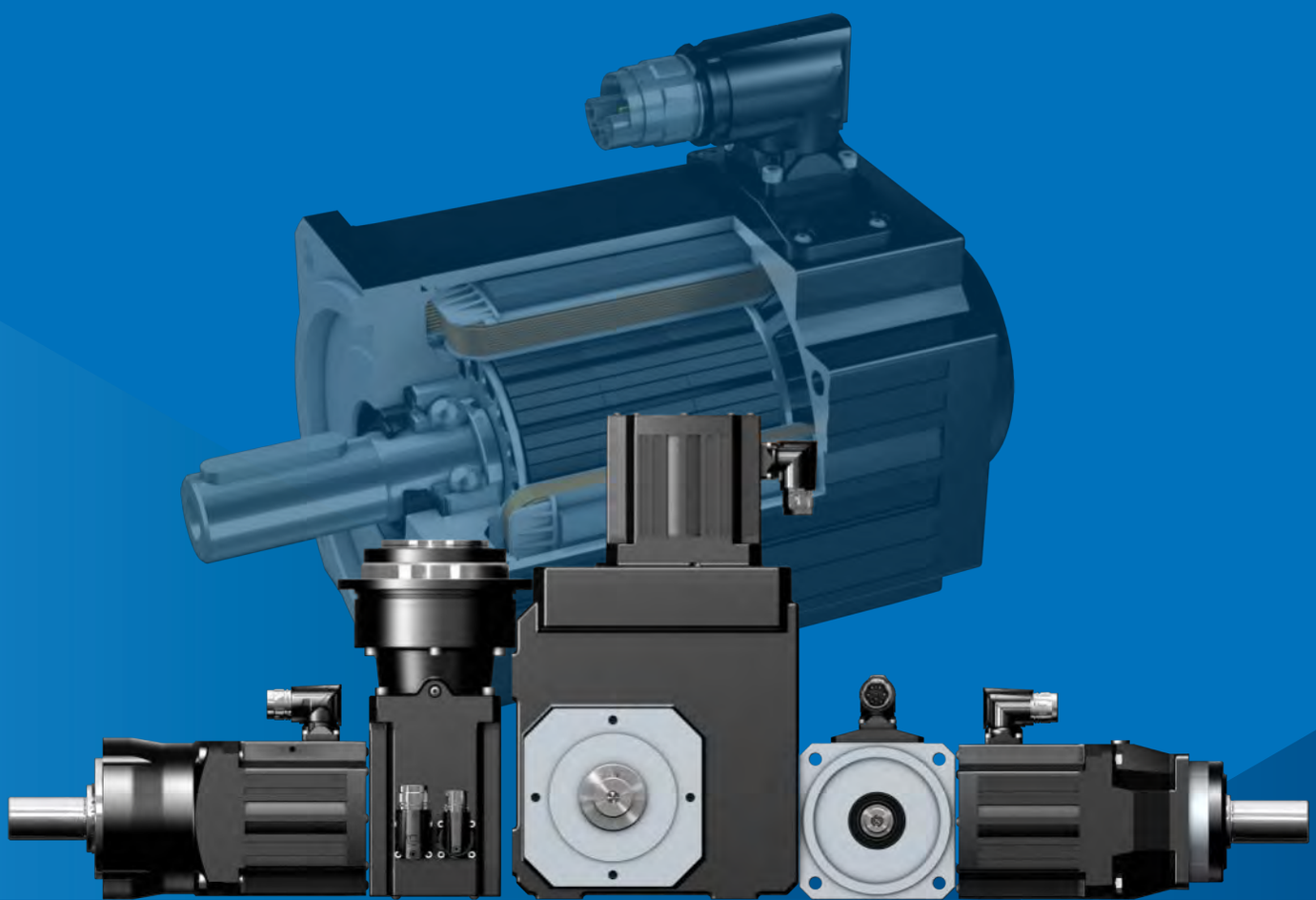


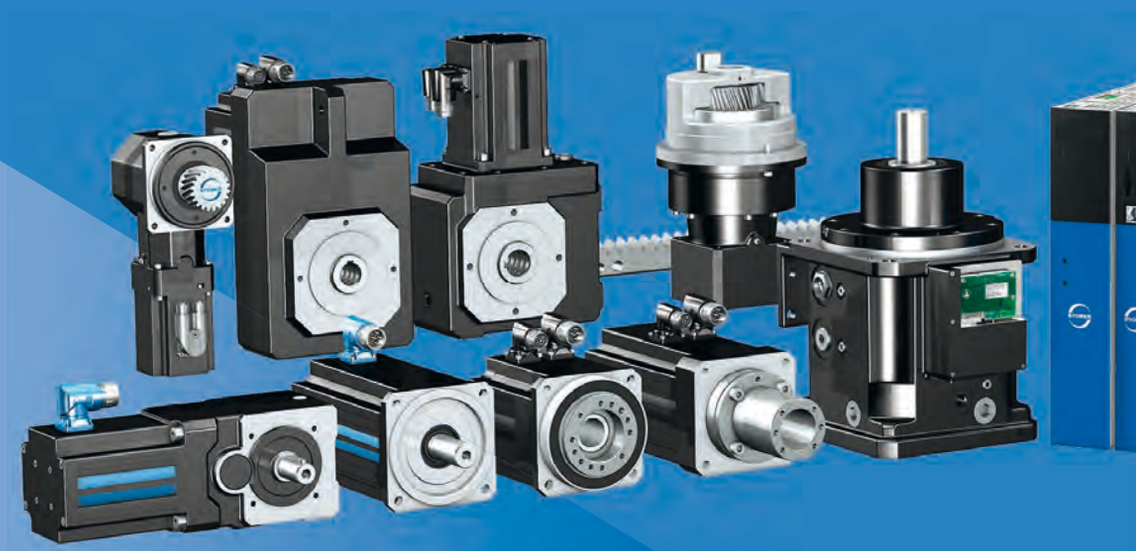
Synchronous servo geared motors

STÖBER

Synchronous servo geared motors

STOBER drive technology for perfectionists

Sooner or later, design engineers never satisfied with the second-best solution end up at STOBER. That is because they can find everything here, with the broadest range of all imaginable drive technology components. Available with the highest level of design granularity to satisfy any individualized requirements perfectly. And the result is a complete STOBER system, from the gear rack and geared motor to open-loop or closed-loop control to intuitive project configuration software. With open interfaces based on established industry standards and reliably functioning communication between the individual components. The STOBER system also includes a complete package of services and practical support. Find out more on the following pages.



You can put your trust in STOBER

STOBER has been building excellent drive technology for more than 80 years. As a medium-sized, owner-operated company, STOBER understands the needs of its customers. Our company is down-to-earth, innovative, dynamic and focused on the customer. Our customers can find certified experts in every area, whether in research and development, production, technical consultation or design support. This goes beyond the technical qualifications. It also includes an equal measure of dedication, dependability and friendly, clear communication.

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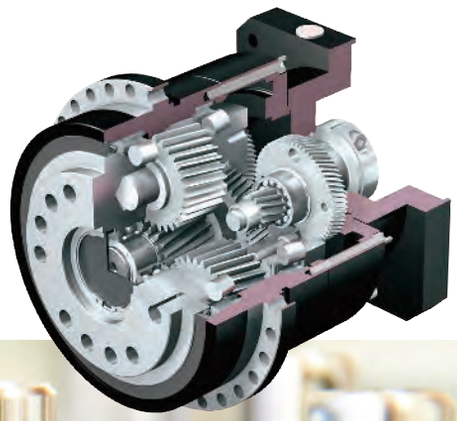
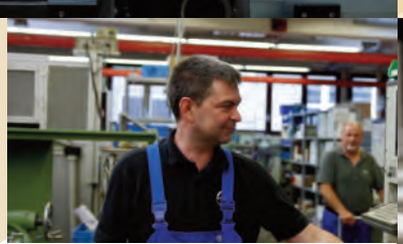


STOBER in motion

Despite our sense of tradition, we always enjoy something new. We continue to push ourselves forward and to refine our products further. We do this by implementing suggestions from real-world use, giving due consideration to customer requests and constantly seeking out even better solutions. This is all made possible by the competitive spirit with which we face every exciting challenge. The strong STOBER team spirit provides for productive collaboration. Both at work and outside the company doors. Our customers benefit from the extraordinary constancy of our employee base. This provides the astounding result where we can provide contacts familiar with a customer's industry and who can identify with a customer's needs.



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ANTRIEBSTECHNIK

The team that works well together wins

STOBER supplies the complete system: controller, automation, geared motors

STOBER has its roots in developing and building geared motors. We have also been developing and manufacturing drive controllers for decades. These STOBER components form drive systems with dependable functionality thanks to their plug-and-play design. Electronics and mechanical systems that speak the same language are critical for this. They understand each other without any adapters. All of the system components can recognize each other by their "electronic nameplate."

Systematic quality assurance

We check every single component and how it works together with others. Mass-producers are not able to do that. We assume responsibility for the complete system. This means certified operational reliability and the highest machine availability are guaranteed.

Technical system advantages

The STOBER system is flexible. One example is the freedom to choose between drive-based mode and controller-based mode. Or the feature allowing you to combine drive controllers in a multi-axis drive system and stand-alone controllers with special functions as you wish. This allows the modular design and free scalability of a drive system. This enables full utilization of capacity.

STOBER engineering software

Our AS6 engineering software based on Codesys plays a leading role in the STOBER system. The AS6 has a whole series of new and useful features integrated into it that make your work easier in every phase of the project. Comprehensive libraries provide direct access to STOBER products from every level of the drive system. You can find detailed technical information and have ready access to presets for standard functions.

STOBER is your partner

Our role does not end with the delivery of hardware and software. If you like, we will accompany and support you throughout your entire project. You can call on programming manpower at STOBER. Our experienced Codesys professionals will be happy to handle tricky special tasks or help you find the right template. This is even possible if components from other manufacturers are part of the bigger picture. You have direct, one-on-one contact with your project engineer. Your personal contact understands your needs and works with you to find the ideal solution.

You receive quick, professional feedback using the 24-hour hotline. You are not a number—you are our priority. We at STOBER do not have anything like a "service ticket."

Geographic proximity is also an intrinsic part of this personal contact. STOBER has four customer support centers throughout Germany. These support centers provide you with a high level of decision-making expertise. Your contacts have technical experience.
And STOBER is international. We have 10 subsidiaries across 3 continents. This is also a valuable part of being near to our customers.

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1 Selection tool

1.1 Inline and Offset Geared Motors

Product chapter	**P**	**PA**	**PE**	**C**	**F**
Chapter number	[2]	[3]	[11]	[12]	[13]
Technical data					
i	3 – 100	3 – 100	3 – 28	2 – 270	4.3 – 274
M_{2acc}	11 – 3000 Nm	15 – 1600 Nm	11 – 310 Nm	8.3 – 6500 Nm	19 – 1100 Nm
$\Delta\phi_2$	3 – 8 arcmin	1 – 3 arcmin	8 – 10 arcmin	10 – 20 arcmin	5 – 11 arcmin
η_{get}	≤ 97 %	≤ 97 %	≤ 97 %	≤ 97 %	≤ 97 %
Features					
Power density	★★★★☆	★★★★☆	★★★☆☆	★☆☆☆☆	★☆☆☆☆
Backlash	★★★★☆	★★★★★	★★★☆☆	★★☆☆☆	★★★☆☆
Price category	€€	€€€	€	€	€
Shaft load	★★★★☆	★★★★☆	★★☆☆☆	★★☆☆☆	★★★☆☆
Smooth operation	★★★★☆	★★★★★	★★★☆☆	★★★☆☆	★★★☆☆
Torsional stiffness	★★★☆☆	★★★☆☆	★★★☆☆	★★☆☆☆	★★☆☆☆
Mass moment of inertia	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Key:	★☆☆☆☆ good | ★★★★★ excellent € Economy | €€€€ Premium				
Shaft design					
Solid shaft with feather key	✓	✓	✓	✓	✓
Solid shaft without feather key	✓	✓	✓	C0 – C5: ✓ Starting at C6: Request	✓
Hollow shaft with keyway					✓
Hollow shaft with shrink ring					✓
Bearing design					
Standard	✓		✓	✓	✓
Axially reinforced	✓ [2.6.2]	✓ [3.6.2]			
Radially reinforced	✓ [2.6.2]				
Maintenance-free	✓	✓	✓	C0 – C5: ✓	✓

1 Selection tool

1.1 Inline and Offset Geared Motors

Product chapter	**PH**	**PHA**	**PHQ**	**PHQA**	**PHV**	**PHVA**	**EZHP**
Chapter number	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Technical data							
i	4 – 100	4 – 100	5.5 – 600	5.5 – 600	61 – 121	61 – 121	3 – 27
M_{2acc}	24 – 7500 Nm	24 – 5000 Nm	84 – 22000 Nm	45 – 6000 Nm	1638 – 7500 Nm	1638 – 4250 Nm	47 – 500 Nm
$\Delta\phi_2$	3 – 4 arcmin	1 – 2 arcmin	3 arcmin	1 arcmin	3 arcmin	1 arcmin	3 – 4 arcmin
η_{get}	≤ 96 %	≤ 96 %	≤ 96 %	≤ 96 %	≤ 90 %	≤ 90 %	≤ 97 %
Features							
Power density	★★★★☆	★★★★☆	★★★★★	★★★★★	★★★★☆	★★★★☆	★★★★☆
Backlash	★★★★☆	★★★★★	★★★★☆	★★★★★	★★★★☆	★★★★★	★★★★☆
Price category	€€€	€€€€	€€€€	€€€€€	€€€	€€€€	€€€€
Shaft load	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Smooth operation	★★★★☆	★★★★★	★★★★☆	★★★★★	★★★★☆	★★★★★	★★★☆☆
Torsional stiffness	★★★★☆	★★★★☆	★★★★★	★★★★★	★★★★☆	★★★★☆	★★★★☆
Mass moment of inertia	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Key:	★☆☆☆☆ good | ★★★★★ excellent € Economy | €€€€ Premium						
Shaft design							
Flange shaft	✓	✓	✓	✓	✓	✓	
Flange hollow shaft							✓
Bearing design							
Standard	✓	✓	✓	✓	✓	✓	✓
Maintenance-free	✓	✓	✓	✓	✓	✓	✓

1 Selection tool

1.2 Right-angle geared motors

Product chapter	**KS**	**PKX**	**PK**
Chapter number	[14]	[15]	[16]
Technical data			
i	6 – 100	3 – 210	12 – 486
M_{2acc}	27 – 400 Nm	11 – 3000 Nm	68 – 2700 Nm
$\Delta\phi_2$	4 – 6 arcmin	4 – 8.5 arcmin	3.5 – 5 arcmin
η_{get}	≤ 95 %	≤ 96 %	≤ 94 %
Features			
Power density	★★★☆☆	★★★★☆	★★★☆☆
Backlash	★★★☆☆	★★★★☆	★★★★☆
Price category	€€€	€€€	€€€
Shaft load	★★★★★	★★★★☆	★★★★☆
Smooth operation	★★★★☆	★★☆☆☆	★★★☆☆
Torsional stiffness	★★★☆☆	★★★☆☆	★★★☆☆
Mass moment of inertia	★★★★★	★★★☆☆	★★★★★
Key:	★☆☆☆☆ good | ★★★★★ excellent € Economy | €€€€€ Premium		
Shaft design			
Solid shaft with feather key	✓	✓	✓
Solid shaft without feather key	✓	✓	✓
Hollow shaft with shrink ring	✓		
Flange hollow shaft	✓		
Bearing design			
Standard	✓	✓	✓
Axially reinforced		✓ [15.6.2]	✓ [16.6.2]
Radially reinforced		✓ [15.6.2]	✓ [16.6.2]
Maintenance-free	✓	✓	✓

1 Selection tool

1.2 Right-angle geared motors

Product chapter	**KS**	**PHKX**	**PHK**	**PHQK**
Chapter number	[14]	[17]	[18]	[19]
Technical data				
i	6 – 100	4 – 210	16 – 486	22 – 2242
M_{2acc}	27 – 400 Nm	26 – 7500 Nm	89 – 7500 Nm	123 – 43000 Nm
$\Delta\phi_2$	4 – 6 arcmin	3 – 6 arcmin	3.5 – 4.5 arcmin	3.5 – 4 arcmin
η_{get}	≤ 95 %	≤ 95 %	≤ 93 %	≤ 93 %
Features				
Power density	★★★☆☆	★★★★★	★★★★☆	★★★★★
Backlash	★★★☆☆	★★★★☆	★★★★☆	★★★★☆
Price category	€€€	€€€€	€€€€	€€€€€
Shaft load	★★★★★	★★★★★	★★★★★	★★★★★
Smooth operation	★★★★☆	★★☆☆☆	★★★☆☆	★★★☆☆
Torsional stiffness	★★★☆☆	★★★★☆	★★★★☆	★★★★★
Mass moment of inertia	★★★★★	★★★☆☆	★★★★★	★★★★★
Key:	★☆☆☆☆ good | ★★★★★ excellent € Economy | €€€€€ Premium			
Shaft design				
Solid shaft with feather key	✓			
Solid shaft without feather key	✓			
Hollow shaft with shrink ring	✓			
Flange hollow shaft	✓			
Flange shaft		✓	✓	✓
Bearing design				
Standard	✓	✓	✓	✓
Maintenance-free	✓	✓	✓	✓

1 Selection tool

1.2 Right-angle geared motors

Product chapter	**KL**	**K**	**S**
Chapter number	[20]	[21]	[22]
Technical data			
i	4 – 32	4 – 381	6 – 548
M_{2acc}	11 – 65 Nm	23 – 13200 Nm	28 – 960 Nm
$\Delta\phi_2$	16 – 25 arcmin	1.5 – 12 arcmin	
η_{get}	≤ 97 %	≤ 97 %	≤ 91 %
Features			
Power density	★★☆☆☆	★★☆☆☆	★★☆☆☆
Backlash	★☆☆☆☆	★★★☆☆	★☆☆☆☆
Price category	€	€€	€
Shaft load	★★☆☆☆	★★★☆☆	★★★☆☆
Smooth operation	★★☆☆☆	★★★☆☆	★★★☆☆
Torsional stiffness	★★☆☆☆	★★☆☆☆	★★☆☆☆
Mass moment of inertia	★★★★★	★★★★★	★★★★★
Key:	★☆☆☆☆ good | ★★★★★ excellent € Economy | €€€€€ Premium		
Shaft design			
Solid shaft with feather key	✓	✓	✓
Solid shaft without feather key	✓	K1 – K4: ✓ Starting at K5: Request	
Solid shaft on both sides	✓	✓	✓
Hollow shaft with keyway	✓	✓	✓
Hollow shaft with shrink ring	✓	✓	✓
Accessories			
Flange	✓	✓	✓
Baseboards	✓	✓	✓
Torque arm		✓	✓
Bearing design			
Standard	✓	✓	✓
Maintenance-free	✓	K1 – K4: ✓	

1 Selection tool

1.3 Synchronous servo motors

Product chapter	**EZ**	**EZHD**
Chapter number	[▶ 23]	[▶ 24]
Technical data		
M_N	0.89 – 77.2 Nm	1.9 – 24.6 Nm
M_0	0.95 – 94 Nm	2.6 – 31.1 Nm
Shaft design		
Solid shaft without feather key	✓	
Flange hollow shaft		✓
Encoder		
EnDat 2.2	✓	✓
EnDat 2.1	✓	✓
HIPERFACE DSL One Cable Solution (OCS)	✓	
Resolver	✓	
Cooling		
Convection cooling	✓	✓
Forced ventilation	✓	
Brake		
Permanent magnet holding brake	✓	✓
Marks and test symbols		
CE	✓	✓
cURus	✓	✓

1 Selection tool

1.3 Synchronous servo motors

Product chapter	**EZM**	**EZS**
Chapter number	[▶ 25]	[▶ 26]
Technical data		
F_{ax}	751 – 21375 N	760 – 31271 N
Shaft design		
Direct drive of the threaded nut	✓	
Direct drive of the threaded spindle		✓
Encoder		
EnDat 2.2	✓	✓
EnDat 2.1	✓	✓
HIPERFACE DSL One Cable Solution (OCS)		✓
Resolver		✓
Cooling		
Convection cooling	✓	✓
Forced ventilation		✓
Brake		
Permanent magnet holding brake	✓	✓
Marks and test symbols		
CE	✓	✓
cURus	✓	✓

2 P planetary geared motors

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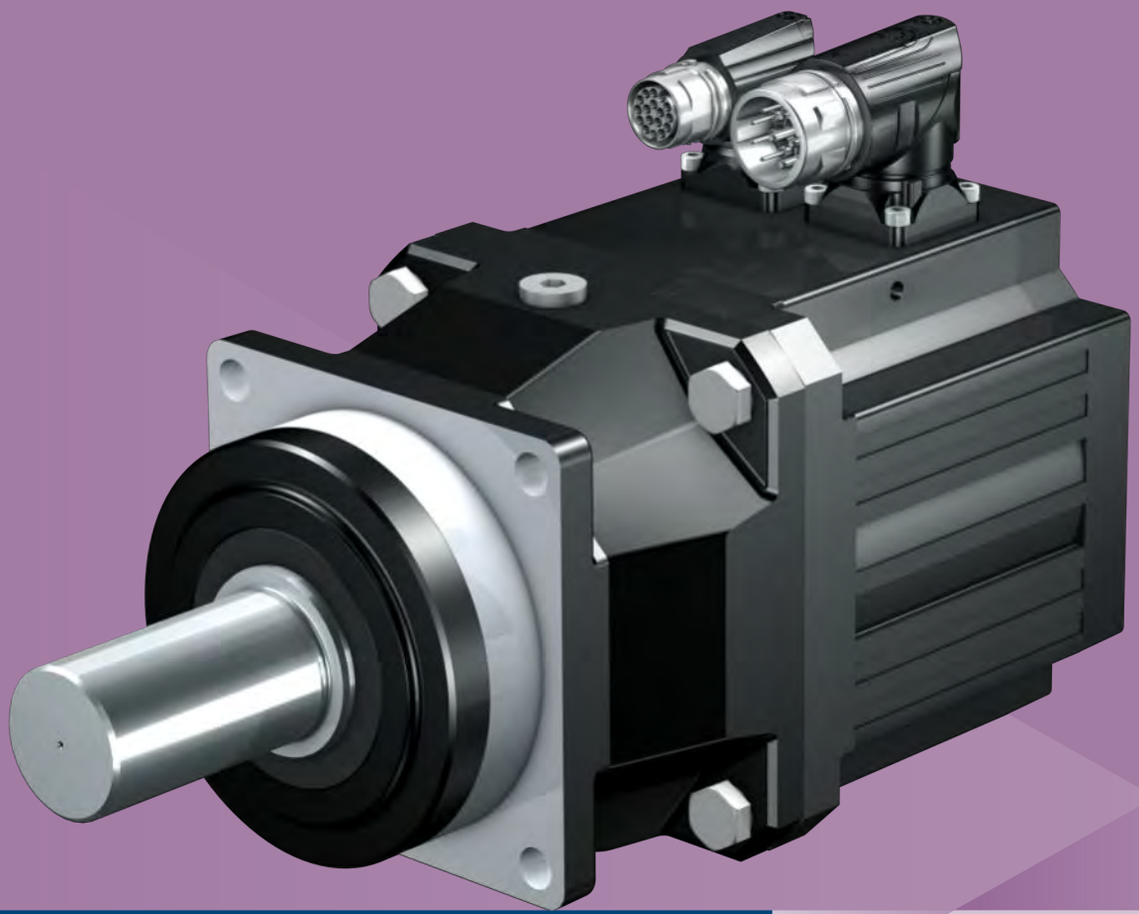


2 Planetary geared motors P

2.1 Overview

Helical-geared precision planetary geared motors

Features

Power density	★★★★☆
Backlash	★★★★☆
Price category	€€
Shaft load	★★★★☆
Smooth operation	★★★★☆
Torsional stiffness	★★★☆☆
Mass moment of inertia	★★★★★
Helical gearing	✓
Maintenance-free	✓
Any mounting position	✓
Continuous operation without cooling	✓
Reinforced output bearing	✓ (optional)
Compact and highly dynamic due to direct motor attachment	✓

Key: ★☆☆☆☆ good | ★★★★★ excellent
€ Economy | €€€€€ Premium

Technical data

i	3 – 100
M_{2acc}	11 – 3000 Nm
$\Delta\phi_2$	3 – 8 arcmin
η_{get}	≤ 97 %

2.2 Selection tables

The technical data specified in the selection tables applies to:

- Installation altitudes up to 1000 m above sea level
- Surrounding temperatures from 0 °C to 40 °C
- Drives with convection-cooled motors (e.g. EZ401**U**)

You can calculate the technical data for drives with forced ventilated motors (for example EZ401**B**) at http://products.stoeber.de.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/arcmin]	m [kg]
P2 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 22 Nm)															
188	14	14	5.8	1.1	P222_0160 EZ301U	22	44	16.00	16/1	4500	8000	0.23	8	1.8	2.9
300	9.0	9.2	1.1	1.2	P221_0100 EZ301U	18	36	10.00	10/1	4500	8000	0.20	6	1.6	2.3
375	7.2	7.4	1.2	1.7	P221_0080 EZ301U	18	36	8.000	8/1	4500	8000	0.20	6	1.7	2.3
429	6.3	6.5	1.2	2.2	P221_0070 EZ301U	19	44	7.000	7/1	4500	8000	0.20	6	1.8	2.3
429	11	11	2.1	1.3	P221_0070 EZ302U	22	44	7.000	7/1	4500	8000	0.30	6	1.8	2.9
600	4.5	4.6	1.9	3.1	P221_0050 EZ301U	14	44	5.000	5/1	4500	8000	0.22	6	1.9	2.3
600	7.7	8.1	3.2	1.8	P221_0050 EZ302U	22	44	5.000	5/1	4500	8000	0.32	6	1.9	2.9
600	10	11	4.2	1.4	P221_0050 EZ303U	22	44	5.000	5/1	4500	8000	0.43	6	1.9	3.4
750	3.6	3.7	2.4	3.9	P221_0040 EZ301U	11	44	4.000	4/1	4500	8000	0.24	6	1.9	2.3
750	6.2	6.5	4.2	2.3	P221_0040 EZ302U	19	44	4.000	4/1	4500	8000	0.34	6	1.9	2.9
750	8.0	8.5	5.4	1.7	P221_0040 EZ303U	22	44	4.000	4/1	4500	8000	0.45	6	1.9	3.4
P2 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 22 Nm)															
375	14	14	5.5	1.2	P222_0160 EZ301U	22	44	16.00	16/1	4500	8000	0.23	8	1.8	2.9
750	6.9	7.4	1.5	1.4	P221_0080 EZ301U	18	36	8.000	8/1	4500	8000	0.20	6	1.7	2.3
857	6.0	6.5	1.5	1.8	P221_0070 EZ301U	19	44	7.000	7/1	4500	8000	0.20	6	1.8	2.3
857	10	11	2.5	1.1	P221_0070 EZ302U	22	44	7.000	7/1	4500	8000	0.30	6	1.8	2.9
1200	4.3	4.6	2.3	2.6	P221_0050 EZ301U	14	44	5.000	5/1	4500	8000	0.22	6	1.9	2.3
1200	7.3	8.1	3.8	1.5	P221_0050 EZ302U	22	44	5.000	5/1	4500	8000	0.32	6	1.9	2.9
1200	9.5	11	5.0	1.2	P221_0050 EZ303U	22	44	5.000	5/1	4500	8000	0.43	6	1.9	3.4
1500	3.5	3.7	2.9	3.2	P221_0040 EZ301U	11	44	4.000	4/1	4500	8000	0.24	6	1.9	2.3
1500	5.8	6.5	5.0	1.9	P221_0040 EZ302U	19	44	4.000	4/1	4500	8000	0.34	6	1.9	2.9
1500	7.6	8.7	6.5	1.5	P221_0040 EZ303U	22	44	4.000	4/1	4500	8000	0.45	6	1.9	3.4
P3 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 65 Nm)															
60	44	45	1.3	1.0	P322_0500 EZ301U	65	130	50.00	50/1	4500	8000	0.20	5	4.5	3.6
75	35	36	1.6	1.2	P322_0400 EZ301U	65	130	40.00	40/1	4500	8000	0.20	5	4.4	3.6
86	31	32	1.6	1.5	P322_0350 EZ301U	65	130	35.00	35/1	4500	8000	0.21	5	4.6	3.6
94	28	29	1.9	1.4	P322_0320 EZ301U	50	100	32.00	32/1	4500	8000	0.23	5	4.1	3.6
107	25	25	1.8	1.8	P322_0280 EZ301U	65	130	28.00	28/1	4500	8000	0.21	5	4.5	3.6
107	42	45	3.0	1.1	P322_0280 EZ302U	65	130	28.00	28/1	4500	8000	0.31	5	4.5	4.2
120	22	23	1.9	2.0	P322_0250 EZ301U	65	130	25.00	25/1	4500	8000	0.22	5	4.6	3.6
120	38	40	3.2	1.2	P322_0250 EZ302U	65	130	25.00	25/1	4500	8000	0.32	5	4.6	4.2
150	18	18	2.1	2.5	P322_0200 EZ301U	53	130	20.00	20/1	4500	8000	0.24	5	4.6	3.6
150	30	32	3.6	1.5	P322_0200 EZ302U	65	130	20.00	20/1	4500	8000	0.34	5	4.6	4.2
150	39	42	4.7	1.1	P322_0200 EZ303U	65	130	20.00	20/1	4500	8000	0.45	5	4.6	4.7
188	14	14	2.4	3.2	P322_0160 EZ301U	43	130	16.00	16/1	4500	8000	0.24	5	4.5	3.6
188	24	26	4.0	1.9	P322_0160 EZ302U	65	130	16.00	16/1	4500	8000	0.34	5	4.5	4.2
188	31	33	5.2	1.4	P322_0160 EZ303U	65	130	16.00	16/1	4500	8000	0.45	5	4.5	4.7
250	11	11	4.1	2.8	P322_0120 EZ301U	32	120	12.00	12/1	4000	8000	0.24	5	4.3	3.6
250	18	19	7.0	1.7	P322_0120 EZ302U	50	120	12.00	12/1	4000	8000	0.34	5	4.3	4.2
250	24	25	9.1	1.3	P322_0120 EZ303U	50	120	12.00	12/1	4000	8000	0.45	5	4.3	4.7
300	9.0	9.2	0.6	2.9	P321_0100 EZ301U	27	100	10.00	10/1	4500	8000	0.21	4	4.0	3.0
300	15	16	0.9	1.7	P321_0100 EZ302U	49	100	10.00	10/1	4500	8000	0.31	4	4.0	3.6
300	20	21	1.2	1.3	P321_0100 EZ303U	50	100	10.00	10/1	4500	8000	0.42	4	4.0	4.1
375	7.2	7.4	0.5	4.8	P321_0080 EZ301U	22	100	8.000	8/1	4500	8000	0.21	4	4.2	3.0
375	12	13	0.9	2.8	P321_0080 EZ302U	39	100	8.000	8/1	4500	8000	0.31	4	4.2	3.6
375	16	17	1.2	2.2	P321_0080 EZ303U	50	100	8.000	8/1	4500	8000	0.42	4	4.2	4.1
375	22	23	1.6	1.6	P321_0080 EZ401U	50	100	8.000	8/1	4500	8000	0.95	4	4.2	5.5
429	11	11	1.0	3.6	P321_0070 EZ302U	34	130	7.000	7/1	4500	8000	0.32	4	4.4	3.6
429	14	15	1.3	2.8	P321_0070 EZ303U	48	130	7.000	7/1	4500	8000	0.43	4	4.4	4.1
429	19	20	1.7	2.1	P321_0070 EZ401U	58	130	7.000	7/1	4500	8000	0.96	4	4.4	5.5
429	32	35	2.9	1.2	P321_0070 EZ402U	60	130	7.000	7/1	4500	8000	1.7	4	4.4	6.6
600	10	11	1.9	3.9	P321_0050 EZ303U	34	110	5.000	5/1	4000	7000	0.48	4	5.1	4.1

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
P3 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 65 Nm)															
600	14	15	2.6	2.9	P321_0050 EZ401U	41	130	5.000	5/1	4000	7000	1.0	4	5.1	5.5
600	21	23	3.9	1.9	P321_0050 EZ501U	65	130	5.000	5/1	4000	7000	3.0	4	5.1	6.5
600	23	25	4.3	1.7	P321_0050 EZ402U	65	130	5.000	5/1	4000	7000	1.7	4	5.1	6.6
600	33	42	6.3	1.2	P321_0050 EZ404U	65	130	5.000	5/1	4000	7000	3.1	4	5.1	8.7
600	36	39	6.8	1.1	P321_0050 EZ502U	65	130	5.000	5/1	4000	7000	5.3	4	5.1	8.0
750	8.0	8.5	2.5	4.9	P321_0040 EZ303U	27	85	4.000	4/1	3700	6500	0.52	4	5.3	4.1
750	11	12	3.3	3.6	P321_0040 EZ401U	33	130	4.000	4/1	3700	6500	1.1	4	5.3	5.5
750	17	18	5.1	2.4	P321_0040 EZ501U	62	130	4.000	4/1	3700	6500	3.0	4	5.3	6.5
750	18	20	5.6	2.2	P321_0040 EZ402U	62	130	4.000	4/1	3700	6500	1.8	4	5.3	6.6
750	27	33	8.2	1.5	P321_0040 EZ404U	65	130	4.000	4/1	3700	6500	3.1	4	5.3	8.7
750	29	31	8.8	1.4	P321_0040 EZ502U	65	130	4.000	4/1	3700	6500	5.3	4	5.3	8.0
750	38	43	12	1.0	P321_0040 EZ503U	65	130	4.000	4/1	3700	6500	7.7	4	5.3	9.5
1000	6.0	6.4	5.2	4.4	P321_0030 EZ303U	20	64	3.000	3/1	3500	6000	0.60	4	5.7	4.1
1000	8.1	8.7	7.1	3.2	P321_0030 EZ401U	25	120	3.000	3/1	3500	6000	1.1	4	5.7	5.5
1000	13	14	11	2.1	P321_0030 EZ501U	47	120	3.000	3/1	3500	6000	3.1	4	5.7	6.5
1000	14	15	12	1.9	P321_0030 EZ402U	47	120	3.000	3/1	3500	6000	1.8	4	5.7	6.6
1000	20	25	17	1.3	P321_0030 EZ404U	50	120	3.000	3/1	3500	6000	3.2	4	5.7	8.7
1000	22	23	19	1.2	P321_0030 EZ502U	50	120	3.000	3/1	3500	6000	5.4	4	5.7	8.0
P3 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 65 Nm)															
171	30	32	1.5	1.5	P322_0350 EZ301U	65	130	35.00	35/1	4500	8000	0.21	5	4.6	3.6
188	27	29	1.8	1.5	P322_0320 EZ301U	50	100	32.00	32/1	4500	8000	0.23	5	4.1	3.6
214	24	25	1.8	1.8	P322_0280 EZ301U	65	130	28.00	28/1	4500	8000	0.21	5	4.5	3.6
214	40	45	3.0	1.1	P322_0280 EZ302U	65	130	28.00	28/1	4500	8000	0.31	5	4.5	4.2
240	21	23	1.8	2.1	P322_0250 EZ301U	65	130	25.00	25/1	4500	8000	0.22	5	4.6	3.6
240	36	40	3.0	1.3	P322_0250 EZ302U	65	130	25.00	25/1	4500	8000	0.32	5	4.6	4.2
300	17	18	2.0	2.7	P322_0200 EZ301U	53	130	20.00	20/1	4500	8000	0.24	5	4.6	3.6
300	29	32	3.4	1.6	P322_0200 EZ302U	65	130	20.00	20/1	4500	8000	0.34	5	4.6	4.2
300	37	43	4.4	1.2	P322_0200 EZ303U	65	130	20.00	20/1	4500	8000	0.45	5	4.6	4.7
375	14	14	2.4	3.2	P322_0160 EZ301U	43	130	16.00	16/1	4500	8000	0.24	5	4.5	3.6
375	23	26	4.0	1.9	P322_0160 EZ302U	65	130	16.00	16/1	4500	8000	0.34	5	4.5	4.2
375	30	34	5.2	1.4	P322_0160 EZ303U	65	130	16.00	16/1	4500	8000	0.45	5	4.5	4.7
500	10	11	3.9	3.0	P322_0120 EZ301U	32	120	12.00	12/1	4000	8000	0.24	5	4.3	3.6
500	17	19	6.6	1.8	P322_0120 EZ302U	50	120	12.00	12/1	4000	8000	0.34	5	4.3	4.2
500	22	26	8.6	1.3	P322_0120 EZ303U	50	120	12.00	12/1	4000	8000	0.45	5	4.3	4.7
600	8.6	9.2	0.7	2.4	P321_0100 EZ301U	27	100	10.00	10/1	4500	8000	0.21	4	4.0	3.0
600	15	16	1.1	1.4	P321_0100 EZ302U	49	100	10.00	10/1	4500	8000	0.31	4	4.0	3.6
600	19	22	1.5	1.1	P321_0100 EZ303U	50	100	10.00	10/1	4500	8000	0.42	4	4.0	4.1
750	6.9	7.4	0.7	4.0	P321_0080 EZ301U	22	100	8.000	8/1	4500	8000	0.21	4	4.2	3.0
750	12	13	1.1	2.4	P321_0080 EZ302U	39	100	8.000	8/1	4500	8000	0.31	4	4.2	3.6
750	15	17	1.4	1.8	P321_0080 EZ303U	50	100	8.000	8/1	4500	8000	0.42	4	4.2	4.1
750	18	22	1.7	1.6	P321_0080 EZ401U	50	100	8.000	8/1	4500	8000	0.95	4	4.2	5.5
750	27	38	2.6	1.0	P321_0080 EZ402U	50	100	8.000	8/1	4500	8000	1.7	4	4.2	6.6
857	10	11	1.2	3.1	P321_0070 EZ302U	34	130	7.000	7/1	4500	8000	0.32	4	4.4	3.6
857	13	15	1.5	2.3	P321_0070 EZ303U	48	130	7.000	7/1	4500	8000	0.43	4	4.4	4.1
857	16	19	1.8	2.0	P321_0070 EZ401U	58	130	7.000	7/1	4500	8000	0.96	4	4.4	5.5
857	24	33	2.7	1.3	P321_0070 EZ402U	60	130	7.000	7/1	4500	8000	1.7	4	4.4	6.6
1200	7.3	8.1	1.7	4.3	P321_0050 EZ302U	24	110	5.000	5/1	4000	7000	0.37	4	5.1	3.6
1200	9.5	11	2.3	3.3	P321_0050 EZ303U	34	110	5.000	5/1	4000	7000	0.48	4	5.1	4.1
1200	11	14	2.6	2.8	P321_0050 EZ401U	41	130	5.000	5/1	4000	7000	1.0	4	5.1	5.5
1200	16	21	3.9	1.9	P321_0050 EZ501U	65	130	5.000	5/1	4000	7000	3.0	4	5.1	6.5
1200	17	24	4.0	1.8	P321_0050 EZ402U	65	130	5.000	5/1	4000	7000	1.7	4	5.1	6.6
1200	25	38	6.0	1.2	P321_0050 EZ502U	65	130	5.000	5/1	4000	7000	5.3	4	5.1	8.0
1200	28	41	6.7	1.1	P321_0050 EZ404U	65	130	5.000	5/1	4000	7000	3.1	4	5.1	8.7
1500	7.6	8.7	3.0	4.1	P321_0040 EZ303U	27	85	4.000	4/1	3700	6500	0.52	4	5.3	4.1
1500	8.9	11	3.5	3.5	P321_0040 EZ401U	33	130	4.000	4/1	3700	6500	1.1	4	5.3	5.5
1500	13	17	5.1	2.4	P321_0040 EZ501U	62	130	4.000	4/1	3700	6500	3.0	4	5.3	6.5
1500	14	19	5.3	2.3	P321_0040 EZ402U	62	130	4.000	4/1	3700	6500	1.8	4	5.3	6.6
1500	20	30	7.8	1.5	P321_0040 EZ502U	65	130	4.000	4/1	3700	6500	5.3	4	5.3	8.0
1500	23	33	8.7	1.4	P321_0040 EZ404U	65	130	4.000	4/1	3700	6500	3.1	4	5.3	8.7
1500	24	41	9.3	1.3	P321_0040 EZ503U	65	130	4.000	4/1	3700	6500	7.7	4	5.3	9.5
2000	4.4	4.9	4.8	4.8	P321_0030 EZ302U	15	64	3.000	3/1	3500	6000	0.49	4	5.7	3.6
2000	5.7	6.5	6.2	3.6	P321_0030 EZ303U	20	64	3.000	3/1	3500	6000	0.60	4	5.7	4.1
2000	6.7	8.1	7.3	3.1	P321_0030 EZ401U	25	120	3.000	3/1	3500	6000	1.1	4	5.7	5.5
2000	9.9	13	11	2.1	P321_0030 EZ501U	47	120	3.000	3/1	3500	6000	3.1	4	5.7	6.5

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
P3 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 65 Nm)															
2000	10	14	11	2.0	P321_0030 EZ402U	47	120	3.000	3/1	3500	6000	1.8	4	5.7	6.6
2000	15	23	17	1.4	P321_0030 EZ502U	50	120	3.000	3/1	3500	6000	5.4	4	5.7	8.0
2000	17	24	18	1.2	P321_0030 EZ404U	50	120	3.000	3/1	3500	6000	3.2	4	5.7	8.7
2000	18	31	20	1.2	P321_0030 EZ503U	50	120	3.000	3/1	3500	6000	7.8	4	5.7	9.5
P4 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 120 Nm)															
38	71	72	0.7	1.1	P422_0800 EZ301U	100	200	80.00	80/1	4500	8000	0.21	5	9.2	6.0
43	62	63	0.7	1.4	P422_0700 EZ301U	110	240	70.00	70/1	4500	8000	0.21	5	9.6	6.0
54	49	51	0.8	1.6	P422_0560 EZ301U	100	200	56.00	56/1	4500	8000	0.23	5	9.2	6.0
60	44	45	0.8	1.9	P422_0500 EZ301U	120	240	50.00	50/1	4500	8000	0.21	5	10	6.0
60	76	80	1.4	1.1	P422_0500 EZ302U	120	240	50.00	50/1	4500	8000	0.31	5	10	6.6
75	35	36	0.9	2.4	P422_0400 EZ301U	110	240	40.00	40/1	4500	8000	0.21	5	10	6.0
75	60	64	1.5	1.4	P422_0400 EZ302U	120	240	40.00	40/1	4500	8000	0.31	5	10	6.6
75	79	83	2.0	1.1	P422_0400 EZ303U	120	240	40.00	40/1	4500	8000	0.42	5	10	7.1
86	31	32	0.9	2.7	P422_0350 EZ301U	93	240	35.00	35/1	4500	8000	0.23	5	11	6.0
86	53	56	1.6	1.6	P422_0350 EZ302U	120	240	35.00	35/1	4500	8000	0.33	5	11	6.6
86	69	73	2.1	1.2	P422_0350 EZ303U	120	240	35.00	35/1	4500	8000	0.44	5	11	7.1
94	28	29	1.1	2.8	P422_0320 EZ301U	85	200	32.00	32/1	3700	6500	0.32	5	9.2	6.0
94	48	51	1.8	1.7	P422_0320 EZ302U	100	200	32.00	32/1	3700	6500	0.42	5	9.2	6.6
94	63	67	2.3	1.3	P422_0320 EZ303U	100	200	32.00	32/1	3700	6500	0.53	5	9.2	7.1
107	25	25	1.1	3.4	P422_0280 EZ301U	74	240	28.00	28/1	4500	8000	0.23	5	10	6.0
107	42	45	1.8	2.0	P422_0280 EZ302U	120	240	28.00	28/1	4500	8000	0.33	5	10	6.6
107	55	58	2.4	1.5	P422_0280 EZ303U	120	240	28.00	28/1	4500	8000	0.44	5	10	7.1
107	74	80	3.2	1.1	P422_0280 EZ401U	120	240	28.00	28/1	4500	8000	0.97	5	10	8.5
120	22	23	1.1	3.8	P422_0250 EZ301U	67	240	25.00	25/1	4000	7000	0.27	5	11	6.0
120	38	40	1.9	2.3	P422_0250 EZ302U	120	240	25.00	25/1	4000	7000	0.37	5	11	6.6
120	49	52	2.5	1.7	P422_0250 EZ303U	120	240	25.00	25/1	4000	7000	0.48	5	11	7.1
120	67	71	3.4	1.3	P422_0250 EZ401U	120	240	25.00	25/1	4000	7000	1.0	5	11	8.5
150	18	18	1.3	4.8	P422_0200 EZ301U	53	240	20.00	20/1	3700	6500	0.32	5	11	6.0
150	30	32	2.1	2.8	P422_0200 EZ302U	95	240	20.00	20/1	3700	6500	0.42	5	11	6.6
150	39	42	2.8	2.2	P422_0200 EZ303U	120	240	20.00	20/1	3700	6500	0.53	5	11	7.1
150	53	57	3.8	1.6	P422_0200 EZ401U	120	240	20.00	20/1	3700	6500	1.1	5	11	8.5
150	82	89	5.8	1.0	P422_0200 EZ501U	120	240	20.00	20/1	3700	6500	3.0	5	11	9.5
188	24	26	2.4	3.5	P422_0160 EZ302U	76	240	16.00	16/1	3700	6500	0.43	5	11	6.6
188	31	33	3.1	2.7	P422_0160 EZ303U	110	240	16.00	16/1	3700	6500	0.54	5	11	7.1
188	43	46	4.2	2.0	P422_0160 EZ401U	120	240	16.00	16/1	3700	6500	1.1	5	11	8.5
188	65	71	6.5	1.3	P422_0160 EZ501U	120	240	16.00	16/1	3700	6500	3.0	5	11	9.5
188	71	79	7.1	1.2	P422_0160 EZ402U	120	240	16.00	16/1	3700	6500	1.8	5	11	9.6
250	11	11	2.8	4.7	P422_0120 EZ301U	32	240	12.00	12/1	3500	6500	0.36	5	9.9	6.0
250	18	19	4.7	2.8	P422_0120 EZ302U	57	240	12.00	12/1	3500	6500	0.46	5	9.9	6.6
250	24	25	6.1	2.1	P422_0120 EZ303U	80	240	12.00	12/1	3500	6500	0.57	5	9.9	7.1
250	32	34	8.3	1.6	P422_0120 EZ401U	97	240	12.00	12/1	3500	6500	1.1	5	9.9	8.5
250	49	54	13	1.0	P422_0120 EZ501U	100	240	12.00	12/1	3500	6500	3.1	5	9.9	9.5
300	27	29	1.0	1.9	P421_0100 EZ401U	82	200	10.00	10/1	4000	7000	0.97	4	9.0	6.6
300	42	46	1.6	1.3	P421_0100 EZ501U	100	200	10.00	10/1	4000	7000	2.9	4	9.0	7.6
300	46	50	1.7	1.2	P421_0100 EZ402U	100	200	10.00	10/1	4000	7000	1.7	4	9.0	7.7
375	22	23	1.0	3.2	P421_0080 EZ401U	66	200	8.000	8/1	4000	7000	0.99	4	9.5	6.6
375	33	36	1.5	2.1	P421_0080 EZ501U	100	200	8.000	8/1	4000	7000	3.0	4	9.5	7.6
375	36	40	1.7	1.9	P421_0080 EZ402U	100	200	8.000	8/1	4000	7000	1.7	4	9.5	7.7
375	54	67	2.5	1.3	P421_0080 EZ404U	100	200	8.000	8/1	4000	7000	3.0	4	9.5	9.8
375	57	62	2.6	1.2	P421_0080 EZ502U	100	200	8.000	8/1	4000	7000	5.3	4	9.5	9.1
429	19	20	1.1	3.9	P421_0070 EZ401U	58	240	7.000	7/1	4000	7000	1.0	4	10	6.6
429	29	32	1.7	2.5	P421_0070 EZ501U	110	240	7.000	7/1	4000	7000	3.0	4	10	7.6
429	32	35	1.9	2.3	P421_0070 EZ402U	110	240	7.000	7/1	4000	7000	1.7	4	10	7.7
429	47	58	2.7	1.6	P421_0070 EZ404U	110	240	7.000	7/1	4000	7000	3.1	4	10	9.8
429	50	54	2.9	1.5	P421_0070 EZ502U	110	240	7.000	7/1	4000	7000	5.3	4	10	9.1
429	66	75	3.8	1.1	P421_0070 EZ503U	110	240	7.000	7/1	4000	7000	7.7	4	10	11
600	21	23	2.5	3.6	P421_0050 EZ501U	78	240	5.000	5/1	3700	6500	3.1	4	12	7.6
600	23	25	2.8	3.3	P421_0050 EZ402U	78	240	5.000	5/1	3700	6500	1.8	4	12	7.7
600	33	42	4.1	2.2	P421_0050 EZ404U	120	240	5.000	5/1	3700	6500	3.2	4	12	9.8
600	36	39	4.4	2.1	P421_0050 EZ502U	120	240	5.000	5/1	3700	6500	5.4	4	12	9.1
600	36	40	4.4	2.1	P421_0050 EZ701U	97	240	5.000	5/1	3700	6500	8.7	4	12	11
600	47	54	5.7	1.6	P421_0050 EZ503U	120	240	5.000	5/1	3700	6500	7.8	4	12	11
600	58	70	7.1	1.3	P421_0050 EZ702U	120	240	5.000	5/1	3700	6500	14	4	12	13
600	65	78	8.0	1.1	P421_0050 EZ505U	120	240	5.000	5/1	3700	6500	12	4	12	14

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
P4 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 120 Nm)															
750	17	18	3.3	4.5	P421_0040 EZ501U	62	240	4.000	4/1	3300	6000	3.2	4	12	7.6
750	18	20	3.6	4.1	P421_0040 EZ402U	62	240	4.000	4/1	3300	6000	1.9	4	12	7.7
750	27	33	5.3	2.8	P421_0040 EZ404U	110	240	4.000	4/1	3300	6000	3.3	4	12	9.8
750	29	31	5.7	2.6	P421_0040 EZ502U	120	240	4.000	4/1	3300	6000	5.5	4	12	9.1
750	29	32	5.7	2.6	P421_0040 EZ701U	78	240	4.000	4/1	3300	6000	8.8	4	12	11
750	38	43	7.5	2.0	P421_0040 EZ503U	120	240	4.000	4/1	3300	6000	7.9	4	12	11
750	47	56	9.3	1.6	P421_0040 EZ702U	120	240	4.000	4/1	3300	6000	14	4	12	13
750	52	62	10	1.4	P421_0040 EZ505U	120	240	4.000	4/1	3300	6000	12	4	12	14
750	64	81	13	1.2	P421_0040 EZ703U	120	240	4.000	4/1	3300	6000	22	4	12	15
1000	13	14	8.0	3.5	P421_0030 EZ501U	47	240	3.000	3/1	3000	5500	3.6	4	13	7.6
1000	14	15	8.7	3.2	P421_0030 EZ402U	47	240	3.000	3/1	3000	5500	2.3	4	13	7.7
1000	20	25	13	2.2	P421_0030 EZ404U	84	240	3.000	3/1	3000	5500	3.7	4	13	9.8
1000	22	23	14	2.0	P421_0030 EZ502U	90	240	3.000	3/1	3000	5500	5.9	4	13	9.1
1000	22	24	14	2.0	P421_0030 EZ701U	58	240	3.000	3/1	3000	5500	9.2	4	13	11
1000	28	32	18	1.5	P421_0030 EZ503U	100	240	3.000	3/1	3000	5500	8.3	4	13	11
1000	35	42	22	1.3	P421_0030 EZ702U	100	240	3.000	3/1	3000	5500	14	4	13	13
1000	39	47	25	1.1	P421_0030 EZ505U	100	240	3.000	3/1	3000	5500	13	4	13	14
P4 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 120 Nm)															
900	46	74	6.4	1.4	P421_0050 EZ505U	120	240	5.000	5/1	3700	6500	12	4	12	14
1125	37	59	8.4	1.8	P421_0040 EZ505U	120	240	4.000	4/1	3300	6000	12	4	12	14
1125	47	78	11	1.4	P421_0040 EZ703U	120	240	4.000	4/1	3300	6000	22	4	12	15
1500	28	45	20	1.4	P421_0030 EZ505U	100	240	3.000	3/1	3000	5500	13	4	13	14
1500	35	58	26	1.1	P421_0030 EZ703U	100	240	3.000	3/1	3000	5500	22	4	13	15
P4 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 120 Nm)															
75	68	72	0.6	1.2	P422_0800 EZ301U	100	200	80.00	80/1	4500	8000	0.21	5	9.2	6.0
86	59	63	0.6	1.4	P422_0700 EZ301U	110	240	70.00	70/1	4500	8000	0.21	5	9.6	6.0
107	47	51	0.8	1.7	P422_0560 EZ301U	100	200	56.00	56/1	4500	8000	0.23	5	9.2	6.0
120	42	45	0.8	2.0	P422_0500 EZ301U	120	240	50.00	50/1	4500	8000	0.21	5	10	6.0
120	71	80	1.3	1.2	P422_0500 EZ302U	120	240	50.00	50/1	4500	8000	0.31	5	10	6.6
150	34	36	0.9	2.4	P422_0400 EZ301U	110	240	40.00	40/1	4500	8000	0.21	5	10	6.0
150	57	64	1.5	1.4	P422_0400 EZ302U	120	240	40.00	40/1	4500	8000	0.31	5	10	6.6
150	74	86	2.0	1.1	P422_0400 EZ303U	120	240	40.00	40/1	4500	8000	0.42	5	10	7.1
171	30	32	0.9	2.9	P422_0350 EZ301U	93	240	35.00	35/1	4500	8000	0.23	5	11	6.0
171	50	56	1.5	1.7	P422_0350 EZ302U	120	240	35.00	35/1	4500	8000	0.33	5	11	6.6
171	65	75	2.0	1.3	P422_0350 EZ303U	120	240	35.00	35/1	4500	8000	0.44	5	11	7.1
188	27	29	1.0	3.0	P422_0320 EZ301U	85	200	32.00	32/1	3700	6500	0.32	5	9.2	6.0
188	46	51	1.7	1.8	P422_0320 EZ302U	100	200	32.00	32/1	3700	6500	0.42	5	9.2	6.6
188	60	68	2.2	1.3	P422_0320 EZ303U	100	200	32.00	32/1	3700	6500	0.53	5	9.2	7.1
214	24	25	1.0	3.6	P422_0280 EZ301U	74	240	28.00	28/1	4500	8000	0.23	5	10	6.0
214	40	45	1.7	2.1	P422_0280 EZ302U	120	240	28.00	28/1	4500	8000	0.33	5	10	6.6
214	52	60	2.2	1.6	P422_0280 EZ303U	120	240	28.00	28/1	4500	8000	0.44	5	10	7.1
214	61	74	2.6	1.4	P422_0280 EZ401U	120	240	28.00	28/1	4500	8000	0.97	5	10	8.5
240	21	23	1.1	4.0	P422_0250 EZ301U	67	240	25.00	25/1	4000	7000	0.27	5	11	6.0
240	36	40	1.8	2.4	P422_0250 EZ302U	120	240	25.00	25/1	4000	7000	0.37	5	11	6.6
240	47	53	2.4	1.8	P422_0250 EZ303U	120	240	25.00	25/1	4000	7000	0.48	5	11	7.1
240	55	67	2.8	1.6	P422_0250 EZ401U	120	240	25.00	25/1	4000	7000	1.0	5	11	8.5
300	29	32	2.0	3.0	P422_0200 EZ302U	95	240	20.00	20/1	3700	6500	0.42	5	11	6.6
300	37	43	2.6	2.3	P422_0200 EZ303U	120	240	20.00	20/1	3700	6500	0.53	5	11	7.1
300	44	53	3.1	1.9	P422_0200 EZ401U	120	240	20.00	20/1	3700	6500	1.1	5	11	8.5
300	65	84	4.6	1.3	P422_0200 EZ501U	120	240	20.00	20/1	3700	6500	3.0	5	11	9.5
375	23	26	2.3	3.7	P422_0160 EZ302U	76	240	16.00	16/1	3700	6500	0.43	5	11	6.6
375	30	34	3.0	2.9	P422_0160 EZ303U	110	240	16.00	16/1	3700	6500	0.54	5	11	7.1
375	35	43	3.5	2.4	P422_0160 EZ401U	120	240	16.00	16/1	3700	6500	1.1	5	11	8.5
375	52	67	5.1	1.6	P422_0160 EZ501U	120	240	16.00	16/1	3700	6500	3.0	5	11	9.5
375	53	74	5.3	1.6	P422_0160 EZ402U	120	240	16.00	16/1	3700	6500	1.8	5	11	9.6
500	10	11	2.6	4.9	P422_0120 EZ301U	32	240	12.00	12/1	3500	6500	0.36	5	9.9	6.0
500	17	19	4.4	2.9	P422_0120 EZ302U	57	240	12.00	12/1	3500	6500	0.46	5	9.9	6.6
500	22	26	5.8	2.2	P422_0120 EZ303U	80	240	12.00	12/1	3500	6500	0.57	5	9.9	7.1
500	26	32	6.8	1.9	P422_0120 EZ401U	97	240	12.00	12/1	3500	6500	1.1	5	9.9	8.5
500	39	50	10	1.3	P422_0120 EZ501U	100	240	12.00	12/1	3500	6500	3.1	5	9.9	9.5
500	40	56	10	1.3	P422_0120 EZ402U	100	240	12.00	12/1	3500	6500	1.8	5	9.9	9.6
600	22	27	1.1	1.9	P421_0100 EZ401U	82	200	10.00	10/1	4000	7000	0.97	4	9.0	6.6
600	33	43	1.6	1.3	P421_0100 EZ501U	100	200	10.00	10/1	4000	7000	2.9	4	9.0	7.6
600	34	48	1.6	1.2	P421_0100 EZ402U	100	200	10.00	10/1	4000	7000	1.7	4	9.0	7.7

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
P4 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 120 Nm)															
750	18	22	1.0	3.1	P421_0080 EZ401U	66	200	8.000	8/1	4000	7000	0.99	4	9.5	6.6
750	26	34	1.5	2.1	P421_0080 EZ501U	100	200	8.000	8/1	4000	7000	3.0	4	9.5	7.6
750	27	38	1.6	2.0	P421_0080 EZ402U	100	200	8.000	8/1	4000	7000	1.7	4	9.5	7.7
750	40	61	2.3	1.4	P421_0080 EZ502U	100	200	8.000	8/1	4000	7000	5.3	4	9.5	9.1
750	45	65	2.6	1.2	P421_0080 EZ404U	100	200	8.000	8/1	4000	7000	3.0	4	9.5	9.8
857	16	19	1.1	3.8	P421_0070 EZ401U	58	240	7.000	7/1	4000	7000	1.0	4	10	6.6
857	23	30	1.7	2.6	P421_0070 EZ501U	110	240	7.000	7/1	4000	7000	3.0	4	10	7.6
857	24	33	1.7	2.5	P421_0070 EZ402U	110	240	7.000	7/1	4000	7000	1.7	4	10	7.7
857	35	53	2.6	1.7	P421_0070 EZ502U	110	240	7.000	7/1	4000	7000	5.3	4	10	9.1
857	39	57	2.9	1.5	P421_0070 EZ404U	110	240	7.000	7/1	4000	7000	3.1	4	10	9.8
857	42	72	3.1	1.4	P421_0070 EZ503U	110	240	7.000	7/1	4000	7000	7.7	4	10	11
1200	16	21	2.5	3.6	P421_0050 EZ501U	78	240	5.000	5/1	3700	6500	3.1	4	12	7.6
1200	17	24	2.6	3.5	P421_0050 EZ402U	78	240	5.000	5/1	3700	6500	1.8	4	12	7.7
1200	25	38	3.9	2.3	P421_0050 EZ502U	120	240	5.000	5/1	3700	6500	5.4	4	12	9.1
1200	25	38	3.9	2.3	P421_0050 EZ701U	97	240	5.000	5/1	3700	6500	8.7	4	12	11
1200	28	41	4.3	2.1	P421_0050 EZ404U	120	240	5.000	5/1	3700	6500	3.2	4	12	9.8
1200	30	51	4.6	2.0	P421_0050 EZ503U	120	240	5.000	5/1	3700	6500	7.8	4	12	11
1200	35	69	5.4	1.7	P421_0050 EZ702U	120	240	5.000	5/1	3700	6500	14	4	12	13
1500	13	17	3.3	4.5	P421_0040 EZ501U	62	240	4.000	4/1	3300	6000	3.2	4	12	7.6
1500	14	19	3.4	4.3	P421_0040 EZ402U	62	240	4.000	4/1	3300	6000	1.9	4	12	7.7
1500	20	30	5.1	2.9	P421_0040 EZ502U	120	240	4.000	4/1	3300	6000	5.5	4	12	9.1
1500	20	31	5.1	2.9	P421_0040 EZ701U	78	240	4.000	4/1	3300	6000	8.8	4	12	11
1500	23	33	5.6	2.6	P421_0040 EZ404U	110	240	4.000	4/1	3300	6000	3.3	4	12	9.8
1500	24	41	6.0	2.5	P421_0040 EZ503U	120	240	4.000	4/1	3300	6000	7.9	4	12	11
1500	28	55	7.0	2.1	P421_0040 EZ702U	120	240	4.000	4/1	3300	6000	14	4	12	13
P5 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 300 Nm)															
43	186	200	0.9	1.1	P522_0700 EZ401U	270	600	70.00	70/1	4000	7000	0.98	4	26	11
54	149	160	1.1	1.3	P522_0560 EZ401U	250	500	56.00	56/1	4000	7000	1.0	4	25	11
60	133	143	1.1	1.6	P522_0500 EZ401U	300	600	50.00	50/1	4000	7000	0.98	4	27	11
60	204	223	1.7	1.0	P522_0500 EZ501U	300	600	50.00	50/1	4000	7000	3.0	4	27	12
75	106	114	1.2	1.9	P522_0400 EZ401U	300	600	40.00	40/1	4000	7000	0.98	4	26	11
75	163	179	1.9	1.2	P522_0400 EZ501U	300	600	40.00	40/1	4000	7000	3.0	4	26	12
75	179	198	2.1	1.1	P522_0400 EZ402U	300	600	40.00	40/1	4000	7000	1.7	4	26	12
86	93	100	1.3	2.3	P522_0350 EZ401U	280	600	35.00	35/1	4000	7000	1.0	4	28	11
86	143	156	2.0	1.5	P522_0350 EZ501U	300	600	35.00	35/1	4000	7000	3.0	4	28	12
86	156	173	2.2	1.3	P522_0350 EZ402U	300	600	35.00	35/1	4000	7000	1.7	4	28	12
94	85	91	1.4	2.4	P522_0320 EZ401U	250	500	32.00	32/1	3300	6000	1.2	4	25	11
94	131	143	2.2	1.5	P522_0320 EZ501U	250	500	32.00	32/1	3300	6000	3.2	4	25	12
94	143	158	2.4	1.4	P522_0320 EZ402U	250	500	32.00	32/1	3300	6000	1.9	4	25	12
107	74	80	1.4	2.8	P522_0280 EZ401U	230	600	28.00	28/1	4000	7000	1.0	4	27	11
107	114	125	2.2	1.8	P522_0280 EZ501U	300	600	28.00	28/1	4000	7000	3.0	4	27	12
107	125	138	2.4	1.7	P522_0280 EZ402U	300	600	28.00	28/1	4000	7000	1.7	4	27	12
107	184	229	3.5	1.1	P522_0280 EZ404U	300	600	28.00	28/1	4000	7000	3.1	4	27	14
107	197	213	3.8	1.1	P522_0280 EZ502U	300	600	28.00	28/1	4000	7000	5.3	4	27	14
120	67	71	1.5	3.2	P522_0250 EZ401U	200	600	25.00	25/1	3700	6500	1.1	4	28	11
120	102	112	2.3	2.1	P522_0250 EZ501U	300	600	25.00	25/1	3700	6500	3.1	4	28	12
120	112	124	2.6	1.9	P522_0250 EZ402U	300	600	25.00	25/1	3700	6500	1.8	4	28	12
120	164	204	3.7	1.3	P522_0250 EZ404U	300	600	25.00	25/1	3700	6500	3.2	4	28	14
120	176	190	4.0	1.2	P522_0250 EZ502U	300	600	25.00	25/1	3700	6500	5.4	4	28	14
120	176	197	4.0	1.2	P522_0250 EZ701U	300	600	25.00	25/1	3700	6500	8.7	4	28	15
150	53	57	1.7	3.9	P522_0200 EZ401U	160	600	20.00	20/1	3300	6000	1.2	4	28	11
150	82	89	2.6	2.6	P522_0200 EZ501U	300	600	20.00	20/1	3300	6000	3.2	4	28	12
150	89	99	2.9	2.4	P522_0200 EZ402U	300	600	20.00	20/1	3300	6000	1.9	4	28	12
150	131	163	4.2	1.6	P522_0200 EZ404U	300	600	20.00	20/1	3300	6000	3.3	4	28	14
150	141	152	4.5	1.5	P522_0200 EZ502U	300	600	20.00	20/1	3300	6000	5.5	4	28	14
150	141	158	4.5	1.5	P522_0200 EZ701U	300	600	20.00	20/1	3300	6000	8.8	4	28	15
150	184	211	5.9	1.1	P522_0200 EZ503U	300	600	20.00	20/1	3300	6000	7.9	4	28	15
188	43	46	1.9	4.9	P522_0160 EZ401U	130	600	16.00	16/1	3300	6000	1.3	4	28	11
188	65	71	2.9	3.2	P522_0160 EZ501U	240	600	16.00	16/1	3300	6000	3.2	4	28	12
188	71	79	3.2	2.9	P522_0160 EZ402U	240	600	16.00	16/1	3300	6000	2.0	4	28	12
188	105	131	4.7	2.0	P522_0160 EZ404U	300	600	16.00	16/1	3300	6000	3.3	4	28	14
188	112	122	5.0	1.9	P522_0160 EZ502U	300	600	16.00	16/1	3300	6000	5.5	4	28	14
188	112	126	5.0	1.9	P522_0160 EZ701U	300	600	16.00	16/1	3300	6000	8.8	4	28	15
188	147	169	6.6	1.4	P522_0160 EZ503U	300	600	16.00	16/1	3300	6000	7.9	4	28	15

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
P5 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 300 Nm)															
188	182	219	8.1	1.2	P522_0160 EZ702U	300	600	16.00	16/1	3300	6000	14	4	28	18
250	32	34	3.8	3.8	P522_0120 EZ401U	97	460	12.00	12/1	3000	6000	1.3	4	27	11
250	49	54	5.9	2.4	P522_0120 EZ501U	180	460	12.00	12/1	3000	6000	3.3	4	27	12
250	54	59	6.4	2.2	P522_0120 EZ402U	180	460	12.00	12/1	3000	6000	2.0	4	27	12
250	79	98	9.5	1.5	P522_0120 EZ404U	200	460	12.00	12/1	3000	6000	3.3	4	27	14
250	84	91	10	1.4	P522_0120 EZ502U	200	460	12.00	12/1	3000	6000	5.6	4	27	14
250	84	95	10	1.4	P522_0120 EZ701U	200	460	12.00	12/1	3000	6000	8.9	4	27	15
250	111	127	13	1.1	P522_0120 EZ503U	200	460	12.00	12/1	3000	6000	7.9	4	27	15
300	42	46	1.8	2.9	P521_0100 EZ501U	160	500	10.00	10/1	3700	6500	3.0	3	25	9.4
300	72	78	3.1	1.7	P521_0100 EZ502U	250	500	10.00	10/1	3700	6500	5.3	3	25	11
300	72	81	3.1	1.7	P521_0100 EZ701U	190	500	10.00	10/1	3700	6500	8.6	3	25	13
300	94	108	4.1	1.3	P521_0100 EZ503U	250	500	10.00	10/1	3700	6500	7.7	3	25	12
300	116	140	5.1	1.1	P521_0100 EZ702U	250	500	10.00	10/1	3700	6500	14	3	25	15
375	57	62	2.9	3.0	P521_0080 EZ502U	240	500	8.000	8/1	3700	6500	5.4	3	26	11
375	57	64	2.9	3.0	P521_0080 EZ701U	160	500	8.000	8/1	3700	6500	8.7	3	26	13
375	75	86	3.8	2.3	P521_0080 EZ503U	250	500	8.000	8/1	3700	6500	7.8	3	26	12
375	93	112	4.7	1.9	P521_0080 EZ702U	250	500	8.000	8/1	3700	6500	14	3	26	15
375	105	124	5.3	1.7	P521_0080 EZ505U	250	500	8.000	8/1	3700	6500	12	3	26	15
375	128	161	6.4	1.4	P521_0080 EZ703U	250	500	8.000	8/1	3700	6500	22	3	26	17
429	50	54	3.2	3.7	P521_0070 EZ502U	210	600	7.000	7/1	3700	6500	5.5	3	28	11
429	50	56	3.2	3.7	P521_0070 EZ701U	140	600	7.000	7/1	3700	6500	8.8	3	28	13
429	66	75	4.2	2.8	P521_0070 EZ503U	270	600	7.000	7/1	3700	6500	7.8	3	28	12
429	81	98	5.2	2.3	P521_0070 EZ702U	270	600	7.000	7/1	3700	6500	14	3	28	15
429	92	109	5.9	2.0	P521_0070 EZ505U	270	600	7.000	7/1	3700	6500	12	3	28	15
429	112	141	7.2	1.6	P521_0070 EZ703U	270	600	7.000	7/1	3700	6500	22	3	28	17
600	47	54	6.3	3.9	P521_0050 EZ503U	210	430	5.000	5/1	3500	6000	8.2	3	31	12
600	58	70	7.8	3.2	P521_0050 EZ702U	200	600	5.000	5/1	3500	6000	14	3	31	15
600	65	78	8.8	2.8	P521_0050 EZ505U	300	600	5.000	5/1	3500	6000	13	3	31	15
600	80	101	11	2.3	P521_0050 EZ703U	300	600	5.000	5/1	3500	6000	22	3	31	17
600	103	146	14	1.8	P521_0050 EZ705U	300	600	5.000	5/1	3500	6000	35	3	31	23
600	108	180	15	1.7	P521_0050 EZ802U	300	600	5.000	5/1	3500	6000	59	3	31	31
750	38	43	8.3	4.9	P521_0040 EZ503U	170	350	4.000	4/1	3000	5000	8.6	3	32	12
750	47	56	10	3.9	P521_0040 EZ702U	160	600	4.000	4/1	3000	5000	15	3	32	15
750	52	62	11	3.5	P521_0040 EZ505U	260	600	4.000	4/1	3000	5000	13	3	32	15
750	64	81	14	2.9	P521_0040 EZ703U	250	600	4.000	4/1	3000	5000	23	3	32	17
750	83	117	18	2.2	P521_0040 EZ705U	300	600	4.000	4/1	3000	5000	35	3	32	23
750	87	144	19	2.1	P521_0040 EZ802U	300	600	4.000	4/1	3000	5000	59	3	32	31
1000	22	23	16	4.9	P521_0030 EZ502U	90	260	3.000	3/1	2500	4500	8.0	3	36	11
1000	22	24	16	4.9	P521_0030 EZ701U	58	460	3.000	3/1	2500	4500	11	3	36	13
1000	28	32	20	3.7	P521_0030 EZ503U	130	260	3.000	3/1	2500	4500	10	3	36	12
1000	35	42	25	3.0	P521_0030 EZ702U	120	460	3.000	3/1	2500	4500	17	3	36	15
1000	39	47	28	2.7	P521_0030 EZ505U	190	460	3.000	3/1	2500	4500	15	3	36	15
1000	48	61	35	2.2	P521_0030 EZ703U	190	460	3.000	3/1	2500	4500	24	3	36	17
1000	62	88	45	1.7	P521_0030 EZ705U	200	460	3.000	3/1	2500	4500	37	3	36	23
1000	65	108	47	1.6	P521_0030 EZ802U	200	460	3.000	3/1	2500	4500	61	3	36	31
P5 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 300 Nm)															
450	92	148	4.6	1.2	P521_0100 EZ505U	250	500	10.00	10/1	3700	6500	12	3	25	15
563	74	119	4.2	2.1	P521_0080 EZ505U	250	500	8.000	8/1	3700	6500	12	3	26	15
563	94	155	5.4	1.6	P521_0080 EZ703U	250	500	8.000	8/1	3700	6500	22	3	26	17
643	65	104	4.7	2.5	P521_0070 EZ505U	270	600	7.000	7/1	3700	6500	12	3	28	15
643	82	136	6.0	2.0	P521_0070 EZ703U	270	600	7.000	7/1	3700	6500	22	3	28	17
900	46	74	7.1	3.5	P521_0050 EZ505U	300	600	5.000	5/1	3500	6000	13	3	31	15
900	51	167	7.8	3.1	P521_0050 EZ802U	300	600	5.000	5/1	3500	6000	59	3	31	31
900	59	97	9.0	2.7	P521_0050 EZ703U	300	600	5.000	5/1	3500	6000	22	3	31	17
900	80	146	12	2.0	P521_0050 EZ705U	300	600	5.000	5/1	3500	6000	35	3	31	23
1125	37	59	9.3	4.3	P521_0040 EZ505U	260	600	4.000	4/1	3000	5000	13	3	32	15
1125	41	134	10	3.9	P521_0040 EZ802U	300	600	4.000	4/1	3000	5000	59	3	32	31
1125	47	78	12	3.4	P521_0040 EZ703U	250	600	4.000	4/1	3000	5000	23	3	32	17
1125	64	116	16	2.5	P521_0040 EZ705U	300	600	4.000	4/1	3000	5000	35	3	32	23
1500	28	45	23	3.3	P521_0030 EZ505U	190	460	3.000	3/1	2500	4500	15	3	36	15
1500	31	100	25	3.0	P521_0030 EZ802U	200	460	3.000	3/1	2500	4500	61	3	36	31
1500	35	58	29	2.6	P521_0030 EZ703U	190	460	3.000	3/1	2500	4500	24	3	36	17
1500	48	87	40	1.9	P521_0030 EZ705U	200	460	3.000	3/1	2500	4500	37	3	36	23

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
P5 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 300 Nm)															
86	153	186	0.7	1.4	P522_0700 EZ401U	270	600	70.00	70/1	4000	7000	0.98	4	26	11
107	122	149	0.9	1.6	P522_0560 EZ401U	250	500	56.00	56/1	4000	7000	1.0	4	25	11
120	109	133	0.9	1.8	P522_0500 EZ401U	300	600	50.00	50/1	4000	7000	0.98	4	27	11
120	162	209	1.4	1.2	P522_0500 EZ501U	300	600	50.00	50/1	4000	7000	3.0	4	27	12
150	87	106	1.3	1.8	P522_0400 EZ401U	300	600	40.00	40/1	4000	7000	0.98	4	26	11
150	129	167	1.9	1.2	P522_0400 EZ501U	300	600	40.00	40/1	4000	7000	3.0	4	26	12
150	133	186	2.0	1.2	P522_0400 EZ402U	300	600	40.00	40/1	4000	7000	1.7	4	26	12
171	76	93	1.1	2.7	P522_0350 EZ401U	280	600	35.00	35/1	4000	7000	1.0	4	28	11
171	113	146	1.6	1.9	P522_0350 EZ501U	300	600	35.00	35/1	4000	7000	3.0	4	28	12
171	116	163	1.6	1.8	P522_0350 EZ402U	300	600	35.00	35/1	4000	7000	1.7	4	28	12
188	70	85	1.2	2.9	P522_0320 EZ401U	250	500	32.00	32/1	3300	6000	1.2	4	25	11
188	103	134	1.7	1.9	P522_0320 EZ501U	250	500	32.00	32/1	3300	6000	3.2	4	25	12
188	106	149	1.8	1.9	P522_0320 EZ402U	250	500	32.00	32/1	3300	6000	1.9	4	25	12
214	61	74	1.2	3.4	P522_0280 EZ401U	230	600	28.00	28/1	4000	7000	1.0	4	27	11
214	90	117	1.7	2.3	P522_0280 EZ501U	300	600	28.00	28/1	4000	7000	3.0	4	27	12
214	93	130	1.8	2.3	P522_0280 EZ402U	300	600	28.00	28/1	4000	7000	1.7	4	27	12
214	138	207	2.7	1.5	P522_0280 EZ502U	300	600	28.00	28/1	4000	7000	5.3	4	27	14
214	154	223	3.0	1.4	P522_0280 EZ404U	300	600	28.00	28/1	4000	7000	3.1	4	27	14
240	55	67	1.2	3.8	P522_0250 EZ401U	200	600	25.00	25/1	3700	6500	1.1	4	28	11
240	81	105	1.8	2.6	P522_0250 EZ501U	300	600	25.00	25/1	3700	6500	3.1	4	28	12
240	83	116	1.9	2.5	P522_0250 EZ402U	300	600	25.00	25/1	3700	6500	1.8	4	28	12
240	124	185	2.8	1.7	P522_0250 EZ502U	300	600	25.00	25/1	3700	6500	5.4	4	28	14
240	124	188	2.8	1.7	P522_0250 EZ701U	300	600	25.00	25/1	3700	6500	8.7	4	28	15
240	138	200	3.1	1.5	P522_0250 EZ404U	300	600	25.00	25/1	3700	6500	3.2	4	28	14
300	44	53	1.4	4.8	P522_0200 EZ401U	160	600	20.00	20/1	3300	6000	1.2	4	28	11
300	65	84	2.1	3.3	P522_0200 EZ501U	300	600	20.00	20/1	3300	6000	3.2	4	28	12
300	67	93	2.1	3.2	P522_0200 EZ402U	300	600	20.00	20/1	3300	6000	1.9	4	28	12
300	99	148	3.2	2.1	P522_0200 EZ502U	300	600	20.00	20/1	3300	6000	5.5	4	28	14
300	99	150	3.2	2.1	P522_0200 EZ701U	300	600	20.00	20/1	3300	6000	8.8	4	28	15
300	110	160	3.5	1.9	P522_0200 EZ404U	300	600	20.00	20/1	3300	6000	3.3	4	28	14
300	118	201	3.8	1.8	P522_0200 EZ503U	300	600	20.00	20/1	3300	6000	7.9	4	28	15
375	52	67	2.3	4.1	P522_0160 EZ501U	240	600	16.00	16/1	3300	6000	3.2	4	28	12
375	53	74	2.4	3.9	P522_0160 EZ402U	240	600	16.00	16/1	3300	6000	2.0	4	28	12
375	79	119	3.5	2.7	P522_0160 EZ502U	300	600	16.00	16/1	3300	6000	5.5	4	28	14
375	79	120	3.5	2.7	P522_0160 EZ701U	300	600	16.00	16/1	3300	6000	8.8	4	28	15
375	88	128	3.9	2.4	P522_0160 EZ404U	300	600	16.00	16/1	3300	6000	3.3	4	28	14
375	94	161	4.2	2.2	P522_0160 EZ503U	300	600	16.00	16/1	3300	6000	7.9	4	28	15
375	109	217	4.9	1.9	P522_0160 EZ702U	300	600	16.00	16/1	3300	6000	14	4	28	18
500	26	32	3.2	4.6	P522_0120 EZ401U	97	460	12.00	12/1	3000	6000	1.3	4	27	11
500	39	50	4.7	3.1	P522_0120 EZ501U	180	460	12.00	12/1	3000	6000	3.3	4	27	12
500	40	56	4.8	3.0	P522_0120 EZ402U	180	460	12.00	12/1	3000	6000	2.0	4	27	12
500	59	89	7.1	2.0	P522_0120 EZ502U	200	460	12.00	12/1	3000	6000	5.6	4	27	14
500	59	90	7.1	2.0	P522_0120 EZ701U	200	460	12.00	12/1	3000	6000	8.9	4	27	15
500	66	96	8.0	1.8	P522_0120 EZ404U	200	460	12.00	12/1	3000	6000	3.3	4	27	14
500	71	121	8.5	1.7	P522_0120 EZ503U	200	460	12.00	12/1	3000	6000	7.9	4	27	15
600	33	43	1.8	2.9	P521_0100 EZ501U	160	500	10.00	10/1	3700	6500	3.0	3	25	9.4
600	50	76	2.8	1.9	P521_0100 EZ502U	250	500	10.00	10/1	3700	6500	5.3	3	25	11
600	50	77	2.8	1.9	P521_0100 EZ701U	190	500	10.00	10/1	3700	6500	8.6	3	25	13
600	60	103	3.3	1.6	P521_0100 EZ503U	250	500	10.00	10/1	3700	6500	7.7	3	25	12
600	70	139	3.9	1.4	P521_0100 EZ702U	250	500	10.00	10/1	3700	6500	14	3	25	15
750	40	61	2.5	3.4	P521_0080 EZ502U	240	500	8.000	8/1	3700	6500	5.4	3	26	11
750	40	61	2.5	3.4	P521_0080 EZ701U	160	500	8.000	8/1	3700	6500	8.7	3	26	13
750	48	82	3.0	2.9	P521_0080 EZ503U	250	500	8.000	8/1	3700	6500	7.8	3	26	12
750	56	111	3.5	2.5	P521_0080 EZ702U	250	500	8.000	8/1	3700	6500	14	3	26	15
857	35	53	2.9	4.1	P521_0070 EZ502U	210	600	7.000	7/1	3700	6500	5.5	3	28	11
857	35	54	2.9	4.1	P521_0070 EZ701U	140	600	7.000	7/1	3700	6500	8.8	3	28	13
857	42	72	3.4	3.5	P521_0070 EZ503U	270	600	7.000	7/1	3700	6500	7.8	3	28	12
857	49	97	3.9	3.0	P521_0070 EZ702U	270	600	7.000	7/1	3700	6500	14	3	28	15
1200	30	51	5.1	4.8	P521_0050 EZ503U	210	430	5.000	5/1	3500	6000	8.2	3	31	12
1200	35	69	5.9	4.2	P521_0050 EZ702U	200	600	5.000	5/1	3500	6000	14	3	31	15
P7 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 700 Nm)															
400	212	321	14	2.1	P721_0050 EZ805U	700	1400	5.000	5/1	3000	5500	135	3	58	54
500	170	256	19	2.6	P721_0040 EZ805U	700	1380	4.000	4/1	2500	4500	136	3	60	54
667	127	192	41	2.2	P721_0030 EZ805U	500	1040	3.000	3/1	2200	3700	141	3	65	54

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
P7 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 700 Nm)															
38	327	357	0.8	1.2	P722_0800 EZ501U	500	1000	80.00	80/1	3700	6500	3.1	4	52	18
43	286	313	0.8	1.5	P722_0700 EZ501U	650	1250	70.00	70/1	3700	6500	3.1	4	53	18
54	229	250	1.0	1.7	P722_0560 EZ501U	500	1000	56.00	56/1	3700	6500	3.2	4	52	18
60	204	223	0.9	2.2	P722_0500 EZ501U	700	1400	50.00	50/1	3700	6500	3.1	4	53	18
60	352	380	1.6	1.3	P722_0500 EZ502U	700	1400	50.00	50/1	3700	6500	5.4	4	53	19
60	352	394	1.6	1.3	P722_0500 EZ701U	700	1400	50.00	50/1	3700	6500	8.7	4	53	21
75	163	179	1.1	2.7	P722_0400 EZ501U	610	1380	40.00	40/1	3700	6500	3.1	4	52	18
75	281	304	1.8	1.6	P722_0400 EZ502U	700	1380	40.00	40/1	3700	6500	5.4	4	52	19
75	281	315	1.8	1.6	P722_0400 EZ701U	700	1380	40.00	40/1	3700	6500	8.7	4	52	21
75	369	422	2.4	1.2	P722_0400 EZ503U	700	1380	40.00	40/1	3700	6500	7.8	4	52	21
86	143	156	1.1	3.1	P722_0350 EZ501U	530	1400	35.00	35/1	3700	6500	3.2	4	53	18
86	246	266	1.9	1.8	P722_0350 EZ502U	700	1400	35.00	35/1	3700	6500	5.5	4	53	19
86	246	276	1.9	1.8	P722_0350 EZ701U	670	1400	35.00	35/1	3700	6500	8.8	4	53	21
86	323	369	2.5	1.4	P722_0350 EZ503U	700	1400	35.00	35/1	3700	6500	7.9	4	53	21
86	399	479	3.2	1.1	P722_0350 EZ702U	700	1400	35.00	35/1	3700	6500	14	4	53	24
94	131	143	1.3	3.1	P722_0320 EZ501U	490	1000	32.00	32/1	3000	5000	3.9	4	52	18
94	225	243	2.2	1.8	P722_0320 EZ502U	500	1000	32.00	32/1	3000	5000	6.2	4	52	19
94	225	252	2.2	1.8	P722_0320 EZ701U	500	1000	32.00	32/1	3000	5000	9.5	4	52	21
94	295	337	2.9	1.4	P722_0320 EZ503U	500	1000	32.00	32/1	3000	5000	8.5	4	52	21
107	114	125	1.3	3.8	P722_0280 EZ501U	430	1380	28.00	28/1	3700	6500	3.3	4	53	18
107	197	213	2.2	2.2	P722_0280 EZ502U	700	1380	28.00	28/1	3700	6500	5.6	4	53	19
107	197	221	2.2	2.2	P722_0280 EZ701U	530	1380	28.00	28/1	3700	6500	8.9	4	53	21
107	258	295	2.9	1.7	P722_0280 EZ503U	700	1380	28.00	28/1	3700	6500	7.9	4	53	21
107	319	383	3.5	1.4	P722_0280 EZ702U	700	1380	28.00	28/1	3700	6500	14	4	53	24
107	359	426	4.0	1.2	P722_0280 EZ505U	700	1380	28.00	28/1	3700	6500	13	4	53	24
120	102	112	1.3	4.3	P722_0250 EZ501U	380	1400	25.00	25/1	3500	6000	3.6	4	54	18
120	176	190	2.3	2.5	P722_0250 EZ502U	700	1400	25.00	25/1	3500	6000	5.9	4	54	19
120	176	197	2.3	2.5	P722_0250 EZ701U	480	1400	25.00	25/1	3500	6000	9.2	4	54	21
120	230	264	3.0	1.9	P722_0250 EZ503U	700	1400	25.00	25/1	3500	6000	8.2	4	54	21
120	285	342	3.7	1.5	P722_0250 EZ702U	700	1400	25.00	25/1	3500	6000	14	4	54	24
120	321	380	4.2	1.4	P722_0250 EZ505U	700	1400	25.00	25/1	3500	6000	13	4	54	24
120	392	494	5.1	1.1	P722_0250 EZ703U	700	1400	25.00	25/1	3500	6000	22	4	54	26
150	141	152	2.6	3.1	P722_0200 EZ502U	590	1400	20.00	20/1	3000	5000	6.2	4	54	19
150	141	158	2.6	3.1	P722_0200 EZ701U	380	1400	20.00	20/1	3000	5000	9.5	4	54	21
150	184	211	3.4	2.4	P722_0200 EZ503U	700	1400	20.00	20/1	3000	5000	8.6	4	54	21
150	228	274	4.2	1.9	P722_0200 EZ702U	700	1400	20.00	20/1	3000	5000	15	4	54	24
150	257	304	4.7	1.7	P722_0200 EZ505U	700	1400	20.00	20/1	3000	5000	13	4	54	24
150	314	395	5.7	1.4	P722_0200 EZ703U	700	1400	20.00	20/1	3000	5000	23	4	54	26
188	112	122	2.9	3.9	P722_0160 EZ502U	470	1340	16.00	16/1	3000	5000	6.3	4	54	19
188	112	126	2.9	3.9	P722_0160 EZ701U	300	1380	16.00	16/1	3000	5000	9.6	4	54	21
188	147	169	3.8	3.0	P722_0160 EZ503U	650	1340	16.00	16/1	3000	5000	8.7	4	54	21
188	182	219	4.7	2.4	P722_0160 EZ702U	620	1380	16.00	16/1	3000	5000	15	4	54	24
188	205	243	5.2	2.1	P722_0160 EZ505U	700	1380	16.00	16/1	3000	5000	13	4	54	24
188	251	316	6.4	1.8	P722_0160 EZ703U	700	1380	16.00	16/1	3000	5000	23	4	54	26
188	324	459	8.3	1.4	P722_0160 EZ705U	700	1380	16.00	16/1	3000	5000	35	4	54	31
250	84	91	5.2	3.3	P722_0120 EZ502U	350	1000	12.00	12/1	2500	5000	6.6	4	53	19
250	84	95	5.2	3.3	P722_0120 EZ701U	230	1040	12.00	12/1	2500	5000	9.9	4	53	21
250	111	127	6.8	2.5	P722_0120 EZ503U	490	1000	12.00	12/1	2500	5000	9.0	4	53	21
250	137	164	8.5	2.0	P722_0120 EZ702U	470	1040	12.00	12/1	2500	5000	15	4	53	24
250	154	182	9.5	1.8	P722_0120 EZ505U	500	1040	12.00	12/1	2500	5000	14	4	53	24
250	188	237	12	1.5	P722_0120 EZ703U	500	1040	12.00	12/1	2500	5000	23	4	53	26
250	243	344	15	1.2	P722_0120 EZ705U	500	1040	12.00	12/1	2500	5000	35	4	53	31
300	72	81	1.8	3.7	P721_0100 EZ701U	190	1000	10.00	10/1	3300	6000	9.0	3	50	17
300	116	140	2.9	2.3	P721_0100 EZ702U	400	1000	10.00	10/1	3300	6000	14	3	50	19
300	160	202	3.9	1.6	P721_0100 EZ703U	500	1000	10.00	10/1	3300	6000	22	3	50	21
300	207	293	5.1	1.3	P721_0100 EZ705U	500	1000	10.00	10/1	3300	6000	35	3	50	27
300	216	360	5.3	1.2	P721_0100 EZ802U	500	1000	10.00	10/1	3300	6000	59	3	50	35
375	93	112	2.8	3.8	P721_0080 EZ702U	320	1000	8.000	8/1	3300	6000	15	3	53	19
375	128	161	3.9	2.7	P721_0080 EZ703U	500	1000	8.000	8/1	3300	6000	22	3	53	21
375	165	234	5.0	2.1	P721_0080 EZ705U	500	1000	8.000	8/1	3300	6000	35	3	53	27
375	173	288	5.2	2.0	P721_0080 EZ802U	500	1000	8.000	8/1	3300	6000	59	3	53	35
429	81	98	3.0	4.7	P721_0070 EZ702U	280	1250	7.000	7/1	3300	6000	15	3	55	19
429	112	141	4.1	3.4	P721_0070 EZ703U	440	1250	7.000	7/1	3300	6000	23	3	55	21
429	145	205	5.3	2.7	P721_0070 EZ705U	650	1250	7.000	7/1	3300	6000	35	3	55	27

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
P7 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 700 Nm)															
429	151	252	5.6	2.5	P721_0070 EZ802U	650	1250	7.000	7/1	3300	6000	59	3	55	35
600	80	101	6.2	4.8	P721_0050 EZ703U	320	900	5.000	5/1	3000	5500	24	3	58	21
600	103	146	7.9	3.7	P721_0050 EZ705U	500	1400	5.000	5/1	3000	5500	36	3	58	27
600	108	180	8.3	3.6	P721_0050 EZ802U	490	1400	5.000	5/1	3000	5500	60	3	58	35
600	129	234	9.9	3.0	P721_0050 EZ803U	700	1400	5.000	5/1	3000	5500	85	3	58	41
750	83	117	10	4.7	P721_0040 EZ705U	400	1380	4.000	4/1	2500	4500	38	3	60	27
750	87	144	11	4.4	P721_0040 EZ802U	390	1380	4.000	4/1	2500	4500	62	3	60	35
750	103	187	13	3.7	P721_0040 EZ803U	560	1380	4.000	4/1	2500	4500	87	3	60	41
1000	62	88	23	3.9	P721_0030 EZ705U	300	1040	3.000	3/1	2200	3700	42	3	65	27
1000	65	108	24	3.8	P721_0030 EZ802U	290	1040	3.000	3/1	2200	3700	66	3	65	35
1000	77	140	29	3.2	P721_0030 EZ803U	420	1040	3.000	3/1	2200	3700	92	3	65	41
P7 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 700 Nm)															
129	316	509	2.5	1.4	P722_0350 EZ505U	700	1400	35.00	35/1	3700	6500	12	4	53	24
161	253	407	2.8	1.7	P722_0280 EZ505U	700	1380	28.00	28/1	3700	6500	13	4	53	24
161	322	532	3.6	1.4	P722_0280 EZ703U	700	1380	28.00	28/1	3700	6500	22	4	53	26
180	226	363	3.0	2.0	P722_0250 EZ505U	700	1400	25.00	25/1	3500	6000	13	4	54	24
180	287	475	3.8	1.5	P722_0250 EZ703U	700	1400	25.00	25/1	3500	6000	22	4	54	26
225	181	291	3.3	2.4	P722_0200 EZ505U	700	1400	20.00	20/1	3000	5000	13	4	54	24
225	230	380	4.2	1.9	P722_0200 EZ703U	700	1400	20.00	20/1	3000	5000	23	4	54	26
281	144	233	3.7	3.0	P722_0160 EZ505U	700	1380	16.00	16/1	3000	5000	13	4	54	24
281	160	524	4.1	2.8	P722_0160 EZ802U	700	1380	16.00	16/1	3000	5000	59	4	54	40
281	184	304	4.7	2.4	P722_0160 EZ703U	700	1380	16.00	16/1	3000	5000	23	4	54	26
281	249	456	6.4	1.8	P722_0160 EZ705U	700	1380	16.00	16/1	3000	5000	35	4	54	31
375	108	174	6.7	2.6	P722_0120 EZ505U	500	1040	12.00	12/1	2500	5000	14	4	53	24
375	138	228	8.5	2.0	P722_0120 EZ703U	500	1040	12.00	12/1	2500	5000	23	4	53	26
375	187	342	12	1.5	P722_0120 EZ705U	500	1040	12.00	12/1	2500	5000	35	4	53	31
450	102	335	2.9	2.2	P721_0100 EZ802U	500	1000	10.00	10/1	3300	6000	59	3	50	35
450	117	194	3.3	2.0	P721_0100 EZ703U	500	1000	10.00	10/1	3300	6000	22	3	50	21
450	159	291	4.5	1.4	P721_0100 EZ705U	500	1000	10.00	10/1	3300	6000	35	3	50	27
563	81	268	2.8	3.7	P721_0080 EZ802U	500	1000	8.000	8/1	3300	6000	59	3	53	35
563	94	155	3.2	3.3	P721_0080 EZ703U	500	1000	8.000	8/1	3300	6000	22	3	53	21
563	127	233	4.4	2.4	P721_0080 EZ705U	500	1000	8.000	8/1	3300	6000	35	3	53	27
643	71	234	3.0	4.7	P721_0070 EZ802U	650	1250	7.000	7/1	3300	6000	59	3	55	35
643	82	136	3.5	4.1	P721_0070 EZ703U	440	1250	7.000	7/1	3300	6000	23	3	55	21
643	111	204	4.7	3.0	P721_0070 EZ705U	650	1250	7.000	7/1	3300	6000	35	3	55	27
900	80	146	7.0	4.2	P721_0050 EZ705U	500	1400	5.000	5/1	3000	5500	36	3	58	27
P7 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 700 Nm)															
75	258	334	0.7	1.5	P722_0800 EZ501U	500	1000	80.00	80/1	3700	6500	3.1	4	52	18
86	226	293	0.6	1.9	P722_0700 EZ501U	650	1250	70.00	70/1	3700	6500	3.1	4	53	18
107	181	234	0.8	2.2	P722_0560 EZ501U	500	1000	56.00	56/1	3700	6500	3.2	4	52	18
120	162	209	0.7	2.7	P722_0500 EZ501U	700	1400	50.00	50/1	3700	6500	3.1	4	53	18
120	247	371	1.1	1.8	P722_0500 EZ502U	700	1400	50.00	50/1	3700	6500	5.4	4	53	19
120	247	375	1.1	1.8	P722_0500 EZ701U	700	1400	50.00	50/1	3700	6500	8.7	4	53	21
120	295	504	1.4	1.5	P722_0500 EZ503U	700	1400	50.00	50/1	3700	6500	7.7	4	53	21
150	129	167	1.0	2.9	P722_0400 EZ501U	610	1380	40.00	40/1	3700	6500	3.1	4	52	18
150	198	296	1.5	1.9	P722_0400 EZ502U	700	1380	40.00	40/1	3700	6500	5.4	4	52	19
150	198	300	1.5	1.9	P722_0400 EZ701U	700	1380	40.00	40/1	3700	6500	8.7	4	52	21
150	236	403	1.8	1.6	P722_0400 EZ503U	700	1380	40.00	40/1	3700	6500	7.8	4	52	21
171	113	146	0.9	3.9	P722_0350 EZ501U	530	1400	35.00	35/1	3700	6500	3.2	4	53	18
171	173	259	1.4	2.5	P722_0350 EZ502U	700	1400	35.00	35/1	3700	6500	5.5	4	53	19
171	173	263	1.4	2.5	P722_0350 EZ701U	670	1400	35.00	35/1	3700	6500	8.8	4	53	21
171	206	352	1.6	2.1	P722_0350 EZ503U	700	1400	35.00	35/1	3700	6500	7.9	4	53	21
171	239	475	1.9	1.8	P722_0350 EZ702U	700	1400	35.00	35/1	3700	6500	14	4	53	24
214	90	117	1.0	4.9	P722_0280 EZ501U	430	1380	28.00	28/1	3700	6500	3.3	4	53	18
214	138	207	1.5	3.2	P722_0280 EZ502U	700	1380	28.00	28/1	3700	6500	5.6	4	53	19
214	138	210	1.5	3.2	P722_0280 EZ701U	530	1380	28.00	28/1	3700	6500	8.9	4	53	21
214	165	282	1.8	2.7	P722_0280 EZ503U	700	1380	28.00	28/1	3700	6500	7.9	4	53	21
214	192	380	2.1	2.3	P722_0280 EZ702U	700	1380	28.00	28/1	3700	6500	14	4	53	24
240	124	185	1.6	3.6	P722_0250 EZ502U	700	1400	25.00	25/1	3500	6000	5.9	4	54	19
240	124	188	1.6	3.6	P722_0250 EZ701U	480	1400	25.00	25/1	3500	6000	9.2	4	54	21
240	147	252	1.9	3.0	P722_0250 EZ503U	700	1400	25.00	25/1	3500	6000	8.2	4	54	21
240	171	340	2.2	2.6	P722_0250 EZ702U	700	1400	25.00	25/1	3500	6000	14	4	54	24
600	50	77	1.6	4.1	P721_0100 EZ701U	190	1000	10.00	10/1	3300	6000	9.0	3	50	17

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
P7 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 700 Nm)															
600	70	139	2.2	3.0	P721_0100 EZ702U	400	1000	10.00	10/1	3300	6000	14	3	50	19
750	56	111	2.1	5.0	P721_0080 EZ702U	320	1000	8.000	8/1	3300	6000	15	3	53	19
P8 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 1600 Nm)															
125	664	1005	10	1.2	P822_0160 EZ805U	1600	3180	16.00	16/1	2500	4500	137	4	169	74
167	498	754	12	1.6	P822_0120 EZ805U	1200	2400	12.00	12/1	2200	4500	138	4	156	74
200	424	641	4.2	1.7	P821_0100 EZ805U	1200	2400	10.00	10/1	2800	4500	135	3	153	64
250	339	513	4.8	2.4	P821_0080 EZ805U	1200	2400	8.000	8/1	2800	4500	136	3	166	64
286	297	449	4.5	3.4	P821_0070 EZ805U	1390	2800	7.000	7/1	2800	4500	138	3	177	64
400	212	321	6.8	4.7	P821_0050 EZ805U	990	2900	5.000	5/1	2500	4000	142	3	194	64
500	170	256	11	4.7	P821_0040 EZ805U	800	2330	4.000	4/1	2200	3500	149	3	205	64
P8 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 1600 Nm)															
38	562	631	0.8	1.4	P822_0800 EZ701U	1200	2400	80.00	80/1	3300	6000	9.0	4	159	37
43	492	552	0.7	2.0	P822_0700 EZ701U	1330	2800	70.00	70/1	3300	6000	9.0	4	165	37
43	798	958	1.1	1.3	P822_0700 EZ702U	1400	2800	70.00	70/1	3300	6000	14	4	165	39
54	394	442	0.9	2.0	P822_0560 EZ701U	1060	2400	56.00	56/1	3300	6000	9.7	4	159	37
54	638	766	1.5	1.3	P822_0560 EZ702U	1200	2400	56.00	56/1	3300	6000	15	4	159	39
60	352	394	0.8	2.8	P822_0500 EZ701U	950	3200	50.00	50/1	3300	6000	9.1	4	168	37
60	570	684	1.3	1.8	P822_0500 EZ702U	1600	3200	50.00	50/1	3300	6000	14	4	168	39
60	784	988	1.7	1.3	P822_0500 EZ703U	1600	3200	50.00	50/1	3300	6000	22	4	168	41
75	281	315	1.1	2.8	P822_0400 EZ701U	760	3180	40.00	40/1	3300	6000	9.2	4	163	37
75	456	547	1.8	1.8	P822_0400 EZ702U	1560	3180	40.00	40/1	3300	6000	14	4	163	39
75	627	790	2.4	1.3	P822_0400 EZ703U	1600	3180	40.00	40/1	3300	6000	22	4	163	41
86	246	276	0.9	4.1	P822_0350 EZ701U	670	3200	35.00	35/1	3300	6000	9.7	4	170	37
86	399	479	1.5	2.5	P822_0350 EZ702U	1360	3200	35.00	35/1	3300	6000	15	4	170	39
86	549	692	2.1	1.8	P822_0350 EZ703U	1600	3200	35.00	35/1	3300	6000	23	4	170	41
86	708	1004	2.7	1.4	P822_0350 EZ705U	1600	3200	35.00	35/1	3300	6000	35	4	170	47
86	741	1234	2.8	1.3	P822_0350 EZ802U	1600	3200	35.00	35/1	3300	6000	59	4	170	55
94	225	252	1.2	3.6	P822_0320 EZ701U	610	2400	32.00	32/1	2500	4500	12	4	159	37
94	365	438	2.0	2.2	P822_0320 EZ702U	1200	2400	32.00	32/1	2500	4500	17	4	159	39
94	502	632	2.7	1.6	P822_0320 EZ703U	1200	2400	32.00	32/1	2500	4500	25	4	159	41
94	648	918	3.5	1.2	P822_0320 EZ705U	1200	2400	32.00	32/1	2500	4500	37	4	159	47
107	197	221	1.3	4.1	P822_0280 EZ701U	530	3180	28.00	28/1	3300	6000	9.8	4	166	37
107	319	383	2.1	2.5	P822_0280 EZ702U	1090	3180	28.00	28/1	3300	6000	15	4	166	39
107	439	553	2.9	1.8	P822_0280 EZ703U	1600	3180	28.00	28/1	3300	6000	23	4	166	41
107	567	803	3.7	1.4	P822_0280 EZ705U	1600	3180	28.00	28/1	3300	6000	35	4	166	47
107	593	987	3.9	1.3	P822_0280 EZ802U	1600	3180	28.00	28/1	3300	6000	59	4	166	55
120	285	342	1.8	3.5	P822_0250 EZ702U	970	3200	25.00	25/1	3000	5500	16	4	171	39
120	392	494	2.4	2.6	P822_0250 EZ703U	1540	3200	25.00	25/1	3000	5500	24	4	171	41
120	506	717	3.2	2.0	P822_0250 EZ705U	1600	3200	25.00	25/1	3000	5500	36	4	171	47
120	530	881	3.3	1.9	P822_0250 EZ802U	1600	3200	25.00	25/1	3000	5500	60	4	171	55
120	632	1145	3.9	1.6	P822_0250 EZ803U	1600	3200	25.00	25/1	3000	5500	86	4	171	61
150	228	274	2.0	4.4	P822_0200 EZ702U	780	3200	20.00	20/1	2500	4500	17	4	172	39
150	314	395	2.7	3.2	P822_0200 EZ703U	1240	3200	20.00	20/1	2500	4500	25	4	172	41
150	405	574	3.5	2.5	P822_0200 EZ705U	1600	3200	20.00	20/1	2500	4500	38	4	172	47
150	424	705	3.7	2.4	P822_0200 EZ802U	1600	3200	20.00	20/1	2500	4500	62	4	172	55
150	505	916	4.4	2.0	P822_0200 EZ803U	1600	3200	20.00	20/1	2500	4500	87	4	172	61
188	182	219	2.8	4.4	P822_0160 EZ702U	620	2790	16.00	16/1	2500	4500	18	4	169	39
188	251	316	3.8	3.2	P822_0160 EZ703U	990	2790	16.00	16/1	2500	4500	26	4	169	41
188	324	459	4.9	2.5	P822_0160 EZ705U	1580	3180	16.00	16/1	2500	4500	38	4	169	47
188	339	564	5.2	2.4	P822_0160 EZ802U	1520	3180	16.00	16/1	2500	4500	62	4	169	55
188	404	733	6.2	2.0	P822_0160 EZ803U	1600	3180	16.00	16/1	2500	4500	88	4	169	61
250	188	237	4.4	4.3	P822_0120 EZ703U	740	2090	12.00	12/1	2200	4500	27	4	156	41
250	243	344	5.7	3.3	P822_0120 EZ705U	1190	2400	12.00	12/1	2200	4500	40	4	156	47
250	254	423	6.0	3.1	P822_0120 EZ802U	1140	2400	12.00	12/1	2200	4500	64	4	156	55
250	303	549	7.1	2.6	P822_0120 EZ803U	1200	2400	12.00	12/1	2200	4500	89	4	156	61
300	216	360	2.5	2.8	P821_0100 EZ802U	970	2400	10.00	10/1	2800	4500	60	3	153	45
300	258	468	2.9	2.4	P821_0100 EZ803U	1200	2400	10.00	10/1	2800	4500	86	3	153	51
375	173	288	2.8	4.0	P821_0080 EZ802U	780	2400	8.000	8/1	2800	4500	62	3	166	45
375	206	374	3.4	3.4	P821_0080 EZ803U	1130	2400	8.000	8/1	2800	4500	87	3	166	51
429	181	327	3.2	4.8	P821_0070 EZ803U	980	2800	7.000	7/1	2800	4500	88	3	177	51
P8 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 1600 Nm)															
90	575	950	1.3	1.7	P822_0500 EZ703U	1600	3200	50.00	50/1	3300	6000	22	4	168	41
113	460	760	1.8	1.7	P822_0400 EZ703U	1600	3180	40.00	40/1	3300	6000	22	4	163	41

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
P8 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 1600 Nm)															
113	623	1140	2.4	1.3	P822_0400 EZ705U	1600	3180	40.00	40/1	3300	6000	35	4	163	47
129	349	1147	1.3	2.9	P822_0350 EZ802U	1600	3200	35.00	35/1	3300	6000	59	4	170	55
129	402	665	1.5	2.5	P822_0350 EZ703U	1600	3200	35.00	35/1	3300	6000	23	4	170	41
129	545	998	2.1	1.8	P822_0350 EZ705U	1600	3200	35.00	35/1	3300	6000	35	4	170	47
141	368	608	2.0	2.2	P822_0320 EZ703U	1200	2400	32.00	32/1	2500	4500	25	4	159	41
141	499	912	2.7	1.6	P822_0320 EZ705U	1200	2400	32.00	32/1	2500	4500	37	4	159	47
161	279	918	1.8	2.9	P822_0280 EZ802U	1600	3180	28.00	28/1	3300	6000	59	4	166	55
161	322	532	2.1	2.5	P822_0280 EZ703U	1600	3180	28.00	28/1	3300	6000	23	4	166	41
161	436	798	2.9	1.8	P822_0280 EZ705U	1600	3180	28.00	28/1	3300	6000	35	4	166	47
180	249	819	1.6	4.0	P822_0250 EZ802U	1600	3200	25.00	25/1	3000	5500	60	4	171	55
180	287	475	1.8	3.5	P822_0250 EZ703U	1540	3200	25.00	25/1	3000	5500	24	4	171	41
180	390	713	2.4	2.6	P822_0250 EZ705U	1600	3200	25.00	25/1	3000	5500	36	4	171	47
225	230	380	2.0	4.4	P822_0200 EZ703U	1240	3200	20.00	20/1	2500	4500	25	4	172	41
225	312	570	2.7	3.2	P822_0200 EZ705U	1600	3200	20.00	20/1	2500	4500	38	4	172	47
281	184	304	2.8	4.4	P822_0160 EZ703U	990	2790	16.00	16/1	2500	4500	26	4	169	41
281	249	456	3.8	3.2	P822_0160 EZ705U	1580	3180	16.00	16/1	2500	4500	38	4	169	47
375	187	342	4.4	4.3	P822_0120 EZ705U	1190	2400	12.00	12/1	2200	4500	40	4	156	47
P8 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 1600 Nm)															
60	494	751	0.6	1.4	P822_1000 EZ701U	1200	2400	100.0	100/1	3300	6000	9.0	4	148	37
75	395	600	0.5	2.0	P822_0800 EZ701U	1200	2400	80.00	80/1	3300	6000	9.0	4	159	37
86	346	525	0.5	2.9	P822_0700 EZ701U	1330	2800	70.00	70/1	3300	6000	9.0	4	165	37
86	479	951	0.6	2.1	P822_0700 EZ702U	1400	2800	70.00	70/1	3300	6000	14	4	165	39
107	277	420	0.6	2.9	P822_0560 EZ701U	1060	2400	56.00	56/1	3300	6000	9.7	4	159	37
107	383	761	0.9	2.1	P822_0560 EZ702U	1200	2400	56.00	56/1	3300	6000	15	4	159	39
120	247	375	0.5	4.0	P822_0500 EZ701U	950	3200	50.00	50/1	3300	6000	9.1	4	168	37
120	342	679	0.8	2.9	P822_0500 EZ702U	1600	3200	50.00	50/1	3300	6000	14	4	168	39
150	198	300	0.8	4.0	P822_0400 EZ701U	760	3180	40.00	40/1	3300	6000	9.2	4	163	37
150	274	543	1.1	2.9	P822_0400 EZ702U	1560	3180	40.00	40/1	3300	6000	14	4	163	39
171	239	475	0.9	4.2	P822_0350 EZ702U	1360	3200	35.00	35/1	3300	6000	15	4	170	39
214	192	380	1.3	4.2	P822_0280 EZ702U	1090	3180	28.00	28/1	3300	6000	15	4	166	39
P9 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 3000 Nm)															
57	1453	2198	2.9	1.4	P922_0350 EZ805U	3000	6000	35.00	35/1	2800	4500	138	4	333	99
71	1162	1758	3.3	1.7	P922_0280 EZ805U	3000	5530	28.00	28/1	2800	4500	138	4	335	99
80	1038	1570	3.5	1.9	P922_0250 EZ805U	3000	6000	25.00	25/1	2500	4000	143	4	335	99
100	830	1256	3.9	2.4	P922_0200 EZ805U	3000	6000	20.00	20/1	2200	3500	149	4	336	99
125	664	1005	4.4	3.0	P922_0160 EZ805U	3000	5530	16.00	16/1	2200	3500	150	4	341	99
P9 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 3000 Nm)															
60	1059	1762	1.3	1.9	P922_0500 EZ802U	3000	6000	50.00	50/1	2800	4500	60	4	329	80
60	1264	2290	1.5	1.6	P922_0500 EZ803U	3000	6000	50.00	50/1	2800	4500	86	4	329	86
75	847	1410	1.4	2.4	P922_0400 EZ802U	3000	5530	40.00	40/1	2800	4500	60	4	329	80
75	1011	1832	1.7	2.0	P922_0400 EZ803U	3000	5530	40.00	40/1	2800	4500	86	4	329	86
86	741	1234	1.5	2.7	P922_0350 EZ802U	3000	6000	35.00	35/1	2800	4500	63	4	333	80
86	884	1603	1.8	2.3	P922_0350 EZ803U	3000	6000	35.00	35/1	2800	4500	89	4	333	86
107	593	987	1.7	3.4	P922_0280 EZ802U	2660	5530	28.00	28/1	2800	4500	63	4	335	80
107	708	1282	2.0	2.8	P922_0280 EZ803U	3000	5530	28.00	28/1	2800	4500	89	4	335	86
120	530	881	1.8	3.8	P922_0250 EZ802U	2380	6000	25.00	25/1	2500	4000	68	4	335	80
120	632	1145	2.1	3.2	P922_0250 EZ803U	3000	6000	25.00	25/1	2500	4000	93	4	335	86
150	424	705	2.0	4.7	P922_0200 EZ802U	1900	6000	20.00	20/1	2200	3500	74	4	336	80
150	505	916	2.4	4.0	P922_0200 EZ803U	2760	6000	20.00	20/1	2200	3500	100	4	336	86
188	404	733	2.7	4.9	P922_0160 EZ803U	2200	5530	16.00	16/1	2200	3500	101	4	341	86
P9 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 3000 Nm)															
90	499	1639	0.6	4.0	P922_0500 EZ802U	3000	6000	50.00	50/1	2800	4500	60	4	329	80

2.3 Dimensional drawings

In this chapter you can find the dimensions of the geared motors.

There is a dimensional drawing for every possible shaft/housing design, each with the tables for gear unit dimensions, motor dimensions and geared motor dimensions.

Dimensions can exceed the specifications of ISO 2768-mK due to casting tolerances or accumulation of individual tolerances.

We reserve the right to make dimensional changes due to ongoing technical development.

You can download CAD models of our standard drives at http://cad.stoeber.de.

Combination options and the dimensions of forced ventilated geared motors can be found at http://cad.stoeber.de.

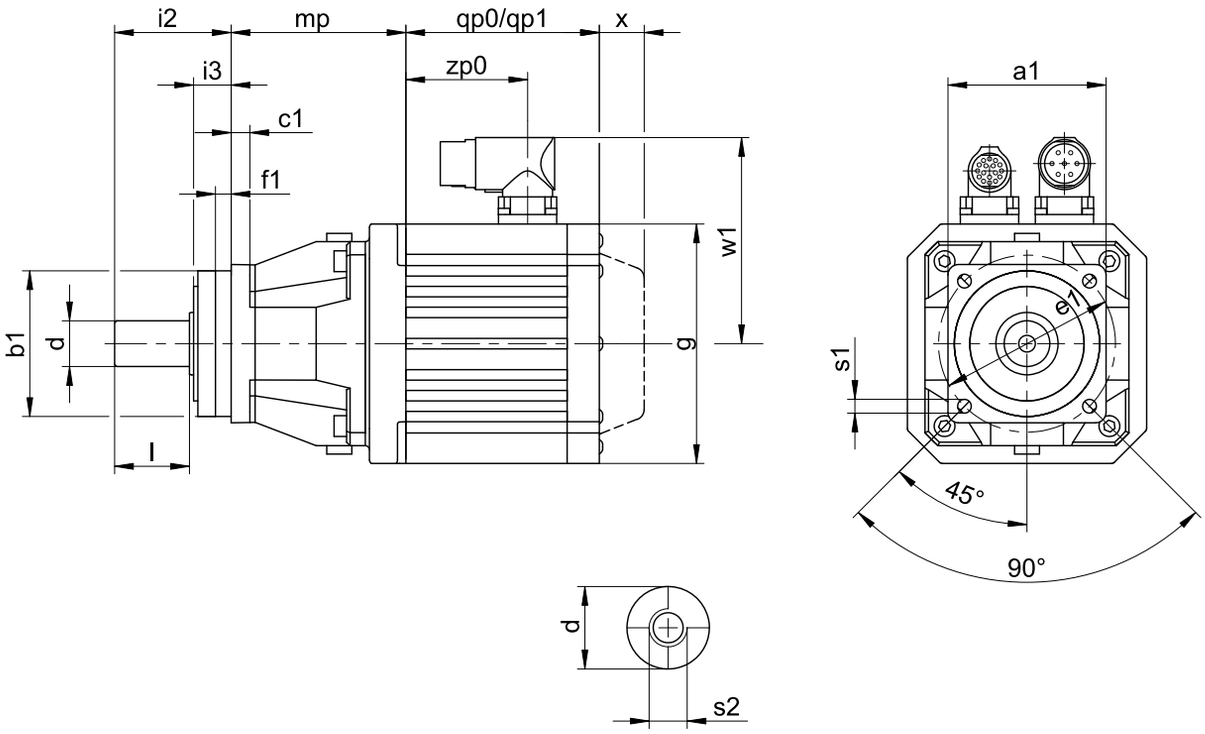
Tolerances

Solid shaft	Tolerance
Shaft ∅ fit ≤ 50 mm	DIN 748-1, ISO k6
Shaft ∅ fit > 50 mm	DIN 748-1, ISO m6
Feather keys	DIN 6885-1, high form A
Balance quality	Q 2.5 (balanced with half feather key)

Centering holes in solid shafts in accordance with DIN 332-2, DR shape

Thread size	M4	M5	M6	M8	M10	M12	M16	M20	M24
Thread depth [mm]	10	12.5	16	19	22	28	36	42	50

2.3.1 G shaft design (solid shaft without feather key)



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]

Dimensions of gear units

Type	□a1	Øb1	c1	Ød	Øe1	f1	i2	i3	l	Øs1	s2
P221	55	50_{h6}	6	12_{k6}	63	7.0	36	12	22	5.5	M4
P222	55	50_{h6}	6	12_{k6}	63	7.0	36	12	22	5.5	M4
P321	72	60_{h6}	7	16_{k6}	75	7.5	48	18	28	5.5	M5
P322	72	60_{h6}	7	16_{k6}	75	7.5	48	18	28	5.5	M5
P421	76	70_{h6}	9	22_{k6}	85	7.5	56	18	36	6.6	M8
P422	76	70_{h6}	9	22_{k6}	85	7.5	56	18	36	6.6	M8
P521	101	90_{h6}	10	32_{k6}	120	15.0	88	28	58	9.0	M12
P522	101	90_{h6}	10	32_{k6}	120	15.0	88	28	58	9.0	M12
P721	144	130_{h6}	15	40_{k6}	165	3.5	112	27	82	11.0	M16
P722	144	130_{h6}	15	40_{k6}	165	3.5	112	27	82	11.0	M16
P821	190	160_{h6}	15	55_{k6}	215	10.0	112	27	82	13.5	M20
P822	190	160_{h6}	15	55_{k6}	215	10.0	112	27	82	13.5	M20
P922	212	180_{h6}	17	75_{k6}	250	10.0	143	34	105	17.5	M20

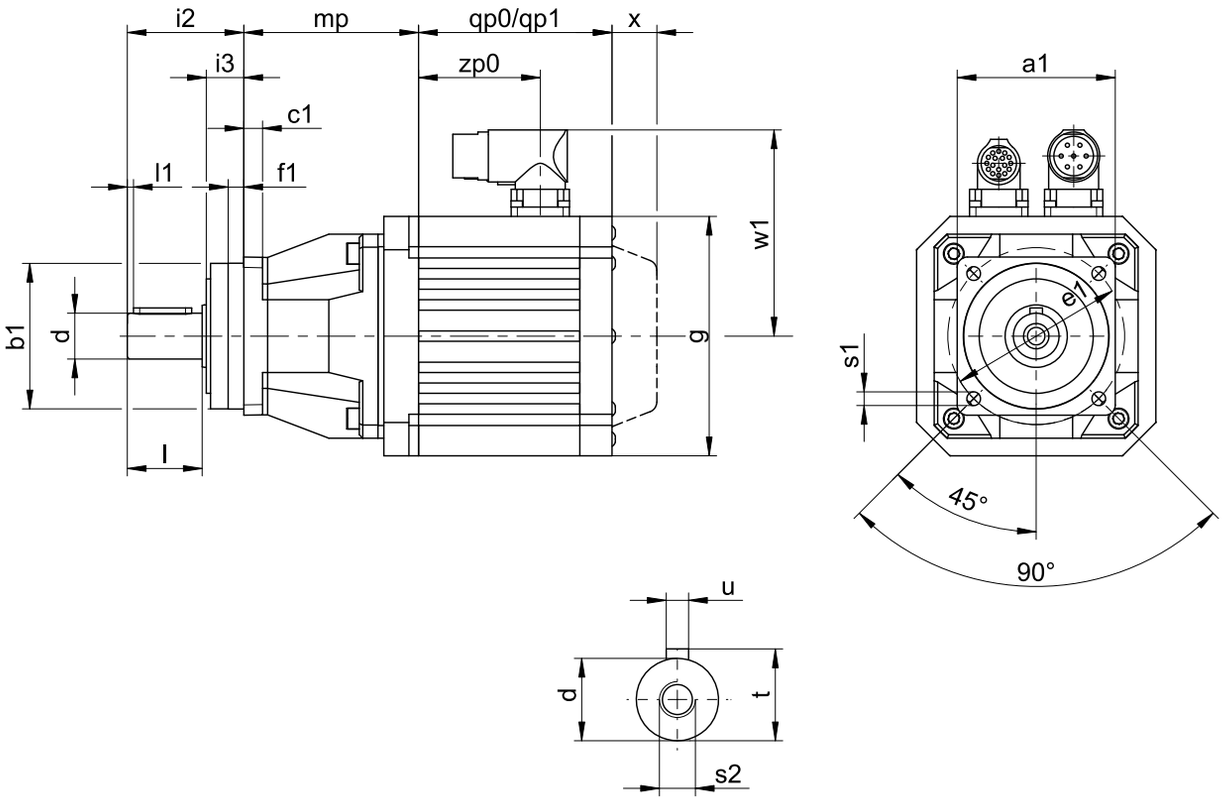
Dimensions of motors

Type	□g	qp0	qp1	w1	x	zp0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0
EZ501U	115	93	147.5	100.0	22	58.5
EZ502U	115	118	172.5	100.0	22	83.5
EZ503U	115	143	197.5	100.0	22	108.5
EZ505U	115	193	247.5	100.0	22	158.5
EZ701U	145	102	161.0	115.0	22	64.0
EZ702U	145	127	186.0	115.0	22	89.0
EZ703U	145	152	211.0	115.0	22	114.0
EZ705U	145	207	266.0	134.0	22	165.0
EZ802U	190	197	274.0	156.5	22	143.0
EZ803U	190	238	315.0	156.5	22	184.0
EZ805U	190	320	397.0	156.5	22	266.0

Dimensions of geared motors

Type	EZ3	EZ4	EZ5	EZ7	EZ8
	mp	mp	mp	mp	mp
P221	61.5	–	–	–	–
P222	93.5	–	–	–	–
P321	73.5	70.0	72.5	–	–
P322	113.5	–	–	–	–
P421	–	79.0	81.5	87.5	–
P422	131.0	127.5	130.0	–	–
P521	–	–	81.0	87.0	102.0
P522	–	136.5	139.0	145.0	–
P721	–	–	–	98.0	113.0
P722	–	–	158.0	164.0	179.0
P821	–	–	–	–	137.0
P822	–	–	–	206.5	221.5
P922	–	–	–	–	264.0

2.3.2 P shaft design (solid shaft with feather key)



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]

Dimensions of gear units

Type	□a1	Øb1	c1	Ød	Øe1	f1	i2	i3	l	l1	Øs1	s2	t	u
P221	55	50_{h6}	6	12_{k6}	63	7.0	36	12	22	2	5.5	M4	13.5	A4×4×18
P222	55	50_{h6}	6	12_{k6}	63	7.0	36	12	22	2	5.5	M4	13.5	A4×4×18
P321	72	60_{h6}	7	16_{k6}	75	7.5	48	18	28	2	5.5	M5	18.0	A5×5×22
P322	72	60_{h6}	7	16_{k6}	75	7.5	48	18	28	2	5.5	M5	18.0	A5×5×22
P421	76	70_{h6}	9	22_{k6}	85	7.5	56	18	36	3	6.6	M8	24.5	A6×6×28
P422	76	70_{h6}	9	22_{k6}	85	7.5	56	18	36	3	6.6	M8	24.5	A6×6×28
P521	101	90_{h6}	10	32_{k6}	120	15.0	88	28	58	3	9.0	M12	35.0	A10×8×50
P522	101	90_{h6}	10	32_{k6}	120	15.0	88	28	58	3	9.0	M12	35.0	A10×8×50
P721	144	130_{h6}	15	40_{k6}	165	3.5	112	27	82	4	11.0	M16	43.0	A12×8×70
P722	144	130_{h6}	15	40_{k6}	165	3.5	112	27	82	4	11.0	M16	43.0	A12×8×70
P821	190	160_{h6}	15	55_{k6}	215	10.0	112	27	82	6	13.5	M20	59.0	A16×10×70
P822	190	160_{h6}	15	55_{k6}	215	10.0	112	27	82	6	13.5	M20	59.0	A16×10×70
P922	212	180_{h6}	17	75_{k6}	250	10.0	143	34	105	7	17.5	M20	79.5	A20×12×90

Dimensions of motors

Type	□g	qp0	qp1	w1	x	zp0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0
EZ501U	115	93	147.5	100.0	22	58.5
EZ502U	115	118	172.5	100.0	22	83.5
EZ503U	115	143	197.5	100.0	22	108.5
EZ505U	115	193	247.5	100.0	22	158.5
EZ701U	145	102	161.0	115.0	22	64.0
EZ702U	145	127	186.0	115.0	22	89.0
EZ703U	145	152	211.0	115.0	22	114.0
EZ705U	145	207	266.0	134.0	22	165.0
EZ802U	190	197	274.0	156.5	22	143.0
EZ803U	190	238	315.0	156.5	22	184.0
EZ805U	190	320	397.0	156.5	22	266.0

Dimensions of geared motors

Type	EZ3	EZ4	EZ5	EZ7	EZ8
	mp	mp	mp	mp	mp
P221	61.5	–	–	–	–
P222	93.5	–	–	–	–
P321	73.5	70.0	72.5	–	–
P322	113.5	–	–	–	–
P421	–	79.0	81.5	87.5	–
P422	131.0	127.5	130.0	–	–
P521	–	–	81.0	87.0	102.0
P522	–	136.5	139.0	145.0	–
P721	–	–	–	98.0	113.0
P722	–	–	158.0	164.0	179.0
P821	–	–	–	–	137.0
P822	–	–	–	206.5	221.5
P922	–	–	–	–	264.0

2.4 Type designation

In this chapter, you can find an explanation of the type designation with the associated options.

Additional ordering information not included in the type designation can be found at the end of the chapter.

Sample code

P	4	2	1	S	G	R	0100	EZ401U

Explanation

Code	Designation	Design
P	Type	Planetary gear unit
4	Size	4 (example)
2	Generation	Generation 2
1	Stages	Single-stage
2		Two-stage
S	Housing	Standard
G	Shaft	Solid shaft without feather key
P		Solid shaft with feather key
R	Bearing	Standard bearing
D		Axially reinforced bearing
Z		Radially reinforced bearing
0100	Transmission ratio (i x 10)	i = 10 (example)
EZ401U	Motor	EZ synchronous servo motor

In order to complete the type designation, also specify:

- A detailed type designation of the motor, see chapter [▶ 23]
- Radial shaft seal rings at the output made of NBR or FKM, see chapter [▶ 2.6.3]
- The position of the plug connectors, see chapter [▶ 2.5.3]
- For reverse operation of the output shaft from ± 20° to ± 90° and horizontal installation, note the chapter [▶ 2.6.4]

2.5 Product description

2.5.1 Installation conditions

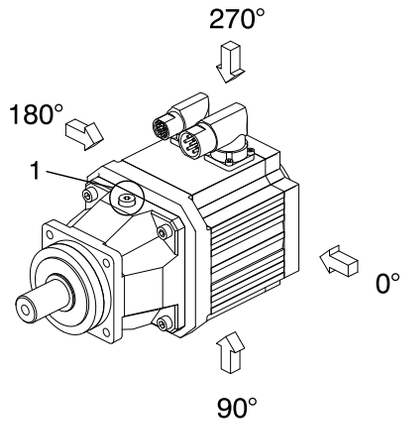
The specified torques and forces only apply when attaching gear units at the machine side using screws of quality 10.9. In addition, the gear housing must be adjusted at the pilot (H7).

2.5.2 Lubricants

STOBER fills the gear units with the amount and type of lubricant specified on the nameplate.

Lubricant filling quantities for gear units, document ID 441871, can be found online at http://www.stoeber.de

2.5.3 Position of the plug connectors



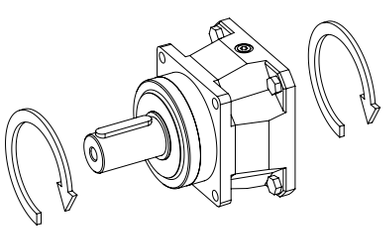
In the standard version, the plug connectors are attached in the 270° position (relative to the oil drain plug (1) of the planetary gear unit). Indicate variations for your geared motor in the purchase order.

2.5.4 Other product features

Feature	Value
Max. permitted gear unit temperature (on the surface of the gear unit)	≤ 90 °C
Paint	Black RAL 9005
(ATEX) Directive 2014/34/EU (option)	Not suitable
Protection class:[1]	
Gear unit	IP65
Motor	IP56, optionally IP66

2.5.5 Direction of rotation

The input and output rotate in the same direction.



2.6 Project configuration

Project your drives using our SERVOsoft designing software. You can receive SERVOsoft for free from your adviser at one of our sales centers. Observe the limit conditions in this chapter to ensure a safe design for your drives.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

2.6.1 Calculation of the operating point

Check the following conditions for operating points other than the nominal point M_{2N} specified in the selection tables.

$$n_{1m^*} \leq \frac{n_{1maxDB}}{fB_T}$$

$$n_{1max^*} \leq \frac{n_{1max\,ZB}}{fB_T}$$

$$M_{2eff^*} \leq M_{2th}$$

[1] Observe the protection class of all the components.

$$M_{2acc*} \leq M_{2acc}$$

$$M_{2NOT*} \leq M_{2NOT}$$

$$M_{2eq*} \leq M_{2N} \cdot \frac{S}{fB_{op} \cdot fB_t}$$

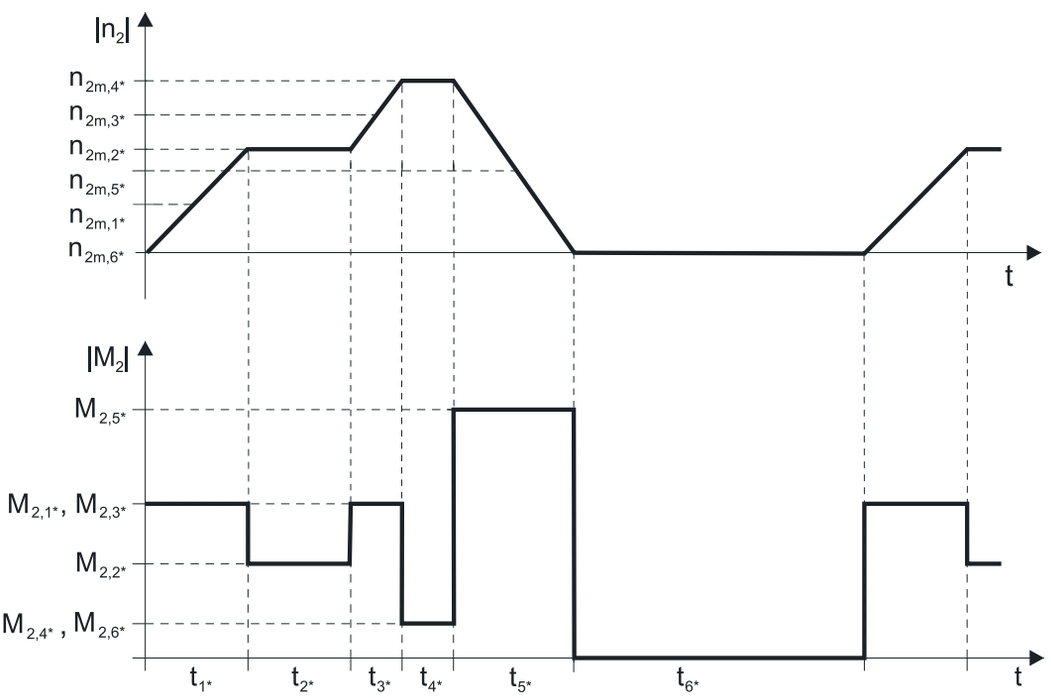
The values for n_{1maxDB}, n_{1maxZB}, M_{2acc}, M_{2NOT}, M_{2N} and S can be found in the selection tables.

The values for fB_T, fB_{op} and fB_t can be found in the corresponding tables in this chapter.

Calculate the thermal limit torque M_{2th} for a duty cycle > 50%.

Example of cyclic operation

The following calculations are based on a representation of the power taken from the output based in accordance with the following example:



Calculation of the actual average input speed

$$n_{1m*} = n_{2m*} \cdot i$$

$$n_{2m*} = \frac{\left|n_{2m,1*}\right| \cdot t_{1*} + \ldots + \left|n_{2m,n*}\right| \cdot t_{n*}}{t_{1*} + \ldots + t_{n*}}$$

If $t_{1*} + \ldots + t_{5*} \geq 20$ min, calculate n_{2m*} without the rest phase t_{6*}.

The values for the ratio i can be found in the selection tables.

Calculation of the actual effective torque

$$M_{2eff*} = \sqrt{\frac{t_{1*} \cdot M_{2,1*}{}^2 + \ldots + t_{n*} \cdot M_{2,n*}{}^2}{t_{1*} + \ldots + t_{n*}}}$$

Calculation of the actual equivalent torque

$$M_{2eq*} = \sqrt[3]{\frac{\left|n_{2m,1*}\right| \cdot t_{1*} \cdot \left|M_{2,1*}{}^3\right| + \ldots + \left|n_{2m,n*}\right| \cdot t_{n*} \cdot \left|M_{2,n*}{}^3\right|}{\left|n_{2m,1*}\right| \cdot t_{1*} + \ldots + \left|n_{2m,n*}\right| \cdot t_{n*}}}$$

Calculation of the thermal limit torque

Calculate the thermal limit torque M_{2th} for a duty cycle ED_{20} > 50% and the actual average input speed n_{1m*}. (At $K_{mot,th} \leq 0$ you must reduce the average input speed n_{1m*} accordingly or select another geared motor size.)

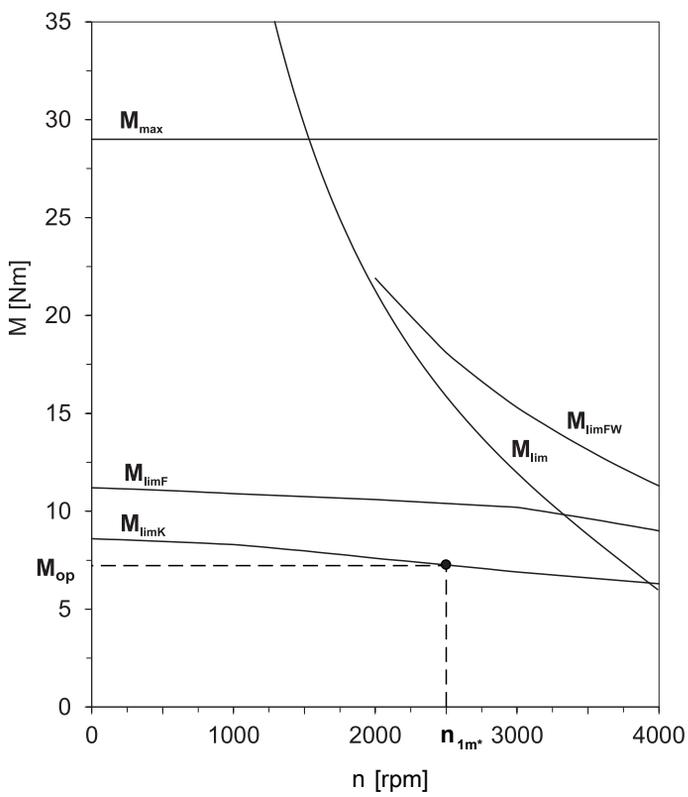
$$M_{2th} = M_{op} \cdot i \cdot K_{mot,th}$$

$$K_{mot,th} = 0,95 - \frac{a_{th}}{1000} \cdot fB_T \cdot \left(\frac{n_{1m*}}{1000} \right)^3$$

The values for i and a_{th} can be found in the selection tables.

The values for fB_T can be found in the corresponding table in this chapter.

The value for the torque of the motor at operating point M_{op} with the determined average input speed n_{1m*} can be found in the motor curve of Chapter [▶ 23.3]. Note the size, nominal speed n_N and cooling type of the motor. The figure below shows an example of reading the torque M_{op} of a motor with convection cooling at the operating point.



Operating factors

Operating mode	fB_{op}
Uniform continuous operation	1.00
Cyclic operation	1.00
Reversing load cyclic operation	1.00

Run time	fB_t
Daily run time ≤ 8 h	1.00
Daily run time ≤ 16 h	1.15
Daily run time ≤ 24 h	1.20

Temperature		fB_T
Motor cooling	**Surrounding temperature**	
Motor with forced ventilation	≤ 20 °C	0.9
	≤ 30 °C	1.0
	≤ 40 °C	1.15
Motor with convection cooling	≤ 20 °C	1.0
	≤ 30 °C	1.1
	≤ 40 °C	1.25

Notes

- The maximum permitted gear unit temperature (see the "Other product features" chapter) must not be exceeded. Doing so may result in damage to the geared motor.
- For braking from full speed (for example when the power fails or when setting up the machine), note the permitted gear unit torques (M_{2acc}, M_{2NOT}) in the selection tables.
- The values specified in the selection tables for M_{2acc} refer to the gear units with a solid shaft design without feather key (G). We recommend this shaft design in general for cyclic operation.

2.6.2 Permitted shaft loads for the output shaft

The values specified in the tables apply to the permitted shaft loads:

- For shaft dimensions in accordance with the catalog
- For output speeds $n_{2m*} \leq 100$ rpm ($F^{2axN} = F_{2ax100}$; $F_{2radN} = F_{2rad100}$; $M_{2kN} = M_{2k100}$)
- Only if radial forces on the gear unit are stabilized by its pilots (housing, flange shaft)

Permitted shaft loads for standard bearing R

Type	z_2	F_{2ax100}	$F_{2rad100}$	$F_{2rad,acc}$	M_{2k100}	$M_{2k,acc}$
	[mm]	[N]	[N]	[N]	[Nm]	[Nm]
P2	17.0	500	1200	1300	34	36
P3	21.0	1000	2500	2500	88	88
P4	22.0	1500	4000	4500	160	180
P5	23.0	2300	6500	7000	338	364
P7	26.0	2900	8000	9000	536	603
P8	28.0	4700	13000	18000	897	1242
P9	40.0	6000	18000	27000	1665	2498

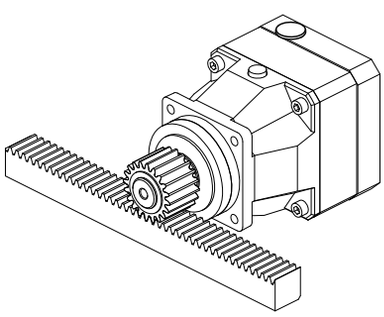


Fig. 1: Recommendation for bearing assignment R

Permitted shaft loads for axially reinforced bearing D

Type	z_2	F_{2ax100}	$F_{2rad100}$	$F_{2rad,acc}$	M_{2k100}	$M_{2k,acc}$
	[mm]	[N]	[N]	[N]	[Nm]	[Nm]
P3	24.0	1400	2750	2750	105	105
P4	25.0	2250	4500	5000	194	215
P5	29.0	3500	7000	8000	406	464
P7	31.0	4500	9000	10000	648	720
P8	35.0	7500	15000	18000	1140	1368
P9	51.0	10000	20000	30000	2070	3105

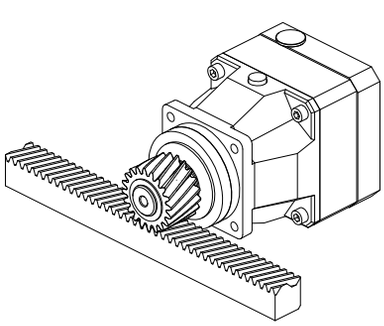


Fig. 2: Recommendation for bearing assignment D

Permitted shaft loads for radially reinforced bearing Z

Type	z_2 [mm]	F_{2ax100} [N]	$F_{2rad100}$ [N]	$F_{2rad,acc}$ [N]	M_{2k100} [Nm]	$M_{2k,acc}$ [Nm]
P3	21.0	600	3000	3000	105	105
P4	22.0	1000	5000	5000	200	200
P5	23.0	1600	8000	8000	416	416
P7	26.0	2000	10000	10000	670	670
P8	28.0	3600	18000	18000	1242	1242
P9	40.0	5000	27000	35000	2500	3238

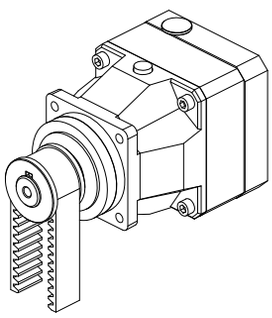


Fig. 3: Recommendation for bearing assignment Z

For other output speeds, download diagrams at http://products.stoeber.de.

The following applies to output speeds n_{2m*} > 100 rpm:

$$F_{2axN} = \frac{F_{2ax100}}{\sqrt[3]{\frac{n_{2m*}}{100\ rpm}}} \qquad F_{2radN} = \frac{F_{2rad100}}{\sqrt[3]{\frac{n_{2m*}}{100\ rpm}}} \qquad M_{2kN} = \frac{M_{2k100}}{\sqrt[3]{\frac{n_{2m*}}{100\ rpm}}}$$

The values for F_{2ax100}, $F_{2rad100}$ and M_{2k100} can be found in the table "Permitted shaft loads" in this chapter.

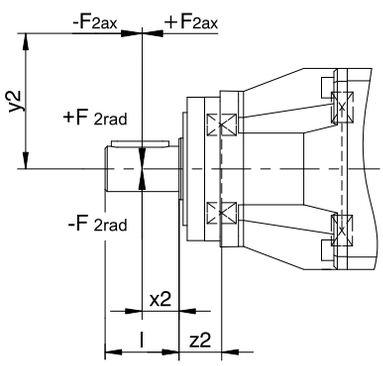


Fig. 4: Force application points

The specified values for $F_{2rad100}$ and $F_{2rad,acc}$ refer to an application of force at the center of the output shaft: $x_2 = l/2$.

Shaft dimensions can be found in the "Dimensional drawings" chapter.

The following applies to other force application points:

$$M_{2k,acc*} = \frac{2 \cdot F_{2ax*} \cdot y_2 + F_{2rad,acc*} \cdot (x_2 + z_2)}{1000} \leq M_{2k,acc}$$

$$F_{2rad,acc*} \leq F_{2rad,acc}$$

$$F_{2ax*} \leq F_{2axN}$$

The values for $F_{2rad,acc}$ and $M_{2k,acc}$ can be found in the table "Permitted shaft loads" in this chapter.

For applications with multiple axial and/or radial forces, you must add the forces as vectors.

In the event of EMERGENCY OFF operation (max. 1000 load changes), you can multiply the permitted forces and torques for F_{2ax100}, $F_{2rad100}$ and M_{2k100} by a factor of two.

Also note the calculation for equivalent values:

$$M_{2k,eq^*} = \sqrt[3]{\frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} \cdot \left|M_{2k,acc,1^*}{}^3\right| + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*} \cdot \left|M_{2k,acc,n^*}{}^3\right|}{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}} \leq M_{2kN}$$

$$F_{2rad,eq^*} = \sqrt[3]{\frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} \cdot \left|F_{2rad,acc,1^*}{}^3\right| + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*} \cdot \left|F_{2rad,acc,n^*}{}^3\right|}{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}} \leq F_{2radN}$$

The following apply to the bearing service life L_{10h} ($ED_{20} \leq 40\%$):

$L_{10h} > 10000$ h with $1 < M_{2kN}/M_{2k^*} < 1.25$

$L_{10h} > 20000$ h with $1.25 < M_{2kN}/M_{2k^*} < 1.5$

$L_{10h} > 30000$ h with $1.5 < M_{2kN}/M_{2k^*}$

For different duty cycles:

$$L_{10h} > L_{10h(ED_{20}=40\%)} \cdot \frac{40\%}{ED_{20}}$$

2.6.3 Recommendation for radial shaft seal rings

For a duty cycle > 60%, we recommend radial shaft seal rings made of FKM.

Properties:

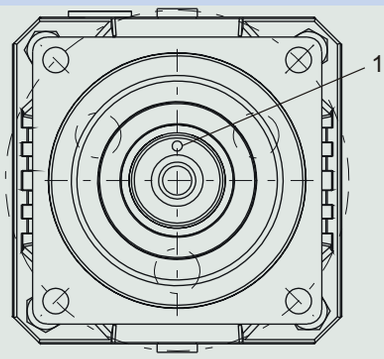
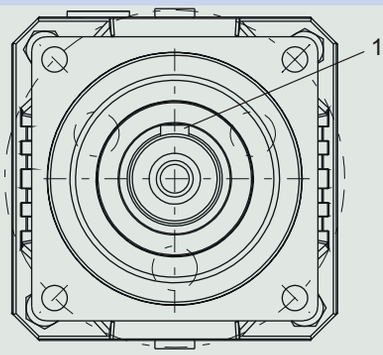
- Excellent temperature resistance
- High chemical stability
- Very good resistance to aging
- Excellent resistance to mineral oils and greases
- For use in the food, beverage and pharmaceutical industries

Leak-proofness

Our gear units are equipped with high-quality radial shaft seal rings and checked for leak-proofness. However, a leak cannot be fully ruled out over the length of use of a gear unit. If you use a gear unit with goods incompatible with the lubricant, you must take measures to prevent direct contact with the gear unit lubricant in case of a leak.

2.6.4 Reverse operation

To ensure lubrication of circulating geared parts during cyclic reverse operation from ± 20° to ± 90°, pay careful attention to the position of the output shaft if the gear unit is installed horizontally as shown in the images below. The images show the center position of reverse operation. Cyclic reverse operation ≤ ± 20° on request.

Solid shaft without feather key	Solid shaft with feather key
	
1) Position of the mark: top	1) Position of the feather key: top

Notes

- If you use the solid shaft without a feather key (G) with a mark, note the position of the mark during assembly.
- As an alternative, you can use the solid shaft with a feather key (P) and clamp. In that case, the feather key functions for position orientation.

2.7 Additional documentation

Additional documentation related to the product can be found at http://www.stoeber.de/en/download

Enter the ID of the documentation in the Search... field.

Documentation	ID
Operating manual for P/PA/PE/PH/PHA/PHQ/PHQA/PHV/PHVA planetary gear units and planetary geared motors	443029_en
Lubricant filling quantities for gear units	441871

3 PA planetary geared motors

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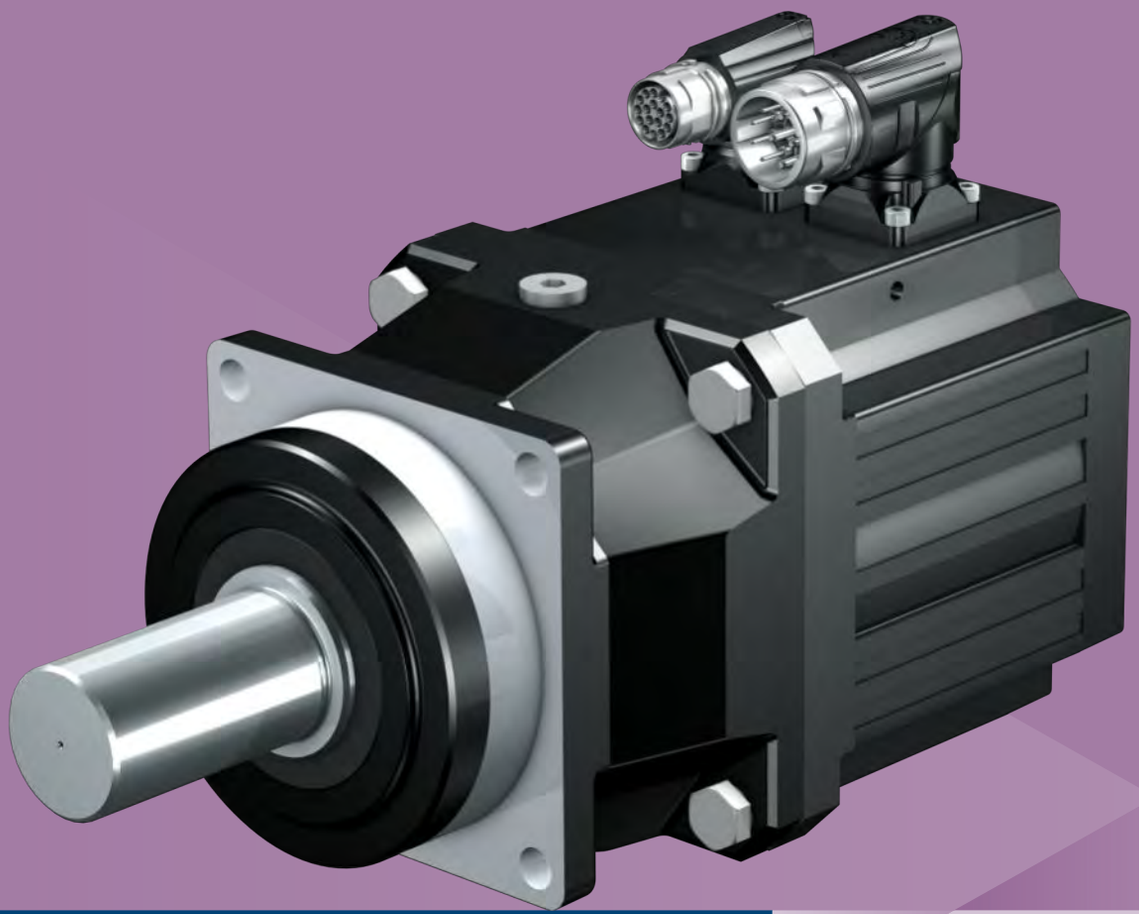


3 Planetary geared motors PA

3.1 Overview

Low-backlash helical-geared precision planetary geared motors

Features

Power density	★★★★☆
Backlash	★★★★★
Price category	€€€
Shaft load	★★★★☆
Smooth operation	★★★★★
Torsional stiffness	★★★☆☆
Mass moment of inertia	★★★★★
Helical gearing	✓
Maintenance-free	✓
Any mounting position	✓
Continuous operation without cooling	✓
Axially reinforced output bearing, ideally suited for helical-geared rack and pinion drives	✓
Compact and highly dynamic due to direct motor attachment	✓

Key: ★☆☆☆☆ good | ★★★★★ excellent
€ Economy | €€€€€ Premium

Technical data

i	3 – 100
M_{2acc}	15 – 1600 Nm
$\Delta\phi_2$	1 – 3 arcmin
η_{get}	≤ 97 %

3.2 Selection tables

The technical data specified in the selection tables applies to:

- Installation altitudes up to 1000 m above sea level
- Surrounding temperatures from 0 °C to 40 °C
- Drives with convection-cooled motors (e.g. EZ401**U**)

You can calculate the technical data for drives with forced ventilated motors (for example EZ401**B**) at http://products.stoeber.de.

An explanation of the formula symbols can be found in Chapter [▶ 29.1].

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2.0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/arcmin]	m [kg]
PA3 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 65 Nm)															
60	44	45	1.3	1.0	PA322_0500 EZ301U	65	130	50.00	50/1	4500	8000	0.20	3	4.5	3.6
75	35	36	1.6	1.2	PA322_0400 EZ301U	65	130	40.00	40/1	4500	8000	0.20	3	4.4	3.6
86	31	32	1.6	1.5	PA322_0350 EZ301U	65	130	35.00	35/1	4500	8000	0.21	3	4.6	3.6
94	28	29	1.9	1.4	PA322_0320 EZ301U	50	100	32.00	32/1	4500	8000	0.23	3	4.1	3.6
107	25	25	1.8	1.8	PA322_0280 EZ301U	65	130	28.00	28/1	4500	8000	0.21	3	4.5	3.6
107	42	45	3.0	1.1	PA322_0280 EZ302U	65	130	28.00	28/1	4500	8000	0.31	3	4.5	4.2
120	22	23	1.9	2.0	PA322_0250 EZ301U	65	130	25.00	25/1	4500	8000	0.22	3	4.6	3.6
120	38	40	3.2	1.2	PA322_0250 EZ302U	65	130	25.00	25/1	4500	8000	0.32	3	4.6	4.2
150	18	18	2.1	2.5	PA322_0200 EZ301U	53	130	20.00	20/1	4500	8000	0.24	3	4.6	3.6
150	30	32	3.6	1.5	PA322_0200 EZ302U	65	130	20.00	20/1	4500	8000	0.34	3	4.6	4.2
150	39	42	4.7	1.1	PA322_0200 EZ303U	65	130	20.00	20/1	4500	8000	0.45	3	4.6	4.7
188	14	14	2.4	3.2	PA322_0160 EZ301U	43	130	16.00	16/1	4500	8000	0.24	3	4.5	3.6
188	24	26	4.0	1.9	PA322_0160 EZ302U	65	130	16.00	16/1	4500	8000	0.34	3	4.5	4.2
188	31	33	5.2	1.4	PA322_0160 EZ303U	65	130	16.00	16/1	4500	8000	0.45	3	4.5	4.7
250	11	11	4.1	2.8	PA322_0120 EZ301U	32	120	12.00	12/1	4500	8000	0.24	3	4.3	3.6
250	18	19	7.0	1.7	PA322_0120 EZ302U	50	120	12.00	12/1	4500	8000	0.34	3	4.3	4.2
250	24	25	9.1	1.3	PA322_0120 EZ303U	50	120	12.00	12/1	4500	8000	0.45	3	4.3	4.7
300	9.0	9.2	0.6	2.9	PA321_0100 EZ301U	27	100	10.00	10/1	4500	8000	0.21	2	4.0	3.0
300	15	16	0.9	1.7	PA321_0100 EZ302U	49	100	10.00	10/1	4500	8000	0.31	2	4.0	3.6
300	20	21	1.2	1.3	PA321_0100 EZ303U	50	100	10.00	10/1	4500	8000	0.42	2	4.0	4.1
375	7.2	7.4	0.5	4.8	PA321_0080 EZ301U	22	100	8.000	8/1	4500	8000	0.21	2	4.2	3.0
375	12	13	0.9	2.8	PA321_0080 EZ302U	39	100	8.000	8/1	4500	8000	0.31	2	4.2	3.6
375	16	17	1.2	2.2	PA321_0080 EZ303U	50	100	8.000	8/1	4500	8000	0.42	2	4.2	4.1
375	22	23	1.6	1.6	PA321_0080 EZ401U	50	100	8.000	8/1	4500	8000	0.95	2	4.2	5.5
429	11	11	1.0	3.6	PA321_0070 EZ302U	34	130	7.000	7/1	4500	8000	0.32	2	4.4	3.6
429	14	15	1.3	2.8	PA321_0070 EZ303U	48	130	7.000	7/1	4500	8000	0.43	2	4.4	4.1
429	19	20	1.7	2.1	PA321_0070 EZ401U	58	130	7.000	7/1	4500	8000	0.96	2	4.4	5.5
429	32	35	2.9	1.2	PA321_0070 EZ402U	60	130	7.000	7/1	4500	8000	1.7	2	4.4	6.6
600	10	11	1.9	3.9	PA321_0050 EZ303U	34	110	5.000	5/1	4000	7000	0.48	2	5.1	4.1
600	14	15	2.6	2.9	PA321_0050 EZ401U	41	130	5.000	5/1	4000	7000	1.0	2	5.1	5.5
600	21	23	3.9	1.9	PA321_0050 EZ501U	65	130	5.000	5/1	4000	7000	3.0	2	5.1	6.5
600	23	25	4.3	1.7	PA321_0050 EZ402U	65	130	5.000	5/1	4000	7000	1.7	2	5.1	6.6
600	33	42	6.3	1.2	PA321_0050 EZ404U	65	130	5.000	5/1	4000	7000	3.1	2	5.1	8.7
600	36	39	6.8	1.1	PA321_0050 EZ502U	65	130	5.000	5/1	4000	7000	5.3	2	5.1	8.0
750	8.0	8.5	2.5	4.9	PA321_0040 EZ303U	27	85	4.000	4/1	3700	6500	0.52	2	5.3	4.1
750	11	12	3.3	3.6	PA321_0040 EZ401U	33	130	4.000	4/1	3700	6500	1.1	2	5.3	5.5
750	17	18	5.1	2.4	PA321_0040 EZ501U	62	130	4.000	4/1	3700	6500	3.0	2	5.3	6.5
750	18	20	5.6	2.2	PA321_0040 EZ402U	62	130	4.000	4/1	3700	6500	1.8	2	5.3	6.6
750	27	33	8.2	1.5	PA321_0040 EZ404U	65	130	4.000	4/1	3700	6500	3.1	2	5.3	8.7
750	29	31	8.8	1.4	PA321_0040 EZ502U	65	130	4.000	4/1	3700	6500	5.3	2	5.3	8.0
750	38	43	12	1.0	PA321_0040 EZ503U	65	130	4.000	4/1	3700	6500	7.7	2	5.3	9.5
1000	6.0	6.4	5.2	4.4	PA321_0030 EZ303U	20	64	3.000	3/1	3500	6000	0.60	2	5.7	4.1
1000	8.1	8.7	7.1	3.2	PA321_0030 EZ401U	25	120	3.000	3/1	3500	6000	1.1	2	5.7	5.5
1000	13	14	11	2.1	PA321_0030 EZ501U	47	120	3.000	3/1	3500	6000	3.1	2	5.7	6.5
1000	14	15	12	1.9	PA321_0030 EZ402U	47	120	3.000	3/1	3500	6000	1.8	2	5.7	6.6
1000	20	25	17	1.3	PA321_0030 EZ404U	50	120	3.000	3/1	3500	6000	3.2	2	5.7	8.7
1000	22	23	19	1.2	PA321_0030 EZ502U	50	120	3.000	3/1	3500	6000	5.4	2	5.7	8.0
PA3 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 65 Nm)															
171	30	32	1.5	1.5	PA322_0350 EZ301U	65	130	35.00	35/1	4500	8000	0.21	3	4.6	3.6
188	27	29	1.8	1.5	PA322_0320 EZ301U	50	100	32.00	32/1	4500	8000	0.23	3	4.1	3.6
214	24	25	1.8	1.8	PA322_0280 EZ301U	65	130	28.00	28/1	4500	8000	0.21	3	4.5	3.6
214	40	45	3.0	1.1	PA322_0280 EZ302U	65	130	28.00	28/1	4500	8000	0.31	3	4.5	4.2

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PA3 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 65 Nm)															
240	21	23	1.8	2.1	PA322_0250 EZ301U	65	130	25.00	25/1	4500	8000	0.22	3	4.6	3.6
240	36	40	3.0	1.3	PA322_0250 EZ302U	65	130	25.00	25/1	4500	8000	0.32	3	4.6	4.2
300	17	18	2.0	2.7	PA322_0200 EZ301U	53	130	20.00	20/1	4500	8000	0.24	3	4.6	3.6
300	29	32	3.4	1.6	PA322_0200 EZ302U	65	130	20.00	20/1	4500	8000	0.34	3	4.6	4.2
300	37	43	4.4	1.2	PA322_0200 EZ303U	65	130	20.00	20/1	4500	8000	0.45	3	4.6	4.7
375	14	14	2.4	3.2	PA322_0160 EZ301U	43	130	16.00	16/1	4500	8000	0.24	3	4.5	3.6
375	23	26	4.0	1.9	PA322_0160 EZ302U	65	130	16.00	16/1	4500	8000	0.34	3	4.5	4.2
375	30	34	5.2	1.4	PA322_0160 EZ303U	65	130	16.00	16/1	4500	8000	0.45	3	4.5	4.7
500	10	11	3.9	3.0	PA322_0120 EZ301U	32	120	12.00	12/1	4500	8000	0.24	3	4.3	3.6
500	17	19	6.6	1.8	PA322_0120 EZ302U	50	120	12.00	12/1	4500	8000	0.34	3	4.3	4.2
500	22	26	8.6	1.3	PA322_0120 EZ303U	50	120	12.00	12/1	4500	8000	0.45	3	4.3	4.7
600	8.6	9.2	0.7	2.4	PA321_0100 EZ301U	27	100	10.00	10/1	4500	8000	0.21	2	4.0	3.0
600	15	16	1.1	1.4	PA321_0100 EZ302U	49	100	10.00	10/1	4500	8000	0.31	2	4.0	3.6
600	19	22	1.5	1.1	PA321_0100 EZ303U	50	100	10.00	10/1	4500	8000	0.42	2	4.0	4.1
750	6.9	7.4	0.7	4.0	PA321_0080 EZ301U	22	100	8.000	8/1	4500	8000	0.21	2	4.2	3.0
750	12	13	1.1	2.4	PA321_0080 EZ302U	39	100	8.000	8/1	4500	8000	0.31	2	4.2	3.6
750	15	17	1.4	1.8	PA321_0080 EZ303U	50	100	8.000	8/1	4500	8000	0.42	2	4.2	4.1
750	18	22	1.7	1.6	PA321_0080 EZ401U	50	100	8.000	8/1	4500	8000	0.95	2	4.2	5.5
750	27	38	2.6	1.0	PA321_0080 EZ402U	50	100	8.000	8/1	4500	8000	1.7	2	4.2	6.6
857	10	11	1.2	3.1	PA321_0070 EZ302U	34	130	7.000	7/1	4500	8000	0.32	2	4.4	3.6
857	13	15	1.5	2.3	PA321_0070 EZ303U	48	130	7.000	7/1	4500	8000	0.43	2	4.4	4.1
857	16	19	1.8	2.0	PA321_0070 EZ401U	58	130	7.000	7/1	4500	8000	0.96	2	4.4	5.5
857	24	33	2.7	1.3	PA321_0070 EZ402U	60	130	7.000	7/1	4500	8000	1.7	2	4.4	6.6
1200	7.3	8.1	1.7	4.3	PA321_0050 EZ302U	24	110	5.000	5/1	4000	7000	0.37	2	5.1	3.6
1200	9.5	11	2.3	3.3	PA321_0050 EZ303U	34	110	5.000	5/1	4000	7000	0.48	2	5.1	4.1
1200	11	14	2.6	2.8	PA321_0050 EZ401U	41	130	5.000	5/1	4000	7000	1.0	2	5.1	5.5
1200	16	21	3.9	1.9	PA321_0050 EZ501U	65	130	5.000	5/1	4000	7000	3.0	2	5.1	6.5
1200	17	24	4.0	1.8	PA321_0050 EZ402U	65	130	5.000	5/1	4000	7000	1.7	2	5.1	6.6
1200	25	38	6.0	1.2	PA321_0050 EZ502U	65	130	5.000	5/1	4000	7000	5.3	2	5.1	8.0
1200	28	41	6.7	1.1	PA321_0050 EZ404U	65	130	5.000	5/1	4000	7000	3.1	2	5.1	8.7
1500	7.6	8.7	3.0	4.1	PA321_0040 EZ303U	27	85	4.000	4/1	3700	6500	0.52	2	5.3	4.1
1500	8.9	11	3.5	3.5	PA321_0040 EZ401U	33	130	4.000	4/1	3700	6500	1.1	2	5.3	5.5
1500	13	17	5.1	2.4	PA321_0040 EZ501U	62	130	4.000	4/1	3700	6500	3.0	2	5.3	6.5
1500	14	19	5.3	2.3	PA321_0040 EZ402U	62	130	4.000	4/1	3700	6500	1.8	2	5.3	6.6
1500	20	30	7.8	1.5	PA321_0040 EZ502U	65	130	4.000	4/1	3700	6500	5.3	2	5.3	8.0
1500	23	33	8.7	1.4	PA321_0040 EZ404U	65	130	4.000	4/1	3700	6500	3.1	2	5.3	8.7
1500	24	41	9.3	1.3	PA321_0040 EZ503U	65	130	4.000	4/1	3700	6500	7.7	2	5.3	9.5
2000	4.4	4.9	4.8	4.8	PA321_0030 EZ302U	15	64	3.000	3/1	3500	6000	0.49	2	5.7	3.6
2000	5.7	6.5	6.2	3.6	PA321_0030 EZ303U	20	64	3.000	3/1	3500	6000	0.60	2	5.7	4.1
2000	6.7	8.1	7.3	3.1	PA321_0030 EZ401U	25	120	3.000	3/1	3500	6000	1.1	2	5.7	5.5
2000	9.9	13	11	2.1	PA321_0030 EZ501U	47	120	3.000	3/1	3500	6000	3.1	2	5.7	6.5
2000	10	14	11	2.0	PA321_0030 EZ402U	47	120	3.000	3/1	3500	6000	1.8	2	5.7	6.6
2000	15	23	17	1.4	PA321_0030 EZ502U	50	120	3.000	3/1	3500	6000	5.4	2	5.7	8.0
2000	17	24	18	1.2	PA321_0030 EZ404U	50	120	3.000	3/1	3500	6000	3.2	2	5.7	8.7
2000	18	31	20	1.2	PA321_0030 EZ503U	50	120	3.000	3/1	3500	6000	7.8	2	5.7	9.5
PA4 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 120 Nm)															
38	71	72	0.7	1.1	PA422_0800 EZ301U	100	200	80.00	80/1	4500	8000	0.21	3	9.2	6.0
43	62	63	0.7	1.4	PA422_0700 EZ301U	110	240	70.00	70/1	4500	8000	0.21	3	9.6	6.0
54	49	51	0.8	1.6	PA422_0560 EZ301U	100	200	56.00	56/1	4500	8000	0.23	3	9.2	6.0
60	44	45	0.8	1.9	PA422_0500 EZ301U	120	240	50.00	50/1	4500	8000	0.21	3	10	6.0
60	76	80	1.4	1.1	PA422_0500 EZ302U	120	240	50.00	50/1	4500	8000	0.31	3	10	6.6
75	35	36	0.9	2.4	PA422_0400 EZ301U	110	240	40.00	40/1	4500	8000	0.21	3	10	6.0
75	60	64	1.5	1.4	PA422_0400 EZ302U	120	240	40.00	40/1	4500	8000	0.31	3	10	6.6
75	79	83	2.0	1.1	PA422_0400 EZ303U	120	240	40.00	40/1	4500	8000	0.42	3	10	7.1
86	31	32	0.9	2.7	PA422_0350 EZ301U	93	240	35.00	35/1	4500	8000	0.23	3	11	6.0
86	53	56	1.6	1.6	PA422_0350 EZ302U	120	240	35.00	35/1	4500	8000	0.33	3	11	6.6
86	69	73	2.1	1.2	PA422_0350 EZ303U	120	240	35.00	35/1	4500	8000	0.44	3	11	7.1
94	28	29	1.1	2.8	PA422_0320 EZ301U	85	200	32.00	32/1	3700	6500	0.32	3	9.2	6.0
94	48	51	1.8	1.7	PA422_0320 EZ302U	100	200	32.00	32/1	3700	6500	0.42	3	9.2	6.6
94	63	67	2.3	1.3	PA422_0320 EZ303U	100	200	32.00	32/1	3700	6500	0.53	3	9.2	7.1
107	25	25	1.1	3.4	PA422_0280 EZ301U	74	240	28.00	28/1	4500	8000	0.23	3	10	6.0
107	42	45	1.8	2.0	PA422_0280 EZ302U	120	240	28.00	28/1	4500	8000	0.33	3	10	6.6
107	55	58	2.4	1.5	PA422_0280 EZ303U	120	240	28.00	28/1	4500	8000	0.44	3	10	7.1
107	74	80	3.2	1.1	PA422_0280 EZ401U	120	240	28.00	28/1	4500	8000	0.97	3	10	8.5

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PA4 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 120 Nm)															
120	22	23	1.1	3.8	PA422_0250 EZ301U	67	240	25.00	25/1	4000	7000	0.27	3	11	6.0
120	38	40	1.9	2.3	PA422_0250 EZ302U	120	240	25.00	25/1	4000	7000	0.37	3	11	6.6
120	49	52	2.5	1.7	PA422_0250 EZ303U	120	240	25.00	25/1	4000	7000	0.48	3	11	7.1
120	67	71	3.4	1.3	PA422_0250 EZ401U	120	240	25.00	25/1	4000	7000	1.0	3	11	8.5
150	18	18	1.3	4.8	PA422_0200 EZ301U	53	240	20.00	20/1	3700	6500	0.32	3	11	6.0
150	30	32	2.1	2.8	PA422_0200 EZ302U	95	240	20.00	20/1	3700	6500	0.42	3	11	6.6
150	39	42	2.8	2.2	PA422_0200 EZ303U	120	240	20.00	20/1	3700	6500	0.53	3	11	7.1
150	53	57	3.8	1.6	PA422_0200 EZ401U	120	240	20.00	20/1	3700	6500	1.1	3	11	8.5
150	82	89	5.8	1.0	PA422_0200 EZ501U	120	240	20.00	20/1	3700	6500	3.0	3	11	9.5
188	24	26	2.4	3.5	PA422_0160 EZ302U	76	240	16.00	16/1	3700	6500	0.43	3	11	6.6
188	31	33	3.1	2.7	PA422_0160 EZ303U	110	240	16.00	16/1	3700	6500	0.54	3	11	7.1
188	43	46	4.2	2.0	PA422_0160 EZ401U	120	240	16.00	16/1	3700	6500	1.1	3	11	8.5
188	65	71	6.5	1.3	PA422_0160 EZ501U	120	240	16.00	16/1	3700	6500	3.0	3	11	9.5
188	71	79	7.1	1.2	PA422_0160 EZ402U	120	240	16.00	16/1	3700	6500	1.8	3	11	9.6
250	11	11	2.8	4.7	PA422_0120 EZ301U	32	240	12.00	12/1	3700	6500	0.36	3	9.9	6.0
250	18	19	4.7	2.8	PA422_0120 EZ302U	57	240	12.00	12/1	3700	6500	0.46	3	9.9	6.6
250	24	25	6.1	2.1	PA422_0120 EZ303U	80	240	12.00	12/1	3700	6500	0.57	3	9.9	7.1
250	32	34	8.3	1.6	PA422_0120 EZ401U	97	240	12.00	12/1	3700	6500	1.1	3	9.9	8.5
250	49	54	13	1.0	PA422_0120 EZ501U	100	240	12.00	12/1	3700	6500	3.1	3	9.9	9.5
300	27	29	1.0	1.9	PA421_0100 EZ401U	82	200	10.00	10/1	4000	7000	0.97	2	9.0	6.6
300	42	46	1.6	1.3	PA421_0100 EZ501U	100	200	10.00	10/1	4000	7000	2.9	2	9.0	7.6
300	46	50	1.7	1.2	PA421_0100 EZ402U	100	200	10.00	10/1	4000	7000	1.7	2	9.0	7.7
375	22	23	1.0	3.2	PA421_0080 EZ401U	66	200	8.000	8/1	4000	7000	0.99	2	9.5	6.6
375	33	36	1.5	2.1	PA421_0080 EZ501U	100	200	8.000	8/1	4000	7000	3.0	2	9.5	7.6
375	36	40	1.7	1.9	PA421_0080 EZ402U	100	200	8.000	8/1	4000	7000	1.7	2	9.5	7.7
375	54	67	2.5	1.3	PA421_0080 EZ404U	100	200	8.000	8/1	4000	7000	3.0	2	9.5	9.8
375	57	62	2.6	1.2	PA421_0080 EZ502U	100	200	8.000	8/1	4000	7000	5.3	2	9.5	9.1
429	19	20	1.1	3.9	PA421_0070 EZ401U	58	240	7.000	7/1	4000	7000	1.0	2	10	6.6
429	29	32	1.7	2.5	PA421_0070 EZ501U	110	240	7.000	7/1	4000	7000	3.0	2	10	7.6
429	32	35	1.9	2.3	PA421_0070 EZ402U	110	240	7.000	7/1	4000	7000	1.7	2	10	7.7
429	47	58	2.7	1.6	PA421_0070 EZ404U	110	240	7.000	7/1	4000	7000	3.1	2	10	9.8
429	50	54	2.9	1.5	PA421_0070 EZ502U	110	240	7.000	7/1	4000	7000	5.3	2	10	9.1
429	66	75	3.8	1.1	PA421_0070 EZ503U	110	240	7.000	7/1	4000	7000	7.7	2	10	11
600	21	23	2.5	3.6	PA421_0050 EZ501U	78	240	5.000	5/1	3700	6500	3.1	2	12	7.6
600	23	25	2.8	3.3	PA421_0050 EZ402U	78	240	5.000	5/1	3700	6500	1.8	2	12	7.7
600	33	42	4.1	2.2	PA421_0050 EZ404U	120	240	5.000	5/1	3700	6500	3.2	2	12	9.8
600	36	39	4.4	2.1	PA421_0050 EZ502U	120	240	5.000	5/1	3700	6500	5.4	2	12	9.1
600	36	40	4.4	2.1	PA421_0050 EZ701U	97	240	5.000	5/1	3700	6500	8.7	2	12	11
600	47	54	5.7	1.6	PA421_0050 EZ503U	120	240	5.000	5/1	3700	6500	7.8	2	12	11
600	58	70	7.1	1.3	PA421_0050 EZ702U	120	240	5.000	5/1	3700	6500	14	2	12	13
600	65	78	8.0	1.1	PA421_0050 EZ505U	120	240	5.000	5/1	3700	6500	12	2	12	14
750	17	18	3.3	4.5	PA421_0040 EZ501U	62	240	4.000	4/1	3300	6000	3.2	2	12	7.6
750	18	20	3.6	4.1	PA421_0040 EZ402U	62	240	4.000	4/1	3300	6000	1.9	2	12	7.7
750	27	33	5.3	2.8	PA421_0040 EZ404U	110	240	4.000	4/1	3300	6000	3.3	2	12	9.8
750	29	31	5.7	2.6	PA421_0040 EZ502U	120	240	4.000	4/1	3300	6000	5.5	2	12	9.1
750	29	32	5.7	2.6	PA421_0040 EZ701U	78	240	4.000	4/1	3300	6000	8.8	2	12	11
750	38	43	7.5	2.0	PA421_0040 EZ503U	120	240	4.000	4/1	3300	6000	7.9	2	12	11
750	47	56	9.3	1.6	PA421_0040 EZ702U	120	240	4.000	4/1	3300	6000	14	2	12	13
750	52	62	10	1.4	PA421_0040 EZ505U	120	240	4.000	4/1	3300	6000	12	2	12	14
750	64	81	13	1.2	PA421_0040 EZ703U	120	240	4.000	4/1	3300	6000	22	2	12	15
1000	13	14	8.0	3.5	PA421_0030 EZ501U	47	240	3.000	3/1	3000	5500	3.6	2	13	7.6
1000	14	15	8.7	3.2	PA421_0030 EZ402U	47	240	3.000	3/1	3000	5500	2.3	2	13	7.7
1000	20	25	13	2.2	PA421_0030 EZ404U	84	240	3.000	3/1	3000	5500	3.7	2	13	9.8
1000	22	23	14	2.0	PA421_0030 EZ502U	90	240	3.000	3/1	3000	5500	5.9	2	13	9.1
1000	22	24	14	2.0	PA421_0030 EZ701U	58	240	3.000	3/1	3000	5500	9.2	2	13	11
1000	28	32	18	1.5	PA421_0030 EZ503U	100	240	3.000	3/1	3000	5500	8.3	2	13	11
1000	35	42	22	1.3	PA421_0030 EZ702U	100	240	3.000	3/1	3000	5500	14	2	13	13
1000	39	47	25	1.1	PA421_0030 EZ505U	100	240	3.000	3/1	3000	5500	13	2	13	14
PA4 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 120 Nm)															
900	46	74	6.4	1.4	PA421_0050 EZ505U	120	240	5.000	5/1	3700	6500	12	2	12	14
1125	37	59	8.4	1.8	PA421_0040 EZ505U	120	240	4.000	4/1	3300	6000	12	2	12	14
1125	47	78	11	1.4	PA421_0040 EZ703U	120	240	4.000	4/1	3300	6000	22	2	12	15
1500	28	45	20	1.4	PA421_0030 EZ505U	100	240	3.000	3/1	3000	5500	13	2	13	14
1500	35	58	26	1.1	PA421_0030 EZ703U	100	240	3.000	3/1	3000	5500	22	2	13	15

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PA4 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 120 Nm)															
75	68	72	0.6	1.2	PA422_0800 EZ301U	100	200	80.00	80/1	4500	8000	0.21	3	9.2	6.0
86	59	63	0.6	1.4	PA422_0700 EZ301U	110	240	70.00	70/1	4500	8000	0.21	3	9.6	6.0
107	47	51	0.8	1.7	PA422_0560 EZ301U	100	200	56.00	56/1	4500	8000	0.23	3	9.2	6.0
120	42	45	0.8	2.0	PA422_0500 EZ301U	120	240	50.00	50/1	4500	8000	0.21	3	10	6.0
120	71	80	1.3	1.2	PA422_0500 EZ302U	120	240	50.00	50/1	4500	8000	0.31	3	10	6.6
150	34	36	0.9	2.4	PA422_0400 EZ301U	110	240	40.00	40/1	4500	8000	0.21	3	10	6.0
150	57	64	1.5	1.4	PA422_0400 EZ302U	120	240	40.00	40/1	4500	8000	0.31	3	10	6.6
150	74	86	2.0	1.1	PA422_0400 EZ303U	120	240	40.00	40/1	4500	8000	0.42	3	10	7.1
171	30	32	0.9	2.9	PA422_0350 EZ301U	93	240	35.00	35/1	4500	8000	0.23	3	11	6.0
171	50	56	1.5	1.7	PA422_0350 EZ302U	120	240	35.00	35/1	4500	8000	0.33	3	11	6.6
171	65	75	2.0	1.3	PA422_0350 EZ303U	120	240	35.00	35/1	4500	8000	0.44	3	11	7.1
188	27	29	1.0	3.0	PA422_0320 EZ301U	85	200	32.00	32/1	3700	6500	0.32	3	9.2	6.0
188	46	51	1.7	1.8	PA422_0320 EZ302U	100	200	32.00	32/1	3700	6500	0.42	3	9.2	6.6
188	60	68	2.2	1.3	PA422_0320 EZ303U	100	200	32.00	32/1	3700	6500	0.53	3	9.2	7.1
214	24	25	1.0	3.6	PA422_0280 EZ301U	74	240	28.00	28/1	4500	8000	0.23	3	10	6.0
214	40	45	1.7	2.1	PA422_0280 EZ302U	120	240	28.00	28/1	4500	8000	0.33	3	10	6.6
214	52	60	2.2	1.6	PA422_0280 EZ303U	120	240	28.00	28/1	4500	8000	0.44	3	10	7.1
214	61	74	2.6	1.4	PA422_0280 EZ401U	120	240	28.00	28/1	4500	8000	0.97	3	10	8.5
240	21	23	1.1	4.0	PA422_0250 EZ301U	67	240	25.00	25/1	4000	7000	0.27	3	11	6.0
240	36	40	1.8	2.4	PA422_0250 EZ302U	120	240	25.00	25/1	4000	7000	0.37	3	11	6.6
240	47	53	2.4	1.8	PA422_0250 EZ303U	120	240	25.00	25/1	4000	7000	0.48	3	11	7.1
240	55	67	2.8	1.6	PA422_0250 EZ401U	120	240	25.00	25/1	4000	7000	1.0	3	11	8.5
300	29	32	2.0	3.0	PA422_0200 EZ302U	95	240	20.00	20/1	3700	6500	0.42	3	11	6.6
300	37	43	2.6	2.3	PA422_0200 EZ303U	120	240	20.00	20/1	3700	6500	0.53	3	11	7.1
300	44	53	3.1	1.9	PA422_0200 EZ401U	120	240	20.00	20/1	3700	6500	1.1	3	11	8.5
300	65	84	4.6	1.3	PA422_0200 EZ501U	120	240	20.00	20/1	3700	6500	3.0	3	11	9.5
375	23	26	2.3	3.7	PA422_0160 EZ302U	76	240	16.00	16/1	3700	6500	0.43	3	11	6.6
375	30	34	3.0	2.9	PA422_0160 EZ303U	110	240	16.00	16/1	3700	6500	0.54	3	11	7.1
375	35	43	3.5	2.4	PA422_0160 EZ401U	120	240	16.00	16/1	3700	6500	1.1	3	11	8.5
375	52	67	5.1	1.6	PA422_0160 EZ501U	120	240	16.00	16/1	3700	6500	3.0	3	11	9.5
375	53	74	5.3	1.6	PA422_0160 EZ402U	120	240	16.00	16/1	3700	6500	1.8	3	11	9.6
500	10	11	2.6	4.9	PA422_0120 EZ301U	32	240	12.00	12/1	3700	6500	0.36	3	9.9	6.0
500	17	19	4.4	2.9	PA422_0120 EZ302U	57	240	12.00	12/1	3700	6500	0.46	3	9.9	6.6
500	22	26	5.8	2.2	PA422_0120 EZ303U	80	240	12.00	12/1	3700	6500	0.57	3	9.9	7.1
500	26	32	6.8	1.9	PA422_0120 EZ401U	97	240	12.00	12/1	3700	6500	1.1	3	9.9	8.5
500	39	50	10	1.3	PA422_0120 EZ501U	100	240	12.00	12/1	3700	6500	3.1	3	9.9	9.5
500	40	56	10	1.3	PA422_0120 EZ402U	100	240	12.00	12/1	3700	6500	1.8	3	9.9	9.6
600	22	27	1.1	1.9	PA421_0100 EZ401U	82	200	10.00	10/1	4000	7000	0.97	2	9.0	6.6
600	33	43	1.6	1.3	PA421_0100 EZ501U	100	200	10.00	10/1	4000	7000	2.9	2	9.0	7.6
600	34	48	1.6	1.2	PA421_0100 EZ402U	100	200	10.00	10/1	4000	7000	1.7	2	9.0	7.7
750	18	22	1.0	3.1	PA421_0080 EZ401U	66	200	8.000	8/1	4000	7000	0.99	2	9.5	6.6
750	26	34	1.5	2.1	PA421_0080 EZ501U	100	200	8.000	8/1	4000	7000	3.0	2	9.5	7.6
750	27	38	1.6	2.0	PA421_0080 EZ402U	100	200	8.000	8/1	4000	7000	1.7	2	9.5	7.7
750	40	61	2.3	1.4	PA421_0080 EZ502U	100	200	8.000	8/1	4000	7000	5.3	2	9.5	9.1
750	45	65	2.6	1.2	PA421_0080 EZ404U	100	200	8.000	8/1	4000	7000	3.0	2	9.5	9.8
857	16	19	1.1	3.8	PA421_0070 EZ401U	58	240	7.000	7/1	4000	7000	1.0	2	10	6.6
857	23	30	1.7	2.6	PA421_0070 EZ501U	110	240	7.000	7/1	4000	7000	3.0	2	10	7.6
857	24	33	1.7	2.5	PA421_0070 EZ402U	110	240	7.000	7/1	4000	7000	1.7	2	10	7.7
857	35	53	2.6	1.7	PA421_0070 EZ502U	110	240	7.000	7/1	4000	7000	5.3	2	10	9.1
857	39	57	2.9	1.5	PA421_0070 EZ404U	110	240	7.000	7/1	4000	7000	3.1	2	10	9.8
857	42	72	3.1	1.4	PA421_0070 EZ503U	110	240	7.000	7/1	4000	7000	7.7	2	10	11
1200	16	21	2.5	3.6	PA421_0050 EZ501U	78	240	5.000	5/1	3700	6500	3.1	2	12	7.6
1200	17	24	2.6	3.5	PA421_0050 EZ402U	78	240	5.000	5/1	3700	6500	1.8	2	12	7.7
1200	25	38	3.9	2.3	PA421_0050 EZ502U	120	240	5.000	5/1	3700	6500	5.4	2	12	9.1
1200	25	38	3.9	2.3	PA421_0050 EZ701U	97	240	5.000	5/1	3700	6500	8.7	2	12	11
1200	28	41	4.3	2.1	PA421_0050 EZ404U	120	240	5.000	5/1	3700	6500	3.2	2	12	9.8
1200	30	51	4.6	2.0	PA421_0050 EZ503U	120	240	5.000	5/1	3700	6500	7.8	2	12	11
1200	35	69	5.4	1.7	PA421_0050 EZ702U	120	240	5.000	5/1	3700	6500	14	2	12	13
1500	13	17	3.3	4.5	PA421_0040 EZ501U	62	240	4.000	4/1	3300	6000	3.2	2	12	7.6
1500	14	19	3.4	4.3	PA421_0040 EZ402U	62	240	4.000	4/1	3300	6000	1.9	2	12	7.7
1500	20	30	5.1	2.9	PA421_0040 EZ502U	120	240	4.000	4/1	3300	6000	5.5	2	12	9.1
1500	20	31	5.1	2.9	PA421_0040 EZ701U	78	240	4.000	4/1	3300	6000	8.8	2	12	11
1500	23	33	5.6	2.6	PA421_0040 EZ404U	110	240	4.000	4/1	3300	6000	3.3	2	12	9.8

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PA4 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 120 Nm)															
1500	24	41	6.0	2.5	PA421_0040 EZ503U	120	240	4.000	4/1	3300	6000	7.9	2	12	11
1500	28	55	7.0	2.1	PA421_0040 EZ702U	120	240	4.000	4/1	3300	6000	14	2	12	13
PA5 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 300 Nm)															
43	186	200	0.9	1.1	PA522_0700 EZ401U	270	600	70.00	70/1	4000	7000	0.98	2	26	11
54	149	160	1.1	1.3	PA522_0560 EZ401U	250	500	56.00	56/1	4000	7000	1.0	2	25	11
60	133	143	1.1	1.6	PA522_0500 EZ401U	300	600	50.00	50/1	4000	7000	0.98	2	27	11
60	204	223	1.7	1.0	PA522_0500 EZ501U	300	600	50.00	50/1	4000	7000	3.0	2	27	12
75	106	114	1.2	1.9	PA522_0400 EZ401U	300	600	40.00	40/1	4000	7000	0.98	2	26	11
75	163	179	1.9	1.2	PA522_0400 EZ501U	300	600	40.00	40/1	4000	7000	3.0	2	26	12
75	179	198	2.1	1.1	PA522_0400 EZ402U	300	600	40.00	40/1	4000	7000	1.7	2	26	12
86	93	100	1.3	2.3	PA522_0350 EZ401U	280	600	35.00	35/1	4000	7000	1.0	2	28	11
86	143	156	2.0	1.5	PA522_0350 EZ501U	300	600	35.00	35/1	4000	7000	3.0	2	28	12
86	156	173	2.2	1.3	PA522_0350 EZ402U	300	600	35.00	35/1	4000	7000	1.7	2	28	12
94	85	91	1.4	2.4	PA522_0320 EZ401U	250	500	32.00	32/1	3300	6000	1.2	2	25	11
94	131	143	2.2	1.5	PA522_0320 EZ501U	250	500	32.00	32/1	3300	6000	3.2	2	25	12
94	143	158	2.4	1.4	PA522_0320 EZ402U	250	500	32.00	32/1	3300	6000	1.9	2	25	12
107	74	80	1.4	2.8	PA522_0280 EZ401U	230	600	28.00	28/1	4000	7000	1.0	2	27	11
107	114	125	2.2	1.8	PA522_0280 EZ501U	300	600	28.00	28/1	4000	7000	3.0	2	27	12
107	125	138	2.4	1.7	PA522_0280 EZ402U	300	600	28.00	28/1	4000	7000	1.7	2	27	12
107	184	229	3.5	1.1	PA522_0280 EZ404U	300	600	28.00	28/1	4000	7000	3.1	2	27	14
107	197	213	3.8	1.1	PA522_0280 EZ502U	300	600	28.00	28/1	4000	7000	5.3	2	27	14
120	67	71	1.5	3.2	PA522_0250 EZ401U	200	600	25.00	25/1	3700	6500	1.1	2	28	11
120	102	112	2.3	2.1	PA522_0250 EZ501U	300	600	25.00	25/1	3700	6500	3.1	2	28	12
120	112	124	2.6	1.9	PA522_0250 EZ402U	300	600	25.00	25/1	3700	6500	1.8	2	28	12
120	164	204	3.7	1.3	PA522_0250 EZ404U	300	600	25.00	25/1	3700	6500	3.2	2	28	14
120	176	190	4.0	1.2	PA522_0250 EZ502U	300	600	25.00	25/1	3700	6500	5.4	2	28	14
120	176	197	4.0	1.2	PA522_0250 EZ701U	300	600	25.00	25/1	3700	6500	8.7	2	28	15
150	53	57	1.7	3.9	PA522_0200 EZ401U	160	600	20.00	20/1	3300	6000	1.2	2	28	11
150	82	89	2.6	2.6	PA522_0200 EZ501U	300	600	20.00	20/1	3300	6000	3.2	2	28	12
150	89	99	2.9	2.4	PA522_0200 EZ402U	300	600	20.00	20/1	3300	6000	1.9	2	28	12
150	131	163	4.2	1.6	PA522_0200 EZ404U	300	600	20.00	20/1	3300	6000	3.3	2	28	14
150	141	152	4.5	1.5	PA522_0200 EZ502U	300	600	20.00	20/1	3300	6000	5.5	2	28	14
150	141	158	4.5	1.5	PA522_0200 EZ701U	300	600	20.00	20/1	3300	6000	8.8	2	28	15
150	184	211	5.9	1.1	PA522_0200 EZ503U	300	600	20.00	20/1	3300	6000	7.9	2	28	15
188	43	46	1.9	4.9	PA522_0160 EZ401U	130	600	16.00	16/1	3300	6000	1.3	2	28	11
188	65	71	2.9	3.2	PA522_0160 EZ501U	240	600	16.00	16/1	3300	6000	3.2	2	28	12
188	71	79	3.2	2.9	PA522_0160 EZ402U	240	600	16.00	16/1	3300	6000	2.0	2	28	12
188	105	131	4.7	2.0	PA522_0160 EZ404U	300	600	16.00	16/1	3300	6000	3.3	2	28	14
188	112	122	5.0	1.9	PA522_0160 EZ502U	300	600	16.00	16/1	3300	6000	5.5	2	28	14
188	112	126	5.0	1.9	PA522_0160 EZ701U	300	600	16.00	16/1	3300	6000	8.8	2	28	15
188	147	169	6.6	1.4	PA522_0160 EZ503U	300	600	16.00	16/1	3300	6000	7.9	2	28	15
188	182	219	8.1	1.2	PA522_0160 EZ702U	300	600	16.00	16/1	3300	6000	14	2	28	18
250	32	34	3.8	3.8	PA522_0120 EZ401U	97	460	12.00	12/1	3300	6000	1.3	2	27	11
250	49	54	5.9	2.4	PA522_0120 EZ501U	180	460	12.00	12/1	3300	6000	3.3	2	27	12
250	54	59	6.4	2.2	PA522_0120 EZ402U	180	460	12.00	12/1	3300	6000	2.0	2	27	12
250	79	98	9.5	1.5	PA522_0120 EZ404U	200	460	12.00	12/1	3300	6000	3.3	2	27	14
250	84	91	10	1.4	PA522_0120 EZ502U	200	460	12.00	12/1	3300	6000	5.6	2	27	14
250	84	95	10	1.4	PA522_0120 EZ701U	200	460	12.00	12/1	3300	6000	8.9	2	27	15
250	111	127	13	1.1	PA522_0120 EZ503U	200	460	12.00	12/1	3300	6000	7.9	2	27	15
300	42	46	1.8	2.9	PA521_0100 EZ501U	160	500	10.00	10/1	3700	6500	3.0	1	25	9.4
300	72	78	3.1	1.7	PA521_0100 EZ502U	250	500	10.00	10/1	3700	6500	5.3	1	25	11
300	72	81	3.1	1.7	PA521_0100 EZ701U	190	500	10.00	10/1	3700	6500	8.6	1	25	13
300	94	108	4.1	1.3	PA521_0100 EZ503U	250	500	10.00	10/1	3700	6500	7.7	1	25	12
300	116	140	5.1	1.1	PA521_0100 EZ702U	250	500	10.00	10/1	3700	6500	14	1	25	15
375	57	62	2.9	3.0	PA521_0080 EZ502U	240	500	8.000	8/1	3700	6500	5.4	1	26	11
375	57	64	2.9	3.0	PA521_0080 EZ701U	160	500	8.000	8/1	3700	6500	8.7	1	26	13
375	75	86	3.8	2.3	PA521_0080 EZ503U	250	500	8.000	8/1	3700	6500	7.8	1	26	12
375	93	112	4.7	1.9	PA521_0080 EZ702U	250	500	8.000	8/1	3700	6500	14	1	26	15
375	105	124	5.3	1.7	PA521_0080 EZ505U	250	500	8.000	8/1	3700	6500	12	1	26	15
375	128	161	6.4	1.4	PA521_0080 EZ703U	250	500	8.000	8/1	3700	6500	22	1	26	17
429	50	54	3.2	3.7	PA521_0070 EZ502U	210	600	7.000	7/1	3700	6500	5.5	1	28	11
429	50	56	3.2	3.7	PA521_0070 EZ701U	140	600	7.000	7/1	3700	6500	8.8	1	28	13
429	66	75	4.2	2.8	PA521_0070 EZ503U	270	600	7.000	7/1	3700	6500	7.8	1	28	12
429	81	98	5.2	2.3	PA521_0070 EZ702U	270	600	7.000	7/1	3700	6500	14	1	28	15

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PA5 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 300 Nm)															
429	92	109	5.9	2.0	PA521_0070 EZ505U	270	600	7.000	7/1	3700	6500	12	1	28	15
429	112	141	7.2	1.6	PA521_0070 EZ703U	270	600	7.000	7/1	3700	6500	22	1	28	17
600	47	54	6.3	3.9	PA521_0050 EZ503U	210	430	5.000	5/1	3500	6000	8.2	1	31	12
600	58	70	7.8	3.2	PA521_0050 EZ702U	200	600	5.000	5/1	3500	6000	14	1	31	15
600	65	78	8.8	2.8	PA521_0050 EZ505U	300	600	5.000	5/1	3500	6000	13	1	31	15
600	80	101	11	2.3	PA521_0050 EZ703U	300	600	5.000	5/1	3500	6000	22	1	31	17
600	103	146	14	1.8	PA521_0050 EZ705U	300	600	5.000	5/1	3500	6000	35	1	31	23
600	108	180	15	1.7	PA521_0050 EZ802U	300	600	5.000	5/1	3500	6000	59	1	31	31
750	38	43	8.3	4.9	PA521_0040 EZ503U	170	350	4.000	4/1	3000	5000	8.6	1	32	12
750	47	56	10	3.9	PA521_0040 EZ702U	160	600	4.000	4/1	3000	5000	15	1	32	15
750	52	62	11	3.5	PA521_0040 EZ505U	260	600	4.000	4/1	3000	5000	13	1	32	15
750	64	81	14	2.9	PA521_0040 EZ703U	250	600	4.000	4/1	3000	5000	23	1	32	17
750	83	117	18	2.2	PA521_0040 EZ705U	300	600	4.000	4/1	3000	5000	35	1	32	23
750	87	144	19	2.1	PA521_0040 EZ802U	300	600	4.000	4/1	3000	5000	59	1	32	31
1000	22	23	16	4.9	PA521_0030 EZ502U	90	260	3.000	3/1	2500	4500	8.0	1	36	11
1000	22	24	16	4.9	PA521_0030 EZ701U	58	460	3.000	3/1	2500	4500	11	1	36	13
1000	28	32	20	3.7	PA521_0030 EZ503U	130	260	3.000	3/1	2500	4500	10	1	36	12
1000	35	42	25	3.0	PA521_0030 EZ702U	120	460	3.000	3/1	2500	4500	17	1	36	15
1000	39	47	28	2.7	PA521_0030 EZ505U	190	460	3.000	3/1	2500	4500	15	1	36	15
1000	48	61	35	2.2	PA521_0030 EZ703U	190	460	3.000	3/1	2500	4500	24	1	36	17
1000	62	88	45	1.7	PA521_0030 EZ705U	200	460	3.000	3/1	2500	4500	37	1	36	23
1000	65	108	47	1.6	PA521_0030 EZ802U	200	460	3.000	3/1	2500	4500	61	1	36	31
PA5 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 300 Nm)															
450	92	148	4.6	1.2	PA521_0100 EZ505U	250	500	10.00	10/1	3700	6500	12	1	25	15
563	74	119	4.2	2.1	PA521_0080 EZ505U	250	500	8.000	8/1	3700	6500	12	1	26	15
563	94	155	5.4	1.6	PA521_0080 EZ703U	250	500	8.000	8/1	3700	6500	22	1	26	17
643	65	104	4.7	2.5	PA521_0070 EZ505U	270	600	7.000	7/1	3700	6500	12	1	28	15
643	82	136	6.0	2.0	PA521_0070 EZ703U	270	600	7.000	7/1	3700	6500	22	1	28	17
900	46	74	7.1	3.5	PA521_0050 EZ505U	300	600	5.000	5/1	3500	6000	13	1	31	15
900	51	167	7.8	3.1	PA521_0050 EZ802U	300	600	5.000	5/1	3500	6000	59	1	31	31
900	59	97	9.0	2.7	PA521_0050 EZ703U	300	600	5.000	5/1	3500	6000	22	1	31	17
900	80	146	12	2.0	PA521_0050 EZ705U	300	600	5.000	5/1	3500	6000	35	1	31	23
1125	37	59	9.3	4.3	PA521_0040 EZ505U	260	600	4.000	4/1	3000	5000	13	1	32	15
1125	41	134	10	3.9	PA521_0040 EZ802U	300	600	4.000	4/1	3000	5000	59	1	32	31
1125	47	78	12	3.4	PA521_0040 EZ703U	250	600	4.000	4/1	3000	5000	23	1	32	17
1125	64	116	16	2.5	PA521_0040 EZ705U	300	600	4.000	4/1	3000	5000	35	1	32	23
1500	28	45	23	3.3	PA521_0030 EZ505U	190	460	3.000	3/1	2500	4500	15	1	36	15
1500	31	100	25	3.0	PA521_0030 EZ802U	200	460	3.000	3/1	2500	4500	61	1	36	31
1500	35	58	29	2.6	PA521_0030 EZ703U	190	460	3.000	3/1	2500	4500	24	1	36	17
1500	48	87	40	1.9	PA521_0030 EZ705U	200	460	3.000	3/1	2500	4500	37	1	36	23
PA5 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 300 Nm)															
86	153	186	0.7	1.4	PA522_0700 EZ401U	270	600	70.00	70/1	4000	7000	0.98	2	26	11
107	122	149	0.9	1.6	PA522_0560 EZ401U	250	500	56.00	56/1	4000	7000	1.0	2	25	11
120	109	133	0.9	1.8	PA522_0500 EZ401U	300	600	50.00	50/1	4000	7000	0.98	2	27	11
120	162	209	1.4	1.2	PA522_0500 EZ501U	300	600	50.00	50/1	4000	7000	3.0	2	27	12
150	87	106	1.3	1.8	PA522_0400 EZ401U	300	600	40.00	40/1	4000	7000	0.98	2	26	11
150	129	167	1.9	1.2	PA522_0400 EZ501U	300	600	40.00	40/1	4000	7000	3.0	2	26	12
150	133	186	2.0	1.2	PA522_0400 EZ402U	300	600	40.00	40/1	4000	7000	1.7	2	26	12
171	76	93	1.1	2.7	PA522_0350 EZ401U	280	600	35.00	35/1	4000	7000	1.0	2	28	11
171	113	146	1.6	1.9	PA522_0350 EZ501U	300	600	35.00	35/1	4000	7000	3.0	2	28	12
171	116	163	1.6	1.8	PA522_0350 EZ402U	300	600	35.00	35/1	4000	7000	1.7	2	28	12
188	70	85	1.2	2.9	PA522_0320 EZ401U	250	500	32.00	32/1	3300	6000	1.2	2	25	11
188	103	134	1.7	1.9	PA522_0320 EZ501U	250	500	32.00	32/1	3300	6000	3.2	2	25	12
188	106	149	1.8	1.9	PA522_0320 EZ402U	250	500	32.00	32/1	3300	6000	1.9	2	25	12
214	61	74	1.2	3.4	PA522_0280 EZ401U	230	600	28.00	28/1	4000	7000	1.0	2	27	11
214	90	117	1.7	2.3	PA522_0280 EZ501U	300	600	28.00	28/1	4000	7000	3.0	2	27	12
214	93	130	1.8	2.3	PA522_0280 EZ402U	300	600	28.00	28/1	4000	7000	1.7	2	27	12
214	138	207	2.7	1.5	PA522_0280 EZ502U	300	600	28.00	28/1	4000	7000	5.3	2	27	14
214	154	223	3.0	1.4	PA522_0280 EZ404U	300	600	28.00	28/1	4000	7000	3.1	2	27	14
240	55	67	1.2	3.8	PA522_0250 EZ401U	200	600	25.00	25/1	3700	6500	1.1	2	28	11
240	81	105	1.8	2.6	PA522_0250 EZ501U	300	600	25.00	25/1	3700	6500	3.1	2	28	12
240	83	116	1.9	2.5	PA522_0250 EZ402U	300	600	25.00	25/1	3700	6500	1.8	2	28	12
240	124	185	2.8	1.7	PA522_0250 EZ502U	300	600	25.00	25/1	3700	6500	5.4	2	28	14
240	124	188	2.8	1.7	PA522_0250 EZ701U	300	600	25.00	25/1	3700	6500	8.7	2	28	15

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PA5 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 300 Nm)															
240	138	200	3.1	1.5	PA522_0250 EZ404U	300	600	25.00	25/1	3700	6500	3.2	2	28	14
300	44	53	1.4	4.8	PA522_0200 EZ401U	160	600	20.00	20/1	3300	6000	1.2	2	28	11
300	65	84	2.1	3.3	PA522_0200 EZ501U	300	600	20.00	20/1	3300	6000	3.2	2	28	12
300	67	93	2.1	3.2	PA522_0200 EZ402U	300	600	20.00	20/1	3300	6000	1.9	2	28	12
300	99	148	3.2	2.1	PA522_0200 EZ502U	300	600	20.00	20/1	3300	6000	5.5	2	28	14
300	99	150	3.2	2.1	PA522_0200 EZ701U	300	600	20.00	20/1	3300	6000	8.8	2	28	15
300	110	160	3.5	1.9	PA522_0200 EZ404U	300	600	20.00	20/1	3300	6000	3.3	2	28	14
300	118	201	3.8	1.8	PA522_0200 EZ503U	300	600	20.00	20/1	3300	6000	7.9	2	28	15
375	52	67	2.3	4.1	PA522_0160 EZ501U	240	600	16.00	16/1	3300	6000	3.2	2	28	12
375	53	74	2.4	3.9	PA522_0160 EZ402U	240	600	16.00	16/1	3300	6000	2.0	2	28	12
375	79	119	3.5	2.7	PA522_0160 EZ502U	300	600	16.00	16/1	3300	6000	5.5	2	28	14
375	79	120	3.5	2.7	PA522_0160 EZ701U	300	600	16.00	16/1	3300	6000	8.8	2	28	15
375	88	128	3.9	2.4	PA522_0160 EZ404U	300	600	16.00	16/1	3300	6000	3.3	2	28	14
375	94	161	4.2	2.2	PA522_0160 EZ503U	300	600	16.00	16/1	3300	6000	7.9	2	28	15
375	109	217	4.9	1.9	PA522_0160 EZ702U	300	600	16.00	16/1	3300	6000	14	2	28	18
500	26	32	3.2	4.6	PA522_0120 EZ401U	97	460	12.00	12/1	3300	6000	1.3	2	27	11
500	39	50	4.7	3.1	PA522_0120 EZ501U	180	460	12.00	12/1	3300	6000	3.3	2	27	12
500	40	56	4.8	3.0	PA522_0120 EZ402U	180	460	12.00	12/1	3300	6000	2.0	2	27	12
500	59	89	7.1	2.0	PA522_0120 EZ502U	200	460	12.00	12/1	3300	6000	5.6	2	27	14
500	59	90	7.1	2.0	PA522_0120 EZ701U	200	460	12.00	12/1	3300	6000	8.9	2	27	15
500	66	96	8.0	1.8	PA522_0120 EZ404U	200	460	12.00	12/1	3300	6000	3.3	2	27	14
500	71	121	8.5	1.7	PA522_0120 EZ503U	200	460	12.00	12/1	3300	6000	7.9	2	27	15
600	33	43	1.8	2.9	PA521_0100 EZ501U	160	500	10.00	10/1	3700	6500	3.0	1	25	9.4
600	50	76	2.8	1.9	PA521_0100 EZ502U	250	500	10.00	10/1	3700	6500	5.3	1	25	11
600	50	77	2.8	1.9	PA521_0100 EZ701U	190	500	10.00	10/1	3700	6500	8.6	1	25	13
600	60	103	3.3	1.6	PA521_0100 EZ503U	250	500	10.00	10/1	3700	6500	7.7	1	25	12
600	70	139	3.9	1.4	PA521_0100 EZ702U	250	500	10.00	10/1	3700	6500	14	1	25	15
750	40	61	2.5	3.4	PA521_0080 EZ502U	240	500	8.000	8/1	3700	6500	5.4	1	26	11
750	40	61	2.5	3.4	PA521_0080 EZ701U	160	500	8.000	8/1	3700	6500	8.7	1	26	13
750	48	82	3.0	2.9	PA521_0080 EZ503U	250	500	8.000	8/1	3700	6500	7.8	1	26	12
750	56	111	3.5	2.5	PA521_0080 EZ702U	250	500	8.000	8/1	3700	6500	14	1	26	15
857	35	53	2.9	4.1	PA521_0070 EZ502U	210	600	7.000	7/1	3700	6500	5.5	1	28	11
857	35	54	2.9	4.1	PA521_0070 EZ701U	140	600	7.000	7/1	3700	6500	8.8	1	28	13
857	42	72	3.4	3.5	PA521_0070 EZ503U	270	600	7.000	7/1	3700	6500	7.8	1	28	12
857	49	97	3.9	3.0	PA521_0070 EZ702U	270	600	7.000	7/1	3700	6500	14	1	28	15
1200	30	51	5.1	4.8	PA521_0050 EZ503U	210	430	5.000	5/1	3500	6000	8.2	1	31	12
1200	35	69	5.9	4.2	PA521_0050 EZ702U	200	600	5.000	5/1	3500	6000	14	1	31	15
PA7 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 700 Nm)															
400	212	321	14	2.1	PA721_0050 EZ805U	700	1400	5.000	5/1	3000	5500	135	1	58	54
500	170	256	19	2.6	PA721_0040 EZ805U	700	1380	4.000	4/1	2500	4500	136	1	60	54
667	127	192	41	2.2	PA721_0030 EZ805U	500	1040	3.000	3/1	2200	3700	141	1	65	54
PA7 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 700 Nm)															
38	327	357	0.8	1.2	PA722_0800 EZ501U	500	1000	80.00	80/1	3700	6500	3.1	2	52	18
43	286	313	0.8	1.5	PA722_0700 EZ501U	650	1250	70.00	70/1	3700	6500	3.1	2	53	18
54	229	250	1.0	1.7	PA722_0560 EZ501U	500	1000	56.00	56/1	3700	6500	3.2	2	52	18
60	204	223	0.9	2.2	PA722_0500 EZ501U	700	1400	50.00	50/1	3700	6500	3.1	2	53	18
60	352	380	1.6	1.3	PA722_0500 EZ502U	700	1400	50.00	50/1	3700	6500	5.4	2	53	19
60	352	394	1.6	1.3	PA722_0500 EZ701U	700	1400	50.00	50/1	3700	6500	8.7	2	53	21
75	163	179	1.1	2.7	PA722_0400 EZ501U	610	1380	40.00	40/1	3700	6500	3.1	2	52	18
75	281	304	1.8	1.6	PA722_0400 EZ502U	700	1380	40.00	40/1	3700	6500	5.4	2	52	19
75	281	315	1.8	1.6	PA722_0400 EZ701U	700	1380	40.00	40/1	3700	6500	8.7	2	52	21
75	369	422	2.4	1.2	PA722_0400 EZ503U	700	1380	40.00	40/1	3700	6500	7.8	2	52	21
86	143	156	1.1	3.1	PA722_0350 EZ501U	530	1400	35.00	35/1	3700	6500	3.2	2	53	18
86	246	266	1.9	1.8	PA722_0350 EZ502U	700	1400	35.00	35/1	3700	6500	5.5	2	53	19
86	246	276	1.9	1.8	PA722_0350 EZ701U	670	1400	35.00	35/1	3700	6500	8.8	2	53	21
86	323	369	2.5	1.4	PA722_0350 EZ503U	700	1400	35.00	35/1	3700	6500	7.9	2	53	21
86	399	479	3.2	1.1	PA722_0350 EZ702U	700	1400	35.00	35/1	3700	6500	14	2	53	24
94	131	143	1.3	3.1	PA722_0320 EZ501U	490	1000	32.00	32/1	3000	5000	3.9	2	52	18
94	225	243	2.2	1.8	PA722_0320 EZ502U	500	1000	32.00	32/1	3000	5000	6.2	2	52	19
94	225	252	2.2	1.8	PA722_0320 EZ701U	500	1000	32.00	32/1	3000	5000	9.5	2	52	21
94	295	337	2.9	1.4	PA722_0320 EZ503U	500	1000	32.00	32/1	3000	5000	8.5	2	52	21
107	114	125	1.3	3.8	PA722_0280 EZ501U	430	1380	28.00	28/1	3700	6500	3.3	2	53	18
107	197	213	2.2	2.2	PA722_0280 EZ502U	700	1380	28.00	28/1	3700	6500	5.6	2	53	19
107	197	221	2.2	2.2	PA722_0280 EZ701U	530	1380	28.00	28/1	3700	6500	8.9	2	53	21

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PA7 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 700 Nm)															
107	258	295	2.9	1.7	PA722_0280 EZ503U	700	1380	28.00	28/1	3700	6500	7.9	2	53	21
107	319	383	3.5	1.4	PA722_0280 EZ702U	700	1380	28.00	28/1	3700	6500	14	2	53	24
107	359	426	4.0	1.2	PA722_0280 EZ505U	700	1380	28.00	28/1	3700	6500	13	2	53	24
120	102	112	1.3	4.3	PA722_0250 EZ501U	380	1400	25.00	25/1	3500	6000	3.6	2	54	18
120	176	190	2.3	2.5	PA722_0250 EZ502U	700	1400	25.00	25/1	3500	6000	5.9	2	54	19
120	176	197	2.3	2.5	PA722_0250 EZ701U	480	1400	25.00	25/1	3500	6000	9.2	2	54	21
120	230	264	3.0	1.9	PA722_0250 EZ503U	700	1400	25.00	25/1	3500	6000	8.2	2	54	21
120	285	342	3.7	1.5	PA722_0250 EZ702U	700	1400	25.00	25/1	3500	6000	14	2	54	24
120	321	380	4.2	1.4	PA722_0250 EZ505U	700	1400	25.00	25/1	3500	6000	13	2	54	24
120	392	494	5.1	1.1	PA722_0250 EZ703U	700	1400	25.00	25/1	3500	6000	22	2	54	26
150	141	152	2.6	3.1	PA722_0200 EZ502U	590	1400	20.00	20/1	3000	5000	6.2	2	54	19
150	141	158	2.6	3.1	PA722_0200 EZ701U	380	1400	20.00	20/1	3000	5000	9.5	2	54	21
150	184	211	3.4	2.4	PA722_0200 EZ503U	700	1400	20.00	20/1	3000	5000	8.6	2	54	21
150	228	274	4.2	1.9	PA722_0200 EZ702U	700	1400	20.00	20/1	3000	5000	15	2	54	24
150	257	304	4.7	1.7	PA722_0200 EZ505U	700	1400	20.00	20/1	3000	5000	13	2	54	24
150	314	395	5.7	1.4	PA722_0200 EZ703U	700	1400	20.00	20/1	3000	5000	23	2	54	26
188	112	122	2.9	3.9	PA722_0160 EZ502U	470	1340	16.00	16/1	3000	5000	6.3	2	54	19
188	112	126	2.9	3.9	PA722_0160 EZ701U	300	1380	16.00	16/1	3000	5000	9.6	2	54	21
188	147	169	3.8	3.0	PA722_0160 EZ503U	650	1340	16.00	16/1	3000	5000	8.7	2	54	21
188	182	219	4.7	2.4	PA722_0160 EZ702U	620	1380	16.00	16/1	3000	5000	15	2	54	24
188	205	243	5.2	2.1	PA722_0160 EZ505U	700	1380	16.00	16/1	3000	5000	13	2	54	24
188	251	316	6.4	1.8	PA722_0160 EZ703U	700	1380	16.00	16/1	3000	5000	23	2	54	26
188	324	459	8.3	1.4	PA722_0160 EZ705U	700	1380	16.00	16/1	3000	5000	35	2	54	31
250	84	91	5.2	3.3	PA722_0120 EZ502U	350	1000	12.00	12/1	3000	5000	6.6	2	53	19
250	84	95	5.2	3.3	PA722_0120 EZ701U	230	1040	12.00	12/1	3000	5000	9.9	2	53	21
250	111	127	6.8	2.5	PA722_0120 EZ503U	490	1000	12.00	12/1	3000	5000	9.0	2	53	21
250	137	164	8.5	2.0	PA722_0120 EZ702U	470	1040	12.00	12/1	3000	5000	15	2	53	24
250	154	182	9.5	1.8	PA722_0120 EZ505U	500	1040	12.00	12/1	3000	5000	14	2	53	24
250	188	237	12	1.5	PA722_0120 EZ703U	500	1040	12.00	12/1	3000	5000	23	2	53	26
250	243	344	15	1.2	PA722_0120 EZ705U	500	1040	12.00	12/1	3000	5000	35	2	53	31
300	72	81	1.8	3.7	PA721_0100 EZ701U	190	1000	10.00	10/1	3300	6000	9.0	1	50	17
300	116	140	2.9	2.3	PA721_0100 EZ702U	400	1000	10.00	10/1	3300	6000	14	1	50	19
300	160	202	3.9	1.6	PA721_0100 EZ703U	500	1000	10.00	10/1	3300	6000	22	1	50	21
300	207	293	5.1	1.3	PA721_0100 EZ705U	500	1000	10.00	10/1	3300	6000	35	1	50	27
300	216	360	5.3	1.2	PA721_0100 EZ802U	500	1000	10.00	10/1	3300	6000	59	1	50	35
375	93	112	2.8	3.8	PA721_0080 EZ702U	320	1000	8.000	8/1	3300	6000	15	1	53	19
375	128	161	3.9	2.7	PA721_0080 EZ703U	500	1000	8.000	8/1	3300	6000	22	1	53	21
375	165	234	5.0	2.1	PA721_0080 EZ705U	500	1000	8.000	8/1	3300	6000	35	1	53	27
375	173	288	5.2	2.0	PA721_0080 EZ802U	500	1000	8.000	8/1	3300	6000	59	1	53	35
429	81	98	3.0	4.7	PA721_0070 EZ702U	280	1250	7.000	7/1	3300	6000	15	1	55	19
429	112	141	4.1	3.4	PA721_0070 EZ703U	440	1250	7.000	7/1	3300	6000	23	1	55	21
429	145	205	5.3	2.7	PA721_0070 EZ705U	650	1250	7.000	7/1	3300	6000	35	1	55	27
429	151	252	5.6	2.5	PA721_0070 EZ802U	650	1250	7.000	7/1	3300	6000	59	1	55	35
600	80	101	6.2	4.8	PA721_0050 EZ703U	320	900	5.000	5/1	3000	5500	24	1	58	21
600	103	146	7.9	3.7	PA721_0050 EZ705U	500	1400	5.000	5/1	3000	5500	36	1	58	27
600	108	180	8.3	3.6	PA721_0050 EZ802U	490	1400	5.000	5/1	3000	5500	60	1	58	35
600	129	234	9.9	3.0	PA721_0050 EZ803U	700	1400	5.000	5/1	3000	5500	85	1	58	41
750	83	117	10	4.7	PA721_0040 EZ705U	400	1380	4.000	4/1	2500	4500	38	1	60	27
750	87	144	11	4.4	PA721_0040 EZ802U	390	1380	4.000	4/1	2500	4500	62	1	60	35
750	103	187	13	3.7	PA721_0040 EZ803U	560	1380	4.000	4/1	2500	4500	87	1	60	41
1000	62	88	23	3.9	PA721_0030 EZ705U	300	1040	3.000	3/1	2200	3700	42	1	65	27
1000	65	108	24	3.8	PA721_0030 EZ802U	290	1040	3.000	3/1	2200	3700	66	1	65	35
1000	77	140	29	3.2	PA721_0030 EZ803U	420	1040	3.000	3/1	2200	3700	92	1	65	41
PA7 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 700 Nm)															
129	316	509	2.5	1.4	PA722_0350 EZ505U	700	1400	35.00	35/1	3700	6500	12	2	53	24
161	253	407	2.8	1.7	PA722_0280 EZ505U	700	1380	28.00	28/1	3700	6500	13	2	53	24
161	322	532	3.6	1.4	PA722_0280 EZ703U	700	1380	28.00	28/1	3700	6500	22	2	53	26
180	226	363	3.0	2.0	PA722_0250 EZ505U	700	1400	25.00	25/1	3500	6000	13	2	54	24
180	287	475	3.8	1.5	PA722_0250 EZ703U	700	1400	25.00	25/1	3500	6000	22	2	54	26
225	181	291	3.3	2.4	PA722_0200 EZ505U	700	1400	20.00	20/1	3000	5000	13	2	54	24
225	230	380	4.2	1.9	PA722_0200 EZ703U	700	1400	20.00	20/1	3000	5000	23	2	54	26
281	144	233	3.7	3.0	PA722_0160 EZ505U	700	1380	16.00	16/1	3000	5000	13	2	54	24
281	160	524	4.1	2.8	PA722_0160 EZ802U	700	1380	16.00	16/1	3000	5000	59	2	54	40
281	184	304	4.7	2.4	PA722_0160 EZ703U	700	1380	16.00	16/1	3000	5000	23	2	54	26

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PA7 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 700 Nm)															
281	249	456	6.4	1.8	PA722_0160 EZ705U	700	1380	16.00	16/1	3000	5000	35	2	54	31
375	108	174	6.7	2.6	PA722_0120 EZ505U	500	1040	12.00	12/1	3000	5000	14	2	53	24
375	138	228	8.5	2.0	PA722_0120 EZ703U	500	1040	12.00	12/1	3000	5000	23	2	53	26
375	187	342	12	1.5	PA722_0120 EZ705U	500	1040	12.00	12/1	3000	5000	35	2	53	31
450	102	335	2.9	2.2	PA721_0100 EZ802U	500	1000	10.00	10/1	3300	6000	59	1	50	35
450	117	194	3.3	2.0	PA721_0100 EZ703U	500	1000	10.00	10/1	3300	6000	22	1	50	21
450	159	291	4.5	1.4	PA721_0100 EZ705U	500	1000	10.00	10/1	3300	6000	35	1	50	27
563	81	268	2.8	3.7	PA721_0080 EZ802U	500	1000	8.000	8/1	3300	6000	59	1	53	35
563	94	155	3.2	3.3	PA721_0080 EZ703U	500	1000	8.000	8/1	3300	6000	22	1	53	21
563	127	233	4.4	2.4	PA721_0080 EZ705U	500	1000	8.000	8/1	3300	6000	35	1	53	27
643	71	234	3.0	4.7	PA721_0070 EZ802U	650	1250	7.000	7/1	3300	6000	59	1	55	35
643	82	136	3.5	4.1	PA721_0070 EZ703U	440	1250	7.000	7/1	3300	6000	23	1	55	21
643	111	204	4.7	3.0	PA721_0070 EZ705U	650	1250	7.000	7/1	3300	6000	35	1	55	27
900	80	146	7.0	4.2	PA721_0050 EZ705U	500	1400	5.000	5/1	3000	5500	36	1	58	27
PA7 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 700 Nm)															
75	258	334	0.7	1.5	PA722_0800 EZ501U	500	1000	80.00	80/1	3700	6500	3.1	2	52	18
86	226	293	0.6	1.9	PA722_0700 EZ501U	650	1250	70.00	70/1	3700	6500	3.1	2	53	18
107	181	234	0.8	2.2	PA722_0560 EZ501U	500	1000	56.00	56/1	3700	6500	3.2	2	52	18
120	162	209	0.7	2.7	PA722_0500 EZ501U	700	1400	50.00	50/1	3700	6500	3.1	2	53	18
120	247	371	1.1	1.8	PA722_0500 EZ502U	700	1400	50.00	50/1	3700	6500	5.4	2	53	19
120	247	375	1.1	1.8	PA722_0500 EZ701U	700	1400	50.00	50/1	3700	6500	8.7	2	53	21
120	295	504	1.4	1.5	PA722_0500 EZ503U	700	1400	50.00	50/1	3700	6500	7.7	2	53	21
150	129	167	1.0	2.9	PA722_0400 EZ501U	610	1380	40.00	40/1	3700	6500	3.1	2	52	18
150	198	296	1.5	1.9	PA722_0400 EZ502U	700	1380	40.00	40/1	3700	6500	5.4	2	52	19
150	198	300	1.5	1.9	PA722_0400 EZ701U	700	1380	40.00	40/1	3700	6500	8.7	2	52	21
150	236	403	1.8	1.6	PA722_0400 EZ503U	700	1380	40.00	40/1	3700	6500	7.8	2	52	21
171	113	146	0.9	3.9	PA722_0350 EZ501U	530	1400	35.00	35/1	3700	6500	3.2	2	53	18
171	173	259	1.4	2.5	PA722_0350 EZ502U	700	1400	35.00	35/1	3700	6500	5.5	2	53	19
171	173	263	1.4	2.5	PA722_0350 EZ701U	670	1400	35.00	35/1	3700	6500	8.8	2	53	21
171	206	352	1.6	2.1	PA722_0350 EZ503U	700	1400	35.00	35/1	3700	6500	7.9	2	53	21
171	239	475	1.9	1.8	PA722_0350 EZ702U	700	1400	35.00	35/1	3700	6500	14	2	53	24
214	90	117	1.0	4.9	PA722_0280 EZ501U	430	1380	28.00	28/1	3700	6500	3.3	2	53	18
214	138	207	1.5	3.2	PA722_0280 EZ502U	700	1380	28.00	28/1	3700	6500	5.6	2	53	19
214	138	210	1.5	3.2	PA722_0280 EZ701U	530	1380	28.00	28/1	3700	6500	8.9	2	53	21
214	165	282	1.8	2.7	PA722_0280 EZ503U	700	1380	28.00	28/1	3700	6500	7.9	2	53	21
214	192	380	2.1	2.3	PA722_0280 EZ702U	700	1380	28.00	28/1	3700	6500	14	2	53	24
240	124	185	1.6	3.6	PA722_0250 EZ502U	700	1400	25.00	25/1	3500	6000	5.9	2	54	19
240	124	188	1.6	3.6	PA722_0250 EZ701U	480	1400	25.00	25/1	3500	6000	9.2	2	54	21
240	147	252	1.9	3.0	PA722_0250 EZ503U	700	1400	25.00	25/1	3500	6000	8.2	2	54	21
240	171	340	2.2	2.6	PA722_0250 EZ702U	700	1400	25.00	25/1	3500	6000	14	2	54	24
600	50	77	1.6	4.1	PA721_0100 EZ701U	190	1000	10.00	10/1	3300	6000	9.0	1	50	17
600	70	139	2.2	3.0	PA721_0100 EZ702U	400	1000	10.00	10/1	3300	6000	14	1	50	19
750	56	111	2.1	5.0	PA721_0080 EZ702U	320	1000	8.000	8/1	3300	6000	15	1	53	19
PA8 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 1600 Nm)															
125	664	1005	10	1.2	PA822_0160 EZ805U	1600	3180	16.00	16/1	2500	4500	137	2	169	74
167	498	754	12	1.6	PA822_0120 EZ805U	1200	2400	12.00	12/1	2500	4500	138	2	156	74
200	424	641	4.2	1.7	PA821_0100 EZ805U	1200	2400	10.00	10/1	2800	4500	135	1	153	64
250	339	513	4.8	2.4	PA821_0080 EZ805U	1200	2400	8.000	8/1	2800	4500	136	1	166	64
286	297	449	4.5	3.4	PA821_0070 EZ805U	1390	2800	7.000	7/1	2800	4500	138	1	177	64
400	212	321	6.8	4.7	PA821_0050 EZ805U	990	2900	5.000	5/1	2500	4000	142	1	194	64
500	170	256	11	4.7	PA821_0040 EZ805U	800	2330	4.000	4/1	2200	3500	149	1	205	64
PA8 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 1600 Nm)															
38	562	631	0.8	1.4	PA822_0800 EZ701U	1200	2400	80.00	80/1	3300	6000	9.0	2	159	37
43	492	552	0.7	2.0	PA822_0700 EZ701U	1330	2800	70.00	70/1	3300	6000	9.0	2	165	37
43	798	958	1.1	1.3	PA822_0700 EZ702U	1400	2800	70.00	70/1	3300	6000	14	2	165	39
54	394	442	0.9	2.0	PA822_0560 EZ701U	1060	2400	56.00	56/1	3300	6000	9.7	2	159	37
54	638	766	1.5	1.3	PA822_0560 EZ702U	1200	2400	56.00	56/1	3300	6000	15	2	159	39
60	352	394	0.8	2.8	PA822_0500 EZ701U	950	3200	50.00	50/1	3300	6000	9.1	2	168	37
60	570	684	1.3	1.8	PA822_0500 EZ702U	1600	3200	50.00	50/1	3300	6000	14	2	168	39
60	784	988	1.7	1.3	PA822_0500 EZ703U	1600	3200	50.00	50/1	3300	6000	22	2	168	41
75	281	315	1.1	2.8	PA822_0400 EZ701U	760	3180	40.00	40/1	3300	6000	9.2	2	163	37
75	456	547	1.8	1.8	PA822_0400 EZ702U	1560	3180	40.00	40/1	3300	6000	14	2	163	39
75	627	790	2.4	1.3	PA822_0400 EZ703U	1600	3180	40.00	40/1	3300	6000	22	2	163	41

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PA8 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 1600 Nm)															
86	246	276	0.9	4.1	PA822_0350 EZ701U	670	3200	35.00	35/1	3300	6000	9.7	2	170	37
86	399	479	1.5	2.5	PA822_0350 EZ702U	1360	3200	35.00	35/1	3300	6000	15	2	170	39
86	549	692	2.1	1.8	PA822_0350 EZ703U	1600	3200	35.00	35/1	3300	6000	23	2	170	41
86	708	1004	2.7	1.4	PA822_0350 EZ705U	1600	3200	35.00	35/1	3300	6000	35	2	170	47
86	741	1234	2.8	1.3	PA822_0350 EZ802U	1600	3200	35.00	35/1	3300	6000	59	2	170	55
94	225	252	1.2	3.6	PA822_0320 EZ701U	610	2400	32.00	32/1	2500	4500	12	2	159	37
94	365	438	2.0	2.2	PA822_0320 EZ702U	1200	2400	32.00	32/1	2500	4500	17	2	159	39
94	502	632	2.7	1.6	PA822_0320 EZ703U	1200	2400	32.00	32/1	2500	4500	25	2	159	41
94	648	918	3.5	1.2	PA822_0320 EZ705U	1200	2400	32.00	32/1	2500	4500	37	2	159	47
107	197	221	1.3	4.1	PA822_0280 EZ701U	530	3180	28.00	28/1	3300	6000	9.8	2	166	37
107	319	383	2.1	2.5	PA822_0280 EZ702U	1090	3180	28.00	28/1	3300	6000	15	2	166	39
107	439	553	2.9	1.8	PA822_0280 EZ703U	1600	3180	28.00	28/1	3300	6000	23	2	166	41
107	567	803	3.7	1.4	PA822_0280 EZ705U	1600	3180	28.00	28/1	3300	6000	35	2	166	47
107	593	987	3.9	1.3	PA822_0280 EZ802U	1600	3180	28.00	28/1	3300	6000	59	2	166	55
120	285	342	1.8	3.5	PA822_0250 EZ702U	970	3200	25.00	25/1	3000	5500	16	2	171	39
120	392	494	2.4	2.6	PA822_0250 EZ703U	1540	3200	25.00	25/1	3000	5500	24	2	171	41
120	506	717	3.2	2.0	PA822_0250 EZ705U	1600	3200	25.00	25/1	3000	5500	36	2	171	47
120	530	881	3.3	1.9	PA822_0250 EZ802U	1600	3200	25.00	25/1	3000	5500	60	2	171	55
120	632	1145	3.9	1.6	PA822_0250 EZ803U	1600	3200	25.00	25/1	3000	5500	86	2	171	61
150	228	274	2.0	4.4	PA822_0200 EZ702U	780	3200	20.00	20/1	2500	4500	17	2	172	39
150	314	395	2.7	3.2	PA822_0200 EZ703U	1240	3200	20.00	20/1	2500	4500	25	2	172	41
150	405	574	3.5	2.5	PA822_0200 EZ705U	1600	3200	20.00	20/1	2500	4500	38	2	172	47
150	424	705	3.7	2.4	PA822_0200 EZ802U	1600	3200	20.00	20/1	2500	4500	62	2	172	55
150	505	916	4.4	2.0	PA822_0200 EZ803U	1600	3200	20.00	20/1	2500	4500	87	2	172	61
188	182	219	2.8	4.4	PA822_0160 EZ702U	620	2790	16.00	16/1	2500	4500	18	2	169	39
188	251	316	3.8	3.2	PA822_0160 EZ703U	990	2790	16.00	16/1	2500	4500	26	2	169	41
188	324	459	4.9	2.5	PA822_0160 EZ705U	1580	3180	16.00	16/1	2500	4500	38	2	169	47
188	339	564	5.2	2.4	PA822_0160 EZ802U	1520	3180	16.00	16/1	2500	4500	62	2	169	55
188	404	733	6.2	2.0	PA822_0160 EZ803U	1600	3180	16.00	16/1	2500	4500	88	2	169	61
250	188	237	4.4	4.3	PA822_0120 EZ703U	740	2090	12.00	12/1	2500	4500	27	2	156	41
250	243	344	5.7	3.3	PA822_0120 EZ705U	1190	2400	12.00	12/1	2500	4500	40	2	156	47
250	254	423	6.0	3.1	PA822_0120 EZ802U	1140	2400	12.00	12/1	2500	4500	64	2	156	55
250	303	549	7.1	2.6	PA822_0120 EZ803U	1200	2400	12.00	12/1	2500	4500	89	2	156	61
300	216	360	2.5	2.8	PA821_0100 EZ802U	970	2400	10.00	10/1	2800	4500	60	1	153	45
300	258	468	2.9	2.4	PA821_0100 EZ803U	1200	2400	10.00	10/1	2800	4500	86	1	153	51
375	173	288	2.8	4.0	PA821_0080 EZ802U	780	2400	8.000	8/1	2800	4500	62	1	166	45
375	206	374	3.4	3.4	PA821_0080 EZ803U	1130	2400	8.000	8/1	2800	4500	87	1	166	51
429	181	327	3.2	4.8	PA821_0070 EZ803U	980	2800	7.000	7/1	2800	4500	88	1	177	51
PA8 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 1600 Nm)															
90	575	950	1.3	1.7	PA822_0500 EZ703U	1600	3200	50.00	50/1	3300	6000	22	2	168	41
113	460	760	1.8	1.7	PA822_0400 EZ703U	1600	3180	40.00	40/1	3300	6000	22	2	163	41
113	623	1140	2.4	1.3	PA822_0400 EZ705U	1600	3180	40.00	40/1	3300	6000	35	2	163	47
129	349	1147	1.3	2.9	PA822_0350 EZ802U	1600	3200	35.00	35/1	3300	6000	59	2	170	55
129	402	665	1.5	2.5	PA822_0350 EZ703U	1600	3200	35.00	35/1	3300	6000	23	2	170	41
129	545	998	2.1	1.8	PA822_0350 EZ705U	1600	3200	35.00	35/1	3300	6000	35	2	170	47
141	368	608	2.0	2.2	PA822_0320 EZ703U	1200	2400	32.00	32/1	2500	4500	25	2	159	41
141	499	912	2.7	1.6	PA822_0320 EZ705U	1200	2400	32.00	32/1	2500	4500	37	2	159	47
161	279	918	1.8	2.9	PA822_0280 EZ802U	1600	3180	28.00	28/1	3300	6000	59	2	166	55
161	322	532	2.1	2.5	PA822_0280 EZ703U	1600	3180	28.00	28/1	3300	6000	23	2	166	41
161	436	798	2.9	1.8	PA822_0280 EZ705U	1600	3180	28.00	28/1	3300	6000	35	2	166	47
180	249	819	1.6	4.0	PA822_0250 EZ802U	1600	3200	25.00	25/1	3000	5500	60	2	171	55
180	287	475	1.8	3.5	PA822_0250 EZ703U	1540	3200	25.00	25/1	3000	5500	24	2	171	41
180	390	713	2.4	2.6	PA822_0250 EZ705U	1600	3200	25.00	25/1	3000	5500	36	2	171	47
225	230	380	2.0	4.4	PA822_0200 EZ703U	1240	3200	20.00	20/1	2500	4500	25	2	172	41
225	312	570	2.7	3.2	PA822_0200 EZ705U	1600	3200	20.00	20/1	2500	4500	38	2	172	47
281	184	304	2.8	4.4	PA822_0160 EZ703U	990	2790	16.00	16/1	2500	4500	26	2	169	41
281	249	456	3.8	3.2	PA822_0160 EZ705U	1580	3180	16.00	16/1	2500	4500	38	2	169	47
375	187	342	4.4	4.3	PA822_0120 EZ705U	1190	2400	12.00	12/1	2500	4500	40	2	156	47
PA8 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 1600 Nm)															
60	494	751	0.6	1.4	PA822_1000 EZ701U	1200	2400	100.0	100/1	3300	6000	9.0	2	148	37
75	395	600	0.5	2.0	PA822_0800 EZ701U	1200	2400	80.00	80/1	3300	6000	9.0	2	159	37
86	346	525	0.5	2.9	PA822_0700 EZ701U	1330	2800	70.00	70/1	3300	6000	9.0	2	165	37
86	479	951	0.6	2.1	PA822_0700 EZ702U	1400	2800	70.00	70/1	3300	6000	14	2	165	39
107	277	420	0.6	2.9	PA822_0560 EZ701U	1060	2400	56.00	56/1	3300	6000	9.7	2	159	37

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm^2]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PA8 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 1600 Nm)															
107	383	761	0.9	2.1	PA822_0560 EZ702U	1200	2400	56.00	56/1	3300	6000	15	2	159	39
120	247	375	0.5	4.0	PA822_0500 EZ701U	950	3200	50.00	50/1	3300	6000	9.1	2	168	37
120	342	679	0.8	2.9	PA822_0500 EZ702U	1600	3200	50.00	50/1	3300	6000	14	2	168	39
150	198	300	0.8	4.0	PA822_0400 EZ701U	760	3180	40.00	40/1	3300	6000	9.2	2	163	37
150	274	543	1.1	2.9	PA822_0400 EZ702U	1560	3180	40.00	40/1	3300	6000	14	2	163	39
171	239	475	0.9	4.2	PA822_0350 EZ702U	1360	3200	35.00	35/1	3300	6000	15	2	170	39
214	192	380	1.3	4.2	PA822_0280 EZ702U	1090	3180	28.00	28/1	3300	6000	15	2	166	39

3.3 Dimensional drawings

In this chapter you can find the dimensions of the geared motors.

There is a dimensional drawing for every possible shaft/housing design, each with the tables for gear unit dimensions, motor dimensions and geared motor dimensions.

Dimensions can exceed the specifications of ISO 2768-mK due to casting tolerances or accumulation of individual tolerances.

We reserve the right to make dimensional changes due to ongoing technical development.

You can download CAD models of our standard drives at http://cad.stoeber.de.

Combination options and the dimensions of forced ventilated geared motors can be found at http://cad.stoeber.de.

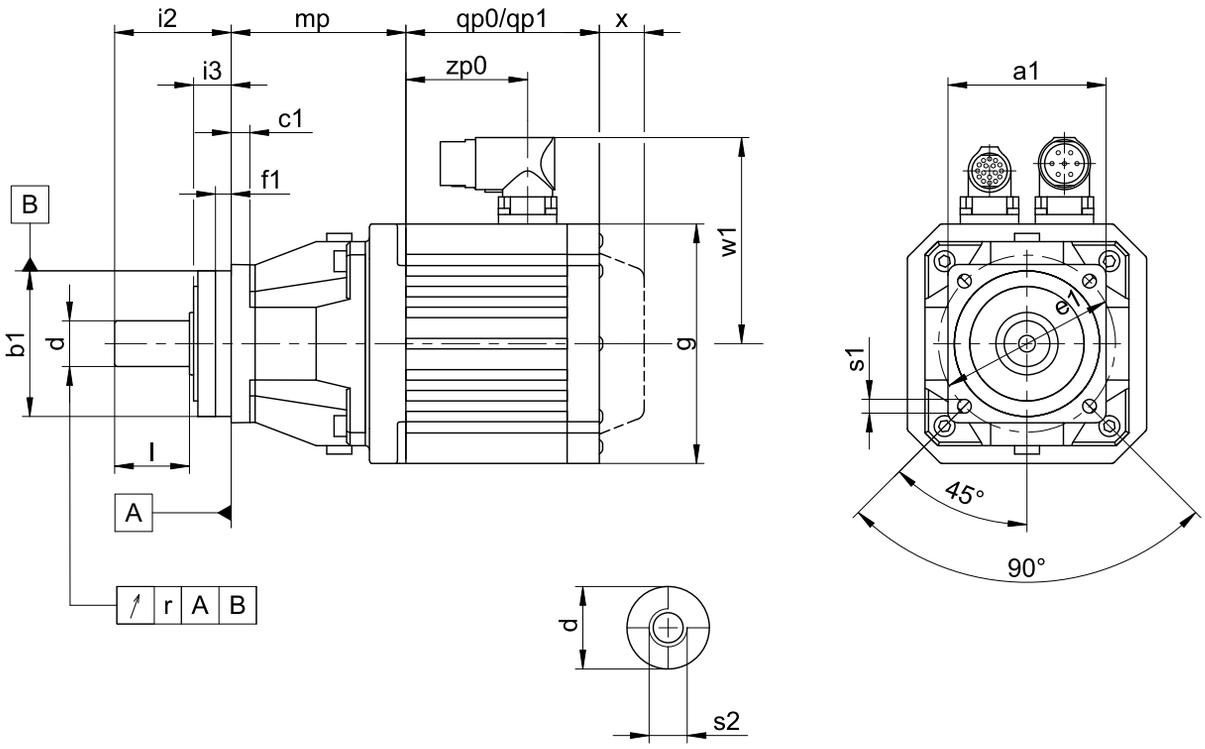
Tolerances

Solid shaft	Tolerance
Shaft ∅ fit ≤ 50 mm	DIN 748-1, ISO k6
Shaft ∅ fit > 50 mm	DIN 748-1, ISO m6
Feather keys	DIN 6885-1, high form A
Balance quality	Q 2.5 (balanced with half feather key)

Centering holes in solid shafts in accordance with DIN 332-2, DR shape

Thread size	M4	M5	M6	M8	M10	M12	M16	M20	M24
Thread depth [mm]	10	12.5	16	19	22	28	36	42	50

3.3.1 G shaft design (solid shaft without feather key)



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▶ 23.4]

Dimensions of gear units

Type	□a1	Ø$b1_{h6}$	c1	Ød_{k6}	Ø$e1_{k6}$	f1	i2	i3	l	r	Ø$s1_{h6}$	s2
PA321	72	60_{h6}	7	16_{k6}	75	7.5	48	18	28	0.025	5.5	M5
PA322	72	60_{h6}	7	16_{k6}	75	7.5	48	18	28	0.025	5.5	M5
PA421	76	70_{h6}	9	22_{k6}	85	7.5	56	18	36	0.025	6.6	M8
PA422	76	70_{h6}	9	22_{k6}	85	7.5	56	18	36	0.025	6.6	M8
PA521	101	90_{h6}	10	32_{k6}	120	15.0	88	28	58	0.030	9.0	M12
PA522	101	90_{h6}	10	32_{k6}	120	15.0	88	28	58	0.030	9.0	M12
PA721	144	130_{h6}	15	40_{k6}	165	3.5	112	27	82	0.035	11.0	M16
PA722	144	130_{h6}	15	40_{k6}	165	3.5	112	27	82	0.035	11.0	M16
PA821	190	160_{h6}	15	55_{k6}	215	10.0	112	27	82	0.035	13.5	M20
PA822	190	160_{h6}	15	55_{k6}	215	10.0	112	27	82	0.035	13.5	M20

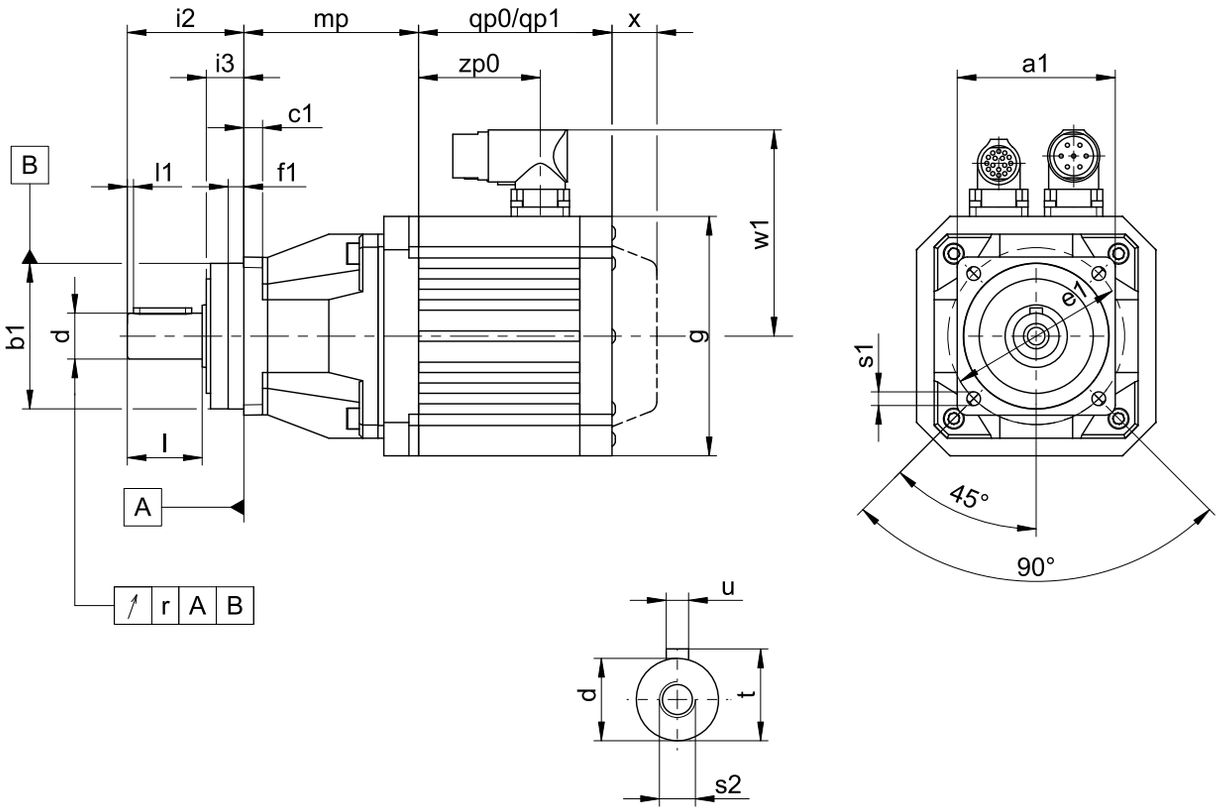
Dimensions of motors

Type	□g	qp0	qp1	w1	x	zp0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0
EZ501U	115	93	147.5	100.0	22	58.5
EZ502U	115	118	172.5	100.0	22	83.5
EZ503U	115	143	197.5	100.0	22	108.5
EZ505U	115	193	247.5	100.0	22	158.5
EZ701U	145	102	161.0	115.0	22	64.0
EZ702U	145	127	186.0	115.0	22	89.0
EZ703U	145	152	211.0	115.0	22	114.0
EZ705U	145	207	266.0	134.0	22	165.0
EZ802U	190	197	274.0	156.5	22	143.0
EZ803U	190	238	315.0	156.5	22	184.0
EZ805U	190	320	397.0	156.5	22	266.0

Dimensions of geared motors

Type	EZ3	EZ4	EZ5	EZ7	EZ8
	mp	mp	mp	mp	mp
PA321	73.5	70.0	72.5	–	–
PA322	113.5	–	–	–	–
PA421	–	79.0	81.5	87.5	–
PA422	131.0	127.5	130.0	–	–
PA521	–	–	81.0	87.0	102.0
PA522	–	136.5	139.0	145.0	–
PA721	–	–	–	98.0	113.0
PA722	–	–	158.0	164.0	179.0
PA821	–	–	–	–	137.0
PA822	–	–	–	206.5	221.5

3.3.2 P shaft design (solid shaft with feather key)



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]

Dimensions of gear units

Type	□a1	Øb1	c1	Ød	Øe1	f1	i2	i3	l	l1	Øs1	s2	t	u
PA321	72	60_{h6}	7	16_{k6}	75	7.5	48	18	28	2	5.5	M5	18.0	A5×5×22
PA322	72	60_{h6}	7	16_{k6}	75	7.5	48	18	28	2	5.5	M5	18.0	A5×5×22
PA421	76	70_{h6}	9	22_{k6}	85	7.5	56	18	36	3	6.6	M8	24.5	A6×6×28
PA422	76	70_{h6}	9	22_{k6}	85	7.5	56	18	36	3	6.6	M8	24.5	A6×6×28
PA521	101	90_{h6}	10	32_{k6}	120	15.0	88	28	58	3	9.0	M12	35.0	A10×8×50
PA522	101	90_{h6}	10	32_{k6}	120	15.0	88	28	58	3	9.0	M12	35.0	A10×8×50
PA721	144	130_{h6}	15	40_{k6}	165	3.5	112	27	82	4	11.0	M16	43.0	A12×8×70
PA722	144	130_{h6}	15	40_{k6}	165	3.5	112	27	82	4	11.0	M16	43.0	A12×8×70
PA821	190	160_{h6}	15	55_{k6}	215	10.0	112	27	82	6	13.5	M20	59.0	A16×10×70
PA822	190	160_{h6}	15	55_{k6}	215	10.0	112	27	82	6	13.5	M20	59.0	A16×10×70

Dimensions of motors

Type	□g	qp0	qp1	w1	x	zp0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0
EZ501U	115	93	147.5	100.0	22	58.5
EZ502U	115	118	172.5	100.0	22	83.5
EZ503U	115	143	197.5	100.0	22	108.5
EZ505U	115	193	247.5	100.0	22	158.5
EZ701U	145	102	161.0	115.0	22	64.0
EZ702U	145	127	186.0	115.0	22	89.0
EZ703U	145	152	211.0	115.0	22	114.0
EZ705U	145	207	266.0	134.0	22	165.0
EZ802U	190	197	274.0	156.5	22	143.0
EZ803U	190	238	315.0	156.5	22	184.0
EZ805U	190	320	397.0	156.5	22	266.0

Dimensions of geared motors

Type	EZ3	EZ4	EZ5	EZ7	EZ8
	mp	mp	mp	mp	mp
PA321	73.5	70.0	72.5	–	–
PA322	113.5	–	–	–	–
PA421	–	79.0	81.5	87.5	–
PA422	131.0	127.5	130.0	–	–
PA521	–	–	81.0	87.0	102.0
PA522	–	136.5	139.0	145.0	–
PA721	–	–	–	98.0	113.0
PA722	–	–	158.0	164.0	179.0
PA821	–	–	–	–	137.0
PA822	–	–	–	206.5	221.5

3.4 Type designation

In this chapter, you can find an explanation of the type designation with the associated options.

Additional ordering information not included in the type designation can be found at the end of the chapter.

Sample code

PA	4	2	2	S	G	D	0200	EZ401U

Explanation

Code	Designation	Design
PA	Type	Low-backlash planetary gear unit
4	Size	4 (example)
2	Generation	Generation 2
1	Stages	Single-stage
2		Two-stage
S	Housing	Standard
G	Shaft	Solid shaft without feather key
P		Solid shaft with feather key
D	Bearing	Axially reinforced bearing
0200	Transmission ratio (i x 10)	i = 20 (example)
EZ401U	Motor	EZ synchronous servo motor

In order to complete the type designation, also specify:

- A detailed type designation of the motor, see chapter [▷ 23]
- The position of the plug connectors, see chapter [▷ 3.5.3]
- For reverse operation of the output shaft from ± 20° to ± 90° and horizontal installation, note the chapter [▷ 3.6.4]

3.5 Product description

3.5.1 Installation conditions

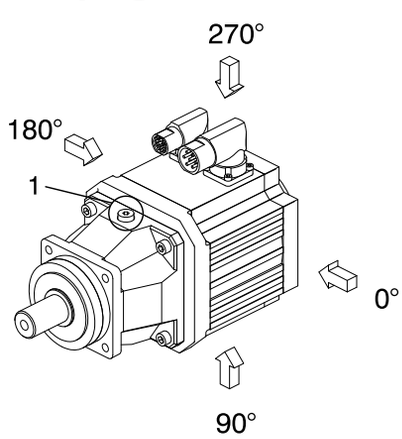
The specified torques and forces only apply when attaching gear units at the machine side using screws of quality 10.9. In addition, the gear housing must be adjusted at the pilot (H7).

3.5.2 Lubricants

STOBER fills the gear units with the amount and type of lubricant specified on the nameplate.

Lubricant filling quantities for gear units, document ID 441871, can be found online at http://www.stoeber.de

3.5.3 Position of the plug connectors



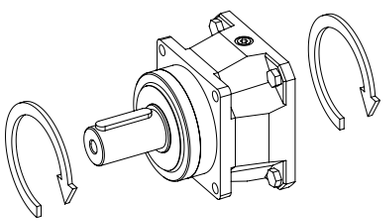
In the standard version, the plug connectors are attached in the 270° position (relative to the oil drain plug (1) of the planetary gear unit). Indicate variations for your geared motor in the purchase order.

3.5.4 Other product features

Feature	Value
Max. permitted gear unit temperature (on the surface of the gear unit)	≤ 90 °C
Paint	Black RAL 9005
(ATEX) Directive 2014/34/EU (option)	Not suitable
Protection class:[1]	
Gear unit	IP65
Motor	IP56, optionally IP66

3.5.5 Direction of rotation

The input and output rotate in the same direction.



3.6 Project configuration

Project your drives using our SERVOsoft designing software. You can receive SERVOsoft for free from your adviser at one of our sales centers. Observe the limit conditions in this chapter to ensure a safe design for your drives.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

3.6.1 Calculation of the operating point

Check the following conditions for operating points other than the nominal point M_{2N} specified in the selection tables.

$$n_{1m^*} \leq \frac{n_{1maxDB}}{fB_T}$$

$$n_{1max^*} \leq \frac{n_{1max\,ZB}}{fB_T}$$

$$M_{2eff^*} \leq M_{2th}$$

$$M_{2acc^*} \leq M_{2acc}$$

$$M_{2NOT^*} \leq M_{2NOT}$$

$$M_{2eq^*} \leq M_{2N} \cdot \frac{S}{fB_{op} \cdot fB_t}$$

The values for n_{1maxDB}, n_{1maxZB}, M_{2acc}, M_{2NOT}, M_{2N} and S can be found in the selection tables.

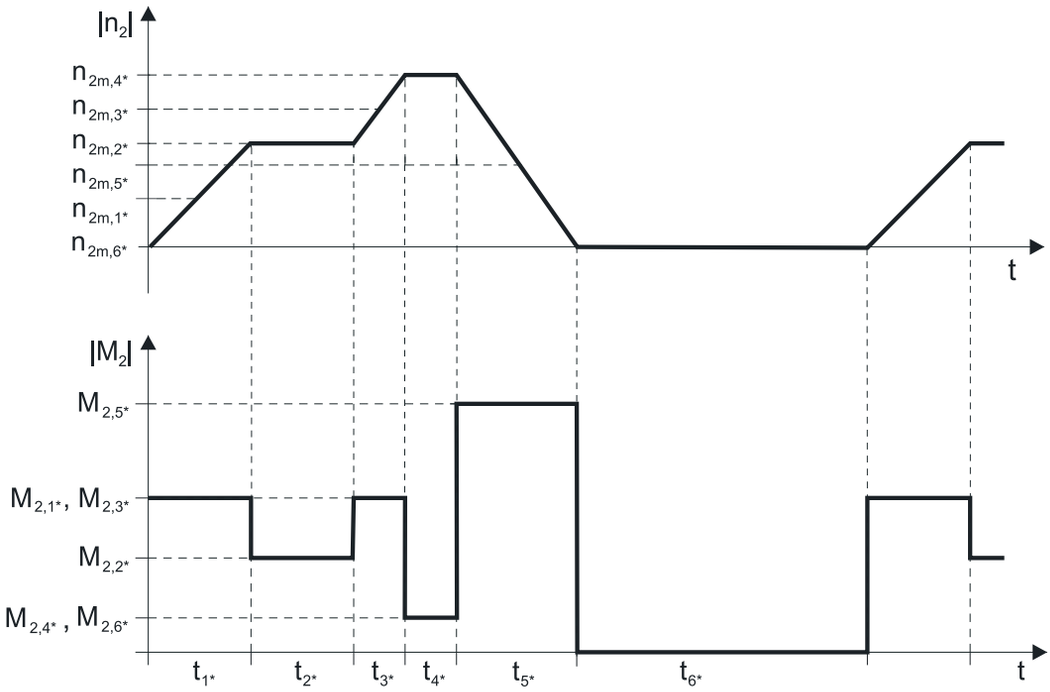
The values for fB_T, fB_{op} and fB_t can be found in the corresponding tables in this chapter.

Calculate the thermal limit torque M_{2th} for a duty cycle > 50%.

[1] Observe the protection class of all the components.

Example of cyclic operation

The following calculations are based on a representation of the power taken from the output based in accordance with the following example:



Calculation of the actual average input speed

$$n_{1m^*} = n_{2m^*} \cdot i$$

$$n_{2m^*} = \frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}{t_{1^*} + \ldots + t_{n^*}}$$

If $t_{1^*} + \ldots + t_{5^*} \geq 20$ min, calculate n_{2m^*} without the rest phase t_{6^*}.

The values for the ratio i can be found in the selection tables.

Calculation of the actual effective torque

$$M_{2eff^*} = \sqrt{\frac{t_{1^*} \cdot M_{2,1^*}{}^2 + \ldots + t_{n^*} \cdot M_{2,n^*}{}^2}{t_{1^*} + \ldots + t_{n^*}}}$$

Calculation of the actual equivalent torque

$$M_{2eq^*} = \sqrt[3]{\frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} \cdot \left|M_{2,1^*}{}^3\right| + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*} \cdot \left|M_{2,n^*}{}^3\right|}{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}}$$

Calculation of the thermal limit torque

Calculate the thermal limit torque M_{2th} for a duty cycle $ED_{20} > 50\%$ and the actual average input speed n_{1m^*}. (At $K_{mot,th} \leq 0$ you must reduce the average input speed n_{1m^*} accordingly or select another geared motor size.)

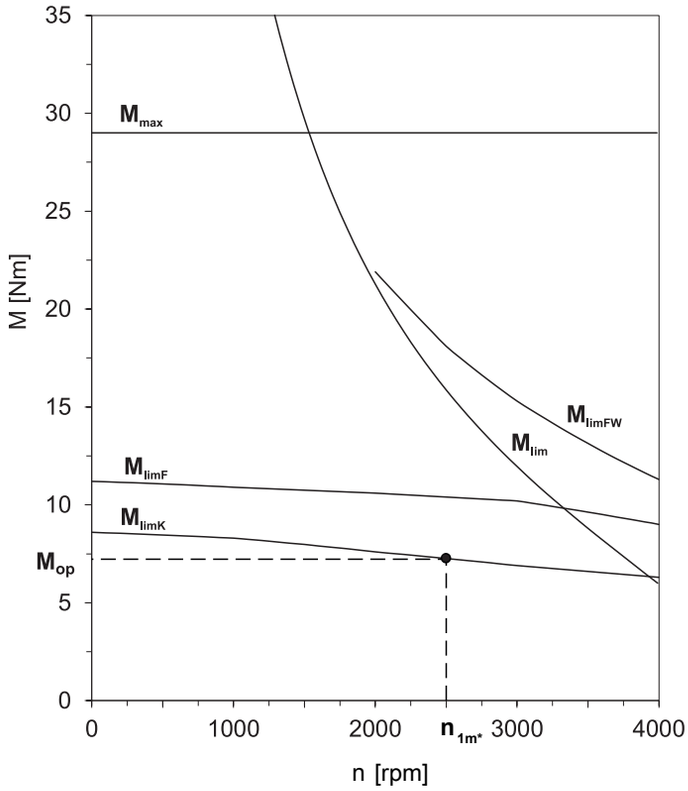
$$M_{2th} = M_{op} \cdot i \cdot K_{mot,th}$$

$$K_{mot,th} = 0{,}95 - \frac{a_{th}}{1000} \cdot fB_T \cdot \left(\frac{n_{1m^*}}{1000}\right)^3$$

The values for i and a_{th} can be found in the selection tables.

The values for fB_T can be found in the corresponding table in this chapter.

The value for the torque of the motor at operating point M_{op} with the determined average input speed n_{1m^*} can be found in the motor curve of Chapter [▶ 23.3]. Note the size, nominal speed n_N and cooling type of the motor. The figure below shows an example of reading the torque M_{op} of a motor with convection cooling at the operating point.



Operating factors

Operating mode	fB_{op}
Uniform continuous operation	1.00
Cyclic operation	1.00
Reversing load cyclic operation	1.00

Run time	fB_t
Daily run time ≤ 8 h	1.00
Daily run time ≤ 16 h	1.15
Daily run time ≤ 24 h	1.20

Temperature		fB_T
Motor cooling	**Surrounding temperature**	
Motor with forced ventilation	≤ 20 °C	0.9
	≤ 30 °C	1.0
	≤ 40 °C	1.15
Motor with convection cooling	≤ 20 °C	1.0
	≤ 30 °C	1.1
	≤ 40 °C	1.25

Notes

- The maximum permitted gear unit temperature (see the "Other product features" chapter) must not be exceeded. Doing so may result in damage to the geared motor.
- For braking from full speed (for example when the power fails or when setting up the machine), note the permitted gear unit torques (M_{2acc}, M_{2NOT}) in the selection tables.
- The values specified in the selection tables for M_{2acc} refer to the gear units with a solid shaft design without feather key (G). We recommend this shaft design in general for cyclic operation.

3.6.2 Permitted shaft loads for the output shaft

The values specified in the tables apply to the permitted shaft loads:

- For shaft dimensions in accordance with the catalog
- For output speeds $n_{2m*} \leq 100$ rpm ($F^{2axN} = F_{2ax100}$; $F_{2radN} = F_{2rad100}$; $M_{2kN} = M_{2k100}$)
- Only if radial forces on the gear unit are stabilized by its pilots (housing, flange shaft)

Permitted shaft loads for axially reinforced bearing D

Type	z_2 [mm]	F_{2ax100} [N]	$F_{2rad100}$ [N]	$F_{2rad,acc}$ [N]	M_{2k100} [Nm]	$M_{2k,acc}$ [Nm]
PA3	24.0	1400	2750	2750	105	105
PA4	25.0	2250	4500	5000	194	215
PA5	29.0	3500	7000	8000	406	464
PA7	31.0	4500	9000	10000	648	720
PA8	35.0	7500	15000	18000	1140	1368

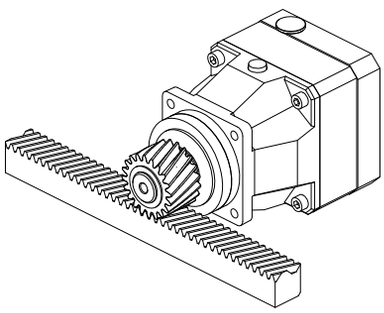


Fig. 1: Recommendation for bearing assignment D

For other output speeds, download diagrams at http://products.stoeber.de.

The following applies to output speeds n_{2m*} > 100 rpm:

$$F_{2axN} = \frac{F_{2ax100}}{\sqrt[3]{\frac{n_{2m*}}{100\ \text{rpm}}}} \qquad F_{2radN} = \frac{F_{2rad100}}{\sqrt[3]{\frac{n_{2m*}}{100\ \text{rpm}}}} \qquad M_{2kN} = \frac{M_{2k100}}{\sqrt[3]{\frac{n_{2m*}}{100\ \text{rpm}}}}$$

The values for F_{2ax100}, $F_{2rad100}$ and M_{2k100} can be found in the table "Permitted shaft loads" in this chapter.

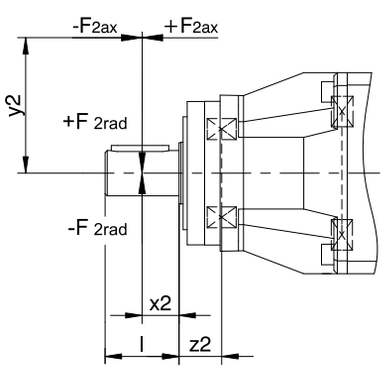


Fig. 2: Force application points

The specified values for $F_{2rad100}$ and $F_{2rad,acc}$ refer to an application of force at the center of the output shaft: $x_2 = l/2$.

Shaft dimensions can be found in the "Dimensional drawings" chapter.

The following applies to other force application points:

$$M_{2k,acc*} = \frac{2 \cdot F_{2ax*} \cdot y_2 + F_{2rad,acc*} \cdot (x_2 + z_2)}{1000} \leq M_{2k,acc}$$

$$F_{2rad,acc*} \leq F_{2rad,acc}$$

$$F_{2ax*} \leq F_{2axN}$$

The values for $F_{2rad,acc}$ and $M_{2k,acc}$ can be found in the table "Permitted shaft loads" in this chapter.

For applications with multiple axial and/or radial forces, you must add the forces as vectors.

In the event of EMERGENCY OFF operation (max. 1000 load changes), you can multiply the permitted forces and torques for F_{2ax100}, $F_{2rad100}$ and M_{2k100} by a factor of two.

Also note the calculation for equivalent values:

$$M_{2k,eq^*} = \sqrt[3]{\frac{|n_{2m,1^*}| \cdot t_{1^*} \cdot |M_{2k,acc,1^*}^{\ 3}| + \ldots + |n_{2m,n^*}| \cdot t_{n^*} \cdot |M_{2k,acc,n^*}^{\ 3}|}{|n_{2m,1^*}| \cdot t_{1^*} + \ldots + |n_{2m,n^*}| \cdot t_{n^*}}} \leq M_{2kN}$$

$$F_{2rad,eq^*} = \sqrt[3]{\frac{|n_{2m,1^*}| \cdot t_{1^*} \cdot |F_{2rad,acc,1^*}^{\ 3}| + \ldots + |n_{2m,n^*}| \cdot t_{n^*} \cdot |F_{2rad,acc,n^*}^{\ 3}|}{|n_{2m,1^*}| \cdot t_{1^*} + \ldots + |n_{2m,n^*}| \cdot t_{n^*}}} \leq F_{2radN}$$

The following apply to the bearing service life L_{10h} ($ED_{20} \leq 40\%$):

$L_{10h} > 10000$ h with $1 < M_{2kN}/M_{2k^*} < 1.25$

$L_{10h} > 20000$ h with $1.25 < M_{2kN}/M_{2k^*} < 1.5$

$L_{10h} > 30000$ h with $1.5 < M_{2kN}/M_{2k^*}$

For different duty cycles:

$$L_{10h} > L_{10h(ED_{20}=40\%)} \cdot \frac{40\%}{ED_{20}}$$

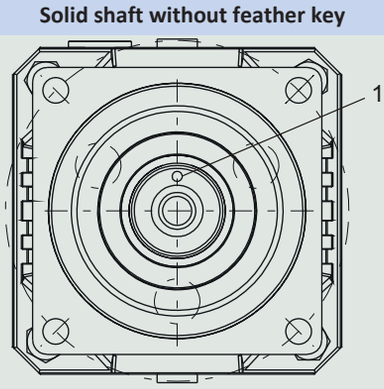
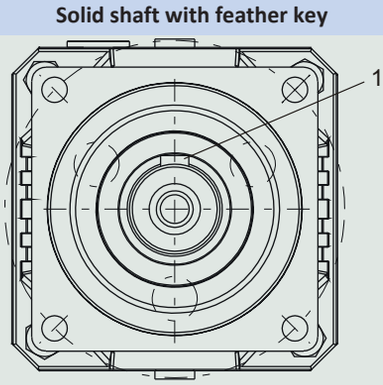
3.6.3 Radial shaft seal rings

Leak-proofness

Our gear units are equipped with high-quality radial shaft seal rings and checked for leak-proofness. However, a leak cannot be fully ruled out over the length of use of a gear unit. If you use a gear unit with goods incompatible with the lubricant, you must take measures to prevent direct contact with the gear unit lubricant in case of a leak.

3.6.4 Reverse operation

To ensure lubrication of circulating geared parts during cyclic reverse operation from ± 20° to ± 90°, pay careful attention to the position of the output shaft if the gear unit is installed horizontally as shown in the images below. The images show the center position of reverse operation. Cyclic reverse operation ≤ ± 20° on request.

Solid shaft without feather key	Solid shaft with feather key
	
1) Position of the mark: top	1) Position of the feather key: top

Notes

- If you use the solid shaft without a feather key (G) with a mark, note the position of the mark during assembly.
- As an alternative, you can use the solid shaft with a feather key (P) and clamp. In that case, the feather key functions for position orientation.

3.7 Additional documentation

Additional documentation related to the product can be found at http://www.stoeber.de/en/download

Enter the ID of the documentation in the Search... field.

Documentation	ID
Operating manual for P/PA/PE/PH/PHA/PHQ/PHQA/PHV/PHVA planetary gear units and planetary geared motors	443029_en
Lubricant filling quantities for gear units	441871

4 PH planetary geared motors

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4 Planetary geared motors PH

4.1 Overview

High-performance precision planetary geared motors

Features

Power density	★★★★☆
Backlash	★★★★☆
Price category	€€€
Shaft load	★★★★★
Smooth operation	★★★★☆
Torsional stiffness	★★★★☆
Mass moment of inertia	★★★★★
Helical gearing	✓
Maintenance-free	✓
Any mounting position	✓
Continuous operation without cooling	✓
Stiff output bearing due to pretension	✓
Compact and highly dynamic due to direct motor attachment	✓

Key: ★☆☆☆☆ good | ★★★★★ excellent
€ Economy | €€€€€ Premium

Technical data

i	4 – 100
M_{2acc}	24 – 7500 Nm
$\Delta\phi_2$	3 – 4 arcmin
η_{get}	≤ 96 %

4.2 Selection tables

The technical data specified in the selection tables applies to:

- Installation altitudes up to 1000 m above sea level
- Surrounding temperatures from 0 °C to 40 °C
- Drives with convection-cooled motors (e.g. EZ401**U**)

You can calculate the technical data for drives with forced ventilated motors (for example EZ401**B**) at http://products.stoeber.de.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2.0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/arcmin]	m [kg]
PH3 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 65 Nm)															
60	43	44	1.5	1.0	PH322_0500 EZ301U	65	130	50.00	50/1	4500	8000	0.20	4	14	2.9
86	30	31	1.8	1.5	PH322_0350 EZ301U	65	130	35.00	35/1	4500	8000	0.20	4	15	2.9
107	24	25	2.0	1.9	PH322_0280 EZ301U	60	130	28.00	28/1	4500	8000	0.23	4	15	2.9
107	41	44	3.5	1.1	PH322_0280 EZ302U	60	130	28.00	28/1	4500	8000	0.33	4	15	3.5
120	22	22	2.2	2.1	PH322_0250 EZ301U	65	130	25.00	25/1	4500	8000	0.22	4	15	2.9
120	37	39	3.7	1.2	PH322_0250 EZ302U	65	130	25.00	25/1	4500	8000	0.32	4	15	3.5
150	17	18	2.4	2.6	PH322_0200 EZ301U	52	130	20.00	20/1	4500	8000	0.24	4	15	2.9
150	30	31	4.1	1.5	PH322_0200 EZ302U	65	130	20.00	20/1	4500	8000	0.34	4	15	3.5
150	39	41	5.4	1.2	PH322_0200 EZ303U	65	130	20.00	20/1	4500	8000	0.45	4	15	4.0
300	8.9	9.1	1.6	2.9	PH321_0100 EZ301U	27	100	10.00	10/1	3800	6000	0.21	4	11	2.4
300	15	16	2.8	1.7	PH321_0100 EZ302U	48	100	10.00	10/1	3800	6000	0.31	4	11	3.0
300	20	21	3.6	1.3	PH321_0100 EZ303U	50	100	10.00	10/1	3800	6000	0.42	4	11	3.5
429	11	11	2.9	3.7	PH321_0070 EZ302U	34	130	7.000	7/1	3500	6000	0.33	4	14	3.0
429	14	15	3.7	2.8	PH321_0070 EZ303U	47	130	7.000	7/1	3500	6000	0.44	4	14	3.5
429	19	20	5.0	2.1	PH321_0070 EZ401U	57	130	7.000	7/1	3500	6000	0.97	4	14	4.9
429	32	35	8.4	1.2	PH321_0070 EZ402U	60	130	7.000	7/1	3500	6000	1.7	4	14	6.0
600	9.9	11	5.6	4.0	PH321_0050 EZ303U	34	110	5.000	5/1	3000	6000	0.47	4	16	3.5
600	13	14	7.5	2.9	PH321_0050 EZ401U	41	130	5.000	5/1	3000	6000	1.0	4	16	4.9
600	23	25	13	1.7	PH321_0050 EZ402U	65	130	5.000	5/1	3000	6000	1.7	4	16	6.0
600	33	41	19	1.2	PH321_0050 EZ404U	65	130	5.000	5/1	3000	6000	3.1	4	16	8.1
PH3 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 65 Nm)															
171	29	31	1.7	1.6	PH322_0350 EZ301U	65	130	35.00	35/1	4500	8000	0.20	4	15	2.9
214	23	25	1.9	1.9	PH322_0280 EZ301U	60	130	28.00	28/1	4500	8000	0.23	4	15	2.9
214	39	44	3.3	1.2	PH322_0280 EZ302U	60	130	28.00	28/1	4500	8000	0.33	4	15	3.5
240	21	22	2.1	2.2	PH322_0250 EZ301U	65	130	25.00	25/1	4500	8000	0.22	4	15	2.9
240	35	39	3.5	1.3	PH322_0250 EZ302U	65	130	25.00	25/1	4500	8000	0.32	4	15	3.5
300	17	18	2.3	2.7	PH322_0200 EZ301U	52	130	20.00	20/1	4500	8000	0.24	4	15	2.9
300	28	31	3.9	1.6	PH322_0200 EZ302U	65	130	20.00	20/1	4500	8000	0.34	4	15	3.5
300	36	42	5.1	1.2	PH322_0200 EZ303U	65	130	20.00	20/1	4500	8000	0.45	4	15	4.0
600	8.5	9.1	2.0	2.4	PH321_0100 EZ301U	27	100	10.00	10/1	3800	6000	0.21	4	11	2.4
600	14	16	3.3	1.4	PH321_0100 EZ302U	48	100	10.00	10/1	3800	6000	0.31	4	11	3.0
600	19	22	4.3	1.1	PH321_0100 EZ303U	50	100	10.00	10/1	3800	6000	0.42	4	11	3.5
857	10	11	3.4	3.1	PH321_0070 EZ302U	34	130	7.000	7/1	3500	6000	0.33	4	14	3.0
857	13	15	4.4	2.4	PH321_0070 EZ303U	47	130	7.000	7/1	3500	6000	0.44	4	14	3.5
857	15	19	5.2	2.0	PH321_0070 EZ401U	57	130	7.000	7/1	3500	6000	0.97	4	14	4.9
857	24	33	7.9	1.3	PH321_0070 EZ402U	60	130	7.000	7/1	3500	6000	1.7	4	14	6.0
1200	7.2	8.1	5.1	4.3	PH321_0050 EZ302U	24	110	5.000	5/1	3000	6000	0.36	4	16	3.0
1200	9.4	11	6.6	3.3	PH321_0050 EZ303U	34	110	5.000	5/1	3000	6000	0.47	4	16	3.5
1200	11	13	7.8	2.8	PH321_0050 EZ401U	41	130	5.000	5/1	3000	6000	1.0	4	16	4.9
1200	17	24	12	1.9	PH321_0050 EZ402U	65	130	5.000	5/1	3000	6000	1.7	4	16	6.0
1200	28	40	20	1.1	PH321_0050 EZ404U	65	130	5.000	5/1	3000	6000	3.1	4	16	8.1
PH4 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 130 Nm)															
43	61	62	0.7	1.5	PH422_0700 EZ301U	110	240	70.00	70/1	4500	8000	0.21	3	27	5.3
60	43	44	0.9	2.1	PH422_0500 EZ301U	130	240	50.00	50/1	4500	8000	0.21	3	27	5.3
60	74	78	1.5	1.2	PH422_0500 EZ302U	130	240	50.00	50/1	4500	8000	0.31	3	27	5.9
75	35	35	1.0	2.6	PH422_0400 EZ301U	100	240	40.00	40/1	4500	8000	0.21	3	24	5.3
75	59	62	1.6	1.5	PH422_0400 EZ302U	130	240	40.00	40/1	4500	8000	0.31	3	24	5.9
75	77	81	2.1	1.2	PH422_0400 EZ303U	130	240	40.00	40/1	4500	8000	0.42	3	24	6.4
86	30	31	1.0	3.0	PH422_0350 EZ301U	91	240	35.00	35/1	4500	8000	0.23	3	28	5.3
86	52	55	1.8	1.7	PH422_0350 EZ302U	130	240	35.00	35/1	4500	8000	0.33	3	28	5.9
86	67	71	2.3	1.3	PH422_0350 EZ303U	130	240	35.00	35/1	4500	8000	0.44	3	28	6.4
107	24	25	1.1	3.7	PH422_0280 EZ301U	73	240	28.00	28/1	4500	8000	0.24	3	25	5.3

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PH4 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 130 Nm)															
107	41	44	2.0	2.2	PH422_0280 EZ302U	130	240	28.00	28/1	4500	8000	0.34	3	25	5.9
107	54	57	2.5	1.7	PH422_0280 EZ303U	130	240	28.00	28/1	4500	8000	0.45	3	25	6.4
107	73	78	3.4	1.2	PH422_0280 EZ401U	130	240	28.00	28/1	4500	8000	0.98	3	25	7.8
120	22	22	1.2	4.2	PH422_0250 EZ301U	65	240	25.00	25/1	4000	7000	0.28	3	29	5.3
120	37	39	2.1	2.4	PH422_0250 EZ302U	120	240	25.00	25/1	4000	7000	0.38	3	29	5.9
120	48	51	2.7	1.9	PH422_0250 EZ303U	130	240	25.00	25/1	4000	7000	0.49	3	29	6.4
120	65	70	3.6	1.4	PH422_0250 EZ401U	130	240	25.00	25/1	4000	7000	1.0	3	29	7.8
150	30	31	2.3	3.0	PH422_0200 EZ302U	93	240	20.00	20/1	3700	6500	0.43	3	29	5.9
150	39	41	3.0	2.3	PH422_0200 EZ303U	130	240	20.00	20/1	3700	6500	0.54	3	29	6.4
150	52	56	4.1	1.7	PH422_0200 EZ401U	130	240	20.00	20/1	3700	6500	1.1	3	29	7.8
150	80	87	6.3	1.1	PH422_0200 EZ501U	130	240	20.00	20/1	3700	6500	3.0	3	29	8.8
150	87	97	6.8	1.0	PH422_0200 EZ402U	130	240	20.00	20/1	3700	6500	1.8	3	29	8.9
188	24	25	2.6	3.8	PH422_0160 EZ302U	74	240	16.00	16/1	3700	6500	0.44	3	27	5.9
188	31	33	3.4	2.9	PH422_0160 EZ303U	100	240	16.00	16/1	3700	6500	0.55	3	27	6.4
188	42	45	4.6	2.2	PH422_0160 EZ401U	130	240	16.00	16/1	3700	6500	1.1	3	27	7.8
188	64	70	7.0	1.4	PH422_0160 EZ501U	130	240	16.00	16/1	3700	6500	3.1	3	27	8.8
188	70	77	7.6	1.3	PH422_0160 EZ402U	130	240	16.00	16/1	3700	6500	1.8	3	27	8.9
300	27	29	2.8	2.0	PH421_0100 EZ401U	82	200	10.00	10/1	3500	6000	1.0	3	21	6.5
300	41	45	4.2	1.3	PH421_0100 EZ501U	100	200	10.00	10/1	3500	6000	3.0	3	21	7.5
300	45	50	4.6	1.2	PH421_0100 EZ402U	100	200	10.00	10/1	3500	6000	1.7	3	21	7.6
429	19	20	3.0	3.9	PH421_0070 EZ401U	57	240	7.000	7/1	3200	6000	1.1	3	31	6.5
429	29	32	4.6	2.6	PH421_0070 EZ501U	110	240	7.000	7/1	3200	6000	3.1	3	31	7.5
429	32	35	5.0	2.4	PH421_0070 EZ402U	110	240	7.000	7/1	3200	6000	1.8	3	31	7.6
429	46	58	7.4	1.6	PH421_0070 EZ404U	110	240	7.000	7/1	3200	6000	3.1	3	31	9.7
429	50	54	7.9	1.5	PH421_0070 EZ502U	110	240	7.000	7/1	3200	6000	5.4	3	31	9.0
429	65	75	10	1.1	PH421_0070 EZ503U	110	240	7.000	7/1	3200	6000	7.7	3	31	11
600	21	23	6.9	3.6	PH421_0050 EZ501U	77	240	5.000	5/1	2700	6000	3.2	3	37	7.5
600	23	25	7.5	3.3	PH421_0050 EZ402U	77	240	5.000	5/1	2700	6000	1.9	3	37	7.6
600	33	41	11	2.2	PH421_0050 EZ404U	130	240	5.000	5/1	2700	6000	3.3	3	37	9.7
600	36	38	12	2.1	PH421_0050 EZ502U	130	240	5.000	5/1	2700	6000	5.5	3	37	9.0
600	47	53	16	1.6	PH421_0050 EZ503U	130	240	5.000	5/1	2700	6000	7.9	3	37	11
600	65	77	22	1.1	PH421_0050 EZ505U	130	240	5.000	5/1	2700	6000	12	3	37	13
750	17	18	9.0	4.5	PH421_0040 EZ501U	61	240	4.000	4/1	2300	5000	3.4	3	39	7.5
750	18	20	9.8	4.1	PH421_0040 EZ402U	61	240	4.000	4/1	2300	5000	2.1	3	39	7.6
750	26	33	14	2.8	PH421_0040 EZ404U	110	240	4.000	4/1	2300	5000	3.5	3	39	9.7
750	28	31	15	2.6	PH421_0040 EZ502U	120	240	4.000	4/1	2300	5000	5.7	3	39	9.0
750	37	43	20	2.0	PH421_0040 EZ503U	130	240	4.000	4/1	2300	5000	8.1	3	39	11
750	52	61	28	1.4	PH421_0040 EZ505U	130	240	4.000	4/1	2300	5000	13	3	39	13
PH4 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 130 Nm)															
900	46	73	17	1.4	PH421_0050 EZ505U	130	240	5.000	5/1	2700	6000	12	3	37	13
1125	36	59	23	1.8	PH421_0040 EZ505U	130	240	4.000	4/1	2300	5000	13	3	39	13
PH4 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 130 Nm)															
86	58	62	0.7	1.6	PH422_0700 EZ301U	110	240	70.00	70/1	4500	8000	0.21	3	27	5.3
120	41	44	0.8	2.2	PH422_0500 EZ301U	130	240	50.00	50/1	4500	8000	0.21	3	27	5.3
120	70	78	1.4	1.3	PH422_0500 EZ302U	130	240	50.00	50/1	4500	8000	0.31	3	27	5.9
150	33	35	1.0	2.4	PH422_0400 EZ301U	100	240	40.00	40/1	4500	8000	0.21	3	24	5.3
150	56	62	1.7	1.4	PH422_0400 EZ302U	130	240	40.00	40/1	4500	8000	0.31	3	24	5.9
150	73	84	2.3	1.1	PH422_0400 EZ303U	130	240	40.00	40/1	4500	8000	0.42	3	24	6.4
171	29	31	1.0	3.1	PH422_0350 EZ301U	91	240	35.00	35/1	4500	8000	0.23	3	28	5.3
171	49	55	1.7	1.8	PH422_0350 EZ302U	130	240	35.00	35/1	4500	8000	0.33	3	28	5.9
171	64	73	2.2	1.4	PH422_0350 EZ303U	130	240	35.00	35/1	4500	8000	0.44	3	28	6.4
171	75	91	2.5	1.2	PH422_0350 EZ401U	130	240	35.00	35/1	4500	8000	0.97	3	28	7.8
214	23	25	1.1	3.9	PH422_0280 EZ301U	73	240	28.00	28/1	4500	8000	0.24	3	25	5.3
214	39	44	1.8	2.3	PH422_0280 EZ302U	130	240	28.00	28/1	4500	8000	0.34	3	25	5.9
214	51	59	2.4	1.8	PH422_0280 EZ303U	130	240	28.00	28/1	4500	8000	0.45	3	25	6.4
214	60	73	2.8	1.5	PH422_0280 EZ401U	130	240	28.00	28/1	4500	8000	0.98	3	25	7.8
240	21	22	1.2	4.3	PH422_0250 EZ301U	65	240	25.00	25/1	4000	7000	0.28	3	29	5.3
240	35	39	2.0	2.6	PH422_0250 EZ302U	120	240	25.00	25/1	4000	7000	0.38	3	29	5.9
240	46	52	2.6	2.0	PH422_0250 EZ303U	130	240	25.00	25/1	4000	7000	0.49	3	29	6.4
240	53	65	3.0	1.7	PH422_0250 EZ401U	130	240	25.00	25/1	4000	7000	1.0	3	29	7.8
300	28	31	2.2	3.2	PH422_0200 EZ302U	93	240	20.00	20/1	3700	6500	0.43	3	29	5.9
300	36	42	2.9	2.5	PH422_0200 EZ303U	130	240	20.00	20/1	3700	6500	0.54	3	29	6.4
300	43	52	3.3	2.1	PH422_0200 EZ401U	130	240	20.00	20/1	3700	6500	1.1	3	29	7.8
300	63	82	5.0	1.4	PH422_0200 EZ501U	130	240	20.00	20/1	3700	6500	3.0	3	29	8.8

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PH4 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 130 Nm)															
300	65	91	5.1	1.4	PH422_0200 EZ402U	130	240	20.00	20/1	3700	6500	1.8	3	29	8.9
375	22	25	2.4	4.0	PH422_0160 EZ302U	74	240	16.00	16/1	3700	6500	0.44	3	27	5.9
375	29	33	3.2	3.1	PH422_0160 EZ303U	100	240	16.00	16/1	3700	6500	0.55	3	27	6.4
375	34	42	3.7	2.6	PH422_0160 EZ401U	130	240	16.00	16/1	3700	6500	1.1	3	27	7.8
375	51	65	5.5	1.8	PH422_0160 EZ501U	130	240	16.00	16/1	3700	6500	3.1	3	27	8.8
375	52	73	5.7	1.7	PH422_0160 EZ402U	130	240	16.00	16/1	3700	6500	1.8	3	27	8.9
600	22	27	2.9	1.9	PH421_0100 EZ401U	82	200	10.00	10/1	3500	6000	1.0	3	21	6.5
600	33	42	4.2	1.3	PH421_0100 EZ501U	100	200	10.00	10/1	3500	6000	3.0	3	21	7.5
600	34	47	4.4	1.2	PH421_0100 EZ402U	100	200	10.00	10/1	3500	6000	1.7	3	21	7.6
857	15	19	3.1	3.8	PH421_0070 EZ401U	57	240	7.000	7/1	3200	6000	1.1	3	31	6.5
857	23	30	4.6	2.6	PH421_0070 EZ501U	110	240	7.000	7/1	3200	6000	3.1	3	31	7.5
857	24	33	4.7	2.5	PH421_0070 EZ402U	110	240	7.000	7/1	3200	6000	1.8	3	31	7.6
857	35	52	7.0	1.7	PH421_0070 EZ502U	110	240	7.000	7/1	3200	6000	5.4	3	31	9.0
857	39	56	7.8	1.5	PH421_0070 EZ404U	110	240	7.000	7/1	3200	6000	3.1	3	31	9.7
857	42	71	8.4	1.4	PH421_0070 EZ503U	110	240	7.000	7/1	3200	6000	7.7	3	31	11
1200	16	21	6.9	3.6	PH421_0050 EZ501U	77	240	5.000	5/1	2700	6000	3.2	3	37	7.5
1200	17	24	7.1	3.5	PH421_0050 EZ402U	77	240	5.000	5/1	2700	6000	1.9	3	37	7.6
1200	25	37	10	2.4	PH421_0050 EZ502U	130	240	5.000	5/1	2700	6000	5.5	3	37	9.0
1200	28	40	12	2.1	PH421_0050 EZ404U	130	240	5.000	5/1	2700	6000	3.3	3	37	9.7
1200	30	51	13	2.0	PH421_0050 EZ503U	130	240	5.000	5/1	2700	6000	7.9	3	37	11
PH5 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 320 Nm)															
43	182	195	1.0	1.2	PH522_0700 EZ401U	270	600	70.00	70/1	4000	7000	0.98	3	66	11
60	130	140	1.2	1.7	PH522_0500 EZ401U	320	600	50.00	50/1	4000	7000	0.98	3	66	11
60	200	219	1.8	1.1	PH522_0500 EZ501U	320	600	50.00	50/1	4000	7000	3.0	3	66	12
60	219	242	2.0	1.0	PH522_0500 EZ402U	320	600	50.00	50/1	4000	7000	1.7	3	66	12
75	104	112	1.4	1.9	PH522_0400 EZ401U	320	600	40.00	40/1	4000	7000	0.98	3	58	11
75	160	175	2.2	1.3	PH522_0400 EZ501U	320	600	40.00	40/1	4000	7000	2.9	3	58	12
75	175	193	2.4	1.2	PH522_0400 EZ402U	320	600	40.00	40/1	4000	7000	1.7	3	58	12
86	91	98	1.4	2.4	PH522_0350 EZ401U	280	600	35.00	35/1	4000	7000	1.0	3	68	11
86	140	153	2.2	1.6	PH522_0350 EZ501U	320	600	35.00	35/1	4000	7000	3.0	3	68	12
86	153	169	2.4	1.4	PH522_0350 EZ402U	320	600	35.00	35/1	4000	7000	1.7	3	68	12
107	73	78	1.6	2.9	PH522_0280 EZ401U	220	600	28.00	28/1	4000	7000	1.0	3	61	11
107	112	122	2.5	1.9	PH522_0280 EZ501U	320	600	28.00	28/1	4000	7000	3.0	3	61	12
107	122	135	2.8	1.7	PH522_0280 EZ402U	320	600	28.00	28/1	4000	7000	1.7	3	61	12
107	180	224	4.0	1.2	PH522_0280 EZ404U	320	600	28.00	28/1	4000	7000	3.1	3	61	14
107	193	208	4.3	1.1	PH522_0280 EZ502U	320	600	28.00	28/1	4000	7000	5.3	3	61	13
120	65	70	1.7	3.4	PH522_0250 EZ401U	200	600	25.00	25/1	3700	6500	1.2	3	71	11
120	100	109	2.5	2.2	PH522_0250 EZ501U	320	600	25.00	25/1	3700	6500	3.1	3	71	12
120	109	121	2.8	2.0	PH522_0250 EZ402U	320	600	25.00	25/1	3700	6500	1.9	3	71	12
120	160	200	4.1	1.4	PH522_0250 EZ404U	320	600	25.00	25/1	3700	6500	3.2	3	71	14
120	172	186	4.4	1.3	PH522_0250 EZ502U	320	600	25.00	25/1	3700	6500	5.4	3	71	13
120	172	193	4.4	1.3	PH522_0250 EZ701U	320	600	25.00	25/1	3700	6500	8.7	3	71	15
150	52	56	1.9	4.2	PH522_0200 EZ401U	160	600	20.00	20/1	3300	6000	1.3	3	71	11
150	80	87	2.8	2.8	PH522_0200 EZ501U	300	600	20.00	20/1	3300	6000	3.2	3	71	12
150	87	97	3.1	2.5	PH522_0200 EZ402U	300	600	20.00	20/1	3300	6000	2.0	3	71	12
150	128	160	4.6	1.7	PH522_0200 EZ404U	320	600	20.00	20/1	3300	6000	3.3	3	71	14
150	138	149	4.9	1.6	PH522_0200 EZ502U	320	600	20.00	20/1	3300	6000	5.5	3	71	13
150	138	154	4.9	1.6	PH522_0200 EZ701U	320	600	20.00	20/1	3300	6000	8.8	3	71	15
150	180	206	6.4	1.2	PH522_0200 EZ503U	320	600	20.00	20/1	3300	6000	7.9	3	71	15
188	64	70	3.3	3.3	PH522_0160 EZ501U	240	600	16.00	16/1	3300	6000	3.2	3	65	12
188	70	77	3.6	3.0	PH522_0160 EZ402U	240	600	16.00	16/1	3300	6000	1.9	3	65	12
188	103	128	5.3	2.0	PH522_0160 EZ404U	320	600	16.00	16/1	3300	6000	3.3	3	65	14
188	110	119	5.7	1.9	PH522_0160 EZ502U	320	600	16.00	16/1	3300	6000	5.5	3	65	13
188	110	124	5.7	1.9	PH522_0160 EZ701U	300	600	16.00	16/1	3300	6000	8.8	3	65	15
188	144	165	7.5	1.5	PH522_0160 EZ503U	320	600	16.00	16/1	3300	6000	7.9	3	65	15
188	179	214	9.3	1.2	PH522_0160 EZ702U	320	600	16.00	16/1	3300	6000	14	3	65	18
188	201	238	10	1.0	PH522_0160 EZ505U	320	600	16.00	16/1	3300	6000	12	3	65	18
300	41	45	2.0	3.0	PH521_0100 EZ501U	150	500	10.00	10/1	3300	6000	3.1	3	55	9.5
300	71	77	3.5	1.7	PH521_0100 EZ502U	250	500	10.00	10/1	3300	6000	5.4	3	55	11
300	71	80	3.5	1.7	PH521_0100 EZ701U	190	500	10.00	10/1	3300	6000	8.7	3	55	13
300	93	107	4.6	1.3	PH521_0100 EZ503U	250	500	10.00	10/1	3300	6000	7.8	3	55	13
300	115	138	5.6	1.1	PH521_0100 EZ702U	250	500	10.00	10/1	3300	6000	14	3	55	15
429	50	54	3.6	3.7	PH521_0070 EZ502U	210	600	7.000	7/1	3000	6000	5.7	3	77	11
429	50	56	3.6	3.7	PH521_0070 EZ701U	130	600	7.000	7/1	3000	6000	9.0	3	77	13

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PH5 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 320 Nm)															
429	65	75	4.7	2.8	PH521_0070 EZ503U	270	600	7.000	7/1	3000	6000	8.1	3	77	13
429	81	97	5.8	2.3	PH521_0070 EZ702U	270	600	7.000	7/1	3000	6000	14	3	77	15
429	91	108	6.5	2.0	PH521_0070 EZ505U	270	600	7.000	7/1	3000	6000	13	3	77	15
429	111	140	7.9	1.7	PH521_0070 EZ703U	270	600	7.000	7/1	3000	6000	22	3	77	17
600	47	53	7.0	3.9	PH521_0050 EZ503U	210	430	5.000	5/1	2500	5500	8.6	3	93	13
600	58	69	8.6	3.2	PH521_0050 EZ702U	200	600	5.000	5/1	2500	5500	15	3	93	15
600	65	77	9.7	2.8	PH521_0050 EZ505U	320	600	5.000	5/1	2500	5500	13	3	93	15
600	79	100	12	2.3	PH521_0050 EZ703U	310	600	5.000	5/1	2500	5500	23	3	93	17
600	102	145	15	1.8	PH521_0050 EZ705U	320	600	5.000	5/1	2500	5500	35	3	93	23
750	37	43	9.1	4.9	PH521_0040 EZ503U	170	340	4.000	4/1	2200	5000	9.1	3	98	13
750	46	55	11	4.0	PH521_0040 EZ702U	160	600	4.000	4/1	2200	5000	15	3	98	15
750	52	61	13	3.5	PH521_0040 EZ505U	260	600	4.000	4/1	2200	5000	14	3	98	15
750	63	80	16	2.9	PH521_0040 EZ703U	250	600	4.000	4/1	2200	5000	23	3	98	17
750	82	116	20	2.2	PH521_0040 EZ705U	320	600	4.000	4/1	2200	5000	36	3	98	23
PH5 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 320 Nm)															
281	141	228	7.4	1.5	PH522_0160 EZ505U	320	600	16.00	16/1	3300	6000	12	3	65	18
450	91	147	5.1	1.2	PH521_0100 EZ505U	250	500	10.00	10/1	3300	6000	12	3	55	15
643	64	103	5.2	2.5	PH521_0070 EZ505U	270	600	7.000	7/1	3000	6000	13	3	77	15
643	81	134	6.7	2.0	PH521_0070 EZ703U	270	600	7.000	7/1	3000	6000	22	3	77	17
900	46	73	7.8	3.5	PH521_0050 EZ505U	320	600	5.000	5/1	2500	5500	13	3	93	15
900	58	96	10	2.8	PH521_0050 EZ703U	310	600	5.000	5/1	2500	5500	23	3	93	17
900	79	144	14	2.0	PH521_0050 EZ705U	320	600	5.000	5/1	2500	5500	35	3	93	23
1125	36	59	10	4.4	PH521_0040 EZ505U	260	600	4.000	4/1	2200	5000	14	3	98	15
1125	46	77	13	3.4	PH521_0040 EZ703U	250	600	4.000	4/1	2200	5000	23	3	98	17
1125	63	115	18	2.5	PH521_0040 EZ705U	320	600	4.000	4/1	2200	5000	36	3	98	23
PH5 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 320 Nm)															
86	150	182	0.9	1.4	PH522_0700 EZ401U	270	600	70.00	70/1	4000	7000	0.98	3	66	11
120	107	130	1.1	1.9	PH522_0500 EZ401U	320	600	50.00	50/1	4000	7000	0.98	3	66	11
120	158	205	1.6	1.3	PH522_0500 EZ501U	320	600	50.00	50/1	4000	7000	3.0	3	66	12
120	163	228	1.6	1.2	PH522_0500 EZ402U	320	600	50.00	50/1	4000	7000	1.7	3	66	12
150	86	104	1.5	1.9	PH522_0400 EZ401U	320	600	40.00	40/1	4000	7000	0.98	3	58	11
150	126	164	2.2	1.3	PH522_0400 EZ501U	320	600	40.00	40/1	4000	7000	2.9	3	58	12
150	130	182	2.3	1.2	PH522_0400 EZ402U	320	600	40.00	40/1	4000	7000	1.7	3	58	12
171	75	91	1.2	2.9	PH522_0350 EZ401U	280	600	35.00	35/1	4000	7000	1.0	3	68	11
171	111	143	1.7	2.0	PH522_0350 EZ501U	320	600	35.00	35/1	4000	7000	3.0	3	68	12
171	114	159	1.8	1.9	PH522_0350 EZ402U	320	600	35.00	35/1	4000	7000	1.7	3	68	12
214	60	73	1.3	3.5	PH522_0280 EZ401U	220	600	28.00	28/1	4000	7000	1.0	3	61	11
214	89	115	2.0	2.4	PH522_0280 EZ501U	320	600	28.00	28/1	4000	7000	3.0	3	61	12
214	91	128	2.1	2.3	PH522_0280 EZ402U	320	600	28.00	28/1	4000	7000	1.7	3	61	12
214	135	203	3.0	1.6	PH522_0280 EZ502U	320	600	28.00	28/1	4000	7000	5.3	3	61	13
214	151	219	3.4	1.4	PH522_0280 EZ404U	320	600	28.00	28/1	4000	7000	3.1	3	61	14
240	53	65	1.4	4.1	PH522_0250 EZ401U	200	600	25.00	25/1	3700	6500	1.2	3	71	11
240	79	102	2.0	2.8	PH522_0250 EZ501U	320	600	25.00	25/1	3700	6500	3.1	3	71	12
240	81	114	2.1	2.7	PH522_0250 EZ402U	320	600	25.00	25/1	3700	6500	1.9	3	71	12
240	121	181	3.1	1.8	PH522_0250 EZ502U	320	600	25.00	25/1	3700	6500	5.4	3	71	13
240	121	184	3.1	1.8	PH522_0250 EZ701U	320	600	25.00	25/1	3700	6500	8.7	3	71	15
240	135	195	3.4	1.6	PH522_0250 EZ404U	320	600	25.00	25/1	3700	6500	3.2	3	71	14
240	144	246	3.7	1.5	PH522_0250 EZ503U	320	600	25.00	25/1	3700	6500	7.8	3	71	15
300	63	82	2.2	3.5	PH522_0200 EZ501U	300	600	20.00	20/1	3300	6000	3.2	3	71	12
300	65	91	2.3	3.4	PH522_0200 EZ402U	300	600	20.00	20/1	3300	6000	2.0	3	71	12
300	97	145	3.4	2.3	PH522_0200 EZ502U	320	600	20.00	20/1	3300	6000	5.5	3	71	13
300	97	147	3.4	2.3	PH522_0200 EZ701U	320	600	20.00	20/1	3300	6000	8.8	3	71	15
300	108	156	3.8	2.0	PH522_0200 EZ404U	320	600	20.00	20/1	3300	6000	3.3	3	71	14
300	115	197	4.1	1.9	PH522_0200 EZ503U	320	600	20.00	20/1	3300	6000	7.9	3	71	15
375	51	65	2.6	4.2	PH522_0160 EZ501U	240	600	16.00	16/1	3300	6000	3.2	3	65	12
375	52	73	2.7	4.0	PH522_0160 EZ402U	240	600	16.00	16/1	3300	6000	1.9	3	65	12
375	77	116	4.0	2.7	PH522_0160 EZ502U	320	600	16.00	16/1	3300	6000	5.5	3	65	13
375	77	118	4.0	2.7	PH522_0160 EZ701U	300	600	16.00	16/1	3300	6000	8.8	3	65	15
375	86	125	4.5	2.4	PH522_0160 EZ404U	320	600	16.00	16/1	3300	6000	3.3	3	65	14
375	92	158	4.8	2.3	PH522_0160 EZ503U	320	600	16.00	16/1	3300	6000	7.9	3	65	15
375	107	213	5.6	2.0	PH522_0160 EZ702U	320	600	16.00	16/1	3300	6000	14	3	65	18
600	33	42	2.0	3.0	PH521_0100 EZ501U	150	500	10.00	10/1	3300	6000	3.1	3	55	9.5
600	50	75	3.1	1.9	PH521_0100 EZ502U	250	500	10.00	10/1	3300	6000	5.4	3	55	11
600	50	76	3.1	1.9	PH521_0100 EZ701U	190	500	10.00	10/1	3300	6000	8.7	3	55	13

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PH5 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 320 Nm)															
600	60	102	3.7	1.6	PH521_0100 EZ503U	250	500	10.00	10/1	3300	6000	7.8	3	55	13
600	69	137	4.3	1.4	PH521_0100 EZ702U	250	500	10.00	10/1	3300	6000	14	3	55	15
857	35	52	3.2	4.2	PH521_0070 EZ502U	210	600	7.000	7/1	3000	6000	5.7	3	77	11
857	35	53	3.2	4.2	PH521_0070 EZ701U	130	600	7.000	7/1	3000	6000	9.0	3	77	13
857	42	71	3.8	3.5	PH521_0070 EZ503U	270	600	7.000	7/1	3000	6000	8.1	3	77	13
857	48	96	4.4	3.0	PH521_0070 EZ702U	270	600	7.000	7/1	3000	6000	14	3	77	15
PH7 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 700 Nm)															
400	210	317	16	2.1	PH721_0050 EZ805U	700	1400	5.000	5/1	2200	5000	135	3	184	54
500	168	254	21	2.6	PH721_0040 EZ805U	700	1370	4.000	4/1	1900	4000	137	3	185	54
PH7 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 700 Nm)															
43	280	306	0.9	1.6	PH722_0700 EZ501U	650	1240	70.00	70/1	3700	6500	3.1	3	142	18
60	200	219	1.1	2.2	PH722_0500 EZ501U	700	1400	50.00	50/1	3700	6500	3.1	3	142	18
60	344	372	1.9	1.3	PH722_0500 EZ502U	700	1400	50.00	50/1	3700	6500	5.4	3	142	19
60	344	386	1.9	1.3	PH722_0500 EZ701U	700	1400	50.00	50/1	3700	6500	8.7	3	142	21
75	160	175	1.2	2.8	PH722_0400 EZ501U	600	1370	40.00	40/1	3700	6500	3.1	3	126	18
75	275	298	2.1	1.6	PH722_0400 EZ502U	700	1370	40.00	40/1	3700	6500	5.4	3	126	19
75	275	309	2.1	1.6	PH722_0400 EZ701U	700	1370	40.00	40/1	3700	6500	8.7	3	126	21
75	361	413	2.7	1.2	PH722_0400 EZ503U	700	1370	40.00	40/1	3700	6500	7.8	3	126	21
86	140	153	1.3	3.1	PH722_0350 EZ501U	520	1400	35.00	35/1	3700	6500	3.2	3	146	18
86	241	260	2.2	1.8	PH722_0350 EZ502U	700	1400	35.00	35/1	3700	6500	5.5	3	146	19
86	241	270	2.2	1.8	PH722_0350 EZ701U	650	1400	35.00	35/1	3700	6500	8.8	3	146	21
86	316	361	2.9	1.4	PH722_0350 EZ503U	700	1400	35.00	35/1	3700	6500	7.9	3	146	21
86	391	469	3.6	1.1	PH722_0350 EZ702U	700	1400	35.00	35/1	3700	6500	14	3	146	23
86	439	521	4.1	1.0	PH722_0350 EZ505U	700	1400	35.00	35/1	3700	6500	12	3	146	23
107	112	122	1.4	3.9	PH722_0280 EZ501U	420	1370	28.00	28/1	3700	6500	3.3	3	131	18
107	193	208	2.5	2.3	PH722_0280 EZ502U	700	1370	28.00	28/1	3700	6500	5.6	3	131	19
107	193	216	2.5	2.3	PH722_0280 EZ701U	520	1370	28.00	28/1	3700	6500	8.9	3	131	21
107	253	289	3.3	1.7	PH722_0280 EZ503U	700	1370	28.00	28/1	3700	6500	8.0	3	131	21
107	312	375	4.0	1.4	PH722_0280 EZ702U	700	1370	28.00	28/1	3700	6500	14	3	131	23
107	352	417	4.5	1.3	PH722_0280 EZ505U	700	1370	28.00	28/1	3700	6500	13	3	131	23
120	100	109	1.5	4.4	PH722_0250 EZ501U	370	1400	25.00	25/1	3500	6000	3.6	3	149	18
120	172	186	2.6	2.6	PH722_0250 EZ502U	700	1400	25.00	25/1	3500	6000	5.9	3	149	19
120	172	193	2.6	2.6	PH722_0250 EZ701U	470	1400	25.00	25/1	3500	6000	9.2	3	149	21
120	226	258	3.4	2.0	PH722_0250 EZ503U	700	1400	25.00	25/1	3500	6000	8.3	3	149	21
120	279	335	4.3	1.6	PH722_0250 EZ702U	700	1400	25.00	25/1	3500	6000	14	3	149	23
120	314	372	4.8	1.4	PH722_0250 EZ505U	700	1400	25.00	25/1	3500	6000	13	3	149	23
120	384	484	5.9	1.1	PH722_0250 EZ703U	700	1400	25.00	25/1	3500	6000	22	3	149	25
150	138	149	2.9	3.2	PH722_0200 EZ502U	580	1400	20.00	20/1	3000	5000	6.3	3	150	19
150	138	154	2.9	3.2	PH722_0200 EZ701U	370	1400	20.00	20/1	3000	5000	9.6	3	150	21
150	180	206	3.9	2.4	PH722_0200 EZ503U	700	1400	20.00	20/1	3000	5000	8.7	3	150	21
150	223	268	4.8	2.0	PH722_0200 EZ702U	700	1400	20.00	20/1	3000	5000	15	3	150	23
150	251	298	5.4	1.8	PH722_0200 EZ505U	700	1400	20.00	20/1	3000	5000	13	3	150	23
150	307	387	6.5	1.4	PH722_0200 EZ703U	700	1400	20.00	20/1	3000	5000	23	3	150	25
188	110	119	3.3	4.0	PH722_0160 EZ502U	460	1330	16.00	16/1	3000	5000	6.4	3	136	19
188	110	124	3.3	4.0	PH722_0160 EZ701U	300	1370	16.00	16/1	3000	5000	9.7	3	136	21
188	144	165	4.3	3.0	PH722_0160 EZ503U	640	1330	16.00	16/1	3000	5000	8.8	3	136	21
188	179	214	5.3	2.5	PH722_0160 EZ702U	610	1370	16.00	16/1	3000	5000	15	3	136	23
188	201	238	6.0	2.2	PH722_0160 EZ505U	700	1370	16.00	16/1	3000	5000	13	3	136	23
188	246	310	7.3	1.8	PH722_0160 EZ703U	700	1370	16.00	16/1	3000	5000	23	3	136	25
188	317	449	9.5	1.4	PH722_0160 EZ705U	700	1370	16.00	16/1	3000	5000	35	3	136	31
300	71	80	2.0	3.7	PH721_0100 EZ701U	190	1000	10.00	10/1	3000	5000	9.2	3	117	17
300	115	138	3.2	2.3	PH721_0100 EZ702U	390	1000	10.00	10/1	3000	5000	14	3	117	19
300	158	200	4.3	1.7	PH721_0100 EZ703U	500	1000	10.00	10/1	3000	5000	22	3	117	21
300	204	290	5.6	1.3	PH721_0100 EZ705U	500	1000	10.00	10/1	3000	5000	35	3	117	27
300	214	356	5.9	1.2	PH721_0100 EZ802U	500	1000	10.00	10/1	3000	5000	59	3	117	35
429	81	97	3.3	4.8	PH721_0070 EZ702U	280	1240	7.000	7/1	2500	5000	15	3	160	19
429	111	140	4.5	3.5	PH721_0070 EZ703U	440	1240	7.000	7/1	2500	5000	23	3	160	21
429	143	203	5.9	2.7	PH721_0070 EZ705U	650	1240	7.000	7/1	2500	5000	35	3	160	27
429	150	249	6.1	2.6	PH721_0070 EZ802U	650	1240	7.000	7/1	2500	5000	59	3	160	35
600	79	100	6.8	4.9	PH721_0050 EZ703U	310	890	5.000	5/1	2200	5000	24	3	184	21
600	102	145	8.8	3.8	PH721_0050 EZ705U	500	1400	5.000	5/1	2200	5000	37	3	184	27
600	107	178	9.2	3.6	PH721_0050 EZ802U	480	1400	5.000	5/1	2200	5000	61	3	184	35
600	128	231	11	3.0	PH721_0050 EZ803U	700	1400	5.000	5/1	2200	5000	86	3	184	41
750	82	116	11	4.7	PH721_0040 EZ705U	400	1370	4.000	4/1	1900	4000	39	3	185	27

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PH7 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 700 Nm)															
750	86	142	12	4.5	PH721_0040 EZ802U	380	1370	4.000	4/1	1900	4000	63	3	185	35
750	102	185	14	3.8	PH721_0040 EZ803U	560	1370	4.000	4/1	1900	4000	88	3	185	41
PH7 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 700 Nm)															
129	309	498	2.9	1.4	PH722_0350 EZ505U	700	1400	35.00	35/1	3700	6500	12	3	146	23
161	247	398	3.2	1.8	PH722_0280 EZ505U	700	1370	28.00	28/1	3700	6500	13	3	131	23
161	315	521	4.1	1.4	PH722_0280 EZ703U	700	1370	28.00	28/1	3700	6500	22	3	131	25
180	221	356	3.4	2.0	PH722_0250 EZ505U	700	1400	25.00	25/1	3500	6000	13	3	149	23
180	281	465	4.3	1.6	PH722_0250 EZ703U	700	1400	25.00	25/1	3500	6000	22	3	149	25
225	177	285	3.8	2.5	PH722_0200 EZ505U	700	1400	20.00	20/1	3000	5000	13	3	150	23
225	225	372	4.8	2.0	PH722_0200 EZ703U	700	1400	20.00	20/1	3000	5000	23	3	150	25
281	141	228	4.2	3.1	PH722_0160 EZ505U	700	1370	16.00	16/1	3000	5000	13	3	136	23
281	156	513	4.7	2.8	PH722_0160 EZ802U	700	1370	16.00	16/1	3000	5000	59	3	136	39
281	180	298	5.4	2.4	PH722_0160 EZ703U	700	1370	16.00	16/1	3000	5000	23	3	136	25
281	244	446	7.3	1.8	PH722_0160 EZ705U	700	1370	16.00	16/1	3000	5000	35	3	136	31
450	101	331	3.2	2.3	PH721_0100 EZ802U	500	1000	10.00	10/1	3000	5000	59	3	117	35
450	116	192	3.6	2.0	PH721_0100 EZ703U	500	1000	10.00	10/1	3000	5000	22	3	117	21
450	157	288	4.9	1.5	PH721_0100 EZ705U	500	1000	10.00	10/1	3000	5000	35	3	117	27
643	71	232	3.3	4.8	PH721_0070 EZ802U	650	1240	7.000	7/1	2500	5000	59	3	160	35
643	81	134	3.8	4.1	PH721_0070 EZ703U	440	1240	7.000	7/1	2500	5000	23	3	160	21
643	110	202	5.2	3.0	PH721_0070 EZ705U	650	1240	7.000	7/1	2500	5000	35	3	160	27
900	79	144	7.7	4.3	PH721_0050 EZ705U	500	1400	5.000	5/1	2200	5000	37	3	184	27
PH7 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 700 Nm)															
86	221	286	0.7	2.0	PH722_0700 EZ501U	650	1240	70.00	70/1	3700	6500	3.1	3	142	18
120	158	205	0.9	2.8	PH722_0500 EZ501U	700	1400	50.00	50/1	3700	6500	3.1	3	142	18
120	242	363	1.3	1.8	PH722_0500 EZ502U	700	1400	50.00	50/1	3700	6500	5.4	3	142	19
120	242	367	1.3	1.8	PH722_0500 EZ701U	700	1400	50.00	50/1	3700	6500	8.7	3	142	21
120	288	493	1.6	1.5	PH722_0500 EZ503U	700	1400	50.00	50/1	3700	6500	7.8	3	142	21
150	126	164	1.1	2.9	PH722_0400 EZ501U	600	1370	40.00	40/1	3700	6500	3.1	3	126	18
150	193	290	1.7	1.9	PH722_0400 EZ502U	700	1370	40.00	40/1	3700	6500	5.4	3	126	19
150	193	294	1.7	1.9	PH722_0400 EZ701U	700	1370	40.00	40/1	3700	6500	8.7	3	126	21
150	231	394	2.1	1.6	PH722_0400 EZ503U	700	1370	40.00	40/1	3700	6500	7.8	3	126	21
150	268	532	2.4	1.4	PH722_0400 EZ702U	700	1370	40.00	40/1	3700	6500	14	3	126	23
171	111	143	1.0	4.0	PH722_0350 EZ501U	520	1400	35.00	35/1	3700	6500	3.2	3	146	18
171	169	254	1.6	2.6	PH722_0350 EZ502U	700	1400	35.00	35/1	3700	6500	5.5	3	146	19
171	169	257	1.6	2.6	PH722_0350 EZ701U	650	1400	35.00	35/1	3700	6500	8.8	3	146	21
171	202	345	1.9	2.2	PH722_0350 EZ503U	700	1400	35.00	35/1	3700	6500	7.9	3	146	21
171	234	465	2.2	1.9	PH722_0350 EZ702U	700	1400	35.00	35/1	3700	6500	14	3	146	23
214	89	115	1.1	5.0	PH722_0280 EZ501U	420	1370	28.00	28/1	3700	6500	3.3	3	131	18
214	135	203	1.7	3.2	PH722_0280 EZ502U	700	1370	28.00	28/1	3700	6500	5.6	3	131	19
214	135	206	1.7	3.2	PH722_0280 EZ701U	520	1370	28.00	28/1	3700	6500	8.9	3	131	21
214	161	276	2.1	2.7	PH722_0280 EZ503U	700	1370	28.00	28/1	3700	6500	8.0	3	131	21
214	187	372	2.4	2.3	PH722_0280 EZ702U	700	1370	28.00	28/1	3700	6500	14	3	131	23
240	121	181	1.8	3.6	PH722_0250 EZ502U	700	1400	25.00	25/1	3500	6000	5.9	3	149	19
240	121	184	1.8	3.6	PH722_0250 EZ701U	470	1400	25.00	25/1	3500	6000	9.2	3	149	21
240	144	246	2.2	3.1	PH722_0250 EZ503U	700	1400	25.00	25/1	3500	6000	8.3	3	149	21
240	167	332	2.6	2.6	PH722_0250 EZ702U	700	1400	25.00	25/1	3500	6000	14	3	149	23
PH8 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 2000 Nm)															
80	1016	1537	5.9	1.2	PH822_0250 EZ805U	2000	3200	25.00	25/1	3000	5500	135	3	484	82
100	813	1229	6.6	1.5	PH822_0200 EZ805U	2000	3200	20.00	20/1	2500	4500	137	3	459	82
125	650	984	8.4	1.7	PH822_0160 EZ805U	2000	3150	16.00	16/1	2500	4500	137	3	452	82
200	420	635	4.1	1.9	PH821_0100 EZ805U	1200	2400	10.00	10/1	2500	4000	136	3	317	73
286	294	444	5.0	3.4	PH821_0070 EZ805U	1380	2770	7.000	7/1	2000	4000	140	3	474	73
400	210	317	7.5	4.8	PH821_0050 EZ805U	980	2870	5.000	5/1	1700	4000	148	3	566	73
500	168	254	12	4.8	PH821_0040 EZ805U	790	2310	4.000	4/1	1500	3500	157	3	634	73
PH8 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 2000 Nm)															
30	688	772	0.8	1.2	PH822_1000 EZ701U	1200	2400	100.0	100/1	3300	6000	9.0	3	305	44
43	482	540	0.7	2.1	PH822_0700 EZ701U	1300	2770	70.00	70/1	3300	6000	9.1	3	421	44
43	781	937	1.2	1.3	PH822_0700 EZ702U	1600	2770	70.00	70/1	3300	6000	14	3	421	47
60	344	386	0.7	3.6	PH822_0500 EZ701U	930	3200	50.00	50/1	3300	6000	9.1	3	436	44
60	558	670	1.1	2.2	PH822_0500 EZ702U	1910	3200	50.00	50/1	3300	6000	14	3	436	47
60	767	967	1.6	1.6	PH822_0500 EZ703U	2000	3200	50.00	50/1	3300	6000	22	3	436	49
60	990	1404	2.0	1.3	PH822_0500 EZ705U	2000	3200	50.00	50/1	3300	6000	35	3	436	54
75	275	309	1.0	3.7	PH822_0400 EZ701U	740	3150	40.00	40/1	3300	6000	9.2	3	418	44

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PH8 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 2000 Nm)															
75	446	536	1.6	2.3	PH822_0400 EZ702U	1530	3150	40.00	40/1	3300	6000	14	3	418	47
75	614	774	2.2	1.6	PH822_0400 EZ703U	1920	3150	40.00	40/1	3300	6000	22	3	418	49
75	792	1123	2.8	1.3	PH822_0400 EZ705U	1920	3150	40.00	40/1	3300	6000	35	3	418	54
75	830	1380	3.0	1.2	PH822_0400 EZ802U	1920	3150	40.00	40/1	3300	6000	59	3	418	63
86	391	469	1.4	3.2	PH822_0350 EZ702U	1330	3200	35.00	35/1	3300	6000	15	3	448	47
86	537	677	1.9	2.3	PH822_0350 EZ703U	2000	3200	35.00	35/1	3300	6000	23	3	448	49
86	693	983	2.4	1.8	PH822_0350 EZ705U	2000	3200	35.00	35/1	3300	6000	35	3	448	54
86	726	1208	2.6	1.7	PH822_0350 EZ802U	2000	3200	35.00	35/1	3300	6000	59	3	448	63
107	312	375	1.7	3.5	PH822_0280 EZ702U	1070	3150	28.00	28/1	3300	6000	15	3	435	47
107	430	542	2.4	2.6	PH822_0280 EZ703U	1690	3150	28.00	28/1	3300	6000	23	3	435	49
107	555	786	3.1	2.0	PH822_0280 EZ705U	2000	3150	28.00	28/1	3300	6000	35	3	435	54
107	581	966	3.2	1.9	PH822_0280 EZ802U	2000	3150	28.00	28/1	3300	6000	59	3	435	63
120	279	335	1.6	4.5	PH822_0250 EZ702U	950	3200	25.00	25/1	3000	5500	16	3	484	47
120	384	484	2.2	3.3	PH822_0250 EZ703U	1510	3200	25.00	25/1	3000	5500	24	3	484	49
120	495	702	2.9	2.5	PH822_0250 EZ705U	2000	3200	25.00	25/1	3000	5500	37	3	484	54
120	518	863	3.0	2.4	PH822_0250 EZ802U	2000	3200	25.00	25/1	3000	5500	61	3	484	63
120	618	1121	3.6	2.0	PH822_0250 EZ803U	2000	3200	25.00	25/1	3000	5500	86	3	484	69
150	307	387	2.5	4.1	PH822_0200 EZ703U	1210	3200	20.00	20/1	2500	4500	26	3	459	49
150	396	562	3.2	3.2	PH822_0200 EZ705U	1930	3200	20.00	20/1	2500	4500	38	3	459	54
150	415	690	3.4	3.0	PH822_0200 EZ802U	1860	3200	20.00	20/1	2500	4500	62	3	459	63
150	495	897	4.0	2.5	PH822_0200 EZ803U	2000	3200	20.00	20/1	2500	4500	88	3	459	69
188	246	310	3.2	4.5	PH822_0160 EZ703U	970	2760	16.00	16/1	2500	4500	26	3	452	49
188	317	449	4.1	3.5	PH822_0160 EZ705U	1550	3150	16.00	16/1	2500	4500	39	3	452	54
188	332	552	4.3	3.3	PH822_0160 EZ802U	1490	3150	16.00	16/1	2500	4500	63	3	452	63
188	396	717	5.1	2.8	PH822_0160 EZ803U	2000	3150	16.00	16/1	2500	4500	88	3	452	69
300	214	356	2.4	3.3	PH821_0100 EZ802U	960	2400	10.00	10/1	2500	4000	62	3	317	54
300	255	463	2.8	2.7	PH821_0100 EZ803U	1200	2400	10.00	10/1	2500	4000	87	3	317	60
429	179	324	3.5	4.9	PH821_0070 EZ803U	970	2770	7.000	7/1	2000	4000	91	3	474	60
PH8 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 2000 Nm)															
90	563	930	1.3	2.0	PH822_0500 EZ703U	2000	3200	50.00	50/1	3300	6000	22	3	436	49
90	763	1395	1.8	1.4	PH822_0500 EZ705U	2000	3200	50.00	50/1	3300	6000	35	3	436	54
113	391	1283	1.6	2.3	PH822_0400 EZ802U	1920	3150	40.00	40/1	3300	6000	59	3	418	63
113	450	744	1.8	2.0	PH822_0400 EZ703U	1920	3150	40.00	40/1	3300	6000	22	3	418	49
113	610	1116	2.5	1.4	PH822_0400 EZ705U	1920	3150	40.00	40/1	3300	6000	35	3	418	54
129	342	1123	1.2	3.7	PH822_0350 EZ802U	2000	3200	35.00	35/1	3300	6000	59	3	448	63
129	394	651	1.4	3.2	PH822_0350 EZ703U	2000	3200	35.00	35/1	3300	6000	23	3	448	49
129	534	977	1.9	2.3	PH822_0350 EZ705U	2000	3200	35.00	35/1	3300	6000	35	3	448	54
161	273	898	1.5	4.0	PH822_0280 EZ802U	2000	3150	28.00	28/1	3300	6000	59	3	435	63
161	315	521	1.8	3.5	PH822_0280 EZ703U	1690	3150	28.00	28/1	3300	6000	23	3	435	49
161	427	781	2.4	2.6	PH822_0280 EZ705U	2000	3150	28.00	28/1	3300	6000	35	3	435	54
180	281	465	1.6	4.4	PH822_0250 EZ703U	1510	3200	25.00	25/1	3000	5500	24	3	484	49
180	381	698	2.2	3.3	PH822_0250 EZ705U	2000	3200	25.00	25/1	3000	5500	37	3	484	54
225	305	558	2.5	4.1	PH822_0200 EZ705U	1930	3200	20.00	20/1	2500	4500	38	3	459	54
281	244	446	3.2	4.5	PH822_0160 EZ705U	1550	3150	16.00	16/1	2500	4500	39	3	452	54
PH8 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 1910 Nm)															
60	484	735	0.6	1.7	PH822_1000 EZ701U	1200	2400	100.0	100/1	3300	6000	9.0	3	305	44
86	339	514	0.5	3.0	PH822_0700 EZ701U	1300	2770	70.00	70/1	3300	6000	9.1	3	421	44
86	469	931	0.7	2.1	PH822_0700 EZ702U	1600	2770	70.00	70/1	3300	6000	14	3	421	47
120	242	367	0.6	4.1	PH822_0500 EZ701U	930	3200	50.00	50/1	3300	6000	9.1	3	436	44
120	335	665	0.9	3.0	PH822_0500 EZ702U	1910	3200	50.00	50/1	3300	6000	14	3	436	47
150	193	294	0.9	4.1	PH822_0400 EZ701U	740	3150	40.00	40/1	3300	6000	9.2	3	418	44
150	268	532	1.2	3.0	PH822_0400 EZ702U	1530	3150	40.00	40/1	3300	6000	14	3	418	47
PH9 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 5000 Nm)															
42	1951	2951	1.9	1.5	PH932_0480 EZ805U	4500	9000	48.00	48/1	2800	4500	137	3	1084	109
48	1707	2582	2.0	1.8	PH932_0420 EZ805U	4500	9000	42.00	42/1	2800	4500	138	3	1099	109
50	1626	2459	2.3	1.7	PH932_0400 EZ805U	4610	9220	40.00	40/1	2800	4500	136	3	1057	109
63	1301	1967	2.3	2.3	PH932_0320 EZ805U	4610	9220	32.00	32/1	2800	4500	138	3	1112	109
67	1219	1844	2.4	2.5	PH932_0300 EZ805U	4500	9000	30.00	30/1	2500	4000	143	3	1115	109
71	1138	1721	2.5	2.6	PH932_0280 EZ805U	5000	10000	28.00	28/1	2800	4500	139	3	1147	109
83	975	1475	2.7	3.1	PH932_0240 EZ805U	4500	9000	24.00	24/1	2200	3500	149	3	1125	109
100	813	1229	3.0	3.7	PH932_0200 EZ805U	3810	10000	20.00	20/1	2500	4000	145	3	1188	109
111	732	1107	3.1	4.1	PH932_0180 EZ805U	3430	9000	18.00	18/1	1800	3000	177	3	1135	109
125	650	984	3.3	4.6	PH932_0160 EZ805U	3050	8960	16.00	16/1	2200	3500	153	3	1212	109

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PH9 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 4610 Nm)															
50	1244	2070	0.9	2.4	PH932_0600 EZ802U	4500	9000	60.00	60/1	2800	4500	60	3	1060	90
50	1484	2690	1.0	2.0	PH932_0600 EZ803U	4500	9000	60.00	60/1	2800	4500	86	3	1060	96
63	995	1656	1.0	3.0	PH932_0480 EZ802U	4460	9000	48.00	48/1	2800	4500	62	3	1084	90
63	1187	2152	1.2	2.5	PH932_0480 EZ803U	4500	9000	48.00	48/1	2800	4500	88	3	1084	96
71	871	1449	1.0	3.4	PH932_0420 EZ802U	3910	9000	42.00	42/1	2800	4500	63	3	1099	90
71	1039	1883	1.2	2.9	PH932_0420 EZ803U	4500	9000	42.00	42/1	2800	4500	89	3	1099	96
75	830	1380	1.4	2.8	PH932_0400 EZ802U	3720	9220	40.00	40/1	2800	4500	61	3	1057	90
75	990	1793	1.6	2.4	PH932_0400 EZ803U	4610	9220	40.00	40/1	2800	4500	86	3	1057	96
94	664	1104	1.3	4.0	PH932_0320 EZ802U	2980	9220	32.00	32/1	2800	4500	63	3	1112	90
94	792	1434	1.6	3.4	PH932_0320 EZ803U	4320	9220	32.00	32/1	2800	4500	88	3	1112	96
100	622	1035	1.2	4.8	PH932_0300 EZ802U	2790	9000	30.00	30/1	2500	4000	68	3	1115	90
100	742	1345	1.5	4.0	PH932_0300 EZ803U	4050	9000	30.00	30/1	2500	4000	94	3	1115	96
107	693	1255	1.5	4.3	PH932_0280 EZ803U	3780	10000	28.00	28/1	2800	4500	90	3	1147	96
PH10 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 7500 Nm)															
33	2438	3688	1.4	1.7	PH1032_0600 EZ805U	6910	13820	60.00	60/1	2800	4500	135	3	1602	124
42	1951	2951	1.3	2.4	PH1032_0480 EZ805U	6910	13820	48.00	48/1	2800	4500	137	3	1657	124
48	1707	2582	1.3	2.9	PH1032_0420 EZ805U	7500	15000	42.00	42/1	2800	4500	138	3	1691	124
67	1219	1844	1.6	4.1	PH1032_0300 EZ805U	5720	15000	30.00	30/1	2500	4000	144	3	1730	124
83	975	1475	1.9	4.7	PH1032_0240 EZ805U	4580	13430	24.00	24/1	2200	3500	151	3	1753	124
PH10 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 6910 Nm)															
50	1244	2070	0.8	2.8	PH1032_0600 EZ802U	5580	13820	60.00	60/1	2800	4500	61	3	1602	105
50	1484	2690	1.0	2.4	PH1032_0600 EZ803U	6910	13820	60.00	60/1	2800	4500	86	3	1602	111
63	995	1656	0.8	4.0	PH1032_0480 EZ802U	4460	13820	48.00	48/1	2800	4500	63	3	1657	105
63	1187	2152	0.9	3.4	PH1032_0480 EZ803U	6470	13820	48.00	48/1	2800	4500	88	3	1657	111
71	1039	1883	0.8	4.8	PH1032_0420 EZ803U	5660	15000	42.00	42/1	2800	4500	89	3	1691	111

4.3 Dimensional drawings

In this chapter you can find the dimensions of the geared motors.

There is a dimensional drawing for every possible shaft/housing design, each with the tables for gear unit dimensions, motor dimensions and geared motor dimensions.

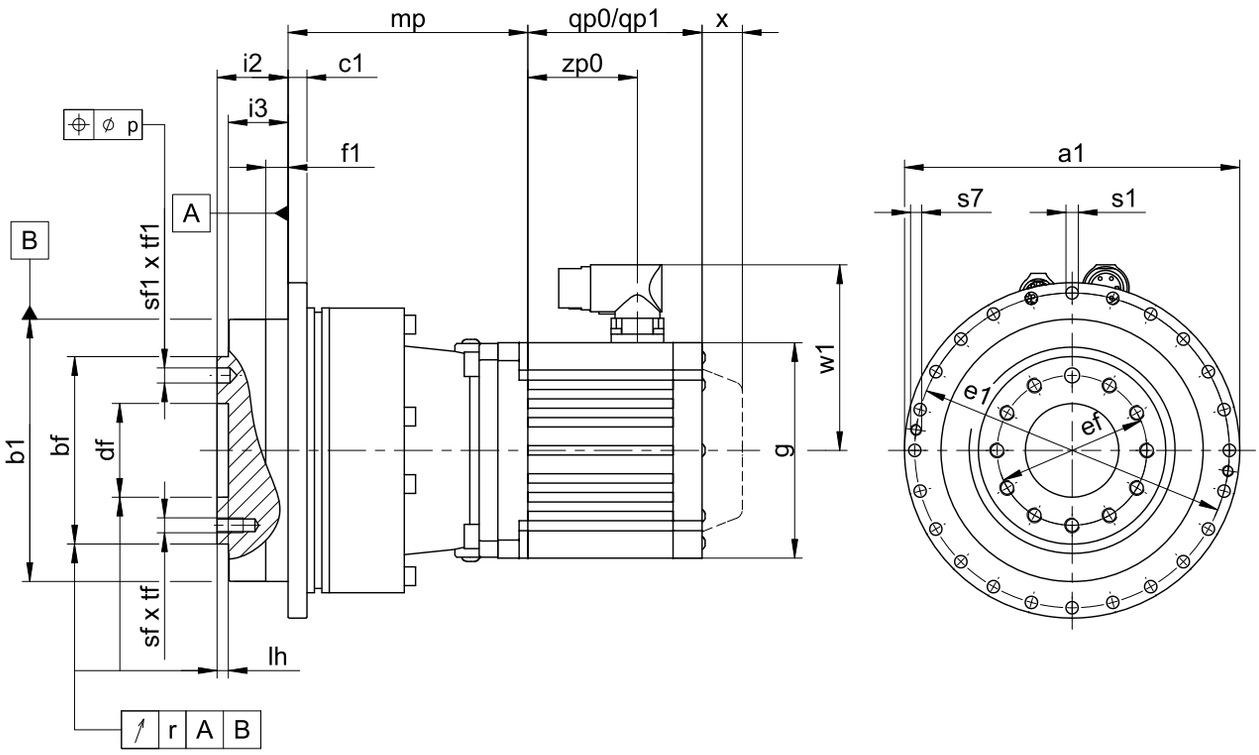
Dimensions can exceed the specifications of ISO 2768-mK due to casting tolerances or accumulation of individual tolerances.

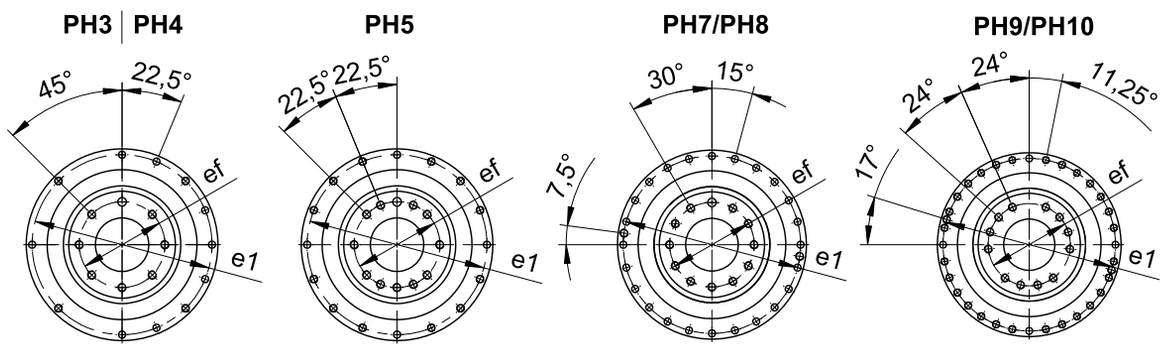
We reserve the right to make dimensional changes due to ongoing technical development.

You can download CAD models of our standard drives at http://cad.stoeber.de.

Combination options and the dimensions of forced ventilated geared motors can be found at http://cad.stoeber.de.

4.3.1 F shaft design (flange shaft)





qp0 Applies to motors without brake.

qp1 Applies to motors with brake.

x Applies to encoders using an optical measuring concept.

w1 For variation for One Cable Solution (OCS), see Chapter [▶ 23.4]

Dimensions of gear units

Type	Øa1	Øb1	Øbf	c1	Ødf	Øe1	Øef	f1	i2	i3	lh	p	r	Øs1	s7	sf	Øsf1	tf	tf1
PH321	86_{h7}	64_{h7}	40_{h7}	4	20.0^{H6}	79	31.5	7	19.5	16.5	4	0.02	0.020	4.5	–	M5	5^{H7}	7	3
PH322	86_{h7}	64_{h7}	40_{h7}	4	20.0^{H6}	79	31.5	7	19.5	16.5	4	0.02	0.020	4.5	–	M5	5^{H7}	7	3
PH421	118_{h7}	90_{h7}	63_{h7}	7	31.5^{H6}	109	50.0	10	30.0	24.0	6	0.02	0.020	5.5	–	M6	6^{H7}	11	7
PH422	118_{h7}	90_{h7}	63_{h7}	7	31.5^{H6}	109	50.0	10	30.0	24.0	6	0.02	0.020	5.5	–	M6	6^{H7}	11	7
PH521	145_{h7}	110_{h7}	80_{h7}	8	40.0^{H6}	135	63.0	10	29.0	23.0	6	0.02	0.020	5.5	–	M6	6^{H7}	11	7
PH522	145_{h7}	110_{h7}	80_{h7}	8	40.0^{H6}	135	63.0	10	29.0	23.0	6	0.02	0.020	5.5	–	M6	6^{H7}	11	7
PH721	179_{h7}	140_{h7}	100_{h7}	10	50.0^{H6}	168	80.0	12	38.0	32.0	6	0.02	0.025	6.6	–	M8	8^{H7}	14	7
PH722	179_{h7}	140_{h7}	100_{h7}	10	50.0^{H6}	168	80.0	12	38.0	32.0	6	0.02	0.025	6.6	–	M8	8^{H7}	14	7
PH821	247_{h7}	200_{h7}	160_{h7}	12	80.0^{H6}	233	125.0	15	50.0	42.0	8	0.02	0.030	9.0	M10	M10	10^{H7}	18	10
PH822	247_{h7}	200_{h7}	160_{h7}	12	80.0^{H6}	233	125.0	15	50.0	42.0	8	0.02	0.030	9.0	M10	M10	10^{H7}	18	10
PH932	300	255_{h7}	180_{h7}	18	90.0^{H6}	280	140.0	20	66.0	55.0	12	–	0.030	13.5	M8	M16	–	24	–
PH1032	330	285_{h7}	200_{h7}	20	95.0^{H6}	310	160.0	20	75.0	60.0	10	–	0.040	13.5	M10	M20	–	30	–

Dimensions of motors

Type	□g	qp0	qp1	w1	x	zp0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0
EZ501U	115	93	147.5	100.0	22	58.5
EZ502U	115	118	172.5	100.0	22	83.5
EZ503U	115	143	197.5	100.0	22	108.5
EZ505U	115	193	247.5	100.0	22	158.5
EZ701U	145	102	161.0	115.0	22	64.0
EZ702U	145	127	186.0	115.0	22	89.0
EZ703U	145	152	211.0	115.0	22	114.0
EZ705U	145	207	266.0	134.0	22	165.0
EZ802U	190	197	274.0	156.5	22	143.0
EZ803U	190	238	315.0	156.5	22	184.0
EZ805U	190	320	397.0	156.5	22	266.0

Dimensions of geared motors

Type	EZ3	EZ4	EZ5	EZ7	EZ8
	mp	mp	mp	mp	mp
PH321	51.0	48.0	–	–	–
PH322	87.5	–	–	–	–
PH421	–	51.0	53.5	–	–
PH422	103.0	99.5	102.0	–	–
PH521	–	–	57.0	63.0	–
PH522	–	112.5	115.0	121.0	–
PH721	–	–	–	68.0	77.0
PH722	–	–	128.0	134.0	149.0
PH821	–	–	–	–	99.5
PH822	–	–	–	169.0	184.0
PH932	–	–	–	–	249.5
PH1032	–	–	–	–	257.0

4.4 Type designation

In this chapter, you can find an explanation of the type designation with the associated options.

Additional ordering information not included in the type designation can be found at the end of the chapter.

Sample code

PH	5	2	2	F	0250	EZ401U

Explanation

Code	Designation	Design
PH	Type	Planetary gear unit
5	Size	5 (example)
2	Generation	Generation 2
3		Generation 3
1	Stages	Single-stage
2		Two-stage
F	Shaft	Flange shaft
0250	Transmission ratio (i x 10)	i = 25 (example)
EZ401U	Motor	EZ synchronous servo motor

In order to complete the type designation, also specify:

- A detailed type designation of the motor, see chapter [▷ 23]
- Radial shaft seal rings at the output made of NBR or FKM, see chapter [▷ 4.6.3]
- For reverse operation of the output shaft from ± 20° to ± 90° and horizontal installation, note the chapter [▷ 4.6.4]

4.5 Product description

4.5.1 Installation conditions

The torque and force values listed in this catalog are valid under the following conditions:

- When using screws with quality 12.9 for machine-side attachment of the flange shaft and gear unit housing
- When the gear unit housings are adjusted at pilot øb1 (H7)
- When the flange shaft is adjusted using the connecting element at pilot øbf or ødf

4.5.2 Lubricants

STOBER fills the gear units with the amount and type of lubricant specified on the nameplate.

Lubricant filling quantities for gear units, document ID 441871, can be found online at http://www.stoeber.de

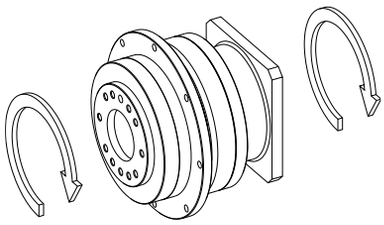
4.5.3 Other product features

Feature	Value
Max. permitted gear unit temperature (on the surface of the gear unit)	≤ 90 °C
Paint	Black RAL 9005
(ATEX) Directive 2014/34/EU (option)	Not suitable
Protection class:[1]	
Gear unit	IP65
Motor	IP56, optionally IP66

[1] Observe the protection class of all the components.

4.5.4 Direction of rotation

The input and output rotate in the same direction.



4.6 Project configuration

Project your drives using our SERVOsoft designing software. You can receive SERVOsoft for free from your adviser at one of our sales centers. Observe the limit conditions in this chapter to ensure a safe design for your drives.

An explanation of the formula symbols can be found in Chapter [▶ 29.1].

4.6.1 Calculation of the operating point

Check the following conditions for operating points other than the nominal point M_{2N} specified in the selection tables.

$$n_{1m^*} \leq \frac{n_{1maxDB}}{fB_T}$$

$$n_{1max^*} \leq \frac{n_{1maxZB}}{fB_T}$$

$$M_{2eff^*} \leq M_{2th}$$

$$M_{2acc^*} \leq M_{2acc}$$

$$M_{2NOT^*} \leq M_{2NOT}$$

$$M_{2eq^*} \leq M_{2N} \cdot \frac{S}{fB_{op} \cdot fB_t}$$

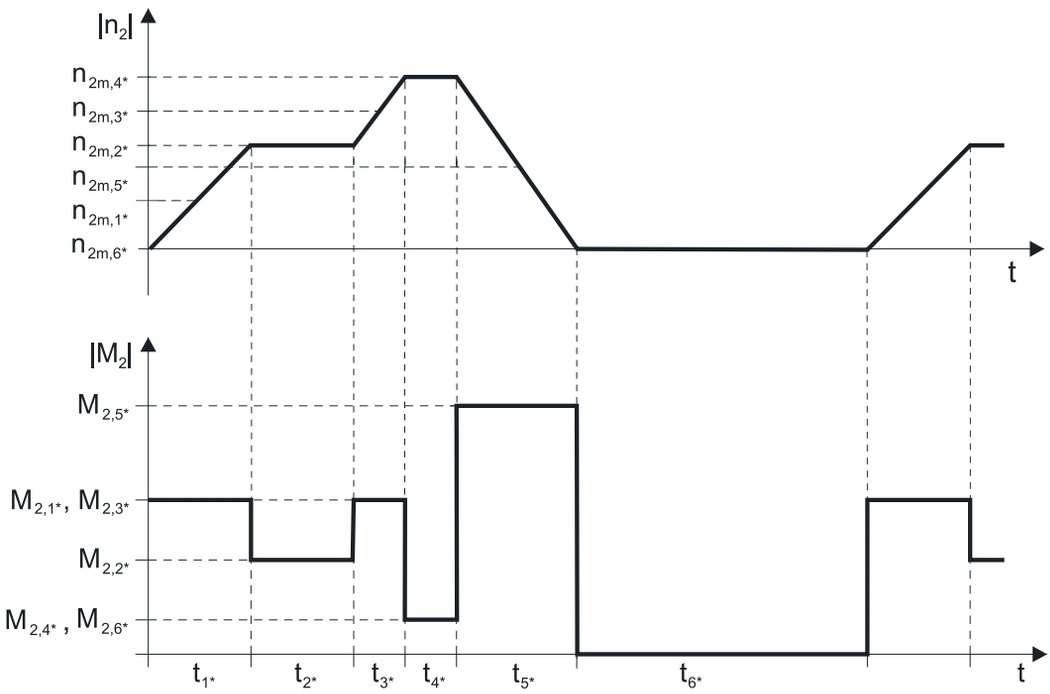
The values for n_{1maxDB}, n_{1maxZB}, M_{2acc}, M_{2NOT}, M_{2N} and S can be found in the selection tables.

The values for fB_T, fB_{op} and fB_t can be found in the corresponding tables in this chapter.

Calculate the thermal limit torque M_{2th} for a duty cycle > 50%.

Example of cyclic operation

The following calculations are based on a representation of the power taken from the output based in accordance with the following example:



Calculation of the actual average input speed

$$n_{1m^*} = n_{2m^*} \cdot i$$

$$n_{2m^*} = \frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}{t_{1^*} + \ldots + t_{n^*}}$$

If $t_{1^*} + \ldots + t_{5^*} \geq 20$ min, calculate n_{2m^*} without the rest phase t_{6^*}.

The values for the ratio i can be found in the selection tables.

Calculation of the actual effective torque

$$M_{2eff^*} = \sqrt{\frac{t_{1^*} \cdot M_{2,1^*}{}^2 + \ldots + t_{n^*} \cdot M_{2,n^*}{}^2}{t_{1^*} + \ldots + t_{n^*}}}$$

Calculation of the actual equivalent torque

$$M_{2eq^*} = \sqrt[3]{\frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} \cdot \left|M_{2,1^*}{}^3\right| + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*} \cdot \left|M_{2,n^*}{}^3\right|}{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}}$$

Calculation of the thermal limit torque

Calculate the thermal limit torque M_{2th} for a duty cycle $ED_{20} > 50\%$ and the actual average input speed n_{1m^*}. (At $K_{mot,th} \leq 0$ you must reduce the average input speed n_{1m^*} accordingly or select another geared motor size.)

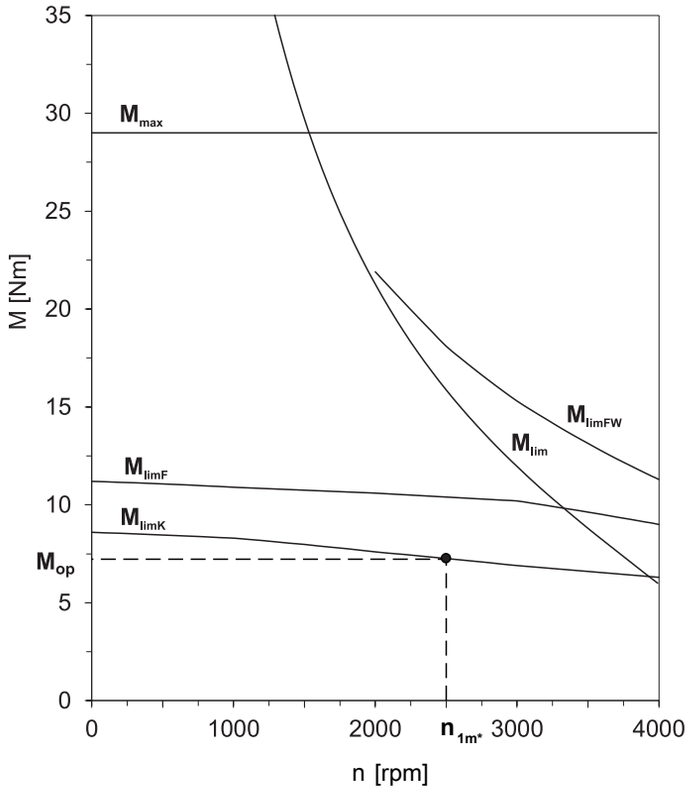
$$M_{2th} = M_{op} \cdot i \cdot K_{mot,th}$$

$$K_{mot,th} = 0{,}93 - \frac{a_{th}}{1000} \cdot fB_T \cdot \left(\frac{n_{1m^*}}{1000}\right)^3$$

The values for i and a_{th} can be found in the selection tables.

The values for fB_T can be found in the corresponding table in this chapter.

The value for the torque of the motor at operating point M_{op} with the determined average input speed n_{1m^*} can be found in the motor curve of Chapter [▶ 23.3]. Note the size, nominal speed n_N and cooling type of the motor. The figure below shows an example of reading the torque M_{op} of a motor with convection cooling at the operating point.



Operating factors

Operating mode	fB_{op}
Uniform continuous operation	1.00
Cyclic operation	1.00
Reversing load cyclic operation	1.00

Run time	fB_t
Daily run time ≤ 8 h	1.00
Daily run time ≤ 16 h	1.15
Daily run time ≤ 24 h	1.20

Temperature		fB_T
Motor cooling	**Surrounding temperature**	
Motor with forced ventilation	≤ 20 °C	0.9
	≤ 30 °C	1.0
	≤ 40 °C	1.15
Motor with convection cooling	≤ 20 °C	1.0
	≤ 30 °C	1.1
	≤ 40 °C	1.25

Notes

- The maximum permitted gear unit temperature (see the "Other product features" chapter) must not be exceeded. Doing so may result in damage to the geared motor.
- For braking from full speed (for example when the power fails or when setting up the machine), note the permitted gear unit torques (M_{2acc}, M_{2NOT}) in the selection tables.

4.6.2 Permitted shaft loads for the output shaft

The values specified in the tables apply to the permitted shaft loads:

- For shaft dimensions in accordance with the catalog
- For output speeds $n_{2m*} \leq 100$ rpm ($F^{2axN} = F_{2ax100}$; $F_{2radN} = F_{2rad100}$; $M_{2kN} = M_{2k100}$)
- Only if radial forces on the gear unit are stabilized by its pilots (housing, flange shaft)

Permitted shaft loads

Type	z_2 [mm]	F_{2ax100} [N]	$F_{2rad100}$ [N]	$F_{2rad,acc}$ [N]	M_{2k100} [Nm]	$M_{2k,acc}$ [Nm]
PH3	62.0	1650	1613	1613	100	100
PH4	84.0	2150	3095	3571	260	300
PH5	97.0	4150	4536	4897	440	475
PH7	88.0	6150	17045	17045	1500	1500
PH8	126.0	10050	27778	27778	3500	3500
PH9	155.0	33000	48387	70968	7500	11000
PH10	171.0	50000	51462	73099	8800	12500

For other output speeds, download diagrams at http://products.stoeber.de.

The following applies to output speeds n_{2m*} > 100 rpm:

$$F_{2axN} = \frac{F_{2ax100}}{\sqrt[3]{\frac{n_{2m*}}{100\ \text{rpm}}}} \qquad F_{2radN} = \frac{F_{2rad100}}{\sqrt[3]{\frac{n_{2m*}}{100\ \text{rpm}}}} \qquad M_{2kN} = \frac{M_{2k100}}{\sqrt[3]{\frac{n_{2m*}}{100\ \text{rpm}}}}$$

The values for F_{2ax100}, $F_{2rad100}$ and M_{2k100} can be found in the table "Permitted shaft loads" in this chapter.

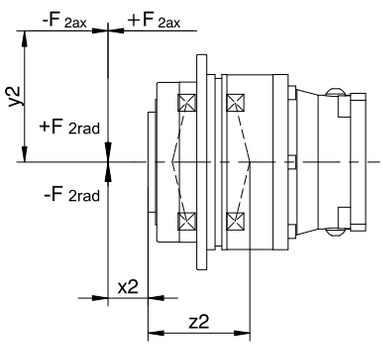


Fig. 1: Force application points

You can determine the permitted radial forces from the permitted breakdown torque M_{2kN} and $M_{2k,acc}$. The actual radial forces may not exceed the permitted radial forces. The permitted radial forces are in relation to the end of the hollow shaft (x2 = 0).

$$M_{2k,acc*} = \frac{2 \cdot F_{2ax*} \cdot y_2 + F_{2rad,acc*} \cdot (x_2 + z_2)}{1000} \leq M_{2k,acc}$$

For applications with multiple axial and/or radial forces, you must add the forces as vectors.

In the event of EMERGENCY OFF operation (max. 1000 load changes), you can multiply the permitted forces and torques for F_{2ax100}, $F_{2rad100}$ and M_{2k100} by a factor of two.

Also note the calculation for equivalent values:

$$M_{2k,eq*} = \sqrt[3]{\frac{|n_{2m,1*}| \cdot t_{1*} \cdot |M_{2k,acc,1*}^{\ 3}| + \ldots + |n_{2m,n*}| \cdot t_{n*} \cdot |M_{2k,acc,n*}^{\ 3}|}{|n_{2m,1*}| \cdot t_{1*} + \ldots + |n_{2m,n*}| \cdot t_{n*}}} \leq M_{2kN}$$

$$F_{2rad,eq*} = \sqrt[3]{\frac{|n_{2m,1*}| \cdot t_{1*} \cdot |F_{2rad,acc,1*}^{\ 3}| + \ldots + |n_{2m,n*}| \cdot t_{n*} \cdot |F_{2rad,acc,n*}^{\ 3}|}{|n_{2m,1*}| \cdot t_{1*} + \ldots + |n_{2m,n*}| \cdot t_{n*}}} \leq F_{2radN}$$

$$F_{2ax,eq*} \leq F_{2axN}$$

The following apply to the bearing service life L_{10h} (ED_{20} ≤ 40%):

L_{10h} > 10000 h with 1 < M_{2kN}/M_{2k*} < 1.25

L_{10h} > 20000 h with 1.25 < M_{2kN}/M_{2k*} < 1.5

L_{10h} > 30000 h with 1.5 < M_{2kN}/M_{2k*}

For different duty cycles:

$$L_{10h} > L_{10h(ED_{20}=40\%)} \cdot \frac{40\%}{ED_{20}}$$

4.6.3 Recommendation for radial shaft seal rings

For a duty cycle > 60%, we recommend radial shaft seal rings made of FKM.

Properties:

- Excellent temperature resistance
- High chemical stability
- Very good resistance to aging
- Excellent resistance to mineral oils and greases
- For use in the food, beverage and pharmaceutical industries

Leak-proofness

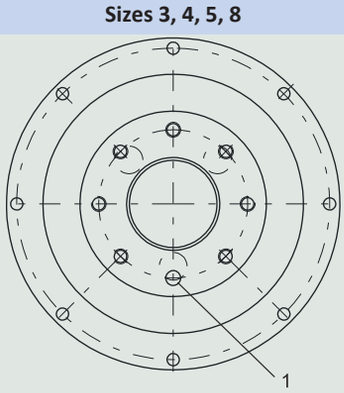
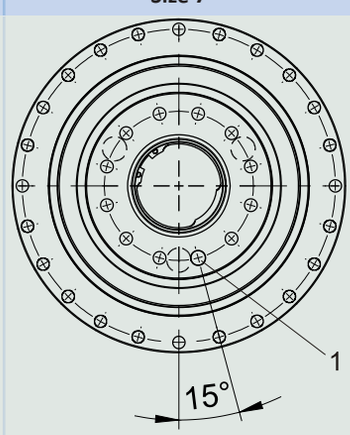
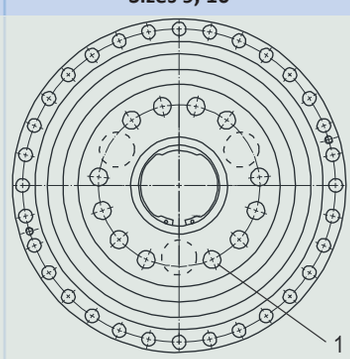
Our gear units are equipped with high-quality radial shaft seal rings and checked for leak-proofness. However, a leak cannot be fully ruled out over the length of use of a gear unit. If you use a gear unit with goods incompatible with the lubricant, you must take measures to prevent direct contact with the gear unit lubricant in case of a leak.

4.6.4 Reverse operation

To ensure lubrication of circulating geared parts during cyclic reverse operation from ± 20° to ± 90°, pay careful attention to the position of the output shaft if the gear unit is installed horizontally as shown in the images below.

The images show the center position of reverse operation.

Cyclic reverse operation ≤ ± 20° on request.

Sizes 3, 4, 5, 8	Size 7	Sizes 9, 10
		
1 Position of the positioning hole: bottom	1 Position of the positioning hole: as shown in the image	1 Position of the fastening thread: as shown in the image

4.7 Additional documentation

Additional documentation related to the product can be found at http://www.stoeber.de/en/download

Enter the ID of the documentation in the Search... field.

Documentation	ID
Operating manual for P/PA/PE/PH/PHA/PHQ/PHQA/PHV/PHVA planetary gear units and planetary geared motors	443029_en
Lubricant filling quantities for gear units	441871

5 PHA planetary geared motors

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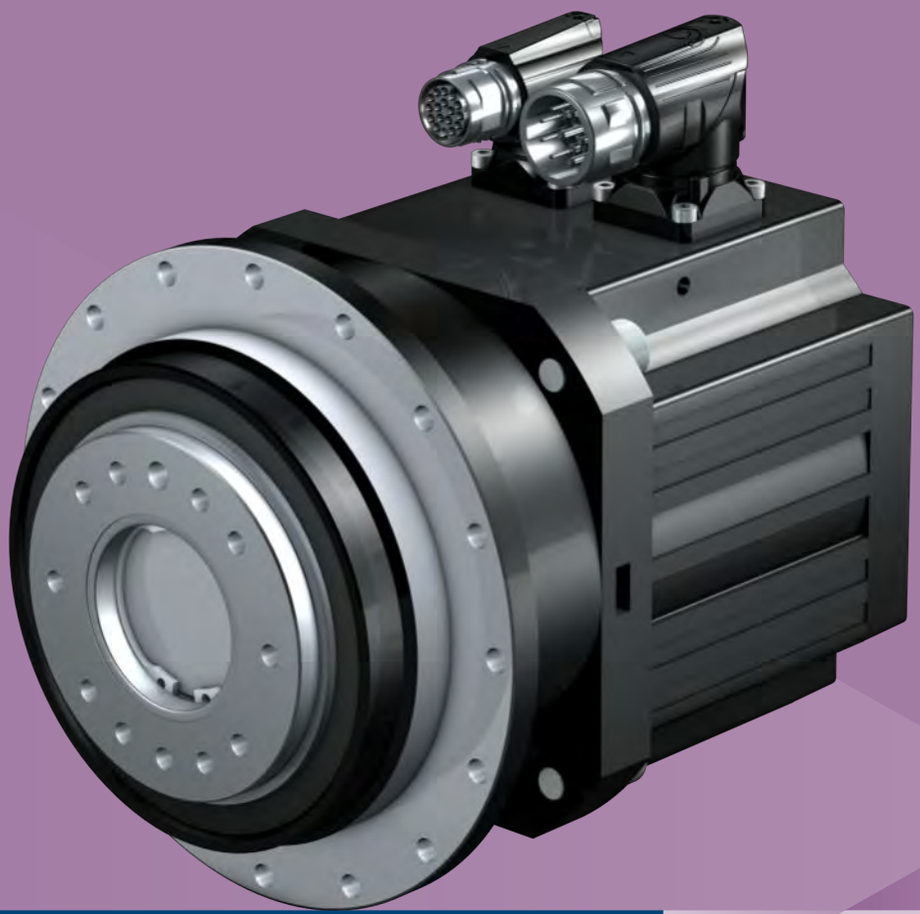


5 Planetary geared motors PHA

5.1 Overview

Low-backlash high-performance precision planetary geared motors

Features

Power density	★★★★☆
Backlash	★★★★★
Price category	€€€€
Shaft load	★★★★★
Smooth operation	★★★★★
Torsional stiffness	★★★★☆
Mass moment of inertia	★★★★★
Helical gearing	✓
Maintenance-free	✓
Any mounting position	✓
Continuous operation without cooling	✓
Stiff output bearing due to pretension	✓
Compact and highly dynamic due to direct motor attachment	✓

Key: ★☆☆☆☆ good | ★★★★★ excellent
€ Economy | €€€€€ Premium

Technical data

i	4 – 100
M_{2acc}	24 – 5000 Nm
$\Delta\phi_2$	1 – 2 arcmin
η_{get}	≤ 96 %

5.2 Selection tables

The technical data specified in the selection tables applies to:

- Installation altitudes up to 1000 m above sea level
- Surrounding temperatures from 0 °C to 40 °C
- Drives with convection-cooled motors (e.g. EZ401**U**)

You can calculate the technical data for drives with forced ventilated motors (for example EZ401**B**) at http://products.stoeber.de.

An explanation of the formula symbols can be found in Chapter [▶ 29.1].

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PHA3 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 65 Nm)															
60	43	44	1.5	1.0	PHA322_0500 EZ301U	65	130	50.00	50/1	4500	8000	0.20	2	14	2.9
86	30	31	1.8	1.5	PHA322_0350 EZ301U	65	130	35.00	35/1	4500	8000	0.20	2	15	2.9
107	24	25	2.0	1.9	PHA322_0280 EZ301U	60	130	28.00	28/1	4500	8000	0.23	2	15	2.9
107	41	44	3.5	1.1	PHA322_0280 EZ302U	60	130	28.00	28/1	4500	8000	0.33	2	15	3.5
120	22	22	2.2	2.1	PHA322_0250 EZ301U	65	130	25.00	25/1	4500	8000	0.22	2	15	2.9
120	37	39	3.7	1.2	PHA322_0250 EZ302U	65	130	25.00	25/1	4500	8000	0.32	2	15	3.5
150	17	18	2.4	2.6	PHA322_0200 EZ301U	52	130	20.00	20/1	4500	8000	0.24	2	15	2.9
150	30	31	4.1	1.5	PHA322_0200 EZ302U	65	130	20.00	20/1	4500	8000	0.34	2	15	3.5
150	39	41	5.4	1.2	PHA322_0200 EZ303U	65	130	20.00	20/1	4500	8000	0.45	2	15	4.0
300	8.9	9.1	1.6	2.9	PHA321_0100 EZ301U	27	100	10.00	10/1	3800	6000	0.21	2	11	2.4
300	15	16	2.8	1.7	PHA321_0100 EZ302U	48	100	10.00	10/1	3800	6000	0.31	2	11	3.0
300	20	21	3.6	1.3	PHA321_0100 EZ303U	50	100	10.00	10/1	3800	6000	0.42	2	11	3.5
429	11	11	2.9	3.7	PHA321_0070 EZ302U	34	130	7.000	7/1	3500	6000	0.33	2	14	3.0
429	14	15	3.7	2.8	PHA321_0070 EZ303U	47	130	7.000	7/1	3500	6000	0.44	2	14	3.5
429	19	20	5.0	2.1	PHA321_0070 EZ401U	57	130	7.000	7/1	3500	6000	0.97	2	14	4.9
429	32	35	8.4	1.2	PHA321_0070 EZ402U	60	130	7.000	7/1	3500	6000	1.7	2	14	6.0
600	9.9	11	5.6	4.0	PHA321_0050 EZ303U	34	110	5.000	5/1	3000	6000	0.47	2	16	3.5
600	13	14	7.5	2.9	PHA321_0050 EZ401U	41	130	5.000	5/1	3000	6000	1.0	2	16	4.9
600	23	25	13	1.7	PHA321_0050 EZ402U	65	130	5.000	5/1	3000	6000	1.7	2	16	6.0
600	33	41	19	1.2	PHA321_0050 EZ404U	65	130	5.000	5/1	3000	6000	3.1	2	16	8.1
PHA3 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 65 Nm)															
171	29	31	1.7	1.6	PHA322_0350 EZ301U	65	130	35.00	35/1	4500	8000	0.20	2	15	2.9
214	23	25	1.9	1.9	PHA322_0280 EZ301U	60	130	28.00	28/1	4500	8000	0.23	2	15	2.9
214	39	44	3.3	1.2	PHA322_0280 EZ302U	60	130	28.00	28/1	4500	8000	0.33	2	15	3.5
240	21	22	2.1	2.2	PHA322_0250 EZ301U	65	130	25.00	25/1	4500	8000	0.22	2	15	2.9
240	35	39	3.5	1.3	PHA322_0250 EZ302U	65	130	25.00	25/1	4500	8000	0.32	2	15	3.5
300	17	18	2.3	2.7	PHA322_0200 EZ301U	52	130	20.00	20/1	4500	8000	0.24	2	15	2.9
300	28	31	3.9	1.6	PHA322_0200 EZ302U	65	130	20.00	20/1	4500	8000	0.34	2	15	3.5
300	36	42	5.1	1.2	PHA322_0200 EZ303U	65	130	20.00	20/1	4500	8000	0.45	2	15	4.0
600	8.5	9.1	2.0	2.4	PHA321_0100 EZ301U	27	100	10.00	10/1	3800	6000	0.21	2	11	2.4
600	14	16	3.3	1.4	PHA321_0100 EZ302U	48	100	10.00	10/1	3800	6000	0.31	2	11	3.0
600	19	22	4.3	1.1	PHA321_0100 EZ303U	50	100	10.00	10/1	3800	6000	0.42	2	11	3.5
857	10	11	3.4	3.1	PHA321_0070 EZ302U	34	130	7.000	7/1	3500	6000	0.33	2	14	3.0
857	13	15	4.4	2.4	PHA321_0070 EZ303U	47	130	7.000	7/1	3500	6000	0.44	2	14	3.5
857	15	19	5.2	2.0	PHA321_0070 EZ401U	57	130	7.000	7/1	3500	6000	0.97	2	14	4.9
857	24	33	7.9	1.3	PHA321_0070 EZ402U	60	130	7.000	7/1	3500	6000	1.7	2	14	6.0
1200	7.2	8.1	5.1	4.3	PHA321_0050 EZ302U	24	110	5.000	5/1	3000	6000	0.36	2	16	3.0
1200	9.4	11	6.6	3.3	PHA321_0050 EZ303U	34	110	5.000	5/1	3000	6000	0.47	2	16	3.5
1200	11	13	7.8	2.8	PHA321_0050 EZ401U	41	130	5.000	5/1	3000	6000	1.0	2	16	4.9
1200	17	24	12	1.9	PHA321_0050 EZ402U	65	130	5.000	5/1	3000	6000	1.7	2	16	6.0
1200	28	40	20	1.1	PHA321_0050 EZ404U	65	130	5.000	5/1	3000	6000	3.1	2	16	8.1
PHA4 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 130 Nm)															
43	61	62	0.7	1.5	PHA422_0700 EZ301U	110	240	70.00	70/1	4500	8000	0.21	1	27	5.3
60	43	44	0.9	2.1	PHA422_0500 EZ301U	130	240	50.00	50/1	4500	8000	0.21	1	27	5.3
60	74	78	1.5	1.2	PHA422_0500 EZ302U	130	240	50.00	50/1	4500	8000	0.31	1	27	5.9
75	35	35	1.0	2.6	PHA422_0400 EZ301U	100	240	40.00	40/1	4500	8000	0.21	1	24	5.3
75	59	62	1.6	1.5	PHA422_0400 EZ302U	130	240	40.00	40/1	4500	8000	0.31	1	24	5.9
75	77	81	2.1	1.2	PHA422_0400 EZ303U	130	240	40.00	40/1	4500	8000	0.42	1	24	6.4
86	30	31	1.0	3.0	PHA422_0350 EZ301U	91	240	35.00	35/1	4500	8000	0.23	1	28	5.3
86	52	55	1.8	1.7	PHA422_0350 EZ302U	130	240	35.00	35/1	4500	8000	0.33	1	28	5.9
86	67	71	2.3	1.3	PHA422_0350 EZ303U	130	240	35.00	35/1	4500	8000	0.44	1	28	6.4
107	24	25	1.1	3.7	PHA422_0280 EZ301U	73	240	28.00	28/1	4500	8000	0.24	1	25	5.3

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PHA4 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 130 Nm)															
107	41	44	2.0	2.2	PHA422_0280 EZ302U	130	240	28.00	28/1	4500	8000	0.34	1	25	5.9
107	54	57	2.5	1.7	PHA422_0280 EZ303U	130	240	28.00	28/1	4500	8000	0.45	1	25	6.4
107	73	78	3.4	1.2	PHA422_0280 EZ401U	130	240	28.00	28/1	4500	8000	0.98	1	25	7.8
120	22	22	1.2	4.2	PHA422_0250 EZ301U	65	240	25.00	25/1	4000	7000	0.28	1	29	5.3
120	37	39	2.1	2.4	PHA422_0250 EZ302U	120	240	25.00	25/1	4000	7000	0.38	1	29	5.9
120	48	51	2.7	1.9	PHA422_0250 EZ303U	130	240	25.00	25/1	4000	7000	0.49	1	29	6.4
120	65	70	3.6	1.4	PHA422_0250 EZ401U	130	240	25.00	25/1	4000	7000	1.0	1	29	7.8
150	30	31	2.3	3.0	PHA422_0200 EZ302U	93	240	20.00	20/1	3700	6500	0.43	1	29	5.9
150	39	41	3.0	2.3	PHA422_0200 EZ303U	130	240	20.00	20/1	3700	6500	0.54	1	29	6.4
150	52	56	4.1	1.7	PHA422_0200 EZ401U	130	240	20.00	20/1	3700	6500	1.1	1	29	7.8
150	80	87	6.3	1.1	PHA422_0200 EZ501U	130	240	20.00	20/1	3700	6500	3.0	1	29	8.8
150	87	97	6.8	1.0	PHA422_0200 EZ402U	130	240	20.00	20/1	3700	6500	1.8	1	29	8.9
188	24	25	2.6	3.8	PHA422_0160 EZ302U	74	240	16.00	16/1	3700	6500	0.44	1	27	5.9
188	31	33	3.4	2.9	PHA422_0160 EZ303U	100	240	16.00	16/1	3700	6500	0.55	1	27	6.4
188	42	45	4.6	2.2	PHA422_0160 EZ401U	130	240	16.00	16/1	3700	6500	1.1	1	27	7.8
188	64	70	7.0	1.4	PHA422_0160 EZ501U	130	240	16.00	16/1	3700	6500	3.1	1	27	8.8
188	70	77	7.6	1.3	PHA422_0160 EZ402U	130	240	16.00	16/1	3700	6500	1.8	1	27	8.9
300	27	29	2.8	2.0	PHA421_0100 EZ401U	82	200	10.00	10/1	3500	6000	1.0	1	21	6.5
300	41	45	4.2	1.3	PHA421_0100 EZ501U	100	200	10.00	10/1	3500	6000	3.0	1	21	7.5
300	45	50	4.6	1.2	PHA421_0100 EZ402U	100	200	10.00	10/1	3500	6000	1.7	1	21	7.6
429	19	20	3.0	3.9	PHA421_0070 EZ401U	57	240	7.000	7/1	3200	6000	1.1	1	31	6.5
429	29	32	4.6	2.6	PHA421_0070 EZ501U	110	240	7.000	7/1	3200	6000	3.1	1	31	7.5
429	32	35	5.0	2.4	PHA421_0070 EZ402U	110	240	7.000	7/1	3200	6000	1.8	1	31	7.6
429	46	58	7.4	1.6	PHA421_0070 EZ404U	110	240	7.000	7/1	3200	6000	3.1	1	31	9.7
429	50	54	7.9	1.5	PHA421_0070 EZ502U	110	240	7.000	7/1	3200	6000	5.4	1	31	9.0
429	65	75	10	1.1	PHA421_0070 EZ503U	110	240	7.000	7/1	3200	6000	7.7	1	31	11
600	21	23	6.9	3.6	PHA421_0050 EZ501U	77	240	5.000	5/1	2700	6000	3.2	1	37	7.5
600	23	25	7.5	3.3	PHA421_0050 EZ402U	77	240	5.000	5/1	2700	6000	1.9	1	37	7.6
600	33	41	11	2.2	PHA421_0050 EZ404U	130	240	5.000	5/1	2700	6000	3.3	1	37	9.7
600	36	38	12	2.1	PHA421_0050 EZ502U	130	240	5.000	5/1	2700	6000	5.5	1	37	9.0
600	47	53	16	1.6	PHA421_0050 EZ503U	130	240	5.000	5/1	2700	6000	7.9	1	37	11
600	65	77	22	1.1	PHA421_0050 EZ505U	130	240	5.000	5/1	2700	6000	12	1	37	13
750	17	18	9.0	4.5	PHA421_0040 EZ501U	61	240	4.000	4/1	2300	5000	3.4	1	39	7.5
750	18	20	9.8	4.1	PHA421_0040 EZ402U	61	240	4.000	4/1	2300	5000	2.1	1	39	7.6
750	26	33	14	2.8	PHA421_0040 EZ404U	110	240	4.000	4/1	2300	5000	3.5	1	39	9.7
750	28	31	15	2.6	PHA421_0040 EZ502U	120	240	4.000	4/1	2300	5000	5.7	1	39	9.0
750	37	43	20	2.0	PHA421_0040 EZ503U	130	240	4.000	4/1	2300	5000	8.1	1	39	11
750	52	61	28	1.4	PHA421_0040 EZ505U	130	240	4.000	4/1	2300	5000	13	1	39	13
PHA4 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 130 Nm)															
900	46	73	17	1.4	PHA421_0050 EZ505U	130	240	5.000	5/1	2700	6000	12	1	37	13
1125	36	59	23	1.8	PHA421_0040 EZ505U	130	240	4.000	4/1	2300	5000	13	1	39	13
PHA4 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 130 Nm)															
86	58	62	0.7	1.6	PHA422_0700 EZ301U	110	240	70.00	70/1	4500	8000	0.21	1	27	5.3
120	41	44	0.8	2.2	PHA422_0500 EZ301U	130	240	50.00	50/1	4500	8000	0.21	1	27	5.3
120	70	78	1.4	1.3	PHA422_0500 EZ302U	130	240	50.00	50/1	4500	8000	0.31	1	27	5.9
150	33	35	1.0	2.4	PHA422_0400 EZ301U	100	240	40.00	40/1	4500	8000	0.21	1	24	5.3
150	56	62	1.7	1.4	PHA422_0400 EZ302U	130	240	40.00	40/1	4500	8000	0.31	1	24	5.9
150	73	84	2.3	1.1	PHA422_0400 EZ303U	130	240	40.00	40/1	4500	8000	0.42	1	24	6.4
171	29	31	1.0	3.1	PHA422_0350 EZ301U	91	240	35.00	35/1	4500	8000	0.23	1	28	5.3
171	49	55	1.7	1.8	PHA422_0350 EZ302U	130	240	35.00	35/1	4500	8000	0.33	1	28	5.9
171	64	73	2.2	1.4	PHA422_0350 EZ303U	130	240	35.00	35/1	4500	8000	0.44	1	28	6.4
171	75	91	2.5	1.2	PHA422_0350 EZ401U	130	240	35.00	35/1	4500	8000	0.97	1	28	7.8
214	23	25	1.1	3.9	PHA422_0280 EZ301U	73	240	28.00	28/1	4500	8000	0.24	1	25	5.3
214	39	44	1.8	2.3	PHA422_0280 EZ302U	130	240	28.00	28/1	4500	8000	0.34	1	25	5.9
214	51	59	2.4	1.8	PHA422_0280 EZ303U	130	240	28.00	28/1	4500	8000	0.45	1	25	6.4
214	60	73	2.8	1.5	PHA422_0280 EZ401U	130	240	28.00	28/1	4500	8000	0.98	1	25	7.8
240	21	22	1.2	4.3	PHA422_0250 EZ301U	65	240	25.00	25/1	4000	7000	0.28	1	29	5.3
240	35	39	2.0	2.6	PHA422_0250 EZ302U	120	240	25.00	25/1	4000	7000	0.38	1	29	5.9
240	46	52	2.6	2.0	PHA422_0250 EZ303U	130	240	25.00	25/1	4000	7000	0.49	1	29	6.4
240	53	65	3.0	1.7	PHA422_0250 EZ401U	130	240	25.00	25/1	4000	7000	1.0	1	29	7.8
300	28	31	2.2	3.2	PHA422_0200 EZ302U	93	240	20.00	20/1	3700	6500	0.43	1	29	5.9
300	36	42	2.9	2.5	PHA422_0200 EZ303U	130	240	20.00	20/1	3700	6500	0.54	1	29	6.4
300	43	52	3.3	2.1	PHA422_0200 EZ401U	130	240	20.00	20/1	3700	6500	1.1	1	29	7.8
300	63	82	5.0	1.4	PHA422_0200 EZ501U	130	240	20.00	20/1	3700	6500	3.0	1	29	8.8

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PHA4 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 130 Nm)															
300	65	91	5.1	1.4	PHA422_0200 EZ402U	130	240	20.00	20/1	3700	6500	1.8	1	29	8.9
375	22	25	2.4	4.0	PHA422_0160 EZ302U	74	240	16.00	16/1	3700	6500	0.44	1	27	5.9
375	29	33	3.2	3.1	PHA422_0160 EZ303U	100	240	16.00	16/1	3700	6500	0.55	1	27	6.4
375	34	42	3.7	2.6	PHA422_0160 EZ401U	130	240	16.00	16/1	3700	6500	1.1	1	27	7.8
375	51	65	5.5	1.8	PHA422_0160 EZ501U	130	240	16.00	16/1	3700	6500	3.1	1	27	8.8
375	52	73	5.7	1.7	PHA422_0160 EZ402U	130	240	16.00	16/1	3700	6500	1.8	1	27	8.9
600	22	27	2.9	1.9	PHA421_0100 EZ401U	82	200	10.00	10/1	3500	6000	1.0	1	21	6.5
600	33	42	4.2	1.3	PHA421_0100 EZ501U	100	200	10.00	10/1	3500	6000	3.0	1	21	7.5
600	34	47	4.4	1.2	PHA421_0100 EZ402U	100	200	10.00	10/1	3500	6000	1.7	1	21	7.6
857	15	19	3.1	3.8	PHA421_0070 EZ401U	57	240	7.000	7/1	3200	6000	1.1	1	31	6.5
857	23	30	4.6	2.6	PHA421_0070 EZ501U	110	240	7.000	7/1	3200	6000	3.1	1	31	7.5
857	24	33	4.7	2.5	PHA421_0070 EZ402U	110	240	7.000	7/1	3200	6000	1.8	1	31	7.6
857	35	52	7.0	1.7	PHA421_0070 EZ502U	110	240	7.000	7/1	3200	6000	5.4	1	31	9.0
857	39	56	7.8	1.5	PHA421_0070 EZ404U	110	240	7.000	7/1	3200	6000	3.1	1	31	9.7
857	42	71	8.4	1.4	PHA421_0070 EZ503U	110	240	7.000	7/1	3200	6000	7.7	1	31	11
1200	16	21	6.9	3.6	PHA421_0050 EZ501U	77	240	5.000	5/1	2700	6000	3.2	1	37	7.5
1200	17	24	7.1	3.5	PHA421_0050 EZ402U	77	240	5.000	5/1	2700	6000	1.9	1	37	7.6
1200	25	37	10	2.4	PHA421_0050 EZ502U	130	240	5.000	5/1	2700	6000	5.5	1	37	9.0
1200	28	40	12	2.1	PHA421_0050 EZ404U	130	240	5.000	5/1	2700	6000	3.3	1	37	9.7
1200	30	51	13	2.0	PHA421_0050 EZ503U	130	240	5.000	5/1	2700	6000	7.9	1	37	11
PHA5 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 320 Nm)															
43	182	195	1.0	1.2	PHA522_0700 EZ401U	270	600	70.00	70/1	4000	7000	0.98	1	66	11
60	130	140	1.2	1.7	PHA522_0500 EZ401U	320	600	50.00	50/1	4000	7000	0.98	1	66	11
60	200	219	1.8	1.1	PHA522_0500 EZ501U	320	600	50.00	50/1	4000	7000	3.0	1	66	12
60	219	242	2.0	1.0	PHA522_0500 EZ402U	320	600	50.00	50/1	4000	7000	1.7	1	66	12
75	104	112	1.4	1.9	PHA522_0400 EZ401U	320	600	40.00	40/1	4000	7000	0.98	1	58	11
75	160	175	2.2	1.3	PHA522_0400 EZ501U	320	600	40.00	40/1	4000	7000	2.9	1	58	12
75	175	193	2.4	1.2	PHA522_0400 EZ402U	320	600	40.00	40/1	4000	7000	1.7	1	58	12
86	91	98	1.4	2.4	PHA522_0350 EZ401U	280	600	35.00	35/1	4000	7000	1.0	1	68	11
86	140	153	2.2	1.6	PHA522_0350 EZ501U	320	600	35.00	35/1	4000	7000	3.0	1	68	12
86	153	169	2.4	1.4	PHA522_0350 EZ402U	320	600	35.00	35/1	4000	7000	1.7	1	68	12
107	73	78	1.6	2.9	PHA522_0280 EZ401U	220	600	28.00	28/1	4000	7000	1.0	1	61	11
107	112	122	2.5	1.9	PHA522_0280 EZ501U	320	600	28.00	28/1	4000	7000	3.0	1	61	12
107	122	135	2.8	1.7	PHA522_0280 EZ402U	320	600	28.00	28/1	4000	7000	1.7	1	61	12
107	180	224	4.0	1.2	PHA522_0280 EZ404U	320	600	28.00	28/1	4000	7000	3.1	1	61	14
107	193	208	4.3	1.1	PHA522_0280 EZ502U	320	600	28.00	28/1	4000	7000	5.3	1	61	13
120	65	70	1.7	3.4	PHA522_0250 EZ401U	200	600	25.00	25/1	3700	6500	1.2	1	71	11
120	100	109	2.5	2.2	PHA522_0250 EZ501U	320	600	25.00	25/1	3700	6500	3.1	1	71	12
120	109	121	2.8	2.0	PHA522_0250 EZ402U	320	600	25.00	25/1	3700	6500	1.9	1	71	12
120	160	200	4.1	1.4	PHA522_0250 EZ404U	320	600	25.00	25/1	3700	6500	3.2	1	71	14
120	172	186	4.4	1.3	PHA522_0250 EZ502U	320	600	25.00	25/1	3700	6500	5.4	1	71	13
120	172	193	4.4	1.3	PHA522_0250 EZ701U	320	600	25.00	25/1	3700	6500	8.7	1	71	15
150	52	56	1.9	4.2	PHA522_0200 EZ401U	160	600	20.00	20/1	3300	6000	1.3	1	71	11
150	80	87	2.8	2.8	PHA522_0200 EZ501U	300	600	20.00	20/1	3300	6000	3.2	1	71	12
150	87	97	3.1	2.5	PHA522_0200 EZ402U	300	600	20.00	20/1	3300	6000	2.0	1	71	12
150	128	160	4.6	1.7	PHA522_0200 EZ404U	320	600	20.00	20/1	3300	6000	3.3	1	71	14
150	138	149	4.9	1.6	PHA522_0200 EZ502U	320	600	20.00	20/1	3300	6000	5.5	1	71	13
150	138	154	4.9	1.6	PHA522_0200 EZ701U	320	600	20.00	20/1	3300	6000	8.8	1	71	15
150	180	206	6.4	1.2	PHA522_0200 EZ503U	320	600	20.00	20/1	3300	6000	7.9	1	71	15
188	64	70	3.3	3.3	PHA522_0160 EZ501U	240	600	16.00	16/1	3300	6000	3.2	1	65	12
188	70	77	3.6	3.0	PHA522_0160 EZ402U	240	600	16.00	16/1	3300	6000	1.9	1	65	12
188	103	128	5.3	2.0	PHA522_0160 EZ404U	320	600	16.00	16/1	3300	6000	3.3	1	65	14
188	110	119	5.7	1.9	PHA522_0160 EZ502U	320	600	16.00	16/1	3300	6000	5.5	1	65	13
188	110	124	5.7	1.9	PHA522_0160 EZ701U	300	600	16.00	16/1	3300	6000	8.8	1	65	15
188	144	165	7.5	1.5	PHA522_0160 EZ503U	320	600	16.00	16/1	3300	6000	7.9	1	65	15
188	179	214	9.3	1.2	PHA522_0160 EZ702U	320	600	16.00	16/1	3300	6000	14	1	65	18
188	201	238	10	1.0	PHA522_0160 EZ505U	320	600	16.00	16/1	3300	6000	12	1	65	18
300	41	45	2.0	3.0	PHA521_0100 EZ501U	150	500	10.00	10/1	3300	6000	3.1	1	55	9.5
300	71	77	3.5	1.7	PHA521_0100 EZ502U	250	500	10.00	10/1	3300	6000	5.4	1	55	11
300	71	80	3.5	1.7	PHA521_0100 EZ701U	190	500	10.00	10/1	3300	6000	8.7	1	55	13
300	93	107	4.6	1.3	PHA521_0100 EZ503U	250	500	10.00	10/1	3300	6000	7.8	1	55	13
300	115	138	5.6	1.1	PHA521_0100 EZ702U	250	500	10.00	10/1	3300	6000	14	1	55	15
429	50	54	3.6	3.7	PHA521_0070 EZ502U	210	600	7.000	7/1	3000	6000	5.7	1	77	11
429	50	56	3.6	3.7	PHA521_0070 EZ701U	130	600	7.000	7/1	3000	6000	9.0	1	77	13

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PHA5 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 320 Nm)															
429	65	75	4.7	2.8	PHA521_0070 EZ503U	270	600	7.000	7/1	3000	6000	8.1	1	77	13
429	81	97	5.8	2.3	PHA521_0070 EZ702U	270	600	7.000	7/1	3000	6000	14	1	77	15
429	91	108	6.5	2.0	PHA521_0070 EZ505U	270	600	7.000	7/1	3000	6000	13	1	77	15
429	111	140	7.9	1.7	PHA521_0070 EZ703U	270	600	7.000	7/1	3000	6000	22	1	77	17
600	47	53	7.0	3.9	PHA521_0050 EZ503U	210	430	5.000	5/1	2500	5500	8.6	1	93	13
600	58	69	8.6	3.2	PHA521_0050 EZ702U	200	600	5.000	5/1	2500	5500	15	1	93	15
600	65	77	9.7	2.8	PHA521_0050 EZ505U	320	600	5.000	5/1	2500	5500	13	1	93	15
600	79	100	12	2.3	PHA521_0050 EZ703U	310	600	5.000	5/1	2500	5500	23	1	93	17
600	102	145	15	1.8	PHA521_0050 EZ705U	320	600	5.000	5/1	2500	5500	35	1	93	23
750	37	43	9.1	4.9	PHA521_0040 EZ503U	170	340	4.000	4/1	2200	5000	9.1	1	98	13
750	46	55	11	4.0	PHA521_0040 EZ702U	160	600	4.000	4/1	2200	5000	15	1	98	15
750	52	61	13	3.5	PHA521_0040 EZ505U	260	600	4.000	4/1	2200	5000	14	1	98	15
750	63	80	16	2.9	PHA521_0040 EZ703U	250	600	4.000	4/1	2200	5000	23	1	98	17
750	82	116	20	2.2	PHA521_0040 EZ705U	320	600	4.000	4/1	2200	5000	36	1	98	23
PHA5 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 320 Nm)															
281	141	228	7.4	1.5	PHA522_0160 EZ505U	320	600	16.00	16/1	3300	6000	12	1	65	18
450	91	147	5.1	1.2	PHA521_0100 EZ505U	250	500	10.00	10/1	3300	6000	12	1	55	15
643	64	103	5.2	2.5	PHA521_0070 EZ505U	270	600	7.000	7/1	3000	6000	13	1	77	15
643	81	134	6.7	2.0	PHA521_0070 EZ703U	270	600	7.000	7/1	3000	6000	22	1	77	17
900	46	73	7.8	3.5	PHA521_0050 EZ505U	320	600	5.000	5/1	2500	5500	13	1	93	15
900	58	96	10	2.8	PHA521_0050 EZ703U	310	600	5.000	5/1	2500	5500	23	1	93	17
900	79	144	14	2.0	PHA521_0050 EZ705U	320	600	5.000	5/1	2500	5500	35	1	93	23
1125	36	59	10	4.4	PHA521_0040 EZ505U	260	600	4.000	4/1	2200	5000	14	1	98	15
1125	46	77	13	3.4	PHA521_0040 EZ703U	250	600	4.000	4/1	2200	5000	23	1	98	17
1125	63	115	18	2.5	PHA521_0040 EZ705U	320	600	4.000	4/1	2200	5000	36	1	98	23
PHA5 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 320 Nm)															
86	150	182	0.9	1.4	PHA522_0700 EZ401U	270	600	70.00	70/1	4000	7000	0.98	1	66	11
120	107	130	1.1	1.9	PHA522_0500 EZ401U	320	600	50.00	50/1	4000	7000	0.98	1	66	11
120	158	205	1.6	1.3	PHA522_0500 EZ501U	320	600	50.00	50/1	4000	7000	3.0	1	66	12
120	163	228	1.6	1.2	PHA522_0500 EZ402U	320	600	50.00	50/1	4000	7000	1.7	1	66	12
150	86	104	1.5	1.9	PHA522_0400 EZ401U	320	600	40.00	40/1	4000	7000	0.98	1	58	11
150	126	164	2.2	1.3	PHA522_0400 EZ501U	320	600	40.00	40/1	4000	7000	2.9	1	58	12
150	130	182	2.3	1.2	PHA522_0400 EZ402U	320	600	40.00	40/1	4000	7000	1.7	1	58	12
171	75	91	1.2	2.9	PHA522_0350 EZ401U	280	600	35.00	35/1	4000	7000	1.0	1	68	11
171	111	143	1.7	2.0	PHA522_0350 EZ501U	320	600	35.00	35/1	4000	7000	3.0	1	68	12
171	114	159	1.8	1.9	PHA522_0350 EZ402U	320	600	35.00	35/1	4000	7000	1.7	1	68	12
214	60	73	1.3	3.5	PHA522_0280 EZ401U	220	600	28.00	28/1	4000	7000	1.0	1	61	11
214	89	115	2.0	2.4	PHA522_0280 EZ501U	320	600	28.00	28/1	4000	7000	3.0	1	61	12
214	91	128	2.1	2.3	PHA522_0280 EZ402U	320	600	28.00	28/1	4000	7000	1.7	1	61	12
214	135	203	3.0	1.6	PHA522_0280 EZ502U	320	600	28.00	28/1	4000	7000	5.3	1	61	13
214	151	219	3.4	1.4	PHA522_0280 EZ404U	320	600	28.00	28/1	4000	7000	3.1	1	61	14
240	53	65	1.4	4.1	PHA522_0250 EZ401U	200	600	25.00	25/1	3700	6500	1.2	1	71	11
240	79	102	2.0	2.8	PHA522_0250 EZ501U	320	600	25.00	25/1	3700	6500	3.1	1	71	12
240	81	114	2.1	2.7	PHA522_0250 EZ402U	320	600	25.00	25/1	3700	6500	1.9	1	71	12
240	121	181	3.1	1.8	PHA522_0250 EZ502U	320	600	25.00	25/1	3700	6500	5.4	1	71	13
240	121	184	3.1	1.8	PHA522_0250 EZ701U	320	600	25.00	25/1	3700	6500	8.7	1	71	15
240	135	195	3.4	1.6	PHA522_0250 EZ404U	320	600	25.00	25/1	3700	6500	3.2	1	71	14
240	144	246	3.7	1.5	PHA522_0250 EZ503U	320	600	25.00	25/1	3700	6500	7.8	1	71	15
300	63	82	2.2	3.5	PHA522_0200 EZ501U	300	600	20.00	20/1	3300	6000	3.2	1	71	12
300	65	91	2.3	3.4	PHA522_0200 EZ402U	300	600	20.00	20/1	3300	6000	2.0	1	71	12
300	97	145	3.4	2.3	PHA522_0200 EZ502U	320	600	20.00	20/1	3300	6000	5.5	1	71	13
300	97	147	3.4	2.3	PHA522_0200 EZ701U	320	600	20.00	20/1	3300	6000	8.8	1	71	15
300	108	156	3.8	2.0	PHA522_0200 EZ404U	320	600	20.00	20/1	3300	6000	3.3	1	71	14
300	115	197	4.1	1.9	PHA522_0200 EZ503U	320	600	20.00	20/1	3300	6000	7.9	1	71	15
375	51	65	2.6	4.2	PHA522_0160 EZ501U	240	600	16.00	16/1	3300	6000	3.2	1	65	12
375	52	73	2.7	4.0	PHA522_0160 EZ402U	240	600	16.00	16/1	3300	6000	1.9	1	65	12
375	77	116	4.0	2.7	PHA522_0160 EZ502U	320	600	16.00	16/1	3300	6000	5.5	1	65	13
375	77	118	4.0	2.7	PHA522_0160 EZ701U	300	600	16.00	16/1	3300	6000	8.8	1	65	15
375	86	125	4.5	2.4	PHA522_0160 EZ404U	320	600	16.00	16/1	3300	6000	3.3	1	65	14
375	92	158	4.8	2.3	PHA522_0160 EZ503U	320	600	16.00	16/1	3300	6000	7.9	1	65	15
375	107	213	5.6	2.0	PHA522_0160 EZ702U	320	600	16.00	16/1	3300	6000	14	1	65	18
600	33	42	2.0	3.0	PHA521_0100 EZ501U	150	500	10.00	10/1	3300	6000	3.1	1	55	9.5
600	50	75	3.1	1.9	PHA521_0100 EZ502U	250	500	10.00	10/1	3300	6000	5.4	1	55	11
600	50	76	3.1	1.9	PHA521_0100 EZ701U	190	500	10.00	10/1	3300	6000	8.7	1	55	13

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PHA5 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 320 Nm)															
600	60	102	3.7	1.6	PHA521_0100 EZ503U	250	500	10.00	10/1	3300	6000	7.8	1	55	13
600	69	137	4.3	1.4	PHA521_0100 EZ702U	250	500	10.00	10/1	3300	6000	14	1	55	15
857	35	52	3.2	4.2	PHA521_0070 EZ502U	210	600	7.000	7/1	3000	6000	5.7	1	77	11
857	35	53	3.2	4.2	PHA521_0070 EZ701U	130	600	7.000	7/1	3000	6000	9.0	1	77	13
857	42	71	3.8	3.5	PHA521_0070 EZ503U	270	600	7.000	7/1	3000	6000	8.1	1	77	13
857	48	96	4.4	3.0	PHA521_0070 EZ702U	270	600	7.000	7/1	3000	6000	14	1	77	15
PHA7 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 700 Nm)															
400	210	317	16	2.1	PHA721_0050 EZ805U	700	1400	5.000	5/1	2200	5000	135	1	184	54
500	168	254	21	2.6	PHA721_0040 EZ805U	700	1370	4.000	4/1	1900	4000	137	1	185	54
PHA7 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 700 Nm)															
43	280	306	0.9	1.6	PHA722_0700 EZ501U	650	1240	70.00	70/1	3700	6500	3.1	1	142	18
60	200	219	1.1	2.2	PHA722_0500 EZ501U	700	1400	50.00	50/1	3700	6500	3.1	1	142	18
60	344	372	1.9	1.3	PHA722_0500 EZ502U	700	1400	50.00	50/1	3700	6500	5.4	1	142	19
60	344	386	1.9	1.3	PHA722_0500 EZ701U	700	1400	50.00	50/1	3700	6500	8.7	1	142	21
75	160	175	1.2	2.8	PHA722_0400 EZ501U	600	1370	40.00	40/1	3700	6500	3.1	1	126	18
75	275	298	2.1	1.6	PHA722_0400 EZ502U	700	1370	40.00	40/1	3700	6500	5.4	1	126	19
75	275	309	2.1	1.6	PHA722_0400 EZ701U	700	1370	40.00	40/1	3700	6500	8.7	1	126	21
75	361	413	2.7	1.2	PHA722_0400 EZ503U	700	1370	40.00	40/1	3700	6500	7.8	1	126	21
86	140	153	1.3	3.1	PHA722_0350 EZ501U	520	1400	35.00	35/1	3700	6500	3.2	1	146	18
86	241	260	2.2	1.8	PHA722_0350 EZ502U	700	1400	35.00	35/1	3700	6500	5.5	1	146	19
86	241	270	2.2	1.8	PHA722_0350 EZ701U	650	1400	35.00	35/1	3700	6500	8.8	1	146	21
86	316	361	2.9	1.4	PHA722_0350 EZ503U	700	1400	35.00	35/1	3700	6500	7.9	1	146	21
86	391	469	3.6	1.1	PHA722_0350 EZ702U	700	1400	35.00	35/1	3700	6500	14	1	146	23
86	439	521	4.1	1.0	PHA722_0350 EZ505U	700	1400	35.00	35/1	3700	6500	12	1	146	23
107	112	122	1.4	3.9	PHA722_0280 EZ501U	420	1370	28.00	28/1	3700	6500	3.3	1	131	18
107	193	208	2.5	2.3	PHA722_0280 EZ502U	700	1370	28.00	28/1	3700	6500	5.6	1	131	19
107	193	216	2.5	2.3	PHA722_0280 EZ701U	520	1370	28.00	28/1	3700	6500	8.9	1	131	21
107	253	289	3.3	1.7	PHA722_0280 EZ503U	700	1370	28.00	28/1	3700	6500	8.0	1	131	21
107	312	375	4.0	1.4	PHA722_0280 EZ702U	700	1370	28.00	28/1	3700	6500	14	1	131	23
107	352	417	4.5	1.3	PHA722_0280 EZ505U	700	1370	28.00	28/1	3700	6500	13	1	131	23
120	100	109	1.5	4.4	PHA722_0250 EZ501U	370	1400	25.00	25/1	3500	6000	3.6	1	149	18
120	172	186	2.6	2.6	PHA722_0250 EZ502U	700	1400	25.00	25/1	3500	6000	5.9	1	149	19
120	172	193	2.6	2.6	PHA722_0250 EZ701U	470	1400	25.00	25/1	3500	6000	9.2	1	149	21
120	226	258	3.4	2.0	PHA722_0250 EZ503U	700	1400	25.00	25/1	3500	6000	8.3	1	149	21
120	279	335	4.3	1.6	PHA722_0250 EZ702U	700	1400	25.00	25/1	3500	6000	14	1	149	23
120	314	372	4.8	1.4	PHA722_0250 EZ505U	700	1400	25.00	25/1	3500	6000	13	1	149	23
120	384	484	5.9	1.1	PHA722_0250 EZ703U	700	1400	25.00	25/1	3500	6000	22	1	149	25
150	138	149	2.9	3.2	PHA722_0200 EZ502U	580	1400	20.00	20/1	3000	5000	6.3	1	150	19
150	138	154	2.9	3.2	PHA722_0200 EZ701U	370	1400	20.00	20/1	3000	5000	9.6	1	150	21
150	180	206	3.9	2.4	PHA722_0200 EZ503U	700	1400	20.00	20/1	3000	5000	8.7	1	150	21
150	223	268	4.8	2.0	PHA722_0200 EZ702U	700	1400	20.00	20/1	3000	5000	15	1	150	23
150	251	298	5.4	1.8	PHA722_0200 EZ505U	700	1400	20.00	20/1	3000	5000	13	1	150	23
150	307	387	6.5	1.4	PHA722_0200 EZ703U	700	1400	20.00	20/1	3000	5000	23	1	150	25
188	110	119	3.3	4.0	PHA722_0160 EZ502U	460	1330	16.00	16/1	3000	5000	6.4	1	136	19
188	110	124	3.3	4.0	PHA722_0160 EZ701U	300	1370	16.00	16/1	3000	5000	9.7	1	136	21
188	144	165	4.3	3.0	PHA722_0160 EZ503U	640	1330	16.00	16/1	3000	5000	8.8	1	136	21
188	179	214	5.3	2.5	PHA722_0160 EZ702U	610	1370	16.00	16/1	3000	5000	15	1	136	23
188	201	238	6.0	2.2	PHA722_0160 EZ505U	700	1370	16.00	16/1	3000	5000	13	1	136	23
188	246	310	7.3	1.8	PHA722_0160 EZ703U	700	1370	16.00	16/1	3000	5000	23	1	136	25
188	317	449	9.5	1.4	PHA722_0160 EZ705U	700	1370	16.00	16/1	3000	5000	35	1	136	31
300	71	80	2.0	3.7	PHA721_0100 EZ701U	190	1000	10.00	10/1	3000	5000	9.2	1	117	17
300	115	138	3.2	2.3	PHA721_0100 EZ702U	390	1000	10.00	10/1	3000	5000	14	1	117	19
300	158	200	4.3	1.7	PHA721_0100 EZ703U	500	1000	10.00	10/1	3000	5000	22	1	117	21
300	204	290	5.6	1.3	PHA721_0100 EZ705U	500	1000	10.00	10/1	3000	5000	35	1	117	27
300	214	356	5.9	1.2	PHA721_0100 EZ802U	500	1000	10.00	10/1	3000	5000	59	1	117	35
429	81	97	3.3	4.8	PHA721_0070 EZ702U	280	1240	7.000	7/1	2500	5000	15	1	160	19
429	111	140	4.5	3.5	PHA721_0070 EZ703U	440	1240	7.000	7/1	2500	5000	23	1	160	21
429	143	203	5.9	2.7	PHA721_0070 EZ705U	650	1240	7.000	7/1	2500	5000	35	1	160	27
429	150	249	6.1	2.6	PHA721_0070 EZ802U	650	1240	7.000	7/1	2500	5000	59	1	160	35
600	79	100	6.8	4.9	PHA721_0050 EZ703U	310	890	5.000	5/1	2200	5000	24	1	184	21
600	102	145	8.8	3.8	PHA721_0050 EZ705U	500	1400	5.000	5/1	2200	5000	37	1	184	27
600	107	178	9.2	3.6	PHA721_0050 EZ802U	480	1400	5.000	5/1	2200	5000	61	1	184	35
600	128	231	11	3.0	PHA721_0050 EZ803U	700	1400	5.000	5/1	2200	5000	86	1	184	41
750	82	116	11	4.7	PHA721_0040 EZ705U	400	1370	4.000	4/1	1900	4000	39	1	185	27

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PHA7 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 700 Nm)															
750	86	142	12	4.5	PHA721_0040 EZ802U	380	1370	4.000	4/1	1900	4000	63	1	185	35
750	102	185	14	3.8	PHA721_0040 EZ803U	560	1370	4.000	4/1	1900	4000	88	1	185	41
PHA7 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 700 Nm)															
129	309	498	2.9	1.4	PHA722_0350 EZ505U	700	1400	35.00	35/1	3700	6500	12	1	146	23
161	247	398	3.2	1.8	PHA722_0280 EZ505U	700	1370	28.00	28/1	3700	6500	13	1	131	23
161	315	521	4.1	1.4	PHA722_0280 EZ703U	700	1370	28.00	28/1	3700	6500	22	1	131	25
180	221	356	3.4	2.0	PHA722_0250 EZ505U	700	1400	25.00	25/1	3500	6000	13	1	149	23
180	281	465	4.3	1.6	PHA722_0250 EZ703U	700	1400	25.00	25/1	3500	6000	22	1	149	25
225	177	285	3.8	2.5	PHA722_0200 EZ505U	700	1400	20.00	20/1	3000	5000	13	1	150	23
225	225	372	4.8	2.0	PHA722_0200 EZ703U	700	1400	20.00	20/1	3000	5000	23	1	150	25
281	141	228	4.2	3.1	PHA722_0160 EZ505U	700	1370	16.00	16/1	3000	5000	13	1	136	23
281	156	513	4.7	2.8	PHA722_0160 EZ802U	700	1370	16.00	16/1	3000	5000	59	1	136	39
281	180	298	5.4	2.4	PHA722_0160 EZ703U	700	1370	16.00	16/1	3000	5000	23	1	136	25
281	244	446	7.3	1.8	PHA722_0160 EZ705U	700	1370	16.00	16/1	3000	5000	35	1	136	31
450	101	331	3.2	2.3	PHA721_0100 EZ802U	500	1000	10.00	10/1	3000	5000	59	1	117	35
450	116	192	3.6	2.0	PHA721_0100 EZ703U	500	1000	10.00	10/1	3000	5000	22	1	117	21
450	157	288	4.9	1.5	PHA721_0100 EZ705U	500	1000	10.00	10/1	3000	5000	35	1	117	27
643	71	232	3.3	4.8	PHA721_0070 EZ802U	650	1240	7.000	7/1	2500	5000	59	1	160	35
643	81	134	3.8	4.1	PHA721_0070 EZ703U	440	1240	7.000	7/1	2500	5000	23	1	160	21
643	110	202	5.2	3.0	PHA721_0070 EZ705U	650	1240	7.000	7/1	2500	5000	35	1	160	27
900	79	144	7.7	4.3	PHA721_0050 EZ705U	500	1400	5.000	5/1	2200	5000	37	1	184	27
PHA7 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 700 Nm)															
86	221	286	0.7	2.0	PHA722_0700 EZ501U	650	1240	70.00	70/1	3700	6500	3.1	1	142	18
120	158	205	0.9	2.8	PHA722_0500 EZ501U	700	1400	50.00	50/1	3700	6500	3.1	1	142	18
120	242	363	1.3	1.8	PHA722_0500 EZ502U	700	1400	50.00	50/1	3700	6500	5.4	1	142	19
120	242	367	1.3	1.8	PHA722_0500 EZ701U	700	1400	50.00	50/1	3700	6500	8.7	1	142	21
120	288	493	1.6	1.5	PHA722_0500 EZ503U	700	1400	50.00	50/1	3700	6500	7.8	1	142	21
150	126	164	1.1	2.9	PHA722_0400 EZ501U	600	1370	40.00	40/1	3700	6500	3.1	1	126	18
150	193	290	1.7	1.9	PHA722_0400 EZ502U	700	1370	40.00	40/1	3700	6500	5.4	1	126	19
150	193	294	1.7	1.9	PHA722_0400 EZ701U	700	1370	40.00	40/1	3700	6500	8.7	1	126	21
150	231	394	2.1	1.6	PHA722_0400 EZ503U	700	1370	40.00	40/1	3700	6500	7.8	1	126	21
150	268	532	2.4	1.4	PHA722_0400 EZ702U	700	1370	40.00	40/1	3700	6500	14	1	126	23
171	111	143	1.0	4.0	PHA722_0350 EZ501U	520	1400	35.00	35/1	3700	6500	3.2	1	146	18
171	169	254	1.6	2.6	PHA722_0350 EZ502U	700	1400	35.00	35/1	3700	6500	5.5	1	146	19
171	169	257	1.6	2.6	PHA722_0350 EZ701U	650	1400	35.00	35/1	3700	6500	8.8	1	146	21
171	202	345	1.9	2.2	PHA722_0350 EZ503U	700	1400	35.00	35/1	3700	6500	7.9	1	146	21
171	234	465	2.2	1.9	PHA722_0350 EZ702U	700	1400	35.00	35/1	3700	6500	14	1	146	23
214	89	115	1.1	5.0	PHA722_0280 EZ501U	420	1370	28.00	28/1	3700	6500	3.3	1	131	18
214	135	203	1.7	3.2	PHA722_0280 EZ502U	700	1370	28.00	28/1	3700	6500	5.6	1	131	19
214	135	206	1.7	3.2	PHA722_0280 EZ701U	520	1370	28.00	28/1	3700	6500	8.9	1	131	21
214	161	276	2.1	2.7	PHA722_0280 EZ503U	700	1370	28.00	28/1	3700	6500	8.0	1	131	21
214	187	372	2.4	2.3	PHA722_0280 EZ702U	700	1370	28.00	28/1	3700	6500	14	1	131	23
240	121	181	1.8	3.6	PHA722_0250 EZ502U	700	1400	25.00	25/1	3500	6000	5.9	1	149	19
240	121	184	1.8	3.6	PHA722_0250 EZ701U	470	1400	25.00	25/1	3500	6000	9.2	1	149	21
240	144	246	2.2	3.1	PHA722_0250 EZ503U	700	1400	25.00	25/1	3500	6000	8.3	1	149	21
240	167	332	2.6	2.6	PHA722_0250 EZ702U	700	1400	25.00	25/1	3500	6000	14	1	149	23
PHA8 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 2000 Nm)															
80	1016	1537	5.9	1.2	PHA822_0250 EZ805U	2000	3200	25.00	25/1	3000	5500	135	1	484	82
100	813	1229	6.6	1.5	PHA822_0200 EZ805U	2000	3200	20.00	20/1	2500	4500	137	1	459	82
125	650	984	8.4	1.7	PHA822_0160 EZ805U	2000	3150	16.00	16/1	2500	4500	137	1	452	82
200	420	635	4.1	1.9	PHA821_0100 EZ805U	1200	2400	10.00	10/1	2500	4000	136	1	317	73
286	294	444	5.0	3.4	PHA821_0070 EZ805U	1380	2770	7.000	7/1	2000	4000	140	1	474	73
400	210	317	7.5	4.8	PHA821_0050 EZ805U	980	2870	5.000	5/1	1700	4000	148	1	566	73
500	168	254	12	4.8	PHA821_0040 EZ805U	790	2310	4.000	4/1	1500	3500	157	1	634	73
PHA8 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 2000 Nm)															
30	688	772	0.8	1.2	PHA822_1000 EZ701U	1200	2400	100.0	100/1	3300	6000	9.0	1	305	44
43	482	540	0.7	2.1	PHA822_0700 EZ701U	1300	2770	70.00	70/1	3300	6000	9.1	1	421	44
43	781	937	1.2	1.3	PHA822_0700 EZ702U	1600	2770	70.00	70/1	3300	6000	14	1	421	47
60	344	386	0.7	3.6	PHA822_0500 EZ701U	930	3200	50.00	50/1	3300	6000	9.1	1	436	44
60	558	670	1.1	2.2	PHA822_0500 EZ702U	1910	3200	50.00	50/1	3300	6000	14	1	436	47
60	767	967	1.6	1.6	PHA822_0500 EZ703U	2000	3200	50.00	50/1	3300	6000	22	1	436	49
60	990	1404	2.0	1.3	PHA822_0500 EZ705U	2000	3200	50.00	50/1	3300	6000	35	1	436	54
75	275	309	1.0	3.7	PHA822_0400 EZ701U	740	3150	40.00	40/1	3300	6000	9.2	1	418	44

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PHA8 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 2000 Nm)															
75	446	536	1.6	2.3	PHA822_0400 EZ702U	1530	3150	40.00	40/1	3300	6000	14	1	418	47
75	614	774	2.2	1.6	PHA822_0400 EZ703U	1920	3150	40.00	40/1	3300	6000	22	1	418	49
75	792	1123	2.8	1.3	PHA822_0400 EZ705U	1920	3150	40.00	40/1	3300	6000	35	1	418	54
75	830	1380	3.0	1.2	PHA822_0400 EZ802U	1920	3150	40.00	40/1	3300	6000	59	1	418	63
86	391	469	1.4	3.2	PHA822_0350 EZ702U	1330	3200	35.00	35/1	3300	6000	15	1	448	47
86	537	677	1.9	2.3	PHA822_0350 EZ703U	2000	3200	35.00	35/1	3300	6000	23	1	448	49
86	693	983	2.4	1.8	PHA822_0350 EZ705U	2000	3200	35.00	35/1	3300	6000	35	1	448	54
86	726	1208	2.6	1.7	PHA822_0350 EZ802U	2000	3200	35.00	35/1	3300	6000	59	1	448	63
107	312	375	1.7	3.5	PHA822_0280 EZ702U	1070	3150	28.00	28/1	3300	6000	15	1	435	47
107	430	542	2.4	2.6	PHA822_0280 EZ703U	1690	3150	28.00	28/1	3300	6000	23	1	435	49
107	555	786	3.1	2.0	PHA822_0280 EZ705U	2000	3150	28.00	28/1	3300	6000	35	1	435	54
107	581	966	3.2	1.9	PHA822_0280 EZ802U	2000	3150	28.00	28/1	3300	6000	59	1	435	63
120	279	335	1.6	4.5	PHA822_0250 EZ702U	950	3200	25.00	25/1	3000	5500	16	1	484	47
120	384	484	2.2	3.3	PHA822_0250 EZ703U	1510	3200	25.00	25/1	3000	5500	24	1	484	49
120	495	702	2.9	2.5	PHA822_0250 EZ705U	2000	3200	25.00	25/1	3000	5500	37	1	484	54
120	518	863	3.0	2.4	PHA822_0250 EZ802U	2000	3200	25.00	25/1	3000	5500	61	1	484	63
120	618	1121	3.6	2.0	PHA822_0250 EZ803U	2000	3200	25.00	25/1	3000	5500	86	1	484	69
150	307	387	2.5	4.1	PHA822_0200 EZ703U	1210	3200	20.00	20/1	2500	4500	26	1	459	49
150	396	562	3.2	3.2	PHA822_0200 EZ705U	1930	3200	20.00	20/1	2500	4500	38	1	459	54
150	415	690	3.4	3.0	PHA822_0200 EZ802U	1860	3200	20.00	20/1	2500	4500	62	1	459	63
150	495	897	4.0	2.5	PHA822_0200 EZ803U	2000	3200	20.00	20/1	2500	4500	88	1	459	69
188	246	310	3.2	4.5	PHA822_0160 EZ703U	970	2760	16.00	16/1	2500	4500	26	1	452	49
188	317	449	4.1	3.5	PHA822_0160 EZ705U	1550	3150	16.00	16/1	2500	4500	39	1	452	54
188	332	552	4.3	3.3	PHA822_0160 EZ802U	1490	3150	16.00	16/1	2500	4500	63	1	452	63
188	396	717	5.1	2.8	PHA822_0160 EZ803U	2000	3150	16.00	16/1	2500	4500	88	1	452	69
300	214	356	2.4	3.3	PHA821_0100 EZ802U	960	2400	10.00	10/1	2500	4000	62	1	317	54
300	255	463	2.8	2.7	PHA821_0100 EZ803U	1200	2400	10.00	10/1	2500	4000	87	1	317	60
429	179	324	3.5	4.9	PHA821_0070 EZ803U	970	2770	7.000	7/1	2000	4000	91	1	474	60
PHA8 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 2000 Nm)															
90	563	930	1.3	2.0	PHA822_0500 EZ703U	2000	3200	50.00	50/1	3300	6000	22	1	436	49
90	763	1395	1.8	1.4	PHA822_0500 EZ705U	2000	3200	50.00	50/1	3300	6000	35	1	436	54
113	391	1283	1.6	2.3	PHA822_0400 EZ802U	1920	3150	40.00	40/1	3300	6000	59	1	418	63
113	450	744	1.8	2.0	PHA822_0400 EZ703U	1920	3150	40.00	40/1	3300	6000	22	1	418	49
113	610	1116	2.5	1.4	PHA822_0400 EZ705U	1920	3150	40.00	40/1	3300	6000	35	1	418	54
129	342	1123	1.2	3.7	PHA822_0350 EZ802U	2000	3200	35.00	35/1	3300	6000	59	1	448	63
129	394	651	1.4	3.2	PHA822_0350 EZ703U	2000	3200	35.00	35/1	3300	6000	23	1	448	49
129	534	977	1.9	2.3	PHA822_0350 EZ705U	2000	3200	35.00	35/1	3300	6000	35	1	448	54
161	273	898	1.5	4.0	PHA822_0280 EZ802U	2000	3150	28.00	28/1	3300	6000	59	1	435	63
161	315	521	1.8	3.5	PHA822_0280 EZ703U	1690	3150	28.00	28/1	3300	6000	23	1	435	49
161	427	781	2.4	2.6	PHA822_0280 EZ705U	2000	3150	28.00	28/1	3300	6000	35	1	435	54
180	281	465	1.6	4.4	PHA822_0250 EZ703U	1510	3200	25.00	25/1	3000	5500	24	1	484	49
180	381	698	2.2	3.3	PHA822_0250 EZ705U	2000	3200	25.00	25/1	3000	5500	37	1	484	54
225	305	558	2.5	4.1	PHA822_0200 EZ705U	1930	3200	20.00	20/1	2500	4500	38	1	459	54
281	244	446	3.2	4.5	PHA822_0160 EZ705U	1550	3150	16.00	16/1	2500	4500	39	1	452	54
PHA8 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 1910 Nm)															
60	484	735	0.6	1.7	PHA822_1000 EZ701U	1200	2400	100.0	100/1	3300	6000	9.0	1	305	44
86	339	514	0.5	3.0	PHA822_0700 EZ701U	1300	2770	70.00	70/1	3300	6000	9.1	1	421	44
86	469	931	0.7	2.1	PHA822_0700 EZ702U	1600	2770	70.00	70/1	3300	6000	14	1	421	47
120	242	367	0.6	4.1	PHA822_0500 EZ701U	930	3200	50.00	50/1	3300	6000	9.1	1	436	44
120	335	665	0.9	3.0	PHA822_0500 EZ702U	1910	3200	50.00	50/1	3300	6000	14	1	436	47
150	193	294	0.9	4.1	PHA822_0400 EZ701U	740	3150	40.00	40/1	3300	6000	9.2	1	418	44
150	268	532	1.2	3.0	PHA822_0400 EZ702U	1530	3150	40.00	40/1	3300	6000	14	1	418	47
PHA9 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 5000 Nm)															
42	1951	2951	1.9	1.5	PHA932_0480 EZ805U	4500	9000	48.00	48/1	2800	4500	137	1	1084	109
48	1707	2582	2.0	1.8	PHA932_0420 EZ805U	4500	9000	42.00	42/1	2800	4500	138	1	1099	109
50	1626	2459	2.3	1.7	PHA932_0400 EZ805U	4610	9220	40.00	40/1	2800	4500	136	1	1057	109
63	1301	1967	2.3	2.3	PHA932_0320 EZ805U	4610	9220	32.00	32/1	2800	4500	138	1	1112	109
67	1219	1844	2.4	2.5	PHA932_0300 EZ805U	4500	9000	30.00	30/1	2500	4000	144	1	1115	109
71	1138	1721	2.5	2.6	PHA932_0280 EZ805U	5000	10000	28.00	28/1	2800	4500	139	1	1147	109
83	975	1475	2.7	3.1	PHA932_0240 EZ805U	4500	9000	24.00	24/1	2200	3500	151	1	1125	109
100	813	1229	3.0	3.7	PHA932_0200 EZ805U	3810	10000	20.00	20/1	2500	4000	146	1	1188	109
111	732	1107	3.1	4.1	PHA932_0180 EZ805U	3430	9000	18.00	18/1	1800	3000	177	1	1135	109
125	650	984	3.3	4.6	PHA932_0160 EZ805U	3050	8960	16.00	16/1	2200	3500	155	1	1212	109

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PHA9 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 4610 Nm)															
50	1244	2070	0.9	2.4	PHA932_0600 EZ802U	4500	9000	60.00	60/1	2800	4500	61	1	1060	90
50	1484	2690	1.0	2.0	PHA932_0600 EZ803U	4500	9000	60.00	60/1	2800	4500	86	1	1060	96
63	995	1656	1.0	3.0	PHA932_0480 EZ802U	4460	9000	48.00	48/1	2800	4500	62	1	1084	90
63	1187	2152	1.2	2.5	PHA932_0480 EZ803U	4500	9000	48.00	48/1	2800	4500	88	1	1084	96
71	871	1449	1.0	3.4	PHA932_0420 EZ802U	3910	9000	42.00	42/1	2800	4500	64	1	1099	90
71	1039	1883	1.2	2.9	PHA932_0420 EZ803U	4500	9000	42.00	42/1	2800	4500	89	1	1099	96
75	830	1380	1.4	2.8	PHA932_0400 EZ802U	3720	9220	40.00	40/1	2800	4500	61	1	1057	90
75	990	1793	1.6	2.4	PHA932_0400 EZ803U	4610	9220	40.00	40/1	2800	4500	87	1	1057	96
94	664	1104	1.3	4.0	PHA932_0320 EZ802U	2980	9220	32.00	32/1	2800	4500	63	1	1112	90
94	792	1434	1.6	3.4	PHA932_0320 EZ803U	4320	9220	32.00	32/1	2800	4500	88	1	1112	96
100	622	1035	1.2	4.8	PHA932_0300 EZ802U	2790	9000	30.00	30/1	2500	4000	69	1	1115	90
100	742	1345	1.5	4.0	PHA932_0300 EZ803U	4050	9000	30.00	30/1	2500	4000	94	1	1115	96
107	693	1255	1.5	4.3	PHA932_0280 EZ803U	3780	10000	28.00	28/1	2800	4500	90	1	1147	96

5.3 Dimensional drawings

In this chapter you can find the dimensions of the geared motors.

There is a dimensional drawing for every possible shaft/housing design, each with the tables for gear unit dimensions, motor dimensions and geared motor dimensions.

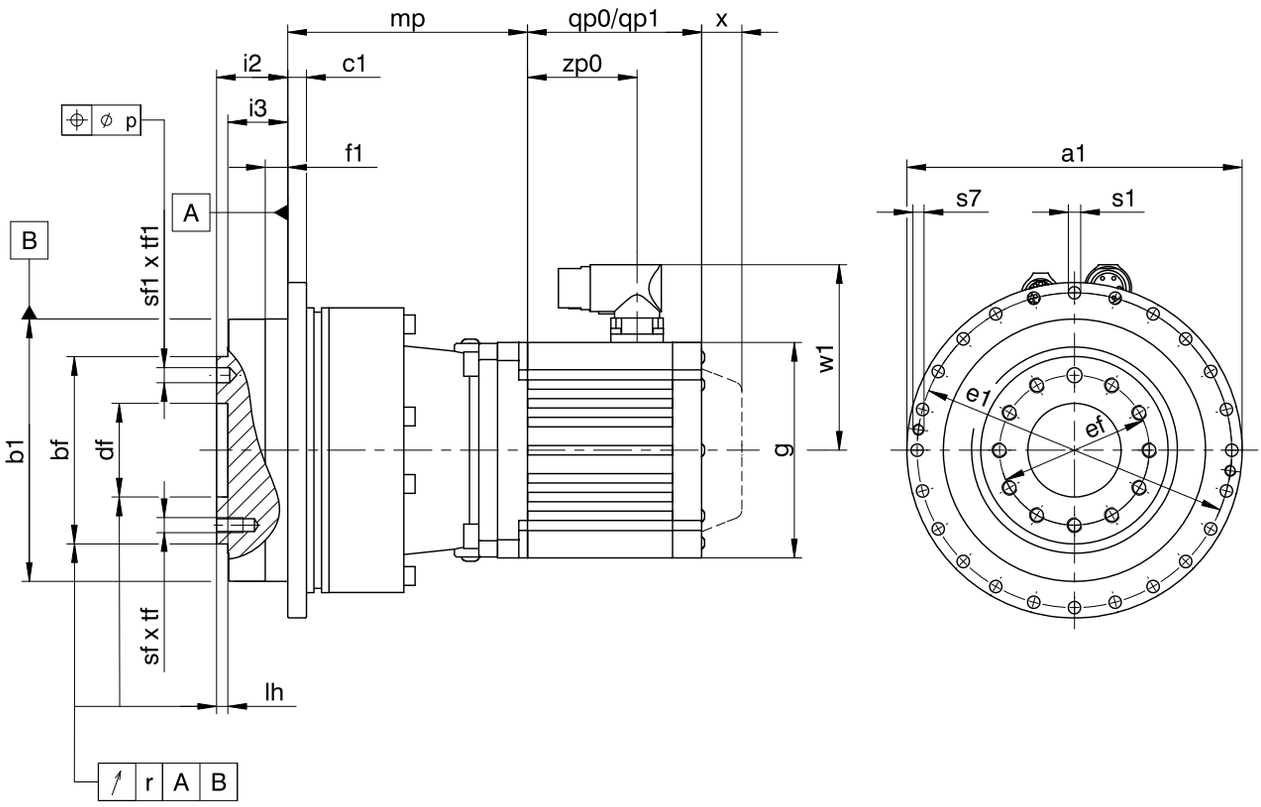
Dimensions can exceed the specifications of ISO 2768-mK due to casting tolerances or accumulation of individual tolerances.

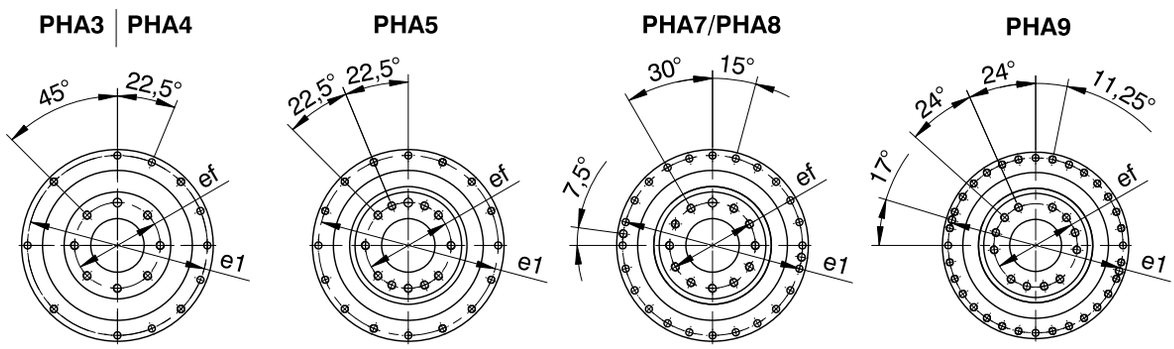
We reserve the right to make dimensional changes due to ongoing technical development.

You can download CAD models of our standard drives at http://cad.stoeber.de.

Combination options and the dimensions of forced ventilated geared motors can be found at http://cad.stoeber.de.

5.3.1 F shaft design (flange shaft)





qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]

Dimensions of gear units

Type	Øa1	Øb1	Øbf	c1	Ødf	Øe1	Øef	f1	i2	i3	lh	p	r	Øs1	s7	sf	sf1	tf	tf1
PHA321	86_{h7}	64_{h7}	40_{h7}	4	20.0^{H6}	79	31.5	7	19.5	16.5	4	0.02	0.020	4.5	–	M5	5^{H7}	7	3
PHA322	86_{h7}	64_{h7}	40_{h7}	4	20.0^{H6}	79	31.5	7	19.5	16.5	4	0.02	0.020	4.5	–	M5	5^{H7}	7	3
PHA421	118_{h7}	90_{h7}	63_{h7}	7	31.5^{H6}	109	50.0	10	30.0	24.0	6	0.02	0.020	5.5	–	M6	6^{H7}	11	7
PHA422	118_{h7}	90_{h7}	63_{h7}	7	31.5^{H6}	109	50.0	10	30.0	24.0	6	0.02	0.020	5.5	–	M6	6^{H7}	11	7
PHA521	145_{h7}	110_{h7}	80_{h7}	8	40.0^{H6}	135	63.0	10	29.0	23.0	6	0.02	0.020	5.5	–	M6	6^{H7}	11	7
PHA522	145_{h7}	110_{h7}	80_{h7}	8	40.0^{H6}	135	63.0	10	29.0	23.0	6	0.02	0.020	5.5	–	M6	6^{H7}	11	7
PHA721	179_{h7}	140_{h7}	100_{h7}	10	50.0^{H6}	168	80.0	12	38.0	32.0	6	0.02	0.025	6.6	–	M8	8^{H7}	14	7
PHA722	179_{h7}	140_{h7}	100_{h7}	10	50.0^{H6}	168	80.0	12	38.0	32.0	6	0.02	0.025	6.6	–	M8	8^{H7}	14	7
PHA821	247_{h7}	200_{h7}	160_{h7}	12	80.0^{H6}	233	125.0	15	50.0	42.0	8	0.02	0.030	9.0	M10	M10	10^{H7}	18	10
PHA822	247_{h7}	200_{h7}	160_{h7}	12	80.0^{H6}	233	125.0	15	50.0	42.0	8	0.02	0.030	9.0	M10	M10	10^{H7}	18	10
PHA932	300	255_{h7}	180_{h7}	18	90.0^{H6}	280	140.0	20	66.0	55.0	12	–	0.030	13.5	M8	M16	–	24	–

Dimensions of motors

Type	□g	qp0	qp1	w1	x	zp0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0

Type	□g	qp0	qp1	w1	x	zp0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0
EZ501U	115	93	147.5	100.0	22	58.5
EZ502U	115	118	172.5	100.0	22	83.5
EZ503U	115	143	197.5	100.0	22	108.5
EZ505U	115	193	247.5	100.0	22	158.5
EZ701U	145	102	161.0	115.0	22	64.0
EZ702U	145	127	186.0	115.0	22	89.0
EZ703U	145	152	211.0	115.0	22	114.0
EZ705U	145	207	266.0	134.0	22	165.0
EZ802U	190	197	274.0	156.5	22	143.0
EZ803U	190	238	315.0	156.5	22	184.0
EZ805U	190	320	397.0	156.5	22	266.0

Dimensions of geared motors

Type	EZ3	EZ4	EZ5	EZ7	EZ8
	mp	mp	mp	mp	mp
PHA321	51.0	48.0	–	–	–
PHA322	87.5	–	–	–	–
PHA421	–	51.0	53.5	–	–
PHA422	103.0	99.5	102.0	–	–
PHA521	–	–	57.0	63.0	–
PHA522	–	112.5	115.0	121.0	–
PHA721	–	–	–	68.0	77.0
PHA722	–	–	128.0	134.0	149.0
PHA821	–	–	–	–	99.5
PHA822	–	–	–	169.0	184.0
PHA932	–	–	–	–	249.5

5.4 Type designation

In this chapter, you can find an explanation of the type designation with the associated options.

Additional ordering information not included in the type designation can be found at the end of the chapter.

Sample code

PHA	5	2	2	F	0250	EZ401U

Explanation

Code	Designation	Design
PHA	Type	Low-backlash planetary gear unit
5	Size	5 (example)
2	Generation	Generation 2
3		Generation 3
1	Stages	Single-stage
2		Two-stage
F	Shaft	Flange shaft
0250	Transmission ratio (i x 10)	i = 25 (example)
EZ401U	Motor	EZ synchronous servo motor

In order to complete the type designation, also specify:

- A detailed type designation of the motor, see chapter [▶ 23]
- For reverse operation of the output shaft from ± 20° to ± 90° and horizontal installation, note the chapter [▶ 5.6.4]

5.5 Product description

5.5.1 Installation conditions

The torque and force values listed in this catalog are valid under the following conditions:

- When using screws with quality 12.9 for machine-side attachment of the flange shaft and gear unit housing
- When the gear unit housings are adjusted at pilot øb1 (H7)
- When the flange shaft is adjusted using the connecting element at pilot øbf or ødf

5.5.2 Lubricants

STOBER fills the gear units with the amount and type of lubricant specified on the nameplate.

Lubricant filling quantities for gear units, document ID 441871, can be found online at http://www.stoeber.de

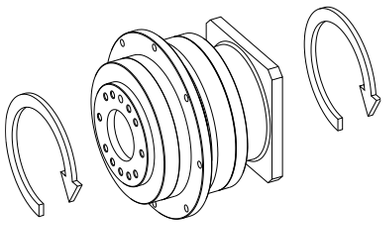
5.5.3 Other product features

Feature	Value
Max. permitted gear unit temperature (on the surface of the gear unit)	≤ 90 °C
Paint	Black RAL 9005
(ATEX) Directive 2014/34/EU (option)	Not suitable
Protection class:[1]	
Gear unit	IP65
Motor	IP56, optionally IP66

[1] Observe the protection class of all the components.

5.5.4 Direction of rotation

The input and output rotate in the same direction.



5.6 Project configuration

Project your drives using our SERVOsoft designing software. You can receive SERVOsoft for free from your adviser at one of our sales centers. Observe the limit conditions in this chapter to ensure a safe design for your drives.

An explanation of the formula symbols can be found in Chapter [▶ 29.1].

5.6.1 Calculation of the operating point

Check the following conditions for operating points other than the nominal point M_{2N} specified in the selection tables.

$$n_{1m^*} \leq \frac{n_{1maxDB}}{fB_T}$$

$$n_{1max^*} \leq \frac{n_{1maxZB}}{fB_T}$$

$$M_{2eff^*} \leq M_{2th}$$

$$M_{2acc^*} \leq M_{2acc}$$

$$M_{2NOT^*} \leq M_{2NOT}$$

$$M_{2eq^*} \leq M_{2N} \cdot \frac{S}{fB_{op} \cdot fB_t}$$

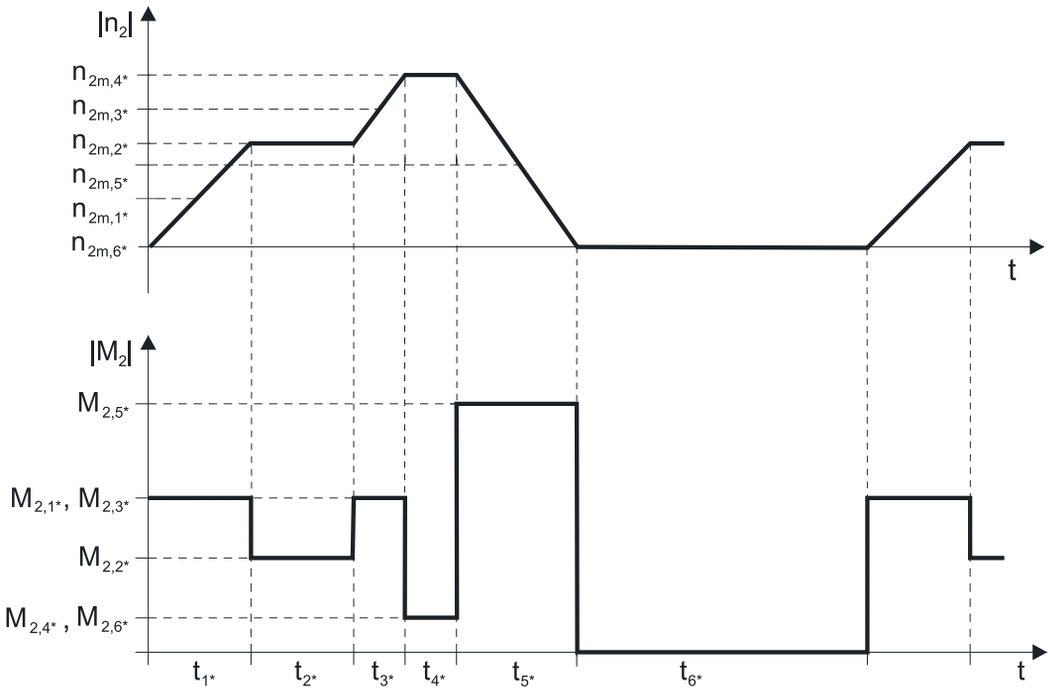
The values for n_{1maxDB}, n_{1maxZB}, M_{2acc}, M_{2NOT}, M_{2N} and S can be found in the selection tables.

The values for fB_T, fB_{op} and fB_t can be found in the corresponding tables in this chapter.

Calculate the thermal limit torque M_{2th} for a duty cycle > 50%.

Example of cyclic operation

The following calculations are based on a representation of the power taken from the output based in accordance with the following example:



Calculation of the actual average input speed

$$n_{1m^*} = n_{2m^*} \cdot i$$

$$n_{2m^*} = \frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}{t_{1^*} + \ldots + t_{n^*}}$$

If $t_{1^*} + \ldots + t_{5^*} \geq 20$ min, calculate n_{2m^*} without the rest phase t_{6^*}.

The values for the ratio i can be found in the selection tables.

Calculation of the actual effective torque

$$M_{2eff^*} = \sqrt{\frac{t_{1^*} \cdot M_{2,1^*}{}^2 + \ldots + t_{n^*} \cdot M_{2,n^*}{}^2}{t_{1^*} + \ldots + t_{n^*}}}$$

Calculation of the actual equivalent torque

$$M_{2eq^*} = \sqrt[3]{\frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} \cdot \left|M_{2,1^*}{}^3\right| + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*} \cdot \left|M_{2,n^*}{}^3\right|}{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}}$$

Calculation of the thermal limit torque

Calculate the thermal limit torque M_{2th} for a duty cycle $ED_{20} > 50\%$ and the actual average input speed n_{1m^*}. (At $K_{mot,th} \leq 0$ you must reduce the average input speed n_{1m^*} accordingly or select another geared motor size.)

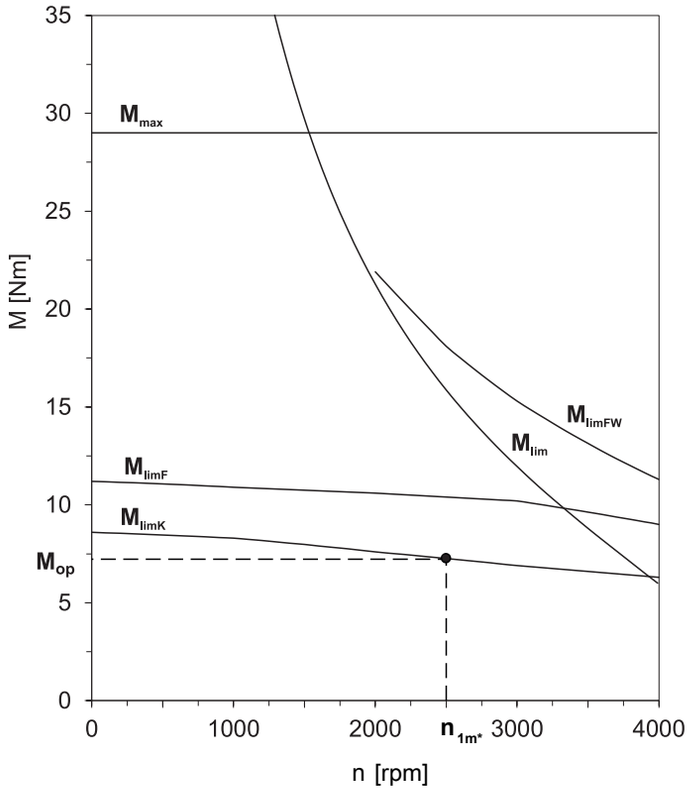
$$M_{2th} = M_{op} \cdot i \cdot K_{mot,th}$$

$$K_{mot,th} = 0{,}93 - \frac{a_{th}}{1000} \cdot fB_T \cdot \left(\frac{n_{1m^*}}{1000}\right)^3$$

The values for i and a_{th} can be found in the selection tables.

The values for fB_T can be found in the corresponding table in this chapter.

The value for the torque of the motor at operating point M_{op} with the determined average input speed n_{1m^*} can be found in the motor curve of Chapter [▶ 23.3]. Note the size, nominal speed n_N and cooling type of the motor. The figure below shows an example of reading the torque M_{op} of a motor with convection cooling at the operating point.



Operating factors

Operating mode	fB_{op}
Uniform continuous operation	1.00
Cyclic operation	1.00
Reversing load cyclic operation	1.00

Run time	fB_t
Daily run time ≤ 8 h	1.00
Daily run time ≤ 16 h	1.15
Daily run time ≤ 24 h	1.20

Temperature		fB_T
Motor cooling	**Surrounding temperature**	
Motor with forced ventilation	≤ 20 °C	0.9
	≤ 30 °C	1.0
	≤ 40 °C	1.15
Motor with convection cooling	≤ 20 °C	1.0
	≤ 30 °C	1.1
	≤ 40 °C	1.25

Notes

- The maximum permitted gear unit temperature (see the "Other product features" chapter) must not be exceeded. Doing so may result in damage to the geared motor.
- For braking from full speed (for example when the power fails or when setting up the machine), note the permitted gear unit torques (M_{2acc}, M_{2NOT}) in the selection tables.

5.6.2 Permitted shaft loads for the output shaft

The values specified in the tables apply to the permitted shaft loads:

- For shaft dimensions in accordance with the catalog
- For output speeds $n_{2m*} \leq 100$ rpm ($F^{2axN} = F_{2ax100}$; $F_{2radN} = F_{2rad100}$; $M_{2kN} = M_{2k100}$)
- Only if radial forces on the gear unit are stabilized by its pilots (housing, flange shaft)

Permitted shaft loads

Type	z_2 [mm]	F_{2ax100} [N]	$F_{2rad100}$ [N]	$F_{2rad,acc}$ [N]	M_{2k100} [Nm]	$M_{2k,acc}$ [Nm]
PHA3	62.0	1650	1613	1613	100	100
PHA4	84.0	2150	3095	3571	260	300
PHA5	97.0	4150	4536	4897	440	475
PHA7	88.0	6150	17045	17045	1500	1500
PHA8	126.0	10050	27778	27778	3500	3500
PHA9	155.0	33000	48387	70968	7500	11000

For other output speeds, download diagrams at http://products.stoeber.de.

The following applies to output speeds n_{2m*} > 100 rpm:

$$F_{2axN} = \frac{F_{2ax100}}{\sqrt[3]{\frac{n_{2m*}}{100\ rpm}}} \qquad F_{2radN} = \frac{F_{2rad100}}{\sqrt[3]{\frac{n_{2m*}}{100\ rpm}}} \qquad M_{2kN} = \frac{M_{2k100}}{\sqrt[3]{\frac{n_{2m*}}{100\ rpm}}}$$

The values for F_{2ax100}, $F_{2rad100}$ and M_{2k100} can be found in the table "Permitted shaft loads" in this chapter.

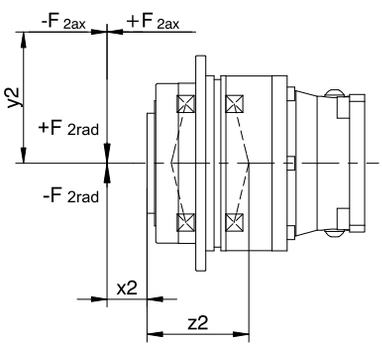


Fig. 1: Force application points

You can determine the permitted radial forces from the permitted breakdown torque M_{2kN} and $M_{2k,acc}$. The actual radial forces may not exceed the permitted radial forces. The permitted radial forces are in relation to the end of the hollow shaft (x2 = 0).

$$M_{2k,acc*} = \frac{2 \cdot F_{2ax*} \cdot y_2 + F_{2rad,acc*} \cdot (x_2 + z_2)}{1000} \le M_{2k,acc}$$

For applications with multiple axial and/or radial forces, you must add the forces as vectors.

In the event of EMERGENCY OFF operation (max. 1000 load changes), you can multiply the permitted forces and torques for F_{2ax100}, $F_{2rad100}$ and M_{2k100} by a factor of two.

Also note the calculation for equivalent values:

$$M_{2k,eq*} = \sqrt[3]{\frac{|n_{2m,1*}| \cdot t_{1*} \cdot |M_{2k,acc,1*}^{\ 3}| + \ldots + |n_{2m,n*}| \cdot t_{n*} \cdot |M_{2k,acc,n*}^{\ 3}|}{|n_{2m,1*}| \cdot t_{1*} + \ldots + |n_{2m,n*}| \cdot t_{n*}}} \le M_{2kN}$$

$$F_{2rad,eq*} = \sqrt[3]{\frac{|n_{2m,1*}| \cdot t_{1*} \cdot |F_{2rad,acc,1*}^{\ 3}| + \ldots + |n_{2m,n*}| \cdot t_{n*} \cdot |F_{2rad,acc,n*}^{\ 3}|}{|n_{2m,1*}| \cdot t_{1*} + \ldots + |n_{2m,n*}| \cdot t_{n*}}} \le F_{2radN}$$

$$F_{2ax,eq*} \le F_{2axN}$$

The following apply to the bearing service life L_{10h} (ED_{20} ≤ 40%):

L_{10h} > 10000 h with 1 < M_{2kN}/M_{2k*} < 1.25

L_{10h} > 20000 h with 1.25 < M_{2kN}/M_{2k*} < 1.5

L_{10h} > 30000 h with 1.5 < M_{2kN}/M_{2k*}

For different duty cycles:

$$L_{10h} > L_{10h(ED_{20}=40\%)} \cdot \frac{40\%}{ED_{20}}$$

5.6.3 Radial shaft seal rings

Leak-proofness

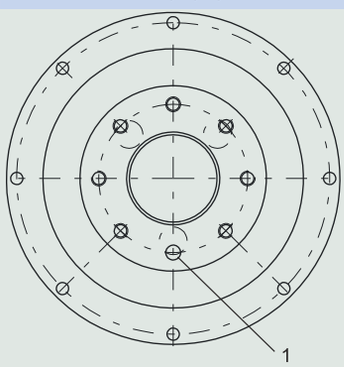
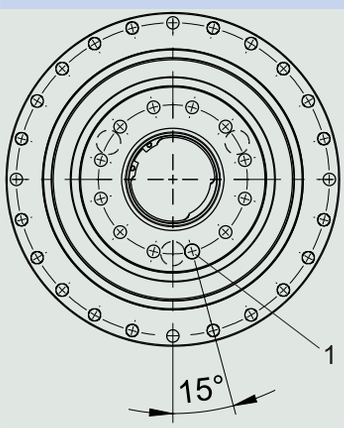
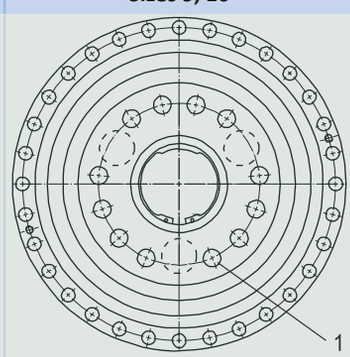
Our gear units are equipped with high-quality radial shaft seal rings and checked for leak-proofness. However, a leak cannot be fully ruled out over the length of use of a gear unit. If you use a gear unit with goods incompatible with the lubricant, you must take measures to prevent direct contact with the gear unit lubricant in case of a leak.

5.6.4 Reverse operation

To ensure lubrication of circulating geared parts during cyclic reverse operation from ± 20° to ± 90°, pay careful attention to the position of the output shaft if the gear unit is installed horizontally as shown in the images below.

The images show the center position of reverse operation.

Cyclic reverse operation ≤ ± 20° on request.

Sizes 3, 4, 5, 8	Size 7	Sizes 9, 10
		
1 Position of the positioning hole: bottom	1 Position of the positioning hole: as shown in the image	1 Position of the fastening thread: as shown in the image

5.7 Additional documentation

Additional documentation related to the product can be found at http://www.stoeber.de/en/download

Enter the ID of the documentation in the Search... field.

Documentation	ID
Operating manual for P/PA/PE/PH/PHA/PHQ/PHQA/PHV/PHVA planetary gear units and planetary geared motors	443029_en
Lubricant filling quantities for gear units	441871

6 PHQ planetary geared motors

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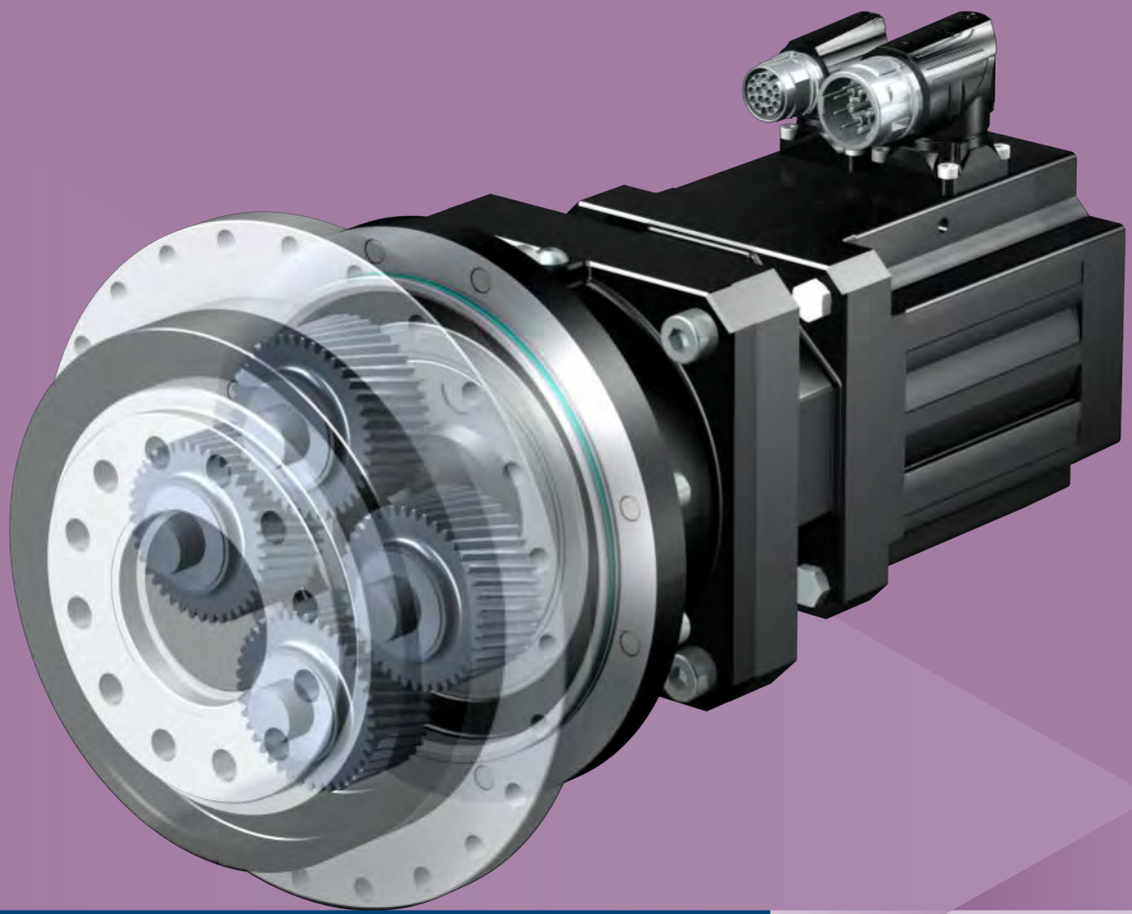


6 Planetary geared motors PHQ

6.1 Overview

Quattro-Power for maximum power density

Features

Power density	★★★★★
Backlash	★★★★☆
Price category	€€€€
Shaft load	★★★★★
Smooth operation	★★★★☆
Torsional stiffness	★★★★★
Mass moment of inertia	★★★★★
Helical gearing	✓
Maintenance-free	✓
Any mounting position (single/two stage)	✓
High power density	✓
Continuous operation without cooling	✓
Stiff output bearing due to pretension	✓
Compact and highly dynamic due to direct motor attachment	✓

Key: ★☆☆☆☆ good | ★★★★★ excellent
€ Economy | €€€€€ Premium

Technical data

i	5.5 – 600
M_{2acc}	84 – 22000 Nm
$\Delta\phi_2$	3 arcmin
η_{get}	≤ 96 %

6.2 Selection tables

The technical data specified in the selection tables applies to:

- Installation altitudes up to 1000 m above sea level
- Surrounding temperatures from 0 °C to 40 °C
- Drives with convection-cooled motors (e.g. EZ401**U**)

You can calculate the technical data for drives with forced ventilated motors (for example EZ401**B**) at http://products.stoeber.de.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2.0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PHQ4 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 170 Nm)															
55	48	49	0.6	2.5	PHQ422_0550 EZ301U	140	300	55.00	55/1	4500	8000	0.21	3	35	5.3
55	81	86	1.0	1.5	PHQ422_0550 EZ302U	170	300	55.00	55/1	4500	8000	0.31	3	35	5.9
55	106	112	1.4	1.1	PHQ422_0550 EZ303U	170	300	55.00	55/1	4500	8000	0.42	3	35	6.4
78	33	34	0.7	3.6	PHQ422_0390 EZ301U	100	300	38.50	77/2	4500	8000	0.24	3	37	5.3
78	57	60	1.3	2.1	PHQ422_0390 EZ302U	170	300	38.50	77/2	4500	8000	0.34	3	37	5.9
78	74	78	1.6	1.6	PHQ422_0390 EZ303U	170	300	38.50	77/2	4500	8000	0.45	3	37	6.4
78	100	107	2.2	1.2	PHQ422_0390 EZ401U	170	300	38.50	77/2	4500	8000	0.98	3	37	7.8
109	41	43	1.5	3.0	PHQ422_0280 EZ302U	130	300	27.50	55/2	4000	7000	0.38	3	37	5.9
109	53	56	1.9	2.3	PHQ422_0280 EZ303U	170	300	27.50	55/2	4000	7000	0.49	3	37	6.4
109	72	77	2.6	1.7	PHQ422_0280 EZ401U	170	300	27.50	55/2	4000	7000	1.0	3	37	7.8
109	110	120	4.0	1.1	PHQ422_0280 EZ501U	170	300	27.50	55/2	4000	7000	3.0	3	37	8.8
136	33	34	1.7	3.7	PHQ422_0220 EZ302U	100	300	22.00	22/1	3700	6500	0.44	3	37	5.9
136	42	45	2.2	2.8	PHQ422_0220 EZ303U	140	300	22.00	22/1	3700	6500	0.55	3	37	6.4
136	57	61	2.9	2.1	PHQ422_0220 EZ401U	170	300	22.00	22/1	3700	6500	1.1	3	37	7.8
136	88	96	4.5	1.4	PHQ422_0220 EZ501U	170	300	22.00	22/1	3700	6500	3.1	3	37	8.8
136	96	106	4.9	1.2	PHQ422_0220 EZ402U	170	300	22.00	22/1	3700	6500	1.8	3	37	8.9
545	23	25	4.8	4.2	PHQ421_0055 EZ501U	84	300	5.500	11/2	2000	6000	3.2	3	42	7.5
545	25	27	5.2	3.8	PHQ421_0055 EZ402U	84	300	5.500	11/2	2000	6000	1.9	3	42	7.6
545	36	45	7.7	2.6	PHQ421_0055 EZ404U	150	300	5.500	11/2	2000	6000	3.2	3	42	9.7
545	39	42	8.2	2.4	PHQ421_0055 EZ502U	160	300	5.500	11/2	2000	6000	5.5	3	42	9.0
545	51	59	11	1.9	PHQ421_0055 EZ503U	170	300	5.500	11/2	2000	6000	7.8	3	42	11
545	71	84	15	1.3	PHQ421_0055 EZ505U	170	300	5.500	11/2	2000	6000	12	3	42	13
PHQ4 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 170 Nm)															
109	46	49	0.6	2.4	PHQ422_0550 EZ301U	140	300	55.00	55/1	4500	8000	0.21	3	35	5.3
109	77	86	1.1	1.4	PHQ422_0550 EZ302U	170	300	55.00	55/1	4500	8000	0.31	3	35	5.9
109	100	115	1.4	1.1	PHQ422_0550 EZ303U	170	300	55.00	55/1	4500	8000	0.42	3	35	6.4
156	32	34	0.7	3.8	PHQ422_0390 EZ301U	100	300	38.50	77/2	4500	8000	0.24	3	37	5.3
156	54	60	1.2	2.2	PHQ422_0390 EZ302U	170	300	38.50	77/2	4500	8000	0.34	3	37	5.9
156	70	81	1.5	1.7	PHQ422_0390 EZ303U	170	300	38.50	77/2	4500	8000	0.45	3	37	6.4
156	82	100	1.8	1.5	PHQ422_0390 EZ401U	170	300	38.50	77/2	4500	8000	0.98	3	37	7.8
218	38	43	1.4	3.1	PHQ422_0280 EZ302U	130	300	27.50	55/2	4000	7000	0.38	3	37	5.9
218	50	58	1.8	2.4	PHQ422_0280 EZ303U	170	300	27.50	55/2	4000	7000	0.49	3	37	6.4
218	59	72	2.1	2.0	PHQ422_0280 EZ401U	170	300	27.50	55/2	4000	7000	1.0	3	37	7.8
218	87	113	3.2	1.4	PHQ422_0280 EZ501U	170	300	27.50	55/2	4000	7000	3.0	3	37	8.8
218	90	125	3.3	1.3	PHQ422_0280 EZ402U	170	300	27.50	55/2	4000	7000	1.7	3	37	8.9
273	31	34	1.6	3.9	PHQ422_0220 EZ302U	100	300	22.00	22/1	3700	6500	0.44	3	37	5.9
273	40	46	2.0	3.0	PHQ422_0220 EZ303U	140	300	22.00	22/1	3700	6500	0.55	3	37	6.4
273	47	57	2.4	2.6	PHQ422_0220 EZ401U	170	300	22.00	22/1	3700	6500	1.1	3	37	7.8
273	70	90	3.5	1.7	PHQ422_0220 EZ501U	170	300	22.00	22/1	3700	6500	3.1	3	37	8.8
273	72	100	3.6	1.7	PHQ422_0220 EZ402U	170	300	22.00	22/1	3700	6500	1.8	3	37	8.9
1091	18	23	4.8	4.2	PHQ421_0055 EZ501U	84	300	5.500	11/2	2000	6000	3.2	3	42	7.5
1091	18	26	4.9	4.1	PHQ421_0055 EZ402U	84	300	5.500	11/2	2000	6000	1.9	3	42	7.6
1091	27	41	7.3	2.8	PHQ421_0055 EZ502U	160	300	5.500	11/2	2000	6000	5.5	3	42	9.0
1091	31	44	8.1	2.5	PHQ421_0055 EZ404U	150	300	5.500	11/2	2000	6000	3.2	3	42	9.7
1091	33	56	8.7	2.3	PHQ421_0055 EZ503U	170	300	5.500	11/2	2000	6000	7.8	3	42	11
PHQ5 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 430 Nm)															
55	143	153	0.9	1.9	PHQ522_0550 EZ401U	430	800	55.00	55/1	4000	7000	0.97	3	87	11
55	220	240	1.4	1.3	PHQ522_0550 EZ501U	430	800	55.00	55/1	4000	7000	2.9	3	87	12
55	240	266	1.5	1.2	PHQ522_0550 EZ402U	430	800	55.00	55/1	4000	7000	1.7	3	87	12
78	100	107	1.0	2.8	PHQ522_0390 EZ401U	300	800	38.50	77/2	4000	7000	1.0	3	92	11
78	154	168	1.6	1.8	PHQ522_0390 EZ501U	430	800	38.50	77/2	4000	7000	3.0	3	92	12
78	168	186	1.8	1.7	PHQ522_0390 EZ402U	430	800	38.50	77/2	4000	7000	1.7	3	92	12

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PHQ5 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 430 Nm)															
78	247	308	2.6	1.1	PHQ522_0390 EZ404U	430	800	38.50	77/2	4000	7000	3.1	3	92	14
78	265	286	2.8	1.1	PHQ522_0390 EZ502U	430	800	38.50	77/2	4000	7000	5.3	3	92	13
109	72	77	1.2	3.9	PHQ522_0280 EZ401U	220	800	27.50	55/2	3700	6500	1.1	3	94	11
109	110	120	1.9	2.5	PHQ522_0280 EZ501U	410	800	27.50	55/2	3700	6500	3.1	3	94	12
109	120	133	2.1	2.3	PHQ522_0280 EZ402U	410	800	27.50	55/2	3700	6500	1.8	3	94	12
109	176	220	3.1	1.6	PHQ522_0280 EZ404U	430	800	27.50	55/2	3700	6500	3.2	3	94	14
109	189	205	3.3	1.5	PHQ522_0280 EZ502U	430	800	27.50	55/2	3700	6500	5.4	3	94	13
109	189	212	3.3	1.5	PHQ522_0280 EZ701U	430	800	27.50	55/2	3700	6500	8.7	3	94	15
109	248	284	4.3	1.1	PHQ522_0280 EZ503U	430	800	27.50	55/2	3700	6500	7.8	3	94	15
136	57	61	1.4	4.9	PHQ522_0220 EZ401U	170	800	22.00	22/1	3300	6000	1.2	3	95	11
136	88	96	2.1	3.2	PHQ522_0220 EZ501U	330	800	22.00	22/1	3300	6000	3.2	3	95	12
136	96	106	2.3	2.9	PHQ522_0220 EZ402U	330	800	22.00	22/1	3300	6000	1.9	3	95	12
136	141	176	3.4	2.0	PHQ522_0220 EZ404U	430	800	22.00	22/1	3300	6000	3.3	3	95	14
136	151	164	3.7	1.8	PHQ522_0220 EZ502U	430	800	22.00	22/1	3300	6000	5.5	3	95	13
136	151	170	3.7	1.8	PHQ522_0220 EZ701U	410	800	22.00	22/1	3300	6000	8.8	3	95	15
136	198	227	4.8	1.4	PHQ522_0220 EZ503U	430	800	22.00	22/1	3300	6000	7.9	3	95	15
136	246	295	6.0	1.1	PHQ522_0220 EZ702U	430	800	22.00	22/1	3300	6000	14	3	95	18
136	276	327	6.7	1.0	PHQ522_0220 EZ505U	430	800	22.00	22/1	3300	6000	12	3	95	18
545	63	76	6.4	3.5	PHQ521_0055 EZ702U	220	800	5.500	11/2	2500	5500	15	3	107	15
545	71	84	7.2	3.1	PHQ521_0055 EZ505U	350	800	5.500	11/2	2500	5500	13	3	107	15
545	87	110	8.8	2.6	PHQ521_0055 EZ703U	340	800	5.500	11/2	2500	5500	22	3	107	17
545	112	159	11	2.0	PHQ521_0055 EZ705U	430	800	5.500	11/2	2500	5500	35	3	107	23
PHQ5 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 430 Nm)															
205	194	313	4.7	1.4	PHQ522_0220 EZ505U	430	800	22.00	22/1	3300	6000	12	3	95	18
818	50	81	5.8	3.9	PHQ521_0055 EZ505U	350	800	5.500	11/2	2500	5500	13	3	107	15
818	64	106	7.3	3.0	PHQ521_0055 EZ703U	340	800	5.500	11/2	2500	5500	22	3	107	17
818	87	158	10	2.2	PHQ521_0055 EZ705U	430	800	5.500	11/2	2500	5500	35	3	107	23
PHQ5 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 430 Nm)															
109	118	143	0.9	1.9	PHQ522_0550 EZ401U	430	800	55.00	55/1	4000	7000	0.97	3	87	11
109	174	225	1.4	1.3	PHQ522_0550 EZ501U	430	800	55.00	55/1	4000	7000	2.9	3	87	12
109	179	251	1.4	1.2	PHQ522_0550 EZ402U	430	800	55.00	55/1	4000	7000	1.7	3	87	12
156	82	100	0.9	3.4	PHQ522_0390 EZ401U	300	800	38.50	77/2	4000	7000	1.0	3	92	11
156	122	158	1.3	2.3	PHQ522_0390 EZ501U	430	800	38.50	77/2	4000	7000	3.0	3	92	12
156	125	175	1.3	2.2	PHQ522_0390 EZ402U	430	800	38.50	77/2	4000	7000	1.7	3	92	12
156	186	279	1.9	1.5	PHQ522_0390 EZ502U	430	800	38.50	77/2	4000	7000	5.3	3	92	13
156	208	301	2.2	1.3	PHQ522_0390 EZ404U	430	800	38.50	77/2	4000	7000	3.1	3	92	14
218	59	72	1.0	4.8	PHQ522_0280 EZ401U	220	800	27.50	55/2	3700	6500	1.1	3	94	11
218	87	113	1.5	3.2	PHQ522_0280 EZ501U	410	800	27.50	55/2	3700	6500	3.1	3	94	12
218	90	125	1.6	3.1	PHQ522_0280 EZ402U	410	800	27.50	55/2	3700	6500	1.8	3	94	12
218	133	199	2.3	2.1	PHQ522_0280 EZ502U	430	800	27.50	55/2	3700	6500	5.4	3	94	13
218	133	202	2.3	2.1	PHQ522_0280 EZ701U	430	800	27.50	55/2	3700	6500	8.7	3	94	15
218	148	215	2.6	1.9	PHQ522_0280 EZ404U	430	800	27.50	55/2	3700	6500	3.2	3	94	14
218	159	271	2.7	1.8	PHQ522_0280 EZ503U	430	800	27.50	55/2	3700	6500	7.8	3	94	15
273	70	90	1.7	4.0	PHQ522_0220 EZ501U	330	800	22.00	22/1	3300	6000	3.2	3	95	12
273	72	100	1.7	3.9	PHQ522_0220 EZ402U	330	800	22.00	22/1	3300	6000	1.9	3	95	12
273	106	160	2.6	2.6	PHQ522_0220 EZ502U	430	800	22.00	22/1	3300	6000	5.5	3	95	13
273	106	162	2.6	2.6	PHQ522_0220 EZ701U	410	800	22.00	22/1	3300	6000	8.8	3	95	15
273	119	172	2.9	2.4	PHQ522_0220 EZ404U	430	800	22.00	22/1	3300	6000	3.3	3	95	14
273	127	217	3.1	2.2	PHQ522_0220 EZ503U	430	800	22.00	22/1	3300	6000	7.9	3	95	15
273	147	293	3.6	1.9	PHQ522_0220 EZ702U	430	800	22.00	22/1	3300	6000	14	3	95	18
PHQ7 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 950 Nm)															
364	231	349	9.5	2.8	PHQ721_0055 EZ805U	950	1700	5.500	11/2	2200	5000	135	3	235	55
PHQ7 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 950 Nm)															
14	554	594	0.2	1.2	PHQ723_2200 EZ401U	950	1700	220.0	220/1	4000	7000	0.99	3	202	19
16	485	520	0.2	1.3	PHQ723_1930 EZ401U	950	1700	192.5	385/2	4000	7000	1.0	3	203	19
19	388	416	0.3	1.7	PHQ723_1540 EZ401U	950	1700	154.0	154/1	4000	7000	1.0	3	203	19
19	596	651	0.4	1.1	PHQ723_1540 EZ501U	950	1700	154.0	154/1	4000	7000	3.0	3	203	20
22	347	371	0.3	1.9	PHQ723_1380 EZ401U	950	1700	137.5	275/2	3700	6500	1.2	3	204	19
22	532	582	0.4	1.2	PHQ723_1380 EZ501U	950	1700	137.5	275/2	3700	6500	3.1	3	204	20
22	582	644	0.5	1.1	PHQ723_1380 EZ402U	950	1700	137.5	275/2	3700	6500	1.9	3	204	20
27	277	297	0.3	2.3	PHQ723_1100 EZ401U	840	1700	110.0	110/1	3300	6000	1.3	3	204	19
27	426	465	0.5	1.5	PHQ723_1100 EZ501U	950	1700	110.0	110/1	3300	6000	3.3	3	204	20
27	465	515	0.5	1.4	PHQ723_1100 EZ402U	950	1700	110.0	110/1	3300	6000	2.0	3	204	20

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PHQ7 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 950 Nm)															
34	222	238	0.3	2.9	PHQ723_0880 EZ401U	670	1700	88.00	88/1	3300	6000	1.3	3	204	19
34	341	372	0.5	1.9	PHQ723_0880 EZ501U	950	1700	88.00	88/1	3300	6000	3.3	3	204	20
34	372	412	0.6	1.7	PHQ723_0880 EZ402U	950	1700	88.00	88/1	3300	6000	2.0	3	204	20
34	546	681	0.9	1.2	PHQ723_0880 EZ404U	950	1700	88.00	88/1	3300	6000	3.4	3	204	22
34	586	634	0.9	1.1	PHQ723_0880 EZ502U	950	1700	88.00	88/1	3300	6000	5.6	3	204	22
34	586	657	0.9	1.1	PHQ723_0880 EZ701U	950	1700	88.00	88/1	3300	6000	8.9	3	204	23
55	220	240	0.7	2.9	PHQ722_0550 EZ501U	820	1700	55.00	55/1	3700	6500	3.1	3	195	18
55	379	409	1.2	1.7	PHQ722_0550 EZ502U	950	1700	55.00	55/1	3700	6500	5.4	3	195	19
55	379	425	1.2	1.7	PHQ722_0550 EZ701U	950	1700	55.00	55/1	3700	6500	8.7	3	195	21
55	496	568	1.6	1.3	PHQ722_0550 EZ503U	950	1700	55.00	55/1	3700	6500	7.8	3	195	21
78	154	168	0.8	4.2	PHQ722_0390 EZ501U	570	1700	38.50	77/2	3700	6500	3.3	3	203	18
78	265	286	1.4	2.5	PHQ722_0390 EZ502U	950	1700	38.50	77/2	3700	6500	5.6	3	203	19
78	265	297	1.4	2.5	PHQ722_0390 EZ701U	720	1700	38.50	77/2	3700	6500	8.9	3	203	21
78	347	397	1.9	1.9	PHQ722_0390 EZ503U	950	1700	38.50	77/2	3700	6500	8.0	3	203	21
78	430	516	2.3	1.5	PHQ722_0390 EZ702U	950	1700	38.50	77/2	3700	6500	14	3	203	23
78	483	573	2.6	1.3	PHQ722_0390 EZ505U	950	1700	38.50	77/2	3700	6500	13	3	203	23
109	189	205	1.7	3.4	PHQ722_0280 EZ502U	790	1700	27.50	55/2	3500	6000	5.9	3	206	19
109	189	212	1.7	3.4	PHQ722_0280 EZ701U	510	1700	27.50	55/2	3500	6000	9.2	3	206	21
109	248	284	2.2	2.6	PHQ722_0280 EZ503U	950	1700	27.50	55/2	3500	6000	8.3	3	206	21
109	307	368	2.8	2.1	PHQ722_0280 EZ702U	950	1700	27.50	55/2	3500	6000	14	3	206	23
109	345	409	3.1	1.9	PHQ722_0280 EZ505U	950	1700	27.50	55/2	3500	6000	13	3	206	23
109	422	532	3.8	1.5	PHQ722_0280 EZ703U	950	1700	27.50	55/2	3500	6000	22	3	206	25
136	151	164	1.9	4.3	PHQ722_0220 EZ502U	630	1700	22.00	22/1	3000	5000	6.4	3	207	19
136	151	170	1.9	4.3	PHQ722_0220 EZ701U	410	1700	22.00	22/1	3000	5000	9.7	3	207	21
136	198	227	2.5	3.3	PHQ722_0220 EZ503U	880	1700	22.00	22/1	3000	5000	8.8	3	207	21
136	246	295	3.1	2.6	PHQ722_0220 EZ702U	840	1700	22.00	22/1	3000	5000	15	3	207	23
136	276	327	3.5	2.4	PHQ722_0220 EZ505U	950	1700	22.00	22/1	3000	5000	13	3	207	23
136	338	426	4.2	1.9	PHQ722_0220 EZ703U	950	1700	22.00	22/1	3000	5000	23	3	207	25
136	436	618	5.5	1.5	PHQ722_0220 EZ705U	950	1700	22.00	22/1	3000	5000	35	3	207	31
545	118	196	5.6	4.8	PHQ721_0055 EZ802U	530	1700	5.500	11/2	2200	5000	61	3	235	36
545	140	254	6.6	4.0	PHQ721_0055 EZ803U	770	1700	5.500	11/2	2200	5000	86	3	235	42
PHQ7 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 950 Nm)															
117	340	548	1.8	1.9	PHQ722_0390 EZ505U	950	1700	38.50	77/2	3700	6500	13	3	203	23
117	433	716	2.3	1.5	PHQ722_0390 EZ703U	950	1700	38.50	77/2	3700	6500	22	3	203	25
164	243	391	2.2	2.7	PHQ722_0280 EZ505U	950	1700	27.50	55/2	3500	6000	13	3	206	23
164	309	512	2.8	2.1	PHQ722_0280 EZ703U	950	1700	27.50	55/2	3500	6000	22	3	206	25
205	194	313	2.4	3.3	PHQ722_0220 EZ505U	950	1700	22.00	22/1	3000	5000	13	3	207	23
205	215	706	2.7	3.0	PHQ722_0220 EZ802U	950	1700	22.00	22/1	3000	5000	59	3	207	39
205	248	409	3.1	2.6	PHQ722_0220 EZ703U	950	1700	22.00	22/1	3000	5000	23	3	207	25
205	336	614	4.2	1.9	PHQ722_0220 EZ705U	950	1700	22.00	22/1	3000	5000	35	3	207	31
PHQ7 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 950 Nm)															
22	569	693	0.2	1.1	PHQ723_2750 EZ401U	950	1700	275.0	275/1	4000	7000	0.99	3	202	19
27	455	554	0.2	1.4	PHQ723_2200 EZ401U	950	1700	220.0	220/1	4000	7000	0.99	3	202	19
31	398	485	0.2	1.6	PHQ723_1930 EZ401U	950	1700	192.5	385/2	4000	7000	1.0	3	203	19
39	319	388	0.2	2.0	PHQ723_1540 EZ401U	950	1700	154.0	154/1	4000	7000	1.0	3	203	19
39	471	610	0.3	1.4	PHQ723_1540 EZ501U	950	1700	154.0	154/1	4000	7000	3.0	3	203	20
39	485	679	0.3	1.3	PHQ723_1540 EZ402U	950	1700	154.0	154/1	4000	7000	1.7	3	203	20
44	285	347	0.2	2.3	PHQ723_1380 EZ401U	950	1700	137.5	275/2	3700	6500	1.2	3	204	19
44	421	545	0.3	1.5	PHQ723_1380 EZ501U	950	1700	137.5	275/2	3700	6500	3.1	3	204	20
44	433	606	0.3	1.5	PHQ723_1380 EZ402U	950	1700	137.5	275/2	3700	6500	1.9	3	204	20
55	228	277	0.3	2.9	PHQ723_1100 EZ401U	840	1700	110.0	110/1	3300	6000	1.3	3	204	19
55	337	436	0.4	1.9	PHQ723_1100 EZ501U	950	1700	110.0	110/1	3300	6000	3.3	3	204	20
55	347	485	0.4	1.9	PHQ723_1100 EZ402U	950	1700	110.0	110/1	3300	6000	2.0	3	204	20
68	182	222	0.3	3.6	PHQ723_0880 EZ401U	670	1700	88.00	88/1	3300	6000	1.3	3	204	19
68	269	348	0.4	2.4	PHQ723_0880 EZ501U	950	1700	88.00	88/1	3300	6000	3.3	3	204	20
68	277	388	0.4	2.3	PHQ723_0880 EZ402U	950	1700	88.00	88/1	3300	6000	2.0	3	204	20
68	412	618	0.6	1.6	PHQ723_0880 EZ502U	950	1700	88.00	88/1	3300	6000	5.6	3	204	22
68	412	626	0.6	1.6	PHQ723_0880 EZ701U	950	1700	88.00	88/1	3300	6000	8.9	3	204	23
68	459	665	0.7	1.4	PHQ723_0880 EZ404U	950	1700	88.00	88/1	3300	6000	3.4	3	204	22
109	174	225	0.7	2.9	PHQ722_0550 EZ501U	820	1700	55.00	55/1	3700	6500	3.1	3	195	18
109	266	399	1.1	1.9	PHQ722_0550 EZ502U	950	1700	55.00	55/1	3700	6500	5.4	3	195	19
109	266	404	1.1	1.9	PHQ722_0550 EZ701U	950	1700	55.00	55/1	3700	6500	8.7	3	195	21
109	317	542	1.3	1.6	PHQ722_0550 EZ503U	950	1700	55.00	55/1	3700	6500	7.8	3	195	21
109	368	731	1.5	1.4	PHQ722_0550 EZ702U	950	1700	55.00	55/1	3700	6500	14	3	195	23

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PHQ7 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 950 Nm)															
156	186	279	1.0	3.5	PHQ722_0390 EZ502U	950	1700	38.50	77/2	3700	6500	5.6	3	203	19
156	186	283	1.0	3.5	PHQ722_0390 EZ701U	720	1700	38.50	77/2	3700	6500	8.9	3	203	21
156	222	380	1.2	2.9	PHQ722_0390 EZ503U	950	1700	38.50	77/2	3700	6500	8.0	3	203	21
156	258	512	1.4	2.5	PHQ722_0390 EZ702U	950	1700	38.50	77/2	3700	6500	14	3	203	23
218	133	199	1.2	4.9	PHQ722_0280 EZ502U	790	1700	27.50	55/2	3500	6000	5.9	3	206	19
218	133	202	1.2	4.9	PHQ722_0280 EZ701U	510	1700	27.50	55/2	3500	6000	9.2	3	206	21
218	159	271	1.4	4.1	PHQ722_0280 EZ503U	950	1700	27.50	55/2	3500	6000	8.3	3	206	21
218	184	366	1.7	3.5	PHQ722_0280 EZ702U	950	1700	27.50	55/2	3500	6000	14	3	206	23
PHQ8 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 2600 Nm)															
73	1118	1691	4.1	1.5	PHQ822_0280 EZ805U	2600	4000	27.50	55/2	3000	5500	135	3	656	82
91	894	1352	4.6	1.9	PHQ822_0220 EZ805U	2600	4000	22.00	22/1	2500	4500	137	3	661	82
PHQ8 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 2600 Nm)															
7.8	1490	1629	0.1	1.1	PHQ823_3850 EZ501U	2600	4000	385.0	385/1	3700	6500	3.1	3	635	46
11	1064	1163	0.1	1.6	PHQ823_2750 EZ501U	2600	4000	275.0	275/1	3700	6500	3.1	3	643	46
14	851	931	0.1	2.0	PHQ823_2200 EZ501U	2600	4000	220.0	220/1	3700	6500	3.1	3	641	46
14	1465	1584	0.2	1.2	PHQ823_2200 EZ502U	2600	4000	220.0	220/1	3700	6500	5.4	3	641	47
14	1465	1643	0.2	1.2	PHQ823_2200 EZ701U	2600	4000	220.0	220/1	3700	6500	8.7	3	641	49
16	745	814	0.1	2.3	PHQ823_1930 EZ501U	2600	4000	192.5	385/2	3700	6500	3.3	3	645	46
16	1282	1386	0.3	1.3	PHQ823_1930 EZ502U	2600	4000	192.5	385/2	3700	6500	5.6	3	645	47
16	1282	1438	0.3	1.3	PHQ823_1930 EZ701U	2600	4000	192.5	385/2	3700	6500	8.9	3	645	49
16	1681	1923	0.3	1.0	PHQ823_1930 EZ503U	2600	4000	192.5	385/2	3700	6500	8.0	3	645	49
19	596	651	0.2	2.9	PHQ823_1540 EZ501U	2220	4000	154.0	154/1	3700	6500	3.3	3	645	46
19	1026	1109	0.3	1.7	PHQ823_1540 EZ502U	2600	4000	154.0	154/1	3700	6500	5.6	3	645	47
19	1026	1150	0.3	1.7	PHQ823_1540 EZ701U	2600	4000	154.0	154/1	3700	6500	8.9	3	645	49
19	1344	1538	0.4	1.3	PHQ823_1540 EZ503U	2600	4000	154.0	154/1	3700	6500	8.0	3	645	49
19	1663	1996	0.5	1.0	PHQ823_1540 EZ702U	2600	4000	154.0	154/1	3700	6500	14	3	645	51
22	532	582	0.2	3.2	PHQ823_1380 EZ501U	1980	4000	137.5	275/2	3500	6000	3.6	3	646	46
22	916	990	0.3	1.9	PHQ823_1380 EZ502U	2600	4000	137.5	275/2	3500	6000	5.9	3	646	47
22	916	1027	0.3	1.9	PHQ823_1380 EZ701U	2480	4000	137.5	275/2	3500	6000	9.2	3	646	49
22	1200	1374	0.4	1.4	PHQ823_1380 EZ503U	2600	4000	137.5	275/2	3500	6000	8.3	3	646	49
22	1485	1782	0.5	1.1	PHQ823_1380 EZ702U	2600	4000	137.5	275/2	3500	6000	14	3	646	51
22	1671	1980	0.6	1.0	PHQ823_1380 EZ505U	2600	4000	137.5	275/2	3500	6000	13	3	646	51
27	426	465	0.2	4.0	PHQ823_1100 EZ501U	1580	4000	110.0	110/1	3000	5000	4.1	3	647	46
27	733	792	0.3	2.3	PHQ823_1100 EZ502U	2600	4000	110.0	110/1	3000	5000	6.4	3	647	47
27	733	822	0.3	2.3	PHQ823_1100 EZ701U	1980	4000	110.0	110/1	3000	5000	9.7	3	647	49
27	960	1099	0.4	1.8	PHQ823_1100 EZ503U	2600	4000	110.0	110/1	3000	5000	8.8	3	647	49
27	1188	1426	0.6	1.4	PHQ823_1100 EZ702U	2600	4000	110.0	110/1	3000	5000	15	3	647	51
27	1337	1584	0.6	1.3	PHQ823_1100 EZ505U	2600	4000	110.0	110/1	3000	5000	13	3	647	51
34	341	372	0.2	5.0	PHQ823_0880 EZ501U	1270	4000	88.00	88/1	3000	5000	4.2	3	647	46
34	586	634	0.4	2.9	PHQ823_0880 EZ502U	2460	4000	88.00	88/1	3000	5000	6.5	3	647	47
34	586	657	0.4	2.9	PHQ823_0880 EZ701U	1580	4000	88.00	88/1	3000	5000	9.8	3	647	49
34	768	879	0.5	2.2	PHQ823_0880 EZ503U	2600	4000	88.00	88/1	3000	5000	8.9	3	647	49
34	950	1140	0.6	1.8	PHQ823_0880 EZ702U	2600	4000	88.00	88/1	3000	5000	15	3	647	51
34	1069	1267	0.7	1.6	PHQ823_0880 EZ505U	2600	4000	88.00	88/1	3000	5000	13	3	647	51
34	1307	1647	0.8	1.3	PHQ823_0880 EZ703U	2600	4000	88.00	88/1	3000	5000	23	3	647	53
55	379	425	0.6	3.7	PHQ822_0550 EZ701U	1020	4000	55.00	55/1	3300	6000	9.2	3	615	44
55	614	737	1.0	2.3	PHQ822_0550 EZ702U	2100	4000	55.00	55/1	3300	6000	14	3	615	47
55	844	1064	1.4	1.6	PHQ822_0550 EZ703U	2600	4000	55.00	55/1	3300	6000	22	3	615	49
55	1089	1545	1.8	1.3	PHQ822_0550 EZ705U	2600	4000	55.00	55/1	3300	6000	35	3	615	54
55	1141	1898	1.8	1.2	PHQ822_0550 EZ802U	2600	4000	55.00	55/1	3300	6000	59	3	615	63
78	430	516	1.0	4.0	PHQ822_0390 EZ702U	1470	4000	38.50	77/2	3300	6000	15	3	643	47
78	591	745	1.3	2.9	PHQ822_0390 EZ703U	2330	4000	38.50	77/2	3300	6000	23	3	643	49
78	763	1081	1.7	2.2	PHQ822_0390 EZ705U	2600	4000	38.50	77/2	3300	6000	35	3	643	54
78	798	1328	1.8	2.1	PHQ822_0390 EZ802U	2600	4000	38.50	77/2	3300	6000	59	3	643	63
109	422	532	1.6	4.0	PHQ822_0280 EZ703U	1660	4000	27.50	55/2	3000	5500	24	3	656	49
109	545	772	2.0	3.1	PHQ822_0280 EZ705U	2600	4000	27.50	55/2	3000	5500	37	3	656	54
109	570	949	2.1	3.0	PHQ822_0280 EZ802U	2560	4000	27.50	55/2	3000	5500	61	3	656	63
109	680	1233	2.5	2.5	PHQ822_0280 EZ803U	2600	4000	27.50	55/2	3000	5500	86	3	656	69
136	436	618	2.3	3.9	PHQ822_0220 EZ705U	2130	4000	22.00	22/1	2500	4500	38	3	661	54
136	456	759	2.4	3.7	PHQ822_0220 EZ802U	2050	4000	22.00	22/1	2500	4500	63	3	661	63
136	544	986	2.8	3.1	PHQ822_0220 EZ803U	2600	4000	22.00	22/1	2500	4500	88	3	661	69

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PHQ8 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 2600 Nm)															
33	1176	1893	0.4	1.4	PHQ823_1380 EZ505U	2600	4000	137.5	275/2	3500	6000	13	3	646	51
41	941	1515	0.4	1.8	PHQ823_1100 EZ505U	2600	4000	110.0	110/1	3000	5000	13	3	647	51
41	1198	1980	0.6	1.4	PHQ823_1100 EZ703U	2600	4000	110.0	110/1	3000	5000	23	3	647	53
51	752	1212	0.5	2.3	PHQ823_0880 EZ505U	2600	4000	88.00	88/1	3000	5000	13	3	647	51
51	958	1584	0.6	1.8	PHQ823_0880 EZ703U	2600	4000	88.00	88/1	3000	5000	23	3	647	53
82	537	1765	1.0	2.3	PHQ822_0550 EZ802U	2600	4000	55.00	55/1	3300	6000	59	3	615	63
82	619	1023	1.1	2.0	PHQ822_0550 EZ703U	2600	4000	55.00	55/1	3300	6000	22	3	615	49
82	839	1535	1.5	1.4	PHQ822_0550 EZ705U	2600	4000	55.00	55/1	3300	6000	35	3	615	54
117	376	1235	0.8	4.5	PHQ822_0390 EZ802U	2600	4000	38.50	77/2	3300	6000	59	3	643	63
117	433	716	1.0	3.9	PHQ822_0390 EZ703U	2330	4000	38.50	77/2	3300	6000	23	3	643	49
117	587	1074	1.3	2.9	PHQ822_0390 EZ705U	2600	4000	38.50	77/2	3300	6000	35	3	643	54
164	419	767	1.6	4.1	PHQ822_0280 EZ705U	2600	4000	27.50	55/2	3000	5500	37	3	656	54
PHQ8 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 2600 Nm)															
16	1178	1525	0.1	1.4	PHQ823_3850 EZ501U	2600	4000	385.0	385/1	3700	6500	3.1	3	635	46
22	842	1089	0.1	2.0	PHQ823_2750 EZ501U	2600	4000	275.0	275/1	3700	6500	3.1	3	643	46
22	1287	1931	0.2	1.3	PHQ823_2750 EZ502U	2600	4000	275.0	275/1	3700	6500	5.4	3	643	47
22	1287	1955	0.2	1.3	PHQ823_2750 EZ701U	2600	4000	275.0	275/1	3700	6500	8.7	3	643	49
27	673	871	0.1	2.5	PHQ823_2200 EZ501U	2600	4000	220.0	220/1	3700	6500	3.1	3	641	46
27	1030	1544	0.2	1.7	PHQ823_2200 EZ502U	2600	4000	220.0	220/1	3700	6500	5.4	3	641	47
27	1030	1564	0.2	1.7	PHQ823_2200 EZ701U	2600	4000	220.0	220/1	3700	6500	8.7	3	641	49
31	589	762	0.1	2.9	PHQ823_1930 EZ501U	2600	4000	192.5	385/2	3700	6500	3.3	3	645	46
31	901	1351	0.2	1.9	PHQ823_1930 EZ502U	2600	4000	192.5	385/2	3700	6500	5.6	3	645	47
31	901	1369	0.2	1.9	PHQ823_1930 EZ701U	2600	4000	192.5	385/2	3700	6500	8.9	3	645	49
31	1074	1836	0.2	1.6	PHQ823_1930 EZ503U	2600	4000	192.5	385/2	3700	6500	8.0	3	645	49
39	471	610	0.1	3.6	PHQ823_1540 EZ501U	2220	4000	154.0	154/1	3700	6500	3.3	3	645	46
39	721	1081	0.2	2.4	PHQ823_1540 EZ502U	2600	4000	154.0	154/1	3700	6500	5.6	3	645	47
39	721	1095	0.2	2.4	PHQ823_1540 EZ701U	2600	4000	154.0	154/1	3700	6500	8.9	3	645	49
39	859	1469	0.2	2.0	PHQ823_1540 EZ503U	2600	4000	154.0	154/1	3700	6500	8.0	3	645	49
39	998	1982	0.3	1.7	PHQ823_1540 EZ702U	2600	4000	154.0	154/1	3700	6500	14	3	645	51
44	421	545	0.1	4.0	PHQ823_1380 EZ501U	1980	4000	137.5	275/2	3500	6000	3.6	3	646	46
44	644	965	0.2	2.6	PHQ823_1380 EZ502U	2600	4000	137.5	275/2	3500	6000	5.9	3	646	47
44	644	978	0.2	2.6	PHQ823_1380 EZ701U	2480	4000	137.5	275/2	3500	6000	9.2	3	646	49
44	767	1312	0.3	2.2	PHQ823_1380 EZ503U	2600	4000	137.5	275/2	3500	6000	8.3	3	646	49
44	891	1770	0.3	1.9	PHQ823_1380 EZ702U	2600	4000	137.5	275/2	3500	6000	14	3	646	51
109	266	404	0.5	4.1	PHQ822_0550 EZ701U	1020	4000	55.00	55/1	3300	6000	9.2	3	615	44
109	368	731	0.7	3.0	PHQ822_0550 EZ702U	2100	4000	55.00	55/1	3300	6000	14	3	615	47
PHQ9 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 6000 Nm)															
28	2832	4283	1.2	1.3	PHQ933_0720 EZ805U	6000	10140	72.00	72/1	2200	4500	139	3	1205	127
33	2438	3688	1.4	1.6	PHQ932_0600 EZ805U	6000	12000	60.00	60/1	2800	4500	135	3	1149	119
48	1707	2582	1.6	2.2	PHQ932_0420 EZ805U	6000	12000	42.00	42/1	2800	4500	138	3	1195	119
67	1219	1844	1.9	3.1	PHQ932_0300 EZ805U	5720	12000	30.00	30/1	2500	4000	143	3	1214	119
83	975	1475	2.1	3.9	PHQ932_0240 EZ805U	4580	12000	24.00	24/1	2200	3500	150	3	1225	119
PHQ9 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 6000 Nm)															
7.1	2797	3137	0.1	1.4	PHQ933_4200 EZ701U	6000	12000	420.0	420/1	3300	6000	9.1	3	1184	90
10	1998	2241	0.1	1.9	PHQ933_3000 EZ701U	5400	12000	300.0	300/1	3300	6000	9.1	3	1196	90
10	3240	3888	0.2	1.2	PHQ933_3000 EZ702U	6000	12000	300.0	300/1	3300	6000	14	3	1196	92
13	1598	1793	0.1	2.4	PHQ933_2400 EZ701U	4320	12000	240.0	240/1	3300	6000	9.2	3	1198	90
13	2592	3110	0.2	1.5	PHQ933_2400 EZ702U	6000	12000	240.0	240/1	3300	6000	14	3	1198	92
13	3564	4493	0.2	1.1	PHQ933_2400 EZ703U	6000	12000	240.0	240/1	3300	6000	22	3	1198	94
14	1399	1569	0.1	2.7	PHQ933_2100 EZ701U	3780	12000	210.0	210/1	3300	6000	9.8	3	1200	90
14	2268	2722	0.2	1.7	PHQ933_2100 EZ702U	6000	12000	210.0	210/1	3300	6000	15	3	1200	92
14	3119	3931	0.3	1.2	PHQ933_2100 EZ703U	6000	12000	210.0	210/1	3300	6000	23	3	1200	94
18	1119	1255	0.1	3.4	PHQ933_1680 EZ701U	3020	12000	168.0	168/1	3300	6000	9.9	3	1204	90
18	1814	2177	0.2	2.1	PHQ933_1680 EZ702U	6000	12000	168.0	168/1	3300	6000	15	3	1204	92
18	2495	3145	0.3	1.5	PHQ933_1680 EZ703U	6000	12000	168.0	168/1	3300	6000	23	3	1204	94
18	3221	4566	0.4	1.2	PHQ933_1680 EZ705U	6000	12000	168.0	168/1	3300	6000	35	3	1204	100
20	999	1121	0.1	3.8	PHQ933_1500 EZ701U	2700	12000	150.0	150/1	3000	5500	11	3	1202	90
20	1620	1944	0.2	2.3	PHQ933_1500 EZ702U	5540	12000	150.0	150/1	3000	5500	16	3	1202	92
20	2228	2808	0.3	1.7	PHQ933_1500 EZ703U	6000	12000	150.0	150/1	3000	5500	24	3	1202	94
20	2876	4077	0.4	1.3	PHQ933_1500 EZ705U	6000	12000	150.0	150/1	3000	5500	37	3	1202	100
25	799	896	0.2	4.8	PHQ933_1200 EZ701U	2160	12000	120.0	120/1	2500	4500	13	3	1203	90
25	1296	1555	0.3	2.9	PHQ933_1200 EZ702U	4430	12000	120.0	120/1	2500	4500	18	3	1203	92
25	1782	2246	0.4	2.1	PHQ933_1200 EZ703U	6000	12000	120.0	120/1	2500	4500	26	3	1203	94

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PHQ9 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 6000 Nm)															
25	2300	3262	0.5	1.7	PHQ933_1200 EZ705U	6000	12000	120.0	120/1	2500	4500	38	3	1203	100
25	2408	4007	0.5	1.6	PHQ933_1200 EZ802U	6000	12000	120.0	120/1	2500	4500	62	3	1203	108
31	1037	1244	0.3	3.7	PHQ933_0960 EZ702U	3540	12000	96.00	96/1	2500	4500	18	3	1207	92
31	1426	1797	0.4	2.7	PHQ933_0960 EZ703U	5620	12000	96.00	96/1	2500	4500	26	3	1207	94
31	1840	2609	0.5	2.1	PHQ933_0960 EZ705U	6000	12000	96.00	96/1	2500	4500	39	3	1207	100
31	1927	3205	0.5	2.0	PHQ933_0960 EZ802U	6000	12000	96.00	96/1	2500	4500	63	3	1207	108
31	2298	4164	0.6	1.7	PHQ933_0960 EZ803U	6000	12000	96.00	96/1	2500	4500	88	3	1207	114
42	778	933	0.3	4.9	PHQ933_0720 EZ702U	2660	10140	72.00	72/1	2200	4500	20	3	1205	92
42	1069	1348	0.5	3.6	PHQ933_0720 EZ703U	4210	10140	72.00	72/1	2200	4500	28	3	1205	94
42	1380	1957	0.6	2.8	PHQ933_0720 EZ705U	6000	12000	72.00	72/1	2200	4500	41	3	1205	100
42	1445	2404	0.6	2.6	PHQ933_0720 EZ802U	6000	10140	72.00	72/1	2200	4500	65	3	1205	108
42	1724	3123	0.7	2.2	PHQ933_0720 EZ803U	6000	10140	72.00	72/1	2200	4500	90	3	1205	114
50	1244	2070	0.7	2.8	PHQ932_0600 EZ802U	5580	12000	60.00	60/1	2800	4500	61	3	1149	100
50	1484	2690	0.9	2.4	PHQ932_0600 EZ803U	6000	12000	60.00	60/1	2800	4500	86	3	1149	106
71	871	1449	0.8	4.4	PHQ932_0420 EZ802U	3910	12000	42.00	42/1	2800	4500	63	3	1195	100
71	1039	1883	1.0	3.7	PHQ932_0420 EZ803U	5660	12000	42.00	42/1	2800	4500	89	3	1195	106
PHQ9 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 6000 Nm)															
19	2614	4320	0.2	1.5	PHQ933_2400 EZ703U	6000	12000	240.0	240/1	3300	6000	22	3	1198	94
21	2287	3780	0.2	1.7	PHQ933_2100 EZ703U	6000	12000	210.0	210/1	3300	6000	23	3	1200	94
27	1830	3024	0.2	2.1	PHQ933_1680 EZ703U	6000	12000	168.0	168/1	3300	6000	23	3	1204	94
27	2480	4536	0.3	1.5	PHQ933_1680 EZ705U	6000	12000	168.0	168/1	3300	6000	35	3	1204	100
30	1634	2700	0.2	2.3	PHQ933_1500 EZ703U	6000	12000	150.0	150/1	3000	5500	24	3	1202	94
30	2214	4050	0.3	1.7	PHQ933_1500 EZ705U	6000	12000	150.0	150/1	3000	5500	37	3	1202	100
38	1134	3726	0.2	3.4	PHQ933_1200 EZ802U	6000	12000	120.0	120/1	2500	4500	62	3	1203	108
38	1307	2160	0.3	2.9	PHQ933_1200 EZ703U	6000	12000	120.0	120/1	2500	4500	26	3	1203	94
38	1771	3240	0.3	2.1	PHQ933_1200 EZ705U	6000	12000	120.0	120/1	2500	4500	38	3	1203	100
47	907	2981	0.2	4.2	PHQ933_0960 EZ802U	6000	12000	96.00	96/1	2500	4500	63	3	1207	108
47	1045	1728	0.3	3.6	PHQ933_0960 EZ703U	5620	12000	96.00	96/1	2500	4500	26	3	1207	94
47	1417	2592	0.4	2.7	PHQ933_0960 EZ705U	6000	12000	96.00	96/1	2500	4500	39	3	1207	100
63	784	1296	0.3	4.8	PHQ933_0720 EZ703U	4210	10140	72.00	72/1	2200	4500	28	3	1205	94
63	1063	1944	0.4	3.6	PHQ933_0720 EZ705U	6000	12000	72.00	72/1	2200	4500	41	3	1205	100
PHQ9 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 6000 Nm)															
10	2808	4266	0.1	1.4	PHQ933_6000 EZ701U	6000	12000	600.0	600/1	3300	6000	9.1	3	1145	90
14	1966	2986	0.1	1.9	PHQ933_4200 EZ701U	6000	12000	420.0	420/1	3300	6000	9.1	3	1184	90
20	1404	2133	0.1	2.7	PHQ933_3000 EZ701U	5400	12000	300.0	300/1	3300	6000	9.1	3	1196	90
20	1944	3861	0.1	2.0	PHQ933_3000 EZ702U	6000	12000	300.0	300/1	3300	6000	14	3	1196	92
25	1123	1706	0.1	3.4	PHQ933_2400 EZ701U	4320	12000	240.0	240/1	3300	6000	9.2	3	1198	90
25	1555	3089	0.1	2.4	PHQ933_2400 EZ702U	6000	12000	240.0	240/1	3300	6000	14	3	1198	92
29	983	1493	0.1	3.9	PHQ933_2100 EZ701U	3780	12000	210.0	210/1	3300	6000	9.8	3	1200	90
29	1361	2703	0.1	2.8	PHQ933_2100 EZ702U	6000	12000	210.0	210/1	3300	6000	15	3	1200	92
36	786	1194	0.1	4.8	PHQ933_1680 EZ701U	3020	12000	168.0	168/1	3300	6000	9.9	3	1204	90
36	1089	2162	0.1	3.5	PHQ933_1680 EZ702U	6000	12000	168.0	168/1	3300	6000	15	3	1204	92
PHQ10 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 10000 Nm)															
17	4720	7139	0.6	1.4	PHQ1033_1200 EZ805U	10000	20000	120.0	120/1	2200	3500	150	3	2062	166
21	3776	5711	0.6	1.7	PHQ1033_0960 EZ805U	10000	20000	96.00	96/1	2200	3500	152	3	2068	166
PHQ10 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 10000 Nm)															
14	4215	7012	0.2	1.5	PHQ1033_2100 EZ802U	10000	20000	210.0	210/1	2800	4500	63	3	2059	147
18	3372	5610	0.3	1.9	PHQ1033_1680 EZ802U	10000	20000	168.0	168/1	2800	4500	64	3	2064	147
18	4022	7288	0.3	1.6	PHQ1033_1680 EZ803U	10000	20000	168.0	168/1	2800	4500	89	3	2064	153
20	3011	5009	0.3	2.2	PHQ1033_1500 EZ802U	10000	20000	150.0	150/1	2500	4000	69	3	2061	147
20	3591	6507	0.3	1.8	PHQ1033_1500 EZ803U	10000	20000	150.0	150/1	2500	4000	94	3	2061	153
25	2408	4007	0.3	2.7	PHQ1033_1200 EZ802U	10000	20000	120.0	120/1	2200	3500	76	3	2062	147
25	2873	5206	0.4	2.3	PHQ1033_1200 EZ803U	10000	20000	120.0	120/1	2200	3500	101	3	2062	153
31	1927	3205	0.3	3.4	PHQ1033_0960 EZ802U	8640	20000	96.00	96/1	2200	3500	77	3	2068	147
31	2298	4164	0.4	2.8	PHQ1033_0960 EZ803U	10000	20000	96.00	96/1	2200	3500	102	3	2068	153
PHQ10 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 10000 Nm)															
19	2268	7452	0.1	2.9	PHQ1033_2400 EZ802U	10000	20000	240.0	240/1	2800	4500	61	3	2055	147
21	1985	6521	0.1	3.3	PHQ1033_2100 EZ802U	10000	20000	210.0	210/1	2800	4500	63	3	2059	147
27	1588	5216	0.1	4.1	PHQ1033_1680 EZ802U	10000	20000	168.0	168/1	2800	4500	64	3	2064	147
PHQ11 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 22000 Nm)															
8.3	9439	14278	0.2	1.4	PHQ1133_2400 EZ805U	22000	40000	240.0	240/1	2800	4500	136	3	3497	276
9.5	8259	12493	0.2	1.6	PHQ1133_2100 EZ805U	22000	40000	210.0	210/1	2800	4500	139	3	3506	276
12	6607	9994	0.3	2.0	PHQ1133_1680 EZ805U	22000	40000	168.0	168/1	2800	4500	140	3	3520	276

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm^2]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PHQ11 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 22000 Nm)															
13	5900	8924	0.3	2.2	PHQ1133_1500 EZ805U	22000	40000	150.0	150/1	2500	4000	145	3	3510	276
17	4720	7139	0.3	2.8	PHQ1133_1200 EZ805U	22000	40000	120.0	120/1	2200	3500	153	3	3514	276
21	3776	5711	0.3	3.4	PHQ1133_0960 EZ805U	17710	40000	96.00	96/1	2200	3500	156	3	3533	276
PHQ11 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 22000 Nm)															
10	6021	10017	0.1	2.2	PHQ1133_3000 EZ802U	22000	40000	300.0	300/1	2800	4500	61	3	3491	257
10	7182	13014	0.1	1.8	PHQ1133_3000 EZ803U	22000	40000	300.0	300/1	2800	4500	87	3	3491	263
13	4817	8014	0.1	2.7	PHQ1133_2400 EZ802U	21600	40000	240.0	240/1	2800	4500	62	3	3497	257
13	5746	10411	0.1	2.3	PHQ1133_2400 EZ803U	22000	40000	240.0	240/1	2800	4500	87	3	3497	263
14	4215	7012	0.1	3.1	PHQ1133_2100 EZ802U	18900	40000	210.0	210/1	2800	4500	64	3	3506	257
14	5027	9110	0.1	2.6	PHQ1133_2100 EZ803U	22000	40000	210.0	210/1	2800	4500	90	3	3506	263
18	3372	5610	0.1	3.9	PHQ1133_1680 EZ802U	15120	40000	168.0	168/1	2800	4500	65	3	3520	257
18	4022	7288	0.2	3.2	PHQ1133_1680 EZ803U	21920	40000	168.0	168/1	2800	4500	91	3	3520	263
20	3011	5009	0.1	4.3	PHQ1133_1500 EZ802U	13500	40000	150.0	150/1	2500	4000	71	3	3510	257
20	3591	6507	0.2	3.6	PHQ1133_1500 EZ803U	19580	40000	150.0	150/1	2500	4000	96	3	3510	263
25	2873	5206	0.2	4.5	PHQ1133_1200 EZ803U	15660	40000	120.0	120/1	2200	3500	104	3	3514	263
PHQ11 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 22000 Nm)															
15	2835	9315	–	4.6	PHQ1133_3000 EZ802U	22000	40000	300.0	300/1	2800	4500	61	3	3491	257

6.3 Dimensional drawings

In this chapter you can find the dimensions of the geared motors.

There is a dimensional drawing for every possible shaft/housing design, each with the tables for gear unit dimensions, motor dimensions and geared motor dimensions.

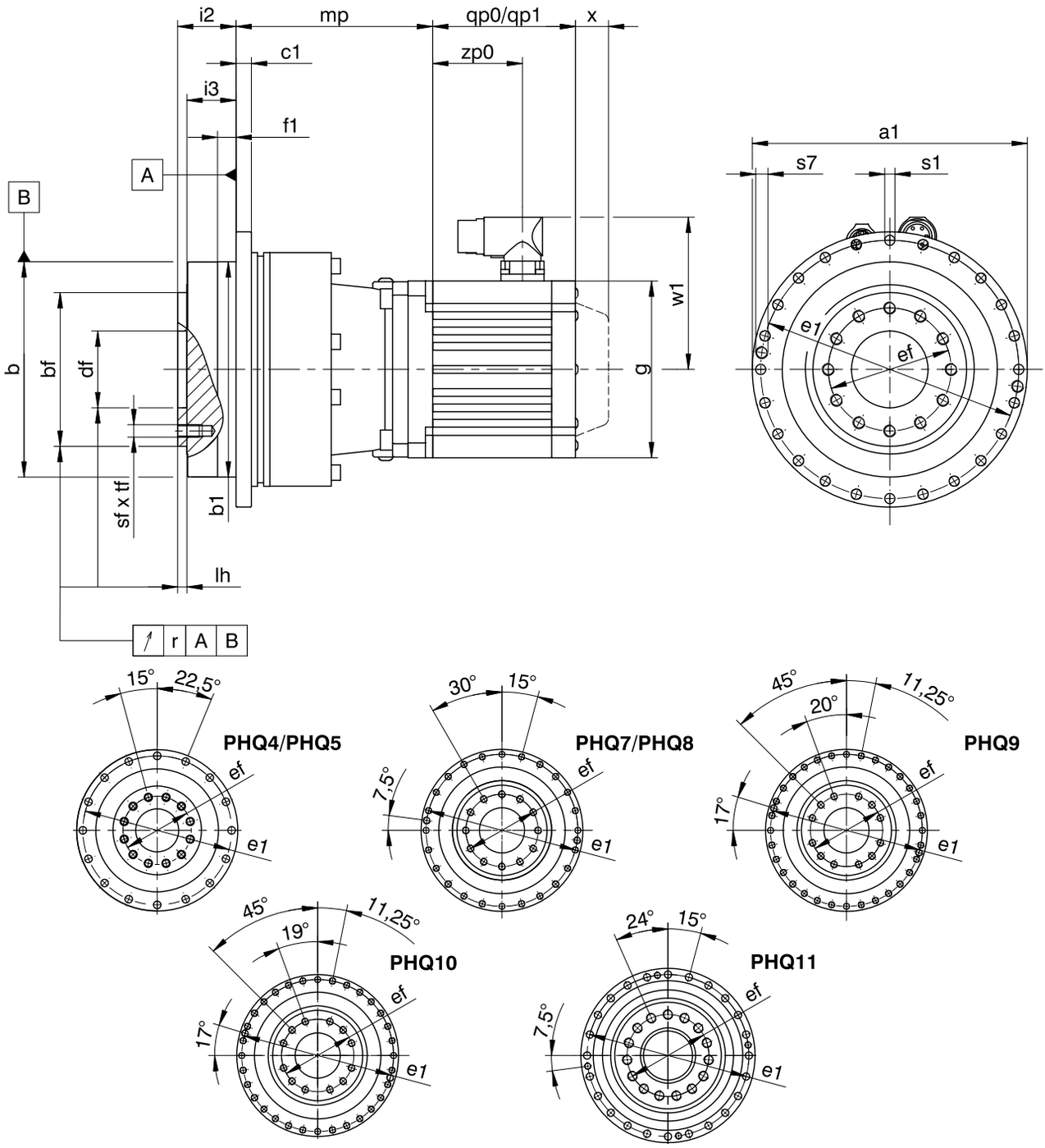
Dimensions can exceed the specifications of ISO 2768-mK due to casting tolerances or accumulation of individual tolerances.

We reserve the right to make dimensional changes due to ongoing technical development.

You can download CAD models of our standard drives at http://cad.stoeber.de.

Combination options and the dimensions of forced ventilated geared motors can be found at http://cad.stoeber.de.

6.3.1 F shaft design (flange shaft)



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]

Dimensions of gear units

Type	Øa1	Øb	Øb1	Øbf	c1	Ødf	Øe1	Øef	f1	i2	i3	lh	r	Øs1	s7	sf	tf
PHQ421	118_{h7}	–	90_{h7}	63_{h7}	7	31.5^{H6}	109	50	10	30	24	6	0.020	5.5	–	M6	11.0
PHQ422	118_{h7}	–	90_{h7}	63_{h7}	7	31.5^{H6}	109	50	10	30	24	6	0.020	5.5	–	M6	11.0
PHQ521	145_{h7}	–	110_{h7}	80_{h7}	8	40.0^{H6}	135	63	10	29	23	6	0.020	5.5	–	M8	11.0
PHQ522	145_{h7}	–	110_{h7}	80_{h7}	8	40.0^{H6}	135	63	10	29	23	6	0.020	5.5	–	M8	11.0
PHQ721	179_{h7}	–	140_{h7}	100_{h7}	10	50.0^{H6}	168	80	12	38	32	6	0.025	6.6	–	M10	16.0
PHQ722	179_{h7}	–	140_{h7}	100_{h7}	10	50.0^{H6}	168	80	12	38	32	6	0.025	6.6	–	M10	16.0
PHQ723	179_{h7}	–	140_{h7}	100_{h7}	10	50.0^{H6}	168	80	12	38	32	6	0.025	6.6	–	M10	16.0
PHQ822	247_{h7}	–	200_{h7}	160_{h7}	12	80.0^{H6}	233	125	15	50	42	8	0.030	9.0	M10	M12	17.0
PHQ823	247_{h7}	–	200_{h7}	160_{h7}	12	80.0^{H6}	233	125	15	50	42	8	0.030	9.0	M10	M12	17.0
PHQ932	300_{h7}	–	255_{h7}	180_{h7}	18	90.0^{H6}	280	145	20	66	55	12	0.030	13.5	M8	M20	28.0
PHQ933	300_{h7}	–	255_{h7}	180_{h7}	18	90.0^{H6}	280	145	20	66	55	12	0.030	13.5	M8	M20	28.0
PHQ1033	330_{h7}	–	285_{h7}	200_{h7}	20	95.0^{H6}	310	166	20	75	60	10	0.040	13.5	M10	M24	35.0
PHQ1133	425	365_{g6}	365_{h6}	260_{h7}	32	120.0^{H6}	395	200	30	190	180	10	0.040	17.5	M16	M24	35.5

Dimensions of motors

Type	□g	qp0	qp1	w1	x	zp0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0
EZ501U	115	93	147.5	100.0	22	58.5
EZ502U	115	118	172.5	100.0	22	83.5
EZ503U	115	143	197.5	100.0	22	108.5
EZ505U	115	193	247.5	100.0	22	158.5
EZ701U	145	102	161.0	115.0	22	64.0
EZ702U	145	127	186.0	115.0	22	89.0
EZ703U	145	152	211.0	115.0	22	114.0
EZ705U	145	207	266.0	134.0	22	165.0
EZ802U	190	197	274.0	156.5	22	143.0
EZ803U	190	238	315.0	156.5	22	184.0
EZ805U	190	320	397.0	156.5	22	266.0

Dimensions of geared motors

Type	EZ3	EZ4	EZ5	EZ7	EZ8
	mp	mp	mp	mp	mp
PHQ421	–	51.0	53.5	–	–
PHQ422	103.0	99.5	102.0	–	–
PHQ521	–	–	57.0	63.0	–
PHQ522	–	112.5	115.0	121.0	–
PHQ721	–	–	–	–	77.0
PHQ722	–	–	128.0	134.0	149.0
PHQ723	–	183.5	186.0	192.0	–
PHQ822	–	–	–	169.0	184.0
PHQ823	–	–	229.0	235.0	–
PHQ932	–	–	–	–	249.5
PHQ933	–	–	–	319.0	334.0
PHQ1033	–	–	–	–	384.0
PHQ1133	–	–	–	–	329.5

6.4 Type designation

In this chapter, you can find an explanation of the type designation with the associated options.

Additional ordering information not included in the type designation can be found at the end of the chapter.

Sample code

PHQ	7	2	3	F	0880	EZ401U

Explanation

Code	Designation	Design
PHQ	Type	Planetary gear unit
7	Size	7 (example)
2	Generation	Generation 2
3		Generation 3
1	Stages	Single-stage
2		Two-stage
3		Three-stage
F	Shaft	Flange shaft
0880	Transmission ratio (i x 10)	i = 88 (example)
EZ401U	Motor	EZ synchronous servo motor

In order to complete the type designation, also specify:

- A detailed type designation of the motor, see chapter [▶ 23]
- The mounting position (for three-stage gear units), see Chapter [▶ 6.5.2]
- Radial shaft seal rings at the output made of NBR or FKM, see chapter [▶ 6.6.3]
- For reverse operation of the output shaft from ± 20° to ± 90° and horizontal installation, note the chapter [▶ 6.6.4]

6.5 Product description

6.5.1 Installation conditions

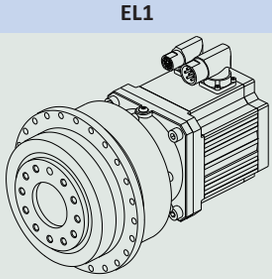
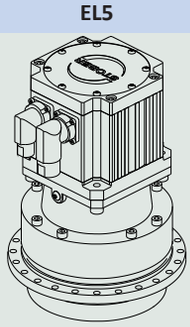
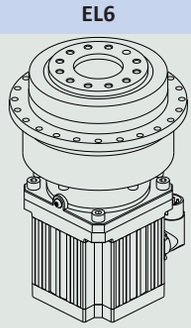
The torque and force values listed in this catalog are valid under the following conditions:

- When using screws with quality 12.9 for machine-side attachment of the flange shaft and gear unit housing
- When the gear unit housings are adjusted at pilot øb1, and also at pilot Øb for size PHQ11 (H7)
- When the flange shaft is adjusted using the connecting element at pilot øbf or ødf

6.5.2 Mounting positions

The following table shows the standard mounting positions.

Please indicate the mounting position when ordering three-stage geared motors.

EL1	EL5	EL6
		
Horizontal output	Vertical downward output	Vertical upward output

6.5.3 Lubricants

STOBER fills the gear units with the amount and type of lubricant specified on the nameplate. The filling volume and the structure of the gear units depend on the mounting position.

Only install the gear units in the intended mounting position! Reposition the gear units only after consulting STOBER. Otherwise, STOBER assumes no liability for the gear units.

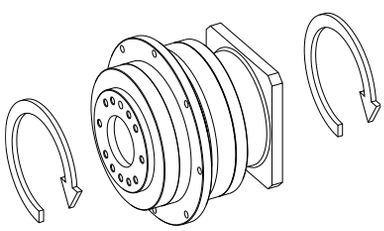
Lubricant filling quantities for gear units, document ID 441871, can be found online at http://www.stoeber.de/en/download. Enter the ID of the documentation in the Search... field.

6.5.4 Other product features

Feature	Value
Max. permitted gear unit temperature (on the surface of the gear unit)	≤ 90 °C
Paint	Black RAL 9005
(ATEX) Directive 2014/34/EU (option)	Not suitable
Protection class:[1]	
Gear unit	IP65
Motor	IP56, optionally IP66

6.5.5 Direction of rotation

The input and output rotate in the same direction.



6.6 Project configuration

Project your drives using our SERVOsoft designing software. You can receive SERVOsoft for free from your adviser at one of our sales centers. Observe the limit conditions in this chapter to ensure a safe design for your drives.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

6.6.1 Calculation of the operating point

Check the following conditions for operating points other than the nominal point M_{2N} specified in the selection tables.

$$n_{1m^*} \leq \frac{n_{1maxDB}}{fB_T}$$

$$n_{1max^*} \leq \frac{n_{1max\,ZB}}{fB_T}$$

$$M_{2eff^*} \leq M_{2th}$$

$$M_{2acc^*} \leq M_{2acc}$$

$$M_{2NOT^*} \leq M_{2NOT}$$

$$M_{2eq^*} \leq M_{2N} \cdot \frac{S}{fB_{op} \cdot fB_t}$$

The values for n_{1maxDB}, n_{1maxZB}, M_{2acc}, M_{2NOT}, M_{2N} and S can be found in the selection tables.

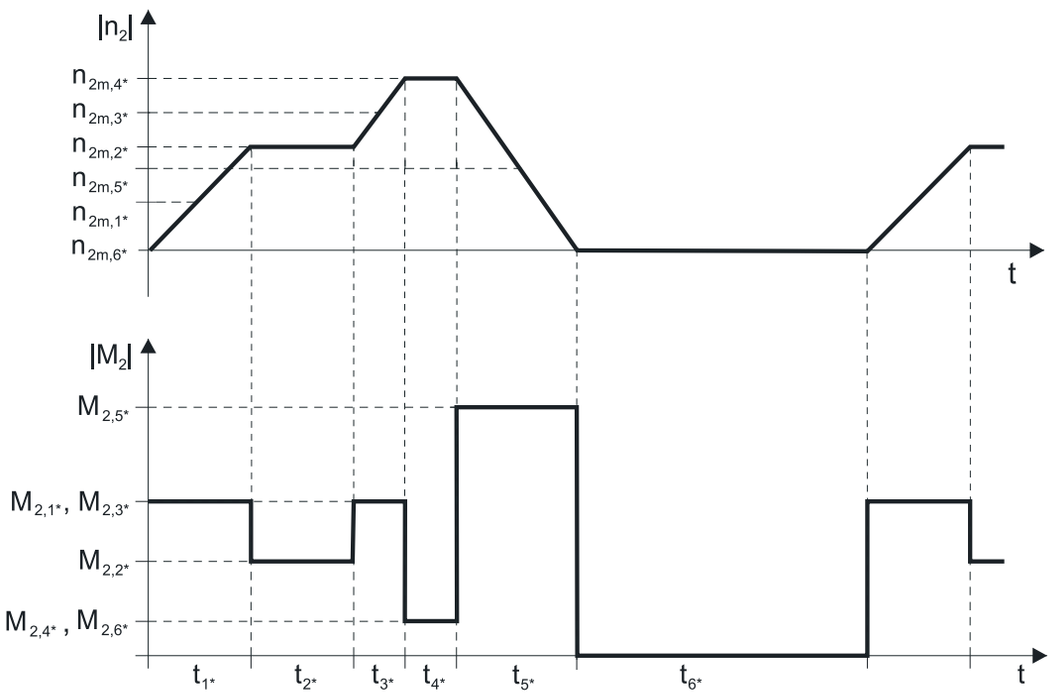
[1] Observe the protection class of all the components.

The values for fB_T, fB_{op} and fB_t can be found in the corresponding tables in this chapter.

Calculate the thermal limit torque M_{2th} for a duty cycle > 50%.

Example of cyclic operation

The following calculations are based on a representation of the power taken from the output based in accordance with the following example:



Calculation of the actual average input speed

$$n_{1m^*} = n_{2m^*} \cdot i$$

$$n_{2m^*} = \frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}{t_{1^*} + \ldots + t_{n^*}}$$

If $t_{1^*} + \ldots + t_{5^*} \geq 20$ min, calculate n_{2m^*} without the rest phase t_{6^*}.

The values for the ratio i can be found in the selection tables.

Calculation of the actual effective torque

$$M_{2eff^*} = \sqrt{\frac{t_{1^*} \cdot {M_{2,1^*}}^2 + \ldots + t_{n^*} \cdot {M_{2,n^*}}^2}{t_{1^*} + \ldots + t_{n^*}}}$$

Calculation of the actual equivalent torque

$$M_{2eq^*} = \sqrt[3]{\frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} \cdot \left|{M_{2,1^*}}^3\right| + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*} \cdot \left|{M_{2,n^*}}^3\right|}{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}}$$

Calculation of the thermal limit torque

Calculate the thermal limit torque M_{2th} for a duty cycle ED_{20} > 50% and the actual average input speed n_{1m^*}. (At $K_{mot,th} \leq 0$ you must reduce the average input speed n_{1m^*} accordingly or select another geared motor size.)

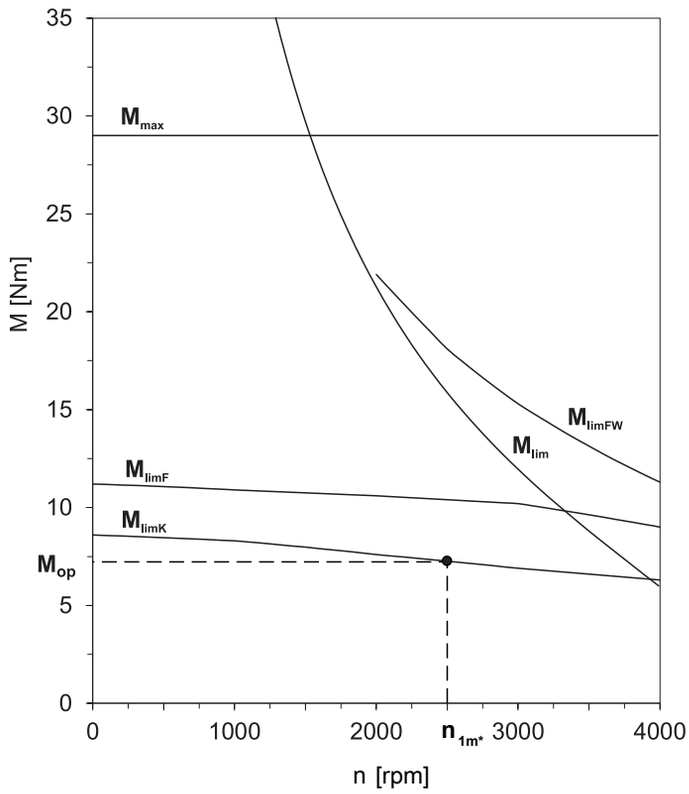
$$M_{2th} = M_{op} \cdot i \cdot K_{mot,th}$$

$$K_{mot,th} = 0{,}93 - \frac{a_{th}}{1000} \cdot fB_T \cdot \left(\frac{n_{1m^*}}{1000}\right)^3$$

The values for i and a_{th} can be found in the selection tables.

The values for fB_T can be found in the corresponding table in this chapter.

The value for the torque of the motor at operating point M_{op} with the determined average input speed n_{1m*} can be found in the motor curve of Chapter [▶ 23.3]. Note the size, nominal speed n_N and cooling type of the motor. The figure below shows an example of reading the torque M_{op} of a motor with convection cooling at the operating point.



Operating factors

Operating mode	fB_{op}
Uniform continuous operation	1.00
Cyclic operation	1.00
Reversing load cyclic operation	1.00

Run time	fB_t
Daily run time ≤ 8 h	1.00
Daily run time ≤ 16 h	1.15
Daily run time ≤ 24 h	1.20

Temperature		fB_T
Motor cooling	**Surrounding temperature**	
Motor with forced ventilation	≤ 20 °C	0.9
	≤ 30 °C	1.0
	≤ 40 °C	1.15
Motor with convection cooling	≤ 20 °C	1.0
	≤ 30 °C	1.1
	≤ 40 °C	1.25

Notes

- The maximum permitted gear unit temperature (see the "Other product features" chapter) must not be exceeded. Doing so may result in damage to the geared motor.
- For braking from full speed (for example when the power fails or when setting up the machine), note the permitted gear unit torques (M_{2acc}, M_{2NOT}) in the selection tables.

6.6.2 Permitted shaft loads for the output shaft

The values specified in the tables apply to the permitted shaft loads:

- For shaft dimensions in accordance with the catalog
- For output speeds $n_{2m*} \leq 100$ rpm ($F^{2axN} = F_{2ax100}$; $F_{2radN} = F_{2rad100}$; $M_{2kN} = M_{2k100}$)
- Only if radial forces on the gear unit are stabilized by its pilots (housing, flange shaft)

Permitted shaft loads

Type	z_2 [mm]	F_{2ax100} [N]	$F_{2rad100}$ [N]	$F_{2rad,acc}$ [N]	M_{2k100} [Nm]	$M_{2k,acc}$ [Nm]
PHQ4	84.0	2150	3095	3929	260	330
PHQ5	97.0	4150	4536	4897	440	475
PHQ7	88.0	6150	17045	17045	1500	1500
PHQ8	126.0	10050	27778	33333	3500	4200
PHQ9	155.0	33000	48387	70968	7500	11000
PHQ10	171.0	50000	51462	73099	8800	12500
PHQ11	231.0	60000	47619	60606	11000	14000
PHQ12	281.0	70000	53380	71040	15000	20000

For other output speeds, download diagrams at http://products.stoeber.de.

The following applies to output speeds $n_{2m*} > 100$ rpm:

$$F_{2axN} = \frac{F_{2ax100}}{\sqrt[3]{\frac{n_{2m*}}{100\ \text{rpm}}}} \qquad F_{2radN} = \frac{F_{2rad100}}{\sqrt[3]{\frac{n_{2m*}}{100\ \text{rpm}}}} \qquad M_{2kN} = \frac{M_{2k100}}{\sqrt[3]{\frac{n_{2m*}}{100\ \text{rpm}}}}$$

The values for F_{2ax100}, $F_{2rad100}$ and M_{2k100} can be found in the table "Permitted shaft loads" in this chapter.

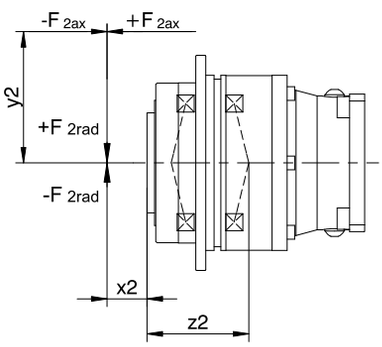


Fig. 1: Force application points

You can determine the permitted radial forces from the permitted breakdown torque M_{2kN} and $M_{2k,acc}$. The actual radial forces may not exceed the permitted radial forces. The permitted radial forces are in relation to the end of the hollow shaft (x2 = 0).

$$M_{2k,acc*} = \frac{2 \cdot F_{2ax*} \cdot y_2 + F_{2rad,acc*} \cdot (x_2 + z_2)}{1000} \leq M_{2k,acc}$$

For applications with multiple axial and/or radial forces, you must add the forces as vectors.

In the event of EMERGENCY OFF operation (max. 1000 load changes), you can multiply the permitted forces and torques for F_{2ax100}, $F_{2rad100}$ and M_{2k100} by a factor of two.

Also note the calculation for equivalent values:

$$M_{2k,eq*} = \sqrt[3]{\frac{|n_{2m,1*}| \cdot t_{1*} \cdot |M_{2k,acc,1*}^{\ 3}| + \ldots + |n_{2m,n*}| \cdot t_{n*} \cdot |M_{2k,acc,n*}^{\ 3}|}{|n_{2m,1*}| \cdot t_{1*} + \ldots + |n_{2m,n*}| \cdot t_{n*}}} \leq M_{2kN}$$

$$F_{2rad,eq*} = \sqrt[3]{\frac{|n_{2m,1*}| \cdot t_{1*} \cdot |F_{2rad,acc,1*}^{\ 3}| + \ldots + |n_{2m,n*}| \cdot t_{n*} \cdot |F_{2rad,acc,n*}^{\ 3}|}{|n_{2m,1*}| \cdot t_{1*} + \ldots + |n_{2m,n*}| \cdot t_{n*}}} \leq F_{2radN}$$

$$F_{2ax,eq^*} \leq F_{2axN}$$

The following apply to the bearing service life L_{10h} ($ED_{20} \leq 40\%$):

$L_{10h} > 10000$ h with $1 < M_{2kN}/M_{2k^*} < 1.25$

$L_{10h} > 20000$ h with $1.25 < M_{2kN}/M_{2k^*} < 1.5$

$L_{10h} > 30000$ h with $1.5 < M_{2kN}/M_{2k^*}$

For different duty cycles:

$$L_{10h} > L_{10h(ED_{20}=40\%)} \cdot \frac{40\%}{ED_{20}}$$

6.6.3 Recommendation for radial shaft seal rings

For a duty cycle > 60%, we recommend radial shaft seal rings made of FKM.

Properties:

- Excellent temperature resistance
- High chemical stability
- Very good resistance to aging
- Excellent resistance to mineral oils and greases
- For use in the food, beverage and pharmaceutical industries

Leak-proofness

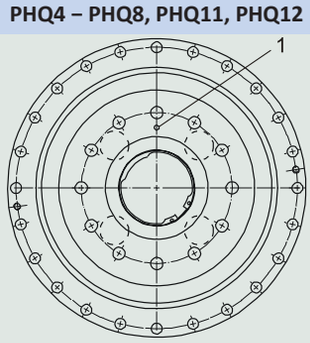
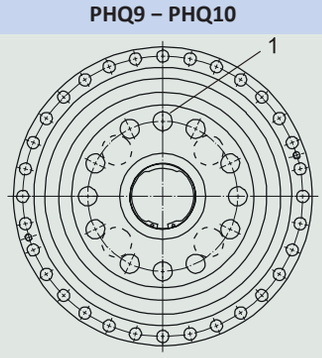
Our gear units are equipped with high-quality radial shaft seal rings and checked for leak-proofness. However, a leak cannot be fully ruled out over the length of use of a gear unit. If you use a gear unit with goods incompatible with the lubricant, you must take measures to prevent direct contact with the gear unit lubricant in case of a leak.

6.6.4 Reverse operation

To ensure lubrication of circulating geared parts during cyclic reverse operation from ± 20° to ± 90°, pay careful attention to the position of the output shaft if the gear unit is installed horizontally as shown in the images below.

The images show the center position of reverse operation.

Cyclic reverse operation ≤ ± 20° on request.

PHQ4 – PHQ8, PHQ11, PHQ12	PHQ9 – PHQ10
	
1 Position of the mark: top	1 Position of the fastening thread: as shown in the image

6.7 Additional documentation

Additional documentation related to the product can be found at http://www.stoeber.de/en/download

Enter the ID of the documentation in the Search... field.

Documentation	ID
Operating manual for P/PA/PE/PH/PHA/PHQ/PHQA/PHV/PHVA planetary gear units and planetary geared motors	443029_en
Lubricant filling quantities for gear units	441871

7 PHQA planetary geared motors

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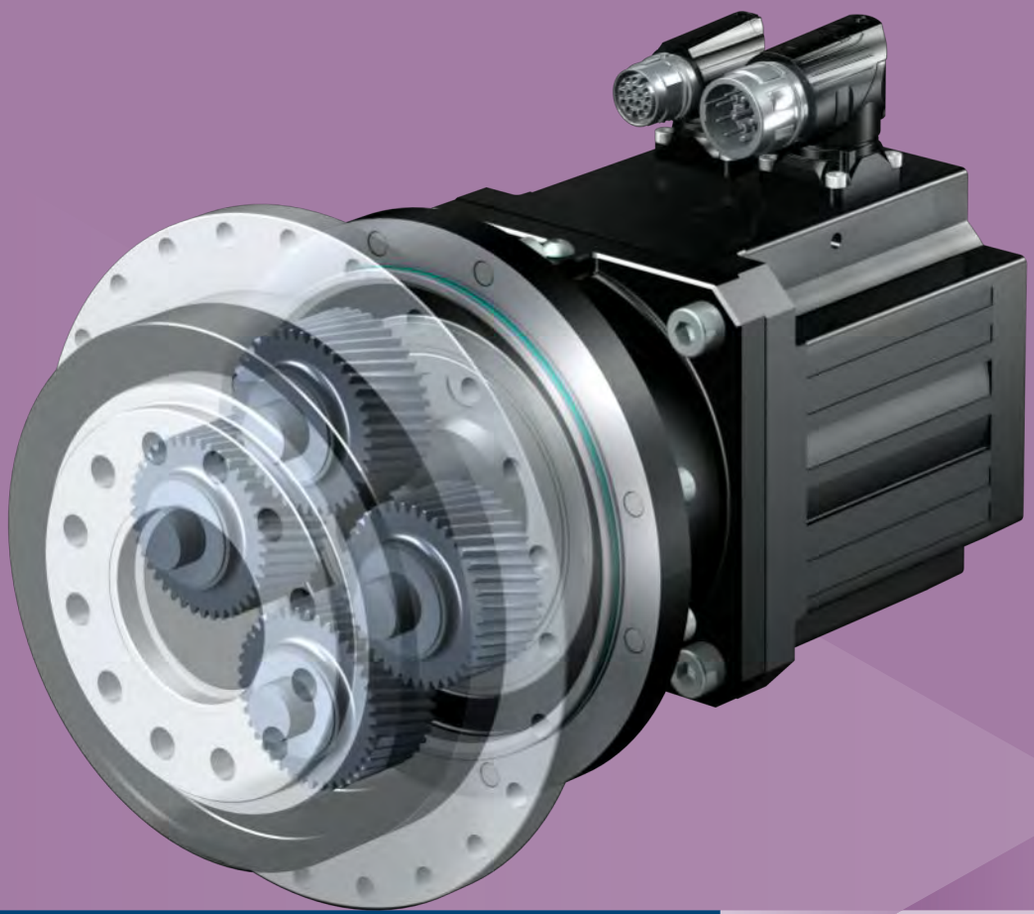


7 Planetary geared motors PHQA

7.1 Overview

Quattro-Power for maximum power density

Features

Power density	★★★★★
Backlash	★★★★★
Price category	€€€€€
Shaft load	★★★★★
Smooth operation	★★★★★
Torsional stiffness	★★★★★
Mass moment of inertia	★★★★★
Helical gearing	✓
Maintenance-free	✓
Any mounting position (single/two stage)	✓
High power density	✓
Continuous operation without cooling	✓
Stiff output bearing due to pretension	✓
Compact and highly dynamic due to direct motor attachment	✓

Key: ★☆☆☆☆ good | ★★★★★ excellent
€ Economy | €€€€€ Premium

Technical data

i	5.5 – 600
M_{2acc}	45 – 6000 Nm
$\Delta\phi_2$	1 arcmin
η_{get}	≤ 96 %

7.2 Selection tables

The technical data specified in the selection tables applies to:

- Installation altitudes up to 1000 m above sea level
- Surrounding temperatures from 0 °C to 40 °C
- Drives with convection-cooled motors (e.g. EZ401**U**)

You can calculate the technical data for drives with forced ventilated motors (for example EZ401**B**) at http://products.stoeber.de.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/arcmin]	m [kg]
PHQA4 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 170 Nm)															
55	48	49	0.6	2.5	PHQA422_0550 EZ301U	140	300	55.00	55/1	4500	8000	0.21	1	35	5.3
55	81	86	1.0	1.5	PHQA422_0550 EZ302U	170	300	55.00	55/1	4500	8000	0.31	1	35	5.9
55	106	112	1.4	1.1	PHQA422_0550 EZ303U	170	300	55.00	55/1	4500	8000	0.42	1	35	6.4
78	33	34	0.7	3.6	PHQA422_0390 EZ301U	100	300	38.50	77/2	4500	8000	0.24	1	37	5.3
78	57	60	1.3	2.1	PHQA422_0390 EZ302U	170	300	38.50	77/2	4500	8000	0.34	1	37	5.9
78	74	78	1.6	1.6	PHQA422_0390 EZ303U	170	300	38.50	77/2	4500	8000	0.45	1	37	6.4
78	100	107	2.2	1.2	PHQA422_0390 EZ401U	170	300	38.50	77/2	4500	8000	0.98	1	37	7.8
109	41	43	1.5	3.0	PHQA422_0280 EZ302U	130	300	27.50	55/2	4000	7000	0.38	1	37	5.9
109	53	56	1.9	2.3	PHQA422_0280 EZ303U	170	300	27.50	55/2	4000	7000	0.49	1	37	6.4
109	72	77	2.6	1.7	PHQA422_0280 EZ401U	170	300	27.50	55/2	4000	7000	1.0	1	37	7.8
109	110	120	4.0	1.1	PHQA422_0280 EZ501U	170	300	27.50	55/2	4000	7000	3.0	1	37	8.8
136	33	34	1.7	3.7	PHQA422_0220 EZ302U	100	300	22.00	22/1	3700	6500	0.44	1	37	5.9
136	42	45	2.2	2.8	PHQA422_0220 EZ303U	140	300	22.00	22/1	3700	6500	0.55	1	37	6.4
136	57	61	2.9	2.1	PHQA422_0220 EZ401U	170	300	22.00	22/1	3700	6500	1.1	1	37	7.8
136	88	96	4.5	1.4	PHQA422_0220 EZ501U	170	300	22.00	22/1	3700	6500	3.1	1	37	8.8
136	96	106	4.9	1.2	PHQA422_0220 EZ402U	170	300	22.00	22/1	3700	6500	1.8	1	37	8.9
545	23	25	4.8	4.2	PHQA421_0055 EZ501U	84	300	5.500	11/2	2000	6000	3.2	1	42	7.5
545	25	27	5.2	3.8	PHQA421_0055 EZ402U	84	300	5.500	11/2	2000	6000	1.9	1	42	7.6
545	36	45	7.7	2.6	PHQA421_0055 EZ404U	150	300	5.500	11/2	2000	6000	3.2	1	42	9.7
545	39	42	8.2	2.4	PHQA421_0055 EZ502U	160	300	5.500	11/2	2000	6000	5.5	1	42	9.0
545	51	59	11	1.9	PHQA421_0055 EZ503U	170	300	5.500	11/2	2000	6000	7.8	1	42	11
545	71	84	15	1.3	PHQA421_0055 EZ505U	170	300	5.500	11/2	2000	6000	12	1	42	13
PHQA4 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 170 Nm)															
109	46	49	0.6	2.4	PHQA422_0550 EZ301U	140	300	55.00	55/1	4500	8000	0.21	1	35	5.3
109	77	86	1.1	1.4	PHQA422_0550 EZ302U	170	300	55.00	55/1	4500	8000	0.31	1	35	5.9
109	100	115	1.4	1.1	PHQA422_0550 EZ303U	170	300	55.00	55/1	4500	8000	0.42	1	35	6.4
156	32	34	0.7	3.8	PHQA422_0390 EZ301U	100	300	38.50	77/2	4500	8000	0.24	1	37	5.3
156	54	60	1.2	2.2	PHQA422_0390 EZ302U	170	300	38.50	77/2	4500	8000	0.34	1	37	5.9
156	70	81	1.5	1.7	PHQA422_0390 EZ303U	170	300	38.50	77/2	4500	8000	0.45	1	37	6.4
156	82	100	1.8	1.5	PHQA422_0390 EZ401U	170	300	38.50	77/2	4500	8000	0.98	1	37	7.8
218	38	43	1.4	3.1	PHQA422_0280 EZ302U	130	300	27.50	55/2	4000	7000	0.38	1	37	5.9
218	50	58	1.8	2.4	PHQA422_0280 EZ303U	170	300	27.50	55/2	4000	7000	0.49	1	37	6.4
218	59	72	2.1	2.0	PHQA422_0280 EZ401U	170	300	27.50	55/2	4000	7000	1.0	1	37	7.8
218	87	113	3.2	1.4	PHQA422_0280 EZ501U	170	300	27.50	55/2	4000	7000	3.0	1	37	8.8
218	90	125	3.3	1.3	PHQA422_0280 EZ402U	170	300	27.50	55/2	4000	7000	1.7	1	37	8.9
273	31	34	1.6	3.9	PHQA422_0220 EZ302U	100	300	22.00	22/1	3700	6500	0.44	1	37	5.9
273	40	46	2.0	3.0	PHQA422_0220 EZ303U	140	300	22.00	22/1	3700	6500	0.55	1	37	6.4
273	47	57	2.4	2.6	PHQA422_0220 EZ401U	170	300	22.00	22/1	3700	6500	1.1	1	37	7.8
273	70	90	3.5	1.7	PHQA422_0220 EZ501U	170	300	22.00	22/1	3700	6500	3.1	1	37	8.8
273	72	100	3.6	1.7	PHQA422_0220 EZ402U	170	300	22.00	22/1	3700	6500	1.8	1	37	8.9
1091	18	23	4.8	4.2	PHQA421_0055 EZ501U	84	300	5.500	11/2	2000	6000	3.2	1	42	7.5
1091	18	26	4.9	4.1	PHQA421_0055 EZ402U	84	300	5.500	11/2	2000	6000	1.9	1	42	7.6
1091	27	41	7.3	2.8	PHQA421_0055 EZ502U	160	300	5.500	11/2	2000	6000	5.5	1	42	9.0
1091	31	44	8.1	2.5	PHQA421_0055 EZ404U	150	300	5.500	11/2	2000	6000	3.2	1	42	9.7
1091	33	56	8.7	2.3	PHQA421_0055 EZ503U	170	300	5.500	11/2	2000	6000	7.8	1	42	11
PHQA5 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 430 Nm)															
55	143	153	0.9	1.9	PHQA522_0550 EZ401U	430	800	55.00	55/1	4000	7000	0.97	1	87	11
55	220	240	1.4	1.3	PHQA522_0550 EZ501U	430	800	55.00	55/1	4000	7000	2.9	1	87	12
55	240	266	1.5	1.2	PHQA522_0550 EZ402U	430	800	55.00	55/1	4000	7000	1.7	1	87	12
78	100	107	1.0	2.8	PHQA522_0390 EZ401U	300	800	38.50	77/2	4000	7000	1.0	1	92	11
78	154	168	1.6	1.8	PHQA522_0390 EZ501U	430	800	38.50	77/2	4000	7000	3.0	1	92	12
78	168	186	1.8	1.7	PHQA522_0390 EZ402U	430	800	38.50	77/2	4000	7000	1.7	1	92	12

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PHQA5 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 430 Nm)															
78	247	308	2.6	1.1	PHQA522_0390 EZ404U	430	800	38.50	77/2	4000	7000	3.1	1	92	14
78	265	286	2.8	1.1	PHQA522_0390 EZ502U	430	800	38.50	77/2	4000	7000	5.3	1	92	13
109	72	77	1.2	3.9	PHQA522_0280 EZ401U	220	800	27.50	55/2	3700	6500	1.1	1	94	11
109	110	120	1.9	2.5	PHQA522_0280 EZ501U	410	800	27.50	55/2	3700	6500	3.1	1	94	12
109	120	133	2.1	2.3	PHQA522_0280 EZ402U	410	800	27.50	55/2	3700	6500	1.8	1	94	12
109	176	220	3.1	1.6	PHQA522_0280 EZ404U	430	800	27.50	55/2	3700	6500	3.2	1	94	14
109	189	205	3.3	1.5	PHQA522_0280 EZ502U	430	800	27.50	55/2	3700	6500	5.4	1	94	13
109	189	212	3.3	1.5	PHQA522_0280 EZ701U	430	800	27.50	55/2	3700	6500	8.7	1	94	15
109	248	284	4.3	1.1	PHQA522_0280 EZ503U	430	800	27.50	55/2	3700	6500	7.8	1	94	15
136	57	61	1.4	4.9	PHQA522_0220 EZ401U	170	800	22.00	22/1	3300	6000	1.2	1	95	11
136	88	96	2.1	3.2	PHQA522_0220 EZ501U	330	800	22.00	22/1	3300	6000	3.2	1	95	12
136	96	106	2.3	2.9	PHQA522_0220 EZ402U	330	800	22.00	22/1	3300	6000	1.9	1	95	12
136	141	176	3.4	2.0	PHQA522_0220 EZ404U	430	800	22.00	22/1	3300	6000	3.3	1	95	14
136	151	164	3.7	1.8	PHQA522_0220 EZ502U	430	800	22.00	22/1	3300	6000	5.5	1	95	13
136	151	170	3.7	1.8	PHQA522_0220 EZ701U	410	800	22.00	22/1	3300	6000	8.8	1	95	15
136	198	227	4.8	1.4	PHQA522_0220 EZ503U	430	800	22.00	22/1	3300	6000	7.9	1	95	15
136	246	295	6.0	1.1	PHQA522_0220 EZ702U	430	800	22.00	22/1	3300	6000	14	1	95	18
136	276	327	6.7	1.0	PHQA522_0220 EZ505U	430	800	22.00	22/1	3300	6000	12	1	95	18
545	63	76	6.4	3.5	PHQA521_0055 EZ702U	220	800	5.500	11/2	2500	5500	15	1	107	15
545	71	84	7.2	3.1	PHQA521_0055 EZ505U	350	800	5.500	11/2	2500	5500	13	1	107	15
545	87	110	8.8	2.6	PHQA521_0055 EZ703U	340	800	5.500	11/2	2500	5500	22	1	107	17
545	112	159	11	2.0	PHQA521_0055 EZ705U	430	800	5.500	11/2	2500	5500	35	1	107	23
PHQA5 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 430 Nm)															
205	194	313	4.7	1.4	PHQA522_0220 EZ505U	430	800	22.00	22/1	3300	6000	12	1	95	18
818	50	81	5.8	3.9	PHQA521_0055 EZ505U	350	800	5.500	11/2	2500	5500	13	1	107	15
818	64	106	7.3	3.0	PHQA521_0055 EZ703U	340	800	5.500	11/2	2500	5500	22	1	107	17
818	87	158	10	2.2	PHQA521_0055 EZ705U	430	800	5.500	11/2	2500	5500	35	1	107	23
PHQA5 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 430 Nm)															
109	118	143	0.9	1.9	PHQA522_0550 EZ401U	430	800	55.00	55/1	4000	7000	0.97	1	87	11
109	174	225	1.4	1.3	PHQA522_0550 EZ501U	430	800	55.00	55/1	4000	7000	2.9	1	87	12
109	179	251	1.4	1.2	PHQA522_0550 EZ402U	430	800	55.00	55/1	4000	7000	1.7	1	87	12
156	82	100	0.9	3.4	PHQA522_0390 EZ401U	300	800	38.50	77/2	4000	7000	1.0	1	92	11
156	122	158	1.3	2.3	PHQA522_0390 EZ501U	430	800	38.50	77/2	4000	7000	3.0	1	92	12
156	125	175	1.3	2.2	PHQA522_0390 EZ402U	430	800	38.50	77/2	4000	7000	1.7	1	92	12
156	186	279	1.9	1.5	PHQA522_0390 EZ502U	430	800	38.50	77/2	4000	7000	5.3	1	92	13
156	208	301	2.2	1.3	PHQA522_0390 EZ404U	430	800	38.50	77/2	4000	7000	3.1	1	92	14
218	59	72	1.0	4.8	PHQA522_0280 EZ401U	220	800	27.50	55/2	3700	6500	1.1	1	94	11
218	87	113	1.5	3.2	PHQA522_0280 EZ501U	410	800	27.50	55/2	3700	6500	3.1	1	94	12
218	90	125	1.6	3.1	PHQA522_0280 EZ402U	410	800	27.50	55/2	3700	6500	1.8	1	94	12
218	133	199	2.3	2.1	PHQA522_0280 EZ502U	430	800	27.50	55/2	3700	6500	5.4	1	94	13
218	133	202	2.3	2.1	PHQA522_0280 EZ701U	430	800	27.50	55/2	3700	6500	8.7	1	94	15
218	148	215	2.6	1.9	PHQA522_0280 EZ404U	430	800	27.50	55/2	3700	6500	3.2	1	94	14
218	159	271	2.7	1.8	PHQA522_0280 EZ503U	430	800	27.50	55/2	3700	6500	7.8	1	94	15
273	70	90	1.7	4.0	PHQA522_0220 EZ501U	330	800	22.00	22/1	3300	6000	3.2	1	95	12
273	72	100	1.7	3.9	PHQA522_0220 EZ402U	330	800	22.00	22/1	3300	6000	1.9	1	95	12
273	106	160	2.6	2.6	PHQA522_0220 EZ502U	430	800	22.00	22/1	3300	6000	5.5	1	95	13
273	106	162	2.6	2.6	PHQA522_0220 EZ701U	410	800	22.00	22/1	3300	6000	8.8	1	95	15
273	119	172	2.9	2.4	PHQA522_0220 EZ404U	430	800	22.00	22/1	3300	6000	3.3	1	95	14
273	127	217	3.1	2.2	PHQA522_0220 EZ503U	430	800	22.00	22/1	3300	6000	7.9	1	95	15
273	147	293	3.6	1.9	PHQA522_0220 EZ702U	430	800	22.00	22/1	3300	6000	14	1	95	18
PHQA7 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 950 Nm)															
364	231	349	9.5	2.8	PHQA721_0055 EZ805U	950	1900	5.500	11/2	2200	5000	135	1	235	55
PHQA7 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 950 Nm)															
14	554	594	0.2	1.2	PHQA723_2200 EZ401U	950	1900	220.0	220/1	4000	7000	0.99	1	202	19
16	485	520	0.2	1.3	PHQA723_1930 EZ401U	950	1900	192.5	385/2	4000	7000	1.0	1	203	19
19	388	416	0.3	1.7	PHQA723_1540 EZ401U	950	1900	154.0	154/1	4000	7000	1.0	1	203	19
19	596	651	0.4	1.1	PHQA723_1540 EZ501U	950	1900	154.0	154/1	4000	7000	3.0	1	203	20
22	347	371	0.3	1.9	PHQA723_1380 EZ401U	950	1900	137.5	275/2	3700	6500	1.2	1	204	19
22	532	582	0.4	1.2	PHQA723_1380 EZ501U	950	1900	137.5	275/2	3700	6500	3.1	1	204	20
22	582	644	0.5	1.1	PHQA723_1380 EZ402U	950	1900	137.5	275/2	3700	6500	1.9	1	204	20
27	277	297	0.3	2.3	PHQA723_1100 EZ401U	840	1900	110.0	110/1	3300	6000	1.3	1	204	19
27	426	465	0.5	1.5	PHQA723_1100 EZ501U	950	1900	110.0	110/1	3300	6000	3.3	1	204	20
27	465	515	0.5	1.4	PHQA723_1100 EZ402U	950	1900	110.0	110/1	3300	6000	2.0	1	204	20

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PHQA7 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 950 Nm)															
34	222	238	0.3	2.9	PHQA723_0880 EZ401U	670	1900	88.00	88/1	3300	6000	1.3	1	204	19
34	341	372	0.5	1.9	PHQA723_0880 EZ501U	950	1900	88.00	88/1	3300	6000	3.3	1	204	20
34	372	412	0.6	1.7	PHQA723_0880 EZ402U	950	1900	88.00	88/1	3300	6000	2.0	1	204	20
34	546	681	0.9	1.2	PHQA723_0880 EZ404U	950	1900	88.00	88/1	3300	6000	3.4	1	204	22
34	586	634	0.9	1.1	PHQA723_0880 EZ502U	950	1900	88.00	88/1	3300	6000	5.6	1	204	22
34	586	657	0.9	1.1	PHQA723_0880 EZ701U	950	1900	88.00	88/1	3300	6000	8.9	1	204	23
55	220	240	0.7	2.9	PHQA722_0550 EZ501U	820	1900	55.00	55/1	3700	6500	3.1	1	195	18
55	379	409	1.2	1.7	PHQA722_0550 EZ502U	950	1900	55.00	55/1	3700	6500	5.4	1	195	19
55	379	425	1.2	1.7	PHQA722_0550 EZ701U	950	1900	55.00	55/1	3700	6500	8.7	1	195	21
55	496	568	1.6	1.3	PHQA722_0550 EZ503U	950	1900	55.00	55/1	3700	6500	7.8	1	195	21
78	154	168	0.8	4.2	PHQA722_0390 EZ501U	570	1900	38.50	77/2	3700	6500	3.3	1	203	18
78	265	286	1.4	2.5	PHQA722_0390 EZ502U	950	1900	38.50	77/2	3700	6500	5.6	1	203	19
78	265	297	1.4	2.5	PHQA722_0390 EZ701U	720	1900	38.50	77/2	3700	6500	8.9	1	203	21
78	347	397	1.9	1.9	PHQA722_0390 EZ503U	950	1900	38.50	77/2	3700	6500	8.0	1	203	21
78	430	516	2.3	1.5	PHQA722_0390 EZ702U	950	1900	38.50	77/2	3700	6500	14	1	203	23
78	483	573	2.6	1.3	PHQA722_0390 EZ505U	950	1900	38.50	77/2	3700	6500	13	1	203	23
109	189	205	1.7	3.4	PHQA722_0280 EZ502U	790	1900	27.50	55/2	3500	6000	5.9	1	206	19
109	189	212	1.7	3.4	PHQA722_0280 EZ701U	510	1900	27.50	55/2	3500	6000	9.2	1	206	21
109	248	284	2.2	2.6	PHQA722_0280 EZ503U	950	1900	27.50	55/2	3500	6000	8.3	1	206	21
109	307	368	2.8	2.1	PHQA722_0280 EZ702U	950	1900	27.50	55/2	3500	6000	14	1	206	23
109	345	409	3.1	1.9	PHQA722_0280 EZ505U	950	1900	27.50	55/2	3500	6000	13	1	206	23
109	422	532	3.8	1.5	PHQA722_0280 EZ703U	950	1900	27.50	55/2	3500	6000	22	1	206	25
136	151	164	1.9	4.3	PHQA722_0220 EZ502U	630	1900	22.00	22/1	3000	5000	6.4	1	207	19
136	151	170	1.9	4.3	PHQA722_0220 EZ701U	410	1900	22.00	22/1	3000	5000	9.7	1	207	21
136	198	227	2.5	3.3	PHQA722_0220 EZ503U	880	1900	22.00	22/1	3000	5000	8.8	1	207	21
136	246	295	3.1	2.6	PHQA722_0220 EZ702U	840	1900	22.00	22/1	3000	5000	15	1	207	23
136	276	327	3.5	2.4	PHQA722_0220 EZ505U	950	1900	22.00	22/1	3000	5000	13	1	207	23
136	338	426	4.2	1.9	PHQA722_0220 EZ703U	950	1900	22.00	22/1	3000	5000	23	1	207	25
136	436	618	5.5	1.5	PHQA722_0220 EZ705U	950	1900	22.00	22/1	3000	5000	35	1	207	31
545	118	196	5.6	4.8	PHQA721_0055 EZ802U	530	1900	5.500	11/2	2200	5000	61	1	235	36
545	140	254	6.6	4.0	PHQA721_0055 EZ803U	770	1900	5.500	11/2	2200	5000	86	1	235	42
PHQA7 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 950 Nm)															
117	340	548	1.8	1.9	PHQA722_0390 EZ505U	950	1900	38.50	77/2	3700	6500	13	1	203	23
117	433	716	2.3	1.5	PHQA722_0390 EZ703U	950	1900	38.50	77/2	3700	6500	22	1	203	25
164	243	391	2.2	2.7	PHQA722_0280 EZ505U	950	1900	27.50	55/2	3500	6000	13	1	206	23
164	309	512	2.8	2.1	PHQA722_0280 EZ703U	950	1900	27.50	55/2	3500	6000	22	1	206	25
205	194	313	2.4	3.3	PHQA722_0220 EZ505U	950	1900	22.00	22/1	3000	5000	13	1	207	23
205	215	706	2.7	3.0	PHQA722_0220 EZ802U	950	1900	22.00	22/1	3000	5000	59	1	207	39
205	248	409	3.1	2.6	PHQA722_0220 EZ703U	950	1900	22.00	22/1	3000	5000	23	1	207	25
205	336	614	4.2	1.9	PHQA722_0220 EZ705U	950	1900	22.00	22/1	3000	5000	35	1	207	31
PHQA7 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 950 Nm)															
22	569	693	0.2	1.1	PHQA723_2750 EZ401U	950	1900	275.0	275/1	4000	7000	0.99	1	202	19
27	455	554	0.2	1.4	PHQA723_2200 EZ401U	950	1900	220.0	220/1	4000	7000	0.99	1	202	19
31	398	485	0.2	1.6	PHQA723_1930 EZ401U	950	1900	192.5	385/2	4000	7000	1.0	1	203	19
39	319	388	0.2	2.0	PHQA723_1540 EZ401U	950	1900	154.0	154/1	4000	7000	1.0	1	203	19
39	471	610	0.3	1.4	PHQA723_1540 EZ501U	950	1900	154.0	154/1	4000	7000	3.0	1	203	20
39	485	679	0.3	1.3	PHQA723_1540 EZ402U	950	1900	154.0	154/1	4000	7000	1.7	1	203	20
44	285	347	0.2	2.3	PHQA723_1380 EZ401U	950	1900	137.5	275/2	3700	6500	1.2	1	204	19
44	421	545	0.3	1.5	PHQA723_1380 EZ501U	950	1900	137.5	275/2	3700	6500	3.1	1	204	20
44	433	606	0.3	1.5	PHQA723_1380 EZ402U	950	1900	137.5	275/2	3700	6500	1.9	1	204	20
55	228	277	0.3	2.9	PHQA723_1100 EZ401U	840	1900	110.0	110/1	3300	6000	1.3	1	204	19
55	337	436	0.4	1.9	PHQA723_1100 EZ501U	950	1900	110.0	110/1	3300	6000	3.3	1	204	20
55	347	485	0.4	1.9	PHQA723_1100 EZ402U	950	1900	110.0	110/1	3300	6000	2.0	1	204	20
68	182	222	0.3	3.6	PHQA723_0880 EZ401U	670	1900	88.00	88/1	3300	6000	1.3	1	204	19
68	269	348	0.4	2.4	PHQA723_0880 EZ501U	950	1900	88.00	88/1	3300	6000	3.3	1	204	20
68	277	388	0.4	2.3	PHQA723_0880 EZ402U	950	1900	88.00	88/1	3300	6000	2.0	1	204	20
68	412	618	0.6	1.6	PHQA723_0880 EZ502U	950	1900	88.00	88/1	3300	6000	5.6	1	204	22
68	412	626	0.6	1.6	PHQA723_0880 EZ701U	950	1900	88.00	88/1	3300	6000	8.9	1	204	23
68	459	665	0.7	1.4	PHQA723_0880 EZ404U	950	1900	88.00	88/1	3300	6000	3.4	1	204	22
109	174	225	0.7	2.9	PHQA722_0550 EZ501U	820	1900	55.00	55/1	3700	6500	3.1	1	195	18
109	266	399	1.1	1.9	PHQA722_0550 EZ502U	950	1900	55.00	55/1	3700	6500	5.4	1	195	19
109	266	404	1.1	1.9	PHQA722_0550 EZ701U	950	1900	55.00	55/1	3700	6500	8.7	1	195	21
109	317	542	1.3	1.6	PHQA722_0550 EZ503U	950	1900	55.00	55/1	3700	6500	7.8	1	195	21
109	368	731	1.5	1.4	PHQA722_0550 EZ702U	950	1900	55.00	55/1	3700	6500	14	1	195	23

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PHQA7 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 950 Nm)															
156	186	279	1.0	3.5	PHQA722_0390 EZ502U	950	1900	38.50	77/2	3700	6500	5.6	1	203	19
156	186	283	1.0	3.5	PHQA722_0390 EZ701U	720	1900	38.50	77/2	3700	6500	8.9	1	203	21
156	222	380	1.2	2.9	PHQA722_0390 EZ503U	950	1900	38.50	77/2	3700	6500	8.0	1	203	21
156	258	512	1.4	2.5	PHQA722_0390 EZ702U	950	1900	38.50	77/2	3700	6500	14	1	203	23
218	133	199	1.2	4.9	PHQA722_0280 EZ502U	790	1900	27.50	55/2	3500	6000	5.9	1	206	19
218	133	202	1.2	4.9	PHQA722_0280 EZ701U	510	1900	27.50	55/2	3500	6000	9.2	1	206	21
218	159	271	1.4	4.1	PHQA722_0280 EZ503U	950	1900	27.50	55/2	3500	6000	8.3	1	206	21
218	184	366	1.7	3.5	PHQA722_0280 EZ702U	950	1900	27.50	55/2	3500	6000	14	1	206	23
PHQA8 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 2600 Nm)															
73	1118	1691	4.1	1.5	PHQA822_0280 EZ805U	2600	4400	27.50	55/2	3000	5500	135	1	656	82
91	894	1352	4.6	1.9	PHQA822_0220 EZ805U	2600	4400	22.00	22/1	2500	4500	137	1	661	82
PHQA8 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 2600 Nm)															
7.8	1490	1629	0.1	1.1	PHQA823_3850 EZ501U	2600	4400	385.0	385/1	3700	6500	3.1	1	635	46
11	1064	1163	0.1	1.6	PHQA823_2750 EZ501U	2600	4400	275.0	275/1	3700	6500	3.1	1	643	46
14	851	931	0.1	2.0	PHQA823_2200 EZ501U	2600	4400	220.0	220/1	3700	6500	3.1	1	641	46
14	1465	1584	0.2	1.2	PHQA823_2200 EZ502U	2600	4400	220.0	220/1	3700	6500	5.4	1	641	47
14	1465	1643	0.2	1.2	PHQA823_2200 EZ701U	2600	4400	220.0	220/1	3700	6500	8.7	1	641	49
16	745	814	0.1	2.3	PHQA823_1930 EZ501U	2600	4400	192.5	385/2	3700	6500	3.3	1	645	46
16	1282	1386	0.3	1.3	PHQA823_1930 EZ502U	2600	4400	192.5	385/2	3700	6500	5.6	1	645	47
16	1282	1438	0.3	1.3	PHQA823_1930 EZ701U	2600	4400	192.5	385/2	3700	6500	8.9	1	645	49
16	1681	1923	0.3	1.0	PHQA823_1930 EZ503U	2600	4400	192.5	385/2	3700	6500	8.0	1	645	49
19	596	651	0.2	2.9	PHQA823_1540 EZ501U	2220	4400	154.0	154/1	3700	6500	3.3	1	645	46
19	1026	1109	0.3	1.7	PHQA823_1540 EZ502U	2600	4400	154.0	154/1	3700	6500	5.6	1	645	47
19	1026	1150	0.3	1.7	PHQA823_1540 EZ701U	2600	4400	154.0	154/1	3700	6500	8.9	1	645	49
19	1344	1538	0.4	1.3	PHQA823_1540 EZ503U	2600	4400	154.0	154/1	3700	6500	8.0	1	645	49
19	1663	1996	0.5	1.0	PHQA823_1540 EZ702U	2600	4400	154.0	154/1	3700	6500	14	1	645	51
22	532	582	0.2	3.2	PHQA823_1380 EZ501U	1980	4400	137.5	275/2	3500	6000	3.6	1	646	46
22	916	990	0.3	1.9	PHQA823_1380 EZ502U	2600	4400	137.5	275/2	3500	6000	5.9	1	646	47
22	916	1027	0.3	1.9	PHQA823_1380 EZ701U	2480	4400	137.5	275/2	3500	6000	9.2	1	646	49
22	1200	1374	0.4	1.4	PHQA823_1380 EZ503U	2600	4400	137.5	275/2	3500	6000	8.3	1	646	49
22	1485	1782	0.5	1.1	PHQA823_1380 EZ702U	2600	4400	137.5	275/2	3500	6000	14	1	646	51
22	1671	1980	0.6	1.0	PHQA823_1380 EZ505U	2600	4400	137.5	275/2	3500	6000	13	1	646	51
27	426	465	0.2	4.0	PHQA823_1100 EZ501U	1580	4400	110.0	110/1	3500	6000	4.1	1	647	46
27	733	792	0.3	2.3	PHQA823_1100 EZ502U	2600	4400	110.0	110/1	3500	6000	6.4	1	647	47
27	733	822	0.3	2.3	PHQA823_1100 EZ701U	1980	4400	110.0	110/1	3500	6000	9.7	1	647	49
27	960	1099	0.4	1.8	PHQA823_1100 EZ503U	2600	4400	110.0	110/1	3500	6000	8.8	1	647	49
27	1188	1426	0.6	1.4	PHQA823_1100 EZ702U	2600	4400	110.0	110/1	3500	6000	15	1	647	51
27	1337	1584	0.6	1.3	PHQA823_1100 EZ505U	2600	4400	110.0	110/1	3500	6000	13	1	647	51
34	341	372	0.2	5.0	PHQA823_0880 EZ501U	1270	4400	88.00	88/1	3000	5000	4.2	1	647	46
34	586	634	0.4	2.9	PHQA823_0880 EZ502U	2460	4400	88.00	88/1	3000	5000	6.5	1	647	47
34	586	657	0.4	2.9	PHQA823_0880 EZ701U	1580	4400	88.00	88/1	3000	5000	9.8	1	647	49
34	768	879	0.5	2.2	PHQA823_0880 EZ503U	2600	4400	88.00	88/1	3000	5000	8.9	1	647	49
34	950	1140	0.6	1.8	PHQA823_0880 EZ702U	2600	4400	88.00	88/1	3000	5000	15	1	647	51
34	1069	1267	0.7	1.6	PHQA823_0880 EZ505U	2600	4400	88.00	88/1	3000	5000	13	1	647	51
34	1307	1647	0.8	1.3	PHQA823_0880 EZ703U	2600	4400	88.00	88/1	3000	5000	23	1	647	53
55	379	425	0.6	3.7	PHQA822_0550 EZ701U	1020	4400	55.00	55/1	3300	6000	9.2	1	615	44
55	614	737	1.0	2.3	PHQA822_0550 EZ702U	2100	4400	55.00	55/1	3300	6000	14	1	615	47
55	844	1064	1.4	1.6	PHQA822_0550 EZ703U	2600	4400	55.00	55/1	3300	6000	22	1	615	49
55	1089	1545	1.8	1.3	PHQA822_0550 EZ705U	2600	4400	55.00	55/1	3300	6000	35	1	615	54
55	1141	1898	1.8	1.2	PHQA822_0550 EZ802U	2600	4400	55.00	55/1	3300	6000	59	1	615	63
78	430	516	1.0	4.0	PHQA822_0390 EZ702U	1470	4400	38.50	77/2	3300	6000	15	1	643	47
78	591	745	1.3	2.9	PHQA822_0390 EZ703U	2330	4400	38.50	77/2	3300	6000	23	1	643	49
78	763	1081	1.7	2.2	PHQA822_0390 EZ705U	2600	4400	38.50	77/2	3300	6000	35	1	643	54
78	798	1328	1.8	2.1	PHQA822_0390 EZ802U	2600	4400	38.50	77/2	3300	6000	59	1	643	63
109	422	532	1.6	4.0	PHQA822_0280 EZ703U	1660	4400	27.50	55/2	3000	5500	24	1	656	49
109	545	772	2.0	3.1	PHQA822_0280 EZ705U	2600	4400	27.50	55/2	3000	5500	37	1	656	54
109	570	949	2.1	3.0	PHQA822_0280 EZ802U	2560	4400	27.50	55/2	3000	5500	61	1	656	63
109	680	1233	2.5	2.5	PHQA822_0280 EZ803U	2600	4400	27.50	55/2	3000	5500	86	1	656	69
136	436	618	2.3	3.9	PHQA822_0220 EZ705U	2130	4400	22.00	22/1	2500	4500	38	1	661	54
136	456	759	2.4	3.7	PHQA822_0220 EZ802U	2050	4400	22.00	22/1	2500	4500	63	1	661	63
136	544	986	2.8	3.1	PHQA822_0220 EZ803U	2600	4400	22.00	22/1	2500	4500	88	1	661	69

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PHQA8 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 2600 Nm)															
33	1176	1893	0.4	1.4	PHQA823_1380 EZ505U	2600	4400	137.5	275/2	3500	6000	13	1	646	51
41	941	1515	0.4	1.8	PHQA823_1100 EZ505U	2600	4400	110.0	110/1	3500	6000	13	1	647	51
41	1198	1980	0.6	1.4	PHQA823_1100 EZ703U	2600	4400	110.0	110/1	3500	6000	23	1	647	53
51	752	1212	0.5	2.3	PHQA823_0880 EZ505U	2600	4400	88.00	88/1	3000	5000	13	1	647	51
51	958	1584	0.6	1.8	PHQA823_0880 EZ703U	2600	4400	88.00	88/1	3000	5000	23	1	647	53
82	537	1765	1.0	2.3	PHQA822_0550 EZ802U	2600	4400	55.00	55/1	3300	6000	59	1	615	63
82	619	1023	1.1	2.0	PHQA822_0550 EZ703U	2600	4400	55.00	55/1	3300	6000	22	1	615	49
82	839	1535	1.5	1.4	PHQA822_0550 EZ705U	2600	4400	55.00	55/1	3300	6000	35	1	615	54
117	376	1235	0.8	4.5	PHQA822_0390 EZ802U	2600	4400	38.50	77/2	3300	6000	59	1	643	63
117	433	716	1.0	3.9	PHQA822_0390 EZ703U	2330	4400	38.50	77/2	3300	6000	23	1	643	49
117	587	1074	1.3	2.9	PHQA822_0390 EZ705U	2600	4400	38.50	77/2	3300	6000	35	1	643	54
164	419	767	1.6	4.1	PHQA822_0280 EZ705U	2600	4400	27.50	55/2	3000	5500	37	1	656	54
PHQA8 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 2600 Nm)															
16	1178	1525	0.1	1.4	PHQA823_3850 EZ501U	2600	4400	385.0	385/1	3700	6500	3.1	1	635	46
22	842	1089	0.1	2.0	PHQA823_2750 EZ501U	2600	4400	275.0	275/1	3700	6500	3.1	1	643	46
22	1287	1931	0.2	1.3	PHQA823_2750 EZ502U	2600	4400	275.0	275/1	3700	6500	5.4	1	643	47
22	1287	1955	0.2	1.3	PHQA823_2750 EZ701U	2600	4400	275.0	275/1	3700	6500	8.7	1	643	49
27	673	871	0.1	2.5	PHQA823_2200 EZ501U	2600	4400	220.0	220/1	3700	6500	3.1	1	641	46
27	1030	1544	0.2	1.7	PHQA823_2200 EZ502U	2600	4400	220.0	220/1	3700	6500	5.4	1	641	47
27	1030	1564	0.2	1.7	PHQA823_2200 EZ701U	2600	4400	220.0	220/1	3700	6500	8.7	1	641	49
31	589	762	0.1	2.9	PHQA823_1930 EZ501U	2600	4400	192.5	385/2	3700	6500	3.3	1	645	46
31	901	1351	0.2	1.9	PHQA823_1930 EZ502U	2600	4400	192.5	385/2	3700	6500	5.6	1	645	47
31	901	1369	0.2	1.9	PHQA823_1930 EZ701U	2600	4400	192.5	385/2	3700	6500	8.9	1	645	49
31	1074	1836	0.2	1.6	PHQA823_1930 EZ503U	2600	4400	192.5	385/2	3700	6500	8.0	1	645	49
39	471	610	0.1	3.6	PHQA823_1540 EZ501U	2220	4400	154.0	154/1	3700	6500	3.3	1	645	46
39	721	1081	0.2	2.4	PHQA823_1540 EZ502U	2600	4400	154.0	154/1	3700	6500	5.6	1	645	47
39	721	1095	0.2	2.4	PHQA823_1540 EZ701U	2600	4400	154.0	154/1	3700	6500	8.9	1	645	49
39	859	1469	0.2	2.0	PHQA823_1540 EZ503U	2600	4400	154.0	154/1	3700	6500	8.0	1	645	49
39	998	1982	0.3	1.7	PHQA823_1540 EZ702U	2600	4400	154.0	154/1	3700	6500	14	1	645	51
44	421	545	0.1	4.0	PHQA823_1380 EZ501U	1980	4400	137.5	275/2	3500	6000	3.6	1	646	46
44	644	965	0.2	2.6	PHQA823_1380 EZ502U	2600	4400	137.5	275/2	3500	6000	5.9	1	646	47
44	644	978	0.2	2.6	PHQA823_1380 EZ701U	2480	4400	137.5	275/2	3500	6000	9.2	1	646	49
44	767	1312	0.3	2.2	PHQA823_1380 EZ503U	2600	4400	137.5	275/2	3500	6000	8.3	1	646	49
44	891	1770	0.3	1.9	PHQA823_1380 EZ702U	2600	4400	137.5	275/2	3500	6000	14	1	646	51
55	515	772	0.2	3.3	PHQA823_1100 EZ502U	2600	4400	110.0	110/1	3500	6000	6.4	1	647	47
55	515	782	0.2	3.3	PHQA823_1100 EZ701U	1980	4400	110.0	110/1	3500	6000	9.7	1	647	49
55	614	1049	0.3	2.8	PHQA823_1100 EZ503U	2600	4400	110.0	110/1	3500	6000	8.8	1	647	49
55	713	1416	0.3	2.4	PHQA823_1100 EZ702U	2600	4400	110.0	110/1	3500	6000	15	1	647	51
109	266	404	0.5	4.1	PHQA822_0550 EZ701U	1020	4400	55.00	55/1	3300	6000	9.2	1	615	44
109	368	731	0.7	3.0	PHQA822_0550 EZ702U	2100	4400	55.00	55/1	3300	6000	14	1	615	47
PHQA9 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 6000 Nm)															
28	2832	4283	1.2	1.3	PHQA933_0720 EZ805U	6000	12000	72.00	72/1	2200	4500	139	1	1205	127
33	2438	3688	1.4	1.6	PHQA932_0600 EZ805U	6000	12000	60.00	60/1	2800	4500	135	1	1149	119
48	1707	2582	1.6	2.2	PHQA932_0420 EZ805U	6000	12000	42.00	42/1	2800	4500	138	1	1195	119
67	1219	1844	1.9	3.1	PHQA932_0300 EZ805U	5720	12000	30.00	30/1	2500	4000	143	1	1214	119
83	975	1475	2.1	3.9	PHQA932_0240 EZ805U	4580	12000	24.00	24/1	2200	3500	150	1	1225	119
PHQA9 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 6000 Nm)															
7.1	2797	3137	0.1	1.4	PHQA933_4200 EZ701U	6000	12000	420.0	420/1	3300	6000	9.1	1	1184	90
10	1998	2241	0.1	1.9	PHQA933_3000 EZ701U	5400	12000	300.0	300/1	3300	6000	9.1	1	1196	90
10	3240	3888	0.2	1.2	PHQA933_3000 EZ702U	6000	12000	300.0	300/1	3300	6000	14	1	1196	92
13	1598	1793	0.1	2.4	PHQA933_2400 EZ701U	4320	12000	240.0	240/1	3300	6000	9.2	1	1198	90
13	2592	3110	0.2	1.5	PHQA933_2400 EZ702U	6000	12000	240.0	240/1	3300	6000	14	1	1198	92
13	3564	4493	0.2	1.1	PHQA933_2400 EZ703U	6000	12000	240.0	240/1	3300	6000	22	1	1198	94
14	1399	1569	0.1	2.7	PHQA933_2100 EZ701U	3780	12000	210.0	210/1	3300	6000	9.8	1	1200	90
14	2268	2722	0.2	1.7	PHQA933_2100 EZ702U	6000	12000	210.0	210/1	3300	6000	15	1	1200	92
14	3119	3931	0.3	1.2	PHQA933_2100 EZ703U	6000	12000	210.0	210/1	3300	6000	23	1	1200	94
18	1119	1255	0.1	3.4	PHQA933_1680 EZ701U	3020	12000	168.0	168/1	3300	6000	9.9	1	1204	90
18	1814	2177	0.2	2.1	PHQA933_1680 EZ702U	6000	12000	168.0	168/1	3300	6000	15	1	1204	92
18	2495	3145	0.3	1.5	PHQA933_1680 EZ703U	6000	12000	168.0	168/1	3300	6000	23	1	1204	94
18	3221	4566	0.4	1.2	PHQA933_1680 EZ705U	6000	12000	168.0	168/1	3300	6000	35	1	1204	100
20	999	1121	0.1	3.8	PHQA933_1500 EZ701U	2700	12000	150.0	150/1	3000	5500	11	1	1202	90
20	1620	1944	0.2	2.3	PHQA933_1500 EZ702U	5540	12000	150.0	150/1	3000	5500	16	1	1202	92
20	2228	2808	0.3	1.7	PHQA933_1500 EZ703U	6000	12000	150.0	150/1	3000	5500	24	1	1202	94

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PHQA9 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 6000 Nm)															
20	2876	4077	0.4	1.3	PHQA933_1500 EZ705U	6000	12000	150.0	150/1	3000	5500	37	1	1202	100
25	799	896	0.2	4.8	PHQA933_1200 EZ701U	2160	12000	120.0	120/1	2500	4500	13	1	1203	90
25	1296	1555	0.3	2.9	PHQA933_1200 EZ702U	4430	12000	120.0	120/1	2500	4500	18	1	1203	92
25	1782	2246	0.4	2.1	PHQA933_1200 EZ703U	6000	12000	120.0	120/1	2500	4500	26	1	1203	94
25	2300	3262	0.5	1.7	PHQA933_1200 EZ705U	6000	12000	120.0	120/1	2500	4500	38	1	1203	100
25	2408	4007	0.5	1.6	PHQA933_1200 EZ802U	6000	12000	120.0	120/1	2500	4500	62	1	1203	108
31	1037	1244	0.3	3.7	PHQA933_0960 EZ702U	3540	12000	96.00	96/1	2500	4500	18	1	1207	92
31	1426	1797	0.4	2.7	PHQA933_0960 EZ703U	5620	12000	96.00	96/1	2500	4500	26	1	1207	94
31	1840	2609	0.5	2.1	PHQA933_0960 EZ705U	6000	12000	96.00	96/1	2500	4500	39	1	1207	100
31	1927	3205	0.5	2.0	PHQA933_0960 EZ802U	6000	12000	96.00	96/1	2500	4500	63	1	1207	108
31	2298	4164	0.6	1.7	PHQA933_0960 EZ803U	6000	12000	96.00	96/1	2500	4500	88	1	1207	114
42	778	933	0.3	4.9	PHQA933_0720 EZ702U	2660	12000	72.00	72/1	2200	4500	20	1	1205	92
42	1069	1348	0.5	3.6	PHQA933_0720 EZ703U	4210	12000	72.00	72/1	2200	4500	28	1	1205	94
42	1380	1957	0.6	2.8	PHQA933_0720 EZ705U	6000	12000	72.00	72/1	2200	4500	41	1	1205	100
42	1445	2404	0.6	2.6	PHQA933_0720 EZ802U	6000	12000	72.00	72/1	2200	4500	65	1	1205	108
42	1724	3123	0.7	2.2	PHQA933_0720 EZ803U	6000	12000	72.00	72/1	2200	4500	90	1	1205	114
50	1244	2070	0.7	2.8	PHQA932_0600 EZ802U	5580	12000	60.00	60/1	2800	4500	61	1	1149	100
50	1484	2690	0.9	2.4	PHQA932_0600 EZ803U	6000	12000	60.00	60/1	2800	4500	86	1	1149	106
71	871	1449	0.8	4.4	PHQA932_0420 EZ802U	3910	12000	42.00	42/1	2800	4500	63	1	1195	100
71	1039	1883	1.0	3.7	PHQA932_0420 EZ803U	5660	12000	42.00	42/1	2800	4500	89	1	1195	106
PHQA9 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 6000 Nm)															
19	2614	4320	0.2	1.5	PHQA933_2400 EZ703U	6000	12000	240.0	240/1	3300	6000	22	1	1198	94
21	2287	3780	0.2	1.7	PHQA933_2100 EZ703U	6000	12000	210.0	210/1	3300	6000	23	1	1200	94
27	1830	3024	0.2	2.1	PHQA933_1680 EZ703U	6000	12000	168.0	168/1	3300	6000	23	1	1204	94
27	2480	4536	0.3	1.5	PHQA933_1680 EZ705U	6000	12000	168.0	168/1	3300	6000	35	1	1204	100
30	1634	2700	0.2	2.3	PHQA933_1500 EZ703U	6000	12000	150.0	150/1	3000	5500	24	1	1202	94
30	2214	4050	0.3	1.7	PHQA933_1500 EZ705U	6000	12000	150.0	150/1	3000	5500	37	1	1202	100
38	1134	3726	0.2	3.4	PHQA933_1200 EZ802U	6000	12000	120.0	120/1	2500	4500	62	1	1203	108
38	1307	2160	0.3	2.9	PHQA933_1200 EZ703U	6000	12000	120.0	120/1	2500	4500	26	1	1203	94
38	1771	3240	0.3	2.1	PHQA933_1200 EZ705U	6000	12000	120.0	120/1	2500	4500	38	1	1203	100
47	907	2981	0.2	4.2	PHQA933_0960 EZ802U	6000	12000	96.00	96/1	2500	4500	63	1	1207	108
47	1045	1728	0.3	3.6	PHQA933_0960 EZ703U	5620	12000	96.00	96/1	2500	4500	26	1	1207	94
47	1417	2592	0.4	2.7	PHQA933_0960 EZ705U	6000	12000	96.00	96/1	2500	4500	39	1	1207	100
63	784	1296	0.3	4.8	PHQA933_0720 EZ703U	4210	12000	72.00	72/1	2200	4500	28	1	1205	94
63	1063	1944	0.4	3.6	PHQA933_0720 EZ705U	6000	12000	72.00	72/1	2200	4500	41	1	1205	100
PHQA9 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 6000 Nm)															
10	2808	4266	0.1	1.4	PHQA933_6000 EZ701U	6000	12000	600.0	600/1	3300	6000	9.1	1	1145	90
14	1966	2986	0.1	1.9	PHQA933_4200 EZ701U	6000	12000	420.0	420/1	3300	6000	9.1	1	1184	90
20	1404	2133	0.1	2.7	PHQA933_3000 EZ701U	5400	12000	300.0	300/1	3300	6000	9.1	1	1196	90
20	1944	3861	0.1	2.0	PHQA933_3000 EZ702U	6000	12000	300.0	300/1	3300	6000	14	1	1196	92
25	1123	1706	0.1	3.4	PHQA933_2400 EZ701U	4320	12000	240.0	240/1	3300	6000	9.2	1	1198	90
25	1555	3089	0.1	2.4	PHQA933_2400 EZ702U	6000	12000	240.0	240/1	3300	6000	14	1	1198	92
29	983	1493	0.1	3.9	PHQA933_2100 EZ701U	3780	12000	210.0	210/1	3300	6000	9.8	1	1200	90
29	1361	2703	0.1	2.8	PHQA933_2100 EZ702U	6000	12000	210.0	210/1	3300	6000	15	1	1200	92
36	786	1194	0.1	4.8	PHQA933_1680 EZ701U	3020	12000	168.0	168/1	3300	6000	9.9	1	1204	90
36	1089	2162	0.1	3.5	PHQA933_1680 EZ702U	6000	12000	168.0	168/1	3300	6000	15	1	1204	92

7.3 Dimensional drawings

In this chapter you can find the dimensions of the geared motors.

There is a dimensional drawing for every possible shaft/housing design, each with the tables for gear unit dimensions, motor dimensions and geared motor dimensions.

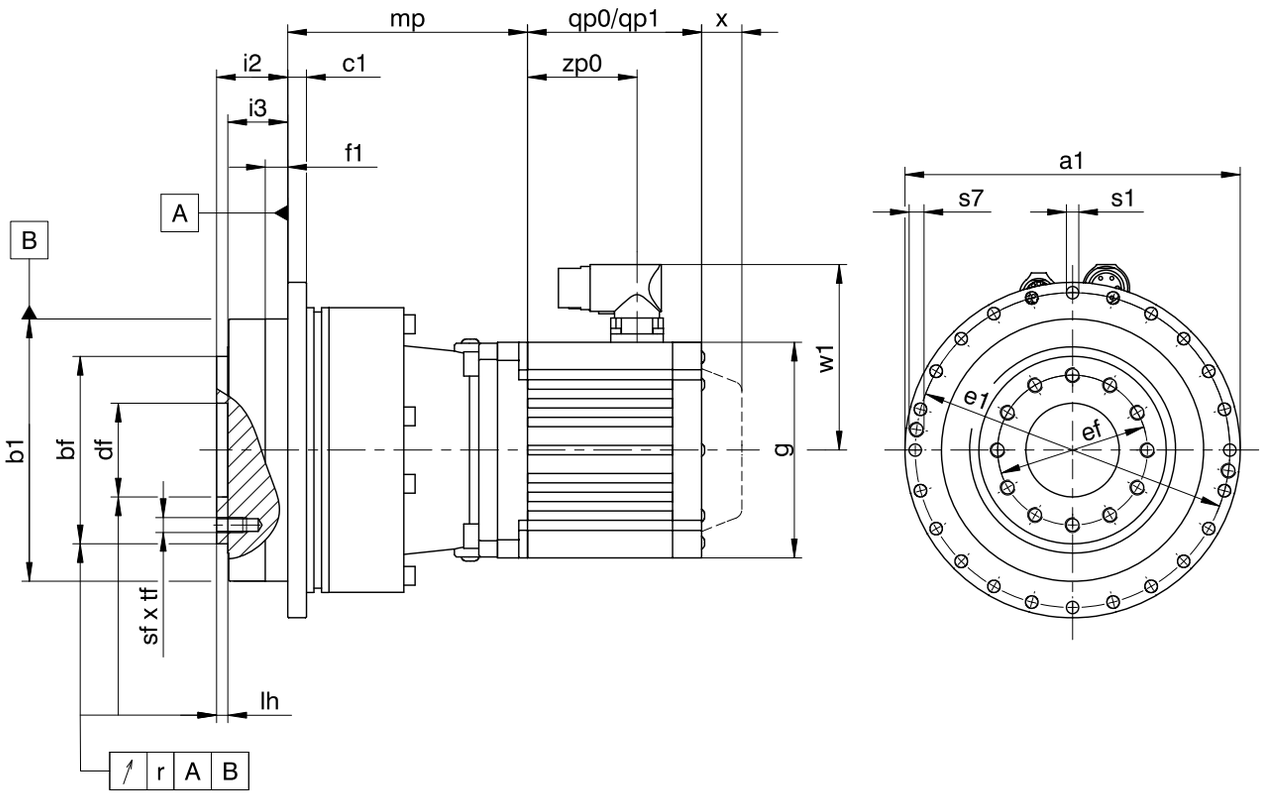
Dimensions can exceed the specifications of ISO 2768-mK due to casting tolerances or accumulation of individual tolerances.

We reserve the right to make dimensional changes due to ongoing technical development.

You can download CAD models of our standard drives at http://cad.stoeber.de.

Combination options and the dimensions of forced ventilated geared motors can be found at http://cad.stoeber.de.

7.3.1 F shaft design (flange shaft)



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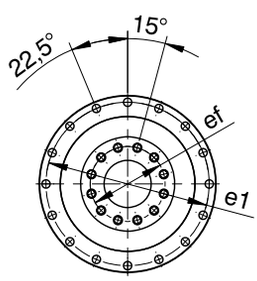
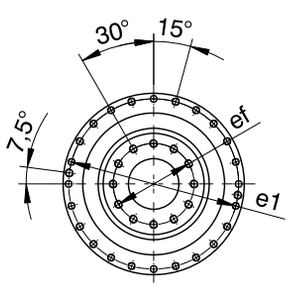
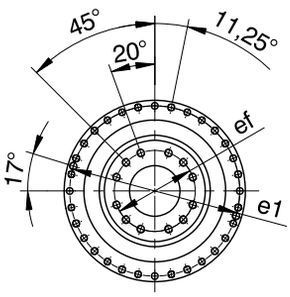


PHQA7/PHQA8



PHQA9



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▶ 23.4]

Dimensions of gear units

Type	Øa1	Øb1	Øbf	c1	Ødf	Øe1	Øef	f1	i2	i3	lh	r	Øs1	s7	sf	tf
PHQA421	118_{h7}	90_{h7}	63_{h7}	7	31.5^{H6}	109	50	10	30	24	6	0.020	5.5	–	M6	11
PHQA422	118_{h7}	90_{h7}	63_{h7}	7	31.5^{H6}	109	50	10	30	24	6	0.020	5.5	–	M6	11
PHQA521	145_{h7}	110_{h7}	80_{h7}	8	40.0^{H6}	135	63	10	29	23	6	0.020	5.5	–	M8	11
PHQA522	145_{h7}	110_{h7}	80_{h7}	8	40.0^{H6}	135	63	10	29	23	6	0.020	5.5	–	M8	11
PHQA721	179_{h7}	140_{h7}	100_{h7}	10	50.0^{H6}	168	80	12	38	32	6	0.025	6.6	–	M10	14
PHQA722	179_{h7}	140_{h7}	100_{h7}	10	50.0^{H6}	168	80	12	38	32	6	0.025	6.6	–	M10	16
PHQA723	179_{h7}	140_{h7}	100_{h7}	10	50.0^{H6}	168	80	12	38	32	6	0.025	6.6	–	M10	16
PHQA822	247_{h7}	200_{h7}	160_{h7}	12	80.0^{H6}	233	125	15	50	42	8	0.030	9.0	M10	M12	17
PHQA823	247_{h7}	200_{h7}	160_{h7}	12	80.0^{H6}	233	125	15	50	42	8	0.030	9.0	M10	M12	17
PHQA932	300	255_{h7}	180_{h7}	18	90.0^{H6}	280	145	20	66	55	12	0.030	13.5	M8	M20	28
PHQA933	300	255_{h7}	180_{h7}	18	90.0^{H6}	280	145	20	66	55	12	0.030	13.5	M8	M20	28

Dimensions of motors

Type	□g	qp0	qp1	w1	x	zp0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0
EZ501U	115	93	147.5	100.0	22	58.5
EZ502U	115	118	172.5	100.0	22	83.5
EZ503U	115	143	197.5	100.0	22	108.5
EZ505U	115	193	247.5	100.0	22	158.5
EZ701U	145	102	161.0	115.0	22	64.0
EZ702U	145	127	186.0	115.0	22	89.0
EZ703U	145	152	211.0	115.0	22	114.0
EZ705U	145	207	266.0	134.0	22	165.0
EZ802U	190	197	274.0	156.5	22	143.0
EZ803U	190	238	315.0	156.5	22	184.0
EZ805U	190	320	397.0	156.5	22	266.0

Dimensions of geared motors

Type	EZ3	EZ4	EZ5	EZ7	EZ8
	mp	mp	mp	mp	mp
PHQA421	–	51.0	53.5	–	–
PHQA422	103.0	99.5	102.0	–	–
PHQA521	–	–	57.0	63.0	–
PHQA522	–	112.5	115.0	121.0	–
PHQA721	–	–	–	–	77.0
PHQA722	–	–	128.0	134.0	149.0
PHQA723	–	183.5	186.0	192.0	–
PHQA822	–	–	–	169.0	184.0
PHQA823	–	–	229.0	235.0	–
PHQA932	–	–	–	–	249.5
PHQA933	–	–	–	319.0	334.0

7.4 Type designation

In this chapter, you can find an explanation of the type designation with the associated options.

Additional ordering information not included in the type designation can be found at the end of the chapter.

Sample code

PHQA	7	2	2	F	0550	EZ501U

Explanation

Code	Designation	Design
PHQA	Type	Low-backlash planetary gear unit
7	Size	7 (example)
2	Generation	Generation 2
3		Generation 3
1	Stages	Single-stage
2		Two-stage
3		Three-stage
F	Shaft	Flange shaft
0550	Transmission ratio (i x 10)	i = 55 (example)
EZ501U	Motor	EZ synchronous servo motor

In order to complete the type designation, also specify:

- A detailed type designation of the motor, see chapter [▶ 23]
- The mounting position (for three-stage gear units), see chapter [▶ 7.5.2]
- For reverse operation of the output shaft from ± 20° to ± 90° and horizontal installation, note the chapter [▶ 7.6.4]

7.5 Product description

7.5.1 Installation conditions

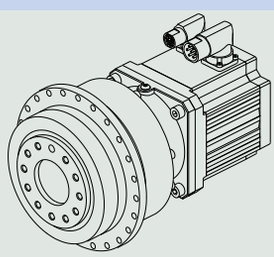
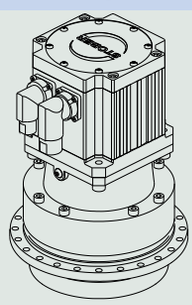
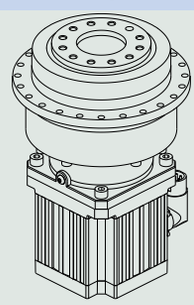
The torque and force values listed in this catalog are valid under the following conditions:

- When using screws with quality 12.9 for machine-side attachment of the flange shaft and gear unit housing
- When the gear unit housings are adjusted at pilot øb1 (H7)
- When the flange shaft is adjusted using the connecting element at pilot øbf or ødf

7.5.2 Mounting positions

The following table shows the standard mounting positions.

Please indicate the mounting position when ordering three-stage geared motors.

EL1	EL5	EL6
		
Horizontal output	Vertical downward output	Vertical upward output

7.5.3 Lubricants

STOBER fills the gear units with the amount and type of lubricant specified on the nameplate. The filling volume and the structure of the gear units depend on the mounting position.

Only install the gear units in the intended mounting position! Reposition the gear units only after consulting STOBER. Otherwise, STOBER assumes no liability for the gear units.

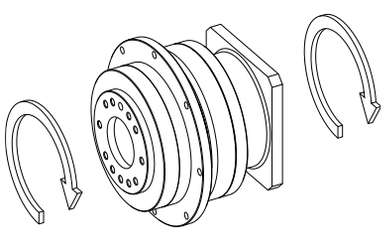
Lubricant filling quantities for gear units, document ID 441871, can be found online at http://www.stoeber.de/en/download. Enter the ID of the documentation in the Search... field.

7.5.4 Other product features

Feature	Value
Max. permitted gear unit temperature (on the surface of the gear unit)	≤ 90 °C
Paint	Black RAL 9005
(ATEX) Directive 2014/34/EU (option)	Not suitable
Protection class:[1]	
Gear unit	IP65
Motor	IP56, optionally IP66

7.5.5 Direction of rotation

The input and output rotate in the same direction.



7.6 Project configuration

Project your drives using our SERVOsoft designing software. You can receive SERVOsoft for free from your adviser at one of our sales centers. Observe the limit conditions in this chapter to ensure a safe design for your drives.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

7.6.1 Calculation of the operating point

Check the following conditions for operating points other than the nominal point M_{2N} specified in the selection tables.

$$n_{1m^*} \leq \frac{n_{1maxDB}}{fB_T}$$

$$n_{1max^*} \leq \frac{n_{1max\,ZB}}{fB_T}$$

$$M_{2eff^*} \leq M_{2th}$$

$$M_{2acc^*} \leq M_{2acc}$$

$$M_{2NOT^*} \leq M_{2NOT}$$

$$M_{2eq^*} \leq M_{2N} \cdot \frac{S}{fB_{op} \cdot fB_t}$$

The values for n_{1maxDB}, n_{1maxZB}, M_{2acc}, M_{2NOT}, M_{2N} and S can be found in the selection tables.

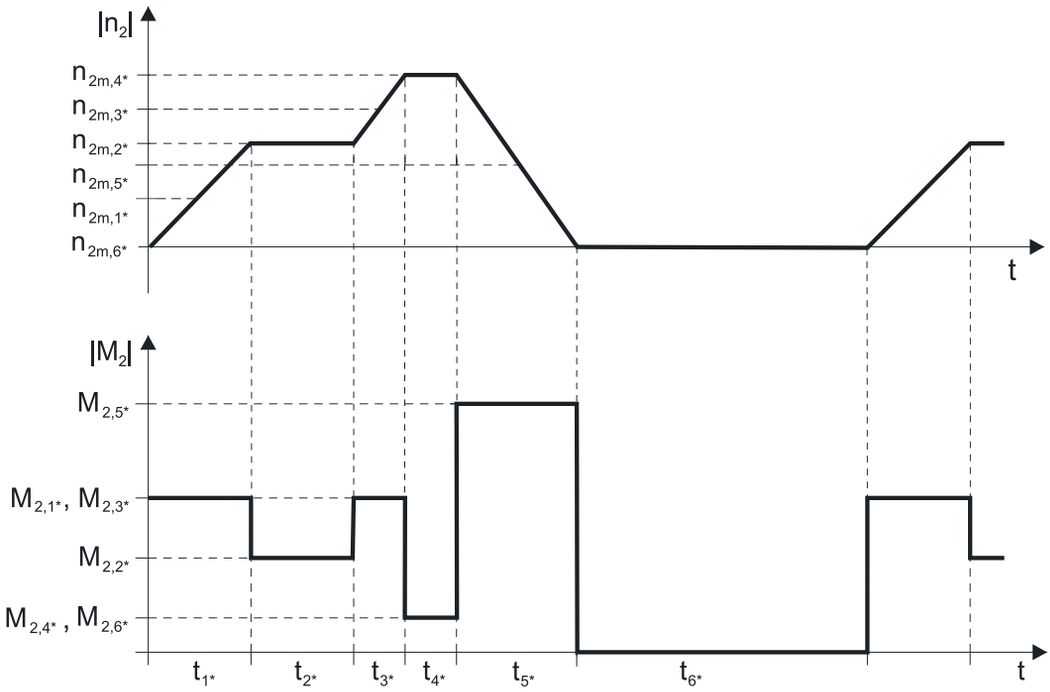
The values for fB_T, fB_{op} and fB_t can be found in the corresponding tables in this chapter.

Calculate the thermal limit torque M_{2th} for a duty cycle > 50%.

[1] Observe the protection class of all the components.

Example of cyclic operation

The following calculations are based on a representation of the power taken from the output based in accordance with the following example:



Calculation of the actual average input speed

$$n_{1m^*} = n_{2m^*} \cdot i$$

$$n_{2m^*} = \frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}{t_{1^*} + \ldots + t_{n^*}}$$

If $t_{1^*} + \ldots + t_{5^*} \geq 20$ min, calculate n_{2m^*} without the rest phase t_{6^*}.

The values for the ratio i can be found in the selection tables.

Calculation of the actual effective torque

$$M_{2eff^*} = \sqrt{\frac{t_{1^*} \cdot M_{2,1^*}{}^2 + \ldots + t_{n^*} \cdot M_{2,n^*}{}^2}{t_{1^*} + \ldots + t_{n^*}}}$$

Calculation of the actual equivalent torque

$$M_{2eq^*} = \sqrt[3]{\frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} \cdot \left|M_{2,1^*}{}^3\right| + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*} \cdot \left|M_{2,n^*}{}^3\right|}{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}}$$

Calculation of the thermal limit torque

Calculate the thermal limit torque M_{2th} for a duty cycle $ED_{20} > 50\%$ and the actual average input speed n_{1m^*}. (At $K_{mot,th} \leq 0$ you must reduce the average input speed n_{1m^*} accordingly or select another geared motor size.)

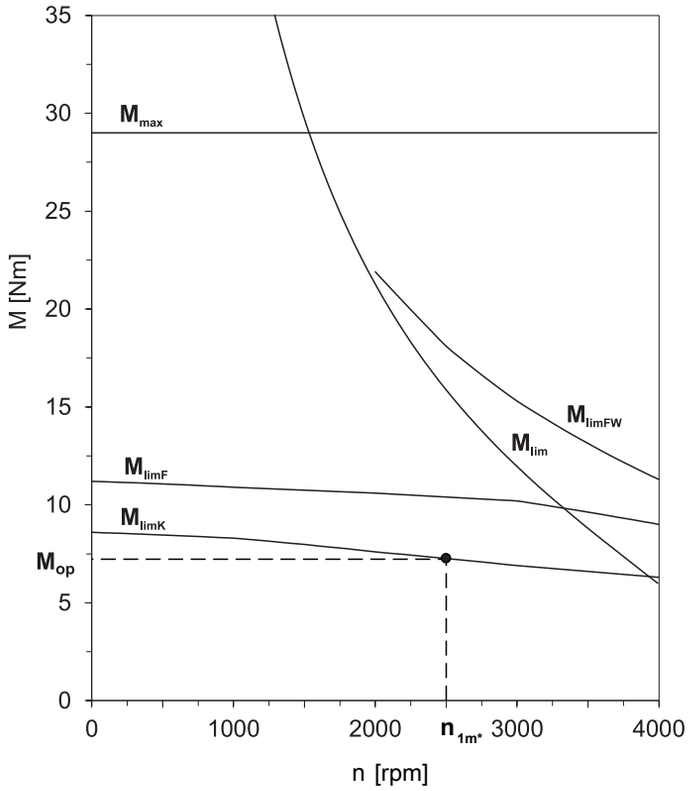
$$M_{2th} = M_{op} \cdot i \cdot K_{mot,th}$$

$$K_{mot,th} = 0{,}93 - \frac{a_{th}}{1000} \cdot fB_T \cdot \left(\frac{n_{1m^*}}{1000}\right)^3$$

The values for i and a_{th} can be found in the selection tables.

The values for fB_T can be found in the corresponding table in this chapter.

The value for the torque of the motor at operating point M_{op} with the determined average input speed n_{1m^*} can be found in the motor curve of Chapter [▶ 23.3]. Note the size, nominal speed n_N and cooling type of the motor. The figure below shows an example of reading the torque M_{op} of a motor with convection cooling at the operating point.



Operating factors

Operating mode	fB_{op}
Uniform continuous operation	1.00
Cyclic operation	1.00
Reversing load cyclic operation	1.00

Run time	fB_t
Daily run time ≤ 8 h	1.00
Daily run time ≤ 16 h	1.15
Daily run time ≤ 24 h	1.20

Temperature		fB_T
Motor cooling	**Surrounding temperature**	
Motor with forced ventilation	≤ 20 °C	0.9
	≤ 30 °C	1.0
	≤ 40 °C	1.15
Motor with convection cooling	≤ 20 °C	1.0
	≤ 30 °C	1.1
	≤ 40 °C	1.25

Notes

- The maximum permitted gear unit temperature (see the "Other product features" chapter) must not be exceeded. Doing so may result in damage to the geared motor.
- For braking from full speed (for example when the power fails or when setting up the machine), note the permitted gear unit torques (M_{2acc}, M_{2NOT}) in the selection tables.

7.6.2 Permitted shaft loads for the output shaft

The values specified in the tables apply to the permitted shaft loads:

- For shaft dimensions in accordance with the catalog
- For output speeds $n_{2m*} \leq 100$ rpm ($F^{2axN} = F_{2ax100}$; $F_{2radN} = F_{2rad100}$; $M_{2kN} = M_{2k100}$)
- Only if radial forces on the gear unit are stabilized by its pilots (housing, flange shaft)

Permitted shaft loads

Type	z_2	F_{2ax100}	$F_{2rad100}$	$F_{2rad,acc}$	M_{2k100}	$M_{2k,acc}$
	[mm]	[N]	[N]	[N]	[Nm]	[Nm]
PHQA4	84.0	2150	3095	3929	260	330
PHQA5	97.0	4150	4536	4897	440	475
PHQA7	88.0	6150	17045	17045	1500	1500
PHQA8	126.0	10050	27778	33333	3500	4200
PHQA9	155.0	33000	48387	70968	7500	11000

For other output speeds, download diagrams at http://products.stoeber.de.

The following applies to output speeds n_{2m*} > 100 rpm:

$$F_{2axN} = \frac{F_{2ax100}}{\sqrt[3]{\frac{n_{2m*}}{100\ rpm}}} \qquad F_{2radN} = \frac{F_{2rad100}}{\sqrt[3]{\frac{n_{2m*}}{100\ rpm}}} \qquad M_{2kN} = \frac{M_{2k100}}{\sqrt[3]{\frac{n_{2m*}}{100\ |rpm}}}$$

The values for F_{2ax100}, $F_{2rad100}$ and M_{2k100} can be found in the table "Permitted shaft loads" in this chapter.

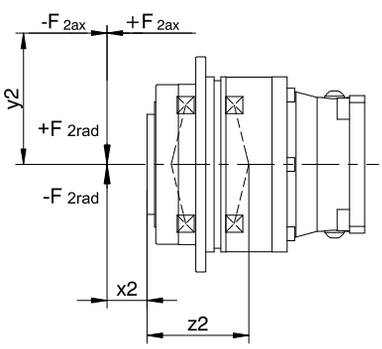


Fig. 1: Force application points

You can determine the permitted radial forces from the permitted breakdown torque M_{2kN} and $M_{2k,acc}$. The actual radial forces may not exceed the permitted radial forces. The permitted radial forces are in relation to the end of the hollow shaft (x2 = 0).

$$M_{2k,acc*} = \frac{2 \cdot F_{2ax*} \cdot y_2 + F_{2rad,acc*} \cdot (x_2 + z_2)}{1000} \leq M_{2k,acc}$$

For applications with multiple axial and/or radial forces, you must add the forces as vectors.

In the event of EMERGENCY OFF operation (max. 1000 load changes), you can multiply the permitted forces and torques for F_{2ax100}, $F_{2rad100}$ and M_{2k100} by a factor of two.

Also note the calculation for equivalent values:

$$M_{2k,eq*} = \sqrt[3]{\frac{|n_{2m,1*}| \cdot t_{1*} \cdot |M_{2k,acc,1*}^{\ 3}| + \ldots + |n_{2m,n*}| \cdot t_{n*} \cdot |M_{2k,acc,n*}^{\ 3}|}{|n_{2m,1*}| \cdot t_{1*} + \ldots + |n_{2m,n*}| \cdot t_{n*}}} \leq M_{2kN}$$

$$F_{2rad,eq*} = \sqrt[3]{\frac{|n_{2m,1*}| \cdot t_{1*} \cdot |F_{2rad,acc,1*}^{\ 3}| + \ldots + |n_{2m,n*}| \cdot t_{n*} \cdot |F_{2rad,acc,n*}^{\ 3}|}{|n_{2m,1*}| \cdot t_{1*} + \ldots + |n_{2m,n*}| \cdot t_{n*}}} \leq F_{2radN}$$

$$F_{2ax,eq*} \leq F_{2axN}$$

The following apply to the bearing service life L_{10h} (ED_{20} ≤ 40%):

L_{10h} > 10000 h with 1 < M_{2kN}/M_{2k*} < 1.25

L_{10h} > 20000 h with 1.25 < M_{2kN}/M_{2k*} < 1.5

L_{10h} > 30000 h with 1.5 < M_{2kN}/M_{2k*}

For different duty cycles:

$$L_{10h} > L_{10h(ED_{20}=40\%)} \cdot \frac{40\%}{ED_{20}}$$

7.6.3 Radial shaft seal rings

Leak-proofness

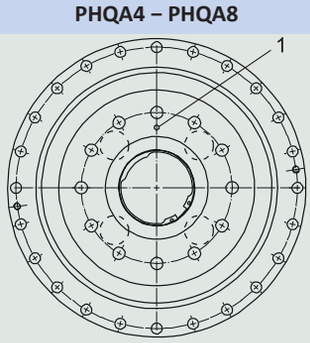
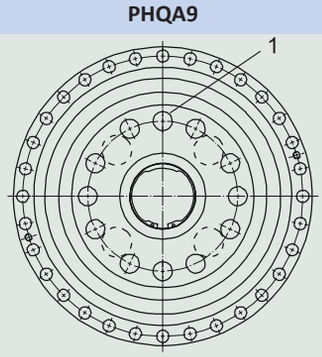
Our gear units are equipped with high-quality radial shaft seal rings and checked for leak-proofness. However, a leak cannot be fully ruled out over the length of use of a gear unit. If you use a gear unit with goods incompatible with the lubricant, you must take measures to prevent direct contact with the gear unit lubricant in case of a leak.

7.6.4 Reverse operation

To ensure lubrication for circulating gearing parts during cyclic reverse operation from ± 20° to ± 90°, pay careful attention to the position of the output shaft for the horizontal mounting of the gear unit, as shown in the diagrams below.

The images show the center position of reverse operation.

Cyclic reverse operation ≤ ± 20° on request.

PHQA4 – PHQA8	PHQA9
	
1 Position of the mark: top	1 Position of the fastening thread: as shown in the image

7.7 Additional documentation

Additional documentation related to the product can be found at http://www.stoeber.de/en/download

Enter the ID of the documentation in the Search... field.

Documentation	ID
Operating manual for P/PA/PE/PH/PHA/PHQ/PHQA/PHV/PHVA planetary gear units and planetary geared motors	443029_en
Lubricant filling quantities for gear units	441871

8 PHV planetary geared motors

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8 Planetary geared motors PHV

8.1 Overview

High-performance precision planetary geared motors

Features

Power density	★★★★☆
Backlash	★★★★☆
Price category	€€€
Shaft load	★★★★★
Smooth operation	★★★★☆
Torsional stiffness	★★★★☆
Mass moment of inertia	★★★★★
Helical gearing	✓
Maintenance-free	✓
Any mounting position	✓
Continuous operation without cooling	✓
Stiff output bearing due to pretension	✓
Compact and highly dynamic due to direct motor attachment	✓

Key: ★☆☆☆☆ good | ★★★★★ excellent
€ Economy | €€€€€ Premium

Technical data

i	61 – 121
M_{2acc}	1638 – 7500 Nm
$\Delta\phi_2$	3 arcmin
η_{get}	≤ 90 %

8.2 Selection tables

The technical data specified in the selection tables applies to:

- Installation altitudes up to 1000 m above sea level
- Surrounding temperatures from 0 °C to 40 °C
- Drives with convection-cooled motors (e.g. EZ401**U**)

You can calculate the technical data for drives with forced ventilated motors (for example EZ401**B**) at http://products.stoeber.de.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PHV9 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 4250 Nm)															
25	806	904	0.2	3.1	PHV933_1210 EZ701U	2180	9000	121.0	121/1	2500	4500	9.8	3	805	67
25	1307	1568	0.4	1.9	PHV933_1210 EZ702U	4250	9000	121.0	121/1	2500	4500	15	3	805	70
25	1797	2265	0.5	1.4	PHV933_1210 EZ703U	4250	9000	121.0	121/1	2500	4500	23	3	805	72
33	606	680	0.3	4.1	PHV933_0910 EZ701U	1640	9000	91.00	91/1	2500	4500	11	3	838	67
33	983	1179	0.4	2.5	PHV933_0910 EZ702U	3360	9000	91.00	91/1	2500	4500	16	3	838	70
33	1351	1704	0.6	1.9	PHV933_0910 EZ703U	4250	9000	91.00	91/1	2500	4500	24	3	838	72
33	1744	2473	0.8	1.4	PHV933_0910 EZ705U	4250	9000	91.00	91/1	2500	4500	36	3	838	77
33	1826	3038	0.8	1.4	PHV933_0910 EZ802U	4250	9000	91.00	91/1	2500	4500	60	3	838	86
49	1169	1658	1.0	2.1	PHV933_0610 EZ705U	4250	9000	61.00	61/1	2500	4500	40	3	850	77
49	1224	2037	1.0	2.0	PHV933_0610 EZ802U	4250	9000	61.00	61/1	2500	4500	64	3	850	86
49	1460	2646	1.2	1.7	PHV933_0610 EZ803U	4250	9000	61.00	61/1	2500	4500	89	3	850	92
PHV9 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 4250 Nm)															
37	1318	2178	0.4	1.7	PHV933_1210 EZ703U	4250	9000	121.0	121/1	2500	4500	23	3	805	72
37	1786	3267	0.6	1.3	PHV933_1210 EZ705U	4250	9000	121.0	121/1	2500	4500	35	3	805	77
49	860	2826	0.4	2.7	PHV933_0910 EZ802U	4250	9000	91.00	91/1	2500	4500	60	3	838	86
49	991	1638	0.5	2.3	PHV933_0910 EZ703U	4250	9000	91.00	91/1	2500	4500	24	3	838	72
49	1343	2457	0.7	1.7	PHV933_0910 EZ705U	4250	9000	91.00	91/1	2500	4500	36	3	838	77
74	576	1894	0.5	4.0	PHV933_0610 EZ802U	4250	9000	61.00	61/1	2500	4500	64	3	850	86
74	900	1647	0.8	2.5	PHV933_0610 EZ705U	4250	9000	61.00	61/1	2500	4500	40	3	850	77
PHV10 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 7500 Nm)															
22	3579	5414	1.1	1.1	PHV1033_0910 EZ805U	7500	15000	91.00	91/1	2500	4500	137	3	1342	128
33	2399	3629	1.3	1.7	PHV1033_0610 EZ805U	7500	15000	61.00	61/1	2500	4500	140	3	1370	128
PHV10 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 7500 Nm)															
33	1826	3038	0.6	2.2	PHV1033_0910 EZ802U	7500	15000	91.00	91/1	2500	4500	62	3	1342	109
33	2179	3948	0.7	1.8	PHV1033_0910 EZ803U	7500	15000	91.00	91/1	2500	4500	87	3	1342	115
49	1460	2646	0.8	2.7	PHV1033_0610 EZ803U	7500	15000	61.00	61/1	2500	4500	90	3	1370	115
PHV10 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 7500 Nm)															
49	860	2826	0.3	4.4	PHV1033_0910 EZ802U	7500	15000	91.00	91/1	2500	4500	62	3	1342	109

8.3 Dimensional drawings

In this chapter you can find the dimensions of the geared motors.

There is a dimensional drawing for every possible shaft/housing design, each with the tables for gear unit dimensions, motor dimensions and geared motor dimensions.

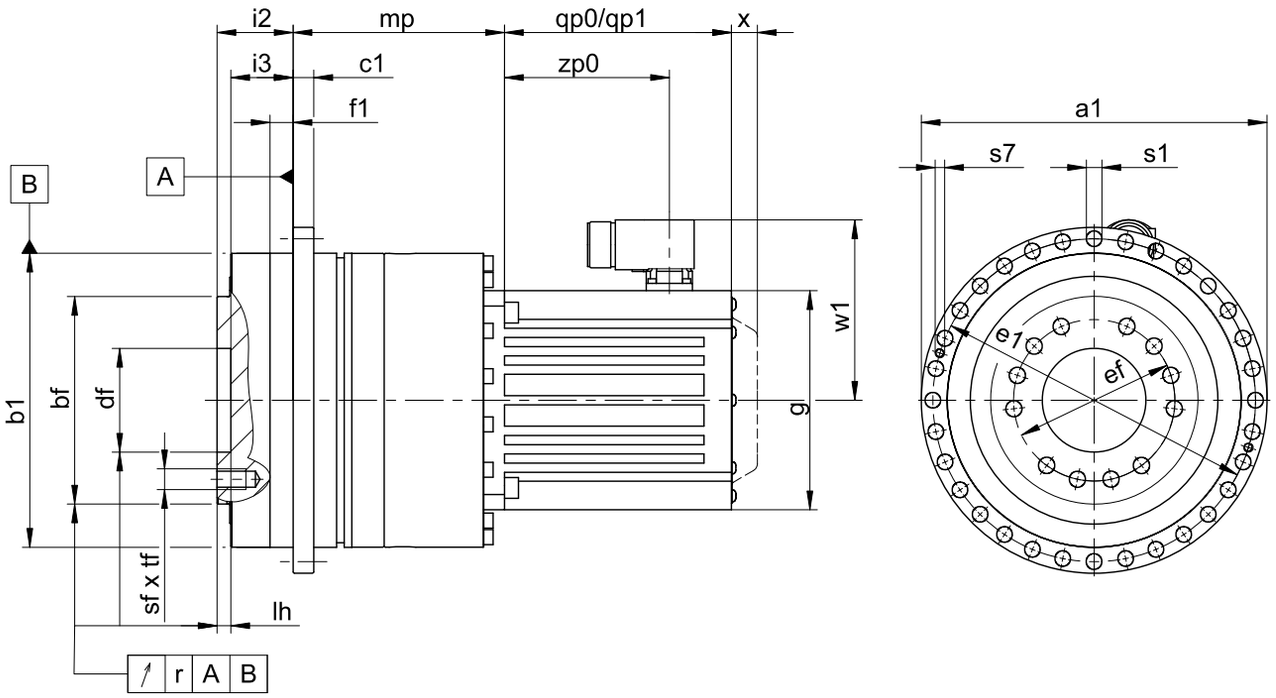
Dimensions can exceed the specifications of ISO 2768-mK due to casting tolerances or accumulation of individual tolerances.

We reserve the right to make dimensional changes due to ongoing technical development.

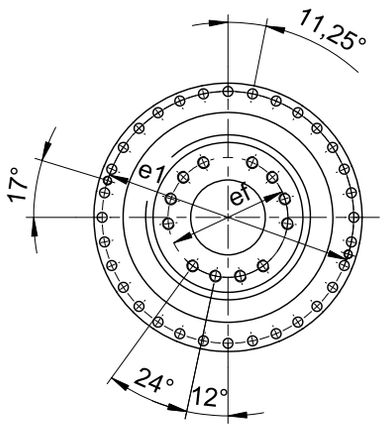
You can download CAD models of our standard drives at http://cad.stoeber.de.

Combination options and the dimensions of forced ventilated geared motors can be found at http://cad.stoeber.de.

8.3.1 F shaft design (flange shaft)



PHV9/PHV10



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]

Dimensions of gear units

Type	Øa1	Øb1	Øbf	c1	Ødf	Øe1	Øef	f1	i2	i3	lh	r	Øs1	s7	sf	tf
PHV933	300	255_{h7}	180_{h7}	18	90^{H6}	280	140	20	66	55	12	0.030	13.5	M8	M16	24
PHV1033	330	285_{h7}	200_{h7}	20	95^{H6}	310	160	20	75	60	10	0.040	13.5	M10	M20	30

Dimensions of motors

Type	□g	qp0	qp1	w1	x	zp0
EZ701U	145	102	161	115.0	22	64
EZ702U	145	127	186	115.0	22	89
EZ703U	145	152	211	115.0	22	114
EZ705U	145	207	266	134.0	22	165
EZ802U	190	197	274	156.5	22	143
EZ803U	190	238	315	156.5	22	184
EZ805U	190	320	397	156.5	22	266

Dimensions of geared motors

Type	EZ7 mp	EZ8 mp
PHV933	97.0	106.0
PHV1033	–	108.5

8.4 Type designation

In this chapter, you can find an explanation of the type designation with the associated options.

Additional ordering information not included in the type designation can be found at the end of the chapter.

Sample code

PHV	9	3	3	F	0910	EZ703U

Explanation

Code	Designation	Design
PHV	Type	Planetary gear unit
9	Size	9 (example)
3	Generation	Generation 3
3	Stages	Three-stage
F	Shaft	Flange shaft
0910	Transmission ratio (i x 10)	i = 91 (example)
EZ703U	Motor	EZ synchronous servo motor

In order to complete the type designation, also specify:

- A detailed type designation of the motor, see chapter [▷ 23]
- Radial shaft seal rings at the output made of NBR or FKM, see chapter [▷ 8.6.3]
- For reverse operation of the output shaft from ± 20° to ± 90° and horizontal installation, note the chapter [▷ 8.6.4]

8.5 Product description

8.5.1 Installation conditions

The torque and force values listed in this catalog are valid under the following conditions:

- When using screws with quality 12.9 for machine-side attachment of the flange shaft and gear unit housing
- When the gear unit housings are adjusted at pilot øb1 (H7)
- When the flange shaft is adjusted using the connecting element at pilot øbf or ødf

8.5.2 Lubricants

STOBER fills the gear units with the amount and type of lubricant specified on the nameplate.

Lubricant filling quantities for gear units, document ID 441871, can be found online at http://www.stoeber.de

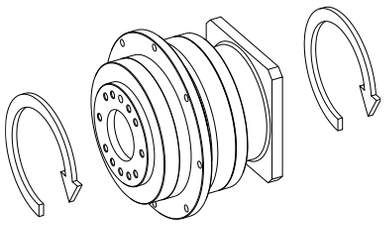
8.5.3 Other product features

Feature	Value
Max. permitted gear unit temperature (on the surface of the gear unit)	≤ 90 °C
Paint	Black RAL 9005
(ATEX) Directive 2014/34/EU (option)	Not suitable
Protection class:[1]	
Gear unit	IP65
Motor	IP56, optionally IP66

[1] Observe the protection class of all the components.

8.5.4 Direction of rotation

The input and output rotate in the same direction.



8.6 Project configuration

Project your drives using our SERVOsoft designing software. You can receive SERVOsoft for free from your adviser at one of our sales centers. Observe the limit conditions in this chapter to ensure a safe design for your drives.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

8.6.1 Calculation of the operating point

Check the following conditions for operating points other than the nominal point M_{2N} specified in the selection tables.

$$n_{1m^*} \leq \frac{n_{1maxDB}}{fB_T}$$

$$n_{1max^*} \leq \frac{n_{1maxZB}}{fB_T}$$

$$M_{2eff^*} \leq M_{2th}$$

$$M_{2acc^*} \leq M_{2acc}$$

$$M_{2NOT^*} \leq M_{2NOT}$$

$$M_{2eq^*} \leq M_{2N} \cdot \frac{S}{fB_{op} \cdot fB_t}$$

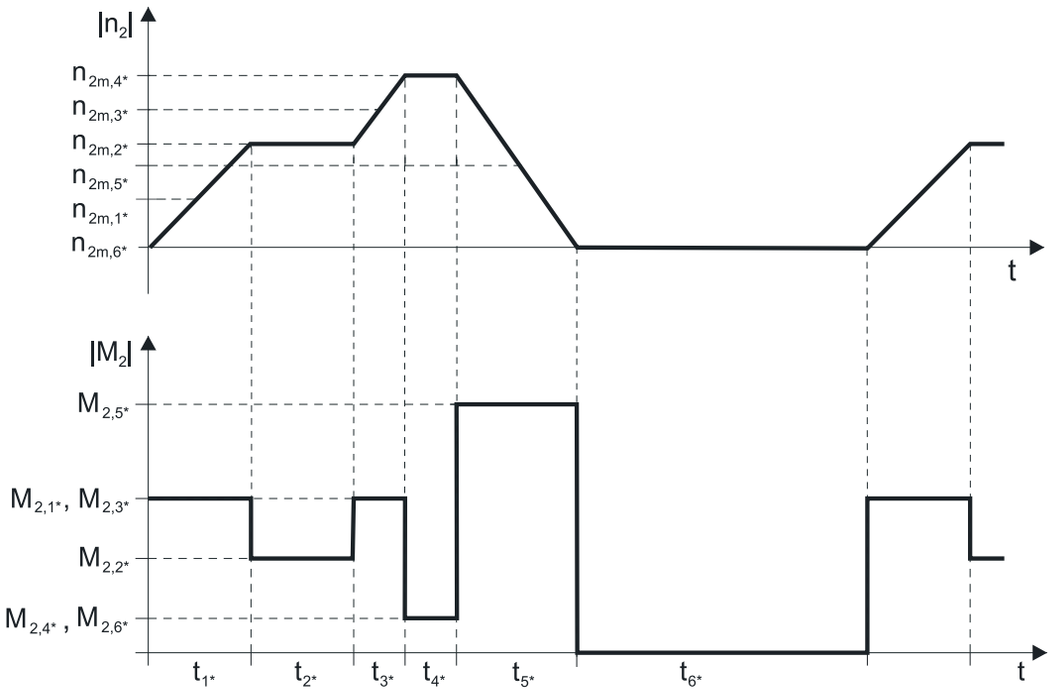
The values for n_{1maxDB}, n_{1maxZB}, M_{2acc}, M_{2NOT}, M_{2N} and S can be found in the selection tables.

The values for fB_T, fB_{op} and fB_t can be found in the corresponding tables in this chapter.

Calculate the thermal limit torque M_{2th} for a duty cycle > 50%.

Example of cyclic operation

The following calculations are based on a representation of the power taken from the output based in accordance with the following example:



Calculation of the actual average input speed

$$n_{1m^*} = n_{2m^*} \cdot i$$

$$n_{2m^*} = \frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}{t_{1^*} + \ldots + t_{n^*}}$$

If $t_{1^*} + \ldots + t_{5^*} \geq 20$ min, calculate n_{2m^*} without the rest phase t_{6^*}.

The values for the ratio i can be found in the selection tables.

Calculation of the actual effective torque

$$M_{2eff^*} = \sqrt{\frac{t_{1^*} \cdot {M_{2,1^*}}^2 + \ldots + t_{n^*} \cdot {M_{2,n^*}}^2}{t_{1^*} + \ldots + t_{n^*}}}$$

Calculation of the actual equivalent torque

$$M_{2eq^*} = \sqrt[3]{\frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} \cdot \left|{M_{2,1^*}}^3\right| + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*} \cdot \left|{M_{2,n^*}}^3\right|}{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}}$$

Calculation of the thermal limit torque

Calculate the thermal limit torque M_{2th} for a duty cycle $ED_{20} > 50\%$ and the actual average input speed n_{1m^*}. (At $K_{mot,th} \leq 0$ you must reduce the average input speed n_{1m^*} accordingly or select another geared motor size.)

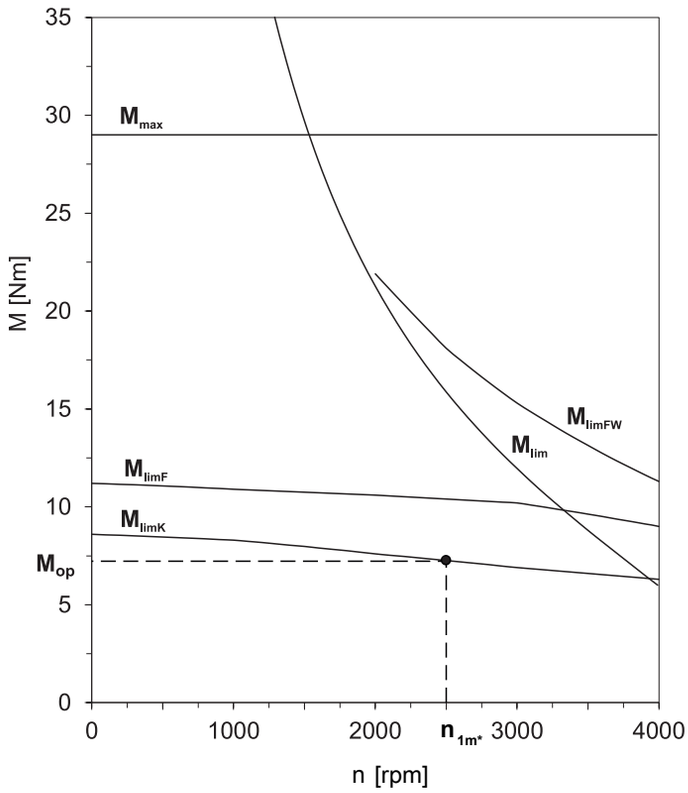
$$M_{2th} = M_{op} \cdot i \cdot K_{mot,th}$$

$$K_{mot,th} = 0{,}93 - \frac{a_{th}}{1000} \cdot fB_T \cdot \left(\frac{n_{1m^*}}{1000}\right)^3$$

The values for i and a_{th} can be found in the selection tables.

The values for fB_T can be found in the corresponding table in this chapter.

The value for the torque of the motor at operating point M_{op} with the determined average input speed n_{1m^*} can be found in the motor curve of Chapter [▷ 23.3]. Note the size, nominal speed n_N and cooling type of the motor. The figure below shows an example of reading the torque M_{op} of a motor with convection cooling at the operating point.



Operating factors

Operating mode	fB_{op}
Uniform continuous operation	1.00
Cyclic operation	1.00
Reversing load cyclic operation	1.00

Run time	fB_t
Daily run time ≤ 8 h	1.00
Daily run time ≤ 16 h	1.15
Daily run time ≤ 24 h	1.20

Temperature		fB_T
Motor cooling	**Surrounding temperature**	
Motor with forced ventilation	≤ 20 °C	0.9
	≤ 30 °C	1.0
	≤ 40 °C	1.15
Motor with convection cooling	≤ 20 °C	1.0
	≤ 30 °C	1.1
	≤ 40 °C	1.25

Notes

- The maximum permitted gear unit temperature (see the "Other product features" chapter) must not be exceeded. Doing so may result in damage to the geared motor.
- For braking from full speed (for example when the power fails or when setting up the machine), note the permitted gear unit torques (M_{2acc}, M_{2NOT}) in the selection tables.

8.6.2 Permitted shaft loads for the output shaft

The values specified in the tables apply to the permitted shaft loads:

- For shaft dimensions in accordance with the catalog
- For output speeds $n_{2m*} \leq 100$ rpm ($F^{2axN} = F_{2ax100}$; $F_{2radN} = F_{2rad100}$; $M_{2kN} = M_{2k100}$)
- Only if radial forces on the gear unit are stabilized by its pilots (housing, flange shaft)

Permitted shaft loads

Type	z_2 [mm]	F_{2ax100} [N]	$F_{2rad100}$ [N]	$F_{2rad,acc}$ [N]	M_{2k100} [Nm]	$M_{2k,acc}$ [Nm]
PHV9	155.0	33000	48387	70968	7500	11000
PHV10	171.0	50000	51462	73099	8800	12500

For other output speeds, download diagrams at http://products.stoeber.de.

The following applies to output speeds n_{2m*} > 100 rpm:

$$F_{2axN} = \frac{F_{2ax100}}{\sqrt[3]{\frac{n_{2m*}}{100\ rpm}}} \qquad F_{2radN} = \frac{F_{2rad100}}{\sqrt[3]{\frac{n_{2m*}}{100\ rpm}}} \qquad M_{2kN} = \frac{M_{2k100}}{\sqrt[3]{\frac{n_{2m*}}{100\ rpm}}}$$

The values for F_{2ax100}, $F_{2rad100}$ and M_{2k100} can be found in the table "Permitted shaft loads" in this chapter.

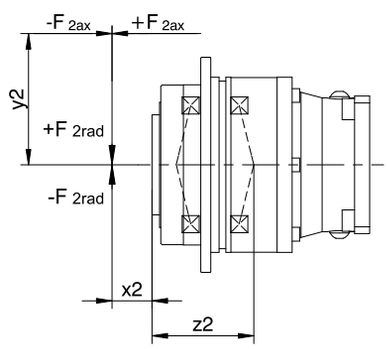


Fig. 1: Force application points

You can determine the permitted radial forces from the permitted breakdown torque M_{2kN} and $M_{2k,acc}$. The actual radial forces may not exceed the permitted radial forces. The permitted radial forces are in relation to the end of the hollow shaft (x2 = 0).

$$M_{2k,acc*} = \frac{2 \cdot F_{2ax*} \cdot y_2 + F_{2rad,acc*} \cdot (x_2 + z_2)}{1000} \le M_{2k,acc}$$

For applications with multiple axial and/or radial forces, you must add the forces as vectors.

In the event of EMERGENCY OFF operation (max. 1000 load changes), you can multiply the permitted forces and torques for F_{2ax100}, $F_{2rad100}$ and M_{2k100} by a factor of two.

Also note the calculation for equivalent values:

$$M_{2k,eq*} = \sqrt[3]{\frac{|n_{2m,1*}| \cdot t_{1*} \cdot |M_{2k,acc,1*}^{\ 3}| + \ldots + |n_{2m,n*}| \cdot t_{n*} \cdot |M_{2k,acc,n*}^{\ 3}|}{|n_{2m,1*}| \cdot t_{1*} + \ldots + |n_{2m,n*}| \cdot t_{n*}}} \le M_{2kN}$$

$$F_{2rad,eq*} = \sqrt[3]{\frac{|n_{2m,1*}| \cdot t_{1*} \cdot |F_{2rad,acc,1*}^{\ 3}| + \ldots + |n_{2m,n*}| \cdot t_{n*} \cdot |F_{2rad,acc,n*}^{\ 3}|}{|n_{2m,1*}| \cdot t_{1*} + \ldots + |n_{2m,n*}| \cdot t_{n*}}} \le F_{2radN}$$

$$F_{2ax,eq*} \le F_{2axN}$$

The following apply to the bearing service life L_{10h} (ED_{20} ≤ 40%):

L_{10h} > 10000 h with 1 < M_{2kN}/M_{2k*} < 1.25

L_{10h} > 20000 h with 1.25 < M_{2kN}/M_{2k*} < 1.5

L_{10h} > 30000 h with 1.5 < M_{2kN}/M_{2k*}

For different duty cycles:

$$L_{10h} > L_{10h(ED_{20}=40\%)} \cdot \frac{40\%}{ED_{20}}$$

8.6.3 Recommendation for radial shaft seal rings

For a duty cycle > 60%, we recommend radial shaft seal rings made of FKM.

Properties:

- Excellent temperature resistance
- High chemical stability
- Very good resistance to aging
- Excellent resistance to mineral oils and greases
- For use in the food, beverage and pharmaceutical industries

Leak-proofness

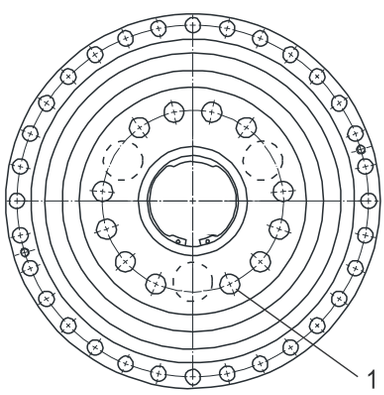
Our gear units are equipped with high-quality radial shaft seal rings and checked for leak-proofness. However, a leak cannot be fully ruled out over the length of use of a gear unit. If you use a gear unit with goods incompatible with the lubricant, you must take measures to prevent direct contact with the gear unit lubricant in case of a leak.

8.6.4 Reverse operation

To ensure lubrication of circulating geared parts during cyclic reverse operation from ± 20° to ± 90°, pay careful attention to the position of the output shaft if the gear unit is installed horizontally as shown in the images below.

The images show the center position of reverse operation.

Cyclic reverse operation ≤ ± 20° on request.



1 Position of the fastening thread: as shown in the image

8.7 Additional documentation

Additional documentation related to the product can be found at http://www.stoeber.de/en/download

Enter the ID of the documentation in the Search... field.

Documentation	ID
Operating manual for P/PA/PE/PH/PHA/PHQ/PHQA/PHV/PHVA planetary gear units and planetary geared motors	443029_en
Lubricant filling quantities for gear units	441871

9 PHVA planetary geared motors

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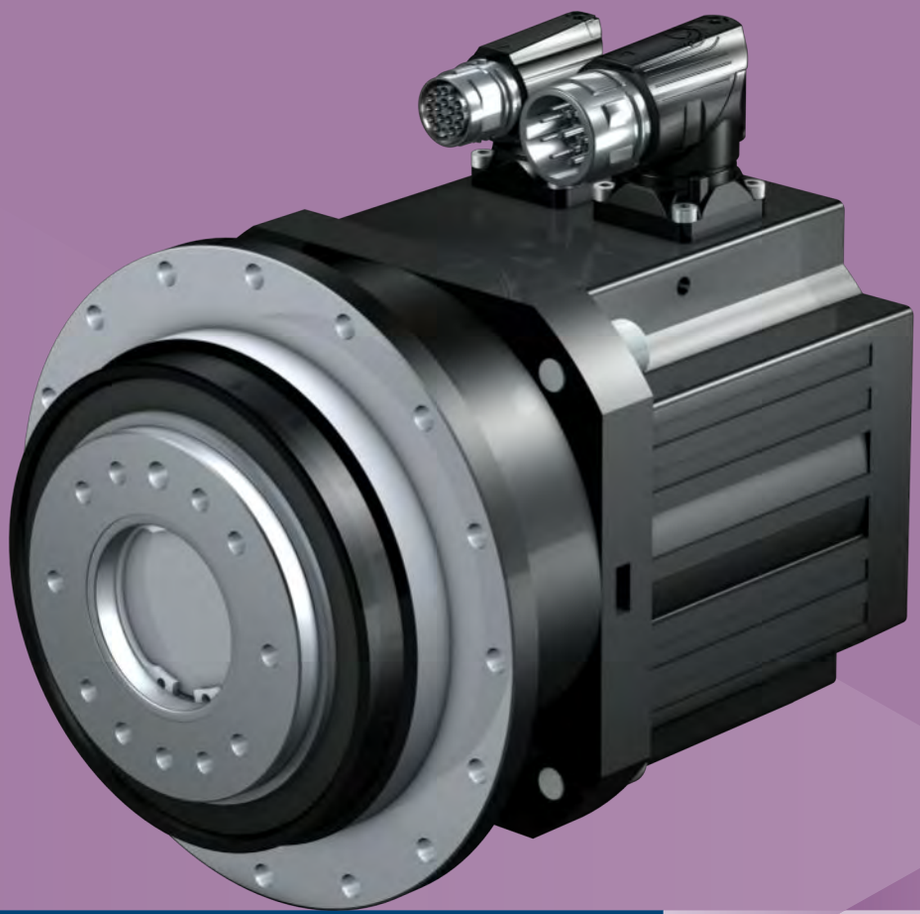

9 Planetary geared motors PHVA

9.1 Overview

Low-backlash high-performance precision planetary geared motors

Features

Power density	★★★★☆
Backlash	★★★★★
Price category	€€€€
Shaft load	★★★★★
Smooth operation	★★★★★
Torsional stiffness	★★★★☆
Mass moment of inertia	★★★★★
Helical gearing	✓
Maintenance-free	✓
Any mounting position	✓
Continuous operation without cooling	✓
Stiff output bearing due to pretension	✓
Compact and highly dynamic due to direct motor attachment	✓

Key: ★☆☆☆☆ good | ★★★★★ excellent
€ Economy | €€€€€ Premium

Technical data

i	61 – 121
M_{2acc}	1638 – 4250 Nm
$\Delta\phi_2$	1 arcmin
η_{get}	≤ 90 %

9.2 Selection tables

The technical data specified in the selection tables applies to:

- Installation altitudes up to 1000 m above sea level
- Surrounding temperatures from 0 °C to 40 °C
- Drives with convection-cooled motors (e.g. EZ401**U**)

You can calculate the technical data for drives with forced ventilated motors (for example EZ401**B**) at http://products.stoeber.de.

An explanation of the formula symbols can be found in Chapter [▶ 29.1].

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/arcmin]	m [kg]
PHVA9 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 4250 Nm)															
25	806	904	0.2	3.1	PHVA933_1210 EZ701U	2180	9000	121.0	121/1	2500	4500	9.8	1	805	67
25	1307	1568	0.4	1.9	PHVA933_1210 EZ702U	4250	9000	121.0	121/1	2500	4500	15	1	805	70
25	1797	2265	0.5	1.4	PHVA933_1210 EZ703U	4250	9000	121.0	121/1	2500	4500	23	1	805	72
33	606	680	0.3	4.1	PHVA933_0910 EZ701U	1640	9000	91.00	91/1	2500	4500	11	1	838	67
33	983	1179	0.4	2.5	PHVA933_0910 EZ702U	3360	9000	91.00	91/1	2500	4500	16	1	838	70
33	1351	1704	0.6	1.9	PHVA933_0910 EZ703U	4250	9000	91.00	91/1	2500	4500	24	1	838	72
33	1744	2473	0.8	1.4	PHVA933_0910 EZ705U	4250	9000	91.00	91/1	2500	4500	36	1	838	77
33	1826	3038	0.8	1.4	PHVA933_0910 EZ802U	4250	9000	91.00	91/1	2500	4500	60	1	838	86
49	1169	1658	1.0	2.1	PHVA933_0610 EZ705U	4250	9000	61.00	61/1	2500	4500	40	1	850	77
49	1224	2037	1.0	2.0	PHVA933_0610 EZ802U	4250	9000	61.00	61/1	2500	4500	64	1	850	86
49	1460	2646	1.2	1.7	PHVA933_0610 EZ803U	4250	9000	61.00	61/1	2500	4500	89	1	850	92
PHVA9 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 4250 Nm)															
37	1318	2178	0.4	1.7	PHVA933_1210 EZ703U	4250	9000	121.0	121/1	2500	4500	23	1	805	72
37	1786	3267	0.6	1.3	PHVA933_1210 EZ705U	4250	9000	121.0	121/1	2500	4500	35	1	805	77
49	860	2826	0.4	2.7	PHVA933_0910 EZ802U	4250	9000	91.00	91/1	2500	4500	60	1	838	86
49	991	1638	0.5	2.3	PHVA933_0910 EZ703U	4250	9000	91.00	91/1	2500	4500	24	1	838	72
49	1343	2457	0.7	1.7	PHVA933_0910 EZ705U	4250	9000	91.00	91/1	2500	4500	36	1	838	77
74	576	1894	0.5	4.0	PHVA933_0610 EZ802U	4250	9000	61.00	61/1	2500	4500	64	1	850	86
74	900	1647	0.8	2.5	PHVA933_0610 EZ705U	4250	9000	61.00	61/1	2500	4500	40	1	850	77

9.3 Dimensional drawings

In this chapter you can find the dimensions of the geared motors.

There is a dimensional drawing for every possible shaft/housing design, each with the tables for gear unit dimensions, motor dimensions and geared motor dimensions.

Dimensions can exceed the specifications of ISO 2768-mK due to casting tolerances or accumulation of individual tolerances.

We reserve the right to make dimensional changes due to ongoing technical development.

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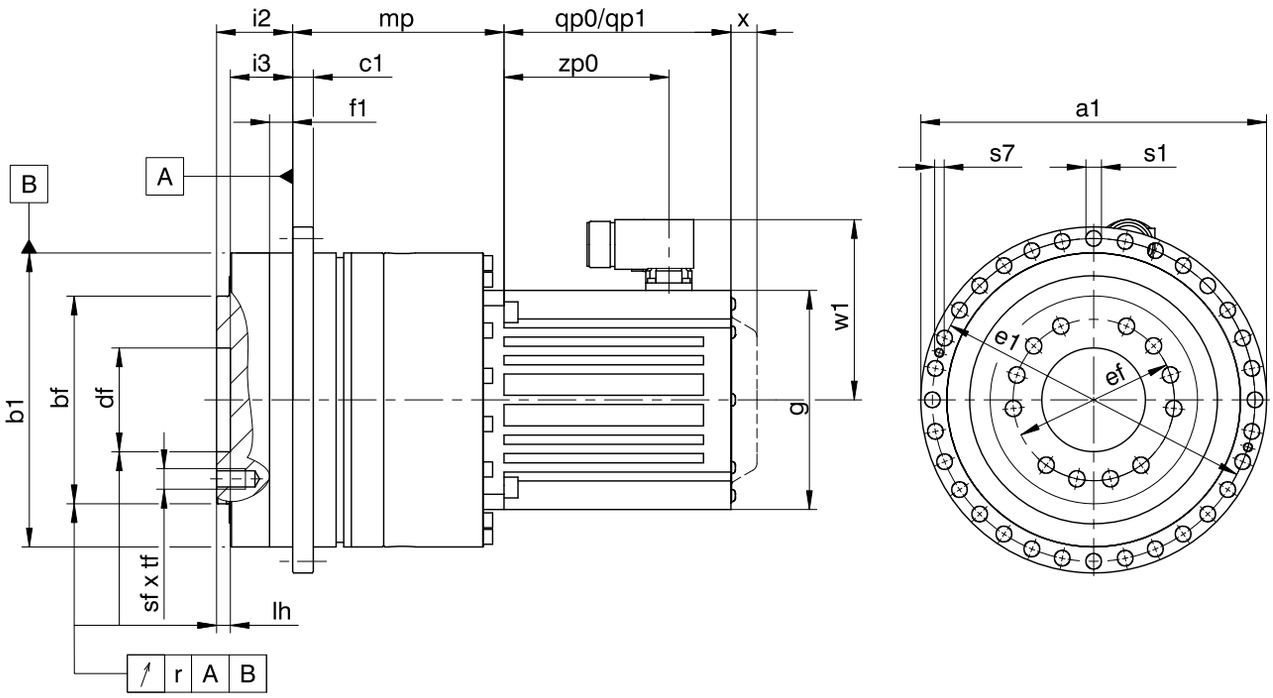
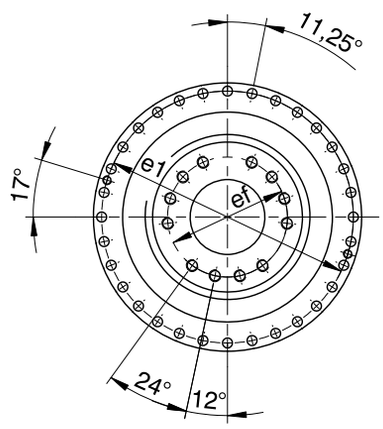
Combination options and the dimensions of forced ventilated geared motors can be found at http://cad.stoeber.de.

9.3.1 F shaft design (flange shaft)



PHVA9



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]

Dimensions of gear units

Type	Øa1	Øb1	Øbf	c1	Ødf	Øe1	Øef	f1	i2	i3	lh	r	Øs1	s7	sf	tf
PHVA933	300	255_{h7}	180_{h7}	18	90^{H6}	280	140	20	66	55	12	0.030	13.5	M8	M16	24

Dimensions of motors

Type	□g	qp0	qp1	w1	x	zp0
EZ701U	145	102	161	115.0	22	64
EZ702U	145	127	186	115.0	22	89
EZ703U	145	152	211	115.0	22	114
EZ705U	145	207	266	134.0	22	165
EZ802U	190	197	274	156.5	22	143
EZ803U	190	238	315	156.5	22	184

Dimensions of geared motors

Type	EZ7	EZ8
	mp	mp
PHVA933	97.0	106.0

9.4 Type designation

In this chapter, you can find an explanation of the type designation with the associated options.

Additional ordering information not included in the type designation can be found at the end of the chapter.

Sample code

PHVA	9	3	3	F	0910	EZ703U

Explanation

Code	Designation	Design
PHVA	Type	nLow-backlash planetary gear unit
9	Size	9 (example)
3	Generation	Generation 3
3	Stages	Three-stage
F	Shaft	Flange shaft
0910	Transmission ratio (i x 10)	i = 91 (example)
EZ703U	Motor	EZ synchronous servo motor

In order to complete the type designation, also specify:

- A detailed type designation of the motor, see chapter [▶ 23]
- For reverse operation of the output shaft from ± 20° to ± 90° and horizontal installation, note the chapter [▶ 9.6.4]

9.5 Product description

9.5.1 Installation conditions

The torque and force values listed in this catalog are valid under the following conditions:

- When using screws with quality 12.9 for machine-side attachment of the flange shaft and gear unit housing
- When the gear unit housings are adjusted at pilot øb1 (H7)
- When the flange shaft is adjusted using the connecting element at pilot øbf or ødf

9.5.2 Lubricants

STOBER fills the gear units with the amount and type of lubricant specified on the nameplate.

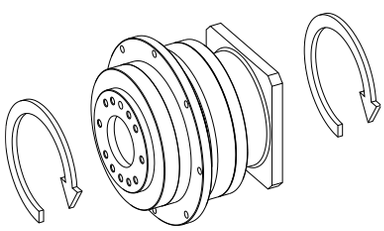
Lubricant filling quantities for gear units, document ID 441871, can be found online at http://www.stoeber.de

9.5.3 Other product features

Feature	Value
Max. permitted gear unit temperature (on the surface of the gear unit)	≤ 90 °C
Paint	Black RAL 9005
(ATEX) Directive 2014/34/EU (option)	Not suitable
Protection class:[1]	
Gear unit	IP65
Motor	IP56, optionally IP66

9.5.4 Direction of rotation

The input and output rotate in the same direction.



9.6 Project configuration

Project your drives using our SERVOsoft designing software. You can receive SERVOsoft for free from your adviser at one of our sales centers. Observe the limit conditions in this chapter to ensure a safe design for your drives.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

9.6.1 Calculation of the operating point

Check the following conditions for operating points other than the nominal point M_{2N} specified in the selection tables.

$$n_{1m^*} \leq \frac{n_{1maxDB}}{fB_T}$$

$$n_{1max^*} \leq \frac{n_{1max\,ZB}}{fB_T}$$

$$M_{2eff^*} \leq M_{2th}$$

$$M_{2acc^*} \leq M_{2acc}$$

$$M_{2NOT^*} \leq M_{2NOT}$$

$$M_{2eq^*} \leq M_{2N} \cdot \frac{S}{fB_{op} \cdot fB_t}$$

The values for n_{1maxDB}, n_{1maxZB}, M_{2acc}, M_{2NOT}, M_{2N} and S can be found in the selection tables.

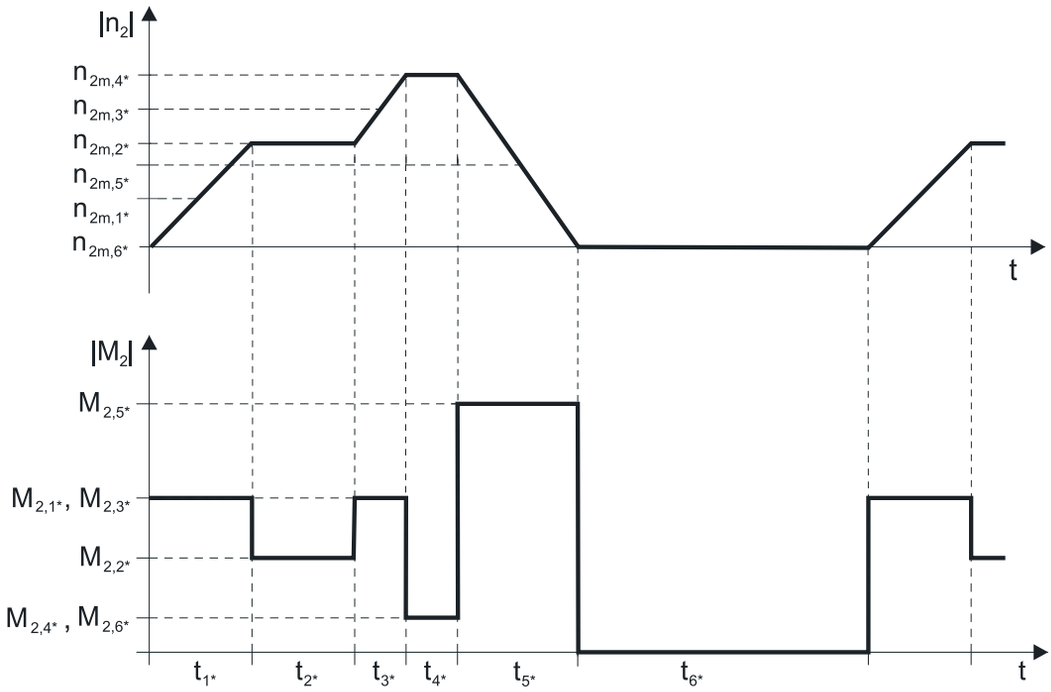
The values for fB_T, fB_{op} and fB_t can be found in the corresponding tables in this chapter.

Calculate the thermal limit torque M_{2th} for a duty cycle > 50%.

[1] Observe the protection class of all the components.

Example of cyclic operation

The following calculations are based on a representation of the power taken from the output based in accordance with the following example:



Calculation of the actual average input speed

$$n_{1m^*} = n_{2m^*} \cdot i$$

$$n_{2m^*} = \frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}{t_{1^*} + \ldots + t_{n^*}}$$

If $t_{1^*} + \ldots + t_{5^*} \geq 20$ min, calculate n_{2m^*} without the rest phase t_{6^*}.

The values for the ratio i can be found in the selection tables.

Calculation of the actual effective torque

$$M_{2eff^*} = \sqrt{\frac{t_{1^*} \cdot M_{2,1^*}{}^2 + \ldots + t_{n^*} \cdot M_{2,n^*}{}^2}{t_{1^*} + \ldots + t_{n^*}}}$$

Calculation of the actual equivalent torque

$$M_{2eq^*} = \sqrt[3]{\frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} \cdot \left|M_{2,1^*}{}^3\right| + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*} \cdot \left|M_{2,n^*}{}^3\right|}{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}}$$

Calculation of the thermal limit torque

Calculate the thermal limit torque M_{2th} for a duty cycle $ED_{20} > 50\%$ and the actual average input speed n_{1m^*}. (At $K_{mot,th} \leq 0$ you must reduce the average input speed n_{1m^*} accordingly or select another geared motor size.)

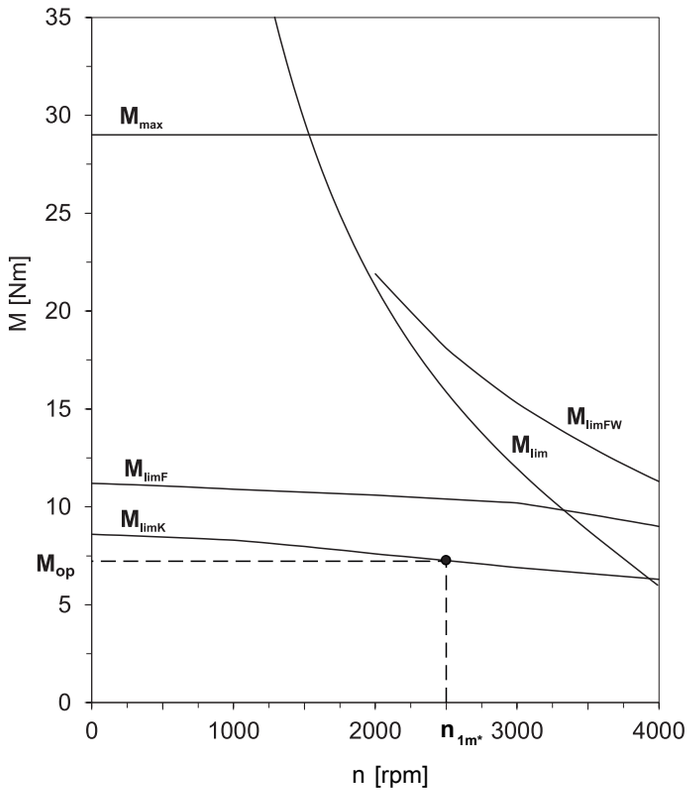
$$M_{2th} = M_{op} \cdot i \cdot K_{mot,th}$$

$$K_{mot,th} = 0{,}93 - \frac{a_{th}}{1000} \cdot fB_T \cdot \left(\frac{n_{1m^*}}{1000}\right)^3$$

The values for i and a_{th} can be found in the selection tables.

The values for fB_T can be found in the corresponding table in this chapter.

The value for the torque of the motor at operating point M_{op} with the determined average input speed n_{1m^*} can be found in the motor curve of Chapter [▶ 23.3]. Note the size, nominal speed n_N and cooling type of the motor. The figure below shows an example of reading the torque M_{op} of a motor with convection cooling at the operating point.



Operating factors

Operating mode	fB_{op}
Uniform continuous operation	1.00
Cyclic operation	1.00
Reversing load cyclic operation	1.00

Run time	fB_t
Daily run time ≤ 8 h	1.00
Daily run time ≤ 16 h	1.15
Daily run time ≤ 24 h	1.20

Temperature		fB_T
Motor cooling	**Surrounding temperature**	
Motor with forced ventilation	≤ 20 °C	0.9
	≤ 30 °C	1.0
	≤ 40 °C	1.15
Motor with convection cooling	≤ 20 °C	1.0
	≤ 30 °C	1.1
	≤ 40 °C	1.25

Notes

- The maximum permitted gear unit temperature (see the "Other product features" chapter) must not be exceeded. Doing so may result in damage to the geared motor.
- For braking from full speed (for example when the power fails or when setting up the machine), note the permitted gear unit torques (M_{2acc}, M_{2NOT}) in the selection tables.

9.6.2 Permitted shaft loads for the output shaft

The values specified in the tables apply to the permitted shaft loads:

- For shaft dimensions in accordance with the catalog
- For output speeds $n_{2m*} \leq 100$ rpm ($F^{2axN} = F_{2ax100}$; $F_{2radN} = F_{2rad100}$; $M_{2kN} = M_{2k100}$)
- Only if radial forces on the gear unit are stabilized by its pilots (housing, flange shaft)

Permitted shaft loads

Type	z_2 [mm]	F_{2ax100} [N]	$F_{2rad100}$ [N]	$F_{2rad,acc}$ [N]	M_{2k100} [Nm]	$M_{2k,acc}$ [Nm]
PHVA9	155.0	33000	48387	70968	7500	11000

For other output speeds, download diagrams at http://products.stoeber.de.

The following applies to output speeds n_{2m*} > 100 rpm:

$$F_{2axN} = \frac{F_{2ax100}}{\sqrt[3]{\frac{n_{2m*}}{100\ rpm}}} \qquad F_{2radN} = \frac{F_{2rad100}}{\sqrt[3]{\frac{n_{2m*}}{100\ rpm}}} \qquad M_{2kN} = \frac{M_{2k100}}{\sqrt[3]{\frac{n_{2m*}}{100\ rpm}}}$$

The values for F_{2ax100}, $F_{2rad100}$ and M_{2k100} can be found in the table "Permitted shaft loads" in this chapter.

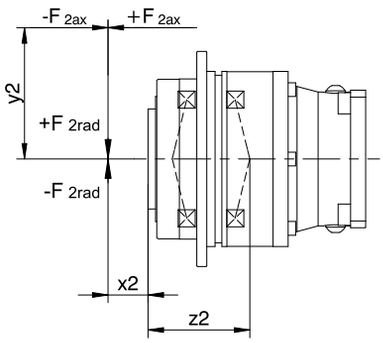


Fig. 1: Force application points

You can determine the permitted radial forces from the permitted breakdown torque M_{2kN} and $M_{2k,acc}$. The actual radial forces may not exceed the permitted radial forces. The permitted radial forces are in relation to the end of the hollow shaft (x2 = 0).

$$M_{2k,acc*} = \frac{2 \cdot F_{2ax*} \cdot y_2 + F_{2rad,acc*} \cdot (x_2 + z_2)}{1000} \leq M_{2k,acc}$$

For applications with multiple axial and/or radial forces, you must add the forces as vectors.

In the event of EMERGENCY OFF operation (max. 1000 load changes), you can multiply the permitted forces and torques for F_{2ax100}, $F_{2rad100}$ and M_{2k100} by a factor of two.

Also note the calculation for equivalent values:

$$M_{2k,eq*} = \sqrt[3]{\frac{|n_{2m,1*}| \cdot t_{1*} \cdot |M_{2k,acc,1*}^{\ 3}| + \ldots + |n_{2m,n*}| \cdot t_{n*} \cdot |M_{2k,acc,n*}^{\ 3}|}{|n_{2m,1*}| \cdot t_{1*} + \ldots + |n_{2m,n*}| \cdot t_{n*}}} \leq M_{2kN}$$

$$F_{2rad,eq*} = \sqrt[3]{\frac{|n_{2m,1*}| \cdot t_{1*} \cdot |F_{2rad,acc,1*}^{\ 3}| + \ldots + |n_{2m,n*}| \cdot t_{n*} \cdot |F_{2rad,acc,n*}^{\ 3}|}{|n_{2m,1*}| \cdot t_{1*} + \ldots + |n_{2m,n*}| \cdot t_{n*}}} \leq F_{2radN}$$

$$F_{2ax,eq*} \leq F_{2axN}$$

The following apply to the bearing service life L_{10h} (ED_{20} ≤ 40%):

L_{10h} > 10000 h with 1 < M_{2kN}/M_{2k*} < 1.25

L_{10h} > 20000 h with 1.25 < M_{2kN}/M_{2k*} < 1.5

L_{10h} > 30000 h with 1.5 < M_{2kN}/M_{2k*}

For different duty cycles:

$$L_{10h} > L_{10h(ED_{20}=40\%)} \cdot \frac{40\%}{ED_{20}}$$

9.6.3 Radial shaft seal rings

Leak-proofness

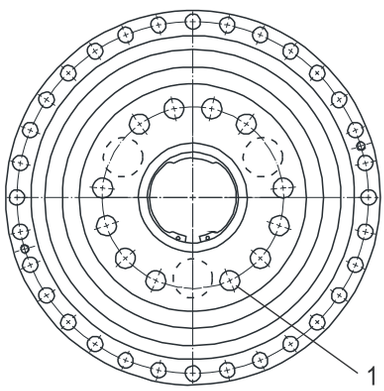
Our gear units are equipped with high-quality radial shaft seal rings and checked for leak-proofness. However, a leak cannot be fully ruled out over the length of use of a gear unit. If you use a gear unit with goods incompatible with the lubricant, you must take measures to prevent direct contact with the gear unit lubricant in case of a leak.

9.6.4 Reverse operation

To ensure lubrication of circulating geared parts during cyclic reverse operation from ± 20° to ± 90°, pay careful attention to the position of the output shaft if the gear unit is installed horizontally as shown in the images below.

The images show the center position of reverse operation.

Cyclic reverse operation ≤ ± 20° on request.



1 Position of the fastening thread: as shown in the image

9.7 Additional documentation

Additional documentation related to the product can be found at http://www.stoeber.de/en/download

Enter the ID of the documentation in the Search... field.

Documentation	ID
Operating manual for P/PA/PE/PH/PHA/PHQ/PHQA/PHV/PHVA planetary gear units and planetary geared motors	443029_en
Lubricant filling quantities for gear units	441871

10 EZHP Planetary geared motors with hollow shaft

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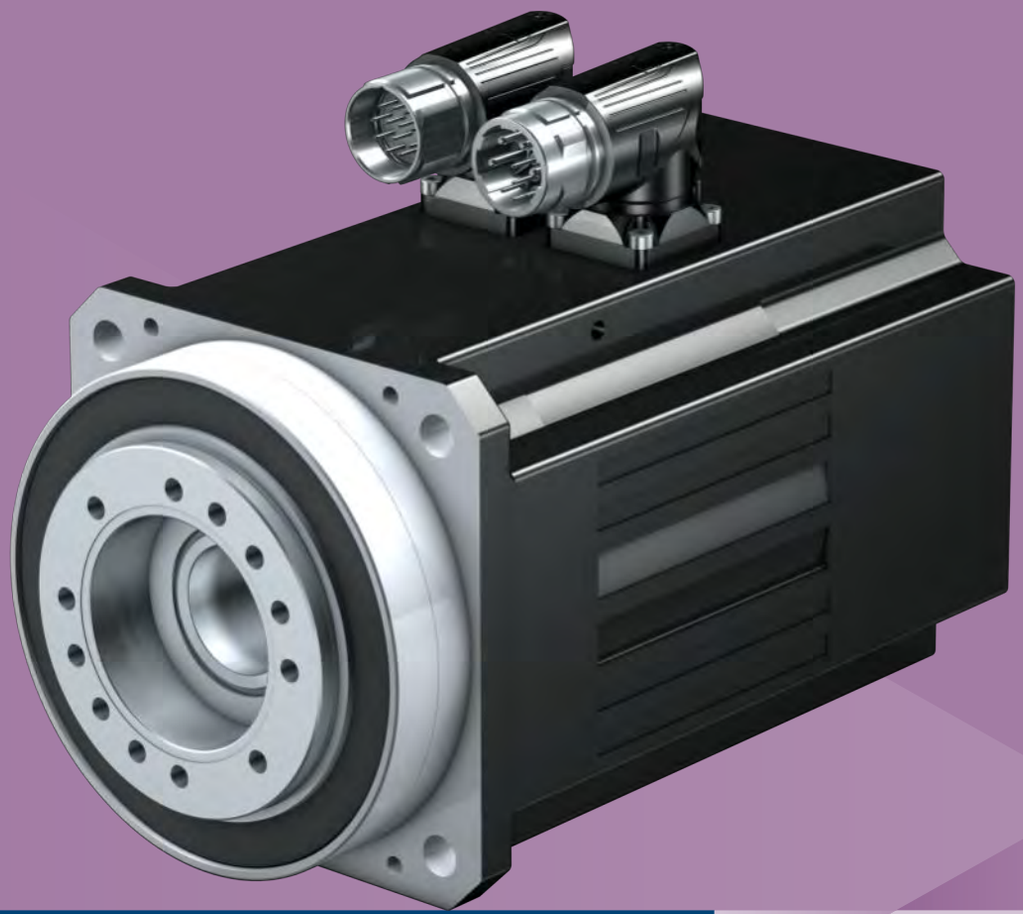


10 Planetary geared motors with hollow shaft EZHP

10.1 Overview

Planetary geared motors with hollow shaft

Features

Continuous flange hollow shaft for conveying media	✓
Attached compact planetary gear unit with i = 3, 9 or 27	✓
Maintenance-free	✓
Any mounting position	✓
Continuous operation without cooling	✓
Backlash-free holding brake (optional)	✓
Convection cooling	✓
Inductive EnDat absolute encoders	✓
Elimination of referencing with multi-turn absolute encoders (optional)	✓
Electronic nameplate for fast and reliable commissioning	✓
Rotating plug connectors with quick lock	✓

Technical data

i	3 – 27
M_{2acc}	47 – 500 Nm

10.2 Selection tables

The technical data specified in the selection tables applies to:

- Installation altitudes up to 1000 m above sea level
- Surrounding temperatures from −15 °C to +40 °C
- Operation on a STOBER drive controller
- DC link voltage U_{ZK} = DC 540 V
- Coating: RAL 9005 Jet black, matte

10.2.1 Technical data for synchronous servo motor

The following table shows the technical data for the motor component of EZHP planetary geared motors. You will need this technical data to calculate the operating point, among other things (see the chapter [▶ 10.7.1])

Formula symbols

An explanation of the formula symbols can be found in Chapter [▶ 29.1].

Observe the additional information on the following formula symbols:

- I_0 = RMS value of the line-to-line current when stall torque M_0 is generated (tolerance ±5%).
- I_{max} = RMS value of the short-term maximum permitted line-to-line current when maximum torque M_{max} is generated (tolerance ±5%). Exceeding I_{max} may lead to irreversible damage (demagnetization) of the rotor.
- I_N = RMS value of the line-to-line current when nominal torque M_N is generated at the nominal point (tolerance ±5%).
- M_0 = Torque that a motor is continuously able to deliver at a speed of 10 rpm (tolerance ±5%). At a speed of 0 rpm, a minor continuous torque has to be taken into account. Contact your STOBER customer advisor for such an application.

Type	K_{EM} [V/1000 rpm]	n_N [rpm]	M_N [Nm]	I_N [A]	$K_{M,N}$ [Nm/A]	P_N [kW]	M_0 [Nm]	I_0 [A]	K_{M0} [Nm/A]	M_R [Nm]	M_{max} [Nm]	I_{max} [A]	R_{U-V} [Ω]	L_{U-V} [mH]	T_{el} [ms]
EZHP_511U	97	3000	3.00	3.32	0.90	0.94	4.10	4.06	1.12	0.44	16.0	22.0	3.80	23.50	6.18
EZHP_512U	121	3000	7.00	5.59	1.25	2.2	7.80	6.13	1.34	0.44	31.0	33.0	2.32	16.80	7.24
EZHP_513U	119	3000	8.30	7.04	1.18	2.6	10.9	8.76	1.29	0.44	43.0	41.0	1.25	10.00	8.00
EZHP_515U	141	3000	14.0	9.46	1.48	4.4	16.4	11.0	1.54	0.44	67.0	52.0	0.93	8.33	8.96
EZHP_711U	95	3000	7.30	7.53	0.97	2.3	7.90	7.98	1.07	0.63	20.0	25.0	1.30	12.83	9.87
EZHP_712U	133	3000	11.6	8.18	1.42	3.6	14.4	9.99	1.50	0.63	41.0	36.0	1.00	11.73	11.73
EZHP_713U	122	3000	17.8	13.4	1.33	5.6	20.4	15.1	1.39	0.63	65.0	62.0	0.52	6.80	13.08
EZHP_715U	140	3000	24.6	17.2	1.43	7.7	31.1	21.1	1.50	0.63	104	87.0	0.33	4.80	14.55

10.2.2 Planetary geared motor selection tables

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
EZHP_5 (n_{1N} = 3000rpm, $M_{2acc,max}$ = 200 Nm)															
111	75	103	9.4	1.6	EZHP3511U	200	400	27.00	27/1	3500	4500	13	4	81	12
333	26	35	17	3.2	EZHP2511U	140	400	9.000	9/1	2700	4500	13	4	84	11
333	60	67	40	1.4	EZHP2512U	200	400	9.000	9/1	2700	4500	16	4	84	13
333	71	93	47	1.2	EZHP2513U	200	400	9.000	9/1	2700	4500	19	4	84	15
1000	8.7	12	23	6.6	EZHP1511U	47	400	3.000	3/1	2000	4500	14	3	101	9.2
1000	20	23	53	2.8	EZHP1512U	90	400	3.000	3/1	2000	4500	17	3	101	11
1000	24	32	63	2.4	EZHP1513U	130	400	3.000	3/1	2000	4500	20	3	101	13
1000	41	48	106	1.4	EZHP1515U	190	400	3.000	3/1	2000	4500	26	3	101	16
EZHP_7 (n_{1N} = 3000rpm, $M_{2acc,max}$ = 500 Nm)															
111	183	198	9.5	1.7	EZHP3711U	500	1000	27.00	27/1	3000	3500	36	4	215	23
111	291	362	15	1.1	EZHP3712U	500	1000	27.00	27/1	3000	3500	45	4	215	25
333	62	68	20	3.4	EZHP2711U	170	1000	9.000	9/1	2000	3500	36	4	217	20
333	99	123	32	2.2	EZHP2712U	350	1000	9.000	9/1	2000	3500	45	4	217	23
333	152	174	50	1.4	EZHP2713U	500	1000	9.000	9/1	2000	3500	54	4	217	26
333	210	266	69	1.0	EZHP2715U	500	1000	9.000	9/1	2000	3500	73	4	217	32
1000	21	23	23	7.0	EZHP1711U	58	1000	3.000	3/1	1600	3500	39	3	259	17
1000	34	42	36	4.4	EZHP1712U	120	1000	3.000	3/1	1600	3500	48	3	259	20
1000	52	59	56	2.9	EZHP1713U	190	1000	3.000	3/1	1600	3500	57	3	259	23
1000	72	91	77	2.1	EZHP1715U	300	1000	3.000	3/1	1600	3500	76	3	259	29

10.3 Torque/speed curves

Torque/speed curves depend on the nominal speed and/or winding design of the motor and the DC link voltage of the drive controller that is used. The following torque/speed curves apply to the DC link voltage DC 540 V.

The following torque/speed curves apply to EZHP planetary geared motors without gear unit component. The torque/speed curves for the entire drive can be found at http://products.stoeber.de.

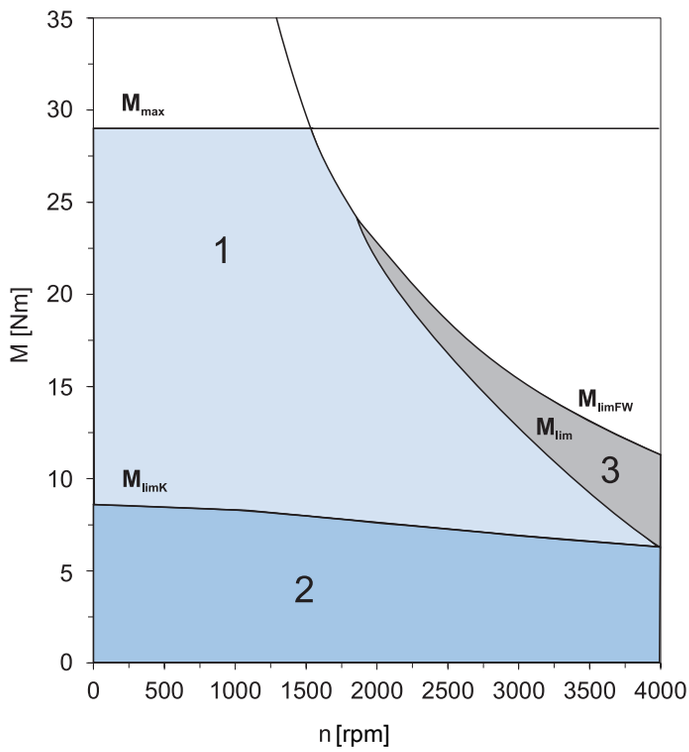
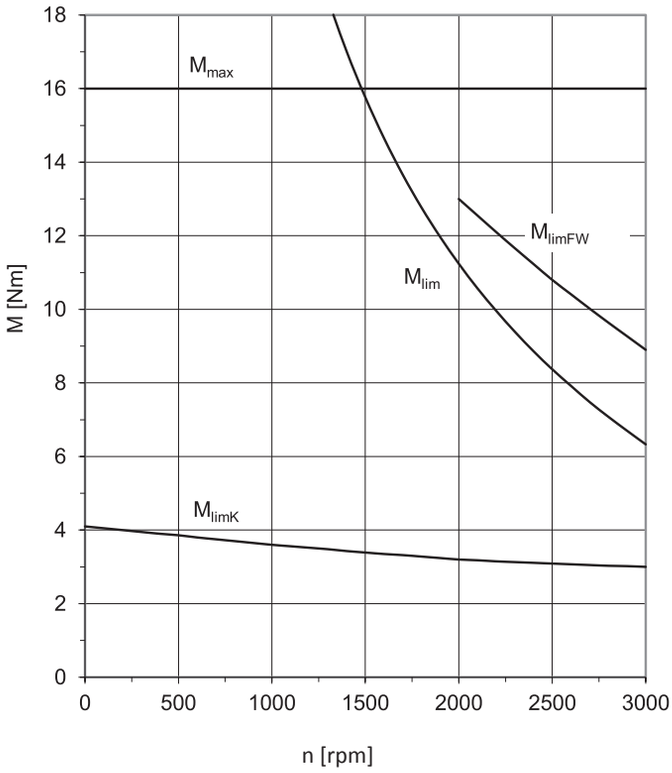


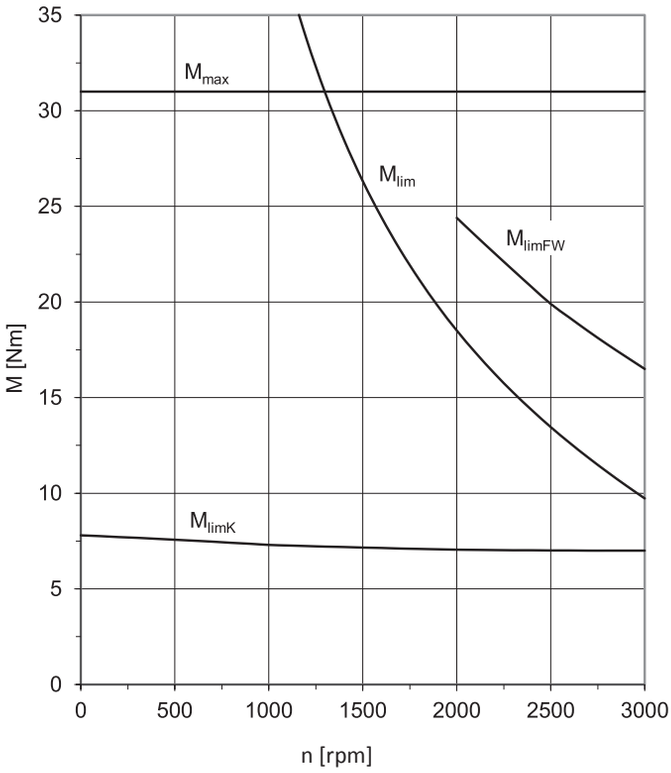
Fig. 1: Explanation of a torque/speed curve

1	Torque range for brief operation (ED_{20} < 100%) with $\Delta\vartheta$ = 100 K	2	Torque range for continuous operation at a constant load (S1 mode, ED_{20} = 100%) with $\Delta\vartheta$ = 100 K
3	Field weakening range (can be used only with operation on STOBER drive controllers)		

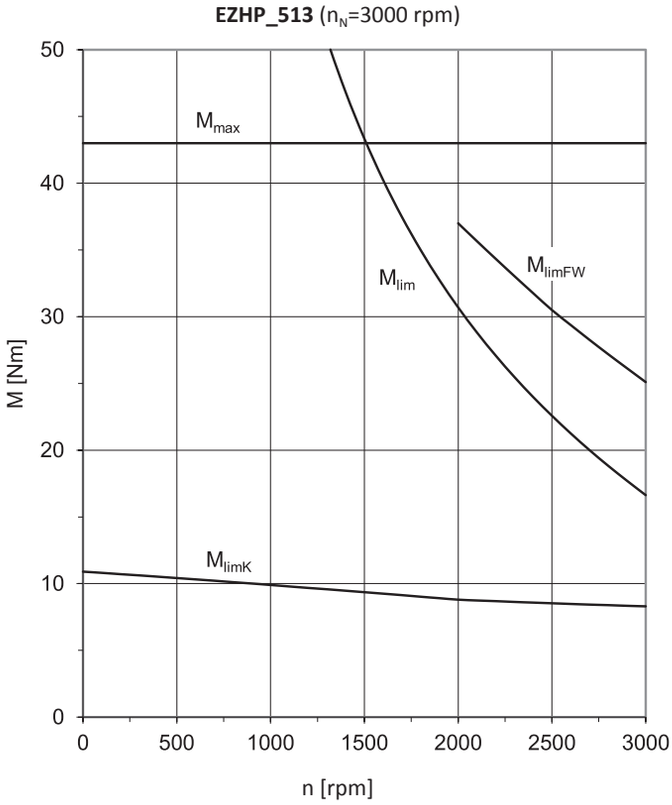
EZHP_511 (n_N=3000 rpm)



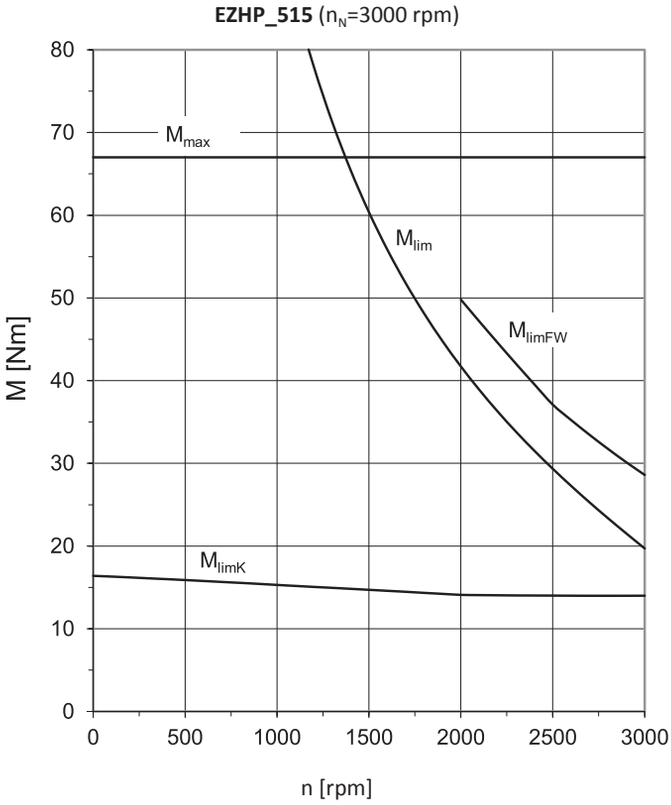
EZHP_512 (n_N=3000 rpm)



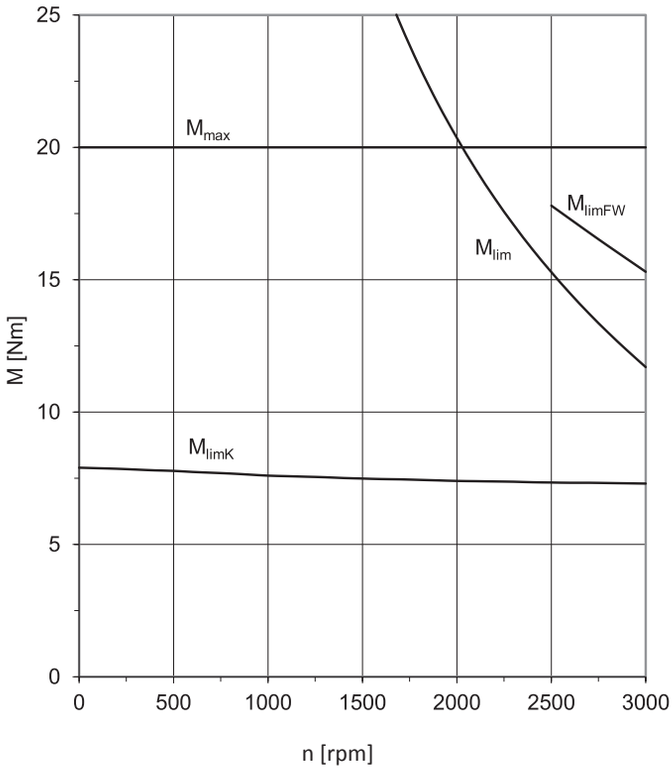
EZHP_513 (n_N=3000 rpm)



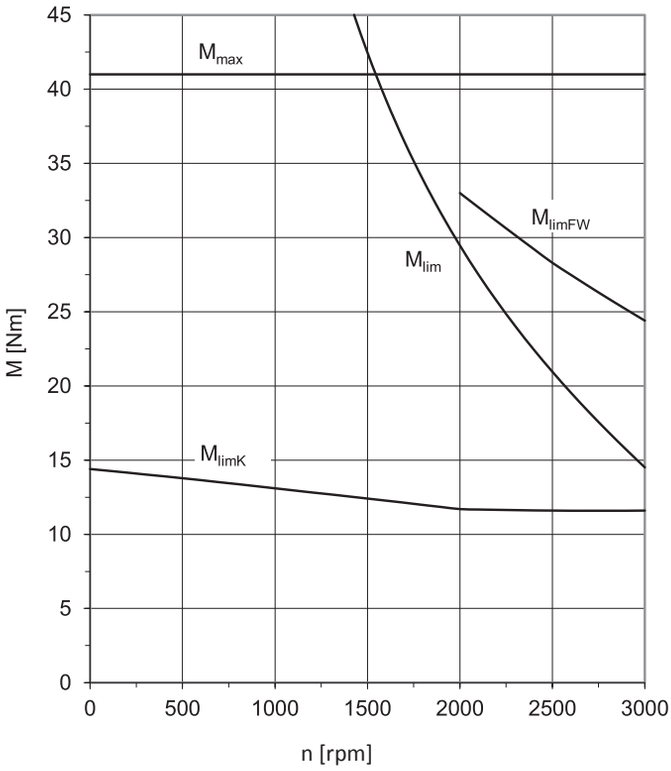
EZHP_515 (n_N=3000 rpm)



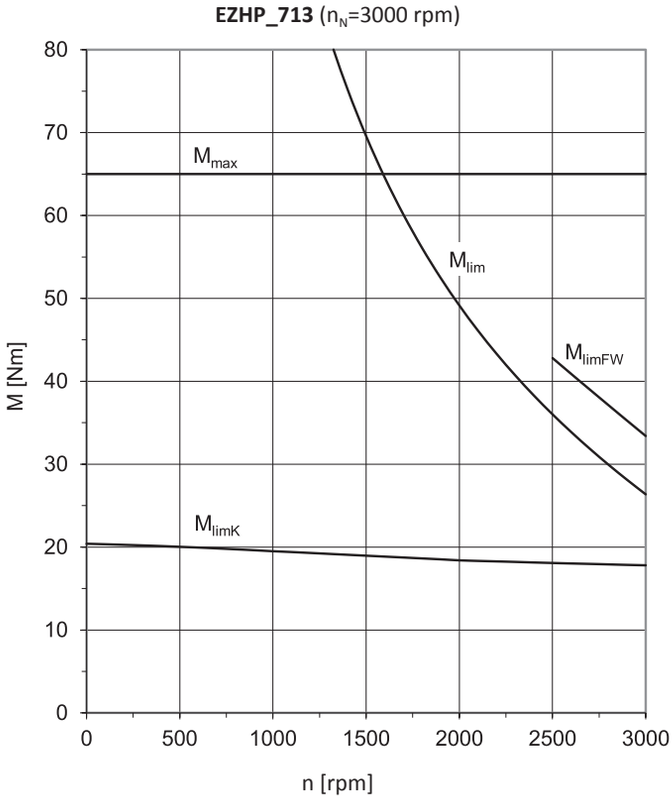
EZHP_711 (n_N=3000 rpm)



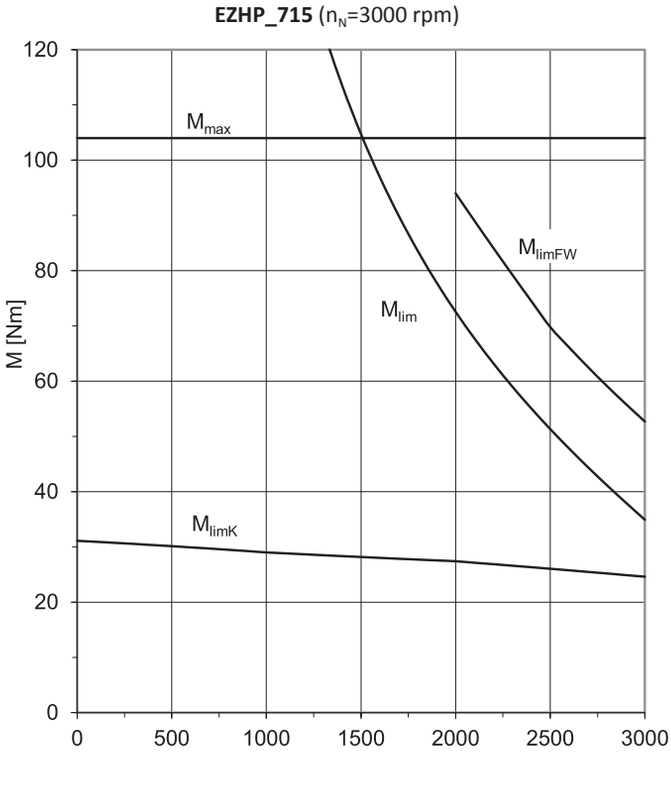
EZHP_712 (n_N=3000 rpm)



EZHP_713 (n_N=3000 rpm)



EZHP_715 (n_N=3000 rpm)



10.4 Dimensional drawings

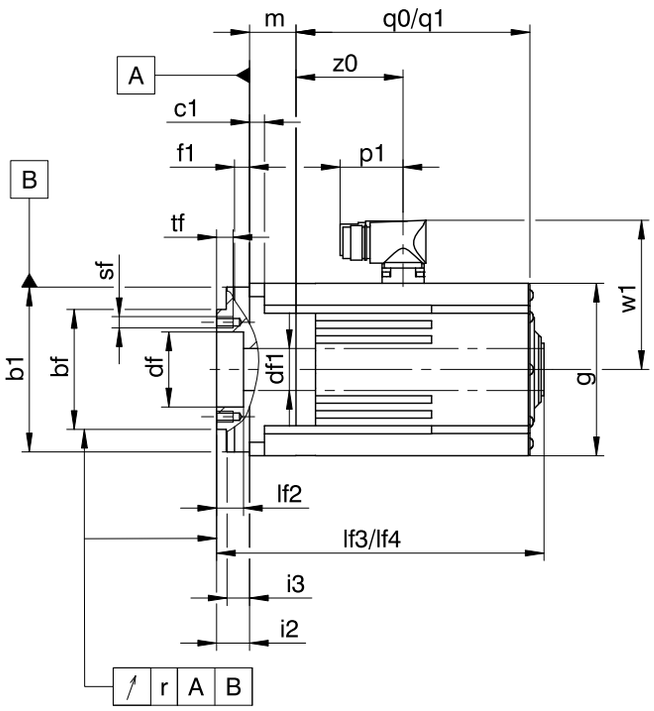
In this chapter, you can find the dimensions of the motors.

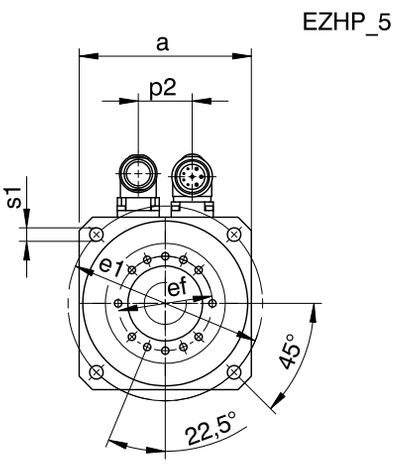
Dimensions can exceed the specifications of ISO 2768-mK due to casting tolerances or accumulation of individual tolerances.

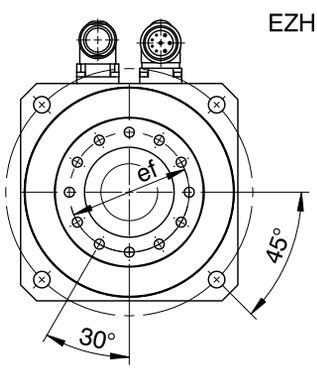
We reserve the right to make dimensional changes due to ongoing technical development.

You can download CAD models of our standard drives at http://cad.stoeber.de.

10.4.1 EZHP planetary geared motor







q0, lf3 Applies to motors without holding brake.

q1, lf4 Applies to motors with holding brake.

Type	□a	Øb1	Øbf	c1	Ødf	Ødf1	Øe1	Øef	f1	□g	i2	i3	lf2	lf3	lf4	m	p1	p2	q0	q1	r	Øs1	sf	tf	w1	z0
EZHP1511U	115	110_{h7}	80_{h7}	10	50^{H7}	28	130	63	10	115	29	22.5	18	218.6	273.9	24.0	40	36	156.1	211.4	0.020	9	M6	11	100	71.5
EZHP1512U	115	110_{h7}	80_{h7}	10	50^{H7}	28	130	63	10	115	29	22.5	18	243.6	298.9	24.0	40	36	181.1	236.4	0.020	9	M6	11	100	96.5
EZHP1513U	115	110_{h7}	80_{h7}	10	50^{H7}	28	130	63	10	115	29	22.5	18	268.6	323.9	24.0	40	36	206.1	261.4	0.020	9	M6	11	100	121.5
EZHP1515U	115	110_{h7}	80_{h7}	10	50^{H7}	28	130	63	10	115	29	22.5	18	318.6	373.9	24.0	40	36	256.1	311.4	0.020	9	M6	11	100	171.5
EZHP1711U	145	140_{h7}	100_{h7}	15	60^{H7}	38	165	80	10	145	38	31.0	20	247.7	307.7	29.5	40	42	170.7	230.7	0.025	11	M8	14	115	77.2
EZHP1712U	145	140_{h7}	100_{h7}	15	60^{H7}	38	165	80	10	145	38	31.0	20	272.7	332.7	29.5	40	42	195.7	255.7	0.025	11	M8	14	115	102.2
EZHP1713U	145	140_{h7}	100_{h7}	15	60^{H7}	38	165	80	10	145	38	31.0	20	297.7	357.7	29.5	40	42	220.7	280.7	0.025	11	M8	14	115	127.2
EZHP1715U	145	140_{h7}	100_{h7}	15	60^{H7}	38	165	80	10	145	38	31.0	20	352.7	412.7	29.5	71	42	275.7	335.7	0.025	11	M8	14	134	178.2
EZHP2511U	115	110_{h7}	80_{h7}	10	50^{H7}	28	130	63	10	115	29	22.5	18	243.1	298.4	48.5	40	36	156.1	211.4	0.020	9	M6	11	100	71.5
EZHP2512U	115	110_{h7}	80_{h7}	10	50^{H7}	28	130	63	10	115	29	22.5	18	268.1	323.4	48.5	40	36	181.1	236.4	0.020	9	M6	11	100	96.5
EZHP2513U	115	110_{h7}	80_{h7}	10	50^{H7}	28	130	63	10	115	29	22.5	18	293.1	348.4	48.5	40	36	206.1	261.4	0.020	9	M6	11	100	121.5
EZHP2711U	145	140_{h7}	100_{h7}	15	60^{H7}	38	165	80	10	145	38	31.0	20	275.2	335.2	57.0	40	42	170.7	230.7	0.025	11	M8	14	115	77.2
EZHP2712U	145	140_{h7}	100_{h7}	15	60^{H7}	38	165	80	10	145	38	31.0	20	300.2	360.2	57.0	40	42	195.7	255.7	0.025	11	M8	14	115	102.2
EZHP2713U	145	140_{h7}	100_{h7}	15	60^{H7}	38	165	80	10	145	38	31.0	20	325.2	385.2	57.0	40	42	220.7	280.7	0.025	11	M8	14	115	127.2
EZHP2715U	145	140_{h7}	100_{h7}	15	60^{H7}	38	165	80	10	145	38	31.0	20	380.2	440.2	57.0	71	42	275.7	335.7	0.025	11	M8	14	134	178.2
EZHP3511U	115	110_{h7}	80_{h7}	10	50^{H7}	28	130	63	10	115	29	22.5	18	267.6	322.9	73.0	40	36	156.1	211.4	0.020	9	M6	11	100	71.5
EZHP3711U	145	140_{h7}	100_{h7}	15	60^{H7}	38	165	80	10	145	38	31.0	20	302.7	362.7	84.5	40	42	170.7	230.7	0.025	11	M8	14	115	77.2
EZHP3712U	145	140_{h7}	100_{h7}	15	60^{H7}	38	165	80	10	145	38	31.0	20	327.7	387.7	84.5	40	42	195.7	255.7	0.025	11	M8	14	115	102.2

10.5 Type designation

Sample code

EZH	P	2	5	1	1	U	F	AD	B1	O	097

Explanation

Code	Designation	Design
EZH	Type	Synchronous servo motor with hollow shaft
P	Drive	Attached planetary gear unit
1	Stages	Single-stage (i=3)
2		Two-stage (i=9)
3		Three-stage (i=27)
5	Motor size	5 (example)
1	Generation	1
1	Length	1 (example)
U	Cooling	Convection cooling
F	Output	Flange
AD	Drive controller	SD6 (example)
B1	Encoder	EBI 135 EnDat 2.2 (example)
O	Brake	Without holding brake
P		Permanent magnet holding brake
097	Electromagnetic constant (EMC) K_{EM}	97 V/1000 rpm (example)

Notes

- In the chapter [▶ 10.6.7], you can find information about available encoders.
- In the chapter [▶ 10.6.7.3], you can find information about connecting planetary geared motors to other drive controllers from STOBER.
- In Chapter [▶ 27], you can find information about options for connecting STOBER synchronous servo motors to drive controllers from other manufacturers.

10.6 Product description

10.6.1 General features

Feature	Description
Design	IM B5, IM V1, IM V3 in accordance with EN 60034-7
Protection class	IP56 / IP66 (option)
Thermal class	155 (F) in accordance with EN 60034-1 (155 °C, heating $\Delta\vartheta$ = 100 K)
Maximum permitted temperature at the surface of the geared motor	≤ 80 °C
Surface	Matte black as per RAL 9005
Cooling	IC 410 convection cooling
Sealing	Gamma ring (on B side), shaft seal ring (on A side)
Shaft	Flange hollow shaft
Vibration intensity	A in accordance with EN 60034-14
Noise level	Limit values in accordance with EN 60034-9 (motor component) Limit values in accordance with VDI 2159 (geared component)

10.6.2 Electrical features

General electrical features of the motor component of the geared motor are described in this chapter. Details can be found in the "Selection tables" chapter.

Feature	Description
DC link voltage	DC 540 V (max. 620 V) on STOBER drive controllers
Winding	Three-phase, single-tooth coil design
Circuit	Star, center not led through
Protection class	I (protective grounding) in accordance with EN 61140
Number of pole pairs	7

10.6.3 Installation conditions

The specified torques and forces only apply when attaching gear units at the machine side using screws of quality 10.9. In addition, the gear housing must be adjusted at the pilot (H7).

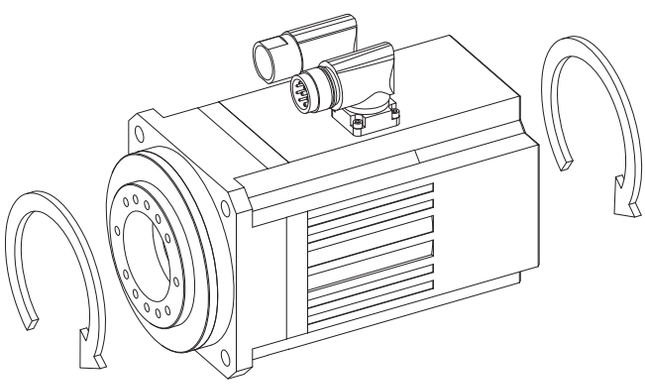
10.6.4 Lubricants

STOBER fills the gear units with the amount and type of lubricant specified on the nameplate.

Lubricant filling quantities for gear units, document ID 441871, can be found online at http://www.stoeber.de

10.6.5 Direction of rotation

The input and output rotate in the same direction.



10.6.6 Ambient conditions

Standard ambient conditions for transport, storage and operation of the geared motor are described in this chapter.

Feature	Description
Surrounding temperature for transport/storage	−30 °C to +85 °C
Surrounding temperature for operation	−15 °C to +40 °C
Installation altitude	≤ 1000 m above sea level
Shock load	≤ 50 m/s² (5 g), 6 ms in accordance with EN 60068-2-27

Notes

- EHZP planetary geared motors are not suitable for potentially explosive atmospheres in accordance with (ATEX) Directive.
- Secure the power cables close to the motor so that vibrations of the cable do not place impermissible loads on the motor plug connector.
- Note that the braking torques of the holding brake (optional) may be reduced by shock loading.
- Also take into consideration the shock load of the geared motor due to output units which are coupled with the geared motor.

10.6.7 Encoders

STOBER synchronous servo motors can be designed with different encoder models. The following chapters include information for choosing the optimal encoder for your application.

10.6.7.1 Selection tool for EnDat interface

The following table offers a selection tool for the EnDat interface of absolute encoders.

Feature	EnDat 2.1	EnDat 2.2
Short cycle times	★★☆	★★★
Transfer of additional information along with the position value	–	✓
Expanded power supply range	★★☆	★★★
Key: ★★☆ = good, ★★★ = very good		

10.6.7.2 EnDat encoders

In this chapter, you can find detailed technical data for encoder models that can be selected with EnDat interface.

Encoders with EnDat 2.2 interface

Encoder model	Code	Measuring method	Recordable revolutions	Resolution	Position values per revolution
EBI 135	B1	Inductive	65536	19 bit	524288
ECI 119-G2	C9	Inductive	–	19 bit	524288

Encoders with EnDat 2.1 interface

Encoder model	Code	Measuring method	Recordable revolutions	Resolution	Position values per revolution	Periods per revolution
ECI 119	C4	Inductive	–	19 bit	524288	Sin/Cos 32

Notes

- The encoder code is a part of the type designation of the motor.
- Multiple revolutions of the motor shaft can be recorded only using multi-turn encoders.
- The EBI 135 encoder requires an external buffer battery so that absolute position information is retained after the power supply is turned off (AES option for STOBER drive controllers).

10.6.7.3 Possible combinations with drive controllers

The following table shows the options for combining STOBER drive controllers with selectable encoder models.

Drive controller		SDS 5000	MDS 5000	SDS 5000/ MDS 5000	SD6		SI6	SC6
Drive controller code		AA	AB	AC	AD	AE	**AP**	**AU**
Connection plan ID		442305	442306	442307	442450	442451	**442771**	**443052**
Encoder	Encoder code							
EBI 135	B1	✓	✓	–	✓	–	✓	✓
ECI 119-G2	C9	✓	✓	–	✓	–	✓	✓
ECI 119	C4	–	–	✓	–	✓	–	–

Notes

- The drive controller and encoder codes are a part of the type designation of the motor (see the "Type designation" chapter).
- In Chapter [▷ 27], you can find information about options for connecting STOBER synchronous servo motors to drive controllers from other manufacturers.

10.6.8 Temperature sensor

In this chapter, you can find technical data for the temperature sensors that are installed in STOBER synchronous servo motors for implementing thermal winding protection. To prevent damage to the motor, always monitor the temperature sensor with appropriate devices that will turn off the motor if the maximum permitted winding temperature is exceeded.

Some encoders feature integrated temperature monitoring, the warning and switch-off thresholds of which may overlap with the corresponding values set for the temperature sensor in the drive controller. In some cases, this may result in an instance where an encoder with internal temperature monitoring forces the motor to shut down, even before the motor has reached its nominal data.

You can find information about the electrical connection of the temperature sensor in the "Connection method" chapter.

10.6.8.1 PTC thermistor

The PTC thermistor is installed as a standard temperature sensor in STOBER synchronous servo motors.

The PTC thermistor is a triple thermistor in accordance with DIN 44082 that can be used for monitoring the temperature of each winding phase. The resistance values in the following table and curve refer to a single thermistor in accordance with DIN 44081. These values must be multiplied by 3 for a triple thermistor in accordance with DIN 44082.

Feature	Description
Nominal response temperature ϑ_{NAT}	145 °C ± 5 K
Resistance R −20 °C up to ϑ_{NAT} − 20 K	≤ 250 Ω
Resistance R with ϑ_{NAT} − 5 K	≤ 550 Ω
Resistance R with ϑ_{NAT} + 5 K	≥ 1330 Ω
Resistance R with ϑ_{NAT} + 15 K	≥ 4000 Ω
Operating voltage	≤ DC 7.5 V
Thermal response time	< 5 s
Thermal class	155 (F) in accordance with EN 60034-1 (155 °C, heating Δϑ = 100 K)

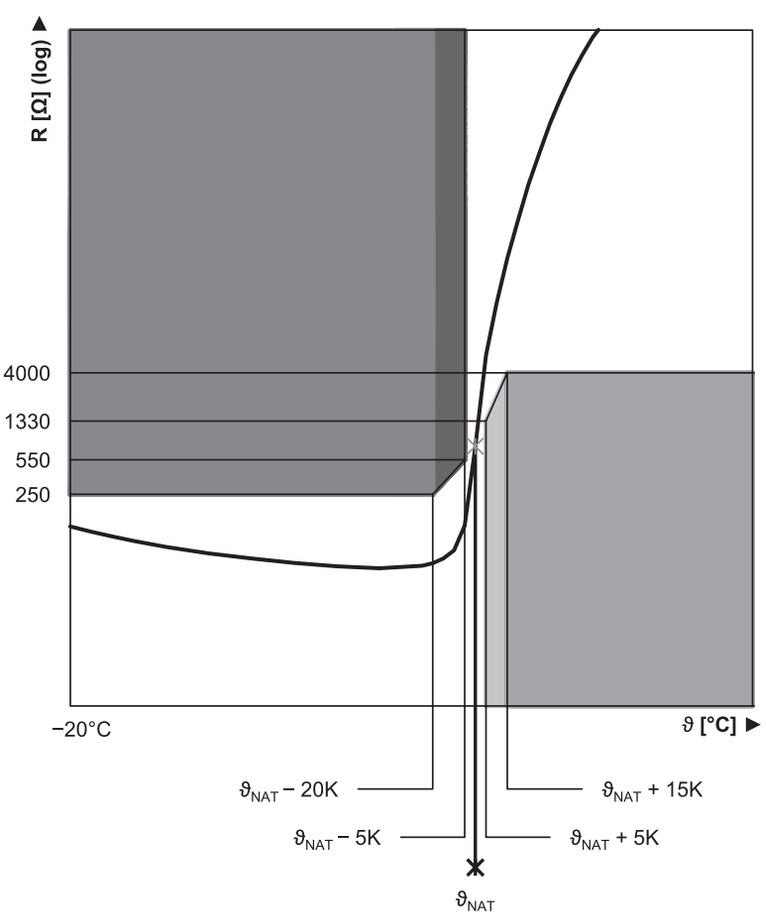


Fig. 2: PTC thermistor curve (single thermistor)

10.6.8.2 Pt1000 temperature sensor

STOBER synchronous servo motors are available in versions with a Pt1000 temperature sensor. The Pt1000 is a temperature-dependent resistor that has a resistance curve with a linear relationship with temperature. As a result, the Pt1000 allows for measurements of the winding temperature. These measurements are limited to one phase of the motor winding, however. In order to adequately protect the motor from exceeding the maximum permitted winding temperature, use a i^2t model in the drive controller to monitor the winding temperature.

Avoid exceeding the specified measurement current so that the measured values are not falsified due to self-heating of the temperature sensor.

Feature	Description
Measurement current (constant)	2 mA
Resistance R for ϑ = 0 °C	1000 Ω
Resistance R for ϑ = 80 °C	1300 Ω
Resistance R for ϑ = 150 °C	1570 Ω

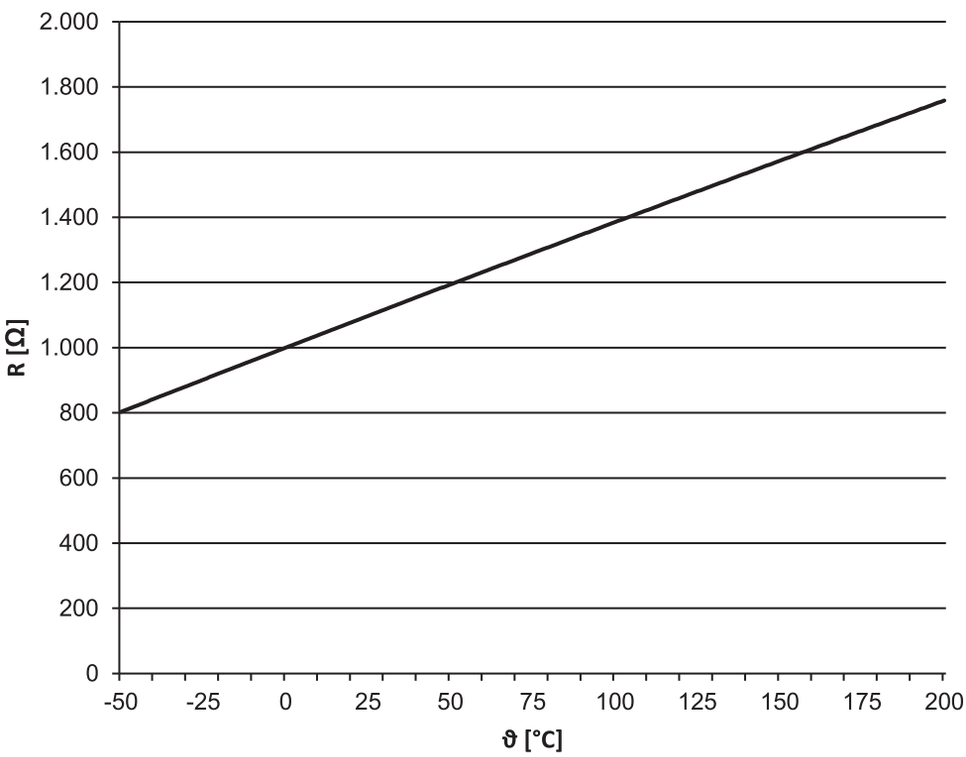


Fig. 3: Pt1000 temperature sensor characteristic curve

10.6.9 Cooling

An EZHP planetary geared motor is cooled by convection cooling (IC 410 in accordance with EN 60034-6). The air flowing around the geared motor is heated by the radiated motor heat and rises.

10.6.10 Holding brake

STOBER synchronous servo motors can be equipped with a backlash-free holding brake using permanent magnets in order to secure the motor shaft when at a standstill. The holding brake engages automatically if the voltage drops.

Nominal voltage of permanent magnet holding brake: DC 24 V ± 5%, smoothed.

Observe the following during project configuration:

- The holding brake is designed to keep the motor shaft from moving. Activate braking processes during operation using the corresponding electrical functions of the drive controller. In exceptional circumstances, the holding brake can be used for braking from full speed (following a power failure or when setting up the machine). The maximum permitted work done by friction $W_{B,Rmax/h}$ may not be exceeded.
- Note that the braking torque M_{Bdyn} may initially be up to 50% less when braking from full speed. As a result, the braking effect has a delayed action and braking distances become longer.

- Regularly perform a brake test to ensure the functional safety of the brakes. Details can be found in the documentation of the motor and the drive controller.
- Connect a varistor of type S14 K35 (or comparable) in parallel to the brake coil to protect your machine from switching surges. (Not necessary for connecting the holding brake to STOBER drive controllers of the 5th and 6th generation with a BRS/BRM brake module).
- The holding brake of the motor does not offer adequate safety for persons in the hazardous area of gravity-loaded vertical axes. Therefore take additional measures to minimize risk, e.g. by providing a mechanical substructure for maintenance work.
- Take into consideration voltage losses in the connection cables that connect the voltage source to the holding brake connections.
- The holding torque of the brake can be reduced by shock loading. Information about shock loading can be found in the "Ambient conditions" chapter.
- At operating temperatures from −15 °C to 0 °C, a cold holding brake in the released state may cause operating noises. As the temperature of the holding brake increases, these noises decrease such that operating noises are not heard when using holding brake at operating temperature in the released state.

Calculation of work done by friction per braking process

$$W_{B,R/B} = \frac{J_{tot} \cdot n^2}{182.4} \cdot \frac{M_{Bdyn}}{M_{Bdyn} \pm M_L}$$

The sign of M_L is positive if the movement runs vertically upwards or horizontally and it is negative if the movement runs vertically down.

Calculation of the stop time

$$t_{dec} = 2.66 \cdot t_{1B} + \frac{n \cdot J_{tot}}{9.55 \cdot M_{Bdyn}}$$

Switching behavior

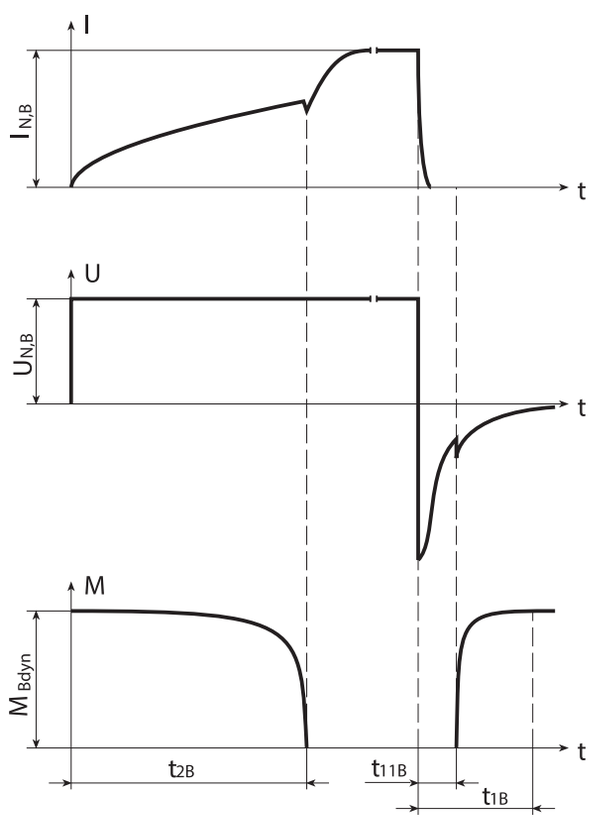


Fig. 4: Holding brake – Switching behavior

Technical data

Type	M_{Bstat} [Nm]	M_{Bdyn} [Nm]	$I_{N,B}$ [A]	$W_{B,Rmax/h}$ [kJ]	$N_{B,stop}$	$J_{B,stop}$ [10^{-4}kgm²]	$W_{B,Rlim}$ [kJ]	t_{2B} [ms]	t_{11B} [ms]	t_{1B} [ms]	$x_{B,N}$ [mm]	ΔJ_B [10^{-4}kgm²]	Δm_B [kg]
EZHP_511	18	15	1.1	11.0	3250	34.1	550	55	3.0	30	0.3	5.450	2.32
EZHP_512	18	15	1.1	11.0	2750	40.2	550	55	3.0	30	0.3	5.450	2.32
EZHP_513	18	15	1.1	11.0	2400	46.3	550	55	3.0	30	0.3	5.450	2.32
EZHP_515	18	15	1.1	11.0	1850	58.8	550	55	3.0	30	0.3	5.450	2.32
EZHP_711	28	25	1.1	25.0	3200	88.6	1400	120	4.0	40	0.4	12.620	3.91
EZHP_712	28	25	1.1	25.0	2650	107	1400	120	4.0	40	0.4	12.620	3.91
EZHP_713	28	25	1.1	25.0	2250	125	1400	120	4.0	40	0.4	12.620	3.91
EZHP_715	28	25	1.1	25.0	1700	162	1400	120	4.0	40	0.4	12.620	3.91

10.6.11 Connection method

The following chapters describe the connection technology of STOBER synchronous servo motors in the standard version on STOBER drive controllers. You can find further information relating to the drive controller type that was specified in your order in the connection plan that is delivered with every synchronous servo motor.

In Chapter [▶ 27], you can find information about options for connecting STOBER synchronous servo motors to drive controllers from other manufacturers.

10.6.11.1 Connection of the motor housing to the grounding conductor system

Connect the motor housing to the grounding conductor system of the machine in order to prevent personal injury and faulty triggering of residual current protective devices.

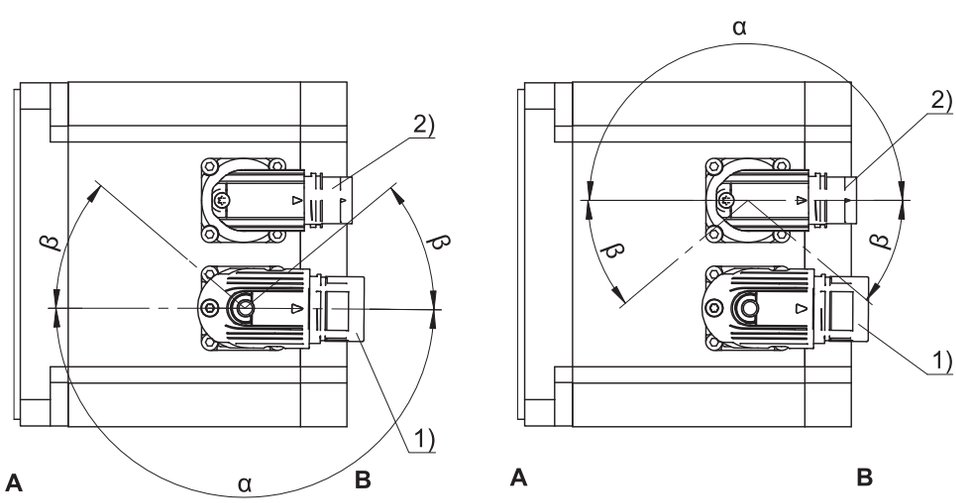
All attachment parts required for the connection of the grounding conductor to the motor housing are delivered with the motor. The grounding screw of the motor is identified with the symbol ⏚ in accordance with IEC 60417-DB. The cross-section of the grounding conductor has to be at least as large as the cross-section of the lines in the power connection.

10.6.11.2 Plug connectors

STOBER synchronous servo motors are equipped with twistable quick-lock plug connectors in the standard version. Details can be found in this chapter.

The figures represent the position of the plug connectors upon delivery.

Turning ranges of plug connectors



1	Power plug connector	2	Encoder plug connector
A	Attachment or output side of the motor	B	Rear side of the motor

Power plug connector features

Motor type	Size	Connection	Turning range	
			α	β
EZHP_5, EZHP_711 – EZHP_713	con.23	Quick lock	180°	40°
EZHP_715	con.40	Quick lock	180°	40°

Encoder plug connector features

Motor type	Size	Connection	Turning range	
			α	β
EZHP	con.17	Quick lock	180°	20°

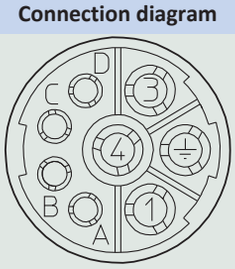
Notes

- The number after "con." indicates the approximate external thread diameter of the plug connector in mm (for example, con.23 designates a plug connector with an external thread diameter of about 23 mm).
- In turning range β, the power or encoder plug connectors can be turned only if doing so does not cause them to collide.

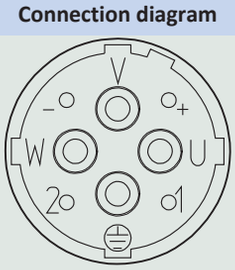
10.6.11.3 Connection assignment of the power plug connector

The size and connection plan of the power plug connector depend on the size of the motor. The colors of the connecting wires inside the motor are specified in accordance with IEC 60757.

Plug connector size con.23 (1)

Connection diagram	Pin	Connection	Color
	1	U phase	black
	3	V phase	blue
	4	W phase	red
	A	Brake +	red
	B	Brake –	black
	C	Temperature sensor +	
	D	Temperature sensor –	
	⏚	Grounding conductor	green-yellow

Plug connector size con.40 (1.5)

Connection diagram	Pin	Connection	Color
	U	U phase	black
	V	V phase	blue
	W	W phase	red
	+	Brake +	red
	–	Brake –	black
	1	Temperature sensor +	
	2	Temperature sensor –	
	⏚	Grounding conductor	green-yellow

10.6.11.4 Connection assignment of the encoder plug connector

The size and connection assignment of the encoder plug connectors depend on the model of encoder installed and the size of the motor. The colors of the connecting wires inside the motor are specified in accordance with IEC 60757.

EnDat 2.1/2.2 digital encoders, plug connector size con.17

Connection diagram	Pin	Connection	Color
	1	Clock +	violet
	2	Up sense	browngreen
	3		
	4		
	5	Data –	pink
	6	Data +	grey
	7		
	8	Clock –	yellow
	9		
	10	0 V GND	whitegreen
	11		
	12	Up +	browngreen
	Pin 2 is connected to pin 12 in the plug connector		

EnDat 2.2 digital encoder with battery buffering, plug connector size con.17

Connection diagram	Pin	Connection	Color
	1	Clock +	violet
	2	UBatt +	blue
	3	UBatt –	white
	4		
	5	Data –	pink
	6	Data +	grey
	7		
	8	Clock –	yellow
	9		
	10	0 V GND	white green
	11		
	12	Up +	brown green
	UBatt+ = DC 3.6 V for encoder model EBI in combination with the AES option of STOBER drive controllers		

EnDat 2.1 encoder with sin/cos incremental signals, plug connector size con.17

Connection diagram	Pin	Connection	Color
	1	Up sense	blue
	2		
	3		
	4	0 V sense	white
	5		
	6		
	7	Up +	brown green
	8	Clock +	violet
	9	Clock –	yellow
	10	0 V GND	white green
	11		
	12	B + (Sin +)	blue black
	13	B – (Sin –)	red black
	14	Data +	grey
	15	A + (Cos +)	green black
	16	A – (Cos –)	yellow black
	17	Data –	pink

10.7 Project configuration

Project your drives using our SERVOsoft designing software. You can receive SERVOsoft for free from your adviser at one of our sales centers. Observe the limit conditions in this chapter to ensure a safe design for your drives.

An explanation of the formula symbols can be found in Chapter [▶ 29.1].

10.7.1 Calculation of the operating point

In this chapter, you can find information needed to calculate the operating point.

Check the following conditions for operating points other than the nominal point M_{2N} specified in the selection tables.

$$n_{1m^*} \leq \frac{n_{1maxDB}}{fB_T}$$

$$n_{1max^*} \leq \frac{n_{1max\,ZB}}{fB_T}$$

$$M_{2eff^*} \leq M_{2th}$$

$$M_{2acc^*} \leq M_{2acc}$$

$$M_{2NOT^*} \leq M_{2NOT}$$

$$M_{2eq^*} \leq M_{2N} \cdot \frac{S}{fB_{op} \cdot fB_t}$$

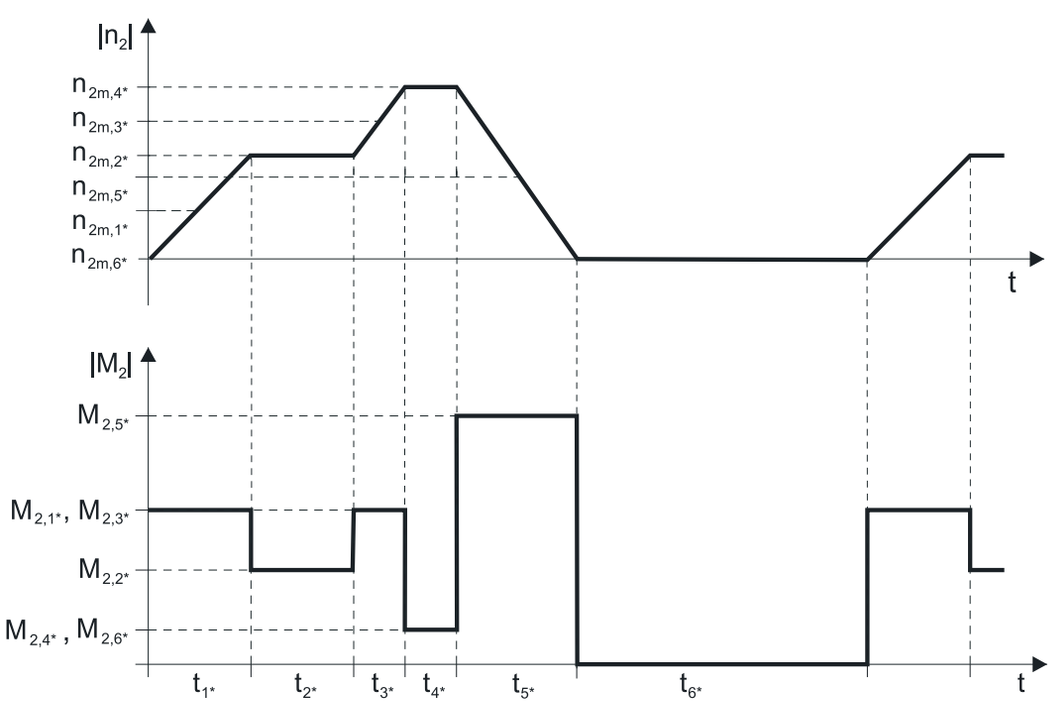
The values for n_{1maxDB}, n_{1maxZB}, M_{2acc}, M_{2NOT}, M_{2N} and S can be found in the selection tables.

The values for fB_T, fB_{op} and fB_t can be found in the corresponding tables in this chapter.

Calculate the thermal limit torque M_{2th} for a duty cycle > 50%.

Example of cyclic operation

The following calculations are based on a representation of the power taken from the output based in accordance with the following example:



Calculation of the actual average input speed

$$n_{1m^*} = n_{2m^*} \cdot i$$

$$n_{2m^*} = \frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}{t_{1^*} + \ldots + t_{n^*}}$$

If $t_{1^*} + \ldots + t_{5^*} \geq 20$ min, calculate n_{2m^*} without the rest phase t_{6^*}.

The values for the ratio i can be found in the selection tables.

Calculation of the actual effective torque

$$M_{2eff^*} = \sqrt{\frac{t_{1^*} \cdot M_{2,1^*}{}^2 + \ldots + t_{n^*} \cdot M_{2,n^*}{}^2}{t_{1^*} + \ldots + t_{n^*}}}$$

Calculation of the actual equivalent torque

$$M_{2eq^*} = \sqrt[3]{\frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} \cdot \left|M_{2,1^*}{}^3\right| + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*} \cdot \left|M_{2,n^*}{}^3\right|}{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}}$$

Calculation of the thermal limit torque

Calculate the thermal limit torque M_{2th} for a duty cycle $ED_{20} > 50\%$ and the actual average input speed n_{1m^*}. (At $K_{mot,th} \leq 0$ you must reduce the average input speed n_{1m^*} accordingly or select another geared motor size.)

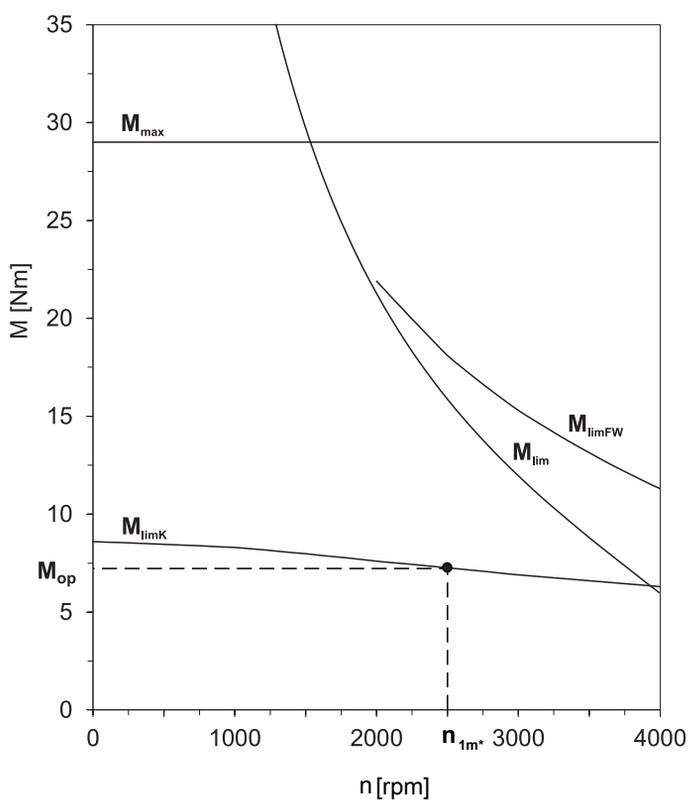
$$M_{2th} = M_{op} \cdot i \cdot K_{mot,th}$$

$$K_{mot,th} = 0{,}93 - \frac{a_{th}}{1000} \cdot fB_T \cdot \left(\frac{n_{1m^*}}{1000}\right)^3$$

The values for i and a_{th} can be found in the selection tables.

The values for fB_T can be found in the corresponding table in this chapter.

The value for the torque of the motor at operating point M_{op} with the determined average input speed n_{1m^*} can be found in the motor curve of Chapter [▶ 10.3]. Note the size and nominal speed n_N of the motor. The figure below shows an example of reading the torque M_{op} at the operating point.



Operating factors

Operating mode	fB_{op}
Uniform continuous operation	1.00
Cyclic operation	1.00
Reversing load cyclic operation	1.00

Run time	fB_t
Daily run time ≤ 8 h	1.00
Daily run time ≤ 16 h	1.15
Daily run time ≤ 24 h	1.20

Temperature	fB_T
Surrounding temperature ≤ 20 °C	1.0
Surrounding temperature ≤ 30 °C	1.1
Surrounding temperature ≤ 40 °C	1.25

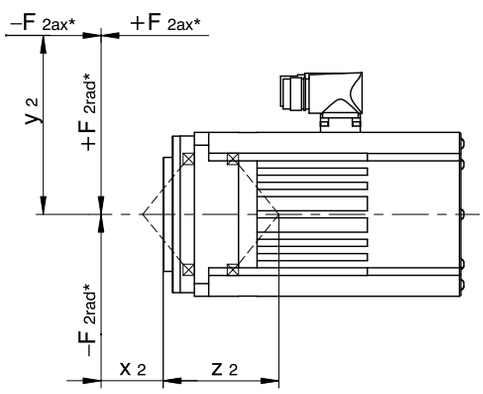
Notes

- The maximum permitted gear unit temperature (see the "General product features" chapter) must not be exceeded. Doing so may result in damage to the geared motor.
- For braking from full speed (for example when the power fails or when setting up the machine), note the permitted gear unit torques (M_{2acc}, M_{2NOT}) in the selection tables.

10.7.2 Permitted shaft loads

The values specified in the tables apply to the permitted shaft loads:

- For shaft dimensions in accordance with the catalog
- For output speeds $n_{2m*} \leq 100$ rpm ($F^{2axN} = F_{2ax100}$; $F_{2radN} = F_{2rad100}$; $M_{2kN} = M_{2k100}$)
- Only if pilots are used (housing, flange hollow shaft)



For other output speeds, download diagrams at http://products.stoeber.de.

The following applies to output speeds $n_{2m*} > 100$ rpm:

$$F_{2axN} = \frac{F_{2ax100}}{\sqrt[3]{\frac{n_{2m*}}{100\ \text{rpm}}}} \qquad F_{2radN} = \frac{F_{2rad100}}{\sqrt[3]{\frac{n_{2m*}}{100\ \text{rpm}}}} \qquad M_{2kN} = \frac{M_{2k100}}{\sqrt[3]{\frac{n_{2m*}}{100\ \text{rpm}}}}$$

The values for F_{2ax100}, $F_{2rad100}$ and M_{2k100} can be found in the following table.

Type	z_2 [mm]	F_{2ax} [N]	F_{2radN} [N]	$F_{2rad,acc}$ [N]	M_{2kN} [Nm]	$M_{2k,acc}$ [Nm]	C_{2k} [Nm/arcmin]
EZHP_5	88.0	4150	5029	5429	440	475	340
EZHP_7	110.0	5000	9070	13605	1000	1500	700

You can determine the permitted radial forces from the permitted breakdown torque M_{2kN} and $M_{2k,acc}$. The actual radial forces may not exceed the permitted radial forces. The permitted radial forces are in relation to the end of the hollow shaft (x2 = 0).

$$M_{2k,acc^*} = \frac{2 \cdot F_{2ax^*} \cdot y_2 + F_{2rad,acc^*} \cdot (x_2 + z_2)}{1000} \leq M_{2k,acc}$$

For applications with multiple axial and/or radial forces, you must add the forces as vectors.

In the event of EMERGENCY OFF operation (max. 1000 load changes), you can multiply the permitted forces and torques for F_{2ax100}, $F_{2rad100}$ and M_{2k100} by a factor of two.

Also note the calculation for equivalent values:

$$M_{2k,eq^*} = \sqrt[3]{\frac{|n_{2m,1^*}| \cdot t_{1^*} \cdot |M_{2k,acc,1^*}^{\ 3}| + \ldots + |n_{2m,n^*}| \cdot t_{n^*} \cdot |M_{2k,acc,n^*}^{\ 3}|}{|n_{2m,1^*}| \cdot t_{1^*} + \ldots + |n_{2m,n^*}| \cdot t_{n^*}}} \leq M_{2kN}$$

$$F_{2rad,eq^*} = \sqrt[3]{\frac{|n_{2m,1^*}| \cdot t_{1^*} \cdot |F_{2rad,acc,1^*}^{\ 3}| + \ldots + |n_{2m,n^*}| \cdot t_{n^*} \cdot |F_{2rad,acc,n^*}^{\ 3}|}{|n_{2m,1^*}| \cdot t_{1^*} + \ldots + |n_{2m,n^*}| \cdot t_{n^*}}} \leq F_{2radN}$$

$$F_{2ax,eq^*} \leq F_{2axN}$$

The following apply to the bearing service life L_{10h} ($ED_{20} \leq 40\%$):

$L_{10h} > 10000$ h with $1 < M_{2kN}/M_{2k^*} < 1.25$

$L_{10h} > 20000$ h with $1.25 < M_{2kN}/M_{2k^*} < 1.5$

$L_{10h} > 30000$ h with $1.5 < M_{2kN}/M_{2k^*}$

For different duty cycles:

$$L_{10h} > L_{10h(ED_{20}=40\%)} \cdot \frac{40\%}{ED_{20}}$$

10.8 Further information

10.8.1 Directives and standards

STOBER synchronous servo motors meet the requirements of the following directives and standards:

- (Low Voltage) Directive 2014/35/EU
- EN 60034-1:2010 + Cor.:2010
- EN 60034-5:2001 + A1:2007
- EN 60034-6:1993

10.8.2 Identifiers and test symbols

STOBER synchronous servo motors have the following identifiers and test symbols:

CE mark: The product meets the requirements of EU directives.

cURus test symbol "Servo and Stepper Motors – Component"; registered under UL number E488992 with Underwriters Laboratories USA (optional).

10.8.3 Additional documentation

Additional documentation related to the product can be found at http://www.stoeber.de/en/download

Enter the ID of the documentation in the Search... field.

Documentation	ID
Operating manual for EZ synchronous servo motors	443032_en

11 PE planetary geared motors

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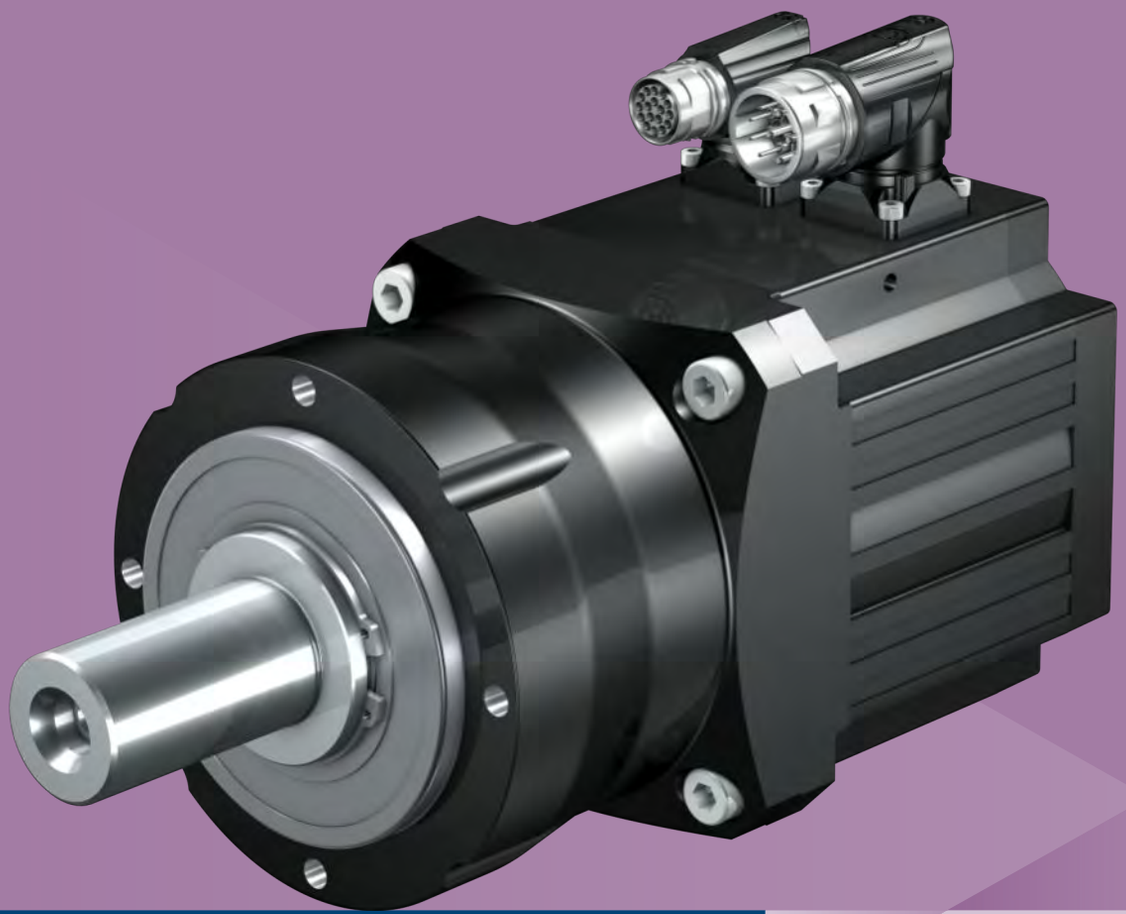


11 Planetary geared motors PE

11.1 Overview

Cost-efficient helical-geared planetary geared motors

Features

Power density	★★★☆☆
Backlash	★★★☆☆
Price category	€
Shaft load	★★☆☆☆
Smooth operation	★★★☆☆
Torsional stiffness	★★★☆☆
Mass moment of inertia	★★★★★
Helical gearing	✓
Maintenance-free	✓
Any mounting position	✓
Non-contact sealing at the input	✓
Compact and highly dynamic due to direct motor attachment	✓

Key: ★☆☆☆☆ good | ★★★★★ excellent
€ Economy | €€€€€ Premium

Technical data

i	3 – 28
M_{2acc}	11 – 310 Nm
$\Delta\phi_2$	8 – 10 arcmin
η_{get}	≤ 97 %

11.2 Selection tables

The technical data specified in the selection tables applies to:

- Installation altitudes up to 1000 m above sea level
- Surrounding temperatures from 0 °C to 40 °C
- Drives with convection-cooled motors (e.g. EZ401**U**)

You can calculate the technical data for drives with forced ventilated motors (for example EZ401**B**) at http://products.stoeber.de.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2.0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/arcmin]	m [kg]
PE2 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 14 Nm)															
600	4.5	4.6	4.4	1.3	PE211_0050 EZ301U	14	26	5.000	5/1	4000	8000	0.20	10	1.4	2.1
750	3.6	3.7	6.1	1.5	PE211_0040 EZ301U	11	26	4.000	4/1	4000	8000	0.20	10	1.4	2.1
PE2 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 14 Nm)															
1200	4.3	4.6	5.3	1.1	PE211_0050 EZ301U	14	26	5.000	5/1	4000	8000	0.20	10	1.4	2.1
1500	3.5	3.7	7.4	1.3	PE211_0040 EZ301U	11	26	4.000	4/1	4000	8000	0.20	10	1.4	2.1
PE3 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 55 Nm)															
107	25	25	2.7	1.2	PE312_0280 EZ301U	55	75	28.00	28/1	4000	6000	0.20	10	4.2	3.7
120	22	23	3.7	1.0	PE312_0250 EZ301U	40	75	25.00	25/1	3700	6000	0.25	10	4.0	3.7
150	18	18	3.2	1.7	PE312_0200 EZ301U	53	75	20.00	20/1	3700	6000	0.25	10	4.2	3.7
188	14	14	3.5	2.1	PE312_0160 EZ301U	43	75	16.00	16/1	3700	6000	0.24	10	4.2	3.7
188	24	26	6.0	1.2	PE312_0160 EZ302U	55	75	16.00	16/1	3700	6000	0.34	10	4.2	4.3
200	13	14	4.8	1.7	PE312_0150 EZ301U	40	75	15.00	15/1	3700	6000	0.29	10	4.0	3.7
200	23	24	8.1	1.0	PE312_0150 EZ302U	40	75	15.00	15/1	3700	6000	0.39	10	4.0	4.3
250	11	11	4.1	2.8	PE312_0120 EZ301U	32	75	12.00	12/1	3700	6000	0.30	10	4.2	3.7
250	18	19	7.0	1.7	PE312_0120 EZ302U	55	75	12.00	12/1	3700	6000	0.40	10	4.2	4.3
250	24	25	9.1	1.3	PE312_0120 EZ303U	55	75	12.00	12/1	3700	6000	0.51	10	4.2	4.8
300	9.0	9.2	1.0	1.7	PE311_0100 EZ301U	27	75	10.00	10/1	4000	6000	0.20	8	3.4	3.1
429	6.3	6.5	1.2	2.9	PE311_0070 EZ301U	19	75	7.000	7/1	4000	6000	0.21	8	3.8	3.1
429	11	11	2.1	1.7	PE311_0070 EZ302U	34	75	7.000	7/1	4000	6000	0.31	8	3.8	3.7
429	14	15	2.7	1.3	PE311_0070 EZ303U	40	75	7.000	7/1	4000	6000	0.42	8	3.8	4.2
600	4.5	4.6	1.8	4.0	PE311_0050 EZ301U	14	75	5.000	5/1	3700	6000	0.26	8	4.1	3.1
600	7.7	8.1	3.1	2.4	PE311_0050 EZ302U	24	75	5.000	5/1	3700	6000	0.36	8	4.1	3.7
600	10	11	4.1	1.8	PE311_0050 EZ303U	34	75	5.000	5/1	3700	6000	0.47	8	4.1	4.2
600	14	15	5.5	1.3	PE311_0050 EZ401U	40	75	5.000	5/1	3700	6000	1.0	8	4.1	5.6
750	3.6	3.7	2.5	4.8	PE311_0040 EZ301U	11	75	4.000	4/1	3700	6000	0.26	8	4.2	3.1
750	6.2	6.5	4.3	2.8	PE311_0040 EZ302U	19	75	4.000	4/1	3700	6000	0.36	8	4.2	3.7
750	8.0	8.5	5.6	2.2	PE311_0040 EZ303U	27	75	4.000	4/1	3700	6000	0.47	8	4.2	4.2
750	11	12	7.5	1.6	PE311_0040 EZ401U	33	75	4.000	4/1	3700	6000	1.0	8	4.2	5.6
750	17	18	12	1.0	PE311_0040 EZ501U	42	75	4.000	4/1	3700	6000	3.0	8	4.2	6.6
1000	4.6	4.9	6.3	3.6	PE311_0030 EZ302U	15	64	3.000	3/1	3500	6000	0.41	8	3.6	3.7
1000	6.0	6.4	8.2	2.8	PE311_0030 EZ303U	20	64	3.000	3/1	3500	6000	0.52	8	3.6	4.2
1000	8.1	8.7	11	2.0	PE311_0030 EZ401U	25	65	3.000	3/1	3500	6000	1.1	8	3.6	5.6
1000	13	14	17	1.3	PE311_0030 EZ501U	40	65	3.000	3/1	3500	6000	3.0	8	3.6	6.6
1000	14	15	19	1.2	PE311_0030 EZ402U	40	65	3.000	3/1	3500	6000	1.8	8	3.6	6.7
PE3 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 55 Nm)															
214	24	25	2.6	1.3	PE312_0280 EZ301U	55	75	28.00	28/1	4000	6000	0.20	10	4.2	3.7
240	21	23	3.5	1.1	PE312_0250 EZ301U	40	75	25.00	25/1	3700	6000	0.25	10	4.0	3.7
300	17	18	3.0	1.8	PE312_0200 EZ301U	53	75	20.00	20/1	3700	6000	0.25	10	4.2	3.7
300	29	32	5.1	1.1	PE312_0200 EZ302U	55	75	20.00	20/1	3700	6000	0.35	10	4.2	4.3
375	14	14	3.4	2.2	PE312_0160 EZ301U	43	75	16.00	16/1	3700	6000	0.24	10	4.2	3.7
375	23	26	5.7	1.3	PE312_0160 EZ302U	55	75	16.00	16/1	3700	6000	0.34	10	4.2	4.3
375	30	34	7.4	1.0	PE312_0160 EZ303U	55	75	16.00	16/1	3700	6000	0.45	10	4.2	4.8
400	13	14	5.0	1.6	PE312_0150 EZ301U	40	75	15.00	15/1	3700	6000	0.29	10	4.0	3.7
500	10	11	4.3	2.7	PE312_0120 EZ301U	32	75	12.00	12/1	3700	6000	0.30	10	4.2	3.7
500	17	19	7.2	1.6	PE312_0120 EZ302U	55	75	12.00	12/1	3700	6000	0.40	10	4.2	4.3
500	22	26	9.5	1.2	PE312_0120 EZ303U	55	75	12.00	12/1	3700	6000	0.51	10	4.2	4.8
500	26	32	11	1.0	PE312_0120 EZ401U	55	75	12.00	12/1	3700	6000	1.0	10	4.2	6.2
600	8.6	9.2	1.2	1.4	PE311_0100 EZ301U	27	75	10.00	10/1	4000	6000	0.20	8	3.4	3.1
857	6.0	6.5	1.5	2.4	PE311_0070 EZ301U	19	75	7.000	7/1	4000	6000	0.21	8	3.8	3.1
857	10	11	2.5	1.4	PE311_0070 EZ302U	34	75	7.000	7/1	4000	6000	0.31	8	3.8	3.7
857	13	15	3.2	1.1	PE311_0070 EZ303U	40	75	7.000	7/1	4000	6000	0.42	8	3.8	4.2
1200	4.3	4.6	2.2	3.4	PE311_0050 EZ301U	14	75	5.000	5/1	3700	6000	0.26	8	4.1	3.1

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PE3 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 55 Nm)															
1200	7.3	8.1	3.7	2.0	PE311_0050 EZ302U	24	75	5.000	5/1	3700	6000	0.36	8	4.1	3.7
1200	9.5	11	4.9	1.5	PE311_0050 EZ303U	34	75	5.000	5/1	3700	6000	0.47	8	4.1	4.2
1200	11	14	5.7	1.3	PE311_0050 EZ401U	40	75	5.000	5/1	3700	6000	1.0	8	4.1	5.6
1500	3.5	3.7	3.0	4.0	PE311_0040 EZ301U	11	75	4.000	4/1	3700	6000	0.26	8	4.2	3.1
1500	5.8	6.5	5.1	2.4	PE311_0040 EZ302U	19	75	4.000	4/1	3700	6000	0.36	8	4.2	3.7
1500	7.6	8.7	6.6	1.8	PE311_0040 EZ303U	27	75	4.000	4/1	3700	6000	0.47	8	4.2	4.2
1500	8.9	11	7.8	1.6	PE311_0040 EZ401U	33	75	4.000	4/1	3700	6000	1.0	8	4.2	5.6
1500	13	17	12	1.1	PE311_0040 EZ501U	42	75	4.000	4/1	3700	6000	3.0	8	4.2	6.6
1500	14	19	12	1.0	PE311_0040 EZ402U	42	75	4.000	4/1	3700	6000	1.7	8	4.2	6.7
2000	4.4	4.9	7.5	3.0	PE311_0030 EZ302U	15	64	3.000	3/1	3500	6000	0.41	8	3.6	3.7
2000	5.7	6.5	9.8	2.3	PE311_0030 EZ303U	20	64	3.000	3/1	3500	6000	0.52	8	3.6	4.2
2000	6.7	8.1	12	2.0	PE311_0030 EZ401U	25	65	3.000	3/1	3500	6000	1.1	8	3.6	5.6
2000	9.9	13	17	1.3	PE311_0030 EZ501U	40	65	3.000	3/1	3500	6000	3.0	8	3.6	6.6
2000	10	14	18	1.3	PE311_0030 EZ402U	40	65	3.000	3/1	3500	6000	1.8	8	3.6	6.7
PE4 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 120 Nm)															
150	53	57	4.9	1.2	PE412_0200 EZ401U	120	190	20.00	20/1	3400	6000	1.2	10	14	8.3
188	43	46	5.5	1.5	PE412_0160 EZ401U	120	190	16.00	16/1	3400	6000	1.1	10	14	8.3
200	40	43	7.4	1.3	PE412_0150 EZ401U	100	190	15.00	15/1	3400	6000	1.3	10	12	8.3
250	32	34	6.4	2.0	PE412_0120 EZ401U	97	190	12.00	12/1	3400	5500	1.3	10	14	8.3
250	49	54	9.8	1.3	PE412_0120 EZ501U	120	190	12.00	12/1	3400	5500	3.3	10	14	9.3
250	54	59	11	1.2	PE412_0120 EZ402U	120	190	12.00	12/1	3400	5500	2.0	10	14	9.4
300	27	29	1.5	1.3	PE411_0100 EZ401U	82	190	10.00	10/1	3600	6000	0.97	8	10	7.1
429	19	20	2.1	2.1	PE411_0070 EZ401U	58	190	7.000	7/1	3600	6000	1.0	8	12	7.1
429	29	32	3.2	1.4	PE411_0070 EZ501U	100	190	7.000	7/1	3600	6000	3.0	8	12	8.1
429	32	35	3.5	1.2	PE411_0070 EZ402U	100	190	7.000	7/1	3600	6000	1.7	8	12	8.2
600	14	15	3.1	2.9	PE411_0050 EZ401U	41	190	5.000	5/1	3400	6000	1.2	8	13	7.1
600	21	23	4.7	1.9	PE411_0050 EZ501U	78	190	5.000	5/1	3400	6000	3.2	8	13	8.1
600	23	25	5.2	1.7	PE411_0050 EZ402U	78	190	5.000	5/1	3400	6000	1.9	8	13	8.2
600	33	42	7.6	1.2	PE411_0050 EZ404U	100	190	5.000	5/1	3400	6000	3.3	8	13	10
600	36	39	8.2	1.1	PE411_0050 EZ502U	100	190	5.000	5/1	3400	6000	5.5	8	13	9.6
600	36	40	8.2	1.1	PE411_0050 EZ701U	97	190	5.000	5/1	3400	6000	8.8	8	13	11
750	11	12	4.0	3.7	PE411_0040 EZ401U	33	190	4.000	4/1	3400	6000	1.2	8	14	7.1
750	17	18	6.2	2.4	PE411_0040 EZ501U	62	190	4.000	4/1	3400	6000	3.2	8	14	8.1
750	18	20	6.8	2.2	PE411_0040 EZ402U	62	190	4.000	4/1	3400	6000	1.9	8	14	8.2
750	27	33	10	1.5	PE411_0040 EZ404U	100	190	4.000	4/1	3400	6000	3.3	8	14	10
750	29	31	11	1.4	PE411_0040 EZ502U	100	190	4.000	4/1	3400	6000	5.5	8	14	9.6
750	29	32	11	1.4	PE411_0040 EZ701U	78	190	4.000	4/1	3400	6000	8.8	8	14	11
750	38	43	14	1.1	PE411_0040 EZ503U	100	190	4.000	4/1	3400	6000	7.9	8	14	11
1000	8.1	8.7	6.3	4.4	PE411_0030 EZ401U	25	180	3.000	3/1	3000	5500	1.5	8	13	7.1
1000	13	14	9.7	2.9	PE411_0030 EZ501U	47	180	3.000	3/1	3000	5500	3.4	8	13	8.1
1000	14	15	11	2.6	PE411_0030 EZ402U	47	180	3.000	3/1	3000	5500	2.2	8	13	8.2
1000	20	25	16	1.8	PE411_0030 EZ404U	84	180	3.000	3/1	3000	5500	3.5	8	13	10
1000	22	23	17	1.7	PE411_0030 EZ502U	90	180	3.000	3/1	3000	5500	5.7	8	13	9.6
1000	22	24	17	1.7	PE411_0030 EZ701U	58	180	3.000	3/1	3000	5500	9.0	8	13	11
1000	28	32	22	1.3	PE411_0030 EZ503U	90	180	3.000	3/1	3000	5500	8.1	8	13	11
1000	35	42	27	1.0	PE411_0030 EZ702U	90	180	3.000	3/1	3000	5500	14	8	13	14
PE4 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 90 Nm)															
1500	28	45	25	1.1	PE411_0030 EZ505U	90	180	3.000	3/1	3000	5500	13	8	13	14
PE4 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 120 Nm)															
214	61	74	3.4	1.1	PE412_0280 EZ401U	120	190	28.00	28/1	3600	6000	0.99	10	13	8.3
300	44	53	4.1	1.5	PE412_0200 EZ401U	120	190	20.00	20/1	3400	6000	1.2	10	14	8.3
300	65	84	6.0	1.0	PE412_0200 EZ501U	120	190	20.00	20/1	3400	6000	3.1	10	14	9.3
375	35	43	4.5	1.9	PE412_0160 EZ401U	120	190	16.00	16/1	3400	6000	1.1	10	14	8.3
375	52	67	6.7	1.3	PE412_0160 EZ501U	120	190	16.00	16/1	3400	6000	3.1	10	14	9.3
375	53	74	6.9	1.2	PE412_0160 EZ402U	120	190	16.00	16/1	3400	6000	1.8	10	14	9.4
400	33	40	6.7	1.4	PE412_0150 EZ401U	100	190	15.00	15/1	3400	6000	1.3	10	12	8.3
600	22	27	1.5	1.3	PE411_0100 EZ401U	82	190	10.00	10/1	3600	6000	0.97	8	10	7.1
857	16	19	2.1	2.0	PE411_0070 EZ401U	58	190	7.000	7/1	3600	6000	1.0	8	12	7.1
857	23	30	3.2	1.4	PE411_0070 EZ501U	100	190	7.000	7/1	3600	6000	3.0	8	12	8.1
857	24	33	3.3	1.3	PE411_0070 EZ402U	100	190	7.000	7/1	3600	6000	1.7	8	12	8.2
1200	11	14	3.2	2.8	PE411_0050 EZ401U	41	190	5.000	5/1	3400	6000	1.2	8	13	7.1
1200	16	21	4.7	1.9	PE411_0050 EZ501U	78	190	5.000	5/1	3400	6000	3.2	8	13	8.1
1200	17	24	4.9	1.9	PE411_0050 EZ402U	78	190	5.000	5/1	3400	6000	1.9	8	13	8.2

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PE4 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 120 Nm)															
1200	25	38	7.2	1.2	PE411_0050 EZ502U	100	190	5.000	5/1	3400	6000	5.5	8	13	9.6
1200	25	38	7.2	1.2	PE411_0050 EZ701U	97	190	5.000	5/1	3400	6000	8.8	8	13	11
1200	28	41	8.1	1.1	PE411_0050 EZ404U	100	190	5.000	5/1	3400	6000	3.3	8	13	10
1200	30	51	8.6	1.0	PE411_0050 EZ503U	100	190	5.000	5/1	3400	6000	7.9	8	13	11
1500	8.9	11	4.2	3.5	PE411_0040 EZ401U	33	190	4.000	4/1	3400	6000	1.2	8	14	7.1
1500	13	17	6.2	2.4	PE411_0040 EZ501U	62	190	4.000	4/1	3400	6000	3.2	8	14	8.1
1500	14	19	6.4	2.3	PE411_0040 EZ402U	62	190	4.000	4/1	3400	6000	1.9	8	14	8.2
1500	20	30	9.5	1.6	PE411_0040 EZ502U	100	190	4.000	4/1	3400	6000	5.5	8	14	9.6
1500	20	31	9.5	1.6	PE411_0040 EZ701U	78	190	4.000	4/1	3400	6000	8.8	8	14	11
1500	23	33	11	1.4	PE411_0040 EZ404U	100	190	4.000	4/1	3400	6000	3.3	8	14	10
1500	24	41	11	1.3	PE411_0040 EZ503U	100	190	4.000	4/1	3400	6000	7.9	8	14	11
1500	28	55	13	1.1	PE411_0040 EZ702U	100	190	4.000	4/1	3400	6000	14	8	14	14
PE5 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 310 Nm)															
107	114	125	2.9	1.4	PE512_0280 EZ501U	310	480	28.00	28/1	2800	5000	3.1	10	35	13
120	102	112	3.8	1.3	PE512_0250 EZ501U	250	480	25.00	25/1	2600	5000	3.3	10	33	13
150	82	89	3.4	2.0	PE512_0200 EZ501U	300	480	20.00	20/1	2600	5000	3.3	10	35	13
150	141	152	5.9	1.1	PE512_0200 EZ502U	310	480	20.00	20/1	2600	5000	5.6	10	35	15
150	141	158	5.9	1.1	PE512_0200 EZ701U	310	480	20.00	20/1	2600	5000	8.9	10	35	17
188	65	71	3.8	2.4	PE512_0160 EZ501U	240	480	16.00	16/1	2600	5000	3.6	10	35	13
188	112	122	6.6	1.4	PE512_0160 EZ502U	310	480	16.00	16/1	2600	5000	5.9	10	35	15
188	112	126	6.6	1.4	PE512_0160 EZ701U	300	480	16.00	16/1	2600	5000	9.2	10	35	17
188	147	169	8.6	1.1	PE512_0160 EZ503U	310	480	16.00	16/1	2600	5000	8.3	10	35	16
200	61	67	4.9	2.1	PE512_0150 EZ501U	230	480	15.00	15/1	2500	4500	4.2	10	33	13
200	105	114	8.4	1.2	PE512_0150 EZ502U	250	480	15.00	15/1	2500	4500	6.5	10	33	15
200	105	118	8.4	1.2	PE512_0150 EZ701U	250	480	15.00	15/1	2500	4500	9.8	10	33	17
250	49	54	4.4	3.3	PE512_0120 EZ501U	180	480	12.00	12/1	2500	4500	4.2	10	35	13
250	84	91	7.6	1.9	PE512_0120 EZ502U	310	480	12.00	12/1	2500	4500	6.5	10	35	15
250	84	95	7.6	1.9	PE512_0120 EZ701U	230	480	12.00	12/1	2500	4500	9.8	10	35	17
250	111	127	10	1.4	PE512_0120 EZ503U	310	480	12.00	12/1	2500	4500	8.9	10	35	16
250	137	164	12	1.2	PE512_0120 EZ702U	310	480	12.00	12/1	2500	4500	15	10	35	19
250	154	182	14	1.0	PE512_0120 EZ505U	310	480	12.00	12/1	2500	4500	13	10	35	19
300	42	46	2.6	2.1	PE511_0100 EZ501U	160	400	10.00	10/1	3000	5000	3.0	8	27	11
300	72	78	4.4	1.2	PE511_0100 EZ502U	220	400	10.00	10/1	3000	5000	5.3	8	27	13
300	72	81	4.4	1.2	PE511_0100 EZ701U	190	400	10.00	10/1	3000	5000	8.6	8	27	14
429	29	32	3.3	3.5	PE511_0070 EZ501U	110	400	7.000	7/1	2800	5000	3.1	8	31	11
429	50	54	5.7	2.1	PE511_0070 EZ502U	210	400	7.000	7/1	2800	5000	5.4	8	31	13
429	50	56	5.7	2.1	PE511_0070 EZ701U	140	400	7.000	7/1	2800	5000	8.7	8	31	14
429	66	75	7.5	1.6	PE511_0070 EZ503U	250	400	7.000	7/1	2800	5000	7.7	8	31	14
429	81	98	9.3	1.3	PE511_0070 EZ702U	250	400	7.000	7/1	2800	5000	14	8	31	17
429	92	109	10	1.1	PE511_0070 EZ505U	250	400	7.000	7/1	2800	5000	12	8	31	17
600	21	23	5.0	4.9	PE511_0050 EZ501U	78	390	5.000	5/1	2600	5000	3.2	8	34	11
600	36	39	8.6	2.9	PE511_0050 EZ502U	150	390	5.000	5/1	2600	5000	5.5	8	34	13
600	36	40	8.6	2.9	PE511_0050 EZ701U	97	400	5.000	5/1	2600	5000	8.8	8	34	14
600	47	54	11	2.2	PE511_0050 EZ503U	210	390	5.000	5/1	2600	5000	7.9	8	34	14
600	58	70	14	1.8	PE511_0050 EZ702U	200	400	5.000	5/1	2600	5000	14	8	34	17
600	65	78	16	1.6	PE511_0050 EZ505U	250	400	5.000	5/1	2600	5000	12	8	34	17
600	80	101	19	1.3	PE511_0050 EZ703U	250	400	5.000	5/1	2600	5000	22	8	34	19
750	29	31	11	3.6	PE511_0040 EZ502U	120	310	4.000	4/1	2600	5000	5.7	8	35	13
750	29	32	11	3.6	PE511_0040 EZ701U	78	400	4.000	4/1	2600	5000	9.0	8	35	14
750	38	43	15	2.7	PE511_0040 EZ503U	170	310	4.000	4/1	2600	5000	8.1	8	35	14
750	47	56	18	2.2	PE511_0040 EZ702U	160	400	4.000	4/1	2600	5000	14	8	35	17
750	52	62	20	2.0	PE511_0040 EZ505U	250	400	4.000	4/1	2600	5000	13	8	35	17
750	64	81	25	1.6	PE511_0040 EZ703U	250	400	4.000	4/1	2600	5000	22	8	35	19
750	83	117	32	1.2	PE511_0040 EZ705U	250	400	4.000	4/1	2600	5000	35	8	35	24
750	87	144	34	1.2	PE511_0040 EZ802U	250	400	4.000	4/1	2600	5000	59	8	35	33
1000	22	23	23	3.3	PE511_0030 EZ502U	90	240	3.000	3/1	2500	4500	5.3	8	35	13
1000	22	24	23	3.3	PE511_0030 EZ701U	58	390	3.000	3/1	2500	4500	8.6	8	35	14
1000	28	32	30	2.5	PE511_0030 EZ503U	130	240	3.000	3/1	2500	4500	7.7	8	35	14
1000	35	42	37	2.0	PE511_0030 EZ702U	120	390	3.000	3/1	2500	4500	14	8	35	17
1000	39	47	42	1.8	PE511_0030 EZ505U	180	390	3.000	3/1	2500	4500	12	8	35	17
1000	48	61	51	1.5	PE511_0030 EZ703U	180	390	3.000	3/1	2500	4500	22	8	35	19
1000	62	88	66	1.2	PE511_0030 EZ705U	180	390	3.000	3/1	2500	4500	34	8	35	24
1000	65	108	69	1.1	PE511_0030 EZ802U	180	390	3.000	3/1	2500	4500	58	8	35	33

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PE5 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 310 Nm)															
281	144	233	8.5	1.1	PE512_0160 EZ505U	310	480	16.00	16/1	2600	5000	13	10	35	19
375	108	174	9.8	1.5	PE512_0120 EZ505U	310	480	12.00	12/1	2500	4500	13	10	35	19
375	138	228	12	1.2	PE512_0120 EZ703U	310	480	12.00	12/1	2500	4500	23	10	35	21
643	65	104	8.4	1.4	PE511_0070 EZ505U	250	400	7.000	7/1	2800	5000	12	8	31	17
643	82	136	11	1.1	PE511_0070 EZ703U	250	400	7.000	7/1	2800	5000	22	8	31	19
900	46	74	13	2.0	PE511_0050 EZ505U	250	400	5.000	5/1	2600	5000	12	8	34	17
900	51	167	14	1.8	PE511_0050 EZ802U	250	400	5.000	5/1	2600	5000	58	8	34	33
900	59	97	16	1.5	PE511_0050 EZ703U	250	400	5.000	5/1	2600	5000	22	8	34	19
900	80	146	22	1.1	PE511_0050 EZ705U	250	400	5.000	5/1	2600	5000	34	8	34	24
1125	37	59	16	2.4	PE511_0040 EZ505U	250	400	4.000	4/1	2600	5000	13	8	35	17
1125	41	134	18	2.2	PE511_0040 EZ802U	250	400	4.000	4/1	2600	5000	59	8	35	33
1125	47	78	21	1.9	PE511_0040 EZ703U	250	400	4.000	4/1	2600	5000	22	8	35	19
1125	64	116	28	1.4	PE511_0040 EZ705U	250	400	4.000	4/1	2600	5000	35	8	35	24
1500	28	45	34	2.3	PE511_0030 EZ505U	180	390	3.000	3/1	2500	4500	12	8	35	17
1500	31	100	37	2.0	PE511_0030 EZ802U	180	390	3.000	3/1	2500	4500	58	8	35	33
1500	35	58	43	1.8	PE511_0030 EZ703U	180	390	3.000	3/1	2500	4500	22	8	35	19
1500	48	87	58	1.3	PE511_0030 EZ705U	180	390	3.000	3/1	2500	4500	34	8	35	24

11.3 Dimensional drawings

In this chapter you can find the dimensions of the geared motors.

There is a dimensional drawing for every possible shaft/housing design, each with the tables for gear unit dimensions, motor dimensions and geared motor dimensions.

Dimensions can exceed the specifications of ISO 2768-mK due to casting tolerances or accumulation of individual tolerances.

We reserve the right to make dimensional changes due to ongoing technical development.

You can download CAD models of our standard drives at http://cad.stoeber.de.

Combination options and the dimensions of forced ventilated geared motors can be found at http://cad.stoeber.de.

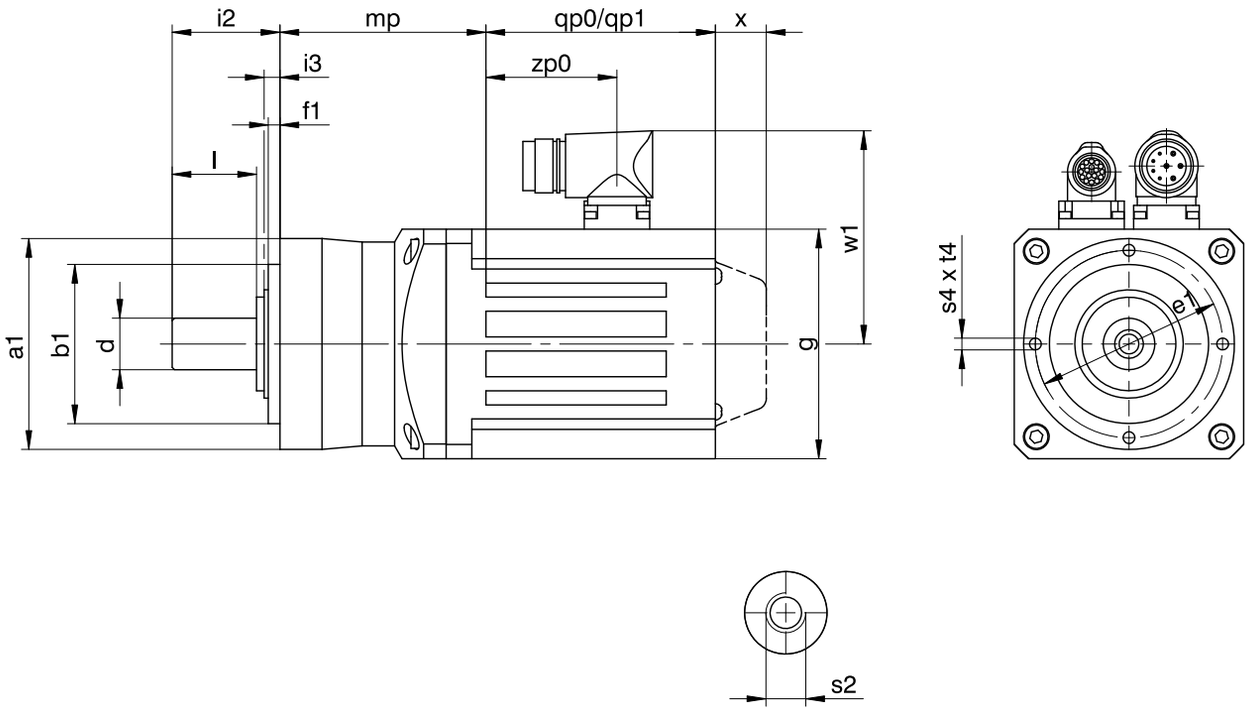
Tolerances

Solid shaft	Tolerance
Shaft ∅ fit ≤ 50 mm	DIN 748-1, ISO k6
Shaft ∅ fit > 50 mm	DIN 748-1, ISO m6
Feather keys	DIN 6885-1, high form A
Balance quality	Q 2.5 (balanced with half feather key)

Centering holes in solid shafts in accordance with DIN 332-2, DR shape

Thread size	M4	M5	M6	M8	M10	M12	M16	M20	M24
Thread depth [mm]	10	12.5	16	19	22	28	36	42	50

11.3.1 G shaft design (solid shaft without feather key)



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]

Dimensions of gear units

Type	Øa1	Øb1	Ød	Øe1	f1	i2	i3	l	s2	s4	t4
PE211	50	35_{h6}	12_{k6}	44	4	24.5	4	18	M4	M4	8
PE311	70	52_{h6}	16_{k6}	62	5	36.0	6	28	M5	M5	10
PE312	70	52_{h6}	16_{k6}	62	5	36.0	6	28	M5	M5	10
PE411	90	68_{h6}	22_{k6}	80	5	46.0	6.5	36	M8	M6	13
PE412	90	68_{h6}	22_{k6}	80	5	46.0	6.5	36	M8	M6	13
PE511	120	90_{h6}	32_{k6}	108	6	70.0	8	58	M12	M8	16
PE512	120	90_{h6}	32_{k6}	108	6	70.0	8	58	M12	M8	16

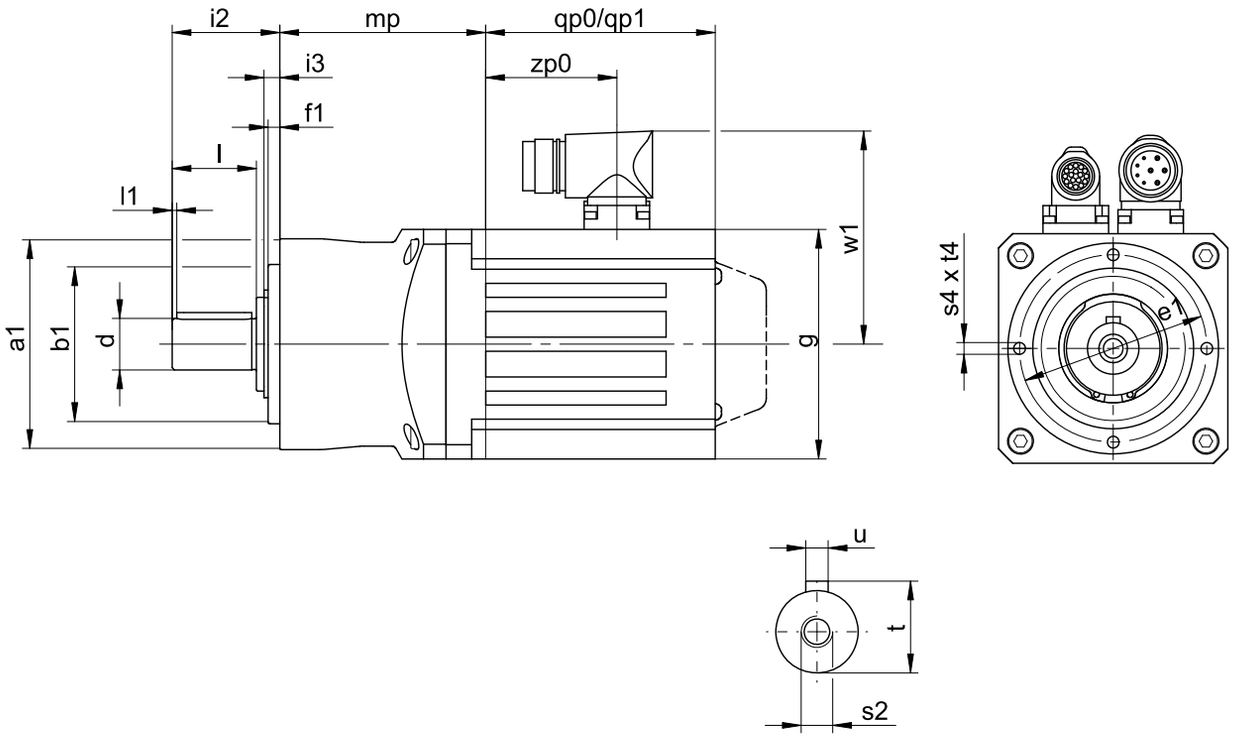
Dimensions of motors

Type	□g	qp0	qp1	w1	x	zp0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0
EZ501U	115	93	147.5	100.0	22	58.5
EZ502U	115	118	172.5	100.0	22	83.5
EZ503U	115	143	197.5	100.0	22	108.5
EZ505U	115	193	247.5	100.0	22	158.5
EZ701U	145	102	161.0	115.0	22	64.0
EZ702U	145	127	186.0	115.0	22	89.0
EZ703U	145	152	211.0	115.0	22	114.0
EZ705U	145	207	266.0	134.0	22	165.0
EZ802U	190	197	274.0	156.5	22	143.0

Dimensions of geared motors

Type	EZ3	EZ4	EZ5	EZ7
	mp	mp	mp	mp
PE211	72.5	–	–	–
PE311	86.0	82.5	85.0	–
PE312	118.5	115.0	–	–
PE411	–	88.0	90.5	96.5
PE412	–	126.0	128.5	–
PE511	–	–	105.5	111.5
PE512	–	–	151.0	157.0

11.3.2 P shaft design (solid shaft with feather key)



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]

Dimensions of gear units

Type	Øa1	Øb1	Ød	Øe1	f1	i2	i3	l	l1	s2	s4	t	t4	u
PE211	50	35_{h6}	12_{k6}	44	4	24.5	4	18	2	M4	M4	13.5	8	A4×4×14
PE311	70	52_{h6}	16_{k6}	62	5	36.0	6	28	2	M5	M5	18.0	10	A5×5×22
PE312	70	52_{h6}	16_{k6}	62	5	36.0	6	28	2	M5	M5	18.0	10	A5×5×22
PE411	90	68_{h6}	22_{k6}	80	5	46.0	6.5	36	2	M8	M6	24.5	13	A6×6×32
PE412	90	68_{h6}	22_{k6}	80	5	46.0	6.5	36	2	M8	M6	24.5	13	A6×6×32
PE511	120	90_{h6}	32_{k6}	108	6	70.0	8	58	4	M12	M8	35.0	16	A10×8×50
PE512	120	90_{h6}	32_{k6}	108	6	70.0	8	58	4	M12	M8	35.0	16	A10×8×50

Dimensions of motors

Type	□g	qp0	qp1	w1	x	zp0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0
EZ501U	115	93	147.5	100.0	22	58.5
EZ502U	115	118	172.5	100.0	22	83.5
EZ503U	115	143	197.5	100.0	22	108.5
EZ505U	115	193	247.5	100.0	22	158.5
EZ701U	145	102	161.0	115.0	22	64.0
EZ702U	145	127	186.0	115.0	22	89.0
EZ703U	145	152	211.0	115.0	22	114.0
EZ705U	145	207	266.0	134.0	22	165.0
EZ802U	190	197	274.0	156.5	22	143.0

Dimensions of geared motors

Type	EZ3	EZ4	EZ5	EZ7
	mp	mp	mp	mp
PE211	72.5	–	–	–
PE311	86.0	82.5	85.0	–
PE312	118.5	115.0	–	–
PE411	–	88.0	90.5	96.5
PE412	–	126.0	128.5	–
PE511	–	–	105.5	111.5
PE512	–	–	151.0	157.0

11.4 Type designation

In this chapter, you can find an explanation of the type designation with the associated options.

Additional ordering information not included in the type designation can be found at the end of the chapter.

Sample code

PE	4	1	2	S	G	R	0200	EZ401U

Explanation

Code	Designation	Design
PE	Type	Planetary gear unit
4	Size	4 (example)
1	Generation	Generation 1
1	Stages	Single-stage
2		Two-stage
S	Housing	Standard
G	Shaft	Solid shaft without feather key
P		Solid shaft with feather key
R	Bearing	Standard bearing
0200	Transmission ratio (i x 10)	i = 20 (example)
EZ401U	Motor	EZ synchronous servo motor

In order to complete the type designation, also specify:

- A detailed type designation of the motor, see Chapter [▶ 23]

11.5 Product description

11.5.1 Installation conditions

The specified torques and forces only apply when attaching gear units at the machine side using screws of quality 10.9. In addition, the gear housing must be adjusted at the pilot (H7).

11.5.2 Lubricants

STOBER fills the gear units with the amount and type of lubricant specified on the nameplate.

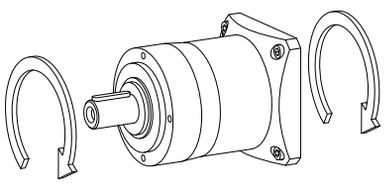
Lubricant filling quantities for gear units, document ID 441871, can be found online at http://www.stoeber.de

11.5.3 Other product features

Feature	Value
Max. permitted gear unit temperature (on the surface of the gear unit)	≤ 80 °C
Paint	Black RAL 9005
(ATEX) Directive 2014/34/EU (option)	Not suitable
Protection class:[1]	
Gear unit	IP64
Motor	IP56, optionally IP66

11.5.4 Direction of rotation

The input and output rotate in the same direction.



11.6 Project configuration

Project your drives using our SERVOsoft designing software. You can receive SERVOsoft for free from your adviser at one of our sales centers. Observe the limit conditions in this chapter to ensure a safe design for your drives.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

11.6.1 Calculation of the operating point

Check the following conditions for operating points other than the nominal point M_{2N} specified in the selection tables.

$$n_{1m^*} \leq \frac{n_{1maxDB}}{fB_T}$$

$$n_{1max^*} \leq \frac{n_{1max\,ZB}}{fB_T}$$

$$M_{2eff^*} \leq M_{2th}$$

$$M_{2acc^*} \leq M_{2acc}$$

$$M_{2NOT^*} \leq M_{2NOT}$$

$$M_{2eq^*} \leq M_{2N} \cdot \frac{S}{fB_{op} \cdot fB_t}$$

The values for n_{1maxDB}, n_{1maxZB}, M_{2acc}, M_{2NOT}, M_{2N} and S can be found in the selection tables.

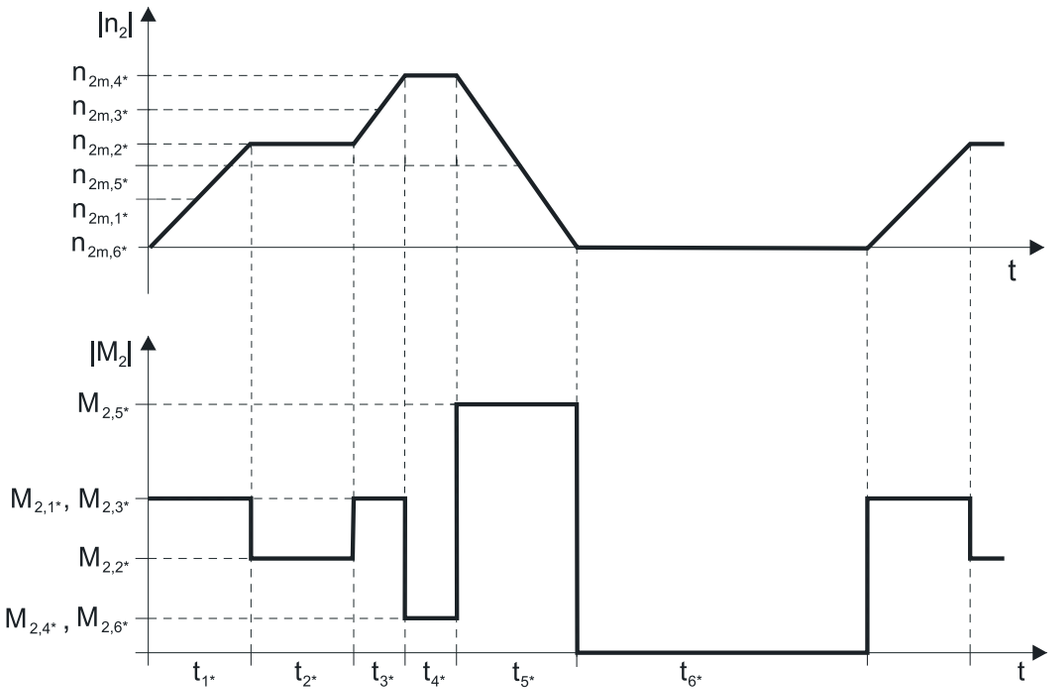
The values for fB_T, fB_{op} and fB_t can be found in the corresponding tables in this chapter.

Calculate the thermal limit torque M_{2th} for a duty cycle > 50%.

Example of cyclic operation

The following calculations are based on a representation of the power taken from the output based in accordance with the following example:

[1] Observe the protection class of all the components.



Calculation of the actual average input speed

$$n_{1m^*} = n_{2m^*} \cdot i$$

$$n_{2m^*} = \frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}{t_{1^*} + \ldots + t_{n^*}}$$

If $t_{1^*} + \ldots + t_{5^*} \geq 20$ min, calculate n_{2m^*} without the rest phase t_{6^*}.

The values for the ratio i can be found in the selection tables.

Calculation of the actual effective torque

$$M_{2eff^*} = \sqrt{\frac{t_{1^*} \cdot {M_{2,1^*}}^2 + \ldots + t_{n^*} \cdot {M_{2,n^*}}^2}{t_{1^*} + \ldots + t_{n^*}}}$$

Calculation of the actual equivalent torque

$$M_{2eq^*} = \sqrt[3]{\frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} \cdot \left|{M_{2,1^*}}^3\right| + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*} \cdot \left|{M_{2,n^*}}^3\right|}{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}}$$

Calculation of the thermal limit torque

Calculate the thermal limit torque M_{2th} for a duty cycle $ED_{20} > 50\%$ and the actual average input speed n_{1m^*}. (At $K_{mot,th} \leq 0$ you must reduce the average input speed n_{1m^*} accordingly or select another geared motor size.)

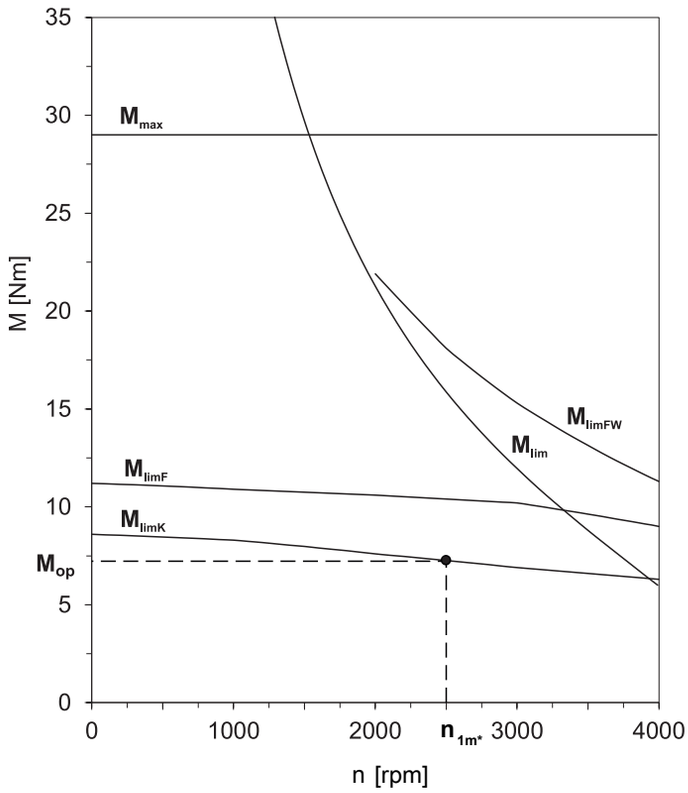
$$M_{2th} = M_{op} \cdot i \cdot K_{mot,th}$$

$$K_{mot,th} = 0{,}95 - \frac{a_{th}}{1000} \cdot fB_T \cdot \left(\frac{n_{1m^*}}{1000}\right)^3$$

The values for i and a_{th} can be found in the selection tables.

The values for fB_T can be found in the corresponding table in this chapter.

The value for the torque of the motor at operating point M_{op} with the determined average input speed n_{1m^*} can be found in the motor curve of Chapter [▶ 23.3]. Note the size, nominal speed n_N and cooling type of the motor. The figure below shows an example of reading the torque M_{op} of a motor with convection cooling at the operating point.



Operating factors

Operating mode	Number of load changes/ hour	fB_{op}
Uniform continuous operation	–	1.00
Cyclic operation	–	1.00
Cyclic operation – reversing load[2]	≤ 1000	1.00
	2000	1.20
	3000	1.40
	4000	1.60
	≥ 5000	1.80

Run time	fB_t
Daily run time ≤ 8 h	1.00
Daily run time ≤ 16 h	1.15
Daily run time ≤ 24 h	1.20

Temperature		fB_T
Motor cooling	**Surrounding temperature**	
Motor with forced ventilation	≤ 20 °C	0.9
	≤ 30 °C	1.0
	≤ 40 °C	1.15
Motor with convection cooling	≤ 20 °C	1.0
	≤ 30 °C	1.1
	≤ 40 °C	1.25

Notes

- The maximum permitted gear unit temperature (see the "Other product features" chapter) must not be exceeded. Doing so may result in damage to the geared motor.
- For braking from full speed (for example when the power fails or when setting up the machine), note the permitted gear unit torques (M_{2acc}, M_{2NOT}) in the selection tables.
- The values specified in the selection tables for M_{2acc} refer to the gear units with a solid shaft design without feather key (G). We recommend this shaft design in general for cyclic operation.

[2] Values between 1000 and 5000 load changes per hour can be interpolated.

11.6.2 Permitted shaft loads for the output shaft

The values specified in the tables apply to the permitted shaft loads:

- For shaft dimensions in accordance with the catalog
- For output speeds $n_{2m*} \leq 100$ rpm ($F^{2axN} = F_{2ax100}$; $F_{2radN} = F_{2rad100}$; $M_{2kN} = M_{2k100}$)
- Only if radial forces on the gear unit are stabilized by its pilots (housing, flange shaft)

Permitted shaft loads for standard bearing R

Type	z_2 [mm]	F_{2ax100} [N]	$F_{2rad100}$ [N]	$F_{2rad,acc}$ [N]	M_{2k100} [Nm]	$M_{2k,acc}$ [Nm]
PE2	8.0	400	800	800	13	13
PE3	11.0	800	1600	1600	40	40
PE4	13.0	1900	2400	2400	73	73
PE5	16.0	4000	4600	4600	206	206

For other output speeds, download diagrams at http://products.stoeber.de.

The following applies to output speeds $n_{2m*} > 100$ rpm:

$$F_{2axN} = \frac{F_{2ax100}}{\sqrt[3]{\frac{n_{2m*}}{100\ \text{rpm}}}} \qquad F_{2radN} = \frac{F_{2rad100}}{\sqrt[3]{\frac{n_{2m*}}{100\ \text{rpm}}}} \qquad M_{2kN} = \frac{M_{2k100}}{\sqrt[3]{\frac{n_{2m*}}{100\ \text{rpm}}}}$$

The values for F_{2ax100}, $F_{2rad100}$ and M_{2k100} can be found in the table "Permitted shaft loads" in this chapter.

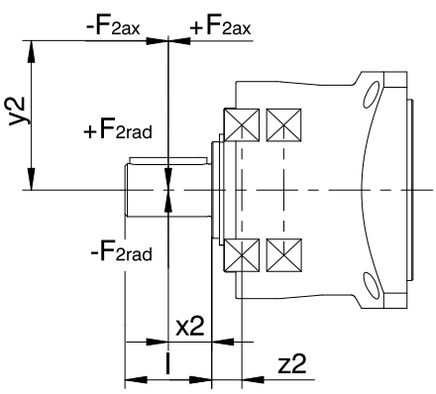


Fig. 1: Force application points

The specified values for $F_{2rad100}$ and $F_{2rad,acc}$ refer to an application of force at the center of the output shaft: $x_2 = l/2$.

Shaft dimensions can be found in the "Dimensional drawings" chapter.

The following applies to other force application points:

$$M_{2k,acc*} = \frac{2 \cdot F_{2ax*} \cdot y_2 + F_{2rad,acc*} \cdot (x_2 + z_2)}{1000} \leq M_{2k,acc}$$

$$F_{2rad,acc*} \leq F_{2rad,acc}$$

$$F_{2ax*} \leq F_{2axN}$$

The values for $F_{2rad,acc}$ and $M_{2k,acc}$ can be found in the table "Permitted shaft loads" in this chapter.

For applications with multiple axial and/or radial forces, you must add the forces as vectors.

In the event of EMERGENCY OFF operation (max. 1000 load changes), you can multiply the permitted forces and torques for F_{2ax100}, $F_{2rad100}$ and M_{2k100} by a factor of two.

Also note the calculation for equivalent values:

$$M_{2k,eq*} = \sqrt[3]{\frac{|n_{2m,1*}| \cdot t_{1*} \cdot |M_{2k,acc,1*}^{\ 3}| + \ldots + |n_{2m,n*}| \cdot t_{n*} \cdot |M_{2k,acc,n*}^{\ 3}|}{|n_{2m,1*}| \cdot t_{1*} + \ldots + |n_{2m,n*}| \cdot t_{n*}}} \leq M_{2kN}$$

$$F_{2rad,eq^*} = \sqrt[3]{\frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} \cdot \left|F_{2rad,acc,1^*}{}^3\right| + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*} \cdot \left|F_{2rad,acc,n^*}{}^3\right|}{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}} \leq F_{2radN}$$

The following apply to the bearing service life L_{10h} ($ED_{20} \leq 40\%$):

$L_{10h} > 10000$ h with $1 < M_{2kN}/M_{2k^*} < 1.25$

$L_{10h} > 20000$ h with $1.25 < M_{2kN}/M_{2k^*} < 1.5$

$L_{10h} > 30000$ h with $1.5 < M_{2kN}/M_{2k^*}$

For different duty cycles:

$$L_{10h} > L_{10h(ED_{20}=40\%)} \cdot \frac{40\%}{ED_{20}}$$

11.6.3 Radial shaft seal rings

Leak-proofness

Our gear units are equipped with high-quality radial shaft seal rings and checked for leak-proofness. However, a leak cannot be fully ruled out over the length of use of a gear unit. If you use a gear unit with goods incompatible with the lubricant, you must take measures to prevent direct contact with the gear unit lubricant in case of a leak.

11.7 Additional documentation

Additional documentation related to the product can be found at http://www.stoeber.de/en/download

Enter the ID of the documentation in the Search... field.

Documentation	ID
Operating manual for P/PA/PE/PH/PHA/PHQ/PHQA/PHV/PHVA planetary gear units and planetary geared motors	443029_en
Lubricant filling quantities for gear units	441871

12 C helical geared motors

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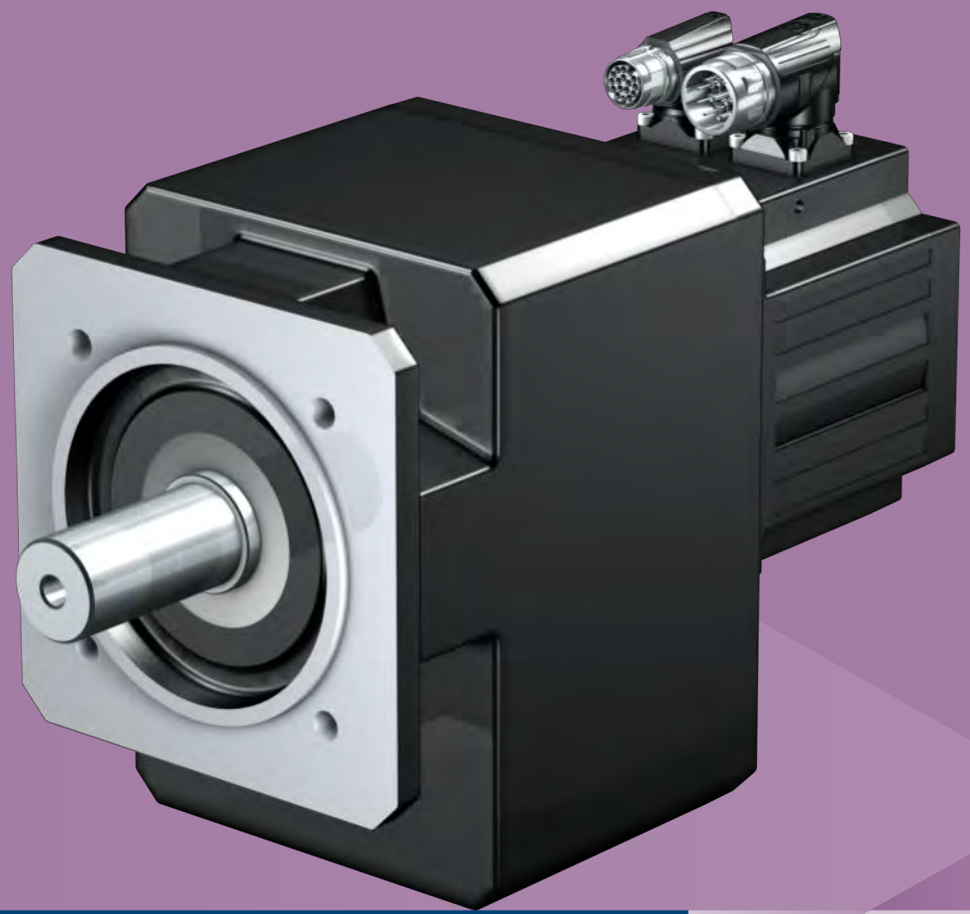


12 Helical geared motors

C

12.1 Overview

Compact helical geared motors

Features

Power density	★☆☆☆☆
Backlash	★★☆☆☆
Price category	€
Shaft load	★★☆☆☆
Smooth operation	★★★☆☆
Torsional stiffness	★★☆☆☆
Mass moment of inertia	★★★★★
Helical gearing	✓
Maintenance-free (C0 – C5)	✓
FKM seal ring at the input	✓
Reinforced output bearing	✓ (on request)
Compact and highly dynamic due to direct motor attachment	✓

Key: ★☆☆☆☆ good | ★★★★★ excellent
€ Economy | €€€€€ Premium

Technical data

i	2 – 270
M_{2acc}	8.3 – 6500 Nm
$\Delta\phi_2$	10 – 20 arcmin
η_{get}	≤ 97 %

12.2 Selection tables

The technical data specified in the selection tables applies to:

- Installation altitudes up to 1000 m above sea level
- Surrounding temperatures from 0 °C to 40 °C
- Drives with convection-cooled motors (e.g. EZ401**U**)
- Weight specification for mounting position EL1, housing design N

You can calculate the technical data for drives with forced ventilated motors (for example EZ401**B**) at http://products.stoeber.de.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
C0 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 72 Nm)																
60	45	46	1.9	1.3	C002_0500 EZ301U	72	120	49.94	899/18	4000	4000	6000	0.21	16	1.6	7.5
64	42	43	1.9	1.4	C002_0470 EZ301U	65	120	46.82	7865/168	4000	4000	6000	0.21	16	1.6	7.5
72	38	38	1.7	1.6	C002_0420 EZ301U	72	120	41.77	3509/84	4000	4000	6000	0.21	16	1.6	7.5
86	32	32	1.6	1.9	C002_0350 EZ301U	65	120	35.03	1261/36	4000	4000	6000	0.23	16	1.6	7.5
96	28	29	1.5	2.1	C002_0310 EZ301U	72	120	31.26	2813/90	4000	4000	6000	0.23	16	1.6	7.5
96	48	51	2.6	1.2	C002_0310 EZ302U	72	120	31.26	2813/90	4000	4000	6000	0.33	16	1.6	8.1
107	25	26	1.4	2.4	C002_0280 EZ301U	65	120	27.99	2015/72	4000	4000	6000	0.25	16	1.6	7.5
107	43	46	2.4	1.4	C002_0280 EZ302U	65	120	27.99	2015/72	4000	4000	6000	0.35	16	1.6	8.1
120	23	23	1.4	2.7	C002_0250 EZ301U	68	120	24.97	899/36	4000	4000	6000	0.25	16	1.6	7.5
120	39	41	2.3	1.6	C002_0250 EZ302U	72	120	24.97	899/36	4000	4000	6000	0.35	16	1.6	8.1
120	50	53	3.0	1.2	C002_0250 EZ303U	72	120	24.97	899/36	4000	4000	6000	0.46	16	1.6	8.6
129	21	21	1.3	2.9	C002_0230 EZ301U	63	120	23.21	325/14	4000	4000	6000	0.27	16	1.6	7.5
129	36	38	2.2	1.7	C002_0230 EZ302U	65	120	23.21	325/14	4000	4000	6000	0.37	16	1.6	8.1
129	47	49	2.9	1.3	C002_0230 EZ303U	65	120	23.21	325/14	4000	4000	6000	0.48	16	1.6	8.6
145	19	19	1.2	3.2	C002_0210 EZ301U	56	120	20.71	145/7	4000	4000	6000	0.27	16	1.6	7.5
145	32	34	2.1	1.9	C002_0210 EZ302U	72	120	20.71	145/7	4000	4000	6000	0.37	16	1.6	8.1
145	42	44	2.7	1.4	C002_0210 EZ303U	72	120	20.71	145/7	4000	4000	6000	0.48	16	1.6	8.6
171	16	16	1.1	3.8	C002_0175 EZ301U	48	120	17.53	3575/204	4000	4000	6000	0.31	16	1.6	7.5
171	27	29	1.9	2.2	C002_0175 EZ302U	65	120	17.53	3575/204	4000	4000	6000	0.41	16	1.6	8.1
171	35	37	2.5	1.7	C002_0175 EZ303U	65	120	17.53	3575/204	4000	4000	6000	0.52	16	1.6	8.6
192	14	14	1.1	4.3	C002_0155 EZ301U	42	110	15.64	1595/102	4000	4000	6000	0.31	16	1.6	7.5
192	24	25	1.8	2.5	C002_0155 EZ302U	72	110	15.64	1595/102	4000	4000	6000	0.41	16	1.6	8.1
192	31	33	2.4	1.9	C002_0155 EZ303U	72	110	15.64	1595/102	4000	4000	6000	0.52	16	1.6	8.6
192	42	46	3.2	1.4	C002_0155 EZ401U	72	120	15.64	1595/102	4000	4000	6000	1.0	16	1.6	10
213	13	13	1.0	4.7	C002_0140 EZ301U	38	100	14.08	169/12	4000	4000	6000	0.35	16	1.6	7.5
213	22	23	1.7	2.8	C002_0140 EZ302U	65	100	14.08	169/12	4000	4000	6000	0.45	16	1.6	8.1
213	28	30	2.3	2.1	C002_0140 EZ303U	65	100	14.08	169/12	4000	4000	6000	0.56	16	1.6	8.6
213	38	41	3.1	1.6	C002_0140 EZ401U	65	120	14.08	169/12	4000	4000	6000	1.1	16	1.6	10
239	11	12	1.0	3.0	C002_0125 EZ301U	34	43	12.57	377/30	4000	4000	6000	0.35	16	1.6	7.5
239	19	20	1.6	3.1	C002_0125 EZ302U	61	91	12.57	377/30	4000	4000	6000	0.45	16	1.6	8.1
239	25	27	2.1	2.4	C002_0125 EZ303U	72	91	12.57	377/30	4000	4000	6000	0.56	16	1.6	8.6
239	34	37	2.9	1.8	C002_0125 EZ401U	72	120	12.57	377/30	4000	4000	6000	1.1	16	1.6	10
260	18	19	1.6	3.3	C002_0115 EZ302U	56	84	11.54	3185/276	3700	3600	6000	0.49	16	1.6	8.1
260	23	25	2.1	2.5	C002_0115 EZ303U	65	84	11.54	3185/276	3700	3600	6000	0.60	16	1.6	8.6
260	31	34	2.9	1.9	C002_0115 EZ401U	65	120	11.54	3185/276	3700	3600	6000	1.1	16	1.6	10
291	16	17	1.6	3.5	C002_0105 EZ302U	50	75	10.30	1421/138	3700	3600	6000	0.49	16	1.6	8.1
291	21	22	2.1	2.7	C002_0105 EZ303U	60	75	10.30	1421/138	3700	3600	6000	0.60	16	1.6	8.6
291	28	30	2.8	2.0	C002_0105 EZ401U	72	120	10.30	1421/138	3700	3600	6000	1.1	16	1.6	10
291	43	47	4.3	1.3	C002_0105 EZ501U	72	120	10.30	1421/138	3700	3600	6000	3.1	16	1.6	11
291	47	52	4.7	1.2	C002_0105 EZ402U	72	120	10.30	1421/138	3700	3600	6000	1.8	16	1.6	11
325	8.3	8.5	0.9	3.0	C002_0092 EZ301U	25	31	9.228	1495/162	3700	3600	6000	0.46	16	1.6	7.5
325	14	15	1.6	3.8	C002_0092 EZ302U	45	67	9.228	1495/162	3700	3600	6000	0.56	16	1.6	8.1
325	19	20	2.0	2.9	C002_0092 EZ303U	54	67	9.228	1495/162	3700	3600	6000	0.67	16	1.6	8.6
325	25	27	2.7	2.2	C002_0092 EZ401U	65	120	9.228	1495/162	3700	3600	6000	1.2	16	1.6	10
325	38	42	4.2	1.4	C002_0092 EZ501U	65	120	9.228	1495/162	3700	3600	6000	3.2	16	1.6	11
325	42	47	4.6	1.3	C002_0092 EZ402U	65	120	9.228	1495/162	3700	3600	6000	1.9	16	1.6	11
364	7.4	7.6	0.9	3.0	C002_0082 EZ301U	22	28	8.235	667/81	3700	3600	6000	0.46	16	1.6	7.5
364	13	13	1.5	3.8	C002_0082 EZ302U	40	60	8.235	667/81	3700	3600	6000	0.56	16	1.6	8.1
364	17	17	2.0	2.9	C002_0082 EZ303U	48	60	8.235	667/81	3700	3600	6000	0.67	16	1.6	8.6
364	22	24	2.7	2.3	C002_0082 EZ401U	68	120	8.235	667/81	3700	3600	6000	1.2	16	1.6	10
364	34	38	4.1	1.5	C002_0082 EZ501U	72	120	8.235	667/81	3700	3600	6000	3.2	16	1.6	11

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
C0 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 72 Nm)																
364	38	42	4.5	1.4	C002_0082 EZ402U	72	120	8.235	667/81	3700	3600	6000	1.9	16	1.6	11
389	7.0	7.1	1.0	2.9	C002_0077 EZ301U	20	25	7.714	54/7	4000	4000	6000	0.28	20	1.3	7.5
389	12	13	1.8	3.5	C002_0077 EZ302U	37	53	7.714	54/7	4000	4000	6000	0.38	20	1.3	8.1
389	15	16	2.3	2.7	C002_0077 EZ303U	42	53	7.714	54/7	4000	4000	6000	0.49	20	1.3	8.6
389	21	22	3.1	2.1	C002_0077 EZ401U	64	110	7.714	54/7	4000	4000	6000	1.0	20	1.3	10
389	32	35	4.8	1.3	C002_0077 EZ501U	65	110	7.714	54/7	4000	4000	6000	3.0	20	1.3	11
389	35	39	5.3	1.2	C002_0077 EZ402U	65	110	7.714	54/7	4000	4000	6000	1.7	20	1.3	11
476	5.7	5.8	1.0	3.0	C002_0063 EZ301U	17	21	6.300	2035/323	4000	4000	6000	0.33	20	1.3	7.5
476	9.7	10	1.7	3.8	C002_0063 EZ302U	31	46	6.300	2035/323	4000	4000	6000	0.43	20	1.3	8.1
476	13	13	2.3	2.9	C002_0063 EZ303U	37	46	6.300	2035/323	4000	4000	6000	0.54	20	1.3	8.6
476	17	18	3.0	2.4	C002_0063 EZ401U	52	110	6.300	2035/323	4000	4000	6000	1.1	20	1.3	10
476	26	29	4.7	1.5	C002_0063 EZ501U	65	110	6.300	2035/323	4000	4000	6000	3.0	20	1.3	11
476	29	32	5.1	1.4	C002_0063 EZ402U	65	110	6.300	2035/323	4000	4000	6000	1.8	20	1.3	11
515	5.3	5.4	1.0	3.0	C002_0058 EZ301U	16	20	5.824	99/17	4000	4000	6000	0.33	20	1.3	7.5
515	9.0	9.5	1.7	3.8	C002_0058 EZ302U	28	42	5.824	99/17	4000	4000	6000	0.43	20	1.3	8.1
515	12	12	2.2	2.9	C002_0058 EZ303U	34	42	5.824	99/17	4000	4000	6000	0.54	20	1.3	8.6
515	16	17	3.0	2.5	C002_0058 EZ401U	48	110	5.824	99/17	4000	4000	6000	1.1	20	1.3	10
515	24	27	4.6	1.6	C002_0058 EZ501U	65	110	5.824	99/17	4000	4000	6000	3.0	20	1.3	11
515	27	29	5.0	1.5	C002_0058 EZ402U	65	110	5.824	99/17	4000	4000	6000	1.8	20	1.3	11
515	39	49	7.4	1.0	C002_0058 EZ404U	65	110	5.824	99/17	4000	4000	6000	3.1	20	1.3	13
593	4.6	4.7	1.0	3.0	C002_0051 EZ301U	14	17	5.063	481/95	4000	4000	6000	0.38	20	1.3	7.5
593	7.8	8.3	1.7	3.8	C002_0051 EZ302U	25	37	5.063	481/95	4000	4000	6000	0.48	20	1.3	8.1
593	10	11	2.2	2.9	C002_0051 EZ303U	29	37	5.063	481/95	4000	4000	6000	0.59	20	1.3	8.6
593	14	15	2.9	2.7	C002_0051 EZ401U	42	110	5.063	481/95	4000	4000	6000	1.1	20	1.3	10
593	21	23	4.5	1.8	C002_0051 EZ501U	65	110	5.063	481/95	4000	4000	6000	3.1	20	1.3	11
593	23	26	4.9	1.6	C002_0051 EZ402U	65	110	5.063	481/95	4000	4000	6000	1.8	20	1.3	11
593	34	42	7.2	1.1	C002_0051 EZ404U	65	110	5.063	481/95	4000	4000	6000	3.2	20	1.3	13
593	36	39	7.8	1.0	C002_0051 EZ502U	65	110	5.063	481/95	4000	4000	6000	5.4	20	1.3	13
593	36	41	7.8	1.0	C002_0051 EZ701U	65	110	5.063	481/95	4000	4000	6000	8.7	20	1.3	14
641	4.2	4.3	1.0	3.0	C002_0047 EZ301U	13	16	4.680	117/25	4000	4000	6000	0.39	20	1.3	7.5
641	7.2	7.6	1.6	3.8	C002_0047 EZ302U	23	34	4.680	117/25	4000	4000	6000	0.49	20	1.3	8.1
641	9.4	9.9	2.1	2.9	C002_0047 EZ303U	27	34	4.680	117/25	4000	4000	6000	0.60	20	1.3	8.6
641	13	14	2.9	2.9	C002_0047 EZ401U	39	110	4.680	117/25	4000	4000	6000	1.1	20	1.3	10
641	20	21	4.5	1.9	C002_0047 EZ501U	65	110	4.680	117/25	4000	4000	6000	3.1	20	1.3	11
641	21	24	4.9	1.7	C002_0047 EZ402U	65	110	4.680	117/25	4000	4000	6000	1.8	20	1.3	11
641	31	39	7.1	1.2	C002_0047 EZ404U	65	110	4.680	117/25	4000	4000	6000	3.2	20	1.3	13
641	34	36	7.7	1.1	C002_0047 EZ502U	65	110	4.680	117/25	4000	4000	6000	5.4	20	1.3	13
641	34	38	7.7	1.1	C002_0047 EZ701U	65	110	4.680	117/25	4000	4000	6000	8.7	20	1.3	14
723	6.4	6.8	1.6	3.8	C002_0041 EZ302U	20	30	4.149	1813/437	3700	3600	6000	0.55	20	1.3	8.1
723	8.3	8.8	2.1	2.9	C002_0041 EZ303U	24	30	4.149	1813/437	3700	3600	6000	0.66	20	1.3	8.6
723	11	12	2.8	3.1	C002_0041 EZ401U	34	110	4.149	1813/437	3700	3600	6000	1.2	20	1.3	10
723	17	19	4.4	2.0	C002_0041 EZ501U	64	110	4.149	1813/437	3700	3600	6000	3.2	20	1.3	11
723	19	21	4.8	1.9	C002_0041 EZ402U	64	110	4.149	1813/437	3700	3600	6000	1.9	20	1.3	11
723	28	35	7.0	1.3	C002_0041 EZ404U	65	110	4.149	1813/437	3700	3600	6000	3.2	20	1.3	13
723	30	32	7.5	1.2	C002_0041 EZ502U	65	110	4.149	1813/437	3700	3600	6000	5.5	20	1.3	13
723	30	33	7.5	1.2	C002_0041 EZ701U	65	110	4.149	1813/437	3700	3600	6000	8.8	20	1.3	14
782	5.9	6.3	1.6	3.8	C002_0038 EZ302U	19	28	3.835	441/115	3700	3600	6000	0.55	20	1.3	8.1
782	7.7	8.1	2.1	2.9	C002_0038 EZ303U	22	28	3.835	441/115	3700	3600	6000	0.66	20	1.3	8.6
782	10	11	2.8	3.3	C002_0038 EZ401U	32	110	3.835	441/115	3700	3600	6000	1.2	20	1.3	10
782	16	17	4.3	2.1	C002_0038 EZ501U	60	110	3.835	441/115	3700	3600	6000	3.2	20	1.3	11
782	17	19	4.7	2.0	C002_0038 EZ402U	60	110	3.835	441/115	3700	3600	6000	1.9	20	1.3	11
782	26	32	6.9	1.3	C002_0038 EZ404U	65	110	3.835	441/115	3700	3600	6000	3.2	20	1.3	13
782	28	30	7.4	1.2	C002_0038 EZ502U	65	110	3.835	441/115	3700	3600	6000	5.5	20	1.3	13
782	28	31	7.4	1.2	C002_0038 EZ701U	65	110	3.835	441/115	3700	3600	6000	8.8	20	1.3	14
904	3.0	3.1	0.9	3.0	C002_0033 EZ301U	9.0	11	3.318	1702/513	3700	3600	6000	0.55	20	1.3	7.5
904	5.1	5.4	1.6	3.8	C002_0033 EZ302U	16	24	3.318	1702/513	3700	3600	6000	0.65	20	1.3	8.1
904	6.7	7.0	2.0	2.9	C002_0033 EZ303U	19	24	3.318	1702/513	3700	3600	6000	0.76	20	1.3	8.6
904	9.0	9.7	2.7	3.6	C002_0033 EZ401U	27	97	3.318	1702/513	3700	3600	6000	1.3	20	1.3	10
904	14	15	4.2	2.4	C002_0033 EZ501U	51	97	3.318	1702/513	3700	3600	6000	3.3	20	1.3	11
904	15	17	4.6	2.2	C002_0033 EZ402U	51	97	3.318	1702/513	3700	3600	6000	2.0	20	1.3	11
904	22	28	6.7	1.5	C002_0033 EZ404U	62	97	3.318	1702/513	3700	3600	6000	3.3	20	1.3	13
904	24	26	7.2	1.4	C002_0033 EZ502U	62	97	3.318	1702/513	3700	3600	6000	5.6	20	1.3	13
904	24	27	7.2	1.4	C002_0033 EZ701U	62	97	3.318	1702/513	3700	3600	6000	8.9	20	1.3	14
904	31	36	9.5	1.0	C002_0033 EZ503U	62	97	3.318	1702/513	3700	3600	6000	7.9	20	1.3	14

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
C0 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 72 Nm)																
978	2.8	2.8	0.9	3.0	C002_0031 EZ301U	8.3	10	3.067	46/15	3700	3600	6000	0.56	20	1.3	7.5
978	4.7	5.0	1.5	3.8	C002_0031 EZ302U	15	22	3.067	46/15	3700	3600	6000	0.66	20	1.3	8.1
978	6.2	6.5	2.0	2.9	C002_0031 EZ303U	18	22	3.067	46/15	3700	3600	6000	0.77	20	1.3	8.6
978	8.3	8.9	2.7	3.8	C002_0031 EZ401U	25	89	3.067	46/15	3700	3600	6000	1.3	20	1.3	10
978	13	14	4.1	2.5	C002_0031 EZ501U	48	89	3.067	46/15	3700	3600	6000	3.3	20	1.3	11
978	14	15	4.5	2.3	C002_0031 EZ402U	48	89	3.067	46/15	3700	3600	6000	2.0	20	1.3	11
978	21	26	6.7	1.5	C002_0031 EZ404U	60	89	3.067	46/15	3700	3600	6000	3.3	20	1.3	13
978	22	24	7.1	1.4	C002_0031 EZ502U	60	89	3.067	46/15	3700	3600	6000	5.6	20	1.3	13
978	22	25	7.1	1.4	C002_0031 EZ701U	60	89	3.067	46/15	3700	3600	6000	8.9	20	1.3	14
978	29	33	9.4	1.1	C002_0031 EZ503U	60	89	3.067	46/15	3700	3600	6000	7.9	20	1.3	14
1083	7.5	8.1	2.7	4.1	C002_0028 EZ401U	23	81	2.769	36/13	3500	3000	6000	1.4	20	1.3	10
1083	12	13	4.1	2.7	C002_0028 EZ501U	43	81	2.769	36/13	3500	3000	6000	3.3	20	1.3	11
1083	13	14	4.5	2.4	C002_0028 EZ402U	43	81	2.769	36/13	3500	3000	6000	2.1	20	1.3	11
1083	19	23	6.5	1.7	C002_0028 EZ404U	58	81	2.769	36/13	3500	3000	6000	3.4	20	1.3	13
1083	20	21	7.0	1.5	C002_0028 EZ502U	58	81	2.769	36/13	3500	3000	6000	5.6	20	1.3	13
1083	20	22	7.0	1.5	C002_0028 EZ701U	54	81	2.769	36/13	3500	3000	6000	8.9	20	1.3	14
1083	26	30	9.2	1.2	C002_0028 EZ503U	58	81	2.769	36/13	3500	3000	6000	8.0	20	1.3	14
1502	3.1	3.3	1.4	3.8	C002_0020 EZ302U	9.7	15	1.997	1480/741	3500	3000	6000	1.0	20	1.3	8.1
1502	4.0	4.2	1.9	2.9	C002_0020 EZ303U	12	15	1.997	1480/741	3500	3000	6000	1.1	20	1.3	8.6
1502	5.4	5.8	2.5	4.3	C002_0020 EZ401U	16	29	1.997	1480/741	3500	3000	6000	1.7	20	1.3	10
1502	8.3	9.1	3.9	3.3	C002_0020 EZ501U	31	58	1.997	1480/741	3500	3000	6000	3.6	20	1.3	11
1502	9.1	10	4.2	3.0	C002_0020 EZ402U	31	58	1.997	1480/741	3500	3000	6000	2.4	20	1.3	11
1502	13	17	6.2	2.1	C002_0020 EZ404U	46	58	1.997	1480/741	3500	3000	6000	3.7	20	1.3	13
1502	14	15	6.6	1.9	C002_0020 EZ502U	46	58	1.997	1480/741	3500	3000	6000	5.9	20	1.3	13
1502	14	16	6.6	1.9	C002_0020 EZ701U	39	58	1.997	1480/741	3500	3000	6000	9.2	20	1.3	14
1502	19	22	8.7	1.5	C002_0020 EZ503U	46	58	1.997	1480/741	3500	3000	6000	8.3	20	1.3	14
C0 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 72 Nm)																
120	43	46	1.8	1.4	C002_0500 EZ301U	72	120	49.94	899/18	4000	4000	6000	0.21	16	1.6	7.5
128	40	43	1.8	1.5	C002_0470 EZ301U	65	120	46.82	7865/168	4000	4000	6000	0.21	16	1.6	7.5
144	36	38	1.7	1.7	C002_0420 EZ301U	72	120	41.77	3509/84	4000	4000	6000	0.21	16	1.6	7.5
171	30	32	1.5	2.0	C002_0350 EZ301U	65	120	35.03	1261/36	4000	4000	6000	0.23	16	1.6	7.5
192	27	29	1.4	2.2	C002_0310 EZ301U	72	120	31.26	2813/90	4000	4000	6000	0.23	16	1.6	7.5
192	45	51	2.4	1.3	C002_0310 EZ302U	72	120	31.26	2813/90	4000	4000	6000	0.33	16	1.6	8.1
214	24	26	1.4	2.5	C002_0280 EZ301U	65	120	27.99	2015/72	4000	4000	6000	0.25	16	1.6	7.5
214	41	46	2.3	1.5	C002_0280 EZ302U	65	120	27.99	2015/72	4000	4000	6000	0.35	16	1.6	8.1
240	22	23	1.3	2.8	C002_0250 EZ301U	68	120	24.97	899/36	4000	4000	6000	0.25	16	1.6	7.5
240	36	41	2.2	1.6	C002_0250 EZ302U	72	120	24.97	899/36	4000	4000	6000	0.35	16	1.6	8.1
240	47	55	2.9	1.3	C002_0250 EZ303U	72	120	24.97	899/36	4000	4000	6000	0.46	16	1.6	8.6
258	20	21	1.3	2.9	C002_0230 EZ301U	63	120	23.21	325/14	4000	4000	6000	0.27	16	1.6	7.5
258	34	38	2.2	1.7	C002_0230 EZ302U	65	120	23.21	325/14	4000	4000	6000	0.37	16	1.6	8.1
290	18	19	1.3	3.1	C002_0210 EZ301U	56	120	20.71	145/7	4000	4000	6000	0.27	16	1.6	7.5
290	30	34	2.1	1.9	C002_0210 EZ302U	72	120	20.71	145/7	4000	4000	6000	0.37	16	1.6	8.1
290	39	45	2.8	1.4	C002_0210 EZ303U	72	120	20.71	145/7	4000	4000	6000	0.48	16	1.6	8.6
342	15	16	1.2	3.5	C002_0175 EZ301U	48	120	17.53	3575/204	4000	4000	6000	0.31	16	1.6	7.5
342	25	29	2.1	2.1	C002_0175 EZ302U	65	120	17.53	3575/204	4000	4000	6000	0.41	16	1.6	8.1
342	33	38	2.7	1.6	C002_0175 EZ303U	65	120	17.53	3575/204	4000	4000	6000	0.52	16	1.6	8.6
342	39	48	3.2	1.4	C002_0175 EZ401U	65	120	17.53	3575/204	4000	4000	6000	1.0	16	1.6	10
384	13	14	1.2	3.8	C002_0155 EZ301U	42	110	15.64	1595/102	4000	4000	6000	0.31	16	1.6	7.5
384	23	25	2.0	2.3	C002_0155 EZ302U	72	110	15.64	1595/102	4000	4000	6000	0.41	16	1.6	8.1
384	30	34	2.6	1.7	C002_0155 EZ303U	72	110	15.64	1595/102	4000	4000	6000	0.52	16	1.6	8.6
384	35	42	3.1	1.5	C002_0155 EZ401U	72	120	15.64	1595/102	4000	4000	6000	1.0	16	1.6	10
426	12	13	1.2	4.1	C002_0140 EZ301U	38	100	14.08	169/12	4000	4000	6000	0.35	16	1.6	7.5
426	20	23	2.0	2.4	C002_0140 EZ302U	65	100	14.08	169/12	4000	4000	6000	0.45	16	1.6	8.1
426	27	31	2.6	1.8	C002_0140 EZ303U	65	100	14.08	169/12	4000	4000	6000	0.56	16	1.6	8.6
426	31	38	3.1	1.6	C002_0140 EZ401U	65	120	14.08	169/12	4000	4000	6000	1.1	16	1.6	10
477	11	12	1.2	4.4	C002_0125 EZ301U	34	91	12.57	377/30	4000	4000	6000	0.35	16	1.6	7.5
477	18	20	2.0	2.6	C002_0125 EZ302U	61	91	12.57	377/30	4000	4000	6000	0.45	16	1.6	8.1
477	24	27	2.5	2.0	C002_0125 EZ303U	72	91	12.57	377/30	4000	4000	6000	0.56	16	1.6	8.6
477	28	34	3.0	1.7	C002_0125 EZ401U	72	120	12.57	377/30	4000	4000	6000	1.1	16	1.6	10
477	41	54	4.4	1.1	C002_0125 EZ501U	72	120	12.57	377/30	4000	4000	6000	3.1	16	1.6	11
520	10	11	1.1	4.6	C002_0115 EZ301U	31	84	11.54	3185/276	3700	3600	6000	0.39	16	1.6	7.5
520	17	19	1.9	2.8	C002_0115 EZ302U	56	84	11.54	3185/276	3700	3600	6000	0.49	16	1.6	8.1
520	22	25	2.5	2.1	C002_0115 EZ303U	65	84	11.54	3185/276	3700	3600	6000	0.60	16	1.6	8.6
520	26	31	2.9	1.8	C002_0115 EZ401U	65	120	11.54	3185/276	3700	3600	6000	1.1	16	1.6	10

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
C0 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 72 Nm)																
520	38	49	4.4	1.2	C002_0115 EZ501U	65	120	11.54	3185/276	3700	3600	6000	3.1	16	1.6	11
583	15	17	1.9	3.0	C002_0105 EZ302U	50	75	10.30	1421/138	3700	3600	6000	0.49	16	1.6	8.1
583	20	22	2.5	2.3	C002_0105 EZ303U	60	75	10.30	1421/138	3700	3600	6000	0.60	16	1.6	8.6
583	23	28	2.9	1.9	C002_0105 EZ401U	72	120	10.30	1421/138	3700	3600	6000	1.1	16	1.6	10
583	34	44	4.3	1.3	C002_0105 EZ501U	72	120	10.30	1421/138	3700	3600	6000	3.1	16	1.6	11
583	35	49	4.4	1.3	C002_0105 EZ402U	72	120	10.30	1421/138	3700	3600	6000	1.8	16	1.6	11
650	8.0	8.5	1.1	3.1	C002_0092 EZ301U	25	31	9.228	1495/162	3700	3600	6000	0.46	16	1.6	7.5
650	13	15	1.9	3.2	C002_0092 EZ302U	45	67	9.228	1495/162	3700	3600	6000	0.56	16	1.6	8.1
650	18	20	2.4	2.4	C002_0092 EZ303U	54	67	9.228	1495/162	3700	3600	6000	0.67	16	1.6	8.6
650	21	25	2.8	2.1	C002_0092 EZ401U	65	120	9.228	1495/162	3700	3600	6000	1.2	16	1.6	10
650	30	39	4.2	1.4	C002_0092 EZ501U	65	120	9.228	1495/162	3700	3600	6000	3.2	16	1.6	11
650	31	44	4.3	1.4	C002_0092 EZ402U	65	120	9.228	1495/162	3700	3600	6000	1.9	16	1.6	11
729	7.1	7.6	1.1	3.1	C002_0082 EZ301U	22	28	8.235	667/81	3700	3600	6000	0.46	16	1.6	7.5
729	12	13	1.8	3.5	C002_0082 EZ302U	40	60	8.235	667/81	3700	3600	6000	0.56	16	1.6	8.1
729	16	18	2.4	2.6	C002_0082 EZ303U	48	60	8.235	667/81	3700	3600	6000	0.67	16	1.6	8.6
729	18	22	2.8	2.3	C002_0082 EZ401U	68	120	8.235	667/81	3700	3600	6000	1.2	16	1.6	10
729	27	35	4.1	1.5	C002_0082 EZ501U	72	120	8.235	667/81	3700	3600	6000	3.2	16	1.6	11
729	28	39	4.2	1.5	C002_0082 EZ402U	72	120	8.235	667/81	3700	3600	6000	1.9	16	1.6	11
778	6.7	7.1	1.3	3.0	C002_0077 EZ301U	20	25	7.714	54/7	4000	4000	6000	0.28	20	1.3	7.5
778	11	13	2.1	3.1	C002_0077 EZ302U	37	53	7.714	54/7	4000	4000	6000	0.38	20	1.3	8.1
778	15	17	2.8	2.3	C002_0077 EZ303U	42	53	7.714	54/7	4000	4000	6000	0.49	20	1.3	8.6
778	17	21	3.3	2.0	C002_0077 EZ401U	64	110	7.714	54/7	4000	4000	6000	1.0	20	1.3	10
778	25	33	4.8	1.3	C002_0077 EZ501U	65	110	7.714	54/7	4000	4000	6000	3.0	20	1.3	11
778	26	37	5.0	1.3	C002_0077 EZ402U	65	110	7.714	54/7	4000	4000	6000	1.7	20	1.3	11
952	5.4	5.8	1.2	3.1	C002_0063 EZ301U	17	21	6.300	2035/323	4000	4000	6000	0.33	20	1.3	7.5
952	9.2	10	2.1	3.5	C002_0063 EZ302U	31	46	6.300	2035/323	4000	4000	6000	0.43	20	1.3	8.1
952	12	14	2.7	2.7	C002_0063 EZ303U	37	46	6.300	2035/323	4000	4000	6000	0.54	20	1.3	8.6
952	14	17	3.2	2.3	C002_0063 EZ401U	52	110	6.300	2035/323	4000	4000	6000	1.1	20	1.3	10
952	21	27	4.7	1.5	C002_0063 EZ501U	65	110	6.300	2035/323	4000	4000	6000	3.0	20	1.3	11
952	21	30	4.8	1.5	C002_0063 EZ402U	65	110	6.300	2035/323	4000	4000	6000	1.8	20	1.3	11
952	32	48	7.1	1.0	C002_0063 EZ502U	65	110	6.300	2035/323	4000	4000	6000	5.3	20	1.3	13
952	32	48	7.1	1.0	C002_0063 EZ701U	65	110	6.300	2035/323	4000	4000	6000	8.6	20	1.3	14
1030	5.0	5.4	1.2	3.1	C002_0058 EZ301U	16	20	5.824	99/17	4000	4000	6000	0.33	20	1.3	7.5
1030	8.5	9.5	2.0	3.7	C002_0058 EZ302U	28	42	5.824	99/17	4000	4000	6000	0.43	20	1.3	8.1
1030	11	13	2.7	2.8	C002_0058 EZ303U	34	42	5.824	99/17	4000	4000	6000	0.54	20	1.3	8.6
1030	13	16	3.1	2.4	C002_0058 EZ401U	48	110	5.824	99/17	4000	4000	6000	1.1	20	1.3	10
1030	19	25	4.6	1.6	C002_0058 EZ501U	65	110	5.824	99/17	4000	4000	6000	3.0	20	1.3	11
1030	20	28	4.7	1.6	C002_0058 EZ402U	65	110	5.824	99/17	4000	4000	6000	1.8	20	1.3	11
1030	29	44	7.0	1.1	C002_0058 EZ502U	65	110	5.824	99/17	4000	4000	6000	5.3	20	1.3	13
1030	29	45	7.0	1.1	C002_0058 EZ701U	65	110	5.824	99/17	4000	4000	6000	8.6	20	1.3	14
1185	4.4	4.7	1.2	3.1	C002_0051 EZ301U	14	17	5.063	481/95	4000	4000	6000	0.38	20	1.3	7.5
1185	7.4	8.3	2.0	4.0	C002_0051 EZ302U	25	37	5.063	481/95	4000	4000	6000	0.48	20	1.3	8.1
1185	9.6	11	2.6	3.1	C002_0051 EZ303U	29	37	5.063	481/95	4000	4000	6000	0.59	20	1.3	8.6
1185	11	14	3.0	2.6	C002_0051 EZ401U	42	110	5.063	481/95	4000	4000	6000	1.1	20	1.3	10
1185	17	22	4.5	1.8	C002_0051 EZ501U	65	110	5.063	481/95	4000	4000	6000	3.1	20	1.3	11
1185	17	24	4.6	1.7	C002_0051 EZ402U	65	110	5.063	481/95	4000	4000	6000	1.8	20	1.3	11
1185	26	38	6.9	1.2	C002_0051 EZ502U	65	110	5.063	481/95	4000	4000	6000	5.4	20	1.3	13
1185	26	39	6.9	1.2	C002_0051 EZ701U	65	110	5.063	481/95	4000	4000	6000	8.7	20	1.3	14
1185	28	41	7.7	1.0	C002_0051 EZ404U	65	110	5.063	481/95	4000	4000	6000	3.2	20	1.3	13
1282	4.0	4.3	1.2	3.1	C002_0047 EZ301U	13	16	4.680	117/25	4000	4000	6000	0.39	20	1.3	7.5
1282	6.8	7.6	2.0	4.0	C002_0047 EZ302U	23	34	4.680	117/25	4000	4000	6000	0.49	20	1.3	8.1
1282	8.9	10	2.6	3.1	C002_0047 EZ303U	27	34	4.680	117/25	4000	4000	6000	0.60	20	1.3	8.6
1282	10	13	3.0	2.8	C002_0047 EZ401U	39	110	4.680	117/25	4000	4000	6000	1.1	20	1.3	10
1282	15	20	4.4	1.9	C002_0047 EZ501U	65	110	4.680	117/25	4000	4000	6000	3.1	20	1.3	11
1282	16	22	4.6	1.8	C002_0047 EZ402U	65	110	4.680	117/25	4000	4000	6000	1.8	20	1.3	11
1282	24	35	6.8	1.2	C002_0047 EZ502U	65	110	4.680	117/25	4000	4000	6000	5.4	20	1.3	13
1282	24	36	6.8	1.2	C002_0047 EZ701U	65	110	4.680	117/25	4000	4000	6000	8.7	20	1.3	14
1282	26	38	7.6	1.1	C002_0047 EZ404U	65	110	4.680	117/25	4000	4000	6000	3.2	20	1.3	13
1282	28	48	8.1	1.0	C002_0047 EZ503U	65	110	4.680	117/25	4000	4000	6000	7.8	20	1.3	14
1446	6.0	6.8	1.9	4.0	C002_0041 EZ302U	20	30	4.149	1813/437	3700	3600	6000	0.55	20	1.3	8.1
1446	7.9	9.1	2.5	3.1	C002_0041 EZ303U	24	30	4.149	1813/437	3700	3600	6000	0.66	20	1.3	8.6
1446	9.3	11	2.9	3.0	C002_0041 EZ401U	34	110	4.149	1813/437	3700	3600	6000	1.2	20	1.3	10
1446	14	18	4.3	2.0	C002_0041 EZ501U	64	110	4.149	1813/437	3700	3600	6000	3.2	20	1.3	11
1446	14	20	4.5	2.0	C002_0041 EZ402U	64	110	4.149	1813/437	3700	3600	6000	1.9	20	1.3	11

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
C0 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 72 Nm)																
1446	21	31	6.6	1.3	C002_0041 EZ502U	65	110	4.149	1813/437	3700	3600	6000	5.5	20	1.3	13
1446	21	32	6.6	1.3	C002_0041 EZ701U	65	110	4.149	1813/437	3700	3600	6000	8.8	20	1.3	14
1446	23	34	7.4	1.2	C002_0041 EZ404U	65	110	4.149	1813/437	3700	3600	6000	3.2	20	1.3	13
1446	25	43	7.9	1.1	C002_0041 EZ503U	65	110	4.149	1813/437	3700	3600	6000	7.8	20	1.3	14
1565	5.6	6.3	1.9	4.0	C002_0038 EZ302U	19	28	3.835	441/115	3700	3600	6000	0.55	20	1.3	8.1
1565	7.3	8.4	2.5	3.1	C002_0038 EZ303U	22	28	3.835	441/115	3700	3600	6000	0.66	20	1.3	8.6
1565	8.6	10	2.9	3.2	C002_0038 EZ401U	32	110	3.835	441/115	3700	3600	6000	1.2	20	1.3	10
1565	13	16	4.3	2.1	C002_0038 EZ501U	60	110	3.835	441/115	3700	3600	6000	3.2	20	1.3	11
1565	13	18	4.4	2.1	C002_0038 EZ402U	60	110	3.835	441/115	3700	3600	6000	1.9	20	1.3	11
1565	19	29	6.6	1.4	C002_0038 EZ502U	65	110	3.835	441/115	3700	3600	6000	5.5	20	1.3	13
1565	19	29	6.6	1.4	C002_0038 EZ701U	65	110	3.835	441/115	3700	3600	6000	8.8	20	1.3	14
1565	22	31	7.3	1.3	C002_0038 EZ404U	65	110	3.835	441/115	3700	3600	6000	3.2	20	1.3	13
1565	23	39	7.8	1.2	C002_0038 EZ503U	65	110	3.835	441/115	3700	3600	6000	7.8	20	1.3	14
1808	2.9	3.1	1.1	3.1	C002_0033 EZ301U	9.0	11	3.318	1702/513	3700	3600	6000	0.55	20	1.3	7.5
1808	4.8	5.4	1.8	4.0	C002_0033 EZ302U	16	24	3.318	1702/513	3700	3600	6000	0.65	20	1.3	8.1
1808	6.3	7.2	2.4	3.1	C002_0033 EZ303U	19	24	3.318	1702/513	3700	3600	6000	0.76	20	1.3	8.6
1808	7.4	9.0	2.8	3.5	C002_0033 EZ401U	27	97	3.318	1702/513	3700	3600	6000	1.3	20	1.3	10
1808	11	14	4.2	2.4	C002_0033 EZ501U	51	97	3.318	1702/513	3700	3600	6000	3.3	20	1.3	11
1808	11	16	4.3	2.3	C002_0033 EZ402U	51	97	3.318	1702/513	3700	3600	6000	2.0	20	1.3	11
1808	17	25	6.4	1.5	C002_0033 EZ502U	62	97	3.318	1702/513	3700	3600	6000	5.6	20	1.3	13
1808	17	25	6.4	1.5	C002_0033 EZ701U	62	97	3.318	1702/513	3700	3600	6000	8.9	20	1.3	14
1808	19	27	7.1	1.4	C002_0033 EZ404U	62	97	3.318	1702/513	3700	3600	6000	3.3	20	1.3	13
1808	20	34	7.6	1.3	C002_0033 EZ503U	62	97	3.318	1702/513	3700	3600	6000	7.9	20	1.3	14
1956	2.6	2.8	1.1	3.1	C002_0031 EZ301U	8.3	10	3.067	46/15	3700	3600	6000	0.56	20	1.3	7.5
1956	4.5	5.0	1.8	4.0	C002_0031 EZ302U	15	22	3.067	46/15	3700	3600	6000	0.66	20	1.3	8.1
1956	5.8	6.7	2.4	3.1	C002_0031 EZ303U	18	22	3.067	46/15	3700	3600	6000	0.77	20	1.3	8.6
1956	6.8	8.3	2.8	3.7	C002_0031 EZ401U	25	89	3.067	46/15	3700	3600	6000	1.3	20	1.3	10
1956	10	13	4.1	2.5	C002_0031 EZ501U	48	89	3.067	46/15	3700	3600	6000	3.3	20	1.3	11
1956	10	15	4.3	2.4	C002_0031 EZ402U	48	89	3.067	46/15	3700	3600	6000	2.0	20	1.3	11
1956	15	23	6.3	1.6	C002_0031 EZ502U	60	89	3.067	46/15	3700	3600	6000	5.6	20	1.3	13
1956	15	24	6.3	1.6	C002_0031 EZ701U	60	89	3.067	46/15	3700	3600	6000	8.9	20	1.3	14
1956	17	25	7.0	1.5	C002_0031 EZ404U	60	89	3.067	46/15	3700	3600	6000	3.3	20	1.3	13
1956	18	32	7.5	1.4	C002_0031 EZ503U	60	89	3.067	46/15	3700	3600	6000	7.9	20	1.3	14
2167	6.2	7.5	2.7	3.9	C002_0028 EZ401U	23	81	2.769	36/13	3500	3000	6000	1.4	20	1.3	10
2167	9.1	12	4.1	2.7	C002_0028 EZ501U	43	81	2.769	36/13	3500	3000	6000	3.3	20	1.3	11
2167	9.4	13	4.2	2.6	C002_0028 EZ402U	43	81	2.769	36/13	3500	3000	6000	2.1	20	1.3	11
2167	14	21	6.2	1.7	C002_0028 EZ502U	58	81	2.769	36/13	3500	3000	6000	5.6	20	1.3	13
2167	14	21	6.2	1.7	C002_0028 EZ701U	54	81	2.769	36/13	3500	3000	6000	8.9	20	1.3	14
2167	16	23	6.9	1.6	C002_0028 EZ404U	58	81	2.769	36/13	3500	3000	6000	3.4	20	1.3	13
2167	17	28	7.4	1.5	C002_0028 EZ503U	58	81	2.769	36/13	3500	3000	6000	8.0	20	1.3	14
3005	2.9	3.3	1.7	4.0	C002_0020 EZ302U	9.7	15	1.997	1480/741	3500	3000	6000	1.0	20	1.3	8.1
3005	3.8	4.4	2.2	3.1	C002_0020 EZ303U	12	15	1.997	1480/741	3500	3000	6000	1.1	20	1.3	8.6
3005	4.5	5.4	2.6	4.9	C002_0020 EZ401U	16	58	1.997	1480/741	3500	3000	6000	1.7	20	1.3	10
3005	6.6	8.5	3.8	3.3	C002_0020 EZ501U	31	58	1.997	1480/741	3500	3000	6000	3.6	20	1.3	11
3005	6.8	9.5	4.0	3.2	C002_0020 EZ402U	31	58	1.997	1480/741	3500	3000	6000	2.4	20	1.3	11
3005	10	15	5.9	2.2	C002_0020 EZ502U	46	58	1.997	1480/741	3500	3000	6000	5.9	20	1.3	13
3005	10	15	5.9	2.2	C002_0020 EZ701U	39	58	1.997	1480/741	3500	3000	6000	9.2	20	1.3	14
3005	11	16	6.6	1.9	C002_0020 EZ404U	46	58	1.997	1480/741	3500	3000	6000	3.7	20	1.3	13
3005	12	21	7.0	1.8	C002_0020 EZ503U	46	58	1.997	1480/741	3500	3000	6000	8.3	20	1.3	14
C1 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 140 Nm)																
27	99	101	1.6	1.2	C103_1110 EZ301U	140	240	111.1	1222/11	4000	3900	6000	0.25	15	3.9	15
33	82	84	1.4	1.5	C103_0920 EZ301U	140	240	92.13	16215/176	4000	3900	6000	0.25	15	3.9	15
37	73	74	1.3	1.7	C103_0820 EZ301U	140	240	81.64	31349/384	4000	3900	6000	0.25	15	3.9	15
43	64	65	1.3	1.9	C102_0700 EZ301U	140	240	70.46	775/11	4000	3900	6000	0.22	15	3.9	12
48	56	58	1.2	2.1	C102_0620 EZ301U	140	240	62.43	4495/72	4000	3900	6000	0.22	15	3.9	12
48	96	102	2.0	1.2	C102_0620 EZ302U	140	240	62.43	4495/72	4000	3900	6000	0.32	15	3.9	13
53	51	52	1.1	2.4	C102_0560 EZ301U	140	240	56.36	620/11	4000	3900	6000	0.24	15	3.9	12
53	87	92	1.9	1.4	C102_0560 EZ302U	140	240	56.36	620/11	4000	3900	6000	0.34	15	3.9	13
60	45	46	1.1	2.7	C102_0500 EZ301U	140	240	49.94	899/18	4000	3900	6000	0.24	15	3.9	12
60	77	81	1.8	1.6	C102_0500 EZ302U	140	240	49.94	899/18	4000	3900	6000	0.34	15	3.9	13
60	100	106	2.4	1.2	C102_0500 EZ303U	140	240	49.94	899/18	4000	3900	6000	0.45	15	3.9	14
64	42	43	1.0	2.8	C102_0470 EZ301U	130	240	46.91	516/11	4000	3900	6000	0.26	15	3.9	12
64	72	76	1.8	1.7	C102_0470 EZ302U	140	240	46.91	516/11	4000	3900	6000	0.36	15	3.9	13
64	94	100	2.3	1.3	C102_0470 EZ303U	140	240	46.91	516/11	4000	3900	6000	0.47	15	3.9	14

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
C1 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 140 Nm)																
72	37	38	1.0	3.2	C102_0420 EZ301U	110	230	41.57	1247/30	4000	3900	6000	0.26	15	3.9	12
72	64	68	1.7	1.9	C102_0420 EZ302U	140	230	41.57	1247/30	4000	3900	6000	0.36	15	3.9	13
72	83	88	2.2	1.4	C102_0420 EZ303U	140	230	41.57	1247/30	4000	3900	6000	0.47	15	3.9	14
86	32	32	0.9	3.8	C102_0350 EZ301U	95	220	35.07	2700/77	4000	3900	6000	0.30	15	3.9	12
86	54	57	1.5	2.2	C102_0350 EZ302U	140	220	35.07	2700/77	4000	3900	6000	0.40	15	3.9	13
86	70	74	2.0	1.7	C102_0350 EZ303U	140	220	35.07	2700/77	4000	3900	6000	0.51	15	3.9	14
86	95	102	2.7	1.3	C102_0350 EZ401U	140	240	35.07	2700/77	4000	3900	6000	1.0	15	3.9	15
97	28	29	0.8	4.3	C102_0310 EZ301U	84	190	31.07	435/14	4000	3900	6000	0.30	15	3.9	12
97	48	51	1.4	2.5	C102_0310 EZ302U	140	190	31.07	435/14	4000	3900	6000	0.40	15	3.9	13
97	62	66	1.9	1.9	C102_0310 EZ303U	140	190	31.07	435/14	4000	3900	6000	0.51	15	3.9	14
97	84	90	2.5	1.4	C102_0310 EZ401U	140	240	31.07	435/14	4000	3900	6000	1.0	15	3.9	15
106	77	83	2.4	1.6	C102_0280 EZ401U	140	240	28.36	312/11	4000	3900	6000	1.1	15	3.9	15
119	68	73	2.3	1.8	C102_0250 EZ401U	140	240	25.13	377/15	4000	3900	6000	1.1	15	3.9	15
128	36	38	1.2	3.3	C102_0240 EZ302U	110	170	23.52	1035/44	4000	3900	6000	0.49	15	3.9	13
128	47	50	1.6	2.5	C102_0240 EZ303U	140	170	23.52	1035/44	4000	3900	6000	0.60	15	3.9	14
128	64	68	2.2	1.9	C102_0240 EZ401U	140	240	23.52	1035/44	4000	3900	6000	1.1	15	3.9	15
144	32	34	1.2	3.7	C102_0210 EZ302U	100	150	20.84	667/32	4000	3900	6000	0.49	15	3.9	13
144	42	44	1.5	2.9	C102_0210 EZ303U	120	150	20.84	667/32	4000	3900	6000	0.60	15	3.9	14
144	57	61	2.1	2.1	C102_0210 EZ401U	140	240	20.84	667/32	4000	3900	6000	1.1	15	3.9	15
144	87	95	3.2	1.4	C102_0210 EZ501U	140	240	20.84	667/32	4000	3900	6000	3.1	15	3.9	16
144	95	105	3.5	1.3	C102_0210 EZ402U	140	240	20.84	667/32	4000	3900	6000	1.8	15	3.9	16
169	27	29	1.1	3.8	C102_0175 EZ302U	86	130	17.73	195/11	3800	3500	6000	0.59	15	3.9	13
169	36	38	1.4	2.9	C102_0175 EZ303U	100	130	17.73	195/11	3800	3500	6000	0.70	15	3.9	14
169	48	52	1.9	2.5	C102_0175 EZ401U	140	240	17.73	195/11	3800	3500	6000	1.2	15	3.9	15
169	74	81	2.9	1.6	C102_0175 EZ501U	140	240	17.73	195/11	3800	3500	6000	3.2	15	3.9	16
169	81	89	3.2	1.5	C102_0175 EZ402U	140	240	17.73	195/11	3800	3500	6000	1.9	15	3.9	16
191	24	26	1.0	3.8	C102_0155 EZ302U	76	110	15.71	377/24	3800	3500	6000	0.60	15	3.9	13
191	32	33	1.3	2.9	C102_0155 EZ303U	91	110	15.71	377/24	3800	3500	6000	0.71	15	3.9	14
191	43	46	1.8	2.8	C102_0155 EZ401U	130	240	15.71	377/24	3800	3500	6000	1.2	15	3.9	15
191	66	72	2.8	1.8	C102_0155 EZ501U	140	240	15.71	377/24	3800	3500	6000	3.2	15	3.9	16
191	72	79	3.0	1.7	C102_0155 EZ402U	140	240	15.71	377/24	3800	3500	6000	1.9	15	3.9	16
213	38	41	1.7	3.1	C102_0140 EZ401U	120	240	14.06	2010/143	3800	3500	6000	1.3	15	3.9	15
213	59	64	2.6	2.0	C102_0140 EZ501U	140	240	14.06	2010/143	3800	3500	6000	3.3	15	3.9	16
213	64	71	2.8	1.9	C102_0140 EZ402U	140	240	14.06	2010/143	3800	3500	6000	2.0	15	3.9	16
241	34	36	1.6	3.5	C102_0125 EZ401U	100	240	12.46	1943/156	3800	3500	6000	1.3	15	3.9	15
241	52	57	2.5	2.3	C102_0125 EZ501U	140	240	12.46	1943/156	3800	3500	6000	3.3	15	3.9	16
241	57	63	2.7	2.1	C102_0125 EZ402U	140	240	12.46	1943/156	3800	3500	6000	2.0	15	3.9	16
241	83	104	4.0	1.4	C102_0125 EZ404U	140	240	12.46	1943/156	3800	3500	6000	3.4	15	3.9	18
241	89	97	4.2	1.3	C102_0125 EZ502U	140	240	12.46	1943/156	3800	3500	6000	5.6	15	3.9	17
241	89	100	4.2	1.3	C102_0125 EZ701U	140	240	12.46	1943/156	3800	3500	6000	8.9	15	3.9	19
256	18	19	0.9	3.8	C102_0115 EZ302U	57	85	11.72	1160/99	3600	3100	6000	0.82	15	3.9	13
256	24	25	1.2	2.9	C102_0115 EZ303U	68	85	11.72	1160/99	3600	3100	6000	0.93	15	3.9	14
256	32	34	1.6	3.7	C102_0115 EZ401U	97	240	11.72	1160/99	3600	3100	6000	1.5	15	3.9	15
256	49	53	2.4	2.4	C102_0115 EZ501U	140	240	11.72	1160/99	3600	3100	6000	3.4	15	3.9	16
256	53	59	2.7	2.2	C102_0115 EZ402U	140	240	11.72	1160/99	3600	3100	6000	2.2	15	3.9	16
256	78	98	3.9	1.5	C102_0115 EZ404U	140	240	11.72	1160/99	3600	3100	6000	3.5	15	3.9	18
256	84	91	4.2	1.4	C102_0115 EZ502U	140	240	11.72	1160/99	3600	3100	6000	5.7	15	3.9	17
256	84	94	4.2	1.4	C102_0115 EZ701U	140	240	11.72	1160/99	3600	3100	6000	9.0	15	3.9	19
289	16	17	0.9	3.8	C102_0105 EZ302U	50	76	10.38	841/81	3600	3100	6000	0.83	15	3.9	13
289	21	22	1.2	2.9	C102_0105 EZ303U	60	76	10.38	841/81	3600	3100	6000	0.94	15	3.9	14
289	28	30	1.6	4.0	C102_0105 EZ401U	86	240	10.38	841/81	3600	3100	6000	1.5	15	3.9	15
289	43	47	2.4	2.6	C102_0105 EZ501U	140	240	10.38	841/81	3600	3100	6000	3.4	15	3.9	16
289	47	52	2.6	2.4	C102_0105 EZ402U	140	240	10.38	841/81	3600	3100	6000	2.2	15	3.9	16
289	69	87	3.8	1.6	C102_0105 EZ404U	140	240	10.38	841/81	3600	3100	6000	3.5	15	3.9	18
289	75	81	4.1	1.5	C102_0105 EZ502U	140	240	10.38	841/81	3600	3100	6000	5.7	15	3.9	17
289	75	84	4.1	1.5	C102_0105 EZ701U	140	240	10.38	841/81	3600	3100	6000	9.0	15	3.9	19
322	25	27	1.5	4.3	C102_0093 EZ401U	77	240	9.326	3180/341	3600	3100	6000	1.6	15	3.9	15
322	39	43	2.3	2.8	C102_0093 EZ501U	140	240	9.326	3180/341	3600	3100	6000	3.6	15	3.9	16
322	43	47	2.6	2.6	C102_0093 EZ402U	140	240	9.326	3180/341	3600	3100	6000	2.3	15	3.9	16
322	62	78	3.8	1.7	C102_0093 EZ404U	140	240	9.326	3180/341	3600	3100	6000	3.7	15	3.9	18
322	67	72	4.0	1.6	C102_0093 EZ502U	140	240	9.326	3180/341	3600	3100	6000	5.9	15	3.9	17
322	67	75	4.0	1.6	C102_0093 EZ701U	140	240	9.326	3180/341	3600	3100	6000	9.2	15	3.9	19
322	88	100	5.3	1.2	C102_0093 EZ503U	140	240	9.326	3180/341	3600	3100	6000	8.3	15	3.9	19
363	22	24	1.5	4.6	C102_0083 EZ401U	68	240	8.263	1537/186	3600	3100	6000	1.7	15	3.9	15

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
C1 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 140 Nm)																
363	34	38	2.3	3.0	C102_0083 EZ501U	130	240	8.263	1537/186	3600	3100	6000	3.6	15	3.9	16
363	38	42	2.5	2.8	C102_0083 EZ402U	130	240	8.263	1537/186	3600	3100	6000	2.4	15	3.9	16
363	55	69	3.7	1.9	C102_0083 EZ404U	140	240	8.263	1537/186	3600	3100	6000	3.7	15	3.9	18
363	59	64	4.0	1.8	C102_0083 EZ502U	140	240	8.263	1537/186	3600	3100	6000	5.9	15	3.9	17
363	59	67	4.0	1.8	C102_0083 EZ701U	140	240	8.263	1537/186	3600	3100	6000	9.2	15	3.9	19
363	78	89	5.2	1.3	C102_0083 EZ503U	140	240	8.263	1537/186	3600	3100	6000	8.3	15	3.9	19
385	12	13	1.0	3.8	C102_0078 EZ302U	38	57	7.796	3243/416	4000	3900	6000	0.54	18	3.1	13
385	16	17	1.3	2.9	C102_0078 EZ303U	45	57	7.796	3243/416	4000	3900	6000	0.65	18	3.1	14
385	21	23	1.8	4.1	C102_0078 EZ401U	64	210	7.796	3243/416	4000	3900	6000	1.2	18	3.1	15
385	33	36	2.7	2.7	C102_0078 EZ501U	120	210	7.796	3243/416	4000	3900	6000	3.1	18	3.1	16
385	36	39	2.9	2.4	C102_0078 EZ402U	120	210	7.796	3243/416	4000	3900	6000	1.9	18	3.1	16
385	52	65	4.3	1.7	C102_0078 EZ404U	130	210	7.796	3243/416	4000	3900	6000	3.2	18	3.1	18
385	56	60	4.6	1.5	C102_0078 EZ502U	130	210	7.796	3243/416	4000	3900	6000	5.4	18	3.1	17
385	56	63	4.6	1.5	C102_0078 EZ701U	130	220	7.796	3243/416	4000	3900	6000	8.7	18	3.1	19
385	73	84	6.1	1.2	C102_0078 EZ503U	130	210	7.796	3243/416	4000	3900	6000	7.8	18	3.1	19
473	9.8	10	1.0	3.8	C102_0063 EZ302U	31	46	6.338	507/80	3800	3500	6000	0.67	18	3.1	13
473	13	13	1.3	2.9	C102_0063 EZ303U	37	46	6.338	507/80	3800	3500	6000	0.78	18	3.1	14
473	17	18	1.7	4.7	C102_0063 EZ401U	52	180	6.338	507/80	3800	3500	6000	1.3	18	3.1	15
473	26	29	2.6	3.1	C102_0063 EZ501U	98	180	6.338	507/80	3800	3500	6000	3.3	18	3.1	16
473	29	32	2.8	2.8	C102_0063 EZ402U	98	180	6.338	507/80	3800	3500	6000	2.0	18	3.1	16
473	42	53	4.2	1.9	C102_0063 EZ404U	130	180	6.338	507/80	3800	3500	6000	3.4	18	3.1	18
473	45	49	4.5	1.8	C102_0063 EZ502U	130	180	6.338	507/80	3800	3500	6000	5.6	18	3.1	17
473	45	51	4.5	1.8	C102_0063 EZ701U	120	220	6.338	507/80	3800	3500	6000	8.9	18	3.1	19
473	60	68	5.9	1.4	C102_0063 EZ503U	130	180	6.338	507/80	3800	3500	6000	8.0	18	3.1	19
473	74	89	7.3	1.1	C102_0063 EZ702U	130	220	6.338	507/80	3800	3500	6000	14	18	3.1	22
511	9.1	9.6	0.9	3.8	C102_0059 EZ302U	28	43	5.875	47/8	3800	3500	6000	0.67	18	3.1	13
511	12	12	1.2	2.9	C102_0059 EZ303U	34	43	5.875	47/8	3800	3500	6000	0.78	18	3.1	14
511	16	17	1.7	4.9	C102_0059 EZ401U	48	170	5.875	47/8	3800	3500	6000	1.3	18	3.1	15
511	25	27	2.6	3.2	C102_0059 EZ501U	91	170	5.875	47/8	3800	3500	6000	3.3	18	3.1	16
511	27	30	2.8	2.9	C102_0059 EZ402U	91	170	5.875	47/8	3800	3500	6000	2.0	18	3.1	16
511	39	49	4.1	2.0	C102_0059 EZ404U	130	170	5.875	47/8	3800	3500	6000	3.4	18	3.1	18
511	42	46	4.4	1.9	C102_0059 EZ502U	130	170	5.875	47/8	3800	3500	6000	5.6	18	3.1	17
511	42	47	4.4	1.9	C102_0059 EZ701U	110	220	5.875	47/8	3800	3500	6000	8.9	18	3.1	19
511	55	63	5.8	1.4	C102_0059 EZ503U	130	170	5.875	47/8	3800	3500	6000	8.0	18	3.1	19
511	68	82	7.2	1.2	C102_0059 EZ702U	130	220	5.875	47/8	3800	3500	6000	14	18	3.1	22
511	77	91	8.1	1.0	C102_0059 EZ505U	130	220	5.875	47/8	3800	3500	6000	13	18	3.1	22
597	14	15	1.6	4.3	C102_0050 EZ401U	41	73	5.025	201/40	3800	3500	6000	1.5	18	3.1	15
597	21	23	2.5	3.6	C102_0050 EZ501U	78	150	5.025	201/40	3800	3500	6000	3.4	18	3.1	16
597	23	25	2.7	3.3	C102_0050 EZ402U	78	150	5.025	201/40	3800	3500	6000	2.2	18	3.1	16
597	34	42	4.0	2.2	C102_0050 EZ404U	120	150	5.025	201/40	3800	3500	6000	3.5	18	3.1	18
597	36	39	4.3	2.1	C102_0050 EZ502U	120	150	5.025	201/40	3800	3500	6000	5.7	18	3.1	17
597	36	40	4.3	2.1	C102_0050 EZ701U	97	220	5.025	201/40	3800	3500	6000	9.0	18	3.1	19
597	47	54	5.6	1.6	C102_0050 EZ503U	120	150	5.025	201/40	3800	3500	6000	8.1	18	3.1	19
597	58	70	7.0	1.3	C102_0050 EZ702U	130	220	5.025	201/40	3800	3500	6000	14	18	3.1	22
597	66	78	7.9	1.1	C102_0050 EZ505U	130	220	5.025	201/40	3800	3500	6000	13	18	3.1	22
644	13	14	1.6	4.3	C102_0047 EZ401U	38	68	4.658	3149/676	3800	3500	6000	1.5	18	3.1	15
644	19	21	2.5	3.8	C102_0047 EZ501U	72	140	4.658	3149/676	3800	3500	6000	3.4	18	3.1	16
644	21	23	2.7	3.4	C102_0047 EZ402U	72	140	4.658	3149/676	3800	3500	6000	2.2	18	3.1	16
644	31	39	4.0	2.3	C102_0047 EZ404U	110	140	4.658	3149/676	3800	3500	6000	3.5	18	3.1	18
644	33	36	4.3	2.2	C102_0047 EZ502U	110	140	4.658	3149/676	3800	3500	6000	5.7	18	3.1	17
644	33	38	4.3	2.2	C102_0047 EZ701U	90	220	4.658	3149/676	3800	3500	6000	9.0	18	3.1	19
644	44	50	5.6	1.7	C102_0047 EZ503U	110	140	4.658	3149/676	3800	3500	6000	8.1	18	3.1	19
644	54	65	6.9	1.3	C102_0047 EZ702U	130	220	4.658	3149/676	3800	3500	6000	14	18	3.1	22
644	61	72	7.8	1.2	C102_0047 EZ505U	130	220	4.658	3149/676	3800	3500	6000	13	18	3.1	22
716	6.5	6.8	0.9	3.8	C102_0042 EZ302U	20	30	4.189	377/90	3600	3100	6000	0.99	18	3.1	13
716	8.4	8.9	1.2	2.9	C102_0042 EZ303U	24	30	4.189	377/90	3600	3100	6000	1.1	18	3.1	14
716	11	12	1.6	4.3	C102_0042 EZ401U	35	61	4.189	377/90	3600	3100	6000	1.6	18	3.1	15
716	17	19	2.4	4.0	C102_0042 EZ501U	65	120	4.189	377/90	3600	3100	6000	3.6	18	3.1	16
716	19	21	2.7	3.7	C102_0042 EZ402U	65	120	4.189	377/90	3600	3100	6000	2.3	18	3.1	16
716	28	35	3.9	2.5	C102_0042 EZ404U	98	120	4.189	377/90	3600	3100	6000	3.7	18	3.1	18
716	30	33	4.2	2.3	C102_0042 EZ502U	98	120	4.189	377/90	3600	3100	6000	5.9	18	3.1	17
716	30	34	4.2	2.3	C102_0042 EZ701U	81	220	4.189	377/90	3600	3100	6000	9.2	18	3.1	19
716	39	45	5.5	1.8	C102_0042 EZ503U	98	120	4.189	377/90	3600	3100	6000	8.3	18	3.1	19
716	49	59	6.8	1.4	C102_0042 EZ702U	130	220	4.189	377/90	3600	3100	6000	14	18	3.1	22

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
C1 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 140 Nm)																
716	55	65	7.6	1.3	C102_0042 EZ505U	130	220	4.189	377/90	3600	3100	6000	13	18	3.1	22
716	67	85	9.3	1.1	C102_0042 EZ703U	130	220	4.189	377/90	3600	3100	6000	22	18	3.1	24
773	6.0	6.3	0.9	3.8	C102_0039 EZ302U	19	28	3.883	1363/351	3600	3100	6000	1.0	18	3.1	13
773	7.8	8.2	1.2	2.9	C102_0039 EZ303U	23	28	3.883	1363/351	3600	3100	6000	1.1	18	3.1	14
773	11	11	1.6	4.3	C102_0039 EZ401U	32	56	3.883	1363/351	3600	3100	6000	1.6	18	3.1	15
773	16	18	2.4	4.2	C102_0039 EZ501U	60	110	3.883	1363/351	3600	3100	6000	3.6	18	3.1	16
773	18	20	2.6	3.9	C102_0039 EZ402U	60	110	3.883	1363/351	3600	3100	6000	2.3	18	3.1	16
773	26	32	3.8	2.6	C102_0039 EZ404U	90	110	3.883	1363/351	3600	3100	6000	3.7	18	3.1	18
773	28	30	4.1	2.5	C102_0039 EZ502U	90	110	3.883	1363/351	3600	3100	6000	5.9	18	3.1	17
773	28	31	4.1	2.5	C102_0039 EZ701U	75	220	3.883	1363/351	3600	3100	6000	9.2	18	3.1	19
773	37	42	5.4	1.9	C102_0039 EZ503U	90	110	3.883	1363/351	3600	3100	6000	8.3	18	3.1	19
773	45	54	6.7	1.5	C102_0039 EZ702U	130	220	3.883	1363/351	3600	3100	6000	14	18	3.1	22
773	51	60	7.5	1.3	C102_0039 EZ505U	130	220	3.883	1363/351	3600	3100	6000	13	18	3.1	22
773	62	78	9.2	1.1	C102_0039 EZ703U	130	220	3.883	1363/351	3600	3100	6000	22	18	3.1	24
900	9.1	9.7	1.5	4.3	C102_0033 EZ401U	27	49	3.334	2067/620	3600	3100	6000	1.9	18	3.1	15
900	14	15	2.3	4.7	C102_0033 EZ501U	52	97	3.334	2067/620	3600	3100	6000	3.9	18	3.1	16
900	15	17	2.6	4.3	C102_0033 EZ402U	52	97	3.334	2067/620	3600	3100	6000	2.6	18	3.1	16
900	22	28	3.7	2.9	C102_0033 EZ404U	78	97	3.334	2067/620	3600	3100	6000	4.0	18	3.1	18
900	24	26	4.0	2.7	C102_0033 EZ502U	78	97	3.334	2067/620	3600	3100	6000	6.2	18	3.1	17
900	24	27	4.0	2.7	C102_0033 EZ701U	65	220	3.334	2067/620	3600	3100	6000	9.5	18	3.1	19
900	31	36	5.3	2.1	C102_0033 EZ503U	78	97	3.334	2067/620	3600	3100	6000	8.6	18	3.1	19
900	39	47	6.5	1.7	C102_0033 EZ702U	120	220	3.334	2067/620	3600	3100	6000	15	18	3.1	22
900	44	52	7.3	1.5	C102_0033 EZ505U	120	220	3.334	2067/620	3600	3100	6000	13	18	3.1	22
900	53	67	9.0	1.2	C102_0033 EZ703U	120	220	3.334	2067/620	3600	3100	6000	23	18	3.1	24
971	8.4	9.0	1.5	4.3	C102_0031 EZ401U	25	45	3.091	2491/806	3600	3100	6000	1.9	18	3.1	15
971	13	14	2.3	4.9	C102_0031 EZ501U	48	90	3.091	2491/806	3600	3100	6000	3.9	18	3.1	16
971	14	16	2.5	4.5	C102_0031 EZ402U	48	90	3.091	2491/806	3600	3100	6000	2.6	18	3.1	16
971	21	26	3.7	3.1	C102_0031 EZ404U	72	90	3.091	2491/806	3600	3100	6000	4.0	18	3.1	18
971	22	24	4.0	2.9	C102_0031 EZ502U	72	90	3.091	2491/806	3600	3100	6000	6.2	18	3.1	17
971	22	25	4.0	2.9	C102_0031 EZ701U	60	220	3.091	2491/806	3600	3100	6000	9.5	18	3.1	19
971	29	33	5.2	2.2	C102_0031 EZ503U	72	90	3.091	2491/806	3600	3100	6000	8.6	18	3.1	19
971	36	43	6.4	1.8	C102_0031 EZ702U	120	220	3.091	2491/806	3600	3100	6000	15	18	3.1	22
971	40	48	7.2	1.6	C102_0031 EZ505U	120	220	3.091	2491/806	3600	3100	6000	13	18	3.1	22
971	49	62	8.9	1.3	C102_0031 EZ703U	120	220	3.091	2491/806	3600	3100	6000	23	18	3.1	24
1162	19	21	3.9	3.2	C102_0026 EZ701U	50	190	2.582	1911/740	3100	2600	5000	10	18	3.1	19
1162	30	36	6.2	2.0	C102_0026 EZ702U	100	190	2.582	1911/740	3100	2600	5000	15	18	3.1	22
1162	34	40	7.0	1.8	C102_0026 EZ505U	110	190	2.582	1911/740	3100	2600	5000	14	18	3.1	22
1162	41	52	8.6	1.4	C102_0026 EZ703U	110	190	2.582	1911/740	3100	2600	5000	23	18	3.1	24
1253	17	19	3.8	3.4	C102_0024 EZ701U	46	170	2.394	2303/962	3100	2600	5000	10	18	3.1	19
1253	28	33	6.2	2.1	C102_0024 EZ702U	95	170	2.394	2303/962	3100	2600	5000	15	18	3.1	22
1253	31	37	6.9	1.9	C102_0024 EZ505U	110	170	2.394	2303/962	3100	2600	5000	14	18	3.1	22
1253	38	48	8.5	1.5	C102_0024 EZ703U	110	170	2.394	2303/962	3100	2600	5000	23	18	3.1	24
1378	15	18	3.5	3.5	C102_0022 EZ404U	51	63	2.177	468/215	3100	2600	5000	4.8	18	3.1	18
1378	16	17	3.7	3.2	C102_0022 EZ502U	51	63	2.177	468/215	3100	2600	5000	7.0	18	3.1	17
1378	16	18	3.7	3.6	C102_0022 EZ701U	42	160	2.177	468/215	3100	2600	5000	10	18	3.1	19
1378	20	23	4.9	2.5	C102_0022 EZ503U	51	63	2.177	468/215	3100	2600	5000	9.4	18	3.1	19
1378	25	30	6.1	2.2	C102_0022 EZ702U	87	160	2.177	468/215	3100	2600	5000	16	18	3.1	22
1378	29	34	6.8	2.0	C102_0022 EZ505U	110	160	2.177	468/215	3100	2600	5000	14	18	3.1	22
1378	35	44	8.3	1.6	C102_0022 EZ703U	110	160	2.177	468/215	3100	2600	5000	23	18	3.1	24
1487	14	17	3.4	3.5	C102_0020 EZ404U	47	59	2.018	1128/559	3100	2600	5000	4.9	18	3.1	18
1487	14	16	3.7	3.2	C102_0020 EZ502U	47	59	2.018	1128/559	3100	2600	5000	7.1	18	3.1	17
1487	14	16	3.7	3.8	C102_0020 EZ701U	39	150	2.018	1128/559	3100	2600	5000	10	18	3.1	19
1487	19	22	4.8	2.5	C102_0020 EZ503U	47	59	2.018	1128/559	3100	2600	5000	9.5	18	3.1	19
1487	23	28	6.0	2.3	C102_0020 EZ702U	80	150	2.018	1128/559	3100	2600	5000	16	18	3.1	22
1487	26	31	6.7	2.1	C102_0020 EZ505U	100	150	2.018	1128/559	3100	2600	5000	14	18	3.1	22
1487	32	41	8.2	1.7	C102_0020 EZ703U	100	150	2.018	1128/559	3100	2600	5000	24	18	3.1	24
C1 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 130 Nm)																
710	58	94	6.6	1.2	C102_0063 EZ505U	130	220	6.338	507/80	3800	3500	6000	13	18	3.1	22
766	54	87	6.5	1.3	C102_0059 EZ505U	130	220	5.875	47/8	3800	3500	6000	13	18	3.1	22
896	46	75	6.3	1.4	C102_0050 EZ505U	130	220	5.025	201/40	3800	3500	6000	13	18	3.1	22
896	59	97	8.1	1.1	C102_0050 EZ703U	130	220	5.025	201/40	3800	3500	6000	22	18	3.1	24
966	43	69	6.2	1.5	C102_0047 EZ505U	130	220	4.658	3149/676	3800	3500	6000	13	18	3.1	22
966	55	90	8.0	1.2	C102_0047 EZ703U	130	220	4.658	3149/676	3800	3500	6000	22	18	3.1	24
1074	39	62	6.1	1.6	C102_0042 EZ505U	130	220	4.189	377/90	3600	3100	6000	13	18	3.1	22

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
C1 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 130 Nm)																
1074	49	81	7.8	1.3	C102_0042 EZ703U	130	220	4.189	377/90	3600	3100	6000	22	18	3.1	24
1159	36	58	6.1	1.7	C102_0039 EZ505U	130	220	3.883	1363/351	3600	3100	6000	13	18	3.1	22
1159	46	75	7.7	1.3	C102_0039 EZ703U	130	220	3.883	1363/351	3600	3100	6000	22	18	3.1	24
1350	31	49	5.9	1.9	C102_0033 EZ505U	120	220	3.334	2067/620	3600	3100	6000	13	18	3.1	22
1350	39	65	7.5	1.5	C102_0033 EZ703U	120	220	3.334	2067/620	3600	3100	6000	23	18	3.1	24
1456	28	46	5.8	2.0	C102_0031 EZ505U	120	220	3.091	2491/806	3600	3100	6000	13	18	3.1	22
1456	36	60	7.4	1.5	C102_0031 EZ703U	120	220	3.091	2491/806	3600	3100	6000	23	18	3.1	24
1743	24	38	5.7	2.2	C102_0026 EZ505U	110	190	2.582	1911/740	3100	2600	5000	14	18	3.1	22
1743	30	50	7.2	1.7	C102_0026 EZ703U	110	190	2.582	1911/740	3100	2600	5000	23	18	3.1	24
1880	22	36	5.6	2.3	C102_0024 EZ505U	110	170	2.394	2303/962	3100	2600	5000	14	18	3.1	22
1880	28	46	7.1	1.8	C102_0024 EZ703U	110	170	2.394	2303/962	3100	2600	5000	23	18	3.1	24
2067	20	32	5.5	2.5	C102_0022 EZ505U	110	160	2.177	468/215	3100	2600	5000	14	18	3.1	22
2067	26	42	7.0	1.9	C102_0022 EZ703U	110	160	2.177	468/215	3100	2600	5000	23	18	3.1	24
2230	19	30	5.4	2.6	C102_0020 EZ505U	100	150	2.018	1128/559	3100	2600	5000	14	18	3.1	22
2230	24	39	6.9	2.0	C102_0020 EZ703U	100	150	2.018	1128/559	3100	2600	5000	24	18	3.1	24
C1 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 140 Nm)																
54	95	101	1.5	1.3	C103_1110 EZ301U	140	240	111.1	1222/11	4000	3900	6000	0.25	15	3.9	15
65	78	84	1.4	1.5	C103_0920 EZ301U	140	240	92.13	16215/176	4000	3900	6000	0.25	15	3.9	15
73	69	74	1.3	1.7	C103_0820 EZ301U	140	240	81.64	31349/384	4000	3900	6000	0.25	15	3.9	15
85	61	65	1.2	2.0	C102_0700 EZ301U	140	240	70.46	775/11	4000	3900	6000	0.22	15	3.9	12
96	54	58	1.1	2.2	C102_0620 EZ301U	140	240	62.43	4495/72	4000	3900	6000	0.22	15	3.9	12
96	91	102	1.9	1.3	C102_0620 EZ302U	140	240	62.43	4495/72	4000	3900	6000	0.32	15	3.9	13
106	49	52	1.1	2.5	C102_0560 EZ301U	140	240	56.36	620/11	4000	3900	6000	0.24	15	3.9	12
106	82	92	1.8	1.5	C102_0560 EZ302U	140	240	56.36	620/11	4000	3900	6000	0.34	15	3.9	13
120	43	46	1.0	2.8	C102_0500 EZ301U	140	240	49.94	899/18	4000	3900	6000	0.24	15	3.9	12
120	73	81	1.7	1.7	C102_0500 EZ302U	140	240	49.94	899/18	4000	3900	6000	0.34	15	3.9	13
128	40	43	1.0	3.0	C102_0470 EZ301U	130	240	46.91	516/11	4000	3900	6000	0.26	15	3.9	12
128	68	76	1.7	1.8	C102_0470 EZ302U	140	240	46.91	516/11	4000	3900	6000	0.36	15	3.9	13
128	89	102	2.2	1.3	C102_0470 EZ303U	140	240	46.91	516/11	4000	3900	6000	0.47	15	3.9	14
144	36	38	0.9	3.3	C102_0420 EZ301U	110	230	41.57	1247/30	4000	3900	6000	0.26	15	3.9	12
144	60	68	1.6	2.0	C102_0420 EZ302U	140	230	41.57	1247/30	4000	3900	6000	0.36	15	3.9	13
144	79	91	2.0	1.5	C102_0420 EZ303U	140	230	41.57	1247/30	4000	3900	6000	0.47	15	3.9	14
171	30	32	0.9	4.0	C102_0350 EZ301U	95	220	35.07	2700/77	4000	3900	6000	0.30	15	3.9	12
171	51	57	1.4	2.4	C102_0350 EZ302U	140	220	35.07	2700/77	4000	3900	6000	0.40	15	3.9	13
171	67	77	1.9	1.8	C102_0350 EZ303U	140	220	35.07	2700/77	4000	3900	6000	0.51	15	3.9	14
171	78	95	2.2	1.5	C102_0350 EZ401U	140	240	35.07	2700/77	4000	3900	6000	1.0	15	3.9	15
193	27	29	0.8	4.5	C102_0310 EZ301U	84	190	31.07	435/14	4000	3900	6000	0.30	15	3.9	12
193	45	51	1.4	2.7	C102_0310 EZ302U	140	190	31.07	435/14	4000	3900	6000	0.40	15	3.9	13
193	59	68	1.8	2.0	C102_0310 EZ303U	140	190	31.07	435/14	4000	3900	6000	0.51	15	3.9	14
193	69	84	2.1	1.7	C102_0310 EZ401U	140	240	31.07	435/14	4000	3900	6000	1.0	15	3.9	15
212	63	77	2.0	1.9	C102_0280 EZ401U	140	240	28.36	312/11	4000	3900	6000	1.1	15	3.9	15
239	56	68	1.9	2.1	C102_0250 EZ401U	140	240	25.13	377/15	4000	3900	6000	1.1	15	3.9	15
255	34	38	1.2	3.4	C102_0240 EZ302U	110	170	23.52	1035/44	4000	3900	6000	0.49	15	3.9	13
255	45	51	1.6	2.6	C102_0240 EZ303U	140	170	23.52	1035/44	4000	3900	6000	0.60	15	3.9	14
255	52	64	1.8	2.2	C102_0240 EZ401U	140	240	23.52	1035/44	4000	3900	6000	1.1	15	3.9	15
255	78	100	2.7	1.5	C102_0240 EZ501U	140	240	23.52	1035/44	4000	3900	6000	3.1	15	3.9	16
288	30	34	1.2	3.7	C102_0210 EZ302U	100	150	20.84	667/32	4000	3900	6000	0.49	15	3.9	13
288	40	45	1.5	2.8	C102_0210 EZ303U	120	150	20.84	667/32	4000	3900	6000	0.60	15	3.9	14
288	47	57	1.8	2.4	C102_0210 EZ401U	140	240	20.84	667/32	4000	3900	6000	1.1	15	3.9	15
288	69	89	2.7	1.6	C102_0210 EZ501U	140	240	20.84	667/32	4000	3900	6000	3.1	15	3.9	16
288	71	99	2.8	1.6	C102_0210 EZ402U	140	240	20.84	667/32	4000	3900	6000	1.8	15	3.9	16
338	26	29	1.1	4.0	C102_0175 EZ302U	86	130	17.73	195/11	3800	3500	6000	0.59	15	3.9	13
338	34	39	1.5	3.1	C102_0175 EZ303U	100	130	17.73	195/11	3800	3500	6000	0.70	15	3.9	14
338	40	48	1.8	2.7	C102_0175 EZ401U	140	240	17.73	195/11	3800	3500	6000	1.2	15	3.9	15
338	58	76	2.6	1.8	C102_0175 EZ501U	140	240	17.73	195/11	3800	3500	6000	3.2	15	3.9	16
338	60	84	2.7	1.8	C102_0175 EZ402U	140	240	17.73	195/11	3800	3500	6000	1.9	15	3.9	16
382	23	26	1.1	4.0	C102_0155 EZ302U	76	110	15.71	377/24	3800	3500	6000	0.60	15	3.9	13
382	30	34	1.5	3.1	C102_0155 EZ303U	91	110	15.71	377/24	3800	3500	6000	0.71	15	3.9	14
382	35	43	1.7	2.9	C102_0155 EZ401U	130	240	15.71	377/24	3800	3500	6000	1.2	15	3.9	15
382	52	67	2.6	2.0	C102_0155 EZ501U	140	240	15.71	377/24	3800	3500	6000	3.2	15	3.9	16
382	53	75	2.6	1.9	C102_0155 EZ402U	140	240	15.71	377/24	3800	3500	6000	1.9	15	3.9	16
427	31	38	1.7	3.2	C102_0140 EZ401U	120	240	14.06	2010/143	3800	3500	6000	1.3	15	3.9	15
427	46	60	2.5	2.1	C102_0140 EZ501U	140	240	14.06	2010/143	3800	3500	6000	3.3	15	3.9	16
427	48	67	2.6	2.1	C102_0140 EZ402U	140	240	14.06	2010/143	3800	3500	6000	2.0	15	3.9	16

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
C1 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 140 Nm)																
427	71	106	3.8	1.4	C102_0140 EZ502U	140	240	14.06	2010/143	3800	3500	6000	5.6	15	3.9	17
482	28	34	1.7	3.4	C102_0125 EZ401U	100	240	12.46	1943/156	3800	3500	6000	1.3	15	3.9	15
482	41	53	2.5	2.3	C102_0125 EZ501U	140	240	12.46	1943/156	3800	3500	6000	3.3	15	3.9	16
482	42	59	2.5	2.2	C102_0125 EZ402U	140	240	12.46	1943/156	3800	3500	6000	2.0	15	3.9	16
482	63	94	3.8	1.5	C102_0125 EZ502U	140	240	12.46	1943/156	3800	3500	6000	5.6	15	3.9	17
482	63	95	3.8	1.5	C102_0125 EZ701U	140	240	12.46	1943/156	3800	3500	6000	8.9	15	3.9	19
482	70	101	4.2	1.4	C102_0125 EZ404U	140	240	12.46	1943/156	3800	3500	6000	3.4	15	3.9	18
512	17	19	1.1	4.0	C102_0115 EZ302U	57	85	11.72	1160/99	3600	3100	6000	0.82	15	3.9	13
512	22	26	1.4	3.1	C102_0115 EZ303U	68	85	11.72	1160/99	3600	3100	6000	0.93	15	3.9	14
512	26	32	1.6	3.6	C102_0115 EZ401U	97	240	11.72	1160/99	3600	3100	6000	1.5	15	3.9	15
512	39	50	2.4	2.4	C102_0115 EZ501U	140	240	11.72	1160/99	3600	3100	6000	3.4	15	3.9	16
512	40	56	2.5	2.3	C102_0115 EZ402U	140	240	11.72	1160/99	3600	3100	6000	2.2	15	3.9	16
512	59	89	3.7	1.6	C102_0115 EZ502U	140	240	11.72	1160/99	3600	3100	6000	5.7	15	3.9	17
512	59	90	3.7	1.6	C102_0115 EZ701U	140	240	11.72	1160/99	3600	3100	6000	9.0	15	3.9	19
512	66	95	4.1	1.4	C102_0115 EZ404U	140	240	11.72	1160/99	3600	3100	6000	3.5	15	3.9	18
578	15	17	1.1	4.0	C102_0105 EZ302U	50	76	10.38	841/81	3600	3100	6000	0.83	15	3.9	13
578	20	23	1.4	3.1	C102_0105 EZ303U	60	76	10.38	841/81	3600	3100	6000	0.94	15	3.9	14
578	23	28	1.6	3.9	C102_0105 EZ401U	86	240	10.38	841/81	3600	3100	6000	1.5	15	3.9	15
578	34	44	2.4	2.6	C102_0105 EZ501U	140	240	10.38	841/81	3600	3100	6000	3.4	15	3.9	16
578	35	49	2.4	2.5	C102_0105 EZ402U	140	240	10.38	841/81	3600	3100	6000	2.2	15	3.9	16
578	52	79	3.6	1.7	C102_0105 EZ502U	140	240	10.38	841/81	3600	3100	6000	5.7	15	3.9	17
578	52	80	3.6	1.7	C102_0105 EZ701U	140	240	10.38	841/81	3600	3100	6000	9.0	15	3.9	19
578	58	85	4.1	1.5	C102_0105 EZ404U	140	240	10.38	841/81	3600	3100	6000	3.5	15	3.9	18
643	21	25	1.6	4.1	C102_0093 EZ401U	77	240	9.326	3180/341	3600	3100	6000	1.6	15	3.9	15
643	31	40	2.3	2.8	C102_0093 EZ501U	140	240	9.326	3180/341	3600	3100	6000	3.6	15	3.9	16
643	32	44	2.4	2.7	C102_0093 EZ402U	140	240	9.326	3180/341	3600	3100	6000	2.3	15	3.9	16
643	47	71	3.6	1.8	C102_0093 EZ502U	140	240	9.326	3180/341	3600	3100	6000	5.9	15	3.9	17
643	47	71	3.6	1.8	C102_0093 EZ701U	140	240	9.326	3180/341	3600	3100	6000	9.2	15	3.9	19
643	52	76	4.0	1.6	C102_0093 EZ404U	140	240	9.326	3180/341	3600	3100	6000	3.7	15	3.9	18
643	56	96	4.3	1.5	C102_0093 EZ503U	140	240	9.326	3180/341	3600	3100	6000	8.3	15	3.9	19
726	18	22	1.6	4.5	C102_0083 EZ401U	68	240	8.263	1537/186	3600	3100	6000	1.7	15	3.9	15
726	27	35	2.3	3.0	C102_0083 EZ501U	130	240	8.263	1537/186	3600	3100	6000	3.6	15	3.9	16
726	28	39	2.4	3.0	C102_0083 EZ402U	130	240	8.263	1537/186	3600	3100	6000	2.4	15	3.9	16
726	42	63	3.5	2.0	C102_0083 EZ502U	140	240	8.263	1537/186	3600	3100	6000	5.9	15	3.9	17
726	42	63	3.5	2.0	C102_0083 EZ701U	140	240	8.263	1537/186	3600	3100	6000	9.2	15	3.9	19
726	46	67	3.9	1.8	C102_0083 EZ404U	140	240	8.263	1537/186	3600	3100	6000	3.7	15	3.9	18
726	50	85	4.2	1.7	C102_0083 EZ503U	140	240	8.263	1537/186	3600	3100	6000	8.3	15	3.9	19
770	11	13	1.2	4.0	C102_0078 EZ302U	38	57	7.796	3243/416	4000	3900	6000	0.54	18	3.1	13
770	15	17	1.5	3.1	C102_0078 EZ303U	45	57	7.796	3243/416	4000	3900	6000	0.65	18	3.1	14
770	17	21	1.8	4.0	C102_0078 EZ401U	64	210	7.796	3243/416	4000	3900	6000	1.2	18	3.1	15
770	26	33	2.7	2.7	C102_0078 EZ501U	120	210	7.796	3243/416	4000	3900	6000	3.1	18	3.1	16
770	26	37	2.8	2.6	C102_0078 EZ402U	120	210	7.796	3243/416	4000	3900	6000	1.9	18	3.1	16
770	39	59	4.1	1.7	C102_0078 EZ502U	130	210	7.796	3243/416	4000	3900	6000	5.4	18	3.1	17
770	39	60	4.1	1.7	C102_0078 EZ701U	130	220	7.796	3243/416	4000	3900	6000	8.7	18	3.1	19
770	44	64	4.6	1.6	C102_0078 EZ404U	130	210	7.796	3243/416	4000	3900	6000	3.2	18	3.1	18
770	47	80	4.9	1.5	C102_0078 EZ503U	130	210	7.796	3243/416	4000	3900	6000	7.8	18	3.1	19
947	9.2	10	1.1	4.0	C102_0063 EZ302U	31	46	6.338	507/80	3800	3500	6000	0.67	18	3.1	13
947	12	14	1.5	3.1	C102_0063 EZ303U	37	46	6.338	507/80	3800	3500	6000	0.78	18	3.1	14
947	14	17	1.8	4.5	C102_0063 EZ401U	52	180	6.338	507/80	3800	3500	6000	1.3	18	3.1	15
947	21	27	2.6	3.1	C102_0063 EZ501U	98	180	6.338	507/80	3800	3500	6000	3.3	18	3.1	16
947	22	30	2.7	3.0	C102_0063 EZ402U	98	180	6.338	507/80	3800	3500	6000	2.0	18	3.1	16
947	32	48	4.0	2.0	C102_0063 EZ502U	130	180	6.338	507/80	3800	3500	6000	5.6	18	3.1	17
947	32	49	4.0	2.0	C102_0063 EZ701U	120	220	6.338	507/80	3800	3500	6000	8.9	18	3.1	19
947	36	52	4.4	1.8	C102_0063 EZ404U	130	180	6.338	507/80	3800	3500	6000	3.4	18	3.1	18
947	38	65	4.7	1.7	C102_0063 EZ503U	130	180	6.338	507/80	3800	3500	6000	8.0	18	3.1	19
947	44	88	5.5	1.4	C102_0063 EZ702U	130	220	6.338	507/80	3800	3500	6000	14	18	3.1	22
1021	8.5	9.6	1.1	4.0	C102_0059 EZ302U	28	43	5.875	47/8	3800	3500	6000	0.67	18	3.1	13
1021	11	13	1.5	3.1	C102_0059 EZ303U	34	43	5.875	47/8	3800	3500	6000	0.78	18	3.1	14
1021	13	16	1.7	4.8	C102_0059 EZ401U	48	170	5.875	47/8	3800	3500	6000	1.3	18	3.1	15
1021	19	25	2.6	3.2	C102_0059 EZ501U	91	170	5.875	47/8	3800	3500	6000	3.3	18	3.1	16
1021	20	28	2.6	3.1	C102_0059 EZ402U	91	170	5.875	47/8	3800	3500	6000	2.0	18	3.1	16
1021	30	44	3.9	2.1	C102_0059 EZ502U	130	170	5.875	47/8	3800	3500	6000	5.6	18	3.1	17
1021	30	45	3.9	2.1	C102_0059 EZ701U	110	220	5.875	47/8	3800	3500	6000	8.9	18	3.1	19
1021	33	48	4.4	1.9	C102_0059 EZ404U	130	170	5.875	47/8	3800	3500	6000	3.4	18	3.1	18

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
C1 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 140 Nm)																
1021	35	60	4.7	1.8	C102_0059 EZ503U	130	170	5.875	47/8	3800	3500	6000	8.0	18	3.1	19
1021	41	81	5.4	1.5	C102_0059 EZ702U	130	220	5.875	47/8	3800	3500	6000	14	18	3.1	22
1194	17	21	2.5	3.6	C102_0050 EZ501U	78	150	5.025	201/40	3800	3500	6000	3.4	18	3.1	16
1194	17	24	2.6	3.5	C102_0050 EZ402U	78	150	5.025	201/40	3800	3500	6000	2.2	18	3.1	16
1194	25	38	3.8	2.3	C102_0050 EZ502U	120	150	5.025	201/40	3800	3500	6000	5.7	18	3.1	17
1194	25	39	3.8	2.3	C102_0050 EZ701U	97	220	5.025	201/40	3800	3500	6000	9.0	18	3.1	19
1194	28	41	4.3	2.1	C102_0050 EZ404U	120	150	5.025	201/40	3800	3500	6000	3.5	18	3.1	18
1194	30	52	4.5	2.0	C102_0050 EZ503U	120	150	5.025	201/40	3800	3500	6000	8.1	18	3.1	19
1194	35	70	5.3	1.7	C102_0050 EZ702U	130	220	5.025	201/40	3800	3500	6000	14	18	3.1	22
1288	15	20	2.5	3.8	C102_0047 EZ501U	72	140	4.658	3149/676	3800	3500	6000	3.4	18	3.1	16
1288	16	22	2.5	3.7	C102_0047 EZ402U	72	140	4.658	3149/676	3800	3500	6000	2.2	18	3.1	16
1288	23	35	3.8	2.5	C102_0047 EZ502U	110	140	4.658	3149/676	3800	3500	6000	5.7	18	3.1	17
1288	23	36	3.8	2.5	C102_0047 EZ701U	90	220	4.658	3149/676	3800	3500	6000	9.0	18	3.1	19
1288	26	38	4.2	2.2	C102_0047 EZ404U	110	140	4.658	3149/676	3800	3500	6000	3.5	18	3.1	18
1288	28	48	4.5	2.1	C102_0047 EZ503U	110	140	4.658	3149/676	3800	3500	6000	8.1	18	3.1	19
1288	33	65	5.2	1.8	C102_0047 EZ702U	130	220	4.658	3149/676	3800	3500	6000	14	18	3.1	22
1432	6.1	6.8	1.1	4.0	C102_0042 EZ302U	20	30	4.189	377/90	3600	3100	6000	0.99	18	3.1	13
1432	8.0	9.1	1.4	3.1	C102_0042 EZ303U	24	30	4.189	377/90	3600	3100	6000	1.1	18	3.1	14
1432	9.3	11	1.6	2.6	C102_0042 EZ401U	24	30	4.189	377/90	3600	3100	6000	1.6	18	3.1	15
1432	14	18	2.4	4.0	C102_0042 EZ501U	65	120	4.189	377/90	3600	3100	6000	3.6	18	3.1	16
1432	14	20	2.5	3.9	C102_0042 EZ402U	65	120	4.189	377/90	3600	3100	6000	2.3	18	3.1	16
1432	21	32	3.7	2.6	C102_0042 EZ502U	98	120	4.189	377/90	3600	3100	6000	5.9	18	3.1	17
1432	21	32	3.7	2.6	C102_0042 EZ701U	81	220	4.189	377/90	3600	3100	6000	9.2	18	3.1	19
1432	24	34	4.1	2.4	C102_0042 EZ404U	98	120	4.189	377/90	3600	3100	6000	3.7	18	3.1	18
1432	25	43	4.4	2.2	C102_0042 EZ503U	98	120	4.189	377/90	3600	3100	6000	8.3	18	3.1	19
1432	29	58	5.1	1.9	C102_0042 EZ702U	130	220	4.189	377/90	3600	3100	6000	14	18	3.1	22
1545	5.7	6.3	1.1	4.0	C102_0039 EZ302U	19	28	3.883	1363/351	3600	3100	6000	1.0	18	3.1	13
1545	7.4	8.5	1.4	3.1	C102_0039 EZ303U	23	28	3.883	1363/351	3600	3100	6000	1.1	18	3.1	14
1545	8.7	11	1.6	2.6	C102_0039 EZ401U	23	28	3.883	1363/351	3600	3100	6000	1.6	18	3.1	15
1545	13	17	2.4	4.3	C102_0039 EZ501U	60	110	3.883	1363/351	3600	3100	6000	3.6	18	3.1	16
1545	13	18	2.5	4.1	C102_0039 EZ402U	60	110	3.883	1363/351	3600	3100	6000	2.3	18	3.1	16
1545	20	29	3.7	2.8	C102_0039 EZ502U	90	110	3.883	1363/351	3600	3100	6000	5.9	18	3.1	17
1545	20	30	3.7	2.8	C102_0039 EZ701U	75	220	3.883	1363/351	3600	3100	6000	9.2	18	3.1	19
1545	22	32	4.1	2.5	C102_0039 EZ404U	90	110	3.883	1363/351	3600	3100	6000	3.7	18	3.1	18
1545	23	40	4.4	2.3	C102_0039 EZ503U	90	110	3.883	1363/351	3600	3100	6000	8.3	18	3.1	19
1545	27	54	5.1	2.0	C102_0039 EZ702U	130	220	3.883	1363/351	3600	3100	6000	14	18	3.1	22
1800	11	14	2.3	4.7	C102_0033 EZ501U	52	97	3.334	2067/620	3600	3100	6000	3.9	18	3.1	16
1800	11	16	2.4	4.6	C102_0033 EZ402U	52	97	3.334	2067/620	3600	3100	6000	2.6	18	3.1	16
1800	17	25	3.6	3.1	C102_0033 EZ502U	78	97	3.334	2067/620	3600	3100	6000	6.2	18	3.1	17
1800	17	26	3.6	3.1	C102_0033 EZ701U	65	220	3.334	2067/620	3600	3100	6000	9.5	18	3.1	19
1800	19	27	4.0	2.8	C102_0033 EZ404U	78	97	3.334	2067/620	3600	3100	6000	4.0	18	3.1	18
1800	20	34	4.2	2.6	C102_0033 EZ503U	78	97	3.334	2067/620	3600	3100	6000	8.6	18	3.1	19
1800	23	46	4.9	2.2	C102_0033 EZ702U	120	220	3.334	2067/620	3600	3100	6000	15	18	3.1	22
1941	10	13	2.3	5.0	C102_0031 EZ501U	48	90	3.091	2491/806	3600	3100	6000	3.9	18	3.1	16
1941	10	15	2.4	4.8	C102_0031 EZ402U	48	90	3.091	2491/806	3600	3100	6000	2.6	18	3.1	16
1941	16	23	3.5	3.2	C102_0031 EZ502U	72	90	3.091	2491/806	3600	3100	6000	6.2	18	3.1	17
1941	16	24	3.5	3.2	C102_0031 EZ701U	60	220	3.091	2491/806	3600	3100	6000	9.5	18	3.1	19
1941	17	25	3.9	2.9	C102_0031 EZ404U	72	90	3.091	2491/806	3600	3100	6000	4.0	18	3.1	18
1941	19	32	4.2	2.7	C102_0031 EZ503U	72	90	3.091	2491/806	3600	3100	6000	8.6	18	3.1	19
1941	22	43	4.9	2.3	C102_0031 EZ702U	120	220	3.091	2491/806	3600	3100	6000	15	18	3.1	22
C2 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 230 Nm)																
32	140	148	1.6	1.4	C203_0920 EZ302U	230	400	92.40	29939/324	4000	3900	6000	0.36	14	8.3	22
37	123	129	1.5	1.6	C203_0810 EZ302U	230	400	80.62	11609/144	4000	3900	6000	0.36	14	8.3	22
37	160	169	2.0	1.3	C203_0810 EZ303U	230	400	80.62	11609/144	4000	3900	6000	0.47	14	8.3	22
43	108	115	1.4	1.8	C202_0700 EZ302U	230	310	70.32	7595/108	4000	3900	6000	0.36	14	8.3	17
43	141	149	1.9	1.4	C202_0700 EZ303U	230	310	70.32	7595/108	4000	3900	6000	0.47	14	8.3	18
49	95	100	1.4	2.0	C202_0610 EZ302U	220	270	61.35	2945/48	4000	3900	6000	0.36	14	8.3	17
49	123	130	1.8	1.5	C202_0610 EZ303U	220	270	61.35	2945/48	4000	3900	6000	0.47	14	8.3	18
53	153	164	2.2	1.3	C202_0560 EZ401U	230	400	56.42	1862/33	4000	3900	6000	1.0	14	8.3	19
61	134	143	2.1	1.5	C202_0490 EZ401U	230	400	49.23	1083/22	4000	3900	6000	1.0	14	8.3	19
64	127	136	2.0	1.6	C202_0470 EZ401U	230	400	46.82	2107/45	4000	3900	6000	1.1	14	8.3	19
73	111	119	1.9	1.8	C202_0410 EZ401U	230	400	40.85	817/20	4000	3900	6000	1.1	14	8.3	19
85	96	102	1.8	2.1	C202_0350 EZ401U	230	400	35.18	1372/39	4000	3900	6000	1.2	14	8.3	19
85	147	160	2.7	1.4	C202_0350 EZ501U	230	400	35.18	1372/39	4000	3900	6000	3.1	14	8.3	20

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
C2 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 230 Nm)																
85	160	177	3.0	1.2	C202_0350 EZ402U	230	400	35.18	1372/39	4000	3900	6000	1.9	14	8.3	20
98	83	89	1.7	2.4	C202_0310 EZ401U	230	400	30.69	399/13	4000	3900	6000	1.2	14	8.3	19
98	128	140	2.5	1.6	C202_0310 EZ501U	230	400	30.69	399/13	4000	3900	6000	3.1	14	8.3	20
98	140	155	2.8	1.4	C202_0310 EZ402U	230	400	30.69	399/13	4000	3900	6000	1.9	14	8.3	20
106	77	82	1.6	2.6	C202_0280 EZ401U	230	400	28.24	4067/144	4000	3900	6000	1.2	14	8.3	19
106	118	129	2.4	1.7	C202_0280 EZ501U	230	400	28.24	4067/144	4000	3900	6000	3.2	14	8.3	20
106	129	142	2.7	1.6	C202_0280 EZ402U	230	400	28.24	4067/144	4000	3900	6000	1.9	14	8.3	20
122	67	72	1.5	3.0	C202_0250 EZ401U	200	400	24.64	1577/64	4000	3900	6000	1.3	14	8.3	19
122	103	112	2.3	1.9	C202_0250 EZ501U	230	400	24.64	1577/64	4000	3900	6000	3.2	14	8.3	20
122	112	124	2.5	1.8	C202_0250 EZ402U	230	400	24.64	1577/64	4000	3900	6000	2.0	14	8.3	20
127	64	69	1.5	3.1	C202_0240 EZ401U	190	400	23.59	637/27	4000	3900	6000	1.3	14	8.3	19
127	98	108	2.2	2.0	C202_0240 EZ501U	230	400	23.59	637/27	4000	3900	6000	3.3	14	8.3	20
127	108	119	2.4	1.9	C202_0240 EZ402U	230	400	23.59	637/27	4000	3900	6000	2.0	14	8.3	20
146	56	60	1.4	3.6	C202_0210 EZ401U	170	400	20.58	247/12	4000	3900	6000	1.4	14	8.3	19
146	86	94	2.1	2.3	C202_0210 EZ501U	230	400	20.58	247/12	4000	3900	6000	3.3	14	8.3	20
146	94	104	2.3	2.1	C202_0210 EZ402U	230	400	20.58	247/12	4000	3900	6000	2.1	14	8.3	20
146	138	172	3.3	1.5	C202_0210 EZ404U	230	400	20.58	247/12	4000	3900	6000	3.4	14	8.3	22
146	148	160	3.6	1.4	C202_0210 EZ502U	230	400	20.58	247/12	4000	3900	6000	5.6	14	8.3	21
146	148	166	3.6	1.4	C202_0210 EZ701U	230	400	20.58	247/12	4000	3900	6000	8.9	14	8.3	23
171	48	51	1.3	4.2	C202_0175 EZ401U	140	400	17.52	3626/207	3700	3500	5500	1.6	14	8.3	19
171	73	80	1.9	2.7	C202_0175 EZ501U	230	400	17.52	3626/207	3700	3500	5500	3.5	14	8.3	20
171	80	88	2.1	2.5	C202_0175 EZ402U	230	400	17.52	3626/207	3700	3500	5500	2.3	14	8.3	20
171	117	146	3.1	1.7	C202_0175 EZ404U	230	400	17.52	3626/207	3700	3500	5500	3.6	14	8.3	22
171	126	136	3.3	1.6	C202_0175 EZ502U	230	400	17.52	3626/207	3700	3500	5500	5.8	14	8.3	21
171	126	141	3.3	1.6	C202_0175 EZ701U	230	400	17.52	3626/207	3700	3500	5500	9.1	14	8.3	23
196	42	44	1.2	4.8	C202_0155 EZ401U	130	400	15.28	703/46	3700	3500	5500	1.6	14	8.3	19
196	64	70	1.8	3.1	C202_0155 EZ501U	230	400	15.28	703/46	3700	3500	5500	3.5	14	8.3	20
196	70	77	2.0	2.9	C202_0155 EZ402U	230	400	15.28	703/46	3700	3500	5500	2.3	14	8.3	20
196	102	127	2.9	2.0	C202_0155 EZ404U	230	400	15.28	703/46	3700	3500	5500	3.6	14	8.3	22
196	110	119	3.1	1.8	C202_0155 EZ502U	230	400	15.28	703/46	3700	3500	5500	5.8	14	8.3	21
196	110	123	3.1	1.8	C202_0155 EZ701U	230	400	15.28	703/46	3700	3500	5500	9.1	14	8.3	23
196	144	165	4.0	1.4	C202_0155 EZ503U	230	400	15.28	703/46	3700	3500	5500	8.2	14	8.3	23
213	59	64	1.7	3.4	C202_0140 EZ501U	220	400	14.12	3430/243	3700	3500	5500	3.7	14	8.3	20
213	64	71	1.9	3.1	C202_0140 EZ402U	220	400	14.12	3430/243	3700	3500	5500	2.5	14	8.3	20
213	94	118	2.8	2.1	C202_0140 EZ404U	230	400	14.12	3430/243	3700	3500	5500	3.8	14	8.3	22
213	101	110	3.0	2.0	C202_0140 EZ502U	230	400	14.12	3430/243	3700	3500	5500	6.0	14	8.3	21
213	101	114	3.0	2.0	C202_0140 EZ701U	230	400	14.12	3430/243	3700	3500	5500	9.3	14	8.3	23
213	133	152	3.9	1.5	C202_0140 EZ503U	230	400	14.12	3430/243	3700	3500	5500	8.4	14	8.3	23
244	51	56	1.6	3.8	C202_0125 EZ501U	190	360	12.32	665/54	3700	3500	5500	3.8	14	8.3	20
244	56	62	1.8	3.5	C202_0125 EZ402U	190	360	12.32	665/54	3700	3500	5500	2.5	14	8.3	20
244	82	103	2.6	2.4	C202_0125 EZ404U	230	360	12.32	665/54	3700	3500	5500	3.8	14	8.3	22
244	88	96	2.8	2.2	C202_0125 EZ502U	230	360	12.32	665/54	3700	3500	5500	6.1	14	8.3	21
244	88	99	2.8	2.2	C202_0125 EZ701U	230	400	12.32	665/54	3700	3500	5500	9.4	14	8.3	23
244	116	133	3.7	1.7	C202_0125 EZ503U	230	360	12.32	665/54	3700	3500	5500	8.4	14	8.3	23
244	143	172	4.6	1.4	C202_0125 EZ702U	230	400	12.32	665/54	3700	3500	5500	15	14	8.3	26
255	49	54	1.6	3.9	C202_0120 EZ501U	180	340	11.76	294/25	3500	3100	5000	4.0	14	8.3	20
255	54	59	1.8	3.6	C202_0120 EZ402U	180	340	11.76	294/25	3500	3100	5000	2.7	14	8.3	20
255	79	98	2.6	2.4	C202_0120 EZ404U	230	340	11.76	294/25	3500	3100	5000	4.1	14	8.3	22
255	84	91	2.8	2.3	C202_0120 EZ502U	230	340	11.76	294/25	3500	3100	5000	6.3	14	8.3	21
255	84	95	2.8	2.3	C202_0120 EZ701U	230	400	11.76	294/25	3500	3100	5000	9.6	14	8.3	23
255	111	127	3.7	1.7	C202_0120 EZ503U	230	340	11.76	294/25	3500	3100	5000	8.7	14	8.3	23
255	137	164	4.6	1.4	C202_0120 EZ702U	230	400	11.76	294/25	3500	3100	5000	15	14	8.3	26
292	43	47	1.6	4.3	C202_0105 EZ501U	160	300	10.26	513/50	3500	3100	5000	4.0	14	8.3	20
292	47	52	1.7	3.9	C202_0105 EZ402U	160	300	10.26	513/50	3500	3100	5000	2.8	14	8.3	20
292	69	86	2.6	2.7	C202_0105 EZ404U	230	300	10.26	513/50	3500	3100	5000	4.1	14	8.3	22
292	74	80	2.7	2.5	C202_0105 EZ502U	230	300	10.26	513/50	3500	3100	5000	6.3	14	8.3	21
292	74	83	2.7	2.5	C202_0105 EZ701U	200	400	10.26	513/50	3500	3100	5000	9.6	14	8.3	23
292	97	110	3.6	1.9	C202_0105 EZ503U	230	300	10.26	513/50	3500	3100	5000	8.7	14	8.3	23
292	119	143	4.5	1.5	C202_0105 EZ702U	230	400	10.26	513/50	3500	3100	5000	15	14	8.3	26
292	134	159	5.0	1.4	C202_0105 EZ505U	230	400	10.26	513/50	3500	3100	5000	13	14	8.3	26
320	67	76	2.7	2.7	C202_0094 EZ701U	180	400	9.387	2450/261	3500	3100	5000	10	14	8.3	23
320	109	131	4.4	1.6	C202_0094 EZ702U	230	400	9.387	2450/261	3500	3100	5000	15	14	8.3	26
320	123	146	4.9	1.5	C202_0094 EZ505U	230	400	9.387	2450/261	3500	3100	5000	14	14	8.3	26
366	59	66	2.6	2.9	C202_0082 EZ701U	160	400	8.190	475/58	3500	3100	5000	10	14	8.3	23

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
C2 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 230 Nm)																
366	95	114	4.3	1.8	C202_0082 EZ702U	230	400	8.190	475/58	3500	3100	5000	15	14	8.3	26
366	107	127	4.8	1.6	C202_0082 EZ505U	230	400	8.190	475/58	3500	3100	5000	14	14	8.3	26
366	131	165	5.9	1.3	C202_0082 EZ703U	230	400	8.190	475/58	3500	3100	5000	23	14	8.3	28
385	21	23	1.3	4.3	C202_0078 EZ401U	64	110	7.800	39/5	4000	3900	6000	1.4	17	6.0	19
385	33	36	1.9	4.1	C202_0078 EZ501U	120	220	7.800	39/5	4000	3900	6000	3.4	17	6.0	20
385	36	39	2.1	3.7	C202_0078 EZ402U	120	220	7.800	39/5	4000	3900	6000	2.1	17	6.0	20
385	52	65	3.1	2.5	C202_0078 EZ404U	170	220	7.800	39/5	4000	3900	6000	3.5	17	6.0	22
385	56	61	3.3	2.4	C202_0078 EZ502U	170	220	7.800	39/5	4000	3900	6000	5.7	17	6.0	21
385	56	63	3.3	2.4	C202_0078 EZ701U	150	350	7.800	39/5	4000	3900	6000	9.0	17	6.0	23
385	73	84	4.4	1.8	C202_0078 EZ503U	170	220	7.800	39/5	4000	3900	6000	8.1	17	6.0	23
385	91	109	5.4	1.5	C202_0078 EZ702U	200	350	7.800	39/5	4000	3900	6000	14	17	6.0	26
385	102	121	6.1	1.3	C202_0078 EZ505U	200	350	7.800	39/5	4000	3900	6000	13	17	6.0	26
477	17	18	1.2	4.3	C202_0063 EZ401U	52	92	6.295	3330/529	3700	3500	5500	1.7	17	6.0	19
477	26	29	1.9	4.7	C202_0063 EZ501U	98	180	6.295	3330/529	3700	3500	5500	3.7	17	6.0	20
477	29	32	2.0	4.3	C202_0063 EZ402U	98	180	6.295	3330/529	3700	3500	5500	2.4	17	6.0	20
477	42	53	3.0	2.9	C202_0063 EZ404U	150	180	6.295	3330/529	3700	3500	5500	3.8	17	6.0	22
477	45	49	3.2	2.7	C202_0063 EZ502U	150	180	6.295	3330/529	3700	3500	5500	6.0	17	6.0	21
477	45	51	3.2	2.7	C202_0063 EZ701U	120	350	6.295	3330/529	3700	3500	5500	9.3	17	6.0	23
477	59	68	4.2	2.1	C202_0063 EZ503U	150	180	6.295	3330/529	3700	3500	5500	8.4	17	6.0	23
477	73	88	5.2	1.7	C202_0063 EZ702U	200	350	6.295	3330/529	3700	3500	5500	15	17	6.0	26
477	82	98	5.9	1.5	C202_0063 EZ505U	200	350	6.295	3330/529	3700	3500	5500	13	17	6.0	26
477	101	127	7.2	1.2	C202_0063 EZ703U	200	350	6.295	3330/529	3700	3500	5500	22	17	6.0	28
518	16	17	1.2	4.3	C202_0058 EZ401U	48	84	5.791	666/115	3700	3500	5500	1.7	17	6.0	19
518	24	26	1.8	5.0	C202_0058 EZ501U	90	170	5.791	666/115	3700	3500	5500	3.7	17	6.0	20
518	26	29	2.0	4.5	C202_0058 EZ402U	90	170	5.791	666/115	3700	3500	5500	2.4	17	6.0	20
518	39	48	3.0	3.1	C202_0058 EZ404U	130	170	5.791	666/115	3700	3500	5500	3.8	17	6.0	22
518	42	45	3.2	2.9	C202_0058 EZ502U	130	170	5.791	666/115	3700	3500	5500	6.0	17	6.0	21
518	42	47	3.2	2.9	C202_0058 EZ701U	110	350	5.791	666/115	3700	3500	5500	9.3	17	6.0	23
518	54	62	4.2	2.2	C202_0058 EZ503U	130	170	5.791	666/115	3700	3500	5500	8.4	17	6.0	23
518	67	81	5.1	1.8	C202_0058 EZ702U	200	350	5.791	666/115	3700	3500	5500	15	17	6.0	26
518	76	90	5.8	1.6	C202_0058 EZ505U	200	350	5.791	666/115	3700	3500	5500	13	17	6.0	26
518	93	117	7.1	1.3	C202_0058 EZ703U	200	350	5.791	666/115	3700	3500	5500	22	17	6.0	28
591	23	26	2.0	5.0	C202_0051 EZ402U	79	150	5.072	350/69	3700	3500	5500	2.7	17	6.0	20
591	34	42	2.9	3.4	C202_0051 EZ404U	120	150	5.072	350/69	3700	3500	5500	4.1	17	6.0	22
591	36	39	3.1	3.1	C202_0051 EZ502U	120	150	5.072	350/69	3700	3500	5500	6.3	17	6.0	21
591	36	41	3.1	3.1	C202_0051 EZ701U	98	350	5.072	350/69	3700	3500	5500	9.6	17	6.0	23
591	48	55	4.1	2.4	C202_0051 EZ503U	120	150	5.072	350/69	3700	3500	5500	8.7	17	6.0	23
591	59	71	5.0	1.9	C202_0051 EZ702U	200	350	5.072	350/69	3700	3500	5500	15	17	6.0	26
591	66	79	5.7	1.7	C202_0051 EZ505U	200	350	5.072	350/69	3700	3500	5500	13	17	6.0	26
591	81	102	6.9	1.4	C202_0051 EZ703U	200	350	5.072	350/69	3700	3500	5500	23	17	6.0	28
643	31	39	2.9	3.5	C202_0047 EZ404U	110	140	4.667	14/3	3700	3500	5500	4.1	17	6.0	22
643	34	36	3.1	3.2	C202_0047 EZ502U	110	140	4.667	14/3	3700	3500	5500	6.3	17	6.0	21
643	34	38	3.1	3.3	C202_0047 EZ701U	91	340	4.667	14/3	3700	3500	5500	9.6	17	6.0	23
643	44	50	4.0	2.5	C202_0047 EZ503U	110	140	4.667	14/3	3700	3500	5500	8.7	17	6.0	23
643	54	65	5.0	2.1	C202_0047 EZ702U	190	340	4.667	14/3	3700	3500	5500	15	17	6.0	26
643	61	72	5.6	1.8	C202_0047 EZ505U	200	340	4.667	14/3	3700	3500	5500	13	17	6.0	26
643	75	94	6.8	1.5	C202_0047 EZ703U	200	340	4.667	14/3	3700	3500	5500	23	17	6.0	28
710	28	35	2.8	3.5	C202_0042 EZ404U	98	120	4.226	486/115	3500	3100	5000	4.4	17	6.0	22
710	30	33	3.0	3.2	C202_0042 EZ502U	98	120	4.226	486/115	3500	3100	5000	6.6	17	6.0	21
710	30	34	3.0	3.6	C202_0042 EZ701U	82	310	4.226	486/115	3500	3100	5000	9.9	17	6.0	23
710	40	46	3.9	2.5	C202_0042 EZ503U	98	120	4.226	486/115	3500	3100	5000	9.0	17	6.0	23
710	49	59	4.9	2.2	C202_0042 EZ702U	170	310	4.226	486/115	3500	3100	5000	15	17	6.0	26
710	55	66	5.5	1.9	C202_0042 EZ505U	200	310	4.226	486/115	3500	3100	5000	14	17	6.0	26
710	68	85	6.7	1.6	C202_0042 EZ703U	200	310	4.226	486/115	3500	3100	5000	23	17	6.0	28
772	26	32	2.8	3.5	C202_0039 EZ404U	91	110	3.888	486/125	3500	3100	5000	4.5	17	6.0	22
772	28	30	3.0	3.2	C202_0039 EZ502U	91	110	3.888	486/125	3500	3100	5000	6.7	17	6.0	21
772	28	31	3.0	3.8	C202_0039 EZ701U	75	280	3.888	486/125	3500	3100	5000	10	17	6.0	23
772	37	42	3.9	2.5	C202_0039 EZ503U	91	110	3.888	486/125	3500	3100	5000	9.1	17	6.0	23
772	45	54	4.8	2.3	C202_0039 EZ702U	150	280	3.888	486/125	3500	3100	5000	15	17	6.0	26
772	51	60	5.4	2.1	C202_0039 EZ505U	200	280	3.888	486/125	3500	3100	5000	14	17	6.0	26
772	62	78	6.6	1.7	C202_0039 EZ703U	200	280	3.888	486/125	3500	3100	5000	23	17	6.0	28
889	24	27	2.9	4.1	C202_0034 EZ701U	65	250	3.373	2250/667	3500	3100	5000	11	17	6.0	23
889	39	47	4.7	2.5	C202_0034 EZ702U	130	250	3.373	2250/667	3500	3100	5000	16	17	6.0	26
889	44	52	5.3	2.3	C202_0034 EZ505U	190	250	3.373	2250/667	3500	3100	5000	14	17	6.0	26

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
C2 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 230 Nm)																
889	54	68	6.5	1.9	C202_0034 EZ703U	190	250	3.373	2250/667	3500	3100	5000	24	17	6.0	28
967	22	25	2.9	4.4	C202_0031 EZ701U	60	230	3.103	90/29	3500	3100	5000	11	17	6.0	23
967	36	43	4.6	2.7	C202_0031 EZ702U	120	230	3.103	90/29	3500	3100	5000	16	17	6.0	26
967	41	48	5.2	2.4	C202_0031 EZ505U	180	230	3.103	90/29	3500	3100	5000	14	17	6.0	26
967	50	63	6.4	2.0	C202_0031 EZ703U	180	230	3.103	90/29	3500	3100	5000	24	17	6.0	28
1115	19	22	2.8	4.8	C202_0027 EZ701U	52	200	2.690	495/184	3000	2600	4500	11	17	6.0	23
1115	31	38	4.5	3.0	C202_0027 EZ702U	110	200	2.690	495/184	3000	2600	4500	17	17	6.0	26
1115	35	42	5.1	2.6	C202_0027 EZ505U	160	200	2.690	495/184	3000	2600	4500	15	17	6.0	26
1115	43	54	6.2	2.2	C202_0027 EZ703U	160	200	2.690	495/184	3000	2600	4500	24	17	6.0	28
1212	29	35	4.5	3.1	C202_0025 EZ702U	98	180	2.475	99/40	3000	2600	4500	17	17	6.0	26
1212	32	38	5.0	2.8	C202_0025 EZ505U	140	180	2.475	99/40	3000	2600	4500	15	17	6.0	26
1212	40	50	6.1	2.3	C202_0025 EZ703U	140	180	2.475	99/40	3000	2600	4500	25	17	6.0	28
1374	25	31	4.4	3.4	C202_0022 EZ702U	87	160	2.184	2160/989	3000	2600	4500	17	17	6.0	26
1374	29	34	4.9	3.0	C202_0022 EZ505U	130	160	2.184	2160/989	3000	2600	4500	16	17	6.0	26
1374	35	44	6.0	2.5	C202_0022 EZ703U	130	160	2.184	2160/989	3000	2600	4500	25	17	6.0	28
1374	45	64	7.8	1.9	C202_0022 EZ705U	160	350	2.184	2160/989	3000	2600	4500	38	17	6.0	33
1493	23	28	4.3	3.6	C202_0020 EZ702U	80	150	2.009	432/215	3000	2600	4500	18	17	6.0	26
1493	26	31	4.9	3.2	C202_0020 EZ505U	120	150	2.009	432/215	3000	2600	4500	16	17	6.0	26
1493	32	41	5.9	2.6	C202_0020 EZ703U	120	150	2.009	432/215	3000	2600	4500	26	17	6.0	28
1493	42	59	7.7	2.0	C202_0020 EZ705U	160	350	2.009	432/215	3000	2600	4500	38	17	6.0	33
C2 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 230 Nm)																
383	108	175	4.1	1.6	C202_0120 EZ505U	230	400	11.76	294/25	3500	3100	5000	13	14	8.3	26
439	95	152	4.0	1.7	C202_0105 EZ505U	230	400	10.26	513/50	3500	3100	5000	13	14	8.3	26
479	87	139	4.0	1.8	C202_0094 EZ505U	230	400	9.387	2450/261	3500	3100	5000	14	14	8.3	26
549	75	122	3.9	2.0	C202_0082 EZ505U	230	400	8.190	475/58	3500	3100	5000	14	14	8.3	26
549	96	159	5.0	1.6	C202_0082 EZ703U	230	400	8.190	475/58	3500	3100	5000	23	14	8.3	28
577	72	116	4.9	1.6	C202_0078 EZ505U	200	350	7.800	39/5	4000	3900	6000	13	17	6.0	26
577	92	151	6.2	1.3	C202_0078 EZ703U	200	350	7.800	39/5	4000	3900	6000	22	17	6.0	28
715	58	93	4.7	1.9	C202_0063 EZ505U	200	350	6.295	3330/529	3700	3500	5500	13	17	6.0	26
715	74	122	6.0	1.5	C202_0063 EZ703U	200	350	6.295	3330/529	3700	3500	5500	22	17	6.0	28
777	53	86	4.7	2.0	C202_0058 EZ505U	200	350	5.791	666/115	3700	3500	5500	13	17	6.0	26
777	68	112	5.9	1.5	C202_0058 EZ703U	200	350	5.791	666/115	3700	3500	5500	22	17	6.0	28
887	47	75	4.6	2.1	C202_0051 EZ505U	200	350	5.072	350/69	3700	3500	5500	13	17	6.0	26
887	60	98	5.8	1.7	C202_0051 EZ703U	200	350	5.072	350/69	3700	3500	5500	23	17	6.0	28
964	43	69	4.5	2.3	C202_0047 EZ505U	200	340	4.667	14/3	3700	3500	5500	13	17	6.0	26
964	55	91	5.7	1.8	C202_0047 EZ703U	200	340	4.667	14/3	3700	3500	5500	23	17	6.0	28
1065	39	63	4.4	2.4	C202_0042 EZ505U	200	310	4.226	486/115	3500	3100	5000	14	17	6.0	26
1065	50	82	5.6	1.9	C202_0042 EZ703U	200	310	4.226	486/115	3500	3100	5000	23	17	6.0	28
1157	36	58	4.4	2.6	C202_0039 EZ505U	200	280	3.888	486/125	3500	3100	5000	14	17	6.0	26
1157	46	75	5.6	2.0	C202_0039 EZ703U	200	280	3.888	486/125	3500	3100	5000	23	17	6.0	28
1334	31	50	4.3	2.8	C202_0034 EZ505U	190	250	3.373	2250/667	3500	3100	5000	14	17	6.0	26
1334	40	65	5.4	2.2	C202_0034 EZ703U	190	250	3.373	2250/667	3500	3100	5000	24	17	6.0	28
1450	29	46	4.2	3.0	C202_0031 EZ505U	180	230	3.103	90/29	3500	3100	5000	14	17	6.0	26
1450	36	60	5.4	2.3	C202_0031 EZ703U	180	230	3.103	90/29	3500	3100	5000	24	17	6.0	28
1673	25	40	4.1	3.3	C202_0027 EZ505U	160	200	2.690	495/184	3000	2600	4500	15	17	6.0	26
1673	32	52	5.2	2.6	C202_0027 EZ703U	160	200	2.690	495/184	3000	2600	4500	24	17	6.0	28
1818	23	37	4.0	3.5	C202_0025 EZ505U	140	180	2.475	99/40	3000	2600	4500	15	17	6.0	26
1818	29	48	5.2	2.7	C202_0025 EZ703U	140	180	2.475	99/40	3000	2600	4500	25	17	6.0	28
2060	20	32	4.0	3.8	C202_0022 EZ505U	130	160	2.184	2160/989	3000	2600	4500	16	17	6.0	26
2060	26	42	5.1	2.9	C202_0022 EZ703U	130	160	2.184	2160/989	3000	2600	4500	25	17	6.0	28
2060	35	64	6.8	2.2	C202_0022 EZ705U	160	350	2.184	2160/989	3000	2600	4500	38	17	6.0	33
2240	19	30	3.9	4.0	C202_0020 EZ505U	120	150	2.009	432/215	3000	2600	4500	16	17	6.0	26
2240	24	39	5.0	3.1	C202_0020 EZ703U	120	150	2.009	432/215	3000	2600	4500	26	17	6.0	28
2240	32	58	6.7	2.3	C202_0020 EZ705U	160	350	2.009	432/215	3000	2600	4500	38	17	6.0	33
C2 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 230 Nm)																
65	133	148	1.5	1.5	C203_0920 EZ302U	230	400	92.40	29939/324	4000	3900	6000	0.36	14	8.3	22
74	116	129	1.4	1.7	C203_0810 EZ302U	230	400	80.62	11609/144	4000	3900	6000	0.36	14	8.3	22
74	151	173	1.9	1.3	C203_0810 EZ303U	230	400	80.62	11609/144	4000	3900	6000	0.47	14	8.3	22
85	102	115	1.3	2.0	C202_0700 EZ302U	230	310	70.32	7595/108	4000	3900	6000	0.36	14	8.3	17
85	134	153	1.8	1.5	C202_0700 EZ303U	230	310	70.32	7595/108	4000	3900	6000	0.47	14	8.3	18
98	89	100	1.3	2.1	C202_0610 EZ302U	220	270	61.35	2945/48	4000	3900	6000	0.36	14	8.3	17
98	117	134	1.8	1.6	C202_0610 EZ303U	220	270	61.35	2945/48	4000	3900	6000	0.47	14	8.3	18
98	137	167	2.1	1.4	C202_0610 EZ401U	220	270	61.35	2945/48	4000	3900	6000	1.0	14	8.3	19
106	126	153	1.8	1.6	C202_0560 EZ401U	230	400	56.42	1862/33	4000	3900	6000	1.0	14	8.3	19

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
C2 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 230 Nm)																
122	110	134	1.7	1.8	C202_0490 EZ401U	230	400	49.23	1083/22	4000	3900	6000	1.0	14	8.3	19
128	104	127	1.7	1.9	C202_0470 EZ401U	230	400	46.82	2107/45	4000	3900	6000	1.1	14	8.3	19
147	91	111	1.6	2.2	C202_0410 EZ401U	230	400	40.85	817/20	4000	3900	6000	1.1	14	8.3	19
147	135	174	2.3	1.5	C202_0410 EZ501U	230	400	40.85	817/20	4000	3900	6000	3.0	14	8.3	20
171	78	96	1.5	2.5	C202_0350 EZ401U	230	400	35.18	1372/39	4000	3900	6000	1.2	14	8.3	19
171	116	150	2.2	1.7	C202_0350 EZ501U	230	400	35.18	1372/39	4000	3900	6000	3.1	14	8.3	20
171	119	167	2.2	1.7	C202_0350 EZ402U	230	400	35.18	1372/39	4000	3900	6000	1.9	14	8.3	20
195	68	83	1.4	2.9	C202_0310 EZ401U	230	400	30.69	399/13	4000	3900	6000	1.2	14	8.3	19
195	101	131	2.0	2.0	C202_0310 EZ501U	230	400	30.69	399/13	4000	3900	6000	3.1	14	8.3	20
195	104	146	2.1	1.9	C202_0310 EZ402U	230	400	30.69	399/13	4000	3900	6000	1.9	14	8.3	20
212	63	77	1.3	3.2	C202_0280 EZ401U	230	400	28.24	4067/144	4000	3900	6000	1.2	14	8.3	19
212	93	121	1.9	2.1	C202_0280 EZ501U	230	400	28.24	4067/144	4000	3900	6000	3.2	14	8.3	20
212	96	134	2.0	2.1	C202_0280 EZ402U	230	400	28.24	4067/144	4000	3900	6000	1.9	14	8.3	20
243	55	67	1.2	3.6	C202_0250 EZ401U	200	400	24.64	1577/64	4000	3900	6000	1.3	14	8.3	19
243	81	105	1.8	2.4	C202_0250 EZ501U	230	400	24.64	1577/64	4000	3900	6000	3.2	14	8.3	20
243	84	117	1.9	2.3	C202_0250 EZ402U	230	400	24.64	1577/64	4000	3900	6000	2.0	14	8.3	20
254	53	64	1.2	3.7	C202_0240 EZ401U	190	400	23.59	637/27	4000	3900	6000	1.3	14	8.3	19
254	78	101	1.8	2.5	C202_0240 EZ501U	230	400	23.59	637/27	4000	3900	6000	3.3	14	8.3	20
254	80	112	1.9	2.4	C202_0240 EZ402U	230	400	23.59	637/27	4000	3900	6000	2.0	14	8.3	20
292	46	56	1.2	4.0	C202_0210 EZ401U	170	400	20.58	247/12	4000	3900	6000	1.4	14	8.3	19
292	68	88	1.8	2.7	C202_0210 EZ501U	230	400	20.58	247/12	4000	3900	6000	3.3	14	8.3	20
292	70	98	1.8	2.6	C202_0210 EZ402U	230	400	20.58	247/12	4000	3900	6000	2.1	14	8.3	20
292	104	156	2.7	1.8	C202_0210 EZ502U	230	400	20.58	247/12	4000	3900	6000	5.6	14	8.3	21
292	104	158	2.7	1.8	C202_0210 EZ701U	230	400	20.58	247/12	4000	3900	6000	8.9	14	8.3	23
292	116	168	3.0	1.6	C202_0210 EZ404U	230	400	20.58	247/12	4000	3900	6000	3.4	14	8.3	22
769	26	33	1.9	4.1	C202_0078 EZ501U	120	220	7.800	39/5	4000	3900	6000	3.4	17	6.0	20
769	26	37	2.0	4.0	C202_0078 EZ402U	120	220	7.800	39/5	4000	3900	6000	2.1	17	6.0	20
769	39	59	3.0	2.7	C202_0078 EZ502U	170	220	7.800	39/5	4000	3900	6000	5.7	17	6.0	21
769	39	60	3.0	2.7	C202_0078 EZ701U	150	350	7.800	39/5	4000	3900	6000	9.0	17	6.0	23
769	44	64	3.3	2.4	C202_0078 EZ404U	170	220	7.800	39/5	4000	3900	6000	3.5	17	6.0	22
769	47	80	3.5	2.2	C202_0078 EZ503U	170	220	7.800	39/5	4000	3900	6000	8.1	17	6.0	23
769	54	108	4.1	1.9	C202_0078 EZ702U	200	350	7.800	39/5	4000	3900	6000	14	17	6.0	26
C3 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 320 Nm)																
516	164	249	10	1.2	C302_0039 EZ805U	320	550	3.878	190/49	3200	2800	4500	135	16	7.1	66
597	142	215	10	1.3	C302_0034 EZ805U	310	550	3.352	429/128	3200	2800	4500	136	16	7.1	66
643	132	199	9.8	1.4	C302_0031 EZ805U	300	550	3.110	1045/336	3200	2800	4500	136	16	7.1	66
739	115	173	9.6	1.5	C302_0027 EZ805U	290	520	2.705	1677/620	2700	2300	4000	138	16	7.1	66
797	106	161	9.5	1.6	C302_0025 EZ805U	280	490	2.510	1634/651	2700	2300	4000	138	16	7.1	66
919	92	140	9.3	1.8	C302_0022 EZ805U	270	420	2.177	468/215	2700	2300	4000	139	16	7.1	66
990	86	130	9.2	1.8	C302_0020 EZ805U	260	390	2.020	608/301	2700	2300	4000	140	16	7.1	66
C3 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 400 Nm)																
22	209	220	1.2	1.7	C303_1370 EZ302U	350	700	137.2	59267/432	3800	3500	5500	0.36	13	8.7	26
27	167	176	1.1	2.1	C303_1100 EZ302U	350	700	109.6	94705/864	3800	3500	5500	0.37	13	8.7	26
27	217	229	1.4	1.6	C303_1100 EZ303U	350	700	109.6	94705/864	3800	3500	5500	0.48	13	8.7	27
33	140	148	1.0	2.5	C303_0920 EZ302U	350	590	91.93	39715/432	3800	3500	5500	0.38	13	8.7	26
33	182	192	1.3	1.9	C303_0920 EZ303U	350	590	91.93	39715/432	3800	3500	5500	0.49	13	8.7	27
33	246	264	1.8	1.4	C303_0920 EZ401U	350	590	91.93	39715/432	3800	3500	5500	1.0	13	8.7	28
37	124	131	0.9	2.8	C303_0810 EZ302U	390	520	81.47	1222/15	3800	3500	5500	0.38	13	8.7	26
37	161	171	1.2	2.2	C303_0810 EZ303U	400	520	81.47	1222/15	3800	3500	5500	0.49	13	8.7	27
37	218	234	1.7	1.6	C303_0810 EZ401U	400	520	81.47	1222/15	3800	3500	5500	1.0	13	8.7	28
48	258	282	2.4	1.3	C302_0620 EZ501U	400	660	61.92	1548/25	3800	3500	5500	3.0	13	8.7	25
53	234	256	2.1	1.5	C302_0560 EZ501U	350	700	56.14	1235/22	3800	3500	5500	3.1	13	8.7	25
60	207	227	2.0	1.7	C302_0500 EZ501U	400	700	49.75	2736/55	3800	3500	5500	3.1	13	8.7	25
64	195	213	2.0	1.8	C302_0470 EZ501U	350	700	46.67	140/3	3800	3500	5500	3.1	13	8.7	25
73	172	189	1.8	2.0	C302_0410 EZ501U	400	700	41.35	2688/65	3800	3500	5500	3.1	13	8.7	25
86	146	160	1.7	2.4	C302_0350 EZ501U	350	700	35.03	1261/36	3800	3500	5500	3.3	13	8.7	25
97	129	142	1.6	2.7	C302_0310 EZ501U	400	700	31.04	776/25	3800	3500	5500	3.3	13	8.7	25
97	223	241	2.7	1.6	C302_0310 EZ502U	400	700	31.04	776/25	3800	3500	5500	5.6	13	8.7	27
97	223	250	2.7	1.6	C302_0310 EZ701U	400	700	31.04	776/25	3800	3500	5500	8.9	13	8.7	28
107	117	128	1.5	3.0	C302_0280 EZ501U	350	700	27.99	2015/72	3800	3500	5500	3.4	13	8.7	25
107	201	217	2.6	1.7	C302_0280 EZ502U	350	700	27.99	2015/72	3800	3500	5500	5.7	13	8.7	27
107	201	225	2.6	1.7	C302_0280 EZ701U	350	700	27.99	2015/72	3800	3500	5500	9.0	13	8.7	28
121	103	113	1.4	3.4	C302_0250 EZ501U	380	670	24.80	124/5	3800	3500	5500	3.4	13	8.7	25
121	178	192	2.5	2.0	C302_0250 EZ502U	400	670	24.80	124/5	3800	3500	5500	5.7	13	8.7	27

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
C3 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 400 Nm)																
121	178	200	2.5	2.0	C302_0250 EZ701U	400	700	24.80	124/5	3800	3500	5500	9.0	13	8.7	28
121	233	267	3.2	1.5	C302_0250 EZ503U	400	670	24.80	124/5	3800	3500	5500	8.1	13	8.7	28
128	98	107	1.4	3.6	C302_0230 EZ501U	350	680	23.47	845/36	3800	3500	5500	3.6	13	8.7	25
128	168	182	2.4	2.1	C302_0230 EZ502U	350	680	23.47	845/36	3800	3500	5500	5.9	13	8.7	27
128	168	189	2.4	2.1	C302_0230 EZ701U	350	700	23.47	845/36	3800	3500	5500	9.2	13	8.7	28
128	221	253	3.1	1.6	C302_0230 EZ503U	350	680	23.47	845/36	3800	3500	5500	8.3	13	8.7	28
144	87	95	1.3	4.0	C302_0210 EZ501U	320	610	20.80	104/5	3800	3500	5500	3.6	13	8.7	25
144	149	161	2.2	2.3	C302_0210 EZ502U	400	610	20.80	104/5	3800	3500	5500	5.9	13	8.7	27
144	149	167	2.2	2.3	C302_0210 EZ701U	400	700	20.80	104/5	3800	3500	5500	9.2	13	8.7	28
144	196	224	2.9	1.8	C302_0210 EZ503U	400	610	20.80	104/5	3800	3500	5500	8.3	13	8.7	28
144	242	291	3.6	1.4	C302_0210 EZ702U	400	700	20.80	104/5	3800	3500	5500	14	13	8.7	31
171	126	141	2.1	2.7	C302_0175 EZ701U	340	700	17.54	1105/63	3500	3100	5000	9.6	13	8.7	28
171	204	245	3.4	1.7	C302_0175 EZ702U	350	700	17.54	1105/63	3500	3100	5000	15	13	8.7	31
193	112	125	2.1	2.9	C302_0155 EZ701U	300	700	15.54	544/35	3500	3100	5000	9.6	13	8.7	28
193	181	217	3.4	1.8	C302_0155 EZ702U	400	700	15.54	544/35	3500	3100	5000	15	13	8.7	31
193	204	241	3.8	1.6	C302_0155 EZ505U	400	700	15.54	544/35	3500	3100	5000	13	13	8.7	31
214	100	113	2.0	3.2	C302_0140 EZ701U	270	700	13.99	2015/144	3500	3100	5000	10	13	8.7	28
214	163	195	3.3	1.9	C302_0140 EZ702U	350	700	13.99	2015/144	3500	3100	5000	15	13	8.7	31
214	183	217	3.7	1.7	C302_0140 EZ505U	350	700	13.99	2015/144	3500	3100	5000	14	13	8.7	31
242	89	100	2.0	3.4	C302_0125 EZ701U	240	700	12.40	62/5	3500	3100	5000	10	13	8.7	28
242	144	173	3.2	2.1	C302_0125 EZ702U	400	700	12.40	62/5	3500	3100	5000	15	13	8.7	31
242	162	192	3.6	1.9	C302_0125 EZ505U	400	700	12.40	62/5	3500	3100	5000	14	13	8.7	31
242	198	250	4.4	1.5	C302_0125 EZ703U	400	700	12.40	62/5	3500	3100	5000	23	13	8.7	33
258	83	93	2.0	3.6	C302_0115 EZ701U	230	700	11.61	325/28	3200	2800	4500	10	13	8.7	28
258	135	162	3.2	2.2	C302_0115 EZ702U	350	700	11.61	325/28	3200	2800	4500	16	13	8.7	31
258	152	180	3.6	2.0	C302_0115 EZ505U	350	700	11.61	325/28	3200	2800	4500	14	13	8.7	31
258	186	234	4.4	1.6	C302_0115 EZ703U	350	700	11.61	325/28	3200	2800	4500	24	13	8.7	33
292	74	83	1.9	3.9	C302_0105 EZ701U	200	700	10.29	72/7	3200	2800	4500	10	13	8.7	28
292	120	144	3.1	2.4	C302_0105 EZ702U	400	700	10.29	72/7	3200	2800	4500	16	13	8.7	31
292	135	160	3.5	2.1	C302_0105 EZ505U	400	700	10.29	72/7	3200	2800	4500	14	13	8.7	31
292	165	208	4.3	1.7	C302_0105 EZ703U	400	700	10.29	72/7	3200	2800	4500	24	13	8.7	33
292	213	301	5.6	1.3	C302_0105 EZ705U	400	700	10.29	72/7	3200	2800	4500	36	13	8.7	38
322	67	75	1.9	4.1	C302_0093 EZ701U	180	680	9.310	3575/384	3200	2800	4500	11	13	8.7	28
322	108	130	3.1	2.6	C302_0093 EZ702U	350	680	9.310	3575/384	3200	2800	4500	16	13	8.7	31
322	122	144	3.5	2.3	C302_0093 EZ505U	350	680	9.310	3575/384	3200	2800	4500	15	13	8.7	31
322	149	188	4.2	1.9	C302_0093 EZ703U	350	680	9.310	3575/384	3200	2800	4500	24	13	8.7	33
364	59	66	1.9	4.5	C302_0083 EZ701U	160	600	8.250	33/4	3200	2800	4500	11	13	8.7	28
364	96	115	3.0	2.8	C302_0083 EZ702U	330	600	8.250	33/4	3200	2800	4500	16	13	8.7	31
364	108	128	3.4	2.5	C302_0083 EZ505U	400	600	8.250	33/4	3200	2800	4500	15	13	8.7	31
364	132	166	4.1	2.0	C302_0083 EZ703U	400	600	8.250	33/4	3200	2800	4500	24	13	8.7	33
364	170	242	5.4	1.6	C302_0083 EZ705U	400	700	8.250	33/4	3200	2800	4500	37	13	8.7	38
364	178	297	5.6	1.5	C302_0083 EZ802U	400	700	8.250	33/4	3200	2800	4500	61	13	8.7	47
383	56	61	2.2	3.2	C302_0078 EZ502U	180	230	7.841	494/63	3800	3500	5500	6.1	16	7.1	27
383	56	63	2.2	3.9	C302_0078 EZ701U	150	470	7.841	494/63	3800	3500	5500	9.4	16	7.1	28
383	74	84	2.9	2.5	C302_0078 EZ503U	180	230	7.841	494/63	3800	3500	5500	8.5	16	7.1	28
383	91	110	3.6	2.4	C302_0078 EZ702U	310	470	7.841	494/63	3800	3500	5500	15	16	7.1	31
383	103	122	4.1	2.1	C302_0078 EZ505U	330	470	7.841	494/63	3800	3500	5500	13	16	7.1	31
383	125	158	5.0	1.7	C302_0078 EZ703U	330	470	7.841	494/63	3800	3500	5500	22	16	7.1	33
383	162	230	6.4	1.3	C302_0078 EZ705U	330	550	7.841	494/63	3800	3500	5500	35	16	7.1	38
475	45	51	2.1	4.5	C302_0063 EZ701U	120	430	6.314	221/35	3500	3100	5000	9.9	16	7.1	28
475	73	88	3.5	2.7	C302_0063 EZ702U	250	430	6.314	221/35	3500	3100	5000	15	16	7.1	31
475	83	98	3.9	2.4	C302_0063 EZ505U	330	430	6.314	221/35	3500	3100	5000	14	16	7.1	31
475	101	127	4.8	2.0	C302_0063 EZ703U	330	430	6.314	221/35	3500	3100	5000	23	16	7.1	33
475	130	185	6.2	1.5	C302_0063 EZ705U	330	550	6.314	221/35	3500	3100	5000	35	16	7.1	38
475	137	227	6.5	1.5	C302_0063 EZ802U	330	550	6.314	221/35	3500	3100	5000	59	16	7.1	47
512	42	47	2.1	4.7	C302_0059 EZ701U	110	400	5.859	2584/441	3500	3100	5000	9.9	16	7.1	28
512	68	82	3.4	2.9	C302_0059 EZ702U	230	400	5.859	2584/441	3500	3100	5000	15	16	7.1	31
512	77	91	3.9	2.6	C302_0059 EZ505U	320	400	5.859	2584/441	3500	3100	5000	14	16	7.1	31
512	94	118	4.7	2.1	C302_0059 EZ703U	320	400	5.859	2584/441	3500	3100	5000	23	16	7.1	33
512	121	172	6.1	1.6	C302_0059 EZ705U	330	550	5.859	2584/441	3500	3100	5000	35	16	7.1	38
512	127	211	6.4	1.6	C302_0059 EZ802U	330	550	5.859	2584/441	3500	3100	5000	59	16	7.1	47
595	59	70	3.4	3.2	C302_0050 EZ702U	200	370	5.038	403/80	3500	3100	5000	16	16	7.1	31
595	66	78	3.8	2.8	C302_0050 EZ505U	290	370	5.038	403/80	3500	3100	5000	14	16	7.1	31
595	81	102	4.6	2.3	C302_0050 EZ703U	290	370	5.038	403/80	3500	3100	5000	24	16	7.1	33

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
C3 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 400 Nm)																
595	104	148	6.0	1.8	C302_0050 EZ705U	330	550	5.038	403/80	3500	3100	5000	36	16	7.1	38
595	109	181	6.2	1.7	C302_0050 EZ802U	330	550	5.038	403/80	3500	3100	5000	60	16	7.1	47
595	130	236	7.4	1.4	C302_0050 EZ803U	330	550	5.038	403/80	3500	3100	5000	85	16	7.1	53
642	54	65	3.3	3.4	C302_0047 EZ702U	190	340	4.675	589/126	3500	3100	5000	16	16	7.1	31
642	61	73	3.7	3.0	C302_0047 EZ505U	270	340	4.675	589/126	3500	3100	5000	14	16	7.1	31
642	75	94	4.6	2.4	C302_0047 EZ703U	270	340	4.675	589/126	3500	3100	5000	24	16	7.1	33
642	97	137	5.9	1.9	C302_0047 EZ705U	330	550	4.675	589/126	3500	3100	5000	36	16	7.1	38
642	101	168	6.2	1.8	C302_0047 EZ802U	330	550	4.675	589/126	3500	3100	5000	60	16	7.1	47
642	121	219	7.3	1.5	C302_0047 EZ803U	330	550	4.675	589/126	3500	3100	5000	85	16	7.1	53
718	49	58	3.2	3.6	C302_0042 EZ702U	170	300	4.179	117/28	3200	2800	4500	16	16	7.1	31
718	55	65	3.7	3.2	C302_0042 EZ505U	240	300	4.179	117/28	3200	2800	4500	15	16	7.1	31
718	67	84	4.5	2.6	C302_0042 EZ703U	240	300	4.179	117/28	3200	2800	4500	24	16	7.1	33
718	86	122	5.8	2.0	C302_0042 EZ705U	330	550	4.179	117/28	3200	2800	4500	37	16	7.1	38
718	90	150	6.0	1.9	C302_0042 EZ802U	330	550	4.179	117/28	3200	2800	4500	61	16	7.1	47
718	108	195	7.2	1.6	C302_0042 EZ803U	330	550	4.179	117/28	3200	2800	4500	86	16	7.1	53
774	45	54	3.2	3.8	C302_0039 EZ702U	150	280	3.878	190/49	3200	2800	4500	16	16	7.1	31
774	51	60	3.6	3.4	C302_0039 EZ505U	230	280	3.878	190/49	3200	2800	4500	15	16	7.1	31
774	62	78	4.4	2.8	C302_0039 EZ703U	230	280	3.878	190/49	3200	2800	4500	24	16	7.1	33
774	80	114	5.7	2.1	C302_0039 EZ705U	320	550	3.878	190/49	3200	2800	4500	37	16	7.1	38
774	84	140	6.0	2.0	C302_0039 EZ802U	320	550	3.878	190/49	3200	2800	4500	61	16	7.1	47
774	100	181	7.1	1.7	C302_0039 EZ803U	320	550	3.878	190/49	3200	2800	4500	86	16	7.1	53
895	39	47	3.1	4.2	C302_0034 EZ702U	130	240	3.352	429/128	3200	2800	4500	17	16	7.1	31
895	44	52	3.5	3.7	C302_0034 EZ505U	200	240	3.352	429/128	3200	2800	4500	16	16	7.1	31
895	54	68	4.3	3.0	C302_0034 EZ703U	200	240	3.352	429/128	3200	2800	4500	25	16	7.1	33
895	69	98	5.6	2.4	C302_0034 EZ705U	310	550	3.352	429/128	3200	2800	4500	37	16	7.1	38
895	73	121	5.8	2.3	C302_0034 EZ802U	310	550	3.352	429/128	3200	2800	4500	62	16	7.1	47
895	86	157	6.9	1.9	C302_0034 EZ803U	310	550	3.352	429/128	3200	2800	4500	87	16	7.1	53
965	36	43	3.1	4.4	C302_0031 EZ702U	120	230	3.110	1045/336	3200	2800	4500	17	16	7.1	31
965	41	48	3.5	3.9	C302_0031 EZ505U	180	230	3.110	1045/336	3200	2800	4500	16	16	7.1	31
965	50	63	4.3	3.2	C302_0031 EZ703U	180	230	3.110	1045/336	3200	2800	4500	25	16	7.1	33
965	64	91	5.5	2.5	C302_0031 EZ705U	300	550	3.110	1045/336	3200	2800	4500	38	16	7.1	38
965	67	112	5.7	2.4	C302_0031 EZ802U	300	550	3.110	1045/336	3200	2800	4500	62	16	7.1	47
965	80	145	6.9	2.0	C302_0031 EZ803U	300	550	3.110	1045/336	3200	2800	4500	87	16	7.1	53
1109	56	79	5.4	2.7	C302_0027 EZ705U	270	520	2.705	1677/620	2700	2300	4000	39	16	7.1	38
1109	59	97	5.6	2.6	C302_0027 EZ802U	260	520	2.705	1677/620	2700	2300	4000	63	16	7.1	47
1109	70	126	6.7	2.2	C302_0027 EZ803U	290	520	2.705	1677/620	2700	2300	4000	88	16	7.1	53
1195	52	74	5.3	2.9	C302_0025 EZ705U	250	490	2.510	1634/651	2700	2300	4000	39	16	7.1	38
1195	54	90	5.5	2.7	C302_0025 EZ802U	240	490	2.510	1634/651	2700	2300	4000	63	16	7.1	47
1195	65	117	6.6	2.3	C302_0025 EZ803U	280	490	2.510	1634/651	2700	2300	4000	89	16	7.1	53
1378	45	64	5.2	3.1	C302_0022 EZ705U	220	420	2.177	468/215	2700	2300	4000	41	16	7.1	38
1378	47	78	5.4	3.0	C302_0022 EZ802U	210	420	2.177	468/215	2700	2300	4000	65	16	7.1	47
1378	56	102	6.5	2.5	C302_0022 EZ803U	270	420	2.177	468/215	2700	2300	4000	90	16	7.1	53
1485	42	59	5.1	3.3	C302_0020 EZ705U	200	390	2.020	608/301	2700	2300	4000	41	16	7.1	38
1485	44	73	5.3	3.2	C302_0020 EZ802U	200	390	2.020	608/301	2700	2300	4000	65	16	7.1	47
1485	52	94	6.4	2.6	C302_0020 EZ803U	260	390	2.020	608/301	2700	2300	4000	90	16	7.1	53
C3 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 400 Nm)																
216	192	309	3.2	1.7	C302_0210 EZ505U	400	700	20.80	104/5	3800	3500	5500	13	13	8.7	31
257	162	260	3.1	1.9	C302_0175 EZ505U	350	700	17.54	1105/63	3500	3100	5000	13	13	8.7	31
290	143	231	3.0	2.0	C302_0155 EZ505U	400	700	15.54	544/35	3500	3100	5000	13	13	8.7	31
290	182	302	3.9	1.6	C302_0155 EZ703U	400	700	15.54	544/35	3500	3100	5000	23	13	8.7	33
322	129	208	3.0	2.2	C302_0140 EZ505U	350	700	13.99	2015/144	3500	3100	5000	14	13	8.7	31
363	114	184	2.9	2.3	C302_0125 EZ505U	400	700	12.40	62/5	3500	3100	5000	14	13	8.7	31
363	146	241	3.7	1.8	C302_0125 EZ703U	400	700	12.40	62/5	3500	3100	5000	23	13	8.7	33
388	107	172	2.9	2.4	C302_0115 EZ505U	350	700	11.61	325/28	3200	2800	4500	14	13	8.7	31
388	136	225	3.7	1.9	C302_0115 EZ703U	350	700	11.61	325/28	3200	2800	4500	24	13	8.7	33
437	95	153	2.8	2.6	C302_0105 EZ505U	400	700	10.29	72/7	3200	2800	4500	14	13	8.7	31
437	121	200	3.6	2.1	C302_0105 EZ703U	400	700	10.29	72/7	3200	2800	4500	24	13	8.7	33
437	164	299	4.9	1.5	C302_0105 EZ705U	400	700	10.29	72/7	3200	2800	4500	36	13	8.7	38
483	86	138	2.8	2.8	C302_0093 EZ505U	350	680	9.310	3575/384	3200	2800	4500	15	13	8.7	31
483	109	181	3.6	2.2	C302_0093 EZ703U	350	680	9.310	3575/384	3200	2800	4500	24	13	8.7	33
545	76	122	2.7	3.1	C302_0083 EZ505U	400	600	8.250	33/4	3200	2800	4500	15	13	8.7	31
545	84	276	3.0	2.8	C302_0083 EZ802U	400	700	8.250	33/4	3200	2800	4500	61	13	8.7	47
545	97	160	3.5	2.4	C302_0083 EZ703U	400	600	8.250	33/4	3200	2800	4500	24	13	8.7	33
545	131	240	4.7	1.8	C302_0083 EZ705U	400	700	8.250	33/4	3200	2800	4500	37	13	8.7	38

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
C3 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 400 Nm)																
574	72	116	3.3	2.6	C302_0078 EZ505U	330	470	7.841	494/63	3800	3500	5500	13	16	7.1	31
574	92	152	4.2	2.1	C302_0078 EZ703U	330	470	7.841	494/63	3800	3500	5500	22	16	7.1	33
574	125	228	5.6	1.5	C302_0078 EZ705U	330	550	7.841	494/63	3800	3500	5500	35	16	7.1	38
713	58	94	3.2	3.0	C302_0063 EZ505U	330	430	6.314	221/35	3500	3100	5000	14	16	7.1	31
713	64	211	3.5	2.7	C302_0063 EZ802U	330	550	6.314	221/35	3500	3100	5000	59	16	7.1	47
713	74	122	4.0	2.4	C302_0063 EZ703U	330	430	6.314	221/35	3500	3100	5000	23	16	7.1	33
713	100	184	5.4	1.8	C302_0063 EZ705U	330	550	6.314	221/35	3500	3100	5000	35	16	7.1	38
768	54	87	3.1	3.2	C302_0059 EZ505U	320	400	5.859	2584/441	3500	3100	5000	14	16	7.1	31
768	60	196	3.4	2.9	C302_0059 EZ802U	330	550	5.859	2584/441	3500	3100	5000	59	16	7.1	47
768	69	114	4.0	2.5	C302_0059 EZ703U	320	400	5.859	2584/441	3500	3100	5000	23	16	7.1	33
768	93	170	5.4	1.8	C302_0059 EZ705U	330	550	5.859	2584/441	3500	3100	5000	35	16	7.1	38
893	46	75	3.0	3.5	C302_0050 EZ505U	290	370	5.038	403/80	3500	3100	5000	14	16	7.1	31
893	51	169	3.4	3.2	C302_0050 EZ802U	330	550	5.038	403/80	3500	3100	5000	60	16	7.1	47
893	59	98	3.9	2.8	C302_0050 EZ703U	290	370	5.038	403/80	3500	3100	5000	24	16	7.1	33
893	80	147	5.2	2.0	C302_0050 EZ705U	330	550	5.038	403/80	3500	3100	5000	36	16	7.1	38
963	43	69	3.0	3.7	C302_0047 EZ505U	270	340	4.675	589/126	3500	3100	5000	14	16	7.1	31
963	48	156	3.3	3.3	C302_0047 EZ802U	330	550	4.675	589/126	3500	3100	5000	60	16	7.1	47
963	55	91	3.8	2.9	C302_0047 EZ703U	270	340	4.675	589/126	3500	3100	5000	24	16	7.1	33
963	74	136	5.2	2.1	C302_0047 EZ705U	330	550	4.675	589/126	3500	3100	5000	36	16	7.1	38
1077	39	62	2.9	4.0	C302_0042 EZ505U	240	300	4.179	117/28	3200	2800	4500	15	16	7.1	31
1077	43	140	3.3	3.6	C302_0042 EZ802U	330	550	4.179	117/28	3200	2800	4500	61	16	7.1	47
1077	49	81	3.8	3.1	C302_0042 EZ703U	240	300	4.179	117/28	3200	2800	4500	24	16	7.1	33
1077	66	122	5.1	2.3	C302_0042 EZ705U	330	550	4.179	117/28	3200	2800	4500	37	16	7.1	38
1160	36	58	2.9	4.2	C302_0039 EZ505U	230	280	3.878	190/49	3200	2800	4500	15	16	7.1	31
1160	39	130	3.2	3.8	C302_0039 EZ802U	320	550	3.878	190/49	3200	2800	4500	61	16	7.1	47
1160	46	75	3.7	3.3	C302_0039 EZ703U	230	280	3.878	190/49	3200	2800	4500	24	16	7.1	33
1160	62	113	5.0	2.4	C302_0039 EZ705U	320	550	3.878	190/49	3200	2800	4500	37	16	7.1	38
1342	31	50	2.8	4.6	C302_0034 EZ505U	200	240	3.352	429/128	3200	2800	4500	16	16	7.1	31
1342	34	112	3.1	4.2	C302_0034 EZ802U	310	550	3.352	429/128	3200	2800	4500	62	16	7.1	47
1342	39	65	3.6	3.6	C302_0034 EZ703U	200	240	3.352	429/128	3200	2800	4500	25	16	7.1	33
1342	53	98	4.9	2.7	C302_0034 EZ705U	310	550	3.352	429/128	3200	2800	4500	37	16	7.1	38
1447	29	46	2.8	4.9	C302_0031 EZ505U	180	230	3.110	1045/336	3200	2800	4500	16	16	7.1	31
1447	32	104	3.1	4.4	C302_0031 EZ802U	300	550	3.110	1045/336	3200	2800	4500	62	16	7.1	47
1447	37	60	3.6	3.8	C302_0031 EZ703U	180	230	3.110	1045/336	3200	2800	4500	25	16	7.1	33
1447	49	91	4.8	2.8	C302_0031 EZ705U	300	550	3.110	1045/336	3200	2800	4500	38	16	7.1	38
C4 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 540 Nm)																
340	250	378	8.2	1.3	C402_0059 EZ805U	540	850	5.891	377/64	3300	2800	4500	136	15	17	76
427	198	300	7.8	1.5	C402_0047 EZ805U	500	800	4.682	899/192	3300	2800	4500	137	15	17	76
514	165	250	7.6	1.7	C402_0039 EZ805U	470	710	3.894	841/216	2900	2500	4000	139	15	17	76
645	131	199	7.3	2.0	C402_0031 EZ805U	440	600	3.099	1537/496	2900	2500	4000	141	15	17	76
814	104	157	7.0	2.4	C402_0025 EZ805U	380	480	2.456	609/248	2500	2100	3500	145	15	17	76
1016	83	126	6.8	2.7	C402_0020 EZ805U	310	380	1.968	551/280	2500	2100	3500	150	15	17	76
C4 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 600 Nm)																
33	371	406	1.8	1.5	C403_0900 EZ501U	550	1100	90.32	8671/96	3500	3200	5000	3.2	12	22	40
37	332	363	1.7	1.7	C403_0810 EZ501U	600	1100	80.81	42021/520	3500	3200	5000	3.2	12	22	40
43	291	319	1.6	1.9	C402_0700 EZ501U	550	1070	69.88	559/8	3500	3200	5000	3.2	12	22	35
48	261	285	1.7	1.9	C402_0630 EZ501U	600	960	62.52	8127/130	3500	3200	5000	3.2	12	22	35
53	234	256	1.5	2.4	C402_0560 EZ501U	550	1040	56.10	9425/168	3500	3200	5000	3.3	12	22	35
60	209	229	1.4	2.6	C402_0500 EZ501U	600	930	50.19	1305/26	3500	3200	5000	3.3	12	22	35
60	360	389	2.4	1.5	C402_0500 EZ502U	600	930	50.19	1305/26	3500	3200	5000	5.6	12	22	37
60	360	404	2.4	1.5	C402_0500 EZ701U	600	930	50.19	1305/26	3500	3200	5000	8.9	12	22	39
64	195	213	1.3	2.8	C402_0470 EZ501U	550	930	46.67	140/3	3500	3200	5000	3.4	12	22	35
64	335	362	2.3	1.6	C402_0470 EZ502U	550	930	46.67	140/3	3500	3200	5000	5.7	12	22	37
64	335	376	2.3	1.6	C402_0470 EZ701U	550	1100	46.67	140/3	3500	3200	5000	9.0	12	22	39
72	174	190	1.3	3.2	C402_0420 EZ501U	600	840	41.75	7056/169	3500	3200	5000	3.5	12	22	35
72	300	324	2.2	1.8	C402_0420 EZ502U	600	840	41.75	7056/169	3500	3200	5000	5.8	12	22	37
72	300	336	2.2	1.8	C402_0420 EZ701U	600	1100	41.75	7056/169	3500	3200	5000	9.1	12	22	39
72	393	450	2.9	1.4	C402_0420 EZ503U	600	840	41.75	7056/169	3500	3200	5000	8.1	12	22	38
86	145	159	1.2	3.8	C402_0350 EZ501U	540	790	34.82	975/28	3500	3200	5000	3.8	12	22	35
86	250	270	2.0	2.2	C402_0350 EZ502U	550	790	34.82	975/28	3500	3200	5000	6.1	12	22	37
86	250	280	2.0	2.2	C402_0350 EZ701U	550	1100	34.82	975/28	3500	3200	5000	9.4	12	22	39
86	328	375	2.6	1.7	C402_0350 EZ503U	550	790	34.82	975/28	3500	3200	5000	8.5	12	22	38
96	130	142	1.1	4.2	C402_0310 EZ501U	480	710	31.15	405/13	3500	3200	5000	3.8	12	22	35
96	224	242	1.9	2.5	C402_0310 EZ502U	570	710	31.15	405/13	3500	3200	5000	6.1	12	22	37

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
C4 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 600 Nm)																
96	224	251	1.9	2.5	C402_0310 EZ701U	600	1100	31.15	405/13	3500	3200	5000	9.4	12	22	39
96	293	335	2.5	1.9	C402_0310 EZ503U	570	710	31.15	405/13	3500	3200	5000	8.5	12	22	38
96	363	435	3.1	1.5	C402_0310 EZ702U	600	1100	31.15	405/13	3500	3200	5000	15	12	22	41
108	200	224	1.8	2.8	C402_0280 EZ701U	540	1100	27.86	195/7	3500	3200	5000	9.8	12	22	39
108	324	389	2.9	1.7	C402_0280 EZ702U	550	1100	27.86	195/7	3500	3200	5000	15	12	22	41
120	179	201	1.7	3.1	C402_0250 EZ701U	480	1100	24.92	324/13	3500	3200	5000	9.8	12	22	39
120	290	348	2.7	1.9	C402_0250 EZ702U	600	1100	24.92	324/13	3500	3200	5000	15	12	22	41
120	326	387	3.1	1.7	C402_0250 EZ505U	600	1100	24.92	324/13	3500	3200	5000	13	12	22	41
128	168	188	1.6	3.3	C402_0230 EZ701U	450	1100	23.36	1495/64	3500	3200	5000	10	12	22	39
128	272	326	2.7	2.0	C402_0230 EZ702U	550	1100	23.36	1495/64	3500	3200	5000	15	12	22	41
128	306	363	3.0	1.8	C402_0230 EZ505U	550	1100	23.36	1495/64	3500	3200	5000	14	12	22	41
144	150	168	1.6	3.7	C402_0210 EZ701U	410	1100	20.90	4347/208	3500	3200	5000	10	12	22	39
144	243	292	2.5	2.3	C402_0210 EZ702U	600	1100	20.90	4347/208	3500	3200	5000	15	12	22	41
144	274	324	2.8	2.0	C402_0210 EZ505U	600	1100	20.90	4347/208	3500	3200	5000	14	12	22	41
144	334	422	3.5	1.6	C402_0210 EZ703U	600	1100	20.90	4347/208	3500	3200	5000	23	12	22	43
170	126	142	1.4	4.4	C402_0175 EZ701U	340	1100	17.60	845/48	3300	2800	4500	11	12	22	39
170	205	246	2.3	2.7	C402_0175 EZ702U	550	1100	17.60	845/48	3300	2800	4500	16	12	22	41
170	231	273	2.6	2.4	C402_0175 EZ505U	550	1100	17.60	845/48	3300	2800	4500	15	12	22	41
170	282	355	3.2	2.0	C402_0175 EZ703U	550	1100	17.60	845/48	3300	2800	4500	24	12	22	43
190	113	127	1.3	4.9	C402_0160 EZ701U	310	1070	15.75	63/4	3300	2800	4500	11	12	22	39
190	183	220	2.2	3.0	C402_0160 EZ702U	600	1070	15.75	63/4	3300	2800	4500	16	12	22	41
190	206	244	2.5	2.7	C402_0160 EZ505U	600	1070	15.75	63/4	3300	2800	4500	15	12	22	41
190	252	318	3.0	2.2	C402_0160 EZ703U	600	1070	15.75	63/4	3300	2800	4500	24	12	22	43
190	325	461	3.9	1.7	C402_0160 EZ705U	600	1100	15.75	63/4	3300	2800	4500	37	12	22	49
214	163	195	2.1	3.3	C402_0140 EZ702U	550	1020	13.99	2015/144	3300	2800	4500	17	12	22	41
214	183	217	2.4	2.9	C402_0140 EZ505U	550	1020	13.99	2015/144	3300	2800	4500	16	12	22	41
214	224	282	2.9	2.4	C402_0140 EZ703U	550	1020	13.99	2015/144	3300	2800	4500	25	12	22	43
214	289	410	3.8	1.8	C402_0140 EZ705U	550	1100	13.99	2015/144	3300	2800	4500	37	12	22	49
240	146	175	2.1	3.5	C402_0125 EZ702U	500	910	12.52	651/52	3300	2800	4500	17	12	22	41
240	164	194	2.3	3.1	C402_0125 EZ505U	600	910	12.52	651/52	3300	2800	4500	16	12	22	41
240	200	253	2.9	2.6	C402_0125 EZ703U	600	910	12.52	651/52	3300	2800	4500	25	12	22	43
240	259	367	3.7	2.0	C402_0125 EZ705U	600	1100	12.52	651/52	3300	2800	4500	37	12	22	49
240	271	451	3.9	1.9	C402_0125 EZ802U	600	1100	12.52	651/52	3300	2800	4500	61	12	22	57
258	135	163	2.1	3.7	C402_0115 EZ702U	460	850	11.64	1885/162	2900	2500	4000	18	12	22	41
258	152	181	2.3	3.3	C402_0115 EZ505U	550	850	11.64	1885/162	2900	2500	4000	16	12	22	41
258	186	235	2.8	2.7	C402_0115 EZ703U	550	850	11.64	1885/162	2900	2500	4000	26	12	22	43
258	240	341	3.7	2.1	C402_0115 EZ705U	550	1100	11.64	1885/162	2900	2500	4000	38	12	22	49
258	252	419	3.8	2.0	C402_0115 EZ802U	550	1100	11.64	1885/162	2900	2500	4000	62	12	22	57
288	121	145	2.0	4.0	C402_0105 EZ702U	410	760	10.41	406/39	2900	2500	4000	18	12	22	41
288	136	162	2.3	3.5	C402_0105 EZ505U	600	760	10.41	406/39	2900	2500	4000	17	12	22	41
288	167	210	2.8	2.9	C402_0105 EZ703U	600	760	10.41	406/39	2900	2500	4000	26	12	22	43
288	215	305	3.6	2.2	C402_0105 EZ705U	600	1100	10.41	406/39	2900	2500	4000	38	12	22	49
288	225	375	3.8	2.1	C402_0105 EZ802U	600	1100	10.41	406/39	2900	2500	4000	62	12	22	57
324	191	271	3.5	2.4	C402_0093 EZ705U	550	1100	9.261	3445/372	2900	2500	4000	40	12	22	49
324	200	333	3.7	2.3	C402_0093 EZ802U	550	1100	9.261	3445/372	2900	2500	4000	64	12	22	57
362	171	243	3.5	2.6	C402_0083 EZ705U	600	1100	8.285	3339/403	2900	2500	4000	40	12	22	49
362	179	298	3.6	2.5	C402_0083 EZ802U	600	1100	8.285	3339/403	2900	2500	4000	64	12	22	57
362	214	387	4.3	2.1	C402_0083 EZ803U	600	1100	8.285	3339/403	2900	2500	4000	89	12	22	63
384	91	109	2.7	3.5	C402_0078 EZ702U	310	450	7.816	2001/256	3500	3200	5000	16	15	17	41
384	102	121	3.0	3.1	C402_0078 EZ505U	360	450	7.816	2001/256	3500	3200	5000	14	15	17	41
384	125	158	3.7	2.5	C402_0078 EZ703U	360	450	7.816	2001/256	3500	3200	5000	24	15	17	43
384	161	229	4.8	2.0	C402_0078 EZ705U	550	850	7.816	2001/256	3500	3200	5000	36	15	17	49
384	169	281	5.0	1.9	C402_0078 EZ802U	550	850	7.816	2001/256	3500	3200	5000	60	15	17	57
384	202	365	6.0	1.6	C402_0078 EZ803U	550	850	7.816	2001/256	3500	3200	5000	86	15	17	63
509	69	82	2.6	4.2	C402_0059 EZ702U	230	400	5.891	377/64	3300	2800	4500	17	15	17	41
509	77	91	2.9	3.7	C402_0059 EZ505U	320	400	5.891	377/64	3300	2800	4500	15	15	17	41
509	94	119	3.5	3.0	C402_0059 EZ703U	320	400	5.891	377/64	3300	2800	4500	25	15	17	43
509	122	173	4.5	2.4	C402_0059 EZ705U	540	850	5.891	377/64	3300	2800	4500	37	15	17	49
509	127	212	4.8	2.3	C402_0059 EZ802U	540	850	5.891	377/64	3300	2800	4500	61	15	17	57
509	152	275	5.7	1.9	C402_0059 EZ803U	540	850	5.891	377/64	3300	2800	4500	87	15	17	63
641	54	65	2.5	4.9	C402_0047 EZ702U	190	340	4.682	899/192	3300	2800	4500	18	15	17	41
641	61	73	2.8	4.3	C402_0047 EZ505U	270	340	4.682	899/192	3300	2800	4500	17	15	17	41
641	75	94	3.4	3.5	C402_0047 EZ703U	270	340	4.682	899/192	3300	2800	4500	26	15	17	43
641	97	137	4.4	2.7	C402_0047 EZ705U	470	800	4.682	899/192	3300	2800	4500	39	15	17	49

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
C4 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 600 Nm)																
641	101	168	4.6	2.6	C402_0047 EZ802U	450	800	4.682	899/192	3300	2800	4500	63	15	17	57
641	121	219	5.5	2.2	C402_0047 EZ803U	500	800	4.682	899/192	3300	2800	4500	88	15	17	63
770	45	54	2.4	5.0	C402_0039 EZ702U	150	280	3.894	841/216	2900	2500	4000	20	15	17	41
770	51	60	2.7	4.4	C402_0039 EZ505U	230	280	3.894	841/216	2900	2500	4000	18	15	17	41
770	62	79	3.3	3.6	C402_0039 EZ703U	230	280	3.894	841/216	2900	2500	4000	28	15	17	43
770	80	114	4.2	3.1	C402_0039 EZ705U	390	710	3.894	841/216	2900	2500	4000	40	15	17	49
770	84	140	4.4	3.0	C402_0039 EZ802U	380	710	3.894	841/216	2900	2500	4000	64	15	17	57
770	100	182	5.3	2.5	C402_0039 EZ803U	470	710	3.894	841/216	2900	2500	4000	89	15	17	63
968	64	91	4.1	3.6	C402_0031 EZ705U	310	600	3.099	1537/496	2900	2500	4000	42	15	17	49
968	67	112	4.3	3.5	C402_0031 EZ802U	300	600	3.099	1537/496	2900	2500	4000	66	15	17	57
968	80	145	5.1	2.9	C402_0031 EZ803U	440	600	3.099	1537/496	2900	2500	4000	92	15	17	63
1221	51	72	3.9	4.2	C402_0025 EZ705U	250	480	2.456	609/248	2500	2100	3500	46	15	17	49
1221	53	88	4.1	4.0	C402_0025 EZ802U	240	480	2.456	609/248	2500	2100	3500	70	15	17	57
1221	63	115	4.9	3.4	C402_0025 EZ803U	350	480	2.456	609/248	2500	2100	3500	96	15	17	63
1524	41	58	3.8	4.9	C402_0020 EZ705U	200	380	1.968	551/280	2500	2100	3500	51	15	17	49
1524	43	71	4.0	4.7	C402_0020 EZ802U	190	380	1.968	551/280	2500	2100	3500	75	15	17	57
1524	51	92	4.7	3.9	C402_0020 EZ803U	280	380	1.968	551/280	2500	2100	3500	101	15	17	63
C4 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 600 Nm)																
144	287	462	2.4	1.9	C402_0310 EZ505U	600	1100	31.15	405/13	3500	3200	5000	13	12	22	41
162	257	413	2.3	2.1	C402_0280 EZ505U	550	1100	27.86	195/7	3500	3200	5000	13	12	22	41
181	230	370	2.2	2.4	C402_0250 EZ505U	600	1100	24.92	324/13	3500	3200	5000	13	12	22	41
193	215	347	2.1	2.6	C402_0230 EZ505U	550	1100	23.36	1495/64	3500	3200	5000	14	12	22	41
215	193	310	2.1	2.8	C402_0210 EZ505U	600	1100	20.90	4347/208	3500	3200	5000	14	12	22	41
215	245	405	2.6	2.2	C402_0210 EZ703U	600	1100	20.90	4347/208	3500	3200	5000	23	12	22	43
256	162	261	2.0	3.1	C402_0175 EZ505U	550	1100	17.60	845/48	3300	2800	4500	15	12	22	41
256	207	342	2.5	2.4	C402_0175 EZ703U	550	1100	17.60	845/48	3300	2800	4500	24	12	22	43
286	145	234	2.0	3.3	C402_0160 EZ505U	600	1070	15.75	63/4	3300	2800	4500	15	12	22	41
286	185	306	2.5	2.6	C402_0160 EZ703U	600	1070	15.75	63/4	3300	2800	4500	24	12	22	43
286	251	458	3.4	1.9	C402_0160 EZ705U	600	1100	15.75	63/4	3300	2800	4500	37	12	22	49
322	129	208	1.9	3.6	C402_0140 EZ505U	550	1020	13.99	2015/144	3300	2800	4500	16	12	22	41
322	164	271	2.5	2.8	C402_0140 EZ703U	550	1020	13.99	2015/144	3300	2800	4500	25	12	22	43
322	223	407	3.3	2.1	C402_0140 EZ705U	550	1100	13.99	2015/144	3300	2800	4500	37	12	22	49
359	115	186	1.9	3.9	C402_0125 EZ505U	600	910	12.52	651/52	3300	2800	4500	16	12	22	41
359	128	419	2.1	3.5	C402_0125 EZ802U	600	1100	12.52	651/52	3300	2800	4500	61	12	22	57
359	147	243	2.4	3.1	C402_0125 EZ703U	600	910	12.52	651/52	3300	2800	4500	25	12	22	43
359	199	364	3.3	2.3	C402_0125 EZ705U	600	1100	12.52	651/52	3300	2800	4500	37	12	22	49
576	72	116	2.4	3.8	C402_0078 EZ505U	360	450	7.816	2001/256	3500	3200	5000	14	15	17	41
576	80	262	2.7	3.5	C402_0078 EZ802U	550	850	7.816	2001/256	3500	3200	5000	60	15	17	57
576	92	152	3.1	3.0	C402_0078 EZ703U	360	450	7.816	2001/256	3500	3200	5000	24	15	17	43
576	124	227	4.2	2.2	C402_0078 EZ705U	550	850	7.816	2001/256	3500	3200	5000	36	15	17	49
764	54	87	2.3	4.6	C402_0059 EZ505U	320	400	5.891	377/64	3300	2800	4500	15	15	17	41
764	60	197	2.6	4.2	C402_0059 EZ802U	540	850	5.891	377/64	3300	2800	4500	61	15	17	57
764	69	114	3.0	3.6	C402_0059 EZ703U	320	400	5.891	377/64	3300	2800	4500	25	15	17	43
764	94	171	4.0	2.7	C402_0059 EZ705U	540	850	5.891	377/64	3300	2800	4500	37	15	17	49
961	48	157	2.5	4.9	C402_0047 EZ802U	450	800	4.682	899/192	3300	2800	4500	63	15	17	57
961	55	91	2.8	4.2	C402_0047 EZ703U	270	340	4.682	899/192	3300	2800	4500	26	15	17	43
961	74	136	3.9	3.1	C402_0047 EZ705U	470	800	4.682	899/192	3300	2800	4500	39	15	17	49
C5 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 920 Nm)																
193	440	666	4.8	1.8	C502_0105 EZ805U	920	1600	10.38	841/81	2800	2400	3500	141	12	23	88
216	393	594	4.5	2.0	C502_0093 EZ805U	850	1600	9.261	3445/372	2800	2400	3500	143	12	23	88
242	350	530	4.4	2.2	C502_0083 EZ805U	920	1600	8.263	1537/186	2800	2400	3500	144	12	23	88
258	329	498	5.9	1.7	C502_0078 EZ805U	800	1110	7.763	621/80	3400	3000	4500	136	14	21	88
342	248	375	5.7	2.0	C502_0059 EZ805U	770	970	5.850	117/20	3100	2700	4000	139	14	21	88
432	196	297	5.4	2.4	C502_0046 EZ805U	700	880	4.629	162/35	3100	2700	4000	141	14	21	88
517	164	248	5.3	2.7	C502_0039 EZ805U	600	750	3.867	58/15	2800	2400	3500	144	14	21	88
650	130	197	5.1	3.1	C502_0031 EZ805U	480	600	3.077	477/155	2800	2400	3500	148	14	21	88
1012	84	127	4.7	4.2	C502_0020 EZ805U	390	720	1.976	81/41	2400	2000	3000	163	14	21	88
C5 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 920 Nm)																
22	556	608	1.7	1.4	C503_1350 EZ501U	850	1600	135.3	406/3	3400	3000	4500	3.2	12	23	51
28	447	488	1.5	1.8	C503_1090 EZ501U	850	1600	108.6	31291/288	3400	3000	4500	3.2	12	23	51
33	371	406	1.4	2.2	C503_0900 EZ501U	850	1490	90.32	8671/96	3400	3000	4500	3.3	12	23	51
37	331	362	1.3	2.4	C503_0810 EZ501U	920	1330	80.60	19343/240	3400	3000	4500	3.3	12	23	51
37	570	616	2.2	1.4	C503_0810 EZ502U	920	1330	80.60	19343/240	3400	3000	4500	5.6	12	23	52

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
C5 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 920 Nm)																
43	292	319	1.2	2.7	C502_0700 EZ501U	850	1210	69.97	10075/144	3400	3000	4500	3.4	12	23	47
43	502	543	2.1	1.6	C502_0700 EZ502U	850	1210	69.97	10075/144	3400	3000	4500	5.7	12	23	48
43	502	563	2.1	1.6	C502_0700 EZ701U	850	1210	69.97	10075/144	3400	3000	4500	9.0	12	23	50
48	260	285	1.3	2.7	C502_0620 EZ501U	860	1080	62.43	4495/72	3400	3000	4500	3.4	12	23	47
48	448	484	2.2	1.6	C502_0620 EZ502U	860	1080	62.43	4495/72	3400	3000	4500	5.7	12	23	48
48	448	503	2.2	1.6	C502_0620 EZ701U	860	1080	62.43	4495/72	3400	3000	4500	9.0	12	23	50
54	233	255	1.1	3.4	C502_0560 EZ501U	850	1120	55.83	335/6	3400	3000	4500	3.6	12	23	47
54	401	433	1.9	2.0	C502_0560 EZ502U	850	1120	55.83	335/6	3400	3000	4500	5.9	12	23	48
54	401	450	1.9	2.0	C502_0560 EZ701U	850	1600	55.83	335/6	3400	3000	4500	9.2	12	23	50
54	525	601	2.5	1.5	C502_0560 EZ503U	850	1120	55.83	335/6	3400	3000	4500	8.3	12	23	50
60	208	227	1.0	3.8	C502_0500 EZ501U	770	1000	49.82	1943/39	3400	3000	4500	3.6	12	23	47
60	358	387	1.8	2.2	C502_0500 EZ502U	800	1000	49.82	1943/39	3400	3000	4500	5.9	12	23	48
60	358	401	1.8	2.2	C502_0500 EZ701U	920	1600	49.82	1943/39	3400	3000	4500	9.2	12	23	50
60	469	536	2.3	1.7	C502_0500 EZ503U	800	1000	49.82	1943/39	3400	3000	4500	8.3	12	23	50
60	580	696	2.9	1.4	C502_0500 EZ702U	920	1600	49.82	1943/39	3400	3000	4500	14	12	23	53
64	335	376	1.7	2.4	C502_0470 EZ701U	850	1600	46.72	1495/32	3400	3000	4500	9.5	12	23	50
64	544	653	2.8	1.5	C502_0470 EZ702U	850	1600	46.72	1495/32	3400	3000	4500	15	12	23	53
72	299	336	1.6	2.7	C502_0420 EZ701U	810	1600	41.69	667/16	3400	3000	4500	9.5	12	23	50
72	485	582	2.6	1.6	C502_0420 EZ702U	920	1600	41.69	667/16	3400	3000	4500	15	12	23	53
72	546	647	3.0	1.5	C502_0420 EZ505U	920	1600	41.69	667/16	3400	3000	4500	13	12	23	53
86	251	282	1.5	3.2	C502_0350 EZ701U	680	1600	35.00	35/1	3400	3000	4500	10	12	23	50
86	407	489	2.4	2.0	C502_0350 EZ702U	850	1600	35.00	35/1	3400	3000	4500	15	12	23	53
86	458	543	2.7	1.7	C502_0350 EZ505U	850	1600	35.00	35/1	3400	3000	4500	14	12	23	53
96	224	251	1.4	3.6	C502_0310 EZ701U	610	1520	31.23	406/13	3400	3000	4500	10	12	23	50
96	364	436	2.3	2.2	C502_0310 EZ702U	920	1520	31.23	406/13	3400	3000	4500	15	12	23	53
96	409	485	2.6	2.0	C502_0310 EZ505U	920	1520	31.23	406/13	3400	3000	4500	14	12	23	53
96	500	630	3.1	1.6	C502_0310 EZ703U	920	1520	31.23	406/13	3400	3000	4500	23	12	23	55
107	202	226	1.3	4.0	C502_0280 EZ701U	550	1600	28.10	5395/192	3400	3000	4500	11	12	23	50
107	327	392	2.2	2.4	C502_0280 EZ702U	850	1600	28.10	5395/192	3400	3000	4500	16	12	23	53
107	368	436	2.4	2.2	C502_0280 EZ505U	850	1600	28.10	5395/192	3400	3000	4500	14	12	23	53
107	450	567	3.0	1.8	C502_0280 EZ703U	850	1600	28.10	5395/192	3400	3000	4500	24	12	23	55
120	180	202	1.3	4.4	C502_0250 EZ701U	490	1440	25.07	2407/96	3400	3000	4500	11	12	23	50
120	292	350	2.0	2.7	C502_0250 EZ702U	920	1440	25.07	2407/96	3400	3000	4500	16	12	23	53
120	328	389	2.3	2.4	C502_0250 EZ505U	920	1440	25.07	2407/96	3400	3000	4500	14	12	23	53
120	401	506	2.8	2.0	C502_0250 EZ703U	920	1440	25.07	2407/96	3400	3000	4500	24	12	23	55
128	168	188	1.2	4.8	C502_0230 EZ701U	450	1490	23.36	1495/64	3400	3000	4500	12	12	23	50
128	272	326	2.0	2.9	C502_0230 EZ702U	850	1490	23.36	1495/64	3400	3000	4500	17	12	23	53
128	306	363	2.2	2.6	C502_0230 EZ505U	850	1490	23.36	1495/64	3400	3000	4500	15	12	23	53
128	374	471	2.7	2.1	C502_0230 EZ703U	850	1490	23.36	1495/64	3400	3000	4500	25	12	23	55
144	243	291	1.9	3.3	C502_0210 EZ702U	830	1330	20.84	667/32	3400	3000	4500	17	12	23	53
144	273	323	2.1	2.9	C502_0210 EZ505U	920	1330	20.84	667/32	3400	3000	4500	15	12	23	53
144	334	421	2.6	2.4	C502_0210 EZ703U	920	1330	20.84	667/32	3400	3000	4500	25	12	23	55
144	431	611	3.3	1.9	C502_0210 EZ705U	920	1600	20.84	667/32	3400	3000	4500	37	12	23	60
170	364	516	3.0	2.2	C502_0175 EZ705U	850	1600	17.60	845/48	3100	2700	4000	39	12	23	60
170	381	634	3.2	2.1	C502_0175 EZ802U	850	1600	17.60	845/48	3100	2700	4000	63	12	23	68
191	325	460	2.9	2.5	C502_0155 EZ705U	920	1600	15.71	377/24	3100	2700	4000	39	12	23	60
191	340	565	3.0	2.4	C502_0155 EZ802U	920	1600	15.71	377/24	3100	2700	4000	63	12	23	68
215	162	195	1.5	4.9	C502_0140 EZ702U	550	1010	13.93	195/14	3100	2700	4000	20	12	23	53
215	182	216	1.7	4.4	C502_0140 EZ505U	810	1010	13.93	195/14	3100	2700	4000	18	12	23	53
215	223	281	2.1	3.6	C502_0140 EZ703U	810	1010	13.93	195/14	3100	2700	4000	28	12	23	55
215	288	408	2.7	2.8	C502_0140 EZ705U	850	1600	13.93	195/14	3100	2700	4000	40	12	23	60
215	301	501	2.8	2.6	C502_0140 EZ802U	850	1600	13.93	195/14	3100	2700	4000	64	12	23	68
215	359	651	3.4	2.2	C502_0140 EZ803U	850	1600	13.93	195/14	3100	2700	4000	90	12	23	75
241	145	174	1.5	5.0	C502_0125 EZ702U	490	900	12.43	87/7	3100	2700	4000	20	12	23	53
241	163	193	1.7	4.4	C502_0125 EZ505U	720	900	12.43	87/7	3100	2700	4000	18	12	23	53
241	199	251	2.1	3.6	C502_0125 EZ703U	720	900	12.43	87/7	3100	2700	4000	28	12	23	55
241	257	364	2.7	3.0	C502_0125 EZ705U	920	1600	12.43	87/7	3100	2700	4000	40	12	23	60
241	269	447	2.8	2.9	C502_0125 EZ802U	920	1600	12.43	87/7	3100	2700	4000	64	12	23	68
241	321	581	3.3	2.4	C502_0125 EZ803U	920	1600	12.43	87/7	3100	2700	4000	90	12	23	75
258	240	341	2.6	3.1	C502_0115 EZ705U	850	1600	11.64	1885/162	2800	2400	3500	42	12	23	60
258	252	419	2.8	3.0	C502_0115 EZ802U	850	1600	11.64	1885/162	2800	2400	3500	66	12	23	68
258	300	544	3.3	2.5	C502_0115 EZ803U	850	1600	11.64	1885/162	2800	2400	3500	91	12	23	75
289	215	304	2.6	3.4	C502_0105 EZ705U	920	1600	10.38	841/81	2800	2400	3500	42	12	23	60
289	225	374	2.7	3.2	C502_0105 EZ802U	920	1600	10.38	841/81	2800	2400	3500	66	12	23	68

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
C5 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 920 Nm)																
289	268	485	3.2	2.7	C502_0105 EZ803U	920	1600	10.38	841/81	2800	2400	3500	92	12	23	75
324	191	271	2.5	3.6	C502_0093 EZ705U	850	1600	9.261	3445/372	2800	2400	3500	45	12	23	60
324	200	333	2.6	3.5	C502_0093 EZ802U	850	1600	9.261	3445/372	2800	2400	3500	69	12	23	68
324	239	433	3.2	2.9	C502_0093 EZ803U	850	1600	9.261	3445/372	2800	2400	3500	94	12	23	75
363	171	242	2.5	3.9	C502_0083 EZ705U	830	1600	8.263	1537/186	2800	2400	3500	45	12	23	60
363	179	297	2.6	3.8	C502_0083 EZ802U	800	1600	8.263	1537/186	2800	2400	3500	69	12	23	68
363	213	386	3.1	3.1	C502_0083 EZ803U	920	1600	8.263	1537/186	2800	2400	3500	94	12	23	75
386	90	108	1.9	4.4	C502_0078 EZ702U	310	500	7.763	621/80	3400	3000	4500	18	14	21	53
386	102	120	2.1	3.9	C502_0078 EZ505U	400	500	7.763	621/80	3400	3000	4500	16	14	21	53
386	124	157	2.6	3.2	C502_0078 EZ703U	400	500	7.763	621/80	3400	3000	4500	25	14	21	55
386	160	227	3.3	3.0	C502_0078 EZ705U	780	1110	7.763	621/80	3400	3000	4500	38	14	21	60
386	168	279	3.5	2.9	C502_0078 EZ802U	750	1110	7.763	621/80	3400	3000	4500	62	14	21	68
386	200	363	4.1	2.4	C502_0078 EZ803U	800	1110	7.763	621/80	3400	3000	4500	87	14	21	75
513	121	171	3.2	3.7	C502_0059 EZ705U	590	970	5.850	117/20	3100	2700	4000	40	14	21	60
513	127	211	3.3	3.5	C502_0059 EZ802U	570	970	5.850	117/20	3100	2700	4000	64	14	21	68
513	151	274	3.9	2.9	C502_0059 EZ803U	770	970	5.850	117/20	3100	2700	4000	89	14	21	75
648	54	65	1.7	5.0	C502_0046 EZ702U	180	340	4.629	162/35	3100	2700	4000	22	14	21	53
648	61	72	1.9	4.4	C502_0046 EZ505U	270	340	4.629	162/35	3100	2700	4000	20	14	21	53
648	74	93	2.4	3.6	C502_0046 EZ703U	270	340	4.629	162/35	3100	2700	4000	30	14	21	55
648	96	136	3.0	4.3	C502_0046 EZ705U	470	880	4.629	162/35	3100	2700	4000	42	14	21	60
648	100	167	3.2	4.1	C502_0046 EZ802U	450	880	4.629	162/35	3100	2700	4000	66	14	21	68
648	119	216	3.8	3.4	C502_0046 EZ803U	650	880	4.629	162/35	3100	2700	4000	92	14	21	75
776	80	113	2.9	4.8	C502_0039 EZ705U	390	750	3.867	58/15	2800	2400	3500	45	14	21	60
776	84	139	3.1	4.6	C502_0039 EZ802U	380	750	3.867	58/15	2800	2400	3500	69	14	21	68
776	100	181	3.7	3.9	C502_0039 EZ803U	540	750	3.867	58/15	2800	2400	3500	94	14	21	75
975	79	144	3.5	4.5	C502_0031 EZ803U	430	600	3.077	477/155	2800	2400	3500	99	14	21	75
C5 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 920 Nm)																
108	384	619	2.1	2.1	C502_0420 EZ505U	920	1600	41.69	667/16	3400	3000	4500	13	12	23	53
129	323	519	1.9	2.5	C502_0350 EZ505U	850	1600	35.00	35/1	3400	3000	4500	14	12	23	53
144	288	463	1.8	2.8	C502_0310 EZ505U	920	1520	31.23	406/13	3400	3000	4500	14	12	23	53
144	367	606	2.3	2.2	C502_0310 EZ703U	920	1520	31.23	406/13	3400	3000	4500	23	12	23	55
160	259	417	1.7	3.1	C502_0280 EZ505U	850	1600	28.10	5395/192	3400	3000	4500	14	12	23	53
160	330	545	2.2	2.4	C502_0280 EZ703U	850	1600	28.10	5395/192	3400	3000	4500	24	12	23	55
179	231	372	1.6	3.5	C502_0250 EZ505U	920	1440	25.07	2407/96	3400	3000	4500	14	12	23	53
179	294	486	2.1	2.7	C502_0250 EZ703U	920	1440	25.07	2407/96	3400	3000	4500	24	12	23	55
193	215	347	1.6	3.7	C502_0230 EZ505U	850	1490	23.36	1495/64	3400	3000	4500	15	12	23	53
193	274	453	2.0	2.9	C502_0230 EZ703U	850	1490	23.36	1495/64	3400	3000	4500	25	12	23	55
216	192	309	1.5	4.2	C502_0210 EZ505U	920	1330	20.84	667/32	3400	3000	4500	15	12	23	53
216	212	698	1.6	3.8	C502_0210 EZ802U	920	1600	20.84	667/32	3400	3000	4500	61	12	23	68
216	245	404	1.9	3.3	C502_0210 EZ703U	920	1330	20.84	667/32	3400	3000	4500	25	12	23	55
216	332	607	2.6	2.4	C502_0210 EZ705U	920	1600	20.84	667/32	3400	3000	4500	37	12	23	60
580	91	151	2.2	4.4	C502_0078 EZ703U	400	500	7.763	621/80	3400	3000	4500	25	14	21	55
580	123	226	2.9	3.4	C502_0078 EZ705U	780	1110	7.763	621/80	3400	3000	4500	38	14	21	60
C6 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 1650 Nm)																
102	831	1257	4.0	1.7	C612_0195 EZ805U	1650	2560	19.61	549/28	3200	2900	4000	138	10	74	103
123	687	1039	3.9	1.9	C612_0160 EZ805U	1650	2900	16.20	1037/64	3200	2900	4000	140	10	74	103
141	600	907	3.8	2.1	C612_0140 EZ805U	1380	2600	14.15	976/69	3000	2600	3500	146	10	74	103
159	533	807	3.7	2.3	C612_0125 EZ805U	1650	2900	12.58	2013/160	3000	2600	3500	143	10	74	103
175	486	735	3.7	2.4	C612_0115 EZ805U	1380	2600	11.46	928/81	2700	2300	3300	150	10	74	103
198	429	648	3.6	2.6	C612_0100 EZ805U	1650	2900	10.11	3721/368	3000	2600	3500	147	10	74	103
219	387	585	3.5	2.8	C612_0091 EZ805U	1380	2600	9.118	848/93	2700	2300	3300	156	10	74	103
244	347	525	3.5	3.0	C612_0082 EZ805U	1630	2900	8.190	1769/216	2700	2300	3300	152	10	74	103
281	301	456	3.4	3.3	C612_0071 EZ805U	1380	2590	7.111	64/9	2300	1900	2800	165	10	74	103
307	276	418	3.3	3.5	C612_0065 EZ805U	1300	2370	6.518	3233/496	2700	2300	3300	158	10	74	103
342	248	375	3.3	3.8	C612_0059 EZ805U	1160	2130	5.854	240/41	2300	1900	2800	174	10	74	103
393	215	326	3.2	4.2	C612_0051 EZ805U	1010	1850	5.083	61/12	2300	1900	2800	169	10	74	103
478	177	268	3.1	4.8	C612_0042 EZ805U	830	1520	4.184	2745/656	2300	1900	2800	180	10	74	103
C6 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 1650 Nm)																
14	876	957	1.4	1.5	C613_2130 EZ501U	1380	2240	213.1	28768/135	3200	2900	4000	3.2	10	74	71
17	721	788	1.3	1.8	C613_1750 EZ501U	1380	2010	175.3	7888/45	3200	2900	4000	3.2	10	74	71
22	554	606	1.1	2.3	C613_1350 EZ501U	1380	1720	134.8	15776/117	3200	2900	4000	3.3	10	74	71
22	954	1031	1.9	1.4	C613_1350 EZ502U	1380	1720	134.8	15776/117	3200	2900	4000	5.6	10	74	72
24	898	1007	1.6	1.6	C613_1270 EZ701U	1650	2900	126.9	48739/384	3200	2900	4000	9.1	10	74	74

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
C6 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 1650 Nm)																
28	760	852	1.7	1.7	C613_1070 EZ701U	1380	2600	107.4	752/7	3200	2900	4000	9.3	10	74	74
28	436	477	1.0	2.9	C613_1060 EZ501U	1280	1600	106.1	3712/35	3200	2900	4000	3.4	10	74	71
28	750	811	1.7	1.7	C613_1060 EZ502U	1280	1600	106.1	3712/35	3200	2900	4000	5.7	10	74	72
31	691	775	1.4	2.1	C613_0980 EZ701U	1650	2900	97.63	243695/2496	3200	2900	4000	9.2	10	74	74
34	628	704	1.5	2.1	C613_0890 EZ701U	1380	2600	88.78	799/9	3200	2900	4000	9.4	10	74	74
39	543	609	1.3	2.7	C613_0770 EZ701U	1470	2560	76.80	8601/112	3200	2900	4000	9.3	10	74	74
39	881	1057	2.1	1.6	C613_0770 EZ702U	1650	2560	76.80	8601/112	3200	2900	4000	15	10	74	76
40	312	341	1.2	2.9	C613_0760 EZ501U	910	1140	75.81	5307/70	3200	2900	4000	3.4	10	74	71
40	536	580	2.1	1.7	C613_0760 EZ502U	910	1140	75.81	5307/70	3200	2900	4000	5.7	10	74	72
44	494	555	1.4	2.6	C612_0690 EZ701U	1340	2360	68.89	620/9	3200	2900	4000	9.6	10	74	65
44	802	962	2.2	1.6	C612_0690 EZ702U	1380	2360	68.89	620/9	3200	2900	4000	15	10	74	68
47	449	504	1.2	3.1	C613_0630 EZ701U	1210	2290	63.46	48739/768	3200	2900	4000	9.4	10	74	74
47	728	874	2.0	1.9	C613_0630 EZ702U	1650	2290	63.46	48739/768	3200	2900	4000	15	10	74	76
47	1001	1262	2.7	1.4	C613_0630 EZ703U	1650	2290	63.46	48739/768	3200	2900	4000	23	10	74	78
54	396	444	1.2	3.3	C612_0550 EZ701U	1070	2240	55.11	496/9	3200	2900	4000	10	10	74	65
54	641	770	2.0	2.0	C612_0550 EZ702U	1380	2240	55.11	496/9	3200	2900	4000	15	10	74	68
61	349	391	1.2	3.7	C613_0490 EZ701U	940	1940	49.28	31537/640	3200	2900	4000	9.7	10	74	74
61	565	678	1.9	2.3	C613_0490 EZ702U	1550	1940	49.28	31537/640	3200	2900	4000	15	10	74	76
61	777	980	2.6	1.6	C613_0490 EZ703U	1550	1940	49.28	31537/640	3200	2900	4000	23	10	74	78
66	325	365	1.1	4.0	C612_0450 EZ701U	880	2010	45.33	136/3	3200	2900	4000	11	10	74	65
66	528	633	1.8	2.5	C612_0450 EZ702U	1380	2010	45.33	136/3	3200	2900	4000	16	10	74	68
66	726	915	2.5	1.8	C612_0450 EZ703U	1380	2010	45.33	136/3	3200	2900	4000	24	10	74	70
76	283	317	1.1	4.3	C612_0390 EZ701U	760	1600	39.40	1891/48	3200	2900	4000	10	10	74	65
76	459	550	1.8	2.7	C612_0390 EZ702U	1280	1600	39.40	1891/48	3200	2900	4000	15	10	74	68
76	631	795	2.5	1.9	C612_0390 EZ703U	1280	1600	39.40	1891/48	3200	2900	4000	23	10	74	70
86	406	487	1.6	3.2	C612_0350 EZ702U	1380	1720	34.87	1360/39	3200	2900	4000	17	10	74	68
86	558	704	2.2	2.3	C612_0350 EZ703U	1380	1720	34.87	1360/39	3200	2900	4000	25	10	74	70
86	720	1022	2.8	1.8	C612_0350 EZ705U	1380	2600	34.87	1360/39	3200	2900	4000	38	10	74	75
93	233	261	0.8	4.9	C612_0320 EZ701U	630	1430	32.41	1037/32	3200	2900	4000	11	10	74	65
93	377	453	1.4	3.0	C612_0320 EZ702U	1150	1430	32.41	1037/32	3200	2900	4000	16	10	74	68
93	519	654	1.9	2.2	C612_0320 EZ703U	1150	1430	32.41	1037/32	3200	2900	4000	24	10	74	70
93	670	949	2.4	2.2	C612_0320 EZ705U	1650	2900	32.41	1037/32	3200	2900	4000	36	10	74	75
93	701	1166	2.5	2.1	C612_0320 EZ802U	1650	2900	32.41	1037/32	3200	2900	4000	60	10	74	84
109	319	383	1.4	4.0	C612_0270 EZ702U	1090	1600	27.43	192/7	3200	2900	4000	19	10	74	68
109	439	553	1.9	2.9	C612_0270 EZ703U	1280	1600	27.43	192/7	3200	2900	4000	27	10	74	70
109	567	804	2.5	2.3	C612_0270 EZ705U	1380	2600	27.43	192/7	3200	2900	4000	39	10	74	75
109	593	987	2.6	2.2	C612_0270 EZ802U	1380	2600	27.43	192/7	3200	2900	4000	63	10	74	84
120	290	348	1.3	3.4	C612_0250 EZ702U	980	1230	24.93	5185/208	3200	2900	4000	17	10	74	68
120	399	503	1.8	2.5	C612_0250 EZ703U	980	1230	24.93	5185/208	3200	2900	4000	25	10	74	70
120	515	730	2.3	2.6	C612_0250 EZ705U	1650	2900	24.93	5185/208	3200	2900	4000	38	10	74	75
120	539	897	2.4	2.5	C612_0250 EZ802U	1650	2900	24.93	5185/208	3200	2900	4000	62	10	74	84
120	643	1165	2.9	2.1	C612_0250 EZ803U	1650	2900	24.93	5185/208	3200	2900	4000	87	10	74	90
132	468	664	2.3	2.8	C612_0230 EZ705U	1380	2600	22.67	68/3	3200	2900	4000	41	10	74	75
132	490	816	2.4	2.6	C612_0230 EZ802U	1380	2600	22.67	68/3	3200	2900	4000	65	10	74	84
132	585	1060	2.9	2.2	C612_0230 EZ803U	1380	2600	22.67	68/3	3200	2900	4000	90	10	74	90
153	228	274	1.3	4.0	C612_0195 EZ702U	780	1140	19.61	549/28	3200	2900	4000	19	10	74	68
153	314	396	1.7	2.9	C612_0195 EZ703U	910	1140	19.61	549/28	3200	2900	4000	27	10	74	70
153	405	574	2.2	3.0	C612_0195 EZ705U	1650	2560	19.61	549/28	3200	2900	4000	39	10	74	75
153	424	706	2.3	2.9	C612_0195 EZ802U	1650	2560	19.61	549/28	3200	2900	4000	63	10	74	84
153	506	917	2.8	2.4	C612_0195 EZ803U	1650	2560	19.61	549/28	3200	2900	4000	89	10	74	90
170	364	516	2.2	3.3	C612_0175 EZ705U	1380	2600	17.60	88/5	3000	2600	3500	44	10	74	75
170	381	633	2.3	3.1	C612_0175 EZ802U	1380	2600	17.60	88/5	3000	2600	3500	68	10	74	84
170	454	823	2.7	2.6	C612_0175 EZ803U	1380	2600	17.60	88/5	3000	2600	3500	94	10	74	90
185	335	475	2.2	3.5	C612_0160 EZ705U	1630	2290	16.20	1037/64	3200	2900	4000	41	10	74	75
185	350	583	2.3	3.3	C612_0160 EZ802U	1570	2290	16.20	1037/64	3200	2900	4000	65	10	74	84
185	418	758	2.7	2.8	C612_0160 EZ803U	1650	2900	16.20	1037/64	3200	2900	4000	91	10	74	90
212	292	414	2.1	3.8	C612_0140 EZ705U	1380	2520	14.15	976/69	3000	2600	3500	48	10	74	75
212	306	509	2.2	3.6	C612_0140 EZ802U	1370	2520	14.15	976/69	3000	2600	3500	72	10	74	84
212	365	661	2.6	3.0	C612_0140 EZ803U	1380	2600	14.15	976/69	3000	2600	3500	97	10	74	90
238	260	369	2.1	4.1	C612_0125 EZ705U	1270	2120	12.58	2013/160	3000	2600	3500	45	10	74	75
238	272	453	2.2	3.9	C612_0125 EZ802U	1220	2120	12.58	2013/160	3000	2600	3500	69	10	74	84
238	325	588	2.6	3.3	C612_0125 EZ803U	1650	2900	12.58	2013/160	3000	2600	3500	94	10	74	90
262	237	336	2.0	4.4	C612_0115 EZ705U	1160	2220	11.46	928/81	2700	2300	3300	52	10	74	75
262	248	412	2.1	4.2	C612_0115 EZ802U	1110	2220	11.46	928/81	2700	2300	3300	76	10	74	84

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
C6 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 1650 Nm)																
262	296	536	2.5	3.5	C612_0115 EZ803U	1380	2600	11.46	928/81	2700	2300	3300	101	10	74	90
297	209	296	2.0	4.7	C612_0100 EZ705U	1020	1800	10.11	3721/368	3000	2600	3500	49	10	74	75
297	219	364	2.1	4.5	C612_0100 EZ802U	980	1800	10.11	3721/368	3000	2600	3500	73	10	74	84
297	261	473	2.5	3.8	C612_0100 EZ803U	1420	2900	10.11	3721/368	3000	2600	3500	98	10	74	90
329	197	328	2.1	4.8	C612_0091 EZ802U	880	1770	9.118	848/93	2700	2300	3300	81	10	74	84
329	235	426	2.4	4.1	C612_0091 EZ803U	1280	2600	9.118	848/93	2700	2300	3300	107	10	74	90
366	211	383	2.4	4.4	C612_0082 EZ803U	1150	2900	8.190	1769/216	2700	2300	3300	102	10	74	90
C7 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 2760 Nm)																
79	1073	1623	2.8	2.2	C712_0250 EZ805U	2540	3170	25.31	405/16	3100	2900	3600	141	10	122	138
86	983	1486	3.3	2.0	C712_0230 EZ805U	2300	4000	23.18	255/11	3100	2900	3600	147	10	122	138
97	876	1325	2.6	2.7	C712_0210 EZ805U	2760	4800	20.67	1323/64	3100	2900	3600	144	10	122	138
110	774	1171	2.9	2.6	C712_0185 EZ805U	2300	4000	18.26	420/23	2900	2600	3400	153	10	122	138
120	709	1073	2.5	3.1	C712_0165 EZ805U	2760	4800	16.73	1071/64	3100	2900	3600	148	10	122	138
146	582	880	2.5	3.4	C712_0135 EZ805U	2300	4000	13.73	4380/319	2900	2600	3400	162	10	122	138
152	559	845	2.4	3.7	C712_0130 EZ805U	2620	4790	13.18	4851/368	2900	2600	3400	154	10	122	138
170	499	754	2.4	3.9	C712_0120 EZ805U	2300	4000	11.76	1035/88	2600	2300	3100	168	10	122	138
202	420	636	2.3	4.4	C712_0099 EZ805U	1970	3610	9.912	4599/464	2900	2600	3400	164	10	122	138
236	360	544	2.2	4.9	C712_0085 EZ805U	1690	3090	8.490	4347/512	2600	2300	3100	171	10	122	138
C7 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 2760 Nm)																
13	1574	1766	1.7	1.3	C713_2230 EZ701U	2300	4000	222.5	29375/132	3100	2900	3600	9.2	10	122	114
16	1297	1455	1.5	1.5	C713_1830 EZ701U	2300	4000	183.4	24205/132	3100	2900	3600	9.3	10	122	114
22	972	1090	1.3	2.1	C713_1370 EZ701U	2300	4000	137.3	10575/77	3100	2900	3600	9.5	10	122	114
23	936	1050	1.3	2.1	C713_1320 EZ701U	2530	3710	132.4	33887/256	3100	2900	3600	9.3	10	122	114
23	1519	1822	2.1	1.3	C713_1320 EZ702U	2760	3710	132.4	33887/256	3100	2900	3600	15	10	122	116
30	701	787	1.2	2.7	C713_0990 EZ701U	1900	3170	99.14	6345/64	3100	2900	3600	9.5	10	122	114
30	1137	1365	2.0	1.6	C713_0990 EZ702U	2530	3170	99.14	6345/64	3100	2900	3600	15	10	122	116
37	573	642	1.2	3.1	C713_0810 EZ701U	1550	2820	80.97	20727/256	3100	2900	3600	9.7	10	122	114
37	929	1115	1.9	1.9	C713_0810 EZ702U	2260	2820	80.97	20727/256	3100	2900	3600	15	10	122	116
37	1277	1610	2.6	1.4	C713_0810 EZ703U	2260	2820	80.97	20727/256	3100	2900	3600	23	10	122	118
43	499	560	1.0	4.0	C712_0700 EZ701U	1350	2650	69.55	765/11	3100	2900	3600	11	10	122	101
43	810	971	1.6	2.5	C712_0700 EZ702U	2120	2650	69.55	765/11	3100	2900	3600	16	10	122	103
43	1113	1403	2.1	1.8	C712_0700 EZ703U	2120	2650	69.55	765/11	3100	2900	3600	24	10	122	105
53	408	457	0.9	4.7	C712_0570 EZ701U	1100	2390	56.82	625/11	3100	2900	3600	12	10	122	101
53	661	794	1.4	2.9	C712_0570 EZ702U	1910	2390	56.82	625/11	3100	2900	3600	17	10	122	103
53	909	1146	1.9	2.1	C712_0570 EZ703U	1910	2390	56.82	625/11	3100	2900	3600	25	10	122	105
53	1174	1664	2.5	1.7	C712_0570 EZ705U	2300	4000	56.82	625/11	3100	2900	3600	37	10	122	111
59	1084	1803	2.0	2.2	C713_0510 EZ802U	2760	4800	50.85	18711/368	3100	2900	3600	61	10	122	132
64	967	1371	2.3	2.1	C712_0470 EZ705U	2300	4000	46.82	515/11	3100	2900	3600	39	10	122	111
64	1013	1685	2.4	2.0	C712_0470 EZ802U	2300	4000	46.82	515/11	3100	2900	3600	63	10	122	119
73	294	330	0.7	4.7	C712_0410 EZ701U	800	1730	41.02	2625/64	3100	2900	3600	12	10	122	101
73	477	573	1.1	2.9	C712_0410 EZ702U	1380	1730	41.02	2625/64	3100	2900	3600	17	10	122	103
73	656	828	1.6	2.1	C712_0410 EZ703U	1380	1730	41.02	2625/64	3100	2900	3600	25	10	122	105
73	847	1202	2.0	2.5	C712_0410 EZ705U	2510	4070	41.02	2625/64	3100	2900	3600	37	10	122	111
73	887	1476	2.1	2.4	C712_0410 EZ802U	2510	4070	41.02	2625/64	3100	2900	3600	62	10	122	119
73	1058	1918	2.5	2.0	C712_0410 EZ803U	2510	4070	41.02	2625/64	3100	2900	3600	87	10	122	125
86	408	490	1.1	3.8	C712_0350 EZ702U	1390	1960	35.07	2700/77	3100	2900	3600	21	10	122	103
86	561	707	1.5	2.8	C712_0350 EZ703U	1570	1960	35.07	2700/77	3100	2900	3600	29	10	122	105
86	724	1027	2.0	2.8	C712_0350 EZ705U	2300	4000	35.07	2700/77	3100	2900	3600	42	10	122	111
86	758	1262	2.0	2.6	C712_0350 EZ802U	2300	4000	35.07	2700/77	3100	2900	3600	66	10	122	119
86	905	1639	2.4	2.2	C712_0350 EZ803U	2300	4000	35.07	2700/77	3100	2900	3600	91	10	122	125
89	698	990	1.6	3.4	C712_0340 EZ705U	2760	3710	33.80	2163/64	3100	2900	3600	39	10	122	111
89	731	1216	1.7	3.3	C712_0340 EZ802U	2760	3710	33.80	2163/64	3100	2900	3600	63	10	122	119
89	872	1580	2.0	2.8	C712_0340 EZ803U	2760	3710	33.80	2163/64	3100	2900	3600	88	10	122	125
105	592	839	1.8	3.4	C712_0290 EZ705U	2300	3910	28.64	315/11	3100	2900	3600	44	10	122	111
105	619	1031	1.9	3.2	C712_0290 EZ802U	2300	3910	28.64	315/11	3100	2900	3600	69	10	122	119
105	739	1339	2.2	2.7	C712_0290 EZ803U	2300	4000	28.64	315/11	3100	2900	3600	94	10	122	125
119	295	354	0.8	3.8	C712_0250 EZ702U	1010	1410	25.31	405/16	3100	2900	3600	22	10	122	103
119	405	511	1.2	2.8	C712_0250 EZ703U	1130	1410	25.31	405/16	3100	2900	3600	29	10	122	105
119	523	742	1.5	4.2	C712_0250 EZ705U	2540	3170	25.31	405/16	3100	2900	3600	42	10	122	111
119	548	911	1.6	4.1	C712_0250 EZ802U	2460	3170	25.31	405/16	3100	2900	3600	66	10	122	119
119	653	1183	1.9	3.4	C712_0250 EZ803U	2540	3170	25.31	405/16	3100	2900	3600	91	10	122	125
129	479	679	1.6	4.2	C712_0230 EZ705U	2300	3770	23.18	255/11	3100	2900	3600	48	10	122	111
129	501	834	1.7	4.0	C712_0230 EZ802U	2250	3770	23.18	255/11	3100	2900	3600	72	10	122	119
129	598	1084	2.0	3.3	C712_0230 EZ803U	2300	4000	23.18	255/11	3100	2900	3600	98	10	122	125

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
C7 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 2760 Nm)																
145	427	606	1.4	4.9	C712_0210 EZ705U	2090	2820	20.67	1323/64	3100	2900	3600	45	10	122	111
145	447	744	1.5	4.6	C712_0210 EZ802U	2010	2820	20.67	1323/64	3100	2900	3600	69	10	122	119
145	533	966	1.8	3.9	C712_0210 EZ803U	2760	4800	20.67	1323/64	3100	2900	3600	94	10	122	125
164	471	854	1.8	4.2	C712_0185 EZ803U	2300	4000	18.26	420/23	2900	2600	3400	104	10	122	125
179	432	782	1.7	4.5	C712_0165 EZ803U	2350	4800	16.73	1071/64	3100	2900	3600	99	10	122	125
C8 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 4800 Nm)																
44	1930	2920	2.7	1.9	C812_0460 EZ805U	4140	7200	45.54	592/13	2900	2700	3400	144	10	204	198
50	1693	2561	2.4	2.2	C812_0400 EZ805U	3690	4610	39.94	2596/65	2900	2700	3400	142	10	145	198
57	1498	2265	2.4	2.4	C812_0350 EZ805U	4140	7200	35.33	106/3	2900	2700	3400	150	10	204	198
60	1424	2153	2.0	3.0	C812_0340 EZ805U	4800	8400	33.59	2183/65	2900	2700	3400	145	10	145	198
73	1164	1761	2.1	3.1	C812_0270 EZ805U	4140	7200	27.47	412/15	2900	2700	3400	159	10	204	198
77	1105	1671	1.8	3.8	C812_0260 EZ805U	4800	7450	26.06	3127/120	2900	2700	3400	151	10	145	198
86	983	1487	1.9	3.7	C812_0230 EZ805U	4140	7200	23.19	1600/69	2900	2700	3400	166	10	204	198
99	859	1299	1.7	4.5	C812_0200 EZ805U	4030	6760	20.26	6077/300	2900	2700	3400	160	10	145	198
116	733	1108	1.7	4.9	C812_0175 EZ805U	3440	6290	17.29	1504/87	2700	2400	3200	183	10	204	198
117	725	1096	1.6	5.0	C812_0170 EZ805U	3400	6220	17.10	1180/69	2900	2700	3400	168	10	145	198
157	540	817	1.6	3.6	C812_0125 EZ805U	1940	2430	12.75	5546/435	2700	2400	3200	186	10	145	198
C8 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 4800 Nm)																
11	1909	2141	1.1	1.8	C813_2700 EZ701U	4140	6750	269.8	7285/27	2900	2700	3400	9.4	10	204	173
14	1501	1683	1.1	2.2	C813_2120 EZ701U	4060	6250	212.1	8272/39	2900	2700	3400	9.6	10	204	173
14	2433	2920	1.7	1.4	C813_2120 EZ702U	4140	6250	212.1	8272/39	2900	2700	3400	15	10	204	175
17	1262	1415	1.0	2.5	C813_1780 EZ701U	3410	5250	178.4	6956/39	2900	2700	3400	9.8	10	204	173
17	2046	2455	1.6	1.6	C813_1780 EZ702U	4140	5250	178.4	6956/39	2900	2700	3400	15	10	204	175
22	979	1098	0.9	3.1	C813_1380 EZ701U	2650	4650	138.4	2491/18	2900	2700	3400	10	10	204	173
22	1588	1905	1.5	1.9	C813_1380 EZ702U	3720	4650	138.4	2491/18	2900	2700	3400	15	10	204	175
22	2183	2752	2.1	1.4	C813_1380 EZ703U	3720	4650	138.4	2491/18	2900	2700	3400	23	10	204	177
28	761	854	0.9	3.8	C813_1080 EZ701U	2060	4210	107.6	4841/45	2900	2700	3400	11	10	204	173
28	1234	1481	1.4	2.3	C813_1080 EZ702U	3370	4210	107.6	4841/45	2900	2700	3400	16	10	204	175
28	1697	2139	1.9	1.7	C813_1080 EZ703U	3370	4210	107.6	4841/45	2900	2700	3400	24	10	204	177
30	2143	3565	2.0	1.7	C813_1010 EZ802U	4800	7450	100.5	28143/280	2900	2700	3400	61	10	204	191
33	643	721	0.8	4.3	C813_0910 EZ701U	1740	3570	90.82	18800/207	2900	2700	3400	11	10	204	173
33	1042	1250	1.4	2.6	C813_0910 EZ702U	2860	3570	90.82	18800/207	2900	2700	3400	16	10	204	175
33	1433	1806	1.9	1.9	C813_0910 EZ703U	2860	3570	90.82	18800/207	2900	2700	3400	24	10	204	177
34	1907	3172	1.9	1.9	C813_0890 EZ802U	4140	7200	89.44	14400/161	2900	2700	3400	62	10	204	191
38	561	630	1.0	3.8	C813_0790 EZ701U	1520	3110	79.34	285619/3600	2900	2700	3400	11	10	204	173
38	910	1092	1.6	2.3	C813_0790 EZ702U	2490	3110	79.34	285619/3600	2900	2700	3400	16	10	204	175
38	1251	1578	2.3	1.7	C813_0790 EZ703U	2490	3110	79.34	285619/3600	2900	2700	3400	24	10	204	177
38	1666	2771	1.8	2.1	C813_0780 EZ802U	4800	6760	78.13	54693/700	2900	2700	3400	61	10	204	191
38	1987	3600	2.2	1.7	C813_0780 EZ803U	4800	6760	78.13	54693/700	2900	2700	3400	87	10	204	197
44	1490	2479	1.7	2.4	C812_0690 EZ802U	4140	6750	68.89	620/9	2900	2700	3400	64	10	204	179
45	1406	2340	1.8	2.4	C813_0660 EZ802U	4800	6220	65.96	10620/161	2900	2700	3400	62	10	204	191
45	1677	3040	2.1	2.0	C813_0660 EZ803U	4800	6220	65.96	10620/161	2900	2700	3400	87	10	204	197
55	1171	1949	1.5	3.1	C812_0540 EZ802U	4140	6250	54.15	704/13	2900	2700	3400	67	10	204	179
55	1397	2532	1.8	2.6	C812_0540 EZ803U	4140	6250	54.15	704/13	2900	2700	3400	92	10	204	185
61	1048	1744	1.7	2.9	C813_0490 EZ802U	3710	4640	49.18	49914/1015	2900	2700	3400	63	10	204	191
61	1251	2266	2.0	2.4	C813_0490 EZ803U	3710	4640	49.18	49914/1015	2900	2700	3400	89	10	204	197
66	985	1639	1.4	3.7	C812_0460 EZ802U	4140	5250	45.54	592/13	2900	2700	3400	70	10	204	179
66	1175	2129	1.6	3.1	C812_0460 EZ803U	4140	7200	45.54	592/13	2900	2700	3400	95	10	204	185
75	864	1437	1.2	4.3	C812_0400 EZ802U	3690	4610	39.94	2596/65	2900	2700	3400	67	10	145	179
75	1030	1867	1.5	3.6	C812_0400 EZ803U	3690	4610	39.94	2596/65	2900	2700	3400	92	10	145	185
85	764	1272	1.2	4.7	C812_0350 EZ802U	3430	4650	35.33	106/3	2900	2700	3400	76	10	204	179
85	912	1652	1.4	3.9	C812_0350 EZ803U	4140	7200	35.33	106/3	2900	2700	3400	101	10	204	185
89	726	1209	1.1	4.3	C812_0340 EZ802U	3100	3870	33.59	2183/65	2900	2700	3400	70	10	145	179
89	867	1570	1.3	4.6	C812_0340 EZ803U	4720	8400	33.59	2183/65	2900	2700	3400	96	10	145	185
109	709	1284	1.3	4.8	C812_0270 EZ803U	3370	4210	27.47	412/15	2900	2700	3400	109	10	204	185
115	564	938	1.0	4.9	C812_0260 EZ802U	2530	3430	26.06	3127/120	2900	2700	3400	76	10	145	179
115	672	1218	1.2	4.1	C812_0260 EZ803U	2740	3430	26.06	3127/120	2900	2700	3400	102	10	145	185
148	523	947	1.2	4.8	C812_0200 EZ803U	2490	3110	20.26	6077/300	2900	2700	3400	111	10	145	185
C9 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 6500 Nm)																
27	2354	3917	1.4	2.4	C913_1100 EZ802U	6500	9990	110.4	21645/196	2800	2600	3200	64	10	393	298
39	1657	2757	1.7	2.4	C913_0780 EZ802U	5630	7030	77.73	60939/784	2800	2600	3200	64	10	393	298
39	1977	3582	2.0	2.0	C913_0780 EZ803U	5630	7030	77.73	60939/784	2800	2600	3200	89	10	393	304

12.3 Dimensional drawings

In this chapter you can find the dimensions of the geared motors.

There is a dimensional drawing for every possible shaft/housing design, each with the tables for gear unit dimensions, motor dimensions and geared motor dimensions.

Dimensions can exceed the specifications of ISO 2768-mK due to casting tolerances or accumulation of individual tolerances.

We reserve the right to make dimensional changes due to ongoing technical development.

You can download CAD models of our standard drives at http://cad.stoeber.de.

Combination options and the dimensions of forced ventilated geared motors can be found at http://cad.stoeber.de.

Tolerances

Axis height in accordance with DIN 747	Tolerance
Up to 50 mm	-0.4 mm
Up to 250 mm	-0.5 mm
Up to 630 mm	-0.6 mm

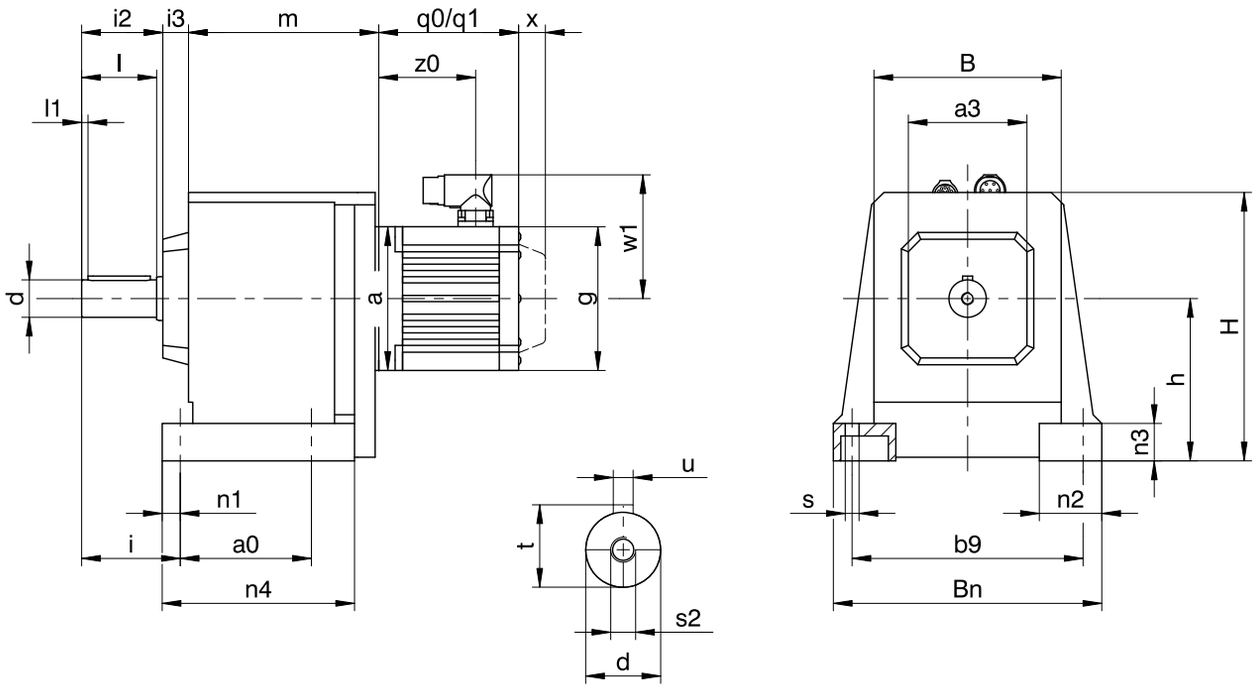
Solid shaft	Tolerance
Shaft ∅ fit ≤ 50 mm	DIN 748-1, ISO k6
Shaft ∅ fit > 50 mm	DIN 748-1, ISO m6
Feather keys	DIN 6885-1, high form A

Flange	Pilot tolerance
Up to 300 mm	ISO j6
Starting at 350 mm	ISO h6

Centering holes in solid shafts in accordance with DIN 332-2, DR shape

Thread size	M4	M5	M6	M8	M10	M12	M16	M20	M24
Thread depth [mm]	10	12.5	16	19	22	28	36	42	50

12.3.1 Solid shaft design with feather key, N housing design (foot)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]

Options: C0 – C5 also available with solid shaft without feather key; on request starting at C6.

Dimensions of gear units

Type	a0	a3	b9	B	Bn	Ød	h	H	i	i2	i3	l	l1	n1	n2	n3	n4	Øs	s2	t	u
C0	62	60	110	92	132	20_{k6}	82	144	55	44	13	40	3	11	35	20	95.0	7	M6	22.5	A6×6×32
C1	70	80	150	124	176	25_{k6}	102	177	67	54	15	50	5	13	42	25	117.5	9	M10	28.0	A8×7×40
C2	85	95	170	138	200	30_{k6}	115	195	79	65	21	60	5	14	50	30	134.5	11	M10	33.0	A8×7×50
C3	105	95	185	150	215	30_{k6}	130	215	79	65	20	60	5	14	50	30	153.5	11	M10	33.0	A8×7×50
C4	110	110	220	175	255	40_{k6}	145	245	105	86	20	80	5	19	60	35	180.0	14	M16	43.0	A12×8×70
C5	130	130	245	192	290	40_{k6}	170	290	108	86	21	80	5	22	70	40	197.0	18	M16	43.0	A12×8×70
C6	215	177	245	225	300	50_{k6}	200	315	130	106	47	100	5	25	75	40	265.0	18	M16	53.5	A14×9×90
C7	235	192	300	265	365	60_{m6}	235	375	163	127	58	120	5	25	90	50	285.0	18	M20	64.0	A18×11×100
C8	300	223	340	310	435	70_{m6}	290	450	190	148	70	140	5	29	95	55	360.0	22	M20	74.5	A20×12×125
C9	340	277	400	365	510	90_{m6}	340	530	222	178	78	170	5	34	110	60	410.0	26	M24	95.0	A25×14×140

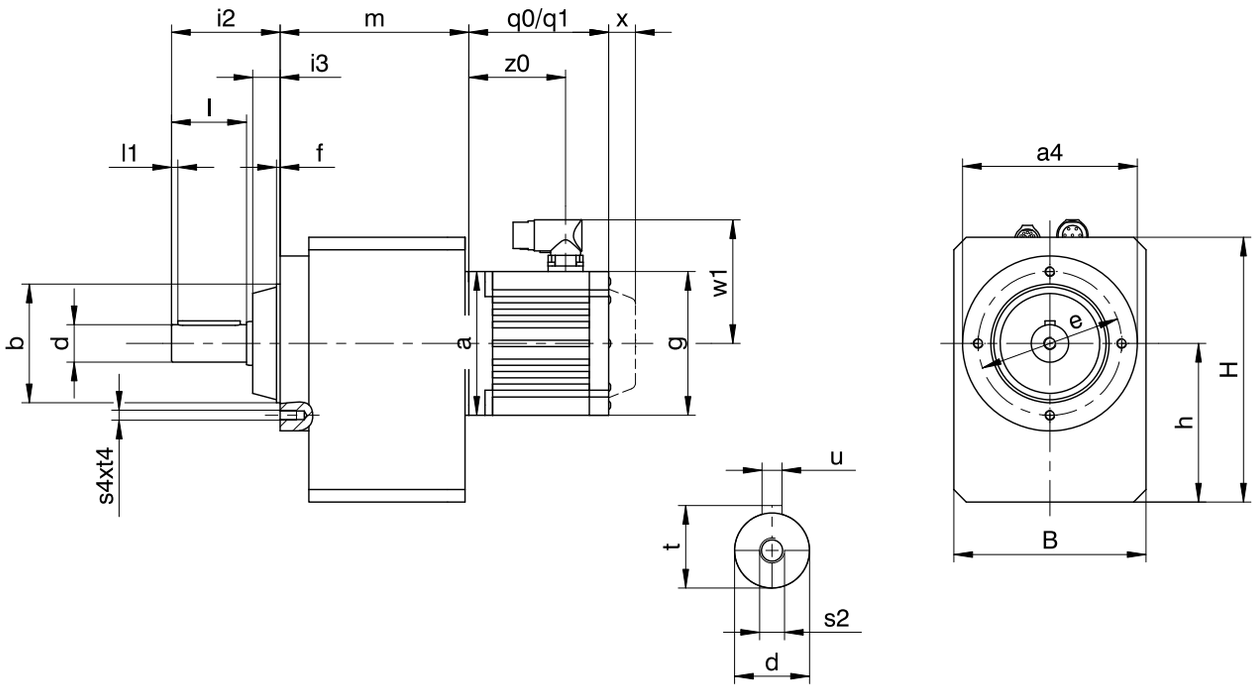
Dimensions of motors

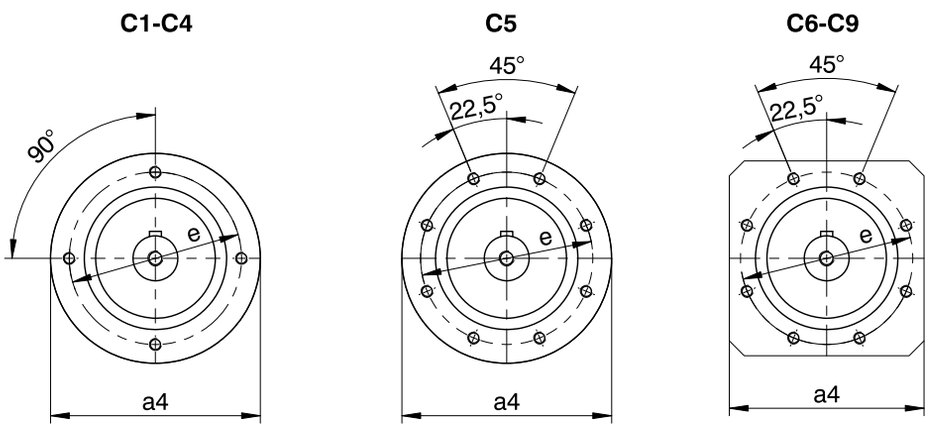
Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5
EZ805U	190	355.5	432.5	156.5	22	301.5

Dimensions of geared motors

Type	EZ3		EZ4		EZ5		EZ7		EZ8	
	a	m	a	m	a	m	a	m	a	m
C002	□72	97.5	□98	97.5	□115	101.5	□145	103.5	–	–
C102	□72	118.0	□98	118.0	□115	122.0	□145	124.0	–	–
C103	∅140	155.0	–	–	–	–	–	–	–	–
C202	∅140	129.0	∅140	129.0	□115	133.0	□145	135.0	–	–
C203	∅140	166.0	–	–	–	–	–	–	–	–
C302	–	–	–	–	∅160	152.5	□145	154.5	□190	157.5
C303	∅140	185.5	∅140	185.5	–	–	–	–	–	–
C402	–	–	–	–	∅160	180.0	□145	182.0	□190	185.0
C403	–	–	–	–	∅160	223.0	–	–	–	–
C502	–	–	–	–	∅160	200.0	∅200	202.0	□190	205.0
C503	–	–	–	–	∅160	243.0	–	–	–	–
C612	–	–	–	–	–	–	∅200	180.0	□190	183.0
C613	–	–	–	–	∅160	222.0	∅200	242.0	–	–
C712	–	–	–	–	–	–	∅200	201.0	∅250	203.0
C713	–	–	–	–	–	–	∅200	262.0	∅250	274.0
C812	–	–	–	–	–	–	–	–	∅250	237.0
C813	–	–	–	–	–	–	∅200	296.0	∅250	308.0
C913	–	–	–	–	–	–	–	–	∅250	337.0

12.3.2 Solid shaft design with feather key, G housing design (pitch circle diameter)





q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]

Options: C0 – C5 also available with solid shaft without feather key; on request starting at C6.

Dimensions of gear units

Type	a4	Øb	B	Ød	Øe	f	h	H	i2	i3	l	l1	s2	s4	t	t4	u
C0	∅87	55_{j6}	97	20_{k6}	75	3.0	79.0	141.0	58	14	40	3	M6	M6	22.5	10	A6×6×32
C1	∅120	80_{j6}	130	25_{k6}	100	3.0	100.0	175.0	71	17	50	5	M10	M6	28.0	13	A8×7×40
C2	∅140	95_{j6}	142	30_{k6}	115	3.0	112.0	192.0	87	22	60	5	M10	M8	33.0	13	A8×7×50
C3	∅140	95_{j6}	154	30_{k6}	115	3.0	127.0	212.0	87	22	60	5	M10	M8	33.0	13	A8×7×50
C4	∅160	110_{j6}	178	40_{k6}	130	3.5	142.5	242.5	108	22	80	5	M16	M10	43.0	16	A12×8×70
C5	∅192	130_{j6}	195	40_{k6}	165	3.5	166.0	286.0	109	23	80	5	M16	M10	43.0	16	A12×8×70
C6	□180	140_{j6}	225	50_{k6}	165	5.0	195.0	310.0	136	30	100	5	M16	M10	53.5	16	A14×9×90
C7	□195	155_{j6}	265	60_{m6}	185	8.0	231.0	371.0	164	37	120	5	M20	M12	64.0	19	A18×11×100
C8	□226	185_{j6}	310	70_{m6}	215	5.0	285.0	445.0	185	37	140	5	M20	M12	74.5	19	A20×12×125
C9	□280	230_{j6}	365	90_{m6}	265	5.0	334.0	524.0	220	42	170	5	M24	M16	95.0	26	A25×14×140

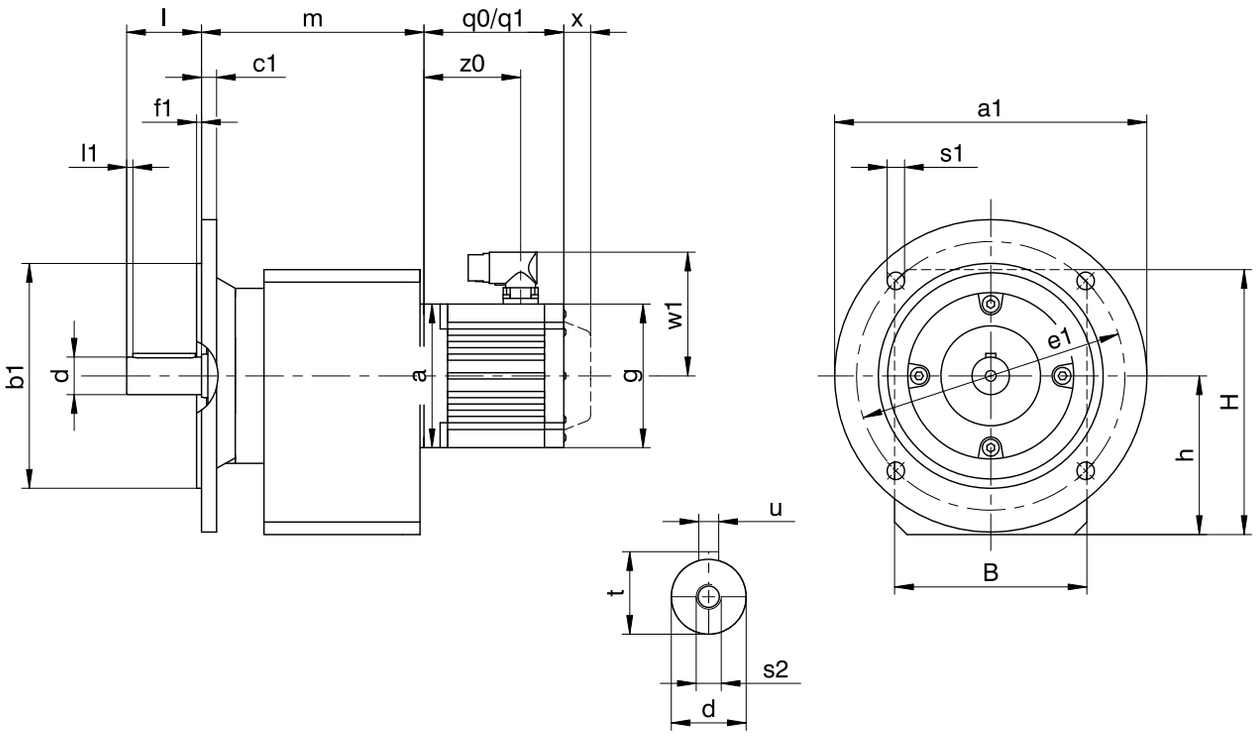
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5
EZ805U	190	355.5	432.5	156.5	22	301.5

Dimensions of geared motors

Type	EZ3		EZ4		EZ5		EZ7		EZ8	
	a	m	a	m	a	m	a	m	a	m
C002	□72	96	□98	96	□115	100	□145	102	–	–
C102	□72	116	□98	116	□115	120	□145	122	–	–
C103	∅140	153	–	–	–	–	–	–	–	–
C202	∅140	128	∅140	128	□115	132	□145	134	–	–
C203	∅140	165	–	–	–	–	–	–	–	–
C302	–	–	–	–	∅160	151	□145	153	□190	156
C303	∅140	184	∅140	184	–	–	–	–	–	–
C402	–	–	–	–	∅160	178	□145	180	□190	183
C403	–	–	–	–	∅160	221	–	–	–	–
C502	–	–	–	–	∅160	198	∅200	200	□190	203
C503	–	–	–	–	∅160	241	–	–	–	–
C612	–	–	–	–	–	–	∅200	197	□190	200
C613	–	–	–	–	∅160	239	∅200	259	–	–
C712	–	–	–	–	–	–	∅200	222	∅250	224
C713	–	–	–	–	–	–	∅200	283	∅250	295
C812	–	–	–	–	–	–	–	–	∅250	270
C813	–	–	–	–	–	–	∅200	329	∅250	341
C913	–	–	–	–	–	–	–	–	∅250	373

12.3.3 Solid shaft design with feather key, F housing design (round flange)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]

Options: C0 – C5 also available with solid shaft without feather key; on request starting at C6.

Dimensions of gear units

Type	Øa1	Øb1	B	c1	Ød	Øe1	f1	h	H	l	l1	Øs1	s2	t	u
C0	160	110_{j6}	97	10	20_{k6}	130	3.0	79.0	141.0	40	3	9	M6	22.5	A6×6×32
C1	200	130_{j6}	130	12	25_{k6}	165	3.5	100.0	175.0	50	5	11	M10	28.0	A8×7×40
C2	200	130_{j6}	142	12	30_{k6}	165	3.5	112.0	192.0	60	5	11	M10	33.0	A8×7×50
C3	250	180_{j6}	154	12	30_{k6}	215	4.0	127.0	212.0	60	5	14	M10	33.0	A8×7×50
C4	250	180_{j6}	178	14	40_{k6}	215	4.0	142.5	242.5	80	5	14	M16	43.0	A12×8×70
C5	300	230_{j6}	195	16	40_{k6}	265	4.0	166.0	286.0	80	5	14	M16	43.0	A12×8×70
C6	300	230_{j6}	225	17	50_{k6}	265	4.0	195.0	310.0	100	5	14	M16	53.5	A14×9×90
C7	350	250_{h6}	265	18	60_{m6}	300	5.0	231.0	371.0	120	5	18	M20	64.0	A18×11×100
C8	400	300_{h6}	310	20	70_{m6}	350	5.0	285.0	445.0	140	5	18	M20	74.5	A20×12×125
C9	450	350_{h6}	365	23	90_{m6}	400	5.0	334.0	524.0	170	5	18	M24	95.0	A25×14×140

Dimensions of additional round flanges

Type	Øa1	Øb1	c1	Øe1	f1	Øs1
C0	120	80_{j6}	10	100	3.0	7
C0	140	95_{j6}	10	115	3.0	9
C1	140	95_{j6}	8	115	3.5	9
C1	160	110_{j6}	10	130	3.5	9
C2	160	110_{j6}	10	130	3.5	9
C2	250	180_{j6}	12	215	4.0	14
C3	160	110_{j6}	10	130	3.5	9
C3	200	130_{j6}	12	165	3.5	11
C4	200	130_{j6}	14	165	3.5	11
C4	300	230_{j6}	14	265	4.0	14
C5	250	180_{j6}	14	215	4.0	14
C8	350	250_{h6}	18	300	5.0	18
C8	450	350_{h6}	20	400	5.0	18

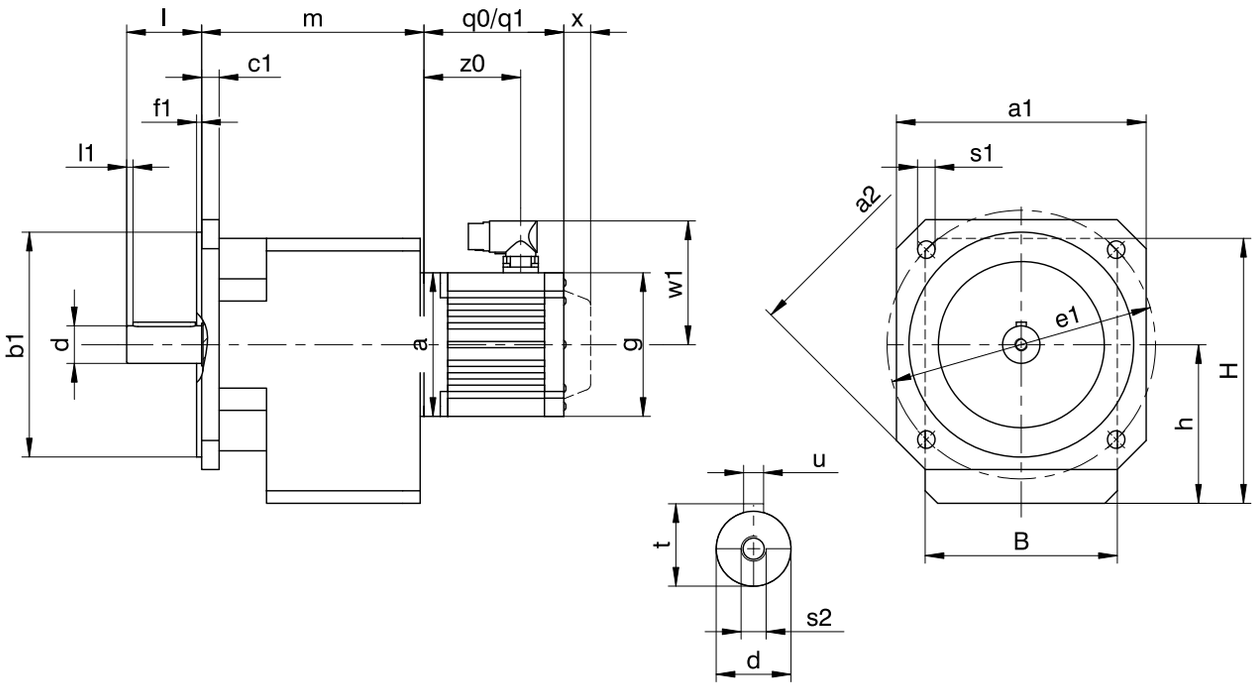
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5
EZ805U	190	355.5	432.5	156.5	22	301.5

Dimensions of geared motors

Type	EZ3		EZ4		EZ5		EZ7		EZ8	
	a	m	a	m	a	m	a	m	a	m
C002	□72	114	□98	114	□115	118	□145	120	–	–
C102	□72	137	□98	137	□115	141	□145	143	–	–
C103	∅140	174	–	–	–	–	–	–	–	–
C202	∅140	155	∅140	155	□115	159	□145	161	–	–
C203	∅140	192	–	–	–	–	–	–	–	–
C302	–	–	–	–	∅160	178	□145	180	□190	183
C303	∅140	211	∅140	211	–	–	–	–	–	–
C402	–	–	–	–	∅160	206	□145	208	□190	211
C403	–	–	–	–	∅160	249	–	–	–	–
C502	–	–	–	–	∅160	227	∅200	229	□190	232
C503	–	–	–	–	∅160	270	–	–	–	–
C612	–	–	–	–	–	–	∅200	233	□190	236
C613	–	–	–	–	∅160	275	∅200	295	–	–
C712	–	–	–	–	–	–	∅200	266	∅250	268
C713	–	–	–	–	–	–	∅200	327	∅250	339
C812	–	–	–	–	–	–	–	–	∅250	315
C813	–	–	–	–	–	–	∅200	374	∅250	386
C913	–	–	–	–	–	–	–	–	∅250	423

12.3.4 Solid shaft design with feather key, Q housing design (square flange)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]

Options: C0 – C5 also available with solid shaft without feather key; on request starting at C6.

Dimensions of gear units

Type	□a1	□a2	Øb1	B	c1	Ød	Øe1	f1	h	H	l	l1	Øs1	s2	t	u
C0	124	160	110_{j6}	97	9	20_{k6}	130	3.0	79.0	141.0	40	3	9	M6	22.5	A6×6×32
C1	145	192	130_{j6}	130	11	25_{k6}	165	3.5	100.0	175.0	50	5	11	M10	28.0	A8×7×40
C2	145	192	130_{j6}	142	11	30_{k6}	165	3.5	112.0	192.0	60	5	11	M10	33.0	A8×7×50
C3	200	250	180_{j6}	154	14	30_{k6}	215	4.0	127.0	212.0	60	5	14	M10	33.0	A8×7×50
C4	200	250	180_{j6}	178	14	40_{k6}	215	4.0	142.5	242.5	80	5	14	M16	43.0	A12×8×70

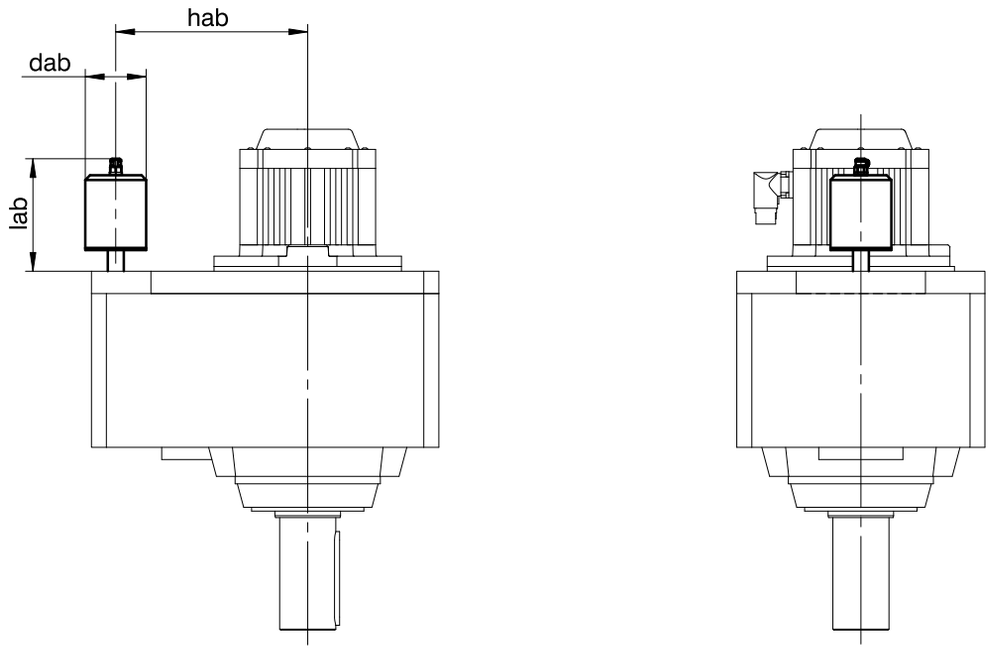
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5
EZ805U	190	355.5	432.5	156.5	22	301.5

Dimensions of geared motors

Type	EZ3		EZ4		EZ5		EZ7		EZ8	
	a	m	a	m	a	m	a	m	a	m
C002	□72	114	□98	114	□115	118	□145	120	–	–
C102	□72	137	□98	137	□115	141	□145	143	–	–
C103	∅140	174	–	–	–	–	–	–	–	–
C202	∅140	155	∅140	155	□115	159	□145	161	–	–
C203	∅140	192	–	–	–	–	–	–	–	–
C302	–	–	–	–	∅160	178	□145	180	□190	183
C303	∅140	211	∅140	211	–	–	–	–	–	–
C402	–	–	–	–	∅160	206	□145	208	□190	211
C403	–	–	–	–	∅160	249	–	–	–	–

12.3.5 Oil expansion tank



Dimensions

Type	EZ7			EZ8		
	dab	hab	lab	dab	hab	lab
C612	65	170	114.5	65	170	112
C712	73	205	129.5	73	205	129.5

More information can be found in Chapter [▶ 12.6.4]

12.4 Type designation

In this chapter, you can find an explanation of the type designation with the associated options.

Additional ordering information not included in the type designation can be found at the end of the chapter.

Sample code

C	2	0	2	N	0280	EZ401U

Explanation

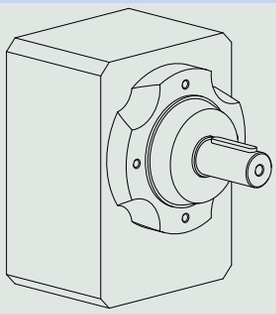
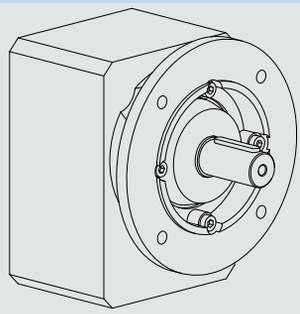
Code	Designation	Design
C	Type	Helical gear unit
2	Size	2 (example)
0	Generation	Generation 0
1		Generation 1
2	Stages	Two-stage
3		Three-stage
G	Housing	Pitch circle diameter
F		Round flange
Q		Square flange
N		Foot
0280	Transmission ratio (i x 10 rounded)	i = 28.24 (example)
EZ401U	Motor	EZ synchronous servo motor

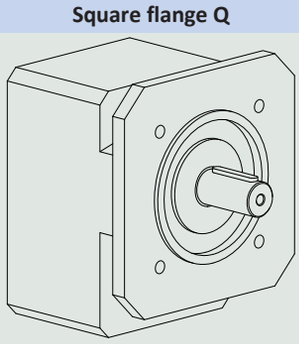
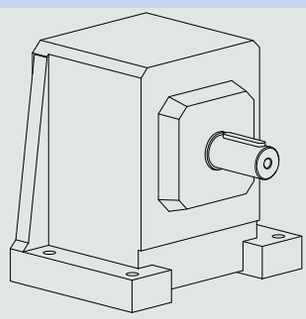
In order to complete the type designation, also specify:

- A detailed type designation of the motor, see Chapter [▶ 23]
- The mounting position, see Chapter [▶ 12.5.4]
- The position of the plug connectors, see Chapter [▶ 12.5.6]
- Oil expansion tank (recommended for gear units in mounting position EL5), see the chapter [▶ 12.6.4]
- Standard or reinforced output bearing

12.5 Product description

12.5.1 Housing design

Pitch circle diameter G	Round flange F
	

Square flange Q	Foot N
	

	G	F	Q	N
C0	✓	✓	✓	✓
C1	✓	✓	✓	✓
C2	✓	✓	✓	✓
C3	✓	✓	✓	✓
C4	✓	✓	✓	✓
C5	✓	✓	–	✓
C6	✓	✓	–	✓
C7	✓	✓	–	✓
C8	✓	✓	–	✓
C9	✓	✓	–	✓

12.5.2 Shaft design

Gear units in sizes C0 – C9 come standard with a solid shaft with feather key.

Gear units in sizes C0 – C5 can be ordered with the option of a solid shaft without feather key. Only upon request starting at size C6.

12.5.3 Installation conditions

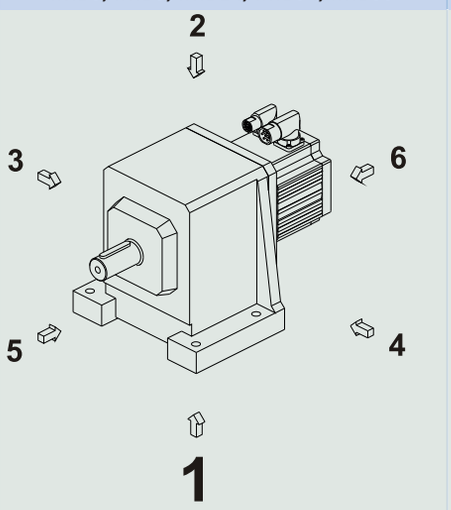
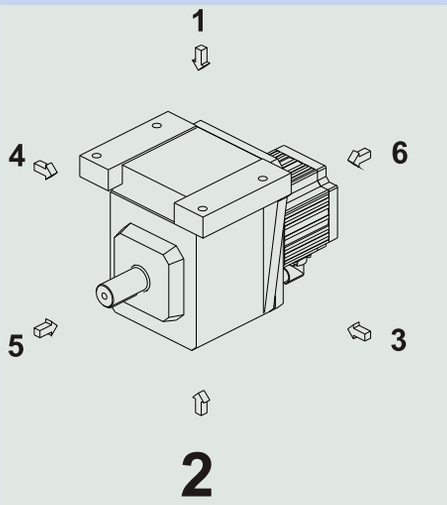
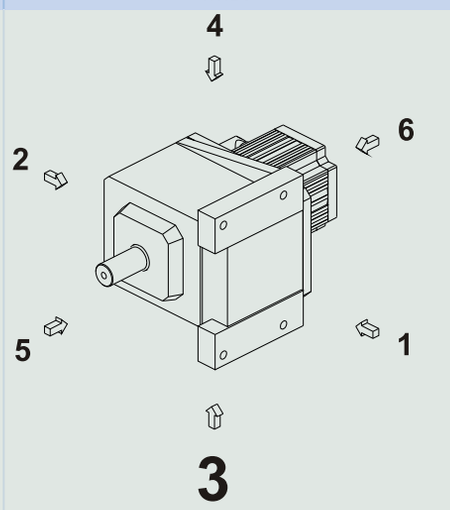
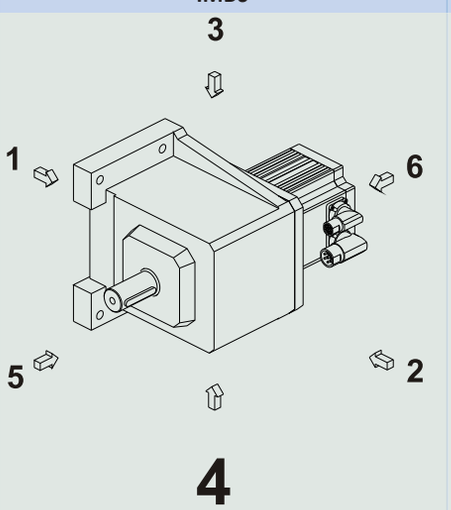
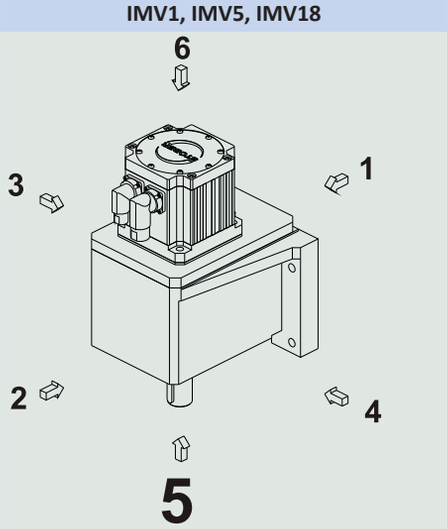
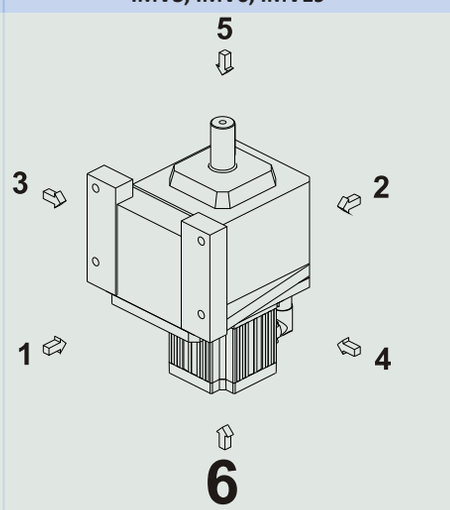
Attaching the gear unit on the machine side using the pitch circle diameter

The specified torques and forces only apply when attaching gear units at the machine side using screws of quality 10.9. In addition, the gear housing must be adjusted at the pilot (H7).

12.5.4 Mounting positions

The following table shows the standard mounting positions.

The numbers identify the gear unit sides. The mounting position is defined by the gear side facing downwards.

EL1 IMB3, IMB5, IMB14, IMB34, IMB35	EL2 IMB8	EL3 IMB7
		
EL4 **IMB6**	**EL5** **IMV1, IMV5, IMV18**	**EL6** **IMV3, IMV6, IMV19**
		

Since the lubricant filling volume of the gear unit depends on the mounting position, the mounting position must be specified when ordering.

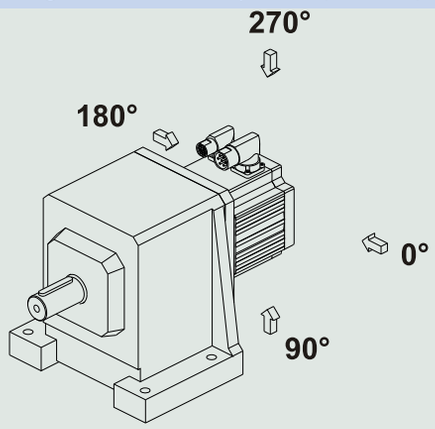
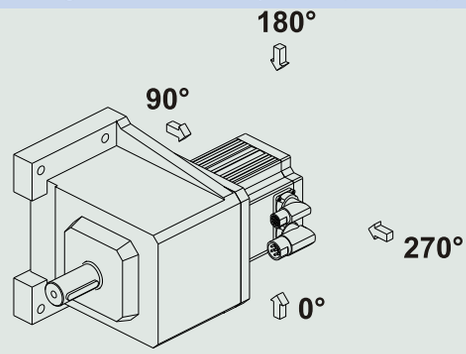
12.5.5 Lubricants

STOBER fills the gear units with the amount and type of lubricant specified on the nameplate. The filling volume and the structure of the gear units depend on the mounting position.

Only install the gear units in the intended mounting position! Reposition the gear units only after consulting STOBER. Otherwise, STOBER assumes no liability for the gear units.

Lubricant filling quantities for gear units, document ID 441871, can be found online at http://www.stoeber.de/en/download. Enter the ID of the documentation in the Search... field.

12.5.6 Position of the plug connectors

Mounting position EL1 Plug connector in 270° position (standard)	Mounting position EL4 Plug connector in 270° position (standard)
	

Indicate variations for your geared motor in the purchase order.

Note that the plug connector position rotates along with the geared motor if the geared motor is in another mounting position.

12.5.7 Other product features

Feature	Value
Max. permitted gear unit temperature (on the surface of the gear unit)	≤ 80 °C
Paint	Black RAL 9005
(ATEX) Directive 2014/34/EU (option)	Not suitable
Protection class:[1]	
Gear unit	IP65
Motor	IP56, optionally IP66

12.5.8 Maintenance

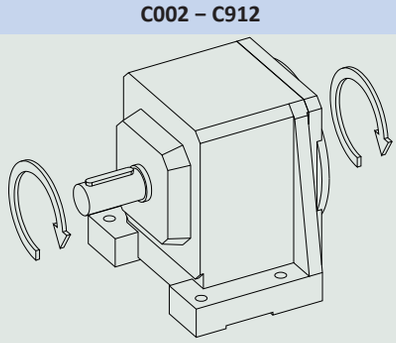
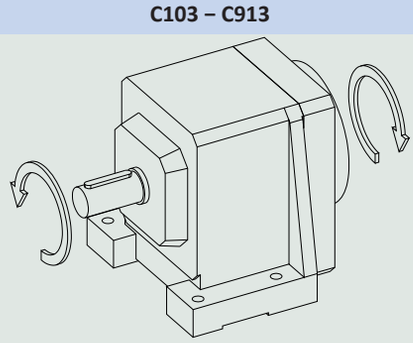
The instructions for maintenance can be found in the operating manual, ID 443027_en, at http://www.stoeber.de/en/download. Enter the ID of the documentation in the Search... field.

Ventilation

Air release valves are fitted as a standard feature and independently of installation position for gear unit sizes C6 to C9.

For the position and dimensions of the air release valve, refer to the 3D model at http://cad.stoeber.de.

12.5.9 Direction of rotation

C002 – C912	C103 – C913
	
The input and output rotate in the same direction.	The input and output rotate in opposite directions.

The pictures show mounting position EL1.

[1] Observe the protection class of all the components.

12.6 Project configuration

Project your drives using our SERVOsoft designing software. You can receive SERVOsoft for free from your adviser at one of our sales centers. Observe the limit conditions in this chapter to ensure a safe design for your drives.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

12.6.1 Calculation of the operating point

Check the following conditions for operating points other than the nominal point M_{2N} specified in the selection tables.

For mounting positions EL1, EL2, EL3, EL4:

$$n_{1m^*} \leq \frac{n_{1maxDBEL1,2,3,4}}{fB_T}$$

For mounting positions EL5, EL6:

$$n_{1m^*} \leq \frac{n_{1maxDBEL5,6}}{fB_T}$$

For all mounting positions:

$$n_{1max^*} \leq \frac{n_{1max\,ZB}}{fB_T}$$

$$M_{2eff^*} \leq M_{2th}$$

$$M_{2acc^*} \leq M_{2acc}$$

$$M_{2NOT^*} \leq M_{2NOT}$$

$$M_{2eq^*} \leq M_{2N} \cdot \frac{S}{fB_{op} \cdot fB_t}$$

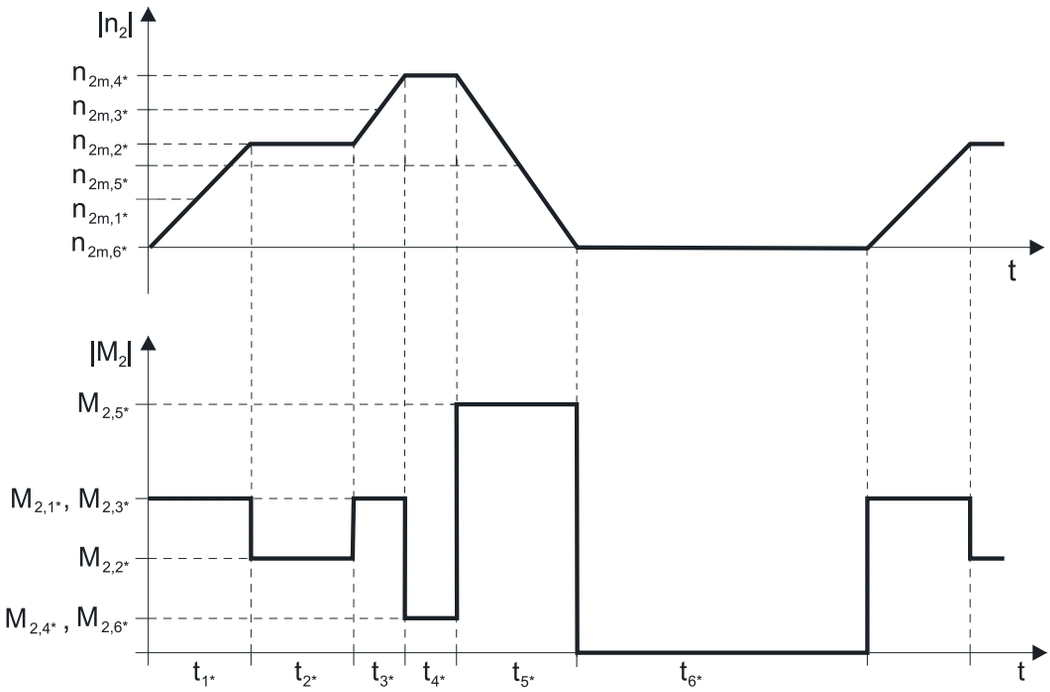
Refer to the selection table for the values for $n_{1maxDBEL1,2,3,4}$ and $n_{1maxDBEL5,6}$, n_{1maxZB}, M_{2acc}, M_{2NOT}, M_{2N} and S.

The values for fB_T, fB_{op} and fB_t can be found in the corresponding tables in this chapter.

Calculate the thermal limit torque M_{2th} for a duty cycle > 50%.

Example of cyclic operation

The following calculations are based on a representation of the power taken from the output based in accordance with the following example:



Calculation of the actual average input speed

$$n_{1m^*} = n_{2m^*} \cdot i$$

$$n_{2m^*} = \frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}{t_{1^*} + \ldots + t_{n^*}}$$

If $t_{1^*} + \ldots + t_{5^*} \geq 20$ min, calculate n_{2m^*} without the rest phase t_{6^*}.

The values for the ratio i can be found in the selection tables.

Calculation of the actual effective torque

$$M_{2eff^*} = \sqrt{\frac{t_{1^*} \cdot {M_{2,1^*}}^2 + \ldots + t_{n^*} \cdot {M_{2,n^*}}^2}{t_{1^*} + \ldots + t_{n^*}}}$$

Calculation of the actual equivalent torque

$$M_{2eq^*} = \sqrt[3]{\frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} \cdot \left|{M_{2,1^*}}^3\right| + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*} \cdot \left|{M_{2,n^*}}^3\right|}{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}}$$

Calculation of the thermal limit torque

Calculate the thermal limit torque M_{2th} for a duty cycle $ED_{20} > 50\%$ and the actual average input speed n_{1m^*}. (At $K_{mot,th} \leq 0$ you must reduce the average input speed n_{1m^*} accordingly or select another geared motor size.)

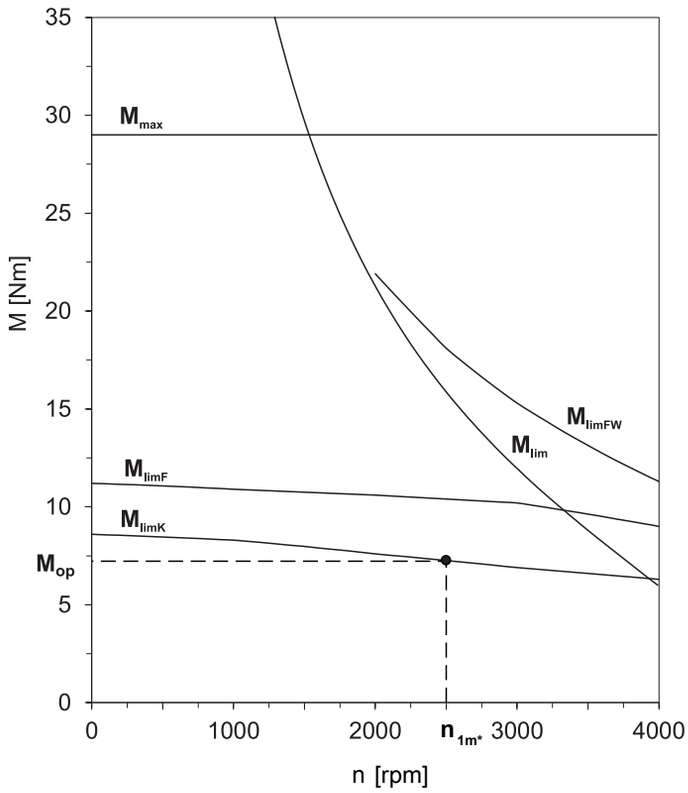
$$M_{2th} = M_{op} \cdot i \cdot K_{mot,th}$$

$$K_{mot,th} = 0{,}95 - \frac{a_{th}}{1000} \cdot athEL \cdot fB_T \cdot \left(\frac{n_{1m^*}}{1000}\right)^3$$

The values for i and a_{th} can be found in the selection tables.

The values for a_{thEL} and fB_T can be found in the corresponding tables in this chapter.

The value for the torque of the motor at operating point M_{op} with the determined average input speed n_{1m^*} can be found in the motor curve of Chapter [▶ 23.3]. Note the size, nominal speed n_N and cooling type of the motor. The figure below shows an example of reading the torque M_{op} of a motor with convection cooling at the operating point.



Operating factors

Parameter a_{thEL}

Mounting position	a_{thEL}
EL1, 2, 5, 6	1.0
EL3, 4	1.1

Operating mode	fB_{op}
Uniform continuous operation	1.00
Cyclic operation	1.25
Reversing load cyclic operation	1.40

Run time	fB_t
Daily run time ≤ 8 h	1.00
Daily run time ≤ 16 h	1.15
Daily run time ≤ 24 h	1.20

Temperature		fB_T
Motor cooling	**Surrounding temperature**	
Motor with forced ventilation	≤ 20 °C	0.9
	≤ 30 °C	1.0
	≤ 40 °C	1.15
Motor with convection cooling	≤ 20 °C	1.0
	≤ 30 °C	1.1
	≤ 40 °C	1.25

Notes

- The maximum permitted gear unit temperature (see the "Other product features" chapter) must not be exceeded. Doing so may result in damage to the geared motor.
- For braking from full speed (for example when the power fails or when setting up the machine), note the permitted gear unit torques (M_{2acc}, M_{2NOT}) in the selection tables.

12.6.2 Permitted shaft loads for the output shaft

The values specified in the tables apply to the permitted shaft loads:

- For shaft dimensions in accordance with the catalog
- For output speeds $n_{2m*} \leq 20$ rpm ($F_{2axN} = F_{2ax20}$; $F_{2radN} = F_{2rad20}$; $M_{2kN} = M_{2k20}$)
- Only if radial forces on the gear unit are stabilized by its pilots for the pitch circle diameter and flange housing design

Permitted shaft loads

Type	z_2	F_{2ax20}	F_{2rad20}	M_{2k20}
	[mm]	[N]	[N]	[Nm]
C0	20.0	500	1900	80
C1	30.0	850	3400	190
C2	30.0	1050	4200	260
C3	30.0	1400	5650	350
C4	35.0	2400	9700	750
C5	42.0	3000	11000	900
C6	40.0	4000	16000	1500
C7	45.0	5500	22000	2400
C8	50.0	7500	30000	3700
C9	55.0	9500	37000	5200

For other output speeds, download diagrams at http://products.stoeber.de.

The following applies to output speeds $n_{2m*} > 20$ rpm:

$$F_{2axN} = \frac{F_{2ax20}}{\sqrt[3]{\frac{n_{2m*}}{20\ \text{rpm}}}} \qquad F_{2radN} = \frac{F_{2rad20}}{\sqrt[3]{\frac{n_{2m*}}{20\ \text{rpm}}}} \qquad M_{2kN} = \frac{M_{2k20}}{\sqrt[3]{\frac{n_{2m*}}{20\ \text{rpm}}}}$$

The values for F_{2ax20}, F_{2rad20} and M_{2k20} can be found in the table "Permitted shaft loads" in this chapter.

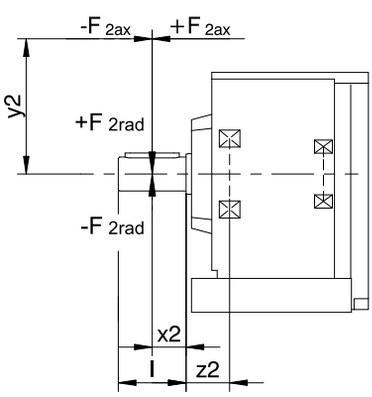


Fig. 1: Force application points

The specified values for F_{2rad20} are based on application of force at the middle of the output shaft: $x_2 = l/2$.

Shaft dimensions can be found in the "Dimensional drawings" chapter.

The following applies to other force application points:

$$M_{2k*} = \frac{2 \cdot F_{2ax*} \cdot y_2 + F_{2rad*} \cdot (x_2 + z_2)}{1000} \leq M_{2kN}$$

$$F_{2rad*} \leq F_{2radN}$$

$$F_{2ax*} \leq F_{2axN}$$

For applications with multiple axial and/or radial forces, you must add the forces as vectors.

In the event of EMERGENCY OFF operation (max. 1000 load changes), you can multiply the permitted forces and torques for F_{2ax20}, F_{2rad20} and M_{2k20} by a factor of two.

12.6.3 Radial shaft seal rings

Leak-proofness

Our gear units are equipped with high-quality radial shaft seal rings and checked for leak-proofness. However, a leak cannot be fully ruled out over the length of use of a gear unit. If you use a gear unit with goods incompatible with the lubricant, you must take measures to prevent direct contact with the gear unit lubricant in case of a leak.

12.6.4 Oil expansion tank

The gear units have a higher fill level in mounting position EL5. The oil expansion tank prevents oil from escaping out of the gear unit.

Notes

- We recommend using an oil expansion tank in mounting position EL5 (additional cost) for fast running gear units with an input speed $n_1 > 1750$ rpm and gear ratios $i < 20$.
- It is not possible to use an oil expansion tank if the plug connector is at 90°!
- The oil expansion tank can only be used with certain sizes; see the chapter [▷ 12.3.5]

12.7 Additional documentation

Additional documentation related to the product can be found at http://www.stoeber.de/en/download

Enter the ID of the documentation in the Search... field.

Documentation	ID
Operating manual for C/F/K/S gear units and gear motors	443027_en
Lubricant filling quantities for gear units	441871

13 F offset helical geared motors

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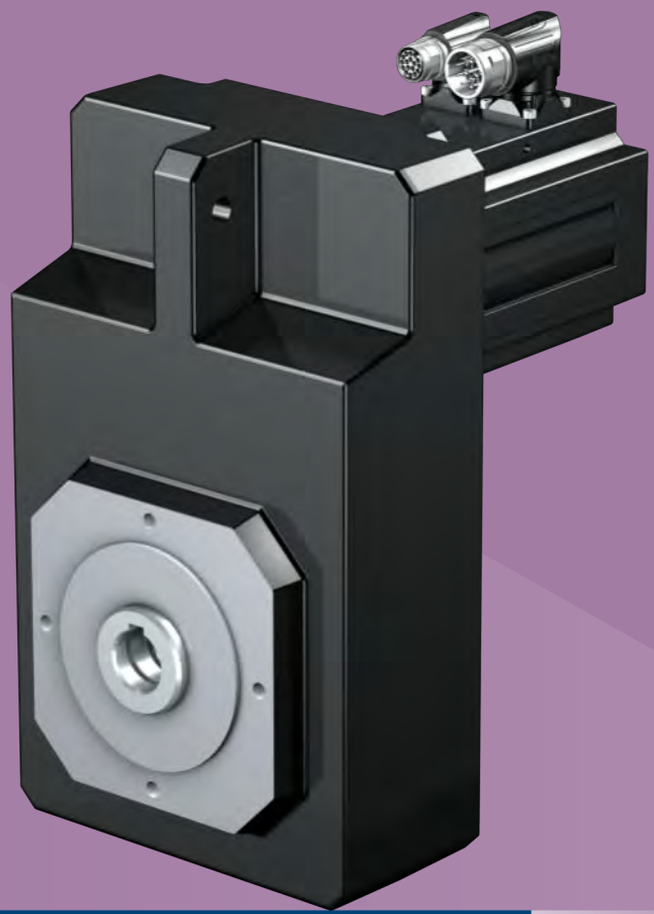


13 Offset helical geared motors F

13.1 Overview

Offset helical geared motors with large axial distances

Features

Power density	★☆☆☆☆
Backlash	★★★☆☆
Price category	€
Shaft load	★★★☆☆
Smooth operation	★★★☆☆
Torsional stiffness	★★☆☆☆
Mass moment of inertia	★★★★★
Helical gearing	✓
Maintenance-free	✓
FKM seal ring at the input	✓
Large axial distances, suitable for confined situations	✓
Compact and highly dynamic due to direct motor attachment	✓

Key: ★☆☆☆☆ good | ★★★★★ excellent
€ Economy | €€€€€ Premium

Technical data

i	4.3 – 274
M_{2acc}	19 – 1100 Nm
$\Delta\phi_2$	5 – 11 arcmin
η_{get}	≤ 97 %

13.2 Selection tables

The technical data specified in the selection tables applies to:

- Installation altitudes up to 1000 m above sea level
- Surrounding temperatures from 0 °C to 40 °C
- Drives with convection-cooled motors (e.g. EZ401**U**)
- Weight specification for mounting position EL1, housing design G

You can calculate the technical data for drives with forced ventilated motors (for example EZ401**B**) at http://products.stoeber.de.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
F1 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 120 Nm)																
32	84	86	1.5	1.4	F102_0940 EZ301U	120	240	93.63	7865/84	4000	4000	6000	0.22	11/6	7.7	13
43	63	65	1.3	1.9	F102_0700 EZ301U	120	240	70.06	1261/18	4000	4000	6000	0.23	11/6	7.7	13
54	50	52	1.1	2.4	F102_0560 EZ301U	120	240	55.97	2015/36	4000	4000	6000	0.25	11/6	7.7	13
54	86	91	1.9	1.4	F102_0560 EZ302U	120	240	55.97	2015/36	4000	4000	6000	0.35	11/6	7.7	13
65	42	43	1.0	2.9	F102_0460 EZ301U	120	240	46.43	325/7	4000	4000	6000	0.28	11/6	7.7	13
65	72	76	1.8	1.7	F102_0460 EZ302U	120	240	46.43	325/7	4000	4000	6000	0.38	11/6	7.7	13
86	32	32	1.0	3.5	F102_0350 EZ301U	95	240	35.05	3575/102	4000	4000	6000	0.32	11/6	7.7	13
86	54	57	1.7	2.0	F102_0350 EZ302U	120	240	35.05	3575/102	4000	4000	6000	0.42	11/6	7.7	13
86	70	74	2.2	1.6	F102_0350 EZ303U	120	240	35.05	3575/102	4000	4000	6000	0.53	11/6	7.7	14
107	25	26	0.9	4.0	F102_0280 EZ301U	77	200	28.17	169/6	4000	4000	6000	0.37	11/6	7.7	13
107	43	46	1.6	2.3	F102_0280 EZ302U	120	200	28.17	169/6	4000	4000	6000	0.47	11/6	7.7	13
107	57	60	2.1	1.8	F102_0280 EZ303U	120	200	28.17	169/6	4000	4000	6000	0.58	11/6	7.7	14
107	77	82	2.8	1.3	F102_0280 EZ401U	120	240	28.17	169/6	4000	4000	6000	1.1	11/6	7.7	15
130	21	21	0.9	4.6	F102_0230 EZ301U	63	170	23.08	3185/138	3700	3600	6000	0.43	11/6	7.7	13
130	36	38	1.6	2.7	F102_0230 EZ302U	110	170	23.08	3185/138	3700	3600	6000	0.53	11/6	7.7	13
130	46	49	2.0	2.1	F102_0230 EZ303U	120	170	23.08	3185/138	3700	3600	6000	0.64	11/6	7.7	14
130	63	67	2.7	1.5	F102_0230 EZ401U	120	240	23.08	3185/138	3700	3600	6000	1.2	11/6	7.7	15
163	17	17	0.9	3.0	F102_0185 EZ301U	50	63	18.46	1495/81	3700	3600	6000	0.52	11/6	7.7	13
163	28	30	1.5	3.1	F102_0185 EZ302U	90	130	18.46	1495/81	3700	3600	6000	0.62	11/6	7.7	13
163	37	39	2.0	2.4	F102_0185 EZ303U	110	130	18.46	1495/81	3700	3600	6000	0.73	11/6	7.7	14
163	50	54	2.6	1.8	F102_0185 EZ401U	120	240	18.46	1495/81	3700	3600	6000	1.3	11/6	7.7	15
163	77	84	4.1	1.1	F102_0185 EZ501U	120	240	18.46	1495/81	3700	3600	6000	3.2	11/6	7.7	16
221	12	13	0.8	3.0	F102_0135 EZ301U	37	46	13.59	231/17	4000	4000	6000	0.41	11/8	6.5	13
221	21	22	1.4	3.8	F102_0135 EZ302U	66	99	13.59	231/17	4000	4000	6000	0.51	11/8	6.5	13
221	27	29	1.9	2.9	F102_0135 EZ303U	79	99	13.59	231/17	4000	4000	6000	0.62	11/8	6.5	14
221	37	40	2.5	2.2	F102_0135 EZ401U	110	200	13.59	231/17	4000	4000	6000	1.1	11/8	6.5	15
221	57	62	3.9	1.4	F102_0135 EZ501U	110	200	13.59	231/17	4000	4000	6000	3.1	11/8	6.5	16
221	62	69	4.2	1.3	F102_0135 EZ402U	110	200	13.59	231/17	4000	4000	6000	1.8	11/8	6.5	16
275	9.9	10	0.8	3.0	F102_0110 EZ301U	30	37	10.92	273/25	4000	4000	6000	0.50	11/8	6.5	13
275	17	18	1.4	3.8	F102_0110 EZ302U	53	79	10.92	273/25	4000	4000	6000	0.60	11/8	6.5	13
275	22	23	1.8	2.9	F102_0110 EZ303U	64	79	10.92	273/25	4000	4000	6000	0.71	11/8	6.5	14
275	30	32	2.4	2.5	F102_0110 EZ401U	90	200	10.92	273/25	4000	4000	6000	1.2	11/8	6.5	15
275	46	50	3.7	1.6	F102_0110 EZ501U	110	200	10.92	273/25	4000	4000	6000	3.2	11/8	6.5	16
275	50	55	4.1	1.5	F102_0110 EZ402U	110	200	10.92	273/25	4000	4000	6000	1.9	11/8	6.5	16
335	14	15	1.3	3.8	F102_0089 EZ302U	43	65	8.948	1029/115	3700	3600	6000	0.73	11/8	6.5	13
335	18	19	1.7	2.9	F102_0089 EZ303U	52	65	8.948	1029/115	3700	3600	6000	0.84	11/8	6.5	14
335	24	26	2.3	2.9	F102_0089 EZ401U	74	200	8.948	1029/115	3700	3600	6000	1.4	11/8	6.5	15
335	37	41	3.6	1.9	F102_0089 EZ501U	110	200	8.948	1029/115	3700	3600	6000	3.3	11/8	6.5	16
335	41	45	3.9	1.7	F102_0089 EZ402U	110	200	8.948	1029/115	3700	3600	6000	2.1	11/8	6.5	16
335	60	75	5.8	1.2	F102_0089 EZ404U	110	200	8.948	1029/115	3700	3600	6000	3.4	11/8	6.5	18
335	64	69	6.2	1.1	F102_0089 EZ502U	110	200	8.948	1029/115	3700	3600	6000	5.6	11/8	6.5	18
335	64	72	6.2	1.1	F102_0089 EZ701U	110	200	8.948	1029/115	3700	3600	6000	8.9	11/8	6.5	20
419	6.5	6.6	0.7	3.0	F102_0072 EZ301U	19	24	7.156	322/45	3700	3600	6000	0.82	11/8	6.5	13
419	11	12	1.3	3.8	F102_0072 EZ302U	35	52	7.156	322/45	3700	3600	6000	0.92	11/8	6.5	13
419	14	15	1.7	2.9	F102_0072 EZ303U	42	52	7.156	322/45	3700	3600	6000	1.0	11/8	6.5	14
419	19	21	2.3	3.3	F102_0072 EZ401U	59	200	7.156	322/45	3700	3600	6000	1.6	11/8	6.5	15
419	30	33	3.5	2.2	F102_0072 EZ501U	110	200	7.156	322/45	3700	3600	6000	3.5	11/8	6.5	16
419	33	36	3.8	2.0	F102_0072 EZ402U	110	200	7.156	322/45	3700	3600	6000	2.3	11/8	6.5	16
419	48	60	5.6	1.3	F102_0072 EZ404U	110	200	7.156	322/45	3700	3600	6000	3.6	11/8	6.5	18
419	51	56	6.0	1.3	F102_0072 EZ502U	110	200	7.156	322/45	3700	3600	6000	5.8	11/8	6.5	18
419	51	58	6.0	1.3	F102_0072 EZ701U	110	200	7.156	322/45	3700	3600	6000	9.1	11/8	6.5	20

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
F1 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 120 Nm)																
464	18	19	2.2	3.6	F102_0065 EZ401U	53	190	6.462	84/13	3500	3000	6000	1.7	11/8	6.5	15
464	27	29	3.4	2.3	F102_0065 EZ501U	100	190	6.462	84/13	3500	3000	6000	3.7	11/8	6.5	16
464	29	33	3.7	2.1	F102_0065 EZ402U	100	190	6.462	84/13	3500	3000	6000	2.4	11/8	6.5	16
464	43	54	5.5	1.4	F102_0065 EZ404U	110	190	6.462	84/13	3500	3000	6000	3.7	11/8	6.5	18
464	46	50	5.9	1.3	F102_0065 EZ502U	110	190	6.462	84/13	3500	3000	6000	6.0	11/8	6.5	18
464	46	52	5.9	1.3	F102_0065 EZ701U	110	190	6.462	84/13	3500	3000	6000	9.3	11/8	6.5	20
464	61	70	7.7	1.0	F102_0065 EZ503U	110	190	6.462	84/13	3500	3000	6000	8.3	11/8	6.5	19
696	6.6	7.0	1.2	3.8	F102_0043 EZ302U	21	31	4.308	56/13	3500	3000	6000	1.8	11/8	6.5	13
696	8.7	9.2	1.5	2.9	F102_0043 EZ303U	25	31	4.308	56/13	3500	3000	6000	1.9	11/8	6.5	14
696	12	13	2.1	4.7	F102_0043 EZ401U	36	130	4.308	56/13	3500	3000	6000	2.4	11/8	6.5	15
696	18	20	3.2	3.0	F102_0043 EZ501U	67	130	4.308	56/13	3500	3000	6000	4.4	11/8	6.5	16
696	20	22	3.5	2.8	F102_0043 EZ402U	67	130	4.308	56/13	3500	3000	6000	3.1	11/8	6.5	16
696	29	36	5.1	1.9	F102_0043 EZ404U	100	130	4.308	56/13	3500	3000	6000	4.5	11/8	6.5	18
696	31	33	5.5	1.8	F102_0043 EZ502U	100	130	4.308	56/13	3500	3000	6000	6.7	11/8	6.5	18
696	31	35	5.5	1.8	F102_0043 EZ701U	84	130	4.308	56/13	3500	3000	6000	10	11/8	6.5	20
696	41	46	7.2	1.3	F102_0043 EZ503U	100	130	4.308	56/13	3500	3000	6000	9.1	11/8	6.5	19
F1 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 120 Nm)																
64	81	86	1.4	1.5	F102_0940 EZ301U	120	240	93.63	7865/84	4000	4000	6000	0.22	11/6	7.7	13
86	60	65	1.3	1.8	F102_0700 EZ301U	120	240	70.06	1261/18	4000	4000	6000	0.23	11/6	7.7	13
107	48	52	1.3	2.1	F102_0560 EZ301U	120	240	55.97	2015/36	4000	4000	6000	0.25	11/6	7.7	13
107	81	91	2.1	1.2	F102_0560 EZ302U	120	240	55.97	2015/36	4000	4000	6000	0.35	11/6	7.7	13
129	40	43	1.2	2.4	F102_0460 EZ301U	120	240	46.43	325/7	4000	4000	6000	0.28	11/6	7.7	13
129	68	76	2.1	1.4	F102_0460 EZ302U	120	240	46.43	325/7	4000	4000	6000	0.38	11/6	7.7	13
171	30	32	1.2	2.9	F102_0350 EZ301U	95	240	35.05	3575/102	4000	4000	6000	0.32	11/6	7.7	13
171	51	57	2.0	1.7	F102_0350 EZ302U	120	240	35.05	3575/102	4000	4000	6000	0.42	11/6	7.7	13
171	67	76	2.6	1.3	F102_0350 EZ303U	120	240	35.05	3575/102	4000	4000	6000	0.53	11/6	7.7	14
213	24	26	1.1	3.3	F102_0280 EZ301U	77	200	28.17	169/6	4000	4000	6000	0.37	11/6	7.7	13
213	41	46	1.9	2.0	F102_0280 EZ302U	120	200	28.17	169/6	4000	4000	6000	0.47	11/6	7.7	13
213	54	61	2.5	1.5	F102_0280 EZ303U	120	200	28.17	169/6	4000	4000	6000	0.58	11/6	7.7	14
213	63	77	2.9	1.3	F102_0280 EZ401U	120	240	28.17	169/6	4000	4000	6000	1.1	11/6	7.7	15
260	20	21	1.1	3.8	F102_0230 EZ301U	63	170	23.08	3185/138	3700	3600	6000	0.43	11/6	7.7	13
260	34	38	1.8	2.3	F102_0230 EZ302U	110	170	23.08	3185/138	3700	3600	6000	0.53	11/6	7.7	13
260	44	50	2.4	1.7	F102_0230 EZ303U	120	170	23.08	3185/138	3700	3600	6000	0.64	11/6	7.7	14
260	51	63	2.8	1.5	F102_0230 EZ401U	120	240	23.08	3185/138	3700	3600	6000	1.2	11/6	7.7	15
325	16	17	1.1	4.4	F102_0185 EZ301U	50	130	18.46	1495/81	3700	3600	6000	0.52	11/6	7.7	13
325	27	30	1.8	2.6	F102_0185 EZ302U	90	130	18.46	1495/81	3700	3600	6000	0.62	11/6	7.7	13
325	35	40	2.3	2.0	F102_0185 EZ303U	110	130	18.46	1495/81	3700	3600	6000	0.73	11/6	7.7	14
325	41	50	2.7	1.7	F102_0185 EZ401U	120	240	18.46	1495/81	3700	3600	6000	1.3	11/6	7.7	15
325	61	79	4.0	1.2	F102_0185 EZ501U	120	240	18.46	1495/81	3700	3600	6000	3.2	11/6	7.7	16
325	63	88	4.2	1.1	F102_0185 EZ402U	120	240	18.46	1495/81	3700	3600	6000	2.0	11/6	7.7	16
442	12	13	1.0	3.1	F102_0135 EZ301U	37	46	13.59	231/17	4000	4000	6000	0.41	11/8	6.5	13
442	20	22	1.7	3.2	F102_0135 EZ302U	66	99	13.59	231/17	4000	4000	6000	0.51	11/8	6.5	13
442	26	30	2.2	2.5	F102_0135 EZ303U	79	99	13.59	231/17	4000	4000	6000	0.62	11/8	6.5	14
442	30	37	2.6	2.1	F102_0135 EZ401U	110	200	13.59	231/17	4000	4000	6000	1.1	11/8	6.5	15
442	45	58	3.8	1.4	F102_0135 EZ501U	110	200	13.59	231/17	4000	4000	6000	3.1	11/8	6.5	16
442	46	65	4.0	1.4	F102_0135 EZ402U	110	200	13.59	231/17	4000	4000	6000	1.8	11/8	6.5	16
549	9.4	10	1.0	3.1	F102_0110 EZ301U	30	37	10.92	273/25	4000	4000	6000	0.50	11/8	6.5	13
549	16	18	1.6	3.7	F102_0110 EZ302U	53	79	10.92	273/25	4000	4000	6000	0.60	11/8	6.5	13
549	21	24	2.1	2.8	F102_0110 EZ303U	64	79	10.92	273/25	4000	4000	6000	0.71	11/8	6.5	14
549	24	30	2.5	2.4	F102_0110 EZ401U	90	200	10.92	273/25	4000	4000	6000	1.2	11/8	6.5	15
549	36	47	3.7	1.6	F102_0110 EZ501U	110	200	10.92	273/25	4000	4000	6000	3.2	11/8	6.5	16
549	37	52	3.8	1.6	F102_0110 EZ402U	110	200	10.92	273/25	4000	4000	6000	1.9	11/8	6.5	16
671	13	15	1.6	4.0	F102_0089 EZ302U	43	65	8.948	1029/115	3700	3600	6000	0.73	11/8	6.5	13
671	17	20	2.1	3.1	F102_0089 EZ303U	52	65	8.948	1029/115	3700	3600	6000	0.84	11/8	6.5	14
671	20	24	2.4	2.8	F102_0089 EZ401U	74	200	8.948	1029/115	3700	3600	6000	1.4	11/8	6.5	15
671	30	38	3.6	1.9	F102_0089 EZ501U	110	200	8.948	1029/115	3700	3600	6000	3.3	11/8	6.5	16
671	30	43	3.7	1.8	F102_0089 EZ402U	110	200	8.948	1029/115	3700	3600	6000	2.1	11/8	6.5	16
671	45	68	5.5	1.2	F102_0089 EZ502U	110	200	8.948	1029/115	3700	3600	6000	5.6	11/8	6.5	18
671	45	69	5.5	1.2	F102_0089 EZ701U	110	200	8.948	1029/115	3700	3600	6000	8.9	11/8	6.5	20
671	50	73	6.1	1.1	F102_0089 EZ404U	110	200	8.948	1029/115	3700	3600	6000	3.4	11/8	6.5	18
838	6.2	6.6	0.9	3.1	F102_0072 EZ301U	19	24	7.156	322/45	3700	3600	6000	0.82	11/8	6.5	13
838	10	12	1.5	4.0	F102_0072 EZ302U	35	52	7.156	322/45	3700	3600	6000	0.92	11/8	6.5	13
838	14	16	2.0	3.1	F102_0072 EZ303U	42	52	7.156	322/45	3700	3600	6000	1.0	11/8	6.5	14
838	16	19	2.3	3.2	F102_0072 EZ401U	59	200	7.156	322/45	3700	3600	6000	1.6	11/8	6.5	15

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
F1 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 120 Nm)																
838	24	31	3.4	2.2	F102_0072 EZ501U	110	200	7.156	322/45	3700	3600	6000	3.5	11/8	6.5	16
838	24	34	3.6	2.1	F102_0072 EZ402U	110	200	7.156	322/45	3700	3600	6000	2.3	11/8	6.5	16
838	36	54	5.3	1.4	F102_0072 EZ502U	110	200	7.156	322/45	3700	3600	6000	5.8	11/8	6.5	18
838	36	55	5.3	1.4	F102_0072 EZ701U	110	200	7.156	322/45	3700	3600	6000	9.1	11/8	6.5	20
838	40	58	5.9	1.3	F102_0072 EZ404U	110	200	7.156	322/45	3700	3600	6000	3.6	11/8	6.5	18
838	43	74	6.3	1.2	F102_0072 EZ503U	110	200	7.156	322/45	3700	3600	6000	8.2	11/8	6.5	19
929	14	18	2.3	3.4	F102_0065 EZ401U	53	190	6.462	84/13	3500	3000	6000	1.7	11/8	6.5	15
929	21	28	3.4	2.3	F102_0065 EZ501U	100	190	6.462	84/13	3500	3000	6000	3.7	11/8	6.5	16
929	22	31	3.5	2.3	F102_0065 EZ402U	100	190	6.462	84/13	3500	3000	6000	2.4	11/8	6.5	16
929	33	49	5.2	1.5	F102_0065 EZ502U	110	190	6.462	84/13	3500	3000	6000	6.0	11/8	6.5	18
929	33	50	5.2	1.5	F102_0065 EZ701U	110	190	6.462	84/13	3500	3000	6000	9.3	11/8	6.5	20
929	36	53	5.8	1.4	F102_0065 EZ404U	110	190	6.462	84/13	3500	3000	6000	3.7	11/8	6.5	18
929	39	66	6.2	1.3	F102_0065 EZ503U	110	190	6.462	84/13	3500	3000	6000	8.3	11/8	6.5	19
1393	6.3	7.0	1.4	4.0	F102_0043 EZ302U	21	31	4.308	56/13	3500	3000	6000	1.8	11/8	6.5	13
1393	8.2	9.4	1.8	3.1	F102_0043 EZ303U	25	31	4.308	56/13	3500	3000	6000	1.9	11/8	6.5	14
1393	9.6	12	2.1	4.5	F102_0043 EZ401U	36	130	4.308	56/13	3500	3000	6000	2.4	11/8	6.5	15
1393	14	18	3.2	3.0	F102_0043 EZ501U	67	130	4.308	56/13	3500	3000	6000	4.4	11/8	6.5	16
1393	15	20	3.3	3.0	F102_0043 EZ402U	67	130	4.308	56/13	3500	3000	6000	3.1	11/8	6.5	16
1393	22	33	4.8	2.0	F102_0043 EZ502U	100	130	4.308	56/13	3500	3000	6000	6.7	11/8	6.5	18
1393	22	33	4.8	2.0	F102_0043 EZ701U	84	130	4.308	56/13	3500	3000	6000	10	11/8	6.5	20
1393	24	35	5.4	1.8	F102_0043 EZ404U	100	130	4.308	56/13	3500	3000	6000	4.5	11/8	6.5	18
1393	26	44	5.8	1.7	F102_0043 EZ503U	100	130	4.308	56/13	3500	3000	6000	9.1	11/8	6.5	19
F2 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 270 Nm)																
14	198	202	1.2	1.2	F203_2220 EZ301U	270	480	222.2	2444/11	4000	3900	6000	0.25	11/7	18	24
16	164	167	1.1	1.5	F203_1840 EZ301U	270	480	184.3	16215/88	4000	3900	6000	0.25	11/7	18	24
21	127	130	1.0	1.9	F202_1410 EZ301U	270	480	140.9	1550/11	4000	3900	6000	0.23	11/6	18	21
27	102	104	0.9	2.4	F202_1130 EZ301U	270	480	112.7	1240/11	4000	3900	6000	0.24	11/6	18	21
27	174	184	1.5	1.4	F202_1130 EZ302U	270	480	112.7	1240/11	4000	3900	6000	0.34	11/6	18	22
32	85	86	0.8	2.8	F202_0940 EZ301U	250	480	93.82	1032/11	4000	3900	6000	0.26	11/6	18	21
32	145	153	1.4	1.7	F202_0940 EZ302U	270	480	93.82	1032/11	4000	3900	6000	0.36	11/6	18	22
32	188	199	1.8	1.3	F202_0940 EZ303U	270	480	93.82	1032/11	4000	3900	6000	0.47	11/6	18	22
43	108	114	1.2	2.2	F202_0700 EZ302U	270	430	70.13	5400/77	4000	3900	6000	0.41	11/6	18	22
43	141	149	1.5	1.7	F202_0700 EZ303U	270	430	70.13	5400/77	4000	3900	6000	0.52	11/6	18	22
43	190	204	2.1	1.3	F202_0700 EZ401U	270	480	70.13	5400/77	4000	3900	6000	1.1	11/6	18	23
53	154	165	1.9	1.6	F202_0570 EZ401U	270	480	56.73	624/11	4000	3900	6000	1.1	11/6	18	23
64	73	77	1.0	3.3	F202_0470 EZ302U	230	340	47.05	1035/22	4000	3900	6000	0.52	11/6	18	22
64	94	100	1.3	2.5	F202_0470 EZ303U	270	340	47.05	1035/22	4000	3900	6000	0.63	11/6	18	22
64	128	137	1.7	1.9	F202_0470 EZ401U	270	480	47.05	1035/22	4000	3900	6000	1.2	11/6	18	23
85	55	58	0.9	3.8	F202_0350 EZ302U	170	260	35.46	390/11	3800	3500	6000	0.65	11/6	18	22
85	71	75	1.2	2.9	F202_0350 EZ303U	210	260	35.46	390/11	3800	3500	6000	0.76	11/6	18	22
85	96	103	1.6	2.3	F202_0350 EZ401U	270	480	35.46	390/11	3800	3500	6000	1.3	11/6	18	23
85	148	162	2.5	1.5	F202_0350 EZ501U	270	480	35.46	390/11	3800	3500	6000	3.3	11/6	18	24
85	162	179	2.7	1.4	F202_0350 EZ402U	270	480	35.46	390/11	3800	3500	6000	2.0	11/6	18	25
107	76	82	1.6	2.7	F202_0280 EZ401U	230	480	28.11	4020/143	3800	3500	6000	1.4	11/6	18	23
107	117	128	2.4	1.7	F202_0280 EZ501U	270	480	28.11	4020/143	3800	3500	6000	3.4	11/6	18	24
107	128	142	2.6	1.6	F202_0280 EZ402U	270	480	28.11	4020/143	3800	3500	6000	2.1	11/6	18	25
128	36	38	0.9	3.8	F202_0230 EZ302U	110	170	23.43	2320/99	3600	3100	6000	0.95	11/6	18	22
128	47	50	1.1	2.9	F202_0230 EZ303U	140	170	23.43	2320/99	3600	3100	6000	1.1	11/6	18	22
128	64	68	1.5	3.0	F202_0230 EZ401U	190	480	23.43	2320/99	3600	3100	6000	1.6	11/6	18	23
128	98	107	2.3	1.9	F202_0230 EZ501U	270	480	23.43	2320/99	3600	3100	6000	3.6	11/6	18	24
128	107	118	2.5	1.8	F202_0230 EZ402U	270	480	23.43	2320/99	3600	3100	6000	2.3	11/6	18	25
128	157	195	3.7	1.2	F202_0230 EZ404U	270	480	23.43	2320/99	3600	3100	6000	3.6	11/6	18	27
128	168	182	4.0	1.1	F202_0230 EZ502U	270	480	23.43	2320/99	3600	3100	6000	5.9	11/6	18	26
128	168	189	4.0	1.1	F202_0230 EZ701U	270	480	23.43	2320/99	3600	3100	6000	9.2	11/6	18	28
161	51	54	1.5	3.5	F202_0185 EZ401U	150	480	18.65	6360/341	3600	3100	6000	1.9	11/6	18	23
161	78	85	2.2	2.3	F202_0185 EZ501U	270	480	18.65	6360/341	3600	3100	6000	3.8	11/6	18	24
161	85	94	2.5	2.1	F202_0185 EZ402U	270	480	18.65	6360/341	3600	3100	6000	2.6	11/6	18	25
161	125	156	3.6	1.4	F202_0185 EZ404U	270	480	18.65	6360/341	3600	3100	6000	3.9	11/6	18	27
161	134	145	3.9	1.3	F202_0185 EZ502U	270	480	18.65	6360/341	3600	3100	6000	6.1	11/6	18	26
161	134	150	3.9	1.3	F202_0185 EZ701U	270	480	18.65	6360/341	3600	3100	6000	9.4	11/6	18	28
161	175	201	5.1	1.0	F202_0185 EZ503U	270	480	18.65	6360/341	3600	3100	6000	8.5	11/6	18	27
220	21	22	0.8	3.8	F202_0135 EZ302U	66	99	13.63	109/8	3800	3500	6000	0.93	11/8	16	22
220	27	29	1.0	2.9	F202_0135 EZ303U	79	99	13.63	109/8	3800	3500	6000	1.0	11/8	16	22
220	37	40	1.4	4.3	F202_0135 EZ401U	110	400	13.63	109/8	3800	3500	6000	1.6	11/8	16	23

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
F2 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 270 Nm)																
220	57	62	2.1	2.8	F202_0135 EZ501U	210	400	13.63	109/8	3800	3500	6000	3.5	11/8	16	24
220	62	69	2.3	2.6	F202_0135 EZ402U	210	400	13.63	109/8	3800	3500	6000	2.3	11/8	16	25
220	91	114	3.4	1.7	F202_0135 EZ404U	210	400	13.63	109/8	3800	3500	6000	3.6	11/8	16	27
220	98	106	3.7	1.6	F202_0135 EZ502U	210	400	13.63	109/8	3800	3500	6000	5.8	11/8	16	26
220	98	110	3.7	1.6	F202_0135 EZ701U	210	400	13.63	109/8	3800	3500	6000	9.1	11/8	16	28
220	128	147	4.8	1.2	F202_0135 EZ503U	210	400	13.63	109/8	3800	3500	6000	8.2	11/8	16	27
278	29	31	1.3	4.3	F202_0110 EZ401U	89	160	10.80	7303/676	3800	3500	6000	1.9	11/8	16	23
278	45	49	2.0	3.3	F202_0110 EZ501U	170	310	10.80	7303/676	3800	3500	6000	3.8	11/8	16	24
278	49	54	2.2	3.0	F202_0110 EZ402U	170	310	10.80	7303/676	3800	3500	6000	2.6	11/8	16	25
278	72	90	3.3	2.0	F202_0110 EZ404U	210	310	10.80	7303/676	3800	3500	6000	3.9	11/8	16	27
278	78	84	3.5	1.9	F202_0110 EZ502U	210	310	10.80	7303/676	3800	3500	6000	6.1	11/8	16	26
278	78	87	3.5	1.9	F202_0110 EZ701U	210	400	10.80	7303/676	3800	3500	6000	9.4	11/8	16	28
278	102	116	4.6	1.4	F202_0110 EZ503U	210	310	10.80	7303/676	3800	3500	6000	8.5	11/8	16	27
278	126	151	5.7	1.2	F202_0110 EZ702U	210	400	10.80	7303/676	3800	3500	6000	15	11/8	16	30
333	14	15	0.7	3.8	F202_0090 EZ302U	44	66	9.006	3161/351	3600	3100	6000	1.6	11/8	16	22
333	18	19	1.0	2.9	F202_0090 EZ303U	52	66	9.006	3161/351	3600	3100	6000	1.7	11/8	16	22
333	24	26	1.3	4.3	F202_0090 EZ401U	74	130	9.006	3161/351	3600	3100	6000	2.2	11/8	16	23
333	38	41	2.0	3.7	F202_0090 EZ501U	140	260	9.006	3161/351	3600	3100	6000	4.2	11/8	16	24
333	41	45	2.2	3.4	F202_0090 EZ402U	140	260	9.006	3161/351	3600	3100	6000	2.9	11/8	16	25
333	60	75	3.2	2.3	F202_0090 EZ404U	210	260	9.006	3161/351	3600	3100	6000	4.3	11/8	16	27
333	65	70	3.4	2.1	F202_0090 EZ502U	210	260	9.006	3161/351	3600	3100	6000	6.5	11/8	16	26
333	65	73	3.4	2.1	F202_0090 EZ701U	170	400	9.006	3161/351	3600	3100	6000	9.8	11/8	16	28
333	85	97	4.5	1.6	F202_0090 EZ503U	210	260	9.006	3161/351	3600	3100	6000	8.9	11/8	16	27
333	105	126	5.6	1.3	F202_0090 EZ702U	210	400	9.006	3161/351	3600	3100	6000	15	11/8	16	30
333	118	140	6.2	1.2	F202_0090 EZ505U	210	400	9.006	3161/351	3600	3100	6000	13	11/8	16	30
419	19	21	1.2	4.3	F202_0072 EZ401U	59	100	7.167	5777/806	3600	3100	6000	2.9	11/8	16	23
419	30	33	1.9	4.3	F202_0072 EZ501U	110	210	7.167	5777/806	3600	3100	6000	4.8	11/8	16	24
419	33	36	2.1	3.9	F202_0072 EZ402U	110	210	7.167	5777/806	3600	3100	6000	3.6	11/8	16	25
419	48	60	3.1	2.7	F202_0072 EZ404U	170	210	7.167	5777/806	3600	3100	6000	4.9	11/8	16	27
419	51	56	3.3	2.5	F202_0072 EZ502U	170	210	7.167	5777/806	3600	3100	6000	7.1	11/8	16	26
419	51	58	3.3	2.5	F202_0072 EZ701U	140	400	7.167	5777/806	3600	3100	6000	10	11/8	16	28
419	67	77	4.3	1.9	F202_0072 EZ503U	170	210	7.167	5777/806	3600	3100	6000	9.5	11/8	16	27
419	83	100	5.3	1.5	F202_0072 EZ702U	210	400	7.167	5777/806	3600	3100	6000	16	11/8	16	30
419	94	111	6.0	1.4	F202_0072 EZ505U	210	400	7.167	5777/806	3600	3100	6000	14	11/8	16	30
419	115	145	7.3	1.1	F202_0072 EZ703U	210	400	7.167	5777/806	3600	3100	6000	24	11/8	16	32
540	40	45	3.2	3.0	F202_0056 EZ701U	110	400	5.552	5341/962	3100	2600	5000	12	11/8	16	28
540	65	78	5.1	1.8	F202_0056 EZ702U	210	400	5.552	5341/962	3100	2600	5000	17	11/8	16	30
540	73	86	5.8	1.6	F202_0056 EZ505U	210	400	5.552	5341/962	3100	2600	5000	15	11/8	16	30
540	89	112	7.0	1.3	F202_0056 EZ703U	210	400	5.552	5341/962	3100	2600	5000	25	11/8	16	32
641	31	39	2.9	3.5	F202_0047 EZ404U	110	140	4.680	2616/559	3100	2600	5000	7.0	11/8	16	27
641	34	36	3.1	3.2	F202_0047 EZ502U	110	140	4.680	2616/559	3100	2600	5000	9.3	11/8	16	26
641	34	38	3.1	3.3	F202_0047 EZ701U	91	340	4.680	2616/559	3100	2600	5000	13	11/8	16	28
641	44	50	4.0	2.5	F202_0047 EZ503U	110	140	4.680	2616/559	3100	2600	5000	12	11/8	16	27
641	54	65	5.0	2.0	F202_0047 EZ702U	190	340	4.680	2616/559	3100	2600	5000	18	11/8	16	30
641	61	73	5.6	1.8	F202_0047 EZ505U	210	340	4.680	2616/559	3100	2600	5000	16	11/8	16	30
641	75	94	6.8	1.5	F202_0047 EZ703U	210	340	4.680	2616/559	3100	2600	5000	26	11/8	16	32
F2 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 210 Nm)																
417	100	160	5.2	1.3	F202_0110 EZ505U	210	400	10.80	7303/676	3800	3500	6000	13	11/8	16	30
500	83	134	5.0	1.5	F202_0090 EZ505U	210	400	9.006	3161/351	3600	3100	6000	13	11/8	16	30
628	66	106	4.8	1.7	F202_0072 EZ505U	210	400	7.167	5777/806	3600	3100	6000	14	11/8	16	30
628	84	139	6.2	1.3	F202_0072 EZ703U	210	400	7.167	5777/806	3600	3100	6000	24	11/8	16	32
811	51	82	4.6	2.0	F202_0056 EZ505U	210	400	5.552	5341/962	3100	2600	5000	15	11/8	16	30
811	65	108	5.9	1.6	F202_0056 EZ703U	210	400	5.552	5341/962	3100	2600	5000	25	11/8	16	32
962	43	69	4.5	2.3	F202_0047 EZ505U	210	340	4.680	2616/559	3100	2600	5000	16	11/8	16	30
962	55	91	5.7	1.8	F202_0047 EZ703U	210	340	4.680	2616/559	3100	2600	5000	26	11/8	16	32
F2 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 270 Nm)																
53	164	184	1.4	1.5	F202_1130 EZ302U	270	480	112.7	1240/11	4000	3900	6000	0.34	11/6	18	22
64	137	153	1.3	1.8	F202_0940 EZ302U	270	480	93.82	1032/11	4000	3900	6000	0.36	11/6	18	22
64	178	205	1.7	1.3	F202_0940 EZ303U	270	480	93.82	1032/11	4000	3900	6000	0.47	11/6	18	22
86	102	114	1.2	2.1	F202_0700 EZ302U	270	430	70.13	5400/77	4000	3900	6000	0.41	11/6	18	22
86	133	153	1.6	1.6	F202_0700 EZ303U	270	430	70.13	5400/77	4000	3900	6000	0.52	11/6	18	22
86	156	190	1.9	1.4	F202_0700 EZ401U	270	480	70.13	5400/77	4000	3900	6000	1.1	11/6	18	23
106	127	154	1.8	1.6	F202_0570 EZ401U	270	480	56.73	624/11	4000	3900	6000	1.1	11/6	18	23
128	68	77	1.2	2.8	F202_0470 EZ302U	230	340	47.05	1035/22	4000	3900	6000	0.52	11/6	18	22

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
F2 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 270 Nm)																
128	89	103	1.5	2.1	F202_0470 EZ303U	270	340	47.05	1035/22	4000	3900	6000	0.63	11/6	18	22
128	105	128	1.8	1.8	F202_0470 EZ401U	270	480	47.05	1035/22	4000	3900	6000	1.2	11/6	18	23
128	155	201	2.6	1.2	F202_0470 EZ501U	270	480	47.05	1035/22	4000	3900	6000	3.1	11/6	18	24
169	52	58	1.1	3.4	F202_0350 EZ302U	170	260	35.46	390/11	3800	3500	6000	0.65	11/6	18	22
169	67	77	1.4	2.6	F202_0350 EZ303U	210	260	35.46	390/11	3800	3500	6000	0.76	11/6	18	22
169	79	96	1.7	2.2	F202_0350 EZ401U	270	480	35.46	390/11	3800	3500	6000	1.3	11/6	18	23
169	117	151	2.5	1.5	F202_0350 EZ501U	270	480	35.46	390/11	3800	3500	6000	3.3	11/6	18	24
169	120	169	2.6	1.4	F202_0350 EZ402U	270	480	35.46	390/11	3800	3500	6000	2.0	11/6	18	25
213	63	76	1.6	2.6	F202_0280 EZ401U	230	480	28.11	4020/143	3800	3500	6000	1.4	11/6	18	23
213	93	120	2.4	1.7	F202_0280 EZ501U	270	480	28.11	4020/143	3800	3500	6000	3.4	11/6	18	24
213	95	134	2.5	1.7	F202_0280 EZ402U	270	480	28.11	4020/143	3800	3500	6000	2.1	11/6	18	25
256	34	38	1.0	4.0	F202_0230 EZ302U	110	170	23.43	2320/99	3600	3100	6000	0.95	11/6	18	22
256	45	51	1.3	3.1	F202_0230 EZ303U	140	170	23.43	2320/99	3600	3100	6000	1.1	11/6	18	22
256	52	64	1.6	2.9	F202_0230 EZ401U	190	480	23.43	2320/99	3600	3100	6000	1.6	11/6	18	23
256	77	100	2.3	2.0	F202_0230 EZ501U	270	480	23.43	2320/99	3600	3100	6000	3.6	11/6	18	24
256	80	111	2.4	1.9	F202_0230 EZ402U	270	480	23.43	2320/99	3600	3100	6000	2.3	11/6	18	25
256	118	177	3.6	1.3	F202_0230 EZ502U	270	480	23.43	2320/99	3600	3100	6000	5.9	11/6	18	26
256	118	180	3.6	1.3	F202_0230 EZ701U	270	480	23.43	2320/99	3600	3100	6000	9.2	11/6	18	28
256	132	191	4.0	1.1	F202_0230 EZ404U	270	480	23.43	2320/99	3600	3100	6000	3.6	11/6	18	27
322	42	51	1.5	3.4	F202_0185 EZ401U	150	480	18.65	6360/341	3600	3100	6000	1.9	11/6	18	23
322	62	80	2.2	2.3	F202_0185 EZ501U	270	480	18.65	6360/341	3600	3100	6000	3.8	11/6	18	24
322	63	89	2.3	2.2	F202_0185 EZ402U	270	480	18.65	6360/341	3600	3100	6000	2.6	11/6	18	25
322	94	141	3.4	1.5	F202_0185 EZ502U	270	480	18.65	6360/341	3600	3100	6000	6.1	11/6	18	26
322	94	143	3.4	1.5	F202_0185 EZ701U	270	480	18.65	6360/341	3600	3100	6000	9.4	11/6	18	28
322	105	152	3.8	1.3	F202_0185 EZ404U	270	480	18.65	6360/341	3600	3100	6000	3.9	11/6	18	27
322	112	192	4.1	1.2	F202_0185 EZ503U	270	480	18.65	6360/341	3600	3100	6000	8.5	11/6	18	27
440	20	22	0.9	4.0	F202_0135 EZ302U	66	99	13.63	109/8	3800	3500	6000	0.93	11/8	16	22
440	26	30	1.2	3.1	F202_0135 EZ303U	79	99	13.63	109/8	3800	3500	6000	1.0	11/8	16	22
440	30	37	1.4	4.2	F202_0135 EZ401U	110	400	13.63	109/8	3800	3500	6000	1.6	11/8	16	23
440	45	58	2.1	2.8	F202_0135 EZ501U	210	400	13.63	109/8	3800	3500	6000	3.5	11/8	16	24
440	46	65	2.2	2.7	F202_0135 EZ402U	210	400	13.63	109/8	3800	3500	6000	2.3	11/8	16	25
440	69	103	3.2	1.8	F202_0135 EZ502U	210	400	13.63	109/8	3800	3500	6000	5.8	11/8	16	26
440	69	104	3.2	1.8	F202_0135 EZ701U	210	400	13.63	109/8	3800	3500	6000	9.1	11/8	16	28
440	77	111	3.6	1.6	F202_0135 EZ404U	210	400	13.63	109/8	3800	3500	6000	3.6	11/8	16	27
440	82	140	3.9	1.5	F202_0135 EZ503U	210	400	13.63	109/8	3800	3500	6000	8.2	11/8	16	27
555	24	29	1.4	4.8	F202_0110 EZ401U	89	310	10.80	7303/676	3800	3500	6000	1.9	11/8	16	23
555	36	46	2.0	3.3	F202_0110 EZ501U	170	310	10.80	7303/676	3800	3500	6000	3.8	11/8	16	24
555	37	51	2.1	3.2	F202_0110 EZ402U	170	310	10.80	7303/676	3800	3500	6000	2.6	11/8	16	25
555	54	82	3.1	2.1	F202_0110 EZ502U	210	310	10.80	7303/676	3800	3500	6000	6.1	11/8	16	26
555	54	83	3.1	2.1	F202_0110 EZ701U	210	400	10.80	7303/676	3800	3500	6000	9.4	11/8	16	28
555	61	88	3.5	1.9	F202_0110 EZ404U	210	310	10.80	7303/676	3800	3500	6000	3.9	11/8	16	27
555	65	111	3.7	1.8	F202_0110 EZ503U	210	310	10.80	7303/676	3800	3500	6000	8.5	11/8	16	27
555	75	150	4.3	1.5	F202_0110 EZ702U	210	400	10.80	7303/676	3800	3500	6000	15	11/8	16	30
666	13	15	0.9	4.0	F202_0090 EZ302U	44	66	9.006	3161/351	3600	3100	6000	1.6	11/8	16	22
666	17	20	1.1	3.1	F202_0090 EZ303U	52	66	9.006	3161/351	3600	3100	6000	1.7	11/8	16	22
666	20	24	1.3	2.6	F202_0090 EZ401U	52	66	9.006	3161/351	3600	3100	6000	2.2	11/8	16	23
666	30	38	2.0	3.7	F202_0090 EZ501U	140	260	9.006	3161/351	3600	3100	6000	4.2	11/8	16	24
666	31	43	2.0	3.6	F202_0090 EZ402U	140	260	9.006	3161/351	3600	3100	6000	2.9	11/8	16	25
666	45	68	3.0	2.4	F202_0090 EZ502U	210	260	9.006	3161/351	3600	3100	6000	6.5	11/8	16	26
666	45	69	3.0	2.4	F202_0090 EZ701U	170	400	9.006	3161/351	3600	3100	6000	9.8	11/8	16	28
666	51	73	3.4	2.2	F202_0090 EZ404U	210	260	9.006	3161/351	3600	3100	6000	4.3	11/8	16	27
666	54	93	3.6	2.0	F202_0090 EZ503U	210	260	9.006	3161/351	3600	3100	6000	8.9	11/8	16	27
666	63	125	4.2	1.7	F202_0090 EZ702U	210	400	9.006	3161/351	3600	3100	6000	15	11/8	16	30
837	24	31	1.9	4.3	F202_0072 EZ501U	110	210	7.167	5777/806	3600	3100	6000	4.8	11/8	16	24
837	24	34	2.0	4.2	F202_0072 EZ402U	110	210	7.167	5777/806	3600	3100	6000	3.6	11/8	16	25
837	36	54	2.9	2.8	F202_0072 EZ502U	170	210	7.167	5777/806	3600	3100	6000	7.1	11/8	16	26
837	36	55	2.9	2.8	F202_0072 EZ701U	140	400	7.167	5777/806	3600	3100	6000	10	11/8	16	28
837	40	58	3.3	2.5	F202_0072 EZ404U	170	210	7.167	5777/806	3600	3100	6000	4.9	11/8	16	27
837	43	74	3.5	2.4	F202_0072 EZ503U	170	210	7.167	5777/806	3600	3100	6000	9.5	11/8	16	27
837	50	99	4.0	2.0	F202_0072 EZ702U	210	400	7.167	5777/806	3600	3100	6000	16	11/8	16	30
F3 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 450 Nm)																
16	281	297	1.2	1.4	F303_1850 EZ302U	450	800	184.8	29939/162	4000	3900	6000	0.37	11/7	22	34
21	217	229	1.1	1.8	F302_1410 EZ302U	450	620	140.6	7595/54	4000	3900	6000	0.37	11/6	22	29
21	282	299	1.4	1.4	F302_1410 EZ303U	450	620	140.6	7595/54	4000	3900	6000	0.48	11/6	22	30

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
F3 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 450 Nm)																
27	306	328	1.7	1.3	F302_1130 EZ401U	450	800	112.8	3724/33	4000	3900	6000	1.0	11/6	22	31
32	254	273	1.6	1.6	F302_0940 EZ401U	450	800	93.64	4214/45	4000	3900	6000	1.1	11/6	22	31
43	191	205	1.4	2.1	F302_0700 EZ401U	450	800	70.36	2744/39	4000	3900	6000	1.2	11/6	22	31
43	293	321	2.1	1.4	F302_0700 EZ501U	450	800	70.36	2744/39	4000	3900	6000	3.2	11/6	22	32
53	153	164	1.2	2.6	F302_0560 EZ401U	450	800	56.49	4067/72	4000	3900	6000	1.3	11/6	22	31
53	236	258	1.9	1.7	F302_0560 EZ501U	450	800	56.49	4067/72	4000	3900	6000	3.3	11/6	22	32
53	258	285	2.1	1.6	F302_0560 EZ402U	450	800	56.49	4067/72	4000	3900	6000	2.0	11/6	22	32
64	128	137	1.1	3.1	F302_0470 EZ401U	390	800	47.19	1274/27	4000	3900	6000	1.4	11/6	22	31
64	197	215	1.7	2.0	F302_0470 EZ501U	450	800	47.19	1274/27	4000	3900	6000	3.4	11/6	22	32
64	215	238	1.9	1.9	F302_0470 EZ402U	450	800	47.19	1274/27	4000	3900	6000	2.1	11/6	22	32
86	95	102	1.1	3.8	F302_0350 EZ401U	290	800	35.03	7252/207	3700	3500	5500	1.7	11/6	22	31
86	146	160	1.6	2.5	F302_0350 EZ501U	450	800	35.03	7252/207	3700	3500	5500	3.6	11/6	22	32
86	160	177	1.8	2.3	F302_0350 EZ402U	450	800	35.03	7252/207	3700	3500	5500	2.4	11/6	22	32
86	234	292	2.6	1.5	F302_0350 EZ404U	450	800	35.03	7252/207	3700	3500	5500	3.7	11/6	22	34
86	251	272	2.8	1.4	F302_0350 EZ502U	450	800	35.03	7252/207	3700	3500	5500	5.9	11/6	22	34
86	251	282	2.8	1.4	F302_0350 EZ701U	450	800	35.03	7252/207	3700	3500	5500	9.2	11/6	22	35
106	77	82	1.0	4.4	F302_0280 EZ401U	230	800	28.23	6860/243	3700	3500	5500	2.0	11/6	22	31
106	118	129	1.6	2.9	F302_0280 EZ501U	440	800	28.23	6860/243	3700	3500	5500	3.9	11/6	22	32
106	129	142	1.7	2.6	F302_0280 EZ402U	440	800	28.23	6860/243	3700	3500	5500	2.7	11/6	22	32
106	189	235	2.5	1.8	F302_0280 EZ404U	450	800	28.23	6860/243	3700	3500	5500	4.0	11/6	22	34
106	203	219	2.7	1.7	F302_0280 EZ502U	450	800	28.23	6860/243	3700	3500	5500	6.2	11/6	22	34
106	203	227	2.7	1.7	F302_0280 EZ701U	450	800	28.23	6860/243	3700	3500	5500	9.5	11/6	22	35
106	266	304	3.6	1.3	F302_0280 EZ503U	450	800	28.23	6860/243	3700	3500	5500	8.6	11/6	22	35
128	64	68	1.0	5.0	F302_0240 EZ401U	190	680	23.52	588/25	3500	3100	5000	2.3	11/6	22	31
128	98	107	1.5	3.2	F302_0240 EZ501U	370	680	23.52	588/25	3500	3100	5000	4.3	11/6	22	32
128	107	119	1.7	3.0	F302_0240 EZ402U	370	680	23.52	588/25	3500	3100	5000	3.0	11/6	22	32
128	157	196	2.5	2.0	F302_0240 EZ404U	450	680	23.52	588/25	3500	3100	5000	4.4	11/6	22	34
128	169	183	2.6	1.9	F302_0240 EZ502U	450	680	23.52	588/25	3500	3100	5000	6.6	11/6	22	34
128	169	189	2.6	1.9	F302_0240 EZ701U	450	800	23.52	588/25	3500	3100	5000	9.9	11/6	22	35
128	221	253	3.5	1.4	F302_0240 EZ503U	450	680	23.52	588/25	3500	3100	5000	9.0	11/6	22	35
128	274	329	4.3	1.2	F302_0240 EZ702U	450	800	23.52	588/25	3500	3100	5000	15	11/6	22	38
160	135	151	2.5	2.2	F302_0190 EZ701U	360	800	18.77	4900/261	3500	3100	5000	10	11/6	22	35
160	219	262	4.1	1.3	F302_0190 EZ702U	450	800	18.77	4900/261	3500	3100	5000	16	11/6	22	38
160	246	291	4.6	1.2	F302_0190 EZ505U	450	800	18.77	4900/261	3500	3100	5000	14	11/6	22	38
224	36	39	0.9	4.3	F302_0135 EZ401U	110	190	13.38	7696/575	3700	3500	5500	2.2	11/8	20	31
224	56	61	1.4	4.7	F302_0135 EZ501U	210	390	13.38	7696/575	3700	3500	5500	4.2	11/8	20	32
224	61	68	1.5	4.3	F302_0135 EZ402U	210	390	13.38	7696/575	3700	3500	5500	2.9	11/8	20	32
224	90	112	2.2	2.9	F302_0135 EZ404U	310	390	13.38	7696/575	3700	3500	5500	4.3	11/8	20	34
224	96	104	2.4	2.7	F302_0135 EZ502U	310	390	13.38	7696/575	3700	3500	5500	6.5	11/8	20	34
224	96	108	2.4	2.7	F302_0135 EZ701U	260	650	13.38	7696/575	3700	3500	5500	9.8	11/8	20	35
224	126	144	3.1	2.1	F302_0135 EZ503U	310	390	13.38	7696/575	3700	3500	5500	8.9	11/8	20	35
224	156	187	3.9	1.7	F302_0135 EZ702U	350	650	13.38	7696/575	3700	3500	5500	15	11/8	20	38
224	175	208	4.4	1.5	F302_0135 EZ505U	350	650	13.38	7696/575	3700	3500	5500	13	11/8	20	38
224	214	270	5.3	1.2	F302_0135 EZ703U	350	650	13.38	7696/575	3700	3500	5500	23	11/8	20	40
278	49	54	1.5	5.0	F302_0110 EZ402U	170	310	10.79	1456/135	3700	3500	5500	3.5	11/8	20	32
278	72	90	2.2	3.4	F302_0110 EZ404U	250	310	10.79	1456/135	3700	3500	5500	4.9	11/8	20	34
278	77	84	2.3	3.2	F302_0110 EZ502U	250	310	10.79	1456/135	3700	3500	5500	7.1	11/8	20	34
278	77	87	2.3	3.2	F302_0110 EZ701U	210	650	10.79	1456/135	3700	3500	5500	10	11/8	20	35
278	101	116	3.0	2.4	F302_0110 EZ503U	250	310	10.79	1456/135	3700	3500	5500	9.5	11/8	20	35
278	126	151	3.7	2.0	F302_0110 EZ702U	350	650	10.79	1456/135	3700	3500	5500	16	11/8	20	38
278	141	167	4.2	1.7	F302_0110 EZ505U	350	650	10.79	1456/135	3700	3500	5500	14	11/8	20	38
278	173	218	5.2	1.4	F302_0110 EZ703U	350	650	10.79	1456/135	3700	3500	5500	24	11/8	20	40
334	60	75	2.1	3.5	F302_0090 EZ404U	210	260	8.986	5616/625	3500	3100	5000	5.6	11/8	20	34
334	65	70	2.2	3.2	F302_0090 EZ502U	210	260	8.986	5616/625	3500	3100	5000	7.8	11/8	20	34
334	65	72	2.2	3.6	F302_0090 EZ701U	170	650	8.986	5616/625	3500	3100	5000	11	11/8	20	35
334	85	97	2.9	2.5	F302_0090 EZ503U	210	260	8.986	5616/625	3500	3100	5000	10	11/8	20	35
334	105	126	3.6	2.2	F302_0090 EZ702U	350	650	8.986	5616/625	3500	3100	5000	16	11/8	20	38
334	118	139	4.1	2.0	F302_0090 EZ505U	350	650	8.986	5616/625	3500	3100	5000	15	11/8	20	38
334	144	181	5.0	1.6	F302_0090 EZ703U	350	650	8.986	5616/625	3500	3100	5000	24	11/8	20	40
418	51	58	2.2	4.2	F302_0072 EZ701U	140	520	7.172	208/29	3500	3100	5000	12	11/8	20	35
418	83	100	3.5	2.6	F302_0072 EZ702U	290	520	7.172	208/29	3500	3100	5000	18	11/8	20	38
418	94	111	3.9	2.3	F302_0072 EZ505U	350	520	7.172	208/29	3500	3100	5000	16	11/8	20	38
418	115	145	4.8	1.9	F302_0072 EZ703U	350	520	7.172	208/29	3500	3100	5000	25	11/8	20	40
524	41	46	2.1	4.8	F302_0057 EZ701U	110	420	5.720	143/25	3000	2600	4500	14	11/8	20	35

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
F3 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 450 Nm)																
524	67	80	3.4	3.0	F302_0057 EZ702U	230	420	5.720	143/25	3000	2600	4500	19	11/8	20	38
524	75	89	3.8	2.6	F302_0057 EZ505U	330	420	5.720	143/25	3000	2600	4500	18	11/8	20	38
524	92	115	4.6	2.2	F302_0057 EZ703U	330	420	5.720	143/25	3000	2600	4500	27	11/8	20	40
646	54	65	3.3	3.4	F302_0046 EZ702U	180	340	4.644	4992/1075	3000	2600	4500	22	11/8	20	38
646	61	72	3.7	3.0	F302_0046 EZ505U	270	340	4.644	4992/1075	3000	2600	4500	20	11/8	20	38
646	74	94	4.5	2.5	F302_0046 EZ703U	270	340	4.644	4992/1075	3000	2600	4500	30	11/8	20	40
646	96	136	5.8	1.9	F302_0046 EZ705U	350	650	4.644	4992/1075	3000	2600	4500	42	11/8	20	45
F3 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 450 Nm)																
240	173	279	3.7	1.5	F302_0190 EZ505U	450	800	18.77	4900/261	3500	3100	5000	14	11/6	22	38
336	123	199	3.5	1.9	F302_0135 EZ505U	350	650	13.38	7696/575	3700	3500	5500	13	11/8	20	38
336	157	260	4.5	1.5	F302_0135 EZ703U	350	650	13.38	7696/575	3700	3500	5500	23	11/8	20	40
417	99	160	3.4	2.2	F302_0110 EZ505U	350	650	10.79	1456/135	3700	3500	5500	14	11/8	20	38
417	127	209	4.3	1.7	F302_0110 EZ703U	350	650	10.79	1456/135	3700	3500	5500	24	11/8	20	40
501	83	133	3.3	2.4	F302_0090 EZ505U	350	650	8.986	5616/625	3500	3100	5000	15	11/8	20	38
501	105	174	4.2	1.9	F302_0090 EZ703U	350	650	8.986	5616/625	3500	3100	5000	24	11/8	20	40
627	66	106	3.2	2.8	F302_0072 EZ505U	350	520	7.172	208/29	3500	3100	5000	16	11/8	20	38
627	84	139	4.0	2.2	F302_0072 EZ703U	350	520	7.172	208/29	3500	3100	5000	25	11/8	20	40
787	53	85	3.1	3.3	F302_0057 EZ505U	330	420	5.720	143/25	3000	2600	4500	18	11/8	20	38
787	67	111	3.9	2.6	F302_0057 EZ703U	330	420	5.720	143/25	3000	2600	4500	27	11/8	20	40
969	43	69	3.0	3.8	F302_0046 EZ505U	270	340	4.644	4992/1075	3000	2600	4500	20	11/8	20	38
969	55	90	3.8	3.0	F302_0046 EZ703U	270	340	4.644	4992/1075	3000	2600	4500	30	11/8	20	40
969	74	135	5.1	2.2	F302_0046 EZ705U	350	650	4.644	4992/1075	3000	2600	4500	42	11/8	20	45
F3 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 450 Nm)																
32	265	297	1.2	1.5	F303_1850 EZ302U	450	800	184.8	29939/162	4000	3900	6000	0.37	11/7	22	34
43	205	229	1.0	2.0	F302_1410 EZ302U	450	620	140.6	7595/54	4000	3900	6000	0.37	11/6	22	29
43	267	307	1.4	1.5	F302_1410 EZ303U	450	620	140.6	7595/54	4000	3900	6000	0.48	11/6	22	30
53	252	306	1.4	1.6	F302_1130 EZ401U	450	800	112.8	3724/33	4000	3900	6000	1.0	11/6	22	31
64	209	254	1.3	1.9	F302_0940 EZ401U	450	800	93.64	4214/45	4000	3900	6000	1.1	11/6	22	31
85	157	191	1.2	2.3	F302_0700 EZ401U	450	800	70.36	2744/39	4000	3900	6000	1.2	11/6	22	31
85	232	300	1.8	1.6	F302_0700 EZ501U	450	800	70.36	2744/39	4000	3900	6000	3.2	11/6	22	32
85	239	334	1.9	1.5	F302_0700 EZ402U	450	800	70.36	2744/39	4000	3900	6000	1.9	11/6	22	32
106	126	153	1.2	2.7	F302_0560 EZ401U	450	800	56.49	4067/72	4000	3900	6000	1.3	11/6	22	31
106	186	241	1.8	1.8	F302_0560 EZ501U	450	800	56.49	4067/72	4000	3900	6000	3.3	11/6	22	32
106	192	268	1.8	1.8	F302_0560 EZ402U	450	800	56.49	4067/72	4000	3900	6000	2.0	11/6	22	32
127	105	128	1.2	3.0	F302_0470 EZ401U	390	800	47.19	1274/27	4000	3900	6000	1.4	11/6	22	31
127	156	201	1.7	2.0	F302_0470 EZ501U	450	800	47.19	1274/27	4000	3900	6000	3.4	11/6	22	32
127	160	224	1.8	2.0	F302_0470 EZ402U	450	800	47.19	1274/27	4000	3900	6000	2.1	11/6	22	32
F4 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 550 Nm)																
344	246	373	7.1	1.5	F402_0058 EZ805U	550	1100	5.813	3784/651	2700	2300	4000	143	10/7	39	81
428	198	300	6.8	1.8	F402_0047 EZ805U	550	910	4.678	1408/301	2700	2300	4000	148	10/7	39	81
F4 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 700 Nm)																
11	417	441	0.9	1.7	F403_2740 EZ302U	700	1400	274.4	59267/216	3800	3500	5500	0.36	10/6	39	42
14	333	352	0.8	2.1	F403_2190 EZ302U	700	1400	219.2	94705/432	3800	3500	5500	0.38	10/6	39	42
14	434	459	1.1	1.6	F403_2190 EZ303U	700	1400	219.2	94705/432	3800	3500	5500	0.49	10/6	39	42
16	279	295	0.8	2.5	F403_1840 EZ302U	700	1180	183.9	39715/216	3800	3500	5500	0.39	10/6	39	42
16	364	385	1.0	1.9	F403_1840 EZ303U	700	1180	183.9	39715/216	3800	3500	5500	0.50	10/6	39	42
16	492	527	1.3	1.4	F403_1840 EZ401U	700	1180	183.9	39715/216	3800	3500	5500	1.0	10/6	39	44
27	468	512	1.6	1.5	F402_1120 EZ501U	700	1400	112.3	1235/11	3800	3500	5500	3.1	10/5	39	40
32	389	426	1.5	1.8	F402_0930 EZ501U	700	1400	93.33	280/3	3800	3500	5500	3.2	10/5	39	40
43	292	319	1.3	2.4	F402_0700 EZ501U	700	1400	70.06	1261/18	3800	3500	5500	3.3	10/5	39	40
54	233	255	1.2	3.0	F402_0560 EZ501U	700	1400	55.97	2015/36	3800	3500	5500	3.5	10/5	39	40
54	402	434	2.0	1.7	F402_0560 EZ502U	700	1400	55.97	2015/36	3800	3500	5500	5.8	10/5	39	42
54	402	451	2.0	1.7	F402_0560 EZ701U	700	1400	55.97	2015/36	3800	3500	5500	9.1	10/5	39	44
64	196	214	1.1	3.4	F402_0470 EZ501U	700	1370	46.94	845/18	3800	3500	5500	3.7	10/5	39	40
64	337	364	1.9	2.0	F402_0470 EZ502U	700	1370	46.94	845/18	3800	3500	5500	6.0	10/5	39	42
64	337	378	1.9	2.0	F402_0470 EZ701U	700	1400	46.94	845/18	3800	3500	5500	9.3	10/5	39	44
64	442	505	2.5	1.5	F402_0470 EZ503U	700	1370	46.94	845/18	3800	3500	5500	8.4	10/5	39	43
86	252	282	1.8	2.4	F402_0350 EZ701U	680	1400	35.08	2210/63	3500	3100	5000	9.8	10/5	39	44
86	408	490	3.0	1.5	F402_0350 EZ702U	700	1400	35.08	2210/63	3500	3100	5000	15	10/5	39	46
107	201	225	1.8	2.8	F402_0280 EZ701U	540	1400	27.99	2015/72	3500	3100	5000	10	10/5	39	44
107	326	391	2.9	1.7	F402_0280 EZ702U	700	1400	27.99	2015/72	3500	3100	5000	16	10/5	39	46
107	366	434	3.2	1.5	F402_0280 EZ505U	700	1400	27.99	2015/72	3500	3100	5000	14	10/5	39	46
129	167	187	1.7	3.1	F402_0230 EZ701U	450	1400	23.21	325/14	3200	2800	4500	11	10/5	39	44

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
F4 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 700 Nm)																
129	270	324	2.8	1.9	F402_0230 EZ702U	700	1400	23.21	325/14	3200	2800	4500	16	10/5	39	46
129	304	360	3.1	1.7	F402_0230 EZ505U	700	1400	23.21	325/14	3200	2800	4500	15	10/5	39	46
129	372	468	3.8	1.4	F402_0230 EZ703U	700	1400	23.21	325/14	3200	2800	4500	24	10/5	39	48
161	134	150	1.7	3.6	F402_0185 EZ701U	360	1350	18.62	3575/192	3200	2800	4500	12	10/5	39	44
161	217	260	2.7	2.2	F402_0185 EZ702U	700	1350	18.62	3575/192	3200	2800	4500	17	10/5	39	46
161	244	289	3.0	2.0	F402_0185 EZ505U	700	1350	18.62	3575/192	3200	2800	4500	15	10/5	39	46
161	298	376	3.7	1.6	F402_0185 EZ703U	700	1350	18.62	3575/192	3200	2800	4500	25	10/5	39	48
221	97	109	1.6	4.5	F402_0135 EZ701U	260	930	13.57	5984/441	3500	3100	5000	11	10/7	39	44
221	158	190	2.6	2.8	F402_0135 EZ702U	540	930	13.57	5984/441	3500	3100	5000	16	10/7	39	46
221	178	211	2.9	2.5	F402_0135 EZ505U	550	930	13.57	5984/441	3500	3100	5000	14	10/7	39	46
221	217	274	3.5	2.0	F402_0135 EZ703U	550	930	13.57	5984/441	3500	3100	5000	24	10/7	39	48
221	280	397	4.5	1.6	F402_0135 EZ705U	550	1100	13.57	5984/441	3500	3100	5000	36	10/7	39	54
277	126	151	2.5	3.2	F402_0110 EZ702U	430	790	10.83	682/63	3500	3100	5000	17	10/7	39	46
277	142	168	2.8	2.9	F402_0110 EZ505U	550	790	10.83	682/63	3500	3100	5000	16	10/7	39	46
277	173	218	3.4	2.3	F402_0110 EZ703U	550	790	10.83	682/63	3500	3100	5000	25	10/7	39	48
277	224	317	4.4	1.8	F402_0110 EZ705U	550	1100	10.83	682/63	3500	3100	5000	37	10/7	39	54
277	234	390	4.6	1.7	F402_0110 EZ802U	550	1100	10.83	682/63	3500	3100	5000	61	10/7	39	62
334	105	125	2.4	3.6	F402_0090 EZ702U	360	650	8.980	440/49	3200	2800	4500	18	10/7	39	46
334	118	139	2.7	3.2	F402_0090 EZ505U	520	650	8.980	440/49	3200	2800	4500	17	10/7	39	46
334	144	181	3.3	2.6	F402_0090 EZ703U	520	650	8.980	440/49	3200	2800	4500	26	10/7	39	48
334	186	263	4.2	2.1	F402_0090 EZ705U	550	1100	8.980	440/49	3200	2800	4500	39	10/7	39	54
334	194	323	4.4	2.0	F402_0090 EZ802U	550	1100	8.980	440/49	3200	2800	4500	63	10/7	39	62
334	232	420	5.3	1.6	F402_0090 EZ803U	550	1100	8.980	440/49	3200	2800	4500	88	10/7	39	68
417	84	101	2.3	4.2	F402_0072 EZ702U	290	520	7.202	605/84	3200	2800	4500	21	10/7	39	46
417	94	112	2.6	3.7	F402_0072 EZ505U	420	520	7.202	605/84	3200	2800	4500	19	10/7	39	46
417	115	145	3.2	3.1	F402_0072 EZ703U	420	520	7.202	605/84	3200	2800	4500	29	10/7	39	48
417	149	211	4.1	2.4	F402_0072 EZ705U	550	1100	7.202	605/84	3200	2800	4500	41	10/7	39	54
417	156	259	4.3	2.3	F402_0072 EZ802U	550	1100	7.202	605/84	3200	2800	4500	65	10/7	39	62
417	186	337	5.1	1.9	F402_0072 EZ803U	550	1100	7.202	605/84	3200	2800	4500	90	10/7	39	68
516	120	170	3.9	2.7	F402_0058 EZ705U	550	1100	5.813	3784/651	2700	2300	4000	44	10/7	39	54
516	126	209	4.1	2.6	F402_0058 EZ802U	550	1100	5.813	3784/651	2700	2300	4000	68	10/7	39	62
516	150	272	4.9	2.2	F402_0058 EZ803U	550	1100	5.813	3784/651	2700	2300	4000	94	10/7	39	68
641	97	137	3.8	3.2	F402_0047 EZ705U	470	910	4.678	1408/301	2700	2300	4000	49	10/7	39	54
641	101	168	4.0	3.0	F402_0047 EZ802U	450	910	4.678	1408/301	2700	2300	4000	73	10/7	39	62
641	121	219	4.7	2.5	F402_0047 EZ803U	550	910	4.678	1408/301	2700	2300	4000	98	10/7	39	68
F4 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 700 Nm)																
128	323	521	2.7	1.6	F402_0350 EZ505U	700	1400	35.08	2210/63	3500	3100	5000	13	10/5	39	46
161	258	415	2.6	1.9	F402_0280 EZ505U	700	1400	27.99	2015/72	3500	3100	5000	14	10/5	39	46
194	214	345	2.5	2.1	F402_0230 EZ505U	700	1400	23.21	325/14	3200	2800	4500	15	10/5	39	46
194	272	450	3.2	1.7	F402_0230 EZ703U	700	1400	23.21	325/14	3200	2800	4500	24	10/5	39	48
242	172	276	2.4	2.5	F402_0185 EZ505U	700	1350	18.62	3575/192	3200	2800	4500	15	10/5	39	46
242	219	361	3.1	1.9	F402_0185 EZ703U	700	1350	18.62	3575/192	3200	2800	4500	25	10/5	39	48
332	125	201	2.3	3.0	F402_0135 EZ505U	550	930	13.57	5984/441	3500	3100	5000	14	10/7	39	46
332	159	263	2.9	2.4	F402_0135 EZ703U	550	930	13.57	5984/441	3500	3100	5000	24	10/7	39	48
332	216	395	4.0	1.8	F402_0135 EZ705U	550	1100	13.57	5984/441	3500	3100	5000	36	10/7	39	54
416	100	161	2.2	3.5	F402_0110 EZ505U	550	790	10.83	682/63	3500	3100	5000	16	10/7	39	46
416	110	362	2.5	3.2	F402_0110 EZ802U	550	1100	10.83	682/63	3500	3100	5000	61	10/7	39	62
416	127	210	2.8	2.8	F402_0110 EZ703U	550	790	10.83	682/63	3500	3100	5000	25	10/7	39	48
416	172	315	3.8	2.1	F402_0110 EZ705U	550	1100	10.83	682/63	3500	3100	5000	37	10/7	39	54
501	83	133	2.2	4.0	F402_0090 EZ505U	520	650	8.980	440/49	3200	2800	4500	17	10/7	39	46
501	91	301	2.4	3.6	F402_0090 EZ802U	550	1100	8.980	440/49	3200	2800	4500	63	10/7	39	62
501	105	174	2.8	3.2	F402_0090 EZ703U	520	650	8.980	440/49	3200	2800	4500	26	10/7	39	48
501	143	261	3.7	2.3	F402_0090 EZ705U	550	1100	8.980	440/49	3200	2800	4500	39	10/7	39	54
625	66	107	2.1	4.7	F402_0072 EZ505U	420	520	7.202	605/84	3200	2800	4500	19	10/7	39	46
625	73	241	2.3	4.2	F402_0072 EZ802U	550	1100	7.202	605/84	3200	2800	4500	65	10/7	39	62
625	85	140	2.7	3.7	F402_0072 EZ703U	420	520	7.202	605/84	3200	2800	4500	29	10/7	39	48
625	115	210	3.6	2.7	F402_0072 EZ705U	550	1100	7.202	605/84	3200	2800	4500	41	10/7	39	54
F6 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 1000 Nm)																
185	459	694	5.4	1.7	F602_0110 EZ805U	1000	1600	10.82	2077/192	3300	2800	4500	141	10/7	73	108
222	381	577	5.2	1.9	F602_0090 EZ805U	1000	1600	8.995	1943/216	2900	2500	4000	144	10/7	73	108
279	303	459	5.0	2.2	F602_0072 EZ805U	1000	1380	7.159	3551/496	2900	2500	4000	149	10/7	73	108
353	240	364	4.9	2.6	F602_0057 EZ805U	880	1100	5.673	1407/248	2500	2100	3500	157	10/7	73	108
440	193	291	4.7	3.0	F602_0045 EZ805U	710	880	4.546	1273/280	2500	2100	3500	169	10/7	73	108

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
F6 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 1100 Nm)																
17	743	812	1.5	1.5	F603_1810 EZ501U	1100	2000	180.6	8671/48	3500	3200	5000	3.2	10/6	77	72
21	583	637	1.3	1.9	F602_1400 EZ501U	1100	2000	139.8	559/4	3500	3200	5000	3.2	10/5	77	67
27	468	512	1.2	2.4	F602_1120 EZ501U	1100	2000	112.2	9425/84	3500	3200	5000	3.3	10/5	77	67
32	389	426	1.1	2.8	F602_0930 EZ501U	1100	1870	93.33	280/3	3500	3200	5000	3.5	10/5	77	67
32	670	724	1.9	1.6	F602_0930 EZ502U	1100	1870	93.33	280/3	3500	3200	5000	5.8	10/5	77	69
32	670	751	1.9	1.6	F602_0930 EZ701U	1100	2000	93.33	280/3	3500	3200	5000	9.1	10/5	77	71
43	290	318	0.9	3.8	F602_0700 EZ501U	1080	1590	69.64	975/14	3500	3200	5000	3.9	10/5	77	67
43	500	540	1.6	2.2	F602_0700 EZ502U	1100	1590	69.64	975/14	3500	3200	5000	6.2	10/5	77	69
43	500	561	1.6	2.2	F602_0700 EZ701U	1100	2000	69.64	975/14	3500	3200	5000	9.5	10/5	77	71
43	655	750	2.1	1.7	F602_0700 EZ503U	1100	1590	69.64	975/14	3500	3200	5000	8.6	10/5	77	70
54	400	449	1.5	2.8	F602_0560 EZ701U	1080	2000	55.71	390/7	3500	3200	5000	10	10/5	77	71
54	649	778	2.4	1.7	F602_0560 EZ702U	1100	2000	55.71	390/7	3500	3200	5000	15	10/5	77	73
64	335	376	1.3	3.3	F602_0470 EZ701U	910	2000	46.72	1495/32	3500	3200	5000	10	10/5	77	71
64	544	653	2.2	2.0	F602_0470 EZ702U	1100	2000	46.72	1495/32	3500	3200	5000	16	10/5	77	73
64	612	725	2.4	1.8	F602_0470 EZ505U	1100	2000	46.72	1495/32	3500	3200	5000	14	10/5	77	73
85	253	283	1.3	4.0	F602_0350 EZ701U	680	2000	35.21	845/24	3300	2800	4500	11	10/5	77	71
85	410	492	2.1	2.4	F602_0350 EZ702U	1100	2000	35.21	845/24	3300	2800	4500	17	10/5	77	73
85	461	546	2.3	2.2	F602_0350 EZ505U	1100	2000	35.21	845/24	3300	2800	4500	15	10/5	77	73
85	564	710	2.8	1.8	F602_0350 EZ703U	1100	2000	35.21	845/24	3300	2800	4500	25	10/5	77	75
107	201	225	1.2	4.6	F602_0280 EZ701U	540	2000	27.99	2015/72	3300	2800	4500	13	10/5	77	71
107	326	391	2.0	2.9	F602_0280 EZ702U	1100	2000	27.99	2015/72	3300	2800	4500	18	10/5	77	73
107	366	434	2.2	2.5	F602_0280 EZ505U	1100	2000	27.99	2015/72	3300	2800	4500	16	10/5	77	73
107	448	565	2.7	2.1	F602_0280 EZ703U	1100	2000	27.99	2015/72	3300	2800	4500	26	10/5	77	75
107	578	820	3.5	1.6	F602_0280 EZ705U	1100	2000	27.99	2015/72	3300	2800	4500	38	10/5	77	81
129	271	325	1.9	3.2	F602_0230 EZ702U	930	1690	23.27	1885/81	2900	2500	4000	19	10/5	77	73
129	305	361	2.2	2.9	F602_0230 EZ505U	1100	1690	23.27	1885/81	2900	2500	4000	18	10/5	77	73
129	372	470	2.7	2.3	F602_0230 EZ703U	1100	1690	23.27	1885/81	2900	2500	4000	27	10/5	77	75
129	481	682	3.4	1.8	F602_0230 EZ705U	1100	2000	23.27	1885/81	2900	2500	4000	39	10/5	77	81
129	503	837	3.6	1.7	F602_0230 EZ802U	1100	2000	23.27	1885/81	2900	2500	4000	63	10/5	77	89
162	383	543	3.3	2.1	F602_0185 EZ705U	1100	2000	18.52	3445/186	2900	2500	4000	42	10/5	77	81
162	401	667	3.5	2.0	F602_0185 EZ802U	1100	2000	18.52	3445/186	2900	2500	4000	66	10/5	77	89
220	158	190	1.8	4.6	F602_0135 EZ702U	540	920	13.61	871/64	3300	2800	4500	19	10/7	73	73
220	178	211	2.0	4.1	F602_0135 EZ505U	740	920	13.61	871/64	3300	2800	4500	18	10/7	73	73
220	218	275	2.4	3.4	F602_0135 EZ703U	740	920	13.61	871/64	3300	2800	4500	27	10/7	73	75
220	281	399	3.1	2.6	F602_0135 EZ705U	1000	1600	13.61	871/64	3300	2800	4500	39	10/7	73	81
220	294	490	3.3	2.5	F602_0135 EZ802U	1000	1600	13.61	871/64	3300	2800	4500	63	10/7	73	89
220	351	636	3.9	2.1	F602_0135 EZ803U	1000	1600	13.61	871/64	3300	2800	4500	89	10/7	73	95
277	126	151	1.7	5.0	F602_0110 EZ702U	430	790	10.82	2077/192	3300	2800	4500	22	10/7	73	73
277	142	168	1.9	4.4	F602_0110 EZ505U	630	790	10.82	2077/192	3300	2800	4500	20	10/7	73	73
277	173	218	2.3	3.6	F602_0110 EZ703U	630	790	10.82	2077/192	3300	2800	4500	30	10/7	73	75
277	224	317	3.0	3.0	F602_0110 EZ705U	1000	1600	10.82	2077/192	3300	2800	4500	42	10/7	73	81
277	234	389	3.2	2.9	F602_0110 EZ802U	1000	1600	10.82	2077/192	3300	2800	4500	66	10/7	73	89
277	279	506	3.8	2.4	F602_0110 EZ803U	1000	1600	10.82	2077/192	3300	2800	4500	91	10/7	73	95
334	105	126	1.6	5.0	F602_0090 EZ702U	360	650	8.995	1943/216	2900	2500	4000	25	10/7	73	73
334	118	140	1.9	4.4	F602_0090 EZ505U	520	650	8.995	1943/216	2900	2500	4000	23	10/7	73	73
334	144	181	2.3	3.6	F602_0090 EZ703U	520	650	8.995	1943/216	2900	2500	4000	33	10/7	73	75
334	186	264	2.9	3.4	F602_0090 EZ705U	910	1600	8.995	1943/216	2900	2500	4000	45	10/7	73	81
334	195	324	3.1	3.3	F602_0090 EZ802U	870	1600	8.995	1943/216	2900	2500	4000	69	10/7	73	89
334	232	421	3.7	2.7	F602_0090 EZ803U	1000	1600	8.995	1943/216	2900	2500	4000	94	10/7	73	95
419	148	210	2.8	4.0	F602_0072 EZ705U	720	1380	7.159	3551/496	2900	2500	4000	50	10/7	73	81
419	155	258	2.9	3.8	F602_0072 EZ802U	690	1380	7.159	3551/496	2900	2500	4000	74	10/7	73	89
419	185	335	3.5	3.2	F602_0072 EZ803U	1000	1380	7.159	3551/496	2900	2500	4000	100	10/7	73	95
529	117	166	2.7	4.7	F602_0057 EZ705U	570	1100	5.673	1407/248	2500	2100	3500	58	10/7	73	81
529	123	204	2.8	4.4	F602_0057 EZ802U	550	1100	5.673	1407/248	2500	2100	3500	82	10/7	73	89
529	146	265	3.4	3.7	F602_0057 EZ803U	800	1100	5.673	1407/248	2500	2100	3500	108	10/7	73	95
660	117	213	3.3	4.3	F602_0045 EZ803U	640	880	4.546	1273/280	2500	2100	3500	120	10/7	73	95
F6 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 1100 Nm)																
81	513	827	2.0	2.0	F602_0560 EZ505U	1100	2000	55.71	390/7	3500	3200	5000	14	10/5	77	73
96	431	693	2.0	2.2	F602_0470 EZ505U	1100	2000	46.72	1495/32	3500	3200	5000	14	10/5	77	73
128	324	523	1.9	2.7	F602_0350 EZ505U	1100	2000	35.21	845/24	3300	2800	4500	15	10/5	77	73
128	413	683	2.4	2.1	F602_0350 EZ703U	1100	2000	35.21	845/24	3300	2800	4500	25	10/5	77	75
161	258	415	1.8	3.1	F602_0280 EZ505U	1100	2000	27.99	2015/72	3300	2800	4500	16	10/5	77	73
161	328	543	2.3	2.5	F602_0280 EZ703U	1100	2000	27.99	2015/72	3300	2800	4500	26	10/5	77	75
161	445	814	3.1	1.8	F602_0280 EZ705U	1100	2000	27.99	2015/72	3300	2800	4500	38	10/5	77	81

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,3,4 [rpm]	n_{1maxDB} EL5,6 [rpm]	n_{1maxDB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
F6 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 1100 Nm)																
331	139	455	1.8	4.6	F602_0135 EZ802U	1000	1600	13.61	871/64	3300	2800	4500	63	10/7	73	89
331	160	264	2.0	4.0	F602_0135 EZ703U	740	920	13.61	871/64	3300	2800	4500	27	10/7	73	75
331	216	396	2.8	2.9	F602_0135 EZ705U	1000	1600	13.61	871/64	3300	2800	4500	39	10/7	73	81
416	127	210	2.0	4.7	F602_0110 EZ703U	630	790	10.82	2077/192	3300	2800	4500	30	10/7	73	75
416	172	315	2.7	3.4	F602_0110 EZ705U	1000	1600	10.82	2077/192	3300	2800	4500	42	10/7	73	81

13.3 Dimensional drawings

In this chapter you can find the dimensions of the geared motors.

There is a dimensional drawing for every possible shaft/housing design, each with the tables for gear unit dimensions, motor dimensions and geared motor dimensions.

Dimensions can exceed the specifications of ISO 2768-mK due to casting tolerances or accumulation of individual tolerances.

We reserve the right to make dimensional changes due to ongoing technical development.

You can download CAD models of our standard drives at http://cad.stoeber.de.

Combination options and the dimensions of forced ventilated geared motors can be found at http://cad.stoeber.de.

Tolerances

Axis height in accordance with DIN 747	Tolerance
Up to 50 mm	-0.4 mm
Up to 250 mm	-0.5 mm
Up to 630 mm	-0.6 mm

Solid shaft	Tolerance
Shaft ∅ fit ≤ 50 mm	DIN 748-1, ISO k6
Shaft ∅ fit > 50 mm	DIN 748-1, ISO m6
Feather keys	DIN 6885-1, high form A

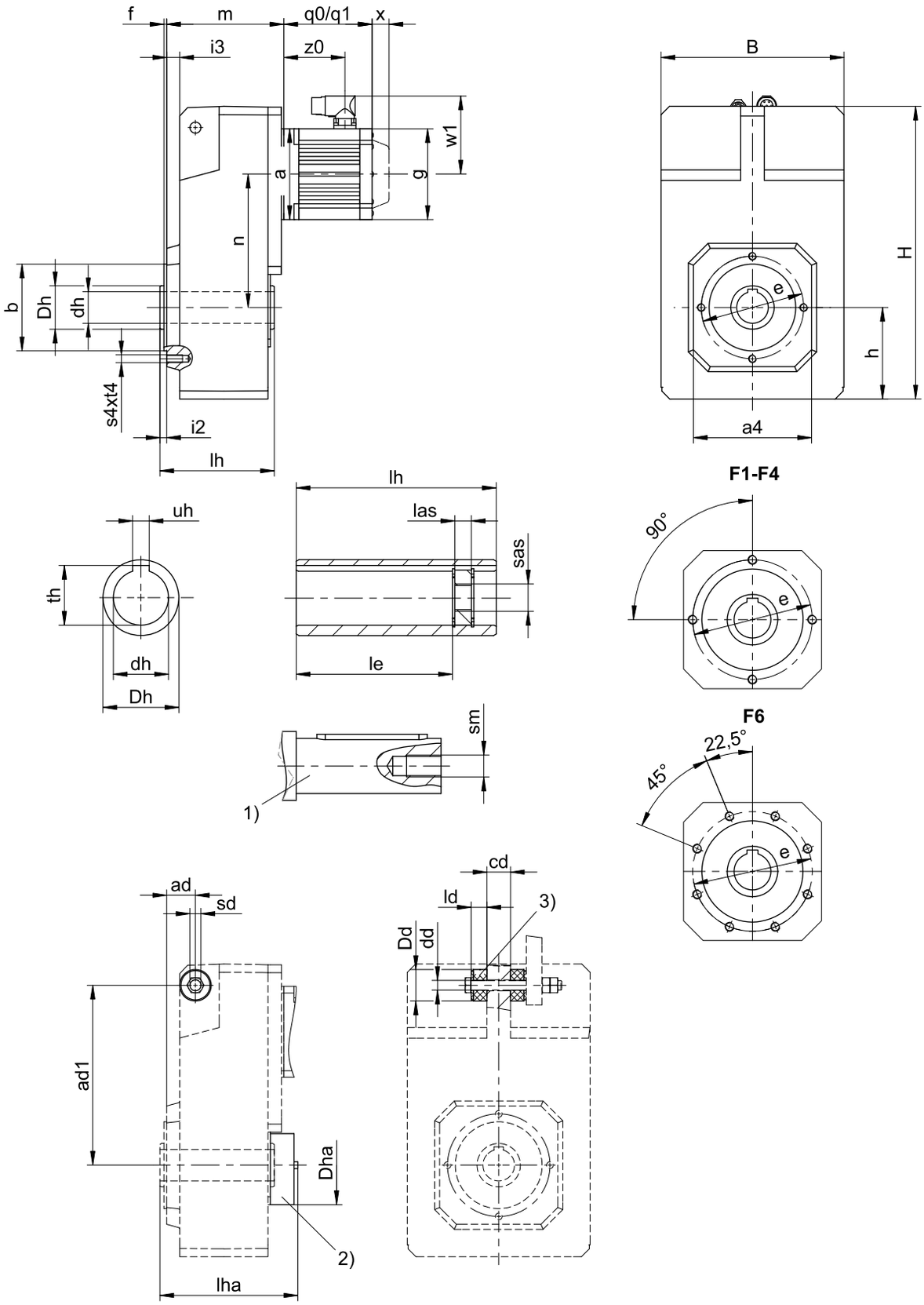
Hollow shaft	Tolerance
Hollow shaft hole fit	ISO H7

Flange	Pilot tolerance
Up to 300 mm	ISO j6
Starting at 350 mm	ISO h6

Centering holes in solid shafts in accordance with DIN 332-2, DR shape

Thread size	M4	M5	M6	M8	M10	M12	M16	M20	M24
Thread depth [mm]	10	12.5	16	19	22	28	36	42	50

13.3.1 A shaft design (hollow shaft), G housing design (pitch circle diameter)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▶ 23.4]
1)	The length of the machine shaft must be at least 2.2 x ∅dh and the length of the feather key must be at least 2 x ∅dh.	2)	Cover (optional)
3)	Rubber buffer for torque arm (optional). Dimension ∅Dd = outer∅ of the rubber buffer when not tensioned.		

Dimensions of gear units

Type	□a4	ad	ad1	Øb	B	cd	Ødd	Ødh	ØDd	ØDh	ØDha	Øe	f	h	H	i2	i3	ld	le	lh	las	lha	s4	sd	sm	sas	t4	th	uh
F1	100	29.5	150	70_{j6}	145	20	$11.0^{+0,5}$	20^{H7}	30	35	70	85	2.5	74	238.0	6.5	12.5	15	73	95	12	112.0	M8	M10	M6	M8	13	22.8	6^{JS9}
F2	130	33.0	181	95_{j6}	180	22	$11.0^{+0,5}$	25^{H7}	30	45	82	115	3.0	93	299.0	8.0	15.0	15	92	115	12	130.5	M8	M10	M10	M12	13	28.3	8^{JS9}
F3	150	38.5	205	110_{j6}	206	30	$14.0^{+0,5}$	30^{H7}	37	50	88	130	3.5	106	335.5	8.5	16.5	20	103	130	12	155.5	M10	M12	M10	M12	16	33.3	8^{JS9}
F4	150	38.5	228	110_{j6}	230	30	$14.0^{+0,5}$	40^{H7}	37	55	100	130	3.5	116	370.0	8.5	16.5	20	114	145	12	174.5	M10	M12	M16	M20	16	43.3	12^{JS9}
F6	180	44.5	270	130_{j6}	265	35	$22.0^{+0,5}$	50^{H7}	60	70	115	165	3.5	137	433.0	10.5	20.5	30	143	180	12	192.5	M10	M20	M16	M20	16	53.8	14^{JS9}

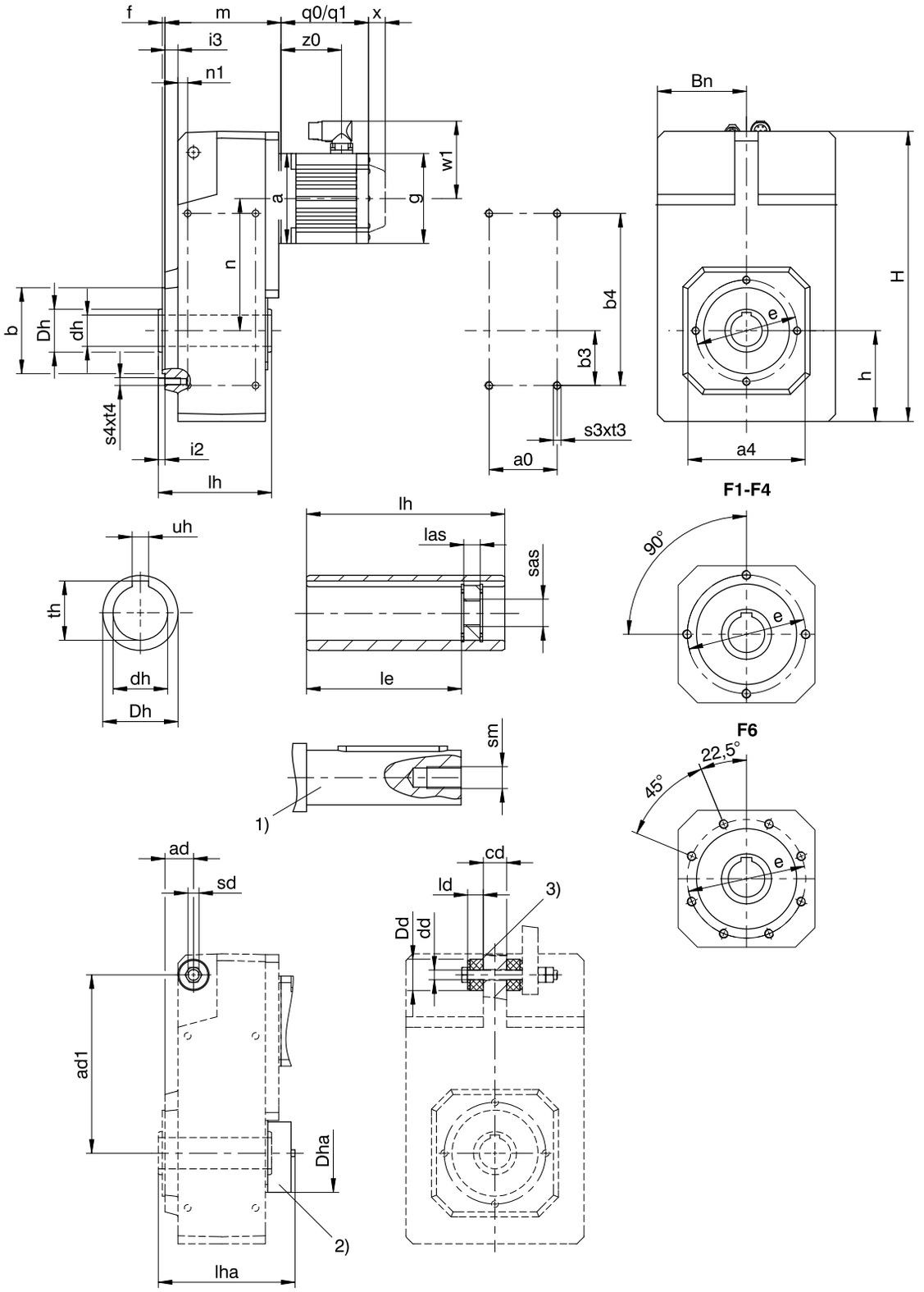
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5
EZ805U	190	355.5	432.5	156.5	22	301.5

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
F102	□72	97.5	102.0	□98	97.5	102.0	□115	101.5	102.0	□145	103.5	102.0	–	–	–
F202	□72	115.0	131.0	□98	115.0	131.0	□115	119.0	131.0	□145	121.0	131.0	–	–	–
F203	∅140	152.0	131.0	–	–	–	–	–	–	–	–	–	–	–	–
F302	∅140	129.5	149.5	∅140	129.5	149.5	□115	133.5	149.5	□145	135.5	149.5	–	–	–
F303	∅140	166.5	149.5	–	–	–	–	–	–	–	–	–	–	–	–
F402	–	–	–	–	–	–	∅160	148.5	169.0	□145	150.5	169.0	□190	153.5	169.0
F403	∅140	181.5	169.0	∅140	181.5	169.0	–	–	–	–	–	–	–	–	–
F602	–	–	–	–	–	–	∅160	179.5	196.0	□145	181.5	196.0	□190	184.5	196.0
F603	–	–	–	–	–	–	∅160	222.5	196.0	–	–	–	–	–	–

13.3.2 A shaft design (hollow shaft), GN housing design (pitch circle diameter + side fastening)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▶ 23.4]
1)	The length of the machine shaft must be at least 2.2 x ∅dh and the length of the feather key must be at least 2 x ∅dh.	2)	Cover (optional)
3)	Rubber buffer for torque arm (optional). Dimension ∅Dd = outer∅ of the rubber buffer when not tensioned.		

Dimensions of gear units

Type	a0	□a4	ad	ad1	Ød	b3	b4	Bn	cd	Ødd	Ødh	ØDd	ØDh	ØDha	Øe	f	h	H
F1	50	100	29.5	150	70_{j6}	40	140	71	20	$11.0^{+0,5}$	20^{H7}	30	35	70	85	2.5	74	238.0
F2	64	130	33.0	181	95_{j6}	55	175	88	22	$11.0^{+0,5}$	25^{H7}	30	45	82	115	3.0	93	299.0
F3	72	150	38.5	205	110_{j6}	60	200	102	30	$14.0^{+0,5}$	30^{H7}	37	50	88	130	3.5	106	335.5
F4	87	150	38.5	228	110_{j6}	70	220	114	30	$14.0^{+0,5}$	40^{H7}	37	55	100	130	3.5	116	370.0
F6	108	180	44.5	270	130_{j6}	85	270	131	35	$22.0^{+0,5}$	50^{H7}	60	70	115	165	3.5	137	433.0

Type	i2	i3	ld	le	lh	las	lha	n1	s3	s4	sd	sm	sas	t3	t4	th	uh
F1	6.5	12.5	15	73	95	12	112.0	10.0	M6	M8	M10	M6	M8	11	13	22.8	6^{JS9}
F2	8.0	15.0	15	92	115	12	130.5	10.5	M8	M8	M10	M10	M12	13	13	28.3	8^{JS9}
F3	8.5	16.5	20	103	130	12	155.5	12.5	M10	M10	M12	M10	M12	16	16	33.3	8^{JS9}
F4	8.5	16.5	20	114	145	12	174.5	12.5	M10	M10	M12	M16	M20	16	16	43.3	12^{JS9}
F6	10.5	20.5	30	143	180	12	192.5	15.5	M12	M10	M20	M16	M20	19	16	53.8	14^{JS9}

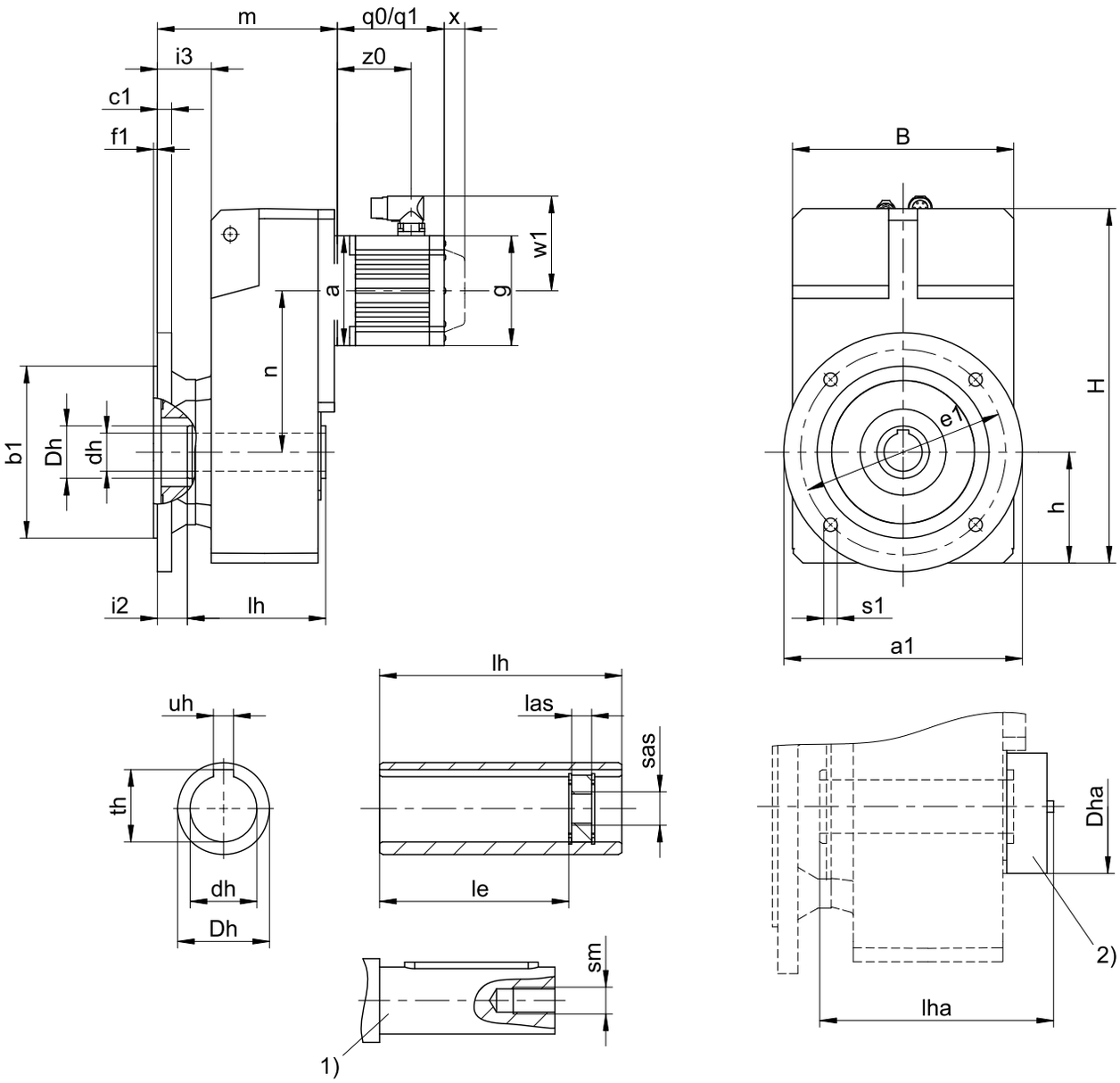
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5
EZ805U	190	355.5	432.5	156.5	22	301.5

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
F102	□72	97.5	102.0	□98	97.5	102.0	□115	101.5	102.0	□145	103.5	102.0	–	–	–
F202	□72	115.0	131.0	□98	115.0	131.0	□115	119.0	131.0	□145	121.0	131.0	–	–	–
F203	∅140	152.0	131.0	–	–	–	–	–	–	–	–	–	–	–	–
F302	∅140	129.5	149.5	∅140	129.5	149.5	□115	133.5	149.5	□145	135.5	149.5	–	–	–
F303	∅140	166.5	149.5	–	–	–	–	–	–	–	–	–	–	–	–
F402	–	–	–	–	–	–	∅160	148.5	169.0	□145	150.5	169.0	□190	153.5	169.0
F403	∅140	181.5	169.0	∅140	181.5	169.0	–	–	–	–	–	–	–	–	–
F602	–	–	–	–	–	–	∅160	179.5	196.0	□145	181.5	196.0	□190	184.5	196.0
F603	–	–	–	–	–	–	∅160	222.5	196.0	–	–	–	–	–	–

13.3.3 A shaft design (hollow shaft), F housing design (round flange)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▶ 23.4]
1)	The length of the machine shaft must be at least 2.2 x ∅dh and the length of the feather key must be at least 2 x ∅dh.	2)	Cover (optional)

Dimensions of gear units

Type	Øa1	Øb1	B	c1	Ødh	ØDh	ØDha	Øe1	f1	h	H	i2	i3	le	lh	las	lha	Øs1	sm	sas	th	uh
F1	160	110_{j6}	145	10	20^{H7}	35	70	130	3.5	74	238.0	25.5	44.5	73	95	12	112.0	9	M6	M8	22.8	6^{JS9}
F2	200	130_{j6}	180	14	25^{H7}	45	82	165	3.5	93	299.0	30.0	53.0	92	115	12	130.5	11	M10	M12	28.3	8^{JS9}
F3	250	180_{j6}	206	15	30^{H7}	50	88	215	4.0	106	335.5	31.5	56.5	103	130	12	155.5	14	M10	M12	33.3	8^{JS9}
F4	250	180_{j6}	230	15	40^{H7}	55	100	215	4.0	116	370.0	31.5	56.5	114	145	12	174.5	14	M16	M20	43.3	12^{JS9}
F6	300	230_{j6}	265	17	50^{H7}	70	115	265	4.0	137	433.0	29.5	60.5	143	180	12	192.5	14	M16	M20	53.8	14^{JS9}

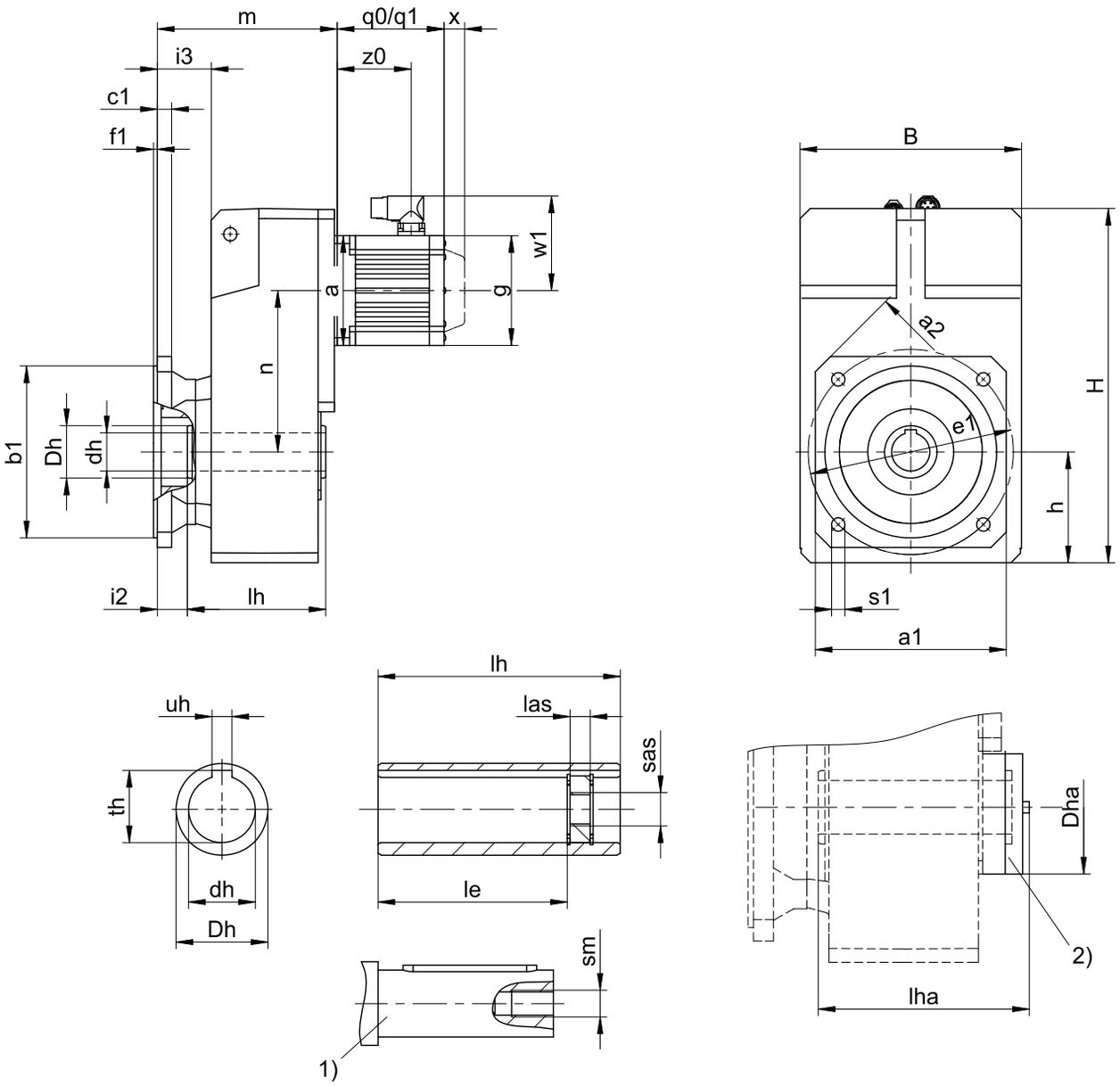
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5
EZ805U	190	355.5	432.5	156.5	22	301.5

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
F102	□72	129.5	102.0	□98	129.5	102.0	□115	133.5	102.0	□145	135.5	102.0	–	–	–
F202	□72	153.0	131.0	□98	153.0	131.0	□115	157.0	131.0	□145	159.0	131.0	–	–	–
F203	∅140	190.0	131.0	–	–	–	–	–	–	–	–	–	–	–	–
F302	∅140	169.5	149.5	∅140	169.5	149.5	□115	173.5	149.5	□145	175.5	149.5	–	–	–
F303	∅140	206.5	149.5	–	–	–	–	–	–	–	–	–	–	–	–
F402	–	–	–	–	–	–	∅160	188.5	169.0	□145	190.5	169.0	□190	193.5	169.0
F403	∅140	221.5	169.0	∅140	221.5	169.0	–	–	–	–	–	–	–	–	–
F602	–	–	–	–	–	–	∅160	219.5	196.0	□145	221.5	196.0	□190	224.5	196.0
F603	–	–	–	–	–	–	∅160	262.5	196.0	–	–	–	–	–	–

13.3.4 A shaft design (hollow shaft), Q housing design (square flange)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]
1)	The length of the machine shaft must be at least 2.2 x ∅dh and the length of the feather key must be at least 2 x ∅dh.	2)	Cover (optional)

Dimensions of gear units

Type	□a1	□a2	Øb1	B	c1	Ødh	ØDh	ØDha	Øe1	f1	h	H	i2	i3	le	lh	las	lha	Øs1	sm	sas	th	uh
F1	125	160	110_{j6}	145	10	20^{H7}	35	70	130	3.5	74	238.0	25.5	44.5	73	95	12	112.0	9	M6	M8	22.8	6^{JS9}
F2	150	195	130_{j6}	180	14	25^{H7}	45	82	165	3.5	93	299.0	30.0	53.0	92	115	12	130.5	11	M10	M12	28.3	8^{JS9}
F3	200	260	180_{j6}	206	15	30^{H7}	50	88	215	4.0	106	335.5	31.5	56.5	103	130	12	155.5	14	M10	M12	33.3	8^{JS9}
F4	200	260	180_{j6}	230	15	40^{H7}	55	100	215	4.0	116	370.0	31.5	56.5	114	145	12	174.5	14	M16	M20	43.3	12^{JS9}
F6	250	325	230_{j6}	265	17	50^{H7}	70	115	265	4.0	137	433.0	29.5	60.5	143	180	12	192.5	14	M16	M20	53.8	14^{JS9}

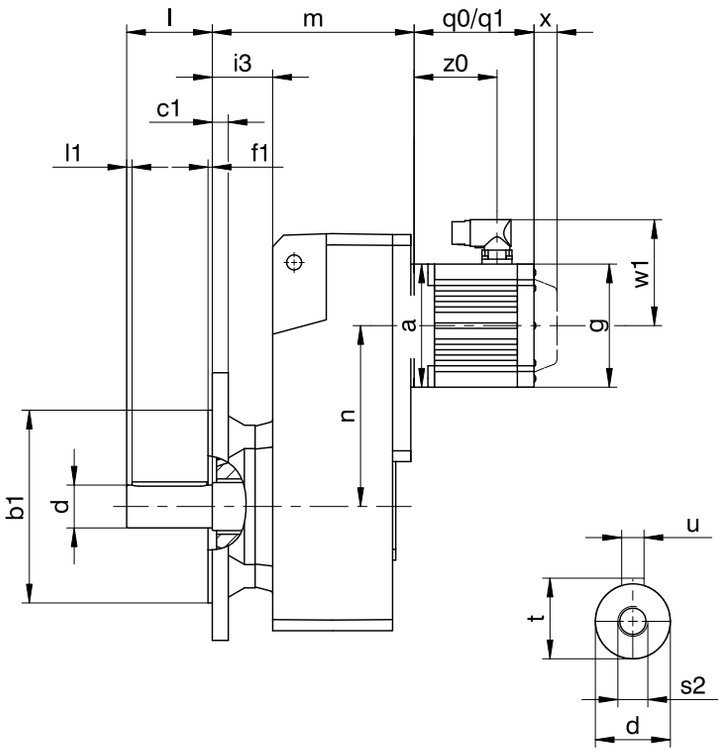
Dimensions of motors

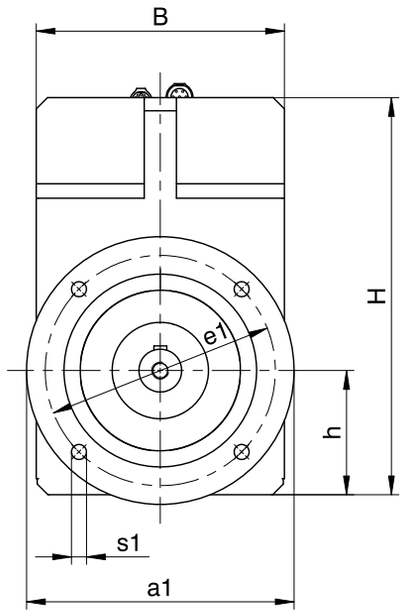
Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5
EZ805U	190	355.5	432.5	156.5	22	301.5

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
F102	□72	129.5	102.0	□98	129.5	102.0	□115	133.5	102.0	□145	135.5	102.0	–	–	–
F202	□72	153.0	131.0	□98	153.0	131.0	□115	157.0	131.0	□145	159.0	131.0	–	–	–
F203	∅140	190.0	131.0	–	–	–	–	–	–	–	–	–	–	–	–
F302	∅140	169.5	149.5	∅140	169.5	149.5	□115	173.5	149.5	□145	175.5	149.5	–	–	–
F303	∅140	206.5	149.5	–	–	–	–	–	–	–	–	–	–	–	–
F402	–	–	–	–	–	–	∅160	188.5	169.0	□145	190.5	169.0	□190	193.5	169.0
F403	∅140	221.5	169.0	∅140	221.5	169.0	–	–	–	–	–	–	–	–	–
F602	–	–	–	–	–	–	∅160	219.5	196.0	□145	221.5	196.0	□190	224.5	196.0
F603	–	–	–	–	–	–	∅160	262.5	196.0	–	–	–	–	–	–

13.3.5 V shaft design (solid shaft), F housing design (round flange)





q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]

Dimensions of gear units

Type	Øa1	Øb1	B	c1	Ød	Øe1	f1	h	H	i3	l	l1	Øs1	s2	t	u
F1	160	110_{j6}	145	10	25_{k6}	130	3.5	74	238.0	44.5	50	5	9	M10	28.0	A8×7×40
F2	200	130_{j6}	180	14	30_{k6}	165	3.5	93	299.0	53.0	60	5	11	M10	33.0	A8×7×50
F3	250	180_{j6}	206	15	35_{k6}	215	4.0	106	335.5	56.5	70	5	14	M12	38.0	A10×8×60
F4	250	180_{j6}	230	15	40_{k6}	215	4.0	116	370.0	56.5	80	5	14	M16	43.0	A12×8×70
F6	300	230_{j6}	265	17	50_{k6}	265	4.0	137	433.0	60.5	100	5	14	M16	53.5	A14×9×90

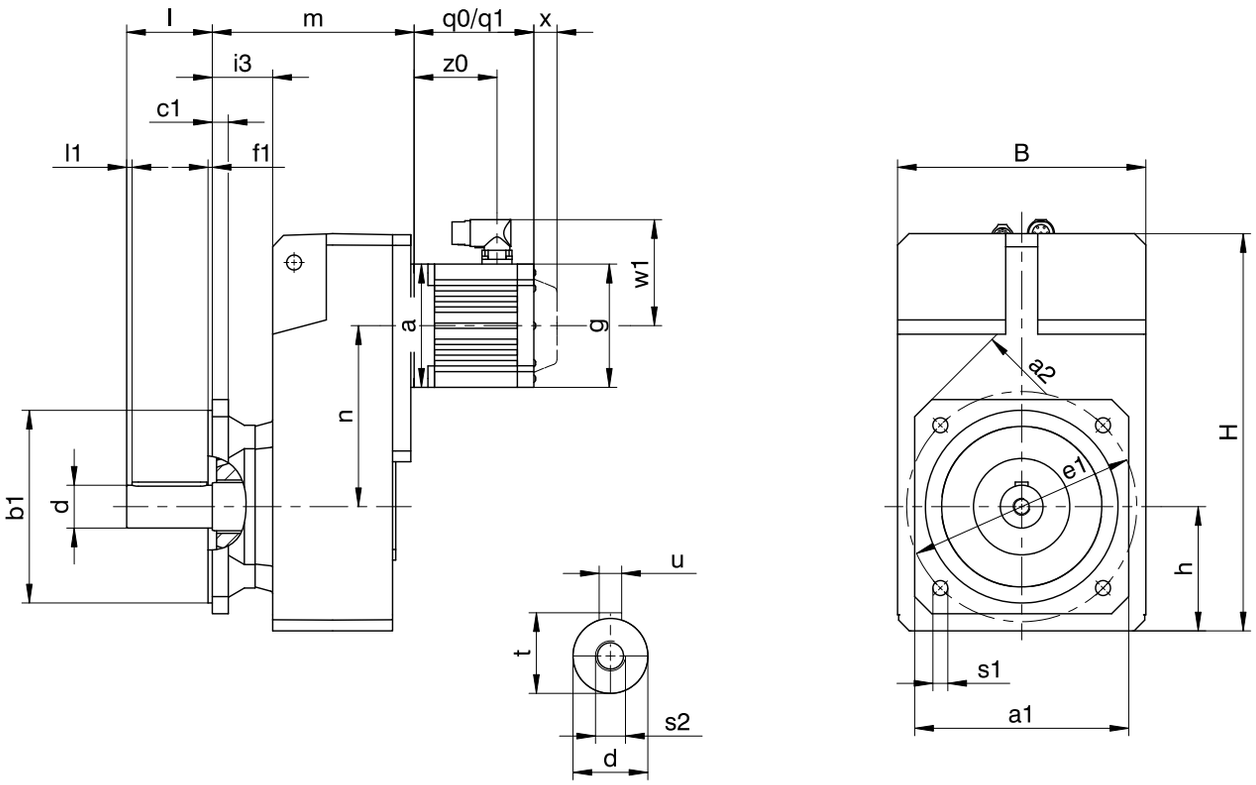
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5
EZ805U	190	355.5	432.5	156.5	22	301.5

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
F102	□72	129.5	102.0	□98	129.5	102.0	□115	133.5	102.0	□145	135.5	102.0	–	–	–
F202	□72	153.0	131.0	□98	153.0	131.0	□115	157.0	131.0	□145	159.0	131.0	–	–	–
F203	∅140	190.0	131.0	–	–	–	–	–	–	–	–	–	–	–	–
F302	∅140	169.5	149.5	∅140	169.5	149.5	□115	173.5	149.5	□145	175.5	149.5	–	–	–
F303	∅140	206.5	149.5	–	–	–	–	–	–	–	–	–	–	–	–
F402	–	–	–	–	–	–	∅160	188.5	169.0	□145	190.5	169.0	□190	193.5	169.0
F403	∅140	221.5	169.0	∅140	221.5	169.0	–	–	–	–	–	–	–	–	–
F602	–	–	–	–	–	–	∅160	219.5	196.0	□145	221.5	196.0	□190	224.5	196.0
F603	–	–	–	–	–	–	∅160	262.5	196.0	–	–	–	–	–	–

13.3.6 V shaft design (solid shaft), Q housing design (square flange)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]

Dimensions of gear units

Type	□a1	□a2	Øb1	c1	B	Ød	Øe1	f1	h	H	i3	l	l1	Øs1	s2	t	u
F1	125	160	110_{j6}	10	145	25_{k6}	130	3.5	74	238.0	44.5	50	5	9	M10	28.0	A8×7×40
F2	150	195	130_{j6}	14	180	30_{k6}	165	3.5	93	299.0	53.0	60	5	11	M10	33.0	A8×7×50
F3	200	260	180_{j6}	15	206	35_{k6}	215	4.0	106	335.5	56.5	70	5	14	M12	38.0	A10×8×60
F4	200	260	180_{j6}	15	230	40_{k6}	215	4.0	116	370.0	56.5	80	5	14	M16	43.0	A12×8×70
F6	250	325	230_{j6}	17	265	50_{k6}	265	4.0	137	433.0	60.5	100	5	14	M16	53.5	A14×9×90

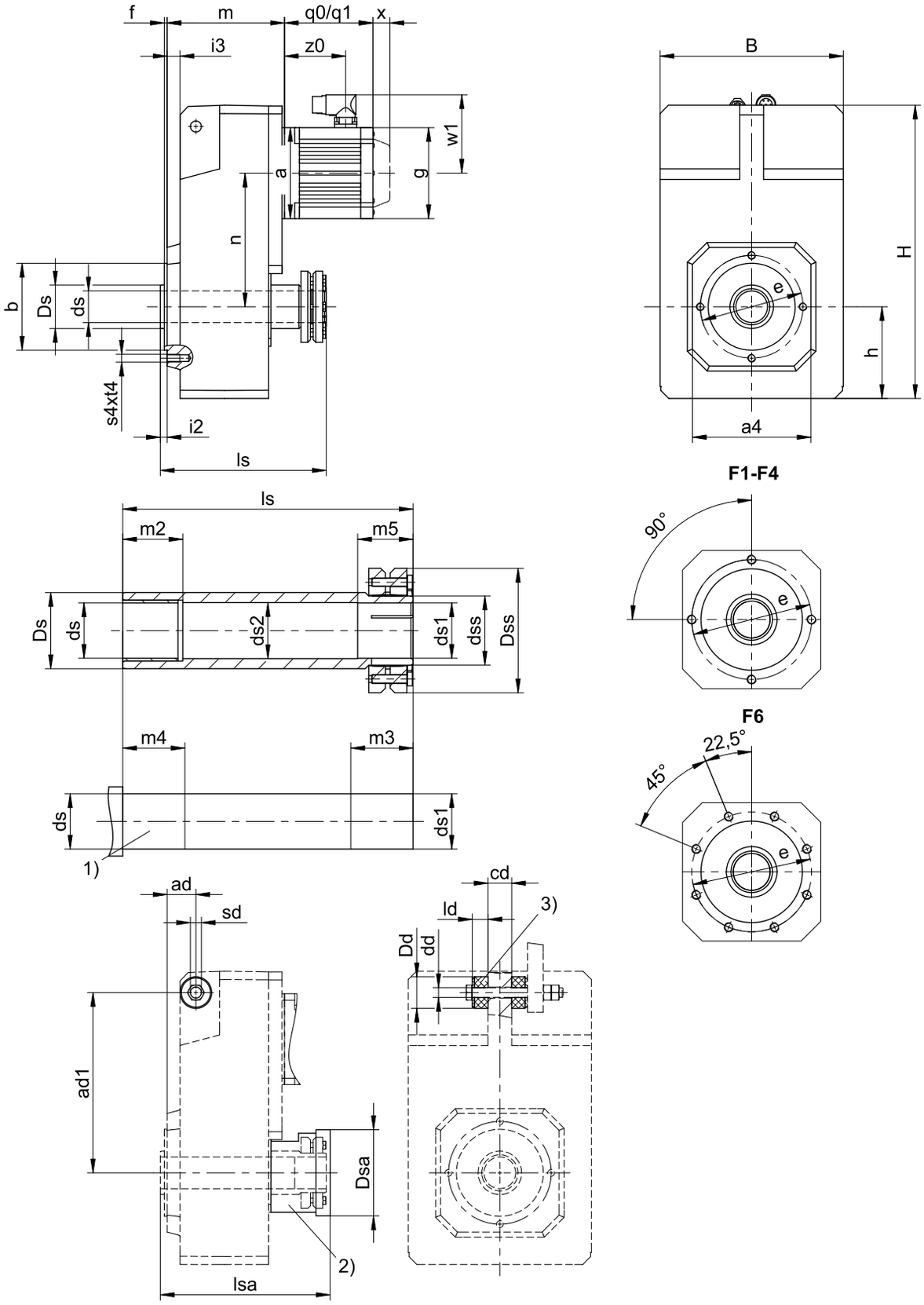
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5
EZ805U	190	355.5	432.5	156.5	22	301.5

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
F102	□72	129.5	102.0	□98	129.5	102.0	□115	133.5	102.0	□145	135.5	102.0	–	–	–
F202	□72	153.0	131.0	□98	153.0	131.0	□115	157.0	131.0	□145	159.0	131.0	–	–	–
F203	∅140	190.0	131.0	–	–	–	–	–	–	–	–	–	–	–	–
F302	∅140	169.5	149.5	∅140	169.5	149.5	□115	173.5	149.5	□145	175.5	149.5	–	–	–
F303	∅140	206.5	149.5	–	–	–	–	–	–	–	–	–	–	–	–
F402	–	–	–	–	–	–	∅160	188.5	169.0	□145	190.5	169.0	□190	193.5	169.0
F403	∅140	221.5	169.0	∅140	221.5	169.0	–	–	–	–	–	–	–	–	–
F602	–	–	–	–	–	–	∅160	219.5	196.0	□145	221.5	196.0	□190	224.5	196.0
F603	–	–	–	–	–	–	∅160	262.5	196.0	–	–	–	–	–	–

13.3.7 S shaft design (hollow shaft with shrink disk), G housing design (pitch circle diameter)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]
1)	Machine shaft: The dimension ls must meet or exceed the specified value.	2)	Cover (optional)
3)	Rubber buffer for torque arm (optional). Dimension ∅Dd = outer∅ of the rubber buffer when not tensioned.		

Dimensions of gear units

Type	□a4	ad	ad1	Øb	B	cd	Ødd	Øds	Øds1	Øds2	Ødss	ØDd	ØDs	ØDsa	ØDss	Øe	f	h	H	i2	i3	ld	ls	lsa	m2	m3	m4	m5	s4	sd	t4
F1	100	29.5	150	70_{j6}	145	20	$11.0^{+0,5}$	20_{h9}	20_{h9}^{H7}	20.5	24	30	35	63	50	85	2.5	74	238.0	6.5	12.5	15	146	150	20	31	25	26	M8	M10	13
F2	130	33.0	181	95_{j6}	180	22	$11.0^{+0,5}$	25_{h9}	25_{h9}^{H7}	25.5	30	30	45	73	60	115	3.0	93	299.0	8.0	15.0	15	175	180	20	37	25	32	M8	M10	13
F3	150	38.5	205	110_{j6}	206	30	$14.0^{+0,5}$	30_{h9}	30_{h9}^{H7}	30.5	36	37	50	83	72	130	3.5	106	335.5	8.5	16.5	20	192	196	25	37	30	32	M10	M12	16
F4	150	38.5	228	110_{j6}	230	30	$14.0^{+0,5}$	40_{h9}	40_{h9}^{H7}	40.5	50	37	55	108	90	130	3.5	116	370.0	8.5	16.5	20	210	215	40	45	45	40	M10	M12	16
F6	180	44.5	270	130_{j6}	265	35	$22.0^{+0,5}$	50_{h9}	50_{h9}^{H7}	50.5	62	60	70	128	106	165	3.5	137	433.0	10.5	20.5	30	248	251	40	47	45	42	M10	M20	16

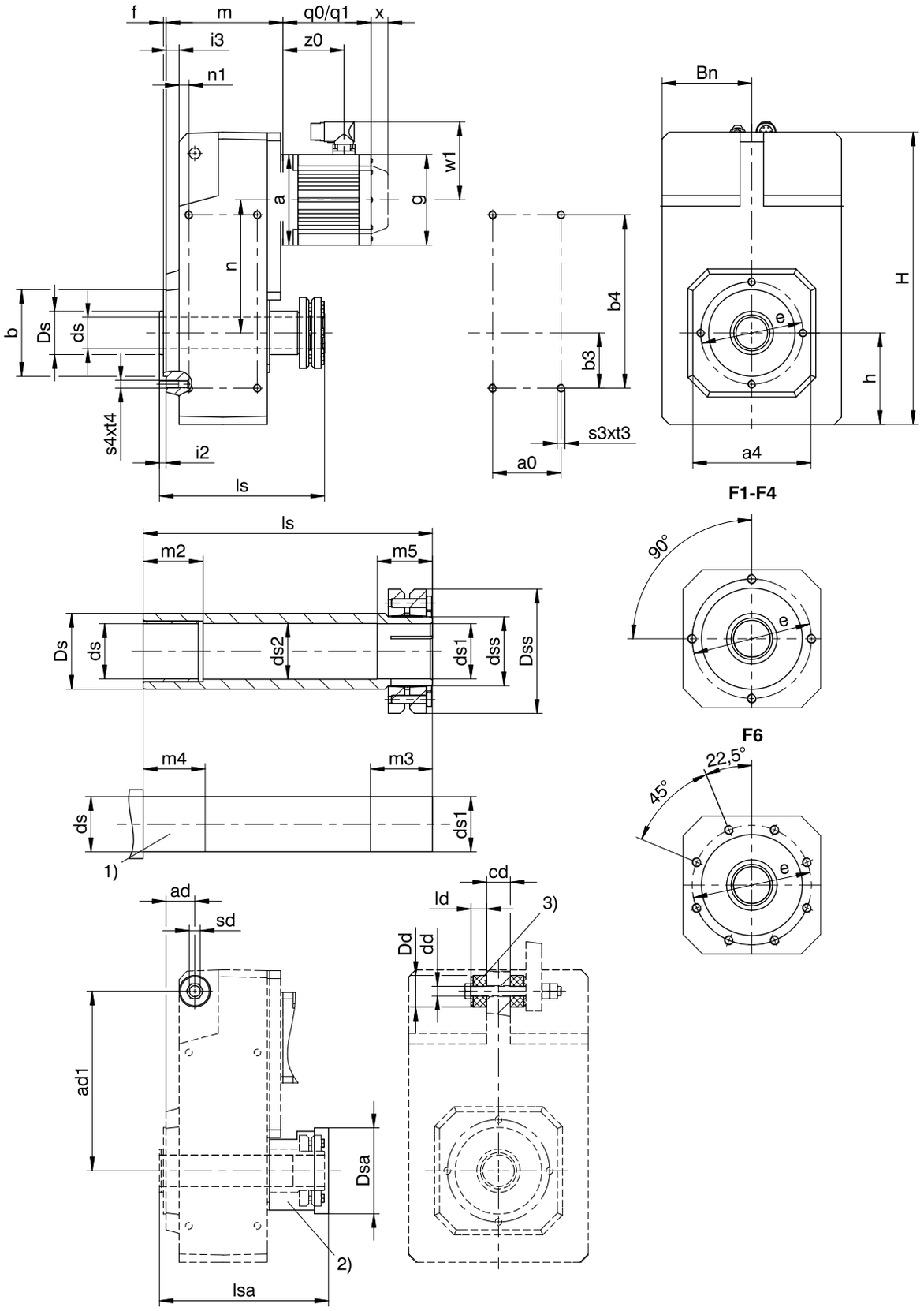
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5
EZ805U	190	355.5	432.5	156.5	22	301.5

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
F102	□72	97.5	102.0	□98	97.5	102.0	□115	101.5	102.0	□145	103.5	102.0	–	–	–
F202	□72	115.0	131.0	□98	115.0	131.0	□115	119.0	131.0	□145	121.0	131.0	–	–	–
F203	∅140	152.0	131.0	–	–	–	–	–	–	–	–	–	–	–	–
F302	∅140	129.5	149.5	∅140	129.5	149.5	□115	133.5	149.5	□145	135.5	149.5	–	–	–
F303	∅140	166.5	149.5	–	–	–	–	–	–	–	–	–	–	–	–
F402	–	–	–	–	–	–	∅160	148.5	169.0	□145	150.5	169.0	□190	153.5	169.0
F403	∅140	181.5	169.0	∅140	181.5	169.0	–	–	–	–	–	–	–	–	–
F602	–	–	–	–	–	–	∅160	179.5	196.0	□145	181.5	196.0	□190	184.5	196.0
F603	–	–	–	–	–	–	∅160	222.5	196.0	–	–	–	–	–	–

13.3.8 S shaft design (hollow shaft with shrink disk), GN housing design (pitch circle diameter + side fastening)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]
1)	Machine shaft: The dimension ls must meet or exceed the specified value.	2)	Cover (optional)
3)	Rubber buffer for torque arm (optional). Dimension ∅Dd = outer∅ of the rubber buffer when not tensioned.		

Dimensions of gear units

Type	a0	□a4	ad	ad1	Øb	b3	b4	Bn	cd	Ødd	Øds	Øds1	Øds2	Ødss	ØDd	ØDs	ØDsa	ØDss
F1	50	100	29.5	150	70_{j6}	40	140	71	20	$11.0^{+0,5}$	20_{h9}	20_{h9}^{H7}	20.5	24	30	63	63	50
F2	64	130	33.0	181	95_{j6}	55	175	88	22	$11.0^{+0,5}$	25_{h9}	25_{h9}^{H7}	25.5	30	30	73	73	60
F3	72	150	38.5	205	110_{j6}	60	200	102	30	$14.0^{+0,5}$	30_{h9}	30_{h9}^{H7}	30.5	36	37	83	83	72
F4	87	150	38.5	228	110_{j6}	70	220	114	30	$14.0^{+0,5}$	40_{h9}	40_{h9}^{H7}	40.5	50	37	108	108	90
F6	108	180	44.5	270	130_{j6}	85	270	131	35	$22.0^{+0,5}$	50_{h9}	50_{h9}^{H7}	50.5	62	60	128	128	106

Type	Øe	f	h	H	i2	i3	ld	ls	lsa	n1	m2	m3	m4	m5	s3	s4	sd	t3	t4
F1	85	2.5	74	238.0	6.5	12.5	15	146	150	10	20	31	25	26	M6	M8	M10	11	13
F2	115	3.0	93	299.0	8.0	15.0	15	175	180	10.5	20	37	25	32	M8	M8	M10	13	13
F3	130	3.5	106	335.5	8.5	16.5	20	192	196	12.5	25	37	30	32	M10	M10	M12	16	16
F4	130	3.5	116	370.0	8.5	16.5	20	210	215	12.5	40	45	45	40	M10	M10	M12	16	16
F6	165	3.5	137	433.0	10.5	20.5	30	248	251	15.5	40	47	45	42	M12	M10	M20	19	16

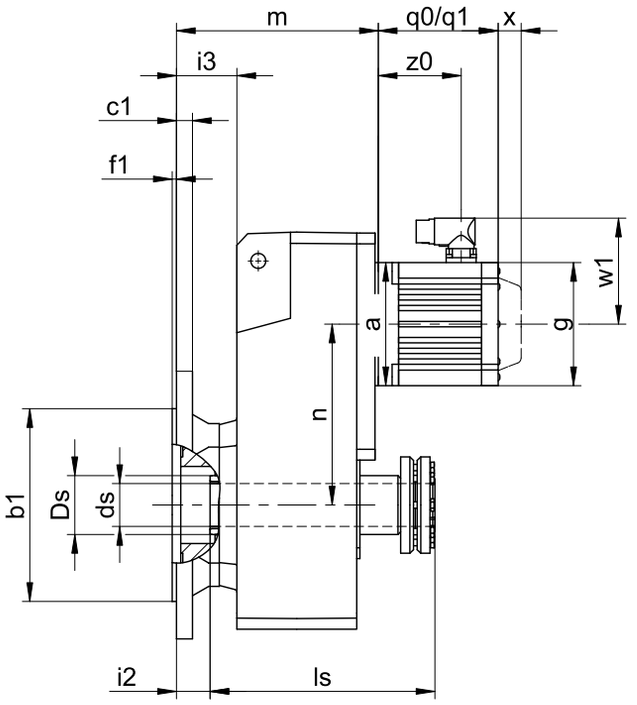
Dimensions of motors

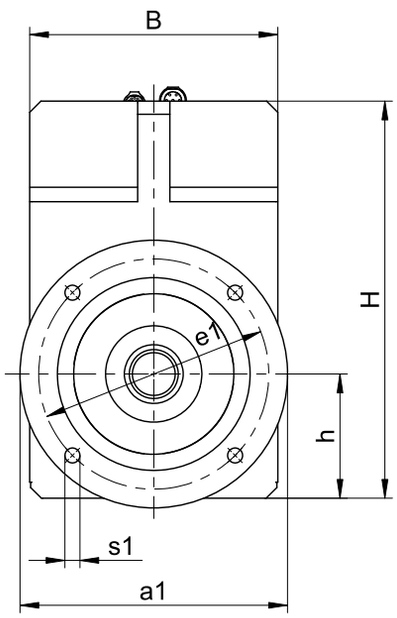
Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5
EZ805U	190	355.5	432.5	156.5	22	301.5

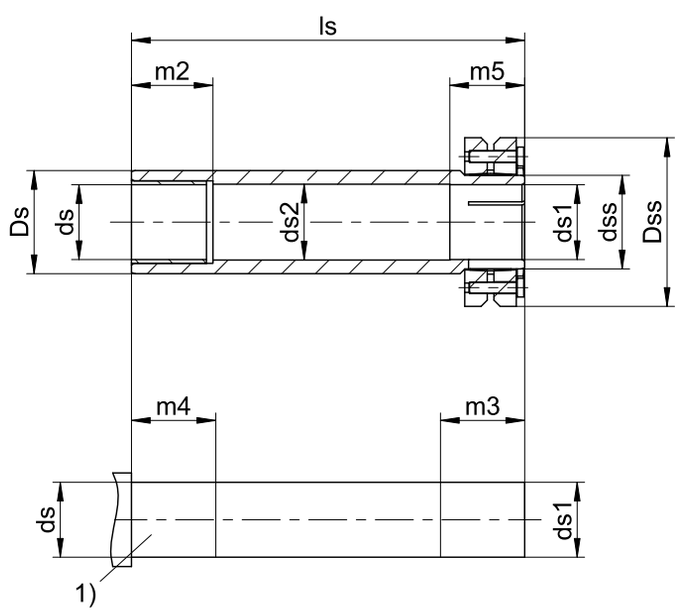
Dimensions of geared motors

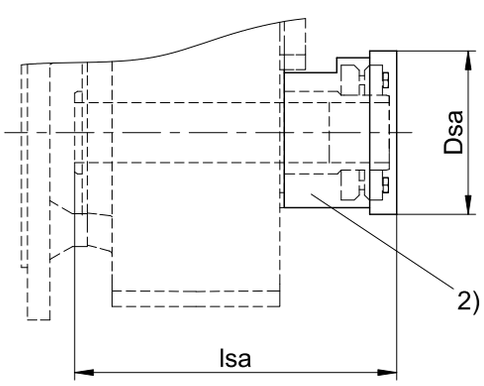
Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
F102	□72	97.5	102.0	□98	97.5	102.0	□115	101.5	102.0	□145	103.5	102.0	–	–	–
F202	□72	115.0	131.0	□98	115.0	131.0	□115	119.0	131.0	□145	121.0	131.0	–	–	–
F203	∅140	152.0	131.0	–	–	–	–	–	–	–	–	–	–	–	–
F302	∅140	129.5	149.5	∅140	129.5	149.5	□115	133.5	149.5	□145	135.5	149.5	–	–	–
F303	∅140	166.5	149.5	–	–	–	–	–	–	–	–	–	–	–	–
F402	–	–	–	–	–	–	∅160	148.5	169.0	□145	150.5	169.0	□190	153.5	169.0
F403	∅140	181.5	169.0	∅140	181.5	169.0	–	–	–	–	–	–	–	–	–
F602	–	–	–	–	–	–	∅160	179.5	196.0	□145	181.5	196.0	□190	184.5	196.0
F603	–	–	–	–	–	–	∅160	222.5	196.0	–	–	–	–	–	–

13.3.9 S shaft design (hollow shaft with shrink disk), F housing design (round flange)









q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]
1)	Machine shaft: The dimension ls must meet or exceed the specified value.	2)	Cover (optional)

Dimensions of gear units

Type	Øa1	Øb1	B	c1	Øds	Øds1	Øds2	Ødss	ØDs	ØDsa	ØDss	Øe1	f1	h	H	i2	i3	ls	lsa	m2	m3	m4	m5	Øs1
F1	160	110_{j6}	145	10	20_{h9}	20_{h9}^{H7}	20.5	24	35	63	50	130	3.5	74	238.0	25.5	44.5	146	150	20	31	25	26	9
F2	200	130_{j6}	180	14	25_{h9}	25_{h9}^{H7}	25.5	30	45	73	60	165	3.5	93	299.0	30.0	53.0	175	180	20	37	25	32	11
F3	250	180_{j6}	206	15	30_{h9}	30_{h9}^{H7}	30.5	36	50	83	72	215	4.0	106	335.5	31.5	56.5	192	196	25	37	30	32	14
F4	250	180_{j6}	230	15	40_{h9}	40_{h9}^{H7}	40.5	50	55	108	90	215	4.0	116	370.0	31.5	56.5	210	215	40	45	45	40	14
F6	300	230_{j6}	265	17	50_{h9}	50_{h9}^{H7}	50.5	62	70	128	106	265	4.0	137	433.0	29.5	60.5	248	251	40	47	45	42	14

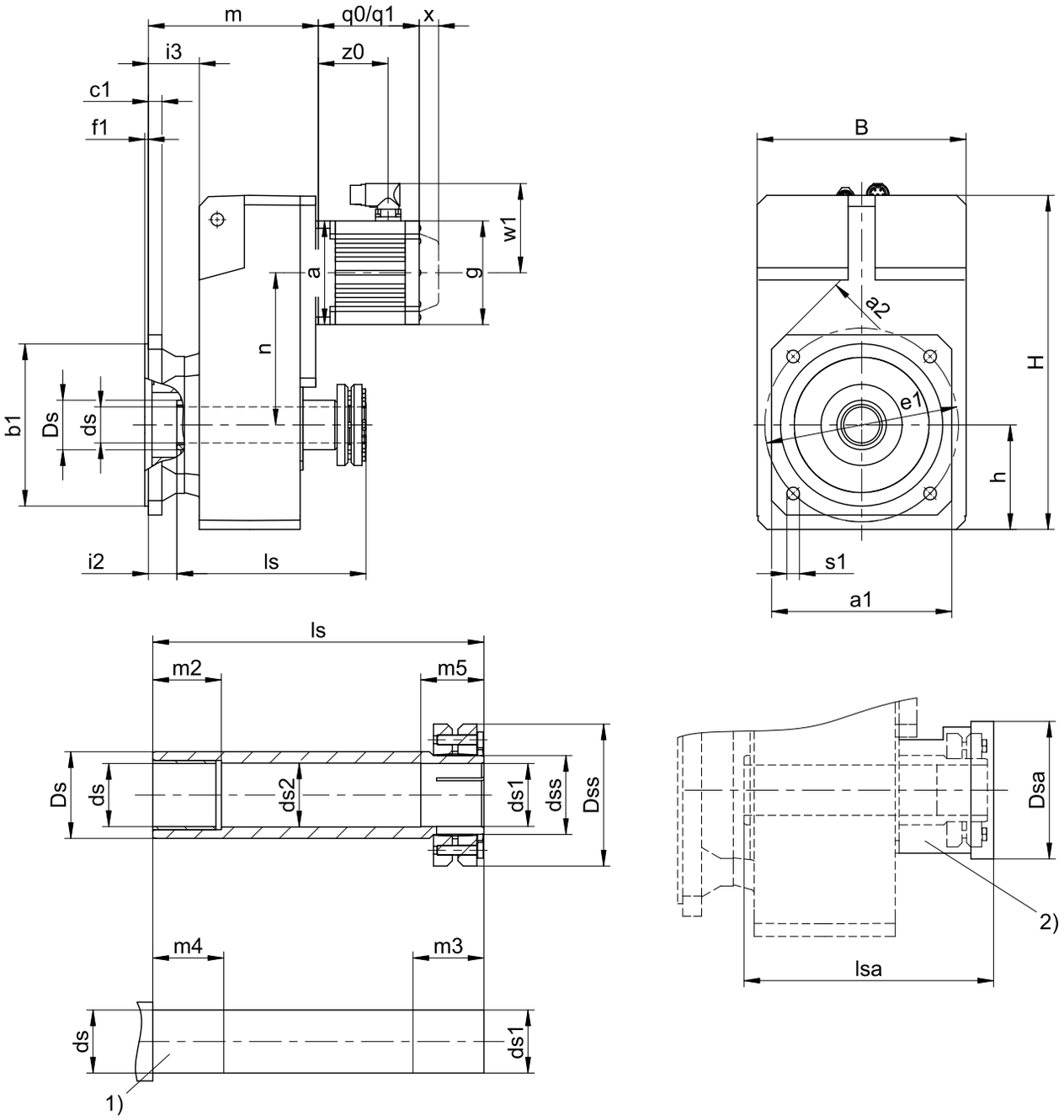
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5
EZ805U	190	355.5	432.5	156.5	22	301.5

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
F102	□72	129.5	102.0	□98	129.5	102.0	□115	133.5	102.0	□145	135.5	102.0	–	–	–
F202	□72	153.0	131.0	□98	153.0	131.0	□115	157.0	131.0	□145	159.0	131.0	–	–	–
F203	∅140	190.0	131.0	–	–	–	–	–	–	–	–	–	–	–	–
F302	∅140	169.5	149.5	∅140	169.5	149.5	□115	173.5	149.5	□145	175.5	149.5	–	–	–
F303	∅140	206.5	149.5	–	–	–	–	–	–	–	–	–	–	–	–
F402	–	–	–	–	–	–	∅160	188.5	169.0	□145	190.5	169.0	□190	193.5	169.0
F403	∅140	221.5	169.0	∅140	221.5	169.0	–	–	–	–	–	–	–	–	–
F602	–	–	–	–	–	–	∅160	219.5	196.0	□145	221.5	196.0	□190	224.5	196.0
F603	–	–	–	–	–	–	∅160	262.5	196.0	–	–	–	–	–	–

13.3.10 S shaft design (hollow shaft with shrink disk), Q housing design (square flange)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]
1)	Machine shaft: The dimension ls must meet or exceed the specified value.	2)	Cover (optional)

Dimensions of gear units

Type	□a1	□a2	Øb1	B	c1	Øds	Øds1	Øds2	Ødss	ØDs	ØDsa	ØDss	Øe1	f1	h	H	i2	i3	ls	lsa	m2	m3	m4	m5	Øs1
F1	125	160	110_{j6}	145	10	20_{h9}	20_{h9}^{H7}	20.5	24	35	63	50	130	3.5	74	238.0	25.5	44.5	146	150	20	31	25	26	9
F2	150	195	130_{j6}	180	14	25_{h9}	25_{h9}^{H7}	25.5	30	45	73	60	165	3.5	93	299.0	30.0	53.0	175	180	20	37	25	32	11
F3	200	260	180_{j6}	206	15	30_{h9}	30_{h9}^{H7}	30.5	36	50	83	72	215	4.0	106	335.5	31.5	56.5	192	196	25	37	30	32	14
F4	200	260	180_{j6}	230	15	40_{h9}	40_{h9}^{H7}	40.5	50	55	108	90	215	4.0	116	370.0	31.5	56.5	210	215	40	45	45	40	14
F6	250	325	230_{j6}	265	17	50_{h9}	50_{h9}^{H7}	50.5	62	70	128	106	265	4.0	137	433.0	29.5	60.5	248	251	40	47	45	42	14

Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5
EZ805U	190	355.5	432.5	156.5	22	301.5

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
F102	□72	129.5	102.0	□98	129.5	102.0	□115	133.5	102.0	□145	135.5	102.0	–	–	–
F202	□72	153.0	131.0	□98	153.0	131.0	□115	157.0	131.0	□145	159.0	131.0	–	–	–
F203	∅140	190.0	131.0	–	–	–	–	–	–	–	–	–	–	–	–
F302	∅140	169.5	149.5	∅140	169.5	149.5	□115	173.5	149.5	□145	175.5	149.5	–	–	–
F303	∅140	206.5	149.5	–	–	–	–	–	–	–	–	–	–	–	–
F402	–	–	–	–	–	–	∅160	188.5	169.0	□145	190.5	169.0	□190	193.5	169.0
F403	∅140	221.5	169.0	∅140	221.5	169.0	–	–	–	–	–	–	–	–	–
F602	–	–	–	–	–	–	∅160	219.5	196.0	□145	221.5	196.0	□190	224.5	196.0
F603	–	–	–	–	–	–	∅160	262.5	196.0	–	–	–	–	–	–

13.4 Type designation

In this chapter, you can find an explanation of the type designation with the associated options.

Additional ordering information not included in the type designation can be found at the end of the chapter.

Sample code

F	2	0	2	A	G	0700	EZ401U

Explanation

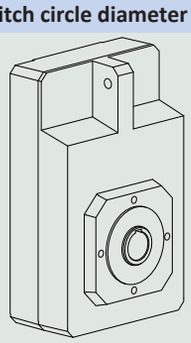
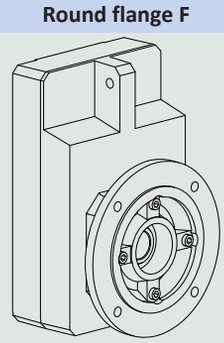
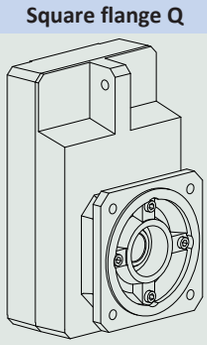
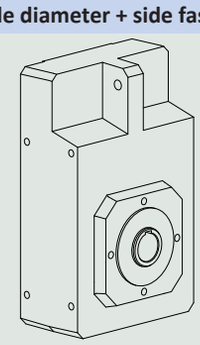
Code	Designation	Design
F	Type	Offset helical gear unit
2	Size	2 (example)
0	Generation	Generation 0
2	Stages	Two-stage
3		Three-stage
A	Shaft	Hollow shaft with keyway
S		Hollow shaft with shrink ring
V		Solid shaft
G	Housing	Pitch circle diameter
F		Round flange
Q		Square flange
GN		Pitch circle diameter + side fastening
/0700	Transmission ratio (i x 10 rounded)	i = 70.13 (example)
EZ401U	Motor	EZ synchronous servo motor

In order to complete the type designation, also specify:

- A detailed type designation of the motor, see Chapter [▷ 23]
- The mounting position, see Chapter [▷ 13.5.4]
- The position of the plug connectors, see Chapter [▷ 13.5.6]

13.5 Product description

13.5.1 Housing design

Pitch circle diameter G	Round flange F
	
Square flange Q	**Pitch circle diameter + side fastening GN**
	

	G	F	Q	GN
F1	✓	✓	✓	✓
F2	✓	✓	✓	✓
F3	✓	✓	✓	✓
F4	✓	✓	✓	✓
F6	✓	✓	✓	✓

13.5.2 Combinatorial shaft/housing design

	Housing design				
Shaft design	**Code**	**G**	**F**	**Q**	**GN**
Hollow shaft with keyway	**A**	AG	AF	AQ	AGN
Hollow shaft with shrink ring	**S**	SG	SF	SQ	SGN
Solid shaft	**V**	–	VF	VQ	–

13.5.3 Installation conditions

Hollow shaft

The hollow shaft hole tolerance is ISO H7. The tolerance of the machine shaft must be ISO k6.

Take care to align the machine shaft with the gear unit hollow shaft when attaching the gear unit.

Maximum deviation ≤ 0.03 mm.

For simpler assembly and disassembly of the machine shaft, the hollow shafts are equipped with a spiral groove (as a grease deposit).

A hardened, threaded keeper plate is included in the scope of delivery. You also have the option to order the hollow shaft without a keeper plate.

Hollow shaft with shrink ring

The tolerance of the hollow shaft hole is ISO H7.

The machine shaft must be ISO h9.

Select a material for the machine shaft with a permitted surface pressure of $p \geq 325\ N/mm^2$.

Possible materials:

- C45E +QT
- 42CrMo4

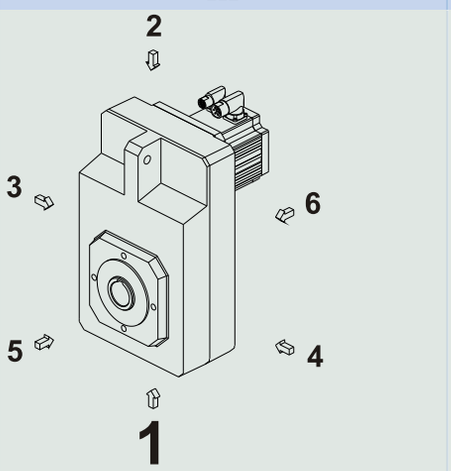
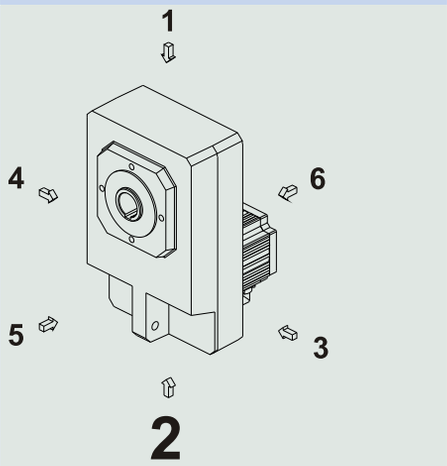
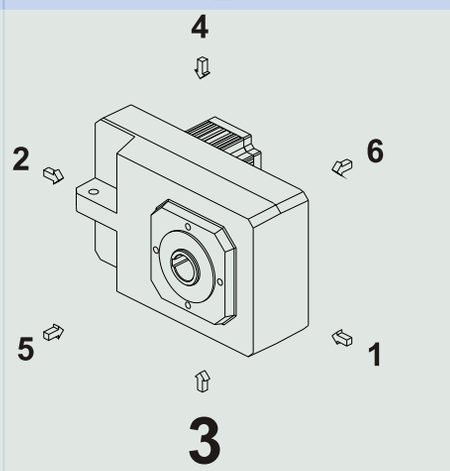
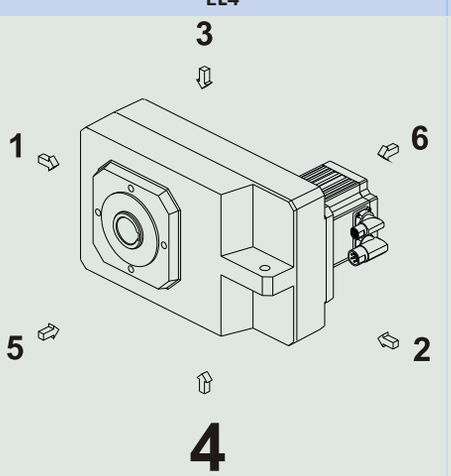
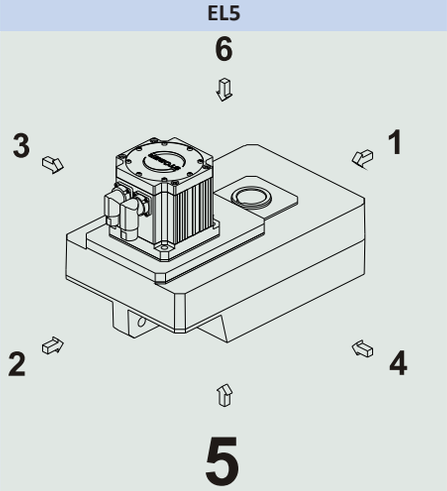
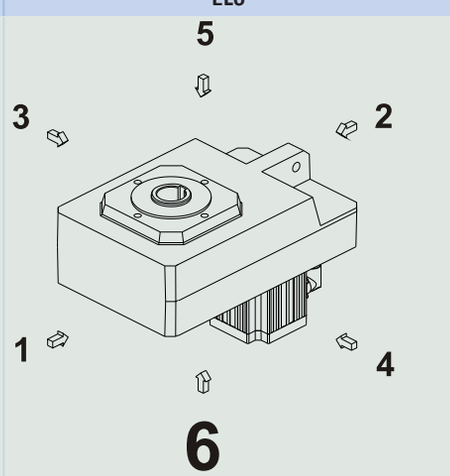
Attaching the gear unit on the machine side using the pitch circle diameter

The specified torques and forces only apply when attaching gear units at the machine side using screws of quality 10.9. In addition, the gear housing must be adjusted at the pilot (H7).

13.5.4 Mounting positions

The following table shows the standard mounting positions.

The numbers identify the gear unit sides. The mounting position is defined by the gear side facing downwards.

EL1	EL2	EL3
		
EL4	**EL5**	**EL6**
		

Since the lubricant filling volume of the gear unit depends on the mounting position, the mounting position must be specified when ordering.

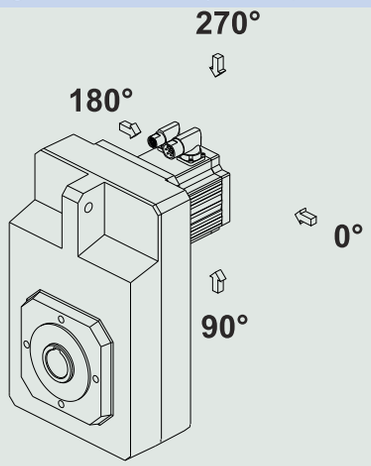
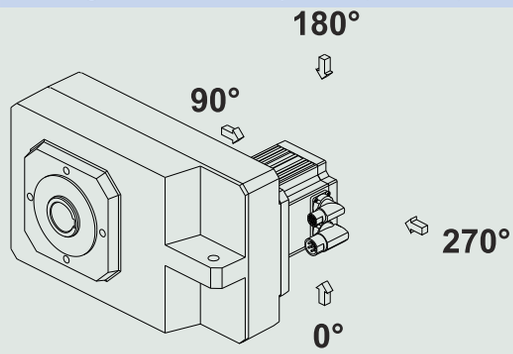
13.5.5 Lubricants

STOBER fills the gear units with the amount and type of lubricant specified on the nameplate. The filling volume and the structure of the gear units depend on the mounting position.

Only install the gear units in the intended mounting position! Reposition the gear units only after consulting STOBER. Otherwise, STOBER assumes no liability for the gear units.

Lubricant filling quantities for gear units, document ID 441871, can be found online at http://www.stoeber.de/en/download. Enter the ID of the documentation in the Search... field.

13.5.6 Position of the plug connectors

Mounting position EL1	Mounting position EL4
Plug connector in 270° position (standard)	Plug connector in 270° position (standard)
	

Indicate variations for your geared motor in the purchase order.

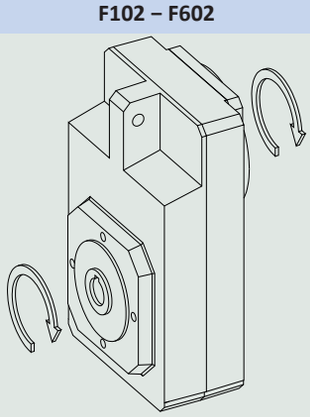
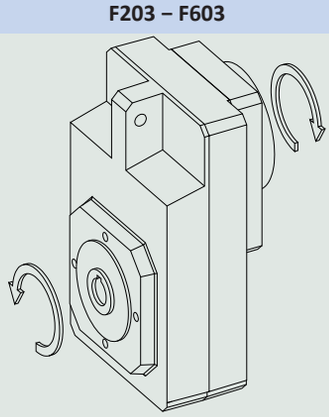
Note that the plug connector position rotates along with the geared motor if the geared motor is in another mounting position.

13.5.7 Other product features

Feature	Value
Max. permitted gear unit temperature (on the surface of the gear unit)	≤ 80 °C
Paint	Black RAL 9005
(ATEX) Directive 2014/34/EU (option)	Not suitable
Protection class:[1]	
Gear unit	IP65
Motor	IP56, optionally IP66

13.5.8 Direction of rotation

Solid shaft (V), hollow shaft with keyway (A), hollow shaft with shrink ring (S)

F102 – F602	F203 – F603
	
The input and output rotate in the same direction.	The input and output rotate in opposite directions.

The pictures show mounting position EL1.

13.6 Project configuration

Project your drives using our SERVOsoft designing software. You can receive SERVOsoft for free from your adviser at one of our sales centers. Observe the limit conditions in this chapter to ensure a safe design for your drives.

An explanation of the formula symbols can be found in Chapter [▶ 29.1].

[1] Observe the protection class of all the components.

13.6.1 Calculation of the operating point

Check the following conditions for operating points other than the nominal point M_{2N} specified in the selection tables.

For mounting positions EL1, EL2, EL3, EL4:

$$n_{1m^*} \leq \frac{n_{1maxDBEL1,2,3,4}}{fB_T}$$

For mounting positions EL5, EL6:

$$n_{1m^*} \leq \frac{n_{1maxDBEL5,6}}{fB_T}$$

For all mounting positions:

$$n_{1max^*} \leq \frac{n_{1max\,ZB}}{fB_T}$$

$$M_{2eff^*} \leq M_{2th}$$

$$M_{2acc^*} \leq M_{2acc}$$

$$M_{2NOT^*} \leq M_{2NOT}$$

$$M_{2eq^*} \leq M_{2N} \cdot \frac{S}{fB_{op} \cdot fB_t}$$

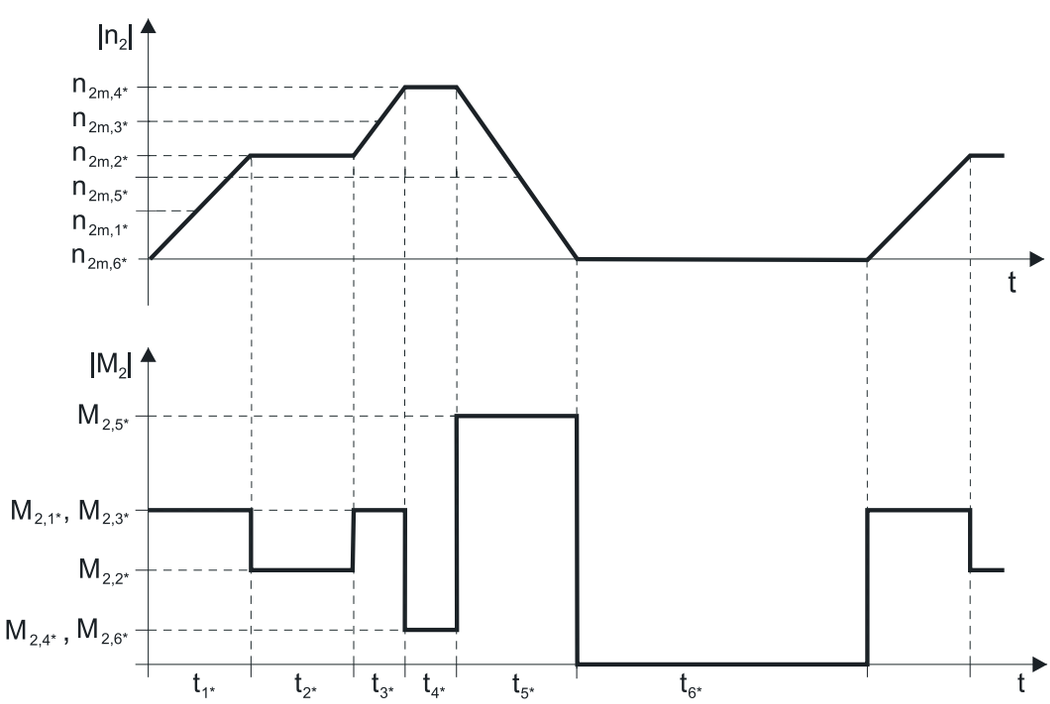
Refer to the selection table for the values for $n_{1maxDBEL1,2,3,4}$ and $n_{1maxDBEL5,6}$, n_{1maxZB}, M_{2acc}, M_{2NOT}, M_{2N} and S.

The values for fB_T, fB_{op} and fB_t can be found in the corresponding tables in this chapter.

Calculate the thermal limit torque M_{2th} for a duty cycle > 50%.

Example of cyclic operation

The following calculations are based on a representation of the power taken from the output based in accordance with the following example:



Calculation of the actual average input speed

$$n_{1m^*} = n_{2m^*} \cdot i$$

$$n_{2m^*} = \frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}{t_{1^*} + \ldots + t_{n^*}}$$

If $t_{1^*} + \ldots + t_{5^*} \geq 20$ min, calculate n_{2m^*} without the rest phase t_{6^*}.

The values for the ratio i can be found in the selection tables.

Calculation of the actual effective torque

$$M_{2eff^*} = \sqrt{\frac{t_{1^*} \cdot {M_{2,1^*}}^2 + \ldots + t_{n^*} \cdot {M_{2,n^*}}^2}{t_{1^*} + \ldots + t_{n^*}}}$$

Calculation of the actual equivalent torque

$$M_{2eq^*} = \sqrt[3]{\frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} \cdot \left|{M_{2,1^*}}^3\right| + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*} \cdot \left|{M_{2,n^*}}^3\right|}{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}}$$

Calculation of the thermal limit torque

Calculate the thermal limit torque M_{2th} for a duty cycle $ED_{20} > 50\%$ and the actual average input speed n_{1m^*}. (At $K_{mot,th} \leq 0$ you must reduce the average input speed n_{1m^*} accordingly or select another geared motor size.)

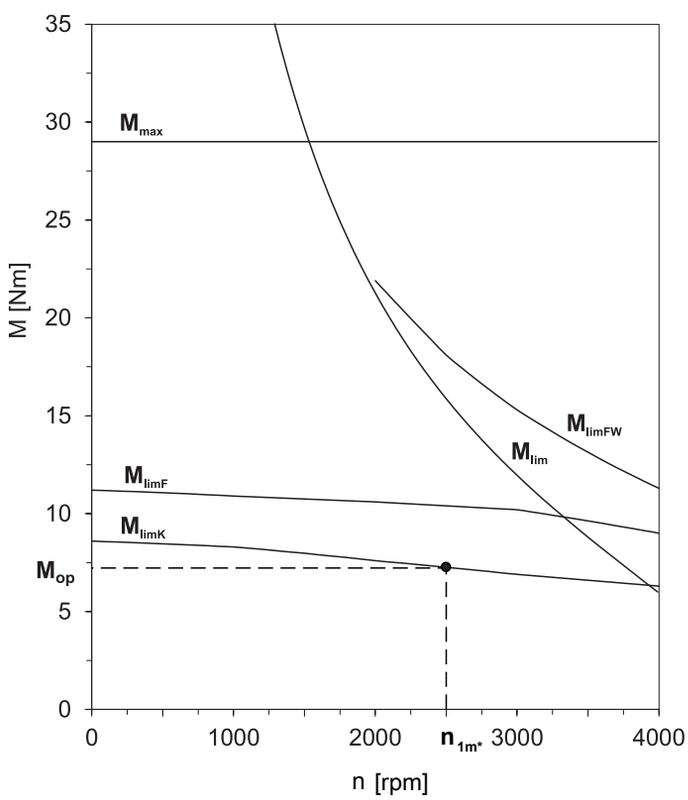
$$M_{2th} = M_{op} \cdot i \cdot K_{mot,th}$$

$$K_{mot,th} = 0{,}95 - \frac{a_{th}}{1000} \cdot athEL \cdot fB_T \cdot \left(\frac{n_{1m^*}}{1000}\right)^3$$

The values for i and a_{th} can be found in the selection tables.

The values for a_{thEL} and fB_T can be found in the corresponding tables in this chapter.

The value for the torque of the motor at operating point M_{op} with the determined average input speed n_{1m^*} can be found in the motor curve of Chapter [▶ 23.3]. Note the size, nominal speed n_N and cooling type of the motor. The figure below shows an example of reading the torque M_{op} of a motor with convection cooling at the operating point.



Operating factors

Parameter a_{thEL}

Mounting position	a_{thEL}
EL1, 2, 5, 6	1.0
EL3, 4	1.1

Operating mode	fB_{op}
Uniform continuous operation	1.00
Cyclic operation	1.25
Reversing load cyclic operation	1.40

Run time	fB_t
Daily run time ≤ 8 h	1.00
Daily run time ≤ 16 h	1.15
Daily run time ≤ 24 h	1.20

Temperature		fB_T
Motor cooling	**Surrounding temperature**	
Motor with forced ventilation	≤ 20 °C	0.9
	≤ 30 °C	1.0
	≤ 40 °C	1.15
Motor with convection cooling	≤ 20 °C	1.0
	≤ 30 °C	1.1
	≤ 40 °C	1.25

Notes

- The maximum permitted gear unit temperature (see the "Other product features" chapter) must not be exceeded. Doing so may result in damage to the geared motor.
- For braking from full speed (for example when the power fails or when setting up the machine), note the permitted gear unit torques (M_{2acc}, M_{2NOT}) in the selection tables.

13.6.2 Permitted shaft loads for the output shaft

The values specified in the tables apply to the permitted shaft loads:

- For shaft dimensions in accordance with the catalog
- For output speeds $n_{2m*} \leq 20$ rpm ($F_{2axN} = F_{2ax20}$; $F_{2radN} = F_{2rad20}$; $M_{2kN} = M_{2k20}$)
- Only if radial forces on the gear unit are stabilized by its pilots for the pitch circle diameter and flange housing design

13.6.2.1 V shaft design

Permitted shaft loads for V shaft design (solid shaft)

Type	z_2 [mm]	F_{2ax20} [N]	F_{2rad20} [N]	M_{2k20} [Nm]
F1	35.0	1100	4200	260
F2	41.0	1400	5400	400
F3	43.0	1900	7500	600
F4	44.0	2350	9250	800
F6	44.0	3100	12500	1200

For other output speeds, download diagrams at http://products.stoeber.de.

The following applies to output speeds $n_{2m*} > 20$ rpm:

$$F_{2axN} = \frac{F_{2ax20}}{\sqrt[3]{\frac{n_{2m*}}{20\,\text{rpm}}}} \qquad F_{2radN} = \frac{F_{2rad20}}{\sqrt[3]{\frac{n_{2m*}}{20\ \text{rpm}}}} \qquad M_{2kN} = \frac{M_{2k20}}{\sqrt[3]{\frac{n_{2m*}}{20\,\text{rpm}}}}$$

The values for F_{2ax20}, F_{2rad20} and M_{2k20} can be found in the table "Permitted shaft loads" in this chapter.

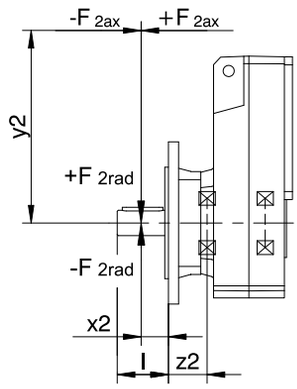


Fig. 1: Force application points for solid shaft

The specified values for F_{2rad20} are based on application of force at the middle of the output shaft: $x_2 = l/2$.

Shaft dimensions can be found in the "Dimensional drawings" chapter.

The following applies to other force application points:

$$M_{2k*} = \frac{2 \cdot F_{2ax*} \cdot y_2 + F_{2rad*} \cdot (x_2 + z_2)}{1000} \leq M_{2kN}$$

$$F_{2rad*} \leq F_{2radN}$$

$$F_{2ax*} \leq F_{2axN}$$

For applications with multiple axial and/or radial forces, you must add the forces as vectors.

In the event of EMERGENCY OFF operation (max. 1000 load changes), you can multiply the permitted forces and torques for F_{2ax20}, F_{2rad20} and M_{2k20} by a factor of two.

13.6.2.2 A and S shaft design

Permitted shaft loads for A shaft design (hollow shaft with keyway)

Type	z_2 [mm]	F_{2ax20} [N]	F_{2rad20} [N]	M_{2k20} [Nm]
F1	30.0	900	4200	175
F2	33.0	1200	5400	250
F3	33.0	1350	7500	375
F4	39.0	1900	9250	550
F6	45.0	2200	12500	800

Permitted shaft loads for S shaft design (hollow shaft with shrink ring)

Type	z_2 [mm]	F_{2ax20} [N]	F_{2rad20} [N]	M_{2k20} [Nm]
F1	30.0	900	4200	175
F2	33.0	1200	5400	250
F3	33.0	1350	7500	375
F4	39.0	1900	9250	550
F6	45.0	2200	12500	800

For other output speeds, download diagrams at http://products.stoeber.de.

The following applies to output speeds n_{2m*} > 20 rpm:

$$F_{2axN} = \frac{F_{2ax20}}{\sqrt[3]{\frac{n_{2m*}}{20\ \text{rpm}}}} \qquad F_{2radN} = \frac{F_{2rad20}}{\sqrt[3]{\frac{n_{2m*}}{20\ \text{rpm}}}} \qquad M_{2kN} = \frac{M_{2k20}}{\sqrt[3]{\frac{n_{2m*}}{20\ \text{rpm}}}}$$

The values for F_{2ax20}, F_{2rad20} and M_{2k20} can be found in the table "Permitted shaft loads" in this chapter.

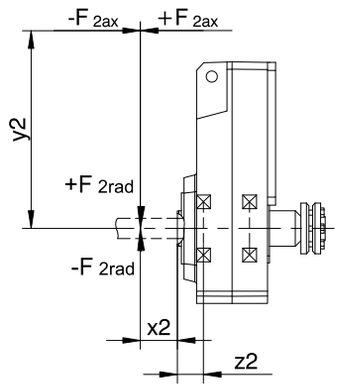


Fig. 2: Force application points for hollow shaft

You can determine the permitted radial forces from the permitted breakdown torque M_{2kN}. The actual radial forces may not exceed the permitted radial forces. The permitted radial forces are in relation to the end of the hollow shaft (x2 = 0).

$$M_{2k*} = \frac{2 \cdot F_{2ax*} \cdot y_2 + F_{2rad*} \cdot (x_2 + z_2)}{1000} \leq M_{2kN}$$

$$F_{2ax*} \leq F_{2axN}$$

For applications with multiple axial and/or radial forces, you must add the forces as vectors.

In the event of EMERGENCY OFF operation (max. 1000 load changes), you can multiply the permitted forces and torques for F_{2ax20}, F_{2rad20} and M_{2k20} by a factor of two.

13.6.3 Radial shaft seal rings

Leak-proofness

Our gear units are equipped with high-quality radial shaft seal rings and checked for leak-proofness. However, a leak cannot be fully ruled out over the length of use of a gear unit. If you use a gear unit with goods incompatible with the lubricant, you must take measures to prevent direct contact with the gear unit lubricant in case of a leak.

13.7 Additional documentation

Additional documentation related to the product can be found at http://www.stoeber.de/en/download

Enter the ID of the documentation in the Search... field.

Documentation	ID
Operating manual for C/F/K/S gear units and gear motors	443027_en
Lubricant filling quantities for gear units	441871

14 KS right-angle servo geared motors

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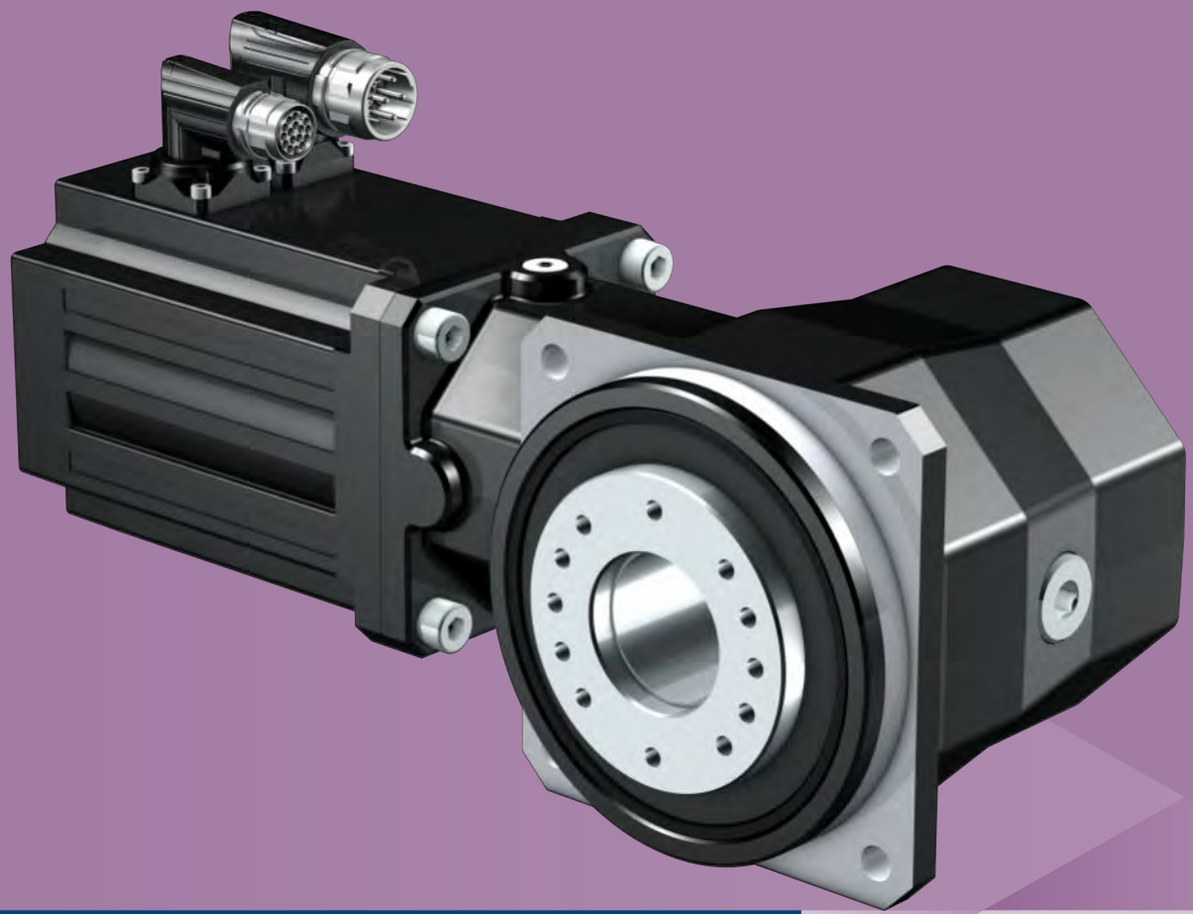


14

KS right-angle servo geared motors

14.1 Overview

Precision right-angle servo geared motors

Features

Power density	★★★☆☆
Backlash	★★★☆☆
Price category	€€€
Shaft load	★★★★★
Smooth operation	★★★★☆
Torsional stiffness	★★★☆☆
Mass moment of inertia	★★★★★
Helical gearing	✓
Maintenance-free	✓
FKM seal ring at the input	✓
Stiff output bearing due to pretension	✓
Compact and highly dynamic due to direct motor attachment	✓

Key: ★☆☆☆☆ good | ★★★★★ excellent
€ Economy | €€€€€ Premium

Technical data

i	6 – 100
M_{2acc}	27 – 400 Nm
$\Delta\phi_2$	4 – 6 arcmin
η_{get}	≤ 95 %

14.2 Selection tables

The technical data specified in the selection tables applies to:

- Installation altitudes up to 1000 m above sea level
- Surrounding temperatures from 0 °C to 40 °C
- Drives with convection-cooled motors (e.g. EZ401**U**)

You can calculate the technical data for drives with forced ventilated motors (for example EZ401**B**) at http://products.stoeber.de.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2.0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/arcmin]	m [kg]
KS4 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 90 Nm)															
60	43	44	0.2	1.2	KS403_0500 EZ301U	90	140	50.00	50/1	4000	6000	0.23	6	8.5	9.0
75	35	35	0.3	1.5	KS403_0400 EZ301U	90	140	40.00	40/1	3500	6000	0.26	6	8.5	9.0
94	28	28	0.4	1.9	KS403_0320 EZ301U	83	140	32.00	32/1	3500	6000	0.27	6	8.5	9.0
94	47	50	0.6	1.1	KS403_0320 EZ302U	90	140	32.00	32/1	3500	6000	0.37	6	8.5	9.6
125	21	21	0.5	2.5	KS403_0240 EZ301U	62	140	24.00	24/1	3500	6000	0.29	6	8.5	9.0
125	35	37	0.9	1.5	KS403_0240 EZ302U	90	140	24.00	24/1	3500	6000	0.39	6	8.5	9.6
125	46	49	1.2	1.1	KS403_0240 EZ303U	90	140	24.00	24/1	3500	6000	0.50	6	8.5	10
150	18	18	0.7	2.9	KS402_0200 EZ301U	53	140	20.00	20/1	4000	6000	0.24	6	8.5	8.5
150	30	32	1.2	1.7	KS402_0200 EZ302U	90	140	20.00	20/1	4000	6000	0.34	6	8.5	9.1
150	39	42	1.5	1.3	KS402_0200 EZ303U	90	140	20.00	20/1	4000	6000	0.45	6	8.5	9.6
214	12	13	1.0	4.2	KS402_0140 EZ301U	37	140	14.00	14/1	4000	6000	0.28	6	8.5	8.5
214	21	22	1.8	2.4	KS402_0140 EZ302U	67	140	14.00	14/1	4000	6000	0.38	6	8.5	9.1
214	28	29	2.3	1.9	KS402_0140 EZ303U	90	140	14.00	14/1	4000	6000	0.49	6	8.5	9.6
214	37	40	3.1	1.4	KS402_0140 EZ401U	90	140	14.00	14/1	4000	6000	1.0	6	8.5	11
300	15	16	2.6	3.4	KS402_0100 EZ302U	48	140	10.00	10/1	3800	6000	0.49	6	8.5	9.1
300	20	21	3.4	2.6	KS402_0100 EZ303U	67	140	10.00	10/1	3800	6000	0.60	6	8.5	9.6
300	27	29	4.7	1.9	KS402_0100 EZ401U	81	140	10.00	10/1	3800	6000	1.1	6	8.5	11
300	41	45	7.2	1.3	KS402_0100 EZ501U	90	140	10.00	10/1	3800	6000	3.1	6	8.5	12
300	45	49	7.8	1.2	KS402_0100 EZ402U	90	140	10.00	10/1	3800	6000	1.8	6	8.5	12
375	12	13	3.5	4.3	KS402_0080 EZ302U	38	140	8.000	8/1	3500	6000	0.62	6	8.5	9.1
375	16	17	4.5	3.3	KS402_0080 EZ303U	53	140	8.000	8/1	3500	6000	0.73	6	8.5	9.6
375	21	23	6.1	2.4	KS402_0080 EZ401U	65	140	8.000	8/1	3500	6000	1.3	6	8.5	11
375	33	36	9.3	1.6	KS402_0080 EZ501U	90	140	8.000	8/1	3500	6000	3.2	6	8.5	12
375	36	40	10	1.4	KS402_0080 EZ402U	90	140	8.000	8/1	3500	6000	2.0	6	8.5	12
500	12	12	6.4	4.4	KS402_0060 EZ303U	40	140	6.000	6/1	3000	6000	1.1	6	8.5	9.6
500	16	17	8.6	3.2	KS402_0060 EZ401U	48	140	6.000	6/1	3000	6000	1.6	6	8.5	11
500	25	27	13	2.1	KS402_0060 EZ501U	90	140	6.000	6/1	3000	6000	3.6	6	8.5	12
500	27	30	14	1.9	KS402_0060 EZ402U	90	140	6.000	6/1	3000	6000	2.3	6	8.5	12
500	39	49	21	1.3	KS402_0060 EZ404U	90	140	6.000	6/1	3000	6000	3.7	6	8.5	14
500	42	46	23	1.2	KS402_0060 EZ502U	90	140	6.000	6/1	3000	6000	5.9	6	8.5	14
KS4 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 90 Nm)															
150	33	35	0.3	1.2	KS403_0400 EZ301U	90	140	40.00	40/1	3500	6000	0.26	6	8.5	9.0
188	26	28	0.5	1.5	KS403_0320 EZ301U	83	140	32.00	32/1	3500	6000	0.27	6	8.5	9.0
250	20	21	0.6	2.1	KS403_0240 EZ301U	62	140	24.00	24/1	3500	6000	0.29	6	8.5	9.0
250	33	37	1.1	1.2	KS403_0240 EZ302U	90	140	24.00	24/1	3500	6000	0.39	6	8.5	9.6
300	17	18	0.8	2.4	KS402_0200 EZ301U	53	140	20.00	20/1	4000	6000	0.24	6	8.5	8.5
300	29	32	1.4	1.4	KS402_0200 EZ302U	90	140	20.00	20/1	4000	6000	0.34	6	8.5	9.1
300	37	43	1.8	1.1	KS402_0200 EZ303U	90	140	20.00	20/1	4000	6000	0.45	6	8.5	9.6
429	12	13	1.2	3.5	KS402_0140 EZ301U	37	140	14.00	14/1	4000	6000	0.28	6	8.5	8.5
429	20	22	2.1	2.1	KS402_0140 EZ302U	67	140	14.00	14/1	4000	6000	0.38	6	8.5	9.1
429	26	30	2.7	1.6	KS402_0140 EZ303U	90	140	14.00	14/1	4000	6000	0.49	6	8.5	9.6
429	31	37	3.2	1.3	KS402_0140 EZ401U	90	140	14.00	14/1	4000	6000	1.0	6	8.5	11
600	8.5	9.0	1.9	4.8	KS402_0100 EZ301U	27	140	10.00	10/1	3800	6000	0.39	6	8.5	8.5
600	14	16	3.1	2.9	KS402_0100 EZ302U	48	140	10.00	10/1	3800	6000	0.49	6	8.5	9.1
600	19	21	4.1	2.2	KS402_0100 EZ303U	67	140	10.00	10/1	3800	6000	0.60	6	8.5	9.6
600	22	27	4.8	1.9	KS402_0100 EZ401U	81	140	10.00	10/1	3800	6000	1.1	6	8.5	11
600	32	42	7.1	1.3	KS402_0100 EZ501U	90	140	10.00	10/1	3800	6000	3.1	6	8.5	12
600	33	47	7.3	1.2	KS402_0100 EZ402U	90	140	10.00	10/1	3800	6000	1.8	6	8.5	12
750	11	13	4.1	3.6	KS402_0080 EZ302U	38	140	8.000	8/1	3500	6000	0.62	6	8.5	9.1
750	15	17	5.4	2.7	KS402_0080 EZ303U	53	140	8.000	8/1	3500	6000	0.73	6	8.5	9.6
750	17	21	6.3	2.3	KS402_0080 EZ401U	65	140	8.000	8/1	3500	6000	1.3	6	8.5	11
750	26	33	9.3	1.6	KS402_0080 EZ501U	90	140	8.000	8/1	3500	6000	3.2	6	8.5	12

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
KS4 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 90 Nm)															
750	27	37	9.6	1.5	KS402_0080 EZ402U	90	140	8.000	8/1	3500	6000	2.0	6	8.5	12
750	40	59	14	1.0	KS402_0080 EZ502U	90	140	8.000	8/1	3500	6000	5.5	6	8.5	14
1000	8.6	9.6	5.8	4.8	KS402_0060 EZ302U	29	140	6.000	6/1	3000	6000	0.97	6	8.5	9.1
1000	11	13	7.6	3.7	KS402_0060 EZ303U	40	140	6.000	6/1	3000	6000	1.1	6	8.5	9.6
1000	13	16	8.9	3.1	KS402_0060 EZ401U	48	140	6.000	6/1	3000	6000	1.6	6	8.5	11
1000	19	25	13	2.1	KS402_0060 EZ501U	90	140	6.000	6/1	3000	6000	3.6	6	8.5	12
1000	20	28	14	2.1	KS402_0060 EZ402U	90	140	6.000	6/1	3000	6000	2.3	6	8.5	12
1000	30	44	20	1.4	KS402_0060 EZ502U	90	140	6.000	6/1	3000	6000	5.9	6	8.5	14
1000	33	48	22	1.2	KS402_0060 EZ404U	90	140	6.000	6/1	3000	6000	3.7	6	8.5	14
1000	35	60	24	1.2	KS402_0060 EZ503U	90	140	6.000	6/1	3000	6000	8.3	6	8.5	15
KS5 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 200 Nm)															
30	86	88	0.1	1.1	KS503_1000 EZ301U	200	300	100.0	100/1	4200	6000	0.22	5	17	15
38	69	71	0.1	1.4	KS503_0800 EZ301U	200	300	80.00	80/1	4200	6000	0.22	5	17	15
43	61	62	0.1	1.6	KS503_0700 EZ301U	180	300	70.00	70/1	4200	6000	0.24	5	17	15
60	43	44	0.1	2.3	KS503_0500 EZ301U	130	300	50.00	50/1	3500	6000	0.31	5	17	15
60	74	78	0.2	1.3	KS503_0500 EZ302U	200	300	50.00	50/1	3500	6000	0.41	5	17	15
60	96	102	0.3	1.0	KS503_0500 EZ303U	200	300	50.00	50/1	3500	6000	0.52	5	17	16
75	35	35	0.2	2.9	KS503_0400 EZ301U	100	300	40.00	40/1	3100	6000	0.39	5	17	15
75	59	62	0.3	1.7	KS503_0400 EZ302U	190	300	40.00	40/1	3100	6000	0.49	5	17	15
75	77	81	0.4	1.3	KS503_0400 EZ303U	200	300	40.00	40/1	3100	6000	0.60	5	17	16
94	28	28	0.2	3.6	KS503_0320 EZ301U	83	300	32.00	32/1	3100	6000	0.41	5	17	15
94	47	50	0.4	2.1	KS503_0320 EZ302U	150	300	32.00	32/1	3100	6000	0.51	5	17	15
94	62	65	0.5	1.6	KS503_0320 EZ303U	200	300	32.00	32/1	3100	6000	0.62	5	17	16
94	83	89	0.7	1.2	KS503_0320 EZ401U	200	300	32.00	32/1	3100	6000	1.2	5	17	17
125	21	21	0.3	4.8	KS503_0240 EZ301U	62	300	24.00	24/1	3100	6000	0.45	5	17	15
125	35	37	0.6	2.8	KS503_0240 EZ302U	110	300	24.00	24/1	3100	6000	0.55	5	17	15
125	46	49	0.7	2.1	KS503_0240 EZ303U	160	300	24.00	24/1	3100	6000	0.66	5	17	16
125	62	67	1.0	1.6	KS503_0240 EZ401U	190	300	24.00	24/1	3100	6000	1.2	5	17	17
125	96	105	1.5	1.0	KS503_0240 EZ501U	200	300	24.00	24/1	3100	6000	3.2	5	17	18
150	53	57	1.2	1.9	KS502_0200 EZ401U	160	300	20.00	20/1	3500	6000	1.0	5	17	16
150	82	89	1.9	1.2	KS502_0200 EZ501U	200	300	20.00	20/1	3500	6000	3.0	5	17	17
150	89	99	2.1	1.1	KS502_0200 EZ402U	200	300	20.00	20/1	3500	6000	1.7	5	17	17
214	37	40	1.9	2.7	KS502_0140 EZ401U	110	300	14.00	14/1	3200	6000	1.2	5	17	16
214	57	63	2.9	1.7	KS502_0140 EZ501U	200	300	14.00	14/1	3200	6000	3.2	5	17	17
214	63	69	3.2	1.6	KS502_0140 EZ402U	200	300	14.00	14/1	3200	6000	1.9	5	17	17
214	92	114	4.7	1.1	KS502_0140 EZ404U	200	300	14.00	14/1	3200	6000	3.3	5	17	19
214	98	106	5.0	1.0	KS502_0140 EZ502U	200	300	14.00	14/1	3200	6000	5.5	5	17	18
300	27	29	2.9	3.7	KS502_0100 EZ401U	81	300	10.00	10/1	3000	6000	1.6	5	17	16
300	41	45	4.4	2.4	KS502_0100 EZ501U	150	300	10.00	10/1	3000	6000	3.5	5	17	17
300	45	49	4.8	2.2	KS502_0100 EZ402U	150	300	10.00	10/1	3000	6000	2.3	5	17	17
300	66	82	7.0	1.5	KS502_0100 EZ404U	200	300	10.00	10/1	3000	6000	3.6	5	17	19
300	70	76	7.6	1.4	KS502_0100 EZ502U	200	300	10.00	10/1	3000	6000	5.8	5	17	18
300	70	79	7.6	1.4	KS502_0100 EZ701U	190	300	10.00	10/1	3000	6000	9.1	5	17	20
300	92	105	9.9	1.1	KS502_0100 EZ503U	200	300	10.00	10/1	3000	6000	8.2	5	17	20
375	21	23	3.7	4.7	KS502_0080 EZ401U	65	300	8.000	8/1	2800	6000	1.9	5	17	16
375	33	36	5.7	3.0	KS502_0080 EZ501U	120	300	8.000	8/1	2800	6000	3.9	5	17	17
375	36	40	6.3	2.8	KS502_0080 EZ402U	120	300	8.000	8/1	2800	6000	2.6	5	17	17
375	52	65	9.2	1.9	KS502_0080 EZ404U	200	300	8.000	8/1	2800	6000	4.0	5	17	19
375	56	61	9.9	1.8	KS502_0080 EZ502U	200	300	8.000	8/1	2800	6000	6.2	5	17	18
375	56	63	9.9	1.8	KS502_0080 EZ701U	150	300	8.000	8/1	2800	6000	9.5	5	17	20
375	74	84	13	1.3	KS502_0080 EZ503U	200	300	8.000	8/1	2800	6000	8.6	5	17	20
375	91	109	16	1.1	KS502_0080 EZ702U	200	300	8.000	8/1	2800	6000	15	5	17	22
500	25	27	9.2	3.6	KS502_0060 EZ501U	91	300	6.000	6/1	2500	5500	4.5	5	17	17
500	27	30	10	3.3	KS502_0060 EZ402U	91	300	6.000	6/1	2500	5500	3.3	5	17	17
500	39	49	15	2.2	KS502_0060 EZ404U	170	300	6.000	6/1	2500	5500	4.6	5	17	19
500	42	46	16	2.1	KS502_0060 EZ502U	180	300	6.000	6/1	2500	5500	6.8	5	17	18
500	42	47	16	2.1	KS502_0060 EZ701U	110	300	6.000	6/1	2500	5500	10	5	17	20
500	55	63	21	1.6	KS502_0060 EZ503U	200	300	6.000	6/1	2500	5500	9.2	5	17	20
500	68	82	26	1.3	KS502_0060 EZ702U	200	300	6.000	6/1	2500	5500	15	5	17	22
500	77	91	29	1.1	KS502_0060 EZ505U	200	300	6.000	6/1	2500	5500	14	5	17	22
KS5 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 200 Nm)															
563	72	116	15	1.2	KS502_0080 EZ505U	200	300	8.000	8/1	2800	6000	13	5	17	22
750	54	87	23	1.4	KS502_0060 EZ505U	200	300	6.000	6/1	2500	5500	14	5	17	22
750	69	114	30	1.1	KS502_0060 EZ703U	200	300	6.000	6/1	2500	5500	23	5	17	24

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
KS5 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 200 Nm)															
75	66	71	0.1	1.2	KS503_0800 EZ301U	200	300	80.00	80/1	4200	6000	0.22	5	17	15
86	58	62	0.1	1.4	KS503_0700 EZ301U	180	300	70.00	70/1	4200	6000	0.24	5	17	15
120	41	44	0.2	1.9	KS503_0500 EZ301U	130	300	50.00	50/1	3500	6000	0.31	5	17	15
120	70	78	0.3	1.1	KS503_0500 EZ302U	200	300	50.00	50/1	3500	6000	0.41	5	17	15
150	33	35	0.2	2.4	KS503_0400 EZ301U	100	300	40.00	40/1	3100	6000	0.39	5	17	15
150	56	62	0.4	1.4	KS503_0400 EZ302U	190	300	40.00	40/1	3100	6000	0.49	5	17	15
150	73	84	0.5	1.1	KS503_0400 EZ303U	200	300	40.00	40/1	3100	6000	0.60	5	17	16
188	26	28	0.3	3.0	KS503_0320 EZ301U	83	300	32.00	32/1	3100	6000	0.41	5	17	15
188	45	50	0.5	1.8	KS503_0320 EZ302U	150	300	32.00	32/1	3100	6000	0.51	5	17	15
188	58	67	0.6	1.4	KS503_0320 EZ303U	200	300	32.00	32/1	3100	6000	0.62	5	17	16
188	68	83	0.7	1.2	KS503_0320 EZ401U	200	300	32.00	32/1	3100	6000	1.2	5	17	17
250	20	21	0.4	4.0	KS503_0240 EZ301U	62	300	24.00	24/1	3100	6000	0.45	5	17	15
250	33	37	0.7	2.4	KS503_0240 EZ302U	110	300	24.00	24/1	3100	6000	0.55	5	17	15
250	44	50	0.9	1.8	KS503_0240 EZ303U	160	300	24.00	24/1	3100	6000	0.66	5	17	16
250	51	62	1.0	1.5	KS503_0240 EZ401U	190	300	24.00	24/1	3100	6000	1.2	5	17	17
250	76	98	1.5	1.0	KS503_0240 EZ501U	200	300	24.00	24/1	3100	6000	3.2	5	17	18
250	78	109	1.5	1.0	KS503_0240 EZ402U	200	300	24.00	24/1	3100	6000	1.9	5	17	18
300	44	53	1.3	1.8	KS502_0200 EZ401U	160	300	20.00	20/1	3500	6000	1.0	5	17	16
300	65	84	1.9	1.2	KS502_0200 EZ501U	200	300	20.00	20/1	3500	6000	3.0	5	17	17
300	67	93	2.0	1.2	KS502_0200 EZ402U	200	300	20.00	20/1	3500	6000	1.7	5	17	17
429	31	37	2.0	2.6	KS502_0140 EZ401U	110	300	14.00	14/1	3200	6000	1.2	5	17	16
429	45	59	2.9	1.7	KS502_0140 EZ501U	200	300	14.00	14/1	3200	6000	3.2	5	17	17
429	47	65	3.0	1.7	KS502_0140 EZ402U	200	300	14.00	14/1	3200	6000	1.9	5	17	17
429	69	104	4.5	1.1	KS502_0140 EZ502U	200	300	14.00	14/1	3200	6000	5.5	5	17	18
429	77	112	5.0	1.0	KS502_0140 EZ404U	200	300	14.00	14/1	3200	6000	3.3	5	17	19
600	22	27	3.0	3.6	KS502_0100 EZ401U	81	300	10.00	10/1	3000	6000	1.6	5	17	16
600	32	42	4.4	2.4	KS502_0100 EZ501U	150	300	10.00	10/1	3000	6000	3.5	5	17	17
600	33	47	4.5	2.4	KS502_0100 EZ402U	150	300	10.00	10/1	3000	6000	2.3	5	17	17
600	49	74	6.7	1.6	KS502_0100 EZ502U	200	300	10.00	10/1	3000	6000	5.8	5	17	18
600	49	75	6.7	1.6	KS502_0100 EZ701U	190	300	10.00	10/1	3000	6000	9.1	5	17	20
600	55	80	7.5	1.4	KS502_0100 EZ404U	200	300	10.00	10/1	3000	6000	3.6	5	17	19
600	59	101	8.0	1.3	KS502_0100 EZ503U	200	300	10.00	10/1	3000	6000	8.2	5	17	20
600	68	136	9.3	1.2	KS502_0100 EZ702U	200	300	10.00	10/1	3000	6000	14	5	17	22
750	17	21	3.9	4.5	KS502_0080 EZ401U	65	300	8.000	8/1	2800	6000	1.9	5	17	16
750	26	33	5.7	3.0	KS502_0080 EZ501U	120	300	8.000	8/1	2800	6000	3.9	5	17	17
750	27	37	5.9	3.0	KS502_0080 EZ402U	120	300	8.000	8/1	2800	6000	2.6	5	17	17
750	40	59	8.7	2.0	KS502_0080 EZ502U	200	300	8.000	8/1	2800	6000	6.2	5	17	18
750	40	60	8.7	2.0	KS502_0080 EZ701U	150	300	8.000	8/1	2800	6000	9.5	5	17	20
750	44	64	9.7	1.8	KS502_0080 EZ404U	200	300	8.000	8/1	2800	6000	4.0	5	17	19
750	47	81	10	1.7	KS502_0080 EZ503U	200	300	8.000	8/1	2800	6000	8.6	5	17	20
750	55	109	12	1.4	KS502_0080 EZ702U	200	300	8.000	8/1	2800	6000	15	5	17	22
KS7 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 400 Nm)															
43	182	195	0.2	1.1	KS703_0700 EZ401U	400	600	70.00	70/1	3500	6000	1.1	4	42	30
60	130	140	0.3	1.5	KS703_0500 EZ401U	400	600	50.00	50/1	3200	6000	1.2	4	42	30
75	104	112	0.3	1.9	KS703_0400 EZ401U	320	600	40.00	40/1	3000	6000	1.4	4	42	30
75	160	175	0.5	1.2	KS703_0400 EZ501U	400	600	40.00	40/1	3000	6000	3.4	4	42	31
75	175	193	0.6	1.1	KS703_0400 EZ402U	400	600	40.00	40/1	3000	6000	2.1	4	42	31
94	83	89	0.5	2.4	KS703_0320 EZ401U	250	600	32.00	32/1	3000	6000	1.5	4	42	30
94	128	140	0.7	1.6	KS703_0320 EZ501U	400	600	32.00	32/1	3000	6000	3.5	4	42	31
94	140	155	0.8	1.4	KS703_0320 EZ402U	400	600	32.00	32/1	3000	6000	2.2	4	42	31
125	62	67	0.6	3.2	KS703_0240 EZ401U	190	600	24.00	24/1	3000	6000	1.7	4	42	30
125	96	105	1.0	2.1	KS703_0240 EZ501U	360	600	24.00	24/1	3000	6000	3.7	4	42	31
125	105	116	1.1	1.9	KS703_0240 EZ402U	360	600	24.00	24/1	3000	6000	2.4	4	42	31
125	154	192	1.6	1.3	KS703_0240 EZ404U	400	600	24.00	24/1	3000	6000	3.7	4	42	33
125	165	179	1.7	1.2	KS703_0240 EZ502U	400	600	24.00	24/1	3000	6000	6.0	4	42	33
125	165	185	1.7	1.2	KS703_0240 EZ701U	400	600	24.00	24/1	3000	6000	9.3	4	42	34
150	82	89	2.7	2.4	KS702_0200 EZ501U	300	600	20.00	20/1	3200	6000	3.3	4	42	28
150	141	152	4.6	1.4	KS702_0200 EZ502U	400	600	20.00	20/1	3200	6000	5.6	4	42	30
150	141	158	4.6	1.4	KS702_0200 EZ701U	380	600	20.00	20/1	3200	6000	8.9	4	42	31
150	184	211	6.0	1.1	KS702_0200 EZ503U	400	600	20.00	20/1	3200	6000	8.0	4	42	31
214	57	63	4.1	3.5	KS702_0140 EZ501U	210	600	14.00	14/1	3000	6000	3.8	4	42	28
214	98	106	7.0	2.0	KS702_0140 EZ502U	400	600	14.00	14/1	3000	6000	6.1	4	42	30
214	98	110	7.0	2.0	KS702_0140 EZ701U	270	600	14.00	14/1	3000	6000	9.4	4	42	31
214	129	148	9.2	1.5	KS702_0140 EZ503U	400	600	14.00	14/1	3000	6000	8.4	4	42	31

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
KS7 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 400 Nm)															
214	160	192	11	1.2	KS702_0140 EZ702U	400	600	14.00	14/1	3000	6000	15	4	42	34
214	180	213	13	1.1	KS702_0140 EZ505U	400	600	14.00	14/1	3000	6000	13	4	42	34
300	41	45	6.1	4.9	KS702_0100 EZ501U	150	600	10.00	10/1	2800	6000	4.7	4	42	28
300	70	76	10	2.8	KS702_0100 EZ502U	290	600	10.00	10/1	2800	6000	7.0	4	42	30
300	70	79	10	2.8	KS702_0100 EZ701U	190	600	10.00	10/1	2800	6000	10	4	42	31
300	92	105	14	2.2	KS702_0100 EZ503U	400	600	10.00	10/1	2800	6000	9.4	4	42	31
300	114	137	17	1.7	KS702_0100 EZ702U	390	600	10.00	10/1	2800	6000	16	4	42	34
300	128	152	19	1.5	KS702_0100 EZ505U	400	600	10.00	10/1	2800	6000	14	4	42	34
300	157	198	23	1.3	KS702_0100 EZ703U	400	600	10.00	10/1	2800	6000	23	4	42	36
375	56	61	14	3.5	KS702_0080 EZ502U	240	600	8.000	8/1	2500	5000	8.1	4	42	30
375	56	63	14	3.5	KS702_0080 EZ701U	150	600	8.000	8/1	2500	5000	11	4	42	31
375	74	84	18	2.7	KS702_0080 EZ503U	330	600	8.000	8/1	2500	5000	10	4	42	31
375	91	109	22	2.2	KS702_0080 EZ702U	310	600	8.000	8/1	2500	5000	17	4	42	34
375	103	122	25	1.9	KS702_0080 EZ505U	400	600	8.000	8/1	2500	5000	15	4	42	34
375	125	158	31	1.6	KS702_0080 EZ703U	400	600	8.000	8/1	2500	5000	25	4	42	36
375	162	230	39	1.2	KS702_0080 EZ705U	400	600	8.000	8/1	2500	5000	37	4	42	41
375	169	282	41	1.2	KS702_0080 EZ802U	400	600	8.000	8/1	2500	5000	61	4	42	50
500	42	46	19	4.7	KS702_0060 EZ502U	180	600	6.000	6/1	2100	4500	11	4	42	30
500	42	47	19	4.7	KS702_0060 EZ701U	110	600	6.000	6/1	2100	4500	14	4	42	31
500	55	63	25	3.6	KS702_0060 EZ503U	250	600	6.000	6/1	2100	4500	13	4	42	31
500	68	82	31	2.9	KS702_0060 EZ702U	230	600	6.000	6/1	2100	4500	19	4	42	34
500	77	91	35	2.6	KS702_0060 EZ505U	380	600	6.000	6/1	2100	4500	18	4	42	34
500	94	119	43	2.1	KS702_0060 EZ703U	370	600	6.000	6/1	2100	4500	27	4	42	36
500	121	172	56	1.6	KS702_0060 EZ705U	400	600	6.000	6/1	2100	4500	40	4	42	41
500	127	211	58	1.6	KS702_0060 EZ802U	400	600	6.000	6/1	2100	4500	64	4	42	50
KS7 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 400 Nm)															
321	126	203	10	1.4	KS702_0140 EZ505U	400	600	14.00	14/1	3000	6000	13	4	42	34
321	161	266	13	1.1	KS702_0140 EZ703U	400	600	14.00	14/1	3000	6000	22	4	42	36
450	90	145	15	1.9	KS702_0100 EZ505U	400	600	10.00	10/1	2800	6000	14	4	42	34
450	115	190	20	1.5	KS702_0100 EZ703U	400	600	10.00	10/1	2800	6000	23	4	42	36
450	156	285	27	1.1	KS702_0100 EZ705U	400	600	10.00	10/1	2800	6000	36	4	42	41
563	72	116	20	2.4	KS702_0080 EZ505U	400	600	8.000	8/1	2500	5000	15	4	42	34
563	80	262	22	2.2	KS702_0080 EZ802U	400	600	8.000	8/1	2500	5000	61	4	42	50
563	92	152	26	1.9	KS702_0080 EZ703U	400	600	8.000	8/1	2500	5000	25	4	42	36
563	125	228	35	1.4	KS702_0080 EZ705U	400	600	8.000	8/1	2500	5000	37	4	42	41
750	54	87	28	3.2	KS702_0060 EZ505U	380	600	6.000	6/1	2100	4500	18	4	42	34
750	60	197	31	2.9	KS702_0060 EZ802U	400	600	6.000	6/1	2100	4500	64	4	42	50
750	69	114	36	2.5	KS702_0060 EZ703U	370	600	6.000	6/1	2100	4500	27	4	42	36
750	93	171	49	1.9	KS702_0060 EZ705U	400	600	6.000	6/1	2100	4500	40	4	42	41
KS7 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 400 Nm)															
86	150	182	0.2	1.1	KS703_0700 EZ401U	400	600	70.00	70/1	3500	6000	1.1	4	42	30
120	107	130	0.3	1.5	KS703_0500 EZ401U	400	600	50.00	50/1	3200	6000	1.2	4	42	30
150	86	104	0.4	1.8	KS703_0400 EZ401U	320	600	40.00	40/1	3000	6000	1.4	4	42	30
150	126	164	0.5	1.2	KS703_0400 EZ501U	400	600	40.00	40/1	3000	6000	3.4	4	42	31
150	130	182	0.5	1.2	KS703_0400 EZ402U	400	600	40.00	40/1	3000	6000	2.1	4	42	31
188	68	83	0.5	2.3	KS703_0320 EZ401U	250	600	32.00	32/1	3000	6000	1.5	4	42	30
188	101	131	0.7	1.6	KS703_0320 EZ501U	400	600	32.00	32/1	3000	6000	3.5	4	42	31
188	104	146	0.7	1.5	KS703_0320 EZ402U	400	600	32.00	32/1	3000	6000	2.2	4	42	31
188	155	232	1.1	1.0	KS703_0320 EZ502U	400	600	32.00	32/1	3000	6000	5.8	4	42	33
188	155	235	1.1	1.0	KS703_0320 EZ701U	400	600	32.00	32/1	3000	6000	9.1	4	42	34
250	51	62	0.7	3.1	KS703_0240 EZ401U	190	600	24.00	24/1	3000	6000	1.7	4	42	30
250	76	98	1.0	2.1	KS703_0240 EZ501U	360	600	24.00	24/1	3000	6000	3.7	4	42	31
250	78	109	1.0	2.0	KS703_0240 EZ402U	360	600	24.00	24/1	3000	6000	2.4	4	42	31
250	116	174	1.5	1.4	KS703_0240 EZ502U	400	600	24.00	24/1	3000	6000	6.0	4	42	33
250	116	176	1.5	1.4	KS703_0240 EZ701U	400	600	24.00	24/1	3000	6000	9.3	4	42	34
250	129	187	1.7	1.2	KS703_0240 EZ404U	400	600	24.00	24/1	3000	6000	3.7	4	42	33
250	138	237	1.8	1.1	KS703_0240 EZ503U	400	600	24.00	24/1	3000	6000	8.3	4	42	34
300	65	84	2.6	2.4	KS702_0200 EZ501U	300	600	20.00	20/1	3200	6000	3.3	4	42	28
300	99	148	4.0	1.6	KS702_0200 EZ502U	400	600	20.00	20/1	3200	6000	5.6	4	42	30
300	99	150	4.0	1.6	KS702_0200 EZ701U	380	600	20.00	20/1	3200	6000	8.9	4	42	31
300	118	201	4.8	1.3	KS702_0200 EZ503U	400	600	20.00	20/1	3200	6000	8.0	4	42	31
300	137	272	5.6	1.2	KS702_0200 EZ702U	400	600	20.00	20/1	3200	6000	14	4	42	34
429	45	59	4.1	3.5	KS702_0140 EZ501U	210	600	14.00	14/1	3000	6000	3.8	4	42	28
429	69	104	6.2	2.3	KS702_0140 EZ502U	400	600	14.00	14/1	3000	6000	6.1	4	42	30

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
KS7 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 400 Nm)															
429	69	105	6.2	2.3	KS702_0140 EZ701U	270	600	14.00	14/1	3000	6000	9.4	4	42	31
429	82	141	7.4	1.9	KS702_0140 EZ503U	400	600	14.00	14/1	3000	6000	8.4	4	42	31
429	96	190	8.6	1.6	KS702_0140 EZ702U	400	600	14.00	14/1	3000	6000	15	4	42	34
600	32	42	6.1	4.9	KS702_0100 EZ501U	150	600	10.00	10/1	2800	6000	4.7	4	42	28
600	49	74	9.3	3.2	KS702_0100 EZ502U	290	600	10.00	10/1	2800	6000	7.0	4	42	30
600	49	75	9.3	3.2	KS702_0100 EZ701U	190	600	10.00	10/1	2800	6000	10	4	42	31
600	59	101	11	2.7	KS702_0100 EZ503U	400	600	10.00	10/1	2800	6000	9.4	4	42	31
600	68	136	13	2.3	KS702_0100 EZ702U	390	600	10.00	10/1	2800	6000	16	4	42	34

14.3 Dimensional drawings

In this chapter you can find the dimensions of the geared motors.

There is a dimensional drawing for every possible shaft/housing design, each with the tables for gear unit dimensions, motor dimensions and geared motor dimensions.

Dimensions can exceed the specifications of ISO 2768-mK due to casting tolerances or accumulation of individual tolerances.

We reserve the right to make dimensional changes due to ongoing technical development.

You can download CAD models of our standard drives at http://cad.stoeber.de.

Combination options and the dimensions of forced ventilated geared motors can be found at http://cad.stoeber.de.

Tolerances

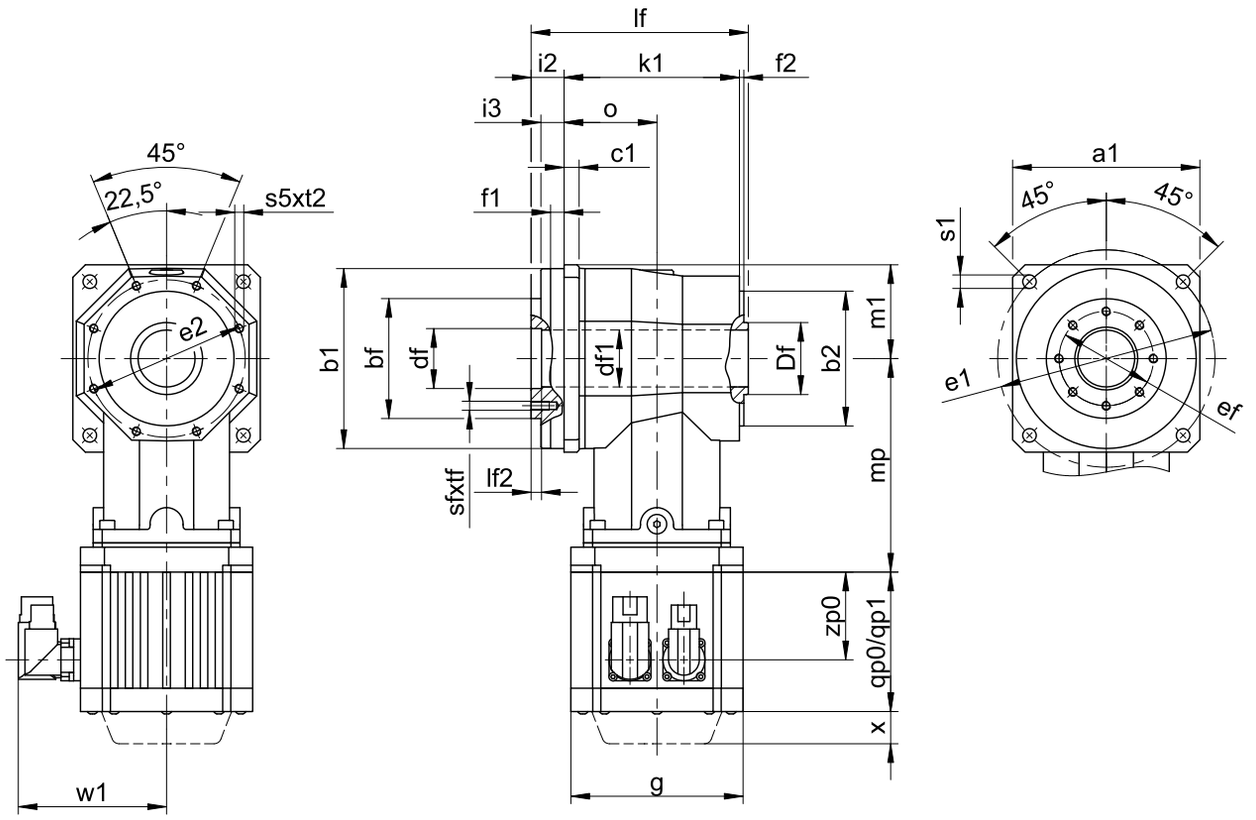
Solid shaft	Tolerance
Shaft ∅ fit ≤ 50 mm	DIN 748-1, ISO k6
Shaft ∅ fit > 50 mm	DIN 748-1, ISO m6
Feather keys	DIN 6885-1, high form A

Hollow shaft	Tolerance
Hollow shaft hole fit	ISO H7

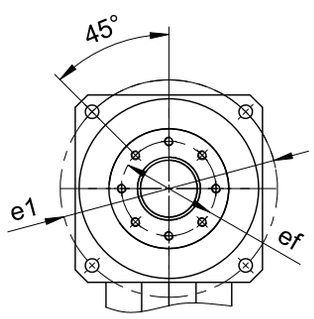
Centering holes in solid shafts in accordance with DIN 332-2, DR shape

Thread size	M8	M12	M16
Thread depth	19	28	36

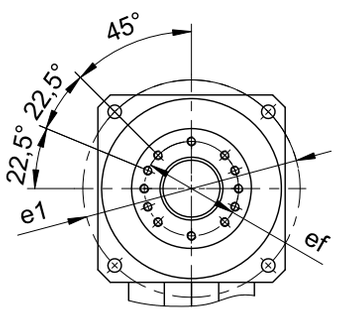
14.3.1 F shaft design (flange hollow shaft)



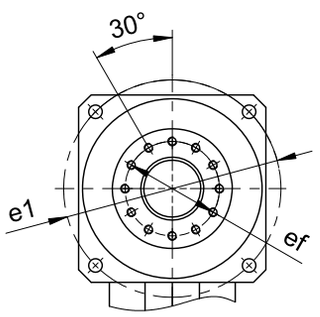
KS4



KS5



KS7



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]

Dimensions of gear units

Type	□a1	Øb1	Øb2	bf	c1	Ødf	Ødf1	ØDf	Øe1	Øe2	ef	f1	f2	i2	i3	k1	lf	lf2	m1	o	Øs1	s5	sf	t2	tf
KS402	101	95_{h6}	75_{h6}	63_{h7}	10	31.5^{H7}	30	40_{d9}	120	88	50	8	3	20	14.0	104	127	6.0	50.5	53	6.6	M5	M6	9	11
KS403	101	95_{h6}	75_{h6}	63_{h7}	10	31.5^{H7}	30	40_{d9}	120	88	50	8	3	20	14.0	104	127	6.0	50.5	53	6.6	M5	M6	9	11
KS502	125	120_{h6}	90_{h6}	80_{h7}	10	40.0^{H7}	38	48_{d9}	145	105	63	9	3	22	15.5	120	145	6.5	62.5	62	9.0	M6	M6	11	12
KS503	125	120_{h6}	90_{h6}	80_{h7}	10	40.0^{H7}	38	48_{d9}	145	105	63	9	3	22	15.5	120	145	6.5	62.5	62	9.0	M6	M6	11	12
KS702	155	150_{h6}	110_{h6}	100_{h7}	15	50.0^{H7}	49	60_{d9}	180	130	80	10	3	27	20.0	148	178	7.0	77.5	78	11.0	M8	M8	14	15
KS703	155	150_{h6}	110_{h6}	100_{h7}	15	50.0^{H7}	49	60_{d9}	180	130	80	10	3	27	20.0	148	178	7.0	77.5	78	11.0	M8	M8	14	15

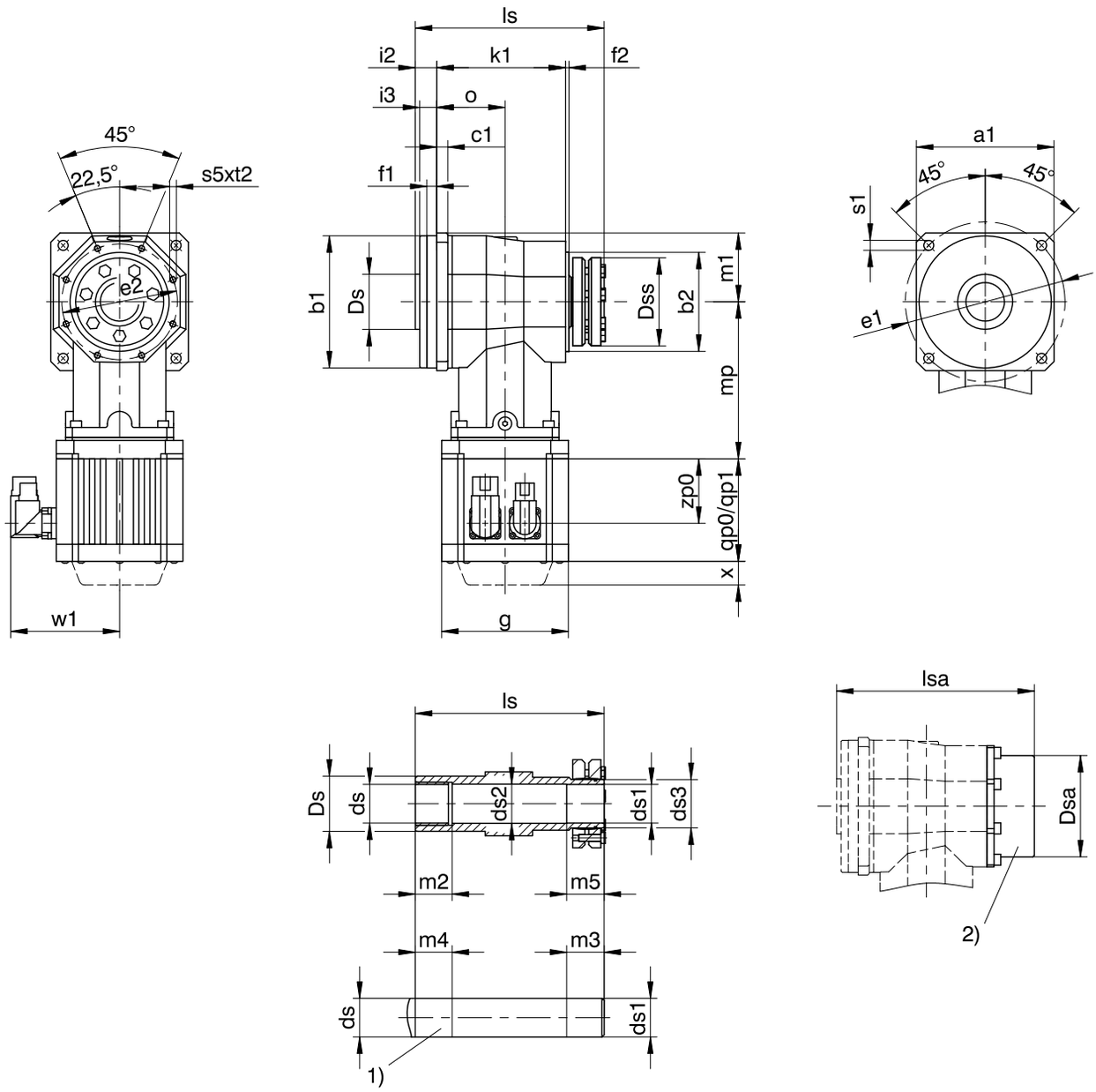
Dimensions of motors

Type	□g	qp0	qp1	w1	x	zp0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0
EZ501U	115	93	147.5	100.0	22	58.5
EZ502U	115	118	172.5	100.0	22	83.5
EZ503U	115	143	197.5	100.0	22	108.5
EZ505U	115	193	247.5	100.0	22	158.5
EZ701U	145	102	161.0	115.0	22	64.0
EZ702U	145	127	186.0	115.0	22	89.0
EZ703U	145	152	211.0	115.0	22	114.0
EZ705U	145	207	266.0	134.0	22	165.0
EZ802U	190	197	274.0	156.5	22	143.0

Dimensions of geared motors

Type	EZ3	EZ4	EZ5	EZ7	EZ8
	mp	mp	mp	mp	mp
KS402	124.0	120.5	123.0	–	–
KS403	164.0	–	–	–	–
KS502	–	140.0	142.5	148.5	–
KS503	192.0	188.5	191.0	–	–
KS702	–	–	167.0	173.0	188.0
KS703	–	222.5	225.0	231.0	–

14.3.2 S shaft design (hollow shaft with shrink disk)



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▶ 23.4]
1)	Machine shaft: The dimension ls must be met.	2)	Cover (optional)

Dimensions of gear units

Type	□a1	Øb1	Øb2	c1	Øds	Øds1	Øds2	Øds3	ØDs	ØDsa	ØDss	Øe1	Øe2	f1	f2	i2	i3	k1	ls	lsa	m1	m2	m3	m4	m5	o	Øs1	s5	t2
KS402	101	95_{h6}	75_{h6}	10	25_{h6}	25_{h6}^{H7}	25.5	30	40	72	60	120	88	8	3	18.0	14.0	104	151.0	158.0	50.5	20	34	25	29	53	6.6	M5	9
KS403	101	95_{h6}	75_{h6}	10	25_{h6}	25_{h6}^{H7}	25.5	30	40	72	60	120	88	8	3	18.0	14.0	104	151.0	158.0	50.5	20	34	25	29	53	6.6	M5	9
KS502	125	120_{h6}	90_{h6}	10	35_{h6}	35_{h6}^{H7}	35.5	44	50	92	80	145	105	9	3	19.5	15.5	120	171.5	179.5	62.5	30	39	35	34	62	9.0	M6	11
KS503	125	120_{h6}	90_{h6}	10	35_{h6}	35_{h6}^{H7}	35.5	44	50	92	80	145	105	9	3	19.5	15.5	120	171.5	179.5	62.5	30	39	35	34	62	9.0	M6	11
KS702	155	150_{h6}	110_{h6}	15	45_{h6}	45_{h6}^{H7}	45.5	55	65	112	100	180	130	10	3	24.0	20.0	148	211.0	218.0	77.5	40	42	45	37	78	11.0	M8	14
KS703	155	150_{h6}	110_{h6}	15	45_{h6}	45_{h6}^{H7}	45.5	55	65	112	100	180	130	10	3	24.0	20.0	148	211.0	218.0	77.5	40	42	45	37	78	11.0	M8	14

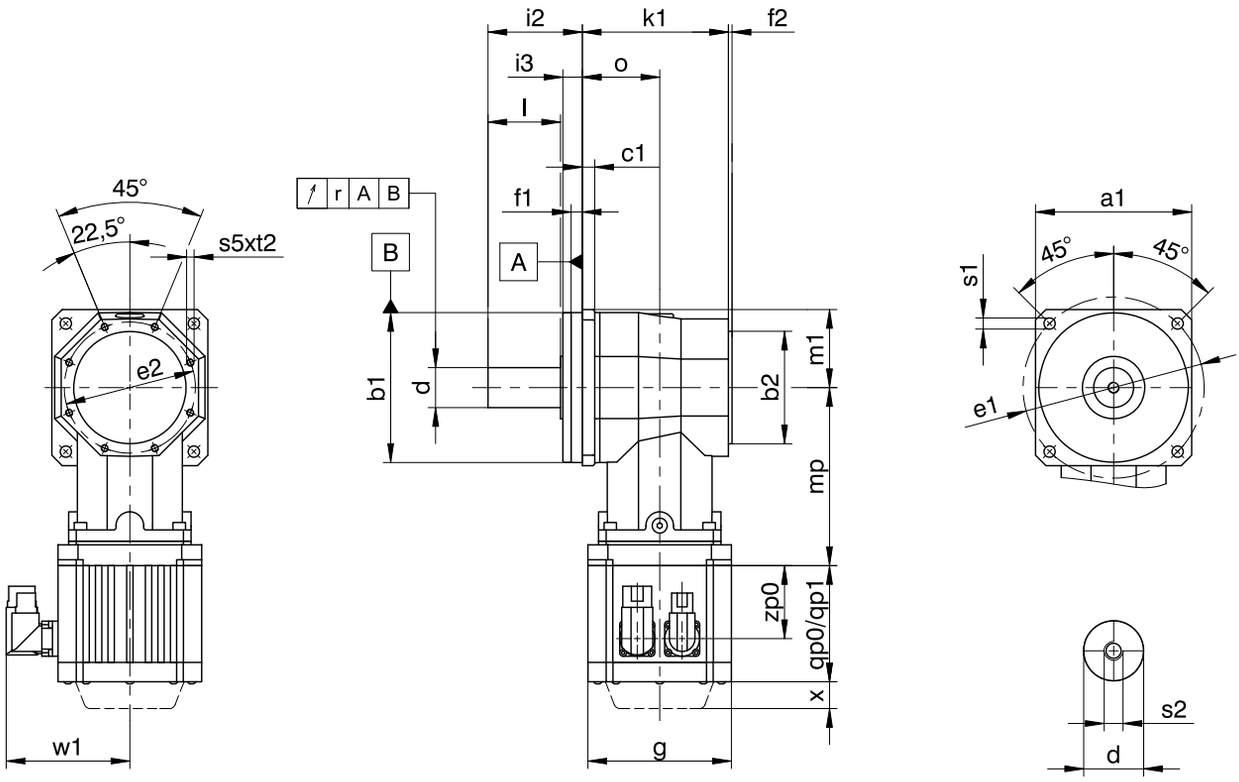
Dimensions of motors

Type	□g	qp0	qp1	w1	x	zp0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0
EZ501U	115	93	147.5	100.0	22	58.5
EZ502U	115	118	172.5	100.0	22	83.5
EZ503U	115	143	197.5	100.0	22	108.5
EZ505U	115	193	247.5	100.0	22	158.5
EZ701U	145	102	161.0	115.0	22	64.0
EZ702U	145	127	186.0	115.0	22	89.0
EZ703U	145	152	211.0	115.0	22	114.0
EZ705U	145	207	266.0	134.0	22	165.0
EZ802U	190	197	274.0	156.5	22	143.0

Dimensions of geared motors

Type	EZ3	EZ4	EZ5	EZ7	EZ8
	mp	mp	mp	mp	mp
KS402	124.0	120.5	123.0	–	–
KS403	164.0	–	–	–	–
KS502	–	140.0	142.5	148.5	–
KS503	192.0	188.5	191.0	–	–
KS702	–	–	167.0	173.0	188.0
KS703	–	222.5	225.0	231.0	–

14.3.3 G shaft design (solid shaft without feather key)



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]

Dimensions of gear units

Type	□a1	Øb1	Øb2	c1	Ød	Øe1	Øe2	f1	f2	i2	i3	l	k1	m1	o	r	Øs1	s2	s5	t2
KS402	101	95_{h6}	75_{h6}	10	22_{k6}	120	88	8	3	52.0	14.0	36	104	50.5	53	0.020	6.6	M8	M5	9
KS403	101	95_{h6}	75_{h6}	10	22_{k6}	120	88	8	3	52.0	14.0	36	104	50.5	53	0.020	6.6	M8	M5	9
KS502	125	120_{h6}	90_{h6}	10	32_{k6}	145	105	9	3	75.5	15.5	58	120	62.5	62	0.020	9.0	M12	M6	11
KS503	125	120_{h6}	90_{h6}	10	32_{k6}	145	105	9	3	75.5	15.5	58	120	62.5	62	0.020	9.0	M12	M6	11
KS702	155	150_{h6}	110_{h6}	15	40_{k6}	180	130	10	3	105.0	20.0	82	148	77.5	78	0.025	11.0	M16	M8	14
KS703	155	150_{h6}	110_{h6}	15	40_{k6}	180	130	10	3	105.0	20.0	82	148	77.5	78	0.025	11.0	M16	M8	14

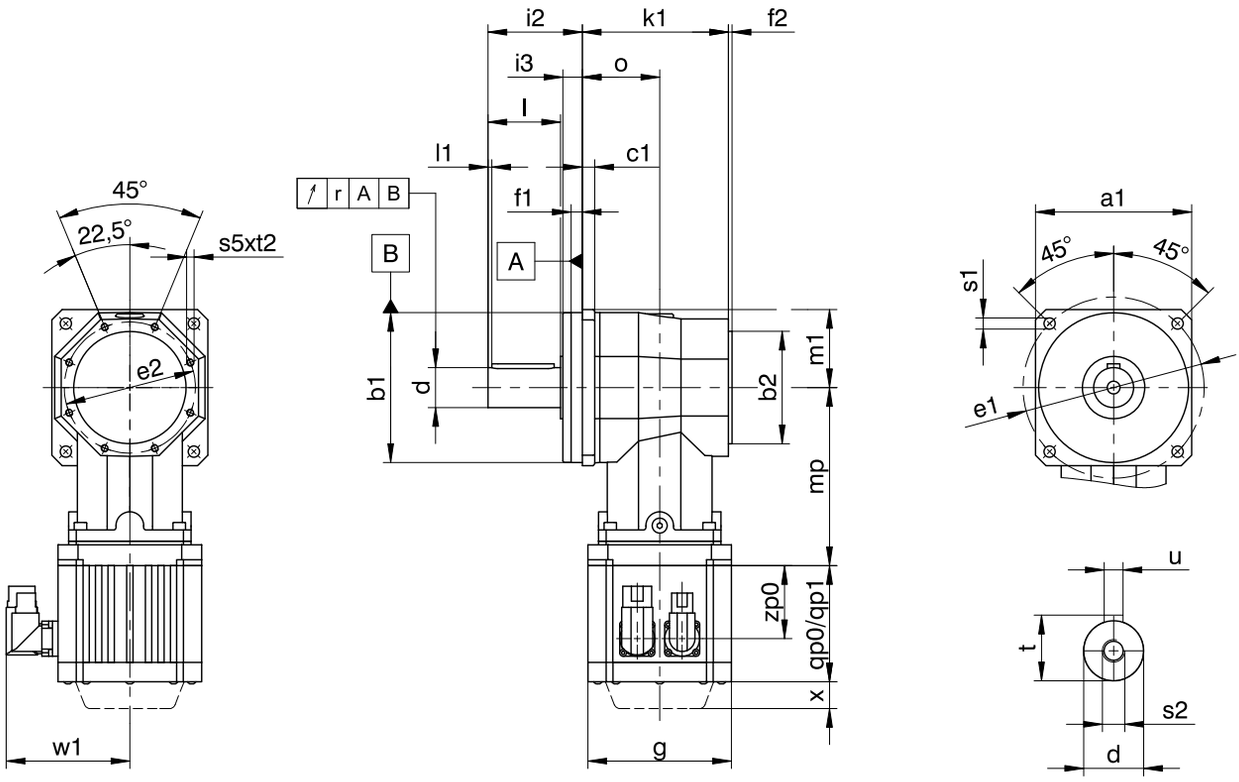
Dimensions of motors

Type	□g	qp0	qp1	w1	x	zp0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0
EZ501U	115	93	147.5	100.0	22	58.5
EZ502U	115	118	172.5	100.0	22	83.5
EZ503U	115	143	197.5	100.0	22	108.5
EZ505U	115	193	247.5	100.0	22	158.5
EZ701U	145	102	161.0	115.0	22	64.0
EZ702U	145	127	186.0	115.0	22	89.0
EZ703U	145	152	211.0	115.0	22	114.0
EZ705U	145	207	266.0	134.0	22	165.0
EZ802U	190	197	274.0	156.5	22	143.0

Dimensions of geared motors

Type	EZ3	EZ4	EZ5	EZ7	EZ8
	mp	mp	mp	mp	mp
KS402	124.0	120.5	123.0	–	–
KS403	164.0	–	–	–	–
KS502	–	140.0	142.5	148.5	–
KS503	192.0	188.5	191.0	–	–
KS702	–	–	167.0	173.0	188.0
KS703	–	222.5	225.0	231.0	–

14.3.4 P shaft design (solid shaft with feather key)



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]

Dimensions of gear units

Type	□a1	Øb1	Øb2	c1	Ød	Øe1	Øe2	f1	f2	i2	i3	l	l1	k1	m1	o	r	Øs1	s2	s5	t	t2	u
KS402	101	95_{h6}	75_{h6}	10	22_{k6}	120	88	8	3	52.0	14.0	36	3	104	50.5	53	0.020	6.6	M8	M5	24.5	9	A6×6×28
KS403	101	95_{h6}	75_{h6}	10	22_{k6}	120	88	8	3	52.0	14.0	36	3	104	50.5	53	0.020	6.6	M8	M5	24.5	9	A6×6×28
KS502	125	120_{h6}	90_{h6}	10	32_{k6}	145	105	9	3	75.5	15.5	58	3	120	62.5	62	0.020	9.0	M12	M6	35.0	11	A10×8×50
KS503	125	120_{h6}	90_{h6}	10	32_{k6}	145	105	9	3	75.5	15.5	58	3	120	62.5	62	0.020	9.0	M12	M6	35.0	11	A10×8×50
KS702	155	150_{h6}	110_{h6}	15	40_{k6}	180	130	10	3	105.0	20.0	82	4	148	77.5	78	0.025	11.0	M16	M8	43.0	14	A12×8×70
KS703	155	150_{h6}	110_{h6}	15	40_{k6}	180	130	10	3	105.0	20.0	82	4	148	77.5	78	0.025	11.0	M16	M8	43.0	14	A12×8×70

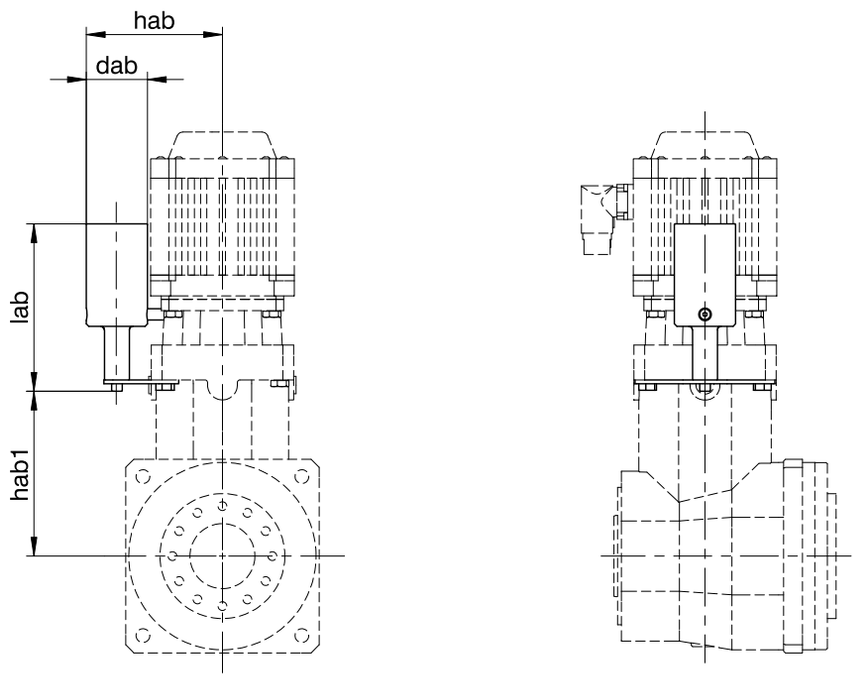
Dimensions of motors

Type	□g	qp0	qp1	w1	x	zp0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0
EZ501U	115	93	147.5	100.0	22	58.5
EZ502U	115	118	172.5	100.0	22	83.5
EZ503U	115	143	197.5	100.0	22	108.5
EZ505U	115	193	247.5	100.0	22	158.5
EZ701U	145	102	161.0	115.0	22	64.0
EZ702U	145	127	186.0	115.0	22	89.0
EZ703U	145	152	211.0	115.0	22	114.0
EZ705U	145	207	266.0	134.0	22	165.0
EZ802U	190	197	274.0	156.5	22	143.0

Dimensions of geared motors

Type	EZ3	EZ4	EZ5	EZ7	EZ8
	mp	mp	mp	mp	mp
KS402	124.0	120.5	123.0	–	–
KS403	164.0	–	–	–	–
KS502	–	140.0	142.5	148.5	–
KS503	192.0	188.5	191.0	–	–
KS702	–	–	167.0	173.0	188.0
KS703	–	222.5	225.0	231.0	–

14.3.5 Oil expansion tank



Dimensions

Type	EZ3				EZ4				EZ5				EZ7			
	dab	lab	hab	hab1	dab	lab	hab	hab1	dab	lab	hab	hab1	dab	lab	hab	hab1
KS403	34	100	74.5	85	–	–	–	–	–	–	–	–	–	–	–	–
KS503	39	122	92.0	105	39	122	92.0	105	39	122	92.0	105	–	–	–	–
KS703	–	–	–	–	49	134	109.5	132	49	134	109.5	132	49	134	109.5	132

More information can be found in Chapter [▸ 14.6.5]

14.4 Type designation

In this chapter, you can find an explanation of the type designation with the associated options.

Additional ordering information not included in the type designation can be found at the end of the chapter.

Sample code

KS	5	0	2	G	F	0200	EZ401U

Explanation

Code	Designation	Design
KS	Type	Right-angle servo gear unit
5	Size	5 (example)
0	Generation	Generation 0
2	Stages	Two-stage
3		Three-stage
F	Shaft	Flange hollow shaft
S		Hollow shaft with shrink ring
G		Solid shaft without feather key
P		Solid shaft with feather key
F	Housing	Standard
0200	Transmission ratio (i x 10)	i = 20 (example)
EZ401U	Motor	EZ synchronous servo motor

In order to complete the type designation, also specify:

- A detailed type designation of the motor, see chapter [▶ 23]
- The mounting position, see Chapter [▶ 14.5.2]
- Radial shaft seal rings at the output made of NBR or FKM, see chapter [▶ 14.6.4]
- The position of the plug connectors, see the chapter [▶ 14.5.4]
- Attachment of oil expansion tank on gear unit side 1 or 2 (required without exception for three-stage gear units in mounting position EL5), see chapter [▶ 14.6.5]

14.5 Product description

14.5.1 Installation conditions

Take care to align the machine shaft with the gear unit hollow shaft when attaching the gear unit.

Maximum deviation ≤ 0.03 mm.

Hollow shaft with shrink ring

The tolerance of the hollow shaft hole is ISO H7.

The machine shaft must be ISO h6.

Select a material for the machine shaft with a permitted surface pressure of $p \geq 325\ N/mm^2$.

Possible materials:

- C45E +QT
- 42CrMo4

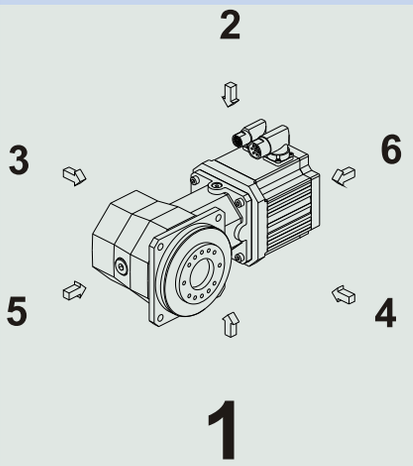
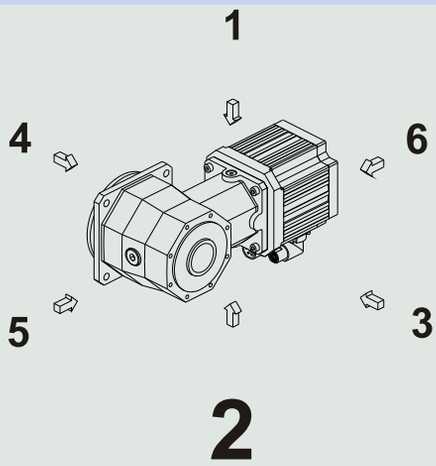
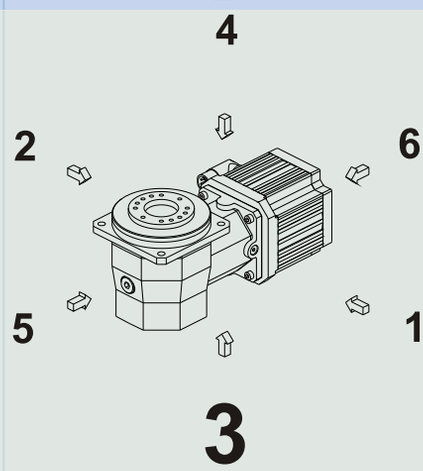
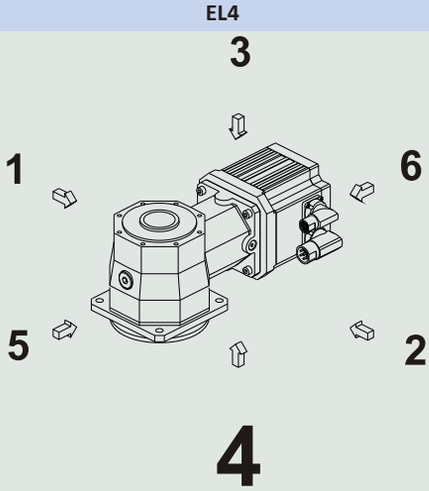
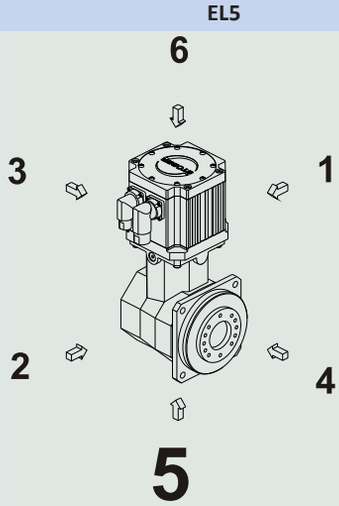
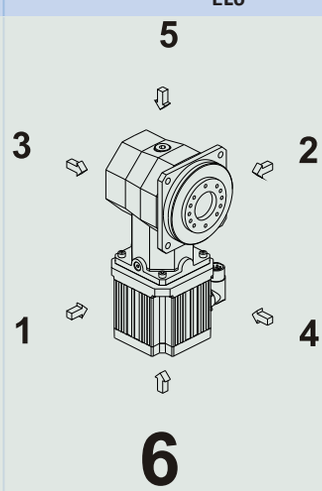
The torque and force values listed in this catalog are valid under the following conditions:

- When using screws with quality 12.9 for machine-side attachment of the flange hollow shaft and gear unit housing
- When the gear unit housings are adjusted at pilot øb1 (H7)
- When the flange hollow shaft is adjusted using the connecting element at pilot øbf or ødf

14.5.2 Mounting positions

The following table shows the standard mounting positions.

The numbers identify the gear unit sides. The mounting position is defined by the gear side facing downwards.

EL1	EL2	EL3
		
EL4	**EL5**	**EL6**
		

Since the lubricant filling volume of the gear unit depends on the mounting position, the mounting position must be specified when ordering.

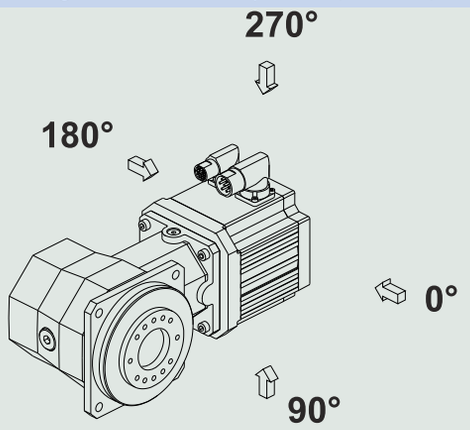
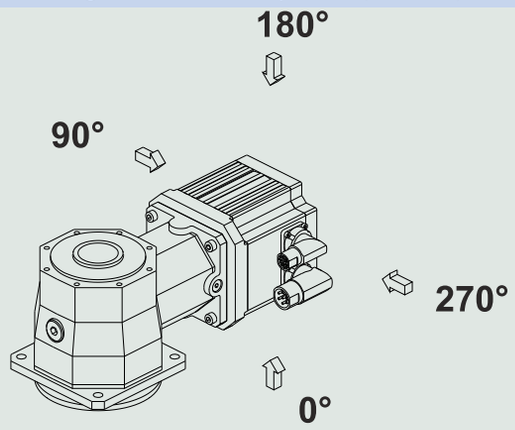
14.5.3 Lubricants

STOBER fills the gear units with the amount and type of lubricant specified on the nameplate. The filling volume and the structure of the gear units depend on the mounting position.

Only install the gear units in the intended mounting position! Reposition the gear units only after consulting STOBER. Otherwise, STOBER assumes no liability for the gear units.

Lubricant filling quantities for gear units, document ID 441871, can be found online at http://www.stoeber.de/en/download. Enter the ID of the documentation in the Search... field.

14.5.4 Position of the plug connectors

Mounting position EL1	Mounting position EL4
Plug connector in 270° position (standard)	Plug connector in 270° position (standard)
	

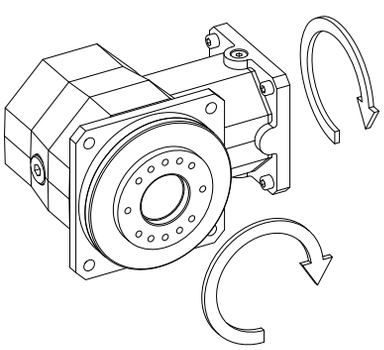
Indicate variations for your geared motor in the purchase order.

Note that the plug connector position rotates along with the geared motor if the geared motor is in another mounting position.

14.5.5 Other product features

Feature	Value
Max. permitted gear unit temperature (on the surface of the gear unit)	≤ 90 °C
Paint	Black RAL 9005
(ATEX) Directive 2014/34/EU (option)	Not suitable
Protection class:[1]	
Gear unit	IP65
Motor	IP56, optionally IP66

14.5.6 Direction of rotation



The pictures show mounting position EL1.

14.6 Project configuration

Project your drives using our SERVOsoft designing software. You can receive SERVOsoft for free from your adviser at one of our sales centers. Observe the limit conditions in this chapter to ensure a safe design for your drives.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

[1] Observe the protection class of all the components.

14.6.1 Calculation of the operating point

Check the following conditions for operating points other than the nominal point M_{2N} specified in the selection tables.

$$n_{1m^*} \leq \frac{n_{1maxDB}}{fB_T}$$

$$n_{1max^*} \leq \frac{n_{1max\,ZB}}{fB_T}$$

$$M_{2eff^*} \leq M_{2th}$$

$$M_{2acc^*} \leq M_{2acc}$$

$$M_{2NOT^*} \leq M_{2NOT}$$

$$M_{2eq^*} \leq M_{2N} \cdot \frac{S}{fB_{op} \cdot fB_t}$$

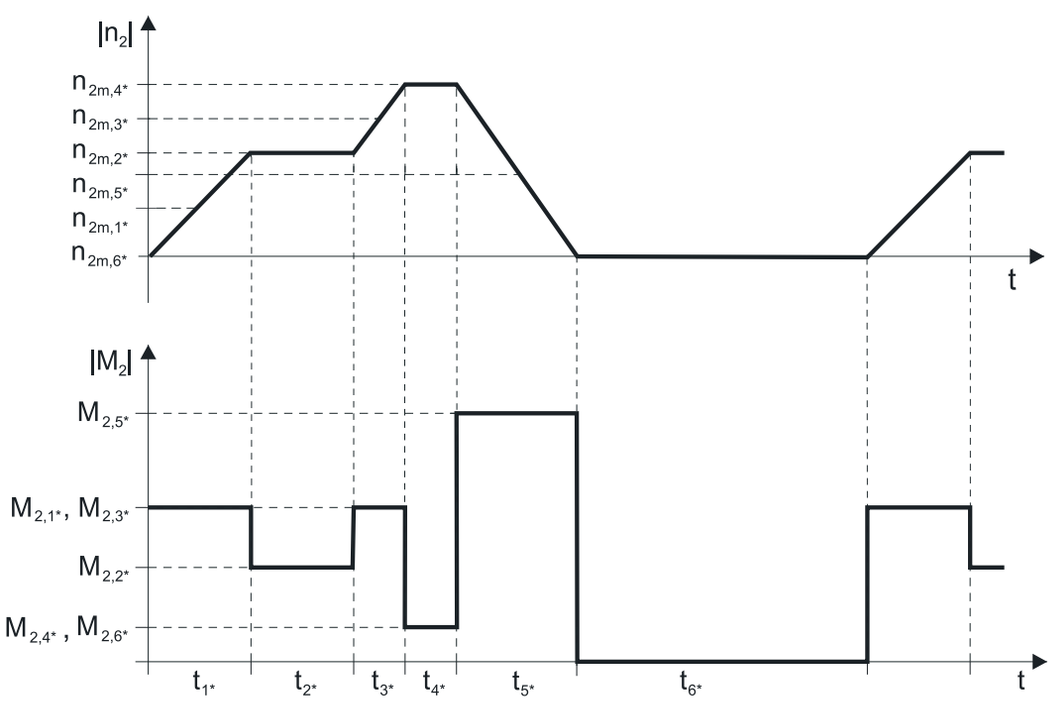
The values for n_{1maxDB}, n_{1maxZB}, M_{2acc}, M_{2NOT}, M_{2N} and S can be found in the selection tables.

The values for fB_T, fB_{op} and fB_t can be found in the corresponding tables in this chapter.

Calculate the thermal limit torque M_{2th} for a duty cycle > 50%.

Example of cyclic operation

The following calculations are based on a representation of the power taken from the output based in accordance with the following example:



Calculation of the actual average input speed

$$n_{1m^*} = n_{2m^*} \cdot i$$

$$n_{2m^*} = \frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}{t_{1^*} + \ldots + t_{n^*}}$$

If $t_{1^*} + \ldots + t_{5^*} \geq 20$ min, calculate n_{2m^*} without the rest phase t_{6^*}.

The values for the ratio i can be found in the selection tables.

Calculation of the actual effective torque

$$M_{2eff^*} = \sqrt{\frac{t_{1^*} \cdot M_{2,1^*}{}^2 + \ldots + t_{n^*} \cdot M_{2,n^*}{}^2}{t_{1^*} + \ldots + t_{n^*}}}$$

Calculation of the actual equivalent torque

$$M_{2eq^*} = \sqrt[3]{\frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} \cdot \left|M_{2,1^*}{}^3\right| + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*} \cdot \left|M_{2,n^*}{}^3\right|}{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}}$$

Calculation of the thermal limit torque

Calculate the thermal limit torque M_{2th} for a duty cycle ED_{20} > 50% and the actual average input speed n_{1m^*}. (At $K_{mot,th} \leq 0$ you must reduce the average input speed n_{1m^*} accordingly or select another geared motor size.)

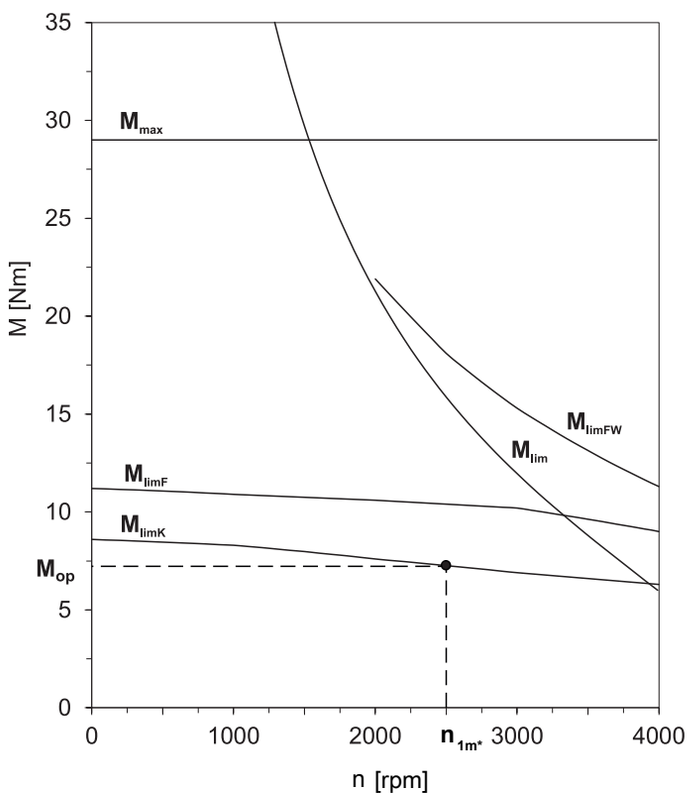
$$M_{2th} = M_{op} \cdot i \cdot K_{mot,th}$$

$$K_{mot,th} = 0{,}93 - \frac{a_{th}}{1000} \cdot fB_T \cdot \left(\frac{n_{1m^*}}{1000}\right)^3$$

The values for i and a_{th} can be found in the selection tables.

The values for fB_T can be found in the corresponding table in this chapter.

The value for the torque of the motor at operating point M_{op} with the determined average input speed n_{1m^*} can be found in the motor curve of Chapter [▶ 23.3]. Note the size, nominal speed n_N and cooling type of the motor. The figure below shows an example of reading the torque M_{op} of a motor with convection cooling at the operating point.



Operating factors

Operating mode	fB_{op}
Uniform continuous operation	1.00
Cyclic operation	1.00
Reversing load cyclic operation	1.00

Run time	fB_t
Daily run time ≤ 8 h	1.00
Daily run time ≤ 16 h	1.15
Daily run time ≤ 24 h	1.20

Temperature		fB_T
Motor cooling	**Surrounding temperature**	
Motor with forced ventilation	≤ 20 °C	0.9
	≤ 30 °C	1.0
	≤ 40 °C	1.15
Motor with convection cooling	≤ 20 °C	1.0
	≤ 30 °C	1.1
	≤ 40 °C	1.25

Notes

- The maximum permitted gear unit temperature (see the "Other product features" chapter) must not be exceeded. Doing so may result in damage to the geared motor.
- For braking from full speed (for example when the power fails or when setting up the machine), note the permitted gear unit torques (M_{2acc}, M_{2NOT}) in the selection tables.

14.6.2 Permitted shaft loads for the output shaft

The values specified in the tables apply to the permitted shaft loads:

- For shaft dimensions in accordance with the catalog
- For output speeds $n_{2m*} \leq 100$ rpm ($F^{2axN} = F_{2ax100}$; $F_{2radN} = F_{2rad100}$; $M_{2kN} = M_{2k100}$)
- Only if radial forces on the gear unit are stabilized by its pilots (housing, flange shaft)

14.6.2.1 F shaft design

Permitted shaft loads for F shaft design (flange hollow shaft)

Type	z_2 [mm]	F_{2ax100} [N]	$F_{2rad100}$ [N]	$F_{2rad,acc}$ [N]	M_{2k100} [Nm]	$M_{2k,acc}$ [Nm]
KS4	38.0	4000	6842	10263	260	390
KS5	45.0	6000	12222	18333	550	825
KS7	55.0	10000	16727	25091	920	1380

For other output speeds, download diagrams at http://products.stoeber.de.

The following applies to output speeds $n_{2m*} > 100$ rpm:

$$F_{2axN} = \frac{F_{2ax100}}{\sqrt[3]{\frac{n_{2m*}}{100\ \text{rpm}}}} \qquad F_{2radN} = \frac{F_{2rad100}}{\sqrt[3]{\frac{n_{2m*}}{100\ \text{rpm}}}} \qquad M_{2kN} = \frac{M_{2k100}}{\sqrt[3]{\frac{n_{2m*}}{100\ \text{rpm}}}}$$

The values for F_{2ax100}, $F_{2rad100}$ and M_{2k100} can be found in the table "Permitted shaft loads" in this chapter.

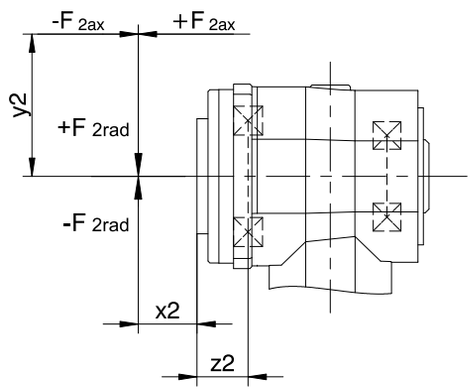


Fig. 1: Force application points for flange hollow shaft

You can determine the permitted radial forces from the permitted breakdown torque M_{2kN} and $M_{2k,acc}$. The actual radial forces may not exceed the permitted radial forces. The permitted radial forces are in relation to the end of the hollow shaft (x2 = 0).

$$M_{2k,acc^*} = \frac{F_{2ax^*} \cdot y_2 + F_{2rad,acc^*} \cdot (x_2 + z_2)}{1000} \leq M_{2k,acc}$$

For applications with multiple axial and/or radial forces, you must add the forces as vectors.

In the event of EMERGENCY OFF operation (max. 1000 load changes), you can multiply the permitted forces and torques for F_{2ax20}, F_{2rad20} and M_{2k20} by a factor of two.

Also note the calculation for equivalent values:

$$M_{2k,eq^*} = \sqrt[3]{\frac{|n_{2m,1^*}| \cdot t_{1^*} \cdot |M_{2k,acc,1^*}|^3 + \ldots + |n_{2m,n^*}| \cdot t_{n^*} \cdot |M_{2k,acc,n^*}|^3}{|n_{2m,1^*}| \cdot t_{1^*} + \ldots + |n_{2m,n^*}| \cdot t_{n^*}}} \leq M_{2kN}$$

$$F_{2rad,eq^*} = \sqrt[3]{\frac{|n_{2m,1^*}| \cdot t_{1^*} \cdot |F_{2rad,acc,1^*}|^3 + \ldots + |n_{2m,n^*}| \cdot t_{n^*} \cdot |F_{2rad,acc,n^*}|^3}{|n_{2m,1^*}| \cdot t_{1^*} + \ldots + |n_{2m,n^*}| \cdot t_{n^*}}} \leq F_{2radN}$$

$$F_{2ax,eq^*} \leq F_{2axN}$$

14.6.2.2 S shaft design

Permitted shaft loads for S shaft design (hollow shaft with shrink ring)

Type	z_2	F_{2ax100}	$F_{2rad100}$	$F_{2rad,acc}$	M_{2k100}	$M_{2k,acc}$
	[mm]	[N]	[N]	[N]	[Nm]	[Nm]
KS4	36.0	4000	5000	5000	260	260
KS5	42.0	6000	8000	8000	550	550
KS7	52.0	10000	10000	10000	920	920

For other output speeds, download diagrams at http://products.stoeber.de.

The following applies to output speeds n_{2m^*} > 100 rpm:

$$F_{2axN} = \frac{F_{2ax100}}{\sqrt[3]{\frac{n_{2m^*}}{100\ \text{rpm}}}} \qquad F_{2radN} = \frac{F_{2rad100}}{\sqrt[3]{\frac{n_{2m^*}}{100\ \text{rpm}}}} \qquad M_{2kN} = \frac{M_{2k100}}{\sqrt[3]{\frac{n_{2m^*}}{100\ \text{rpm}}}}$$

The values for F_{2ax100}, $F_{2rad100}$ and M_{2k100} can be found in the table "Permitted shaft loads" in this chapter.

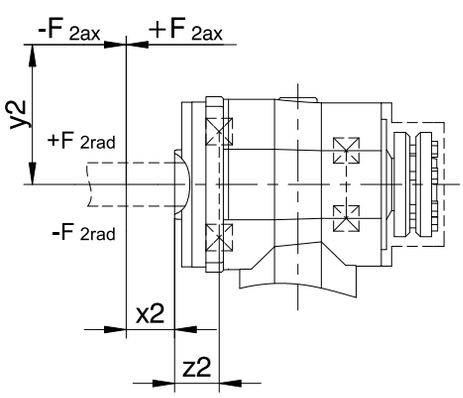


Fig. 2: Force application points for the hollow shaft with shrink ring

You can determine the permitted radial forces from the permitted breakdown torque M_{2kN} and $M_{2k,acc}$. The actual radial forces may not exceed the permitted radial forces. The permitted radial forces are in relation to the end of the hollow shaft (x2 = 0).

$$M_{2k,acc^*} = \frac{2 \cdot F_{2ax^*} \cdot y_2 + F_{2rad,acc^*} \cdot (x_2 + z_2)}{1000} \leq M_{2k,acc}$$

For applications with multiple axial and/or radial forces, you must add the forces as vectors.

In the event of EMERGENCY OFF operation (max. 1000 load changes), you can multiply the permitted forces and torques for F_{2ax20}, F_{2rad20} and M_{2k20} by a factor of two.

Also note the calculation for equivalent values:

$$M_{2k,eq^*} = \sqrt[3]{\frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} \cdot \left|M_{2k,acc,1^*}{}^3\right| + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*} \cdot \left|M_{2k,acc,n^*}{}^3\right|}{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}} \leq M_{2kN}$$

$$F_{2rad,eq^*} = \sqrt[3]{\frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} \cdot \left|F_{2rad,acc,1^*}{}^3\right| + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*} \cdot \left|F_{2rad,acc,n^*}{}^3\right|}{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}} \leq F_{2radN}$$

$$F_{2ax,eq^*} \leq F_{2axN}$$

14.6.2.3 G and P shaft designs

Permitted shaft loads for G and P shaft designs (solid shaft)

Type	z_2	F_{2ax100}	$F_{2rad100}$	$F_{2rad,acc}$	M_{2k100}	$M_{2k,acc}$
	[mm]	[N]	[N]	[N]	[Nm]	[Nm]
KS4	34.0	4000	5000	5000	260	260
KS5	40.0	6000	8000	8000	550	550
KS7	51.0	10000	10000	10000	920	920

For other output speeds, download diagrams at http://products.stoeber.de.

The following applies to output speeds n_{2m^*} > 100 rpm:

$$F_{2axN} = \frac{F_{2ax100}}{\sqrt[3]{\frac{n_{2m^*}}{100\ \text{rpm}}}} \qquad F_{2radN} = \frac{F_{2rad100}}{\sqrt[3]{\frac{n_{2m^*}}{100\ \text{rpm}}}} \qquad M_{2kN} = \frac{M_{2k100}}{\sqrt[3]{\frac{n_{2m^*}}{100\ \text{rpm}}}}$$

The values for F_{2ax100}, $F_{2rad100}$ and M_{2k100} can be found in the table "Permitted shaft loads" in this chapter.

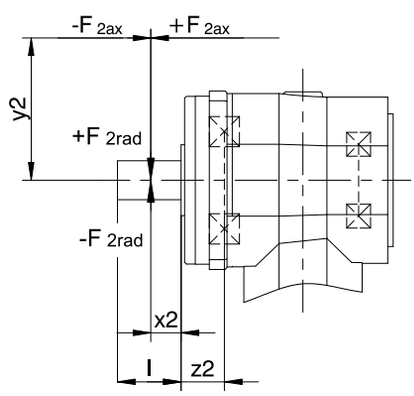


Fig. 3: Force application points for solid shaft

The specified values for $F_{2rad100}$ and $F_{2rad,acc}$ refer to an application of force at the center of the output shaft: $x_2 = l/2$.

Shaft dimensions can be found in the "Dimensional drawings" chapter.

The following applies to other force application points:

$$M_{2k,acc^*} = \frac{2 \cdot F_{2ax^*} \cdot y_2 + F_{2rad,acc^*} \cdot (x_2 + z_2)}{1000} \leq M_{2k,acc}$$

$$F_{2rad,acc^*} \leq F_{2rad,acc}$$

$$F_{2ax^*} \leq F_{2axN}$$

The values for $F_{2rad,acc}$ and $M_{2k,acc}$ can be found in the table "Permitted shaft loads" in this chapter.

For applications with multiple axial and/or radial forces, you must add the forces as vectors.

In the event of EMERGENCY OFF operation (max. 1000 load changes), you can multiply the permitted forces and torques for F_{2ax20}, F_{2rad20} and M_{2k20} by a factor of two.

Also note the calculation for equivalent values:

$$M_{2k,eq^*} = \sqrt[3]{\frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} \cdot \left|M_{2k,acc,1^*}{}^3\right| + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*} \cdot \left|M_{2k,acc,n^*}{}^3\right|}{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}} \leq M_{2kN}$$

$$F_{2rad,eq^*} = \sqrt[3]{\frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} \cdot \left|F_{2rad,acc,1^*}{}^3\right| + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*} \cdot \left|F_{2rad,acc,n^*}{}^3\right|}{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}} \leq F_{2radN}$$

14.6.3 Torsional stiffness

The torsional stiffness C_2 depends on the shaft design. Details for the F shaft design can be found in the selection tables.

Details regarding the G, P and S shaft designs can be found in the following table:

	Torsional stiffness C_2 G and P shaft designs	Torsional stiffness C_2 S shaft design
KS4	6.5	7.1
KS5	15	16
KS7	32	36

14.6.4 Recommendation for radial shaft seal rings

For a duty cycle > 60%, we recommend radial shaft seal rings made of FKM.

Properties:

- Excellent temperature resistance
- High chemical stability
- Very good resistance to aging
- Excellent resistance to mineral oils and greases
- For use in the food, beverage and pharmaceutical industries

Leak-proofness

Our gear units are equipped with high-quality radial shaft seal rings and checked for leak-proofness. However, a leak cannot be fully ruled out over the length of use of a gear unit. If you use a gear unit with goods incompatible with the lubricant, you must take measures to prevent direct contact with the gear unit lubricant in case of a leak.

14.6.5 Oil expansion tank

The gear units have a higher fill level in mounting position EL5. The oil expansion tank prevents oil from escaping out of the gear unit.

Notes

- Three-stage KS gear units in mounting position EL5 can be used only in combination with an oil expansion tank!
- It is not possible to use an oil expansion tank if the plug connector and oil expansion tank are on the same side!
- Please specify the attachment side (gear unit side 1 or 2) in the purchase order.

14.7 Additional documentation

Additional documentation related to the product can be found at http://www.stoeber.de/en/download

Enter the ID of the documentation in the Search... field.

Documentation	ID
Operating manual for KL/KS/PHK/PHKX/PHQK/PK/PKX right-angle gear units and right-angle geared motors	443004_en
Lubricant filling quantities for gear units	441871

15 PKX right-angle planetary geared motors

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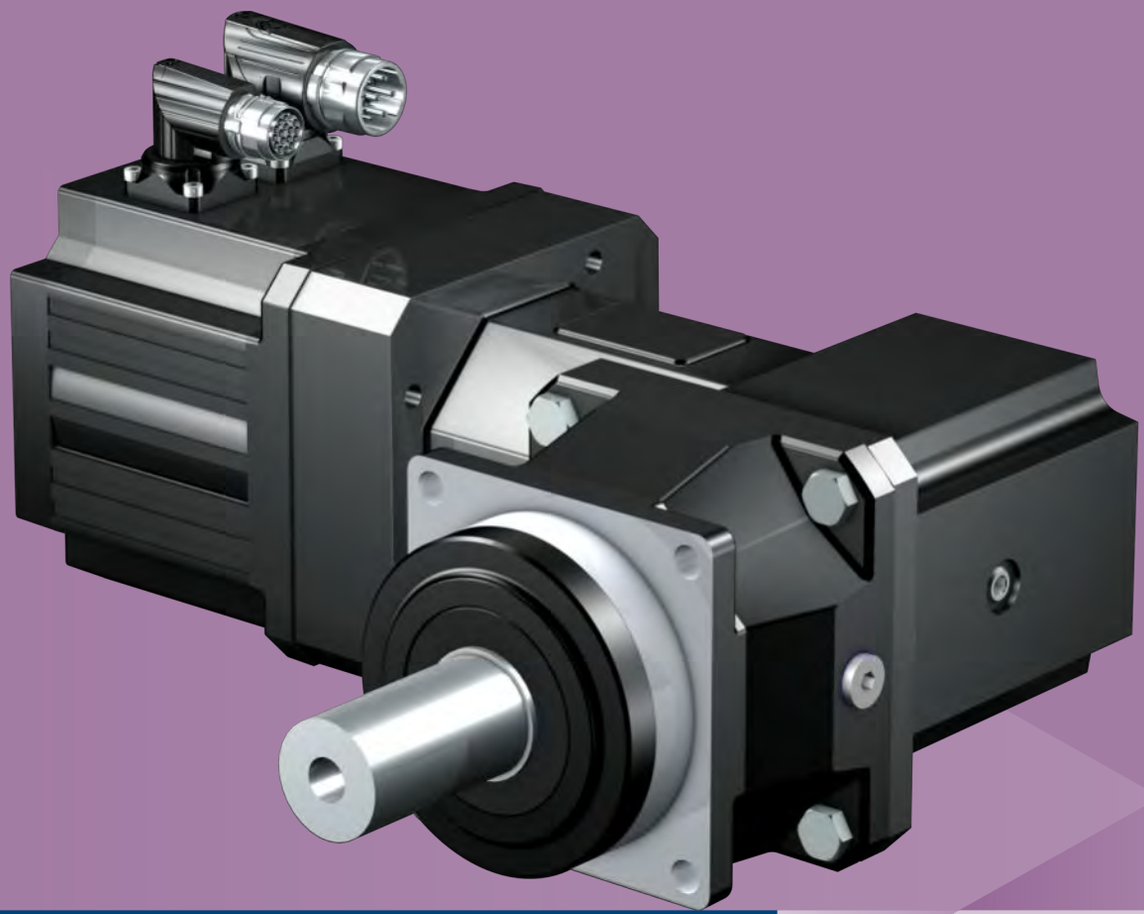


15 PKX right-angle planetary geared motors

15.1 Overview

Helical-geared precision right-angle planetary geared motors

Features

Power density	★★★★☆
Backlash	★★★★☆
Price category	€€€
Shaft load	★★★★☆
Smooth operation	★★☆☆☆
Torsional stiffness	★★★☆☆
Mass moment of inertia	★★★☆☆
Helical gearing	✓
Maintenance-free	✓
Small installation space	✓
Continuous operation without cooling	✓
Reinforced output bearing	✓ (optional)
Compact and highly dynamic due to direct motor attachment	✓

Key: ★☆☆☆☆ good | ★★★★★ excellent
€ Economy | €€€€€ Premium

Technical data

i	3 – 210
M_{2acc}	11 – 3000 Nm
$\Delta\phi_2$	4 – 8.5 arcmin
η_{get}	≤ 96 %

15.2 Selection tables

The technical data specified in the selection tables applies to:

- Installation altitudes up to 1000 m above sea level
- Surrounding temperatures from 0 °C to 40 °C
- Drives with convection-cooled motors (e.g. EZ401**U**)

You can calculate the technical data for drives with forced ventilated motors (for example EZ401**B**) at http://products.stoeber.de.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,5,6 [rpm]	n_{1maxDB} EL3,4 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
P2KX (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 22 Nm)																
200	13	14	35	1.2	P221_0050 KX301VF0030 MF EZ301U	22	44	15.00	15/1	3500	3500	6000	0.94	8	1.6	4.8
214	12	13	44	1.3	P221_0070 KX301VF0020 MF EZ301U	22	44	14.00	14/1	3500	3000	5500	1.0	7.5	1.7	4.8
250	11	11	28	1.5	P221_0040 KX301VF0030 MF EZ301U	22	44	12.00	12/1	3500	3500	6000	0.94	8.5	1.5	4.8
300	8.9	9.1	32	1.8	P221_0050 KX301VF0020 MF EZ301U	22	44	10.00	10/1	3500	3000	5500	1.0	8	1.6	4.8
300	15	16	54	1.1	P221_0050 KX301VF0020 MF EZ302U	22	44	10.00	10/1	3500	3000	5500	1.1	8	1.6	5.4
375	7.1	7.3	25	2.3	P221_0040 KX301VF0020 MF EZ301U	21	44	8.000	8/1	3500	3000	5500	1.0	8.5	1.5	4.8
375	12	13	43	1.3	P221_0040 KX301VF0020 MF EZ302U	22	44	8.000	8/1	3500	3000	5500	1.1	8.5	1.5	5.4
375	16	17	56	1.0	P221_0040 KX301VF0020 MF EZ303U	22	44	8.000	8/1	3500	3000	5500	1.2	8.5	1.5	5.9
429	6.2	6.4	43	2.2	P221_0070 KX301VF0010 MF EZ301U	19	44	7.000	7/1	3000	2500	4500	1.2	7.5	1.7	4.8
429	11	11	73	1.3	P221_0070 KX301VF0010 MF EZ302U	22	44	7.000	7/1	3000	2500	4500	1.3	7.5	1.7	5.4
429	14	15	95	1.0	P221_0070 KX301VF0010 MF EZ303U	22	44	7.000	7/1	3000	2500	4500	1.4	7.5	1.7	5.9
600	4.4	4.5	31	3.1	P221_0050 KX301VF0010 MF EZ301U	13	44	5.000	5/1	3000	2500	4500	1.2	8	1.6	4.8
600	7.6	8.0	52	1.8	P221_0050 KX301VF0010 MF EZ302U	22	44	5.000	5/1	3000	2500	4500	1.3	8	1.6	5.4
600	9.9	10	68	1.4	P221_0050 KX301VF0010 MF EZ303U	22	44	5.000	5/1	3000	2500	4500	1.4	8	1.6	5.9
600	13	14	92	1.0	P221_0050 KX301VF0010 MF EZ401U	22	44	5.000	5/1	3000	2500	4500	2.0	8	1.6	7.3
750	3.6	3.6	24	3.9	P221_0040 KX301VF0010 MF EZ301U	11	44	4.000	4/1	3000	2500	4500	1.2	8.5	1.5	4.8
750	6.1	6.4	42	2.3	P221_0040 KX301VF0010 MF EZ302U	19	44	4.000	4/1	3000	2500	4500	1.3	8.5	1.5	5.4
750	7.9	8.4	54	1.8	P221_0040 KX301VF0010 MF EZ303U	22	44	4.000	4/1	3000	2500	4500	1.5	8.5	1.5	5.9
750	11	11	74	1.3	P221_0040 KX301VF0010 MF EZ401U	22	44	4.000	4/1	3000	2500	4500	2.0	8.5	1.5	7.3
P2KX (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 22 Nm)																
400	13	14	34	1.3	P221_0050 KX301VF0030 MF EZ301U	22	44	15.00	15/1	3500	3500	6000	0.94	8	1.6	4.8
500	10	11	27	1.6	P221_0040 KX301VF0030 MF EZ301U	22	44	12.00	12/1	3500	3500	6000	0.94	8.5	1.5	4.8
P3KX (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 65 Nm)																
60	44	44	55	1.0	P322_0250 KX301VF0020 MF EZ301U	65	130	50.00	50/1	3500	3000	5500	1.0	5.5	4.5	6.1
75	35	36	44	1.3	P322_0200 KX301VF0020 MF EZ301U	65	130	40.00	40/1	3500	3000	5500	1.0	5.5	4.5	6.1
86	30	31	65	1.5	P322_0350 KX301VF0010 MF EZ301U	65	130	35.00	35/1	3000	2500	4500	1.2	5.5	4.5	6.1
94	28	28	35	1.6	P322_0160 KX301VF0020 MF EZ301U	65	130	32.00	32/1	3500	3000	5500	1.0	5.5	4.4	6.1
100	27	27	37	1.1	P321_0100 KX301VF0030 MF EZ301U	50	100	30.00	30/1	3500	3500	6000	0.94	5	3.7	5.5
125	21	22	22	1.9	P321_0080 KX301VF0030 MF EZ301U	50	100	24.00	24/1	3500	3500	6000	0.94	5.5	3.7	5.5
125	36	39	38	1.1	P321_0080 KX301VF0030 MF EZ302U	50	100	24.00	24/1	3500	3500	6000	1.0	5.5	3.7	6.1
143	19	19	17	2.4	P321_0070 KX301VF0030 MF EZ301U	56	130	21.00	21/1	3500	3500	6000	0.94	5.5	3.7	5.5
143	32	34	30	1.4	P321_0070 KX301VF0030 MF EZ302U	60	130	21.00	21/1	3500	3500	6000	1.0	5.5	3.7	6.1
143	42	44	39	1.1	P321_0070 KX301VF0030 MF EZ303U	60	130	21.00	21/1	3500	3500	6000	1.1	5.5	3.7	6.6
150	18	18	34	1.7	P321_0100 KX301VF0020 MF EZ301U	50	100	20.00	20/1	3500	3000	5500	1.0	5	3.7	5.5
188	14	15	20	2.8	P321_0080 KX301VF0020 MF EZ301U	43	100	16.00	16/1	3500	3000	5500	1.0	5.5	3.7	5.5
188	24	26	35	1.6	P321_0080 KX301VF0020 MF EZ302U	50	100	16.00	16/1	3500	3000	5500	1.1	5.5	3.7	6.1
188	32	33	45	1.3	P321_0080 KX301VF0020 MF EZ303U	50	100	16.00	16/1	3500	3000	5500	1.2	5.5	3.7	6.6
200	13	14	13	3.2	P321_0050 KX301VF0030 MF EZ301U	40	130	15.00	15/1	3500	3500	6000	0.94	6	3.6	5.5
200	23	24	23	1.9	P321_0050 KX301VF0030 MF EZ302U	63	130	15.00	15/1	3500	3500	6000	1.0	6	3.6	6.1
200	30	31	29	1.4	P321_0050 KX301VF0030 MF EZ303U	63	130	15.00	15/1	3500	3500	6000	1.2	6	3.6	6.6
200	40	43	40	1.1	P321_0050 KX301VF0030 MF EZ401U	63	130	15.00	15/1	3500	3500	6000	1.7	6	3.6	8.0
214	12	13	16	3.6	P321_0070 KX301VF0020 MF EZ301U	37	130	14.00	14/1	3500	3000	5500	1.0	5.5	3.7	5.5
214	21	22	27	2.1	P321_0070 KX301VF0020 MF EZ302U	60	130	14.00	14/1	3500	3000	5500	1.1	5.5	3.7	6.1
214	28	29	35	1.6	P321_0070 KX301VF0020 MF EZ303U	60	130	14.00	14/1	3500	3000	5500	1.2	5.5	3.7	6.6
214	37	40	48	1.2	P321_0070 KX301VF0020 MF EZ401U	60	130	14.00	14/1	3500	3000	5500	1.7	5.5	3.7	8.0
250	11	11	13	3.2	P321_0040 KX301VF0030 MF EZ301U	32	100	12.00	12/1	3500	3500	6000	0.95	6.5	3.2	5.5
250	18	19	23	1.9	P321_0040 KX301VF0030 MF EZ302U	50	100	12.00	12/1	3500	3500	6000	1.0	6.5	3.2	6.1
250	24	25	29	1.4	P321_0040 KX301VF0030 MF EZ303U	50	100	12.00	12/1	3500	3500	6000	1.2	6.5	3.2	6.6
250	32	34	40	1.1	P321_0040 KX301VF0030 MF EZ401U	50	100	12.00	12/1	3500	3500	6000	1.7	6.5	3.2	8.0
300	8.9	9.1	12	4.8	P321_0050 KX301VF0020 MF EZ301U	27	130	10.00	10/1	3500	3000	5500	1.0	6	3.6	5.5
300	15	16	20	2.8	P321_0050 KX301VF0020 MF EZ302U	48	130	10.00	10/1	3500	3000	5500	1.1	6	3.6	6.1
300	20	21	27	2.1	P321_0050 KX301VF0020 MF EZ303U	63	130	10.00	10/1	3500	3000	5500	1.2	6	3.6	6.6

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,5,6 [rpm]	n_{1maxDB} EL3,4 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
P3KX (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 65 Nm)																
300	27	29	36	1.6	P321_0050 KX301VF0020 MF EZ401U	63	130	10.00	10/1	3500	3000	5500	1.8	6	3.6	8.0
375	7.1	7.3	12	4.8	P321_0040 KX301VF0020 MF EZ301U	21	100	8.000	8/1	3500	3000	5500	1.0	6.5	3.2	5.5
375	12	13	20	2.8	P321_0040 KX301VF0020 MF EZ302U	38	100	8.000	8/1	3500	3000	5500	1.1	6.5	3.2	6.1
375	16	17	27	2.1	P321_0040 KX301VF0020 MF EZ303U	50	100	8.000	8/1	3500	3000	5500	1.2	6.5	3.2	6.6
375	21	23	36	1.6	P321_0040 KX301VF0020 MF EZ401U	50	100	8.000	8/1	3500	3000	5500	1.8	6.5	3.2	8.0
429	11	11	26	3.7	P321_0070 KX301VF0010 MF EZ302U	33	130	7.000	7/1	3000	2500	4500	1.3	5.5	3.7	6.1
429	14	15	34	2.8	P321_0070 KX301VF0010 MF EZ303U	47	130	7.000	7/1	3000	2500	4500	1.4	5.5	3.7	6.6
429	19	20	46	2.1	P321_0070 KX301VF0010 MF EZ401U	57	130	7.000	7/1	3000	2500	4500	2.0	5.5	3.7	8.0
429	31	35	77	1.3	P321_0070 KX301VF0010 MF EZ402U	60	130	7.000	7/1	3000	2500	4500	2.7	5.5	3.7	9.1
500	5.3	5.4	12	4.8	P321_0030 KX301VF0020 MF EZ301U	16	77	6.000	6/1	3500	3000	5500	1.0	7.5	2.5	5.5
500	9.1	9.6	20	2.8	P321_0030 KX301VF0020 MF EZ302U	29	77	6.000	6/1	3500	3000	5500	1.1	7.5	2.5	6.1
500	12	13	27	2.1	P321_0030 KX301VF0020 MF EZ303U	38	77	6.000	6/1	3500	3000	5500	1.3	7.5	2.5	6.6
500	16	17	36	1.6	P321_0030 KX301VF0020 MF EZ401U	38	77	6.000	6/1	3500	3000	5500	1.8	7.5	2.5	8.0
600	9.9	10	24	4.0	P321_0050 KX301VF0010 MF EZ303U	33	110	5.000	5/1	3000	2500	4500	1.5	6	3.6	6.6
600	13	14	33	2.9	P321_0050 KX301VF0010 MF EZ401U	41	110	5.000	5/1	3000	2500	4500	2.0	6	3.6	8.0
600	22	25	55	1.8	P321_0050 KX301VF0010 MF EZ402U	63	110	5.000	5/1	3000	2500	4500	2.7	6	3.6	9.1
600	33	41	80	1.2	P321_0050 KX301VF0010 MF EZ404U	63	110	5.000	5/1	3000	2500	4500	4.1	6	3.6	11
750	7.9	8.4	22	4.3	P321_0040 KX301VF0010 MF EZ303U	27	91	4.000	4/1	3000	2500	4500	1.5	6.5	3.2	6.6
750	11	11	30	3.2	P321_0040 KX301VF0010 MF EZ401U	32	91	4.000	4/1	3000	2500	4500	2.1	6.5	3.2	8.0
750	18	20	51	1.9	P321_0040 KX301VF0010 MF EZ402U	50	91	4.000	4/1	3000	2500	4500	2.8	6.5	3.2	9.1
750	26	33	75	1.3	P321_0040 KX301VF0010 MF EZ404U	50	91	4.000	4/1	3000	2500	4500	4.1	6.5	3.2	11
1000	5.9	6.3	22	4.3	P321_0030 KX301VF0010 MF EZ303U	20	68	3.000	3/1	3000	2500	4500	1.6	7.5	2.5	6.6
1000	8.0	8.6	30	3.2	P321_0030 KX301VF0010 MF EZ401U	24	68	3.000	3/1	3000	2500	4500	2.1	7.5	2.5	8.0
1000	13	15	51	1.9	P321_0030 KX301VF0010 MF EZ402U	38	68	3.000	3/1	3000	2500	4500	2.8	7.5	2.5	9.1
1000	20	25	75	1.3	P321_0030 KX301VF0010 MF EZ404U	38	68	3.000	3/1	3000	2500	4500	4.2	7.5	2.5	11
P3KX (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 63 Nm)																
200	26	27	36	1.2	P321_0100 KX301VF0030 MF EZ301U	50	100	30.00	30/1	3500	3500	6000	0.94	5	3.7	5.5
250	20	22	21	2.0	P321_0080 KX301VF0030 MF EZ301U	50	100	24.00	24/1	3500	3500	6000	0.94	5.5	3.7	5.5
250	34	39	36	1.2	P321_0080 KX301VF0030 MF EZ302U	50	100	24.00	24/1	3500	3500	6000	1.0	5.5	3.7	6.1
286	18	19	17	2.5	P321_0070 KX301VF0030 MF EZ301U	56	130	21.00	21/1	3500	3500	6000	0.94	5.5	3.7	5.5
286	30	34	28	1.5	P321_0070 KX301VF0030 MF EZ302U	60	130	21.00	21/1	3500	3500	6000	1.0	5.5	3.7	6.1
286	39	45	37	1.1	P321_0070 KX301VF0030 MF EZ303U	60	130	21.00	21/1	3500	3500	6000	1.1	5.5	3.7	6.6
400	13	14	16	2.6	P321_0050 KX301VF0030 MF EZ301U	40	130	15.00	15/1	3500	3500	6000	0.94	6	3.6	5.5
400	21	24	27	1.6	P321_0050 KX301VF0030 MF EZ302U	63	130	15.00	15/1	3500	3500	6000	1.0	6	3.6	6.1
400	28	32	35	1.2	P321_0050 KX301VF0030 MF EZ303U	63	130	15.00	15/1	3500	3500	6000	1.2	6	3.6	6.6
400	33	40	41	1.0	P321_0050 KX301VF0030 MF EZ401U	63	130	15.00	15/1	3500	3500	6000	1.7	6	3.6	8.0
500	10	11	16	2.6	P321_0040 KX301VF0030 MF EZ301U	32	100	12.00	12/1	3500	3500	6000	0.95	6.5	3.2	5.5
500	17	19	27	1.6	P321_0040 KX301VF0030 MF EZ302U	50	100	12.00	12/1	3500	3500	6000	1.0	6.5	3.2	6.1
500	22	26	35	1.2	P321_0040 KX301VF0030 MF EZ303U	50	100	12.00	12/1	3500	3500	6000	1.2	6.5	3.2	6.6
500	26	32	41	1.0	P321_0040 KX301VF0030 MF EZ401U	50	100	12.00	12/1	3500	3500	6000	1.7	6.5	3.2	8.0
P4KX (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 120 Nm)																
36	73	75	36	1.2	P422_0280 KX301VF0030 MF EZ301U	120	240	84.00	84/1	3500	3500	6000	0.94	5.5	10	8.5
38	70	71	47	1.2	P422_0400 KX301VF0020 MF EZ301U	120	240	80.00	80/1	3500	3000	5500	1.0	5.5	10	8.5
40	65	67	32	1.3	P422_0250 KX301VF0030 MF EZ301U	120	240	75.00	75/1	3500	3500	6000	0.94	5.5	10	8.5
43	61	62	41	1.4	P422_0350 KX301VF0020 MF EZ301U	120	240	70.00	70/1	3500	3000	5500	1.0	5.5	10	8.5
47	56	57	40	1.4	P422_0320 KX301VF0020 MF EZ301U	100	200	64.00	64/1	3500	3000	5500	1.0	5.5	9.1	8.5
50	52	53	26	1.6	P422_0200 KX301VF0030 MF EZ301U	120	240	60.00	60/1	3500	3500	6000	0.95	5.5	10	8.5
54	49	50	33	1.7	P422_0280 KX301VF0020 MF EZ301U	120	240	56.00	56/1	3500	3000	5500	1.0	5.5	10	8.5
54	83	88	56	1.0	P422_0280 KX301VF0020 MF EZ302U	120	240	56.00	56/1	3500	3000	5500	1.1	5.5	10	9.1
60	44	44	29	2.0	P422_0250 KX301VF0020 MF EZ301U	120	240	50.00	50/1	3500	3000	5500	1.0	5.5	10	8.5
60	74	79	50	1.1	P422_0250 KX301VF0020 MF EZ302U	120	240	50.00	50/1	3500	3000	5500	1.1	5.5	10	9.1
75	35	36	23	2.4	P422_0200 KX301VF0020 MF EZ301U	100	240	40.00	40/1	3500	3000	5500	1.0	5.5	10	8.5
75	60	63	40	1.4	P422_0200 KX301VF0020 MF EZ302U	120	240	40.00	40/1	3500	3000	5500	1.1	5.5	10	9.1
75	77	82	52	1.1	P422_0200 KX301VF0020 MF EZ303U	120	240	40.00	40/1	3500	3000	5500	1.2	5.5	10	9.6
86	30	31	34	2.8	P422_0350 KX301VF0010 MF EZ301U	92	240	35.00	35/1	3000	2500	4500	1.2	5.5	10	8.5
86	52	55	59	1.6	P422_0350 KX301VF0010 MF EZ302U	120	240	35.00	35/1	3000	2500	4500	1.3	5.5	10	9.1
86	68	72	77	1.3	P422_0350 KX301VF0010 MF EZ303U	120	240	35.00	35/1	3000	2500	4500	1.4	5.5	10	9.6
94	28	28	19	3.1	P422_0160 KX301VF0020 MF EZ301U	84	240	32.00	32/1	3500	3000	5500	1.0	5.5	9.7	8.5
94	48	50	32	1.8	P422_0160 KX301VF0020 MF EZ302U	120	240	32.00	32/1	3500	3000	5500	1.1	5.5	9.7	9.1
94	62	66	42	1.4	P422_0160 KX301VF0020 MF EZ303U	120	240	32.00	32/1	3500	3000	5500	1.2	5.5	9.7	9.6
94	84	90	56	1.0	P422_0160 KX301VF0020 MF EZ401U	120	240	32.00	32/1	3500	3000	5500	1.8	5.5	9.7	11
100	27	27	21	2.3	P421_0100 KX401VF0030 MF EZ301U	80	200	30.00	30/1	3000	3000	5500	1.6	5	8.3	8.3
100	46	48	36	1.3	P421_0100 KX401VF0030 MF EZ302U	100	200	30.00	30/1	3000	3000	5500	1.7	5	8.3	8.9
100	59	63	47	1.0	P421_0100 KX401VF0030 MF EZ303U	100	200	30.00	30/1	3000	3000	5500	1.8	5	8.3	9.4

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,5,6 [rpm]	n_{1maxDB} EL3,4 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm^2]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
P4KX (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 120 Nm)																
125	21	22	13	3.8	P421_0080 KX401VF0030 MF EZ301U	64	200	24.00	24/1	3000	3000	5500	1.6	5.5	8.3	8.3
125	36	39	22	2.2	P421_0080 KX401VF0030 MF EZ302U	100	200	24.00	24/1	3000	3000	5500	1.7	5.5	8.3	8.9
125	47	50	28	1.7	P421_0080 KX401VF0030 MF EZ303U	100	200	24.00	24/1	3000	3000	5500	1.8	5.5	8.3	9.4
125	64	69	38	1.2	P421_0080 KX401VF0030 MF EZ401U	100	200	24.00	24/1	3000	3000	5500	2.4	5.5	8.3	11
143	19	19	10	4.6	P421_0070 KX401VF0030 MF EZ301U	56	240	21.00	21/1	3000	3000	5500	1.6	5.5	8.4	8.3
143	32	34	18	2.7	P421_0070 KX401VF0030 MF EZ302U	100	240	21.00	21/1	3000	3000	5500	1.7	5.5	8.4	8.9
143	42	44	23	2.0	P421_0070 KX401VF0030 MF EZ303U	110	240	21.00	21/1	3000	3000	5500	1.8	5.5	8.4	9.4
143	56	60	31	1.5	P421_0070 KX401VF0030 MF EZ401U	110	240	21.00	21/1	3000	3000	5500	2.4	5.5	8.4	11
150	18	18	19	3.4	P421_0100 KX401VF0020 MF EZ301U	54	200	20.00	20/1	2500	2500	5000	1.8	5	8.3	8.3
150	30	32	33	2.0	P421_0100 KX401VF0020 MF EZ302U	96	200	20.00	20/1	2500	2500	5000	1.9	5	8.3	8.9
150	40	42	42	1.5	P421_0100 KX401VF0020 MF EZ303U	100	200	20.00	20/1	2500	2500	5000	2.0	5	8.3	9.4
150	54	57	57	1.1	P421_0100 KX401VF0020 MF EZ401U	100	200	20.00	20/1	2500	2500	5000	2.6	5	8.3	11
188	24	26	20	3.3	P421_0080 KX401VF0020 MF EZ302U	76	200	16.00	16/1	2500	2500	5000	1.9	5.5	8.3	8.9
188	32	33	25	2.5	P421_0080 KX401VF0020 MF EZ303U	100	200	16.00	16/1	2500	2500	5000	2.0	5.5	8.3	9.4
188	43	46	34	1.9	P421_0080 KX401VF0020 MF EZ401U	100	200	16.00	16/1	2500	2500	5000	2.6	5.5	8.3	11
188	66	72	53	1.2	P421_0080 KX401VF0020 MF EZ501U	100	200	16.00	16/1	2500	2500	5000	4.5	5.5	8.3	12
200	23	24	13	3.7	P421_0050 KX401VF0030 MF EZ302U	72	240	15.00	15/1	3000	3000	5500	1.7	6	8.0	8.9
200	30	31	17	2.9	P421_0050 KX401VF0030 MF EZ303U	100	240	15.00	15/1	3000	3000	5500	1.9	6	8.0	9.4
200	40	43	22	2.1	P421_0050 KX401VF0030 MF EZ401U	120	240	15.00	15/1	3000	3000	5500	2.4	6	8.0	11
200	62	67	34	1.4	P421_0050 KX401VF0030 MF EZ501U	120	240	15.00	15/1	3000	3000	5500	4.4	6	8.0	12
200	67	75	38	1.3	P421_0050 KX401VF0030 MF EZ402U	120	240	15.00	15/1	3000	3000	5500	3.1	6	8.0	12
214	21	22	16	4.0	P421_0070 KX401VF0020 MF EZ302U	67	240	14.00	14/1	2500	2500	5000	1.9	5.5	8.4	8.9
214	28	29	21	3.1	P421_0070 KX401VF0020 MF EZ303U	94	240	14.00	14/1	2500	2500	5000	2.0	5.5	8.4	9.4
214	37	40	28	2.3	P421_0070 KX401VF0020 MF EZ401U	110	240	14.00	14/1	2500	2500	5000	2.6	5.5	8.4	11
214	58	63	43	1.5	P421_0070 KX401VF0020 MF EZ501U	110	240	14.00	14/1	2500	2500	5000	4.5	5.5	8.4	12
214	63	70	47	1.4	P421_0070 KX401VF0020 MF EZ402U	110	240	14.00	14/1	2500	2500	5000	3.3	5.5	8.4	12
250	18	19	13	3.7	P421_0040 KX401VF0030 MF EZ302U	57	210	12.00	12/1	3000	3000	5500	1.8	6.5	6.9	8.9
250	24	25	17	2.9	P421_0040 KX401VF0030 MF EZ303U	80	210	12.00	12/1	3000	3000	5500	1.9	6.5	6.9	9.4
250	32	34	22	2.1	P421_0040 KX401VF0030 MF EZ401U	97	210	12.00	12/1	3000	3000	5500	2.4	6.5	6.9	11
250	49	54	34	1.4	P421_0040 KX401VF0030 MF EZ501U	97	210	12.00	12/1	3000	3000	5500	4.4	6.5	6.9	12
250	54	60	38	1.3	P421_0040 KX401VF0030 MF EZ402U	97	210	12.00	12/1	3000	3000	5500	3.1	6.5	6.9	12
300	20	21	15	4.3	P421_0050 KX401VF0020 MF EZ303U	67	240	10.00	10/1	2500	2500	5000	2.1	6	8.0	9.4
300	27	29	20	3.2	P421_0050 KX401VF0020 MF EZ401U	81	240	10.00	10/1	2500	2500	5000	2.6	6	8.0	11
300	41	45	31	2.1	P421_0050 KX401VF0020 MF EZ501U	120	240	10.00	10/1	2500	2500	5000	4.6	6	8.0	12
300	45	50	34	1.9	P421_0050 KX401VF0020 MF EZ402U	120	240	10.00	10/1	2500	2500	5000	3.3	6	8.0	12
300	66	82	50	1.3	P421_0050 KX401VF0020 MF EZ404U	120	240	10.00	10/1	2500	2500	5000	4.6	6	8.0	14
300	71	76	54	1.2	P421_0050 KX401VF0020 MF EZ502U	120	240	10.00	10/1	2500	2500	5000	6.9	6	8.0	13
300	71	79	54	1.2	P421_0050 KX401VF0020 MF EZ701U	120	240	10.00	10/1	2500	2500	5000	10	6	8.0	15
375	16	17	15	4.3	P421_0040 KX401VF0020 MF EZ303U	54	210	8.000	8/1	2500	2500	5000	2.1	6.5	6.9	9.4
375	21	23	20	3.2	P421_0040 KX401VF0020 MF EZ401U	65	210	8.000	8/1	2500	2500	5000	2.6	6.5	6.9	11
375	33	36	31	2.1	P421_0040 KX401VF0020 MF EZ501U	97	210	8.000	8/1	2500	2500	5000	4.6	6.5	6.9	12
375	36	40	34	1.9	P421_0040 KX401VF0020 MF EZ402U	97	210	8.000	8/1	2500	2500	5000	3.3	6.5	6.9	12
375	53	66	50	1.3	P421_0040 KX401VF0020 MF EZ404U	97	210	8.000	8/1	2500	2500	5000	4.7	6.5	6.9	14
375	57	61	54	1.2	P421_0040 KX401VF0020 MF EZ502U	97	210	8.000	8/1	2500	2500	5000	6.9	6.5	6.9	13
375	57	63	54	1.2	P421_0040 KX401VF0020 MF EZ701U	97	210	8.000	8/1	2500	2500	5000	10	6.5	6.9	15
429	19	20	27	4.0	P421_0070 KX401VF0010 MF EZ401U	57	240	7.000	7/1	2500	2000	4000	3.4	5.5	8.4	11
429	29	31	42	2.6	P421_0070 KX401VF0010 MF EZ501U	110	240	7.000	7/1	2500	2000	4000	5.3	5.5	8.4	12
429	31	35	46	2.4	P421_0070 KX401VF0010 MF EZ402U	110	240	7.000	7/1	2500	2000	4000	4.1	5.5	8.4	12
429	46	58	67	1.6	P421_0070 KX401VF0010 MF EZ404U	110	240	7.000	7/1	2500	2000	4000	5.4	5.5	8.4	14
429	49	54	72	1.5	P421_0070 KX401VF0010 MF EZ502U	110	240	7.000	7/1	2500	2000	4000	7.6	5.5	8.4	13
429	49	56	72	1.5	P421_0070 KX401VF0010 MF EZ701U	110	240	7.000	7/1	2500	2000	4000	11	5.5	8.4	15
429	65	74	94	1.1	P421_0070 KX401VF0010 MF EZ503U	110	240	7.000	7/1	2500	2000	4000	10	5.5	8.4	15
500	12	13	15	4.2	P421_0030 KX401VF0020 MF EZ303U	40	150	6.000	6/1	2500	2500	5000	2.2	7.5	5.2	9.4
500	16	17	21	3.1	P421_0030 KX401VF0020 MF EZ401U	49	150	6.000	6/1	2500	2500	5000	2.7	7.5	5.2	11
500	25	27	32	2.0	P421_0030 KX401VF0020 MF EZ501U	73	150	6.000	6/1	2500	2500	5000	4.7	7.5	5.2	12
500	27	30	35	1.9	P421_0030 KX401VF0020 MF EZ402U	73	150	6.000	6/1	2500	2500	5000	3.4	7.5	5.2	12
500	40	49	51	1.3	P421_0030 KX401VF0020 MF EZ404U	73	150	6.000	6/1	2500	2500	5000	4.8	7.5	5.2	14
500	42	46	54	1.2	P421_0030 KX401VF0020 MF EZ502U	73	150	6.000	6/1	2500	2500	5000	7.0	7.5	5.2	13
500	42	48	54	1.2	P421_0030 KX401VF0020 MF EZ701U	73	150	6.000	6/1	2500	2500	5000	10	7.5	5.2	15
600	21	22	30	3.6	P421_0050 KX401VF0010 MF EZ501U	76	240	5.000	5/1	2500	2000	4000	5.4	6	8.0	12
600	22	25	33	3.3	P421_0050 KX401VF0010 MF EZ402U	76	240	5.000	5/1	2500	2000	4000	4.2	6	8.0	12
600	33	41	48	2.3	P421_0050 KX401VF0010 MF EZ404U	120	240	5.000	5/1	2500	2000	4000	5.5	6	8.0	14
600	35	38	51	2.1	P421_0050 KX401VF0010 MF EZ502U	120	240	5.000	5/1	2500	2000	4000	7.7	6	8.0	13
600	35	40	51	2.1	P421_0050 KX401VF0010 MF EZ701U	96	240	5.000	5/1	2500	2000	4000	11	6	8.0	15

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,5,6 [rpm]	n_{1maxDB} EL3,4 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm^2]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
P4KX (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 120 Nm)																
600	46	53	67	1.6	P421_0050 KX401VF0010 MF EZ503U	120	240	5.000	5/1	2500	2000	4000	10	6	8.0	15
600	57	69	83	1.3	P421_0050 KX401VF0010 MF EZ702U	120	240	5.000	5/1	2500	2000	4000	16	6	8.0	18
600	64	76	94	1.2	P421_0050 KX401VF0010 MF EZ505U	120	240	5.000	5/1	2500	2000	4000	15	6	8.0	18
750	16	18	26	4.1	P421_0040 KX401VF0010 MF EZ501U	61	210	4.000	4/1	2500	2000	4000	5.6	6.5	6.9	12
750	18	20	29	3.8	P421_0040 KX401VF0010 MF EZ402U	61	210	4.000	4/1	2500	2000	4000	4.3	6.5	6.9	12
750	26	33	42	2.6	P421_0040 KX401VF0010 MF EZ404U	97	210	4.000	4/1	2500	2000	4000	5.6	6.5	6.9	14
750	28	31	45	2.4	P421_0040 KX401VF0010 MF EZ502U	97	210	4.000	4/1	2500	2000	4000	7.9	6.5	6.9	13
750	28	32	45	2.4	P421_0040 KX401VF0010 MF EZ701U	76	210	4.000	4/1	2500	2000	4000	11	6.5	6.9	15
750	37	42	59	1.8	P421_0040 KX401VF0010 MF EZ503U	97	210	4.000	4/1	2500	2000	4000	10	6.5	6.9	15
750	46	55	73	1.5	P421_0040 KX401VF0010 MF EZ702U	97	210	4.000	4/1	2500	2000	4000	16	6.5	6.9	18
750	52	61	82	1.3	P421_0040 KX401VF0010 MF EZ505U	97	210	4.000	4/1	2500	2000	4000	15	6.5	6.9	18
1000	12	13	30	3.5	P421_0030 KX401VF0010 MF EZ501U	46	150	3.000	3/1	2500	2000	4000	5.9	7.5	5.2	12
1000	13	15	33	3.2	P421_0030 KX401VF0010 MF EZ402U	46	150	3.000	3/1	2500	2000	4000	4.7	7.5	5.2	12
1000	20	25	49	2.2	P421_0030 KX401VF0010 MF EZ404U	73	150	3.000	3/1	2500	2000	4000	6.0	7.5	5.2	14
1000	21	23	52	2.1	P421_0030 KX401VF0010 MF EZ502U	73	150	3.000	3/1	2500	2000	4000	8.2	7.5	5.2	13
1000	21	24	52	2.1	P421_0030 KX401VF0010 MF EZ701U	57	150	3.000	3/1	2500	2000	4000	12	7.5	5.2	15
1000	28	32	69	1.6	P421_0030 KX401VF0010 MF EZ503U	73	150	3.000	3/1	2500	2000	4000	11	7.5	5.2	15
1000	34	41	85	1.3	P421_0030 KX401VF0010 MF EZ702U	73	150	3.000	3/1	2500	2000	4000	17	7.5	5.2	18
1000	39	46	96	1.1	P421_0030 KX401VF0010 MF EZ505U	73	150	3.000	3/1	2500	2000	4000	15	7.5	5.2	18
P4KX (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 120 Nm)																
71	70	75	35	1.2	P422_0280 KX301VF0030 MF EZ301U	120	240	84.00	84/1	3500	3500	6000	0.94	5.5	10	8.5
80	62	67	31	1.4	P422_0250 KX301VF0030 MF EZ301U	120	240	75.00	75/1	3500	3500	6000	0.94	5.5	10	8.5
100	50	53	25	1.7	P422_0200 KX301VF0030 MF EZ301U	120	240	60.00	60/1	3500	3500	6000	0.95	5.5	10	8.5
P5KX (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 300 Nm)																
14	183	187	41	1.1	P522_0700 KX401VF0030 MF EZ301U	270	600	210.0	210/1	3000	3000	5500	1.6	4	26	13
20	131	133	29	1.6	P522_0500 KX401VF0030 MF EZ301U	300	600	150.0	150/1	3000	3000	5500	1.6	4	27	13
21	122	124	37	1.7	P522_0700 KX401VF0020 MF EZ301U	270	600	140.0	140/1	2500	2500	5000	1.8	4	26	13
25	104	107	24	2.0	P522_0400 KX401VF0030 MF EZ301U	300	600	120.0	120/1	3000	3000	5500	1.6	4.5	26	13
25	179	189	40	1.2	P522_0400 KX401VF0030 MF EZ302U	300	600	120.0	120/1	3000	3000	5500	1.7	4.5	26	13
29	91	93	21	2.3	P522_0350 KX401VF0030 MF EZ301U	280	600	105.0	105/1	3000	3000	5500	1.6	4.5	27	13
29	156	165	35	1.3	P522_0350 KX401VF0030 MF EZ302U	300	600	105.0	105/1	3000	3000	5500	1.7	4.5	27	13
29	203	215	46	1.0	P522_0350 KX401VF0030 MF EZ303U	300	600	105.0	105/1	3000	3000	5500	1.8	4.5	27	14
30	87	89	27	2.4	P522_0500 KX401VF0020 MF EZ301U	260	600	100.0	100/1	2500	2500	5000	1.8	4	27	13
30	149	157	46	1.4	P522_0500 KX401VF0020 MF EZ302U	300	600	100.0	100/1	2500	2500	5000	1.9	4	27	13
30	194	205	59	1.1	P522_0500 KX401VF0020 MF EZ303U	300	600	100.0	100/1	2500	2500	5000	2.0	4	27	14
36	73	75	16	2.9	P522_0280 KX401VF0030 MF EZ301U	220	600	84.00	84/1	3000	3000	5500	1.6	4.5	26	13
36	125	132	28	1.7	P522_0280 KX401VF0030 MF EZ302U	300	600	84.00	84/1	3000	3000	5500	1.7	4.5	26	13
36	163	172	37	1.3	P522_0280 KX401VF0030 MF EZ303U	300	600	84.00	84/1	3000	3000	5500	1.8	4.5	26	14
38	70	71	21	3.0	P522_0400 KX401VF0020 MF EZ301U	210	600	80.00	80/1	2500	2500	5000	1.8	4.5	26	13
38	119	126	36	1.8	P522_0400 KX401VF0020 MF EZ302U	300	600	80.00	80/1	2500	2500	5000	1.9	4.5	26	13
38	155	164	47	1.4	P522_0400 KX401VF0020 MF EZ303U	300	600	80.00	80/1	2500	2500	5000	2.0	4.5	26	14
38	210	225	64	1.0	P522_0400 KX401VF0020 MF EZ401U	300	600	80.00	80/1	2500	2500	5000	2.6	4.5	26	15
40	65	67	15	3.2	P522_0250 KX401VF0030 MF EZ301U	200	600	75.00	75/1	3000	3000	5500	1.6	4.5	27	13
40	112	118	25	1.9	P522_0250 KX401VF0030 MF EZ302U	300	600	75.00	75/1	3000	3000	5500	1.7	4.5	27	13
40	145	154	33	1.4	P522_0250 KX401VF0030 MF EZ303U	300	600	75.00	75/1	3000	3000	5500	1.9	4.5	27	14
40	197	211	44	1.1	P522_0250 KX401VF0030 MF EZ401U	300	600	75.00	75/1	3000	3000	5500	2.4	4.5	27	15
43	61	62	19	3.4	P522_0350 KX401VF0020 MF EZ301U	180	600	70.00	70/1	2500	2500	5000	1.8	4.5	27	13
43	104	110	32	2.0	P522_0350 KX401VF0020 MF EZ302U	300	600	70.00	70/1	2500	2500	5000	1.9	4.5	27	13
43	136	143	41	1.5	P522_0350 KX401VF0020 MF EZ303U	300	600	70.00	70/1	2500	2500	5000	2.0	4.5	27	14
43	183	197	56	1.1	P522_0350 KX401VF0020 MF EZ401U	300	600	70.00	70/1	2500	2500	5000	2.6	4.5	27	15
47	56	57	18	3.6	P522_0320 KX401VF0020 MF EZ301U	170	500	64.00	64/1	2500	2500	5000	1.9	4.5	25	13
47	95	101	31	2.1	P522_0320 KX401VF0020 MF EZ302U	250	500	64.00	64/1	2500	2500	5000	2.0	4.5	25	13
47	124	131	40	1.6	P522_0320 KX401VF0020 MF EZ303U	250	500	64.00	64/1	2500	2500	5000	2.1	4.5	25	14
47	168	180	54	1.2	P522_0320 KX401VF0020 MF EZ401U	250	500	64.00	64/1	2500	2500	5000	2.6	4.5	25	15
50	52	53	12	4.0	P522_0200 KX401VF0030 MF EZ301U	160	600	60.00	60/1	3000	3000	5500	1.7	4.5	26	13
50	89	94	20	2.4	P522_0200 KX401VF0030 MF EZ302U	280	600	60.00	60/1	3000	3000	5500	1.8	4.5	26	13
50	116	123	26	1.8	P522_0200 KX401VF0030 MF EZ303U	300	600	60.00	60/1	3000	3000	5500	1.9	4.5	26	14
50	157	168	35	1.3	P522_0200 KX401VF0030 MF EZ401U	300	600	60.00	60/1	3000	3000	5500	2.4	4.5	26	15
54	49	50	15	4.3	P522_0280 KX401VF0020 MF EZ301U	150	600	56.00	56/1	2500	2500	5000	1.8	4.5	26	13
54	83	88	25	2.5	P522_0280 KX401VF0020 MF EZ302U	260	600	56.00	56/1	2500	2500	5000	1.9	4.5	26	13
54	108	115	33	1.9	P522_0280 KX401VF0020 MF EZ303U	300	600	56.00	56/1	2500	2500	5000	2.0	4.5	26	14
54	147	157	45	1.4	P522_0280 KX401VF0020 MF EZ401U	300	600	56.00	56/1	2500	2500	5000	2.6	4.5	26	15
60	44	44	13	4.8	P522_0250 KX401VF0020 MF EZ301U	130	600	50.00	50/1	2500	2500	5000	1.9	4.5	27	13
60	74	79	23	2.8	P522_0250 KX401VF0020 MF EZ302U	230	600	50.00	50/1	2500	2500	5000	2.0	4.5	27	13

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,5,6 [rpm]	n_{1maxDB} EL3,4 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
P5KX (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 300 Nm)																
60	97	102	30	2.2	P522_0250 KX401VF0020 MF EZ303U	300	600	50.00	50/1	2500	2500	5000	2.1	4.5	27	14
60	131	140	40	1.6	P522_0250 KX401VF0020 MF EZ401U	300	600	50.00	50/1	2500	2500	5000	2.6	4.5	27	15
60	201	220	62	1.0	P522_0250 KX401VF0020 MF EZ501U	300	600	50.00	50/1	2500	2500	5000	4.6	4.5	27	16
75	60	63	18	3.5	P522_0200 KX401VF0020 MF EZ302U	190	600	40.00	40/1	2500	2500	5000	2.0	4.5	26	13
75	77	82	24	2.7	P522_0200 KX401VF0020 MF EZ303U	260	600	40.00	40/1	2500	2500	5000	2.1	4.5	26	14
75	105	112	32	2.0	P522_0200 KX401VF0020 MF EZ401U	300	600	40.00	40/1	2500	2500	5000	2.6	4.5	26	15
75	161	176	49	1.3	P522_0200 KX401VF0020 MF EZ501U	300	600	40.00	40/1	2500	2500	5000	4.6	4.5	26	16
75	176	195	54	1.2	P522_0200 KX401VF0020 MF EZ402U	300	600	40.00	40/1	2500	2500	5000	3.3	4.5	26	16
86	52	55	27	4.0	P522_0350 KX401VF0010 MF EZ302U	160	600	35.00	35/1	2500	2000	4000	2.7	4.5	27	13
86	68	72	35	3.1	P522_0350 KX401VF0010 MF EZ303U	230	600	35.00	35/1	2500	2000	4000	2.9	4.5	27	14
86	92	98	47	2.3	P522_0350 KX401VF0010 MF EZ401U	280	600	35.00	35/1	2500	2000	4000	3.4	4.5	27	15
86	141	154	72	1.5	P522_0350 KX401VF0010 MF EZ501U	300	600	35.00	35/1	2500	2000	4000	5.4	4.5	27	16
86	154	170	79	1.4	P522_0350 KX401VF0010 MF EZ402U	300	600	35.00	35/1	2500	2000	4000	4.1	4.5	27	16
94	48	50	15	4.4	P522_0160 KX401VF0020 MF EZ302U	150	600	32.00	32/1	2500	2500	5000	2.0	4.5	25	13
94	62	66	19	3.4	P522_0160 KX401VF0020 MF EZ303U	210	600	32.00	32/1	2500	2500	5000	2.1	4.5	25	14
94	84	90	26	2.5	P522_0160 KX401VF0020 MF EZ401U	250	600	32.00	32/1	2500	2500	5000	2.6	4.5	25	15
94	129	141	39	1.6	P522_0160 KX401VF0020 MF EZ501U	300	600	32.00	32/1	2500	2500	5000	4.6	4.5	25	16
94	141	156	43	1.5	P522_0160 KX401VF0020 MF EZ402U	300	600	32.00	32/1	2500	2500	5000	3.3	4.5	25	16
100	80	86	30	1.7	P521_0100 KX501VF0030 MF EZ401U	240	500	30.00	30/1	3000	3000	5000	5.7	4	23	17
100	123	135	46	1.1	P521_0100 KX501VF0030 MF EZ501U	250	500	30.00	30/1	3000	3000	5000	7.7	4	23	18
100	135	149	51	1.0	P521_0100 KX501VF0030 MF EZ402U	250	500	30.00	30/1	3000	3000	5000	6.4	4	23	18
125	64	69	17	3.1	P521_0080 KX501VF0030 MF EZ401U	190	500	24.00	24/1	3000	3000	5000	5.7	4.5	22	17
125	99	108	26	2.0	P521_0080 KX501VF0030 MF EZ501U	250	500	24.00	24/1	3000	3000	5000	7.7	4.5	22	18
125	108	119	28	1.9	P521_0080 KX501VF0030 MF EZ402U	250	500	24.00	24/1	3000	3000	5000	6.4	4.5	22	18
125	170	183	45	1.2	P521_0080 KX501VF0030 MF EZ502U	250	500	24.00	24/1	3000	3000	5000	10	4.5	22	19
125	170	190	45	1.2	P521_0080 KX501VF0030 MF EZ701U	250	500	24.00	24/1	3000	3000	5000	13	4.5	22	21
143	56	60	14	3.7	P521_0070 KX501VF0030 MF EZ401U	170	600	21.00	21/1	3000	3000	5000	5.7	4.5	23	17
143	86	94	22	2.4	P521_0070 KX501VF0030 MF EZ501U	270	600	21.00	21/1	3000	3000	5000	7.7	4.5	23	18
143	94	104	24	2.2	P521_0070 KX501VF0030 MF EZ402U	270	600	21.00	21/1	3000	3000	5000	6.4	4.5	23	18
143	138	173	35	1.5	P521_0070 KX501VF0030 MF EZ404U	270	600	21.00	21/1	3000	3000	5000	7.8	4.5	23	20
143	148	161	37	1.4	P521_0070 KX501VF0030 MF EZ502U	270	600	21.00	21/1	3000	3000	5000	10	4.5	23	19
143	148	167	37	1.4	P521_0070 KX501VF0030 MF EZ701U	270	600	21.00	21/1	3000	3000	5000	13	4.5	23	21
150	54	57	27	2.6	P521_0100 KX501VF0020 MF EZ401U	160	500	20.00	20/1	2500	2500	4500	6.2	4	23	17
150	82	90	42	1.7	P521_0100 KX501VF0020 MF EZ501U	250	500	20.00	20/1	2500	2500	4500	8.2	4	23	18
150	90	99	46	1.6	P521_0100 KX501VF0020 MF EZ402U	250	500	20.00	20/1	2500	2500	4500	6.9	4	23	18
150	132	164	67	1.1	P521_0100 KX501VF0020 MF EZ404U	250	500	20.00	20/1	2500	2500	4500	8.3	4	23	20
188	43	46	15	4.7	P521_0080 KX501VF0020 MF EZ401U	130	500	16.00	16/1	2500	2500	4500	6.3	4.5	22	17
188	66	72	23	3.0	P521_0080 KX501VF0020 MF EZ501U	240	500	16.00	16/1	2500	2500	4500	8.2	4.5	22	18
188	72	79	26	2.8	P521_0080 KX501VF0020 MF EZ402U	240	500	16.00	16/1	2500	2500	4500	7.0	4.5	22	18
188	105	131	38	1.9	P521_0080 KX501VF0020 MF EZ404U	250	500	16.00	16/1	2500	2500	4500	8.3	4.5	22	20
188	113	122	40	1.8	P521_0080 KX501VF0020 MF EZ502U	250	500	16.00	16/1	2500	2500	4500	11	4.5	22	19
188	113	127	40	1.8	P521_0080 KX501VF0020 MF EZ701U	250	500	16.00	16/1	2500	2500	4500	14	4.5	22	21
188	148	170	53	1.3	P521_0080 KX501VF0020 MF EZ503U	250	500	16.00	16/1	2500	2500	4500	13	4.5	22	21
200	62	67	15	3.4	P521_0050 KX501VF0030 MF EZ501U	230	600	15.00	15/1	3000	3000	5000	7.7	5	20	18
200	67	75	17	3.1	P521_0050 KX501VF0030 MF EZ402U	230	600	15.00	15/1	3000	3000	5000	6.5	5	20	18
200	99	123	25	2.1	P521_0050 KX501VF0030 MF EZ404U	300	600	15.00	15/1	3000	3000	5000	7.8	5	20	20
200	106	115	27	2.0	P521_0050 KX501VF0030 MF EZ502U	300	600	15.00	15/1	3000	3000	5000	10	5	20	19
200	106	119	27	2.0	P521_0050 KX501VF0030 MF EZ701U	290	600	15.00	15/1	3000	3000	5000	13	5	20	21
200	139	159	35	1.5	P521_0050 KX501VF0030 MF EZ503U	300	600	15.00	15/1	3000	3000	5000	12	5	20	21
200	172	206	43	1.2	P521_0050 KX501VF0030 MF EZ702U	300	600	15.00	15/1	3000	3000	5000	19	5	20	24
200	193	229	49	1.1	P521_0050 KX501VF0030 MF EZ505U	300	600	15.00	15/1	3000	3000	5000	17	5	20	24
214	58	63	20	3.7	P521_0070 KX501VF0020 MF EZ501U	210	600	14.00	14/1	2500	2500	4500	8.2	4.5	23	18
214	63	70	21	3.3	P521_0070 KX501VF0020 MF EZ402U	210	600	14.00	14/1	2500	2500	4500	7.0	4.5	23	18
214	92	115	31	2.3	P521_0070 KX501VF0020 MF EZ404U	270	600	14.00	14/1	2500	2500	4500	8.3	4.5	23	20
214	99	107	34	2.1	P521_0070 KX501VF0020 MF EZ502U	270	600	14.00	14/1	2500	2500	4500	11	4.5	23	19
214	99	111	34	2.1	P521_0070 KX501VF0020 MF EZ701U	270	600	14.00	14/1	2500	2500	4500	14	4.5	23	21
214	130	148	44	1.6	P521_0070 KX501VF0020 MF EZ503U	270	600	14.00	14/1	2500	2500	4500	13	4.5	23	21
214	161	193	55	1.3	P521_0070 KX501VF0020 MF EZ702U	270	600	14.00	14/1	2500	2500	4500	19	4.5	23	24
250	49	54	15	3.4	P521_0040 KX501VF0030 MF EZ501U	180	520	12.00	12/1	3000	3000	5000	7.8	5.5	17	18
250	54	60	17	3.1	P521_0040 KX501VF0030 MF EZ402U	180	520	12.00	12/1	3000	3000	5000	6.5	5.5	17	18
250	79	99	25	2.1	P521_0040 KX501VF0030 MF EZ404U	240	520	12.00	12/1	3000	3000	5000	7.9	5.5	17	20
250	85	92	26	2.0	P521_0040 KX501VF0030 MF EZ502U	240	520	12.00	12/1	3000	3000	5000	10	5.5	17	19
250	85	95	26	2.0	P521_0040 KX501VF0030 MF EZ701U	230	520	12.00	12/1	3000	3000	5000	13	5.5	17	21
250	111	127	35	1.5	P521_0040 KX501VF0030 MF EZ503U	240	520	12.00	12/1	3000	3000	5000	12	5.5	17	21

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,5,6 [rpm]	n_{1maxDB} EL3,4 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
P5KX (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 300 Nm)																
250	138	165	43	1.2	P521_0040 KX501VF0030 MF EZ702U	240	520	12.00	12/1	3000	3000	5000	19	5.5	17	24
250	155	183	48	1.1	P521_0040 KX501VF0030 MF EZ505U	240	520	12.00	12/1	3000	3000	5000	17	5.5	17	24
300	45	50	15	4.7	P521_0050 KX501VF0020 MF EZ402U	150	600	10.00	10/1	2500	2500	4500	7.1	5	20	18
300	66	82	22	3.2	P521_0050 KX501VF0020 MF EZ404U	280	600	10.00	10/1	2500	2500	4500	8.4	5	20	20
300	71	76	24	3.0	P521_0050 KX501VF0020 MF EZ502U	300	600	10.00	10/1	2500	2500	4500	11	5	20	19
300	71	79	24	3.0	P521_0050 KX501VF0020 MF EZ701U	190	600	10.00	10/1	2500	2500	4500	14	5	20	21
300	93	106	31	2.3	P521_0050 KX501VF0020 MF EZ503U	300	600	10.00	10/1	2500	2500	4500	13	5	20	21
300	115	138	39	1.8	P521_0050 KX501VF0020 MF EZ702U	300	600	10.00	10/1	2500	2500	4500	19	5	20	24
300	129	153	44	1.6	P521_0050 KX501VF0020 MF EZ505U	300	600	10.00	10/1	2500	2500	4500	18	5	20	24
300	158	199	54	1.3	P521_0050 KX501VF0020 MF EZ703U	300	600	10.00	10/1	2500	2500	4500	27	5	20	26
375	36	40	15	4.7	P521_0040 KX501VF0020 MF EZ402U	120	520	8.000	8/1	2500	2500	4500	7.2	5.5	17	18
375	53	66	22	3.2	P521_0040 KX501VF0020 MF EZ404U	220	520	8.000	8/1	2500	2500	4500	8.5	5.5	17	20
375	57	61	24	3.0	P521_0040 KX501VF0020 MF EZ502U	240	520	8.000	8/1	2500	2500	4500	11	5.5	17	19
375	57	63	24	3.0	P521_0040 KX501VF0020 MF EZ701U	150	520	8.000	8/1	2500	2500	4500	14	5.5	17	21
375	74	85	31	2.3	P521_0040 KX501VF0020 MF EZ503U	240	520	8.000	8/1	2500	2500	4500	13	5.5	17	21
375	92	110	39	1.8	P521_0040 KX501VF0020 MF EZ702U	240	520	8.000	8/1	2500	2500	4500	19	5.5	17	24
375	103	122	43	1.6	P521_0040 KX501VF0020 MF EZ505U	240	520	8.000	8/1	2500	2500	4500	18	5.5	17	24
375	126	159	53	1.3	P521_0040 KX501VF0020 MF EZ703U	240	520	8.000	8/1	2500	2500	4500	27	5.5	17	26
429	46	58	30	4.0	P521_0070 KX501VF0010 MF EZ404U	190	600	7.000	7/1	2500	2000	3500	11	4.5	23	20
429	49	54	32	3.7	P521_0070 KX501VF0010 MF EZ502U	210	600	7.000	7/1	2500	2000	3500	13	4.5	23	19
429	49	56	32	3.7	P521_0070 KX501VF0010 MF EZ701U	130	600	7.000	7/1	2500	2000	3500	16	4.5	23	21
429	65	74	42	2.8	P521_0070 KX501VF0010 MF EZ503U	270	600	7.000	7/1	2500	2000	3500	15	4.5	23	21
429	80	96	52	2.3	P521_0070 KX501VF0010 MF EZ702U	270	600	7.000	7/1	2500	2000	3500	21	4.5	23	24
429	90	107	59	2.0	P521_0070 KX501VF0010 MF EZ505U	270	600	7.000	7/1	2500	2000	3500	20	4.5	23	24
429	110	139	72	1.7	P521_0070 KX501VF0010 MF EZ703U	270	600	7.000	7/1	2500	2000	3500	29	4.5	23	26
429	142	202	93	1.3	P521_0070 KX501VF0010 MF EZ705U	270	600	7.000	7/1	2500	2000	3500	42	4.5	23	31
500	25	27	15	4.9	P521_0030 KX501VF0020 MF EZ501U	92	390	6.000	6/1	2500	2500	4500	8.9	6.5	14	18
500	27	30	16	4.5	P521_0030 KX501VF0020 MF EZ402U	92	390	6.000	6/1	2500	2500	4500	7.6	6.5	14	18
500	40	49	24	3.0	P521_0030 KX501VF0020 MF EZ404U	170	390	6.000	6/1	2500	2500	4500	8.9	6.5	14	20
500	42	46	25	2.8	P521_0030 KX501VF0020 MF EZ502U	180	390	6.000	6/1	2500	2500	4500	11	6.5	14	19
500	42	48	25	2.8	P521_0030 KX501VF0020 MF EZ701U	110	390	6.000	6/1	2500	2500	4500	14	6.5	14	21
500	56	64	33	2.2	P521_0030 KX501VF0020 MF EZ503U	180	390	6.000	6/1	2500	2500	4500	14	6.5	14	21
500	69	83	41	1.7	P521_0030 KX501VF0020 MF EZ702U	180	390	6.000	6/1	2500	2500	4500	20	6.5	14	24
500	77	92	46	1.6	P521_0030 KX501VF0020 MF EZ505U	180	390	6.000	6/1	2500	2500	4500	18	6.5	14	24
500	95	119	56	1.3	P521_0030 KX501VF0020 MF EZ703U	180	390	6.000	6/1	2500	2500	4500	28	6.5	14	26
600	46	53	30	4.0	P521_0050 KX501VF0010 MF EZ503U	210	600	5.000	5/1	2500	2000	3500	16	5	20	21
600	57	69	38	3.2	P521_0050 KX501VF0010 MF EZ702U	200	600	5.000	5/1	2500	2000	3500	22	5	20	24
600	64	76	42	2.8	P521_0050 KX501VF0010 MF EZ505U	300	600	5.000	5/1	2500	2000	3500	20	5	20	24
600	79	99	52	2.3	P521_0050 KX501VF0010 MF EZ703U	300	600	5.000	5/1	2500	2000	3500	30	5	20	26
600	102	144	67	1.8	P521_0050 KX501VF0010 MF EZ705U	300	600	5.000	5/1	2500	2000	3500	42	5	20	31
750	37	42	26	4.6	P521_0040 KX501VF0010 MF EZ503U	160	520	4.000	4/1	2500	2000	3500	16	5.5	17	21
750	46	55	32	3.7	P521_0040 KX501VF0010 MF EZ702U	160	520	4.000	4/1	2500	2000	3500	22	5.5	17	24
750	52	61	37	3.3	P521_0040 KX501VF0010 MF EZ505U	240	520	4.000	4/1	2500	2000	3500	21	5.5	17	24
750	63	79	45	2.7	P521_0040 KX501VF0010 MF EZ703U	240	520	4.000	4/1	2500	2000	3500	30	5.5	17	26
750	81	115	58	2.1	P521_0040 KX501VF0010 MF EZ705U	240	520	4.000	4/1	2500	2000	3500	43	5.5	17	31
1000	21	23	24	4.9	P521_0030 KX501VF0010 MF EZ502U	89	390	3.000	3/1	2500	2000	3500	15	6.5	14	19
1000	21	24	24	4.9	P521_0030 KX501VF0010 MF EZ701U	57	390	3.000	3/1	2500	2000	3500	19	6.5	14	21
1000	28	32	32	3.8	P521_0030 KX501VF0010 MF EZ503U	120	390	3.000	3/1	2500	2000	3500	18	6.5	14	21
1000	34	41	39	3.0	P521_0030 KX501VF0010 MF EZ702U	120	390	3.000	3/1	2500	2000	3500	24	6.5	14	24
1000	39	46	44	2.7	P521_0030 KX501VF0010 MF EZ505U	180	390	3.000	3/1	2500	2000	3500	22	6.5	14	24
1000	47	60	54	2.2	P521_0030 KX501VF0010 MF EZ703U	180	390	3.000	3/1	2500	2000	3500	32	6.5	14	26
1000	61	87	70	1.7	P521_0030 KX501VF0010 MF EZ705U	180	390	3.000	3/1	2500	2000	3500	44	6.5	14	31
P5KX (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 300 Nm)																
300	136	219	39	1.4	P521_0050 KX501VF0030 MF EZ505U	300	600	15.00	15/1	3000	3000	5000	17	5	20	24
321	127	205	45	1.6	P521_0070 KX501VF0020 MF EZ505U	270	600	14.00	14/1	2500	2500	4500	17	4.5	23	24
375	109	175	39	1.4	P521_0040 KX501VF0030 MF EZ505U	240	520	12.00	12/1	3000	3000	5000	17	5.5	17	24
450	91	146	35	2.0	P521_0050 KX501VF0020 MF EZ505U	300	600	10.00	10/1	2500	2500	4500	18	5	20	24
450	116	191	45	1.6	P521_0050 KX501VF0020 MF EZ703U	300	600	10.00	10/1	2500	2500	4500	27	5	20	26
563	73	117	35	2.0	P521_0040 KX501VF0020 MF EZ505U	240	520	8.000	8/1	2500	2500	4500	18	5.5	17	24
563	92	153	45	1.6	P521_0040 KX501VF0020 MF EZ703U	240	520	8.000	8/1	2500	2500	4500	27	5.5	17	26
750	54	88	35	2.0	P521_0030 KX501VF0020 MF EZ505U	180	390	6.000	6/1	2500	2500	4500	18	6.5	14	24
750	69	115	45	1.6	P521_0030 KX501VF0020 MF EZ703U	180	390	6.000	6/1	2500	2500	4500	28	6.5	14	26

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,5,6 [rpm]	n_{1maxDB} EL3,4 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
P7KX (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 650 Nm)																
286	292	442	239	1.5	P721_0070 KX701VF0010 MF EZ805U	650	1250	7.000	7/1	1800	1600	3000	159	4.5	49	69
400	209	316	171	2.1	P721_0050 KX701VF0010 MF EZ805U	610	1130	5.000	5/1	1800	1600	3000	160	5	46	69
500	167	253	155	2.3	P721_0040 KX701VF0010 MF EZ805U	490	910	4.000	4/1	1800	1600	3000	161	5.5	43	69
667	125	189	161	2.2	P721_0030 KX701VF0010 MF EZ805U	360	680	3.000	3/1	1800	1600	3000	166	6.5	37	69
P7KX (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 700 Nm)																
20	393	421	47	1.1	P722_0500 KX501VF0030 MF EZ401U	700	1400	150.0	150/1	3000	3000	5000	5.7	4	52	25
21	367	393	59	1.2	P722_0700 KX501VF0020 MF EZ401U	650	1250	140.0	140/1	2500	2500	4500	6.2	4	52	25
25	314	337	38	1.4	P722_0400 KX501VF0030 MF EZ401U	700	1380	120.0	120/1	3000	3000	5000	5.7	4.5	51	25
29	275	295	33	1.6	P722_0350 KX501VF0030 MF EZ401U	700	1400	105.0	105/1	3000	3000	5000	5.7	4.5	52	25
29	422	462	51	1.0	P722_0350 KX501VF0030 MF EZ501U	700	1400	105.0	105/1	3000	3000	5000	7.7	4.5	52	26
30	262	281	42	1.7	P722_0500 KX501VF0020 MF EZ401U	700	1400	100.0	100/1	2500	2500	4500	6.2	4	52	25
30	402	440	65	1.1	P722_0500 KX501VF0020 MF EZ501U	700	1400	100.0	100/1	2500	2500	4500	8.2	4	52	26
30	440	487	71	1.0	P722_0500 KX501VF0020 MF EZ402U	700	1400	100.0	100/1	2500	2500	4500	6.9	4	52	26
36	220	236	26	2.0	P722_0280 KX501VF0030 MF EZ401U	670	1380	84.00	84/1	3000	3000	5000	5.7	4.5	51	25
36	338	369	40	1.3	P722_0280 KX501VF0030 MF EZ501U	700	1380	84.00	84/1	3000	3000	5000	7.7	4.5	51	26
36	369	409	44	1.2	P722_0280 KX501VF0030 MF EZ402U	700	1380	84.00	84/1	3000	3000	5000	6.4	4.5	51	26
38	210	225	34	2.1	P722_0400 KX501VF0020 MF EZ401U	640	1380	80.00	80/1	2500	2500	4500	6.2	4.5	51	25
38	322	352	52	1.4	P722_0400 KX501VF0020 MF EZ501U	700	1380	80.00	80/1	2500	2500	4500	8.2	4.5	51	26
38	352	389	57	1.3	P722_0400 KX501VF0020 MF EZ402U	700	1380	80.00	80/1	2500	2500	4500	6.9	4.5	51	26
40	197	211	24	2.2	P722_0250 KX501VF0030 MF EZ401U	600	1400	75.00	75/1	3000	3000	5000	5.8	4.5	52	25
40	302	330	36	1.5	P722_0250 KX501VF0030 MF EZ501U	700	1400	75.00	75/1	3000	3000	5000	7.7	4.5	52	26
40	330	365	39	1.3	P722_0250 KX501VF0030 MF EZ402U	700	1400	75.00	75/1	3000	3000	5000	6.5	4.5	52	26
43	183	197	30	2.4	P722_0350 KX501VF0020 MF EZ401U	560	1400	70.00	70/1	2500	2500	4500	6.3	4.5	52	25
43	282	308	46	1.6	P722_0350 KX501VF0020 MF EZ501U	700	1400	70.00	70/1	2500	2500	4500	8.3	4.5	52	26
43	308	341	50	1.4	P722_0350 KX501VF0020 MF EZ402U	700	1400	70.00	70/1	2500	2500	4500	7.0	4.5	52	26
47	168	180	30	2.4	P722_0320 KX501VF0020 MF EZ401U	500	1000	64.00	64/1	2500	2500	4500	6.4	4.5	51	25
47	258	281	46	1.6	P722_0320 KX501VF0020 MF EZ501U	500	1000	64.00	64/1	2500	2500	4500	8.4	4.5	51	26
47	281	311	50	1.4	P722_0320 KX501VF0020 MF EZ402U	500	1000	64.00	64/1	2500	2500	4500	7.1	4.5	51	26
50	157	168	19	2.8	P722_0200 KX501VF0030 MF EZ401U	480	1400	60.00	60/1	3000	3000	5000	5.8	4.5	51	25
50	241	264	29	1.8	P722_0200 KX501VF0030 MF EZ501U	700	1400	60.00	60/1	3000	3000	5000	7.8	4.5	51	26
50	264	292	32	1.7	P722_0200 KX501VF0030 MF EZ402U	700	1400	60.00	60/1	3000	3000	5000	6.5	4.5	51	26
50	387	483	46	1.1	P722_0200 KX501VF0030 MF EZ404U	700	1400	60.00	60/1	3000	3000	5000	7.9	4.5	51	29
50	415	449	50	1.1	P722_0200 KX501VF0030 MF EZ502U	700	1400	60.00	60/1	3000	3000	5000	10	4.5	51	28
50	415	466	50	1.1	P722_0200 KX501VF0030 MF EZ701U	700	1400	60.00	60/1	3000	3000	5000	13	4.5	51	30
54	147	157	24	3.0	P722_0280 KX501VF0020 MF EZ401U	450	1380	56.00	56/1	2500	2500	4500	6.3	4.5	51	25
54	225	246	37	2.0	P722_0280 KX501VF0020 MF EZ501U	700	1380	56.00	56/1	2500	2500	4500	8.3	4.5	51	26
54	246	272	40	1.8	P722_0280 KX501VF0020 MF EZ402U	700	1380	56.00	56/1	2500	2500	4500	7.0	4.5	51	26
54	362	451	59	1.2	P722_0280 KX501VF0020 MF EZ404U	700	1380	56.00	56/1	2500	2500	4500	8.3	4.5	51	29
54	388	419	63	1.1	P722_0280 KX501VF0020 MF EZ502U	700	1380	56.00	56/1	2500	2500	4500	11	4.5	51	28
54	388	435	63	1.1	P722_0280 KX501VF0020 MF EZ701U	700	1380	56.00	56/1	2500	2500	4500	14	4.5	51	30
60	131	140	21	3.4	P722_0250 KX501VF0020 MF EZ401U	400	1400	50.00	50/1	2500	2500	4500	6.4	4.5	52	25
60	201	220	33	2.2	P722_0250 KX501VF0020 MF EZ501U	700	1400	50.00	50/1	2500	2500	4500	8.3	4.5	52	26
60	220	243	36	2.0	P722_0250 KX501VF0020 MF EZ402U	700	1400	50.00	50/1	2500	2500	4500	7.1	4.5	52	26
60	323	402	52	1.4	P722_0250 KX501VF0020 MF EZ404U	700	1400	50.00	50/1	2500	2500	4500	8.4	4.5	52	29
60	346	374	56	1.3	P722_0250 KX501VF0020 MF EZ502U	700	1400	50.00	50/1	2500	2500	4500	11	4.5	52	28
60	346	388	56	1.3	P722_0250 KX501VF0020 MF EZ701U	700	1400	50.00	50/1	2500	2500	4500	14	4.5	52	30
75	105	112	17	4.2	P722_0200 KX501VF0020 MF EZ401U	320	1400	40.00	40/1	2500	2500	4500	6.5	4.5	51	25
75	161	176	26	2.7	P722_0200 KX501VF0020 MF EZ501U	600	1400	40.00	40/1	2500	2500	4500	8.4	4.5	51	26
75	176	195	29	2.5	P722_0200 KX501VF0020 MF EZ402U	600	1400	40.00	40/1	2500	2500	4500	7.2	4.5	51	26
75	258	322	42	1.7	P722_0200 KX501VF0020 MF EZ404U	700	1400	40.00	40/1	2500	2500	4500	8.5	4.5	51	29
75	277	299	45	1.6	P722_0200 KX501VF0020 MF EZ502U	700	1400	40.00	40/1	2500	2500	4500	11	4.5	51	28
75	277	311	45	1.6	P722_0200 KX501VF0020 MF EZ701U	700	1400	40.00	40/1	2500	2500	4500	14	4.5	51	30
75	363	415	59	1.2	P722_0200 KX501VF0020 MF EZ503U	700	1400	40.00	40/1	2500	2500	4500	13	4.5	51	29
86	92	98	25	4.8	P722_0350 KX501VF0010 MF EZ401U	280	1400	35.00	35/1	2500	2000	3500	8.7	4.5	52	25
86	141	154	38	3.1	P722_0350 KX501VF0010 MF EZ501U	520	1400	35.00	35/1	2500	2000	3500	11	4.5	52	26
86	154	170	42	2.9	P722_0350 KX501VF0010 MF EZ402U	520	1400	35.00	35/1	2500	2000	3500	9.4	4.5	52	26
86	226	282	62	1.9	P722_0350 KX501VF0010 MF EZ404U	700	1400	35.00	35/1	2500	2000	3500	11	4.5	52	29
86	242	262	66	1.8	P722_0350 KX501VF0010 MF EZ502U	700	1400	35.00	35/1	2500	2000	3500	13	4.5	52	28
86	242	272	66	1.8	P722_0350 KX501VF0010 MF EZ701U	660	1400	35.00	35/1	2500	2000	3500	16	4.5	52	30
86	318	364	87	1.4	P722_0350 KX501VF0010 MF EZ503U	700	1400	35.00	35/1	2500	2000	3500	15	4.5	52	29
86	393	472	107	1.1	P722_0350 KX501VF0010 MF EZ702U	700	1400	35.00	35/1	2500	2000	3500	22	4.5	52	32
94	129	141	21	3.4	P722_0160 KX501VF0020 MF EZ501U	480	1380	32.00	32/1	2500	2500	4500	8.5	4.5	49	26
94	141	156	23	3.1	P722_0160 KX501VF0020 MF EZ402U	480	1380	32.00	32/1	2500	2500	4500	7.2	4.5	49	26
94	207	258	33	2.1	P722_0160 KX501VF0020 MF EZ404U	700	1380	32.00	32/1	2500	2500	4500	8.5	4.5	49	29

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,5,6 [rpm]	n_{1maxDB} EL3,4 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm^2]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
P7KX (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 700 Nm)																
94	222	240	36	2.0	P722_0160 KX501VF0020 MF EZ502U	700	1380	32.00	32/1	2500	2500	4500	11	4.5	49	28
94	222	249	36	2.0	P722_0160 KX501VF0020 MF EZ701U	600	1380	32.00	32/1	2500	2500	4500	14	4.5	49	30
94	290	332	47	1.5	P722_0160 KX501VF0020 MF EZ503U	700	1380	32.00	32/1	2500	2500	4500	13	4.5	49	29
94	359	431	58	1.2	P722_0160 KX501VF0020 MF EZ702U	700	1380	32.00	32/1	2500	2500	4500	19	4.5	49	32
94	404	479	66	1.1	P722_0160 KX501VF0020 MF EZ505U	700	1380	32.00	32/1	2500	2500	4500	18	4.5	49	32
100	123	135	65	2.4	P721_0100 KX701VF0030 MF EZ501U	460	1000	30.00	30/1	2100	2100	4000	15	4	47	28
100	212	229	112	1.4	P721_0100 KX701VF0030 MF EZ502U	500	1000	30.00	30/1	2100	2100	4000	18	4	47	30
100	212	238	112	1.4	P721_0100 KX701VF0030 MF EZ701U	500	1000	30.00	30/1	2100	2100	4000	21	4	47	32
100	278	318	146	1.1	P721_0100 KX701VF0030 MF EZ503U	500	1000	30.00	30/1	2100	2100	4000	20	4	47	31
125	99	108	39	4.1	P721_0080 KX701VF0030 MF EZ501U	370	1000	24.00	24/1	2100	2100	4000	15	4.5	49	28
125	170	183	67	2.4	P721_0080 KX701VF0030 MF EZ502U	500	1000	24.00	24/1	2100	2100	4000	18	4.5	49	30
125	170	190	67	2.4	P721_0080 KX701VF0030 MF EZ701U	460	1000	24.00	24/1	2100	2100	4000	21	4.5	49	32
125	222	255	88	1.8	P721_0080 KX701VF0030 MF EZ503U	500	1000	24.00	24/1	2100	2100	4000	20	4.5	49	31
125	275	330	109	1.5	P721_0080 KX701VF0030 MF EZ702U	500	1000	24.00	24/1	2100	2100	4000	26	4.5	49	34
125	310	367	122	1.3	P721_0080 KX701VF0030 MF EZ505U	500	1000	24.00	24/1	2100	2100	4000	25	4.5	49	34
143	148	161	53	3.0	P721_0070 KX701VF0030 MF EZ502U	620	1250	21.00	21/1	2100	2100	4000	18	4.5	49	30
143	148	167	53	3.0	P721_0070 KX701VF0030 MF EZ701U	400	1250	21.00	21/1	2100	2100	4000	21	4.5	49	32
143	195	223	70	2.3	P721_0070 KX701VF0030 MF EZ503U	650	1250	21.00	21/1	2100	2100	4000	20	4.5	49	31
143	241	289	86	1.8	P721_0070 KX701VF0030 MF EZ702U	650	1250	21.00	21/1	2100	2100	4000	26	4.5	49	34
143	271	321	97	1.6	P721_0070 KX701VF0030 MF EZ505U	650	1250	21.00	21/1	2100	2100	4000	25	4.5	49	34
143	331	417	119	1.3	P721_0070 KX701VF0030 MF EZ703U	650	1250	21.00	21/1	2100	2100	4000	34	4.5	49	36
150	82	90	59	3.7	P721_0100 KX701VF0020 MF EZ501U	310	1000	20.00	20/1	1800	1800	3500	18	4	47	28
150	141	153	101	2.1	P721_0100 KX701VF0020 MF EZ502U	500	1000	20.00	20/1	1800	1800	3500	20	4	47	30
150	141	159	101	2.1	P721_0100 KX701VF0020 MF EZ701U	380	1000	20.00	20/1	1800	1800	3500	23	4	47	32
150	185	212	132	1.6	P721_0100 KX701VF0020 MF EZ503U	500	1000	20.00	20/1	1800	1800	3500	22	4	47	31
150	229	275	164	1.3	P721_0100 KX701VF0020 MF EZ702U	500	1000	20.00	20/1	1800	1800	3500	29	4	47	34
150	258	306	184	1.2	P721_0100 KX701VF0020 MF EZ505U	500	1000	20.00	20/1	1800	1800	3500	27	4	47	34
188	113	122	61	3.5	P721_0080 KX701VF0020 MF EZ502U	470	1000	16.00	16/1	1800	1800	3500	20	4.5	49	30
188	113	127	61	3.5	P721_0080 KX701VF0020 MF EZ701U	310	1000	16.00	16/1	1800	1800	3500	23	4.5	49	32
188	148	170	79	2.7	P721_0080 KX701VF0020 MF EZ503U	500	1000	16.00	16/1	1800	1800	3500	22	4.5	49	31
188	183	220	98	2.2	P721_0080 KX701VF0020 MF EZ702U	500	1000	16.00	16/1	1800	1800	3500	29	4.5	49	34
188	206	245	110	1.9	P721_0080 KX701VF0020 MF EZ505U	500	1000	16.00	16/1	1800	1800	3500	27	4.5	49	34
188	252	318	135	1.6	P721_0080 KX701VF0020 MF EZ703U	500	1000	16.00	16/1	1800	1800	3500	37	4.5	49	36
200	106	115	40	4.0	P721_0050 KX701VF0030 MF EZ502U	440	1290	15.00	15/1	2100	2100	4000	18	5	46	30
200	106	119	40	4.0	P721_0050 KX701VF0030 MF EZ701U	290	1290	15.00	15/1	2100	2100	4000	21	5	46	32
200	139	159	52	3.0	P721_0050 KX701VF0030 MF EZ503U	610	1290	15.00	15/1	2100	2100	4000	20	5	46	31
200	172	206	64	2.5	P721_0050 KX701VF0030 MF EZ702U	590	1290	15.00	15/1	2100	2100	4000	26	5	46	34
200	193	229	72	2.2	P721_0050 KX701VF0030 MF EZ505U	610	1290	15.00	15/1	2100	2100	4000	25	5	46	34
200	236	298	88	1.8	P721_0050 KX701VF0030 MF EZ703U	610	1290	15.00	15/1	2100	2100	4000	34	5	46	36
200	305	433	114	1.4	P721_0050 KX701VF0030 MF EZ705U	610	1290	15.00	15/1	2100	2100	4000	47	5	46	42
214	99	107	48	4.4	P721_0070 KX701VF0020 MF EZ502U	410	1250	14.00	14/1	1800	1800	3500	20	4.5	49	30
214	99	111	48	4.4	P721_0070 KX701VF0020 MF EZ701U	270	1250	14.00	14/1	1800	1800	3500	23	4.5	49	32
214	130	148	63	3.4	P721_0070 KX701VF0020 MF EZ503U	580	1250	14.00	14/1	1800	1800	3500	23	4.5	49	31
214	161	193	78	2.7	P721_0070 KX701VF0020 MF EZ702U	550	1250	14.00	14/1	1800	1800	3500	29	4.5	49	34
214	181	214	88	2.4	P721_0070 KX701VF0020 MF EZ505U	650	1250	14.00	14/1	1800	1800	3500	27	4.5	49	34
214	221	278	107	2.0	P721_0070 KX701VF0020 MF EZ703U	650	1250	14.00	14/1	1800	1800	3500	37	4.5	49	36
214	285	404	139	1.5	P721_0070 KX701VF0020 MF EZ705U	650	1250	14.00	14/1	1800	1800	3500	49	4.5	49	42
214	298	496	145	1.5	P721_0070 KX701VF0020 MF EZ802U	650	1250	14.00	14/1	1800	1800	3500	73	4.5	49	50
250	85	92	40	4.0	P721_0040 KX701VF0030 MF EZ502U	360	1030	12.00	12/1	2100	2100	4000	18	5.5	43	30
250	85	95	40	4.0	P721_0040 KX701VF0030 MF EZ701U	230	1030	12.00	12/1	2100	2100	4000	21	5.5	43	32
250	111	127	52	3.0	P721_0040 KX701VF0030 MF EZ503U	490	1030	12.00	12/1	2100	2100	4000	20	5.5	43	31
250	138	165	64	2.5	P721_0040 KX701VF0030 MF EZ702U	470	1030	12.00	12/1	2100	2100	4000	27	5.5	43	34
250	155	183	72	2.2	P721_0040 KX701VF0030 MF EZ505U	490	1030	12.00	12/1	2100	2100	4000	25	5.5	43	34
250	189	238	88	1.8	P721_0040 KX701VF0030 MF EZ703U	490	1030	12.00	12/1	2100	2100	4000	34	5.5	43	36
250	244	346	114	1.4	P721_0040 KX701VF0030 MF EZ705U	490	1030	12.00	12/1	2100	2100	4000	47	5.5	43	42
300	93	106	47	4.6	P721_0050 KX701VF0020 MF EZ503U	410	1290	10.00	10/1	1800	1800	3500	23	5	46	31
300	115	138	58	3.7	P721_0050 KX701VF0020 MF EZ702U	390	1290	10.00	10/1	1800	1800	3500	29	5	46	34
300	129	153	65	3.3	P721_0050 KX701VF0020 MF EZ505U	610	1290	10.00	10/1	1800	1800	3500	27	5	46	34
300	158	199	80	2.7	P721_0050 KX701VF0020 MF EZ703U	610	1290	10.00	10/1	1800	1800	3500	37	5	46	36
300	204	289	103	2.1	P721_0050 KX701VF0020 MF EZ705U	610	1290	10.00	10/1	1800	1800	3500	49	5	46	42
300	213	354	108	2.0	P721_0050 KX701VF0020 MF EZ802U	610	1290	10.00	10/1	1800	1800	3500	73	5	46	50
300	254	461	128	1.7	P721_0050 KX701VF0020 MF EZ803U	610	1290	10.00	10/1	1800	1800	3500	99	5	46	56
375	74	85	47	4.6	P721_0040 KX701VF0020 MF EZ503U	330	1030	8.000	8/1	1800	1800	3500	23	5.5	43	31
375	92	110	58	3.7	P721_0040 KX701VF0020 MF EZ702U	310	1030	8.000	8/1	1800	1800	3500	29	5.5	43	34

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,5,6 [rpm]	n_{1maxDB} EL3,4 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
P7KX (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 700 Nm)																
375	103	122	65	3.3	P721_0040 KX701VF0020 MF EZ505U	490	1030	8.000	8/1	1800	1800	3500	28	5.5	43	34
375	126	159	80	2.7	P721_0040 KX701VF0020 MF EZ703U	490	1030	8.000	8/1	1800	1800	3500	37	5.5	43	36
375	163	231	103	2.1	P721_0040 KX701VF0020 MF EZ705U	490	1030	8.000	8/1	1800	1800	3500	50	5.5	43	42
375	170	284	108	2.0	P721_0040 KX701VF0020 MF EZ802U	490	1030	8.000	8/1	1800	1800	3500	74	5.5	43	50
375	203	368	128	1.7	P721_0040 KX701VF0020 MF EZ803U	490	1030	8.000	8/1	1800	1800	3500	99	5.5	43	56
429	80	96	75	4.8	P721_0070 KX701VF0010 MF EZ702U	270	1250	7.000	7/1	1800	1600	3000	40	4.5	49	34
429	90	107	85	4.3	P721_0070 KX701VF0010 MF EZ505U	450	1250	7.000	7/1	1800	1600	3000	38	4.5	49	34
429	110	139	103	3.5	P721_0070 KX701VF0010 MF EZ703U	430	1250	7.000	7/1	1800	1600	3000	48	4.5	49	36
429	142	202	133	2.7	P721_0070 KX701VF0010 MF EZ705U	650	1250	7.000	7/1	1800	1600	3000	60	4.5	49	42
429	149	248	140	2.6	P721_0070 KX701VF0010 MF EZ802U	650	1250	7.000	7/1	1800	1600	3000	84	4.5	49	50
429	178	322	167	2.2	P721_0070 KX701VF0010 MF EZ803U	650	1250	7.000	7/1	1800	1600	3000	109	4.5	49	56
500	56	64	47	4.6	P721_0030 KX701VF0020 MF EZ503U	250	770	6.000	6/1	1800	1800	3500	24	6.5	37	31
500	69	83	58	3.7	P721_0030 KX701VF0020 MF EZ702U	240	770	6.000	6/1	1800	1800	3500	31	6.5	37	34
500	77	92	65	3.3	P721_0030 KX701VF0020 MF EZ505U	360	770	6.000	6/1	1800	1800	3500	29	6.5	37	34
500	95	119	80	2.7	P721_0030 KX701VF0020 MF EZ703U	360	770	6.000	6/1	1800	1800	3500	38	6.5	37	36
500	122	173	103	2.1	P721_0030 KX701VF0020 MF EZ705U	360	770	6.000	6/1	1800	1800	3500	51	6.5	37	42
500	128	213	108	2.0	P721_0030 KX701VF0020 MF EZ802U	360	770	6.000	6/1	1800	1800	3500	75	6.5	37	50
500	152	276	128	1.7	P721_0030 KX701VF0020 MF EZ803U	360	770	6.000	6/1	1800	1800	3500	100	6.5	37	56
600	79	99	74	4.9	P721_0050 KX701VF0010 MF EZ703U	310	1130	5.000	5/1	1800	1600	3000	49	5	46	36
600	102	144	95	3.8	P721_0050 KX701VF0010 MF EZ705U	500	1130	5.000	5/1	1800	1600	3000	61	5	46	42
600	107	177	100	3.6	P721_0050 KX701VF0010 MF EZ802U	480	1130	5.000	5/1	1800	1600	3000	85	5	46	50
600	127	230	119	3.0	P721_0050 KX701VF0010 MF EZ803U	610	1130	5.000	5/1	1800	1600	3000	110	5	46	56
750	81	115	86	4.2	P721_0040 KX701VF0010 MF EZ705U	400	910	4.000	4/1	1800	1600	3000	62	5.5	43	42
750	85	142	91	4.0	P721_0040 KX701VF0010 MF EZ802U	380	910	4.000	4/1	1800	1600	3000	86	5.5	43	50
750	102	184	108	3.3	P721_0040 KX701VF0010 MF EZ803U	490	910	4.000	4/1	1800	1600	3000	112	5.5	43	56
1000	61	87	90	4.0	P721_0030 KX701VF0010 MF EZ705U	300	680	3.000	3/1	1800	1600	3000	67	6.5	37	42
1000	64	106	94	3.8	P721_0030 KX701VF0010 MF EZ802U	290	680	3.000	3/1	1800	1600	3000	91	6.5	37	50
1000	76	138	112	3.2	P721_0030 KX701VF0010 MF EZ803U	360	680	3.000	3/1	1800	1600	3000	117	6.5	37	56
P7KX (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 700 Nm)																
141	284	458	46	1.5	P722_0160 KX501VF0020 MF EZ505U	700	1380	32.00	32/1	2500	2500	4500	18	4.5	49	32
P8KX (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 1400 Nm)																
133	626	947	110	1.5	P821_0050 KX801VF0030 MF EZ805U	1330	2580	15.00	15/1	1300	1300	3000	177	5	128	93
143	585	884	136	1.7	P821_0070 KX801VF0020 MF EZ805U	1400	2800	14.00	14/1	1100	1100	2500	183	4.5	142	93
167	501	758	110	1.5	P821_0040 KX801VF0030 MF EZ805U	1070	2060	12.00	12/1	1300	1300	3000	178	5.5	111	93
200	418	632	100	2.3	P821_0050 KX801VF0020 MF EZ805U	1330	2580	10.00	10/1	1100	1100	2500	184	5	128	93
250	334	505	100	2.3	P821_0040 KX801VF0020 MF EZ805U	1070	2060	8.000	8/1	1100	1100	2500	186	5.5	111	93
286	292	442	114	3.4	P821_0070 KX801VF0010 MF EZ805U	1370	2800	7.000	7/1	1000	750	2000	215	4.5	142	93
333	251	379	100	2.3	P821_0030 KX801VF0020 MF EZ805U	800	1550	6.000	6/1	1100	1100	2500	192	6.5	84	93
400	209	316	84	4.6	P821_0050 KX801VF0010 MF EZ805U	980	2160	5.000	5/1	1000	750	2000	220	5	128	93
500	167	253	84	4.6	P821_0040 KX801VF0010 MF EZ805U	780	1730	4.000	4/1	1000	750	2000	226	5.5	111	93
667	125	189	84	4.6	P821_0030 KX801VF0010 MF EZ805U	590	1300	3.000	3/1	1000	750	2000	250	6.5	84	93
P8KX (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 1600 Nm)																
14	845	924	133	1.2	P822_0700 KX701VF0030 MF EZ501U	1400	2800	210.0	210/1	2100	2100	4000	15	4	164	48
20	604	660	95	1.7	P822_0500 KX701VF0030 MF EZ501U	1600	3200	150.0	150/1	2100	2100	4000	15	4	167	48
21	563	616	121	1.8	P822_0700 KX701VF0020 MF EZ501U	1400	2800	140.0	140/1	1800	1800	3500	18	4	164	48
21	969	1048	207	1.0	P822_0700 KX701VF0020 MF EZ502U	1400	2800	140.0	140/1	1800	1800	3500	20	4	164	50
25	483	528	95	1.7	P822_0400 KX701VF0030 MF EZ501U	1600	3180	120.0	120/1	2100	2100	4000	15	4.5	161	48
29	422	462	67	2.4	P822_0350 KX701VF0030 MF EZ501U	1570	3200	105.0	105/1	2100	2100	4000	15	4.5	168	48
29	727	786	115	1.4	P822_0350 KX701VF0030 MF EZ502U	1600	3200	105.0	105/1	2100	2100	4000	18	4.5	168	50
29	727	816	115	1.4	P822_0350 KX701VF0030 MF EZ701U	1600	3200	105.0	105/1	2100	2100	4000	21	4.5	168	52
29	953	1091	151	1.0	P822_0350 KX701VF0030 MF EZ503U	1600	3200	105.0	105/1	2100	2100	4000	20	4.5	168	51
30	402	440	86	2.5	P822_0500 KX701VF0020 MF EZ501U	1500	3200	100.0	100/1	1800	1800	3500	18	4	167	48
30	692	749	148	1.4	P822_0500 KX701VF0020 MF EZ502U	1600	3200	100.0	100/1	1800	1800	3500	20	4	167	50
30	692	777	148	1.4	P822_0500 KX701VF0020 MF EZ701U	1600	3200	100.0	100/1	1800	1800	3500	23	4	167	52
30	908	1039	194	1.1	P822_0500 KX701VF0020 MF EZ503U	1600	3200	100.0	100/1	1800	1800	3500	22	4	167	51
36	338	369	67	2.4	P822_0280 KX701VF0030 MF EZ501U	1260	3180	84.00	84/1	2100	2100	4000	15	4.5	163	48
36	582	629	115	1.4	P822_0280 KX701VF0030 MF EZ502U	1600	3180	84.00	84/1	2100	2100	4000	18	4.5	163	50
36	582	652	115	1.4	P822_0280 KX701VF0030 MF EZ701U	1570	3180	84.00	84/1	2100	2100	4000	21	4.5	163	52
36	762	872	151	1.0	P822_0280 KX701VF0030 MF EZ503U	1600	3180	84.00	84/1	2100	2100	4000	20	4.5	163	51
38	322	352	86	2.5	P822_0400 KX701VF0020 MF EZ501U	1200	3180	80.00	80/1	1800	1800	3500	18	4.5	161	48
38	554	599	148	1.4	P822_0400 KX701VF0020 MF EZ502U	1600	3180	80.00	80/1	1800	1800	3500	20	4.5	161	50
38	554	621	148	1.4	P822_0400 KX701VF0020 MF EZ701U	1500	3180	80.00	80/1	1800	1800	3500	23	4.5	161	52
38	726	831	194	1.1	P822_0400 KX701VF0020 MF EZ503U	1600	3180	80.00	80/1	1800	1800	3500	22	4.5	161	51

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,5,6 [rpm]	n_{1maxDB} EL3,4 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm^2]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
P8KX (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 1600 Nm)																
40	302	330	48	3.3	P822_0250 KX701VF0030 MF EZ501U	1120	3200	75.00	75/1	2100	2100	4000	16	4.5	166	48
40	519	561	82	1.9	P822_0250 KX701VF0030 MF EZ502U	1600	3200	75.00	75/1	2100	2100	4000	18	4.5	166	50
40	519	583	82	1.9	P822_0250 KX701VF0030 MF EZ701U	1400	3200	75.00	75/1	2100	2100	4000	21	4.5	166	52
40	681	779	108	1.5	P822_0250 KX701VF0030 MF EZ503U	1600	3200	75.00	75/1	2100	2100	4000	20	4.5	166	51
40	842	1011	133	1.2	P822_0250 KX701VF0030 MF EZ702U	1600	3200	75.00	75/1	2100	2100	4000	26	4.5	166	54
40	947	1123	150	1.1	P822_0250 KX701VF0030 MF EZ505U	1600	3200	75.00	75/1	2100	2100	4000	25	4.5	166	54
43	282	308	60	3.6	P822_0350 KX701VF0020 MF EZ501U	1050	3200	70.00	70/1	1800	1800	3500	18	4.5	168	48
43	485	524	104	2.1	P822_0350 KX701VF0020 MF EZ502U	1600	3200	70.00	70/1	1800	1800	3500	20	4.5	168	50
43	485	544	104	2.1	P822_0350 KX701VF0020 MF EZ701U	1310	3200	70.00	70/1	1800	1800	3500	24	4.5	168	52
43	635	727	136	1.6	P822_0350 KX701VF0020 MF EZ503U	1600	3200	70.00	70/1	1800	1800	3500	23	4.5	168	51
43	786	943	168	1.3	P822_0350 KX701VF0020 MF EZ702U	1600	3200	70.00	70/1	1800	1800	3500	29	4.5	168	54
43	884	1048	189	1.1	P822_0350 KX701VF0020 MF EZ505U	1600	3200	70.00	70/1	1800	1800	3500	27	4.5	168	54
47	258	281	69	3.1	P822_0320 KX701VF0020 MF EZ501U	960	2400	64.00	64/1	1800	1800	3500	18	4.5	157	48
47	443	479	119	1.8	P822_0320 KX701VF0020 MF EZ502U	1200	2400	64.00	64/1	1800	1800	3500	21	4.5	157	50
47	443	497	119	1.8	P822_0320 KX701VF0020 MF EZ701U	1200	2400	64.00	64/1	1800	1800	3500	24	4.5	157	52
47	581	665	155	1.4	P822_0320 KX701VF0020 MF EZ503U	1200	2400	64.00	64/1	1800	1800	3500	23	4.5	157	51
47	719	862	192	1.1	P822_0320 KX701VF0020 MF EZ702U	1200	2400	64.00	64/1	1800	1800	3500	29	4.5	157	54
50	241	264	38	4.1	P822_0200 KX701VF0030 MF EZ501U	900	3200	60.00	60/1	2100	2100	4000	16	4.5	164	48
50	415	449	66	2.4	P822_0200 KX701VF0030 MF EZ502U	1600	3200	60.00	60/1	2100	2100	4000	18	4.5	164	50
50	415	466	66	2.4	P822_0200 KX701VF0030 MF EZ701U	1120	3200	60.00	60/1	2100	2100	4000	21	4.5	164	52
50	545	623	86	1.8	P822_0200 KX701VF0030 MF EZ503U	1600	3200	60.00	60/1	2100	2100	4000	20	4.5	164	51
50	674	808	106	1.5	P822_0200 KX701VF0030 MF EZ702U	1600	3200	60.00	60/1	2100	2100	4000	27	4.5	164	54
50	758	898	120	1.3	P822_0200 KX701VF0030 MF EZ505U	1600	3200	60.00	60/1	2100	2100	4000	25	4.5	164	54
50	926	1168	146	1.1	P822_0200 KX701VF0030 MF EZ703U	1600	3200	60.00	60/1	2100	2100	4000	34	4.5	164	56
54	225	246	60	3.6	P822_0280 KX701VF0020 MF EZ501U	840	3180	56.00	56/1	1800	1800	3500	18	4.5	163	48
54	388	419	104	2.1	P822_0280 KX701VF0020 MF EZ502U	1600	3180	56.00	56/1	1800	1800	3500	20	4.5	163	50
54	388	435	104	2.1	P822_0280 KX701VF0020 MF EZ701U	1050	3180	56.00	56/1	1800	1800	3500	24	4.5	163	52
54	508	582	136	1.6	P822_0280 KX701VF0020 MF EZ503U	1600	3180	56.00	56/1	1800	1800	3500	23	4.5	163	51
54	629	755	168	1.3	P822_0280 KX701VF0020 MF EZ702U	1600	3180	56.00	56/1	1800	1800	3500	29	4.5	163	54
54	707	838	189	1.1	P822_0280 KX701VF0020 MF EZ505U	1600	3180	56.00	56/1	1800	1800	3500	27	4.5	163	54
60	201	220	43	5.0	P822_0250 KX701VF0020 MF EZ501U	750	3200	50.00	50/1	1800	1800	3500	18	4.5	166	48
60	346	374	74	2.9	P822_0250 KX701VF0020 MF EZ502U	1450	3200	50.00	50/1	1800	1800	3500	20	4.5	166	50
60	346	388	74	2.9	P822_0250 KX701VF0020 MF EZ701U	940	3200	50.00	50/1	1800	1800	3500	24	4.5	166	52
60	454	519	97	2.2	P822_0250 KX701VF0020 MF EZ503U	1600	3200	50.00	50/1	1800	1800	3500	23	4.5	166	51
60	561	674	120	1.8	P822_0250 KX701VF0020 MF EZ702U	1600	3200	50.00	50/1	1800	1800	3500	29	4.5	166	54
60	632	749	135	1.6	P822_0250 KX701VF0020 MF EZ505U	1600	3200	50.00	50/1	1800	1800	3500	27	4.5	166	54
60	772	973	165	1.3	P822_0250 KX701VF0020 MF EZ703U	1600	3200	50.00	50/1	1800	1800	3500	37	4.5	166	56
75	277	299	59	3.6	P822_0200 KX701VF0020 MF EZ502U	1160	3200	40.00	40/1	1800	1800	3500	21	4.5	164	50
75	277	311	59	3.6	P822_0200 KX701VF0020 MF EZ701U	750	3200	40.00	40/1	1800	1800	3500	24	4.5	164	52
75	363	415	78	2.8	P822_0200 KX701VF0020 MF EZ503U	1600	3200	40.00	40/1	1800	1800	3500	23	4.5	164	51
75	449	539	96	2.2	P822_0200 KX701VF0020 MF EZ702U	1530	3200	40.00	40/1	1800	1800	3500	29	4.5	164	54
75	505	599	108	2.0	P822_0200 KX701VF0020 MF EZ505U	1600	3200	40.00	40/1	1800	1800	3500	28	4.5	164	54
75	618	779	132	1.6	P822_0200 KX701VF0020 MF EZ703U	1600	3200	40.00	40/1	1800	1800	3500	37	4.5	164	56
75	797	1130	171	1.3	P822_0200 KX701VF0020 MF EZ705U	1600	3200	40.00	40/1	1800	1800	3500	50	4.5	164	62
86	242	262	87	4.1	P822_0350 KX701VF0010 MF EZ502U	1020	3200	35.00	35/1	1800	1600	3000	31	4.5	168	50
86	242	272	87	4.1	P822_0350 KX701VF0010 MF EZ701U	660	3200	35.00	35/1	1800	1600	3000	35	4.5	168	52
86	318	364	114	3.1	P822_0350 KX701VF0010 MF EZ503U	1410	3200	35.00	35/1	1800	1600	3000	34	4.5	168	51
86	393	472	142	2.5	P822_0350 KX701VF0010 MF EZ702U	1340	3200	35.00	35/1	1800	1600	3000	40	4.5	168	54
86	442	524	159	2.3	P822_0350 KX701VF0010 MF EZ505U	1600	3200	35.00	35/1	1800	1600	3000	38	4.5	168	54
86	540	681	195	1.9	P822_0350 KX701VF0010 MF EZ703U	1600	3200	35.00	35/1	1800	1600	3000	48	4.5	168	56
86	698	989	251	1.4	P822_0350 KX701VF0010 MF EZ705U	1600	3200	35.00	35/1	1800	1600	3000	60	4.5	168	62
86	730	1215	263	1.4	P822_0350 KX701VF0010 MF EZ802U	1600	3200	35.00	35/1	1800	1600	3000	84	4.5	168	70
94	222	240	59	3.6	P822_0160 KX701VF0020 MF EZ502U	930	3180	32.00	32/1	1800	1800	3500	21	4.5	158	50
94	222	249	59	3.6	P822_0160 KX701VF0020 MF EZ701U	600	3180	32.00	32/1	1800	1800	3500	24	4.5	158	52
94	290	332	78	2.8	P822_0160 KX701VF0020 MF EZ503U	1290	3180	32.00	32/1	1800	1800	3500	23	4.5	158	51
94	359	431	96	2.2	P822_0160 KX701VF0020 MF EZ702U	1230	3180	32.00	32/1	1800	1800	3500	29	4.5	158	54
94	404	479	108	2.0	P822_0160 KX701VF0020 MF EZ505U	1600	3180	32.00	32/1	1800	1800	3500	28	4.5	158	54
94	494	623	132	1.6	P822_0160 KX701VF0020 MF EZ703U	1600	3180	32.00	32/1	1800	1800	3500	37	4.5	158	56
94	638	904	171	1.3	P822_0160 KX701VF0020 MF EZ705U	1600	3180	32.00	32/1	1800	1800	3500	50	4.5	158	62
94	668	1111	179	1.2	P822_0160 KX701VF0020 MF EZ802U	1600	3180	32.00	32/1	1800	1800	3500	74	4.5	158	70
100	212	238	52	3.3	P821_0100 KX801VF0030 MF EZ701U	570	2400	30.00	30/1	1300	1300	3000	52	4	139	56
100	344	413	84	2.0	P821_0100 KX801VF0030 MF EZ702U	1180	2400	30.00	30/1	1300	1300	3000	57	4	139	58
100	473	596	116	1.5	P821_0100 KX801VF0030 MF EZ703U	1200	2400	30.00	30/1	1300	1300	3000	65	4	139	60
100	611	866	149	1.1	P821_0100 KX801VF0030 MF EZ705U	1200	2400	30.00	30/1	1300	1300	3000	78	4	139	66

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,5,6 [rpm]	n_{1maxDB} EL3,4 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
P8KX (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 1600 Nm)																
125	170	190	36	4.7	P821_0080 KX801VF0030 MF EZ701U	460	2400	24.00	24/1	1300	1300	3000	52	4.5	142	56
125	275	330	59	2.9	P821_0080 KX801VF0030 MF EZ702U	940	2400	24.00	24/1	1300	1300	3000	57	4.5	142	58
125	378	477	81	2.1	P821_0080 KX801VF0030 MF EZ703U	1200	2400	24.00	24/1	1300	1300	3000	65	4.5	142	60
125	488	693	104	1.6	P821_0080 KX801VF0030 MF EZ705U	1200	2400	24.00	24/1	1300	1300	3000	78	4.5	142	66
125	511	851	109	1.6	P821_0080 KX801VF0030 MF EZ802U	1200	2400	24.00	24/1	1300	1300	3000	102	4.5	142	74
143	241	289	41	4.2	P821_0070 KX801VF0030 MF EZ702U	820	2800	21.00	21/1	1300	1300	3000	58	4.5	142	58
143	331	417	57	3.0	P821_0070 KX801VF0030 MF EZ703U	1300	2800	21.00	21/1	1300	1300	3000	65	4.5	142	60
143	427	606	73	2.3	P821_0070 KX801VF0030 MF EZ705U	1400	2800	21.00	21/1	1300	1300	3000	78	4.5	142	66
143	447	744	77	2.2	P821_0070 KX801VF0030 MF EZ802U	1400	2800	21.00	21/1	1300	1300	3000	102	4.5	142	74
143	534	967	91	1.9	P821_0070 KX801VF0030 MF EZ803U	1400	2800	21.00	21/1	1300	1300	3000	127	4.5	142	80
200	172	206	35	4.9	P821_0050 KX801VF0030 MF EZ702U	590	2580	15.00	15/1	1300	1300	3000	58	5	128	58
200	236	298	48	3.6	P821_0050 KX801VF0030 MF EZ703U	930	2580	15.00	15/1	1300	1300	3000	66	5	128	60
200	305	433	62	2.8	P821_0050 KX801VF0030 MF EZ705U	1330	2580	15.00	15/1	1300	1300	3000	78	5	128	66
200	320	532	65	2.7	P821_0050 KX801VF0030 MF EZ802U	1330	2580	15.00	15/1	1300	1300	3000	102	5	128	74
200	381	691	77	2.2	P821_0050 KX801VF0030 MF EZ803U	1330	2580	15.00	15/1	1300	1300	3000	128	5	128	80
250	138	165	35	4.9	P821_0040 KX801VF0030 MF EZ702U	470	2060	12.00	12/1	1300	1300	3000	59	5.5	111	58
250	189	238	48	3.6	P821_0040 KX801VF0030 MF EZ703U	750	2060	12.00	12/1	1300	1300	3000	67	5.5	111	60
250	244	346	62	2.8	P821_0040 KX801VF0030 MF EZ705U	1070	2060	12.00	12/1	1300	1300	3000	79	5.5	111	66
250	256	425	65	2.7	P821_0040 KX801VF0030 MF EZ802U	1070	2060	12.00	12/1	1300	1300	3000	103	5.5	111	74
250	305	553	77	2.2	P821_0040 KX801VF0030 MF EZ803U	1070	2060	12.00	12/1	1300	1300	3000	129	5.5	111	80
P9KX (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 3000 Nm)																
57	1431	2165	279	1.4	P922_0350 KX801VF0010 MF EZ805U	3000	6000	35.00	35/1	1000	750	2000	215	4.5	327	128
63	1309	1979	152	1.5	P922_0160 KX801VF0020 MF EZ805U	3000	5530	32.00	32/1	1100	1100	2500	186	4.5	313	128
P9KX (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 3000 Nm)																
14	1454	1631	124	1.4	P922_0700 KX801VF0030 MF EZ701U	2700	5400	210.0	210/1	1300	1300	3000	52	4	315	90
20	1039	1165	89	1.9	P922_0500 KX801VF0030 MF EZ701U	2810	6000	150.0	150/1	1300	1300	3000	52	4	326	90
20	1684	2021	144	1.2	P922_0500 KX801VF0030 MF EZ702U	3000	6000	150.0	150/1	1300	1300	3000	57	4	326	93
25	831	932	71	2.4	P922_0400 KX801VF0030 MF EZ701U	2250	5530	120.0	120/1	1300	1300	3000	52	4.5	324	90
25	1347	1617	115	1.5	P922_0400 KX801VF0030 MF EZ702U	3000	5530	120.0	120/1	1300	1300	3000	57	4.5	324	93
29	727	816	62	2.8	P922_0350 KX801VF0030 MF EZ701U	1970	6000	105.0	105/1	1300	1300	3000	52	4.5	327	90
29	1179	1415	101	1.7	P922_0350 KX801VF0030 MF EZ702U	3000	6000	105.0	105/1	1300	1300	3000	58	4.5	327	93
29	1621	2044	139	1.2	P922_0350 KX801VF0030 MF EZ703U	3000	6000	105.0	105/1	1300	1300	3000	65	4.5	327	95
36	582	652	50	3.4	P922_0280 KX801VF0030 MF EZ701U	1570	5530	84.00	84/1	1300	1300	3000	52	4.5	326	90
36	943	1132	81	2.1	P922_0280 KX801VF0030 MF EZ702U	3000	5530	84.00	84/1	1300	1300	3000	58	4.5	326	93
36	1297	1635	111	1.5	P922_0280 KX801VF0030 MF EZ703U	3000	5530	84.00	84/1	1300	1300	3000	65	4.5	326	95
40	519	583	44	3.9	P922_0250 KX801VF0030 MF EZ701U	1400	6000	75.00	75/1	1300	1300	3000	53	4.5	324	90
40	842	1011	72	2.4	P922_0250 KX801VF0030 MF EZ702U	2880	6000	75.00	75/1	1300	1300	3000	58	4.5	324	93
40	1158	1460	99	1.7	P922_0250 KX801VF0030 MF EZ703U	3000	6000	75.00	75/1	1300	1300	3000	66	4.5	324	95
40	1495	2119	128	1.3	P922_0250 KX801VF0030 MF EZ705U	3000	6000	75.00	75/1	1300	1300	3000	78	4.5	324	100
50	415	466	36	4.8	P922_0200 KX801VF0030 MF EZ701U	1120	6000	60.00	60/1	1300	1300	3000	54	4.5	319	90
50	674	808	58	3.0	P922_0200 KX801VF0030 MF EZ702U	2300	6000	60.00	60/1	1300	1300	3000	59	4.5	319	93
50	926	1168	79	2.2	P922_0200 KX801VF0030 MF EZ703U	3000	6000	60.00	60/1	1300	1300	3000	67	4.5	319	95
50	1196	1696	102	1.7	P922_0200 KX801VF0030 MF EZ705U	3000	6000	60.00	60/1	1300	1300	3000	79	4.5	319	100
50	1252	2083	107	1.6	P922_0200 KX801VF0030 MF EZ802U	3000	6000	60.00	60/1	1300	1300	3000	103	4.5	319	109

15.3 Dimensional drawings

In this chapter you can find the dimensions of the geared motors.

There is a dimensional drawing for every possible shaft/housing design, each with the tables for gear unit dimensions, motor dimensions and geared motor dimensions.

Dimensions can exceed the specifications of ISO 2768-mK due to casting tolerances or accumulation of individual tolerances.

We reserve the right to make dimensional changes due to ongoing technical development.

You can download CAD models of our standard drives at http://cad.stoeber.de.

Combination options and the dimensions of forced ventilated geared motors can be found at http://cad.stoeber.de.

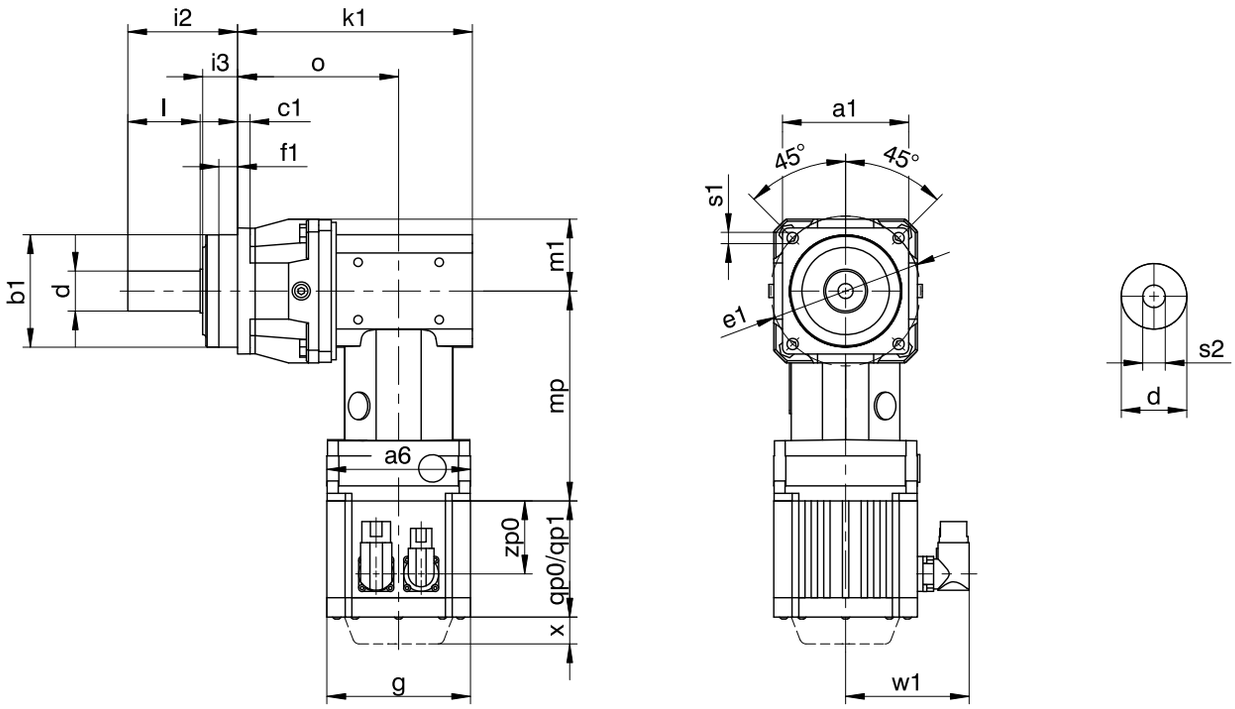
Tolerances

Solid shaft	Tolerance
Shaft ∅ fit ≤ 50 mm	DIN 748-1, ISO k6
Shaft ∅ fit > 50 mm	DIN 748-1, ISO m6
Feather keys	DIN 6885-1, high form A
Balance quality	Q 2.5 (balanced with half feather key)

Centering holes in solid shafts in accordance with DIN 332-2, DR shape

Thread size	M4	M5	M6	M8	M10	M12	M16	M20	M24
Thread depth [mm]	10	12.5	16	19	22	28	36	42	50

15.3.1 G shaft design (solid shaft without feather key)



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▶ 23.4]

Dimensions of gear units

Type	□a1	Øb1	c1	Ød	Øe1	f1	i2	i3	k1	l	m1	o	Øs1	s2
P221_KX301_	55	50_{h6}	6	12_{k6}	63	7.0	36	12	124.0	22	31.0	84.0	5.5	M4
P321_KX301_	72	60_{h6}	7	16_{k6}	75	7.5	48	18	136.0	28	36.0	96.0	5.5	M5
P322_KX301_	72	60_{h6}	7	16_{k6}	75	7.5	48	18	176.0	28	36.0	136.0	5.5	M5
P421_KX401_	76	70_{h6}	9	22_{k6}	85	7.5	56	18	163.0	36	49.0	113.0	6.6	M8
P422_KX301_	76	70_{h6}	9	22_{k6}	85	7.5	56	18	193.5	36	49.0	153.5	6.6	M8
P521_KX501_	101	90_{h6}	10	32_{k6}	120	15.0	88	28	188.0	58	57.0	129.0	9.0	M12
P522_KX401_	101	90_{h6}	10	32_{k6}	120	15.0	88	28	220.5	58	57.0	170.5	9.0	M12
P721_KX701_	144	130_{h6}	15	40_{k6}	165	3.5	112	27	231.0	82	72.0	157.0	11.0	M16
P722_KX501_	144	130_{h6}	15	40_{k6}	165	3.5	112	27	265.0	82	72.0	206.0	11.0	M16
P821_KX801_	190	160_{h6}	15	55_{k6}	215	10.0	112	27	305.0	82	95.0	213.0	13.5	M20
P822_KX701_	190	160_{h6}	15	55_{k6}	215	10.0	112	27	339.5	82	95.0	265.5	13.5	M20
P922_KX801_	212	180_{h6}	17	75_{k6}	250	10.0	143	34	432.0	105	112.5	340.0	17.5	M20

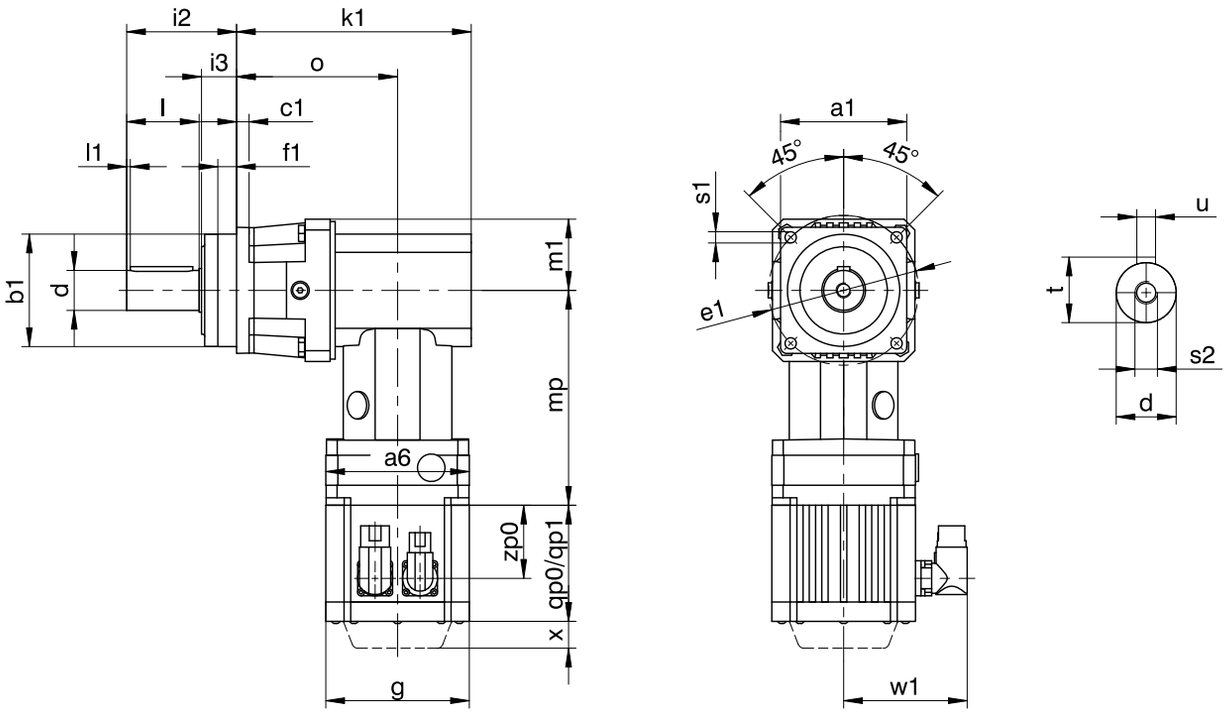
Dimensions of motors

Type	□g	qp0	qp1	w1	x	zp0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0
EZ501U	115	93	147.5	100.0	22	58.5
EZ502U	115	118	172.5	100.0	22	83.5
EZ503U	115	143	197.5	100.0	22	108.5
EZ505U	115	193	247.5	100.0	22	158.5
EZ701U	145	102	161.0	115.0	22	64.0
EZ702U	145	127	186.0	115.0	22	89.0
EZ703U	145	152	211.0	115.0	22	114.0
EZ705U	145	207	266.0	134.0	22	165.0
EZ802U	190	197	274.0	156.5	22	143.0
EZ803U	190	238	315.0	156.5	22	184.0
EZ805U	190	320	397.0	156.5	22	266.0

Dimensions of geared motors

Type	EZ3		EZ4		EZ5		EZ7		EZ8	
	□a6	mp	□a6	mp	□a6	mp	□a6	mp	□a6	mp
P221_KX301_	75	139.5	100	134.0	–	–	–	–	–	–
P321_KX301_	75	139.5	100	134.0	–	–	–	–	–	–
P322_KX301_	75	139.5	–	–	–	–	–	–	–	–
P421_KX401_	100	151.0	100	145.5	115	150.0	140	153.0	–	–
P422_KX301_	75	139.5	100	134.0	–	–	–	–	–	–
P521_KX501_	–	–	115	176.5	115	172.0	140	183.0	–	–
P522_KX401_	100	151.0	100	145.5	115	150.0	–	–	–	–
P721_KX701_	–	–	–	–	145	214.5	190	217.5	145	242.5
P722_KX501_	–	–	115	176.5	115	172.0	140	183.0	–	–
P821_KX801_	–	–	–	–	–	–	190	263.0	190	270.0
P822_KX701_	–	–	–	–	145	214.5	190	217.5	145	242.5
P922_KX801_	–	–	–	–	–	–	190	263.0	190	270.0

15.3.2 P shaft design (solid shaft with feather key)



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]

Dimensions of gear units

Type	□a1	Øb1	c1	Ød	Øe1	f1	i2	i3	k1	l	l1	m1	o	Øs1	s2	t	u
P221_KX301_	55	50_{h6}	6	12_{k6}	63	7.0	36	12	124.0	22	2	31.0	84.0	5.5	M4	13.5	A4×4×18
P321_KX301_	72	60_{h6}	7	16_{k6}	75	7.5	48	18	136.0	28	2	36.0	96.0	5.5	M5	18.0	A5×5×22
P322_KX301_	72	60_{h6}	7	16_{k6}	75	7.5	48	18	176.0	28	2	36.0	136.0	5.5	M5	18.0	A5×5×22
P421_KX401_	76	70_{h6}	9	22_{k6}	85	7.5	56	18	163.0	36	3	49.0	113.0	6.6	M8	24.5	A6×6×28
P422_KX301_	76	70_{h6}	9	22_{k6}	85	7.5	56	18	193.5	36	3	49.0	153.5	6.6	M8	24.5	A6×6×28
P521_KX501_	101	90_{h6}	10	32_{k6}	120	15.0	88	28	188.0	58	3	57.0	129.0	9.0	M12	35.0	A10×8×50
P522_KX401_	101	90_{h6}	10	32_{k6}	120	15.0	88	28	220.5	58	3	57.0	170.5	9.0	M12	35.0	A10×8×50
P721_KX701_	144	130_{h6}	15	40_{k6}	165	3.5	112	27	231.0	82	4	72.0	157.0	11.0	M16	43.0	A12×8×70
P722_KX501_	144	130_{h6}	15	40_{k6}	165	3.5	112	27	265.0	82	4	72.0	206.0	11.0	M16	43.0	A12×8×70
P821_KX801_	190	160_{h6}	15	55_{k6}	215	10.0	112	27	305.0	82	6	95.0	213.0	13.5	M20	59.0	A16×10×70
P822_KX701_	190	160_{h6}	15	55_{k6}	215	10.0	112	27	339.5	82	6	95.0	265.5	13.5	M20	59.0	A16×10×70
P922_KX801_	212	180_{h6}	17	75_{k6}	250	10.0	143	34	432.0	105	7	112.5	340.0	17.5	M20	79.5	A20×12×90

Dimensions of motors

Type	□g	qp0	qp1	w1	x	zp0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0
EZ501U	115	93	147.5	100.0	22	58.5
EZ502U	115	118	172.5	100.0	22	83.5
EZ503U	115	143	197.5	100.0	22	108.5
EZ505U	115	193	247.5	100.0	22	158.5
EZ701U	145	102	161.0	115.0	22	64.0
EZ702U	145	127	186.0	115.0	22	89.0
EZ703U	145	152	211.0	115.0	22	114.0
EZ705U	145	207	266.0	134.0	22	165.0
EZ802U	190	197	274.0	156.5	22	143.0
EZ803U	190	238	315.0	156.5	22	184.0
EZ805U	190	320	397.0	156.5	22	266.0

Dimensions of geared motors

Type	EZ3		EZ4		EZ5		EZ7		EZ8	
	□a6	mp	□a6	mp	□a6	mp	□a6	mp	□a6	mp
P221_KX301_	75	139.5	100	134.0	–	–	–	–	–	–
P321_KX301_	75	139.5	100	134.0	–	–	–	–	–	–
P322_KX301_	75	139.5	–	–	–	–	–	–	–	–
P421_KX401_	100	151.0	100	145.5	115	150.0	140	153.0	–	–
P422_KX301_	75	139.5	100	134.0	–	–	–	–	–	–
P521_KX501_	–	–	115	176.5	115	172.0	140	183.0	–	–
P522_KX401_	100	151.0	100	145.5	115	150.0	–	–	–	–
P721_KX701_	–	–	–	–	145	214.5	190	217.5	145	242.5
P722_KX501_	–	–	115	176.5	115	172.0	140	183.0	–	–
P821_KX801_	–	–	–	–	–	–	190	263.0	190	270.0
P822_KX701_	–	–	–	–	145	214.5	190	217.5	145	242.5
P922_KX801_	–	–	–	–	–	–	190	263.0	190	270.0

15.4 Type designation

In this chapter, you can find an explanation of the type designation with the associated options.

Additional ordering information not included in the type designation can be found at the end of the chapter.

Sample code

P	7	2	1	S	G	R	0050	KX701VF	0030	MF	EZ703U

Explanation

Code	Designation	Design
P	Type	Planetary gear unit
7	Size	7 (example)
2	Generation	Generation 2
1	Stages	Single-stage
2		Two-stage
S	Housing	Standard
G	Shaft	Solid shaft without feather key
P		Solid shaft with feather key
R	Bearing	Standard bearing
D		Axially reinforced bearing
Z		Radially reinforced bearing
0050	Transmission ratio of output (i x 10)	i = 5 (example)
KX701 VF	Input	KX7 right-angle geared motor (example)
0030	Transmission ratio of input (i x 10)	i = 3 (example)
MF	Attachment to motor	MF motor adapter
EZ703U	Motor	EZ synchronous servo motor

In order to complete the type designation, also specify:

- A detailed type designation of the motor, see chapter [▶ 23]
- The mounting position, see Chapter [▶ 15.5.2]
- Radial shaft seal rings at the output made of NBR or FKM, see chapter [▶ 15.6.3]
- The position of the plug connectors, see chapter [▶ 15.5.4]
- For reverse operation of the output shaft from ± 20° to ± 90° and horizontal installation, note the chapter [▶ 15.6.4]

15.5 Product description

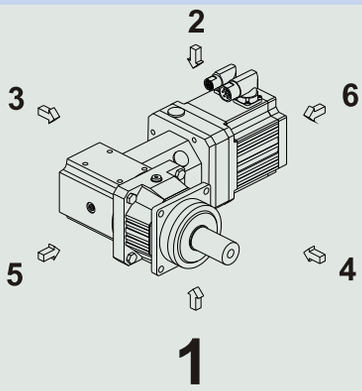
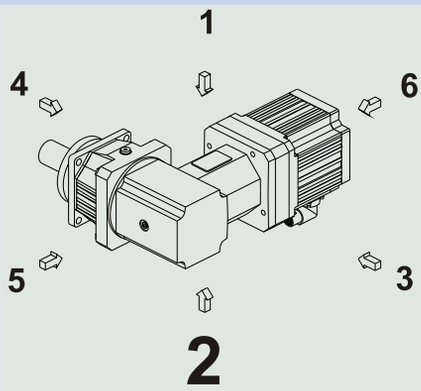
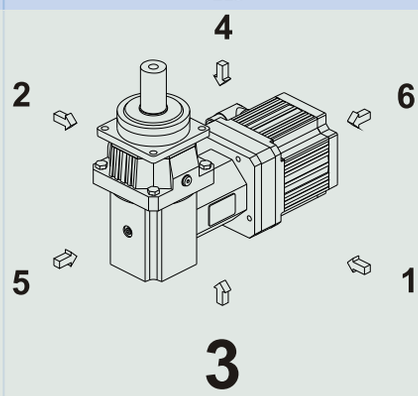
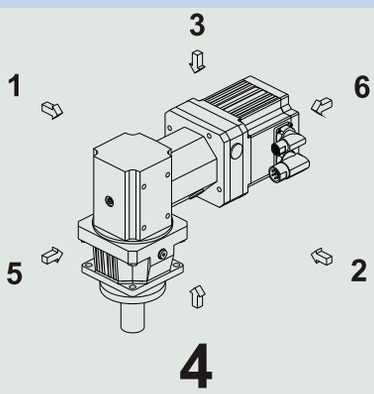
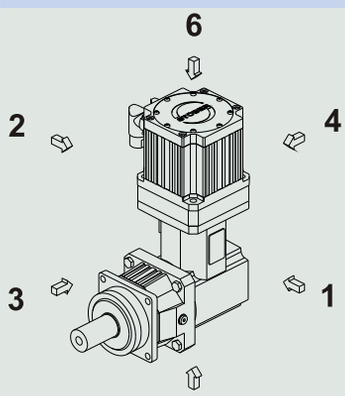
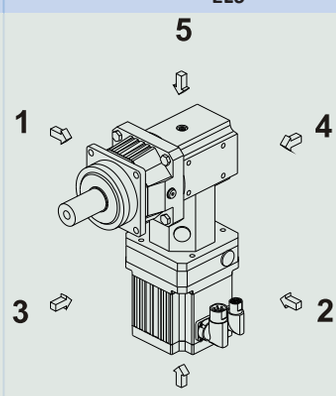
15.5.1 Installation conditions

The specified torques and forces only apply when attaching gear units at the machine side using screws of quality 10.9. In addition, the gear housing must be adjusted at the pilot (H7).

15.5.2 Mounting positions

The following table shows the standard mounting positions.

The numbers identify the gear unit sides. The mounting position is defined by the gear side facing downwards.

EL1	EL2	EL3
		
EL4	**EL5**	**EL6**
		

Since the lubricant filling volume of the gear unit depends on the mounting position, the mounting position must be specified when ordering.

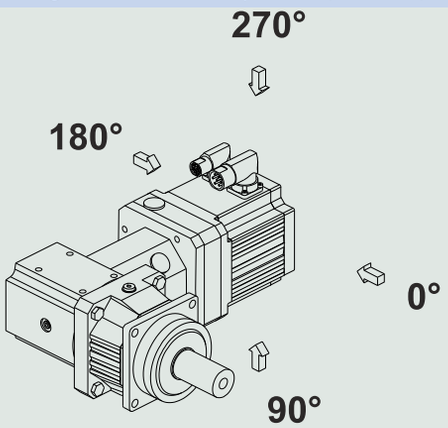
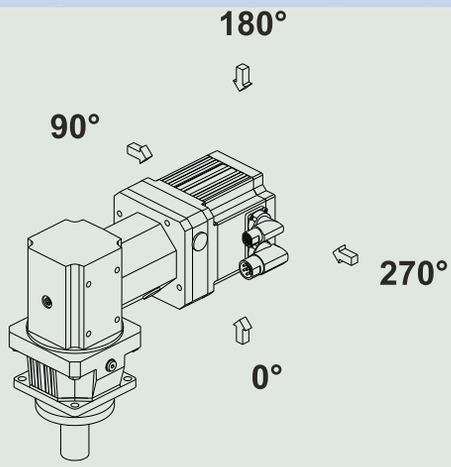
15.5.3 Lubricants

STOBER fills the gear units with the amount and type of lubricant specified on the nameplate. The filling volume and the structure of the gear units depend on the mounting position.

Only install the gear units in the intended mounting position! Reposition the gear units only after consulting STOBER. Otherwise, STOBER assumes no liability for the gear units.

Lubricant filling quantities for gear units, document ID 441871, can be found online at http://www.stoeber.de/en/download. Enter the ID of the documentation in the Search... field.

15.5.4 Position of the plug connectors

Mounting position EL1	Mounting position EL4
Plug connector in 270° position (standard)	Plug connector in 270° position (standard)
	

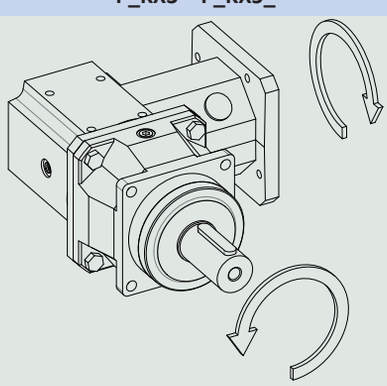
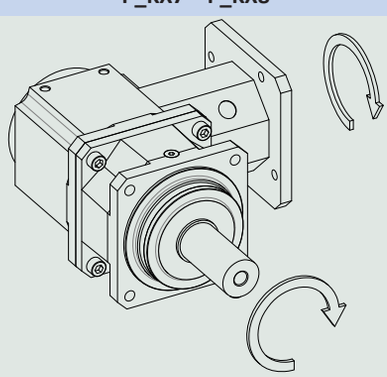
Indicate variations for your geared motor in the purchase order.

Note that the plug connector position rotates along with the geared motor if the geared motor is in another mounting position.

15.5.5 Other product features

Feature	Value
Max. permitted gear unit temperature (on the surface of the gear unit)	≤ 90 °C
Paint	Black RAL 9005
(ATEX) Directive 2014/34/EU (option)	Not suitable
Protection class:[1]	
Gear unit	IP65
Motor	IP56, optionally IP66

15.5.6 Direction of rotation

P_KX3 – P_KX5_	P_KX7 – P_KX8
	

The pictures show mounting position EL1.

15.6 Project configuration

Project your drives using our SERVOsoft designing software. You can receive SERVOsoft for free from your adviser at one of our sales centers. Observe the limit conditions in this chapter to ensure a safe design for your drives.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

[1] Observe the protection class of all the components.

15.6.1 Calculation of the operating point

Check the following conditions for operating points other than the nominal point M_{2N} specified in the selection tables.

For mounting positions EL1, EL2, EL5, EL6:

$$n_{1m^*} \leq \frac{n_{1maxDBEL1,2,5,6}}{fB_T}$$

For mounting positions EL3, EL4:

$$n_{1m^*} \leq \frac{n_{1maxDBEL3,4}}{fB_T}$$

$$n_{1max^*} \leq \frac{n_{1max\,ZB}}{fB_T}$$

$$M_{2eff^*} \leq M_{2th}$$

$$M_{2acc^*} \leq M_{2acc}$$

$$M_{2NOT^*} \leq M_{2NOT}$$

$$M_{2eq^*} \leq M_{2N} \cdot \frac{S}{fB_{op} \cdot fB_t}$$

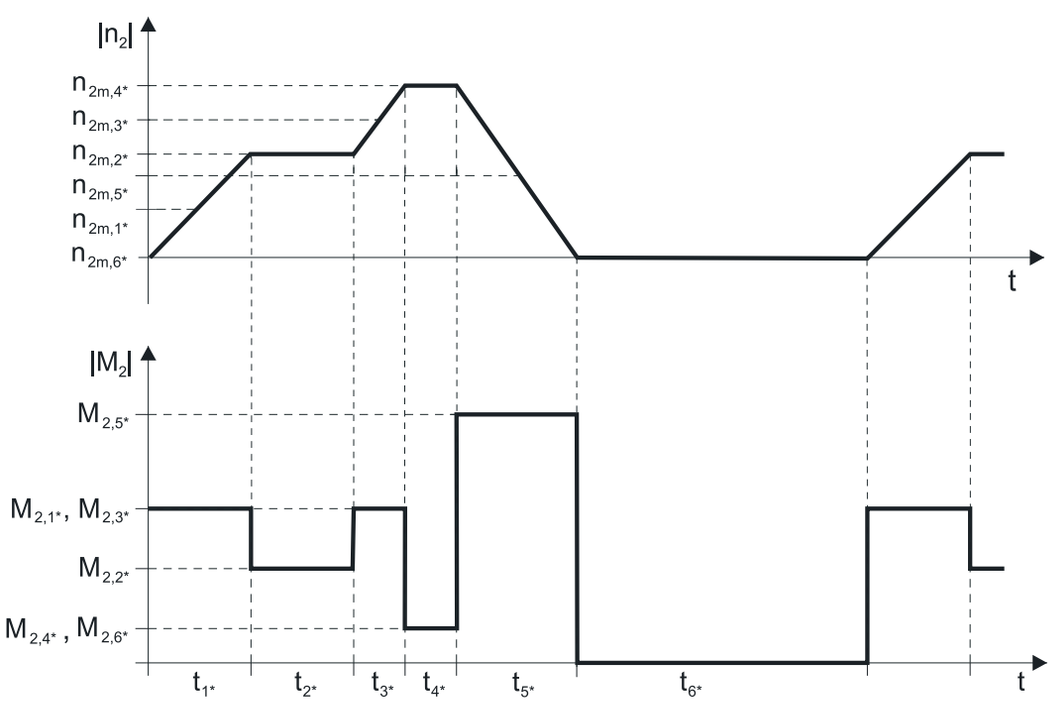
The values for $n_{1maxDBEL1,2,5,6}$, $n_{1maxDBEL3,4}$, n_{1maxZB}, M_{2acc}, M_{2NOT}, M_{2N} and S can be found in the selection tables.

The values for fB_T, fB_{op} and fB_t can be found in the corresponding tables in this chapter.

Calculate the thermal limit torque M_{2th} for a duty cycle > 50%.

Example of cyclic operation

The following calculations are based on a representation of the power taken from the output based in accordance with the following example:



Calculation of the actual average input speed

$$n_{1m^*} = n_{2m^*} \cdot i$$

$$n_{2m^*} = \frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}{t_{1^*} + \ldots + t_{n^*}}$$

If $t_{1*} + ... + t_{5*} \geq 20$ min, calculate n_{2m*} without the rest phase t_{6*}.

The values for the ratio i can be found in the selection tables.

Calculation of the actual effective torque

$$M_{2eff*} = \sqrt{\frac{t_{1*} \cdot M_{2,1*}{}^2 + ... + t_{n*} \cdot M_{2,n*}{}^2}{t_{1*} + ... + t_{n*}}}$$

Calculation of the actual equivalent torque

$$M_{2eq*} = \sqrt[3]{\frac{\left|n_{2m,1*}\right| \cdot t_{1*} \cdot \left|M_{2,1*}{}^3\right| + ... + \left|n_{2m,n*}\right| \cdot t_{n*} \cdot \left|M_{2,n*}{}^3\right|}{\left|n_{2m,1*}\right| \cdot t_{1*} + ... + \left|n_{2m,n*}\right| \cdot t_{n*}}}$$

Calculation of the thermal limit torque

Calculate the thermal limit torque M_{2th} for a duty cycle $ED_{20} > 50\%$ and the actual average input speed n_{1m*}. (At $K_{mot,th} \leq 0$ you must reduce the average input speed n_{1m*} accordingly or select another geared motor size.)

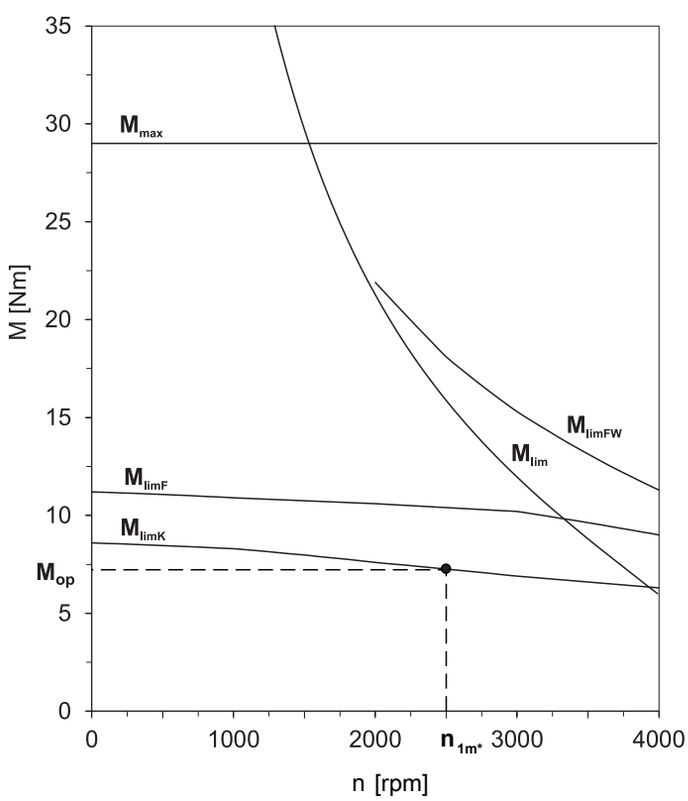
$$M_{2th} = M_{op} \cdot i \cdot K_{mot,th}$$

$$K_{mot,th} = 0,9 - \frac{a_{th}}{1000} \cdot athEL \cdot fB_T \cdot \left(\frac{n_{1m*}}{1000}\right)^3$$

The values for i and a_{th} can be found in the selection tables.

The values for a_{thEL} and fB_T can be found in the corresponding tables in this chapter.

The value for the torque of the motor at operating point M_{op} with the determined average input speed n_{1m*} can be found in the motor curve of Chapter [▶ 23.3]. Note the size, nominal speed n_N and cooling type of the motor. The figure below shows an example of reading the torque M_{op} of a motor with convection cooling at the operating point.



Operating factors

Parameter a_{thEL}

Mounting position	a_{thEL}
EL1, 2, 5, 6	1.0
EL3, 4	1.1

Operating mode	fB_{op}
Uniform continuous operation	1.00
Cyclic operation	1.25
Reversing load cyclic operation	1.40

Run time	fB_t
Daily run time ≤ 8 h	1.00
Daily run time ≤ 16 h	1.15
Daily run time ≤ 24 h	1.20

Temperature		fB_T
Motor cooling	**Surrounding temperature**	
Motor with forced ventilation	≤ 20 °C	0.9
	≤ 30 °C	1.0
	≤ 40 °C	1.15
Motor with convection cooling	≤ 20 °C	1.0
	≤ 30 °C	1.1
	≤ 40 °C	1.25

Notes

- The maximum permitted gear unit temperature (see the "Other product features" chapter) must not be exceeded. Doing so may result in damage to the geared motor.
- For braking from full speed (for example when the power fails or when setting up the machine), note the permitted gear unit torques (M_{2acc}, M_{2NOT}) in the selection tables.
- The values specified in the selection tables for M_{2acc} refer to the gear units with a solid shaft design without feather key (G). We recommend this shaft design in general for cyclic operation.

15.6.2 Permitted shaft loads for the output shaft

The values specified in the tables apply to the permitted shaft loads:

- For shaft dimensions in accordance with the catalog
- For output speeds $n_{2m*} \leq 100$ rpm ($F^{2axN} = F_{2ax100}$; $F_{2radN} = F_{2rad100}$; $M_{2kN} = M_{2k100}$)
- Only if radial forces on the gear unit are stabilized by its pilots (housing, flange shaft)

Permitted shaft loads for standard bearing R

Type	z_2	F_{2ax100}	$F_{2rad100}$	$F_{2rad,acc}$	M_{2k100}	$M_{2k,acc}$
	[mm]	[N]	[N]	[N]	[Nm]	[Nm]
P2	17.0	500	1200	1300	34	36
P3	21.0	1000	2500	2500	88	88
P4	22.0	1500	4000	4500	160	180
P5	23.0	2300	6500	7000	338	364
P7	26.0	2900	8000	9000	536	603
P8	28.0	4700	13000	18000	897	1242
P9	40.0	6000	18000	27000	1665	2498

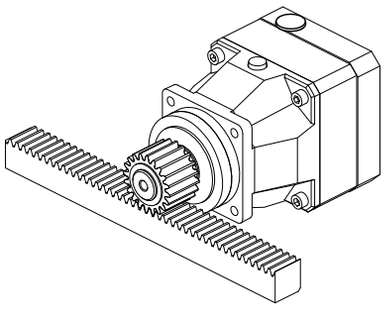


Fig. 1: Recommendation for bearing assignment R

Permitted shaft loads for axially reinforced bearing D

Type	z_2 [mm]	F_{2ax100} [N]	$F_{2rad100}$ [N]	$F_{2rad,acc}$ [N]	M_{2k100} [Nm]	$M_{2k,acc}$ [Nm]
P3	24.0	1400	2750	2750	105	105
P4	25.0	2250	4500	5000	194	215
P5	29.0	3500	7000	8000	406	464
P7	31.0	4500	9000	10000	648	720
P8	35.0	7500	15000	18000	1140	1368
P9	51.0	10000	20000	30000	2070	3105

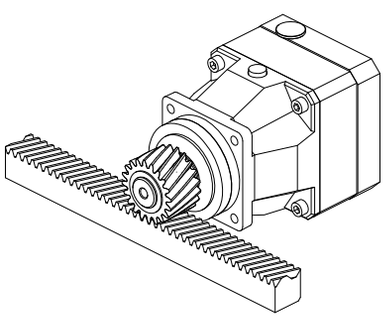


Fig. 2: Recommendation for bearing assignment D

Permitted shaft loads for radially reinforced bearing Z

Type	z_2 [mm]	F_{2ax100} [N]	$F_{2rad100}$ [N]	$F_{2rad,acc}$ [N]	M_{2k100} [Nm]	$M_{2k,acc}$ [Nm]
P3	21.0	600	3000	3000	105	105
P4	22.0	1000	5000	5000	200	200
P5	23.0	1600	8000	8000	416	416
P7	26.0	2000	10000	10000	670	670
P8	28.0	3600	18000	18000	1242	1242
P9	40.0	5000	27000	35000	2500	3238

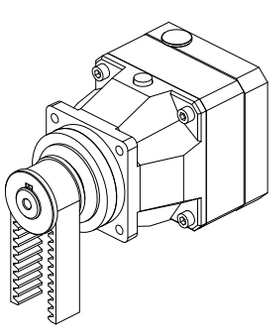


Fig. 3: Recommendation for bearing assignment Z

For other output speeds, download diagrams at http://products.stoeber.de.

The following applies to output speeds n_{2m*} > 100 rpm:

$$F_{2axN} = \frac{F_{2ax100}}{\sqrt[3]{\frac{n_{2m*}}{100\ rpm}}} \qquad F_{2radN} = \frac{F_{2rad100}}{\sqrt[3]{\frac{n_{2m*}}{100\ rpm}}} \qquad M_{2kN} = \frac{M_{2k100}}{\sqrt[3]{\frac{n_{2m*}}{100\ rpm}}}$$

The values for F_{2ax100}, $F_{2rad100}$ and M_{2k100} can be found in the table "Permitted shaft loads" in this chapter.

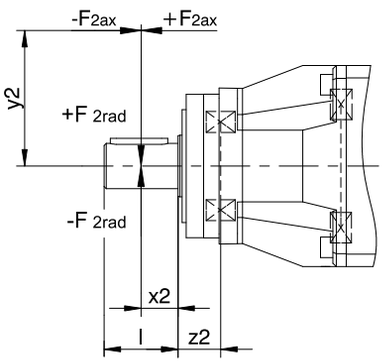


Fig. 4: Force application points

The specified values for $F_{2rad100}$ and $F_{2rad,acc}$ refer to an application of force at the center of the output shaft: $x_2 = l/2$.

Shaft dimensions can be found in the "Dimensional drawings" chapter.

The following applies to other force application points:

$$M_{2k,acc*} = \frac{2 \cdot F_{2ax*} \cdot y_2 + F_{2rad,acc*} \cdot (x_2 + z_2)}{1000} \le M_{2k,acc}$$

$$F_{2rad,acc*} \le F_{2rad,acc}$$

$$F_{2ax*} \le F_{2axN}$$

The values for $F_{2rad,acc}$ and $M_{2k,acc}$ can be found in the table "Permitted shaft loads" in this chapter.

For applications with multiple axial and/or radial forces, you must add the forces as vectors.

In the event of EMERGENCY OFF operation (max. 1000 load changes), you can multiply the permitted forces and torques for F_{2ax100}, $F_{2rad100}$ and M_{2k100} by a factor of two.

Also note the calculation for equivalent values:

$$M_{2k,eq*} = \sqrt[3]{\frac{|n_{2m,1*}| \cdot t_{1*} \cdot |M_{2k,acc,1*}^{\ 3}| + \ldots + |n_{2m,n*}| \cdot t_{n*} \cdot |M_{2k,acc,n*}^{\ 3}|}{|n_{2m,1*}| \cdot t_{1*} + \ldots + |n_{2m,n*}| \cdot t_{n*}}} \le M_{2kN}$$

$$F_{2rad,eq*} = \sqrt[3]{\frac{|n_{2m,1*}| \cdot t_{1*} \cdot |F_{2rad,acc,1*}^{\ 3}| + \ldots + |n_{2m,n*}| \cdot t_{n*} \cdot |F_{2rad,acc,n*}^{\ 3}|}{|n_{2m,1*}| \cdot t_{1*} + \ldots + |n_{2m,n*}| \cdot t_{n*}}} \le F_{2radN}$$

The following apply to the bearing service life L_{10h} (ED_{20} ≤ 40%):

L_{10h} > 10000 h with 1 < M_{2kN}/M_{2k*} < 1.25

L_{10h} > 20000 h with 1.25 < M_{2kN}/M_{2k*} < 1.5

L_{10h} > 30000 h with 1.5 < M_{2kN}/M_{2k*}

For different duty cycles:

$$L_{10h} > L_{10h(ED_{20}=40\%)} \cdot \frac{40\%}{ED_{20}}$$

15.6.3 Recommendation for radial shaft seal rings

For a duty cycle > 60%, we recommend radial shaft seal rings made of FKM.

Properties:

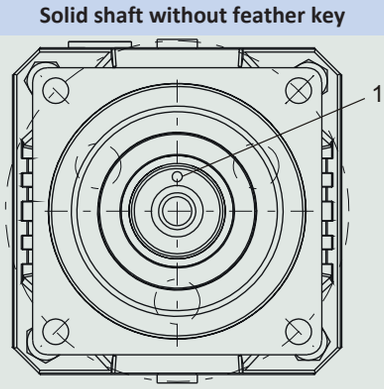
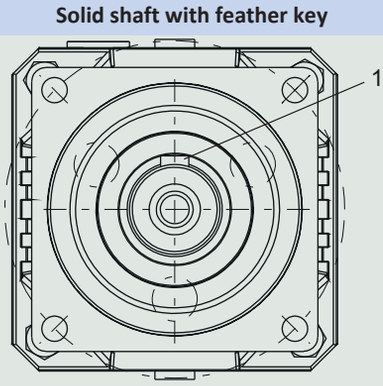
- Excellent temperature resistance
- High chemical stability
- Very good resistance to aging
- Excellent resistance to mineral oils and greases
- For use in the food, beverage and pharmaceutical industries

Leak-proofness

Our gear units are equipped with high-quality radial shaft seal rings and checked for leak-proofness. However, a leak cannot be fully ruled out over the length of use of a gear unit. If you use a gear unit with goods incompatible with the lubricant, you must take measures to prevent direct contact with the gear unit lubricant in case of a leak.

15.6.4 Reverse operation

To ensure lubrication of circulating geared parts during cyclic reverse operation from ± 20° to ± 90°, pay careful attention to the position of the output shaft if the gear unit is installed horizontally as shown in the images below. The images show the center position of reverse operation. Cyclic reverse operation ≤ ± 20° on request.

Solid shaft without feather key	Solid shaft with feather key
	
1) Position of the mark: top	1) Position of the feather key: top

Notes

- If you use the solid shaft without a feather key (G) with a mark, note the position of the mark during assembly.
- As an alternative, you can use the solid shaft with a feather key (P) and clamp. In that case, the feather key functions for position orientation.

15.7 Additional documentation

Additional documentation related to the product can be found at http://www.stoeber.de/en/download

Enter the ID of the documentation in the Search... field.

Documentation	ID
Operating manual for KL/KS/PHK/PHKX/PHQK/PK/PKX right-angle gear units and right-angle geared motors	443004_en
Lubricant filling quantities for gear units	441871

16 PK right-angle planetary geared motors

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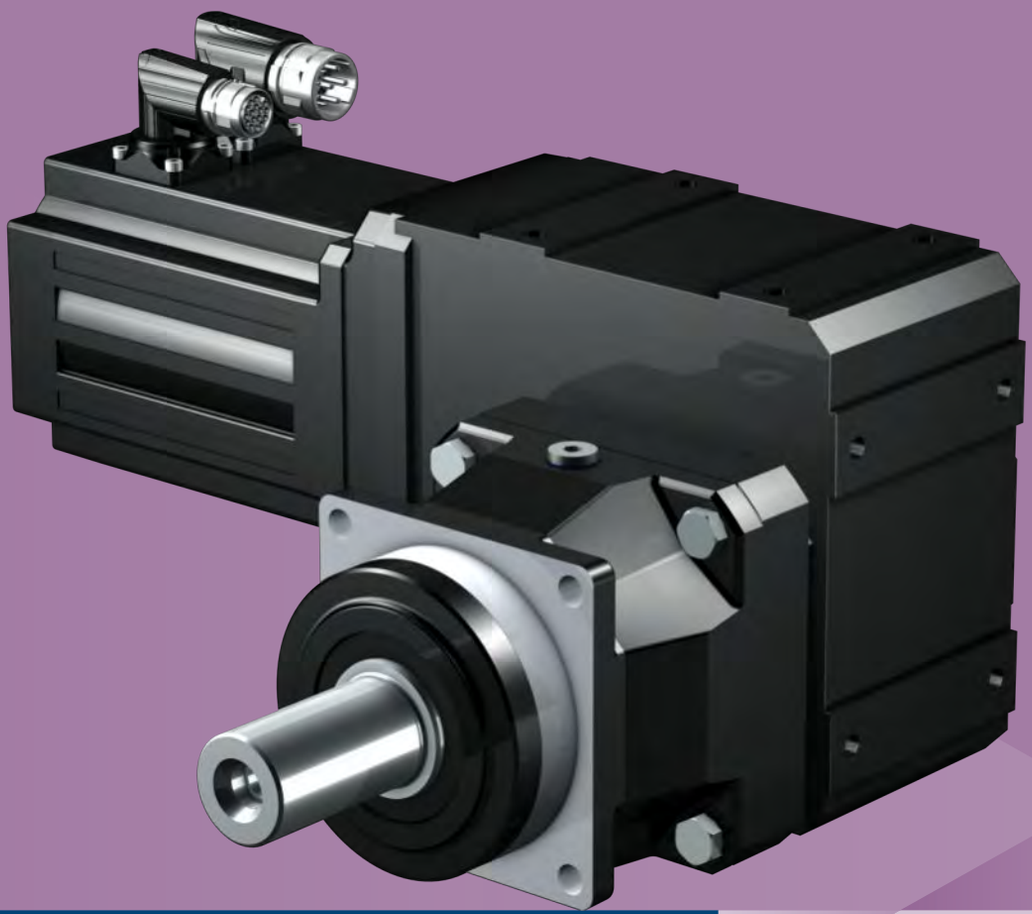


16

PK right-angle planetary geared motors

16.1 Overview

Helical-geared precision right-angle planetary geared motors

Features

Power density	★★★☆☆
Backlash	★★★★☆
Price category	€€€
Shaft load	★★★★☆
Smooth operation	★★★☆☆
Torsional stiffness	★★★☆☆
Mass moment of inertia	★★★★★
Helical gearing	✓
Maintenance-free	✓
Continuous operation without cooling	✓
Reinforced output bearing	✓ (optional)
Compact and highly dynamic due to direct motor attachment	✓

Key: ★☆☆☆☆ good | ★★★★★ excellent
€ Economy | €€€€€ Premium

Technical data

i	12 – 486
M_{2acc}	68 – 2700 Nm
$\Delta\phi_2$	3.5 – 5 arcmin
η_{get}	≤ 94 %

16.2 Selection tables

The technical data specified in the selection tables applies to:

- Installation altitudes up to 1000 m above sea level
- Surrounding temperatures from 0 °C to 40 °C
- Drives with convection-cooled motors (e.g. EZ401**U**)

You can calculate the technical data for drives with forced ventilated motors (for example EZ401**B**) at http://products.stoeber.de.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
P5K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 300 Nm)																
13	205	210	12	1.0	P521_0050 K102VF0470 EZ301U	300	600	234.6	11495/49	4000	4000	6000	0.22	4	26	17
17	154	157	11	1.4	P521_0050 K102VF0350 EZ301U	300	600	175.5	3686/21	4000	4000	6000	0.23	4	26	17
21	123	125	11	1.7	P521_0050 K102VF0280 EZ301U	300	600	140.2	2945/21	4000	4000	6000	0.26	4	26	17
21	210	222	18	1.0	P521_0050 K102VF0280 EZ302U	300	600	140.2	2945/21	4000	4000	6000	0.36	4	26	18
26	102	104	10	2.1	P521_0050 K102VF0230 EZ301U	300	600	116.3	5700/49	4000	4000	6000	0.28	4	26	17
26	174	184	18	1.2	P521_0050 K102VF0230 EZ302U	300	600	116.3	5700/49	4000	4000	6000	0.38	4	26	18
34	77	78	9.6	2.7	P521_0050 K102VF0175 EZ301U	230	600	87.82	10450/119	4000	3800	5500	0.32	4	26	17
34	131	139	16	1.6	P521_0050 K102VF0175 EZ302U	300	600	87.82	10450/119	4000	3800	5500	0.42	4	26	18
34	171	181	21	1.2	P521_0050 K102VF0175 EZ303U	300	600	87.82	10450/119	4000	3800	5500	0.53	4	26	18
43	62	63	9.1	3.4	P521_0050 K102VF0140 EZ301U	190	530	70.57	494/7	4000	3800	5500	0.37	4	26	17
43	106	112	16	2.0	P521_0050 K102VF0140 EZ302U	300	530	70.57	494/7	4000	3800	5500	0.47	4	26	18
43	137	145	20	1.5	P521_0050 K102VF0140 EZ303U	300	530	70.57	494/7	4000	3800	5500	0.58	4	26	18
43	186	199	27	1.1	P521_0050 K102VF0140 EZ401U	300	600	70.57	494/7	4000	3800	5500	1.1	4	26	19
52	51	52	8.6	4.2	P521_0050 K102VF0115 EZ301U	150	430	57.83	1330/23	3600	3300	5000	0.43	4	26	17
52	87	91	15	2.4	P521_0050 K102VF0115 EZ302U	270	430	57.83	1330/23	3600	3300	5000	0.53	4	26	18
52	113	119	19	1.9	P521_0050 K102VF0115 EZ303U	300	430	57.83	1330/23	3600	3300	5000	0.64	4	26	18
52	152	163	26	1.4	P521_0050 K102VF0115 EZ401U	300	600	57.83	1330/23	3600	3300	5000	1.2	4	26	19
65	69	73	14	3.0	P521_0050 K102VF0092 EZ302U	220	350	46.25	8740/189	3600	3300	5000	0.62	4	26	18
65	90	95	18	2.3	P521_0050 K102VF0092 EZ303U	260	350	46.25	8740/189	3600	3300	5000	0.73	4	26	18
65	122	131	25	1.7	P521_0050 K102VF0092 EZ401U	300	600	46.25	8740/189	3600	3300	5000	1.3	4	26	19
65	187	205	38	1.1	P521_0050 K102VF0092 EZ501U	300	600	46.25	8740/189	3600	3300	5000	3.2	4	26	20
65	205	226	41	1.0	P521_0050 K102VF0092 EZ402U	300	600	46.25	8740/189	3600	3300	5000	2.0	4	26	21
72	62	66	14	3.4	P521_0050 K102VF0083 EZ302U	200	310	41.55	1911/46	3600	3300	5000	0.59	4	26	18
72	81	86	18	2.6	P521_0050 K102VF0083 EZ303U	230	310	41.55	1911/46	3600	3300	5000	0.70	4	26	18
72	109	117	24	1.9	P521_0050 K102VF0083 EZ401U	300	600	41.55	1911/46	3600	3300	5000	1.2	4	26	19
72	168	184	37	1.2	P521_0050 K102VF0083 EZ501U	300	600	41.55	1911/46	3600	3300	5000	3.2	4	26	20
72	184	203	40	1.1	P521_0050 K102VF0083 EZ402U	300	600	41.55	1911/46	3600	3300	5000	1.9	4	26	21
90	50	53	13	3.8	P521_0050 K102VF0066 EZ302U	160	250	33.22	299/9	3600	3300	5000	0.71	4	26	18
90	65	68	17	2.9	P521_0050 K102VF0066 EZ303U	190	250	33.22	299/9	3600	3300	5000	0.82	4	26	18
90	88	94	23	2.4	P521_0050 K102VF0066 EZ401U	270	600	33.22	299/9	3600	3300	5000	1.3	4	26	19
90	134	147	35	1.6	P521_0050 K102VF0066 EZ501U	300	600	33.22	299/9	3600	3300	5000	3.3	4	26	20
90	147	163	38	1.4	P521_0050 K102VF0066 EZ402U	300	600	33.22	299/9	3600	3300	5000	2.0	4	26	21
100	79	85	22	2.7	P521_0050 K102VF0060 EZ401U	240	600	30.00	30/1	3300	2800	4500	1.4	4	26	19
100	121	133	34	1.7	P521_0050 K102VF0060 EZ501U	300	600	30.00	30/1	3300	2800	4500	3.4	4	26	20
100	133	147	37	1.6	P521_0050 K102VF0060 EZ402U	300	600	30.00	30/1	3300	2800	4500	2.1	4	26	21
100	209	226	58	1.0	P521_0050 K102VF0060 EZ502U	300	600	30.00	30/1	3300	2800	4500	5.7	4	26	22
108	42	44	12	3.8	P521_0050 K102VF0056 EZ302U	130	210	27.84	7600/273	3300	2800	4500	0.97	4	26	18
108	54	57	16	2.9	P521_0050 K102VF0056 EZ303U	160	210	27.84	7600/273	3300	2800	4500	1.1	4	26	18
108	73	79	22	2.9	P521_0050 K102VF0056 EZ401U	220	600	27.84	7600/273	3300	2800	4500	1.6	4	26	19
108	113	123	33	1.9	P521_0050 K102VF0056 EZ501U	300	600	27.84	7600/273	3300	2800	4500	3.6	4	26	20
108	123	136	36	1.7	P521_0050 K102VF0056 EZ402U	300	600	27.84	7600/273	3300	2800	4500	2.3	4	26	21
108	181	225	53	1.2	P521_0050 K102VF0056 EZ404U	300	600	27.84	7600/273	3300	2800	4500	3.7	4	26	23
108	194	210	57	1.1	P521_0050 K102VF0056 EZ502U	300	600	27.84	7600/273	3300	2800	4500	5.9	4	26	22
108	194	217	57	1.1	P521_0050 K102VF0056 EZ701U	300	600	27.84	7600/273	3300	2800	4500	9.2	4	26	24
150	39	41	15	2.9	P521_0050 K102VF0040 EZ303U	110	150	20.00	20/1	3300	2800	4500	1.3	4	26	18
150	53	56	20	4.0	P521_0050 K102VF0040 EZ401U	160	600	20.00	20/1	3300	2800	4500	1.8	4	26	19
150	81	88	31	2.6	P521_0050 K102VF0040 EZ501U	300	600	20.00	20/1	3300	2800	4500	3.8	4	26	20
150	88	98	34	2.4	P521_0050 K102VF0040 EZ402U	300	600	20.00	20/1	3300	2800	4500	2.5	4	26	21
150	130	162	49	1.6	P521_0050 K102VF0040 EZ404U	300	600	20.00	20/1	3300	2800	4500	3.9	4	26	23
150	139	151	53	1.5	P521_0050 K102VF0040 EZ502U	300	600	20.00	20/1	3300	2800	4500	6.1	4	26	22
150	139	156	53	1.5	P521_0050 K102VF0040 EZ701U	300	600	20.00	20/1	3300	2800	4500	9.4	4	26	24
150	183	209	69	1.2	P521_0050 K102VF0040 EZ503U	300	600	20.00	20/1	3300	2800	4500	8.5	4	26	23

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
P5K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 300 Nm)																
188	31	33	12	2.9	P521_0040 K102VF0040 EZ303U	90	120	16.00	16/1	3300	2800	4500	1.3	4.5	25	18
188	42	45	17	4.8	P521_0040 K102VF0040 EZ401U	130	480	16.00	16/1	3300	2800	4500	1.9	4.5	25	19
188	65	71	26	3.1	P521_0040 K102VF0040 EZ501U	240	480	16.00	16/1	3300	2800	4500	3.8	4.5	25	20
188	71	78	28	2.8	P521_0040 K102VF0040 EZ402U	240	480	16.00	16/1	3300	2800	4500	2.6	4.5	25	21
188	104	129	41	1.9	P521_0040 K102VF0040 EZ404U	300	480	16.00	16/1	3300	2800	4500	3.9	4.5	25	23
188	111	120	44	1.8	P521_0040 K102VF0040 EZ502U	300	480	16.00	16/1	3300	2800	4500	6.1	4.5	25	22
188	111	125	44	1.8	P521_0040 K102VF0040 EZ701U	300	480	16.00	16/1	3300	2800	4500	9.4	4.5	25	24
188	146	167	58	1.4	P521_0040 K102VF0040 EZ503U	300	480	16.00	16/1	3300	2800	4500	8.5	4.5	25	23
250	23	25	15	2.9	P521_0030 K102VF0040 EZ303U	68	90	12.00	12/1	3300	2800	4500	1.4	5	23	18
250	32	34	21	3.8	P521_0030 K102VF0040 EZ401U	96	360	12.00	12/1	3300	2800	4500	2.0	5	23	19
250	49	53	32	2.5	P521_0030 K102VF0040 EZ501U	180	360	12.00	12/1	3300	2800	4500	3.9	5	23	20
250	53	59	35	2.3	P521_0030 K102VF0040 EZ402U	180	360	12.00	12/1	3300	2800	4500	2.7	5	23	21
250	78	97	52	1.5	P521_0030 K102VF0040 EZ404U	200	360	12.00	12/1	3300	2800	4500	4.0	5	23	23
250	84	90	55	1.4	P521_0030 K102VF0040 EZ502U	200	360	12.00	12/1	3300	2800	4500	6.2	5	23	22
250	84	94	55	1.4	P521_0030 K102VF0040 EZ701U	200	360	12.00	12/1	3300	2800	4500	9.5	5	23	24
250	110	125	73	1.1	P521_0030 K102VF0040 EZ503U	200	360	12.00	12/1	3300	2800	4500	8.6	5	23	23
P5K (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 300 Nm)																
26	196	210	12	1.1	P521_0050 K102VF0470 EZ301U	300	600	234.6	11495/49	4000	4000	6000	0.22	4	26	17
34	147	157	11	1.4	P521_0050 K102VF0350 EZ301U	300	600	175.5	3686/21	4000	4000	6000	0.23	4	26	17
43	117	125	10	1.8	P521_0050 K102VF0280 EZ301U	300	600	140.2	2945/21	4000	4000	6000	0.26	4	26	17
43	198	222	17	1.1	P521_0050 K102VF0280 EZ302U	300	600	140.2	2945/21	4000	4000	6000	0.36	4	26	18
52	97	104	9.9	2.2	P521_0050 K102VF0230 EZ301U	300	600	116.3	5700/49	4000	4000	6000	0.28	4	26	17
52	164	184	17	1.3	P521_0050 K102VF0230 EZ302U	300	600	116.3	5700/49	4000	4000	6000	0.38	4	26	18
P7K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 700 Nm)																
7.6	344	351	8.6	1.3	P721_0070 K102VF0560 EZ301U	650	1230	392.7	1178/3	4000	4000	6000	0.21	4	47	21
9.1	287	294	8.2	1.5	P721_0070 K102VF0470 EZ301U	650	1250	328.4	2299/7	4000	4000	6000	0.22	4	47	21
11	247	252	8.3	1.7	P721_0070 K102VF0400 EZ301U	500	890	282.1	2821/10	4000	4000	6000	0.21	4	47	21
11	245	251	15	1.2	P721_0100 K102VF0280 EZ301U	500	1000	280.5	5890/21	4000	4000	6000	0.26	3.5	46	21
11	415	439	12	1.1	P721_0050 K202VF0560 EZ302U	700	1400	277.7	6665/24	4000	3900	5500	0.34	4	47	29
12	215	220	7.6	2.0	P721_0070 K102VF0350 EZ301U	650	1250	245.7	3686/15	4000	4000	6000	0.23	4	47	21
12	368	388	13	1.2	P721_0070 K102VF0350 EZ302U	650	1250	245.7	3686/15	4000	4000	6000	0.33	4	47	22
13	206	211	7.5	2.1	P721_0070 K102VF0340 EZ301U	590	1050	235.9	4719/20	4000	4000	6000	0.22	4	47	21
13	353	373	13	1.2	P721_0070 K102VF0340 EZ302U	590	1050	235.9	4719/20	4000	4000	6000	0.32	4	47	22
13	204	208	14	1.5	P721_0100 K102VF0230 EZ301U	500	1000	232.7	11400/49	4000	4000	6000	0.28	3.5	46	21
13	346	365	11	1.3	P721_0050 K202VF0460 EZ302U	700	1320	231.1	1849/8	4000	3900	5500	0.36	4	47	29
15	172	175	7.2	2.6	P721_0070 K102VF0280 EZ301U	520	1220	196.3	589/3	4000	4000	6000	0.26	4	47	21
15	294	310	12	1.5	P721_0070 K102VF0280 EZ302U	650	1220	196.3	589/3	4000	4000	6000	0.36	4	47	22
15	382	405	16	1.2	P721_0070 K102VF0280 EZ303U	650	1220	196.3	589/3	4000	4000	6000	0.47	4	47	22
17	154	158	7.0	2.8	P721_0070 K102VF0250 EZ301U	470	1010	176.5	8827/50	4000	4000	6000	0.24	4	47	21
17	264	279	12	1.7	P721_0070 K102VF0250 EZ302U	650	1010	176.5	8827/50	4000	4000	6000	0.34	4	47	22
17	344	364	16	1.3	P721_0070 K102VF0250 EZ303U	650	1010	176.5	8827/50	4000	4000	6000	0.45	4	47	22
17	258	273	10	1.7	P721_0050 K202VF0350 EZ302U	700	1100	172.8	9675/56	4000	3900	5500	0.41	4	47	29
17	336	356	13	1.3	P721_0050 K202VF0350 EZ303U	700	1100	172.8	9675/56	4000	3900	5500	0.52	4	47	30
18	143	146	6.9	3.1	P721_0070 K102VF0230 EZ301U	430	1150	162.9	1140/7	4000	4000	6000	0.28	4	47	21
18	244	257	12	1.8	P721_0070 K102VF0230 EZ302U	650	1150	162.9	1140/7	4000	4000	6000	0.38	4	47	22
18	317	336	15	1.4	P721_0070 K102VF0230 EZ303U	650	1150	162.9	1140/7	4000	4000	6000	0.49	4	47	22
18	429	460	21	1.0	P721_0070 K102VF0230 EZ401U	650	1250	162.9	1140/7	4000	4000	6000	1.0	4	47	24
21	123	126	6.6	3.6	P721_0070 K102VF0200 EZ301U	370	870	141.1	2821/20	4000	4000	6000	0.27	4	47	21
21	211	223	11	2.1	P721_0070 K102VF0200 EZ302U	650	870	141.1	2821/20	4000	4000	6000	0.37	4	47	22
21	275	291	15	1.6	P721_0070 K102VF0200 EZ303U	650	870	141.1	2821/20	4000	4000	6000	0.48	4	47	22
21	372	398	20	1.2	P721_0070 K102VF0200 EZ401U	650	1250	141.1	2821/20	4000	4000	6000	1.0	4	47	24
21	368	394	17	1.2	P721_0050 K202VF0280 EZ401U	700	1400	139.8	559/4	4000	3900	5500	1.1	4	47	31
24	108	110	6.4	4.1	P721_0070 K102VF0175 EZ301U	320	920	122.9	2090/17	4000	3800	5500	0.32	4	47	21
24	184	194	11	2.4	P721_0070 K102VF0175 EZ302U	580	920	122.9	2090/17	4000	3800	5500	0.42	4	47	22
24	239	253	14	1.8	P721_0070 K102VF0175 EZ303U	650	920	122.9	2090/17	4000	3800	5500	0.53	4	47	22
24	324	347	19	1.4	P721_0070 K102VF0175 EZ401U	650	1250	122.9	2090/17	4000	3800	5500	1.1	4	47	24
26	102	105	6.3	4.3	P721_0070 K102VF0165 EZ301U	310	820	117.0	117/1	4000	4000	6000	0.29	4	47	21
26	175	185	11	2.5	P721_0070 K102VF0165 EZ302U	550	820	117.0	117/1	4000	4000	6000	0.39	4	47	22
26	228	241	14	1.9	P721_0070 K102VF0165 EZ303U	620	820	117.0	117/1	4000	4000	6000	0.50	4	47	22
26	308	330	19	1.4	P721_0070 K102VF0165 EZ401U	650	1250	117.0	117/1	4000	4000	6000	1.0	4	47	24
26	173	183	9.3	2.5	P721_0050 K202VF0230 EZ302U	550	870	115.9	14835/128	4000	3900	5500	0.53	4	47	29
26	226	239	12	1.9	P721_0050 K202VF0230 EZ303U	650	870	115.9	14835/128	4000	3900	5500	0.64	4	47	30
26	305	327	16	1.4	P721_0050 K202VF0230 EZ401U	700	1400	115.9	14835/128	4000	3900	5500	1.2	4	47	31
26	101	103	12	3.0	P721_0100 K102VF0115 EZ301U	300	870	115.7	2660/23	3600	3300	5000	0.43	3.5	46	21

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
P7K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 700 Nm)																
26	173	183	21	1.7	P721_0100 K102VF0115 EZ302U	500	870	115.7	2660/23	3600	3300	5000	0.53	3.5	46	22
26	225	238	27	1.3	P721_0100 K102VF0115 EZ303U	500	870	115.7	2660/23	3600	3300	5000	0.64	3.5	46	22
30	86	88	6.1	3.0	P721_0070 K102VF0140 EZ301U	260	350	98.80	494/5	4000	3800	5500	0.37	4	47	21
30	148	156	10	3.0	P721_0070 K102VF0140 EZ302U	460	740	98.80	494/5	4000	3800	5500	0.47	4	47	22
30	192	204	14	2.3	P721_0070 K102VF0140 EZ303U	560	740	98.80	494/5	4000	3800	5500	0.58	4	47	22
30	260	279	18	1.7	P721_0070 K102VF0140 EZ401U	650	1250	98.80	494/5	4000	3800	5500	1.1	4	47	24
30	400	437	28	1.1	P721_0070 K102VF0140 EZ501U	650	1250	98.80	494/5	4000	3800	5500	3.1	4	47	25
30	437	483	31	1.0	P721_0070 K102VF0140 EZ402U	650	1250	98.80	494/5	4000	3800	5500	1.8	4	47	25
32	138	146	20	2.2	P721_0100 K102VF0092 EZ302U	440	690	92.49	17480/189	3600	3300	5000	0.62	3.5	46	22
32	180	191	25	1.7	P721_0100 K102VF0092 EZ303U	500	690	92.49	17480/189	3600	3300	5000	0.73	3.5	46	22
32	244	261	34	1.2	P721_0100 K102VF0092 EZ401U	500	1000	92.49	17480/189	3600	3300	5000	1.3	3.5	46	24
34	77	79	5.9	3.0	P721_0070 K102VF0125 EZ301U	230	310	88.33	3003/34	4000	3800	5500	0.35	4	47	21
34	132	140	10	3.3	P721_0070 K102VF0125 EZ302U	420	660	88.33	3003/34	4000	3800	5500	0.45	4	47	22
34	172	182	13	2.6	P721_0070 K102VF0125 EZ303U	500	660	88.33	3003/34	4000	3800	5500	0.56	4	47	22
34	233	249	18	1.9	P721_0070 K102VF0125 EZ401U	650	1250	88.33	3003/34	4000	3800	5500	1.1	4	47	24
34	357	391	27	1.2	P721_0070 K102VF0125 EZ501U	650	1250	88.33	3003/34	4000	3800	5500	3.1	4	47	25
34	391	432	30	1.1	P721_0070 K102VF0125 EZ402U	650	1250	88.33	3003/34	4000	3800	5500	1.8	4	47	25
34	131	138	8.7	3.4	P721_0050 K202VF0175 EZ302U	410	660	87.35	2795/32	3900	3500	5000	0.66	4	47	29
34	170	180	11	2.6	P721_0050 K202VF0175 EZ303U	490	660	87.35	2795/32	3900	3500	5000	0.77	4	47	30
34	230	247	15	1.9	P721_0050 K202VF0175 EZ401U	700	1400	87.35	2795/32	3900	3500	5000	1.3	4	47	31
34	353	386	24	1.2	P721_0050 K202VF0175 EZ501U	700	1400	87.35	2795/32	3900	3500	5000	3.3	4	47	32
34	386	427	26	1.1	P721_0050 K202VF0175 EZ402U	700	1400	87.35	2795/32	3900	3500	5000	2.0	4	47	32
36	124	131	19	2.4	P721_0100 K102VF0083 EZ302U	390	620	83.09	1911/23	3600	3300	5000	0.58	3.5	46	22
36	162	171	25	1.9	P721_0100 K102VF0083 EZ303U	470	620	83.09	1911/23	3600	3300	5000	0.69	3.5	46	22
36	219	235	34	1.4	P721_0100 K102VF0083 EZ401U	500	1000	83.09	1911/23	3600	3300	5000	1.2	3.5	46	24
37	121	128	9.9	3.6	P721_0070 K102VF0115 EZ302U	380	610	80.96	1862/23	3600	3300	5000	0.54	4	47	22
37	158	167	13	2.8	P721_0070 K102VF0115 EZ303U	460	610	80.96	1862/23	3600	3300	5000	0.65	4	47	22
37	213	229	17	2.1	P721_0070 K102VF0115 EZ401U	650	1250	80.96	1862/23	3600	3300	5000	1.2	4	47	24
37	328	358	27	1.3	P721_0070 K102VF0115 EZ501U	650	1250	80.96	1862/23	3600	3300	5000	3.1	4	47	25
37	358	396	29	1.2	P721_0070 K102VF0115 EZ402U	650	1250	80.96	1862/23	3600	3300	5000	1.9	4	47	25
42	106	112	9.6	3.8	P721_0070 K102VF0100 EZ302U	330	530	70.98	3549/50	4000	3800	5500	0.51	4	47	22
42	138	146	12	2.9	P721_0070 K102VF0100 EZ303U	400	530	70.98	3549/50	4000	3800	5500	0.62	4	47	22
42	187	200	17	2.4	P721_0070 K102VF0100 EZ401U	570	1250	70.98	3549/50	4000	3800	5500	1.2	4	47	24
42	287	314	26	1.5	P721_0070 K102VF0100 EZ501U	650	1250	70.98	3549/50	4000	3800	5500	3.1	4	47	25
42	314	347	28	1.4	P721_0070 K102VF0100 EZ402U	650	1250	70.98	3549/50	4000	3800	5500	1.9	4	47	25
43	182	195	14	2.4	P721_0050 K202VF0140 EZ401U	550	1400	69.26	14405/208	3900	3500	5000	1.4	4	47	31
43	280	306	22	1.6	P721_0050 K202VF0140 EZ501U	700	1400	69.26	14405/208	3900	3500	5000	3.4	4	47	32
43	306	339	24	1.4	P721_0050 K202VF0140 EZ402U	700	1400	69.26	14405/208	3900	3500	5000	2.1	4	47	32
45	99	105	18	3.0	P721_0100 K102VF0066 EZ302U	310	500	66.44	598/9	3600	3300	5000	0.70	3.5	46	22
45	129	137	23	2.3	P721_0100 K102VF0066 EZ303U	380	500	66.44	598/9	3600	3300	5000	0.81	3.5	46	22
45	175	188	32	1.7	P721_0100 K102VF0066 EZ401U	500	1000	66.44	598/9	3600	3300	5000	1.3	3.5	46	24
45	269	294	49	1.1	P721_0100 K102VF0066 EZ501U	500	1000	66.44	598/9	3600	3300	5000	3.3	3.5	46	25
45	294	325	53	1.0	P721_0100 K102VF0066 EZ402U	500	1000	66.44	598/9	3600	3300	5000	2.0	3.5	46	25
46	97	102	9.3	3.8	P721_0070 K102VF0092 EZ302U	300	490	64.74	1748/27	3600	3300	5000	0.63	4	47	22
46	126	133	12	2.9	P721_0070 K102VF0092 EZ303U	370	490	64.74	1748/27	3600	3300	5000	0.74	4	47	22
46	171	183	16	2.6	P721_0070 K102VF0092 EZ401U	520	1250	64.74	1748/27	3600	3300	5000	1.3	4	47	24
46	262	286	25	1.7	P721_0070 K102VF0092 EZ501U	650	1250	64.74	1748/27	3600	3300	5000	3.2	4	47	25
46	286	317	28	1.5	P721_0070 K102VF0092 EZ402U	650	1250	64.74	1748/27	3600	3300	5000	2.0	4	47	25
50	158	169	31	1.9	P721_0100 K102VF0060 EZ401U	480	1000	60.00	60/1	3300	2800	4500	1.4	3.5	46	24
50	243	265	47	1.2	P721_0100 K102VF0060 EZ501U	500	1000	60.00	60/1	3300	2800	4500	3.4	3.5	46	25
50	265	294	52	1.1	P721_0100 K102VF0060 EZ402U	500	1000	60.00	60/1	3300	2800	4500	2.1	3.5	46	25
52	87	92	9.1	3.8	P721_0070 K102VF0083 EZ302U	270	440	58.16	13377/230	3600	3300	5000	0.59	4	47	22
52	113	120	12	2.9	P721_0070 K102VF0083 EZ303U	330	440	58.16	13377/230	3600	3300	5000	0.70	4	47	22
52	153	164	16	2.9	P721_0070 K102VF0083 EZ401U	470	1250	58.16	13377/230	3600	3300	5000	1.2	4	47	24
52	235	257	25	1.9	P721_0070 K102VF0083 EZ501U	650	1250	58.16	13377/230	3600	3300	5000	3.2	4	47	25
52	257	285	27	1.7	P721_0070 K102VF0083 EZ402U	650	1250	58.16	13377/230	3600	3300	5000	1.9	4	47	25
52	378	471	39	1.2	P721_0070 K102VF0083 EZ404U	650	1250	58.16	13377/230	3600	3300	5000	3.3	4	47	27
52	405	438	42	1.1	P721_0070 K102VF0083 EZ502U	650	1250	58.16	13377/230	3600	3300	5000	5.5	4	47	26
52	405	454	42	1.1	P721_0070 K102VF0083 EZ701U	650	1250	58.16	13377/230	3600	3300	5000	8.8	4	47	28
52	86	91	7.8	3.8	P721_0050 K202VF0115 EZ302U	270	430	57.73	6235/108	3500	3100	4500	0.97	4	47	29
52	112	119	10	2.9	P721_0050 K202VF0115 EZ303U	330	430	57.73	6235/108	3500	3100	4500	1.1	4	47	30
52	152	163	14	2.9	P721_0050 K202VF0115 EZ401U	460	1400	57.73	6235/108	3500	3100	4500	1.6	4	47	31
52	234	255	21	1.9	P721_0050 K202VF0115 EZ501U	700	1400	57.73	6235/108	3500	3100	4500	3.6	4	47	32
52	255	282	23	1.7	P721_0050 K202VF0115 EZ402U	700	1400	57.73	6235/108	3500	3100	4500	2.3	4	47	32

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
P7K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 700 Nm)																
52	375	467	34	1.2	P721_0050 K202VF0115 EZ404U	700	1400	57.73	6235/108	3500	3100	4500	3.7	4	47	34
52	402	435	36	1.1	P721_0050 K202VF0115 EZ502U	700	1400	57.73	6235/108	3500	3100	4500	5.9	4	47	34
52	402	451	36	1.1	P721_0050 K202VF0115 EZ701U	700	1400	57.73	6235/108	3500	3100	4500	9.2	4	47	35
54	83	88	17	3.6	P721_0100 K102VF0056 EZ302U	260	420	55.68	15200/273	3300	2800	4500	0.96	3.5	46	22
54	108	115	22	2.8	P721_0100 K102VF0056 EZ303U	310	420	55.68	15200/273	3300	2800	4500	1.1	3.5	46	22
54	147	157	30	2.0	P721_0100 K102VF0056 EZ401U	450	1000	55.68	15200/273	3300	2800	4500	1.6	3.5	46	24
54	225	246	47	1.3	P721_0100 K102VF0056 EZ501U	500	1000	55.68	15200/273	3300	2800	4500	3.6	3.5	46	25
54	246	272	51	1.2	P721_0100 K102VF0056 EZ402U	500	1000	55.68	15200/273	3300	2800	4500	2.3	3.5	46	25
65	70	74	9.1	3.8	P721_0070 K102VF0066 EZ302U	220	350	46.51	2093/45	3600	3300	5000	0.71	4	47	22
65	91	96	12	2.9	P721_0070 K102VF0066 EZ303U	260	350	46.51	2093/45	3600	3300	5000	0.82	4	47	22
65	123	131	16	3.4	P721_0070 K102VF0066 EZ401U	370	1250	46.51	2093/45	3600	3300	5000	1.4	4	47	24
65	188	206	25	2.2	P721_0070 K102VF0066 EZ501U	650	1250	46.51	2093/45	3600	3300	5000	3.3	4	47	25
65	206	228	27	2.0	P721_0070 K102VF0066 EZ402U	650	1250	46.51	2093/45	3600	3300	5000	2.1	4	47	25
65	302	376	39	1.4	P721_0070 K102VF0066 EZ404U	650	1250	46.51	2093/45	3600	3300	5000	3.4	4	47	27
65	324	350	42	1.3	P721_0070 K102VF0066 EZ502U	650	1250	46.51	2093/45	3600	3300	5000	5.6	4	47	26
65	324	363	42	1.3	P721_0070 K102VF0066 EZ701U	650	1250	46.51	2093/45	3600	3300	5000	8.9	4	47	28
65	121	130	13	3.6	P721_0050 K202VF0092 EZ401U	370	1380	45.95	11395/248	3500	3100	4500	1.9	4	47	31
65	186	203	20	2.4	P721_0050 K202VF0092 EZ501U	690	1380	45.95	11395/248	3500	3100	4500	3.8	4	47	32
65	203	225	22	2.2	P721_0050 K202VF0092 EZ402U	690	1380	45.95	11395/248	3500	3100	4500	2.6	4	47	32
65	298	372	32	1.5	P721_0050 K202VF0092 EZ404U	700	1380	45.95	11395/248	3500	3100	4500	3.9	4	47	34
65	320	346	34	1.4	P721_0050 K202VF0092 EZ502U	700	1380	45.95	11395/248	3500	3100	4500	6.1	4	47	34
65	320	359	34	1.4	P721_0050 K202VF0092 EZ701U	700	1400	45.95	11395/248	3500	3100	4500	9.4	4	47	35
65	419	480	45	1.0	P721_0050 K202VF0092 EZ503U	700	1380	45.95	11395/248	3500	3100	4500	8.5	4	47	35
71	111	119	16	3.6	P721_0070 K102VF0060 EZ401U	340	1250	42.00	42/1	3300	2800	4500	1.4	4	47	24
71	170	186	25	2.4	P721_0070 K102VF0060 EZ501U	630	1250	42.00	42/1	3300	2800	4500	3.4	4	47	25
71	186	205	27	2.2	P721_0070 K102VF0060 EZ402U	630	1250	42.00	42/1	3300	2800	4500	2.1	4	47	25
71	273	340	40	1.5	P721_0070 K102VF0060 EZ404U	650	1250	42.00	42/1	3300	2800	4500	3.5	4	47	27
71	292	316	43	1.4	P721_0070 K102VF0060 EZ502U	650	1250	42.00	42/1	3300	2800	4500	5.7	4	47	26
71	292	328	43	1.4	P721_0070 K102VF0060 EZ701U	650	1250	42.00	42/1	3300	2800	4500	9.0	4	47	28
71	383	439	56	1.0	P721_0070 K102VF0060 EZ503U	650	1250	42.00	42/1	3300	2800	4500	8.1	4	47	28
71	82	87	9.4	2.9	P721_0050 K202VF0084 EZ303U	240	310	41.99	12470/297	3500	3100	4500	1.2	4	47	30
71	111	119	13	4.0	P721_0050 K202VF0084 EZ401U	340	1260	41.99	12470/297	3500	3100	4500	1.7	4	47	31
71	170	186	20	2.6	P721_0050 K202VF0084 EZ501U	630	1260	41.99	12470/297	3500	3100	4500	3.7	4	47	32
71	186	205	21	2.4	P721_0050 K202VF0084 EZ402U	630	1260	41.99	12470/297	3500	3100	4500	2.4	4	47	32
71	273	340	31	1.6	P721_0050 K202VF0084 EZ404U	700	1260	41.99	12470/297	3500	3100	4500	3.8	4	47	34
71	292	316	34	1.5	P721_0050 K202VF0084 EZ502U	700	1260	41.99	12470/297	3500	3100	4500	6.0	4	47	34
71	292	328	34	1.5	P721_0050 K202VF0084 EZ701U	700	1400	41.99	12470/297	3500	3100	4500	9.3	4	47	35
71	383	438	44	1.1	P721_0050 K202VF0084 EZ503U	700	1260	41.99	12470/297	3500	3100	4500	8.4	4	47	35
75	78	82	21	2.9	P721_0100 K102VF0040 EZ303U	230	300	40.00	40/1	3300	2800	4500	1.3	3.5	46	22
75	105	113	28	2.8	P721_0100 K102VF0040 EZ401U	320	1000	40.00	40/1	3300	2800	4500	1.8	3.5	46	24
75	162	177	43	1.9	P721_0100 K102VF0040 EZ501U	500	1000	40.00	40/1	3300	2800	4500	3.8	3.5	46	25
75	177	196	47	1.7	P721_0100 K102VF0040 EZ402U	500	1000	40.00	40/1	3300	2800	4500	2.5	3.5	46	25
75	260	324	69	1.2	P721_0100 K102VF0040 EZ404U	500	1000	40.00	40/1	3300	2800	4500	3.9	3.5	46	27
75	279	301	74	1.1	P721_0100 K102VF0040 EZ502U	500	1000	40.00	40/1	3300	2800	4500	6.1	3.5	46	26
75	279	312	74	1.1	P721_0100 K102VF0040 EZ701U	500	1000	40.00	40/1	3300	2800	4500	9.4	3.5	46	28
77	58	62	9.2	3.8	P721_0070 K102VF0056 EZ302U	180	290	38.98	1520/39	3300	2800	4500	0.98	4	47	22
77	76	80	12	2.9	P721_0070 K102VF0056 EZ303U	220	290	38.98	1520/39	3300	2800	4500	1.1	4	47	22
77	103	110	16	3.8	P721_0070 K102VF0056 EZ401U	310	1170	38.98	1520/39	3300	2800	4500	1.6	4	47	24
77	158	172	25	2.5	P721_0070 K102VF0056 EZ501U	590	1170	38.98	1520/39	3300	2800	4500	3.6	4	47	25
77	172	191	27	2.3	P721_0070 K102VF0056 EZ402U	590	1170	38.98	1520/39	3300	2800	4500	2.3	4	47	25
77	253	315	40	1.5	P721_0070 K102VF0056 EZ404U	650	1170	38.98	1520/39	3300	2800	4500	3.7	4	47	27
77	271	293	43	1.4	P721_0070 K102VF0056 EZ502U	650	1170	38.98	1520/39	3300	2800	4500	5.9	4	47	26
77	271	304	43	1.4	P721_0070 K102VF0056 EZ701U	650	1170	38.98	1520/39	3300	2800	4500	9.2	4	47	28
77	356	407	56	1.1	P721_0070 K102VF0056 EZ503U	650	1170	38.98	1520/39	3300	2800	4500	8.3	4	47	28
90	88	94	12	5.0	P721_0050 K202VF0067 EZ401U	270	1000	33.42	11395/341	3500	3100	4500	2.1	4	47	31
90	135	148	18	3.3	P721_0050 K202VF0067 EZ501U	500	1000	33.42	11395/341	3500	3100	4500	4.0	4	47	32
90	148	163	20	3.0	P721_0050 K202VF0067 EZ402U	500	1000	33.42	11395/341	3500	3100	4500	2.8	4	47	32
90	217	270	30	2.0	P721_0050 K202VF0067 EZ404U	700	1000	33.42	11395/341	3500	3100	4500	4.1	4	47	34
90	233	252	32	1.9	P721_0050 K202VF0067 EZ502U	700	1000	33.42	11395/341	3500	3100	4500	6.3	4	47	34
90	233	261	32	1.9	P721_0050 K202VF0067 EZ701U	630	1400	33.42	11395/341	3500	3100	4500	9.6	4	47	35
90	305	349	42	1.4	P721_0050 K202VF0067 EZ503U	700	1000	33.42	11395/341	3500	3100	4500	8.7	4	47	35
90	377	453	52	1.2	P721_0050 K202VF0067 EZ702U	700	1400	33.42	11395/341	3500	3100	4500	15	4	47	38
90	424	503	58	1.0	P721_0050 K202VF0067 EZ505U	700	1400	33.42	11395/341	3500	3100	4500	13	4	47	38
100	121	133	18	3.6	P721_0050 K202VF0060 EZ501U	450	900	30.00	30/1	3000	2600	4000	4.6	4	47	32

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
P7K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 700 Nm)																
100	133	147	20	3.3	P721_0050 K202VF0060 EZ402U	450	900	30.00	30/1	3000	2600	4000	3.4	4	47	32
100	195	243	29	2.3	P721_0050 K202VF0060 EZ404U	680	900	30.00	30/1	3000	2600	4000	4.7	4	47	34
100	209	226	31	2.1	P721_0050 K202VF0060 EZ502U	680	900	30.00	30/1	3000	2600	4000	6.9	4	47	34
100	209	234	31	2.1	P721_0050 K202VF0060 EZ701U	560	1400	30.00	30/1	3000	2600	4000	10	4	47	35
100	274	313	41	1.6	P721_0050 K202VF0060 EZ503U	680	900	30.00	30/1	3000	2600	4000	9.3	4	47	35
100	339	406	50	1.3	P721_0050 K202VF0060 EZ702U	700	1400	30.00	30/1	3000	2600	4000	15	4	47	38
100	381	452	56	1.2	P721_0050 K202VF0060 EZ505U	700	1400	30.00	30/1	3000	2600	4000	14	4	47	38
107	55	58	12	2.9	P721_0070 K102VF0040 EZ303U	160	210	28.00	28/1	3300	2800	4500	1.3	4	47	22
107	74	79	17	4.8	P721_0070 K102VF0040 EZ401U	220	840	28.00	28/1	3300	2800	4500	1.9	4	47	24
107	113	124	26	3.1	P721_0070 K102VF0040 EZ501U	420	840	28.00	28/1	3300	2800	4500	3.8	4	47	25
107	124	137	28	2.8	P721_0070 K102VF0040 EZ402U	420	840	28.00	28/1	3300	2800	4500	2.6	4	47	25
107	182	227	41	1.9	P721_0070 K102VF0040 EZ404U	630	840	28.00	28/1	3300	2800	4500	3.9	4	47	27
107	195	211	44	1.8	P721_0070 K102VF0040 EZ502U	630	840	28.00	28/1	3300	2800	4500	6.1	4	47	26
107	195	219	44	1.8	P721_0070 K102VF0040 EZ701U	530	840	28.00	28/1	3300	2800	4500	9.4	4	47	28
107	256	292	58	1.4	P721_0070 K102VF0040 EZ503U	630	840	28.00	28/1	3300	2800	4500	8.5	4	47	28
116	180	202	30	2.4	P721_0050 K202VF0052 EZ701U	490	1400	25.89	10535/407	3000	2600	4000	10	4	47	35
116	292	351	48	1.5	P721_0050 K202VF0052 EZ702U	700	1400	25.89	10535/407	3000	2600	4000	15	4	47	38
116	329	390	54	1.3	P721_0050 K202VF0052 EZ505U	700	1400	25.89	10535/407	3000	2600	4000	14	4	47	38
116	402	507	67	1.1	P721_0050 K202VF0052 EZ703U	700	1400	25.89	10535/407	3000	2600	4000	23	4	47	40
150	53	56	11	4.3	P721_0050 K202VF0040 EZ401U	160	300	20.00	20/1	3000	2600	4000	3.5	4	47	31
150	81	88	16	2.8	P721_0050 K202VF0040 EZ501U	230	300	20.00	20/1	3000	2600	4000	5.4	4	47	32
150	88	98	18	2.6	P721_0050 K202VF0040 EZ402U	230	300	20.00	20/1	3000	2600	4000	4.2	4	47	32
150	139	156	28	3.2	P721_0050 K202VF0040 EZ701U	380	1400	20.00	20/1	3000	2600	4000	11	4	47	35
150	226	271	45	1.9	P721_0050 K202VF0040 EZ702U	700	1400	20.00	20/1	3000	2600	4000	16	4	47	38
150	254	301	51	1.7	P721_0050 K202VF0040 EZ505U	700	1400	20.00	20/1	3000	2600	4000	15	4	47	38
150	310	391	62	1.4	P721_0050 K202VF0040 EZ703U	700	1400	20.00	20/1	3000	2600	4000	24	4	47	40
188	42	45	10	4.3	P721_0040 K202VF0040 EZ401U	130	240	16.00	16/1	3000	2600	4000	3.6	4.5	44	31
188	65	71	16	2.8	P721_0040 K202VF0040 EZ501U	180	240	16.00	16/1	3000	2600	4000	5.5	4.5	44	32
188	71	78	17	2.6	P721_0040 K202VF0040 EZ402U	180	240	16.00	16/1	3000	2600	4000	4.3	4.5	44	32
188	111	125	27	3.2	P721_0040 K202VF0040 EZ701U	300	1200	16.00	16/1	3000	2600	4000	11	4.5	44	35
188	181	217	45	2.0	P721_0040 K202VF0040 EZ702U	620	1200	16.00	16/1	3000	2600	4000	16	4.5	44	38
188	203	241	50	1.8	P721_0040 K202VF0040 EZ505U	680	1200	16.00	16/1	3000	2600	4000	15	4.5	44	38
188	248	313	61	1.4	P721_0040 K202VF0040 EZ703U	680	1200	16.00	16/1	3000	2600	4000	24	4.5	44	40
250	32	34	10	4.3	P721_0030 K202VF0040 EZ401U	96	180	12.00	12/1	3000	2600	4000	3.8	4.5	39	31
250	49	53	16	2.8	P721_0030 K202VF0040 EZ501U	140	180	12.00	12/1	3000	2600	4000	5.8	4.5	39	32
250	53	59	17	2.6	P721_0030 K202VF0040 EZ402U	140	180	12.00	12/1	3000	2600	4000	4.5	4.5	39	32
250	84	94	27	3.2	P721_0030 K202VF0040 EZ701U	230	900	12.00	12/1	3000	2600	4000	11	4.5	39	35
250	135	163	45	2.0	P721_0030 K202VF0040 EZ702U	460	900	12.00	12/1	3000	2600	4000	17	4.5	39	38
250	152	181	50	1.8	P721_0030 K202VF0040 EZ505U	500	900	12.00	12/1	3000	2600	4000	15	4.5	39	38
250	186	235	61	1.4	P721_0030 K202VF0040 EZ703U	500	900	12.00	12/1	3000	2600	4000	25	4.5	39	40
P7K (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 700 Nm)																
135	299	481	41	1.5	P721_0050 K202VF0067 EZ505U	700	1400	33.42	11395/341	3500	3100	4500	13	4	47	38
P7K (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 650 Nm)																
15	329	351	8.2	1.3	P721_0070 K102VF0560 EZ301U	650	1230	392.7	1178/3	4000	4000	6000	0.21	4	47	21
17	294	314	15	1.0	P721_0100 K102VF0350 EZ301U	500	1000	351.1	7372/21	4000	4000	6000	0.23	3.5	46	21
18	275	294	7.8	1.6	P721_0070 K102VF0470 EZ301U	650	1250	328.4	2299/7	4000	4000	6000	0.22	4	47	21
21	236	252	8.0	1.8	P721_0070 K102VF0400 EZ301U	500	890	282.1	2821/10	4000	4000	6000	0.21	4	47	21
21	235	251	14	1.3	P721_0100 K102VF0280 EZ301U	500	1000	280.5	5890/21	4000	4000	6000	0.26	3.5	46	21
24	206	220	7.3	2.1	P721_0070 K102VF0350 EZ301U	650	1250	245.7	3686/15	4000	4000	6000	0.23	4	47	21
24	347	388	12	1.3	P721_0070 K102VF0350 EZ302U	650	1250	245.7	3686/15	4000	4000	6000	0.33	4	47	22
25	198	211	7.2	2.2	P721_0070 K102VF0340 EZ301U	590	1050	235.9	4719/20	4000	4000	6000	0.22	4	47	21
25	333	373	12	1.3	P721_0070 K102VF0340 EZ302U	590	1050	235.9	4719/20	4000	4000	6000	0.32	4	47	22
26	195	208	14	1.5	P721_0100 K102VF0230 EZ301U	500	1000	232.7	11400/49	4000	4000	6000	0.28	3.5	46	21
31	164	175	6.9	2.7	P721_0070 K102VF0280 EZ301U	520	1220	196.3	589/3	4000	4000	6000	0.26	4	47	21
31	277	310	12	1.6	P721_0070 K102VF0280 EZ302U	650	1220	196.3	589/3	4000	4000	6000	0.36	4	47	22
31	362	416	15	1.2	P721_0070 K102VF0280 EZ303U	650	1220	196.3	589/3	4000	4000	6000	0.47	4	47	22
34	148	158	6.7	3.0	P721_0070 K102VF0250 EZ301U	470	1010	176.5	8827/50	4000	4000	6000	0.24	4	47	21
34	249	279	11	1.8	P721_0070 K102VF0250 EZ302U	650	1010	176.5	8827/50	4000	4000	6000	0.34	4	47	22
34	326	374	15	1.4	P721_0070 K102VF0250 EZ303U	650	1010	176.5	8827/50	4000	4000	6000	0.45	4	47	22
34	382	465	17	1.2	P721_0070 K102VF0250 EZ401U	650	1250	176.5	8827/50	4000	4000	6000	0.98	4	47	24
37	136	146	6.6	3.2	P721_0070 K102VF0230 EZ301U	430	1150	162.9	1140/7	4000	4000	6000	0.28	4	47	21
37	230	257	11	1.9	P721_0070 K102VF0230 EZ302U	650	1150	162.9	1140/7	4000	4000	6000	0.38	4	47	22
37	300	345	14	1.5	P721_0070 K102VF0230 EZ303U	650	1150	162.9	1140/7	4000	4000	6000	0.49	4	47	22
37	352	429	17	1.2	P721_0070 K102VF0230 EZ401U	650	1250	162.9	1140/7	4000	4000	6000	1.0	4	47	24

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
P7K (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 650 Nm)																
43	118	126	6.4	3.7	P721_0070 K102VF0200 EZ301U	370	870	141.1	2821/20	4000	4000	6000	0.27	4	47	21
43	199	223	11	2.2	P721_0070 K102VF0200 EZ302U	650	870	141.1	2821/20	4000	4000	6000	0.37	4	47	22
43	260	299	14	1.7	P721_0070 K102VF0200 EZ303U	650	870	141.1	2821/20	4000	4000	6000	0.48	4	47	22
43	305	372	16	1.4	P721_0070 K102VF0200 EZ401U	650	1250	141.1	2821/20	4000	4000	6000	1.0	4	47	24
51	98	105	6.1	4.5	P721_0070 K102VF0165 EZ301U	310	820	117.0	117/1	4000	4000	6000	0.29	4	47	21
51	165	185	10	2.7	P721_0070 K102VF0165 EZ302U	550	820	117.0	117/1	4000	4000	6000	0.39	4	47	22
51	216	248	13	2.0	P721_0070 K102VF0165 EZ303U	620	820	117.0	117/1	4000	4000	6000	0.50	4	47	22
51	253	308	16	1.7	P721_0070 K102VF0165 EZ401U	650	1250	117.0	117/1	4000	4000	6000	1.0	4	47	24
51	374	484	23	1.2	P721_0070 K102VF0165 EZ501U	650	1250	117.0	117/1	4000	4000	6000	3.0	4	47	25
P8K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 1600 Nm)																
6.2	727	768	8.4	1.2	P821_0070 K202VF0690 EZ302U	1080	1910	486.0	46655/96	4000	3900	5500	0.33	3.5	132	42
6.5	692	731	14	1.0	P821_0100 K202VF0460 EZ302U	1200	2400	462.3	1849/4	4000	3900	5500	0.36	3.5	134	42
7.7	582	615	7.1	1.7	P821_0070 K202VF0560 EZ302U	1290	1980	388.8	9331/24	4000	3900	5500	0.35	3.5	132	42
7.7	757	801	9.3	1.3	P821_0070 K202VF0560 EZ303U	1290	1980	388.8	9331/24	4000	3900	5500	0.46	3.5	132	43
8.5	529	559	11	1.2	P821_0070 K202VF0500 EZ302U	780	1390	353.4	46655/132	4000	3900	5500	0.33	3.5	132	42
8.7	517	546	13	1.4	P821_0100 K202VF0350 EZ302U	1200	2210	345.5	9675/28	4000	3900	5500	0.41	3.5	134	42
8.7	673	712	17	1.0	P821_0100 K202VF0350 EZ303U	1200	2210	345.5	9675/28	4000	3900	5500	0.52	3.5	134	43
9.3	484	511	6.8	2.1	P821_0070 K202VF0460 EZ302U	1390	1850	323.6	12943/40	4000	3900	5500	0.37	3.5	132	42
9.3	630	667	8.9	1.6	P821_0070 K202VF0460 EZ303U	1390	1850	323.6	12943/40	4000	3900	5500	0.48	3.5	132	43
9.3	852	913	12	1.2	P821_0070 K202VF0460 EZ401U	1400	2800	323.6	12943/40	4000	3900	5500	1.0	3.5	132	44
11	423	447	8.4	1.9	P821_0070 K202VF0400 EZ302U	940	1440	282.8	9331/33	4000	3900	5500	0.35	3.5	132	42
11	551	583	11	1.4	P821_0070 K202VF0400 EZ303U	940	1440	282.8	9331/33	4000	3900	5500	0.46	3.5	132	43
11	734	786	9.9	1.4	P821_0050 K302VF0560 EZ401U	1540	2730	278.5	12255/44	3800	3500	5000	1.0	4	132	49
12	362	382	6.3	2.8	P821_0070 K202VF0350 EZ302U	1140	1550	241.9	1935/8	4000	3900	5500	0.42	3.5	132	42
12	471	498	8.3	2.1	P821_0070 K202VF0350 EZ303U	1160	1550	241.9	1935/8	4000	3900	5500	0.53	3.5	132	43
12	637	683	11	1.6	P821_0070 K202VF0350 EZ401U	1400	2800	241.9	1935/8	4000	3900	5500	1.1	3.5	132	44
12	979	1070	17	1.0	P821_0070 K202VF0350 EZ501U	1400	2800	241.9	1935/8	4000	3900	5500	3.0	3.5	132	45
13	352	372	6.3	2.8	P821_0070 K202VF0340 EZ302U	1010	1350	235.3	12943/55	4000	3900	5500	0.37	3.5	132	42
13	458	485	8.2	2.2	P821_0070 K202VF0340 EZ303U	1010	1350	235.3	12943/55	4000	3900	5500	0.48	3.5	132	43
13	620	664	11	1.6	P821_0070 K202VF0340 EZ401U	1250	2220	235.3	12943/55	4000	3900	5500	1.0	3.5	132	44
13	347	366	12	2.0	P821_0100 K202VF0230 EZ302U	1090	1740	231.8	14835/64	4000	3900	5500	0.53	3.5	134	42
13	451	478	15	1.6	P821_0100 K202VF0230 EZ303U	1200	1740	231.8	14835/64	4000	3900	5500	0.64	3.5	134	43
13	611	654	21	1.1	P821_0100 K202VF0230 EZ401U	1200	2400	231.8	14835/64	4000	3900	5500	1.2	3.5	134	44
13	609	652	9.4	1.6	P821_0050 K302VF0460 EZ401U	1600	2900	231.1	1849/8	3800	3500	5000	1.1	4	132	49
13	935	1022	15	1.1	P821_0050 K302VF0460 EZ501U	1600	2900	231.1	1849/8	3800	3500	5000	3.1	4	132	50
15	515	552	11	1.9	P821_0070 K202VF0280 EZ401U	1400	2800	195.7	3913/20	4000	3900	5500	1.1	3.5	132	44
15	792	865	16	1.3	P821_0070 K202VF0280 EZ501U	1400	2800	195.7	3913/20	4000	3900	5500	3.1	3.5	132	45
15	865	957	18	1.2	P821_0070 K202VF0280 EZ402U	1400	2800	195.7	3913/20	4000	3900	5500	1.8	3.5	132	45
17	263	278	5.9	3.2	P821_0070 K202VF0250 EZ302U	830	1120	175.9	1935/11	4000	3900	5500	0.43	3.5	132	42
17	343	362	7.6	2.5	P821_0070 K202VF0250 EZ303U	850	1120	175.9	1935/11	4000	3900	5500	0.54	3.5	132	43
17	463	497	10	2.2	P821_0070 K202VF0250 EZ401U	1400	2800	175.9	1935/11	4000	3900	5500	1.1	3.5	132	44
17	712	778	16	1.4	P821_0070 K202VF0250 EZ501U	1400	2800	175.9	1935/11	4000	3900	5500	3.0	3.5	132	45
17	778	861	17	1.3	P821_0070 K202VF0250 EZ402U	1400	2800	175.9	1935/11	4000	3900	5500	1.8	3.5	132	45
17	261	276	11	2.7	P821_0100 K202VF0175 EZ302U	820	1310	174.7	2795/16	3900	3500	5000	0.66	3.5	134	42
17	340	360	14	2.1	P821_0100 K202VF0175 EZ303U	990	1310	174.7	2795/16	3900	3500	5000	0.77	3.5	134	43
17	460	493	19	1.5	P821_0100 K202VF0175 EZ401U	1200	2400	174.7	2795/16	3900	3500	5000	1.3	3.5	134	44
17	457	490	8.8	2.2	P821_0050 K302VF0350 EZ401U	1390	2900	173.7	4515/26	3800	3500	5000	1.2	4	132	49
17	703	768	14	1.4	P821_0050 K302VF0350 EZ501U	1600	2900	173.7	4515/26	3800	3500	5000	3.2	4	132	50
17	768	850	15	1.3	P821_0050 K302VF0350 EZ402U	1600	2900	173.7	4515/26	3800	3500	5000	1.9	4	132	50
18	243	256	5.7	3.8	P821_0070 K202VF0230 EZ302U	760	1220	162.3	20769/128	4000	3900	5500	0.53	3.5	132	42
18	316	334	7.5	2.9	P821_0070 K202VF0230 EZ303U	920	1220	162.3	20769/128	4000	3900	5500	0.64	3.5	132	43
18	427	458	10	2.3	P821_0070 K202VF0230 EZ401U	1300	2800	162.3	20769/128	4000	3900	5500	1.2	3.5	132	44
18	656	718	16	1.5	P821_0070 K202VF0230 EZ501U	1400	2800	162.3	20769/128	4000	3900	5500	3.1	3.5	132	45
18	718	794	17	1.4	P821_0070 K202VF0230 EZ402U	1400	2800	162.3	20769/128	4000	3900	5500	1.9	3.5	132	45
21	375	402	9.8	2.7	P821_0070 K202VF0200 EZ401U	1140	2800	142.3	7826/55	4000	3900	5500	1.1	3.5	132	44
21	576	629	15	1.7	P821_0070 K202VF0200 EZ501U	1400	2800	142.3	7826/55	4000	3900	5500	3.1	3.5	132	45
21	629	696	16	1.6	P821_0070 K202VF0200 EZ402U	1400	2800	142.3	7826/55	4000	3900	5500	1.8	3.5	132	45
21	991	1071	26	1.0	P821_0070 K202VF0200 EZ502U	1400	2800	142.3	7826/55	4000	3900	5500	5.4	3.5	132	47
22	367	394	8.3	2.7	P821_0050 K302VF0280 EZ401U	1110	2900	139.4	17845/128	3800	3500	5000	1.3	4	132	49
22	564	617	13	1.8	P821_0050 K302VF0280 EZ501U	1600	2900	139.4	17845/128	3800	3500	5000	3.3	4	132	50
22	617	682	14	1.6	P821_0050 K302VF0280 EZ402U	1600	2900	139.4	17845/128	3800	3500	5000	2.0	4	132	50
22	905	1128	21	1.1	P821_0050 K302VF0280 EZ404U	1600	2900	139.4	17845/128	3800	3500	5000	3.4	4	132	52
22	971	1049	22	1.0	P821_0050 K302VF0280 EZ502U	1600	2900	139.4	17845/128	3800	3500	5000	5.6	4	132	52
22	971	1089	22	1.0	P821_0050 K302VF0280 EZ701U	1600	2900	139.4	17845/128	3800	3500	5000	8.9	4	132	53

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
P8K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 1600 Nm)																
22	365	391	18	1.9	P821_0100 K202VF0140 EZ401U	1110	2400	138.5	14405/104	3900	3500	5000	1.4	3.5	134	44
22	560	613	28	1.2	P821_0100 K202VF0140 EZ501U	1200	2400	138.5	14405/104	3900	3500	5000	3.4	3.5	134	45
22	613	678	30	1.1	P821_0100 K202VF0140 EZ402U	1200	2400	138.5	14405/104	3900	3500	5000	2.1	3.5	134	45
25	183	193	5.4	3.8	P821_0070 K202VF0175 EZ302U	580	920	122.3	3913/32	3900	3500	5000	0.67	3.5	132	42
25	238	252	7.0	2.9	P821_0070 K202VF0175 EZ303U	690	920	122.3	3913/32	3900	3500	5000	0.78	3.5	132	43
25	322	345	9.4	3.1	P821_0070 K202VF0175 EZ401U	980	2800	122.3	3913/32	3900	3500	5000	1.3	3.5	132	44
25	495	541	14	2.0	P821_0070 K202VF0175 EZ501U	1400	2800	122.3	3913/32	3900	3500	5000	3.3	3.5	132	45
25	541	598	16	1.8	P821_0070 K202VF0175 EZ402U	1400	2800	122.3	3913/32	3900	3500	5000	2.0	3.5	132	45
25	794	989	23	1.3	P821_0070 K202VF0175 EZ404U	1400	2800	122.3	3913/32	3900	3500	5000	3.4	3.5	132	47
25	851	920	25	1.2	P821_0070 K202VF0175 EZ502U	1400	2800	122.3	3913/32	3900	3500	5000	5.6	3.5	132	47
25	851	955	25	1.2	P821_0070 K202VF0175 EZ701U	1400	2800	122.3	3913/32	3900	3500	5000	8.9	3.5	132	48
25	177	187	5.3	3.8	P821_0070 K202VF0170 EZ302U	560	890	118.0	20769/176	4000	3900	5500	0.57	3.5	132	42
25	230	243	6.9	2.9	P821_0070 K202VF0170 EZ303U	670	890	118.0	20769/176	4000	3900	5500	0.68	3.5	132	43
25	311	333	9.3	3.2	P821_0070 K202VF0170 EZ401U	940	2800	118.0	20769/176	4000	3900	5500	1.2	3.5	132	44
25	477	522	14	2.1	P821_0070 K202VF0170 EZ501U	1400	2800	118.0	20769/176	4000	3900	5500	3.2	3.5	132	45
25	522	577	16	1.9	P821_0070 K202VF0170 EZ402U	1400	2800	118.0	20769/176	4000	3900	5500	1.9	3.5	132	45
25	766	955	23	1.3	P821_0070 K202VF0170 EZ404U	1400	2800	118.0	20769/176	4000	3900	5500	3.3	3.5	132	47
25	822	888	25	1.2	P821_0070 K202VF0170 EZ502U	1400	2800	118.0	20769/176	4000	3900	5500	5.5	3.5	132	47
25	822	922	25	1.2	P821_0070 K202VF0170 EZ701U	1400	2800	118.0	20769/176	4000	3900	5500	8.8	3.5	132	48
26	307	329	8.0	3.3	P821_0050 K302VF0230 EZ401U	930	2900	116.5	2795/24	3800	3500	5000	1.4	4	132	49
26	471	515	12	2.1	P821_0050 K302VF0230 EZ501U	1600	2900	116.5	2795/24	3800	3500	5000	3.4	4	132	50
26	515	570	13	1.9	P821_0050 K302VF0230 EZ402U	1600	2900	116.5	2795/24	3800	3500	5000	2.1	4	132	50
26	756	942	20	1.3	P821_0050 K302VF0230 EZ404U	1600	2900	116.5	2795/24	3800	3500	5000	3.5	4	132	52
26	811	877	21	1.2	P821_0050 K302VF0230 EZ502U	1600	2900	116.5	2795/24	3800	3500	5000	5.7	4	132	52
26	811	909	21	1.2	P821_0050 K302VF0230 EZ701U	1600	2900	116.5	2795/24	3800	3500	5000	9.0	4	132	53
26	173	183	9.8	3.8	P821_0100 K202VF0115 EZ302U	540	870	115.5	6235/54	3500	3100	4500	0.97	3.5	134	42
26	225	238	13	2.9	P821_0100 K202VF0115 EZ303U	650	870	115.5	6235/54	3500	3100	4500	1.1	3.5	134	43
26	304	326	17	2.3	P821_0100 K202VF0115 EZ401U	920	2400	115.5	6235/54	3500	3100	4500	1.6	3.5	134	44
26	467	511	27	1.5	P821_0100 K202VF0115 EZ501U	1200	2400	115.5	6235/54	3500	3100	4500	3.6	3.5	134	45
26	511	565	29	1.4	P821_0100 K202VF0115 EZ402U	1200	2400	115.5	6235/54	3500	3100	4500	2.3	3.5	134	45
31	255	274	9.4	3.7	P821_0070 K202VF0140 EZ401U	780	2800	96.96	20167/208	3900	3500	5000	1.5	3.5	132	44
31	392	429	14	2.4	P821_0070 K202VF0140 EZ501U	1400	2800	96.96	20167/208	3900	3500	5000	3.4	3.5	132	45
31	429	474	16	2.2	P821_0070 K202VF0140 EZ402U	1400	2800	96.96	20167/208	3900	3500	5000	2.2	3.5	132	45
31	629	785	23	1.5	P821_0070 K202VF0140 EZ404U	1400	2800	96.96	20167/208	3900	3500	5000	3.5	3.5	132	47
31	675	730	25	1.4	P821_0070 K202VF0140 EZ502U	1400	2800	96.96	20167/208	3900	3500	5000	5.7	3.5	132	47
31	675	757	25	1.4	P821_0070 K202VF0140 EZ701U	1400	2800	96.96	20167/208	3900	3500	5000	9.0	3.5	132	48
31	885	1013	32	1.1	P821_0070 K202VF0140 EZ503U	1400	2800	96.96	20167/208	3900	3500	5000	8.1	3.5	132	48
33	242	259	16	2.9	P821_0100 K202VF0092 EZ401U	730	2400	91.90	11395/124	3500	3100	4500	1.9	3.5	134	44
33	372	406	25	1.9	P821_0100 K202VF0092 EZ501U	1200	2400	91.90	11395/124	3500	3100	4500	3.8	3.5	134	45
33	406	450	28	1.7	P821_0100 K202VF0092 EZ402U	1200	2400	91.90	11395/124	3500	3100	4500	2.6	3.5	134	45
33	597	744	40	1.2	P821_0100 K202VF0092 EZ404U	1200	2400	91.90	11395/124	3500	3100	4500	3.9	3.5	134	47
33	640	692	43	1.1	P821_0100 K202VF0092 EZ502U	1200	2400	91.90	11395/124	3500	3100	4500	6.1	3.5	134	47
33	640	718	43	1.1	P821_0100 K202VF0092 EZ701U	1200	2400	91.90	11395/124	3500	3100	4500	9.4	3.5	134	48
34	133	141	5.4	3.8	P821_0070 K202VF0125 EZ302U	420	670	88.94	3913/44	3900	3500	5000	0.73	3.5	132	42
34	173	183	7.0	2.9	P821_0070 K202VF0125 EZ303U	500	670	88.94	3913/44	3900	3500	5000	0.84	3.5	132	43
34	234	251	9.4	3.9	P821_0070 K202VF0125 EZ401U	710	2670	88.94	3913/44	3900	3500	5000	1.4	3.5	132	44
34	360	393	15	2.6	P821_0070 K202VF0125 EZ501U	1340	2670	88.94	3913/44	3900	3500	5000	3.3	3.5	132	45
34	393	435	16	2.3	P821_0070 K202VF0125 EZ402U	1340	2670	88.94	3913/44	3900	3500	5000	2.1	3.5	132	45
34	577	720	23	1.6	P821_0070 K202VF0125 EZ404U	1400	2670	88.94	3913/44	3900	3500	5000	3.4	3.5	132	47
34	619	669	25	1.5	P821_0070 K202VF0125 EZ502U	1400	2670	88.94	3913/44	3900	3500	5000	5.6	3.5	132	47
34	619	695	25	1.5	P821_0070 K202VF0125 EZ701U	1400	2800	88.94	3913/44	3900	3500	5000	8.9	3.5	132	48
34	812	929	33	1.1	P821_0070 K202VF0125 EZ503U	1400	2670	88.94	3913/44	3900	3500	5000	8.0	3.5	132	48
35	228	244	7.4	4.4	P821_0050 K302VF0175 EZ401U	690	2590	86.47	7955/92	3500	3100	5000	1.7	4	132	49
35	350	382	11	2.9	P821_0050 K302VF0175 EZ501U	1300	2590	86.47	7955/92	3500	3100	5000	3.7	4	132	50
35	382	423	12	2.6	P821_0050 K302VF0175 EZ402U	1300	2590	86.47	7955/92	3500	3100	5000	2.4	4	132	50
35	561	700	18	1.8	P821_0050 K302VF0175 EZ404U	1600	2590	86.47	7955/92	3500	3100	5000	3.8	4	132	52
35	602	651	20	1.7	P821_0050 K302VF0175 EZ502U	1600	2590	86.47	7955/92	3500	3100	5000	6.0	4	132	52
35	602	675	20	1.7	P821_0050 K302VF0175 EZ701U	1600	2900	86.47	7955/92	3500	3100	5000	9.3	4	132	53
35	789	903	26	1.3	P821_0050 K302VF0175 EZ503U	1600	2590	86.47	7955/92	3500	3100	5000	8.4	4	132	53
35	976	1172	32	1.0	P821_0050 K302VF0175 EZ702U	1600	2900	86.47	7955/92	3500	3100	5000	15	4	132	56
36	164	173	12	2.9	P821_0100 K202VF0084 EZ303U	470	630	83.97	24940/297	3500	3100	4500	1.2	3.5	134	43
36	221	237	16	3.2	P821_0100 K202VF0084 EZ401U	670	2400	83.97	24940/297	3500	3100	4500	1.7	3.5	134	44
36	340	371	25	2.1	P821_0100 K202VF0084 EZ501U	1200	2400	83.97	24940/297	3500	3100	4500	3.7	3.5	134	45
36	371	411	27	1.9	P821_0100 K202VF0084 EZ402U	1200	2400	83.97	24940/297	3500	3100	4500	2.4	3.5	134	45

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
P8K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 1600 Nm)																
36	545	679	39	1.3	P821_0100 K202VF0084 EZ404U	1200	2400	83.97	24940/297	3500	3100	4500	3.8	3.5	134	47
36	585	632	42	1.2	P821_0100 K202VF0084 EZ502U	1200	2400	83.97	24940/297	3500	3100	4500	6.0	3.5	134	47
36	585	656	42	1.2	P821_0100 K202VF0084 EZ701U	1200	2400	83.97	24940/297	3500	3100	4500	9.3	3.5	134	48
37	121	128	5.4	3.8	P821_0070 K202VF0115 EZ302U	380	610	80.82	8729/108	3500	3100	4500	0.99	3.5	132	42
37	157	167	7.0	2.9	P821_0070 K202VF0115 EZ303U	460	610	80.82	8729/108	3500	3100	4500	1.1	3.5	132	43
37	213	228	9.5	4.2	P821_0070 K202VF0115 EZ401U	650	2420	80.82	8729/108	3500	3100	4500	1.6	3.5	132	44
37	327	357	15	2.7	P821_0070 K202VF0115 EZ501U	1220	2420	80.82	8729/108	3500	3100	4500	3.6	3.5	132	45
37	357	395	16	2.5	P821_0070 K202VF0115 EZ402U	1220	2420	80.82	8729/108	3500	3100	4500	2.3	3.5	132	45
37	525	654	23	1.7	P821_0070 K202VF0115 EZ404U	1400	2420	80.82	8729/108	3500	3100	4500	3.7	3.5	132	47
37	563	608	25	1.6	P821_0070 K202VF0115 EZ502U	1400	2420	80.82	8729/108	3500	3100	4500	5.9	3.5	132	47
37	563	631	25	1.6	P821_0070 K202VF0115 EZ701U	1400	2800	80.82	8729/108	3500	3100	4500	9.2	3.5	132	48
37	738	844	33	1.2	P821_0070 K202VF0115 EZ503U	1400	2420	80.82	8729/108	3500	3100	4500	8.3	3.5	132	48
43	186	199	9.6	4.6	P821_0070 K202VF0100 EZ401U	560	2120	70.51	20167/286	3900	3500	5000	1.6	3.5	132	44
43	285	312	15	3.0	P821_0070 K202VF0100 EZ501U	1060	2120	70.51	20167/286	3900	3500	5000	3.5	3.5	132	45
43	312	345	16	2.7	P821_0070 K202VF0100 EZ402U	1060	2120	70.51	20167/286	3900	3500	5000	2.3	3.5	132	45
43	458	571	24	1.9	P821_0070 K202VF0100 EZ404U	1400	2120	70.51	20167/286	3900	3500	5000	3.6	3.5	132	47
43	491	531	25	1.7	P821_0070 K202VF0100 EZ502U	1400	2120	70.51	20167/286	3900	3500	5000	5.8	3.5	132	47
43	491	551	25	1.7	P821_0070 K202VF0100 EZ701U	1330	2800	70.51	20167/286	3900	3500	5000	9.1	3.5	132	48
43	644	736	33	1.3	P821_0070 K202VF0100 EZ503U	1400	2120	70.51	20167/286	3900	3500	5000	8.2	3.5	132	48
43	796	955	41	1.1	P821_0070 K202VF0100 EZ702U	1400	2800	70.51	20167/286	3900	3500	5000	14	3.5	132	51
43	282	308	11	3.5	P821_0050 K302VF0140 EZ501U	1050	2090	69.68	7525/108	3500	3100	5000	4.0	4	132	50
43	308	341	12	3.2	P821_0050 K302VF0140 EZ402U	1050	2090	69.68	7525/108	3500	3100	5000	2.7	4	132	50
43	452	564	17	2.2	P821_0050 K302VF0140 EZ404U	1570	2090	69.68	7525/108	3500	3100	5000	4.1	4	132	52
43	485	524	19	2.1	P821_0050 K302VF0140 EZ502U	1570	2090	69.68	7525/108	3500	3100	5000	6.3	4	132	52
43	485	544	19	2.1	P821_0050 K302VF0140 EZ701U	1310	2900	69.68	7525/108	3500	3100	5000	9.6	4	132	53
43	636	728	24	1.6	P821_0050 K302VF0140 EZ503U	1570	2090	69.68	7525/108	3500	3100	5000	8.7	4	132	53
43	787	944	30	1.3	P821_0050 K302VF0140 EZ702U	1600	2900	69.68	7525/108	3500	3100	5000	15	4	132	56
43	885	1049	34	1.1	P821_0050 K302VF0140 EZ505U	1600	2900	69.68	7525/108	3500	3100	5000	13	4	132	56
45	176	189	15	4.0	P821_0100 K202VF0067 EZ401U	530	2000	66.83	22790/341	3500	3100	4500	2.1	3.5	134	44
45	270	296	23	2.6	P821_0100 K202VF0067 EZ501U	1010	2000	66.83	22790/341	3500	3100	4500	4.0	3.5	134	45
45	296	327	25	2.4	P821_0100 K202VF0067 EZ402U	1010	2000	66.83	22790/341	3500	3100	4500	2.8	3.5	134	45
45	434	541	37	1.6	P821_0100 K202VF0067 EZ404U	1200	2000	66.83	22790/341	3500	3100	4500	4.1	3.5	134	47
45	465	503	40	1.5	P821_0100 K202VF0067 EZ502U	1200	2000	66.83	22790/341	3500	3100	4500	6.3	3.5	134	47
45	465	522	40	1.5	P821_0100 K202VF0067 EZ701U	1200	2400	66.83	22790/341	3500	3100	4500	9.6	3.5	134	48
45	610	698	52	1.1	P821_0100 K202VF0067 EZ503U	1200	2000	66.83	22790/341	3500	3100	4500	8.7	3.5	134	48
47	169	182	9.7	4.9	P821_0070 K202VF0092 EZ401U	510	1930	64.33	15953/248	3500	3100	4500	1.9	3.5	132	44
47	260	284	15	3.2	P821_0070 K202VF0092 EZ501U	970	1930	64.33	15953/248	3500	3100	4500	3.9	3.5	132	45
47	284	315	16	2.9	P821_0070 K202VF0092 EZ402U	970	1930	64.33	15953/248	3500	3100	4500	2.6	3.5	132	45
47	418	521	24	2.0	P821_0070 K202VF0092 EZ404U	1400	1930	64.33	15953/248	3500	3100	4500	4.0	3.5	132	47
47	448	484	26	1.8	P821_0070 K202VF0092 EZ502U	1400	1930	64.33	15953/248	3500	3100	4500	6.2	3.5	132	47
47	448	502	26	1.8	P821_0070 K202VF0092 EZ701U	1210	2800	64.33	15953/248	3500	3100	4500	9.5	3.5	132	48
47	587	672	34	1.4	P821_0070 K202VF0092 EZ503U	1400	1930	64.33	15953/248	3500	3100	4500	8.6	3.5	132	48
47	726	872	42	1.1	P821_0070 K202VF0092 EZ702U	1400	2800	64.33	15953/248	3500	3100	4500	15	3.5	132	51
47	817	968	47	1.0	P821_0070 K202VF0092 EZ505U	1400	2800	64.33	15953/248	3500	3100	4500	13	3.5	132	51
50	158	169	15	4.4	P821_0100 K202VF0060 EZ401U	480	1800	60.00	60/1	3000	2600	4000	2.7	3.5	134	44
50	243	265	23	2.9	P821_0100 K202VF0060 EZ501U	900	1800	60.00	60/1	3000	2600	4000	4.6	3.5	134	45
50	265	294	25	2.6	P821_0100 K202VF0060 EZ402U	900	1800	60.00	60/1	3000	2600	4000	3.4	3.5	134	45
50	390	486	36	1.8	P821_0100 K202VF0060 EZ404U	1200	1800	60.00	60/1	3000	2600	4000	4.7	3.5	134	47
50	418	452	39	1.7	P821_0100 K202VF0060 EZ502U	1200	1800	60.00	60/1	3000	2600	4000	6.9	3.5	134	47
50	418	469	39	1.7	P821_0100 K202VF0060 EZ701U	1130	2400	60.00	60/1	3000	2600	4000	10	3.5	134	48
50	548	627	51	1.3	P821_0100 K202VF0060 EZ503U	1200	1800	60.00	60/1	3000	2600	4000	9.3	3.5	134	48
50	677	813	63	1.0	P821_0100 K202VF0060 EZ702U	1200	2400	60.00	60/1	3000	2600	4000	15	3.5	134	51
51	114	121	7.2	2.9	P821_0070 K202VF0084 EZ303U	330	440	58.78	17458/297	3500	3100	4500	1.2	3.5	132	43
51	155	166	9.8	4.3	P821_0070 K202VF0084 EZ401U	470	880	58.78	17458/297	3500	3100	4500	1.8	3.5	132	44
51	238	260	15	3.4	P821_0070 K202VF0084 EZ501U	880	1760	58.78	17458/297	3500	3100	4500	3.7	3.5	132	45
51	260	288	16	3.1	P821_0070 K202VF0084 EZ402U	880	1760	58.78	17458/297	3500	3100	4500	2.5	3.5	132	45
51	382	476	24	2.1	P821_0070 K202VF0084 EZ404U	1330	1760	58.78	17458/297	3500	3100	4500	3.8	3.5	132	47
51	409	442	26	2.0	P821_0070 K202VF0084 EZ502U	1330	1760	58.78	17458/297	3500	3100	4500	6.0	3.5	132	47
51	409	459	26	2.0	P821_0070 K202VF0084 EZ701U	1110	2800	58.78	17458/297	3500	3100	4500	9.3	3.5	132	48
51	536	614	34	1.5	P821_0070 K202VF0084 EZ503U	1330	1760	58.78	17458/297	3500	3100	4500	8.4	3.5	132	48
51	664	796	42	1.2	P821_0070 K202VF0084 EZ702U	1400	2800	58.78	17458/297	3500	3100	4500	15	3.5	132	51
51	747	885	47	1.1	P821_0070 K202VF0084 EZ505U	1400	2800	58.78	17458/297	3500	3100	4500	13	3.5	132	51
52	235	257	10	4.3	P821_0050 K302VF0115 EZ501U	870	1740	58.05	1161/20	3200	2800	4200	4.3	4	132	50
52	257	284	11	3.9	P821_0050 K302VF0115 EZ402U	870	1740	58.05	1161/20	3200	2800	4200	3.1	4	132	50

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
P8K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 1600 Nm)																
52	377	470	16	2.7	P821_0050 K302VF0115 EZ404U	1310	1740	58.05	1161/20	3200	2800	4200	4.4	4	132	52
52	404	437	18	2.5	P821_0050 K302VF0115 EZ502U	1310	1740	58.05	1161/20	3200	2800	4200	6.6	4	132	52
52	404	453	18	2.5	P821_0050 K302VF0115 EZ701U	1090	2900	58.05	1161/20	3200	2800	4200	9.9	4	132	53
52	530	606	23	1.9	P821_0050 K302VF0115 EZ503U	1310	1740	58.05	1161/20	3200	2800	4200	9.0	4	132	53
52	655	787	29	1.5	P821_0050 K302VF0115 EZ702U	1600	2900	58.05	1161/20	3200	2800	4200	15	4	132	56
52	737	874	32	1.4	P821_0050 K302VF0115 EZ505U	1600	2900	58.05	1161/20	3200	2800	4200	14	4	132	56
52	901	1136	39	1.1	P821_0050 K302VF0115 EZ703U	1600	2900	58.05	1161/20	3200	2800	4200	23	4	132	58
58	360	404	38	1.9	P821_0100 K202VF0052 EZ701U	970	2400	51.77	21070/407	3000	2600	4000	10	3.5	134	48
58	585	701	61	1.2	P821_0100 K202VF0052 EZ702U	1200	2400	51.77	21070/407	3000	2600	4000	15	3.5	134	51
58	658	779	68	1.1	P821_0100 K202VF0052 EZ505U	1200	2400	51.77	21070/407	3000	2600	4000	14	3.5	134	51
60	347	389	26	2.2	P821_0070 K202VF0071 EZ701U	940	2800	49.83	14749/296	3000	2600	4000	9.9	3.5	132	48
60	563	675	42	1.4	P821_0070 K202VF0071 EZ702U	1400	2800	49.83	14749/296	3000	2600	4000	15	3.5	132	51
60	633	750	48	1.2	P821_0070 K202VF0071 EZ505U	1400	2800	49.83	14749/296	3000	2600	4000	14	3.5	132	51
64	123	132	10	4.3	P821_0070 K202VF0067 EZ401U	370	700	46.78	15953/341	3500	3100	4500	2.1	3.5	132	44
64	189	207	15	3.9	P821_0070 K202VF0067 EZ501U	700	1400	46.78	15953/341	3500	3100	4500	4.1	3.5	132	45
64	207	229	17	3.6	P821_0070 K202VF0067 EZ402U	700	1400	46.78	15953/341	3500	3100	4500	2.8	3.5	132	45
64	304	379	25	2.4	P821_0070 K202VF0067 EZ404U	1060	1400	46.78	15953/341	3500	3100	4500	4.2	3.5	132	47
64	326	352	26	2.3	P821_0070 K202VF0067 EZ502U	1060	1400	46.78	15953/341	3500	3100	4500	6.4	3.5	132	47
64	326	365	26	2.3	P821_0070 K202VF0067 EZ701U	880	2800	46.78	15953/341	3500	3100	4500	9.7	3.5	132	48
64	427	489	35	1.7	P821_0070 K202VF0067 EZ503U	1060	1400	46.78	15953/341	3500	3100	4500	8.8	3.5	132	48
64	528	634	43	1.4	P821_0070 K202VF0067 EZ702U	1400	2800	46.78	15953/341	3500	3100	4500	15	3.5	132	51
64	594	704	48	1.3	P821_0070 K202VF0067 EZ505U	1400	2800	46.78	15953/341	3500	3100	4500	13	3.5	132	51
64	726	916	59	1.0	P821_0070 K202VF0067 EZ703U	1400	2800	46.78	15953/341	3500	3100	4500	23	3.5	132	53
65	323	362	17	3.1	P821_0050 K302VF0093 EZ701U	870	2900	46.34	5375/116	3200	2800	4200	11	4	132	53
65	523	628	27	1.9	P821_0050 K302VF0093 EZ702U	1600	2900	46.34	5375/116	3200	2800	4200	16	4	132	56
65	589	698	30	1.7	P821_0050 K302VF0093 EZ505U	1600	2900	46.34	5375/116	3200	2800	4200	14	4	132	56
65	719	907	37	1.4	P821_0050 K302VF0093 EZ703U	1600	2900	46.34	5375/116	3200	2800	4200	24	4	132	58
71	170	186	15	4.2	P821_0070 K202VF0060 EZ501U	630	1260	42.00	42/1	3000	2600	4000	4.7	3.5	132	45
71	186	205	17	3.9	P821_0070 K202VF0060 EZ402U	630	1260	42.00	42/1	3000	2600	4000	3.4	3.5	132	45
71	273	340	25	2.6	P821_0070 K202VF0060 EZ404U	950	1260	42.00	42/1	3000	2600	4000	4.8	3.5	132	47
71	292	316	27	2.5	P821_0070 K202VF0060 EZ502U	950	1260	42.00	42/1	3000	2600	4000	7.0	3.5	132	47
71	292	328	27	2.5	P821_0070 K202VF0060 EZ701U	790	2800	42.00	42/1	3000	2600	4000	10	3.5	132	48
71	383	439	35	1.9	P821_0070 K202VF0060 EZ503U	950	1260	42.00	42/1	3000	2600	4000	9.4	3.5	132	48
71	474	569	43	1.5	P821_0070 K202VF0060 EZ702U	1360	2800	42.00	42/1	3000	2600	4000	16	3.5	132	51
71	533	632	48	1.3	P821_0070 K202VF0060 EZ505U	1360	2800	42.00	42/1	3000	2600	4000	14	3.5	132	51
71	652	822	59	1.1	P821_0070 K202VF0060 EZ703U	1360	2800	42.00	42/1	3000	2600	4000	23	3.5	132	53
75	105	113	13	4.3	P821_0100 K202VF0040 EZ401U	320	600	40.00	40/1	3000	2600	4000	3.5	3.5	134	44
75	162	177	20	2.8	P821_0100 K202VF0040 EZ501U	450	600	40.00	40/1	3000	2600	4000	5.5	3.5	134	45
75	177	196	22	2.6	P821_0100 K202VF0040 EZ402U	450	600	40.00	40/1	3000	2600	4000	4.2	3.5	134	45
75	279	312	35	2.5	P821_0100 K202VF0040 EZ701U	750	2400	40.00	40/1	3000	2600	4000	11	3.5	134	48
75	452	542	57	1.6	P821_0100 K202VF0040 EZ702U	1200	2400	40.00	40/1	3000	2600	4000	16	3.5	134	51
75	508	602	64	1.4	P821_0100 K202VF0040 EZ505U	1200	2400	40.00	40/1	3000	2600	4000	15	3.5	134	51
75	621	783	78	1.1	P821_0100 K202VF0040 EZ703U	1200	2400	40.00	40/1	3000	2600	4000	24	3.5	134	53
81	257	289	16	3.7	P821_0050 K302VF0074 EZ701U	700	2770	36.96	2365/64	2700	2300	3800	11	4	132	53
81	417	501	27	2.3	P821_0050 K302VF0074 EZ702U	1430	2770	36.96	2365/64	2700	2300	3800	17	4	132	56
81	469	556	30	2.1	P821_0050 K302VF0074 EZ505U	1600	2770	36.96	2365/64	2700	2300	3800	15	4	132	56
81	574	723	37	1.7	P821_0050 K302VF0074 EZ703U	1600	2770	36.96	2365/64	2700	2300	3800	24	4	132	58
83	252	283	27	2.7	P821_0070 K202VF0052 EZ701U	680	2720	36.24	14749/407	3000	2600	4000	10	3.5	132	48
83	409	491	44	1.7	P821_0070 K202VF0052 EZ702U	1290	2720	36.24	14749/407	3000	2600	4000	16	3.5	132	51
83	460	546	49	1.5	P821_0070 K202VF0052 EZ505U	1290	2720	36.24	14749/407	3000	2600	4000	14	3.5	132	51
83	563	709	60	1.2	P821_0070 K202VF0052 EZ703U	1290	2720	36.24	14749/407	3000	2600	4000	23	3.5	132	53
98	135	149	17	4.8	P821_0070 K202VF0044 EZ402U	460	920	30.55	336/11	3000	2600	4000	4.0	3.5	132	45
98	198	247	25	3.3	P821_0070 K202VF0044 EZ404U	690	920	30.55	336/11	3000	2600	4000	5.3	3.5	132	47
98	213	230	27	3.0	P821_0070 K202VF0044 EZ502U	690	920	30.55	336/11	3000	2600	4000	7.5	3.5	132	47
98	213	239	27	3.0	P821_0070 K202VF0044 EZ701U	570	2290	30.55	336/11	3000	2600	4000	11	3.5	132	48
98	279	319	36	2.3	P821_0070 K202VF0044 EZ503U	690	920	30.55	336/11	3000	2600	4000	9.9	3.5	132	48
98	345	414	44	1.9	P821_0070 K202VF0044 EZ702U	1180	2290	30.55	336/11	3000	2600	4000	16	3.5	132	51
98	388	460	50	1.7	P821_0070 K202VF0044 EZ505U	1220	2290	30.55	336/11	3000	2600	4000	14	3.5	132	51
98	474	598	61	1.4	P821_0070 K202VF0044 EZ703U	1220	2290	30.55	336/11	3000	2600	4000	24	3.5	132	53
100	209	234	17	4.3	P821_0050 K302VF0060 EZ701U	560	2250	30.00	30/1	2700	2300	3800	12	4	132	53
100	339	406	27	2.7	P821_0050 K302VF0060 EZ702U	1160	2250	30.00	30/1	2700	2300	3800	17	4	132	56
100	381	452	30	2.4	P821_0050 K302VF0060 EZ505U	1600	2250	30.00	30/1	2700	2300	3800	16	4	132	56
100	466	587	37	1.9	P821_0050 K302VF0060 EZ703U	1600	2250	30.00	30/1	2700	2300	3800	25	4	132	58
100	601	852	48	1.5	P821_0050 K302VF0060 EZ705U	1600	2900	30.00	30/1	2700	2300	3800	38	4	132	63

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
P8K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 1600 Nm)																
107	74	79	10	4.3	P821_0070 K202VF0040 EZ401U	220	420	28.00	28/1	3000	2600	4000	3.6	3.5	132	44
107	113	124	16	2.8	P821_0070 K202VF0040 EZ501U	320	420	28.00	28/1	3000	2600	4000	5.6	3.5	132	45
107	124	137	17	2.6	P821_0070 K202VF0040 EZ402U	320	420	28.00	28/1	3000	2600	4000	4.3	3.5	132	45
107	195	219	27	3.2	P821_0070 K202VF0040 EZ701U	530	2100	28.00	28/1	3000	2600	4000	11	3.5	132	48
107	316	379	45	2.0	P821_0070 K202VF0040 EZ702U	1080	2100	28.00	28/1	3000	2600	4000	16	3.5	132	51
107	356	422	50	1.8	P821_0070 K202VF0040 EZ505U	1180	2100	28.00	28/1	3000	2600	4000	15	3.5	132	51
107	435	548	61	1.4	P821_0070 K202VF0040 EZ703U	1180	2100	28.00	28/1	3000	2600	4000	24	3.5	132	53
112	187	210	17	4.6	P821_0050 K302VF0054 EZ701U	510	2020	26.88	215/8	2700	2300	3800	12	4	132	53
112	303	364	27	2.9	P821_0050 K302VF0054 EZ702U	1040	2020	26.88	215/8	2700	2300	3800	17	4	132	56
112	341	405	31	2.5	P821_0050 K302VF0054 EZ505U	1520	2020	26.88	215/8	2700	2300	3800	16	4	132	56
112	417	526	38	2.1	P821_0050 K302VF0054 EZ703U	1520	2020	26.88	215/8	2700	2300	3800	25	4	132	58
150	226	271	28	3.5	P821_0050 K302VF0040 EZ702U	770	1500	20.00	20/1	2700	2300	3800	19	4	132	56
150	254	301	31	3.1	P821_0050 K302VF0040 EZ505U	1130	1500	20.00	20/1	2700	2300	3800	18	4	132	56
150	310	391	38	2.5	P821_0050 K302VF0040 EZ703U	1130	1500	20.00	20/1	2700	2300	3800	27	4	132	58
150	401	568	50	2.0	P821_0050 K302VF0040 EZ705U	1480	2900	20.00	20/1	2700	2300	3800	40	4	132	63
188	181	217	28	3.5	P821_0040 K302VF0040 EZ702U	620	1200	16.00	16/1	2700	2300	3800	20	4	115	56
188	203	241	31	3.1	P821_0040 K302VF0040 EZ505U	900	1200	16.00	16/1	2700	2300	3800	18	4	115	56
188	248	313	38	2.5	P821_0040 K302VF0040 EZ703U	900	1200	16.00	16/1	2700	2300	3800	28	4	115	58
188	321	455	50	2.0	P821_0040 K302VF0040 EZ705U	1190	2330	16.00	16/1	2700	2300	3800	40	4	115	63
250	135	163	28	3.5	P821_0030 K302VF0040 EZ702U	460	900	12.00	12/1	2700	2300	3800	21	4.5	89	56
250	152	181	31	3.1	P821_0030 K302VF0040 EZ505U	680	900	12.00	12/1	2700	2300	3800	20	4.5	89	56
250	186	235	38	2.5	P821_0030 K302VF0040 EZ703U	680	900	12.00	12/1	2700	2300	3800	29	4.5	89	58
250	240	341	50	2.0	P821_0030 K302VF0040 EZ705U	890	1760	12.00	12/1	2700	2300	3800	41	4.5	89	63
P8K (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 1600 Nm)																
64	630	1015	37	1.2	P821_0070 K202VF0100 EZ505U	1400	2800	70.51	20167/286	3900	3500	5000	13	3.5	132	51
65	623	1003	24	1.6	P821_0050 K302VF0140 EZ505U	1600	2900	69.68	7525/108	3500	3100	5000	13	4	132	56
70	575	926	38	1.3	P821_0070 K202VF0092 EZ505U	1400	2800	64.33	15953/248	3500	3100	4500	13	3.5	132	51
77	525	846	38	1.3	P821_0070 K202VF0084 EZ505U	1400	2800	58.78	17458/297	3500	3100	4500	13	3.5	132	51
96	418	673	39	1.6	P821_0070 K202VF0067 EZ505U	1400	2800	46.78	15953/341	3500	3100	4500	13	3.5	132	51
96	533	880	49	1.2	P821_0070 K202VF0067 EZ703U	1400	2800	46.78	15953/341	3500	3100	4500	23	3.5	132	53
P9K (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 2700 Nm)																
65	1256	1900	64	1.5	P921_0070 K402VF0044 EZ805U	2700	5400	30.55	336/11	2600	2200	3500	142	3.5	271	126
71	1151	1741	65	1.6	P921_0070 K402VF0040 EZ805U	2700	5400	28.00	28/1	2600	2200	3500	143	3.5	271	126
P9K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 2700 Nm)																
7.7	1578	1724	12	1.3	P921_0070 K402VF0560 EZ501U	2700	5400	389.9	17157/44	3600	3300	5000	3.1	3.5	271	85
8.5	1428	1561	12	1.3	P921_0070 K402VF0500 EZ501U	2200	3890	353.0	38829/110	3600	3300	5000	3.1	3.5	271	85
9.3	1311	1433	11	1.5	P921_0070 K402VF0460 EZ501U	2700	5400	324.2	4214/13	3600	3300	5000	3.2	3.5	271	85
11	1147	1254	11	1.7	P921_0070 K402VF0410 EZ501U	2510	4450	283.6	34314/121	3600	3300	5000	3.1	3.5	271	85
12	984	1076	10	2.0	P921_0070 K402VF0350 EZ501U	2700	5400	243.3	29197/120	3600	3300	5000	3.4	3.5	271	85
12	1694	1831	18	1.2	P921_0070 K402VF0350 EZ502U	2700	5400	243.3	29197/120	3600	3300	5000	5.7	3.5	271	87
12	1694	1900	18	1.2	P921_0070 K402VF0350 EZ701U	2700	5400	243.3	29197/120	3600	3300	5000	9.0	3.5	271	89
13	954	1043	10	2.1	P921_0070 K402VF0340 EZ501U	2700	5160	235.7	33712/143	3600	3300	5000	3.2	3.5	271	85
13	1641	1775	18	1.2	P921_0070 K402VF0340 EZ502U	2700	5160	235.7	33712/143	3600	3300	5000	5.5	3.5	271	87
13	1641	1841	18	1.2	P921_0070 K402VF0340 EZ701U	2700	5160	235.7	33712/143	3600	3300	5000	8.8	3.5	271	89
15	787	860	9.8	2.5	P921_0070 K402VF0280 EZ501U	2700	5380	194.4	9331/48	3600	3300	5000	3.6	3.5	271	85
15	1354	1463	17	1.5	P921_0070 K402VF0280 EZ502U	2700	5380	194.4	9331/48	3600	3300	5000	5.9	3.5	271	87
15	1354	1518	17	1.5	P921_0070 K402VF0280 EZ701U	2700	5400	194.4	9331/48	3600	3300	5000	9.2	3.5	271	89
15	1774	2030	22	1.1	P921_0070 K402VF0280 EZ503U	2700	5380	194.4	9331/48	3600	3300	5000	8.2	3.5	271	88
17	716	783	9.5	2.8	P921_0070 K402VF0250 EZ501U	2660	4240	177.0	29197/165	3600	3300	5000	3.4	3.5	271	85
17	1232	1332	16	1.6	P921_0070 K402VF0250 EZ502U	2700	4240	177.0	29197/165	3600	3300	5000	5.7	3.5	271	87
17	1232	1382	16	1.6	P921_0070 K402VF0250 EZ701U	2700	5400	177.0	29197/165	3600	3300	5000	9.0	3.5	271	89
17	1615	1848	21	1.2	P921_0070 K402VF0250 EZ503U	2700	4240	177.0	29197/165	3600	3300	5000	8.1	3.5	271	88
18	660	721	9.3	3.0	P921_0070 K402VF0230 EZ501U	2450	4890	163.0	3913/24	3600	3300	5000	3.8	3.5	271	85
18	1135	1227	16	1.8	P921_0070 K402VF0230 EZ502U	2700	4890	163.0	3913/24	3600	3300	5000	6.1	3.5	271	87
18	1135	1273	16	1.8	P921_0070 K402VF0230 EZ701U	2700	5400	163.0	3913/24	3600	3300	5000	9.4	3.5	271	89
18	1488	1703	21	1.3	P921_0070 K402VF0230 EZ503U	2700	4890	163.0	3913/24	3600	3300	5000	8.5	3.5	271	88
21	572	625	9.0	3.5	P921_0070 K402VF0200 EZ501U	2130	3910	141.4	9331/66	3600	3300	5000	3.7	3.5	271	85
21	984	1064	15	2.0	P921_0070 K402VF0200 EZ502U	2700	3910	141.4	9331/66	3600	3300	5000	6.0	3.5	271	87
21	984	1104	15	2.0	P921_0070 K402VF0200 EZ701U	2660	5400	141.4	9331/66	3600	3300	5000	9.3	3.5	271	89
21	1290	1477	20	1.6	P921_0070 K402VF0200 EZ503U	2700	3910	141.4	9331/66	3600	3300	5000	8.3	3.5	271	88
21	1596	1916	25	1.3	P921_0070 K402VF0200 EZ702U	2700	5400	141.4	9331/66	3600	3300	5000	14	3.5	271	91
25	848	951	15	2.4	P921_0070 K402VF0175 EZ701U	2290	5400	121.8	731/6	3400	3000	4500	9.9	3.5	271	89
25	1376	1651	24	1.5	P921_0070 K402VF0175 EZ702U	2700	5400	121.8	731/6	3400	3000	4500	15	3.5	271	91

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
P9K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 2700 Nm)																
25	1548	1834	27	1.3	P921_0070 K402VF0175 EZ505U	2700	5400	121.8	731/6	3400	3000	4500	14	3.5	271	91
25	480	524	8.6	4.2	P921_0070 K402VF0170 EZ501U	1790	3560	118.6	3913/33	3600	3300	5000	3.9	3.5	271	85
25	826	893	15	2.4	P921_0070 K402VF0170 EZ502U	2680	3560	118.6	3913/33	3600	3300	5000	6.2	3.5	271	87
25	826	926	15	2.4	P921_0070 K402VF0170 EZ701U	2230	5400	118.6	3913/33	3600	3300	5000	9.5	3.5	271	89
25	1082	1238	19	1.8	P921_0070 K402VF0170 EZ503U	2680	3560	118.6	3913/33	3600	3300	5000	8.6	3.5	271	88
25	1339	1607	24	1.5	P921_0070 K402VF0170 EZ702U	2700	5400	118.6	3913/33	3600	3300	5000	15	3.5	271	91
25	1506	1785	27	1.3	P921_0070 K402VF0170 EZ505U	2700	5400	118.6	3913/33	3600	3300	5000	13	3.5	271	91
31	677	759	14	3.0	P921_0070 K402VF0140 EZ701U	1830	5400	97.20	9331/96	3400	3000	4500	11	3.5	271	89
31	1097	1317	23	1.8	P921_0070 K402VF0140 EZ702U	2700	5400	97.20	9331/96	3400	3000	4500	16	3.5	271	91
31	1235	1463	26	1.6	P921_0070 K402VF0140 EZ505U	2700	5400	97.20	9331/96	3400	3000	4500	14	3.5	271	91
31	1509	1902	31	1.3	P921_0070 K402VF0140 EZ703U	2700	5400	97.20	9331/96	3400	3000	4500	24	3.5	271	93
34	617	692	14	3.2	P921_0070 K402VF0125 EZ701U	1670	5400	88.61	2924/33	3400	3000	4500	10	3.5	271	89
34	1000	1201	22	2.0	P921_0070 K402VF0125 EZ702U	2700	5400	88.61	2924/33	3400	3000	4500	15	3.5	271	91
34	1125	1334	25	1.8	P921_0070 K402VF0125 EZ505U	2700	5400	88.61	2924/33	3400	3000	4500	14	3.5	271	91
34	1376	1734	31	1.5	P921_0070 K402VF0125 EZ703U	2700	5400	88.61	2924/33	3400	3000	4500	23	3.5	271	93
37	561	630	13	3.6	P921_0070 K402VF0115 EZ701U	1520	5400	80.63	645/8	3000	2600	4000	11	3.5	271	89
37	910	1092	22	2.2	P921_0070 K402VF0115 EZ702U	2700	5400	80.63	645/8	3000	2600	4000	16	3.5	271	91
37	1024	1214	25	2.0	P921_0070 K402VF0115 EZ505U	2700	5400	80.63	645/8	3000	2600	4000	15	3.5	271	91
37	1252	1578	30	1.6	P921_0070 K402VF0115 EZ703U	2700	5400	80.63	645/8	3000	2600	4000	24	3.5	271	93
42	492	552	13	4.1	P921_0070 K402VF0100 EZ701U	1330	5300	70.69	9331/132	3400	3000	4500	11	3.5	271	89
42	798	958	21	2.5	P921_0070 K402VF0100 EZ702U	2700	5300	70.69	9331/132	3400	3000	4500	16	3.5	271	91
42	898	1064	24	2.2	P921_0070 K402VF0100 EZ505U	2700	5300	70.69	9331/132	3400	3000	4500	15	3.5	271	91
42	1097	1383	29	1.8	P921_0070 K402VF0100 EZ703U	2700	5300	70.69	9331/132	3400	3000	4500	24	3.5	271	93
42	1417	2009	38	1.4	P921_0070 K402VF0100 EZ705U	2700	5400	70.69	9331/132	3400	3000	4500	36	3.5	271	99
46	450	505	13	4.4	P921_0070 K402VF0092 EZ701U	1220	4850	64.67	16555/256	3000	2600	4000	12	3.5	271	89
46	730	876	21	2.7	P921_0070 K402VF0092 EZ702U	2490	4850	64.67	16555/256	3000	2600	4000	17	3.5	271	91
46	821	974	23	2.4	P921_0070 K402VF0092 EZ505U	2700	4850	64.67	16555/256	3000	2600	4000	16	3.5	271	91
46	1004	1266	28	2.0	P921_0070 K402VF0092 EZ703U	2700	4850	64.67	16555/256	3000	2600	4000	25	3.5	271	93
46	1296	1837	37	1.5	P921_0070 K402VF0092 EZ705U	2700	5400	64.67	16555/256	3000	2600	4000	38	3.5	271	99
51	408	458	12	4.9	P921_0070 K402VF0084 EZ701U	1100	4400	58.64	645/11	3000	2600	4000	12	3.5	271	89
51	662	794	20	3.0	P921_0070 K402VF0084 EZ702U	2260	4400	58.64	645/11	3000	2600	4000	17	3.5	271	91
51	745	883	23	2.7	P921_0070 K402VF0084 EZ505U	2700	4400	58.64	645/11	3000	2600	4000	15	3.5	271	91
51	910	1148	28	2.2	P921_0070 K402VF0084 EZ703U	2700	4400	58.64	645/11	3000	2600	4000	25	3.5	271	93
51	1175	1666	36	1.7	P921_0070 K402VF0084 EZ705U	2700	5400	58.64	645/11	3000	2600	4000	37	3.5	271	99
51	1230	2047	37	1.6	P921_0070 K402VF0084 EZ802U	2700	5400	58.64	645/11	3000	2600	4000	61	3.5	271	107
57	1046	1483	35	1.9	P921_0070 K402VF0075 EZ705U	2700	5400	52.19	12943/248	2600	2200	3500	39	3.5	271	99
57	1095	1822	36	1.8	P921_0070 K402VF0075 EZ802U	2700	5400	52.19	12943/248	2600	2200	3500	63	3.5	271	107
64	531	637	19	3.7	P921_0070 K402VF0067 EZ702U	1810	3530	47.03	1505/32	3000	2600	4000	18	3.5	271	91
64	597	708	22	3.3	P921_0070 K402VF0067 EZ505U	2660	3530	47.03	1505/32	3000	2600	4000	17	3.5	271	91
64	730	920	27	2.7	P921_0070 K402VF0067 EZ703U	2660	3530	47.03	1505/32	3000	2600	4000	26	3.5	271	93
64	943	1336	35	2.1	P921_0070 K402VF0067 EZ705U	2700	5400	47.03	1505/32	3000	2600	4000	39	3.5	271	99
64	987	1642	36	2.0	P921_0070 K402VF0067 EZ802U	2700	5400	47.03	1505/32	3000	2600	4000	63	3.5	271	107
71	842	1193	35	2.2	P921_0070 K402VF0060 EZ705U	2700	5400	42.00	42/1	2600	2200	3500	41	3.5	271	99
71	881	1466	37	2.1	P921_0070 K402VF0060 EZ802U	2700	5400	42.00	42/1	2600	2200	3500	65	3.5	271	107
71	1051	1905	44	1.8	P921_0070 K402VF0060 EZ803U	2700	5400	42.00	42/1	2600	2200	3500	91	3.5	271	113
79	761	1078	35	2.4	P921_0070 K402VF0054 EZ705U	2700	5400	37.95	12943/341	2600	2200	3500	41	3.5	271	99
79	796	1325	37	2.3	P921_0070 K402VF0054 EZ802U	2700	5400	37.95	12943/341	2600	2200	3500	65	3.5	271	107
79	950	1721	44	1.9	P921_0070 K402VF0054 EZ803U	2700	5400	37.95	12943/341	2600	2200	3500	90	3.5	271	113
98	612	868	36	2.8	P921_0070 K402VF0044 EZ705U	2700	5400	30.55	336/11	2600	2200	3500	43	3.5	271	99
98	641	1066	38	2.6	P921_0070 K402VF0044 EZ802U	2700	5400	30.55	336/11	2600	2200	3500	67	3.5	271	107
98	765	1385	45	2.2	P921_0070 K402VF0044 EZ803U	2700	5400	30.55	336/11	2600	2200	3500	93	3.5	271	113
107	561	796	36	2.9	P921_0070 K402VF0040 EZ705U	2700	5400	28.00	28/1	2600	2200	3500	45	3.5	271	99
107	587	977	38	2.8	P921_0070 K402VF0040 EZ802U	2630	5400	28.00	28/1	2600	2200	3500	69	3.5	271	107
107	701	1270	45	2.4	P921_0070 K402VF0040 EZ803U	2700	5400	28.00	28/1	2600	2200	3500	94	3.5	271	113
P9K (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 2700 Nm)																
32	1264	2035	20	1.6	P921_0070 K402VF0200 EZ505U	2700	5400	141.4	9331/66	3600	3300	5000	13	3.5	271	91
37	1089	1754	19	1.8	P921_0070 K402VF0175 EZ505U	2700	5400	121.8	731/6	3400	3000	4500	14	3.5	271	91
38	1060	1707	19	1.9	P921_0070 K402VF0170 EZ505U	2700	5400	118.6	3913/33	3600	3300	5000	13	3.5	271	91
46	869	1399	18	2.3	P921_0070 K402VF0140 EZ505U	2700	5400	97.20	9331/96	3400	3000	4500	14	3.5	271	91
46	1107	1829	23	1.8	P921_0070 K402VF0140 EZ703U	2700	5400	97.20	9331/96	3400	3000	4500	24	3.5	271	93
51	792	1276	18	2.5	P921_0070 K402VF0125 EZ505U	2700	5400	88.61	2924/33	3400	3000	4500	14	3.5	271	91
51	1009	1667	23	2.0	P921_0070 K402VF0125 EZ703U	2700	5400	88.61	2924/33	3400	3000	4500	23	3.5	271	93
64	632	1018	17	3.1	P921_0070 K402VF0100 EZ505U	2700	5300	70.69	9331/132	3400	3000	4500	15	3.5	271	91

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm^2]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
P9K (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 2700 Nm)																
64	805	1330	22	2.4	P921_0070 K402VF0100 EZ703U	2700	5300	70.69	9331/132	3400	3000	4500	24	3.5	271	93
64	1091	1995	29	1.8	P921_0070 K402VF0100 EZ705U	2700	5400	70.69	9331/132	3400	3000	4500	36	3.5	271	99

16.3 Dimensional drawings

In this chapter you can find the dimensions of the geared motors.

There is a dimensional drawing for every possible shaft/housing design, each with the tables for gear unit dimensions, motor dimensions and geared motor dimensions.

Dimensions can exceed the specifications of ISO 2768-mK due to casting tolerances or accumulation of individual tolerances.

We reserve the right to make dimensional changes due to ongoing technical development.

You can download CAD models of our standard drives at http://cad.stoeber.de.

Combination options and the dimensions of forced ventilated geared motors can be found at http://cad.stoeber.de.

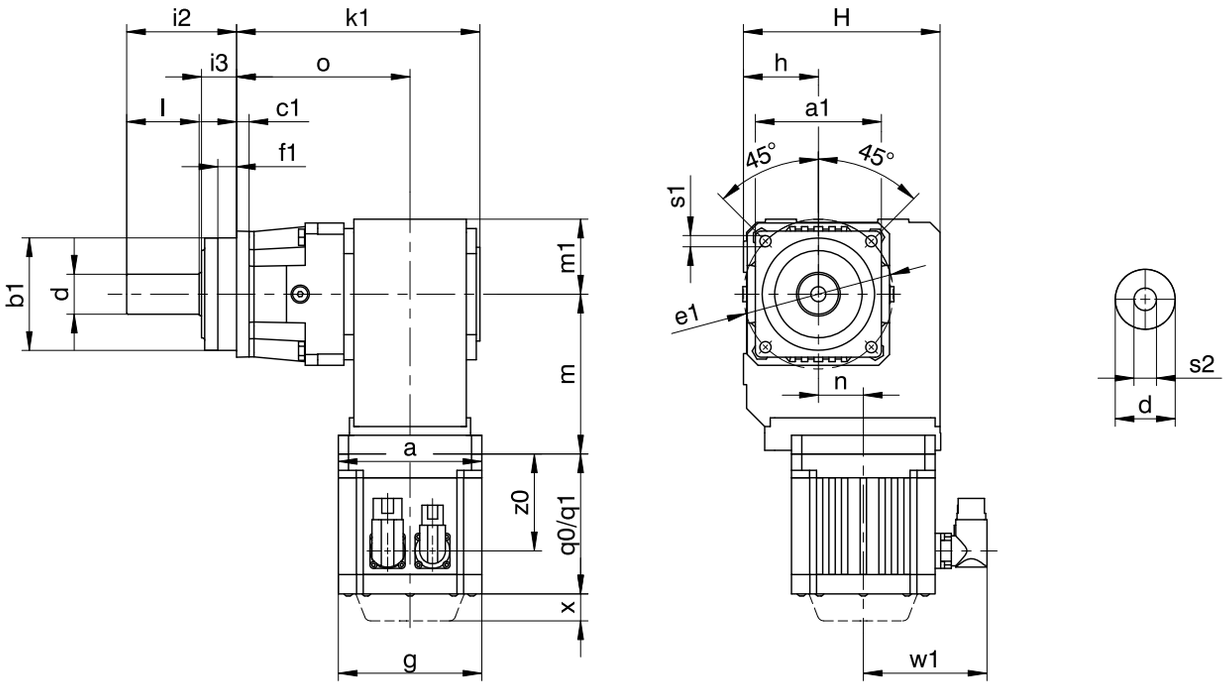
Tolerances

Solid shaft	Tolerance
Shaft ∅ fit ≤ 50 mm	DIN 748-1, ISO k6
Shaft ∅ fit > 50 mm	DIN 748-1, ISO m6
Feather keys	DIN 6885-1, high form A
Balance quality	Q 2.5 (balanced with half feather key)

Centering holes in solid shafts in accordance with DIN 332-2, DR shape

Thread size	M4	M5	M6	M8	M10	M12	M16	M20	M24
Thread depth [mm]	10	12.5	16	19	22	28	36	42	50

16.3.1 G shaft design (solid shaft without feather key)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]

Dimensions of gear units

Type	□a1	Øb1	c1	Ød	Øe1	f1	h	H	i2	i3	k1	l	m1	o	Øs1	s2
P521_K102_	101	90_{h6}	10	32_{k6}	120	15.0	60	160	88	28	195.0	58	60	139.0	9.0	M12
P721_K102_	144	130_{h6}	15	40_{k6}	165	3.5	60	160	112	27	206.0	82	60	150.0	11.0	M16
P721_K202_	144	130_{h6}	15	40_{k6}	165	3.5	65	190	112	27	234.0	82	65	164.0	11.0	M16
P821_K202_	190	160_{h6}	15	55_{k6}	215	10.0	65	190	112	27	272.5	82	65	202.5	13.5	M20
P821_K302_	190	160_{h6}	15	55_{k6}	215	10.0	75	213	112	27	286.0	82	75	210.0	13.5	M20
P921_K402_	212	180_{h6}	17	75_{k6}	250	10.0	90	240	143	34	347.5	105	90	257.5	17.5	M20

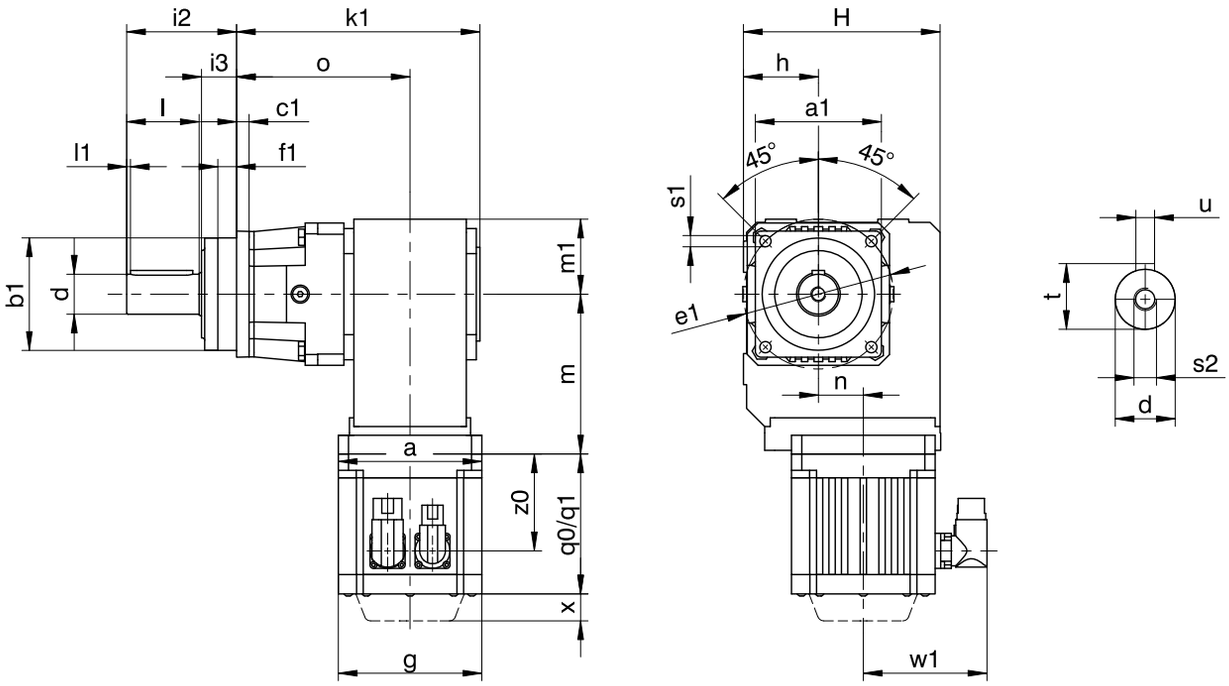
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5
EZ805U	190	355.5	432.5	156.5	22	301.5

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
P521_K102_	□72	124	36.0	□98	124	36.0	□115	128	36.0	□145	130	36.0	–	–	–
P721_K102_	□72	124	36.0	□98	124	36.0	□115	128	36.0	□145	130	36.0	–	–	–
P721_K202_	□72	143	46.0	□98	143	46.0	□115	147	46.0	□145	149	46.0	–	–	–
P821_K202_	□72	143	46.0	□98	143	46.0	□115	147	46.0	□145	149	46.0	–	–	–
P821_K302_	–	–	–	∅140	163	52.5	□115	167	52.5	□145	169	52.5	–	–	–
P921_K402_	–	–	–	–	–	–	∅160	187	60.0	□145	189	60.0	□190	192	60.0

16.3.2 P shaft design (solid shaft with feather key)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]

Dimensions of gear units

Type	□a1	Ø$b1_{h6}$	c1	Ød_{k6}	Øe1	f1	h	H	i2	i3	k1	l	l1	m1	o	Øs1	s2	t	u
P521_K102_	101	90_{h6}	10	32_{k6}	120	15.0	60	160	88	28	195.0	58	3	60	139.0	9.0	M12	35.0	A10×8×50
P721_K102_	144	130_{h6}	15	40_{k6}	165	3.5	60	160	112	27	206.0	82	4	60	150.0	11.0	M16	43.0	A12×8×70
P721_K202_	144	130_{h6}	15	40_{k6}	165	3.5	65	190	112	27	234.0	82	4	65	164.0	11.0	M16	43.0	A12×8×70
P821_K202_	190	160_{h6}	15	55_{k6}	215	10.0	65	190	112	27	272.5	82	6	65	202.5	13.5	M20	59.0	A16×10×70
P821_K302_	190	160_{h6}	15	55_{k6}	215	10.0	75	213	112	27	286.0	82	6	75	210.0	13.5	M20	59.0	A16×10×70
P921_K402_	212	180_{h6}	17	75_{k6}	250	10.0	90	240	143	34	347.5	105	7	90	257.5	17.5	M20	79.5	A20×12×90

Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5
EZ805U	190	355.5	432.5	156.5	22	301.5

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
P521_K102_	□72	124	36.0	□98	124	36.0	□115	128	36.0	□145	130	36.0	–	–	–
P721_K102_	□72	124	36.0	□98	124	36.0	□115	128	36.0	□145	130	36.0	–	–	–
P721_K202_	□72	143	46.0	□98	143	46.0	□115	147	46.0	□145	149	46.0	–	–	–
P821_K202_	□72	143	46.0	□98	143	46.0	□115	147	46.0	□145	149	46.0	–	–	–
P821_K302_	–	–	–	∅140	163	52.5	□115	167	52.5	□145	169	52.5	–	–	–
P921_K402_	–	–	–	–	–	–	∅160	187	60.0	□145	189	60.0	□190	192	60.0

16.4 Type designation

In this chapter, you can find an explanation of the type designation with the associated options.

Additional ordering information not included in the type designation can be found at the end of the chapter.

Sample code

P	5	2	1	S	G	R	0050	K102VF	0060	EZ401U

Explanation

Code	Designation	Design
P	Type	Planetary gear unit
5	Size	5 (example)
2	Generation	Generation 2
1	Stages	Single-stage
S	Housing	Standard
G	Shaft	Solid shaft without feather key
P		Solid shaft with feather key
R	Bearing	Standard bearing
D		Axially reinforced bearing
Z		Radially reinforced bearing
0050	Transmission ratio of output (i x 10)	i = 5 (example)
K102VF	Input	K1 right-angle geared motor (example)
0060	Transmission ratio of input (i x 10)	i = 6 (example)
EZ401U	Motor	EZ synchronous servo motor

In order to complete the type designation, also specify:

- A detailed type designation of the motor, see chapter [▶ 23]
- The mounting position, see Chapter [▶ 16.5.2]
- Output gear unit side 3 or 4, see Chapter [▶ 16.5.2]
- Radial shaft seal rings at the output made of NBR or FKM, see chapter [▶ 16.6.3]
- The position of the plug connectors, see chapter [▶ 16.5.4]
- For reverse operation of the output shaft from ± 20° to ± 90° and horizontal installation, note the chapter [▶ 16.6.4]

16.5 Product description

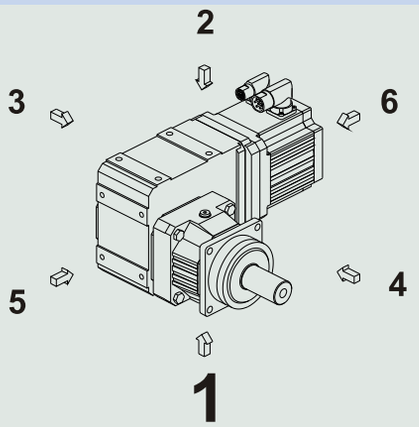
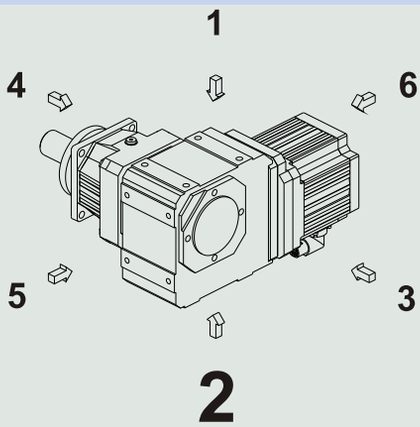
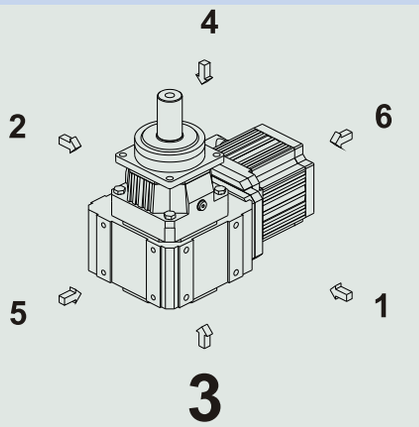
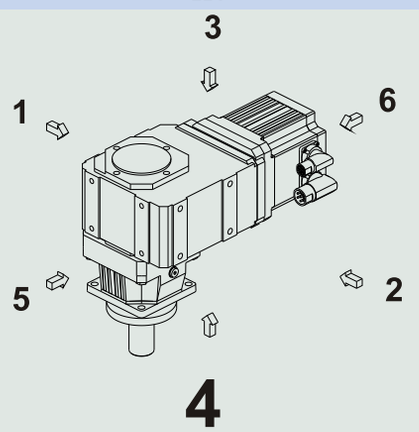
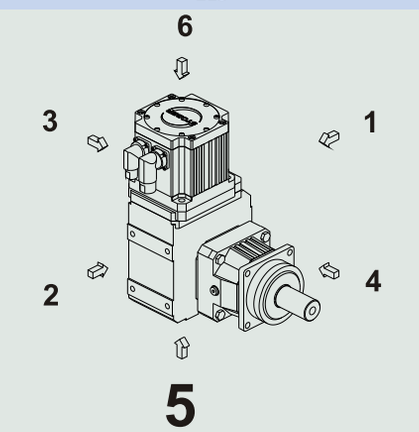
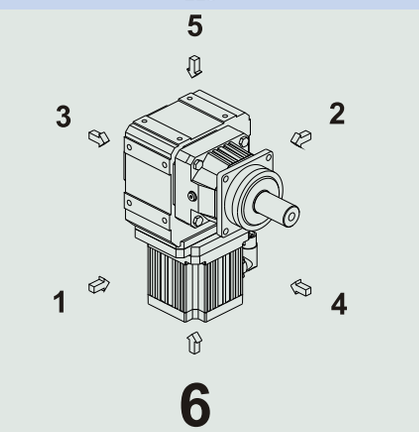
16.5.1 Installation conditions

The specified torques and forces only apply when attaching gear units at the machine side using screws of quality 10.9. In addition, the gear housing must be adjusted at the pilot (H7).

16.5.2 Mounting positions

The following table shows the standard mounting positions.

The numbers identify the gear unit sides. The mounting position is defined by the gear side facing downwards.

EL1	EL2	EL3
		
EL4	**EL5**	**EL6**
		

Since the lubricant filling volume of the gear unit depends on the mounting position, the mounting position must be specified when ordering.

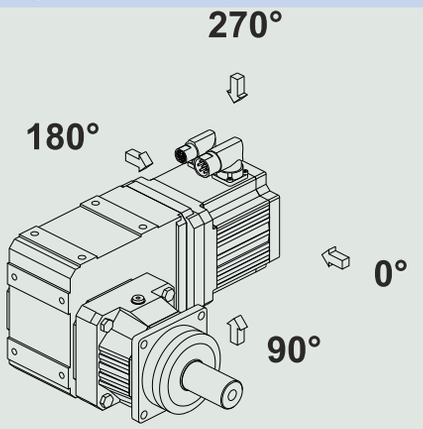
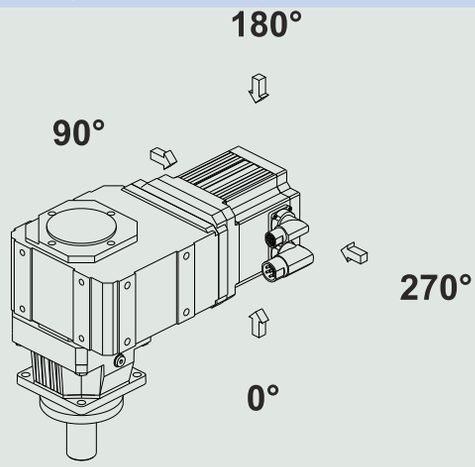
16.5.3 Lubricants

STOBER fills the gear units with the amount and type of lubricant specified on the nameplate. The filling volume and the structure of the gear units depend on the mounting position.

Only install the gear units in the intended mounting position! Reposition the gear units only after consulting STOBER. Otherwise, STOBER assumes no liability for the gear units.

Lubricant filling quantities for gear units, document ID 441871, can be found online at http://www.stoeber.de/en/download. Enter the ID of the documentation in the Search... field.

16.5.4 Position of the plug connectors

Mounting position EL1	Mounting position EL4
Plug connector in 270° position (standard)	Plug connector in 270° position (standard)
	

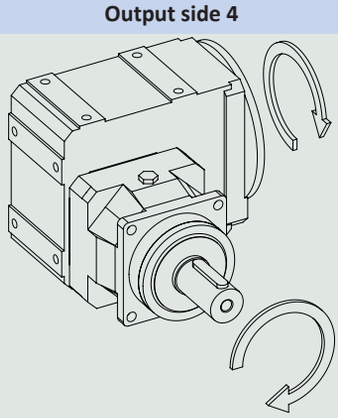
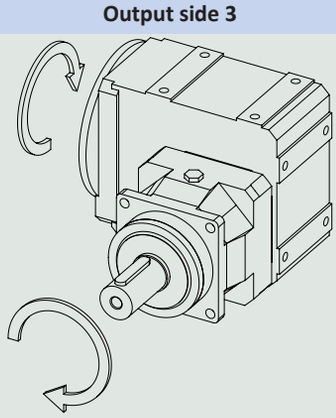
Indicate variations for your geared motor in the purchase order.

Note that the plug connector position rotates along with the geared motor if the geared motor is in another mounting position.

16.5.5 Other product features

Feature	Value
Max. permitted gear unit temperature (on the surface of the gear unit)	≤ 90 °C
Paint	Black RAL 9005
(ATEX) Directive 2014/34/EU (option)	Not suitable
Protection class:[1]	
Gear unit	IP65
Motor	IP56, optionally IP66

16.5.6 Direction of rotation

Output side 4	Output side 3
	

The pictures show mounting position EL1.

16.6 Project configuration

Project your drives using our SERVOsoft designing software. You can receive SERVOsoft for free from your adviser at one of our sales centers. Observe the limit conditions in this chapter to ensure a safe design for your drives.

An explanation of the formula symbols can be found in Chapter [▶ 29.1].

[1] Observe the protection class of all the components.

16.6.1 Calculation of the operating point

Check the following conditions for operating points other than the nominal point M_{2N} specified in the selection tables.

For continuous operation in mounting positions EL1, EL2:

$$n_{1m^*} \leq \frac{n_{1maxDBEL1,2}}{fB_T}$$

For continuous operation in mounting positions EL3, EL4, EL5, EL6:

$$n_{1m^*} \leq \frac{n_{1maxDBEL3,4,5,6}}{fB_T}$$

For all mounting positions:

$$n_{1max^*} \leq \frac{n_{1max\,ZB}}{fB_T}$$

$$M_{2eff^*} \leq M_{2th}$$

$$M_{2acc^*} \leq M_{2acc}$$

$$M_{2NOT^*} \leq M_{2NOT}$$

$$M_{2eq^*} \leq M_{2N} \cdot \frac{S}{fB_{op} \cdot fB_t}$$

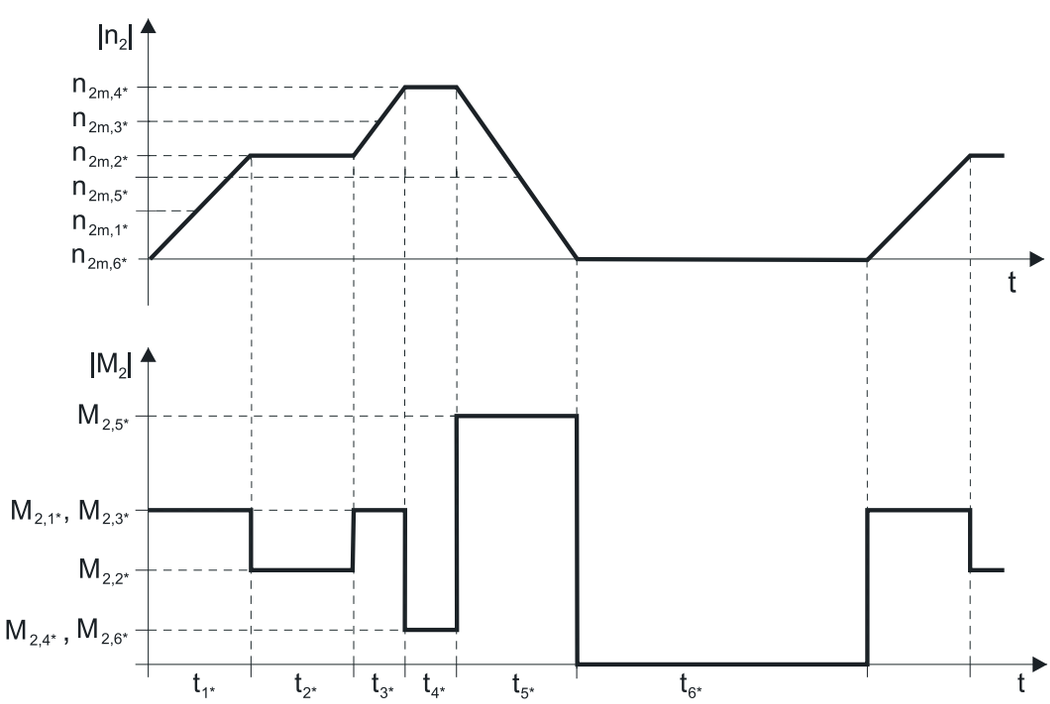
Refer to the selection tables for the values for $n_{1maxDBEL1,2}$ and $n_{1maxDBEL3,4,5,6}$, n_{1maxZB}, M_{2acc}, M_{2NOT}, M_{2N} and S.

The values for fB_T, fB_{op} and fB_t can be found in the corresponding tables in this chapter.

Calculate the thermal limit torque M_{2th} for a duty cycle > 50%.

Example of cyclic operation

The following calculations are based on a representation of the power taken from the output based in accordance with the following example:



Calculation of the actual average input speed

$$n_{1m^*} = n_{2m^*} \cdot i$$

$$n_{2m^*} = \frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}{t_{1^*} + \ldots + t_{n^*}}$$

If $t_{1^*} + \ldots + t_{5^*} \geq 20$ min, calculate n_{2m^*} without the rest phase t_{6^*}.

The values for the ratio i can be found in the selection tables.

Calculation of the actual effective torque

$$M_{2eff^*} = \sqrt{\frac{t_{1^*} \cdot {M_{2,1^*}}^2 + \ldots + t_{n^*} \cdot {M_{2,n^*}}^2}{t_{1^*} + \ldots + t_{n^*}}}$$

Calculation of the actual equivalent torque

$$M_{2eq^*} = \sqrt[3]{\frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} \cdot \left|{M_{2,1^*}}^3\right| + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*} \cdot \left|{M_{2,n^*}}^3\right|}{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}}$$

Calculation of the thermal limit torque

Calculate the thermal limit torque M_{2th} for a duty cycle $ED_{20} > 50\%$ and the actual average input speed n_{1m^*}. (At $K_{mot,th} \leq 0$ you must reduce the average input speed n_{1m^*} accordingly or select another geared motor size.)

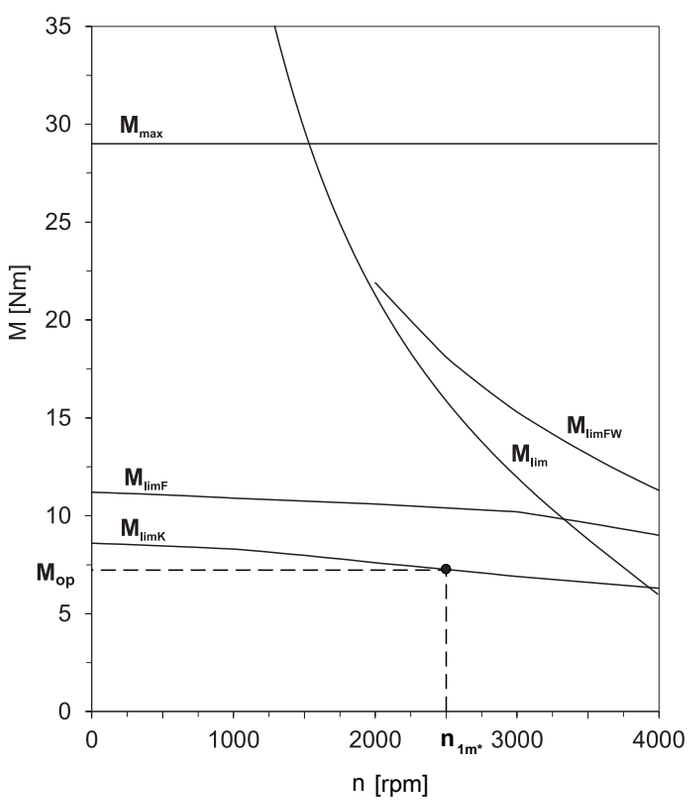
$$M_{2th} = M_{op} \cdot i \cdot K_{mot,th}$$

$$K_{mot,th} = 0{,}95 - \frac{a_{th}}{1000} \cdot athEL \cdot fB_T \cdot \left(\frac{n_{1m^*}}{1000}\right)^2$$

The values for i and a_{th} can be found in the selection tables.

The values for a_{thEL} and fB_T can be found in the corresponding tables in this chapter.

The value for the torque of the motor at operating point M_{op} with the determined average input speed n_{1m^*} can be found in the motor curve of Chapter [▶ 23.3]. Note the size, nominal speed n_N and cooling type of the motor. The figure below shows an example of reading the torque M_{op} of a motor with convection cooling at the operating point.



Operating factors

Parameter a_{thEL}

Mounting position	a_{thEL}
EL1, 2	1.0
EL3, 4, 5, 6	1.1

Operating mode	fB_{op}
Uniform continuous operation	1.00
Cyclic operation	1.25
Reversing load cyclic operation	1.40

Run time	fB_t
Daily run time ≤ 8 h	1.00
Daily run time ≤ 16 h	1.15
Daily run time ≤ 24 h	1.20

Temperature		fB_T
Motor cooling	**Surrounding temperature**	
Motor with forced ventilation	≤ 20 °C	0.9
	≤ 30 °C	1.0
	≤ 40 °C	1.15
Motor with convection cooling	≤ 20 °C	1.0
	≤ 30 °C	1.1
	≤ 40 °C	1.25

Notes

- The maximum permitted gear unit temperature (see the "Other product features" chapter) must not be exceeded. Doing so may result in damage to the geared motor.
- For braking from full speed (for example when the power fails or when setting up the machine), note the permitted gear unit torques (M_{2acc}, M_{2NOT}) in the selection tables.
- The values specified in the selection tables for M_{2acc} refer to the gear units with a solid shaft design without feather key (G). We recommend this shaft design in general for cyclic operation.

16.6.2 Permitted shaft loads for the output shaft

The values specified in the tables apply to the permitted shaft loads:

- For shaft dimensions in accordance with the catalog
- For output speeds $n_{2m*} \leq 100$ rpm ($F^{2axN} = F_{2ax100}$; $F_{2radN} = F_{2rad100}$; $M_{2kN} = M_{2k100}$)
- Only if radial forces on the gear unit are stabilized by its pilots (housing, flange shaft)

Permitted shaft loads for standard bearing R

Type	z_2	F_{2ax100}	$F_{2rad100}$	$F_{2rad,acc}$	M_{2k100}	$M_{2k,acc}$
	[mm]	[N]	[N]	[N]	[Nm]	[Nm]
P2	17.0	500	1200	1300	34	36
P3	21.0	1000	2500	2500	88	88
P4	22.0	1500	4000	4500	160	180
P5	23.0	2300	6500	7000	338	364
P7	26.0	2900	8000	9000	536	603
P8	28.0	4700	13000	18000	897	1242
P9	40.0	6000	18000	27000	1665	2498

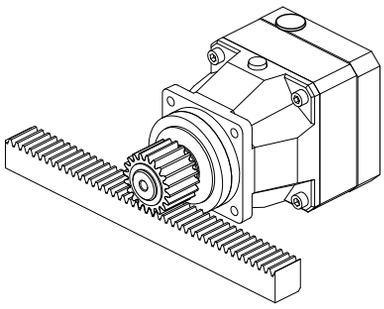


Fig. 1: Recommendation for bearing assignment R

Permitted shaft loads for axially reinforced bearing D

Type	z_2 [mm]	F_{2ax100} [N]	$F_{2rad100}$ [N]	$F_{2rad,acc}$ [N]	M_{2k100} [Nm]	$M_{2k,acc}$ [Nm]
P3	24.0	1400	2750	2750	105	105
P4	25.0	2250	4500	5000	194	215
P5	29.0	3500	7000	8000	406	464
P7	31.0	4500	9000	10000	648	720
P8	35.0	7500	15000	18000	1140	1368
P9	51.0	10000	20000	30000	2070	3105

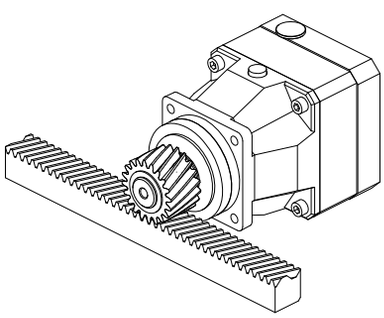


Fig. 2: Recommendation for bearing assignment D

Permitted shaft loads for radially reinforced bearing Z

Type	z_2 [mm]	F_{2ax100} [N]	$F_{2rad100}$ [N]	$F_{2rad,acc}$ [N]	M_{2k100} [Nm]	$M_{2k,acc}$ [Nm]
P3	21.0	600	3000	3000	105	105
P4	22.0	1000	5000	5000	200	200
P5	23.0	1600	8000	8000	416	416
P7	26.0	2000	10000	10000	670	670
P8	28.0	3600	18000	18000	1242	1242
P9	40.0	5000	27000	35000	2500	3238

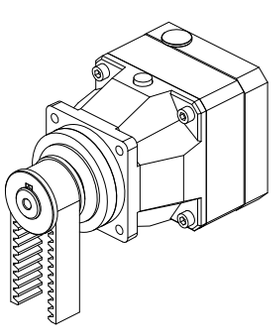


Fig. 3: Recommendation for bearing assignment Z

For other output speeds, download diagrams at http://products.stoeber.de.

The following applies to output speeds n_{2m*} > 100 rpm:

$$F_{2axN} = \frac{F_{2ax100}}{\sqrt[3]{\frac{n_{2m*}}{100\ rpm}}} \qquad F_{2radN} = \frac{F_{2rad100}}{\sqrt[3]{\frac{n_{2m*}}{100\ rpm}}} \qquad M_{2kN} = \frac{M_{2k100}}{\sqrt[3]{\frac{n_{2m*}}{100\ rpm}}}$$

The values for F_{2ax100}, $F_{2rad100}$ and M_{2k100} can be found in the table "Permitted shaft loads" in this chapter.

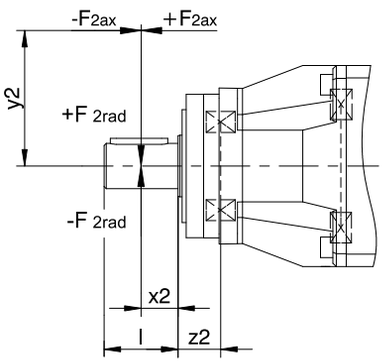


Fig. 4: Force application points

The specified values for $F_{2rad100}$ and $F_{2rad,acc}$ refer to an application of force at the center of the output shaft: $x_2 = l/2$.

Shaft dimensions can be found in the "Dimensional drawings" chapter.

The following applies to other force application points:

$$M_{2k,acc*} = \frac{2 \cdot F_{2ax*} \cdot y_2 + F_{2rad,acc*} \cdot (x_2 + z_2)}{1000} \le M_{2k,acc}$$

$$F_{2rad,acc*} \le F_{2rad,acc}$$

$$F_{2ax*} \le F_{2axN}$$

The values for $F_{2rad,acc}$ and $M_{2k,acc}$ can be found in the table "Permitted shaft loads" in this chapter.

For applications with multiple axial and/or radial forces, you must add the forces as vectors.

In the event of EMERGENCY OFF operation (max. 1000 load changes), you can multiply the permitted forces and torques for F_{2ax100}, $F_{2rad100}$ and M_{2k100} by a factor of two.

Also note the calculation for equivalent values:

$$M_{2k,eq*} = \sqrt[3]{\frac{|n_{2m,1*}| \cdot t_{1*} \cdot |M_{2k,acc,1*}{}^3| + \ldots + |n_{2m,n*}| \cdot t_{n*} \cdot |M_{2k,acc,n*}{}^3|}{|n_{2m,1*}| \cdot t_{1*} + \ldots + |n_{2m,n*}| \cdot t_{n*}}} \le M_{2kN}$$

$$F_{2rad,eq*} = \sqrt[3]{\frac{|n_{2m,1*}| \cdot t_{1*} \cdot |F_{2rad,acc,1*}{}^3| + \ldots + |n_{2m,n*}| \cdot t_{n*} \cdot |F_{2rad,acc,n*}{}^3|}{|n_{2m,1*}| \cdot t_{1*} + \ldots + |n_{2m,n*}| \cdot t_{n*}}} \le F_{2radN}$$

The following apply to the bearing service life L_{10h} ($ED_{20} \le 40\%$):

L_{10h} > 10000 h with 1 < M_{2kN}/M_{2k*} < 1.25

L_{10h} > 20000 h with 1.25 < M_{2kN}/M_{2k*} < 1.5

L_{10h} > 30000 h with 1.5 < M_{2kN}/M_{2k*}

For different duty cycles:

$$L_{10h} > L_{10h(ED_{20}=40\%)} \cdot \frac{40\%}{ED_{20}}$$

16.6.3 Recommendation for radial shaft seal rings

For a duty cycle > 60%, we recommend radial shaft seal rings made of FKM.

Properties:

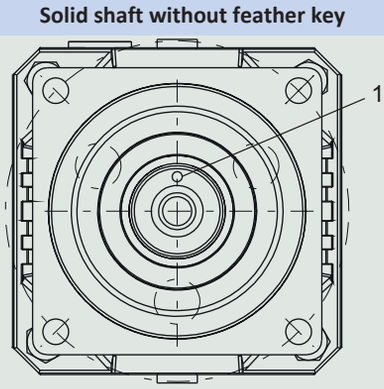
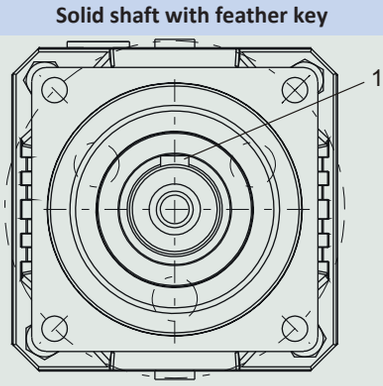
- Excellent temperature resistance
- High chemical stability
- Very good resistance to aging
- Excellent resistance to mineral oils and greases
- For use in the food, beverage and pharmaceutical industries

Leak-proofness

Our gear units are equipped with high-quality radial shaft seal rings and checked for leak-proofness. However, a leak cannot be fully ruled out over the length of use of a gear unit. If you use a gear unit with goods incompatible with the lubricant, you must take measures to prevent direct contact with the gear unit lubricant in case of a leak.

16.6.4 Reverse operation

To ensure lubrication of circulating geared parts during cyclic reverse operation from ± 20° to ± 90°, pay careful attention to the position of the output shaft if the gear unit is installed horizontally as shown in the images below. The images show the center position of reverse operation. Cyclic reverse operation ≤ ± 20° on request.

Solid shaft without feather key	Solid shaft with feather key
	
1) Position of the mark: top	1) Position of the feather key: top

Notes

- If you use the solid shaft without a feather key (G) with a mark, note the position of the mark during assembly.
- As an alternative, you can use the solid shaft with a feather key (P) and clamp. In that case, the feather key functions for position orientation.

16.7 Additional documentation

Additional documentation related to the product can be found at http://www.stoeber.de/en/download

Enter the ID of the documentation in the Search... field.

Documentation	ID
Operating manual for KL/KS/PHK/PHKX/PHQK/PK/PKX right-angle gear units and right-angle geared motors	443004_en
Lubricant filling quantities for gear units	441871

17 PHKX right-angle planetary geared motors

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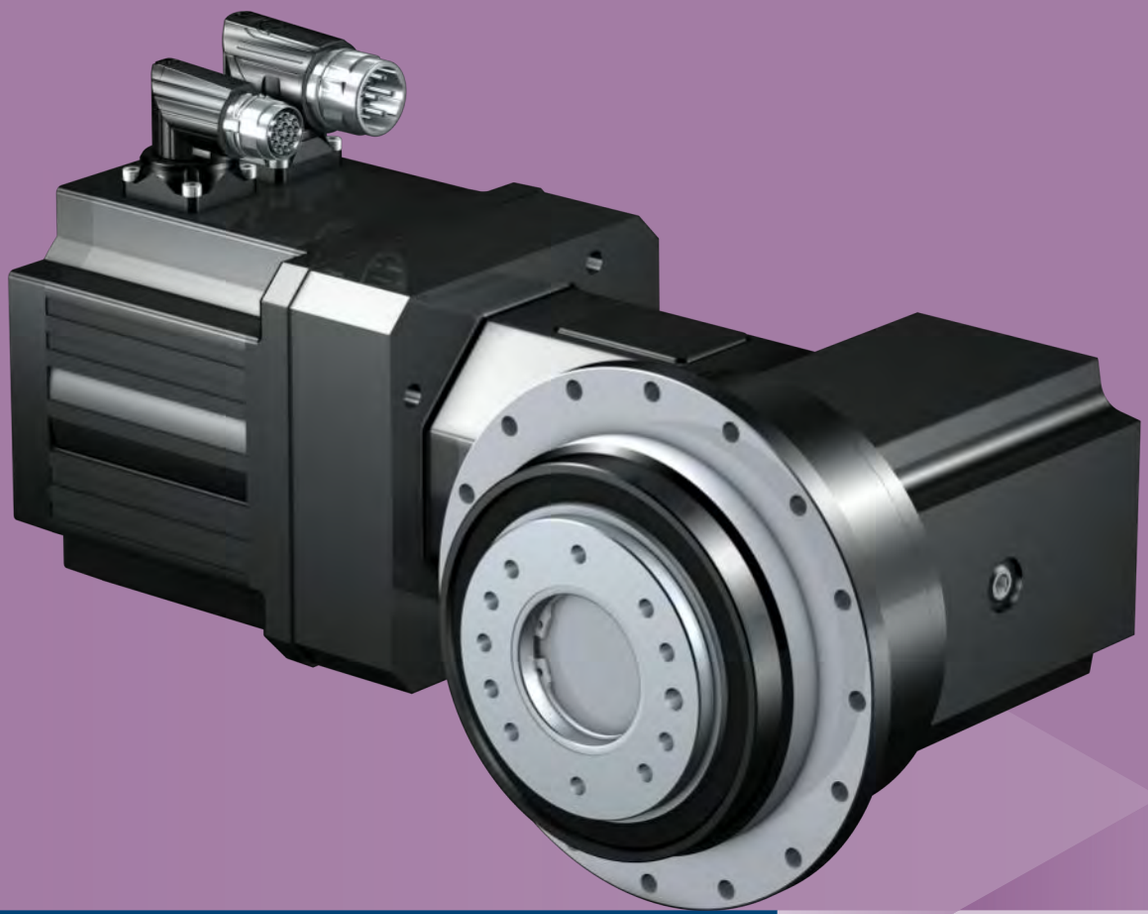


17

PHKX right-angle planetary geared motors

17.1 Overview

High-performance precision right-angle planetary geared motors

Features

Power density	★★★★★
Backlash	★★★★☆
Price category	€€€€
Shaft load	★★★★★
Smooth operation	★★☆☆☆
Torsional stiffness	★★★★☆
Mass moment of inertia	★★★☆☆
Helical gearing	✓
Maintenance-free	✓
Small installation space	✓
Continuous operation without cooling	✓
Stiff output bearing due to pretension	✓
Compact and highly dynamic due to direct motor attachment	✓

Key: ★☆☆☆☆ good | ★★★★★ excellent
€ Economy | €€€€€ Premium

Technical data

i	4 – 210
M_{2acc}	26 – 7500 Nm
$\Delta\phi_2$	3 – 6 arcmin
η_{get}	≤ 95 %

17.2 Selection tables

The technical data specified in the selection tables applies to:

- Installation altitudes up to 1000 m above sea level
- Surrounding temperatures from 0 °C to 40 °C
- Drives with convection-cooled motors (e.g. EZ401**U**)

You can calculate the technical data for drives with forced ventilated motors (for example EZ401**B**) at http://products.stoeber.de.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,5,6 [rpm]	n_{1maxDB} EL3,4 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PH3KX (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 65 Nm)																
60	43	44	54	1.1	PH322F0250 KX301VF0020 MF EZ301U	65	130	50.00	50/1	3500	3000	5500	1.0	4.5	14	5.4
75	34	35	43	1.3	PH322F0200 KX301VF0020 MF EZ301U	65	130	40.00	40/1	3500	3000	5500	1.0	4.5	14	5.4
86	30	30	64	1.5	PH322F0350 KX301VF0010 MF EZ301U	65	130	35.00	35/1	3000	2500	4500	1.2	4.5	14	5.4
100	26	27	37	1.1	PH321F0100 KX301VF0030 MF EZ301U	50	100	30.00	30/1	3500	3500	6000	0.94	5	9.0	4.9
143	18	19	17	2.4	PH321F0070 KX301VF0030 MF EZ301U	56	130	21.00	21/1	3500	3500	6000	0.94	5.5	8.9	4.9
143	32	33	30	1.4	PH321F0070 KX301VF0030 MF EZ302U	60	130	21.00	21/1	3500	3500	6000	1.0	5.5	8.9	5.5
143	41	43	38	1.1	PH321F0070 KX301VF0030 MF EZ303U	60	130	21.00	21/1	3500	3500	6000	1.1	5.5	8.9	6.0
150	18	18	33	1.7	PH321F0100 KX301VF0020 MF EZ301U	50	100	20.00	20/1	3500	3000	5500	1.0	5	9.0	4.9
200	13	13	13	3.2	PH321F0050 KX301VF0030 MF EZ301U	40	130	15.00	15/1	3500	3500	6000	0.94	6	7.0	4.9
200	23	24	23	1.9	PH321F0050 KX301VF0030 MF EZ302U	62	130	15.00	15/1	3500	3500	6000	1.0	6	7.0	5.5
200	29	31	29	1.4	PH321F0050 KX301VF0030 MF EZ303U	62	130	15.00	15/1	3500	3500	6000	1.2	6	7.0	6.0
200	40	43	40	1.1	PH321F0050 KX301VF0030 MF EZ401U	62	130	15.00	15/1	3500	3500	6000	1.7	6	7.0	7.4
214	12	13	16	3.7	PH321F0070 KX301VF0020 MF EZ301U	37	130	14.00	14/1	3500	3000	5500	1.0	5.5	8.9	4.9
214	21	22	27	2.1	PH321F0070 KX301VF0020 MF EZ302U	60	130	14.00	14/1	3500	3000	5500	1.1	5.5	8.9	5.5
214	27	29	35	1.6	PH321F0070 KX301VF0020 MF EZ303U	60	130	14.00	14/1	3500	3000	5500	1.2	5.5	8.9	6.0
214	37	40	47	1.2	PH321F0070 KX301VF0020 MF EZ401U	60	130	14.00	14/1	3500	3000	5500	1.7	5.5	8.9	7.4
300	8.8	9.0	12	4.8	PH321F0050 KX301VF0020 MF EZ301U	26	130	10.00	10/1	3500	3000	5500	1.0	6	7.0	4.9
300	15	16	20	2.8	PH321F0050 KX301VF0020 MF EZ302U	47	130	10.00	10/1	3500	3000	5500	1.1	6	7.0	5.5
300	20	21	27	2.1	PH321F0050 KX301VF0020 MF EZ303U	62	130	10.00	10/1	3500	3000	5500	1.2	6	7.0	6.0
300	26	28	36	1.6	PH321F0050 KX301VF0020 MF EZ401U	62	130	10.00	10/1	3500	3000	5500	1.8	6	7.0	7.4
429	11	11	26	3.7	PH321F0070 KX301VF0010 MF EZ302U	33	130	7.000	7/1	3000	2500	4500	1.3	5.5	8.9	5.5
429	14	14	33	2.9	PH321F0070 KX301VF0010 MF EZ303U	46	130	7.000	7/1	3000	2500	4500	1.4	5.5	8.9	6.0
429	19	20	45	2.1	PH321F0070 KX301VF0010 MF EZ401U	56	130	7.000	7/1	3000	2500	4500	2.0	5.5	8.9	7.4
429	31	34	76	1.3	PH321F0070 KX301VF0010 MF EZ402U	60	130	7.000	7/1	3000	2500	4500	2.7	5.5	8.9	8.5
600	9.8	10	24	4.0	PH321F0050 KX301VF0010 MF EZ303U	33	110	5.000	5/1	3000	2500	4500	1.5	6	7.0	6.0
600	13	14	32	3.0	PH321F0050 KX301VF0010 MF EZ401U	40	110	5.000	5/1	3000	2500	4500	2.0	6	7.0	7.4
600	22	25	54	1.8	PH321F0050 KX301VF0010 MF EZ402U	62	110	5.000	5/1	3000	2500	4500	2.7	6	7.0	8.5
600	33	41	80	1.2	PH321F0050 KX301VF0010 MF EZ404U	62	110	5.000	5/1	3000	2500	4500	4.1	6	7.0	11
PH3KX (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 62 Nm)																
200	25	27	35	1.2	PH321F0100 KX301VF0030 MF EZ301U	50	100	30.00	30/1	3500	3500	6000	0.94	5	9.0	4.9
286	18	19	17	2.5	PH321F0070 KX301VF0030 MF EZ301U	56	130	21.00	21/1	3500	3500	6000	0.94	5.5	8.9	4.9
286	30	33	28	1.5	PH321F0070 KX301VF0030 MF EZ302U	60	130	21.00	21/1	3500	3500	6000	1.0	5.5	8.9	5.5
286	39	45	36	1.2	PH321F0070 KX301VF0030 MF EZ303U	60	130	21.00	21/1	3500	3500	6000	1.1	5.5	8.9	6.0
400	13	13	16	2.6	PH321F0050 KX301VF0030 MF EZ301U	40	130	15.00	15/1	3500	3500	6000	0.94	6	7.0	4.9
400	21	24	27	1.6	PH321F0050 KX301VF0030 MF EZ302U	62	130	15.00	15/1	3500	3500	6000	1.0	6	7.0	5.5
400	28	32	35	1.2	PH321F0050 KX301VF0030 MF EZ303U	62	130	15.00	15/1	3500	3500	6000	1.2	6	7.0	6.0
400	33	40	41	1.0	PH321F0050 KX301VF0030 MF EZ401U	62	130	15.00	15/1	3500	3500	6000	1.7	6	7.0	7.4
PH4KX (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 130 Nm)																
29	89	91	42	1.0	PH422F0350 KX301VF0030 MF EZ301U	130	240	105.0	105/1	3500	3500	6000	0.94	3.5	26	7.8
30	85	87	54	1.1	PH422F0500 KX301VF0020 MF EZ301U	130	240	100.0	100/1	3500	3000	5500	1.0	3	26	7.8
36	72	73	33	1.3	PH422F0280 KX301VF0030 MF EZ301U	130	240	84.00	84/1	3500	3500	6000	0.94	3.5	24	7.8
38	68	70	43	1.3	PH422F0400 KX301VF0020 MF EZ301U	130	240	80.00	80/1	3500	3000	5500	1.0	3.5	24	7.8
40	64	65	30	1.4	PH422F0250 KX301VF0030 MF EZ301U	130	240	75.00	75/1	3500	3500	6000	0.95	3.5	26	7.8
43	60	61	38	1.5	PH422F0350 KX301VF0020 MF EZ301U	130	240	70.00	70/1	3500	3000	5500	1.0	3.5	26	7.8
50	51	52	24	1.8	PH422F0200 KX301VF0030 MF EZ301U	130	240	60.00	60/1	3500	3500	6000	0.95	3.5	25	7.8
50	87	92	41	1.0	PH422F0200 KX301VF0030 MF EZ302U	130	240	60.00	60/1	3500	3500	6000	1.1	3.5	25	8.4
54	48	49	30	1.9	PH422F0280 KX301VF0020 MF EZ301U	130	240	56.00	56/1	3500	3000	5500	1.0	3.5	24	7.8
54	82	86	52	1.1	PH422F0280 KX301VF0020 MF EZ302U	130	240	56.00	56/1	3500	3000	5500	1.1	3.5	24	8.4
60	43	44	27	2.1	PH422F0250 KX301VF0020 MF EZ301U	130	240	50.00	50/1	3500	3000	5500	1.0	3.5	26	7.8
60	73	77	46	1.2	PH422F0250 KX301VF0020 MF EZ302U	130	240	50.00	50/1	3500	3000	5500	1.1	3.5	26	8.4
63	41	42	19	2.2	PH422F0160 KX301VF0030 MF EZ301U	120	240	48.00	48/1	3500	3500	6000	0.95	3.5	22	7.8
63	70	74	33	1.3	PH422F0160 KX301VF0030 MF EZ302U	130	240	48.00	48/1	3500	3500	6000	1.1	3.5	22	8.4

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,5,6 [rpm]	n_{1maxDB} EL3,4 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PH4KX (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 130 Nm)																
75	34	35	22	2.6	PH422F0200 KX301VF0020 MF EZ301U	100	240	40.00	40/1	3500	3000	5500	1.0	3.5	25	7.8
75	58	62	37	1.5	PH422F0200 KX301VF0020 MF EZ302U	130	240	40.00	40/1	3500	3000	5500	1.1	3.5	25	8.4
75	76	80	48	1.2	PH422F0200 KX301VF0020 MF EZ303U	130	240	40.00	40/1	3500	3000	5500	1.2	3.5	25	8.9
86	30	30	32	3.0	PH422F0350 KX301VF0010 MF EZ301U	90	240	35.00	35/1	3000	2500	4500	1.2	3.5	26	7.8
86	51	54	54	1.8	PH422F0350 KX301VF0010 MF EZ302U	130	240	35.00	35/1	3000	2500	4500	1.3	3.5	26	8.4
86	66	70	71	1.4	PH422F0350 KX301VF0010 MF EZ303U	130	240	35.00	35/1	3000	2500	4500	1.4	3.5	26	8.9
86	90	96	96	1.0	PH422F0350 KX301VF0010 MF EZ401U	130	240	35.00	35/1	3000	2500	4500	2.0	3.5	26	10
94	27	28	17	3.3	PH422F0160 KX301VF0020 MF EZ301U	82	240	32.00	32/1	3500	3000	5500	1.0	3.5	22	7.8
94	47	49	30	1.9	PH422F0160 KX301VF0020 MF EZ302U	130	240	32.00	32/1	3500	3000	5500	1.1	3.5	22	8.4
94	61	64	38	1.5	PH422F0160 KX301VF0020 MF EZ303U	130	240	32.00	32/1	3500	3000	5500	1.2	3.5	22	8.9
94	82	88	52	1.1	PH422F0160 KX301VF0020 MF EZ401U	130	240	32.00	32/1	3500	3000	5500	1.8	3.5	22	10
100	26	27	21	2.3	PH421F0100 KX401VF0030 MF EZ301U	79	200	30.00	30/1	3000	3000	5500	1.6	4	17	8.2
100	45	48	36	1.3	PH421F0100 KX401VF0030 MF EZ302U	100	200	30.00	30/1	3000	3000	5500	1.7	4	17	8.8
100	59	62	46	1.0	PH421F0100 KX401VF0030 MF EZ303U	100	200	30.00	30/1	3000	3000	5500	1.8	4	17	9.3
143	18	19	9.7	4.9	PH421F0070 KX401VF0030 MF EZ301U	56	240	21.00	21/1	3000	3000	5500	1.6	4.5	19	8.2
143	32	33	17	2.9	PH421F0070 KX401VF0030 MF EZ302U	99	240	21.00	21/1	3000	3000	5500	1.7	4.5	19	8.8
143	41	43	22	2.2	PH421F0070 KX401VF0030 MF EZ303U	110	240	21.00	21/1	3000	3000	5500	1.8	4.5	19	9.3
143	56	60	29	1.6	PH421F0070 KX401VF0030 MF EZ401U	110	240	21.00	21/1	3000	3000	5500	2.4	4.5	19	11
150	18	18	19	3.4	PH421F0100 KX401VF0020 MF EZ301U	53	200	20.00	20/1	2500	2500	5000	1.8	4	17	8.2
150	30	32	32	2.0	PH421F0100 KX401VF0020 MF EZ302U	95	200	20.00	20/1	2500	2500	5000	1.9	4	17	8.8
150	39	41	42	1.5	PH421F0100 KX401VF0020 MF EZ303U	100	200	20.00	20/1	2500	2500	5000	2.0	4	17	9.3
150	53	57	57	1.1	PH421F0100 KX401VF0020 MF EZ401U	100	200	20.00	20/1	2500	2500	5000	2.6	4	17	11
200	23	24	13	3.7	PH421F0050 KX401VF0030 MF EZ302U	71	240	15.00	15/1	3000	3000	5500	1.8	5	15	8.8
200	29	31	17	2.9	PH421F0050 KX401VF0030 MF EZ303U	99	240	15.00	15/1	3000	3000	5500	1.9	5	15	9.3
200	40	43	22	2.1	PH421F0050 KX401VF0030 MF EZ401U	120	240	15.00	15/1	3000	3000	5500	2.4	5	15	11
200	61	67	34	1.4	PH421F0050 KX401VF0030 MF EZ501U	120	240	15.00	15/1	3000	3000	5500	4.4	5	15	12
200	67	74	38	1.3	PH421F0050 KX401VF0030 MF EZ402U	120	240	15.00	15/1	3000	3000	5500	3.1	5	15	12
214	21	22	15	4.3	PH421F0070 KX401VF0020 MF EZ302U	66	240	14.00	14/1	2500	2500	5000	2.0	4.5	19	8.8
214	27	29	20	3.3	PH421F0070 KX401VF0020 MF EZ303U	93	240	14.00	14/1	2500	2500	5000	2.1	4.5	19	9.3
214	37	40	26	2.4	PH421F0070 KX401VF0020 MF EZ401U	110	240	14.00	14/1	2500	2500	5000	2.6	4.5	19	11
214	57	62	41	1.6	PH421F0070 KX401VF0020 MF EZ501U	110	240	14.00	14/1	2500	2500	5000	4.6	4.5	19	12
214	62	69	44	1.4	PH421F0070 KX401VF0020 MF EZ402U	110	240	14.00	14/1	2500	2500	5000	3.3	4.5	19	12
250	18	19	13	3.7	PH421F0040 KX401VF0030 MF EZ302U	57	210	12.00	12/1	3000	3000	5500	1.8	5.5	11	8.8
250	23	25	17	2.9	PH421F0040 KX401VF0030 MF EZ303U	79	210	12.00	12/1	3000	3000	5500	1.9	5.5	11	9.3
250	32	34	22	2.1	PH421F0040 KX401VF0030 MF EZ401U	96	210	12.00	12/1	3000	3000	5500	2.4	5.5	11	11
250	49	53	34	1.4	PH421F0040 KX401VF0030 MF EZ501U	96	210	12.00	12/1	3000	3000	5500	4.4	5.5	11	12
250	53	59	38	1.3	PH421F0040 KX401VF0030 MF EZ402U	96	210	12.00	12/1	3000	3000	5500	3.1	5.5	11	12
300	20	21	15	4.3	PH421F0050 KX401VF0020 MF EZ303U	66	240	10.00	10/1	2500	2500	5000	2.1	5	15	9.3
300	26	28	20	3.2	PH421F0050 KX401VF0020 MF EZ401U	80	240	10.00	10/1	2500	2500	5000	2.6	5	15	11
300	41	44	31	2.1	PH421F0050 KX401VF0020 MF EZ501U	120	240	10.00	10/1	2500	2500	5000	4.6	5	15	12
300	44	49	34	1.9	PH421F0050 KX401VF0020 MF EZ402U	120	240	10.00	10/1	2500	2500	5000	3.3	5	15	12
300	65	81	50	1.3	PH421F0050 KX401VF0020 MF EZ404U	120	240	10.00	10/1	2500	2500	5000	4.7	5	15	14
300	70	76	54	1.2	PH421F0050 KX401VF0020 MF EZ502U	120	240	10.00	10/1	2500	2500	5000	6.9	5	15	13
300	70	78	54	1.2	PH421F0050 KX401VF0020 MF EZ701U	120	240	10.00	10/1	2500	2500	5000	10	5	15	15
375	16	17	15	4.3	PH421F0040 KX401VF0020 MF EZ303U	53	210	8.000	8/1	2500	2500	5000	2.1	5.5	11	9.3
375	21	23	20	3.2	PH421F0040 KX401VF0020 MF EZ401U	64	210	8.000	8/1	2500	2500	5000	2.7	5.5	11	11
375	33	36	31	2.1	PH421F0040 KX401VF0020 MF EZ501U	96	210	8.000	8/1	2500	2500	5000	4.6	5.5	11	12
375	36	39	34	1.9	PH421F0040 KX401VF0020 MF EZ402U	96	210	8.000	8/1	2500	2500	5000	3.4	5.5	11	12
375	52	65	50	1.3	PH421F0040 KX401VF0020 MF EZ404U	96	210	8.000	8/1	2500	2500	5000	4.7	5.5	11	14
375	56	61	54	1.2	PH421F0040 KX401VF0020 MF EZ502U	96	210	8.000	8/1	2500	2500	5000	6.9	5.5	11	13
375	56	63	54	1.2	PH421F0040 KX401VF0020 MF EZ701U	96	210	8.000	8/1	2500	2500	5000	10	5.5	11	15
429	19	20	27	4.0	PH421F0070 KX401VF0010 MF EZ401U	56	240	7.000	7/1	2500	2000	4000	3.4	4.5	19	11
429	28	31	41	2.6	PH421F0070 KX401VF0010 MF EZ501U	110	240	7.000	7/1	2500	2000	4000	5.4	4.5	19	12
429	31	34	45	2.4	PH421F0070 KX401VF0010 MF EZ402U	110	240	7.000	7/1	2500	2000	4000	4.1	4.5	19	12
429	46	57	66	1.6	PH421F0070 KX401VF0010 MF EZ404U	110	240	7.000	7/1	2500	2000	4000	5.5	4.5	19	14
429	49	53	71	1.5	PH421F0070 KX401VF0010 MF EZ502U	110	240	7.000	7/1	2500	2000	4000	7.7	4.5	19	13
429	49	55	71	1.5	PH421F0070 KX401VF0010 MF EZ701U	110	240	7.000	7/1	2500	2000	4000	11	4.5	19	15
429	64	73	93	1.2	PH421F0070 KX401VF0010 MF EZ503U	110	240	7.000	7/1	2500	2000	4000	10	4.5	19	15
600	20	22	30	3.7	PH421F0050 KX401VF0010 MF EZ501U	76	240	5.000	5/1	2500	2000	4000	5.6	5	15	12
600	22	25	32	3.3	PH421F0050 KX401VF0010 MF EZ402U	76	240	5.000	5/1	2500	2000	4000	4.3	5	15	12
600	33	41	47	2.3	PH421F0050 KX401VF0010 MF EZ404U	120	240	5.000	5/1	2500	2000	4000	5.6	5	15	14
600	35	38	51	2.1	PH421F0050 KX401VF0010 MF EZ502U	120	240	5.000	5/1	2500	2000	4000	7.9	5	15	13
600	35	39	51	2.1	PH421F0050 KX401VF0010 MF EZ701U	95	240	5.000	5/1	2500	2000	4000	11	5	15	15
600	46	52	67	1.6	PH421F0050 KX401VF0010 MF EZ503U	120	240	5.000	5/1	2500	2000	4000	10	5	15	15

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,5,6 [rpm]	n_{1maxDB} EL3,4 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PH4KX (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 130 Nm)																
600	57	68	83	1.3	PH421F0050 KX401VF0010 MF EZ702U	120	240	5.000	5/1	2500	2000	4000	16	5	15	18
600	64	76	93	1.2	PH421F0050 KX401VF0010 MF EZ505U	120	240	5.000	5/1	2500	2000	4000	15	5	15	18
750	16	18	26	4.1	PH421F0040 KX401VF0010 MF EZ501U	61	210	4.000	4/1	2500	2000	4000	5.7	5.5	11	12
750	18	20	29	3.8	PH421F0040 KX401VF0010 MF EZ402U	61	210	4.000	4/1	2500	2000	4000	4.5	5.5	11	12
750	26	33	42	2.6	PH421F0040 KX401VF0010 MF EZ404U	96	210	4.000	4/1	2500	2000	4000	5.8	5.5	11	14
750	28	30	45	2.4	PH421F0040 KX401VF0010 MF EZ502U	96	210	4.000	4/1	2500	2000	4000	8.0	5.5	11	13
750	28	31	45	2.4	PH421F0040 KX401VF0010 MF EZ701U	76	210	4.000	4/1	2500	2000	4000	11	5.5	11	15
750	37	42	59	1.8	PH421F0040 KX401VF0010 MF EZ503U	96	210	4.000	4/1	2500	2000	4000	10	5.5	11	15
750	45	54	73	1.5	PH421F0040 KX401VF0010 MF EZ702U	96	210	4.000	4/1	2500	2000	4000	17	5.5	11	18
750	51	61	82	1.3	PH421F0040 KX401VF0010 MF EZ505U	96	210	4.000	4/1	2500	2000	4000	15	5.5	11	18
PH4KX (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 130 Nm)																
57	86	91	40	1.1	PH422F0350 KX301VF0030 MF EZ301U	130	240	105.0	105/1	3500	3500	6000	0.94	3.5	26	7.8
71	68	73	32	1.3	PH422F0280 KX301VF0030 MF EZ301U	130	240	84.00	84/1	3500	3500	6000	0.94	3.5	24	7.8
80	61	65	29	1.5	PH422F0250 KX301VF0030 MF EZ301U	130	240	75.00	75/1	3500	3500	6000	0.95	3.5	26	7.8
100	49	52	23	1.8	PH422F0200 KX301VF0030 MF EZ301U	130	240	60.00	60/1	3500	3500	6000	0.95	3.5	25	7.8
100	82	92	39	1.1	PH422F0200 KX301VF0030 MF EZ302U	130	240	60.00	60/1	3500	3500	6000	1.1	3.5	25	8.4
125	39	42	18	2.3	PH422F0160 KX301VF0030 MF EZ301U	120	240	48.00	48/1	3500	3500	6000	0.95	3.5	22	7.8
125	66	74	31	1.4	PH422F0160 KX301VF0030 MF EZ302U	130	240	48.00	48/1	3500	3500	6000	1.1	3.5	22	8.4
125	86	99	40	1.0	PH422F0160 KX301VF0030 MF EZ303U	130	240	48.00	48/1	3500	3500	6000	1.2	3.5	22	8.9
PH5KX (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 320 Nm)																
14	179	183	40	1.2	PH522F0700 KX401VF0030 MF EZ301U	270	600	210.0	210/1	3000	3000	5500	1.6	3	65	12
20	128	131	28	1.7	PH522F0500 KX401VF0030 MF EZ301U	320	600	150.0	150/1	3000	3000	5500	1.6	3	64	12
20	218	231	47	1.0	PH522F0500 KX401VF0030 MF EZ302U	320	600	150.0	150/1	3000	3000	5500	1.7	3	64	13
21	119	122	36	1.8	PH522F0700 KX401VF0020 MF EZ301U	270	600	140.0	140/1	2500	2500	5000	1.8	3	65	12
25	102	104	23	2.1	PH522F0400 KX401VF0030 MF EZ301U	310	600	120.0	120/1	3000	3000	5500	1.6	3.5	56	12
25	175	185	39	1.2	PH522F0400 KX401VF0030 MF EZ302U	320	600	120.0	120/1	3000	3000	5500	1.7	3.5	56	13
29	89	91	19	2.5	PH522F0350 KX401VF0030 MF EZ301U	270	600	105.0	105/1	3000	3000	5500	1.6	3.5	64	12
29	153	162	33	1.4	PH522F0350 KX401VF0030 MF EZ302U	320	600	105.0	105/1	3000	3000	5500	1.7	3.5	64	13
29	199	211	43	1.1	PH522F0350 KX401VF0030 MF EZ303U	320	600	105.0	105/1	3000	3000	5500	1.8	3.5	64	14
30	85	87	25	2.6	PH522F0500 KX401VF0020 MF EZ301U	260	600	100.0	100/1	2500	2500	5000	1.8	3	64	12
30	146	154	43	1.5	PH522F0500 KX401VF0020 MF EZ302U	320	600	100.0	100/1	2500	2500	5000	1.9	3	64	13
30	190	201	55	1.2	PH522F0500 KX401VF0020 MF EZ303U	320	600	100.0	100/1	2500	2500	5000	2.0	3	64	14
36	72	73	16	2.9	PH522F0280 KX401VF0030 MF EZ301U	220	600	84.00	84/1	3000	3000	5500	1.6	3.5	57	12
36	122	129	28	1.7	PH522F0280 KX401VF0030 MF EZ302U	320	600	84.00	84/1	3000	3000	5500	1.7	3.5	57	13
36	159	169	36	1.3	PH522F0280 KX401VF0030 MF EZ303U	320	600	84.00	84/1	3000	3000	5500	1.8	3.5	57	14
38	68	70	21	3.1	PH522F0400 KX401VF0020 MF EZ301U	210	600	80.00	80/1	2500	2500	5000	1.8	3.5	56	12
38	117	123	36	1.8	PH522F0400 KX401VF0020 MF EZ302U	320	600	80.00	80/1	2500	2500	5000	1.9	3.5	56	13
38	152	160	46	1.4	PH522F0400 KX401VF0020 MF EZ303U	320	600	80.00	80/1	2500	2500	5000	2.0	3.5	56	14
38	205	220	63	1.0	PH522F0400 KX401VF0020 MF EZ401U	320	600	80.00	80/1	2500	2500	5000	2.6	3.5	56	15
40	64	65	14	3.4	PH522F0250 KX401VF0030 MF EZ301U	190	600	75.00	75/1	3000	3000	5500	1.6	3.5	63	12
40	109	115	24	2.0	PH522F0250 KX401VF0030 MF EZ302U	320	600	75.00	75/1	3000	3000	5500	1.7	3.5	63	13
40	142	150	31	1.5	PH522F0250 KX401VF0030 MF EZ303U	320	600	75.00	75/1	3000	3000	5500	1.9	3.5	63	14
40	192	206	41	1.1	PH522F0250 KX401VF0030 MF EZ401U	320	600	75.00	75/1	3000	3000	5500	2.4	3.5	63	15
43	60	61	17	3.7	PH522F0350 KX401VF0020 MF EZ301U	180	600	70.00	70/1	2500	2500	5000	1.8	3.5	64	12
43	102	108	30	2.2	PH522F0350 KX401VF0020 MF EZ302U	320	600	70.00	70/1	2500	2500	5000	1.9	3.5	64	13
43	133	140	39	1.7	PH522F0350 KX401VF0020 MF EZ303U	320	600	70.00	70/1	2500	2500	5000	2.0	3.5	64	14
43	180	192	52	1.2	PH522F0350 KX401VF0020 MF EZ401U	320	600	70.00	70/1	2500	2500	5000	2.6	3.5	64	15
50	51	52	11	4.3	PH522F0200 KX401VF0030 MF EZ301U	150	600	60.00	60/1	3000	3000	5500	1.7	3.5	60	12
50	87	92	19	2.5	PH522F0200 KX401VF0030 MF EZ302U	270	600	60.00	60/1	3000	3000	5500	1.8	3.5	60	13
50	114	120	24	1.9	PH522F0200 KX401VF0030 MF EZ303U	320	600	60.00	60/1	3000	3000	5500	1.9	3.5	60	14
50	154	165	33	1.4	PH522F0200 KX401VF0030 MF EZ401U	320	600	60.00	60/1	3000	3000	5500	2.4	3.5	60	15
54	48	49	15	4.4	PH522F0280 KX401VF0020 MF EZ301U	140	600	56.00	56/1	2500	2500	5000	1.8	3.5	57	12
54	82	86	25	2.6	PH522F0280 KX401VF0020 MF EZ302U	260	600	56.00	56/1	2500	2500	5000	1.9	3.5	57	13
54	106	112	32	2.0	PH522F0280 KX401VF0020 MF EZ303U	320	600	56.00	56/1	2500	2500	5000	2.0	3.5	57	14
54	144	154	44	1.5	PH522F0280 KX401VF0020 MF EZ401U	320	600	56.00	56/1	2500	2500	5000	2.6	3.5	57	15
60	73	77	21	3.0	PH522F0250 KX401VF0020 MF EZ302U	230	600	50.00	50/1	2500	2500	5000	2.0	3.5	63	13
60	95	100	28	2.3	PH522F0250 KX401VF0020 MF EZ303U	320	600	50.00	50/1	2500	2500	5000	2.1	3.5	63	14
60	128	137	37	1.7	PH522F0250 KX401VF0020 MF EZ401U	320	600	50.00	50/1	2500	2500	5000	2.6	3.5	63	15
60	197	215	57	1.1	PH522F0250 KX401VF0020 MF EZ501U	320	600	50.00	50/1	2500	2500	5000	4.6	3.5	63	16
60	215	238	63	1.0	PH522F0250 KX401VF0020 MF EZ402U	320	600	50.00	50/1	2500	2500	5000	3.3	3.5	63	16
63	70	74	16	3.0	PH522F0160 KX401VF0030 MF EZ302U	220	600	48.00	48/1	3000	3000	5500	1.8	3.5	52	13
63	91	96	21	2.3	PH522F0160 KX401VF0030 MF EZ303U	310	600	48.00	48/1	3000	3000	5500	1.9	3.5	52	14
63	123	132	28	1.7	PH522F0160 KX401VF0030 MF EZ401U	320	600	48.00	48/1	3000	3000	5500	2.4	3.5	52	15
63	189	207	43	1.1	PH522F0160 KX401VF0030 MF EZ501U	320	600	48.00	48/1	3000	3000	5500	4.4	3.5	52	16

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,5,6 [rpm]	n_{1maxDB} EL3,4 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PH5KX (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 320 Nm)																
63	207	229	47	1.0	PH522F0160 KX401VF0030 MF EZ402U	320	600	48.00	48/1	3000	3000	5500	3.1	3.5	52	16
75	58	62	17	3.8	PH522F0200 KX401VF0020 MF EZ302U	180	600	40.00	40/1	2500	2500	5000	2.0	3.5	60	13
75	76	80	22	2.9	PH522F0200 KX401VF0020 MF EZ303U	260	600	40.00	40/1	2500	2500	5000	2.1	3.5	60	14
75	103	110	30	2.1	PH522F0200 KX401VF0020 MF EZ401U	310	600	40.00	40/1	2500	2500	5000	2.6	3.5	60	15
75	158	172	46	1.4	PH522F0200 KX401VF0020 MF EZ501U	320	600	40.00	40/1	2500	2500	5000	4.6	3.5	60	16
75	172	191	50	1.3	PH522F0200 KX401VF0020 MF EZ402U	320	600	40.00	40/1	2500	2500	5000	3.3	3.5	60	16
86	51	54	25	4.3	PH522F0350 KX401VF0010 MF EZ302U	160	600	35.00	35/1	2500	2000	4000	2.8	3.5	64	13
86	66	70	33	3.3	PH522F0350 KX401VF0010 MF EZ303U	220	600	35.00	35/1	2500	2000	4000	2.9	3.5	64	14
86	90	96	44	2.5	PH522F0350 KX401VF0010 MF EZ401U	270	600	35.00	35/1	2500	2000	4000	3.4	3.5	64	15
86	138	151	68	1.6	PH522F0350 KX401VF0010 MF EZ501U	320	600	35.00	35/1	2500	2000	4000	5.4	3.5	64	16
86	151	167	74	1.5	PH522F0350 KX401VF0010 MF EZ402U	320	600	35.00	35/1	2500	2000	4000	4.1	3.5	64	16
94	47	49	14	4.5	PH522F0160 KX401VF0020 MF EZ302U	150	600	32.00	32/1	2500	2500	5000	2.0	3.5	52	13
94	61	64	19	3.5	PH522F0160 KX401VF0020 MF EZ303U	210	600	32.00	32/1	2500	2500	5000	2.1	3.5	52	14
94	82	88	25	2.6	PH522F0160 KX401VF0020 MF EZ401U	250	600	32.00	32/1	2500	2500	5000	2.6	3.5	52	15
94	126	138	39	1.7	PH522F0160 KX401VF0020 MF EZ501U	320	600	32.00	32/1	2500	2500	5000	4.6	3.5	52	16
94	138	152	42	1.5	PH522F0160 KX401VF0020 MF EZ402U	320	600	32.00	32/1	2500	2500	5000	3.3	3.5	52	16
100	79	85	30	1.8	PH521F0100 KX501VF0030 MF EZ401U	240	500	30.00	30/1	3000	3000	5000	5.7	4	45	17
100	122	133	46	1.1	PH521F0100 KX501VF0030 MF EZ501U	250	500	30.00	30/1	3000	3000	5000	7.7	4	45	18
100	133	148	50	1.1	PH521F0100 KX501VF0030 MF EZ402U	250	500	30.00	30/1	3000	3000	5000	6.4	4	45	18
143	56	60	14	3.8	PH521F0070 KX501VF0030 MF EZ401U	170	600	21.00	21/1	3000	3000	5000	5.8	4.5	47	17
143	85	93	21	2.5	PH521F0070 KX501VF0030 MF EZ501U	270	600	21.00	21/1	3000	3000	5000	7.7	4.5	47	18
143	93	103	23	2.3	PH521F0070 KX501VF0030 MF EZ402U	270	600	21.00	21/1	3000	3000	5000	6.5	4.5	47	18
143	137	171	34	1.5	PH521F0070 KX501VF0030 MF EZ404U	270	600	21.00	21/1	3000	3000	5000	7.8	4.5	47	20
143	147	159	37	1.4	PH521F0070 KX501VF0030 MF EZ502U	270	600	21.00	21/1	3000	3000	5000	10	4.5	47	19
143	147	165	37	1.4	PH521F0070 KX501VF0030 MF EZ701U	270	600	21.00	21/1	3000	3000	5000	13	4.5	47	21
150	53	57	27	2.6	PH521F0100 KX501VF0020 MF EZ401U	160	500	20.00	20/1	2500	2500	4500	6.3	4	45	17
150	81	89	41	1.7	PH521F0100 KX501VF0020 MF EZ501U	250	500	20.00	20/1	2500	2500	4500	8.2	4	45	18
150	89	98	45	1.6	PH521F0100 KX501VF0020 MF EZ402U	250	500	20.00	20/1	2500	2500	4500	7.0	4	45	18
150	130	163	66	1.1	PH521F0100 KX501VF0020 MF EZ404U	250	500	20.00	20/1	2500	2500	4500	8.3	4	45	20
150	140	151	71	1.0	PH521F0100 KX501VF0020 MF EZ502U	250	500	20.00	20/1	2500	2500	4500	11	4	45	19
150	140	157	71	1.0	PH521F0100 KX501VF0020 MF EZ701U	250	500	20.00	20/1	2500	2500	4500	14	4	45	21
200	61	67	15	3.4	PH521F0050 KX501VF0030 MF EZ501U	230	600	15.00	15/1	3000	3000	5000	7.8	5	36	18
200	67	74	17	3.1	PH521F0050 KX501VF0030 MF EZ402U	230	600	15.00	15/1	3000	3000	5000	6.5	5	36	18
200	98	122	25	2.1	PH521F0050 KX501VF0030 MF EZ404U	300	600	15.00	15/1	3000	3000	5000	7.9	5	36	20
200	105	113	26	2.0	PH521F0050 KX501VF0030 MF EZ502U	300	600	15.00	15/1	3000	3000	5000	10	5	36	19
200	105	118	26	2.0	PH521F0050 KX501VF0030 MF EZ701U	280	600	15.00	15/1	3000	3000	5000	13	5	36	21
200	138	157	35	1.5	PH521F0050 KX501VF0030 MF EZ503U	300	600	15.00	15/1	3000	3000	5000	12	5	36	21
200	170	204	43	1.2	PH521F0050 KX501VF0030 MF EZ702U	300	600	15.00	15/1	3000	3000	5000	19	5	36	24
200	191	227	48	1.1	PH521F0050 KX501VF0030 MF EZ505U	300	600	15.00	15/1	3000	3000	5000	17	5	36	24
214	57	62	19	3.7	PH521F0070 KX501VF0020 MF EZ501U	210	600	14.00	14/1	2500	2500	4500	8.3	4.5	47	18
214	62	69	21	3.4	PH521F0070 KX501VF0020 MF EZ402U	210	600	14.00	14/1	2500	2500	4500	7.0	4.5	47	18
214	91	114	31	2.3	PH521F0070 KX501VF0020 MF EZ404U	270	600	14.00	14/1	2500	2500	4500	8.4	4.5	47	20
214	98	106	33	2.1	PH521F0070 KX501VF0020 MF EZ502U	270	600	14.00	14/1	2500	2500	4500	11	4.5	47	19
214	98	110	33	2.1	PH521F0070 KX501VF0020 MF EZ701U	260	600	14.00	14/1	2500	2500	4500	14	4.5	47	21
214	128	147	44	1.6	PH521F0070 KX501VF0020 MF EZ503U	270	600	14.00	14/1	2500	2500	4500	13	4.5	47	21
214	159	191	54	1.3	PH521F0070 KX501VF0020 MF EZ702U	270	600	14.00	14/1	2500	2500	4500	19	4.5	47	24
250	49	53	15	3.4	PH521F0040 KX501VF0030 MF EZ501U	180	520	12.00	12/1	3000	3000	5000	7.8	5.5	28	18
250	53	59	17	3.1	PH521F0040 KX501VF0030 MF EZ402U	180	520	12.00	12/1	3000	3000	5000	6.6	5.5	28	18
250	78	98	25	2.1	PH521F0040 KX501VF0030 MF EZ404U	240	520	12.00	12/1	3000	3000	5000	7.9	5.5	28	20
250	84	91	26	2.0	PH521F0040 KX501VF0030 MF EZ502U	240	520	12.00	12/1	3000	3000	5000	10	5.5	28	19
250	84	94	26	2.0	PH521F0040 KX501VF0030 MF EZ701U	230	520	12.00	12/1	3000	3000	5000	13	5.5	28	21
250	110	126	35	1.5	PH521F0040 KX501VF0030 MF EZ503U	240	520	12.00	12/1	3000	3000	5000	13	5.5	28	21
250	136	163	43	1.2	PH521F0040 KX501VF0030 MF EZ702U	240	520	12.00	12/1	3000	3000	5000	19	5.5	28	24
250	153	182	48	1.1	PH521F0040 KX501VF0030 MF EZ505U	240	520	12.00	12/1	3000	3000	5000	17	5.5	28	24
300	44	49	15	4.7	PH521F0050 KX501VF0020 MF EZ402U	150	600	10.00	10/1	2500	2500	4500	7.1	5	36	18
300	65	81	22	3.2	PH521F0050 KX501VF0020 MF EZ404U	270	600	10.00	10/1	2500	2500	4500	8.5	5	36	20
300	70	76	24	3.0	PH521F0050 KX501VF0020 MF EZ502U	290	600	10.00	10/1	2500	2500	4500	11	5	36	19
300	70	78	24	3.0	PH521F0050 KX501VF0020 MF EZ701U	190	600	10.00	10/1	2500	2500	4500	14	5	36	21
300	92	105	31	2.3	PH521F0050 KX501VF0020 MF EZ503U	300	600	10.00	10/1	2500	2500	4500	13	5	36	21
300	113	136	39	1.8	PH521F0050 KX501VF0020 MF EZ702U	300	600	10.00	10/1	2500	2500	4500	19	5	36	24
300	128	151	43	1.6	PH521F0050 KX501VF0020 MF EZ505U	300	600	10.00	10/1	2500	2500	4500	18	5	36	24
300	156	197	53	1.3	PH521F0050 KX501VF0020 MF EZ703U	300	600	10.00	10/1	2500	2500	4500	27	5	36	26
375	36	39	15	4.7	PH521F0040 KX501VF0020 MF EZ402U	120	520	8.000	8/1	2500	2500	4500	7.3	5.5	28	18
375	52	65	22	3.2	PH521F0040 KX501VF0020 MF EZ404U	220	520	8.000	8/1	2500	2500	4500	8.6	5.5	28	20

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,5,6 [rpm]	n_{1maxDB} EL3,4 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PH5KX (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 320 Nm)																
375	56	61	24	3.0	PH521F0040 KX501VF0020 MF EZ502U	230	520	8.000	8/1	2500	2500	4500	11	5.5	28	19
375	56	63	24	3.0	PH521F0040 KX501VF0020 MF EZ701U	150	520	8.000	8/1	2500	2500	4500	14	5.5	28	21
375	73	84	31	2.3	PH521F0040 KX501VF0020 MF EZ503U	240	520	8.000	8/1	2500	2500	4500	13	5.5	28	21
375	91	109	39	1.8	PH521F0040 KX501VF0020 MF EZ702U	240	520	8.000	8/1	2500	2500	4500	19	5.5	28	24
375	102	121	43	1.6	PH521F0040 KX501VF0020 MF EZ505U	240	520	8.000	8/1	2500	2500	4500	18	5.5	28	24
375	125	157	53	1.3	PH521F0040 KX501VF0020 MF EZ703U	240	520	8.000	8/1	2500	2500	4500	27	5.5	28	26
429	46	57	30	4.0	PH521F0070 KX501VF0010 MF EZ404U	190	600	7.000	7/1	2500	2000	3500	11	4.5	47	20
429	49	53	32	3.7	PH521F0070 KX501VF0010 MF EZ502U	210	600	7.000	7/1	2500	2000	3500	13	4.5	47	19
429	49	55	32	3.7	PH521F0070 KX501VF0010 MF EZ701U	130	600	7.000	7/1	2500	2000	3500	16	4.5	47	21
429	64	73	42	2.9	PH521F0070 KX501VF0010 MF EZ503U	270	600	7.000	7/1	2500	2000	3500	16	4.5	47	21
429	79	95	52	2.3	PH521F0070 KX501VF0010 MF EZ702U	270	600	7.000	7/1	2500	2000	3500	22	4.5	47	24
429	89	106	58	2.1	PH521F0070 KX501VF0010 MF EZ505U	270	600	7.000	7/1	2500	2000	3500	20	4.5	47	24
429	109	138	71	1.7	PH521F0070 KX501VF0010 MF EZ703U	270	600	7.000	7/1	2500	2000	3500	30	4.5	47	26
429	141	200	92	1.3	PH521F0070 KX501VF0010 MF EZ705U	270	600	7.000	7/1	2500	2000	3500	42	4.5	47	31
600	46	52	30	4.0	PH521F0050 KX501VF0010 MF EZ503U	200	600	5.000	5/1	2500	2000	3500	16	5	36	21
600	57	68	37	3.2	PH521F0050 KX501VF0010 MF EZ702U	190	600	5.000	5/1	2500	2000	3500	22	5	36	24
600	64	76	42	2.9	PH521F0050 KX501VF0010 MF EZ505U	300	600	5.000	5/1	2500	2000	3500	21	5	36	24
600	78	98	51	2.4	PH521F0050 KX501VF0010 MF EZ703U	300	600	5.000	5/1	2500	2000	3500	30	5	36	26
600	101	143	66	1.8	PH521F0050 KX501VF0010 MF EZ705U	300	600	5.000	5/1	2500	2000	3500	42	5	36	31
750	37	42	26	4.6	PH521F0040 KX501VF0010 MF EZ503U	160	520	4.000	4/1	2500	2000	3500	17	5.5	28	21
750	45	54	32	3.7	PH521F0040 KX501VF0010 MF EZ702U	160	520	4.000	4/1	2500	2000	3500	23	5.5	28	24
750	51	61	37	3.3	PH521F0040 KX501VF0010 MF EZ505U	240	520	4.000	4/1	2500	2000	3500	21	5.5	28	24
750	62	79	45	2.7	PH521F0040 KX501VF0010 MF EZ703U	240	520	4.000	4/1	2500	2000	3500	31	5.5	28	26
750	81	114	58	2.1	PH521F0040 KX501VF0010 MF EZ705U	240	520	4.000	4/1	2500	2000	3500	43	5.5	28	31
PH5KX (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 300 Nm)																
300	135	217	39	1.4	PH521F0050 KX501VF0030 MF EZ505U	300	600	15.00	15/1	3000	3000	5000	17	5	36	24
321	126	203	44	1.6	PH521F0070 KX501VF0020 MF EZ505U	270	600	14.00	14/1	2500	2500	4500	18	4.5	47	24
375	108	174	39	1.4	PH521F0040 KX501VF0030 MF EZ505U	240	520	12.00	12/1	3000	3000	5000	17	5.5	28	24
450	90	145	35	2.0	PH521F0050 KX501VF0020 MF EZ505U	300	600	10.00	10/1	2500	2500	4500	18	5	36	24
450	114	189	45	1.6	PH521F0050 KX501VF0020 MF EZ703U	300	600	10.00	10/1	2500	2500	4500	27	5	36	26
563	72	116	35	2.0	PH521F0040 KX501VF0020 MF EZ505U	240	520	8.000	8/1	2500	2500	4500	18	5.5	28	24
563	92	151	45	1.6	PH521F0040 KX501VF0020 MF EZ703U	240	520	8.000	8/1	2500	2500	4500	27	5.5	28	26
PH7KX (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 650 Nm)																
286	289	438	237	1.5	PH721F0070 KX701VF0010 MF EZ805U	650	1240	7.000	7/1	1800	1600	3000	159	4.5	119	69
400	207	313	169	2.1	PH721F0050 KX701VF0010 MF EZ805U	600	1150	5.000	5/1	1800	1600	3000	160	5	104	69
500	165	250	155	2.3	PH721F0040 KX701VF0010 MF EZ805U	480	920	4.000	4/1	1800	1600	3000	162	5.5	83	69
PH7KX (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 700 Nm)																
20	385	412	46	1.1	PH722F0500 KX501VF0030 MF EZ401U	700	1400	150.0	150/1	3000	3000	5000	5.7	3	139	25
21	359	385	58	1.2	PH722F0700 KX501VF0020 MF EZ401U	650	1240	140.0	140/1	2500	2500	4500	6.2	3	140	25
25	308	330	37	1.4	PH722F0400 KX501VF0030 MF EZ401U	700	1370	120.0	120/1	3000	3000	5000	5.7	3.5	122	25
29	269	289	32	1.6	PH722F0350 KX501VF0030 MF EZ401U	700	1400	105.0	105/1	3000	3000	5000	5.7	3.5	139	25
29	414	452	49	1.1	PH722F0350 KX501VF0030 MF EZ501U	700	1400	105.0	105/1	3000	3000	5000	7.7	3.5	139	26
30	256	275	42	1.7	PH722F0500 KX501VF0020 MF EZ401U	700	1400	100.0	100/1	2500	2500	4500	6.2	3	139	25
30	394	431	64	1.1	PH722F0500 KX501VF0020 MF EZ501U	700	1400	100.0	100/1	2500	2500	4500	8.2	3	139	26
30	431	476	70	1.0	PH722F0500 KX501VF0020 MF EZ402U	700	1400	100.0	100/1	2500	2500	4500	6.9	3	139	26
36	215	231	26	2.0	PH722F0280 KX501VF0030 MF EZ401U	650	1370	84.00	84/1	3000	3000	5000	5.7	3.5	122	25
36	331	362	40	1.3	PH722F0280 KX501VF0030 MF EZ501U	700	1370	84.00	84/1	3000	3000	5000	7.7	3.5	122	26
36	362	400	43	1.2	PH722F0280 KX501VF0030 MF EZ402U	700	1370	84.00	84/1	3000	3000	5000	6.4	3.5	122	26
38	205	220	33	2.1	PH722F0400 KX501VF0020 MF EZ401U	620	1370	80.00	80/1	2500	2500	4500	6.3	3.5	122	25
38	315	344	51	1.4	PH722F0400 KX501VF0020 MF EZ501U	700	1370	80.00	80/1	2500	2500	4500	8.2	3.5	122	26
38	344	381	56	1.3	PH722F0400 KX501VF0020 MF EZ402U	700	1370	80.00	80/1	2500	2500	4500	7.0	3.5	122	26
40	192	206	23	2.3	PH722F0250 KX501VF0030 MF EZ401U	580	1400	75.00	75/1	3000	3000	5000	5.8	3.5	135	25
40	295	323	35	1.5	PH722F0250 KX501VF0030 MF EZ501U	700	1400	75.00	75/1	3000	3000	5000	7.8	3.5	135	26
40	323	357	39	1.4	PH722F0250 KX501VF0030 MF EZ402U	700	1400	75.00	75/1	3000	3000	5000	6.5	3.5	135	26
43	180	192	29	2.5	PH722F0350 KX501VF0020 MF EZ401U	550	1400	70.00	70/1	2500	2500	4500	6.3	3.5	139	25
43	276	301	45	1.6	PH722F0350 KX501VF0020 MF EZ501U	700	1400	70.00	70/1	2500	2500	4500	8.3	3.5	139	26
43	301	333	49	1.5	PH722F0350 KX501VF0020 MF EZ402U	700	1400	70.00	70/1	2500	2500	4500	7.0	3.5	139	26
50	154	165	18	2.9	PH722F0200 KX501VF0030 MF EZ401U	470	1400	60.00	60/1	3000	3000	5000	5.8	3.5	129	25
50	236	258	28	1.9	PH722F0200 KX501VF0030 MF EZ501U	700	1400	60.00	60/1	3000	3000	5000	7.8	3.5	129	26
50	258	286	31	1.7	PH722F0200 KX501VF0030 MF EZ402U	700	1400	60.00	60/1	3000	3000	5000	6.5	3.5	129	26
50	379	473	45	1.2	PH722F0200 KX501VF0030 MF EZ404U	700	1400	60.00	60/1	3000	3000	5000	7.9	3.5	129	28
50	407	440	49	1.1	PH722F0200 KX501VF0030 MF EZ502U	700	1400	60.00	60/1	3000	3000	5000	10	3.5	129	27
50	407	456	49	1.1	PH722F0200 KX501VF0030 MF EZ701U	700	1400	60.00	60/1	3000	3000	5000	13	3.5	129	29

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,5,6 [rpm]	n_{1maxDB} EL3,4 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PH7KX (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 700 Nm)																
54	144	154	23	3.1	PH722F0280 KX501VF0020 MF EZ401U	440	1370	56.00	56/1	2500	2500	4500	6.3	3.5	122	25
54	221	241	36	2.0	PH722F0280 KX501VF0020 MF EZ501U	700	1370	56.00	56/1	2500	2500	4500	8.3	3.5	122	26
54	241	267	39	1.8	PH722F0280 KX501VF0020 MF EZ402U	700	1370	56.00	56/1	2500	2500	4500	7.0	3.5	122	26
54	354	441	57	1.2	PH722F0280 KX501VF0020 MF EZ404U	700	1370	56.00	56/1	2500	2500	4500	8.3	3.5	122	28
54	380	410	62	1.2	PH722F0280 KX501VF0020 MF EZ502U	700	1370	56.00	56/1	2500	2500	4500	11	3.5	122	27
54	380	426	62	1.2	PH722F0280 KX501VF0020 MF EZ701U	700	1370	56.00	56/1	2500	2500	4500	14	3.5	122	29
60	128	137	21	3.4	PH722F0250 KX501VF0020 MF EZ401U	390	1400	50.00	50/1	2500	2500	4500	6.4	3.5	135	25
60	197	215	32	2.2	PH722F0250 KX501VF0020 MF EZ501U	700	1400	50.00	50/1	2500	2500	4500	8.3	3.5	135	26
60	215	238	35	2.0	PH722F0250 KX501VF0020 MF EZ402U	700	1400	50.00	50/1	2500	2500	4500	7.1	3.5	135	26
60	316	394	51	1.4	PH722F0250 KX501VF0020 MF EZ404U	700	1400	50.00	50/1	2500	2500	4500	8.4	3.5	135	28
60	339	366	55	1.3	PH722F0250 KX501VF0020 MF EZ502U	700	1400	50.00	50/1	2500	2500	4500	11	3.5	135	27
60	339	380	55	1.3	PH722F0250 KX501VF0020 MF EZ701U	700	1400	50.00	50/1	2500	2500	4500	14	3.5	135	29
63	123	132	15	3.6	PH722F0160 KX501VF0030 MF EZ401U	370	1370	48.00	48/1	3000	3000	5000	5.8	3.5	111	25
63	189	207	23	2.3	PH722F0160 KX501VF0030 MF EZ501U	700	1370	48.00	48/1	3000	3000	5000	7.8	3.5	111	26
63	207	229	25	2.1	PH722F0160 KX501VF0030 MF EZ402U	700	1370	48.00	48/1	3000	3000	5000	6.5	3.5	111	26
63	303	378	36	1.5	PH722F0160 KX501VF0030 MF EZ404U	700	1370	48.00	48/1	3000	3000	5000	7.9	3.5	111	28
63	325	352	39	1.4	PH722F0160 KX501VF0030 MF EZ502U	700	1370	48.00	48/1	3000	3000	5000	10	3.5	111	27
63	325	365	39	1.4	PH722F0160 KX501VF0030 MF EZ701U	700	1370	48.00	48/1	3000	3000	5000	13	3.5	111	29
63	427	488	51	1.0	PH722F0160 KX501VF0030 MF EZ503U	700	1370	48.00	48/1	3000	3000	5000	12	3.5	111	29
75	103	110	17	4.3	PH722F0200 KX501VF0020 MF EZ401U	310	1400	40.00	40/1	2500	2500	4500	6.5	3.5	129	25
75	158	172	26	2.8	PH722F0200 KX501VF0020 MF EZ501U	590	1400	40.00	40/1	2500	2500	4500	8.4	3.5	129	26
75	172	191	28	2.6	PH722F0200 KX501VF0020 MF EZ402U	590	1400	40.00	40/1	2500	2500	4500	7.2	3.5	129	26
75	253	315	41	1.7	PH722F0200 KX501VF0020 MF EZ404U	700	1400	40.00	40/1	2500	2500	4500	8.5	3.5	129	28
75	271	293	44	1.6	PH722F0200 KX501VF0020 MF EZ502U	700	1400	40.00	40/1	2500	2500	4500	11	3.5	129	27
75	271	304	44	1.6	PH722F0200 KX501VF0020 MF EZ701U	700	1400	40.00	40/1	2500	2500	4500	14	3.5	129	29
75	355	407	58	1.2	PH722F0200 KX501VF0020 MF EZ503U	700	1400	40.00	40/1	2500	2500	4500	13	3.5	129	29
75	440	528	71	1.0	PH722F0200 KX501VF0020 MF EZ702U	700	1400	40.00	40/1	2500	2500	4500	19	3.5	129	32
86	90	96	24	4.9	PH722F0350 KX501VF0010 MF EZ401U	270	1400	35.00	35/1	2500	2000	3500	8.7	3.5	139	25
86	138	151	38	3.2	PH722F0350 KX501VF0010 MF EZ501U	510	1400	35.00	35/1	2500	2000	3500	11	3.5	139	26
86	151	167	41	2.9	PH722F0350 KX501VF0010 MF EZ402U	510	1400	35.00	35/1	2500	2000	3500	9.4	3.5	139	26
86	221	276	60	2.0	PH722F0350 KX501VF0010 MF EZ404U	700	1400	35.00	35/1	2500	2000	3500	11	3.5	139	28
86	237	256	65	1.9	PH722F0350 KX501VF0010 MF EZ502U	700	1400	35.00	35/1	2500	2000	3500	13	3.5	139	27
86	237	266	65	1.9	PH722F0350 KX501VF0010 MF EZ701U	640	1400	35.00	35/1	2500	2000	3500	16	3.5	139	29
86	311	356	85	1.4	PH722F0350 KX501VF0010 MF EZ503U	700	1400	35.00	35/1	2500	2000	3500	15	3.5	139	29
86	385	462	105	1.1	PH722F0350 KX501VF0010 MF EZ702U	700	1400	35.00	35/1	2500	2000	3500	22	3.5	139	32
86	433	513	118	1.0	PH722F0350 KX501VF0010 MF EZ505U	700	1400	35.00	35/1	2500	2000	3500	20	3.5	139	32
94	126	138	20	3.5	PH722F0160 KX501VF0020 MF EZ501U	470	1370	32.00	32/1	2500	2500	4500	8.5	3.5	111	26
94	138	152	22	3.2	PH722F0160 KX501VF0020 MF EZ402U	470	1370	32.00	32/1	2500	2500	4500	7.2	3.5	111	26
94	202	252	33	2.2	PH722F0160 KX501VF0020 MF EZ404U	700	1370	32.00	32/1	2500	2500	4500	8.6	3.5	111	28
94	217	235	35	2.0	PH722F0160 KX501VF0020 MF EZ502U	700	1370	32.00	32/1	2500	2500	4500	11	3.5	111	27
94	217	243	35	2.0	PH722F0160 KX501VF0020 MF EZ701U	590	1370	32.00	32/1	2500	2500	4500	14	3.5	111	29
94	284	325	46	1.5	PH722F0160 KX501VF0020 MF EZ503U	700	1370	32.00	32/1	2500	2500	4500	13	3.5	111	29
94	352	422	57	1.3	PH722F0160 KX501VF0020 MF EZ702U	700	1370	32.00	32/1	2500	2500	4500	19	3.5	111	32
94	396	469	64	1.1	PH722F0160 KX501VF0020 MF EZ505U	700	1370	32.00	32/1	2500	2500	4500	18	3.5	111	32
100	122	133	64	2.5	PH721F0100 KX701VF0030 MF EZ501U	450	1000	30.00	30/1	2100	2100	4000	15	4	104	29
100	210	227	111	1.4	PH721F0100 KX701VF0030 MF EZ502U	500	1000	30.00	30/1	2100	2100	4000	18	4	104	30
100	210	235	111	1.4	PH721F0100 KX701VF0030 MF EZ701U	500	1000	30.00	30/1	2100	2100	4000	21	4	104	32
100	275	315	145	1.1	PH721F0100 KX701VF0030 MF EZ503U	500	1000	30.00	30/1	2100	2100	4000	20	4	104	32
143	147	159	53	3.0	PH721F0070 KX701VF0030 MF EZ502U	620	1240	21.00	21/1	2100	2100	4000	18	4.5	119	30
143	147	165	53	3.0	PH721F0070 KX701VF0030 MF EZ701U	400	1240	21.00	21/1	2100	2100	4000	21	4.5	119	32
143	193	220	69	2.3	PH721F0070 KX701VF0030 MF EZ503U	650	1240	21.00	21/1	2100	2100	4000	20	4.5	119	32
143	238	286	86	1.8	PH721F0070 KX701VF0030 MF EZ702U	650	1240	21.00	21/1	2100	2100	4000	26	4.5	119	34
143	268	318	96	1.6	PH721F0070 KX701VF0030 MF EZ505U	650	1240	21.00	21/1	2100	2100	4000	25	4.5	119	34
143	328	413	118	1.3	PH721F0070 KX701VF0030 MF EZ703U	650	1240	21.00	21/1	2100	2100	4000	34	4.5	119	36
150	81	89	58	3.7	PH721F0100 KX701VF0020 MF EZ501U	300	1000	20.00	20/1	1800	1800	3500	18	4	104	29
150	140	151	100	2.1	PH721F0100 KX701VF0020 MF EZ502U	500	1000	20.00	20/1	1800	1800	3500	20	4	104	30
150	140	157	100	2.1	PH721F0100 KX701VF0020 MF EZ701U	380	1000	20.00	20/1	1800	1800	3500	23	4	104	32
150	183	210	131	1.6	PH721F0100 KX701VF0020 MF EZ503U	500	1000	20.00	20/1	1800	1800	3500	22	4	104	32
150	227	272	162	1.3	PH721F0100 KX701VF0020 MF EZ702U	500	1000	20.00	20/1	1800	1800	3500	29	4	104	34
150	255	303	182	1.2	PH721F0100 KX701VF0020 MF EZ505U	500	1000	20.00	20/1	1800	1800	3500	27	4	104	34
200	105	113	40	4.0	PH721F0050 KX701VF0030 MF EZ502U	440	1300	15.00	15/1	2100	2100	4000	18	5	104	30
200	105	118	40	4.0	PH721F0050 KX701VF0030 MF EZ701U	280	1300	15.00	15/1	2100	2100	4000	21	5	104	32
200	138	157	52	3.0	PH721F0050 KX701VF0030 MF EZ503U	600	1300	15.00	15/1	2100	2100	4000	20	5	104	32
200	170	204	64	2.5	PH721F0050 KX701VF0030 MF EZ702U	580	1300	15.00	15/1	2100	2100	4000	26	5	104	34

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,5,6 [rpm]	n_{1maxDB} EL3,4 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PH7KX (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 700 Nm)																
200	191	227	72	2.2	PH721F0050 KX701VF0030 MF EZ505U	600	1300	15.00	15/1	2100	2100	4000	25	5	104	34
200	234	295	88	1.8	PH721F0050 KX701VF0030 MF EZ703U	600	1300	15.00	15/1	2100	2100	4000	34	5	104	36
200	302	428	114	1.4	PH721F0050 KX701VF0030 MF EZ705U	600	1300	15.00	15/1	2100	2100	4000	47	5	104	42
214	98	106	48	4.5	PH721F0070 KX701VF0020 MF EZ502U	410	1240	14.00	14/1	1800	1800	3500	20	4.5	119	30
214	98	110	48	4.5	PH721F0070 KX701VF0020 MF EZ701U	260	1240	14.00	14/1	1800	1800	3500	24	4.5	119	32
214	128	147	62	3.4	PH721F0070 KX701VF0020 MF EZ503U	570	1240	14.00	14/1	1800	1800	3500	23	4.5	119	32
214	159	191	77	2.8	PH721F0070 KX701VF0020 MF EZ702U	540	1240	14.00	14/1	1800	1800	3500	29	4.5	119	34
214	179	212	87	2.5	PH721F0070 KX701VF0020 MF EZ505U	650	1240	14.00	14/1	1800	1800	3500	27	4.5	119	34
214	218	275	106	2.0	PH721F0070 KX701VF0020 MF EZ703U	650	1240	14.00	14/1	1800	1800	3500	37	4.5	119	36
214	282	400	137	1.6	PH721F0070 KX701VF0020 MF EZ705U	650	1240	14.00	14/1	1800	1800	3500	49	4.5	119	42
214	295	491	144	1.5	PH721F0070 KX701VF0020 MF EZ802U	650	1240	14.00	14/1	1800	1800	3500	73	4.5	119	50
250	84	91	40	4.0	PH721F0040 KX701VF0030 MF EZ502U	350	1040	12.00	12/1	2100	2100	4000	18	5.5	83	30
250	84	94	40	4.0	PH721F0040 KX701VF0030 MF EZ701U	230	1040	12.00	12/1	2100	2100	4000	21	5.5	83	32
250	110	126	52	3.0	PH721F0040 KX701VF0030 MF EZ503U	480	1040	12.00	12/1	2100	2100	4000	21	5.5	83	32
250	136	163	64	2.5	PH721F0040 KX701VF0030 MF EZ702U	470	1040	12.00	12/1	2100	2100	4000	27	5.5	83	34
250	153	182	72	2.2	PH721F0040 KX701VF0030 MF EZ505U	480	1040	12.00	12/1	2100	2100	4000	25	5.5	83	34
250	187	236	88	1.8	PH721F0040 KX701VF0030 MF EZ703U	480	1040	12.00	12/1	2100	2100	4000	35	5.5	83	36
250	242	343	114	1.4	PH721F0040 KX701VF0030 MF EZ705U	480	1040	12.00	12/1	2100	2100	4000	47	5.5	83	42
300	92	105	47	4.6	PH721F0050 KX701VF0020 MF EZ503U	410	1300	10.00	10/1	1800	1800	3500	23	5	104	32
300	113	136	58	3.7	PH721F0050 KX701VF0020 MF EZ702U	390	1300	10.00	10/1	1800	1800	3500	29	5	104	34
300	128	151	65	3.3	PH721F0050 KX701VF0020 MF EZ505U	600	1300	10.00	10/1	1800	1800	3500	28	5	104	34
300	156	197	80	2.7	PH721F0050 KX701VF0020 MF EZ703U	600	1300	10.00	10/1	1800	1800	3500	37	5	104	36
300	201	286	103	2.1	PH721F0050 KX701VF0020 MF EZ705U	600	1300	10.00	10/1	1800	1800	3500	49	5	104	42
300	211	351	108	2.0	PH721F0050 KX701VF0020 MF EZ802U	600	1300	10.00	10/1	1800	1800	3500	73	5	104	50
300	252	456	128	1.7	PH721F0050 KX701VF0020 MF EZ803U	600	1300	10.00	10/1	1800	1800	3500	99	5	104	56
375	73	84	47	4.6	PH721F0040 KX701VF0020 MF EZ503U	330	1040	8.000	8/1	1800	1800	3500	23	5.5	83	32
375	91	109	58	3.7	PH721F0040 KX701VF0020 MF EZ702U	310	1040	8.000	8/1	1800	1800	3500	30	5.5	83	34
375	102	121	65	3.3	PH721F0040 KX701VF0020 MF EZ505U	480	1040	8.000	8/1	1800	1800	3500	28	5.5	83	34
375	125	157	80	2.7	PH721F0040 KX701VF0020 MF EZ703U	480	1040	8.000	8/1	1800	1800	3500	38	5.5	83	36
375	161	228	103	2.1	PH721F0040 KX701VF0020 MF EZ705U	480	1040	8.000	8/1	1800	1800	3500	50	5.5	83	42
375	169	281	108	2.0	PH721F0040 KX701VF0020 MF EZ802U	480	1040	8.000	8/1	1800	1800	3500	74	5.5	83	50
375	201	365	128	1.7	PH721F0040 KX701VF0020 MF EZ803U	480	1040	8.000	8/1	1800	1800	3500	99	5.5	83	56
429	79	95	74	4.8	PH721F0070 KX701VF0010 MF EZ702U	270	1240	7.000	7/1	1800	1600	3000	40	4.5	119	34
429	89	106	84	4.3	PH721F0070 KX701VF0010 MF EZ505U	440	1240	7.000	7/1	1800	1600	3000	38	4.5	119	34
429	109	138	102	3.5	PH721F0070 KX701VF0010 MF EZ703U	430	1240	7.000	7/1	1800	1600	3000	48	4.5	119	36
429	141	200	132	2.7	PH721F0070 KX701VF0010 MF EZ705U	650	1240	7.000	7/1	1800	1600	3000	60	4.5	119	42
429	148	246	138	2.6	PH721F0070 KX701VF0010 MF EZ802U	650	1240	7.000	7/1	1800	1600	3000	84	4.5	119	50
429	176	319	165	2.2	PH721F0070 KX701VF0010 MF EZ803U	650	1240	7.000	7/1	1800	1600	3000	110	4.5	119	56
600	78	98	73	4.9	PH721F0050 KX701VF0010 MF EZ703U	310	1150	5.000	5/1	1800	1600	3000	49	5	104	36
600	101	143	94	3.8	PH721F0050 KX701VF0010 MF EZ705U	490	1150	5.000	5/1	1800	1600	3000	62	5	104	42
600	105	175	99	3.6	PH721F0050 KX701VF0010 MF EZ802U	470	1150	5.000	5/1	1800	1600	3000	86	5	104	50
600	126	228	118	3.1	PH721F0050 KX701VF0010 MF EZ803U	600	1150	5.000	5/1	1800	1600	3000	111	5	104	56
750	81	114	86	4.2	PH721F0040 KX701VF0010 MF EZ705U	390	920	4.000	4/1	1800	1600	3000	64	5.5	83	42
750	84	140	91	4.0	PH721F0040 KX701VF0010 MF EZ802U	380	920	4.000	4/1	1800	1600	3000	88	5.5	83	50
750	101	182	108	3.3	PH721F0040 KX701VF0010 MF EZ803U	480	920	4.000	4/1	1800	1600	3000	113	5.5	83	56
PH7KX (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 700 Nm)																
141	278	448	45	1.6	PH722F0160 KX501VF0020 MF EZ505U	700	1370	32.00	32/1	2500	2500	4500	18	3.5	111	32
PH8KX (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 1600 Nm)																
133	620	938	110	1.5	PH821F0050 KX801VF0030 MF EZ805U	1320	2600	15.00	15/1	1300	1300	3000	178	5	226	102
143	579	875	134	1.7	PH821F0070 KX801VF0020 MF EZ805U	1600	2770	14.00	14/1	1100	1100	2500	184	4.5	288	102
167	496	750	110	1.5	PH821F0040 KX801VF0030 MF EZ805U	1060	2080	12.00	12/1	1300	1300	3000	179	5.5	174	102
200	413	625	100	2.3	PH821F0050 KX801VF0020 MF EZ805U	1320	2600	10.00	10/1	1100	1100	2500	185	5	226	102
250	331	500	100	2.3	PH821F0040 KX801VF0020 MF EZ805U	1060	2080	8.000	8/1	1100	1100	2500	188	5.5	174	102
286	289	438	113	3.5	PH821F0070 KX801VF0010 MF EZ805U	1360	2770	7.000	7/1	1000	750	2000	218	4.5	288	102
400	207	313	84	4.6	PH821F0050 KX801VF0010 MF EZ805U	970	2190	5.000	5/1	1000	750	2000	225	5	226	102
500	165	250	84	4.6	PH821F0040 KX801VF0010 MF EZ805U	780	1750	4.000	4/1	1000	750	2000	234	5.5	174	102
PH8KX (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 2000 Nm)																
14	827	904	131	1.2	PH822F0700 KX701VF0030 MF EZ501U	1600	2770	210.0	210/1	2100	2100	4000	15	3	417	56
15	788	861	211	1.0	PH822F1000 KX701VF0020 MF EZ501U	1200	2400	200.0	200/1	1800	1800	3500	18	3	304	56
20	591	646	75	2.1	PH822F0500 KX701VF0030 MF EZ501U	2000	3200	150.0	150/1	2100	2100	4000	15	3	428	56
20	1017	1099	129	1.2	PH822F0500 KX701VF0030 MF EZ502U	2000	3200	150.0	150/1	2100	2100	4000	18	3	428	58
20	1017	1140	129	1.2	PH822F0500 KX701VF0030 MF EZ701U	2000	3200	150.0	150/1	2100	2100	4000	21	3	428	59
21	551	603	118	1.8	PH822F0700 KX701VF0020 MF EZ501U	1600	2770	140.0	140/1	1800	1800	3500	18	3	417	56

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,5,6 [rpm]	n_{1maxDB} EL3,4 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PH8KX (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 2000 Nm)																
21	949	1026	203	1.1	PH822F0700 KX701VF0020 MF EZ502U	1600	2770	140.0	140/1	1800	1800	3500	20	3	417	58
21	949	1064	203	1.1	PH822F0700 KX701VF0020 MF EZ701U	1600	2770	140.0	140/1	1800	1800	3500	23	3	417	59
25	473	517	68	2.3	PH822F0400 KX701VF0030 MF EZ501U	1760	3150	120.0	120/1	2100	2100	4000	15	3.5	406	56
25	813	879	117	1.4	PH822F0400 KX701VF0030 MF EZ502U	1920	3150	120.0	120/1	2100	2100	4000	18	3.5	406	58
25	813	912	117	1.4	PH822F0400 KX701VF0030 MF EZ701U	1920	3150	120.0	120/1	2100	2100	4000	21	3.5	406	59
25	1066	1220	153	1.0	PH822F0400 KX701VF0030 MF EZ503U	1920	3150	120.0	120/1	2100	2100	4000	20	3.5	406	59
29	414	452	52	3.0	PH822F0350 KX701VF0030 MF EZ501U	1540	3200	105.0	105/1	2100	2100	4000	15	3.5	432	56
29	712	769	90	1.8	PH822F0350 KX701VF0030 MF EZ502U	2000	3200	105.0	105/1	2100	2100	4000	18	3.5	432	58
29	712	798	90	1.8	PH822F0350 KX701VF0030 MF EZ701U	1920	3200	105.0	105/1	2100	2100	4000	21	3.5	432	59
29	933	1068	118	1.3	PH822F0350 KX701VF0030 MF EZ503U	2000	3200	105.0	105/1	2100	2100	4000	20	3.5	432	59
29	1154	1385	146	1.1	PH822F0350 KX701VF0030 MF EZ702U	2000	3200	105.0	105/1	2100	2100	4000	26	3.5	432	62
30	394	431	67	3.2	PH822F0500 KX701VF0020 MF EZ501U	1470	3200	100.0	100/1	1800	1800	3500	18	3	428	56
30	678	733	116	1.8	PH822F0500 KX701VF0020 MF EZ502U	2000	3200	100.0	100/1	1800	1800	3500	20	3	428	58
30	678	760	116	1.8	PH822F0500 KX701VF0020 MF EZ701U	1830	3200	100.0	100/1	1800	1800	3500	23	3	428	59
30	889	1017	152	1.4	PH822F0500 KX701VF0020 MF EZ503U	2000	3200	100.0	100/1	1800	1800	3500	22	3	428	59
30	1099	1319	188	1.1	PH822F0500 KX701VF0020 MF EZ702U	2000	3200	100.0	100/1	1800	1800	3500	29	3	428	62
30	1237	1466	212	1.0	PH822F0500 KX701VF0020 MF EZ505U	2000	3200	100.0	100/1	1800	1800	3500	27	3	428	62
36	331	362	48	3.3	PH822F0280 KX701VF0030 MF EZ501U	1230	3150	84.00	84/1	2100	2100	4000	15	3.5	411	56
36	569	616	82	1.9	PH822F0280 KX701VF0030 MF EZ502U	2000	3150	84.00	84/1	2100	2100	4000	18	3.5	411	58
36	569	639	82	1.9	PH822F0280 KX701VF0030 MF EZ701U	1540	3150	84.00	84/1	2100	2100	4000	21	3.5	411	59
36	746	854	107	1.5	PH822F0280 KX701VF0030 MF EZ503U	2000	3150	84.00	84/1	2100	2100	4000	20	3.5	411	59
36	923	1108	133	1.2	PH822F0280 KX701VF0030 MF EZ702U	2000	3150	84.00	84/1	2100	2100	4000	26	3.5	411	62
36	1039	1231	149	1.1	PH822F0280 KX701VF0030 MF EZ505U	2000	3150	84.00	84/1	2100	2100	4000	25	3.5	411	62
38	315	344	61	3.5	PH822F0400 KX701VF0020 MF EZ501U	1170	3150	80.00	80/1	1800	1800	3500	18	3.5	406	56
38	542	586	106	2.0	PH822F0400 KX701VF0020 MF EZ502U	1920	3150	80.00	80/1	1800	1800	3500	20	3.5	406	58
38	542	608	106	2.0	PH822F0400 KX701VF0020 MF EZ701U	1470	3150	80.00	80/1	1800	1800	3500	23	3.5	406	59
38	711	813	138	1.5	PH822F0400 KX701VF0020 MF EZ503U	1920	3150	80.00	80/1	1800	1800	3500	22	3.5	406	59
38	879	1055	171	1.3	PH822F0400 KX701VF0020 MF EZ702U	1920	3150	80.00	80/1	1800	1800	3500	29	3.5	406	62
38	989	1173	192	1.1	PH822F0400 KX701VF0020 MF EZ505U	1920	3150	80.00	80/1	1800	1800	3500	27	3.5	406	62
40	295	323	37	4.2	PH822F0250 KX701VF0030 MF EZ501U	1100	3200	75.00	75/1	2100	2100	4000	16	3.5	448	56
40	508	550	64	2.5	PH822F0250 KX701VF0030 MF EZ502U	2000	3200	75.00	75/1	2100	2100	4000	18	3.5	448	58
40	508	570	64	2.5	PH822F0250 KX701VF0030 MF EZ701U	1370	3200	75.00	75/1	2100	2100	4000	21	3.5	448	59
40	666	763	84	1.9	PH822F0250 KX701VF0030 MF EZ503U	2000	3200	75.00	75/1	2100	2100	4000	20	3.5	448	59
40	824	989	104	1.5	PH822F0250 KX701VF0030 MF EZ702U	2000	3200	75.00	75/1	2100	2100	4000	26	3.5	448	62
40	928	1099	117	1.3	PH822F0250 KX701VF0030 MF EZ505U	2000	3200	75.00	75/1	2100	2100	4000	25	3.5	448	62
40	1134	1429	143	1.1	PH822F0250 KX701VF0030 MF EZ703U	2000	3200	75.00	75/1	2100	2100	4000	34	3.5	448	64
43	276	301	47	4.5	PH822F0350 KX701VF0020 MF EZ501U	1030	3200	70.00	70/1	1800	1800	3500	18	3.5	432	56
43	475	513	81	2.6	PH822F0350 KX701VF0020 MF EZ502U	1990	3200	70.00	70/1	1800	1800	3500	20	3.5	432	58
43	475	532	81	2.6	PH822F0350 KX701VF0020 MF EZ701U	1280	3200	70.00	70/1	1800	1800	3500	24	3.5	432	59
43	622	712	106	2.0	PH822F0350 KX701VF0020 MF EZ503U	2000	3200	70.00	70/1	1800	1800	3500	23	3.5	432	59
43	769	923	132	1.6	PH822F0350 KX701VF0020 MF EZ702U	2000	3200	70.00	70/1	1800	1800	3500	29	3.5	432	62
43	866	1026	148	1.4	PH822F0350 KX701VF0020 MF EZ505U	2000	3200	70.00	70/1	1800	1800	3500	27	3.5	432	62
43	1058	1334	181	1.2	PH822F0350 KX701VF0020 MF EZ703U	2000	3200	70.00	70/1	1800	1800	3500	37	3.5	432	64
50	407	440	51	3.1	PH822F0200 KX701VF0030 MF EZ502U	1700	3200	60.00	60/1	2100	2100	4000	18	3.5	410	58
50	407	456	51	3.1	PH822F0200 KX701VF0030 MF EZ701U	1100	3200	60.00	60/1	2100	2100	4000	21	3.5	410	59
50	533	610	67	2.3	PH822F0200 KX701VF0030 MF EZ503U	2000	3200	60.00	60/1	2100	2100	4000	20	3.5	410	59
50	660	791	83	1.9	PH822F0200 KX701VF0030 MF EZ702U	2000	3200	60.00	60/1	2100	2100	4000	27	3.5	410	62
50	742	879	94	1.7	PH822F0200 KX701VF0030 MF EZ505U	2000	3200	60.00	60/1	2100	2100	4000	25	3.5	410	62
50	907	1143	115	1.4	PH822F0200 KX701VF0030 MF EZ703U	2000	3200	60.00	60/1	2100	2100	4000	34	3.5	410	64
54	221	241	43	5.0	PH822F0280 KX701VF0020 MF EZ501U	820	3150	56.00	56/1	1800	1800	3500	18	3.5	411	56
54	380	410	74	2.9	PH822F0280 KX701VF0020 MF EZ502U	1590	3150	56.00	56/1	1800	1800	3500	20	3.5	411	58
54	380	426	74	2.9	PH822F0280 KX701VF0020 MF EZ701U	1030	3150	56.00	56/1	1800	1800	3500	24	3.5	411	59
54	498	569	97	2.2	PH822F0280 KX701VF0020 MF EZ503U	2000	3150	56.00	56/1	1800	1800	3500	23	3.5	411	59
54	616	739	120	1.8	PH822F0280 KX701VF0020 MF EZ702U	2000	3150	56.00	56/1	1800	1800	3500	29	3.5	411	62
54	693	821	135	1.6	PH822F0280 KX701VF0020 MF EZ505U	2000	3150	56.00	56/1	1800	1800	3500	27	3.5	411	62
54	846	1067	165	1.3	PH822F0280 KX701VF0020 MF EZ703U	2000	3150	56.00	56/1	1800	1800	3500	37	3.5	411	64
60	339	366	58	3.7	PH822F0250 KX701VF0020 MF EZ502U	1420	3200	50.00	50/1	1800	1800	3500	21	3.5	448	58
60	339	380	58	3.7	PH822F0250 KX701VF0020 MF EZ701U	920	3200	50.00	50/1	1800	1800	3500	24	3.5	448	59
60	444	508	76	2.8	PH822F0250 KX701VF0020 MF EZ503U	1970	3200	50.00	50/1	1800	1800	3500	23	3.5	448	59
60	550	660	94	2.3	PH822F0250 KX701VF0020 MF EZ702U	1880	3200	50.00	50/1	1800	1800	3500	29	3.5	448	62
60	618	733	106	2.0	PH822F0250 KX701VF0020 MF EZ505U	2000	3200	50.00	50/1	1800	1800	3500	28	3.5	448	62
60	756	953	129	1.7	PH822F0250 KX701VF0020 MF EZ703U	2000	3200	50.00	50/1	1800	1800	3500	37	3.5	448	64
60	976	1383	167	1.3	PH822F0250 KX701VF0020 MF EZ705U	2000	3200	50.00	50/1	1800	1800	3500	49	3.5	448	69
63	325	352	47	3.4	PH822F0160 KX701VF0030 MF EZ502U	1360	3150	48.00	48/1	2100	2100	4000	18	3.5	381	58

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,5,6 [rpm]	n_{1maxDB} EL3,4 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PH8KX (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 2000 Nm)																
63	325	365	47	3.4	PH822F0160 KX701VF0030 MF EZ701U	880	3150	48.00	48/1	2100	2100	4000	21	3.5	381	59
63	427	488	61	2.6	PH822F0160 KX701VF0030 MF EZ503U	1860	3150	48.00	48/1	2100	2100	4000	21	3.5	381	59
63	528	633	76	2.1	PH822F0160 KX701VF0030 MF EZ702U	1800	3150	48.00	48/1	2100	2100	4000	27	3.5	381	62
63	594	704	85	1.9	PH822F0160 KX701VF0030 MF EZ505U	1860	3150	48.00	48/1	2100	2100	4000	25	3.5	381	62
63	726	915	104	1.5	PH822F0160 KX701VF0030 MF EZ703U	1860	3150	48.00	48/1	2100	2100	4000	35	3.5	381	64
63	937	1328	135	1.2	PH822F0160 KX701VF0030 MF EZ705U	1860	3150	48.00	48/1	2100	2100	4000	47	3.5	381	69
75	271	293	46	4.6	PH822F0200 KX701VF0020 MF EZ502U	1140	3200	40.00	40/1	1800	1800	3500	21	3.5	410	58
75	271	304	46	4.6	PH822F0200 KX701VF0020 MF EZ701U	730	3200	40.00	40/1	1800	1800	3500	24	3.5	410	59
75	355	407	61	3.5	PH822F0200 KX701VF0020 MF EZ503U	1580	3200	40.00	40/1	1800	1800	3500	23	3.5	410	59
75	440	528	75	2.8	PH822F0200 KX701VF0020 MF EZ702U	1500	3200	40.00	40/1	1800	1800	3500	29	3.5	410	62
75	495	586	85	2.5	PH822F0200 KX701VF0020 MF EZ505U	2000	3200	40.00	40/1	1800	1800	3500	28	3.5	410	62
75	605	762	104	2.1	PH822F0200 KX701VF0020 MF EZ703U	2000	3200	40.00	40/1	1800	1800	3500	37	3.5	410	64
75	780	1107	134	1.6	PH822F0200 KX701VF0020 MF EZ705U	2000	3200	40.00	40/1	1800	1800	3500	50	3.5	410	69
75	817	1359	140	1.5	PH822F0200 KX701VF0020 MF EZ802U	2000	3200	40.00	40/1	1800	1800	3500	74	3.5	410	78
86	311	356	90	4.0	PH822F0350 KX701VF0010 MF EZ503U	1380	3200	35.00	35/1	1800	1600	3000	34	3.5	432	59
86	385	462	111	3.2	PH822F0350 KX701VF0010 MF EZ702U	1310	3200	35.00	35/1	1800	1600	3000	40	3.5	432	62
86	433	513	125	2.9	PH822F0350 KX701VF0010 MF EZ505U	2000	3200	35.00	35/1	1800	1600	3000	38	3.5	432	62
86	529	667	152	2.4	PH822F0350 KX701VF0010 MF EZ703U	2000	3200	35.00	35/1	1800	1600	3000	48	3.5	432	64
86	683	968	197	1.8	PH822F0350 KX701VF0010 MF EZ705U	2000	3200	35.00	35/1	1800	1600	3000	60	3.5	432	69
86	715	1189	206	1.7	PH822F0350 KX701VF0010 MF EZ802U	2000	3200	35.00	35/1	1800	1600	3000	84	3.5	432	78
94	284	325	55	3.9	PH822F0160 KX701VF0020 MF EZ503U	1260	3150	32.00	32/1	1800	1800	3500	23	3.5	381	59
94	352	422	68	3.1	PH822F0160 KX701VF0020 MF EZ702U	1200	3150	32.00	32/1	1800	1800	3500	30	3.5	381	62
94	396	469	77	2.8	PH822F0160 KX701VF0020 MF EZ505U	1860	3150	32.00	32/1	1800	1800	3500	28	3.5	381	62
94	484	610	94	2.3	PH822F0160 KX701VF0020 MF EZ703U	1860	3150	32.00	32/1	1800	1800	3500	37	3.5	381	64
94	624	885	121	1.8	PH822F0160 KX701VF0020 MF EZ705U	1860	3150	32.00	32/1	1800	1800	3500	50	3.5	381	69
94	654	1088	127	1.7	PH822F0160 KX701VF0020 MF EZ802U	1860	3150	32.00	32/1	1800	1800	3500	74	3.5	381	78
94	780	1413	152	1.4	PH822F0160 KX701VF0020 MF EZ803U	1860	3150	32.00	32/1	1800	1800	3500	99	3.5	381	84
100	210	235	45	3.8	PH821F0100 KX801VF0030 MF EZ701U	570	2400	30.00	30/1	1300	1300	3000	52	4	262	64
100	340	408	73	2.4	PH821F0100 KX801VF0030 MF EZ702U	1160	2400	30.00	30/1	1300	1300	3000	57	4	262	67
100	468	590	100	1.7	PH821F0100 KX801VF0030 MF EZ703U	1200	2400	30.00	30/1	1300	1300	3000	65	4	262	69
100	604	857	129	1.3	PH821F0100 KX801VF0030 MF EZ705U	1200	2400	30.00	30/1	1300	1300	3000	78	4	262	74
143	238	286	41	4.2	PH821F0070 KX801VF0030 MF EZ702U	810	2770	21.00	21/1	1300	1300	3000	58	4.5	288	67
143	328	413	56	3.1	PH821F0070 KX801VF0030 MF EZ703U	1290	2770	21.00	21/1	1300	1300	3000	66	4.5	288	69
143	423	600	72	2.4	PH821F0070 KX801VF0030 MF EZ705U	1600	2770	21.00	21/1	1300	1300	3000	78	4.5	288	74
143	443	737	76	2.3	PH821F0070 KX801VF0030 MF EZ802U	1600	2770	21.00	21/1	1300	1300	3000	102	4.5	288	83
143	528	957	90	1.9	PH821F0070 KX801VF0030 MF EZ803U	1600	2770	21.00	21/1	1300	1300	3000	128	4.5	288	89
200	170	204	35	4.9	PH821F0050 KX801VF0030 MF EZ702U	580	2600	15.00	15/1	1300	1300	3000	59	5	226	67
200	234	295	48	3.6	PH821F0050 KX801VF0030 MF EZ703U	920	2600	15.00	15/1	1300	1300	3000	67	5	226	69
200	302	428	62	2.8	PH821F0050 KX801VF0030 MF EZ705U	1320	2600	15.00	15/1	1300	1300	3000	79	5	226	74
200	316	526	65	2.7	PH821F0050 KX801VF0030 MF EZ802U	1320	2600	15.00	15/1	1300	1300	3000	103	5	226	83
200	377	684	77	2.2	PH821F0050 KX801VF0030 MF EZ803U	1320	2600	15.00	15/1	1300	1300	3000	128	5	226	89
250	136	163	35	4.9	PH821F0040 KX801VF0030 MF EZ702U	470	2080	12.00	12/1	1300	1300	3000	60	5.5	174	67
250	187	236	48	3.6	PH821F0040 KX801VF0030 MF EZ703U	740	2080	12.00	12/1	1300	1300	3000	68	5.5	174	69
250	242	343	62	2.8	PH821F0040 KX801VF0030 MF EZ705U	1060	2080	12.00	12/1	1300	1300	3000	80	5.5	174	74
250	253	421	65	2.7	PH821F0040 KX801VF0030 MF EZ802U	1060	2080	12.00	12/1	1300	1300	3000	104	5.5	174	83
250	302	547	77	2.2	PH821F0040 KX801VF0030 MF EZ803U	1060	2080	12.00	12/1	1300	1300	3000	129	5.5	174	89
PH9KX (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 5000 Nm)																
37	2162	3270	123	1.4	PH932F0180 KX801VF0030 MF EZ805U	4500	9000	54.00	54/1	1300	1300	3000	181	3.5	920	138
42	1922	2906	149	1.6	PH932F0240 KX801VF0020 MF EZ805U	4500	9000	48.00	48/1	1100	1100	2500	186	3.5	995	138
48	1681	2543	219	1.8	PH932F0420 KX801VF0010 MF EZ805U	4500	9000	42.00	42/1	1000	750	2000	215	3	1055	138
50	1601	2422	124	1.9	PH932F0200 KX801VF0020 MF EZ805U	5000	10000	40.00	40/1	1100	1100	2500	185	3.5	991	138
56	1441	2180	111	2.1	PH932F0180 KX801VF0020 MF EZ805U	4500	9000	36.00	36/1	1100	1100	2500	193	3.5	920	138
63	1281	1938	100	2.3	PH932F0160 KX801VF0020 MF EZ805U	4090	8600	32.00	32/1	1100	1100	2500	187	3.5	921	138
67	1201	1817	156	2.5	PH932F0300 KX801VF0010 MF EZ805U	4500	9000	30.00	30/1	1000	750	2000	220	3.5	1030	138
83	961	1453	100	2.3	PH932F0120 KX801VF0020 MF EZ805U	3070	6450	24.00	24/1	1100	1100	2500	194	4	788	138
100	801	1211	104	3.7	PH932F0200 KX801VF0010 MF EZ805U	3760	9030	20.00	20/1	1000	750	2000	222	3.5	991	138
111	721	1090	94	4.2	PH932F0180 KX801VF0010 MF EZ805U	3380	8130	18.00	18/1	1000	750	2000	254	3.5	920	138
125	641	969	84	4.6	PH932F0160 KX801VF0010 MF EZ805U	3000	7230	16.00	16/1	1000	750	2000	230	3.5	921	138
167	480	727	84	4.6	PH932F0120 KX801VF0010 MF EZ805U	2250	5420	12.00	12/1	1000	750	2000	260	4	788	138
PH9KX (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 4500 Nm)																
17	1220	1369	70	2.5	PH932F0600 KX801VF0030 MF EZ701U	3300	9000	180.0	180/1	1300	1300	3000	52	3	1040	100
17	1979	2374	113	1.5	PH932F0600 KX801VF0030 MF EZ702U	4500	9000	180.0	180/1	1300	1300	3000	57	3	1040	103
17	2721	3430	155	1.1	PH932F0600 KX801VF0030 MF EZ703U	4500	9000	180.0	180/1	1300	1300	3000	65	3	1040	105
21	976	1095	56	3.1	PH932F0480 KX801VF0030 MF EZ701U	2640	9000	144.0	144/1	1300	1300	3000	52	3	1051	100

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2,5,6 [rpm]	n_{1maxDB} EL3,4 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PH9KX (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 4500 Nm)																
21	1583	1900	90	1.9	PH932F0480 KX801VF0030 MF EZ702U	4500	9000	144.0	144/1	1300	1300	3000	57	3	1051	103
21	2177	2744	124	1.4	PH932F0480 KX801VF0030 MF EZ703U	4500	9000	144.0	144/1	1300	1300	3000	65	3	1051	105
24	854	958	49	3.5	PH932F0420 KX801VF0030 MF EZ701U	2310	9000	126.0	126/1	1300	1300	3000	52	3	1055	100
24	1385	1662	79	2.2	PH932F0420 KX801VF0030 MF EZ702U	4500	9000	126.0	126/1	1300	1300	3000	58	3	1055	103
24	1904	2401	109	1.6	PH932F0420 KX801VF0030 MF EZ703U	4500	9000	126.0	126/1	1300	1300	3000	65	3	1055	105
33	610	684	35	4.9	PH932F0300 KX801VF0030 MF EZ701U	1650	9000	90.00	90/1	1300	1300	3000	53	3.5	1030	100
33	989	1187	56	3.0	PH932F0300 KX801VF0030 MF EZ702U	3380	9000	90.00	90/1	1300	1300	3000	58	3.5	1030	103
33	1360	1715	78	2.2	PH932F0300 KX801VF0030 MF EZ703U	4500	9000	90.00	90/1	1300	1300	3000	66	3.5	1030	105
33	1756	2490	100	1.7	PH932F0300 KX801VF0030 MF EZ705U	4500	9000	90.00	90/1	1300	1300	3000	78	3.5	1030	110
33	1839	3059	105	1.6	PH932F0300 KX801VF0030 MF EZ802U	4500	9000	90.00	90/1	1300	1300	3000	102	3.5	1030	119
42	791	950	45	3.8	PH932F0240 KX801VF0030 MF EZ702U	2700	9000	72.00	72/1	1300	1300	3000	59	3.5	995	103
42	1088	1372	62	2.8	PH932F0240 KX801VF0030 MF EZ703U	4290	9000	72.00	72/1	1300	1300	3000	67	3.5	995	105
42	1405	1992	80	2.1	PH932F0240 KX801VF0030 MF EZ705U	4500	9000	72.00	72/1	1300	1300	3000	79	3.5	995	110
42	1471	2447	84	2.0	PH932F0240 KX801VF0030 MF EZ802U	4500	9000	72.00	72/1	1300	1300	3000	103	3.5	995	119
42	1754	3179	100	1.7	PH932F0240 KX801VF0030 MF EZ803U	4500	9000	72.00	72/1	1300	1300	3000	129	3.5	995	125
56	594	712	35	4.9	PH932F0180 KX801VF0030 MF EZ702U	2030	9000	54.00	54/1	1300	1300	3000	62	3.5	920	103
56	816	1029	48	3.6	PH932F0180 KX801VF0030 MF EZ703U	3220	9000	54.00	54/1	1300	1300	3000	70	3.5	920	105
56	1054	1494	62	2.8	PH932F0180 KX801VF0030 MF EZ705U	4500	9000	54.00	54/1	1300	1300	3000	82	3.5	920	110
56	1103	1835	65	2.7	PH932F0180 KX801VF0030 MF EZ802U	4500	9000	54.00	54/1	1300	1300	3000	106	3.5	920	119
56	1316	2384	77	2.2	PH932F0180 KX801VF0030 MF EZ803U	4500	9000	54.00	54/1	1300	1300	3000	132	3.5	920	125
PH10KX (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 7500 Nm)																
22	3603	5450	123	1.4	PH1032F0300 KX801VF0030 MF EZ805U	7500	15000	90.00	90/1	1300	1300	3000	177	3.5	1534	153
24	3363	5086	156	1.5	PH1032F0420 KX801VF0020 MF EZ805U	7500	15000	84.00	84/1	1100	1100	2500	183	3	1589	153
28	2882	4360	110	1.5	PH1032F0240 KX801VF0030 MF EZ805U	6140	12900	72.00	72/1	1300	1300	3000	178	3.5	1457	153
33	2402	3633	111	2.1	PH1032F0300 KX801VF0020 MF EZ805U	7500	15000	60.00	60/1	1100	1100	2500	184	3.5	1534	153
37	2162	3270	110	1.5	PH1032F0180 KX801VF0030 MF EZ805U	4600	9680	54.00	54/1	1300	1300	3000	181	3.5	1302	153
42	1922	2906	100	2.3	PH1032F0240 KX801VF0020 MF EZ805U	6140	12900	48.00	48/1	1100	1100	2500	186	3.5	1457	153
48	1681	2543	131	3.0	PH1032F0420 KX801VF0010 MF EZ805U	7500	15000	42.00	42/1	1000	750	2000	216	3	1589	153
56	1441	2180	100	2.3	PH1032F0180 KX801VF0020 MF EZ805U	4600	9680	36.00	36/1	1100	1100	2500	193	3.5	1302	153
67	1201	1817	94	4.2	PH1032F0300 KX801VF0010 MF EZ805U	5630	13550	30.00	30/1	1000	750	2000	221	3.5	1534	153
83	961	1453	84	4.6	PH1032F0240 KX801VF0010 MF EZ805U	4510	10840	24.00	24/1	1000	750	2000	228	3.5	1457	153
111	721	1090	84	4.6	PH1032F0180 KX801VF0010 MF EZ805U	3380	8130	18.00	18/1	1000	750	2000	257	3.5	1302	153
PH10KX (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 7500 Nm)																
17	1220	1369	52	3.3	PH1032F0600 KX801VF0030 MF EZ701U	3300	13820	180.0	180/1	1300	1300	3000	52	3	1556	116
17	1979	2374	84	2.0	PH1032F0600 KX801VF0030 MF EZ702U	6760	13820	180.0	180/1	1300	1300	3000	57	3	1556	118
17	2721	3430	115	1.5	PH1032F0600 KX801VF0030 MF EZ703U	6910	13820	180.0	180/1	1300	1300	3000	65	3	1556	120
17	3512	4980	149	1.1	PH1032F0600 KX801VF0030 MF EZ705U	6910	13820	180.0	180/1	1300	1300	3000	78	3	1556	126
21	976	1095	36	4.7	PH1032F0480 KX801VF0030 MF EZ701U	2640	13820	144.0	144/1	1300	1300	3000	52	3	1581	116
21	1583	1900	59	2.9	PH1032F0480 KX801VF0030 MF EZ702U	5410	13820	144.0	144/1	1300	1300	3000	57	3	1581	118
21	2177	2744	81	2.1	PH1032F0480 KX801VF0030 MF EZ703U	6910	13820	144.0	144/1	1300	1300	3000	65	3	1581	120
21	2810	3984	104	1.6	PH1032F0480 KX801VF0030 MF EZ705U	6910	13820	144.0	144/1	1300	1300	3000	78	3	1581	126
21	2942	4894	109	1.6	PH1032F0480 KX801VF0030 MF EZ802U	6910	13820	144.0	144/1	1300	1300	3000	102	3	1581	134
24	1385	1662	47	3.6	PH1032F0420 KX801VF0030 MF EZ702U	4730	15000	126.0	126/1	1300	1300	3000	58	3	1589	118
24	1904	2401	65	2.6	PH1032F0420 KX801VF0030 MF EZ703U	7500	15000	126.0	126/1	1300	1300	3000	66	3	1589	120
24	2458	3486	84	2.0	PH1032F0420 KX801VF0030 MF EZ705U	7500	15000	126.0	126/1	1300	1300	3000	78	3	1589	126
24	2574	4282	88	1.9	PH1032F0420 KX801VF0030 MF EZ802U	7500	15000	126.0	126/1	1300	1300	3000	102	3	1589	134
24	3070	5563	105	1.6	PH1032F0420 KX801VF0030 MF EZ803U	7500	15000	126.0	126/1	1300	1300	3000	127	3	1589	140
33	989	1187	35	4.9	PH1032F0300 KX801VF0030 MF EZ702U	3380	15000	90.00	90/1	1300	1300	3000	58	3.5	1534	118
33	1360	1715	48	3.6	PH1032F0300 KX801VF0030 MF EZ703U	5360	15000	90.00	90/1	1300	1300	3000	66	3.5	1534	120
33	1756	2490	62	2.8	PH1032F0300 KX801VF0030 MF EZ705U	7500	15000	90.00	90/1	1300	1300	3000	79	3.5	1534	126
33	1839	3059	65	2.7	PH1032F0300 KX801VF0030 MF EZ802U	7500	15000	90.00	90/1	1300	1300	3000	103	3.5	1534	134
33	2193	3974	77	2.2	PH1032F0300 KX801VF0030 MF EZ803U	7500	15000	90.00	90/1	1300	1300	3000	128	3.5	1534	140
42	791	950	35	4.9	PH1032F0240 KX801VF0030 MF EZ702U	2700	12900	72.00	72/1	1300	1300	3000	59	3.5	1457	118
42	1088	1372	48	3.6	PH1032F0240 KX801VF0030 MF EZ703U	4290	12900	72.00	72/1	1300	1300	3000	67	3.5	1457	120
42	1405	1992	62	2.8	PH1032F0240 KX801VF0030 MF EZ705U	6140	12900	72.00	72/1	1300	1300	3000	79	3.5	1457	126
42	1471	2447	65	2.7	PH1032F0240 KX801VF0030 MF EZ802U	6140	12900	72.00	72/1	1300	1300	3000	103	3.5	1457	134
42	1754	3179	77	2.2	PH1032F0240 KX801VF0030 MF EZ803U	6140	12900	72.00	72/1	1300	1300	3000	129	3.5	1457	140
56	594	712	35	4.9	PH1032F0180 KX801VF0030 MF EZ702U	2030	9680	54.00	54/1	1300	1300	3000	62	3.5	1302	118
56	816	1029	48	3.6	PH1032F0180 KX801VF0030 MF EZ703U	3220	9680	54.00	54/1	1300	1300	3000	70	3.5	1302	120
56	1054	1494	62	2.8	PH1032F0180 KX801VF0030 MF EZ705U	4600	9680	54.00	54/1	1300	1300	3000	82	3.5	1302	126
56	1103	1835	65	2.7	PH1032F0180 KX801VF0030 MF EZ802U	4600	9680	54.00	54/1	1300	1300	3000	107	3.5	1302	134
56	1316	2384	77	2.2	PH1032F0180 KX801VF0030 MF EZ803U	4600	9680	54.00	54/1	1300	1300	3000	132	3.5	1302	140

17.3 Dimensional drawings

In this chapter you can find the dimensions of the geared motors.

There is a dimensional drawing for every possible shaft/housing design, each with the tables for gear unit dimensions, motor dimensions and geared motor dimensions.

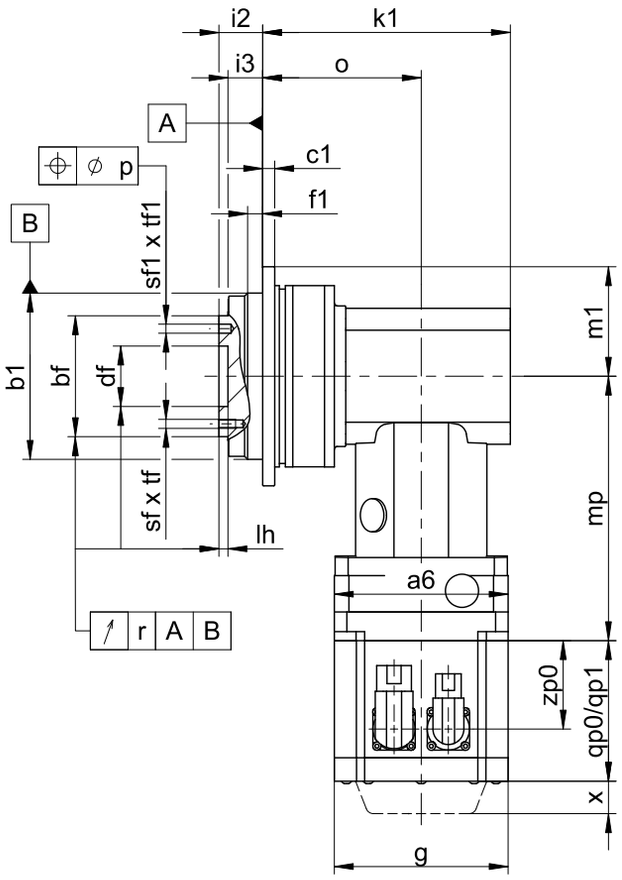
Dimensions can exceed the specifications of ISO 2768-mK due to casting tolerances or accumulation of individual tolerances.

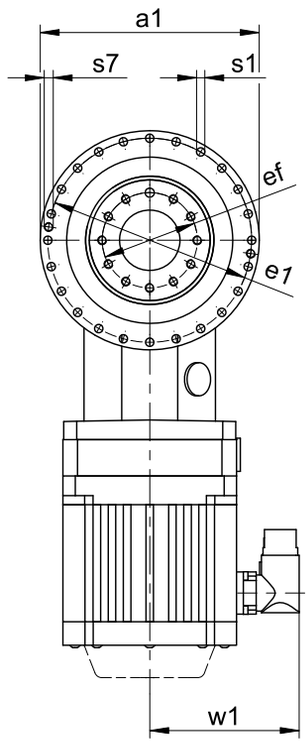
We reserve the right to make dimensional changes due to ongoing technical development.

You can download CAD models of our standard drives at http://cad.stoeber.de.

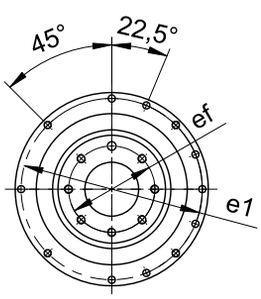
Combination options and the dimensions of forced ventilated geared motors can be found at http://cad.stoeber.de.

17.3.1 F shaft design (flange shaft)

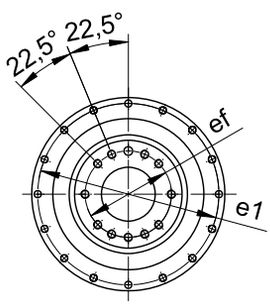




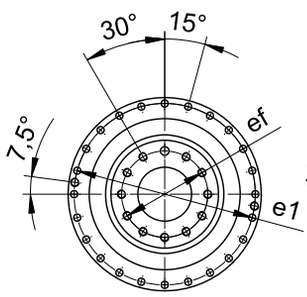
PH3 | PH4



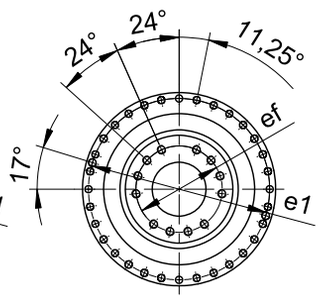
PH5



PH7/PH8



PH9/PH10



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]

Dimensions of gear units

Type	Øa1	Øb1	Øbf	c1	Ødf	Øe1	Øef	f1	i2	i3	k1	lh	m1	o	p	r	Øs1	s7	sf	Øsf1	tf	tf1
PH321_KX301_	86_{h7}	64_{h7}	40_{h7}	4	20.0^{H6}	79	32	7	19.5	16.5	114.0	4	31.0	74.0	0.02	0.020	4.5	–	M5	5^{H7}	7	3
PH322_KX301_	86_{h7}	64_{h7}	40_{h7}	4	20.0^{H6}	79	32	7	19.5	16.5	150.0	4	31.0	110.0	0.02	0.020	4.5	–	M5	5^{H7}	7	3
PH421_KX401_	118_{h7}	90_{h7}	63_{h7}	7	31.5^{H6}	109	50	10	30.0	24.0	137.0	6	37.5	87.0	0.02	0.020	5.5	–	M6	6^{H7}	11	7
PH422_KX301_	118_{h7}	90_{h7}	63_{h7}	7	31.5^{H6}	109	50	10	30.0	24.0	165.5	6	31.0	125.5	0.02	0.020	5.5	–	M6	6^{H7}	11	7
PH521_KX501_	145_{h7}	110_{h7}	80_{h7}	8	40.0^{H6}	135	63	10	29.0	23.0	164.0	6	45.0	105.0	0.02	0.020	5.5	–	M6	6^{H7}	11	7
PH522_KX401_	145_{h7}	110_{h7}	80_{h7}	8	40.0^{H6}	135	63	10	29.0	23.0	198.5	6	37.5	148.5	0.02	0.020	5.5	–	M6	6^{H7}	11	7
PH721_KX701_	179_{h7}	140_{h7}	100_{h7}	10	50.0^{H6}	168	80	12	38.0	32.0	201.0	6	60.0	127.0	0.02	0.025	6.6	–	M8	8^{H7}	14	7
PH722_KX501_	179_{h7}	140_{h7}	100_{h7}	10	50.0^{H6}	168	80	12	38.0	32.0	235.0	6	45.0	176.0	0.02	0.025	6.6	–	M8	8^{H7}	14	7
PH821_KX801_	247_{h7}	200_{h7}	160_{h7}	12	80.0^{H6}	233	125	15	50.0	42.0	267.5	8	75.0	175.5	0.02	0.030	9.0	M10	M10	10^{H7}	18	10
PH822_KX701_	247_{h7}	200_{h7}	160_{h7}	12	80.0^{H6}	233	125	15	50.0	42.0	302.0	8	60.0	228.0	0.02	0.030	9.0	M10	M10	10^{H7}	18	10
PH932_KX801_	300	255_{h7}	180_{h7}	18	90.0^{H6}	280	140	20	66.0	55.0	417.5	12	75.0	325.5	–	0.030	13.5	M8	M16	–	24	–
PH1032_KX801_	330	285_{h7}	200_{h7}	20	95.0^{H6}	310	160	20	75.0	60.0	425.0	10	75.0	333.0	–	0.040	13.5	M10	M20	–	30	–

Dimensions of motors

Type	□g	qp0	qp1	w1	x	zp0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0
EZ501U	115	93	147.5	100.0	22	58.5
EZ502U	115	118	172.5	100.0	22	83.5
EZ503U	115	143	197.5	100.0	22	108.5
EZ505U	115	193	247.5	100.0	22	158.5
EZ701U	145	102	161.0	115.0	22	64.0
EZ702U	145	127	186.0	115.0	22	89.0
EZ703U	145	152	211.0	115.0	22	114.0
EZ705U	145	207	266.0	134.0	22	165.0
EZ802U	190	197	274.0	156.5	22	143.0
EZ803U	190	238	315.0	156.5	22	184.0
EZ805U	190	320	397.0	156.5	22	266.0

Dimensions of geared motors

Type	EZ3		EZ4		EZ5		EZ7		EZ8	
	□a6	mp	□a6	mp	□a6	mp	□a6	mp	□a6	mp
PH321_KX301_	75	139.5	100	134.0	–	–	–	–	–	–
PH322_KX301_	75	139.5	–	–	–	–	–	–	–	–
PH421_KX401_	100	151.0	100	145.5	115	150.0	140	153.0	–	–
PH422_KX301_	75	139.5	100	134.0	–	–	–	–	–	–
PH521_KX501_	–	–	115	176.5	115	172.0	140	183.0	–	–
PH522_KX401_	100	151.0	100	145.5	115	150.0	–	–	–	–
PH721_KX701_	–	–	–	–	145	214.5	190	217.5	145	242.5
PH722_KX501_	–	–	115	176.5	115	172.0	140	183.0	–	–
PH821_KX801_	–	–	–	–	–	–	190	263.0	190	270.0
PH822_KX701_	–	–	–	–	145	214.5	190	217.5	145	242.5
PH932_KX801_	–	–	–	–	–	–	190	263.0	190	270.0
PH1032_KX801_	–	–	–	–	–	–	190	263.0	190	270.0

17.4 Type designation

In this chapter, you can find an explanation of the type designation with the associated options.

Additional ordering information not included in the type designation can be found at the end of the chapter.

Sample code

PH	7	2	1	F	0050	KX701VF	0010	MF	EZ703U

Explanation

Code	Designation	Design
PH	Type	Planetary gear unit
7	Size	7 (example)
2	Generation	Generation 2
1 2	Stages	Single-stage Two-stage
F	Shaft	Flange shaft
0050	Transmission ratio of output (i x 10)	i = 5 (example)
KX701 **VF**	Input	KX7 right-angle geared motor (example)
0010	Transmission ratio of input (i x 10)	i = 1 (example)
MF	Attachment to motor	MF motor adapter
EZ703U	Motor	EZ synchronous servo motor

In order to complete the type designation, also specify:

- A detailed type designation of the motor, see chapter [▶ 23]
- The mounting position, see Chapter [▶ 17.5.2]
- Radial shaft seal rings at the output made of NBR or FKM, see chapter [▶ 17.6.3]
- The position of the plug connectors, see chapter [▶ 17.5.4]
- For reverse operation of the output shaft from ± 20° to ± 90° and horizontal installation, note the chapter [▶ 17.6.4]

17.5 Product description

17.5.1 Installation conditions

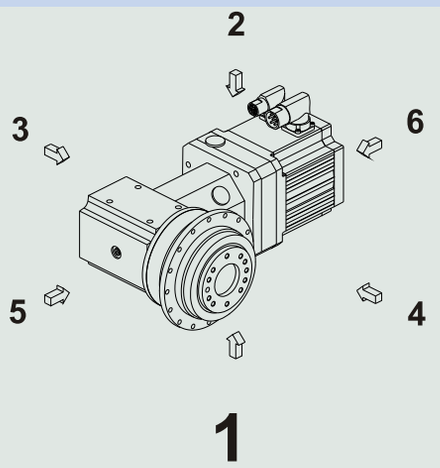
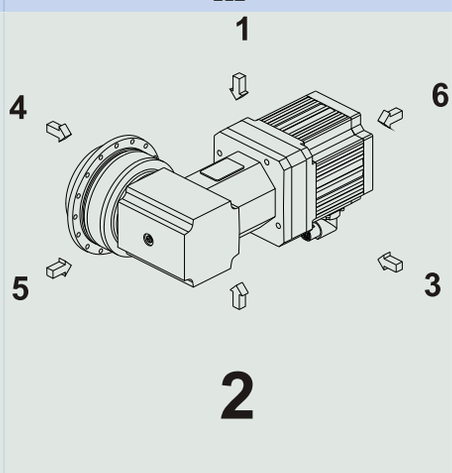
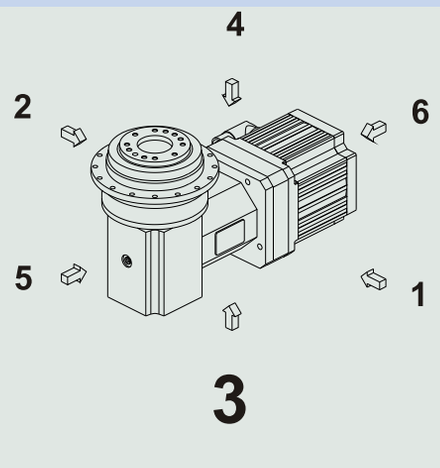
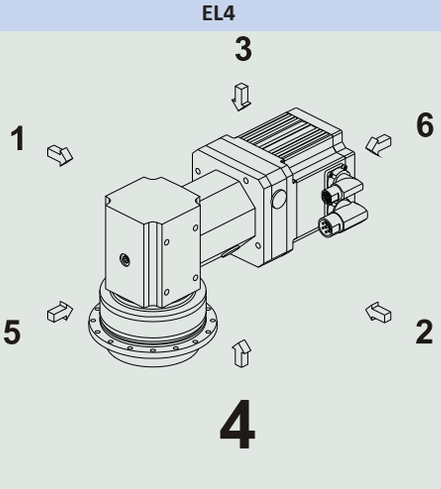
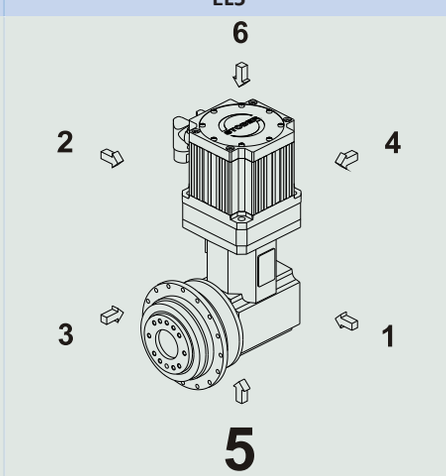
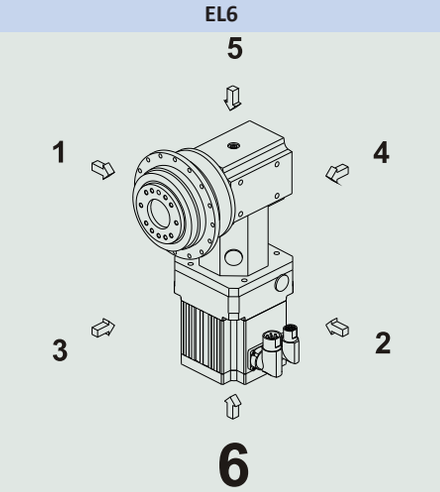
The torque and force values listed in this catalog are valid under the following conditions:

- When using screws with quality 12.9 for machine-side attachment of the flange shaft and gear unit housing
- When the gear unit housings are adjusted at pilot øb1 (H7)
- When the flange shaft is adjusted using the connecting element at pilot øbf or ødf

17.5.2 Mounting positions

The following table shows the standard mounting positions.

The numbers identify the gear unit sides. The mounting position is defined by the gear side facing downwards.

EL1	EL2	EL3
		
EL4	**EL5**	**EL6**
		

Since the lubricant filling volume of the gear unit depends on the mounting position, the mounting position must be specified when ordering.

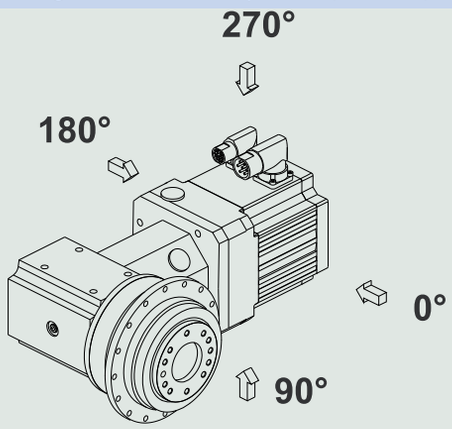
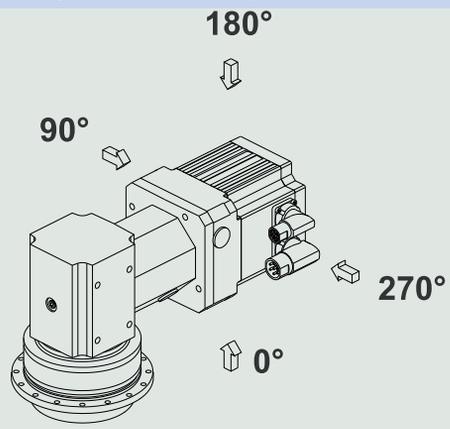
17.5.3 Lubricants

STOBER fills the gear units with the amount and type of lubricant specified on the nameplate. The filling volume and the structure of the gear units depend on the mounting position.

Only install the gear units in the intended mounting position! Reposition the gear units only after consulting STOBER. Otherwise, STOBER assumes no liability for the gear units.

Lubricant filling quantities for gear units, document ID 441871, can be found online at http://www.stoeber.de/en/download. Enter the ID of the documentation in the Search... field.

17.5.4 Position of the plug connectors

Mounting position EL1	Mounting position EL4
Plug connector in 270° position (standard)	Plug connector in 270° position (standard)
	

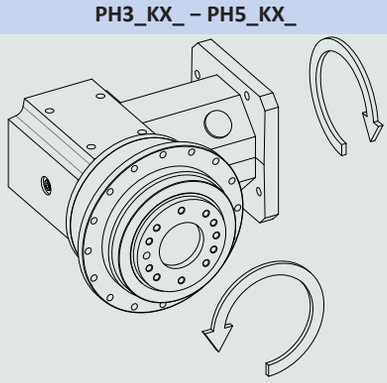
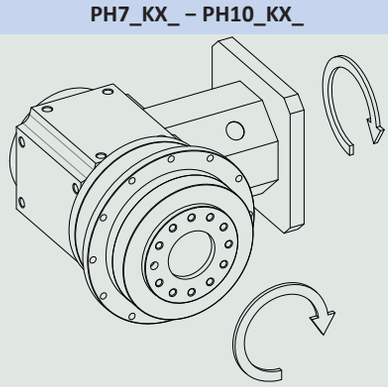
Indicate variations for your geared motor in the purchase order.

Note that the plug connector position rotates along with the geared motor if the geared motor is in another mounting position.

17.5.5 Other product features

Feature	Value
Max. permitted gear unit temperature (on the surface of the gear unit)	≤ 90 °C
Paint	Black RAL 9005
(ATEX) Directive 2014/34/EU (option)	Not suitable
Protection class:[1]	
Gear unit	IP65
Motor	IP56, optionally IP66

17.5.6 Direction of rotation

PH3_KX_ – PH5_KX_	PH7_KX_ – PH10_KX_
	

The pictures show mounting position EL1.

17.6 Project configuration

Project your drives using our SERVOsoft designing software. You can receive SERVOsoft for free from your adviser at one of our sales centers. Observe the limit conditions in this chapter to ensure a safe design for your drives.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

[1] Observe the protection class of all the components.

17.6.1 Calculation of the operating point

Check the following conditions for operating points other than the nominal point M_{2N} specified in the selection tables.

For mounting positions EL1, EL2, EL5, EL6:

$$n_{1m^*} \leq \frac{n_{1maxDBEL1,2,5,6}}{fB_T}$$

For mounting positions EL3, EL4:

$$n_{1m^*} \leq \frac{n_{1maxDBEL3,4}}{fB_T}$$

For all mounting positions:

$$n_{1max^*} \leq \frac{n_{1max\,ZB}}{fB_T}$$

$$M_{2eff^*} \leq M_{2th}$$

$$M_{2acc^*} \leq M_{2acc}$$

$$M_{2NOT^*} \leq M_{2NOT}$$

$$M_{2eq^*} \leq M_{2N} \cdot \frac{S}{fB_{op} \cdot fB_t}$$

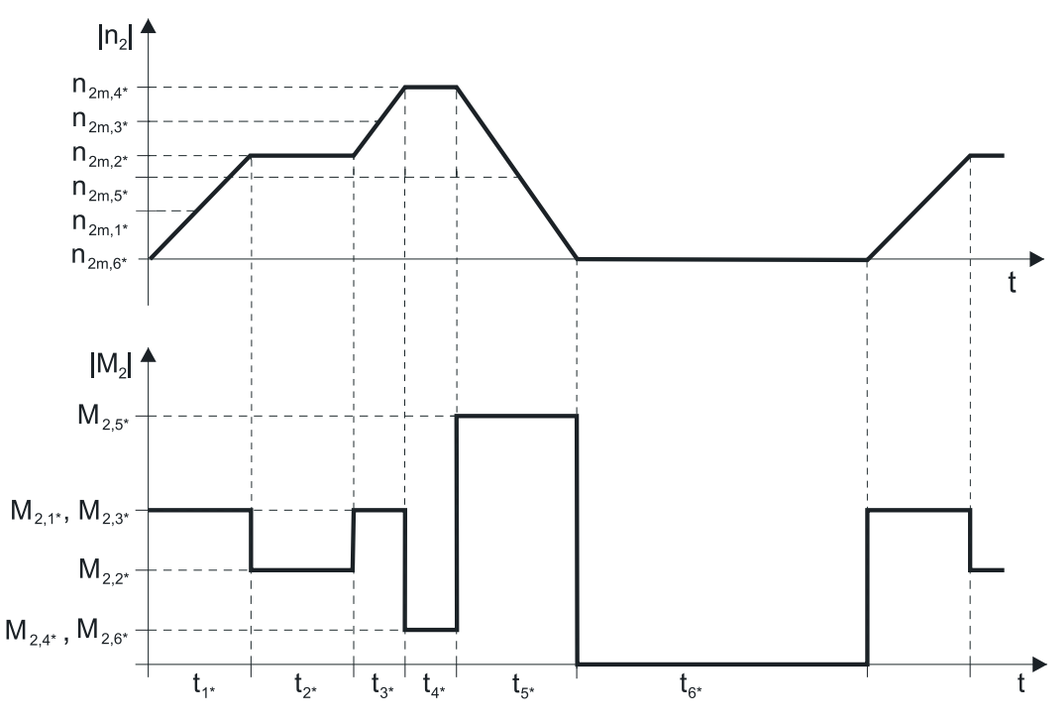
The values for $n_{1maxDBEL1,2,5,6}$, $n_{1maxDBEL3,4}$, n_{1maxZB}, M_{2acc}, M_{2NOT}, M_{2N} and S can be found in the selection tables.

The values for fB_T, fB_{op} and fB_t can be found in the corresponding tables in this chapter.

Calculate the thermal limit torque M_{2th} for a duty cycle > 50%.

Example of cyclic operation

The following calculations are based on a representation of the power taken from the output based in accordance with the following example:



Calculation of the actual average input speed

$$n_{1m^*} = n_{2m^*} \cdot i$$

$$n_{2m^*} = \frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}{t_{1^*} + \ldots + t_{n^*}}$$

If $t_{1^*} + \ldots + t_{5^*} \geq 20$ min, calculate n_{2m^*} without the rest phase t_{6^*}.

The values for the ratio i can be found in the selection tables.

Calculation of the actual effective torque

$$M_{2eff^*} = \sqrt{\frac{t_{1^*} \cdot M_{2,1^*}{}^2 + \ldots + t_{n^*} \cdot M_{2,n^*}{}^2}{t_{1^*} + \ldots + t_{n^*}}}$$

Calculation of the actual equivalent torque

$$M_{2eq^*} = \sqrt[3]{\frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} \cdot \left|M_{2,1^*}{}^3\right| + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*} \cdot \left|M_{2,n^*}{}^3\right|}{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}}$$

Calculation of the thermal limit torque

Calculate the thermal limit torque M_{2th} for a duty cycle $ED_{20} > 50\%$ and the actual average input speed n_{1m^*}. (At $K_{mot,th} \leq 0$ you must reduce the average input speed n_{1m^*} accordingly or select another geared motor size.)

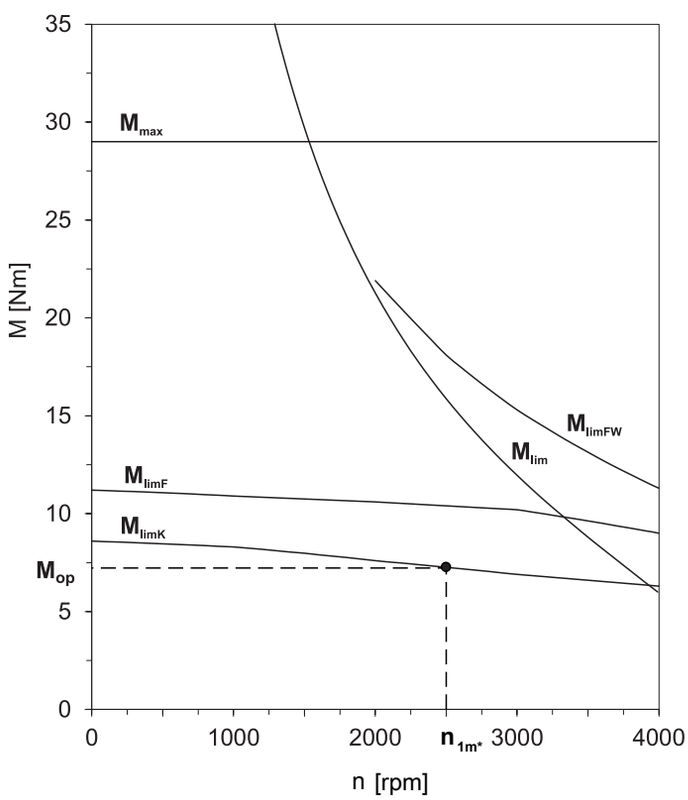
$$M_{2th} = M_{op} \cdot i \cdot K_{mot,th}$$

$$K_{mot,th} = 0{,}93 - \frac{a_{th}}{1000} \cdot athEL \cdot fB_T \cdot \left(\frac{n_{1m^*}}{1000}\right)^3$$

The values for i and a_{th} can be found in the selection tables.

The values for a_{thEL} and fB_T can be found in the corresponding tables in this chapter.

The value for the torque of the motor at operating point M_{op} with the determined average input speed n_{1m^*} can be found in the motor curve of Chapter [▶ 23.3]. Note the size, nominal speed n_N and cooling type of the motor. The figure below shows an example of reading the torque M_{op} of a motor with convection cooling at the operating point.



Operating factors

Parameter a_{thEL}

Mounting position	a_{thEL}
EL1, 2, 5, 6	1.0
EL3, 4	1.1

Operating mode	fB_{op}
Uniform continuous operation	1.00
Cyclic operation	1.25
Reversing load cyclic operation	1.40

Run time	fB_t
Daily run time ≤ 8 h	1.00
Daily run time ≤ 16 h	1.15
Daily run time ≤ 24 h	1.20

Temperature		fB_T
Motor cooling	**Surrounding temperature**	
Motor with forced ventilation	≤ 20 °C	0.9
	≤ 30 °C	1.0
	≤ 40 °C	1.15
Motor with convection cooling	≤ 20 °C	1.0
	≤ 30 °C	1.1
	≤ 40 °C	1.25

Notes

- The maximum permitted gear unit temperature (see the "Other product features" chapter) must not be exceeded. Doing so may result in damage to the geared motor.
- For braking from full speed (for example when the power fails or when setting up the machine), note the permitted gear unit torques (M_{2acc}, M_{2NOT}) in the selection tables.

17.6.2 Permitted shaft loads for the output shaft

The values specified in the tables apply to the permitted shaft loads:

- For shaft dimensions in accordance with the catalog
- For output speeds $n_{2m*} \leq 100$ rpm ($F^{2axN} = F_{2ax100}$; $F_{2radN} = F_{2rad100}$; $M_{2kN} = M_{2k100}$)
- Only if radial forces on the gear unit are stabilized by its pilots (housing, flange shaft)

Permitted shaft loads

Type	z_2	F_{2ax100}	$F_{2rad100}$	$F_{2rad,acc}$	M_{2k100}	$M_{2k,acc}$
	[mm]	[N]	[N]	[N]	[Nm]	[Nm]
PH3	62.0	1650	1613	1613	100	100
PH4	84.0	2150	3095	3571	260	300
PH5	97.0	4150	4536	4897	440	475
PH7	88.0	6150	17045	17045	1500	1500
PH8	126.0	10050	27778	27778	3500	3500
PH9	155.0	33000	48387	70968	7500	11000
PH10	171.0	50000	51462	73099	8800	12500

For other output speeds, download diagrams at http://products.stoeber.de.

The following applies to output speeds $n_{2m*} > 100$ rpm:

$$F_{2axN} = \frac{F_{2ax100}}{\sqrt[3]{\frac{n_{2m*}}{100\ \text{rpm}}}} \qquad F_{2radN} = \frac{F_{2rad100}}{\sqrt[3]{\frac{n_{2m*}}{100\ \text{rpm}}}} \qquad M_{2kN} = \frac{M_{2k100}}{\sqrt[3]{\frac{n_{2m*}}{100\ \text{rpm}}}}$$

The values for F_{2ax100}, $F_{2rad100}$ and M_{2k100} can be found in the table "Permitted shaft loads" in this chapter.

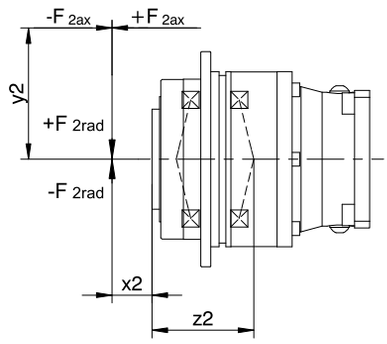


Fig. 1: Force application points

You can determine the permitted radial forces from the permitted breakdown torque M_{2kN} and $M_{2k,acc}$. The actual radial forces may not exceed the permitted radial forces. The permitted radial forces are in relation to the end of the hollow shaft (x2 = 0).

$$M_{2k,acc^*} = \frac{2 \cdot F_{2ax^*} \cdot y_2 + F_{2rad,acc^*} \cdot (x_2 + z_2)}{1000} \leq M_{2k,acc}$$

For applications with multiple axial and/or radial forces, you must add the forces as vectors.

In the event of EMERGENCY OFF operation (max. 1000 load changes), you can multiply the permitted forces and torques for F_{2ax100}, $F_{2rad100}$ and M_{2k100} by a factor of two.

Also note the calculation for equivalent values:

$$M_{2k,eq^*} = \sqrt[3]{\frac{|n_{2m,1^*}| \cdot t_{1^*} \cdot |M_{2k,acc,1^*}^3| + \ldots + |n_{2m,n^*}| \cdot t_{n^*} \cdot |M_{2k,acc,n^*}^3|}{|n_{2m,1^*}| \cdot t_{1^*} + \ldots + |n_{2m,n^*}| \cdot t_{n^*}}} \leq M_{2kN}$$

$$F_{2rad,eq^*} = \sqrt[3]{\frac{|n_{2m,1^*}| \cdot t_{1^*} \cdot |F_{2rad,acc,1^*}^3| + \ldots + |n_{2m,n^*}| \cdot t_{n^*} \cdot |F_{2rad,acc,n^*}^3|}{|n_{2m,1^*}| \cdot t_{1^*} + \ldots + |n_{2m,n^*}| \cdot t_{n^*}}} \leq F_{2radN}$$

$$F_{2ax,eq^*} \leq F_{2axN}$$

The following apply to the bearing service life L_{10h} ($ED_{20} \leq 40\%$):

$L_{10h} > 10000$ h with $1 < M_{2kN}/M_{2k^*} < 1.25$

$L_{10h} > 20000$ h with $1.25 < M_{2kN}/M_{2k^*} < 1.5$

$L_{10h} > 30000$ h with $1.5 < M_{2kN}/M_{2k^*}$

For different duty cycles:

$$L_{10h} > L_{10h(ED_{20}=40\%)} \cdot \frac{40\%}{ED_{20}}$$

17.6.3 Recommendation for radial shaft seal rings

For a duty cycle > 60%, we recommend radial shaft seal rings made of FKM.

Properties:

- Excellent temperature resistance
- High chemical stability
- Very good resistance to aging
- Excellent resistance to mineral oils and greases
- For use in the food, beverage and pharmaceutical industries

Leak-proofness

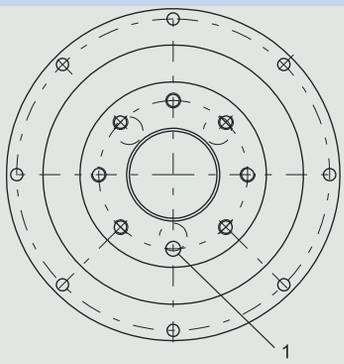
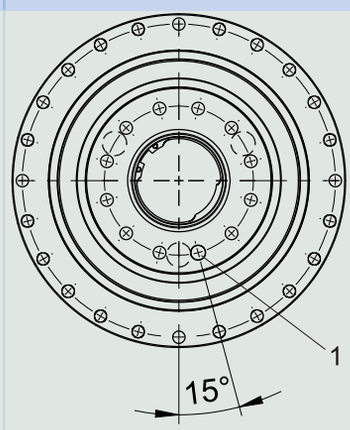
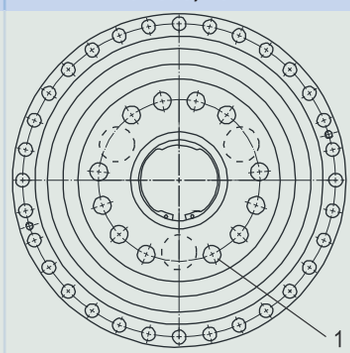
Our gear units are equipped with high-quality radial shaft seal rings and checked for leak-proofness. However, a leak cannot be fully ruled out over the length of use of a gear unit. If you use a gear unit with goods incompatible with the lubricant, you must take measures to prevent direct contact with the gear unit lubricant in case of a leak.

17.6.4 Reverse operation

To ensure lubrication of circulating geared parts during cyclic reverse operation from ± 20° to ± 90°, pay careful attention to the position of the output shaft if the gear unit is installed horizontally as shown in the images below.

The images show the center position of reverse operation.

Cyclic reverse operation ≤ ± 20° on request.

Sizes 3, 4, 5, 8	Size 7	Sizes 9, 10
		
1 Position of the positioning hole: bottom	1 Position of the positioning hole: as shown in the image	1 Position of the fastening thread: as shown in the image

17.7 Additional documentation

Additional documentation related to the product can be found at http://www.stoeber.de/en/download

Enter the ID of the documentation in the Search... field.

Documentation	ID
Operating manual for KL/KS/PHK/PHKX/PHQK/PK/PKX right-angle gear units and right-angle geared motors	443004_en
Lubricant filling quantities for gear units	441871

18 PHK right-angle planetary geared motors

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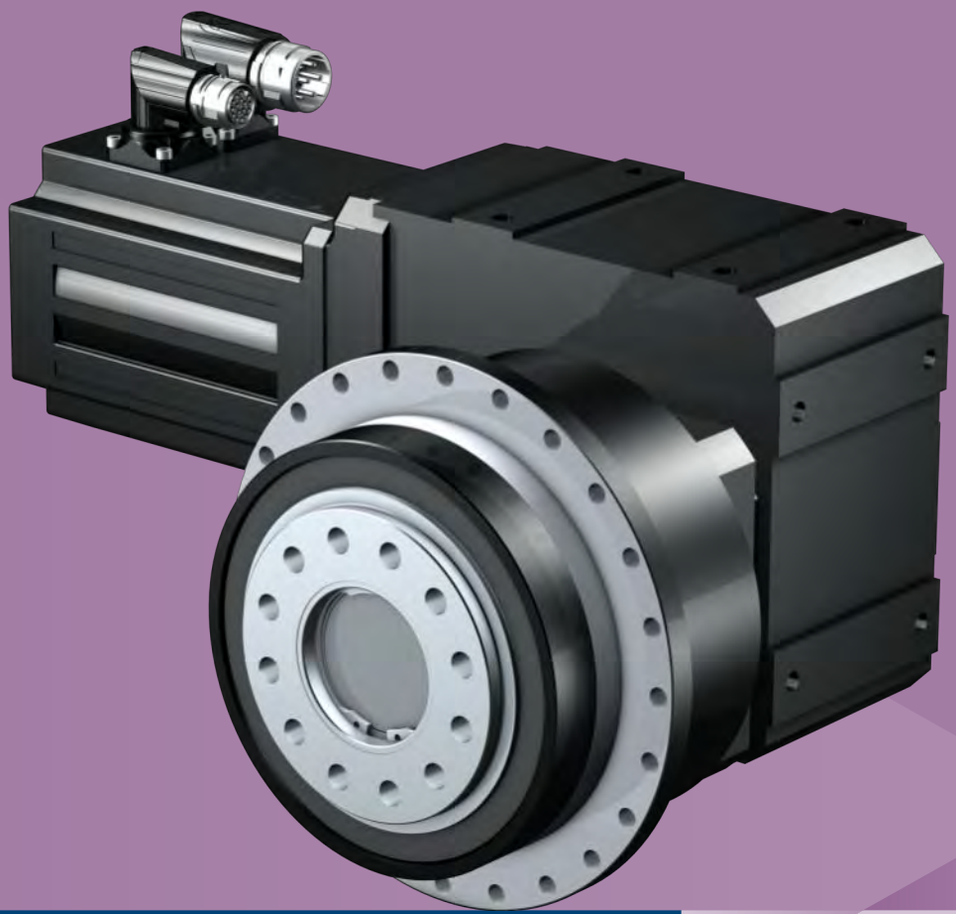


18 PHK right-angle planetary geared motors

18.1 Overview

High-performance precision right-angle planetary geared motors

Features

Power density	★★★★☆
Backlash	★★★★☆
Price category	€€€€
Shaft load	★★★★★
Smooth operation	★★★☆☆
Torsional stiffness	★★★★☆
Mass moment of inertia	★★★★★
Helical gearing	✓
Maintenance-free	✓
Continuous operation without cooling	✓
Stiff output bearing due to pretension	✓
Compact and highly dynamic due to direct motor attachment	✓

Key: ★☆☆☆☆ good | ★★★★★ excellent
€ Economy | €€€€€ Premium

Technical data

i	16 – 486
M_{2acc}	89 – 7500 Nm
$\Delta\phi_2$	3.5 – 4.5 arcmin
η_{get}	≤ 93 %

18.2 Selection tables

The technical data specified in the selection tables applies to:

- Installation altitudes up to 1000 m above sea level
- Surrounding temperatures from 0 °C to 40 °C
- Drives with convection-cooled motors (e.g. EZ401**U**)

You can calculate the technical data for drives with forced ventilated motors (for example EZ401**B**) at http://products.stoeber.de.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2.0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/arcmin]	m [kg]
PH5K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 320 Nm)																
13	203	208	12	1.1	PH521F0050 K102VF0470 EZ301U	320	600	234.6	11495/49	4000	4000	6000	0.22	4	60	17
17	152	155	11	1.4	PH521F0050 K102VF0350 EZ301U	320	600	175.5	3686/21	4000	4000	6000	0.23	4	60	17
21	121	124	10	1.8	PH521F0050 K102VF0280 EZ301U	320	600	140.2	2945/21	4000	4000	6000	0.26	4	60	17
21	208	219	17	1.1	PH521F0050 K102VF0280 EZ302U	320	600	140.2	2945/21	4000	4000	6000	0.36	4	60	18
26	101	103	9.7	2.2	PH521F0050 K102VF0230 EZ301U	300	600	116.3	5700/49	4000	4000	6000	0.28	4	60	17
26	172	182	17	1.3	PH521F0050 K102VF0230 EZ302U	320	600	116.3	5700/49	4000	4000	6000	0.38	4	60	18
34	76	78	9.1	2.9	PH521F0050 K102VF0175 EZ301U	230	600	87.82	10450/119	4000	3800	5500	0.32	4	60	17
34	130	137	16	1.7	PH521F0050 K102VF0175 EZ302U	320	600	87.82	10450/119	4000	3800	5500	0.42	4	60	18
34	169	179	20	1.3	PH521F0050 K102VF0175 EZ303U	320	600	87.82	10450/119	4000	3800	5500	0.53	4	60	18
43	61	62	8.6	3.6	PH521F0050 K102VF0140 EZ301U	180	530	70.57	494/7	4000	3800	5500	0.37	4	60	17
43	104	110	15	2.1	PH521F0050 K102VF0140 EZ302U	320	530	70.57	494/7	4000	3800	5500	0.47	4	60	18
43	136	144	19	1.6	PH521F0050 K102VF0140 EZ303U	320	530	70.57	494/7	4000	3800	5500	0.58	4	60	18
43	184	197	26	1.2	PH521F0050 K102VF0140 EZ401U	320	600	70.57	494/7	4000	3800	5500	1.1	4	60	20
52	50	51	8.2	4.4	PH521F0050 K102VF0115 EZ301U	150	440	57.83	1330/23	3600	3300	5000	0.43	4	60	17
52	86	90	14	2.6	PH521F0050 K102VF0115 EZ302U	270	440	57.83	1330/23	3600	3300	5000	0.53	4	60	18
52	111	118	18	2.0	PH521F0050 K102VF0115 EZ303U	320	440	57.83	1330/23	3600	3300	5000	0.64	4	60	18
52	151	162	25	1.5	PH521F0050 K102VF0115 EZ401U	320	600	57.83	1330/23	3600	3300	5000	1.2	4	60	20
65	68	72	13	3.2	PH521F0050 K102VF0092 EZ302U	220	350	46.25	8740/189	3600	3300	5000	0.63	4	60	18
65	89	94	17	2.5	PH521F0050 K102VF0092 EZ303U	260	350	46.25	8740/189	3600	3300	5000	0.74	4	60	18
65	121	129	23	1.8	PH521F0050 K102VF0092 EZ401U	320	600	46.25	8740/189	3600	3300	5000	1.3	4	60	20
65	185	202	36	1.2	PH521F0050 K102VF0092 EZ501U	320	600	46.25	8740/189	3600	3300	5000	3.2	4	60	21
65	202	224	39	1.1	PH521F0050 K102VF0092 EZ402U	320	600	46.25	8740/189	3600	3300	5000	2.0	4	60	21
72	62	65	13	3.6	PH521F0050 K102VF0083 EZ302U	190	310	41.55	1911/46	3600	3300	5000	0.59	4	60	18
72	80	85	17	2.7	PH521F0050 K102VF0083 EZ303U	230	310	41.55	1911/46	3600	3300	5000	0.70	4	60	18
72	108	116	23	2.0	PH521F0050 K102VF0083 EZ401U	320	600	41.55	1911/46	3600	3300	5000	1.2	4	60	20
72	166	182	35	1.3	PH521F0050 K102VF0083 EZ501U	320	600	41.55	1911/46	3600	3300	5000	3.2	4	60	21
72	182	201	38	1.2	PH521F0050 K102VF0083 EZ402U	320	600	41.55	1911/46	3600	3300	5000	1.9	4	60	21
90	49	52	12	3.8	PH521F0050 K102VF0066 EZ302U	150	250	33.22	299/9	3600	3300	5000	0.71	4	60	18
90	64	68	16	2.9	PH521F0050 K102VF0066 EZ303U	190	250	33.22	299/9	3600	3300	5000	0.82	4	60	18
90	87	93	21	2.5	PH521F0050 K102VF0066 EZ401U	260	600	33.22	299/9	3600	3300	5000	1.4	4	60	20
90	133	145	33	1.7	PH521F0050 K102VF0066 EZ501U	320	600	33.22	299/9	3600	3300	5000	3.3	4	60	21
90	145	161	36	1.5	PH521F0050 K102VF0066 EZ402U	320	600	33.22	299/9	3600	3300	5000	2.1	4	60	21
100	78	84	21	2.8	PH521F0050 K102VF0060 EZ401U	240	600	30.00	30/1	3300	2800	4500	1.4	4	60	20
100	120	131	32	1.8	PH521F0050 K102VF0060 EZ501U	320	600	30.00	30/1	3300	2800	4500	3.4	4	60	21
100	131	145	35	1.7	PH521F0050 K102VF0060 EZ402U	320	600	30.00	30/1	3300	2800	4500	2.1	4	60	21
100	193	240	51	1.1	PH521F0050 K102VF0060 EZ404U	320	600	30.00	30/1	3300	2800	4500	3.5	4	60	23
100	207	223	55	1.1	PH521F0050 K102VF0060 EZ502U	320	600	30.00	30/1	3300	2800	4500	5.7	4	60	22
100	207	232	55	1.1	PH521F0050 K102VF0060 EZ701U	320	600	30.00	30/1	3300	2800	4500	9.0	4	60	24
108	41	44	12	3.8	PH521F0050 K102VF0056 EZ302U	130	210	27.84	7600/273	3300	2800	4500	0.98	4	60	18
108	54	57	15	2.9	PH521F0050 K102VF0056 EZ303U	160	210	27.84	7600/273	3300	2800	4500	1.1	4	60	18
108	73	78	20	3.0	PH521F0050 K102VF0056 EZ401U	220	600	27.84	7600/273	3300	2800	4500	1.6	4	60	20
108	111	122	31	2.0	PH521F0050 K102VF0056 EZ501U	320	600	27.84	7600/273	3300	2800	4500	3.6	4	60	21
108	122	135	34	1.8	PH521F0050 K102VF0056 EZ402U	320	600	27.84	7600/273	3300	2800	4500	2.3	4	60	21
108	179	223	50	1.2	PH521F0050 K102VF0056 EZ404U	320	600	27.84	7600/273	3300	2800	4500	3.7	4	60	23
108	192	207	54	1.1	PH521F0050 K102VF0056 EZ502U	320	600	27.84	7600/273	3300	2800	4500	5.9	4	60	22
108	192	215	54	1.1	PH521F0050 K102VF0056 EZ701U	320	600	27.84	7600/273	3300	2800	4500	9.2	4	60	24
150	39	41	14	2.9	PH521F0050 K102VF0040 EZ303U	110	150	20.00	20/1	3300	2800	4500	1.3	4	60	18
150	52	56	19	4.2	PH521F0050 K102VF0040 EZ401U	160	600	20.00	20/1	3300	2800	4500	1.9	4	60	20
150	80	88	29	2.7	PH521F0050 K102VF0040 EZ501U	300	600	20.00	20/1	3300	2800	4500	3.8	4	60	21
150	88	97	32	2.5	PH521F0050 K102VF0040 EZ402U	300	600	20.00	20/1	3300	2800	4500	2.6	4	60	21
150	129	160	46	1.7	PH521F0050 K102VF0040 EZ404U	320	600	20.00	20/1	3300	2800	4500	3.9	4	60	23
150	138	149	50	1.6	PH521F0050 K102VF0040 EZ502U	320	600	20.00	20/1	3300	2800	4500	6.1	4	60	22

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PH5K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 320 Nm)																
150	138	155	50	1.6	PH521F0050 K102VF0040 EZ701U	320	600	20.00	20/1	3300	2800	4500	9.4	4	60	24
150	181	207	65	1.2	PH521F0050 K102VF0040 EZ503U	320	600	20.00	20/1	3300	2800	4500	8.5	4	60	24
188	31	33	12	2.9	PH521F0040 K102VF0040 EZ303U	89	120	16.00	16/1	3300	2800	4500	1.4	4.5	52	18
188	42	45	17	4.8	PH521F0040 K102VF0040 EZ401U	130	490	16.00	16/1	3300	2800	4500	1.9	4.5	52	20
188	64	70	26	3.1	PH521F0040 K102VF0040 EZ501U	240	490	16.00	16/1	3300	2800	4500	3.9	4.5	52	21
188	70	77	28	2.8	PH521F0040 K102VF0040 EZ402U	240	490	16.00	16/1	3300	2800	4500	2.6	4.5	52	21
188	103	128	41	1.9	PH521F0040 K102VF0040 EZ404U	320	490	16.00	16/1	3300	2800	4500	3.9	4.5	52	23
188	110	119	44	1.8	PH521F0040 K102VF0040 EZ502U	320	490	16.00	16/1	3300	2800	4500	6.2	4.5	52	22
188	110	124	44	1.8	PH521F0040 K102VF0040 EZ701U	300	490	16.00	16/1	3300	2800	4500	9.5	4.5	52	24
188	145	165	58	1.4	PH521F0040 K102VF0040 EZ503U	320	490	16.00	16/1	3300	2800	4500	8.5	4.5	52	24
PH5K (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 320 Nm)																
26	194	208	11	1.1	PH521F0050 K102VF0470 EZ301U	320	600	234.6	11495/49	4000	4000	6000	0.22	4	60	17
34	145	155	10	1.5	PH521F0050 K102VF0350 EZ301U	320	600	175.5	3686/21	4000	4000	6000	0.23	4	60	17
43	116	124	9.8	1.9	PH521F0050 K102VF0280 EZ301U	320	600	140.2	2945/21	4000	4000	6000	0.26	4	60	17
43	196	219	16	1.1	PH521F0050 K102VF0280 EZ302U	320	600	140.2	2945/21	4000	4000	6000	0.36	4	60	18
52	96	103	9.3	2.3	PH521F0050 K102VF0230 EZ301U	300	600	116.3	5700/49	4000	4000	6000	0.28	4	60	17
52	162	182	16	1.4	PH521F0050 K102VF0230 EZ302U	320	600	116.3	5700/49	4000	4000	6000	0.38	4	60	18
52	212	244	21	1.0	PH521F0050 K102VF0230 EZ303U	320	600	116.3	5700/49	4000	4000	6000	0.49	4	60	18
PH7K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 700 Nm)																
7.6	340	347	8.5	1.3	PH721F0070 K102VF0560 EZ301U	650	1240	392.7	1178/3	4000	4000	6000	0.21	4	108	21
9.1	284	291	8.1	1.5	PH721F0070 K102VF0470 EZ301U	650	1240	328.4	2299/7	4000	4000	6000	0.22	4	108	21
11	244	250	8.3	1.7	PH721F0070 K102VF0400 EZ301U	500	900	282.1	2821/10	4000	4000	6000	0.21	4	108	21
11	243	248	15	1.2	PH721F0100 K102VF0280 EZ301U	500	1000	280.5	5890/21	4000	4000	6000	0.26	3.5	100	21
11	411	434	11	1.1	PH721F0050 K202VF0560 EZ302U	700	1400	277.7	6665/24	4000	3900	5500	0.34	4	109	29
12	213	217	7.5	2.1	PH721F0070 K102VF0350 EZ301U	640	1240	245.7	3686/15	4000	4000	6000	0.23	4	108	21
12	364	384	13	1.2	PH721F0070 K102VF0350 EZ302U	650	1240	245.7	3686/15	4000	4000	6000	0.33	4	108	22
13	204	209	7.5	2.2	PH721F0070 K102VF0340 EZ301U	590	1060	235.9	4719/20	4000	4000	6000	0.22	4	108	21
13	349	369	13	1.3	PH721F0070 K102VF0340 EZ302U	590	1060	235.9	4719/20	4000	4000	6000	0.32	4	108	22
13	201	206	14	1.5	PH721F0100 K102VF0230 EZ301U	500	1000	232.7	11400/49	4000	4000	6000	0.28	3.5	100	21
13	342	362	11	1.3	PH721F0050 K202VF0460 EZ302U	700	1340	231.1	1849/8	4000	3900	5500	0.36	4	109	29
15	170	174	7.1	2.6	PH721F0070 K102VF0280 EZ301U	510	1230	196.3	589/3	4000	4000	6000	0.26	4	108	21
15	291	307	12	1.5	PH721F0070 K102VF0280 EZ302U	650	1230	196.3	589/3	4000	4000	6000	0.36	4	108	22
15	378	400	16	1.2	PH721F0070 K102VF0280 EZ303U	650	1230	196.3	589/3	4000	4000	6000	0.47	4	108	22
17	153	156	6.9	2.9	PH721F0070 K102VF0250 EZ301U	460	1020	176.5	8827/50	4000	4000	6000	0.24	4	108	21
17	261	276	12	1.7	PH721F0070 K102VF0250 EZ302U	650	1020	176.5	8827/50	4000	4000	6000	0.34	4	108	22
17	340	360	15	1.3	PH721F0070 K102VF0250 EZ303U	650	1020	176.5	8827/50	4000	4000	6000	0.45	4	108	22
17	256	270	10	1.7	PH721F0050 K202VF0350 EZ302U	700	1120	172.8	9675/56	4000	3900	5500	0.41	4	109	29
17	333	352	13	1.3	PH721F0050 K202VF0350 EZ303U	700	1120	172.8	9675/56	4000	3900	5500	0.52	4	109	30
18	141	144	6.8	3.1	PH721F0070 K102VF0230 EZ301U	420	1160	162.9	1140/7	4000	4000	6000	0.28	4	108	21
18	241	255	12	1.8	PH721F0070 K102VF0230 EZ302U	650	1160	162.9	1140/7	4000	4000	6000	0.38	4	108	22
18	314	332	15	1.4	PH721F0070 K102VF0230 EZ303U	650	1160	162.9	1140/7	4000	4000	6000	0.49	4	108	22
18	425	455	21	1.0	PH721F0070 K102VF0230 EZ401U	650	1240	162.9	1140/7	4000	4000	6000	1.0	4	108	24
21	122	125	6.6	3.6	PH721F0070 K102VF0200 EZ301U	370	880	141.1	2821/20	4000	4000	6000	0.27	4	108	21
21	209	221	11	2.1	PH721F0070 K102VF0200 EZ302U	650	880	141.1	2821/20	4000	4000	6000	0.37	4	108	22
21	272	288	15	1.6	PH721F0070 K102VF0200 EZ303U	650	880	141.1	2821/20	4000	4000	6000	0.48	4	108	22
21	368	394	20	1.2	PH721F0070 K102VF0200 EZ401U	650	1240	141.1	2821/20	4000	4000	6000	1.0	4	108	24
21	364	390	17	1.2	PH721F0050 K202VF0280 EZ401U	700	1400	139.8	559/4	4000	3900	5500	1.1	4	109	31
24	106	109	6.3	4.1	PH721F0070 K102VF0175 EZ301U	320	930	122.9	2090/17	4000	3800	5500	0.33	4	108	21
24	182	192	11	2.4	PH721F0070 K102VF0175 EZ302U	570	930	122.9	2090/17	4000	3800	5500	0.43	4	108	22
24	237	251	14	1.9	PH721F0070 K102VF0175 EZ303U	650	930	122.9	2090/17	4000	3800	5500	0.54	4	108	22
24	321	343	19	1.4	PH721F0070 K102VF0175 EZ401U	650	1240	122.9	2090/17	4000	3800	5500	1.1	4	108	24
26	101	104	6.3	4.3	PH721F0070 K102VF0165 EZ301U	310	830	117.0	117/1	4000	4000	6000	0.29	4	108	21
26	173	183	11	2.5	PH721F0070 K102VF0165 EZ302U	540	830	117.0	117/1	4000	4000	6000	0.39	4	108	22
26	226	239	14	2.0	PH721F0070 K102VF0165 EZ303U	610	830	117.0	117/1	4000	4000	6000	0.50	4	108	22
26	305	327	19	1.4	PH721F0070 K102VF0165 EZ401U	650	1240	117.0	117/1	4000	4000	6000	1.0	4	108	24
26	172	181	9.2	2.6	PH721F0050 K202VF0230 EZ302U	540	880	115.9	14835/128	4000	3900	5500	0.53	4	109	29
26	223	236	12	2.0	PH721F0050 K202VF0230 EZ303U	650	880	115.9	14835/128	4000	3900	5500	0.64	4	109	30
26	302	324	16	1.5	PH721F0050 K202VF0230 EZ401U	700	1400	115.9	14835/128	4000	3900	5500	1.2	4	109	31
26	100	102	12	3.0	PH721F0100 K102VF0115 EZ301U	300	880	115.7	2660/23	3600	3300	5000	0.43	3.5	100	21
26	171	181	20	1.8	PH721F0100 K102VF0115 EZ302U	500	880	115.7	2660/23	3600	3300	5000	0.53	3.5	100	22
26	223	236	27	1.3	PH721F0100 K102VF0115 EZ303U	500	880	115.7	2660/23	3600	3300	5000	0.64	3.5	100	22
30	86	87	6.0	3.0	PH721F0070 K102VF0140 EZ301U	260	350	98.80	494/5	4000	3800	5500	0.38	4	108	21
30	146	155	10	3.0	PH721F0070 K102VF0140 EZ302U	460	750	98.80	494/5	4000	3800	5500	0.48	4	108	22
30	190	201	13	2.3	PH721F0070 K102VF0140 EZ303U	550	750	98.80	494/5	4000	3800	5500	0.59	4	108	22

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PH7K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 700 Nm)																
30	258	276	18	1.7	PH721F0070 K102VF0140 EZ401U	650	1240	98.80	494/5	4000	3800	5500	1.1	4	108	24
30	396	432	28	1.1	PH721F0070 K102VF0140 EZ501U	650	1240	98.80	494/5	4000	3800	5500	3.1	4	108	25
30	432	478	30	1.0	PH721F0070 K102VF0140 EZ402U	650	1240	98.80	494/5	4000	3800	5500	1.8	4	108	25
32	137	145	19	2.2	PH721F0100 K102VF0092 EZ302U	430	700	92.49	17480/189	3600	3300	5000	0.62	3.5	100	22
32	178	189	25	1.7	PH721F0100 K102VF0092 EZ303U	500	700	92.49	17480/189	3600	3300	5000	0.73	3.5	100	22
32	241	258	34	1.2	PH721F0100 K102VF0092 EZ401U	500	1000	92.49	17480/189	3600	3300	5000	1.3	3.5	100	24
34	76	78	5.8	3.0	PH721F0070 K102VF0125 EZ301U	230	310	88.33	3003/34	4000	3800	5500	0.35	4	108	21
34	131	138	10	3.4	PH721F0070 K102VF0125 EZ302U	410	670	88.33	3003/34	4000	3800	5500	0.45	4	108	22
34	170	180	13	2.6	PH721F0070 K102VF0125 EZ303U	490	670	88.33	3003/34	4000	3800	5500	0.56	4	108	22
34	230	247	18	1.9	PH721F0070 K102VF0125 EZ401U	650	1240	88.33	3003/34	4000	3800	5500	1.1	4	108	24
34	354	387	27	1.2	PH721F0070 K102VF0125 EZ501U	650	1240	88.33	3003/34	4000	3800	5500	3.1	4	108	25
34	387	428	30	1.1	PH721F0070 K102VF0125 EZ402U	650	1240	88.33	3003/34	4000	3800	5500	1.8	4	108	25
34	129	137	8.6	3.4	PH721F0050 K202VF0175 EZ302U	410	660	87.35	2795/32	3900	3500	5000	0.66	4	109	29
34	168	178	11	2.6	PH721F0050 K202VF0175 EZ303U	490	660	87.35	2795/32	3900	3500	5000	0.77	4	109	30
34	228	244	15	1.9	PH721F0050 K202VF0175 EZ401U	690	1400	87.35	2795/32	3900	3500	5000	1.3	4	109	31
34	350	382	23	1.3	PH721F0050 K202VF0175 EZ501U	700	1400	87.35	2795/32	3900	3500	5000	3.3	4	109	32
34	382	423	25	1.2	PH721F0050 K202VF0175 EZ402U	700	1400	87.35	2795/32	3900	3500	5000	2.0	4	109	32
36	123	130	19	2.4	PH721F0100 K102VF0083 EZ302U	390	630	83.09	1911/23	3600	3300	5000	0.59	3.5	100	22
36	160	169	25	1.9	PH721F0100 K102VF0083 EZ303U	460	630	83.09	1911/23	3600	3300	5000	0.70	3.5	100	22
36	217	232	33	1.4	PH721F0100 K102VF0083 EZ401U	500	1000	83.09	1911/23	3600	3300	5000	1.2	3.5	100	24
37	120	127	9.8	3.7	PH721F0070 K102VF0115 EZ302U	380	610	80.96	1862/23	3600	3300	5000	0.54	4	108	22
37	156	165	13	2.8	PH721F0070 K102VF0115 EZ303U	450	610	80.96	1862/23	3600	3300	5000	0.65	4	108	22
37	211	226	17	2.1	PH721F0070 K102VF0115 EZ401U	640	1240	80.96	1862/23	3600	3300	5000	1.2	4	108	24
37	324	354	26	1.4	PH721F0070 K102VF0115 EZ501U	650	1240	80.96	1862/23	3600	3300	5000	3.1	4	108	25
37	354	392	29	1.2	PH721F0070 K102VF0115 EZ402U	650	1240	80.96	1862/23	3600	3300	5000	1.9	4	108	25
42	105	111	9.5	3.8	PH721F0070 K102VF0100 EZ302U	330	540	70.98	3549/50	4000	3800	5500	0.52	4	108	22
42	137	145	12	2.9	PH721F0070 K102VF0100 EZ303U	400	540	70.98	3549/50	4000	3800	5500	0.63	4	108	22
42	185	198	17	2.4	PH721F0070 K102VF0100 EZ401U	560	1240	70.98	3549/50	4000	3800	5500	1.2	4	108	24
42	284	311	26	1.5	PH721F0070 K102VF0100 EZ501U	650	1240	70.98	3549/50	4000	3800	5500	3.1	4	108	25
42	311	344	28	1.4	PH721F0070 K102VF0100 EZ402U	650	1240	70.98	3549/50	4000	3800	5500	1.9	4	108	25
43	181	193	14	2.4	PH721F0050 K202VF0140 EZ401U	550	1400	69.26	14405/208	3900	3500	5000	1.4	4	109	31
43	277	303	22	1.6	PH721F0050 K202VF0140 EZ501U	700	1400	69.26	14405/208	3900	3500	5000	3.4	4	109	32
43	303	335	24	1.5	PH721F0050 K202VF0140 EZ402U	700	1400	69.26	14405/208	3900	3500	5000	2.1	4	109	32
45	98	104	18	3.1	PH721F0100 K102VF0066 EZ302U	310	500	66.44	598/9	3600	3300	5000	0.71	3.5	100	22
45	128	135	23	2.3	PH721F0100 K102VF0066 EZ303U	370	500	66.44	598/9	3600	3300	5000	0.82	3.5	100	22
45	173	186	31	1.7	PH721F0100 K102VF0066 EZ401U	500	1000	66.44	598/9	3600	3300	5000	1.3	3.5	100	24
45	266	291	48	1.1	PH721F0100 K102VF0066 EZ501U	500	1000	66.44	598/9	3600	3300	5000	3.3	3.5	100	25
45	291	322	53	1.0	PH721F0100 K102VF0066 EZ402U	500	1000	66.44	598/9	3600	3300	5000	2.0	3.5	100	25
46	96	101	9.2	3.8	PH721F0070 K102VF0092 EZ302U	300	490	64.74	1748/27	3600	3300	5000	0.63	4	108	22
46	125	132	12	2.9	PH721F0070 K102VF0092 EZ303U	360	490	64.74	1748/27	3600	3300	5000	0.74	4	108	22
46	169	181	16	2.6	PH721F0070 K102VF0092 EZ401U	510	1240	64.74	1748/27	3600	3300	5000	1.3	4	108	24
46	259	283	25	1.7	PH721F0070 K102VF0092 EZ501U	650	1240	64.74	1748/27	3600	3300	5000	3.2	4	108	25
46	283	314	27	1.6	PH721F0070 K102VF0092 EZ402U	650	1240	64.74	1748/27	3600	3300	5000	2.0	4	108	25
50	156	168	31	1.9	PH721F0100 K102VF0060 EZ401U	470	1000	60.00	60/1	3300	2800	4500	1.4	3.5	100	24
50	240	263	47	1.2	PH721F0100 K102VF0060 EZ501U	500	1000	60.00	60/1	3300	2800	4500	3.4	3.5	100	25
50	263	291	51	1.1	PH721F0100 K102VF0060 EZ402U	500	1000	60.00	60/1	3300	2800	4500	2.1	3.5	100	25
52	86	91	9.0	3.8	PH721F0070 K102VF0083 EZ302U	270	440	58.16	13377/230	3600	3300	5000	0.60	4	108	22
52	112	119	12	2.9	PH721F0070 K102VF0083 EZ303U	320	440	58.16	13377/230	3600	3300	5000	0.71	4	108	22
52	152	162	16	2.9	PH721F0070 K102VF0083 EZ401U	460	1240	58.16	13377/230	3600	3300	5000	1.2	4	108	24
52	233	255	24	1.9	PH721F0070 K102VF0083 EZ501U	650	1240	58.16	13377/230	3600	3300	5000	3.2	4	108	25
52	255	282	27	1.7	PH721F0070 K102VF0083 EZ402U	650	1240	58.16	13377/230	3600	3300	5000	1.9	4	108	25
52	374	466	39	1.2	PH721F0070 K102VF0083 EZ404U	650	1240	58.16	13377/230	3600	3300	5000	3.3	4	108	27
52	401	433	42	1.1	PH721F0070 K102VF0083 EZ502U	650	1240	58.16	13377/230	3600	3300	5000	5.5	4	108	26
52	401	450	42	1.1	PH721F0070 K102VF0083 EZ701U	650	1240	58.16	13377/230	3600	3300	5000	8.8	4	108	28
52	85	90	7.8	3.8	PH721F0050 K202VF0115 EZ302U	270	440	57.73	6235/108	3500	3100	4500	0.97	4	109	29
52	111	118	10	2.9	PH721F0050 K202VF0115 EZ303U	320	440	57.73	6235/108	3500	3100	4500	1.1	4	109	30
52	151	161	14	2.9	PH721F0050 K202VF0115 EZ401U	460	1400	57.73	6235/108	3500	3100	4500	1.6	4	109	31
52	231	253	21	1.9	PH721F0050 K202VF0115 EZ501U	700	1400	57.73	6235/108	3500	3100	4500	3.6	4	109	32
52	253	280	23	1.7	PH721F0050 K202VF0115 EZ402U	700	1400	57.73	6235/108	3500	3100	4500	2.3	4	109	32
52	371	462	34	1.2	PH721F0050 K202VF0115 EZ404U	700	1400	57.73	6235/108	3500	3100	4500	3.7	4	109	35
52	398	430	36	1.1	PH721F0050 K202VF0115 EZ502U	700	1400	57.73	6235/108	3500	3100	4500	5.9	4	109	34
52	398	446	36	1.1	PH721F0050 K202VF0115 EZ701U	700	1400	57.73	6235/108	3500	3100	4500	9.2	4	109	36
54	82	87	17	3.6	PH721F0100 K102VF0056 EZ302U	260	420	55.68	15200/273	3300	2800	4500	0.97	3.5	100	22
54	107	114	22	2.8	PH721F0100 K102VF0056 EZ303U	310	420	55.68	15200/273	3300	2800	4500	1.1	3.5	100	22

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PH7K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 700 Nm)																
54	145	156	30	2.1	PH721F0100 K102VF0056 EZ401U	440	1000	55.68	15200/273	3300	2800	4500	1.6	3.5	100	24
54	223	244	46	1.3	PH721F0100 K102VF0056 EZ501U	500	1000	55.68	15200/273	3300	2800	4500	3.6	3.5	100	25
54	244	270	50	1.2	PH721F0100 K102VF0056 EZ402U	500	1000	55.68	15200/273	3300	2800	4500	2.3	3.5	100	25
65	69	73	9.1	3.8	PH721F0070 K102VF0066 EZ302U	220	350	46.51	2093/45	3600	3300	5000	0.72	4	108	22
65	90	95	12	2.9	PH721F0070 K102VF0066 EZ303U	260	350	46.51	2093/45	3600	3300	5000	0.83	4	108	22
65	121	130	16	3.4	PH721F0070 K102VF0066 EZ401U	370	1240	46.51	2093/45	3600	3300	5000	1.4	4	108	24
65	186	204	25	2.2	PH721F0070 K102VF0066 EZ501U	650	1240	46.51	2093/45	3600	3300	5000	3.3	4	108	25
65	204	225	27	2.0	PH721F0070 K102VF0066 EZ402U	650	1240	46.51	2093/45	3600	3300	5000	2.1	4	108	25
65	299	372	39	1.4	PH721F0070 K102VF0066 EZ404U	650	1240	46.51	2093/45	3600	3300	5000	3.4	4	108	27
65	320	346	42	1.3	PH721F0070 K102VF0066 EZ502U	650	1240	46.51	2093/45	3600	3300	5000	5.6	4	108	26
65	320	359	42	1.3	PH721F0070 K102VF0066 EZ701U	650	1240	46.51	2093/45	3600	3300	5000	8.9	4	108	28
65	120	128	13	3.7	PH721F0050 K202VF0092 EZ401U	360	1390	45.95	11395/248	3500	3100	4500	1.9	4	109	31
65	184	201	20	2.4	PH721F0050 K202VF0092 EZ501U	680	1390	45.95	11395/248	3500	3100	4500	3.9	4	109	32
65	201	223	22	2.2	PH721F0050 K202VF0092 EZ402U	680	1390	45.95	11395/248	3500	3100	4500	2.6	4	109	32
65	295	368	32	1.5	PH721F0050 K202VF0092 EZ404U	700	1390	45.95	11395/248	3500	3100	4500	3.9	4	109	35
65	317	342	34	1.4	PH721F0050 K202VF0092 EZ502U	700	1390	45.95	11395/248	3500	3100	4500	6.2	4	109	34
65	317	355	34	1.4	PH721F0050 K202VF0092 EZ701U	700	1400	45.95	11395/248	3500	3100	4500	9.5	4	109	36
65	415	475	45	1.1	PH721F0050 K202VF0092 EZ503U	700	1390	45.95	11395/248	3500	3100	4500	8.5	4	109	35
71	110	117	16	3.6	PH721F0070 K102VF0060 EZ401U	330	1240	42.00	42/1	3300	2800	4500	1.4	4	108	24
71	168	184	25	2.4	PH721F0070 K102VF0060 EZ501U	630	1240	42.00	42/1	3300	2800	4500	3.4	4	108	25
71	184	203	27	2.2	PH721F0070 K102VF0060 EZ402U	630	1240	42.00	42/1	3300	2800	4500	2.1	4	108	25
71	270	336	40	1.5	PH721F0070 K102VF0060 EZ404U	650	1240	42.00	42/1	3300	2800	4500	3.5	4	108	27
71	289	313	43	1.4	PH721F0070 K102VF0060 EZ502U	650	1240	42.00	42/1	3300	2800	4500	5.7	4	108	26
71	289	325	43	1.4	PH721F0070 K102VF0060 EZ701U	650	1240	42.00	42/1	3300	2800	4500	9.0	4	108	28
71	379	434	56	1.0	PH721F0070 K102VF0060 EZ503U	650	1240	42.00	42/1	3300	2800	4500	8.1	4	108	28
71	81	86	9.3	2.9	PH721F0050 K202VF0084 EZ303U	230	320	41.99	12470/297	3500	3100	4500	1.2	4	109	30
71	109	117	13	4.0	PH721F0050 K202VF0084 EZ401U	330	1270	41.99	12470/297	3500	3100	4500	1.7	4	109	31
71	168	184	19	2.6	PH721F0050 K202VF0084 EZ501U	630	1270	41.99	12470/297	3500	3100	4500	3.7	4	109	32
71	184	203	21	2.4	PH721F0050 K202VF0084 EZ402U	630	1270	41.99	12470/297	3500	3100	4500	2.4	4	109	32
71	270	336	31	1.6	PH721F0050 K202VF0084 EZ404U	700	1270	41.99	12470/297	3500	3100	4500	3.8	4	109	35
71	289	313	33	1.5	PH721F0050 K202VF0084 EZ502U	700	1270	41.99	12470/297	3500	3100	4500	6.0	4	109	34
71	289	325	33	1.5	PH721F0050 K202VF0084 EZ701U	700	1400	41.99	12470/297	3500	3100	4500	9.3	4	109	36
71	379	434	44	1.2	PH721F0050 K202VF0084 EZ503U	700	1270	41.99	12470/297	3500	3100	4500	8.4	4	109	35
75	77	82	20	2.9	PH721F0100 K102VF0040 EZ303U	220	300	40.00	40/1	3300	2800	4500	1.3	3.5	100	22
75	104	112	28	2.9	PH721F0100 K102VF0040 EZ401U	320	1000	40.00	40/1	3300	2800	4500	1.8	3.5	100	24
75	160	175	42	1.9	PH721F0100 K102VF0040 EZ501U	500	1000	40.00	40/1	3300	2800	4500	3.8	3.5	100	25
75	175	194	46	1.7	PH721F0100 K102VF0040 EZ402U	500	1000	40.00	40/1	3300	2800	4500	2.5	3.5	100	25
75	257	320	68	1.2	PH721F0100 K102VF0040 EZ404U	500	1000	40.00	40/1	3300	2800	4500	3.9	3.5	100	27
75	276	298	73	1.1	PH721F0100 K102VF0040 EZ502U	500	1000	40.00	40/1	3300	2800	4500	6.1	3.5	100	26
75	276	309	73	1.1	PH721F0100 K102VF0040 EZ701U	500	1000	40.00	40/1	3300	2800	4500	9.4	3.5	100	28
77	58	61	9.2	3.8	PH721F0070 K102VF0056 EZ302U	180	300	38.98	1520/39	3300	2800	4500	0.99	4	108	22
77	75	79	12	2.9	PH721F0070 K102VF0056 EZ303U	220	300	38.98	1520/39	3300	2800	4500	1.1	4	108	22
77	102	109	16	3.8	PH721F0070 K102VF0056 EZ401U	310	1180	38.98	1520/39	3300	2800	4500	1.6	4	108	24
77	156	171	25	2.5	PH721F0070 K102VF0056 EZ501U	580	1180	38.98	1520/39	3300	2800	4500	3.6	4	108	25
77	171	189	27	2.3	PH721F0070 K102VF0056 EZ402U	580	1180	38.98	1520/39	3300	2800	4500	2.3	4	108	25
77	250	312	40	1.5	PH721F0070 K102VF0056 EZ404U	650	1180	38.98	1520/39	3300	2800	4500	3.7	4	108	27
77	269	290	43	1.4	PH721F0070 K102VF0056 EZ502U	650	1180	38.98	1520/39	3300	2800	4500	5.9	4	108	26
77	269	301	43	1.4	PH721F0070 K102VF0056 EZ701U	650	1180	38.98	1520/39	3300	2800	4500	9.2	4	108	28
77	352	403	56	1.1	PH721F0070 K102VF0056 EZ503U	650	1180	38.98	1520/39	3300	2800	4500	8.3	4	108	28
90	87	93	12	4.3	PH721F0050 K202VF0067 EZ401U	260	510	33.42	11395/341	3500	3100	4500	2.1	4	109	31
90	134	146	18	3.3	PH721F0050 K202VF0067 EZ501U	500	1010	33.42	11395/341	3500	3100	4500	4.1	4	109	32
90	146	162	20	3.0	PH721F0050 K202VF0067 EZ402U	500	1010	33.42	11395/341	3500	3100	4500	2.8	4	109	32
90	215	268	29	2.0	PH721F0050 K202VF0067 EZ404U	700	1010	33.42	11395/341	3500	3100	4500	4.1	4	109	35
90	230	249	31	1.9	PH721F0050 K202VF0067 EZ502U	700	1010	33.42	11395/341	3500	3100	4500	6.4	4	109	34
90	230	258	31	1.9	PH721F0050 K202VF0067 EZ701U	620	1400	33.42	11395/341	3500	3100	4500	9.7	4	109	36
90	302	345	41	1.5	PH721F0050 K202VF0067 EZ503U	700	1010	33.42	11395/341	3500	3100	4500	8.7	4	109	35
90	373	448	51	1.2	PH721F0050 K202VF0067 EZ702U	700	1400	33.42	11395/341	3500	3100	4500	15	4	109	38
90	420	498	57	1.0	PH721F0050 K202VF0067 EZ505U	700	1400	33.42	11395/341	3500	3100	4500	13	4	109	38
100	120	131	18	3.7	PH721F0050 K202VF0060 EZ501U	450	910	30.00	30/1	3000	2600	4000	4.7	4	109	32
100	131	145	19	3.4	PH721F0050 K202VF0060 EZ402U	450	910	30.00	30/1	3000	2600	4000	3.4	4	109	32
100	193	240	29	2.3	PH721F0050 K202VF0060 EZ404U	670	910	30.00	30/1	3000	2600	4000	4.7	4	109	35
100	207	223	31	2.1	PH721F0050 K202VF0060 EZ502U	670	910	30.00	30/1	3000	2600	4000	7.0	4	109	34
100	207	232	31	2.1	PH721F0050 K202VF0060 EZ701U	560	1400	30.00	30/1	3000	2600	4000	10	4	109	36
100	271	310	40	1.6	PH721F0050 K202VF0060 EZ503U	670	910	30.00	30/1	3000	2600	4000	9.3	4	109	35

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PH7K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 700 Nm)																
100	335	402	50	1.3	PH721F0050 K202VF0060 EZ702U	700	1400	30.00	30/1	3000	2600	4000	15	4	109	38
100	377	447	56	1.2	PH721F0050 K202VF0060 EZ505U	700	1400	30.00	30/1	3000	2600	4000	14	4	109	38
107	54	57	12	2.9	PH721F0070 K102VF0040 EZ303U	160	210	28.00	28/1	3300	2800	4500	1.4	4	108	22
107	73	78	17	4.8	PH721F0070 K102VF0040 EZ401U	220	850	28.00	28/1	3300	2800	4500	1.9	4	108	24
107	112	123	26	3.1	PH721F0070 K102VF0040 EZ501U	420	850	28.00	28/1	3300	2800	4500	3.9	4	108	25
107	123	136	28	2.8	PH721F0070 K102VF0040 EZ402U	420	850	28.00	28/1	3300	2800	4500	2.6	4	108	25
107	180	224	41	1.9	PH721F0070 K102VF0040 EZ404U	630	850	28.00	28/1	3300	2800	4500	3.9	4	108	27
107	193	209	44	1.8	PH721F0070 K102VF0040 EZ502U	630	850	28.00	28/1	3300	2800	4500	6.2	4	108	26
107	193	216	44	1.8	PH721F0070 K102VF0040 EZ701U	520	850	28.00	28/1	3300	2800	4500	9.5	4	108	28
107	253	289	58	1.4	PH721F0070 K102VF0040 EZ503U	630	850	28.00	28/1	3300	2800	4500	8.5	4	108	28
116	178	200	30	2.5	PH721F0050 K202VF0052 EZ701U	480	1400	25.89	10535/407	3000	2600	4000	10	4	109	36
116	289	347	48	1.5	PH721F0050 K202VF0052 EZ702U	700	1400	25.89	10535/407	3000	2600	4000	15	4	109	38
116	325	386	54	1.4	PH721F0050 K202VF0052 EZ505U	700	1400	25.89	10535/407	3000	2600	4000	14	4	109	38
116	398	501	66	1.1	PH721F0050 K202VF0052 EZ703U	700	1400	25.89	10535/407	3000	2600	4000	23	4	109	40
150	52	56	10	4.3	PH721F0050 K202VF0040 EZ401U	160	300	20.00	20/1	3000	2600	4000	3.5	4	109	31
150	80	88	16	2.8	PH721F0050 K202VF0040 EZ501U	220	300	20.00	20/1	3000	2600	4000	5.5	4	109	32
150	88	97	18	2.6	PH721F0050 K202VF0040 EZ402U	220	300	20.00	20/1	3000	2600	4000	4.2	4	109	32
150	138	155	28	3.2	PH721F0050 K202VF0040 EZ701U	370	1400	20.00	20/1	3000	2600	4000	11	4	109	36
150	223	268	45	2.0	PH721F0050 K202VF0040 EZ702U	700	1400	20.00	20/1	3000	2600	4000	16	4	109	38
150	251	298	51	1.8	PH721F0050 K202VF0040 EZ505U	700	1400	20.00	20/1	3000	2600	4000	15	4	109	38
150	307	387	62	1.4	PH721F0050 K202VF0040 EZ703U	700	1400	20.00	20/1	3000	2600	4000	24	4	109	40
188	42	45	10	4.3	PH721F0040 K202VF0040 EZ401U	130	240	16.00	16/1	3000	2600	4000	3.6	4.5	89	31
188	64	70	16	2.8	PH721F0040 K202VF0040 EZ501U	180	240	16.00	16/1	3000	2600	4000	5.6	4.5	89	32
188	70	77	17	2.6	PH721F0040 K202VF0040 EZ402U	180	240	16.00	16/1	3000	2600	4000	4.3	4.5	89	32
188	110	124	27	3.2	PH721F0040 K202VF0040 EZ701U	300	1210	16.00	16/1	3000	2600	4000	11	4.5	89	36
188	179	215	45	2.0	PH721F0040 K202VF0040 EZ702U	610	1210	16.00	16/1	3000	2600	4000	16	4.5	89	38
188	201	238	50	1.8	PH721F0040 K202VF0040 EZ505U	670	1210	16.00	16/1	3000	2600	4000	15	4.5	89	38
188	246	310	61	1.4	PH721F0040 K202VF0040 EZ703U	670	1210	16.00	16/1	3000	2600	4000	24	4.5	89	40
PH7K (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 700 Nm)																
135	296	476	40	1.5	PH721F0050 K202VF0067 EZ505U	700	1400	33.42	11395/341	3500	3100	4500	13	4	109	38
PH7K (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 650 Nm)																
15	325	347	8.1	1.4	PH721F0070 K102VF0560 EZ301U	650	1240	392.7	1178/3	4000	4000	6000	0.21	4	108	21
17	291	311	15	1.0	PH721F0100 K102VF0350 EZ301U	500	1000	351.1	7372/21	4000	4000	6000	0.23	3.5	100	21
18	272	291	7.8	1.6	PH721F0070 K102VF0470 EZ301U	650	1240	328.4	2299/7	4000	4000	6000	0.22	4	108	21
21	234	250	8.0	1.8	PH721F0070 K102VF0400 EZ301U	500	900	282.1	2821/10	4000	4000	6000	0.21	4	108	21
21	232	248	14	1.3	PH721F0100 K102VF0280 EZ301U	500	1000	280.5	5890/21	4000	4000	6000	0.26	3.5	100	21
24	204	217	7.2	2.2	PH721F0070 K102VF0350 EZ301U	640	1240	245.7	3686/15	4000	4000	6000	0.23	4	108	21
24	343	384	12	1.3	PH721F0070 K102VF0350 EZ302U	650	1240	245.7	3686/15	4000	4000	6000	0.33	4	108	22
25	196	209	7.1	2.3	PH721F0070 K102VF0340 EZ301U	590	1060	235.9	4719/20	4000	4000	6000	0.22	4	108	21
25	330	369	12	1.3	PH721F0070 K102VF0340 EZ302U	590	1060	235.9	4719/20	4000	4000	6000	0.32	4	108	22
26	193	206	14	1.6	PH721F0100 K102VF0230 EZ301U	500	1000	232.7	11400/49	4000	4000	6000	0.28	3.5	100	21
31	163	174	6.8	2.7	PH721F0070 K102VF0280 EZ301U	510	1230	196.3	589/3	4000	4000	6000	0.26	4	108	21
31	274	307	12	1.6	PH721F0070 K102VF0280 EZ302U	650	1230	196.3	589/3	4000	4000	6000	0.36	4	108	22
31	358	411	15	1.2	PH721F0070 K102VF0280 EZ303U	650	1230	196.3	589/3	4000	4000	6000	0.47	4	108	22
34	146	156	6.6	3.0	PH721F0070 K102VF0250 EZ301U	460	1020	176.5	8827/50	4000	4000	6000	0.24	4	108	21
34	247	276	11	1.8	PH721F0070 K102VF0250 EZ302U	650	1020	176.5	8827/50	4000	4000	6000	0.34	4	108	22
34	322	370	15	1.4	PH721F0070 K102VF0250 EZ303U	650	1020	176.5	8827/50	4000	4000	6000	0.45	4	108	22
34	378	460	17	1.2	PH721F0070 K102VF0250 EZ401U	650	1240	176.5	8827/50	4000	4000	6000	0.98	4	108	24
37	135	144	6.5	3.3	PH721F0070 K102VF0230 EZ301U	420	1160	162.9	1140/7	4000	4000	6000	0.28	4	108	21
37	227	255	11	1.9	PH721F0070 K102VF0230 EZ302U	650	1160	162.9	1140/7	4000	4000	6000	0.38	4	108	22
37	297	341	14	1.5	PH721F0070 K102VF0230 EZ303U	650	1160	162.9	1140/7	4000	4000	6000	0.49	4	108	22
37	349	425	17	1.3	PH721F0070 K102VF0230 EZ401U	650	1240	162.9	1140/7	4000	4000	6000	1.0	4	108	24
43	117	125	6.3	3.8	PH721F0070 K102VF0200 EZ301U	370	880	141.1	2821/20	4000	4000	6000	0.27	4	108	21
43	197	221	11	2.2	PH721F0070 K102VF0200 EZ302U	650	880	141.1	2821/20	4000	4000	6000	0.37	4	108	22
43	257	296	14	1.7	PH721F0070 K102VF0200 EZ303U	650	880	141.1	2821/20	4000	4000	6000	0.48	4	108	22
43	302	368	16	1.5	PH721F0070 K102VF0200 EZ401U	650	1240	141.1	2821/20	4000	4000	6000	1.0	4	108	24
51	97	104	6.0	4.5	PH721F0070 K102VF0165 EZ301U	310	830	117.0	117/1	4000	4000	6000	0.29	4	108	21
51	163	183	10	2.7	PH721F0070 K102VF0165 EZ302U	540	830	117.0	117/1	4000	4000	6000	0.39	4	108	22
51	214	245	13	2.1	PH721F0070 K102VF0165 EZ303U	610	830	117.0	117/1	4000	4000	6000	0.50	4	108	22
51	251	305	16	1.8	PH721F0070 K102VF0165 EZ401U	650	1240	117.0	117/1	4000	4000	6000	1.0	4	108	24
51	370	479	23	1.2	PH721F0070 K102VF0165 EZ501U	650	1240	117.0	117/1	4000	4000	6000	3.0	4	108	25

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PH8K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 1850 Nm)																
6.2	720	760	8.4	1.2	PH821F0070 K202VF0690 EZ302U	1070	1930	486.0	46655/96	4000	3900	5500	0.33	3.5	248	51
6.5	684	723	12	1.2	PH821F0100 K202VF0460 EZ302U	1200	2400	462.3	1849/4	4000	3900	5500	0.37	3.5	244	51
7.7	576	608	7.1	1.7	PH821F0070 K202VF0560 EZ302U	1280	2010	388.8	9331/24	4000	3900	5500	0.35	3.5	248	51
7.7	749	793	9.2	1.3	PH821F0070 K202VF0560 EZ303U	1280	2010	388.8	9331/24	4000	3900	5500	0.46	3.5	248	51
8.5	523	553	11	1.2	PH821F0070 K202VF0500 EZ302U	780	1400	353.4	46655/132	4000	3900	5500	0.33	3.5	248	51
8.7	512	541	11	1.6	PH821F0100 K202VF0350 EZ302U	1200	2230	345.5	9675/28	4000	3900	5500	0.42	3.5	244	51
8.7	666	705	15	1.2	PH821F0100 K202VF0350 EZ303U	1200	2230	345.5	9675/28	4000	3900	5500	0.53	3.5	244	51
9.3	479	506	6.8	2.1	PH821F0070 K202VF0460 EZ302U	1380	1870	323.6	12943/40	4000	3900	5500	0.37	3.5	248	51
9.3	624	660	8.8	1.6	PH821F0070 K202VF0460 EZ303U	1380	1870	323.6	12943/40	4000	3900	5500	0.48	3.5	248	51
9.3	844	904	12	1.2	PH821F0070 K202VF0460 EZ401U	1480	2770	323.6	12943/40	4000	3900	5500	1.0	3.5	248	53
11	419	442	8.4	1.9	PH821F0070 K202VF0400 EZ302U	930	1460	282.8	9331/33	4000	3900	5500	0.35	3.5	248	51
11	545	577	11	1.4	PH821F0070 K202VF0400 EZ303U	930	1460	282.8	9331/33	4000	3900	5500	0.46	3.5	248	51
11	729	781	19	1.1	PH821F0100 K202VF0280 EZ401U	1200	2400	279.5	559/2	4000	3900	5500	1.1	3.5	244	53
11	726	778	8.9	1.5	PH821F0050 K302VF0560 EZ401U	1520	2760	278.5	12255/44	3800	3500	5000	1.0	4	239	58
12	358	378	6.3	2.8	PH821F0070 K202VF0350 EZ302U	1130	1560	241.9	1935/8	4000	3900	5500	0.42	3.5	248	51
12	466	493	8.2	2.1	PH821F0070 K202VF0350 EZ303U	1150	1560	241.9	1935/8	4000	3900	5500	0.53	3.5	248	51
12	631	676	11	1.6	PH821F0070 K202VF0350 EZ401U	1480	2770	241.9	1935/8	4000	3900	5500	1.1	3.5	248	53
12	969	1059	17	1.0	PH821F0070 K202VF0350 EZ501U	1480	2770	241.9	1935/8	4000	3900	5500	3.0	3.5	248	54
13	348	368	6.2	2.9	PH821F0070 K202VF0340 EZ302U	1000	1360	235.3	12943/55	4000	3900	5500	0.38	3.5	248	51
13	454	480	8.1	2.2	PH821F0070 K202VF0340 EZ303U	1000	1360	235.3	12943/55	4000	3900	5500	0.49	3.5	248	51
13	614	657	11	1.6	PH821F0070 K202VF0340 EZ401U	1240	2250	235.3	12943/55	4000	3900	5500	1.0	3.5	248	53
13	343	363	10	2.3	PH821F0100 K202VF0230 EZ302U	1080	1760	231.8	14835/64	4000	3900	5500	0.53	3.5	244	51
13	447	473	13	1.8	PH821F0100 K202VF0230 EZ303U	1200	1760	231.8	14835/64	4000	3900	5500	0.64	3.5	244	51
13	604	648	18	1.3	PH821F0100 K202VF0230 EZ401U	1200	2400	231.8	14835/64	4000	3900	5500	1.2	3.5	244	53
13	603	646	8.5	1.8	PH821F0050 K302VF0460 EZ401U	1830	2870	231.1	1849/8	3800	3500	5000	1.1	4	239	58
13	925	1012	13	1.2	PH821F0050 K302VF0460 EZ501U	1850	2870	231.1	1849/8	3800	3500	5000	3.1	4	239	59
13	1012	1119	14	1.1	PH821F0050 K302VF0460 EZ402U	1850	2870	231.1	1849/8	3800	3500	5000	1.8	4	239	59
15	510	547	10	2.0	PH821F0070 K202VF0280 EZ401U	1480	2770	195.7	3913/20	4000	3900	5500	1.1	3.5	248	53
15	783	856	16	1.3	PH821F0070 K202VF0280 EZ501U	1480	2770	195.7	3913/20	4000	3900	5500	3.1	3.5	248	54
15	856	947	18	1.2	PH821F0070 K202VF0280 EZ402U	1480	2770	195.7	3913/20	4000	3900	5500	1.8	3.5	248	54
17	260	275	5.8	3.2	PH821F0070 K202VF0250 EZ302U	820	1140	175.9	1935/11	4000	3900	5500	0.44	3.5	248	51
17	339	359	7.6	2.5	PH821F0070 K202VF0250 EZ303U	840	1140	175.9	1935/11	4000	3900	5500	0.55	3.5	248	51
17	459	491	10	2.2	PH821F0070 K202VF0250 EZ401U	1390	2770	175.9	1935/11	4000	3900	5500	1.1	3.5	248	53
17	704	770	16	1.4	PH821F0070 K202VF0250 EZ501U	1480	2770	175.9	1935/11	4000	3900	5500	3.0	3.5	248	54
17	770	852	17	1.3	PH821F0070 K202VF0250 EZ402U	1480	2770	175.9	1935/11	4000	3900	5500	1.8	3.5	248	54
17	259	273	9.5	3.1	PH821F0100 K202VF0175 EZ302U	810	1320	174.7	2795/16	3900	3500	5000	0.66	3.5	244	51
17	337	356	12	2.4	PH821F0100 K202VF0175 EZ303U	980	1320	174.7	2795/16	3900	3500	5000	0.77	3.5	244	51
17	455	488	17	1.8	PH821F0100 K202VF0175 EZ401U	1200	2400	174.7	2795/16	3900	3500	5000	1.3	3.5	244	53
17	699	765	26	1.1	PH821F0100 K202VF0175 EZ501U	1200	2400	174.7	2795/16	3900	3500	5000	3.3	3.5	244	54
17	765	846	28	1.0	PH821F0100 K202VF0175 EZ402U	1200	2400	174.7	2795/16	3900	3500	5000	2.0	3.5	244	54
17	453	485	7.9	2.4	PH821F0050 K302VF0350 EZ401U	1370	2870	173.7	4515/26	3800	3500	5000	1.2	4	239	58
17	695	760	12	1.6	PH821F0050 K302VF0350 EZ501U	1850	2870	173.7	4515/26	3800	3500	5000	3.2	4	239	59
17	760	841	13	1.4	PH821F0050 K302VF0350 EZ402U	1850	2870	173.7	4515/26	3800	3500	5000	1.9	4	239	59
18	240	254	5.7	3.8	PH821F0070 K202VF0230 EZ302U	760	1230	162.3	20769/128	4000	3900	5500	0.54	3.5	248	51
18	313	331	7.4	2.9	PH821F0070 K202VF0230 EZ303U	910	1230	162.3	20769/128	4000	3900	5500	0.65	3.5	248	51
18	423	453	10	2.4	PH821F0070 K202VF0230 EZ401U	1280	2770	162.3	20769/128	4000	3900	5500	1.2	3.5	248	53
18	650	710	15	1.5	PH821F0070 K202VF0230 EZ501U	1480	2770	162.3	20769/128	4000	3900	5500	3.1	3.5	248	54
18	710	786	17	1.4	PH821F0070 K202VF0230 EZ402U	1480	2770	162.3	20769/128	4000	3900	5500	1.9	3.5	248	54
21	371	397	9.7	2.7	PH821F0070 K202VF0200 EZ401U	1130	2770	142.3	7826/55	4000	3900	5500	1.1	3.5	248	53
21	570	623	15	1.8	PH821F0070 K202VF0200 EZ501U	1480	2770	142.3	7826/55	4000	3900	5500	3.1	3.5	248	54
21	623	689	16	1.6	PH821F0070 K202VF0200 EZ402U	1480	2770	142.3	7826/55	4000	3900	5500	1.8	3.5	248	54
21	914	1139	24	1.1	PH821F0070 K202VF0200 EZ404U	1480	2770	142.3	7826/55	4000	3900	5500	3.2	3.5	248	56
21	980	1060	26	1.0	PH821F0070 K202VF0200 EZ502U	1480	2770	142.3	7826/55	4000	3900	5500	5.4	3.5	248	55
21	980	1100	26	1.0	PH821F0070 K202VF0200 EZ701U	1480	2770	142.3	7826/55	4000	3900	5500	8.7	3.5	248	57
22	364	389	7.5	3.0	PH821F0050 K302VF0280 EZ401U	1100	2870	139.4	17845/128	3800	3500	5000	1.3	4	239	58
22	558	610	11	2.0	PH821F0050 K302VF0280 EZ501U	1850	2870	139.4	17845/128	3800	3500	5000	3.3	4	239	59
22	610	675	13	1.8	PH821F0050 K302VF0280 EZ402U	1850	2870	139.4	17845/128	3800	3500	5000	2.0	4	239	59
22	896	1116	18	1.2	PH821F0050 K302VF0280 EZ404U	1850	2870	139.4	17845/128	3800	3500	5000	3.4	4	239	61
22	961	1039	20	1.1	PH821F0050 K302VF0280 EZ502U	1850	2870	139.4	17845/128	3800	3500	5000	5.6	4	239	60
22	961	1078	20	1.1	PH821F0050 K302VF0280 EZ701U	1850	2870	139.4	17845/128	3800	3500	5000	8.9	4	239	62
22	361	387	16	2.2	PH821F0100 K202VF0140 EZ401U	1100	2400	138.5	14405/104	3900	3500	5000	1.5	3.5	244	53
22	555	606	24	1.4	PH821F0100 K202VF0140 EZ501U	1200	2400	138.5	14405/104	3900	3500	5000	3.4	3.5	244	54
22	606	671	26	1.3	PH821F0100 K202VF0140 EZ402U	1200	2400	138.5	14405/104	3900	3500	5000	2.2	3.5	244	54
25	181	191	5.3	3.8	PH821F0070 K202VF0175 EZ302U	570	930	122.3	3913/32	3900	3500	5000	0.67	3.5	248	51

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PH8K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 1850 Nm)																
25	236	249	6.9	2.9	PH821F0070 K202VF0175 EZ303U	680	930	122.3	3913/32	3900	3500	5000	0.78	3.5	248	51
25	319	342	9.3	3.1	PH821F0070 K202VF0175 EZ401U	970	2770	122.3	3913/32	3900	3500	5000	1.3	3.5	248	53
25	490	535	14	2.0	PH821F0070 K202VF0175 EZ501U	1480	2770	122.3	3913/32	3900	3500	5000	3.3	3.5	248	54
25	535	592	16	1.9	PH821F0070 K202VF0175 EZ402U	1480	2770	122.3	3913/32	3900	3500	5000	2.0	3.5	248	54
25	786	979	23	1.3	PH821F0070 K202VF0175 EZ404U	1480	2770	122.3	3913/32	3900	3500	5000	3.4	3.5	248	56
25	843	911	25	1.2	PH821F0070 K202VF0175 EZ502U	1480	2770	122.3	3913/32	3900	3500	5000	5.6	3.5	248	55
25	843	945	25	1.2	PH821F0070 K202VF0175 EZ701U	1480	2770	122.3	3913/32	3900	3500	5000	8.9	3.5	248	57
25	175	185	5.3	3.8	PH821F0070 K202VF0170 EZ302U	550	890	118.0	20769/176	4000	3900	5500	0.58	3.5	248	51
25	227	241	6.8	2.9	PH821F0070 K202VF0170 EZ303U	660	890	118.0	20769/176	4000	3900	5500	0.69	3.5	248	51
25	308	330	9.2	3.3	PH821F0070 K202VF0170 EZ401U	930	2770	118.0	20769/176	4000	3900	5500	1.2	3.5	248	53
25	473	516	14	2.1	PH821F0070 K202VF0170 EZ501U	1480	2770	118.0	20769/176	4000	3900	5500	3.2	3.5	248	54
25	516	571	16	1.9	PH821F0070 K202VF0170 EZ402U	1480	2770	118.0	20769/176	4000	3900	5500	1.9	3.5	248	54
25	758	945	23	1.3	PH821F0070 K202VF0170 EZ404U	1480	2770	118.0	20769/176	4000	3900	5500	3.3	3.5	248	56
25	813	879	24	1.2	PH821F0070 K202VF0170 EZ502U	1480	2770	118.0	20769/176	4000	3900	5500	5.5	3.5	248	55
25	813	912	24	1.2	PH821F0070 K202VF0170 EZ701U	1480	2770	118.0	20769/176	4000	3900	5500	8.8	3.5	248	57
26	304	325	7.2	3.6	PH821F0050 K302VF0230 EZ401U	920	2870	116.5	2795/24	3800	3500	5000	1.4	4	239	58
26	466	510	11	2.4	PH821F0050 K302VF0230 EZ501U	1740	2870	116.5	2795/24	3800	3500	5000	3.4	4	239	59
26	510	564	12	2.2	PH821F0050 K302VF0230 EZ402U	1740	2870	116.5	2795/24	3800	3500	5000	2.1	4	239	59
26	748	933	18	1.5	PH821F0050 K302VF0230 EZ404U	1850	2870	116.5	2795/24	3800	3500	5000	3.5	4	239	61
26	803	868	19	1.4	PH821F0050 K302VF0230 EZ502U	1850	2870	116.5	2795/24	3800	3500	5000	5.7	4	239	60
26	803	900	19	1.4	PH821F0050 K302VF0230 EZ701U	1850	2870	116.5	2795/24	3800	3500	5000	9.0	4	239	62
26	1052	1204	25	1.0	PH821F0050 K302VF0230 EZ503U	1850	2870	116.5	2795/24	3800	3500	5000	8.1	4	239	62
26	171	181	8.5	3.8	PH821F0100 K202VF0115 EZ302U	540	870	115.5	6235/54	3500	3100	4500	0.98	3.5	244	51
26	223	235	11	2.9	PH821F0100 K202VF0115 EZ303U	650	870	115.5	6235/54	3500	3100	4500	1.1	3.5	244	51
26	301	323	15	2.7	PH821F0100 K202VF0115 EZ401U	910	2400	115.5	6235/54	3500	3100	4500	1.6	3.5	244	53
26	462	505	23	1.7	PH821F0100 K202VF0115 EZ501U	1200	2400	115.5	6235/54	3500	3100	4500	3.6	3.5	244	54
26	505	559	25	1.6	PH821F0100 K202VF0115 EZ402U	1200	2400	115.5	6235/54	3500	3100	4500	2.3	3.5	244	54
26	742	925	37	1.1	PH821F0100 K202VF0115 EZ404U	1200	2400	115.5	6235/54	3500	3100	4500	3.7	3.5	244	56
26	796	860	40	1.0	PH821F0100 K202VF0115 EZ502U	1200	2400	115.5	6235/54	3500	3100	4500	5.9	3.5	244	55
26	796	892	40	1.0	PH821F0100 K202VF0115 EZ701U	1200	2400	115.5	6235/54	3500	3100	4500	9.2	3.5	244	57
31	253	271	9.4	3.7	PH821F0070 K202VF0140 EZ401U	770	2770	96.96	20167/208	3900	3500	5000	1.5	3.5	248	53
31	388	424	14	2.4	PH821F0070 K202VF0140 EZ501U	1440	2770	96.96	20167/208	3900	3500	5000	3.4	3.5	248	54
31	424	469	16	2.2	PH821F0070 K202VF0140 EZ402U	1440	2770	96.96	20167/208	3900	3500	5000	2.2	3.5	248	54
31	623	776	23	1.5	PH821F0070 K202VF0140 EZ404U	1480	2770	96.96	20167/208	3900	3500	5000	3.5	3.5	248	56
31	668	722	25	1.4	PH821F0070 K202VF0140 EZ502U	1480	2770	96.96	20167/208	3900	3500	5000	5.7	3.5	248	55
31	668	749	25	1.4	PH821F0070 K202VF0140 EZ701U	1480	2770	96.96	20167/208	3900	3500	5000	9.0	3.5	248	57
31	876	1002	32	1.1	PH821F0070 K202VF0140 EZ503U	1480	2770	96.96	20167/208	3900	3500	5000	8.1	3.5	248	57
33	240	257	14	3.3	PH821F0100 K202VF0092 EZ401U	730	2400	91.90	11395/124	3500	3100	4500	1.9	3.5	244	53
33	368	402	22	2.2	PH821F0100 K202VF0092 EZ501U	1200	2400	91.90	11395/124	3500	3100	4500	3.9	3.5	244	54
33	402	445	24	2.0	PH821F0100 K202VF0092 EZ402U	1200	2400	91.90	11395/124	3500	3100	4500	2.6	3.5	244	54
33	590	736	35	1.4	PH821F0100 K202VF0092 EZ404U	1200	2400	91.90	11395/124	3500	3100	4500	3.9	3.5	244	56
33	633	685	38	1.3	PH821F0100 K202VF0092 EZ502U	1200	2400	91.90	11395/124	3500	3100	4500	6.2	3.5	244	55
33	633	710	38	1.3	PH821F0100 K202VF0092 EZ701U	1200	2400	91.90	11395/124	3500	3100	4500	9.5	3.5	244	57
34	132	139	5.4	3.8	PH821F0070 K202VF0125 EZ302U	410	670	88.94	3913/44	3900	3500	5000	0.74	3.5	248	51
34	171	181	7.0	2.9	PH821F0070 K202VF0125 EZ303U	500	670	88.94	3913/44	3900	3500	5000	0.85	3.5	248	51
34	232	248	9.4	3.9	PH821F0070 K202VF0125 EZ401U	700	2700	88.94	3913/44	3900	3500	5000	1.4	3.5	248	53
34	356	389	15	2.6	PH821F0070 K202VF0125 EZ501U	1330	2700	88.94	3913/44	3900	3500	5000	3.4	3.5	248	54
34	389	431	16	2.3	PH821F0070 K202VF0125 EZ402U	1330	2700	88.94	3913/44	3900	3500	5000	2.1	3.5	248	54
34	571	712	23	1.6	PH821F0070 K202VF0125 EZ404U	1480	2700	88.94	3913/44	3900	3500	5000	3.4	3.5	248	56
34	613	663	25	1.5	PH821F0070 K202VF0125 EZ502U	1480	2700	88.94	3913/44	3900	3500	5000	5.7	3.5	248	55
34	613	687	25	1.5	PH821F0070 K202VF0125 EZ701U	1480	2770	88.94	3913/44	3900	3500	5000	9.0	3.5	248	57
34	803	919	33	1.1	PH821F0070 K202VF0125 EZ503U	1480	2700	88.94	3913/44	3900	3500	5000	8.0	3.5	248	57
35	225	242	6.6	4.9	PH821F0050 K302VF0175 EZ401U	680	2620	86.47	7955/92	3500	3100	5000	1.7	4	239	58
35	346	378	10	3.2	PH821F0050 K302VF0175 EZ501U	1290	2620	86.47	7955/92	3500	3100	5000	3.7	4	239	59
35	378	419	11	2.9	PH821F0050 K302VF0175 EZ402U	1290	2620	86.47	7955/92	3500	3100	5000	2.4	4	239	59
35	556	692	16	2.0	PH821F0050 K302VF0175 EZ404U	1850	2620	86.47	7955/92	3500	3100	5000	3.8	4	239	61
35	596	644	18	1.8	PH821F0050 K302VF0175 EZ502U	1850	2620	86.47	7955/92	3500	3100	5000	6.0	4	239	60
35	596	668	18	1.8	PH821F0050 K302VF0175 EZ701U	1610	2870	86.47	7955/92	3500	3100	5000	9.3	4	239	62
35	781	894	23	1.4	PH821F0050 K302VF0175 EZ503U	1850	2620	86.47	7955/92	3500	3100	5000	8.4	4	239	62
35	966	1159	28	1.1	PH821F0050 K302VF0175 EZ702U	1850	2870	86.47	7955/92	3500	3100	5000	15	4	239	64
35	1087	1288	32	1.0	PH821F0050 K302VF0175 EZ505U	1850	2870	86.47	7955/92	3500	3100	5000	13	4	239	65
36	162	171	10	2.9	PH821F0100 K202VF0084 EZ303U	470	640	83.97	24940/297	3500	3100	4500	1.2	3.5	244	51
36	219	235	14	3.7	PH821F0100 K202VF0084 EZ401U	660	2400	83.97	24940/297	3500	3100	4500	1.8	3.5	244	53
36	336	368	21	2.4	PH821F0100 K202VF0084 EZ501U	1200	2400	83.97	24940/297	3500	3100	4500	3.7	3.5	244	54

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PH8K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 1850 Nm)																
36	368	407	23	2.2	PH821F0100 K202VF0084 EZ402U	1200	2400	83.97	24940/297	3500	3100	4500	2.5	3.5	244	54
36	540	672	34	1.5	PH821F0100 K202VF0084 EZ404U	1200	2400	83.97	24940/297	3500	3100	4500	3.8	3.5	244	56
36	579	626	37	1.4	PH821F0100 K202VF0084 EZ502U	1200	2400	83.97	24940/297	3500	3100	4500	6.0	3.5	244	55
36	579	649	37	1.4	PH821F0100 K202VF0084 EZ701U	1200	2400	83.97	24940/297	3500	3100	4500	9.3	3.5	244	57
36	758	868	48	1.1	PH821F0100 K202VF0084 EZ503U	1200	2400	83.97	24940/297	3500	3100	4500	8.4	3.5	244	57
37	120	126	5.4	3.8	PH821F0070 K202VF0115 EZ302U	380	610	80.82	8729/108	3500	3100	4500	1.0	3.5	248	51
37	156	165	7.0	2.9	PH821F0070 K202VF0115 EZ303U	450	610	80.82	8729/108	3500	3100	4500	1.1	3.5	248	51
37	211	226	9.5	4.2	PH821F0070 K202VF0115 EZ401U	640	2450	80.82	8729/108	3500	3100	4500	1.6	3.5	248	53
37	324	354	15	2.7	PH821F0070 K202VF0115 EZ501U	1200	2450	80.82	8729/108	3500	3100	4500	3.6	3.5	248	54
37	354	391	16	2.5	PH821F0070 K202VF0115 EZ402U	1200	2450	80.82	8729/108	3500	3100	4500	2.3	3.5	248	54
37	519	647	23	1.7	PH821F0070 K202VF0115 EZ404U	1480	2450	80.82	8729/108	3500	3100	4500	3.7	3.5	248	56
37	557	602	25	1.6	PH821F0070 K202VF0115 EZ502U	1480	2450	80.82	8729/108	3500	3100	4500	5.9	3.5	248	55
37	557	625	25	1.6	PH821F0070 K202VF0115 EZ701U	1480	2770	80.82	8729/108	3500	3100	4500	9.2	3.5	248	57
37	730	835	33	1.2	PH821F0070 K202VF0115 EZ503U	1480	2450	80.82	8729/108	3500	3100	4500	8.3	3.5	248	57
43	184	197	9.6	4.6	PH821F0070 K202VF0100 EZ401U	560	2140	70.51	20167/286	3900	3500	5000	1.6	3.5	248	53
43	282	309	15	3.0	PH821F0070 K202VF0100 EZ501U	1050	2140	70.51	20167/286	3900	3500	5000	3.6	3.5	248	54
43	309	341	16	2.7	PH821F0070 K202VF0100 EZ402U	1050	2140	70.51	20167/286	3900	3500	5000	2.3	3.5	248	54
43	453	565	24	1.9	PH821F0070 K202VF0100 EZ404U	1480	2140	70.51	20167/286	3900	3500	5000	3.6	3.5	248	56
43	486	525	25	1.7	PH821F0070 K202VF0100 EZ502U	1480	2140	70.51	20167/286	3900	3500	5000	5.9	3.5	248	55
43	486	545	25	1.7	PH821F0070 K202VF0100 EZ701U	1310	2770	70.51	20167/286	3900	3500	5000	9.2	3.5	248	57
43	637	729	33	1.3	PH821F0070 K202VF0100 EZ503U	1480	2140	70.51	20167/286	3900	3500	5000	8.2	3.5	248	57
43	788	946	41	1.1	PH821F0070 K202VF0100 EZ702U	1480	2770	70.51	20167/286	3900	3500	5000	14	3.5	248	59
43	279	305	9.7	3.9	PH821F0050 K302VF0140 EZ501U	1040	2110	69.68	7525/108	3500	3100	5000	4.0	4	239	59
43	305	337	11	3.6	PH821F0050 K302VF0140 EZ402U	1040	2110	69.68	7525/108	3500	3100	5000	2.7	4	239	59
43	448	558	16	2.5	PH821F0050 K302VF0140 EZ404U	1560	2110	69.68	7525/108	3500	3100	5000	4.1	4	239	61
43	480	519	17	2.3	PH821F0050 K302VF0140 EZ502U	1560	2110	69.68	7525/108	3500	3100	5000	6.3	4	239	60
43	480	539	17	2.3	PH821F0050 K302VF0140 EZ701U	1300	2870	69.68	7525/108	3500	3100	5000	9.6	4	239	62
43	629	720	22	1.7	PH821F0050 K302VF0140 EZ503U	1560	2110	69.68	7525/108	3500	3100	5000	8.7	4	239	62
43	779	934	27	1.4	PH821F0050 K302VF0140 EZ702U	1850	2870	69.68	7525/108	3500	3100	5000	15	4	239	64
43	876	1038	30	1.3	PH821F0050 K302VF0140 EZ505U	1850	2870	69.68	7525/108	3500	3100	5000	13	4	239	65
43	1071	1350	37	1.0	PH821F0050 K302VF0140 EZ703U	1850	2870	69.68	7525/108	3500	3100	5000	23	4	239	66
45	174	187	13	4.6	PH821F0100 K202VF0067 EZ401U	530	2030	66.83	22790/341	3500	3100	4500	2.1	3.5	244	53
45	268	292	20	3.0	PH821F0100 K202VF0067 EZ501U	1000	2030	66.83	22790/341	3500	3100	4500	4.1	3.5	244	54
45	292	324	22	2.7	PH821F0100 K202VF0067 EZ402U	1000	2030	66.83	22790/341	3500	3100	4500	2.8	3.5	244	54
45	429	535	32	1.9	PH821F0100 K202VF0067 EZ404U	1200	2030	66.83	22790/341	3500	3100	4500	4.2	3.5	244	56
45	461	498	35	1.7	PH821F0100 K202VF0067 EZ502U	1200	2030	66.83	22790/341	3500	3100	4500	6.4	3.5	244	55
45	461	517	35	1.7	PH821F0100 K202VF0067 EZ701U	1200	2400	66.83	22790/341	3500	3100	4500	9.7	3.5	244	57
45	604	691	45	1.3	PH821F0100 K202VF0067 EZ503U	1200	2030	66.83	22790/341	3500	3100	4500	8.8	3.5	244	57
45	747	896	56	1.1	PH821F0100 K202VF0067 EZ702U	1200	2400	66.83	22790/341	3500	3100	4500	15	3.5	244	59
47	168	180	9.7	4.9	PH821F0070 K202VF0092 EZ401U	510	1950	64.33	15953/248	3500	3100	4500	1.9	3.5	248	53
47	258	282	15	3.2	PH821F0070 K202VF0092 EZ501U	960	1950	64.33	15953/248	3500	3100	4500	3.9	3.5	248	54
47	282	312	16	2.9	PH821F0070 K202VF0092 EZ402U	960	1950	64.33	15953/248	3500	3100	4500	2.6	3.5	248	54
47	413	515	24	2.0	PH821F0070 K202VF0092 EZ404U	1440	1950	64.33	15953/248	3500	3100	4500	4.0	3.5	248	56
47	443	479	26	1.8	PH821F0070 K202VF0092 EZ502U	1440	1950	64.33	15953/248	3500	3100	4500	6.2	3.5	248	55
47	443	497	26	1.8	PH821F0070 K202VF0092 EZ701U	1200	2770	64.33	15953/248	3500	3100	4500	9.5	3.5	248	57
47	581	665	34	1.4	PH821F0070 K202VF0092 EZ503U	1440	1950	64.33	15953/248	3500	3100	4500	8.6	3.5	248	57
47	719	863	42	1.1	PH821F0070 K202VF0092 EZ702U	1480	2770	64.33	15953/248	3500	3100	4500	15	3.5	248	59
47	809	958	47	1.0	PH821F0070 K202VF0092 EZ505U	1480	2770	64.33	15953/248	3500	3100	4500	13	3.5	248	60
50	240	263	20	3.3	PH821F0100 K202VF0060 EZ501U	890	1820	60.00	60/1	3000	2600	4000	4.7	3.5	244	54
50	263	291	21	3.0	PH821F0100 K202VF0060 EZ402U	890	1820	60.00	60/1	3000	2600	4000	3.4	3.5	244	54
50	386	480	31	2.1	PH821F0100 K202VF0060 EZ404U	1200	1820	60.00	60/1	3000	2600	4000	4.8	3.5	244	56
50	413	447	34	1.9	PH821F0100 K202VF0060 EZ502U	1200	1820	60.00	60/1	3000	2600	4000	7.0	3.5	244	55
50	413	464	34	1.9	PH821F0100 K202VF0060 EZ701U	1120	2400	60.00	60/1	3000	2600	4000	10	3.5	244	57
50	542	620	44	1.5	PH821F0100 K202VF0060 EZ503U	1200	1820	60.00	60/1	3000	2600	4000	9.4	3.5	244	57
50	670	805	55	1.2	PH821F0100 K202VF0060 EZ702U	1200	2400	60.00	60/1	3000	2600	4000	16	3.5	244	59
50	754	894	61	1.1	PH821F0100 K202VF0060 EZ505U	1200	2400	60.00	60/1	3000	2600	4000	14	3.5	244	60
51	113	120	7.2	2.9	PH821F0070 K202VF0084 EZ303U	330	450	58.78	17458/297	3500	3100	4500	1.3	3.5	248	51
51	153	164	9.8	4.3	PH821F0070 K202VF0084 EZ401U	470	890	58.78	17458/297	3500	3100	4500	1.8	3.5	248	53
51	235	257	15	3.4	PH821F0070 K202VF0084 EZ501U	880	1780	58.78	17458/297	3500	3100	4500	3.8	3.5	248	54
51	257	285	16	3.1	PH821F0070 K202VF0084 EZ402U	880	1780	58.78	17458/297	3500	3100	4500	2.5	3.5	248	54
51	378	471	24	2.1	PH821F0070 K202VF0084 EZ404U	1310	1780	58.78	17458/297	3500	3100	4500	3.9	3.5	248	56
51	405	438	26	2.0	PH821F0070 K202VF0084 EZ502U	1310	1780	58.78	17458/297	3500	3100	4500	6.1	3.5	248	55
51	405	454	26	2.0	PH821F0070 K202VF0084 EZ701U	1090	2770	58.78	17458/297	3500	3100	4500	9.4	3.5	248	57
51	531	608	34	1.5	PH821F0070 K202VF0084 EZ503U	1310	1780	58.78	17458/297	3500	3100	4500	8.5	3.5	248	57

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PH8K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 1850 Nm)																
51	657	788	42	1.2	PH821F0070 K202VF0084 EZ702U	1480	2770	58.78	17458/297	3500	3100	4500	15	3.5	248	59
51	739	876	47	1.1	PH821F0070 K202VF0084 EZ505U	1480	2770	58.78	17458/297	3500	3100	4500	13	3.5	248	60
52	232	254	9.2	4.7	PH821F0050 K302VF0115 EZ501U	860	1760	58.05	1161/20	3200	2800	4200	4.4	4	239	59
52	254	281	10	4.3	PH821F0050 K302VF0115 EZ402U	860	1760	58.05	1161/20	3200	2800	4200	3.1	4	239	59
52	373	465	15	3.0	PH821F0050 K302VF0115 EZ404U	1300	1760	58.05	1161/20	3200	2800	4200	4.5	4	239	61
52	400	432	16	2.8	PH821F0050 K302VF0115 EZ502U	1300	1760	58.05	1161/20	3200	2800	4200	6.7	4	239	60
52	400	449	16	2.8	PH821F0050 K302VF0115 EZ701U	1080	2870	58.05	1161/20	3200	2800	4200	10	4	239	62
52	524	600	21	2.1	PH821F0050 K302VF0115 EZ503U	1300	1760	58.05	1161/20	3200	2800	4200	9.1	4	239	62
52	649	778	26	1.7	PH821F0050 K302VF0115 EZ702U	1850	2870	58.05	1161/20	3200	2800	4200	15	4	239	64
52	730	865	29	1.5	PH821F0050 K302VF0115 EZ505U	1850	2870	58.05	1161/20	3200	2800	4200	14	4	239	65
52	892	1124	35	1.2	PH821F0050 K302VF0115 EZ703U	1850	2870	58.05	1161/20	3200	2800	4200	23	4	239	66
58	357	400	32	2.2	PH821F0100 K202VF0052 EZ701U	960	2400	51.77	21070/407	3000	2600	4000	10	3.5	244	57
58	578	694	53	1.4	PH821F0100 K202VF0052 EZ702U	1200	2400	51.77	21070/407	3000	2600	4000	15	3.5	244	59
58	651	771	59	1.2	PH821F0100 K202VF0052 EZ505U	1200	2400	51.77	21070/407	3000	2600	4000	14	3.5	244	60
60	343	385	26	2.2	PH821F0070 K202VF0071 EZ701U	930	2770	49.83	14749/296	3000	2600	4000	10	3.5	248	57
60	557	668	42	1.4	PH821F0070 K202VF0071 EZ702U	1420	2770	49.83	14749/296	3000	2600	4000	15	3.5	248	59
60	626	742	48	1.2	PH821F0070 K202VF0071 EZ505U	1420	2770	49.83	14749/296	3000	2600	4000	14	3.5	248	60
64	122	131	10	4.3	PH821F0070 K202VF0067 EZ401U	370	710	46.78	15953/341	3500	3100	4500	2.2	3.5	248	53
64	187	205	15	3.9	PH821F0070 K202VF0067 EZ501U	700	1420	46.78	15953/341	3500	3100	4500	4.2	3.5	248	54
64	205	227	17	3.6	PH821F0070 K202VF0067 EZ402U	700	1420	46.78	15953/341	3500	3100	4500	2.9	3.5	248	54
64	301	375	25	2.4	PH821F0070 K202VF0067 EZ404U	1050	1420	46.78	15953/341	3500	3100	4500	4.2	3.5	248	56
64	322	349	26	2.3	PH821F0070 K202VF0067 EZ502U	1050	1420	46.78	15953/341	3500	3100	4500	6.5	3.5	248	55
64	322	362	26	2.3	PH821F0070 K202VF0067 EZ701U	870	2770	46.78	15953/341	3500	3100	4500	9.8	3.5	248	57
64	423	484	35	1.7	PH821F0070 K202VF0067 EZ503U	1050	1420	46.78	15953/341	3500	3100	4500	8.8	3.5	248	57
64	523	627	43	1.4	PH821F0070 K202VF0067 EZ702U	1390	2770	46.78	15953/341	3500	3100	4500	15	3.5	248	59
64	588	697	48	1.3	PH821F0070 K202VF0067 EZ505U	1390	2770	46.78	15953/341	3500	3100	4500	13	3.5	248	60
64	719	906	59	1.0	PH821F0070 K202VF0067 EZ703U	1390	2770	46.78	15953/341	3500	3100	4500	23	3.5	248	61
65	319	358	16	3.2	PH821F0050 K302VF0093 EZ701U	860	2870	46.34	5375/116	3200	2800	4200	11	4	239	62
65	518	621	26	2.0	PH821F0050 K302VF0093 EZ702U	1770	2870	46.34	5375/116	3200	2800	4200	16	4	239	64
65	582	690	29	1.8	PH821F0050 K302VF0093 EZ505U	1850	2870	46.34	5375/116	3200	2800	4200	14	4	239	65
65	712	897	36	1.4	PH821F0050 K302VF0093 EZ703U	1850	2870	46.34	5375/116	3200	2800	4200	24	4	239	66
71	168	184	15	4.2	PH821F0070 K202VF0060 EZ501U	630	1270	42.00	42/1	3000	2600	4000	4.8	3.5	248	54
71	184	203	17	3.9	PH821F0070 K202VF0060 EZ402U	630	1270	42.00	42/1	3000	2600	4000	3.5	3.5	248	54
71	270	336	25	2.6	PH821F0070 K202VF0060 EZ404U	940	1270	42.00	42/1	3000	2600	4000	4.9	3.5	248	56
71	289	313	27	2.5	PH821F0070 K202VF0060 EZ502U	940	1270	42.00	42/1	3000	2600	4000	7.1	3.5	248	55
71	289	325	27	2.5	PH821F0070 K202VF0060 EZ701U	780	2770	42.00	42/1	3000	2600	4000	10	3.5	248	57
71	379	434	35	1.9	PH821F0070 K202VF0060 EZ503U	940	1270	42.00	42/1	3000	2600	4000	9.5	3.5	248	57
71	469	563	43	1.5	PH821F0070 K202VF0060 EZ702U	1340	2770	42.00	42/1	3000	2600	4000	16	3.5	248	59
71	528	626	48	1.3	PH821F0070 K202VF0060 EZ505U	1340	2770	42.00	42/1	3000	2600	4000	14	3.5	248	60
71	645	813	59	1.1	PH821F0070 K202VF0060 EZ703U	1340	2770	42.00	42/1	3000	2600	4000	24	3.5	248	61
75	104	112	12	4.3	PH821F0100 K202VF0040 EZ401U	320	610	40.00	40/1	3000	2600	4000	3.6	3.5	244	53
75	160	175	18	2.8	PH821F0100 K202VF0040 EZ501U	450	610	40.00	40/1	3000	2600	4000	5.5	3.5	244	54
75	175	194	19	2.6	PH821F0100 K202VF0040 EZ402U	450	610	40.00	40/1	3000	2600	4000	4.3	3.5	244	54
75	276	309	30	2.9	PH821F0100 K202VF0040 EZ701U	740	2400	40.00	40/1	3000	2600	4000	11	3.5	244	57
75	447	536	49	1.8	PH821F0100 K202VF0040 EZ702U	1200	2400	40.00	40/1	3000	2600	4000	16	3.5	244	59
75	503	596	56	1.6	PH821F0100 K202VF0040 EZ505U	1200	2400	40.00	40/1	3000	2600	4000	15	3.5	244	60
75	615	775	68	1.3	PH821F0100 K202VF0040 EZ703U	1200	2400	40.00	40/1	3000	2600	4000	24	3.5	244	61
81	255	286	16	3.7	PH821F0050 K302VF0074 EZ701U	690	2800	36.96	2365/64	2700	2300	3800	11	4	239	62
81	413	496	27	2.3	PH821F0050 K302VF0074 EZ702U	1410	2800	36.96	2365/64	2700	2300	3800	17	4	239	64
81	465	551	30	2.1	PH821F0050 K302VF0074 EZ505U	1800	2800	36.96	2365/64	2700	2300	3800	15	4	239	65
81	568	716	37	1.7	PH821F0050 K302VF0074 EZ703U	1800	2800	36.96	2365/64	2700	2300	3800	25	4	239	66
83	250	280	27	2.7	PH821F0070 K202VF0052 EZ701U	670	2750	36.24	14749/407	3000	2600	4000	10	3.5	248	57
83	405	486	44	1.7	PH821F0070 K202VF0052 EZ702U	1280	2750	36.24	14749/407	3000	2600	4000	16	3.5	248	59
83	456	540	49	1.5	PH821F0070 K202VF0052 EZ505U	1280	2750	36.24	14749/407	3000	2600	4000	14	3.5	248	60
83	557	702	60	1.2	PH821F0070 K202VF0052 EZ703U	1280	2750	36.24	14749/407	3000	2600	4000	24	3.5	248	61
98	134	148	17	4.8	PH821F0070 K202VF0044 EZ402U	460	930	30.55	336/11	3000	2600	4000	4.1	3.5	248	54
98	196	245	25	3.3	PH821F0070 K202VF0044 EZ404U	680	930	30.55	336/11	3000	2600	4000	5.5	3.5	248	56
98	211	228	27	3.0	PH821F0070 K202VF0044 EZ502U	680	930	30.55	336/11	3000	2600	4000	7.7	3.5	248	55
98	211	236	27	3.0	PH821F0070 K202VF0044 EZ701U	570	2310	30.55	336/11	3000	2600	4000	11	3.5	248	57
98	276	316	36	2.3	PH821F0070 K202VF0044 EZ503U	680	930	30.55	336/11	3000	2600	4000	10	3.5	248	57
98	341	410	44	1.9	PH821F0070 K202VF0044 EZ702U	1170	2310	30.55	336/11	3000	2600	4000	16	3.5	248	59
98	384	455	50	1.7	PH821F0070 K202VF0044 EZ505U	1210	2310	30.55	336/11	3000	2600	4000	15	3.5	248	60
98	469	592	61	1.4	PH821F0070 K202VF0044 EZ703U	1210	2310	30.55	336/11	3000	2600	4000	24	3.5	248	61
100	207	232	17	4.3	PH821F0050 K302VF0060 EZ701U	560	2270	30.00	30/1	2700	2300	3800	12	4	239	62

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PH8K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 1850 Nm)																
100	335	402	27	2.7	PH821F0050 K302VF0060 EZ702U	1150	2270	30.00	30/1	2700	2300	3800	18	4	239	64
100	377	447	30	2.4	PH821F0050 K302VF0060 EZ505U	1680	2270	30.00	30/1	2700	2300	3800	16	4	239	65
100	461	581	37	1.9	PH821F0050 K302VF0060 EZ703U	1680	2270	30.00	30/1	2700	2300	3800	26	4	239	66
100	595	844	48	1.5	PH821F0050 K302VF0060 EZ705U	1680	2870	30.00	30/1	2700	2300	3800	38	4	239	72
107	73	78	10	4.3	PH821F0070 K202VF0040 EZ401U	220	420	28.00	28/1	3000	2600	4000	3.8	3.5	248	53
107	112	123	16	2.8	PH821F0070 K202VF0040 EZ501U	310	420	28.00	28/1	3000	2600	4000	5.8	3.5	248	54
107	123	136	17	2.6	PH821F0070 K202VF0040 EZ402U	310	420	28.00	28/1	3000	2600	4000	4.5	3.5	248	54
107	193	216	27	3.2	PH821F0070 K202VF0040 EZ701U	520	2120	28.00	28/1	3000	2600	4000	11	3.5	248	57
107	313	375	45	2.0	PH821F0070 K202VF0040 EZ702U	1070	2120	28.00	28/1	3000	2600	4000	17	3.5	248	59
107	352	417	50	1.8	PH821F0070 K202VF0040 EZ505U	1170	2120	28.00	28/1	3000	2600	4000	15	3.5	248	60
107	430	542	61	1.4	PH821F0070 K202VF0040 EZ703U	1170	2120	28.00	28/1	3000	2600	4000	24	3.5	248	61
112	185	208	17	4.6	PH821F0050 K302VF0054 EZ701U	500	2040	26.88	215/8	2700	2300	3800	12	4	239	62
112	300	360	27	2.9	PH821F0050 K302VF0054 EZ702U	1030	2040	26.88	215/8	2700	2300	3800	17	4	239	64
112	338	400	31	2.5	PH821F0050 K302VF0054 EZ505U	1500	2040	26.88	215/8	2700	2300	3800	16	4	239	65
112	413	521	38	2.1	PH821F0050 K302VF0054 EZ703U	1500	2040	26.88	215/8	2700	2300	3800	25	4	239	66
150	223	268	28	3.5	PH821F0050 K302VF0040 EZ702U	760	1520	20.00	20/1	2700	2300	3800	20	4	239	64
150	251	298	31	3.1	PH821F0050 K302VF0040 EZ505U	1120	1520	20.00	20/1	2700	2300	3800	18	4	239	65
150	307	387	38	2.5	PH821F0050 K302VF0040 EZ703U	1120	1520	20.00	20/1	2700	2300	3800	28	4	239	66
150	397	562	50	2.0	PH821F0050 K302VF0040 EZ705U	1470	2870	20.00	20/1	2700	2300	3800	40	4	239	72
188	179	215	28	3.5	PH821F0040 K302VF0040 EZ702U	610	1210	16.00	16/1	2700	2300	3800	20	4	186	64
188	201	238	31	3.1	PH821F0040 K302VF0040 EZ505U	890	1210	16.00	16/1	2700	2300	3800	19	4	186	65
188	246	310	38	2.5	PH821F0040 K302VF0040 EZ703U	890	1210	16.00	16/1	2700	2300	3800	28	4	186	66
188	317	450	50	2.0	PH821F0040 K302VF0040 EZ705U	1170	2310	16.00	16/1	2700	2300	3800	40	4	186	72
PH8K (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 1850 Nm)																
52	765	1232	23	1.4	PH821F0050 K302VF0175 EZ505U	1850	2870	86.47	7955/92	3500	3100	5000	13	4	239	65
64	624	1005	37	1.2	PH821F0070 K202VF0100 EZ505U	1480	2770	70.51	20167/286	3900	3500	5000	13	3.5	248	60
65	616	993	23	1.7	PH821F0050 K302VF0140 EZ505U	1850	2870	69.68	7525/108	3500	3100	5000	13	4	239	65
65	785	1298	29	1.3	PH821F0050 K302VF0140 EZ703U	1850	2870	69.68	7525/108	3500	3100	5000	23	4	239	66
70	569	917	38	1.3	PH821F0070 K202VF0092 EZ505U	1480	2770	64.33	15953/248	3500	3100	4500	13	3.5	248	60
77	520	837	38	1.3	PH821F0070 K202VF0084 EZ505U	1480	2770	58.78	17458/297	3500	3100	4500	13	3.5	248	60
77	662	1095	48	1.0	PH821F0070 K202VF0084 EZ703U	1480	2770	58.78	17458/297	3500	3100	4500	22	3.5	248	61
96	414	667	39	1.6	PH821F0070 K202VF0067 EZ505U	1390	2770	46.78	15953/341	3500	3100	4500	13	3.5	248	60
96	527	871	49	1.2	PH821F0070 K202VF0067 EZ703U	1390	2770	46.78	15953/341	3500	3100	4500	23	3.5	248	61
PH9K (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 4500 Nm)																
41	1957	2961	60	1.5	PH931F0060 K513VF0081 EZ805U	4500	9000	48.80	17081/350	1900	1800	3000	147	4	730	132
49	1628	2463	48	1.7	PH931F0040 K513VF0100 EZ805U	3840	7500	40.60	203/5	1900	1800	3000	144	4.5	525	132
61	1305	1974	48	1.9	PH931F0040 K513VF0081 EZ805U	3840	6480	32.54	17081/525	1900	1800	3000	148	4.5	525	132
PH9K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 4500 Nm)																
6.4	1837	2008	12	1.6	PH931F0060 K513VF0780 EZ501U	4500	8840	465.6	26071/56	3400	3000	4500	3.3	4	730	91
7.7	1528	1670	11	2.0	PH931F0060 K513VF0650 EZ501U	4500	7950	387.3	25172/65	3400	3000	4500	3.5	4	730	91
7.7	2630	2843	19	1.1	PH931F0060 K513VF0650 EZ502U	4500	7950	387.3	25172/65	3400	3000	4500	5.8	4	730	93
7.7	2630	2950	19	1.1	PH931F0060 K513VF0650 EZ701U	4500	9000	387.3	25172/65	3400	3000	4500	9.1	4	730	95
10	1140	1246	10	2.6	PH931F0060 K513VF0480 EZ501U	4240	6760	289.0	8091/28	3400	3000	4500	3.9	4	730	91
10	1962	2122	17	1.5	PH931F0060 K513VF0480 EZ502U	4500	6760	289.0	8091/28	3400	3000	4500	6.2	4	730	93
10	1962	2201	17	1.5	PH931F0060 K513VF0480 EZ701U	4500	9000	289.0	8091/28	3400	3000	4500	9.5	4	730	95
10	2572	2944	23	1.2	PH931F0060 K513VF0480 EZ503U	4500	6760	289.0	8091/28	3400	3000	4500	8.6	4	730	94
13	1570	1761	16	1.9	PH931F0060 K513VF0390 EZ701U	4240	9000	231.2	8091/35	3400	3000	4500	10	4	730	95
13	2546	3055	26	1.2	PH931F0060 K513VF0390 EZ702U	4500	9000	231.2	8091/35	3400	3000	4500	15	4	730	97
13	2864	3395	30	1.0	PH931F0060 K513VF0390 EZ505U	4500	9000	231.2	8091/35	3400	3000	4500	14	4	730	97
15	1317	1477	15	2.3	PH931F0060 K513VF0320 EZ701U	3560	9000	193.8	62031/320	3400	3000	4500	10	4	730	95
15	2135	2562	25	1.4	PH931F0060 K513VF0320 EZ702U	4500	9000	193.8	62031/320	3400	3000	4500	16	4	730	97
15	2402	2846	28	1.2	PH931F0060 K513VF0320 EZ505U	4500	9000	193.8	62031/320	3400	3000	4500	14	4	730	97
21	992	1113	14	3.0	PH931F0060 K513VF0240 EZ701U	2680	9000	146.1	11687/80	2800	2500	4000	11	4	730	95
21	1609	1931	23	1.9	PH931F0060 K513VF0240 EZ702U	4500	9000	146.1	11687/80	2800	2500	4000	17	4	730	97
21	1810	2145	26	1.7	PH931F0060 K513VF0240 EZ505U	4500	9000	146.1	11687/80	2800	2500	4000	15	4	730	97
21	2212	2789	32	1.4	PH931F0060 K513VF0240 EZ703U	4500	9000	146.1	11687/80	2800	2500	4000	25	4	730	99
26	789	885	13	3.8	PH931F0060 K513VF0195 EZ701U	2130	8670	116.1	27869/240	2800	2500	4000	13	4	730	95
26	1279	1535	21	2.3	PH931F0060 K513VF0195 EZ702U	4370	8670	116.1	27869/240	2800	2500	4000	18	4	730	97
26	1439	1705	24	2.1	PH931F0060 K513VF0195 EZ505U	4500	8670	116.1	27869/240	2800	2500	4000	16	4	730	97
26	1758	2217	29	1.7	PH931F0060 K513VF0195 EZ703U	4500	8670	116.1	27869/240	2800	2500	4000	26	4	730	99
26	2270	3218	38	1.3	PH931F0060 K513VF0195 EZ705U	4500	9000	116.1	27869/240	2800	2500	4000	38	4	730	105
31	656	736	13	4.6	PH931F0060 K513VF0160 EZ701U	1770	7210	96.56	26071/270	2300	2200	3600	14	4	730	95
31	1063	1276	20	2.8	PH931F0060 K513VF0160 EZ702U	3630	7210	96.56	26071/270	2300	2200	3600	19	4	730	97

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PH9K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 4500 Nm)																
31	1196	1418	23	2.5	PH931F0060 K513VF0160 EZ505U	4500	7210	96.56	26071/270	2300	2200	3600	18	4	730	97
31	1462	1843	28	2.1	PH931F0060 K513VF0160 EZ703U	4500	7210	96.56	26071/270	2300	2200	3600	27	4	730	99
31	1888	2676	36	1.6	PH931F0060 K513VF0160 EZ705U	4500	9000	96.56	26071/270	2300	2200	3600	39	4	730	105
31	1976	3288	38	1.5	PH931F0060 K513VF0160 EZ802U	4500	9000	96.56	26071/270	2300	2200	3600	63	4	730	113
39	1502	2130	34	2.0	PH931F0060 K513VF0130 EZ705U	4500	9000	76.85	1537/20	2300	2200	3600	42	4	730	105
39	1573	2617	35	1.9	PH931F0060 K513VF0130 EZ802U	4500	9000	76.85	1537/20	2300	2200	3600	66	4	730	113
39	1876	3399	42	1.6	PH931F0060 K513VF0130 EZ803U	4500	9000	76.85	1537/20	2300	2200	3600	91	4	730	119
49	1190	1688	31	2.5	PH931F0060 K513VF0100 EZ705U	4500	9000	60.90	609/10	1900	1800	3000	45	4	730	105
49	1246	2074	33	2.4	PH931F0060 K513VF0100 EZ802U	4500	9000	60.90	609/10	1900	1800	3000	69	4	730	113
49	1487	2694	39	2.0	PH931F0060 K513VF0100 EZ803U	4500	9000	60.90	609/10	1900	1800	3000	94	4	730	119
61	954	1353	29	3.1	PH931F0060 K513VF0081 EZ705U	4500	9000	48.80	17081/350	1900	1800	3000	49	4	730	105
61	999	1662	31	3.0	PH931F0060 K513VF0081 EZ802U	4480	9000	48.80	17081/350	1900	1800	3000	73	4	730	113
61	1191	2159	37	2.5	PH931F0060 K513VF0081 EZ803U	4500	9000	48.80	17081/350	1900	1800	3000	98	4	730	119
74	794	1125	27	3.0	PH931F0040 K513VF0100 EZ705U	3840	7500	40.60	203/5	1900	1800	3000	45	4.5	525	105
74	831	1382	28	2.8	PH931F0040 K513VF0100 EZ802U	3730	7500	40.60	203/5	1900	1800	3000	69	4.5	525	113
74	991	1796	33	2.4	PH931F0040 K513VF0100 EZ803U	3840	7500	40.60	203/5	1900	1800	3000	95	4.5	525	119
92	636	902	27	3.4	PH931F0040 K513VF0081 EZ705U	3110	6480	32.54	17081/525	1900	1800	3000	49	4.5	525	105
92	666	1108	28	3.3	PH931F0040 K513VF0081 EZ802U	2990	6480	32.54	17081/525	1900	1800	3000	73	4.5	525	113
92	794	1439	33	2.8	PH931F0040 K513VF0081 EZ803U	3840	6480	32.54	17081/525	1900	1800	3000	99	4.5	525	119
PH9K (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 4500 Nm)																
19	2016	3246	21	1.5	PH931F0060 K513VF0390 EZ505U	4500	9000	231.2	8091/35	3400	3000	4500	14	4	730	97
23	1690	2722	20	1.8	PH931F0060 K513VF0320 EZ505U	4500	9000	193.8	62031/320	3400	3000	4500	14	4	730	97
PH10K (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 7500 Nm)																
21	3818	5776	49	1.3	PH1031F0060 K613VF0160 EZ805U	7500	15000	95.21	54839/576	2200	2000	3200	143	4	1210	177
26	3039	4597	45	1.6	PH1031F0060 K613VF0125 EZ805U	7500	15000	75.77	9699/128	2200	2000	3200	147	4	1210	177
41	1951	2951	40	2.5	PH1031F0060 K613VF0081 EZ805U	7500	15000	48.64	255285/5248	1800	1700	2900	161	4	1210	177
PH10K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 7500 Nm)																
6.6	1803	1971	7.6	2.8	PH1031F0060 K613VF0760 EZ501U	6710	9380	456.8	380091/832	3100	2800	4000	3.7	4	1210	136
6.6	3103	3354	13	1.6	PH1031F0060 K613VF0760 EZ502U	6920	9380	456.8	380091/832	3100	2800	4000	6.0	4	1210	137
6.6	3103	3480	13	1.6	PH1031F0060 K613VF0760 EZ701U	7500	15000	456.8	380091/832	3100	2800	4000	9.3	4	1210	139
6.6	4067	4654	17	1.2	PH1031F0060 K613VF0760 EZ503U	6920	9380	456.8	380091/832	3100	2800	4000	8.4	4	1210	139
7.8	2596	2912	12	1.9	PH1031F0060 K613VF0640 EZ701U	7020	15000	382.3	391437/1024	3100	2800	4000	9.6	4	1210	139
7.8	4210	5052	20	1.2	PH1031F0060 K613VF0640 EZ702U	7500	15000	382.3	391437/1024	3100	2800	4000	15	4	1210	142
7.8	4736	5613	23	1.1	PH1031F0060 K613VF0640 EZ505U	7500	15000	382.3	391437/1024	3100	2800	4000	13	4	1210	142
10	1945	2181	11	2.6	PH1031F0060 K613VF0480 EZ701U	5260	14340	286.4	119133/416	3100	2800	4000	10	4	1210	139
10	3154	3785	19	1.6	PH1031F0060 K613VF0480 EZ702U	7500	14340	286.4	119133/416	3100	2800	4000	16	4	1210	142
10	3548	4205	21	1.4	PH1031F0060 K613VF0480 EZ505U	7500	14340	286.4	119133/416	3100	2800	4000	14	4	1210	142
10	4337	5467	25	1.2	PH1031F0060 K613VF0480 EZ703U	7500	14340	286.4	119133/416	3100	2800	4000	24	4	1210	144
13	1561	1751	11	3.2	PH1031F0060 K613VF0380 EZ701U	4220	13590	229.9	470859/2048	3100	2800	4000	11	4	1210	139
13	2532	3038	17	2.0	PH1031F0060 K613VF0380 EZ702U	7500	13590	229.9	470859/2048	3100	2800	4000	16	4	1210	142
13	2849	3376	20	1.8	PH1031F0060 K613VF0380 EZ505U	7500	13590	229.9	470859/2048	3100	2800	4000	15	4	1210	142
13	3482	4389	24	1.4	PH1031F0060 K613VF0380 EZ703U	7500	13590	229.9	470859/2048	3100	2800	4000	24	4	1210	144
16	1298	1456	10	3.9	PH1031F0060 K613VF0320 EZ701U	3510	12520	191.1	391437/2048	3100	2800	4000	12	4	1210	139
16	2105	2526	16	2.4	PH1031F0060 K613VF0320 EZ702U	7190	12520	191.1	391437/2048	3100	2800	4000	17	4	1210	142
16	2368	2807	18	2.1	PH1031F0060 K613VF0320 EZ505U	7500	12520	191.1	391437/2048	3100	2800	4000	16	4	1210	142
16	2894	3649	23	1.7	PH1031F0060 K613VF0320 EZ703U	7500	12520	191.1	391437/2048	3100	2800	4000	25	4	1210	144
16	3736	5297	29	1.3	PH1031F0060 K613VF0320 EZ705U	7500	15000	191.1	391437/2048	3100	2800	4000	38	4	1210	149
21	2816	3992	27	1.8	PH1031F0060 K613VF0240 EZ705U	7500	15000	144.0	73749/512	2600	2300	3600	40	4	1210	149
21	2948	4904	28	1.7	PH1031F0060 K613VF0240 EZ802U	7500	15000	144.0	73749/512	2600	2300	3600	64	4	1210	157
26	1255	1506	14	4.0	PH1031F0060 K613VF0190 EZ702U	4290	8510	114.0	51057/448	2600	2300	3600	22	4	1210	142
26	1412	1673	16	3.5	PH1031F0060 K613VF0190 EZ505U	6280	8510	114.0	51057/448	2600	2300	3600	20	4	1210	142
26	1726	2176	19	2.9	PH1031F0060 K613VF0190 EZ703U	6280	8510	114.0	51057/448	2600	2300	3600	29	4	1210	144
26	2228	3159	25	2.2	PH1031F0060 K613VF0190 EZ705U	7500	15000	114.0	51057/448	2600	2300	3600	42	4	1210	149
26	2332	3880	26	2.1	PH1031F0060 K613VF0190 EZ802U	7500	15000	114.0	51057/448	2600	2300	3600	66	4	1210	157
26	2782	5041	31	1.8	PH1031F0060 K613VF0190 EZ803U	7500	15000	114.0	51057/448	2600	2300	3600	91	4	1210	164
32	1861	2639	24	2.7	PH1031F0060 K613VF0160 EZ705U	7500	15000	95.21	54839/576	2200	2000	3200	44	4	1210	149
32	1949	3242	25	2.6	PH1031F0060 K613VF0160 EZ802U	7500	15000	95.21	54839/576	2200	2000	3200	68	4	1210	157
32	2324	4212	30	2.2	PH1031F0060 K613VF0160 EZ803U	7500	15000	95.21	54839/576	2200	2000	3200	94	4	1210	164
40	1481	2100	22	3.4	PH1031F0060 K613VF0125 EZ705U	7230	15000	75.77	9699/128	2200	2000	3200	48	4	1210	149
40	1551	2580	23	3.2	PH1031F0060 K613VF0125 EZ802U	6950	15000	75.77	9699/128	2200	2000	3200	73	4	1210	157
40	1850	3352	28	2.7	PH1031F0060 K613VF0125 EZ803U	7500	15000	75.77	9699/128	2200	2000	3200	98	4	1210	164

18.3 Dimensional drawings

In this chapter you can find the dimensions of the geared motors.

There is a dimensional drawing for every possible shaft/housing design, each with the tables for gear unit dimensions, motor dimensions and geared motor dimensions.

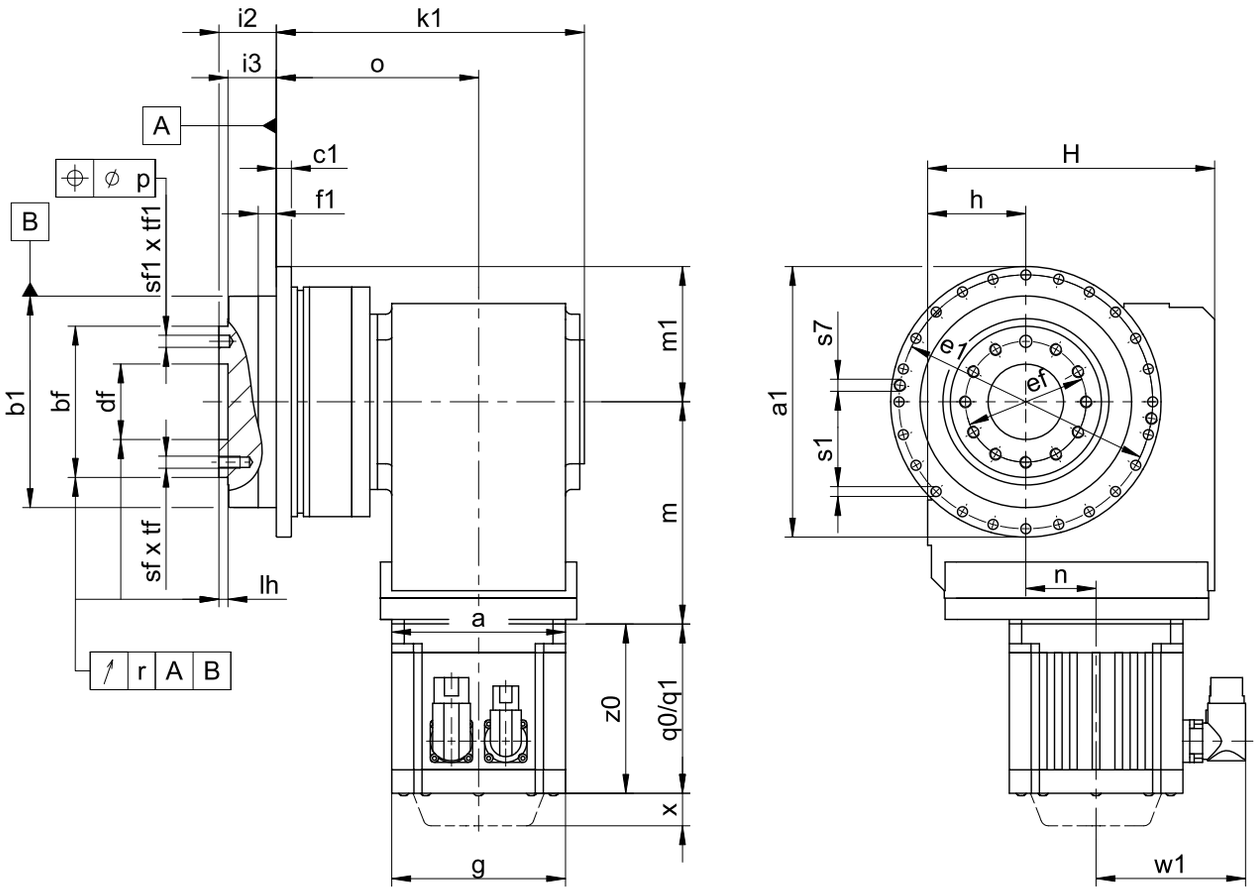
Dimensions can exceed the specifications of ISO 2768-mK due to casting tolerances or accumulation of individual tolerances.

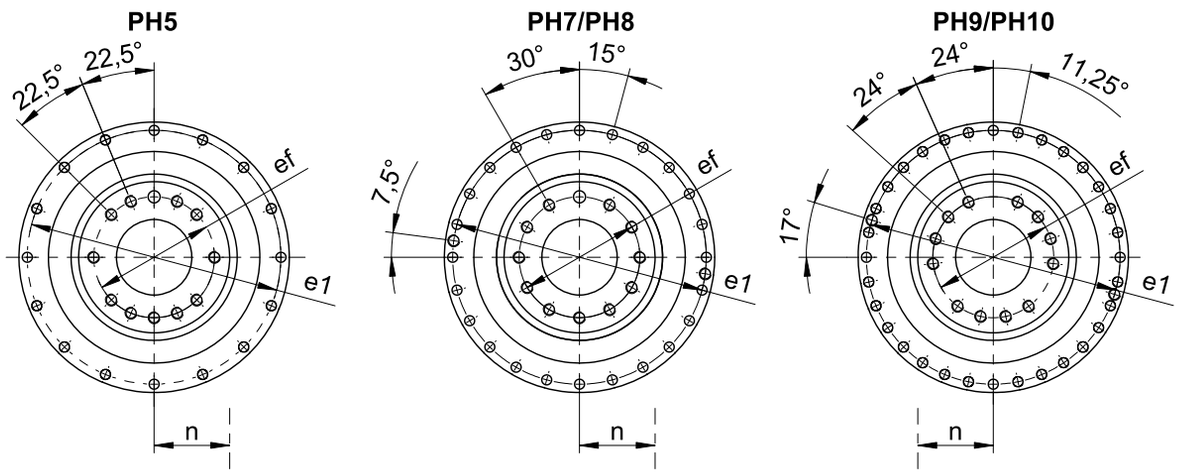
We reserve the right to make dimensional changes due to ongoing technical development.

You can download CAD models of our standard drives at http://cad.stoeber.de.

Combination options and the dimensions of forced ventilated geared motors can be found at http://cad.stoeber.de.

18.3.1 F shaft design (flange shaft)





q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▶ 23.4]

Dimensions of gear units

Type	Øa1	Øb1	Øbf	c1	Ødf	Øe1	Øef	f1	h	H	i2	i3	k1	lh	m1	o	p	r	Øs1	s7	sf	Øsf1	tf	tf1
PH521_K102_	145_{h7}	110_{h7}	80_{h7}	8	40^{H6}	135	63	10	60	160	29	23	172.0	6	60	116.0	0.02	0.020	5.5	–	M6	6^{H7}	11	7
PH721_K102_	179_{h7}	140_{h7}	100_{h7}	10	50^{H6}	168	80	12	60	160	38	32	176.0	6	60	120.0	0.02	0.025	6.6	–	M8	8^{H7}	14	7
PH721_K202_	179_{h7}	140_{h7}	100_{h7}	10	50^{H6}	168	80	12	65	190	38	32	204.0	6	65	134.0	0.02	0.025	6.6	–	M8	8^{H7}	14	7
PH821_K202_	247_{h7}	200_{h7}	160_{h7}	12	80^{H6}	233	125	15	65	190	50	42	234.5	8	65	164.5	0.02	0.030	9.0	M10	M10	10^{H7}	18	10
PH821_K302_	247_{h7}	200_{h7}	160_{h7}	12	80^{H6}	233	125	15	75	213	50	42	248.0	8	75	172.0	0.02	0.030	9.0	M10	M10	10^{H7}	18	10
PH931_K513_	300	255_{h7}	180_{h7}	18	90^{H6}	280	140	20	160	260	66	55	326.0	12	100	230.0	–	0.030	13.5	M8	M16	–	24	–
PH1031_K613_	330	285_{h7}	200_{h7}	20	95^{H6}	310	160	20	190	310	75	60	353.5	10	120	250.0	–	0.040	13.5	M10	M20	–	30	–

Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5
EZ805U	190	355.5	432.5	156.5	22	301.5

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
PH521_K102_	□72	124	36.0	□98	124	36.0	□115	128	36.0	□145	130	36.0	–	–	–
PH721_K102_	□72	124	36.0	□98	124	36.0	□115	128	36.0	□145	130	36.0	–	–	–
PH721_K202_	□72	143	46.0	□98	143	46.0	□115	147	46.0	□145	149	46.0	–	–	–
PH821_K202_	□72	143	46.0	□98	143	46.0	□115	147	46.0	□145	149	46.0	–	–	–
PH821_K302_	–	–	–	∅140	163	52.5	□115	167	52.5	□145	169	52.5	–	–	–
PH931_K513_	–	–	–	–	–	–	∅160	172	15.0	□145	174	15.0	□190	177	15.0
PH1031_K613_	–	–	–	–	–	–	∅160	191	18.0	∅200	193	18.0	□190	196	18.0

18.4 Type designation

In this chapter, you can find an explanation of the type designation with the associated options.

Additional ordering information not included in the type designation can be found at the end of the chapter.

Sample code

PH	7	2	1	F	0100	K102VF	0115	EZ302U

Explanation

Code	Designation	Design
PH	Type	Planetary gear unit
7	Size	7 (example)
2 3	Generation	Generation 2 Generation 3
1	Stages	Single-stage
F	Shaft	Flange shaft
0100	Transmission ratio of output (i x 10)	i = 10 (example)
K102VF	Input	K1 right-angle geared motor (example)
0115	Transmission ratio of input (i x 10 rounded)	i = 11.57 (example)
EZ302U	Motor	EZ synchronous servo motor

In order to complete the type designation, also specify:

- A detailed type designation of the motor, see the chapter [▶ 23]
- The mounting position, see Chapter [▶ 18.5.2]
- Output gear unit side 3 or 4, see Chapter [▶ 18.5.2]
- Radial shaft seal rings at the output made of NBR or FKM, see chapter [▶ 18.6.3]
- The position of the plug connectors, see chapter [▶ 18.5.4]
- For reverse operation of the output shaft from ± 20° to ± 90° and horizontal installation, note the chapter [▶ 18.6.4]

18.5 Product description

18.5.1 Installation conditions

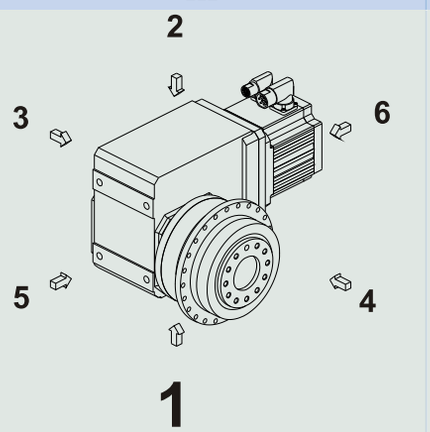
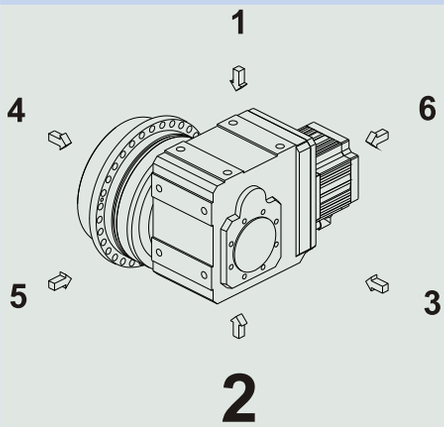
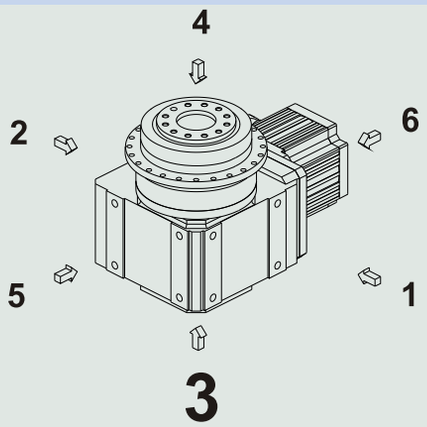
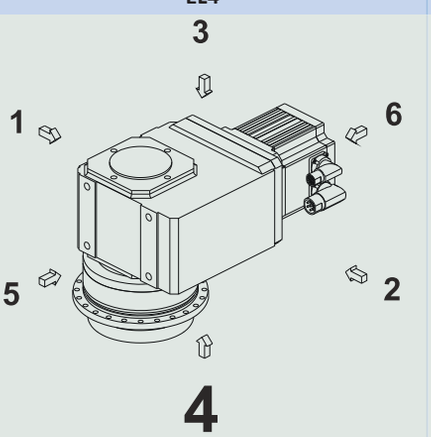
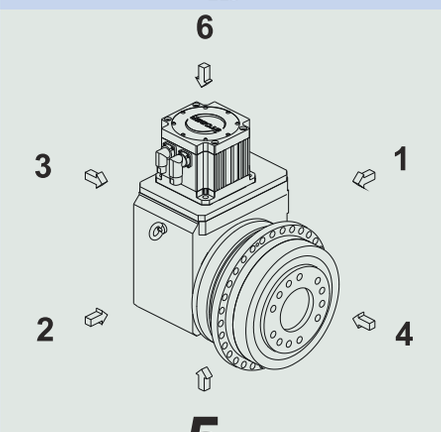
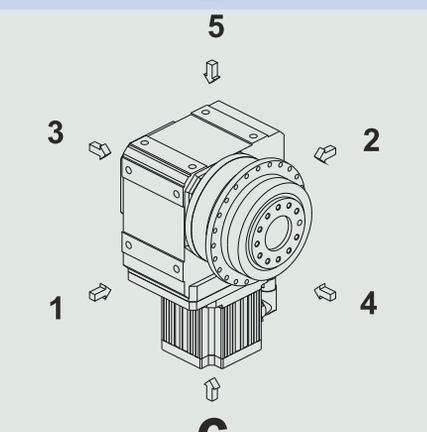
The torque and force values listed in this catalog are valid under the following conditions:

- When using screws with quality 12.9 for machine-side attachment of the flange shaft and gear unit housing
- When the gear unit housings are adjusted at pilot øb1 (H7)
- When the flange shaft is adjusted using the connecting element at pilot øbf or ødf

18.5.2 Mounting positions

The following table shows the standard mounting positions.

The numbers identify the gear unit sides. The mounting position is defined by the gear side facing downwards.

EL1	EL2	EL3
		
EL4	**EL5**	**EL6**
		

Since the lubricant filling volume of the gear unit depends on the mounting position, the mounting position must be specified when ordering.

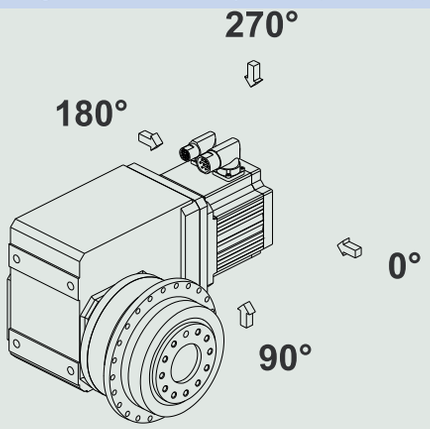
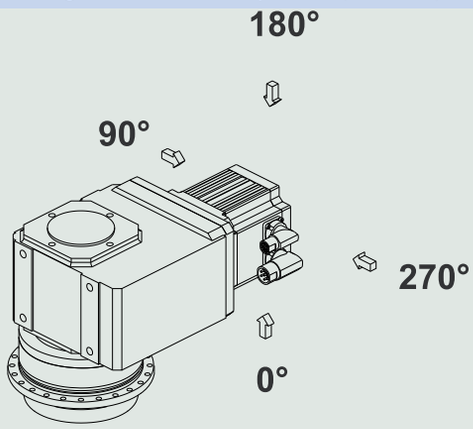
18.5.3 Lubricants

STOBER fills the gear units with the amount and type of lubricant specified on the nameplate. The filling volume and the structure of the gear units depend on the mounting position.

Only install the gear units in the intended mounting position! Reposition the gear units only after consulting STOBER. Otherwise, STOBER assumes no liability for the gear units.

Lubricant filling quantities for gear units, document ID 441871, can be found online at http://www.stoeber.de/en/download. Enter the ID of the documentation in the Search... field.

18.5.4 Position of the plug connectors

Mounting position EL1	Mounting position EL4
Plug connector in 270° position (standard)	Plug connector in 270° position (standard)
	

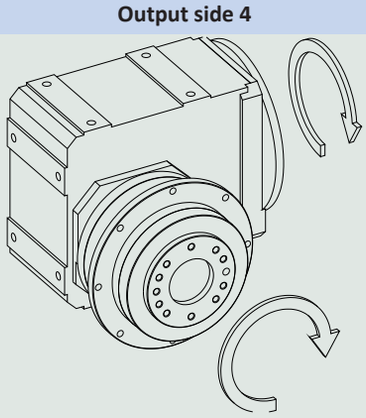
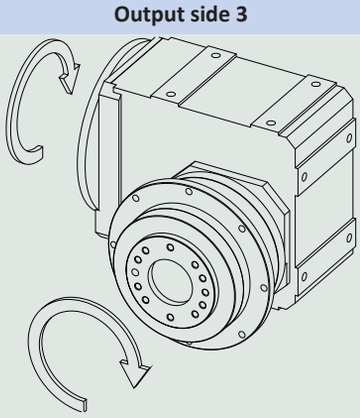
Indicate variations for your geared motor in the purchase order.

Note that the plug connector position rotates along with the geared motor if the geared motor is in another mounting position.

18.5.5 Other product features

Feature	Value
Max. permitted gear unit temperature (on the surface of the gear unit)	≤ 90 °C
Paint	Black RAL 9005
(ATEX) Directive 2014/34/EU (option)	Not suitable
Protection class:[1]	
Gear unit	IP65
Motor	IP56, optionally IP66

18.5.6 Direction of rotation

Output side 4	Output side 3
	

The pictures show mounting position EL1.

18.6 Project configuration

Project your drives using our SERVOsoft designing software. You can receive SERVOsoft for free from your adviser at one of our sales centers. Observe the limit conditions in this chapter to ensure a safe design for your drives.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

[1] Observe the protection class of all the components.

18.6.1 Calculation of the operating point

Check the following conditions for operating points other than the nominal point M_{2N} specified in the selection tables.

For continuous operation in mounting positions EL1, EL2:

$$n_{1m^*} \leq \frac{n_{1maxDBEL1,2}}{fB_T}$$

For continuous operation in mounting positions EL3, EL4, EL5, EL6:

$$n_{1m^*} \leq \frac{n_{1maxDBEL3,4,5,6}}{fB_T}$$

For all mounting positions:

$$n_{1max^*} \leq \frac{n_{1max\,ZB}}{fB_T}$$

$$M_{2eff^*} \leq M_{2th}$$

$$M_{2acc^*} \leq M_{2acc}$$

$$M_{2NOT^*} \leq M_{2NOT}$$

$$M_{2eq^*} \leq M_{2N} \cdot \frac{S}{fB_{op} \cdot fB_t}$$

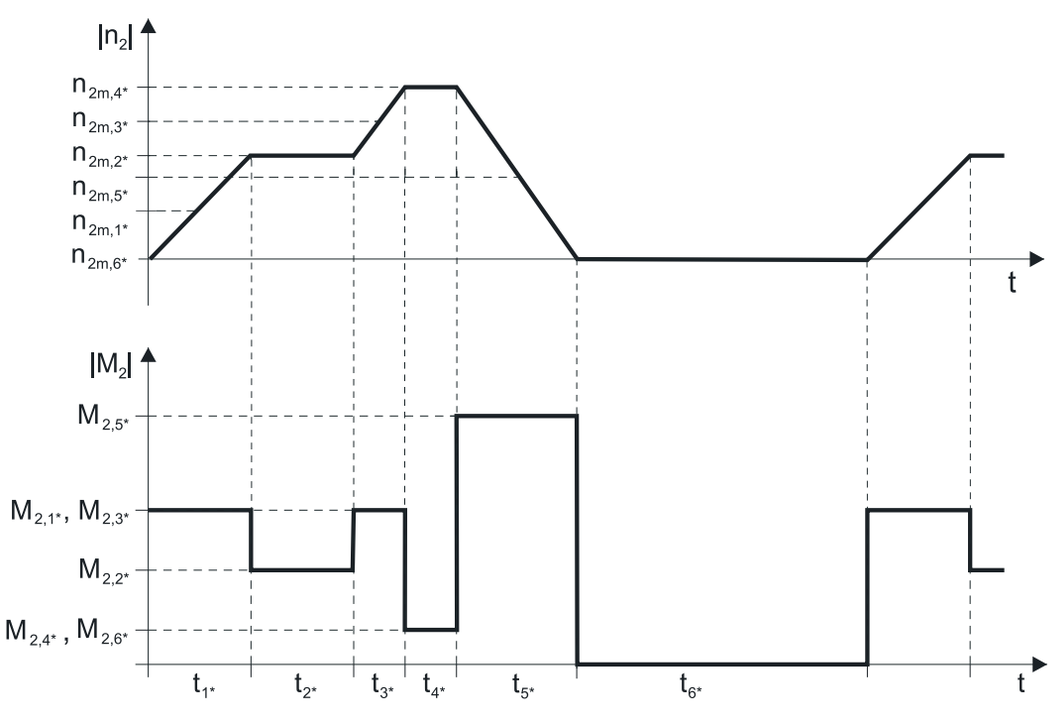
Refer to the selection tables for the values for $n_{1maxDBEL1,2}$ and $n_{1maxDBEL3,4,5,6}$, n_{1maxZB}, M_{2acc}, M_{2NOT}, M_{2N} and S.

The values for fB_T, fB_{op} and fB_t can be found in the corresponding tables in this chapter.

Calculate the thermal limit torque M_{2th} for a duty cycle > 50%.

Example of cyclic operation

The following calculations are based on a representation of the power taken from the output based in accordance with the following example:



Calculation of the actual average input speed

$$n_{1m^*} = n_{2m^*} \cdot i$$

$$n_{2m^*} = \frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}{t_{1^*} + \ldots + t_{n^*}}$$

If $t_{1^*} + \ldots + t_{5^*} \geq 20$ min, calculate n_{2m^*} without the rest phase t_{6^*}.

The values for the ratio i can be found in the selection tables.

Calculation of the actual effective torque

$$M_{2eff^*} = \sqrt{\frac{t_{1^*} \cdot M_{2,1^*}{}^2 + \ldots + t_{n^*} \cdot M_{2,n^*}{}^2}{t_{1^*} + \ldots + t_{n^*}}}$$

Calculation of the actual equivalent torque

$$M_{2eq^*} = \sqrt[3]{\frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} \cdot \left|M_{2,1^*}{}^3\right| + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*} \cdot \left|M_{2,n^*}{}^3\right|}{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}}$$

Calculation of the thermal limit torque

Calculate the thermal limit torque M_{2th} for a duty cycle $ED_{20} > 50\%$ and the actual average input speed n_{1m^*}. (At $K_{mot,th} \leq 0$ you must reduce the average input speed n_{1m^*} accordingly or select another geared motor size.)

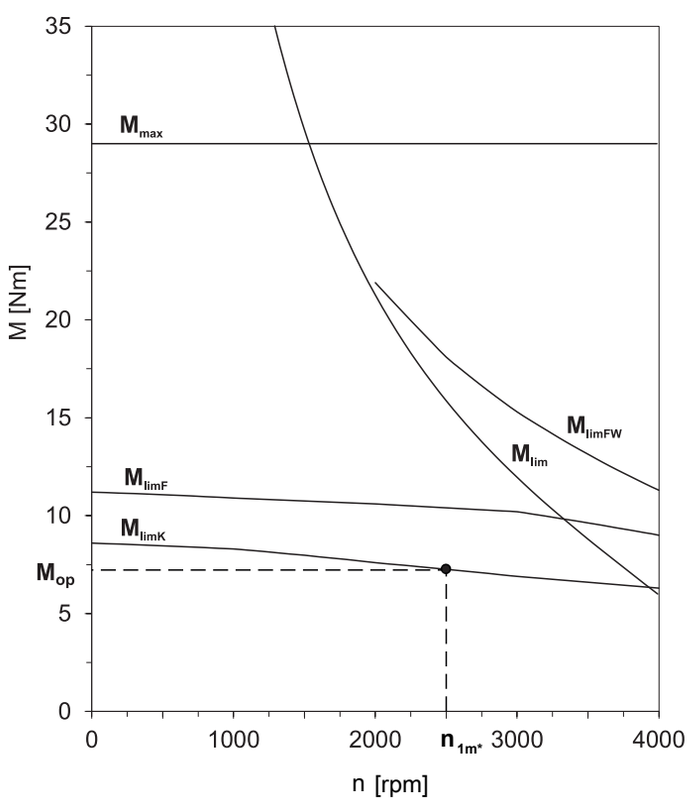
$$M_{2th} = M_{op} \cdot i \cdot K_{mot,th}$$

$$K_{mot,th} = 0{,}93 - \frac{a_{th}}{1000} \cdot athEL \cdot fB_T \cdot \left(\frac{n_{1m^*}}{1000}\right)^2$$

The values for i and a_{th} can be found in the selection tables.

The values for a_{thEL} and fB_T can be found in the corresponding tables in this chapter.

The value for the torque of the motor at operating point M_{op} with the determined average input speed n_{1m^*} can be found in the motor curve of Chapter [▶ 23.3]. Note the size, nominal speed n_N and cooling type of the motor. The figure below shows an example of reading the torque M_{op} of a motor with convection cooling at the operating point.



Operating factors

Parameter a_{thEL}

Mounting position	a_{thEL}
EL1, 2	1.0
EL3, 4, 5, 6	1.1

Operating mode	fB_{op}
Uniform continuous operation	1.00
Cyclic operation	1.25
Reversing load cyclic operation	1.40

Run time	fB_t
Daily run time ≤ 8 h	1.00
Daily run time ≤ 16 h	1.15
Daily run time ≤ 24 h	1.20

Temperature		fB_T
Motor cooling	**Surrounding temperature**	
Motor with forced ventilation	≤ 20 °C	0.9
	≤ 30 °C	1.0
	≤ 40 °C	1.15
Motor with convection cooling	≤ 20 °C	1.0
	≤ 30 °C	1.1
	≤ 40 °C	1.25

Notes

- The maximum permitted gear unit temperature (see the "Other product features" chapter) must not be exceeded. Doing so may result in damage to the geared motor.
- For braking from full speed (for example when the power fails or when setting up the machine), note the permitted gear unit torques (M_{2acc}, M_{2NOT}) in the selection tables.

18.6.2 Permitted shaft loads for the output shaft

The values specified in the tables apply to the permitted shaft loads:

- For shaft dimensions in accordance with the catalog
- For output speeds $n_{2m*} \leq 100$ rpm ($F^{2axN} = F_{2ax100}$; $F_{2radN} = F_{2rad100}$; $M_{2kN} = M_{2k100}$)
- Only if radial forces on the gear unit are stabilized by its pilots (housing, flange shaft)

Permitted shaft loads

Type	z_2	F_{2ax100}	$F_{2rad100}$	$F_{2rad,acc}$	M_{2k100}	$M_{2k,acc}$
	[mm]	[N]	[N]	[N]	[Nm]	[Nm]
PH3	62.0	1650	1613	1613	100	100
PH4	84.0	2150	3095	3571	260	300
PH5	97.0	4150	4536	4897	440	475
PH7	88.0	6150	17045	17045	1500	1500
PH8	126.0	10050	27778	27778	3500	3500
PH9	155.0	33000	48387	70968	7500	11000
PH10	171.0	50000	51462	73099	8800	12500

For other output speeds, download diagrams at http://products.stoeber.de.

The following applies to output speeds $n_{2m*} > 100$ rpm:

$$F_{2axN} = \frac{F_{2ax100}}{\sqrt[3]{\frac{n_{2m*}}{100\ \text{rpm}}}} \qquad F_{2radN} = \frac{F_{2rad100}}{\sqrt[3]{\frac{n_{2m*}}{100\ \text{rpm}}}} \qquad M_{2kN} = \frac{M_{2k100}}{\sqrt[3]{\frac{n_{2m*}}{100\ \text{rpm}}}}$$

The values for F_{2ax100}, $F_{2rad100}$ and M_{2k100} can be found in the table "Permitted shaft loads" in this chapter.

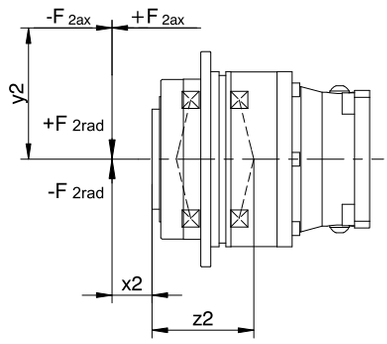


Fig. 1: Force application points

You can determine the permitted radial forces from the permitted breakdown torque M_{2kN} and $M_{2k,acc}$. The actual radial forces may not exceed the permitted radial forces. The permitted radial forces are in relation to the end of the hollow shaft (x2 = 0).

$$M_{2k,acc^*} = \frac{2 \cdot F_{2ax^*} \cdot y_2 + F_{2rad,acc^*} \cdot (x_2 + z_2)}{1000} \leq M_{2k,acc}$$

For applications with multiple axial and/or radial forces, you must add the forces as vectors.

In the event of EMERGENCY OFF operation (max. 1000 load changes), you can multiply the permitted forces and torques for F_{2ax100}, $F_{2rad100}$ and M_{2k100} by a factor of two.

Also note the calculation for equivalent values:

$$M_{2k,eq^*} = \sqrt[3]{\frac{|n_{2m,1^*}| \cdot t_{1^*} \cdot |M_{2k,acc,1^*}|^3 + \ldots + |n_{2m,n^*}| \cdot t_{n^*} \cdot |M_{2k,acc,n^*}|^3}{|n_{2m,1^*}| \cdot t_{1^*} + \ldots + |n_{2m,n^*}| \cdot t_{n^*}}} \leq M_{2kN}$$

$$F_{2rad,eq^*} = \sqrt[3]{\frac{|n_{2m,1^*}| \cdot t_{1^*} \cdot |F_{2rad,acc,1^*}|^3 + \ldots + |n_{2m,n^*}| \cdot t_{n^*} \cdot |F_{2rad,acc,n^*}|^3}{|n_{2m,1^*}| \cdot t_{1^*} + \ldots + |n_{2m,n^*}| \cdot t_{n^*}}} \leq F_{2radN}$$

$$F_{2ax,eq^*} \leq F_{2axN}$$

The following apply to the bearing service life L_{10h} ($ED_{20} \leq 40\%$):

$L_{10h} > 10000$ h with $1 < M_{2kN}/M_{2k^*} < 1.25$

$L_{10h} > 20000$ h with $1.25 < M_{2kN}/M_{2k^*} < 1.5$

$L_{10h} > 30000$ h with $1.5 < M_{2kN}/M_{2k^*}$

For different duty cycles:

$$L_{10h} > L_{10h(ED_{20}=40\%)} \cdot \frac{40\%}{ED_{20}}$$

18.6.3 Recommendation for radial shaft seal rings

For a duty cycle > 60%, we recommend radial shaft seal rings made of FKM.

Properties:

- Excellent temperature resistance
- High chemical stability
- Very good resistance to aging
- Excellent resistance to mineral oils and greases
- For use in the food, beverage and pharmaceutical industries

Leak-proofness

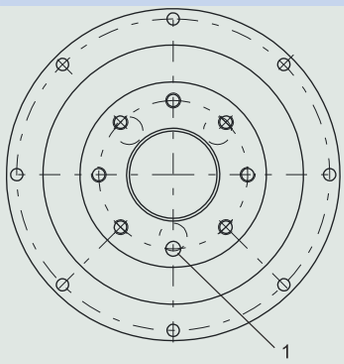
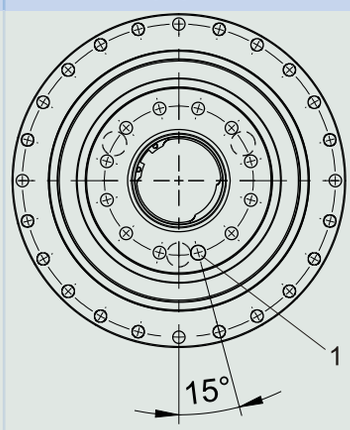
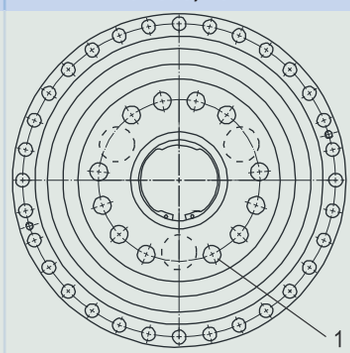
Our gear units are equipped with high-quality radial shaft seal rings and checked for leak-proofness. However, a leak cannot be fully ruled out over the length of use of a gear unit. If you use a gear unit with goods incompatible with the lubricant, you must take measures to prevent direct contact with the gear unit lubricant in case of a leak.

18.6.4 Reverse operation

To ensure lubrication of circulating geared parts during cyclic reverse operation from ± 20° to ± 90°, pay careful attention to the position of the output shaft if the gear unit is installed horizontally as shown in the images below.

The images show the center position of reverse operation.

Cyclic reverse operation ≤ ± 20° on request.

Sizes 3, 4, 5, 8	Size 7	Sizes 9, 10
		
1 Position of the positioning hole: bottom	1 Position of the positioning hole: as shown in the image	1 Position of the fastening thread: as shown in the image

18.7 Additional documentation

Additional documentation related to the product can be found at http://www.stoeber.de/en/download

Enter the ID of the documentation in the Search... field.

Documentation	ID
Operating manual for KL/KS/PHK/PHKX/PHQK/PK/PKX right-angle gear units and right-angle geared motors	443004_en
Lubricant filling quantities for gear units	441871

19 PHQK right-angle planetary geared motors

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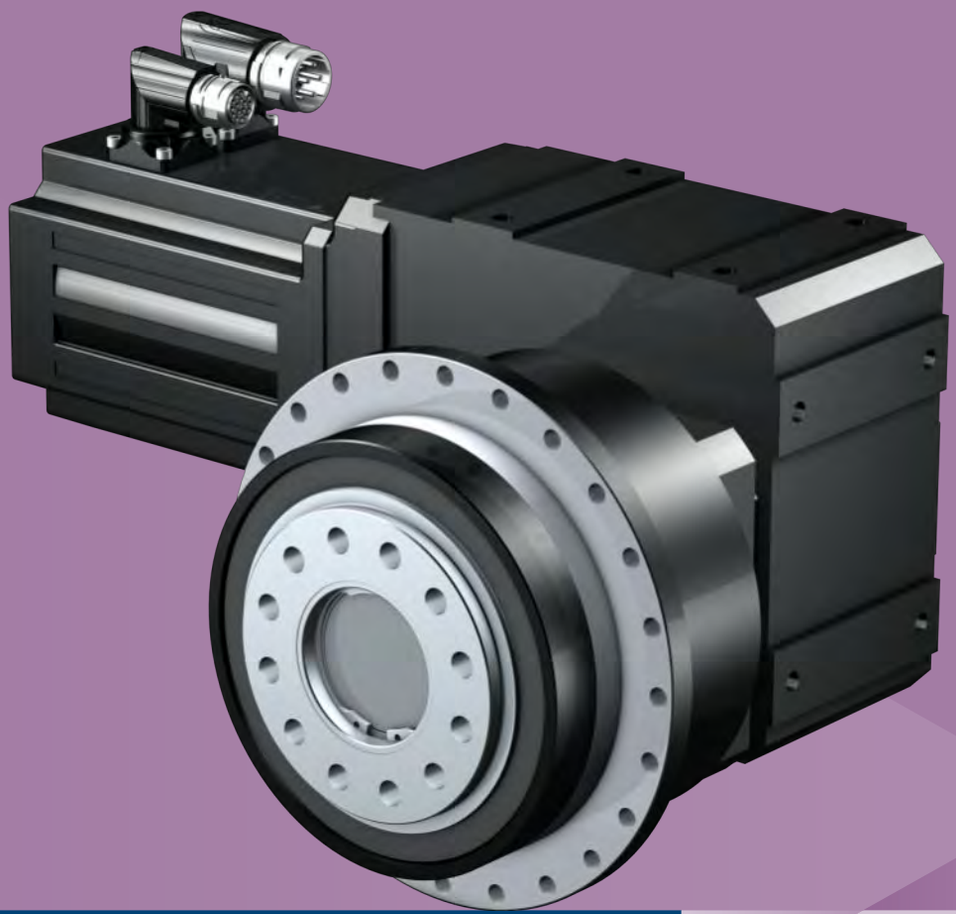


19

PHQK right-angle planetary geared motors

19.1 Overview

Quattro-Power precision right-angle planetary geared motors

Features

Power density	★★★★★
Backlash	★★★★☆
Price category	€€€€€
Shaft load	★★★★★
Smooth operation	★★★☆☆
Torsional stiffness	★★★★★
Mass moment of inertia	★★★★★
Helical gearing	✓
Maintenance-free	✓
High power density	✓
Continuous operation without cooling	✓
Stiff output bearing due to pretension	✓
Compact and highly dynamic due to direct motor attachment	✓

Key: ★☆☆☆☆ good | ★★★★★ excellent
€ Economy | €€€€€ Premium

Technical data

i	22 – 2242
M_{2acc}	123 – 43000 Nm
$\Delta\phi_2$	3.5 – 4 arcmin
η_{get}	≤ 93 %

19.2 Selection tables

The technical data specified in the selection tables applies to:

- Installation altitudes up to 1000 m above sea level
- Surrounding temperatures from 0 °C to 40 °C
- Drives with convection-cooled motors (e.g. EZ401**U**)

You can calculate the technical data for drives with forced ventilated motors (for example EZ401**B**) at http://products.stoeber.de.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PHQ5K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 430 Nm)																
9.7	267	273	10	1.0	PHQ521F0055 K102VF0560 EZ301U	430	800	308.5	6479/21	4000	4000	6000	0.21	4	70	16
12	223	228	10	1.3	PHQ521F0055 K102VF0470 EZ301U	430	800	258.0	25289/98	4000	4000	6000	0.22	4	70	16
14	192	196	9.6	1.5	PHQ521F0055 K102VF0400 EZ301U	390	700	221.7	4433/20	4000	4000	6000	0.21	4	70	16
16	167	171	9.3	1.7	PHQ521F0055 K102VF0350 EZ301U	430	800	193.1	20273/105	4000	4000	6000	0.23	4	70	16
16	161	164	9.2	1.7	PHQ521F0055 K102VF0340 EZ301U	430	800	185.4	51909/280	4000	4000	6000	0.22	4	70	16
16	274	290	16	1.0	PHQ521F0055 K102VF0340 EZ302U	430	800	185.4	51909/280	4000	4000	6000	0.32	4	70	16
19	134	136	8.8	2.1	PHQ521F0055 K102VF0280 EZ301U	400	800	154.3	6479/42	4000	4000	6000	0.26	4	70	16
19	228	241	15	1.2	PHQ521F0055 K102VF0280 EZ302U	430	800	154.3	6479/42	4000	4000	6000	0.36	4	70	16
22	120	123	8.6	2.3	PHQ521F0055 K102VF0250 EZ301U	360	800	138.7	13871/100	4000	4000	6000	0.24	4	70	16
22	205	217	15	1.4	PHQ521F0055 K102VF0250 EZ302U	430	800	138.7	13871/100	4000	4000	6000	0.34	4	70	16
22	267	283	19	1.0	PHQ521F0055 K102VF0250 EZ303U	430	800	138.7	13871/100	4000	4000	6000	0.45	4	70	17
23	111	113	8.4	2.5	PHQ521F0055 K102VF0230 EZ301U	330	800	128.0	6270/49	4000	4000	6000	0.28	4	70	16
23	189	200	14	1.5	PHQ521F0055 K102VF0230 EZ302U	430	800	128.0	6270/49	4000	4000	6000	0.38	4	70	16
23	247	261	19	1.1	PHQ521F0055 K102VF0230 EZ303U	430	800	128.0	6270/49	4000	4000	6000	0.49	4	70	17
27	96	98	8.1	2.9	PHQ521F0055 K102VF0200 EZ301U	290	690	110.8	4433/40	4000	4000	6000	0.26	4	70	16
27	164	173	14	1.7	PHQ521F0055 K102VF0200 EZ302U	430	690	110.8	4433/40	4000	4000	6000	0.36	4	70	16
27	214	226	18	1.3	PHQ521F0055 K102VF0200 EZ303U	430	690	110.8	4433/40	4000	4000	6000	0.47	4	70	17
31	84	85	7.8	3.3	PHQ521F0055 K102VF0175 EZ301U	250	730	96.60	11495/119	4000	3800	5500	0.32	4	70	16
31	143	151	13	2.0	PHQ521F0055 K102VF0175 EZ302U	430	730	96.60	11495/119	4000	3800	5500	0.42	4	70	16
31	186	197	17	1.5	PHQ521F0055 K102VF0175 EZ303U	430	730	96.60	11495/119	4000	3800	5500	0.53	4	70	17
31	252	270	24	1.1	PHQ521F0055 K102VF0175 EZ401U	430	800	96.60	11495/119	4000	3800	5500	1.1	4	70	18
33	80	81	7.7	3.5	PHQ521F0055 K102VF0165 EZ301U	240	650	91.93	1287/14	4000	4000	6000	0.29	4	70	16
33	136	144	13	2.1	PHQ521F0055 K102VF0165 EZ302U	430	650	91.93	1287/14	4000	4000	6000	0.39	4	70	16
33	177	187	17	1.6	PHQ521F0055 K102VF0165 EZ303U	430	650	91.93	1287/14	4000	4000	6000	0.50	4	70	17
33	240	257	23	1.2	PHQ521F0055 K102VF0165 EZ401U	430	800	91.93	1287/14	4000	4000	6000	1.0	4	70	18
39	67	69	7.4	4.2	PHQ521F0055 K102VF0140 EZ301U	200	590	77.63	2717/35	4000	3800	5500	0.37	4	70	16
39	115	121	13	2.4	PHQ521F0055 K102VF0140 EZ302U	360	590	77.63	2717/35	4000	3800	5500	0.47	4	70	16
39	150	158	17	1.9	PHQ521F0055 K102VF0140 EZ303U	430	590	77.63	2717/35	4000	3800	5500	0.58	4	70	17
39	202	217	22	1.4	PHQ521F0055 K102VF0140 EZ401U	430	800	77.63	2717/35	4000	3800	5500	1.1	4	70	18
43	60	61	7.2	4.7	PHQ521F0055 K102VF0125 EZ301U	180	530	69.40	4719/68	4000	3800	5500	0.35	4	70	16
43	103	109	12	2.7	PHQ521F0055 K102VF0125 EZ302U	320	530	69.40	4719/68	4000	3800	5500	0.45	4	70	16
43	134	142	16	2.1	PHQ521F0055 K102VF0125 EZ303U	390	530	69.40	4719/68	4000	3800	5500	0.56	4	70	17
43	181	194	22	1.5	PHQ521F0055 K102VF0125 EZ401U	430	800	69.40	4719/68	4000	3800	5500	1.1	4	70	18
43	278	304	33	1.0	PHQ521F0055 K102VF0125 EZ501U	430	800	69.40	4719/68	4000	3800	5500	3.1	4	70	19
47	94	100	12	3.0	PHQ521F0055 K102VF0115 EZ302U	300	480	63.61	1463/23	3600	3300	5000	0.53	4	70	16
47	123	130	16	2.3	PHQ521F0055 K102VF0115 EZ303U	360	480	63.61	1463/23	3600	3300	5000	0.64	4	70	17
47	166	178	21	1.7	PHQ521F0055 K102VF0115 EZ401U	430	800	63.61	1463/23	3600	3300	5000	1.2	4	70	18
47	255	278	33	1.1	PHQ521F0055 K102VF0115 EZ501U	430	800	63.61	1463/23	3600	3300	5000	3.1	4	70	19
47	278	308	36	1.0	PHQ521F0055 K102VF0115 EZ402U	430	800	63.61	1463/23	3600	3300	5000	1.9	4	70	19
54	83	87	12	3.4	PHQ521F0055 K102VF0100 EZ302U	260	420	55.77	5577/100	4000	3800	5500	0.51	4	70	16
54	108	114	15	2.6	PHQ521F0055 K102VF0100 EZ303U	310	420	55.77	5577/100	4000	3800	5500	0.62	4	70	17
54	145	156	21	1.9	PHQ521F0055 K102VF0100 EZ401U	430	800	55.77	5577/100	4000	3800	5500	1.2	4	70	18
54	223	244	32	1.3	PHQ521F0055 K102VF0100 EZ501U	430	800	55.77	5577/100	4000	3800	5500	3.1	4	70	19
54	244	270	35	1.1	PHQ521F0055 K102VF0100 EZ402U	430	800	55.77	5577/100	4000	3800	5500	1.9	4	70	19
59	75	80	11	3.7	PHQ521F0055 K102VF0092 EZ302U	240	390	50.87	9614/189	3600	3300	5000	0.63	4	70	16
59	98	104	15	2.9	PHQ521F0055 K102VF0092 EZ303U	280	390	50.87	9614/189	3600	3300	5000	0.74	4	70	17
59	133	142	20	2.1	PHQ521F0055 K102VF0092 EZ401U	400	800	50.87	9614/189	3600	3300	5000	1.3	4	70	18
59	204	223	31	1.4	PHQ521F0055 K102VF0092 EZ501U	430	800	50.87	9614/189	3600	3300	5000	3.2	4	70	19
59	223	246	34	1.3	PHQ521F0055 K102VF0092 EZ402U	430	800	50.87	9614/189	3600	3300	5000	2.0	4	70	19
66	68	71	11	3.8	PHQ521F0055 K102VF0083 EZ302U	210	350	45.70	21021/460	3600	3300	5000	0.59	4	70	16
66	88	93	14	2.9	PHQ521F0055 K102VF0083 EZ303U	260	350	45.70	21021/460	3600	3300	5000	0.70	4	70	17
66	119	128	20	2.4	PHQ521F0055 K102VF0083 EZ401U	360	800	45.70	21021/460	3600	3300	5000	1.2	4	70	18

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PHQ5K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 430 Nm)																
66	183	200	30	1.5	PHQ521F0055 K102VF0083 EZ501U	430	800	45.70	21021/460	3600	3300	5000	3.2	4	70	19
66	200	221	33	1.4	PHQ521F0055 K102VF0083 EZ402U	430	800	45.70	21021/460	3600	3300	5000	1.9	4	70	19
82	54	57	11	3.8	PHQ521F0055 K102VF0066 EZ302U	170	280	36.54	3289/90	3600	3300	5000	0.71	4	70	16
82	70	75	14	2.9	PHQ521F0055 K102VF0066 EZ303U	200	280	36.54	3289/90	3600	3300	5000	0.82	4	70	17
82	95	102	18	2.9	PHQ521F0055 K102VF0066 EZ401U	290	800	36.54	3289/90	3600	3300	5000	1.4	4	70	18
82	146	160	28	1.9	PHQ521F0055 K102VF0066 EZ501U	430	800	36.54	3289/90	3600	3300	5000	3.3	4	70	19
82	160	177	31	1.8	PHQ521F0055 K102VF0066 EZ402U	430	800	36.54	3289/90	3600	3300	5000	2.1	4	70	19
82	235	293	46	1.2	PHQ521F0055 K102VF0066 EZ404U	430	800	36.54	3289/90	3600	3300	5000	3.4	4	70	21
82	252	272	49	1.1	PHQ521F0055 K102VF0066 EZ502U	430	800	36.54	3289/90	3600	3300	5000	5.6	4	70	21
82	252	282	49	1.1	PHQ521F0055 K102VF0066 EZ701U	430	800	36.54	3289/90	3600	3300	5000	8.9	4	70	23
91	86	92	18	3.3	PHQ521F0055 K102VF0060 EZ401U	260	800	33.00	33/1	3300	2800	4500	1.4	4	70	18
91	132	144	28	2.1	PHQ521F0055 K102VF0060 EZ501U	430	800	33.00	33/1	3300	2800	4500	3.4	4	70	19
91	144	160	30	1.9	PHQ521F0055 K102VF0060 EZ402U	430	800	33.00	33/1	3300	2800	4500	2.1	4	70	19
91	212	264	44	1.3	PHQ521F0055 K102VF0060 EZ404U	430	800	33.00	33/1	3300	2800	4500	3.5	4	70	21
91	227	246	48	1.2	PHQ521F0055 K102VF0060 EZ502U	430	800	33.00	33/1	3300	2800	4500	5.7	4	70	21
91	227	255	48	1.2	PHQ521F0055 K102VF0060 EZ701U	430	800	33.00	33/1	3300	2800	4500	9.0	4	70	23
98	45	48	10	3.8	PHQ521F0055 K102VF0056 EZ302U	140	230	30.62	8360/273	3300	2800	4500	0.97	4	70	16
98	59	62	13	2.9	PHQ521F0055 K102VF0056 EZ303U	170	230	30.62	8360/273	3300	2800	4500	1.1	4	70	17
98	80	86	18	3.5	PHQ521F0055 K102VF0056 EZ401U	240	800	30.62	8360/273	3300	2800	4500	1.6	4	70	18
98	123	134	27	2.3	PHQ521F0055 K102VF0056 EZ501U	430	800	30.62	8360/273	3300	2800	4500	3.6	4	70	19
98	134	148	30	2.1	PHQ521F0055 K102VF0056 EZ402U	430	800	30.62	8360/273	3300	2800	4500	2.3	4	70	19
98	197	245	44	1.4	PHQ521F0055 K102VF0056 EZ404U	430	800	30.62	8360/273	3300	2800	4500	3.7	4	70	21
98	211	228	47	1.3	PHQ521F0055 K102VF0056 EZ502U	430	800	30.62	8360/273	3300	2800	4500	5.9	4	70	21
98	211	237	47	1.3	PHQ521F0055 K102VF0056 EZ701U	430	800	30.62	8360/273	3300	2800	4500	9.2	4	70	23
98	277	317	61	1.0	PHQ521F0055 K102VF0056 EZ503U	430	800	30.62	8360/273	3300	2800	4500	8.3	4	70	22
136	42	45	12	2.9	PHQ521F0055 K102VF0040 EZ303U	120	170	22.00	22/1	3300	2800	4500	1.3	4	70	17
136	57	61	17	4.8	PHQ521F0055 K102VF0040 EZ401U	170	670	22.00	22/1	3300	2800	4500	1.9	4	70	18
136	88	96	26	3.1	PHQ521F0055 K102VF0040 EZ501U	330	670	22.00	22/1	3300	2800	4500	3.8	4	70	19
136	96	107	28	2.8	PHQ521F0055 K102VF0040 EZ402U	330	670	22.00	22/1	3300	2800	4500	2.6	4	70	19
136	141	176	41	1.9	PHQ521F0055 K102VF0040 EZ404U	430	670	22.00	22/1	3300	2800	4500	3.9	4	70	21
136	152	164	44	1.8	PHQ521F0055 K102VF0040 EZ502U	430	670	22.00	22/1	3300	2800	4500	6.1	4	70	21
136	152	170	44	1.8	PHQ521F0055 K102VF0040 EZ701U	410	670	22.00	22/1	3300	2800	4500	9.4	4	70	23
136	199	227	58	1.4	PHQ521F0055 K102VF0040 EZ503U	430	670	22.00	22/1	3300	2800	4500	8.5	4	70	22
PHQ5K (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 430 Nm)																
19	256	273	10	1.1	PHQ521F0055 K102VF0560 EZ301U	430	800	308.5	6479/21	4000	4000	6000	0.21	4	70	16
23	214	228	9.6	1.3	PHQ521F0055 K102VF0470 EZ301U	430	800	258.0	25289/98	4000	4000	6000	0.22	4	70	16
27	184	196	9.2	1.5	PHQ521F0055 K102VF0400 EZ301U	390	700	221.7	4433/20	4000	4000	6000	0.21	4	70	16
31	160	171	8.9	1.8	PHQ521F0055 K102VF0350 EZ301U	430	800	193.1	20273/105	4000	4000	6000	0.23	4	70	16
31	270	302	15	1.0	PHQ521F0055 K102VF0350 EZ302U	430	800	193.1	20273/105	4000	4000	6000	0.33	4	70	16
32	154	164	8.8	1.8	PHQ521F0055 K102VF0340 EZ301U	430	800	185.4	51909/280	4000	4000	6000	0.22	4	70	16
32	259	290	15	1.1	PHQ521F0055 K102VF0340 EZ302U	430	800	185.4	51909/280	4000	4000	6000	0.32	4	70	16
39	128	136	8.4	2.2	PHQ521F0055 K102VF0280 EZ301U	400	800	154.3	6479/42	4000	4000	6000	0.26	4	70	16
39	215	241	14	1.3	PHQ521F0055 K102VF0280 EZ302U	430	800	154.3	6479/42	4000	4000	6000	0.36	4	70	16
43	115	123	8.2	2.4	PHQ521F0055 K102VF0250 EZ301U	360	800	138.7	13871/100	4000	4000	6000	0.24	4	70	16
43	194	217	14	1.4	PHQ521F0055 K102VF0250 EZ302U	430	800	138.7	13871/100	4000	4000	6000	0.34	4	70	16
43	253	291	18	1.1	PHQ521F0055 K102VF0250 EZ303U	430	800	138.7	13871/100	4000	4000	6000	0.45	4	70	17
47	106	113	8.0	2.6	PHQ521F0055 K102VF0230 EZ301U	330	800	128.0	6270/49	4000	4000	6000	0.28	4	70	16
47	179	200	14	1.6	PHQ521F0055 K102VF0230 EZ302U	430	800	128.0	6270/49	4000	4000	6000	0.38	4	70	16
47	234	268	18	1.2	PHQ521F0055 K102VF0230 EZ303U	430	800	128.0	6270/49	4000	4000	6000	0.49	4	70	17
54	92	98	7.8	3.0	PHQ521F0055 K102VF0200 EZ301U	290	690	110.8	4433/40	4000	4000	6000	0.26	4	70	16
54	155	173	13	1.8	PHQ521F0055 K102VF0200 EZ302U	430	690	110.8	4433/40	4000	4000	6000	0.36	4	70	16
54	202	232	17	1.4	PHQ521F0055 K102VF0200 EZ303U	430	690	110.8	4433/40	4000	4000	6000	0.47	4	70	17
54	237	289	20	1.2	PHQ521F0055 K102VF0200 EZ401U	430	800	110.8	4433/40	4000	4000	6000	1.0	4	70	18
65	76	81	7.4	3.7	PHQ521F0055 K102VF0165 EZ301U	240	650	91.93	1287/14	4000	4000	6000	0.29	4	70	16
65	128	144	12	2.2	PHQ521F0055 K102VF0165 EZ302U	430	650	91.93	1287/14	4000	4000	6000	0.39	4	70	16
65	168	193	16	1.7	PHQ521F0055 K102VF0165 EZ303U	430	650	91.93	1287/14	4000	4000	6000	0.50	4	70	17
65	197	240	19	1.4	PHQ521F0055 K102VF0165 EZ401U	430	800	91.93	1287/14	4000	4000	6000	1.0	4	70	18
PHQ7K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 950 Nm)																
7.9	565	597	9.0	1.2	PHQ721F0055 K202VF0690 EZ302U	840	1520	381.8	73315/192	4000	3900	5500	0.33	4	136	28
9.8	452	478	8.6	1.4	PHQ721F0055 K202VF0560 EZ302U	950	1580	305.5	14663/48	4000	3900	5500	0.34	4	136	28
9.8	589	623	11	1.1	PHQ721F0055 K202VF0560 EZ303U	950	1580	305.5	14663/48	4000	3900	5500	0.45	4	136	29
11	411	434	11	1.2	PHQ721F0055 K202VF0500 EZ302U	610	1100	277.7	6665/24	4000	3900	5500	0.33	4	136	28
12	376	398	8.2	1.7	PHQ721F0055 K202VF0460 EZ302U	950	1470	254.2	20339/80	4000	3900	5500	0.36	4	136	28
12	490	518	11	1.3	PHQ721F0055 K202VF0460 EZ303U	950	1470	254.2	20339/80	4000	3900	5500	0.47	4	136	29

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PHQ7K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 950 Nm)																
14	329	348	8.4	1.9	PHQ721F0055 K202VF0400 EZ302U	730	1150	222.2	1333/6	4000	3900	5500	0.35	4	136	28
14	428	453	11	1.4	PHQ721F0055 K202VF0400 EZ303U	730	1150	222.2	1333/6	4000	3900	5500	0.46	4	136	29
16	281	297	7.6	2.3	PHQ721F0055 K202VF0350 EZ302U	880	1230	190.0	21285/112	4000	3900	5500	0.41	4	136	28
16	366	388	9.9	1.8	PHQ721F0055 K202VF0350 EZ303U	900	1230	190.0	21285/112	4000	3900	5500	0.52	4	136	29
16	496	531	13	1.3	PHQ721F0055 K202VF0350 EZ401U	950	1700	190.0	21285/112	4000	3900	5500	1.1	4	136	30
16	274	289	7.5	2.4	PHQ721F0055 K202VF0340 EZ302U	790	1070	184.9	1849/10	4000	3900	5500	0.37	4	136	28
16	356	377	9.8	1.8	PHQ721F0055 K202VF0340 EZ303U	790	1070	184.9	1849/10	4000	3900	5500	0.48	4	136	29
16	482	517	13	1.3	PHQ721F0055 K202VF0340 EZ401U	950	1700	184.9	1849/10	4000	3900	5500	1.0	4	136	30
20	401	429	13	1.6	PHQ721F0055 K202VF0280 EZ401U	950	1700	153.7	6149/40	4000	3900	5500	1.1	4	136	30
20	616	673	19	1.1	PHQ721F0055 K202VF0280 EZ501U	950	1700	153.7	6149/40	4000	3900	5500	3.1	4	136	31
22	205	216	7.0	3.2	PHQ721F0055 K202VF0250 EZ302U	640	890	138.2	1935/14	4000	3900	5500	0.43	4	136	28
22	266	282	9.1	2.4	PHQ721F0055 K202VF0250 EZ303U	660	890	138.2	1935/14	4000	3900	5500	0.54	4	136	29
22	360	386	12	1.8	PHQ721F0055 K202VF0250 EZ401U	950	1700	138.2	1935/14	4000	3900	5500	1.1	4	136	30
22	553	605	19	1.2	PHQ721F0055 K202VF0250 EZ501U	950	1700	138.2	1935/14	4000	3900	5500	3.0	4	136	31
22	605	669	21	1.1	PHQ721F0055 K202VF0250 EZ402U	950	1700	138.2	1935/14	4000	3900	5500	1.8	4	136	31
24	189	199	6.9	3.4	PHQ721F0055 K202VF0230 EZ302U	590	970	127.5	32637/256	4000	3900	5500	0.53	4	136	28
24	246	260	8.9	2.6	PHQ721F0055 K202VF0230 EZ303U	710	970	127.5	32637/256	4000	3900	5500	0.64	4	136	29
24	332	356	12	2.0	PHQ721F0055 K202VF0230 EZ401U	950	1700	127.5	32637/256	4000	3900	5500	1.2	4	136	30
24	510	558	19	1.3	PHQ721F0055 K202VF0230 EZ501U	950	1700	127.5	32637/256	4000	3900	5500	3.1	4	136	31
24	558	617	20	1.2	PHQ721F0055 K202VF0230 EZ402U	950	1700	127.5	32637/256	4000	3900	5500	1.9	4	136	31
27	291	312	12	2.2	PHQ721F0055 K202VF0200 EZ401U	880	1700	111.8	559/5	4000	3900	5500	1.1	4	136	30
27	448	489	18	1.5	PHQ721F0055 K202VF0200 EZ501U	950	1700	111.8	559/5	4000	3900	5500	3.1	4	136	31
27	489	541	20	1.3	PHQ721F0055 K202VF0200 EZ402U	950	1700	111.8	559/5	4000	3900	5500	1.8	4	136	31
31	142	150	6.4	3.8	PHQ721F0055 K202VF0175 EZ302U	450	730	96.08	6149/64	3900	3500	5000	0.66	4	136	28
31	185	196	8.3	2.9	PHQ721F0055 K202VF0175 EZ303U	540	730	96.08	6149/64	3900	3500	5000	0.77	4	136	29
31	251	268	11	2.6	PHQ721F0055 K202VF0175 EZ401U	760	1700	96.08	6149/64	3900	3500	5000	1.3	4	136	30
31	385	421	17	1.7	PHQ721F0055 K202VF0175 EZ501U	950	1700	96.08	6149/64	3900	3500	5000	3.3	4	136	31
31	421	465	19	1.5	PHQ721F0055 K202VF0175 EZ402U	950	1700	96.08	6149/64	3900	3500	5000	2.0	4	136	31
32	137	145	6.3	3.8	PHQ721F0055 K202VF0170 EZ302U	430	700	92.72	2967/32	4000	3900	5500	0.56	4	136	28
32	179	189	8.3	2.9	PHQ721F0055 K202VF0170 EZ303U	520	700	92.72	2967/32	4000	3900	5500	0.67	4	136	29
32	242	259	11	2.7	PHQ721F0055 K202VF0170 EZ401U	730	1700	92.72	2967/32	4000	3900	5500	1.2	4	136	30
32	371	406	17	1.8	PHQ721F0055 K202VF0170 EZ501U	950	1700	92.72	2967/32	4000	3900	5500	3.2	4	136	31
32	406	449	19	1.6	PHQ721F0055 K202VF0170 EZ402U	950	1700	92.72	2967/32	4000	3900	5500	1.9	4	136	31
32	639	691	30	1.0	PHQ721F0055 K202VF0170 EZ502U	950	1700	92.72	2967/32	4000	3900	5500	5.5	4	136	33
32	639	717	30	1.0	PHQ721F0055 K202VF0170 EZ701U	950	1700	92.72	2967/32	4000	3900	5500	8.8	4	136	35
39	199	213	11	3.3	PHQ721F0055 K202VF0140 EZ401U	600	1700	76.18	31691/416	3900	3500	5000	1.4	4	136	30
39	305	333	16	2.1	PHQ721F0055 K202VF0140 EZ501U	950	1700	76.18	31691/416	3900	3500	5000	3.4	4	136	31
39	333	369	18	2.0	PHQ721F0055 K202VF0140 EZ402U	950	1700	76.18	31691/416	3900	3500	5000	2.1	4	136	31
39	489	610	26	1.3	PHQ721F0055 K202VF0140 EZ404U	950	1700	76.18	31691/416	3900	3500	5000	3.5	4	136	34
39	525	568	28	1.2	PHQ721F0055 K202VF0140 EZ502U	950	1700	76.18	31691/416	3900	3500	5000	5.7	4	136	33
39	525	589	28	1.2	PHQ721F0055 K202VF0140 EZ701U	950	1700	76.18	31691/416	3900	3500	5000	9.0	4	136	35
43	103	109	5.9	3.8	PHQ721F0055 K202VF0125 EZ302U	330	530	69.88	559/8	3900	3500	5000	0.71	4	136	28
43	135	143	7.7	2.9	PHQ721F0055 K202VF0125 EZ303U	390	530	69.88	559/8	3900	3500	5000	0.82	4	136	29
43	182	195	10	3.6	PHQ721F0055 K202VF0125 EZ401U	550	1700	69.88	559/8	3900	3500	5000	1.4	4	136	30
43	280	306	16	2.3	PHQ721F0055 K202VF0125 EZ501U	950	1700	69.88	559/8	3900	3500	5000	3.3	4	136	31
43	306	338	17	2.1	PHQ721F0055 K202VF0125 EZ402U	950	1700	69.88	559/8	3900	3500	5000	2.1	4	136	31
43	449	560	26	1.4	PHQ721F0055 K202VF0125 EZ404U	950	1700	69.88	559/8	3900	3500	5000	3.4	4	136	34
43	482	521	28	1.4	PHQ721F0055 K202VF0125 EZ502U	950	1700	69.88	559/8	3900	3500	5000	5.6	4	136	33
43	482	540	28	1.4	PHQ721F0055 K202VF0125 EZ701U	950	1700	69.88	559/8	3900	3500	5000	8.9	4	136	35
43	631	722	36	1.0	PHQ721F0055 K202VF0125 EZ503U	950	1700	69.88	559/8	3900	3500	5000	8.0	4	136	34
47	94	99	5.8	3.8	PHQ721F0055 K202VF0115 EZ302U	300	480	63.50	13717/216	3500	3100	4500	0.97	4	136	28
47	122	130	7.5	2.9	PHQ721F0055 K202VF0115 EZ303U	350	480	63.50	13717/216	3500	3100	4500	1.1	4	136	29
47	166	177	10	3.9	PHQ721F0055 K202VF0115 EZ401U	500	1700	63.50	13717/216	3500	3100	4500	1.6	4	136	30
47	254	278	16	2.6	PHQ721F0055 K202VF0115 EZ501U	950	1700	63.50	13717/216	3500	3100	4500	3.6	4	136	31
47	278	307	17	2.3	PHQ721F0055 K202VF0115 EZ402U	950	1700	63.50	13717/216	3500	3100	4500	2.3	4	136	31
47	408	509	25	1.6	PHQ721F0055 K202VF0115 EZ404U	950	1700	63.50	13717/216	3500	3100	4500	3.7	4	136	34
47	438	473	27	1.5	PHQ721F0055 K202VF0115 EZ502U	950	1700	63.50	13717/216	3500	3100	4500	5.9	4	136	33
47	438	491	27	1.5	PHQ721F0055 K202VF0115 EZ701U	950	1700	63.50	13717/216	3500	3100	4500	9.2	4	136	35
47	574	656	35	1.1	PHQ721F0055 K202VF0115 EZ503U	950	1700	63.50	13717/216	3500	3100	4500	8.3	4	136	34
54	144	155	9.8	4.5	PHQ721F0055 K202VF0100 EZ401U	440	1680	55.40	2881/52	3900	3500	5000	1.5	4	136	30
54	222	242	15	2.9	PHQ721F0055 K202VF0100 EZ501U	830	1680	55.40	2881/52	3900	3500	5000	3.5	4	136	31
54	242	268	16	2.7	PHQ721F0055 K202VF0100 EZ402U	830	1680	55.40	2881/52	3900	3500	5000	2.2	4	136	31
54	356	444	24	1.8	PHQ721F0055 K202VF0100 EZ404U	950	1680	55.40	2881/52	3900	3500	5000	3.6	4	136	34
54	382	413	26	1.7	PHQ721F0055 K202VF0100 EZ502U	950	1680	55.40	2881/52	3900	3500	5000	5.8	4	136	33

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PHQ7K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 950 Nm)																
54	382	428	26	1.7	PHQ721F0055 K202VF0100 EZ701U	950	1700	55.40	2881/52	3900	3500	5000	9.1	4	136	35
54	500	573	34	1.3	PHQ721F0055 K202VF0100 EZ503U	950	1680	55.40	2881/52	3900	3500	5000	8.2	4	136	34
59	132	141	9.7	4.9	PHQ721F0055 K202VF0092 EZ401U	400	1530	50.55	25069/496	3500	3100	4500	1.9	4	136	30
59	202	221	15	3.2	PHQ721F0055 K202VF0092 EZ501U	750	1530	50.55	25069/496	3500	3100	4500	3.8	4	136	31
59	221	245	16	2.9	PHQ721F0055 K202VF0092 EZ402U	750	1530	50.55	25069/496	3500	3100	4500	2.6	4	136	31
59	325	405	24	2.0	PHQ721F0055 K202VF0092 EZ404U	950	1530	50.55	25069/496	3500	3100	4500	3.9	4	136	34
59	348	377	26	1.8	PHQ721F0055 K202VF0092 EZ502U	950	1530	50.55	25069/496	3500	3100	4500	6.1	4	136	33
59	348	391	26	1.8	PHQ721F0055 K202VF0092 EZ701U	940	1700	50.55	25069/496	3500	3100	4500	9.4	4	136	35
59	457	522	34	1.4	PHQ721F0055 K202VF0092 EZ503U	950	1530	50.55	25069/496	3500	3100	4500	8.5	4	136	34
59	565	678	42	1.1	PHQ721F0055 K202VF0092 EZ702U	950	1700	50.55	25069/496	3500	3100	4500	15	4	136	37
65	89	94	7.2	2.9	PHQ721F0055 K202VF0084 EZ303U	260	350	46.18	1247/27	3500	3100	4500	1.2	4	136	29
65	120	129	9.8	4.3	PHQ721F0055 K202VF0084 EZ401U	370	700	46.18	1247/27	3500	3100	4500	1.7	4	136	30
65	185	202	15	3.4	PHQ721F0055 K202VF0084 EZ501U	690	1400	46.18	1247/27	3500	3100	4500	3.7	4	136	31
65	202	224	16	3.1	PHQ721F0055 K202VF0084 EZ402U	690	1400	46.18	1247/27	3500	3100	4500	2.4	4	136	31
65	297	370	24	2.1	PHQ721F0055 K202VF0084 EZ404U	950	1400	46.18	1247/27	3500	3100	4500	3.8	4	136	34
65	318	344	26	2.0	PHQ721F0055 K202VF0084 EZ502U	950	1400	46.18	1247/27	3500	3100	4500	6.0	4	136	33
65	318	357	26	2.0	PHQ721F0055 K202VF0084 EZ701U	860	1700	46.18	1247/27	3500	3100	4500	9.3	4	136	35
65	417	477	34	1.5	PHQ721F0055 K202VF0084 EZ503U	950	1400	46.18	1247/27	3500	3100	4500	8.4	4	136	34
65	516	619	42	1.2	PHQ721F0055 K202VF0084 EZ702U	950	1700	46.18	1247/27	3500	3100	4500	15	4	136	37
65	581	688	47	1.1	PHQ721F0055 K202VF0084 EZ505U	950	1700	46.18	1247/27	3500	3100	4500	13	4	136	37
77	270	303	26	2.2	PHQ721F0055 K202VF0071 EZ701U	730	1700	39.15	23177/592	3000	2600	4000	9.9	4	136	35
77	437	525	42	1.4	PHQ721F0055 K202VF0071 EZ702U	950	1700	39.15	23177/592	3000	2600	4000	15	4	136	37
77	492	583	48	1.2	PHQ721F0055 K202VF0071 EZ505U	950	1700	39.15	23177/592	3000	2600	4000	14	4	136	37
82	96	103	10	4.3	PHQ721F0055 K202VF0067 EZ401U	290	560	36.76	2279/62	3500	3100	4500	2.1	4	136	30
82	147	161	15	3.9	PHQ721F0055 K202VF0067 EZ501U	550	1110	36.76	2279/62	3500	3100	4500	4.0	4	136	31
82	161	178	17	3.6	PHQ721F0055 K202VF0067 EZ402U	550	1110	36.76	2279/62	3500	3100	4500	2.8	4	136	31
82	236	294	25	2.4	PHQ721F0055 K202VF0067 EZ404U	820	1110	36.76	2279/62	3500	3100	4500	4.1	4	136	34
82	253	274	26	2.3	PHQ721F0055 K202VF0067 EZ502U	820	1110	36.76	2279/62	3500	3100	4500	6.3	4	136	33
82	253	284	26	2.3	PHQ721F0055 K202VF0067 EZ701U	680	1700	36.76	2279/62	3500	3100	4500	9.6	4	136	35
82	332	380	35	1.7	PHQ721F0055 K202VF0067 EZ503U	820	1110	36.76	2279/62	3500	3100	4500	8.7	4	136	34
82	411	493	43	1.4	PHQ721F0055 K202VF0067 EZ702U	950	1700	36.76	2279/62	3500	3100	4500	15	4	136	37
82	462	548	48	1.3	PHQ721F0055 K202VF0067 EZ505U	950	1700	36.76	2279/62	3500	3100	4500	13	4	136	37
82	565	712	59	1.0	PHQ721F0055 K202VF0067 EZ703U	950	1700	36.76	2279/62	3500	3100	4500	23	4	136	39
91	132	144	15	4.2	PHQ721F0055 K202VF0060 EZ501U	490	1000	33.00	33/1	3000	2600	4000	4.7	4	136	31
91	144	160	17	3.9	PHQ721F0055 K202VF0060 EZ402U	490	1000	33.00	33/1	3000	2600	4000	3.4	4	136	31
91	212	264	25	2.6	PHQ721F0055 K202VF0060 EZ404U	740	1000	33.00	33/1	3000	2600	4000	4.7	4	136	34
91	227	246	27	2.5	PHQ721F0055 K202VF0060 EZ502U	740	1000	33.00	33/1	3000	2600	4000	7.0	4	136	33
91	227	255	27	2.5	PHQ721F0055 K202VF0060 EZ701U	610	1700	33.00	33/1	3000	2600	4000	10	4	136	35
91	298	341	35	1.9	PHQ721F0055 K202VF0060 EZ503U	740	1000	33.00	33/1	3000	2600	4000	9.3	4	136	34
91	369	443	43	1.5	PHQ721F0055 K202VF0060 EZ702U	950	1700	33.00	33/1	3000	2600	4000	15	4	136	37
91	415	492	48	1.3	PHQ721F0055 K202VF0060 EZ505U	950	1700	33.00	33/1	3000	2600	4000	14	4	136	37
91	507	639	59	1.1	PHQ721F0055 K202VF0060 EZ703U	950	1700	33.00	33/1	3000	2600	4000	23	4	136	39
105	196	220	27	2.7	PHQ721F0055 K202VF0052 EZ701U	530	1700	28.47	2107/74	3000	2600	4000	10	4	136	35
105	318	382	44	1.7	PHQ721F0055 K202VF0052 EZ702U	950	1700	28.47	2107/74	3000	2600	4000	15	4	136	37
105	358	424	49	1.5	PHQ721F0055 K202VF0052 EZ505U	950	1700	28.47	2107/74	3000	2600	4000	14	4	136	37
105	437	552	60	1.2	PHQ721F0055 K202VF0052 EZ703U	950	1700	28.47	2107/74	3000	2600	4000	23	4	136	39
125	105	116	17	4.8	PHQ721F0055 K202VF0044 EZ402U	360	730	24.00	24/1	3000	2600	4000	3.8	4	136	31
125	154	192	25	3.3	PHQ721F0055 K202VF0044 EZ404U	540	730	24.00	24/1	3000	2600	4000	5.2	4	136	34
125	165	179	27	3.0	PHQ721F0055 K202VF0044 EZ502U	540	730	24.00	24/1	3000	2600	4000	7.4	4	136	33
125	165	186	27	3.0	PHQ721F0055 K202VF0044 EZ701U	450	1700	24.00	24/1	3000	2600	4000	11	4	136	35
125	217	248	36	2.3	PHQ721F0055 K202VF0044 EZ503U	540	730	24.00	24/1	3000	2600	4000	9.8	4	136	34
125	268	322	44	1.9	PHQ721F0055 K202VF0044 EZ702U	920	1700	24.00	24/1	3000	2600	4000	16	4	136	37
125	302	358	50	1.7	PHQ721F0055 K202VF0044 EZ505U	950	1700	24.00	24/1	3000	2600	4000	14	4	136	37
125	369	465	61	1.4	PHQ721F0055 K202VF0044 EZ703U	950	1700	24.00	24/1	3000	2600	4000	24	4	136	39
136	57	61	10	4.3	PHQ721F0055 K202VF0040 EZ401U	170	330	22.00	22/1	3000	2600	4000	3.5	4	136	30
136	88	96	16	2.8	PHQ721F0055 K202VF0040 EZ501U	250	330	22.00	22/1	3000	2600	4000	5.5	4	136	31
136	96	107	17	2.6	PHQ721F0055 K202VF0040 EZ402U	250	330	22.00	22/1	3000	2600	4000	4.2	4	136	31
136	152	170	27	3.2	PHQ721F0055 K202VF0040 EZ701U	410	1670	22.00	22/1	3000	2600	4000	11	4	136	35
136	246	295	45	2.0	PHQ721F0055 K202VF0040 EZ702U	840	1670	22.00	22/1	3000	2600	4000	16	4	136	37
136	277	328	50	1.8	PHQ721F0055 K202VF0040 EZ505U	920	1670	22.00	22/1	3000	2600	4000	15	4	136	37
136	338	426	61	1.4	PHQ721F0055 K202VF0040 EZ703U	920	1670	22.00	22/1	3000	2600	4000	24	4	136	39
PHQ7K (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 950 Nm)																
89	447	720	38	1.3	PHQ721F0055 K202VF0092 EZ505U	950	1700	50.55	25069/496	3500	3100	4500	13	4	136	37
97	409	658	38	1.3	PHQ721F0055 K202VF0084 EZ505U	950	1700	46.18	1247/27	3500	3100	4500	13	4	136	37

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PHQ7K (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 950 Nm)																
122	325	524	39	1.6	PHQ721F0055 K202VF0067 EZ505U	950	1700	36.76	2279/62	3500	3100	4500	13	4	136	37
122	414	685	49	1.2	PHQ721F0055 K202VF0067 EZ703U	950	1700	36.76	2279/62	3500	3100	4500	23	4	136	39
PHQ8K (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 2600 Nm)																
67	1214	1836	63	1.3	PHQ821F0055 K402VF0054 EZ805U	2600	4000	29.82	1849/62	2600	2200	3500	139	3.5	400	108
83	977	1477	64	1.5	PHQ821F0055 K402VF0044 EZ805U	2490	4000	24.00	24/1	2600	2200	3500	142	3.5	400	108
91	895	1354	65	1.6	PHQ821F0055 K402VF0040 EZ805U	2420	4000	22.00	22/1	2600	2200	3500	143	3.5	400	108
PHQ8K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 2600 Nm)																
7.9	1527	1669	11	1.1	PHQ821F0055 K402VF0690 EZ501U	2350	4000	381.4	61017/160	3600	3300	5000	3.0	3.5	400	67
9.8	1227	1341	11	1.4	PHQ821F0055 K402VF0560 EZ501U	2600	4000	306.4	2451/8	3600	3300	5000	3.1	3.5	400	67
11	1111	1214	12	1.3	PHQ821F0055 K402VF0500 EZ501U	1710	3090	277.3	5547/20	3600	3300	5000	3.1	3.5	400	67
12	1020	1115	10	1.7	PHQ821F0055 K402VF0460 EZ501U	2600	4000	254.7	3311/13	3600	3300	5000	3.2	3.5	400	67
13	892	975	10	1.8	PHQ821F0055 K402VF0410 EZ501U	1950	3530	222.8	2451/11	3600	3300	5000	3.1	3.5	400	67
16	765	837	9.4	2.2	PHQ821F0055 K402VF0350 EZ501U	2600	4000	191.2	45881/240	3600	3300	5000	3.4	3.5	400	67
16	1317	1424	16	1.3	PHQ821F0055 K402VF0350 EZ502U	2600	4000	191.2	45881/240	3600	3300	5000	5.7	3.5	400	68
16	1317	1478	16	1.3	PHQ821F0055 K402VF0350 EZ701U	2600	4000	191.2	45881/240	3600	3300	5000	9.0	3.5	400	70
16	742	811	9.4	2.3	PHQ821F0055 K402VF0340 EZ501U	2460	4000	185.2	2408/13	3600	3300	5000	3.2	3.5	400	67
16	1276	1380	16	1.3	PHQ821F0055 K402VF0340 EZ502U	2460	4000	185.2	2408/13	3600	3300	5000	5.5	3.5	400	68
16	1276	1432	16	1.3	PHQ821F0055 K402VF0340 EZ701U	2460	4000	185.2	2408/13	3600	3300	5000	8.8	3.5	400	70
20	612	668	8.9	2.8	PHQ821F0055 K402VF0280 EZ501U	2280	4000	152.7	14663/96	3600	3300	5000	3.6	3.5	400	67
20	1053	1138	15	1.6	PHQ821F0055 K402VF0280 EZ502U	2600	4000	152.7	14663/96	3600	3300	5000	5.9	3.5	400	68
20	1053	1181	15	1.6	PHQ821F0055 K402VF0280 EZ701U	2600	4000	152.7	14663/96	3600	3300	5000	9.2	3.5	400	70
20	1380	1579	20	1.2	PHQ821F0055 K402VF0280 EZ503U	2600	4000	152.7	14663/96	3600	3300	5000	8.2	3.5	400	70
22	557	609	8.7	3.1	PHQ821F0055 K402VF0250 EZ501U	2070	3360	139.0	4171/30	3600	3300	5000	3.4	3.5	400	67
22	958	1036	15	1.8	PHQ821F0055 K402VF0250 EZ502U	2480	3360	139.0	4171/30	3600	3300	5000	5.7	3.5	400	68
22	958	1075	15	1.8	PHQ821F0055 K402VF0250 EZ701U	2590	4000	139.0	4171/30	3600	3300	5000	9.0	3.5	400	70
22	1256	1437	20	1.4	PHQ821F0055 K402VF0250 EZ503U	2480	3360	139.0	4171/30	3600	3300	5000	8.1	3.5	400	70
22	1554	1864	24	1.1	PHQ821F0055 K402VF0250 EZ702U	2600	4000	139.0	4171/30	3600	3300	5000	14	3.5	400	73
23	513	561	8.5	3.3	PHQ821F0055 K402VF0230 EZ501U	1910	3880	128.1	6149/48	3600	3300	5000	3.8	3.5	400	67
23	883	954	15	1.9	PHQ821F0055 K402VF0230 EZ502U	2600	3880	128.1	6149/48	3600	3300	5000	6.1	3.5	400	68
23	883	990	15	1.9	PHQ821F0055 K402VF0230 EZ701U	2390	4000	128.1	6149/48	3600	3300	5000	9.4	3.5	400	70
23	1157	1324	19	1.5	PHQ821F0055 K402VF0230 EZ503U	2600	3880	128.1	6149/48	3600	3300	5000	8.5	3.5	400	70
23	1432	1718	24	1.2	PHQ821F0055 K402VF0230 EZ702U	2600	4000	128.1	6149/48	3600	3300	5000	15	3.5	400	73
23	1610	1909	27	1.1	PHQ821F0055 K402VF0230 EZ505U	2600	4000	128.1	6149/48	3600	3300	5000	13	3.5	400	73
27	445	486	8.2	3.8	PHQ821F0055 K402VF0200 EZ501U	1660	3110	111.1	1333/12	3600	3300	5000	3.7	3.5	400	67
27	765	828	14	2.2	PHQ821F0055 K402VF0200 EZ502U	2290	3110	111.1	1333/12	3600	3300	5000	6.0	3.5	400	68
27	765	859	14	2.2	PHQ821F0055 K402VF0200 EZ701U	2070	4000	111.1	1333/12	3600	3300	5000	9.3	3.5	400	70
27	1003	1148	19	1.7	PHQ821F0055 K402VF0200 EZ503U	2290	3110	111.1	1333/12	3600	3300	5000	8.3	3.5	400	70
27	1241	1490	23	1.4	PHQ821F0055 K402VF0200 EZ702U	2600	4000	111.1	1333/12	3600	3300	5000	14	3.5	400	73
27	1396	1655	26	1.2	PHQ821F0055 K402VF0200 EZ505U	2600	4000	111.1	1333/12	3600	3300	5000	13	3.5	400	73
31	660	740	14	2.6	PHQ821F0055 K402VF0175 EZ701U	1780	4000	95.73	8041/84	3400	3000	4500	9.9	3.5	400	70
31	1070	1284	22	1.6	PHQ821F0055 K402VF0175 EZ702U	2600	4000	95.73	8041/84	3400	3000	4500	15	3.5	400	73
31	1203	1426	25	1.4	PHQ821F0055 K402VF0175 EZ505U	2600	4000	95.73	8041/84	3400	3000	4500	14	3.5	400	73
31	1471	1854	30	1.2	PHQ821F0055 K402VF0175 EZ703U	2600	4000	95.73	8041/84	3400	3000	4500	23	3.5	400	75
32	373	408	7.9	4.6	PHQ821F0055 K402VF0170 EZ501U	1390	2820	93.16	559/6	3600	3300	5000	3.9	3.5	400	67
32	642	694	14	2.6	PHQ821F0055 K402VF0170 EZ502U	2080	2820	93.16	559/6	3600	3300	5000	6.2	3.5	400	68
32	642	720	14	2.6	PHQ821F0055 K402VF0170 EZ701U	1740	4000	93.16	559/6	3600	3300	5000	9.5	3.5	400	70
32	842	963	18	2.0	PHQ821F0055 K402VF0170 EZ503U	2080	2820	93.16	559/6	3600	3300	5000	8.6	3.5	400	70
32	1041	1249	22	1.6	PHQ821F0055 K402VF0170 EZ702U	2600	4000	93.16	559/6	3600	3300	5000	15	3.5	400	73
32	1171	1388	25	1.5	PHQ821F0055 K402VF0170 EZ505U	2600	4000	93.16	559/6	3600	3300	5000	13	3.5	400	73
32	1431	1804	30	1.2	PHQ821F0055 K402VF0170 EZ703U	2600	4000	93.16	559/6	3600	3300	5000	23	3.5	400	75
39	526	590	13	3.2	PHQ821F0055 K402VF0140 EZ701U	1420	4000	76.37	14663/192	3400	3000	4500	11	3.5	400	70
39	853	1024	21	2.0	PHQ821F0055 K402VF0140 EZ702U	2600	4000	76.37	14663/192	3400	3000	4500	16	3.5	400	73
39	960	1138	24	1.8	PHQ821F0055 K402VF0140 EZ505U	2600	4000	76.37	14663/192	3400	3000	4500	14	3.5	400	73
39	1173	1479	29	1.4	PHQ821F0055 K402VF0140 EZ703U	2600	4000	76.37	14663/192	3400	3000	4500	24	3.5	400	75
43	480	538	13	3.5	PHQ821F0055 K402VF0125 EZ701U	1300	4000	69.62	1462/21	3400	3000	4500	10	3.5	400	70
43	778	934	20	2.2	PHQ821F0055 K402VF0125 EZ702U	2600	4000	69.62	1462/21	3400	3000	4500	15	3.5	400	73
43	875	1037	23	1.9	PHQ821F0055 K402VF0125 EZ505U	2600	4000	69.62	1462/21	3400	3000	4500	14	3.5	400	73
43	1070	1348	28	1.6	PHQ821F0055 K402VF0125 EZ703U	2600	4000	69.62	1462/21	3400	3000	4500	23	3.5	400	75
43	1381	1958	36	1.2	PHQ821F0055 K402VF0125 EZ705U	2600	4000	69.62	1462/21	3400	3000	4500	36	3.5	400	80
47	437	490	12	3.9	PHQ821F0055 K402VF0115 EZ701U	1180	4000	63.35	7095/112	3000	2600	4000	11	3.5	400	70
47	708	849	20	2.4	PHQ821F0055 K402VF0115 EZ702U	2420	4000	63.35	7095/112	3000	2600	4000	16	3.5	400	73
47	796	944	22	2.1	PHQ821F0055 K402VF0115 EZ505U	2600	4000	63.35	7095/112	3000	2600	4000	15	3.5	400	73
47	973	1227	27	1.7	PHQ821F0055 K402VF0115 EZ703U	2600	4000	63.35	7095/112	3000	2600	4000	24	3.5	400	75
47	1257	1782	35	1.4	PHQ821F0055 K402VF0115 EZ705U	2600	4000	63.35	7095/112	3000	2600	4000	37	3.5	400	80

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PHQ8K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 2600 Nm)																
54	383	429	12	4.4	PHQ821F0055 K402VF0100 EZ701U	1030	4000	55.54	1333/24	3400	3000	4500	11	3.5	400	70
54	621	745	19	2.7	PHQ821F0055 K402VF0100 EZ702U	2120	4000	55.54	1333/24	3400	3000	4500	16	3.5	400	73
54	698	827	22	2.4	PHQ821F0055 K402VF0100 EZ505U	2600	4000	55.54	1333/24	3400	3000	4500	15	3.5	400	73
54	853	1076	27	2.0	PHQ821F0055 K402VF0100 EZ703U	2600	4000	55.54	1333/24	3400	3000	4500	24	3.5	400	75
54	1102	1562	34	1.5	PHQ821F0055 K402VF0100 EZ705U	2600	4000	55.54	1333/24	3400	3000	4500	36	3.5	400	80
54	1153	1919	36	1.5	PHQ821F0055 K402VF0100 EZ802U	2600	4000	55.54	1333/24	3400	3000	4500	60	3.5	400	89
59	350	393	12	4.8	PHQ821F0055 K402VF0092 EZ701U	950	3850	50.81	26015/512	3000	2600	4000	12	3.5	400	70
59	568	681	19	3.0	PHQ821F0055 K402VF0092 EZ702U	1940	3850	50.81	26015/512	3000	2600	4000	17	3.5	400	73
59	639	757	21	2.7	PHQ821F0055 K402VF0092 EZ505U	2600	3850	50.81	26015/512	3000	2600	4000	16	3.5	400	73
59	781	984	26	2.2	PHQ821F0055 K402VF0092 EZ703U	2600	3850	50.81	26015/512	3000	2600	4000	25	3.5	400	75
59	1008	1429	34	1.7	PHQ821F0055 K402VF0092 EZ705U	2600	4000	50.81	26015/512	3000	2600	4000	38	3.5	400	80
59	1055	1755	35	1.6	PHQ821F0055 K402VF0092 EZ802U	2600	4000	50.81	26015/512	3000	2600	4000	62	3.5	400	89
65	515	618	19	3.2	PHQ821F0055 K402VF0084 EZ702U	1760	3490	46.07	645/14	3000	2600	4000	17	3.5	400	73
65	579	686	22	2.8	PHQ821F0055 K402VF0084 EZ505U	2570	3490	46.07	645/14	3000	2600	4000	15	3.5	400	73
65	708	892	26	2.3	PHQ821F0055 K402VF0084 EZ703U	2570	3490	46.07	645/14	3000	2600	4000	25	3.5	400	75
65	914	1296	34	1.8	PHQ821F0055 K402VF0084 EZ705U	2600	4000	46.07	645/14	3000	2600	4000	37	3.5	400	80
65	957	1592	36	1.7	PHQ821F0055 K402VF0084 EZ802U	2600	4000	46.07	645/14	3000	2600	4000	61	3.5	400	89
73	813	1153	34	1.9	PHQ821F0055 K402VF0075 EZ705U	2600	4000	41.01	20339/496	2600	2200	3500	39	3.5	400	80
73	852	1417	36	1.9	PHQ821F0055 K402VF0075 EZ802U	2600	4000	41.01	20339/496	2600	2200	3500	63	3.5	400	89
73	1016	1841	43	1.6	PHQ821F0055 K402VF0075 EZ803U	2600	4000	41.01	20339/496	2600	2200	3500	89	3.5	400	95
81	413	496	19	3.7	PHQ821F0055 K402VF0067 EZ702U	1410	2800	36.95	2365/64	3000	2600	4000	18	3.5	400	73
81	465	551	22	3.3	PHQ821F0055 K402VF0067 EZ505U	2060	2800	36.95	2365/64	3000	2600	4000	17	3.5	400	73
81	568	716	27	2.7	PHQ821F0055 K402VF0067 EZ703U	2060	2800	36.95	2365/64	3000	2600	4000	26	3.5	400	75
81	733	1039	35	2.1	PHQ821F0055 K402VF0067 EZ705U	2600	4000	36.95	2365/64	3000	2600	4000	39	3.5	400	80
81	767	1277	36	2.0	PHQ821F0055 K402VF0067 EZ802U	2600	4000	36.95	2365/64	3000	2600	4000	63	3.5	400	89
81	915	1659	43	1.7	PHQ821F0055 K402VF0067 EZ803U	2600	4000	36.95	2365/64	3000	2600	4000	88	3.5	400	95
91	655	928	35	2.2	PHQ821F0055 K402VF0060 EZ705U	2600	4000	33.00	33/1	2600	2200	3500	41	3.5	400	80
91	685	1140	37	2.1	PHQ821F0055 K402VF0060 EZ802U	2600	4000	33.00	33/1	2600	2200	3500	65	3.5	400	89
91	817	1481	44	1.8	PHQ821F0055 K402VF0060 EZ803U	2600	4000	33.00	33/1	2600	2200	3500	91	3.5	400	95
101	591	839	35	2.4	PHQ821F0055 K402VF0054 EZ705U	2600	4000	29.82	1849/62	2600	2200	3500	40	3.5	400	80
101	619	1030	37	2.3	PHQ821F0055 K402VF0054 EZ802U	2600	4000	29.82	1849/62	2600	2200	3500	65	3.5	400	89
101	739	1338	44	1.9	PHQ821F0055 K402VF0054 EZ803U	2600	4000	29.82	1849/62	2600	2200	3500	90	3.5	400	95
125	476	675	36	2.8	PHQ821F0055 K402VF0044 EZ705U	2320	4000	24.00	24/1	2600	2200	3500	43	3.5	400	80
125	498	829	38	2.6	PHQ821F0055 K402VF0044 EZ802U	2240	4000	24.00	24/1	2600	2200	3500	67	3.5	400	89
125	595	1077	45	2.2	PHQ821F0055 K402VF0044 EZ803U	2490	4000	24.00	24/1	2600	2200	3500	93	3.5	400	95
136	436	619	36	2.9	PHQ821F0055 K402VF0040 EZ705U	2130	4000	22.00	22/1	2600	2200	3500	44	3.5	400	80
136	457	760	38	2.8	PHQ821F0055 K402VF0040 EZ802U	2050	4000	22.00	22/1	2600	2200	3500	69	3.5	400	89
136	545	987	45	2.4	PHQ821F0055 K402VF0040 EZ803U	2420	4000	22.00	22/1	2600	2200	3500	94	3.5	400	95
PHQ8K (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 2600 Nm)																
32	1230	1981	19	1.4	PHQ821F0055 K402VF0250 EZ505U	2600	4000	139.0	4171/30	3600	3300	5000	13	3.5	400	73
35	1133	1825	19	1.5	PHQ821F0055 K402VF0230 EZ505U	2600	4000	128.1	6149/48	3600	3300	5000	13	3.5	400	73
41	983	1583	18	1.7	PHQ821F0055 K402VF0200 EZ505U	2600	4000	111.1	1333/12	3600	3300	5000	13	3.5	400	73
47	847	1364	18	2.0	PHQ821F0055 K402VF0175 EZ505U	2600	4000	95.73	8041/84	3400	3000	4500	14	3.5	400	73
47	1079	1783	22	1.6	PHQ821F0055 K402VF0175 EZ703U	2600	4000	95.73	8041/84	3400	3000	4500	23	3.5	400	75
48	824	1327	17	2.1	PHQ821F0055 K402VF0170 EZ505U	2600	4000	93.16	559/6	3600	3300	5000	13	3.5	400	73
48	1050	1735	22	1.6	PHQ821F0055 K402VF0170 EZ703U	2600	4000	93.16	559/6	3600	3300	5000	23	3.5	400	75
59	676	1088	17	2.5	PHQ821F0055 K402VF0140 EZ505U	2600	4000	76.37	14663/192	3400	3000	4500	14	3.5	400	73
59	860	1422	21	2.0	PHQ821F0055 K402VF0140 EZ703U	2600	4000	76.37	14663/192	3400	3000	4500	24	3.5	400	75
65	616	992	17	2.7	PHQ821F0055 K402VF0125 EZ505U	2600	4000	69.62	1462/21	3400	3000	4500	14	3.5	400	73
65	784	1297	21	2.1	PHQ821F0055 K402VF0125 EZ703U	2600	4000	69.62	1462/21	3400	3000	4500	23	3.5	400	75
65	1063	1945	29	1.5	PHQ821F0055 K402VF0125 EZ705U	2600	4000	69.62	1462/21	3400	3000	4500	36	3.5	400	80
81	491	791	17	3.1	PHQ821F0055 K402VF0100 EZ505U	2600	4000	55.54	1333/24	3400	3000	4500	15	3.5	400	73
81	543	1784	19	2.8	PHQ821F0055 K402VF0100 EZ802U	2600	4000	55.54	1333/24	3400	3000	4500	60	3.5	400	89
81	626	1034	22	2.4	PHQ821F0055 K402VF0100 EZ703U	2600	4000	55.54	1333/24	3400	3000	4500	24	3.5	400	75
81	848	1552	29	1.8	PHQ821F0055 K402VF0100 EZ705U	2600	4000	55.54	1333/24	3400	3000	4500	36	3.5	400	80
PHQ9K (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 5760 Nm)																
29	2784	4211	53	1.4	PHQ931F0060 K513VF0115 EZ805U	5760	11250	69.41	10759/155	2300	2200	3600	141	4	771	133
33	2442	3694	51	1.6	PHQ931F0060 K513VF0100 EZ805U	5760	11250	60.90	609/10	1900	1800	3000	143	4	771	133
36	2206	3337	49	1.7	PHQ931F0060 K513VF0092 EZ805U	5760	10960	55.01	8526/155	1900	1800	3000	145	4	771	133
41	1957	2961	48	1.9	PHQ931F0060 K513VF0081 EZ805U	5760	9720	48.80	17081/350	1900	1800	3000	147	4	771	133
45	1768	2674	48	2.1	PHQ931F0060 K513VF0073 EZ805U	5760	8780	44.08	1102/25	1900	1800	3000	149	4	771	133

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PHQ9K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 5760 Nm)																
5.2	2288	2501	9.8	1.7	PHQ931F0060 K513VF0970 EZ501U	5280	9110	579.9	115971/200	3400	3000	4500	3.2	4	771	93
5.7	2067	2259	9.5	1.8	PHQ931F0060 K513VF0870 EZ501U	4760	8230	523.7	26187/50	3400	3000	4500	3.2	4	771	93
6.4	1837	2008	9.2	2.1	PHQ931F0060 K513VF0780 EZ501U	5760	8840	465.6	26071/56	3400	3000	4500	3.3	4	771	93
6.4	3162	3418	16	1.2	PHQ931F0060 K513VF0780 EZ502U	5760	8840	465.6	26071/56	3400	3000	4500	5.6	4	771	94
6.4	3162	3546	16	1.2	PHQ931F0060 K513VF0780 EZ701U	5760	8840	465.6	26071/56	3400	3000	4500	8.9	4	771	96
7.1	1659	1814	8.9	2.3	PHQ931F0060 K513VF0700 EZ501U	5670	7980	420.5	841/2	3400	3000	4500	3.4	4	771	93
7.1	2856	3087	15	1.3	PHQ931F0060 K513VF0700 EZ502U	5670	7980	420.5	841/2	3400	3000	4500	5.7	4	771	94
7.1	2856	3203	15	1.3	PHQ931F0060 K513VF0700 EZ701U	5670	7980	420.5	841/2	3400	3000	4500	9.0	4	771	96
7.1	3743	4284	20	1.0	PHQ931F0060 K513VF0700 EZ503U	5670	7980	420.5	841/2	3400	3000	4500	8.0	4	771	96
7.7	1528	1670	8.7	2.5	PHQ931F0060 K513VF0650 EZ501U	5690	7950	387.3	25172/65	3400	3000	4500	3.5	4	771	93
7.7	2630	2843	15	1.4	PHQ931F0060 K513VF0650 EZ502U	5760	7950	387.3	25172/65	3400	3000	4500	5.8	4	771	94
7.7	2630	2950	15	1.4	PHQ931F0060 K513VF0650 EZ701U	5760	11250	387.3	25172/65	3400	3000	4500	9.1	4	771	96
7.7	3448	3945	20	1.1	PHQ931F0060 K513VF0650 EZ503U	5760	7950	387.3	25172/65	3400	3000	4500	8.2	4	771	96
8.6	1380	1509	8.4	2.8	PHQ931F0060 K513VF0580 EZ501U	5140	7180	349.8	22736/65	3400	3000	4500	3.5	4	771	93
8.6	2376	2568	15	1.6	PHQ931F0060 K513VF0580 EZ502U	5300	7180	349.8	22736/65	3400	3000	4500	5.8	4	771	94
8.6	2376	2664	15	1.6	PHQ931F0060 K513VF0580 EZ701U	5760	11250	349.8	22736/65	3400	3000	4500	9.1	4	771	96
8.6	3114	3563	19	1.2	PHQ931F0060 K513VF0580 EZ503U	5300	7180	349.8	22736/65	3400	3000	4500	8.2	4	771	96
10	1140	1246	8.0	3.3	PHQ931F0060 K513VF0480 EZ501U	4240	6760	289.0	8091/28	3400	3000	4500	3.9	4	771	93
10	1962	2122	14	1.9	PHQ931F0060 K513VF0480 EZ502U	4990	6760	289.0	8091/28	3400	3000	4500	6.2	4	771	94
10	1962	2201	14	1.9	PHQ931F0060 K513VF0480 EZ701U	5300	11250	289.0	8091/28	3400	3000	4500	9.5	4	771	96
10	2572	2944	18	1.5	PHQ931F0060 K513VF0480 EZ503U	4990	6760	289.0	8091/28	3400	3000	4500	8.6	4	771	96
10	3182	3819	22	1.2	PHQ931F0060 K513VF0480 EZ702U	5760	11250	289.0	8091/28	3400	3000	4500	15	4	771	98
10	3580	4243	25	1.1	PHQ931F0060 K513VF0480 EZ505U	5760	11250	289.0	8091/28	3400	3000	4500	13	4	771	98
11	1030	1126	7.7	3.7	PHQ931F0060 K513VF0440 EZ501U	3830	6110	261.0	261/1	3400	3000	4500	4.0	4	771	93
11	1773	1916	13	2.1	PHQ931F0060 K513VF0440 EZ502U	4500	6110	261.0	261/1	3400	3000	4500	6.3	4	771	94
11	1773	1988	13	2.1	PHQ931F0060 K513VF0440 EZ701U	4790	11250	261.0	261/1	3400	3000	4500	9.6	4	771	96
11	2323	2659	17	1.6	PHQ931F0060 K513VF0440 EZ503U	4500	6110	261.0	261/1	3400	3000	4500	8.6	4	771	96
11	2874	3449	22	1.3	PHQ931F0060 K513VF0440 EZ702U	5760	11250	261.0	261/1	3400	3000	4500	15	4	771	98
11	3234	3833	24	1.2	PHQ931F0060 K513VF0440 EZ505U	5760	11250	261.0	261/1	3400	3000	4500	13	4	771	98
13	1570	1761	13	2.4	PHQ931F0060 K513VF0390 EZ701U	4240	11250	231.2	8091/35	3400	3000	4500	10	4	771	96
13	2546	3055	21	1.5	PHQ931F0060 K513VF0390 EZ702U	5760	11250	231.2	8091/35	3400	3000	4500	15	4	771	98
13	2864	3395	23	1.3	PHQ931F0060 K513VF0390 EZ505U	5760	11250	231.2	8091/35	3400	3000	4500	14	4	771	98
13	3501	4413	29	1.1	PHQ931F0060 K513VF0390 EZ703U	5760	11250	231.2	8091/35	3400	3000	4500	23	4	771	100
14	1418	1591	12	2.7	PHQ931F0060 K513VF0350 EZ701U	3830	11130	208.8	1044/5	3400	3000	4500	10	4	771	96
14	2300	2759	20	1.7	PHQ931F0060 K513VF0350 EZ702U	5760	11130	208.8	1044/5	3400	3000	4500	15	4	771	98
14	2587	3066	23	1.5	PHQ931F0060 K513VF0350 EZ505U	5760	11130	208.8	1044/5	3400	3000	4500	14	4	771	98
14	3162	3986	28	1.2	PHQ931F0060 K513VF0350 EZ703U	5760	11130	208.8	1044/5	3400	3000	4500	23	4	771	100
15	1317	1477	12	2.9	PHQ931F0060 K513VF0320 EZ701U	3560	11250	193.8	62031/320	3400	3000	4500	10	4	771	96
15	2135	2562	20	1.8	PHQ931F0060 K513VF0320 EZ702U	5760	11250	193.8	62031/320	3400	3000	4500	16	4	771	98
15	2402	2846	22	1.6	PHQ931F0060 K513VF0320 EZ505U	5760	11250	193.8	62031/320	3400	3000	4500	14	4	771	98
15	2935	3700	27	1.3	PHQ931F0060 K513VF0320 EZ703U	5760	11250	193.8	62031/320	3400	3000	4500	24	4	771	100
17	1189	1334	12	3.2	PHQ931F0060 K513VF0290 EZ701U	3210	10350	175.1	14007/80	3400	3000	4500	11	4	771	96
17	1928	2314	19	2.0	PHQ931F0060 K513VF0290 EZ702U	5760	10350	175.1	14007/80	3400	3000	4500	16	4	771	98
17	2169	2571	22	1.8	PHQ931F0060 K513VF0290 EZ505U	5760	10350	175.1	14007/80	3400	3000	4500	14	4	771	98
17	2651	3342	26	1.4	PHQ931F0060 K513VF0290 EZ703U	5760	10350	175.1	14007/80	3400	3000	4500	24	4	771	100
21	992	1113	11	3.8	PHQ931F0060 K513VF0240 EZ701U	2680	10140	146.1	11687/80	2800	2500	4000	11	4	771	96
21	1609	1931	18	2.4	PHQ931F0060 K513VF0240 EZ702U	5500	10140	146.1	11687/80	2800	2500	4000	17	4	771	98
21	1810	2145	20	2.1	PHQ931F0060 K513VF0240 EZ505U	5760	10140	146.1	11687/80	2800	2500	4000	15	4	771	98
21	2212	2789	25	1.7	PHQ931F0060 K513VF0240 EZ703U	5760	10140	146.1	11687/80	2800	2500	4000	25	4	771	100
21	2856	4049	32	1.3	PHQ931F0060 K513VF0240 EZ705U	5760	11250	146.1	11687/80	2800	2500	4000	37	4	771	106
23	896	1005	11	4.2	PHQ931F0060 K513VF0220 EZ701U	2420	9160	132.0	2639/20	2800	2500	4000	12	4	771	96
23	1453	1744	18	2.6	PHQ931F0060 K513VF0220 EZ702U	4970	9160	132.0	2639/20	2800	2500	4000	17	4	771	98
23	1635	1938	20	2.3	PHQ931F0060 K513VF0220 EZ505U	5760	9160	132.0	2639/20	2800	2500	4000	15	4	771	98
23	1998	2519	24	1.9	PHQ931F0060 K513VF0220 EZ703U	5760	9160	132.0	2639/20	2800	2500	4000	25	4	771	100
23	2579	3657	31	1.5	PHQ931F0060 K513VF0220 EZ705U	5760	11250	132.0	2639/20	2800	2500	4000	37	4	771	106
26	789	885	10	4.8	PHQ931F0060 K513VF0195 EZ701U	2130	8670	116.1	27869/240	2800	2500	4000	13	4	771	96
26	1279	1535	17	3.0	PHQ931F0060 K513VF0195 EZ702U	4370	8670	116.1	27869/240	2800	2500	4000	18	4	771	98
26	1439	1705	19	2.6	PHQ931F0060 K513VF0195 EZ505U	5760	8670	116.1	27869/240	2800	2500	4000	16	4	771	98
26	1758	2217	23	2.2	PHQ931F0060 K513VF0195 EZ703U	5760	8670	116.1	27869/240	2800	2500	4000	26	4	771	100
26	2270	3218	30	1.7	PHQ931F0060 K513VF0195 EZ705U	5760	11250	116.1	27869/240	2800	2500	4000	38	4	771	106
26	2376	3954	31	1.6	PHQ931F0060 K513VF0195 EZ802U	5760	11250	116.1	27869/240	2800	2500	4000	62	4	771	114
29	1155	1386	16	3.3	PHQ931F0060 K513VF0175 EZ702U	3950	7830	104.9	6293/60	2800	2500	4000	18	4	771	98
29	1300	1540	18	2.9	PHQ931F0060 K513VF0175 EZ505U	5760	7830	104.9	6293/60	2800	2500	4000	17	4	771	98
29	1588	2002	23	2.4	PHQ931F0060 K513VF0175 EZ703U	5760	7830	104.9	6293/60	2800	2500	4000	26	4	771	100

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PHQ9K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 5760 Nm)																
29	2050	2907	29	1.9	PHQ931F0060 K513VF0175 EZ705U	5760	11250	104.9	6293/60	2800	2500	4000	38	4	771	106
29	2147	3571	30	1.8	PHQ931F0060 K513VF0175 EZ802U	5760	11250	104.9	6293/60	2800	2500	4000	63	4	771	114
31	1063	1276	16	3.6	PHQ931F0060 K513VF0160 EZ702U	3630	7210	96.56	26071/270	2300	2200	3600	19	4	771	98
31	1196	1418	18	3.2	PHQ931F0060 K513VF0160 EZ505U	5320	7210	96.56	26071/270	2300	2200	3600	18	4	771	98
31	1462	1843	22	2.6	PHQ931F0060 K513VF0160 EZ703U	5320	7210	96.56	26071/270	2300	2200	3600	27	4	771	100
31	1888	2676	28	2.0	PHQ931F0060 K513VF0160 EZ705U	5760	11250	96.56	26071/270	2300	2200	3600	39	4	771	106
31	1976	3288	30	1.9	PHQ931F0060 K513VF0160 EZ802U	5760	11250	96.56	26071/270	2300	2200	3600	63	4	771	114
31	2357	4271	35	1.6	PHQ931F0060 K513VF0160 EZ803U	5760	11250	96.56	26071/270	2300	2200	3600	89	4	771	120
34	961	1153	16	4.0	PHQ931F0060 K513VF0145 EZ702U	3280	6510	87.22	11774/135	2300	2200	3600	20	4	771	98
34	1081	1281	17	3.5	PHQ931F0060 K513VF0145 EZ505U	4800	6510	87.22	11774/135	2300	2200	3600	18	4	771	98
34	1321	1665	21	2.9	PHQ931F0060 K513VF0145 EZ703U	4800	6510	87.22	11774/135	2300	2200	3600	28	4	771	100
34	1705	2417	28	2.2	PHQ931F0060 K513VF0145 EZ705U	5760	11250	87.22	11774/135	2300	2200	3600	40	4	771	106
34	1785	2970	29	2.1	PHQ931F0060 K513VF0145 EZ802U	5760	11250	87.22	11774/135	2300	2200	3600	64	4	771	114
34	2129	3858	34	1.8	PHQ931F0060 K513VF0145 EZ803U	5760	11250	87.22	11774/135	2300	2200	3600	89	4	771	120
39	1502	2130	27	2.5	PHQ931F0060 K513VF0130 EZ705U	5760	11250	76.85	1537/20	2300	2200	3600	42	4	771	106
39	1573	2617	28	2.4	PHQ931F0060 K513VF0130 EZ802U	5760	11250	76.85	1537/20	2300	2200	3600	66	4	771	114
39	1876	3399	33	2.0	PHQ931F0060 K513VF0130 EZ803U	5760	11250	76.85	1537/20	2300	2200	3600	91	4	771	120
43	1357	1924	26	2.7	PHQ931F0060 K513VF0115 EZ705U	5760	11250	69.41	10759/155	2300	2200	3600	42	4	771	106
43	1421	2363	28	2.6	PHQ931F0060 K513VF0115 EZ802U	5760	11250	69.41	10759/155	2300	2200	3600	66	4	771	114
43	1695	3071	33	2.2	PHQ931F0060 K513VF0115 EZ803U	5760	11250	69.41	10759/155	2300	2200	3600	92	4	771	120
49	1190	1688	27	3.0	PHQ931F0060 K513VF0100 EZ705U	5760	11250	60.90	609/10	1900	1800	3000	45	4	771	106
49	1246	2074	28	2.8	PHQ931F0060 K513VF0100 EZ802U	5590	11250	60.90	609/10	1900	1800	3000	69	4	771	114
49	1487	2694	33	2.4	PHQ931F0060 K513VF0100 EZ803U	5760	11250	60.90	609/10	1900	1800	3000	94	4	771	120
55	1075	1525	27	3.2	PHQ931F0060 K513VF0092 EZ705U	5250	10960	55.01	8526/155	1900	1800	3000	46	4	771	106
55	1126	1873	28	3.0	PHQ931F0060 K513VF0092 EZ802U	5050	10960	55.01	8526/155	1900	1800	3000	70	4	771	114
55	1343	2433	33	2.5	PHQ931F0060 K513VF0092 EZ803U	5760	10960	55.01	8526/155	1900	1800	3000	95	4	771	120
61	954	1353	27	3.4	PHQ931F0060 K513VF0081 EZ705U	4660	9720	48.80	17081/350	1900	1800	3000	49	4	771	106
61	999	1662	28	3.3	PHQ931F0060 K513VF0081 EZ802U	4480	9720	48.80	17081/350	1900	1800	3000	73	4	771	114
61	1191	2159	33	2.8	PHQ931F0060 K513VF0081 EZ803U	5760	9720	48.80	17081/350	1900	1800	3000	98	4	771	120
68	862	1222	27	3.7	PHQ931F0060 K513VF0073 EZ705U	4210	8780	44.08	1102/25	1900	1800	3000	51	4	771	106
68	902	1501	28	3.5	PHQ931F0060 K513VF0073 EZ802U	4050	8780	44.08	1102/25	1900	1800	3000	75	4	771	114
68	1076	1950	34	3.0	PHQ931F0060 K513VF0073 EZ803U	5760	8780	44.08	1102/25	1900	1800	3000	100	4	771	120
PHQ9K (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 5760 Nm)																
16	2519	4058	18	1.5	PHQ931F0060 K513VF0480 EZ505U	5760	11250	289.0	8091/28	3400	3000	4500	13	4	771	98
17	2276	3665	17	1.7	PHQ931F0060 K513VF0440 EZ505U	5760	11250	261.0	261/1	3400	3000	4500	13	4	771	98
19	2016	3246	16	1.9	PHQ931F0060 K513VF0390 EZ505U	5760	11250	231.2	8091/35	3400	3000	4500	14	4	771	98
19	2567	4243	21	1.5	PHQ931F0060 K513VF0390 EZ703U	5760	11250	231.2	8091/35	3400	3000	4500	23	4	771	100
22	1820	2932	16	2.1	PHQ931F0060 K513VF0350 EZ505U	5760	11130	208.8	1044/5	3400	3000	4500	14	4	771	98
22	2319	3833	20	1.6	PHQ931F0060 K513VF0350 EZ703U	5760	11130	208.8	1044/5	3400	3000	4500	23	4	771	100
23	1690	2722	16	2.2	PHQ931F0060 K513VF0320 EZ505U	5760	11250	193.8	62031/320	3400	3000	4500	14	4	771	98
23	2153	3558	20	1.8	PHQ931F0060 K513VF0320 EZ703U	5760	11250	193.8	62031/320	3400	3000	4500	24	4	771	100
26	1527	2459	15	2.5	PHQ931F0060 K513VF0290 EZ505U	5760	10350	175.1	14007/80	3400	3000	4500	14	4	771	98
26	1944	3214	19	2.0	PHQ931F0060 K513VF0290 EZ703U	5760	10350	175.1	14007/80	3400	3000	4500	24	4	771	100
PHQ10K (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 10000 Nm)																
16	4869	7364	44	1.3	PHQ1031F0060 K713VF0200 EZ805U	10000	20000	121.4	357399/2944	2400	2200	3400	149	4	1561	193
18	4398	6652	42	1.5	PHQ1031F0060 K713VF0185 EZ805U	10000	20000	109.7	80703/736	2400	2200	3400	150	4	1561	193
20	3944	5965	41	1.6	PHQ1031F0060 K713VF0165 EZ805U	10000	20000	98.33	6293/64	2000	1900	3000	154	4	1561	193
23	3562	5388	40	1.8	PHQ1031F0060 K713VF0150 EZ805U	10000	20000	88.81	1421/16	2000	1900	3000	155	4	1561	193
26	3139	4747	38	2.1	PHQ1031F0060 K713VF0130 EZ805U	10000	20000	78.26	10017/128	2000	1900	3000	162	4	1561	193
28	2835	4288	37	2.3	PHQ1031F0060 K713VF0120 EZ805U	10000	20000	70.69	70119/992	2000	1900	3000	164	4	1561	193
33	2448	3702	36	2.7	PHQ1031F0060 K713VF0100 EZ805U	10000	20000	61.03	1953/32	1700	1600	2700	175	4	1561	193
36	2211	3344	35	2.9	PHQ1031F0060 K713VF0092 EZ805U	10000	20000	55.13	441/8	1700	1600	2700	178	4	1561	193
40	2015	3048	34	3.2	PHQ1031F0060 K713VF0084 EZ805U	9450	18760	50.24	263655/5248	1700	1600	2700	189	4	1561	193
44	1820	2753	33	3.6	PHQ1031F0060 K713VF0076 EZ805U	8540	16950	45.38	59535/1312	1700	1600	2700	193	4	1561	193
PHQ10K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 10000 Nm)																
5.1	4015	4504	12	1.6	PHQ1031F0060 K713VF0990 EZ701U	10000	20000	591.2	302715/512	2900	2600	3800	9.7	4	1561	156
5.6	3627	4068	12	1.8	PHQ1031F0060 K713VF0890 EZ701U	9800	18790	534.0	68355/128	2900	2600	3800	9.7	4	1561	156
5.6	5881	7058	19	1.1	PHQ1031F0060 K713VF0890 EZ702U	10000	18790	534.0	68355/128	2900	2600	3800	15	4	1561	158
6.3	3212	3603	11	2.0	PHQ1031F0060 K713VF0790 EZ701U	8680	19700	473.0	60543/128	2900	2600	3800	10	4	1561	156
6.3	5209	6251	18	1.2	PHQ1031F0060 K713VF0790 EZ702U	10000	19700	473.0	60543/128	2900	2600	3800	16	4	1561	158
7.0	2901	3254	11	2.2	PHQ1031F0060 K713VF0710 EZ701U	7840	17790	427.2	13671/32	2900	2600	3800	10	4	1561	156
7.0	4705	5646	18	1.4	PHQ1031F0060 K713VF0710 EZ702U	10000	17790	427.2	13671/32	2900	2600	3800	16	4	1561	158
7.7	2642	2964	11	2.5	PHQ1031F0060 K713VF0650 EZ701U	7140	17680	389.1	99603/256	2900	2600	3800	11	4	1561	156

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PHQ10K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 10000 Nm)																
7.7	4285	5142	17	1.5	PHQ1031F0060 K713VF0650 EZ702U	10000	17680	389.1	99603/256	2900	2600	3800	16	4	1561	158
7.7	5892	7427	23	1.1	PHQ1031F0060 K713VF0650 EZ703U	10000	17680	389.1	99603/256	2900	2600	3800	24	4	1561	160
8.5	2387	2677	10	2.7	PHQ1031F0060 K713VF0590 EZ701U	6450	15970	351.4	22491/64	2900	2600	3800	11	4	1561	156
8.5	3870	4644	17	1.7	PHQ1031F0060 K713VF0590 EZ702U	10000	15970	351.4	22491/64	2900	2600	3800	16	4	1561	158
8.5	5322	6708	23	1.2	PHQ1031F0060 K713VF0590 EZ703U	10000	15970	351.4	22491/64	2900	2600	3800	24	4	1561	160
10	2033	2280	9.7	3.2	PHQ1031F0060 K713VF0500 EZ701U	5490	15150	299.3	498015/1664	2900	2600	3800	12	4	1561	156
10	3296	3955	16	2.0	PHQ1031F0060 K713VF0500 EZ702U	10000	15150	299.3	498015/1664	2900	2600	3800	18	4	1561	158
10	4532	5713	22	1.4	PHQ1031F0060 K713VF0500 EZ703U	10000	15150	299.3	498015/1664	2900	2600	3800	26	4	1561	160
11	1836	2059	9.4	3.5	PHQ1031F0060 K713VF0450 EZ701U	4960	13680	270.3	112455/416	2900	2600	3800	13	4	1561	156
11	2977	3573	15	2.2	PHQ1031F0060 K713VF0450 EZ702U	10000	13680	270.3	112455/416	2900	2600	3800	18	4	1561	158
11	4094	5160	21	1.6	PHQ1031F0060 K713VF0450 EZ703U	10000	13680	270.3	112455/416	2900	2600	3800	26	4	1561	160
11	5284	7492	27	1.2	PHQ1031F0060 K713VF0450 EZ705U	10000	20000	270.3	112455/416	2900	2600	3800	38	4	1561	166
13	1599	1793	9.0	4.1	PHQ1031F0060 K713VF0390 EZ701U	4320	14060	235.4	7533/32	2900	2600	3800	14	4	1561	156
13	2593	3111	15	2.5	PHQ1031F0060 K713VF0390 EZ702U	8860	14060	235.4	7533/32	2900	2600	3800	20	4	1561	158
13	3565	4494	20	1.8	PHQ1031F0060 K713VF0390 EZ703U	10000	14060	235.4	7533/32	2900	2600	3800	27	4	1561	160
13	4602	6525	26	1.4	PHQ1031F0060 K713VF0390 EZ705U	10000	20000	235.4	7533/32	2900	2600	3800	40	4	1561	166
14	1444	1620	8.8	4.5	PHQ1031F0060 K713VF0350 EZ701U	3900	12700	212.6	1701/8	2900	2600	3800	15	4	1561	156
14	2342	2810	14	2.8	PHQ1031F0060 K713VF0350 EZ702U	8000	12700	212.6	1701/8	2900	2600	3800	20	4	1561	158
14	3220	4059	20	2.0	PHQ1031F0060 K713VF0350 EZ703U	9370	12700	212.6	1701/8	2900	2600	3800	28	4	1561	160
14	4157	5893	25	1.6	PHQ1031F0060 K713VF0350 EZ705U	10000	20000	212.6	1701/8	2900	2600	3800	40	4	1561	166
14	4352	7240	26	1.5	PHQ1031F0060 K713VF0350 EZ802U	10000	20000	212.6	1701/8	2900	2600	3800	64	4	1561	174
15	3803	5392	25	1.7	PHQ1031F0060 K713VF0320 EZ705U	10000	20000	194.5	99603/512	2900	2600	3800	42	4	1561	166
15	3981	6624	26	1.6	PHQ1031F0060 K713VF0320 EZ802U	10000	20000	194.5	99603/512	2900	2600	3800	66	4	1561	174
17	3435	4870	24	1.9	PHQ1031F0060 K713VF0290 EZ705U	10000	20000	175.7	22491/128	2900	2600	3800	42	4	1561	166
17	3596	5983	25	1.8	PHQ1031F0060 K713VF0290 EZ802U	10000	20000	175.7	22491/128	2900	2600	3800	66	4	1561	174
20	2953	4187	23	2.2	PHQ1031F0060 K713VF0250 EZ705U	10000	20000	151.1	193347/1280	2400	2200	3400	46	4	1561	166
20	3091	5143	24	2.1	PHQ1031F0060 K713VF0250 EZ802U	10000	20000	151.1	193347/1280	2400	2200	3400	70	4	1561	174
20	3687	6682	28	1.8	PHQ1031F0060 K713VF0250 EZ803U	10000	20000	151.1	193347/1280	2400	2200	3400	95	4	1561	180
22	2667	3781	22	2.4	PHQ1031F0060 K713VF0230 EZ705U	10000	20000	136.4	43659/320	2400	2200	3400	46	4	1561	166
22	2792	4645	23	2.3	PHQ1031F0060 K713VF0230 EZ802U	10000	20000	136.4	43659/320	2400	2200	3400	70	4	1561	174
22	3331	6035	28	2.0	PHQ1031F0060 K713VF0230 EZ803U	10000	20000	136.4	43659/320	2400	2200	3400	96	4	1561	180
25	2373	3365	21	2.7	PHQ1031F0060 K713VF0200 EZ705U	10000	20000	121.4	357399/2944	2400	2200	3400	50	4	1561	166
25	2485	4133	22	2.6	PHQ1031F0060 K713VF0200 EZ802U	10000	20000	121.4	357399/2944	2400	2200	3400	74	4	1561	174
25	2964	5370	27	2.2	PHQ1031F0060 K713VF0200 EZ803U	10000	20000	121.4	357399/2944	2400	2200	3400	100	4	1561	180
27	2143	3039	21	3.0	PHQ1031F0060 K713VF0185 EZ705U	10000	20000	109.7	80703/736	2400	2200	3400	51	4	1561	166
27	2244	3733	22	2.9	PHQ1031F0060 K713VF0185 EZ802U	10000	20000	109.7	80703/736	2400	2200	3400	75	4	1561	174
27	2677	4850	26	2.4	PHQ1031F0060 K713VF0185 EZ803U	10000	20000	109.7	80703/736	2400	2200	3400	100	4	1561	180
31	1922	2725	20	3.4	PHQ1031F0060 K713VF0165 EZ705U	9390	19530	98.33	6293/64	2000	1900	3000	55	4	1561	166
31	2012	3348	21	3.2	PHQ1031F0060 K713VF0165 EZ802U	9020	19530	98.33	6293/64	2000	1900	3000	79	4	1561	174
31	2400	4350	25	2.7	PHQ1031F0060 K713VF0165 EZ803U	10000	20000	98.33	6293/64	2000	1900	3000	105	4	1561	180
34	1736	2462	19	3.7	PHQ1031F0060 K713VF0150 EZ705U	8480	17640	88.81	1421/16	2000	1900	3000	57	4	1561	166
34	1818	3024	20	3.6	PHQ1031F0060 K713VF0150 EZ802U	8150	17640	88.81	1421/16	2000	1900	3000	81	4	1561	174
34	2168	3929	24	3.0	PHQ1031F0060 K713VF0150 EZ803U	10000	20000	88.81	1421/16	2000	1900	3000	106	4	1561	180
38	1530	2169	19	4.2	PHQ1031F0060 K713VF0130 EZ705U	7470	15590	78.26	10017/128	2000	1900	3000	63	4	1561	166
38	1602	2665	20	4.1	PHQ1031F0060 K713VF0130 EZ802U	7180	15590	78.26	10017/128	2000	1900	3000	87	4	1561	174
38	1910	3462	23	3.4	PHQ1031F0060 K713VF0130 EZ803U	10000	20000	78.26	10017/128	2000	1900	3000	113	4	1561	180
42	1382	1959	18	4.7	PHQ1031F0060 K713VF0120 EZ705U	6750	14080	70.69	70119/992	2000	1900	3000	65	4	1561	166
42	1447	2407	19	4.5	PHQ1031F0060 K713VF0120 EZ802U	6490	14080	70.69	70119/992	2000	1900	3000	89	4	1561	174
42	1726	3127	23	3.8	PHQ1031F0060 K713VF0120 EZ803U	9410	20000	70.69	70119/992	2000	1900	3000	115	4	1561	180
PHQ11K (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 22000 Nm)																
7.5	10648	16106	30	1.2	PHQ1131F0060 K813VF0440 EZ805U	22000	34120	265.5	531/2	2800	2500	3600	142	4	2623	334
8.3	9628	14563	29	1.4	PHQ1131F0060 K813VF0400 EZ805U	22000	40000	240.1	38409/160	2800	2500	3600	145	4	2623	334
9.2	8696	13154	28	1.5	PHQ1131F0060 K813VF0360 EZ805U	22000	40000	216.8	8673/40	2800	2500	3600	146	4	2623	334
10	7794	11789	27	1.7	PHQ1131F0060 K813VF0320 EZ805U	22000	40000	194.3	31093/160	2800	2500	3600	150	4	2623	334
11	7040	10648	26	1.8	PHQ1131F0060 K813VF0290 EZ805U	22000	40000	175.5	7021/40	2800	2500	3600	151	4	2623	334
13	6139	9286	25	2.1	PHQ1131F0060 K813VF0260 EZ805U	22000	40000	153.1	140833/920	2300	2100	3300	158	4	2623	334
14	5545	8388	25	2.3	PHQ1131F0060 K813VF0230 EZ805U	22000	40000	138.3	31801/230	2300	2100	3300	159	4	2623	334
17	4616	6982	23	2.8	PHQ1131F0060 K813VF0190 EZ805U	21650	40000	115.1	133517/1160	2300	2100	3300	171	4	2623	334
19	4170	6307	23	3.1	PHQ1131F0060 K813VF0175 EZ805U	19560	38820	104.0	30149/290	2300	2100	3300	173	4	2623	334
20	3954	5981	22	3.3	PHQ1131F0060 K813VF0165 EZ805U	18550	36820	98.59	126201/1280	1900	1800	2900	180	4	2623	334
22	3572	5402	22	3.6	PHQ1131F0060 K813VF0150 EZ805U	16750	33260	89.05	28497/320	1900	1800	2900	184	4	2623	334
PHQ11K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 22000 Nm)																
5.1	3959	4441	6.4	3.3	PHQ1131F0060 K813VF0970 EZ701U	10700	22820	583.0	93279/160	2800	2500	3600	11	4	2623	296
5.1	6421	7705	10	2.0	PHQ1131F0060 K813VF0970 EZ702U	16830	22820	583.0	93279/160	2800	2500	3600	16	4	2623	299

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PHQ11K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 22000 Nm)																
5.1	8828	11129	14	1.5	PHQ1131F0060 K813VF0970 EZ703U	16830	22820	583.0	93279/160	2800	2500	3600	24	4	2623	301
5.7	3576	4011	6.2	3.6	PHQ1131F0060 K813VF0880 EZ701U	9670	20610	526.6	21063/40	2800	2500	3600	11	4	2623	296
5.7	5799	6959	10	2.2	PHQ1131F0060 K813VF0880 EZ702U	15200	20610	526.6	21063/40	2800	2500	3600	17	4	2623	299
5.7	7974	10052	14	1.6	PHQ1131F0060 K813VF0880 EZ703U	15200	20610	526.6	21063/40	2800	2500	3600	24	4	2623	301
6.3	3235	3628	6.1	4.0	PHQ1131F0060 K813VF0790 EZ701U	8740	20570	476.3	45725/96	2800	2500	3600	12	4	2623	296
6.3	5246	6295	9.8	2.5	PHQ1131F0060 K813VF0790 EZ702U	15170	20570	476.3	45725/96	2800	2500	3600	18	4	2623	299
6.3	7213	9092	14	1.8	PHQ1131F0060 K813VF0790 EZ703U	15170	20570	476.3	45725/96	2800	2500	3600	25	4	2623	301
6.3	9311	13201	17	1.4	PHQ1131F0060 K813VF0790 EZ705U	22000	40000	476.3	45725/96	2800	2500	3600	38	4	2623	306
6.3	9748	16218	18	1.3	PHQ1131F0060 K813VF0790 EZ802U	22000	40000	476.3	45725/96	2800	2500	3600	62	4	2623	314
7.0	2922	3277	5.9	4.4	PHQ1131F0060 K813VF0720 EZ701U	7900	18580	430.2	10325/24	2800	2500	3600	13	4	2623	296
7.0	4738	5685	9.5	2.7	PHQ1131F0060 K813VF0720 EZ702U	13700	18580	430.2	10325/24	2800	2500	3600	18	4	2623	299
7.0	6515	8212	13	2.0	PHQ1131F0060 K813VF0720 EZ703U	13700	18580	430.2	10325/24	2800	2500	3600	26	4	2623	301
7.0	8410	11924	17	1.5	PHQ1131F0060 K813VF0720 EZ705U	22000	40000	430.2	10325/24	2800	2500	3600	38	4	2623	306
7.0	8805	14648	18	1.5	PHQ1131F0060 K813VF0720 EZ802U	22000	40000	430.2	10325/24	2800	2500	3600	62	4	2623	314
7.6	7672	10878	16	1.7	PHQ1131F0060 K813VF0650 EZ705U	22000	40000	392.5	188387/480	2800	2500	3600	39	4	2623	306
7.6	8032	13363	17	1.6	PHQ1131F0060 K813VF0650 EZ802U	22000	40000	392.5	188387/480	2800	2500	3600	64	4	2623	314
8.5	6930	9825	16	1.9	PHQ1131F0060 K813VF0590 EZ705U	22000	39940	354.5	42539/120	2800	2500	3600	40	4	2623	306
8.5	7255	12070	17	1.8	PHQ1131F0060 K813VF0590 EZ802U	22000	39940	354.5	42539/120	2800	2500	3600	64	4	2623	314
8.5	8654	15681	20	1.5	PHQ1131F0060 K813VF0590 EZ803U	22000	39940	354.5	42539/120	2800	2500	3600	89	4	2623	320
10	3237	3885	8.5	3.8	PHQ1131F0060 K813VF0490 EZ702U	11060	16840	293.9	16461/56	2800	2500	3600	23	4	2623	299
10	4451	5611	12	2.8	PHQ1131F0060 K813VF0490 EZ703U	12420	16840	293.9	16461/56	2800	2500	3600	30	4	2623	301
10	5746	8147	15	2.3	PHQ1131F0060 K813VF0490 EZ705U	22000	37780	293.9	16461/56	2800	2500	3600	43	4	2623	306
10	6016	10009	16	2.2	PHQ1131F0060 K813VF0490 EZ802U	22000	37780	293.9	16461/56	2800	2500	3600	67	4	2623	314
10	7176	13003	19	1.8	PHQ1131F0060 K813VF0490 EZ803U	22000	37780	293.9	16461/56	2800	2500	3600	92	4	2623	320
11	2924	3509	8.2	3.8	PHQ1131F0060 K813VF0440 EZ702U	9990	15210	265.5	531/2	2800	2500	3600	23	4	2623	299
11	4020	5068	11	2.8	PHQ1131F0060 K813VF0440 EZ703U	11220	15210	265.5	531/2	2800	2500	3600	31	4	2623	301
11	5190	7359	15	2.5	PHQ1131F0060 K813VF0440 EZ705U	22000	34120	265.5	531/2	2800	2500	3600	43	4	2623	306
11	5434	9040	15	2.4	PHQ1131F0060 K813VF0440 EZ802U	22000	34120	265.5	531/2	2800	2500	3600	67	4	2623	314
11	6481	11745	18	2.0	PHQ1131F0060 K813VF0440 EZ803U	22000	34120	265.5	531/2	2800	2500	3600	93	4	2623	320
12	4693	6653	14	2.8	PHQ1131F0060 K813VF0400 EZ705U	22000	33620	240.1	38409/160	2800	2500	3600	46	4	2623	306
12	4913	8174	15	2.6	PHQ1131F0060 K813VF0400 EZ802U	22000	33620	240.1	38409/160	2800	2500	3600	70	4	2623	314
12	5860	10619	18	2.2	PHQ1131F0060 K813VF0400 EZ803U	22000	40000	240.1	38409/160	2800	2500	3600	96	4	2623	320
14	4239	6010	14	3.1	PHQ1131F0060 K813VF0360 EZ705U	20700	30360	216.8	8673/40	2800	2500	3600	47	4	2623	306
14	4438	7383	14	2.9	PHQ1131F0060 K813VF0360 EZ802U	19900	30360	216.8	8673/40	2800	2500	3600	71	4	2623	314
14	5293	9592	17	2.5	PHQ1131F0060 K813VF0360 EZ803U	22000	40000	216.8	8673/40	2800	2500	3600	96	4	2623	320
15	3799	5386	13	3.4	PHQ1131F0060 K813VF0320 EZ705U	18550	32430	194.3	31093/160	2800	2500	3600	51	4	2623	306
15	3977	6617	14	3.3	PHQ1131F0060 K813VF0320 EZ802U	17840	32430	194.3	31093/160	2800	2500	3600	75	4	2623	314
15	4744	8597	17	2.7	PHQ1131F0060 K813VF0320 EZ803U	22000	40000	194.3	31093/160	2800	2500	3600	101	4	2623	320
17	3431	4865	13	3.8	PHQ1131F0060 K813VF0290 EZ705U	16750	29300	175.5	7021/40	2800	2500	3600	52	4	2623	306
17	3592	5976	14	3.6	PHQ1131F0060 K813VF0290 EZ802U	16110	29300	175.5	7021/40	2800	2500	3600	76	4	2623	314
17	4285	7764	16	3.0	PHQ1131F0060 K813VF0290 EZ803U	22000	40000	175.5	7021/40	2800	2500	3600	102	4	2623	320
20	2992	4243	12	4.3	PHQ1131F0060 K813VF0260 EZ705U	14610	27110	153.1	140833/920	2300	2100	3300	59	4	2623	306
20	3133	5212	13	4.2	PHQ1131F0060 K813VF0260 EZ802U	14050	27110	153.1	140833/920	2300	2100	3300	83	4	2623	314
20	3737	6772	15	3.5	PHQ1131F0060 K813VF0260 EZ803U	20370	40000	153.1	140833/920	2300	2100	3300	109	4	2623	320
22	2703	3832	12	4.8	PHQ1131F0060 K813VF0230 EZ705U	13200	24490	138.3	31801/230	2300	2100	3300	61	4	2623	306
22	2830	4708	13	4.6	PHQ1131F0060 K813VF0230 EZ802U	12690	24490	138.3	31801/230	2300	2100	3300	85	4	2623	314
22	3375	6116	15	3.9	PHQ1131F0060 K813VF0230 EZ803U	18400	40000	138.3	31801/230	2300	2100	3300	110	4	2623	320
26	2810	5091	14	4.6	PHQ1131F0060 K813VF0190 EZ803U	15320	40000	115.1	133517/1160	2300	2100	3300	122	4	2623	320
PHQ12K (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 43000 Nm)																
4.4	18049	27300	20	1.4	PHQ1231F0060 K913VF0750 EZ805U	39290	53300	450.0	187209/416	2600	2500	3400	142	4	4665	580
5.3	15177	22957	19	1.6	PHQ1231F0060 K913VF0630 EZ805U	43000	80000	378.4	629703/1664	2600	2500	3400	146	4	4665	580
6.8	11776	17812	17	2.1	PHQ1231F0060 K913VF0490 EZ805U	43000	80000	293.6	300669/1024	2600	2500	3400	153	4	4665	580
8.8	9154	13847	16	2.7	PHQ1231F0060 K913VF0380 EZ805U	42940	78170	228.3	584319/2560	2600	2500	3400	163	4	4665	580
10	7728	11690	15	3.2	PHQ1231F0060 K913VF0320 EZ805U	36250	71960	192.7	141825/736	2600	2500	3400	173	4	4665	580
14	5762	8715	14	4.3	PHQ1231F0060 K913VF0240 EZ805U	27030	53650	143.7	266631/1856	2200	2100	3100	195	4	4665	580
PHQ12K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 43000 Nm)																
1.3	14989	16812	5.3	1.7	PHQ1231F0060 K914VF3740 EZ701U	37160	57590	2242	13775935/6144	2600	2500	3400	9.4	4	4665	555
1.7	11783	13216	4.9	2.1	PHQ1231F0060 K914VF2940 EZ701U	31840	53290	1763	2932941/1664	2600	2500	3400	9.6	4	4665	555
1.7	19107	22928	8.0	1.3	PHQ1231F0060 K914VF2940 EZ702U	39290	53290	1763	2932941/1664	2600	2500	3400	15	4	4665	558
2.0	9908	11113	4.7	2.5	PHQ1231F0060 K914VF2470 EZ701U	26780	44790	1482	9865347/6656	2600	2500	3400	9.9	4	4665	555
2.0	16067	19281	7.6	1.6	PHQ1231F0060 K914VF2470 EZ702U	33020	44790	1482	9865347/6656	2600	2500	3400	15	4	4665	558
2.6	7688	8623	4.6	3.1	PHQ1231F0060 K914VF1920 EZ701U	20780	39640	1150	4710481/4096	2600	2500	3400	10	4	4665	555
2.6	12467	14960	7.4	1.9	PHQ1231F0060 K914VF1920 EZ702U	29230	39640	1150	4710481/4096	2600	2500	3400	16	4	4665	558
2.6	17142	21609	10	1.4	PHQ1231F0060 K914VF1920 EZ703U	29230	39640	1150	4710481/4096	2600	2500	3400	23	4	4665	560

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
PHQ12K (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 43000 Nm)																
3.4	5976	6703	4.5	3.8	PHQ1231F0060 K914VF1490 EZ701U	16150	35940	894.0	9154331/10240	2600	2500	3400	11	4	4665	555
3.4	9691	11629	7.3	2.3	PHQ1231F0060 K914VF1490 EZ702U	26500	35940	894.0	9154331/10240	2600	2500	3400	16	4	4665	558
3.4	13325	16798	10	1.7	PHQ1231F0060 K914VF1490 EZ703U	26500	35940	894.0	9154331/10240	2600	2500	3400	24	4	4665	560
3.4	17735	29506	12	1.4	PHQ1231F0060 K914VF1470 EZ802U	43000	78170	880.4	15776613/17920	2600	2500	3400	62	4	4665	574
4.0	5045	5659	4.4	4.3	PHQ1231F0060 K914VF1260 EZ701U	13640	30460	754.7	2221925/2944	2600	2500	3400	12	4	4665	555
4.0	8181	9818	7.2	2.6	PHQ1231F0060 K914VF1260 EZ702U	22460	30460	754.7	2221925/2944	2600	2500	3400	17	4	4665	558
4.0	11250	14181	9.9	1.9	PHQ1231F0060 K914VF1260 EZ703U	22460	30460	754.7	2221925/2944	2600	2500	3400	25	4	4665	560
4.0	14973	24910	11	1.7	PHQ1231F0060 K914VF1240 EZ802U	43000	71960	743.3	3829275/5152	2600	2500	3400	62	4	4665	574
4.0	17860	32363	14	1.4	PHQ1231F0060 K914VF1240 EZ803U	43000	71960	743.3	3829275/5152	2600	2500	3400	88	4	4665	580
5.2	11716	19492	11	2.1	PHQ1231F0060 K913VF0950 EZ802U	37160	57590	572.5	293105/512	2600	2500	3400	64	4	4665	561
5.2	13975	25324	13	1.8	PHQ1231F0060 K913VF0950 EZ803U	37160	57590	572.5	293105/512	2600	2500	3400	90	4	4665	567
5.3	6099	7319	8.6	2.7	PHQ1231F0060 K914VF0940 EZ702U	16740	22710	562.7	4177219/7424	2600	2500	3400	18	4	4665	558
5.3	8387	10572	12	2.0	PHQ1231F0060 K914VF0940 EZ703U	16740	22710	562.7	4177219/7424	2600	2500	3400	26	4	4665	560
5.4	11163	18571	11	2.2	PHQ1231F0060 K914VF0920 EZ802U	39550	53650	554.1	7199037/12992	2600	2500	3400	64	4	4665	574
5.4	13315	24127	13	1.9	PHQ1231F0060 K914VF0920 EZ803U	39550	53650	554.1	7199037/12992	2600	2500	3400	89	4	4665	580
6.7	9210	15323	10	2.7	PHQ1231F0060 K913VF0750 EZ802U	39290	53300	450.0	187209/416	2600	2500	3400	68	4	4665	561
6.7	10986	19907	12	2.3	PHQ1231F0060 K913VF0750 EZ803U	39290	53300	450.0	187209/416	2600	2500	3400	93	4	4665	567
7.9	7745	12885	9.5	3.2	PHQ1231F0060 K913VF0630 EZ802U	33030	44790	378.4	629703/1664	2600	2500	3400	71	4	4665	561
7.9	9238	16740	11	2.7	PHQ1231F0060 K913VF0630 EZ803U	43000	80000	378.4	629703/1664	2600	2500	3400	97	4	4665	567
10	6009	9998	8.8	4.2	PHQ1231F0060 K913VF0490 EZ802U	26950	39650	293.6	300669/1024	2600	2500	3400	78	4	4665	561
10	7168	12989	11	3.5	PHQ1231F0060 K913VF0490 EZ803U	39070	80000	293.6	300669/1024	2600	2500	3400	104	4	4665	567
13	5572	10097	9.8	4.5	PHQ1231F0060 K913VF0380 EZ803U	30370	78170	228.3	584319/2560	2600	2500	3400	114	4	4665	567

19.3 Dimensional drawings

In this chapter you can find the dimensions of the geared motors.

There is a dimensional drawing for every possible shaft/housing design, each with the tables for gear unit dimensions, motor dimensions and geared motor dimensions.

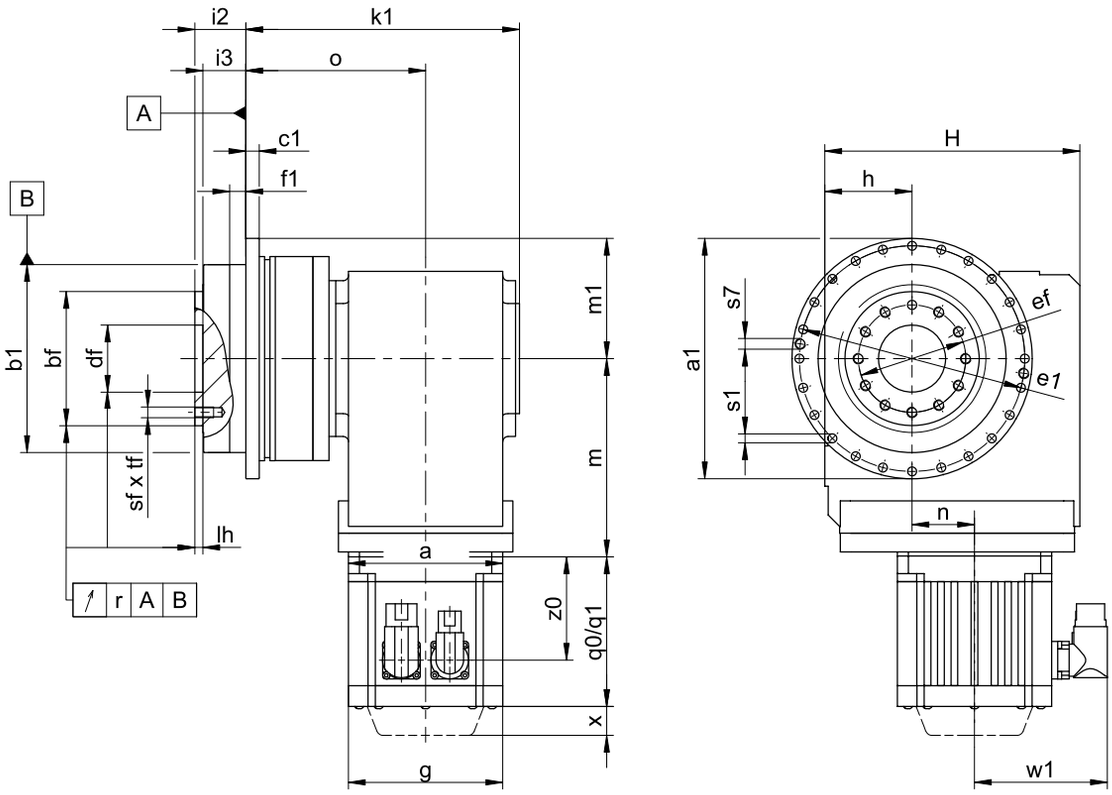
Dimensions can exceed the specifications of ISO 2768-mK due to casting tolerances or accumulation of individual tolerances.

We reserve the right to make dimensional changes due to ongoing technical development.

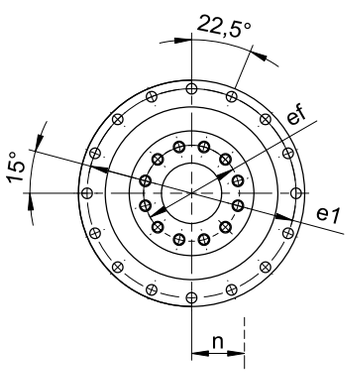
You can download CAD models of our standard drives at http://cad.stoeber.de.

Combination options and the dimensions of forced ventilated geared motors can be found at http://cad.stoeber.de.

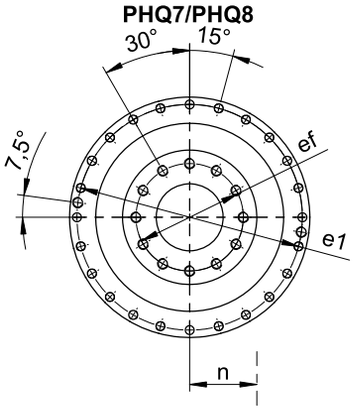
19.3.1 PHQ5 – PHQ10 F shaft design (flange shaft)



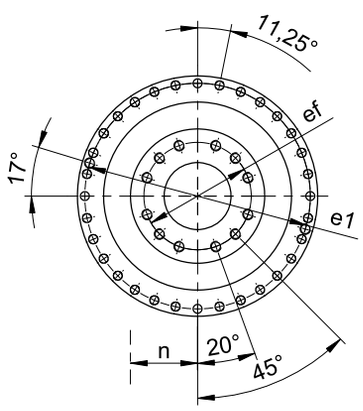
PHQ5



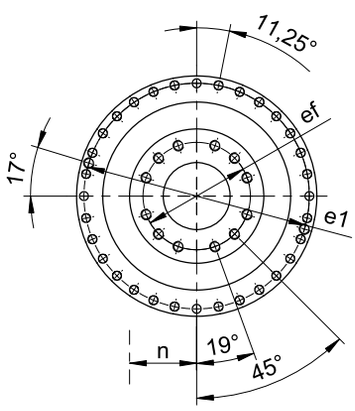
PHQ7/PHQ8



PHQ9



PHQ10



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▶ 23.4]

Dimensions of gear units

Type	Øa1	Øb1	Øbf	c1	Ødf	Øe1	Øef	f1	i2	i3	k1	lh	m1	o	r	Øs1	s7	sf	tf
PHQ521_K102_	145_{h7}	110_{h7}	80_{h7}	8	40^{H6}	135	63	10	29	23	172.0	6	60	116.0	0.020	5.5	–	M8	11.0
PHQ721_K202_	179_{h7}	140_{h7}	100_{h7}	10	50^{H6}	168	80	12	38	32	204.0	6	65	134.0	0.025	6.6	–	M10	16.0
PHQ821_K402_	247_{h7}	200_{h7}	160_{h7}	12	80^{H6}	233	125	15	50	42	274.0	8	90	184.0	0.030	9.0	M10	M12	17.0
PHQ931_K513_	300_{h7}	255_{h7}	180_{h7}	18	90^{H6}	280	145	20	66	55	292.5	12	100	196.5	0.030	13.5	M8	M20	28.0
PHQ1031_K713_	330_{h7}	285_{h7}	200_{h7}	20	95^{H6}	310	166	20	75	60	344.5	10	125	228.0	0.040	13.5	M10	M24	35.0

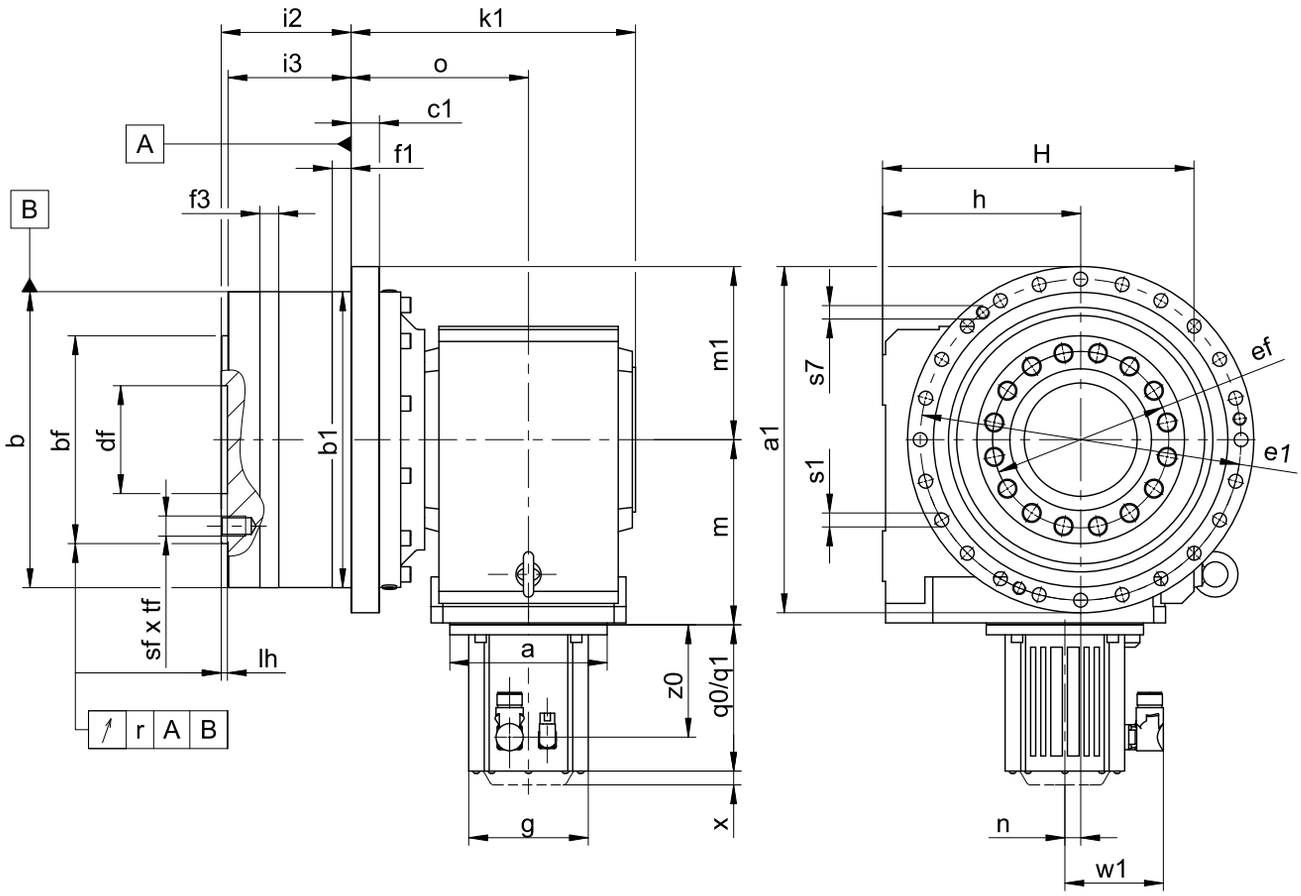
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91	22	76.5
EZ402U	98	143.5	192.0	91	22	101.5
EZ404U	98	193.5	242.0	91	22	151.5
EZ501U	115	112.0	166.5	100	22	77.5
EZ502U	115	137.0	191.5	100	22	102.5
EZ503U	115	162.0	216.5	100	22	127.5
EZ505U	115	212.0	266.5	100	22	177.5
EZ701U	145	125.0	184.0	115	22	87.0
EZ702U	145	150.0	209.0	115	22	112.0
EZ703U	145	175.0	234.0	115	22	137.0
EZ705U	145	230.0	289.0	134	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5
EZ805U	190	355.5	432.5	156.5	22	301.5

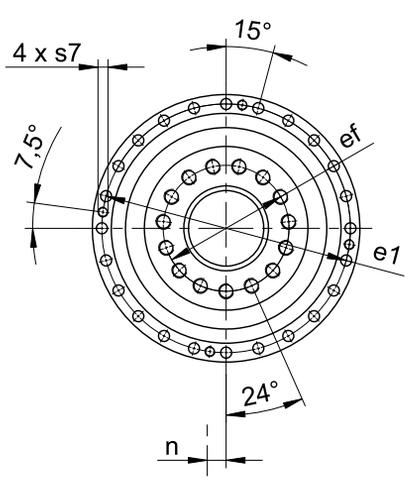
Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
PHQ5_K1_	□72	124	36.0	□98	124	36.0	□115	128	36.0	□145	130	36.0	–	–	–
PHQ7_K2_	□72	143	46.0	□98	143	46.0	□115	147	46.0	□145	149	46.0	–	–	–
PHQ8_K4_	–	–	–	–	–	–	∅160	187	60.0	□145	189	60.0	□190	192	60.0
PHQ9_K5_	–	–	–	–	–	–	∅160	172	15.0	□145	174	15.0	□190	177	15.0
PHQ10_K7_	–	–	–	–	–	–	–	–	–	∅200	221	20.0	□190	224	20.0

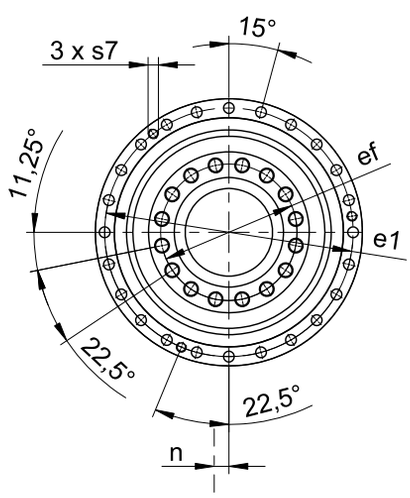
19.3.2 PHQ11 – PHQ12 F shaft design (flange shaft)



PHQ11



PHQ12



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]

Dimensions of gear units

Type	Øa1	Øb	Øb1	Øbf	c1	Ødf	Øe1	Øef	f1	f3	i2	i3	k1	lh	m1	o	r	Øs1	s7	sf	tf
PHQ1131_K813_	425	365_{g6}	365_{h6}	260_{h7}	32	120^{H6}	395	200	30	30	190	180	381.5	10	145	236.5	0.040	17.5	M16	M24	35.5
PHQ1231_K913_	550	470_{g6}	470_{h6}	330_{h7}	45	180^{H7}	510	280	30	30	206.5	195.5	452.0	10	180	282.0	0.040	22.0	M16	M30	48.0

Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ701U	145	125.0	184.0	115	22	87.0
EZ702U	145	150.0	209.0	115	22	112.0
EZ703U	145	175.0	234.0	115	22	137.0
EZ705U	145	230.0	289.0	134	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5
EZ805U	190	355.5	432.5	156.5	22	301.5

Dimensions of geared motors

Type	EZ7			EZ8		
	a	m	n	a	m	n
PHQ11_K8_	∅200	247	24.0	∅250	249	24.0
PHQ12_K9_	∅200	353	25.0	∅250	294	25.0

19.4 Type designation

In this chapter, you can find an explanation of the type designation with the associated options.

Additional ordering information not included in the type designation can be found at the end of the chapter.

Sample code

PHQ	7	2	1	F	0055	K202VF	0115	EZ401U

Explanation

Code	Designation	Design
PHQ	Type	Planetary gear unit
7	Size	7 (example)
2 3	Generation	Generation 2 Generation 3
1	Stages	Single-stage
F	Shaft	Flange shaft
0055	Transmission ratio of output (i x 10)	i = 5.5 (example)
K202VF	Input	K2 right-angle geared motor (example)
0115	Transmission ratio of input (i x 10 rounded)	i = 11.55 (example)
EZ401U	Motor	EZ synchronous servo motor

In order to complete the type designation, also specify:

- A detailed type designation of the motor, see the chapter [▶ 23]
- The mounting position, see Chapter [▶ 19.5.2]
- Output gear unit side 3 or 4, see Chapter [▶ 19.5.2]
- Radial shaft seal rings at the output made of NBR or FKM, see chapter [▶ 19.6.3]
- The position of the plug connectors, see chapter [▶ 19.5.4]
- For reverse operation of the output shaft from ± 20° to ± 90° and horizontal installation, note the chapter [▶ 19.6.4]

19.5 Product description

19.5.1 Installation conditions

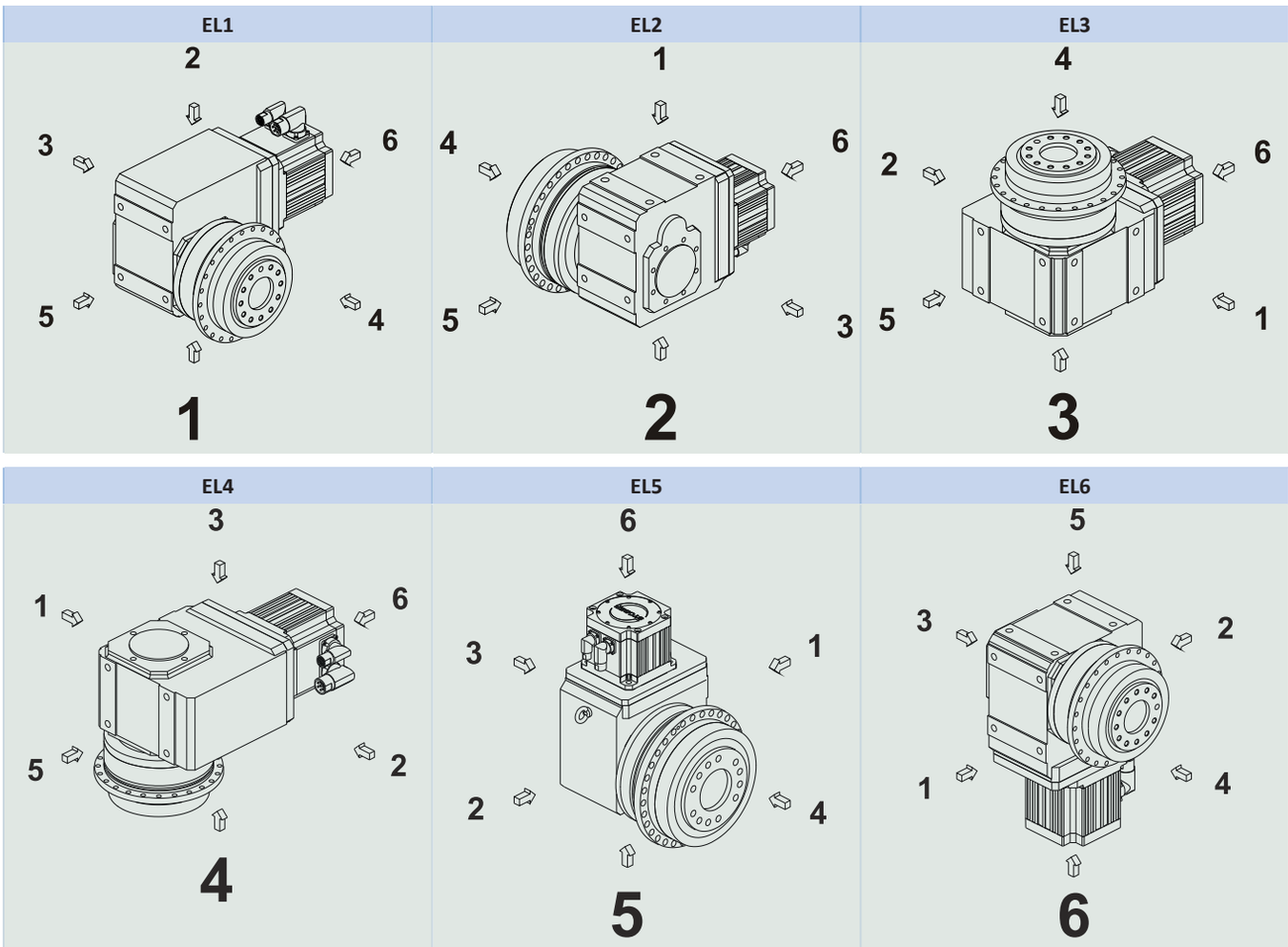
The torque and force values listed in this catalog are valid under the following conditions:

- When using screws with quality 12.9 for machine-side attachment of the flange shaft and gear unit housing
- When the gear unit housings are adjusted at pilot øb1, and also at pilot Øb for sizes PHQ11 and PHQ12 (H7)
- When the flange shaft is adjusted using the connecting element at pilot øbf or ødf

19.5.2 Mounting positions

The following table shows the standard mounting positions.

The numbers identify the gear unit sides. The mounting position is defined by the gear side facing downwards.



Since the lubricant filling volume of the gear unit depends on the mounting position, the mounting position must be specified when ordering.

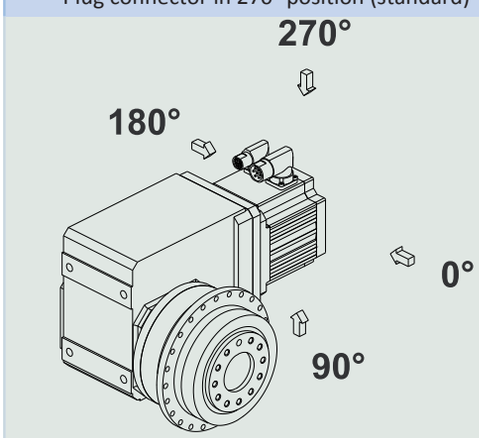
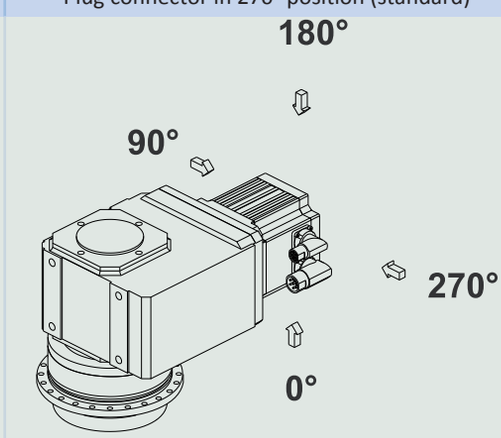
19.5.3 Lubricants

STOBER fills the gear units with the amount and type of lubricant specified on the nameplate. The filling volume and the structure of the gear units depend on the mounting position.

Only install the gear units in the intended mounting position! Reposition the gear units only after consulting STOBER. Otherwise, STOBER assumes no liability for the gear units.

Lubricant filling quantities for gear units, document ID 441871, can be found online at http://www.stoeber.de/en/download. Enter the ID of the documentation in the Search... field.

19.5.4 Position of the plug connectors

Mounting position EL1 Plug connector in 270° position (standard)	Mounting position EL4 Plug connector in 270° position (standard)
	

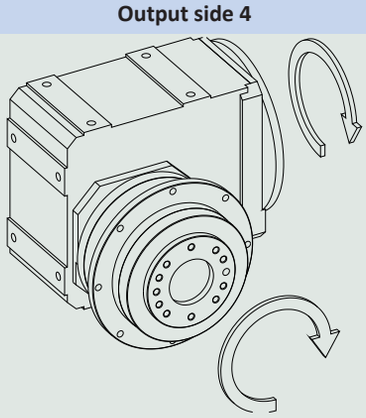
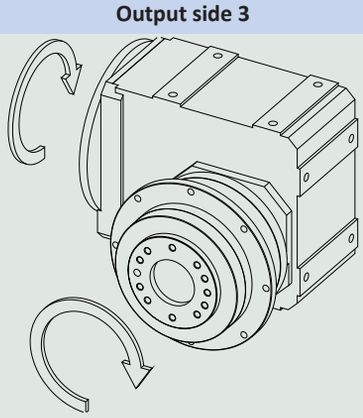
Indicate variations for your geared motor in the purchase order.

Note that the plug connector position rotates along with the geared motor if the geared motor is in another mounting position.

19.5.5 Other product features

Feature	Value
Max. permitted gear unit temperature (on the surface of the gear unit)	≤ 90 °C
Paint	Black RAL 9005
(ATEX) Directive 2014/34/EU (option)	Not suitable
Protection class:[1]	
Gear unit	IP65
Motor	IP56, optionally IP66

19.5.6 Direction of rotation

Output side 4	Output side 3
	

The pictures show mounting position EL1.

19.6 Project configuration

Project your drives using our SERVOsoft designing software. You can receive SERVOsoft for free from your adviser at one of our sales centers. Observe the limit conditions in this chapter to ensure a safe design for your drives.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

19.6.1 Calculation of the operating point

Check the following conditions for operating points other than the nominal point M_{2N} specified in the selection tables.

For continuous operation in mounting positions EL1, EL2:

$$n_{1m^*} \leq \frac{n_{1maxDBEL1,2}}{fB_T}$$

For continuous operation in mounting positions EL3, EL4, EL5, EL6:

$$n_{1m^*} \leq \frac{n_{1maxDBEL3,4,5,6}}{fB_T}$$

For all mounting positions:

$$n_{1max^*} \leq \frac{n_{1max\,ZB}}{fB_T}$$

$$M_{2eff^*} \leq M_{2th}$$

$$M_{2acc^*} \leq M_{2acc}$$

[1] Observe the protection class of all the components.

$$M_{2NOT^*} \leq M_{2NOT}$$

$$M_{2eq^*} \leq M_{2N} \cdot \frac{S}{fB_{op} \cdot fB_t}$$

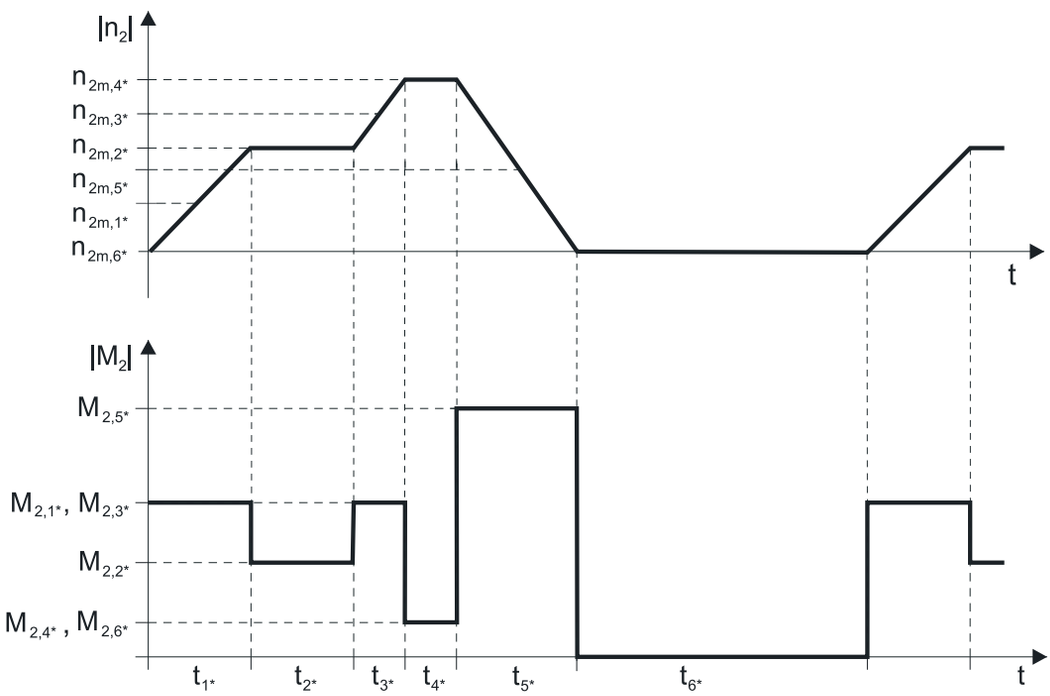
Refer to the selection tables for the values for $n_{1maxDBEL1,2}$ and $n_{1maxDBEL3,4,5,6}$, n_{1maxZB}, M_{2acc}, M_{2NOT}, M_{2N} and S.

The values for fB_T, fB_{op} and fB_t can be found in the corresponding tables in this chapter.

Calculate the thermal limit torque M_{2th} for a duty cycle > 50%.

Example of cyclic operation

The following calculations are based on a representation of the power taken from the output based in accordance with the following example:



Calculation of the actual average input speed

$$n_{1m^*} = n_{2m^*} \cdot i$$

$$n_{2m^*} = \frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}{t_{1^*} + \ldots + t_{n^*}}$$

If $t_{1^*} + \ldots + t_{5^*} \geq 20$ min, calculate n_{2m^*} without the rest phase t_{6^*}.

The values for the ratio i can be found in the selection tables.

Calculation of the actual effective torque

$$M_{2eff^*} = \sqrt{\frac{t_{1^*} \cdot M_{2,1^*}{}^2 + \ldots + t_{n^*} \cdot M_{2,n^*}{}^2}{t_{1^*} + \ldots + t_{n^*}}}$$

Calculation of the actual equivalent torque

$$M_{2eq^*} = \sqrt[3]{\frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} \cdot \left|M_{2,1^*}{}^3\right| + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*} \cdot \left|M_{2,n^*}{}^3\right|}{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}}$$

Calculation of the thermal limit torque

Calculate the thermal limit torque M_{2th} for a duty cycle ED_{20} > 50% and the actual average input speed n_{1m^*}. (At $K_{mot,th} \leq 0$ you must reduce the average input speed n_{1m^*} accordingly or select another geared motor size.)

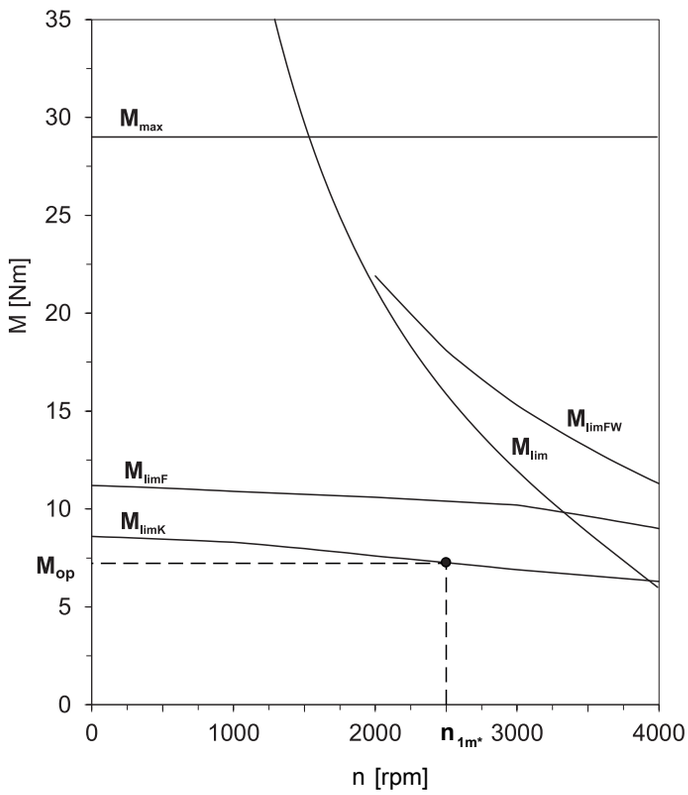
$$M_{2th} = M_{op} \cdot i \cdot K_{mot,th}$$

$$K_{mot,th} = 0,93 - \frac{a_{th}}{1000} \cdot athEL \cdot fB_T \cdot \left(\frac{n_{1m*}}{1000} \right)^2$$

The values for i and a_{th} can be found in the selection tables.

The values for a_{thEL} and fB_T can be found in the corresponding tables in this chapter.

The value for the torque of the motor at operating point M_{op} with the determined average input speed n_{1m*} can be found in the motor curve of Chapter [▶ 23.3]. Note the size, nominal speed n_N and cooling type of the motor. The figure below shows an example of reading the torque M_{op} of a motor with convection cooling at the operating point.



Operating factors

Parameter a_{thEL}

Mounting position	a_{thEL}
EL1, 2	1.0
EL3, 4, 5, 6	1.1

Operating mode	fB_{op}
Uniform continuous operation	1.00
Cyclic operation	1.25
Reversing load cyclic operation	1.40

Run time	fB_t
Daily run time ≤ 8 h	1.00
Daily run time ≤ 16 h	1.15
Daily run time ≤ 24 h	1.20

Temperature		fB_T
Motor cooling	**Surrounding temperature**	
Motor with forced ventilation	≤ 20 °C	0.9
	≤ 30 °C	1.0
	≤ 40 °C	1.15
Motor with convection cooling	≤ 20 °C	1.0
	≤ 30 °C	1.1
	≤ 40 °C	1.25

Notes

- The maximum permitted gear unit temperature (see the "Other product features" chapter) must not be exceeded. Doing so may result in damage to the geared motor.
- For braking from full speed (for example when the power fails or when setting up the machine), note the permitted gear unit torques (M_{2acc}, M_{2NOT}) in the selection tables.

19.6.2 Permitted shaft loads for the output shaft

The values specified in the tables apply to the permitted shaft loads:

- For shaft dimensions in accordance with the catalog
- For output speeds $n_{2m*} \leq 100$ rpm ($F^{2axN} = F_{2ax100}$; $F_{2radN} = F_{2rad100}$; $M_{2kN} = M_{2k100}$)
- Only if radial forces on the gear unit are stabilized by its pilots (housing, flange shaft)

Permitted shaft loads

Type	z_2	F_{2ax100}	$F_{2rad100}$	$F_{2rad,acc}$	M_{2k100}	$M_{2k,acc}$
	[mm]	[N]	[N]	[N]	[Nm]	[Nm]
PHQ4	84.0	2150	3095	3929	260	330
PHQ5	97.0	4150	4536	4897	440	475
PHQ7	88.0	6150	17045	17045	1500	1500
PHQ8	126.0	10050	27778	33333	3500	4200
PHQ9	155.0	33000	48387	70968	7500	11000
PHQ10	171.0	50000	51462	73099	8800	12500
PHQ11	231.0	60000	47619	60606	11000	14000
PHQ12	281.0	70000	53380	71040	15000	20000

For other output speeds, download diagrams at http://products.stoeber.de.

The following applies to output speeds $n_{2m*} > 100$ rpm:

$$F_{2axN} = \frac{F_{2ax100}}{\sqrt[3]{\frac{n_{2m*}}{100\ \text{rpm}}}} \qquad F_{2radN} = \frac{F_{2rad100}}{\sqrt[3]{\frac{n_{2m*}}{100\ \text{rpm}}}} \qquad M_{2kN} = \frac{M_{2k100}}{\sqrt[3]{\frac{n_{2m*}}{100\ \text{rpm}}}}$$

The values for F_{2ax100}, $F_{2rad100}$ and M_{2k100} can be found in the table "Permitted shaft loads" in this chapter.

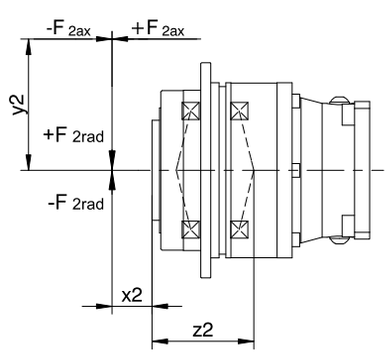


Fig. 1: Force application points

You can determine the permitted radial forces from the permitted breakdown torque M_{2kN} and $M_{2k,acc}$. The actual radial forces may not exceed the permitted radial forces. The permitted radial forces are in relation to the end of the hollow shaft (x2 = 0).

$$M_{2k,acc*} = \frac{2 \cdot F_{2ax*} \cdot y_2 + F_{2rad,acc*} \cdot (x_2 + z_2)}{1000} \leq M_{2k,acc}$$

For applications with multiple axial and/or radial forces, you must add the forces as vectors.

In the event of EMERGENCY OFF operation (max. 1000 load changes), you can multiply the permitted forces and torques for F_{2ax100}, $F_{2rad100}$ and M_{2k100} by a factor of two.

Also note the calculation for equivalent values:

$$M_{2k,eq^*} = \sqrt[3]{\frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} \cdot \left|M_{2k,acc,1^*}{}^3\right| + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*} \cdot \left|M_{2k,acc,n^*}{}^3\right|}{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}} \leq M_{2kN}$$

$$F_{2rad,eq^*} = \sqrt[3]{\frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} \cdot \left|F_{2rad,acc,1^*}{}^3\right| + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*} \cdot \left|F_{2rad,acc,n^*}{}^3\right|}{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}} \leq F_{2radN}$$

$$F_{2ax,eq^*} \leq F_{2axN}$$

The following apply to the bearing service life L_{10h} ($ED_{20} \leq 40\%$):

$L_{10h} > 10000$ h with $1 < M_{2kN}/M_{2k^*} < 1.25$

$L_{10h} > 20000$ h with $1.25 < M_{2kN}/M_{2k^*} < 1.5$

$L_{10h} > 30000$ h with $1.5 < M_{2kN}/M_{2k^*}$

For different duty cycles:

$$L_{10h} > L_{10h(ED_{20}=40\%)} \cdot \frac{40\%}{ED_{20}}$$

19.6.3 Recommendation for radial shaft seal rings

For a duty cycle > 60%, we recommend radial shaft seal rings made of FKM.

Properties:

- Excellent temperature resistance
- High chemical stability
- Very good resistance to aging
- Excellent resistance to mineral oils and greases
- For use in the food, beverage and pharmaceutical industries

Leak-proofness

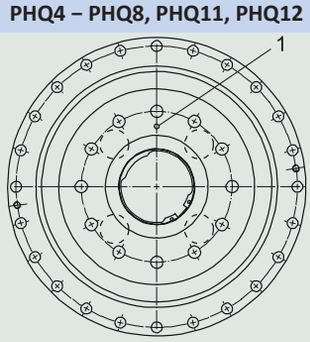
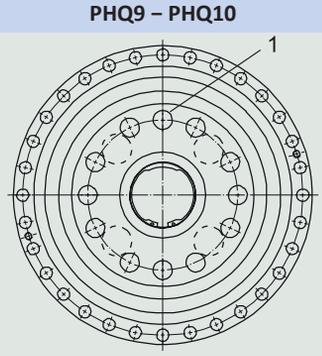
Our gear units are equipped with high-quality radial shaft seal rings and checked for leak-proofness. However, a leak cannot be fully ruled out over the length of use of a gear unit. If you use a gear unit with goods incompatible with the lubricant, you must take measures to prevent direct contact with the gear unit lubricant in case of a leak.

19.6.4 Reverse operation

To ensure lubrication of circulating geared parts during cyclic reverse operation from ± 20° to ± 90°, pay careful attention to the position of the output shaft if the gear unit is installed horizontally as shown in the images below.

The images show the center position of reverse operation.

Cyclic reverse operation ≤ ± 20° on request.

PHQ4 – PHQ8, PHQ11, PHQ12	PHQ9 – PHQ10
	
1 Position of the mark: top	1 Position of the fastening thread: as shown in the image

19.7 Additional documentation

Additional documentation related to the product can be found at http://www.stoeber.de/en/download

Enter the ID of the documentation in the Search... field.

Documentation	ID
Operating manual for KL/KS/PHK/PHKX/PHQK/PK/PKX right-angle gear units and right-angle geared motors	443004_en
Lubricant filling quantities for gear units	441871

20 KL helical bevel geared motors

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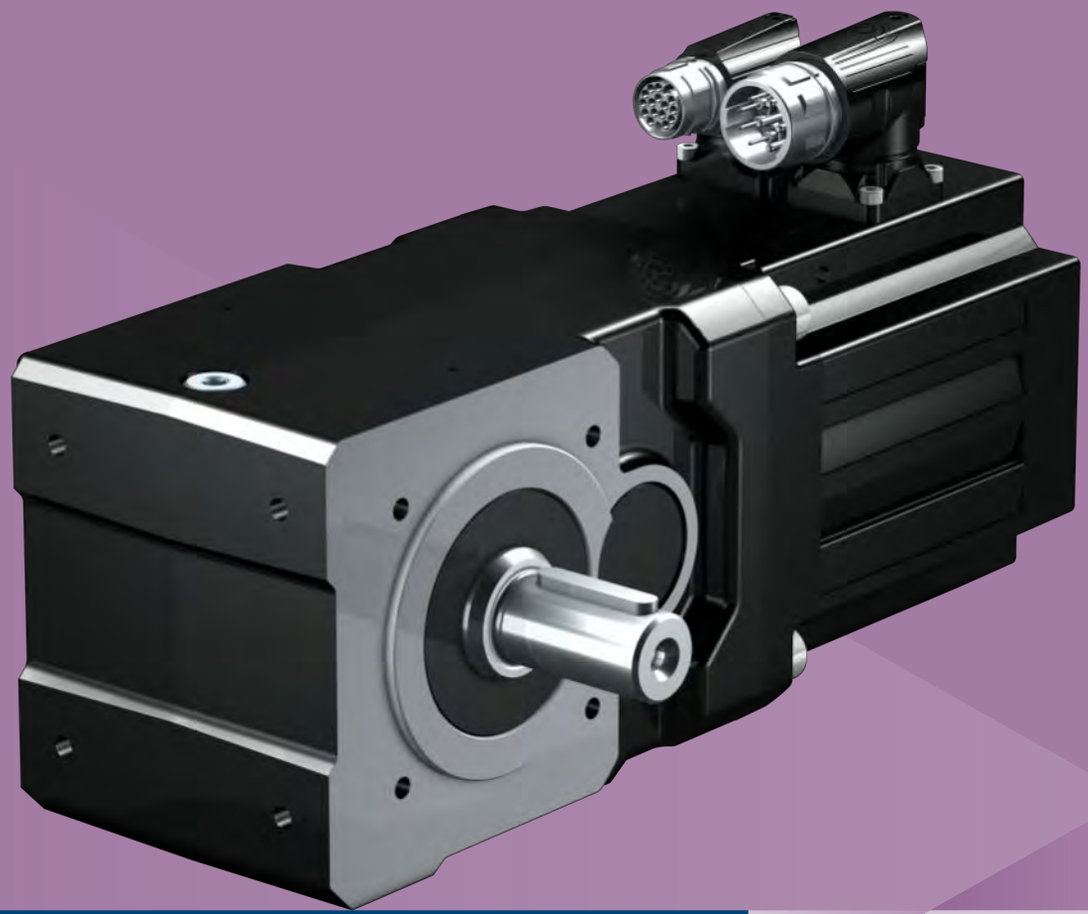


20 Helical bevel geared motors KL

20.1 Overview

Compact helical-geared right-angle geared motors

Features

Power density	★★☆☆☆
Backlash	★☆☆☆☆
Price category	€
Shaft load	★★☆☆☆
Smooth operation	★★☆☆☆
Torsional stiffness	★★☆☆☆
Mass moment of inertia	★★★★★
Helical gearing	✓
Maintenance-free	✓
Any mounting position	✓
Small installation space	✓
FKM seal ring at the input	✓
Compact and highly dynamic due to direct motor attachment	✓

Key: ★☆☆☆☆ good | ★★★★★ excellent
€ Economy | €€€€€ Premium

Technical data

i	4 – 32
M_{2acc}	11 – 65 Nm
$\Delta\phi_2$	16 – 25 arcmin
η_{get}	≤ 97 %

20.2 Selection tables

The technical data specified in the selection tables applies to:

- Installation altitudes up to 1000 m above sea level
- Surrounding temperatures from 0 °C to 40 °C
- Drives with convection-cooled motors (e.g. EZ401**U**)

You can calculate the technical data for drives with forced ventilated motors (for example EZ401**B**) at http://products.stoeber.de.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1max} DB [rpm]	n_{1max} ZB [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/arcmin]	m [kg]
KL1 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 30 Nm)															
188	14	15	16	1.7	KL102_0160 EZ301U	30	60	16.00	16/1	4000	6000	0.22	20	1.8	6.6
375	7.2	7.4	17	2.7	KL102_0080 EZ301U	22	58	8.000	8/1	3500	5000	0.28	20	1.8	6.6
375	12	13	29	1.6	KL102_0080 EZ302U	30	58	8.000	8/1	3500	5000	0.38	20	1.8	7.2
375	16	17	38	1.2	KL102_0080 EZ303U	30	58	8.000	8/1	3500	5000	0.49	20	1.8	7.7
750	3.6	3.7	22	3.6	KL102_0040 EZ301U	11	29	4.000	4/1	3500	5000	0.31	25	1.3	6.6
750	6.2	6.5	37	2.1	KL102_0040 EZ302U	19	29	4.000	4/1	3500	5000	0.41	25	1.3	7.2
750	8.0	8.5	49	1.6	KL102_0040 EZ303U	22	29	4.000	4/1	3500	5000	0.52	25	1.3	7.7
KL1 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 30 Nm)															
375	14	15	20	1.4	KL102_0160 EZ301U	30	60	16.00	16/1	4000	6000	0.22	20	1.8	6.6
KL2 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 65 Nm)															
94	29	29	11	1.6	KL202_0320 EZ301U	65	130	32.00	32/1	4000	6000	0.26	16	3.2	9.1
188	14	15	9.0	3.5	KL202_0160 EZ301U	43	120	16.00	16/1	4000	6000	0.28	16	4.0	9.1
188	25	26	15	2.0	KL202_0160 EZ302U	60	120	16.00	16/1	4000	6000	0.38	16	4.0	9.7
188	32	34	20	1.6	KL202_0160 EZ303U	60	120	16.00	16/1	4000	6000	0.49	16	4.0	10
375	7.2	7.4	15	3.5	KL202_0080 EZ301U	22	58	8.000	8/1	4000	6000	0.31	20	2.4	9.1
375	12	13	26	2.0	KL202_0080 EZ302U	35	58	8.000	8/1	4000	6000	0.41	20	2.4	9.7
375	16	17	33	1.6	KL202_0080 EZ303U	35	58	8.000	8/1	4000	6000	0.52	20	2.4	10
375	22	23	29	1.8	KL202_0080 EZ401U	60	120	8.000	8/1	3500	5000	1.2	16	4.0	12
375	36	40	48	1.1	KL202_0080 EZ402U	60	120	8.000	8/1	3500	5000	1.9	16	4.0	13
750	11	12	34	2.6	KL202_0040 EZ401U	33	110	4.000	4/1	3500	5000	1.4	20	2.4	12
750	18	20	57	1.5	KL202_0040 EZ402U	53	110	4.000	4/1	3500	5000	2.1	20	2.4	13
750	27	33	84	1.0	KL202_0040 EZ404U	53	110	4.000	4/1	3500	5000	3.4	20	2.4	15
KL2 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 65 Nm)															
188	28	29	14	1.4	KL202_0320 EZ301U	65	130	32.00	32/1	4000	6000	0.26	16	3.2	9.1
375	14	15	11	2.9	KL202_0160 EZ301U	43	120	16.00	16/1	4000	6000	0.28	16	4.0	9.1
375	23	26	18	1.7	KL202_0160 EZ302U	60	120	16.00	16/1	4000	6000	0.38	16	4.0	9.7
375	30	35	24	1.3	KL202_0160 EZ303U	60	120	16.00	16/1	4000	6000	0.49	16	4.0	10
375	36	43	28	1.1	KL202_0160 EZ401U	60	120	16.00	16/1	4000	6000	1.0	16	4.0	12
750	6.9	7.4	14	3.7	KL202_0080 EZ301U	22	58	8.000	8/1	4000	6000	0.31	20	2.4	9.1
750	12	13	24	2.2	KL202_0080 EZ302U	35	58	8.000	8/1	4000	6000	0.41	20	2.4	9.7
750	15	17	32	1.7	KL202_0080 EZ303U	35	58	8.000	8/1	4000	6000	0.52	20	2.4	10

20.3 Dimensional drawings

In this chapter you can find the dimensions of the geared motors.

There is a dimensional drawing for every possible shaft/housing design, each with the tables for gear unit dimensions, motor dimensions and geared motor dimensions.

Dimensions can exceed the specifications of ISO 2768-mK due to casting tolerances or accumulation of individual tolerances.

We reserve the right to make dimensional changes due to ongoing technical development.

You can download CAD models of our standard drives at http://cad.stoeber.de.

Combination options and the dimensions of forced ventilated geared motors can be found at http://cad.stoeber.de.

Tolerances

Axis height in accordance with DIN 747	Tolerance
Up to 50 mm	-0.4 mm
Up to 250 mm	-0.5 mm
Up to 630 mm	-0.6 mm

Solid shaft	Tolerance
Shaft ∅ fit ≤ 50 mm	DIN 748-1, ISO k6
Shaft ∅ fit > 50 mm	DIN 748-1, ISO m6
Feather keys	DIN 6885-1, high form A

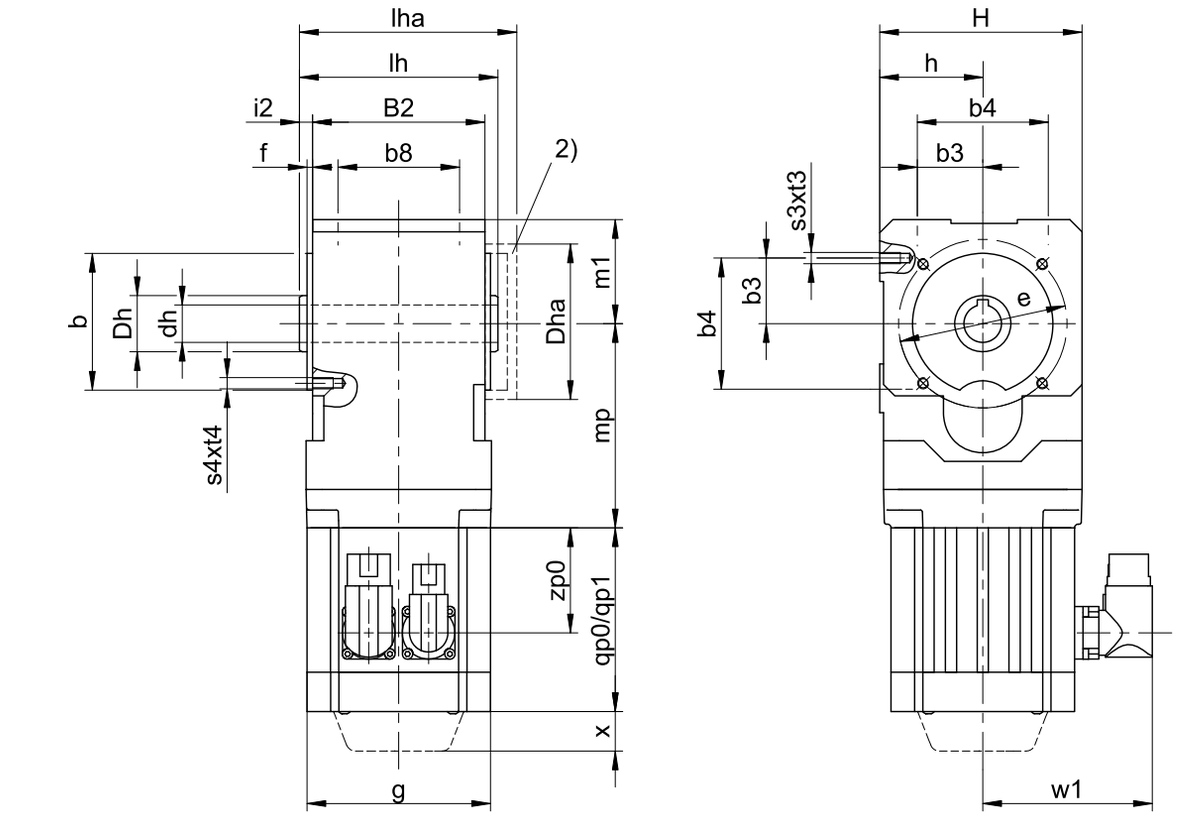
Centering holes in solid shafts in accordance with DIN 332-2, DR shape

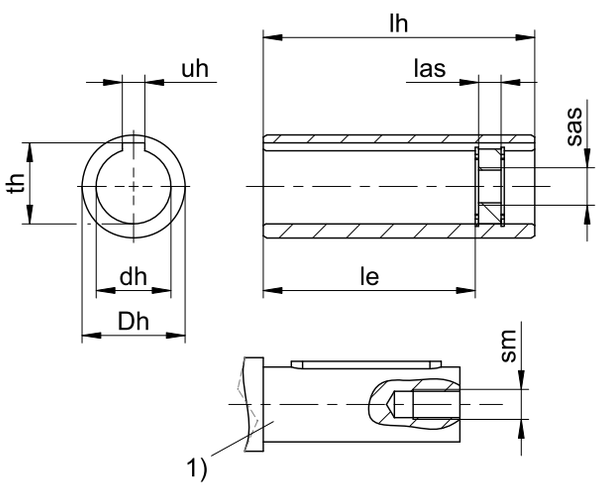
Thread size	M4	M5	M6	M8	M10	M12	M16	M20	M24
Thread depth [mm]	10	12.5	16	19	22	28	36	42	50

Hollow shaft	Tolerance
Hollow shaft hole fit	ISO G7

Flange	Pilot tolerance
Up to 300 mm	ISO j6
Starting at 350 mm	ISO h6

20.3.1 A shaft design (hollow shaft), G housing design (pitch circle diameter)





qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]
1)	The length of the machine shaft must be at least 2.2 x ∅dh and the length of the feather key must be at least 2 x ∅dh.	2)	Cover (optional)

Dimensions of gear units

Type	∅b	b3	b4	b8	B2	∅dh	Dh	Dha	∅e	f	h	H	i2	le	lh	las	lha	m1	s3	s4	sm	sas	t3	t4	th	uh
KL1	60_{j6}	27.5	55	50	75	16^{H7}	25	70	75	3	46	90	6	60.5	87	12	91	46	M6	M6	M5	M6	11	11	18.3	5^{JS9}
KL2	75_{j6}	35.0	70	65	92	20^{H7}	30	80	90	3	55	108	7	79.5	106	12	110	55	M6	M6	M6	M8	13	13	22.8	6^{JS9}

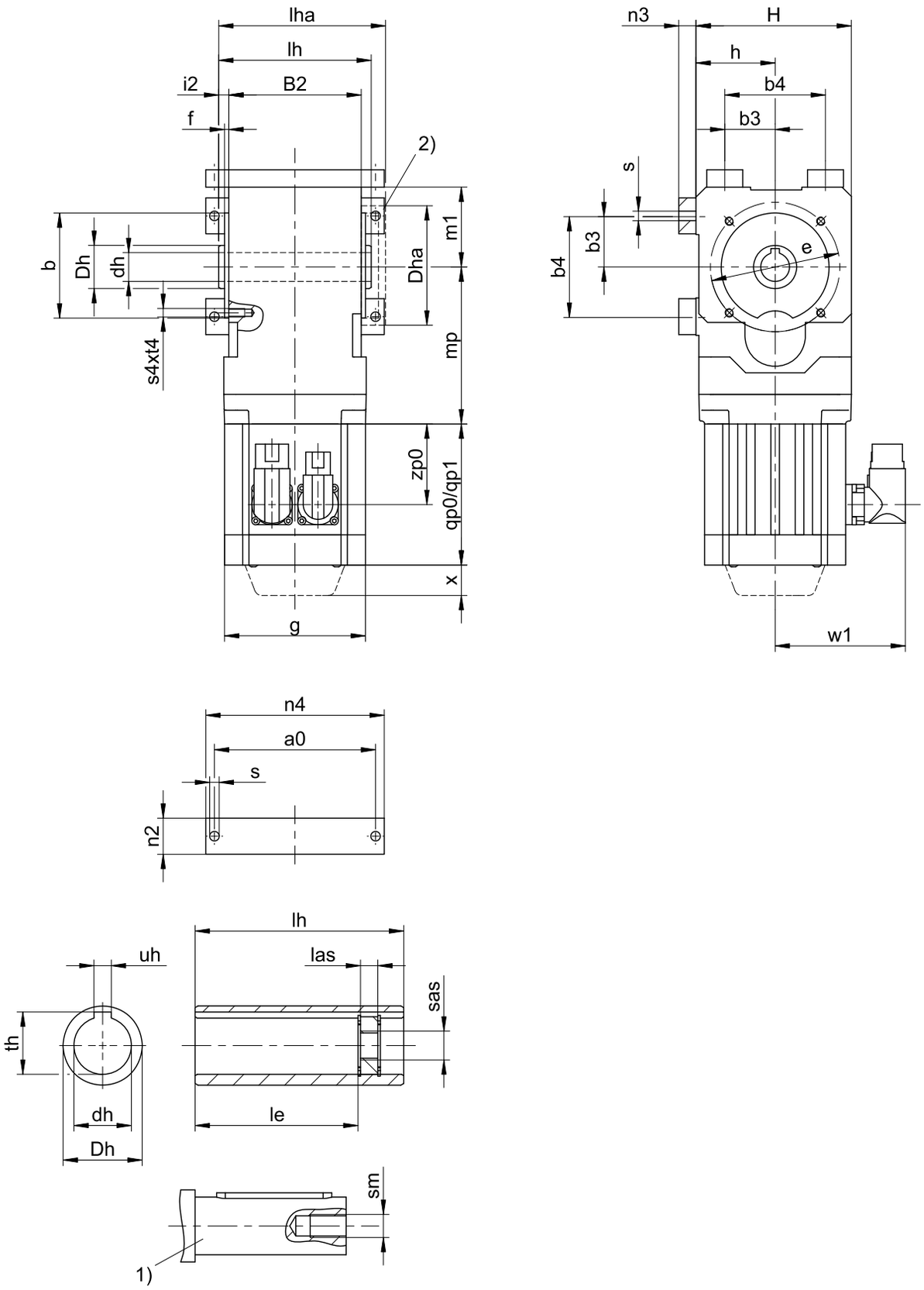
Dimensions of motors

Type	□g	qp0	qp1	w1	x	zp0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0

Dimensions of geared motors

Type	EZ3	EZ4
	mp	mp
KL102	95.5	–
KL202	112.5	109.0

20.3.2 A shaft design (hollow shaft), NG housing design (base + pitch circle diameter)



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]
1)	The length of the machine shaft must be at least 2.2 x ∅dh and the length of the feather key must be at least 2 x ∅dh.	2)	Cover (optional)

Dimensions of gear units

Type	a0	Øb	b3	b4	B2	Ødh	Dh	Dha	Øe	f	h	H	i2	le	lh	las	lha	m1	n2	n3	n4	Øs	s4	sm	sas	t4	th	uh
KL1	95	60_{j6}	27.5	55	75	16^{H7}	25	70	75	3	46	90	6	60.5	87	12	91	46	20	12	107	6.6	M6	M5	M6	11	18.3	5^{JS9}
KL2	112	75_{j6}	35.0	70	92	20^{H7}	30	80	90	3	55	108	7	79.5	106	12	110	55	25	12	124	6.6	M6	M6	M8	13	22.8	6^{JS9}

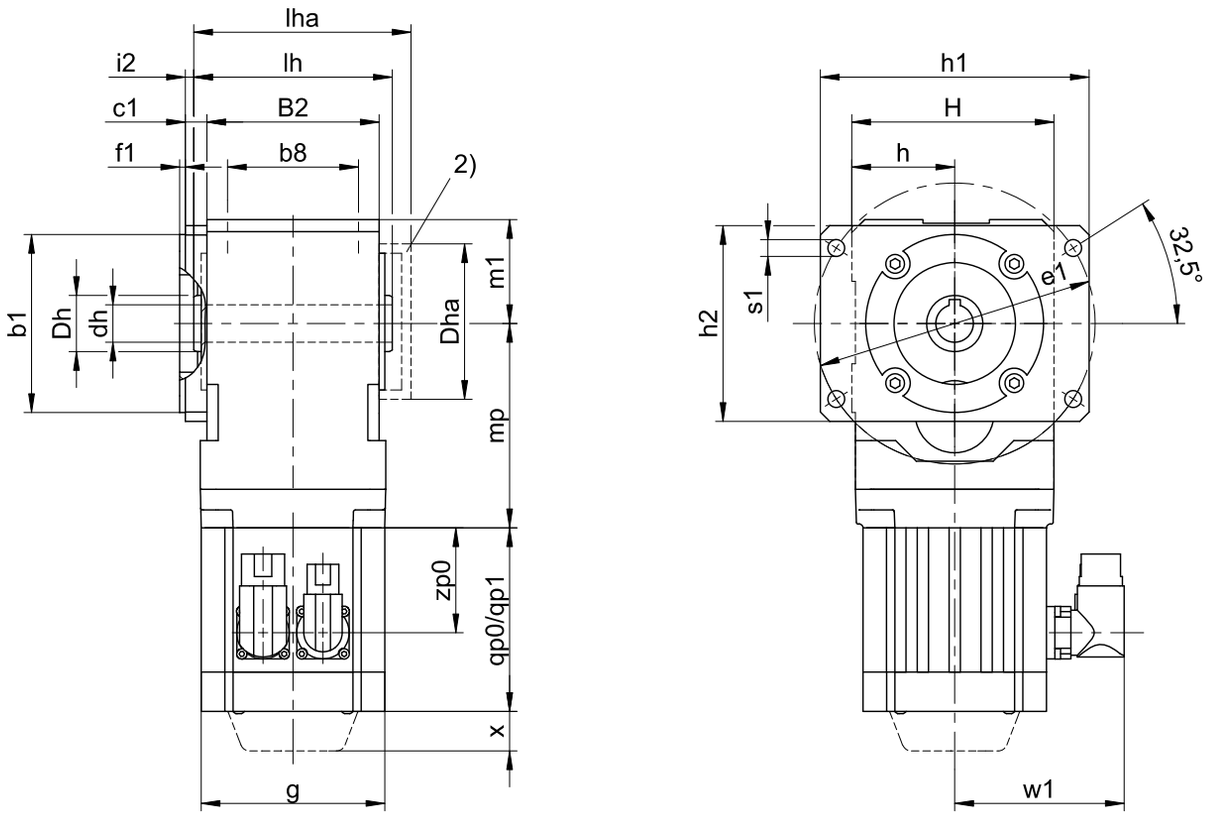
Dimensions of motors

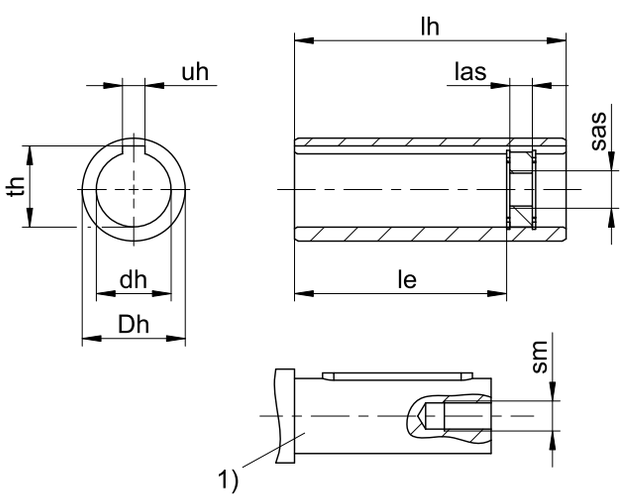
Type	□g	qp0	qp1	w1	x	zp0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0

Dimensions of geared motors

Type	EZ3	EZ4
	mp	mp
KL102	95.5	–
KL202	112.5	109.0

20.3.3 A shaft design (hollow shaft), F housing design (flange)





qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]
1)	The length of the machine shaft must be at least 2.2 x ∅dh and the length of the feather key must be at least 2 x ∅dh.	2)	Cover (optional)

Dimensions of gear units

Type	Ø$b1$	$b8$	$B2$	$c1$	Ødh	Dh	Dha	Ø$e1$	$f1$	h	$h1$	$h2$	H	$i2$	le	lh	las	lha	$m1$	Ø$s1$	sm	sas	th	uh
KL1	60_{j6}	50	75	11.5	16^{H7}	25	70	130	3	46	128.5	88.5	90	5.5	60.5	87	12	91	46	9	M5	M6	18.3	5^{JS9}
KL2	95_{j6}	65	92	11.5	20^{H7}	30	80	150	3	55	143.5	104.5	108	4.5	79.5	106	12	110	55	9	M6	M8	22.8	6^{JS9}

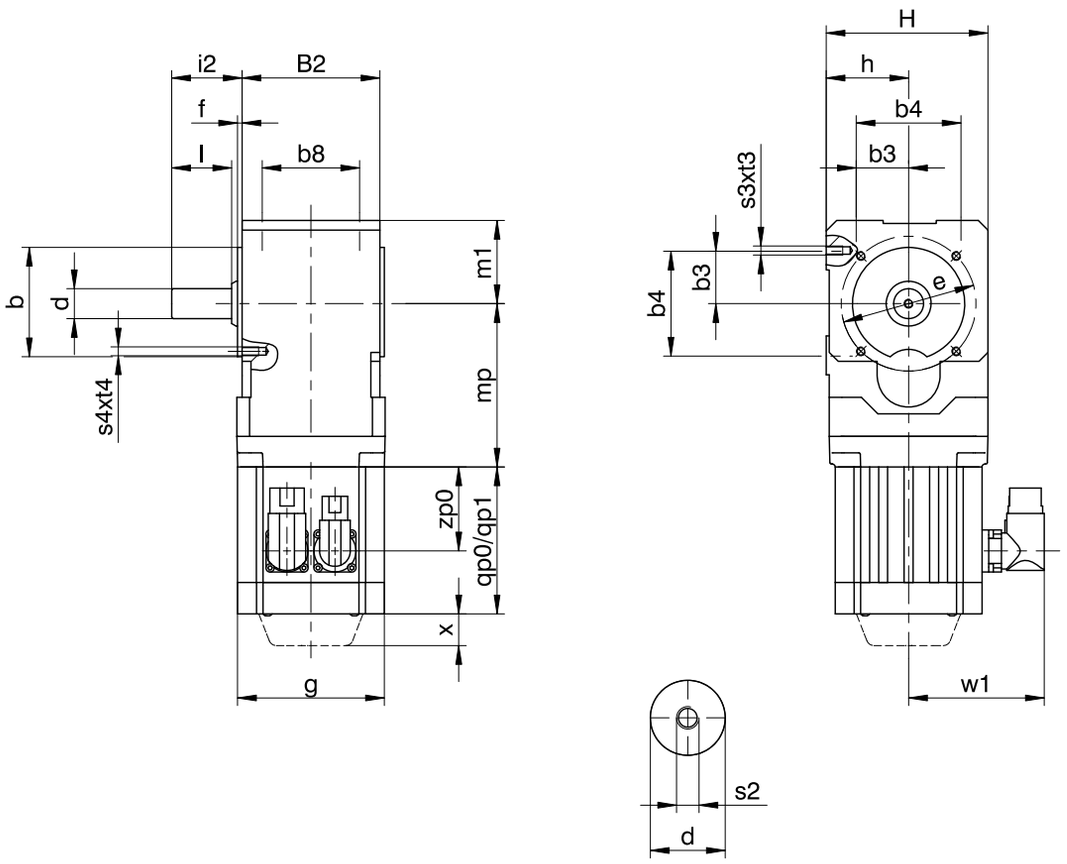
Dimensions of motors

Type	□g	$qp0$	$qp1$	$w1$	x	$zp0$
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0

Dimensions of geared motors

Type	EZ3	EZ4
	mp	mp
KL102	95.5	–
KL202	112.5	109.0

20.3.4 G shaft design (solid shaft without feather key), G housing design (pitch circle diameter)



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]

Dimensions of gear units

Type	Øb	b3	b4	b8	B2	Ød	Øe	f	h	H	i2	l	m1	s2	s3	s4	t3	t4
KL1	60_{j6}	27.5	55	50	75	16_{k6}	75	3	46	90	38	32	46	M5	M6	M6	11	11
KL2	75_{j6}	35.0	70	65	92	20_{k6}	90	3	55	108	47	40	55	M6	M6	M6	13	13

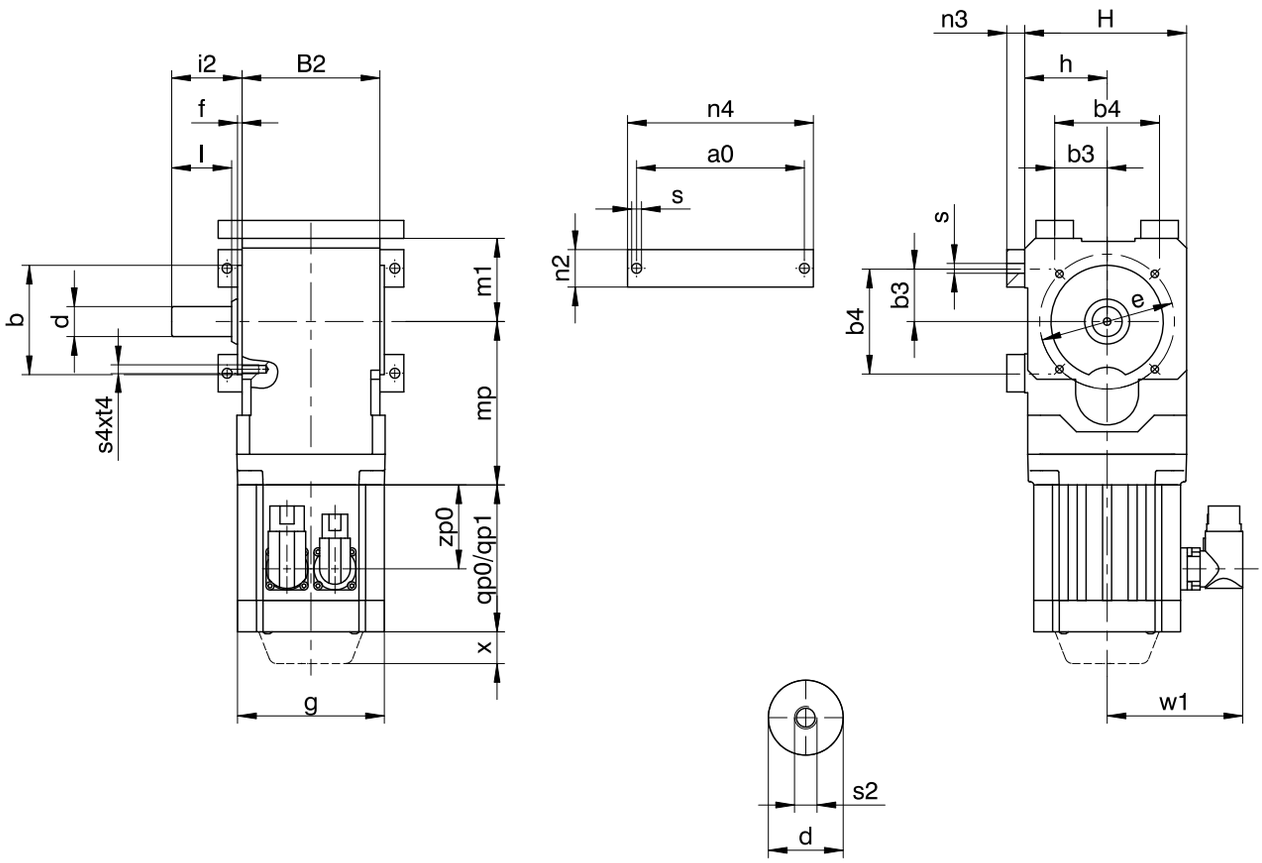
Dimensions of motors

Type	□g	qp0	qp1	w1	x	zp0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0

Dimensions of geared motors

Type	EZ3	EZ4
	mp	mp
KL102	95.5	–
KL202	112.5	109.0

20.3.5 G shaft design (solid shaft without feather key), NG housing design (base + pitch circle diameter)



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]

Dimensions of gear units

Type	a0	Ød	b3	b4	B2	Ød	Øe	f	h	H	i2	l	m1	n2	n3	n4	Øs	s2	s4	t4
KL1	95	60_{j6}	27.5	55	75	16_{k6}	75	3	46	90	38	32	46	20	12	107	6.6	M5	M6	11
KL2	112	75_{j6}	35.0	70	92	20_{k6}	90	3	55	108	47	40	55	25	12	124	6.6	M6	M6	13

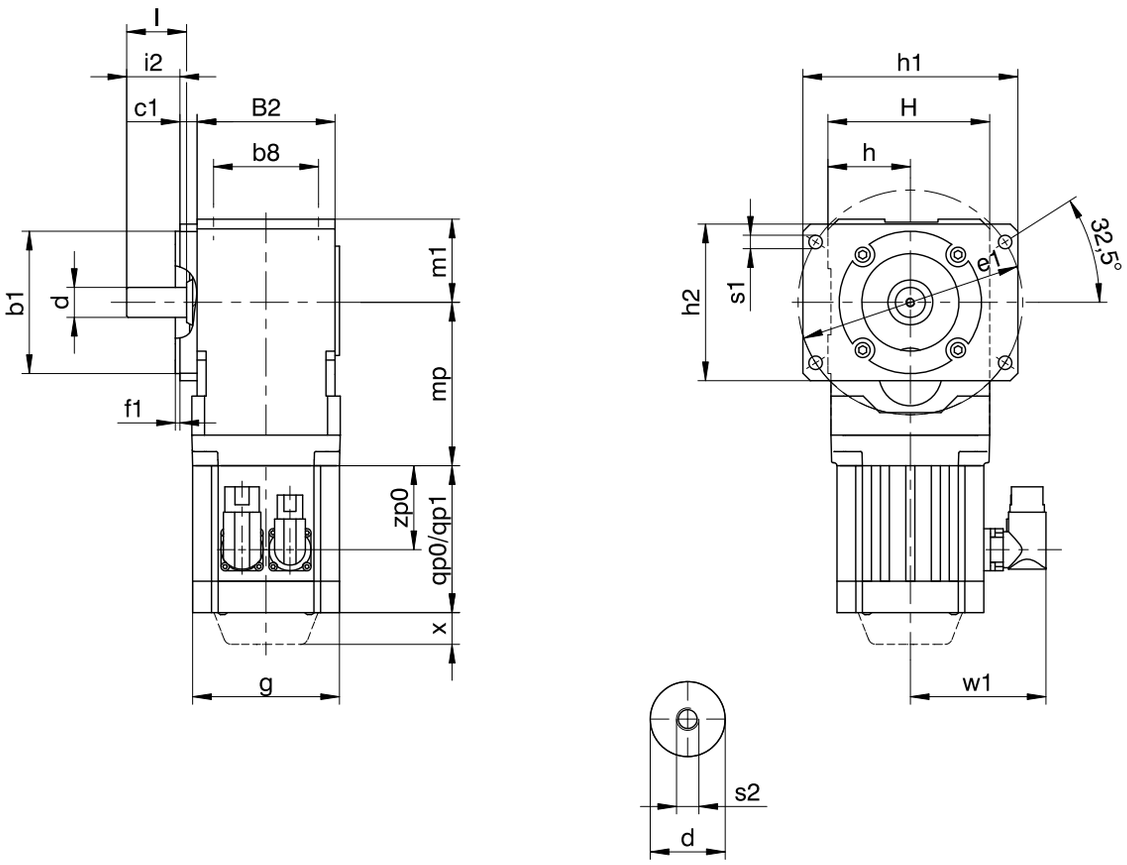
Dimensions of motors

Type	□g	qp0	qp1	w1	x	zp0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0

Dimensions of geared motors

Type	EZ3	EZ4
	mp	mp
KL102	95.5	–
KL202	112.5	109.0

20.3.6 G shaft design (solid shaft without feather key), F housing design (flange)



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]

Dimensions of gear units

Type	Øb1	b8	B2	c1	Ød	Øe1	f1	h	h1	h2	H	i2	l	m1	Øs1	s2
KL1	60_{j6}	50	75	11.5	16_{k6}	130	3	46	128.5	88.5	90	26.5	32	46	9	M5
KL2	95_{j6}	65	92	11.5	20_{k6}	150	3	55	143.5	104.5	108	35.5	40	55	9	M6

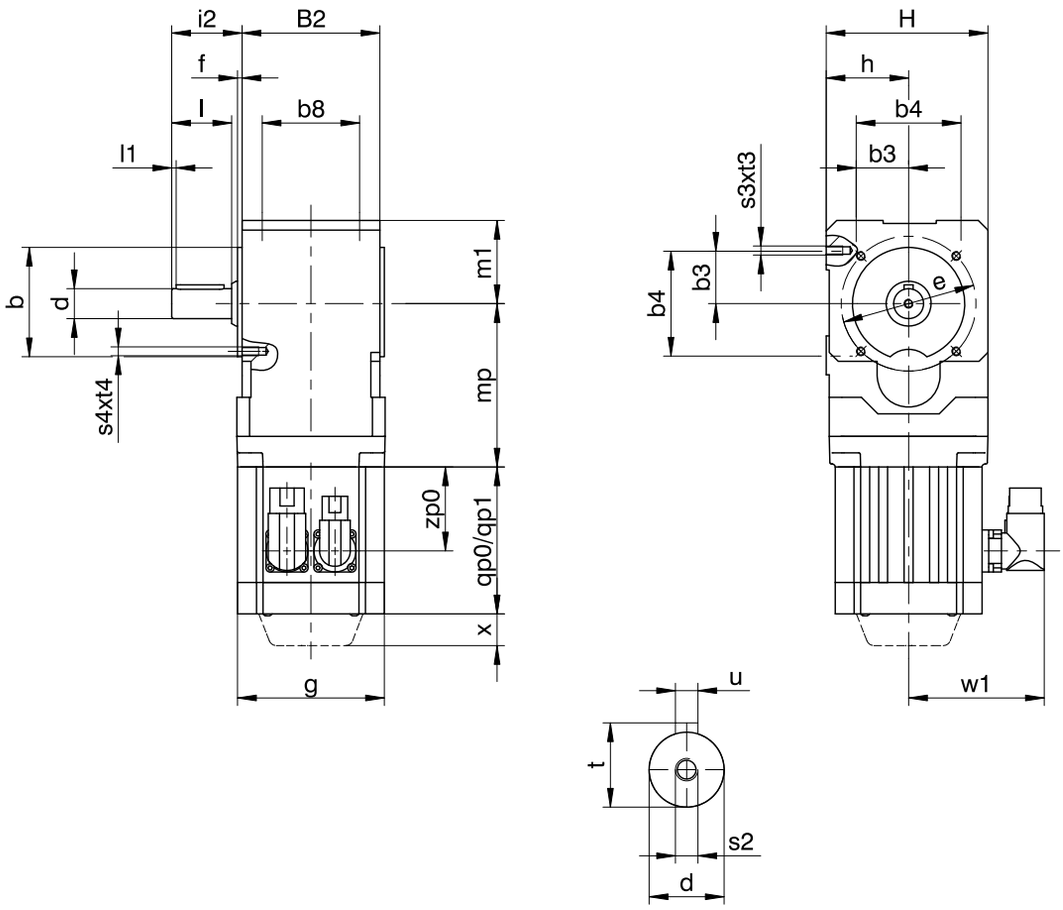
Dimensions of motors

Type	□g	qp0	qp1	w1	x	zp0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0

Dimensions of geared motors

Type	EZ3	EZ4
	mp	mp
KL102	95.5	–
KL202	112.5	109.0

20.3.7 P shaft design (solid shaft with feather key), G housing design (pitch circle diameter)



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]

Dimensions of gear units

Type	Øb	b3	b4	b8	B2	Ød	Øe	f	h	H	i2	l	l1	m1	s2	s3	s4	t	t3	t4	u
KL1	60_{j6}	27.5	55	50	75	16_{k6}	75	3	46	90	38	32	3	46	M5	M6	M6	18	11	11	A5×5×22
KL2	75_{j6}	35.0	70	65	92	20_{k6}	90	3	55	108	47	40	3	55	M6	M6	M6	22.5	13	13	A6×6×32

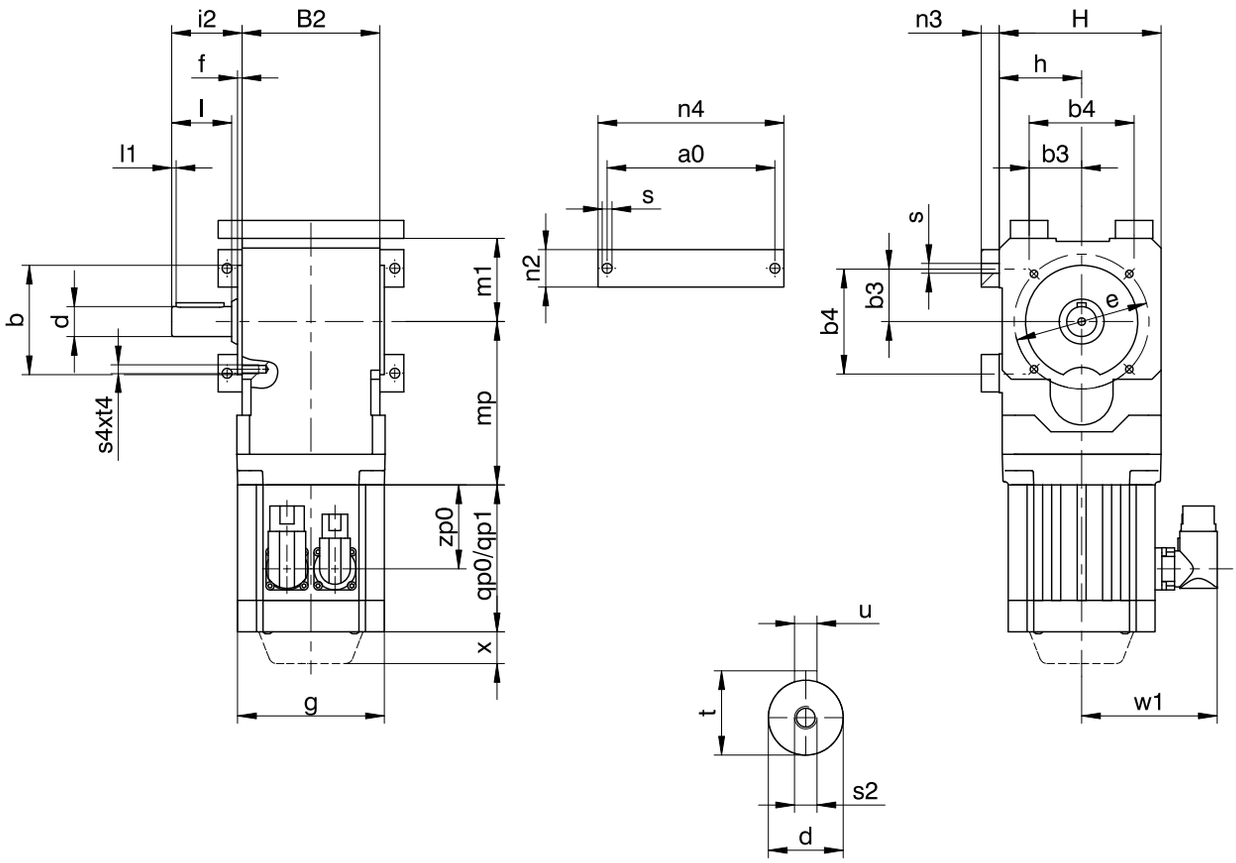
Dimensions of motors

Type	□g	qp0	qp1	w1	x	zp0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0

Dimensions of geared motors

Type	EZ3	EZ4
	mp	mp
KL102	95.5	–
KL202	112.5	109.0

20.3.8 P shaft design (solid shaft with feather key), NG housing design (base + pitch circle diameter)



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▶ 23.4]

Dimensions of gear units

Type	a0	Øb	b3	b4	B2	Ød	Øe	f	h	H	i2	l	l1	m1	n2	n3	n4	Øs	s2	s4	t	t4	u
KL1	95	60_{j6}	27.5	55	75	16_{k6}	75	3	46	90	38	32	3	46	20	12	107	6.6	M5	M6	18.0	11	A5×5×22
KL2	112	75_{j6}	35.0	70	92	20_{k6}	90	3	55	108	47	40	3	55	25	12	124	6.6	M6	M6	22.5	13	A6×6×32

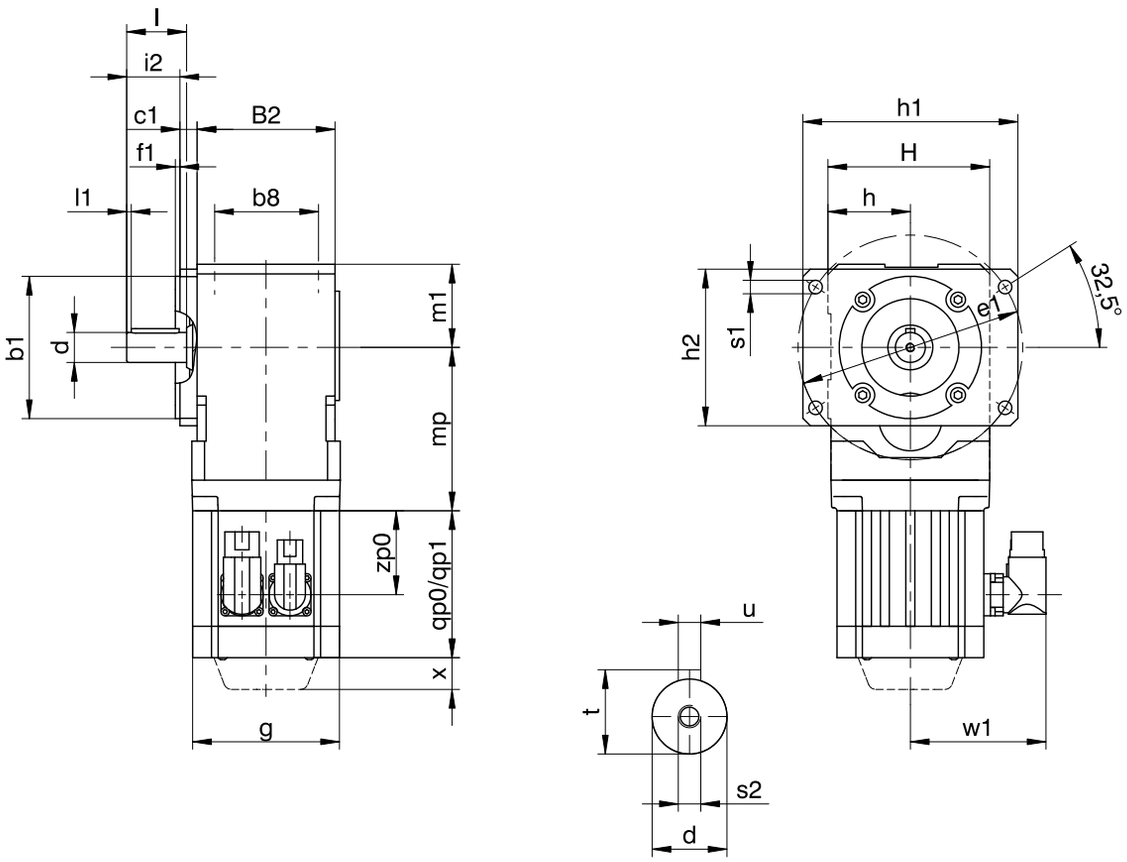
Dimensions of motors

Type	□g	qp0	qp1	w1	x	zp0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0

Dimensions of geared motors

Type	EZ3	EZ4
	mp	mp
KL102	95.5	–
KL202	112.5	109.0

20.3.9 P shaft design (solid shaft with feather key), F housing design (flange)



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]

Dimensions of gear units

Type	Øb1	b8	B2	c1	Ød	Øe1	f1	h	h1	h2	H	i2	l	l1	m1	Øs1	s2	t	u
KL1	60_{j6}	50	75	11.5	16_{k6}	130	3	46	128.5	88.5	90	26.5	32	3	46	9	M5	18.0	A5×5×22
KL2	95_{j6}	65	92	11.5	20_{k6}	150	3	55	143.5	104.5	108	35.5	40	3	55	9	M6	22.5	A6×6×32

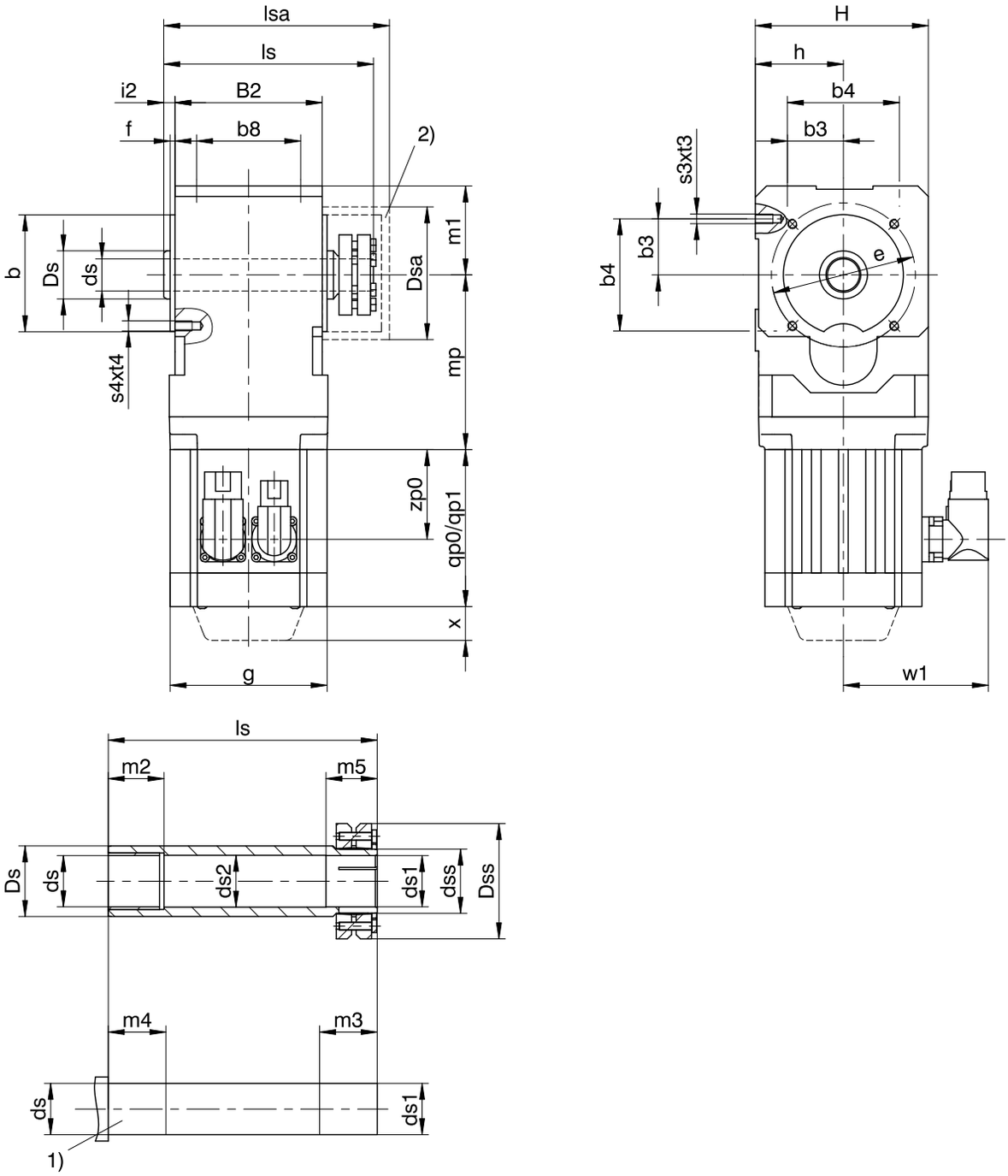
Dimensions of motors

Type	□g	qp0	qp1	w1	x	zp0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0

Dimensions of geared motors

Type	EZ3	EZ4
	mp	mp
KL102	95.5	–
KL202	112.5	109.0

20.3.10 S shaft design (hollow shaft with shrink disk), G housing design (pitch circle diameter)



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]
1)	Machine shaft: The dimension ls must meet or exceed the specified value.	2)	Cover (optional)

Dimensions of gear units

Type	Øb	b3	b4	b8	B2	Ød	Ød1	Ød2	Ødss	ØDs	ØDsa	ØDss	Øe	f	h	H	i2	ls	lsa	m1	m2	m3	m4	m5	s3	s4	t3	t4
KL1	60_{j6}	27.5	55	50	75	16^{H7}	$16_{h6}{}^{H7}$	17.5	20	25	64	46.2	75	3	46	90	6	109	114.5	46	17	22	28	23	M6	M6	11	11
KL2	75_{j6}	35.0	70	65	92	20^{H7}	$20_{h6}{}^{H7}$	21.5	24	30	79	50.0	90	3	55	108	7	131	139.0	55	22	27	31	26	M6	M6	13	13

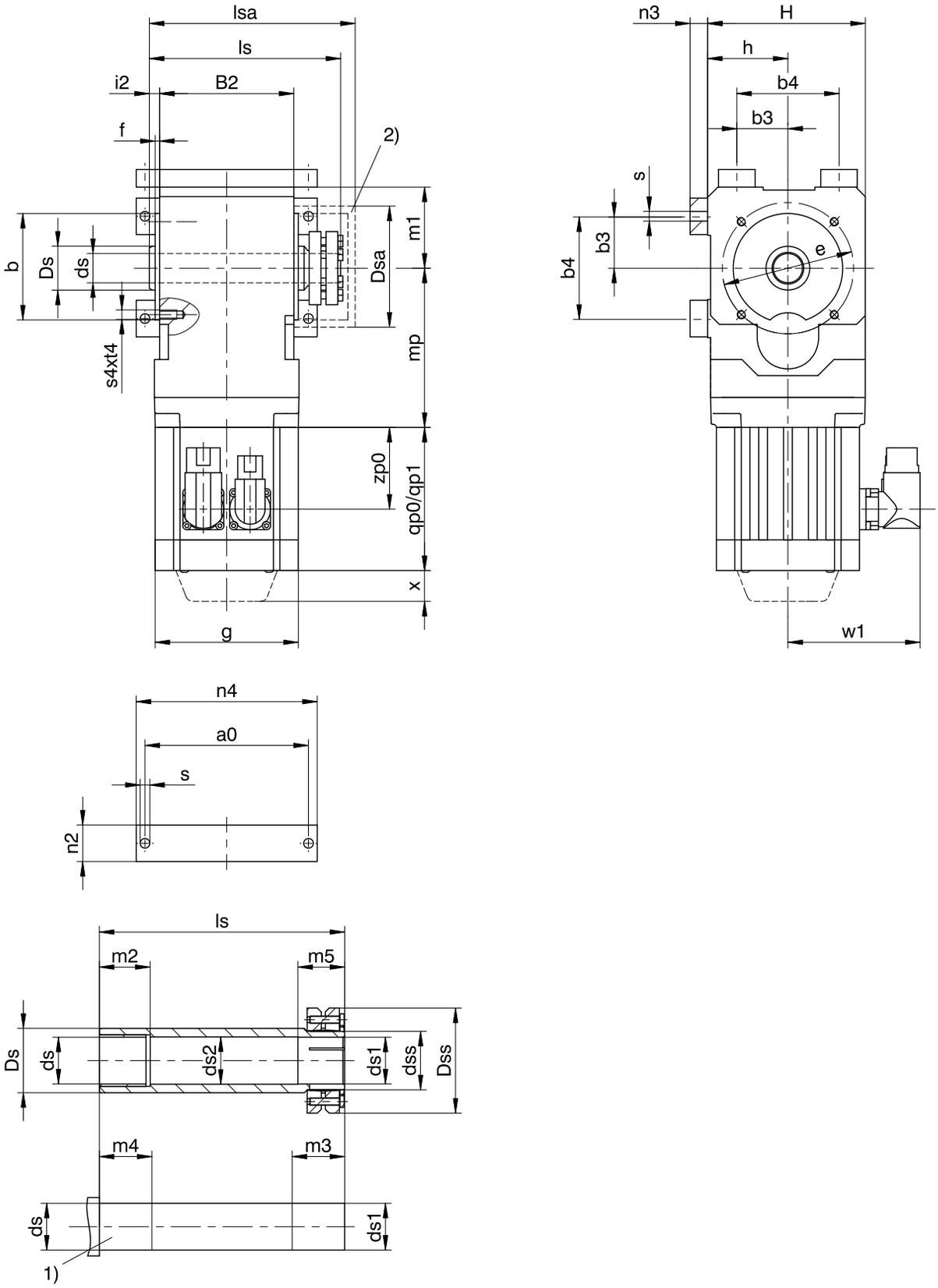
Dimensions of motors

Type	□g	qp0	qp1	w1	x	zp0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0

Dimensions of geared motors

Type	EZ3	EZ4
	mp	mp
KL102	95.5	–
KL202	112.5	109.0

20.3.11 S shaft design (hollow shaft with shrink disk), NG housing design (base + pitch circle diameter)



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]
1)	Machine shaft: The dimension ls must meet or exceed the specified value.	2)	Cover (optional)

Dimensions of gear units

Type	a0	Øb	b3	b4	B2	Ød	Ød1	Ød2	Ødss	ØDs	ØDsa	ØDss	Øe	f	h	H	i2	ls	lsa	m1	m2	m3	m4	m5	n2	n3	n4	Øs	s4	t4
KL1	95	60_{j6}	27.5	55	75	16^{H7}	$16_{h6}{}^{H7}$	17.5	20	25	64	46.2	75	3	46	90	6	109	114.5	46	17	22	28	23	20	12	107	6.6	M6	11
KL2	112	75_{j6}	35.0	70	92	20^{H7}	$20_{h6}{}^{H7}$	21.5	24	30	79	50.0	90	3	55	108	7	131	139.0	55	22	27	31	26	25	12	124	6.6	M6	13

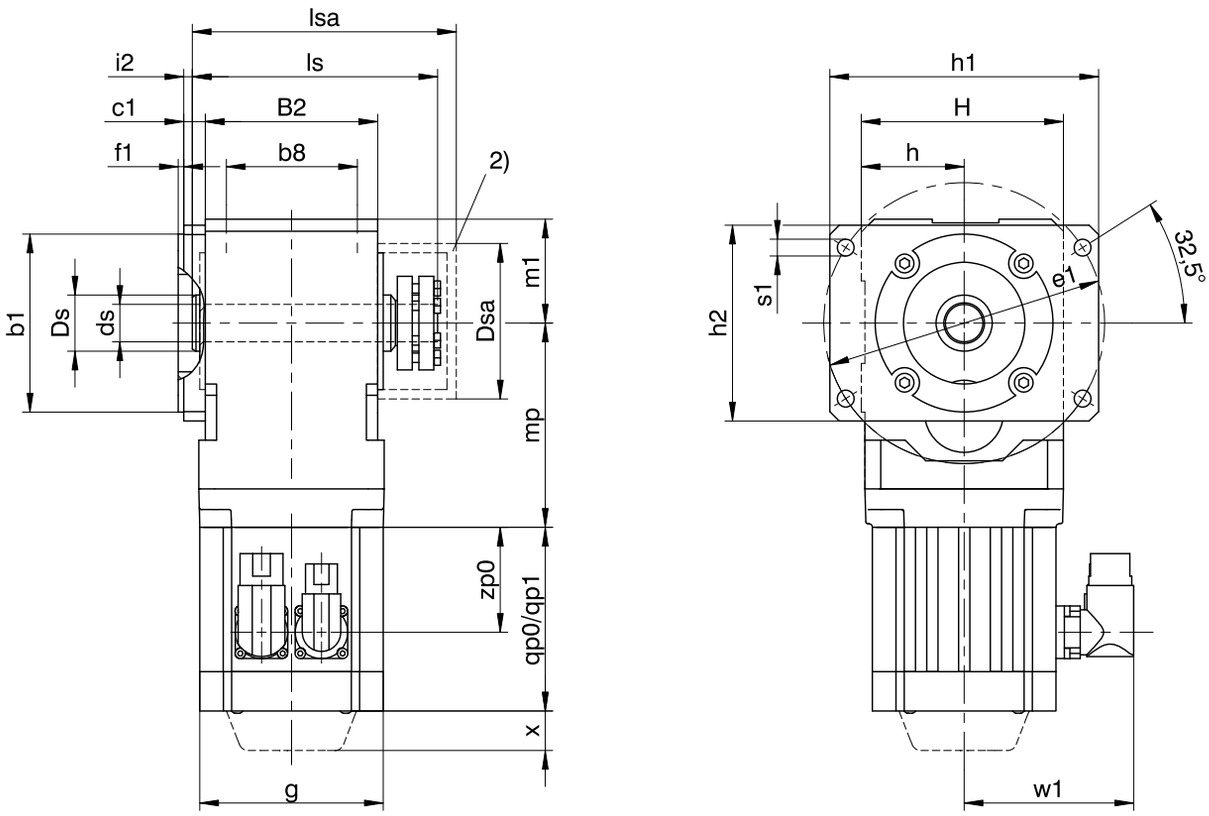
Dimensions of motors

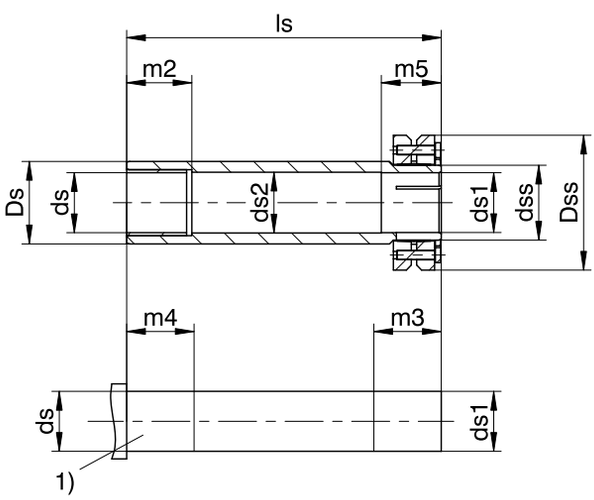
Type	□g	qp0	qp1	w1	x	zp0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0

Dimensions of geared motors

Type	EZ3	EZ4
	mp	mp
KL102	95.5	–
KL202	112.5	109.0

20.3.12 S shaft design (hollow shaft with shrink disk), F housing design (flange)





qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]
1)	Machine shaft: The dimension ls must meet or exceed the specified value.	2)	Cover (optional)

Dimensions of gear units

Type	Øb1	b8	B2	c1	Øds	Øds1	Øds2	Ødss	ØDs	ØDsa	ØDss	Øe1	f1	h	h1	h2	H	i2	ls	lsa	m1	m2	m3	m4	m5	Øs1
KL1	60_{j6}	50	75	11.5	16^{H7}	$16_{h6}{}^{H7}$	17.5	20	25	64	46.2	130	3	46	128.5	88.5	90	5.5	109	114.5	46	17	22	28	23	9
KL2	95_{j6}	65	92	11.5	20^{H7}	$20_{h6}{}^{H7}$	21.5	24	30	79	50.0	150	3	55	143.5	104.5	108	4.5	131	139.0	55	22	27	31	26	9

Dimensions of motors

Type	□g	qp0	qp1	w1	x	zp0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0

Dimensions of geared motors

Type	EZ3	EZ4
	mp	mp
KL102	95.5	–
KL202	112.5	109.0

20.4 Type designation

In this chapter, you can find an explanation of the type designation with the associated options.

Additional ordering information not included in the type designation can be found at the end of the chapter.

Sample code

KL	2	0	2	P	G	0080	EZ401U

Explanation

Code	Designation	Design
KL	Type	Helical bevel gear unit
2	Size	2 (example)
0	Generation	Generation 0
2	Stages	Two-stage
A	Shaft	Hollow shaft with keyway
S		Hollow shaft with shrink ring
G		Solid shaft without feather key
P		Solid shaft with feather key
G	Housing	Pitch circle diameter
F		Flange
NG		Foot + pitch circle diameter
0080	Transmission ratio (i x 10)	i = 8 (example)
EZ401U	Motor	EZ synchronous servo motor

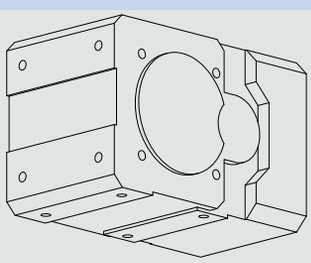
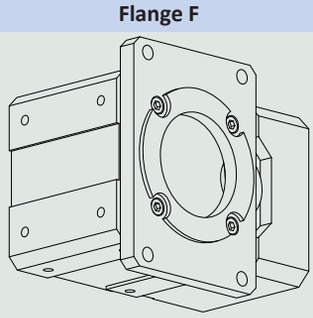
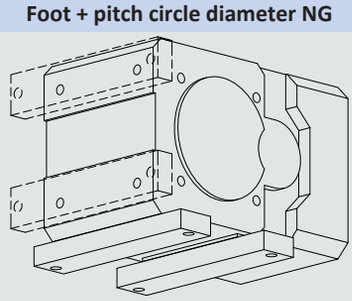
In order to complete the type designation, also specify:

- A detailed type designation of the motor, see Chapter [▶ 23]
- Attachment of solid shaft: gear unit side 3 or 4; solid shaft on both sides
- Attachment of hollow shaft with keyway: insertion side 3 or 4
- Attachment of hollow shaft with shrink ring: shrink ring on gear unit side 3 or 4
- Attachment of baseboards: gear unit side 1 or 5
- Attachment of flange: gear unit side 3 or 4
- Pitch circle diameter: gear unit side 3 or 4
- The position of the plug connectors, see Chapter [▶ 20.5.6]

An explanation of the gear unit sides can be found in Chapter [▶ 20.5.4].

20.5 Product description

20.5.1 Housing design

Pitch circle diameter G	Flange F	Foot + pitch circle diameter NG
		

	G	F	NG
KL1	✓	✓	✓
KL2	✓	✓	✓

20.5.2 Combinatorial shaft/housing design

	Housing design			
Shaft design	**Code**	**G**	**F**	**NG**
Hollow shaft with keyway	**A**	AG	AF	ANG
Hollow shaft with shrink ring	**S**	SG	SF	SNG
Solid shaft without feather key	**G**	GG	GF	GNG
Solid shaft with feather key	**P**	PG	PF	PNG

20.5.3 Installation conditions

Hollow shaft

The hollow shaft hole tolerance is ISO H7. The tolerance of the machine shaft must be ISO k6.

Take care to align the machine shaft with the gear unit hollow shaft when attaching the gear unit.

Maximum deviation ≤ 0.03 mm.

For simpler assembly and disassembly of the machine shaft, the hollow shafts are equipped with a spiral groove (as a grease deposit).

A hardened, threaded keeper plate is included in the scope of delivery. You also have the option to order the hollow shaft without a keeper plate.

Hollow shaft with shrink ring

The tolerance of the hollow shaft hole is ISO H7.

The machine shaft must be ISO h9.

Select a material for the machine shaft with a permitted surface pressure of $p \geq 325\ N/mm^2$.

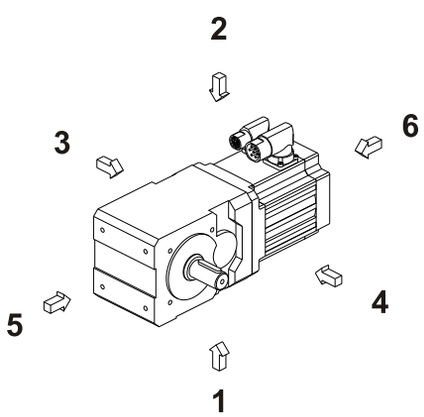
Possible materials:

- C45E +QT
- 42CrMo4

Attaching the gear unit on the machine side using the pitch circle diameter

The specified torques and forces only apply when attaching gear units at the machine side using screws of quality 10.9. In addition, the gear housing must be adjusted at the pilot (H7).

20.5.4 Gear unit sides



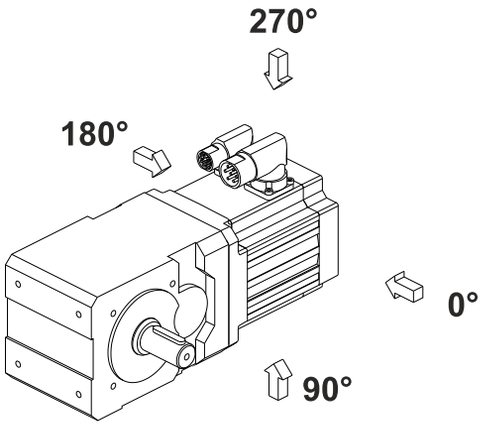
The numbers identify the gear unit sides.

20.5.5 Lubricants

STOBER fills the gear units with the amount and type of lubricant specified on the nameplate.

Lubricant filling quantities for gear units, document ID 441871, can be found online at http://www.stoeber.de

20.5.6 Position of the plug connectors



In the standard version, the plug connectors are attached in the 270° position.

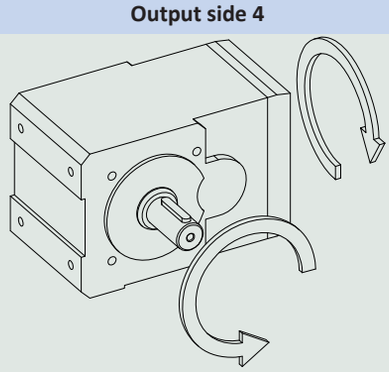
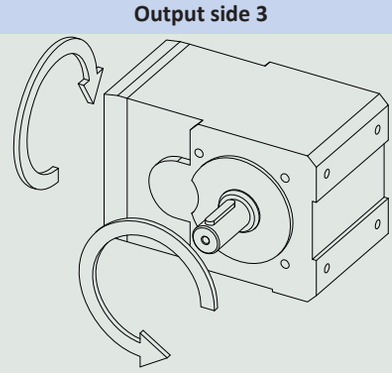
Indicate variations for your geared motor in the purchase order.

20.5.7 Other product features

Feature	Value
Max. permitted gear unit temperature (on the surface of the gear unit)	≤ 80 °C
Paint	Black RAL 9005
(ATEX) Directive 2014/34/EU (option)	Not suitable
Protection class:[1]	
Gear unit	IP65
Motor	IP56, optionally IP66

20.5.8 Direction of rotation

Solid shaft (P and G), solid shaft on both sides (P and G), hollow shaft with keyway (A)

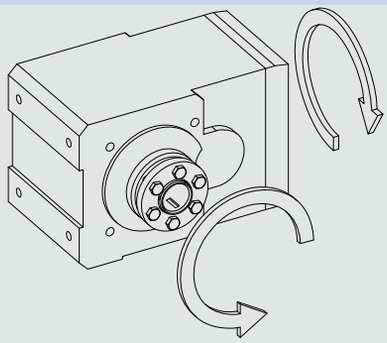
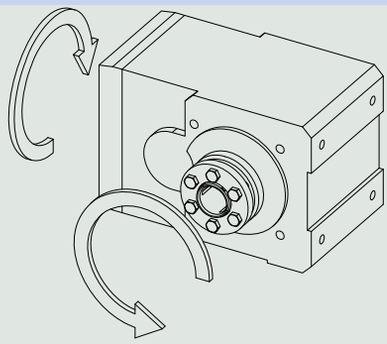
Output side 4	Output side 3
	

The specified directions of rotation also apply to gear units with hollow shaft (A) if the insertion side of the machine shaft corresponds to the side of the solid shaft that is shown.

The pictures show mounting position EL1.

[1] Observe the protection class of all the components.

Hollow shaft with shrink ring (S)

Shrink ring side 4	Shrink ring side 3
	

The pictures show mounting position EL1.

20.6 Project configuration

Project your drives using our SERVOsoft designing software. You can receive SERVOsoft for free from your adviser at one of our sales centers. Observe the limit conditions in this chapter to ensure a safe design for your drives.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

20.6.1 Calculation of the operating point

Check the following conditions for operating points other than the nominal point M_{2N} specified in the selection tables.

$$n_{1m^*} \leq \frac{n_{1maxDB}}{fB_T}$$

$$n_{1max^*} \leq \frac{n_{1maxZB}}{fB_T}$$

$$M_{2eff^*} \leq M_{2th}$$

$$M_{2acc^*} \leq M_{2acc}$$

$$M_{2NOT^*} \leq M_{2NOT}$$

$$M_{2eq^*} \leq M_{2N} \cdot \frac{S}{fB_{op} \cdot fB_t}$$

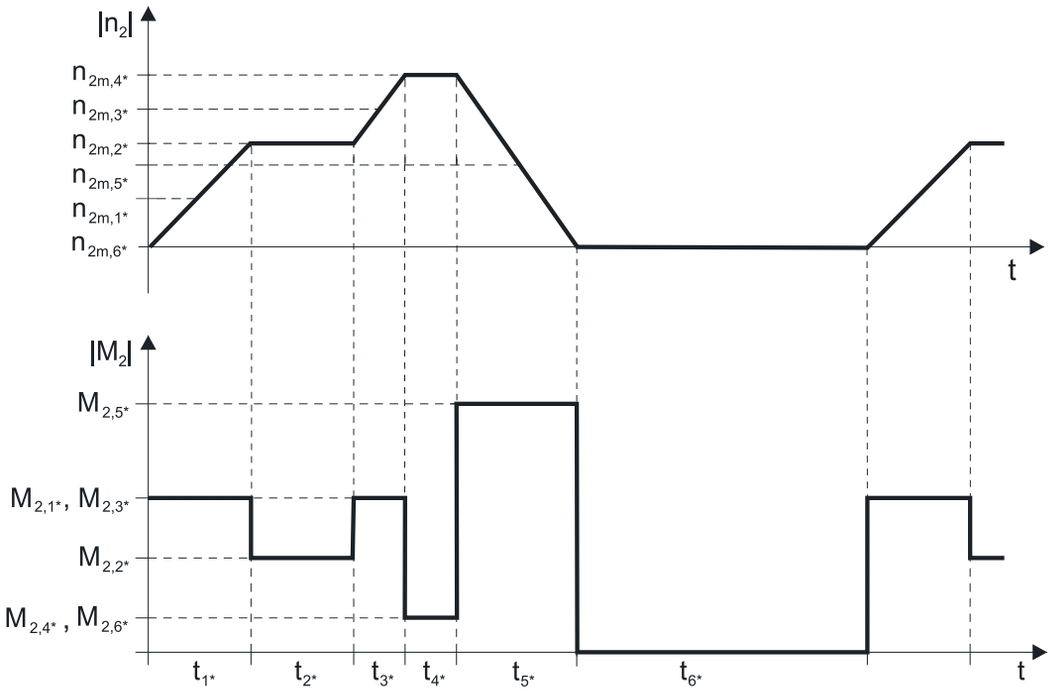
The values for n_{1maxDB}, n_{1maxZB}, M_{2acc}, M_{2NOT}, M_{2N} and S can be found in the selection tables.

The values for fB_T, fB_{op} and fB_t can be found in the corresponding tables in this chapter.

Calculate the thermal limit torque M_{2th} for a duty cycle > 50%.

Example of cyclic operation

The following calculations are based on a representation of the power taken from the output based in accordance with the following example:



Calculation of the actual average input speed

$$n_{1m^*} = n_{2m^*} \cdot i$$

$$n_{2m^*} = \frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}{t_{1^*} + \ldots + t_{n^*}}$$

If $t_{1^*} + \ldots + t_{5^*} \geq 20$ min, calculate n_{2m^*} without the rest phase t_{6^*}.

The values for the ratio i can be found in the selection tables.

Calculation of the actual effective torque

$$M_{2eff^*} = \sqrt{\frac{t_{1^*} \cdot M_{2,1^*}{}^2 + \ldots + t_{n^*} \cdot M_{2,n^*}{}^2}{t_{1^*} + \ldots + t_{n^*}}}$$

Calculation of the actual equivalent torque

$$M_{2eq^*} = \sqrt[3]{\frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} \cdot \left|M_{2,1^*}{}^3\right| + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*} \cdot \left|M_{2,n^*}{}^3\right|}{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}}$$

Calculation of the thermal limit torque

Calculate the thermal limit torque M_{2th} for a duty cycle $ED_{20} > 50\%$ and the actual average input speed n_{1m^*}. (At $K_{mot,th} \leq 0$ you must reduce the average input speed n_{1m^*} accordingly or select another geared motor size.)

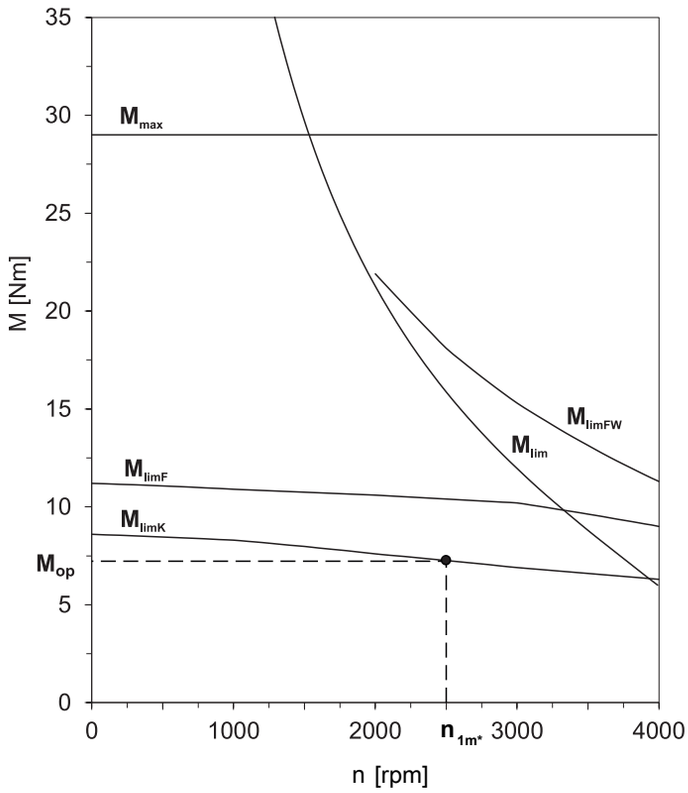
$$M_{2th} = M_{op} \cdot i \cdot K_{mot,th}$$

$$K_{mot,th} = 0{,}9 - \frac{a_{th}}{1000} \cdot fB_T \cdot \left(\frac{n_{1m^*}}{1000}\right)^2$$

The values for i and a_{th} can be found in the selection tables.

The values for fB_T can be found in the corresponding table in this chapter.

The value for the torque of the motor at operating point M_{op} with the determined average input speed n_{1m^*} can be found in the motor curve of Chapter [▶ 23.3]. Note the size, nominal speed n_N and cooling type of the motor. The figure below shows an example of reading the torque M_{op} of a motor with convection cooling at the operating point.



Operating mode	fB_{op}
Uniform continuous operation	1.00
Cyclic operation	1.25
Reversing load cyclic operation	1.40

Run time	fB_t
Daily run time ≤ 8 h	1.00
Daily run time ≤ 16 h	1.15
Daily run time ≤ 24 h	1.20

Temperature		fB_T
Motor cooling	**Surrounding temperature**	
Motor with forced ventilation	≤ 20 °C	0.9
	≤ 30 °C	1.0
	≤ 40 °C	1.15
Motor with convection cooling	≤ 20 °C	1.0
	≤ 30 °C	1.1
	≤ 40 °C	1.25

Notes

- The maximum permitted gear unit temperature (see the "Other product features" chapter) must not be exceeded. Doing so may result in damage to the geared motor.
- For braking from full speed (for example when the power fails or when setting up the machine), note the permitted gear unit torques (M_{2acc}, M_{2NOT}) in the selection tables.

20.6.2 Permitted shaft loads for the output shaft

The values specified in the tables apply to the permitted shaft loads:

- For shaft dimensions in accordance with the catalog
- For output speeds $n_{2m*} \leq 100$ rpm ($F^{2axN} = F_{2ax100}$; $F_{2radN} = F_{2rad100}$; $M_{2kN} = M_{2k100}$)
- Only if radial forces on the gear unit are stabilized by its pilots for the pitch circle diameter and flange housing design

20.6.2.1 G and P shaft designs

Permitted shaft loads for G and P shaft designs (solid shaft)

Type	z_2 [mm]	F_{2ax100} [N]	$F_{2rad100}$ [N]	M_{2k100} [Nm]
KL1	20.0	380	1900	68
KL2	22.0	560	2800	118

For other output speeds, download diagrams at http://products.stoeber.de.

The following applies to output speeds n_{2m*} > 100 rpm:

$$F_{2axN} = \frac{F_{2ax100}}{\sqrt[3]{\frac{n_{2m*}}{100\ rpm}}} \qquad F_{2radN} = \frac{F_{2rad100}}{\sqrt[3]{\frac{n_{2m*}}{100\ rpm}}} \qquad M_{2kN} = \frac{M_{2k100}}{\sqrt[3]{\frac{n_{2m*}}{100\ rpm}}}$$

The values for F_{2ax100}, $F_{2rad100}$ and M_{2k100} can be found in the table "Permitted shaft loads" in this chapter.

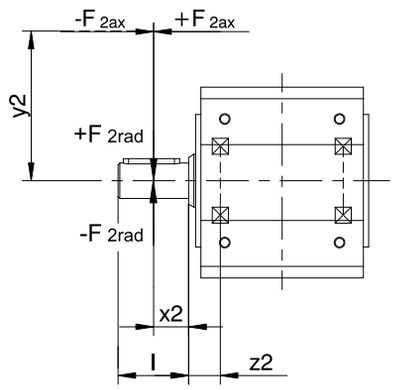


Fig. 1: Force application points for solid shaft

The specified values for $F_{2rad100}$ refer to force application on the center of the output shaft: $x_2 = l/2$.

Shaft dimensions can be found in the "Dimensional drawings" chapter.

The following applies to other force application points:

$$M_{2k*} = \frac{2 \cdot F_{2ax*} \cdot y_2 + F_{2rad*} \cdot (x_2 + z_2)}{1000} \leq M_{2kN}$$

$$F_{2rad*} \leq F_{2radN}$$

$$F_{2ax*} \leq F_{2axN}$$

For applications with multiple axial and/or radial forces, you must add the forces as vectors.

In the event of EMERGENCY OFF operation (max. 1000 load changes), you can multiply the permitted forces and torques for F_{2ax20}, F_{2rad20} and M_{2k20} by a factor of two.

20.6.2.2 A and S shaft design

Permitted shaft loads for A shaft design (hollow shaft with keyway)

Type	z_2 [mm]	F_{2ax100} [N]	$F_{2rad100}$ [N]	M_{2k100} [Nm]
KL1	18.5	250	1250	43
KL2	22.0	560	2800	118

Permitted shaft loads for S shaft design (hollow shaft with shrink ring)

Type	z_2 [mm]	F_{2ax100} [N]	$F_{2rad100}$ [N]	M_{2k100} [Nm]
KL1	18.5	250	1250	43
KL2	22.0	560	2800	118

For other output speeds, download diagrams at http://products.stoeber.de.

The following applies to output speeds n_{2m*} > 100 rpm:

$$F_{2axN} = \frac{F_{2ax100}}{\sqrt[3]{\frac{n_{2m*}}{100\ rpm}}} \qquad F_{2radN} = \frac{F_{2rad100}}{\sqrt[3]{\frac{n_{2m*}}{100\ rpm}}} \qquad M_{2kN} = \frac{M_{2k100}}{\sqrt[3]{\frac{n_{2m*}}{100\ rpm}}}$$

The values for F_{2ax100}, $F_{2rad100}$ and M_{2k100} can be found in the table "Permitted shaft loads" in this chapter.

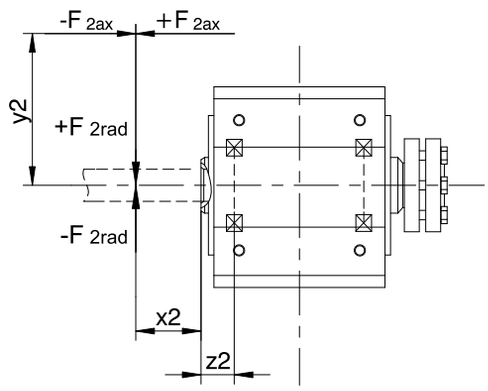


Fig. 2: Force application points for hollow shaft

You can determine the permitted radial forces from the permitted breakdown torque M_{2kN}. The actual radial forces may not exceed the permitted radial forces. The permitted radial forces are in relation to the end of the hollow shaft (x2 = 0).

$$M_{2k*} = \frac{2 \cdot F_{2ax*} \cdot y_2 + F_{2rad*} \cdot (x_2 + z_2)}{1000} \leq M_{2kN}$$

$$F_{2ax*} \leq F_{2axN}$$

For applications with multiple axial and/or radial forces, you must add the forces as vectors.

In the event of EMERGENCY OFF operation (max. 1000 load changes), you can multiply the permitted forces and torques for F_{2ax20}, F_{2rad20} and M_{2k20} by a factor of two.

20.6.3 Radial shaft seal rings

Leak-proofness

Our gear units are equipped with high-quality radial shaft seal rings and checked for leak-proofness. However, a leak cannot be fully ruled out over the length of use of a gear unit. If you use a gear unit with goods incompatible with the lubricant, you must take measures to prevent direct contact with the gear unit lubricant in case of a leak.

20.7 Additional documentation

Additional documentation related to the product can be found at http://www.stoeber.de/en/download

Enter the ID of the documentation in the Search... field.

Documentation	ID
Operating manual for KL/KS/PHK/PHKX/PHQK/PK/PKX right-angle gear units and right-angle geared motors	443004_en
Lubricant filling quantities for gear units	441871

21 K helical bevel geared motors

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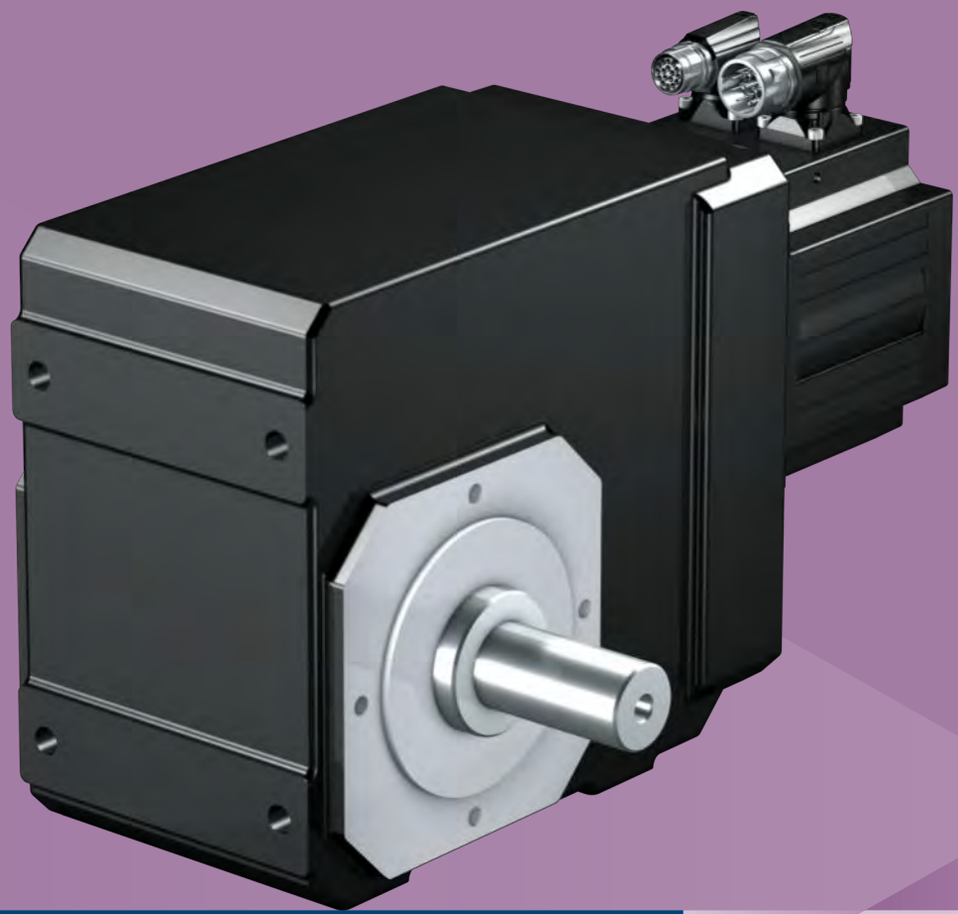


21 Helical bevel geared motors K

21.1 Overview

Highly rigid helical-geared right-angle geared motor

Features

Power density	★★☆☆☆
Backlash	★★★☆☆
Price category	€€
Shaft load	★★★☆☆
Smooth operation	★★★☆☆
Torsional stiffness	★★☆☆☆
Mass moment of inertia	★★★★★
Helical gearing	✓
Maintenance-free (K1 – K4)	✓
FKM seal ring at the input	✓
Reinforced output bearing (K5 – K8)	✓ (on request)
Compact and highly dynamic due to direct motor attachment	✓

Key: ★☆☆☆☆ good | ★★★★★ excellent
€ Economy | €€€€€ Premium

Technical data

i	4 – 381
M_{2acc}	23 – 13200 Nm
$\Delta\phi_2$	1.5 – 12 arcmin
η_{get}	≤ 97 %

21.2 Selection tables

The technical data specified in the selection tables applies to:

- Installation altitudes up to 1000 m above sea level
- Surrounding temperatures from 0 °C to 40 °C
- Drives with convection-cooled motors (e.g. EZ401**U**)
- Weight specification for mounting position EL1, housing design G

You can calculate the technical data for drives with forced ventilated motors (for example EZ401**B**) at http://products.stoeber.de.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
K1 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 140 Nm)																
53	51	52	6.5	1.7	K102_0560 EZ301U	100	170	56.10	1178/21	4000	4000	6000	0.21	12/6	6.8	11
64	42	43	5.2	2.4	K102_0470 EZ301U	120	200	46.92	2299/49	4000	4000	6000	0.22	12/6	6.8	11
64	72	76	8.9	1.4	K102_0470 EZ302U	120	200	46.92	2299/49	4000	4000	6000	0.32	12/6	6.8	12
74	36	37	8.3	1.7	K102_0400 EZ301U	74	120	40.30	403/10	4000	4000	6000	0.21	12/6	6.8	11
85	32	32	4.6	3.4	K102_0350 EZ301U	95	190	35.11	3686/105	4000	4000	6000	0.23	12/6	6.8	11
85	54	57	7.9	2.0	K102_0350 EZ302U	140	190	35.11	3686/105	4000	4000	6000	0.33	12/6	6.8	12
85	70	75	10	1.5	K102_0350 EZ303U	140	190	35.11	3686/105	4000	4000	6000	0.44	12/6	6.8	12
85	95	102	14	1.1	K102_0350 EZ401U	140	240	35.11	3686/105	4000	4000	6000	0.97	12/6	6.8	14
89	30	31	6.7	2.4	K102_0340 EZ301U	88	150	33.71	4719/140	4000	4000	6000	0.22	12/6	6.8	11
89	52	55	11	1.4	K102_0340 EZ302U	88	150	33.71	4719/140	4000	4000	6000	0.32	12/6	6.8	12
107	25	26	4.7	3.9	K102_0280 EZ301U	76	170	28.05	589/21	4000	4000	6000	0.25	12/6	6.8	11
107	43	46	8.1	2.3	K102_0280 EZ302U	130	170	28.05	589/21	4000	4000	6000	0.35	12/6	6.8	12
107	56	60	11	1.8	K102_0280 EZ303U	130	170	28.05	589/21	4000	4000	6000	0.46	12/6	6.8	12
107	76	82	14	1.3	K102_0280 EZ401U	140	240	28.05	589/21	4000	4000	6000	0.99	12/6	6.8	14
119	23	23	4.8	4.2	K102_0250 EZ301U	68	140	25.22	1261/50	4000	4000	6000	0.24	12/6	6.8	11
119	39	41	8.1	2.5	K102_0250 EZ302U	110	140	25.22	1261/50	4000	4000	6000	0.34	12/6	6.8	12
119	51	54	11	1.9	K102_0250 EZ303U	110	140	25.22	1261/50	4000	4000	6000	0.45	12/6	6.8	12
119	68	73	14	1.4	K102_0250 EZ401U	120	190	25.22	1261/50	4000	4000	6000	0.98	12/6	6.8	14
129	21	21	4.8	4.4	K102_0230 EZ301U	63	160	23.27	1140/49	4000	4000	6000	0.28	12/6	6.8	11
129	36	38	8.2	2.6	K102_0230 EZ302U	110	160	23.27	1140/49	4000	4000	6000	0.38	12/6	6.8	12
129	47	49	11	2.0	K102_0230 EZ303U	130	160	23.27	1140/49	4000	4000	6000	0.49	12/6	6.8	12
129	63	68	14	1.5	K102_0230 EZ401U	140	240	23.27	1140/49	4000	4000	6000	1.0	12/6	6.8	14
149	18	19	4.9	4.9	K102_0200 EZ301U	55	120	20.15	403/20	4000	4000	6000	0.26	12/6	6.8	11
149	31	33	8.3	2.9	K102_0200 EZ302U	97	120	20.15	403/20	4000	4000	6000	0.36	12/6	6.8	12
149	40	43	11	2.2	K102_0200 EZ303U	97	120	20.15	403/20	4000	4000	6000	0.47	12/6	6.8	12
149	55	59	15	1.6	K102_0200 EZ401U	130	220	20.15	403/20	4000	4000	6000	1.0	12/6	6.8	14
149	84	92	22	1.1	K102_0200 EZ501U	130	220	20.15	403/20	4000	4000	6000	3.0	12/6	6.8	15
171	16	16	4.9	3.0	K102_0175 EZ301U	48	60	17.56	2090/119	4000	3800	5500	0.32	12/6	6.8	11
171	27	29	8.4	3.1	K102_0175 EZ302U	85	130	17.56	2090/119	4000	3800	5500	0.42	12/6	6.8	12
171	35	37	11	2.4	K102_0175 EZ303U	100	130	17.56	2090/119	4000	3800	5500	0.53	12/6	6.8	12
171	48	51	15	1.8	K102_0175 EZ401U	140	240	17.56	2090/119	4000	3800	5500	1.1	12/6	6.8	14
171	73	80	23	1.2	K102_0175 EZ501U	140	240	17.56	2090/119	4000	3800	5500	3.0	12/6	6.8	15
171	80	89	25	1.1	K102_0175 EZ402U	140	240	17.56	2090/119	4000	3800	5500	1.8	12/6	6.8	15
179	15	15	4.9	2.9	K102_0165 EZ301U	44	55	16.71	117/7	4000	4000	6000	0.29	12/6	6.8	11
179	26	27	8.4	3.2	K102_0165 EZ302U	81	110	16.71	117/7	4000	4000	6000	0.39	12/6	6.8	12
179	34	36	11	2.5	K102_0165 EZ303U	91	110	16.71	117/7	4000	4000	6000	0.50	12/6	6.8	12
179	45	49	15	1.8	K102_0165 EZ401U	130	220	16.71	117/7	4000	4000	6000	1.0	12/6	6.8	14
179	70	76	23	1.2	K102_0165 EZ501U	130	220	16.71	117/7	4000	4000	6000	3.0	12/6	6.8	15
179	76	84	25	1.1	K102_0165 EZ402U	130	220	16.71	117/7	4000	4000	6000	1.7	12/6	6.8	15
213	13	13	5.0	3.0	K102_0140 EZ301U	38	48	14.11	494/35	4000	3800	5500	0.37	12/6	6.8	11
213	22	23	8.5	3.6	K102_0140 EZ302U	68	100	14.11	494/35	4000	3800	5500	0.47	12/6	6.8	12
213	28	30	11	2.8	K102_0140 EZ303U	82	100	14.11	494/35	4000	3800	5500	0.58	12/6	6.8	12
213	38	41	15	2.1	K102_0140 EZ401U	120	240	14.11	494/35	4000	3800	5500	1.1	12/6	6.8	14
213	59	64	23	1.3	K102_0140 EZ501U	140	240	14.11	494/35	4000	3800	5500	3.1	12/6	6.8	15
213	64	71	25	1.2	K102_0140 EZ402U	140	240	14.11	494/35	4000	3800	5500	1.8	12/6	6.8	15
238	11	12	5.0	3.0	K102_0125 EZ301U	34	43	12.62	429/34	4000	3800	5500	0.34	12/6	6.8	11
238	19	21	8.6	3.8	K102_0125 EZ302U	61	92	12.62	429/34	4000	3800	5500	0.44	12/6	6.8	12
238	25	27	11	2.9	K102_0125 EZ303U	73	92	12.62	429/34	4000	3800	5500	0.55	12/6	6.8	12
238	34	37	15	2.2	K102_0125 EZ401U	100	220	12.62	429/34	4000	3800	5500	1.1	12/6	6.8	14
238	53	58	23	1.4	K102_0125 EZ501U	130	220	12.62	429/34	4000	3800	5500	3.1	12/6	6.8	15
238	58	64	25	1.3	K102_0125 EZ402U	130	220	12.62	429/34	4000	3800	5500	1.8	12/6	6.8	15

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
K1 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 140 Nm)																
259	18	19	8.7	3.8	K102_0115 EZ302U	56	84	11.57	266/23	3600	3300	5000	0.53	12/6	6.8	12
259	23	25	11	2.9	K102_0115 EZ303U	67	84	11.57	266/23	3600	3300	5000	0.64	12/6	6.8	12
259	31	34	15	2.3	K102_0115 EZ401U	95	240	11.57	266/23	3600	3300	5000	1.2	12/6	6.8	14
259	48	53	23	1.5	K102_0115 EZ501U	140	240	11.57	266/23	3600	3300	5000	3.1	12/6	6.8	15
259	53	58	26	1.4	K102_0115 EZ402U	140	240	11.57	266/23	3600	3300	5000	1.9	12/6	6.8	15
296	16	17	8.8	3.8	K102_0100 EZ302U	49	74	10.14	507/50	4000	3800	5500	0.50	12/6	6.8	12
296	20	22	11	2.9	K102_0100 EZ303U	59	74	10.14	507/50	4000	3800	5500	0.61	12/6	6.8	12
296	28	30	15	2.6	K102_0100 EZ401U	84	220	10.14	507/50	4000	3800	5500	1.1	12/6	6.8	14
296	42	46	24	1.7	K102_0100 EZ501U	130	220	10.14	507/50	4000	3800	5500	3.1	12/6	6.8	15
296	46	51	26	1.5	K102_0100 EZ402U	130	220	10.14	507/50	4000	3800	5500	1.8	12/6	6.8	15
296	68	85	38	1.0	K102_0100 EZ404U	130	220	10.14	507/50	4000	3800	5500	3.2	12/6	6.8	17
324	14	15	8.9	3.8	K102_0092 EZ302U	45	67	9.249	1748/189	3600	3300	5000	0.62	12/6	6.8	12
324	19	20	12	2.9	K102_0092 EZ303U	54	67	9.249	1748/189	3600	3300	5000	0.73	12/6	6.8	12
324	25	27	16	2.7	K102_0092 EZ401U	76	240	9.249	1748/189	3600	3300	5000	1.3	12/6	6.8	14
324	39	42	24	1.8	K102_0092 EZ501U	130	240	9.249	1748/189	3600	3300	5000	3.2	12/6	6.8	15
324	42	47	26	1.6	K102_0092 EZ402U	130	240	9.249	1748/189	3600	3300	5000	2.0	12/6	6.8	15
324	62	77	38	1.1	K102_0092 EZ404U	130	240	9.249	1748/189	3600	3300	5000	3.3	12/6	6.8	17
324	66	72	41	1.0	K102_0092 EZ502U	130	240	9.249	1748/189	3600	3300	5000	5.5	12/6	6.8	16
324	66	74	41	1.0	K102_0092 EZ701U	130	240	9.249	1748/189	3600	3300	5000	8.8	12/6	6.8	18
361	13	14	8.9	3.8	K102_0083 EZ302U	40	60	8.309	1911/230	3600	3300	5000	0.58	12/6	6.8	12
361	17	18	12	2.9	K102_0083 EZ303U	48	60	8.309	1911/230	3600	3300	5000	0.69	12/6	6.8	12
361	23	24	16	2.9	K102_0083 EZ401U	69	220	8.309	1911/230	3600	3300	5000	1.2	12/6	6.8	14
361	35	38	24	1.9	K102_0083 EZ501U	120	220	8.309	1911/230	3600	3300	5000	3.2	12/6	6.8	15
361	38	42	26	1.7	K102_0083 EZ402U	120	220	8.309	1911/230	3600	3300	5000	1.9	12/6	6.8	15
361	56	69	39	1.2	K102_0083 EZ404U	120	220	8.309	1911/230	3600	3300	5000	3.3	12/6	6.8	17
361	60	64	42	1.1	K102_0083 EZ502U	120	220	8.309	1911/230	3600	3300	5000	5.5	12/6	6.8	16
361	60	67	42	1.1	K102_0083 EZ701U	120	220	8.309	1911/230	3600	3300	5000	8.8	12/6	6.8	18
452	10	11	9.1	3.8	K102_0066 EZ302U	32	48	6.644	299/45	3600	3300	5000	0.69	12/6	6.8	12
452	13	14	12	2.9	K102_0066 EZ303U	39	48	6.644	299/45	3600	3300	5000	0.80	12/6	6.8	12
452	18	19	16	3.4	K102_0066 EZ401U	55	190	6.644	299/45	3600	3300	5000	1.3	12/6	6.8	14
452	28	30	25	2.2	K102_0066 EZ501U	100	190	6.644	299/45	3600	3300	5000	3.3	12/6	6.8	15
452	30	34	27	2.0	K102_0066 EZ402U	100	190	6.644	299/45	3600	3300	5000	2.0	12/6	6.8	15
452	44	55	39	1.4	K102_0066 EZ404U	120	190	6.644	299/45	3600	3300	5000	3.4	12/6	6.8	17
452	48	52	42	1.3	K102_0066 EZ502U	120	190	6.644	299/45	3600	3300	5000	5.6	12/6	6.8	16
452	48	53	42	1.3	K102_0066 EZ701U	120	190	6.644	299/45	3600	3300	5000	8.9	12/6	6.8	18
500	16	17	16	3.6	K102_0060 EZ401U	49	170	6.000	6/1	3300	2800	4500	1.4	12/6	6.8	14
500	25	27	25	2.4	K102_0060 EZ501U	93	170	6.000	6/1	3300	2800	4500	3.4	12/6	6.8	15
500	27	30	27	2.2	K102_0060 EZ402U	93	170	6.000	6/1	3300	2800	4500	2.1	12/6	6.8	15
500	40	50	40	1.5	K102_0060 EZ404U	110	170	6.000	6/1	3300	2800	4500	3.5	12/6	6.8	17
500	43	47	43	1.4	K102_0060 EZ502U	110	170	6.000	6/1	3300	2800	4500	5.7	12/6	6.8	16
500	43	48	43	1.4	K102_0060 EZ701U	110	170	6.000	6/1	3300	2800	4500	9.0	12/6	6.8	18
500	56	65	56	1.0	K102_0060 EZ503U	110	170	6.000	6/1	3300	2800	4500	8.1	12/6	6.8	18
539	8.6	9.1	9.2	3.8	K102_0056 EZ302U	27	41	5.568	1520/273	3300	2800	4500	0.95	12/6	6.8	12
539	11	12	12	2.9	K102_0056 EZ303U	32	41	5.568	1520/273	3300	2800	4500	1.1	12/6	6.8	12
539	15	16	16	3.8	K102_0056 EZ401U	46	160	5.568	1520/273	3300	2800	4500	1.6	12/6	6.8	14
539	23	25	25	2.5	K102_0056 EZ501U	86	160	5.568	1520/273	3300	2800	4500	3.6	12/6	6.8	15
539	25	28	27	2.3	K102_0056 EZ402U	86	160	5.568	1520/273	3300	2800	4500	2.3	12/6	6.8	15
539	37	46	40	1.5	K102_0056 EZ404U	110	160	5.568	1520/273	3300	2800	4500	3.6	12/6	6.8	17
539	40	43	43	1.4	K102_0056 EZ502U	110	160	5.568	1520/273	3300	2800	4500	5.9	12/6	6.8	16
539	40	45	43	1.4	K102_0056 EZ701U	110	160	5.568	1520/273	3300	2800	4500	9.2	12/6	6.8	18
539	52	60	56	1.1	K102_0056 EZ503U	110	160	5.568	1520/273	3300	2800	4500	8.2	12/6	6.8	18
750	8.0	8.5	12	2.9	K102_0040 EZ303U	23	29	4.000	4/1	3300	2800	4500	1.3	12/6	6.8	12
750	11	12	17	4.8	K102_0040 EZ401U	33	120	4.000	4/1	3300	2800	4500	1.8	12/6	6.8	14
750	17	18	26	3.1	K102_0040 EZ501U	62	120	4.000	4/1	3300	2800	4500	3.8	12/6	6.8	15
750	18	20	28	2.8	K102_0040 EZ402U	62	120	4.000	4/1	3300	2800	4500	2.5	12/6	6.8	15
750	27	33	41	1.9	K102_0040 EZ404U	93	120	4.000	4/1	3300	2800	4500	3.8	12/6	6.8	17
750	29	31	44	1.8	K102_0040 EZ502U	93	120	4.000	4/1	3300	2800	4500	6.1	12/6	6.8	16
750	29	32	44	1.8	K102_0040 EZ701U	78	120	4.000	4/1	3300	2800	4500	9.4	12/6	6.8	18
750	38	43	58	1.4	K102_0040 EZ503U	93	120	4.000	4/1	3300	2800	4500	8.4	12/6	6.8	18
K1 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 140 Nm)																
107	48	52	6.2	1.8	K102_0560 EZ301U	100	170	56.10	1178/21	4000	4000	6000	0.21	12/6	6.8	11
128	41	43	5.5	2.3	K102_0470 EZ301U	120	200	46.92	2299/49	4000	4000	6000	0.22	12/6	6.8	11
128	68	76	9.2	1.4	K102_0470 EZ302U	120	200	46.92	2299/49	4000	4000	6000	0.32	12/6	6.8	12
149	35	37	8.0	1.8	K102_0400 EZ301U	74	120	40.30	403/10	4000	4000	6000	0.21	12/6	6.8	11

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
K1 (n_{1N} = 6000 rpm, $M_{2acc,max}$ = 140 Nm)																
171	30	32	5.6	2.8	K102_0350 EZ301U	95	190	35.11	3686/105	4000	4000	6000	0.23	12/6	6.8	11
171	51	57	9.4	1.7	K102_0350 EZ302U	140	190	35.11	3686/105	4000	4000	6000	0.33	12/6	6.8	12
171	67	77	12	1.3	K102_0350 EZ303U	140	190	35.11	3686/105	4000	4000	6000	0.44	12/6	6.8	12
171	78	95	14	1.1	K102_0350 EZ401U	140	240	35.11	3686/105	4000	4000	6000	0.97	12/6	6.8	14
178	29	31	6.4	2.5	K102_0340 EZ301U	88	150	33.71	4719/140	4000	4000	6000	0.22	12/6	6.8	11
178	49	55	11	1.5	K102_0340 EZ302U	88	150	33.71	4719/140	4000	4000	6000	0.32	12/6	6.8	12
214	24	26	5.7	3.2	K102_0280 EZ301U	76	170	28.05	589/21	4000	4000	6000	0.25	12/6	6.8	11
214	41	46	9.6	1.9	K102_0280 EZ302U	130	170	28.05	589/21	4000	4000	6000	0.35	12/6	6.8	12
214	53	61	13	1.5	K102_0280 EZ303U	130	170	28.05	589/21	4000	4000	6000	0.46	12/6	6.8	12
214	63	76	15	1.3	K102_0280 EZ401U	140	240	28.05	589/21	4000	4000	6000	0.99	12/6	6.8	14
238	22	23	5.7	3.5	K102_0250 EZ301U	68	140	25.22	1261/50	4000	4000	6000	0.24	12/6	6.8	11
238	37	41	9.7	2.1	K102_0250 EZ302U	110	140	25.22	1261/50	4000	4000	6000	0.34	12/6	6.8	12
238	48	55	13	1.6	K102_0250 EZ303U	110	140	25.22	1261/50	4000	4000	6000	0.45	12/6	6.8	12
238	56	68	15	1.3	K102_0250 EZ401U	120	190	25.22	1261/50	4000	4000	6000	0.98	12/6	6.8	14
258	20	21	5.8	3.7	K102_0230 EZ301U	63	160	23.27	1140/49	4000	4000	6000	0.28	12/6	6.8	11
258	34	38	9.7	2.2	K102_0230 EZ302U	110	160	23.27	1140/49	4000	4000	6000	0.38	12/6	6.8	12
258	44	51	13	1.7	K102_0230 EZ303U	130	160	23.27	1140/49	4000	4000	6000	0.49	12/6	6.8	12
258	52	63	15	1.4	K102_0230 EZ401U	140	240	23.27	1140/49	4000	4000	6000	1.0	12/6	6.8	14
298	17	19	5.9	4.0	K102_0200 EZ301U	55	120	20.15	403/20	4000	4000	6000	0.26	12/6	6.8	11
298	29	33	9.9	2.4	K102_0200 EZ302U	97	120	20.15	403/20	4000	4000	6000	0.36	12/6	6.8	12
298	38	44	13	1.8	K102_0200 EZ303U	97	120	20.15	403/20	4000	4000	6000	0.47	12/6	6.8	12
298	45	55	15	1.6	K102_0200 EZ401U	130	220	20.15	403/20	4000	4000	6000	1.0	12/6	6.8	14
298	66	86	22	1.1	K102_0200 EZ501U	130	220	20.15	403/20	4000	4000	6000	3.0	12/6	6.8	15
298	68	96	23	1.0	K102_0200 EZ402U	130	220	20.15	403/20	4000	4000	6000	1.7	12/6	6.8	15
359	14	15	5.9	4.6	K102_0165 EZ301U	45	110	16.71	117/7	4000	4000	6000	0.29	12/6	6.8	11
359	24	27	10	2.7	K102_0165 EZ302U	81	110	16.71	117/7	4000	4000	6000	0.39	12/6	6.8	12
359	32	36	13	2.1	K102_0165 EZ303U	91	110	16.71	117/7	4000	4000	6000	0.50	12/6	6.8	12
359	37	45	15	1.8	K102_0165 EZ401U	130	220	16.71	117/7	4000	4000	6000	1.0	12/6	6.8	14
359	55	71	23	1.2	K102_0165 EZ501U	130	220	16.71	117/7	4000	4000	6000	3.0	12/6	6.8	15
359	57	79	23	1.2	K102_0165 EZ402U	130	220	16.71	117/7	4000	4000	6000	1.7	12/6	6.8	15
K2 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 220 Nm)																
17	161	164	4.1	1.2	K203_1810 EZ301U	220	390	181.0	86903/480	4000	3900	5500	0.24	10/6/2.5	11	22
22	120	123	3.8	1.7	K203_1350 EZ301U	220	390	135.3	30315/224	4000	3900	5500	0.24	10/6/2.5	11	22
27	97	99	3.6	2.1	K203_1090 EZ301U	220	390	109.5	26273/240	4000	3900	5500	0.25	10/6/2.5	11	22
33	81	82	3.4	2.5	K203_0910 EZ301U	220	390	90.79	46483/512	4000	3900	5500	0.25	10/6/2.5	11	22
33	138	146	5.9	1.4	K203_0910 EZ302U	220	390	90.79	46483/512	4000	3900	5500	0.35	10/6/2.5	11	22
38	121	128	5.7	1.7	K203_0800 EZ302U	220	390	79.62	26273/330	4000	3900	5500	0.35	10/6/2.5	11	22
38	158	167	7.4	1.3	K203_0800 EZ303U	220	390	79.62	26273/330	4000	3900	5500	0.46	10/6/2.5	11	23
43	107	113	8.4	1.2	K202_0690 EZ302U	160	260	69.43	6665/96	4000	3900	5500	0.33	10/5/1.5	11	19
44	104	110	5.5	1.9	K203_0680 EZ302U	220	390	68.42	26273/384	4000	3900	5500	0.36	10/6/2.5	11	22
44	135	143	7.1	1.5	K203_0680 EZ303U	220	390	68.42	26273/384	4000	3900	5500	0.47	10/6/2.5	11	23
45	100	106	5.4	2.0	K203_0660 EZ302U	220	390	66.03	46483/704	4000	3900	5500	0.35	10/6/2.5	11	22
45	131	138	7.1	1.5	K203_0660 EZ303U	220	390	66.03	46483/704	4000	3900	5500	0.46	10/6/2.5	11	23
54	86	91	6.6	1.9	K202_0560 EZ302U	190	280	55.54	1333/24	4000	3900	5500	0.34	10/5/1.5	11	19
54	112	118	8.6	1.4	K202_0560 EZ303U	190	280	55.54	1333/24	4000	3900	5500	0.45	10/5/1.5	11	20
55	82	87	5.2	2.4	K203_0540 EZ302U	220	350	54.25	135407/2496	4000	3900	5500	0.37	10/6/2.5	11	22
55	107	114	6.7	1.9	K203_0540 EZ303U	220	350	54.25	135407/2496	4000	3900	5500	0.48	10/6/2.5	11	23
55	145	156	9.1	1.4	K203_0540 EZ401U	220	350	54.25	135407/2496	4000	3900	5500	1.0	10/6/2.5	11	24
59	78	82	11	1.2	K202_0500 EZ302U	120	190	50.49	6665/132	4000	3900	5500	0.33	10/5/1.5	11	19
60	76	80	5.0	2.6	K203_0500 EZ302U	220	320	49.76	26273/528	4000	3900	5500	0.36	10/6/2.5	11	22
60	98	104	6.6	2.0	K203_0500 EZ303U	220	320	49.76	26273/528	4000	3900	5500	0.47	10/6/2.5	11	23
60	133	143	8.9	1.5	K203_0500 EZ401U	220	320	49.76	26273/528	4000	3900	5500	1.0	10/6/2.5	11	24
65	71	75	5.0	2.8	K202_0460 EZ302U	210	260	46.23	1849/40	4000	3900	5500	0.36	10/5/1.5	11	19
65	93	98	6.5	2.2	K202_0460 EZ303U	210	260	46.23	1849/40	4000	3900	5500	0.47	10/5/1.5	11	20
65	126	135	8.9	1.6	K202_0460 EZ401U	220	400	46.23	1849/40	4000	3900	5500	1.0	10/5/1.5	11	21
66	69	73	4.9	2.9	K203_0450 EZ302U	220	290	45.22	58609/1296	4000	3900	5500	0.38	10/6/2.5	11	22
66	89	95	6.4	2.2	K203_0450 EZ303U	220	290	45.22	58609/1296	4000	3900	5500	0.49	10/6/2.5	11	23
66	121	130	8.7	1.7	K203_0450 EZ401U	220	290	45.22	58609/1296	4000	3900	5500	1.0	10/6/2.5	11	24
74	62	66	8.4	1.9	K202_0400 EZ302U	140	200	40.39	1333/33	4000	3900	5500	0.35	10/5/1.5	11	19
74	81	86	11	1.4	K202_0400 EZ303U	140	200	40.39	1333/33	4000	3900	5500	0.46	10/5/1.5	11	20
76	60	63	4.8	3.3	K203_0390 EZ302U	190	250	39.45	135407/3432	4000	3900	5500	0.37	10/6/2.5	11	22
76	78	83	6.3	2.5	K203_0390 EZ303U	200	250	39.45	135407/3432	4000	3900	5500	0.48	10/6/2.5	11	23
76	106	113	8.5	1.9	K203_0390 EZ401U	200	250	39.45	135407/3432	4000	3900	5500	1.0	10/6/2.5	11	24
87	53	56	4.9	3.2	K202_0350 EZ302U	170	210	34.55	1935/56	4000	3900	5500	0.41	10/5/1.5	11	19

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
K2 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 220 Nm)																
87	69	73	6.4	2.5	K202_0350 EZ303U	170	210	34.55	1935/56	4000	3900	5500	0.52	10/5/1.5	11	20
87	94	101	8.7	2.0	K202_0350 EZ401U	220	400	34.55	1935/56	4000	3900	5500	1.1	10/5/1.5	11	21
87	144	158	13	1.3	K202_0350 EZ501U	220	400	34.55	1935/56	4000	3900	5500	3.0	10/5/1.5	11	22
89	52	55	6.0	2.9	K202_0340 EZ302U	150	190	33.62	1849/55	4000	3900	5500	0.37	10/5/1.5	11	19
89	68	71	7.8	2.2	K202_0340 EZ303U	150	190	33.62	1849/55	4000	3900	5500	0.48	10/5/1.5	11	20
89	91	98	11	1.7	K202_0340 EZ401U	180	310	33.62	1849/55	4000	3900	5500	1.0	10/5/1.5	11	21
107	76	81	8.8	2.3	K202_0280 EZ401U	220	400	27.95	559/20	4000	3900	5500	1.1	10/5/1.5	11	21
107	117	127	14	1.5	K202_0280 EZ501U	220	400	27.95	559/20	4000	3900	5500	3.1	10/5/1.5	11	22
107	127	141	15	1.4	K202_0280 EZ402U	220	400	27.95	559/20	4000	3900	5500	1.8	10/5/1.5	11	22
119	39	41	5.1	3.2	K202_0250 EZ302U	120	160	25.13	1935/77	4000	3900	5500	0.42	10/5/1.5	11	19
119	50	53	6.6	2.5	K202_0250 EZ303U	120	160	25.13	1935/77	4000	3900	5500	0.53	10/5/1.5	11	20
119	68	73	8.9	2.5	K202_0250 EZ401U	210	400	25.13	1935/77	4000	3900	5500	1.1	10/5/1.5	11	21
119	105	115	14	1.6	K202_0250 EZ501U	220	400	25.13	1935/77	4000	3900	5500	3.0	10/5/1.5	11	22
119	115	127	15	1.5	K202_0250 EZ402U	220	400	25.13	1935/77	4000	3900	5500	1.8	10/5/1.5	11	22
129	36	38	5.1	3.8	K202_0230 EZ302U	110	170	23.18	2967/128	4000	3900	5500	0.52	10/5/1.5	11	19
129	47	49	6.6	2.9	K202_0230 EZ303U	130	170	23.18	2967/128	4000	3900	5500	0.63	10/5/1.5	11	20
129	63	67	9.0	2.6	K202_0230 EZ401U	190	400	23.18	2967/128	4000	3900	5500	1.2	10/5/1.5	11	21
129	97	106	14	1.7	K202_0230 EZ501U	220	400	23.18	2967/128	4000	3900	5500	3.1	10/5/1.5	11	22
129	106	117	15	1.6	K202_0230 EZ402U	220	400	23.18	2967/128	4000	3900	5500	1.9	10/5/1.5	11	22
148	55	59	9.1	2.9	K202_0200 EZ401U	170	400	20.33	1118/55	4000	3900	5500	1.1	10/5/1.5	11	21
148	85	93	14	1.9	K202_0200 EZ501U	220	400	20.33	1118/55	4000	3900	5500	3.1	10/5/1.5	11	22
148	93	103	15	1.7	K202_0200 EZ402U	220	400	20.33	1118/55	4000	3900	5500	1.8	10/5/1.5	11	22
148	136	170	22	1.2	K202_0200 EZ404U	220	400	20.33	1118/55	4000	3900	5500	3.2	10/5/1.5	11	24
148	146	158	24	1.1	K202_0200 EZ502U	220	400	20.33	1118/55	4000	3900	5500	5.4	10/5/1.5	11	24
148	146	164	24	1.1	K202_0200 EZ701U	220	400	20.33	1118/55	4000	3900	5500	8.7	10/5/1.5	11	26
172	27	28	5.2	3.8	K202_0175 EZ302U	85	130	17.47	559/32	3900	3500	5000	0.65	10/5/1.5	11	19
172	35	37	6.8	2.9	K202_0175 EZ303U	100	130	17.47	559/32	3900	3500	5000	0.76	10/5/1.5	11	20
172	47	51	9.2	3.2	K202_0175 EZ401U	140	400	17.47	559/32	3900	3500	5000	1.3	10/5/1.5	11	21
172	73	80	14	2.1	K202_0175 EZ501U	220	400	17.47	559/32	3900	3500	5000	3.3	10/5/1.5	11	22
172	80	88	15	1.9	K202_0175 EZ402U	220	400	17.47	559/32	3900	3500	5000	2.0	10/5/1.5	11	22
172	117	146	23	1.3	K202_0175 EZ404U	220	400	17.47	559/32	3900	3500	5000	3.3	10/5/1.5	11	24
172	125	136	24	1.2	K202_0175 EZ502U	220	400	17.47	559/32	3900	3500	5000	5.6	10/5/1.5	11	24
172	125	141	24	1.2	K202_0175 EZ701U	220	400	17.47	559/32	3900	3500	5000	8.9	10/5/1.5	11	26
178	26	27	5.2	3.8	K202_0170 EZ302U	82	120	16.86	2967/176	4000	3900	5500	0.55	10/5/1.5	11	19
178	34	36	6.8	2.9	K202_0170 EZ303U	98	120	16.86	2967/176	4000	3900	5500	0.66	10/5/1.5	11	20
178	46	49	9.2	3.3	K202_0170 EZ401U	140	400	16.86	2967/176	4000	3900	5500	1.2	10/5/1.5	11	21
178	70	77	14	2.1	K202_0170 EZ501U	220	400	16.86	2967/176	4000	3900	5500	3.2	10/5/1.5	11	22
178	77	85	15	1.9	K202_0170 EZ402U	220	400	16.86	2967/176	4000	3900	5500	1.9	10/5/1.5	11	22
178	113	141	23	1.3	K202_0170 EZ404U	220	400	16.86	2967/176	4000	3900	5500	3.2	10/5/1.5	11	24
178	121	131	24	1.2	K202_0170 EZ502U	220	400	16.86	2967/176	4000	3900	5500	5.5	10/5/1.5	11	24
178	121	136	24	1.2	K202_0170 EZ701U	220	400	16.86	2967/176	4000	3900	5500	8.8	10/5/1.5	11	26
217	38	40	9.4	3.7	K202_0140 EZ401U	110	400	13.85	2881/208	3900	3500	5000	1.4	10/5/1.5	11	21
217	58	63	14	2.4	K202_0140 EZ501U	210	400	13.85	2881/208	3900	3500	5000	3.4	10/5/1.5	11	22
217	63	70	16	2.2	K202_0140 EZ402U	210	400	13.85	2881/208	3900	3500	5000	2.1	10/5/1.5	11	22
217	93	116	23	1.5	K202_0140 EZ404U	220	400	13.85	2881/208	3900	3500	5000	3.5	10/5/1.5	11	24
217	99	107	25	1.4	K202_0140 EZ502U	220	400	13.85	2881/208	3900	3500	5000	5.7	10/5/1.5	11	24
217	99	112	25	1.4	K202_0140 EZ701U	220	400	13.85	2881/208	3900	3500	5000	9.0	10/5/1.5	11	26
217	130	149	32	1.1	K202_0140 EZ503U	220	400	13.85	2881/208	3900	3500	5000	8.1	10/5/1.5	11	25
236	20	21	5.4	3.8	K202_0125 EZ302U	62	92	12.71	559/44	3900	3500	5000	0.70	10/5/1.5	11	19
236	26	27	7.0	2.9	K202_0125 EZ303U	74	92	12.71	559/44	3900	3500	5000	0.81	10/5/1.5	11	20
236	35	37	9.4	3.9	K202_0125 EZ401U	100	370	12.71	559/44	3900	3500	5000	1.3	10/5/1.5	11	21
236	53	58	15	2.6	K202_0125 EZ501U	200	370	12.71	559/44	3900	3500	5000	3.3	10/5/1.5	11	22
236	58	64	16	2.3	K202_0125 EZ402U	200	370	12.71	559/44	3900	3500	5000	2.0	10/5/1.5	11	22
236	85	106	23	1.6	K202_0125 EZ404U	220	370	12.71	559/44	3900	3500	5000	3.4	10/5/1.5	11	24
236	91	99	25	1.5	K202_0125 EZ502U	220	370	12.71	559/44	3900	3500	5000	5.6	10/5/1.5	11	24
236	91	102	25	1.5	K202_0125 EZ701U	220	400	12.71	559/44	3900	3500	5000	8.9	10/5/1.5	11	26
236	120	137	33	1.1	K202_0125 EZ503U	220	370	12.71	559/44	3900	3500	5000	8.0	10/5/1.5	11	25
260	18	19	5.4	3.8	K202_0115 EZ302U	56	84	11.55	1247/108	3500	3100	4500	0.95	10/5/1.5	11	19
260	23	25	7.0	2.9	K202_0115 EZ303U	67	84	11.55	1247/108	3500	3100	4500	1.1	10/5/1.5	11	20
260	31	34	9.5	4.2	K202_0115 EZ401U	95	340	11.55	1247/108	3500	3100	4500	1.6	10/5/1.5	11	21
260	48	53	15	2.7	K202_0115 EZ501U	180	340	11.55	1247/108	3500	3100	4500	3.6	10/5/1.5	11	22
260	53	58	16	2.5	K202_0115 EZ402U	180	340	11.55	1247/108	3500	3100	4500	2.3	10/5/1.5	11	22
260	77	96	23	1.7	K202_0115 EZ404U	220	340	11.55	1247/108	3500	3100	4500	3.6	10/5/1.5	11	24
260	83	90	25	1.6	K202_0115 EZ502U	220	340	11.55	1247/108	3500	3100	4500	5.9	10/5/1.5	11	24

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
K2 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 220 Nm)																
260	83	93	25	1.6	K202_0115 EZ701U	220	400	11.55	1247/108	3500	3100	4500	9.2	10/5/1.5	11	26
260	109	124	33	1.2	K202_0115 EZ503U	220	340	11.55	1247/108	3500	3100	4500	8.2	10/5/1.5	11	25
298	27	29	9.6	4.6	K202_0100 EZ401U	83	290	10.07	2881/286	3900	3500	5000	1.5	10/5/1.5	11	21
298	42	46	15	3.0	K202_0100 EZ501U	160	290	10.07	2881/286	3900	3500	5000	3.5	10/5/1.5	11	22
298	46	51	16	2.7	K202_0100 EZ402U	160	290	10.07	2881/286	3900	3500	5000	2.2	10/5/1.5	11	22
298	67	84	24	1.9	K202_0100 EZ404U	220	290	10.07	2881/286	3900	3500	5000	3.6	10/5/1.5	11	24
298	72	78	25	1.7	K202_0100 EZ502U	220	290	10.07	2881/286	3900	3500	5000	5.8	10/5/1.5	11	24
298	72	81	25	1.7	K202_0100 EZ701U	200	400	10.07	2881/286	3900	3500	5000	9.1	10/5/1.5	11	26
298	95	108	33	1.3	K202_0100 EZ503U	220	290	10.07	2881/286	3900	3500	5000	8.2	10/5/1.5	11	25
298	117	141	41	1.1	K202_0100 EZ702U	220	400	10.07	2881/286	3900	3500	5000	14	10/5/1.5	11	28
326	25	27	9.7	4.9	K202_0092 EZ401U	76	270	9.190	2279/248	3500	3100	4500	1.8	10/5/1.5	11	21
326	38	42	15	3.2	K202_0092 EZ501U	140	270	9.190	2279/248	3500	3100	4500	3.8	10/5/1.5	11	22
326	42	46	16	2.9	K202_0092 EZ402U	140	270	9.190	2279/248	3500	3100	4500	2.5	10/5/1.5	11	22
326	62	77	24	2.0	K202_0092 EZ404U	210	270	9.190	2279/248	3500	3100	4500	3.9	10/5/1.5	11	24
326	66	71	26	1.8	K202_0092 EZ502U	210	270	9.190	2279/248	3500	3100	4500	6.1	10/5/1.5	11	24
326	66	74	26	1.8	K202_0092 EZ701U	180	400	9.190	2279/248	3500	3100	4500	9.4	10/5/1.5	11	26
326	86	99	34	1.4	K202_0092 EZ503U	210	270	9.190	2279/248	3500	3100	4500	8.5	10/5/1.5	11	25
326	107	128	42	1.1	K202_0092 EZ702U	220	400	9.190	2279/248	3500	3100	4500	15	10/5/1.5	11	28
326	120	143	47	1.0	K202_0092 EZ505U	220	400	9.190	2279/248	3500	3100	4500	13	10/5/1.5	11	28
357	17	18	7.2	2.9	K202_0084 EZ303U	49	61	8.397	2494/297	3500	3100	4500	1.2	10/5/1.5	11	20
357	23	24	9.8	4.3	K202_0084 EZ401U	69	120	8.397	2494/297	3500	3100	4500	1.7	10/5/1.5	11	21
357	35	38	15	3.4	K202_0084 EZ501U	130	240	8.397	2494/297	3500	3100	4500	3.7	10/5/1.5	11	22
357	38	42	16	3.1	K202_0084 EZ402U	130	240	8.397	2494/297	3500	3100	4500	2.4	10/5/1.5	11	22
357	56	70	24	2.1	K202_0084 EZ404U	200	240	8.397	2494/297	3500	3100	4500	3.7	10/5/1.5	11	24
357	60	65	26	2.0	K202_0084 EZ502U	200	240	8.397	2494/297	3500	3100	4500	6.0	10/5/1.5	11	24
357	60	68	26	2.0	K202_0084 EZ701U	160	400	8.397	2494/297	3500	3100	4500	9.3	10/5/1.5	11	26
357	79	90	34	1.5	K202_0084 EZ503U	200	240	8.397	2494/297	3500	3100	4500	8.3	10/5/1.5	11	25
357	98	117	42	1.2	K202_0084 EZ702U	220	400	8.397	2494/297	3500	3100	4500	14	10/5/1.5	11	28
357	110	130	47	1.1	K202_0084 EZ505U	220	400	8.397	2494/297	3500	3100	4500	13	10/5/1.5	11	28
421	51	57	26	2.2	K202_0071 EZ701U	140	400	7.118	2107/296	3000	2600	4000	9.8	10/5/1.5	11	26
421	83	99	42	1.4	K202_0071 EZ702U	210	400	7.118	2107/296	3000	2600	4000	15	10/5/1.5	11	28
421	93	110	48	1.2	K202_0071 EZ505U	210	400	7.118	2107/296	3000	2600	4000	13	10/5/1.5	11	28
449	18	19	10	4.3	K202_0067 EZ401U	55	97	6.683	2279/341	3500	3100	4500	2.0	10/5/1.5	11	21
449	28	30	15	3.9	K202_0067 EZ501U	100	190	6.683	2279/341	3500	3100	4500	4.0	10/5/1.5	11	22
449	30	34	17	3.6	K202_0067 EZ402U	100	190	6.683	2279/341	3500	3100	4500	2.7	10/5/1.5	11	22
449	45	56	25	2.4	K202_0067 EZ404U	160	190	6.683	2279/341	3500	3100	4500	4.1	10/5/1.5	11	24
449	48	52	26	2.3	K202_0067 EZ502U	160	190	6.683	2279/341	3500	3100	4500	6.3	10/5/1.5	11	24
449	48	54	26	2.3	K202_0067 EZ701U	130	400	6.683	2279/341	3500	3100	4500	9.6	10/5/1.5	11	26
449	63	72	35	1.7	K202_0067 EZ503U	160	190	6.683	2279/341	3500	3100	4500	8.7	10/5/1.5	11	25
449	78	93	43	1.4	K202_0067 EZ702U	210	400	6.683	2279/341	3500	3100	4500	15	10/5/1.5	11	28
449	88	104	48	1.3	K202_0067 EZ505U	210	400	6.683	2279/341	3500	3100	4500	13	10/5/1.5	11	28
449	107	135	59	1.0	K202_0067 EZ703U	210	400	6.683	2279/341	3500	3100	4500	23	10/5/1.5	11	30
500	25	27	15	4.2	K202_0060 EZ501U	93	170	6.000	6/1	3000	2600	4000	4.6	10/5/1.5	11	22
500	27	30	17	3.9	K202_0060 EZ402U	93	170	6.000	6/1	3000	2600	4000	3.3	10/5/1.5	11	22
500	40	50	25	2.6	K202_0060 EZ404U	140	170	6.000	6/1	3000	2600	4000	4.7	10/5/1.5	11	24
500	43	47	27	2.5	K202_0060 EZ502U	140	170	6.000	6/1	3000	2600	4000	6.9	10/5/1.5	11	24
500	43	48	27	2.5	K202_0060 EZ701U	120	400	6.000	6/1	3000	2600	4000	10	10/5/1.5	11	26
500	56	65	35	1.9	K202_0060 EZ503U	140	170	6.000	6/1	3000	2600	4000	9.3	10/5/1.5	11	25
500	70	84	43	1.5	K202_0060 EZ702U	200	400	6.000	6/1	3000	2600	4000	15	10/5/1.5	11	28
500	79	93	48	1.3	K202_0060 EZ505U	200	400	6.000	6/1	3000	2600	4000	14	10/5/1.5	11	28
500	96	121	59	1.1	K202_0060 EZ703U	200	400	6.000	6/1	3000	2600	4000	23	10/5/1.5	11	30
579	37	42	27	2.7	K202_0052 EZ701U	100	380	5.177	2107/407	3000	2600	4000	10	10/5/1.5	11	26
579	60	72	44	1.7	K202_0052 EZ702U	190	380	5.177	2107/407	3000	2600	4000	15	10/5/1.5	11	28
579	68	80	49	1.5	K202_0052 EZ505U	190	380	5.177	2107/407	3000	2600	4000	14	10/5/1.5	11	28
579	83	104	60	1.2	K202_0052 EZ703U	190	380	5.177	2107/407	3000	2600	4000	23	10/5/1.5	11	30
687	20	22	17	4.8	K202_0044 EZ402U	68	130	4.364	48/11	3000	2600	4000	3.7	10/5/1.5	11	22
687	29	36	25	3.3	K202_0044 EZ404U	100	130	4.364	48/11	3000	2600	4000	5.1	10/5/1.5	11	24
687	31	34	27	3.0	K202_0044 EZ502U	100	130	4.364	48/11	3000	2600	4000	7.3	10/5/1.5	11	24
687	31	35	27	3.0	K202_0044 EZ701U	85	320	4.364	48/11	3000	2600	4000	11	10/5/1.5	11	26
687	41	47	36	2.3	K202_0044 EZ503U	100	130	4.364	48/11	3000	2600	4000	9.7	10/5/1.5	11	25
687	51	61	44	1.9	K202_0044 EZ702U	170	320	4.364	48/11	3000	2600	4000	16	10/5/1.5	11	28
687	57	68	50	1.7	K202_0044 EZ505U	180	320	4.364	48/11	3000	2600	4000	14	10/5/1.5	11	28
687	70	88	61	1.4	K202_0044 EZ703U	180	320	4.364	48/11	3000	2600	4000	24	10/5/1.5	11	30
750	11	12	10	4.3	K202_0040 EZ401U	33	58	4.000	4/1	3000	2600	4000	3.3	10/5/1.5	11	21

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
K2 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 220 Nm)																
750	17	18	16	2.8	K202_0040 EZ501U	47	58	4.000	4/1	3000	2600	4000	5.3	10/5/1.5	11	22
750	18	20	17	2.6	K202_0040 EZ402U	47	58	4.000	4/1	3000	2600	4000	4.0	10/5/1.5	11	22
750	29	32	27	3.2	K202_0040 EZ701U	78	290	4.000	4/1	3000	2600	4000	11	10/5/1.5	11	26
750	47	56	45	2.0	K202_0040 EZ702U	160	290	4.000	4/1	3000	2600	4000	16	10/5/1.5	11	28
750	52	62	50	1.8	K202_0040 EZ505U	170	290	4.000	4/1	3000	2600	4000	15	10/5/1.5	11	28
750	64	81	61	1.4	K202_0040 EZ703U	170	290	4.000	4/1	3000	2600	4000	24	10/5/1.5	11	30
K2 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 220 Nm)																
447	93	149	37	1.2	K202_0100 EZ505U	220	400	10.07	2881/286	3900	3500	5000	13	10/5/1.5	11	28
490	85	136	38	1.3	K202_0092 EZ505U	220	400	9.190	2279/248	3500	3100	4500	13	10/5/1.5	11	28
536	77	125	38	1.3	K202_0084 EZ505U	220	400	8.397	2494/297	3500	3100	4500	13	10/5/1.5	11	28
536	99	163	48	1.0	K202_0084 EZ703U	220	400	8.397	2494/297	3500	3100	4500	22	10/5/1.5	11	30
673	62	99	39	1.6	K202_0067 EZ505U	210	400	6.683	2279/341	3500	3100	4500	13	10/5/1.5	11	28
673	78	130	49	1.2	K202_0067 EZ703U	210	400	6.683	2279/341	3500	3100	4500	23	10/5/1.5	11	30
K3 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 390 Nm)																
17	275	291	4.5	1.3	K303_1810 EZ302U	380	690	181.0	86903/480	3800	3500	5000	0.35	10/5/2.5	16	29
22	207	218	4.1	1.7	K303_1360 EZ302U	380	690	136.0	14147/104	3800	3500	5000	0.35	10/5/2.5	16	29
22	269	285	5.3	1.3	K303_1360 EZ303U	380	690	136.0	14147/104	3800	3500	5000	0.46	10/5/2.5	16	30
27	166	175	3.9	2.1	K303_1090 EZ302U	380	690	109.2	167743/1536	3800	3500	5000	0.36	10/5/2.5	16	29
27	216	229	5.0	1.6	K303_1090 EZ303U	380	690	109.2	167743/1536	3800	3500	5000	0.47	10/5/2.5	16	30
33	139	147	3.7	2.5	K303_0910 EZ302U	380	590	91.23	26273/288	3800	3500	5000	0.37	10/5/2.5	16	29
33	181	191	4.8	1.9	K303_0910 EZ303U	380	590	91.23	26273/288	3800	3500	5000	0.48	10/5/2.5	16	30
33	244	262	6.5	1.4	K303_0910 EZ401U	380	590	91.23	26273/288	3800	3500	5000	1.0	10/5/2.5	16	31
38	121	128	4.4	2.4	K303_0790 EZ302U	380	510	79.42	167743/2112	3800	3500	5000	0.36	10/5/2.5	16	29
38	157	166	5.7	1.8	K303_0790 EZ303U	380	510	79.42	167743/2112	3800	3500	5000	0.47	10/5/2.5	16	30
38	213	228	7.7	1.3	K303_0790 EZ401U	380	510	79.42	167743/2112	3800	3500	5000	1.0	10/5/2.5	16	31
43	107	113	5.8	2.0	K302_0690 EZ302U	250	310	69.43	6665/96	3800	3500	5000	0.37	10/4/1.5	16	24
43	139	147	7.5	1.5	K302_0690 EZ303U	250	310	69.43	6665/96	3800	3500	5000	0.48	10/4/1.5	16	25
44	103	109	3.5	3.3	K303_0680 EZ302U	320	430	67.73	74777/1104	3800	3500	5000	0.38	10/5/2.5	16	29
44	134	142	4.6	2.6	K303_0680 EZ303U	350	430	67.73	74777/1104	3800	3500	5000	0.49	10/5/2.5	16	30
44	181	194	6.2	1.9	K303_0680 EZ401U	350	430	67.73	74777/1104	3800	3500	5000	1.0	10/5/2.5	16	31
45	101	107	4.4	2.7	K303_0660 EZ302U	320	430	66.35	26273/396	3800	3500	5000	0.37	10/5/2.5	16	29
45	131	139	5.8	2.0	K303_0660 EZ303U	340	430	66.35	26273/396	3800	3500	5000	0.48	10/5/2.5	16	30
45	178	190	7.8	1.5	K303_0660 EZ401U	340	430	66.35	26273/396	3800	3500	5000	1.0	10/5/2.5	16	31
54	151	162	7.7	1.8	K302_0560 EZ401U	320	530	55.71	2451/44	3800	3500	5000	1.0	10/4/1.5	16	26
55	83	88	3.6	3.4	K303_0550 EZ302U	260	350	54.58	70735/1296	3800	3500	5000	0.40	10/5/2.5	16	29
55	108	114	4.6	2.6	K303_0550 EZ303U	280	350	54.58	70735/1296	3800	3500	5000	0.51	10/5/2.5	16	30
55	146	157	6.3	1.9	K303_0550 EZ401U	280	350	54.58	70735/1296	3800	3500	5000	1.0	10/5/2.5	16	31
56	222	242	8.8	1.6	K303_0540 EZ501U	380	690	53.88	8729/162	3800	3500	5000	3.1	10/5/2.5	16	32
59	78	82	7.3	2.0	K302_0500 EZ302U	180	220	50.49	6665/132	3800	3500	5000	0.37	10/4/1.5	16	24
59	101	107	9.6	1.5	K302_0500 EZ303U	180	220	50.49	6665/132	3800	3500	5000	0.48	10/4/1.5	16	25
61	75	79	4.5	3.3	K303_0490 EZ302U	240	320	49.26	74777/1518	3800	3500	5000	0.39	10/5/2.5	16	29
61	97	103	5.8	2.6	K303_0490 EZ303U	250	320	49.26	74777/1518	3800	3500	5000	0.50	10/5/2.5	16	30
61	132	141	7.8	1.9	K303_0490 EZ401U	250	320	49.26	74777/1518	3800	3500	5000	1.0	10/5/2.5	16	31
62	200	219	8.5	1.8	K303_0490 EZ501U	380	690	48.63	184556/3795	3800	3500	5000	3.1	10/5/2.5	16	32
65	126	135	5.7	2.7	K302_0460 EZ401U	380	690	46.23	1849/40	3800	3500	5000	1.1	10/4/1.5	16	26
65	193	211	8.7	1.8	K302_0460 EZ501U	390	690	46.23	1849/40	3800	3500	5000	3.1	10/4/1.5	16	27
65	211	233	9.5	1.6	K302_0460 EZ402U	390	690	46.23	1849/40	3800	3500	5000	1.8	10/4/1.5	16	27
67	185	202	8.4	1.9	K303_0450 EZ501U	380	690	44.89	11223/250	3800	3500	5000	3.1	10/5/2.5	16	32
74	110	118	9.8	1.8	K302_0410 EZ401U	230	390	40.51	4902/121	3800	3500	5000	1.1	10/4/1.5	16	26
77	161	176	8.2	2.1	K303_0390 EZ501U	380	690	39.19	34916/891	3800	3500	5000	3.1	10/5/2.5	16	32
84	147	161	8.2	2.3	K303_0360 EZ501U	380	630	35.83	215/6	3800	3500	5000	3.2	10/5/2.5	16	32
84	253	274	14	1.3	K303_0360 EZ502U	380	630	35.83	215/6	3800	3500	5000	5.5	10/5/2.5	16	34
86	94	101	5.5	3.5	K302_0350 EZ401U	290	700	34.73	903/26	3800	3500	5000	1.2	10/4/1.5	16	26
86	145	158	8.4	2.3	K302_0350 EZ501U	390	700	34.73	903/26	3800	3500	5000	3.2	10/4/1.5	16	27
86	158	175	9.2	2.1	K302_0350 EZ402U	390	700	34.73	903/26	3800	3500	5000	1.9	10/4/1.5	16	27
86	232	290	13	1.4	K302_0350 EZ404U	390	700	34.73	903/26	3800	3500	5000	3.2	10/4/1.5	16	29
86	249	270	14	1.3	K302_0350 EZ502U	390	700	34.73	903/26	3800	3500	5000	5.5	10/4/1.5	16	29
86	249	280	14	1.3	K302_0350 EZ701U	390	700	34.73	903/26	3800	3500	5000	8.8	10/4/1.5	16	31
89	91	98	7.2	2.7	K302_0340 EZ401U	280	500	33.62	1849/55	3800	3500	5000	1.1	10/4/1.5	16	26
89	140	153	11	1.8	K302_0340 EZ501U	300	500	33.62	1849/55	3800	3500	5000	3.1	10/4/1.5	16	27
89	153	170	12	1.6	K302_0340 EZ402U	300	500	33.62	1849/55	3800	3500	5000	1.8	10/4/1.5	16	27
92	134	147	8.3	2.4	K303_0330 EZ501U	380	580	32.65	44892/1375	3800	3500	5000	3.1	10/5/2.5	16	32
92	231	250	14	1.4	K303_0330 EZ502U	380	580	32.65	44892/1375	3800	3500	5000	5.4	10/5/2.5	16	34
108	76	81	5.6	4.1	K302_0280 EZ401U	230	700	27.88	3569/128	3800	3500	5000	1.3	10/4/1.5	16	26

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
K3 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 390 Nm)																
108	116	127	8.5	2.7	K302_0280 EZ501U	390	700	27.88	3569/128	3800	3500	5000	3.3	10/4/1.5	16	27
108	127	141	9.3	2.4	K302_0280 EZ402U	390	700	27.88	3569/128	3800	3500	5000	2.0	10/4/1.5	16	27
108	187	233	14	1.7	K302_0280 EZ404U	390	700	27.88	3569/128	3800	3500	5000	3.3	10/4/1.5	16	29
108	200	216	15	1.5	K302_0280 EZ502U	390	700	27.88	3569/128	3800	3500	5000	5.6	10/4/1.5	16	29
108	200	224	15	1.5	K302_0280 EZ701U	390	700	27.88	3569/128	3800	3500	5000	8.9	10/4/1.5	16	31
119	69	74	5.6	4.4	K302_0250 EZ401U	210	600	25.26	3612/143	3800	3500	5000	1.2	10/4/1.5	16	26
119	105	115	8.6	2.8	K302_0250 EZ501U	390	600	25.26	3612/143	3800	3500	5000	3.2	10/4/1.5	16	27
119	115	127	9.4	2.6	K302_0250 EZ402U	390	600	25.26	3612/143	3800	3500	5000	1.9	10/4/1.5	16	27
119	169	211	14	1.8	K302_0250 EZ404U	390	600	25.26	3612/143	3800	3500	5000	3.3	10/4/1.5	16	29
119	181	196	15	1.6	K302_0250 EZ502U	390	600	25.26	3612/143	3800	3500	5000	5.5	10/4/1.5	16	29
119	181	203	15	1.6	K302_0250 EZ701U	390	600	25.26	3612/143	3800	3500	5000	8.8	10/4/1.5	16	31
119	238	272	19	1.3	K302_0250 EZ503U	390	600	25.26	3612/143	3800	3500	5000	7.9	10/4/1.5	16	30
129	63	68	5.6	4.6	K302_0230 EZ401U	190	640	23.29	559/24	3800	3500	5000	1.4	10/4/1.5	16	26
129	97	106	8.7	3.0	K302_0230 EZ501U	360	640	23.29	559/24	3800	3500	5000	3.4	10/4/1.5	16	27
129	106	117	9.5	2.7	K302_0230 EZ402U	360	640	23.29	559/24	3800	3500	5000	2.1	10/4/1.5	16	27
129	156	194	14	1.9	K302_0230 EZ404U	390	640	23.29	559/24	3800	3500	5000	3.5	10/4/1.5	16	29
129	167	181	15	1.7	K302_0230 EZ502U	390	640	23.29	559/24	3800	3500	5000	5.7	10/4/1.5	16	29
129	167	188	15	1.7	K302_0230 EZ701U	390	700	23.29	559/24	3800	3500	5000	9.0	10/4/1.5	16	31
129	219	251	20	1.3	K302_0230 EZ503U	390	640	23.29	559/24	3800	3500	5000	8.1	10/4/1.5	16	30
148	55	59	5.7	4.3	K302_0200 EZ401U	170	300	20.28	3569/176	3800	3500	5000	1.3	10/4/1.5	16	26
148	85	92	8.8	3.3	K302_0200 EZ501U	310	510	20.28	3569/176	3800	3500	5000	3.3	10/4/1.5	16	27
148	92	102	9.6	3.0	K302_0200 EZ402U	310	510	20.28	3569/176	3800	3500	5000	2.0	10/4/1.5	16	27
148	136	169	14	2.0	K302_0200 EZ404U	390	510	20.28	3569/176	3800	3500	5000	3.4	10/4/1.5	16	29
148	146	157	15	1.9	K302_0200 EZ502U	390	510	20.28	3569/176	3800	3500	5000	5.6	10/4/1.5	16	29
148	146	163	15	1.9	K302_0200 EZ701U	390	700	20.28	3569/176	3800	3500	5000	8.9	10/4/1.5	16	31
148	191	218	20	1.5	K302_0200 EZ503U	390	510	20.28	3569/176	3800	3500	5000	8.0	10/4/1.5	16	30
148	236	283	24	1.2	K302_0200 EZ702U	390	700	20.28	3569/176	3800	3500	5000	14	10/4/1.5	16	33
173	47	50	5.8	4.3	K302_0175 EZ401U	140	250	17.29	1591/92	3500	3100	5000	1.7	10/4/1.5	16	26
173	72	79	8.9	3.7	K302_0175 EZ501U	270	500	17.29	1591/92	3500	3100	5000	3.7	10/4/1.5	16	27
173	79	87	9.7	3.3	K302_0175 EZ402U	270	500	17.29	1591/92	3500	3100	5000	2.4	10/4/1.5	16	27
173	116	144	14	2.3	K302_0175 EZ404U	390	500	17.29	1591/92	3500	3100	5000	3.7	10/4/1.5	16	29
173	124	134	15	2.1	K302_0175 EZ502U	390	500	17.29	1591/92	3500	3100	5000	6.0	10/4/1.5	16	29
173	124	139	15	2.1	K302_0175 EZ701U	340	700	17.29	1591/92	3500	3100	5000	9.3	10/4/1.5	16	31
173	163	186	20	1.6	K302_0175 EZ503U	390	500	17.29	1591/92	3500	3100	5000	8.3	10/4/1.5	16	30
173	201	242	25	1.3	K302_0175 EZ702U	390	700	17.29	1591/92	3500	3100	5000	14	10/4/1.5	16	33
173	226	268	28	1.2	K302_0175 EZ505U	390	700	17.29	1591/92	3500	3100	5000	13	10/4/1.5	16	33
177	46	49	5.8	4.3	K302_0170 EZ401U	140	250	16.94	559/33	3800	3500	5000	1.5	10/4/1.5	16	26
177	71	77	8.9	3.7	K302_0170 EZ501U	260	470	16.94	559/33	3800	3500	5000	3.4	10/4/1.5	16	27
177	77	85	9.7	3.4	K302_0170 EZ402U	260	470	16.94	559/33	3800	3500	5000	2.2	10/4/1.5	16	27
177	113	141	14	2.3	K302_0170 EZ404U	380	470	16.94	559/33	3800	3500	5000	3.5	10/4/1.5	16	29
177	122	131	15	2.2	K302_0170 EZ502U	380	470	16.94	559/33	3800	3500	5000	5.7	10/4/1.5	16	29
177	122	136	15	2.2	K302_0170 EZ701U	330	700	16.94	559/33	3800	3500	5000	9.0	10/4/1.5	16	31
177	159	182	20	1.6	K302_0170 EZ503U	380	470	16.94	559/33	3800	3500	5000	8.1	10/4/1.5	16	30
177	197	237	25	1.3	K302_0170 EZ702U	390	700	16.94	559/33	3800	3500	5000	14	10/4/1.5	16	33
177	222	263	28	1.2	K302_0170 EZ505U	390	700	16.94	559/33	3800	3500	5000	13	10/4/1.5	16	33
215	58	64	9.0	4.2	K302_0140 EZ501U	220	410	13.94	1505/108	3500	3100	5000	3.9	10/4/1.5	16	27
215	64	70	9.9	3.9	K302_0140 EZ402U	220	410	13.94	1505/108	3500	3100	5000	2.7	10/4/1.5	16	27
215	93	116	15	2.6	K302_0140 EZ404U	320	410	13.94	1505/108	3500	3100	5000	4.0	10/4/1.5	16	29
215	100	108	16	2.5	K302_0140 EZ502U	320	410	13.94	1505/108	3500	3100	5000	6.2	10/4/1.5	16	29
215	100	112	16	2.5	K302_0140 EZ701U	270	700	13.94	1505/108	3500	3100	5000	9.5	10/4/1.5	16	31
215	131	150	20	1.9	K302_0140 EZ503U	320	410	13.94	1505/108	3500	3100	5000	8.6	10/4/1.5	16	30
215	162	195	25	1.5	K302_0140 EZ702U	390	700	13.94	1505/108	3500	3100	5000	15	10/4/1.5	16	33
215	182	216	28	1.3	K302_0140 EZ505U	390	700	13.94	1505/108	3500	3100	5000	13	10/4/1.5	16	33
215	223	281	35	1.1	K302_0140 EZ703U	390	700	13.94	1505/108	3500	3100	5000	23	10/4/1.5	16	35
239	34	37	5.9	4.3	K302_0125 EZ401U	100	180	12.58	3182/253	3500	3100	5000	1.8	10/4/1.5	16	26
239	52	57	9.1	4.5	K302_0125 EZ501U	200	370	12.58	3182/253	3500	3100	5000	3.8	10/4/1.5	16	27
239	57	63	10	4.1	K302_0125 EZ402U	200	370	12.58	3182/253	3500	3100	5000	2.5	10/4/1.5	16	27
239	84	105	15	2.8	K302_0125 EZ404U	290	370	12.58	3182/253	3500	3100	5000	3.8	10/4/1.5	16	29
239	90	98	16	2.6	K302_0125 EZ502U	290	370	12.58	3182/253	3500	3100	5000	6.1	10/4/1.5	16	29
239	90	101	16	2.6	K302_0125 EZ701U	240	700	12.58	3182/253	3500	3100	5000	9.4	10/4/1.5	16	31
239	118	135	21	2.0	K302_0125 EZ503U	290	370	12.58	3182/253	3500	3100	5000	8.4	10/4/1.5	16	30
239	146	176	25	1.6	K302_0125 EZ702U	390	700	12.58	3182/253	3500	3100	5000	15	10/4/1.5	16	33
239	165	195	29	1.4	K302_0125 EZ505U	390	700	12.58	3182/253	3500	3100	5000	13	10/4/1.5	16	33
239	201	254	35	1.2	K302_0125 EZ703U	390	700	12.58	3182/253	3500	3100	5000	22	10/4/1.5	16	35

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
K3 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 390 Nm)																
258	48	53	9.2	4.8	K302_0115 EZ501U	180	340	11.61	1161/100	3200	2800	4200	4.3	10/4/1.5	16	27
258	53	59	10	4.4	K302_0115 EZ402U	180	340	11.61	1161/100	3200	2800	4200	3.0	10/4/1.5	16	27
258	78	97	15	3.0	K302_0115 EZ404U	270	340	11.61	1161/100	3200	2800	4200	4.4	10/4/1.5	16	29
258	83	90	16	2.8	K302_0115 EZ502U	270	340	11.61	1161/100	3200	2800	4200	6.6	10/4/1.5	16	29
258	83	93	16	2.8	K302_0115 EZ701U	230	700	11.61	1161/100	3200	2800	4200	9.9	10/4/1.5	16	31
258	109	125	21	2.1	K302_0115 EZ503U	270	340	11.61	1161/100	3200	2800	4200	9.0	10/4/1.5	16	30
258	135	162	26	1.7	K302_0115 EZ702U	390	700	11.61	1161/100	3200	2800	4200	15	10/4/1.5	16	33
258	152	180	29	1.5	K302_0115 EZ505U	390	700	11.61	1161/100	3200	2800	4200	14	10/4/1.5	16	33
258	186	234	35	1.2	K302_0115 EZ703U	390	700	11.61	1161/100	3200	2800	4200	23	10/4/1.5	16	35
296	46	51	10	4.8	K302_0100 EZ402U	160	290	10.14	3010/297	3500	3100	5000	2.8	10/4/1.5	16	27
296	68	85	15	3.3	K302_0100 EZ404U	240	290	10.14	3010/297	3500	3100	5000	4.2	10/4/1.5	16	29
296	73	79	16	3.0	K302_0100 EZ502U	240	290	10.14	3010/297	3500	3100	5000	6.4	10/4/1.5	16	29
296	73	82	16	3.0	K302_0100 EZ701U	200	700	10.14	3010/297	3500	3100	5000	9.7	10/4/1.5	16	31
296	95	109	21	2.3	K302_0100 EZ503U	240	290	10.14	3010/297	3500	3100	5000	8.8	10/4/1.5	16	30
296	118	142	26	1.9	K302_0100 EZ702U	390	700	10.14	3010/297	3500	3100	5000	15	10/4/1.5	16	33
296	133	157	29	1.7	K302_0100 EZ505U	390	700	10.14	3010/297	3500	3100	5000	13	10/4/1.5	16	33
296	162	204	36	1.4	K302_0100 EZ703U	390	700	10.14	3010/297	3500	3100	5000	23	10/4/1.5	16	35
324	67	75	16	3.2	K302_0093 EZ701U	180	670	9.267	1075/116	3200	2800	4200	10	10/4/1.5	16	31
324	108	129	26	2.0	K302_0093 EZ702U	370	670	9.267	1075/116	3200	2800	4200	16	10/4/1.5	16	33
324	121	144	29	1.8	K302_0093 EZ505U	390	670	9.267	1075/116	3200	2800	4200	14	10/4/1.5	16	33
324	148	187	36	1.4	K302_0093 EZ703U	390	670	9.267	1075/116	3200	2800	4200	24	10/4/1.5	16	35
355	57	70	15	3.5	K302_0084 EZ404U	200	250	8.444	2322/275	3200	2800	4200	4.6	10/4/1.5	16	29
355	61	66	16	3.2	K302_0084 EZ502U	200	250	8.444	2322/275	3200	2800	4200	6.8	10/4/1.5	16	29
355	61	68	16	3.4	K302_0084 EZ701U	160	610	8.444	2322/275	3200	2800	4200	10	10/4/1.5	16	31
355	79	91	21	2.5	K302_0084 EZ503U	200	250	8.444	2322/275	3200	2800	4200	9.2	10/4/1.5	16	30
355	98	118	26	2.1	K302_0084 EZ702U	340	610	8.444	2322/275	3200	2800	4200	15	10/4/1.5	16	33
355	111	131	30	1.9	K302_0084 EZ505U	390	610	8.444	2322/275	3200	2800	4200	14	10/4/1.5	16	33
355	135	170	36	1.5	K302_0084 EZ703U	390	610	8.444	2322/275	3200	2800	4200	23	10/4/1.5	16	35
406	53	60	16	3.7	K302_0074 EZ701U	140	540	7.391	473/64	2700	2300	3800	11	10/4/1.5	16	31
406	86	103	27	2.3	K302_0074 EZ702U	290	540	7.391	473/64	2700	2300	3800	16	10/4/1.5	16	33
406	97	115	30	2.1	K302_0074 EZ505U	380	540	7.391	473/64	2700	2300	3800	15	10/4/1.5	16	33
406	118	149	37	1.7	K302_0074 EZ703U	380	540	7.391	473/64	2700	2300	3800	24	10/4/1.5	16	35
445	48	54	17	4.0	K302_0067 EZ701U	130	490	6.740	2150/319	3200	2800	4200	11	10/4/1.5	16	31
445	78	94	27	2.5	K302_0067 EZ702U	270	490	6.740	2150/319	3200	2800	4200	16	10/4/1.5	16	33
445	88	105	30	2.2	K302_0067 EZ505U	360	490	6.740	2150/319	3200	2800	4200	14	10/4/1.5	16	33
445	108	136	37	1.8	K302_0067 EZ703U	360	490	6.740	2150/319	3200	2800	4200	24	10/4/1.5	16	35
500	43	48	17	4.3	K302_0060 EZ701U	120	440	6.000	6/1	2700	2300	3800	12	10/4/1.5	16	31
500	70	84	27	2.7	K302_0060 EZ702U	240	440	6.000	6/1	2700	2300	3800	17	10/4/1.5	16	33
500	79	93	30	2.4	K302_0060 EZ505U	350	440	6.000	6/1	2700	2300	3800	16	10/4/1.5	16	33
500	96	121	37	1.9	K302_0060 EZ703U	350	440	6.000	6/1	2700	2300	3800	25	10/4/1.5	16	35
500	124	176	48	1.5	K302_0060 EZ705U	350	700	6.000	6/1	2700	2300	3800	37	10/4/1.5	16	41
558	39	43	17	4.6	K302_0054 EZ701U	100	390	5.375	43/8	2700	2300	3800	12	10/4/1.5	16	31
558	63	75	27	2.9	K302_0054 EZ702U	210	390	5.375	43/8	2700	2300	3800	17	10/4/1.5	16	33
558	70	83	31	2.5	K302_0054 EZ505U	310	390	5.375	43/8	2700	2300	3800	15	10/4/1.5	16	33
558	86	108	38	2.1	K302_0054 EZ703U	310	390	5.375	43/8	2700	2300	3800	25	10/4/1.5	16	35
687	51	61	28	3.3	K302_0044 EZ702U	170	320	4.364	48/11	2700	2300	3800	18	10/4/1.5	16	33
687	57	68	31	2.9	K302_0044 EZ505U	250	320	4.364	48/11	2700	2300	3800	16	10/4/1.5	16	33
687	70	88	38	2.4	K302_0044 EZ703U	250	320	4.364	48/11	2700	2300	3800	26	10/4/1.5	16	35
687	90	128	49	1.8	K302_0044 EZ705U	310	700	4.364	48/11	2700	2300	3800	38	10/4/1.5	16	41
750	47	56	28	3.5	K302_0040 EZ702U	160	290	4.000	4/1	2700	2300	3800	19	10/4/1.5	16	33
750	52	62	31	3.1	K302_0040 EZ505U	230	290	4.000	4/1	2700	2300	3800	17	10/4/1.5	16	33
750	64	81	38	2.5	K302_0040 EZ703U	230	290	4.000	4/1	2700	2300	3800	27	10/4/1.5	16	35
750	83	117	50	2.0	K302_0040 EZ705U	310	700	4.000	4/1	2700	2300	3800	39	10/4/1.5	16	41
K3 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 390 Nm)																
260	159	257	22	1.4	K302_0175 EZ505U	390	700	17.29	1591/92	3500	3100	5000	13	10/4/1.5	16	33
266	156	251	22	1.5	K302_0170 EZ505U	390	700	16.94	559/33	3800	3500	5000	13	10/4/1.5	16	33
323	128	207	23	1.7	K302_0140 EZ505U	390	700	13.94	1505/108	3500	3100	5000	13	10/4/1.5	16	33
323	164	270	29	1.3	K302_0140 EZ703U	390	700	13.94	1505/108	3500	3100	5000	23	10/4/1.5	16	35
358	116	187	23	1.8	K302_0125 EZ505U	390	700	12.58	3182/253	3500	3100	5000	13	10/4/1.5	16	33
358	148	244	29	1.4	K302_0125 EZ703U	390	700	12.58	3182/253	3500	3100	5000	22	10/4/1.5	16	35
444	93	150	23	2.1	K302_0100 EZ505U	390	700	10.14	3010/297	3500	3100	5000	13	10/4/1.5	16	33
444	119	197	30	1.6	K302_0100 EZ703U	390	700	10.14	3010/297	3500	3100	5000	23	10/4/1.5	16	35

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
K4 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 520 Nm)																
333	254	385	63	1.3	K402_0060 EZ805U	520	1100	6.000	6/1	2600	2200	3500	139	10/4/1.5	31	82
369	230	348	63	1.3	K402_0054 EZ805U	510	1050	5.422	1849/341	2600	2200	3500	139	10/4/1.5	31	82
458	185	280	64	1.5	K402_0044 EZ805U	470	850	4.364	48/11	2600	2200	3500	141	10/4/1.5	31	82
500	170	256	65	1.6	K402_0040 EZ805U	460	780	4.000	4/1	2600	2200	3500	142	10/4/1.5	31	82
K4 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 600 Nm)																
14	332	350	4.1	1.3	K403_2180 EZ302U	510	850	218.2	38399/176	3600	3300	5000	0.35	10/5/2.5	31	42
17	276	291	3.4	1.8	K403_1810 EZ302U	590	980	181.4	14147/78	3600	3300	5000	0.35	10/5/2.5	31	42
17	359	380	4.4	1.4	K403_1810 EZ303U	590	980	181.4	14147/78	3600	3300	5000	0.46	10/5/2.5	31	43
22	207	219	3.4	2.2	K403_1360 EZ302U	590	810	136.1	196037/1440	3600	3300	5000	0.36	10/5/2.5	31	42
22	269	285	4.4	1.7	K403_1360 EZ303U	590	810	136.1	196037/1440	3600	3300	5000	0.47	10/5/2.5	31	43
22	364	390	5.9	1.3	K403_1360 EZ401U	590	810	136.1	196037/1440	3600	3300	5000	1.0	10/5/2.5	31	44
28	165	175	3.3	2.7	K403_1090 EZ302U	520	700	108.8	62651/576	3600	3300	5000	0.38	10/5/2.5	31	42
28	215	228	4.4	2.0	K403_1090 EZ303U	560	700	108.8	62651/576	3600	3300	5000	0.49	10/5/2.5	31	43
28	291	312	5.9	1.5	K403_1090 EZ401U	560	700	108.8	62651/576	3600	3300	5000	1.0	10/5/2.5	31	44
33	139	147	3.4	3.0	K403_0910 EZ302U	440	590	91.23	26273/288	3600	3300	5000	0.39	10/5/2.5	31	42
33	181	191	4.4	2.3	K403_0910 EZ303U	470	590	91.23	26273/288	3600	3300	5000	0.50	10/5/2.5	31	43
33	244	262	5.9	1.7	K403_0910 EZ401U	470	590	91.23	26273/288	3600	3300	5000	1.0	10/5/2.5	31	44
33	370	405	6.9	1.5	K403_0900 EZ501U	590	1080	90.06	16211/180	3600	3300	5000	3.1	10/5/2.5	31	45
38	120	127	4.2	2.7	K403_0790 EZ302U	380	510	79.11	62651/792	3600	3300	5000	0.38	10/5/2.5	31	42
38	157	166	5.5	2.0	K403_0790 EZ303U	410	510	79.11	62651/792	3600	3300	5000	0.49	10/5/2.5	31	43
38	212	227	7.5	1.5	K403_0790 EZ401U	410	510	79.11	62651/792	3600	3300	5000	1.0	10/5/2.5	31	44
38	321	351	6.7	1.7	K403_0780 EZ501U	590	1080	78.10	38657/495	3600	3300	5000	3.1	10/5/2.5	31	45
43	289	316	9.7	1.3	K402_0690 EZ501U	440	740	69.34	5547/80	3600	3300	5000	3.0	10/4/1.5	31	41
45	277	302	6.4	2.0	K403_0670 EZ501U	590	1080	67.30	21199/315	3600	3300	5000	3.1	10/5/2.5	31	45
45	101	107	4.3	3.0	K403_0660 EZ302U	320	430	66.35	26273/396	3600	3300	5000	0.40	10/5/2.5	31	42
45	131	139	5.6	2.3	K403_0660 EZ303U	340	430	66.35	26273/396	3600	3300	5000	0.51	10/5/2.5	31	43
45	178	190	7.5	1.7	K403_0660 EZ401U	340	430	66.35	26273/396	3600	3300	5000	1.0	10/5/2.5	31	44
46	269	294	6.4	2.0	K403_0650 EZ501U	590	1010	65.50	32422/495	3600	3300	5000	3.1	10/5/2.5	31	45
54	232	254	8.1	1.8	K402_0560 EZ501U	510	850	55.71	2451/44	3600	3300	5000	3.1	10/4/1.5	31	41
56	221	241	6.1	2.5	K403_0540 EZ501U	590	950	53.69	38657/720	3600	3300	5000	3.2	10/5/2.5	31	45
56	380	411	10	1.4	K403_0540 EZ502U	590	950	53.69	38657/720	3600	3300	5000	5.5	10/5/2.5	31	46
59	210	230	12	1.3	K402_0500 EZ501U	320	540	50.43	5547/110	3600	3300	5000	3.0	10/4/1.5	31	41
61	201	220	5.9	2.7	K403_0490 EZ501U	590	870	48.94	169592/3465	3600	3300	5000	3.1	10/5/2.5	31	45
61	346	374	10	1.6	K403_0490 EZ502U	590	870	48.94	169592/3465	3600	3300	5000	5.4	10/5/2.5	31	46
65	193	211	6.1	2.8	K402_0460 EZ501U	600	980	46.31	602/13	3600	3300	5000	3.2	10/4/1.5	31	41
65	332	359	11	1.6	K402_0460 EZ502U	600	980	46.31	602/13	3600	3300	5000	5.5	10/4/1.5	31	42
65	332	373	11	1.6	K402_0460 EZ701U	600	980	46.31	602/13	3600	3300	5000	8.8	10/4/1.5	31	44
67	183	200	5.9	3.0	K403_0450 EZ501U	590	790	44.54	1247/28	3600	3300	5000	3.2	10/5/2.5	31	45
67	315	341	10	1.7	K403_0450 EZ502U	590	790	44.54	1247/28	3600	3300	5000	5.5	10/5/2.5	31	46
74	169	185	10	1.8	K402_0410 EZ501U	370	620	40.51	4902/121	3600	3300	5000	3.1	10/4/1.5	31	41
77	161	175	6.1	3.1	K403_0390 EZ501U	550	690	39.05	38657/990	3600	3300	5000	3.2	10/5/2.5	31	45
77	276	299	11	1.8	K403_0390 EZ502U	550	690	39.05	38657/990	3600	3300	5000	5.5	10/5/2.5	31	46
77	362	414	14	1.4	K403_0390 EZ503U	550	690	39.05	38657/990	3600	3300	5000	7.9	10/5/2.5	31	48
84	147	161	6.0	3.4	K403_0360 EZ501U	510	630	35.72	13717/384	3600	3300	5000	3.3	10/5/2.5	31	45
84	253	273	10	2.0	K403_0360 EZ502U	510	630	35.72	13717/384	3600	3300	5000	5.6	10/5/2.5	31	46
84	331	379	14	1.5	K403_0360 EZ503U	510	630	35.72	13717/384	3600	3300	5000	8.0	10/5/2.5	31	48
86	145	158	6.1	3.4	K402_0350 EZ501U	540	810	34.76	4171/120	3600	3300	5000	3.4	10/4/1.5	31	41
86	249	270	10	2.0	K402_0350 EZ502U	600	810	34.76	4171/120	3600	3300	5000	5.7	10/4/1.5	31	42
86	249	280	10	2.0	K402_0350 EZ701U	600	1100	34.76	4171/120	3600	3300	5000	9.0	10/4/1.5	31	44
86	327	374	14	1.5	K402_0350 EZ503U	600	810	34.76	4171/120	3600	3300	5000	8.0	10/4/1.5	31	44
89	140	154	7.8	2.8	K402_0340 EZ501U	470	710	33.68	4816/143	3600	3300	5000	3.2	10/4/1.5	31	41
89	242	261	13	1.6	K402_0340 EZ502U	470	710	33.68	4816/143	3600	3300	5000	5.5	10/4/1.5	31	42
89	242	271	13	1.6	K402_0340 EZ701U	470	710	33.68	4816/143	3600	3300	5000	8.8	10/4/1.5	31	44
93	133	146	6.2	3.4	K403_0320 EZ501U	460	570	32.39	2494/77	3600	3300	5000	3.2	10/5/2.5	31	45
93	229	248	11	2.0	K403_0320 EZ502U	460	570	32.39	2494/77	3600	3300	5000	5.5	10/5/2.5	31	46
93	300	344	14	1.5	K403_0320 EZ503U	460	570	32.39	2494/77	3600	3300	5000	7.9	10/5/2.5	31	48
108	116	127	6.2	4.0	K402_0280 EZ501U	430	750	27.77	1333/48	3600	3300	5000	3.6	10/4/1.5	31	41
108	199	216	11	2.3	K402_0280 EZ502U	600	750	27.77	1333/48	3600	3300	5000	5.9	10/4/1.5	31	42
108	199	224	11	2.3	K402_0280 EZ701U	540	1100	27.77	1333/48	3600	3300	5000	9.2	10/4/1.5	31	44
108	261	299	14	1.8	K402_0280 EZ503U	600	750	27.77	1333/48	3600	3300	5000	8.2	10/4/1.5	31	44
108	323	388	17	1.4	K402_0280 EZ702U	600	1100	27.77	1333/48	3600	3300	5000	14	10/4/1.5	31	47
108	364	431	19	1.3	K402_0280 EZ505U	600	1100	27.77	1333/48	3600	3300	5000	13	10/4/1.5	31	47
119	105	115	6.3	4.3	K402_0250 EZ501U	390	590	25.28	4171/165	3600	3300	5000	3.4	10/4/1.5	31	41
119	181	196	11	2.5	K402_0250 EZ502U	470	590	25.28	4171/165	3600	3300	5000	5.7	10/4/1.5	31	42

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
K4 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 600 Nm)																
119	181	204	11	2.5	K402_0250 EZ701U	490	1000	25.28	4171/165	3600	3300	5000	9.0	10/4/1.5	31	44
119	238	272	14	1.9	K402_0250 EZ503U	470	590	25.28	4171/165	3600	3300	5000	8.1	10/4/1.5	31	44
119	294	353	17	1.5	K402_0250 EZ702U	600	1000	25.28	4171/165	3600	3300	5000	14	10/4/1.5	31	47
119	331	392	20	1.4	K402_0250 EZ505U	600	1000	25.28	4171/165	3600	3300	5000	13	10/4/1.5	31	47
129	97	106	6.3	4.5	K402_0230 EZ501U	360	680	23.29	559/24	3600	3300	5000	3.8	10/4/1.5	31	41
129	167	181	11	2.6	K402_0230 EZ502U	540	680	23.29	559/24	3600	3300	5000	6.1	10/4/1.5	31	42
129	167	188	11	2.6	K402_0230 EZ701U	450	1100	23.29	559/24	3600	3300	5000	9.4	10/4/1.5	31	44
129	219	251	14	2.0	K402_0230 EZ503U	540	680	23.29	559/24	3600	3300	5000	8.4	10/4/1.5	31	44
129	271	325	18	1.6	K402_0230 EZ702U	600	1100	23.29	559/24	3600	3300	5000	15	10/4/1.5	31	47
129	305	361	20	1.4	K402_0230 EZ505U	600	1100	23.29	559/24	3600	3300	5000	13	10/4/1.5	31	47
149	84	92	6.4	4.9	K402_0200 EZ501U	310	540	20.20	1333/66	3600	3300	5000	3.6	10/4/1.5	31	41
149	145	157	11	2.9	K402_0200 EZ502U	430	540	20.20	1333/66	3600	3300	5000	5.9	10/4/1.5	31	42
149	145	163	11	2.9	K402_0200 EZ701U	390	1100	20.20	1333/66	3600	3300	5000	9.2	10/4/1.5	31	44
149	190	217	14	2.2	K402_0200 EZ503U	430	540	20.20	1333/66	3600	3300	5000	8.3	10/4/1.5	31	44
149	235	282	18	1.8	K402_0200 EZ702U	600	1100	20.20	1333/66	3600	3300	5000	14	10/4/1.5	31	47
149	264	313	20	1.6	K402_0200 EZ505U	600	1100	20.20	1333/66	3600	3300	5000	13	10/4/1.5	31	47
149	323	407	24	1.3	K402_0200 EZ703U	600	1100	20.20	1333/66	3600	3300	5000	22	10/4/1.5	31	49
172	125	140	11	3.2	K402_0175 EZ701U	340	1100	17.41	731/42	3400	3000	4500	9.9	10/4/1.5	31	44
172	203	243	18	2.0	K402_0175 EZ702U	600	1100	17.41	731/42	3400	3000	4500	15	10/4/1.5	31	47
172	228	270	20	1.7	K402_0175 EZ505U	600	1100	17.41	731/42	3400	3000	4500	14	10/4/1.5	31	47
172	279	351	25	1.4	K402_0175 EZ703U	600	1100	17.41	731/42	3400	3000	4500	23	10/4/1.5	31	49
177	122	131	11	3.2	K402_0170 EZ502U	390	490	16.94	559/33	3600	3300	5000	6.2	10/4/1.5	31	42
177	122	136	11	3.2	K402_0170 EZ701U	330	1010	16.94	559/33	3600	3300	5000	9.5	10/4/1.5	31	44
177	159	182	15	2.5	K402_0170 EZ503U	390	490	16.94	559/33	3600	3300	5000	8.5	10/4/1.5	31	44
177	197	237	18	2.0	K402_0170 EZ702U	600	1010	16.94	559/33	3600	3300	5000	15	10/4/1.5	31	47
177	222	263	20	1.8	K402_0170 EZ505U	600	1010	16.94	559/33	3600	3300	5000	13	10/4/1.5	31	47
177	271	342	25	1.4	K402_0170 EZ703U	600	1010	16.94	559/33	3600	3300	5000	23	10/4/1.5	31	49
216	100	112	11	3.7	K402_0140 EZ701U	270	1010	13.89	1333/96	3400	3000	4500	10	10/4/1.5	31	44
216	162	194	18	2.3	K402_0140 EZ702U	550	1010	13.89	1333/96	3400	3000	4500	16	10/4/1.5	31	47
216	182	215	21	2.0	K402_0140 EZ505U	600	1010	13.89	1333/96	3400	3000	4500	14	10/4/1.5	31	47
216	222	280	25	1.7	K402_0140 EZ703U	600	1010	13.89	1333/96	3400	3000	4500	24	10/4/1.5	31	49
216	287	407	33	1.3	K402_0140 EZ705U	600	1100	13.89	1333/96	3400	3000	4500	36	10/4/1.5	31	54
237	91	102	11	3.9	K402_0125 EZ701U	250	870	12.66	2924/231	3400	3000	4500	10	10/4/1.5	31	44
237	147	177	18	2.4	K402_0125 EZ702U	500	870	12.66	2924/231	3400	3000	4500	15	10/4/1.5	31	47
237	166	196	21	2.1	K402_0125 EZ505U	600	870	12.66	2924/231	3400	3000	4500	14	10/4/1.5	31	47
237	203	255	25	1.8	K402_0125 EZ703U	600	870	12.66	2924/231	3400	3000	4500	23	10/4/1.5	31	49
237	262	371	33	1.4	K402_0125 EZ705U	600	1100	12.66	2924/231	3400	3000	4500	36	10/4/1.5	31	54
237	274	456	34	1.3	K402_0125 EZ802U	600	1100	12.66	2924/231	3400	3000	4500	60	10/4/1.5	31	62
260	83	93	11	4.2	K402_0115 EZ701U	220	840	11.52	645/56	3000	2600	4000	11	10/4/1.5	31	44
260	134	161	19	2.6	K402_0115 EZ702U	460	840	11.52	645/56	3000	2600	4000	16	10/4/1.5	31	47
260	151	179	21	2.3	K402_0115 EZ505U	600	840	11.52	645/56	3000	2600	4000	15	10/4/1.5	31	47
260	184	232	26	1.9	K402_0115 EZ703U	600	840	11.52	645/56	3000	2600	4000	24	10/4/1.5	31	49
260	238	337	33	1.5	K402_0115 EZ705U	600	1100	11.52	645/56	3000	2600	4000	37	10/4/1.5	31	54
260	249	414	35	1.4	K402_0115 EZ802U	600	1100	11.52	645/56	3000	2600	4000	61	10/4/1.5	31	62
297	72	81	12	4.6	K402_0100 EZ701U	200	730	10.10	1333/132	3400	3000	4500	11	10/4/1.5	31	44
297	118	141	19	2.8	K402_0100 EZ702U	400	730	10.10	1333/132	3400	3000	4500	16	10/4/1.5	31	47
297	132	157	21	2.5	K402_0100 EZ505U	590	730	10.10	1333/132	3400	3000	4500	14	10/4/1.5	31	47
297	162	204	26	2.0	K402_0100 EZ703U	590	730	10.10	1333/132	3400	3000	4500	24	10/4/1.5	31	49
297	209	296	33	1.6	K402_0100 EZ705U	600	1100	10.10	1333/132	3400	3000	4500	36	10/4/1.5	31	54
297	218	363	35	1.5	K402_0100 EZ802U	600	1100	10.10	1333/132	3400	3000	4500	60	10/4/1.5	31	62
325	66	74	12	4.8	K402_0092 EZ701U	180	670	9.238	2365/256	3000	2600	4000	12	10/4/1.5	31	44
325	108	129	19	3.0	K402_0092 EZ702U	370	670	9.238	2365/256	3000	2600	4000	17	10/4/1.5	31	47
325	121	143	21	2.7	K402_0092 EZ505U	540	670	9.238	2365/256	3000	2600	4000	16	10/4/1.5	31	47
325	148	186	26	2.2	K402_0092 EZ703U	540	670	9.238	2365/256	3000	2600	4000	25	10/4/1.5	31	49
325	191	271	34	1.7	K402_0092 EZ705U	600	1100	9.238	2365/256	3000	2600	4000	38	10/4/1.5	31	54
325	200	332	35	1.6	K402_0092 EZ802U	600	1100	9.238	2365/256	3000	2600	4000	62	10/4/1.5	31	62
325	238	432	42	1.3	K402_0092 EZ803U	600	1100	9.238	2365/256	3000	2600	4000	87	10/4/1.5	31	68
358	98	117	19	3.2	K402_0084 EZ702U	330	610	8.377	645/77	3000	2600	4000	17	10/4/1.5	31	47
358	110	130	22	2.8	K402_0084 EZ505U	490	610	8.377	645/77	3000	2600	4000	15	10/4/1.5	31	47
358	134	169	26	2.3	K402_0084 EZ703U	490	610	8.377	645/77	3000	2600	4000	25	10/4/1.5	31	49
358	173	245	34	1.8	K402_0084 EZ705U	590	1100	8.377	645/77	3000	2600	4000	37	10/4/1.5	31	54
358	181	301	36	1.7	K402_0084 EZ802U	590	1100	8.377	645/77	3000	2600	4000	61	10/4/1.5	31	62
358	216	392	42	1.4	K402_0084 EZ803U	590	1100	8.377	645/77	3000	2600	4000	86	10/4/1.5	31	68
402	154	218	34	1.9	K402_0075 EZ705U	560	1100	7.456	1849/248	2600	2200	3500	39	10/4/1.5	31	54

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
K4 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 600 Nm)																
402	161	268	36	1.9	K402_0075 EZ802U	560	1100	7.456	1849/248	2600	2200	3500	63	10/4/1.5	31	62
402	192	349	43	1.6	K402_0075 EZ803U	560	1100	7.456	1849/248	2600	2200	3500	88	10/4/1.5	31	68
446	78	94	19	3.7	K402_0067 EZ702U	270	490	6.719	215/32	3000	2600	4000	18	10/4/1.5	31	47
446	88	104	22	3.3	K402_0067 EZ505U	390	490	6.719	215/32	3000	2600	4000	16	10/4/1.5	31	47
446	108	136	27	2.7	K402_0067 EZ703U	390	490	6.719	215/32	3000	2600	4000	26	10/4/1.5	31	49
446	139	197	35	2.1	K402_0067 EZ705U	550	1100	6.719	215/32	3000	2600	4000	38	10/4/1.5	31	54
446	145	242	36	2.0	K402_0067 EZ802U	550	1100	6.719	215/32	3000	2600	4000	62	10/4/1.5	31	62
446	173	314	43	1.7	K402_0067 EZ803U	550	1100	6.719	215/32	3000	2600	4000	88	10/4/1.5	31	68
500	124	176	35	2.2	K402_0060 EZ705U	520	1100	6.000	6/1	2600	2200	3500	41	10/4/1.5	31	54
500	130	216	37	2.1	K402_0060 EZ802U	520	1100	6.000	6/1	2600	2200	3500	65	10/4/1.5	31	62
500	155	281	44	1.8	K402_0060 EZ803U	520	1100	6.000	6/1	2600	2200	3500	90	10/4/1.5	31	68
553	112	159	35	2.4	K402_0054 EZ705U	510	1050	5.422	1849/341	2600	2200	3500	40	10/4/1.5	31	54
553	117	195	37	2.3	K402_0054 EZ802U	510	1050	5.422	1849/341	2600	2200	3500	64	10/4/1.5	31	62
553	140	254	44	1.9	K402_0054 EZ803U	510	1050	5.422	1849/341	2600	2200	3500	89	10/4/1.5	31	68
687	90	128	36	2.8	K402_0044 EZ705U	440	850	4.364	48/11	2600	2200	3500	42	10/4/1.5	31	54
687	94	157	38	2.6	K402_0044 EZ802U	420	850	4.364	48/11	2600	2200	3500	66	10/4/1.5	31	62
687	113	204	45	2.2	K402_0044 EZ803U	470	850	4.364	48/11	2600	2200	3500	92	10/4/1.5	31	68
750	83	117	36	2.9	K402_0040 EZ705U	400	780	4.000	4/1	2600	2200	3500	44	10/4/1.5	31	54
750	87	144	38	2.8	K402_0040 EZ802U	390	780	4.000	4/1	2600	2200	3500	68	10/4/1.5	31	62
750	103	187	45	2.4	K402_0040 EZ803U	460	780	4.000	4/1	2600	2200	3500	93	10/4/1.5	31	68
K4 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 600 Nm)																
162	256	412	16	1.6	K402_0280 EZ505U	600	1100	27.77	1333/48	3600	3300	5000	13	10/4/1.5	31	47
178	233	375	16	1.7	K402_0250 EZ505U	600	1000	25.28	4171/165	3600	3300	5000	13	10/4/1.5	31	47
193	215	346	16	1.8	K402_0230 EZ505U	600	1100	23.29	559/24	3600	3300	5000	13	10/4/1.5	31	47
193	273	452	20	1.4	K402_0230 EZ703U	600	1100	23.29	559/24	3600	3300	5000	22	10/4/1.5	31	49
223	186	300	16	2.0	K402_0200 EZ505U	600	1100	20.20	1333/66	3600	3300	5000	13	10/4/1.5	31	47
223	237	392	21	1.5	K402_0200 EZ703U	600	1100	20.20	1333/66	3600	3300	5000	22	10/4/1.5	31	49
259	160	258	16	2.2	K402_0175 EZ505U	600	1100	17.41	731/42	3400	3000	4500	14	10/4/1.5	31	47
259	204	338	21	1.7	K402_0175 EZ703U	600	1100	17.41	731/42	3400	3000	4500	23	10/4/1.5	31	49
266	156	251	16	2.2	K402_0170 EZ505U	600	1010	16.94	559/33	3600	3300	5000	13	10/4/1.5	31	47
266	199	329	21	1.7	K402_0170 EZ703U	600	1010	16.94	559/33	3600	3300	5000	23	10/4/1.5	31	49
324	128	206	17	2.5	K402_0140 EZ505U	600	1010	13.89	1333/96	3400	3000	4500	14	10/4/1.5	31	47
324	163	269	21	2.0	K402_0140 EZ703U	600	1010	13.89	1333/96	3400	3000	4500	24	10/4/1.5	31	49
324	221	404	29	1.5	K402_0140 EZ705U	600	1100	13.89	1333/96	3400	3000	4500	36	10/4/1.5	31	54
356	117	188	17	2.7	K402_0125 EZ505U	600	870	12.66	2924/231	3400	3000	4500	14	10/4/1.5	31	47
356	129	424	19	2.4	K402_0125 EZ802U	600	1100	12.66	2924/231	3400	3000	4500	60	10/4/1.5	31	62
356	149	246	21	2.1	K402_0125 EZ703U	600	870	12.66	2924/231	3400	3000	4500	23	10/4/1.5	31	49
356	201	368	29	1.5	K402_0125 EZ705U	600	1100	12.66	2924/231	3400	3000	4500	36	10/4/1.5	31	54
446	93	150	17	3.1	K402_0100 EZ505U	590	730	10.10	1333/132	3400	3000	4500	14	10/4/1.5	31	47
446	103	338	19	2.8	K402_0100 EZ802U	600	1100	10.10	1333/132	3400	3000	4500	60	10/4/1.5	31	62
446	119	196	22	2.4	K402_0100 EZ703U	590	730	10.10	1333/132	3400	3000	4500	24	10/4/1.5	31	49
446	161	294	29	1.8	K402_0100 EZ705U	600	1100	10.10	1333/132	3400	3000	4500	36	10/4/1.5	31	54
K5 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 1000 Nm)																
173	483	731	47	1.5	K513_0115 EZ805U	1000	1800	11.57	10759/930	2300	2200	3600	141	10/5/2	50	87
197	424	641	48	1.7	K513_0100 EZ805U	1000	1800	10.15	203/20	1900	1800	3000	143	10/5/2	50	87
218	383	579	48	1.8	K513_0092 EZ805U	1000	1750	9.168	1421/155	1900	1800	3000	144	10/5/2	50	87
246	340	514	48	1.9	K513_0081 EZ805U	1000	1560	8.134	17081/2100	1900	1800	3000	147	10/5/2	50	87
272	307	464	48	2.1	K513_0073 EZ805U	1000	1400	7.347	551/75	1900	1800	3000	149	10/5/2	50	87
K5 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 1000 Nm)																
18	681	744	8.4	1.3	K514_1680 EZ501U	1000	1800	168.2	841/5	3400	3000	4500	3.1	10/6/3	50	51
20	603	659	8.1	1.5	K514_1490 EZ501U	1000	1800	149.0	26071/175	3400	3000	4500	3.2	10/6/3	50	51
22	544	595	7.8	1.7	K514_1350 EZ501U	1000	1780	134.6	3364/25	3400	3000	4500	3.2	10/6/3	50	51
24	505	553	7.7	1.8	K514_1250 EZ501U	1000	1800	124.9	599633/4800	3400	3000	4500	3.2	10/6/3	50	51
27	457	499	7.4	2.0	K514_1130 EZ501U	1000	1660	112.8	135401/1200	3400	3000	4500	3.2	10/6/3	50	51
31	397	434	8.5	1.9	K513_0970 EZ501U	920	1460	96.64	38657/400	3400	3000	4500	3.2	10/5/2	50	47
32	381	416	7.0	2.4	K514_0940 EZ501U	1000	1620	94.15	338923/3600	3400	3000	4500	3.3	10/6/3	50	51
32	656	709	12	1.4	K514_0940 EZ502U	1000	1620	94.15	338923/3600	3400	3000	4500	5.6	10/6/3	50	53
34	359	392	9.1	1.9	K513_0870 EZ501U	830	1320	87.29	8729/100	3400	3000	4500	3.2	10/5/2	50	47
35	344	376	6.8	2.6	K514_0850 EZ501U	1000	1470	85.03	76531/900	3400	3000	4500	3.3	10/6/3	50	51
35	592	640	12	1.5	K514_0850 EZ502U	1000	1470	85.03	76531/900	3400	3000	4500	5.6	10/6/3	50	53
39	319	349	6.7	2.8	K513_0780 EZ501U	1000	1410	77.59	26071/336	3400	3000	4500	3.3	10/5/2	50	47
39	549	593	12	1.6	K513_0780 EZ502U	1000	1410	77.59	26071/336	3400	3000	4500	5.6	10/5/2	50	48
39	549	616	12	1.6	K513_0780 EZ701U	1000	1410	77.59	26071/336	3400	3000	4500	8.9	10/5/2	50	50

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
K5 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 1000 Nm)																
43	288	315	7.2	2.8	K513_0700 EZ501U	980	1280	70.08	841/12	3400	3000	4500	3.4	10/5/2	50	47
43	496	536	12	1.7	K513_0700 EZ502U	980	1280	70.08	841/12	3400	3000	4500	5.7	10/5/2	50	48
43	496	556	12	1.7	K513_0700 EZ701U	980	1280	70.08	841/12	3400	3000	4500	9.0	10/5/2	50	50
43	650	744	16	1.3	K513_0700 EZ503U	980	1280	70.08	841/12	3400	3000	4500	8.0	10/5/2	50	50
46	265	290	6.4	3.4	K513_0650 EZ501U	990	1270	64.54	12586/195	3400	3000	4500	3.5	10/5/2	50	47
46	457	494	11	2.0	K513_0650 EZ502U	1000	1270	64.54	12586/195	3400	3000	4500	5.8	10/5/2	50	48
46	457	512	11	2.0	K513_0650 EZ701U	1000	1800	64.54	12586/195	3400	3000	4500	9.1	10/5/2	50	50
46	599	685	14	1.5	K513_0650 EZ503U	1000	1270	64.54	12586/195	3400	3000	4500	8.2	10/5/2	50	50
51	240	262	6.2	3.8	K513_0580 EZ501U	890	1150	58.30	11368/195	3400	3000	4500	3.5	10/5/2	50	47
51	412	446	11	2.2	K513_0580 EZ502U	920	1150	58.30	11368/195	3400	3000	4500	5.8	10/5/2	50	48
51	412	463	11	2.2	K513_0580 EZ701U	1000	1800	58.30	11368/195	3400	3000	4500	9.1	10/5/2	50	50
51	541	619	14	1.7	K513_0580 EZ503U	920	1150	58.30	11368/195	3400	3000	4500	8.2	10/5/2	50	50
62	198	216	5.8	4.4	K513_0480 EZ501U	740	1080	48.16	2697/56	3400	3000	4500	3.9	10/5/2	50	47
62	341	368	10	2.5	K513_0480 EZ502U	870	1080	48.16	2697/56	3400	3000	4500	6.2	10/5/2	50	48
62	341	382	10	2.6	K513_0480 EZ701U	920	1800	48.16	2697/56	3400	3000	4500	9.5	10/5/2	50	50
62	447	511	13	1.9	K513_0480 EZ503U	870	1080	48.16	2697/56	3400	3000	4500	8.6	10/5/2	50	50
62	553	663	16	1.6	K513_0480 EZ702U	1000	1800	48.16	2697/56	3400	3000	4500	15	10/5/2	50	52
62	622	737	18	1.4	K513_0480 EZ505U	1000	1800	48.16	2697/56	3400	3000	4500	13	10/5/2	50	52
69	179	195	5.7	4.4	K513_0440 EZ501U	670	980	43.50	87/2	3400	3000	4500	3.9	10/5/2	50	47
69	308	333	9.8	2.5	K513_0440 EZ502U	780	980	43.50	87/2	3400	3000	4500	6.2	10/5/2	50	48
69	308	345	9.8	2.9	K513_0440 EZ701U	830	1800	43.50	87/2	3400	3000	4500	9.5	10/5/2	50	50
69	403	462	13	1.9	K513_0440 EZ503U	780	980	43.50	87/2	3400	3000	4500	8.6	10/5/2	50	50
69	499	599	16	1.8	K513_0440 EZ702U	1000	1800	43.50	87/2	3400	3000	4500	15	10/5/2	50	52
69	561	665	18	1.6	K513_0440 EZ505U	1000	1800	43.50	87/2	3400	3000	4500	13	10/5/2	50	52
78	273	306	9.4	3.3	K513_0390 EZ701U	740	1800	38.53	2697/70	3400	3000	4500	9.9	10/5/2	50	50
78	442	530	15	2.0	K513_0390 EZ702U	1000	1800	38.53	2697/70	3400	3000	4500	15	10/5/2	50	52
78	497	589	17	1.8	K513_0390 EZ505U	1000	1800	38.53	2697/70	3400	3000	4500	14	10/5/2	50	52
78	608	766	21	1.5	K513_0390 EZ703U	1000	1800	38.53	2697/70	3400	3000	4500	23	10/5/2	50	54
86	246	276	9.1	3.7	K513_0350 EZ701U	670	1780	34.80	174/5	3400	3000	4500	10	10/5/2	50	50
86	399	479	15	2.3	K513_0350 EZ702U	1000	1780	34.80	174/5	3400	3000	4500	15	10/5/2	50	52
86	449	532	17	2.0	K513_0350 EZ505U	1000	1780	34.80	174/5	3400	3000	4500	14	10/5/2	50	52
86	549	692	20	1.6	K513_0350 EZ703U	1000	1780	34.80	174/5	3400	3000	4500	23	10/5/2	50	54
93	229	256	8.9	3.9	K513_0320 EZ701U	620	1800	32.31	20677/640	3400	3000	4500	10	10/5/2	50	50
93	371	445	14	2.4	K513_0320 EZ702U	1000	1800	32.31	20677/640	3400	3000	4500	16	10/5/2	50	52
93	417	494	16	2.2	K513_0320 EZ505U	1000	1800	32.31	20677/640	3400	3000	4500	14	10/5/2	50	52
93	510	642	20	1.8	K513_0320 EZ703U	1000	1800	32.31	20677/640	3400	3000	4500	24	10/5/2	50	54
103	206	232	8.9	4.2	K513_0290 EZ701U	560	1660	29.18	4669/160	3400	3000	4500	11	10/5/2	50	50
103	335	402	14	2.6	K513_0290 EZ702U	1000	1660	29.18	4669/160	3400	3000	4500	16	10/5/2	50	52
103	377	446	16	2.3	K513_0290 EZ505U	1000	1660	29.18	4669/160	3400	3000	4500	14	10/5/2	50	52
103	460	580	20	1.9	K513_0290 EZ703U	1000	1660	29.18	4669/160	3400	3000	4500	24	10/5/2	50	54
123	172	193	9.0	4.8	K513_0240 EZ701U	470	1620	24.35	11687/480	2800	2500	4000	11	10/5/2	50	50
123	279	335	15	2.9	K513_0240 EZ702U	950	1620	24.35	11687/480	2800	2500	4000	17	10/5/2	50	52
123	314	372	16	2.6	K513_0240 EZ505U	1000	1620	24.35	11687/480	2800	2500	4000	15	10/5/2	50	52
123	384	484	20	2.1	K513_0240 EZ703U	1000	1620	24.35	11687/480	2800	2500	4000	25	10/5/2	50	54
123	496	703	26	1.7	K513_0240 EZ705U	1000	1800	24.35	11687/480	2800	2500	4000	37	10/5/2	50	60
136	252	303	15	3.1	K513_0220 EZ702U	860	1470	21.99	2639/120	2800	2500	4000	17	10/5/2	50	52
136	284	336	16	2.8	K513_0220 EZ505U	1000	1470	21.99	2639/120	2800	2500	4000	15	10/5/2	50	52
136	347	437	20	2.3	K513_0220 EZ703U	1000	1470	21.99	2639/120	2800	2500	4000	25	10/5/2	50	54
136	448	635	26	1.8	K513_0220 EZ705U	1000	1800	21.99	2639/120	2800	2500	4000	37	10/5/2	50	60
155	222	266	15	3.4	K513_0195 EZ702U	760	1390	19.35	27869/1440	2800	2500	4000	18	10/5/2	50	52
155	250	296	16	3.0	K513_0195 EZ505U	1000	1390	19.35	27869/1440	2800	2500	4000	16	10/5/2	50	52
155	305	385	20	2.5	K513_0195 EZ703U	1000	1390	19.35	27869/1440	2800	2500	4000	26	10/5/2	50	54
155	394	559	26	1.9	K513_0195 EZ705U	1000	1800	19.35	27869/1440	2800	2500	4000	38	10/5/2	50	60
155	413	686	27	1.8	K513_0195 EZ802U	1000	1800	19.35	27869/1440	2800	2500	4000	62	10/5/2	50	68
172	201	241	15	3.7	K513_0175 EZ702U	690	1250	17.48	6293/360	2800	2500	4000	18	10/5/2	50	52
172	226	267	17	3.3	K513_0175 EZ505U	1000	1250	17.48	6293/360	2800	2500	4000	16	10/5/2	50	52
172	276	348	20	2.7	K513_0175 EZ703U	1000	1250	17.48	6293/360	2800	2500	4000	26	10/5/2	50	54
172	356	505	26	2.1	K513_0175 EZ705U	1000	1800	17.48	6293/360	2800	2500	4000	38	10/5/2	50	60
172	373	620	27	2.0	K513_0175 EZ802U	1000	1800	17.48	6293/360	2800	2500	4000	62	10/5/2	50	68
186	185	222	15	3.9	K513_0160 EZ702U	630	1150	16.09	26071/1620	2300	2200	3600	19	10/5/2	50	52
186	208	246	17	3.4	K513_0160 EZ505U	920	1150	16.09	26071/1620	2300	2200	3600	17	10/5/2	50	52
186	254	320	20	2.8	K513_0160 EZ703U	920	1150	16.09	26071/1620	2300	2200	3600	27	10/5/2	50	54
186	328	465	26	2.2	K513_0160 EZ705U	1000	1800	16.09	26071/1620	2300	2200	3600	39	10/5/2	50	60
186	343	571	27	2.1	K513_0160 EZ802U	1000	1800	16.09	26071/1620	2300	2200	3600	63	10/5/2	50	68

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
K5 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 1000 Nm)																
186	409	742	33	1.7	K513_0160 EZ803U	1000	1800	16.09	26071/1620	2300	2200	3600	89	10/5/2	50	74
206	167	200	15	4.1	K513_0145 EZ702U	570	1040	14.54	5887/405	2300	2200	3600	19	10/5/2	50	52
206	188	222	17	3.7	K513_0145 EZ505U	830	1040	14.54	5887/405	2300	2200	3600	18	10/5/2	50	52
206	229	289	20	3.0	K513_0145 EZ703U	830	1040	14.54	5887/405	2300	2200	3600	27	10/5/2	50	54
206	296	420	26	2.3	K513_0145 EZ705U	1000	1800	14.54	5887/405	2300	2200	3600	40	10/5/2	50	60
206	310	516	28	2.2	K513_0145 EZ802U	1000	1800	14.54	5887/405	2300	2200	3600	64	10/5/2	50	68
206	370	670	33	1.9	K513_0145 EZ803U	1000	1800	14.54	5887/405	2300	2200	3600	89	10/5/2	50	74
234	261	370	26	2.5	K513_0130 EZ705U	1000	1800	12.81	1537/120	2300	2200	3600	41	10/5/2	50	60
234	273	454	28	2.4	K513_0130 EZ802U	1000	1800	12.81	1537/120	2300	2200	3600	65	10/5/2	50	68
234	326	590	33	2.0	K513_0130 EZ803U	1000	1800	12.81	1537/120	2300	2200	3600	91	10/5/2	50	74
259	236	334	26	2.7	K513_0115 EZ705U	1000	1800	11.57	10759/930	2300	2200	3600	42	10/5/2	50	60
259	247	410	28	2.6	K513_0115 EZ802U	1000	1800	11.57	10759/930	2300	2200	3600	66	10/5/2	50	68
259	294	533	33	2.2	K513_0115 EZ803U	1000	1800	11.57	10759/930	2300	2200	3600	91	10/5/2	50	74
296	207	293	27	3.0	K513_0100 EZ705U	1000	1800	10.15	203/20	1900	1800	3000	44	10/5/2	50	60
296	216	360	28	2.8	K513_0100 EZ802U	970	1800	10.15	203/20	1900	1800	3000	68	10/5/2	50	68
296	258	468	33	2.4	K513_0100 EZ803U	1000	1800	10.15	203/20	1900	1800	3000	94	10/5/2	50	74
327	187	265	27	3.2	K513_0092 EZ705U	910	1750	9.168	1421/155	1900	1800	3000	45	10/5/2	50	60
327	195	325	28	3.0	K513_0092 EZ802U	880	1750	9.168	1421/155	1900	1800	3000	69	10/5/2	50	68
327	233	422	33	2.5	K513_0092 EZ803U	1000	1750	9.168	1421/155	1900	1800	3000	95	10/5/2	50	74
369	166	235	27	3.4	K513_0081 EZ705U	810	1560	8.134	17081/2100	1900	1800	3000	48	10/5/2	50	60
369	173	288	28	3.3	K513_0081 EZ802U	780	1560	8.134	17081/2100	1900	1800	3000	72	10/5/2	50	68
369	207	375	33	2.8	K513_0081 EZ803U	1000	1560	8.134	17081/2100	1900	1800	3000	98	10/5/2	50	74
408	150	212	27	3.7	K513_0073 EZ705U	730	1400	7.347	551/75	1900	1800	3000	50	10/5/2	50	60
408	157	261	28	3.5	K513_0073 EZ802U	700	1400	7.347	551/75	1900	1800	3000	74	10/5/2	50	68
408	187	339	34	3.0	K513_0073 EZ803U	1000	1400	7.347	551/75	1900	1800	3000	99	10/5/2	50	74
K5 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 1000 Nm)																
93	437	704	13	2.1	K513_0480 EZ505U	1000	1800	48.16	2697/56	3400	3000	4500	13	10/5/2	50	52
103	395	636	13	2.2	K513_0440 EZ505U	1000	1800	43.50	87/2	3400	3000	4500	13	10/5/2	50	52
117	350	564	13	2.4	K513_0390 EZ505U	1000	1800	38.53	2697/70	3400	3000	4500	14	10/5/2	50	52
117	446	737	17	1.9	K513_0390 EZ703U	1000	1800	38.53	2697/70	3400	3000	4500	23	10/5/2	50	54
129	316	509	13	2.6	K513_0350 EZ505U	1000	1780	34.80	174/5	3400	3000	4500	14	10/5/2	50	52
129	403	665	17	2.0	K513_0350 EZ703U	1000	1780	34.80	174/5	3400	3000	4500	23	10/5/2	50	54
139	293	473	13	2.7	K513_0320 EZ505U	1000	1800	32.31	20677/640	3400	3000	4500	14	10/5/2	50	52
139	374	618	17	2.1	K513_0320 EZ703U	1000	1800	32.31	20677/640	3400	3000	4500	24	10/5/2	50	54
154	265	427	13	2.9	K513_0290 EZ505U	1000	1660	29.18	4669/160	3400	3000	4500	14	10/5/2	50	52
154	338	558	17	2.3	K513_0290 EZ703U	1000	1660	29.18	4669/160	3400	3000	4500	24	10/5/2	50	54
K6 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 1600 Nm)																
105	794	1200	39	1.4	K613_0190 EZ805U	1600	2900	18.99	17019/896	2600	2300	3600	140	10/5/2	83	109
117	717	1084	39	1.5	K613_0170 EZ805U	1600	2900	17.16	549/32	2600	2300	3600	141	10/5/2	83	109
126	663	1003	39	1.6	K613_0160 EZ805U	1600	2900	15.87	54839/3456	2200	2000	3200	143	10/5/2	83	109
140	599	906	39	1.7	K613_0145 EZ805U	1600	2740	14.33	12383/864	2200	2000	3200	143	10/5/2	83	109
158	528	798	39	1.9	K613_0125 EZ805U	1600	2410	12.63	3233/256	2200	2000	3200	147	10/5/2	83	109
175	477	721	40	2.0	K613_0115 EZ805U	1590	2180	11.41	22631/1984	2200	2000	3200	148	10/5/2	83	109
247	339	512	40	2.5	K613_0081 EZ805U	1420	2900	8.107	85095/10496	1800	1700	2900	160	10/5/2	83	109
273	306	463	40	2.7	K613_0073 EZ805U	1370	2630	7.323	19215/2624	1800	1700	2900	162	10/5/2	83	109
K6 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 1600 Nm)																
11	1076	1176	7.2	1.2	K614_2660 EZ501U	1580	2630	265.9	829661/3120	3100	2800	4000	3.1	10/6/3	83	72
12	997	1090	6.4	1.5	K614_2460 EZ501U	1600	2900	246.3	1261297/5120	3100	2800	4000	3.1	10/6/3	83	72
13	900	984	6.2	1.6	K614_2230 EZ501U	1600	2800	222.5	284809/1280	3100	2800	4000	3.1	10/6/3	83	72
16	747	816	5.9	1.9	K614_1850 EZ501U	1600	2290	184.6	383873/2080	3100	2800	4000	3.2	10/6/3	83	72
18	674	737	5.7	2.1	K614_1670 EZ501U	1600	2070	166.7	86681/520	3100	2800	4000	3.2	10/6/3	83	72
20	600	655	5.5	2.4	K614_1480 EZ501U	1600	2170	148.2	4551637/30720	3100	2800	4000	3.2	10/6/3	83	72
20	1032	1115	9.5	1.4	K614_1480 EZ502U	1600	2170	148.2	4551637/30720	3100	2800	4000	5.5	10/6/3	83	73
22	542	592	5.6	2.5	K614_1340 EZ501U	1570	1960	133.8	1027789/7680	3100	2800	4000	3.2	10/6/3	83	72
22	932	1007	9.7	1.5	K614_1340 EZ502U	1570	1960	133.8	1027789/7680	3100	2800	4000	5.5	10/6/3	83	73
24	498	545	5.2	2.9	K614_1230 EZ501U	1600	2000	123.2	1261297/10240	3100	2800	4000	3.3	10/6/3	83	72
24	858	927	9.0	1.7	K614_1230 EZ502U	1600	2000	123.2	1261297/10240	3100	2800	4000	5.6	10/6/3	83	73
27	450	492	5.5	3.0	K614_1110 EZ501U	1450	1810	111.3	284809/2560	3100	2800	4000	3.3	10/6/3	83	72
27	775	838	9.5	1.7	K614_1110 EZ502U	1450	1810	111.3	284809/2560	3100	2800	4000	5.6	10/6/3	83	73
31	392	429	6.6	2.7	K613_0950 EZ501U	1290	1630	95.41	293105/3072	3100	2800	4000	3.5	10/5/2	83	68
31	675	730	11	1.6	K613_0950 EZ502U	1290	1630	95.41	293105/3072	3100	2800	4000	5.8	10/5/2	83	70
31	675	757	11	1.6	K613_0950 EZ701U	1290	1630	95.41	293105/3072	3100	2800	4000	9.1	10/5/2	83	71
35	354	387	7.1	2.7	K613_0860 EZ501U	1170	1470	86.18	66185/768	3100	2800	4000	3.5	10/5/2	83	68

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
K6 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 1600 Nm)																
35	610	659	12	1.6	K613_0860 EZ502U	1170	1470	86.18	66185/768	3100	2800	4000	5.8	10/5/2	83	70
35	610	684	12	1.6	K613_0860 EZ701U	1170	1470	86.18	66185/768	3100	2800	4000	9.1	10/5/2	83	71
39	313	342	4.6	3.8	K613_0760 EZ501U	1160	1500	76.14	126697/1664	3100	2800	4000	3.7	10/5/2	83	68
39	539	582	7.9	2.2	K613_0760 EZ502U	1200	1500	76.14	126697/1664	3100	2800	4000	6.0	10/5/2	83	70
39	539	604	7.9	2.7	K613_0760 EZ701U	1460	2900	76.14	126697/1664	3100	2800	4000	9.3	10/5/2	83	71
39	706	808	10	1.7	K613_0760 EZ503U	1200	1500	76.14	126697/1664	3100	2800	4000	8.4	10/5/2	83	71
39	873	1048	13	1.7	K613_0760 EZ702U	1600	2900	76.14	126697/1664	3100	2800	4000	15	10/5/2	83	74
39	983	1165	14	1.5	K613_0760 EZ505U	1600	2900	76.14	126697/1664	3100	2800	4000	13	10/5/2	83	74
44	283	309	4.9	3.8	K613_0690 EZ501U	1050	1360	68.77	28609/416	3100	2800	4000	3.8	10/5/2	83	68
44	487	526	8.4	2.2	K613_0690 EZ502U	1080	1360	68.77	28609/416	3100	2800	4000	6.1	10/5/2	83	70
44	487	546	8.4	2.7	K613_0690 EZ701U	1310	2630	68.77	28609/416	3100	2800	4000	9.4	10/5/2	83	71
44	638	730	11	1.7	K613_0690 EZ503U	1080	1360	68.77	28609/416	3100	2800	4000	8.4	10/5/2	83	71
44	789	947	14	1.7	K613_0690 EZ702U	1580	2630	68.77	28609/416	3100	2800	4000	15	10/5/2	83	74
44	888	1052	15	1.5	K613_0690 EZ505U	1580	2630	68.77	28609/416	3100	2800	4000	13	10/5/2	83	74
47	451	506	7.5	3.2	K613_0640 EZ701U	1220	2900	63.71	130479/2048	3100	2800	4000	9.6	10/5/2	83	71
47	731	877	12	2.0	K613_0640 EZ702U	1600	2900	63.71	130479/2048	3100	2800	4000	15	10/5/2	83	74
47	822	975	14	1.8	K613_0640 EZ505U	1600	2900	63.71	130479/2048	3100	2800	4000	13	10/5/2	83	74
52	407	457	7.3	3.6	K613_0580 EZ701U	1100	2800	57.55	29463/512	3100	2800	4000	9.7	10/5/2	83	71
52	660	792	12	2.2	K613_0580 EZ702U	1600	2800	57.55	29463/512	3100	2800	4000	15	10/5/2	83	74
52	743	880	13	1.9	K613_0580 EZ505U	1600	2800	57.55	29463/512	3100	2800	4000	13	10/5/2	83	74
52	908	1144	16	1.6	K613_0580 EZ703U	1600	2800	57.55	29463/512	3100	2800	4000	23	10/5/2	83	76
63	338	379	7.3	4.0	K613_0480 EZ701U	910	2290	47.73	39711/832	3100	2800	4000	10	10/5/2	83	71
63	548	657	12	2.5	K613_0480 EZ702U	1600	2290	47.73	39711/832	3100	2800	4000	16	10/5/2	83	74
63	616	730	13	2.2	K613_0480 EZ505U	1600	2290	47.73	39711/832	3100	2800	4000	14	10/5/2	83	74
63	753	949	16	1.8	K613_0480 EZ703U	1600	2290	47.73	39711/832	3100	2800	4000	23	10/5/2	83	76
70	305	342	7.3	4.3	K613_0430 EZ701U	820	2070	43.11	8967/208	3100	2800	4000	10	10/5/2	83	71
70	495	593	12	2.7	K613_0430 EZ702U	1600	2070	43.11	8967/208	3100	2800	4000	16	10/5/2	83	74
70	556	659	13	2.4	K613_0430 EZ505U	1600	2070	43.11	8967/208	3100	2800	4000	14	10/5/2	83	74
70	680	857	16	1.9	K613_0430 EZ703U	1600	2070	43.11	8967/208	3100	2800	4000	24	10/5/2	83	76
78	271	304	7.4	4.7	K613_0380 EZ701U	730	2170	38.32	156953/4096	3100	2800	4000	11	10/5/2	83	71
78	440	528	12	2.9	K613_0380 EZ702U	1500	2170	38.32	156953/4096	3100	2800	4000	16	10/5/2	83	74
78	495	586	13	2.6	K613_0380 EZ505U	1600	2170	38.32	156953/4096	3100	2800	4000	15	10/5/2	83	74
78	604	762	16	2.1	K613_0380 EZ703U	1600	2170	38.32	156953/4096	3100	2800	4000	24	10/5/2	83	76
78	780	1106	21	1.6	K613_0380 EZ705U	1600	2900	38.32	156953/4096	3100	2800	4000	37	10/5/2	83	81
87	245	275	7.4	5.0	K613_0350 EZ701U	660	1960	34.61	35441/1024	3100	2800	4000	11	10/5/2	83	71
87	397	476	12	3.1	K613_0350 EZ702U	1360	1960	34.61	35441/1024	3100	2800	4000	16	10/5/2	83	74
87	447	529	13	2.7	K613_0350 EZ505U	1570	1960	34.61	35441/1024	3100	2800	4000	15	10/5/2	83	74
87	546	688	16	2.2	K613_0350 EZ703U	1570	1960	34.61	35441/1024	3100	2800	4000	24	10/5/2	83	76
87	705	999	21	1.7	K613_0350 EZ705U	1600	2900	34.61	35441/1024	3100	2800	4000	37	10/5/2	83	81
87	738	1228	22	1.7	K613_0350 EZ802U	1600	2900	34.61	35441/1024	3100	2800	4000	61	10/5/2	83	90
94	365	439	12	3.2	K613_0320 EZ702U	1250	2000	31.86	130479/4096	3100	2800	4000	17	10/5/2	83	74
94	411	487	14	2.9	K613_0320 EZ505U	1600	2000	31.86	130479/4096	3100	2800	4000	16	10/5/2	83	74
94	502	633	17	2.4	K613_0320 EZ703U	1600	2000	31.86	130479/4096	3100	2800	4000	25	10/5/2	83	76
94	649	920	21	1.8	K613_0320 EZ705U	1600	2900	31.86	130479/4096	3100	2800	4000	38	10/5/2	83	81
94	679	1130	22	1.7	K613_0320 EZ802U	1600	2900	31.86	130479/4096	3100	2800	4000	62	10/5/2	83	90
104	330	396	12	3.5	K613_0290 EZ702U	1130	1810	28.77	29463/1024	3100	2800	4000	17	10/5/2	83	74
104	371	440	14	3.1	K613_0290 EZ505U	1450	1810	28.77	29463/1024	3100	2800	4000	16	10/5/2	83	74
104	454	572	17	2.5	K613_0290 EZ703U	1450	1810	28.77	29463/1024	3100	2800	4000	25	10/5/2	83	76
104	586	831	21	2.0	K613_0290 EZ705U	1600	2900	28.77	29463/1024	3100	2800	4000	38	10/5/2	83	81
104	613	1020	22	1.9	K613_0290 EZ802U	1600	2900	28.77	29463/1024	3100	2800	4000	62	10/5/2	83	90
125	489	693	22	2.2	K613_0240 EZ705U	1600	2900	24.01	24583/1024	2600	2300	3600	40	10/5/2	83	81
125	512	851	23	2.1	K613_0240 EZ802U	1600	2900	24.01	24583/1024	2600	2300	3600	64	10/5/2	83	90
125	610	1106	27	1.8	K613_0240 EZ803U	1600	2900	24.01	24583/1024	2600	2300	3600	89	10/5/2	83	96
138	442	626	22	2.4	K613_0220 EZ705U	1600	2900	21.68	5551/256	2600	2300	3600	40	10/5/2	83	81
138	462	769	23	2.3	K613_0220 EZ802U	1600	2900	21.68	5551/256	2600	2300	3600	64	10/5/2	83	90
138	551	999	27	1.9	K613_0220 EZ803U	1600	2900	21.68	5551/256	2600	2300	3600	89	10/5/2	83	96
158	218	261	12	4.6	K613_0190 EZ702U	740	1360	18.99	17019/896	2600	2300	3600	21	10/5/2	83	74
158	245	291	14	4.1	K613_0190 EZ505U	1090	1360	18.99	17019/896	2600	2300	3600	20	10/5/2	83	74
158	300	378	17	3.3	K613_0190 EZ703U	1090	1360	18.99	17019/896	2600	2300	3600	29	10/5/2	83	76
158	387	548	22	2.6	K613_0190 EZ705U	1600	2900	18.99	17019/896	2600	2300	3600	42	10/5/2	83	81
158	405	674	23	2.5	K613_0190 EZ802U	1600	2900	18.99	17019/896	2600	2300	3600	66	10/5/2	83	90
158	483	875	27	2.1	K613_0190 EZ803U	1600	2900	18.99	17019/896	2600	2300	3600	91	10/5/2	83	96
175	197	236	12	4.9	K613_0170 EZ702U	670	1230	17.16	549/32	2600	2300	3600	22	10/5/2	83	74
175	221	262	14	4.4	K613_0170 EZ505U	980	1230	17.16	549/32	2600	2300	3600	20	10/5/2	83	74

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
K6 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 1600 Nm)																
175	271	341	17	3.6	K613_0170 EZ703U	980	1230	17.16	549/32	2600	2300	3600	30	10/5/2	83	76
175	349	495	22	2.8	K613_0170 EZ705U	1600	2900	17.16	549/32	2600	2300	3600	42	10/5/2	83	81
175	366	608	23	2.6	K613_0170 EZ802U	1600	2900	17.16	549/32	2600	2300	3600	66	10/5/2	83	90
175	436	791	27	2.2	K613_0170 EZ803U	1600	2900	17.16	549/32	2600	2300	3600	92	10/5/2	83	96
189	323	458	22	2.9	K613_0160 EZ705U	1580	2900	15.87	54839/3456	2200	2000	3200	44	10/5/2	83	81
189	338	563	23	2.8	K613_0160 EZ802U	1520	2900	15.87	54839/3456	2200	2000	3200	68	10/5/2	83	90
189	404	731	27	2.3	K613_0160 EZ803U	1600	2900	15.87	54839/3456	2200	2000	3200	94	10/5/2	83	96
209	292	414	22	3.1	K613_0145 EZ705U	1420	2740	14.33	12383/864	2200	2000	3200	45	10/5/2	83	81
209	306	508	23	3.0	K613_0145 EZ802U	1370	2740	14.33	12383/864	2200	2000	3200	69	10/5/2	83	90
209	364	660	27	2.5	K613_0145 EZ803U	1600	2740	14.33	12383/864	2200	2000	3200	94	10/5/2	83	96
238	257	365	22	3.4	K613_0125 EZ705U	1260	2410	12.63	3233/256	2200	2000	3200	48	10/5/2	83	81
238	269	448	23	3.2	K613_0125 EZ802U	1210	2410	12.63	3233/256	2200	2000	3200	72	10/5/2	83	90
238	321	582	27	2.7	K613_0125 EZ803U	1600	2410	12.63	3233/256	2200	2000	3200	98	10/5/2	83	96
263	232	329	22	3.6	K613_0115 EZ705U	1130	2180	11.41	22631/1984	2200	2000	3200	49	10/5/2	83	81
263	243	405	23	3.5	K613_0115 EZ802U	1090	2180	11.41	22631/1984	2200	2000	3200	73	10/5/2	83	90
263	290	526	28	2.9	K613_0115 EZ803U	1580	2180	11.41	22631/1984	2200	2000	3200	98	10/5/2	83	96
K7 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 2600 Nm)																
68	1223	1851	26	1.8	K713_0290 EZ805U	2600	4800	29.29	7497/256	2900	2600	3800	141	10/5/2	126	137
79	1052	1591	26	2.0	K713_0250 EZ805U	2600	4800	25.18	64449/2560	2400	2200	3400	144	10/5/2	126	137
88	950	1437	26	2.1	K713_0230 EZ805U	2600	4800	22.74	14553/640	2400	2200	3400	145	10/5/2	126	137
99	845	1279	26	2.3	K713_0200 EZ805U	2600	4800	20.23	119133/5888	2400	2200	3400	149	10/5/2	126	137
109	763	1155	26	2.4	K713_0185 EZ805U	2600	4800	18.28	26901/1472	2400	2200	3400	149	10/5/2	126	137
122	685	1036	26	2.6	K713_0165 EZ805U	2600	4800	16.39	6293/384	2000	1900	3000	154	10/5/2	126	137
135	618	935	26	2.8	K713_0150 EZ805U	2600	4800	14.80	1421/96	2000	1900	3000	155	10/5/2	126	137
153	545	824	26	3.0	K713_0130 EZ805U	2560	4680	13.04	3339/256	2000	1900	3000	162	10/5/2	126	137
170	492	744	26	3.2	K713_0120 EZ805U	2310	4220	11.78	23373/1984	2000	1900	3000	163	10/5/2	126	137
197	425	643	26	3.6	K713_0100 EZ805U	1990	3650	10.17	651/64	1700	1600	2700	174	10/5/2	126	137
218	384	581	27	3.8	K713_0092 EZ805U	1800	3290	9.188	147/16	1700	1600	2700	177	10/5/2	126	137
239	350	529	27	4.1	K713_0084 EZ805U	1640	3000	8.373	87885/10496	1700	1600	2700	188	10/5/2	126	137
264	316	478	27	4.4	K713_0076 EZ805U	1480	2710	7.563	19845/2624	1700	1600	2700	192	10/5/2	126	137
K7 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 2600 Nm)																
7.9	1542	1685	6.2	1.2	K714_3810 EZ501U	2220	3330	381.0	195083/512	2900	2600	3800	3.1	10/6/3	126	105
8.7	1393	1522	6.7	1.2	K714_3440 EZ501U	2010	3010	344.1	44051/128	2900	2600	3800	3.1	10/6/3	126	105
9.8	1233	1348	5.3	1.7	K714_3050 EZ501U	2520	3150	304.8	195083/640	2900	2600	3800	3.2	10/6/3	126	105
11	1114	1218	5.7	1.7	K714_2750 EZ501U	2280	2850	275.3	44051/160	2900	2600	3800	3.2	10/6/3	126	105
12	1769	1984	7.3	1.4	K714_2540 EZ701U	2600	4800	254.0	520149/2048	2900	2600	3800	9.1	10/6/3	126	108
12	1015	1109	5.1	2.0	K714_2510 EZ501U	2260	2830	250.7	320943/1280	2900	2600	3800	3.2	10/6/3	126	105
13	1597	1792	7.1	1.5	K714_2290 EZ701U	2600	4800	229.4	117453/512	2900	2600	3800	9.1	10/6/3	126	108
13	916	1002	5.5	2.0	K714_2260 EZ501U	2040	2560	226.5	72471/320	2900	2600	3800	3.2	10/6/3	126	105
15	1360	1526	6.8	1.8	K714_1950 EZ701U	2600	4800	195.4	2600745/13312	2900	2600	3800	9.2	10/6/3	126	108
16	780	853	5.0	2.4	K714_1930 EZ501U	1940	2420	192.9	320943/1664	2900	2600	3800	3.3	10/6/3	126	105
16	1343	1452	8.7	1.4	K714_1930 EZ502U	1940	2420	192.9	320943/1664	2900	2600	3800	5.6	10/6/3	126	106
17	1229	1378	6.6	2.0	K714_1760 EZ701U	2600	4800	176.5	587265/3328	2900	2600	3800	9.2	10/6/3	126	108
17	705	770	5.4	2.4	K714_1740 EZ501U	1750	2190	174.2	72471/416	2900	2600	3800	3.3	10/6/3	126	105
17	1213	1311	9.3	1.4	K714_1740 EZ502U	1750	2190	174.2	72471/416	2900	2600	3800	5.6	10/6/3	126	106
20	1070	1200	6.3	2.2	K714_1540 EZ701U	2600	4800	153.7	39339/256	2900	2600	3800	9.3	10/6/3	126	108
20	614	671	5.0	2.9	K714_1520 EZ501U	1800	2250	151.7	24273/160	2900	2600	3800	3.5	10/6/3	126	105
20	1056	1142	8.5	1.7	K714_1520 EZ502U	1800	2250	151.7	24273/160	2900	2600	3800	5.8	10/6/3	126	106
22	966	1084	6.1	2.5	K714_1390 EZ701U	2600	4560	138.8	8883/64	2900	2600	3800	9.3	10/6/3	126	108
22	1567	1881	9.9	1.5	K714_1390 EZ702U	2600	4560	138.8	8883/64	2900	2600	3800	15	10/6/3	126	111
22	554	606	5.3	2.9	K714_1370 EZ501U	1630	2030	137.0	5481/40	2900	2600	3800	3.5	10/6/3	126	105
22	954	1032	9.2	1.7	K714_1370 EZ502U	1630	2030	137.0	5481/40	2900	2600	3800	5.8	10/6/3	126	106
24	884	992	6.0	2.7	K714_1270 EZ701U	2390	4530	127.0	520149/4096	2900	2600	3800	9.5	10/6/3	126	108
24	1434	1721	9.7	1.7	K714_1270 EZ702U	2600	4530	127.0	520149/4096	2900	2600	3800	15	10/6/3	126	111
26	799	896	5.8	3.0	K714_1150 EZ701U	2160	4090	114.7	117453/1024	2900	2600	3800	9.5	10/6/3	126	108
26	1295	1554	9.4	1.9	K714_1150 EZ702U	2600	4090	114.7	117453/1024	2900	2600	3800	15	10/6/3	126	111
30	687	770	5.5	3.5	K714_0990 EZ701U	1860	3820	98.60	1009701/10240	2900	2600	3800	9.7	10/6/3	126	108
30	1113	1336	9.0	2.2	K714_0990 EZ702U	2600	3820	98.60	1009701/10240	2900	2600	3800	15	10/6/3	126	111
30	1531	1930	12	1.6	K714_0990 EZ703U	2600	3820	98.60	1009701/10240	2900	2600	3800	23	10/6/3	126	113
30	697	782	7.3	2.7	K713_0990 EZ701U	1880	3330	98.54	100905/1024	2900	2600	3800	9.7	10/5/2	126	100
30	1130	1357	12	1.6	K713_0990 EZ702U	2220	3330	98.54	100905/1024	2900	2600	3800	15	10/5/2	126	102
34	620	696	5.6	3.7	K714_0890 EZ701U	1680	3450	89.06	227997/2560	2900	2600	3800	9.7	10/6/3	126	108
34	1006	1207	9.1	2.3	K714_0890 EZ702U	2600	3450	89.06	227997/2560	2900	2600	3800	15	10/6/3	126	111
34	1383	1743	13	1.6	K714_0890 EZ703U	2600	3450	89.06	227997/2560	2900	2600	3800	23	10/6/3	126	113

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
K7 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 2600 Nm)																
34	630	706	7.8	2.7	K713_0890 EZ701U	1700	3010	89.00	22785/256	2900	2600	3800	9.7	10/5/2	126	100
34	1021	1225	13	1.6	K713_0890 EZ702U	2010	3010	89.00	22785/256	2900	2600	3800	15	10/5/2	126	102
38	558	626	5.2	4.3	K713_0790 EZ701U	1510	3150	78.83	20181/256	2900	2600	3800	10	10/5/2	126	100
38	904	1085	8.5	2.7	K713_0790 EZ702U	2520	3150	78.83	20181/256	2900	2600	3800	15	10/5/2	126	102
38	1243	1568	12	1.9	K713_0790 EZ703U	2520	3150	78.83	20181/256	2900	2600	3800	23	10/5/2	126	104
42	504	565	5.6	4.3	K713_0710 EZ701U	1360	2850	71.20	4557/64	2900	2600	3800	10	10/5/2	126	100
42	817	980	9.1	2.7	K713_0710 EZ702U	2280	2850	71.20	4557/64	2900	2600	3800	16	10/5/2	126	102
42	1123	1416	13	1.9	K713_0710 EZ703U	2280	2850	71.20	4557/64	2900	2600	3800	23	10/5/2	126	104
46	459	515	4.9	4.9	K713_0650 EZ701U	1240	2830	64.85	33201/512	2900	2600	3800	11	10/5/2	126	100
46	744	893	8.0	3.0	K713_0650 EZ702U	2260	2830	64.85	33201/512	2900	2600	3800	16	10/5/2	126	102
46	1023	1289	11	2.2	K713_0650 EZ703U	2260	2830	64.85	33201/512	2900	2600	3800	24	10/5/2	126	104
46	1320	1872	14	1.8	K713_0650 EZ705U	2600	4800	64.85	33201/512	2900	2600	3800	36	10/5/2	126	110
51	414	465	4.8	4.9	K713_0590 EZ701U	1120	2560	58.57	7497/128	2900	2600	3800	11	10/5/2	126	100
51	672	806	7.8	3.0	K713_0590 EZ702U	2040	2560	58.57	7497/128	2900	2600	3800	16	10/5/2	126	102
51	924	1165	11	2.2	K713_0590 EZ703U	2040	2560	58.57	7497/128	2900	2600	3800	24	10/5/2	126	104
51	1193	1691	14	2.0	K713_0590 EZ705U	2600	4800	58.57	7497/128	2900	2600	3800	37	10/5/2	126	110
60	572	687	7.9	3.4	K713_0500 EZ702U	1940	2420	49.88	166005/3328	2900	2600	3800	18	10/5/2	126	102
60	787	992	11	2.5	K713_0500 EZ703U	1940	2420	49.88	166005/3328	2900	2600	3800	26	10/5/2	126	104
60	1016	1440	14	2.2	K713_0500 EZ705U	2600	4800	49.88	166005/3328	2900	2600	3800	38	10/5/2	126	110
60	1063	1769	15	2.1	K713_0500 EZ802U	2600	4800	49.88	166005/3328	2900	2600	3800	62	10/5/2	126	118
67	517	620	7.9	3.4	K713_0450 EZ702U	1750	2190	45.05	37485/832	2900	2600	3800	18	10/5/2	126	102
67	711	896	11	2.5	K713_0450 EZ703U	1750	2190	45.05	37485/832	2900	2600	3800	26	10/5/2	126	104
67	917	1301	14	2.4	K713_0450 EZ705U	2600	4800	45.05	37485/832	2900	2600	3800	38	10/5/2	126	110
67	960	1598	15	2.3	K713_0450 EZ802U	2600	4800	45.05	37485/832	2900	2600	3800	62	10/5/2	126	118
76	450	540	7.9	4.0	K713_0390 EZ702U	1540	2250	39.23	2511/64	2900	2600	3800	20	10/5/2	126	102
76	619	780	11	2.9	K713_0390 EZ703U	1800	2250	39.23	2511/64	2900	2600	3800	27	10/5/2	126	104
76	799	1133	14	2.6	K713_0390 EZ705U	2600	4800	39.23	2511/64	2900	2600	3800	40	10/5/2	126	110
76	836	1392	15	2.5	K713_0390 EZ802U	2600	4800	39.23	2511/64	2900	2600	3800	64	10/5/2	126	118
76	998	1808	18	2.1	K713_0390 EZ803U	2600	4800	39.23	2511/64	2900	2600	3800	89	10/5/2	126	124
85	407	488	8.0	4.0	K713_0350 EZ702U	1390	2030	35.44	567/16	2900	2600	3800	20	10/5/2	126	102
85	559	705	11	2.9	K713_0350 EZ703U	1630	2030	35.44	567/16	2900	2600	3800	28	10/5/2	126	104
85	722	1023	14	2.8	K713_0350 EZ705U	2600	4560	35.44	567/16	2900	2600	3800	40	10/5/2	126	110
85	755	1257	15	2.7	K713_0350 EZ802U	2600	4560	35.44	567/16	2900	2600	3800	64	10/5/2	126	118
85	901	1633	18	2.2	K713_0350 EZ803U	2600	4560	35.44	567/16	2900	2600	3800	89	10/5/2	126	124
93	660	936	14	3.0	K713_0320 EZ705U	2600	4530	32.42	33201/1024	2900	2600	3800	42	10/5/2	126	110
93	691	1150	15	2.8	K713_0320 EZ802U	2600	4530	32.42	33201/1024	2900	2600	3800	66	10/5/2	126	118
93	825	1494	18	2.4	K713_0320 EZ803U	2600	4800	32.42	33201/1024	2900	2600	3800	91	10/5/2	126	124
102	596	845	14	3.2	K713_0290 EZ705U	2600	4090	29.29	7497/256	2900	2600	3800	42	10/5/2	126	110
102	624	1039	15	3.0	K713_0290 EZ802U	2600	4090	29.29	7497/256	2900	2600	3800	66	10/5/2	126	118
102	745	1349	18	2.5	K713_0290 EZ803U	2600	4800	29.29	7497/256	2900	2600	3800	92	10/5/2	126	124
119	513	727	14	3.5	K713_0250 EZ705U	2500	4180	25.18	64449/2560	2400	2200	3400	46	10/5/2	126	110
119	537	893	15	3.3	K713_0250 EZ802U	2410	4180	25.18	64449/2560	2400	2200	3400	70	10/5/2	126	118
119	640	1160	18	2.8	K713_0250 EZ803U	2600	4800	25.18	64449/2560	2400	2200	3400	95	10/5/2	126	124
132	463	657	14	3.8	K713_0230 EZ705U	2260	3780	22.74	14553/640	2400	2200	3400	46	10/5/2	126	110
132	485	806	15	3.6	K713_0230 EZ802U	2170	3780	22.74	14553/640	2400	2200	3400	70	10/5/2	126	118
132	578	1048	18	3.0	K713_0230 EZ803U	2600	4800	22.74	14553/640	2400	2200	3400	96	10/5/2	126	124
148	412	584	14	4.1	K713_0200 EZ705U	2010	3550	20.23	119133/5888	2400	2200	3400	50	10/5/2	126	110
148	431	718	15	3.9	K713_0200 EZ802U	1930	3550	20.23	119133/5888	2400	2200	3400	74	10/5/2	126	118
148	515	932	18	3.2	K713_0200 EZ803U	2600	4800	20.23	119133/5888	2400	2200	3400	100	10/5/2	126	124
164	372	528	14	4.3	K713_0185 EZ705U	1820	3200	18.28	26901/1472	2400	2200	3400	51	10/5/2	126	110
164	390	648	15	4.1	K713_0185 EZ802U	1750	3200	18.28	26901/1472	2400	2200	3400	75	10/5/2	126	118
164	465	842	18	3.5	K713_0185 EZ803U	2530	4800	18.28	26901/1472	2400	2200	3400	100	10/5/2	126	124
183	334	473	15	4.7	K713_0165 EZ705U	1630	3130	16.39	6293/384	2000	1900	3000	55	10/5/2	126	110
183	349	581	15	4.5	K713_0165 EZ802U	1570	3130	16.39	6293/384	2000	1900	3000	79	10/5/2	126	118
183	417	755	18	3.7	K713_0165 EZ803U	2270	4800	16.39	6293/384	2000	1900	3000	105	10/5/2	126	124
203	301	427	15	5.0	K713_0150 EZ705U	1470	2820	14.80	1421/96	2000	1900	3000	56	10/5/2	126	110
203	316	525	15	4.8	K713_0150 EZ802U	1420	2820	14.80	1421/96	2000	1900	3000	80	10/5/2	126	118
203	376	682	18	4.0	K713_0150 EZ803U	2050	4800	14.80	1421/96	2000	1900	3000	106	10/5/2	126	124
230	332	601	18	4.4	K713_0130 EZ803U	1810	4680	13.04	3339/256	2000	1900	3000	112	10/5/2	126	124
255	300	543	18	4.7	K713_0120 EZ803U	1630	4220	11.78	23373/1984	2000	1900	3000	114	10/5/2	126	124
K8 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 4650 Nm)																
41	2047	3096	17	2.1	K813_0490 EZ805U	4650	6040	48.99	5487/112	2800	2500	3600	141	10/5/2	196	191
45	1849	2796	16	2.3	K813_0440 EZ805U	4370	5460	44.25	177/4	2800	2500	3600	142	10/5/2	196	191
50	1671	2528	16	2.5	K813_0400 EZ805U	4650	8400	40.01	12803/320	2800	2500	3600	145	10/5/2	196	191

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
K8 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 4650 Nm)																
55	1510	2284	16	2.7	K813_0360 EZ805U	4650	8400	36.14	2891/80	2800	2500	3600	146	10/5/2	196	191
62	1353	2047	16	2.9	K813_0320 EZ805U	4650	8400	32.39	31093/960	2800	2500	3600	150	10/5/2	196	191
68	1222	1849	16	3.1	K813_0290 EZ805U	4650	8400	29.25	7021/240	2800	2500	3600	151	10/5/2	196	191
78	1066	1612	16	3.4	K813_0260 EZ805U	4650	8400	25.51	140833/5520	2300	2100	3300	158	10/5/2	196	191
87	963	1456	16	3.6	K813_0230 EZ805U	4520	8260	23.04	31801/1380	2300	2100	3300	159	10/5/2	196	191
104	801	1212	16	4.1	K813_0190 EZ805U	3760	6880	19.18	133517/6960	2300	2100	3300	170	10/5/2	196	191
115	724	1095	16	4.3	K813_0175 EZ805U	3400	6210	17.33	30149/1740	2300	2100	3300	173	10/5/2	196	191
122	686	1038	16	4.5	K813_0165 EZ805U	3220	5890	16.43	42067/2560	1900	1800	2900	179	10/5/2	196	191
135	620	938	16	4.8	K813_0150 EZ805U	2910	5320	14.84	9499/640	1900	1800	2900	182	10/5/2	196	191
K8 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 4650 Nm)																
9.6	2165	2428	5.2	1.8	K814_3110 EZ701U	4650	7760	310.9	2149075/6912	2800	2500	3600	9.2	10/6/3	196	166
11	1956	2193	5.5	1.8	K814_2810 EZ701U	4330	7010	280.8	485275/1728	2800	2500	3600	9.3	10/6/3	196	166
12	1784	2001	5.1	2.1	K814_2560 EZ701U	4650	7070	256.2	8854189/34560	2800	2500	3600	9.3	10/6/3	196	166
12	2893	3472	8.2	1.3	K814_2560 EZ702U	4650	7070	256.2	8854189/34560	2800	2500	3600	15	10/6/3	196	169
13	1611	1807	5.4	2.1	K814_2310 EZ701U	4360	6390	231.4	1999333/8640	2800	2500	3600	9.4	10/6/3	196	166
13	2613	3136	8.8	1.3	K814_2310 EZ702U	4650	6390	231.4	1999333/8640	2800	2500	3600	15	10/6/3	196	169
16	1336	1499	4.9	2.7	K814_1920 EZ701U	3610	6040	191.9	85963/448	2800	2500	3600	9.6	10/6/3	196	166
16	2167	2600	8.0	1.6	K814_1920 EZ702U	4650	6040	191.9	85963/448	2800	2500	3600	15	10/6/3	196	169
17	1207	1354	5.3	2.7	K814_1730 EZ701U	3260	5460	173.3	2773/16	2800	2500	3600	9.6	10/6/3	196	166
17	1957	2348	8.6	1.6	K814_1730 EZ702U	4370	5460	173.3	2773/16	2800	2500	3600	15	10/6/3	196	169
19	1091	1224	4.9	3.1	K814_1570 EZ701U	2950	5380	156.7	601741/3840	2800	2500	3600	9.8	10/6/3	196	166
19	1769	2123	7.9	1.9	K814_1570 EZ702U	4300	5380	156.7	601741/3840	2800	2500	3600	15	10/6/3	196	169
19	2433	3067	11	1.4	K814_1570 EZ703U	4300	5380	156.7	601741/3840	2800	2500	3600	23	10/6/3	196	171
21	986	1105	5.3	3.1	K814_1420 EZ701U	2660	4860	141.5	135877/960	2800	2500	3600	9.8	10/6/3	196	166
21	1598	1918	8.5	1.9	K814_1420 EZ702U	3890	4860	141.5	135877/960	2800	2500	3600	15	10/6/3	196	169
21	2198	2770	12	1.4	K814_1420 EZ703U	3890	4860	141.5	135877/960	2800	2500	3600	23	10/6/3	196	171
24	883	991	4.8	3.7	K814_1270 EZ701U	2390	4910	126.9	1461371/11520	2800	2500	3600	10	10/6/3	196	166
24	1432	1719	7.7	2.3	K814_1270 EZ702U	3930	4910	126.9	1461371/11520	2800	2500	3600	15	10/6/3	196	169
24	1970	2483	11	1.6	K814_1270 EZ703U	3930	4910	126.9	1461371/11520	2800	2500	3600	23	10/6/3	196	171
26	798	895	5.1	3.7	K814_1150 EZ701U	2160	4440	114.6	329987/2880	2800	2500	3600	10	10/6/3	196	166
26	1294	1553	8.3	2.3	K814_1150 EZ702U	3550	4440	114.6	329987/2880	2800	2500	3600	15	10/6/3	196	169
26	1779	2243	11	1.6	K814_1150 EZ703U	3550	4440	114.6	329987/2880	2800	2500	3600	23	10/6/3	196	171
30	2065	3436	10	2.0	K814_0980 EZ802U	4650	8400	98.41	181071/1840	2800	2500	3600	61	10/6/3	196	184
31	687	771	4.7	4.2	K813_0970 EZ701U	1860	3650	97.17	31093/320	2800	2500	3600	11	10/5/2	196	153
31	1115	1338	7.6	2.6	K813_0970 EZ702U	2920	3650	97.17	31093/320	2800	2500	3600	16	10/5/2	196	156
31	1533	1932	10	1.9	K813_0970 EZ703U	2920	3650	97.17	31093/320	2800	2500	3600	24	10/5/2	196	158
34	1865	3103	10	2.3	K814_0890 EZ802U	4650	8260	88.89	40887/460	2800	2500	3600	61	10/6/3	196	184
34	621	696	5.0	4.2	K813_0880 EZ701U	1680	3300	87.76	7021/80	2800	2500	3600	11	10/5/2	196	153
34	1007	1208	8.1	2.6	K813_0880 EZ702U	2640	3300	87.76	7021/80	2800	2500	3600	16	10/5/2	196	156
34	1384	1745	11	1.9	K813_0880 EZ703U	2640	3300	87.76	7021/80	2800	2500	3600	24	10/5/2	196	158
38	562	630	3.4	4.7	K813_0790 EZ701U	1520	3290	79.38	45725/576	2800	2500	3600	12	10/5/2	196	153
38	911	1093	5.6	2.9	K813_0790 EZ702U	2630	3290	79.38	45725/576	2800	2500	3600	18	10/5/2	196	156
38	1252	1579	7.6	2.1	K813_0790 EZ703U	2630	3290	79.38	45725/576	2800	2500	3600	25	10/5/2	196	158
38	1616	2292	9.9	2.5	K813_0790 EZ705U	4650	7760	79.38	45725/576	2800	2500	3600	38	10/5/2	196	163
38	1692	2816	10	2.4	K813_0790 EZ802U	4650	7760	79.38	45725/576	2800	2500	3600	62	10/5/2	196	171
41	1553	2583	9.5	2.7	K814_0740 EZ802U	4650	6880	73.99	1201653/16240	2800	2500	3600	62	10/6/3	196	184
41	1852	3356	11	2.3	K814_0740 EZ803U	4650	6880	73.99	1201653/16240	2800	2500	3600	88	10/6/3	196	191
42	507	569	3.7	4.7	K813_0720 EZ701U	1370	2970	71.70	10325/144	2800	2500	3600	12	10/5/2	196	153
42	823	987	6.0	2.9	K813_0720 EZ702U	2380	2970	71.70	10325/144	2800	2500	3600	18	10/5/2	196	156
42	1131	1426	8.2	2.1	K813_0720 EZ703U	2380	2970	71.70	10325/144	2800	2500	3600	26	10/5/2	196	158
42	1460	2070	11	2.5	K813_0720 EZ705U	4330	7010	71.70	10325/144	2800	2500	3600	38	10/5/2	196	163
42	1529	2543	11	2.4	K813_0720 EZ802U	4330	7010	71.70	10325/144	2800	2500	3600	62	10/5/2	196	171
42	1823	3304	13	2.0	K813_0720 EZ803U	4330	7010	71.70	10325/144	2800	2500	3600	87	10/5/2	196	177
45	1402	2333	9.4	2.9	K814_0670 EZ802U	4650	6210	66.83	38763/580	2800	2500	3600	62	10/6/3	196	184
45	1673	3031	11	2.4	K814_0670 EZ803U	4650	6210	66.83	38763/580	2800	2500	3600	88	10/6/3	196	191
46	1332	1889	8.8	3.2	K813_0650 EZ705U	4650	7080	65.41	188387/2880	2800	2500	3600	39	10/5/2	196	163
46	1395	2320	9.3	3.0	K813_0650 EZ802U	4650	7080	65.41	188387/2880	2800	2500	3600	63	10/5/2	196	171
46	1663	3014	11	2.5	K813_0650 EZ803U	4650	7080	65.41	188387/2880	2800	2500	3600	89	10/5/2	196	177
51	1203	1706	8.7	3.4	K813_0590 EZ705U	4650	6390	59.08	42539/720	2800	2500	3600	40	10/5/2	196	163
51	1260	2095	9.1	3.3	K813_0590 EZ802U	4650	6390	59.08	42539/720	2800	2500	3600	64	10/5/2	196	171
51	1502	2722	11	2.8	K813_0590 EZ803U	4650	6390	59.08	42539/720	2800	2500	3600	89	10/5/2	196	177
61	562	674	4.9	3.8	K813_0490 EZ702U	1920	2690	48.99	5487/112	2800	2500	3600	22	10/5/2	196	156
61	773	974	6.8	2.8	K813_0490 EZ703U	2160	2690	48.99	5487/112	2800	2500	3600	30	10/5/2	196	158
61	998	1414	8.8	3.9	K813_0490 EZ705U	4650	6040	48.99	5487/112	2800	2500	3600	43	10/5/2	196	163

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	$\Delta\varphi_2$ [arcmin]	C_2 [Nm/ arcmin]	m [kg]
K8 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 4650 Nm)																
61	1044	1738	9.2	3.7	K813_0490 EZ802U	4650	6040	48.99	5487/112	2800	2500	3600	67	10/5/2	196	171
61	1246	2257	11	3.1	K813_0490 EZ803U	4650	6040	48.99	5487/112	2800	2500	3600	92	10/5/2	196	177
68	508	609	5.0	3.8	K813_0440 EZ702U	1730	2430	44.25	177/4	2800	2500	3600	23	10/5/2	196	156
68	698	880	6.8	2.8	K813_0440 EZ703U	1950	2430	44.25	177/4	2800	2500	3600	31	10/5/2	196	158
68	901	1278	8.8	4.2	K813_0440 EZ705U	4370	5460	44.25	177/4	2800	2500	3600	43	10/5/2	196	163
68	943	1569	9.2	4.0	K813_0440 EZ802U	4230	5460	44.25	177/4	2800	2500	3600	67	10/5/2	196	171
68	1125	2039	11	3.3	K813_0440 EZ803U	4370	5460	44.25	177/4	2800	2500	3600	93	10/5/2	196	177
75	815	1155	8.8	4.5	K813_0400 EZ705U	3980	5380	40.01	12803/320	2800	2500	3600	46	10/5/2	196	163
75	853	1419	9.2	4.3	K813_0400 EZ802U	3820	5380	40.01	12803/320	2800	2500	3600	70	10/5/2	196	171
75	1017	1844	11	3.6	K813_0400 EZ803U	4650	8400	40.01	12803/320	2800	2500	3600	96	10/5/2	196	177
83	736	1043	8.9	4.8	K813_0360 EZ705U	3590	4860	36.14	2891/80	2800	2500	3600	47	10/5/2	196	163
83	770	1282	9.3	4.6	K813_0360 EZ802U	3450	4860	36.14	2891/80	2800	2500	3600	71	10/5/2	196	171
83	919	1665	11	3.8	K813_0360 EZ803U	4650	8400	36.14	2891/80	2800	2500	3600	96	10/5/2	196	177
93	690	1149	9.3	4.9	K813_0320 EZ802U	3100	5190	32.39	31093/960	2800	2500	3600	75	10/5/2	196	171
93	824	1492	11	4.1	K813_0320 EZ803U	4490	8400	32.39	31093/960	2800	2500	3600	101	10/5/2	196	177
103	744	1348	11	4.4	K813_0290 EZ803U	4060	8400	29.25	7021/240	2800	2500	3600	102	10/5/2	196	177
118	649	1176	11	4.8	K813_0260 EZ803U	3540	8400	25.51	140833/5520	2300	2100	3300	108	10/5/2	196	177
K9 (n_{1N} = 2000 rpm, $M_{2acc,max}$ = 7700 Nm)																
27	3133	4740	12	2.2	K913_0750 EZ805U	6820	8530	75.00	62403/832	2600	2500	3400	142	10/5	379	305
32	2635	3986	12	2.7	K913_0630 EZ805U	7700	14000	63.07	209901/3328	2600	2500	3400	146	10/5	379	305
41	2044	3092	11	3.4	K913_0490 EZ805U	7700	13790	48.94	100223/2048	2600	2500	3400	153	10/5	379	305
53	1589	2404	10	4.4	K913_0380 EZ805U	7460	12510	38.04	194773/5120	2600	2500	3400	163	10/5	379	305
62	1342	2029	9.5	3.2	K913_0320 EZ805U	4240	5300	32.12	47275/1472	2600	2500	3400	172	10/5	379	305
84	1000	1513	9.5	3.6	K913_0240 EZ805U	3590	4490	23.94	88877/3712	2200	2100	3100	193	10/5	379	305
K9 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 7700 Nm)																
8.0	2602	2919	4.9	1.8	K914_3740 EZ701U	6450	9210	373.7	13775935/36864	2600	2500	3400	9.4	10/5	379	280
10	2046	2294	4.7	2.2	K914_2940 EZ701U	5530	8530	293.8	977647/3328	2600	2500	3400	9.6	10/5	379	280
10	3317	3981	7.7	1.4	K914_2940 EZ702U	6820	8530	293.8	977647/3328	2600	2500	3400	15	10/5	379	283
12	1720	1929	4.7	2.5	K914_2470 EZ701U	4650	7170	247.0	3288449/13312	2600	2500	3400	9.9	10/5	379	280
12	2789	3347	7.6	1.6	K914_2470 EZ702U	5730	7170	247.0	3288449/13312	2600	2500	3400	15	10/5	379	283
16	1335	1497	4.6	3.1	K914_1920 EZ701U	3610	6340	191.7	4710481/24576	2600	2500	3400	10	10/5	379	280
16	2164	2597	7.4	1.9	K914_1920 EZ702U	5070	6340	191.7	4710481/24576	2600	2500	3400	16	10/5	379	283
16	2976	3752	10	1.4	K914_1920 EZ703U	5070	6340	191.7	4710481/24576	2600	2500	3400	23	10/5	379	285
20	1038	1164	4.5	3.8	K914_1490 EZ701U	2800	5750	149.0	9154331/61440	2600	2500	3400	11	10/5	379	280
20	1682	2019	7.3	2.3	K914_1490 EZ702U	4600	5750	149.0	9154331/61440	2600	2500	3400	16	10/5	379	283
20	2313	2916	10	1.7	K914_1490 EZ703U	4600	5750	149.0	9154331/61440	2600	2500	3400	24	10/5	379	285
20	3079	5123	8.2	2.1	K914_1470 EZ802U	7700	12510	146.7	5258871/35840	2600	2500	3400	62	10/5	379	299
24	876	982	4.4	4.3	K914_1260 EZ701U	2370	4870	125.8	2221925/17664	2600	2500	3400	12	10/5	379	280
24	1420	1704	7.2	2.6	K914_1260 EZ702U	3900	4870	125.8	2221925/17664	2600	2500	3400	17	10/5	379	283
24	1953	2462	9.9	1.9	K914_1260 EZ703U	3900	4870	125.8	2221925/17664	2600	2500	3400	25	10/5	379	285
24	2599	4325	8.1	2.4	K914_1240 EZ802U	7700	11510	123.9	1276425/10304	2600	2500	3400	62	10/5	379	299
24	3101	5619	9.7	2.0	K914_1240 EZ803U	7700	11510	123.9	1276425/10304	2600	2500	3400	88	10/5	379	305
31	2034	3384	8.7	2.6	K913_0950 EZ802U	6450	9210	95.41	293105/3072	2600	2500	3400	64	10/5	379	286
31	2426	4397	10	2.2	K913_0950 EZ803U	6450	9210	95.41	293105/3072	2600	2500	3400	90	10/5	379	292
32	1059	1271	8.6	2.7	K914_0940 EZ702U	2910	3630	93.78	4177219/44544	2600	2500	3400	18	10/5	379	283
32	1456	1835	12	2.0	K914_0940 EZ703U	2910	3630	93.78	4177219/44544	2600	2500	3400	26	10/5	379	285
32	1938	3224	8.1	2.9	K914_0920 EZ802U	6870	8580	92.35	2399679/25984	2600	2500	3400	64	10/5	379	299
32	2312	4189	9.6	2.4	K914_0920 EZ803U	6870	8580	92.35	2399679/25984	2600	2500	3400	89	10/5	379	305
40	1599	2660	6.2	4.3	K913_0750 EZ802U	6820	8530	75.00	62403/832	2600	2500	3400	68	10/5	379	286
40	1907	3456	7.4	3.6	K913_0750 EZ803U	6820	8530	75.00	62403/832	2600	2500	3400	93	10/5	379	292
48	1345	2237	5.9	4.3	K913_0630 EZ802U	5730	7170	63.07	209901/3328	2600	2500	3400	71	10/5	379	286
48	1604	2906	7.1	4.4	K913_0630 EZ803U	7700	14000	63.07	209901/3328	2600	2500	3400	97	10/5	379	292
61	1043	1736	5.5	4.9	K913_0490 EZ802U	4680	6340	48.94	100223/2048	2600	2500	3400	78	10/5	379	286
61	1244	2255	6.5	4.1	K913_0490 EZ803U	5070	6340	48.94	100223/2048	2600	2500	3400	103	10/5	379	292
79	967	1753	6.5	4.8	K913_0380 EZ803U	4600	5750	38.04	194773/5120	2600	2500	3400	113	10/5	379	292
K10 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 13200 Nm)																
10	6093	10136	8.1	1.4	K1014_2900 EZ802U	13200	19570	290.4	392553/1352	2500	2300	3200	61	10/5	725	508
13	4982	8289	7.9	1.7	K1014_2370 EZ802U	12750	15940	237.4	49383/208	2500	2300	3200	62	10/5	725	508
20	3124	5198	7.6	2.4	K1014_1490 EZ802U	10620	13280	148.9	30969/208	2500	2300	3200	64	10/5	725	508
20	3727	6753	9.0	2.0	K1014_1490 EZ803U	10620	13280	148.9	30969/208	2500	2300	3200	90	10/5	725	514

21.3 Dimensional drawings

In this chapter you can find the dimensions of the geared motors.

There is a dimensional drawing for every possible shaft/housing design, each with the tables for gear unit dimensions, motor dimensions and geared motor dimensions.

Dimensions can exceed the specifications of ISO 2768-mK due to casting tolerances or accumulation of individual tolerances.

We reserve the right to make dimensional changes due to ongoing technical development.

You can download CAD models of our standard drives at http://cad.stoeber.de.

Combination options and the dimensions of forced ventilated geared motors can be found at http://cad.stoeber.de.

Tolerances

Axis height in accordance with DIN 747	Tolerance
Up to 50 mm	-0.4 mm
Up to 250 mm	-0.5 mm
Up to 630 mm	-0.6 mm

Solid shaft	Tolerance
Shaft ∅ fit ≤ 50 mm	DIN 748-1, ISO k6
Shaft ∅ fit > 50 mm	DIN 748-1, ISO m6
Feather keys	DIN 6885-1, high form A

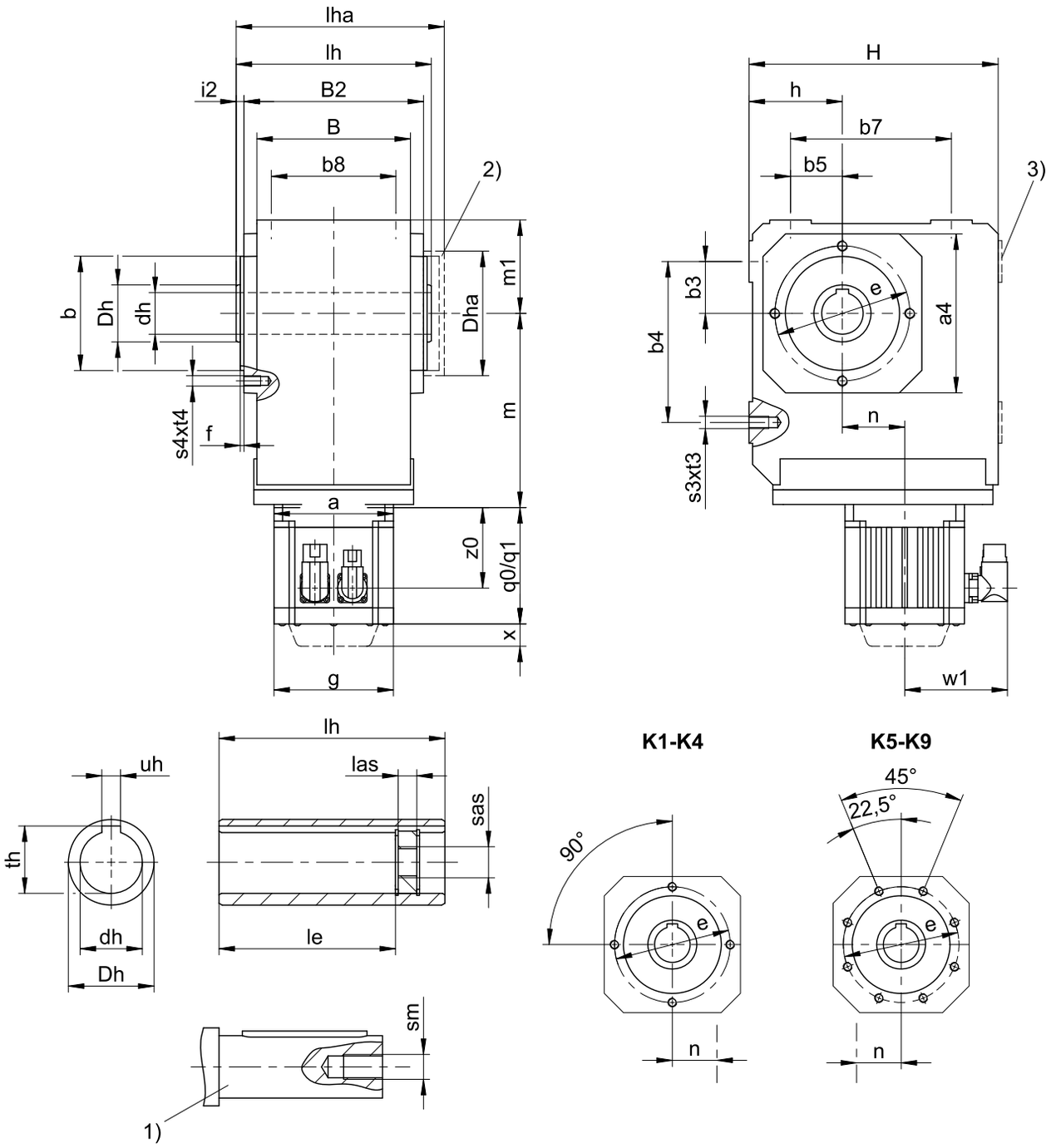
Hollow shaft	Tolerance
Hollow shaft hole fit	ISO H7
Feather keys	DIN 6885-1, high form S1/K1 ∅30: DIN 6885-3, low form

Flange	Pilot tolerance
Up to 300 mm	ISO j6
Starting at 350 mm	ISO h6

Centering holes in solid shafts in accordance with DIN 332-2, DR shape

Thread size	M4	M5	M6	M8	M10	M12	M16	M20	M24
Thread depth [mm]	10	12.5	16	19	22	28	36	42	50

21.3.1 A shaft design (hollow shaft), G housing design (pitch circle diameter)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]
1)	The length of the machine shaft must be at least 2.2 x ∅dh and the length of the feather key must be at least 2 x ∅dh.	2)	Cover (optional)
3)	Only for K1 (other sizes on request)		

Dimensions of gear units

Type	□a4	Øb	b3	b4	b5	b7	b8	B	B2	Ødh	ØDh	Dha	Øe	f	h	H	i2	le	lh	las	lha	m1	s3	s4	sm	sas	t3	t4	th	uh
K1	105	75_{j6}	30	90	30	90	70	90	106	20^{H7}	40	□105	90	3.0	60	160	7.0	98.0	120	12	127.0	60	M8	M8	M6	M8	13	13	22.8	6^{JS9}
K1	105	75_{j6}	30	90	30	90	70	90	106	25^{H7}	40	□105	90	3.0	60	160	7.0	98.0	120	12	127.0	60	M8	M8	M10	M12	13	13	28.3	8^{JS9}
K1	105	75_{j6}	30	90	30	90	70	90	106	30^{H7}	40	□105	90	3.0	60	160	7.0	93.5	120	12	127.0	60	M8	M8	M10	M12	13	13	32.0	8^{JS9}
K2	116	82_{j6}	35	115	35	115	90	115	134	30^{H7}	45	□116	100	3.0	65	190	7.0	121.5	148	12	156.0	65	M10	M8	M10	M12	16	13	33.3	8^{JS9}
K3	132	95_{j6}	40	130	40	130	105	130	146	35^{H7}	50	□132	115	3.0	75	213	7.0	125.0	160	12	168.0	75	M10	M8	M12	M16	16	13	38.3	10^{JS9}
K4	152	110_{j6}	50	155	50	155	120	148	173	40^{H7}	55	□152	130	3.5	90	240	7.5	157.0	188	12	197.5	90	M12	M10	M16	M20	19	16	43.3	12^{JS9}
K5	145	110_{j6}	40	140	100	140	125	160	185	50^{H7}	65	□145	130	3.5	160	260	7.5	164.0	200	12	209.5	100	M16	M10	M16	M20	26	16	53.8	14^{JS9}
K6	180	140_{j6}	50	160	110	160	130	168	200	50^{H7}	70	∅183	165	3.5	190	310	7.5	179.0	215	12	224.5	120	M16	M10	M16	M20	26	16	53.8	14^{JS9}
K7	195	155_{j6}	55	180	125	180	145	190	226	60^{H7}	85	∅205	185	3.5	212	342	8.0	214.0	242	12	252.0	125	M20	M12	M20	M24	33	19	64.4	18^{JS9}
K8	226	185_{j6}	75	240	165	240	185	235	282	70^{H7}	100	∅184	215	4.0	265	410	9.0	263.0	300	20	311.0	145	M24	M12	M20	M24	38	19	74.9	20^{JS9}
K9	280	230_{j6}	95	280	185	280	225	285	330	90^{H7}	120	∅230	265	5.0	315	495	10.0	302.0	350	26	361.0	180	M30	M16	M24	M30	48	26	95.4	25^{JS9}

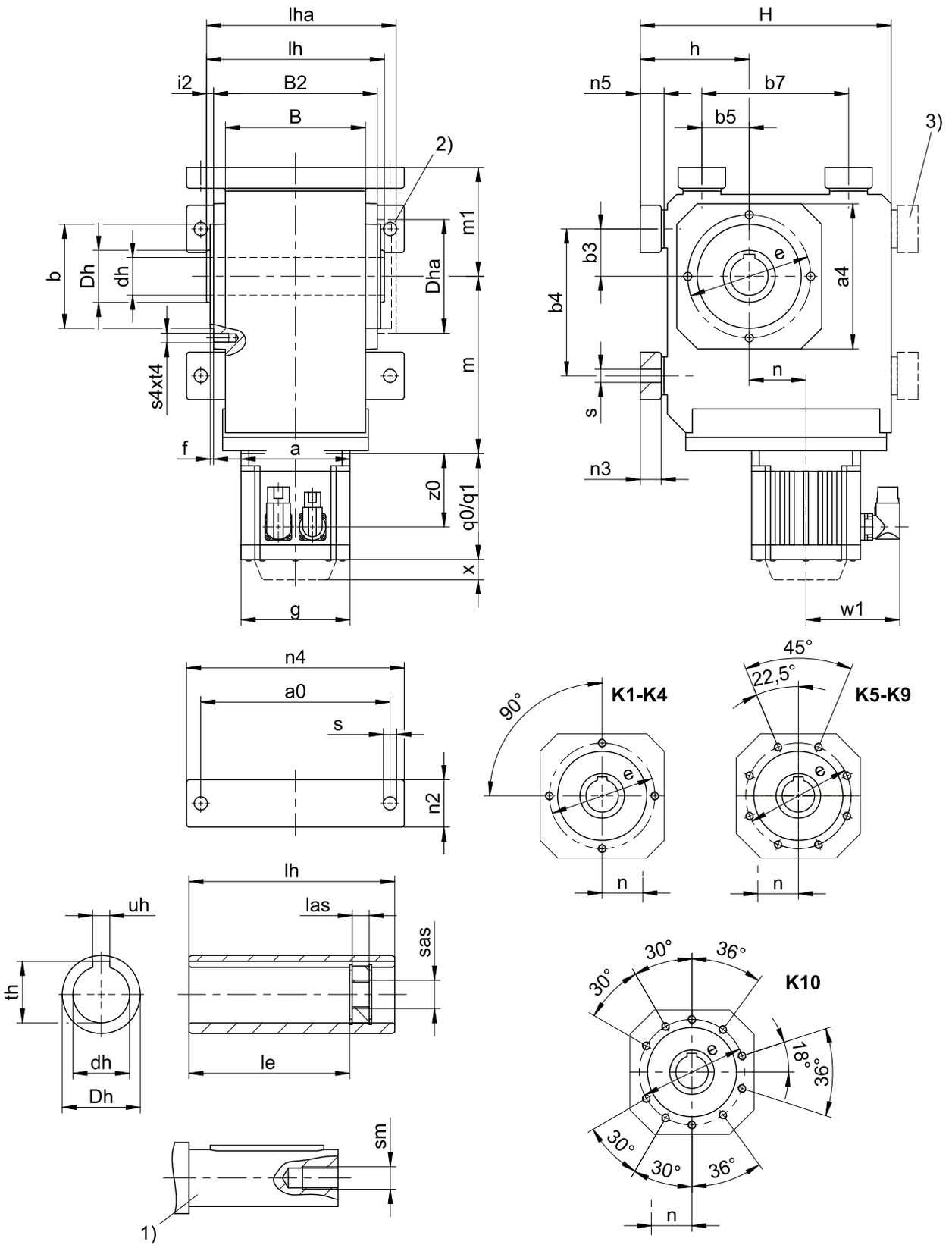
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5
EZ805U	190	355.5	432.5	156.5	22	301.5

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
K102	□72	124	36.0	□98	124	36.0	□115	128	36.0	□145	130	36.0	–	–	–
K202	□72	143	46.0	□98	143	46.0	□115	147	46.0	□145	149	46.0	–	–	–
K203	∅140	180	46.0	∅140	180	46.0	–	–	–	–	–	–	–	–	–
K302	∅140	163	52.5	∅140	163	52.5	□115	167	52.5	□145	169	52.5	–	–	–
K303	∅140	200	52.5	∅140	200	52.5	∅160	210	16.0	–	–	–	–	–	–
K402	–	–	–	–	–	–	∅160	187	60.0	□145	189	60.0	□190	192	60.0
K403	∅140	220	60.0	∅140	220	60.0	∅160	230	23.0	–	–	–	–	–	–
K513	–	–	–	–	–	–	∅160	172	15.0	□145	174	15.0	□190	177	15.0
K514	–	–	–	–	–	–	∅160	215	15.0	–	–	–	–	–	–
K613	–	–	–	–	–	–	∅160	191	18.0	∅200	193	18.0	□190	196	18.0
K614	–	–	–	–	–	–	∅160	234	18.0	–	–	–	–	–	–
K713	–	–	–	–	–	–	–	–	–	∅200	221	20.0	□190	224	20.0
K714	–	–	–	–	–	–	∅160	263	20.0	∅200	283	20.0	–	–	–
K813	–	–	–	–	–	–	–	–	–	∅200	247	24.0	∅250	249	24.0
K814	–	–	–	–	–	–	–	–	–	∅200	308	24.0	∅250	320	5.0
K913	–	–	–	–	–	–	–	–	–	–	–	–	∅250	294	25.0
K914	–	–	–	–	–	–	–	–	–	∅200	353	25.0	∅250	365	25.0

21.3.2 A shaft design (hollow shaft), NG housing design (base + pitch circle diameter)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▶ 23.4]
1)	The length of the machine shaft must be at least 2.2 x ∅dh and the length of the feather key must be at least 2 x ∅dh.	2)	Cover (optional)
3)	Only for K1 (other sizes on request)		

Dimensions of gear units

Type	a0	□a4	Øb	b3	b4	b5	b7	B	B2	Ødh	ØDh	Dha	Øe	f	h	H	i2	le	lh	las	lha	m1	n2	n3	n4	n5	Øs	s4	sm	sas	t4	th	uh
K1	115	105	75_{j6}	30	90	30	90	90	106	20^{H7}	40	□105	90	3.0	75	175	7.0	98.0	120	12	127.0	75	30	13	140	15	9.0	M8	M6	M8	13	22.8	6^{JS9}
K1	115	105	75_{j6}	30	90	30	90	90	106	25^{H7}	40	□105	90	3.0	75	175	7.0	98.0	120	12	127.0	75	30	13	140	15	9.0	M8	M10	M12	13	28.3	8^{JS9}
K1	115	105	75_{j6}	30	90	30	90	90	106	30^{H7}	40	□105	90	3.0	75	175	7.0	93.5	120	12	127.0	75	30	13	140	15	9.0	M8	M10	M12	13	32.0	8^{JS9}
K2	155	116	82_{j6}	35	115	35	115	115	134	30^{H7}	45	□116	100	3.0	88	213	7.0	121.5	148	12	156.0	88	40	20	185	23	11.0	M8	M10	M12	13	33.3	8^{JS9}
K3	170	132	95_{j6}	40	130	40	130	130	146	35^{H7}	50	□132	115	3.0	98	236	7.0	125.0	160	12	168.0	98	45	20	200	23	11.0	M8	M12	M16	13	38.3	10^{JS9}
K4	200	152	110_{j6}	50	155	50	155	148	173	40^{H7}	55	□152	130	3.5	115	265	7.5	157.0	188	12	197.5	115	50	22	230	25	14.0	M10	M16	M20	16	43.3	12^{JS9}
K5	200	145	110_{j6}	40	140	100	140	160	185	50^{H7}	65	□145	130	3.5	190	290	7.5	164.0	200	12	209.5	130	60	27	240	30	18.0	M10	M16	M20	16	53.8	14^{JS9}
K6	210	180	140_{j6}	50	160	110	160	168	200	50^{H7}	70	∅183	165	3.5	220	340	7.5	179.0	215	12	224.5	150	65	27	250	30	18.5	M10	M16	M20	16	53.8	14^{JS9}
K7	241	195	155_{j6}	55	180	125	180	190	226	60^{H7}	85	∅205	185	3.5	250	380	8.0	214.0	242	12	252.0	163	70	35	290	38	23.0	M12	M20	M24	19	64.4	18^{JS9}
K8	300	226	185_{j6}	75	240	165	240	235	282	70^{H7}	100	∅184	215	4.0	310	455	9.0	263.0	300	20	311.0	190	85	41	360	45	27.0	M12	M20	M24	19	74.9	20^{JS9}
K9	360	280	230_{j6}	95	280	185	280	285	330	90^{H7}	120	∅230	265	5.0	365	545	10.0	302.0	350	26	361.0	230	95	46	430	50	31.0	M16	M24	M30	26	95.4	25^{JS9}
K10	330	340	250_{h6}	115	350	265	420	400	356	100^{H7}	130	∅200	300	20.0	420	636	27.0	361.0	410	26	441.0	270	120	–	400	45	39.0	M20	M24	M30	33	106.4	28^{JS9}

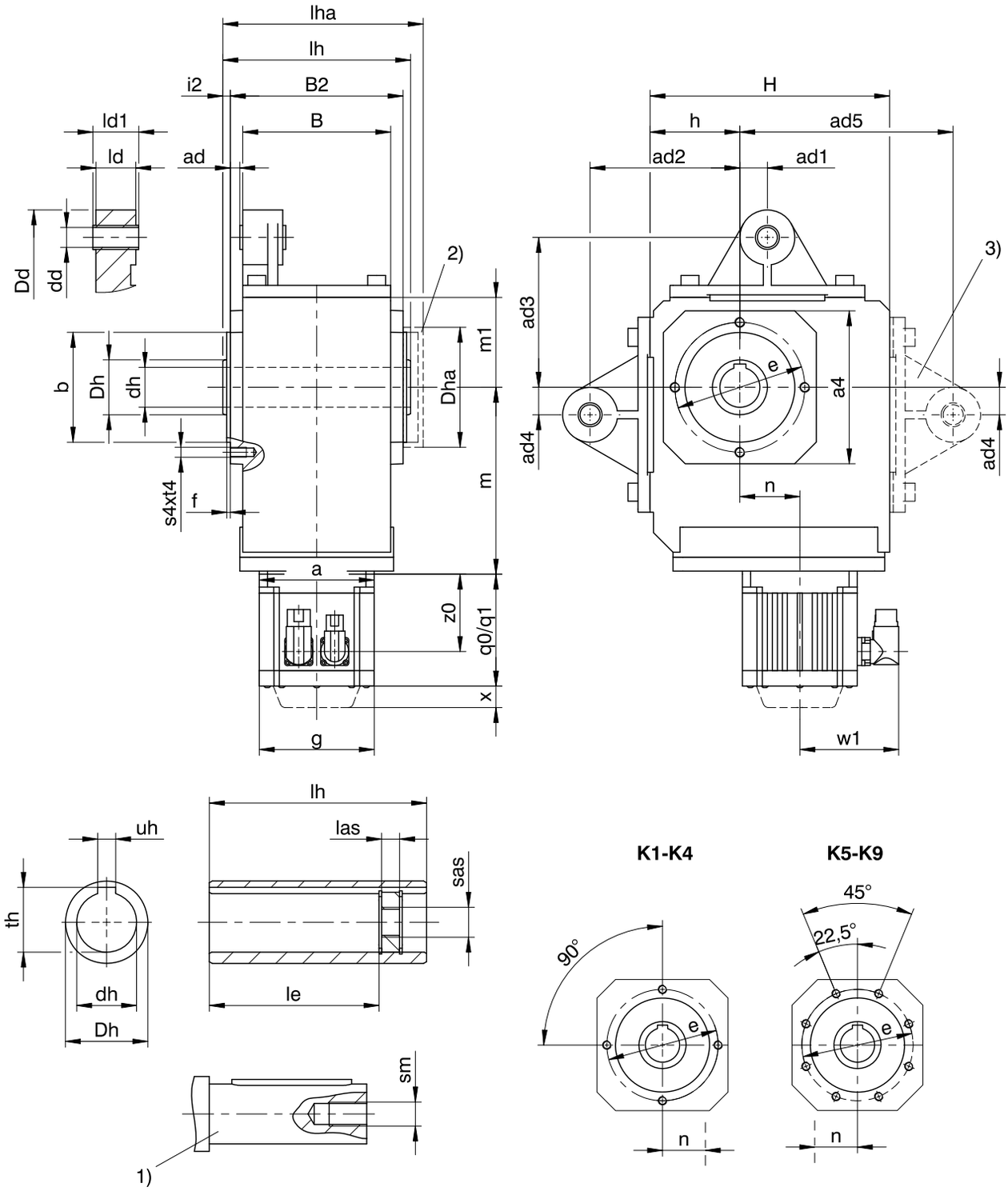
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5
EZ805U	190	355.5	432.5	156.5	22	301.5

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
K102	□72	124	36.0	□98	124	36.0	□115	128	36.0	□145	130	36.0	–	–	–
K202	□72	143	46.0	□98	143	46.0	□115	147	46.0	□145	149	46.0	–	–	–
K203	∅140	180	46.0	∅140	180	46.0	–	–	–	–	–	–	–	–	–
K302	∅140	163	52.5	∅140	163	52.5	□115	167	52.5	□145	169	52.5	–	–	–
K303	∅140	200	52.5	∅140	200	52.5	∅160	210	16.0	–	–	–	–	–	–
K402	–	–	–	–	–	–	∅160	187	60.0	□145	189	60.0	□190	192	60.0
K403	∅140	220	60.0	∅140	220	60.0	∅160	230	23.0	–	–	–	–	–	–
K513	–	–	–	–	–	–	∅160	172	15.0	□145	174	15.0	□190	177	15.0
K514	–	–	–	–	–	–	∅160	215	15.0	–	–	–	–	–	–
K613	–	–	–	–	–	–	∅160	191	18.0	∅200	193	18.0	□190	196	18.0
K614	–	–	–	–	–	–	∅160	234	18.0	–	–	–	–	–	–
K713	–	–	–	–	–	–	–	–	–	∅200	221	20.0	□190	224	20.0
K714	–	–	–	–	–	–	∅160	263	20.0	∅200	283	20.0	–	–	–
K813	–	–	–	–	–	–	–	–	–	∅200	247	24.0	∅250	249	24.0
K814	–	–	–	–	–	–	–	–	–	∅200	308	24.0	∅250	320	5.0
K913	–	–	–	–	–	–	–	–	–	–	–	–	∅250	294	25.0
K914	–	–	–	–	–	–	–	–	–	∅200	353	25.0	∅250	365	25.0
K1014	–	–	–	–	–	–	–	–	–	–	–	–	∅250	450	28.0

21.3.3 A shaft design (hollow shaft), GD housing design (pitch circle diameter + torque arm)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]
1)	The length of the machine shaft must be at least 2.2 x ∅dh and the length of the feather key must be at least 2 x ∅dh.	2)	Cover (optional)
3)	Only for K1 (other sizes on request)	–	If you brace the gear units without the factory-adjusted torque arms provided for this purpose, the dimensions for ad2 and ad3 must meet the specified value.

Dimensions of gear units

Type	□a4	ad	ad1	ad2	ad3	ad4	ad5	Øb	B	B2	Ødd	Ødh	ØDd	ØDh	Dha	Øe	f
K1	105	6.0	15.0	90	90	15.0	130	75_{j6}	90	106	12^{H9}	20^{H7}	43	40	□105	90	3.0
K1	105	6.0	15.0	90	90	15.0	130	75_{j6}	90	106	12^{H9}	25^{H7}	43	40	□105	90	3.0
K1	105	6.0	15.0	90	90	15.0	130	75_{j6}	90	106	12^{H9}	30^{H7}	43	40	□105	90	3.0
K2	116	6.5	22.5	100	100	22.5	–	82_{j6}	115	134	16^{H9}	30^{H7}	45	45	□116	100	3.0
K3	132	5.0	25.0	120	120	25.0	–	95_{j6}	130	146	16^{H9}	35^{H7}	45	50	□132	115	3.0
K4	152	9.5	27.5	150	150	27.5	–	110_{j6}	148	173	20^{H9}	40^{H7}	55	55	□152	130	3.5
K5	145	9.5	30.0	250	190	30.0	–	110_{j6}	160	185	20^{H9}	50^{H7}	58	65	□145	130	3.5
K6	180	13.0	30.0	250	180	30.0	–	140_{j6}	168	200	20^{H9}	50^{H7}	58	70	∅183	165	3.5
K7	195	15.0	35.0	300	213	35.0	–	155_{j6}	190	226	20^{H9}	60^{H7}	68	85	∅205	185	3.5
K8	226	17.0	45.0	350	230	45.0	–	185_{j6}	235	282	24^{H9}	70^{H7}	72	100	∅184	215	4.0
K9	280	16.0	45.0	450	315	45.0	–	230_{j6}	285	330	24^{H9}	90^{H7}	75	120	∅230	265	5.0

Dimensions of gear units

Type	h	H	i2	ld	ld1	le	lh	las	lha	m1	s4	sm	sas	t4	th	uh
K1	60	160	7.0	24	28	98.0	120	12	127.0	60	M8	M6	M8	13	22.8	6^{JS9}
K1	60	160	7.0	24	28	98.0	120	12	127.0	60	M8	M10	M12	13	28.3	8^{JS9}
K1	60	160	7.0	24	28	93.5	120	12	127.0	60	M8	M10	M12	13	32.0	8^{JS9}
K2	65	190	7.0	32	38	121.5	148	12	156.0	65	M8	M10	M12	13	33.3	8^{JS9}
K3	75	213	7.0	32	38	125.0	160	12	168.0	75	M8	M12	M16	13	38.3	10^{JS9}
K4	90	240	7.5	40	46	157.0	188	12	197.5	90	M10	M16	M20	16	43.3	12^{JS9}
K5	160	260	7.5	40	46	164.0	200	12	209.5	100	M10	M16	M20	16	53.8	14^{JS9}
K6	190	310	7.5	40	46	179.0	215	12	224.5	120	M10	M16	M20	16	53.8	14^{JS9}
K7	212	342	8.0	64	70	214.0	242	12	252.0	125	M12	M20	M24	19	64.4	18^{JS9}
K8	265	410	9.0	102	115	263.0	300	20	311.0	145	M12	M20	M24	19	74.9	20^{JS9}
K9	315	495	10.0	102	115	302.0	350	26	361.0	180	M16	M24	M30	26	95.4	25^{JS9}

Dimensions of motors

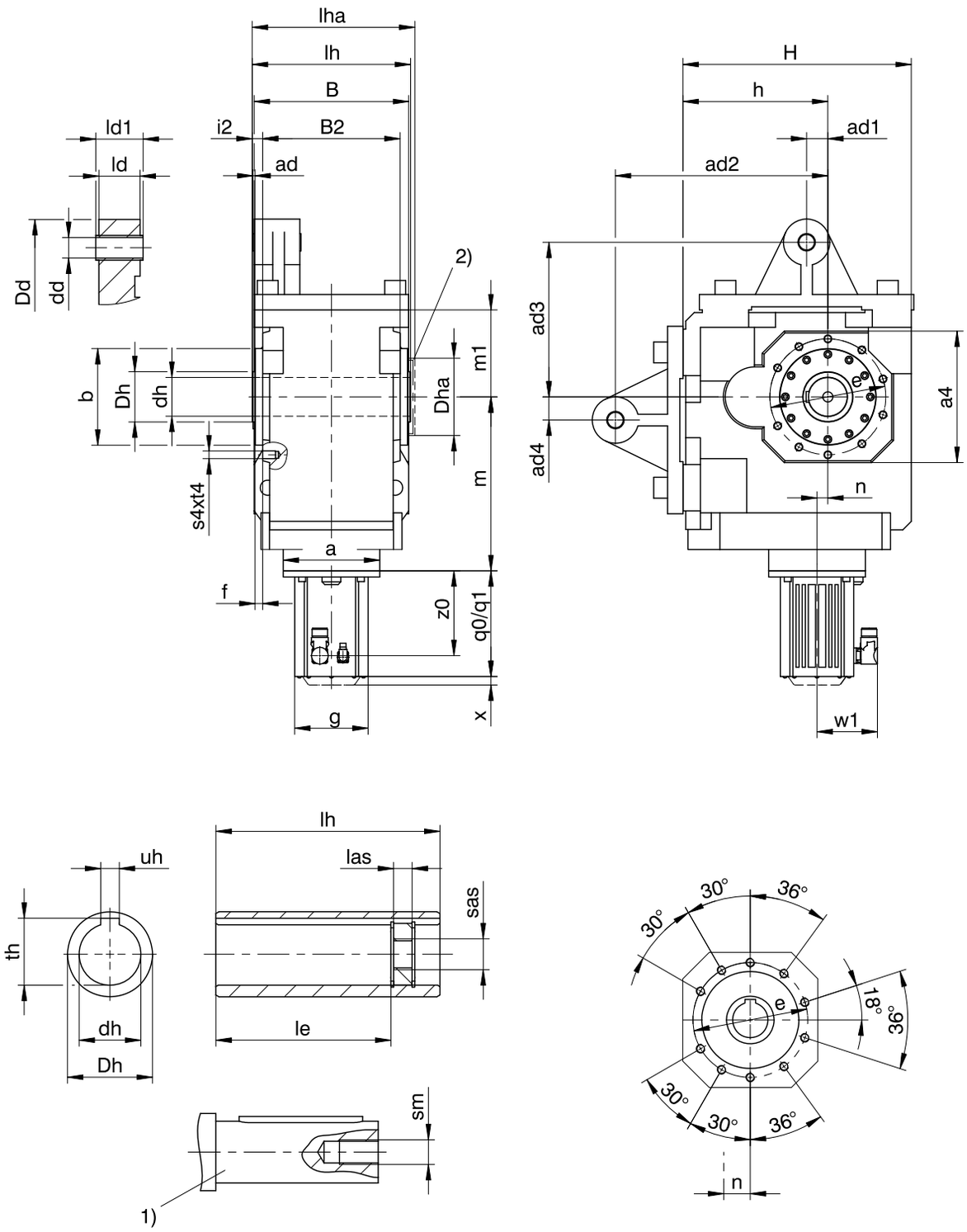
Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5
EZ805U	190	355.5	432.5	156.5	22	301.5

The dimensions a, m and n can be found on the next page.

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
K102	□72	124	36.0	□98	124	36.0	□115	128	36.0	□145	130	36.0	–	–	–
K202	□72	143	46.0	□98	143	46.0	□115	147	46.0	□145	149	46.0	–	–	–
K203	∅140	180	46.0	∅140	180	46.0	–	–	–	–	–	–	–	–	–
K302	∅140	163	52.5	∅140	163	52.5	□115	167	52.5	□145	169	52.5	–	–	–
K303	∅140	200	52.5	∅140	200	52.5	∅160	210	16.0	–	–	–	–	–	–
K402	–	–	–	–	–	–	∅160	187	60.0	□145	189	60.0	□190	192	60.0
K403	∅140	220	60.0	∅140	220	60.0	∅160	230	23.0	–	–	–	–	–	–
K513	–	–	–	–	–	–	∅160	172	15.0	□145	174	15.0	□190	177	15.0
K514	–	–	–	–	–	–	∅160	215	15.0	–	–	–	–	–	–
K613	–	–	–	–	–	–	∅160	191	18.0	∅200	193	18.0	□190	196	18.0
K614	–	–	–	–	–	–	∅160	234	18.0	–	–	–	–	–	–
K713	–	–	–	–	–	–	–	–	–	∅200	221	20.0	□190	224	20.0
K714	–	–	–	–	–	–	∅160	263	20.0	∅200	283	20.0	–	–	–
K813	–	–	–	–	–	–	–	–	–	∅200	247	24.0	∅250	249	24.0
K814	–	–	–	–	–	–	–	–	–	∅200	308	24.0	∅250	320	5.0
K913	–	–	–	–	–	–	–	–	–	–	–	–	∅250	294	25.0
K914	–	–	–	–	–	–	–	–	–	∅200	353	25.0	∅250	365	25.0

21.3.4 A shaft design (hollow shaft), NGD housing design (base + pitch circle diameter + torque arm)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]
1)	The length of the machine shaft must be at least 2.2 x ∅dh and the length of the feather key must be at least 2 x ∅dh.	2)	Cover (optional)
–	If you brace the gear units without the factory-adjusted torque arms provided for this purpose, the dimensions for ad2 and ad3 must meet the specified value.		

Dimensions of gear units

Type	□a4	ad	ad1	ad2	ad3	ad4	Øb	B	B2	Ødd	Ødh	ØDd	ØDh	Dha	Øe	f
K10	340	5	60	550	400	55	250_{h6}	400	356	40^{H9}	100^{H7}	120	130	∅200	300	20

Dimensions of gear units

Type	h	H	i2	ld	ld1	le	lh	las	lha	m1	s4	sm	sas	t4	th	uh
K10	375	591	27	118	124	361	410	26	441	225	M20	M24	M30	33	106.4	28^{JS9}

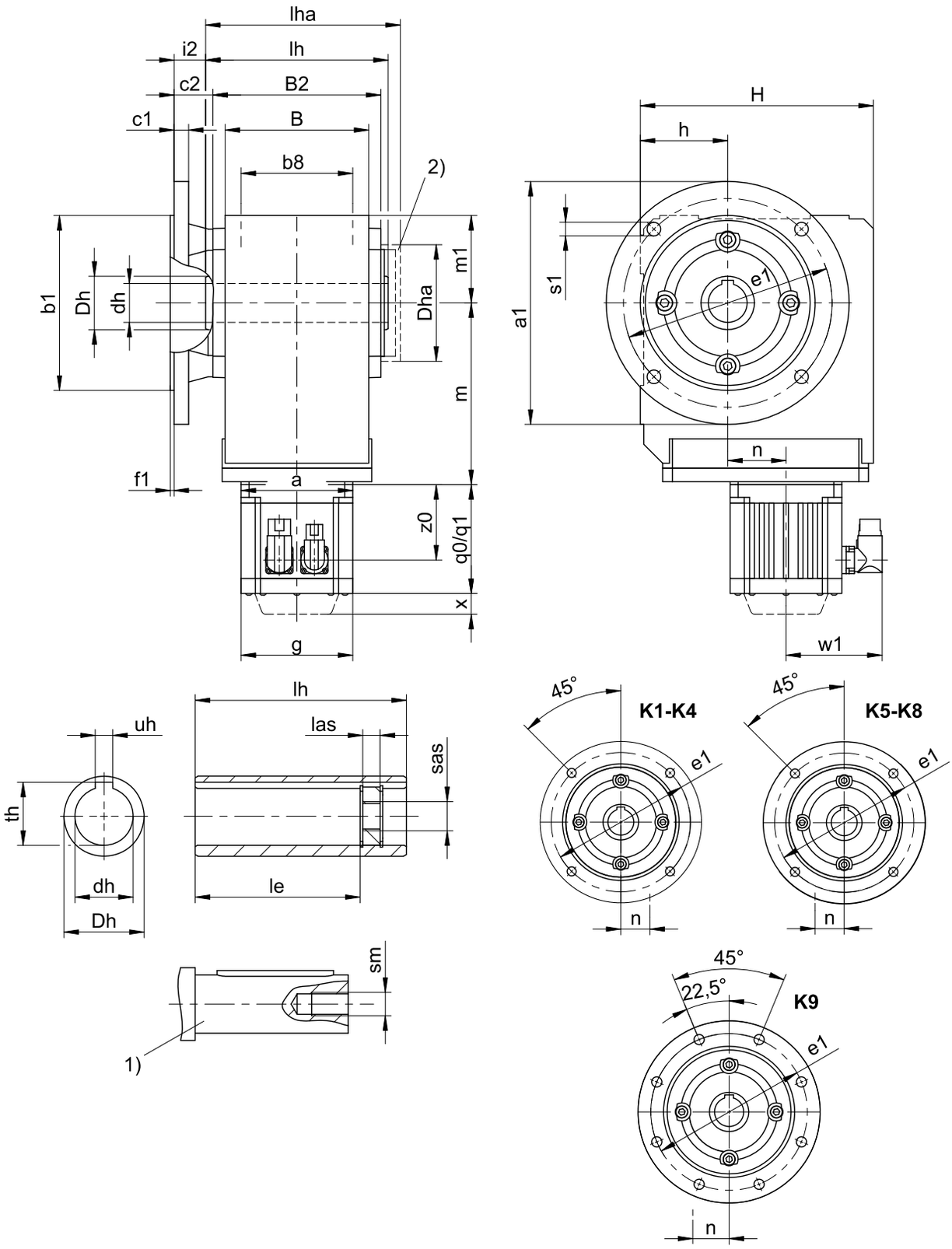
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5

Dimensions of geared motors

Type	EZ8		
	a	m	n
K1014	∅250	450	28.0

21.3.5 A shaft design (hollow shaft), F housing design (round flange)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▶ 23.4]
1)	The length of the machine shaft must be at least 2.2 x ∅dh and the length of the feather key must be at least 2 x ∅dh.	2)	Cover (optional)

Dimensions of gear units

Type	Øa1	Øb1	b8	B	B2	c1	c2	Ødh	ØDh	Dha	Øe1	f1	h	H	i2	le	lh	las	lha	m1	Øs1	sm	sas	th	uh
K1	160	110_{j6}	70	90	106	10	32.0	20^{H7}	40	□105	130	3.5	60	160	25.0	98.0	120	12	127.0	60	9	M6	M8	22.8	6^{JS9}
K1	160	110_{j6}	70	90	106	10	32.0	25^{H7}	40	□105	130	3.5	60	160	25.0	98.0	120	12	127.0	60	9	M10	M12	28.3	8^{JS9}
K1	160	110_{j6}	70	90	106	10	32.0	30^{H7}	40	□105	130	3.5	60	160	25.0	93.5	120	12	127.0	60	9	M10	M12	32.0	8^{JS9}
K2	200	130_{j6}	90	115	134	12	32.0	30^{H7}	45	□116	165	3.5	65	190	25.0	121.5	148	12	156.0	65	11	M10	M12	33.3	8^{JS9}
K3	200	130_{j6}	105	130	146	14	38.0	35^{H7}	50	□132	165	3.5	75	213	31.0	125.0	160	12	168.0	75	11	M12	M16	38.3	10^{JS9}
K4	250	180_{j6}	120	148	173	15	40.0	40^{H7}	55	□152	215	4.0	90	240	32.5	157.0	188	12	197.5	90	14	M16	M20	43.3	12^{JS9}
K5	250	180_{j6}	125	160	185	15	39.5	50^{H7}	65	□145	215	4.0	160	260	32.0	164.0	200	12	209.5	100	14	M16	M20	53.8	14^{JS9}
K6	300	230_{j6}	130	168	200	17	36.0	50^{H7}	70	∅183	265	4.0	190	310	28.5	179.0	215	12	224.5	120	14	M16	M20	53.8	14^{JS9}
K7	350	250_{h6}	145	190	226	18	44.0	60^{H7}	85	∅205	300	5.0	212	342	36.0	214.0	242	12	252.0	125	18	M20	M24	64.4	18^{JS9}
K8	400	300_{h6}	185	235	282	20	45.0	70^{H7}	100	∅184	350	5.0	265	410	36.0	263.0	300	20	311.0	145	18	M20	M24	74.9	20^{JS9}
K9	450	350_{h6}	225	285	330	23	50.0	90^{H7}	120	∅230	400	5.0	315	495	40.0	302.0	350	26	361.0	180	18	M24	M30	95.4	25^{JS9}

Dimensions of additional round flanges

Type	Øa1	Øb1	c1	Øe1	f1	Øs1
K1	140	95_{j6}	10	115	3.0	9
K2	160	110_{j6}	12	130	3.5	9
K3	160	110_{j6}	14	130	3.5	9
K3	250	180_{j6}	14	215	4.0	14
K8	350	250_{h6}	18	300	5.0	18
K8	450	350_{h6}	20	400	5.0	18

Dimensions of motors

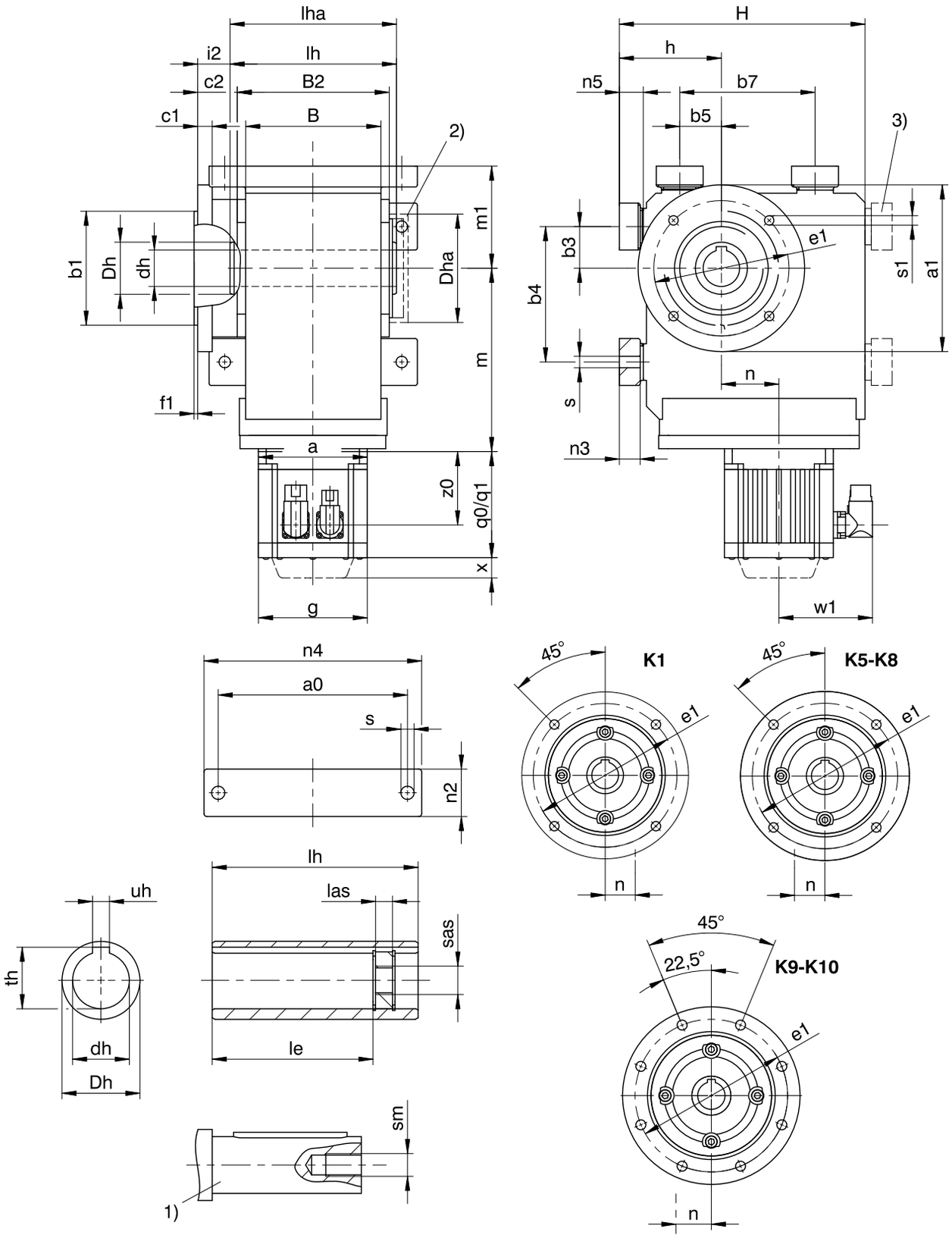
Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5
EZ805U	190	355.5	432.5	156.5	22	301.5

The dimensions a, m and n can be found on the next page.

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
K102	□72	124	36.0	□98	124	36.0	□115	128	36.0	□145	130	36.0	–	–	–
K202	□72	143	46.0	□98	143	46.0	□115	147	46.0	□145	149	46.0	–	–	–
K203	∅140	180	46.0	∅140	180	46.0	–	–	–	–	–	–	–	–	–
K302	∅140	163	52.5	∅140	163	52.5	□115	167	52.5	□145	169	52.5	–	–	–
K303	∅140	200	52.5	∅140	200	52.5	∅160	210	16.0	–	–	–	–	–	–
K402	–	–	–	–	–	–	∅160	187	60.0	□145	189	60.0	□190	192	60.0
K403	∅140	220	60.0	∅140	220	60.0	∅160	230	23.0	–	–	–	–	–	–
K513	–	–	–	–	–	–	∅160	172	15.0	□145	174	15.0	□190	177	15.0
K514	–	–	–	–	–	–	∅160	215	15.0	–	–	–	–	–	–
K613	–	–	–	–	–	–	∅160	191	18.0	∅200	193	18.0	□190	196	18.0
K614	–	–	–	–	–	–	∅160	234	18.0	–	–	–	–	–	–
K713	–	–	–	–	–	–	–	–	–	∅200	221	20.0	□190	224	20.0
K714	–	–	–	–	–	–	∅160	263	20.0	∅200	283	20.0	–	–	–
K813	–	–	–	–	–	–	–	–	–	∅200	247	24.0	∅250	249	24.0
K814	–	–	–	–	–	–	–	–	–	∅200	308	24.0	∅250	320	5.0
K913	–	–	–	–	–	–	–	–	–	–	–	–	∅250	294	25.0
K914	–	–	–	–	–	–	–	–	–	∅200	353	25.0	∅250	365	25.0

21.3.6 A shaft design (hollow shaft), NF housing design (base + round flange)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▶ 23.4]
1)	The length of the machine shaft must be at least 2.2 x ∅dh and the length of the feather key must be at least 2 x ∅dh.	2)	Cover (optional)
3)	Only for K1 (other sizes on request)		

Dimensions of gear units

Type	a0	Øa1	Øb1	b3	b4	b5	b7	B	B2	c1	c2	Ødh	ØDh	Dha	Øe1	f1	h
K1	115	160	110_{j6}	30	90	30	90	90	106	10	32.0	20^{H7}	40	□105	130	3.5	75
K1	115	160	110_{j6}	30	90	30	90	90	106	10	32.0	25^{H7}	40	□105	130	3.5	75
K1	115	160	110_{j6}	30	90	30	90	90	106	10	32.0	30^{H7}	40	□105	130	3.5	75
K3	170	160	110_{j6}	40	130	40	130	130	146	14	38.0	35^{H7}	50	□132	130	3.5	98
K5	200	250	180_{j6}	40	140	100	140	160	185	15	39.5	50^{H7}	65	□145	215	4.0	190
K6	210	300	230_{j6}	50	160	110	160	168	200	17	36.0	50^{H7}	70	∅183	265	4.0	220
K7	241	350	250_{h6}	55	180	125	180	190	226	18	44.0	60^{H7}	85	∅205	300	5.0	250
K8	300	400	300_{h6}	75	240	165	240	235	282	20	45.0	70^{H7}	100	∅184	350	5.0	310
K9	360	450	350_{h6}	95	280	185	280	285	330	23	50.0	90^{H7}	120	∅230	400	5.0	365
K10	330	550	450_{h6}	115	350	265	420	400	356	25	78.0	100^{H7}	130	∅200	500	5.0	420

Dimensions of gear units

Type	H	i2	le	lh	las	lha	m1	n2	n3	n4	n5	Øs	Øs1	sm	sas	th	uh
K1	175	25.0	98.0	120	12	127.0	75	30	13	140	15	9.0	9	M6	M8	22.8	6^{JS9}
K1	175	25.0	98.0	120	12	127.0	75	30	13	140	15	9.0	9	M10	M12	28.3	8^{JS9}
K1	175	25.0	93.5	120	12	127.0	75	30	13	140	15	9.0	9	M10	M12	32.0	8^{JS9}
K3	236	31.0	125.0	160	12	168.0	98	45	20	200	23	11.0	9	M12	M16	38.3	10^{JS9}
K5	290	32.0	164.0	200	12	209.5	130	60	27	240	30	18.0	14	M16	M20	53.8	14^{JS9}
K6	340	28.5	179.0	215	12	224.5	150	65	27	250	30	18.5	14	M16	M20	53.8	14^{JS9}
K7	380	36.0	214.0	242	12	252.0	163	70	35	290	38	23.0	18	M20	M24	64.4	18^{JS9}
K8	455	36.0	263.0	300	20	311.0	190	85	41	360	45	27.0	18	M20	M24	74.9	20^{JS9}
K9	545	40.0	302.0	350	26	361.0	230	95	46	430	50	31.0	18	M24	M30	95.4	25^{JS9}
K10	636	51.0	361.0	410	26	441.0	270	120	–	400	45	39.0	18	M24	M30	106.4	28^{JS9}

Dimensions of additional round flanges

Type	Øa1	Øb1	c1	Øe1	f1	Øs1
K1	140	95_{j6}	10	115	3.0	9
K8	350	250_{h6}	18	300	5.0	18
K8	450	350_{h6}	20	400	5.0	18

Dimensions of motors

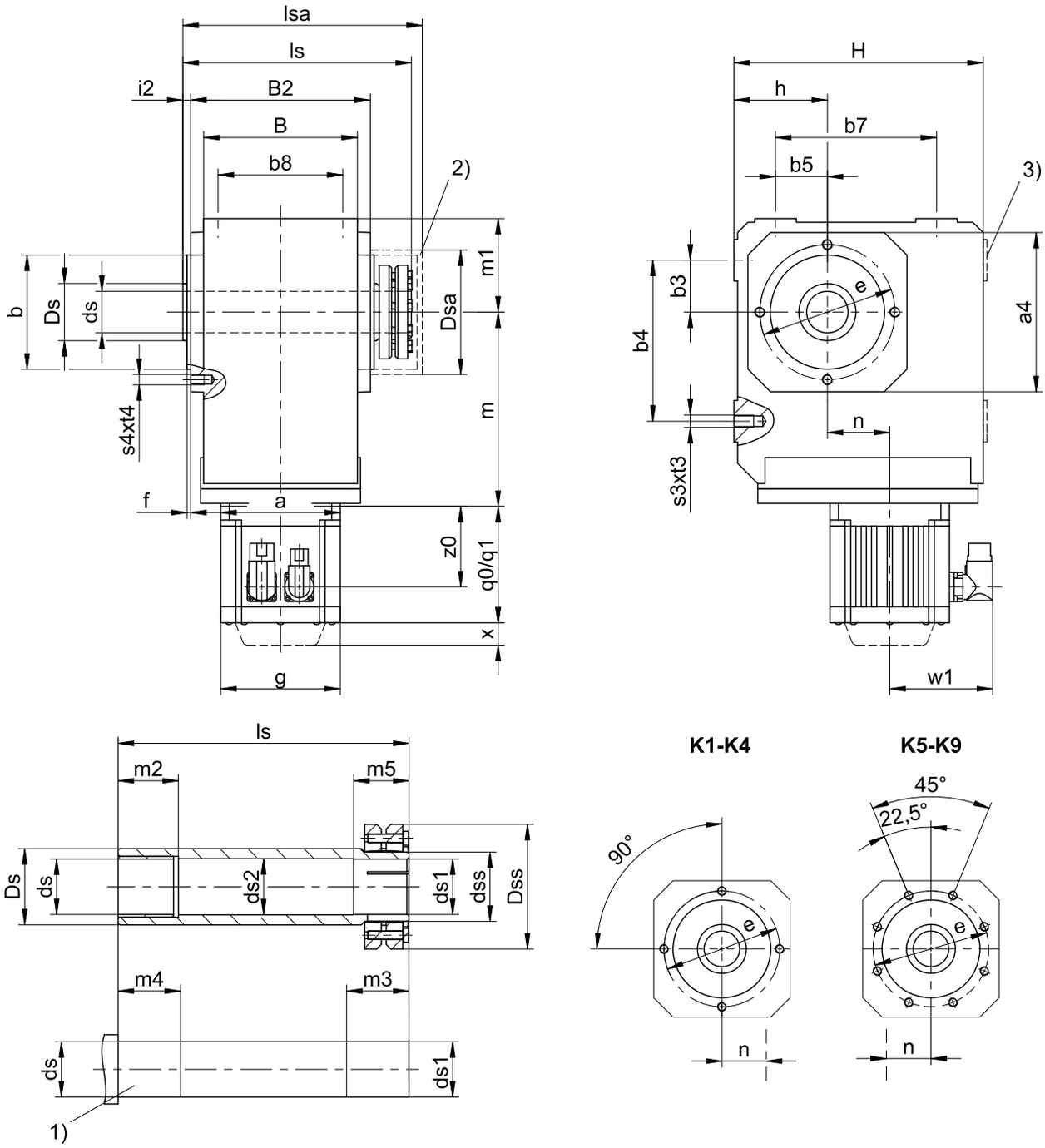
Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5
EZ805U	190	355.5	432.5	156.5	22	301.5

The dimensions a, m and n can be found on the next page.

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
K102	□72	124	36.0	□98	124	36.0	□115	128	36.0	□145	130	36.0	–	–	–
K302	∅140	163	52.5	∅140	163	52.5	□115	167	52.5	□145	169	52.5	–	–	–
K303	∅140	200	52.5	∅140	200	52.5	∅160	210	16.0	–	–	–	–	–	–
K513	–	–	–	–	–	–	∅160	172	15.0	□145	174	15.0	□190	177	15.0
K514	–	–	–	–	–	–	∅160	215	15.0	–	–	–	–	–	–
K613	–	–	–	–	–	–	∅160	191	18.0	∅200	193	18.0	□190	196	18.0
K614	–	–	–	–	–	–	∅160	234	18.0	–	–	–	–	–	–
K713	–	–	–	–	–	–	–	–	–	∅200	221	20.0	□190	224	20.0
K714	–	–	–	–	–	–	∅160	263	20.0	∅200	283	20.0	–	–	–
K813	–	–	–	–	–	–	–	–	–	∅200	247	24.0	∅250	249	24.0
K814	–	–	–	–	–	–	–	–	–	∅200	308	24.0	∅250	320	5.0
K913	–	–	–	–	–	–	–	–	–	–	–	–	∅250	294	25.0
K914	–	–	–	–	–	–	–	–	–	∅200	353	25.0	∅250	365	25.0
K1014	–	–	–	–	–	–	–	–	–	–	–	–	∅250	450	28.0

21.3.7 S shaft design (hollow shaft with shrink disk), G housing design (pitch circle diameter)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▶ 23.4]
1)	Machine shaft: The dimension ls must meet or exceed the specified value.	2)	Cover (optional)
3)	Only for K1 (other sizes on request)		

Dimensions of gear units

Type	□a4	Øb	b3	b4	b5	b7	b8	B	B2	Ød	Ød1	Ød2	Ødss	ØDs	ØDsa	ØDss	Øe	f	h	H	i2	ls	lsa	m1	m2	m3	m4	m5	s3	s4	t3	t4
K1	105	75_{j6}	30	90	30	90	70	90	106	25_{h9}	25_{h9}^{H7}	25.5	30	40	80	60	90	3.0	60	160	7.0	149	163	60	20	34	25	29	M8	M8	13	13
K2	116	82_{j6}	35	115	35	115	90	115	134	30_{h9}	30_{h9}^{H7}	30.5	36	45	88	72	100	3.0	65	190	7.0	178	193	65	25	39	30	34	M10	M8	16	13
K3	132	95_{j6}	40	130	40	130	105	130	146	35_{h9}	35_{h9}^{H7}	35.5	44	50	101	80	115	3.0	75	213	7.0	190	206	75	30	39	35	34	M10	M8	16	13
K4	152	110_{j6}	50	155	50	155	120	148	173	40_{h9}	40_{h9}^{H7}	40.5	50	55	114	88	130	3.5	90	240	7.5	220	243	90	40	39	45	34	M12	M10	19	16
K5	145	110_{j6}	40	140	100	140	125	160	185	50_{h9}	50_{h9}^{H7}	50.5	62	65	116	106	130	3.5	160	260	7.5	237	254	100	40	44	45	39	M16	M10	26	16
K6	180	140_{j6}	50	160	110	160	130	168	200	50_{h9}	50_{h9}^{H7}	50.5	62	70	128	106	165	3.5	190	310	7.5	254	276	120	40	45	45	40	M16	M10	26	16
K7	195	155_{h6}	55	180	125	180	145	190	226	60_{h6}	60_{h6}^{H7}	62.0	75	85	161.5	138	185	3.5	212	342	8.0	278	314	125	40	45	45	40	M20	M12	33	19
K8	226	185_{h6}	75	240	165	240	185	235	282	70_{h6}	70_{h6}^{H7}	72.0	90	100	193	155	215	4.0	265	410	9.0	352	378	145	50	60	60	50	M24	M12	38	19
K9	280	230_{h6}	95	280	185	280	225	285	330	90_{h6}	90_{h6}^{H7}	92.0	120	120	244	200	265	5.0	315	495	10.0	418	428	180	60	70	70	60	M30	M16	48	26

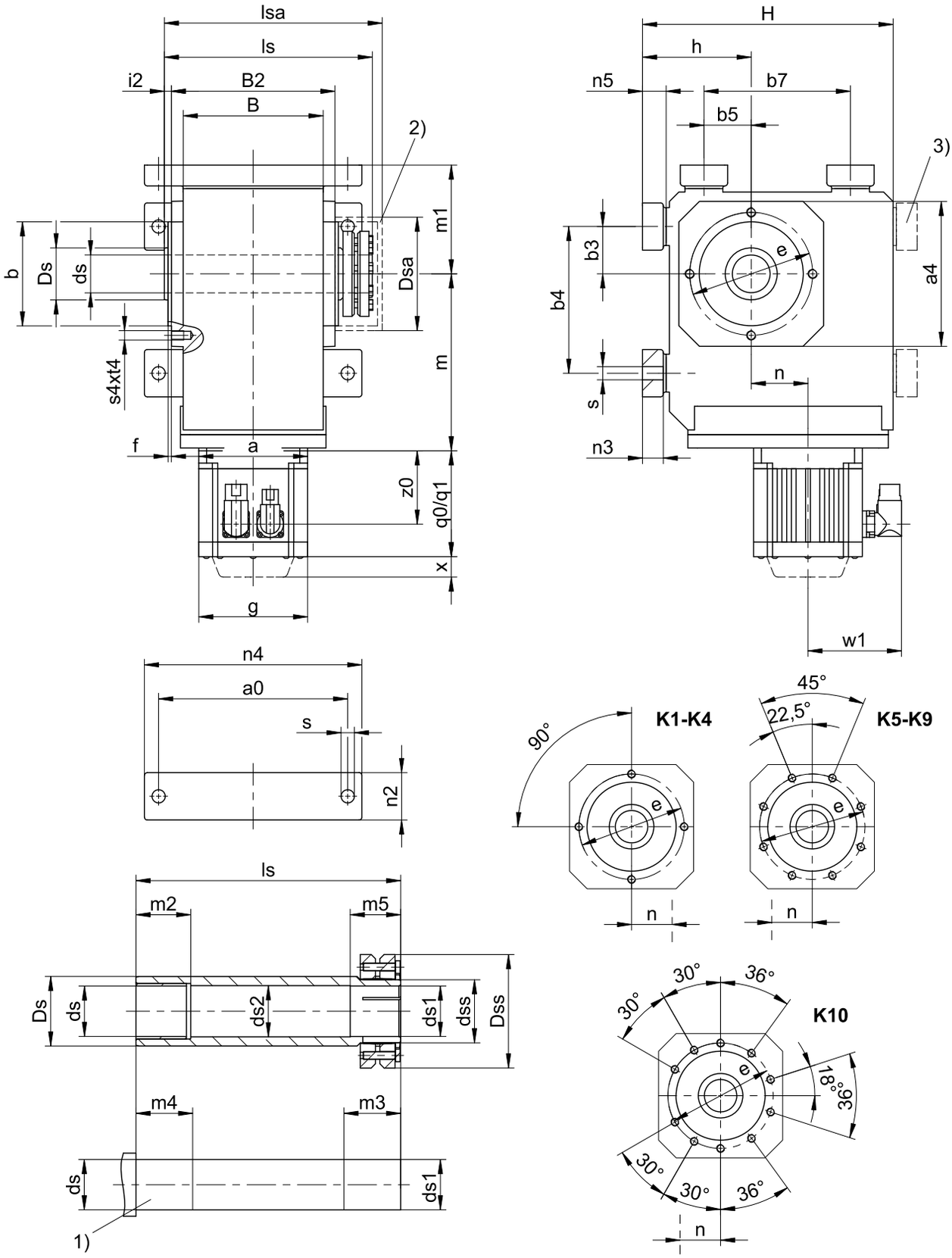
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5
EZ805U	190	355.5	432.5	156.5	22	301.5

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
K102	□72	124	36.0	□98	124	36.0	□115	128	36.0	□145	130	36.0	–	–	–
K202	□72	143	46.0	□98	143	46.0	□115	147	46.0	□145	149	46.0	–	–	–
K203	∅140	180	46.0	∅140	180	46.0	–	–	–	–	–	–	–	–	–
K302	∅140	163	52.5	∅140	163	52.5	□115	167	52.5	□145	169	52.5	–	–	–
K303	∅140	200	52.5	∅140	200	52.5	∅160	210	16.0	–	–	–	–	–	–
K402	–	–	–	–	–	–	∅160	187	60.0	□145	189	60.0	□190	192	60.0
K403	∅140	220	60.0	∅140	220	60.0	∅160	230	23.0	–	–	–	–	–	–
K513	–	–	–	–	–	–	∅160	172	15.0	□145	174	15.0	□190	177	15.0
K514	–	–	–	–	–	–	∅160	215	15.0	–	–	–	–	–	–
K613	–	–	–	–	–	–	∅160	191	18.0	∅200	193	18.0	□190	196	18.0
K614	–	–	–	–	–	–	∅160	234	18.0	–	–	–	–	–	–
K713	–	–	–	–	–	–	–	–	–	∅200	221	20.0	□190	224	20.0
K714	–	–	–	–	–	–	∅160	263	20.0	∅200	283	20.0	–	–	–
K813	–	–	–	–	–	–	–	–	–	∅200	247	24.0	∅250	249	24.0
K814	–	–	–	–	–	–	–	–	–	∅200	308	24.0	∅250	320	5.0
K913	–	–	–	–	–	–	–	–	–	–	–	–	∅250	294	25.0
K914	–	–	–	–	–	–	–	–	–	∅200	353	25.0	∅250	365	25.0

21.3.8 S shaft design (hollow shaft with shrink disk), NG housing design (base + pitch circle diameter)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]
1)	Machine shaft: The dimension ls must meet or exceed the specified value.	2)	Cover (optional)
3)	Only for K1 (other sizes on request)		

Dimensions of gear units

Type	a0	a4	Øb	b3	b4	b5	b7	B	B2	Ød	Ød1	Ød2	Ødss	ØDs	ØDsa
K1	115	105	75_{j6}	30	90	30	90	90	106	25_{h9}	25_{h9}^{H7}	25.5	30	40	80
K2	155	116	82_{j6}	35	115	35	115	115	134	30_{h9}	30_{h9}^{H7}	30.5	36	45	88
K3	170	132	95_{j6}	40	130	40	130	130	146	35_{h9}	35_{h9}^{H7}	35.5	44	50	101
K4	200	152	110_{j6}	50	155	50	155	148	173	40_{h9}	40_{h9}^{H7}	40.5	50	55	114
K5	200	145	110_{j6}	40	140	100	140	160	185	50_{h9}	50_{h9}^{H7}	50.5	62	65	116
K6	210	180	140_{j6}	50	160	110	160	168	200	50_{h9}	50_{h9}^{H7}	50.5	62	70	128
K7	241	195	155_{j6}	55	180	125	180	190	226	60_{h6}	60_{h6}^{H7}	62.0	75	85	161.5
K8	300	226	185_{j6}	75	240	165	240	235	282	70_{h6}	70_{h6}^{H7}	72.0	90	100	193
K9	360	280	230_{j6}	95	280	185	280	285	330	90_{h6}	90_{h6}^{H7}	92.0	120	120	244
K10	330	340	250_{h6}	115	350	265	420	400	356	100_{h6}	100_{h6}^{H7}	102.0	130	130	274

Dimensions of gear units

Type	ØDss	Øe	f	h	H	i2	ls	lsa	m1	m2	m3	m4	m5	n2	n3	n4	n5	Øs	s4	t4
K1	60	90	3.0	75	175	7.0	149	163	75	20	34	25	29	30	13	140	15	9.0	M8	13
K2	72	100	3.0	88	213	7.0	178	193	88	25	39	30	34	40	20	185	23	11.0	M8	13
K3	80	115	3.0	98	236	7.0	190	206	98	30	39	35	34	45	20	200	23	11.0	M8	13
K4	88	130	3.5	115	265	7.5	220	243	115	40	39	45	34	50	22	230	25	14.0	M10	16
K5	106	130	3.5	190	290	7.5	237	254	130	40	44	45	39	60	27	240	30	18.0	M10	16
K6	106	165	3.5	220	340	7.5	254	276	150	40	45	45	40	65	27	250	30	18.5	M10	16
K7	138	185	3.5	250	380	8.0	278	314	163	40	45	45	40	70	35	290	38	23.0	M12	19
K8	155	215	4.0	310	455	9.0	352	378	190	50	60	60	50	85	41	360	45	27.0	M12	19
K9	200	265	5.0	365	545	10.0	418	428	230	60	70	70	60	95	46	430	50	31.0	M16	26
K10	215	300	20.0	420	636	27.0	483	497	270	60	80	70	70	120	–	400	45	39.0	M20	33

Dimensions of motors

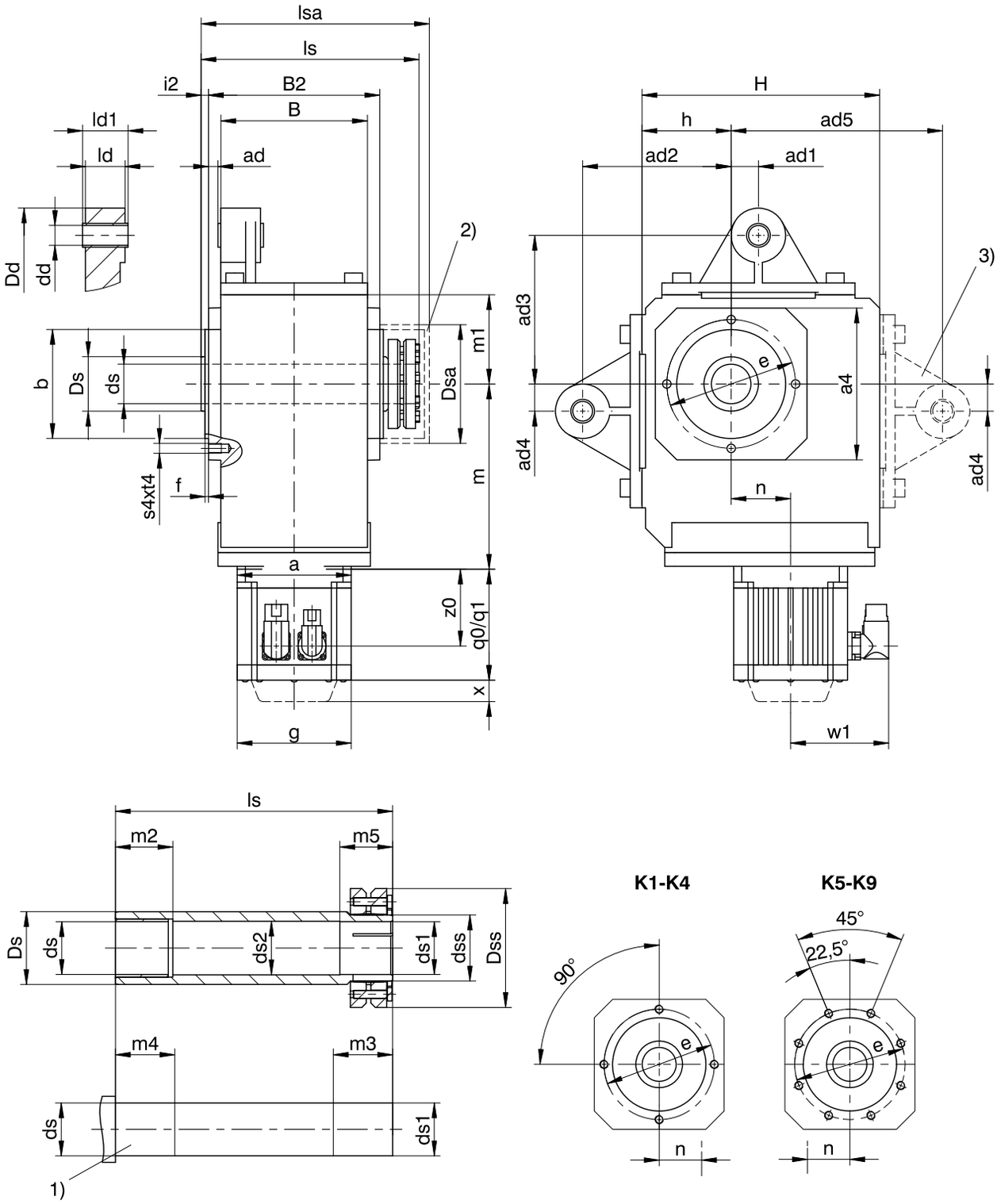
Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5
EZ805U	190	355.5	432.5	156.5	22	301.5

The dimensions a, m and n can be found on the next page.

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
K102	□72	124	36.0	□98	124	36.0	□115	128	36.0	□145	130	36.0	–	–	–
K202	□72	143	46.0	□98	143	46.0	□115	147	46.0	□145	149	46.0	–	–	–
K203	∅140	180	46.0	∅140	180	46.0	–	–	–	–	–	–	–	–	–
K302	∅140	163	52.5	∅140	163	52.5	□115	167	52.5	□145	169	52.5	–	–	–
K303	∅140	200	52.5	∅140	200	52.5	∅160	210	16.0	–	–	–	–	–	–
K402	–	–	–	–	–	–	∅160	187	60.0	□145	189	60.0	□190	192	60.0
K403	∅140	220	60.0	∅140	220	60.0	∅160	230	23.0	–	–	–	–	–	–
K513	–	–	–	–	–	–	∅160	172	15.0	□145	174	15.0	□190	177	15.0
K514	–	–	–	–	–	–	∅160	215	15.0	–	–	–	–	–	–
K613	–	–	–	–	–	–	∅160	191	18.0	∅200	193	18.0	□190	196	18.0
K614	–	–	–	–	–	–	∅160	234	18.0	–	–	–	–	–	–
K713	–	–	–	–	–	–	–	–	–	∅200	221	20.0	□190	224	20.0
K714	–	–	–	–	–	–	∅160	263	20.0	∅200	283	20.0	–	–	–
K813	–	–	–	–	–	–	–	–	–	∅200	247	24.0	∅250	249	24.0
K814	–	–	–	–	–	–	–	–	–	∅200	308	24.0	∅250	320	5.0
K913	–	–	–	–	–	–	–	–	–	–	–	–	∅250	294	25.0
K914	–	–	–	–	–	–	–	–	–	∅200	353	25.0	∅250	365	25.0
K1014	–	–	–	–	–	–	–	–	–	–	–	–	∅250	450	28.0

21.3.9 S shaft design (hollow shaft with shrink disk), GD housing design (pitch circle diameter + torque arm)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]
1)	Machine shaft: The dimension ls must meet or exceed the specified value.	2)	Cover (optional)
3)	Only for K1 (other sizes on request)	–	If you brace the gear units without the factory-adjusted torque arms provided for this purpose, the dimensions for ad2 and ad3 must meet the specified value.

Dimensions of gear units

Type	□a4	ad	ad1	ad2	ad3	ad4	ad5	Øb	B	B2	Ødd	Øds	Øds1	Øds2	Ødss	ØDd	ØDs	ØDsa
K1	105	6.0	15.0	90	90	15.0	130	75_{j6}	90	106	12^{H9}	25_{h9}	$25_{h9}{}^{H7}$	25.5	30	43	40	80
K2	116	6.5	22.5	100	100	22.5	–	82_{j6}	115	134	16^{H9}	30_{h9}	$30_{h9}{}^{H7}$	30.5	36	45	45	88
K3	132	5.0	25.0	120	120	25.0	–	95_{j6}	130	146	16^{H9}	35_{h9}	$35_{h9}{}^{H7}$	35.5	44	45	50	101
K4	152	9.5	27.5	150	150	27.5	–	110_{j6}	148	173	20^{H9}	40_{h9}	$40_{h9}{}^{H7}$	40.5	50	55	55	114
K5	145	9.5	30.0	250	190	30.0	–	110_{j6}	160	185	20^{H9}	50_{h9}	$50_{h9}{}^{H7}$	50.5	62	58	65	116
K6	180	13.0	30.0	250	180	30.0	–	140_{j6}	168	200	20^{H9}	50_{h9}	$50_{h9}{}^{H7}$	50.5	62	58	70	128
K7	195	15.0	35.0	300	213	35.0	–	155_{h6}	190	226	20^{H9}	60_{h6}	$60_{h6}{}^{H7}$	62.0	75	68	85	161.5
K8	226	17.0	45.0	350	230	45.0	–	185_{h6}	235	282	24^{H9}	70_{h6}	$70_{h6}{}^{H7}$	72.0	90	72	100	193
K9	280	16.0	45.0	450	315	45.0	–	230_{h6}	285	330	24^{H9}	90_{h6}	$90_{h6}{}^{H7}$	92.0	120	75	120	244

Dimensions of gear units

Type	ØDss	Øe	f	h	H	i2	ld	ld1	ls	lsa	m1	m2	m3	m4	m5	s4	t4
K1	60	90	3.0	60	160	7.0	24	28	149	163	60	20	34	25	29	M8	13
K2	72	100	3.0	65	190	7.0	32	38	178	193	65	25	39	30	34	M8	13
K3	80	115	3.0	75	213	7.0	32	38	190	206	75	30	39	35	34	M8	13
K4	88	130	3.5	90	240	7.5	40	46	220	243	90	40	39	45	34	M10	16
K5	106	130	3.5	160	260	7.5	40	46	237	254	100	40	44	45	39	M10	16
K6	106	165	3.5	190	310	7.5	40	46	254	276	120	40	45	45	40	M10	16
K7	138	185	3.5	212	342	8.0	64	70	278	314	125	40	45	45	40	M12	19
K8	155	215	4.0	265	410	9.0	102	115	352	378	145	50	60	60	50	M12	19
K9	200	265	5.0	315	495	10.0	102	115	418	428	180	60	70	70	60	M16	26

Dimensions of motors

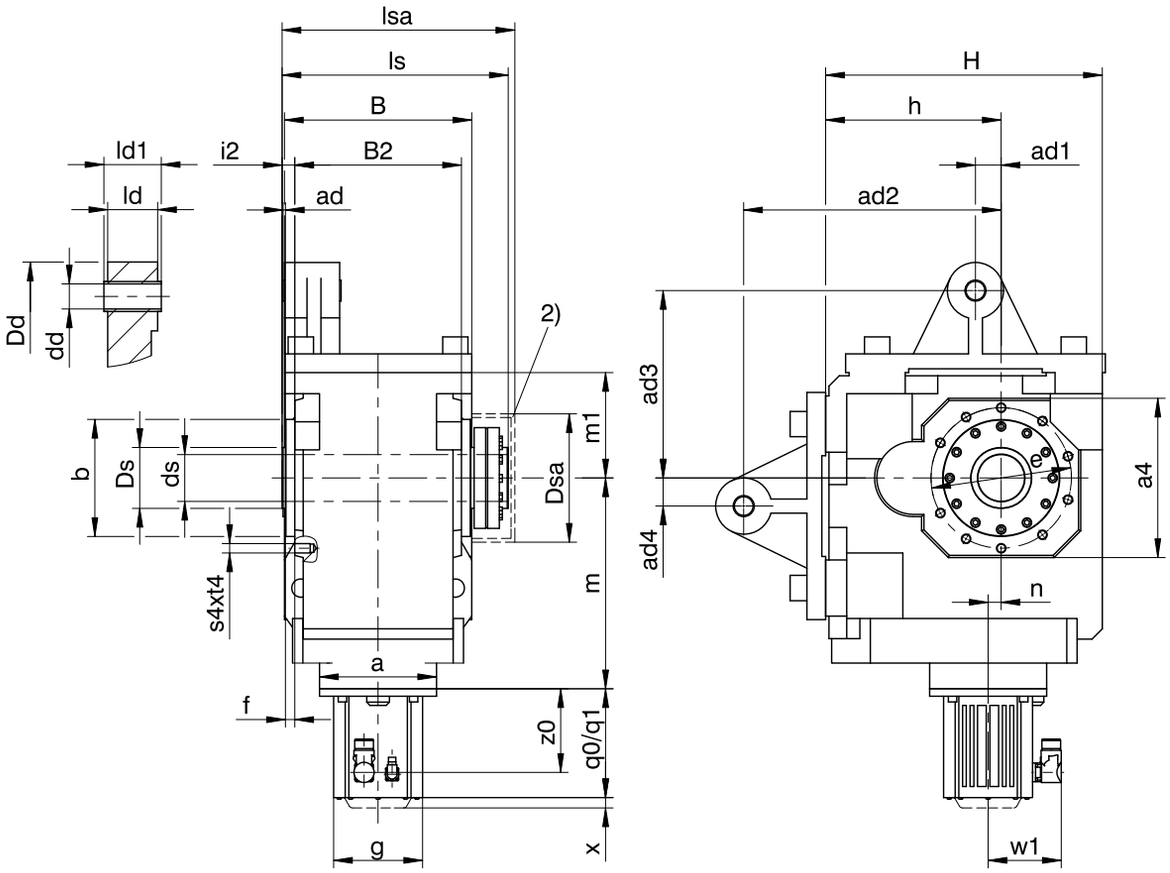
Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5
EZ805U	190	355.5	432.5	156.5	22	301.5

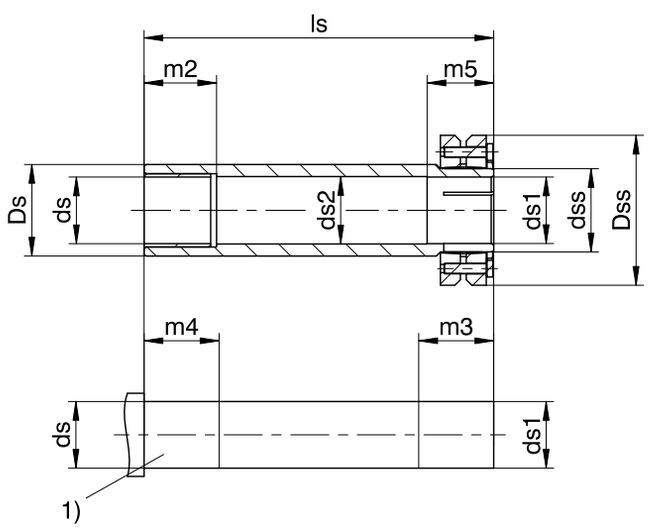
The dimensions a, m and n can be found on the next page.

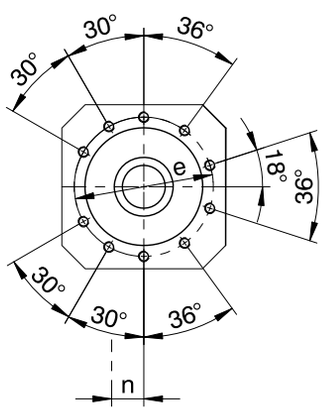
Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
K102	□72	124	36.0	□98	124	36.0	□115	128	36.0	□145	130	36.0	–	–	–
K202	□72	143	46.0	□98	143	46.0	□115	147	46.0	□145	149	46.0	–	–	–
K203	∅140	180	46.0	∅140	180	46.0	–	–	–	–	–	–	–	–	–
K302	∅140	163	52.5	∅140	163	52.5	□115	167	52.5	□145	169	52.5	–	–	–
K303	∅140	200	52.5	∅140	200	52.5	∅160	210	16.0	–	–	–	–	–	–
K402	–	–	–	–	–	–	∅160	187	60.0	□145	189	60.0	□190	192	60.0
K403	∅140	220	60.0	∅140	220	60.0	∅160	230	23.0	–	–	–	–	–	–
K513	–	–	–	–	–	–	∅160	172	15.0	□145	174	15.0	□190	177	15.0
K514	–	–	–	–	–	–	∅160	215	15.0	–	–	–	–	–	–
K613	–	–	–	–	–	–	∅160	191	18.0	∅200	193	18.0	□190	196	18.0
K614	–	–	–	–	–	–	∅160	234	18.0	–	–	–	–	–	–
K713	–	–	–	–	–	–	–	–	–	∅200	221	20.0	□190	224	20.0
K714	–	–	–	–	–	–	∅160	263	20.0	∅200	283	20.0	–	–	–
K813	–	–	–	–	–	–	–	–	–	∅200	247	24.0	∅250	249	24.0
K814	–	–	–	–	–	–	–	–	–	∅200	308	24.0	∅250	320	5.0
K913	–	–	–	–	–	–	–	–	–	–	–	–	∅250	294	25.0
K914	–	–	–	–	–	–	–	–	–	∅200	353	25.0	∅250	365	25.0

21.3.10 S shaft design (hollow shaft with shrink disk), NGD housing design (base + pitch circle diameter + torque arm)







q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]
1)	Machine shaft: The dimension ls must meet or exceed the specified value.	2)	Cover (optional)
–	If you brace the gear units without the factory-adjusted torque arms provided for this purpose, the dimensions for ad2 and ad3 must meet the specified value.		

Dimensions of gear units

Type	□a4	ad	ad1	ad2	ad3	ad4	Øb	B	B2	Ødd	Øds	Øds1	Øds2	Ødss	ØDd	ØDs	ØDsa
K10	340	5	55	550	400	60	250_{h6}	400	356	40^{H9}	100_{h6}	100_{h6}^{H7}	102	130	120	130	274

Dimensions of gear units

Type	ØDss	Øe	f	h	H	i2	ld	ld1	ls	lsa	m1	m2	m3	m4	m5	s4	t4
K10	215	300	20	375	591	27	118	124	483	497	225	60	80	70	70	M20	33

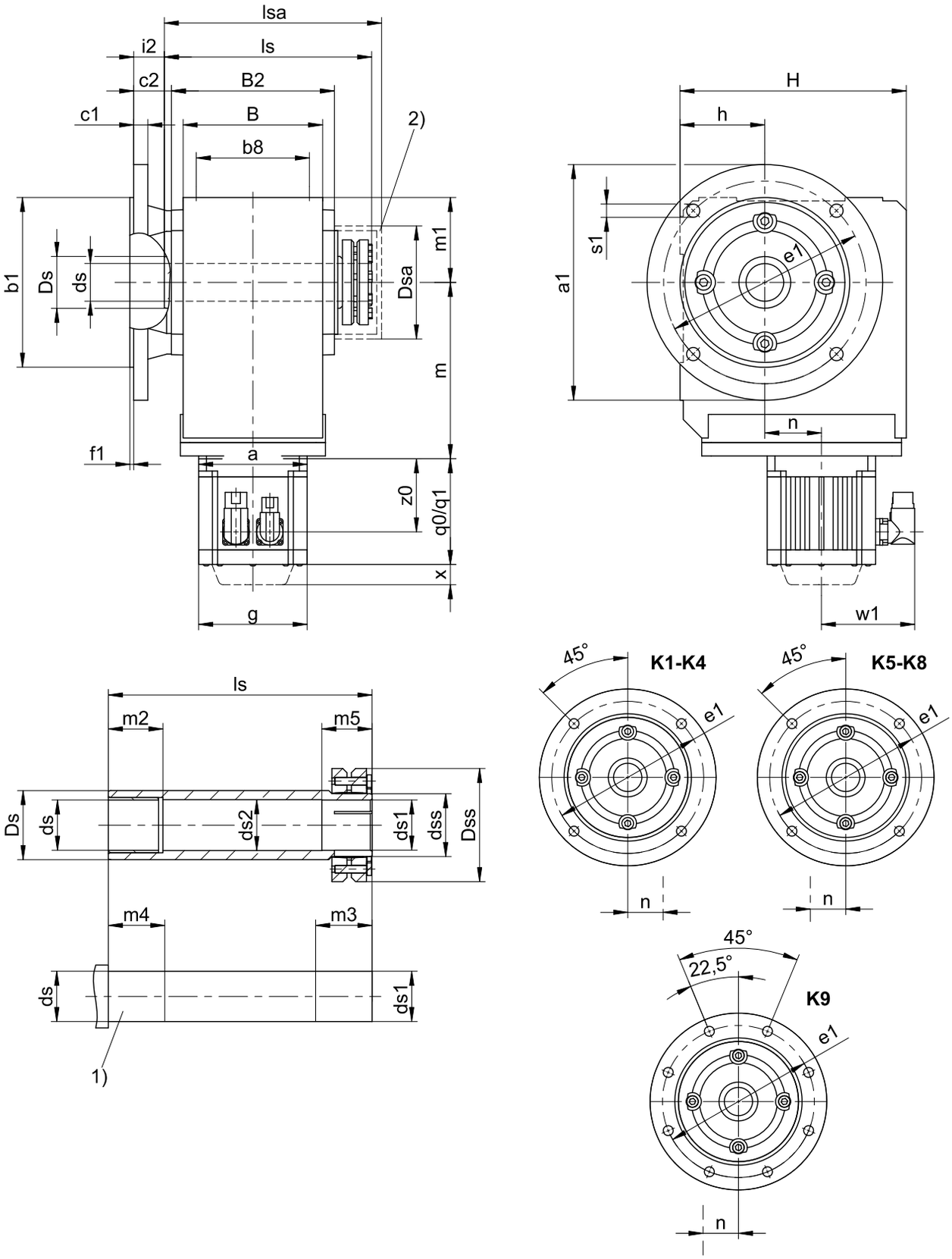
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5

Dimensions of geared motors

Type	EZ8		
	a	m	n
K1014	∅250	450	28.0

21.3.11 S shaft design (hollow shaft with shrink disk), F housing design (round flange)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]
1)	Machine shaft: The dimension ls must meet or exceed the specified value.	2)	Cover (optional)

Dimensions of gear units

Type	Øa1	Øb1	b8	B	B2	c1	c2	Ød	Ød1	Ød2	Ødss	ØDs	ØDsa	ØDss	Øe1	f1	h	H	i2	ls	lsa	m1	m2	m3	m4	m5	Øs1
K1	160	110_{j6}	70	90	106	10	32.0	25_{h9}	25_{h9}^{H7}	25.5	30	40	80	60	130	3.5	60	160	25.0	149	163	60	20	34	25	29	9
K2	200	130_{j6}	90	115	134	12	32.0	30_{h9}	30_{h9}^{H7}	30.5	36	45	88	72	165	3.5	65	190	25.0	178	193	65	25	39	30	34	11
K3	200	130_{j6}	105	130	146	14	38.0	35_{h9}	35_{h9}^{H7}	35.5	44	50	101	80	165	3.5	75	213	31.0	190	206	75	30	39	35	34	11
K4	250	180_{j6}	120	148	173	15	40.0	40_{h9}	40_{h9}^{H7}	40.5	50	55	114	88	215	4.0	90	240	32.5	220	243	90	40	39	45	34	14
K5	250	180_{j6}	125	160	185	15	39.5	50_{h9}	50_{h9}^{H7}	50.5	62	65	116	106	215	4.0	160	260	32.0	237	254	100	40	44	45	39	14
K6	300	230_{j6}	130	168	200	17	36.0	50_{h9}	50_{h9}^{H7}	50.5	62	70	128	106	265	4.0	190	310	28.5	254	276	120	40	45	45	40	14
K7	350	250_{h6}	145	190	226	18	44.0	60_{h6}	60_{h6}^{H7}	62.0	75	85	161.5	138	300	5.0	212	342	36.0	278	314	125	40	45	45	40	18
K8	400	300_{h6}	185	235	282	20	45.0	70_{h6}	70_{h6}^{H7}	72.0	90	100	193	155	350	5.0	265	410	36.0	352	378	145	50	60	60	50	18
K9	450	350_{h6}	225	285	330	23	50.0	90_{h6}	90_{h6}^{H7}	92.0	120	120	244	200	400	5.0	315	495	40.0	418	428	180	60	70	70	60	18

Dimensions of additional round flanges

Type	Øa1	Øb1	c1	Øe1	f1	Øs1
K1	140	95_{j6}	10	115	3.0	9
K2	160	110_{j6}	12	130	3.5	9
K3	160	110_{j6}	14	130	3.5	9
K3	250	180_{j6}	14	215	4.0	14
K8	350	250_{h6}	18	300	5.0	18
K8	450	350_{h6}	20	400	5.0	18

Dimensions of motors

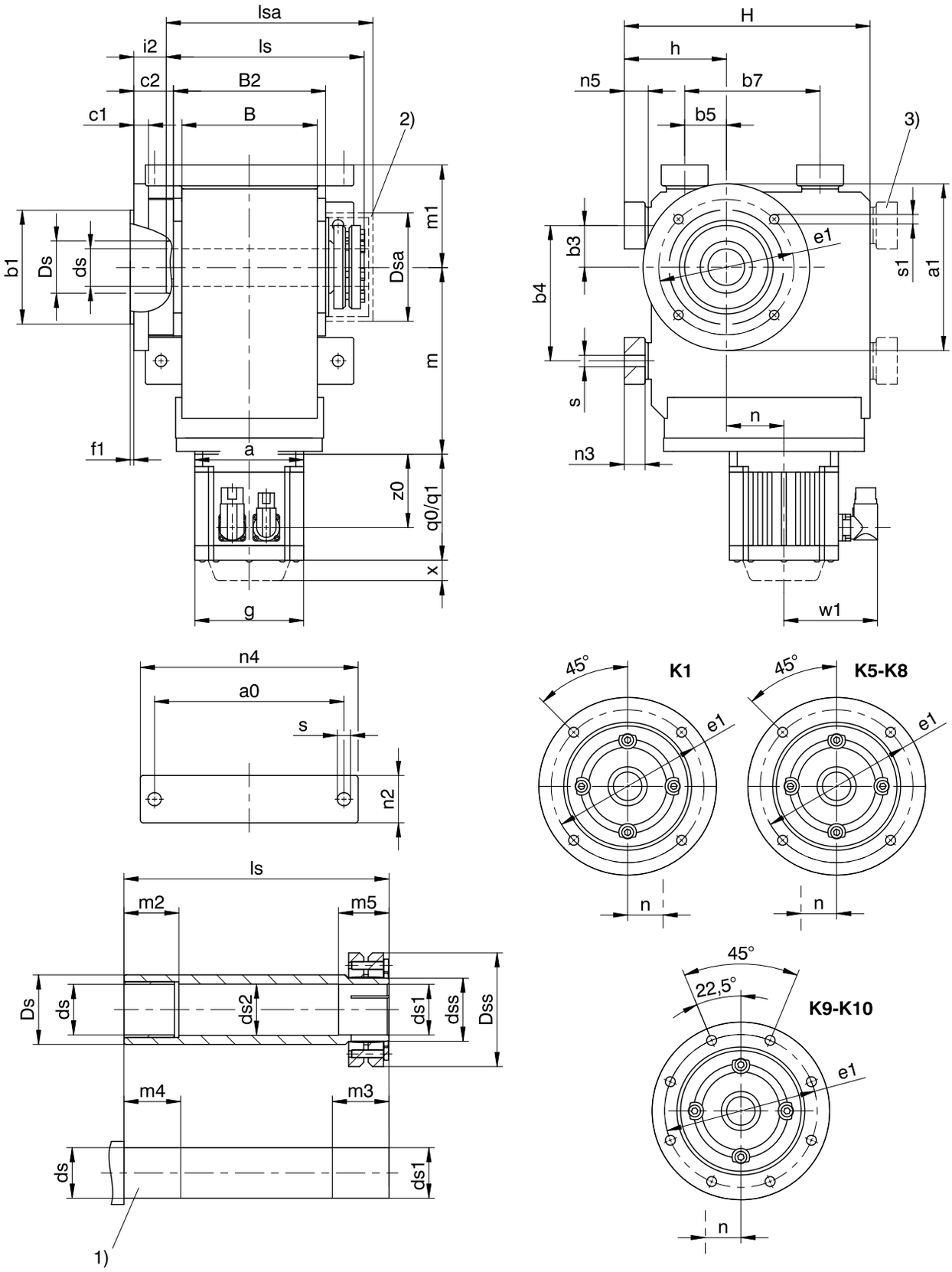
Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5
EZ805U	190	355.5	432.5	156.5	22	301.5

The dimensions a, m and n can be found on the next page.

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
K102	□72	124	36.0	□98	124	36.0	□115	128	36.0	□145	130	36.0	–	–	–
K202	□72	143	46.0	□98	143	46.0	□115	147	46.0	□145	149	46.0	–	–	–
K203	∅140	180	46.0	∅140	180	46.0	–	–	–	–	–	–	–	–	–
K302	∅140	163	52.5	∅140	163	52.5	□115	167	52.5	□145	169	52.5	–	–	–
K303	∅140	200	52.5	∅140	200	52.5	∅160	210	16.0	–	–	–	–	–	–
K402	–	–	–	–	–	–	∅160	187	60.0	□145	189	60.0	□190	192	60.0
K403	∅140	220	60.0	∅140	220	60.0	∅160	230	23.0	–	–	–	–	–	–
K513	–	–	–	–	–	–	∅160	172	15.0	□145	174	15.0	□190	177	15.0
K514	–	–	–	–	–	–	∅160	215	15.0	–	–	–	–	–	–
K613	–	–	–	–	–	–	∅160	191	18.0	∅200	193	18.0	□190	196	18.0
K614	–	–	–	–	–	–	∅160	234	18.0	–	–	–	–	–	–
K713	–	–	–	–	–	–	–	–	–	∅200	221	20.0	□190	224	20.0
K714	–	–	–	–	–	–	∅160	263	20.0	∅200	283	20.0	–	–	–
K813	–	–	–	–	–	–	–	–	–	∅200	247	24.0	∅250	249	24.0
K814	–	–	–	–	–	–	–	–	–	∅200	308	24.0	∅250	320	5.0
K913	–	–	–	–	–	–	–	–	–	–	–	–	∅250	294	25.0
K914	–	–	–	–	–	–	–	–	–	∅200	353	25.0	∅250	365	25.0

21.3.12 S shaft design (hollow shaft with shrink disk), NF housing design (base + round flange)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]
1)	Machine shaft: The dimension ls must meet or exceed the specified value.	2)	Cover (optional)
3)	Only for K1 (other sizes on request)		

Dimensions of gear units

Type	a0	Øa1	Øb1	b3	b4	b5	b7	B	B2	c1	Ød	Ød1	Ød2	Ødss	ØD	ØDa	ØDs
K1	115	160	110_{j6}	30	90	30	90	90	106	10	25_{h9}	25_{h9}^{H7}	25.5	30	40	80	60
K3	170	160	110_{j6}	40	130	40	130	130	146	14	35_{h9}	35_{h9}^{H7}	35.5	44	50	101	80
K5	200	250	180_{j6}	40	140	100	140	160	185	15	50_{h9}	50_{h9}^{H7}	50.5	62	65	116	106
K6	210	300	230_{j6}	50	160	110	160	168	200	17	50_{h9}	50_{h9}^{H7}	50.5	62	70	128	106
K7	241	350	250_{h6}	55	180	125	180	190	226	18	60_{h6}	60_{h6}^{H7}	62.0	75	85	161.5	138
K8	300	400	300_{h6}	75	240	165	240	235	282	20	70_{h6}	70_{h6}^{H7}	72.0	90	100	193	155
K9	360	450	350_{h6}	95	280	185	280	285	330	23	90_{h6}	90_{h6}^{H7}	92.0	120	120	244	200
K10	330	550	450_{h6}	115	350	265	420	400	356	25	100_{h6}	100_{h6}^{H7}	102.0	130	130	274	215

Dimensions of gear units

Type	Øe1	f1	h	H	i2	ls	lsa	m1	m2	m3	m4	m5	n2	n3	n4	n5	Øs	Øs1
K1	130	3.5	75	175	25.0	149	163	75	20	34	25	29	30	13	140	15	9.0	9
K3	130	3.5	98	236	31.0	190	206	98	30	39	35	34	45	20	200	23	11.0	9
K5	215	4.0	190	290	32.0	237	254	130	40	44	45	39	60	27	240	30	18.0	14
K6	265	4.0	220	340	28.5	254	276	150	40	45	45	40	65	27	250	30	18.5	14
K7	300	5.0	250	380	36.0	278	314	163	40	45	45	40	70	35	290	38	23.0	18
K8	350	5.0	310	455	36.0	352	378	190	50	60	60	50	85	41	360	45	27.0	18
K9	400	5.0	365	545	40.0	418	428	230	60	70	70	60	95	46	430	50	31.0	18
K10	500	5.0	420	636	51.0	483	497	270	60	80	70	70	120	–	400	45	39.0	18

Dimensions of additional round flanges

Type	Øa1	Øb1	c1	Øe1	f1	Øs1
K1	140	95_{j6}	10	115	3.0	9
K8	350	250_{h6}	18	300	5.0	18
K8	450	350_{h6}	20	400	5.0	18

Dimensions of motors

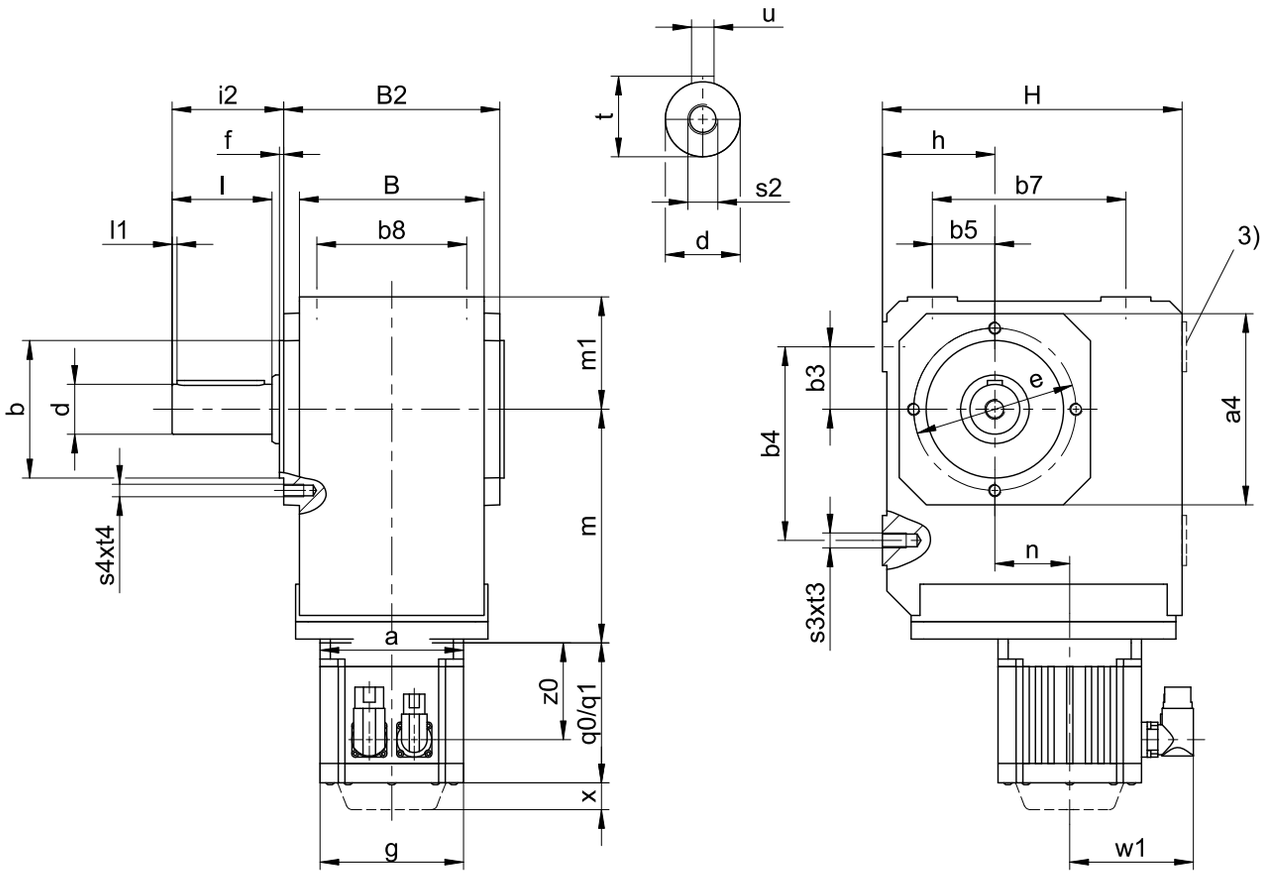
Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5
EZ805U	190	355.5	432.5	156.5	22	301.5

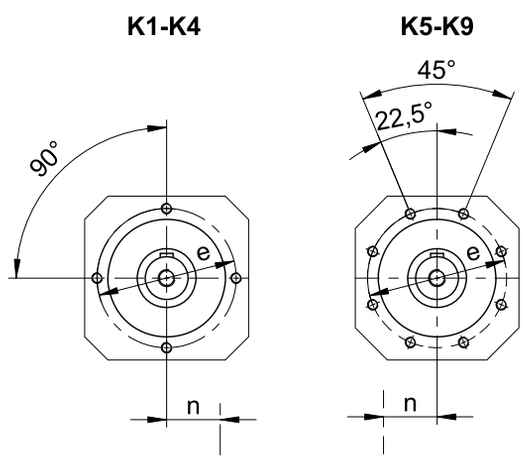
The dimensions a, m and n can be found on the next page.

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
K102	□72	124	36.0	□98	124	36.0	□115	128	36.0	□145	130	36.0	–	–	–
K302	∅140	163	52.5	∅140	163	52.5	□115	167	52.5	□145	169	52.5	–	–	–
K303	∅140	200	52.5	∅140	200	52.5	∅160	210	16.0	–	–	–	–	–	–
K513	–	–	–	–	–	–	∅160	172	15.0	□145	174	15.0	□190	177	15.0
K514	–	–	–	–	–	–	∅160	215	15.0	–	–	–	–	–	–
K613	–	–	–	–	–	–	∅160	191	18.0	∅200	193	18.0	□190	196	18.0
K614	–	–	–	–	–	–	∅160	234	18.0	–	–	–	–	–	–
K713	–	–	–	–	–	–	–	–	–	∅200	221	20.0	□190	224	20.0
K714	–	–	–	–	–	–	∅160	263	20.0	∅200	283	20.0	–	–	–
K813	–	–	–	–	–	–	–	–	–	∅200	247	24.0	∅250	249	24.0
K814	–	–	–	–	–	–	–	–	–	∅200	308	24.0	∅250	320	5.0
K913	–	–	–	–	–	–	–	–	–	–	–	–	∅250	294	25.0
K914	–	–	–	–	–	–	–	–	–	∅200	353	25.0	∅250	365	25.0
K1014	–	–	–	–	–	–	–	–	–	–	–	–	∅250	450	28.0

21.3.13 A shaft design (solid shaft), G housing design (pitch circle diameter)





q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]
3)	Only for K1 (other sizes on request)	–	K1 – K4: solid shaft without feather key available, on request starting at K5.
–	K1 – K9: Solid shaft on both sides available.		

Dimensions of gear units

Type	□a4	Øb	b3	b4	b5	b7	b8	B	B2	Ød	Øe	f	h	H	i2	l	l1	m1	s2	s3	s4	t	t3	t4	u
K1	105	75_{j6}	30	90	30	90	70	90	106	25_{k6}	90	3.0	60	160	62.0	50	4	60	M10	M8	M8	28.0	13	13	A8×7×40
K2	116	82_{j6}	35	115	35	115	90	115	134	30_{k6}	100	3.0	65	190	68.0	60	4	65	M10	M10	M8	33.0	16	13	A8×7×50
K3	132	95_{j6}	40	130	40	130	105	130	146	30_{k6}	115	3.0	75	213	69.0	60	4	75	M10	M10	M8	33.0	16	13	A8×7×50
K4	152	110_{j6}	50	155	50	155	120	148	173	40_{k6}	130	3.5	90	240	89.5	80	4	90	M16	M12	M10	43.0	19	16	A12×8×70
K5	145	110_{j6}	40	140	100	140	125	160	185	45_{k6}	130	3.5	160	260	129.5	90	4	100	M16	M16	M10	48.5	26	16	A14×9×80
K6	180	140_{j6}	50	160	110	160	130	168	200	50_{k6}	165	3.5	190	310	136.0	100	4	120	M16	M16	M10	53.5	26	16	A14×9×90
K7	195	155_{j6}	55	180	125	180	145	190	226	60_{m6}	185	3.5	212	342	164.0	120	4	125	M20	M20	M12	64.0	33	19	A18×11×110
K8	226	185_{j6}	75	240	165	240	185	235	282	70_{m6}	215	4.0	265	410	185.0	140	5	145	M20	M24	M12	74.5	38	19	A20×12×125
K9	280	230_{j6}	95	280	185	280	225	285	330	90_{m6}	265	5.0	315	495	220.0	170	8	180	M24	M30	M16	95.0	48	26	A25×14×140

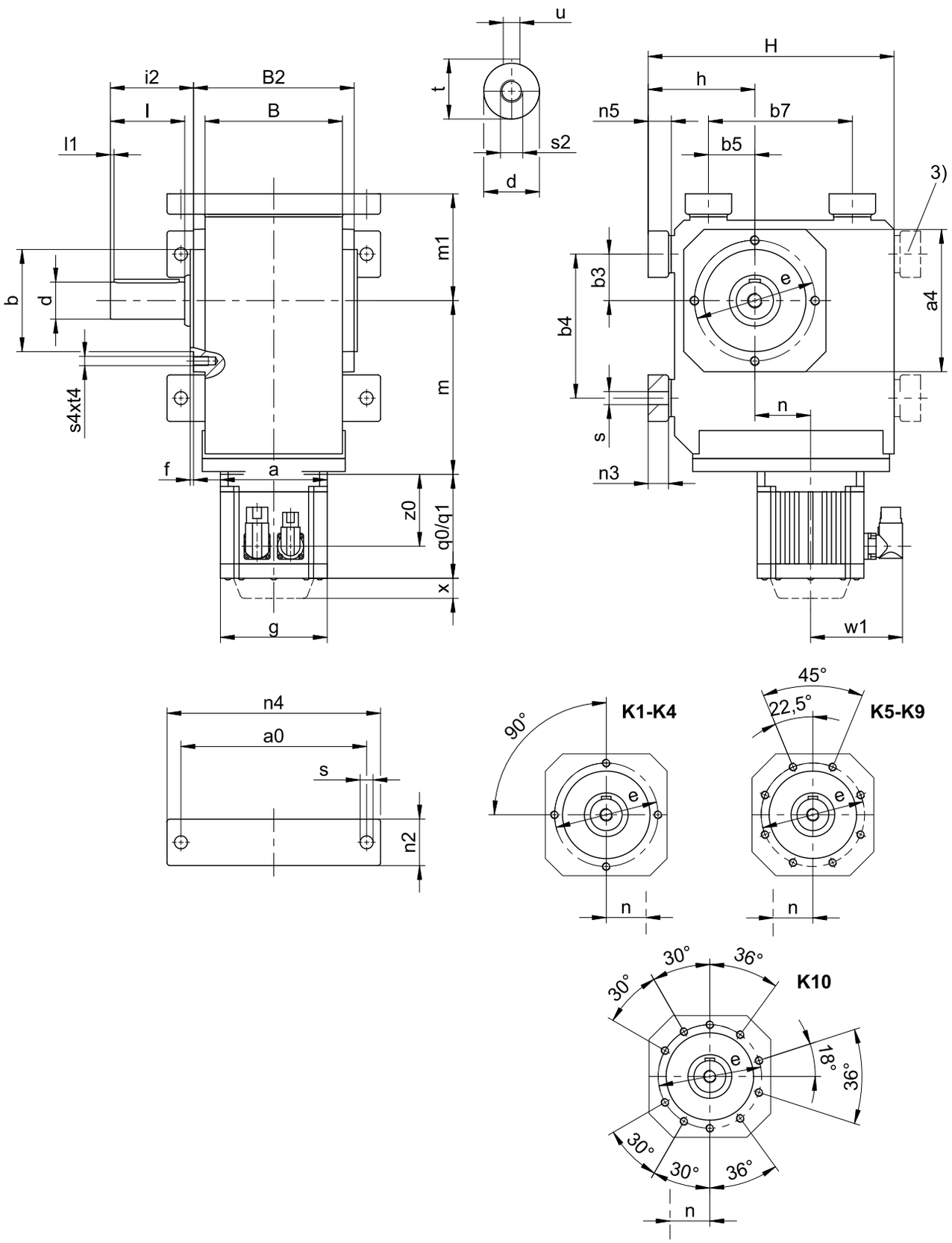
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5
EZ805U	190	355.5	432.5	156.5	22	301.5

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
K102	□72	124	36.0	□98	124	36.0	□115	128	36.0	□145	130	36.0	–	–	–
K202	□72	143	46.0	□98	143	46.0	□115	147	46.0	□145	149	46.0	–	–	–
K203	∅140	180	46.0	∅140	180	46.0	–	–	–	–	–	–	–	–	–
K302	∅140	163	52.5	∅140	163	52.5	□115	167	52.5	□145	169	52.5	–	–	–
K303	∅140	200	52.5	∅140	200	52.5	∅160	210	16.0	–	–	–	–	–	–
K402	–	–	–	–	–	–	∅160	187	60.0	□145	189	60.0	□190	192	60.0
K403	∅140	220	60.0	∅140	220	60.0	∅160	230	23.0	–	–	–	–	–	–
K513	–	–	–	–	–	–	∅160	172	15.0	□145	174	15.0	□190	177	15.0
K514	–	–	–	–	–	–	∅160	215	15.0	–	–	–	–	–	–
K613	–	–	–	–	–	–	∅160	191	18.0	∅200	193	18.0	□190	196	18.0
K614	–	–	–	–	–	–	∅160	234	18.0	–	–	–	–	–	–
K713	–	–	–	–	–	–	–	–	–	∅200	221	20.0	□190	224	20.0
K714	–	–	–	–	–	–	∅160	263	20.0	∅200	283	20.0	–	–	–
K813	–	–	–	–	–	–	–	–	–	∅200	247	24.0	∅250	249	24.0
K814	–	–	–	–	–	–	–	–	–	∅200	308	24.0	∅250	320	5.0
K913	–	–	–	–	–	–	–	–	–	–	–	–	∅250	294	25.0
K914	–	–	–	–	–	–	–	–	–	∅200	353	25.0	∅250	365	25.0

21.3.14 V shaft design (solid shaft), NG housing design (base + pitch circle diameter)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]
3)	Only for K1 (other sizes on request)	–	K1 – K4: solid shaft without feather key available, on request starting at K5.
–	K1 – K10: Solid shaft on both sides available.		

Dimensions of gear units

Type	a0	□a4	Øb	b3	b4	b5	b7	B	B2	Ød	Øe	f	h	H	i2	l	l1	m1	n2	n3	n4	n5	Øs	s2	s4	t	t4	u
K1	115	105	75_{j6}	30	90	30	90	90	106	25_{k6}	90	3.0	75	175	62.0	50	4	75	30	13	140	15	9.0	M10	M8	28.0	13	A8×7×40
K2	155	116	82_{j6}	35	115	35	115	115	134	30_{k6}	100	3.0	88	213	68.0	60	4	88	40	20	185	23	11.0	M10	M8	33.0	13	A8×7×50
K3	170	132	95_{j6}	40	130	40	130	130	146	30_{k6}	115	3.0	98	236	69.0	60	4	98	45	20	200	23	11.0	M10	M8	33.0	13	A8×7×50
K4	200	152	110_{j6}	50	155	50	155	148	173	40_{k6}	130	3.5	115	265	89.5	80	4	115	50	22	230	25	14.0	M16	M10	43.0	16	A12×8×70
K5	200	145	110_{j6}	40	140	100	140	160	185	45_{k6}	130	3.5	190	290	129.5	90	4	130	60	27	240	30	18.0	M16	M10	48.5	16	A14×9×80
K6	210	180	140_{j6}	50	160	110	160	168	200	50_{k6}	165	3.5	220	340	136.0	100	4	150	65	27	250	30	18.5	M16	M10	53.5	16	A14×9×90
K7	241	195	155_{j6}	55	180	125	180	190	226	60_{m6}	185	3.5	250	380	164.0	120	4	163	70	35	290	38	23.0	M20	M12	64.0	19	A18×11×110
K8	300	226	185_{j6}	75	240	165	240	235	282	70_{m6}	215	4.0	310	455	185.0	140	5	190	85	41	360	45	27.0	M20	M12	74.5	19	A20×12×125
K9	360	280	230_{j6}	95	280	185	280	285	330	90_{m6}	265	5.0	365	545	220.0	170	8	230	95	46	430	50	31.0	M24	M16	95.0	26	A25×14×140
K10	330	340	250_{h6}	115	350	265	420	400	356	110_{m6}	300	20.0	420	636	240.0	210	15	270	120	–	400	45	39.0	M24	M20	116.0	33	A28×16×180

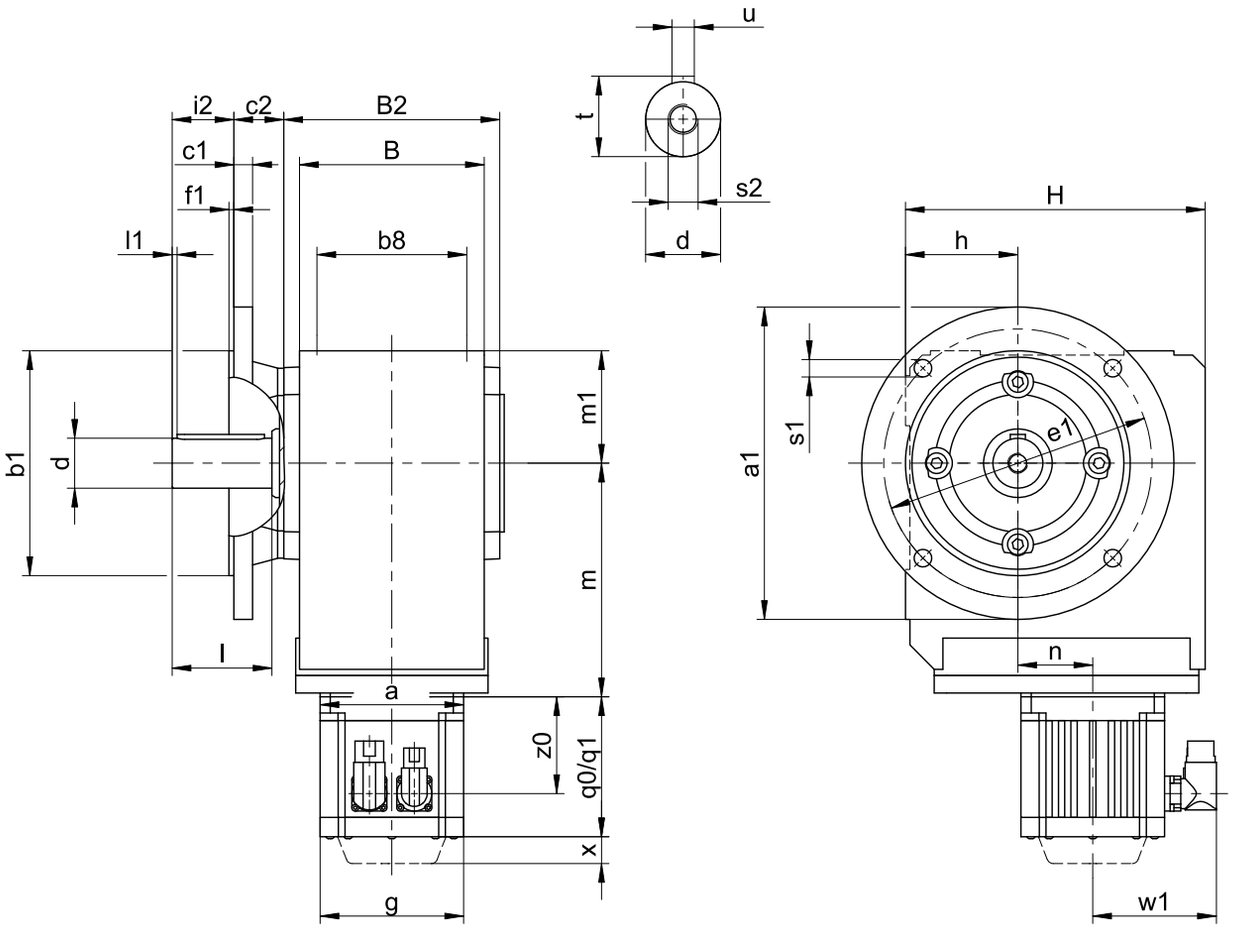
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5
EZ805U	190	355.5	432.5	156.5	22	301.5

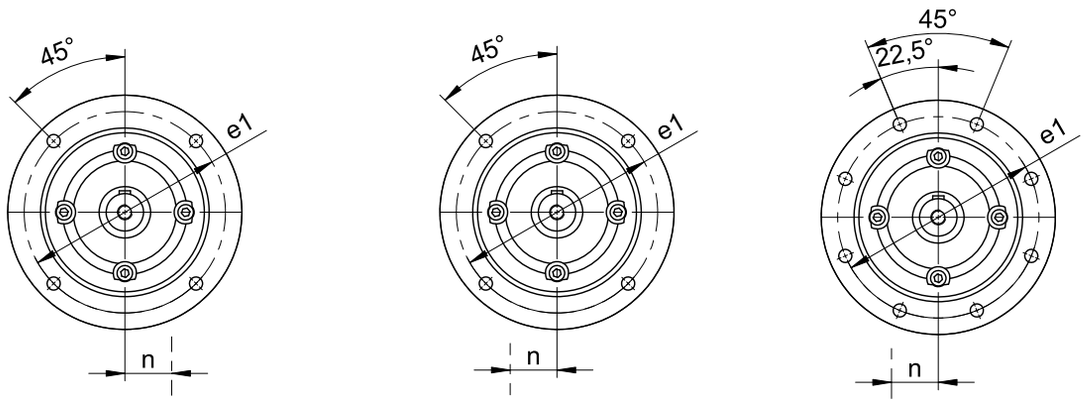
Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
K102	□72	124	36.0	□98	124	36.0	□115	128	36.0	□145	130	36.0	–	–	–
K202	□72	143	46.0	□98	143	46.0	□115	147	46.0	□145	149	46.0	–	–	–
K203	∅140	180	46.0	∅140	180	46.0	–	–	–	–	–	–	–	–	–
K302	∅140	163	52.5	∅140	163	52.5	□115	167	52.5	□145	169	52.5	–	–	–
K303	∅140	200	52.5	∅140	200	52.5	∅160	210	16.0	–	–	–	–	–	–
K402	–	–	–	–	–	–	∅160	187	60.0	□145	189	60.0	□190	192	60.0
K403	∅140	220	60.0	∅140	220	60.0	∅160	230	23.0	–	–	–	–	–	–
K513	–	–	–	–	–	–	∅160	172	15.0	□145	174	15.0	□190	177	15.0
K514	–	–	–	–	–	–	∅160	215	15.0	–	–	–	–	–	–
K613	–	–	–	–	–	–	∅160	191	18.0	∅200	193	18.0	□190	196	18.0
K614	–	–	–	–	–	–	∅160	234	18.0	–	–	–	–	–	–
K713	–	–	–	–	–	–	–	–	–	∅200	221	20.0	□190	224	20.0
K714	–	–	–	–	–	–	∅160	263	20.0	∅200	283	20.0	–	–	–
K813	–	–	–	–	–	–	–	–	–	∅200	247	24.0	∅250	249	24.0
K814	–	–	–	–	–	–	–	–	–	∅200	308	24.0	∅250	320	5.0
K913	–	–	–	–	–	–	–	–	–	–	–	–	∅250	294	25.0
K914	–	–	–	–	–	–	–	–	–	∅200	353	25.0	∅250	365	25.0
K1014	–	–	–	–	–	–	–	–	–	–	–	–	∅250	450	28.0

21.3.15 V shaft design (solid shaft), F housing design (round flange)



K1-K4 **K5-K8** **K9**



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]
–	K1 – K4: solid shaft without feather key available, on request starting at K5.	–	K1 – K9: Solid shaft on both sides available.

Dimensions of gear units

Type	Øa1	Øb1	b8	B	B2	c1	c2	Ød	Øe1	f1	h	H	i2	l	l1	m1	Øs1	s2	t	u
K1	160	110_{j6}	70	90	106	10	32.0	25_{k6}	130	3.5	60	160	30.0	50	4	60	9	M10	28.0	A8×7×40
K2	200	130_{j6}	90	115	134	12	32.0	30_{k6}	165	3.5	65	190	36.0	60	4	65	11	M10	33.0	A8×7×50
K3	200	130_{j6}	105	130	146	14	38.0	30_{k6}	165	3.5	75	213	31.0	60	4	75	11	M10	33.0	A8×7×50
K4	250	180_{j6}	120	148	173	15	40.0	40_{k6}	215	4.0	90	240	49.5	80	4	90	14	M16	43.0	A12×8×70
K5	250	180_{j6}	125	160	185	15	39.5	45_{k6}	215	4.0	160	260	90.0	90	4	100	14	M16	48.5	A14×9×80
K6	300	230_{j6}	130	168	200	17	36.0	50_{k6}	265	4.0	190	310	100.0	100	4	120	14	M16	53.5	A14×9×90
K7	350	250_{h6}	145	190	226	18	44.0	60_{m6}	300	5.0	212	342	120.0	120	4	125	18	M20	64.0	A18×11×110
K8	400	300_{h6}	185	235	282	20	45.0	70_{m6}	350	5.0	265	410	140.0	140	5	145	18	M20	74.5	A20×12×125
K9	450	350_{h6}	225	285	330	23	50.0	90_{m6}	400	5.0	315	495	170.0	170	8	180	18	M24	95.0	A25×14×140

Dimensions of additional round flanges

Type	Øa1	Øb1	c1	Øe1	f1	Øs1
K1	140	95_{j6}	10	115	3.0	9
K2	160	110_{j6}	12	130	3.5	9
K3	160	110_{j6}	14	130	3.5	9
K3	250	180_{j6}	14	215	4.0	14
K8	350	250_{h6}	18	300	5.0	18
K8	450	350_{h6}	20	400	5.0	18

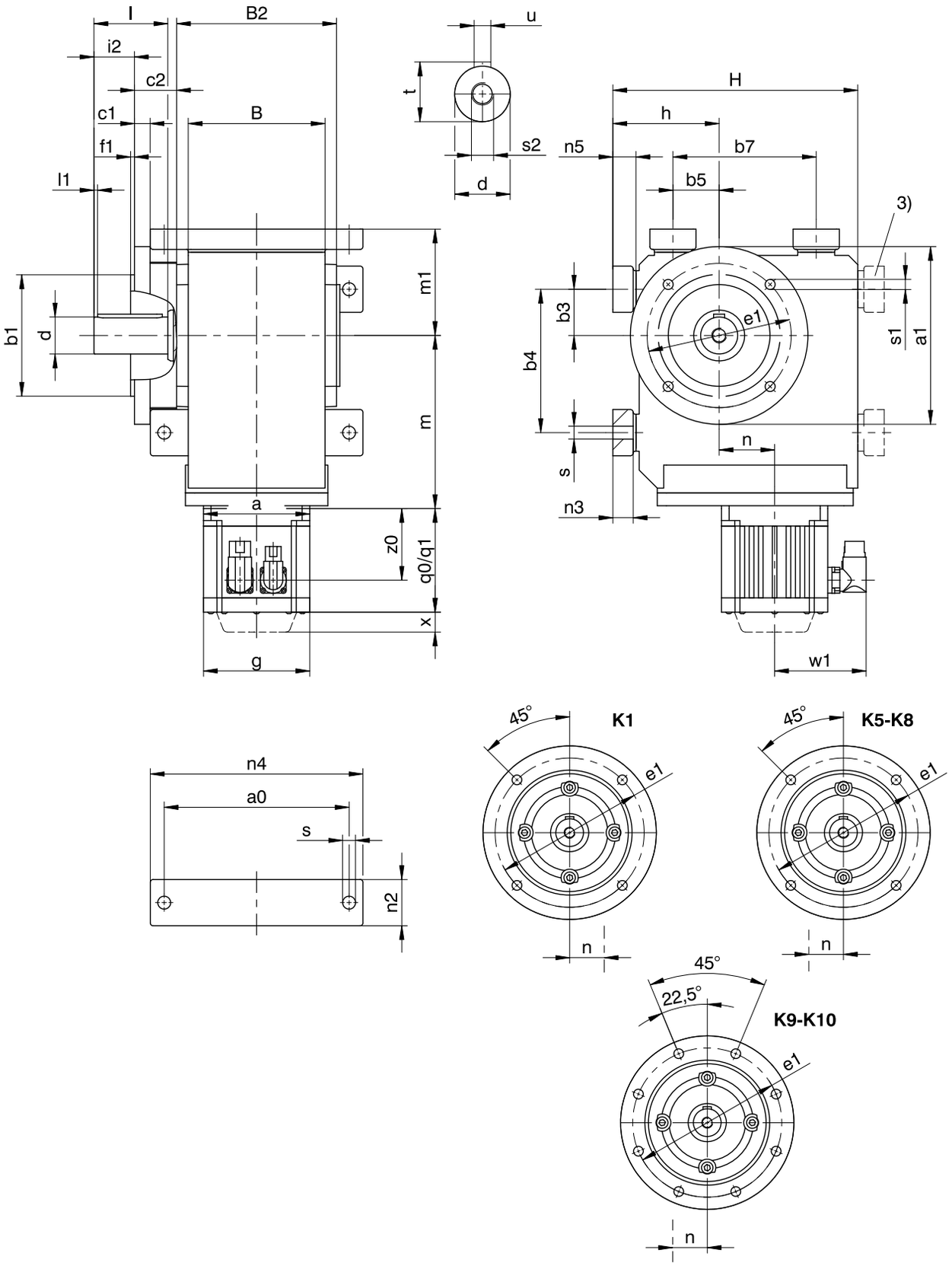
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5
EZ805U	190	355.5	432.5	156.5	22	301.5

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
K102	□72	124	36.0	□98	124	36.0	□115	128	36.0	□145	130	36.0	–	–	–
K202	□72	143	46.0	□98	143	46.0	□115	147	46.0	□145	149	46.0	–	–	–
K203	∅140	180	46.0	∅140	180	46.0	–	–	–	–	–	–	–	–	–
K302	∅140	163	52.5	∅140	163	52.5	□115	167	52.5	□145	169	52.5	–	–	–
K303	∅140	200	52.5	∅140	200	52.5	∅160	210	16.0	–	–	–	–	–	–
K402	–	–	–	–	–	–	∅160	187	60.0	□145	189	60.0	□190	192	60.0
K403	∅140	220	60.0	∅140	220	60.0	∅160	230	23.0	–	–	–	–	–	–
K513	–	–	–	–	–	–	∅160	172	15.0	□145	174	15.0	□190	177	15.0
K514	–	–	–	–	–	–	∅160	215	15.0	–	–	–	–	–	–
K613	–	–	–	–	–	–	∅160	191	18.0	∅200	193	18.0	□190	196	18.0
K614	–	–	–	–	–	–	∅160	234	18.0	–	–	–	–	–	–
K713	–	–	–	–	–	–	–	–	–	∅200	221	20.0	□190	224	20.0
K714	–	–	–	–	–	–	∅160	263	20.0	∅200	283	20.0	–	–	–
K813	–	–	–	–	–	–	–	–	–	∅200	247	24.0	∅250	249	24.0
K814	–	–	–	–	–	–	–	–	–	∅200	308	24.0	∅250	320	5.0
K913	–	–	–	–	–	–	–	–	–	–	–	–	∅250	294	25.0
K914	–	–	–	–	–	–	–	–	–	∅200	353	25.0	∅250	365	25.0

21.3.16 V shaft design (solid shaft), NF housing design (base + round flange)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]
3)	Only for K1 (other sizes on request)	–	K1 – K4: solid shaft without feather key available, on request starting at K5.
–	K1 – K10: Solid shaft on both sides available.		

Dimensions of gear units

Type	a0	Øa1	Øb1	b3	b4	b5	b7	B	B2	c1	c2	Ød	Øe1	f1	h	H	i2	l	l1	m1	n2	n3	n4	n5	Øs	Øs1	s2	t	u
K1	115	160	110_{j6}	30	90	30	90	90	106	10	32.0	25_{k6}	130	3.5	75	175	30.0	50	4	75	30	13	140	15	9.0	9	M10	28.0	A8×7×40
K3	170	160	110_{j6}	40	130	40	130	130	146	14	38.0	30_{k6}	130	3.5	98	236	31.0	60	4	98	45	20	200	23	11.0	9	M10	33.0	A8×7×50
K5	200	250	180_{j6}	40	140	100	140	160	185	15	39.5	45_{k6}	215	4.0	190	290	90.0	90	4	130	60	27	240	30	18.0	14	M16	48.5	A14×9×80
K6	210	300	230_{j6}	50	160	110	160	168	200	17	36.0	50_{k6}	265	4.0	220	340	100.0	100	4	150	65	27	250	30	18.5	14	M16	53.5	A14×9×90
K7	241	350	250_{h6}	55	180	125	180	190	226	18	44.0	60_{m6}	300	5.0	250	380	120.0	120	4	163	70	35	290	38	23.0	18	M20	64.0	A18×11×110
K8	300	400	300_{h6}	75	240	165	240	235	282	20	45.0	70_{m6}	350	5.0	310	455	140.0	140	5	190	85	41	360	45	27.0	18	M20	74.5	A20×12×125
K9	360	450	350_{h6}	95	280	185	280	285	330	23	50.0	90_{m6}	400	5.0	365	545	170.0	170	8	230	95	46	430	50	31.0	18	M24	95.0	A25×14×140
K10	330	550	450_{h6}	115	350	265	420	400	356	25	78.0	110_{m6}	500	5.0	420	636	210.0	210	15	270	120	–	400	45	39.0	18	M24	116.0	A28×16×180

Dimensions of additional round flanges

Type	Øa1	Øb1	c1	Øe1	f1	Øs1
K1	140	95_{j6}	10	115	3.0	9
K8	350	250_{h6}	18	300	5.0	18
K8	450	350_{h6}	20	400	5.0	18

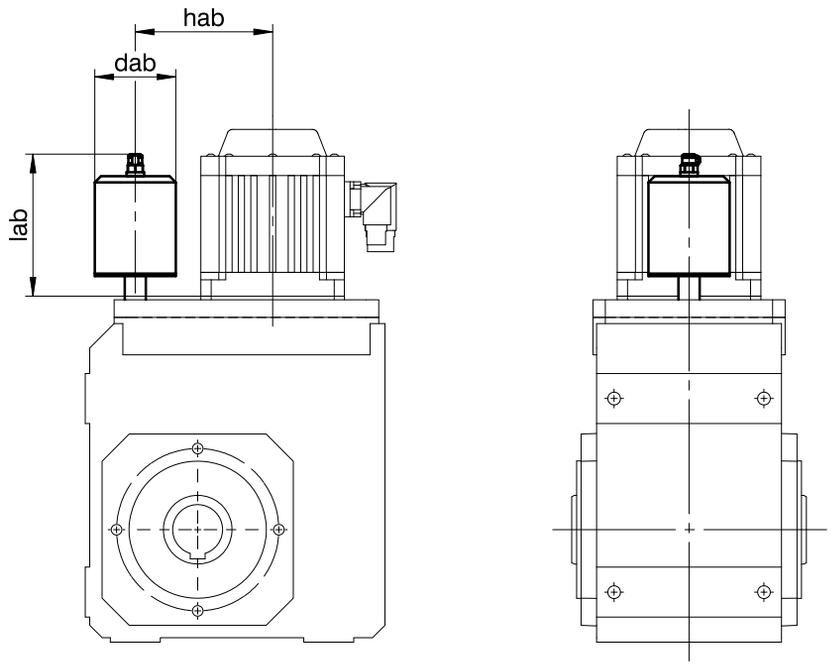
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5
EZ803U	190	273.5	350.5	156.5	22	219.5
EZ805U	190	355.5	432.5	156.5	22	301.5

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
K102	□72	124	36.0	□98	124	36.0	□115	128	36.0	□145	130	36.0	–	–	–
K302	∅140	163	52.5	∅140	163	52.5	□115	167	52.5	□145	169	52.5	–	–	–
K303	∅140	200	52.5	∅140	200	52.5	∅160	210	16.0	–	–	–	–	–	–
K513	–	–	–	–	–	–	∅160	172	15.0	□145	174	15.0	□190	177	15.0
K514	–	–	–	–	–	–	∅160	215	15.0	–	–	–	–	–	–
K613	–	–	–	–	–	–	∅160	191	18.0	∅200	193	18.0	□190	196	18.0
K614	–	–	–	–	–	–	∅160	234	18.0	–	–	–	–	–	–
K713	–	–	–	–	–	–	–	–	–	∅200	221	20.0	□190	224	20.0
K714	–	–	–	–	–	–	∅160	263	20.0	∅200	283	20.0	–	–	–
K813	–	–	–	–	–	–	–	–	–	∅200	247	24.0	∅250	249	24.0
K814	–	–	–	–	–	–	–	–	–	∅200	308	24.0	∅250	320	5.0
K913	–	–	–	–	–	–	–	–	–	–	–	–	∅250	294	25.0
K914	–	–	–	–	–	–	–	–	–	∅200	353	25.0	∅250	365	25.0
K1014	–	–	–	–	–	–	–	–	–	–	–	–	∅250	450	28.0

21.3.17 Oil expansion tank



Dimensions

Type	EZ5			EZ7			EZ8		
	dab	hab	lab	dab	hab	lab	dab	hab	lab
K513	65	122.0	113.5	65	122.0	113.5	65	170.0	163.5
K613	65	148.5	116.5	65	148.5	116.5	65	150.5	111.5
K713	–	–	–	65	170.0	114.5	65	170.0	112.0
K813	–	–	–	73	205.0	129.5	73	205.0	129.5
K913	–	–	–	–	–	–	73	255.0	129.5

More information can be found in Chapter [▸ 21.6.4]

21.4 Type designation

In this chapter, you can find an explanation of the type designation with the associated options.

Additional ordering information not included in the type designation can be found at the end of the chapter.

Sample code

K	4	0	2	A	G	0560	EZ501U

Explanation

Code	Designation	Design
K	Type	Helical bevel gear unit
4	Size	4 (example)
0	Generation	Generation 0
1		Generation 1
2	Stages	Two-stage
3		Three-stage
4		Four-stage
A	Shaft	Hollow shaft with keyway
S		Hollow shaft with shrink ring
V		Solid shaft
G	Housing	Pitch circle diameter
F		Round flange
NG		Foot + pitch circle diameter
NF		Foot + round flange
GD		Pitch circle diameter + torque arm
NGD		Foot + pitch circle diameter + torque arm
0560	Transmission ratio (i x 10 rounded)	i = 55.71 (example)
EZ501U	Motor	EZ synchronous servo motor

In order to complete the type designation, also specify:

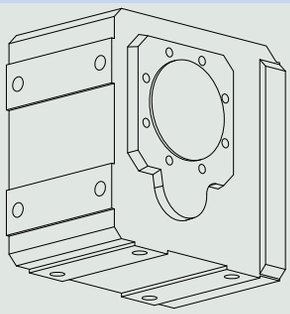
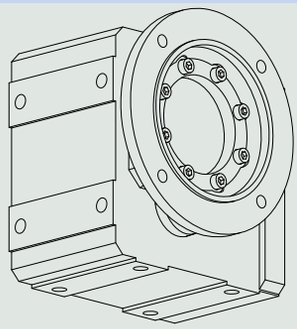
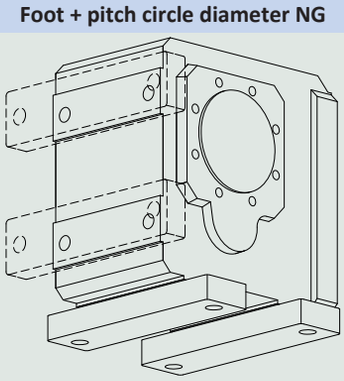
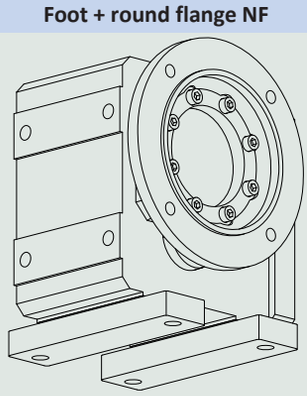
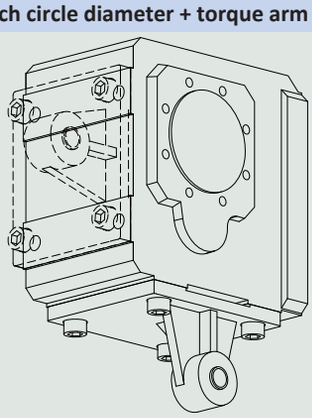
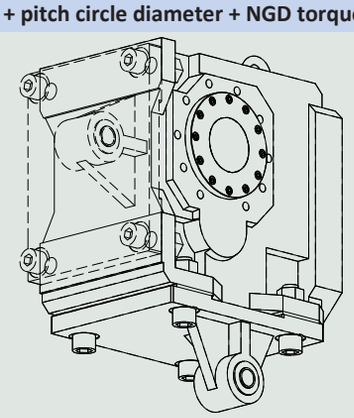
- A detailed type designation of the motor, see Chapter [▷ 23]
- The mounting position, see Chapter [▷ 21.5.4]
- Attachment of solid shaft: gear unit side 3 or 4; solid shaft on both sides
- Attachment of hollow shaft with keyway: insertion side 3 or 4
- Attachment of hollow shaft with shrink ring: shrink ring on gear unit side 3 or 4
- Attachment of baseboards: gear unit side 1 or 5
- Attachment of flange: gear unit side 3 or 4
- Pitch circle diameter: gear unit side 3 or 4
- Attachment of torque arm: torque arm on gear unit side 1 or 5, eye on gear unit side 3 or 4
- The position of the plug connectors, see Chapter [▷ 21.5.6]
- Oil expansion tank (recommended for gear units in mounting position EL5), see section [▷ 21.6.4]
- Backlash: standard/class II/class I. Backlash class II and class I for an additional charge.

  Backlash class I with reduced input speeds (see section [▷ 21.6.1]) and only possible in conjunction with synthetic oil.
- Standard or reinforced output bearing

An explanation of the gear unit sides can be found in the chapter [▷ 21.5.4].

21.5 Product description

21.5.1 Housing design

Pitch circle diameter G	Round flange F
	
Foot + pitch circle diameter NG	**Foot + round flange NF**
	
Pitch circle diameter + torque arm GD	**Foot + pitch circle diameter + NGD torque arm**
	

	G	F	NG	NF	GD	NGD
K1	✓	✓	✓	✓	✓	–
K2	✓	✓	✓	–	✓	–
K3	✓	✓	✓	–	✓	–
K4	✓	✓	✓	–	✓	–
K5	✓	✓	✓	✓	✓	–
K6	✓	✓	✓	✓	✓	–
K7	✓	✓	✓	✓	✓	–
K8	✓	✓	✓	✓	✓	–
K9	✓	✓	✓	✓	✓	–
K10	–	–	✓	✓	–	✓

21.5.2 Combinatorial shaft/housing design

	Housing design						
Shaft design	**Code**	**G**	**F**	**NG**	**NF**	**GD**	**NGD**
Hollow shaft with keyway	**A**	AG	AF	ANG	ANF	AGD	ANGD
Hollow shaft with shrink ring	**S**	SG	SF	SNG	SNF	SGD	SNGD
Solid shaft [1)]	**V**	VG	VF	VNG	VNF	–	–

[1)] Gear units in sizes K1 – K10 come with a solid shaft with feather key as standard. Gear units in sizes K1 – K4 can be ordered with the option of a solid shaft without feather key. Only upon request starting at size K5.

21.5.3 Installation conditions

Hollow shaft

The hollow shaft hole tolerance is ISO H7. The tolerance of the machine shaft must be ISO k6.

Take care to align the machine shaft with the gear unit hollow shaft when attaching the gear unit.

Maximum deviation ≤ 0.03 mm.

For simpler assembly and disassembly of the machine shaft, the hollow shafts are equipped with a spiral groove (as a grease deposit).

A hardened, threaded keeper plate is included in the scope of delivery. You also have the option to order the hollow shaft without a keeper plate.

Hollow shaft with shrink ring

The tolerance of the hollow shaft hole is ISO H7.

The machine shaft must be executed as follows:

Gear unit type	Tolerance
K1 to K6	ISO h9
K7 to K10	ISO h6

Select a material for the machine shaft with a permitted surface pressure of $p \geq 325\ N/mm^2$.

Possible materials:

- C45E +QT
- 42CrMo4

Attaching the gear unit on the machine side using the pitch circle diameter

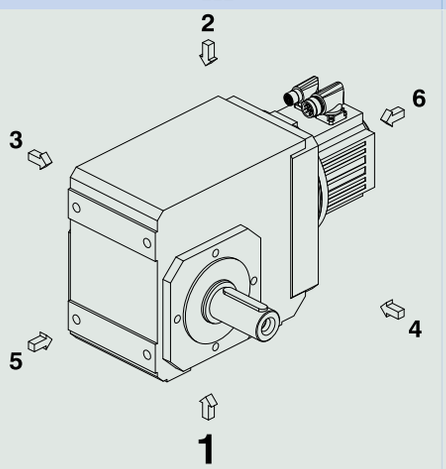
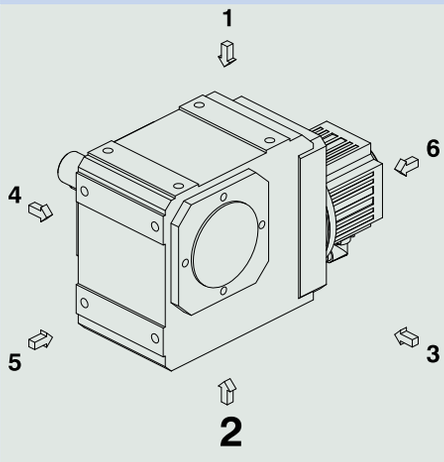
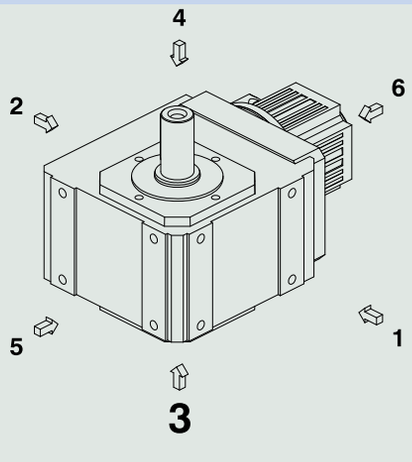
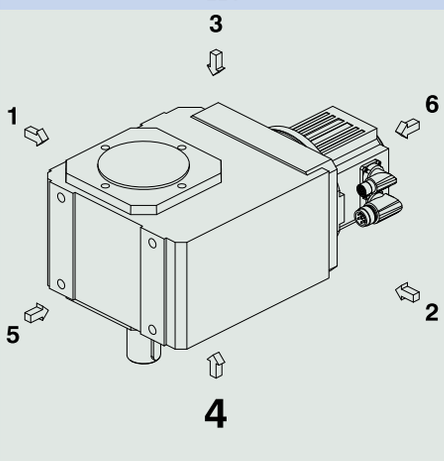
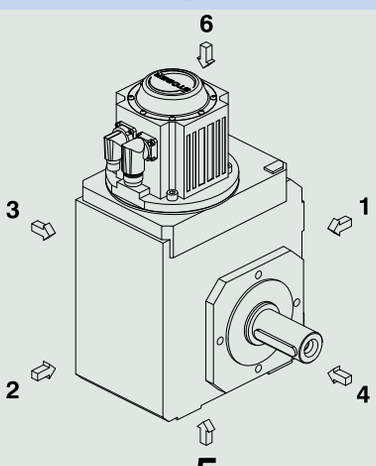
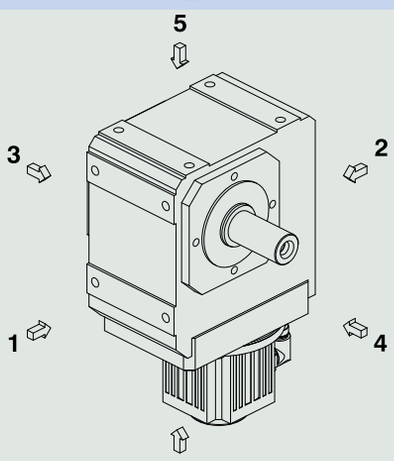
The specified torques and forces only apply when attaching gear units at the machine side using screws of quality 10.9. In addition, the gear housing must be adjusted at the pilot (H7).

21.5.4 Mounting positions

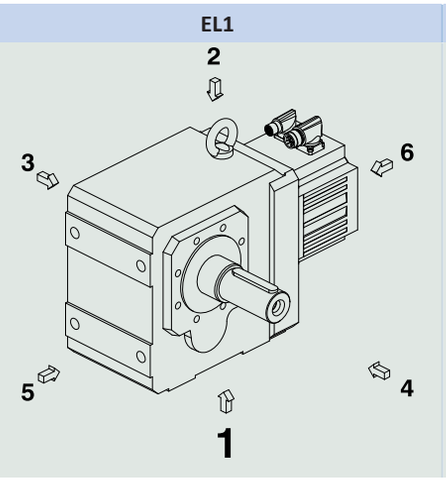
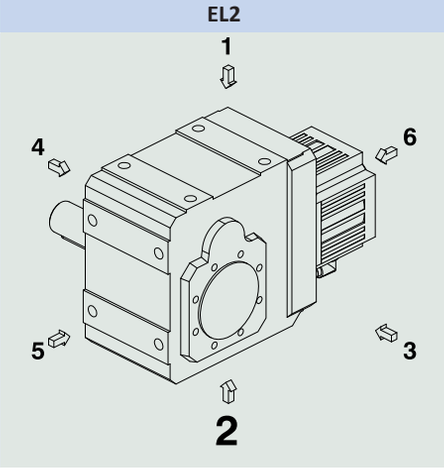
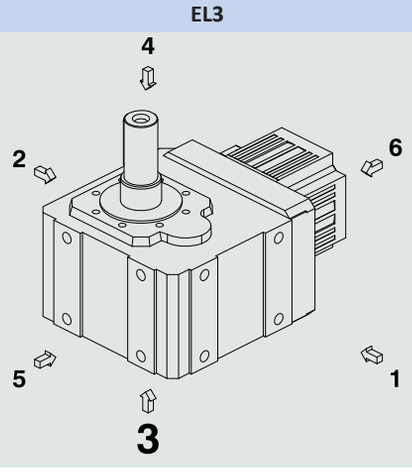
The following table shows the standard mounting positions.

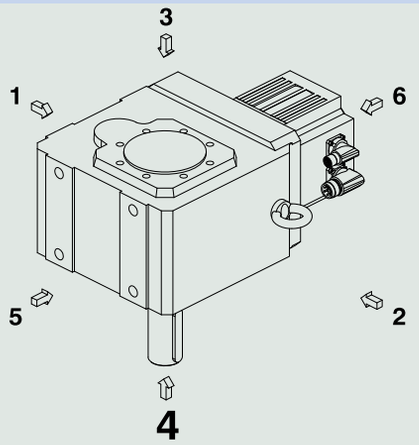
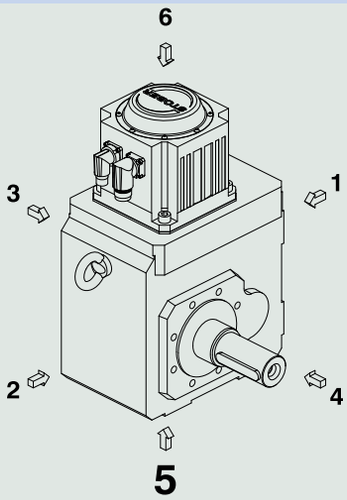
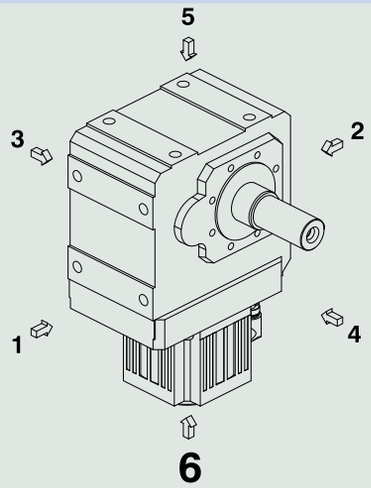
The numbers identify the gear unit sides. The mounting position is defined by the gear side facing downwards.

Mounting positions for gear unit sizes K1 – K4

EL1	EL2	EL3
		
EL4	**EL5**	**EL6**
		

Mounting positions for gear unit sizes K5 – K10

EL1	EL2	EL3
		

EL4	EL5	EL6
		

Since the lubricant filling volume of the gear unit depends on the mounting position, the mounting position must be specified when ordering.

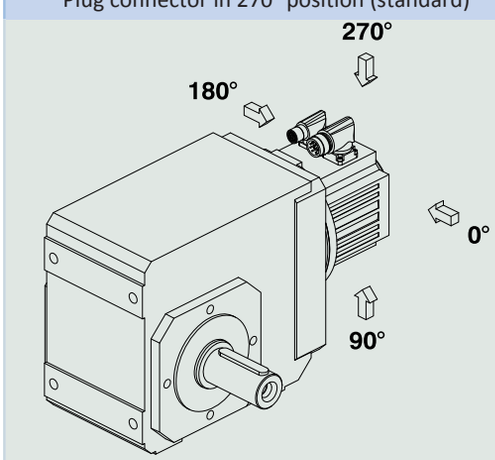
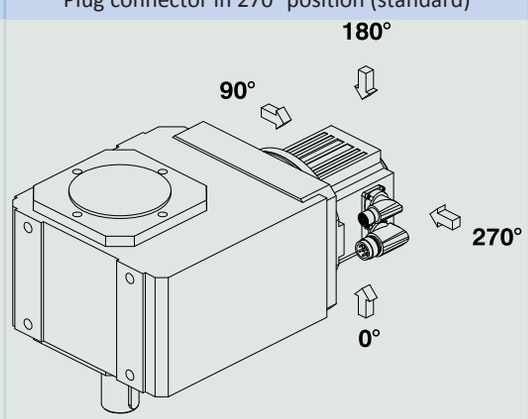
21.5.5 Lubricants

STOBER fills the gear units with the amount and type of lubricant specified on the nameplate. The filling volume and the structure of the gear units depend on the mounting position.

Only install the gear units in the intended mounting position! Reposition the gear units only after consulting STOBER. Otherwise, STOBER assumes no liability for the gear units.

Lubricant filling quantities for gear units, document ID 441871, can be found online at http://www.stoeber.de/en/download. Enter the ID of the documentation in the Search... field.

21.5.6 Position of the plug connectors

Mounting position EL1 Plug connector in 270° position (standard)	Mounting position EL4 Plug connector in 270° position (standard)
	

Indicate variations for your geared motor in the purchase order.

Note that the plug connector position rotates along with the geared motor if the geared motor is in another mounting position.

21.5.7 Other product features

Feature	Value
Max. permitted gear unit temperature (on the surface of the gear unit)	≤ 80 °C
Paint	Black RAL 9005
(ATEX) Directive 2014/34/EU (option)	Not suitable
Protection class:[1]	
Gear unit	IP65
Motor	IP56, optionally IP66

21.5.8 Maintenance

The instructions for maintenance can be found in the operating manual, ID 443027_en, at http://www.stoeber.de/en/download. Enter the ID of the documentation in the Search... field.

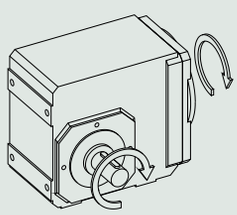
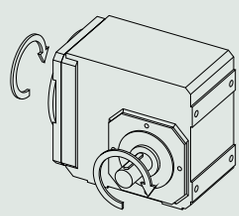
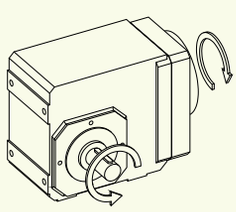
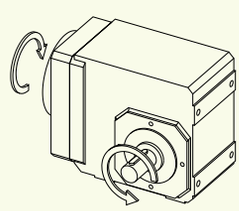
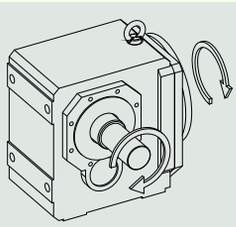
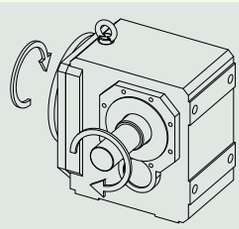
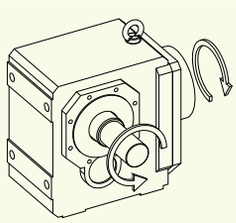
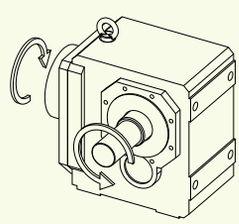
Ventilation

Air release valves are fitted as a standard feature and independently of installation position for gear unit sizes K5 to K10.

For the position and dimensions of the air release valve, refer to the 3D model at http://cad.stoeber.de.

21.5.9 Direction of rotation

Solid shaft (V), solid shaft on both sides (V), hollow shaft with keyway (A)

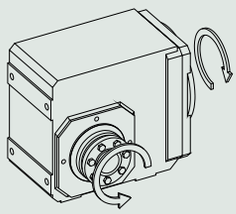
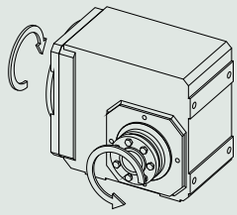
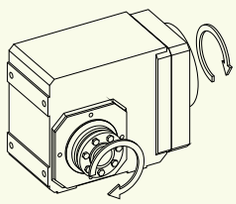
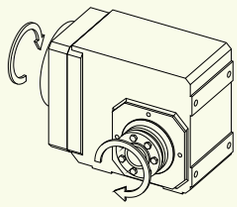
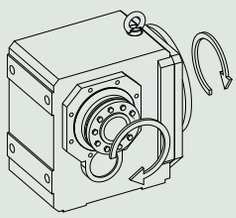
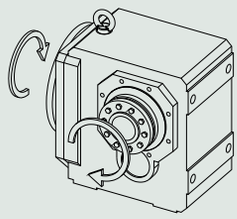
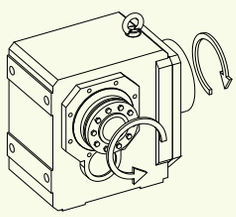
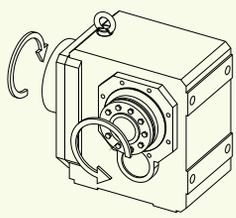
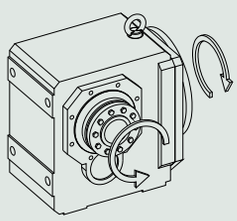
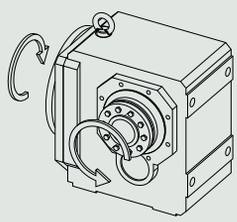
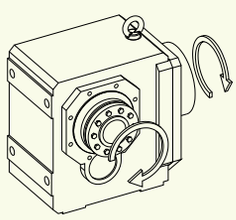
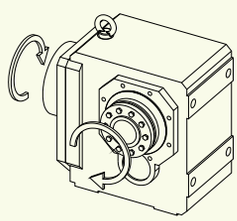
Type	Output side 4	Output side 3
K102 – K402		
K203 – K403		
K513 – K1013		
K514 – K1014		

The specified directions of rotation also apply to gear units with hollow shaft (A) if the insertion side of the machine shaft corresponds to the side of the solid shaft that is shown.

The pictures show mounting position EL1.

[1] Observe the protection class of all the components.

Hollow shaft with shrink ring (S)

Type	Shrink ring side 4	Shrink ring side 3
K102 – K402		
K203 – K403		
K513 – K813		
K514 – K814		
K913 – K1013		
K914 – K1014		

The pictures show mounting position EL1.

21.6 Project configuration

Project your drives using our SERVOsoft designing software. You can receive SERVOsoft for free from your adviser at one of our sales centers. Observe the limit conditions in this chapter to ensure a safe design for your drives.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

21.6.1 Calculation of the operating point

Check the following conditions for operating points other than the nominal point M_{2N} specified in the selection tables.

For continuous operation in mounting positions EL1, EL2:

$$n_{1m^*} \leq \frac{n_{1maxDBEL1,2}}{fB_T}$$

For continuous operation in mounting positions EL3, EL4, EL5, EL6:

$$n_{1m^*} \leq \frac{n_{1maxDBEL3,4,5,6}}{fB_T}$$

For all mounting positions:

$$n_{1max^*} \leq \frac{n_{1max\,ZB}}{fB_T}$$

$$M_{2eff^*} \leq M_{2th}$$

$$M_{2acc^*} \leq M_{2acc}$$

$$M_{2NOT^*} \leq M_{2NOT}$$

$$M_{2eq^*} \leq M_{2N} \cdot \frac{S}{fB_{op} \cdot fB_t}$$

Notes

Note that for gear units with backlash class I the maximum permitted input speed of the gear unit in continuous operation is reduced by 20%.

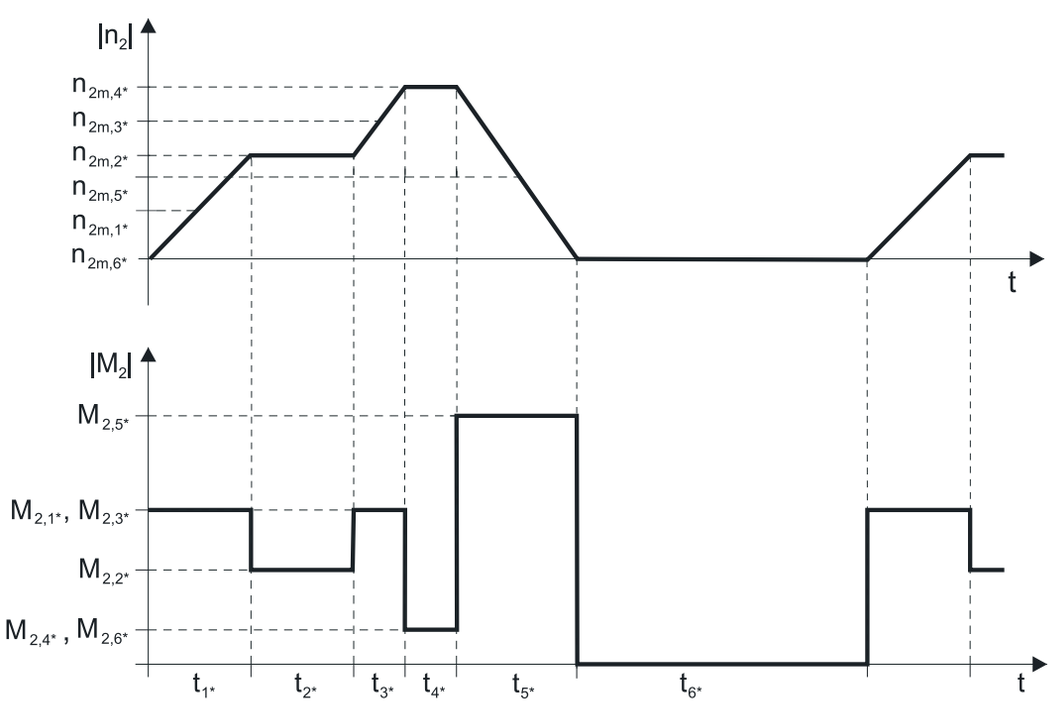
Refer to the selection tables for the values for $n_{1maxDBEL1,2}$ and $n_{1maxDBEL3,4,5,6}$, n_{1maxZB}, M_{2acc}, M_{2NOT}, M_{2N} and S.

The values for fB_T, fB_{op} and fB_t can be found in the corresponding tables in this chapter.

Calculate the thermal limit torque M_{2th} for a duty cycle > 50%.

Example of cyclic operation

The following calculations are based on a representation of the power taken from the output based in accordance with the following example:



Calculation of the actual average input speed

$$n_{1m^*} = n_{2m^*} \cdot i$$

$$n_{2m^*} = \frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}{t_{1^*} + \ldots + t_{n^*}}$$

If $t_{1^*} + \ldots + t_{5^*} \geq 20$ min, calculate n_{2m^*} without the rest phase t_{6^*}.

The values for the ratio i can be found in the selection tables.

Calculation of the actual effective torque

$$M_{2eff^*} = \sqrt{\frac{t_{1^*} \cdot M_{2,1^*}{}^2 + \ldots + t_{n^*} \cdot M_{2,n^*}{}^2}{t_{1^*} + \ldots + t_{n^*}}}$$

Calculation of the actual equivalent torque

$$M_{2eq^*} = \sqrt[3]{\frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} \cdot \left|M_{2,1^*}{}^3\right| + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*} \cdot \left|M_{2,n^*}{}^3\right|}{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}}$$

Calculation of the thermal limit torque

Calculate the thermal limit torque M_{2th} for a duty cycle $ED_{20} > 50\%$ and the actual average input speed n_{1m^*}. (At $K_{mot,th} \leq 0$ you must reduce the average input speed n_{1m^*} accordingly or select another geared motor size.)

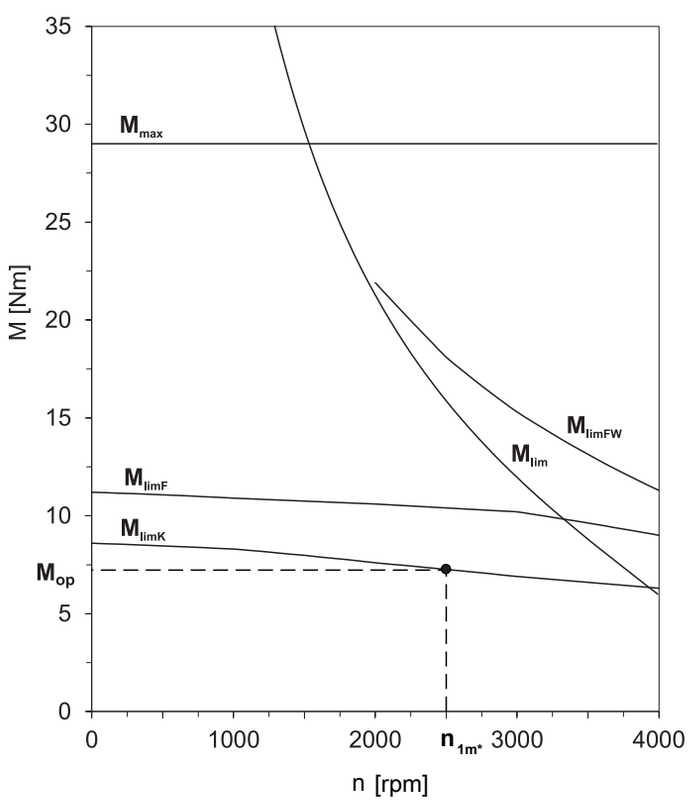
$$M_{2th} = M_{op} \cdot i \cdot K_{mot,th}$$

$$K_{mot,th} = 0{,}95 - \frac{a_{th}}{1000} \cdot athEL \cdot fB_T \cdot \left(\frac{n_{1m^*}}{1000}\right)^2$$

The values for i and a_{th} can be found in the selection tables.

The values for a_{thEL} and fB_T can be found in the corresponding tables in this chapter.

The value for the torque of the motor at operating point M_{op} with the determined average input speed n_{1m^*} can be found in the motor curve of Chapter [▶ 23.3]. Note the size, nominal speed n_N and cooling type of the motor. The figure below shows an example of reading the torque M_{op} of a motor with convection cooling at the operating point.



Operating factors

Parameter a_{thEL}

Mounting position	a_{thEL}
EL1, 2	1.0
EL3, 4, 5, 6	1.1

Operating mode	fB_{op}
Uniform continuous operation	1.00
Cyclic operation	1.25
Reversing load cyclic operation	1.40

Run time	fB_t
Daily run time ≤ 8 h	1.00
Daily run time ≤ 16 h	1.15
Daily run time ≤ 24 h	1.20

Temperature		fB_T
Motor cooling	**Surrounding temperature**	
Motor with forced ventilation	≤ 20 °C	0.9
	≤ 30 °C	1.0
	≤ 40 °C	1.15
Motor with convection cooling	≤ 20 °C	1.0
	≤ 30 °C	1.1
	≤ 40 °C	1.25

Notes

- The maximum permitted gear unit temperature (see the "Other product features" chapter) must not be exceeded. Doing so may result in damage to the geared motor.
- For braking from full speed (for example when the power fails or when setting up the machine), note the permitted gear unit torques (M_{2acc}, M_{2NOT}) in the selection tables.

21.6.2 Permitted shaft loads for the output shaft

The values specified in the tables apply to the permitted shaft loads:

- For shaft dimensions in accordance with the catalog
- For output speeds $n_{2m*} \leq 20$ rpm ($F_{2axN} = F_{2ax20}$; $F_{2radN} = F_{2rad20}$; $M_{2kN} = M_{2k20}$)
- Only if radial forces on the gear unit are stabilized by its pilots for the pitch circle diameter and flange housing design

21.6.2.1 V shaft design

Permitted shaft loads for V shaft design (solid shaft)

Type	z_2 [mm]	F_{2ax20} [N]	F_{2rad20} [N]	M_{2k20} [Nm]
K1	40.0	1900	5000	360
K2	42.0	2100	6000	430
K3	45.0	2400	7000	525
K4	52.0	3500	11200	1050
K5	72.0	3500	13450	1580
K6	72.0	4000	16000	1960
K8	60.0	7250	29000	3800
K9	87.0	16500	65000	11200
K10	84.0	25000	80000	15200

Reduced values apply in the case of a V shaft design (solid shaft) in conjunction with an NF housing design (foot + round flange):

Type	z_2 [mm]	F_{2ax20} [N]	F_{2rad20} [N]	M_{2k20} [Nm]
K10	132.0	25000	64000	15200

For the V solid shaft design on both sides, the values for F_{2rad20} and M_{2k20} must be multiplied by a factor of 0.7.

For other output speeds, download diagrams at http://products.stoeber.de.

The following applies to output speeds n_{2m*} > 20 rpm:

$$F_{2axN} = \frac{F_{2ax20}}{\sqrt[3]{\frac{n_{2m*}}{20\ rpm}}} \qquad F_{2radN} = \frac{F_{2rad20}}{\sqrt[3]{\frac{n_{2m*}}{20\ rpm}}} \qquad M_{2kN} = \frac{M_{2k20}}{\sqrt[3]{\frac{n_{2m*}}{20\ rpm}}}$$

The values for F_{2ax20}, F_{2rad20} and M_{2k20} can be found in the table "Permitted shaft loads" in this chapter.

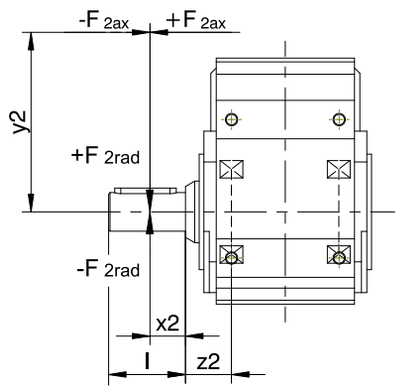


Fig. 1: Force application points for solid shaft

The specified values for F_{2rad20} are based on application of force at the middle of the output shaft: $x_2 = l/2$.

Shaft dimensions can be found in the "Dimensional drawings" chapter.

The following applies to other force application points:

$$M_{2k*} = \frac{2 \cdot F_{2ax*} \cdot y_2 + F_{2rad*} \cdot (x_2 + z_2)}{1000} \leq M_{2kN}$$

$$F_{2rad*} \leq F_{2radN}$$

$$F_{2ax*} \leq F_{2axN}$$

For applications with multiple axial and/or radial forces, you must add the forces as vectors.

In the event of EMERGENCY OFF operation (max. 1000 load changes), you can multiply the permitted forces and torques for F_{2ax20}, F_{2rad20} and M_{2k20} by a factor of two.

21.6.2.2 A and S shaft design

Permitted shaft loads for A shaft design (hollow shaft with keyway)

Type	z_2 [mm]	F_{2ax20} [N]	F_{2rad20} [N]	M_{2k20} [Nm]
K1	40.0	1900	5000	240
K2	42.0	2100	6000	310
K3	45.0	2400	7000	380
K4	52.0	3500	11200	740
K5	39.0	2500	13450	1000
K6	42.0	3000	16000	1300
K7	45.0	4100	22000	2100
K8	50.0	5300	29000	2600
K9	56.0	7000	65000	3600
K10	56.0	9000	80000	5000

Permitted shaft loads for S shaft design (hollow shaft with shrink ring)

Type	z_2 [mm]	F_{2ax20} [N]	F_{2rad20} [N]	M_{2k20} [Nm]
K1	40.0	1900	5000	240
K2	42.0	2100	6000	310
K3	45.0	2400	7000	380
K4	52.0	3500	11200	740
K5	39.0	2500	13450	1000
K6	42.0	3000	16000	1300
K7	45.0	4100	22000	2100
K8	50.0	5300	29000	2600
K9	56.0	7000	65000	3600
K10	56.0	9000	80000	5000

For other output speeds, download diagrams at http://products.stoeber.de.

The following applies to output speeds n_{2m*} > 20 rpm:

$$F_{2axN} = \frac{F_{2ax20}}{\sqrt[3]{\frac{n_{2m*}}{20\ rpm}}} \qquad F_{2radN} = \frac{F_{2rad20}}{\sqrt[3]{\frac{n_{2m*}}{20\ rpm}}} \qquad M_{2kN} = \frac{M_{2k20}}{\sqrt[3]{\frac{n_{2m*}}{20\ rpm}}}$$

The values for F_{2ax20}, F_{2rad20} and M_{2k20} can be found in the table "Permitted shaft loads" in this chapter.

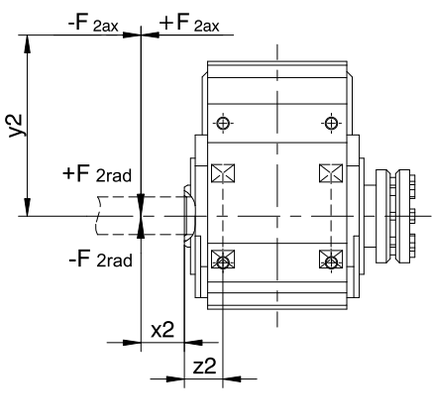


Fig. 2: Force application points for hollow shaft

You can determine the permitted radial forces from the permitted breakdown torque M_{2kN}. The actual radial forces may not exceed the permitted radial forces. The permitted radial forces are in relation to the end of the hollow shaft (x2 = 0).

$$M_{2k*} = \frac{2 \cdot F_{2ax*} \cdot y_2 + F_{2rad*} \cdot (x_2 + z_2)}{1000} \leq M_{2kN}$$

$$F_{2ax*} \leq F_{2axN}$$

For applications with multiple axial and/or radial forces, you must add the forces as vectors.

In the event of EMERGENCY OFF operation (max. 1000 load changes), you can multiply the permitted forces and torques for F_{2ax20}, F_{2rad20} and M_{2k20} by a factor of two.

21.6.3 Radial shaft seal rings

Leak-proofness

Our gear units are equipped with high-quality radial shaft seal rings and checked for leak-proofness. However, a leak cannot be fully ruled out over the length of use of a gear unit. If you use a gear unit with goods incompatible with the lubricant, you must take measures to prevent direct contact with the gear unit lubricant in case of a leak.

21.6.4 Oil expansion tank

The gear units have a higher fill level in mounting position EL5. The oil expansion tank prevents oil from escaping out of the gear unit.

Notes

- We recommend using an oil expansion tank in mounting position EL5 (additional cost) for fast running gear units with an input speed n_1 > 1750 rpm and gear ratios i < 20.
- It is not possible to use an oil expansion tank if the plug connector is at 90°!
- The oil expansion tank can only be used with certain sizes; see the chapter [▷ 21.3.17]

21.7 Additional documentation

Additional documentation related to the product can be found at http://www.stoeber.de/en/download

Enter the ID of the documentation in the Search... field.

Documentation	ID
Operating manual for C/F/K/S gear units and gear motors	443027_en
Lubricant filling quantities for gear units	441871

22 S helical worm geared motors

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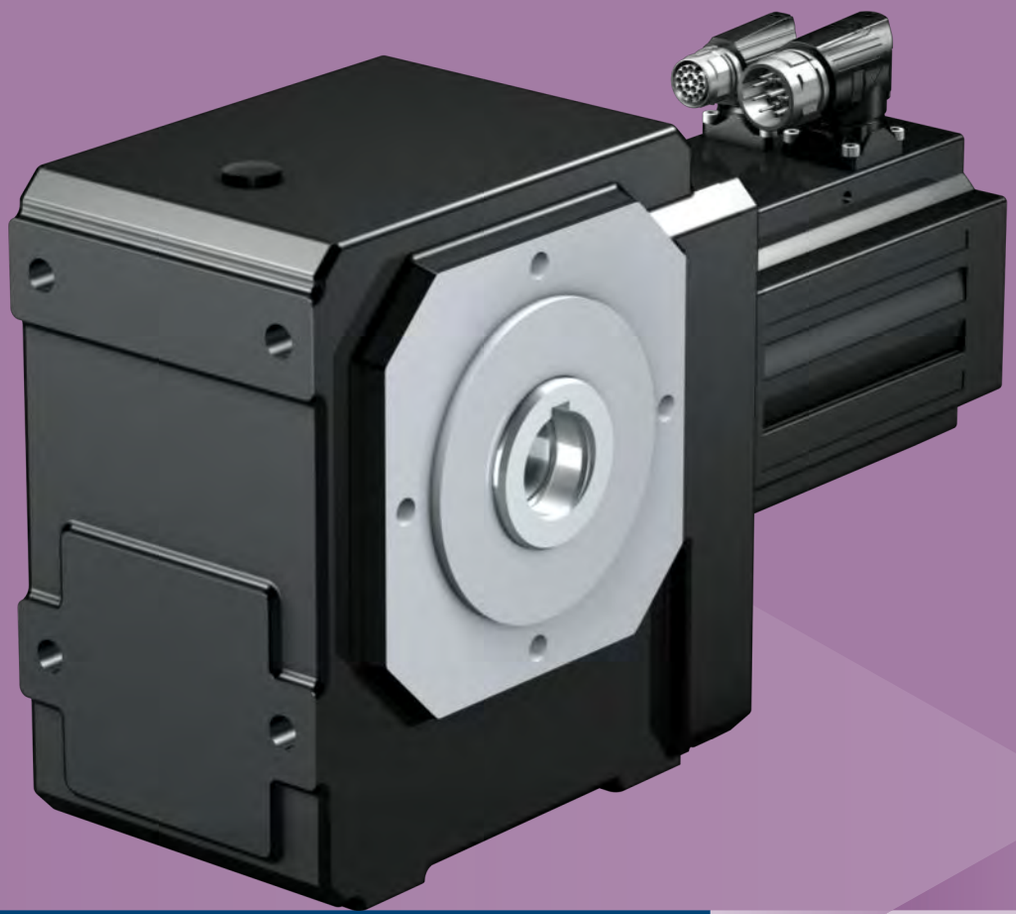


22 Helical worm geared motors S

22.1 Overview

Compact helical-geared right-angle geared motors

Features

Power density	★★☆☆☆
Backlash	★☆☆☆☆
Price category	€
Shaft load	★★★☆☆
Smooth operation	★★★☆☆
Torsional stiffness	★★☆☆☆
Mass moment of inertia	★★★★★
Helical gearing	✓
FKM seal ring at the input	✓
Reinforced output bearing	✓ (on request)
Compact and highly dynamic due to direct motor attachment	✓

Key: ★☆☆☆☆ good | ★★★★★ excellent
€ Economy | €€€€€ Premium

Technical data

i	6 – 548
M_{2acc}	28 – 960 Nm
η_{get}	≤ 91 %

22.2 Selection tables

The technical data specified in the selection tables applies to:

- Installation altitudes up to 1000 m above sea level
- Surrounding temperatures from 0 °C to 40 °C
- Drives with convection-cooled motors (e.g. EZ401**U**)
- Weight specification for mounting position EL1, housing design G

You can calculate the technical data for drives with forced ventilated motors (for example EZ401**B**) at http://products.stoeber.de.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	C_2 [Nm/ arcmin]	m [kg]
S0 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 110 Nm)															
30	73	75	36	1.1	S002_1000 EZ301U	110	160	100.3	702/7	3000	3000	4500	0.21	5.5	7.9
40	55	56	31	1.3	S002_0750 EZ301U	110	150	74.70	747/10	3000	3000	4500	0.22	5.5	7.9
51	44	44	26	1.6	S002_0590 EZ301U	100	140	58.50	117/2	3000	3000	4500	0.24	5.5	7.9
62	36	37	23	1.8	S002_0480 EZ301U	95	130	48.21	675/14	3000	3000	4500	0.25	5.5	7.9
62	62	65	40	1.0	S002_0480 EZ302U	95	130	48.21	675/14	3000	3000	4500	0.35	5.5	8.5
80	28	29	19	2.0	S002_0370 EZ301U	85	120	37.32	1269/34	3000	3000	4500	0.28	5.5	7.9
80	48	51	33	1.2	S002_0370 EZ302U	87	120	37.32	1269/34	3000	3000	4500	0.38	5.5	8.5
101	23	23	16	2.3	S002_0300 EZ301U	69	110	29.70	297/10	2800	2600	4500	0.32	5.5	7.9
101	39	41	28	1.4	S002_0300 EZ302U	79	110	29.70	297/10	2800	2600	4500	0.42	5.5	8.5
101	51	54	36	1.0	S002_0300 EZ303U	79	110	29.70	297/10	2800	2600	4500	0.53	5.5	9.0
128	19	20	13	3.1	S002_0230 EZ301U	58	100	23.40	117/5	3000	3000	4500	0.24	4.4	7.9
128	33	35	23	1.8	S002_0230 EZ302U	82	100	23.40	117/5	3000	3000	4500	0.34	4.4	8.5
128	43	45	30	1.4	S002_0230 EZ303U	82	100	23.40	117/5	3000	3000	4500	0.45	4.4	9.0
128	58	62	40	1.0	S002_0230 EZ401U	82	100	23.40	117/5	3000	3000	4500	0.98	4.4	10
156	16	16	12	3.6	S002_0195 EZ301U	48	100	19.29	135/7	3000	3000	4500	0.26	4.4	7.9
156	27	29	20	2.1	S002_0195 EZ302U	82	100	19.29	135/7	3000	3000	4500	0.36	4.4	8.5
156	35	38	27	1.6	S002_0195 EZ303U	82	100	19.29	135/7	3000	3000	4500	0.47	4.4	9.0
156	48	51	36	1.2	S002_0195 EZ401U	82	100	19.29	135/7	3000	3000	4500	1.0	4.4	10
201	12	13	10	4.1	S002_0150 EZ301U	37	98	14.93	1269/85	3000	3000	4500	0.30	4.4	7.9
201	21	22	18	2.4	S002_0150 EZ302U	67	98	14.93	1269/85	3000	3000	4500	0.40	4.4	8.5
201	28	29	23	1.9	S002_0150 EZ303U	77	98	14.93	1269/85	3000	3000	4500	0.51	4.4	9.0
201	37	40	31	1.4	S002_0150 EZ401U	77	100	14.93	1269/85	3000	3000	4500	1.0	4.4	10
253	9.9	10	8.7	4.7	S002_0120 EZ301U	30	79	11.88	297/25	3000	2800	4500	0.34	4.4	7.9
253	17	18	15	2.7	S002_0120 EZ302U	53	79	11.88	297/25	3000	2800	4500	0.44	4.4	8.5
253	22	23	19	2.1	S002_0120 EZ303U	63	79	11.88	297/25	3000	2800	4500	0.55	4.4	9.0
253	30	32	26	1.6	S002_0120 EZ401U	70	93	11.88	297/25	3000	2800	4500	1.1	4.4	10
312	14	15	12	3.1	S002_0096 EZ302U	44	64	9.626	1107/115	3000	2800	4500	0.50	4.4	8.5
312	18	19	16	2.4	S002_0096 EZ303U	51	64	9.626	1107/115	3000	2800	4500	0.61	4.4	9.0
312	24	26	22	1.7	S002_0096 EZ401U	64	85	9.626	1107/115	3000	2800	4500	1.1	4.4	10
312	41	45	37	1.0	S002_0096 EZ402U	64	85	9.626	1107/115	3000	2800	4500	1.8	4.4	12
405	11	11	10	3.6	S002_0074 EZ302U	34	50	7.400	37/5	2600	2300	3700	0.61	4.4	8.5
405	14	15	13	2.8	S002_0074 EZ303U	40	50	7.400	37/5	2600	2300	3700	0.72	4.4	9.0
405	19	20	18	2.0	S002_0074 EZ401U	57	77	7.400	37/5	2600	2300	3700	1.2	4.4	10
405	32	35	31	1.2	S002_0074 EZ402U	58	77	7.400	37/5	2600	2300	3700	1.9	4.4	12
500	8.8	9.3	12	3.7	S002_0060 EZ302U	28	41	6.000	6/1	2600	2300	3700	0.73	4.4	8.5
500	11	12	16	2.8	S002_0060 EZ303U	32	41	6.000	6/1	2600	2300	3700	0.84	4.4	9.0
500	15	17	22	2.4	S002_0060 EZ401U	47	73	6.000	6/1	2600	2300	3700	1.4	4.4	10
500	26	29	37	1.4	S002_0060 EZ402U	55	73	6.000	6/1	2600	2300	3700	2.1	4.4	12
S1 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 190 Nm)															
12	144	147	42	1.0	S102_2420 EZ301U	190	290	242.0	242/1	3000	3000	4500	0.22	7.6	12
17	126	129	33	1.1	S102_1740 EZ301U	190	270	174.2	3483/20	3000	3000	4500	0.20	7.6	12
22	102	104	26	1.6	S102_1400 EZ301U	190	320	139.5	279/2	3000	3000	4500	0.21	7.6	12
26	86	88	23	1.8	S102_1170 EZ301U	190	310	116.7	3267/28	3000	3000	4500	0.22	7.6	12
34	65	66	20	2.3	S102_0870 EZ301U	190	290	87.30	873/10	3000	3000	4500	0.23	7.6	12
34	111	117	34	1.3	S102_0870 EZ302U	190	290	87.30	873/10	3000	3000	4500	0.33	7.6	12
43	52	53	17	2.7	S102_0700 EZ301U	160	280	69.75	279/4	3000	3000	4500	0.25	7.6	12
43	89	94	29	1.6	S102_0700 EZ302U	190	280	69.75	279/4	3000	3000	4500	0.35	7.6	12
43	116	123	38	1.2	S102_0700 EZ303U	190	280	69.75	279/4	3000	3000	4500	0.46	7.6	13
52	44	45	15	3.0	S102_0580 EZ301U	130	260	57.86	405/7	3000	3000	4500	0.27	7.6	12
52	75	79	26	1.8	S102_0580 EZ302U	190	260	57.86	405/7	3000	3000	4500	0.37	7.6	12
52	97	103	34	1.4	S102_0580 EZ303U	190	260	57.86	405/7	3000	3000	4500	0.48	7.6	13

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	C_2 [Nm/ arcmin]	m [kg]
S1 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 190 Nm)															
52	132	141	46	1.0	S102_0580 EZ401U	190	260	57.86	405/7	3000	3000	4500	1.0	7.6	14
69	33	34	13	3.5	S102_0440 EZ301U	100	240	43.68	1485/34	3000	2800	4500	0.32	7.6	12
69	57	60	23	2.1	S102_0440 EZ302U	180	240	43.68	1485/34	3000	2800	4500	0.42	7.6	12
69	74	79	30	1.6	S102_0440 EZ303U	180	240	43.68	1485/34	3000	2800	4500	0.53	7.6	13
69	101	108	40	1.2	S102_0440 EZ401U	180	240	43.68	1485/34	3000	2800	4500	1.1	7.6	14
86	29	29	10	4.1	S102_0350 EZ301U	86	170	34.92	873/25	3000	3000	4500	0.24	5.8	12
86	49	52	18	2.4	S102_0350 EZ302U	140	170	34.92	873/25	3000	3000	4500	0.34	5.8	12
86	64	67	23	1.8	S102_0350 EZ303U	140	170	34.92	873/25	3000	3000	4500	0.45	5.8	13
86	86	92	31	1.4	S102_0350 EZ401U	150	230	34.92	873/25	3000	3000	4500	0.98	5.8	14
108	23	23	9.6	2.5	S102_0280 EZ301U	58	73	27.90	279/10	3000	3000	4500	0.26	5.8	12
108	39	42	16	3.1	S102_0280 EZ302U	120	150	27.90	279/10	3000	3000	4500	0.36	5.8	12
108	51	54	21	2.4	S102_0280 EZ303U	120	150	27.90	279/10	3000	3000	4500	0.47	5.8	13
108	69	74	29	1.7	S102_0280 EZ401U	150	240	27.90	279/10	3000	3000	4500	1.0	5.8	14
108	106	116	44	1.1	S102_0280 EZ501U	150	240	27.90	279/10	3000	3000	4500	3.0	5.8	15
130	19	20	9.1	2.9	S102_0230 EZ301U	55	69	23.14	162/7	3000	3000	4500	0.29	5.8	12
130	33	35	16	3.5	S102_0230 EZ302U	100	140	23.14	162/7	3000	3000	4500	0.39	5.8	12
130	43	45	20	2.7	S102_0230 EZ303U	110	140	23.14	162/7	3000	3000	4500	0.50	5.8	13
130	58	62	27	2.0	S102_0230 EZ401U	150	230	23.14	162/7	3000	3000	4500	1.0	5.8	14
130	89	97	42	1.3	S102_0230 EZ501U	150	230	23.14	162/7	3000	3000	4500	3.0	5.8	15
130	97	107	46	1.2	S102_0230 EZ402U	150	230	23.14	162/7	3000	3000	4500	1.7	5.8	15
172	15	15	8.5	3.0	S102_0175 EZ301U	43	54	17.47	297/17	3000	3000	4500	0.34	5.8	12
172	25	26	14	3.7	S102_0175 EZ302U	78	120	17.47	297/17	3000	3000	4500	0.44	5.8	12
172	32	34	19	2.8	S102_0175 EZ303U	92	120	17.47	297/17	3000	3000	4500	0.55	5.8	13
172	44	47	25	2.3	S102_0175 EZ401U	130	200	17.47	297/17	3000	3000	4500	1.1	5.8	14
172	67	74	39	1.5	S102_0175 EZ501U	150	200	17.47	297/17	3000	3000	4500	3.1	5.8	15
172	74	82	43	1.4	S102_0175 EZ402U	150	200	17.47	297/17	3000	3000	4500	1.8	5.8	15
214	20	21	14	3.7	S102_0140 EZ302U	63	93	14.04	351/25	3000	3000	4500	0.50	5.8	12
214	26	28	18	2.8	S102_0140 EZ303U	75	93	14.04	351/25	3000	3000	4500	0.61	5.8	13
214	35	38	24	2.4	S102_0140 EZ401U	110	170	14.04	351/25	3000	3000	4500	1.1	5.8	14
214	55	60	37	1.6	S102_0140 EZ501U	130	170	14.04	351/25	3000	3000	4500	3.1	5.8	15
214	60	66	40	1.5	S102_0140 EZ402U	130	170	14.04	351/25	3000	3000	4500	1.8	5.8	15
261	17	18	13	3.7	S102_0115 EZ302U	52	77	11.50	1323/115	3000	2600	4000	0.57	5.8	12
261	22	23	17	2.8	S102_0115 EZ303U	61	77	11.50	1323/115	3000	2600	4000	0.68	5.8	13
261	29	31	23	2.6	S102_0115 EZ401U	89	150	11.50	1323/115	3000	2600	4000	1.2	5.8	14
261	45	49	35	1.7	S102_0115 EZ501U	110	150	11.50	1323/115	3000	2600	4000	3.2	5.8	15
261	49	54	38	1.5	S102_0115 EZ402U	110	150	11.50	1323/115	3000	2600	4000	1.9	5.8	15
326	13	14	12	3.7	S102_0092 EZ302U	42	62	9.200	46/5	3000	2600	4000	0.68	5.8	12
326	17	18	16	2.8	S102_0092 EZ303U	49	62	9.200	46/5	3000	2600	4000	0.79	5.8	13
326	24	25	22	2.7	S102_0092 EZ401U	71	130	9.200	46/5	3000	2600	4000	1.3	5.8	14
326	36	40	33	1.8	S102_0092 EZ501U	96	130	9.200	46/5	3000	2600	4000	3.3	5.8	15
326	40	44	36	1.6	S102_0092 EZ402U	96	130	9.200	46/5	3000	2600	4000	2.0	5.8	15
326	58	72	53	1.1	S102_0092 EZ404U	96	130	9.200	46/5	3000	2600	4000	3.4	5.8	18
326	62	67	57	1.0	S102_0092 EZ502U	96	130	9.200	46/5	3000	2600	4000	5.6	5.8	17
326	62	70	57	1.0	S102_0092 EZ701U	96	130	9.200	46/5	3000	2600	4000	8.9	5.8	19
S2 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 360 Nm)															
8.8	245	250	33	1.2	S203_3400 EZ301U	360	600	339.9	19035/56	3000	3000	4500	0.24	11	22
11	199	203	27	1.5	S203_2750 EZ301U	360	600	275.0	5499/20	3000	3000	4500	0.25	11	22
13	166	169	23	1.8	S203_2280 EZ301U	360	600	228.0	29187/128	3000	3000	4500	0.25	11	22
17	222	234	33	1.2	S202_1740 EZ302U	360	530	174.4	1395/8	3000	3000	4500	0.33	11	20
17	215	227	32	1.4	S203_1720 EZ302U	360	600	171.8	5499/32	3000	3000	4500	0.36	11	23
22	178	189	28	1.7	S202_1400 EZ302U	360	560	139.5	279/2	3000	3000	4500	0.34	11	20
22	232	246	37	1.3	S202_1400 EZ303U	360	560	139.5	279/2	3000	3000	4500	0.45	11	20
22	172	182	27	1.7	S203_1360 EZ302U	360	590	136.3	28341/208	3000	3000	4500	0.37	11	23
22	224	237	36	1.3	S203_1360 EZ303U	360	590	136.3	28341/208	3000	3000	4500	0.48	11	23
26	149	158	25	1.9	S202_1160 EZ302U	360	530	116.1	1161/10	3000	3000	4500	0.36	11	20
26	195	206	33	1.5	S202_1160 EZ303U	360	530	116.1	1161/10	3000	3000	4500	0.47	11	20
26	263	282	44	1.1	S202_1160 EZ401U	360	580	116.1	1161/10	3000	3000	4500	1.0	11	22
35	113	119	22	2.4	S202_0870 EZ302U	350	440	86.79	1215/14	3000	3000	4500	0.41	11	20
35	147	155	28	1.8	S202_0870 EZ303U	350	440	86.79	1215/14	3000	3000	4500	0.52	11	20
35	199	213	38	1.4	S202_0870 EZ401U	360	540	86.79	1215/14	3000	3000	4500	1.0	11	22
43	162	174	34	1.6	S202_0700 EZ401U	360	510	70.20	351/5	3000	3000	4500	1.1	11	22
43	249	272	52	1.0	S202_0700 EZ501U	360	510	70.20	351/5	3000	3000	4500	3.1	11	23
52	77	81	17	3.1	S202_0580 EZ302U	240	350	58.22	1863/32	3000	3000	4500	0.51	11	20
52	100	106	22	2.4	S202_0580 EZ303U	280	350	58.22	1863/32	3000	3000	4500	0.62	11	20

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	C_2 [Nm/ arcmin]	m [kg]
S2 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 360 Nm)															
52	135	145	30	1.7	S202_0580 EZ401U	360	470	58.22	1863/32	3000	3000	4500	1.2	11	22
52	208	227	46	1.1	S202_0580 EZ501U	360	470	58.22	1863/32	3000	3000	4500	3.1	11	23
52	227	252	51	1.0	S202_0580 EZ402U	360	470	58.22	1863/32	3000	3000	4500	1.9	11	23
68	59	62	15	3.5	S202_0440 EZ302U	180	270	43.88	351/8	3000	2700	4200	0.63	11	20
68	76	81	19	2.7	S202_0440 EZ303U	220	270	43.88	351/8	3000	2700	4200	0.74	11	20
68	103	111	26	2.0	S202_0440 EZ401U	310	420	43.88	351/8	3000	2700	4200	1.3	11	22
68	159	173	40	1.3	S202_0440 EZ501U	310	420	43.88	351/8	3000	2700	4200	3.2	11	23
68	173	192	44	1.2	S202_0440 EZ402U	310	420	43.88	351/8	3000	2700	4200	2.0	11	23
86	49	52	10	3.2	S202_0350 EZ302U	150	190	34.71	243/7	3000	3000	4500	0.42	9.5	20
86	64	67	13	2.4	S202_0350 EZ303U	150	190	34.71	243/7	3000	3000	4500	0.53	9.5	20
86	86	92	18	2.7	S202_0350 EZ401U	260	470	34.71	243/7	3000	3000	4500	1.1	9.5	22
86	132	144	28	1.8	S202_0350 EZ501U	310	470	34.71	243/7	3000	3000	4500	3.0	9.5	23
86	144	160	31	1.6	S202_0350 EZ402U	310	470	34.71	243/7	3000	3000	4500	1.8	9.5	23
107	70	75	17	3.2	S202_0280 EZ401U	210	450	28.08	702/25	3000	3000	4500	1.1	9.5	22
107	107	117	26	2.1	S202_0280 EZ501U	310	450	28.08	702/25	3000	3000	4500	3.1	9.5	23
107	117	130	28	1.9	S202_0280 EZ402U	310	450	28.08	702/25	3000	3000	4500	1.8	9.5	23
107	172	215	41	1.3	S202_0280 EZ404U	310	450	28.08	702/25	3000	3000	4500	3.2	9.5	25
107	185	200	44	1.2	S202_0280 EZ502U	310	450	28.08	702/25	3000	3000	4500	5.4	9.5	24
107	185	207	44	1.2	S202_0280 EZ701U	310	450	28.08	702/25	3000	3000	4500	8.7	9.5	26
129	33	35	9.0	3.7	S202_0230 EZ302U	100	150	23.29	1863/80	3000	3000	4500	0.55	9.5	20
129	43	46	12	2.8	S202_0230 EZ303U	120	150	23.29	1863/80	3000	3000	4500	0.66	9.5	20
129	58	62	16	3.7	S202_0230 EZ401U	180	430	23.29	1863/80	3000	3000	4500	1.2	9.5	22
129	90	98	24	2.4	S202_0230 EZ501U	310	430	23.29	1863/80	3000	3000	4500	3.2	9.5	23
129	98	108	27	2.2	S202_0230 EZ402U	310	430	23.29	1863/80	3000	3000	4500	1.9	9.5	23
129	144	179	39	1.5	S202_0230 EZ404U	310	430	23.29	1863/80	3000	3000	4500	3.2	9.5	25
129	154	167	42	1.4	S202_0230 EZ502U	310	430	23.29	1863/80	3000	3000	4500	5.5	9.5	24
129	154	173	42	1.4	S202_0230 EZ701U	310	430	23.29	1863/80	3000	3000	4500	8.8	9.5	26
129	202	231	55	1.1	S202_0230 EZ503U	310	430	23.29	1863/80	3000	3000	4500	7.8	9.5	26
171	25	27	8.3	3.7	S202_0175 EZ302U	79	120	17.55	351/20	3000	3000	4500	0.70	9.5	20
171	33	35	11	2.8	S202_0175 EZ303U	93	120	17.55	351/20	3000	3000	4500	0.81	9.5	20
171	44	47	15	4.3	S202_0175 EZ401U	130	380	17.55	351/20	3000	3000	4500	1.3	9.5	22
171	68	74	23	2.8	S202_0175 EZ501U	250	380	17.55	351/20	3000	3000	4500	3.3	9.5	23
171	74	82	25	2.6	S202_0175 EZ402U	250	380	17.55	351/20	3000	3000	4500	2.0	9.5	23
171	109	136	36	1.7	S202_0175 EZ404U	280	380	17.55	351/20	3000	3000	4500	3.4	9.5	25
171	117	127	39	1.6	S202_0175 EZ502U	280	380	17.55	351/20	3000	3000	4500	5.6	9.5	24
171	117	131	39	1.6	S202_0175 EZ701U	280	380	17.55	351/20	3000	3000	4500	8.9	9.5	26
171	154	176	51	1.2	S202_0175 EZ503U	280	380	17.55	351/20	3000	3000	4500	8.0	9.5	26
216	35	38	14	4.7	S202_0140 EZ401U	110	330	13.92	1809/130	3000	3000	4500	1.5	9.5	22
216	54	59	21	3.0	S202_0140 EZ501U	200	330	13.92	1809/130	3000	3000	4500	3.5	9.5	23
216	59	66	23	2.8	S202_0140 EZ402U	200	330	13.92	1809/130	3000	3000	4500	2.2	9.5	23
216	87	109	34	1.9	S202_0140 EZ404U	250	330	13.92	1809/130	3000	3000	4500	3.6	9.5	25
216	93	101	36	1.8	S202_0140 EZ502U	250	330	13.92	1809/130	3000	3000	4500	5.8	9.5	24
216	93	105	36	1.8	S202_0140 EZ701U	250	330	13.92	1809/130	3000	3000	4500	9.1	9.5	26
216	123	140	48	1.3	S202_0140 EZ503U	250	330	13.92	1809/130	3000	3000	4500	8.2	9.5	26
216	152	182	59	1.1	S202_0140 EZ702U	250	330	13.92	1809/130	3000	3000	4500	14	9.5	29
259	22	23	9.6	2.8	S202_0115 EZ303U	62	78	11.60	58/5	2800	2500	3900	1.2	9.5	20
259	30	32	13	4.9	S202_0115 EZ401U	90	290	11.60	58/5	2800	2500	3900	1.7	9.5	22
259	46	50	20	3.2	S202_0115 EZ501U	170	290	11.60	58/5	2800	2500	3900	3.7	9.5	23
259	50	55	22	2.9	S202_0115 EZ402U	170	290	11.60	58/5	2800	2500	3900	2.4	9.5	23
259	73	91	32	2.0	S202_0115 EZ404U	220	290	11.60	58/5	2800	2500	3900	3.8	9.5	25
259	78	85	34	1.9	S202_0115 EZ502U	220	290	11.60	58/5	2800	2500	3900	6.0	9.5	24
259	78	88	34	1.9	S202_0115 EZ701U	210	290	11.60	58/5	2800	2500	3900	9.3	9.5	26
259	103	118	45	1.4	S202_0115 EZ503U	220	290	11.60	58/5	2800	2500	3900	8.4	9.5	26
259	127	152	56	1.2	S202_0115 EZ702U	220	290	11.60	58/5	2800	2500	3900	15	9.5	29
259	143	169	63	1.0	S202_0115 EZ505U	220	290	11.60	58/5	2800	2500	3900	13	9.5	29
325	24	25	12	4.2	S202_0092 EZ401U	72	120	9.232	1431/155	2800	2500	3900	2.0	9.5	22
325	36	40	19	3.4	S202_0092 EZ501U	140	250	9.232	1431/155	2800	2500	3900	4.0	9.5	23
325	40	44	20	3.1	S202_0092 EZ402U	140	250	9.232	1431/155	2800	2500	3900	2.7	9.5	23
325	59	73	30	2.1	S202_0092 EZ404U	190	250	9.232	1431/155	2800	2500	3900	4.1	9.5	25
325	63	68	32	2.0	S202_0092 EZ502U	190	250	9.232	1431/155	2800	2500	3900	6.3	9.5	24
325	63	70	32	2.0	S202_0092 EZ701U	170	250	9.232	1431/155	2800	2500	3900	9.6	9.5	26
325	82	94	42	1.5	S202_0092 EZ503U	190	250	9.232	1431/155	2800	2500	3900	8.7	9.5	26
325	102	122	52	1.2	S202_0092 EZ702U	190	250	9.232	1431/155	2800	2500	3900	15	9.5	29
325	115	136	59	1.1	S202_0092 EZ505U	190	250	9.232	1431/155	2800	2500	3900	13	9.5	29

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	C_2 [Nm/ arcmin]	m [kg]
S2 (n_{1N} = 4500 rpm, $M_{2acc,max}$ = 250 Nm)															
323	121	196	62	1.4	S202_0140 EZ505U	250	330	13.92	1809/130	3000	3000	4500	13	9.5	29
S3 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 660 Nm)															
8.8	426	450	34	1.3	S303_3420 EZ302U	660	1100	341.7	8883/26	3000	2700	4000	0.35	26	34
11	344	363	28	1.6	S303_2740 EZ302U	660	1100	274.3	35109/128	3000	2700	4000	0.36	26	34
11	448	474	36	1.2	S303_2740 EZ303U	660	1100	274.3	35109/128	3000	2700	4000	0.47	26	35
13	289	305	24	1.9	S303_2290 EZ302U	660	1100	229.1	1833/8	3000	2700	4000	0.37	26	34
13	376	397	31	1.5	S303_2290 EZ303U	660	1100	229.1	1833/8	3000	2700	4000	0.48	26	35
17	225	237	23	1.9	S302_1740 EZ302U	510	630	174.4	1395/8	3000	2700	4000	0.37	26	29
17	293	310	29	1.5	S302_1740 EZ303U	510	630	174.4	1395/8	3000	2700	4000	0.48	26	30
18	216	228	19	2.5	S303_1700 EZ302U	660	900	170.1	15651/92	3000	2700	4000	0.38	26	34
18	281	298	25	2.0	S303_1700 EZ303U	660	900	170.1	15651/92	3000	2700	4000	0.49	26	35
18	380	408	33	1.4	S303_1700 EZ401U	660	900	170.1	15651/92	3000	2700	4000	1.0	26	36
21	320	342	30	1.7	S302_1400 EZ401U	660	1080	139.9	1539/11	3000	2700	4000	1.0	26	31
22	175	185	16	3.1	S303_1370 EZ302U	550	730	137.1	1645/12	3000	2700	4000	0.40	26	34
22	228	241	21	2.4	S303_1370 EZ303U	580	730	137.1	1645/12	3000	2700	4000	0.51	26	35
22	309	331	29	1.8	S303_1370 EZ401U	580	730	137.1	1645/12	3000	2700	4000	1.0	26	36
22	468	512	44	1.2	S303_1350 EZ501U	660	1090	135.3	406/3	3000	2700	4000	3.1	26	37
26	267	286	26	2.0	S302_1160 EZ401U	660	1060	116.1	1161/10	3000	2700	4000	1.1	26	31
26	410	448	40	1.3	S302_1160 EZ501U	660	1060	116.1	1161/10	3000	2700	4000	3.1	26	32
26	448	496	44	1.2	S302_1160 EZ402U	660	1060	116.1	1161/10	3000	2700	4000	1.8	26	32
34	203	217	23	2.5	S302_0870 EZ401U	620	1010	87.23	1134/13	3000	2700	4000	1.2	26	31
34	311	340	35	1.6	S302_0870 EZ501U	660	1010	87.23	1134/13	3000	2700	4000	3.2	26	32
34	340	376	38	1.5	S302_0870 EZ402U	660	1010	87.23	1134/13	3000	2700	4000	1.9	26	32
43	164	176	20	2.9	S302_0700 EZ401U	500	950	70.03	2241/32	3000	2700	4000	1.3	26	31
43	252	275	30	1.9	S302_0700 EZ501U	660	950	70.03	2241/32	3000	2700	4000	3.3	26	32
43	275	305	33	1.7	S302_0700 EZ402U	660	950	70.03	2241/32	3000	2700	4000	2.0	26	32
43	404	504	49	1.2	S302_0700 EZ404U	660	950	70.03	2241/32	3000	2700	4000	3.3	26	34
43	434	469	52	1.1	S302_0700 EZ502U	660	950	70.03	2241/32	3000	2700	4000	5.6	26	34
43	434	486	52	1.1	S302_0700 EZ701U	660	950	70.03	2241/32	3000	2700	4000	8.9	26	35
51	138	148	18	3.2	S302_0590 EZ401U	420	900	58.50	117/2	3000	2700	4000	1.4	26	31
51	212	232	28	2.1	S302_0590 EZ501U	660	900	58.50	117/2	3000	2700	4000	3.4	26	32
51	232	257	30	1.9	S302_0590 EZ402U	660	900	58.50	117/2	3000	2700	4000	2.1	26	32
51	340	424	44	1.3	S302_0590 EZ404U	660	900	58.50	117/2	3000	2700	4000	3.5	26	34
51	365	395	47	1.2	S302_0590 EZ502U	660	900	58.50	117/2	3000	2700	4000	5.7	26	34
51	365	409	47	1.2	S302_0590 EZ701U	660	900	58.50	117/2	3000	2700	4000	9.0	26	35
69	104	111	16	3.8	S302_0430 EZ401U	320	790	43.44	999/23	2900	2400	3800	1.7	26	31
69	160	174	24	2.5	S302_0430 EZ501U	590	790	43.44	999/23	2900	2400	3800	3.6	26	32
69	174	193	26	2.3	S302_0430 EZ402U	590	790	43.44	999/23	2900	2400	3800	2.4	26	32
69	256	319	39	1.5	S302_0430 EZ404U	590	790	43.44	999/23	2900	2400	3800	3.7	26	34
69	275	297	42	1.4	S302_0430 EZ502U	590	790	43.44	999/23	2900	2400	3800	5.9	26	34
69	275	308	42	1.4	S302_0430 EZ701U	590	790	43.44	999/23	2900	2400	3800	9.2	26	35
69	360	412	54	1.1	S302_0430 EZ503U	590	790	43.44	999/23	2900	2400	3800	8.3	26	35
86	87	93	11	4.9	S302_0350 EZ401U	260	750	34.89	2268/65	3000	3000	4000	1.2	20	31
86	134	146	17	3.2	S302_0350 EZ501U	500	750	34.89	2268/65	3000	3000	4000	3.2	20	32
86	146	162	18	2.9	S302_0350 EZ402U	500	750	34.89	2268/65	3000	3000	4000	1.9	20	32
86	215	268	27	2.0	S302_0350 EZ404U	520	750	34.89	2268/65	3000	3000	4000	3.3	20	34
86	230	249	29	1.9	S302_0350 EZ502U	520	750	34.89	2268/65	3000	3000	4000	5.5	20	34
86	230	259	29	1.9	S302_0350 EZ701U	520	750	34.89	2268/65	3000	3000	4000	8.8	20	35
86	302	346	38	1.4	S302_0350 EZ503U	520	750	34.89	2268/65	3000	3000	4000	7.9	20	35
107	70	75	10	4.2	S302_0280 EZ401U	210	370	28.01	2241/80	3000	3000	4000	1.4	20	31
107	108	118	16	3.9	S302_0280 EZ501U	400	640	28.01	2241/80	3000	3000	4000	3.3	20	32
107	118	131	18	3.6	S302_0280 EZ402U	400	640	28.01	2241/80	3000	3000	4000	2.1	20	32
107	174	216	26	2.4	S302_0280 EZ404U	520	640	28.01	2241/80	3000	3000	4000	3.4	20	34
107	186	201	28	2.3	S302_0280 EZ502U	520	640	28.01	2241/80	3000	3000	4000	5.6	20	34
107	186	209	28	2.3	S302_0280 EZ701U	500	840	28.01	2241/80	3000	3000	4000	8.9	20	35
107	244	279	36	1.7	S302_0280 EZ503U	520	640	28.01	2241/80	3000	3000	4000	8.0	20	35
107	302	362	45	1.4	S302_0280 EZ702U	520	840	28.01	2241/80	3000	3000	4000	14	20	38
107	339	402	50	1.2	S302_0280 EZ505U	520	840	28.01	2241/80	3000	3000	4000	13	20	38
128	59	63	10	4.2	S302_0230 EZ401U	180	310	23.40	117/5	3000	3000	4000	1.5	20	31
128	91	99	16	4.4	S302_0230 EZ501U	340	590	23.40	117/5	3000	3000	4000	3.5	20	32
128	99	110	18	4.0	S302_0230 EZ402U	340	590	23.40	117/5	3000	3000	4000	2.2	20	32
128	146	182	26	2.7	S302_0230 EZ404U	470	590	23.40	117/5	3000	3000	4000	3.6	20	34
128	156	169	28	2.5	S302_0230 EZ502U	470	590	23.40	117/5	3000	3000	4000	5.8	20	34
128	156	175	28	2.5	S302_0230 EZ701U	420	790	23.40	117/5	3000	3000	4000	9.1	20	35

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	C_2 [Nm/ arcmin]	m [kg]
S3 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 660 Nm)															
128	205	234	36	1.9	S302_0230 EZ503U	470	590	23.40	117/5	3000	3000	4000	8.2	20	35
128	253	304	45	1.6	S302_0230 EZ702U	520	790	23.40	117/5	3000	3000	4000	14	20	38
128	285	338	51	1.4	S302_0230 EZ505U	520	790	23.40	117/5	3000	3000	4000	13	20	38
173	44	47	11	4.2	S302_0175 EZ401U	130	230	17.37	1998/115	3000	3000	4000	1.9	20	31
173	68	74	16	2.7	S302_0175 EZ501U	190	230	17.37	1998/115	3000	3000	4000	3.9	20	32
173	74	82	18	4.7	S302_0175 EZ402U	250	470	17.37	1998/115	3000	3000	4000	2.6	20	32
173	109	136	26	3.2	S302_0175 EZ404U	370	470	17.37	1998/115	3000	3000	4000	3.9	20	34
173	117	126	28	3.0	S302_0175 EZ502U	370	470	17.37	1998/115	3000	3000	4000	6.2	20	34
173	117	131	28	3.0	S302_0175 EZ701U	320	700	17.37	1998/115	3000	3000	4000	9.5	20	35
173	153	175	37	2.3	S302_0175 EZ503U	370	470	17.37	1998/115	3000	3000	4000	8.5	20	35
173	190	228	45	1.8	S302_0175 EZ702U	520	700	17.37	1998/115	3000	3000	4000	15	20	38
173	213	253	51	1.6	S302_0175 EZ505U	520	700	17.37	1998/115	3000	3000	4000	13	20	38
173	261	329	62	1.3	S302_0175 EZ703U	520	700	17.37	1998/115	3000	3000	4000	23	20	40
214	60	67	18	4.9	S302_0140 EZ402U	200	380	14.00	14/1	3000	3000	4000	3.0	20	32
214	88	110	26	3.4	S302_0140 EZ404U	300	380	14.00	14/1	3000	3000	4000	4.3	20	34
214	95	102	28	3.1	S302_0140 EZ502U	300	380	14.00	14/1	3000	3000	4000	6.5	20	34
214	95	106	28	3.1	S302_0140 EZ701U	260	590	14.00	14/1	3000	3000	4000	9.8	20	35
214	124	142	37	2.4	S302_0140 EZ503U	300	380	14.00	14/1	3000	3000	4000	8.9	20	35
214	154	184	46	1.9	S302_0140 EZ702U	450	590	14.00	14/1	3000	3000	4000	15	20	38
214	173	205	51	1.7	S302_0140 EZ505U	450	590	14.00	14/1	3000	3000	4000	13	20	38
214	211	266	63	1.4	S302_0140 EZ703U	450	590	14.00	14/1	3000	3000	4000	23	20	40
257	50	56	18	4.9	S302_0115 EZ402U	170	320	11.66	1458/125	2600	2300	3600	3.5	20	32
257	74	92	26	3.3	S302_0115 EZ404U	250	320	11.66	1458/125	2600	2300	3600	4.8	20	34
257	79	86	28	3.1	S302_0115 EZ502U	250	320	11.66	1458/125	2600	2300	3600	7.0	20	34
257	79	89	28	3.1	S302_0115 EZ701U	210	490	11.66	1458/125	2600	2300	3600	10	20	35
257	104	119	37	2.4	S302_0115 EZ503U	250	320	11.66	1458/125	2600	2300	3600	9.4	20	35
257	129	154	46	1.9	S302_0115 EZ702U	370	490	11.66	1458/125	2600	2300	3600	16	20	38
257	145	172	52	1.7	S302_0115 EZ505U	370	490	11.66	1458/125	2600	2300	3600	14	20	38
257	177	223	63	1.4	S302_0115 EZ703U	370	490	11.66	1458/125	2600	2300	3600	23	20	40
322	64	72	28	3.1	S302_0093 EZ701U	170	390	9.310	270/29	2600	2300	3600	11	20	35
322	103	124	46	1.9	S302_0093 EZ702U	300	390	9.310	270/29	2600	2300	3600	16	20	38
322	116	138	52	1.7	S302_0093 EZ505U	300	390	9.310	270/29	2600	2300	3600	15	20	38
322	142	179	63	1.4	S302_0093 EZ703U	300	390	9.310	270/29	2600	2300	3600	24	20	40
S4 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 960 Nm)															
5.5	684	722	41	1.2	S403_5480 EZ302U	960	1680	548.0	24111/44	2800	2600	4000	0.35	36	43
6.6	570	603	34	1.4	S403_4560 EZ302U	960	1700	455.5	5922/13	2800	2600	4000	0.35	36	43
8.8	431	455	26	1.9	S403_3420 EZ302U	960	1630	341.9	13677/40	2800	2600	4000	0.36	36	43
8.8	560	593	34	1.4	S403_3420 EZ303U	960	1630	341.9	13677/40	2800	2600	4000	0.47	36	43
11	450	476	27	1.8	S403_2730 EZ303U	960	1440	273.2	4371/16	2800	2600	4000	0.48	36	43
11	609	652	37	1.3	S403_2730 EZ401U	960	1440	273.2	4371/16	2800	2600	4000	1.0	36	44
13	379	401	23	2.1	S403_2290 EZ303U	960	1210	229.1	1833/8	2800	2600	4000	0.50	36	43
13	513	550	31	1.6	S403_2290 EZ401U	960	1210	229.1	1833/8	2800	2600	4000	1.0	36	44
17	613	670	39	1.2	S402_1740 EZ501U	960	1520	174.2	3483/20	2800	2600	4000	3.0	36	41
18	586	641	38	1.4	S403_1690 EZ501U	960	1660	169.0	5916/35	2800	2600	4000	3.1	36	45
21	496	542	34	1.6	S402_1400 EZ501U	960	1630	139.9	1539/11	2800	2600	4000	3.1	36	41
22	471	515	32	1.7	S403_1350 EZ501U	960	1620	134.9	2697/20	2800	2600	4000	3.2	36	45
26	415	453	30	1.9	S402_1160 EZ501U	960	1580	116.3	1512/13	2800	2600	4000	3.2	36	41
34	314	344	26	2.4	S402_0870 EZ501U	960	1500	87.30	873/10	2800	2600	4000	3.3	36	41
34	541	585	44	1.4	S402_0870 EZ502U	960	1500	87.30	873/10	2800	2600	4000	5.6	36	43
34	541	607	44	1.4	S402_0870 EZ701U	960	1500	87.30	873/10	2800	2600	4000	8.9	36	45
43	253	277	23	2.8	S402_0700 EZ501U	940	1410	69.75	279/4	2800	2600	4000	3.5	36	41
43	436	472	39	1.6	S402_0700 EZ502U	960	1410	69.75	279/4	2800	2600	4000	5.8	36	43
43	436	489	39	1.6	S402_0700 EZ701U	960	1410	69.75	279/4	2800	2600	4000	9.1	36	45
43	572	654	51	1.2	S402_0700 EZ503U	960	1410	69.75	279/4	2800	2600	4000	8.2	36	44
51	214	234	21	3.1	S402_0590 EZ501U	800	1330	58.50	117/2	2800	2600	4000	3.7	36	41
51	368	398	35	1.8	S402_0590 EZ502U	960	1330	58.50	117/2	2800	2600	4000	6.0	36	43
51	368	413	35	1.8	S402_0590 EZ701U	960	1330	58.50	117/2	2800	2600	4000	9.3	36	45
51	483	553	46	1.4	S402_0590 EZ503U	960	1330	58.50	117/2	2800	2600	4000	8.4	36	44
51	598	717	57	1.1	S402_0590 EZ702U	960	1330	58.50	117/2	2800	2600	4000	15	36	47
69	279	313	31	2.1	S402_0440 EZ701U	750	1170	43.71	306/7	2600	2300	3600	9.7	36	45
69	452	542	50	1.3	S402_0440 EZ702U	880	1170	43.71	306/7	2600	2300	3600	15	36	47
69	509	603	56	1.1	S402_0440 EZ505U	880	1170	43.71	306/7	2600	2300	3600	13	36	47
86	134	147	12	4.4	S402_0350 EZ501U	500	740	34.92	873/25	3000	3000	4000	3.4	29	41
86	231	250	21	2.5	S402_0350 EZ502U	590	740	34.92	873/25	3000	3000	4000	5.7	29	43

n_{2N} [rpm]	M_{2N} [Nm]	$M_{2,0}$ [Nm]	a_{th}	S	Type	M_{2acc} [Nm]	M_{2NOT} [Nm]	i	i_{exakt}	n_{1maxDB} EL1,2 [rpm]	n_{1maxDB} EL3,4,5,6 [rpm]	n_{1maxZB} [rpm]	J_1 [10^{-4} kgm²]	C_2 [Nm/ arcmin]	m [kg]
S4 (n_{1N} = 3000 rpm, $M_{2acc,max}$ = 960 Nm)															
86	231	259	21	2.7	S402_0350 EZ701U	630	1200	34.92	873/25	3000	3000	4000	9.0	29	45
86	303	347	27	1.9	S402_0350 EZ503U	590	740	34.92	873/25	3000	3000	4000	8.1	29	44
86	375	450	34	1.6	S402_0350 EZ702U	720	1200	34.92	873/25	3000	3000	4000	14	29	47
86	422	500	38	1.5	S402_0350 EZ505U	720	1200	34.92	873/25	3000	3000	4000	13	29	47
108	108	118	11	2.7	S402_0280 EZ501U	300	370	27.90	279/10	3000	3000	4000	3.7	29	41
108	186	201	20	2.9	S402_0280 EZ502U	550	680	27.90	279/10	3000	3000	4000	6.0	29	43
108	186	209	20	3.4	S402_0280 EZ701U	500	1200	27.90	279/10	3000	3000	4000	9.3	29	45
108	244	279	26	2.2	S402_0280 EZ503U	550	680	27.90	279/10	3000	3000	4000	8.3	29	44
108	302	362	32	2.1	S402_0280 EZ702U	720	1200	27.90	279/10	3000	3000	4000	14	29	47
108	339	402	36	1.9	S402_0280 EZ505U	720	1200	27.90	279/10	3000	3000	4000	13	29	47
108	415	523	44	1.5	S402_0280 EZ703U	720	1200	27.90	279/10	3000	3000	4000	22	29	49
128	157	169	20	3.2	S402_0230 EZ502U	500	620	23.40	117/5	3000	3000	4000	6.2	29	43
128	157	176	20	3.8	S402_0230 EZ701U	420	1200	23.40	117/5	3000	3000	4000	9.5	29	45
128	205	235	26	2.4	S402_0230 EZ503U	500	620	23.40	117/5	3000	3000	4000	8.6	29	44
128	254	305	32	2.4	S402_0230 EZ702U	720	1200	23.40	117/5	3000	3000	4000	15	29	47
128	286	339	36	2.1	S402_0230 EZ505U	720	1200	23.40	117/5	3000	3000	4000	13	29	47
128	349	441	44	1.7	S402_0230 EZ703U	720	1200	23.40	117/5	3000	3000	4000	23	29	49
172	118	132	19	4.5	S402_0175 EZ701U	320	1060	17.49	612/35	2800	2500	3800	10	29	45
172	191	230	31	2.8	S402_0175 EZ702U	650	1060	17.49	612/35	2800	2500	3800	15	29	47
172	215	255	35	2.5	S402_0175 EZ505U	720	1060	17.49	612/35	2800	2500	3800	14	29	47
172	263	332	43	2.0	S402_0175 EZ703U	720	1060	17.49	612/35	2800	2500	3800	23	29	49
172	340	482	56	1.6	S402_0175 EZ705U	720	1060	17.49	612/35	2800	2500	3800	36	29	55
215	95	106	19	4.8	S402_0140 EZ701U	260	910	13.95	279/20	2800	2500	3800	11	29	45
215	154	184	31	2.9	S402_0140 EZ702U	530	910	13.95	279/20	2800	2500	3800	16	29	47
215	173	205	35	2.6	S402_0140 EZ505U	680	910	13.95	279/20	2800	2500	3800	15	29	47
215	211	266	43	2.1	S402_0140 EZ703U	680	910	13.95	279/20	2800	2500	3800	24	29	49
215	273	387	55	1.7	S402_0140 EZ705U	680	910	13.95	279/20	2800	2500	3800	36	29	55
215	286	475	58	1.6	S402_0140 EZ802U	680	910	13.95	279/20	2800	2500	3800	60	29	63
259	79	89	19	4.8	S402_0115 EZ701U	210	760	11.57	81/7	2400	2100	3200	12	29	45
259	128	154	31	3.0	S402_0115 EZ702U	440	760	11.57	81/7	2400	2100	3200	17	29	47
259	144	171	35	2.6	S402_0115 EZ505U	570	760	11.57	81/7	2400	2100	3200	15	29	47
259	176	222	42	2.2	S402_0115 EZ703U	570	760	11.57	81/7	2400	2100	3200	25	29	49
259	228	323	55	1.7	S402_0115 EZ705U	570	760	11.57	81/7	2400	2100	3200	37	29	55
259	238	396	57	1.6	S402_0115 EZ802U	570	760	11.57	81/7	2400	2100	3200	61	29	63
323	64	72	19	4.9	S402_0093 EZ701U	170	620	9.281	297/32	2400	2100	3200	13	29	45
323	103	124	30	3.0	S402_0093 EZ702U	350	620	9.281	297/32	2400	2100	3200	18	29	47
323	116	138	34	2.7	S402_0093 EZ505U	470	620	9.281	297/32	2400	2100	3200	17	29	47
323	142	179	42	2.2	S402_0093 EZ703U	470	620	9.281	297/32	2400	2100	3200	26	29	49
323	184	260	54	1.7	S402_0093 EZ705U	470	620	9.281	297/32	2400	2100	3200	39	29	55
323	192	320	57	1.6	S402_0093 EZ802U	470	620	9.281	297/32	2400	2100	3200	63	29	63

22.3 Dimensional drawings

In this chapter you can find the dimensions of the geared motors.

There is a dimensional drawing for every possible shaft/housing design, each with the tables for gear unit dimensions, motor dimensions and geared motor dimensions.

Dimensions can exceed the specifications of ISO 2768-mK due to casting tolerances or accumulation of individual tolerances.

We reserve the right to make dimensional changes due to ongoing technical development.

You can download CAD models of our standard drives at http://cad.stoeber.de.

Combination options and the dimensions of forced ventilated geared motors can be found at http://cad.stoeber.de.

Tolerances

Axis height in accordance with DIN 747	Tolerance
Up to 50 mm	-0.4 mm
Up to 250 mm	-0.5 mm
Up to 630 mm	-0.6 mm

Solid shaft	Tolerance
Shaft ∅ fit ≤ 50 mm	DIN 748-1, ISO k6
Shaft ∅ fit > 50 mm	DIN 748-1, ISO m6
Feather keys	DIN 6885-1, high form A

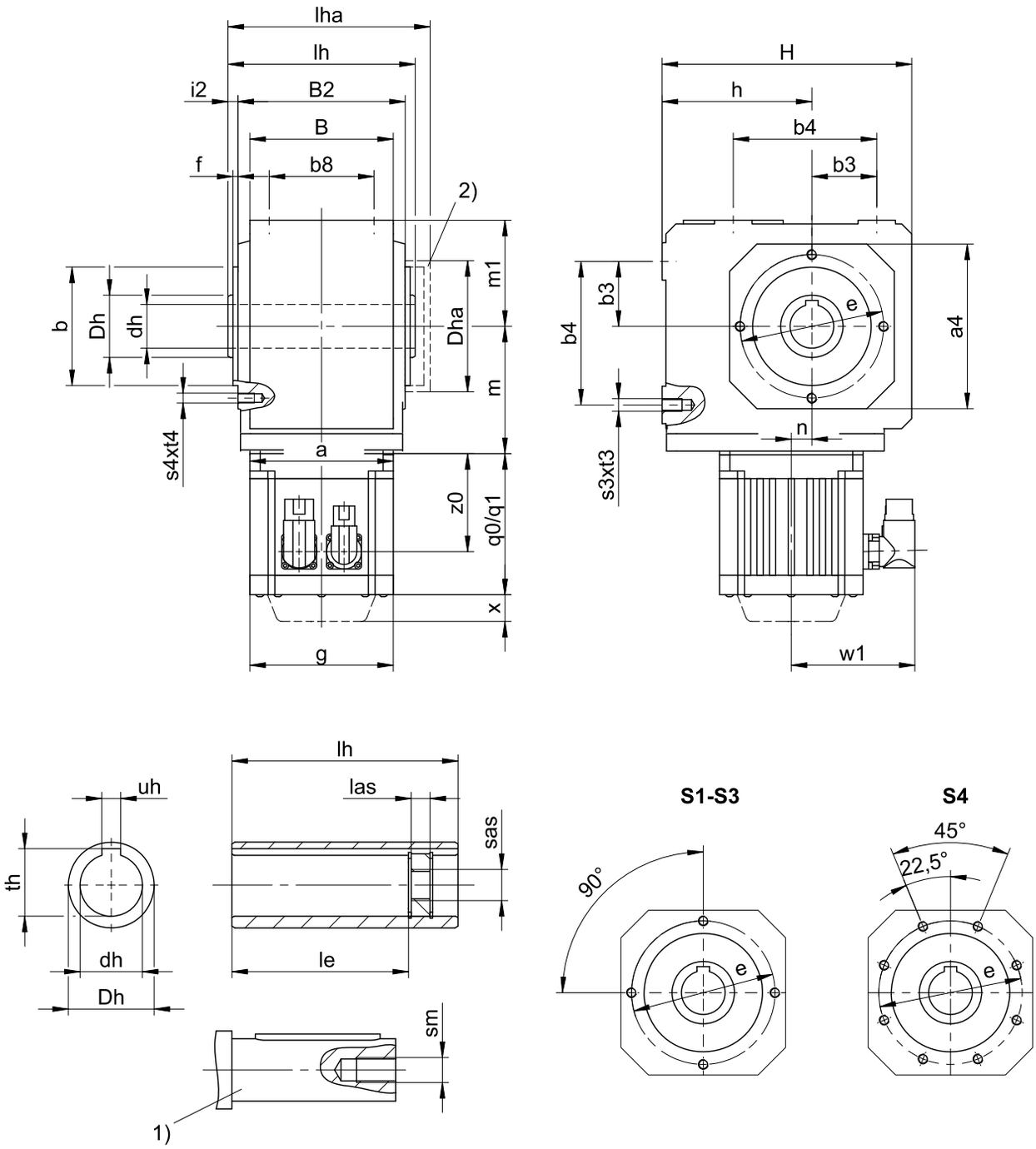
Hollow shaft	Tolerance
Hollow shaft hole fit	ISO H7
Feather keys	DIN 6885-1, high form S1/K1 ∅30: DIN 6885-3, low form

Flange	Pilot tolerance
Up to 300 mm	ISO j6
Starting at 350 mm	ISO h6

Centering holes in solid shafts in accordance with DIN 332-2, DR shape

Thread size	M4	M5	M6	M8	M10	M12	M16	M20	M24
Thread depth [mm]	10	12.5	16	19	22	28	36	42	50

22.3.1 A shaft design (hollow shaft), G housing design (pitch circle diameter)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▶ 23.4]
1)	The length of the machine shaft must be at least 2.2 x ∅dh and the length of the feather key must be at least 2 x ∅dh.	2)	Cover (optional)

Dimensions of gear units

Type	a4	Øb	b3	b4	b8	B	B2	Ødh	ØDh	□Dha	Øe	f	h	H	i2	le	lh	las	lha	m1	s3	s4	sm	sas	t3	t4	th	uh
S1	□105	75_{j6}	40	90	70	90	106	20^{H7}	40	105	90	3.0	100	167	7.0	98.0	120	12	127.0	70	M8	M8	M6	M8	13	13	22.8	6^{JS9}
S1	□105	75_{j6}	40	90	70	90	106	25^{H7}	40	105	90	3.0	100	167	7.0	98.0	120	12	127.0	70	M8	M8	M10	M12	13	13	28.3	8^{JS9}
S1	□105	75_{j6}	40	90	70	90	106	30^{H7}	40	105	90	3.0	100	167	7.0	93.5	120	12	127.0	70	M8	M8	M10	M12	13	13	32	8^{JS9}
S2	□132	95_{j6}	52	115	90	115	134	30^{H7}	50	132	115	4.0	120	200	8.0	123.5	150	12	157.0	85	M10	M8	M10	M12	16	13	33.3	8^{JS9}
S2	□132	95_{j6}	52	115	90	115	134	35^{H7}	50	132	115	4.0	120	200	8.0	119.0	150	12	157.0	85	M10	M8	M12	M16	16	13	38.3	10^{JS9}
S3	□152	110_{j6}	52	130	105	130	153	40^{H7}	55	152	130	3.5	140	233	7.5	136.5	168	12	177.5	100	M10	M10	M16	M20	16	16	43.3	12^{JS9}
S4	□145	110_{j6}	67	155	120	148	173	50^{H7}	65	145	130	3.5	160	263	8.5	153.0	190	12	198.5	110	M12	M10	M16	M20	19	16	53.8	14^{JS9}

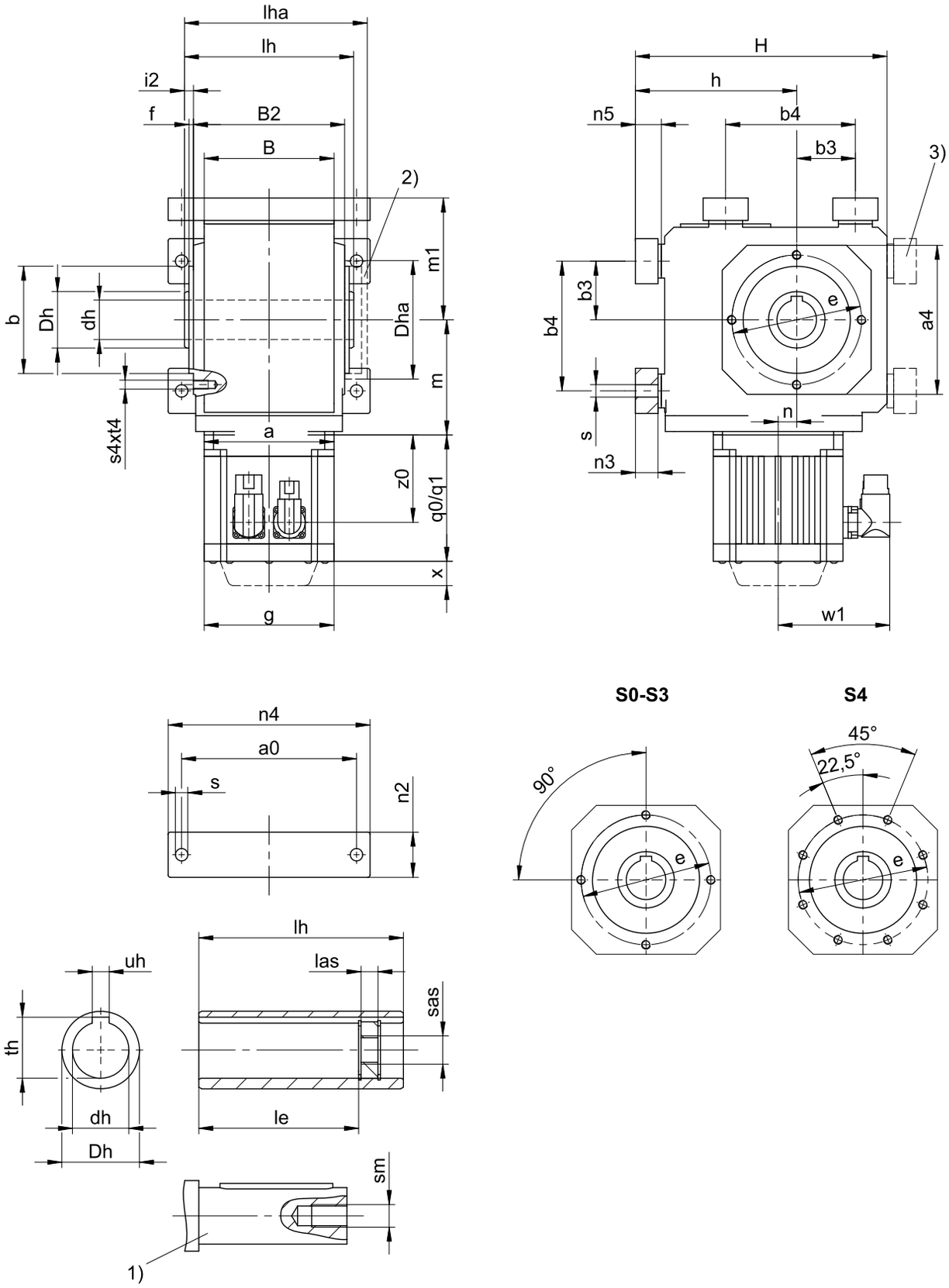
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
S102	□72	83	14.0	□98	83	14.0	□115	87	14.0	□145	89	14.0	–	–	–
S202	□72	98	17.0	□98	98	17.0	□115	102	17.0	□145	104	17.0	–	–	–
S203	∅140	135	17.0	–	–	–	–	–	–	–	–	–	–	–	–
S302	∅140	113	25.5	∅140	113	25.5	□115	117	25.5	□145	119	25.5	–	–	–
S303	∅140	150	25.5	∅140	150	25.5	∅160	160	62.0	–	–	–	–	–	–
S402	–	–	–	–	–	–	∅160	129	30.0	□145	131	30.0	□190	134	30.0
S403	∅140	162	30.0	∅140	162	30.0	∅160	172	67.0	–	–	–	–	–	–

22.3.2 A shaft design (hollow shaft), NG housing design (base + pitch circle diameter)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▶ 23.4]
1)	The length of the machine shaft must be at least 2.2 x ∅dh and the length of the feather key must be at least 2 x ∅dh.	2)	Cover (optional)
3)	Only for S0		

Dimensions of gear units

Type	a0	a4	Øb	b3	b4	B	B2	Ødh	ØDh	□Dha	Øe	f	h	H	i2	le	lh	las	lha	m1	n2	n3	n4	n5	Øs	s4	sm	sas	t4	th	uh
S0	75	∅85	75_{j6}	40	80	92	94	20^{H7}	40	102	90	3.0	80	143	7.0	86.0	108	12	113.0	72	22	9	92	9	6.6	M6	M6	M8	13	22.8	6^{JS9}
S0	75	∅85	75_{j6}	40	80	92	94	25^{H7}	40	102	90	3.0	80	143	7.0	86.0	108	12	113.0	72	22	9	92	9	6.6	M6	M10	M12	13	28.3	8^{JS9}
S1	115	□105	75_{j6}	40	90	90	106	20^{H7}	40	105	90	3.0	115	182	7.0	98.0	120	12	127.0	85	30	13	140	15	9.0	M8	M6	M8	13	22.8	6^{JS9}
S1	115	□105	75_{j6}	40	90	90	106	25^{H7}	40	105	90	3.0	115	182	7.0	98.0	120	12	127.0	85	30	13	140	15	9.0	M8	M10	M12	13	28.3	8^{JS9}
S1	115	□105	75_{j6}	40	90	90	106	30^{H7}	40	105	90	3.0	115	182	7.0	93.5	120	12	127.0	85	30	13	140	15	9.0	M8	M10	M12	13	32	8^{JS9}
S2	155	□132	95_{j6}	52	115	115	134	30^{H7}	50	132	115	4.0	143	223	8.0	123.5	150	12	157.0	108	40	20	185	23	11.0	M8	M10	M12	13	33.3	8^{JS9}
S2	155	□132	95_{j6}	52	115	115	134	35^{H7}	50	132	115	4.0	143	223	8.0	119.0	150	12	157.0	108	40	20	185	23	11.0	M8	M12	M16	13	38.3	10^{JS9}
S3	170	□152	110_{j6}	52	130	130	153	40^{H7}	55	152	130	3.5	163	256	7.5	136.5	168	12	177.5	123	45	20	200	23	11.0	M10	M16	M20	16	43.3	12^{JS9}
S4	200	□145	110_{j6}	67	155	148	173	50^{H7}	65	145	130	3.5	185	288	8.5	153.0	190	12	198.5	135	50	22	230	25	14.0	M10	M16	M20	16	53.8	14^{JS9}

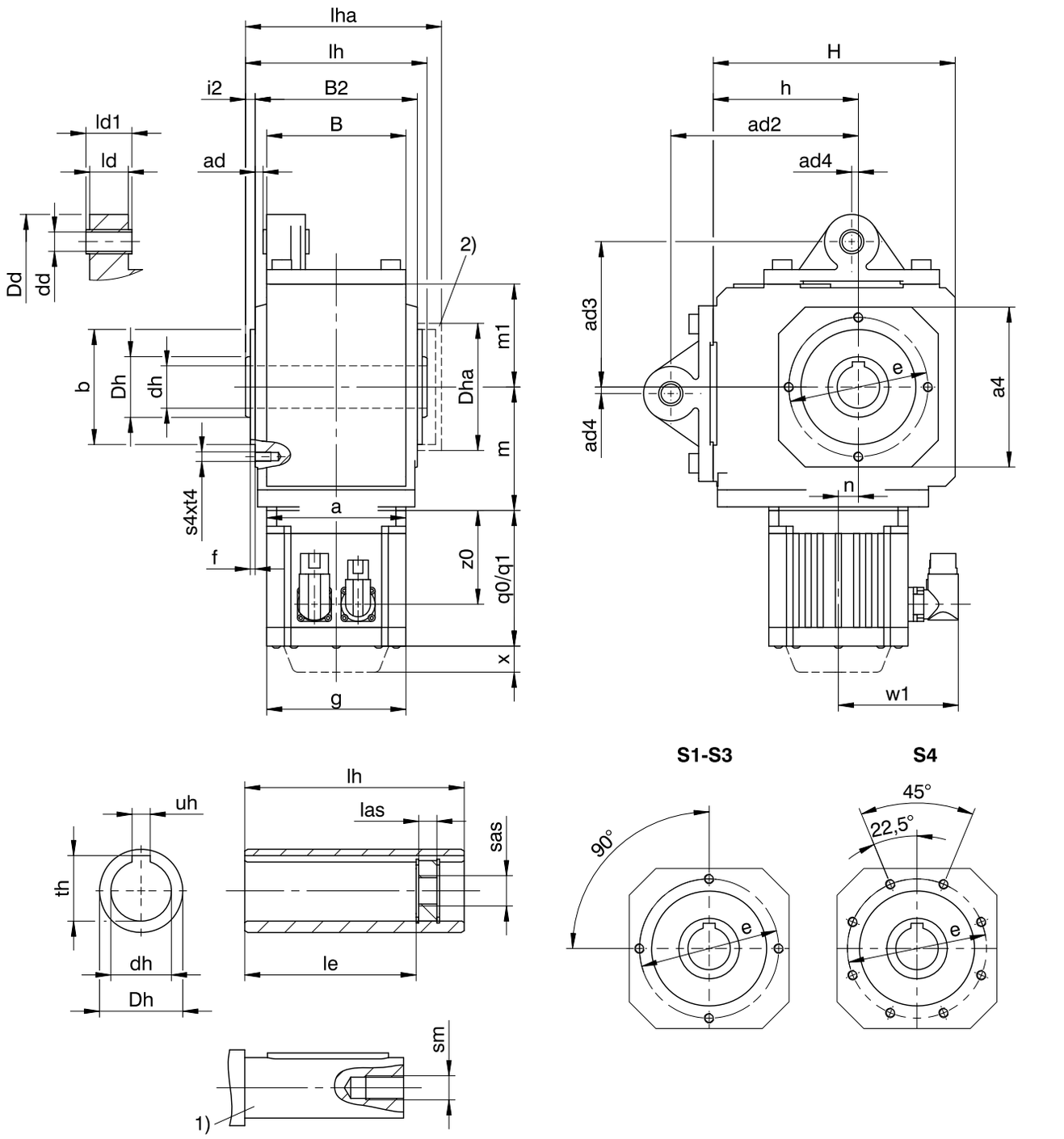
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
S002	∅140	70	8.5	∅140	70	8.5	–	–	–	–	–	–	–	–	–
S102	□72	83	14.0	□98	83	14.0	□115	87	14.0	□145	89	14.0	–	–	–
S202	□72	98	17.0	□98	98	17.0	□115	102	17.0	□145	104	17.0	–	–	–
S203	∅140	135	17.0	–	–	–	–	–	–	–	–	–	–	–	–
S302	∅140	113	25.5	∅140	113	25.5	□115	117	25.5	□145	119	25.5	–	–	–
S303	∅140	150	25.5	∅140	150	25.5	∅160	160	62.0	–	–	–	–	–	–
S402	–	–	–	–	–	–	∅160	129	30.0	□145	131	30.0	□190	134	30.0
S403	∅140	162	30.0	∅140	162	30.0	∅160	172	67.0	–	–	–	–	–	–

22.3.3 A shaft design (hollow shaft), GD housing design (pitch circle diameter + torque arm)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▶ 23.4]
1)	The length of the machine shaft must be at least 2.2 x ∅dh and the length of the feather key must be at least 2 x ∅dh.	2)	Cover (optional)

Dimensions of gear units

Type	a4	ad	ad2	ad3	ad4	Øb	B	B2	Ødd	Ødh	ØDd	ØDh	□Dha	Øe	f	h	H	i2	ld	ld1	le	lh	las	lha	m1	s4	sm	sas	t4	th	uh
S1	□105	6.0	130	100	5.0	75_{j6}	90	106	12^{H9}	20^{H7}	43	40	105	90	3.0	100	167	7.0	24	28	98.0	120	12	127.0	70	M8	M6	M8	13	22.8	6^{JS9}
S1	□105	6.0	130	100	5.0	75_{j6}	90	106	12^{H9}	25^{H7}	43	40	105	90	3.0	100	167	7.0	24	28	98.0	120	12	127.0	70	M8	M10	M12	13	28.3	8^{JS9}
S1	□105	6.0	130	100	5.0	75_{j6}	90	106	12^{H9}	30^{H7}	43	40	105	90	3.0	100	167	7.0	24	28	93.5	120	12	127.0	70	M8	M10	M12	13	32	8^{JS9}
S2	□132	6.5	155	120	5.5	95_{j6}	115	134	16^{H9}	30^{H7}	45	50	132	115	4.0	120	200	8.0	32	38	123.5	150	12	157.0	85	M8	M10	M12	13	33.3	8^{JS9}
S2	□132	6.5	155	120	5.5	95_{j6}	115	134	16^{H9}	35^{H7}	45	50	132	115	4.0	120	200	8.0	32	38	119.0	150	12	157.0	85	M8	M12	M16	13	38.3	10^{JS9}
S3	□152	5.0	185	145	13.0	110_{j6}	130	153	16^{H9}	40^{H7}	45	55	152	130	3.5	140	233	7.5	32	38	136.5	168	12	177.5	100	M10	M16	M20	16	43.3	12^{JS9}
S4	□145	9.5	220	170	10.5	110_{j6}	148	173	20^{H9}	50^{H7}	55	65	145	130	3.5	160	263	8.5	40	46	153.0	190	12	198.5	110	M10	M16	M20	16	53.8	14^{JS9}

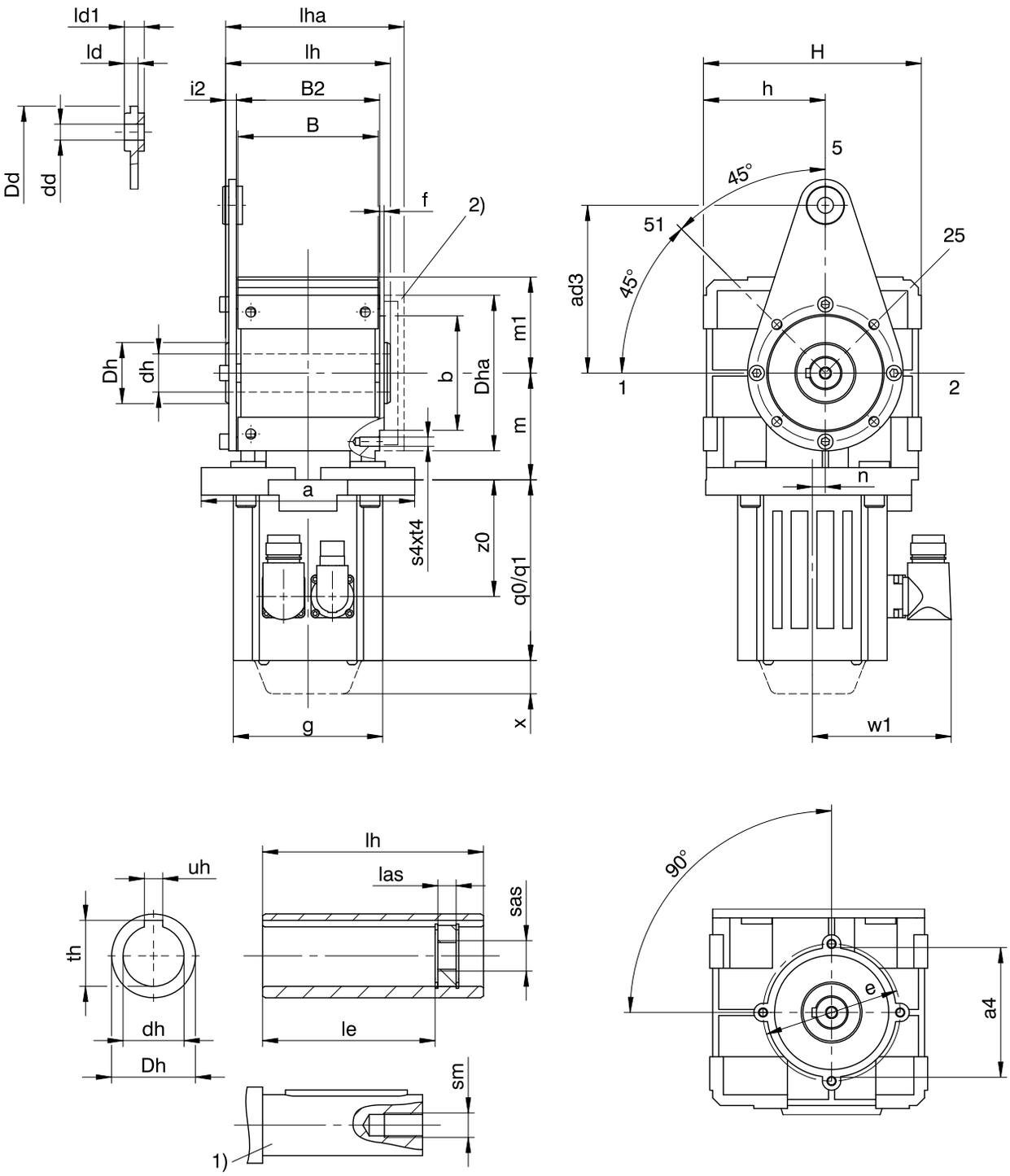
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
S102	□72	83	14.0	□98	83	14.0	□115	87	14.0	□145	89	14.0	–	–	–
S202	□72	98	17.0	□98	98	17.0	□115	102	17.0	□145	104	17.0	–	–	–
S203	∅140	135	17.0	–	–	–	–	–	–	–	–	–	–	–	–
S302	∅140	113	25.5	∅140	113	25.5	□115	117	25.5	□145	119	25.5	–	–	–
S303	∅140	150	25.5	∅140	150	25.5	∅160	160	62.0	–	–	–	–	–	–
S402	–	–	–	–	–	–	∅160	129	30.0	□145	131	30.0	□190	134	30.0
S403	∅140	162	30.0	∅140	162	30.0	∅160	172	67.0	–	–	–	–	–	–

22.3.4 A shaft design (hollow shaft), NGD housing design (base + pitch circle diameter + torque arm)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]
1)	The length of the machine shaft must be at least 2.2 x ∅dh and the length of the feather key must be at least 2 x ∅dh.	2)	Cover (optional)

Dimensions of gear units

Type	a4	ad3	Øb	B	B2	Ødd	Ødh	ØDd	ØDh	□Dha	Øe	f	h	H	i2	ld	ld1	le	lh	las	lha	m1	s4	sm	sas	t4	th	uh
S0	∅85	110	75_{j6}	92	94	10.5	20^{H7}	34	40	102	90	3	80	143	7	5	13	86	108	12	113	63	M6	M6	M8	13	22.8	6^{JS9}
S0	∅85	110	75_{j6}	92	94	10.5	25^{H7}	34	40	102	90	3	80	143	7	5	13	86	108	12	113	63	M6	M10	M12	13	28.3	8^{JS9}

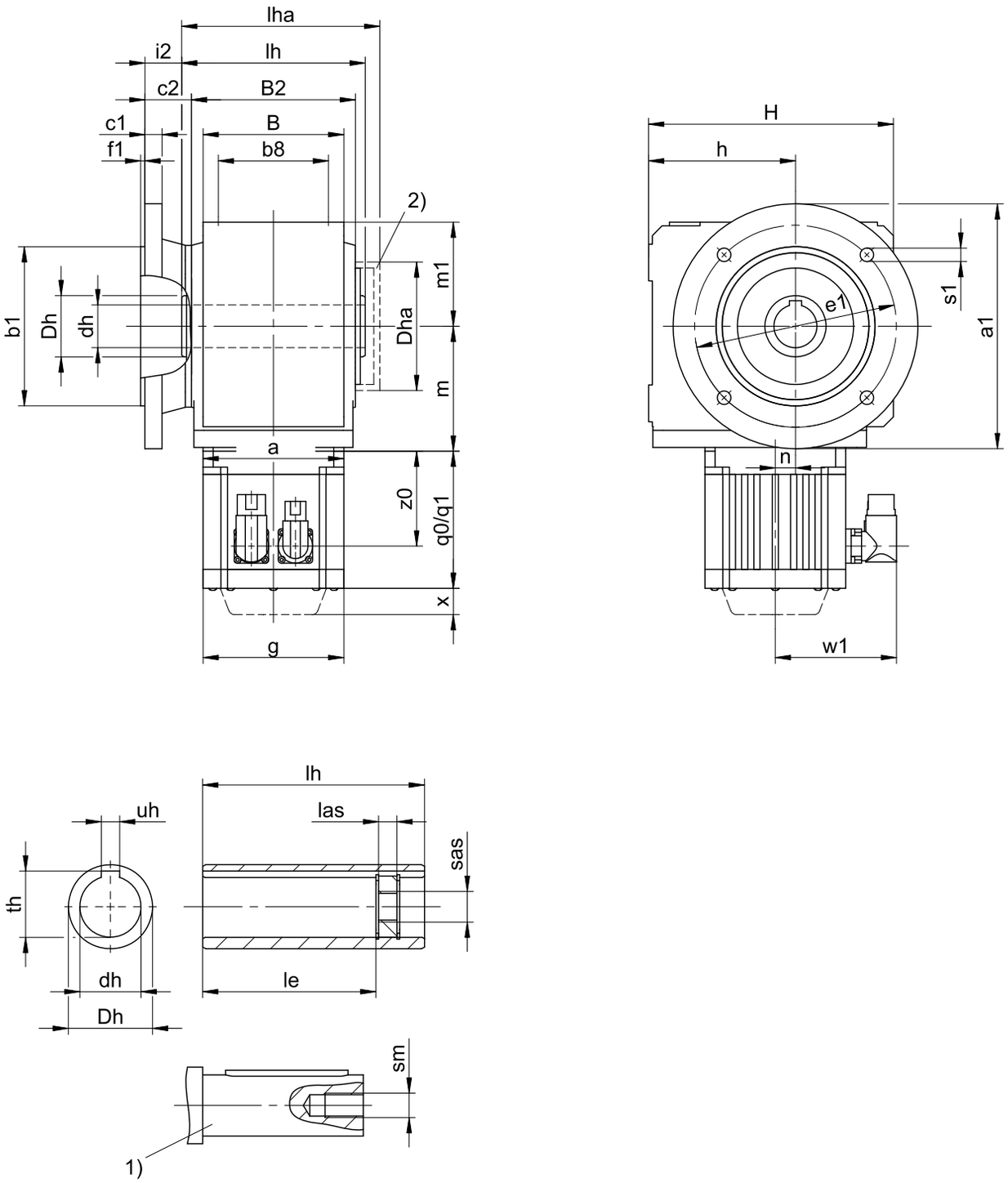
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5

Dimensions of geared motors

Type	EZ3			EZ4		
	a	m	n	a	m	n
S002	∅140	70	8.5	∅140	70	8.5

22.3.5 A shaft design (hollow shaft), F housing design (round flange)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]
1)	The length of the machine shaft must be at least 2.2 x ∅dh and the length of the feather key must be at least 2 x ∅dh.	2)	Cover (optional)

Dimensions of gear units

Type	Øa1	Øb1	b8	B	B2	c1	c2	Ødh	ØDh	□Dha	Øe1	f1	h	H	i2	le	lh	las	lha	m1	Øs1	sm	sas	th	uh
S1	160	110_{j6}	70	90	106	10	32.0	20^{H7}	40	105	130	3.5	100	167	25.0	98.0	120	12	127.0	70	9.0	M6	M8	22.8	6^{JS9}
S1	160	110_{j6}	70	90	106	10	32.0	25^{H7}	40	105	130	3.5	100	167	25.0	98.0	120	12	127.0	70	9.0	M10	M12	28.3	8^{JS9}
S1	160	110_{j6}	70	90	106	10	32.0	30^{H7}	40	105	130	3.5	100	167	25.0	93.5	120	12	127.0	70	9.0	M10	M12	32.0	8^{JS9}
S2	200	130_{j6}	90	115	134	14	38.0	30^{H7}	50	132	165	3.5	120	200	30.0	123.5	150	12	157.0	85	11.0	M10	M12	33.3	8^{JS9}
S2	200	130_{j6}	90	115	134	14	38.0	35^{H7}	50	132	165	3.5	120	200	30.0	119.0	150	12	157.0	85	11.0	M12	M16	38.3	10^{JS9}
S3	250	180_{j6}	105	130	153	15	40.0	40^{H7}	55	152	215	4.0	140	233	32.5	136.5	168	12	177.5	100	14.0	M16	M20	43.3	12^{JS9}
S4	250	180_{j6}	120	148	173	15	39.5	50^{H7}	65	145	215	4.0	160	263	31.0	153.0	190	12	198.5	110	14.0	M16	M20	53.8	14^{JS9}

Dimensions of additional round flanges

Type	Øa1	Øb1	c1	Øe1	f1	Øs1
S1	140	95_{j6}	10	115	3.0	9.0
S2	160	110_{j6}	14	130	3.5	9.0

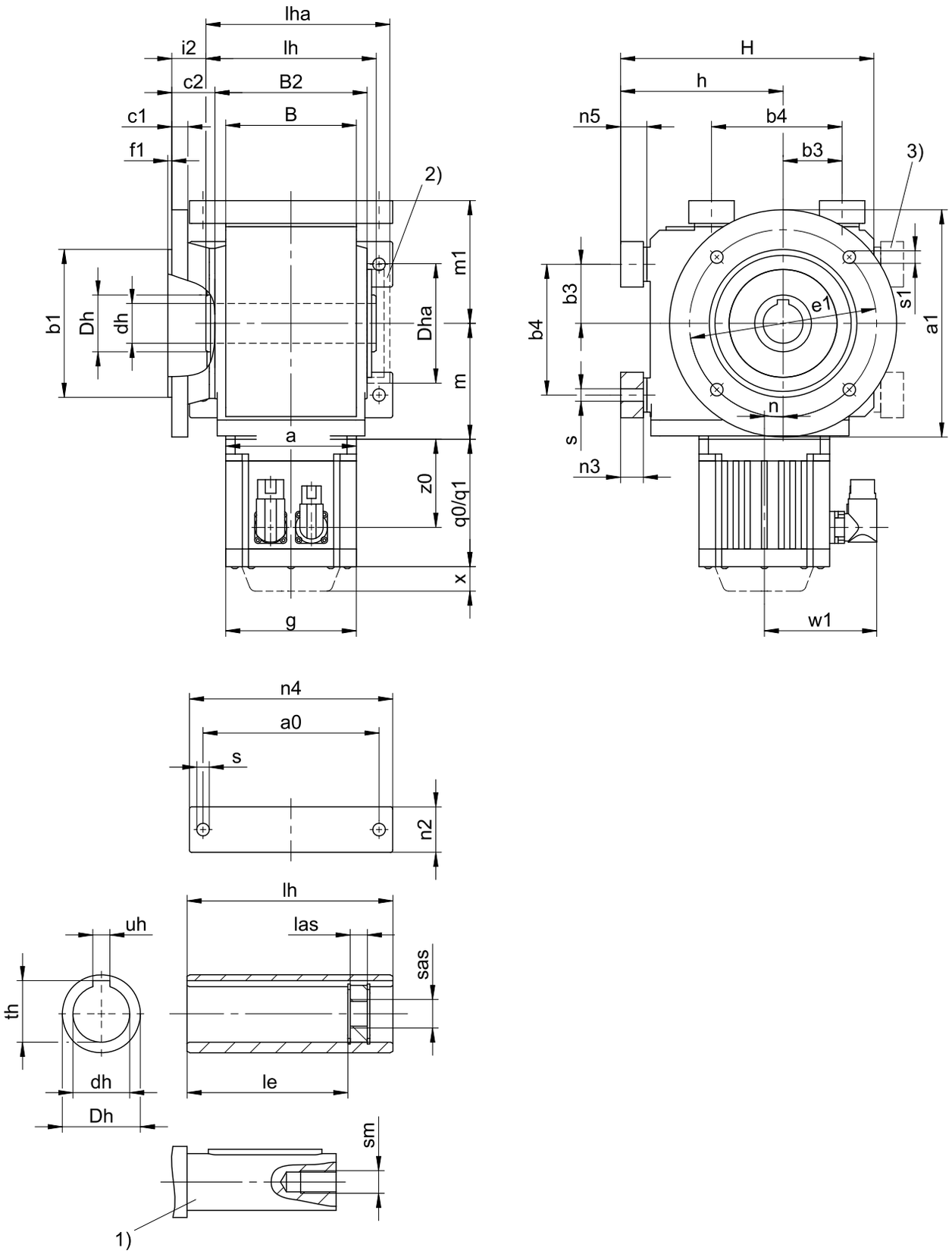
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
S102	□72	83	14.0	□98	83	14.0	□115	87	14.0	□145	89	14.0	–	–	–
S202	□72	98	17.0	□98	98	17.0	□115	102	17.0	□145	104	17.0	–	–	–
S203	∅140	135	17.0	–	–	–	–	–	–	–	–	–	–	–	–
S302	∅140	113	25.5	∅140	113	25.5	□115	117	25.5	□145	119	25.5	–	–	–
S303	∅140	150	25.5	∅140	150	25.5	∅160	160	62.0	–	–	–	–	–	–
S402	–	–	–	–	–	–	∅160	129	30.0	□145	131	30.0	□190	134	30.0
S403	∅140	162	30.0	∅140	162	30.0	∅160	172	67.0	–	–	–	–	–	–

22.3.6 A shaft design (hollow shaft), NF housing design (base + round flange)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]
1)	The length of the machine shaft must be at least 2.2 x ∅dh and the length of the feather key must be at least 2 x ∅dh.	2)	Cover (optional)
3)	Only for S0		

Dimensions of gear units

Type	a0	Øa1	Øb1	b3	b4	B	B2	c1	c2	Ødh	ØDh	□Dha	Øe1	f1	h	H	i2	le	lh	las	lha	m1	n2	n3	n4	n5	Øs	Øs1	sm	sas	th	uh
S0	75	120	80_{j6}	40	80	92	94	9	28.0	20^{H7}	40	102	100	3.0	80	143	21.0	86.0	108	12	113.0	72	22	9	92	9	6.6	6.6	M6	M8	22.8	6^{JS9}
S0	75	120	80_{j6}	40	80	92	94	9	28.0	25^{H7}	40	102	100	3.0	80	143	21.0	86.0	108	12	113.0	72	22	9	92	9	6.6	6.6	M10	M12	28.3	8^{JS9}
S1	115	160	110_{j6}	40	90	90	106	10	32.0	20^{H7}	40	105	130	3.5	115	182	25.0	98.0	120	12	127.0	85	30	13	140	15	9.0	9.0	M6	M8	22.8	6^{JS9}
S1	115	160	110_{j6}	40	90	90	106	10	32.0	25^{H7}	40	105	130	3.5	115	182	25.0	98.0	120	12	127.0	85	30	13	140	15	9.0	9.0	M10	M12	28.3	8^{JS9}
S1	115	160	110_{j6}	40	90	90	106	10	32.0	30^{H7}	40	105	130	3.5	115	182	25.0	93.5	120	12	127.0	85	30	13	140	15	9.0	9.0	M10	M12	32.0	8^{JS9}
S2	155	200	130_{j6}	52	115	115	134	14	38.0	30^{H7}	50	132	165	3.5	143	223	30.0	123.5	150	12	157.0	108	40	20	185	23	11.0	11.0	M10	M12	33.3	8^{JS9}
S2	155	200	130_{j6}	52	115	115	134	14	38.0	35^{H7}	50	132	165	3.5	143	223	30.0	119.0	150	12	157.0	108	40	20	185	23	11.0	11.0	M12	M16	38.3	10^{JS9}
S3	170	250	180_{j6}	52	130	130	153	15	40.0	40^{H7}	55	152	215	4.0	163	256	32.5	136.5	168	12	177.5	123	45	20	200	23	11.0	14.0	M16	M20	43.3	12^{JS9}
S4	200	250	180_{j6}	67	155	148	173	15	39.5	50^{H7}	65	145	215	4.0	185	288	31.0	153.0	190	12	198.5	135	50	22	230	25	14.0	14.0	M16	M20	53.8	14^{JS9}

Dimensions of additional round flanges

Type	Øa1	Øb1	c1	Øe1	f1	Øs1
S0	160	110_{j6}	10	130	3.5	9.0
S1	140	95_{j6}	10	115	3.0	9.0
S2	160	110_{j6}	14	130	3.5	9.0

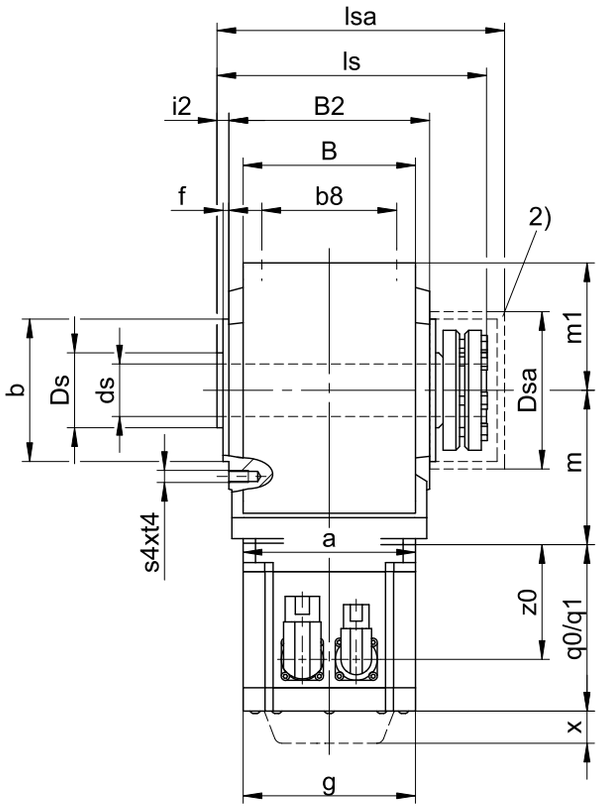
Dimensions of motors

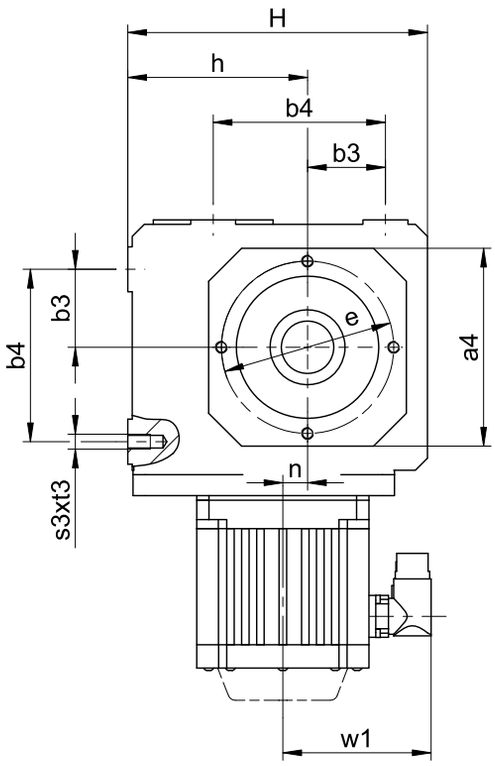
Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5

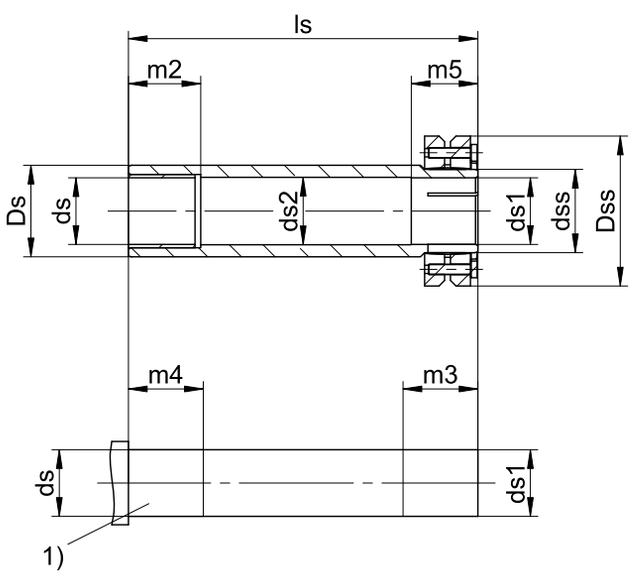
Dimensions of geared motors

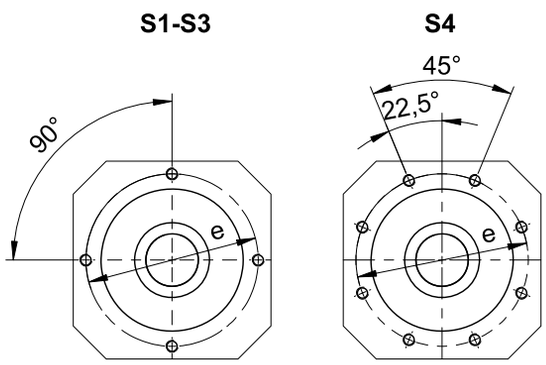
Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
S002	∅140	70	8.5	∅140	70	8.5	–	–	–	–	–	–	–	–	–
S102	□72	83	14.0	□98	83	14.0	□115	87	14.0	□145	89	14.0	–	–	–
S202	□72	98	17.0	□98	98	17.0	□115	102	17.0	□145	104	17.0	–	–	–
S203	∅140	135	17.0	–	–	–	–	–	–	–	–	–	–	–	–
S302	∅140	113	25.5	∅140	113	25.5	□115	117	25.5	□145	119	25.5	–	–	–
S303	∅140	150	25.5	∅140	150	25.5	∅160	160	62.0	–	–	–	–	–	–
S402	–	–	–	–	–	–	∅160	129	30.0	□145	131	30.0	□190	134	30.0
S403	∅140	162	30.0	∅140	162	30.0	∅160	172	67.0	–	–	–	–	–	–

22.3.7 S shaft design (hollow shaft with shrink disk), G housing design (pitch circle diameter)









q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]
1)	Machine shaft: The dimension ls must meet or exceed the specified value.	2)	Cover (optional)

Dimensions of gear units

Type	a4	Øb	b3	b4	b8	B	B2	Øds	Øds1	Øds2	Ødss	ØDs	ØDsa	ØDss	Øe	f	h	H	i2	ls	lsa	m1	m2	m3	m4	m5	s3	s4	t3	t4
S1	□105	75_{j6}	40	90	70	90	106	25_{h9}	25_{h9}^{H7}	25.5	30	40	80	60	90	3.0	100	167	7.0	149	163	70	20	34	25	29	M8	M8	13	13
S2	□132	95_{j6}	52	115	90	115	134	35_{h9}	35_{h9}^{H7}	35.5	44	50	101	80	115	4.0	120	200	8.0	180	195	85	30	37	35	32	M10	M8	16	13
S3	□152	110_{j6}	52	130	105	130	153	40_{h9}	40_{h9}^{H7}	40.5	50	55	114	88	130	3.5	140	233	7.5	200	222	100	40	39	45	34	M10	M10	16	16
S4	□145	110_{j6}	67	155	120	148	173	50_{h9}	50_{h9}^{H7}	50.5	62	65	116	106	130	3.5	160	263	8.5	227	243	110	40	44	45	39	M12	M10	19	16

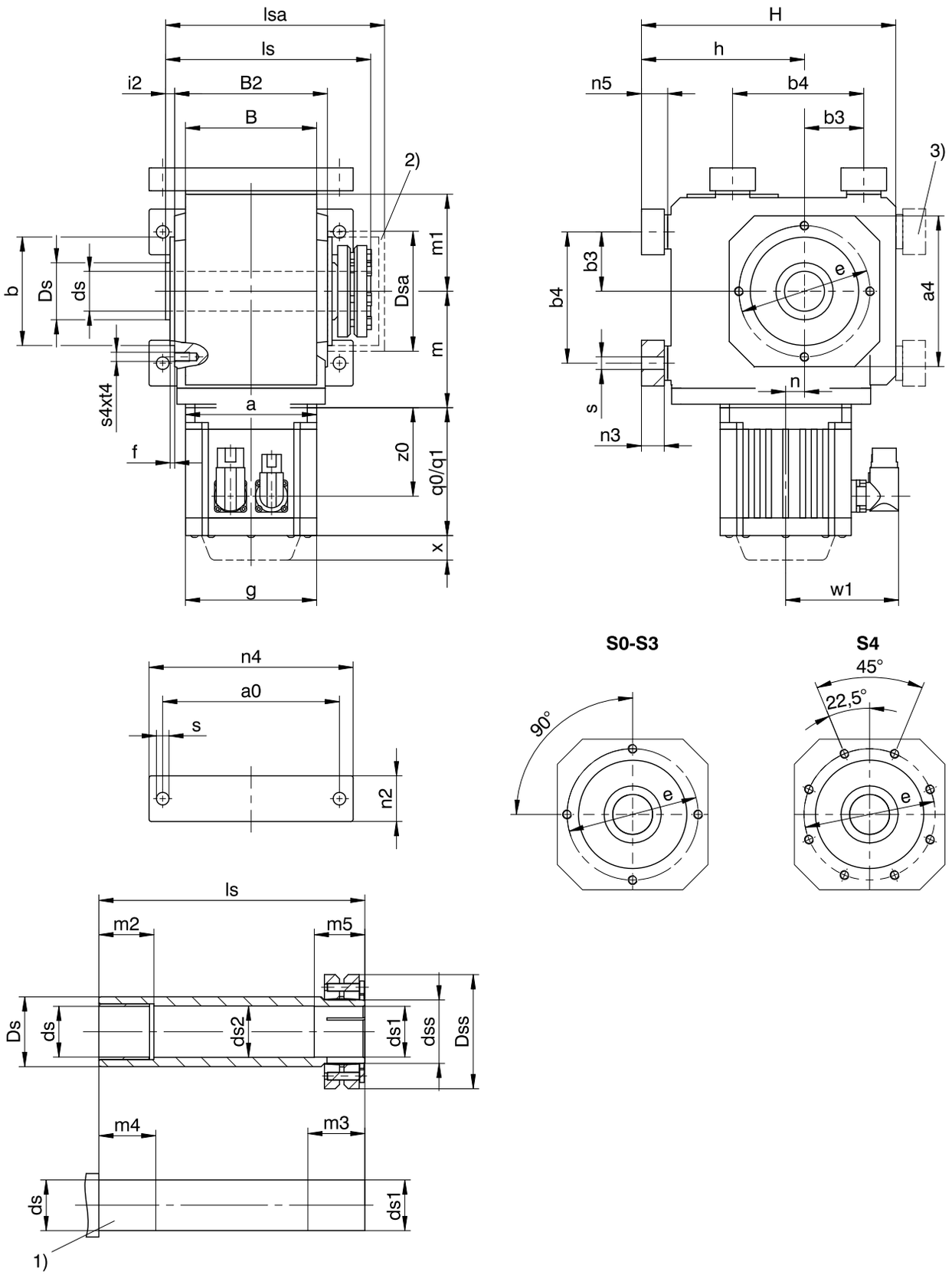
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
S102	□72	83	14.0	□98	83	14.0	□115	87	14.0	□145	89	14.0	–	–	–
S202	□72	98	17.0	□98	98	17.0	□115	102	17.0	□145	104	17.0	–	–	–
S203	∅140	135	17.0	–	–	–	–	–	–	–	–	–	–	–	–
S302	∅140	113	25.5	∅140	113	25.5	□115	117	25.5	□145	119	25.5	–	–	–
S303	∅140	150	25.5	∅140	150	25.5	∅160	160	62.0	–	–	–	–	–	–
S402	–	–	–	–	–	–	∅160	129	30.0	□145	131	30.0	□190	134	30.0
S403	∅140	162	30.0	∅140	162	30.0	∅160	172	67.0	–	–	–	–	–	–

22.3.8 S shaft design (hollow shaft with shrink disk), NG housing design (base + pitch circle diameter)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]
1)	Machine shaft: The dimension ls must meet or exceed the specified value.	2)	Cover (optional)
3)	Only for S0		

Dimensions of gear units

Type	a0	a4	Øb	b3	b4	B	B2	Ød	Ød1	Ød2	Ødss	ØDs	ØDsa	ØDss	Øe	f	h	H	i2	ls	lsa	m1	m2	m3	m4	m5	n2	n3	n4	n5	Øs	s4	t4
S0	75	∅85	75_{j6}	40	80	92	94	20_{h9}	20_{h9}^{H7}	20.5	24	40	80	50	90	3.0	80	143	7.0	136	151	72	20	33	25	28	22	9	92	9	6.6	M6	13
S0	75	∅85	75_{j6}	40	80	92	94	25_{h9}	25_{h9}^{H7}	25.5	30	40	80	60	90	3.0	80	143	7.0	136	151	72	20	34	25	29	22	9	92	9	6.6	M6	13
S1	115	□105	75_{j6}	40	90	90	106	25_{h9}	25_{h9}^{H7}	25.5	30	40	80	60	90	3.0	115	182	7.0	149	163	85	20	34	25	29	30	13	140	15	9.0	M8	13
S2	155	□132	95_{j6}	52	115	115	134	35_{h9}	35_{h9}^{H7}	35.5	44	50	101	80	115	4.0	143	223	8.0	180	195	108	30	37	35	32	40	20	185	23	11.0	M8	13
S3	170	□152	110_{j6}	52	130	130	153	40_{h9}	40_{h9}^{H7}	40.5	50	55	114	88	130	3.5	163	256	7.5	200	222	123	40	39	45	34	45	20	200	23	11.0	M10	16
S4	200	□145	110_{j6}	67	155	148	173	50_{h9}	50_{h9}^{H7}	50.5	62	65	116	106	130	3.5	185	288	8.5	227	243	135	40	44	45	39	50	22	230	25	14.0	M10	16

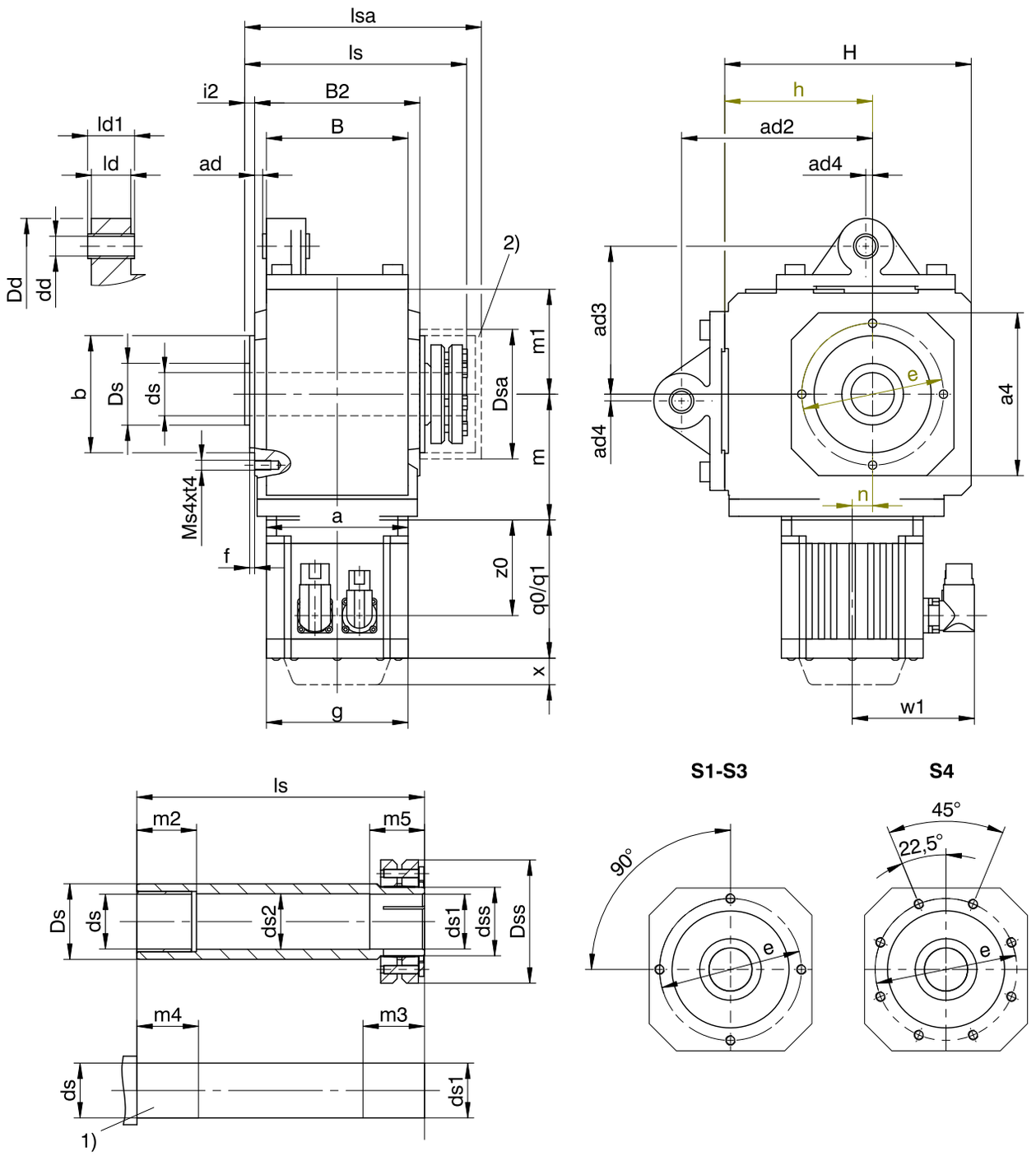
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
S002	∅140	70	8.5	∅140	70	8.5	–	–	–	–	–	–	–	–	–
S102	□72	83	14.0	□98	83	14.0	□115	87	14.0	□145	89	14.0	–	–	–
S202	□72	98	17.0	□98	98	17.0	□115	102	17.0	□145	104	17.0	–	–	–
S203	∅140	135	17.0	–	–	–	–	–	–	–	–	–	–	–	–
S302	∅140	113	25.5	∅140	113	25.5	□115	117	25.5	□145	119	25.5	–	–	–
S303	∅140	150	25.5	∅140	150	25.5	∅160	160	62.0	–	–	–	–	–	–
S402	–	–	–	–	–	–	∅160	129	30.0	□145	131	30.0	□190	134	30.0
S403	∅140	162	30.0	∅140	162	30.0	∅160	172	67.0	–	–	–	–	–	–

22.3.9 S shaft design (hollow shaft with shrink disk), GD housing design (pitch circle diameter + torque arm)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▶ 23.4]
1)	Machine shaft: The dimension ls must meet or exceed the specified value.	2)	Cover (optional)

Dimensions of gear units

Type	a4	ad	ad2	ad3	ad4	Øb	B	B2	Ødd	ØDd	Øds	Øds1	Øds2	Ødss	ØDs	ØDsa	ØDss	Øe	f	h	H	i2	ld	ld1	ls	lsa	m1	m2	m3	m4	m5	s4	t4
S1	□105	6.0	130	100	5.0	75_{j6}	90	106	12.0^{H9}	43	25_{h9}	25_{h9}^{H7}	25.5	30	40	80	60	90	3.0	100	167	7.0	24	28	149	163	70	20	34	25	29	M8	13
S2	□132	6.5	155	120	5.5	95_{j6}	115	134	16.0^{H9}	45	35_{h9}	35_{h9}^{H7}	35.5	44	50	101	80	115	4.0	120	200	8.0	32	38	180	195	85	30	37	35	32	M8	13
S3	□152	5.0	185	145	13.0	110_{j6}	130	153	16.0^{H9}	45	40_{h9}	40_{h9}^{H7}	40.5	50	55	114	88	130	3.5	140	233	7.5	32	38	200	222	100	40	39	45	34	M10	16
S4	□145	9.5	220	170	10.5	110_{j6}	148	173	20.0^{H9}	55	50_{h9}	50_{h9}^{H7}	50.5	62	65	116	106	130	3.5	160	263	8.5	40	46	227	243	110	40	44	45	39	M10	16

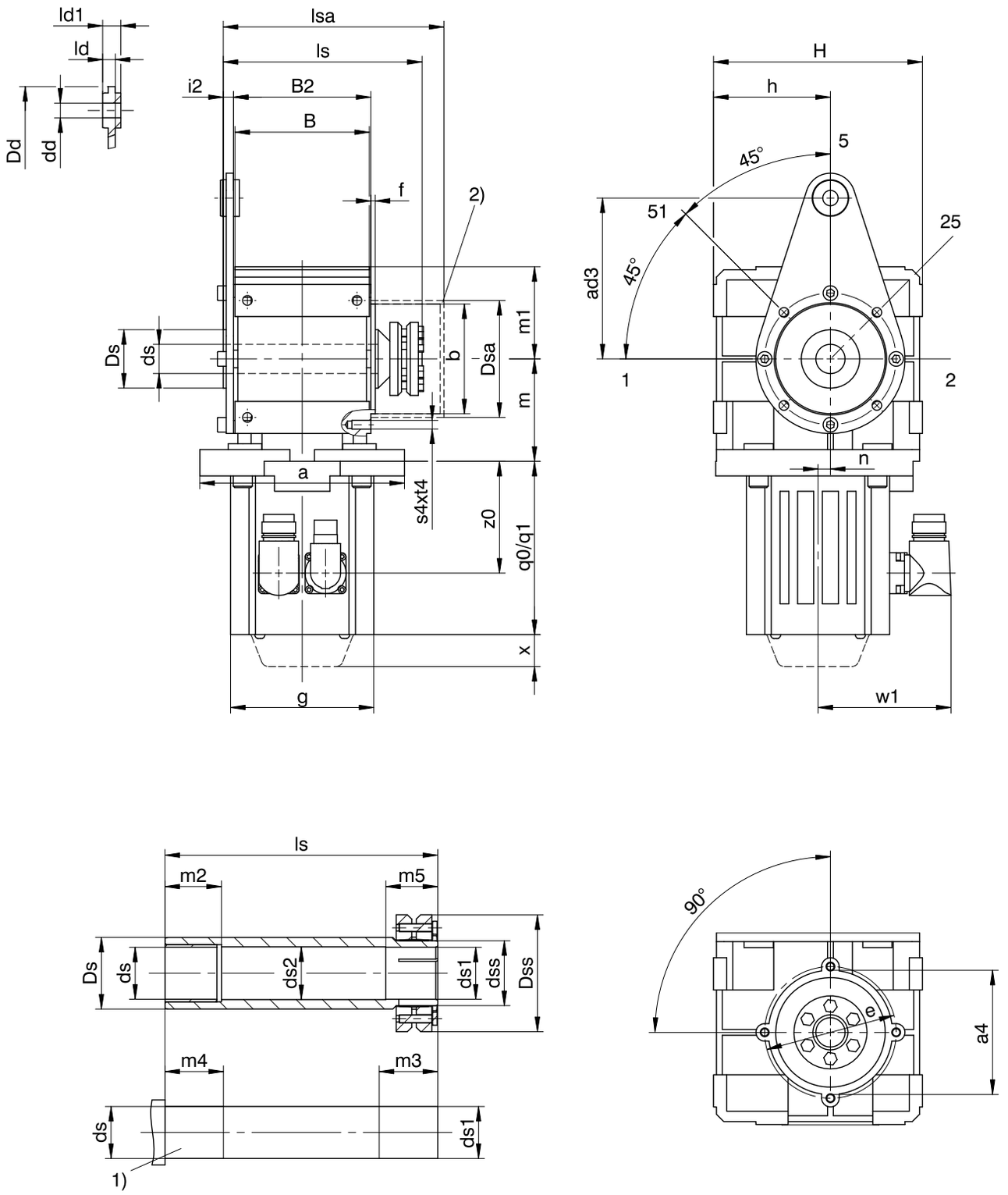
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
S102	□72	83	14.0	□98	83	14.0	□115	87	14.0	□145	89	14.0	–	–	–
S202	□72	98	17.0	□98	98	17.0	□115	102	17.0	□145	104	17.0	–	–	–
S203	∅140	135	17.0	–	–	–	–	–	–	–	–	–	–	–	–
S302	∅140	113	25.5	∅140	113	25.5	□115	117	25.5	□145	119	25.5	–	–	–
S303	∅140	150	25.5	∅140	150	25.5	∅160	160	62.0	–	–	–	–	–	–
S402	–	–	–	–	–	–	∅160	129	30.0	□145	131	30.0	□190	134	30.0
S403	∅140	162	30.0	∅140	162	30.0	∅160	172	67.0	–	–	–	–	–	–

22.3.10 S shaft design (hollow shaft with shrink disk), NGD housing design (base + pitch circle diameter + torque arm)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▶ 23.4]
1)	Machine shaft: The dimension ls must meet or exceed the specified value.	2)	Cover (optional)

Dimensions of gear units

Type	a4	ad2	ad3	Øb	B	B2	Ødd	Øds	Øds1	Øds2	Ødss	ØDd	ØDs	ØDsa	ØDss	Øe	f	h	H	i2	ld	ld1	ls	lsa	m1	m2	m3	m4	m5	s4	t4
S0	∅85	127	110	75_{j6}	92	94	10.5	20_{h9}	20_{h9}^{H7}	20.5	24	34	40	80	50	90	3	80	143	7	5	13	136	151	63	20	33	25	28	M6	13
S0	∅85	127	110	75_{j6}	92	94	10.5	25_{h9}	25_{h9}^{H7}	25.5	30	34	40	80	60	90	3	80	143	7	5	13	136	151	63	20	34	25	29	M6	13

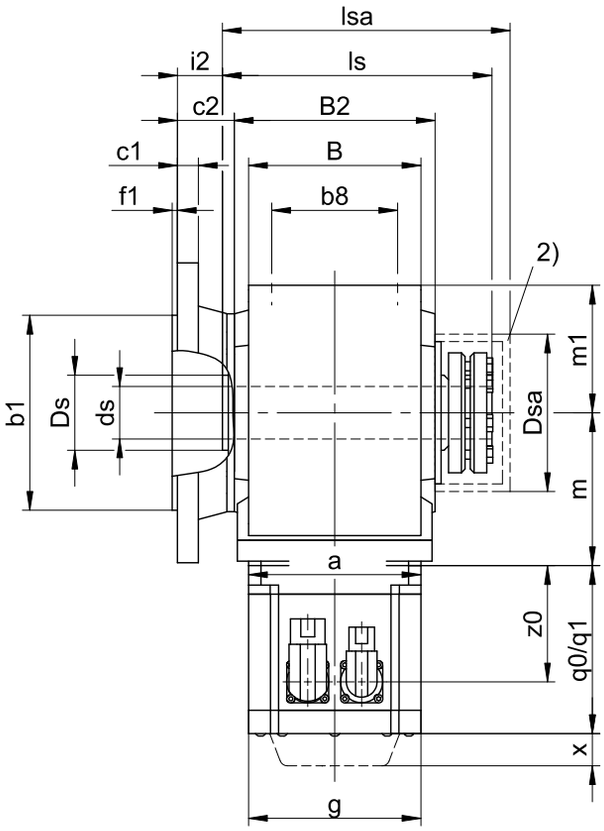
Dimensions of motors

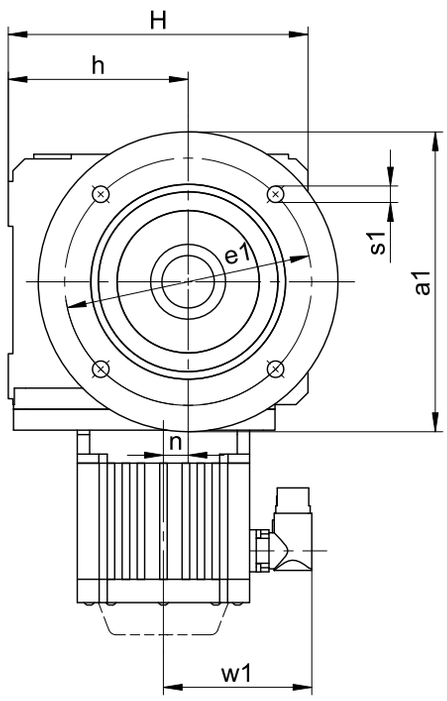
Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5

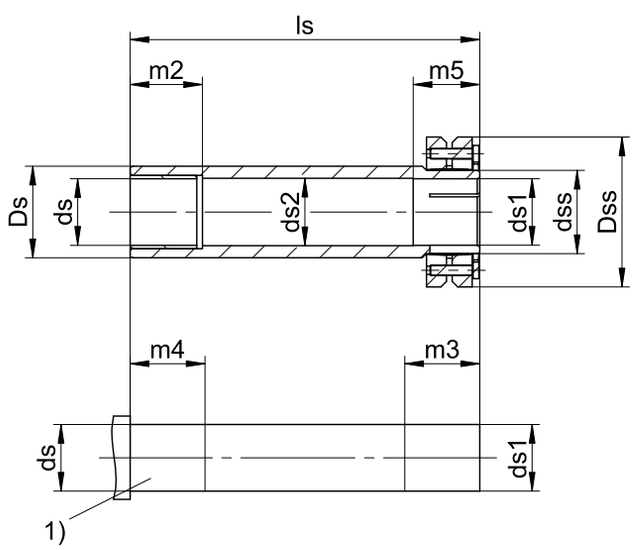
Dimensions of geared motors

Type	EZ3			EZ4		
	a	m	n	a	m	n
S002	∅140	70	8.5	∅140	70	8.5

22.3.11 S shaft design (hollow shaft with shrink disk), F housing design (round flange)







q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]
1)	Machine shaft: The dimension ls must meet or exceed the specified value.	2)	Cover (optional)

Dimensions of gear units

Type	Øa1	Øb1	b8	B	B2	c1	c2	Øds	Øds1	Øds2	Ødss	ØDs	ØDsa	ØDss	Øe1	f1	h	H	i2	ls	lsa	m1	m2	m3	m4	m5	Øs1
S1	160	110_{j6}	70	90	106	10	32.0	25_{h9}	25_{h9}^{H7}	25.5	30	40	80	60	130	3.5	100	167	25.0	149	163	70	20	34	25	29	9.0
S2	200	130_{j6}	90	115	134	14	38.0	35_{h9}	35_{h9}^{H7}	35.5	44	50	101	80	165	3.5	120	200	30.0	180	195	85	30	37	35	32	11.0
S3	250	180_{j6}	105	130	153	15	40.0	40_{h9}	40_{h9}^{H7}	40.5	50	55	114	88	215	4.0	140	233	32.5	200	222	100	40	39	45	34	14.0
S4	250	180_{j6}	120	148	173	15	39.5	50_{h9}	50_{h9}^{H7}	50.5	62	65	116	106	215	4.0	160	263	31.0	227	243	110	40	44	45	39	14.0

Dimensions of additional round flanges

Type	Øa1	Øb1	c1	Øe1	f1	Øs1
S1	140	95_{j6}	10	115	3.0	9.0
S2	160	110_{j6}	14	130	3.5	9.0

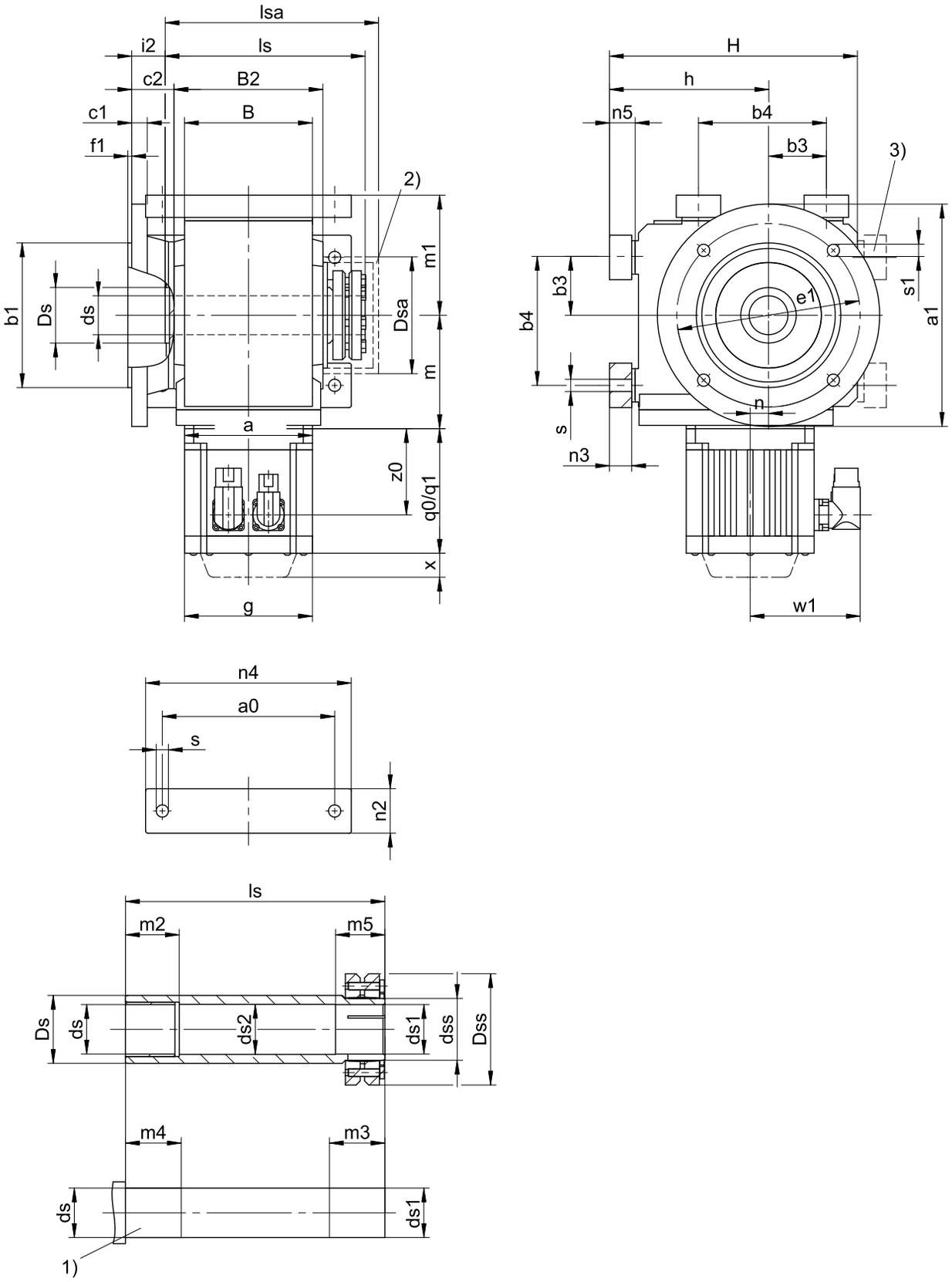
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
S102	□72	83	14.0	□98	83	14.0	□115	87	14.0	□145	89	14.0	–	–	–
S202	□72	98	17.0	□98	98	17.0	□115	102	17.0	□145	104	17.0	–	–	–
S203	∅140	135	17.0	–	–	–	–	–	–	–	–	–	–	–	–
S302	∅140	113	25.5	∅140	113	25.5	□115	117	25.5	□145	119	25.5	–	–	–
S303	∅140	150	25.5	∅140	150	25.5	∅160	160	62.0	–	–	–	–	–	–
S402	–	–	–	–	–	–	∅160	129	30.0	□145	131	30.0	□190	134	30.0
S403	∅140	162	30.0	∅140	162	30.0	∅160	172	67.0	–	–	–	–	–	–

22.3.12 S shaft design (hollow shaft with shrink disk), NF housing design (base + round flange)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▶ 23.4]
1)	Machine shaft: The dimension ls must meet or exceed the specified value.	2)	Cover (optional)
3)	Only for S0		

Dimensions of gear units

Type	a0	Øa1	Øb1	b3	b4	B	B2	c1	c2	Ød	Ød1	Ød2	Ødss	ØDs	ØDsa	ØDss	Øe1	f1	h	H	i2	ls	lsa	m1	m2	m3	m4	m5	n2	n3	n4	n5	Øs	Øs1
S0	75	120	80_{j6}	40	80	92	94	9	28.0	20_{h9}	20_{h9}^{H7}	20.5	24	40	80	50	100	3.0	80	143	21.0	136	151	72	20	33	25	28	22	9	92	9	6.6	6.6
S0	75	120	80_{j6}	40	80	92	94	9	28.0	25_{h9}	25_{h9}^{H7}	25.5	30	40	80	60	100	3.0	80	143	21.0	136	151	72	20	34	25	29	22	9	92	9	6.6	6.6
S1	115	160	110_{j6}	40	90	90	106	10	32.0	25_{h9}	25_{h9}^{H7}	25.5	30	40	80	60	130	3.5	115	182	25.0	149	163	85	20	34	25	29	30	13	140	15	9.0	9.0
S2	155	200	130_{j6}	52	115	115	134	14	38.0	35_{h9}	35_{h9}^{H7}	35.5	44	50	101	80	165	3.5	143	223	30.0	180	195	108	30	37	35	32	40	20	185	23	11.0	11.0
S3	170	250	180_{j6}	52	130	130	153	15	40.0	40_{h9}	40_{h9}^{H7}	40.5	50	55	114	88	215	4.0	163	256	32.5	200	222	123	40	39	45	34	45	20	200	23	11.0	14.0
S4	200	250	180_{j6}	67	155	148	173	15	39.5	50_{h9}	50_{h9}^{H7}	50.5	62	65	116	106	215	4.0	185	288	31.0	227	243	135	40	44	45	39	50	22	230	25	14.0	14.0

Dimensions of additional round flanges

Type	Øa1	Øb1	c1	Øe1	f1	Øs1
S0	160	110_{j6}	10	130	3.5	9.0
S1	140	95_{j6}	10	115	3.0	9.0
S2	160	110_{j6}	14	130	3.5	9.0

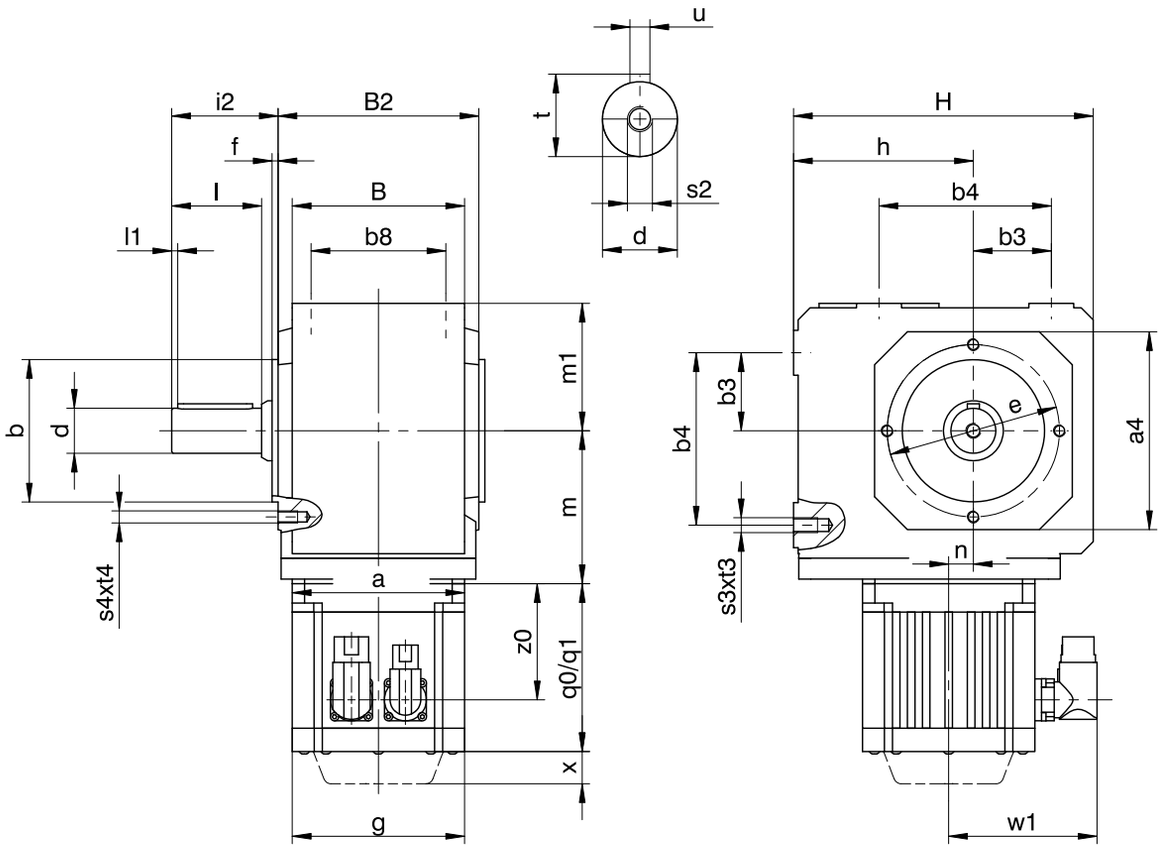
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5

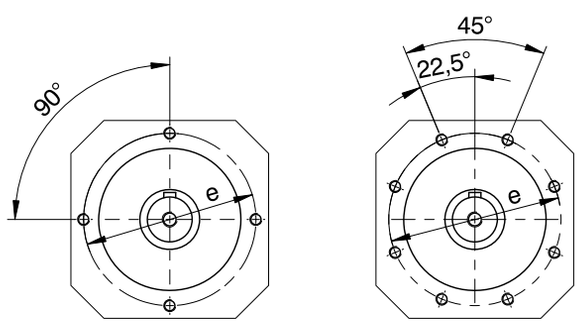
Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
S002	∅140	70	8.5	∅140	70	8.5	–	–	–	–	–	–	–	–	–
S102	□72	83	14.0	□98	83	14.0	□115	87	14.0	□145	89	14.0	–	–	–
S202	□72	98	17.0	□98	98	17.0	□115	102	17.0	□145	104	17.0	–	–	–
S203	∅140	135	17.0	–	–	–	–	–	–	–	–	–	–	–	–
S302	∅140	113	25.5	∅140	113	25.5	□115	117	25.5	□145	119	25.5	–	–	–
S303	∅140	150	25.5	∅140	150	25.5	∅160	160	62.0	–	–	–	–	–	–
S402	–	–	–	–	–	–	∅160	129	30.0	□145	131	30.0	□190	134	30.0
S403	∅140	162	30.0	∅140	162	30.0	∅160	172	67.0	–	–	–	–	–	–

22.3.13 A shaft design (solid shaft), G housing design (pitch circle diameter)



S1-S3 **S4**



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▶ 23.4]
–	Solid shaft on both sides available.		

Dimensions of gear units

Type	a4	Øb	b3	b4	b8	B	B2	Ød	Øe	f	h	H	i2	l	l1	m1	s2	s3	s4	t	t3	t4	u
S1	□105	75_{j6}	40	90	70	90	106	25_{k6}	90	3.0	100	167	62.0	50	4	70	M10	M8	M8	28.0	13	13	A8×7×40
S2	□132	95_{j6}	52	115	90	115	134	30_{k6}	115	4.0	120	200	71.0	60	4	85	M10	M10	M8	33.0	16	13	A8×7×50
S3	□152	110_{j6}	52	130	105	130	153	40_{k6}	130	3.5	140	233	93.5	80	4	100	M16	M10	M10	43.0	16	16	A12×8×70
S4	□145	110_{j6}	67	155	120	148	173	45_{k6}	130	3.5	160	263	103.5	90	4	110	M16	M12	M10	48.5	19	16	A14×9×80

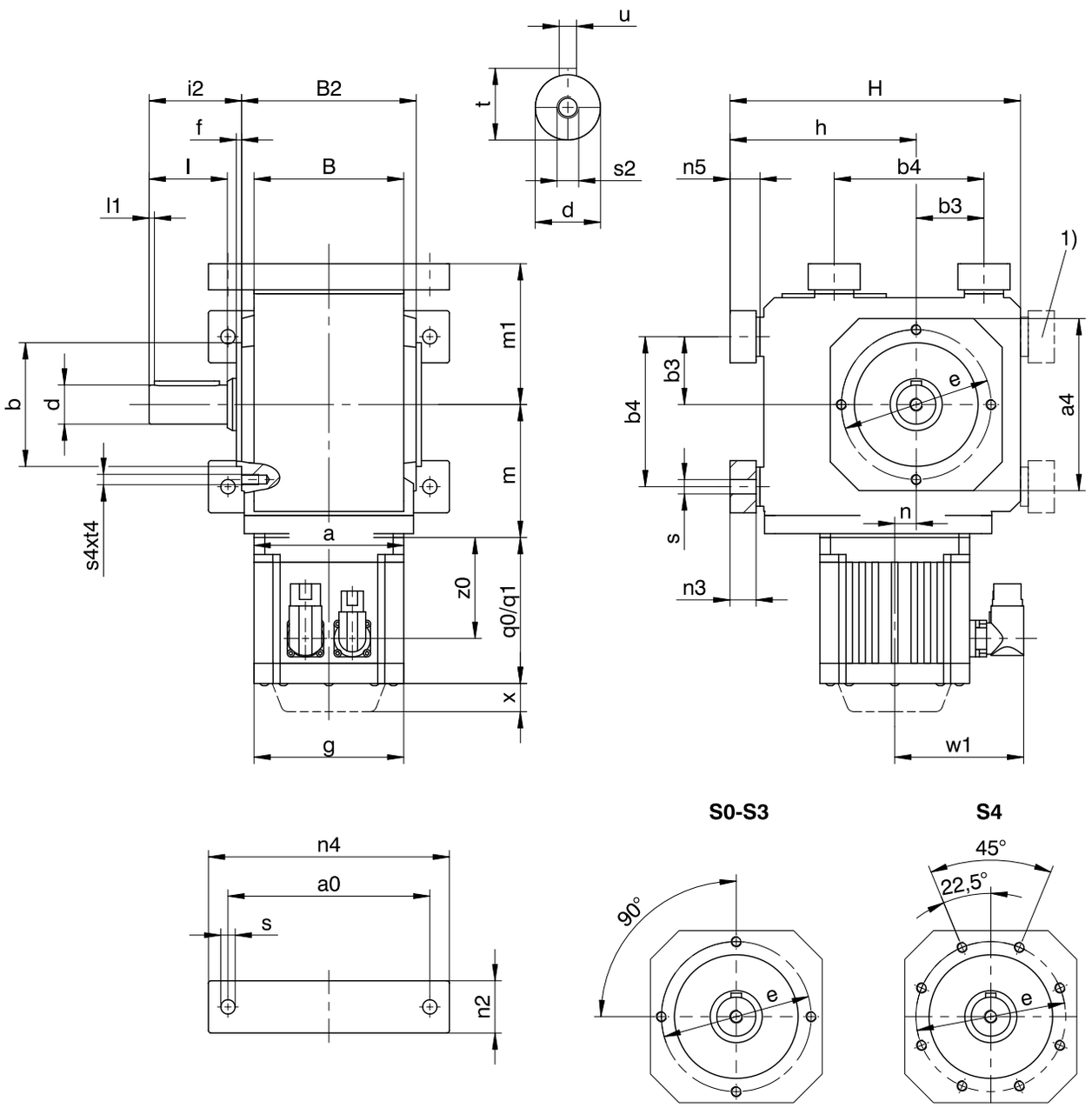
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
S102	□72	83	14.0	□98	83	14.0	□115	87	14.0	□145	89	14.0	–	–	–
S202	□72	98	17.0	□98	98	17.0	□115	102	17.0	□145	104	17.0	–	–	–
S203	∅140	135	17.0	–	–	–	–	–	–	–	–	–	–	–	–
S302	∅140	113	25.5	∅140	113	25.5	□115	117	25.5	□145	119	25.5	–	–	–
S303	∅140	150	25.5	∅140	150	25.5	∅160	160	62.0	–	–	–	–	–	–
S402	–	–	–	–	–	–	∅160	129	30.0	□145	131	30.0	□190	134	30.0
S403	∅140	162	30.0	∅140	162	30.0	∅160	172	67.0	–	–	–	–	–	–

22.3.14 V shaft design (solid shaft), NG housing design (base + pitch circle diameter)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]
1)	Only for S0	–	Solid shaft on both sides available.

Dimensions of gear units

Type	a0	a4	Øb	b3	b4	B	B2	Ød	Øe	f	h	H	i2	l	l1	m1	n2	n3	n4	n5	Øs	s2	s4	t	t4	u
S0	75	∅85	75_{j6}	40	80	92	94	20_{k6}	90	3.0	80	143	53.0	40	3	72	22	9	92	9	6.6	M6	M6	22.5	13	A6×6×32
S1	115	□105	75_{j6}	40	90	90	106	25_{k6}	90	3.0	115	182	62.0	50	4	85	30	13	140	15	9.0	M10	M8	28.0	13	A8×7×40
S2	155	□132	95_{j6}	52	115	115	134	30_{k6}	115	4.0	143	223	71.0	60	4	108	40	20	185	23	11.0	M10	M8	33.0	13	A8×7×50
S3	170	□152	110_{j6}	52	130	130	153	40_{k6}	130	3.5	163	256	93.5	80	4	123	45	20	200	23	11.0	M16	M10	43.0	16	A12×8×70
S4	200	□145	110_{j6}	67	155	148	173	45_{k6}	130	3.5	185	288	103.5	90	4	135	50	22	230	25	14.0	M16	M10	48.5	16	A14×9×80

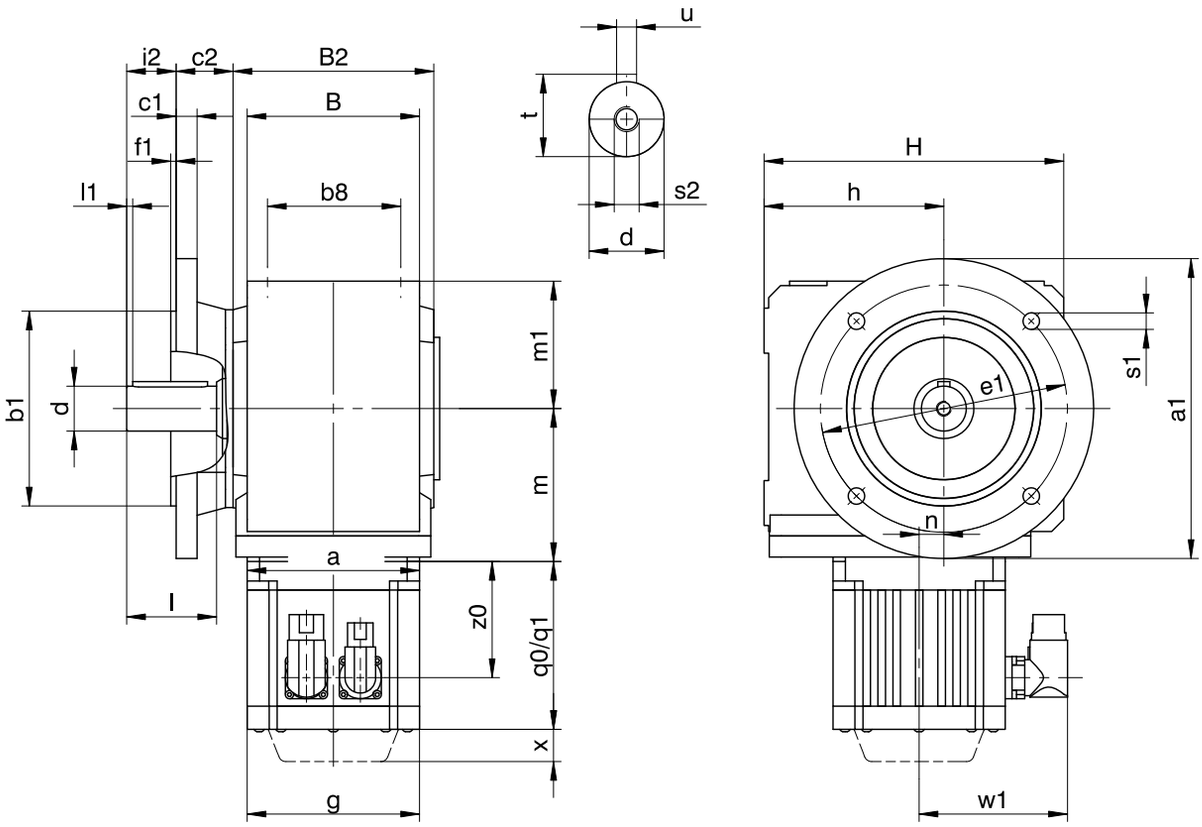
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
S002	∅140	70	8.5	∅140	70	8.5	–	–	–	–	–	–	–	–	–
S102	□72	83	14.0	□98	83	14.0	□115	87	14.0	□145	89	14.0	–	–	–
S202	□72	98	17.0	□98	98	17.0	□115	102	17.0	□145	104	17.0	–	–	–
S203	∅140	135	17.0	–	–	–	–	–	–	–	–	–	–	–	–
S302	∅140	113	25.5	∅140	113	25.5	□115	117	25.5	□145	119	25.5	–	–	–
S303	∅140	150	25.5	∅140	150	25.5	∅160	160	62.0	–	–	–	–	–	–
S402	–	–	–	–	–	–	∅160	129	30.0	□145	131	30.0	□190	134	30.0
S403	∅140	162	30.0	∅140	162	30.0	∅160	172	67.0	–	–	–	–	–	–

22.3.15 V shaft design (solid shaft), F housing design (round flange)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]
–	Solid shaft on both sides available.		

Dimensions of gear units

Type	Øa1	Øb1	b8	B	B2	c1	c2	Ød	Øe1	f1	h	H	i2	l	l1	m1	Øs1	s2	t	u
S1	160	110_{j6}	70	90	106	10	32.0	25_{k6}	130	3.5	100	167	30.0	50	4	70	9.0	M10	28.0	A8×7×40
S2	200	130_{j6}	90	115	134	14	38.0	30_{k6}	165	3.5	120	200	33.0	60	4	85	11.0	M10	33.0	A8×7×50
S3	250	180_{j6}	105	130	153	15	40.0	40_{k6}	215	4.0	140	233	53.5	80	4	100	14.0	M16	43.0	A12×8×70
S4	250	180_{j6}	120	148	173	15	39.5	45_{k6}	215	4.0	160	263	64.0	90	4	110	14.0	M16	48.5	A14×9×80

Dimensions of additional round flanges

Type	Øa1	Øb1	c1	Øe1	f1	Øs1
S1	140	95_{j6}	10	115	3.0	9.0
S2	160	110_{j6}	14	130	3.5	9.0

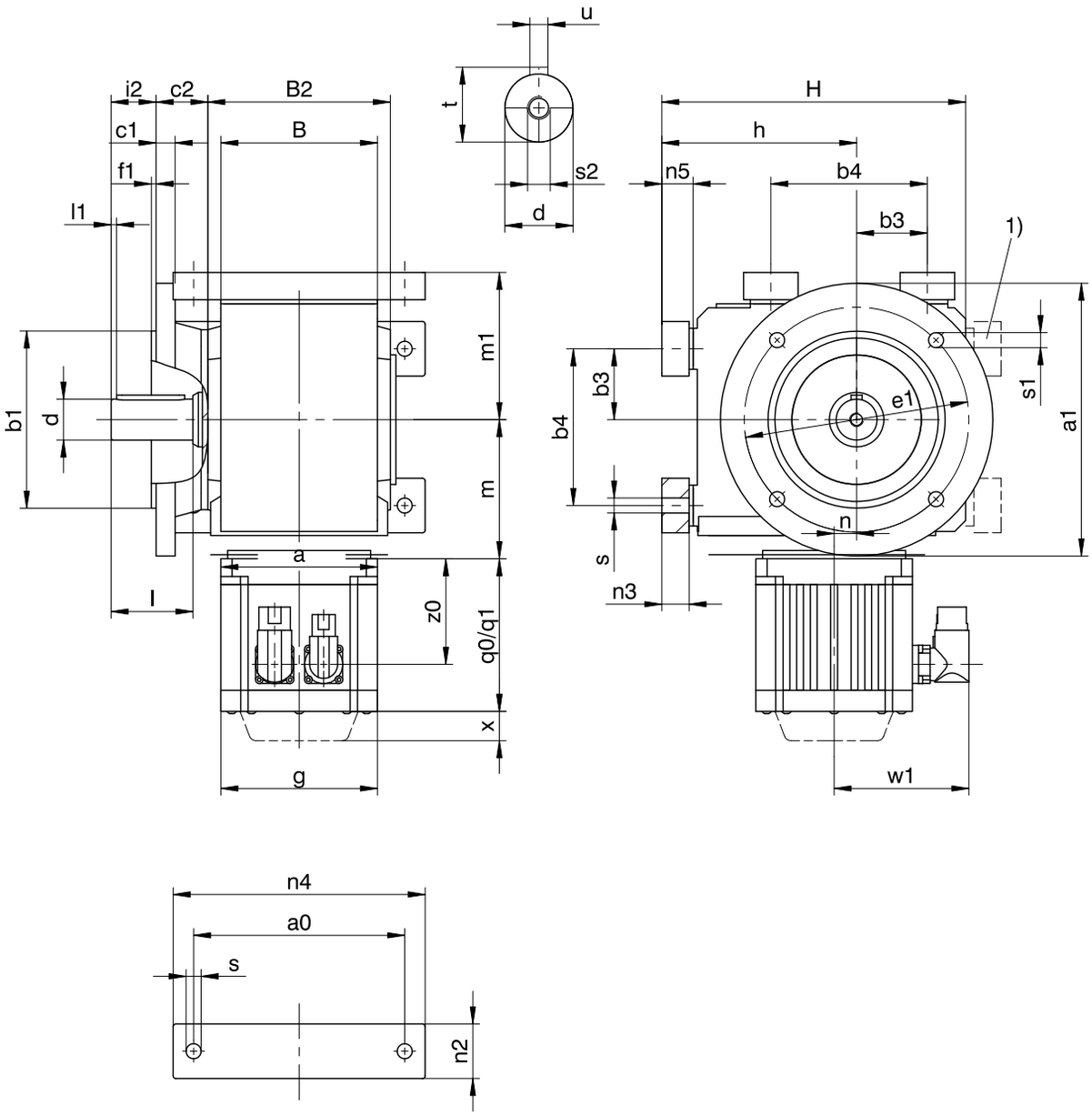
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
S102	□72	83	14.0	□98	83	14.0	□115	87	14.0	□145	89	14.0	–	–	–
S202	□72	98	17.0	□98	98	17.0	□115	102	17.0	□145	104	17.0	–	–	–
S203	∅140	135	17.0	–	–	–	–	–	–	–	–	–	–	–	–
S302	∅140	113	25.5	∅140	113	25.5	□115	117	25.5	□145	119	25.5	–	–	–
S303	∅140	150	25.5	∅140	150	25.5	∅160	160	62.0	–	–	–	–	–	–
S402	–	–	–	–	–	–	∅160	129	30.0	□145	131	30.0	□190	134	30.0
S403	∅140	162	30.0	∅140	162	30.0	∅160	172	67.0	–	–	–	–	–	–

22.3.16 V shaft design (solid shaft), NF housing design (base + round flange)



q0	Applies to motors without brake.	q1	Applies to motors with brake.
x	Applies to encoders using an optical measuring concept.	w1	For variation for One Cable Solution (OCS), see Chapter [▷ 23.4]
1)	Only for S0	–	Solid shaft on both sides available.

Dimensions of gear units

Type	a0	Øa1	Øb1	b3	b4	B	B2	c1	c2	Ød	Øe1	f1	h	H	i2	l	l1	m1	n2	n3	n4	n5	Øs	Øs1	s2	t	u
S0	75	120	80_{j6}	40	80	92	94	9	28.0	20_{k6}	100	3.0	80	143	40.0	40	3	72	22	9	92	9	6.6	6.6	M6	22.5	A6×6×32
S1	115	160	110_{j6}	40	90	90	106	10	32.0	25_{k6}	130	3.5	115	182	30.0	50	4	85	30	13	140	15	9.0	9.0	M10	28.0	A8×7×40
S2	155	200	130_{j6}	52	115	115	134	14	38.0	30_{k6}	165	3.5	143	223	33.0	60	4	108	40	20	185	23	11.0	11.0	M10	33.0	A8×7×50
S3	170	250	180_{j6}	52	130	130	153	15	40.0	40_{k6}	215	4.0	163	256	53.5	80	4	123	45	20	200	23	11.0	14.0	M16	43.0	A12×8×70
S4	200	250	180_{j6}	67	155	148	173	15	39.5	45_{k6}	215	4.0	185	288	64.0	90	4	135	50	22	230	25	14.0	14.0	M16	48.5	A14×9×80

Dimensions of additional round flanges

Type	Øa1	Øb1	c1	Øe1	f1	Øs1
S0	160	110_{j6}	10	130	3.5	9.0
S1	140	95_{j6}	10	115	3.0	9.0
S2	160	110_{j6}	14	130	3.5	9.0

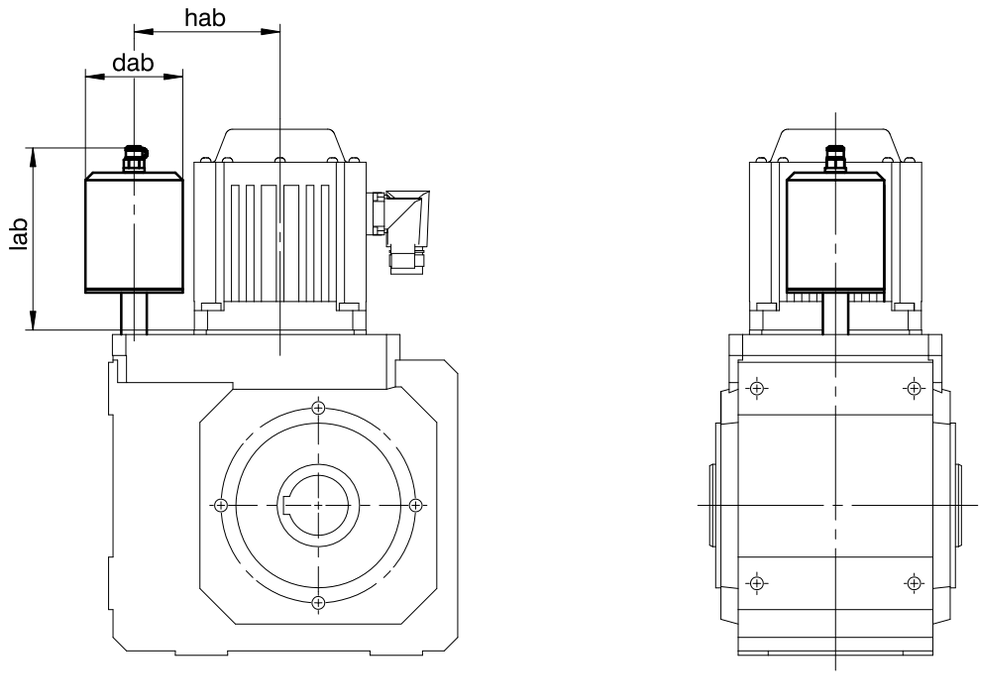
Dimensions of motors

Type	□g	q0	q1	w1	x	z0
EZ301U	72	114.0	154.0	55.5	21	78.5
EZ302U	72	136.0	176.0	55.5	21	100.5
EZ303U	72	158.0	198.0	55.5	21	122.5
EZ401U	98	118.5	167.0	91.0	22	76.5
EZ402U	98	143.5	192.0	91.0	22	101.5
EZ404U	98	193.5	242.0	91.0	22	151.5
EZ501U	115	112.0	166.5	100.0	22	77.5
EZ502U	115	137.0	191.5	100.0	22	102.5
EZ503U	115	162.0	216.5	100.0	22	127.5
EZ505U	115	212.0	266.5	100.0	22	177.5
EZ701U	145	125.0	184.0	115.0	22	87.0
EZ702U	145	150.0	209.0	115.0	22	112.0
EZ703U	145	175.0	234.0	115.0	22	137.0
EZ705U	145	230.0	289.0	134.0	22	188.0
EZ802U	190	232.5	309.5	156.5	22	178.5

Dimensions of geared motors

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	a	m	n	a	m	n	a	m	n	a	m	n	a	m	n
S002	∅140	70	8.5	∅140	70	8.5	–	–	–	–	–	–	–	–	–
S102	□72	83	14.0	□98	83	14.0	□115	87	14.0	□145	89	14.0	–	–	–
S202	□72	98	17.0	□98	98	17.0	□115	102	17.0	□145	104	17.0	–	–	–
S203	∅140	135	17.0	–	–	–	–	–	–	–	–	–	–	–	–
S302	∅140	113	25.5	∅140	113	25.5	□115	117	25.5	□145	119	25.5	–	–	–
S303	∅140	150	25.5	∅140	150	25.5	∅160	160	62.0	–	–	–	–	–	–
S402	–	–	–	–	–	–	∅160	129	30.0	□145	131	30.0	□190	134	30.0
S403	∅140	162	30.0	∅140	162	30.0	∅160	172	67.0	–	–	–	–	–	–

22.3.17 Oil expansion tank



Dimensions

Type	EZ3			EZ4			EZ5			EZ7			EZ8		
	dab	hab	lab	dab	hab	lab	dab	hab	lab	dab	hab	lab	dab	hab	lab
S102	65	66.0	162.0	65	113.0	161.0	65	130.0	156.5	–	–	–	–	–	–
S202	65	86.0	114.0	65	86.0	114.0	65	134.0	160.5	65	134.0	161.0	–	–	–
S302	65	97.5	138.0	65	97.5	138.0	65	97.5	113.5	65	145.0	161.0	–	–	–
S402	–	–	–	–	–	–	65	134.0	162.5	65	111.0	113.0	65	110.0	157.5

More information can be found in Chapter [▸ 22.6.4]

22.4 Type designation

In this chapter, you can find an explanation of the type designation with the associated options.

Additional ordering information not included in the type designation can be found at the end of the chapter.

Sample code

S	3	0	3	A	G	1700	EZ401U

Explanation

Code	Designation	Design
S	Type	Helical worm gear unit
3	Size	3 (example)
0	Generation	Generation 0
2	Stages	Two-stage
3		Three-stage
A	Shaft	Hollow shaft with keyway
S		Hollow shaft with shrink ring
V		Solid shaft
G	Housing	Pitch circle diameter
F		Round flange
NG		Foot + pitch circle diameter
NF		Foot + round flange
GD		Pitch circle diameter + torque arm
NGD		Foot + pitch circle diameter + torque arm
1700	Transmission ratio (i x 10 rounded)	i = 170.1 (example)
EZ401U	Motor	EZ synchronous servo motor

In order to complete the type designation, also specify:

- A detailed type designation of the motor, see the chapter [▶ 23]
- The mounting position, see Chapter [▶ 22.5.4]
- Attachment of solid shaft: gear unit side 3 or 4; solid shaft on both sides
- Attachment of hollow shaft with keyway: insertion side 3 or 4
- Attachment of hollow shaft with shrink ring: shrink ring on gear unit side 3 or 4
- Attachment of baseboards: gear unit side 1 or 5
- Attachment of flange: gear unit side 3 or 4
- Pitch circle diameter: gear unit side 3 or 4
- Attachment of torque arm: torque arm:

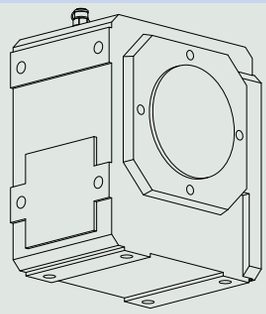
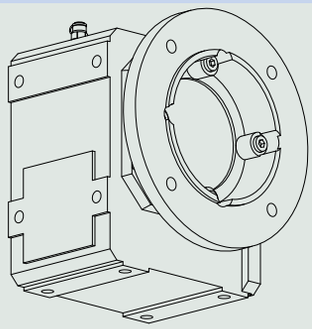
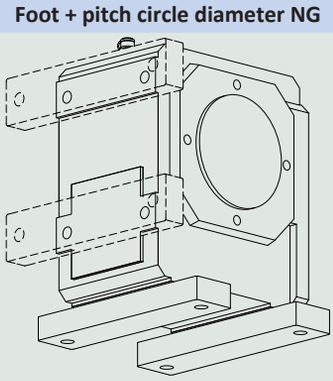
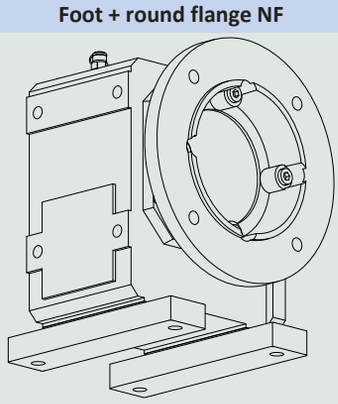
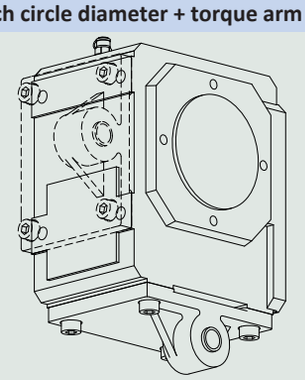
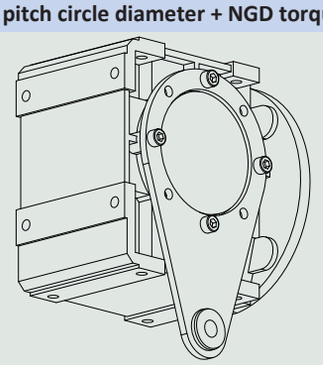
  S0: torque arm on gear unit side 3 or 4, eye on gear unit side 1, 2, 5, 25, 51

  S1 – S4: torque arm on gear unit side 1 or 5, eye on gear unit side 3 or 4
- The position of the plug connectors, see the chapter [▶ 22.5.6]
- Oil expansion tank (recommended for gear units in mounting position EL5), see the chapter [▶ 22.6.4]
- Standard or reinforced output bearing

An explanation of the gear unit sides can be found in the chapter [▶ 22.5.4].

22.5 Product description

22.5.1 Housing design

Pitch circle diameter G	Round flange F
	
Foot + pitch circle diameter NG	**Foot + round flange NF**
	
Pitch circle diameter + torque arm GD	**Foot + pitch circle diameter + NGD torque arm**
	

	G	F	NG	NF	GD	NGD
S0	–	–	✓	✓	–	✓
S1	✓	✓	✓	✓	✓	–
S2	✓	✓	✓	✓	✓	–
S3	✓	✓	✓	✓	✓	–
S4	✓	✓	✓	✓	✓	–

22.5.2 Combinatorial shaft/housing design

	Housing design						
Shaft design	**Code**	**G**	**F**	**NG**	**NF**	**GD**	**NGD**
Hollow shaft with keyway	**A**	AG	AF	ANG	ANF	AGD	ANGD
Hollow shaft with shrink ring	**S**	SG	SF	SNG	SNF	SGD	SNGD
Solid shaft	**V**	VG	VF	VNG	VNF	–	–

22.5.3 Installation conditions

Hollow shaft

The hollow shaft hole tolerance is ISO H7. The tolerance of the machine shaft must be ISO k6.

Take care to align the machine shaft with the gear unit hollow shaft when attaching the gear unit.

Maximum deviation ≤ 0.03 mm.

For simpler assembly and disassembly of the machine shaft, the hollow shafts are equipped with a spiral groove (as a grease deposit).

A hardened, threaded keeper plate is included in the scope of delivery. You also have the option to order the hollow shaft without a keeper plate.

Hollow shaft with shrink ring

The tolerance of the hollow shaft hole is ISO H7.

The machine shaft must be ISO h9.

Select a material for the machine shaft with a permitted surface pressure of $p \geq 325\ N/mm^2$.

Possible materials:

- C45E +QT
- 42CrMo4

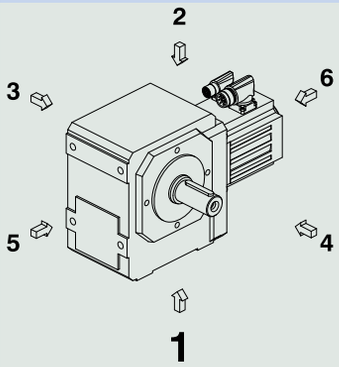
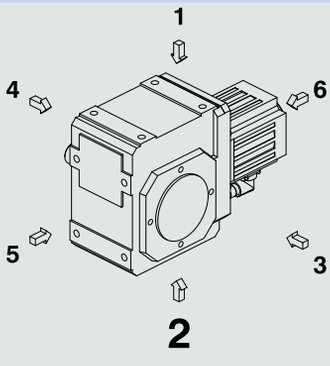
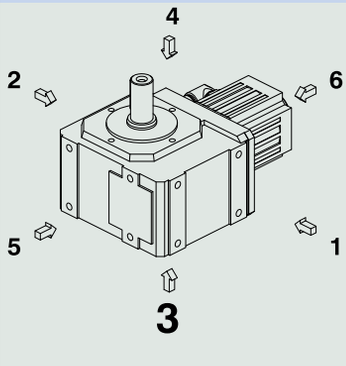
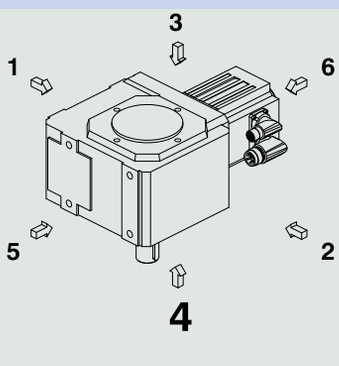
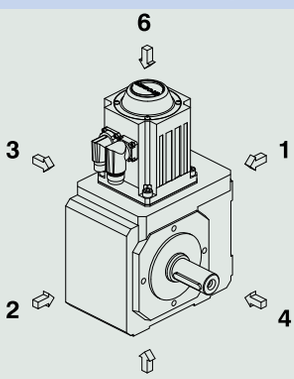
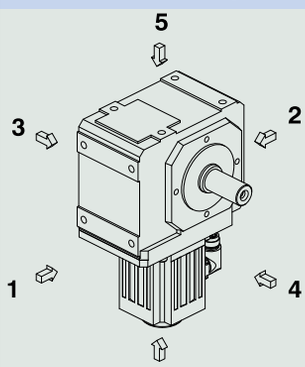
Attaching the gear unit on the machine side using the pitch circle diameter

The specified torques and forces only apply when attaching gear units at the machine side using screws of quality 10.9. In addition, the gear housing must be adjusted at the pilot (H7).

22.5.4 Mounting positions

The following table shows the standard mounting positions.

The numbers identify the gear unit sides. The mounting position is defined by the gear side facing downwards.

EL1	EL2	EL3
		
EL4	**EL5**	**EL6**
		

Since the lubricant filling volume of the gear unit depends on the mounting position, the mounting position must be specified when ordering.

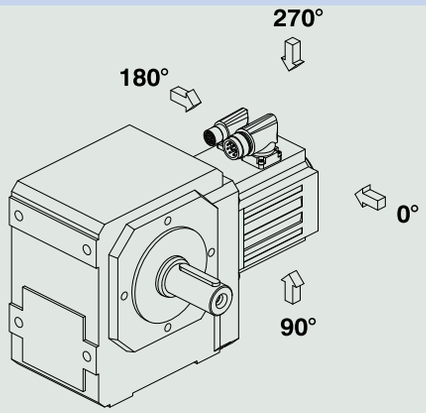
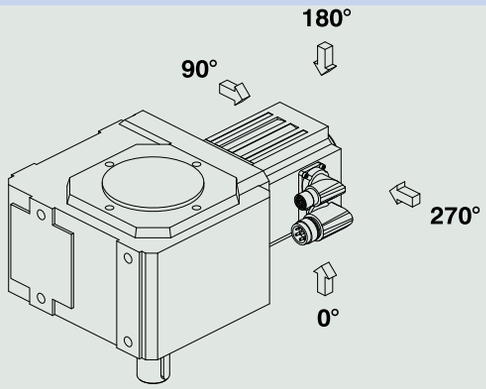
22.5.5 Lubricants

STOBER fills the gear units with the amount and type of lubricant specified on the nameplate. The filling volume and the structure of the gear units depend on the mounting position.

Only install the gear units in the intended mounting position! Reposition the gear units only after consulting STOBER. Otherwise, STOBER assumes no liability for the gear units.

Lubricant filling quantities for gear units, document ID 441871, can be found online at http://www.stoeber.de/en/download. Enter the ID of the documentation in the Search... field.

22.5.6 Position of the plug connectors

Mounting position EL1	Mounting position EL4
Plug connector in 270° position (standard)	Plug connector in 270° position (standard)
	

Indicate variations for your geared motor in the purchase order.

Note that the plug connector position rotates along with the geared motor if the geared motor is in another mounting position.

22.5.7 Other product features

Feature	Value
Max. permitted gear unit temperature (on the surface of the gear unit)	≤ 80 °C
Paint	Black RAL 9005
(ATEX) Directive 2014/34/EU (option)	Not suitable
Protection class:[1]	
Gear unit	IP65
Motor	IP56, optionally IP66

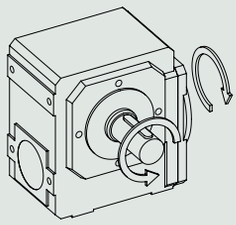
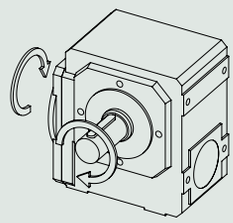
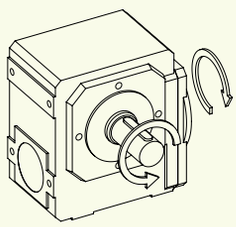
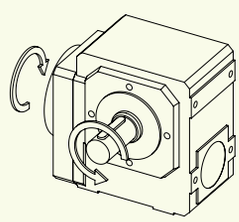
22.5.8 Maintenance

The instructions for maintenance can be found in the operating manual, ID 443027_en, at http://www.stoeber.de/en/download. Enter the ID of the documentation in the Search... field.

[1] Observe the protection class of all the components.

22.5.9 Direction of rotation

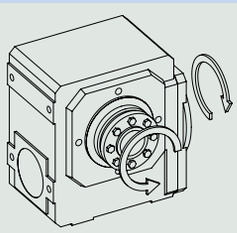
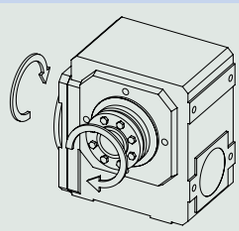
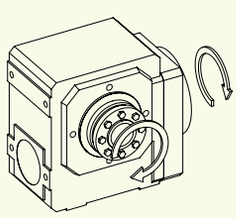
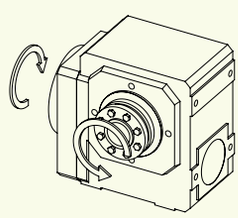
Solid shaft (V), solid shaft on both sides (V), hollow shaft with keyway (A)

Type	Output side 4	Output side 3
S002 – S402		
S203 – S403		

The specified directions of rotation also apply to gear units with hollow shaft (A) if the insertion side of the machine shaft corresponds to the side of the solid shaft that is shown.

The pictures show mounting position EL1.

Hollow shaft with shrink ring (S)

Type	Output side 4	Output side 3
S002 – S402		
S203 – S403		

The pictures show mounting position EL1.

22.6 Project configuration

Project your drives using our SERVOsoft designing software. You can receive SERVOsoft for free from your adviser at one of our sales centers. Observe the limit conditions in this chapter to ensure a safe design for your drives.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

22.6.1 Calculation of the operating point

Check the following conditions for operating points other than the nominal point M_{2N} specified in the selection tables.

For continuous operation in mounting positions EL1, EL2:

$$n_{1m^*} \leq \frac{n_{1maxDBEL1,2}}{fB_T}$$

For continuous operation in mounting positions EL3, EL4, EL5, EL6:

$$n_{1m^*} \leq \frac{n_{1maxDBEL3,4,5,6}}{fB_T}$$

For all mounting positions:

$$n_{1max^*} \leq \frac{n_{1max\,ZB}}{fB_T}$$

$$M_{2eff^*} \leq M_{2th}$$

$$M_{2acc^*} \leq M_{2acc}$$

$$M_{2NOT^*} \leq M_{2NOT}$$

$$M_{2eq^*} \leq M_{2N} \cdot \frac{S}{fB_{op} \cdot fB_t}$$

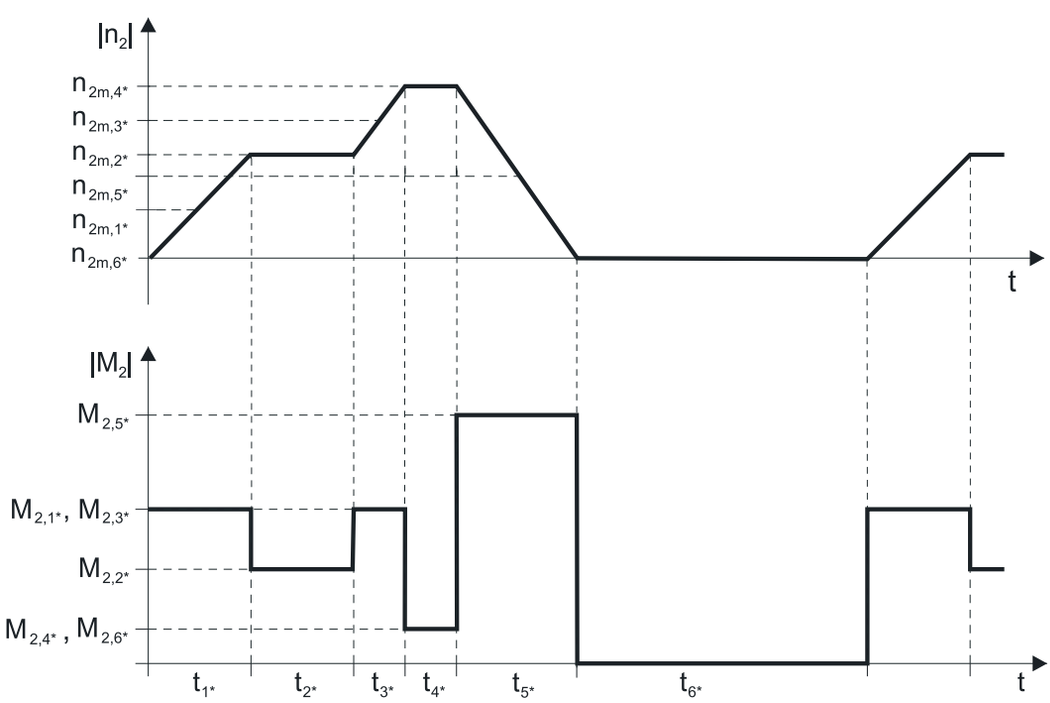
Refer to the selection tables for the values for $n_{1maxDBEL1,2}$ and $n_{1maxDBEL3,4,5,6}$, n_{1maxZB}, M_{2acc}, M_{2NOT}, M_{2N} and S.

The values for fB_T, fB_{op} and fB_t can be found in the corresponding tables in this chapter.

Calculate the thermal limit torque M_{2th} for a duty cycle > 50%.

Example of cyclic operation

The following calculations are based on a representation of the power taken from the output based in accordance with the following example:



Calculation of the actual average input speed

$$n_{1m^*} = n_{2m^*} \cdot i$$

$$n_{2m^*} = \frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}{t_{1^*} + \ldots + t_{n^*}}$$

If $t_{1^*} + \ldots + t_{5^*} \geq 20$ min, calculate n_{2m^*} without the rest phase t_{6^*}.

The values for the ratio i can be found in the selection tables.

Calculation of the actual effective torque

$$M_{2eff^*} = \sqrt{\frac{t_{1^*} \cdot M_{2,1^*}{}^2 + \ldots + t_{n^*} \cdot M_{2,n^*}{}^2}{t_{1^*} + \ldots + t_{n^*}}}$$

Calculation of the actual equivalent torque

$$M_{2eq^*} = \sqrt[3]{\frac{\left|n_{2m,1^*}\right| \cdot t_{1^*} \cdot \left|M_{2,1^*}{}^3\right| + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*} \cdot \left|M_{2,n^*}{}^3\right|}{\left|n_{2m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{2m,n^*}\right| \cdot t_{n^*}}}$$

Calculation of the thermal limit torque

Calculate the thermal limit torque M_{2th} for a duty cycle ED_{20} > 50% and the actual average input speed n_{1m^*}. (At $K_{mot,th} \leq 0$ you must reduce the average input speed n_{1m^*} accordingly or select another geared motor size.)

$$M_{2th} = M_{op} \cdot i \cdot K_{mot,th}$$

Ratio i < 40:

$$K_{mot,th} = 0,8 - \frac{a_{th}}{1000} \cdot athEL \cdot fB_T \cdot \left(\frac{n_{1m^*}}{1000}\right)^2$$

Ratio 40 < i ≤ 100:

$$K_{mot,th} = 0,7 - \frac{a_{th}}{1000} \cdot athEL \cdot fB_T \cdot \left(\frac{n_{1m^*}}{1000}\right)^2$$

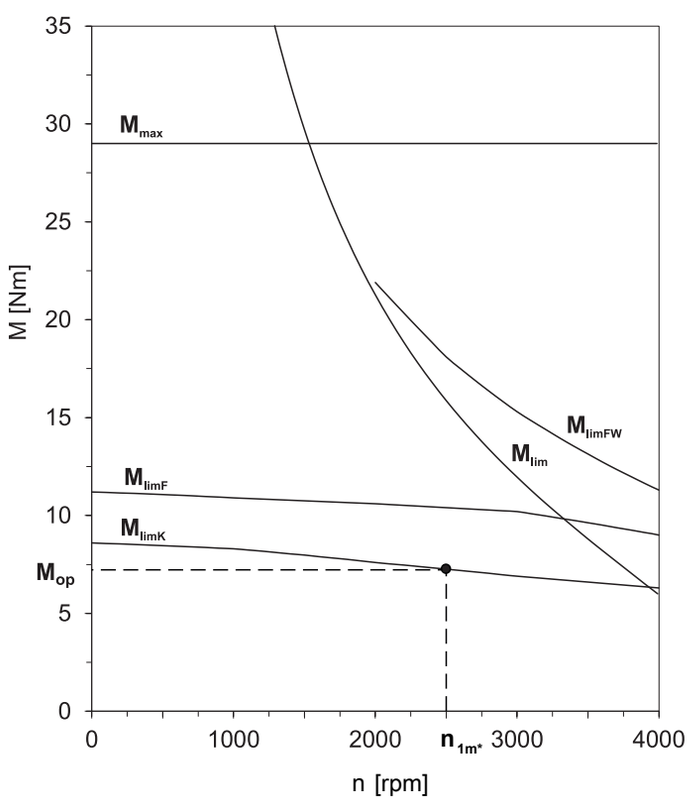
Ratio i > 100:

$$K_{mot,th} = 0,65 - \frac{a_{th}}{1000} \cdot athEL \cdot fB_T \cdot \left(\frac{n_{1m^*}}{1000}\right)^2$$

The values for i and a_{th} can be found in the selection tables.

The values for a_{thEL} and fB_T can be found in the corresponding tables in this chapter.

The value for the torque of the motor at operating point M_{op} with the determined average input speed n_{1m^*} can be found in the motor curve of Chapter [▶ 23.3]. Note the size, nominal speed n_N and cooling type of the motor. The figure below shows an example of reading the torque M_{op} of a motor with convection cooling at the operating point.



Operating factors

Parameter a_{thEL}

Mounting position	a_{thEL}
EL1, 2	1.0
EL3, 4, 5, 6	1.1

Operating mode	fB_{op}
Uniform continuous operation	1.00
Cyclic operation	1.25
Reversing load cyclic operation	1.40

Run time	fB_t
Daily run time ≤ 8 h	1.00
Daily run time ≤ 16 h	1.15
Daily run time ≤ 24 h	1.20

Temperature		fB_T
Motor cooling	**Surrounding temperature**	
Motor with forced ventilation	≤ 20 °C	0.9
	≤ 30 °C	1.0
	≤ 40 °C	1.15
Motor with convection cooling	≤ 20 °C	1.0
	≤ 30 °C	1.1
	≤ 40 °C	1.25

Notes

- The maximum permitted gear unit temperature (see the "Other product features" chapter) must not be exceeded. Doing so may result in damage to the geared motor.
- For braking from full speed (for example when the power fails or when setting up the machine), note the permitted gear unit torques (M_{2acc}, M_{2NOT}) in the selection tables.

22.6.2 Permitted shaft loads for the output shaft

The values specified in the tables apply to the permitted shaft loads:

- For shaft dimensions in accordance with the catalog
- For output speeds $n_{2m*} \leq 20$ rpm ($F_{2axN} = F_{2ax20}$; $F_{2radN} = F_{2rad20}$; $M_{2kN} = M_{2k20}$)
- Only if radial forces on the gear unit are stabilized by its pilots for the pitch circle diameter and flange housing design

22.6.2.1 V shaft design

Permitted shaft loads for V shaft design (solid shaft)

Type	z_2 [mm]	F_{2ax20} [N]	F_{2rad20} [N]	M_{2k20} [Nm]
S0	31.0	1050	3500	180
S1	37.0	1650	5000	350
S2	38.0	2400	7000	550
S3	46.0	3000	10000	900
S4	47.0	3900	13000	1200

Reduced values apply in the case of a V shaft design (solid shaft) in conjunction with an NF housing design (foot + round flange):

Type	z_2 [mm]	F_{2ax20} [N]	F_{2rad20} [N]	M_{2k20} [Nm]
S0	46.0	1050	2700	180

For the V solid shaft design on both sides, the values for F_{2rad20} and M_{2k20} must be multiplied by a factor of 0.7.

For other output speeds, download diagrams at http://products.stoeber.de.

The following applies to output speeds n_{2m*} > 20 rpm:

$$F_{2axN} = \frac{F_{2ax20}}{\sqrt[3]{\frac{n_{2m*}}{20\ rpm}}} \qquad F_{2radN} = \frac{F_{2rad20}}{\sqrt[3]{\frac{n_{2m*}}{20\ rpm}}} \qquad M_{2kN} = \frac{M_{2k20}}{\sqrt[3]{\frac{n_{2m*}}{20\ rpm}}}$$

The values for F_{2ax20}, F_{2rad20} and M_{2k20} can be found in the table "Permitted shaft loads" in this chapter.

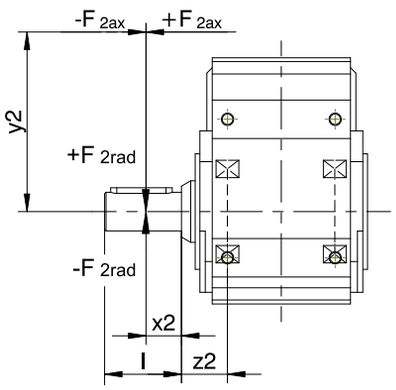


Fig. 1: Force application points for solid shaft

The specified values for F_{2rad20} are based on application of force at the middle of the output shaft: $x_2 = l/2$.

Shaft dimensions can be found in the "Dimensional drawings" chapter.

The following applies to other force application points:

$$M_{2k*} = \frac{2 \cdot F_{2ax*} \cdot y_2 + F_{2rad*} \cdot (x_2 + z_2)}{1000} \leq M_{2kN}$$

$$F_{2rad*} \leq F_{2radN}$$

$$F_{2ax*} \leq F_{2axN}$$

For applications with multiple axial and/or radial forces, you must add the forces as vectors.

In the event of EMERGENCY OFF operation (max. 1000 load changes), you can multiply the permitted forces and torques for F_{2ax20}, F_{2rad20} and M_{2k20} by a factor of two.

22.6.2.2 A and S shaft design

Permitted shaft loads for A shaft design (hollow shaft with keyway)

Type	z_2 [mm]	F_{2ax20} [N]	F_{2rad20} [N]	M_{2k20} [Nm]
S0	25.0	1050	3500	150
S1	32.0	1650	5000	200
S2	35.0	1700	7000	350
S3	39.0	2100	10000	600
S4	40.0	2800	13000	800

Permitted shaft loads for S shaft design (hollow shaft with shrink ring)

Type	z_2 [mm]	F_{2ax20} [N]	F_{2rad20} [N]	M_{2k20} [Nm]
S0	25.0	1050	3500	150
S1	32.0	1650	5000	200
S2	35.0	1700	7000	350
S3	39.0	2100	10000	600
S4	40.0	2800	13000	800

For other output speeds, download diagrams at http://products.stoeber.de.

The following applies to output speeds n_{2m*} > 20 rpm:

$$F_{2axN} = \frac{F_{2ax20}}{\sqrt[3]{\frac{n_{2m*}}{20\ rpm}}} \qquad F_{2radN} = \frac{F_{2rad20}}{\sqrt[3]{\frac{n_{2m*}}{20\ rpm}}} \qquad M_{2kN} = \frac{M_{2k20}}{\sqrt[3]{\frac{n_{2m*}}{20\ rpm}}}$$

The values for F_{2ax20}, F_{2rad20} and M_{2k20} can be found in the table "Permitted shaft loads" in this chapter.

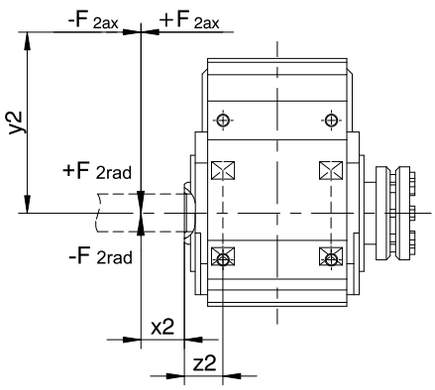


Fig. 2: Force application points for hollow shaft

You can determine the permitted radial forces from the permitted breakdown torque M_{2kN}. The actual radial forces may not exceed the permitted radial forces. The permitted radial forces are in relation to the end of the hollow shaft (x2 = 0).

$$M_{2k*} = \frac{2 \cdot F_{2ax*} \cdot y_2 + F_{2rad*} \cdot (x_2 + z_2)}{1000} \leq M_{2kN}$$

$$F_{2ax*} \leq F_{2axN}$$

For applications with multiple axial and/or radial forces, you must add the forces as vectors.

In the event of EMERGENCY OFF operation (max. 1000 load changes), you can multiply the permitted forces and torques for F_{2ax20}, F_{2rad20} and M_{2k20} by a factor of two.

22.6.3 Radial shaft seal rings

Leak-proofness

Our gear units are equipped with high-quality radial shaft seal rings and checked for leak-proofness. However, a leak cannot be fully ruled out over the length of use of a gear unit. If you use a gear unit with goods incompatible with the lubricant, you must take measures to prevent direct contact with the gear unit lubricant in case of a leak.

22.6.4 Oil expansion tank

The gear units have a higher fill level in mounting position EL5. The oil expansion tank prevents oil from escaping out of the gear unit.

Notes

- We recommend using an oil expansion tank in mounting position EL5 (additional cost) for fast running gear units with an input speed n_1 > 1750 rpm and gear ratios i < 20.
- It is not possible to use an oil expansion tank if the plug connector is at 90°!
- The oil expansion tank can only be used with certain sizes; see the chapter [▷ 12.3.5]

22.7 Additional documentation

Additional documentation related to the product can be found at http://www.stoeber.de/en/download

Enter the ID of the documentation in the Search... field.

Documentation	ID
Operating manual for C/F/K/S gear units and gear motors	443027_en
Lubricant filling quantities for gear units	441871

23 EZ synchronous servo motors

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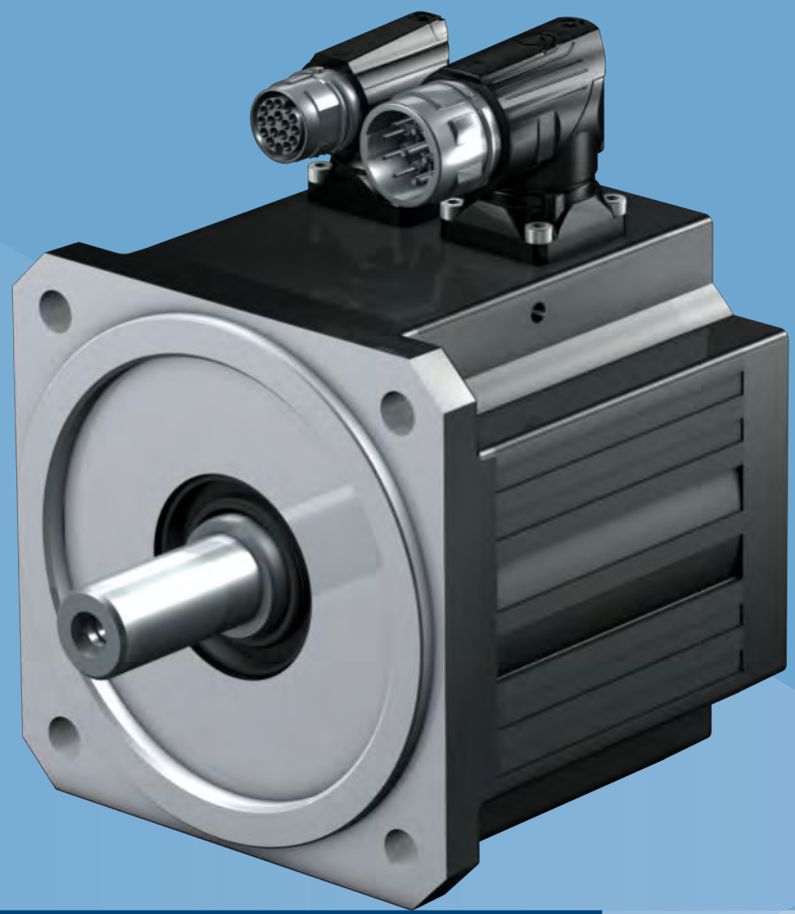


23 Synchronous servo motors EZ

23.1 Overview

Synchronous servo motors with single tooth winding

Features

High dynamics	✓
Short length	✓
Super compact due to tooth-coil winding method with the highest possible copper fill factor	✓
Backlash-free holding brake (optional)	✓
Electronic nameplate for fast and reliable commissioning	✓
Convection cooling or forced ventilation (optional)	✓
Optical, inductive EnDat absolute encoders or resolvers	✓
Elimination of referencing with multi-turn absolute encoders (optional)	✓
One Cable Solution (OCS) with HIPERFACE DSL encoder (optional)	✓
Rotating plug connectors with quick lock	✓

Torques

M_N	0.89 – 77.2 Nm
M_0	0.95 – 94 Nm

23.2 Selection tables

The technical data specified in the selection tables applies to:

- Installation altitudes up to 1000 m above sea level
- Surrounding temperatures from −15 °C to +40 °C
- Operation on a STOBER drive controller
- DC link voltage U_{ZK} = DC 540 V
- Coating: RAL 9005 Jet black, matte

In addition, the technical data applies to an uninsulated design with the following thermal mounting conditions:

Type	Dimensions of steel mounting flange (thickness x width x height)	Convection surface area Steel mounting flange
EZ3 – EZ5	23 x 210 x 275 mm	0.16 m^2
EZ7 – EZ8	28 x 300 x 400 mm	0.3 m^2

Note the differing ambient conditions in Chapter Derating

Formula symbols

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

Observe the additional information on the following formula symbols:

- I_0 = RMS value of the line-to-line current when stall torque M_0 is generated (tolerance ±5%).
- I_{max} = RMS value of the short-term maximum permitted line-to-line current when maximum torque M_{max} is generated (tolerance ±5%). Exceeding I_{max} may lead to irreversible damage (demagnetization) of the rotor.
- I_N = RMS value of the line-to-line current when nominal torque M_N is generated at the nominal point (tolerance ±5%).
- M_0 = Torque that a motor is continuously able to deliver at a speed of 10 rpm (tolerance ±5%). At a speed of 0 rpm, a minor continuous torque has to be taken into account. Contact your STOBER customer advisor for such an application.

23.2.1 EZ motors with convection cooling

Type	K_{EM} [V/1000 rpm]	n_N [rpm]	M_N [Nm]	I_N [A]	$K_{M,N}$ [Nm/A]	P_N [kW]	M_0 [Nm]	I_0 [A]	K_{M0} [Nm/A]	M_R [Nm]	M_{max} [Nm]	I_{max} [A]	R_{U-V} [Ω]	L_{U-V} [mH]	T_{el} [ms]	J_{dyn} [10^{-4} kgm²]	m_{dyn} [kg]
EZ301U	40	6000	0.89	1.93	0.46	0.56	0.95	2.02	0.49	0.04	2.80	12.7	11.70	39.80	3.40	0.19	1.50
EZ301U	40	3000	0.93	1.99	0.47	0.29	0.95	2.02	0.49	0.04	2.80	12.7	11.70	39.80	3.40	0.19	1.50
EZ302U	42	6000	1.50	3.18	0.47	0.94	1.68	3.48	0.49	0.04	5.00	17.8	4.50	18.70	4.16	0.29	2.10
EZ302U	86	3000	1.59	1.60	0.99	0.50	1.68	1.67	1.03	0.04	5.00	8.55	17.80	75.00	4.21	0.29	2.10
EZ303U	55	6000	1.96	3.17	0.62	1.2	2.25	3.55	0.65	0.04	7.00	16.9	4.90	21.10	4.31	0.40	2.60
EZ303U	109	3000	2.07	1.63	1.27	0.65	2.19	1.71	1.30	0.04	7.00	8.25	20.30	68.70	5.24	0.40	2.60
EZ401U	47	6000	2.30	4.56	0.50	1.4	2.80	5.36	0.53	0.04	8.50	33.0	1.94	11.52	5.94	0.93	4.00
EZ401U	96	3000	2.80	2.74	1.02	0.88	3.00	2.88	1.06	0.04	8.50	16.5	6.70	37.70	5.63	0.93	4.00
EZ402U	60	6000	3.50	5.65	0.62	2.2	4.90	7.43	0.66	0.04	16.0	43.5	1.20	8.88	7.40	1.63	5.10
EZ402U	94	3000	4.70	4.40	1.07	1.5	5.20	4.80	1.09	0.04	16.0	26.5	3.00	21.80	7.26	1.63	5.10
EZ404U	78	6000	5.80	7.18	0.81	3.6	8.40	9.78	0.86	0.04	29.0	51.0	0.89	7.07	7.94	2.98	7.20
EZ404U	116	3000	6.90	5.80	1.19	2.2	8.60	6.60	1.31	0.04	29.0	35.0	1.85	15.00	8.11	2.98	7.20
EZ501U	68	6000	3.40	4.77	0.71	2.1	4.40	5.80	0.77	0.06	16.0	31.0	2.10	12.10	5.76	2.90	5.00
EZ501U	97	3000	4.30	3.74	1.15	1.4	4.70	4.00	1.19	0.06	16.0	22.0	3.80	23.50	6.18	2.90	5.00
EZ502U	72	6000	5.20	7.35	0.71	3.3	7.80	9.80	0.80	0.06	31.0	59.0	0.76	5.60	7.37	5.20	6.50
EZ502U	121	3000	7.40	5.46	1.36	2.3	8.00	5.76	1.40	0.06	31.0	33.0	2.32	16.80	7.24	5.20	6.50
EZ503U	84	6000	6.20	7.64	0.81	3.9	10.6	11.6	0.92	0.06	43.0	63.5	0.62	5.00	8.06	7.58	8.00
EZ503U	119	3000	9.70	6.90	1.41	3.1	11.1	7.67	1.46	0.06	43.0	41.0	1.25	10.00	8.00	7.58	8.00
EZ505U	103	4500	9.50	8.94	1.06	4.5	15.3	13.4	1.15	0.06	67.0	73.0	0.50	4.47	8.94	12.2	10.9
EZ505U	141	3000	13.5	8.80	1.53	4.2	16.0	10.0	1.61	0.06	67.0	52.0	0.93	8.33	8.96	12.2	10.9
EZ701U	76	6000	5.20	6.68	0.78	3.3	7.90	9.38	0.87	0.24	20.0	31.0	0.87	8.13	9.34	8.50	8.30
EZ701U	95	3000	7.40	7.20	1.03	2.3	8.30	8.00	1.07	0.24	20.0	25.0	1.30	12.83	9.87	8.50	8.30
EZ702U	82	6000	7.20	8.96	0.80	4.5	14.3	16.5	0.88	0.24	41.0	60.5	0.34	3.90	11.47	13.7	10.8
EZ702U	133	3000	12.0	8.20	1.46	3.8	14.4	9.60	1.53	0.24	41.0	36.0	1.00	11.73	11.73	13.7	10.8
EZ703U	99	4500	12.1	11.5	1.05	5.7	20.0	17.8	1.14	0.24	65.0	78.0	0.36	4.42	12.28	21.6	12.8
EZ703U	122	3000	16.5	11.4	1.45	5.2	20.8	14.0	1.50	0.24	65.0	62.0	0.52	6.80	13.08	21.6	12.8
EZ705U	106	4500	16.4	14.8	1.11	7.7	30.0	25.2	1.20	0.24	104	114	0.22	2.76	12.55	34.0	18.3
EZ705U	140	3000	21.3	14.2	1.50	6.7	30.2	19.5	1.56	0.24	104	87.0	0.33	4.80	14.55	34.0	18.3
EZ802U	90	4500	10.5	11.2	0.94	5.0	34.5	33.3	1.05	0.30	100	135	0.13	1.90	14.60	58.0	26.6
EZ802U	136	3000	22.3	13.9	1.60	7.0	37.1	22.3	1.68	0.30	100	84.0	0.30	5.00	16.66	58.0	26.6
EZ803U	131	3000	26.6	17.7	1.50	8.4	48.2	31.1	1.56	0.30	145	124	0.18	2.79	15.50	83.5	32.7
EZ805U	142	2000	43.7	25.9	1.69	9.2	66.1	37.9	1.75	0.30	205	155	0.13	2.22	17.08	133	45.8

23.2.2 EZ motors with forced ventilation

Type	K_{EM} [V/1000 rpm]	n_N [rpm]	M_N [Nm]	I_N [A]	$K_{M,N}$ [Nm/A]	P_N [kW]	M_0 [Nm]	I_0 [A]	K_{M0} [Nm/A]	M_R [Nm]	M_{max} [Nm]	I_{max} [A]	R_{U-V} [Ω]	L_{U-V} [mH]	T_{el} [ms]	J_{dyn} [10^{-4} kgm²]	m_{dyn} [kg]
EZ401B	47	6000	2.90	5.62	0.52	1.8	3.50	6.83	0.52	0.04	8.50	33.0	1.94	11.52	5.94	0.93	5.40
EZ401B	96	3000	3.40	3.40	1.00	1.1	3.70	3.60	1.04	0.04	8.50	16.5	6.70	37.70	5.63	0.93	5.40
EZ402B	60	6000	5.10	7.88	0.65	3.2	6.40	9.34	0.69	0.04	16.0	43.5	1.20	8.88	7.40	1.63	6.50
EZ402B	94	3000	5.90	5.50	1.07	1.9	6.30	5.80	1.09	0.04	16.0	26.5	3.00	21.80	7.26	1.63	6.50
EZ404B	78	6000	8.00	9.98	0.80	5.0	10.5	12.0	0.88	0.04	29.0	51.0	0.89	7.07	7.94	2.98	8.60
EZ404B	116	3000	10.2	8.20	1.24	3.2	11.2	8.70	1.29	0.04	29.0	35.0	1.85	15.00	8.11	2.98	8.60
EZ501B	68	6000	4.50	6.70	0.67	2.8	5.70	7.50	0.77	0.06	16.0	31.0	2.10	12.10	5.76	2.90	7.00
EZ501B	97	3000	5.40	4.70	1.15	1.7	5.80	5.00	1.17	0.06	16.0	22.0	3.80	23.50	6.18	2.90	7.00
EZ502B	72	6000	8.20	11.4	0.72	5.2	10.5	13.4	0.79	0.06	31.0	59.0	0.76	5.60	7.37	5.20	8.50
EZ502B	121	3000	10.3	7.80	1.32	3.2	11.2	8.16	1.38	0.06	31.0	33.0	2.32	16.80	7.24	5.20	8.50
EZ503B	84	6000	10.4	13.5	0.77	6.5	14.8	15.9	1.07	0.06	43.0	63.5	0.62	5.00	8.06	7.58	10.0
EZ503B	119	3000	14.4	10.9	1.32	4.5	15.9	11.8	1.35	0.06	43.0	41.0	1.25	10.00	8.00	7.58	10.0
EZ505B	103	4500	16.4	16.4	1.00	7.7	22.0	19.4	1.14	0.06	67.0	73.0	0.50	4.47	8.94	12.2	12.9
EZ505B	141	3000	20.2	13.7	1.47	6.4	23.4	14.7	1.60	0.06	67.0	52.0	0.93	8.33	8.96	12.2	12.9
EZ701B	76	6000	7.50	10.6	0.71	4.7	10.2	12.4	0.84	0.24	20.0	31.0	0.87	8.13	9.34	8.50	13.3
EZ701B	95	3000	9.70	9.50	1.02	3.1	10.5	10.0	1.07	0.24	20.0	25.0	1.30	12.83	9.87	8.50	13.3
EZ702B	82	6000	12.5	16.7	0.75	7.9	19.3	22.1	0.89	0.24	41.0	60.5	0.34	3.90	11.47	13.7	15.8
EZ702B	133	3000	16.6	11.8	1.41	5.2	19.3	12.9	1.51	0.24	41.0	36.0	1.00	11.73	11.73	13.7	15.8
EZ703B	99	4500	19.8	20.3	0.98	9.3	27.2	24.2	1.13	0.24	65.0	78.0	0.36	4.42	12.28	21.6	17.8
EZ703B	122	3000	24.0	18.2	1.32	7.5	28.0	20.0	1.41	0.24	65.0	62.0	0.52	6.80	13.08	21.6	17.8
EZ705B	106	4500	27.7	25.4	1.09	13	39.4	32.8	1.21	0.24	104	114	0.22	2.76	12.55	34.0	23.3
EZ705B	140	3000	33.8	22.9	1.48	11	41.8	26.5	1.59	0.24	104	87.0	0.33	4.80	14.55	34.0	23.3
EZ802B	90	4500	30.6	30.5	1.00	14	47.4	45.1	1.06	0.30	100	135	0.13	1.90	14.60	58.0	31.6
EZ802B	136	3000	34.3	26.5	1.29	11	47.9	28.9	1.67	0.30	100	84.0	0.30	5.00	16.66	58.0	31.6
EZ803B	131	3000	49.0	35.9	1.37	15	66.7	42.3	1.58	0.30	145	124	0.18	2.79	15.50	83.5	37.7
EZ805B	142	2000	77.2	45.2	1.71	16	94.0	53.9	1.75	0.30	205	155	0.13	2.22	17.08	133	51.8

23.3 Torque/speed curves

Torque/speed curves depend on the nominal speed and/or winding design of the motor and the DC link voltage of the drive controller that is used. The following torque/speed curves apply to the DC link voltage DC 540 V.

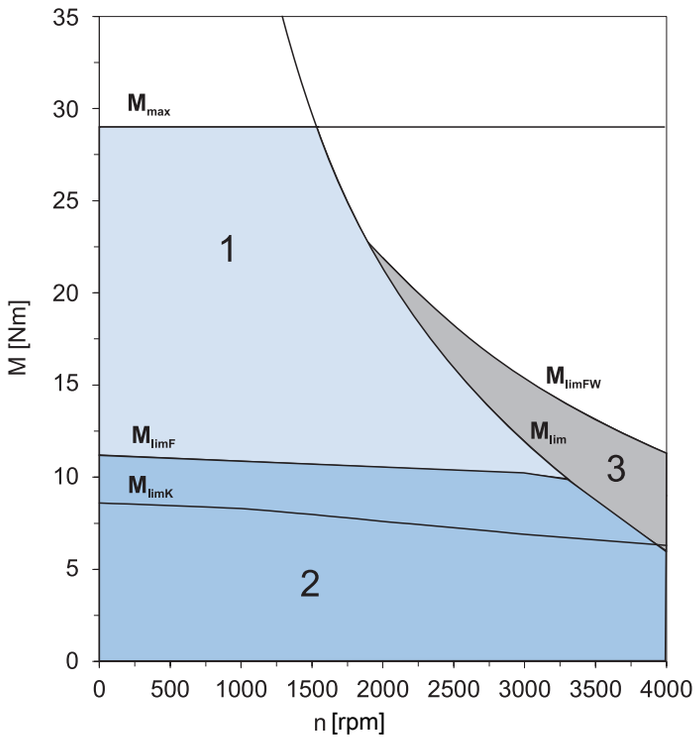
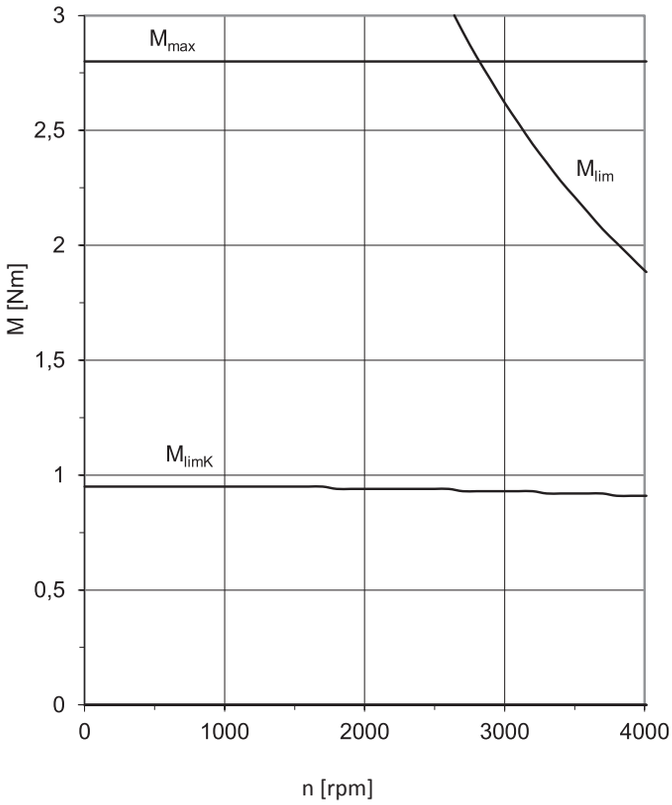


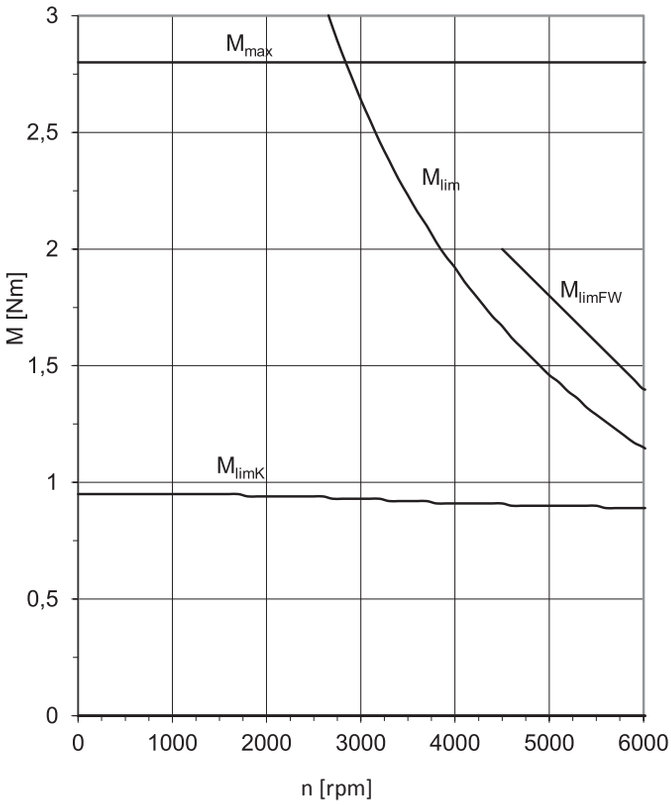
Fig. 1: Explanation of a torque/speed curve

1	Torque range for brief operation (ED_{10} < 100%) with $\Delta\vartheta$ = 100 K	2	Torque range for continuous operation with constant load (S1 mode, ED_{10} = 100%) with $\Delta\vartheta$ = 100 K
3	Field weakening range (can be used only with operation on STOBER drive controllers)		

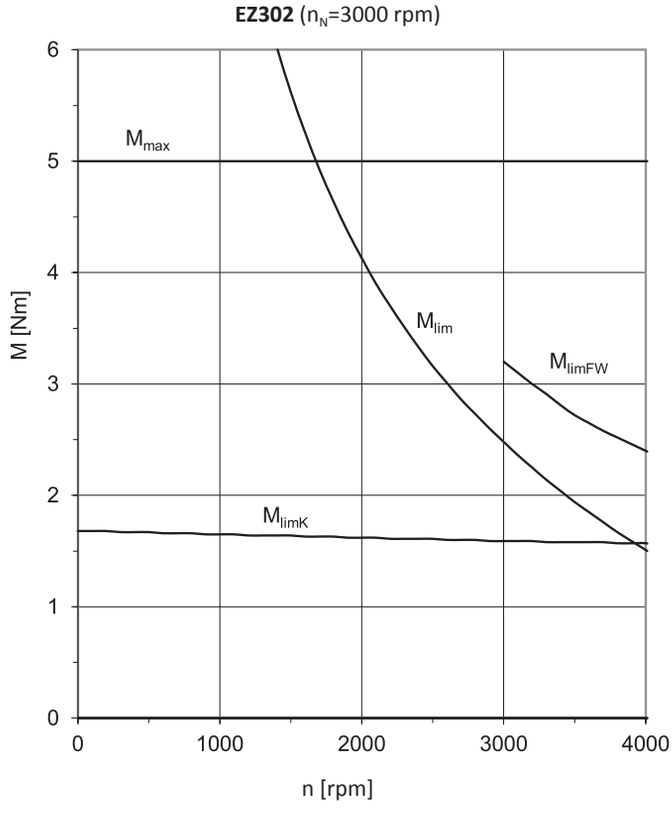
EZ301 (n_N=3000 rpm)



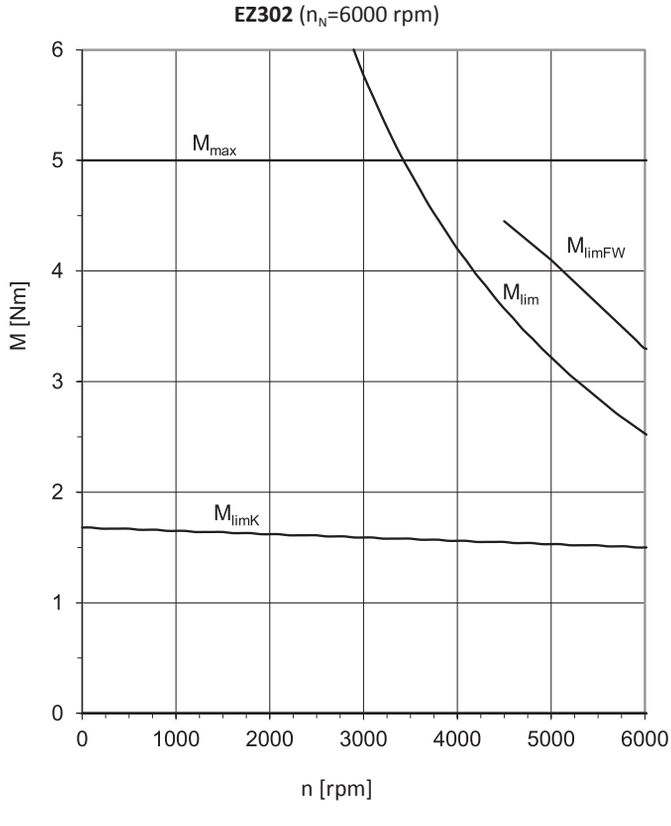
EZ301 (n_N=6000 rpm)



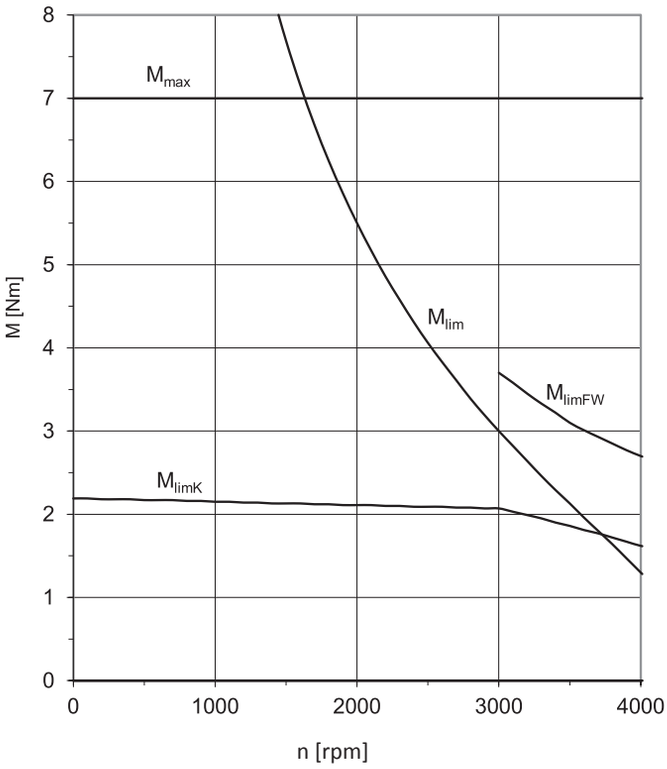
EZ302 (n_N=3000 rpm)



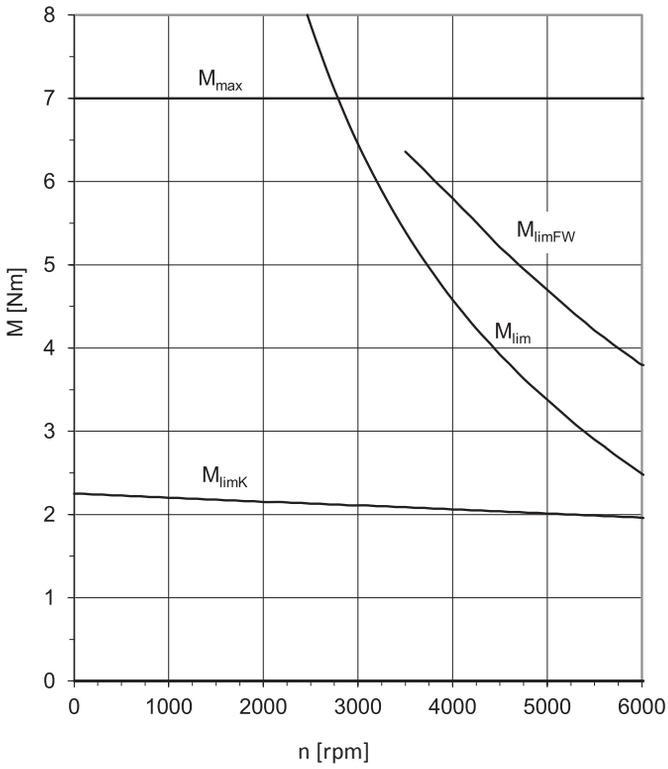
EZ302 (n_N=6000 rpm)



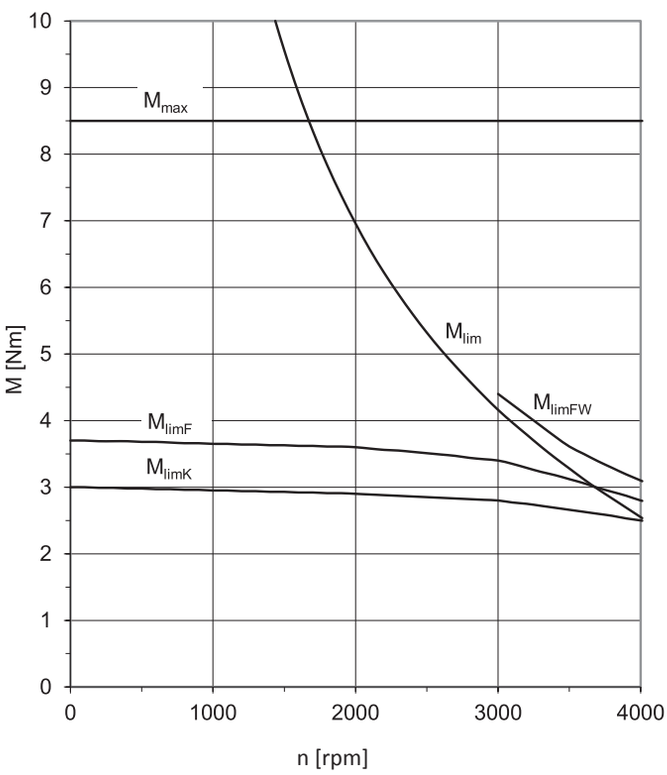
EZ303 (n_N=3000 rpm)



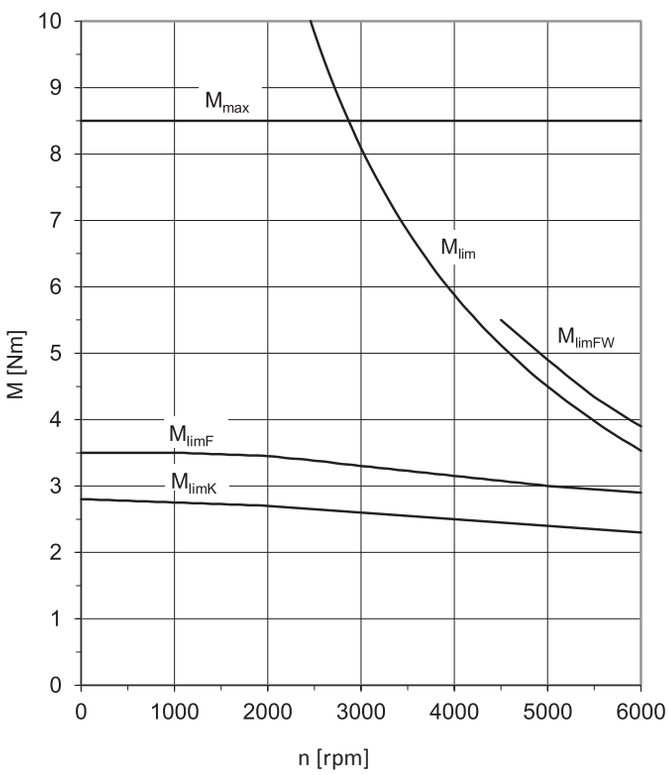
EZ303 (n_N=6000 rpm)



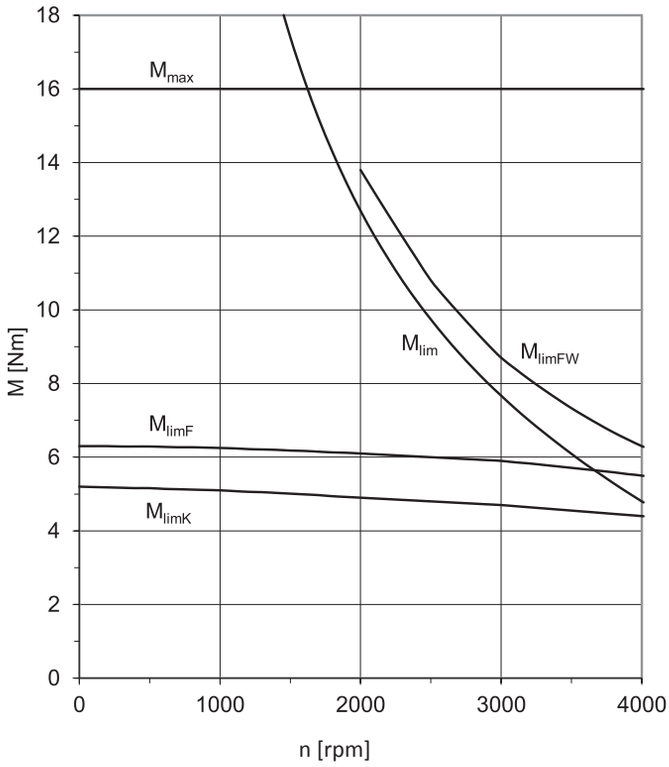
EZ401 (n_N=3000 rpm)



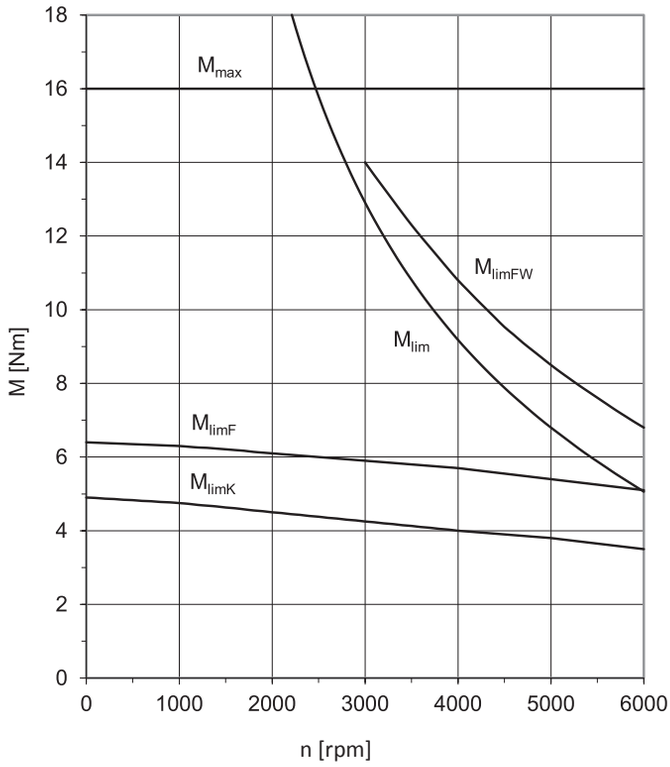
EZ401 (n_N=6000 rpm)



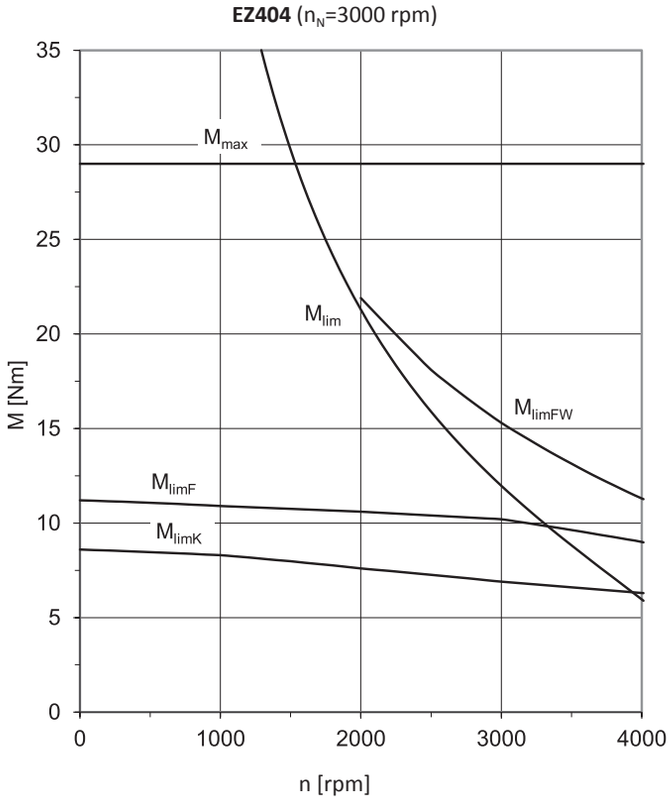
EZ402 (n_N=3000 rpm)



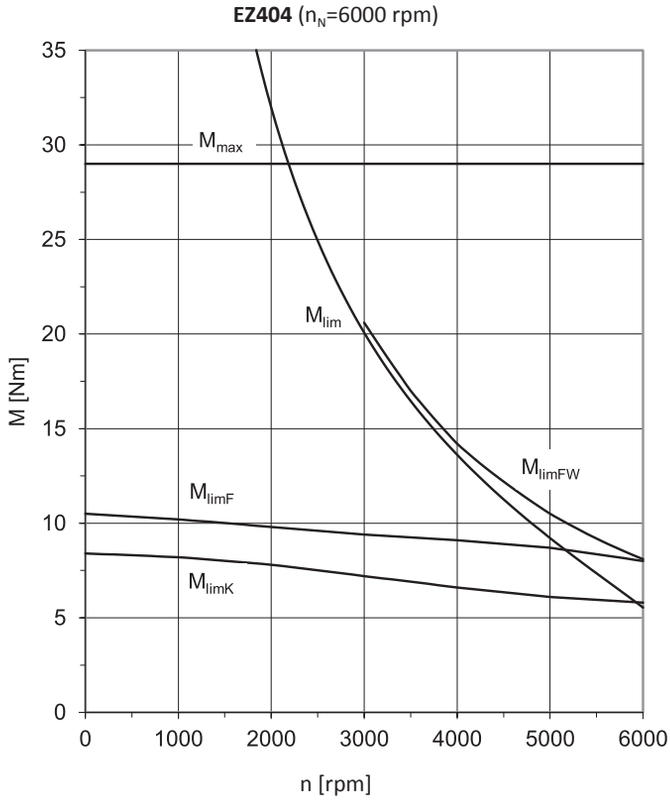
EZ402 (n_N=6000 rpm)



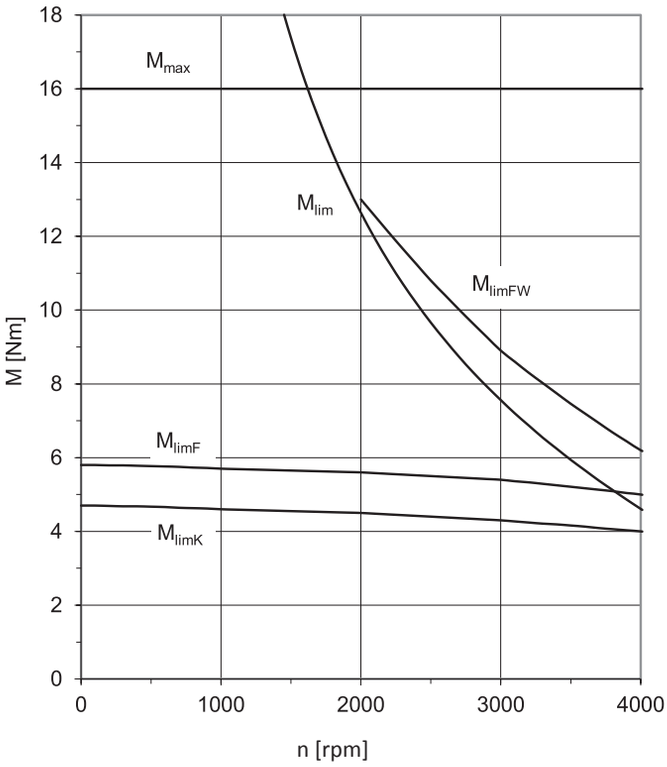
EZ404 (n_N=3000 rpm)



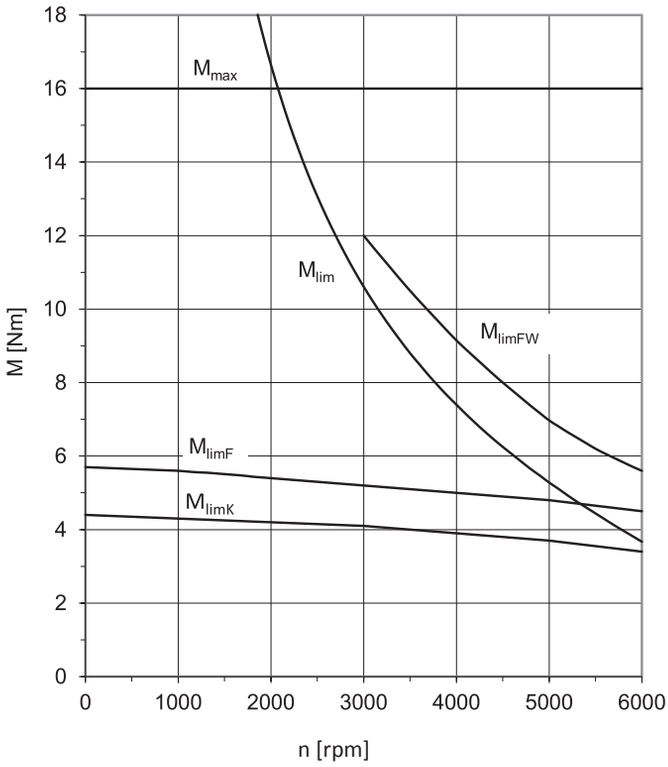
EZ404 (n_N=6000 rpm)



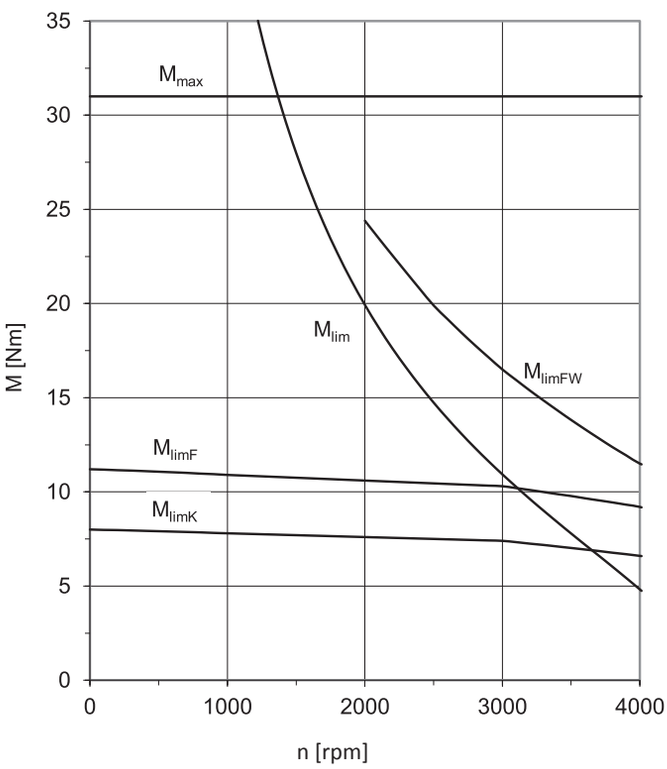
EZ501 (n_N=3000 rpm)



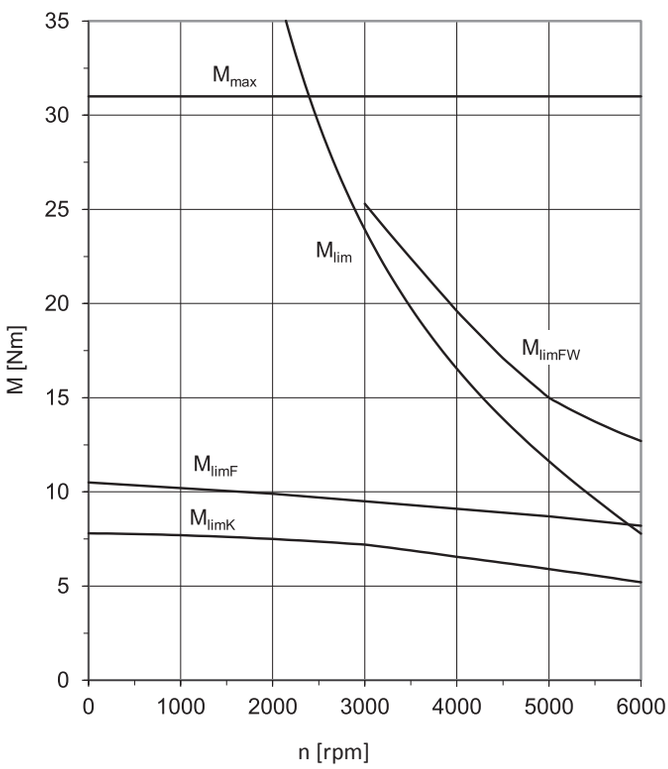
EZ501 (n_N=6000 rpm)



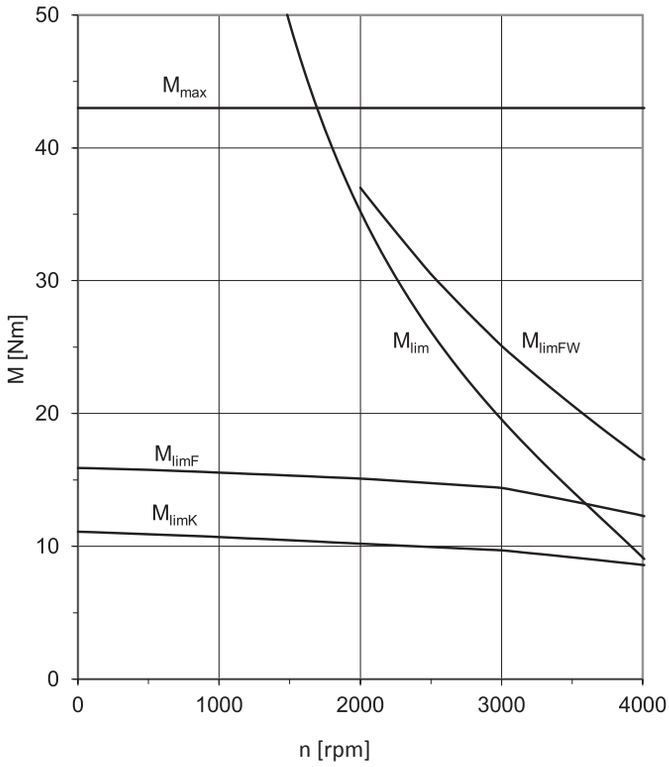
EZ502 (n_N=3000 rpm)



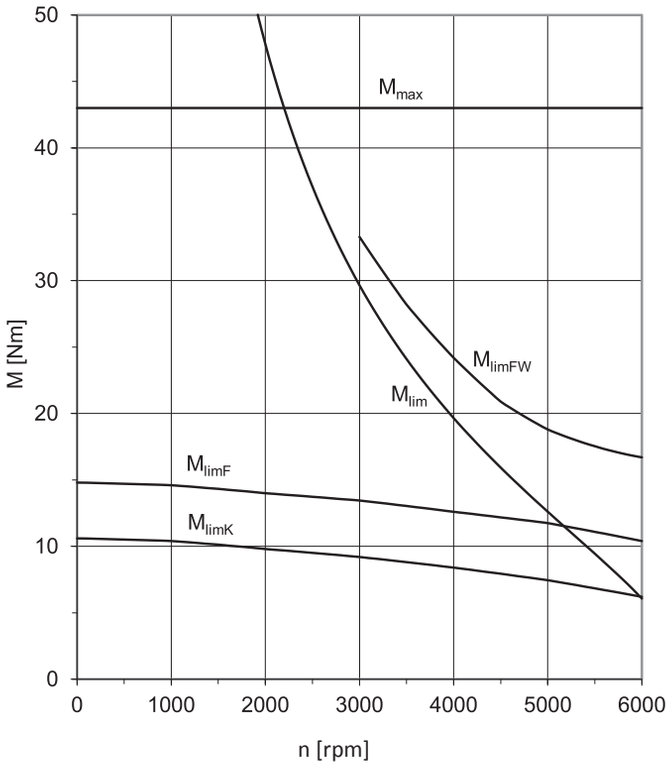
EZ502 (n_N=6000 rpm)



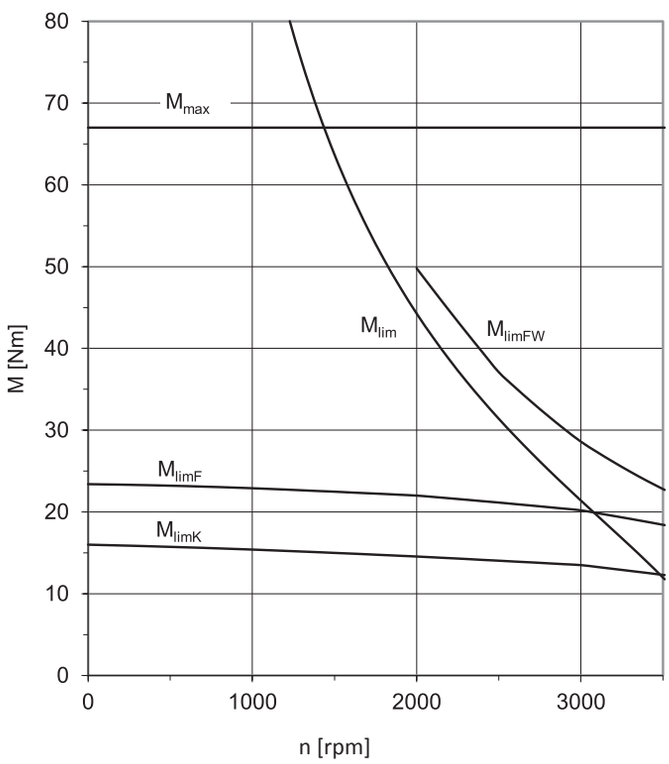
EZ503 (n_N=3000 rpm)



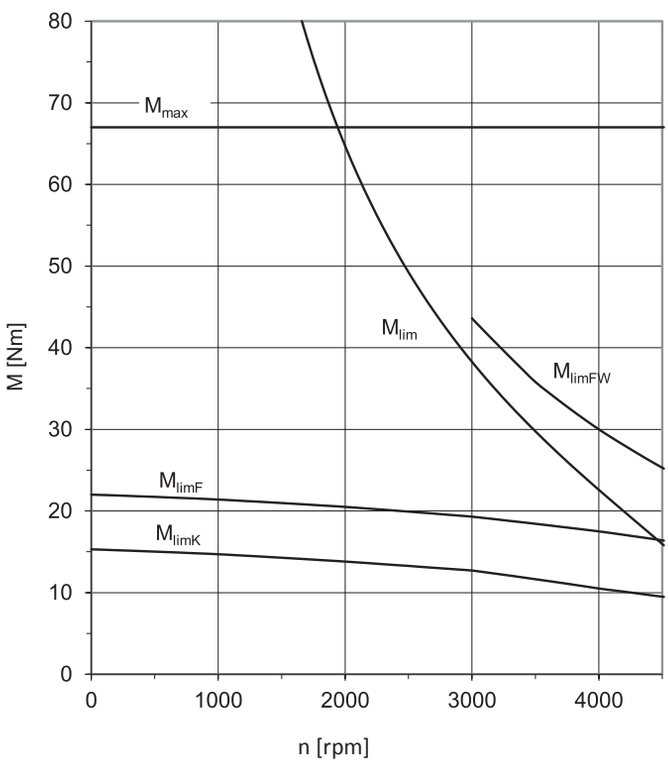
EZ503 (n_N=6000 rpm)



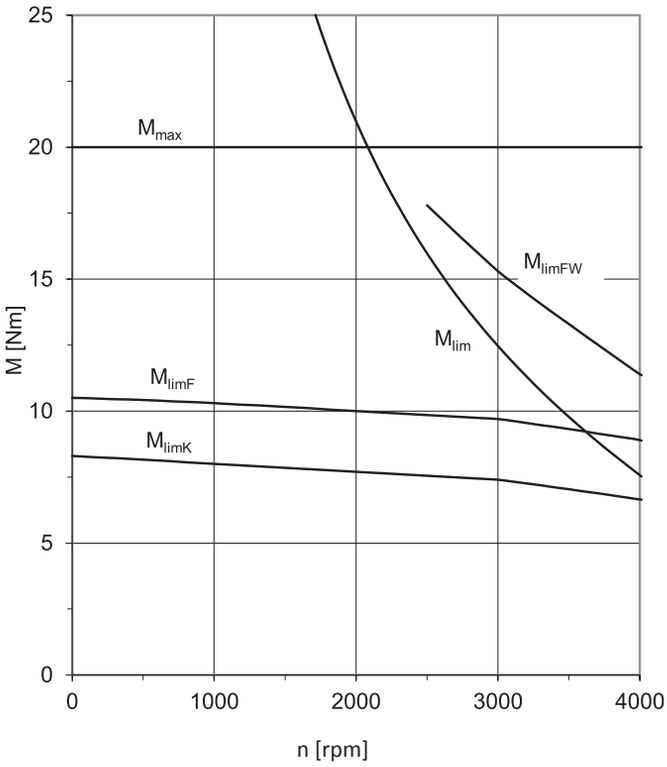
EZ505 (n_N=3000 rpm)



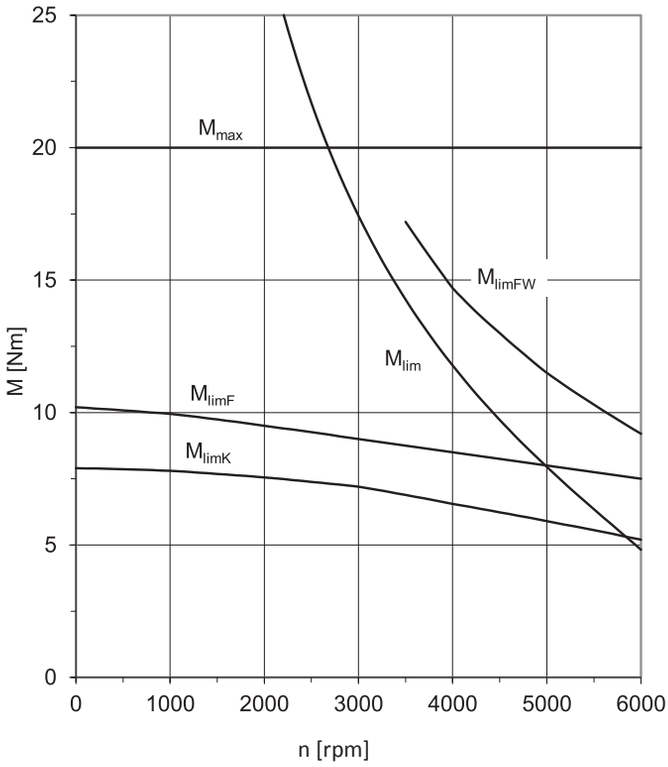
EZ505 (n_N=4500 rpm)



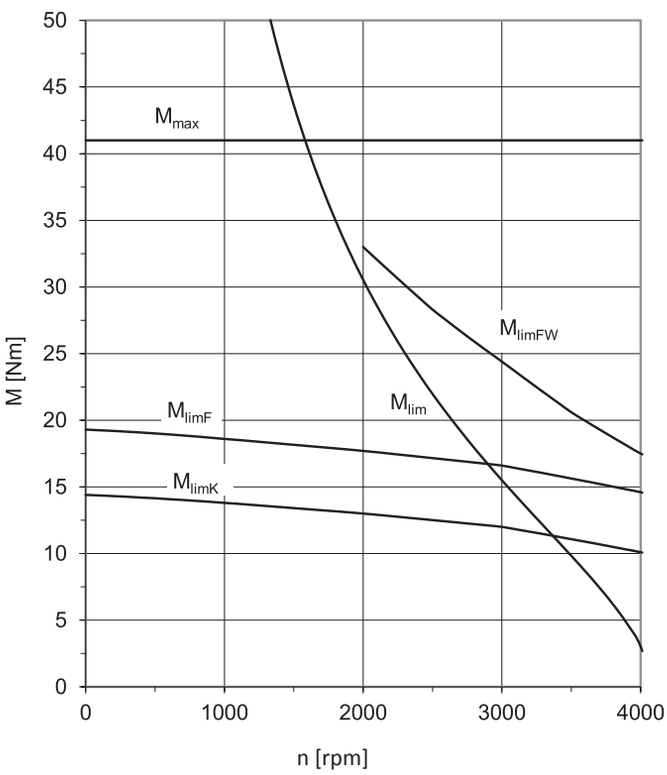
EZ701 (n_N=3000 rpm)



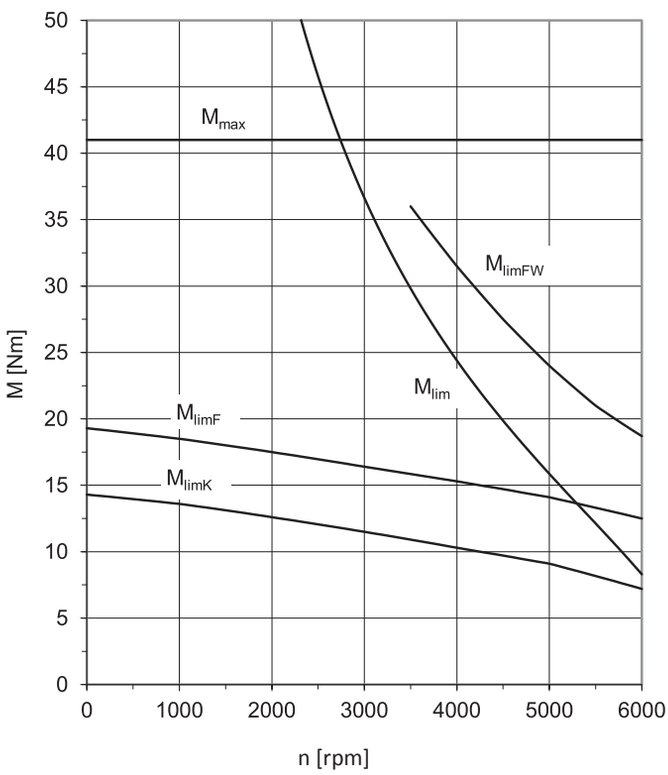
EZ701 (n_N=6000 rpm)



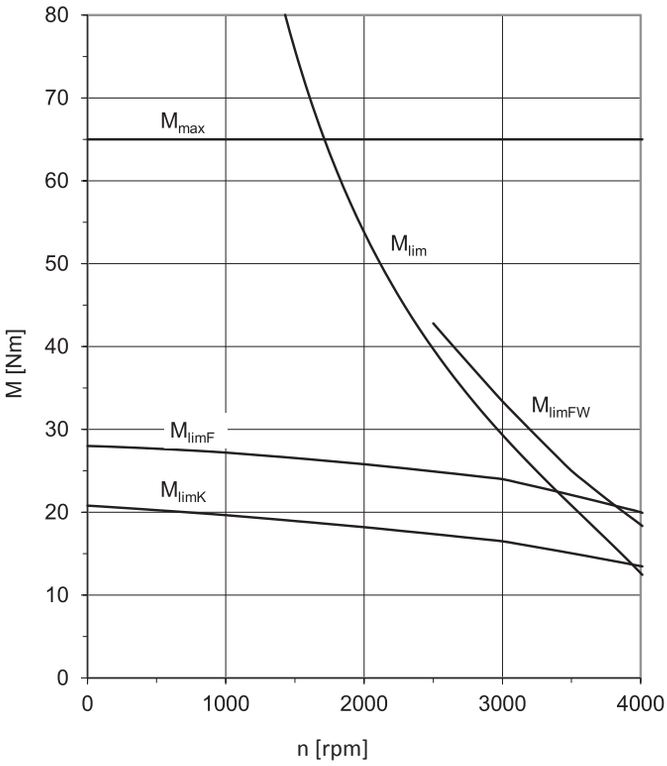
EZ702 (n_N=3000 rpm)



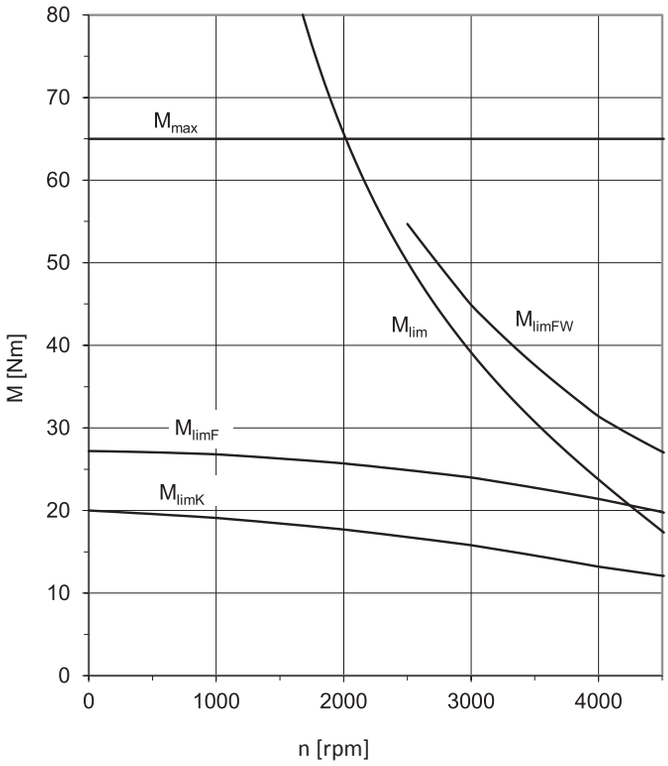
EZ702 (n_N=6000 rpm)



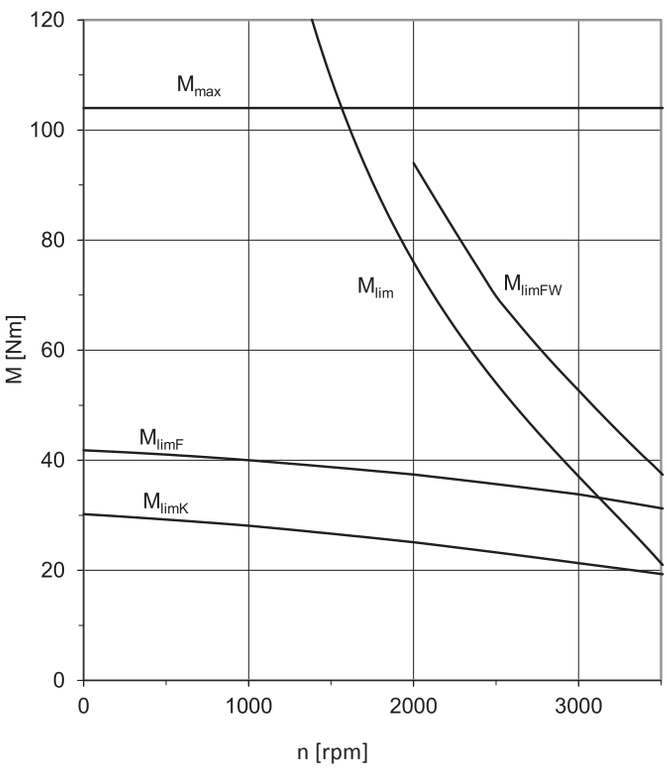
EZ703 (n_N=3000 rpm)



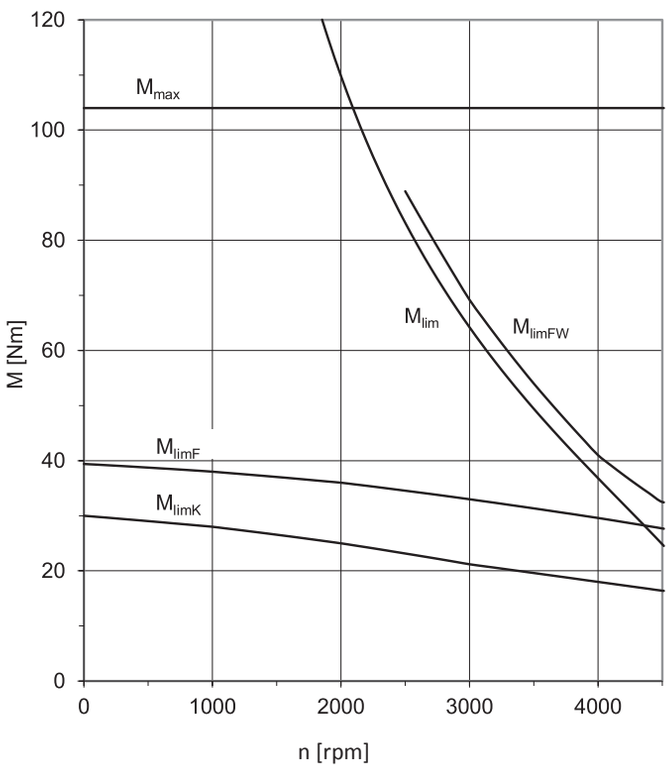
EZ703 (n_N=4500 rpm)



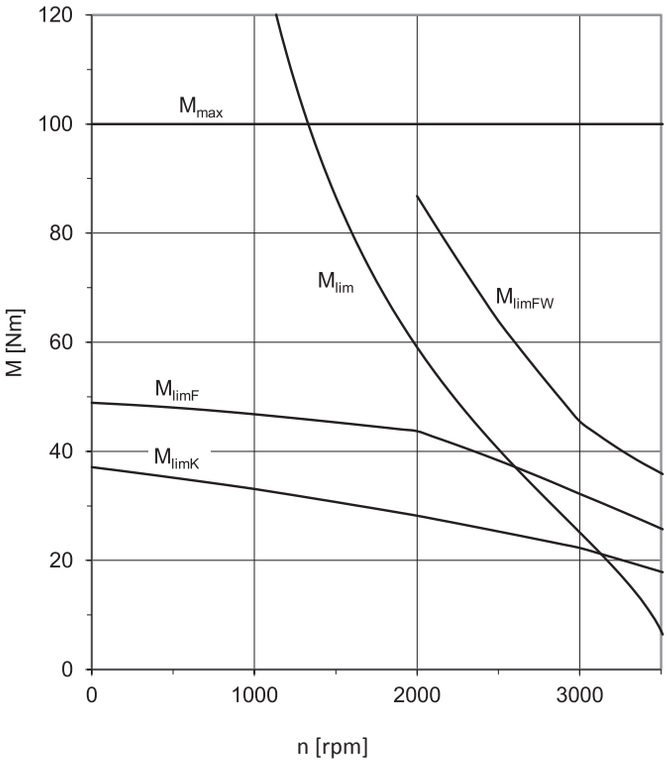
EZ705 (n_N=3000 rpm)



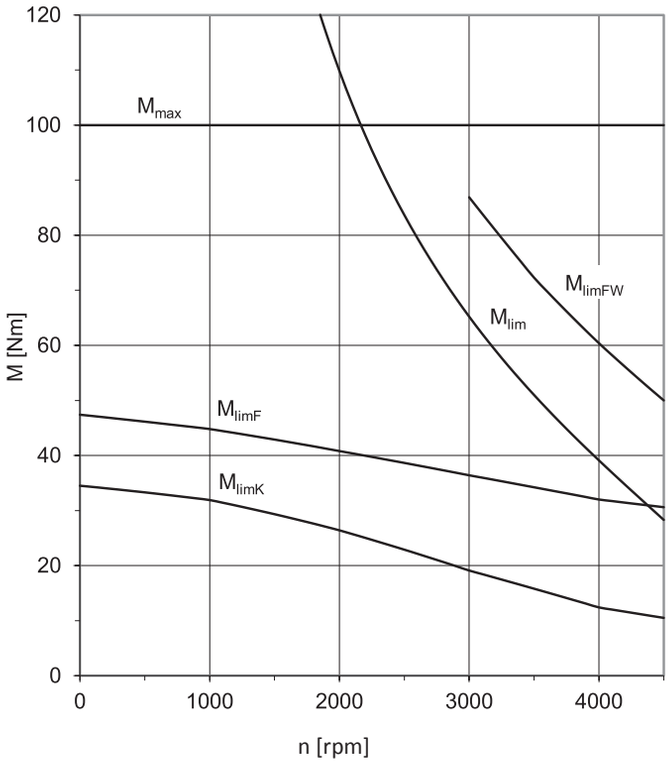
EZ705 (n_N=4500 rpm)



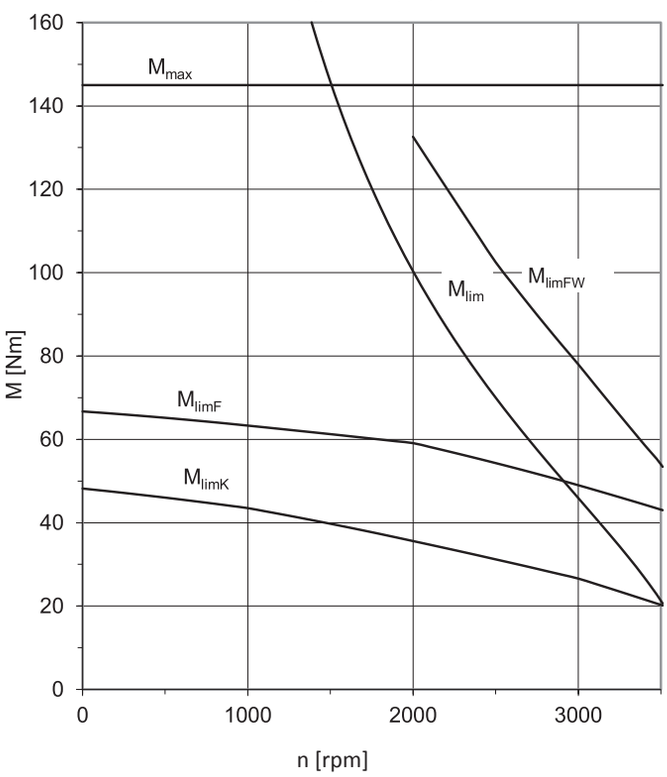
EZ802 (n_N=3000 rpm)



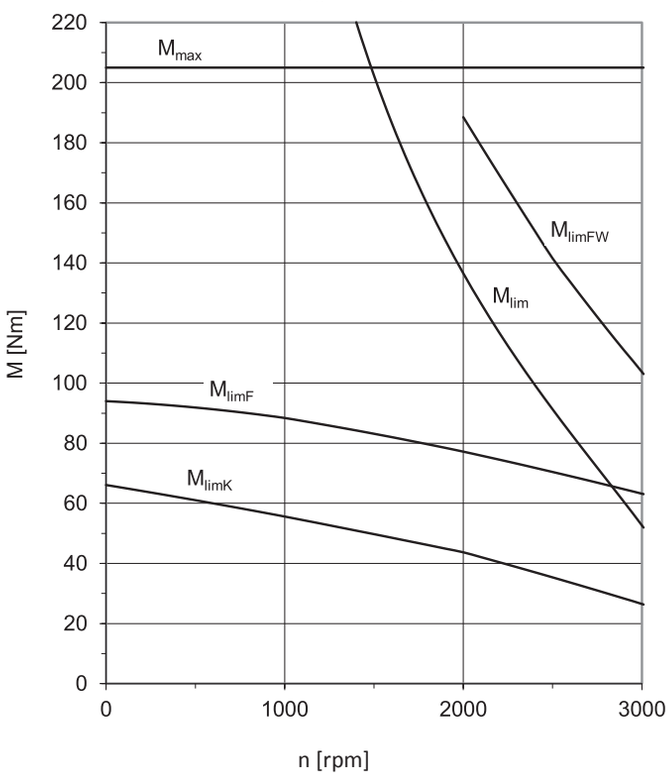
EZ802 (n_N=4500 rpm)



EZ803 (n_N=3000 rpm)



EZ805 (n_N=2000 rpm)



23.4 Dimensional drawings

In this chapter, you can find the dimensions of the motors.

Dimensions can exceed the specifications of ISO 2768-mK due to casting tolerances or accumulation of individual tolerances.

We reserve the right to make dimensional changes due to ongoing technical development.

You can download CAD models of our standard drives at http://cad.stoeber.de.

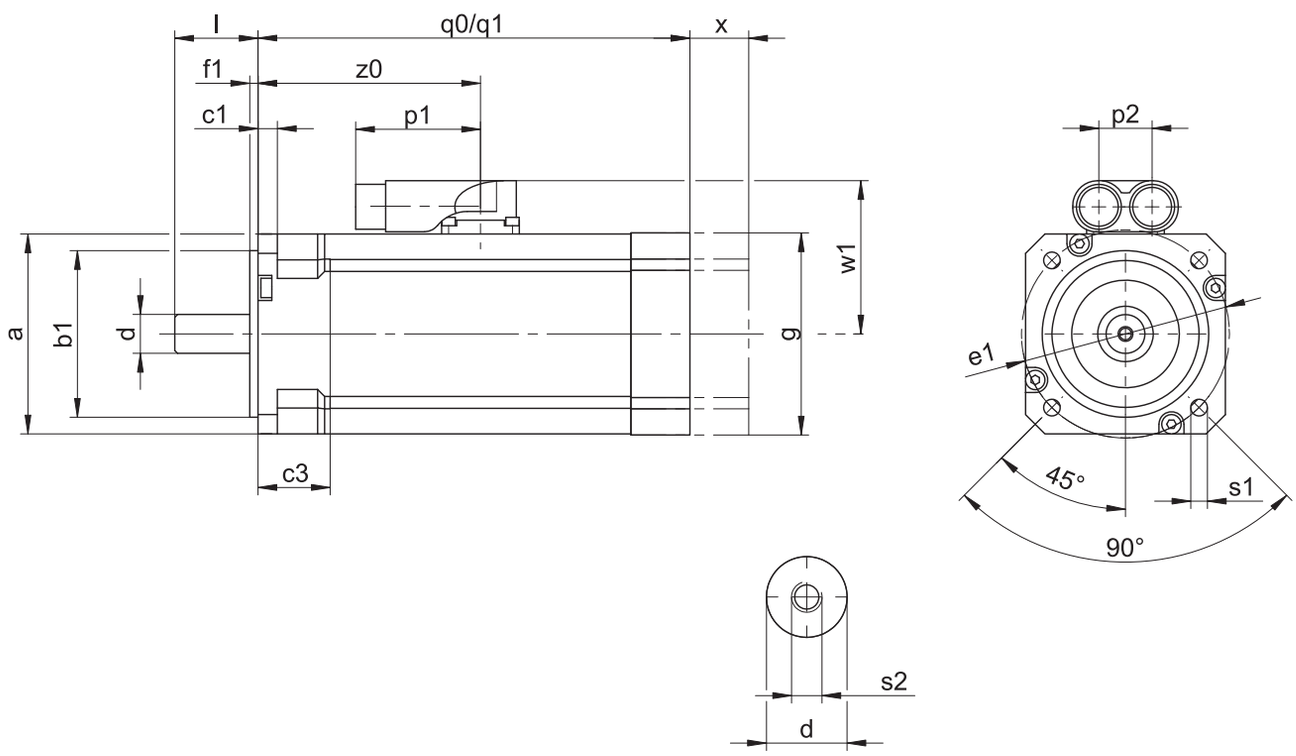
Tolerances

Solid shaft	Tolerance
Shaft ∅ fit ≤ 50 mm	DIN 748-1, ISO k6
Shaft ∅ fit > 50 mm	DIN 748-1, ISO m6

Centering holes in solid shafts in accordance with DIN 332-2, DR shape

Thread size	M4	M5	M6	M8	M10	M12	M16	M20	M24
Thread depth [mm]	10	12.5	16	19	22	28	36	42	50

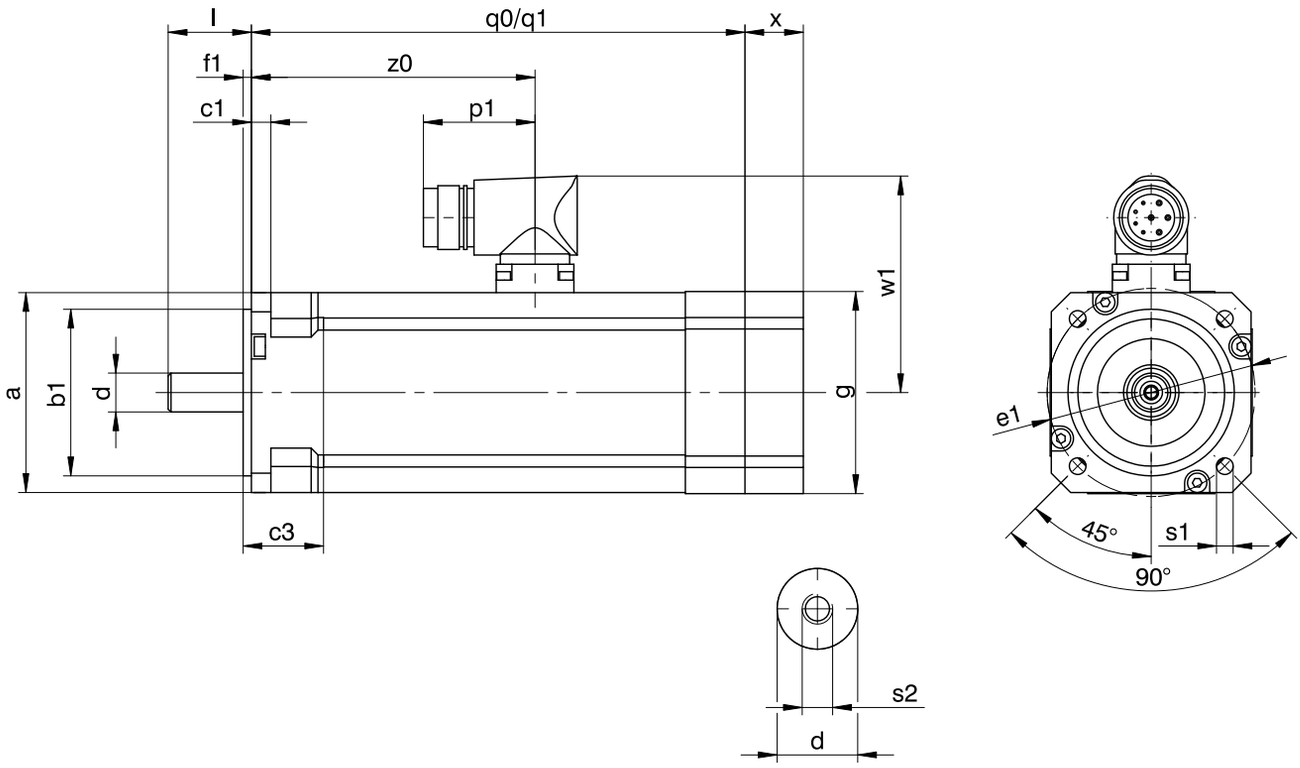
23.4.1 EZ3 motors



q0	Applies to motors without holding brake	q1	Applies to motors with holding brake
x	Applies to encoders based on an optical measuring principle		

Type	□a	Øb1	c1	c3	Ød	Øe1	f1	□g	l	p1	p2	q0	q1	Øs1	s2	w1	x	z0
EZ301U	72	60_{j6}	7	26	14_{k6}	75	3	72	30	40	19	116	156	6	M5	55.5	21	80.5
EZ302U	72	60_{j6}	7	26	14_{k6}	75	3	72	30	40	19	138	178	6	M5	55.5	21	102.5
EZ303U	72	60_{j6}	7	26	14_{k6}	75	3	72	30	40	19	160	200	6	M5	55.5	21	124.5

23.4.2 EZ3 motors (One Cable Solution)

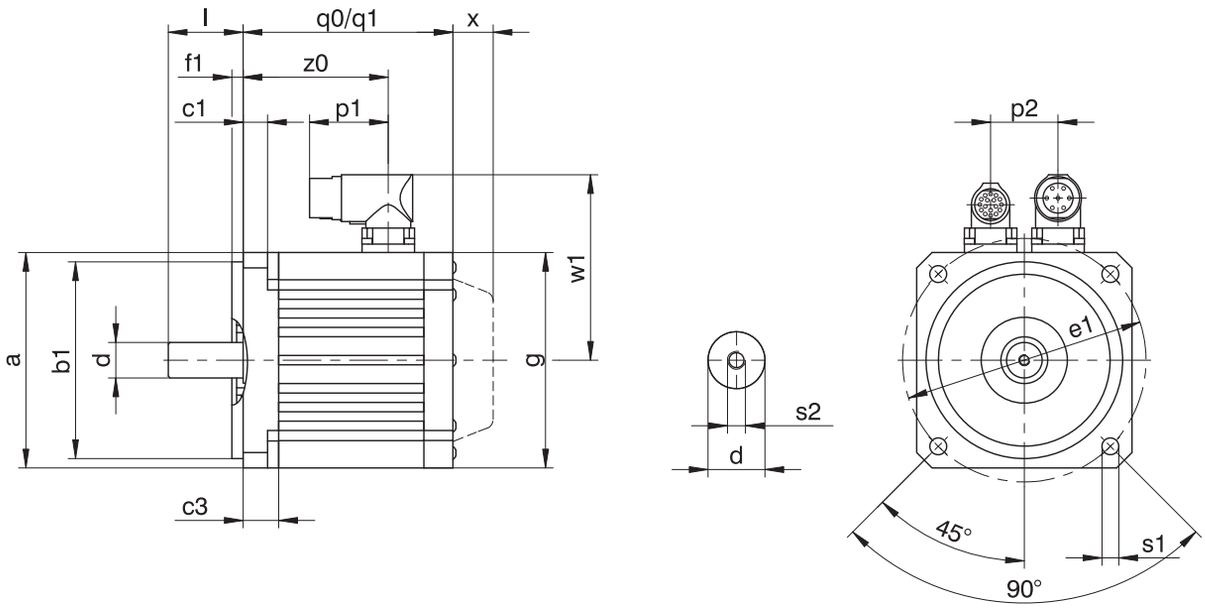


q0 Applies to motors without holding brake

q1 Applies to motors with holding brake

Type	□a	Øb1	c1	c3	Ød	Øe1	f1	□g	l	p1	q0	q1	Øs1	s2	w1	x	z0
EZ301U	72	60_{j6}	7	26	14_{k6}	75	3	72	30	40	116	156	6	M5	78	21	80.5
EZ302U	72	60_{j6}	7	26	14_{k6}	75	3	72	30	40	138	178	6	M5	78	21	102.5
EZ303U	72	60_{j6}	7	26	14_{k6}	75	3	72	30	40	160	200	6	M5	78	21	124.5

23.4.3 EZ4 – EZ8 motors with convection cooling



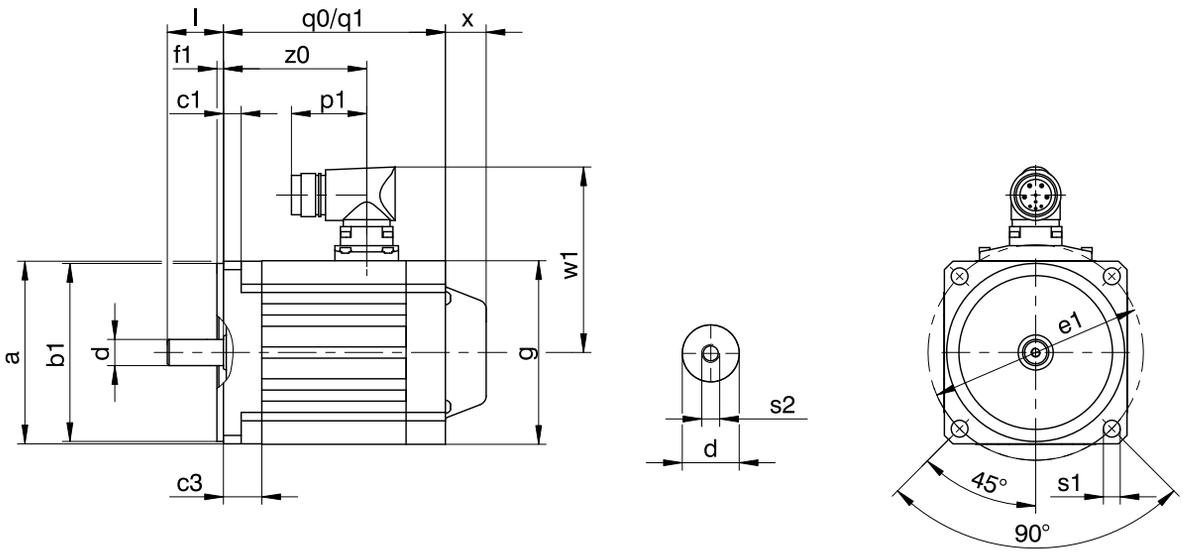
q0 Applies to motors without holding brake

q1 Applies to motors with holding brake

x Applies to encoders based on an optical measuring principle

Type	□a	Øb1	c1	c3	Ød	Øe1	f1	□g	l	p1	p2	q0	q1	Øs1	s2	w1	x	z0
EZ401U	98	95_{j6}	9.5	20.5	14_{k6}	115	3.5	98	30	40	32	118.5	167.0	9	M5	91.0	22	76.5
EZ402U	98	95_{j6}	9.5	20.5	19_{k6}	115	3.5	98	40	40	32	143.5	192.0	9	M6	91.0	22	101.5
EZ404U	98	95_{j6}	9.5	20.5	19_{k6}	115	3.5	98	40	40	32	193.5	242.0	9	M6	91.0	22	151.5
EZ501U	115	110_{j6}	10.0	16.0	19_{k6}	130	3.5	115	40	40	36	109.0	163.5	9	M6	100.0	22	74.5
EZ502U	115	110_{j6}	10.0	16.0	19_{k6}	130	3.5	115	40	40	36	134.0	188.5	9	M6	100.0	22	99.5
EZ503U	115	110_{j6}	10.0	16.0	24_{k6}	130	3.5	115	50	40	36	159.0	213.5	9	M8	100.0	22	124.5
EZ505U	115	110_{j6}	10.0	16.0	24_{k6}	130	3.5	115	50	40	36	209.0	263.5	9	M8	100.0	22	174.5
EZ701U	145	130_{j6}	10.0	19.0	24_{k6}	165	3.5	145	50	40	42	121.0	180.0	11	M8	115.0	22	83.0
EZ702U	145	130_{j6}	10.0	19.0	24_{k6}	165	3.5	145	50	40	42	146.0	205.0	11	M8	115.0	22	108.0
EZ703U	145	130_{j6}	10.0	19.0	24_{k6}	165	3.5	145	50	40	42	171.0	230.0	11	M8	115.0	22	133.0
EZ705U	145	130_{j6}	10.0	19.0	32_{k6}	165	3.5	145	58	71	42	226.0	285.0	11	M12	134.0	22	184.0
EZ802U	190	180_{j6}	15.0	25.0	32_{k6}	215	3.5	190	58	71	60	222.0	299.0	13.5	M12	156.5	22	168.0
EZ803U	190	180_{j6}	15.0	25.0	38_{k6}	215	3.5	190	80	71	60	263.0	340.0	13.5	M12	156.5	22	209.0
EZ805U	190	180_{j6}	15.0	25.0	38_{k6}	215	3.5	190	80	71	60	345.0	422.0	13.5	M12	156.5	22	277.0

23.4.4 EZ4 – EZ7 motors with convection cooling (One Cable Solution)

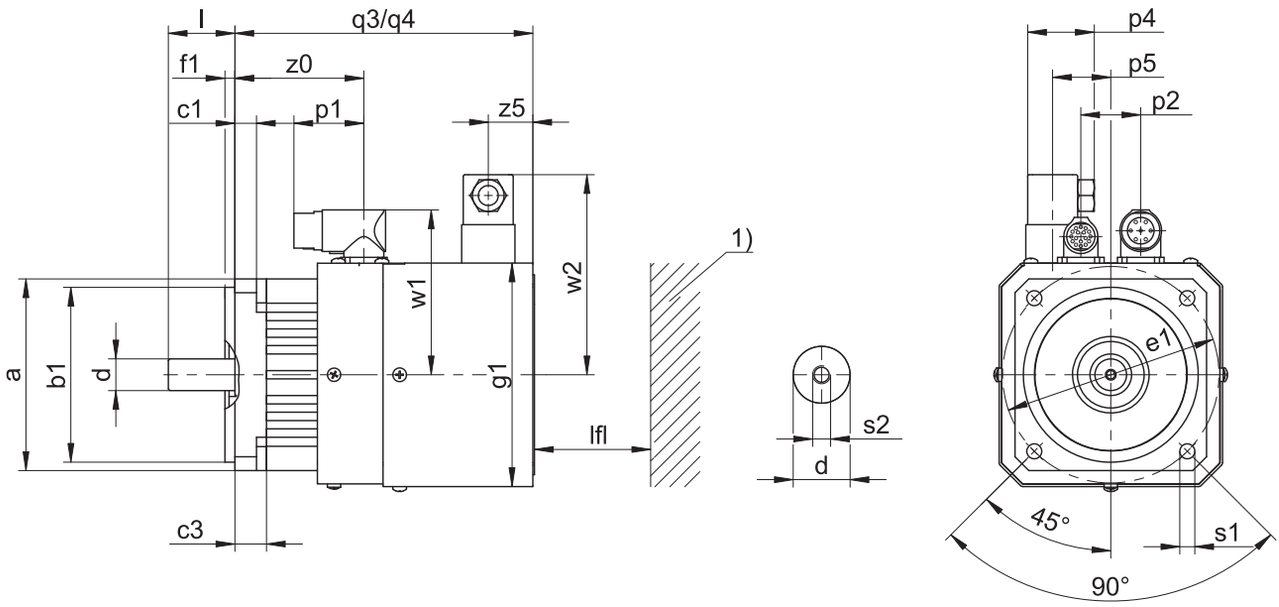


q0 Applies to motors without holding brake

q1 Applies to motors with holding brake

Type	□a	Øb1	c1	c3	Ød	Øe1	f1	□g	l	p1	q0	q1	Øs1	s2	w1	x	z0
EZ401U	98	95_{j6}	9.5	20.5	14_{k6}	115	3.5	98	30	40	118.5	167.0	9	M5	99	22	76.5
EZ402U	98	95_{j6}	9.5	20.5	19_{k6}	115	3.5	98	40	40	143.5	192.0	9	M6	99	22	101.5
EZ404U	98	95_{j6}	9.5	20.5	19_{k6}	115	3.5	98	40	40	193.5	242.0	9	M6	99	22	151.5
EZ501U	115	110_{j6}	10.0	16.0	19_{k6}	130	3.5	115	40	40	109.0	163.5	9	M6	110	22	74.5
EZ502U	115	110_{j6}	10.0	16.0	19_{k6}	130	3.5	115	40	40	134.0	188.5	9	M6	110	22	99.5
EZ503U	115	110_{j6}	10.0	16.0	24_{k6}	130	3.5	115	50	40	159.0	213.5	9	M8	110	22	124.5
EZ505U	115	110_{j6}	10.0	16.0	24_{k6}	130	3.5	115	50	40	209.0	263.5	9	M8	110	22	174.5
EZ701U	145	130_{j6}	10.0	19.0	24_{k6}	165	3.5	145	50	40	121.0	180.0	11	M8	125	22	83.0
EZ702U	145	130_{j6}	10.0	19.0	24_{k6}	165	3.5	145	50	40	146.0	205.0	11	M8	125	22	108.0
EZ703U	145	130_{j6}	10.0	19.0	24_{k6}	165	3.5	145	50	40	171.0	230.0	11	M8	125	22	133.0
EZ705U	145	130_{j6}	10.0	19.0	32_{k6}	165	3.5	145	58	71	226.0	285.0	11	M12	144	22	184.0

23.4.5 EZ4 – EZ8 motors with forced ventilation



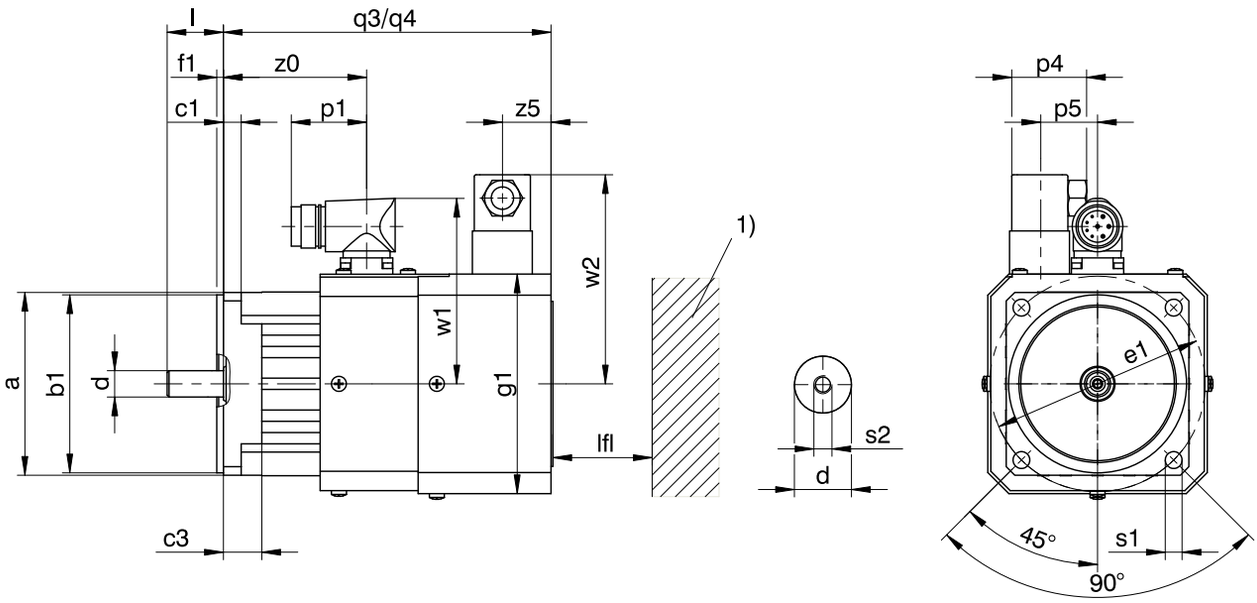
q3 Applies to motors without holding brake

q4 Applies to motors with holding brake

1) Machine wall

Type	□a	Øb1	c1	c3	Ød	Øe1	f1	□g1	l	lfl_{min}	p1	p2	p4	p5	q3	q4	Øs1	s2	w1	w2	z0	z5
EZ401B	98	95_{j6}	9.5	20.5	14_{k6}	115	3.5	118	30	20	40	32	37.5	0	175	224	9.0	M5	91.0	111	76.5	25
EZ402B	98	95_{j6}	9.5	20.5	19_{k6}	115	3.5	118	40	20	40	32	37.5	0	200	249	9.0	M6	91.0	111	101.5	25
EZ404B	98	95_{j6}	9.5	20.5	19_{k6}	115	3.5	118	40	20	40	32	37.5	0	250	299	9.0	M6	91.0	111	151.5	25
EZ501B	115	110_{j6}	10.0	16.0	19_{k6}	130	3.5	135	40	20	40	36	37.5	0	179	234	9.0	M6	100.0	120	74.5	25
EZ502B	115	110_{j6}	10.0	16.0	19_{k6}	130	3.5	135	40	20	40	36	37.5	0	204	259	9.0	M6	100.0	120	99.5	25
EZ503B	115	110_{j6}	10.0	16.0	24_{k6}	130	3.5	135	50	20	40	36	37.5	0	229	284	9.0	M8	100.0	120	124.5	25
EZ505B	115	110_{j6}	10.0	16.0	24_{k6}	130	3.5	135	50	20	40	36	37.5	0	279	334	9.0	M8	100.0	120	174.5	25
EZ701B	145	130_{j6}	10.0	19.0	24_{k6}	165	3.5	165	50	30	40	42	37.5	0	213	272	11.0	M8	115.0	134	83.0	40
EZ702B	145	130_{j6}	10.0	19.0	24_{k6}	165	3.5	165	50	30	40	42	37.5	0	238	297	11.0	M8	115.0	134	108.0	40
EZ703B	145	130_{j6}	10.0	19.0	24_{k6}	165	3.5	165	50	30	40	42	37.5	0	263	322	11.0	M8	115.0	134	133.0	40
EZ705B	145	130_{j6}	10.0	19.0	32_{k6}	165	3.5	165	58	30	71	42	37.5	0	318	377	11.0	M12	134.0	134	184.0	40
EZ802B	190	180_{j6}	15.0	25.0	32_{k6}	215	3.5	215	58	30	71	60	37.5	62	322	399	13.5	M12	156.5	160	168.0	40
EZ803B	190	180_{j6}	15.0	25.0	38_{k6}	215	3.5	215	80	30	71	60	37.5	62	363	440	13.5	M12	156.5	160	209.0	40
EZ805B	190	180_{j6}	15.0	25.0	38_{k6}	215	3.5	215	80	30	71	60	37.5	62	445	522	13.5	M12	178.0	160	277.0	40

23.4.6 EZ4 – EZ7 motors with forced ventilation (One Cable Solution)



q3 Applies to motors without holding brake

q4 Applies to motors with holding brake

1) Machine wall

Type	□a	Øb1	c1	c3	Ød	Øe1	f1	□g1	l	lfl_{min}	p1	p4	p5	q3	q4	Øs1	s2	w1	w2	z0	z5
EZ401B	98	95_{j6}	9.5	20.5	14_{k6}	115	3.5	118	30	20	40	37.5	0	175	224	9.0	M5	99	111	76.5	25
EZ402B	98	95_{j6}	9.5	20.5	19_{k6}	115	3.5	118	40	20	40	37.5	0	200	249	9.0	M6	99	111	101.5	25
EZ404B	98	95_{j6}	9.5	20.5	19_{k6}	115	3.5	118	40	20	40	37.5	0	250	299	9.0	M6	99	111	151.5	25
EZ501B	115	110_{j6}	10.0	16.0	19_{k6}	130	3.5	135	40	20	40	37.5	0	179	234	9.0	M6	110	120	74.5	25
EZ502B	115	110_{j6}	10.0	16.0	19_{k6}	130	3.5	135	40	20	40	37.5	0	204	259	9.0	M6	110	120	99.5	25
EZ503B	115	110_{j6}	10.0	16.0	24_{k6}	130	3.5	135	50	20	40	37.5	0	229	284	9.0	M8	110	120	124.5	25
EZ505B	115	110_{j6}	10.0	16.0	24_{k6}	130	3.5	135	50	20	40	37.5	0	279	334	9.0	M8	110	120	174.5	25
EZ701B	145	130_{j6}	10.0	19.0	24_{k6}	165	3.5	165	50	30	40	37.5	0	213	272	11.0	M8	125	134	83.0	40
EZ702B	145	130_{j6}	10.0	19.0	24_{k6}	165	3.5	165	50	30	40	37.5	0	238	297	11.0	M8	125	134	108.0	40
EZ703B	145	130_{j6}	10.0	19.0	24_{k6}	165	3.5	165	50	30	40	37.5	0	263	322	11.0	M8	125	134	133.0	40
EZ705B	145	130_{j6}	10.0	19.0	32_{k6}	165	3.5	165	58	30	71	37.5	0	318	377	11.0	M12	144	134	184.0	40

23.5 Type designation

Sample code

EZ	4	0	1	U	D	AD	M4	O	096

Explanation

Code	Designation	Design
EZ	Type	Synchronous servo motor
4	Size	4 (example)
0	Generation	0
1	Length	1 (example)
U	Cooling[1]	Convection cooling
B		Forced ventilation
D	Design	Dynamic
AD	Drive controller	SD6 (example)
M4	Encoder	EQI 1131 FMA EnDat 2.2 (example)
O	Brake	Without holding brake
P		Permanent magnet holding brake
096	Electromagnetic constant (EMC) K_{EM}	96 V/1000 rpm (example)

Notes

- In Chapter [▷ 23.6.4], you can find information about available encoders.
- In Chapter [▷ 23.6.4.6], you can find information about connecting synchronous servo motors to other drive controllers from STOBER.
- In Chapter [▷ 27], you can find information about options for connecting STOBER synchronous servo motors to drive controllers from other manufacturers.

23.6 Product description

23.6.1 General features

Feature	Description
Design	IM B5, IM V1, IM V3 in accordance with EN 60034-7
Protection class	IP56 / IP66 (option)
Thermal class	155 (F) in accordance with EN 60034-1 (155 °C, heating $\Delta\vartheta$ = 100 K)
Surface	Matte black as per RAL 9005
Cooling	IC 410 convection cooling (IC 416 convection cooling with forced ventilation units, optional)
Bearing	Rolling bearing with lifetime lubrication and non-contact sealing
Sealing	Radial shaft seal rings made of FKM (A side)
Shaft	Shaft without feather key, diameter quality k6
Radial runout	Normal tolerance class in accordance with IEC 60072-1
Concentricity	Normal tolerance class in accordance with IEC 60072-1
Axial runout	Normal tolerance class in accordance with IEC 60072-1
Vibration intensity	A in accordance with EN 60034-14
Noise level	Limit values in accordance with EN 60034-9

[1] EZ3 motors only available with convection cooling

23.6.2 Electrical features

General electrical features of the motor are described in this chapter. Details can be found in the "Selection tables" chapter.

Feature	Description
DC link voltage	DC 540 V (max. 620 V) on STOBER drive controllers
Winding	Three-phase, single-tooth coil design
Circuit	Star, center not led through
Protection class	I (protective grounding) in accordance with EN 61140
Number of pole pairs	5 (EZ3) 7 (EZ4/EZ5/EZ7) 8 (EZ8)

23.6.3 Ambient conditions

Standard ambient conditions for transport, storage and operation of the motor are described in this chapter. Information about differing ambient conditions can be found in the chapter Derating.

Feature	Description
Surrounding temperature for transport/storage	−30 °C to +85 °C
Surrounding temperature for operation	−15 °C to +40 °C
Installation altitude	≤ 1000 m above sea level
Shock load	≤ 50 m/s² (5 g), 6 ms in accordance with EN 60068-2-27

Notes

- STOBER synchronous servo motors are not suitable for potentially explosive atmospheres in accordance with (ATEX) Directive2014/34/EU.
- Secure the power cables close to the motor so that vibrations of the cable do not place impermissible loads on the motor plug connector.
- Note that the braking torques of the holding brake (optional) may be reduced by shock loading.
- Also take into consideration the shock load of the motor due to output units (such as gear units and pumps) which are coupled with the motor.

23.6.4 Encoders

STOBER synchronous servo motors can be designed with different encoder models. The following chapters include information for choosing the optimal encoder for your application.

23.6.4.1 Encoder measuring method selection tool

The following table offers a selection tool for an encoder measuring method that is optimally suited for your application.

Feature	Absolute encoder		Resolver
Measuring method	Optical	Inductive	Electromagnetic
Temperature resistance	★★☆	★★★	★★★
Vibration strength and shock resistance	★★☆	★★★	★★★
System accuracy	★★★	★★☆	★☆☆
FMA version with fault exclusion for mechanical coupling (option with EnDat interface)	✓	✓	–
Elimination of referencing with multi-turn design (optional)	✓	✓	–
Simple commissioning with electronic nameplate	✓	✓	–
Key: ★☆☆ = satisfactory, ★★☆ = good, ★★★ = very good			

23.6.4.2 Selection tool for EnDat interface

The following table offers a selection tool for the EnDat interface of absolute encoders.

Feature	EnDat 2.1	EnDat 2.2
Short cycle times	★★☆	★★★
Transfer of additional information along with the position value	–	✓
Expanded power supply range	★★☆	★★★
Key: ★★☆ = good, ★★★ = very good		

23.6.4.3 EnDat encoders

In this chapter, you can find detailed technical data for encoder models that can be selected with EnDat interface.

Encoders with EnDat 2.2 interface

Encoder model	Code	Measuring method	Recordable revolutions	Resolution	Position values per revolution
EQI 1131 FMA	M4	Inductive	4096	19 bit	524288
EQI 1131	Q6	Inductive	4096	19 bit	524288
EBI 1135	B0	Inductive	65536	18 bit	262144
EQN 1135 FMA	M3	Optical	4096	23 bit	8388608
EQN 1135	Q5	Optical	4096	23 bit	8388608
ECN 1123 FMA	M1	Optical	–	23 bit	8388608
ECN 1123	C7	Optical	–	23 bit	8388608
ECI 1118-G2	C5	Inductive	–	18 bit	262144

Encoders with EnDat 2.1 interface

Encoder model	Code	Measuring method	Recordable revolutions	Resolution	Position values per revolution	Periods per revolution
EQN 1125 FMA	M2	Optical	4096	13 bit	8192	Sin/Cos 512
EQN 1125	Q4	Optical	4096	13 bit	8192	Sin/Cos 512
ECN 1113 FMA	M0	Optical	–	13 bit	8192	Sin/Cos 512
ECN 1113	C6	Optical	–	13 bit	8192	Sin/Cos 512

Notes

- The encoder code is a part of the type designation of the motor.
- FMA = Version with fault exclusion for mechanical coupling.
- The EBI 1135 encoder requires an external buffer battery so that absolute position information is retained after the power supply is turned off (AES option for STOBER drive controllers).
- Multiple revolutions of the motor shaft can be recorded only using multi-turn encoders.

23.6.4.4 HIPERFACE DSL encoders

HIPERFACE DSL is a robust, purely digital protocol that functions with minimal connection lines. HIPERFACE DSL facilitates the One Cable Solution, which allows the connection lines between the encoder and drive controller to be routed along in the motor's power cable.

The One Cable Solution offers the following advantages:

- Significantly reduced wiring effort by eliminating the encoder cable
- Significantly reduced space requirements by eliminating the encoder plug connector
- Transmission of measured values from the temperature sensor using the HIPERFACE DSL protocol.

A motor with the HIPERFACE DSL encoder can be operated only on a SI6 or SC6 drive controller from STOBER.

The HIPERFACE DSL encoder has the following features:

Encoder model	Code	Measuring method	Recordable revolutions	Resolution	Position values per revolution
EKM36	H3	Optical	4096	20 bit	1048576

23.6.4.5 Resolver

In this chapter, you can find detailed technical data for the resolver that can be installed as an encoder in a STOBER synchronous servo motor.

Feature	Description
Input voltage U_{1eff}	7 V ± 5%
Input frequency f_1	10 kHz
Output voltage $U_{2,S1–S3}$	$K_{tr} \cdot U_{R1–R2} \cdot \cos \theta$
Output voltage $U_{2,S2–S4}$	$K_{tr} \cdot U_{R1–R2} \cdot \sin \theta$
Transformation ratio K_{tr}	0.5 ± 5%
Electrical fault	±10 arcmin

23.6.4.6 Possible combinations with drive controllers

The following table shows the options for combining STOBER drive controllers with selectable encoder models.

Drive controller		SDS 5000	MDS 5000	SDS 5000/ MDS 5000	SD6		SI6			SC6		
Drive controller code		AA	AB	AC	AD	AE	AP	AQ	AS	AU	AV	AW
Connection plan ID		442305	442306	442307	442450	442451	442771	442772	442788	443052	443053	443065
Encoder	Encoder code											
EQI 1131 FMA	M4	✓	–	–	✓	–	–	–	–	–	–	–
EQI 1131	Q6	✓	✓	–	✓	–	✓	–	–	✓	–	–
EBI 1135	B0	✓	✓	–	✓	–	✓	–	–	✓	–	–
EQN 1135 FMA	M3	✓	–	–	✓	–	–	–	–	–	–	–
EQN 1135	Q5	✓	✓	–	✓	–	✓	–	–	✓	–	–
ECN 1123 FMA	M1	✓	–	–	✓	–	–	–	–	–	–	–
ECN 1123	C7	✓	✓	–	✓	–	✓	–	–	✓	–	–
ECI 1118-G2	C5	✓	✓	–	✓	–	✓	–	–	✓	–	–
EQN 1125 FMA	M2	✓	✓	✓	✓	✓	–	–	–	–	–	–
EQN 1125	Q4	✓	✓	✓	✓	✓	–	–	–	–	–	–
ECN 1113 FMA	M0	✓	✓	✓	✓	✓	–	–	–	–	–	–
ECN 1113	C6	✓	✓	✓	✓	✓	–	–	–	–	–	–
EKM36	H3	–	–	–	–	–	–	–	✓	–	–	✓
Resolver	R0	✓	✓	–	–	✓	–	✓	–	–	✓	–

Notes

- The drive controller and encoder codes are a part of the type designation of the motor (see the "Type designation" chapter).
- In Chapter [▷ 27], you can find information about options for connecting STOBER synchronous servo motors to drive controllers from other manufacturers.

23.6.5 Temperature sensor

In this chapter, you can find technical data for the temperature sensors that are installed in STOBER synchronous servo motors for implementing thermal winding protection. To prevent damage to the motor, always monitor the temperature sensor with appropriate devices that will turn off the motor if the maximum permitted winding temperature is exceeded.

Some encoders feature integrated temperature monitoring, the warning and switch-off thresholds of which may overlap with the corresponding values set for the temperature sensor in the drive controller. In some cases, this may result in an instance where an encoder with internal temperature monitoring forces the motor to shut down, even before the motor has reached its nominal data.

You can find information about the electrical connection of the temperature sensor in the "Connection method" chapter.

23.6.5.1 PTC thermistor

The PTC thermistor is installed as a standard temperature sensor in STOBER synchronous servo motors.

The PTC thermistor is a triple thermistor in accordance with DIN 44082 that can be used for monitoring the temperature of each winding phase. The resistance values in the following table and curve refer to a single thermistor in accordance with DIN 44081. These values must be multiplied by 3 for a triple thermistor in accordance with DIN 44082.

Feature	Description
Nominal response temperature ϑ_{NAT}	145 °C ± 5 K
Resistance R −20 °C up to ϑ_{NAT} − 20 K	≤ 250 Ω
Resistance R with ϑ_{NAT} − 5 K	≤ 550 Ω
Resistance R with ϑ_{NAT} + 5 K	≥ 1330 Ω
Resistance R with ϑ_{NAT} + 15 K	≥ 4000 Ω
Operating voltage	≤ DC 7.5 V
Thermal response time	< 5 s
Thermal class	155 (F) in accordance with EN 60034-1 (155 °C, heating Δϑ = 100 K)

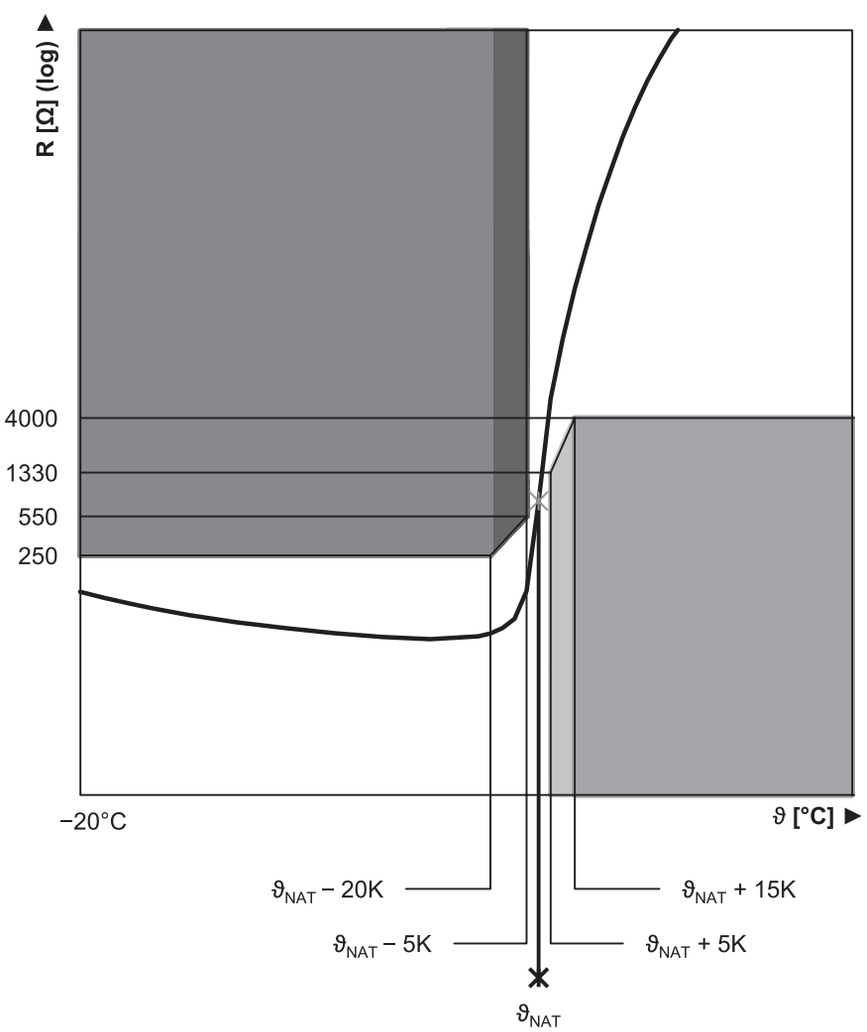


Fig. 2: PTC thermistor curve (single thermistor)

23.6.5.2 Pt1000 temperature sensor

STOBER synchronous servo motors are available in versions with a Pt1000 temperature sensor. The Pt1000 is a temperature-dependent resistor that has a resistance curve with a linear relationship with temperature. As a result, the Pt1000 allows for measurements of the winding temperature. These measurements are limited to one phase of the motor winding, however. In order to adequately protect the motor from exceeding the maximum permitted winding temperature, use a i^2t model in the drive controller to monitor the winding temperature.

Avoid exceeding the specified measurement current so that the measured values are not falsified due to self-heating of the temperature sensor.

Feature	Description
Measurement current (constant)	2 mA
Resistance R for ϑ = 0 °C	1000 Ω
Resistance R for ϑ = 80 °C	1300 Ω
Resistance R for ϑ = 150 °C	1570 Ω

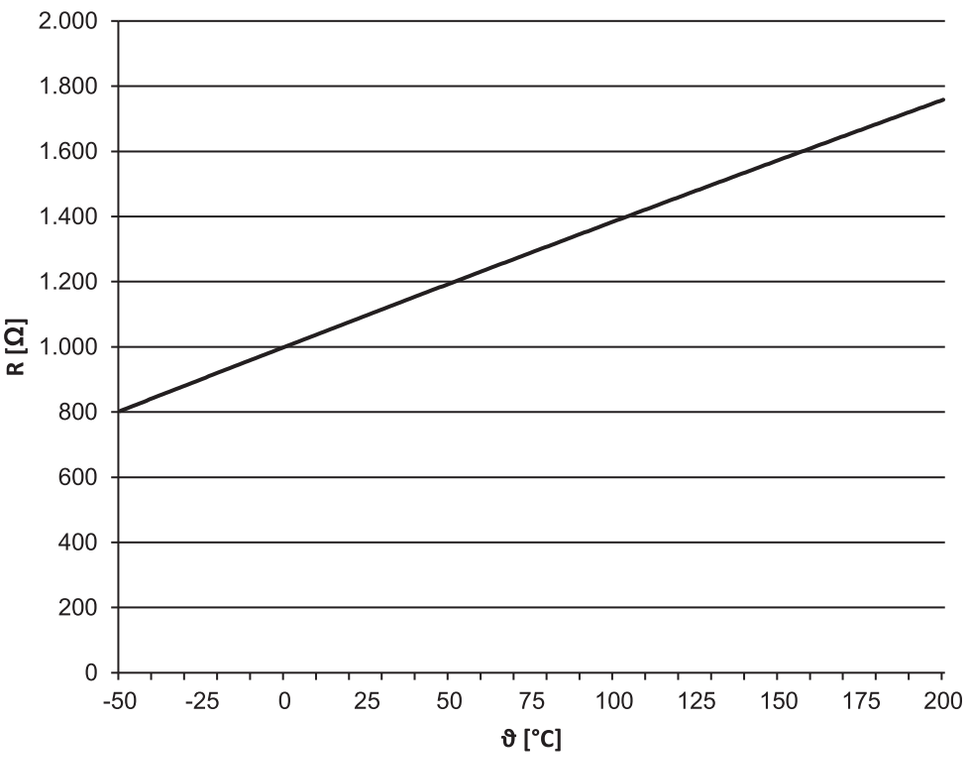


Fig. 3: Pt1000 temperature sensor characteristic curve

23.6.6 Cooling

A synchronous servo motor in the standard version is cooled by convection cooling (IC 410 in accordance with EN 60034-6). The air flowing around the motor is heated by the radiated motor heat and rises. Optionally, forced ventilation can be used to cool the motor.

23.6.6.1 Forced ventilation

STOBER synchronous servo motors offer the option of being cooled with forced ventilation in order to increase performance data while maintaining the same size. Retrofitting with a forced ventilation unit is also possible in order to optimize the drive at a later date. When retrofitting, check whether the conductor cross-section of the power cable of the motor must be increased. Also take into account the dimensions of the forced ventilation unit.

The performance data for motors with forced ventilation can be found in the chapter Selection tables and the dimensions in the chapter Dimensional drawings.

Technical data

Motor	Forced ventilation unit	$U_{N,F}$ [V]	$I_{N,F}$ [A]	$P_{N,F}$ [W]	$q_{v,F}$ [m³/h]	$L_{p(A)}$ [dBA]	m_F [kg]	Protection class
EZ4_B	FL4	230 V ± 5%, 50/60 Hz	0.07	10	59	41	1.4	IP44
EZ5_B	FL5		0.10	14	160	45	1.9	IP54
EZ7_B	FL7		0.10	14	160	45	2.9	IP54
EZ8_B	FL8		0.20	26	420	54	5.0	IP55

Terminal assignment for forced ventilation unit plug connectors

Connection diagram	Pin	Connection
	1	L1 (phase)
	2	N (neutral conductor)
	3	
	⏚	Grounding conductor

23.6.7 Holding brake

STOBER synchronous servo motors can be equipped with a backlash-free holding brake using permanent magnets in order to secure the motor shaft when at a standstill. The holding brake engages automatically if the voltage drops.

Nominal voltage of permanent magnet holding brake: DC 24 V ± 5%, smoothed.

Observe the following during project configuration:

- The holding brake is designed to keep the motor shaft from moving. Activate braking processes during operation using the corresponding electrical functions of the drive controller. In exceptional circumstances, the holding brake can be used for braking from full speed (following a power failure or when setting up the machine). The maximum permitted work done by friction $W_{B,Rmax/h}$ may not be exceeded.
- Note that the braking torque M_{Bdyn} may initially be up to 50% less when braking from full speed. As a result, the braking effect has a delayed action and braking distances become longer.
- Regularly perform a brake test to ensure the functional safety of the brakes. Details can be found in the documentation of the motor and the drive controller.
- Connect a varistor of type S14 K35 (or comparable) in parallel to the brake coil to protect your machine from switching surges. (Not necessary for connecting the holding brake to STOBER drive controllers of the 5th and 6th generation with a BRS/BRM brake module).
- The holding brake of the motor does not offer adequate safety for persons in the hazardous area of gravity-loaded vertical axes. Therefore take additional measures to minimize risk, e.g. by providing a mechanical substructure for maintenance work.
- Take into consideration voltage losses in the connection cables that connect the voltage source to the holding brake connections.
- The holding torque of the brake can be reduced by shock loading. Information about shock loading can be found in the "Ambient conditions" chapter.
- At operating temperatures from −15 °C to 0 °C, a cold holding brake in the released state may cause operating noises. As the temperature of the holding brake increases, these noises decrease such that operating noises are not heard when using holding brake at operating temperature in the released state.

Calculation of work done by friction per braking process

$$W_{B,R/B} = \frac{J_{tot} \cdot n^2}{182.4} \cdot \frac{M_{Bdyn}}{M_{Bdyn} \pm M_L}$$

The sign of M_L is positive if the movement runs vertically upwards or horizontally and it is negative if the movement runs vertically down.

Calculation of the stop time

$$t_{dec} = 2.66 \cdot t_{1B} + \frac{n \cdot J_{tot}}{9.55 \cdot M_{Bdyn}}$$

Switching behavior

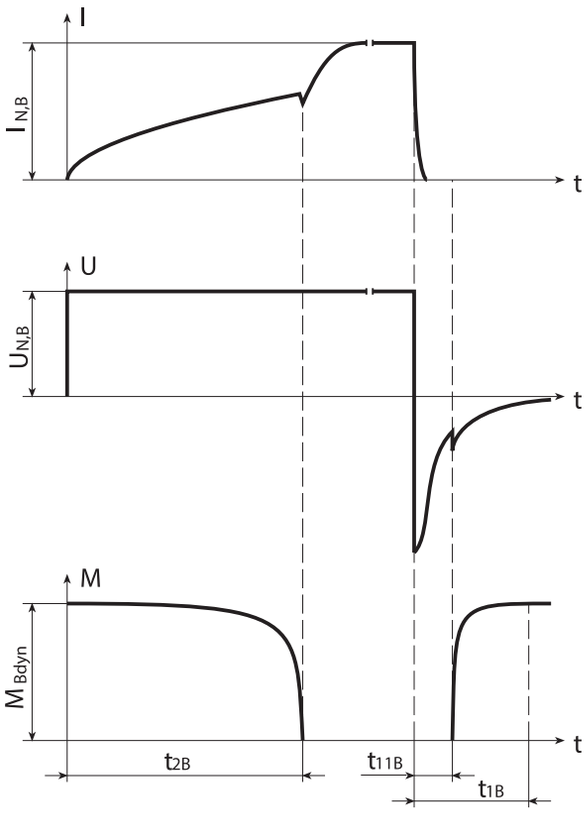


Fig. 4: Holding brake – Switching behavior

Technical data

Type	M_{Bstat} [Nm]	M_{Bdyn} [Nm]	$I_{N,B}$ [A]	$W_{B,Rmax/h}$ [kJ]	$N_{B,stop}$	$J_{B,stop}$ [10^{-4}kgm²]	$W_{B,Rlim}$ [kJ]	t_{2B} [ms]	t_{11B} [ms]	t_{1B} [ms]	$x_{B,N}$ [mm]	ΔJ_B [10^{-4}kgm²]	Δm_B [kg]
EZ301	2.5	2.3	0.51	6.0	48000	0.752	180	25	3.0	20	0.2	0.186	0.55
EZ302	4.0	3.8	0.50	8.5	38000	0.952	180	44	4.0	26	0.3	0.186	0.55
EZ303	4.0	3.8	0.50	8.5	30000	1.17	180	44	4.0	26	0.3	0.186	0.55
EZ401	4.0	3.8	0.50	8.5	16000	2.24	180	44	4.0	26	0.3	0.192	0.76
EZ402	8.0	7.0	0.75	8.5	13500	4.39	300	40	2.0	20	0.3	0.566	0.97
EZ404	8.0	7.0	0.75	8.5	8500	7.09	300	40	2.0	20	0.3	0.566	0.97
EZ501	8.0	7.0	0.75	8.5	8700	6.94	300	40	2.0	20	0.3	0.571	1.19
EZ502	8.0	7.0	0.80	8.5	5200	11.5	300	40	2.0	20	0.3	0.571	1.19
EZ503	15	12	1.0	11.0	5900	18.6	550	60	5.0	30	0.3	1.721	1.62
EZ505	15	12	1.0	11.0	4000	27.8	550	60	5.0	30	0.3	1.721	1.62
EZ701	15	12	1.0	11.0	5400	20.5	550	60	5.0	30	0.3	1.743	1.94
EZ702	15	12	1.0	11.0	3600	30.9	550	60	5.0	30	0.3	1.743	1.94
EZ703	32	28	1.1	25.0	5200	54.6	1400	100	5.0	25	0.4	5.680	2.81
EZ705	32	28	1.1	25.0	3500	79.4	1400	100	5.0	25	0.4	5.680	2.81
EZ802	65	35	1.7	45.0	6000	149	2250	200	10	50	0.4	16.460	5.40
EZ803	65	35	1.7	45.0	4500	200	2250	200	10	50	0.4	16.460	5.40
EZ805	115	70	2.1	65.0	7000	376	6500	190	12	65	0.5	55.460	8.40

23.6.8 Connection method

The following chapters describe the connection technology of STOBER synchronous servo motors in the standard version on STOBER drive controllers. You can find further information relating to the drive controller type that was specified in your order in the connection plan that is delivered with every synchronous servo motor.

In Chapter [▶ 27], you can find information about options for connecting STOBER synchronous servo motors to drive controllers from other manufacturers.

23.6.8.1 Connection of the motor housing to the grounding conductor system

Connect the motor housing to the grounding conductor system of the machine in order to prevent personal injury and faulty triggering of residual current protective devices.

All attachment parts required for the connection of the grounding conductor to the motor housing are delivered with the motor. The grounding screw of the motor is identified with the symbol ⏚ in accordance with IEC 60417-DB. The cross-section of the grounding conductor has to be at least as large as the cross-section of the lines in the power connection.

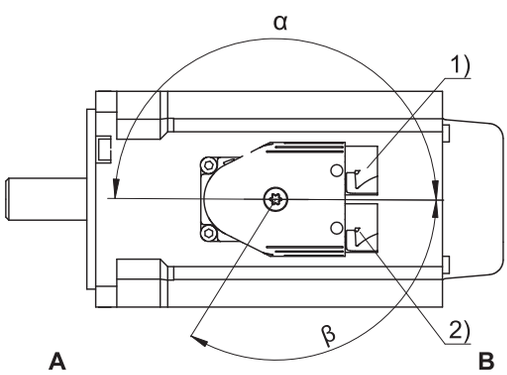
23.6.8.2 Plug connectors

STOBER synchronous servo motors are equipped with twistable quick-lock plug connectors in the standard version (except for plug connector size con.58). Details can be found in this chapter.

For motors with forced ventilation, avoid collisions between the motor connection cables and the plug connector of the forced ventilation unit. In the event of a collision, turn the motor plug connectors accordingly. Details regarding the position of the plug connector for the forced ventilation unit can be found in the "Dimensional drawings" chapter.

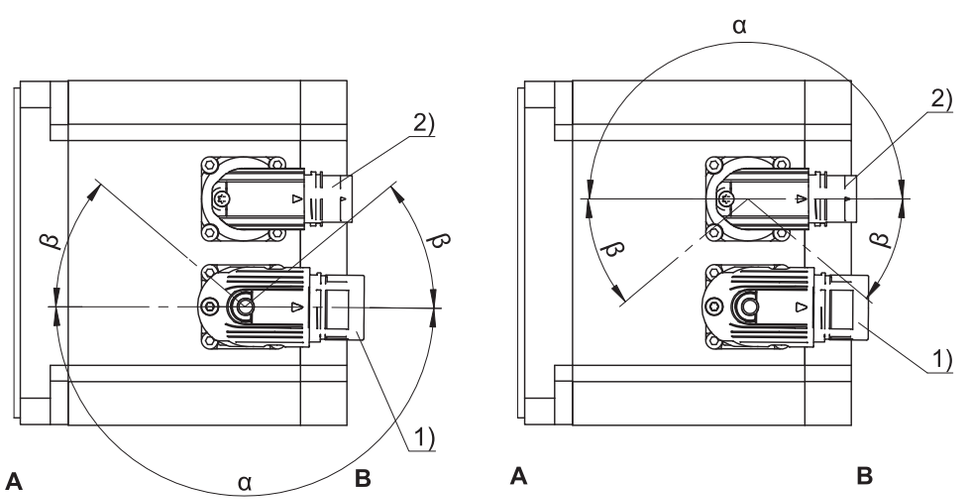
The figures represent the position of the plug connectors upon delivery.

Turning ranges of plug connectors (EZ3 motors)



1	Power plug connector	2	Encoder plug connector
A	Attachment or output side of the motor	B	Rear side of the motor

Turning ranges of plug connectors (EZ4 – EZ8 motors)



1	Power plug connector	2	Encoder plug connector
A	Attachment or output side of the motor	B	Rear side of the motor

Power plug connector features

Motor type	Size	Connection	Turning range	
			α	β
EZ3	con.15	Quick lock	180°	120°
EZ4, EZ5, EZ701, EZ702, EZ703	con.23	Quick lock	180°	40°
EZ705, EZ802, EZ803, EZ805U	con.40	Quick lock	180°	40°
EZ805B	con.58	Screw thread[2]	0°	0°

[2] Specify alignment on side A or B in the purchase order.

Encoder plug connector features

Motor type	Size	Connection	Turning range	
			α	β
EZ3	con.15	Quick lock	180°	120°
EZ4, EZ5, EZ7, EZ802, EZ803, EZ805U	con.17	Quick lock	180°	20°
EZ805B	con.17	Quick lock	180°	0°

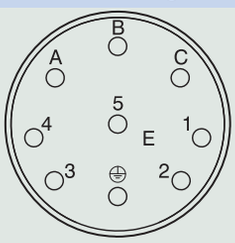
Notes

- The number after "con." indicates the approximate external thread diameter of the plug connector in mm (for example, con.23 designates a plug connector with an external thread diameter of about 23 mm).
- In turning range β, the power or encoder plug connectors can be turned only if doing so does not cause them to collide.
- For the EZ3 motor, the power and encoder plug connectors are mechanically connected and can only be turned together.

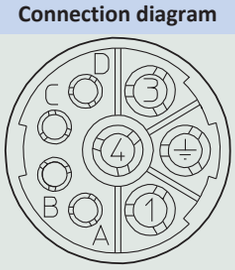
23.6.8.3 Connection assignment of the power plug connector

The size and connection plan of the power plug connector depend on the size of the motor. The colors of the connecting wires inside the motor are specified in accordance with IEC 60757.

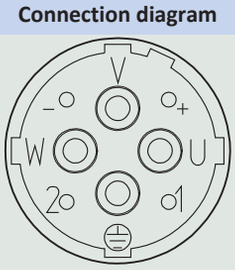
Plug connector size con.15

Connection diagram	Pin	Connection	Color
	A	U phase	black
	B	V phase	blue
	C	W phase	red
	1	Temperature sensor +	
	2	Temperature sensor –	
	3	Brake +	red
	4	Brake –	black
	⏚	Grounding conductor	green-yellow

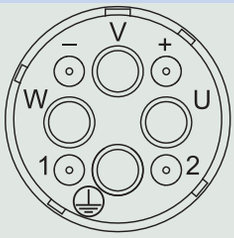
Plug connector size con.23 (1)

Connection diagram	Pin	Connection	Color
	1	U phase	black
	3	V phase	blue
	4	W phase	red
	A	Brake +	red
	B	Brake –	black
	C	Temperature sensor +	
	D	Temperature sensor –	
	⏚	Grounding conductor	green-yellow

Plug connector size con.40 (1.5)

Connection diagram	Pin	Connection	Color
	U	U phase	black
	V	V phase	blue
	W	W phase	red
	+	Brake +	red
	–	Brake –	black
	1	Temperature sensor +	
	2	Temperature sensor –	
	⏚	Grounding conductor	green-yellow

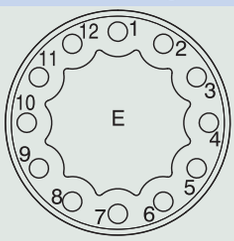
Plug connector size con.58 (3)

Connection diagram	Pin	Connection	Color
	U	U phase	black
	V	V phase	blue
	W	W phase	red
	+	Brake +	red
	–	Brake –	black
	1	Temperature sensor +	
	2	Temperature sensor –	
	⏚	Grounding conductor	green-yellow

23.6.8.4 Connection assignment of the encoder plug connector

The size and connection assignment of the encoder plug connectors depend on the model of encoder installed and the size of the motor.

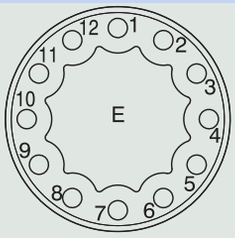
EnDat 2.1/2.2 digital encoders, plug connector size con.15

Connection diagram	Pin	Connection	Color
	1	Clock +	violet
	2	Up sense	browngreen
	3		
	4		
	5	Data –	pink
	6	Data +	grey
	7		
	8	Clock –	yellow
	9		
	10	0 V GND	whitegreen
	11		
	12	Up +	browngreen
	Pin 2 is connected to pin 12 in the plug connector		

EnDat 2.1/2.2 digital encoders, plug connector size con.17

Connection diagram	Pin	Connection	Color
	1	Clock +	violet
	2	Up sense	browngreen
	3		
	4		
	5	Data –	pink
	6	Data +	grey
	7		
	8	Clock –	yellow
	9		
	10	0 V GND	whitegreen
	11		
	12	Up +	browngreen
	Pin 2 is connected to pin 12 in the plug connector		

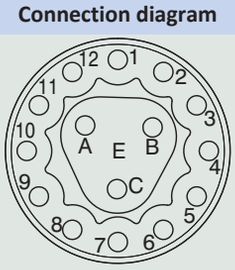
EnDat 2.2 digital encoder with battery buffering, plug connector size con.15

Connection diagram	Pin	Connection	Color
	1	Clock +	violet
	2	UBatt +	blue
	3	UBatt –	white
	4		
	5	Data –	pink
	6	Data +	grey
	7		
	8	Clock –	yellow
	9		
	10	0 V GND	white green
	11		
	12	Up +	brown green
	UBatt+ = DC 3.6 V for encoder model EBI in combination with the AES option of STOBER drive controllers		

EnDat 2.2 digital encoder with battery buffering, plug connector size con.17

Connection diagram	Pin	Connection	Color
	1	Clock +	violet
	2	UBatt +	blue
	3	UBatt –	white
	4		
	5	Data –	pink
	6	Data +	grey
	7		
	8	Clock –	yellow
	9		
	10	0 V GND	white green
	11		
	12	Up +	brown green
	UBatt+ = DC 3.6 V for encoder model EBI in combination with the AES option of STOBER drive controllers		

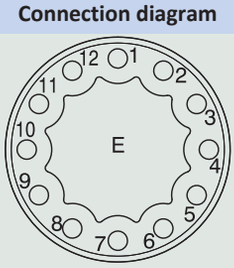
EnDat 2.1 encoder with sin/cos incremental signals, plug connector size con.15

Connection diagram	Pin	Connection	Color
	1	Up sense	blue
	2	0 V sense	white
	3	Up +	brown green
	4	Clock +	violet
	5	Clock –	yellow
	6	0 V GND	white green
	7	B + (Sin +)	blue black
	8	B – (Sin –)	red black
	9	Data +	grey
	10	A + (Cos +)	green black
	11	A – (Cos –)	yellow black
	12	Data –	pink
	A		
	B		
	C		

EnDat 2.1 encoder with sin/cos incremental signals, plug connector size con.17

Connection diagram	Pin	Connection	Color
	1	Up sense	blue
	2		
	3		
	4	0 V sense	white
	5		
	6		
	7	Up +	brown green
	8	Clock +	violet
	9	Clock –	yellow
	10	0 V GND	white green
	11		
	12	B + (Sin +)	blue black
	13	B – (Sin –)	red black
	14	Data +	grey
	15	A + (Cos +)	green black
	16	A – (Cos –)	yellow black
	17	Data –	pink

Resolver, plug connector size con.15

Connection diagram	Pin	Connection	Color
	1	S3 Cos +	black
	2	S1 Cos –	red
	3	S4 Sin +	blue
	4	S2 Sin –	yellow
	5		
	6		
	7	R2 Ref +	yellowwhite[3]
	8	R1 Ref –	redwhite
	9		
	10		
	11		
	12		

Resolver, plug connector size con.17

Connection diagram	Pin	Connection	Color
	1	S3 Cos +	black
	2	S1 Cos –	red
	3	S4 Sin +	blue
	4	S2 Sin –	yellow
	5		
	6		
	7	R2 Ref +	yellowwhite[4]
	8	R1 Ref –	redwhite
	9		
	10		
	11		
	12		

[3] or black and white(depending on the manufacturer of the resolver)

[4] or black and white(depending on the manufacturer of the resolver)

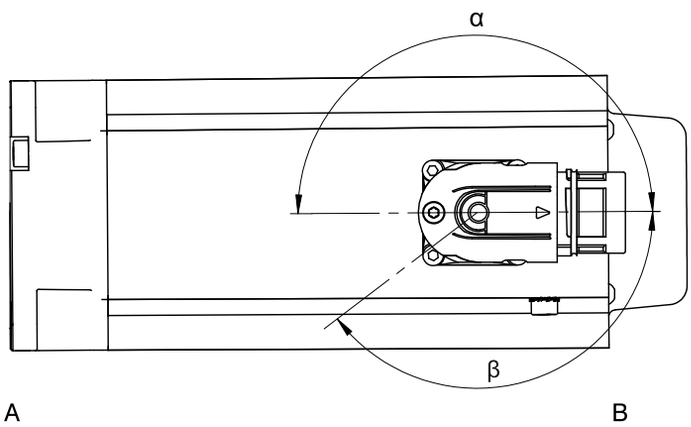
23.6.8.5 Plug connectors (One Cable Solution)

In the One Cable Solution design, the power and encoder lines are connected using a shared plug connector.

For motors with forced ventilation, avoid collisions between the motor connection cables and the plug connector of the forced ventilation unit. In the event of a collision, turn the motor plug connectors accordingly. Details regarding the position of the plug connector for the forced ventilation unit can be found in the "Dimensional drawings" chapter.

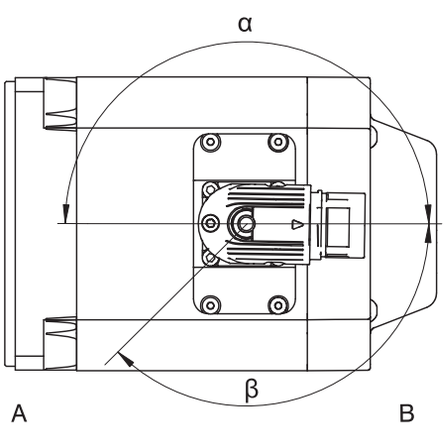
The figures represent the position of the plug connectors upon delivery.

Turning ranges of plug connectors (EZ3 motors)



A	Attachment or output side of the motor	B	Rear side of the motor

Turning ranges of plug connectors (EZ4 – EZ7 motors)



A	Attachment or output side of the motor	B	Rear side of the motor

Plug connector features

Motor type	Size	Connection	Turning range	
			α	β
EZ3, EZ4, EZ5, EZ701, EZ702, EZ703	con.23	Quick lock	180°	135°
EZ705	con.40	Quick lock	180°	135°

Notes

- The number after "con." indicates the approximate external thread diameter of the plug connector in mm (for example, con.23 designates a plug connector with an external thread diameter of about 23 mm).

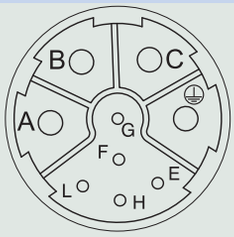
23.6.8.6 Terminal assignment for plug connectors (One Cable Solution)

In the One Cable Solution design, the power and encoder lines are connected using a shared plug connector.

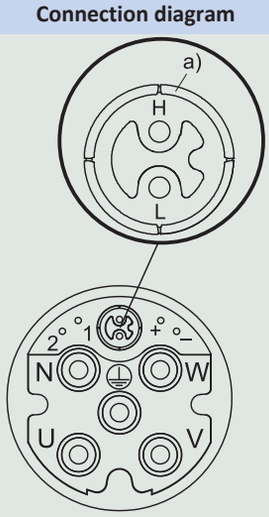
The temperature sensor of the motor is connected to the encoder internally. The measured values from the temperature sensor are transmitted via the HIPERFACE DSL log of the encoder.

The size of the plug connector depends on the size of the motor.

Plug connector size con.23 (1)

Connection diagram	Pin	Connection	Color
	A	U phase	black
	B	V phase	blue
	C	W phase	red
	E	DSL– (L)	green
	F	DSL shield	
	G	Brake +	red
	H	DSL+ (H)	grey
	L	Brake –	black
	⏚	Grounding conductor	green-yellow

Plug connector size con.40 (1.5)

Connection diagram	Pin	Connection	Color
	U	U phase	black
	V	V phase	blue
	W	W phase	red
	N		
	+	Brake +	red
	–	Brake –	black
	1		
	2		
	H	DSL+ (H)	grey
	L	DSL– (L)	green
	⏚	Grounding conductor	green-yellow
a) Coaxial shield to which the DSL shield is connected			

23.7 Project configuration

Project your drives using our SERVOsoft designing software. You can receive SERVOsoft for free from your adviser at one of our sales centers. Observe the limit conditions in this chapter to ensure a safe design for your drives.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

23.7.1 Calculation of the operating point

In this chapter, you can find information needed to calculate the operating point.

Check the following conditions for operating points other than the nominal point M_N specified in the selection tables:

$n_{m*} \leq n_N$

$M_{eff*} \leq M_{limK}$ and $M_{eff*} \leq M_{limF}$

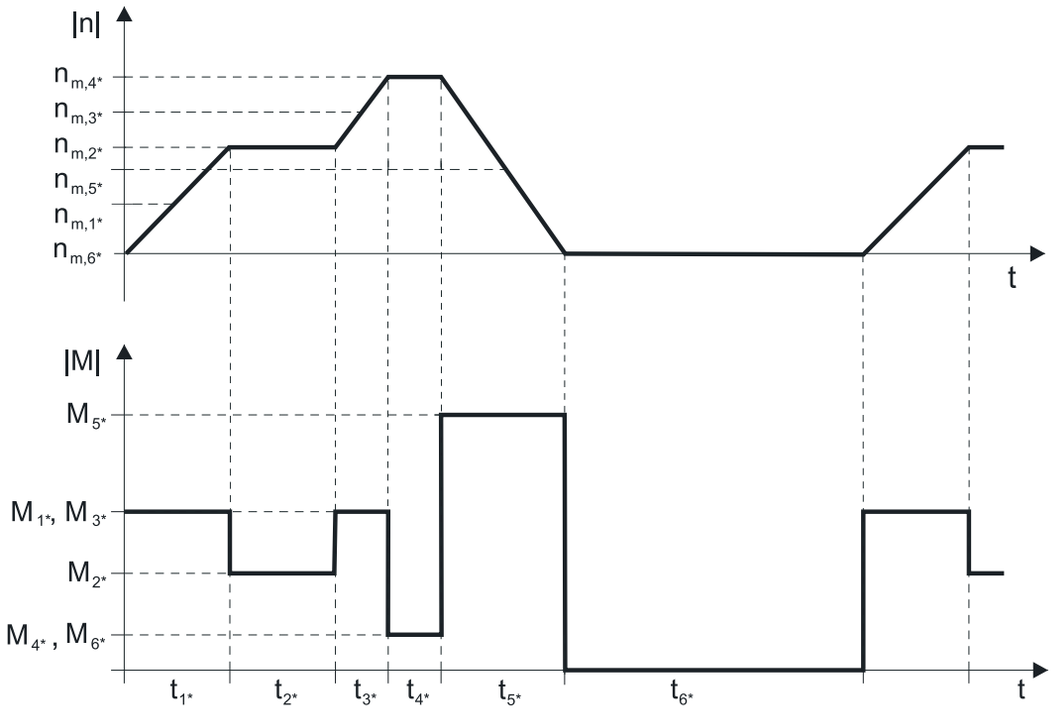
$M_{max*} < M_{max}$

The values for M_N, n_N, M_{max} can be found in the selection tables.

The values for M_{limK} and M_{limF} can be found in the torque/speed curves.

Example of cyclic operation

The following calculations refer to a representation of the power delivered at the motor shaft based on the following example:



Calculation of the actual average input speed

$$n_{m^*} = \frac{\left|n_{m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{m,n^*}\right| \cdot t_{n^*}}{t_{1^*} + \ldots + t_{n^*}}$$

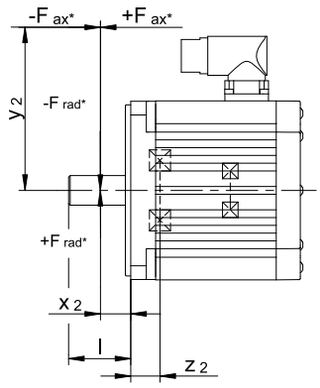
If $t_{1^*} + \ldots + t_{5^*} \geq 10$ min, determine n_{m^*} without the rest phase t_{6^*}.

Calculation of the actual effective torque

$$M_{eff^*} = \sqrt{\frac{t_{1^*} \cdot M_{1^*}{}^2 + \ldots + t_{n^*} \cdot M_{n^*}{}^2}{t_{1^*} + \ldots + t_{n^*}}}$$

23.7.2 Permitted shaft loads

This chapter contains information about the maximum permitted shaft loads of the output shaft of the motor.



	z_2 [mm]	F_{ax100} [N]	F_{rad100} [N]	M_{k100} [Nm]
EZ301	24.0	350	1000	39
EZ302	24.0	350	1000	39
EZ303	24.0	350	1000	39
EZ401	19.5	550	1800	62
EZ402	19.5	550	1800	71
EZ404	19.5	550	1800	71
EZ501	19.5	750	2000	79
EZ502	19.5	750	2400	95
EZ503	19.5	750	2400	107
EZ505	19.5	750	2400	107
EZ701	24.5	1300	3500	173
EZ702	24.5	1300	4200	208
EZ703	24.5	1300	4200	208
EZ705	24.5	1300	4200	225
EZ802	28.5	1750	5600	384
EZ803	28.5	1750	5600	384
EZ805	28.5	1750	5600	384

The values for permitted shaft loads specified in the table apply:

- For shaft dimensions in accordance with the catalog
- A force applied at the center of the output shaft: x_2 = l / 2 (shaft dimensions can be found in the chapter [▶ 23.4])
- Output speeds $n_{m*} \leq 100$ rpm ($F_{ax} = F_{ax100}$; $F_{rad} = F_{rad100}$; $M_k = M_{k100}$)

The following applies to output speeds $n_{m*} > 100$ rpm:

$$F_{ax} = \frac{F_{ax100}}{\sqrt[3]{\frac{n_{m*}}{100\ \text{rpm}}}} \qquad F_{rad} = \frac{F_{rad100}}{\sqrt[3]{\frac{n_{m*}}{100\ \text{rpm}}}} \qquad M_k = \frac{M_{k100}}{\sqrt[3]{\frac{n_{m*}}{100\ \text{rpm}}}}$$

The following applies to other force application points:

$$M_{k*} = \frac{2 \cdot F_{ax*} \cdot y_2 + F_{rad*} \cdot (x_2 + z_2)}{1000} \leq M_{k100}$$

$$F_{rad*} \leq F_{rad100}$$

$$F_{ax*} \leq F_{ax100}$$

For applications with multiple axial and/or radial forces, you must add the forces as vectors.

23.7.3 Derating

If you use the motor under ambient conditions that differ from the standard ambient conditions, the nominal torque M_N of the motor is reduced. In this chapter, you can find information for calculating the reduced nominal torque.

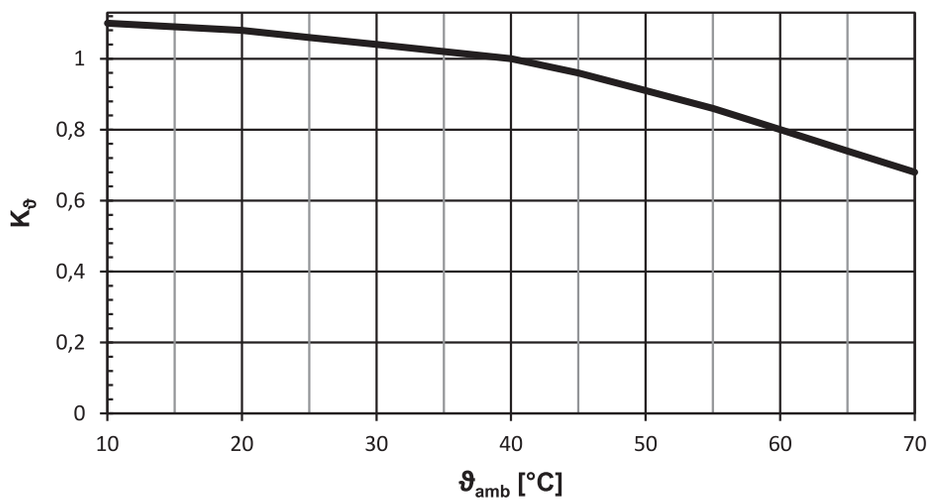


Fig. 5: Derating depending on the surrounding temperature

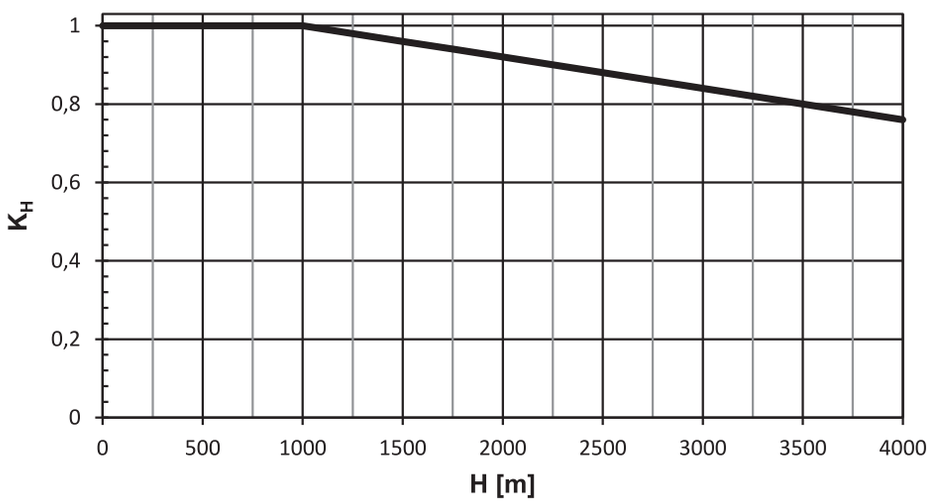


Fig. 6: Derating depending on the installation height

Calculation

If surrounding temperature ϑ_{amb} > 40 °C:

$M_{Nred} = M_N \cdot K_\vartheta$

If installation altitude H > 1000 m above sea level:

$M_{Nred} = M_N \cdot K_H$

If the surrounding temperature ϑ_{amb} > 40 °C and installation altitude H > 1000 m above sea level:

$M_{Nred} = M_N \cdot K_H \cdot K_\vartheta$

23.8 Further information

23.8.1 Directives and standards

STOBER synchronous servo motors meet the requirements of the following directives and standards:

- (Low Voltage) Directive 2014/35/EU
- EN 60034-1:2010 + Cor.:2010
- EN 60034-5:2001 + A1:2007
- EN 60034-6:1993

23.8.2 Identifiers and test symbols

STOBER synchronous servo motors have the following identifiers and test symbols:

CE mark: The product meets the requirements of EU directives.

cURus test symbol "Servo and Stepper Motors – Component"; registered under UL number E488992 with Underwriters Laboratories USA (optional).

23.8.3 Additional documentation

Additional documentation related to the product can be found at http://www.stoeber.de/en/download

Enter the ID of the documentation in the Search... field.

Documentation	ID
Operating manual for EZ synchronous servo motors	443032_en

24 EZHD synchronous servo motors with hollow shaft

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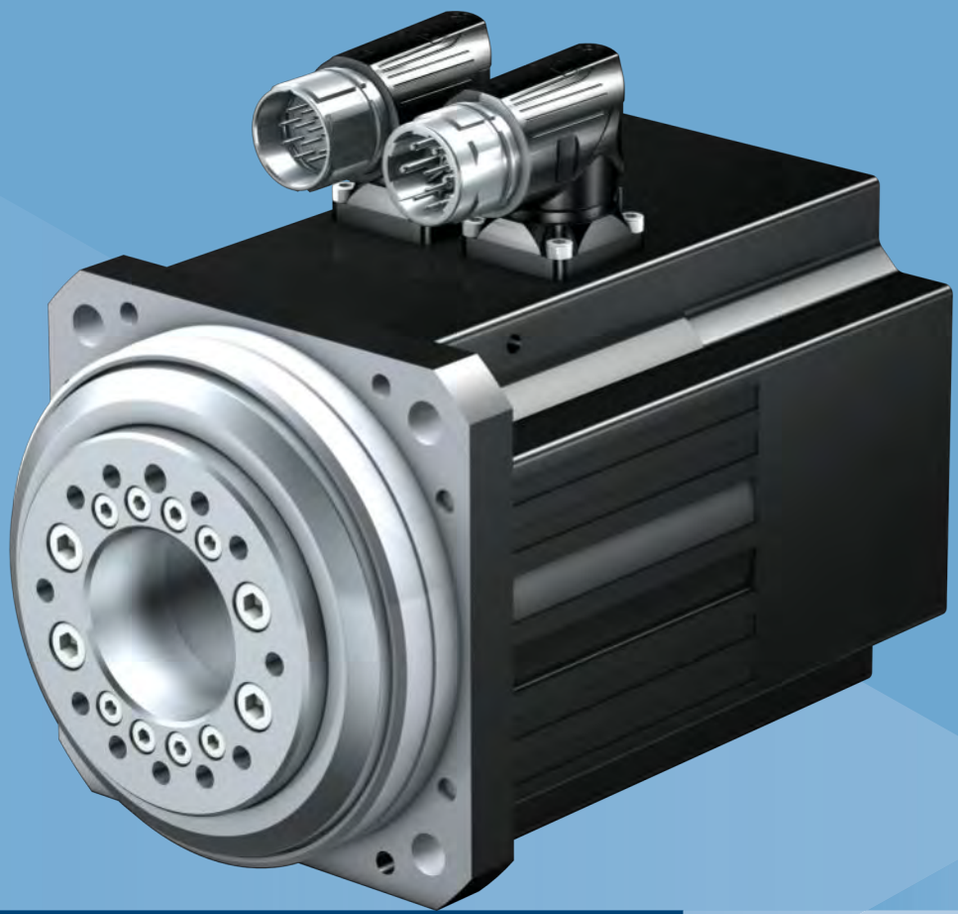


24

Synchronous servo motors with hollow shaft

EZHD

24.1 Overview

Synchronous servo motors with hollow shaft

Features

Continuous flange hollow shaft for conveying media	✓
Reinforced A-side bearing for absorbing radial forces	✓
Reinforced B-side bearing for absorbing axial forces	✓
High dynamics	✓
Super compact due to tooth-coil winding method with the highest possible copper fill factor	✓
Backlash-free holding brake (optional)	✓
Inductive EnDat absolute encoders	✓
Elimination of referencing with multi-turn absolute encoders (optional)	✓
Electronic nameplate for fast and reliable commissioning	✓
Rotating plug connectors with quick lock	✓

Torques

M_N	1.9 – 24.6 Nm
M_0	2.6 – 31.1 Nm

24.2 Selection tables

The technical data specified in the selection tables applies to:

- Installation altitudes up to 1000 m above sea level
- Surrounding temperatures from −15 °C to +40 °C
- Operation on a STOBER drive controller
- DC link voltage U_{ZK} = DC 540 V
- Coating: RAL 9005 Jet black, matte

In addition, the technical data applies to an uninsulated design with the following thermal mounting conditions:

Type	Dimensions of steel mounting flange (thickness x width x height)	Convection surface area Steel mounting flange
EZHD04 EZHD05	23 x 210 x 275 mm	0.16 m^2
EZHD07	28 x 300 x 400 mm	0.3 m^2

Note the differing ambient conditions in Chapter [▷ 24.7.3]

Formula symbols

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

Observe the additional information on the following formula symbols:

- I_0 = RMS value of the line-to-line current when stall torque M_0 is generated (tolerance ±5%).
- I_{max} = RMS value of the short-term maximum permitted line-to-line current when maximum torque M_{max} is generated (tolerance ±5%). Exceeding I_{max} may lead to irreversible damage (demagnetization) of the rotor.
- I_N = RMS value of the line-to-line current when nominal torque M_N is generated at the nominal point (tolerance ±5%).
- M_0 = Torque that a motor is continuously able to deliver at a speed of 10 rpm (tolerance ±5%). At a speed of 0 rpm, a minor continuous torque has to be taken into account. Contact your STOBER customer advisor for such an application.

Type	K_{EM} [V/1000 rpm]	n_N [rpm]	M_N [Nm]	I_N [A]	$K_{M,N}$ [Nm/A]	P_N [kW]	M_0 [Nm]	I_0 [A]	K_{M0} [Nm/A]	M_R [Nm]	M_{max} [Nm]	I_{max} [A]	R_{U-V} [Ω]	L_{U-V} [mH]	T_{el} [ms]	J [10^{-4} kgm^2]	m [kg]
EZHD0411U	96	3000	1.90	2.36	0.81	0.60	2.60	2.89	1.05	0.44	8.50	16.5	6.70	37.70	5.63	9.35	5.46
EZHD0412U	94	3000	4.20	4.29	0.98	1.3	5.10	4.94	1.12	0.44	16.0	26.5	3.00	21.80	7.26	10.1	6.55
EZHD0414U	116	3000	7.70	6.30	1.22	2.4	8.50	6.88	1.30	0.44	29.0	35.0	1.85	15.00	8.11	11.6	8.55
EZHD0511U	97	3000	3.00	3.32	0.90	0.94	4.10	4.06	1.12	0.44	16.0	22.0	3.80	23.50	6.18	22.3	7.50
EZHD0512U	121	3000	7.00	5.59	1.25	2.2	7.80	6.13	1.34	0.44	31.0	33.0	2.32	16.80	7.24	25.1	8.90
EZHD0513U	119	3000	8.30	7.04	1.18	2.6	10.9	8.76	1.29	0.44	43.0	41.0	1.25	10.00	8.00	27.9	10.3
EZHD0515U	141	3000	14.0	9.46	1.48	4.4	16.4	11.0	1.54	0.44	67.0	52.0	0.93	8.33	8.96	33.6	13.1
EZHD0711U	95	3000	7.30	7.53	0.97	2.3	7.90	7.98	1.07	0.63	20.0	25.0	1.30	12.83	9.87	63.6	13.8
EZHD0712U	133	3000	11.6	8.18	1.42	3.6	14.4	9.99	1.50	0.63	41.0	36.0	1.00	11.73	11.73	72.5	16.2
EZHD0713U	122	3000	17.8	13.4	1.33	5.6	20.4	15.1	1.39	0.63	65.0	62.0	0.52	6.80	13.08	81.4	18.5
EZHD0715U	140	3000	24.6	17.2	1.43	7.7	31.1	21.1	1.50	0.63	104	87.0	0.33	4.80	14.55	100	23.9

24.3 Torque/speed curves

Torque/speed curves depend on the nominal speed and/or winding design of the motor and the DC link voltage of the drive controller that is used. The following torque/speed curves apply to the DC link voltage DC 540 V.

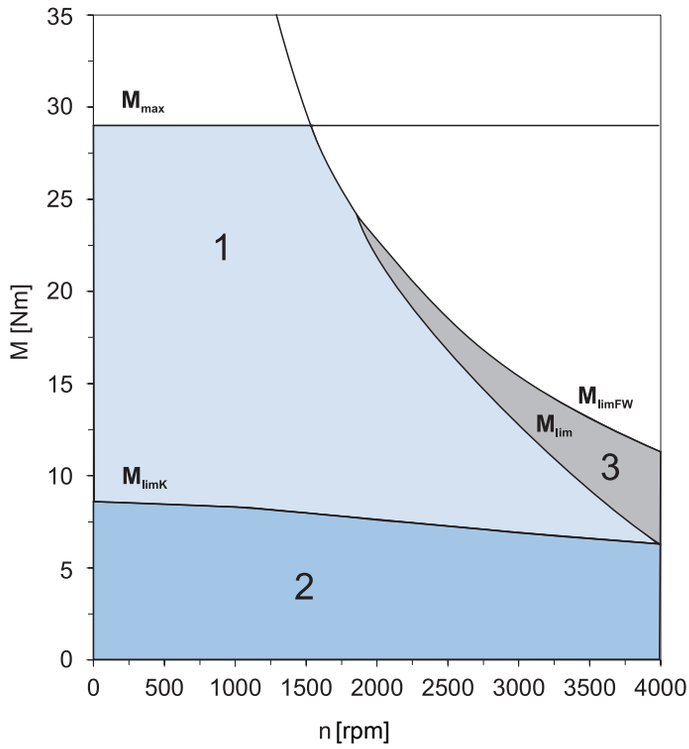
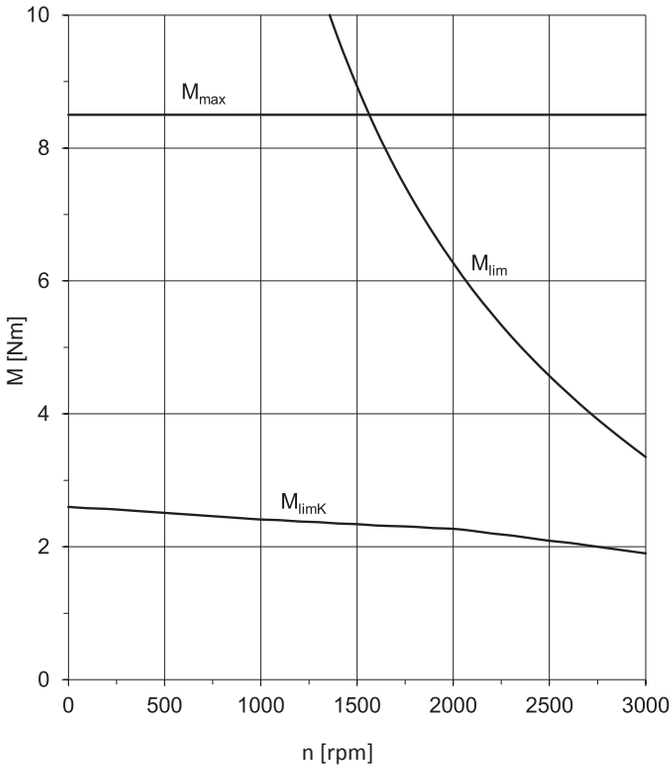


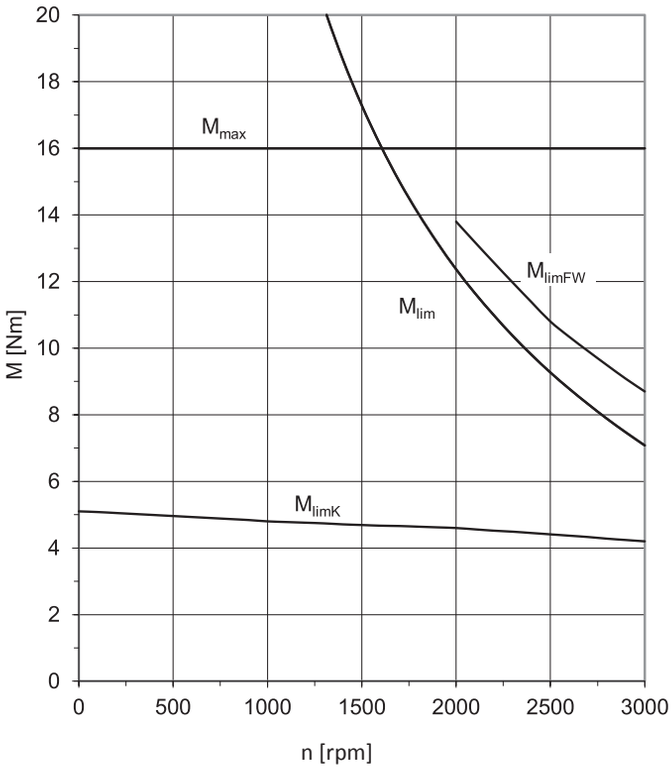
Fig. 1: Explanation of a torque/speed curve

1	Torque range for brief operation (ED_{10} < 100%) with $\Delta\vartheta$ = 100 K	2	Torque range for continuous operation with constant load (S1 mode, ED_{10} = 100%) with $\Delta\vartheta$ = 100 K
3	Field weakening range (can be used only with operation on STOBER drive controllers)		

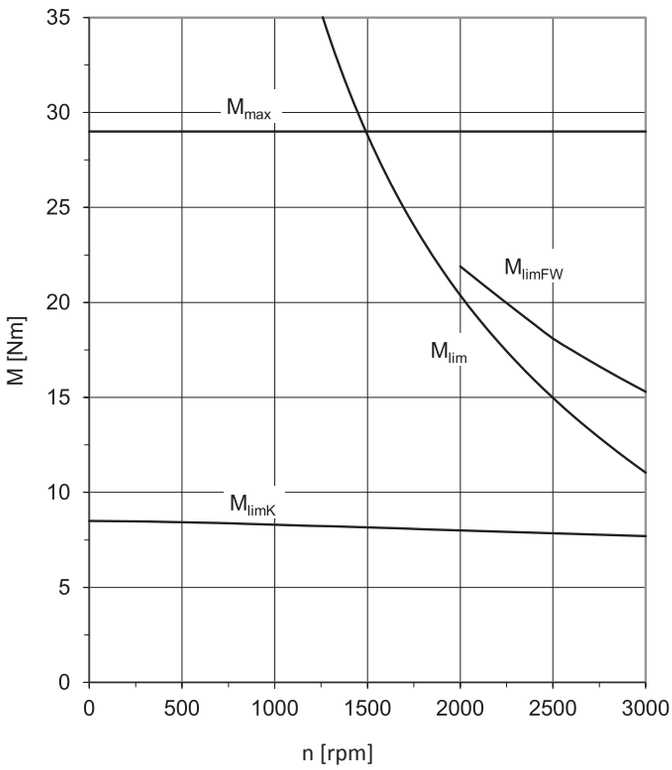
EZHD0411U (n_N=3000 rpm)



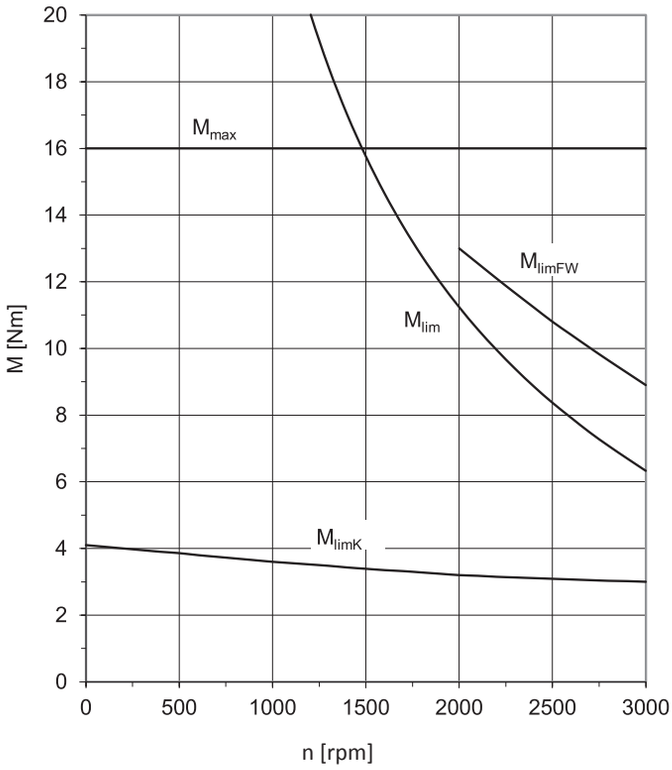
EZHD0412U (n_N=3000 rpm)



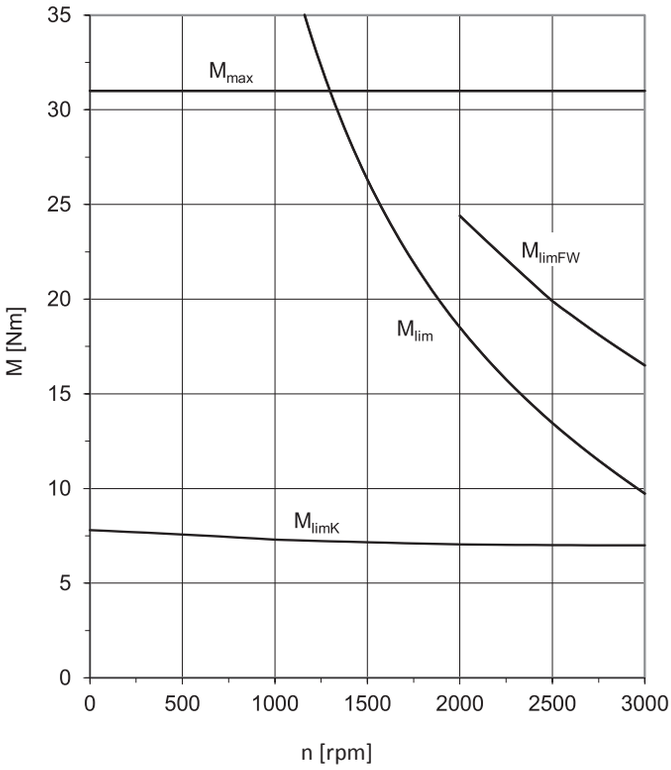
EZHD0414U (n_N=3000 rpm)



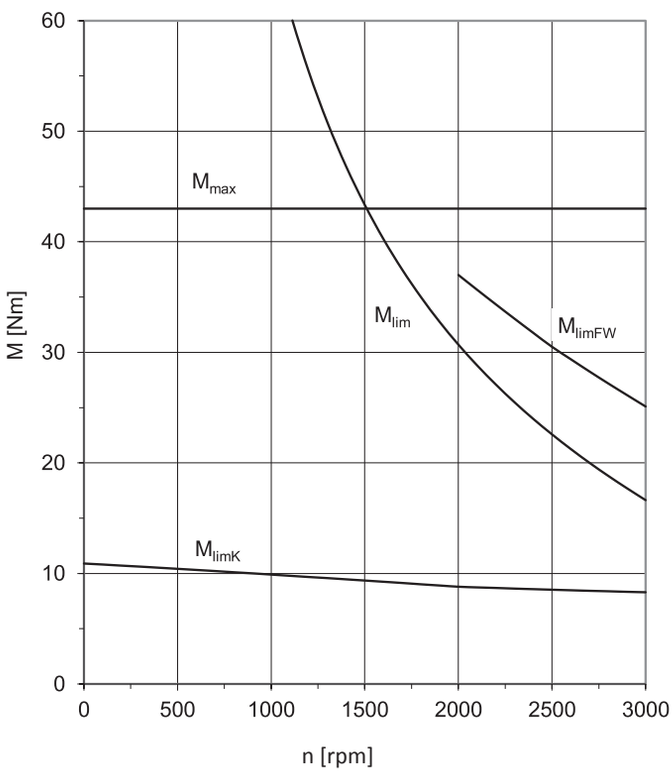
EZHD0511U (n_N=3000 rpm)



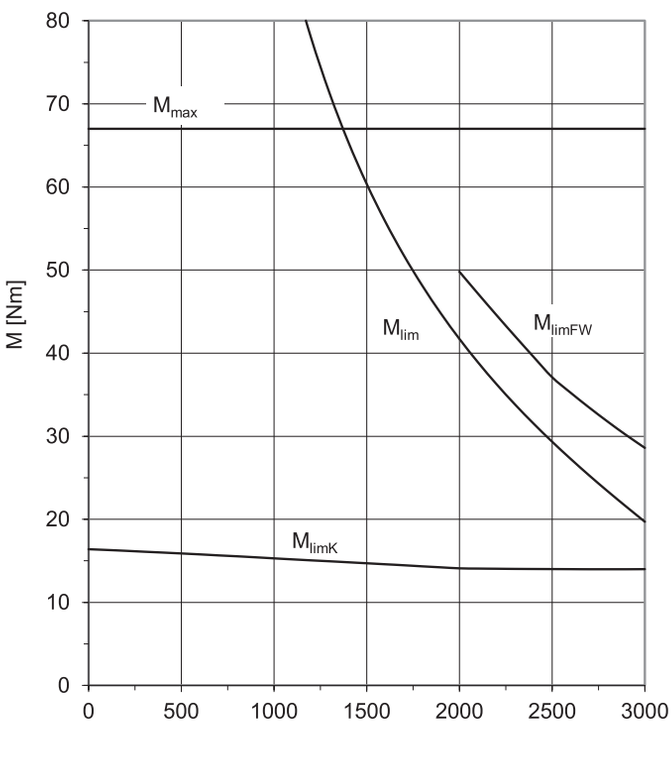
EZHD0512U (n_N=3000 rpm)



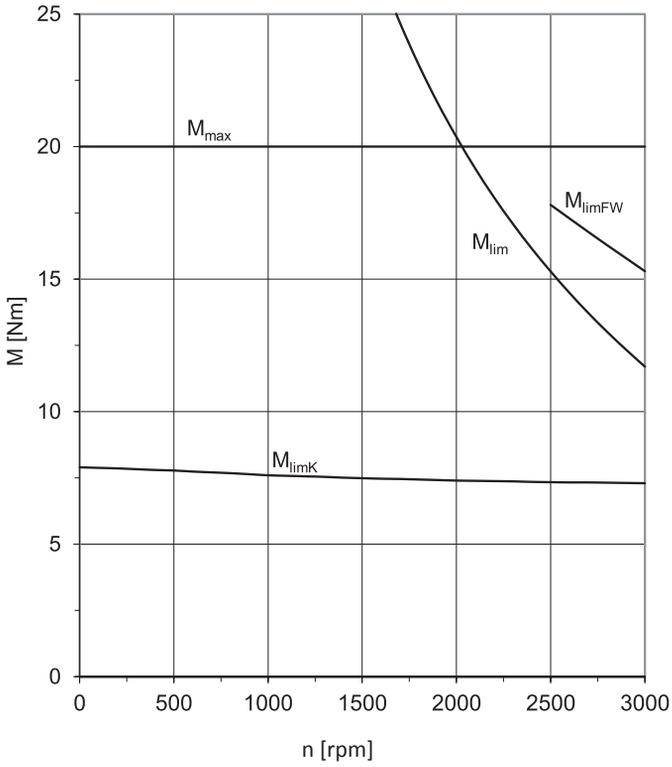
EZHD0513U (n_N=3000 rpm)



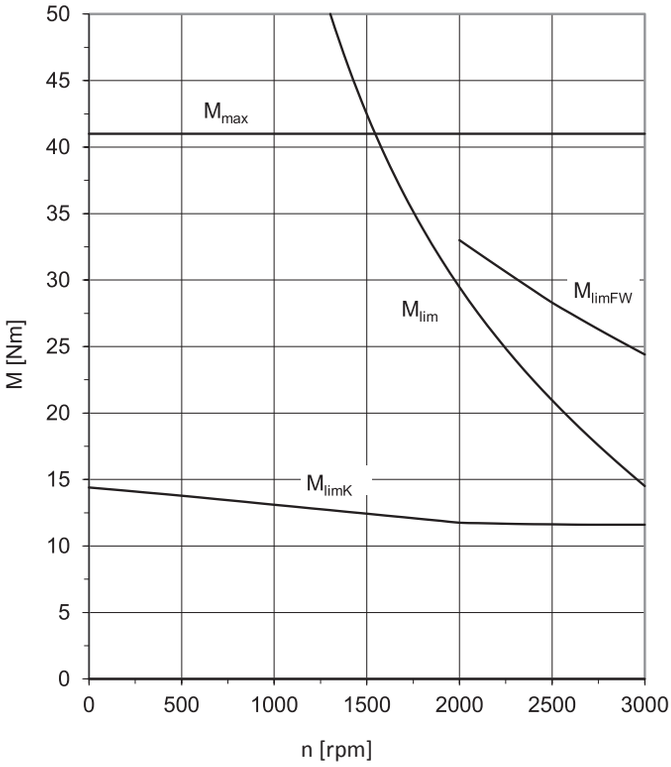
EZHD0515U (n_N=3000 rpm)



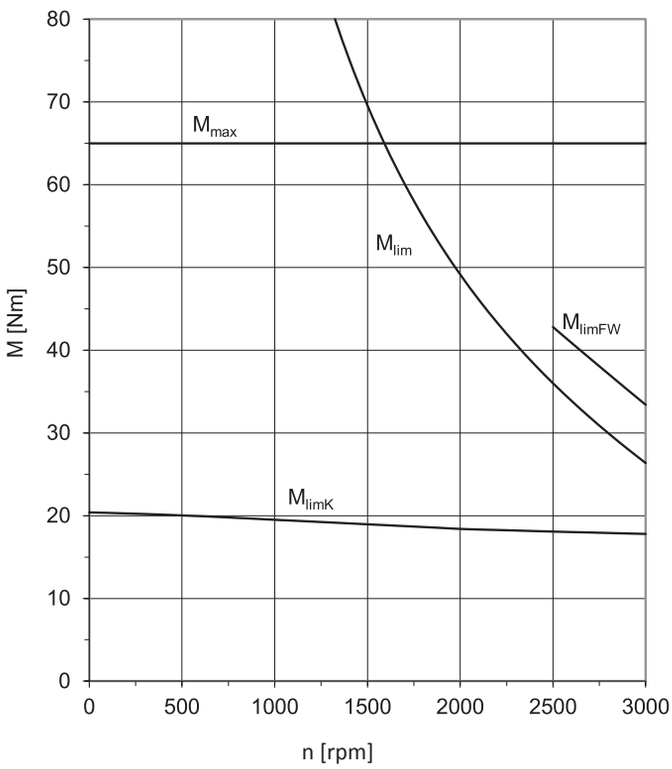
EZHD0711U (n_N=3000 rpm)



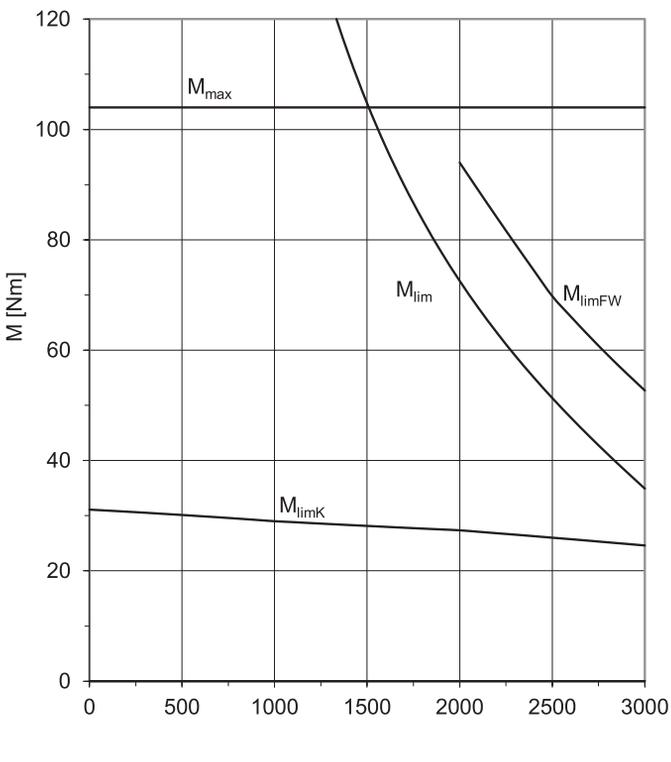
EZHD0712U (n_N=3000 rpm)



EZHD0713U (n_N=3000 rpm)



EZHD0715U (n_N=3000 rpm)



24.4 Dimensional drawings

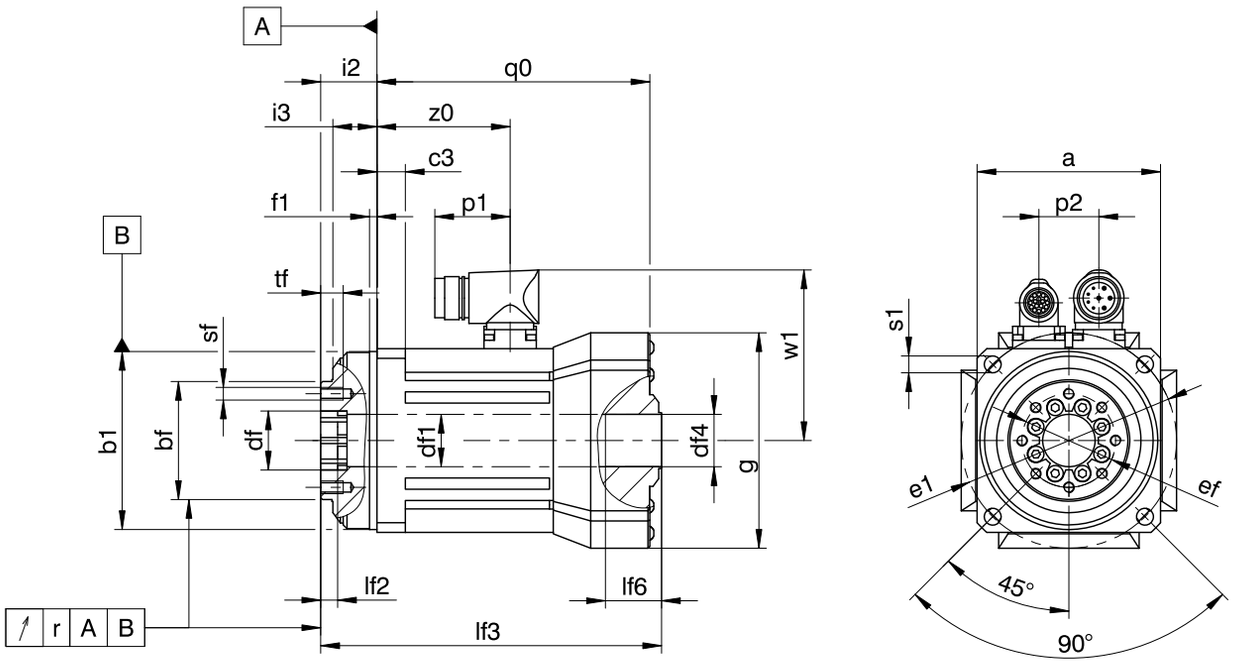
In this chapter, you can find the dimensions of the motors.

Dimensions can exceed the specifications of ISO 2768-mK due to casting tolerances or accumulation of individual tolerances.

We reserve the right to make dimensional changes due to ongoing technical development.

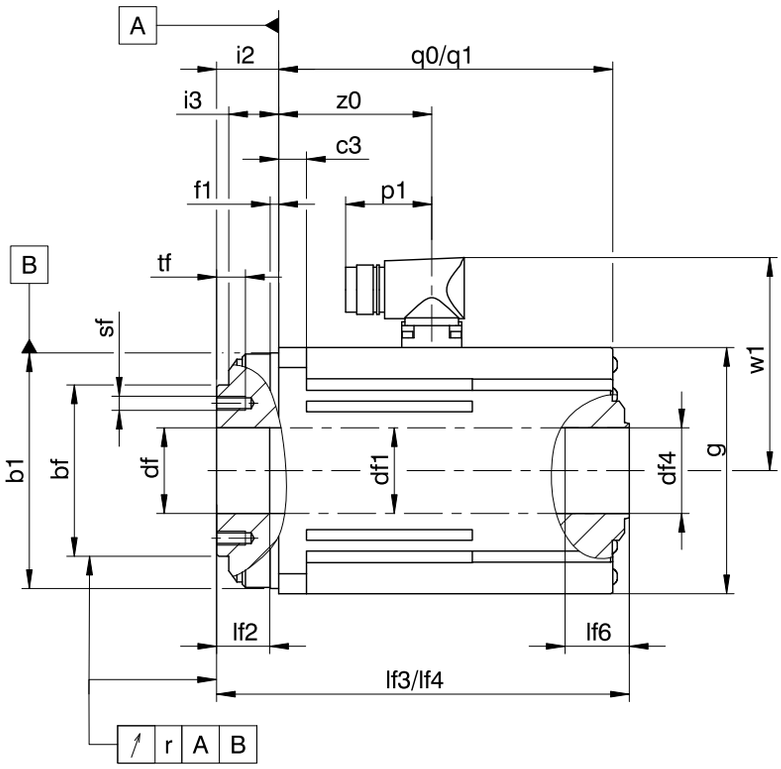
You can download CAD models of our standard drives at http://cad.stoeber.de.

24.4.1 EZHD04 motors

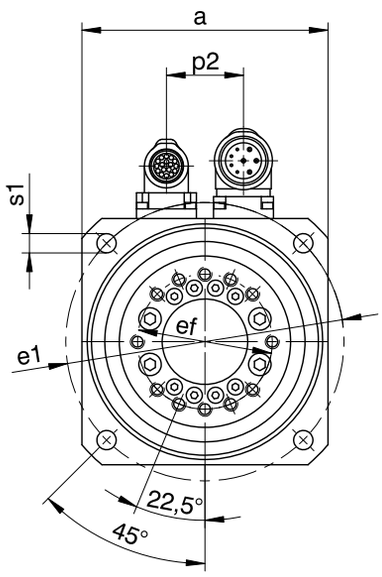


Type	□a	Øb1	Øbf	c3	Ødf	Ødf1	Ødf4	Øe1	Øef	f1	□g	i2	i3	lf2	lf3	lf6	p1	p2	q0	r	Øs1	sf	tf	w1	z0
EZHD0411	98	95_{j6}	63_{h7}	15.1	31.5^{H7}	28.4	28^{JS10}	115	50	4	115	30±0.4	23.5	9	182	30	40	32	145.8	0.030	9	M6	11	91	71
EZHD0412	98	95_{j6}	63_{h7}	15.1	31.5^{H7}	28.4	28^{JS10}	115	50	4	115	30±0.4	23.5	9	207	30	40	32	170.8	0.030	9	M6	11	91	96
EZHD0414	98	95_{j6}	63_{h7}	15.1	31.5^{H7}	28.4	28^{JS10}	115	50	4	115	30±0.4	23.5	9	257	30	40	32	220.8	0.030	9	M6	11	91	143

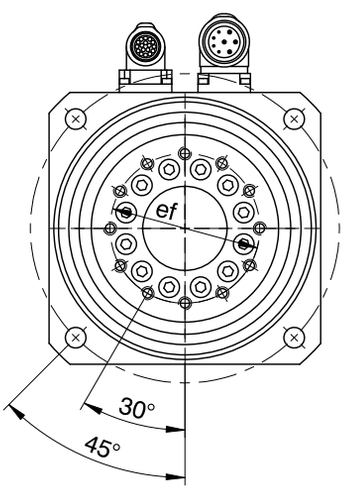
24.4.2 EZHD05 – EZHD07 motors



EZHD05



EZHD07



q0, lf3 Applies to motors without holding brake.

q1. lf4 Applies to motors with holding brake.

Type	□a	Øb1	Øbf	c3	Ødf	Ødf1	Ødf4	Øe1	Øef	f1	□g	i2	i3	lf2	lf3	lf4	lf6	p1	p2	q0	q1	r	Øs1	sf	tf	w1	z0
EZHD0511	115	110_{j6}	80_{h7}	13.0	40.0^{H7}	40.5	40^{JS10}	130	63	4	115	29±0.4	23.3	24.8	192.8	248.3	30	40	36	156.1	211.4	0.030	9	M6	11	100	71.5
EZHD0512	115	110_{j6}	80_{h7}	13.0	40.0^{H7}	40.5	40^{JS10}	130	63	4	115	29±0.4	23.3	24.8	217.8	273.3	30	40	36	181.1	236.4	0.030	9	M6	11	100	96.3
EZHD0513	115	110_{j6}	80_{h7}	13.0	40.0^{H7}	40.5	40^{JS10}	130	63	4	115	29±0.4	23.3	24.8	242.8	298.3	30	40	36	206.1	261.4	0.030	9	M6	11	100	121.5
EZHD0515	115	110_{j6}	80_{h7}	13.0	40.0^{H7}	40.5	40^{JS10}	130	63	4	115	29±0.4	23.3	24.8	292.8	348.3	30	40	36	256.1	311.4	0.030	9	M6	11	100	171.5
EZHD0711	145	140_{j6}	100_{h7}	14.5	50.0^{H7}	45.5	45^{JS10}	165	80	4	145	38±0.4	24.5	32.5	219.0	278.7	30	40	42	172.2	232.2	0.030	11	M8	15	115	78.7
EZHD0712	145	140_{j6}	100_{h7}	14.5	50.0^{H7}	45.5	45^{JS10}	165	80	4	145	38±0.4	24.5	32.5	244.0	303.7	30	40	42	197.2	257.2	0.030	11	M8	15	115	103.7
EZHD0713	145	140_{j6}	100_{h7}	14.5	50.0^{H7}	45.5	45^{JS10}	165	80	4	145	38±0.4	24.5	32.5	269.0	328.7	30	40	42	222.2	282.2	0.030	11	M8	15	115	128.7
EZHD0715	145	140_{j6}	100_{h7}	14.5	50.0^{H7}	45.5	45^{JS10}	165	80	4	145	38±0.4	24.5	32.5	324.0	383.7	30	71	42	277.2	337.2	0.030	11	M8	15	134	179.7

24.5 Type designation

Sample code

EZH	D	0	5	1	1	U	F	AD	B1	O	097

Explanation

Code	Designation	Design
EZH	Type	Synchronous servo motor with hollow shaft
D	Drive	Direct drive
0	Stages	Zero-stage (direct drive)
5	Motor size	5 (example)
1	Generation	1
1	Length	1 (example)
U	Cooling	Convection cooling
F	Output	Flange
AD	Drive controller	SD6 (example)
B1	Encoder	EBI 135 EnDat 2.2 (example)
O	Brake	Without holding brake
P		Permanent magnet holding brake[1]
097	Electromagnetic constant (EMC) K_{EM}	97 V/1000 rpm (example)

Notes

- In Chapter [▷ 24.6.4], you can find information about available encoders.
- In Chapter [▷ 24.6.4.3], you can find information about connecting synchronous servo motors to other drive controllers from STOBER.
- In Chapter [▷ 27], you can find information about options for connecting STOBER synchronous servo motors to drive controllers from other manufacturers.

24.6 Product description

24.6.1 General features

Feature	Description
Design	IM B5, IM V1, IM V3 in accordance with EN 60034-7
Protection class	IP56
Thermal class	155 (F) in accordance with EN 60034-1 (155 °C, heating $\Delta\vartheta$ = 100 K)
Surface	Matte black as per RAL 9005
Cooling	IC 410 convection cooling
Bearing	Rolling bearing with lifetime lubrication and non-contact sealing
Sealing	Gamma ring (on A and B side)
Vibration intensity	A in accordance with EN 60034-14
Noise level	Limit values in accordance with EN 60034-9

24.6.2 Electrical features

General electrical features of the motor are described in this chapter. Details can be found in the "Selection tables" chapter.

Feature	Description
DC link voltage	DC 540 V (max. 620 V) on STOBER drive controllers
Winding	Three-phase, single-tooth coil design
Circuit	Star, center not led through
Protection class	I (protective grounding) in accordance with EN 61140
Number of pole pairs	7

[1] Not available for EZHD_4.

24.6.3 Ambient conditions

Standard ambient conditions for transport, storage and operation of the motor are described in this chapter. Information about differing ambient conditions can be found in the chapter [▶ 24.7.3].

Feature	Description
Surrounding temperature for transport/storage	−30 °C to +85 °C
Surrounding temperature for operation	−15 °C to +40 °C
Installation altitude	≤ 1000 m above sea level
Shock load	≤ 50 m/s² (5 g), 6 ms in accordance with EN 60068-2-27

Notes

- STOBER synchronous servo motors are not suitable for potentially explosive atmospheres in accordance with (ATEX) Directive2014/34/EU.
- Secure the power cables close to the motor so that vibrations of the cable do not place impermissible loads on the motor plug connector.
- Note that the braking torques of the holding brake (optional) may be reduced by shock loading.
- Also take into consideration the shock load of the motor due to output units (such as gear units and pumps) which are coupled with the motor.

24.6.4 Encoders

STOBER synchronous servo motors can be designed with different encoder models. The following chapters include information for choosing the optimal encoder for your application.

24.6.4.1 Selection tool for EnDat interface

The following table offers a selection tool for the EnDat interface of absolute encoders.

Feature	EnDat 2.1	EnDat 2.2
Short cycle times	★★☆	★★★
Transfer of additional information along with the position value	–	✓
Expanded power supply range	★★☆	★★★
Key: ★★☆ = good, ★★★ = very good		

24.6.4.2 EnDat encoders

In this chapter, you can find detailed technical data for encoder models that can be selected with EnDat interface.

Encoders with EnDat 2.2 interface

Encoder model	Code	Measuring method	Recordable revolutions	Resolution	Position values per revolution
EBI 135	B1	Inductive	65536	19 bit	524288
ECI 119-G2	C9	Inductive	–	19 bit	524288

Encoders with EnDat 2.1 interface

Encoder model	Code	Measuring method	Recordable revolutions	Resolution	Position values per revolution	Periods per revolution
ECI 119	C4	Inductive	–	19 bit	524288	Sin/Cos 32

Notes

- The encoder code is a part of the type designation of the motor.
- Multiple revolutions of the motor shaft can be recorded only using multi-turn encoders.
- The EBI 135 encoder requires an external buffer battery so that absolute position information is retained after the power supply is turned off (AES option for STOBER drive controllers).

24.6.4.3 Possible combinations with drive controllers

The following table shows the options for combining STOBER drive controllers with selectable encoder models.

Drive controller		SDS 5000	MDS 5000	SDS 5000/ MDS 5000	SD6		SI6	SC6
Drive controller code		AA	AB	AC	AD	AE	**AP**	**AU**
Connection plan ID		442305	442306	442307	442450	442451	**442771**	**443052**
Encoder	**Encoder code**							
EBI 135	B1	✓	✓	–	✓	–	✓	✓
ECI 119-G2	C9	✓	✓	–	✓	–	✓	✓
ECI 119	C4	–	–	✓	–	✓	–	–

Notes

- The drive controller and encoder codes are a part of the type designation of the motor (see the "Type designation" chapter).
- In Chapter [▷ 27], you can find information about options for connecting STOBER synchronous servo motors to drive controllers from other manufacturers.

24.6.5 Temperature sensor

In this chapter, you can find technical data for the temperature sensors that are installed in STOBER synchronous servo motors for implementing thermal winding protection. To prevent damage to the motor, always monitor the temperature sensor with appropriate devices that will turn off the motor if the maximum permitted winding temperature is exceeded.

Some encoders feature integrated temperature monitoring, the warning and switch-off thresholds of which may overlap with the corresponding values set for the temperature sensor in the drive controller. In some cases, this may result in an instance where an encoder with internal temperature monitoring forces the motor to shut down, even before the motor has reached its nominal data.

You can find information about the electrical connection of the temperature sensor in the "Connection method" chapter.

24.6.5.1 PTC thermistor

The PTC thermistor is installed as a standard temperature sensor in STOBER synchronous servo motors.

The PTC thermistor is a triple thermistor in accordance with DIN 44082 that can be used for monitoring the temperature of each winding phase. The resistance values in the following table and curve refer to a single thermistor in accordance with DIN 44081. These values must be multiplied by 3 for a triple thermistor in accordance with DIN 44082.

Feature	Description
Nominal response temperature ϑ_{NAT}	145 °C ± 5 K
Resistance R –20 °C up to ϑ_{NAT} – 20 K	≤ 250 Ω
Resistance R with ϑ_{NAT} – 5 K	≤ 550 Ω
Resistance R with ϑ_{NAT} + 5 K	≥ 1330 Ω
Resistance R with ϑ_{NAT} + 15 K	≥ 4000 Ω
Operating voltage	≤ DC 7.5 V
Thermal response time	< 5 s
Thermal class	155 (F) in accordance with EN 60034-1 (155 °C, heating $\Delta\vartheta$ = 100 K)

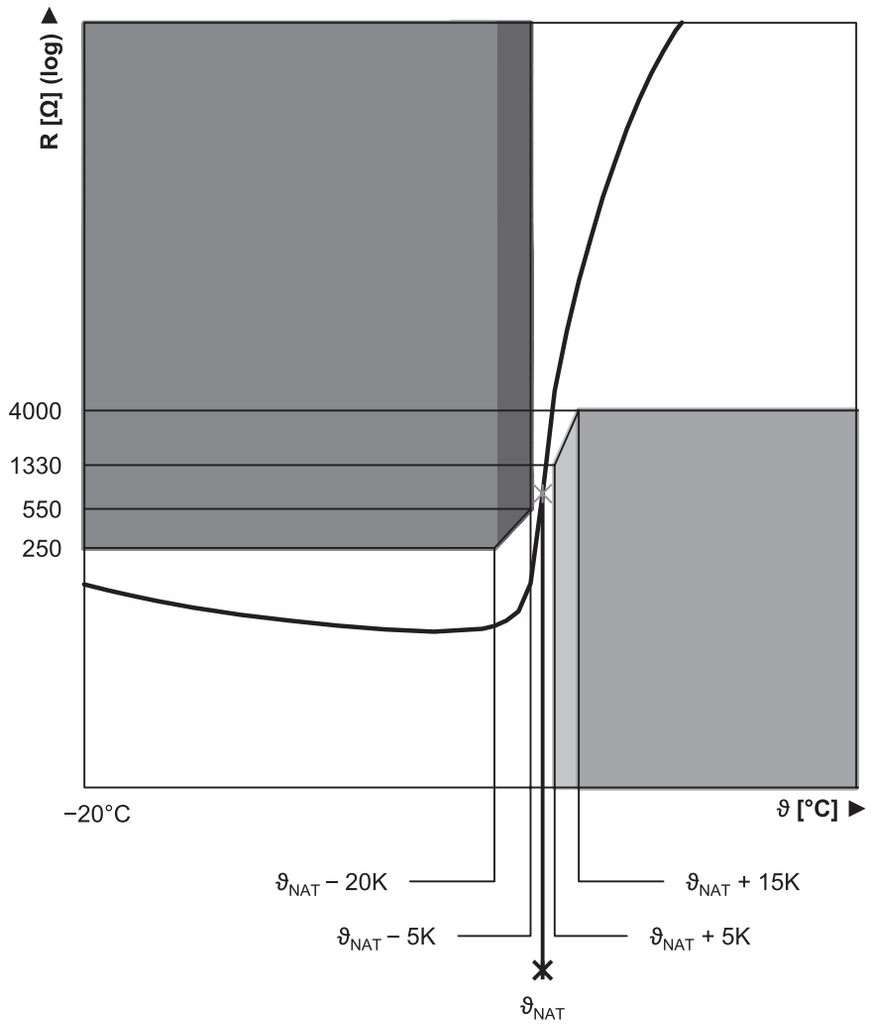


Fig. 2: PTC thermistor curve (single thermistor)

24.6.5.2 Pt1000 temperature sensor

STOBER synchronous servo motors are available in versions with a Pt1000 temperature sensor. The Pt1000 is a temperature-dependent resistor that has a resistance curve with a linear relationship with temperature. As a result, the Pt1000 allows for measurements of the winding temperature. These measurements are limited to one phase of the motor winding, however. In order to adequately protect the motor from exceeding the maximum permitted winding temperature, use a i^2t model in the drive controller to monitor the winding temperature.

Avoid exceeding the specified measurement current so that the measured values are not falsified due to self-heating of the temperature sensor.

Feature	Description
Measurement current (constant)	2 mA
Resistance R for ϑ = 0 °C	1000 Ω
Resistance R for ϑ = 80 °C	1300 Ω
Resistance R for ϑ = 150 °C	1570 Ω

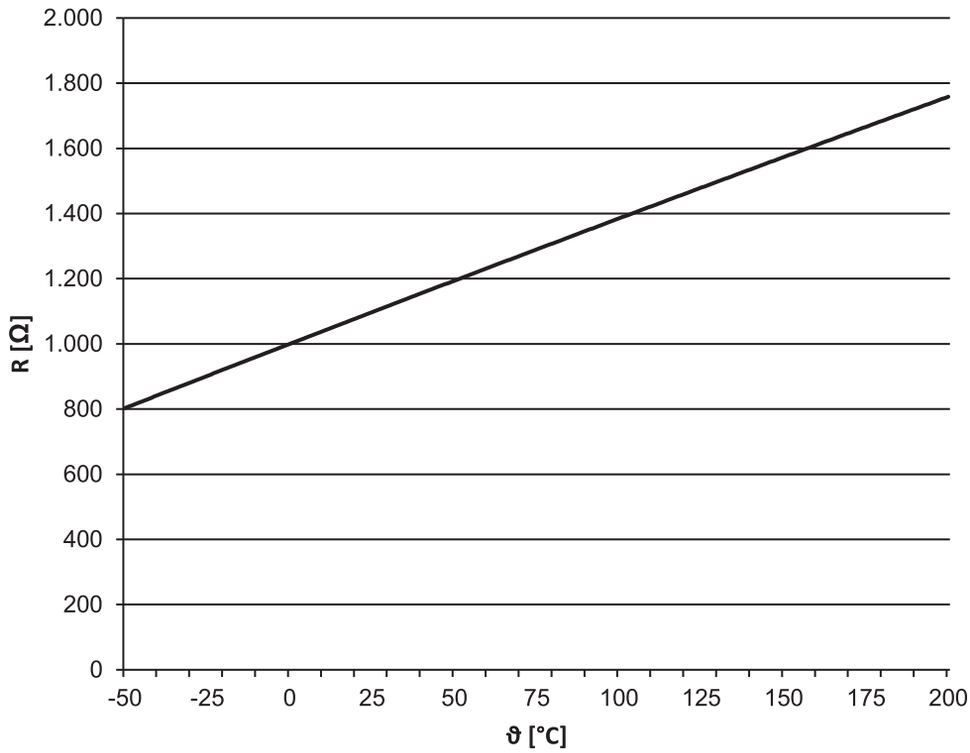


Fig. 3: Pt1000 temperature sensor characteristic curve

24.6.6 Cooling

An EZHD motor is cooled by convection cooling (IC 410 in accordance with EN 60034-6). The air flowing around the motor is heated by the radiated motor heat and rises.

24.6.7 Holding brake

STOBER synchronous servo motors can be equipped with a backlash-free holding brake using permanent magnets in order to secure the motor shaft when at a standstill. The holding brake engages automatically if the voltage drops.

Nominal voltage of permanent magnet holding brake: DC 24 V ± 5%, smoothed.

Observe the following during project configuration:

- The holding brake is designed to keep the motor shaft from moving. Activate braking processes during operation using the corresponding electrical functions of the drive controller. In exceptional circumstances, the holding brake can be used for braking from full speed (following a power failure or when setting up the machine). The maximum permitted work done by friction $W_{B,Rmax/h}$ may not be exceeded.
- Note that the braking torque M_{Bdyn} may initially be up to 50% less when braking from full speed. As a result, the braking effect has a delayed action and braking distances become longer.
- Regularly perform a brake test to ensure the functional safety of the brakes. Details can be found in the documentation of the motor and the drive controller.
- Connect a varistor of type S14 K35 (or comparable) in parallel to the brake coil to protect your machine from switching surges. (Not necessary for connecting the holding brake to STOBER drive controllers of the 5th and 6th generation with a BRS/BRM brake module).
- The holding brake of the motor does not offer adequate safety for persons in the hazardous area of gravity-loaded vertical axes. Therefore take additional measures to minimize risk, e.g. by providing a mechanical substructure for maintenance work.
- Take into consideration voltage losses in the connection cables that connect the voltage source to the holding brake connections.
- The holding torque of the brake can be reduced by shock loading. Information about shock loading can be found in the "Ambient conditions" chapter.
- At operating temperatures from −15 °C to 0 °C, a cold holding brake in the released state may cause operating noises. As the temperature of the holding brake increases, these noises decrease such that operating noises are not heard when using holding brake at operating temperature in the released state.

Calculation of work done by friction per braking process

$$W_{B,R/B} = \frac{J_{tot} \cdot n^2}{182.4} \cdot \frac{M_{Bdyn}}{M_{Bdyn} \pm M_L}$$

The sign of M_L is positive if the movement runs vertically upwards or horizontally and it is negative if the movement runs vertically down.

Calculation of the stop time

$$t_{dec} = 2.66 \cdot t_{1B} + \frac{n \cdot J_{tot}}{9.55 \cdot M_{Bdyn}}$$

Switching behavior

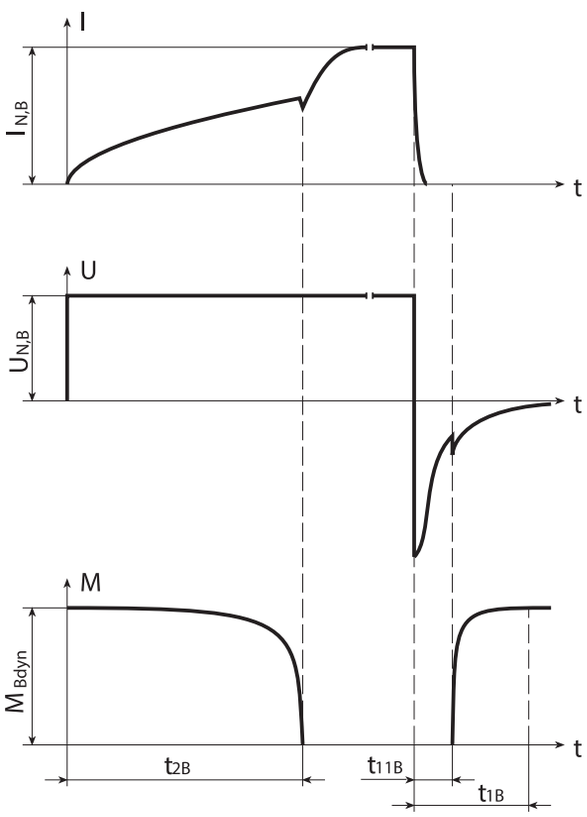


Fig. 4: Holding brake – Switching behavior

Technical data

Type	M_{Bstat} [Nm]	M_{Bdyn} [Nm]	$I_{N,B}$ [A]	$W_{B,Rmax/h}$ [kJ]	$N_{B,stop}$	$J_{B,stop}$ [10^{-4}kgm²]	$W_{B,Rlim}$ [kJ]	t_{2B} [ms]	t_{11B} [ms]	t_{1B} [ms]	$x_{B,N}$ [mm]	ΔJ_B [10^{-4}kgm²]	Δm_B [kg]
EZHD0511	18	15	1.1	11.0	2050	54.3	550	55	3.0	30	0.3	4.840	2.30
EZHD0512	18	15	1.1	11.0	1850	59.8	550	55	3.0	30	0.3	4.840	2.30
EZHD0513	18	15	1.1	11.0	1700	65.5	550	55	3.0	30	0.3	4.840	2.30
EZHD0515	18	15	1.1	11.0	1450	76.9	550	55	3.0	30	0.3	4.840	2.30
EZHD0711	28	25	1.1	25.0	1850	152	1400	120	4.0	40	0.4	12.280	3.77
EZHD0712	28	25	1.1	25.0	1650	170	1400	120	4.0	40	0.4	12.280	3.77
EZHD0713	28	25	1.1	25.0	1500	187	1400	120	4.0	40	0.4	12.280	3.77
EZHD0715	28	25	1.1	25.0	1250	224	1400	120	4.0	40	0.4	12.280	3.77

24.6.8 Connection method

The following chapters describe the connection technology of STOBER synchronous servo motors in the standard version on STOBER drive controllers. You can find further information relating to the drive controller type that was specified in your order in the connection plan that is delivered with every synchronous servo motor.

In Chapter [▶ 27], you can find information about options for connecting STOBER synchronous servo motors to drive controllers from other manufacturers.

24.6.8.1 Connection of the motor housing to the grounding conductor system

Connect the motor housing to the grounding conductor system of the machine in order to prevent personal injury and faulty triggering of residual current protective devices.

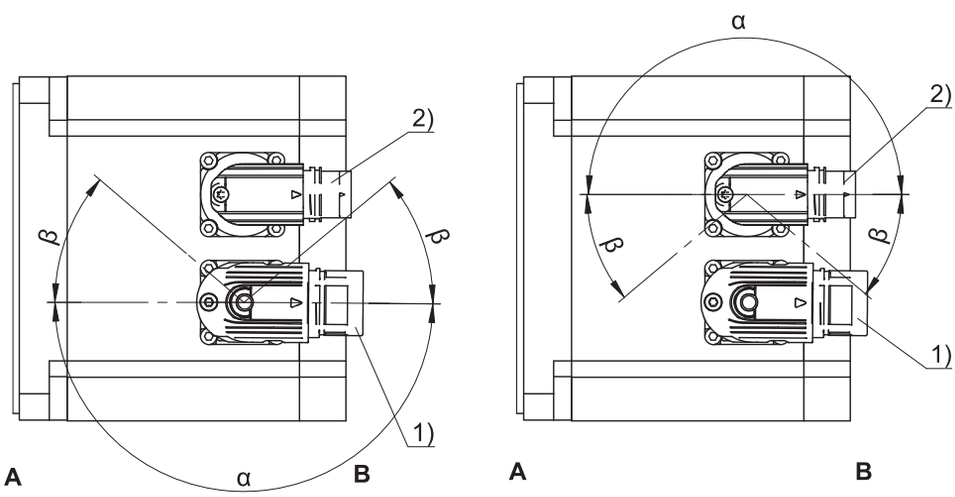
All attachment parts required for the connection of the grounding conductor to the motor housing are delivered with the motor. The grounding screw of the motor is identified with the symbol ⏚ in accordance with IEC 60417-DB. The cross-section of the grounding conductor has to be at least as large as the cross-section of the lines in the power connection.

24.6.8.2 Plug connectors

STOBER synchronous servo motors are equipped with twistable quick-lock plug connectors in the standard version. Details can be found in this chapter.

The figures represent the position of the plug connectors upon delivery.

Turning ranges of plug connectors



1	Power plug connector	2	Encoder plug connector
A	Attachment or output side of the motor	B	Rear side of the motor

Power plug connector features

Motor type	Size	Connection	Turning range	
			α	β
EZHD_4, EZHD_5, EZHD_711 – EZHD_713	con.23	Quick lock	180°	40°
EZHD_715	con.40	Quick lock	180°	40°

Encoder plug connector features

Motor type	Size	Connection	Turning range	
			α	β
EZHD	con.17	Quick lock	180°	20°

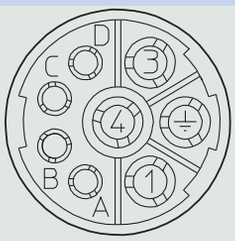
Notes

- The number after "con." indicates the approximate external thread diameter of the plug connector in mm (for example, con.23 designates a plug connector with an external thread diameter of about 23 mm).
- In turning range β, the power or encoder plug connectors can be turned only if doing so does not cause them to collide.

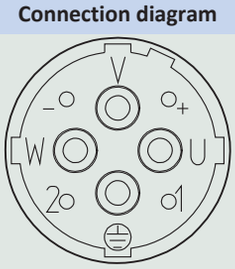
24.6.8.3 Connection assignment of the power plug connector

The size and connection plan of the power plug connector depend on the size of the motor. The colors of the connecting wires inside the motor are specified in accordance with IEC 60757.

Plug connector size con.23 (1)

Connection diagram	Pin	Connection	Color
	1	U phase	black
	3	V phase	blue
	4	W phase	red
	A	Brake +	red
	B	Brake –	black
	C	Temperature sensor +	
	D	Temperature sensor –	
	⏚	Grounding conductor	green-yellow

Plug connector size con.40 (1.5)

Connection diagram	Pin	Connection	Color
	U	U phase	black
	V	V phase	blue
	W	W phase	red
	+	Brake +	red
	–	Brake –	black
	1	Temperature sensor +	
	2	Temperature sensor –	
	⏚	Grounding conductor	green-yellow

24.6.8.4 Connection assignment of the encoder plug connector

The size and connection assignment of the encoder plug connectors depend on the model of encoder installed and the size of the motor. The colors of the connecting wires inside the motor are specified in accordance with IEC 60757.

EnDat 2.1/2.2 digital encoders, plug connector size con.17

Connection diagram	Pin	Connection	Color
	1	Clock +	violet
	2	Up sense	browngreen
	3		
	4		
	5	Data –	pink
	6	Data +	grey
	7		
	8	Clock –	yellow
	9		
	10	0 V GND	whitegreen
	11		
	12	Up +	browngreen
	Pin 2 is connected to pin 12 in the plug connector		

EnDat 2.2 digital encoder with battery buffering, plug connector size con.17

Connection diagram	Pin	Connection	Color
	1	Clock +	violet
	2	UBatt +	blue
	3	UBatt –	white
	4		
	5	Data –	pink
	6	Data +	grey
	7		
	8	Clock –	yellow
	9		
	10	0 V GND	white green
	11		
	12	Up +	brown green
	UBatt+ = DC 3.6 V for encoder model EBI in combination with the AES option of STOBER drive controllers		

EnDat 2.1 encoder with sin/cos incremental signals, plug connector size con.17

Connection diagram	Pin	Connection	Color
	1	Up sense	blue
	2		
	3		
	4	0 V sense	white
	5		
	6		
	7	Up +	brown green
	8	Clock +	violet
	9	Clock –	yellow
	10	0 V GND	white green
	11		
	12	B + (Sin +)	blue black
	13	B – (Sin –)	red black
	14	Data +	grey
	15	A + (Cos +)	green black
	16	A – (Cos –)	yellow black
	17	Data –	pink

24.7 Project configuration

Project your drives using our SERVOsoft designing software. You can receive SERVOsoft for free from your adviser at one of our sales centers. Observe the limit conditions in this chapter to ensure a safe design for your drives.

An explanation of the formula symbols can be found in Chapter [▶ 29.1].

24.7.1 Calculation of the operating point

In this chapter, you can find information needed to calculate the operating point.

Check the following conditions for operating points other than the nominal point M_N specified in the selection tables:

$n_{m*} \leq n_N$

$M_{eff*} \leq M_{limK}$

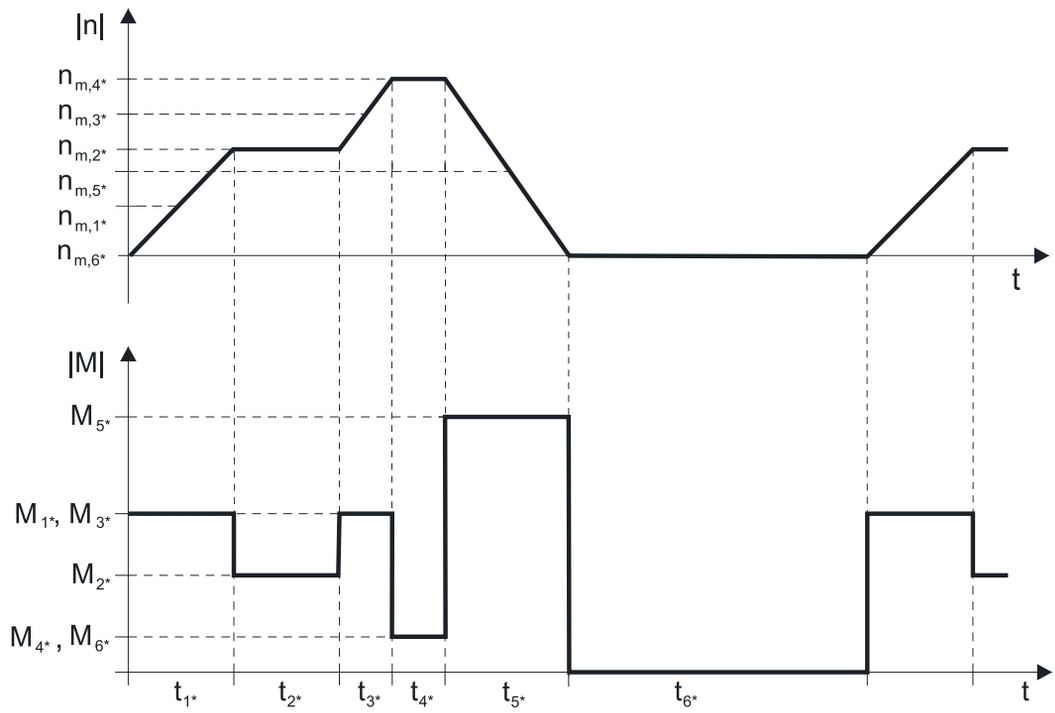
$M_{max*} < M_{max}$

The values for M_N, n_N, M_{max} can be found in the selection tables.

The values for M_{limK} can be found in the torque/speed characteristic curves.

Example of cyclic operation

The following calculations refer to a representation of the power delivered at the motor shaft based on the following example:



Calculation of the actual average input speed

$$n_{m^*} = \frac{\left|n_{m,1^*}\right| \cdot t_{1^*} + \ldots + \left|n_{m,n^*}\right| \cdot t_{n^*}}{t_{1^*} + \ldots + t_{n^*}}$$

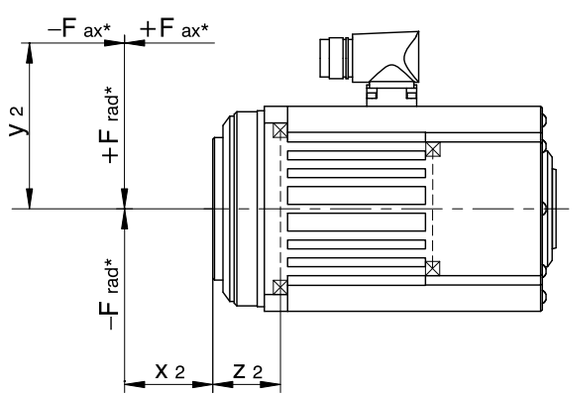
If $t_{1^*} + \ldots + t_{5^*} \geq 10$ min, determine n_{m^*} without the rest phase t_{6^*}.

Calculation of the actual effective torque

$$M_{eff^*} = \sqrt{\frac{t_{1^*} \cdot M_{1^*}{}^2 + \ldots + t_{n^*} \cdot M_{n^*}{}^2}{t_{1^*} + \ldots + t_{n^*}}}$$

24.7.2 Permitted shaft loads

This chapter contains information about the maximum permitted shaft loads of the output shaft of the motor.



	z_2 [mm]	F_{ax300} [N]	F_{rad300} [N]	M_{k300} [Nm]	C_{2k} [Nm/ arcmin]
EZHD0411	29.5	1600	3400	102	60
EZHD0412	29.5	1600	3700	109	66
EZHD0414	29.5	1600	4000	118	44
EZHD0511	30.0	4500	3400	102	111
EZHD0512	30.0	4500	3600	108	126
EZHD0513	30.0	4500	3750	113	130
EZHD0515	30.0	4500	4000	120	122
EZHD0711	41.5	7000	5000	208	212
EZHD0712	41.5	7000	5300	220	256
EZHD0713	41.5	7000	5500	229	287
EZHD0715	41.5	7000	5800	241	315

The values for permitted shaft loads specified in the table apply:

- For shaft dimensions in accordance with the catalog
- Output speed $n_{m*} \leq 300$ rpm ($F^{ax} = F_{ax300}$; $F_{rad} = F_{rad300}$; $M_k = M_{k300}$)
- Only if pilots are used (housing, flange hollow shaft)

The following applies to output speeds $n_{m*} > 300$ rpm:

$$F_{ax} = \frac{F_{ax300}}{\sqrt[3]{\frac{n_{m*}}{300\ \text{rpm}}}} \qquad F_{rad} = \frac{F_{rad300}}{\sqrt[3]{\frac{n_{m*}}{300\ \text{rpm}}}} \qquad M_k = \frac{M_{k300}}{\sqrt[3]{\frac{n_{m*}}{300\ \text{rpm}}}}$$

The following applies to other force application points:

$$M_{k*} = \frac{F_{ax*} \cdot y_2 + F_{rad*} \cdot (x_2 + z_2)}{1000} \leq M_{k300}$$

$$F_{rad*} \leq F_{rad300}$$

$$F_{ax*} \leq F_{ax300}$$

For applications with multiple axial and/or radial forces, you must add the forces as vectors.

24.7.3 Derating

If you use the motor under ambient conditions that differ from the standard ambient conditions, the nominal torque M_N of the motor is reduced. In this chapter, you can find information for calculating the reduced nominal torque.

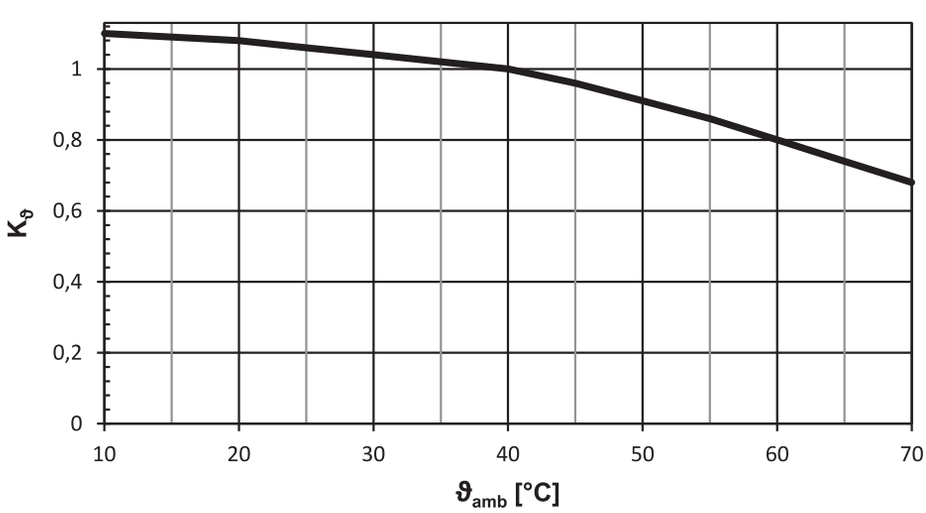


Fig. 5: Derating depending on the surrounding temperature

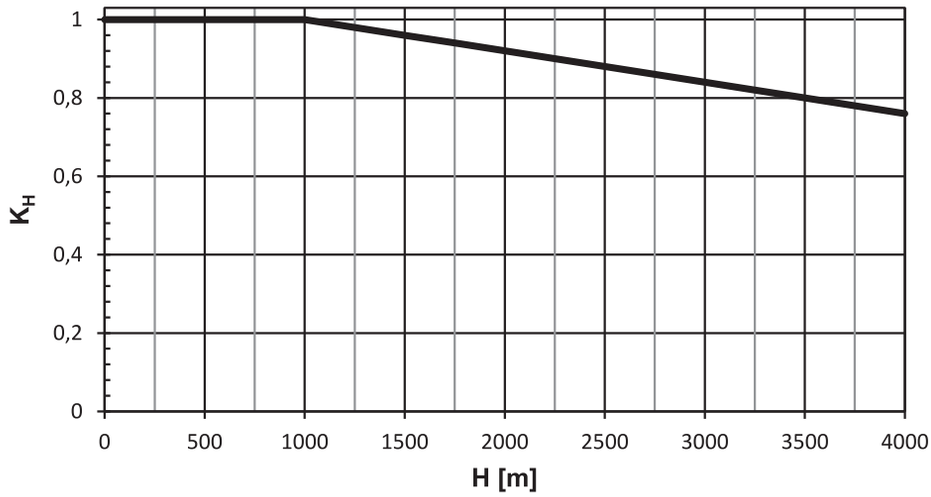


Fig. 6: Derating depending on the installation height

Calculation

If surrounding temperature ϑ_{amb} > 40 °C:

$M_{Nred} = M_N \cdot K_\vartheta$

If installation altitude H > 1000 m above sea level:

$M_{Nred} = M_N \cdot K_H$

If the surrounding temperature ϑ_{amb} > 40 °C and installation altitude H > 1000 m above sea level:

$M_{Nred} = M_N \cdot K_H \cdot K_\vartheta$

24.8 Further information

24.8.1 Directives and standards

STOBER synchronous servo motors meet the requirements of the following directives and standards:

- (Low Voltage) Directive 2014/35/EU
- EN 60034-1:2010 + Cor.:2010
- EN 60034-5:2001 + A1:2007
- EN 60034-6:1993

24.8.2 Identifiers and test symbols

STOBER synchronous servo motors have the following identifiers and test symbols:

CE mark: The product meets the requirements of EU directives.

cURus test symbol "Servo and Stepper Motors – Component"; registered under UL number E488992 with Underwriters Laboratories USA (optional).

24.8.3 Additional documentation

Additional documentation related to the product can be found at http://www.stoeber.de/en/download

Enter the ID of the documentation in the Search... field.

Documentation	ID
Operating manual for EZ synchronous servo motors	443032_en

25 EZM synchronous servo motors for screw drives

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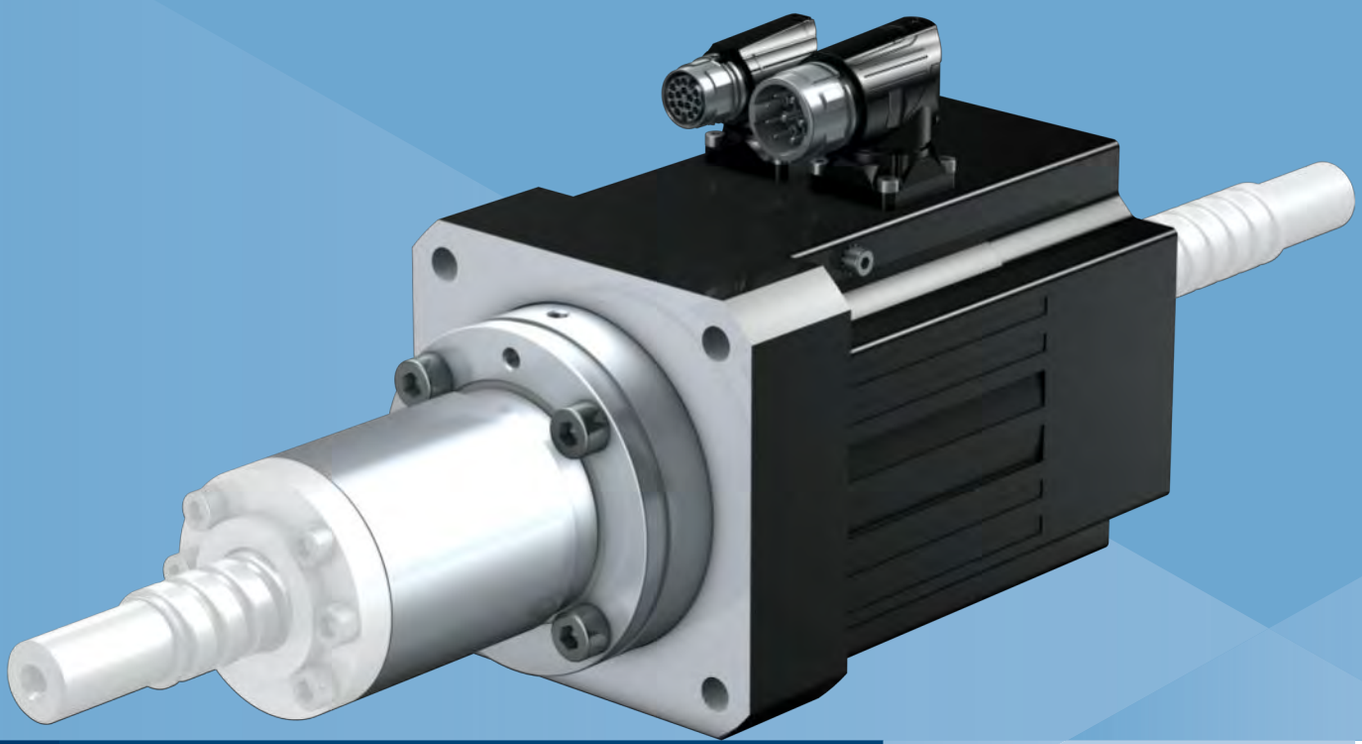


25

Synchronous servo motors for screw drives

EZM

25.1 Overview

Synchronous servo motor for screw drives (direct drive for threaded nut)

Features

Designed for driving the ball-threaded nut of ball screws in accordance with DIN 69051-2.	✓
Axial angular contact ball bearing acting on two sides for direct absorption of the threaded spindle forces	✓
Super compact due to tooth-coil winding method with the highest possible copper fill factor	✓
Backlash-free holding brake (optional)	✓
Convection cooling	✓
Inductive EnDat absolute encoders	✓
Elimination of referencing with multi-turn absolute encoders (optional)	✓
Electronic nameplate for fast and reliable commissioning	✓
Rotating plug connectors with quick lock	✓

Axial forces

F_{ax}	751 – 21375 N

25.2 Selection tables

The technical data specified in the selection tables applies to:

- Installation altitudes up to 1000 m above sea level
- Surrounding temperatures from −15 °C to +40 °C
- Operation on a STOBER drive controller
- DC link voltage U_{ZK} = DC 540 V
- Coating: RAL 9005 Jet black, matte

In addition, the technical data applies to an uninsulated design with the following thermal mounting conditions:

Type	Dimensions of steel mounting flange (thickness x width x height)	Convection surface area Steel mounting flange
EZM5	23 x 210 x 275 mm	0.16 m^2
EZM7	28 x 300 x 400 mm	0.3 m^2

Formula symbols

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

Observe the additional information on the following formula symbols:

- I_0 = RMS value of the line-to-line current when stall torque M_0 is generated (tolerance ±5%).
- I_{max} = RMS value of the short-term maximum permitted line-to-line current when maximum torque M_{max} is generated (tolerance ±5%). Exceeding I_{max} may lead to irreversible damage (demagnetization) of the rotor.
- I_N = RMS value of the line-to-line current when nominal torque M_N is generated at the nominal point (tolerance ±5%).
- M_0 = Torque that a motor is continuously able to deliver at a speed of 10 rpm (tolerance ±5%). At a speed of 0 rpm, a minor continuous torque has to be taken into account. Contact your STOBER customer advisor for such an application.

Type	K_{EM} [V/1000 rpm]	n_N [rpm]	M_N [Nm]	I_N [A]	$K_{M,N}$ [Nm/A]	P_N [kW]	M_0 [Nm]	I_0 [A]	K_{M0} [Nm/A]	M_R [Nm]	M_{max} [Nm]	I_{max} [A]	R_{U-V} [Ω]	L_{U-V} [mH]	T_{el} [ms]
EZM511U	97	3000	3.65	3.55	1.03	1.2	4.25	4.00	1.19	0.49	16.0	22.0	3.80	23.50	6.18
EZM512U	121	3000	6.60	5.20	1.27	2.1	7.55	5.75	1.40	0.49	31.0	33.0	2.32	16.80	7.24
EZM513U	119	3000	8.80	6.55	1.34	2.8	10.6	7.60	1.46	0.49	43.0	41.0	1.25	10.00	8.00
EZM711U	95	3000	6.35	6.60	0.96	2.0	7.30	7.40	1.07	0.65	20.0	25.0	1.30	12.83	9.87
EZM712U	133	3000	10.6	7.50	1.41	3.3	13.0	8.90	1.53	0.65	41.0	36.0	1.00	11.73	11.73
EZM713U	122	3000	14.7	10.4	1.41	4.6	18.9	13.0	1.50	0.65	65.0	62.0	0.52	6.80	13.08

25.2.1 Mass moments of inertia and weights

	df [mm]	ef [mm]	ef2 [mm]	J [10^{-4} kgm^2]	m [kg]
EZM511	40	51	65	20.3	9.9
EZM512	40	51	65	23.6	11.5
EZM513	40	51	65	26.8	13.1
EZM711	50	65	78	53.7	17.4
EZM711	56	71	78	60.3	17.6
EZM712	50	65	78	63.1	19.9
EZM712	56	71	78	69.7	20.1
EZM713	50	65	78	72.4	22.5
EZM713	56	71	78	79.0	22.7

25.3 Torque/speed curves

Torque/speed curves depend on the nominal speed and/or winding design of the motor and the DC link voltage of the drive controller that is used. The following torque/speed curves apply to the DC link voltage DC 540 V.

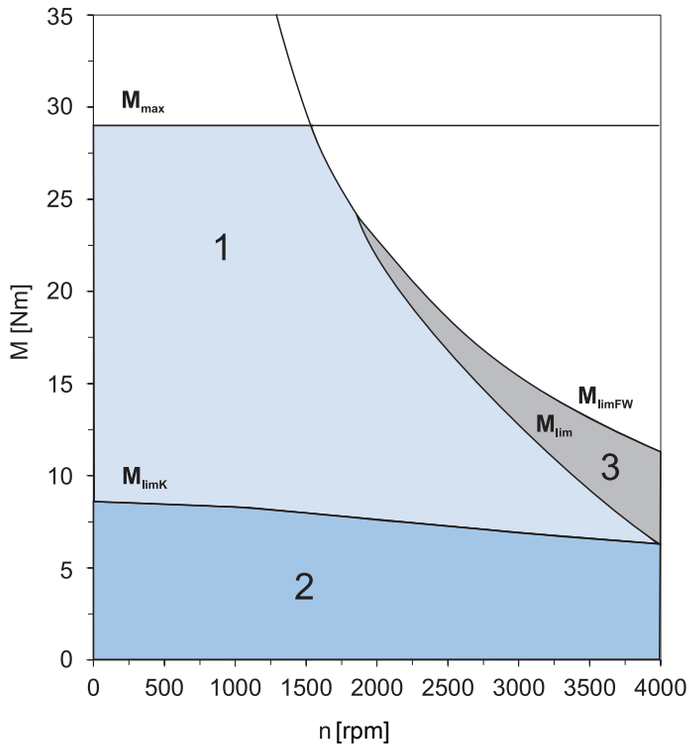
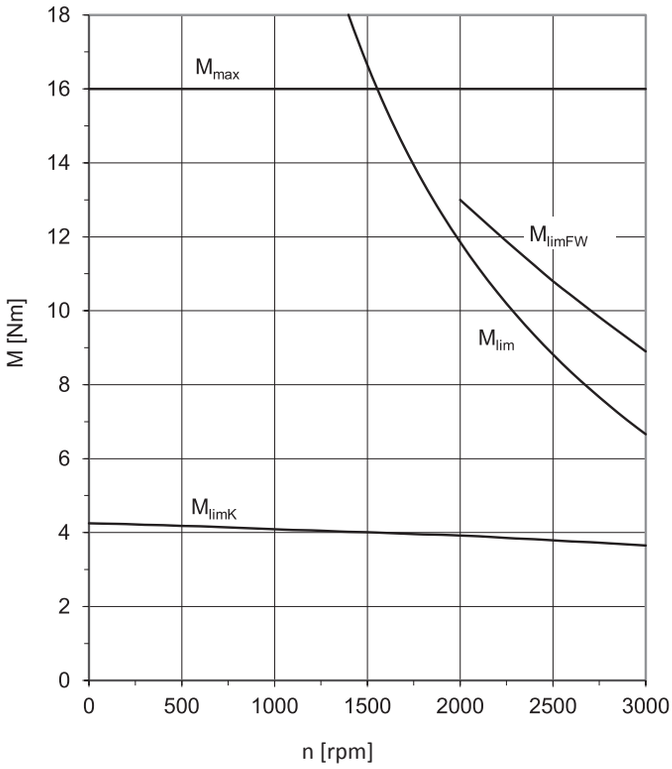


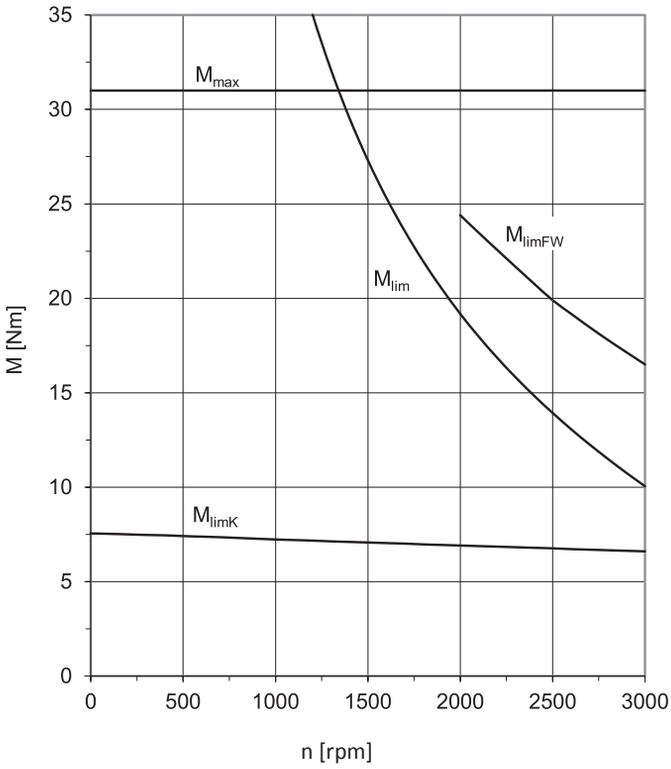
Fig. 1: Explanation of a torque/speed curve

1	Torque range for brief operation (ED_{10} < 100%) with $\Delta\vartheta$ = 100 K	2	Torque range for continuous operation with constant load (S1 mode, ED_{10} = 100%) with $\Delta\vartheta$ = 100 K
3	Field weakening range (can be used only with operation on STOBER drive controllers)		

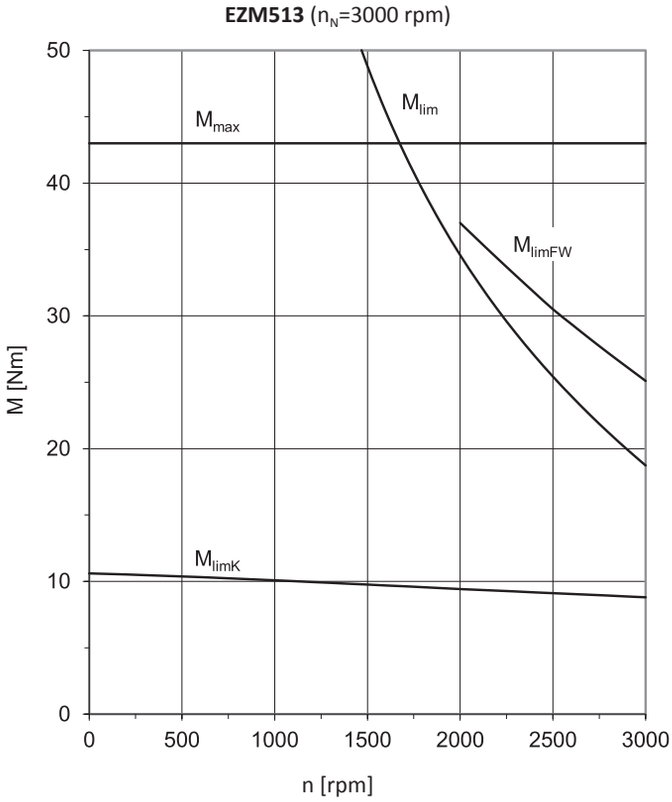
EZM511 (n_N=3000 rpm)



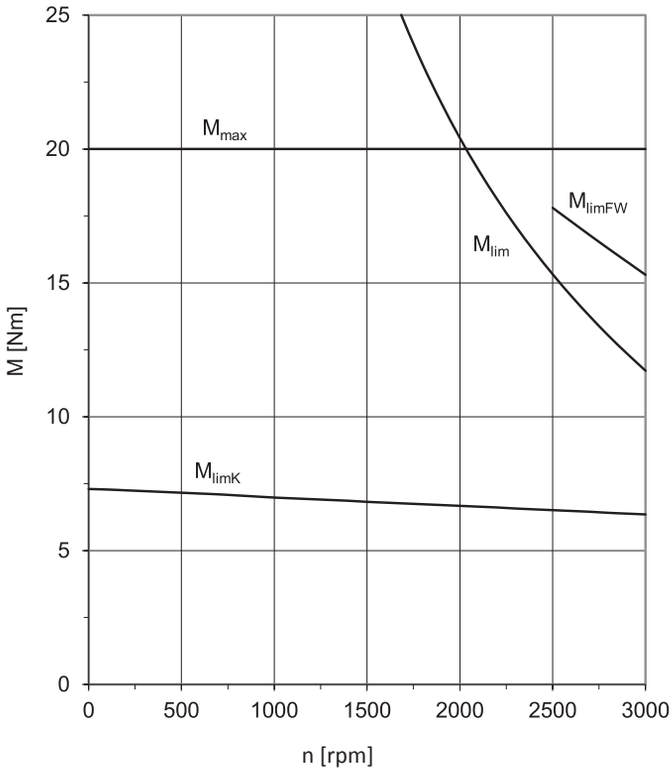
EZM512 (n_N=3000 rpm)



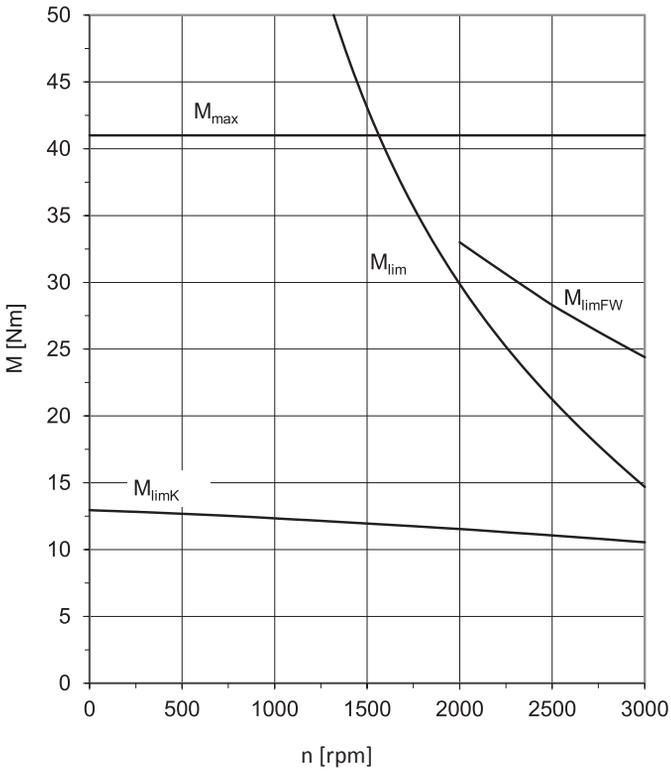
EZM513 (n_N=3000 rpm)



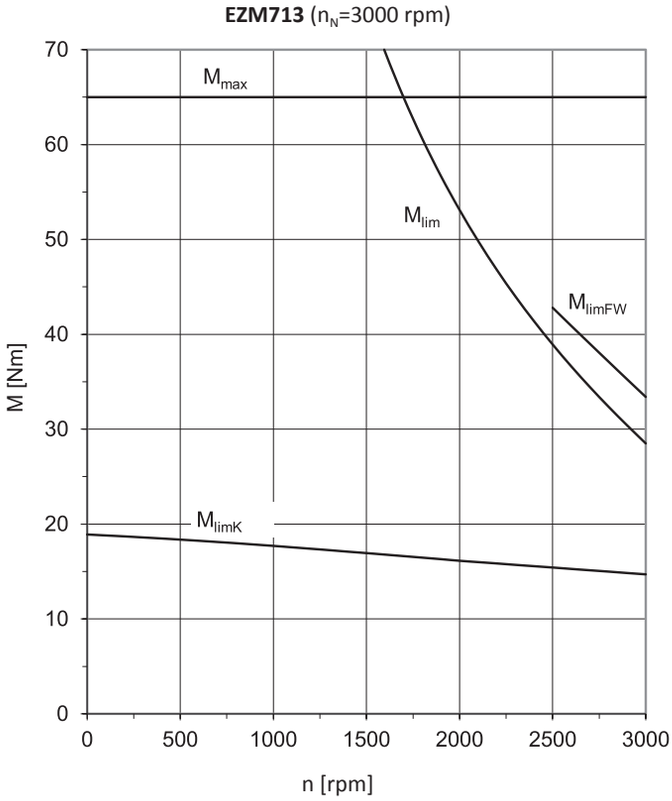
EZM711 (n_N=3000 rpm)



EZM712 (n_N=3000 rpm)



EZM713 (n_N=3000 rpm)



25.4 Dimensional drawings

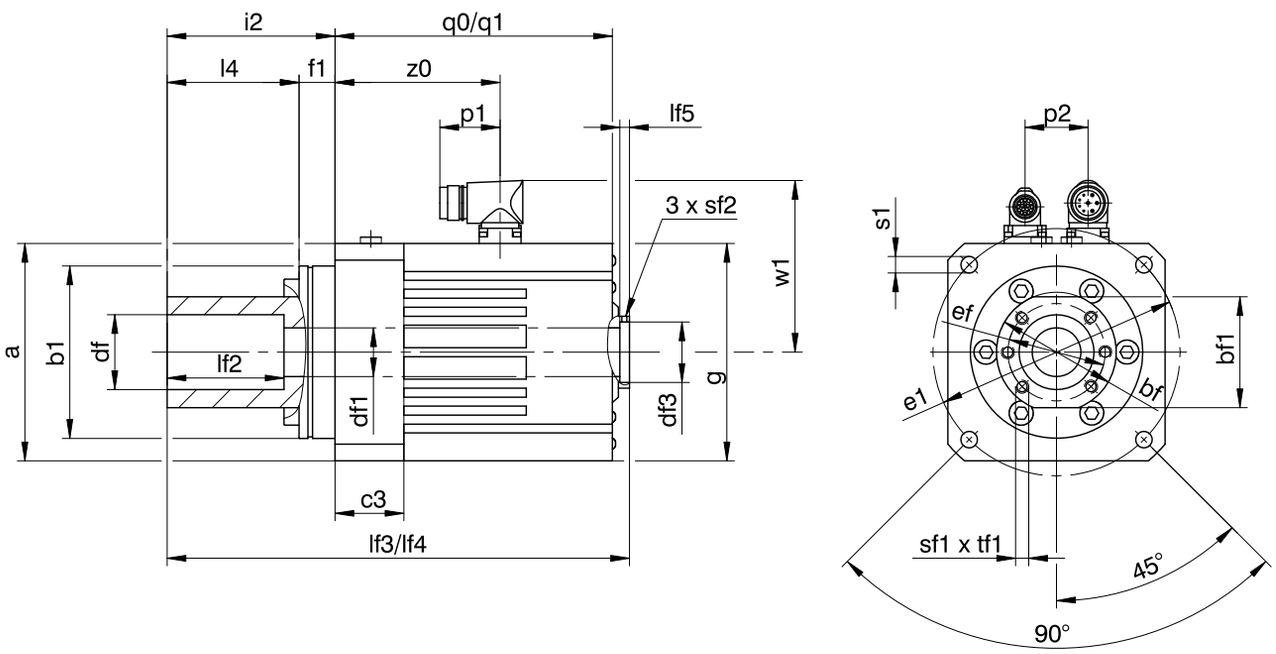
In this chapter, you can find the dimensions of the motors.

Dimensions can exceed the specifications of ISO 2768-mK due to casting tolerances or accumulation of individual tolerances.

We reserve the right to make dimensional changes due to ongoing technical development.

You can download CAD models of our standard drives at http://cad.stoeber.de.

25.4.1 EZM motors



q0, lf3 Applies to motors without holding brake.

q1, lf4 Applies to motors with holding brake.

Type	□a	Øb1	Øbf	bf1	c3	Ødf	Ødf1	Ødf3	Øe1	Øef	f1	□g	i2	l4	lf2	lf3	lf4	lf5	p1	p2	q0	q1	Øs1	sf1	sf2	tf1	w1	z0
EZM511U	115	$90_{-0,01}$	62	59	37	40^{JS6}	25.5	32.3	130	51	24	115	98	74	66	279.0	333.0	4.4	40	36	170.1	225.4	9	M6	M3	12	100	95.5
EZM512U	115	$90_{-0,01}$	62	59	37	40^{JS6}	25.5	32.3	130	51	24	115	98	74	66	304.0	358.3	4.4	40	36	195.1	250.4	9	M6	M3	12	100	120.5
EZM513U	115	$90_{-0,01}$	62	59	37	40^{JS6}	25.5	32.3	130	51	24	115	98	74	66	329.0	383.3	4.4	40	36	220.1	275.4	9	M6	M3	12	100	145.5
EZM711U	145	$115_{-0,01}$	80	74	46	50^{JS6}	32.5	40.3	165	65	24	145	112	88	79	308.6	368.6	5.2	40	42	185.2	245.2	11	M8	M4	14	115	110.2
EZM712U	145	$115_{-0,01}$	80	74	46	50^{JS6}	32.5	40.3	165	65	24	145	112	88	79	333.6	393.6	5.2	40	42	210.2	270.2	11	M8	M4	14	115	135.2
EZM713U	145	$115_{-0,01}$	80	74	46	50^{JS6}	32.5	40.3	165	65	24	145	112	88	79	358.6	418.6	5.2	40	42	235.2	295.2	11	M8	M4	14	115	160.2
EZM711U	145	$115_{-0,01}$	86	80	46	56^{JS6}	32.5	40.3	165	71	24	145	112	88	79	308.6	368.6	5.2	40	42	185.2	245.2	11	M8	M4	14	115	110.2
EZM712U	145	$115_{-0,01}$	86	80	46	56^{JS6}	32.5	40.3	165	71	24	145	112	88	79	333.6	393.6	5.2	40	42	210.2	270.2	11	M8	M4	14	115	135.2
EZM713U	145	$115_{-0,01}$	86	80	46	56^{JS6}	32.5	40.3	165	71	24	145	112	88	79	358.6	418.6	5.2	40	42	235.2	295.2	11	M8	M4	14	115	160.2

25.5 Type designation

Sample code

EZM	5	1	1	U	S	AD	B1	O	097

Explanation

Code	Designation	Design
EZM	Type	Synchronous servo motor for screw drives
5	Motor size	5 (example)
1	Generation	1
1	Length	1 (example)
U	Cooling	Convection cooling
S	Design	Standard
AD	Drive controller	SD6 (example)
B1	Encoder	EBI 135 EnDat 2.2 (example)
O	Brake	Without holding brake
P		Permanent magnet holding brake
097	Electromagnetic constant (EMC) K_{EM}	97 V/1000 rpm (example)

Notes

- In Chapter [▷ 25.6.6], you can find information about available encoders.
- In Chapter [▷ 25.6.6.3], you can find information about connecting synchronous servo motors to other drive controllers from STOBER.
- In Chapter [▷ 27], you can find information about options for connecting STOBER synchronous servo motors to drive controllers from other manufacturers.

25.6 Product description

25.6.1 General features

Feature	EZM5	EZM7
Maximum threaded spindle diameter ∅dkg [mm]	25.00	32.00
Pitch of threaded spindle P_{st}	5 – 25	5 – 32
Pilot ∅Dkg [mm]	40	50/56
Bolt circle ∅ekg [mm]	51	65/71
Nominal speed n_N [rpm]	3000	3000
Bearing type[1]	INA ZKLF 3590-2Z[2]	INA ZKLF 50115-2Z[3]
Maximum bearing speed n_{la} [rpm]	3800	3000
Axial bearing load rating, dynamic C_{dyn} [N]	41000	46500
Axial rigidity C_{ax} [N/µm]	500	770
Protection class	IP40	IP40
Thermal class	155 (F) in accordance with EN 60034-1 (155°C, heating $\Delta\vartheta$ = 100 K)	
Surface[4]	Matte black as per RAL 9005	
Noise level	Limit values in accordance with EN 60034-9	
Cooling	IC 410 convection cooling	

25.6.2 Electrical features

General electrical features of the motor are described in this chapter. Details can be found in the "Selection tables" chapter.

[1] Axial angular contact ball bearing for screw drives, grease-lubricated, can be relubricated

[2] Or comparable products from other providers

[3] Or comparable products from other providers

[4] Repainting the motor will change the thermal properties and therefore the performance limits.

Feature	Description
DC link voltage	DC 540 V (max. 620 V) on STOBER drive controllers
Winding	Three-phase, single-tooth coil design
Circuit	Star, center not led through
Protection class	I (protective grounding) in accordance with EN 61140
Number of pole pairs	7

25.6.3 Ambient conditions

Standard ambient conditions for transport, storage and operation of the motor are described in this chapter.

Feature	Description
Surrounding temperature for transport/storage	–30 °C to +85 °C
Surrounding temperature for operation	–15 °C to +40 °C
Installation altitude	≤ 1000 m above sea level
Shock load	≤ 50 m/s² (5 g), 6 ms in accordance with EN 60068-2-27

Notes

- STOBER synchronous servo motors are not suitable for potentially explosive atmospheres in accordance with (ATEX) Directive2014/34/EU.
- Secure the power cables close to the motor so that vibrations of the cable do not place impermissible loads on the motor plug connector.
- Note that the braking torques of the holding brake (optional) may be reduced by shock loading.

25.6.4 Threaded nut

The driven threaded nut (stationary mounting of threaded spindle) has the following advantages compared to the driven threaded spindle (stationary mounting of threaded nut):

- Higher axial velocity can be achieved with long threaded spindles because the swinging of the threaded spindle is less problematic.
- Drastic reduction in the power loss of the threaded spindle bearing because the stretching forces of the threaded spindle do not have to be channeled through the bearing.
- Liquid cooling of the threaded spindle is easier.
- Increased axial rigidity and torsional rigidity of the threaded spindle (especially with a high pitch/diameter ratio) because the axial forces and torques at both ends of the threaded spindle can be channeled to the surrounding structure.

25.6.4.1 Lubrication of the threaded nut

As the system makes supplying lubricant to the driven threaded nut difficult, it should be lubricated via the threaded spindle. The following options are available for this purpose.

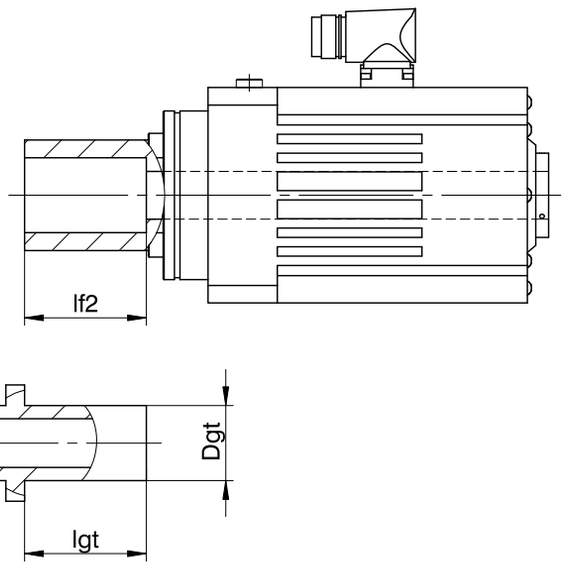
- For threaded nut with axial motion: using a lubrication channel in the threaded spindle that is implemented axially parallel up to the tool change position of the threaded nut. Lubricant can be injected into the threaded nut through a cross-hole if it is correctly aligned in this position. The amount of lubricant is generally sufficient until the next tool change without any problems.
- For threaded spindle with axial motion: using lubrication brushes attached to the machine that are connected to the lubrication supply and dispense the lubricant to the threaded spindle as it moves axially.

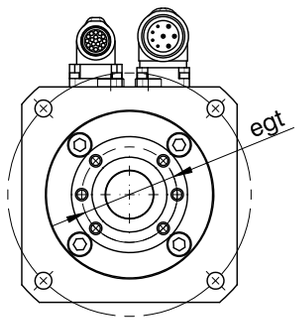
Lubricants that enter into the inside of the motor can impair the function of the holding brake and encoder. Therefore, take the protection class of the synchronous servo motor into account when configuring your screw drive, especially when installing the synchronous servo motor vertically with the A side on top. For detailed information about lubricating the screw drive, contact your screw drive manufacturer.

25.6.4.2 Possible combinations with ball screw nuts in accordance with DIN 69051-5

As the screw drive is not included in the scope of delivery from STOBER, you can find information in the following chapters about possible combinations of the EZM motor with ball screw nuts in accordance with DIN 69051-5 from a few well-known manufacturers. Information about EZM motors for other types of threaded nuts is available on request.

Dimensions of the ball screw nut





Manufacturer	Type	Ødgt	P_{st}	ØDgt	Øegt	lgt	Motor type	lf2
HIWIN	FSC/DEB	25	10	40	51	51/55	EZM5	66
HIWIN	FSC/DEB	25	25	40	51	60	EZM5	66
HIWIN	FSC/DEB	32	10	50	65	65	EZM7	79
HIWIN	FSC/DEB	32	20	50*	65*	76	EZM7	79
HIWIN	FSC/DEB	32	32	50*	65*	68	EZM7	79
Steinmeyer	Series 2426	25	10	40	51	52	EZM5	66
Steinmeyer	Series 2426	25	20	40	51	40	EZM5	66
Steinmeyer	Series 2426	25	20	40	51	60	EZM5	66
Steinmeyer	Series 2426	25	25	40	51	49	EZM5	66
Steinmeyer	Series 3426	32	10	50	65	65	EZM7	79
Steinmeyer	Series 3426	32	10	50	65	76	EZM7	79
Steinmeyer	Series 3426	32	20	56	71	47	EZM7	79
Steinmeyer	Series 3426	32	20	56	71	67	EZM7	79
Steinmeyer	Series 3426	32	30	56	71	67	EZM7	79
THK	EBA	25	10	40	51	65	EZM5	66
THK	EBA	32	10	50	65	65	EZM7	79
THK	EBA	32	10	50	65	77	EZM7	79
Kammerer	FM	25	10	40	51	50	EZM5	66
Kammerer	FM	25	20	40	51	60	EZM5	66
Kammerer	FM	32	10	50	65	68	EZM7	79
Kammerer	FM	32	10	56*	71*	66	EZM7	79
NSK	PR	25	10	40	51	48	EZM5	66
NSK	LPR	25	25	40	51	51	EZM5	66
NSK	PR	32	10	50	65	47	EZM7	79
NSK	LPR	32	32	50	65	78	EZM7	79
Neff	KGF-D	25	10	40	51	45	EZM5	66
Neff	KGF-D	25	20	40	51	25	EZM5	66
Neff	KGF-D	25	25	40	51	45	EZM5	66
Neff	KGF-D	32	5	50	65	43	EZM7	79
Neff	KGF-D	32	10	50	65	57	EZM7	79
Rodriguez	SFU	25	5	40	51	40	EZM5	66
Rodriguez	SFS*	25	6	40	51	50	EZM5	66
Rodriguez	SFS*	25	6	40	51	50	EZM5	66
Rodriguez	SFS*	32	6	50	65	39	EZM7	79
Rodriguez	SFS*	31	8	50	65	50	EZM7	79
Rodriguez	FK*	25	5	40	51	33	EZM5	66

Manufacturer	Type	Ødgt	P_{st}	ØDgt	Øegt	lgt	Motor type	lf2
Rodriguez	FK*	32	5	50	65	39	EZM7	79
Rodriguez	FK*	32	10	50	65	55	EZM7	79
Rodriguez	FH*	25	10	40	51	25	EZM5	66
Rodriguez	FH*	25	25	40	51	45.5	EZM5	66
Rodriguez	FH*	32	20	56	71	52	EZM7	79
Rodriguez	FH*	32	32	56	71	57.5	EZM7	79

*Design does not correspond to DIN 69051-5.

25.6.5 Threaded spindle

The design of the EZM motor allows for the threaded spindle of the screw drive to be guided through the entire length of the motor. Contact between the threaded spindle and motor shaft during operation is not permitted. The dimensions of the EZM motor are designed so that they can incorporate threaded spindles with a maximum outer diameter that does not exceed the nominal diameter. Be aware when selecting your screw drive that there are spindle nut/threaded spindle combinations for which the maximum threaded spindle diameter exceeds the nominal diameter of the threaded nut or spindle nut. In this case, the attachment of the screw drive to the EZM motor is not permitted (also see the maximum threaded spindle diameter Ødkg feature in Chapter General features).

25.6.6 Encoders

STOBER synchronous servo motors can be designed with different encoder models. The following chapters include information for choosing the optimal encoder for your application.

25.6.6.1 Selection tool for EnDat interface

The following table offers a selection tool for the EnDat interface of absolute encoders.

Feature	EnDat 2.1	EnDat 2.2
Short cycle times	★★☆	★★★
Transfer of additional information along with the position value	–	✓
Expanded power supply range	★★☆	★★★
Key: ★★☆ = good, ★★★ = very good		

25.6.6.2 EnDat encoders

In this chapter, you can find detailed technical data for encoder models that can be selected with EnDat interface.

Encoders with EnDat 2.2 interface

Encoder model	Code	Measuring method	Recordable revolutions	Resolution	Position values per revolution
EBI 135	B1	Inductive	65536	19 bit	524288
ECI 119-G2	C9	Inductive	–	19 bit	524288

Encoders with EnDat 2.1 interface

Encoder model	Code	Measuring method	Recordable revolutions	Resolution	Position values per revolution	Periods per revolution
ECI 119	C4	Inductive	–	19 bit	524288	Sin/Cos 32

Notes

- The encoder code is a part of the type designation of the motor.
- Multiple revolutions of the motor shaft can be recorded only using multi-turn encoders.
- The EBI 135 encoder requires an external buffer battery so that absolute position information is retained after the power supply is turned off (AES option for STOBER drive controllers).

25.6.6.3 Possible combinations with drive controllers

The following table shows the options for combining STOBER drive controllers with selectable encoder models.

Drive controller		SDS 5000	MDS 5000	SDS 5000/ MDS 5000	SD6		SI6	SC6
Drive controller code		AA	AB	AC	AD	AE	**AP**	**AU**
Connection plan ID		442305	442306	442307	442450	442451	**442771**	**443052**
Encoder	**Encoder code**							
EBI 135	B1	✓	✓	–	✓	–	✓	✓
ECI 119-G2	C9	✓	✓	–	✓	–	✓	✓
ECI 119	C4	–	–	✓	–	✓	–	–

Notes

- The drive controller and encoder codes are a part of the type designation of the motor (see the "Type designation" chapter).
- In Chapter [▷ 27], you can find information about options for connecting STOBER synchronous servo motors to drive controllers from other manufacturers.

25.6.7 Temperature sensor

In this chapter, you can find technical data for the temperature sensors that are installed in STOBER synchronous servo motors for implementing thermal winding protection. To prevent damage to the motor, always monitor the temperature sensor with appropriate devices that will turn off the motor if the maximum permitted winding temperature is exceeded.

Some encoders feature integrated temperature monitoring, the warning and switch-off thresholds of which may overlap with the corresponding values set for the temperature sensor in the drive controller. In some cases, this may result in an instance where an encoder with internal temperature monitoring forces the motor to shut down, even before the motor has reached its nominal data.

You can find information about the electrical connection of the temperature sensor in the "Connection method" chapter.

25.6.7.1 PTC thermistor

The PTC thermistor is installed as a standard temperature sensor in STOBER synchronous servo motors.

The PTC thermistor is a triple thermistor in accordance with DIN 44082 that can be used for monitoring the temperature of each winding phase. The resistance values in the following table and curve refer to a single thermistor in accordance with DIN 44081. These values must be multiplied by 3 for a triple thermistor in accordance with DIN 44082.

Feature	Description
Nominal response temperature ϑ_{NAT}	145 °C ± 5 K
Resistance R −20 °C up to ϑ_{NAT} − 20 K	≤ 250 Ω
Resistance R with ϑ_{NAT} − 5 K	≤ 550 Ω
Resistance R with ϑ_{NAT} + 5 K	≥ 1330 Ω
Resistance R with ϑ_{NAT} + 15 K	≥ 4000 Ω
Operating voltage	≤ DC 7.5 V
Thermal response time	< 5 s
Thermal class	155 (F) in accordance with EN 60034-1 (155 °C, heating $\Delta\vartheta$ = 100 K)

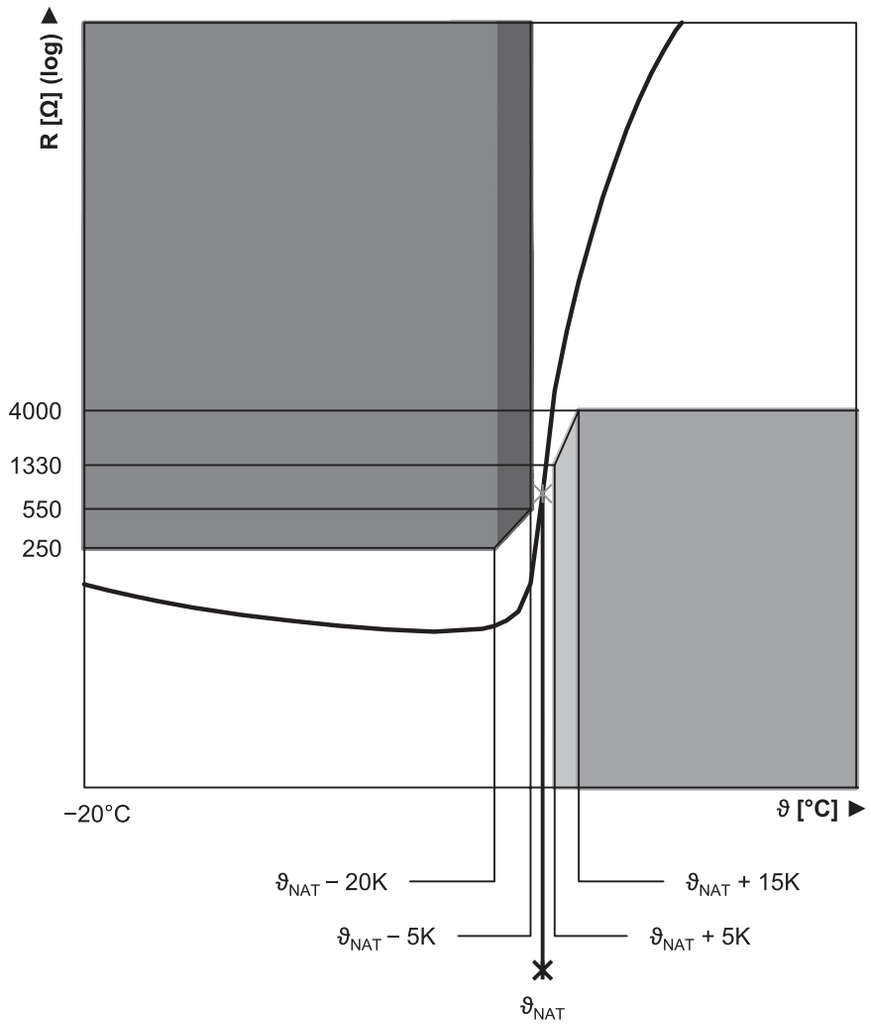


Fig. 2: PTC thermistor curve (single thermistor)

25.6.7.2 Pt1000 temperature sensor

STOBER synchronous servo motors are available in versions with a Pt1000 temperature sensor. The Pt1000 is a temperature-dependent resistor that has a resistance curve with a linear relationship with temperature. As a result, the Pt1000 allows for measurements of the winding temperature. These measurements are limited to one phase of the motor winding, however. In order to adequately protect the motor from exceeding the maximum permitted winding temperature, use a i^2t model in the drive controller to monitor the winding temperature.

Avoid exceeding the specified measurement current so that the measured values are not falsified due to self-heating of the temperature sensor.

Feature	Description
Measurement current (constant)	2 mA
Resistance R for ϑ = 0 °C	1000 Ω
Resistance R for ϑ = 80 °C	1300 Ω
Resistance R for ϑ = 150 °C	1570 Ω

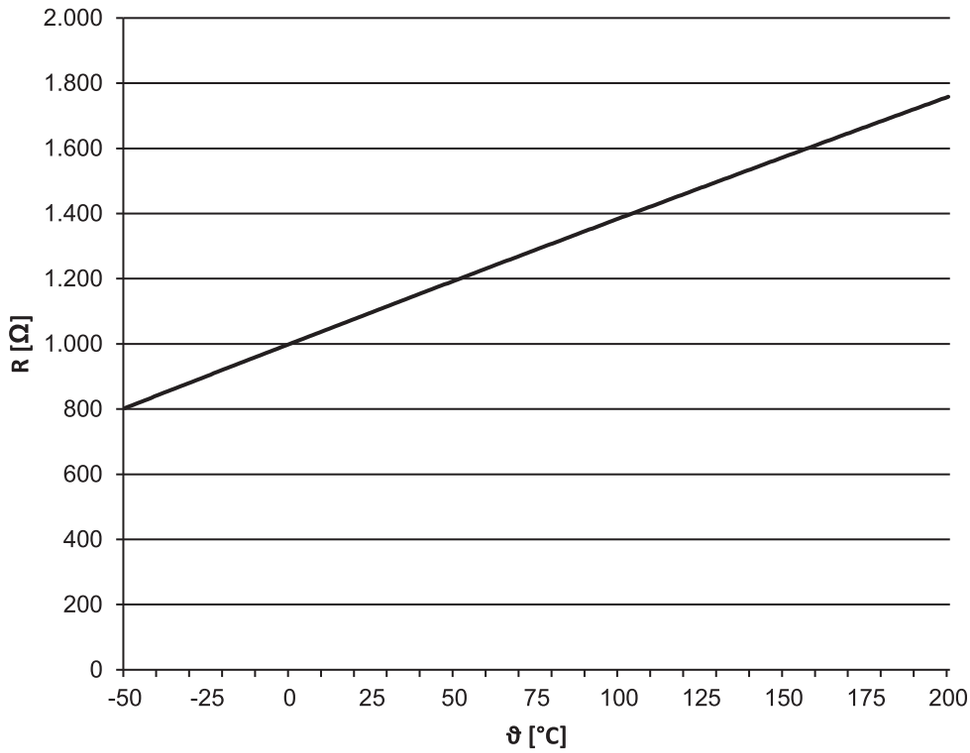


Fig. 3: Pt1000 temperature sensor characteristic curve

25.6.8 Cooling

An EZM motor is cooled by convection cooling (IC 410 in accordance with EN 60034-6). The air flowing around the motor is heated by the radiated motor heat and rises.

25.6.9 Holding brake

STOBER synchronous servo motors can be equipped with a backlash-free holding brake using permanent magnets in order to secure the motor shaft when at a standstill. The holding brake engages automatically if the voltage drops.

Nominal voltage of permanent magnet holding brake: DC 24 V ± 5%, smoothed.

Observe the following during project configuration:

- The holding brake is designed to keep the motor shaft from moving. Activate braking processes during operation using the corresponding electrical functions of the drive controller. In exceptional circumstances, the holding brake can be used for braking from full speed (following a power failure or when setting up the machine). The maximum permitted work done by friction $W_{B,Rmax/h}$ may not be exceeded.
- Note that the braking torque M_{Bdyn} may initially be up to 50% less when braking from full speed. As a result, the braking effect has a delayed action and braking distances become longer.
- Regularly perform a brake test to ensure the functional safety of the brakes. Details can be found in the documentation of the motor and the drive controller.
- Connect a varistor of type S14 K35 (or comparable) in parallel to the brake coil to protect your machine from switching surges. (Not necessary for connecting the holding brake to STOBER drive controllers of the 5th and 6th generation with a BRS/BRM brake module).
- The holding brake of the motor does not offer adequate safety for persons in the hazardous area of gravity-loaded vertical axes. Therefore take additional measures to minimize risk, e.g. by providing a mechanical substructure for maintenance work.
- Take into consideration voltage losses in the connection cables that connect the voltage source to the holding brake connections.
- The holding torque of the brake can be reduced by shock loading. Information about shock loading can be found in the "Ambient conditions" chapter.
- At operating temperatures from −15 °C to 0 °C, a cold holding brake in the released state may cause operating noises. As the temperature of the holding brake increases, these noises decrease such that operating noises are not heard when using holding brake at operating temperature in the released state.

Calculation of work done by friction per braking process

$$W_{B,R/B} = \frac{J_{tot} \cdot n^2}{182.4} \cdot \frac{M_{Bdyn}}{M_{Bdyn} \pm M_L}$$

The sign of M_L is positive if the movement runs vertically upwards or horizontally and it is negative if the movement runs vertically down.

Calculation of the stop time

$$t_{dec} = 2.66 \cdot t_{1B} + \frac{n \cdot J_{tot}}{9.55 \cdot M_{Bdyn}}$$

Switching behavior

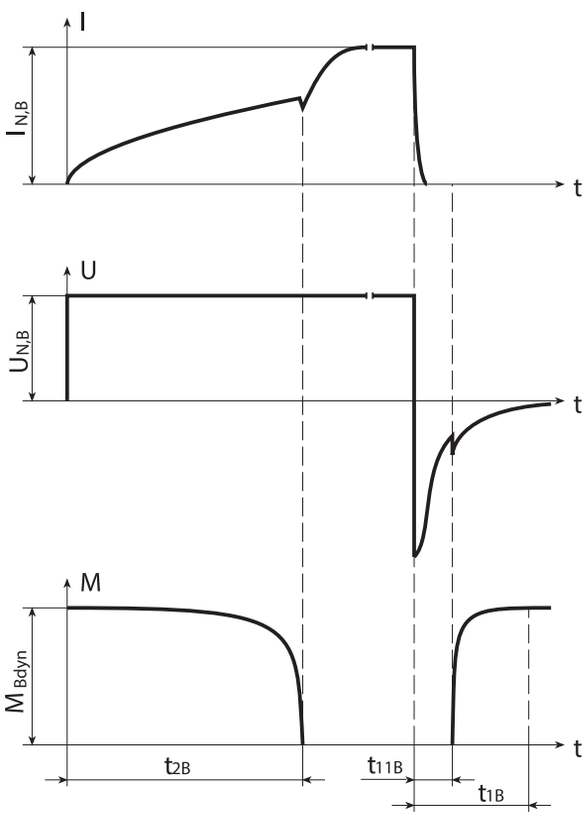


Fig. 4: Holding brake – Switching behavior

Technical data

Type	M_{Bstat} [Nm]	M_{Bdyn} [Nm]	$I_{N,B}$ [A]	$W_{B,Rmax/h}$ [kJ]	$N_{B,stop}$	$J_{B,stop}$ [10^{-4}kgm²]	$W_{B,Rlim}$ [kJ]	t_{2B} [ms]	t_{11B} [ms]	t_{1B} [ms]	$x_{B,N}$ [mm]	ΔJ_B [10^{-4}kgm²]	Δm_B [kg]
EZM511	18	15	1.1	11.0	2100	52.5	550	55	3.0	30	0.3	5.970	2.50
EZM512	18	15	1.1	11.0	1850	59.1	550	55	3.0	30	0.3	5.970	2.50
EZM513	18	15	1.1	11.0	1700	65.5	550	55	3.0	30	0.3	5.970	2.50
EZM711	28	25	1.1	25.0	1900	149	1400	120	4.0	40	0.4	14.100	4.33
EZM712	28	25	1.1	25.0	1650	168	1400	120	4.0	40	0.4	14.100	4.33
EZM713	28	25	1.1	25.0	1500	186	1400	120	4.0	40	0.4	14.100	4.33

25.6.10 Connection method

The following chapters describe the connection technology of STOBER synchronous servo motors in the standard version on STOBER drive controllers. You can find further information relating to the drive controller type that was specified in your order in the connection plan that is delivered with every synchronous servo motor.

In Chapter [▶ 27], you can find information about options for connecting STOBER synchronous servo motors to drive controllers from other manufacturers.

25.6.10.1 Connection of the motor housing to the grounding conductor system

Connect the motor housing to the grounding conductor system of the machine in order to prevent personal injury and faulty triggering of residual current protective devices.

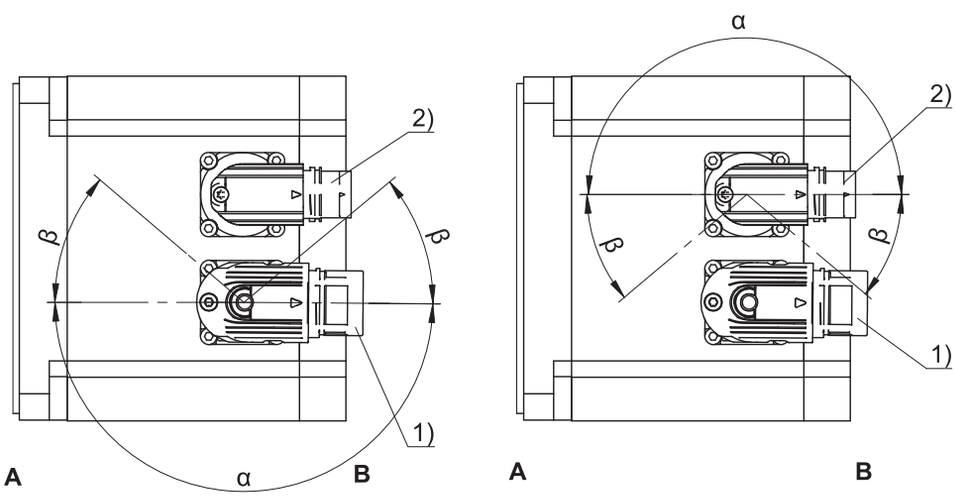
All attachment parts required for the connection of the grounding conductor to the motor housing are delivered with the motor. The grounding screw of the motor is identified with the symbol ⏚ in accordance with IEC 60417-DB. The cross-section of the grounding conductor has to be at least as large as the cross-section of the lines in the power connection.

25.6.10.2 Plug connectors

STOBER synchronous servo motors are equipped with twistable quick-lock plug connectors in the standard version. Details can be found in this chapter.

The figures represent the position of the plug connectors upon delivery.

Turning ranges of plug connectors



1	Power plug connector	2	Encoder plug connector
A	Attachment or output side of the motor	B	Rear side of the motor

Power plug connector features

Motor type	Size	Connection	Turning range	
			α	β
EZM	con.23	Quick lock	180°	40°

Encoder plug connector features

Motor type	Size	Connection	Turning range	
			α	β
EZM	con.17	Quick lock	180°	20°

Notes

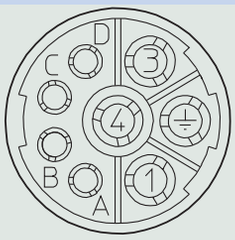
- The number after "con." indicates the approximate external thread diameter of the plug connector in mm (for example, con.23 designates a plug connector with an external thread diameter of about 23 mm).
- In turning range β, the power or encoder plug connectors can be turned only if doing so does not cause them to collide.

25.6.10.3 Connection assignment of the power plug connector

The colors of the connecting wires inside the motor are specified in accordance with IEC 60757.

Power connection

Plug connector size con.23 (1)

Connection diagram	Pin	Connection	Color
	1	U phase	black
	3	V phase	blue
	4	W phase	red
	A	Brake +	red
	B	Brake –	black
	C	Temperature sensor +	
	D	Temperature sensor –	
	⏚	Grounding conductor	green-yellow

25.6.10.4 Connection assignment of the encoder plug connector

The size and connection assignment of the encoder plug connectors depend on the model of encoder installed and the size of the motor. The colors of the connecting wires inside the motor are specified in accordance with IEC 60757.

EnDat 2.1/2.2 digital encoders, plug connector size con.17

Connection diagram	Pin	Connection	Color
	1	Clock +	violet
	2	Up sense	browngreen
	3		
	4		
	5	Data –	pink
	6	Data +	grey
	7		
	8	Clock –	yellow
	9		
	10	0 V GND	whitegreen
	11		
	12	Up +	browngreen
	Pin 2 is connected to pin 12 in the plug connector		

EnDat 2.2 digital encoder with battery buffering, plug connector size con.17

Connection diagram	Pin	Connection	Color
	1	Clock +	violet
	2	UBatt +	blue
	3	UBatt –	white
	4		
	5	Data –	pink
	6	Data +	grey
	7		
	8	Clock –	yellow
	9		
	10	0 V GND	white green
	11		
	12	Up +	brown green
	UBatt+ = DC 3.6 V for encoder model EBI in combination with the AES option of STOBER drive controllers		

EnDat 2.1 encoder with sin/cos incremental signals, plug connector size con.17

Connection diagram	Pin	Connection	Color
	1	Up sense	blue
	2		
	3		
	4	0 V sense	white
	5		
	6		
	7	Up +	brown green
	8	Clock +	violet
	9	Clock –	yellow
	10	0 V GND	white green
	11		
	12	B + (Sin +)	blue black
	13	B – (Sin –)	red black
	14	Data +	grey
	15	A + (Cos +)	green black
	16	A – (Cos –)	yellow black
	17	Data –	pink

25.7 Project configuration

Project your drives using our SERVOsoft designing software. You can receive SERVOsoft for free from your adviser at one of our sales centers. Observe the limit conditions in this chapter to ensure a safe design for your drives.

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

25.7.1 Design of the screw drive

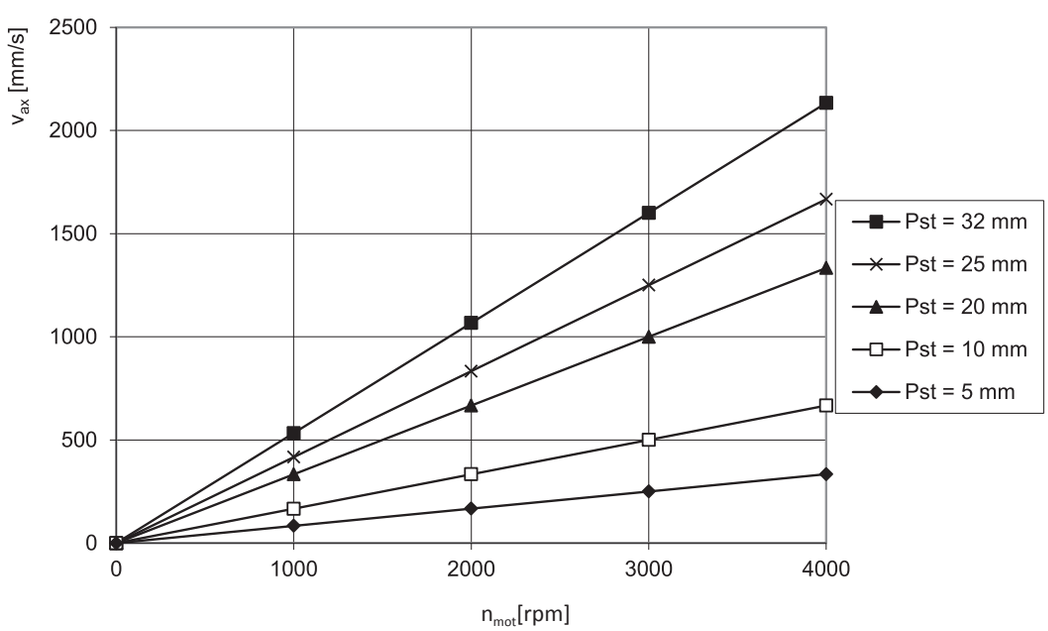
You can use the information below to select a suitable synchronous servo motor for your screw drive. For detailed design information on the screw drive, please contact the screw drive manufacturer.

Axial velocity

The axial velocity of a screw drive can be calculated as follows:

$$v_{ax} = \frac{n_{mot} \cdot P_{st}}{60}$$

The following diagram represents the characteristic curves of screw drives with common pitches that can be implemented with STOBER synchronous servo motors for screw drives.



Axial force

The axial force of a screw drive can be calculated as follows:

$$F_{ax} = \frac{2000 \cdot M \cdot \pi \cdot \eta_{gt}}{P_{st}}$$

You can use the following table to select the right motor type/screw drive pitch combination for your application. The axial forces are calculated in the table for η_{gt} = 0.9.

	M_0	F_{ax0} P_{st}=5	F_{ax0} P_{st}=10	F_{ax0} P_{st}=15	F_{ax0} P_{st}=20	F_{ax0} P_{st}=25	F_{ax0} P_{st}=32
	[Nm]	[N]	[N]	[N]	[N]	[N]	[N]
EZM511U	4.3	4807	2403	1602	1202	961	751
EZM512U	7.6	8539	4269	2846	2135	1708	1334
EZM513U	10.6	11988	5994	3996	2997	2398	1873
EZM711U	7.3	8256	4128	2752	2064	1651	1290
EZM712U	13.0	14646	7323	4882	3662	2929	2288
EZM713U	18.9	21375	10688	7125	5344	4275	3340

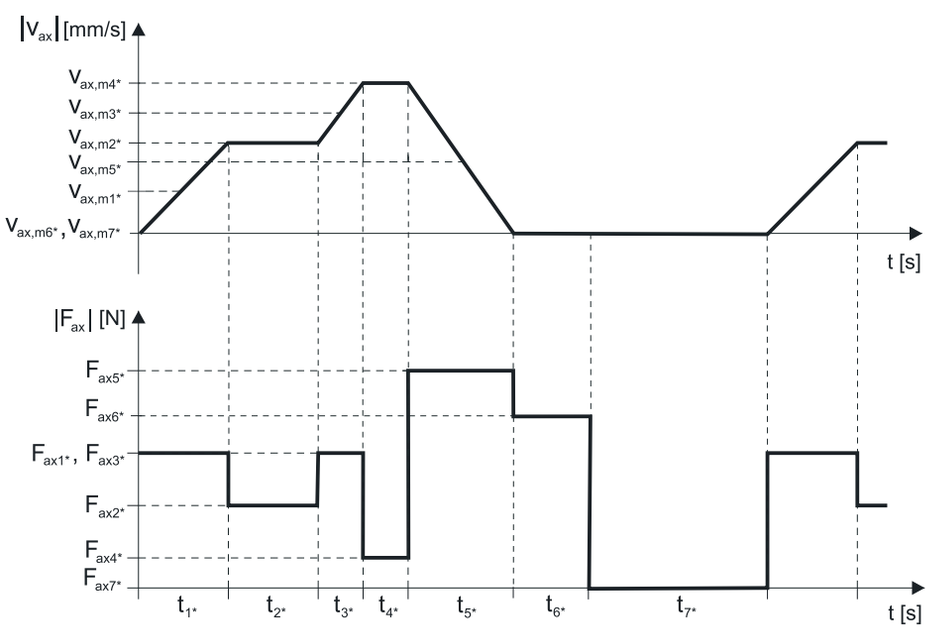
If the synchronous servo motor at absolute standstill (n_{mot}=0) must hold the load using its torque, the following formula defines the permitted axial force:

$$F_{ax0,abs} \leq 0.6 \cdot \frac{2000 \cdot M_0 \cdot \pi \cdot \eta_{gt}}{P_{st}}$$

25.7.2 Calculation of the operating point

In this chapter, you can find information needed to calculate the operating point.

The following calculations refer to a representation of the power delivered at the motor shaft based on the following example:



Calculation of the actual average axial velocity

$$v_{ax,m^*} = \frac{\left|v_{ax,m1^*}\right| \cdot t_{1^*} + \ldots + \left|v_{ax,mn^*}\right| \cdot t_{n^*}}{t_{1^*} + \ldots + t_{n^*}}$$

If $t_{1^*} + \ldots + t_{6^*} \geq 10$ min, determine v_{ax,m^*} without the rest phase t_{7^*}.

Calculation of the actual average speed

$$n_{m^*} = \frac{v_{ax,m^*} \cdot 60}{P_{st}}$$

Check the condition $n_{m^*} \leq n_N$ and adjust the parameters as needed.

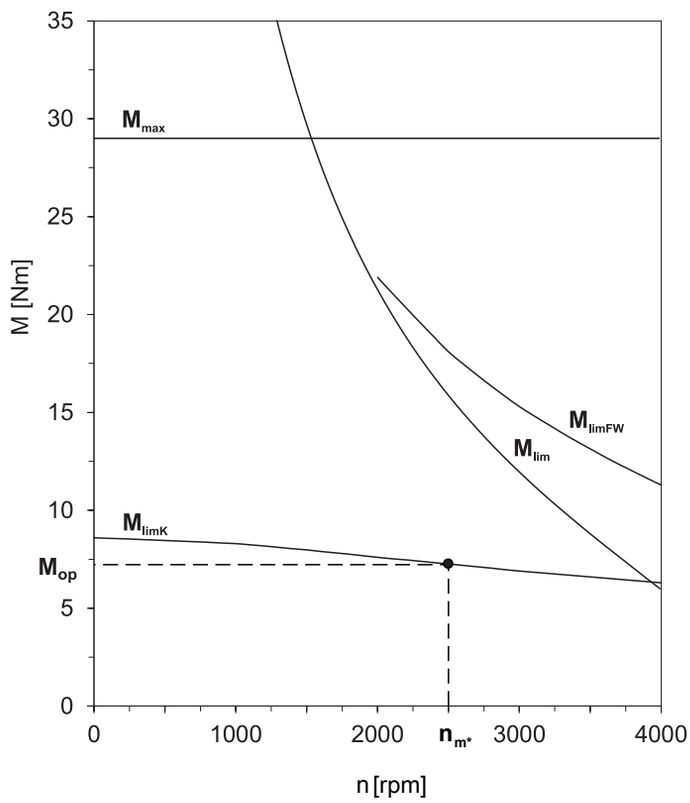
Calculation of the actual effective axial force

$$F_{ax,eff*} = \sqrt{\frac{t_{1*} \cdot F_{ax1*}{}^2 + \ldots + t_{n*} \cdot F_{ax,n*}{}^2}{t_{1*} + \ldots + t_{n*}}}$$

Calculation of the actual effective torque

$$M_{eff*} = \frac{F_{ax,eff*} \cdot P_{st}}{2000 \cdot \pi \cdot \eta_{gt}}$$

You can find the value for the torque of the motor at operating point M_{op} with the determined average input speed n_{m*} in the motor curve in Chapter [▷ 25.3]. In doing so, keep the size of the motor in mind. The figure below shows an example of reading the torque M_{op} of a motor at the operating point.



Check the condition: $M_{eff*} \leq M_{op}$ and adjust the parameters as needed.

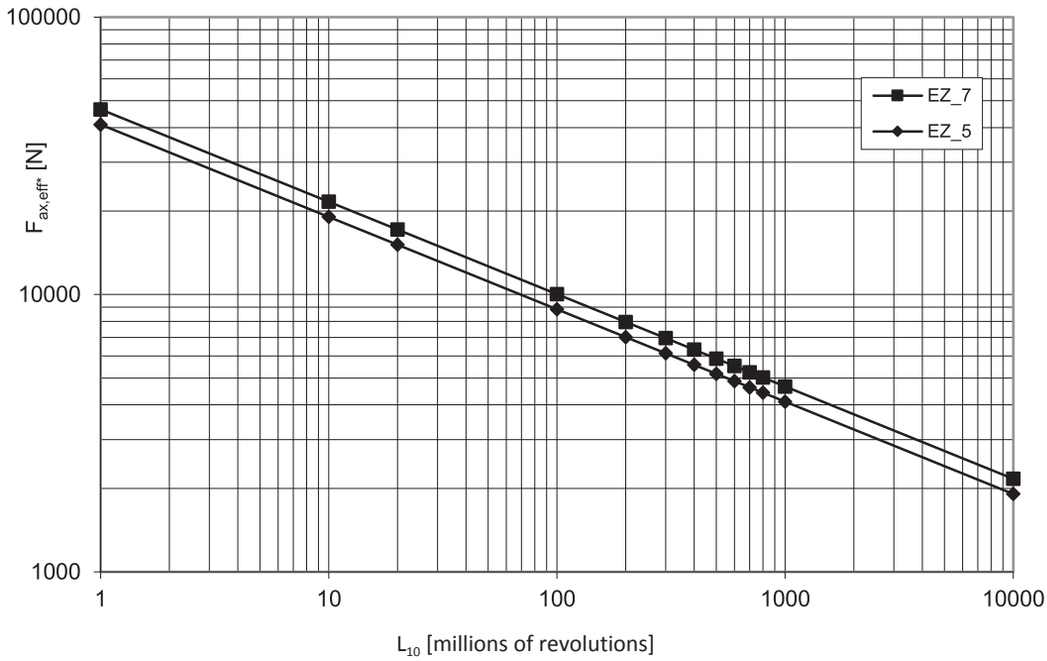
25.7.3 Calculation of the bearing service life

The service life of the axial angular contact ball bearing of a STOBER synchronous servo motor for screw drives is generally longer than the service life of the screw drive bearing.

You can calculate the service life of the axial angular contact ball bearing as follows (the value for C_{dyn} can be found in the "General features" chapter):

$$L_{10} = \left(\frac{C_{dyn}}{F_{ax,eff*}} \right)^3 \cdot 10^6$$

The following diagram shows the bearing service life L_{10}.



$$L_{10h} = \frac{L_{10}}{n_{m*} \cdot 60}$$

25.8 Further information

25.8.1 Directives and standards

STOBER synchronous servo motors meet the requirements of the following directives and standards:

- (Low Voltage) Directive 2014/35/EU
- EN 60034-1:2010 + Cor.:2010
- EN 60034-5:2001 + A1:2007
- EN 60034-6:1993

25.8.2 Identifiers and test symbols

STOBER synchronous servo motors have the following identifiers and test symbols:

CE mark: The product meets the requirements of EU directives.

cURus test symbol "Servo and Stepper Motors – Component"; registered under UL number E488992 with Underwriters Laboratories USA (optional).

25.8.3 Additional documentation

Additional documentation related to the product can be found at http://www.stoeber.de/en/download

Enter the ID of the documentation in the Search... field.

Documentation	ID
Operating manual for EZ synchronous servo motors	443032_en

26 EZS synchronous servo motors for screw drives

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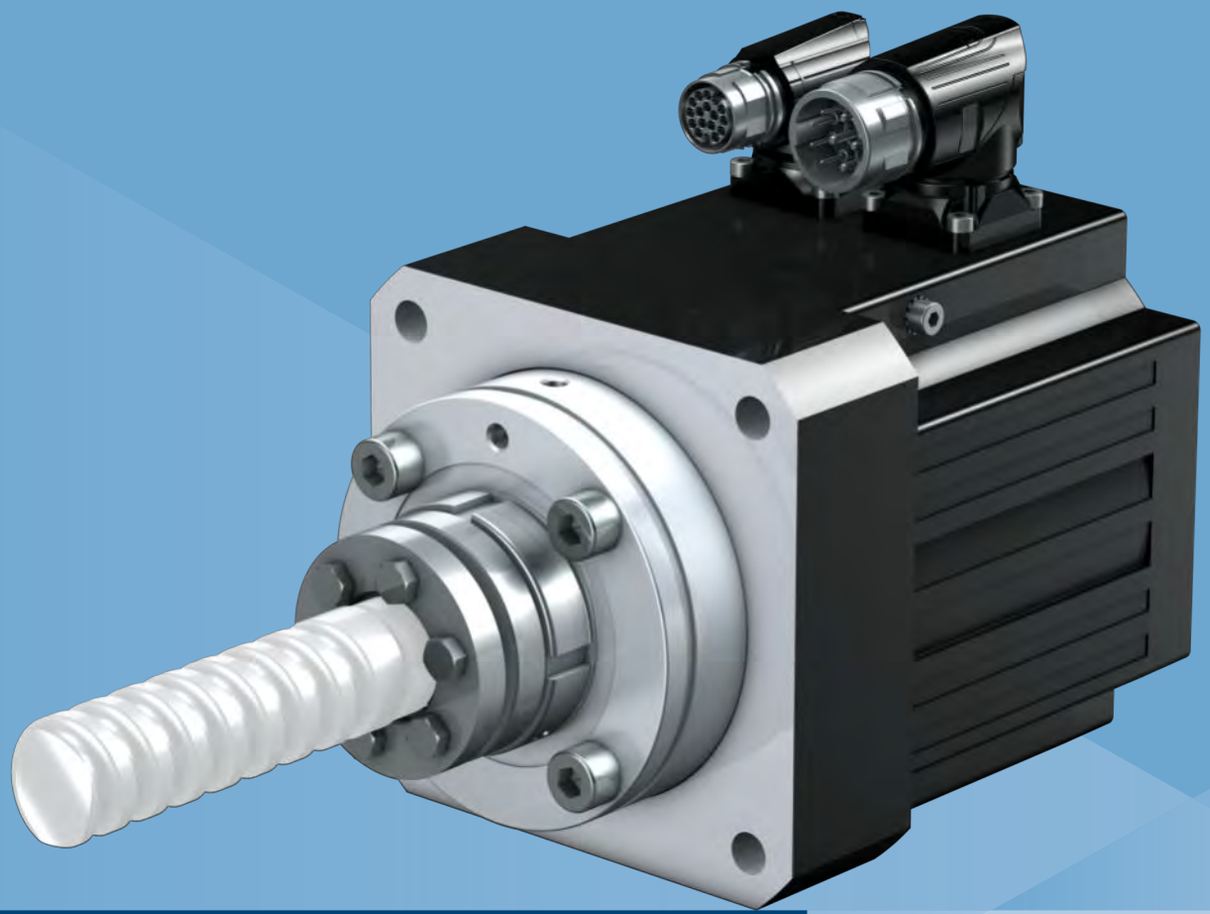


26 Synchronous servo motors for screw drives

EZS

26.1 Overview

Synchronous servo motors for screw drives (direct drive for threaded spindle)

Features

Backlash-free connection with the threaded spindle using a clamping unit	✓
Axial angular contact ball bearing acting on two sides for direct absorption of the threaded spindle forces	✓
Super compact due to tooth-coil winding method with the highest possible copper fill factor	✓
Backlash-free holding brake (optional)	✓
Convection cooling or forced ventilation (optional)	✓
Optical, inductive EnDat absolute encoders or resolvers	✓
Elimination of referencing with multi-turn absolute encoders (optional)	✓
One Cable Solution (OCS) with HIPERFACE DSL encoder (optional)	✓
Electronic nameplate for fast and reliable commissioning	✓
Rotating plug connectors with quick lock	✓

Axial forces

F_{ax}	760 – 31271 N

26.2 Selection tables

The technical data specified in the selection tables applies to:

- Installation altitudes up to 1000 m above sea level
- Surrounding temperatures from −15 °C to +40 °C
- Operation on a STOBER drive controller
- DC link voltage U_{ZK} = DC 540 V
- Coating: RAL 9005 Jet black, matte

In addition, the technical data applies to an uninsulated design with the following thermal mounting conditions:

Type	Dimensions of steel mounting flange (thickness x width x height)	Convection surface area Steel mounting flange
EZS5	23 x 210 x 275 mm	0.16 m^2
EZS7	28 x 300 x 400 mm	0.3 m^2

Formula symbols

An explanation of the formula symbols can be found in Chapter [▷ 29.1].

Observe the additional information on the following formula symbols:

- I_0 = RMS value of the line-to-line current when stall torque M_0 is generated (tolerance ±5%).
- I_{max} = RMS value of the short-term maximum permitted line-to-line current when maximum torque M_{max} is generated (tolerance ±5%). Exceeding I_{max} may lead to irreversible damage (demagnetization) of the rotor.
- I_N = RMS value of the line-to-line current when nominal torque M_N is generated at the nominal point (tolerance ±5%).
- M_0 = Torque that a motor is continuously able to deliver at a speed of 10 rpm (tolerance ±5%). At a speed of 0 rpm, a minor continuous torque has to be taken into account. Contact your STOBER customer advisor for such an application.

26.2.1 EZS motors with convection cooling

Type	K_{EM} [V/1000 rpm]	n_N [rpm]	M_N [Nm]	I_N [A]	$K_{M,N}$ [Nm/A]	P_N [kW]	M_0 [Nm]	I_0 [A]	K_{M0} [Nm/A]	M_R [Nm]	M_{max} [Nm]	I_{max} [A]	R_{U-V} [Ω]	L_{U-V} [mH]	T_{el} [ms]	J [10^{-4} kgm^2]	m [kg]
EZS501U	97	3000	3.85	3.65	1.05	1.2	4.30	3.95	1.19	0.40	16.0	22.0	3.80	23.50	6.18	6.50	7.10
EZS502U	121	3000	6.90	5.30	1.30	2.2	7.55	5.70	1.40	0.40	31.0	33.0	2.32	16.80	7.24	8.80	8.50
EZS503U	119	3000	9.10	6.70	1.36	2.9	10.7	7.60	1.46	0.40	43.0	41.0	1.25	10.00	8.00	11.1	10.0
EZS701U	95	3000	6.65	6.80	0.98	2.1	7.65	7.70	1.07	0.59	20.0	25.0	1.30	12.83	9.87	20.3	12.6
EZS702U	133	3000	11.0	7.75	1.42	3.5	13.5	9.25	1.53	0.59	41.0	36.0	1.00	11.73	11.73	25.6	14.9
EZS703U	122	3000	15.3	10.8	1.42	4.8	19.7	13.5	1.50	0.59	65.0	62.0	0.52	6.80	13.08	30.8	17.2

26.2.2 EZS motors with forced ventilation

Type	K_{EM} [V/1000 rpm]	n_N [rpm]	M_N [Nm]	I_N [A]	$K_{M,N}$ [Nm/A]	P_N [kW]	M_0 [Nm]	I_0 [A]	K_{M0} [Nm/A]	M_R [Nm]	M_{max} [Nm]	I_{max} [A]	R_{U-V} [Ω]	L_{U-V} [mH]	T_{el} [ms]	J [10^{-4} kgm^2]	m [kg]
EZS501B	97	3000	5.10	4.70	1.09	1.6	5.45	5.00	1.17	0.40	16.0	22.0	3.80	23.50	6.18	6.50	7.10
EZS502B	121	3000	10.0	7.80	1.28	3.1	10.9	8.16	1.38	0.40	31.0	33.0	2.32	16.80	7.24	8.80	8.50
EZS503B	119	3000	14.1	10.9	1.29	4.4	15.6	11.8	1.35	0.40	43.0	41.0	1.25	10.00	8.00	11.1	10.0
EZS701B	95	3000	9.35	9.50	0.98	2.9	10.2	10.0	1.07	0.59	20.0	25.0	1.30	12.83	9.87	20.3	12.6
EZS702B	133	3000	16.3	11.8	1.38	5.1	19.0	12.9	1.51	0.59	41.0	36.0	1.00	11.73	11.73	25.6	14.9
EZS703B	122	3000	23.7	18.2	1.30	7.4	27.7	20.0	1.41	0.59	65.0	62.0	0.52	6.80	13.08	30.8	17.2

26.3 Torque/speed curves

Torque/speed curves depend on the nominal speed and/or winding design of the motor and the DC link voltage of the drive controller that is used. The following torque/speed curves apply to the DC link voltage DC 540 V.

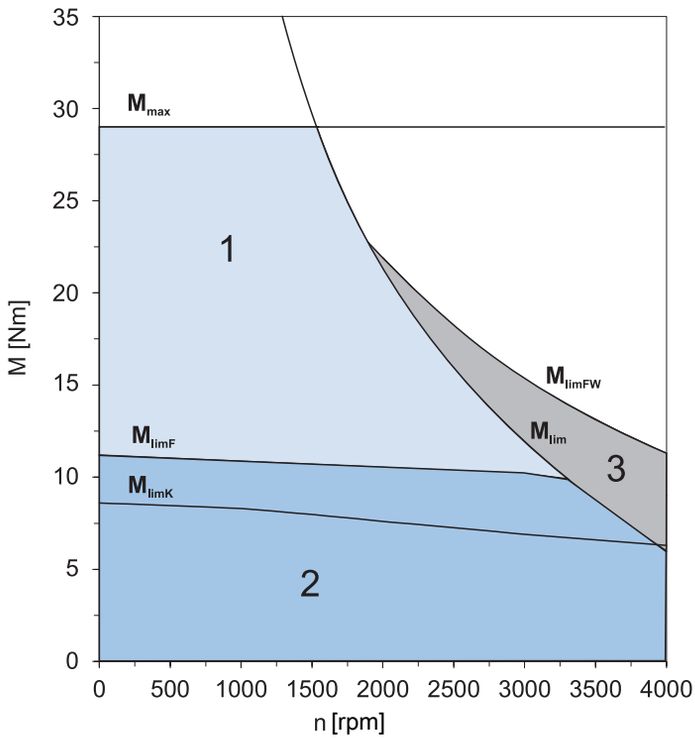
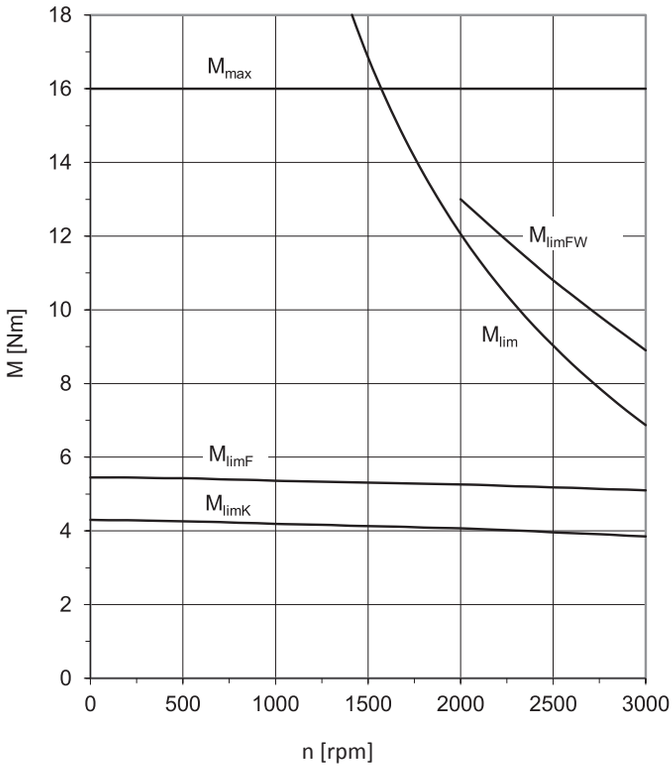


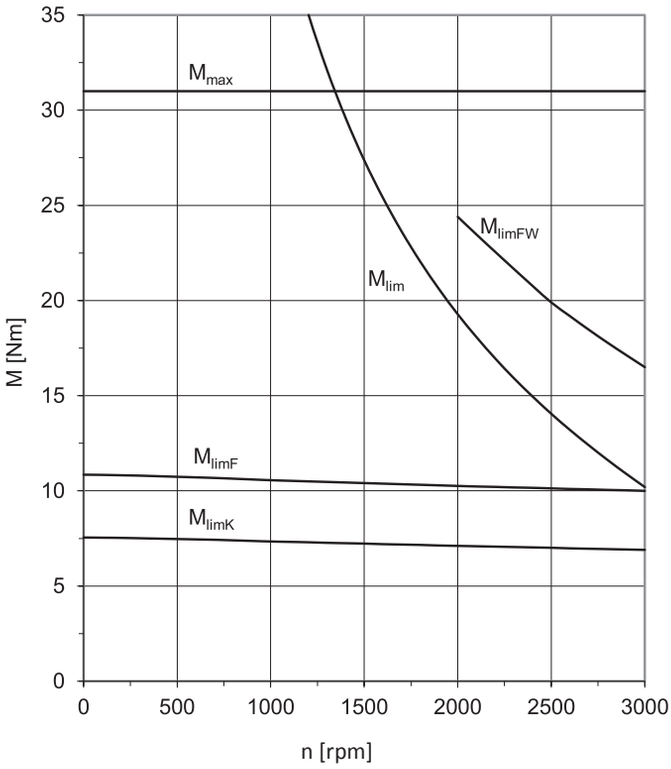
Fig. 1: Explanation of a torque/speed curve

1	Torque range for brief operation (ED_{10} < 100%) with $\Delta\vartheta$ = 100 K	2	Torque range for continuous operation with constant load (S1 mode, ED_{10} = 100%) with $\Delta\vartheta$ = 100 K
3	Field weakening range (can be used only with operation on STOBER drive controllers)		

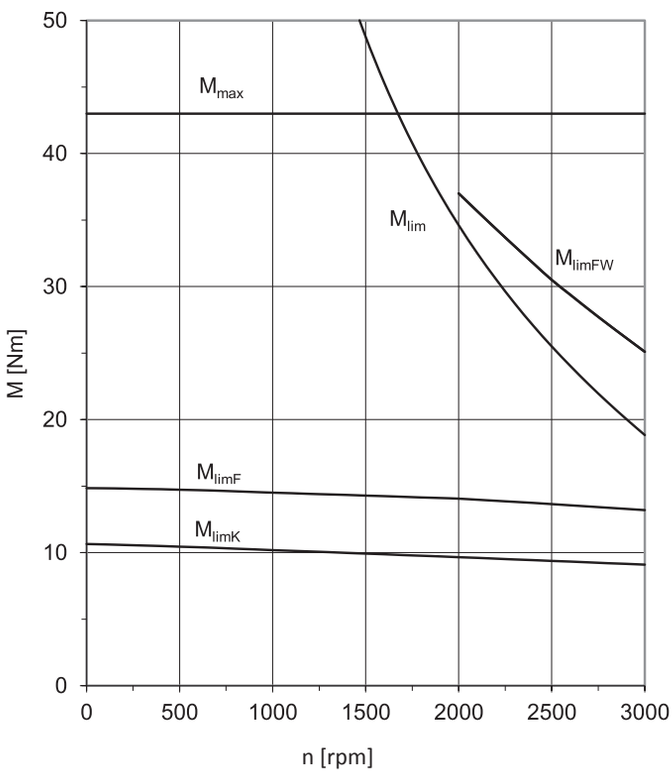
EZS501 (n_N=3000 rpm)



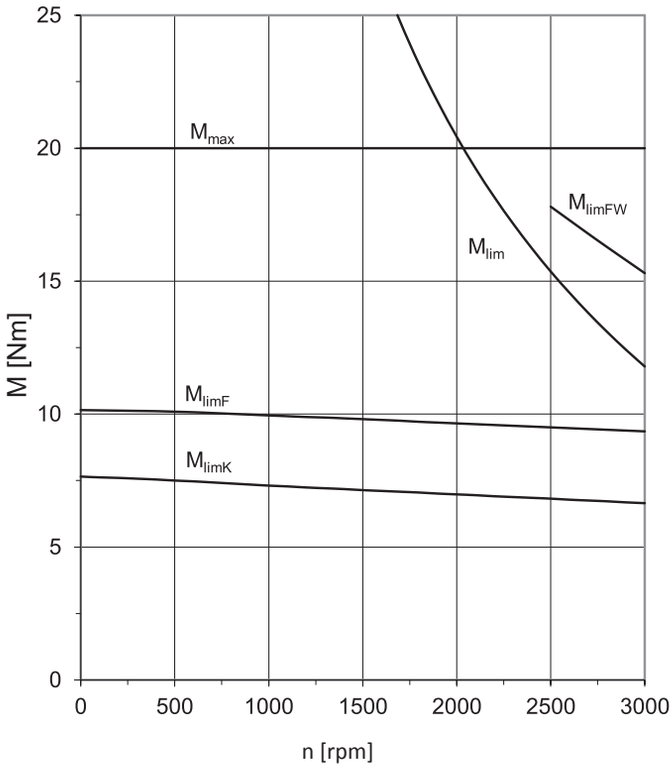
EZS502 (n_N=3000 rpm)



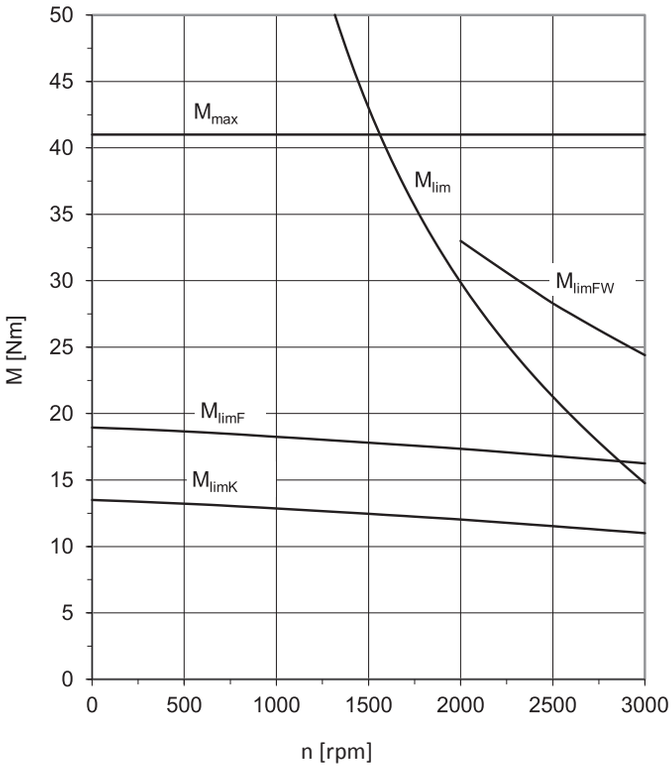
EZS503 (n_N=3000 rpm)



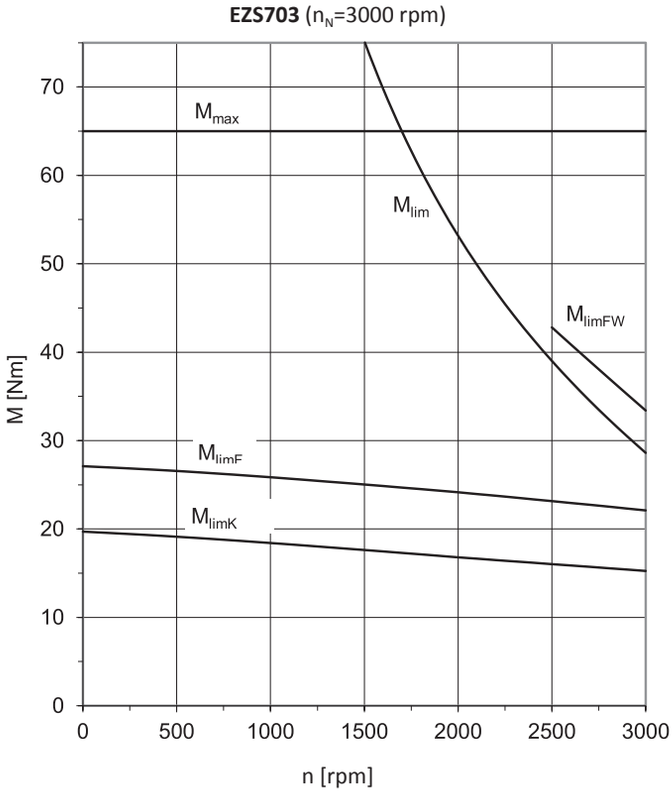
EZS701 (n_N=3000 rpm)



EZS702 (n_N=3000 rpm)



EZS703 (n_N=3000 rpm)



26.4 Dimensional drawings

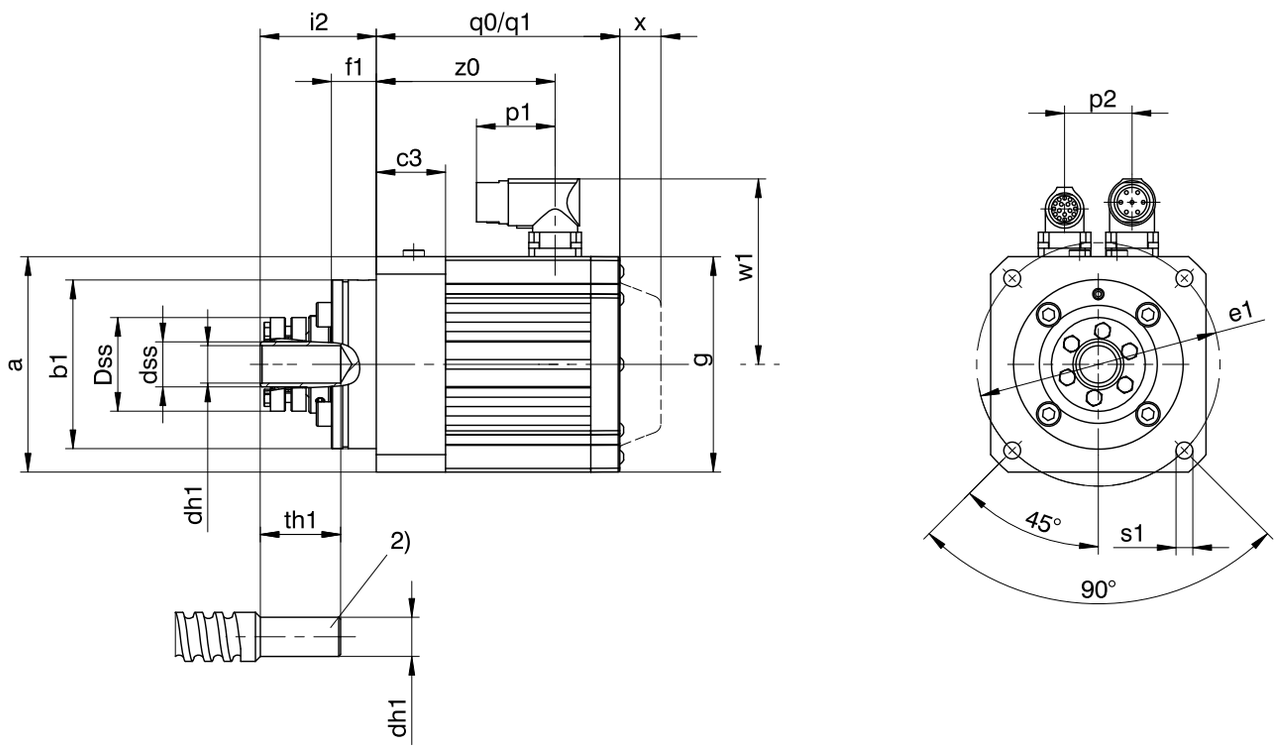
In this chapter, you can find the dimensions of the motors.

Dimensions can exceed the specifications of ISO 2768-mK due to casting tolerances or accumulation of individual tolerances.

We reserve the right to make dimensional changes due to ongoing technical development.

You can download CAD models of our standard drives at http://cad.stoeber.de.

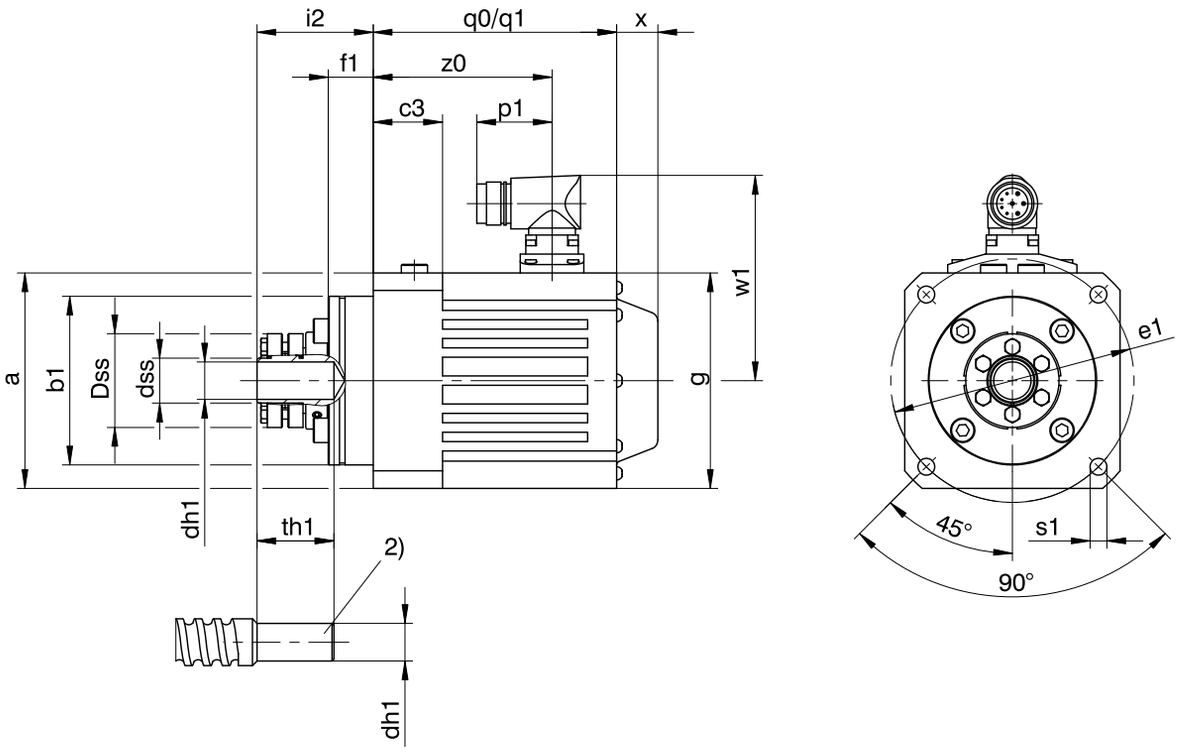
26.4.1 EZS motors with convection cooling



q0	Applies to motors without holding brake	q1	Applies to motors with holding brake
x	Applies to encoders based on an optical measuring method	2)	Threaded spindle provided by customer

Type	□a	Øb1	c3	Ødh1	Ødss	ØDss	Øe1	f1	□g	i2	p1	p2	q0	q1	Øs1	th1	w1	x	z0
EZS501U	115	$90_{-0,01}$	37	20_{h6}^{H6}	24_{h7}	50	130	24	115	62.0	40	36	130	184.5	9	40.5	100	22	95.5
EZS502U	115	$90_{-0,01}$	37	20_{h6}^{H6}	24_{h7}	50	130	24	115	62.0	40	36	155	209.5	9	40.5	100	22	120.5
EZS503U	115	$90_{-0,01}$	37	20_{h6}^{H6}	24_{h7}	50	130	24	115	62.0	40	36	180	234.5	9	40.5	100	22	145.5
EZS701U	145	$115_{-0,01}$	46	25_{h6}^{H6}	30_{h7}	60	165	24	145	66.5	40	42	148	206.7	11	44.5	115	22	110.2
EZS702U	145	$115_{-0,01}$	46	25_{h6}^{H6}	30_{h7}	60	165	24	145	66.5	40	42	173	231.7	11	44.5	115	22	135.2
EZS703U	145	$115_{-0,01}$	46	25_{h6}^{H6}	30_{h7}	60	165	24	145	66.5	40	42	198	256.7	11	44.5	115	22	160.2

26.4.2 EZS motors with convection cooling (One Cable Solution)



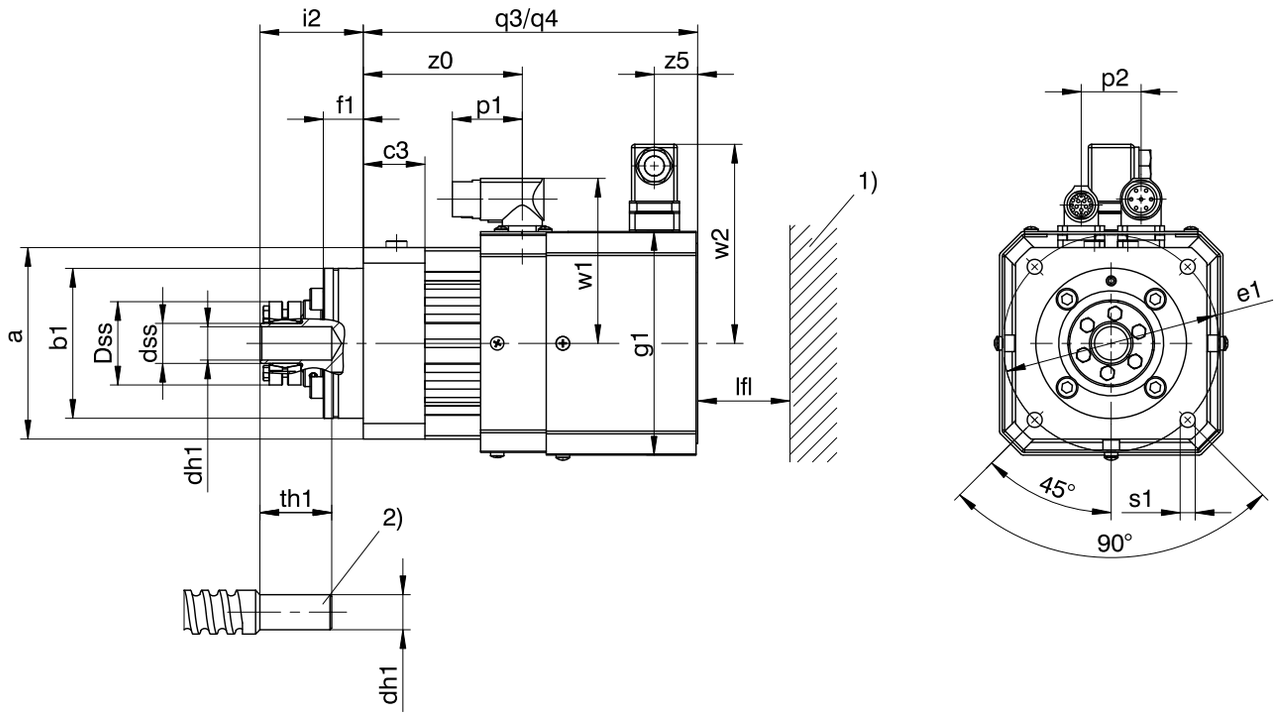
q0 Applies to motors without holding brake

q1 Applies to motors with holding brake

2) Threaded spindle provided by customer

Type	□a	Øb1	c3	Ødh1	Ødss	ØDss	Øe1	f1	□g	i2	p1	q0	q1	Øs1	th1	w1	x	z0
EZS501U	115	$90_{-0,01}$	37	20_{h6}^{H6}	24_{h7}	50	130	24	115	62.0	40	130	184.5	9	40.5	110	22	95.5
EZS502U	115	$90_{-0,01}$	37	20_{h6}^{H6}	24_{h7}	50	130	24	115	62.0	40	155	209.5	9	40.5	110	22	120.5
EZS503U	115	$90_{-0,01}$	37	20_{h6}^{H6}	24_{h7}	50	130	24	115	62.0	40	180	234.5	9	40.5	110	22	145.5
EZS701U	145	$115_{-0,01}$	46	25_{h6}^{H6}	30_{h7}	60	165	24	145	66.5	40	148	206.7	11	44.5	125	22	110.2
EZS702U	145	$115_{-0,01}$	46	25_{h6}^{H6}	30_{h7}	60	165	24	145	66.5	40	173	231.7	11	44.5	125	22	135.2
EZS703U	145	$115_{-0,01}$	46	25_{h6}^{H6}	30_{h7}	60	165	24	145	66.5	40	198	256.7	11	44.5	125	22	160.2

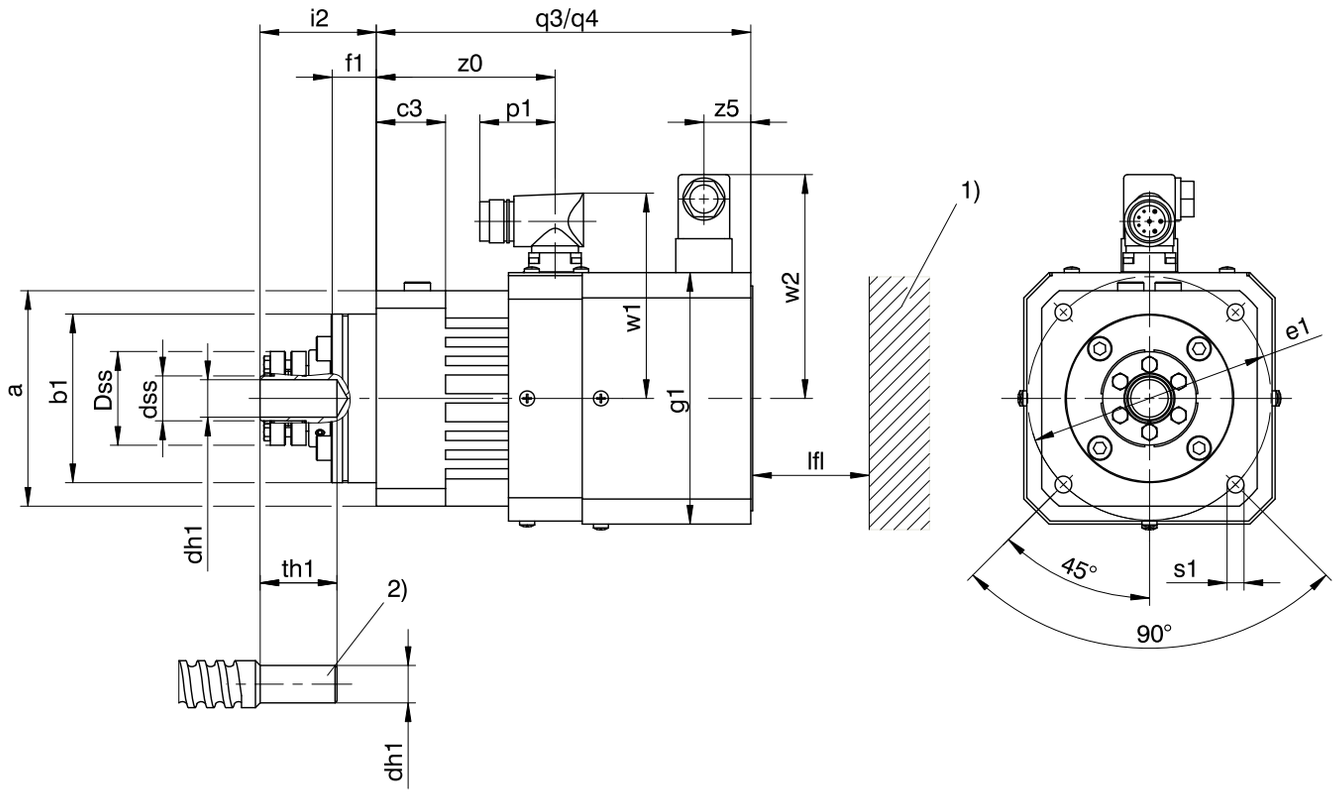
26.4.3 EZS motors with forced ventilation



q3	Applies to motors without holding brake	q4	Applies to motors with holding brake
1)	Machine wall	2)	Threaded spindle provided by customer

Type	□a	Øb1	c3	Ødh1	Ødss	ØDss	Øe1	f1	□g1	i2	lfl_{min}	p1	p2	q3	q4	Øs1	th1	w1	w2	z0	z5
EZS501B	115	$90_{-0,01}$	37	20_{h6}^{H6}	24_{h7}	50	130	24	134.5	62.0	20	40	36	200	265.0	9	40.5	100	120	95.5	25
EZS502B	115	$90_{-0,01}$	37	20_{h6}^{H6}	24_{h7}	50	130	24	134.5	62.0	20	40	36	225	280.0	9	40.5	100	120	120.5	25
EZS503B	115	$90_{-0,01}$	37	20_{h6}^{H6}	24_{h7}	50	130	24	134.5	62.0	20	40	36	250	305.0	9	40.5	100	120	145.5	25
EZS701B	145	$115_{-0,01}$	46	25_{h6}^{H6}	30_{h7}	60	165	24	164.5	66.5	30	40	42	240	298.7	11	44.5	115	134	110.2	40
EZS702B	145	$115_{-0,01}$	46	25_{h6}^{H6}	30_{h7}	60	165	24	164.5	66.5	30	40	42	265	321.7	11	44.5	115	134	135.2	40
EZS703B	145	$115_{-0,01}$	46	25_{h6}^{H6}	30_{h7}	60	165	24	164.5	66.5	30	40	42	290	348.7	11	44.5	115	134	160.2	40

26.4.4 EZS motors with forced ventilation (One Cable Solution)



q3 Applies to motors without holding brake

q4 Applies to motors with holding brake

1) Machine wall

2) Threaded spindle provided by customer

Type	□a	Øb1	c3	Ødh1	Ødss	ØDss	Øe1	f1	□g1	i2	lfl_{min}	p1	q3	q4	Øs1	th1	w1	w2	z0	z5
EZS501B	115	$90_{-0,01}$	37	20_{h6}^{H6}	24_{h7}	50	130	24	134.5	62.0	20	40	200	265.0	9	40.5	110	120	95.5	25
EZS502B	115	$90_{-0,01}$	37	20_{h6}^{H6}	24_{h7}	50	130	24	134.5	62.0	20	40	225	280.0	9	40.5	110	120	120.5	25
EZS503B	115	$90_{-0,01}$	37	20_{h6}^{H6}	24_{h7}	50	130	24	134.5	62.0	20	40	250	305.0	9	40.5	110	120	145.5	25
EZS701B	145	$115_{-0,01}$	46	25_{h6}^{H6}	30_{h7}	60	165	24	164.5	66.5	30	40	240	298.7	11	44.5	125	134	110.2	40
EZS702B	145	$115_{-0,01}$	46	25_{h6}^{H6}	30_{h7}	60	165	24	164.5	66.5	30	40	265	321.7	11	44.5	125	134	135.2	40
EZS703B	145	$115_{-0,01}$	46	25_{h6}^{H6}	30_{h7}	60	165	24	164.5	66.5	30	40	290	348.7	11	44.5	125	134	160.2	40

26.5 Type designation

Sample code

EZS	5	0	1	U	D	AD	M4	O	097

Explanation

Code	Designation	Design
EZS	Type	Synchronous servo motor for screw drives
5	Motor size	5 (example)
0	Generation	0
1	Length	1 (example)
U	Cooling	Convection cooling
B		Forced ventilation
D	Design	Dynamic
AD	Drive controller	SD6 (example)
M4	Encoder	EQI 1131 FMA EnDat 2.2 (example)
O	Brake	Without holding brake
P		Permanent magnet holding brake
097	Electromagnetic constant (EMC) K_{EM}	97 V/1000 rpm (example)

Notes

- In Chapter [▷ 26.6.5], you can find information about available encoders.
- In Chapter [▷ 26.6.5.6], you can find information about connecting synchronous servo motors to other drive controllers from STOBER.
- In Chapter [▷ 27], you can find information about options for connecting STOBER synchronous servo motors to drive controllers from other manufacturers.

26.6 Product description

26.6.1 General features

Feature	EZS5	EZS7
Threaded spindle ∅ [mm]	25/32	32/40
Nominal speed n_N [rpm]	3000	3000
Bearing type[1]	INA ZKLF 3590-2Z[2]	INA ZKLF 50115-2Z[3]
Maximum bearing speed n_{la} [rpm]	3800	3000
Axial bearing load rating, dynamic C_{dyn} [N]	41000	46500
Axial rigidity C_{ax} [N/µm]	500	770
Protection class	IP40	IP40
Thermal class	155 (F) in accordance with EN 60034-1 (155°C, heating $\Delta\vartheta$ = 100 K)	
Surface[4]	Matte black as per RAL 9005	
Noise level	Limit values in accordance with EN 60034-9	
Cooling	IC 410 convection cooling (IC 416 convection cooling with optional forced ventilation)	

[1] Axial angular contact ball bearing for screw drives, grease-lubricated, can be relubricated

[2] Or comparable products from other providers

[3] Or comparable products from other providers

[4] Repainting the motor will change the thermal properties and therefore the performance limits.

26.6.2 Electrical features

General electrical features of the motor are described in this chapter. Details can be found in the "Selection tables" chapter.

Feature	Description
DC link voltage	DC 540 V (max. 620 V) on STOBER drive controllers
Winding	Three-phase, single-tooth coil design
Circuit	Star, center not led through
Protection class	I (protective grounding) in accordance with EN 61140
Number of pole pairs	7

26.6.3 Ambient conditions

Standard ambient conditions for transport, storage and operation of the motor are described in this chapter.

Feature	Description
Surrounding temperature for transport/storage	−30 °C to +85 °C
Surrounding temperature for operation	−15 °C to +40 °C
Installation altitude	≤ 1000 m above sea level
Shock load	≤ 50 m/s² (5 g), 6 ms in accordance with EN 60068-2-27

Notes

- STOBER synchronous servo motors are not suitable for potentially explosive atmospheres in accordance with (ATEX) Directive2014/34/EU.
- Secure the power cables close to the motor so that vibrations of the cable do not place impermissible loads on the motor plug connector.
- Note that the braking torques of the holding brake (optional) may be reduced by shock loading.

26.6.4 Lubrication of the screw drive

Lubricants that enter into the inside of the motor can impair the function of the holding brake and encoder. Therefore, take the protection class of the synchronous servo motor into account when configuring your screw drive, especially when installing the synchronous servo motor vertically with the A side on top.

For detailed information about lubricating the screw drive, contact your screw drive manufacturer.

26.6.5 Encoders

STOBER synchronous servo motors can be designed with different encoder models. The following chapters include information for choosing the optimal encoder for your application.

26.6.5.1 Encoder measuring method selection tool

The following table offers a selection tool for an encoder measuring method that is optimally suited for your application.

Feature	Absolute encoder		Resolver
Measuring method	Optical	Inductive	Electromagnetic
Temperature resistance	★★☆	★★★	★★★
Vibration strength and shock resistance	★★☆	★★★	★★★
System accuracy	★★★	★★☆	★☆☆
FMA version with fault exclusion for mechanical coupling (option with EnDat interface)	✓	✓	–
Elimination of referencing with multi-turn design (optional)	✓	✓	–
Simple commissioning with electronic nameplate	✓	✓	–
Key: ★☆☆ = satisfactory, ★★☆ = good, ★★★ = very good			

26.6.5.2 Selection tool for EnDat interface

The following table offers a selection tool for the EnDat interface of absolute encoders.

Feature	EnDat 2.1	EnDat 2.2
Short cycle times	★★☆	★★★
Transfer of additional information along with the position value	–	✓
Expanded power supply range	★★☆	★★★
Key: ★★☆ = good, ★★★ = very good		

26.6.5.3 EnDat encoders

In this chapter, you can find detailed technical data for encoder models that can be selected with EnDat interface.

Encoders with EnDat 2.2 interface

Encoder model	Code	Measuring method	Recordable revolutions	Resolution	Position values per revolution
EQI 1131 FMA	M4	Inductive	4096	19 bit	524288
EQI 1131	Q6	Inductive	4096	19 bit	524288
EBI 1135	B0	Inductive	65536	18 bit	262144
EQN 1135 FMA	M3	Optical	4096	23 bit	8388608
EQN 1135	Q5	Optical	4096	23 bit	8388608
ECN 1123 FMA	M1	Optical	–	23 bit	8388608
ECN 1123	C7	Optical	–	23 bit	8388608
ECI 1118-G2	C5	Inductive	–	18 bit	262144

Encoders with EnDat 2.1 interface

Encoder model	Code	Measuring method	Recordable revolutions	Resolution	Position values per revolution	Periods per revolution
EQN 1125 FMA	M2	Optical	4096	13 bit	8192	Sin/Cos 512
EQN 1125	Q4	Optical	4096	13 bit	8192	Sin/Cos 512
ECN 1113 FMA	M0	Optical	–	13 bit	8192	Sin/Cos 512
ECN 1113	C6	Optical	–	13 bit	8192	Sin/Cos 512

Notes

- The encoder code is a part of the type designation of the motor.
- FMA = Version with fault exclusion for mechanical coupling.
- The EBI 1135 encoder requires an external buffer battery so that absolute position information is retained after the power supply is turned off (AES option for STOBER drive controllers).
- Multiple revolutions of the motor shaft can be recorded only using multi-turn encoders.

26.6.5.4 HIPERFACE DSL encoders

HIPERFACE DSL is a robust, purely digital protocol that functions with minimal connection lines. HIPERFACE DSL facilitates the One Cable Solution, which allows the connection lines between the encoder and drive controller to be routed along in the motor's power cable.

The One Cable Solution offers the following advantages:

- Significantly reduced wiring effort by eliminating the encoder cable
- Significantly reduced space requirements by eliminating the encoder plug connector
- Transmission of measured values from the temperature sensor using the HIPERFACE DSL protocol.

A motor with the HIPERFACE DSL encoder can be operated only on a SI6 or SC6 drive controller from STOBER.

The HIPERFACE DSL encoder has the following features:

Encoder model	Code	Measuring method	Recordable revolutions	Resolution	Position values per revolution
EKM36	H3	Optical	4096	20 bit	1048576

26.6.5.5 Resolver

In this chapter, you can find detailed technical data for the resolver that can be installed as an encoder in a STOBER synchronous servo motor.

Feature	Description
Input voltage U_{1eff}	7 V ± 5%
Input frequency f_1	10 kHz
Output voltage $U_{2,S1–S3}$	$K_{tr} \cdot U_{R1–R2} \cdot \cos \theta$
Output voltage $U_{2,S2–S4}$	$K_{tr} \cdot U_{R1–R2} \cdot \sin \theta$
Transformation ratio K_{tr}	0.5 ± 5%
Electrical fault	±10 arcmin

26.6.5.6 Possible combinations with drive controllers

The following table shows the options for combining STOBER drive controllers with selectable encoder models.

Drive controller		SDS 5000	MDS 5000	SDS 5000/ MDS 5000	SD6		SI6			SC6		
Drive controller code		AA	AB	AC	AD	AE	AP	AQ	AS	AU	AV	AW
Connection plan ID		442305	442306	442307	442450	442451	442771	442772	442788	443052	443053	443065
Encoder	Encoder code											
EQI 1131 FMA	M4	✓	–	–	✓	–	–	–	–	–	–	–
EQI 1131	Q6	✓	✓	–	✓	–	✓	–	–	✓	–	–
EBI 1135	B0	✓	✓	–	✓	–	✓	–	–	✓	–	–
EQN 1135 FMA	M3	✓	–	–	✓	–	–	–	–	–	–	–
EQN 1135	Q5	✓	✓	–	✓	–	✓	–	–	✓	–	–
ECN 1123 FMA	M1	✓	–	–	✓	–	–	–	–	–	–	–
ECN 1123	C7	✓	✓	–	✓	–	✓	–	–	✓	–	–
ECI 1118-G2	C5	✓	✓	–	✓	–	✓	–	–	✓	–	–
EQN 1125 FMA	M2	✓	✓	✓	✓	✓	–	–	–	–	–	–
EQN 1125	Q4	✓	✓	✓	✓	✓	–	–	–	–	–	–
ECN 1113 FMA	M0	✓	✓	✓	✓	✓	–	–	–	–	–	–
ECN 1113	C6	✓	✓	✓	✓	✓	–	–	–	–	–	–
EKM36	H3	–	–	–	–	–	–	–	✓	–	–	✓
Resolver	R0	✓	✓	–	–	✓	–	✓	–	–	✓	–

Notes

- The drive controller and encoder codes are a part of the type designation of the motor (see the "Type designation" chapter).
- In Chapter [▷ 27], you can find information about options for connecting STOBER synchronous servo motors to drive controllers from other manufacturers.

26.6.6 Temperature sensor

In this chapter, you can find technical data for the temperature sensors that are installed in STOBER synchronous servo motors for implementing thermal winding protection. To prevent damage to the motor, always monitor the temperature sensor with appropriate devices that will turn off the motor if the maximum permitted winding temperature is exceeded.

Some encoders feature integrated temperature monitoring, the warning and switch-off thresholds of which may overlap with the corresponding values set for the temperature sensor in the drive controller. In some cases, this may result in an instance where an encoder with internal temperature monitoring forces the motor to shut down, even before the motor has reached its nominal data.

You can find information about the electrical connection of the temperature sensor in the "Connection method" chapter.

26.6.6.1 PTC thermistor

The PTC thermistor is installed as a standard temperature sensor in STOBER synchronous servo motors.

The PTC thermistor is a triple thermistor in accordance with DIN 44082 that can be used for monitoring the temperature of each winding phase. The resistance values in the following table and curve refer to a single thermistor in accordance with DIN 44081. These values must be multiplied by 3 for a triple thermistor in accordance with DIN 44082.

Feature	Description
Nominal response temperature ϑ_{NAT}	145 °C ± 5 K
Resistance R −20 °C up to ϑ_{NAT} − 20 K	≤ 250 Ω
Resistance R with ϑ_{NAT} − 5 K	≤ 550 Ω
Resistance R with ϑ_{NAT} + 5 K	≥ 1330 Ω
Resistance R with ϑ_{NAT} + 15 K	≥ 4000 Ω
Operating voltage	≤ DC 7.5 V
Thermal response time	< 5 s
Thermal class	155 (F) in accordance with EN 60034-1 (155 °C, heating $\Delta\vartheta$ = 100 K)

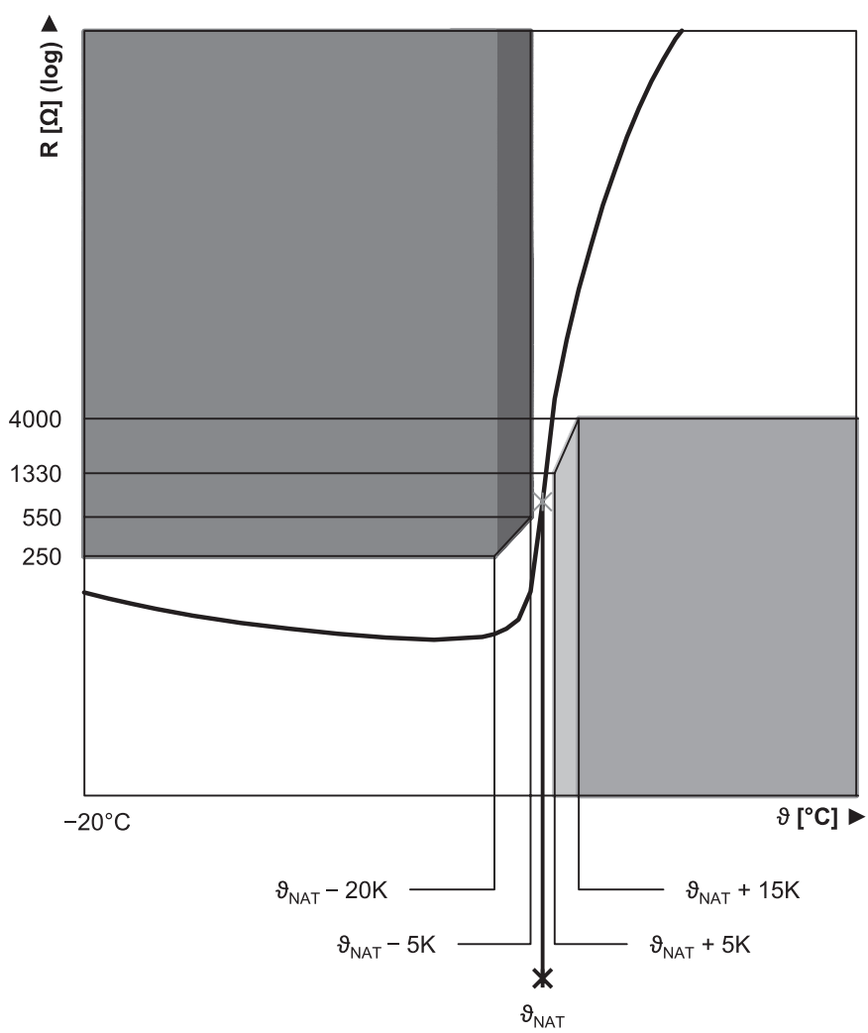


Fig. 2: PTC thermistor curve (single thermistor)

26.6.6.2 Pt1000 temperature sensor

STOBER synchronous servo motors are available in versions with a Pt1000 temperature sensor. The Pt1000 is a temperature-dependent resistor that has a resistance curve with a linear relationship with temperature. As a result, the Pt1000 allows for measurements of the winding temperature. These measurements are limited to one phase of the motor winding, however. In order to adequately protect the motor from exceeding the maximum permitted winding temperature, use a i^2t model in the drive controller to monitor the winding temperature.

Avoid exceeding the specified measurement current so that the measured values are not falsified due to self-heating of the temperature sensor.

Feature	Description
Measurement current (constant)	2 mA
Resistance R for ϑ = 0 °C	1000 Ω
Resistance R for ϑ = 80 °C	1300 Ω
Resistance R for ϑ = 150 °C	1570 Ω

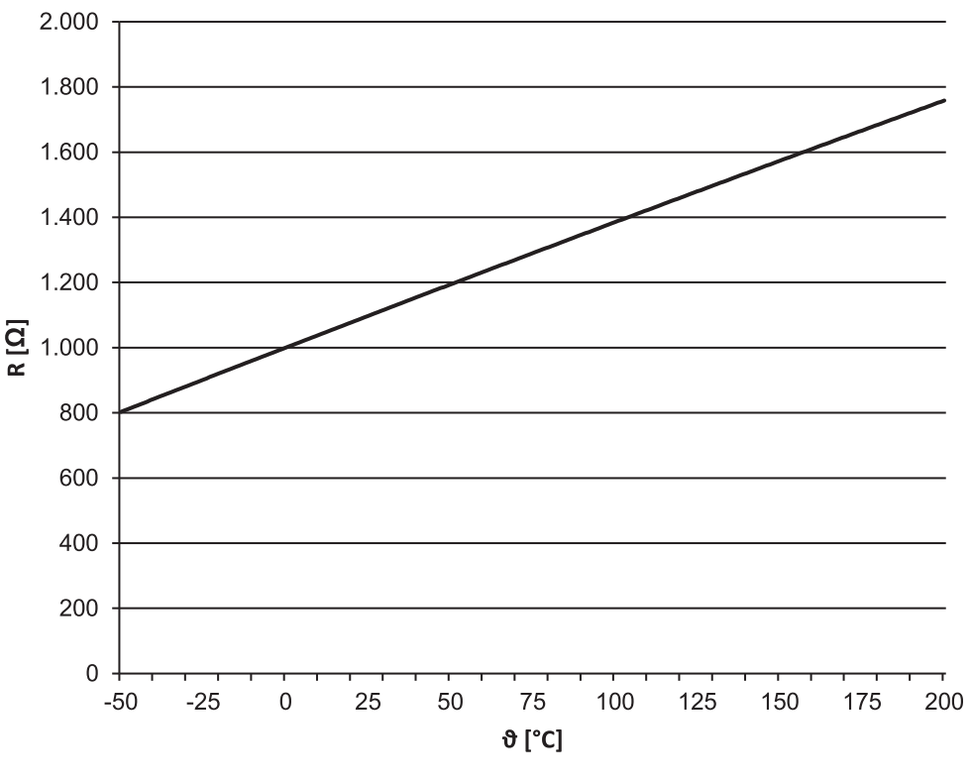


Fig. 3: Pt1000 temperature sensor characteristic curve

26.6.7 Cooling

A synchronous servo motor in the standard version is cooled by convection cooling (IC 410 in accordance with EN 60034-6). The air flowing around the motor is heated by the radiated motor heat and rises. Optionally, forced ventilation can be used to cool the motor.

26.6.7.1 Forced ventilation

STOBER synchronous servo motors offer the option of being cooled with forced ventilation in order to increase performance data while maintaining the same size. Retrofitting with a forced ventilation unit is also possible in order to optimize the drive at a later date. When retrofitting, check whether the conductor cross-section of the power cable of the motor must be increased. Also take into account the dimensions of the forced ventilation unit.

The performance data for motors with forced ventilation can be found in the chapter Selection tables and the dimensions in the chapter Dimensional drawings.

Technical data

Motor	Forced ventilation unit	$U_{N,F}$ [V]	$I_{N,F}$ [V]	$P_{N,F}$ [W]	$q_{v,F}$ [m³/h]	$L_{p(A)}$ [dBA]	m_F [kg]	Protection class
EZS5_B	FL5	230 V ± 5%,	0.10	14	160	45	1.9	IP54
EZS7_B	FL7	50/60 Hz	0.10	14	160	45	2.9	IP54

Terminal assignment for forced ventilation unit plug connectors

Connection diagram	Pin	Connection
	1	L1 (phase)
	2	N (neutral conductor)
	3	
	⏚	Grounding conductor

26.6.8 Holding brake

STOBER synchronous servo motors can be equipped with a backlash-free holding brake using permanent magnets in order to secure the motor shaft when at a standstill. The holding brake engages automatically if the voltage drops.

Nominal voltage of permanent magnet holding brake: DC 24 V ± 5%, smoothed.

Observe the following during project configuration:

- The holding brake is designed to keep the motor shaft from moving. Activate braking processes during operation using the corresponding electrical functions of the drive controller. In exceptional circumstances, the holding brake can be used for braking from full speed (following a power failure or when setting up the machine). The maximum permitted work done by friction $W_{B,Rmax/h}$ may not be exceeded.
- Note that the braking torque M_{Bdyn} may initially be up to 50% less when braking from full speed. As a result, the braking effect has a delayed action and braking distances become longer.
- Regularly perform a brake test to ensure the functional safety of the brakes. Details can be found in the documentation of the motor and the drive controller.
- Connect a varistor of type S14 K35 (or comparable) in parallel to the brake coil to protect your machine from switching surges. (Not necessary for connecting the holding brake to STOBER drive controllers of the 5th and 6th generation with a BRS/BRM brake module).
- The holding brake of the motor does not offer adequate safety for persons in the hazardous area of gravity-loaded vertical axes. Therefore take additional measures to minimize risk, e.g. by providing a mechanical substructure for maintenance work.
- Take into consideration voltage losses in the connection cables that connect the voltage source to the holding brake connections.
- The holding torque of the brake can be reduced by shock loading. Information about shock loading can be found in the "Ambient conditions" chapter.
- At operating temperatures from −15 °C to 0 °C, a cold holding brake in the released state may cause operating noises. As the temperature of the holding brake increases, these noises decrease such that operating noises are not heard when using holding brake at operating temperature in the released state.

Calculation of work done by friction per braking process

$$W_{B,R/B} = \frac{J_{tot} \cdot n^2}{182.4} \cdot \frac{M_{Bdyn}}{M_{Bdyn} \pm M_L}$$

The sign of M_L is positive if the movement runs vertically upwards or horizontally and it is negative if the movement runs vertically down.

Calculation of the stop time

$$t_{dec} = 2.66 \cdot t_{1B} + \frac{n \cdot J_{tot}}{9.55 \cdot M_{Bdyn}}$$

Switching behavior

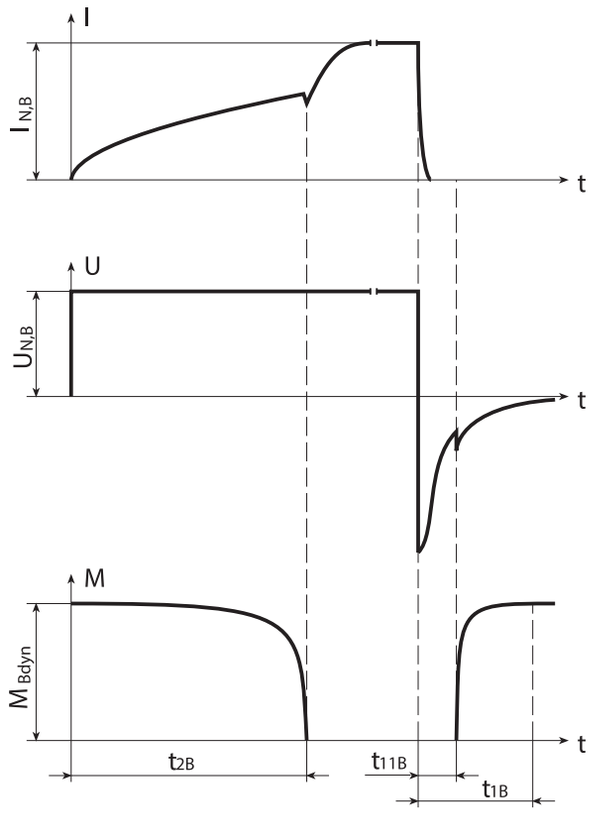


Fig. 4: Holding brake – Switching behavior

Technical data

Type	M_{Bstat} [Nm]	M_{Bdyn} [Nm]	$I_{N,B}$ [A]	$W_{B,Rmax/h}$ [kJ]	$N_{B,stop}$	$J_{B,stop}$ [10^{-4}kgm²]	$W_{B,Rlim}$ [kJ]	t_{2B} [ms]	t_{11B} [ms]	t_{1B} [ms]	$x_{B,N}$ [mm]	ΔJ_B [10^{-4}kgm²]	Δm_B [kg]
EZS501	8.0	7.0	0.75	8.5	4300	14.1	300	40	2.0	20	0.3	0.550	1.19
EZS502	8.0	7.0	0.75	8.5	3200	18.7	300	40	2.0	20	0.3	0.550	1.19
EZS503	15	12	1.0	11.0	4300	25.6	550	60	5.0	30	0.3	1.700	1.62
EZS701	15	12	1.0	11.0	2500	44.0	550	60	5.0	30	0.3	1.700	1.94
EZS702	15	12	1.0	11.0	2000	54.6	550	60	5.0	30	0.3	1.700	1.94
EZS703	32	28	1.1	25.0	3800	72.8	1400	100	5.0	25	0.4	5.600	2.81

26.6.9 Connection method

The following chapters describe the connection technology of STOBER synchronous servo motors in the standard version on STOBER drive controllers. You can find further information relating to the drive controller type that was specified in your order in the connection plan that is delivered with every synchronous servo motor.

In Chapter [▶ 27], you can find information about options for connecting STOBER synchronous servo motors to drive controllers from other manufacturers.

26.6.9.1 Connection of the motor housing to the grounding conductor system

Connect the motor housing to the grounding conductor system of the machine in order to prevent personal injury and faulty triggering of residual current protective devices.

All attachment parts required for the connection of the grounding conductor to the motor housing are delivered with the motor. The grounding screw of the motor is identified with the symbol ⏚ in accordance with IEC 60417-DB. The cross-section of the grounding conductor has to be at least as large as the cross-section of the lines in the power connection.

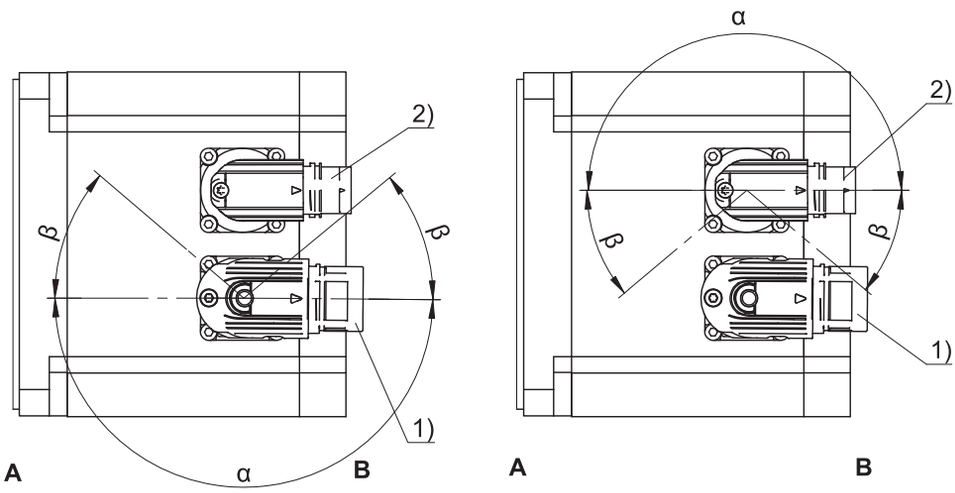
26.6.9.2 Plug connectors

STOBER synchronous servo motors are equipped with twistable quick-lock plug connectors in the standard version. Details can be found in this chapter.

For motors with forced ventilation, avoid collisions between the motor connection cables and the plug connector of the forced ventilation unit. In the event of a collision, turn the motor plug connectors accordingly. Details regarding the position of the plug connector for the forced ventilation unit can be found in the "Dimensional drawings" chapter.

The figures represent the position of the plug connectors upon delivery.

Turning ranges of plug connectors



1	Power plug connector	2	Encoder plug connector
A	Attachment or output side of the motor	B	Rear side of the motor

Power plug connector features

Motor type	Size	Connection	Turning range	
			α	β
EZS	con.23	Quick lock	180°	40°

Encoder plug connector features

Motor type	Size	Connection	Turning range	
			α	β
EZS	con.17	Quick lock	180°	20°

Notes

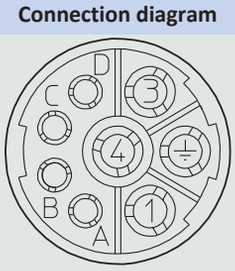
- The number after "con." indicates the approximate external thread diameter of the plug connector in mm (for example, con.23 designates a plug connector with an external thread diameter of about 23 mm).
- In turning range β, the power or encoder plug connectors can be turned only if doing so does not cause them to collide.

26.6.9.3 Connection assignment of the power plug connector

The colors of the connecting wires inside the motor are specified in accordance with IEC 60757.

Power connection

Plug connector size con.23 (1)

Connection diagram	Pin	Connection	Color
	1	U phase	black
	3	V phase	blue
	4	W phase	red
	A	Brake +	red
	B	Brake –	black
	C	Temperature sensor +	
	D	Temperature sensor –	
	⏚	Grounding conductor	green-yellow

26.6.9.4 Connection assignment of the encoder plug connector

The size and connection assignment of the encoder plug connectors depend on the model of encoder installed and the size of the motor. The colors of the connecting wires inside the motor are specified in accordance with IEC 60757.

EnDat 2.1/2.2 digital encoders, plug connector size con.17

Connection diagram	Pin	Connection	Color
	1	Clock +	violet
	2	Up sense	browngreen
	3		
	4		
	5	Data –	pink
	6	Data +	grey
	7		
	8	Clock –	yellow
	9		
	10	0 V GND	whitegreen
	11		
	12	Up +	browngreen
	Pin 2 is connected to pin 12 in the plug connector		

EnDat 2.2 digital encoder with battery buffering, plug connector size con.17

Connection diagram	Pin	Connection	Color
	1	Clock +	violet
	2	UBatt +	blue
	3	UBatt –	white
	4		
	5	Data –	pink
	6	Data +	grey
	7		
	8	Clock –	yellow
	9		
	10	0 V GND	white green
	11		
	12	Up +	brown green
	UBatt+ = DC 3.6 V for encoder model EBI in combination with the AES option of STOBER drive controllers		

EnDat 2.1 encoder with sin/cos incremental signals, plug connector size con.17

Connection diagram	Pin	Connection	Color
	1	Up sense	blue
	2		
	3		
	4	0 V sense	white
	5		
	6		
	7	Up +	brown green
	8	Clock +	violet
	9	Clock –	yellow
	10	0 V GND	white green
	11		
	12	B + (Sin +)	blue black
	13	B – (Sin –)	red black
	14	Data +	grey
	15	A + (Cos +)	green black
	16	A – (Cos –)	yellow black
	17	Data –	pink

Resolver, plug connector size con.17

Connection diagram	Pin	Connection	Color
	1	S3 Cos +	black
	2	S1 Cos –	red
	3	S4 Sin +	blue
	4	S2 Sin –	yellow
	5		
	6		
	7	R2 Ref +	yellowwhite[5]
	8	R1 Ref –	redwhite
	9		
	10		
	11		
	12		

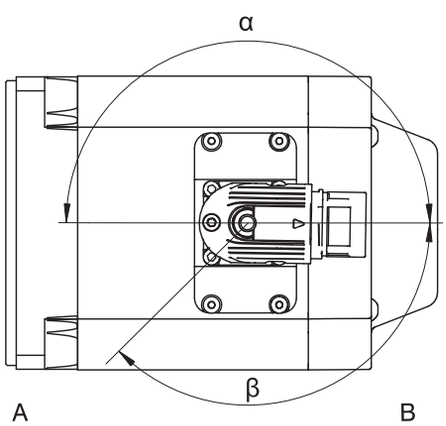
26.6.9.5 Plug connectors (One Cable Solution)

In the One Cable Solution design, the power and encoder lines are connected using a shared plug connector.

For motors with forced ventilation, avoid collisions between the motor connection cables and the plug connector of the forced ventilation unit. In the event of a collision, turn the motor plug connectors accordingly. Details regarding the position of the plug connector for the forced ventilation unit can be found in the "Dimensional drawings" chapter.

The figures represent the position of the plug connectors upon delivery.

Turning ranges of plug connectors



A	Attachment or output side of the motor	B	Rear side of the motor

Motor type	Size	Connection	Turning range	
			α	β
EZS	con.23	Quick lock	180°	135°

Notes

- The number after "con." indicates the approximate external thread diameter of the plug connector in mm (for example, con.23 designates a plug connector with an external thread diameter of about 23 mm).

26.6.9.6 Terminal assignment for plug connectors (One Cable Solution)

In the One Cable Solution design, the power and encoder lines are connected using a shared plug connector.

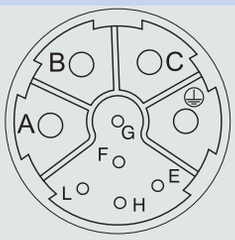
The temperature sensor of the motor is connected to the encoder internally. The measured values from the temperature sensor are transmitted via the HIPERFACE DSL log of the encoder.

The colors of the connecting wires inside the motor are specified in accordance with IEC 60757.

[5] or black and white(depending on the manufacturer of the resolver)

Power connection

Plug connector size con.23 (1)

Connection diagram	Pin	Connection	Color
	A	U phase	black
	B	V phase	blue
	C	W phase	red
	E	DSL– (L)	green
	F	DSL shield	
	G	Brake +	red
	H	DSL+ (H)	grey
	L	Brake –	black
	⏚	Grounding conductor	green-yellow

26.7 Project configuration

Project your drives using our SERVOsoft designing software. You can receive SERVOsoft for free from your adviser at one of our sales centers. Observe the limit conditions in this chapter to ensure a safe design for your drives.

An explanation of the formula symbols can be found in Chapter [▶ 29.1].

26.7.1 Design of the screw drive

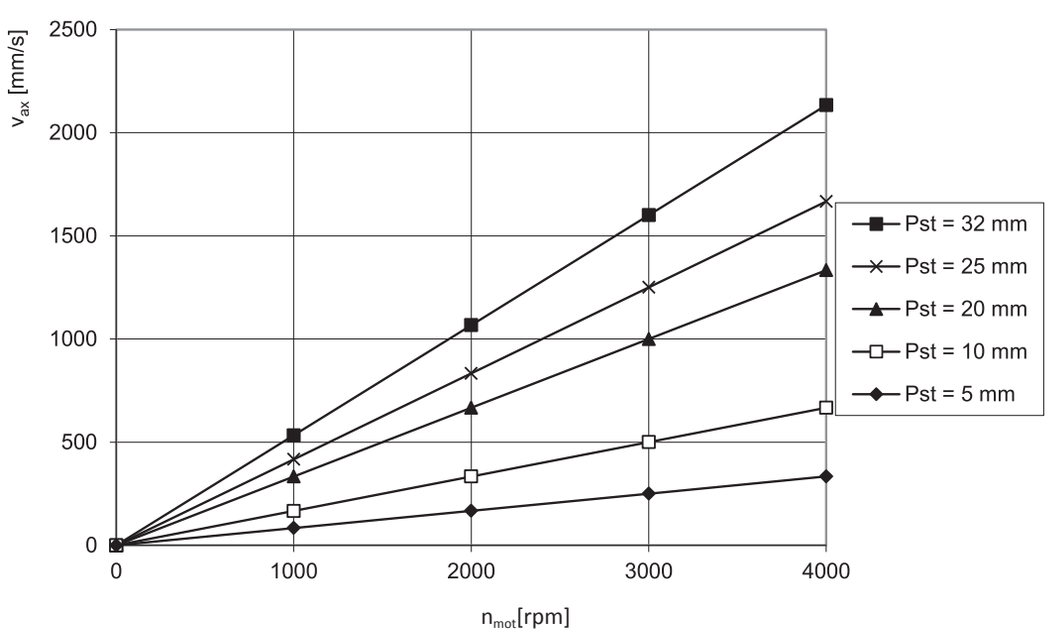
You can use the information below to select a suitable synchronous servo motor for your screw drive. For detailed design information on the screw drive, please contact the screw drive manufacturer.

Axial velocity

The axial velocity of a screw drive can be calculated as follows:

$$v_{ax} = \frac{n_{mot} \cdot P_{st}}{60}$$

The following diagram represents the characteristic curves of screw drives with common pitches that can be implemented with STOBER synchronous servo motors for screw drives.



Axial force

The axial force of a screw drive can be calculated as follows:

$$F_{ax} = \frac{2000 \cdot M \cdot \pi \cdot \eta_{gt}}{P_{st}}$$

You can use the following table to select the right motor type/screw drive pitch combination for your application. The axial forces are calculated in the table for η_{gt} = 0.9.

	M_0	F_{ax0} P_{st}=5	F_{ax0} P_{st}=10	F_{ax0} P_{st}=15	F_{ax0} P_{st}=20	F_{ax0} P_{st}=25	F_{ax0} P_{st}=32
	[Nm]	[N]	[N]	[N]	[N]	[N]	[N]
EZS501U	4.3	4863	2432	1621	1216	973	760
EZS501B	5.5	6164	3082	2055	1541	1233	963
EZS502U	7.6	8539	4269	2846	2135	1708	1334
EZS502B	10.9	12271	6136	4090	3068	2454	1917
EZS503U	10.7	12045	6022	4015	3011	2409	1882
EZS503B	15.6	17587	8793	5862	4397	3517	2748
EZS701U	7.7	8652	4326	2884	2163	1730	1352
EZS701B	10.2	11479	5740	3826	2870	2296	1794
EZS702U	13.5	15268	7634	5089	3817	3054	2386
EZS702B	19.0	21432	10716	7144	5358	4286	3349
EZS703U	19.7	22280	11140	7427	5570	4456	3481
EZS703B	27.7	31271	15636	10424	7818	6254	4886

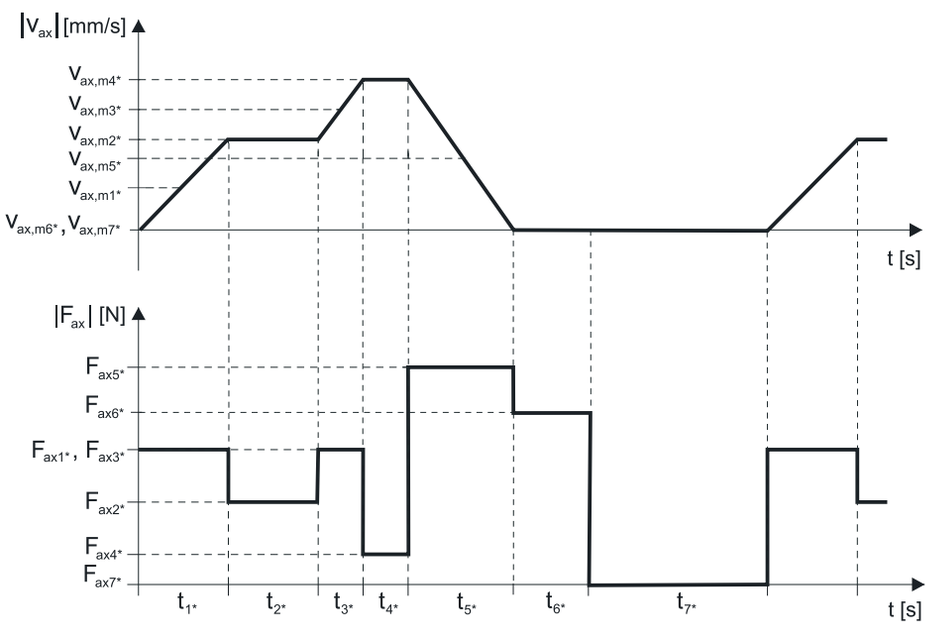
If the synchronous servo motor at absolute standstill (n_{mot}=0) must hold the load using its torque, the following formula defines the permitted axial force:

$$F_{ax0,abs} \leq 0.6 \cdot \frac{2000 \cdot M_0 \cdot \pi \cdot \eta_{gt}}{P_{st}}$$

26.7.2 Calculation of the operating point

In this chapter, you can find information needed to calculate the operating point.

The following calculations refer to a representation of the power delivered at the motor shaft based on the following example:



Calculation of the actual average axial velocity

$$v_{ax,m^*} = \frac{\left|v_{ax,m1^*}\right| \cdot t_{1^*} + \ldots + \left|v_{ax,mn^*}\right| \cdot t_{n^*}}{t_{1^*} + \ldots + t_{n^*}}$$

If $t_{1^*} + \ldots + t_{6^*} \geq 10$ min, determine v_{ax,m^*} without the rest phase t_{7^*}.

Calculation of the actual average speed

$$n_{m^*} = \frac{v_{ax,m^*} \cdot 60}{P_{st}}$$

Check the condition $n_{m*} \leq n_N$ and adjust the parameters as needed.

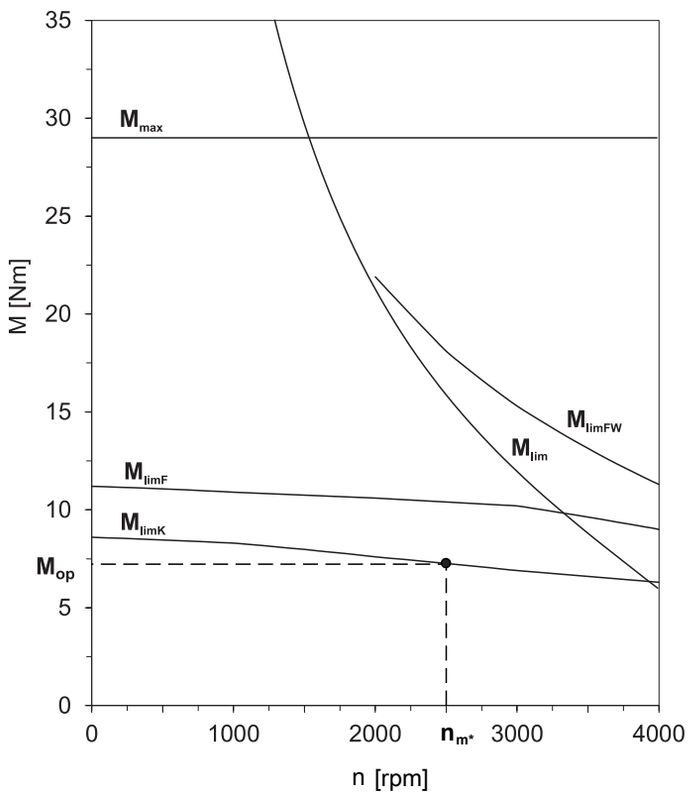
Calculation of the actual effective axial force

$$F_{ax,eff*} = \sqrt{\frac{t_{1*} \cdot F_{ax1*}{}^2 + \ldots + t_{n*} \cdot F_{ax,n*}{}^2}{t_{1*} + \ldots + t_{n*}}}$$

Calculation of the actual effective torque

$$M_{eff*} = \frac{F_{ax,eff*} \cdot P_{st}}{2000 \cdot \pi \cdot \eta_{gt}}$$

You can find the value for the torque of the motor at operating point M_{op} with the determined average input speed n_{m*} in the motor curve in Chapter [▷ 25.3]. In doing so, keep the size and cooling type of the motor in mind. The figure below shows an example of reading the torque M_{op} of a motor with convection cooling at the operating point.



Check the condition: $M_{eff*} \leq M_{op}$ and adjust the parameters as needed.

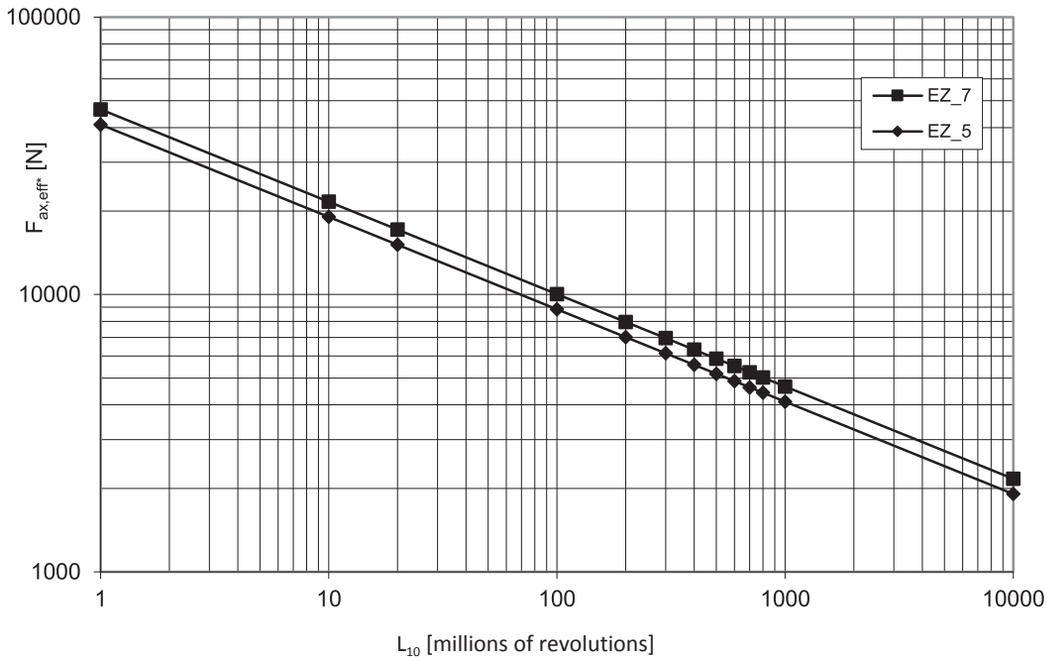
26.7.3 Calculation of the bearing service life

The service life of the axial angular contact ball bearing of a STOBER synchronous servo motor for screw drives is generally longer than the service life of the screw drive bearing.

You can calculate the service life of the axial angular contact ball bearing as follows (the value for C_{dyn} can be found in the "General features" chapter):

$$L_{10} = \left(\frac{C_{dyn}}{F_{ax,eff*}} \right)^3 \cdot 10^6$$

The following diagram shows the bearing service life L_{10}.



$$L_{10h} = \frac{L_{10}}{n_{m*} \cdot 60}$$

26.8 Further information

26.8.1 Directives and standards

STOBER synchronous servo motors meet the requirements of the following directives and standards:

- (Low Voltage) Directive 2014/35/EU
- EN 60034-1:2010 + Cor.:2010
- EN 60034-5:2001 + A1:2007
- EN 60034-6:1993

26.8.2 Identifiers and test symbols

STOBER synchronous servo motors have the following identifiers and test symbols:

CE mark: The product meets the requirements of EU directives.

cURus test symbol "Servo and Stepper Motors – Component"; registered under UL number E488992 with Underwriters Laboratories USA (optional).

26.8.3 Additional documentation

Additional documentation related to the product can be found at http://www.stoeber.de/en/download

Enter the ID of the documentation in the Search... field.

Documentation	ID
Operating manual for EZ synchronous servo motors	443032_en

27 Connecting to drive controllers of third-party manufacturers

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27.1 General notes

STOBER synchronous servo motors are designed for connection to STOBER drive controllers in the standard version. STOBER offers an extensive assortment of high-quality, trusted power and encoder connection cables for this purpose. However, STOBER synchronous servo motors can also be operated on drive controllers from third-party manufacturers. Notes and information for this purpose can be found in the following chapters. You can find all other information about STOBER synchronous servo motors in the corresponding chapters of this catalog.

27.1.1 Nominal data

Nominal data for synchronous servo motors specified in the selection tables of this catalog were calculated for connecting to STOBER drive controllers. Note that this nominal data may change when STOBER synchronous servo motors are connected to drive controllers of third-party manufacturers. The following drive controller plug connectors are determining factors here:

- f_{2PU}
- $f_{PWM,PU}$
- U_{ZK}
- Compensation of the field weakening range.

The maximum achievable speed of a synchronous servo motor depends on the number of pole pairs (p) of the synchronous servo motor and, if applicable, on the restriction of f_{2PU} by Regulation (EC) No. 428/2009 (EC Dual Use Regulation). Details are shown in the figure below.

Some encoders feature integrated temperature monitoring, the warning and switch-off thresholds of which may overlap with the corresponding values set for the thermal winding protection in the drive controller. In some cases, this may result in an instance where an encoder with internal temperature monitoring forces the motor to shut down, even before the motor has reached its nominal data.

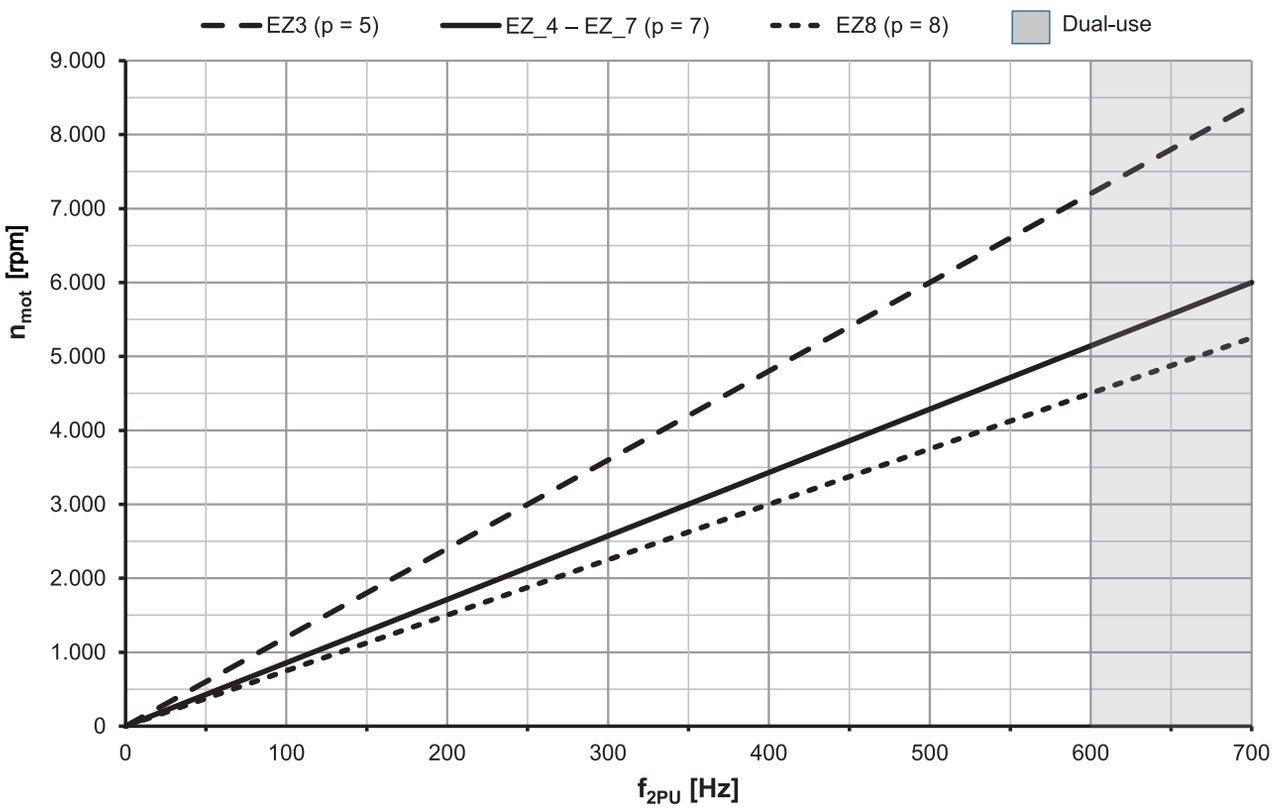


Fig. 1: Speed/frequency graph for EZ motors

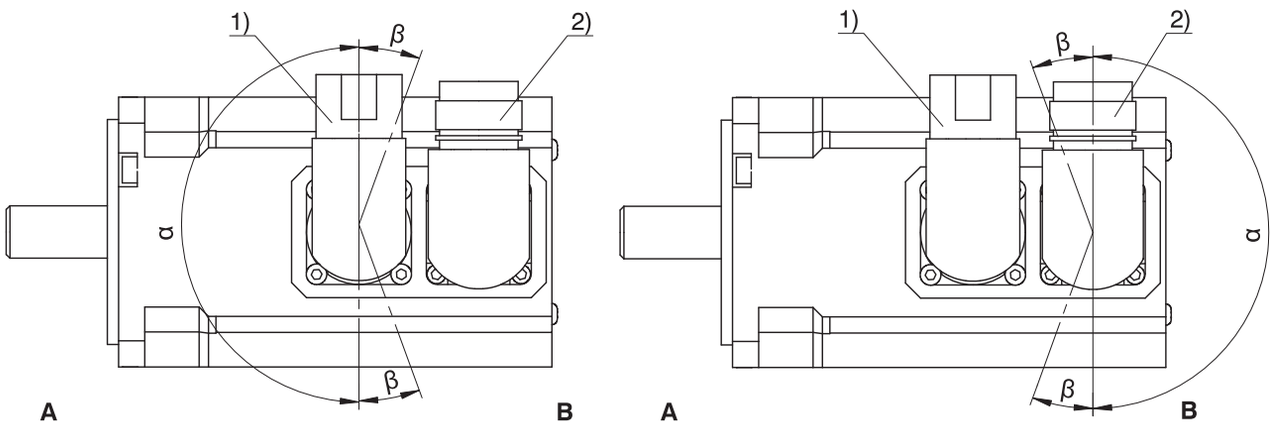
27.1.2 Plug connectors

STOBER synchronous servo motors are equipped with angled, round plug connectors (INTERCONTEC brand) for power and encoder connection in the standard version. You can find detailed technical information about the plug connectors at http://www.intercontec.biz.

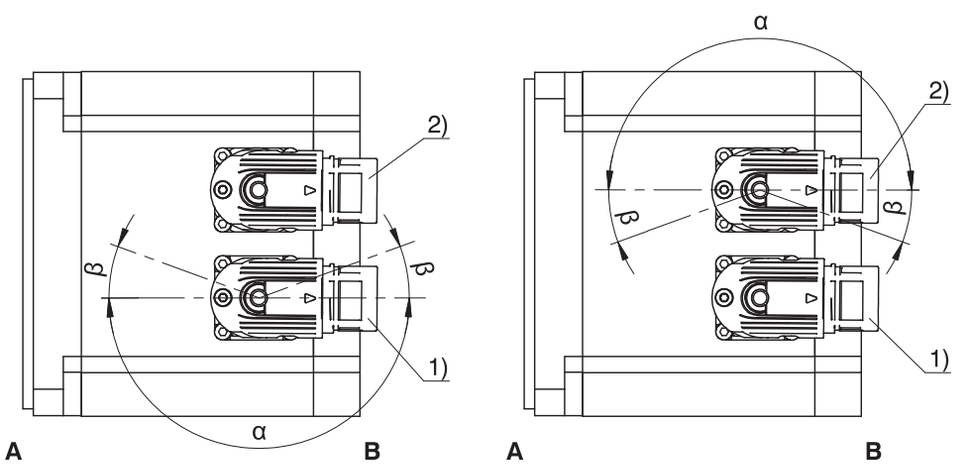
For motors with forced ventilation, avoid collisions between the motor connection cables and the plug connector of the forced ventilation unit. In the event of a collision, turn the motor plug connectors accordingly. Details regarding the position of the plug connector for the forced ventilation unit can be found in the "Dimensional drawings" chapter.

The figures represent the position of the plug connectors upon delivery.

Turning ranges of plug connectors (EZ3 motors)



Turning ranges of plug connectors (motors EZ4 – EZ8, EZHD, EZHP, EZM, EZS)



1	Power plug connector	2	Encoder plug connector
A	Attachment or output side of the motor	B	Rear side of the motor

Power plug connector features

Motor type	Size	Connection	Turning range	
			α	β
EZ3 – EZ5, EZ701, EZ703 EZHD_4, EZHD_5, EZHD_711 – EZHD_713 EZHP_5, EZHP_711 – EZHP_713 EZM, EZS	con.23	Quick lock	180°	20°
EZ705, EZ802, EZ803, EZ805U EZHD_715, EZHP_715	con.40	Quick lock	180°	20°
EZ805B	con.58	Screw thread[1]	0°	0°

[1] Specify alignment on side A or B in the purchase order.

Encoder plug connector features

Motor type	Size	Connection	Turning range	
			α	β
EZ3 – EZ7, EZ802, EZ803, EZ805U EZHD, EZHP, EZM, EZS	con.23[2]	Quick lock	180°	20°
EZ805B	con.23[3]	Quick lock	180°	0°

Notes

- In turning range β, the power or encoder plug connectors can be turned only if doing so does not cause them to collide.
- The number after "con." indicates the approximate external thread diameter of the plug connector in mm (for example, con.23 designates a plug connector with an external thread diameter of about 23 mm).

27.1.3 Connection cables

The plug connectors and connection assignment of STOBER synchronous servo motors are designed for connecting to drive controllers from third-party manufacturers in such a way that allows you to connect the original cable of the respective manufacturer. Keep the following information regarding cable quality and design in mind.

- Because the original cable from Bosch Rexroth cannot be used, STOBER offers suitable cables for this purpose. More detailed information is available from your STOBER customer consultant.
- Ensure that the cable quality and cable design is suitable for the ambient conditions at the installation location.

Electromagnetic compatibility (EMC)

Ensure compliance with statutory EMC requirements for the drive system at the installation location.

Connect the cable shields on both ends of the connection cable. Connect the grounding screw of the synchronous servo motor with the grounding at the installation location.

Power cables

Operation with unsuitable power cables may lead to inadmissibly high voltage peaks, which could damage the motor. For this reason, the capacitances and inductances must match the motor. Recommended values can be found in the table below.

The conductor cross-section of the power cable must be designed appropriately for the stall current of the motor. Details on this can be found in the table below.

Conductor cross-section [mm²]	1.0	1.5	2.5	4.0	6.0	10.0	16.0	25.0
Nominal current [A]	12.5	15.0	20.0	28.3	35.8	49.2	66.7	90.0
Maximum capacitance in accordance with test type A (core/core) [nF/km]	45	55	65	60	70	75	75	Values on request
Maximum capacitance in accordance with test type B (core/residual) [nF/km]	250	300	325	260	300	350	360	Values on request
Maximum inductance (core/core) [µH/km]	800	700	700	600	650	600	570	Values on request

Notes

- The maximum capacitance is specified in accordance with DIN VDE 0472-504. Specifications in accordance with EN 50289-1-5 in preparation.
- The maximum inductance is specified in accordance with EN 50289-1-12.

[2] con.15 for connecting to B&R ACOPOSmulti with EnDat 2.2 Interface (drive controller type code GG).

[3] con.15 for connecting to B&R ACOPOSmulti with EnDat 2.2 Interface (drive controller type code GG).

Encoder cables

When operating with unsuitable encoder cables, encoder signals can no longer be transferred free of interference. Note the recommended values in the following table.

Signal shape	Digital		Sin-Cos			Resolver	
Conductor cross-section [mm²]	0.14	0.25	0.14	0.25	0.37	0.14	0.25
Maximum capacitance in accordance with test type A (core/core) [nF/km]	30	35	60	110	130	40	50
Maximum capacitance in accordance with test type B (core/remainder) [nF/km]	110	130	300	300	325	300	300
Maximum inductance (core/core) [µH/km]	800	800	650	700	700	800	800
Shielding type of cable	Tin-plated copper braiding						
Shielding type of conductor pairs	–		Tin-plated copper braiding			Film + braiding	
Cover	≥ 90 %		≥ 80 %			≥ 80 %	

Notes

- The maximum capacitance is specified in accordance with DIN VDE 0472-504. Specifications in accordance with EN 50289-1-5 in preparation.
- The maximum inductance is specified in accordance with EN 50289-1-12.

27.2 Connection to B&R drive controllers

This chapter contains the information for connecting STOBER synchronous servo motors to drive controllers of the above-named manufacturer which differs from connecting to STOBER drive controllers. You can find all other information about STOBER synchronous servo motors in the respective chapter of this catalog.

27.2.1 Encoders

Encoders with EnDat 2.2 interface

Encoder model	Code	Measuring method	Recordable revolutions	Resolution	Position values per revolution
EQI 1131 FMA	M4	Inductive	4096	19 bit	524288
EQI 1131	Q6	Inductive	4096	19 bit	524288
EQN 1135 FMA	M3	Optical	4096	23 bit	8388608
EQN 1135	Q5	Optical	4096	23 bit	8388608
ECN 1123 FMA	M1	Optical	–	23 bit	8388608
ECN 1123	C7	Optical	–	23 bit	8388608
ECI 1118-G2	C5	Inductive	–	18 bit	262144

Encoders with EnDat 2.1 interface

Encoder model	Code	Measuring method	Recordable revolutions	Resolution	Position values per revolution	Periods per revolution
ECI 119	C4	Inductive	–	19 bit	524288	Sin/Cos 32
EQN 1125 FMA	M2	Optical	4096	13 bit	8192	Sin/Cos 512
EQN 1125	Q4	Optical	4096	13 bit	8192	Sin/Cos 512
ECN 1113 FMA	M0	Optical	–	13 bit	8192	Sin/Cos 512
ECN 1113	C6	Optical	–	13 bit	8192	Sin/Cos 512

Notes

- The encoder code is a part of the type designation of the motor.
- FMA = Version with fault exclusion for mechanical coupling.
- Encoders with EnDat 2.2 interface and in the FMA design are ready for operation as a one-encoder solution on a safety-related position measuring system with an EnDat 2.2 interface
- Multiple revolutions of the motor shaft can be recorded only using multi-turn encoders.

27.2.2 Possible combinations with drive controllers

The following table shows the possible combinations of STOBER synchronous servo motors with drive controllers from B&R depending on the encoder model.

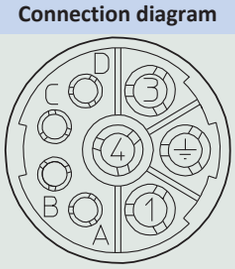
Drive controller		ACOPOS	ACOPOSmulti (with EnDat 2.1 interface)	ACOPOSmulti (with EnDat 2.2 interface)
Drive controller code		FG	FV	GG
Connection plan ID		442313	442444	442677
Encoder	**Encoder code**			
EQI 1131 FMA	M4	–	–	EZ, EZS
EQI 1131	Q6	–	–	EZ, EZS
EQN 1135 FMA	M3	–	–	EZ, EZS
EQN 1135	Q5	–	–	EZ, EZS
ECN 1123 FMA	M1	–	–	EZ, EZS
ECN 1123	C7	–	–	EZ, EZS
ECI 1118-G2	C5	–	–	EZ, EZS
ECI 119	C4	–	EZHD, EZHP, EZM	–
EQN 1125 FMA	M2	EZ, EZS	EZ, EZS	–
EQN 1125	Q4	EZ, EZS	EZ, EZS	–
ECN 1113 FMA	M0	–	EZ, EZS	–
ECN 1113	C6	–	EZ, EZS	–
Resolver	R0	EZ, EZS	EZ, EZS	–

The encoder and drive controller codes are a part of the type designation of the motor.

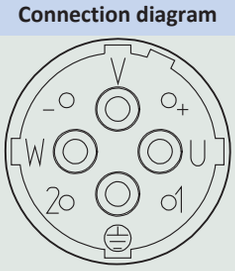
27.2.3 Connection assignment of the power plug connector

The size and connection plan of the power plug connector depend on the size of the motor. The colors of the connecting wires inside the motor are specified in accordance with IEC 60757.

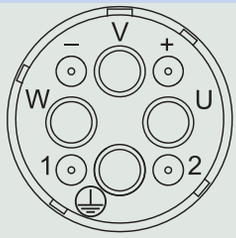
Plug connector size con.23 (1)

Connection diagram	Pin	Connection	Color
	1	U phase	black
	3	W phase	red
	4	V phase	blue
	A	Temperature sensor +	
	B	Temperature sensor –	
	C	Brake +	red
	D	Brake –	black
	⏚	Grounding conductor	green-yellow

Plug connector size con.40 (1.5)

Connection diagram	Pin	Connection	Color
	U	U phase	black
	V	V phase	blue
	W	W phase	red
	+	Brake +	red
	–	Brake –	black
	1	Temperature sensor +	
	2	Temperature sensor –	
	⏚	Grounding conductor	green-yellow

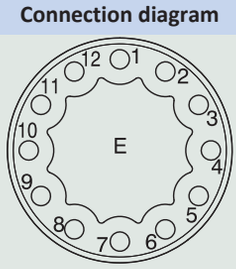
Plug connector size con.58 (3)

Connection diagram	Pin	Connection	Color
	U	U phase	black
	V	V phase	blue
	W	W phase	red
	+	Brake +	red
	–	Brake –	black
	1	Temperature sensor +	
	2	Temperature sensor –	
	⏚	Grounding conductor	green-yellow

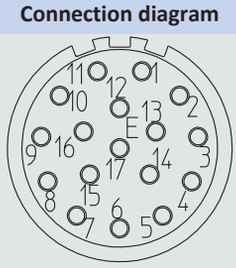
27.2.4 Connection assignment of the encoder plug connector

The size and connection assignment of the encoder plug connectors depend on the model of encoder installed and the size of the motor. The colors of the connecting wires inside the motor are specified in accordance with IEC 60757.

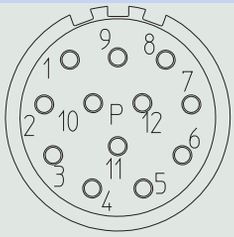
EnDat 2.2 digital encoder, plug connector size con.15

Connection diagram	Pin	Connection	Color
	1	Up +	brown green
	2	Data +	grey
	3	Data –	pink
	4	Clock +	violet
	5	Clock –	yellow
	6		
	7	0 V GND	white green
	8		
	9		
	10		
	11		
	12		

EnDat 2.1 encoder with sin/cos incremental signals, plug connector size con.23

Connection diagram	Pin	Connection	Color
	1	Up sense	blue
	2		
	3		
	4	0 V sense	white
	5		
	6		
	7	Up +	brown green
	8	Clock +	violet
	9	Clock –	yellow
	10	0 V GND	white green
	11		
	12	B + (Sin +)	blue black
	13	B – (Sin –)	red black
	14	Data +	grey
	15	A + (Cos +)	green black
	16	A – (Cos –)	yellow black
	17	Data –	pink

Resolver, plug connector size con.23

Connection diagram	Pin	Connection	Color
	1		
	2		
	3	S4 Sin +	blue
	4	S1 Cos –	red
	5	R2 Ref +	yellow white
	6		
	7	S2 Sin –	yellow
	8	S3 Cos +	black
	9	R1 Ref –	red white
	10		
	11		
	12		

27.3 Connection to Siemens drive controllers

This chapter contains the information for connecting STOBER synchronous servo motors to drive controllers of the above-named manufacturer which differs from connecting to STOBER drive controllers. You can find all other information about STOBER synchronous servo motors in the respective chapter of this catalog.

27.3.1 EIB 3392S interface

The EIB 3392S interface made by Heidenhain enables the connection of EnDat 2.2 encoders to Siemens SINAMICS S120 drive controllers using the powerful DRIVE-CLiQ system interface. STOBER offers the EIB 3392S interface with the ID 1250663-01. In this design, the connector and the terminal assignment on the EnDat 2.2 side are adapted to STOBER synchronous servo motors so that the interface can be connected and commissioned without additional work.

Advantages

- Support for all DRIVE-CLiQ interface options
- Compact and robust industrial design
- Easy, fast commissioning
- No space or wiring necessary in the control cabinet
- Because the DRIVE-CLiQ electronics are located outside of the motor, it is not necessary to reduce the performance data of the motor based on the temperature.

Features

Feature	Description
Surrounding temperature for operation	0 °C to 60 °C
Protection class	IP 65
Bending radius of the interface connection cable	75 mm, freely movable 20 mm, permanently installed

The EIB 3392S interface is connected to the plug connector of the motor on the EnDat 2.2 side. On the DRIVE-CLiQ side, an original Siemens encoder cable with a length of up to 30 m can be connected.

The EIB 3392S interface may only be connected to motors with a Pt1000 temperature sensor. The temperature sensor is connected to the EnDat 2.2 encoder inside the motor. The EIB 3392S interface transmits the values from the temperature sensor over the DRIVE-CLiQ interface unchanged.

The housing of the EIB 3392S must be attached at the installation location. A cable clip can be used for this purpose (see dimensional drawing).

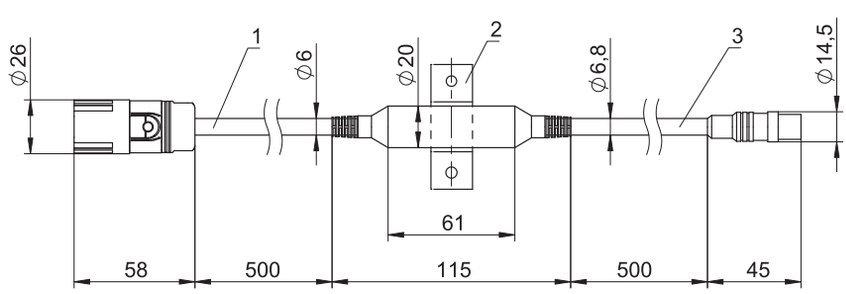
Functional safety

Depending on the connected encoder and the downstream electronics, the EIB 3392S can be used in safety-oriented applications up to Safety Integrity Level (SIL) 2 in accordance with EN 61508-1 / EN 61800-5-2 or up to Category 3, PL d in accordance with EN ISO 13849-1.

The probability of a failure per hour (PFH) is 26×10^{-9} for an installation altitude ≤ 1000 m above sea level.

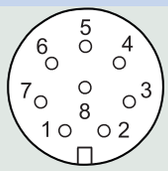
The EIB 3392S interface does not have any effect on the safe position that can be implemented by the motor encoder and the downstream electronics.

27.3.1.1 Dimensional drawing



1	Black cable color (EnDat 2.2 side)	2	Cable clip (not included in the scope of delivery)
3	Green cable color (DRIVE-CLiQ side)		

27.3.1.2 Terminal assignment

EnDat 2.2 side, con.23 plug connector			DRIVE-CLiQ side, M12 plug connector		
Connection diagram	Pin	Connection	Connection	Pin	Connection diagram
	1	Clock +	Up +	1	
	2			2	
	3		RXP	3	
	4		RXN	4	
	5	Data –	0 V GND	5	
	6	Data +	TXN	6	
	7		TXP	7	
	8	Clock –		8	
	9				
	10	0 V GND			
	11				
	12	Up +			

27.3.2 Encoders

Encoders with EnDat 2.2 interface

Encoders with an EnDat 2.2 interface can be connected to Siemens S120 drive controllers and operated using the EIB 3392S interface.

Encoder model	Code	Measuring method	Recordable revolutions	Resolution	Position values per revolution
EQI 1131 FMA	M4	Inductive	4096	19 bit	524288
EQI 1131	Q6	Inductive	4096	19 bit	524288
EQN 1135 FMA	M3	Optical	4096	23 bit	8388608
EQN 1135	Q5	Optical	4096	23 bit	8388608
ECN 1123 FMA	M1	Optical	–	23 bit	8388608
ECN 1123	C7	Optical	–	23 bit	8388608
ECI 119-G2	C9	Inductive	–	19 bit	524288

Encoders with EnDat 2.1 interface

Encoder model	Code	Measuring method	Recordable revolutions	Resolution	Position values per revolution	Periods per revolution
ECI 119	C4	Inductive	–	19 bit	524288	Sin/Cos 32
EQN 1125 FMA	M2	Optical	4096	13 bit	8192	Sin/Cos 512
EQN 1125	Q4	Optical	4096	13 bit	8192	Sin/Cos 512
ECN 1113 FMA	M0	Optical	–	13 bit	8192	Sin/Cos 512
ECN 1113	C6	Optical	–	13 bit	8192	Sin/Cos 512

Notes

- The encoder code is a part of the type designation of the motor.
- FMA = Version with fault exclusion for mechanical coupling.
- Multiple revolutions of the motor shaft can be recorded only using multi-turn encoders.

27.3.3 Possible combinations with drive controllers

The following table shows the possible combinations of STOBER synchronous servo motors with drive controllers from Siemens depending on the encoder model.

Encoders with an EnDat 2.2 interface can be connected to Siemens S120 drive controllers and operated using the EIB 3392S interface.

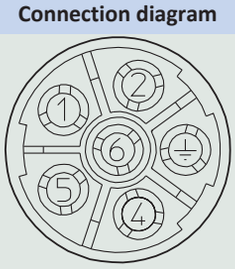
Drive controller		**SINAMICS S120** (with EnDat 2.1 and resolver interface)	**SINAMICS S120** (with DRIVE-CLiQ interface)
Drive controller code		FJ	GQ
Connection plan ID		442315	443049
Encoder	**Encoder code**		
EQI 1131 FMA	M4	–	EZ, EZS
EQI 1131	Q6	–	EZ, EZS
EQN 1135 FMA	M3	–	EZ, EZS
EQN 1135	Q5	–	EZ, EZS
ECN 1123 FMA	M1	–	EZ, EZS
ECN 1123	C7	–	EZ, EZS
ECI 119-G2	C9	–	EZHD, EZHP, EZM
ECI 119	C4	EZHD, EZHP, EZM	–
EQN 1125 FMA	M2	EZ, EZS	–
EQN 1125	Q4	EZ, EZS	–
ECN 1113 FMA	M0	EZ, EZS	–
ECN 1113	C6	EZ, EZS	–
Resolver	R0	EZ, EZS	–

The encoder and drive controller codes are a part of the type designation of the motor.

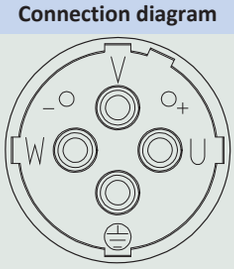
27.3.4 Connection assignment of the power plug connector

The size and connection plan of the power plug connector depend on the size of the motor. The colors of the connecting wires inside the motor are specified in accordance with IEC 60757.

Plug connector size con.23 (1)

Connection diagram	**Pin**	**Connection**	**Color**
	1	U phase	black
	2	V phase	blue
	4	Brake +	red
	5	Brake –	black
	6	W phase	red
	⏚	Grounding conductor	green-yellow

Plug connector size con.40 (1.5)

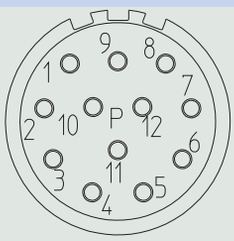
Connection diagram	**Pin**	**Connection**	**Color**
	U	U phase	black
	V	V phase	blue
	W	W phase	red
	+	Brake +	red
	–	Brake –	black
	⏚	Grounding conductor	green-yellow

27.3.5 Connection assignment of the encoder plug connector

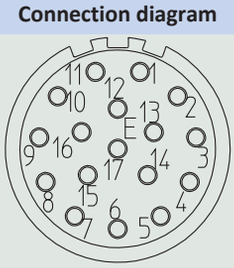
The size and terminal assignment of the encoder plug connectors depend on the model of encoder installed and the size of the motor.

EnDat 2.2 digital encoder, plug connector size con.23

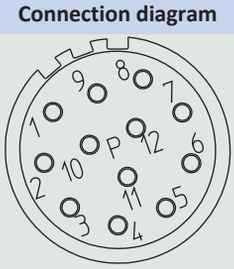
Encoders with an EnDat 2.2 interface can be connected to Siemens S120 drive controllers and operated using the EIB 3392S interface.

Connection diagram	Pin	Connection	Color
	1	Clock +	violet
	2		
	3		
	4		
	5	Data –	pink
	6	Data +	grey
	7		
	8	Clock –	yellow
	9		
	10	0 V GND	white green
	11		
	12	Up +	brown green

EnDat 2.1 encoder with sin/cos incremental signals, plug connector size con.23

Connection diagram	Pin	Connection	Color
	1	A + (Cos +)	green black
	2	A – (Cos –)	yellow black
	3	Data +	grey
	4		
	5	Clock +	violet
	6		
	7	0 V GND	white green
	8	Temperature sensor +	black/brown
	9	Temperature sensor –	white/white
	10	Up +	brown green
	11	B + (Sin +)	blue black
	12	B – (Sin –)	red black
	13	Data –	pink
	14	Clock –	yellow
	15	0 V sense	white
	16	Up sense	blue
	17		

Resolver, plug connector size con.23

Connection diagram	Pin	Connection	Color
	1	S4 Sin +	blue
	2	S2 Sin –	yellow
	3		
	4		
	5		
	6		
	7	R1 Ref –	red white
	8	Temperature sensor +	black/brown
	9	Temperature sensor –	white/white
	10	R2 Ref +	yellow white
	11	S3 Cos +	black
	12	S1 Cos –	red

27.4 Connection to Kollmorgen drive controllers

This chapter contains the information for connecting STOBER synchronous servo motors to drive controllers of the above-named manufacturer which differs from connecting to STOBER drive controllers. You can find all other information about STOBER synchronous servo motors in the respective chapter of this catalog.

27.4.1 Encoders

Encoders with EnDat 2.1 interface

Encoder model	Code	Measuring method	Recordable revolutions	Resolution	Position values per revolution	Periods per revolution
ECI 119	C4	Inductive	–	19 bit	524288	Sin/Cos 32
EQN 1125 FMA	M2	Optical	4096	13 bit	8192	Sin/Cos 512
EQN 1125	Q4	Optical	4096	13 bit	8192	Sin/Cos 512

Notes

- The encoder code is a part of the type designation of the motor.
- FMA = Version with fault exclusion for mechanical coupling.
- Multiple revolutions of the motor shaft can be recorded only using multi-turn encoders.

27.4.2 Possible combinations with drive controllers

The following table shows the possible combinations of STOBER synchronous servo motors with drive controllers from Kollmorgen depending on the encoder model.

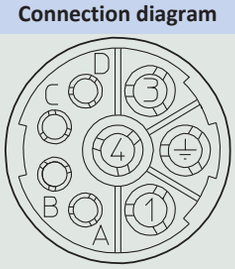
Drive controller		Servostar S300/S400/S600/S700
Drive controller code		FE
Connection plan ID		442311
Encoder	Encoder code	
ECI 119	C4	EZHD, EZHP, EZM
EQN 1125 FMA	M2	EZ, EZS
EQN 1125	Q4	EZ, EZS
Resolver	R0	EZ, EZS

The encoder and drive controller codes are a part of the type designation of the motor.

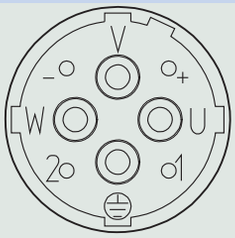
27.4.3 Connection assignment of the power plug connector

The size and connection plan of the power plug connector depend on the size of the motor. The colors of the connecting wires inside the motor are specified in accordance with IEC 60757.

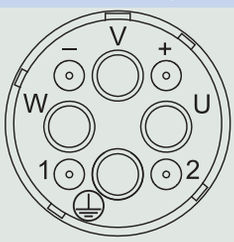
Plug connector size con.23 (1)

Connection diagram	Pin	Connection	Color
	1	U phase	black
	3	W phase	red
	4	V phase	blue
	A	Brake +	red
	B	Brake –	black
	C		
	D		
	⏚	Grounding conductor	green-yellow

Plug connector size con.40 (1.5)

Connection diagram	Pin	Connection	Color
	U	U phase	black
	V	V phase	blue
	W	W phase	red
	+	Brake +	red
	–	Brake –	black
	1		
	2		
	⏚	Grounding conductor	green-yellow

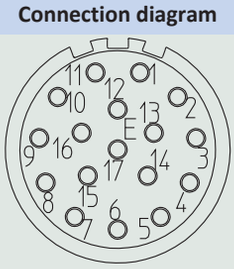
Plug connector size con.58 (3)

Connection diagram	Pin	Connection	Color
	U	U phase	black
	V	V phase	blue
	W	W phase	red
	+	Brake +	red
	–	Brake –	black
	1		
	2		
	⏚	Grounding conductor	green-yellow

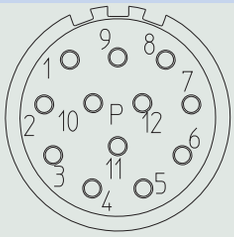
27.4.4 Connection assignment of the encoder plug connector

The size and connection assignment of the encoder plug connectors depend on the model of encoder installed and the size of the motor.

EnDat 2.1 encoder with sin/cos incremental signals, plug connector size con.23

Connection diagram	Pin	Connection	Color
	1	B – (Sin –)	red black
	2	0 V GND	white green
	3	A – (Cos –)	yellow black
	4	Up +	brown green
	5	Data +	grey
	6		
	7	Temperature sensor +	black/brown
	8	Clock +	violet
	9	B + (Sin +)	blue black
	10	0 V sense	white
	11	A + (Cos +)	green black
	12	Up sense	blue
	13	Data –	pink
	14	Temperature sensor –	white/white
	15	Clock –	yellow
	16		
	17		

Resolver, plug connector size con.23

Connection diagram	Pin	Connection	Color
	1		
	2	Temperature sensor +	black/brown
	3	S4 Sin +	blue
	4	S1 Cos –	red
	5	R2 Ref +	yellow white
	6	Temperature sensor –	white/white
	7	S2 Sin –	yellow
	8	S3 Cos +	black
	9	R1 Ref –	red white
	10		
	11		
	12		

27.5 Connection to Bosch Rexroth drive controllers

This chapter contains the information for connecting STOBER synchronous servo motors to drive controllers of the above-named manufacturer which differs from connecting to STOBER drive controllers. You can find all other information about STOBER synchronous servo motors in the respective chapter of this catalog.

27.5.1 Encoders

Encoders with EnDat 2.1 interface

Encoder model	Code	Measuring method	Recordable revolutions	Resolution	Position values per revolution	Periods per revolution
ECI 119	C4	Inductive	–	19 bit	524288	Sin/Cos 32
EQN 1125 FMA	M2	Optical	4096	13 bit	8192	Sin/Cos 512
EQN 1125	Q4	Optical	4096	13 bit	8192	Sin/Cos 512
ECN 1113 FMA	M0	Optical	–	13 bit	8192	Sin/Cos 512
ECN 1113	C6	Optical	–	13 bit	8192	Sin/Cos 512

Encoders with HIPERFACE interface

Encoder model	Code	Measuring method	Recordable revolutions	Resolution	Position values per revolution	Periods per revolution
SKM36	H1	Optical	4096	–	–	Sin/Cos 128

Notes

- The encoder code is a part of the type designation of the motor.
- FMA = Version with fault exclusion for mechanical coupling.
- Multiple revolutions of the motor shaft can be recorded only using multi-turn encoders.

27.5.2 Possible combinations with drive controllers

The following table shows the possible combinations of STOBER synchronous servo motors with drive controllers from Bosch Rexroth depending on the encoder model.

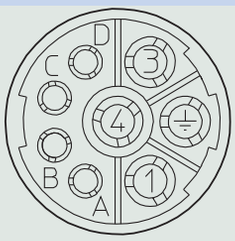
Drive controller		IndraDrive C/Cs	IndraDrive Mi	IndraDrive C/Cs
Drive controller code		FW	FW	GH
DC link voltage U_{ZK}		540 V	540 V	310 V
Connection plan ID		442445	442445	442678
Encoder	**Encoder code**			
ECI 119	C4	EZHD, EZHP, EZM	–	EZHD, EZHP, EZM
EQN 1125 FMA	M2	EZ, EZS	–	EZ, EZS
EQN 1125	Q4	EZ, EZS	–	EZ, EZS
ECN 1113 FMA	M0	EZ, EZS	–	EZ, EZS
ECN 1113	C6	EZ, EZS	–	EZ, EZS
SKM36	H1	–	EZ, EZS	–

The encoder and drive controller codes are a part of the type designation of the motor.

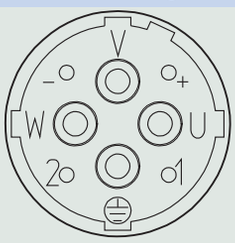
27.5.3 Connection assignment of the power plug connector

The size and connection plan of the power plug connector depend on the size of the motor. The colors of the connecting wires inside the motor are specified in accordance with IEC 60757.

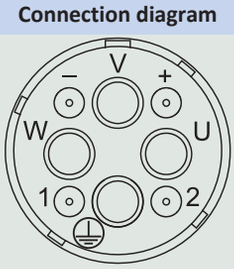
Plug connector size con.23 (1)

Connection diagram	Pin	Connection	Color
	1	U phase	black
	3	V phase	blue
	4	W phase	red
	A	Brake +	red
	B	Brake –	black
	C	Temperature sensor +	
	D	Temperature sensor –	
	⏚	Grounding conductor	green-yellow

Plug connector size con.40 (1.5)

Connection diagram	Pin	Connection	Color
	U	U phase	black
	V	V phase	blue
	W	W phase	red
	+	Brake +	red
	–	Brake –	black
	1	Temperature sensor +	
	2	Temperature sensor –	
	⏚	Grounding conductor	green-yellow

Plug connector size con.58 (3)

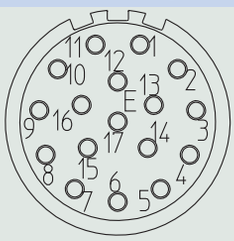
Connection diagram	Pin	Connection	Color
	U	U phase	black
	V	V phase	blue
	W	W phase	red
	+	Brake +	red
	–	Brake –	black
	1	Temperature sensor +	
	2	Temperature sensor –	
	⏚	Grounding conductor	green-yellow

27.5.4 Connection assignment of the encoder plug connector

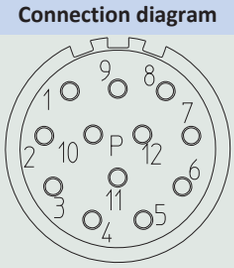
The size and connection assignment of the encoder plug connectors depend on the model of encoder installed and the size of the motor. The colors of the connecting wires inside the motor are specified in accordance with IEC 60757.

EnDat 2.1 encoder with sin/cos incremental signals, plug connector size con.23

This connection assignment only applies to the IndraDrive C/Cs drive controller.

Connection diagram	Pin	Connection	Color
	1	Up sense	blue
	2		
	3		
	4	0 V sense	white
	5		
	6		
	7	Up +	brown green
	8	Clock +	violet
	9	Clock –	yellow
	10	0 V GND	white green
	11		
	12	B + (Sin +)	blue black
	13	B – (Sin –)	red black
	14	Data +	grey
	15	A + (Cos +)	green black
	16	A – (Cos –)	yellow black
	17	Data –	pink

Hiperface encoder, plug connector size con.23

Connection diagram	Pin	Connection	Color
	1	Us	red
	2	0 V GND	blue
	3	REFSIN	brown
	4	REFCOS	black
	5	Data +	grey
	6	Data –	green
	7	+ SIN	white
	8	+ COS	pink
	9		
	10		
	11		
	12		

27.6 Connection to Beckhoff drive controllers

This chapter contains the information for connecting STOBER synchronous servo motors to drive controllers of the above-named manufacturer which differs from connecting to STOBER drive controllers. You can find all other information about STOBER synchronous servo motors in the respective chapter of this catalog.

27.6.1 Encoders

Encoders with EnDat 2.1 interface

Encoder model	Code	Measuring method	Recordable revolutions	Resolution	Position values per revolution	Periods per revolution
ECI 119	C4	Inductive	–	19 bit	524288	Sin/Cos 32
EQN 1125 FMA	M2	Optical	4096	13 bit	8192	Sin/Cos 512
EQN 1125	Q4	Optical	4096	13 bit	8192	Sin/Cos 512
ECN 1113 FMA	M0	Optical	–	13 bit	8192	Sin/Cos 512
ECN 1113	C6	Optical	–	13 bit	8192	Sin/Cos 512

Notes

- The encoder code is a part of the type designation of the motor.
- FMA = Version with fault exclusion for mechanical coupling.
- Multiple revolutions of the motor shaft can be recorded only using multi-turn encoders.

27.6.2 Possible combinations with drive controllers

The following table shows the possible combinations of STOBER synchronous servo motors with drive controllers from Beckhoff depending on the encoder model.

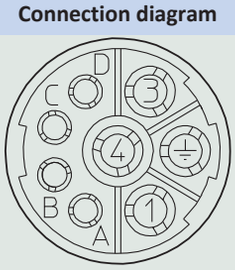
Drive controller		AX5000
Drive controller code		FM
Connection plan ID		442318
Encoder	Encoder code	
ECI 119	C4	EZHD, EZHP, EZM
EQN 1125 FMA	M2	EZ, EZS
EQN 1125	Q4	EZ, EZS
ECN 1113 FMA	M0	EZ, EZS
ECN 1113	C6	EZ, EZS

The encoder and drive controller codes are a part of the type designation of the motor.

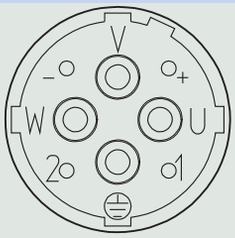
27.6.3 Connection assignment of the power plug connector

The size and connection plan of the power plug connector depend on the size of the motor. The colors of the connecting wires inside the motor are specified in accordance with IEC 60757.

Plug connector size con.23 (1)

Connection diagram	Pin	Connection	Color
	1	U phase	black
	3	W phase	red
	4	V phase	blue
	A	Brake +	red
	B	Brake –	black
	C	Temperature sensor +	
	D	Temperature sensor –	
	⏚	Grounding conductor	green-yellow

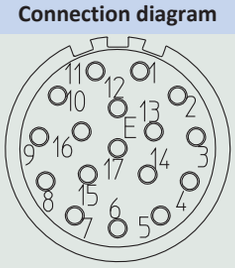
Plug connector size con.40 (1.5)

Connection diagram	Pin	Connection	Color
	U	U phase	black
	V	V phase	blue
	W	W phase	red
	+	Brake +	red
	–	Brake –	black
	1	Temperature sensor +	
	2	Temperature sensor –	
	⏚	Grounding conductor	green-yellow

27.6.4 Connection assignment of the encoder plug connector

The size and connection assignment of the encoder plug connectors depend on the model of encoder installed and the size of the motor.

EnDat 2.1 encoder with sin/cos incremental signals, plug connector size con.23

Connection diagram	Pin	Connection	Color
	1	B – (Sin –)	red black
	2	0 V GND	white green
	3	A – (Cos –)	yellow black
	4	Up +	brown green
	5	Data +	grey
	6		
	7		
	8	Clock +	violet
	9	B + (Sin +)	blue black
	10	0 V sense	white
	11	A + (Cos +)	green black
	12	Up sense	blue
	13	Data –	pink
	14		
	15	Clock –	yellow
	16		
	17		

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29 Appendix

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29.1 Symbols in formulas

The formula symbols for values actually present in the application are marked with *.

Symbol	Unit	Explanation
a_{th}	–	Parameter for calculating $K_{mot,th}$
a_{thEL}	–	Parameters for calculating $K_{mot,th}$ (dependent on the mounting position)
C_2	Nm/ arcmin	Torsional stiffness relative to the gear unit output
C_{2k}	Nm/arcmin	Tilting stiffness
C_{dyn}	N	Dynamic bearing load rating
ΔJ_B	kgm^2	Additive mass moment of inertia of a motor with brake
Δm_B	kg	Additive weight of a motor with brake
$\Delta\phi_2$	arcmin	Backlash at the output shaft with a blocked input
		For K helical bevel gear units: Standard/Class II/Class I
$\Delta\vartheta$	K	Temperature difference
η_{get}	%	Efficiency of the gear unit
η_{gt}	%	Efficiency of the screw drive
ED_{20}	%	Duty cycle relative to 20 minutes
ED_{10}	%	Duty cycle based on 10 minutes
F_{2ax*}	N	Actual axial force at the gear unit output
F_{2ax100}	N	Permitted axial force at the gear unit output for $n_{2m*} \leq 100$ rpm
F_{2ax20}	N	Permitted axial force on the gear unit output for $n_{2m*} \leq 20$ rpm
$F_{2ax,eq*}$	N	Actual equivalent axial force on the gear unit output
F_{2axN}	N	Permitted nominal axial force at the gear unit output
f_{2PU}	Hz	Output frequency of the power unit
$f_{PWM,PU}$	Hz	Frequency of the pulse width modulation of the power unit
F_{2rad*}	N	Actual radial force on the gear unit output
$F_{2rad100}$	N	Permitted radial force at the gear unit output for $n_{2m*} \leq 100$ rpm
F_{2rad20}	N	Permitted radial force on the gear unit output for $n_{2m*} \leq 20$ rpm
$F_{2rad,acc}$	N	Permitted radial acceleration force at the gear unit output
$F_{2rad,acc*}$	N	Radial acceleration force present at the gear unit output
$F_{2rad,acc,1*}$	N	Radial acceleration force present at the gear unit output in the first time period
$F_{2rad,acc,n*}$	N	Radial acceleration force present at the gear unit output in the nth time period
$F_{2rad,eq*}$	N	Actual equivalent force at the gear unit output
F_{2radN}	N	Permitted nominal radial force at the gear unit output
F_{ax}	N	Permitted axial force on the output
F_{ax0}	N	Permitted axial force when the motor is at a standstill for holding the load using the motor torque
$F_{ax1*} – F_{axn*}$	N	Actual axial force in the respective time segment
F_{ax100}	N	Permitted axial force on the output for $n_{m*} \leq 100$ rpm
F_{ax300}	N	Permitted axial force on the output for $n_{m*} \leq 300$ rpm
$F_{ax,eff*}$	N	Actual effective axial force on the output
fB_{op}	–	Operating mode operating factor
fB_t	–	Run-time operating factor
fB_T	–	Temperature operating factor
F_{rad}	N	Permitted radial force on the output
F_{rad100}	N	Permitted radial force on the output for $n_{m*} \leq 100$ rpm
F_{rad300}	N	Permitted radial force on the output for $n_{m*} \leq 300$ rpm
H	m	Installation altitude above sea level
i	–	Gear ratio
i_{exact}	–	Mathematically exact gear ratio
I_0	A	Stall current
I_{max}	A	Maximum current
I_N	A	Nominal current
$I_{N,B}$	A	Nominal current of the brake at 20 °C
$I_{N,F}$	A	Nominal current of the forced ventilation unit

Symbol	Unit	Explanation
J_1	kgm^2	Mass moment of inertia relative to the gear unit input
J_{Bstop}	kgm^2	Reference mass moment of inertia when braking from full speed: $J_{Bstop} = J_{dyn} \times 2$
J_{dyn}	kgm^2	Mass moment of inertia of a motor in dynamic operation
J_{tot}	kgm^2	Total mass moment of inertia (based on the motor shaft)
K_{EM}	V/1000 rpm	Voltage constant: Peak value of the induced motor voltage at a speed of 1000 rpm and a winding temperature $\Delta\vartheta$ = 100 K (tolerance ±10%)
K_H	–	Derating factor for installation altitude
K_{M0}	Nm/A	Torque constant: ratio of the stall torque and frictional torque to the stall current; $K_{M0} = (M_0 + M_R) / I_0$ (tolerance ±10%)
$K_{M,N}$	Nm/A	Torque constant: ratio of the nominal torque M_N to the nominal current I_N; $K_{M,N} = M_N / I_N$ (tolerance ±10%)
$K_{mot,th}$	–	Factor for determining the thermal limit torque
K_ϑ	–	Derating factor for surrounding temperature
l	mm	Length of the output shaft
L_{10}		Nominal bearing service life for a survival probability of 90% in 10^6 rollovers
L_{10h}	h	Bearing service life
$L_{pA,F}$	dBA	Noise level of the forced ventilation unit in the optimal operating range
L_{U-V}	mH	Winding inductance of a motor between two phases (determined in a resonant circuit)
m	kg	Weight
M_0	Nm	Stall torque: The continuous torque the motor is able to deliver at a speed of 10 rpm (tolerance ±5%)
$\lvert M_2 \rvert$	Nm	Amount of torque on the output
$M_{2.0}$	Nm	Stall torque on the gear unit output
$M_{2,1*} – M_{2,6*}$	Nm	Actual torque in the respective time segment (1 to 6)
$M_{2,n*}$	Nm	Actual torque in the n-th time segment
M_{2acc}	Nm	Maximum permitted acceleration torque on the gear unit output
M_{2acc*}	Nm	Actual acceleration torque on the gear unit output
$M_{2acc,max}$	Nm	Maximum permitted acceleration torque of a group of geared motors whose size and nominal torque n_{1N} are the same
M_{2eff*}	Nm	Actual effective torque on the gear unit output
M_{2eq*}	Nm	Equivalent torque present on the gear unit output
M_{2k*}	Nm	Actual breakdown torque on the gear unit output
M_{2k100}	Nm	Permitted breakdown torque on the gear unit output for $n_{2m*} \leq 100$ rpm
M_{2k20}	Nm	Permitted breakdown torque on the gear unit output for $n_{2m*} \leq 20$ rpm
$M_{2k,acc}$	Nm	Permitted acceleration breakdown torque at the gear unit output
$M_{2k,acc*}$	Nm	Acceleration breakdown torque present at the gear unit output
$M_{2k,acc,1*}$	Nm	Acceleration breakdown torque present at the gear unit output in the first time period
$M_{2k,acc,n*}$	Nm	Acceleration breakdown torque present at the gear unit output in the nth time period
$M_{2k,eq*}$	Nm	Actual equivalent breakdown torque on the gear unit output
M_{2kN}	Nm	Permitted nominal breakdown torque at the gear unit output
M_{2max}	Nm	Maximum torque at the gear unit output
M_{2N}	Nm	Nominal torque on the gear unit output (relative to n_{1N})
M_{2NOT}	Nm	Gear unit emergency-off torque on the gear unit output for max. 1000 load changes
M_{2NOT*}	Nm	Actual emergency off torque for the gear unit on the gear unit output
M_{2th}	Nm	Thermal limit torque on the gear unit output
M_{Bdyn}	Nm	Dynamic braking torque at 100 °C (Tolerance +40%, −20%)
M_{Bstat}	Nm	Static braking torque at 100 °C (Tolerance +40%, −20%)
m_{dyn}	kg	Weight of a motor in dynamic operation
M_{eff*}	Nm	Actual effective torque of the motor
m_F	kg	Weight of the forced ventilation unit
M_k	Nm	Permitted breakdown torque on the output
M_{k100}	Nm	Permitted breakdown torque on the output for $n_{m*} \leq 100$ rpm
M_{k300}	Nm	Permitted breakdown torque on the output for $n_{m*} \leq 300$ rpm

Symbol	Unit	Explanation
M_L	Nm	Load torque
M_{lim}	Nm	Torque limit without compensating for field weakening
M_{limF}	Nm	Torque limit of the motor with forced ventilation
M_{limFW}	Nm	Torque limit with compensation for field weakening (applies to operation on STOBER drive controllers only)
M_{limK}	Nm	Torque limit of the motor with convection cooling
M_{max}	Nm	Maximum torque: the maximum permitted torque the motor is able to deliver over a short period (when accelerating or decelerating) (tolerance ±10%)
m_n	–	Gearing module
M_{n*}	Nm	Actual torque of the motor in the n-th time segment
M_N	Nm	Nominal torque: the maximum torque of a motor in S1 mode at nominal speed n_N (tolerance ±5%)
		You can calculate other torque values as follows: $M_{N*} = K_{M0} \cdot I^* - M_R$.
M_{Nred}	Nm	Reduced nominal torque of the motor
M_{op}	Nm	Torque of motor at the operating point from the motor characteristic curve at n_{1m*}
M_R	Nm	Frictional torque (of the bearings and seals) of a motor at winding temperature $\Delta\vartheta$ = 100 K
n	rpm	Speed
n_{1m*}	rpm	Actual average input speed
n_{1max}	rpm	Maximum permitted input speed
n_{1maxDB}	min^{-1}	Maximum permitted input speed of the gear unit in continuous operation
		(at surrounding temperature of 20 °C)
$n_{1maxDBEL1,2}$	rpm	Maximum permitted input speed of the gear unit in continuous operation Mounting positions EL1, EL2
		(at surrounding temperature of 20 °C)
$n_{1maxDBEL1,2,3,4}$	rpm	Maximum permitted input speed of the gear unit in continuous operation Mounting positions EL1, EL2, EL3, EL4
		(at surrounding temperature of 20 °C)
$n_{1maxDBEL1,2,5,6}$	rpm	Maximum permitted input speed of the gear unit in continuous operation Mounting positions EL1, EL2, EL5, EL6
		(at surrounding temperature of 20 °C)
$n_{1maxDBEL3,4}$	rpm	Maximum permitted input speed of the gear unit in continuous operation Mounting positions EL3, EL4
		(at surrounding temperature of 20 °C)
$n_{1maxDBEL3,4,5,6}$	rpm	Maximum permitted input speed of the gear unit in continuous operation Mounting positions EL3, EL4, EL5, EL6
		(at surrounding temperature of 20 °C)
$n_{1maxDBEL5,6}$	rpm	Maximum permitted input speed of the gear unit in continuous operation Mounting positions EL5, EL6
		(at surrounding temperature of 20 °C)
n_{1maxZB}	min^{-1}	Maximum permitted input speed of the gear unit in cyclic operation
		(at surrounding temperature of 20 °C)
n_{1N}	rpm	Nominal speed at the gear unit input
n_2	rpm	Speed at the gear unit output
$\lvert n_2 \rvert$	rpm	Value of output speed
n_{2m*}	rpm	Actual average output speed
$n_{2m,1*} - n_{2m,6*}$	rpm	Actual average output speed in the respective time segment (1 to 6)
$n_{2m,n*}$	rpm	Actual average output speed in the n-th time segment
n_{2N}	min^{-1}	Nominal speed at the gear unit output
N_{Bstop}	–	Permitted number of braking processes from full speed (n = 3000 rpm) with J_{Bstop} (M_L = 0). The following applies if the values of n and J_{Bstop} differ: $N_{Bstop} = W_{B,Rlim} / W_{B,R/B}$.
n_{m*}	rpm	Actual average motor speed
$n_{m,n*}$	rpm	Actual average speed of the motor in the n-th time segment
n_{mot}	rpm	Speed of the motor
n_N	rpm	Nominal speed: The speed for which the nominal torque M_N is specified
p	–	Number of pole pairs

Symbol	Unit	Explanation
P_N	kW	Nominal power: the power the motor is able to deliver long term in S1 mode at the nominal point (tolerance ±5 %)
$P_{N,F}$	W	Nominal output of the forced ventilation unit
P_{st}	mm	Pitch of the screw drive
R_{U-V}	Ω	Winding resistance of a motor between two phases at a winding temperature of 20 °C
q_{vF}	m³/h	Delivery capacity of the forced ventilation unit in open air
S	–	Service factor: Quotient of the nominal torque from the gear unit and the motor without consideration for thermal limiting performance. Represents a value for the reserve of the geared motor.
t	s	Time
t_{1B}	ms	Linking time: time from when the current is turned off until the nominal braking torque is reached
t_{11B}	ms	Response delay: time from when the current is turned off until the torque increases
t_{2B}	ms	Disengagement time: time from when the current is turned on until the torque begins to drop
t_{dec}	ms	Stop time
T_{el}	ms	Electrical time constant: ratio of the winding inductance to the winding resistance of a motor: $T_{el} = L_{U-V} / R_{U-V}$
t_{n*}	s	Duration of the n-th time segment
ϑ_{amb}	°C	Surrounding temperature
$U_{N,B}$	V	Nominal voltage of brake
$U_{N,F}$	V	Nominal voltage of the forced ventilation unit
U_{ZK}	V	DC link voltage: characteristic value of a drive controller
v_{ax}	mm/s	Axial velocity
$v_{ax,m*}$	mm/s	Actual average axial velocity
$v_{ax,m1*} – v_{ax,mn*}$	mm/s	Actual average axial velocity in the respective time segment
$W_{B,R/B}$	J	Work done by friction for braking
$W_{B,Rlim}$	J	Work done by friction until wear limit is reached
$W_{B,Rmax/h}$	J	Maximum permitted work done by friction per hour with individual braking
x_2	mm	Distance of the shaft shoulder to the force application point
$x_{B,N}$	mm	Nominal air gap of brake
y_2	mm	Distance of the shaft axis to the axial force application point
z_2	mm	Distance of the shaft shoulder to the middle of the output bearing

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29.4 Publication details

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