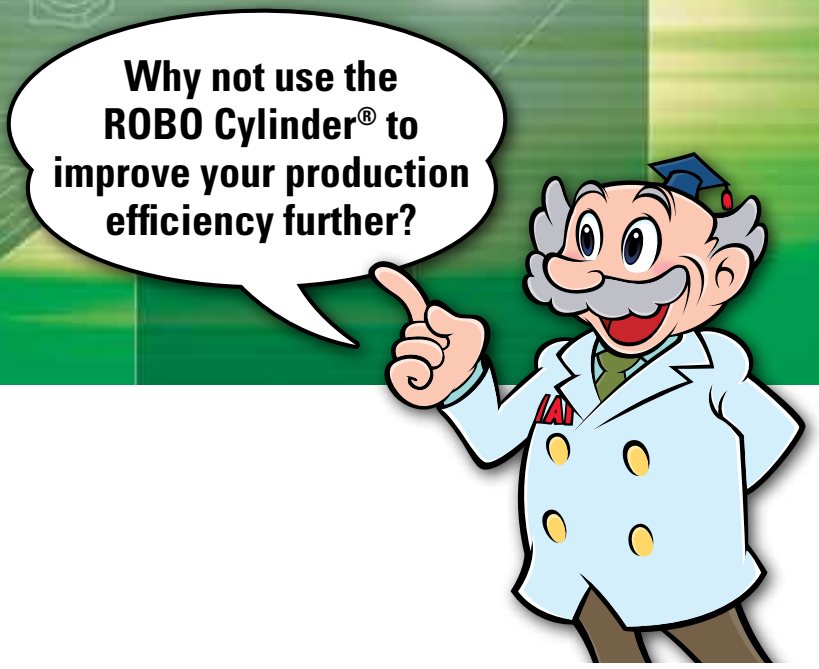
IAI
Quality and Innovation

ROBO Cylinder® with Built-in Controller

ERC3 series



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Transform your factory with the efficiency-improving, space-saving ERC3 ROBO Cylinder®.

FACTORY REVOLUTION

The key to a successful production process reform is selecting the right cylinder. If used effectively, the motorized "ROBO Cylinder®" will let you transform your factory by utilizing existing equipment.

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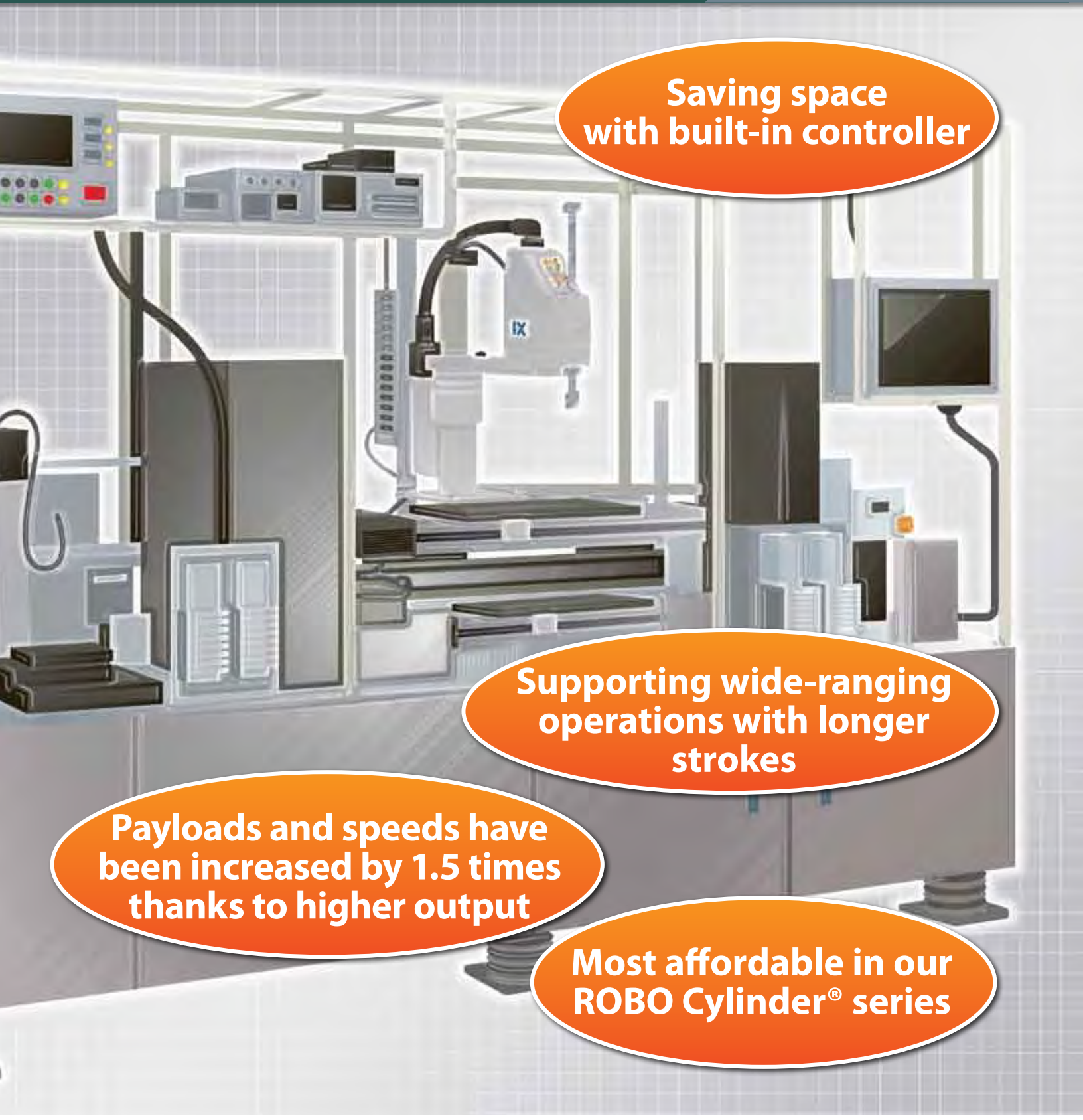

Product Overview

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Options

PIO Converter p37
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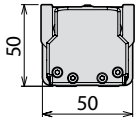
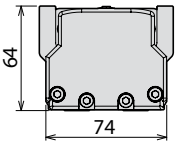
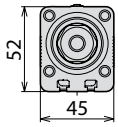
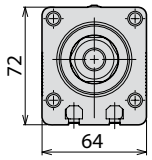
CON-PTA p41

Supporting Wide-ranging Applications

Product Lineup

The product lineup of IAI's ERC3 series with built-in controller is shown below.

Type		Slider type				Rod type			
		SA5C		SA7C		RA4C		RA6C	
External view									
Section view (mm)									
Stroke (mm)		50~800				50~300			
Ball screw lead (mm)		3	6	12	20	4	8	16	24
Maximum speed (mm/s)*1		225	450	900	1120	210	490	980	1200
Maximum payload (kg)*2	Horizontal	20	18	9	6.5	45	40	35	17
	Vertical	12	6	2.5	1	22	14	6	3
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Type		Rod type							
		RA4C				RA6C			
External view									
Section view (mm)									
Stroke (mm)		50~300							
Ball screw lead (mm)		3	6	12	20	4	8	16	24
Maximum speed (mm/s)*1		225	450	700	800	210	420	700	800
Maximum payload (kg)*2	Horizontal	40	40	25	6	70	55	40	13
	Vertical	18	12	4.5	1.5	25	17.5	8	3
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(Notes) All of the values shown above assume that the high-output setting is enabled.

*1 The maximum speed may not be reached when the stroke is shorter. Also note that the longer the stroke, the lower the maximum speed becomes in order to avoid reaching a dangerous speed. For details, refer to the specification page of each model.

*2 The maximum payload is based on operation at the rated acceleration. The higher the acceleration, the lower the maximum payload becomes. For details, refer to the table of payloads by acceleration on P. 26.

Finding the Right Model from the Purpose of Use

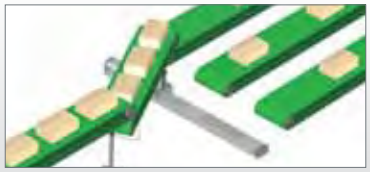
Model Selection Guide ERC3

Select the right model in the ERC3 series by referring to the diagram of use conditions provided below.

What is the required operation?

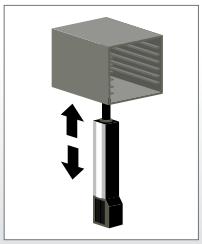
Transporting (without guide)

- Move work parts in horizontal or vertical direction without using a guide mechanism



Transporting (with guide)

- Move up and down a system having a guide mechanism



Pushing/ press-fitting

- Push and hold work parts
- Press-fit work parts

→ **Slider type** / **Rod type**

What is the required force?

Slider type		Rod type			
Work part weighing 20kg or less (horizontal) or 12kg or less (vertical) (*)	Work part weighing 45kg or less (horizontal) or 22kg or less (vertical) (*)	Work part weighing 18kg or less (vertical) (*)	Work part weighing 25kg or less (vertical) (*)	Push force of 370 N (83lbf) or less	Push force of 1094 N (245.9lbf) or less

This is the optimal ROBO Cylinder® for you!

SA5C

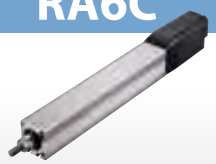
Go to P.17

SA7C

Go to P.19

RA4C

Go to P.21



RA6C

Go to P.23

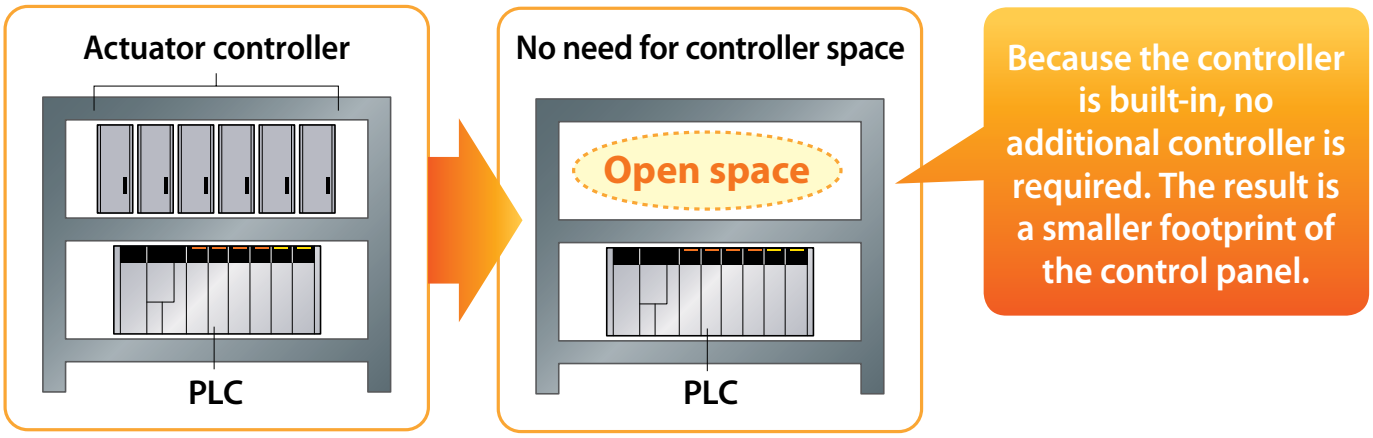
* When the high-output setting is enabled.

Feature 1 Space-saving and High Performance

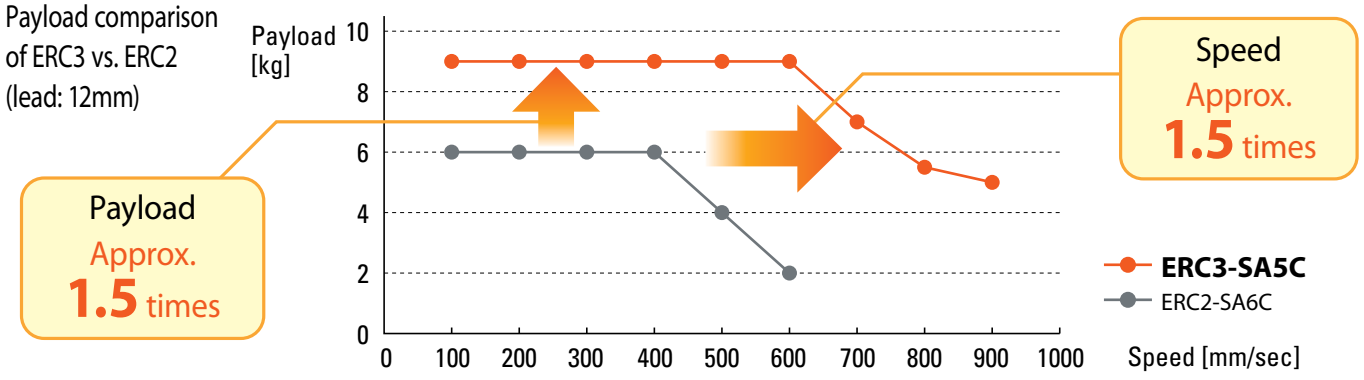
Great Features Made Possible

1. Saves space, allowing for effective use of equipment

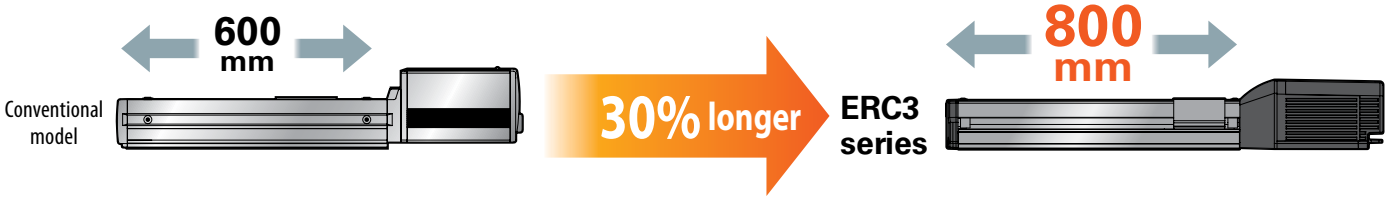
■ No space is required for installing the controller, so the control panel can be made smaller. A smaller control panel allows for effective use of space.



2. Approx. 1.5 times the payload and maximum speed of a conventional model



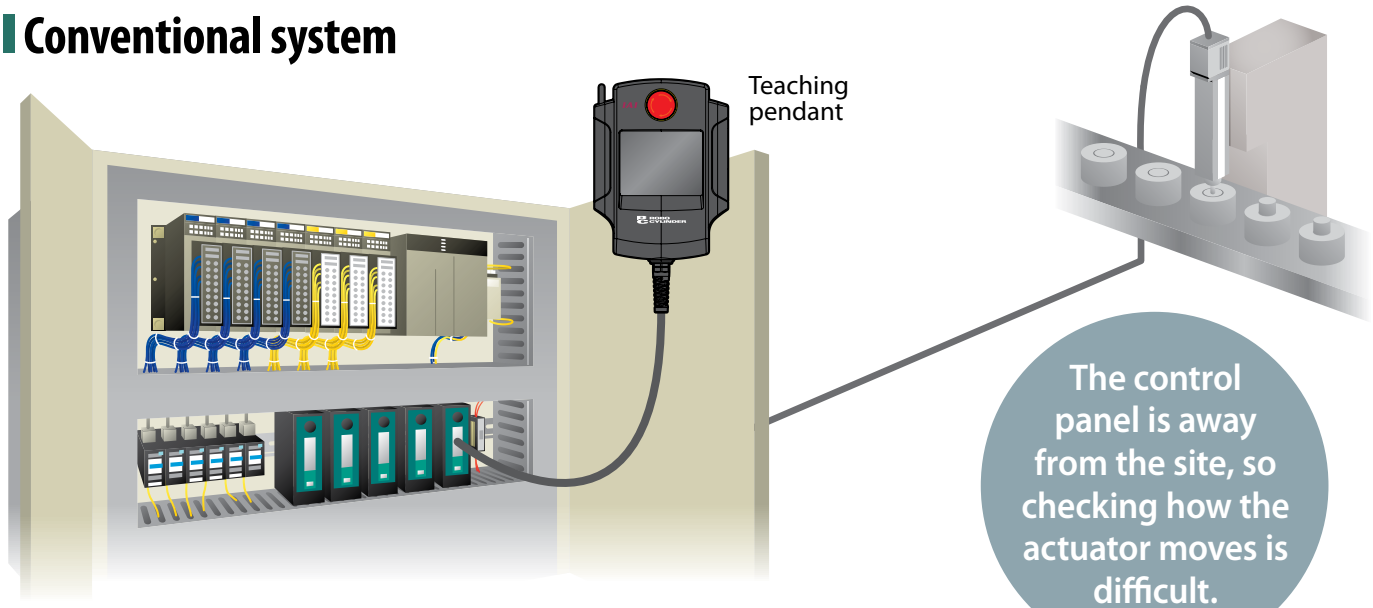
3. Longer maximum standard stroke



by the Built-in Controller ERC3

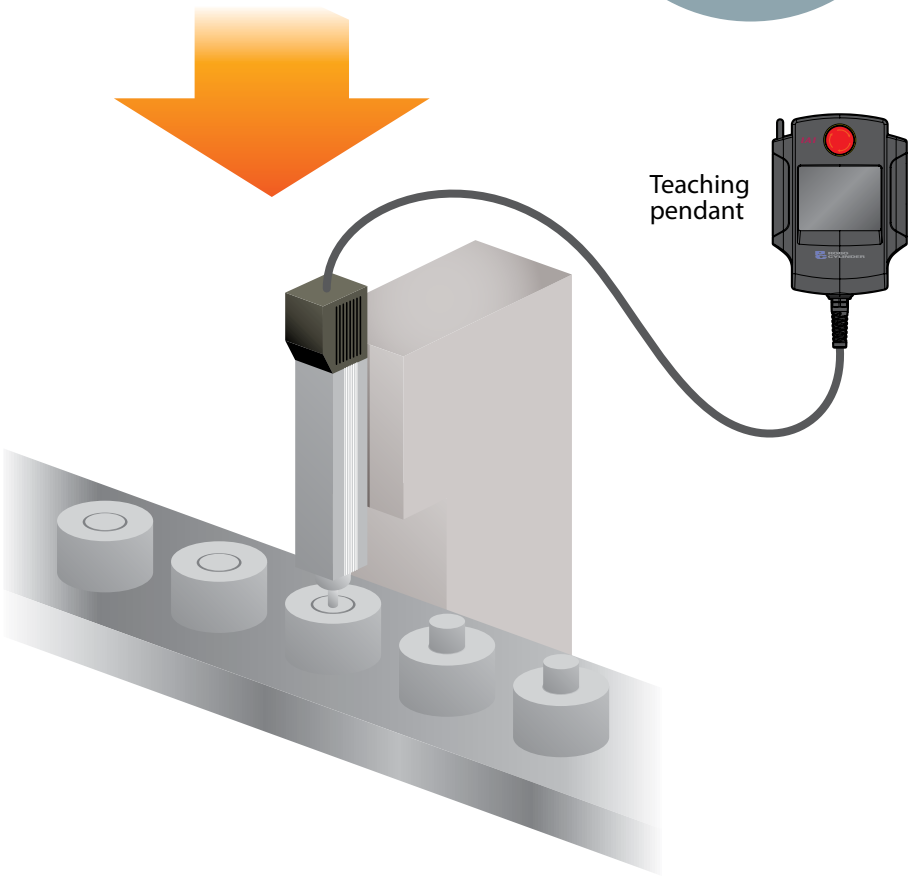
4. Teaching can be performed near the actuator because the controller is built-in.

Conventional system



The control panel is away from the site, so checking how the actuator moves is difficult.

ERC3 series

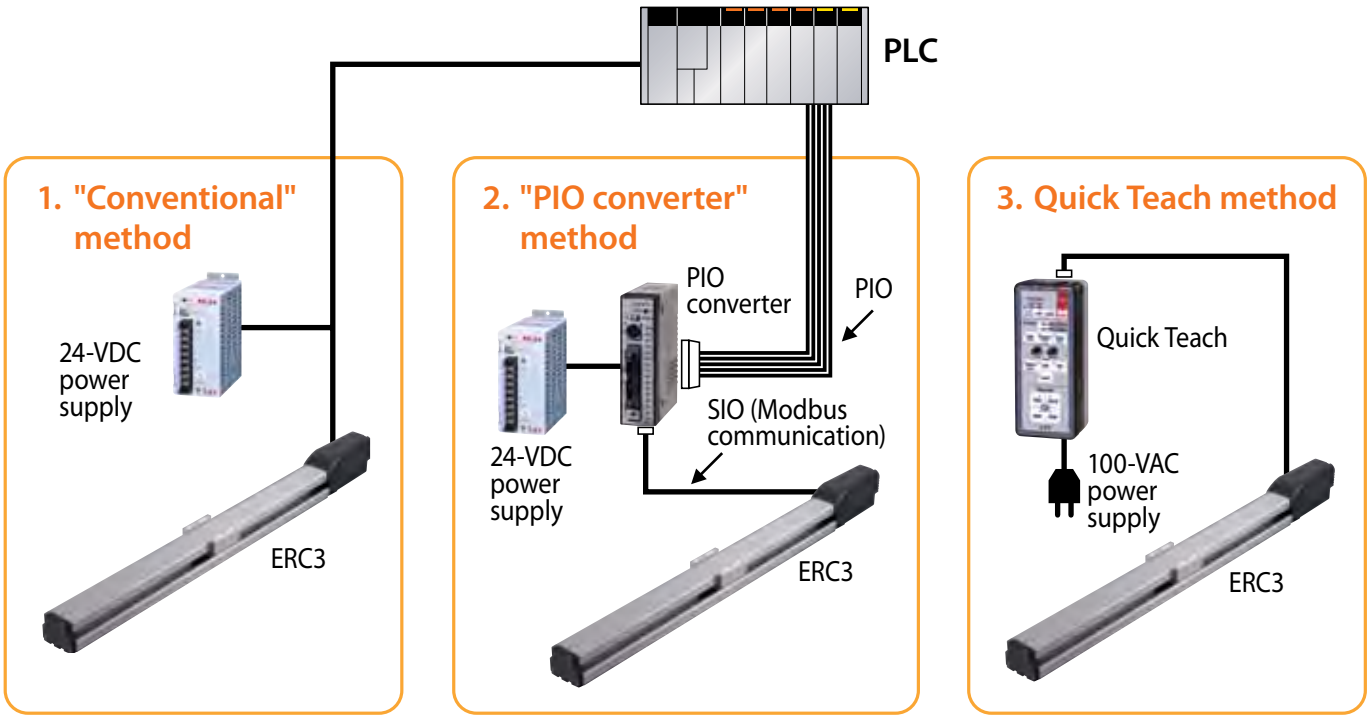


Detailed adjustments can be made while closely checking the operation.

Feature 2 Supporting Various Connection Methods

Built-in Controller Offering Excellent Scalability

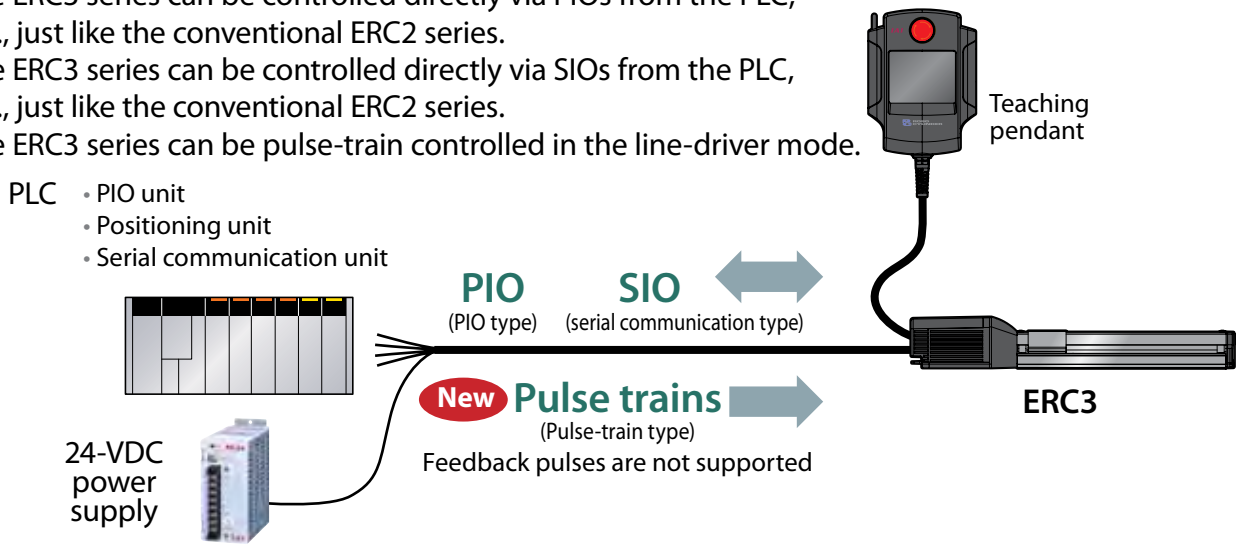
Supporting 3 connection methods



1. "Conventional" method

The ERC3 series can be connected to a PLC or other host device in the manner illustrated below.
Up to 16 positioning points are supported.

- The ERC3 series can be controlled directly via PIOs from the PLC, etc., just like the conventional ERC2 series.
- The ERC3 series can be controlled directly via SIOs from the PLC, etc., just like the conventional ERC2 series.
- The ERC3 series can be pulse-train controlled in the line-driver mode.



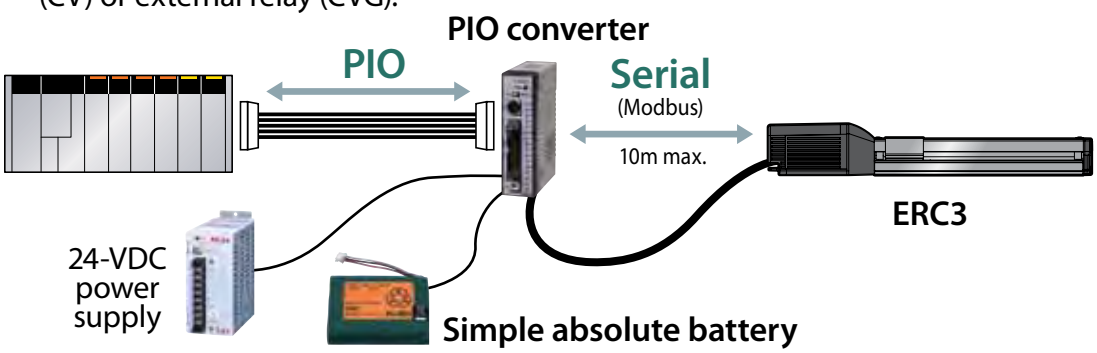
Actuator

ERC3

2. "PIO converter" method

Various functions offered by the ERC3's built-in controller can be enhanced by connecting the PIO converter.

- All six PIO patterns will be supported and the maximum number of positioning points will increase to 512.
- The ERC3's encoder can be operated in the simple absolute mode.
- The drive source can be cut off using the built-in relay (CV) or external relay (CVG).
- Calendar function can be used.
- Equipped with a brake release switch for the ERC3.
- Various statuses of the ERC3 can be checked in a simple mode.

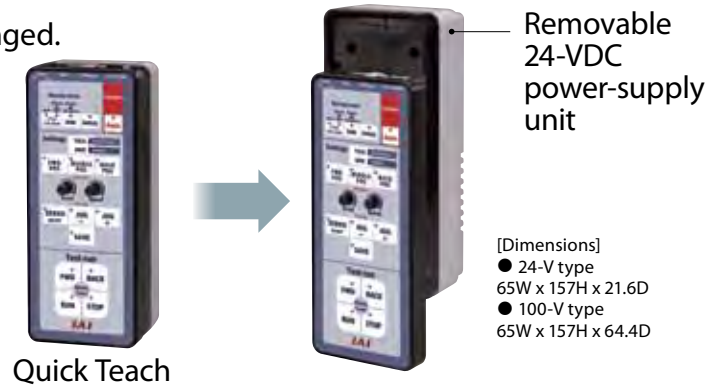


PIO converter

3. Quick Teach method

When the Quick Teach is connected, test runs can be performed without supplying power to the ERC3.

- Power can be supplied from the Quick Teach.
- Speed, acceleration and position can be changed.
- Power supply specifications of 24 VDC and 100/200 VAC are supported.*



The ERC3 series can be used in the way you are familiar with, but it also lets you enhance functions by connecting the PIO converter. (Refer to P. 9 for details.)

* The ERC3 series may not operate as specified if test runs are performed using the Quick Teach connected to a power-supply unit, with the high power output setting is enabled. (Position data can be edited without problems.)
If you want to perform test runs with the high-output setting enabled, connect a 24-VDC power supply to the Quick Teach and disconnect the power-supply unit.

Attractive Option ①

Features of the PIO Converter

Realizing controller functions of the next higher class with the ERC3 series

When connected to the PIO converter, the ERC3 series can demonstrate functions equivalent to the RCP4 controller "PCON-CA." Use the PIO converter if you want to configure a high-function system using the ERC3 series, use the absolute function or monitor the status of the actuator.

PIO converter

POINT 1 Increased maximum number of positioning points

While the maximum number of positioning points supported by the ERC3 series' built-in controller is 16, it increases to 512 when the PIO converter is connected. Connecting the PIO converter also increases the numbers of I/O signals, allowing for complex controls and connection with peripheral equipment.

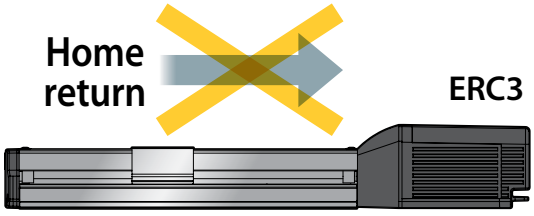
POINT 2 Supporting the simple absolute mode

The standard encoder of the ERC3 series is of the incremental type. Once the power is turned off, therefore, the actuator's current position is lost and the home return operation will be required next time the actuator is started. When the PIO converter is connected, the ERC3 lets you select the simple absolute mode. Home return operation is not required while the encoder is in the simple absolute mode, because the current position is in memory.

* To use the simple absolute function, the separately sold PIO converter of simple absolute specification (with battery) is required.
* Only "Serial communication" can be selected for the I/O type.

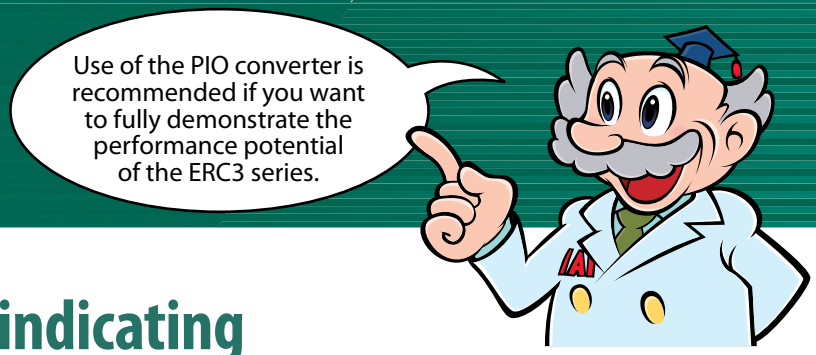
In the simple absolute mode…

Home return operation is no longer required



The actuator can be operated immediately after reconnecting the power.

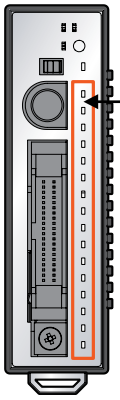
Go to P.37 for details



POINT 3 Status LEDs indicating the operating status of the actuator

The PIO converter lets you check the following statuses using the status LEDs provided on the front panel (optional).

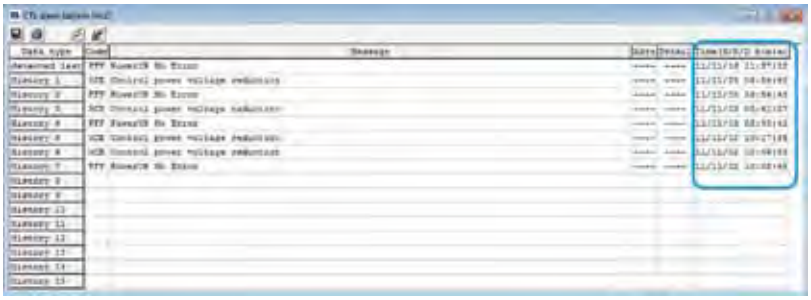
- Command current ratio
- Alarm code
- PIO input terminal status
- PIO output terminal status



16 LEDs indicate the operating status of the actuator.

POINT 4 Calendar function for checking when errors occurred

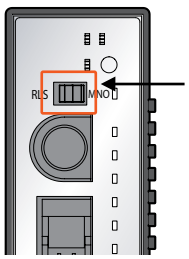
The PIO converter has a calendar function that lets you check the details of past alarms, such as when each alarm occurred, by connecting the teaching pendant and PC software to the PIO converter. This function is useful when analyzing alarms.



POINT 5 Brake release switch for at-will release of the brake

If your ERC3 actuator comes with a brake, the brake can be turned on/off freely using the brake release switch on the front panel of the PIO converter. To release the brake, turn the switch to the "RLS" position.

* If the actuator is used vertically, hold the actuator in place before releasing the brake.



Brake release switch

Brake released: RLS
Normal: NOM

Attractive Option ②

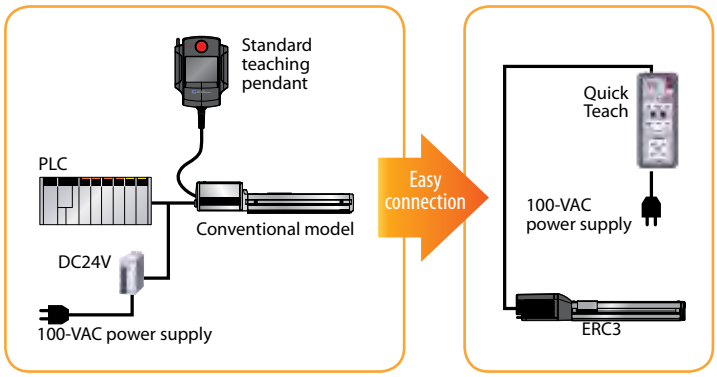
Features of the Quick Teach

Go to P. 39 for details

The ERC3 can be operated right away.

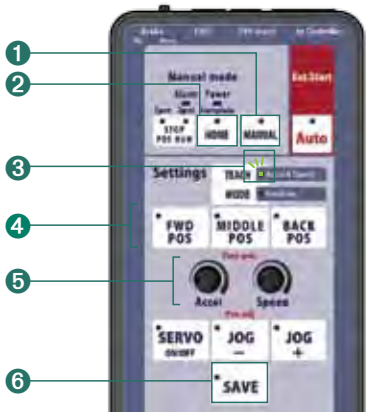
The Quick Teach lets you operate the actuator with ease using the buttons and knobs on the operation panel, without having to supply power or sending signals from a PLC. By using the Quick Teach, you can change the number of stop positions (2 points or 3 points) and each stop position, speed, and acceleration, and perform test run (forward/back movement and continuous operation).

* The above functions are available when the ERC3's controller type is set to the "MEC" mode. If the "CON mode" is selected, only the jog operation is available. Refer to P. 14 for the controller types.



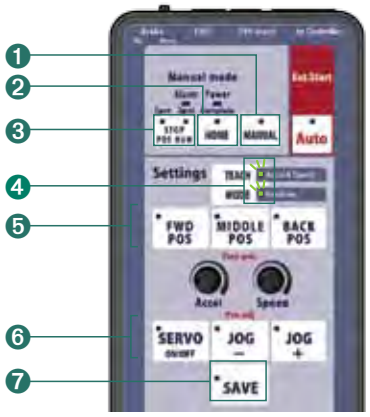
Changing the acceleration/speed

1. Press and hold the **MANUAL** button.
2. Press the **HOME** button.
3. Confirm that the **Accel & Speed** LED is lit.
4. Press the button corresponding to the stop position (**FWD POS/MIDDLE POS/BACK POS**) where you want to change the acceleration/speed.
   * The **MIDDLE POS** button is available when the actuator is stopping at three points.
5. Turn the **Accel/Speed** knobs.
   * You can use the knobs to change the acceleration and speed within a range of 1% to 100% of the rated acceleration/deceleration and maximum speed, respectively. The minimum speed may not be 1% of the maximum speed, depending on the actuator. Refer to the operation manual for the minimum speed.
6. Press the **SAVE** button.



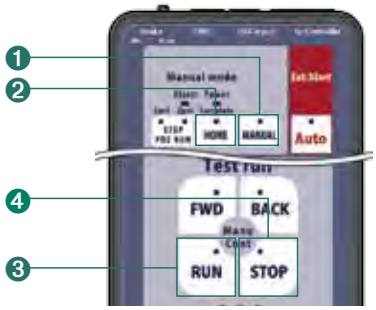
Changing the position

1. Press and hold the **MANUAL** button.
2. Press the **HOME** button.
3. Press the **STOP POS NUM** button and determine the number of stop positions.
4. Press the **TEACH MODE**. (Both the Accel & Speed LED and Position LED should illuminate.)
5. Press the button corresponding to the stop position (**FWD POS/MIDDLE POS/BACK POS**) where you want to change the position.
   * The **MIDDLE POS** button is available when the actuator is stopping at three points.
6. Move the actuator to a desired position.
   * You can jog the actuator or turn off the servo and move the actuator by hand.
7. Press the **SAVE** button.
   * Exercise caution because the conditions of the **Accel/Speed** knobs will also be saved together with the position.



Performing test run (continuous operation)

1. Press and hold the **MANUAL** button.
2. Press the **HOME** button.
3. Press the **RUN** button.
   * The actuator will move back and forth between the "forward position and back position" if it has been set to stop at two points.
   The actuator will move repeatedly in the sequence of "forward position → middle position → back position → forward position" if it has been set to stop at three points.
4. Press the **STOP** button to stop the operation.



Explanation of the Operation Panel

HOME button

When the actuator is started, home return is performed first to confirm the coordinate position of 0mm.

MANUAL button

Press this button (and hold it for at least 1 second) to set the acceleration/speed or perform a test run.

AUTO button

Pressing this button disables the operation and all inputs from the operation panel buttons. It also enables PIO commands to the ERC3.

STOP POS NUM button

Press this button (and hold it for at least 1 second) to switch the number of positions between 2 and 3.

TEACH MODE button

Use this button to switch between modes 1 and 2 below:
1. Acceleration/speed
2. Acceleration/speed/position

Acceleration/Deceleration and Speed Settings

Use buttons in this area to set how you want the actuator to move.

FWD POS / **MIDDLE POS** / **BACK POS** button

Switch to a desired movement (among the following types):
FWD POS: The actuator moves toward the end position.
BACK POS: The actuator moves toward the home position.
MIDDLE POS: The actuator moves toward the middle position.

ACCEL / **SPEED** button

You can turn these knobs to change the actuator speed and acceleration within a range of 1% to 100% of the maximum speed and rated acceleration/deceleration, respectively.

* The minimum speed may not be 1% of the maximum speed. For the minimum speed, refer to the operation manual.

SERVO ON/OFF button

Use this button to turn on/off the motor power.

JOG- / **JOG+** button

Use these buttons to jog the actuator in the negative and positive directions.

SAVE button

Pressing this button saves the speed, acceleration and position adjusted above.

Test run

Use buttons in this area to actually move the actuator and check the saved operation.

FWD button

In a 2-position travel, the actuator moves from the BACK position to the FWD position.
In a 3-position travel, the actuator moves from the BACK position to the intermediate position, then to the FWD position.

BACK button

The actuator returns to the home position.

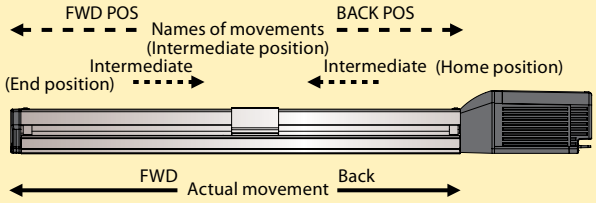
RUN button

In a 2-position travel, the actuator moves back and forth between the FWD and BACK positions.
In a 3-position travel, the actuator repeats its movement from the BACK position, intermediate position, FWD position, then BACK position.

STOP button

Stops the above operation.

Explanation of Terms

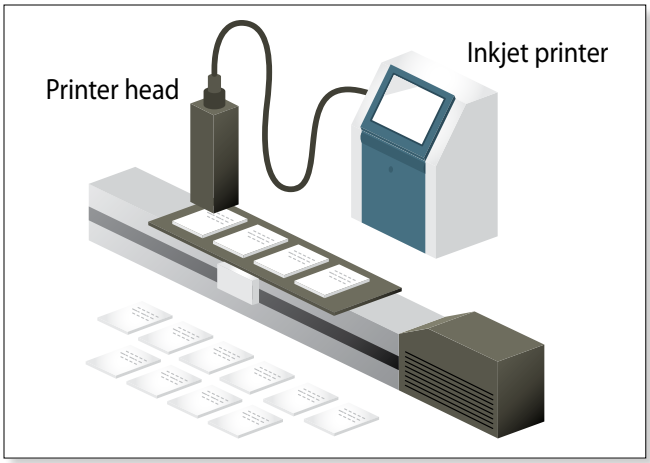


Useful in Various Situations

Application Examples

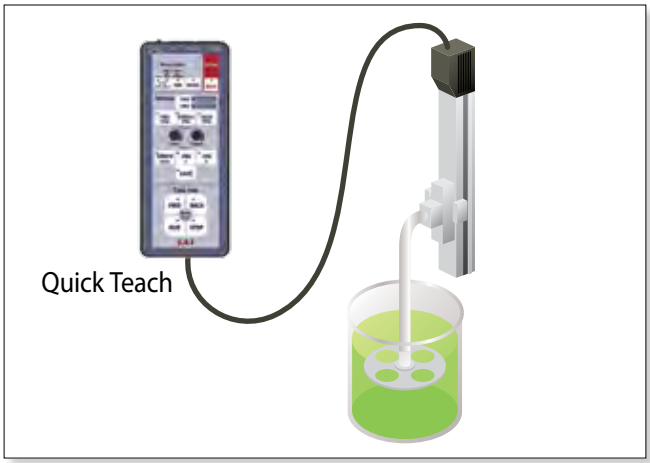
Slider type

Inkjet printer system



This system prints on components using an inkjet printer. The ERC3 is used to move components. Since the ERC3 can operate at a constant speed, stable printing quality can be achieved.

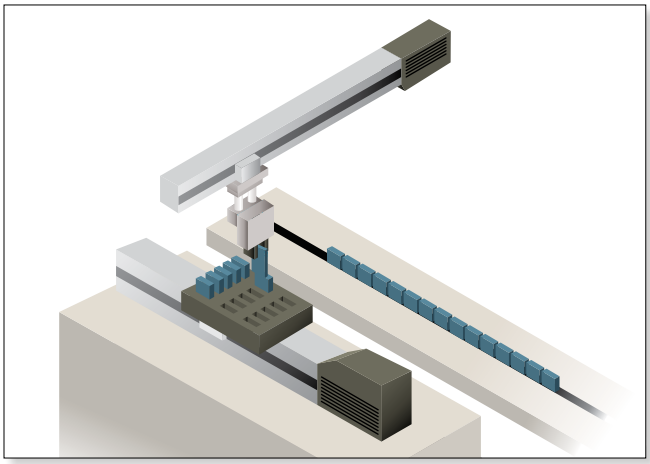
Liquid agitation system



Comprising of the ERC3 and the Quick Teach, this system is used to agitate a liquid such as a chemical agent. Use of the Quick Teach makes it possible to operate the system without a PLC and set the oscillation band and speed to the desired levels.

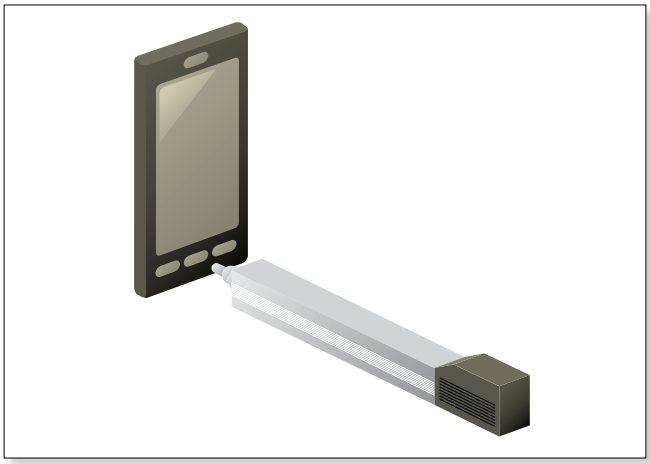
Rod type

Component palletizing system



This ERC3-based system palletizes automobile components. Two axes are arranged separately to pick components and place them onto the pallet. The takt time can be reduced by performing approach and return at high speed and placement at low speed.

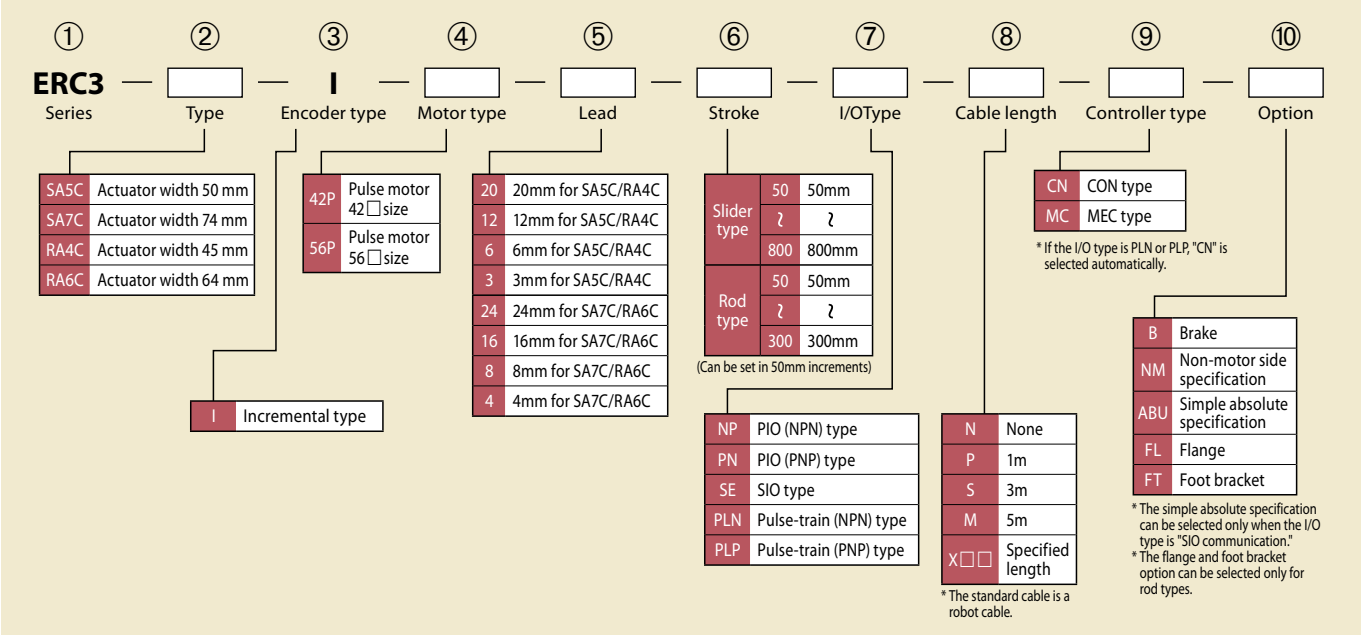
Product life test system



This ERC3-based system conducts life test on electronic equipment. The push speed and force can be changed according to the product.

Explanation of the Model Specification Items

The model number consists of the items specified below.
For the description of each item, refer to the applicable explanation provided below. Since the available selections (for lead, stroke, etc.) vary depending on the type, check the details on the page where each type is explained.



Explanation of items

①Series

Name of each series.

②Type

The ERC3 series consists of the following four types of actuators.

Type	Actuator width
SA5C	50mm
SA7C	74mm
RA4C	45mm
RA6C	64mm

③Encoder type

Encoder equipped in the actuator.

I: Incremental type	Since the slider's position data is lost once the power is turned off, home return must be performed every time the power is turned on.

④Motor type

Wattage of the motor installed in the actuator.
Since the ERC3 series is driven by a pulse motor, the motor size (42P = 42 square motor) is indicated instead of the wattage.

⑤Lead

Lead of the ball screw (distance travelled by the slider as the ball screw makes one rotation).

⑥Stroke

Stroke (range of operation) of the actuator (unit: mm).

⑦I/OType

Type of connectable controllers. With the ERC3 series having a built-in controller, the I/O (input/output signal) type is indicated.

⑧Cable length

Length of the cable that connects the ERC3 series with the host system and options.

⑨Controller type

Two types of controllers are available:
- CON type: At least eight positioning points (or at least 64 points when the PIO converter is used) are supported.
- MEC type: The actuator can be operated with ease. As for positioning, the actuator stops at two points or three points.

(Note) Switching between the CON type and MEC type is not possible after the shipment.

⑩Option

Options installed on the actuator.
Refer to P. 15 for details.
*If multiple options are selected, enter them in an alphabetic order. (Example: ABU-B-NM)

Actuator Options

Brake
Model number: **B**

Applicable models: ERC3-SA5C/SA7C/RA4C/RA6C

Description: A mechanism to hold the slider in place when the actuator is used vertically, so that it will not drop and damage the work part, etc., when the power or servo is turned off.

Non-motor side specification
Model number: **NM**

Applicable models: ERC3-SA5C/SA7C/RA4C/RA6C

Description: Select this option if you want to change the home position of the actuator slider or rod from the normal position (motor side) to the front side.

Simple absolute specification
Model number: **ABU**

Applicable models: ERC3-SA5C/SA7C/RA4C/RA6C

Description: This option is used to allow the actuator to operate without returning home first when the power is turned on. It can be selected only when the I/O type is "SIO communication (SE)."

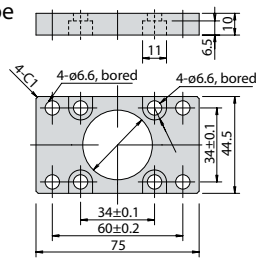
* The simple absolute battery is installed in the PIO converter (refer to P. 37), so the separately sold PIO converter of simple absolute specification is required.

Flange
Model number: **FL**

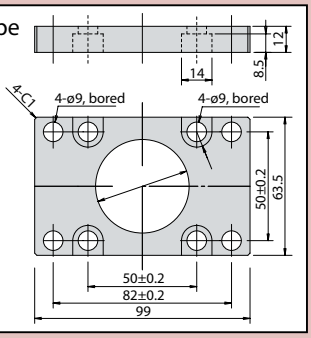
Applicable models: ERC3-RA4C/RA6C

Description: A bracket used to secure a rod actuator from the actuator side. The flange can be purchased separately later on.

ERC3-RA4C type



ERC3-RA6C type

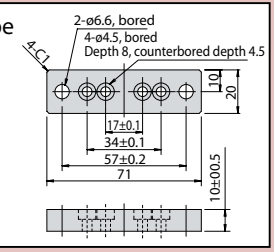


Foot bracket
Model number: **FT**

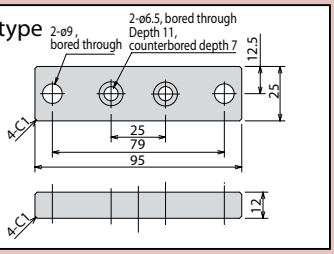
Applicable models: ERC3-RA4C/RA6C

Description: This bracket is used to affix the rod type with bolts from above the actuator. The bracket can be purchased separately later on.

ERC3-RA4C type



ERC3-RA6C type



Explanations of/Cautionary Notes on Items Specified in Catalog

1. Speed

"Speed" refers to the set speed at which to move the actuator slider (or rod).
After accelerating from the stationary state and reaching the set speed, the slider continues to move at that speed until immediately before the target position (specified position) and then decelerates to a stop.

<Caution>

❶ The pulse motors used in the ERC3 series change their maximum speed depending on the transported mass. When selecting your model, refer to "Correlation diagrams of speed vs. payload" (on the page featuring each model).

❷ Regardless of whether the stroke is short or long, the set speed may not be reached if the travel distance is short.

❸ The longer the stroke, the lower the maximum speed becomes in order to avoid reaching a dangerous speed. For details, refer to the "Stroke vs. Maximum Speed" table on the page featuring each model.

❹ When calculating the travel time, consider not only the travel time at the set speed, but also the acceleration, deceleration and settling times.

2. Acceleration/Deceleration

"Acceleration" refers to the rate of change in speed until the stationary actuator reaches the set speed.
"Deceleration" refers to the rate of change in speed until the actuator traveling at the set speed comes to a stop.
Both are specified in "G" in programs (0.3 G = 2940 mm/sec^2).

<Caution>

❶ The greater the value of acceleration (deceleration), the faster the actuator accelerates (decelerates) and consequently the travel time becomes shorter.
Note, however, that an excessively higher acceleration (deceleration) is a cause of error and malfunction.

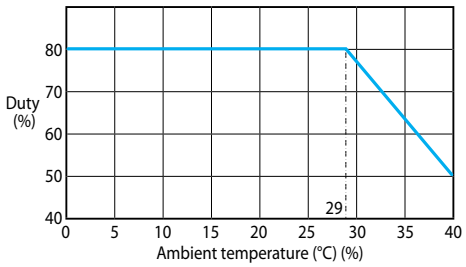
❷ The rated acceleration (deceleration) is 0.3 G.
Although the upper limit of acceleration (deceleration) is 1 G (or 0.5 G in a vertical application), increasing the value of acceleration/deceleration reduces the payload.

3. Duty

With the ERC3 series, the duty is limited according to the ambient temperature to prevent the motor unit from generating heat. Operate the actuator at a duty ratio not exceeding the allowable value shown in the graph below.

<Caution>

The duty limits shown below assume that the high-output setting of the controller is enabled. If the high-output setting is disabled, the payload and maximum speed become lower, but the actuator can be used at a duty of 100%. Refer to the operation manual for information on how to change the high-output setting.



The duration of one cycle shall be assumed as follows:

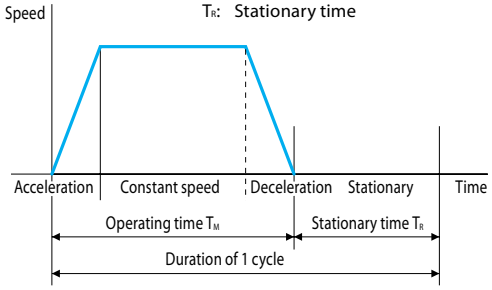
Model	Duration of 1 cycle ($T_M + T_R$)
SA5C/RA4C	15 minutes or less
SA7C/RA6C	10 minutes or less

Notes:
Do not operate the actuator at a duty ratio exceeding the allowable value.
If the actuator is operated at a duty ratio exceeding the allowable value, the life of the capacitor used in the controller will become shorter.

[Duty ratio]
"Duty ratio" refers to the utilization ratio indicated by a percentage of the time during which the actuator operates in one cycle.

$$D = \frac{T_M}{T_M + T_R} \times 100(\%)$$

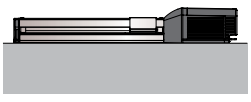
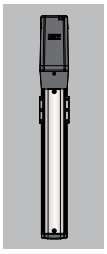
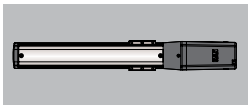
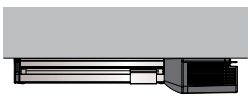
D: Duty
T_M: Operating time (including push-motion operation)
T_R: Stationary time



4. Installation

Check the installation orientation of each model in the table below.

○: Can be installed

Installation orientation / Type	Installed horizontally and flat	Installed vertically Note 1	Installed on its side	Installed on the ceiling
				
SA5C, SA7C	○	○	○ Note 2	○
RA4C, RA6C	○	○	○	○

Note 1 If the actuator is installed vertically, orient it so that the motor is at the top whenever possible. If the actuator is installed with the motor at the bottom, no problems are anticipated during normal operation but if the actuator is not operated for a prolonged period of time, grease may separate depending on the ambient environment (especially when the ambient temperature is high), in which case base oil may flow into the motor and cause problems on rare occasions.

Note 2 If the actuator is installed on its side, it becomes more vulnerable to entry of foreign matters into the actuator or scattering of grease on the guide and ball screw from openings on the exposed side.

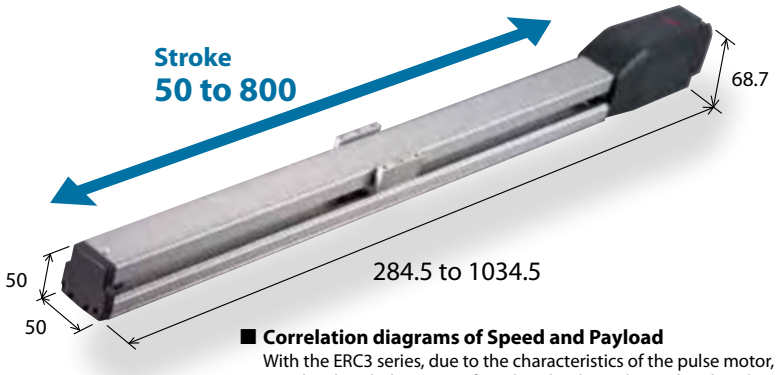
ERC3-SA5C ● Slider type ● Actuator Width 50mm

■ Model Specification Items

ERC3 — SA5C — I — 42P — ☐ — ☐ — ☐ — ☐ — ☐ — ☐ — ☐

Series	Type	Encoder type	Motor type	Lead	Stroke	I/O type	Cable length	Controller type	Option
		I: Incremental specification	42P: Pulse motor, size 42□	20: 20mm 12: 12mm 6: 6mm 3: 3mm	50:50mm ~ 800:800mm (Can be set in 50-mm increments)	NP: PIO (NPN) type PN: PIO (PNP) type SE: SIO type PLN: Pulse-train (NPN) type PLP: Pulse-train (PNP) type	N: None P: 1m S: 3 m M: 5m X□□: Specified length	CN: CON type MC: MEC type	B : Brake NM : Non-motor side specification ABU: Simple absolute specification

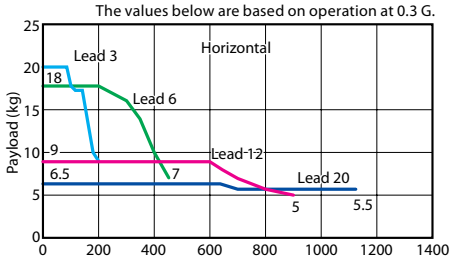
*Refer to P. 14 for the description of items constituting the model number.

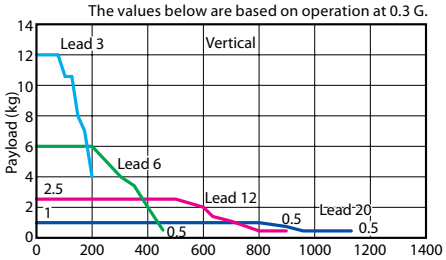


Unit: mm

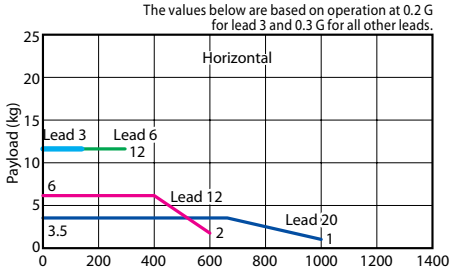
■ Correlation diagrams of Speed and Payload

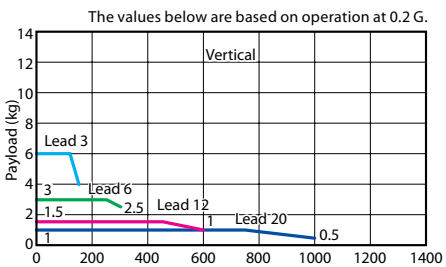
With the ERC3 series, due to the characteristics of the pulse motor, payload decreases as the speed increases. Use the chart below to confirm that the desired speed and payload requirements are met.





High-output setting enabled (Factory default)





High-output setting disabled

POINT Notes on selection

If the high-output setting is enabled (factory default), the duty must be limited. (Refer to P. 16.) If the high-output setting is disabled, the payload and maximum speed become lower, but the actuator can be used at a duty of 100%. Refer to the operation manual for information on how to change the high-output setting. Refer to P. 26 for the payload at each speed/acceleration when the high-output setting is enabled.
For other cautionary items, refer to "Explanations of/Cautionary Notes on Items Specified in Catalog (P. 15)."

Actuator Specifications (High-output Setting Enabled)

■ Leads and Payloads

(Note 1) Take caution that the maximum payload decreases as the speed increases.

Model number	Lead (mm)	Maximum payload (Note 1) Horizontal (kg)	Maximum payload (Note 1) Vertical (kg)	Stroke (mm)
ERC3-SA5C-I-42P-20-①-②-③-④	20	6.5	1	50~800 (every 50 mm)
ERC3-SA5C-I-42P-12-①-②-③-④	12	9	2.5	
ERC3-SA5C-I-42P-6-①-②-③-④	6	18	6	
ERC3-SA5C-I-42P-3-①-②-③-④	3	20	12	

Legend ① Stroke ② I/O type ③ Cable length ④ Option

■ Stroke and Maximum Speed

Lead \ Stroke	50~450 (every 50mm)	500 (mm)	550 (mm)	600 (mm)	650 (mm)	700 (mm)	750 (mm)	800 (mm)
20	1120		1115	935	795	680	585	510
12	900	805	665	560	475	405	350	300
6	450	400	330	280	235	200	175	150
3	225	200	165	140	115	100	85	75

(Unit: mm/s)

①Stroke

Stroke (mm)	Standard price	Stroke (mm)	Standard price
50	—	450	—
100	—	500	—
150	—	550	—
200	—	600	—
250	—	650	—
300	—	700	—
350	—	750	—
400	—	800	—

③Cable length

Type	Cable symbol	Standard price PIO type	Standard price SIO type
Standard type (Robot cable)	P (1m)	—	—
	S (3m)	—	—
	M(5m)	—	—
Special length	X06(6m)~X10(10m)	—	—

*Refer to P. 36 for maintenance cables.

④Options

Name	Option code	See page	Standard price
Brake	B	→P15	—
Non-motor side specification	NM	→P15	—
Simple absolute specification	ABU	→P15	— (*)

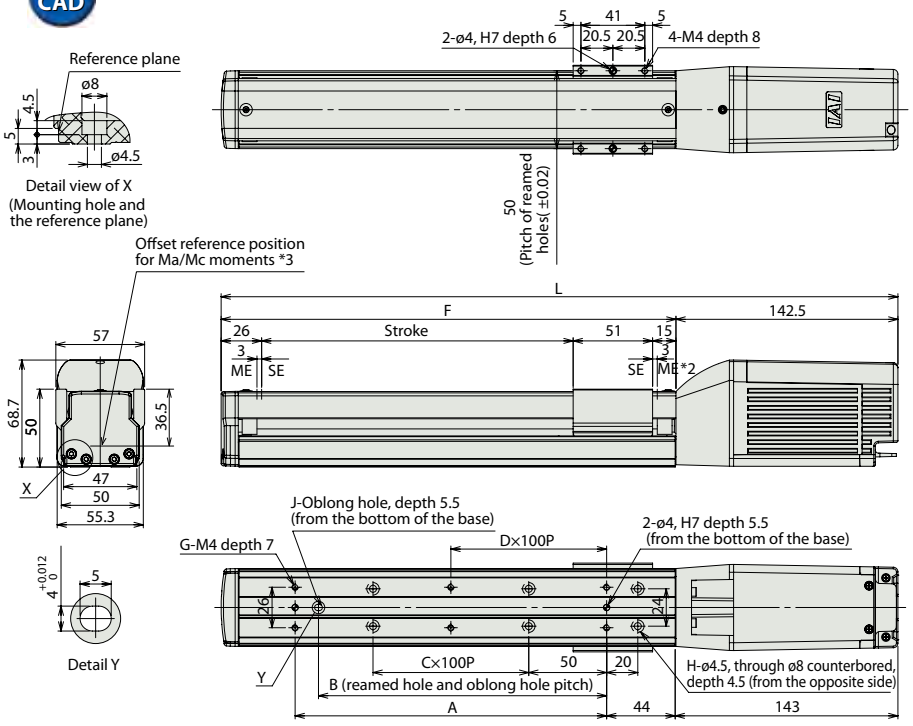
(*) If the simple absolute specification is selected, the separately sold PIO converter of simple absolute specification (with battery) is required.

Dimensional Drawings

CAD drawings can be downloaded from the website. **www.intelligentactuator.com**

2D CAD

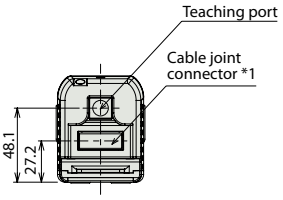
* If the non-motor side (NM) specification is selected, the dimension on the motor side (the distance to the home from ME) and that on the front side are flipped.



*1 Connect the power & I/O cable. Refer to P. 36 for details on this cable. SE: Stroke End ME: Mechanical End

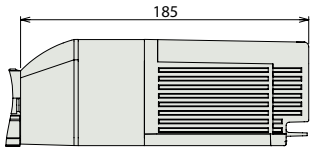
*2 The slider moves to the ME during home return, so pay attention to possible contact with surrounding structures.

*3 Reference position is used when calculating the Ma and Mc moments.



External view of the brake specification

*The overall length of the brake specification is 42.5 mm longer than the standard specification and its mass is 0.4 kg heavier.

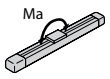


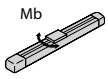
Actuator specificaton

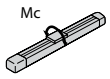
Item	Description
Drive system	Ball screw ø10 mm, rolled C10
Positioning repeatability (*1)	± 0.02 mm [± 0.03 mm]
Lost motion	0.1 mm or less
Static allowable load moment	Ma: 29.4 N•m, Mb: 42.0 N•m, Mc: 60.5 N•m
Dynamic allowable load moment (*2)	Ma: 7.1 N•m, Mb: 10.2 N•m, Mc: 14.7 N•m
Overhang load lengths	150 mm or less in Ma directions, 150 mm or less in Mb and Mc directions
Ambient operating temperature, humidity	0 to 40°C, 85% RH or less (Non-condensing)

(*1) The specification in [ ] applies when the lead is 20 mm.
(*2) Based on 5,000 km of traveling life

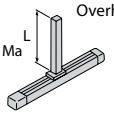
Allowable load moment directions

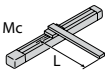






Overhang load lengths





■Dimensions and Mass by Stroke

Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
L	284.5	334.5	384.5	434.5	484.5	534.5	584.5	634.5	684.5	734.5	784.5	834.5	884.5	934.5	984.5	1034.5
A	73	100	100	200	200	300	300	400	400	500	500	600	600	700	700	800
B	0	85	85	185	185	285	285	385	385	485	485	585	585	685	685	785
C	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7
D	0	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7
F	142	192	242	292	342	392	442	492	542	592	642	692	742	792	842	892
G	4	4	4	6	6	8	8	10	10	12	12	14	14	16	16	18
H	4	4	6	6	8	8	10	10	12	12	14	14	16	16	18	18
J	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Mass (kg)	1.4	1.5	1.6	1.7	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.7	2.8	2.9	3.0	3.1

Controllers (Built into the Actuator)

②I/O type

With the ERC3 series, one of the following five types of built-in controllers can be selected depending on the external input/output (I/O) type. Select the type that meets your purpose.

Name	External view	Model number	Features	Maximum number of positioning points	Input power	Power supply capacity	Standard price	Reference page
PIO type (NPN specification)		ERC3-SA5C-I-42P-☐-☐-NP-☐-☐	Simple control type accommodating up to 16 positioning points	16	DC24V	High-output setting enabled: 3.5A rated 4.2A max. High-output setting disabled: 2A	—	→P27
PIO type (PNP specification)		ERC3-SA5C-I-42P-☐-☐-PN-☐-☐	PNP I/O type	16				
SIO type		ERC3-SA5C-I-42P-☐-☐-SE-☐-☐	High-function type accommodating up to 512 positioning points (PIO converter is used)	512				
Pulse-train type (NPN specification)		ERC3-SA5C-I-42P-☐-☐-PLN-☐-☐	Pulse-train input type supporting the NPN specification	–				
Pulse-train type (PNP specification)		ERC3-SA5C-I-42P-☐-☐-PLP-☐-☐	Pulse-train input type supporting the PNP specification	–				

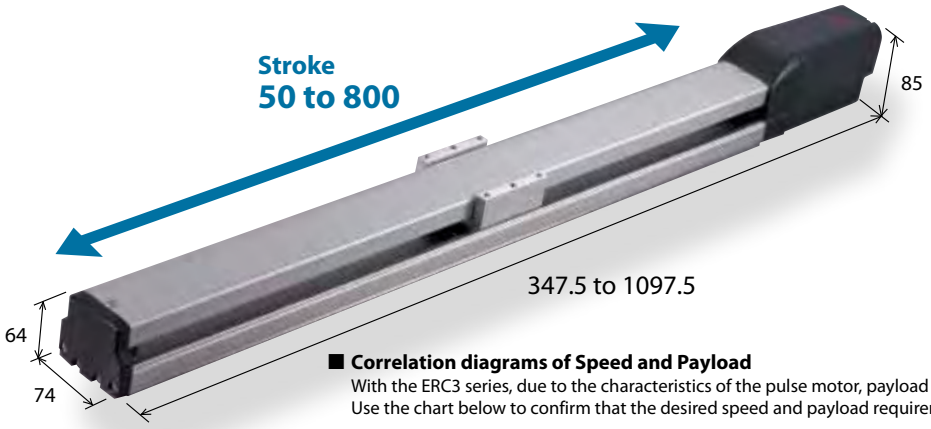
ERC3-SA7C ● Slider type ● Actuator Width 74mm

■ Model Specification Items

ERC3 — SA7C — I — 56P — ☐ — ☐ — ☐ — ☐ — ☐ — ☐ — ☐

Series	Type	Encoder type	Motor type	Lead	Stroke	I/O type	Cable length	Controller type	Option
		I: Incremental Type	56P: Pulse motor, size 56☐	24: 24mm 16: 16mm 8: 8mm 4: 4mm	50:50mm 〜 800:800mm (Can be set in 50mm increments)	NP: PIO (NPN) type PN: PIO (PNP) type SE: SIO type PLN: Pulse-train (NPN) type PLP: Pulse-train (PNP) type	N: None P: 1m S: 3 m M: 5m X☐☐: Specified length	CN: CON type MC: MEC type	B : Brake NM : Non-motor side specification ABU: Simple absolute specification

*Refer to P. 14 for the description of items constituting the model number.



Unit: mm

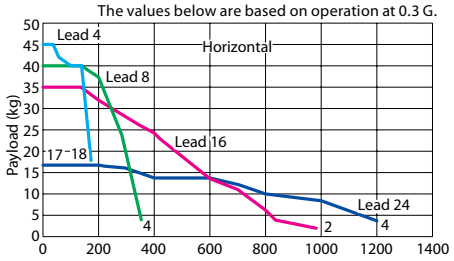
■ Correlation diagrams of Speed and Payload

With the ERC3 series, due to the characteristics of the pulse motor, payload decreases as the speed increases. Use the chart below to confirm that the desired speed and payload requirements are met.

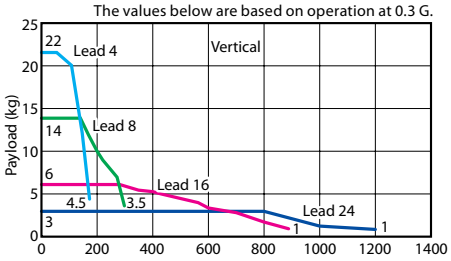
POINT **Notes on selection**

If the high-output setting is enabled (factory default), the duty must be limited. (Refer to P. 16.) If the high-output setting is disabled, the payload and maximum speed become lower, but the actuator can be used at a duty of 100%. Refer to the operation manual for information on how to change the high-output setting. Refer to P. 26 for the payload at each speed/acceleration when the high-output setting is enabled.
For other cautionary items, refer to "Explanations of/Cautionary Notes on Items Specified in Catalog (P. 15)."

The values below are based on operation at 0.3 G.

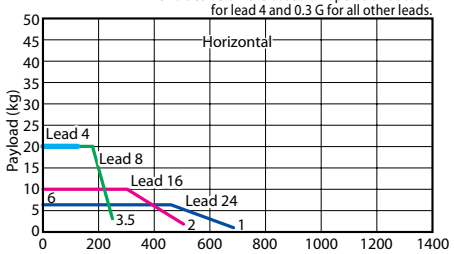


The values below are based on operation at 0.3 G.

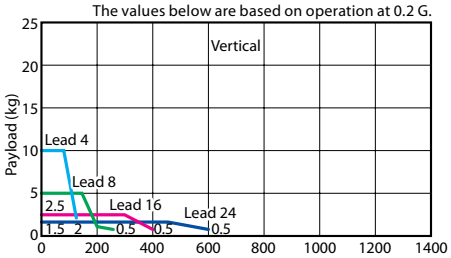


High-output setting enabled (Factory default)

The values below are based on operation at 0.2 G for lead 4 and 0.3 G for all other leads.



The values below are based on operation at 0.2 G.



High-output setting disabled

Actuator Specifications (High-output Setting Enabled)

■ Leads and Payloads

(Note 1) Take caution that the maximum payload decreases as the speed increases.

Model number	Lead (mm)	Maximum payload (Note 1) Horizontal (kg)	Maximum payload (Note 1) Vertical (kg)	Stroke (mm)
ERC3-SA7C-I-56P-24-①-②-③-④	24	17	3	50~800 (every 50 mm)
ERC3-SA7C-I-56P-16-①-②-③-④	16	35	6	
ERC3-SA7C-I-56P-8-①-②-③-④	8	40	14	
ERC3-SA7C-I-56P-4-①-②-③-④	4	45	22	

Legend ① Stroke ② I/O type ③ Cable length ④ Option

■ Stroke and Maximum Speed

Lead \ Stroke	50~550 (every 50mm)	600 (mm)	650 (mm)	700 (mm)	750 (mm)	800 (mm)
24	1200		1130	975	850	745
16	980 <840>	880 <840>	750	645	565	495
8	490	440	375	320	280	245
4	210		185	160	140	120

The values in < > apply when the actuator is used vertically. (Unit: mm/s)

①Stroke

Stroke (mm)	Standard price	Stroke (mm)	Standard price
50	—	450	—
100	—	500	—
150	—	550	—
200	—	600	—
250	—	650	—
300	—	700	—
350	—	750	—
400	—	800	—

③Cable length

Type	Cable symbol	Standard price PIO type	Standard price SIO type
Standard type (Robot cable)	P (1m)	—	—
	S (3m)	—	—
	M(5m)	—	—
Special length	X06(6m)~X10(10m)	—	—

*Refer to P. 36 for maintenance cables.

④Options

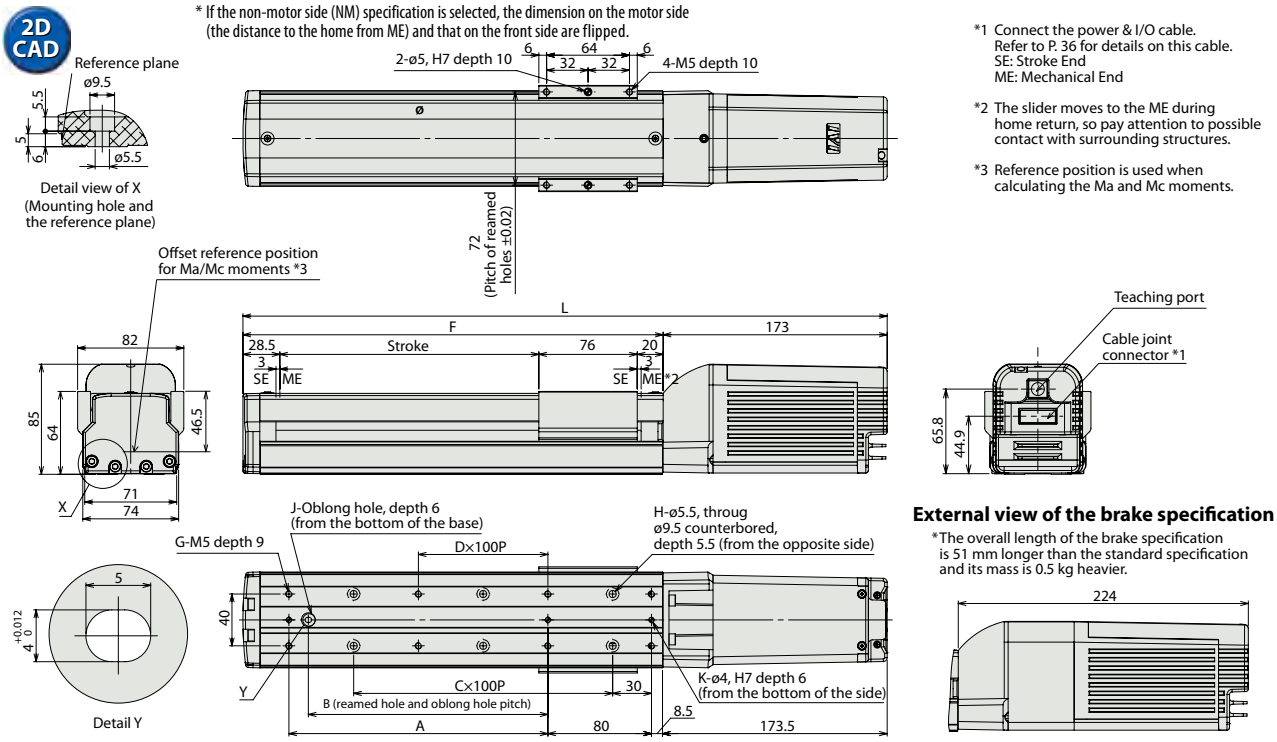
Name	Option code	See page	Standard price
Brake	B	→P15	—
Non-motor side specification	NM	→P15	—
Simple absolute specification	ABU	→P15	— (*)

(*) If the simple absolute specification is selected, the separately sold PIO converter of simple absolute specification (with battery) is required.

Dimensional Drawings

CAD drawings can be downloaded from the website. www.intelligentactuator.com

2D CAD



*1 Connect the power & I/O cable. Refer to P. 36 for details on this cable.
SE: Stroke End
ME: Mechanical End

*2 The slider moves to the ME during home return, so pay attention to possible contact with surrounding structures.

*3 Reference position is used when calculating the Ma and Mc moments.

External view of the brake specification

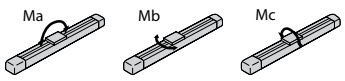
*The overall length of the brake specification is 51 mm longer than the standard specification and its mass is 0.5 kg heavier.

Actuator specificaton

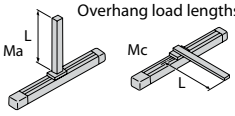
Item	Description
Drive system	Ball screw ø12 mm, rolled C10
Positioning repeatability (*1)	± 0.02 mm [± 0.03 mm]
Lost motion	0.1 mm or less
Static allowable load moment	Ma: 70.0 N•m, Mb: 100.0 N•m, Mc: 159.5 N•m
Dynamic allowable load moment (*2)	Ma: 15.0 N•m, Mb: 21.4 N•m, Mc: 34.1 N•m
Overhang load lengths	150 mm or less in Ma directions, 150 mm or less in Mb and Mc directions
Ambient operating temperature, humidity	0 to 40°C, 85% RH or less (Non-condensing)

(*1) The specification in [ ] applies when the lead is 20 mm.
(*2) Based on 5,000 km of traveling life

Allowable load moment directions



Overhang load lengths



■Dimensions and Mass by Stroke

Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
L	347.5	397.5	447.5	497.5	547.5	597.5	647.5	697.5	747.5	797.5	847.5	897.5	947.5	997.5	1047.5	1097.5
A	0	100	100	200	200	300	300	400	400	500	500	600	600	700	700	800
B	0	85	85	185	185	285	285	385	385	485	485	585	585	685	685	785
C	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8
D	0	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7
F	174.5	224.5	274.5	324.5	374.5	424.5	474.5	524.5	574.5	624.5	674.5	724.5	774.5	824.5	874.5	924.5
G	4	6	6	8	8	10	10	12	12	14	14	16	16	18	18	20
H	4	4	6	6	8	8	10	10	12	12	14	14	16	16	18	18
J	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
K	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Mass (kg)	3.2	3.4	3.6	3.8	4.0	4.3	4.5	4.7	4.9	5.1	5.4	5.6	5.8	6.0	6.2	6.5

Controllers (Built into the Actuator)

②I/O type

With the ERC3 series, one of the following five types of built-in controllers can be selected depending on the external input/output (I/O) type. Select the type that meets your purpose.

Name	External view	Model number	Features	Maximum number of positioning points	Input power	Power supply capacity	Standard price	Reference page
PIO type (NPN specification)		ERC3-SA7C-I-56P-□-□-NP-□-□	Simple control type accommodating up to 16 positioning points	16	DC24V	High-output setting enabled: 3.5A rated 4.2A max. High-output setting disabled: 2A	—	→P27
PIO type (PNP specification)		ERC3-SA7C-I-56P-□-□-PN-□-□	PNP I/O type	16				
SIO type		ERC3-SA7C-I-56P-□-□-SE-□-□	High-function type accommodating up to 512 positioning points (PIO converter is used)	512				
Pulse-train type (NPN specification)		ERC3-SA7C-I-56P-□-□-PLN-□-□	Pulse-train input type supporting the NPN specification	–				
Pulse-train type (PNP specification)		ERC3-SA7C-I-56P-□-□-PLP-□-□	Pulse-train input type supporting the PNP specification	–				

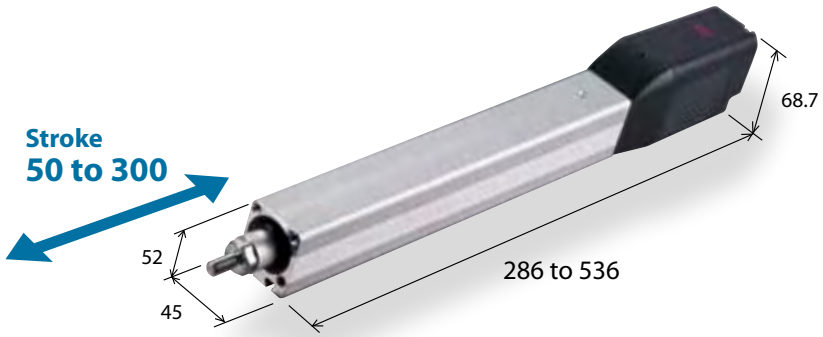
ERC3-RA4C ● Rod type ● Actuator Width 45mm

■ Model Specification Items

ERC3 – RA4C – I – 42P – ☐ – ☐ – ☐ – ☐ – ☐ – ☐ – ☐

Series	Type	Encoder type	Motor type	Lead	Stroke	I/O type	Cable length	Controller type	Option
		I: Incremental specification	42P: Pulse motor, size 42□	20: 20mm 12: 12mm 6: 6mm 3: 3mm	50:50mm 〜 300:300mm (Can be set in 50-mm increments)	NP: PIO (NPN) type PN: PIO (PNP) type SE: SIO type PLN: Pulse-train (NPN) type PLP: Pulse-train (PNP) type	N: None P: 1m S: 3 m M: 5m X□□: Specified length	CN: CON type MC: MEC type	B : Brake NM : Non-motor side specification ABU: Simple absolute specification FL : Flange FT : Foot bracket

*Refer to P. 14 for the description of items constituting the model number.



Unit: mm

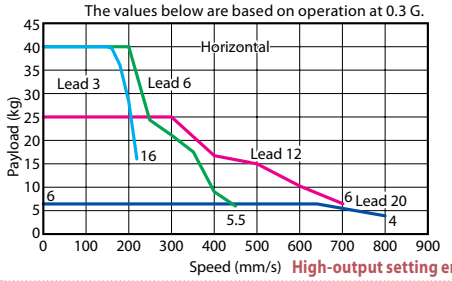
■ Correlation diagrams of Speed and Payload

With the ERC3 series, due to the characteristics of the pulse motor, payload decreases as the speed increases. Use the chart below to confirm that the desired speed and payload requirements are met.

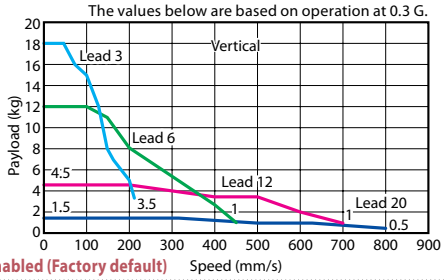
POINT Notes on selection

If the high-output setting is enabled (factory default), the duty must be limited. (Refer to P. 16.) If the high-output setting is disabled, the payload and maximum speed become lower, but the actuator can be used at a duty of 100%. Refer to the operation manual for information on how to change the high-output setting. Refer to P. 26 for the payload at each speed/acceleration when the high-output setting is enabled.
For other cautionary items, refer to "Explanations of/Cautionary Notes on Items Specified in Catalog (P. 15)."

The values below are based on operation at 0.3 G.

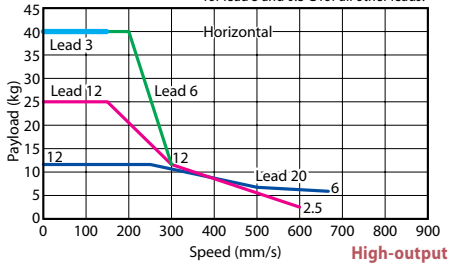


The values below are based on operation at 0.3 G.

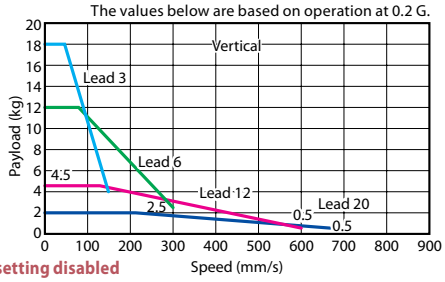


High-output setting enabled (Factory default)

The values below are based on operation at 0.2 G for lead 3 and 0.3 G for all other leads.



The values below are based on operation at 0.2 G.



High-output setting disabled

Actuator Specifications (High-output Setting Enabled)

■ Leads and Payloads

(Note 1) Take caution that the maximum payload decreases as the speed increases.

Model number	Lead (mm)	Maximum payload (Note 1) Horizontal (kg)	Maximum payload (Note 1) Vertical (kg)	Maximum push force (N)	Stroke (mm)
ERC3-RA4C-I-42P-20-①-②-③-④	20	6	1.5	56	50~300 (every 50 mm)
ERC3-RA4C-I-42P-12-①-②-③-④	12	25	4.5	93	
ERC3-RA4C-I-42P-6-①-②-③-④	6	40	12	185	
ERC3-RA4C-I-42P-3-①-②-③-④	3	40	18	370	

Legend ① Stroke ② I/O type ③ Cable length ④ Option

■ Stroke and Maximum Speed

Lead \ Stroke	50~200 (every 50mm)	250 (mm)	300 (mm)
20	800		
12	700	695	485
6	450	345	240
3	225	170	120

(Unit: mm/s)

①Stroke

Stroke (mm)	Standard price
50	—
100	—
150	—
200	—
250	—
300	—

③Cable length

Type	Cable symbol	Standard price PIO type	Standard price SIO type
Standard type (Robot cable)	P (1m)	—	—
	S (3m)	—	—
	M (5m)	—	—
Special length	X06(6m)~X10(10m)	—	—

*Refer to P. 36 for maintenance cables.

④Options

Name	Option code	See page	Standard price
Brake	B	→P15	—
Non-motor side specification	NM	→P15	—
Simple absolute specification	ABU	→P15	—(*)
Flange	FL	→P15	—
Foot bracket	FT	→P15	—

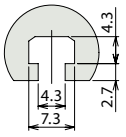
(*) If the simple absolute specification is selected, the separately sold PIO converter of simple absolute specification (with battery) is required.

Dimensional Drawings

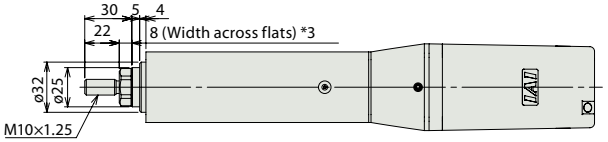
CAD drawings can be downloaded from the website. www.intelligentactuator.com

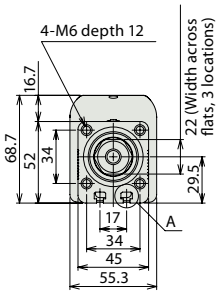
2D CAD

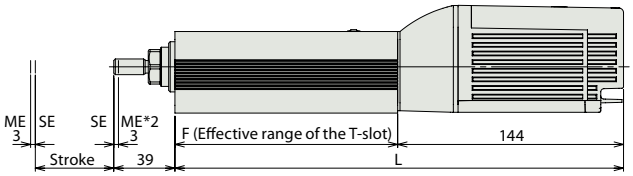
* If the non-motor side (NM) specification is selected, the dimension on the motor side (the distance to the home from ME) and that on the front side are flipped.

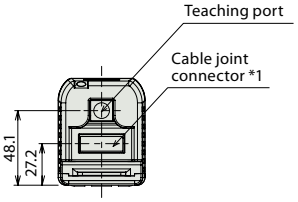


Detail A





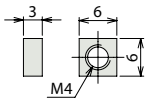




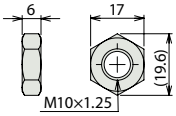
*1 Connect the power & I/O cable. Refer to P. 36 for details on this cable.
SE: Stroke End
ME: Mechanical End

*2 The slider moves to the ME during home return, so pay attention to possible contact with surrounding structures.

*3 The orientation of the bolt will vary depending on the product.



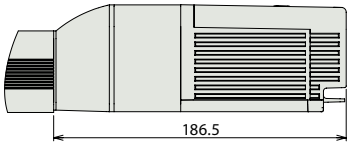
Supplied square nut for mounting via the T-slot (4 pcs are supplied)



Supplied rod end nut

External view of the brake specification

*The overall length of the brake specification is 42.5 mm longer than the standard specification and its mass is 0.4 kg heavier.



Actuator specificaton

Item	Description
Drive system	Ball screw ø10 mm, rolled C10
Positioning repeatability (*1)	± 0.02 mm [± 0.03 mm]
Lost motion	0.1 mm or less [0.2 mm or less]
Rod diameter	ø25 mm
Rod non-rotation preciseness	±1.5 degrees
Ambient operating temperature, humidity	0 to 40°C, 85% RH or less (Non-condensing)

(*1)The specification in [ ] applies when the lead is 20 mm.

■Dimensions and Mass by Stroke

Stroke	50	100	150	200	250	300
L	286	336	386	436	486	536
F	142	192	242	292	342	392
Mass (kg)	1.4	1.7	2.0	2.3	2.6	2.9

Controllers (Built into the Actuator)

②I/O type

With the ERC3 series, one of the following five types of built-in controllers can be selected depending on the external input/output (I/O) type. Select the type that meets your purpose.

Name	External view	Model number	Features	Maximum number of positioning points	Input power	Power supply capacity	Standard price	Reference page
PIO type (NPN specification)		ERC3-RA4C-I-42P-□-□-NP-□-□	Simple control type accommodating up to 16 positioning points	16	DC24V	High-output setting enabled: 3.5A rated 4.2A max. High-output setting disabled: 2A	—	→P27
PIO type (PNP specification)		ERC3-RA4C-I-42P-□-□-PN-□-□	PNP I/O type	16				
SIO type		ERC3-RA4C-I-42P-□-□-SE-□-□	High-function type accommodating up to 512 positioning points (PIO converter is used)	512				
Pulse-train type (NPN specification)		ERC3-RA4C-I-42P-□-□-PLN-□-□	Pulse-train input type supporting the NPN specification	–				
Pulse-train type (PNP specification)		ERC3-RA4C-I-42P-□-□-PLP-□-□	Pulse-train input type supporting the PNP specification	–				

ERC3-RA6C ● Rod type ● Actuator Width 64mm

■ Model Specification Items

ERC3 — RA6C — I — 56P — ☐ — ☐ — ☐ — ☐ — ☐ — ☐ — ☐

Series	Type	Encoder type	Motor type	Lead	Stroke	I/O type	Cable length	Controller type	Option
		I: Incremental specification	56P: Pulse motor, size 56☐	24: 24mm 16: 16mm 8: 8mm 4: 4mm	50:50mm 〜 300:300mm (Can be set in 50-mm increments)	NP: PIO (NPN) type PN: PIO (PNP) type SE: SIO type PLN: Pulse-train (NPN) type PLP: Pulse-train (PNP) type	N: None P: 1m S: 3 m M: 5m X☐☐: Specified length	CN: CON type MC: MEC type	B : Brake NM : Non-motor side specification ABU: Simple absolute specification FL : Flange FT : Foot bracket

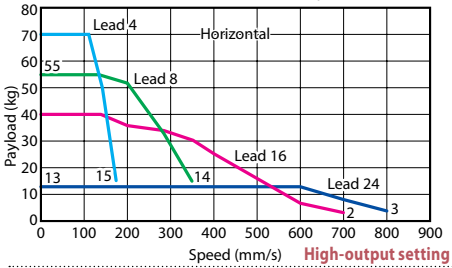
*Refer to P. 14 for the description of items constituting the model number.

Unit: mm

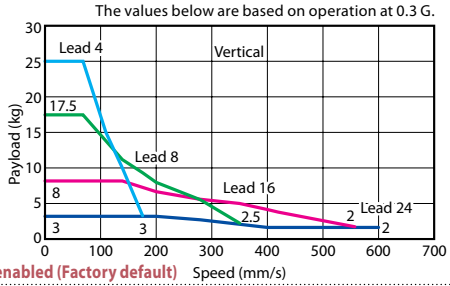
■ Correlation diagrams of Speed and Payload

With the ERC3 series, due to the characteristics of the pulse motor, payload decreases as the speed increases. Use the chart below to confirm that the desired speed and payload requirements are met.

The values below are based on operation at 0.3 G.

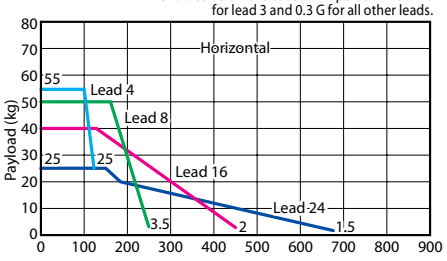


The values below are based on operation at 0.3 G.

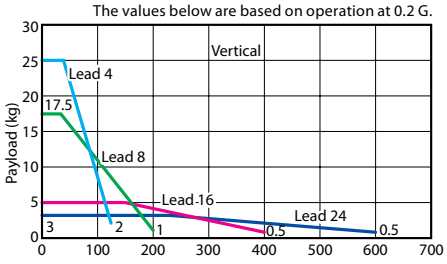


High-output setting enabled (Factory default)

The values below are based on operation at 0.2 G for lead 3 and 0.3 G for all other leads.



The values below are based on operation at 0.2 G.



High-output setting disabled

POINT Notes on selection

If the high-output setting is enabled (factory default), the duty must be limited. (Refer to P. 16.) If the high-output setting is disabled, the payload and maximum speed become lower, but the actuator can be used at a duty of 100%. Refer to the operation manual for information on how to change the high-output setting. Refer to P. 26 for the payload at each speed/acceleration when the high-output setting is enabled.
For other cautionary items, refer to "Explanations of/Cautionary Notes on Items Specified in Catalog (P. 15)."

Actuator Specifications (High-output Setting Enabled)

■ Leads and Payloads

(Note 1) Take caution that the maximum payload decreases as the speed increases.

Model number	Lead (mm)	Maximum payload (Note 1) Horizontal (kg)	Maximum payload (Note 1) Vertical (kg)	Maximum push force (N)	Stroke (mm)
ERC3-RA6C-I-56P-24-①-②-③-④	24	13	3	182	50~300 (every 50 mm)
ERC3-RA6C-I-56P-16-①-②-③-④	16	40	8	273	
ERC3-RA6C-I-56P-8-①-②-③-④	8	55	17.5	547	
ERC3-RA6C-I-56P-4-①-②-③-④	4	70	25	1094	

Legend ① Stroke ② I/O type ③ Cable length ④ Option

■ Stroke and Maximum Speed

Lead \ Stroke	50~200 (every 50mm)	300 (mm)
24	800 <600>	
16	700 <560>	
8	420	400
4	210 <175>	200 <175>

The values in < > apply when the actuator is used vertically. (Unit: mm/s)

①Stroke

Stroke (mm)	Standard price
50	—
100	—
150	—
200	—
250	—
300	—

③Cable length

Type	Cable symbol	Standard price PIO type	Standard price SIO type
Standard type (Robot cable)	P (1m)	—	—
	S (3m)	—	—
	M (5m)	—	—
Special length	X06(6m)~X10(10m)	—	—

*Refer to P. 36 for maintenance cables.

④Options

Name	Option code	See page	Standard price
Brake	B	→P15	—
Non-motor side specification	NM	→P15	—
Simple absolute specification	ABU	→P15	—(*)
Flange	FL	→P15	—
Foot bracket	FT	→P15	—

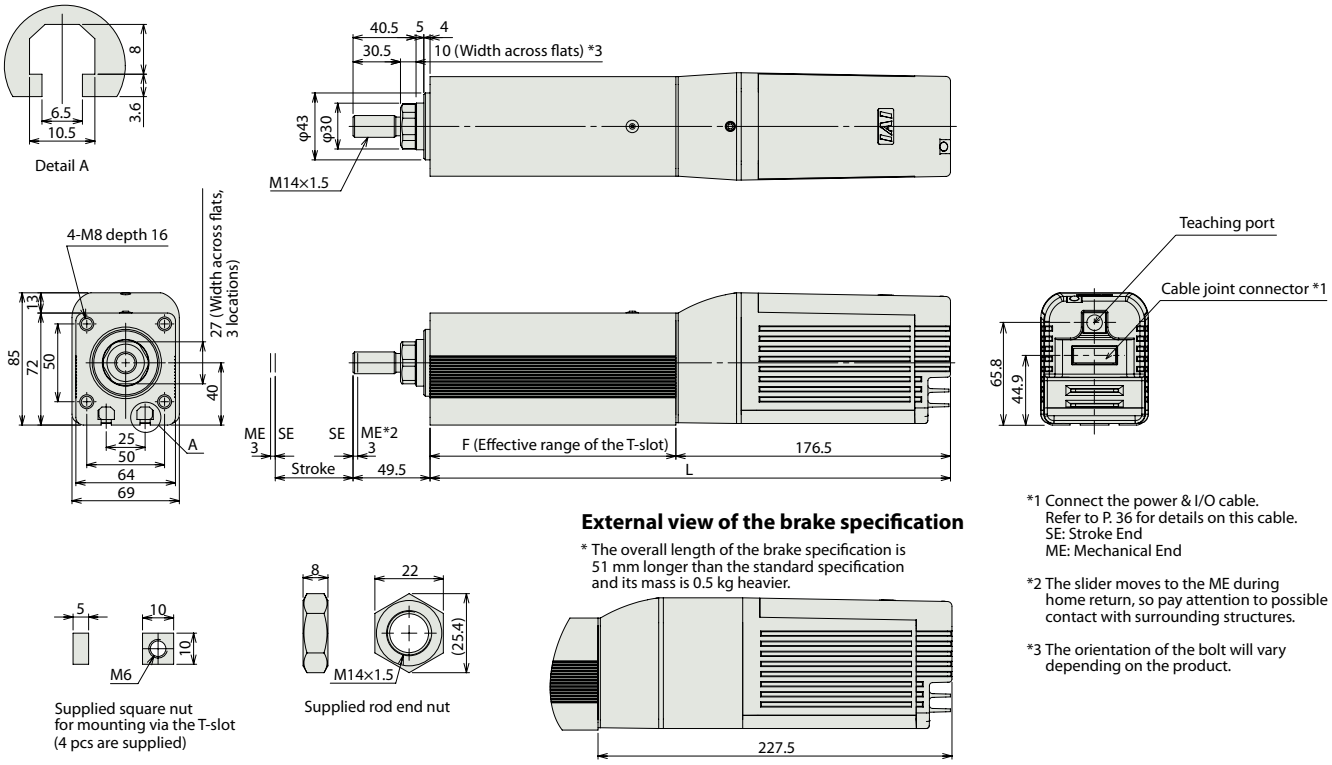
(*) If the simple absolute specification is selected, the separately sold PIO converter of simple absolute specification (with battery) is required.

Dimensional Drawings

CAD drawings can be downloaded from the website. www.intelligentactuator.com

2D CAD

* If the non-motor side (NM) specification is selected, the dimension on the motor side (the distance to the home from ME) and that on the front side are flipped.



External view of the brake specification

* The overall length of the brake specification is 51 mm longer than the standard specification and its mass is 0.5 kg heavier.

*1 Connect the power & I/O cable. Refer to P. 36 for details on this cable.
SE: Stroke End
ME: Mechanical End

*2 The slider moves to the ME during home return, so pay attention to possible contact with surrounding structures.

*3 The orientation of the bolt will vary depending on the product.

Actuator specificaton

Item	Description
Drive system	Ball screw ø12mm, rolled C10
Positioning repeatability (*1)	± 0.02 mm [± 0.03 mm]
Lost motion	0.1 mm or less [0.2 mm or less]
Rod diameter	ø30 mm
Rod non-rotation preciseness	±1.0 degrees
Ambient operating temperature, humidity	0 to 40°C, 85% RH or less (Non-condensing)

(*1)The specification in [ ] applies when the lead is 24 mm.

■Dimensions and Mass by Stroke

Stroke	50	100	150	200	250	300
L	334.5	384.5	434.5	484.5	534.5	584.5
F	158	208	258	308	358	408
Mass (kg)	3.9	4.4	4.9	5.4	5.9	6.4

Controllers (Built into the Actuator)

②I/O type

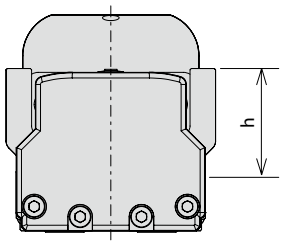
With the ERC3 series, one of the following five types of built-in controllers can be selected depending on the external input/output (I/O) type. Select the type that meets your purpose.

Name	External view	Model number	Features	Maximum number of positioning points	Input power	Power supply capacity	Standard price	Reference page
PIO type (NPN specification)		ERC3-RA6C-I-56P-□-□-NP-□-□	Simple control type accommodating up to 16 positioning points	16	DC24V	High-output setting enabled: 3.5A rated 4.2A max. High-output setting disabled: 2A	—	→P27
PIO type (PNP specification)		ERC3-RA46C-I-56P-□-□-PN-□-□	PNP I/O type	16				
SIO type		ERC3-RA6C-I-56P-□-□-SE-□-□	High-function type accommodating up to 512 positioning points (PIO converter is used)	512				
Pulse-train type (NPN specification)		ERC3-RA6C-I-56P-□-□-PLN-□-□	Pulse-train input type supporting the NPN specification	–				
Pulse-train type (PNP specification)		ERC3-RA6C-I-56P-□-□-PLP-□-□	Pulse-train input type supporting the PNP specification	–				

Selection Guideline (Correlation Diagram of the Push Force and the Current-limiting Value)

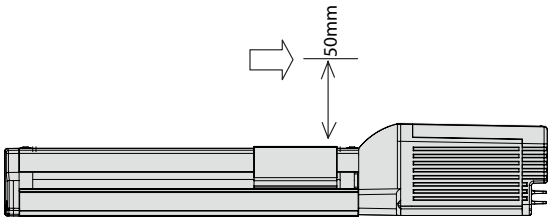
In a push-motion operation, the push force can be used by changing the current-limiting value of the controller over a range of 20% to 70%. The maximum push-force varies depending on the model, so check the required push force from the table below and select an appropriate type meeting the purpose of use.

When performing a push-motion operation using a slider actuator, limit the push current so that the reactive force moment generated by the push force will not exceed 80% of the rated moment (Ma, Mb) specified in the catalog.
To help with the moment calculations, the application position of the guide moment is shown in the figure below. Calculate the necessary moment by considering the offset of the push force application position.
Note that if an excessive force exceeding the rated moment is applied, the guide may be damaged and the life may become shorter. Accordingly, include a sufficient safety factor when deciding on the push force.



SA5C：h=36.5mm
SA7C：h=46.5mm

Calculation example)
If a push-motion operation is performed with an ERC3-SA7C by applying 100 N at the position shown to the right, the moment received by the guide, or Ma, is calculated as (46.5 + 50) x 100
= 9650 (N•mm)
= 9.65 (N•m).

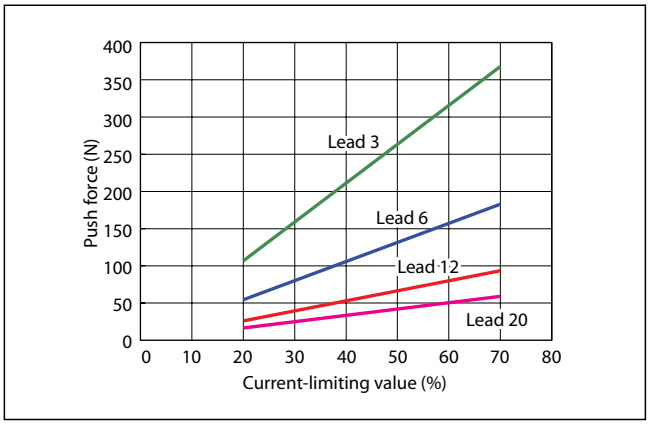


Since the rated moment Ma of the SA7C is 15 (N•m), 15 x 0.8 = 12 > 9.65, suggesting that this selection is acceptable. If an Mb moment generates due to the push-motion operation, calculate the moment from the overhang length and confirm, in the same way, that the calculated moment is within 80% of the rated moment.

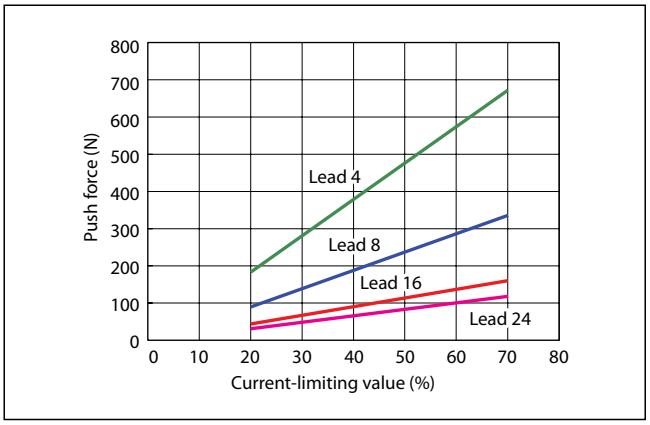
Correlation Diagrams of the Push Force and the Current-limiting Value

The table below is only a reference, and the graphs may vary slightly from the actual values.

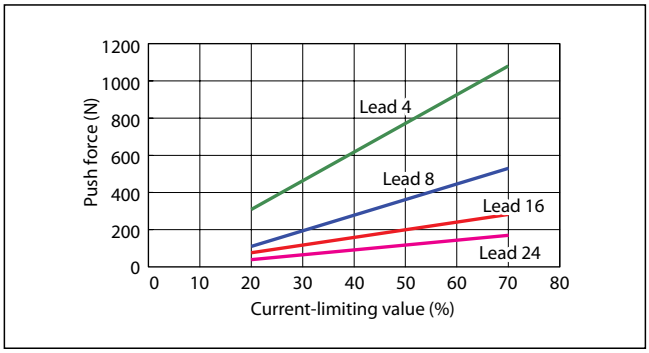
SA5C/RA4C type



SA7C type



RA6C type



Notes on Use

- The relationship of the push force and the current-limiting value is only a reference, and the graphs may vary slightly from the actual values.
- If the current-limiting value is less than 20%, the push force may vary. Make sure the current-limiting value remains 20% or more.
- The graphs assume a traveling speed of 20 mm/s during push-motion operation.

Selection Guideline
(Table of ERC3 Payload by Speed/Acceleration)

High-output setting enabled (Factory default)

The maximum acceleration/deceleration of the ERC3 is 1.0 G in a horizontal application or 0.5 G in vertical application. The payload drops as the acceleration increases, so when selecting a model, use the tables below to find one that meets the desired speed, acceleration and payload.

■ERC3-SA5C

Lead 20

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	6.5	6.5	5	5	4	1	1	1
160	6.5	6.5	5	5	4	1	1	1
320	6.5	6.5	5	5	4	1	1	1
480	6.5	6.5	4	4	4	1	1	1
640	6.5	6.5	3.5	3.5	3	1	1	1
800	5.5	5.5	3.5	3	1	1	1	1
960		5.5	2.5	2	1		0.5	0.5
1120		5.5	1	1	1		0.5	0.5

Lead 12

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	9	9	9	9	8	2.5	2.5	2.5
100	9	9	9	9	8	2.5	2.5	2.5
200	9	9	9	9	8	2.5	2.5	2.5
300	9	9	9	9	7	2.5	2.5	2.5
400	9	9	8	8	6	2.5	2.5	2.5
500	9	9	8	5.5	5.5	2.5	2.5	2
600	9	9	8	5.5	4	2.5	2	1.5
700	9	7	6	4	2.5	2.5	1	0.5
800		5.5	3.5	2	1		0.5	0.5
900		5	2.5	1			0.5	

Lead 6

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	18	18	13	12	11	6	6	6
50	18	18	13	12	11	6	6	6
100	18	18	13	12	11	6	6	6
150	18	18	13	12	11	6	6	6
200	18	18	13	12	11	6	6	6
250	18	17	13	12	9	6	5	4.5
300	16	16	12	11	7	4.5	4	3.5
350	14	14	8	8	6	4	3.5	3
400	10.5	10	7	4.5	4	2.5	2	1.5
450	7.5	7	4	2.5	1	1	0.5	

Lead 3

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	20	20	16	16	13	12	12	12
25	20	20	16	16	13	12	12	12
50	20	20	16	16	12	12	12	12
75	20	20	16	16	12	12	12	12
100	20	18	14	12	10	12	10.5	10.5
125	20	17	14	9.5	8	12	10.5	10.5
150	20	17	11	8	7	9.5	8	8
175	20	10	10	4.5	3.5	7	7	6
200	20	9	3			6	4	2
225	15					4.5		

■ERC3-SA7C

Lead 24

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	20	17	15	13	11	3	3	3
200	20	17	15	13	11	3	3	3
400	20	14	14	13	10	3	3	3
600	20	14	10	8	8	3	3	3
800	10	10	8	6	2.5		3	2.5
1000		8	4	2	1		2	
1200		4	2				1	

Lead 16

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	35	35	35	26.5	26.5	7	6	4
140	35	35	35	26.5	26.5	7	6	4
280	35	28	28	22	18	7	6	4
420	30	23	12.5	11	10	5	5	4
560	22	15	9.5	7.5	5.5	5	4	3
700	20	11	5.5	3.5	2	3.5	2.5	1.5
840		4	2.5				1	
980		2						

Lead 8

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	43	40	40	40	40	15	14	13
70	43	40	40	40	40	15	14	13
140	40	40	40	38	35	15	14	13
210	40	36	35	30	24	11	9	9
280	40	23	11	8	2	8	7	6
350	35	4	2	2		5	3.5	1.5
420	25					2.5		
490	15					1.5		

Lead 4

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	45	45	45	40	35	22	22	22
35	45	45	45	40	35	22	22	22
70	45	42	42	35	35	22	22	22
105	42	40	40	35	35	20	20	19
140	42	40	25	25	22	15	12	11
175	38	18				10	4.5	
210	35					6.5		

■ERC3-RA4C

Lead 20

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	6	6	6	5	4.5	1.5	1.5	1.5
160	6	6	6	5	4.5	1.5	1.5	1.5
320	6	6	6	5	3	1.5	1.5	1.5
480	6	6	6	4.5	3	1	1	1
640		6	4	3	2		1	1
800		4	3				0.5	0.5

Lead 12

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	25	25	14	14	12	4.5	4.5	3.5
100	25	25	14	14	12	4.5	4.5	3.5
200	25	25	11	8	8	4.5	4.5	3.5
300	25	25	11	7	5.5	4	4	3.5
400	17.5	16.5	8	4	3.5	3.5	3.5	2.5
500		15	5.5	2	2		3.5	2
600		10	3.5				2	1
700		6	2				1	1

Lead 6

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	40	40	31.5	30	25	12	12	10
50	40	40	31.5	30	25	12	12	10
100	40	40	31.5	24.5	21	12	12	10
150	40	40	24.5	17.5	17.5	11	11	7
200	40	40	21	14	12.5	8	8	5.5
250	35	24.5	17.5	14	11	7	7	4
300	28	21	12.5	12.5	8	5.5	5.5	4
350	24.5	17.5	9.5	5.5	5.5	4	3.5	3.5
400	17.5	9.5	7	4	2.5	3.5	2.5	2
450	17.5	5.5	2				1	1

Lead 3

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	40	40	40	40	35	18	18	17
25	40	40	40	40	35	18	18	17
50	40	40	40	40	35	18	18	17
75	40	40	40	40	35	16	16	16
100	40	40	40	40	35	16	15	15
125	40	40	40	40	30	16	12	10
150	40	40	40	30	25	10	8	5.5
175	36	36	35	25	20	10	5.5	5
200	36	28	28	19.5	14	7	5	4.5
225	36	16	14	10	6	4	3.5	2

■ERC3-RA6C

Lead 24

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	20	13	11	10	8	3	3	2
200	20	13	11	10	8	3	3	2
400	20	13	11	10	8	2	2	2
600		13	7	5	3.5		2	2
800		3	1					

Lead 16

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	45	40	30	28	26	8	8	8
140	45	40	30	28	26	8	8	8
280	45	34	30	24	18	6.5	5.5	5.5
420	45	22	17	13	10	5.5	4	3
560		9.5	5	2.5	1.5		2	1
700		2						

Lead 8

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	60	55	45	40	40	17.5	17.5	17.5
70	60	55	45	40	40	17.5	17.5	17.5
140	60	55	40	40	40	11	11	11
210	60	50	40	28	26	7.5	7.5	7
280	60	32	20	15	11	6	5.5	4.5
350	50	14	4.5	1		3	2.5	2
420	15					2		

Lead 4

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	70	70	60	60	50	25	25	25
35	70	70	60	60	50	25	25	25
70	70	70	60	60	50	25	25	25
105	70	70	55	45	40	15	15	15
140	70	50	30	20	15	11.5	10	8
175	50	15				6	3	
210	20							

ERC3 controller specification

■Model number NP/PN/SE/PLN/PLPP

Controller part of actuator with built-in controller

List of Models/Prices

Operation Mode		Positioner mode			Pulse-train control mode	
I/O type name		NP	PN	SE	PLN	PLP
Name		PIO type (NPN specification)	PIO type (PNP specification)	SIO type	Pulse-train type (NPN specification)	Pulse-train type (PNP specification)
External view						
Description		Type that moves by specifying the positioning number with NPN PIO from PLC.	Type that moves by specifying the positioning number with PNP PIO from PLC.	High-function type accommodating up to 512 positioning points (PIO converter is used)	Pulse-train input type supporting the NPN specification	Pulse-train input type supporting the PNP specification
Position points		16 points	16 points	512 points	(–)	(–)
Standard price	SA5C	—				
	SA7C	—				
	RA4C	—				
	RA6C	—				

Model number

ERC3 — [Type] — I — [Encoder type] — [Motor type] — [Lead] — [Stroke] — [I/OType] — [Cable length] — [Controller type] — [Option]

Series

Type

SA5C	Actuator width 50 mm
SA7C	Actuator width 74 mm
RA4C	Actuator width 45 mm
RA6C	Actuator width 64 mm

Encoder type

I	Incremental type

Motor type

42P	Pulse motor 42□ size
56P	Pulse motor 56□ size

Lead

20	for SA5C/RA4C 20mm
12	for SA5C/RA4C 12mm
6	for SA5C/RA4C 6mm
3	for SA5C/RA4C 3mm
24	for SA7C/RA6C 24mm
16	for SA7C/RA6C 16mm
8	for SA7C/RA6C 8mm
4	for SA7C/RA6C 4mm

Stroke

Slider type	50	50mm
	≀	≀
	800	800mm
Rod type	50	50mm
	≀	≀
	300	300mm

(Can be set in 50mm increments)

I/OType

NP	PIO (NPN) type
PN	PIO (PNP) type
SE	SIO type
PLN	Pulse-train (NPN) type
PLP	Pulse-train (PNP) type

Cable length

N	None
P	1m
S	3m
M	5m
X□□	Specified length

* The standard cable is a robot cable.

Controller type

CN	CON type
MC	MEC type

* If the I/O type is PLN or PLP, "CN" is selected automatically.
* Refer to P. 14 for each type.

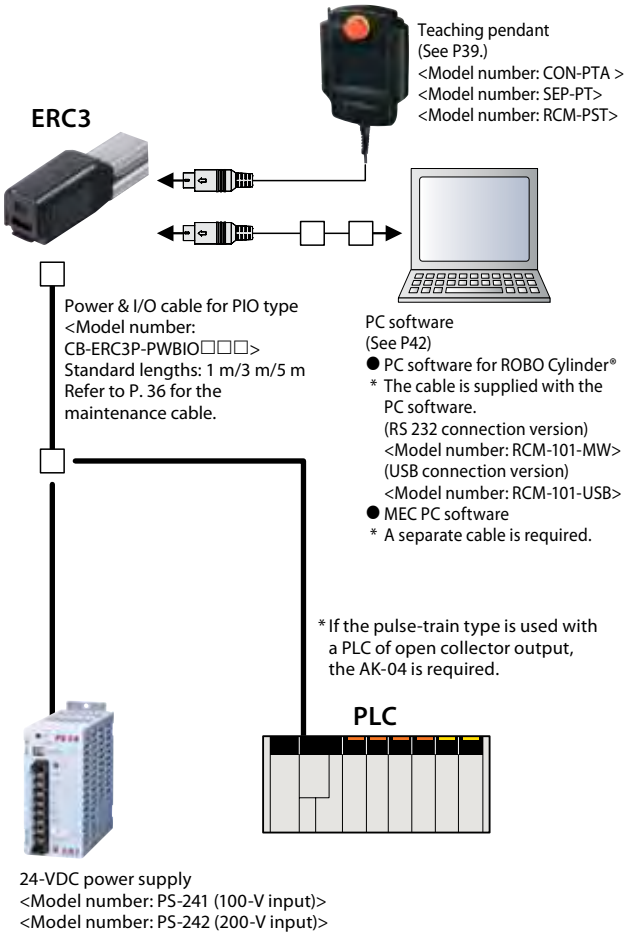
Option

B	Brake
NM	Non-motor side specification
ABU	Simple absolute specification
FL	Flange
FT	Foot bracket

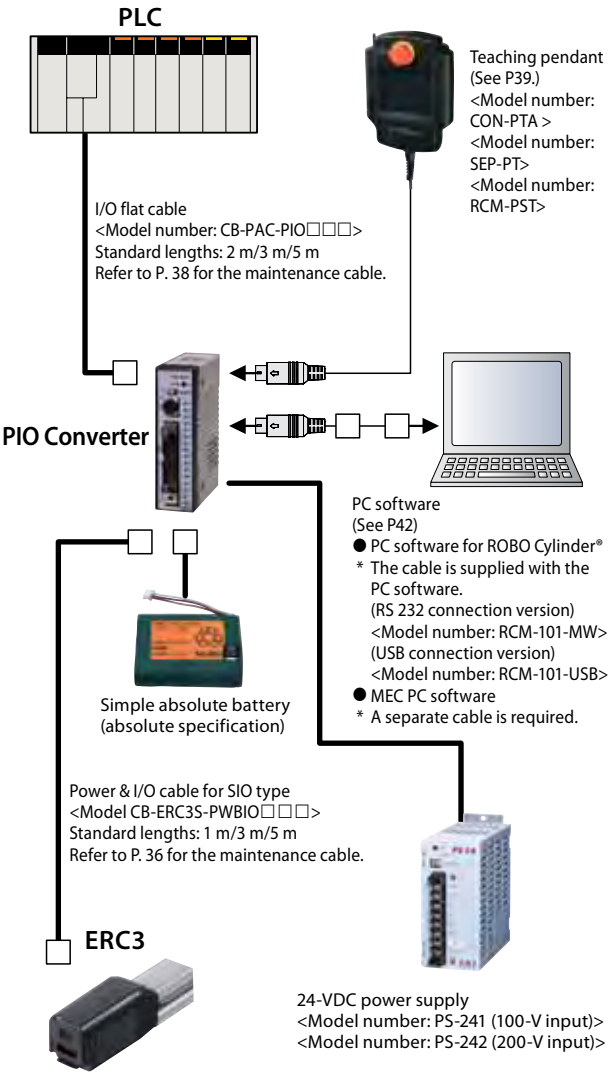
* The simple absolute specification can be selected only when the I/O type is "SIO communication."
* The flange and foot bracket option can be selected only for rod types.

System Configuration

■PIO Type/Pulse-train type

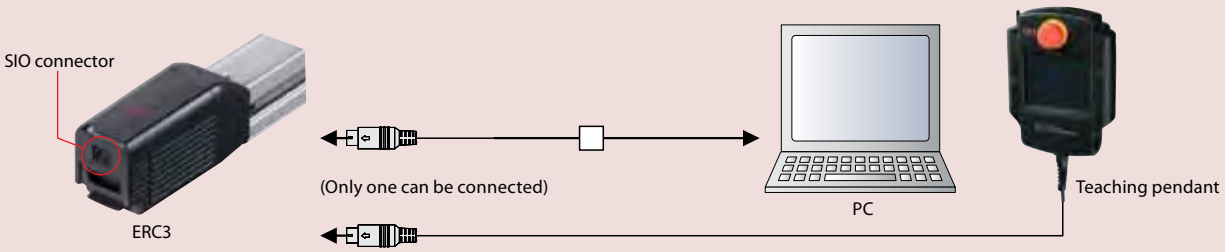


■SIO Type



PC Wiring Diagram

The SIO connector is used to connect a teaching tool.



List of Base Controller Specifications

Item		Description
Power supply voltage		24 VDC±10%
Load current (including current consumed for control)		High-output setting enabled: 3.5 A rated/4.2 A max. High-output setting disabled: 2A
Heat output		High-output setting enabled: 8 W High-output setting disabled: 5W
Rush current (Note 1)		8.3A
Momentary power failure resistance		MAX.500μs
Motor control method		Field-weakening vector control
Supported encoder		Incremental encoder of 800 pulses/rev in resolution
Actuator cable length		10 m max.
Serial communication interface (SIO port)		RS485: 1 channel (conforming to Modbus protocol RTU/ASCII) / Speed: 9.6 to 230.4 kbps Actuators can be controlled via serial communication in a mode other than pulse-train
External interface PIO specification		Dedicated 24-VDC signal input/output (NPN or PNP selected)—Up to 6 input points, up to 4 output points Cable length: 10m max.
Data setting/input method		PC software, touch-panel teaching pendant, quick teach
Data retention memory		Position data and parameters are saved in the non-volatile memory (There is no limit to the number of times the memory can be written.)
Operation mode		Positioner mode/Pulse-train control mode
Number of positions in positioner mode		Standard 8 points, maximum 16 points Note) Positioning points vary depending on the selected PIO pattern.
Pulse-train interface	Input pulse	Differential method (line driver method): 200 kpps max. / Cable length: 10m max.
		Open collector method: Not supported * If the host is of open collector output type, use the optional AK-04 (sold separately) to convert open collector pulses to differential pulses.
	Command pulse magnification (electronic gear ratio: A/B)	1/50 < A/B < 50/1 Setting range of A and B (set by parameters): 1 to 4096
	Feedback pulse output	None
LED indicators (installed on the motor unit)		Servo ON (green), servo OFF (unlit), emergency stop (red), alarm (red), resetting (orange)
Isolation resistance		500 VDC, 10 MΩ or more
Electric shock protection mechanism		Class I basic isolation
Cooling method		Natural air cooling
Environment	Ambient operating temperature	0 to 40°C
	Ambient operating humidity	85%RH or less (non-condensing)
	Ambient storage temperature	-20 to 70°C (excluding batteries)
	Operating altitude	Altitude 1000m or less
	Protection degree	IP20
	Cooling method	Natural air cooling
	Vibration resistance	(Test conditions) Number of vibrations: 10 to 57 Hz/Amplitude: 0.075 mm Number of vibrations: 57 to 150 Hz/Acceleration: 9.8 m/s^2 Sweep time in X/Y/Z directions: 10 minutes/Number of sweeps: 10 times
	Impact	(Test conditions) 150mm/sec^2, 11mm/sec, sinusoidal half pulse, 3 times each in X, Y and Z directions

Note 1 Rush current will flow for approx. 5msec after the power is turned on (at 40°C).
Take note that the value of rush current varies depending on the impedance of the power line.

Emergency Stop Circuit

The ERC3 series has no built-in emergency stop circuit, so the customer must provide an emergency stop circuit. Refer to the operation manual for details on the emergency stop circuit.

■Positioner mode

I/O specification (PIO type)

■Input Part

Item	Specification
Input points	6 points
Input voltage	24 VDC ±10%
Input current	5mA/1 circuit
Leak current	1mA/point max.

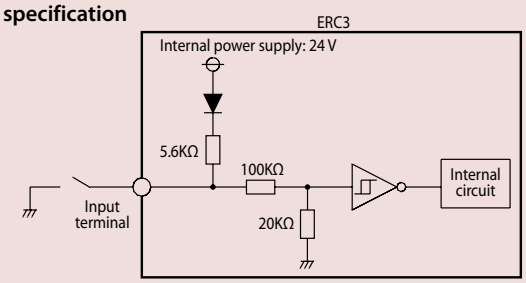
* The input circuit is not isolated from signals input from external equipment.

■Output Part

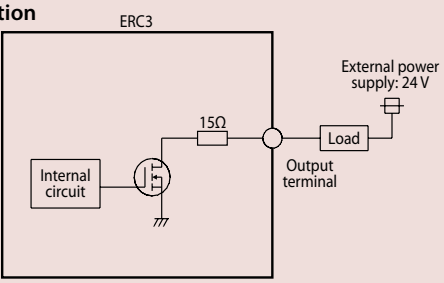
Item	Specification
Output points	4 points
Load voltage	24 VDC ±10%
Maximum load current	5mA/1 circuit
Residual voltage	2 V or less

* The output circuit is not isolated from signals output to external equipment.

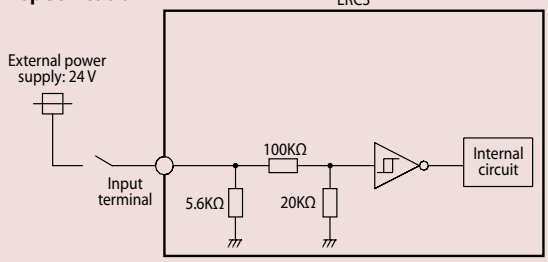
NPN specification



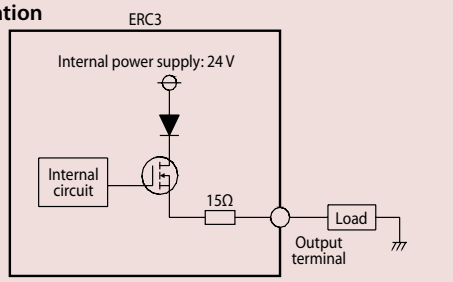
NPN specification



PNP specification



PNP specification



I/O Signal Table (PIO Type) [ERC3 and PLC Connected Directly]

Pin number	Category	Controller type	CN (CON type)			MC (MEC type)	
		PIO function	Parameter No. 25 (PIO pattern) selection			Selected on teaching pendant or in PC software	
			0	1	2		
			8-point type	Solenoid type	16-point type	Standard/Movement between 2 points (single solenoid)	2 inputs/Movement among 3 points
	Input	Number of positioning points	8 points	3 points	16 points	2 points	3 points
		Home return signal	○	×	×	×	×
		Jog signal	×	×	×	×	×
		Teaching signal (writing of current position)	×	×	×	×	×
		Brake release	×	×	×	×	×
	Output	Moving signal	×	×	×	×	×
		Zone signal	○	×	○	×	×
		Position zone signal	×	×	○	×	×
A1	Frame ground	FG					
B1	+24V for control power supply	CP					
A2	–	—					
B2	0 V for control power supply	GND					
A3	External brake release input	BK					
B3	+24V for motor power supply	MP					
A4	Emergency stop input	EMG					
B4	0 V for motor power supply	GND					
A5	–	—					
B5	–	—					
A6	–	—					
B6	–	—					
A7	–	—					
B7	–	—					
A8	–	—					
B8	–	—					
A9	Input	IN0	PC1	ST0	PC1	ST0	ST0
B9		IN1	PC2	ST1	PC2	—	ST1
A10		IN2	PC4	ST2	PC4	RES	RES
B10		IN3	HOME	—	PC8	—	—
A11		IN4	CSTR	RES	CSTR	—	—
B11		IN5	*STP	*STP	*STP	—	—
A12	Output	OUT0	PEND	PE0	PEND	LS0/PE0	LS0/PE0
B12		OUT1	HEND	PE1	HEND	LS1/PE1	LS1/PE1
A13		OUT2	ZONE1	PE2	PZONE/ZONE1	HEND	LS2/PE2
B13		OUT3	*ALM	*ALM	*ALM	*ALM	*ALM

(Note) Signals marked with an asterisk (*) (ALM/STP) are negative logic signals so they are nomally on.

I/O Signal Table (SIO Type) [ERC3 and PLC Connected via PIO Converter]

Pin number		Category	Controller type	CN (CON type)						MC (MEC type)	
			PIO function	Parameter No. 25 (PIO pattern) selection						Selected on teaching pendant or in PC software	
				0	1	2	3	4	5		
				Positioning mode	Teaching mode	256-point mode	512-point mode	Solenoid valve mode 1	Solenoid valve mode 2	Standard/Movement between 2 points (single solenoid)	2 inputs/Movement among 3 points
		Input	Number of positioning points	64 points	64 points	256 points	512 points	7 points	3 points	2 points	3 points
			Home return signal	○	○	○	○	○	×	×	×
			Jog signal	×	○	×	×	×	×	×	×
			Teaching signal (writing of current position)	×	○	×	×	×	×	×	×
			Brake release	○	×	○	○	○	○	×	×
		Output	Moving signal	○	○	×	×	×	×	×	×
			Zone signal	○	×	×	×	○	○	×	×
			Position zone signal	○	○	○	×	○	○	×	×
PIO converter	1A	—		—							
	2A	—		—							
	3A	—		—							
	4A	—		—							
	5A	Input	IN0	PC1	PC1	PC1	PC1	ST0	ST0	ST0	ST0
	6A		IN1	PC2	PC2	PC2	PC2	ST1	ST1(JOG+)	—	ST1
	7A		IN2	PC4	PC4	PC4	PC4	ST2	ST2 *1	RES	RES
	8A		IN3	PC8	PC8	PC8	PC8	ST3	—	—	—
	9A		IN4	PC16	PC16	PC16	PC16	ST4	—	—	—
	10A		IN5	PC32	PC32	PC32	PC32	ST5	—	—	—
	11A		IN6	—	MODE	PC64	PC64	ST6	—	—	—
	12A		IN7	—	JISL	PC128	P128	—	—	—	—
	13A		IN8	—	JOG+	—	PC256	—	—	—	—
	14A		IN9	BKRL	JOG-	BKRL	BKRL	BKRL	BKRL	—	—
	15A		IN10	—	—	—	—	—	—	—	—
	16A		IN11	HOME	HOME	HOME	HOME	HOME	—	—	—
	17A		IN12	*STP	*STP	*STP	*STP	*STP	—	—	—
	18A		IN13	CSTR	CSTR/PWRT	CSTR	CSTR	—	—	—	—
	19A		IN14	RES	RES	RES	RES	RES	RES	—	—
	20A		IN15	SON	SON	SON	SON	SON	SON	—	—
	1B	Output	OUT0	PM1(ALM1)	PM1(ALM1)	PM1(ALM1)	PM1(ALM1)	PE0	LS0	LS0/PE0	LS0/PE0
	2B		OUT1	PM2(ALM2)	PM2(ALM2)	PM2(ALM2)	PM2(ALM2)	PE1	LS1(TRQS)	LS1/PE1	LS1/PE1
	3B		OUT2	PM4(ALM4)	PM4(ALM4)	PM4(ALM4)	PM4(ALM4)	PE2	LS2 *1	HEND	LS2/PE2
	4B		OUT3	PM8(ALM8)	PM8(ALM8)	PM8(ALM8)	PM8(ALM8)	PE3	—	*ALM	*ALM
	5B		OUT4	PM16	PM16	PM16	PM16	PE4	—	—	—
	6B		OUT5	PM32	PM32	PM32	PM32	PE5	—	—	—
	7B		OUT6	MOVE	MOVE	PM64	PM64	PE6	—	—	—
	8B		OUT7	ZONE1	MODES	PM128	PM128	ZONE1	ZONE1	—	—
	9B		OUT8	PZONE/ZONE2	PZONE/ZONE1	PZONE/ZONE1	PM256	PZONE/ZONE2	PZONE/ZONE2	—	—
	10B		OUT9	—	—	—	—	—	—	—	—
	11B		OUT10	HEND	HEND	HEND	HEND	HEND	HEND	—	—
	12B		OUT11	PEND	PEND/WEND	PEND	PEND	PEND	—	—	—
	13B		OUT12	SV	SV	SV	SV	SV	SV	—	—
	14B		OUT13	*EMGS	*EMGS	*EMGS	*EMGS	*EMGS	*EMGS	—	—
	15B		OUT14	*ALM	*LM	*ALM	*ALM	*ALM	*ALM	—	—
	16B		OUT15	LOAD/TRQS *ALML	* ALML	LOAD/TRQS *ALML	LOAD/TRQS *ALML	LOAD/TRQS *ALML	*ALML	—	—
	17B	—		—							
	18B	—		—							
	19B	—		—							
	20B	—		—							

(Note) In the table above, codes in ( ) indicate functions effective before the home return. * indicates a negative logic signal. PM1 to PM8 serve as alarm binary code output signals when an alarm occurs.

*1 These signals are invalid before the home return.

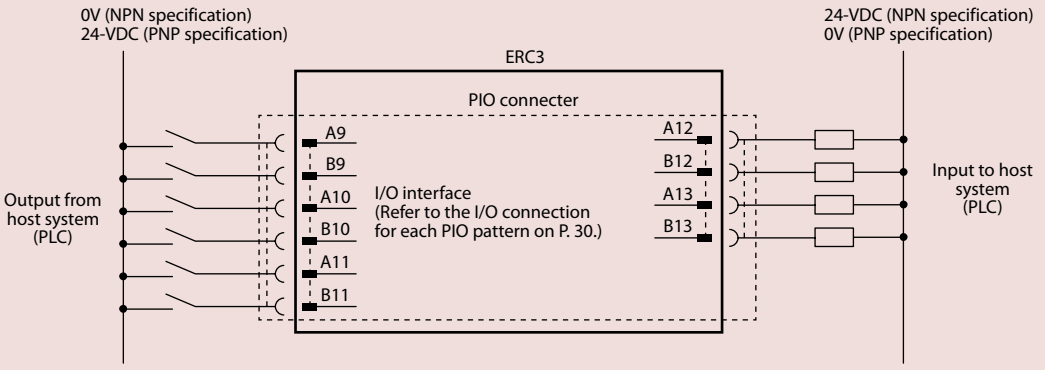
Explanation of Signal Names

Category	Signal name	Signal abbreviation	Function overview
Input	PTP strobe (start signal)	CSTR	The actuator starts moving to the position set by the command position number.
	Command position number	PC1~PC256	This signal is used to input the position number of the position to move the actuator to (binary input).
	Forced brake release	BKRL	The brake is forcibly released.
	Pause	*STP	When this signal turns OFF while the actuator is moving, the actuator will decelerate to a stop. The remaining travel is put on hold while the actuator is stopped and will resume when the signal turns ON.
	Reset	RES	Present alarms are reset when this signal turns ON. By turning ON this signal while the actuator is paused (*STP signal is OFF), the remaining travel can be cancelled.
	Servo ON	SON	The servo is ON while this signal is ON, and OFF while the signal is OFF.
	Home return	HOME	Home return operation is performed when this signal is turned ON.
	Teaching mode	MODE	The actuator switches to the teaching mode when this signal turns ON. The mode will not change unless the CSTR, JOG+ and JOG- signals are all OFF and the actuator is not operating.
	Jog/inching switching	JISL	The actuator can be jogged with a JOG+ or JOG- command while this signal is OFF. The actuator operates by inching with a JOG+ or JOG- command while this signal is ON.
	Jog	JOG + JOG –	When the JISL signal is OFF, the actuator jogs in the positive direction upon detection of the ON edge of the JOG+ signal, or in the negative direction upon detection of the ON edge of the JOG- signal. The actuator decelerates to a stop if the OFF edge is detected while jogging in each direction. The actuator operates by inching when the JISL signal is ON.
	Current position write	PWRT	When a position number is specified and this signal is turned ON for 20 ms or more in the teaching mode, the current position is written to the specified position number.
	Start signal	ST0~ST6	In the solenoid mode, the actuator moves to the specified position when this signal turns ON.
Out put	ositioning complete	PEND/INP	This signal turns ON when the actuator reaches the positioning band after moving. The PEND signal does not turn OFF even when the actuator moves beyond the positioning band, but the INP signal turns OFF. A parameter is used to switch between PEND and INP.
	Completed position number	PM1~PM256	The position number of the position reached upon completion of positioning is output (by a binary signal).
	Home return complete	HEND	This signal turns ON upon completion of home return. It will remain ON until the home position is lost.
	Zone signal 1	ZONE1	This signal turns ON when the current position of the actuator falls within the parameter-set range.
	Zone signal 2	ZONE2	
	Position zone	PZONE	This signal turns ON when the current position of the actuator enters the range set in the position data table while moving to a position. This signal can be used with ZONE1, but the PZONE signal is effective only when moving to a set position.
	Alarm	*ALM	This signal remains ON while the controller is normal, and turns OFF when an alarm occurs.
	Moving	MOVE	This signal is ON while the actuator is moving (also during home return and push-motion operation).
	Servo ON	SV	This signal is ON when the servo is ON.
	Emergency stop output	*EMGS	This signal is ON when the controller is not in the emergency stop mode, and turns OFF when an emergency stop is actuated.
	Teaching mode output	MODES	This signal turns ON when the actuator enters the teaching mode due to an input of the MODE signal. It turns OFF when the actuator returns to the normal mode.
	Write complete	WEND	This signal is OFF immediately after switching to the teaching mode, and turns ON the moment the writing per the PWRT signal is completed. This signal also turns OFF when the PWRT signal turns OFF.
	Current position number	PE0~PE6	This signal turns ON when the actuator completes moving to the target position in the solenoid mode.
	Limit switch output	LS0~LS2	This signal turns ON when the current position of the actuator enters the positioning band (±) around the target position. If the home return has been completed, this signal is output even before a move command is issued or the servo is OFF.
	Load output judgment status	LOAD	This signal turns ON when the in-certification-range command torque exceeds the threshold.
	Torque level status signal	TRQS	This signal turns ON when the motor current reaches the threshold.
	Minor failure alarm	*ALML	This signal is output when a message-level alarm generates.

(Note) In the table above, * indicates a negative logic signal.

I/O Wiring Diagram

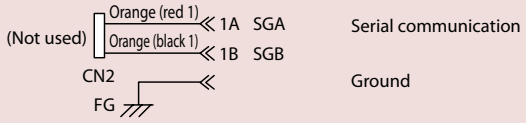
PIO 8-point Type (ERC3 and PLC Connected Directly)



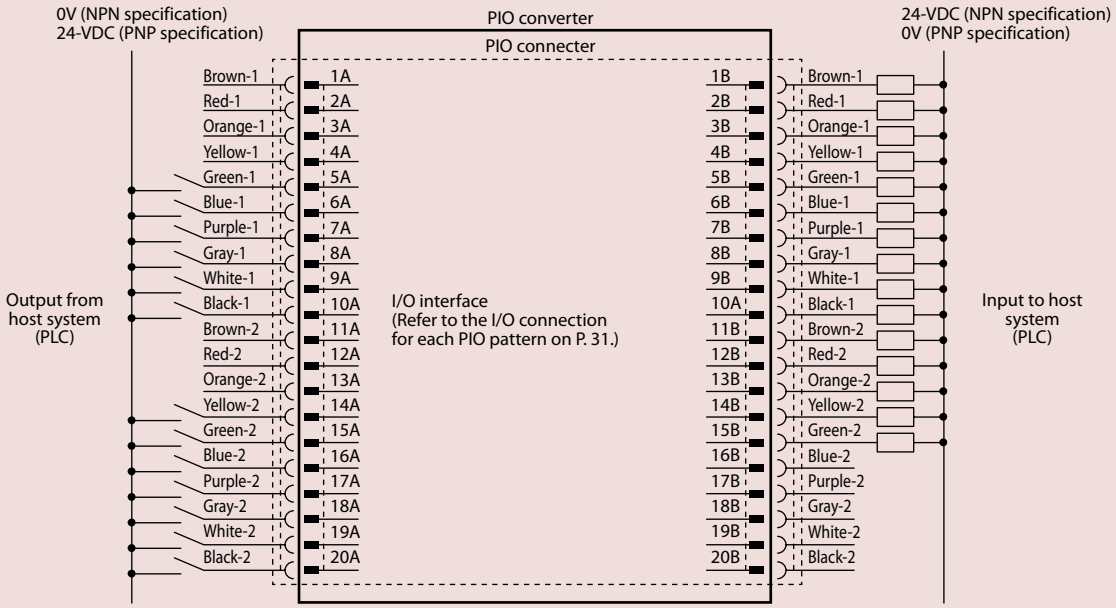
*The wire colors change as follows if a robot cable is used.

Line color	Pin number
Gray (red 1)	2A
Gray (black 1)	2B
Gray (red 2)	7A
Gray (black 2)	7B

(Note) To forcibly release the brake, provide a switch between BKR and 0V and turn it ON.



PIO Positioning Mode (Standard Type) (ERC3 and PLC Connected via PIO Converter)



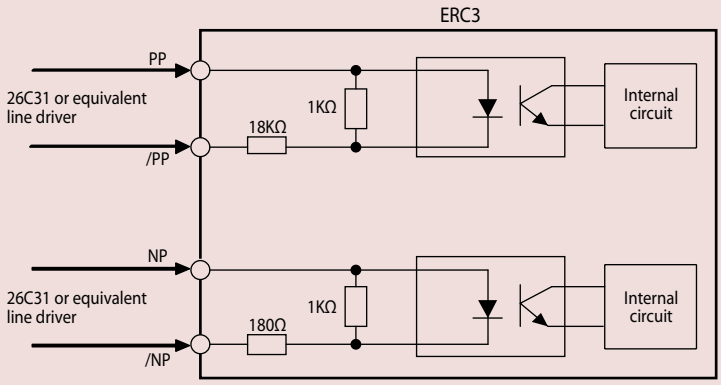
■Pulse-train control mode

I/O specification (Pulse-train type)

■Input Part

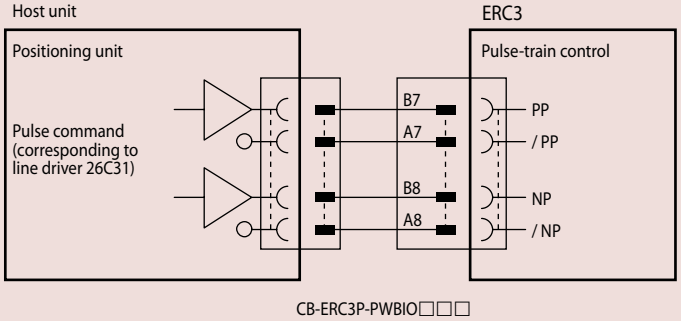
Code	Remarks
Differential input voltage range	26C31 or equivalent
Maximum cable length	Differential line driver method: 10m max. Open collector method (AK-04 used): 2m max.
Maximum number of input pulses	Differential line driver method: 200 kpps max. Open collector method (AK-04 used): 60kpps max.

* If the user-side I/O is of open collector type, use the AK-04.

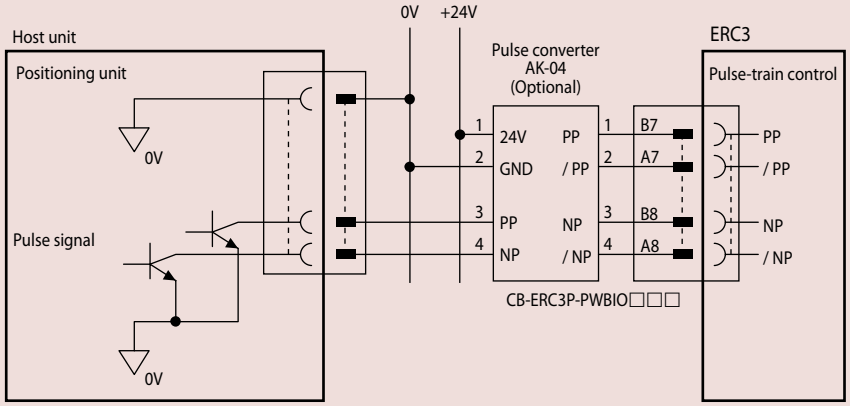


Pulse-train Control Circuit

●Host Unit = Differential Type



●Host Unit = Open Collector Type



* The AK-04 (optional) is needed to input pulses.
* Use the same power supply for open collector input/output to/from the host and for the AK-04.

I/O Signals for the Pulse-train Control Mode

The table below lists the signal assignments for the flat cable for the pulse-train control mode. Connect an external device (such as PLC) according to this table.

[1] Positioning Operation - PIO Pattern: 0

Pin number	Category	I/O number	Signal abbreviation	Signal name	Description of function
A1	Frame ground		FG	—	Frame ground.
B1	+24 V for control power supply		CP	—	+24 V of the control power supply is input.
A2				—	
B2	0 V for control power supply		GND	—	0 V of the control power supply.
A3	External brake release input		BK	—	This signal is used to release the brake externally. The brake is released when +24 V is input.
B3	+24 V for motor power supply		MP	—	+24 V of the motor power supply is input.
A4	Emergency stop input		EMG	—	Input signal for emergency stop.
B4	0 V for motor power supply		GND	—	+24 V of the motor power supply is input.
A5					
B5					
A6					
B6					
A7			/PP	Command pulse	
B7			PP	Command pulse	
A8			/NP	Command pulse	
B8			NP	Command pulse	
A9	Input	IN0	SON	Servo ON	The servo is ON while this signal is ON, and OFF while the signal is OFF.
B9		IN1	TL	Torque limit selection	When this signal is turned ON, the motor torque is limited to the value set by a parameter.
A10		IN2	HOME	Home return	Home return operation is performed when this signal is turned ON.
B10		IN3	RES	Reset	Present alarms are reset when this signal is turned ON.
A11		IN4	—		
B11		IN5	—		
A12	Output	OUT0	SV	Servo ON status	This signal turns ON when the servo is ON.
B12		OUT1	INP	Positioning complete	This signal turns ON when the amount of remaining travel pulses in the deviation counter falls within the positioning band.
A13		OUT2	HEND	Home return complete	This signal turns ON upon completion of home return.
B13		OUT3	*ALM	Controller alarm status	This signal turns ON when the controller is normal, and turns OFF when an alarm generates.

* indicates a negative logic signal. Negative logic signals are normally ON while the power is supplied, and turn OFF when the signal is output.

[2] Push-motion Operation - PIO Pattern: 1

Pin number	Category	I/O number	Signal abbreviation	Signal name	Description of function
A1	Frame ground		FG	—	Frame ground.
B1	+24 V for control power supply		CP	—	+24 V of the control power supply is input.
A2				—	
B2	0 V for control power supply		GND	—	0 V of the control power supply.
A3	External brake release input		BK	—	This signal is used to release the brake externally. The brake is released when +24 V is input.
B3	+24 V for motor power supply		MP	—	+24 V of the motor power supply is input.
A4	Emergency stop input		EMG	—	Input signal for emergency stop.
B4	0 V for motor power supply		GND	—	+24 V of the motor power supply is input.
A5					
B5					
A6					
B6					
A7			/PP	Command pulse	
B7			PP	Command pulse	
A8			/NP	Command pulse	
B8			NP	Command pulse	
A9	Input	IN0	SON	Servo ON	The servo is ON while this signal is ON, and OFF while the signal is OFF.
B9		IN1	TL	Torque limit selection	When this signal is turned ON, the motor torque is limited to the value set by a parameter.
A10		IN2	HOME	Home return	Home return operation is performed when this signal is turned ON.
B10		IN3	RES	Reset	This signal serves as a reset signal when the torque is not limited (torque TL signal is OFF). When this signal turns ON, present alarms are reset.
			DCLR	Deviation counter clear	This signal serves as a deviation counter signal when the torque is limited (torque TL signal is ON). This signal clears the deviation counter.
A11		IN4	—		
B11		IN5	—		
A12	Output	OUT0	SV	Servo ON status	This signal turns ON when the servo is ON.
B12		OUT1	INP	Positioning complete	This signal serves as a positioning complete signal when the torque is not limited (torque TL signal is OFF). It turns ON when the remaining travel pulses in the deviation counter are within the range of positioning band.
			TLR	Torque limited	This signal serves as a torque limited signal when the torque is limited (torque TL signal is ON). If the torque is limited, this signal turns ON when the torque limit is reached.
A13		OUT2	HEND	Home return complete	This signal turns ON upon completion of home return.
B13		OUT3	*ALM	Controller alarm status	This signal turns ON when the controller is normal, and turns OFF when an alarm generates.

*indicates a negative logic signal. Negative logic signals are normally ON while the power is supplied, and turn OFF when the signal is output.

Cable/Maintenance Parts

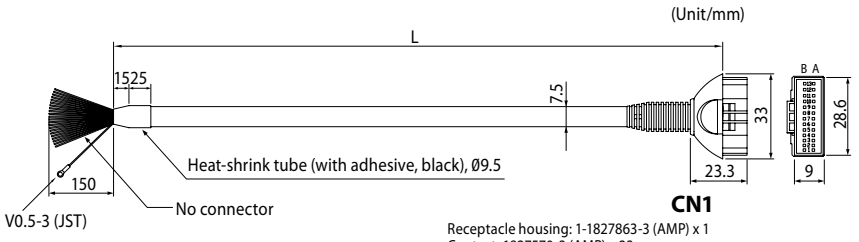
Power & I/O Cable for PIO Type

Model number **CB-ERC3P-PWBIO□□□**

*□□□ indicates the cable length (L). A desired length can be specified up to 10m. Example: 080=8m

* The standard cable is a robot cable.

Wiring	Color	Signal	No.
AWG22	Ground	FG	1



No.	Signal	Color	Wiring
A1	FG	Ground	AWG22
A2	N.C	—	—
A3	BK	Red 1	AWG28
A4	EMG	Orange 1	
A5	N.C	—	—
A6	N.C	—	—
B1	CP	Brown	AWG22
B2	CP_GND	Red	
B3	MP	Orange	AWG19
B4	MP_GND	Yellow	
B5	SA	Green	AWG28
B6	SB	Brown1	
A7	/PP	Blue	
B7	PP	Purple	
A8	/NP	Gray	
B8	NP	White	
A9	IN0	Brown2	
B9	IN1	Red2	
A10	IN2	Orange2	
B10	IN3	Yellow2	
A11	IN4	Green2	
B11	IN5	Blue2	
A12	OUT0	Purple2	
B12	OUT1	Gray2	
A13	OUT2	White2	
B13	OUT3	Black	

Minimum bending R r = 45mm or more (when movable type is used)

Power & I/O Cable for SIO Type

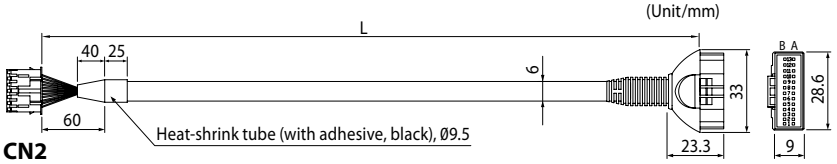
Model number **CB-ERC3S-PWBIO□□□**

*□□□ indicates the cable length (L). A desired length can be specified up to 10m. Example: 080=8m

* The standard cable is a robot cable.

Wiring	Color	Signal	No.
AWG28	Brown1	SB	1
	Green	SA	2
	Orange1	EMG	3
	Red1	BK	4
	Green1	BAT	5
AWG22	Yellow1	BGND	6
	Brown	CP	7
	Red	CP_GND	8
AWG19 (AWG22)	Orange	MP	9
	Yellow	MP_GND	10
—	—	N.C	11
—	—	N.C	12
—	—	N.C	13
AWG22	Ground	FG	14

Wiring	Color	Signal	No.
A1	FG	Ground	AWG22
A2	–	–	–
A3	BK	Red 1	AWG28
A4	EMG	Orange 1	
A5	BGND	Yellow 1	AWG22
A6	BAT	Green1	AWG28
B1	CP	Brown	AWG22
B2	CP_GND	Red	
B3	MP	Orange	AWG19
B4	MP_GND	Yellow	
B5	SA	Green	AWG28
B6	SB	Brown 1	
A7	N.C	—	—
B7	N.C	—	—
A8	N.C	—	—
B8	N.C	—	—
A9	N.C	—	—
B9	N.C	—	—
A10	N.C	—	—
B10	N.C	—	—
A11	N.C	—	—
B11	N.C	—	—
A12	N.C	—	—
B12	N.C	—	—
A13	N.C	—	—
B13	N.C	—	—



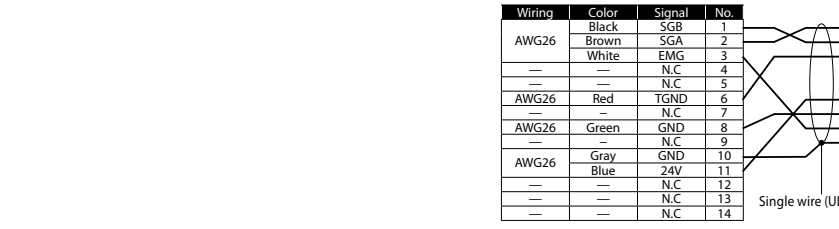
Minimum bending R r = 36 mm or more (when movable type is used)

SIO Communication Cable (for Quick Teach)

Model number **CB-PST-SIO050**

Wiring	Color	Signal	No.
AWG26	Black	SGB	1
	Brown	SGA	2
	White	EMG	3
—	—	N.C	4
—	—	N.C	5
AWG26	Red	TGND	6
—	–	N.C	7
AWG26	Green	GND	8
—	–	N.C	9
AWG26	Gray	GND	10
	Blue	24V	11
—	—	N.C	12
—	—	N.C	13
—	—	N.C	14

No.	Signal	Color	Wiring
1	SGA	Brown	AWG26
2	SGB	Black	
3	SV	Red	
4	N.C	—	
5	N.C	—	
6	24V	Yellow	AWG26
7	GND	Green	
8	EMGB	White	
GND		Shield	—



Options

PIO Converter

The PIO converter is a wiring/power supply unit used exclusively with the ERC3 series.
By connecting the PIO converter to the ERC3 series, functions of the ERC3 series can be extended.

Features

- The compact size (25W x 90H x 98D) saves space.
- Can be installed on a DIN rail or removed with a single action.
- Comes with a PIO interface offering 16 input points/16 output points. NPN and PNP specifications are available.
- Brake release switch on the front panel.
- Comes with SIO terminals. Teaching of ERC3-series actuators is possible from the teaching pendant or PC software.
- LEDs on the front panel indicate the command current ratio, alarm code and PIO status (optional).
- When combined with an ERC3 actuator of absolute specification, the simple absolute function is supported (optional).
- Comes with a calendar function. (Connecting the PIO converter enables the calendar function of the ERC3.)

Model Configuration

RCB Series — Type — I/O type — I/O cable length — Simple absolute function supported

Type	
CV	Built-in power cutoff relay type (standard)
CVG	External power cutoff relay type

I/O type	
NP	NPN specification (without monitoring LEDs)
PN	PNP specification (without monitoring LEDs)
NPM	NPN specification (with monitoring LEDs)
PNM	PNP specification (with monitoring LEDs)

* Select "NPM/PNM" if you want to use the functions of monitoring LEDs on the front panel.

I/O cable length	
0	No cable
2	With 2m cable
3	With 3m cable
5	With 5m cable

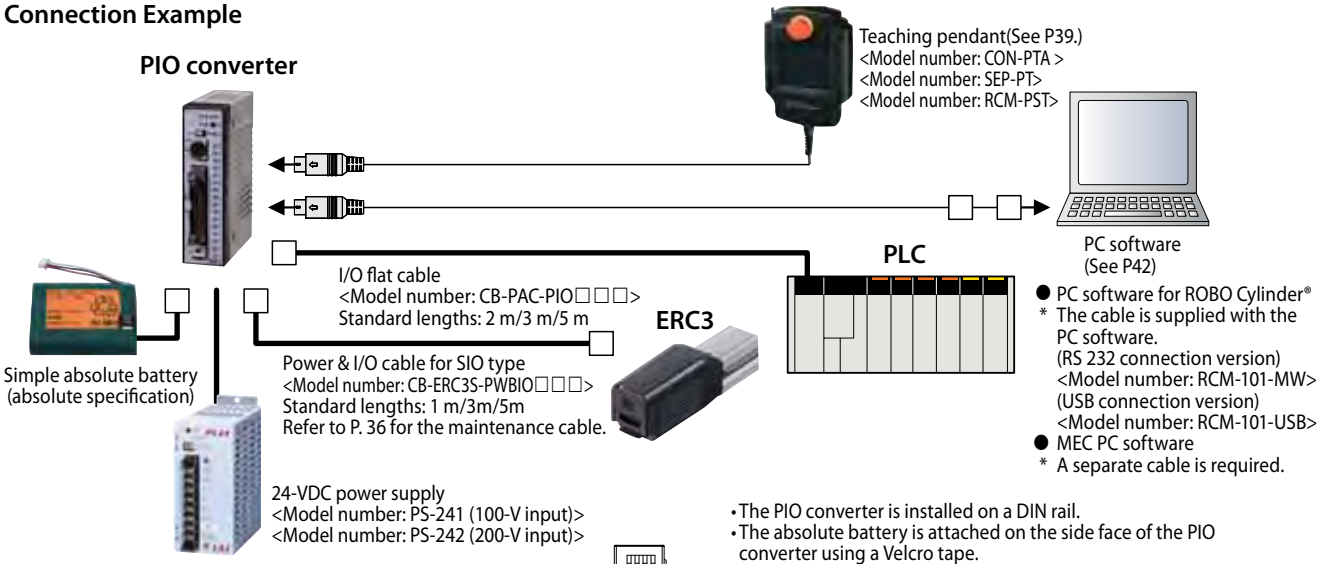
Simple absolute function supported	
(No entry)	Simple absolute function not supported (for incremental specification only)
AB	Simple absolute function supported (with simple absolute battery)
ABUN	Simple absolute function supported (without simple absolute battery

Base Specifications

Item		Description
Number of connected axes		ERC3 1 axis
Power supply voltage		24VDC±10%
Control power capacity		0.8A max.
Heat output		1.3W
Momentary power failure resistance		500μs max.
Serial communication interface (SIO port)		RS485: 1 channel (conforming to Modbus protocol RTU/ASCII) / Speed: 9.6 to 230.4 kbps Actuators can be controlled via serial communication.
External interface		Dedicated 24-VDC signal input/output (NPN or PNP selected)—Up to 16 input points, up to 16 output points / Cable length: 10 m max.
Data setting/input method		PC software, touch-panel teaching pendant
Operation Mode		Positioner mode
Number of positions in positioner mode		Standard 64 points, maximum 512 points Note) Positioning points vary depending on the selected PIO pattern.
LED display (installed on the front panel)		Status indicator LED - Steady green light: Servo ON / Blinking green light: Auto servo OFF / Steady red light: Alarm present Absolute battery status indicator LED - Green: Fully charged / Orange: Charging / Red: Not connected Absolute reset status LED - Green: Absolute reset complete / Red: Absolute reset not yet complete LED0 to LED15 (optional): 4 different statuses can be indicated by changing the switch setting. Command current ratio, alarm code, PIO input status, PIO output status
Electromagnetic brake forced release switch (installed on the front panel)		Switched between NOM (standard) and BK RLS (forced releases)
Isolation resistance		500VDC, 10MΩ or more
Electric shock protection mechanism		Class I basic isolation
Cooling method		Natural air cooling
Environment	Ambient operating temperature	0 to 40°
	Ambient operating humidity	85%RH or less (non-condensing)
	Ambient storage temperature	−20 to 70° (excluding batteries)
	Operating altitude	Altitude 1000m or less
	Protection degree	IP20
	Vibration resistance	Number of vibrations: 10 to 57 Hz / Amplitude: 0.075 mm Number of vibrations: 57 to 150 Hz / Acceleration: 9.8 m/s^2 Sweep time in X/Y/Z directions: 10 minutes / Number of sweeps: 10 times
	Weight	103g or less, or 287g (including 190g for the battery) or less for the simple absolute specification
	External Dimensions	25W×90H×98D
Consumable parts		RTC backup capacitor: Approx. 5 years* Drive-source cutoff relay: Approx. 100,000 actuations Absolute battery: Approx. 3 years

*When the power is supplied 12 hours a day at an ambient temperature of 40°C and the actuator is stopped (power turned off) 12 hours a day in an ambient temperature of 20°C.

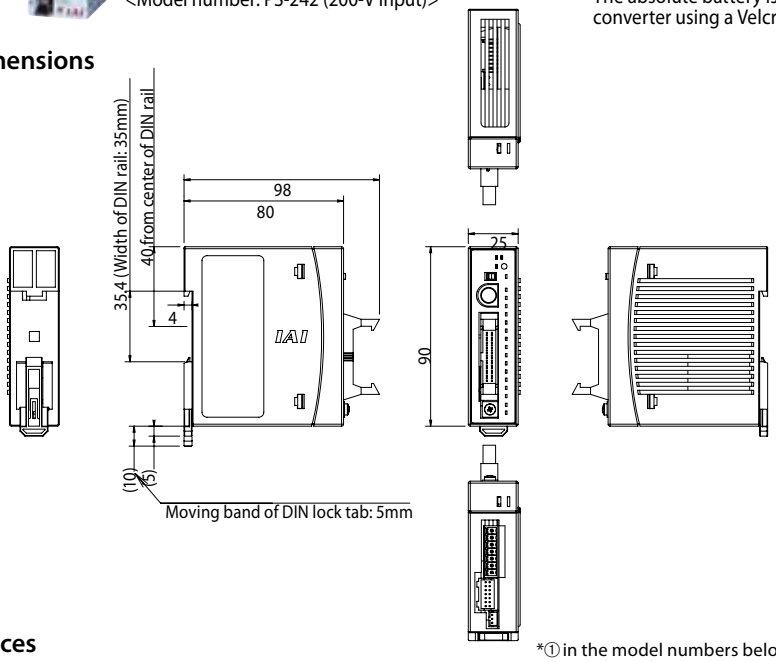
Connection Example



- PC software for ROBO Cylinder®
  * The cable is supplied with the PC software.
  (RS 232 connection version)
  <Model number: RCM-101-MW>
  (USB connection version)
  <Model number: RCM-101-USB>
- MEC PC software
  * A separate cable is required.

- The PIO converter is installed on a DIN rail.
- The absolute battery is attached on the side face of the PIO converter using a Velcro tape.

External Dimensions



Standard Prices

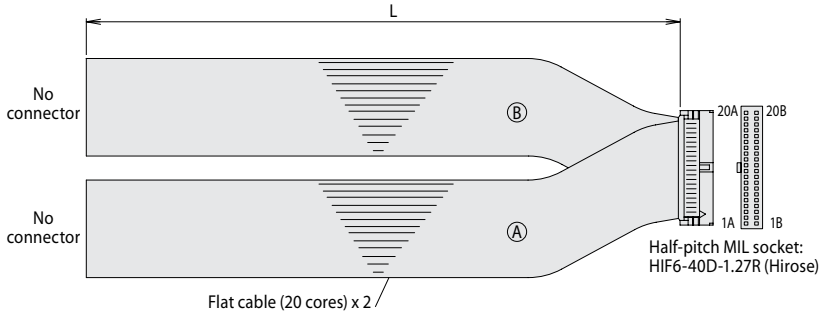
*① in the model numbers below represents the number indicating I/O cable length.

Power cut-off relay	Monitoring LEDs	Positoning method	Model Numbers	Standard Prices
Built-in type	N/A	Incremental specification	RCB-CV-(NP/PN)-①	—
		Simple absolute specification (with battery)	RCB-CV-(NP/PN)-①-AB	—
		Simple absolute specification (without battery)	RCB-CV-(NP/PN)-①-ABUN	—
	Available	Incremental specification	RCB-CV-(NPM/PNM)-①	—
		Simple absolute specification (with battery)	RCB-CV-(NPM/PNM)-①-AB	—
		Simple absolute specification (without battery)	RCB-CV-(NPM/PNM)-①-ABUN	—
External type	N/A	Incremental specification	RCB-CVG-(NP/PN)-①	—
		Simple absolute specification (with battery)	RCB-CVG-(NP/PN)-①-AB	—
		Simple absolute specification (without battery)	RCB-CVG-(NP/PN)-①-ABUN	—
	Available	Incremental specification	RCB-CVG-(NPM/PNM)-①	—
		Simple absolute specification (with battery)	RCB-CVG-(NPM/PNM)-①-AB	—
		Simple absolute specification (without battery)	RCB-CVG-(NPM/PNM)-①-ABUN	—

I/O Flat Cable

Model number **CB-PAC-PIO□□□**

*□□□ indicates the cable length (L). A desired length can be specified up to 10m. Example: 080=8m



HIF6-40D-1.27R

No.	Signal name	Cable color	Wiring
1A	-	Brown - 1	Flat cable Ⓐ (crimped)
2A	-	Red - 1	
3A	-	Orange - 1	
4A	-	Yellow - 1	
5A	IN0	Green - 1	
6A	IN1	Blue - 1	
7A	IN2	Purple - 1	
8A	IN3	Gray - 1	
9A	IN4	White - 1	
10A	IN5	Black - 1	
11A	IN6	Brown - 2	
12A	IN7	Red - 2	
13A	IN8	Orange - 2	
14A	IN9	Yellow - 2	
15A	IN10	Green - 2	
16A	IN11	Blue - 2	
17A	IN12	Purple - 2	
18A	IN13	Gray - 2	
19A	IN14	White - 2	
20A	IN15	Black - 2	

No.	Signal name	Cable color	Wiring
1B	OUT0	Brown - 3	Flat cable Ⓑ (crimped) AWG 28
2B	OUT1	Red - 3	
3B	OUT2	Orange - 3	
4B	OUT3	Yellow - 3	
5B	OUT4	Green - 3	
6B	OUT5	Blue - 3	
7B	OUT6	Purple - 3	
8B	OUT7	Gray - 3	
9B	OUT8	White - 3	
10B	OUT9	Black - 3	
11B	OUT10	Brown - 4	
12B	OUT11	Red - 4	
13B	OUT12	Orange - 4	
14B	OUT13	Yellow - 4	
15B	OUT14	Green - 4	
16B	OUT15	Blue - 4	
17B	—	Purple - 4	
18B	—	Gray - 4	
19B	—	White - 4	
20B	—	Black - 4	

Notes on Selecting Teaching Pendant and PC Software

With the ERC3 series, usable teaching pendant and PC software vary depending on the controller type (CON type/MEC type). Refer to P.14 for controller types.

Teaching pendant

Controller type	CON-PTA	RCM-PST	SEP-PT
CON type	○	△	—
MEC type	○	○	○

PC software

Controller type	RCM-101-MW	RCM-101-USB	MEC PC software
CON type	○	○	—
MEC type	—	—	○

○: All functions are supported / △: Limited functions are supported (home return, servo ON/OFF, JOG+, JOG-, stop (press and hold to reset alarms))

Options

Quick Teach

A teaching pendant equipped with intuitive operation buttons and acceleration/speed knobs that can be used easily even by mechanical engineers and those who never operated a robot before.

Features
- User-friendly panel sheet switches and knobs let you complete the settings in no time.
- The small pendant can be held in a hand.
- Separate power-supply unit

Model configuration

RCM — [Unit name] — [Input power supply] — [Panel language]

Series

Unit name	
PST	Product unit
PS	Power-supply unit

Input power supply	
0	24 VDC (24-V power-supply specification, without power-supply unit)
1	Single-phase 100 to 115 VAC (100-V power-supply specification)
2	Single-phase 100 to 230 VAC (200-V power-supply specification)
EU	Single-phase 100 to 230 VAC (200-V power-supply specification for Europe)

Panel language	
(No entry)	Japanese version
ENG	English version

Base Specifications

Item		Description			
Product name		24-VDC specification	100-VDC specification	200-VDC specification	200-V power-supply specification for Europe (Note 2)
Product model		RCM-PST-0	RCM-PST-1	RCM-PST-2	RCM-PST-EU
Product configuration	Teaching pendant	RCM-PST-0			
	Power-supply unit	– (Teaching pendant only)	RCM-PS-1	RCM-PS-2	RCM-PS-EU
Power supply voltage		24 VDC±10% (DC 21.6V to DC 26.4V)	Single-phase 100 to 115 VAC±10% (AC 90V to AC 126.5V)	Single-phase 100 to 230 VAC±10% (AC 90V to AC253 V)	Single-phase 100 to 230 VAC±10% (AC 90V to AC 126.5V)
Load capacity (motor power capacity) of connected ERC3 (Note 1)	ERC3	Rated		Maximum	
	42P	1.2A		2.0A	
	56P	1.2A		2.0A	
Number of controlled axes		1 axis			
Environment conditions		Operating temperature range: 0 to 40°C Operating humidity range: 85% RH or less (non-condensing) Storage temperature range: -20°C to 70°C			
Protection degree		IP20			
Power-supply frequency		50Hz/60Hz			
Pollution degree		Pollution degree 2			
Leak current		—	0.5mA max	0.75mA max	
Cooling method		Natural air cooling			
Cable length		Actuator cable: 10m or less AC cable: 2m SIO communication cable (optional): 5m			
Product size		65 (W) x 157 (H) x 21.6 (D)	65 (W) x 157 (H) x 64.4 (D)		
Weight *Excluding connection cables		120g	540g	535g	
Standard price		—	—	—	—

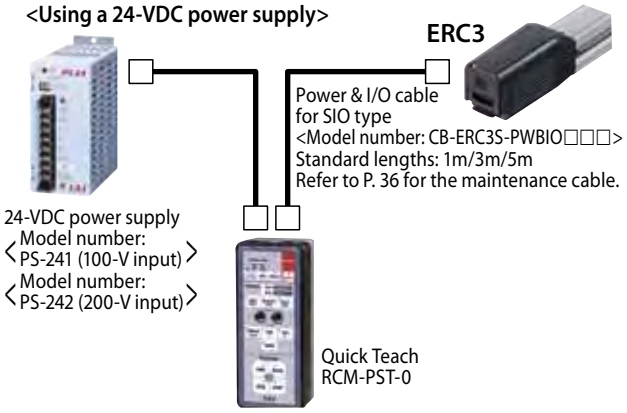
Note 1) If an ERC3 actuator whose high-output setting is enabled is used to perform test run using the Quick Teach connected to the above power-supply unit, the ERC3 may not operate as specified. (Position data can be edited without problems.)
If test run is performed with the actuator's high-output setting enabled, connect a 24-VDC power supply to the Quick Teach. In this case, disconnect the power-supply unit.

Note 2) The CE Mark-compliant 200-V power-supply specification for Europe will be released soon.

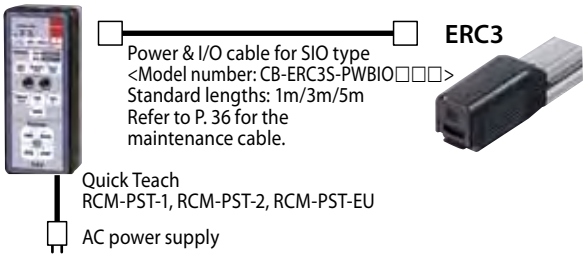
Connection Example

■ Supplying power from the Quick Teach to the ERC3

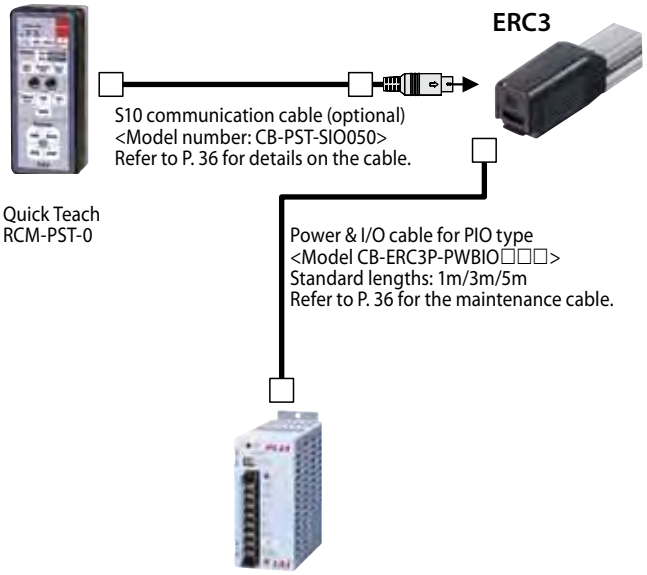
<Using a 24-VDC power supply>



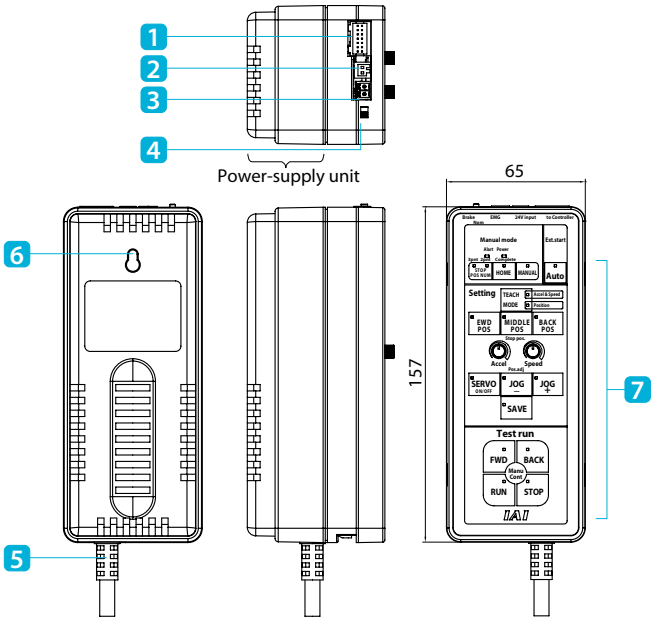
<Using a 100/200-VAC power supply>

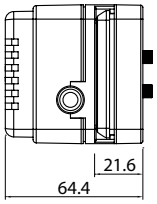


■ Connecting the Quick Teach to the ERC3 supplied with power



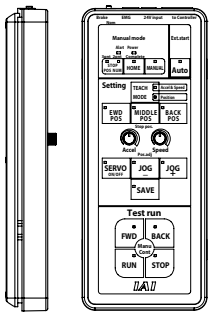
Name and Function of Each Part/External Dimensions



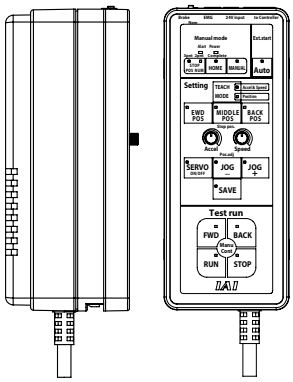


Shown above are the external dimensions of the Quick Teach with power-supply unit (model number: RCM-PST-1/2/EU).
The 24-V power-supply specification (model number: RCM-PST-0) has no power-supply unit.

<Quick Teach and Model Numbers>



Model number: RCM-PST-0
(24-VDC specification)



Model number: RCM-PST-1
RCM-PST-2
RCM-PST-EU
(Power-supply unit specifications)

1	ERC3 connector	For cable connection with the ERC3.
2	External 24-V connector	24 VDC±10%. * Supplied with a plug connector.
3	Emergency stop connector	Connect an emergency stop switch. * Supplied with a plug connector.
4	Brake switch	Forced release switch for an actuator with brake.
5	AC input cable	Single-phase 100 or 230-V input. * Varies depending on the product.
6	Wall-mounting hook	The hook can be secured with M3 or equivalent screws or bolts (screw head size: Ø6 or less).
7	Operation switches	Panel sheet switches

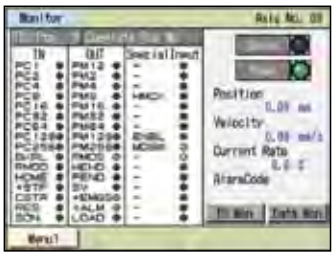
Options

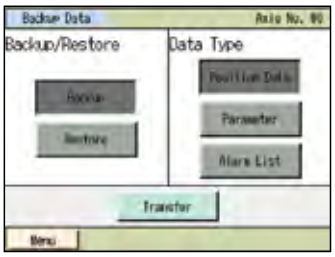
Touch-panel Teaching Pendant for Position Controller

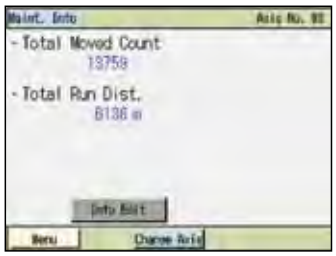
Developed based on the design of the popular CON-PT series adopting an easy-to-use interactive touch-panel menu screen, this new data input device supports various functions offered by the PCON-CA controller.

1. Color screen for greater ease of view
2. Supporting the takt time minimization function and maintenance information checking/ input functions of the PCON-CA
3. Position, parameters and other data can be saved in a SD card
4. Built-in clock function records the date & time of each event; data can then be saved in a SD card.

CON-PTA







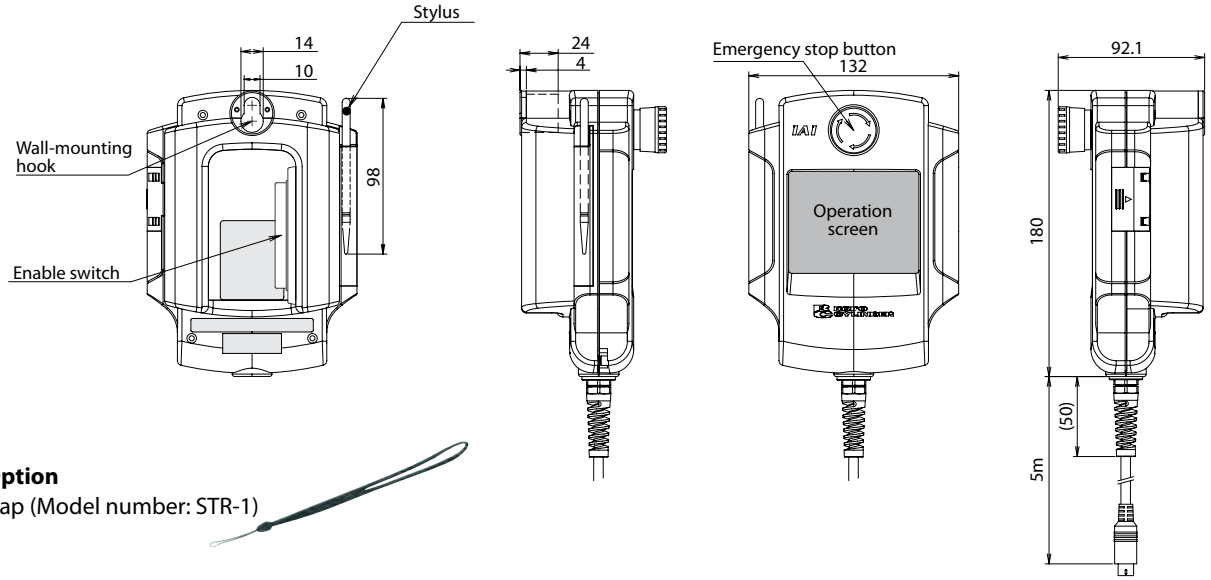
Model Numbers/Specifications

Item	Description		
Model number	CON-PTA-C-ENG	CON-PDA-C-ENG	CON-PGA-C-S-ENG
Type	Standard type	Enable switch type	Safety-category compliant type
Connectable controllers	ACON/PCON/SCON/RACON/RPCON ASEP/PSEP AMEC/PMEC ERC2 (*1) /ERC3		
3-position enable switch	×	○	○
Functions	• Position data input/editing • Moving function (moving to set positions, jogging/inching) • Parameter editing • Monitoring (current position, current speed, I/O signals, alarm code, alarm generation time) • Saving/reading data to/from external SD cards (position data parameters, alarm list) • Takt time minimization function • Maintenance information (total number of movements, total distance travelled, etc.)		
Display	65536 colors (16-bit colors), white LED backlight		
Ambient operating temperature/humidity	0 to 50°C, 20 to 80% RH (non-condensing)		
Environmental resistance	IP40 or equivalent		
Mass	Approx. 570g	Approx. 600g	
Cable length	5m		
Accessories	Stylus	Stylus	Stylus, TP adapter (Model number: RCB-LB-TG) Dummy plug (Model number: DP-4) Controller cable (Model number: CB-CON-LB005)

*1 Among the ERC2 series, only the actuators bearing 4904 or greater number stamped on the serial number label can be connected.

Name of Eeach Part

■ Name of Each Part/External Dimensions



■ Option

• Strap (Model number: STR-1)

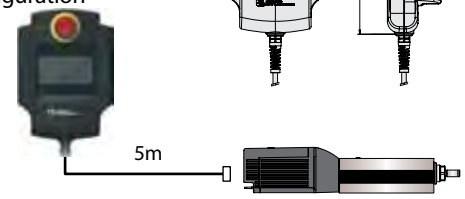
Options

Touch-panel Teaching Pendant for Position Controller SEP-PT

Features Teaching device offering position input, test run, monitoring and other functions.
* This teaching pendant can be used when the ERC3's controller type is set to "MEC type."

SEP-PT version 3.00 or later is supported.

Configuration



Specifications

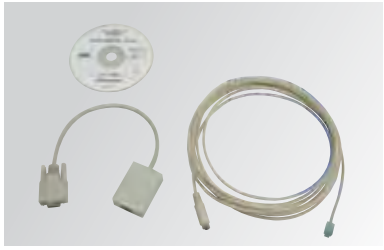
Item	SEP-PT
Data input	○
Actuator operation	○
Ambient operating temperature/humidity	Temperature 0 to 40°C, humidity 85%RH or less
Operating ambience	Free from corrosive gases or significant powder dust.
Protection degree	IP40
Mass	Approx. 550g
Cable length	5m
Display	3-color LED touch panel with backlight
Standard price	—

PC Software (Windows Only)

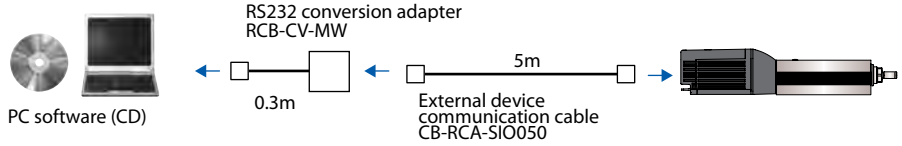
SEP-PT version 8.03.00.00 or later is supported.

Features This startup support software provides functions to input positions, perform test runs and monitor data, among others.
Incorporating all functions needed to make adjustments, this software helps shorten the initial startup time.
* This teaching pendant can be used when the ERC3's controller type is set to "CON type."

Model number **RCM-101-MW**
(With external device communication cable + RS232 conversion unit)

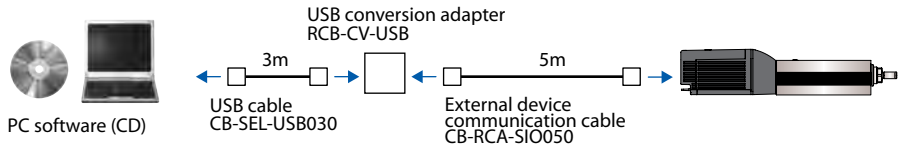


Configuration



Model number **RCM-101-USB**
(With external equipment communication cable + USB conversion adapter + USB cable)

Configuration



MEC PC Software

You can change the stop position data, perform test run and do many other things on a PC using the MEC PC software. This software also lets you use the middle stop function, perform push-motion operation, change the coordinates, etc., with ease.
The MEC PC software can be downloaded on the IAI's website.

The MEC PC software can be used with the version 2.00.00.00 or later.

IAI's website: www.intelligentactuator.com

* This teaching pendant can be used when the ERC3's controller type is set to "MEC type."

The cable supplied with the above "PC software (RCM-101-MW/RCM-101-USB)" can be used to connect the PC and ERC3 series.
To purchase a cable separately, select an appropriate cable/adapter by referring to the table below.

PC connection method	Model	Name	Price
RS232	CB-RCA-SIO050	External device communication cable	—
	RCB-CV-MW	RS232 conversion adapter	—
USB	CB-RCA-SIO050	External device communication cable	—
	RCB-CV-USB	USB conversion adapter	—
	CB-SEL-USB030	USB cable	—

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The information contained in this product brochure may change without prior notice due to product improvements.