



MSEL

First Step Guide Seventh 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 download 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_d/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.

Caution : In case of purchasing this product individually in order to connect it to the existing SCARA Robot (IXP) in such a purpose as maintenance, make sure to have a backup of the parameters before replacing the purchased product and copy (transfer) the parameters to this product after replacement. Failure to do so will cause an alarm to be generated, and operation could not be made. Refer to transfer of parameter files in the PC software provided separately for how to transfer the parameters.

- 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

The standard configuration of this product is comprised of the following parts.

If you find any fault with the product you have received, or any missing parts, contact us or our distributor.

1. Parts

No.	Part Name	Model	Quantity	Reference
1	Controller Main Body	Refer to "How to read the model plate", "How to read the model".	1	
Accessories				
2	System I/O Plug	DFMC1.5/6-ST-3.5 (Supplier : PHOENIX CONTACT)	1	Recommended cable size 1.25 to 0.3mm ² (AWG16 to 22)
3	AC Power Plug	MSTB2.5/3-STF-5.08 (SK : N-PE) (Supplier : PHOENIX CONTACT)	1	Recommended cable size 1.25 to 0.5mm ² (AWG16 to 20)
4	Motor Drive Power Line Connector	FKIC2.5HC/2-ST-5.08 (Supplier : PHOENIX CONTACT)	1	Recommended cable size 1.25 to 0.75mm ² (AWG16 to 18)
5	Dummy Plug	DP-4S (Enclosed in PG, PGF or PGX)	1	
6	I/O Flat Cable	CB-PAC-PIO□□□	1 (Standard only) 2 (Standard + Extension)	□□□ shows the cable length (Example) □□□ : 020 = 2m
7	CC-Link Connector	Model CC : MSTB2.5/5-STF-5.08 AU (Supplier : PHOENIX CONTACT)	1	Terminal Resistance (130Ω1/2W, 110Ω1/2W) One each enclosed
		Model CC2: TMSTBP2.5/5-STF-5.08 AUBD-FG (Supplier : PHOENIX CONTACT)		
8	DeviceNet Connector	Model DV : MSTB2.5/5-STF-5.08 AU (Supplier : PHOENIX CONTACT)	1	Prepare a terminal resistor separately when this controller is on the terminal.
		Model DV2: TMSTBP2.5/5-STF-5.08 AU M (Supplier : PHOENIX CONTACT)		
9	First Step Guide	M0194	1	

2. Teaching Tool (to be purchased separately)

A teaching tool such as PC software is necessary when performing the setup for position setting, parameter setting, etc. that can only be done on the teaching tool. Please prepare either of the following teaching tools.

No.	Part Name	Model
1	PC Software (with RS232C Cable + Connector Conversion Cable + Emergency Stop Box)	IA-101-X-MW-JS
2	PC Software (with USB Cable (CB-SEL-USB030) + Dummy Plug (DP-4S))	IA-101-X-USBS
3	Teaching Pendant	TB-01/TB-02/TB-03

3. Instruction Manuals related to this product

No.	Name	Manual No.
1	SEL Language Programming Manual	ME0224
2	PC Software IA-101-X-MW-JS/IA-101-X-USBS Instruction Manual	ME0154
3	Touch Panel Teaching TB-01 Instruction Manual	ME0325
4	Touch Panel Teaching TB-02 Instruction Manual	ME0356
5	Touch Panel Teaching TB-02 Instruction Manual	ME0377
6	DeviceNet Instruction Manual	ME0124
7	CC-Link Instruction Manual	ME0123
8	PROFIBUS-DP Instruction Manual	ME0153
9	EtherNet/IP Instruction Manual	ME0308
10	Ethernet Instruction Manual	ME0140
11	EtherCAT Instruction Manual	ME0309
12	PROFINET-IO Instruction Manual	ME0361

4. How to read the model plate

Model	MODEL MSEL-PCX4-3N4515WAI-56PWAI-NP-CC-2-4-DN-*	MADE IN JAPAN
Serial Number	SERIAL No.200198765	

5. How to read the model of the controller

Single-Axis and Cartesian Type Controllers

MSEL-PC-2-56PSA-42PSAB-NP-CC-2-4-ABB-DN-*	
<Series>	<Identification for IAI use only> * There is no identification in some cases.
<Type>	<Type of Installation> Not Specified : Screw attachment type DN : DIN Rail Mounting type
PC : Standard type PG : Safety category compliant type PCF : High-Thrust type PGF : High-Thrust safety category compliant type	<Absolute Battery :When simple absolute type is used> ABB : Simple absolute (with battery box) ABBN : Simple absolute (without battery box)
<Number of Connected Axis> 1 to 4 : Number of driver axis	<Power-supply Voltage> 4 : 100 to 230V AC
<Connected Axis Content> 20P : 20□ pulse motor 20SP : 20□ pulse motor 28P : 28□ pulse motor 28SP : 28□ pulse motor 35P : 35□ pulse motor 42P : 42□ pulse motor 56P : 56□ pulse motor	<I/O Cable Length> 0 : Equipped with no cable 2 : 2m (Standard) 3 : 3m 5 : 5m
For High-Thrust (Note 1) 56SP : 56□ pulse motor 60P : 60□ pulse motor 86P : 86□ pulse motor	
[Encoder Type] WAI : Incremental/batteryless absolute SA : Simple absolute	<Extended I/O Type> E : Not use NP : NPN (Sink Type) DV : DeviceNet
[Optional] HS : Homeposition check sensor B : Brake	DV2 : DeviceNet (Multidrop connector enclosed) CC : CC-Link CC2 : CC-Link (Multidrop connector enclosed)
<Standard I/O Type> NP : NPN (Sink Type) PN : PNP (Source Type)	PR : PROFIBUS-DP PRT : PROFINET-IO SE1 : RS232C IA : IA Net

Note 1 For the high-thrust (PCF) type and the high-thrust safety category compliant (PGF) type, 1st axis or 1st and 2nd axes are equipped with the high-thrust motor.

SCARA Robot Controller

MSEL-PCX4-3 N 4515 GM WAI-56PWAI-NP-DV-2-4-DN-*	
<Series>	<Identification for IAI use only> * There is no identification in some cases.
<Type>	<Type of Installation> Not Specified : Screw attachment type DN : DIN rail mounting type
PCX3 : 3 axes standard type PGX3 : 3 axes safety category compliant type PCX4 : 4 axes standard type PGX4 : 4 axes safety category compliant type	<Power-supply Voltage> 4 : 100 to 230V AC
<Power-con SCARA Model> [Axis No.] 3 : 3 axes (with no rotation control) 4 : 4 axes	<I/O Cable Length> 0 : Equipped with no cable 2 : 2m (Standard) 3 : 3m 5 : 5m
[Type] N : Standard type C : Cleanroom Type W : Dust Proof/Splash Proof Type	<Extended I/O Type> E : Not use NP : NPN (Sink Type) DV : DeviceNet DV2 : DeviceNet (Multidrop connector enclosed)
[Arm length] 1808 : Arm length 180mm 2508 : Arm length 250mm 3515 : Arm length 350mm 4515 : Arm length 450mm 5520 : Arm length 550mm 6520 : Arm length 650mm	CC : CC-Link CC2 : CC-Link (Multidrop connector enclosed)
[Gripper equipped : Three axes type only] Not Specified : Gripper Not equipped (Choose this for 4-axis type)	PR : PROFIBUS-DP EP : EtherNet/IP EC : EtherCAT PRT : PROFINET-IO SE1 : RS232C SE2 : RS485 IA : IA Net
GM : Gripper GRSMML equipped GL : Gripper GRSL equipped GW : Gripper GRSWL equipped	< Standard I/O Type > NP : NPN (Sink Type) PN : PNP (Source Type)

< Added axis (4th axis content)>

20P : 20□ pulse motor
20SP : 20□ pulse motor
28P : 28□ pulse motor
28SP : 28□ pulse motor
35P : 35□ pulse motor
42P : 42□ pulse motor
56P : 56□ pulse motor

[Encoder Type]
WAI : Incremental/batteryless absolute
[Optional]
HS : Homeposition check sensor
B : Brake

Basic Specifications

Specification Item	Specification Content
Number of Controlled Axes	1-axis to 4-axis (Total of RC axis or SCARA axis + RC axis is four axes max.)
Power Supply Voltage	Single-phase 100V to 230V AC ±10%
Power Current (typ value)	2.9A (100V AC), 1.4A (200V AC), 1.2A (230V)
Power Supply Frequency	50Hz/60Hz±5%
Rush Current (typ value) (Note 1)	15A (100V AC), 30A (200V AC) (Ambient Temp. 25°C, Measurement in one time of turn-ON: when no repeating of ON/OFF)
Leakage Current (Note 2)	0.75mA or less
Transient Power Cutoff Durability	20ms or more
Heat Generation	40W (100V AC), 35.2W (200V AC), 30.4W (230V AC)
PIO Power Supply (Note 3)	24V DC ±10% (Supplied from external equipment)
Motor Control System	Weak field-magnet vector control
Applicable Encoder	Battery-less absolute encoder or Incremental encoder : Resolution 800pulse/rev High resolution battery-less absolute encoder : 8192pulse/rev
Actuator Cable Length	MAX. 20m (when simple absolute type is used Max.10m)
Serial Communication Interface (SIO port or USB port)	Teaching tool dedicated connector (SIO ports and USB ports excluded) (XSEL Serial Communication Protocol (Format B))
External Interface	(Standard/ Extension)PIO 24V DC general-purpose signal I/O (NPN/PNP selection) Input 32 points max., output 32 points max. (Total of standard and extension) Cable length MAX.10m
	(Dedicated for Extension) Fieldbus DeviceNet, CC-Link, PROFIBUS-DP, EtherCAT, PROFINET-IO, EtherNet/IP (Note 4)
Data Setting and Input	PC software or teaching pendant
Program Specification	SEL Language
Max. Number of Program Steps	9999 steps
Max. Number of Positions	30000 position
Max. Number of Programs	255 program
Max. Number of Multitask Programs	16 program
Data Retention Memory	Flash ROM and FeRAM
Clock Function	Retaining time after power turned OFF: approximately 10 days Time for battery charge after the clock data is lost: approximately 100 hours
System I/O	Emergency stop input, safety gate input
Safety Circuit Configuration	Drive-source Cutoff Method Contact point for semiconductor (connect externally such as driving source cutoff relay when required to comply with Safety Categories for PG/PGF/PGX Types)
	Emergency-stop Input b Contact (Normally closed) Input (Internal power supply)
Enable Input b Contact (Normally closed) Input (Internal power supply)	
Protective Functions	Motor over current, overload, encoder open circuit detection, soft limit over, system abnormality, battery abnormality
Protection Function Against Electric Shock	Class I In case grounding conducted on ground terminal in addition to basic insulation for electric shock proof.
Overvoltage Category	Category II Voltage durability 2500V at less than 300V AC for input rating
Insulation Resistance	10MΩ or more (Between power terminal and I/O terminal and also all external terminals and case at the power supply of DC500V)
Insulation Strength	1500V AC for 1 min (between Primary and PE) 3000V AC for 1 min (between Primary and Secondary)
Protection Conduction	10A 1.0V or less (for 10sec)
Cooling Method	Forced Air-Cooling
Environment	Surrounding Air Temperature 0 to +40°C
	Surrounding Humidity 85% RH or less (non-condensing)
	Surrounding Environment (Refer to the Item for the Installation Environment).
	Surrounding Storage Temperature -20 to 70°C (Note) 0 to 40°C for absolute battery
	Surrounding Storage Humidity 85% RH or less (non-condensing)
	Maximum Operation Height 1000m
	Vibration Resistance 10 to 57 Hz in XYZ directions Swing width: 0.075mm, 57 to 150Hz Acceleration: 9.8m/s ²
	Protection Class IP20
Pollution Degree Pollution degree 2	
External Dimensions [Refer to the External Dimensions]	
Mass	Approx. 1.4kg

Note 1 Rush current at the power connection continues for 5 msec. Note that the value of in-rush current differs depending on the impedance of the power supply line.

Note 2 Leak current varies depending on the capacity of connected motor, cable length and the surrounding environment. Measure the leak current at the point where a ground fault circuit interrupter is to be installed when leakage protection is conducted. Regarding the leakage breaker, it is necessary to have a clear purpose for selection such as a fire protection or protection of human body. Use the harmonic type (for inverter) for a leakage breaker.

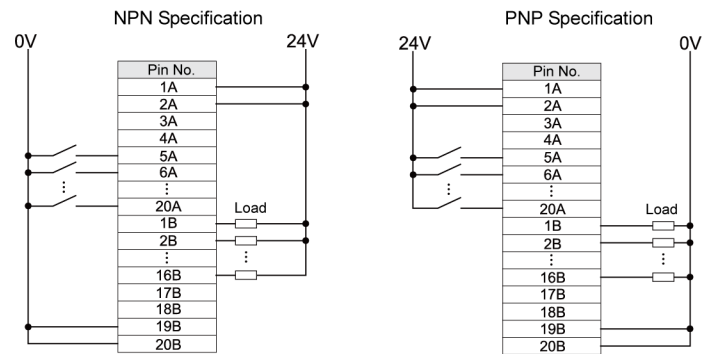
Note 3 Power supply is not necessary if PIO is not to be used.

Note 4 EtherNet/IP can also communicate with EtherNet.

Standard I/O Interfaces Specification

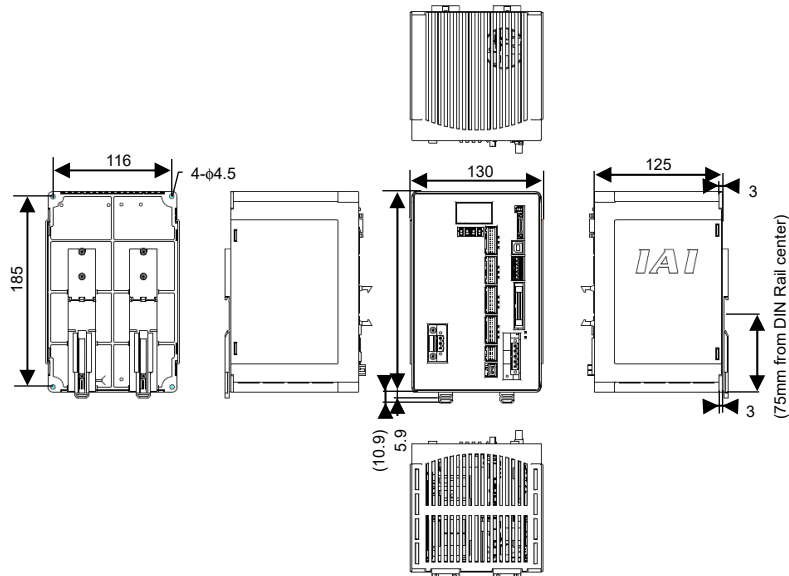
	Input	Output
Specification	Input voltage	24V DC±10%
	Input current	7mA 1 circuit
	ON/OFF voltage	ON voltage MIN. 16V DC OFF voltage MAX. 5V DC
Leak Current		MAX. 2mA/1 point
Insulation with external circuit and photocoupler		
NPN		
PNP		

Note 1 The total of lead current reaches max. 400mA every 8 ports from output port No. 316.

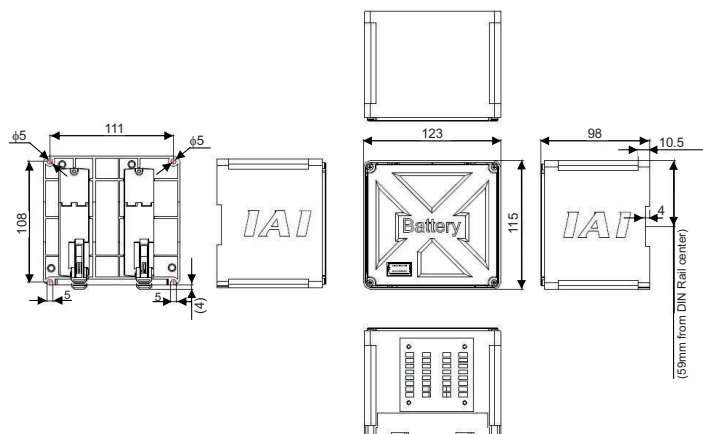


External Dimensions

• Main Body



• Absolute Battery Box (Simple Absolute Type)



Installation Environment

This product is capable for use in the environment of pollution degree 2¹ or equivalent.

*1 Pollution Degree 2: Environment that may cause non-conductive pollution or transient conductive pollution by frost (IEC60664-1)

1. Installation Environment

Do not use this product in the following environment

- Location where the surrounding air temperature exceeds the range of 0 to 40°C
- Location where condensation occurs due to abrupt temperature changes
- Location where relative humidity exceeds 85%RH
- Location exposed to corrosive gases or combustible gases
- Location exposed to significant amount of dust, salt or iron powder
- Location subject to direct vibration or impact
- Location exposed to direct sunlight
- Location where the product may come in contact with water, oil or chemical droplets
- Environment that blocks the air vent [Refer to Installation and Noise Elimination]

When using the product in any of the locations specified below, provide a sufficient shield.

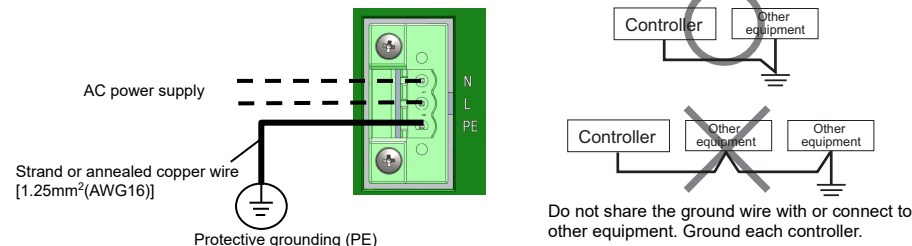
- Location subject to electrostatic noise
- Location where high electrical or magnetic field is present
- Location with the mains or power lines passing nearby

2. Storage and Preservation Environment

- Storage and preservation environment follows the installation environment. Especially in a long-term storage, consider to avoid condensation of surrounding air. 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 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.

Installation and Noise Elimination

1. Noise Elimination Grounding (Frame Ground)



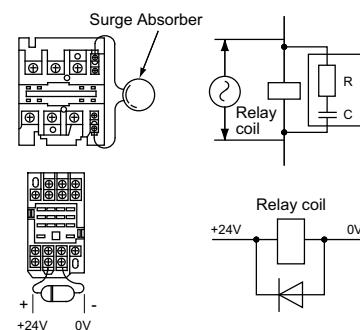
2. Precautions Regarding Wiring Method

- 1) Use a twisted cable for connection to the power supply.
- 2) To reduce the interference to each other, have the I/O line, communication and encoder lines, power and driving supply lines separate from each other.

3. Noise Sources and Elimination

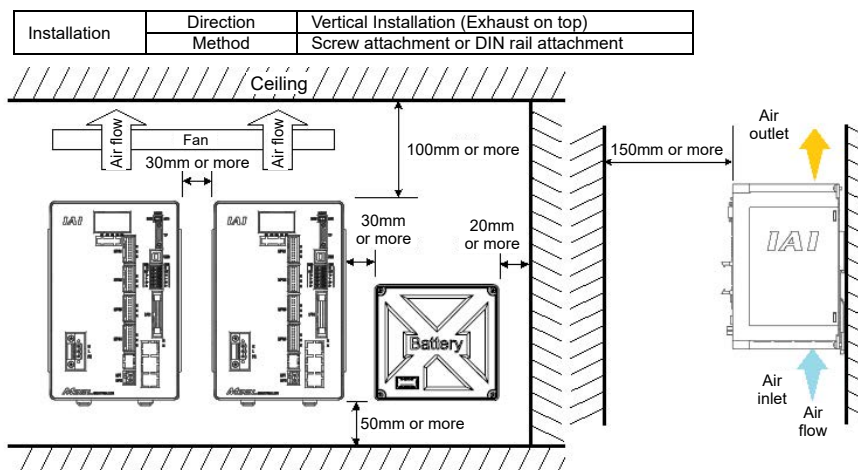
Carry out noise elimination measures for power devices on the same power path and in the same equipment. The following are examples of measures to eliminate noise sources:

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

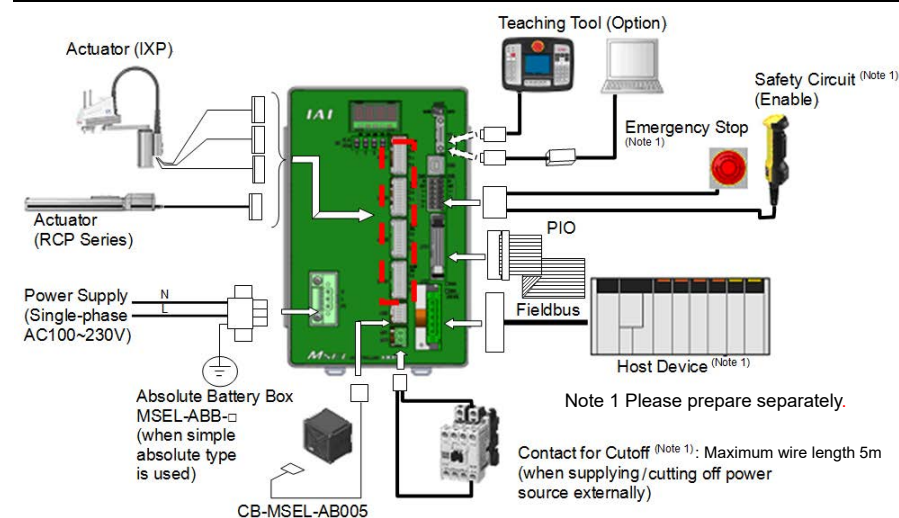


4. Heat Radiation and Installation

Conduct design and manufacture in consideration of the control box size, controller layout and cooling in such a way that the temperature around the controller will be 40°C or less. In case of layout with multiple controllers aligned vertically, consider not to have exhaust of bottom side controllers flow directly to the inlet of the upper controllers. Especially around the battery, the performance may drop in both low and high temperature. Keep it in ambient temperature as much as possible. (Approximately 20°C is the recommended temperature.)



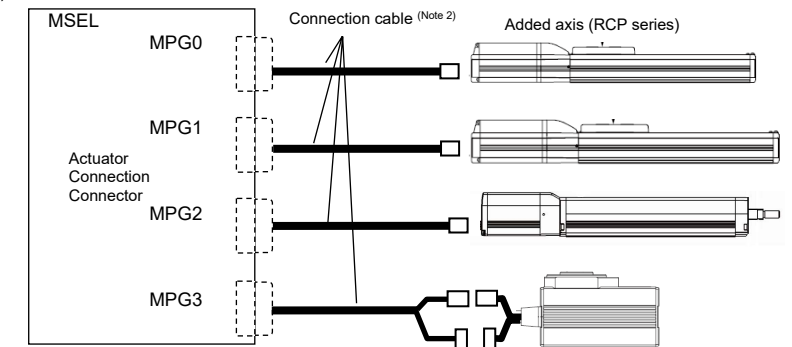
Connection Diagram



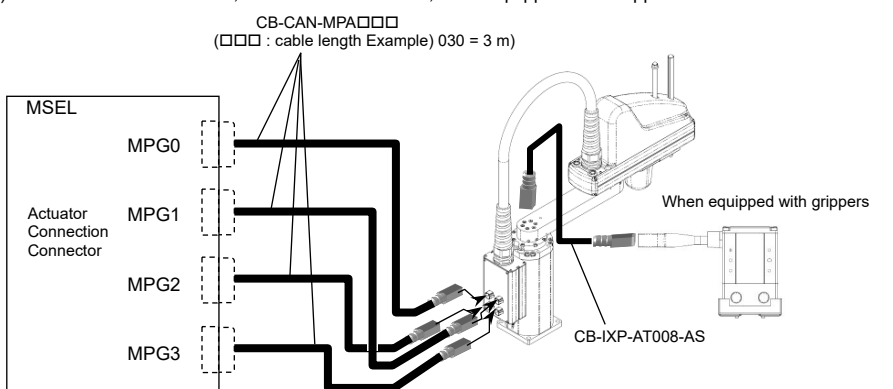
Note 1 Please prepare separately.

Contact for Cutoff (Note 1): Maximum wire length 5m (when supplying/cutting off power source externally)

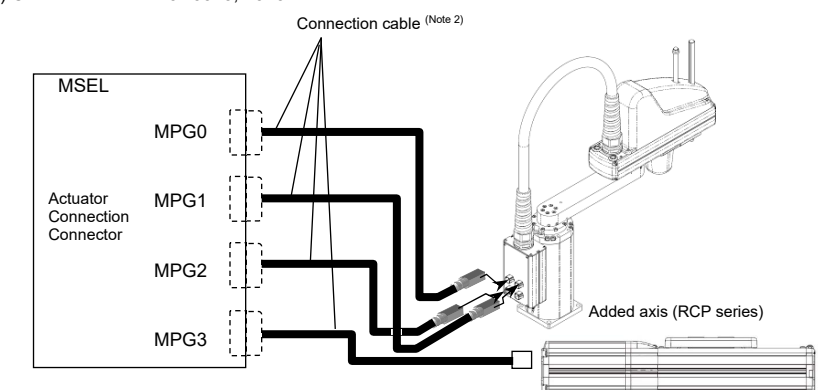
1) Connection of Linear Axes



2) Connection to IXP-4N3515, 4515 and IXP-3N3515, 4515 Equipped with Grippers.



3) Connection to IXP-3N3515, 4515 and Additional Axes



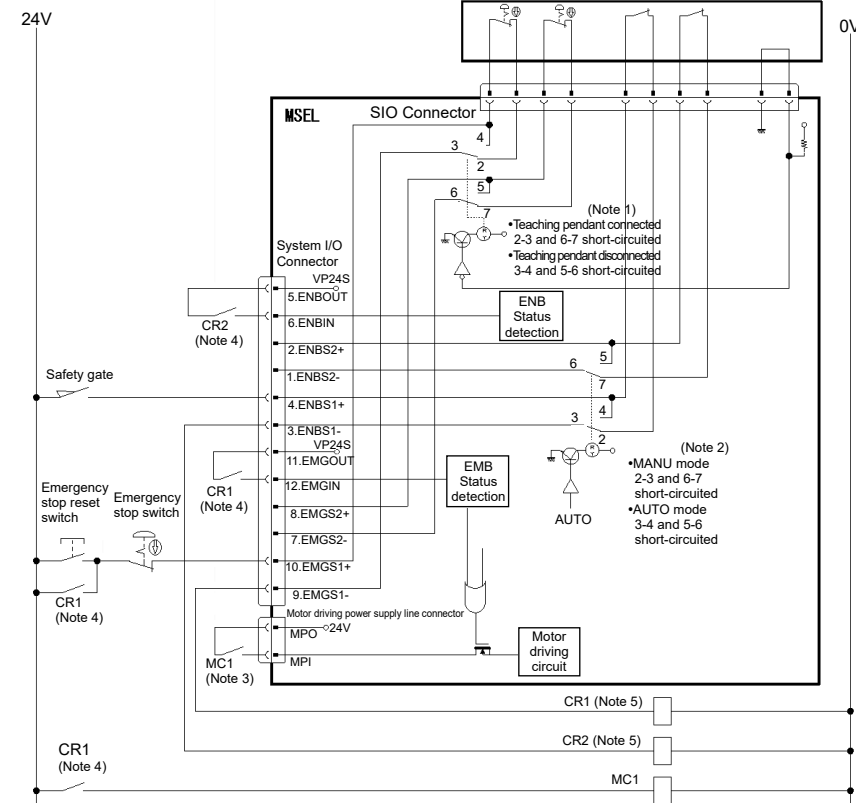
Note 2 Applicable Connection Cable Model No. □□□□ : cable length Example) 030 = 3 m		
Model	Cable	Remarks
RCP2	CB-PSEP-MPA□□□□	Robot cable from 0.5 to 20m
RCP3	CB-APSEP-MPA□□□□	Robot cable from 0.5 to 20m
	CB-APSEP-MPA□□□□-LC	Standard cable from 0.5 to 20m
RCP4 (except for GR* Type)	CB-CA-MPA□□□□-RB	Robot cable from 0.5 to 20m
	CB-CA-MPA□□□□	Standard cable from 0.5 to 20m
RCP4 (GR* Type), RCP5, RCP6, IXP	CB-CAN-MPA□□□□-RB	Robot cable from 0.5 to 20m
	CB-CAN-MPA□□□□	Standard cable from 0.5 to 20m
RCP2 High-Thrust Type	CB-CFA-MPA□□□□-RB	Robot cable from 0.5 to 20m
	CB-CFA-MPA□□□□	Standard cable from 0.5 to 20m
RCP4 High-Thrust Type	CB-CFA2-MPA□□□□-RB	Robot cable from 0.5 to 20m
	CB-CFA2-MPA□□□□	Standard cable from 0.5 to 20m
RCP5/6 High-Thrust Type	CB-CFA3-MPA□□□□-RB	Robot cable from 0.5 to 20m
	CB-CFA3-MPA□□□□	Standard cable from 0.5 to 20m

Caution: In such case, give a number to each connector to avoid any mistake. If the cable is not correctly connected, it might cause a damage to or malfunction of the motor or PCB board.

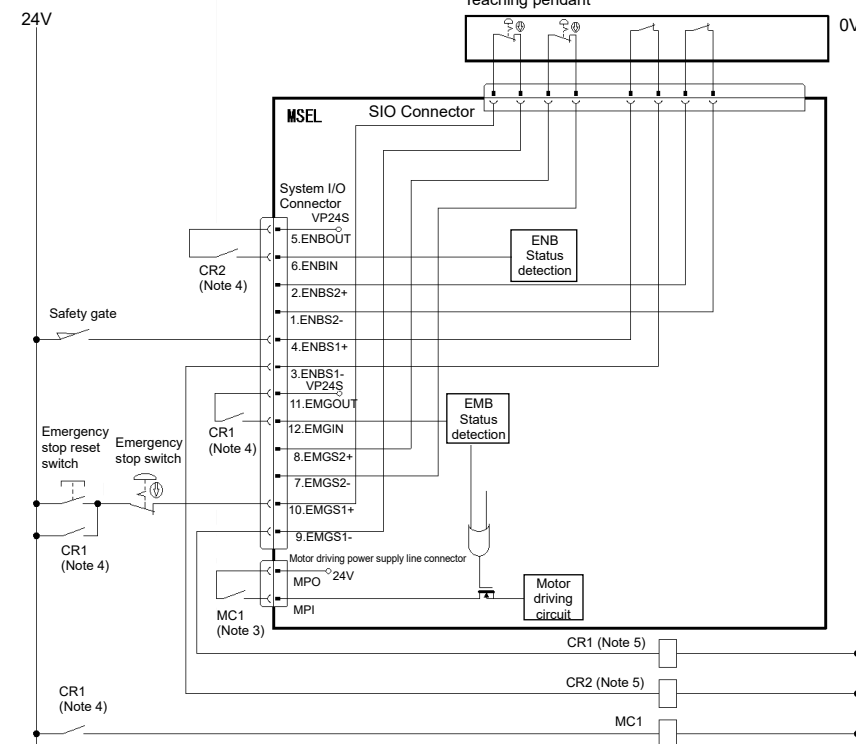
Emergency Stop Circuit

This shows the circuit example when the emergency stop switch in the teaching pendant is enabled on the emergency stop circuit to be built up by the client.

● PC/PCF/PCX Type



● PG/PGF/PGX Type



Note 1: EMGS1+ and EMGS1- make short-circuit inside the controller if a teaching pendant is not connected.

Note 2: In AUTO Mode, short-circuit is made between ENBS1+ and ENBS1- inside the controller.

Note 3: When it is necessary to cut off the motor power source externally for such reason as to comply with Safety Category, connect a contact such as a connector on the wire between MPO and MPI terminals on the motor driving power line connector. Shown below is table for the power specifications between MPO and MPI terminals.

Specifications	
Voltage	24V DC (Built-in power supply)
Rated current	Min. 1.5A (1 axis type) to Max. 8A (4 axis type) Number of High-Thrust Axes × 1.5A + Number of Other Axes × 2A
Maximum current	Min. 4A (1 axis type) to Max. 20A (4 axis type) Number of High-Thrust Axes × 6A + Number of Other Axes × 4A

Note 4: The ratings for the emergency stop signal (EMGIN) that turns ON/OFF at the contact CR1 and the enable signal (ENBIN) that turns on/off at the contact CR2 are 24V DC and 10mA or less.

The emergency stop output (EMGOUT) and the enable output (ENBOUT) are available for connection to 30V DC and 0.5A or less.

Note 5: For CR1 and CR2, select the one with coil current 0.1A or less.

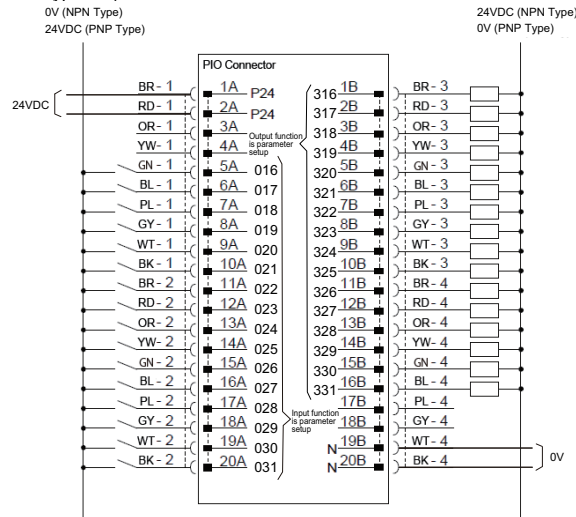
PIO

(1) I/O Map

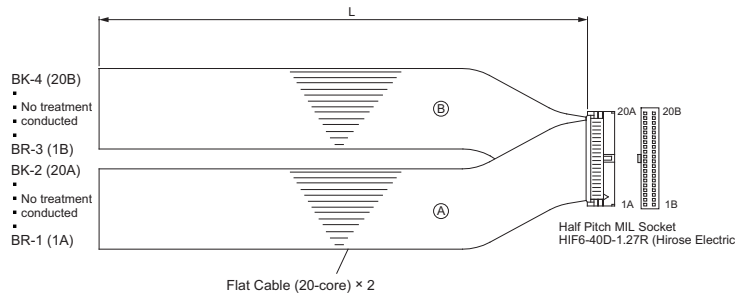
Type	Port No.	Function	Type	Port No.	Function
Internal DI	000~015	For future expansion	Internal DO	300	ALM (LED on the front panel)
				301	RDY (LED on the front panel)
				302	EMG (LED on the front panel)
				303	For future expansion
				304	HPS (LED on the front panel)
			305~315	For future expansion	
Standard I/O (input side) (I/O1)	016	Program start ^(Note)	Standard I/O (output side) (I/O1)	316	Alarm output ^(Note)
	017	General-purpose input		317	READY output ^(Note)
	018			318	Emergency-stop output ^(Note)
	019			319	General-purpose output
	020			320	
	021			321	
	022	322			
	023	323			
	024	324			
	025	Program number specification ^(Note)		325	
	026			326	
	027			327	
	028			328	
	029			329	
	030	General-purpose input		330	
031	331				
Internal DI	032~047	For future expansion	Internal DO	332	7-segment user display digit
				333	7-segment user display digit
				334~336	For future expansion
				337	7-segment display refresh
				338	7-segment user/system alternate
				339	7-segment user display specification
				340~346	DT0~6 (7-segment user display bit)
				347	For future expansion
Extension I/O (input side) (I/O2)	048~295 (16 points selected from this range)	General-purpose input	Extension I/O (output side) (I/O2)	348~595 (16 points selected from this range)	General-purpose output

Note The dedicated functions set in the standard I/O board can be changed by the settings in I/O Parameter No. 30 to 61.

(2) Wiring (Standard type I/O)



Model : CB-PAC-PIO□□□□ (□□□□ indicates the cable length L. Example. 020 = 2m)

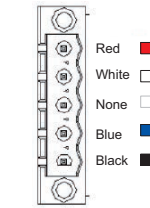


LED	Color	Lamp condition	Description
RUN	Green	○	Initialization complete, In the normal operation
ERR	Orange	○	PIO Power Voltage (24V DC) Drop Error



DeviceNet

[Refer to the instruction manuals for DeviceNet]

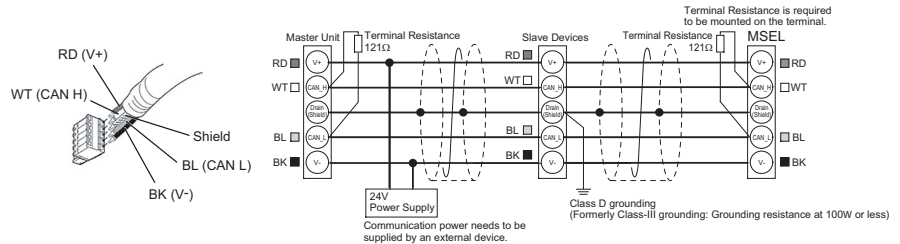


Connector Name	DeviceNet Connector	
Cable Side	MSTB2.5/5-STF-5.08 AU M	Enclosed in standard package Manufactured by PHOENIX CONTACT
Controller Side	MSTB2.5/5-GF-5.08 AU	

Pin No.	Signal Name (Color)	Description	Applicable cable diameter
1	V- (BK)	Power Supply Cable Negative Side	Dedicated cable for DeviceNet
2	CAN L (BL)	Communication Data Low Side	
3	Shield (None)	Shield	
4	CAN H (WT)	Communication Data High Side	
5	V+ (RD)	Power Supply Cable Positive Side	

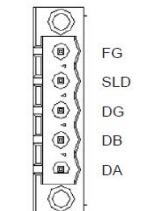
Monitoring LED ○ : Illuminating × : OFF ☆ : Flashing

LED	Color	Lamp condition	Description
MS	Green	○	Normal Operation
		☆	Configuration setting not established or not complete, test run required
	Orange	○	An error that cannot be recovered
		☆	An error that can be recovered
	Green/Orange	(Blink by turn)	Self-testing
NS	Green	○	No power supply confirmed
		☆	Online, Communication in normal condition
	Orange	○	Online, No connection established
		☆	Critical link error
	Green/Orange	(Blink by turn)	Self-testing
	-	×	Offline/No power supply confirmed



CC-Link

[Refer to the instruction manuals for CC-Link]

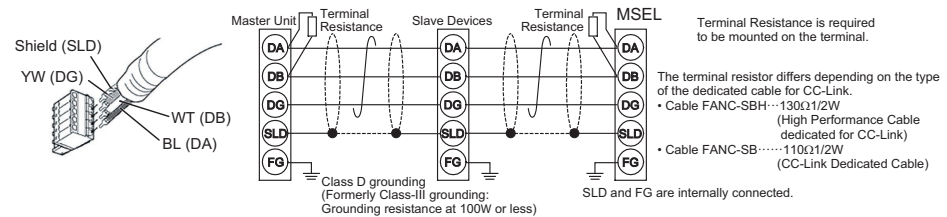


Connector Name	CC-Link Connector	
Cable Side	MSTB2.5/5-STF-5.08 AU	Enclosed in standard package Manufactured by PHOENIX CONTACT
Controller Side	MSTB2.5/5-GF-5.08 AU	

Pin No.	Signal Name (Color)	Description	Applicable cable diameter
1	DA (BL)	Communication Line A	Dedicated cable for CC-Link
2	DB (WT)	Communication Line B	
3	DG (YW)	Digital GND	
4	SLD	Connect the shield of the shielded cable	
5	FG	Frame Ground	

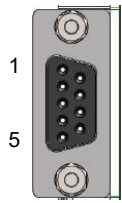
Monitoring LED ○ : Illuminating × : OFF ☆ : Flashing

LED	Color	Lamp condition	Description
RUN	Green	○	Turns on when communication is started, and turns OFF when communication is disconnected for the specified time
ERR	Orange	○	Data reception error
		☆	Communication Setting Error (Station Number Setting/ Baud rate setting, etc.)
		×	The station No. and baud rate set values are changed from ones set at the time of reset cancellation (0.4 sec flashing)
		×	Communication in normal condition



PROFIBUS-DP

[Refer to the instruction manuals for PROFIBUS-DP]

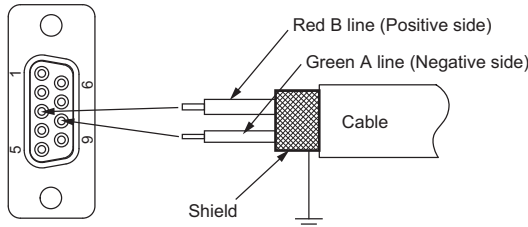


Connector Name	PROFIBUS-DP Connector		
Cable Side	9-pin D-sub Connector (Male)	Please prepare separately	
Controller Side	9-pin D-sub Connector (Female)		

Pin No.	Signal Name	Description	Applicable cable diameter
1	NC	Disconnected	For Ethernet cable, use a straight STP cable that possesses the performance of Category 5 or more.
2	NC	Disconnected	
3	B-Line	Communication Line B (RS485)	
4	RTS	Request for Sending	
5	GND	Signal GND (Insulation)	
6	+5V	+5V Output (Insulation)	
7	NC	Disconnected	
8	A-Line	Communication Line A (RS485)	
9	NC	Disconnected	

Monitoring LED ○ : Illuminating × : OFF ☆ : Flashing

LED	Color	Lamp condition	Description
MS	Green	○	Initial condition
		☆	Initial condition (with network check event)
		○	Exception error
NS	Green	○	Online (Communication in normal condition)
		☆	Online (Cleared)
		○	Error occurrence



EtherNet/IP

[Refer to the instruction manuals for EtherNet/IP]



Front View of Connector on Controller side

Connector Name	EtherNet/IP Connector		
Cable Side	8P8C Modular Plug	Please prepare separately	
Controller Side	8P8C Modular Jack		

Pin No.	Signal Name	Description	Applicable cable diameter
1	TD+	Data sending +	For Ethernet cable, use a straight STP cable that possesses the performance of Category 5 or more.
2	TD-	Data sending -	
3	RD+	Data receiving +	
4	-	Disconnected	
5	-	Disconnected	
6	RD-	Data receiving -	
7	-	Disconnected	
8	-	Disconnected	

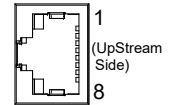
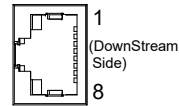
Monitoring LED ○ : Illuminating × : OFF ☆ : Flashing

LED	Color	Lamp condition	Description
MS	Green	○	In normal operation and under control of scanner (master)
		☆	Setting of construction information incomplete, or scanner (master) in idling condition
		○	Fatal malfunction (exception condition or critical error)
	Orange	☆	Light malfunction possible to recover
		×	Power OFF
NS	Green	○	Online (Connection established on one or more)
		☆	Online (connection not established)
	Orange	○	Critical error such as IP address duplication
		☆	Timeout in connection on one or more
	Green/Orange	×	Power OFF, IP address not established



EtherCAT

[Refer to the instruction manuals for EtherCAT]



Front View of Connector on Controller side

Connector Name	EtherCAT Connector		
Cable Side	8P8C Modular Plug	Please prepare separately	
Controller Side	8P8C Modular Jack		

Pin No.	Signal Name	Description	Applicable cable diameter
1	TD+	Data sending +	For Ethernet cable, use a straight STP cable that possesses the performance of Category 5 or more.
2	TD-	Data sending -	
3	RD+	Data receiving +	
4	-	Disconnected	
5	-	Disconnected	
6	RD-	Data receiving -	
7	-	Disconnected	
8	-	Disconnected	

Monitoring LED ○ : Illuminating × : OFF ☆ : Flashing

LED	Lamp condition (Color)	Description
RUN	×	Initial status ("INIT" status of EtherCAT communication), or the power is turned off
	○ (Green)	Normal operation ("OPERATION" status of EtherCAT communication)
	☆ (Green)	"PRE-OPERATION" status of EtherCAT communication
	☆ (Green)	"SAFE-OPERATION" status of EtherCAT communication
	○ (Orange)	A communication part (module) error
ERR	×	No error, or the power is turned off
	☆ (Orange)	Configuration information (setting) error (Information received from the master cannot be configured.)
	☆ (Orange)	Communication part circuit error (Watchdog timer timeout)
	○ (Orange)	Communication part (module) error



PROFINET-IO

[Refer to the instruction manuals for PROFINET-IO]



Front View of Connector on Controller side

Connector Name	PROFINET-IO Connector		
Cable Side	8P8C Modular Plug	Please prepare separately	
Controller Side	8P8C Modular Jack		

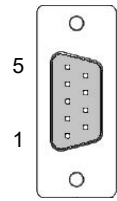
Pin No.	Signal Name	Description	Applicable cable diameter
1	TD+	Data sending +	For Ethernet cable, use a straight STP cable that possesses the performance of Category 5 or more.
2	TD-	Data sending -	
3	RD+	Data receiving +	
4	-	Disconnected	
5	-	Disconnected	
6	RD-	Data receiving -	
7	-	Disconnected	
8	-	Disconnected	

Monitoring LED ○ : Illuminating × : OFF ☆ : Flashing

LED	Color	Lamp condition	Description
MS	Green	○	In the normal operation
		☆	Communication under diagnosis
		○	Exception error (The board must be replaced.)
	Orange	☆	(Repeating off for 0.75sec → on for 0.25sec) There is an error in communication setting.
		☆	(Repeating twice of flashing with off for 0.75sec → on for 0.5sec) There is an error in IP address setting.
		☆	(Repeating three times of flashing with off for 0.75sec → on for 0.5sec) A wrong station name has been applied.
		☆	(Repeating four times of flashing with off for 0.75sec → on for 0.5sec) A hardware error is present. (The board must be replaced.)
	-	×	Power OFF, or Initialization incomplete
	NS	○	Connection established, Communication in normal condition (RUN)
		☆	Connection established, Communication Stop (STOP)
	-	×	No connectable controller, Power OFF



RS232C/RS485

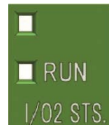


Connector Name	SIO Connector		
Cable Side	9-pin D-sub Connector (Female)	Please prepare separately	
Controller Side	9-pin D-sub Connector (Male)		

Pin No.	RS232C Signal Name	RS485 Signal Name	Description
1	NC	NC	Disconnected
2	RXD	NC	Data receiving (RS232C)
3	TXD	SGA	Data sending (RS232C)/ Communication Line A (RS485)
4	NC	NC	Disconnected
5	GND	GND	Signal GND (Insulation)
6	NC	NC	Disconnected
7	NC	SGB	Communication Line B (RS485)
8	NC	NC	Disconnected
9	NC	NC	Disconnected

Monitoring LED ○ : Illuminating × : OFF ☆ : Flashing

LED	Color	Lamp condition	Description
RUN	Green	○	Communication in normal condition



Starting Procedures

When using this product for the first time, make sure to avoid mistakes and incorrect wiring by referring to the procedure below.

Check of Packed Items
Are there all the delivered items? No → Contact us or our distributor.

↓ Yes
Installation and Wiring [Refer to Chapter 1 and 2.1]
Perform the installation of and wiring for the actuator and controller.

↓
Point Check Item
• Is frame ground (FG) and protection earthing (PE) connected? • Has the noise countermeasure been taken?

↓
Power Supply and Alarm Check
Connect a teaching tool such as PC, turn the operation mode setting switch to "MANU" side and turn the power ON for unit.

↓
Check Item
Is the panel window showing "rdy"? No → Connect the teaching tool such as PC to confirm the content of alarm and have an appropriate treatment.
• It is necessary to supply I/O power for PIO Type. When I/O is not to be used, set I/O Parameter No. 10 = 0
• Connect to the upper master for Fieldbus Type (Set I/O Parameter No. 18 = 0 when not connecting to master)

↓ Yes
Servo ON
Turn the servo ON with the operation on the teaching tool such as PC.
Caution
Please perform this process with the actuator away from the mechanical end or interfering subjects as much as possible.
Put the actuator away if it interferes with surroundings. It may generate an alarm if the actuator hit the mechanical end or interfering subjects when the servo is turned ON.
The slider may get slightly dropped by self-weight if servo ON and OFF is repeatedly performed at the same position. Be careful not to pinch the hand or damage the work.

↓
Check Item
Confirm that "Servo-ON: SV" is turned on in a teaching tool such as PC. No → If an alarm is generated, connect the PC or teaching pendant and check the content of the alarm to have the right treatment.

↓ Yes
Safety Circuit Check
Does the emergency stop circuit (drive cutoff circuit) work properly and turn the servo OFF? No → Check the emergency stop circuit.

↓ Yes
Operation check on actuator
Check by JOG operation that operation of the full stroke can be performed with no abnormality.

↓
Caution
• To ensure safety, it is recommended that safety speed be enabled during initial movements.
• When putting the brake release switch to "RLS" side on a robot installed vertically, pay attention not to pinch fingers or damage a hand by the actuator dropped by its own weight.

Now, preparation for operation is complete.

●Troubleshooting

The following alarm displays are frequently generated at the start-up operation.
Deal with each of them referring to the following table.

Status display	Status contents	Cause and Remedy
	During Emergency-stop	It is not an alarm. • It is caused when the emergency stop button is not cleared on the front panel. Clear it. • It is generated when the emergency stop switch in the teaching pendant or the personal computer application software is not cancelled. In such case, cancel it. • It is generated when the personal computer cable is not connected to the emergency stop box.
	Deadman switch OFF	It is not an alarm. • It generated when the AUTO/MANU switch has been set to "MANU" and the personal computer or the teaching pendant is not connected. Connect the personal computer or the teaching pendant or set the AUTO/MANU switch to "AUTO". • When the actuator is to be started up, hold the deadman switch on the teaching pendant to turn it on.
	AC Power Interruption Momentary Power Failure Power Voltage Drop	It is generated when the power voltage is not supplied. Check the power supply.
	24V I/O Error	It is generated when the +24V power for I/O is not supplied. Check the power supply. (Procedure for starting up I/O 24V power unit without connection) Set both the I/O parameter No. 10 to "0". In this case, the I/O connection is invalid.
	Field Bus Error	It is generated when the field bus link connection is not established. Check the link cable connection, I/O parameter and PLC parameter settings. (How to start up the controller without connecting the field bus) Set both the I/O parameter No. 18 to "0".



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