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GB

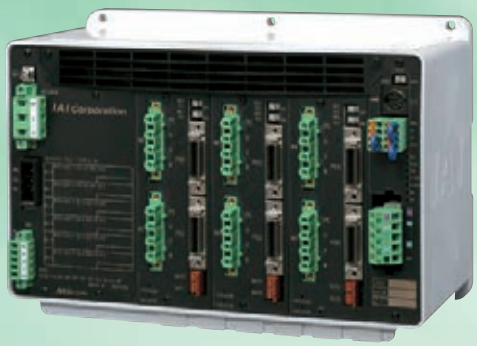
RCS2/RCS3/Single-axis Robot Field Network Position Controller SCON Series 6-axis Type

MSCON

www.intelligentactuator.de

Combining six RCS2/RCS3 position controllers into one unit

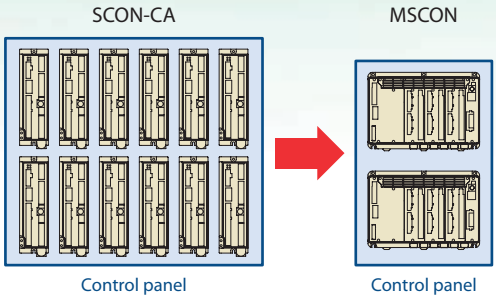
Space-saving, low-cost dedicated network multi-axis controller



1 Space-saving, low-cost, and easy to use

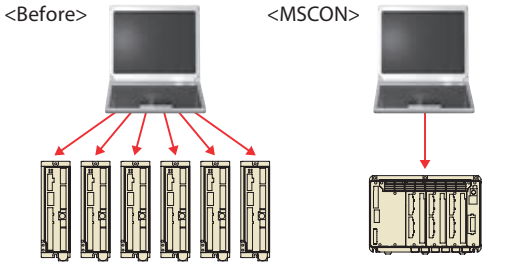
Six RCS2/RCS3 (SCON-CA) controllers are combined into one unit to save the installation space and achieve cost reduction.

In implementations where many SCON controllers are used, switching to MSCON controllers will save the controller installation space to a half or even less. As the controller panel size becomes smaller, cost drops.



<Easy Teaching>

When teaching the moving position of each axis, the SCON controller requires that the teaching tool (cable) be disconnected from/connected to each controller one by one. With the MSCON controller, all you need is to switch the screen to change the data input axis, which saves the adjustment time.



<Actuators Supported by MSCON>

	RoboCylinder <RCS2 series>	RoboCylinder <RCS3 series>	Single-axis robot <ISA/ISB series, NS series, RS series, etc.>
12W			
20W			
30W			
60W			
100W			
150W			
200W			

* Linear motors (LSA series) are not supported.

2 Movement by numerical specification via Field network Substantially shorter transmission time

MSCON controllers can be connected directly to key field networks such as DeviceNet, CC-Link, PROFIBUS-DP, PROFINET IO, CompoNet, EtherCAT and Ethernet/IP.

Features of Network Specification

- 256 positioning points per axis
- Moving the actuator after numerically specifying the position to move to, and the speed
- Checking the current position in real time
- Significantly shorter communication time within the controller (approx. one-sixth compared to conventional controllers)

3 Offboard tuning function to enhance actuator payload capacity

The offboard tuning function increases the acceleration/deceleration speed when the load is small, and decreases the acceleration/deceleration when the load is large, to ensure optimal operation settings according to the load.

4 Vibration control function for shorter cycle time

The vibration control function has been added to prevent the work from shaking (vibrating) on the actuator slider as the slider moves. The wait time for vibration to stabilize is shorter and the cycle time can also be shortened.

5 Calculating the total number of moves and total distance travelled to alert when maintenance is due

The total number of times the actuator has moved, and total distance travelled, are calculated and recorded in the controller, and a signal will be output to an external device once the preset count or distance is exceeded. This function lets you know when to add grease or carry out periodic inspection.

6 Calendar function to save alarm generation times

The additional clock function makes it easy to analyze alarms as the alarm history is based on time of generation.
(Time data will be retained for 10 days after the power is turned off.)

Model List

Model		MSCON-C						
External view								
I/O type		DeviceNet connection specification	CC-Link connection specification	PROFIBUS connection specification	CompoNet connection specification	PROFINET connection specification	EtherCAT connection specification	EtherNet/IP connection specification
I/O type model code		DV	CC	PR	CN	PRT	EC	EP
Applicable encoder type		Incremental/Absolute						
Field network type specifications	Communication Protocol	DeviceNet 2.0	CC-Link 1.1 or 2	ProfiBus-DP	CompoNet specialized protocol	IEC61158 (IEEE802.3), IEC61784	IEC61158 type 12	IEC61158 (IEEE802.3)
	Baud Rate	Automatically follows the master	10M/5M/2.5M/ 625K/156kbps	Automatically follows the master	Automatically follows the master	100Mbps	Automatically follows the master	10BASE-T/ 100BASE-T (Autonegotiation setting is recommended)
	Communications Cable	Use the dedicated cable	Use the dedicated cable	STP cable AWG18	Round-type cable (JIS C3306, VCTF2 conductors) Flat cable I (with no sheathed) Flat cable II (sheathed)	Category 5e or higher (Double shielded cable braided with aluminum foil recommended)	Category 5e or higher (Double shielded cable braided with aluminum foil recommended)	Category 5e or higher (Double shielded cable braided with aluminum foil recommended)
	Connector	MSTBA2.5/5-G-5.08-ABGY AU (Manufactured by PHOENIX CONTACT or equivalent)	MSTBA2.5/5-G-5.08 AU (Manufactured by PHOENIX CONTACT or equivalent)	9 pin female D-sub Connector	XW7D-PB4-R (Manufactured by OMRON or equivalent)	RJ45 Connector x1pc (per connector)	RJ45 Connector x 2pc (Input x1, Output x1)	RJ45 Connector x1pc (per connector)

Model Description

MSCON – C – [ ] – [ ] [ ] [ ] – ([ ] [ ] [ ]) – [ ] – 0 – [ ]

MSCON Series | C: Type | Number of axes | Motor | Encoder | Option | (Specs for 1st axis) | Motor | Encoder | Option | (Specs for axis 2 - 6) | I/O type | 0: I/O cable length | Power/ voltage

Number of axes	
1	Single-axis model
2	2-axis model
3	3-axis model
4	4-axis model
5	5-axis model
6	6-axis model

Motor	
12	12W servo motor
20	20W servo motor
30D	30W servo motor
30R	30W servo motor (RS series)
60	60W servo motor
100	100W servo motor
150	150W servo motor
200	200W servo motor

Encoder	
I	Incremental
A	Absolute

Option	
HA	High acceleration/ deceleration type

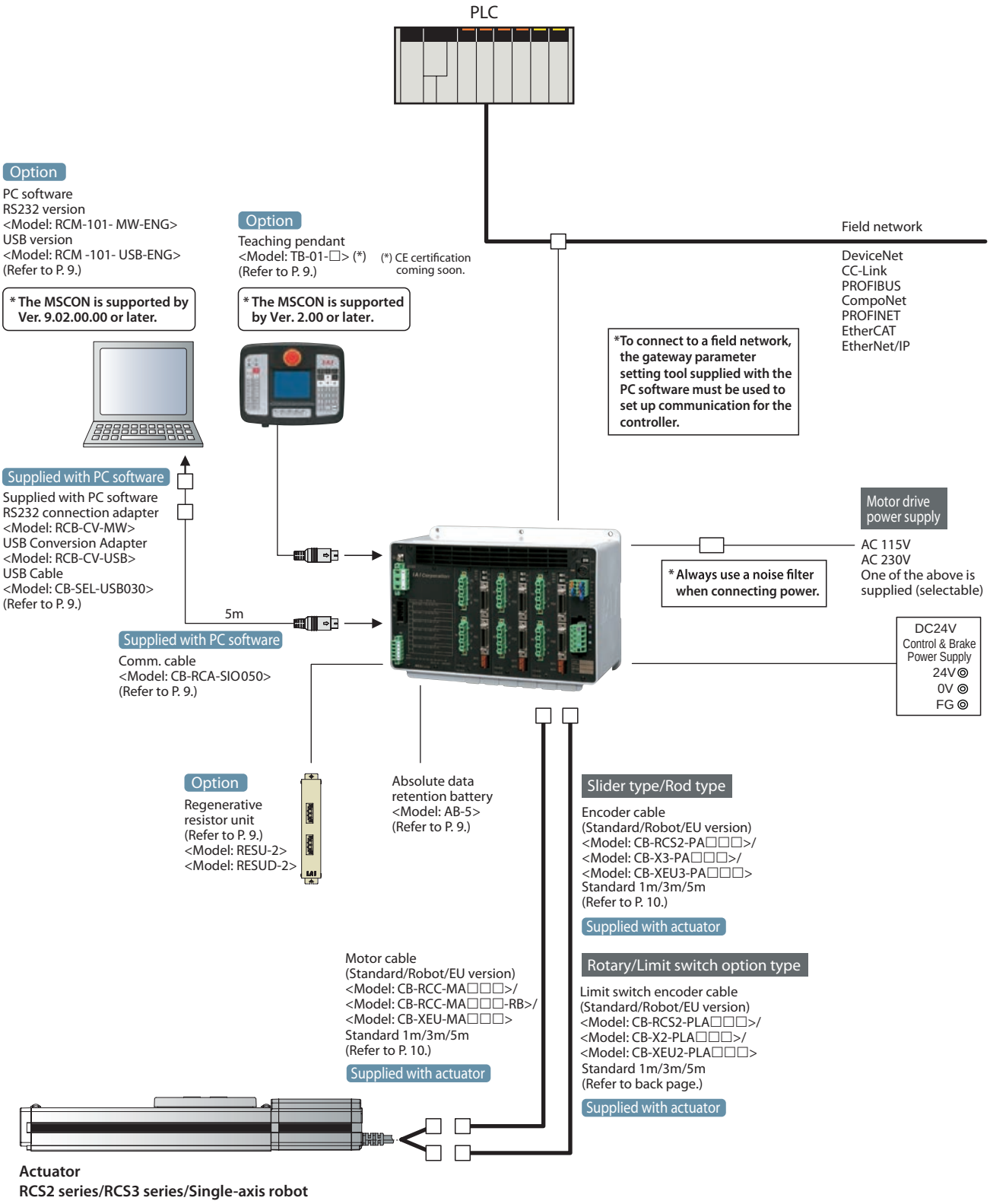
I/O type	
DV	DeviceNet connection specification
CC	CC-Link connection specification
PR	PROFIBUS-DP connection specification
CN	CompoNet connection specification
PRT	PROFINET IO connection specification
EC	EtherCAT connection specification
EP	EtherNet/IP connection specification

I/O cable length	
0	No cable

* The MSCON is available only in network specifications and does not come with I/O cables.

Power/ voltage	
1	AC115V
2	AC230V

System Configuration



Note Take note that the following models are not supported by the MSCON:
All linear motor models (LSA series), RCS2-RN5N/RP5N/GS5N/GD5N/SD5N/TCA5N/TWA5N/TFA5N/SRA7BD/SRGS7BD/SRGD7BD, NS-SXM□/SZM□ (both incremental specifications only)

Operation Mode

When the MSCON is controlled via a field network, one of the following seven operation modes can be used. The necessary data areas on the PLC side vary depending on the mode, so please consult the MSCON controller manual or contact IAI before use.

Mode	Description
Simple direct input mode	The target position is specified by directly entering a value, while other operating conditions (speed, acceleration, etc.) are set by specifying the desired position number corresponding to the desired operating conditions already input to the position data table.
Positioner 1 mode	The target position, speed, acceleration/deceleration, etc., are input to the position data table of the controller and input position numbers are specified to operate the actuator (maximum 256 points). The current position can be read, as well.
Direct input mode	The actuator is operated by specifying the target position, speed, acceleration/deceleration, push current control value, etc., by directly entering values. The current position, current speed, command current, etc., can also be read.
Direct input mode 2	Same as the direct input mode, except that jog operation is not supported and vibration control is added.
Positioner 2 mode	Same as the positioner 1 mode, except that the target position is not specified and reading of current position not supported, in order to reduce the amount of data to be transmitted/received.
Positioner 3 mode	Same as the positioner 2 mode, with the amount of data to be transmitted/received reduced further to allow for actuator operation with minimum input/output signals.
Remote I/O mode (*)	In this mode, the actuator is operated by controlling the ON/OFF of bits via the network, just like with the PIO specification. The number of positioning points and functions vary with each of the operation patterns (PIO patterns) that can be set by the controller's parameter.

(*) Take note that if the remote I/O mode is selected, all axes will operate in the remote I/O mode.

List of Functions for Operation Mode

	Simple direct input mode	Positioner 1 mode	Direct input mode	Direct input mode 2	Positioner 2 mode	Positioner 3 mode
Number of positions	Unlimited	256 points	Unlimited	Unlimited	256 points	256 points
Home return operation	○	○	○	○	○	○
Positioning operation	○	△	○	○	△	△
Speed & acceleration/ deceleration setting	△	△	○	○	△	△
Pitch feed (inching)	△	△	○	○	△	△
Push-motion operation	△	△	○	○	△	△
Speed change during movement	△	△	○	○	△	△
Pause	○	○	○	○	○	○
Zone signal output	△	△	△	△	△	△
Vibration control	△	△	—	○	△	△
Reading of current value	○	○	○	○	—	—
Selection of PIO pattern	—	—	—	—	—	—

*○ indicates that direct setting is possible; △ indicates that position data or parameter must be input; and — indicates that the function is not supported.

	Remote I/O mode				
	Positioning mode	Teaching mode	256-point mode	Solenoid valve mode 1	Solenoid valve mode 2
Number of positions	64 points	64 points	256 points	7 points	3 points
Home return operation	○	○	○	○	—
Positioning operation	△	△	△	△	△
Speed & acceleration/ deceleration setting	△	△	△	△	△
Pitch feed (inching)	△	△	△	△	—
Push-motion operation	△	△	△	△	—
Speed change during movement	△	△	△	△	—
Pause	○	○	○	○	—
Zone signal output	△	△	△	△	△
Vibration control	△	△	△	△	△
Reading of current value	—	—	—	—	—
Selection of PIO pattern	○	○	○	○	○

*○ indicates that direct setting is possible; △ indicates that position data or parameter must be input; and — indicates that the function is not supported.

Explanation of I/O Signal Functions

The table below explains the functions assigned to the controller's I/O signals.
The controller can be operated by setting the remote I/O mode, selecting one of modes 0 to 5, and then turning each port number ON/OFF via the network.

		Setting of MSCON Parameter No. 25									
		Positioning mode		Teaching mode		256-point mode		Solenoid valve mode 1		Solenoid valve mode 2	
		0		1		2		4		5	
Classification	Port No.	Code	Signal name	Code	Signal name	Code	Signal name	Code	Signal name	Code	Signal name
PLC output ↓ MSCON input	0	PC1	Command position number	PC1	Command position number	PC1	Command position number	ST0	Start position 0	ST0	Start position 0
	1	PC2		PC2		PC2		ST1	Start position 1	ST1	Start position 1
	2	PC4		PC4		PC4		ST2	Start position 2	ST2	Start position 2
	3	PC8		PC8		PC8		ST3	Start position 3	—	Cannot be used
	4	PC16		PC16		PC16		ST4	Start position 4	—	
	5	PC32		PC32		PC32		ST5	Start position 5	—	
	6	—	Cannot be used	MODE	Teaching mode command	PC64		ST6	Start position 6	—	
	7	—		JISL	Jog/inch switching	PC128		—	Cannot be used	—	
	8	—		JOG+	Jogging in + direction	—	Cannot be used	—		—	
	9	BKRL	Forced brake release	JOG–	Jogging in - direction	BKRL	Forced brake release	BKRL	Forced brake release	BKRL	Forced brake release
	10	—	Cannot be used	—	Cannot be used	—	Cannot be used	—	Cannot be used	—	Cannot be used
	11	HOME	Home return	HOME	Home return	HOME	Home return	HOME	Home return	—	
	12	*STP	Pause	*STP	Pause	*STP	Pause	*STP	Pause	—	
	13	CSTR	Positioning start	CSTR/ PWRT	Positioning start/ position data load command	CSTR	Positioning start	—	Cannot be used	—	
	14	RES	Reset	RES	Reset	RES	Reset	RES	Reset	RES	Reset
	15	SON	Servo ON command	SON	Servo ON command	SON	Servo ON command	SON	Servo ON command	SON	Servo ON command
MSCON output ↓ PLC input	0	PM1	Complete position number	PM1	Complete position number	PM1	Complete position number	PE0	Position complete 0	LS0	Rear end movement command 0
	1	PM2		PM2		PM2		PE1	Position complete 1	LS1	Rear end movement command 1
	2	PM4		PM4		PM4		PE2	Position complete 2	LS2	Rear end movement command 2
	3	PM8		PM8		PM8		PE3	Position complete 3	—	Cannot be used
	4	PM16		PM16		PM16		PE4	Position complete 4	—	
	5	PM32		PM32		PM32		PE5	Position complete 5	—	
	6	MOVE	Moving signal	MOVE	Moving signal	PM64		PE6	Position complete 6	—	
	7	ZONE1	Zone 1	MODES	Teaching mode signal	PM128		ZONE1	ZONE1	ZONE1	ZONE1
	8	PZONE/ ZONE2	Position zone/ Zone 2	PZONE/ ZONE1	Position zone/ Zone 1	PZONE/ ZONE1	Position zone/ Zone 1	PZONE/ ZONE2	Position zone/ Zone 2	PZONE/ ZONE2	Position zone/ Zone 2
	9	—	Cannot be used	—	Cannot be used	—	Cannot be used	—	Cannot be used	—	Cannot be used
	10	HEND	Home return complete	HEND	Home return complete	HEND	Home return complete	HEND	Home return complete	HEND	Home return complete
	11	PEND	Positioning complete signal	PEND/ WEND	Positioning complete signal/position data load complete	PEND	Positioning complete signal	PEND	Positioning complete signal	—	Cannot be used
	12	SV	Ready	SV	Ready	SV	Ready	SV	Ready	SV	Ready
	13	*EMGS	Emergency stop	*EMGS	Emergency stop	*EMGS	Emergency stop	*EMGS	Emergency stop	*EMGS	Emergency stop
	14	*ALM	Alarm	*ALM	Alarm	*ALM	Alarm	*ALM	Alarm	*ALM	Alarm
	15	*BALM	Absolute battery voltage low warning	*BALM	Absolute battery voltage low warning	*BALM	Absolute battery voltage low warning	*BALM	Absolute battery voltage low warning	*BALM	Absolute battery voltage low warning

In the table above, * accompanying each code indicates a negative logic signal.

List of Base Controller Specifications

Item		Specification
Number of controlled axes		1 to 6 axes
Control power-supply voltage		DC 24 V ± 10%
Control power-supply current consumption		2.4 A max.
Control power-supply rush current (Note 1)		7 A max., 5 msec or less
Drive (motor) power-supply voltage	Drive power-supply voltage AC 115 V specification	AC 100 to 115 V ± 10%
	Drive power-supply voltage AC 230 V specification	AC 200 to 230 V ± 10%
Drive (motor) power-supply rush current (Note 1)	Drive power-supply voltage AC 115 V specification	20 A, 10 A max. within 80 msec (Drive power-supply voltage 100 V 25°C ambience) 45 A, 10 A max. within 80 msec (Drive power-supply voltage 115 V x 10%, 40°C ambience)
	Drive power-supply voltage AC 230 V specification	45 A, 10 A max. within 40 msec (Drive power-supply voltage 200 V 25°C ambience) 95 A, 10 A max. within 40 msec (Drive power-supply voltage 230 V x 10%, 40°C ambience)
Connectable actuator motor capacity	Drive power-supply voltage AC 115 V specification	200 W max. per axis (Total of 6 axes limited to 450 W)
	Drive power-supply voltage AC 230 V specification	200 W max. per axis (Total of 6 axes limited to 900 W)
Electromagnetic brake power-supply voltage (when actuator with brake is connected)		DC 24 V ± 10%
Brake power-supply current		1 A max. per axis (0.5 A per axis in steady state)
Brake power-supply rush current (Note 1)		10 A max., 10 msec or less
Leak current (Note 2)		3.5 mA (motor power supply) ◉ No leak current from the control power supply or brake power supply
Motor control method		Sinusoidal PWM vector current control
Applicable encoder		Incremental serial encoder Absolute serial encoder
Serial communication (SIO port: Teaching only)		RS485: 1 channel (conforming to Modbus protocol) / Speed: 9.6 to 230.4 kbps
External interface		DeviceNet, CC-Link, PROFIBUS-DP, CompoNet, PROFINET IO, Ethernet/IP, EtherCAT
Data setting/input method		PC software, touch panel teaching, gateway parameter setting tool
Data retention memory		Saving of position data and parameters to nonvolatile memory (Memory can be rewritten an unlimited number of times)
Number of positioning points		Max. 256 points (Not limited in the simple direct input mode or direct input mode) Note: The number of positioning points varies depending on the operation mode selected by the parameter.
LED display (installed on the front panel)		Driver status LED x 2 Fieldbus status LED x 2 Gateway status LED x 5 Power-supply status LED x 2
Electromagnetic brake forced release switch (installed on the front panel)		Switched between NOM (standard) and RLS (forced releases)
Protective function		Overload, overcurrent, overvoltage, etc.
Electric shock protection mechanism		Class I
Isolation resistance		DC 500 V, 10 MΩ or more
Withstand voltage		AC 1500 V for 1 minute
External dimensions		225W×154H×115D
Weight	Incremental specification (When drivers for 6 axes are installed)	Approx. 1900g
	Absolute specification (When drivers for 6 axes are installed)	Approx. 2000g
Cooling method		Forced air cooling
Environment	Ambient operating temperature	0 to 40°C
	Ambient operating humidity	85% RH or less (non-condensing)
	Operating ambience	[Refer to manual chapter 1.7, "Installation and Storage Environment."]
	Protection degree	IP20

Note 1: Take note that the rush current value varies depending on the impedance of the power supply line.
Note 2: Leak current varies depending on the motor capacity to be connected, cable length, and ambient environment. To protect against leak current, measure leak current at locations where the earth leakage breaker is set.
An earth leakage breaker must be selected that serves the specific purpose required, such as fire protection and injury protection.
Use an earth leakage breaker of harmonic wave type (inverter type).

Power Supply Selection

With the MSCON controller, motor driver power (AC 115 V/AC 230 V) and control power (DC 24 V) must be supplied separately. Check the necessary power-supply capacity according to the table below.

■ Motor Drive Power-supply Capacity

RS: Rotary actuator

Actuator motor W number	Motor power supply capacity [VA]	Momentary maximum motor power-supply capacity [VA]	Heat output [W]
12	41	123	1.7
20	50	150	2.0
30D (other than RS)	47	141	2.0
30R (RS)	138	414	4.0
60	146	438	4.8
100	238	714	7.0
150	328	984	8.3
200	421	1263	9.2

■ Selecting the Circuit Breaker

Select the circuit breaker as follows:

- Three times the rated current will flow through the controller during acceleration/deceleration. (Refer to "Momentary maximum motor power-supply capacity" above).
  Select a circuit breaker that will not trip when this current flows. If the selected circuit breaker trips under this current, select another breaker of the next higher rated current. (Confirm on the operation characteristic curve in the manufacturer's catalog to confirm that the circuit breaker will not trip.)
- Select a circuit breaker that will not trip due to rush current. (Confirm on the operation characteristic curve in the manufacturer's catalog to confirm that the circuit breaker will not trip.)
- Select a rated break current that will break the circuit even when a short-circuit current flows.
  Rated break current > Short-circuit current = Primary power-supply capacity of circuit breaker / Power-supply voltage

Consider allowance when selecting the rated current of circuit breaker.

<Rated current of circuit breaker>
Total sum of motor power-supply capacities of all actuators connected [VA] / AC input voltage x Safety factor (Rough guide: 1.2 to 1.3)

■ Control Power-supply (DC 24-V) Capacity

Calculate the DC 24-V power-supply capacity as follows:

(1) Current consumption of control power supply: Select the applicable control power-supply current shown in the table below <=> ①

Number of controlled axes (Note 1)	1 axis	2 axes	3 axes	4 axes	5 axes	6 axes
Heat generation from control power supply [W]	25.5	31.5	38.2	44.2	50.9	56.9
Control power-supply current [A]	1.1	1.3	1.6	1.8	2.1	2.4

(Note 1): Check the maximum number of controlled axes that can be connected to the MSCON. This information is available on the manufacturer's nameplate. MSCON-C-*-...: * represents the maximum number of axes that can be connected.

(2) Current consumption of brake power supply: 1 A or 0.5 A (Note 2) x Number of actuators with brakes <=> ②

(Note 2): When the brake is released, up to 1 A of current will flow per actuator for a period of approx. 100 ms. If this maximum current can be accommodated by the DC 24-V power supply used which is capable of handling momentary load fluctuation at the time of peak load, etc., calculate at 0.5 A/unit. If not, calculate at 1 A/unit.

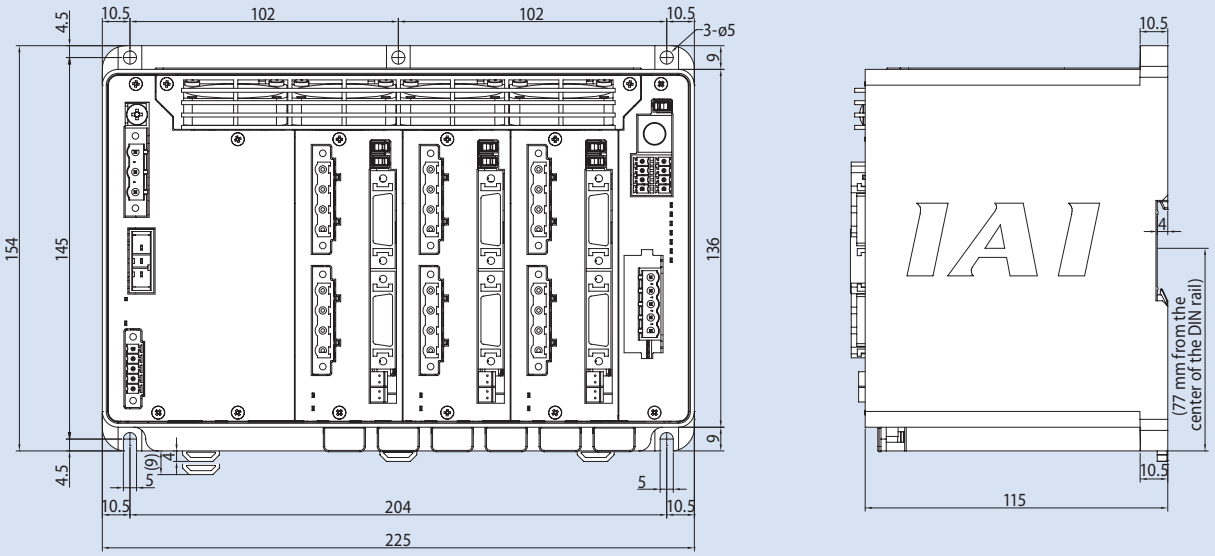
(3) Rush current of control power supply: 7 A/unit <=> ③

[Selection of power supply]

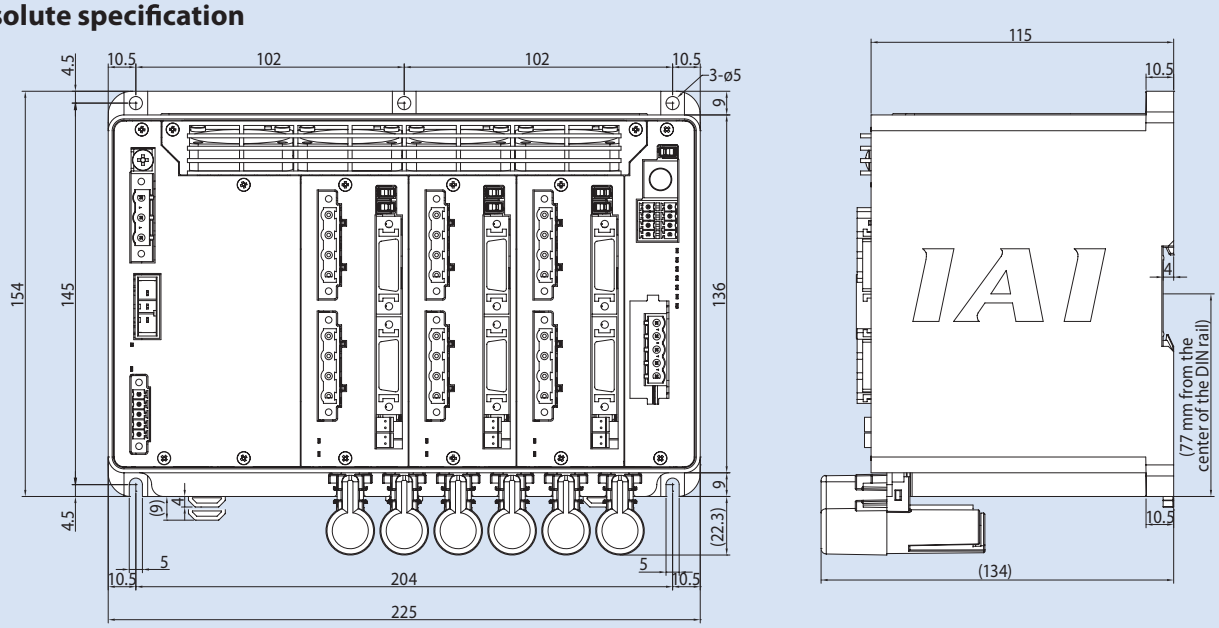
Normally a power supply whose rated current is approx. 1.3 times is selected by considering approx. 30% of allowance on top of the load current of ① + ② above. Since the current of ③ will flow for a short period, select a power supply of the "peak load accommodation" specification or having enough allowance. If the selected power supply has no allowance, voltage may drop momentarily. In particular, pay attention to the power supply with remote sensing function.

External Dimensions

Incremental specification



Absolute specification



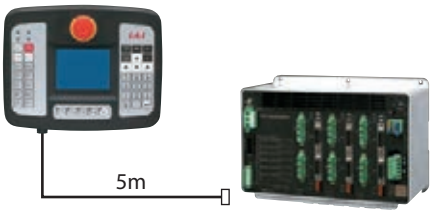
Option

Teaching Pendant

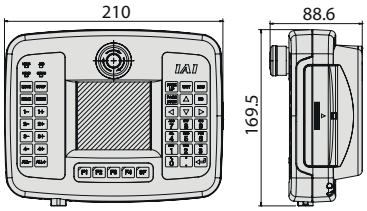
Features: Teaching device offering position input, test operation, monitoring and other functions.

Model: **TB-01-C-ENG (*)** (*) CE certification coming soon.

Configuration



TB-01-C-ENG



The MSCON is supported by **Ver. 2.00** or later.

Specification

Item	TB-01-☐
Data input	○
Actuator operation	○
Ambient operating temperature/humidity	0 to 50°C / 20 to 85% RH (non-condensing)
Display	3.5" full-color touch panel
Protection degree	IP40 (in initial state)
Weight	Approx. 507 g

Option

• Strap: Model number **STR-1**

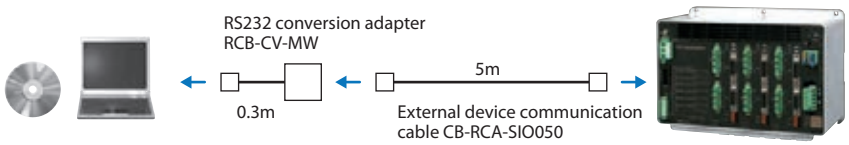
PC Software (Windows dedicated)

Features: This startup support software provides functions to input positions, perform test operations and monitor data, among others. Incorporating all functions needed to make adjustments, this software helps shorten the initial startup time.

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

Configuration

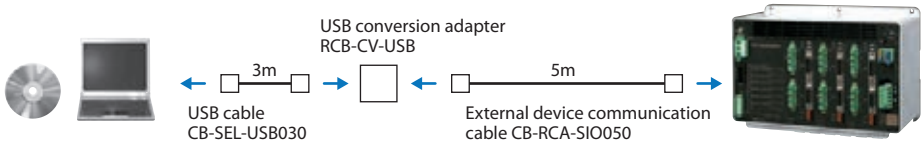
The MSCON is supported by Ver. 9.02.00.00 or later.



Model: **RCM-101-USB-ENG** (With external device communication cable + USB conversion adapter + USB cable)

Configuration

The MSCON is supported by Ver. 9.02.00.00 or later.



Regenerative Resistor Unit

Features: This unit converts regenerative current that generates when the motor decelerates, to heat. Check the total wattage of the actuators to be operated and provide a regenerative resistance unit or units if required.

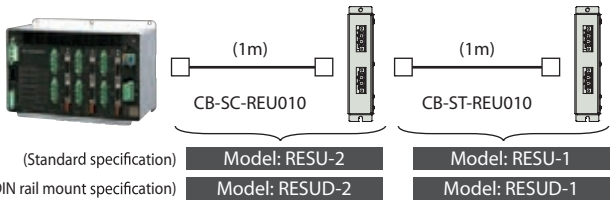
* If two regenerative units are required, arrange one RESU-2/RESUD-2 (1st) and one RESU-1/RESUD-1 (2nd or after).

Model:
RESU-2 (Standard specification)
RESUD-2 (DIN rail mount specification)
RESU-1 (Standard specification, second or subsequent unit)
RESUD-1 (DIN rail mount specification, second or subsequent unit)

Specification

Model	RESU-2	RESUD-2	RESU-1	RESUD-1
Connected to	MSCON controller		RESU-2/RESUD-2	
Supplied cable	CB-SC-REU010		CB-ST-REU010	
Unit installation method	Screw mount	DIN rail mount	Screw mount	DIN rail mount
Main unit weight	Approx. 0.4kg			
Built-in regenerative resistor	220 Ω, 80W			

* The first regenerative resistor unit connected to the MSCON should be the RESU-2/RESUD-2.
The regenerative resistor unit connected to this regenerative resistor unit should be the RESU-1/RESUD-1.



Reference Number of Units to Be Connected

Total wattage of 6 motor axes		Number of regenerative resistor units to be connected
Actuators installed horizontally	Actuators installed vertically	
~450	~200	0
~900	~600	1
—	~800	2
—	~900	3

Note:
The numbers of units to be connected are reference values based on the following operating conditions:
[Conditions] Operate the actuator to travel back and forth over 1000 mm at the maximum speed, acceleration/deceleration of 0.3 G, rated load, and operation duty of 50%.
Depending on the operating conditions, an error may generate and regenerative resistance greater than the applicable value shown in the table above may be required. In this case, add a regenerative resistor unit or units. Note that only up to four regenerative resistor units can be connected. If five or more units are connected, a failure may occur.

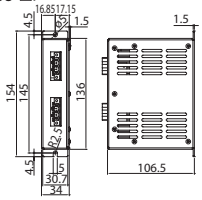
Absolute Data Backup Battery

Features: This is the battery to save the absolute data when the actuator with the absolute specification is operated.

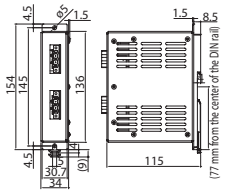
Model: **AB-5** (battery only) / **AB-5-CS2** (with case)

External dimensional drawing

<RESU-☐>



<RESUD-☐>



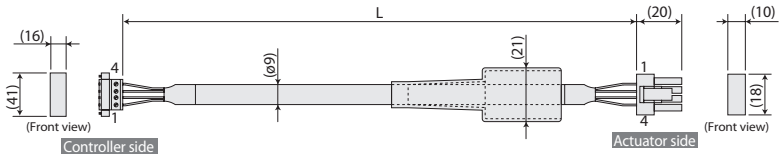
Maintenance Parts

Please refer to the models listed below if a cable needs to be exchanged, etc., after your purchase.

Model number			
	CB-RCC-MA □□□	Motor cable	for RCS2 / RCS3
	CB-RCC-MA □□□-RB	Motor robot cable	
	CB-X-MA □□□	Motor robot cable	for models other than RCS2 / RCS3
	CB-XEU-MA □□□	EU motor robot cable	for RCS2 / RCS3 and other models

* Enter the cable length (L) into □□□. Compatible to a Maximum of 30 meters.
Ex.: 080 = 8m

(Fig.: Motor cable CB-RCC-MA□□□ / CB-RCC-MA□□□-RB / CB-X-MA□□□ with plastic connector)

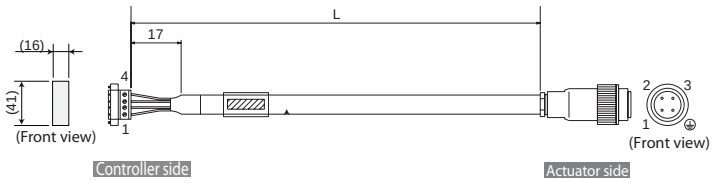


Wire	Color	Signal	No.
0.75sq	Green	PE	1
	Red	U	2
	White	V	3
	Black	W	4

No.	Signal	Color	Wire
1	U	Red	0.75sq (crimped)
2	V	White	
3	W	Black	
4	PE	Green	

Minimum bending R: r = 51 mm or more (for movable use)
* If the cable must be guided in a cable track, use a robot cable.

(Fig.: EU motor robot cable CB-XEU-MA□□□, EU version with M18 plastic round connector)



Wire	Color	Signal	No.
0.75sq	Green/yellow	PE	1
	Black/white"1"	U	2
	Black/white"2"	V	3
	Black/white"3"	W	4

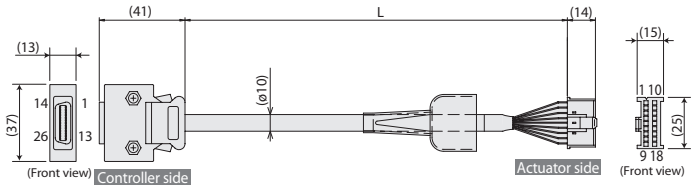
No.	Signal	Color	Wire
⏚	PE	Green/yellow	0.75sq (crimped)
1	U	Black/white"1"	
2	V	Black/white"2"	
3	W	Black/white"3"	

Minimum bending R: r = 51 mm or more (for movable use)
*Only robot cable is available for this model

Model number			
	CB-RCS2-PA □□□	Encoder cable	for RCS2 / RCS3
	CB-X3-PA □□□	Encoder robot cable	for NS / RCS2 / RCS3
	CB-XEU3-PA □□□	EU encoder robot cable	

* Enter the cable length (L) into □□□. Compatible to a Maximum of 30 meters.
Ex.: 080 = 8m

(Fig.: Encoder cable CB-RCS2-PA□□□ / CB-X3-PA□□□ with plastic connector)



Wire	Color	Signal	No.
AWG26 (soldered)	–	–	10
	–	–	11
	–	E24V	12
	White/green	0V	13
	White/orange	LS	26
	–	CREEP	25
	–	OT	24
	–	RSV	23
	–	–	9
	–	–	18
	–	–	19
	White/blue	A+	1
	White/yellow	A-	2
	White/red	B+	3
	White/black	B-	4
	White/purple	Z+	5
	White/gray	Z-	6
	Orange	SRD+	7
	Green	SRD-	8
	Purple	BAT+	14
	Gray	BAT-	15
	Red	VCC	16
	Black	GND	17
	Blue	BKR-	20
	Yellow	BKR+	21
	–	–	22

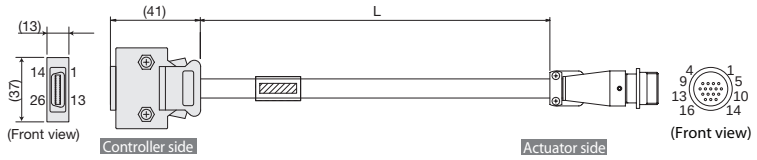
The shield is connected to the hood by a clamp.

No.	Signal	Color	Wire
1	A	White/blue	AWG26 (crimped)
2	Ā	White/yellow	
3	B	White/red	
4	B̄	White/black	
5	Z	White/purple	
6	Z̄	White/gray	
7	LS+	White/orange	
8	–	–	
9	FG	(Ground)	
10	SD	Orange	
11	SD	Green	
12	BAT+	Purple	
13	BAT-	Gray	
14	VCC	Red	
15	GND	Black	
16	LS-	White/green	
17	BK-	Blue	
18	BK+	Yellow	

Ground wire and braided shield

Minimum bending R: r = 58 mm or more (for movable use)
* If the cable must be guided in a cable track, use a robot cable.

(Fig.: EU encoder robot cable CB-XEU3-PA□□□, EU version with metal connector)



Wire	Color	Signal	No.
AWG26 (soldered)	–	–	10
	–	–	11
	–	E24V	12
	White/green	0V	13
	White/orange	LS	26
	–	CREEP	25
	–	OT	24
	–	RSV	23
	–	–	9
	–	–	18
	–	–	19
	White/blue	A+	1
	White/yellow	A-	2
	White/red	B+	3
	White/black	B-	4
	White/purple	Z+	5
	White/gray	Z-	6
	Orange	SRD+	7
	Green	SRD-	8
	Purple	BAT+	14
	Grey	BAT–	15
	Red	VCC	16
	Black	GND	17
	Blue	BKR-	20
	Yellow	BKR+	21
	–	–	22

The shield is clamped to the hood

No.	Signal	Color	Wire
1	SD	Orange	AWG26 soldered
2	SD	Green	
3	A+	White/blue	
4	A-	White/yellow	
5	LS+	White/orange	
6	B+	White/red	
7	B-	White/black	
8	Z+	White/purple	
9	Z-	White/gray	
10	VCC	Red	
11	GND	Black	
12	BAT+	Purple	
13	BAT-	Grey	
14	LS-	White/green	
15	BK-	Blue	
16	BK+	Yellow	

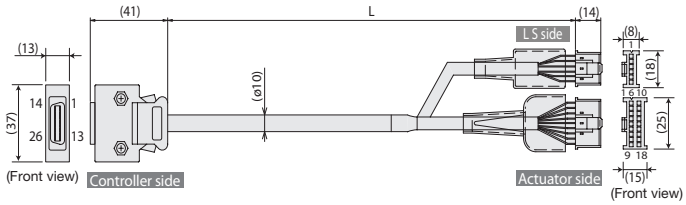
A shield is connected to shield soldered part

Ground wire and braided shield

Model number			
	CB-RCS2-PLA □□□	Limit switch encoder cable	for RCS2 Rotary type
	CB-X2-PLA □□□	Limit switch encoder robot cable	for LS specification models
	CB-XEU2-PLA □□□	EU limit switch encoder robot cable	NS / RCS2 Rotary type

* Enter the cable length (L) into □□□. Compatible to a Maximum of 30 meters.
Ex.: 080 = 8m

(Fig.: LS encoder cable CB-RCS2-PLA□□□ / CB-X2-PLA□□□ with plastic connector)



Minimum bending R: r = 58 mm or more (for movable use)
* If the cable must be guided in a cable track, use a robot cable.

Wire	Color Stand. Cable	Color Robot Cable	Signal	No.
	–	–	–	10
	–	–	–	11
	Brown/white	White/orange	E24V	12
	Gray/white	White/green	0V	13
	Red/white	Brown/blue	LS	26
	Black/white	Brown/yellow	CREEP	25
	Yellow/black	Brown/red	OT	24
	Pink/black	Brown/black	RSV	23
	–	–	–	9
	–	–	–	18
	–	–	–	19
	Pink	White/blue	A+	1
	Purple	White/yellow	A–	2
	White	White/red	B+	3
	Blue/red	White/black	B–	4
	Orange/white	White/purple	Z+	5
	Green/white	White/gray	Z–	6
	Blue	Orange	SRD+	7
	Orange	Green	SRD–	8
	Black	Purple	BAT+	14
	Yellow	Grey	BAT–	15
	Green	Red	VCC	16
	Brown	Black	GND	17
	Gray	Blue	BKR–	20
	Red	Yellow	BKR+	21
	–	–	–	22

AWG26 (soldered)

The shield is connected to the hood by a clamp.

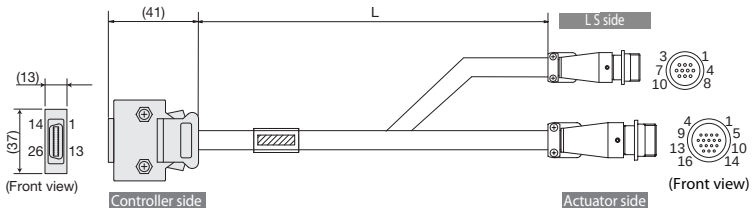
Ground wire and braided shield

No.	Signal	Color Robot Cable	Color Stand. Cable	Wire
1	E24V	White/orange	Brown/white	AWG26 (crimped)
2	0V	White/green	Gray/white	
3	LS	Brown/blue	Red/white	
4	CREEP	Brown/yellow	Black/white	
5	OT	Brown/red	Yellow/black	
6	RSV	Brown/black	Pink/black	

No.	Signal	Color Robot Cable	Color Stand. Cable	Wire
1	A	White/blue	Pink	AWG26 (crimped)
2	Ā	White/yellow	Purple	
3	B	White/red	White	
4	B̄	White/black	Blue/red	
5	Z	White/purple	Orange/white	
6	Z̄	White/gray	Green/white	
7	–	–	–	
8	–	–	–	
9	FG	Floating ground	Floating ground	
10	SD	Orange	Blue	
11	SD	Green	Orange	
12	BAT+	Purple	Black	
13	BAT–	Grey	Yellow	
14	VCC	Red	Green	
15	GND	Black	Brown	
16	–	–	–	
17	BK–	Blue	Gray	
18	BK+	Yellow	Red	

("Brown/white" in cable color indicates the colors of line/insulator.)

(Fig.: EU LS encoder robot cable CB-XEU2-PLA□□□, EU version with metal connector)



Minimum bending R: r = 58 mm or more (for movable use)

Wire	Color	Signal	No.
	–	–	10
	–	–	11
	White/orange	E24V	12
	White/green	0V	13
	Brown/blue	LS	26
	Brown/yellow	CREEP	25
	Brown/red	OT	24
	Brown/black	RSV	23
	–	–	9
	–	–	18
	–	–	19
	White/blue	A+	1
	White/yellow	A-	2
	White/red	B+	3
	White/black	B-	4
	White/purple	Z+	5
	White/gray	Z-	6
	Orange	SRD+	7
	Green	SRD-	8
	Purple	BAT+	14
	Grey	BAT–	15
	Red	VCC	16
	Black	GND	17
	Blue	BKR-	20
	Yellow	BKR+	21
	–	–	22

AWG26 (soldered)

The shield is clamped to the hood

Ground wire and braided shield

No.	Signal	Color	Wire
1	E24V	White/orange	AWG26 soldered
2	0V	White/green	
3	-	-	
4	LS	Brown/blue	
5	CREEP	Brown/yellow	
6	OT	Brown/red	
7	RSV	Brown/black	
8/9/10	-	-	

No.	Signal	Color	Wire
1	SD	Orange	AWG26 soldered
2	SD	Green	
3	A+	White/blue	
4	A-	White/yellow	
5	-	-	
6	B+	White/red	
7	B-	White/black	
8	Z+	White/purple	
9	Z-	White/gray	
10	VCC	Red	
11	GND	Black	
12	BAT+	Purple	
13	BAT-	Grey	
14	-	-	
15	BK-	Blue	
16	BK+	Yellow	

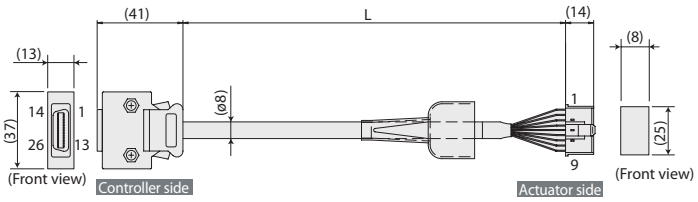
A shield is connected to shield soldered part

("White/orange" in cable color indicates the colors of line/insulator.)

Model number			
	CB-X1-PA□□□	Encoder robot cable	for models other than NS / RCS2 / RCS3
	CB-XEU1-PA□□□	EU encoder robot cable	

* Enter the cable length (L) into □□□. Compatible to a Maximum of 30 meters.
Ex.: 080 = 8m

(Fig.: Encoder robot cable CB-X1-PA□□□ with plastic connector)



Minimum bend radius R: r = 44mm or larger (for movable use)
*Only robot cable is available for this model.

Wire	Color	Signal	No.
	—	—	10
	—	—	11
	—	E24V	12
	—	0V	13
	—	LS	26
	—	CREEP	25
	—	OT	24
	—	RSV	23
	—	—	9
	—	—	18
	—	—	19
	—	A+	1
	—	A-	2
	—	B+	3
	—	B-	4
	—	Z+	5
	—	Z-	6
	Orange	SRD+	7
	Green	SRD-	8
	Purple	BAT+	14
	Gray	BAT-	15
	Red	VCC	16
	Black	GND	17
	Blue	BKR-	20
	Yellow	BKR+	21
	—	—	22

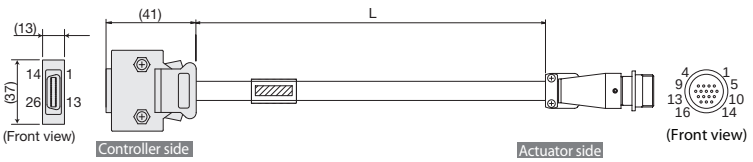
AWG26 (soldered)

The shield is clamped to the hood

Braided ground & shield wire

No.	Signal	Color	Wire
1	BAT+	Purple	AWG26 (crimped)
2	BAT-	Gray	
3	SD	Orange	
4	SD	Green	
5	VCC	Red	
6	GND	Black	
7	FG	Ground	
8	BK-	Blue	
9	BK+	Yellow	

(Fig.: EU encoder robot cable CB-XEU1-PA□□□, EU version with metal connector)



Minimum bend radius R: r = 44mm or larger (for movable use)
*Only robot cable is available for this model.

Wire	Color	Signal	No.
	–	–	10
	–	–	11
	–	E24V	12
	–	0V	13
	–	LS	26
	–	CREEP	25
	–	OT	24
	–	RSV	23
	–	–	9
	–	–	18
	–	–	19
	–	A+	1
	–	A-	2
	–	B+	3
	–	B-	4
	–	Z+	5
	–	Z-	6
	Orange	SRD+	7
	Green	SRD-	8
	Purple	BAT+	14
	Grey	BAT–	15
	Red	VCC	16
	Black	GND	17
	Blue	BKR-	20
	Yellow	BKR+	21
	–	–	22

AWG26 (soldered)

The shield is clamped to the hood

Ground wire and braided shield

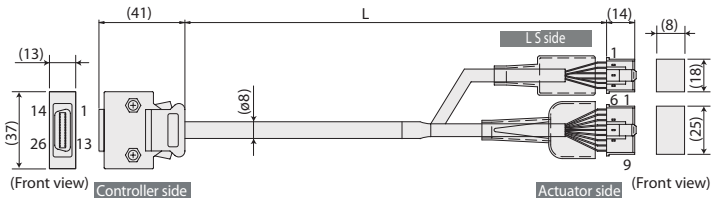
No.	Signal	Color	Wire
1	SD	Orange	AWG26 soldered
2	SD	Green	
3	-	-	
4	-	-	
5	-	-	
6	-	-	
7	-	-	
8	-	-	
9	-	-	
10	VCC	Red	
11	GND	Black	
12	BAT+	Purple	
13	BAT-	Grey	
14	-	-	
15	BK-	Blue	
16	BK+	Yellow	

A shield is connected to shield soldered part

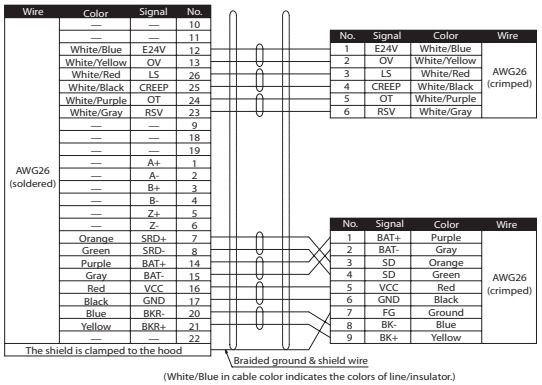
Model number	CB-X1-PLA□□□	Limit switch encoder robot cable	for LS specification models other than NS / RCS2 / RCS3
	CB-XEU1-PLA□□□	EU limit switch encoder robot cable	

* Enter the cable length (L) into □□□. Compatible to a Maximum of 30 meters.
Ex.: 080 = 8m

(Fig.: LS encoder robot cable CB-X1-PLA□□□ with plastic connector)

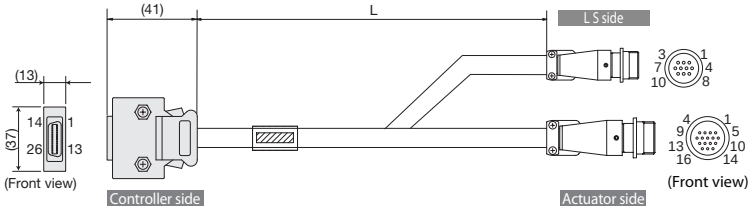


Minimum bend. radius R: r = 54mm or larger (for movable use)
*Only robot cable is available for this model.

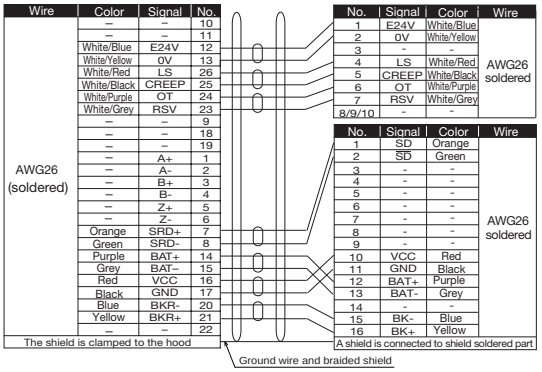


(White/Blue in cable color indicates the colors of line/insulator.)

(Fig.: EU LS encoder robot cable CB-XEU1-PLA□□□, EU version with metal connector)



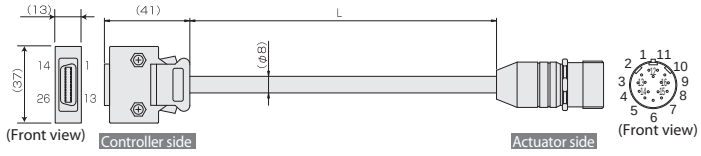
Minimum bend. radius R: r = 54mm or larger (for movable use)
*Only robot cable is available for this model.



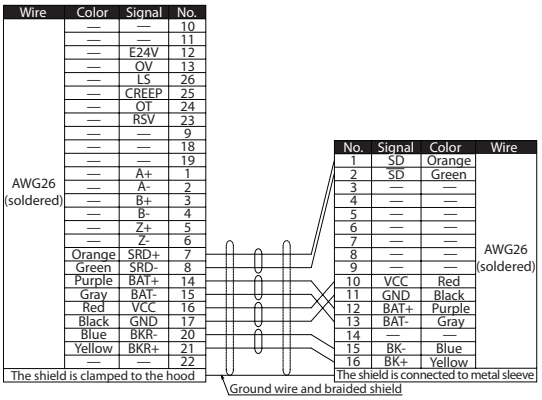
("White/Blue" in cable color indicates the colors of line/insulator.)

Model number	CB-X1-PA□□□-WC	Encoder robot cable	(Dedicated motor robot cable: CB-XEU-MA□□□, see P. 13)	for splash-proof slider ISWA

* Enter the cable length (L) into □□□. Compatible to a Maximum of 30 meters.
Ex.: 080 = 8m

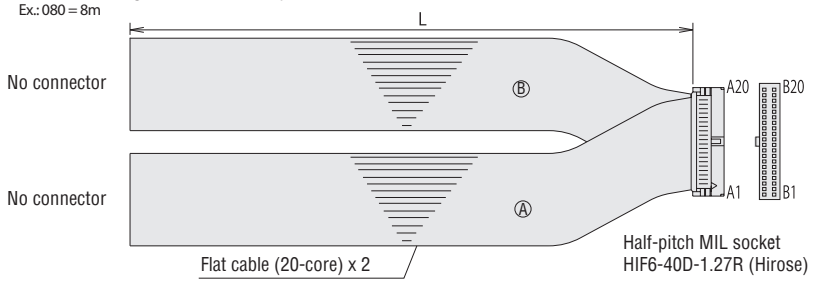


Minimum bend. radius R: r = 44mm or larger (for movable use)
*Only robot cable is available for this model.



Model number	CB-PAC-PIO□□□	PIO Flat Cable

* Enter the cable length (L) into □□□. Compatible to a Maximum of 10 meters.
Ex.: 080 = 8m



HIF6-40D-1.27R

No.	Signal name	Cable color	Wiring
A1	24V	Brown-1	Flat cable Ⓐ (pressure-welded)
A2	24V	Red-1	
A3	—	Orange-1	
A4		Yellow-1	
A5	IN0	Green-1	
A6	IN1	Blue-1	
A7	IN2	Purple-1	
A8	IN3	Gray-1	
A9	IN4	White-1	
A10	IN5	Black-1	
A11	IN6	Brown-2	
A12	IN7	Red-2	
A13	IN8	Orange-2	
A14	IN9	Yellow-2	
A15	IN10	Green-2	
A16	IN11	Blue-2	
A17	IN12	Purple-2	
A18	IN13	Gray-2	
A19	IN14	White-2	
A20	IN15	Black-2	

No.	Signal name	Cable color	Wiring
B1	OUT0	Brown-3	Flat cable Ⓑ (pressure-welded)
B2	OUT1	Red-3	
B3	OUT2	Orange-3	
B4	OUT3	Yellow-3	
B5	OUT4	Green-3	
B6	OUT5	Blue-3	
B7	OUT6	Purple-3	
B8	OUT7	Gray-3	
B9	OUT8	White-3	
B10	OUT9	Black-3	
B11	OUT10	Brown-4	
B12	OUT11	Red-4	
B13	OUT12	Orange-4	
B14	OUT13	Yellow-4	
B15	OUT14	Green-4	
B16	OUT15	Blue-4	
B17	—	Purple-4	
B18		Gray-4	
B19	0V	White-4	
B20	0V	Black-4	

MSCON Series V2
Catalogue No. 0413-E

The information contained in this catalog is subject to change without notice for the purpose of product inprovement

ISO 9001
BUREAU VERITAS
Certification

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Quality and Innovation

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