

ERC3 Actuator

Slider Type/Rod Type

First Step Guide Sixth Edition

Thank you for purchasing our product.

Make sure to read the Safety Guide and detailed Instruction Manual as well as this First Step Guide to ensure correct use. This Instruction Manual is original.

Warning : Read the instruction manual carefully and follow the instruction manual when handling this equipment. Please downloaded the user's manual from our website. You can download it free of charge. User registration is required for first time users.
 URL: www.iai-robot.co.jp/data_dl/CAD_MANUAL/
 Keep a printout of the introduction manual near the equipment in which this product is installed so that it can be checked at all times, or display it on your computer, tablet terminal, etc. so that you can check it immediately.
 If you need a bound copy of the instruction manual, order it from the nearest sales office listed in the First Step Guide or at the end of the instruction manual. It will be provided for a fee.

- Using or copying all or part of this Instruction Manual without permission is prohibited.
- The company names, names of products and trademarks of each company shown in the sentences are registered trademarks.

Product Check

This product is comprised of the following parts if it is of standard configuration. If you find any fault in the contained model or any missing parts, contact us or our distributor.

1. Parts (The option is excluded.)

No.	Part Name	Model	Remarks
1	Actuator Main Body	Refer to "How to read the model plate", "How to read the model No."	
Accessories			
2	Power Supply • I/O Cable ^{Note 1}	Except for SE Type	CB-ERC3P-PWBIO□□□ □□□ shows the cable length (Example) □□□ : 020 = 2[m]
		SE Type	CB-ERC3S-PWBIO□□□
3	Home Position Marking Sticker		Packaged in slider type
4	Nut		Refer to list below
5	First Step Guide	ME0296	
6	Safety Guide	M0194	

Note 1 Please refer to a cable listed in wiring for a power supply, the I/O cable attached to.

(List of Included Nut Type)

Model No.	Nut M10×1.25	Nut M14×1.5
ERC3-RA5C	1	
ERC3-RA6C		1

2. How to read the model plate

Model	MODEL	ERC3-SA5-I-42P-20-50-SE-S-CN-B
Serial number	SERIAL No.	000049893
		MADE IN JAPAN

3. How to read the Model No.

ERC3-SA5-I-42P-20-50-SE-S-CN-B-*	
<Series Name> Standard Type (Screw Cover Type) ERC3 Standard Type (Stainless Steel Sheet Type) ERC3D Cleanroom Type ERC3CR	<Identification for IAI use only> * There is no identification in some cases <Option> B : Brake NM : Reversed Home Specification FL : Flange FT : Foot bracket ABU : Simple Absolute Type (*1)
<Type> Slider Type SA5C SA7C Rod Type RA4C RA6C	<Controller Type> CN : CON Mode MC : MEC Mode
<Encoder Type> I : Incremental	<Cable Length> N : None S : 3m M : 5m X□□ : Specified Length
<Motor Type> 42P : 42 □Size 56P : 56 □Size	<I/O Type> SE : Serial Communication Type NP : Parallel Communication NPN Type PLN : Pulse Train Control NPN Type PN : Parallel Communication PNP Type PLP : Pulse Train Control PNP Type
<Lead> 3 : 3mm 4 : 4mm 6 : 6mm 8 : 8mm 12 : 12mm 16 : 16mm 20 : 20mm 24 : 24mm	<Stroke>

*1 : For Simple Absolute Type, I/O type is SE (Serial Communicate Type).

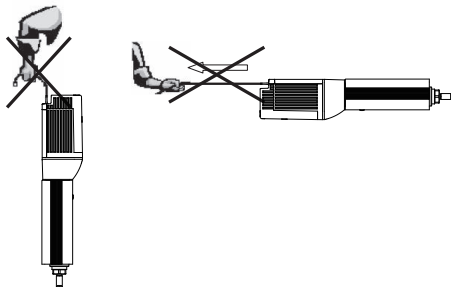
Precautions in Handling

1. Handling of the Packed Product

- Take the greatest care in transporting the product, not to bump or drop it.
- An operator should never attempt to carry a heavy package on their own.
- When setting down the package temporarily, keep it horizontal.
- Do not step on the package.
- Do not place on the package a heavy object that may cause the box deformation or apply stress on it.

2. Handling of the Unpacked Product

- Do not transport the actuator by holding the motor unit and cable or move it by pulling the cable.



- When the actuator is taken out from the package and handled, hold the base section.
- When transporting the actuator, be careful not to hit it against other objects. In particular, pay attention to the side cover.
- Do not give any unnatural force to any of the sections in the actuator.

Environments for Installation, Storage and Preservation

1. Installation Environment

- Please attempt to avoid installing the product to such places as listed below. Also, make sure to keep enough space necessary for maintenance work.
- Place where exposed to radiant heat from a huge heat source such as heat treatment
- Place where the ambient temperature goes out of the applicable range from 0 to 40°C
- Place where condensation would occur due to sudden temperature change
- Place where the relative humidity exceeds 85% RH
- Place where exposed to the direct sunlight
- Place where corrosive gas or flammable gas exist
- Place where it contains a lot of dust, salt or iron (Outside of an ordinary assembly plant)
- Place where water, oil (includes oil mist and cutting fluid) or chemical is splashed
- Place where the product main body receives vibration or hit impact

Make sure to have a treatment for blocking when using in the following conditions:

- Place where noise is generated by such facts as static electricity
- Place where exposed to the influence of strong electric or magnetic field
- Place where exposed to the influence of ultraviolet or radiant rays

2. Storage and Preservation Environment

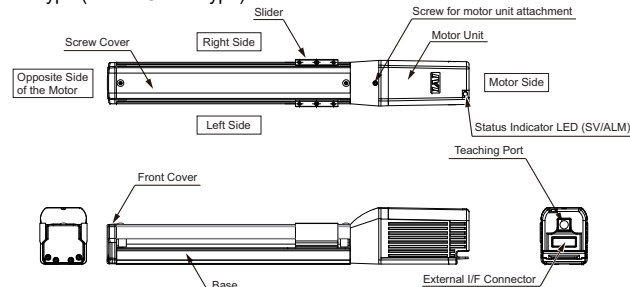
The storage and preservation environment should comply with the same standards as those for the installation environment. In particular, when the machine is to be stored for a long time, pay close attention to environmental conditions so that no dew condensation forms.

Unless specially specified, moisture absorber protection is not included in the package when the machine is delivered. In the case that the machine is to be stored and preserved in an environment where dew condensation is anticipated, take the condensation preventive measures from outside of the entire package, or directly after opening the package. For storage and preservation temperature, the machine withstands temperatures up to 60°C for a short time, but in the case of the storage and preservation period of 1 month or more, control the temperature to 50°C or less.

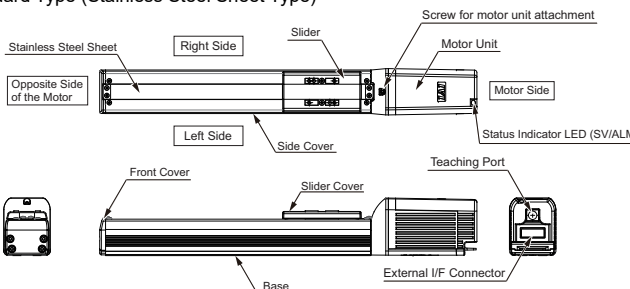
The product should be settled in the horizontal orientation while in storage and reservation. In the case it is stored in the packaged condition, follow the posture instruction if any displayed on the package.

Names of the Parts

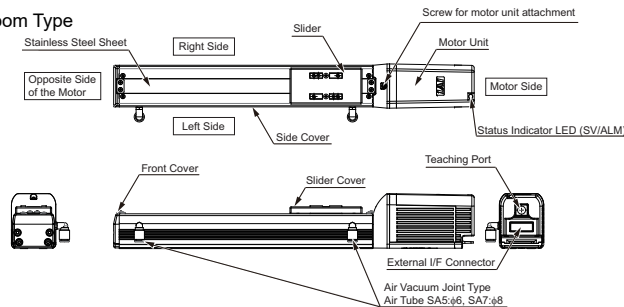
1. Slider Standard Type (Screw Cover Type)



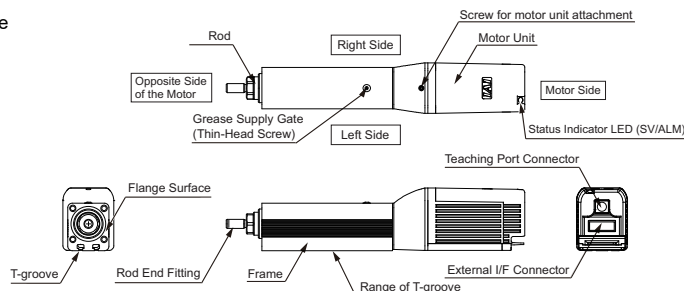
2. Slider Standard Type (Stainless Steel Sheet Type)



3. Slider Cleanroom Type



4. Rod Type

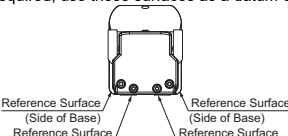


Refer to Catalog or Instruction Manual (ME0297) for the dimensions and profile.

Attachment

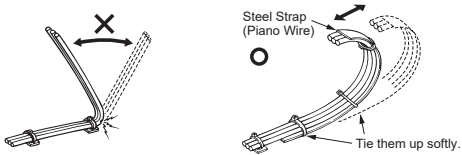
Refer to the Instruction Manual (ME0297) for the attachments of the actuator and loads.

[Precautions for Attachments]

No.	Item	Precautions
1	Installation	- If the actuator is installed in horizontally oriented wall mount for the Slider Standard Type (Screw Cover Type) SA5C and SA7C, it is easy for a foreign object to get inside the actuator from the opening on the side of the actuator. And also it becomes easy to splash the grease applied on the guide and ball screw from the opening on the side surface. - Installation of the slider standard type (stainless steel sheet type) and cleanroom types SA5C and SA7C in horizontally oriented wall mount or in ceiling mount may cause the stainless steel sheet to be slacked or displaced. Keeping use of the actuator in such conditions may cause such failures as breakage of the stainless steel sheet. Adjust the sheet condition if necessary in the daily inspections. (Refer to the section for maintenance in instruction manual for how to adjust the stainless steel sheet.) - Avoid using the actuator with no brake in the vertical orientation. - Secure the space where maintenance work can be performed.
2	Attachment Surface	- The base has to have a structure with sufficient rigidity to prevent oscillation. - The side and the bottom surfaces of the base of the actuator are the datum for the slider drive. If accuracy for its run is required, use these surfaces as a datum of the installation.  - The actuator mounting surface and other surfaces that are used as a datum should be flat enough with an accuracy of machining or equivalent treatment, and the flatness of the mounting surface needs to be ±0.05mm/m or less.
3	Bolt to be used	- For the bolts to be used, a high-tensile bolt complying with ISO-10.9 or more is recommended. - If using the tapped holes, use screws with the thread length dimension being less than the effective depth of the holes. - For the actuator mounting, use a bolt with the dimension of its effective mating length to the tapped hole is as stated below. If tapped hole on steel → thread length same as nominal diameter If tapped hole on aluminum → thread length 1.8 times longer than nominal diameter
4	Tightening Torque	Please follow the specification values stated in the Instruction Manual for the tightening torque. Failure to do so may cause an operation problem.
5	Load Moment and Overhung length	- In the case of slider Type please follow the specification values stated in the Instruction Manual for the load moment and the overhung length. Failure to do so may cause abnormal vibration or noise, and also may remarkably shorten the product life. - Please do not apply any external force from other than rod moving direction (radial load) to the rod. Any perpendicular or radial force to the rod may cause damage to the actuator or operation problem. Equip guide in the direction of the load if any external force from other direction than the rod movement.
6	Stainless Steel Sheet	- Do not attempt to hold the stainless steel sheet directly with hand. Also pay attention not to make a dent mark on the sheet. Stainless steel sheet is easy to get dented because it is thin. Using it with a dent on may cause a breakage. - Wipe away dust or iron particles completely if there is any on the stainless steel sheet. Operation with the stainless steel sheet that has foreign matters on its surface may cause problems such as sheet damage, waviness, etc. inside the slider. - Do not operate the product in an ambient with dust or iron particles.
7	Load Attachment to Rod	- Do not apply rotation torque on the rod (slide shaft). There is a possibility of damaging an inside. - Tighten the nut on the rod tip by holding the rod with a wrench or an equivalent tool (such as a backing wrench). 

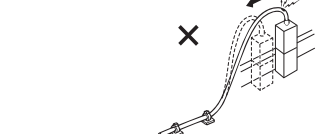
[Prohibited Items in the Cable Processing]

- Do not pull or bend forcibly the cable so as to give any extra load or tension to the cable.
- Do not process the cable to extend or shortening by means of cutting out, combination or connecting with another cable.
- Do not let the cable flex at a single point.
- Do not let the cable bend, kink or twist.



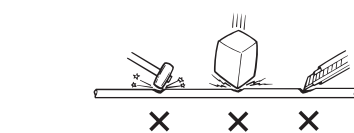
- Do not pull the cable with a strong force

- Do not let the cable receive a turning force at a single point.

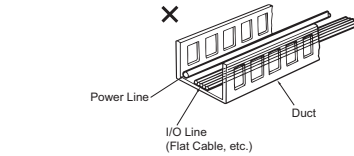


- Do not pinch, drop a heavy object onto or cut the cable.

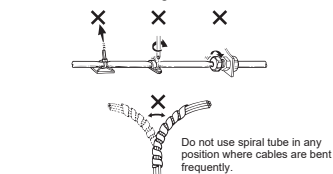
- When fixing the cable, provide a moderate slack and do not tension it too tight.



- Separate the I/O line, communication line and power line from each other. Do not store in the same duct.



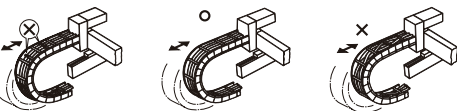
- Note:**
- When the cable is connected or disconnected, make sure to turn off the power to the controller. When the cable is connected or disconnected with the controller power turned ON, it might cause a malfunction of the actuator and result in a serious injury or damage to the machinery.
 - When the connector connection is not correct, it would be dangerous because of a malfunction of the actuator. Make sure to confirm that the connector is connected correctly.



Follow the instructions below when using a cable track.

- If there is an indication to the cable for the space factor in a cable track, refer to the wiring instruction given by the supplier when storing the cable in the cable track.
- Avoid the cables to get twined or twisted in the cable track, and also to have the cables move freely and do not tie them up. (Arrange the wiring so the cables are not to be pulled when bent.)

Do not pile up cables. It may cause faster abrasion of the sheaths or cable breakage.



Item	Description
Environment (Note 4)	Surrounding Air Temperature
	0 to 40°C
	Surrounding Humidity
	85%RH or less (non-condensing)
	Surrounding Environment
	[Refer to Installation Environment]
	Surrounding Storage Temperature
	0 to 60°C (0 to 50°C if stored for 1 month or more.)
	Surrounding Storage Humidity
	85%RH or less (non-condensing)
	Usage Altitude
	1000m or lower above sea level
	Protection Class
	IP20
	Vibration Durability
	Frequency 10 to 57Hz / Swing width : 0.075mm Frequency 57 to 150Hz / Acceleration : 9.8m/s ² XYZ Each direction Sweep time: 10 min. Number of sweep: 10 times
	Impact
	150mm/s ² , 11mm/s Semi-sine wave pulse to each of the directions X, Y and Z
Weight	Refer to the Instruction Manual.
External Dimensions	

Note 1 It is the power source to be supplied when compulsorily releasing the brake.

Note 2 Rush current passes for about 5ms after the power is injected (at 40°C).

The rush current value varies depending on the impedance of the power line.

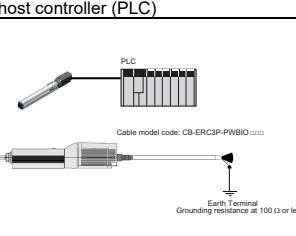
Note 3 If the pulse train applies the open collector output, prepare AK-04 (option) separately to convert to the differential type.

Note 4 The environmental specifications include the actuator main unit.

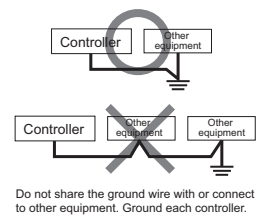
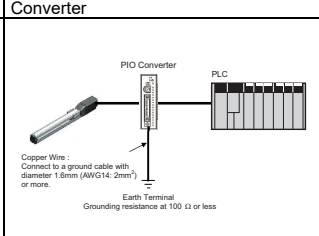
Installation and Noise Elimination

1. Noise Elimination Grounding (Frame Ground)

When controlling ERC directly from the host controller (PLC)

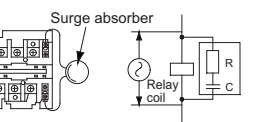


When Controlling with using PIO Converter



2. Precautions regarding wiring method

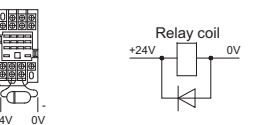
- Wire is to be twisted for the 24V DC power supply.
- Separate the signal and encoder lines from the power supply and power lines.



3. Noise Sources and Elimination

Carry out noise elimination measures for power devices on the same power path and in the same equipment. The following are examples of measures to eliminate noise sources.

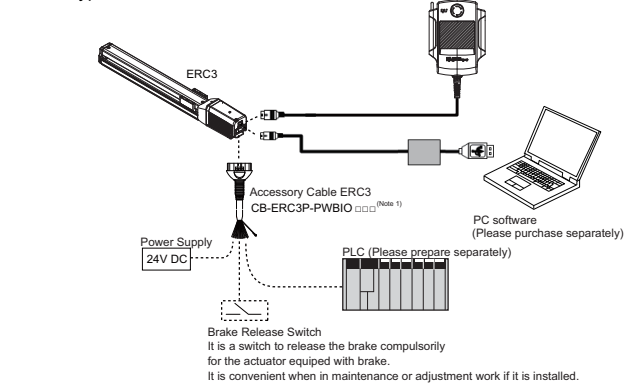
- AC solenoid valves, magnet switches and relays
[Measure] Install a Surge absorber parallel with the coil.
- DC solenoid valves, magnet switches and relays
[Measure] Install a diode parallel with the coil. Use a DC relay with a built-in diode.



Connection Diagram

1. Patterns to connect with ERC3 unit

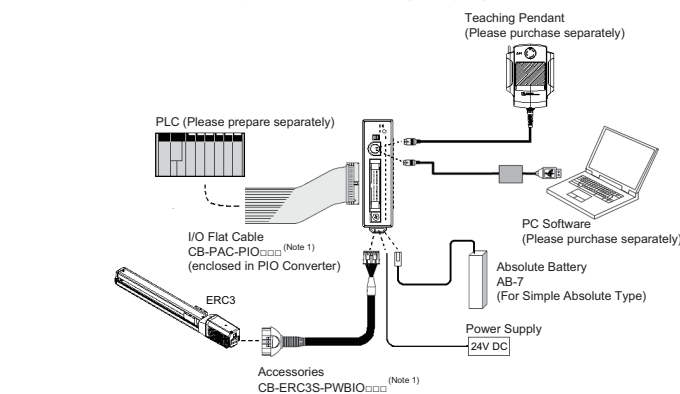
I/O type of the model code is NP or PN.



Note 1 □□□ indicates the cable length. (Example) 030 = 3m

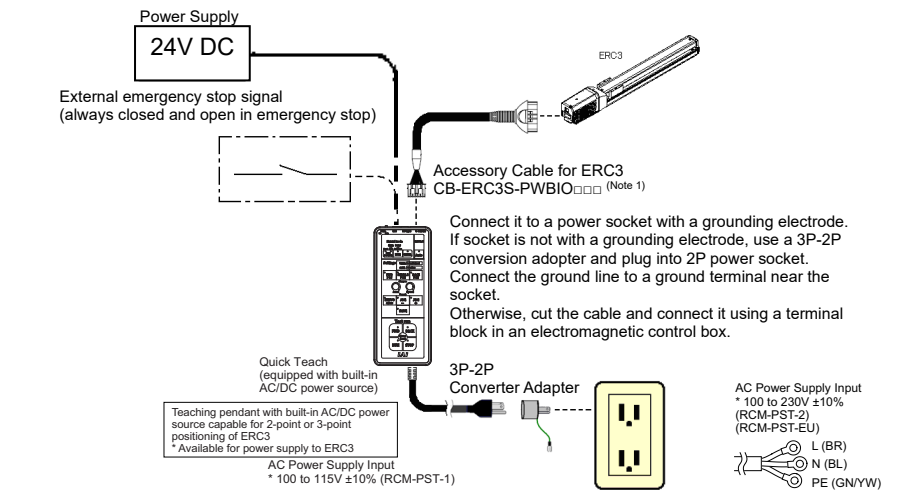
2. Connections to ERC3 Unit and PIO Converter

The model code for I/O type of ERC3 is SE (SIO type).



Note 1 □□□ indicates the cable length. (Example) 030 = 3m

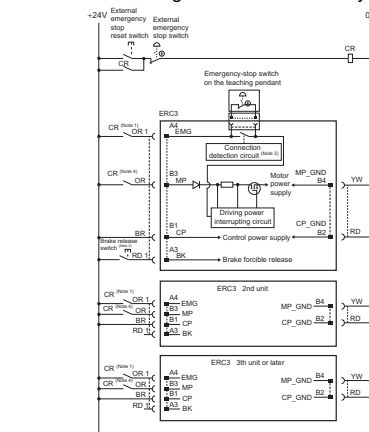
3. Connections to ERC3 Unit and Quick Teach



Note 1 □□□ indicates the cable length. (Example) 030 = 3m

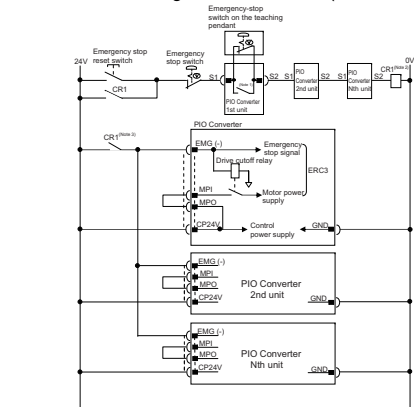
Power Source and Emergency Stop Circuit

1. When connecting with ERC3 main body



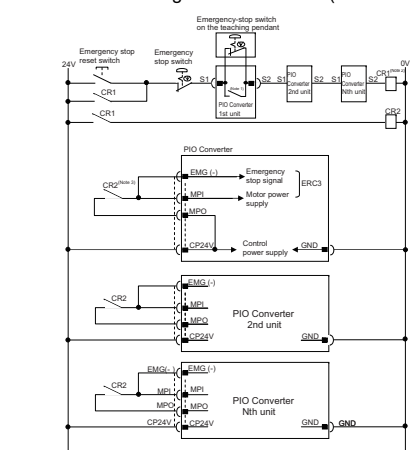
- Note 1 The load current for the emergency stop signal EMG to turn ON/OFF at contact CR is 24V DC and 10mA.
- Note 2 This is a switch to compulsorily release the brake of the actuator equipped with a brake. It is convenient when in maintenance or adjustment work if it is installed. It is necessary to have at least 24V DC and 150mA for the switch contact capacity.
- Note 3 The controller automatically identifies that the teaching tool is connected and activates the emergency stop switch of the teaching pendant.
- Note 4 Apply contact CR when having external cutoff of driving source.
- The motor drive power line MP that turns ON/OFF at CR is as load current for the as shown below.
- | | |
|----------------|--|
| Load current | ERC3 high output setting valid: 3.5A (MAX. 4.2A)
ERC3 high output setting invalid: 2.0A |
| During in-rush | 8.3A |
- (Note) It is not feasible to reflect the emergency stop switch of the touch panel teaching or teaching pendant to the circuit of the system emergency stop.

2. When connecting to PIO converter (drive cutoff relay built-in type)



- Note 1 When the teaching pendant is not connected, S1 and S2 become short-circuited inside the controller.
- Note 2 For CR1, select the one with coil current 0.1A or less.
- Note 3 This circuit is equivalent to Safety Category 1. The load current for the emergency stop signal EMG (-) to turn ON/OFF at contact CR1 is 24V DC and 20mA.

3. When connecting to PIO converter (drive cutoff relay separated type)



- Note 1 When the teaching pendant is not connected, S1 and S2 become short-circuited inside the controller.
- Note 2 For CR1, select the one with coil current 0.1A or less.
- Note 3 The motor driving power line MPI that is to be turned ON/OFF at contact CR2 and the load current of the emergency stop signal EMG (-) are follows:

Load current	ERC3 high output setting valid: 3.5A (MAX. 4.2A) ERC3 high output setting invalid: 2.0A
During in-rush	8.3A

I/O Signal (PIO)			
Function description for I/O Signals			
Category	Signal Abbreviation	Signal Name	Function Description
Input	CSTR	PTP strobe (Start signal)	The actuator will start to move to the position set by the command position number.
	PC1 to PC256	Command position number	Input of the position number to move (binary input)
	BKRL	Brake forcible release	The brake will forcibly be released.
	*STP	Pause	When this signal turns OFF while the actuator is moving, the actuator will decelerate to stop. The remaining movement is retained and will resume when the signal is turned ON again.
	RES	Reset	An alarm will be reset when this signal is turned ON. Also, when it is turned ON in the pause mode (*STP is turned OFF), the remaining movement amount can be cancelled.
	SON	Servo ON	The servo remains ON while this signal is ON, or OFF while this signal is OFF.
	HOME	Home return	The controller will perform home return operation when this signal is turned ON.
	MODE	Teaching mode	The operating mode will change to the teaching mode when this signal is turned ON. The mode will not be switched over unless CSTR, JOG+ and JOG- are all OFF and the actuator operation is stopped.
	JISL	Jog/inching selector	Jog Operation can be performed with JOG+ and JOG- while this signal is OFF. Inching Operation is performed with JOG+ and JOG- when it is ON.
	JOG + JOG -	Jog	Jog Operation is performed to positive direction by detecting ON edge of JOG+ signal and to negative direction by JOG- signal while JISL signal is OFF. The actuator will decelerate and stop if OFF edge is detected while in each Operation. Inching Operation is performed while JISL signal is ON.
	PWRT	Current Position Write	When the write position is specified in the teaching mode and this signal has remained ON for 20msec or longer, the controller will write the current position in the specified position field.
	ST0 to ST6	Start Signal	The actuator moves to the commanded position with this signal ON during the electromagnetic valve mode.
Output	PEND/INP	Position Complete	Turns ON in the positioning band range after actuator operation. The INP signal will turn OFF if the position deviation exceeds the in-position range. PEND and INP can be switched over by the parameter.
	PM1 to PM256	Completion Position No.	The position No. reached after the positioning completion, is output (binary output).
	HEND	Home Return Completion	This signal will turn ON when home return has been completed. It will be kept ON unless the home position is lost.
	ZONE1	Zone Signal 1	Turns ON if the current actuator position is within the range set to the parameter.
	ZONE2	Zone Signal 2	This signal will turn ON when the current actuator position enters the range specified the position data after position movement. The combined use with ZONE 1 is possible, but PZONE becomes effective only for movement to the set position.
	PZONE	Position Zone	
	*ALM	Alarm	Turns ON when the controller is in normal condition, and turns OFF when an alarm is generated.
	MOVE	Moving	Turns ON during the actuator is moving (including home-return operation and pressing operation).
	SV	Servo ON	This signal will remain ON while the servo is ON.
	*EMGS	Emergency Stop Output	This signal remains ON while the controller is under the emergency stop reset condition and turns OFF when the emergency stop condition is enabled. (Regardless of alarms.)
	MODES	Teaching Mode Output	This signal will turn ON while the teaching mode is enabled by the input of the mode signal and will turn OFF when the mode changes to the normal mode.
	WEND	Writing Complete	This signal will turn OFF after the controller has switched to the teaching mode. It will turn ON when writing in response to the PWRT signal has been completed. When the PWRT signal turns OFF, this signal will also turn OFF.
	PE0 to PE6	Current Position Number	In the electromagnetic valve mode, this signal will turn ON when the actuator completes moving to the target position.
	LS0 to LS2	Limit Switch Output	Turns ON when the current actuator position is within the range of positioning band (±) of the target position. It is output even before the movement command and the servo is OFF if the home-return operation is completed.
	*ALML	Light Error Output	Outputs when a message level alarm is generated. (It is necessary to set parameter)

1. When connecting with ERC3 : CON mode

Pin No.	Wire Color	Category	PIO Functions	Parameter No.25 "PIO Pattern" Selection		
				0	1	2
				8-point type	Solenoid valve type	16-point type
				8 points	3 points	16 points
Input	Input	Input	Number of positioning points	○	×	×
			Home return signal	×	×	×
			Jog signal	×	×	×
			Teaching signal (Current position writing)	×	×	×
			Brake release	×	×	×
			Moving signal	×	×	×
			Zone signal	○	×	○
			Position zone signal	×	×	×
A1	Drain	Frame ground	FG			
B1	BR	Control power unit +24V	CP			
A2	—	—	—			
B2	RD	External brake release input	CP_GND			
A3	RD1		BK			
B3	OR	Motor power unit +24V	MP			
A4	OR1	Emergency-stop input	EMG			
B4	YW	Motor power unit 0V	MP_GND			
A5	—	—	—			
B5	GN		—			
A6	—	—	—			
B6	BR1		—			
A7	BL		—			
B7	PL		—			
A8	GY		—			
B8	WT		—			
A9	BR2	Input	IN0	PC1	ST0	PC1
B9	RD2		IN1	PC2	ST1	PC2
A10	OR2		IN2	PC4	ST2	PC4
B10	YW2		IN3	HOME	—	PC8
A11	GN2		IN4	CSTR	RES	CSTR
B11	BL2	Output	IN5	*STP	*STP	*STP
A12	PL2		OUT0	PEND	PE0	PEND
B12	GY2		OUT1	HEND	PE1	HEND
A13	WT2		OUT2	ZONE1	PE2	PZONE/ZONE1
B13	BK		OUT3	*ALM	*ALM	*ALM

*** in codes above shows the signal of the active low.

(Reference) Signal of Active Low

Signal with *** expresses the signal of active low. A signal of active low is a signal that the input signal is processed when it is turned OFF, output signal is ordinary on while the power is ON, and turns OFF when the signal is output.

2. When connecting with ERC3 : MEC mode

Pin No.	Wire Color	Category	Operation pattern		
			Stopping at 2 points (2-point positioning)	Stopping at 3 points (3-point positioning)	
			Movement by 1 input between 2 points [Single-solenoid mode]	Movement by 2 input between 2 points [Double-solenoid mode]	Movement by 2 input between 3 points [3-point positioning]
A1	Drain	Frame ground		FG	
B1	BR	Control power unit +24V		CP	
A2	—	—		—	
B2	RD	Control power unit 0V		CP_GND	
A3	RD 1	Brake forcible release		BK	
B3	OR	Motor power unit +24V		MP	
A4	OR 1	Emergency-stop input		EMG	
B4	YW	Motor power unit 0V		MP_GND	
A5	—	—		—	
B5	GN			—	
A6	—	—		—	
B6	BR 1			—	
A7	BL			—	
B7	PL			—	
A8	GY			—	
B8	WT			—	
A9	BR 2	Input	IN0	ST0	ST0
B9	RD 2		IN1	—	ST1
A10	OR 2		IN2	RES	RES
B10	YW 2		IN3	—	—
A11	GN 2		IN4	—	—
B11	BL 2	Output	IN5	—	—
A12	PL 2		OUT0	LS0/PE0	LS0/PE0
B12	GY 2		OUT1	LS1/PE1	LS1/PE1
A13	WT 2		OUT2	HEND	LS2/PE2
B13	BK		OUT3	*ALM	*ALM

*** in codes above shows the signal of the active low.

(Reference) Signal of Active Low

Signal with *** expresses the signal of active low. A signal of active low is a signal that the input signal is processed when it is turned OFF, output signal is ordinary on while the power is ON, and turns OFF when the signal is output.

3. When connecting to PIO converter

Pin No.	Wire Color	Category	PIO Functions	Parameter No.25 "PIO Pattern" Selection		
				0	1	2
				Positioning mode	Teaching mode	256-point mode
				64 points	64 points	256 points
Input	Input	Input	Number of positioning points	64 points	64 points	256 points
			Home return signal	○	○	○
			Jog signal	×	○	×
			Teaching signal (Current position writing)	×	○	×
			Brake release	○	×	○
			Moving signal	○	○	×
			Zone signal	○	×	×
			Position zone signal	○	○	○
1A	BR-1	—		—		
2A	RD-1	—		—		
3A	OR-1	—		—		
4A	YW-1	—		—		
5A	GN-1	Input	IN0	PC1	PC1	PC1
6A	BL-1		IN1	PC2	PC2	PC2
7A	PL-1		IN2	PC4	PC4	PC4
8A	GY-1		IN3	PC8	PC8	PC8
9A	WT-1		IN4	PC16	PC16	PC16
10A	BK-1		IN5	PC32	PC32	PC32
11A	BR-2		IN6	—	MODE	PC64
12A	RD-2		IN7	—	JISL	PC128
13A	OR-2		IN8	—	JOG+	—
14A	YW-2		IN9	BKRL	JOG-	BKRL
15A	GN-2	Output	IN10	—	—	—
16A	BL-2		IN11	HOME	HOME	HOME
17A	PL-2		IN12	*STP	*STP	*STP
18A	GY-2		IN13	CSTR	CSTR/PWRT	CSTR
19A	WT-2		IN14	RES	RES	RES
20A	BK-2		IN15	SON	SON	SON
1B	BR-3		OUT0	PM1(ALM1)	PM1(ALM1)	PM1(ALM1)
2B	RD-3		OUT1	PM2(ALM2)	PM2(ALM2)	PM2(ALM2)
3B	OR-3		OUT2	PM4(ALM4)	PM4(ALM4)	PM4(ALM4)
4B	YW-3		OUT3	PM8(ALM8)	PM8(ALM8)	PM8(ALM8)
5B	GN-3	Output	OUT4	PM16	PM16	PM16
6B	BL-3		OUT5	PM32	PM32	PM32
7B	PL-3		OUT6	MOVE	MOVE	PM64
8B	GY-3		OUT7	ZONE1	MODES	PM128
9B	WT-3		OUT8	PZONE/ZONE2	PZONE/ZONE1	PZONE/ZONE1
10B	BK-3		OUT9	—	—	—
11B	BR-4		OUT10	HEND	HEND	HEND
12B	RD-4		OUT11	PEND	PEND/WEND	PEND
13B	OR-4		OUT12	SV	SV	SV
14B	YW-4		OUT13	*EMGS	*EMGS	*EMGS
15B	GN-4	Output	OUT14	*ALM	*ALM	*ALM
16B	BL-4		OUT15	*ALML	*ALML	*ALML
17B	PL-4		—	—		
18B	GY-4		—	—		
19B	WT-4		—	—		
20B	BK-4	—	—	—		

*** in codes above shows the signal of the active low.

PM1 to PM8 indicate the alarm binary code output signal when an alarm is generated.

(Reference) Signal of Active Low

Signal with *** expresses the signal of active low. A signal of active low is a signal that the input signal is processed when it is turned OFF, output signal is ordinary on while the power is ON, and turns OFF when the signal is output.

Pin No.	Wire Color	Category	PIO Functions	Parameter No.25 "PIO Pattern" Selection		
				3	4	5
				512-point mode	Solenoid valve mode 1	Solenoid valve mode 2
				512 points	7 points	3 points
Input	Input	Input	Number of positioning points	512 points	7 points	3 points
			Home return signal	○	○	×
			Jog signal	×	×	×
			Teaching signal (Current position writing)	×	×	×
			Brake release	○	○	○
			Moving signal	×	×	×
			Zone signal	×	○	○
			Position zone signal	×	○	○
1A	BR-1	24V		P24		
2A	RD-1	24V		P24		
3A	OR-1	Pulse input		—		
4A	YW-1			—		
5A	GN-1		IN0	PC1	ST0	ST0
6A	BL-1		IN1	PC2	ST1	ST1(JOG+)
7A	PL-1		IN2	PC4	ST2	ST2 ^{Note1)}
8A	GY-1		IN3	PC8	ST3	—
9A	WT-1		IN4	PC16	ST4	—
10A	BK-1		IN5	PC32	ST5	—
11A	BR-2		IN6	PC64	ST6	—
12A	RD-2		IN7	P128	—	—
13A	OR-2	Input	IN8	PC256	—	—
14A	YW-2		IN9	BKRL	BKRL	BKRL
15A	GN-2		IN10	—	—	—
16A	BL-2		IN11	HOME	HOME	—
17A	PL-2		IN12	*STP	*STP	—
18A	GY-2		IN13	CSTR	—	—
19A	WT-2		IN14	RES	RES	RES
20A	BK-2		IN15	SON	SON	SON
1B	BR-3	Output	OUT0	PM1(ALM1)	PE0	LS0
2B	RD-3		OUT1	PM2(ALM2)	PE1	LS1(TRQS)
3B	OR-3		OUT2	PM4(ALM4)	PE2	LS2 ^{Note1)}
4B	YW-3		OUT3	PM8(ALM8)	PE3	—
5B	GN-3		OUT4	PM16	PE4	—
6B	BL-3		OUT5	PM32	PE5	—
7B	PL-3		OUT6	PM64	PE6	—
8B	GY-3		OUT7	PM128	ZONE1	ZONE1
9B	WT-3		OUT8	PM256	PZONE/ZONE2	PZONE/ZONE2
10B	BK-3		OUT9	—	—	—
11B	BR-4	Output	OUT10	HEND	HEND	HEND
12B	RD-4		OUT11	PEND	PEND	—
13B	OR-4		OUT12	SV	SV	SV
14B	YW-4		OUT13	*EMGS	*EMGS	*EMGS
15B	GN-4		OUT14	*ALM	*ALM	*ALM
16B	BL-4		OUT15	*ALML	*ALML	*ALML
17B	PL-4		—	—		
18B	GY-4		—	—		
19B	WT-4		—	—		
20B	BK-4		—	—		

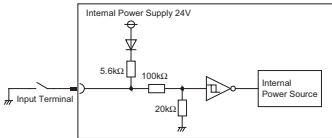
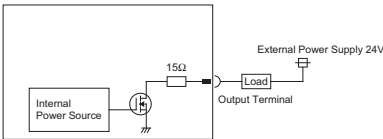
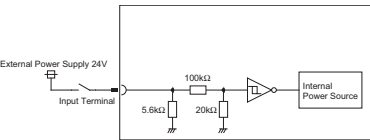
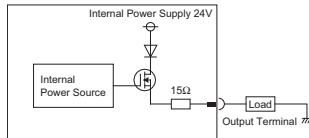
Shown in () after the signal names above tell the functions performed before the home-return operation. *** in codes above shows the signal of the active low.

PM1 to PM8 indicate the alarm binary code output signal when an alarm is generated.

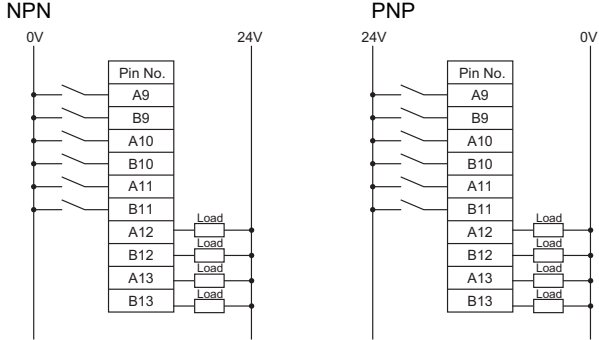
Note 1 It is invalid before home-return operation.

(Reference) Signal of Active Low

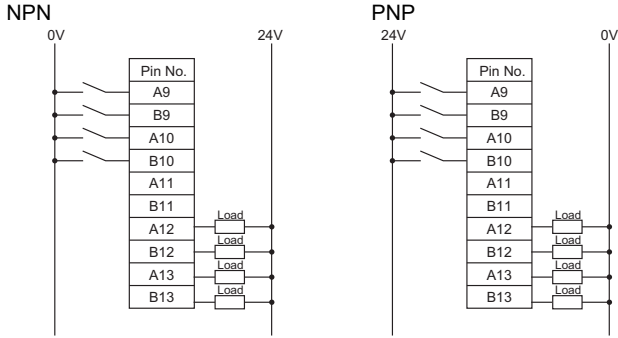
Signal with *** expresses the signal of active low. A signal of active low is a signal that the input signal is processed when it is turned OFF, output signal is ordinary on while the power is ON, and turns OFF when the signal is output.

	Input Section		Output Section	
Specification	Input Voltage	24V DC $\pm 10\%$	Rated Load Voltage	24V DC $\pm 10\%$
	Input Current	5mA / 1 circuit	MAX. current	50mA / 1 point
	ON/OFF voltage	ON voltage MIN.DC18V OFF voltage MAX.DC6V	Residual Voltage	2V or less
	Leak Current	MAX. 1mA/1 point		
Insulation Type	Non-isolated from external output signal		Non-isolated from external input signal	
NPN	 The diagram shows the internal circuit for an NPN input. An 'Input Terminal' is connected to a 5.6kΩ resistor. The other end of this resistor is connected to a 100kΩ resistor and the base of an NPN transistor. The emitter of the transistor is grounded. The collector of the transistor is connected to a 20kΩ resistor, which is also grounded. The transistor's output is connected to an 'Internal Power Source'.		 The diagram shows the internal circuit for an NPN output. An 'Internal Power Source' is connected to the base of an NPN transistor. The emitter of the transistor is grounded. The collector of the transistor is connected to a 15Ω resistor, which is then connected to a 'Load' and finally to an 'Output Terminal'. An 'External Power Supply 24V' is connected to the 'Output Terminal'.	
PNP	 The diagram shows the internal circuit for a PNP input. An 'External Power Supply 24V' is connected to the 'Input Terminal'. The 'Input Terminal' is connected to a 5.6kΩ resistor, which is grounded. The other end of the 5.6kΩ resistor is connected to a 100kΩ resistor and the base of a PNP transistor. The emitter of the transistor is connected to an 'Internal Power Source'. The collector of the transistor is connected to a 20kΩ resistor, which is grounded.		 The diagram shows the internal circuit for a PNP output. An 'Internal Power Source' is connected to the emitter of a PNP transistor. The base of the transistor is connected to a 15Ω resistor, which is then connected to a 'Load' and finally to an 'Output Terminal'. The 'Output Terminal' is grounded.	

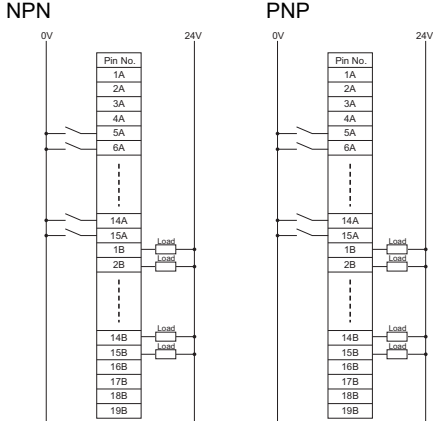
[When Connecting to ERC3 Unit, in CON Mode]



[When Connecting to ERC3 Unit, in MEC Mode]



[When connecting to PIO converter]

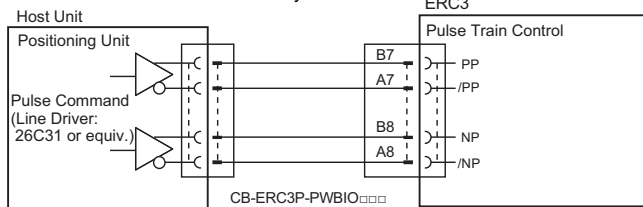


Operation in Pulse Train Control Mode (function for PLN and PLP Types only)

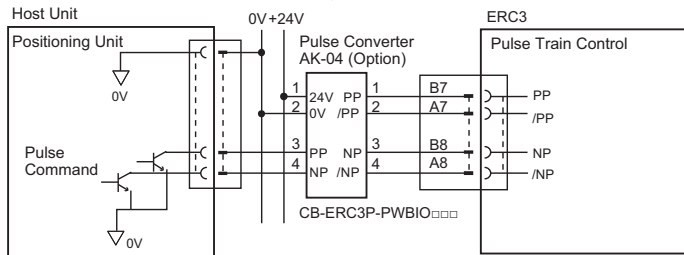
Pulse Train Input and Output Interface

Category	Signal Abbreviation	Signal Name	Function Description
Input	PP, /PP	Command Pulse Input	Inputs the command pulse train. Input pulse frequency differs depending on the type. [Refer to Basic Specifications]
	NP, /NP		

- When Host Unit is Differential System



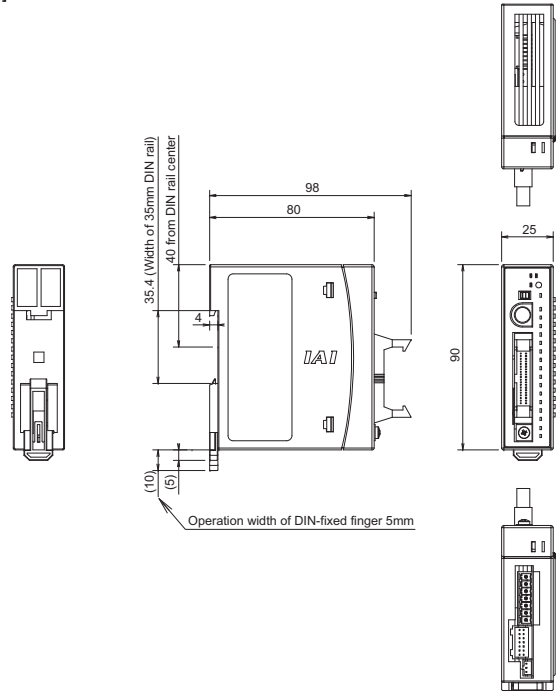
- When Host Unit is Open Collector System [AK-04 option is required]



Note1 : Use the same power source (0V) for the host open collector output, AK-04.

PIO converter (Option)

[External Dimensions]



[Specification]

Item		Description
Number of Controlled Axes		1 axis
Power-supply Voltage		24V DC $\pm 10\%$
Load current when actuator is connected (including current consumption for control)		High output setting is enabled (Set in delivery) : 4.3A (MAX.5.0A) High output setting is disabled : 3.0A
Power Supply for Electromagnetic Brake ^(Note 1) (In the case of the actuator with a brake)		24V DC $\pm 10\%$ 0.15A (MAX.)
Heat Generation		1.3W
In-rush current when actuator is connected ^(Note 2)		8.4A
Transient Power Cutoff Durability		MAX. 500 μ s
Serial Communication Interface (SIO Port)		RS485: 1CH (based on Modbus Protocol RTU/ASCII) Speed : 9.6 to 230.4Kbps Control available with serial communication
External Interface	PIO Type	Signal I/O dedicated for 24V DC (selected from NPN/PNP) --- Input 16 points max., output 16 points max. Cable length MAX. 10m
	Fieldbus Type	Not applicable
Data Setting and Input		PC Software, Teaching Pendant Position data and parameters to be saved in the non-volatile memory inside the built-in controller in the actuator via this unit (There is no limitation in number of writing) However, the clock data is to be stored in this unit (retained by capacitor power: approx. 10 days)
Actuator I/O Type		SIO Type (Model: SE) An operation with Positioner Mode is available
Number of Positions in Positioner Mode		MAX. 512 points (Note) Number of positioning points differs depending on the selected PIO pattern
LED Display	Standard Type	Controller status display
	Simple Absolute Type	Display of absolute battery status and absolute reset status
	With Monitor	Monitor display with switching Command Current Ratio / Alarm Code / PIO Input Status / PIO Output Status
Electromagnetic Brake Compulsory Release Switch		NOM (Normal Operation) / RLS (Brake release) Changeover
Insulation Resistance		500V DC 10M Ω or more
Protection Function against Electric Shock		Class I basic insulation
Cooling Method		Natural air-cooling
Environment	Surrounding Air Temperature	0 to 40°C
	Surrounding Humidity	85%RH or less (non-condensing)
	Surrounding Environment	[Refer to installation Environment]
	Surrounding Storage Temperature	-20 to 70°C (Excluding battery)
	Surrounding Storage Humidity	85%RH or less (non-condensing)
	Usage Altitude	1000m or lower above sea level
	Protection Class	IP20
	Vibration Durability	Frequency 10 to 57Hz / Swing width : 0.075mm Frequency 57 to 150Hz / Acceleration : 9.8m/s ² XYZ Each direction Sweep time: 10 min. Number of sweep: 10 times
	Impact	150mm/s ² , 11mm/s Semi-sine wave pulse to each of the directions X, Y and Z
	Weight	Standard: 103g, Simple Absolute Type: 287g (including 190g for battery)
External Dimensions		25W $\times$ 90H $\times$ 98D

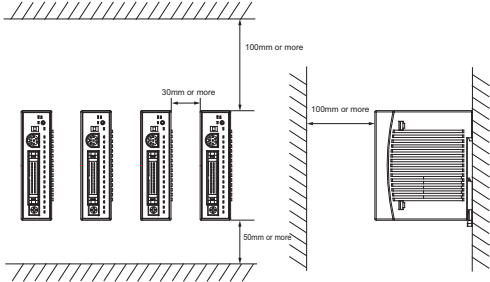
Note 1 It is the power source to be supplied when compulsorily releasing the brake.

Note 2 Rush current passes for about 5ms after the power is injected (at 40°C).

The rush current value varies depending on the impedance of the power line.

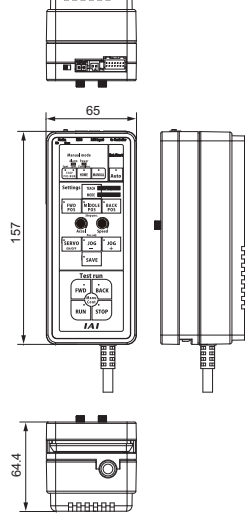
[Installation]

Design and Build the system considering the size of the controller box, location of the controller and cooling factors to keep the ambient temperature around the controller below 40°C



Quick Teach (Option)

[External Dimensions]



[Specification]

Item	RCM-PST-0	RCM-PST-1	RCM-PST-2
	24V DC power supply type (Main unit of teaching pendant)	Equipped with 100V AC power supply unit	Equipped with 200V AC power supply unit
Power Supply Unit Model	—	RCM-PS-1 (Equipped with 2m cable with 3P power socket plug)	RCM-PS-2 (Equipped with 2m cable with ϕ 4.3-hole solderless ring tongue terminals)
Number of Controlled Axes	1 axis		
Power-supply Voltage	24V DC $\pm 10\%$	Single-phase 100 to 115V AC $\pm 10\%$ 50/60Hz	Single-phase 100 to 230V AC $\pm 10\%$ 50/60Hz
Load current when actuator is connected (including current consumption for control)	2.2A (High output setting is disabled)	1.3A (when 100V AC is used)	0.67A (when 100V AC is used) 0.36A (when 200V AC is used)
Heat generation when actuator is connected	2W	11W	
In-rush current when actuator is connected ^(Note 1)	8.3A	MAX. 30A	MAX. 15A
Current leakage when actuator is connected	—	MAX. 5mA	MAX. 0.75mA
Transient Power Cutoff Durability	—	MAX. 10ms	MAX. 10ms
Emergency Stop	External signal input		
Data Setting and Input	Pressing button switches and dials on the operation panel		
Data Retention Memory	Position data to be saved in non-volatile memory inside built-in controller in actuator (There is no limitation in number of writing)		
Number of Settable Positions	2 or 3-point		
Operation Functions/LED Display	Servo ON/OFF, try run function as JOG, power ON/OFF, error display, etc.		
Electromagnetic Brake Compulsory Release Switch	Normal / Release (Compulsory release) changeover		
Insulation Resistance	500V DC 10M Ω or more		
Protection Function against Electric Shock	Class I basic insulation		
Cooling Method	Natural air-cooling		
Environment	Surrounding Air Temperature	0 to 40°C	
	Surrounding Humidity	10 to 85%RH (non-condensing)	
	Surrounding Environment	[Refer to installation Environment]	
	Surrounding Storage Temperature	-20 to 70°C	
	Surrounding Storage Humidity	90%RH (non-condensing)	
	Usage Altitude	1000m or lower above sea level	
	Protection Class	IP20	
	Vibration Durability	Frequency 5 to 9Hz / Swing width: 1.75mm (continuous), 3.5mm (intermittent) Frequency 9 to 150Hz / Acceleration 4.9m/s ² (continuous), 9.8m/s ² (intermittent) XYZ Each direction	
Weight	120g	540g	535g
External Dimensions	65W $\times$ 157H $\times$ 21.6D	65W $\times$ 157H $\times$ 64.4D	

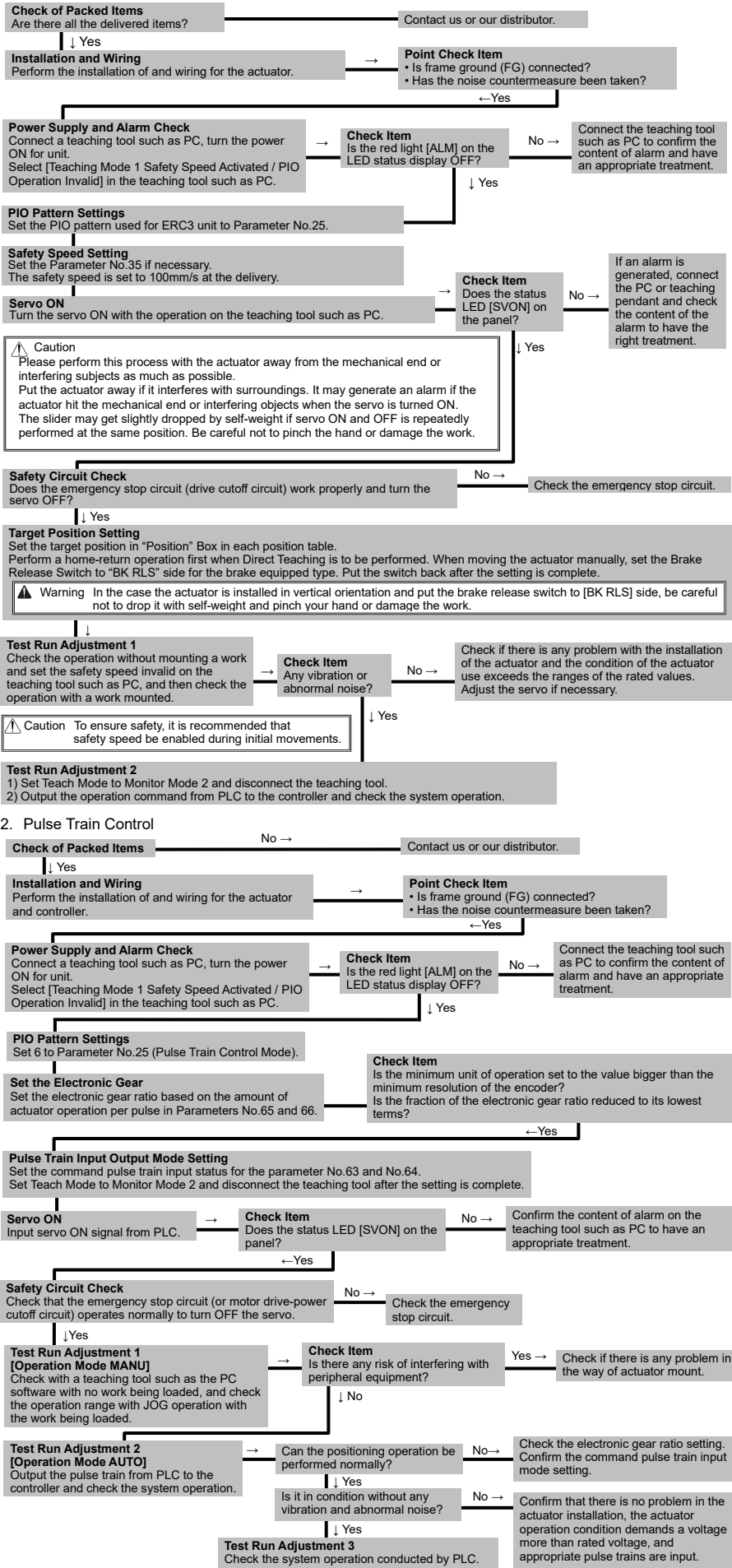
Note 1 Rush current passes for about 5ms after the power is injected (at 40°C).

The rush current value varies depending on the impedance of the power line.

Starting Procedures

When using this product for the first time, work while making sure to avoid omission and incorrect wiring by referring to the procedure below.

1. PIO



- Action to Take When Error Occurred
- Shown below are the alarms that you may often see after power up. Have an appropriate treatment following the instructions below.
Please refer to the Instruction Manual (ME0297) for other alarms.

Error Code	Error Description	Cause and Treatment
069	Real Time Clock Operation Stop Detection	It indicates that the calendar function is stopped in PIO converter and the current time data has been lost. Reset the clock settings again from the teaching tool.
0B8	Excitement Detection Error	The detection of excitation is conducted when the servo is turned ON for the first time after the power is supplied. The status is that the detection did not complete even after a certain time (set in Parameter No.29) was passed. 1) Connection error or wire breakage of motor/encoder cables 2) Brake is not released (when equipped with a brake). 3) Load to the motor is high due to external force. 4) Power was turned on while touching to the mechanical end. 5) The slide resistance of the actuator itself is large.
0E5	Encoder Receive Error	This error code appears when the right signal was not received from the encoder side to the controller command. Check if any wire breakage on a connector and the condition of wire connections. If no error is generated under the condition that the power to all the peripheral equipment is shut and operate only this ERC3, noise can be considered as the cause of the problem.
0EE	Absolute Encoder Error Detection 2	This error code appears when the absolute encoder PCB cannot detect the position information properly. The voltage for the absolute data battery is dropped. Check the battery alarm output on PIO, and if it is off, replace the battery. Perform Absolute Reset after the replacement. Check the encoder cable connection.
20A	Servo OFF While in Operation	It shows the operation command was generated in the condition that the servo is OFF. Resume the operation after turning the servo ON.



IAI Corporation

Head Office: 577-1 Obane Shimizu-KU Shizuoka City Shizuoka 424-0103, Japan
TEL +81-54-364-5105 FAX +81-54-364-2589
website: www.iai-robot.co.jp/

IAI America, Inc.

Head Office: 2690 W. 237th Street, Torrance, CA 90505
TEL (310) 891-6015 FAX (310) 891-0815
Chicago Office: 110 East State Parkway, Schaumburg, IL 60173
TEL(847) 908-1400 FAX (847) 908-1399
Atlanta Office: 1220 Kennestone Circle, Suite 108, Marietta, GA 30066
TEL (678) 354-9470 FAX (678) 354-9471
website: www.intelligentactuator.com

IAI Industrieroboter GmbH

Ober der Röth 4, D-65824 Schwalbach am Taunus, Germany
TEL 06196-88950 FAX 06196-889524
website: www.iai-automation.com

Technical Support available in Great Britain



Duttons Way, Shadsworth Business Park, Blackburn, Lancashire, BB1 2QR, United Kingdom
TEL 01254-685900
website: www.lcautomation.com

IAI (Shanghai) Co.,Ltd.

SHANGHAI JIAHUA BUSINESS CENTER A8-303, 808, Hongqiao Rd. Shanghai 200030, China
TEL 021-6448-4753 FAX 021-6448-3992
website: www.iai-robot.com

IAI Robot (Thailand) Co.,Ltd.

825 PhairojKijja Tower 7th Floor, Debaratana RD., Bangna-Nuea, Bangna, Bangkok 10260, Thailand
TEL +66-2-361-4458 FAX +66-2-361-4456
website:www.iai-robot.co.th