IAI Quality and Innovation

EtherNet/IP | EtherCAT | PROFINET-IO

PCON-CA/CFA/CB/CFB, ACON-CA/CB/CGB, DCON-CA/CB/CGB First Step Guide Sixth Edition

Thank you for purchasing our product.
Make sure to read the Safety Guide and detailed Instruction Manual (DVD) included with the product in addition to this First Step Guide to ensure correct use. This Instruction Manual is original.

Warning : Operation of this equipment requires detailed installation and operation instructions which are provided on the DVD Manual included in the box this device was packaged in. It should be retained with this device at all times.
A hardcopy of the Manual can be requested by contacting your nearest IAI Sales Office listed at the back cover of the Instruction Manual or on the First Step Guide.

- 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.
- EtherCAT® is a registered mark of Beckoff Automation GmbH.
- EtherNet/IP is a trademark used under the license of ODVA.

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	Reference
1	Controller Main Body	Refer to "How to read the model plate", "How to read the model of the controller"	
Accessories			
2	Power Connector	FMC1.5/8-ST-3.5 (Supplier : PHOENIX CONTACT)	Recommended cable size AWG16 to 20 (1.25 to 0.5mm^2)
3	Absolute Battery (Option)	AB-7 or SEP-ABU*	If applicable for Simple Absolute Type
4	Serial Absolute Battery (Option)	AB-5	If applicable for Serial Absolute Type (for ACON only)
5	First Step Guide		
6	Instruction Manual (DVD)		
7	Safety Guide		

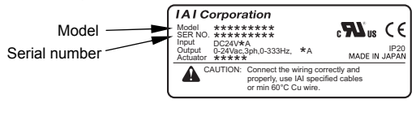
2. Teaching Tool (to be purchased separately)
A teaching tool, such as PC Software, is necessary when performing programming and commissioning, such as editing position data or parameters.
Please utilise any of the following teaching tools.

No.	Part Name	Model
1	PC Software (with RS232C converter adapter + external equipment communication cable)	RCM-101-MW
2	PC Software (with USB converter adapter + USB cable + external equipment communication cable)	RCM-101-USB
3	Touch Panel Teaching	TB-01
4	Touch Panel Teaching (with Deadman Switch Attached on the Left side)	TB-01D
5	Touch Panel Teaching (with Deadman Switch Attached on the Right side)	TB-01DR
6	Touch Panel Teaching	CON-PTA
7	Touch Panel Teaching (with Deadman Switch)	CON-PDA
8	Touch Panel Teaching (with Deadman Switch + TP Adapter (RCB-LB-TG))	CON-PGAS

3. Instruction Manuals related to this product, which are contained in the Instruction Manual (DVD).

No.	Name	Manual No.
1	PCON-CA/CFA Controller Instruction Manual	ME0289
2	PCON-CB/CFB Controller Instruction Manual	ME0342
3	ACON-CA, DCON-CA Controller Instruction Manual	ME0326
4	ACON-CB Series Controller, DCON-CB Series Controller, Instruction Manual	ME0343
5	PC Software RCM-101-MW/RCM-101-USB Instruction Manual	ME0155
6	Touch Panel Teaching CON-PTA/PDA/PGA Instruction Manual	ME0295
7	Instruction Manual for the Serial Communication [for Modbus]	ME0162
8	CC-Link Instruction Manual	ME0254
9	DeviceNet Instruction Manual	ME0256
10	PROFIBUS-DP Instruction Manual	ME0258
11	CompoNet Instruction Manual	ME0220
12	MECHATROLINK-Ⅰ/Ⅱ Instruction Manual	ME0221
13	EtherCAT Instruction Manual	ME0273
14	EtherNet/IP Instruction Manual	ME0278
15	PROFINET-IO Instruction Manual	ME0333

4. How to read the model plate



5. How to read the model of the controller

● PCON

PCON-CA-56P WAI-EP-2-0-ABU-DN-**

<Series>
<Type>
CA/CB : Standard Type
CFA/CFB : High-Thrust Actuator Connection Type
CGB : Sagety Categories Complied Type
CGFB : High-Thrust Actuator Connection Sagety Categories Complied Type

<Detail of Connected Axis>
[Motor Type]
20P : 20□ pulse motor, 20SP : 20□ pulse motor,
28P : 28□ pulse motor, 28SP : 28□ pulse motor,
35P : 35□ pulse motor
42P : 42□ pulse motor, 42SP : 42□ pulse motor
56P : 56□ pulse motor, 56SP : 56□ pulse motor
60P : 60□ pulse motor, 86P : 86□ pulse motor

[Encoder Type]
WAI : Incremental / Battery-less Absolute Shared
SA : Simple Absolute

<I/O Type>
NP : NPN Type (Sync. Type) (Standard),
PN : PNP Type (Source Type),
PLN : Pulse Train Control NPN Type (Sync. Type),
PLP : Pulse Train Control PNP Type (Source Type),
DV : DeviceNet Connection Type,
PR : PROFIBUS-DP Connection Type,
ML : MECHATROLINK-Ⅰ/Ⅱ Connection Type,
EP : EtherNet/IP Connection Type,
CC : CC-Link Connection Type,
CN : CompoNet Connection Type,
EC : EtherCAT Connection Type,
PRT : PROFINET-IO Connection Type

<Identification for IAI use only>
* There is no identification in some cases.

<Type of Installation>
(Not Specified) : Screw Attachment Type
DN : DIN Rail Mounting Type

<Applicable to Simplified Absolute Unit>
AB : Simple Absolute Type (With the Absolute Battery)
ABU : Simple Absolute Type (With the Absolute Battery Unit (SEP-ABU))
ABUN : Simple Absolute Type (With no Absolute Battery)

<Power-supply Voltage>
0 : 24V DC

<I/O Cable Length>
0 : Equipped with no cable
2 : 2m (Standard)
3 : 3m
5 : 5m

● ACON

ACON-CA-30 I-EC-2-0-AB-DN-**

<Series>
<Type>
CA/CB : Standard Type
CGB : Safety Categories Complied Type

<Detail of Connected Axis>
[Motor Type]
2 : 2W AC servo motor
5 : 5W AC servo motor
10 : 10W AC servo motor
20S : 20W AC servo motor
20 : 20W AC servo motor
30 : 30W AC servo motor
[Encoder Type]
WAI : Incremental/Battery-less Absolute Shared (CB dedicated)
I : Incremental
A : Absolute

<I/O Type>
NP : NPN Type (Sync. Type) (Standard),
PN : PNP Type (Source Type),
PLN : Pulse Train Control NPN Type (Sync. Type),
PLP : Pulse Train Control PNP Type (Source Type),
DV : DeviceNet Connection Type,
PR : PROFIBUS-DP Connection Type,
ML : MECHATROLINK-Ⅰ/Ⅱ Connection Type,
EP : EtherNet/IP Connection Type,
CC : CC-Link Connection Type,
CN : CompoNet Connection Type,
EC : EtherCAT Connection Type,
PRT : PROFINET-IO Connection Type

<Identification for IAI use only>
* There is no identification in some cases.

<Type of Installation>
(Not Specified) : Screw Attachment Type
DN : DIN Rail Mounting Type

<Applicable to Simplified Absolute Unit>
AB : Simple Absolute Type (With the Absolute Battery)
ABU : Simple Absolute Type (With the Absolute Battery Unit (SEP-ABU))
ABUN : Simple Absolute Type (With no Absolute Battery)

<Power-supply Voltage>
0 : 24V DC

<I/O Cable Length>
0 : Equipped with no cable
2 : 2m (Standard)
3 : 3m
5 : 5m

● DCON

DCON-CA-3 I-EP-2-0-DN-**

<Series>
<Type>
CA/CB : Standard Type
CGB : Safety Categories Complied Type

<Detail of Connected Axis>
[Motor Type]
3 : 2.5W DC Brushless motor
[Encoder Type]
I : Incremental

<I/O Type>
NP : NPN Type (Sync. Type) (Standard),
PN : PNP Type (Source Type),
PLN : Pulse Train Control NPN Type (Sync. Type),
PLP : Pulse Train Control PNP Type (Source Type),
DV : DeviceNet Connection Type,
PR : PROFIBUS-DP Connection Type,
ML : MECHATROLINK-Ⅰ/Ⅱ Connection Type,
EP : EtherNet/IP Connection Type,
CC : CC-Link Connection Type,
CN : CompoNet Connection Type,
EC : EtherCAT Connection Type,
PRT : PROFINET-IO Connection Type

<Identification for IAI use only>
* There is no identification in some cases.

<Type of Installation>
(Not Specified) : Screw Attachment Type
DN : DIN Rail Mounting Type

<Power-supply Voltage>
0 : 24V DC

<I/O Cable Length>
0 : Equipped with no cable
2 : 2m (Standard)
3 : 3m
5 : 5m

Basic Specifications

PCON List of Specifications

Item				Description	
				PCON-CA/CB/CGB	PCON-CFA/CFB/CGFB
Number of controlled axes				1-axis	
Power-supply Voltage				24V DC ±10%	
Load Capacity (including control side current consumption) (Note1)	RCP2 RCP3	Motor Type	20P, 28P, 28SP	MAX. 1A	
			42P, 56P	MAX. 2A	
			86P		Rated 4.2A / MAX. 6A
	RCP4 RCP5 RCP6	Motor Type	28P, 35P, 42P, 56P	High-thrust function is disabled: MAX.2.0A	
				High-thrust function is enabled: Rated 3.5A / MAX. 4.2A	
			60P, 86P		Rated 4.2A / MAX. 6A
Power Supply for Electromagnetic Brake (for actuator equipped with brake)				24V DC ±10% 0.15A (MAX.)	
Heat Generation	RCP2, RCP3			5W	26.4W
	RCP4 to RCP6			3W	
Rush Current (Note2)				8.3A	10A
Transient Power Cutoff Durability				MAX. 500μs	
Motor Control System				Weak field-magnet vector control	
Corresponding Encoder	RCP2 to RCP5			Incremental Encoder, Battery-less Encoder Resolution 800pulse/rev	
	RCP6			Battery-less Encoder Resolution 8192pulse/rev	
Actuator Cable Length				MAX. 20m	
Serial Communication Interface (SIO Port)				RS485 : 1 CH (based on Modbus Protocol RTU/ASCII) Speed : 9.6 to 230.4Kbps Control available with serial communication in the modes other than the pulse train	
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			DeviceNet, CC-Link, PROFIBUS-DP, CompoNet, MECHATROLINK, EtherCAT, EtherNet/IP, PROFINET-IO	
Data Setting and Input				PC Software, Touch Panel Teaching, Teaching Pendant	
Data Retention Memory				Saves position data and parameters to non-volatile memory (There is no limitation to the number of times data may be written.)	
Operation Mode				Positioner Mode/Pulse Train Control Mode (selected by parameter setting)	
Number of Positions in Positioner Mode				Standard 64 points, MAX. 512 points (PIO Type) (Note) Number of positions differs depending on the selection in PIO pattern.	
Pulse Train Interface	Input Pulse Frequency			Differential System (Line Driver System) : MAX. 200kpps Cable length MAX. 10m	
				Open Collector System : Not applicable. * If the host applies the open collector output, prepare AK-04 (option) separately to convert to the differential type.	
	Command Pulse Multiplying Factor (Electrical Gear : A/B)			1/50 < A/B < 50/1 Setting Range of A and B (set to parameter) : 1 to 4096	
	Feedback Pulse Output			None	
LED Display (mounted on Front Panel)				SV (GN)/ALM (RD) : Servo ON/Alarm generated STS0 to 3 : Status display RDY (GN)/ALM (RD) : Absolute function in normal / absolute function error (for the simple absolute type) 1, 0 (GN) (RD) : Absolute function status display (for the simple absolute type)	
Electromagnetic Brake Compulsory Release Switch (mounted on Front Panel)				Switching NOM (standard)/BK RLS (compulsory release)	
Insulation Resistance				500V DC 10MΩ or more	
Protection Function against Electric Shock				Class I basic insulation	
Weight (Note3)	Incremental Type			Screw fixed type : 250g or less DIN rail fixed type : 285g or less	Screw fixed type : 270g or less DIN rail fixed type : 305g or less
	Simple Absolute Type (including 190g for battery)			Screw fixed type : 450g or less DIN rail fixed type : 485g or less	
Cooling Method				Natural air-cooling	Forced air-cooling
External dimensions				Screw fixed type : 35W×178.5H×69.1D DIN rail fixed type : 35W×185H×77.6D	Screw fixed type : 35W×190H×69.1D DIN rail fixed type : 35W×196.3H×77.6D
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)	
	Usage Altitude			1000m or less	
	Protection Class			IP20	
	Vibration Durability			Frequency 10 to 57Hz / Swing width : 0.075mm Frequency 57 to 150Hz / Acceleration 9.8m/s^2 XYZ directions Sweep time : 10 minutes Number of sweep : 10 times	

Note1 Add an additional 0.3A inrush for Fieldbus Types.
Note2 In-rush current will flow for approximately 5msec after the power is turned on (at 40°C).
Note that the value of in-rush current differs depending on the impedance of the power supply line.
Note3 Add an additional 30g for Fieldbus Type of CA/CB/CGB Type. Add an additional 10g for Fieldbus Type of CFA/CFB/CGFB Type .

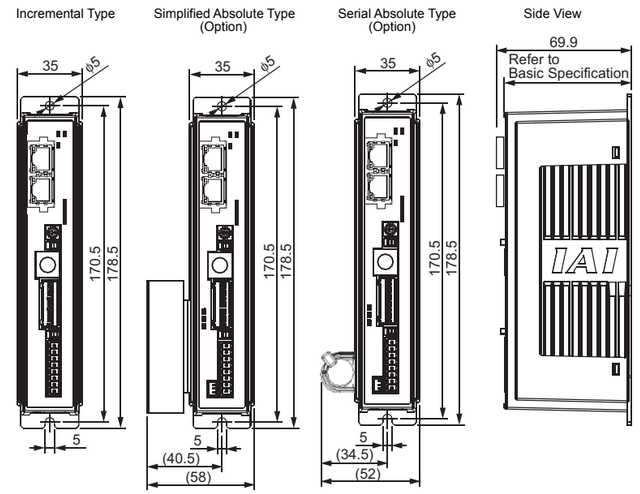
ACON, DCON List of Specifications

Item			Description				
			ACON-CA/CB/CGB			DCON-CA/CB/CGB	
Number of controlled axes			1-axis				
Power-supply Voltage			24V DC ±10%				
Load Capacity (including control side current consumption) (Note1)	Series	Motor Type	Rated	Max. Power Consumption	MAX.(Note5)	Rated	MAX.
	RCA, RCA2, RCL	2W	0.8A		4.6A		
		5W	1.0A		6.4A		
		10W (RCL)	1.3A		6.4A		
		10W (RCA/ RCA2)	1.3A	2.5A	4.4A		
		20W	1.3A	2.5A	4.4A		
		20W (Model: 20S)	1.7A	3.4A	5.1A		
		30W	1.3A	2.2A	4.4A		
	RCD	3W				0.7A	1.5A
Power Supply for Electromagnetic Brake (for actuator equipped with brake)			24V DC ±10% 0.15A (MAX.)				
Heat Generation			8.4W			4W	
Rush Current (Note2)			10A				
Transient Power Cutoff Durability			MAX. 500μs				
Motor Control System			Sinusoidal Waveform (AC) Drive			Rectangular Waveform (DC) Drive	
Corresponding Encoder			Incremental Encoder Serial Absolute Encoder Battery-less Absolute Encoder			Incremental Encoder	
Corresponding Encoder Resolution	RCA	Incremental Type	800pulse/rev				
		Serial Absolute Type	16384pulse/rev				
	RCA2	RCA2_*** N	1048pulse/rev				
		Other than RCA2_*** N	800pulse/rev				
	RCA /RCA2	Battery-less Absolute Type	16384pulse/rev				
	RCL	RA1, RA4, SA1, SA4	715pulse/rev				
		RA2, RA5, SA2, SA5	855pulse/rev				
		RA3, RA6, SA3, SA6	1145pulse/rev				
	RCD					400pulse/rev	
Actuator Cable Length			MAX. 20m				
Serial Communication Interface (SIO Port)			RS485 : 1 CH (based on Modbus Protocol RTU/ASCII) Speed : 9.6 to 230.4Kbps Control available with serial communication in the modes other than the pulse train				
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				
	Field Network Type		DeviceNet, CC-Link, PROFIBUS-DP, CompoNet, MECHATROLINK, EtherCAT, EtherNet/IP, PROFINET-IO				
Data Setting and Input			PC Software, Touch Panel Teaching, Teaching Pendant				
Data Retention Memory			Saves position data and parameters to non-volatile memory (There is no limitation to the number of times data may be written.)				
Operation Mode			Positioner Mode/Pulse Train Control Mode (selected by parameter setting)				
Number of Positions in Positioner Mode			Standard 64 points, MAX. 512 points (PIO Type) (Note) Number of positions differs depending on the selection in PIO pattern.				
Pulse Train Interface (Note4)	Input Pulse Frequency		Differential System (Line Driver System) : MAX. 200kpps Cable length MAX. 10m				
			Open Collector System : Not applicable. * If the host applies the open collector output, prepare AK-04 (option) separately to convert to the differential type.				
	Command Pulse Multiplying Factor (Electrical Gear : A/B)		1/50 < A/B < 50/1 Setting Range of A and B (set to parameter) : 1 to 4096				
	Feedback Pulse Output		None				
LED Display (mounted on Front Panel)			SV (GN)/ALM (RD) : Servo ON/Alarm generated STS0 to 3 : Status display RDY (GN)/ALM (RD) : Absolute function in normal / absolute function error (for the simple absolute type) 1, 0 (GN) (RD) : Absolute function status display (for the simple absolute type)				
Electromagnetic Brake Compulsory Release Switch (mounted on Front Panel)			Switching NOM (standard)/BK RLS (compulsory release)				
Insulation Resistance			500V DC 10MΩ or more				
Protection Function against Electric Shock			Class I basic insulation				
Weight (Note3) (Other than Field Network Type)	Incremental Type		Screw fixed type : 230g or less DIN rail fixed type : 265g or less				
	Simple Absolute Type		Battery (AB-7) : 190g or less Absolute Battery Case (SEP-ABU): 140g or less				
	Serial Absolute Type		Battery (AB-5) : 20g				
Cooling Method			Natural air-cooling				
External dimensions			Screw fixed type : 35W×178.5H×69.6D DIN rail fixed type : 35W×185H×78.1D			Screw fixed type : 35W×190H×69.6D DIN rail fixed type : 35W×196.3H×78.1D	
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)				
	Usage Altitude		1000m or less				
	Protection Class		IP20				
	Vibration Durability		Frequency 10 to 57Hz / Swing width : 0.075mm Frequency 57 to 150Hz / Acceleration 9.8m/s^2 XYZ directions Sweep time : 10 minutes Number of sweep : 10 times				

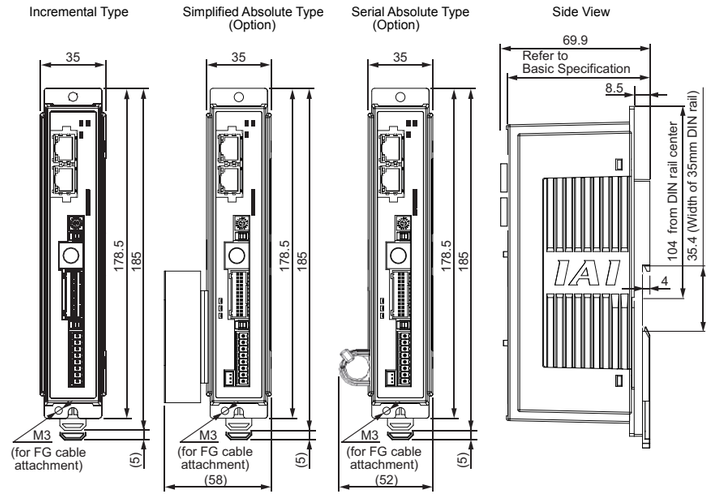
Note1 Add an additional 0.3A inrush for Fieldbus Types.
Note2 In-rush current will flow for approximately 5msec after the power is turned on (at 40°C).
Note that the value of in-rush current differs depending on the impedance of the power supply line.
Note3 Add the weight of the battery (case) for “Simple Absolute Type” and “Serial Absolute Type”.
Note4 Serial absolute type is not applicable for the pulse train control mode.
Note5 The current reaches the maximum at the excitation phase detection of the motor conducted when the servo is turned on for the first time after the power is supplied. (TYP 1 to 2 second, MAX. 10 second)

External Dimensions (All Types Except for PCON-CFA/CFB/CGFB)

- Screw fixed type

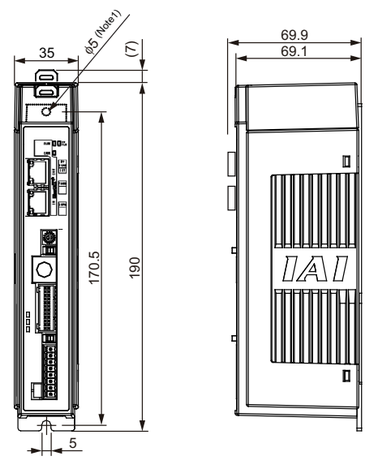


- DIN rail fixed type

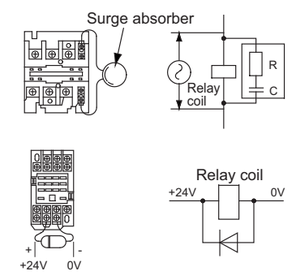


External Dimensions (PCON-CFA/CFB/CGFB Type)

- Screw fixed type



- DIN rail fixed type



Installation Environment

This product is capable for use in the environment of pollution degree 2*1 or equivalent.
*1 Pollution Degree 2: Environment that may cause non-conductive pollution or transient conductive pollution by frost (IEC60664-1)

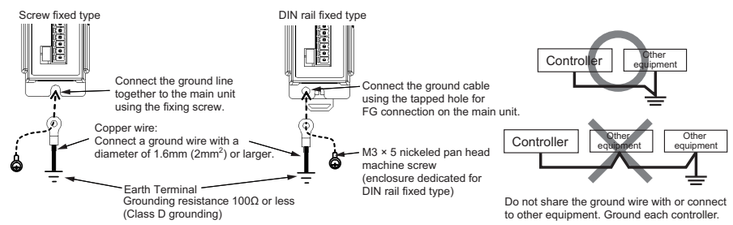
1. Installation Environment
Do not use this product in the following environment
- Location where the surrounding air temperature exceeds the range of 0 to 40°C
- Location where condensation occurs due to abrupt temperature changes
- Location where relative humidity exceeds 85%RH
- Location exposed to 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 absorbency 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

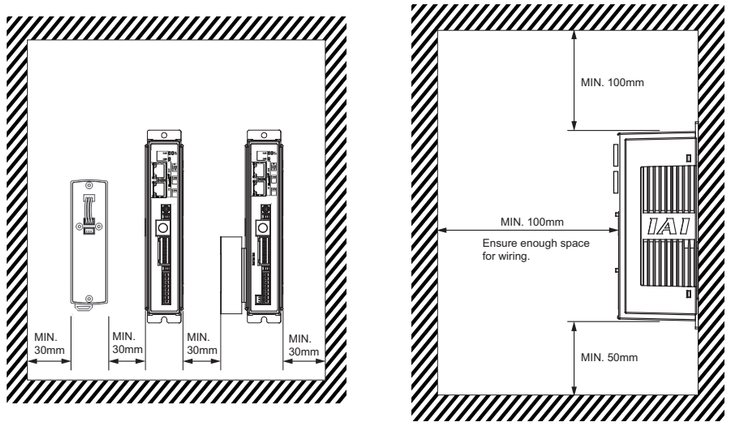
1. Noise Elimination Grounding (Frame Ground)



2. Precautions regarding wiring method
1) Wire is to be twisted for the 24V DC power supply.
2) Separate the signal and encoder lines from the power supply and power lines.

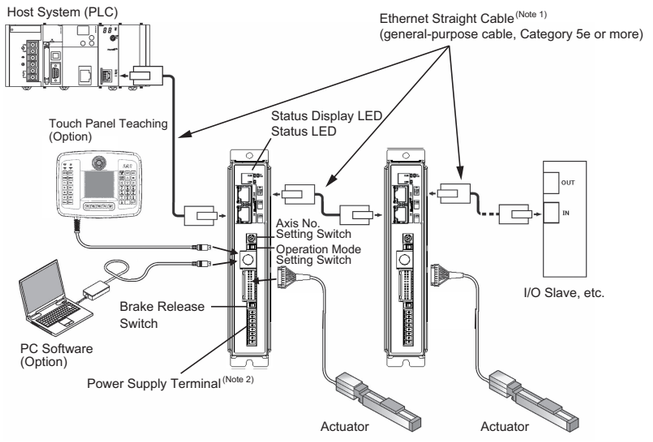
3. Noise Sources and Elimination
Carry out noise elimination measures for power devices on the same power path and in the same equipment.
The following are examples of measures to eliminate noise sources.
1) AC solenoid valves, magnet switches and relays
[Measure] Install a Surge absorber parallel with 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
Design and Build the system considering the size of the controller box, location of the controller and cooling factors to keep the surrounding temperature around the controller below 40°C.



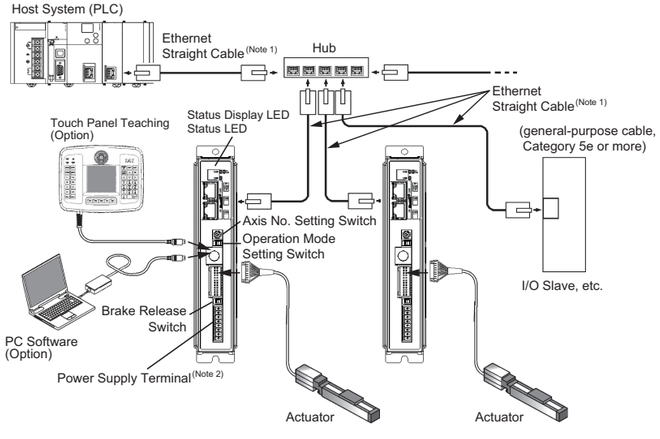
Connection Diagram

● EtherCAT®



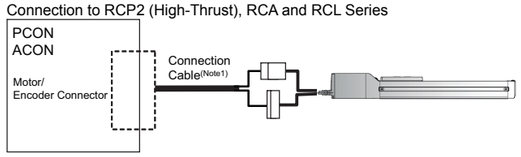
(Note 1) STP (with shield) is recommended for Ethernet cable.
(Note 2) It is necessary to prepare a power supply cable and the cables for the emergency stop circuit wiring as well as this cable. [Refer to power supply and emergency stop circuit.]

● For EtherNet/IP and PROFINET-IO

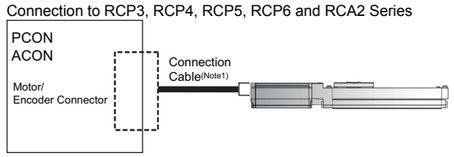


(Note 1) STP (with shield) is recommended for Ethernet cable.
(Note 2) It is necessary to prepare a power supply cable and the cables for the emergency stop circuit wiring as well as this cable. [Refer to power supply and emergency stop circuit.]

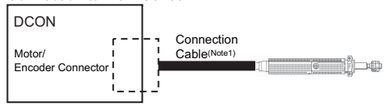
● Connection to RCP2 (High-Thrust), RCA and RCL Series



● Connection to RCP3, RCP4, RCP5, RCP6 and RCA2 Series



● Connection to RCD Series



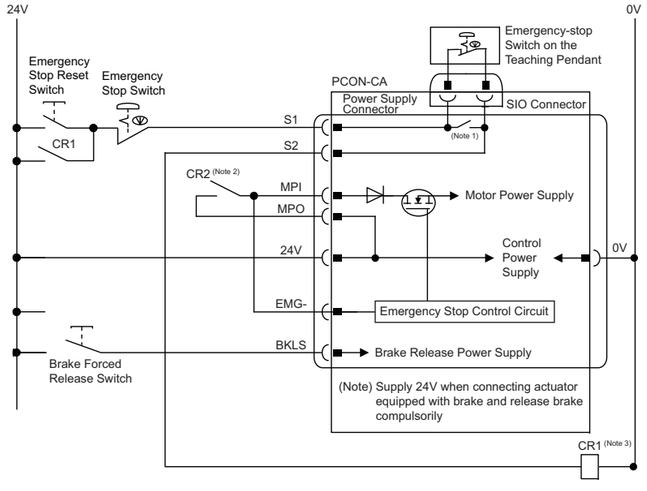
Note 1 Applicable Connection Cable Model Codes □□□ : Cable Length Example) 030 = 3m

Model Name	Cable	Reference
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 (Other Than GR*Type) RCD (Applicable Controller Symbol : D3)	CB-CAN-MPA□□□-RB	Robot cable from 0.5 to 20m
	CB-CAN-MPA□□□	Standard cable from 0.5 to 20m
RCP4 (GR*Type), RCP5 RCD (Applicable Controller Symbol : D5)	CB-CAN-MPA□□□-RB	Robot cable from 0.5 to 20m
	CB-CAN-MPA□□□	Standard cable from 0.5 to 20m
High-Thrust	CB-CFA-MPA□□□	Standard cable for CFA type from 0.5 to 20m
	CB-CFA-MPA□□□-RB	Robot cable for CFA type from 0.5 to 20m
RCA, RCL (Incremental Type)	CB-ASEP-MPA□□□ CB-ASEP2-MPA□□□	Robot cable from 0.5 to 20m
RCA (Serial Absolute Type) RCA2	CB-APSEP-MPA□□□	Robot cable from 0.5 to 20m

Power Supply and 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.

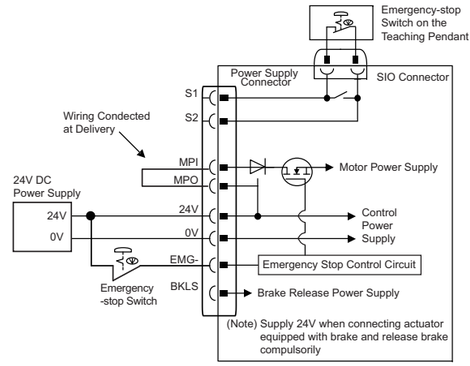
In the example below, uses PCON-CA. It is the same in case of except for PCON-CA.



Note 1 : The safety categories complied type (CGB Type, etc.) is not equipped with the relay to have the controller automatically identify that a teaching tool was plugged in and switch the wiring layout. Those other than the safety categories complied type do the automatic identification and have S1 and S2 short-circuited.
Note 2 : When the motor driving source is cut off externally for a compliance with the safety category, connect a contact such as a contactor to the wires between MPI and MPO. Also, the ratings for the emergency stop signal that turns ON/OFF at the contact CR1 are 24V DC and 10mA or less.
Note 3 : For CR1, select the one with coil current 0.1A or less.

⚠ Caution If supplying power with using a 24V DC, having it turned ON/OFF, keep the 0V connected and have the +24V supplied/cut (cut one side only).

[Reference] Example for operating an actuator by using the standard type (CA or CB Type) with optimum wiring layout
(Note) In this example, the emergency stop switch on the teaching pendant would not work.



Operation Modes and Functions (Common to Each Fieldbus)

The machine can be operated selecting one mode from the following five operation modes.
(1) Remote I/O Mode : This is the method where the operation through PIO (24V I/O) is performed using the fieldbus.
(2) Position/ Simple Direct Value Mode : This is the method where the machine is operated by means of directly specifying the target position using numerical values. For the speed, acceleration, deceleration, or positioning width, the already registered position data values are used.
(3) Half Direct Value Mode : In this operation mode, in addition to the target position, the speed, acceleration, deceleration and push current value are directly specified using numerical values.
(4) Full Direct Value Mode : In this operation mode, all the values related to the position control, are directly specified using numerical values.
(5) Remote I/O Mode 2 : Additionally, the current position and current speed reading functions are added to the remote I/O mode.

Operation Modes and Main Functions

Main Functions	Remote I/O Mode	Position/ Simple Direct Value Mode	Half Direct Value Mode	Full Direct Value Mode	Remote I/O Mode 2
No. of Occupied Bytes	2	8	16	32	12
Operation with the Position No. Specified	○	○	×	×	○
Operation with the Position Data Specified	×	○ (Note)	○	○	×
Speed and Acceleration Direct Setup	×	×	○	○	×
Pressing Operation	○	○	○	○	○
Current Position Read	×	○	○	○	○
Current Speed Read	×	×	○	○	○
Completion Position No. Read	○	○	×	×	○
Max. Number of position table	512	768	Unused	Unused	512

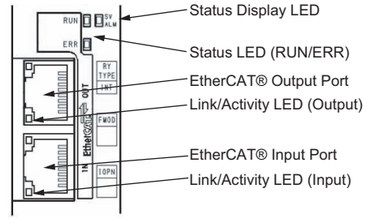
(Note) The actuator is operated by specifying all position data, other than the position, using a position number.

EtherCAT®

● Specification

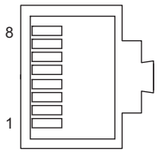
Item	Specification
Communication Protocol	IEC61158Type12
Physical Layer	100BASE-TX (IEEE802.3)
Communication Frequency	Automatic following to the Master
Communication Cable Length	Depends on EtherCAT® Type (Distance between each node: 100m max.)
Slave Type	I/O slave
Applicable Node Address	0 to 127 (17 to 80 : When connected to the master (CJ1W-NC*81) manufactured by OMRON)
Communication Cable	Category 5e or more (Double shielded cable braided with aluminum foil recommended)
Connector	RJ45 Connector × 2pcs (Input × 1, Output × 1)
Connection	Daisy chain only

● Interface Section



(Note) Refer to the troubleshooting or the Instruction Manual for the details of LED displays.

- EtherCAT® Connector



RJ45 8-pin
Modular Connector
(Controller side)

Pin No.	Signal Name	Abbreviated Code
1	Data sending +	TD+
2	Data sending -	TD–
3	Data receiving +	RD+
4	Not used	
5	Not used	
6	Data receiving -	RD–
7	Not used	
8	Not used	
Connector Hood	Security grounding	FG

- Operation Mode Setting and Address Allocation
  The operation mode is set using the parameters.
  Set the mode change switch on the controller front panel to “MANU” side and set the parameter No.84 “FMOD: Fieldbus Operation Mode” using the teaching tool such as PC software for RC.
  [Refer to the Instruction Manual for the details]
- Node address setting
  Node address can be set with the parameter.
  Set Parameter No.85 “NADR: Fieldbus Node Address” with a teaching tool such as PC software for RC.
  Settable Range: 0 to 127 (It is set to 17 which is the I/O slave top address of EtherCAT® at the delivery.)
- Communication Speed Setting
  The setting for the communication speed is not required because it automatically follows the master’s communication speed.

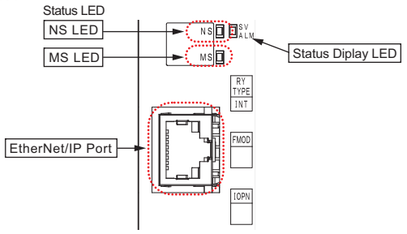
(Note) After parameter setting, reset the controller mode change witch to “AUTO” side, and then cycle the controller power.

EtherNet/IP

- Specification

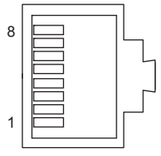
Item	Specification
Communication Protocol	IEC61158 (IEEE802.3)
Communication Speed	10BASE-T/100BASE-T (Autonegotiation setting is recommended)
Communication Cable Length	Depends on EtherNet/IP Type (Distance between hub and each node: 100m max.)
Number of Connection	Depends on the master unit
Applicable Node Address	0.0.0.0 to 255.255.255.255
Communication Cable	Category 5 or more (Double shielded cable braided with aluminum foil recommended)
Connector	RJ45 Connector × 1pc

- Interface Section



(Note) Refer to the troubleshooting or the Instruction Manual for the details of LED displays.

- EtherNet/IP Connector



RJ45 8-pin
Modular Connector
(Controller side)

Pin No.	Signal Name	Abbreviated Code
1	Data sending +	TD+
2	Data sending -	TD–
3	Data receiving +	RD+
4	Not used	
5	Not used	
6	Data receiving -	RD–
7	Not used	
8	Not used	
Connector Hood	Security grounding	FG

- Operation Mode Setting and Address Allocation
  The operation mode is set using the parameters.
  Set the mode change switch on the controller front panel to “MANU” side and set the parameter No.84 “FMOD: Fieldbus Operation Mode” using the teaching tool such as PC software for RC.
  [Refer to the Instruction Manual for the details]
- Communication Speed Setting
  The Communication speed can be set with the parameter. A special setting is not necessary since it is set to automatic negotiation when the product is delivered. However, when a fixed speed is required, change the setting to the desired speed in Parameter No.86 “FBRS: Fieldbus Communication Speed” of the teaching tool in the PC software for RC.
  [Refer to the Instruction Manual for the details]
- IP Address Setting
  IP Address can be set with the parameter.
  Set Parameter No.140 “IPAD: IP Address” with a teaching tool such as PC software for RC.
  Settable Range: 0.0.0.0 to 255.255.255.255 (It is set to “192.168.0.1” when the machine is delivered from the factory.)
- Settings for Subnet Mask
  Subnet Mask can be set with the parameter.
  Set Parameter No.141 “SNMK: Subnet Mask” with a teaching tool such as PC software for RC.
  Settable Range: 0.0.0.0 to 255.255.255.255 (It is set to “255.255.255.0” when the machine is delivered from the factory.)
- Settings for Default Gateway
  Default Gateway can be set with the parameter.
  Set Parameter No.142 “DFGW: Default Gateway” with a teaching tool such as PC software for RC.
  Settable Range: 0.0.0.0 to 255.255.255.255 (It is set to “0.0.0.0” when the machine is delivered from the factory.)

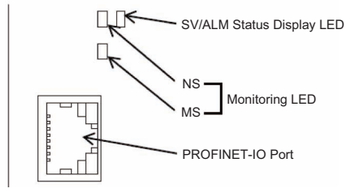
(Note) After parameter setting, reset the controller mode change witch to “AUTO” side, and then cycle the controller power.

PROFINET-IO

- Specification

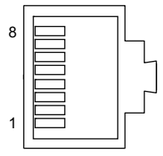
Item	Specification
Communication protocol	IEC61158 (IEEE802.3), IEC61748
Communication Speed	100Mbps
Communication cable length	Depends on PROFINET-IO Specification (Distance between each segment: 100m Max.)
Number of Connection	Depends on the master unit
Applicable node address	0.0.0.0 to 255.255.255.255
Communication cable	Category 5 or more (Double shielded cable braided with aluminum foil recommended)
Connector	RJ45 Connector × 1pc

- Interface Section



(Note) Refer to the troubleshooting or the Instruction Manual for the details of LED displays.

- EherNet/IP Connector



RJ45 8-pin
Modular Connector
(Controller Side)

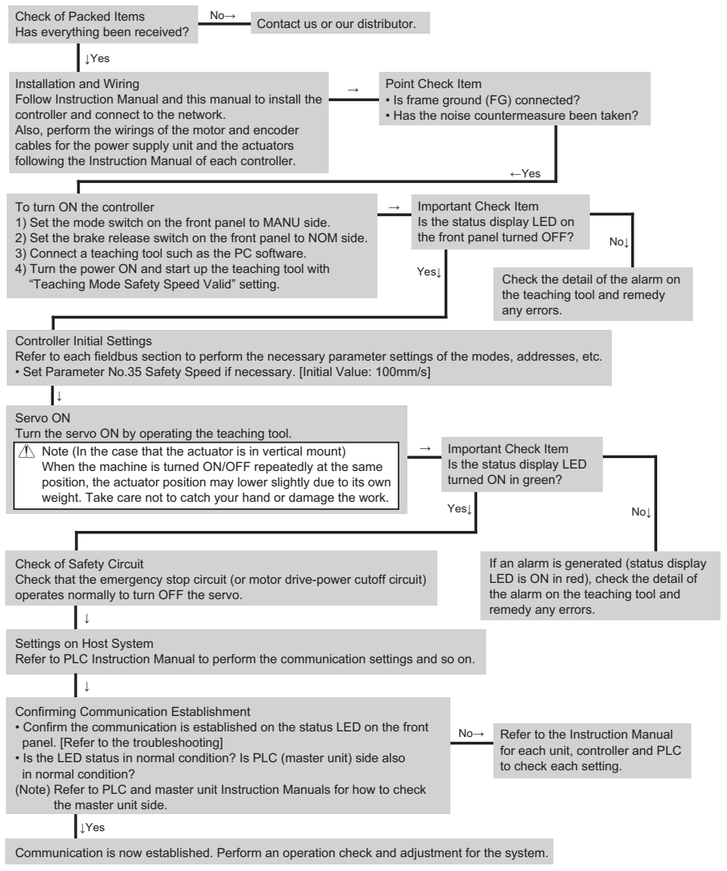
Pin No.	Signal Name	Abbreviated Code
1	Data sending +	TD+
2	Data sending –	TD–
3	Data receiving +	RD+
4	Not used	
5	Not used	
6	Data receiving –	RD–
7	Not used	
8	Not used	
Connector Hood	Security grounding	FG

- Operation Mode Setting and Address Allocation
  The operation mode is set using the parameters.
  Set the mode change switch on the controller front panel to “MANU” side and set the parameter No. 84 “FMOD: Field Bus Operation Mode” using the teaching tool such as PC software for RC.
  [Refer to the Instruction Manual for the details]
- Communication Speed Setting
  It is not necessary to establish setting. It is fixed at 100Mbps.
- Node address setting
  It is not necessary to establish setting on the IAI controller side as it should be established on the master side.

(Note) After parameter setting, reset the controller mode change witch to “AUTO” side, and then cycle the controller power.

Starting Procedure

When using this product for the first time, make sure to avoid mistakes and incorrect wiring by referring to the procedure below.
This section explains how to start up an EtherCAT®, EtherNet/IP and PROFINET-IO complaint PCON, ACON and DCON (described as the “controller” in the following diagram). For the settings and wiring of each of the individual devices, controllers, and actuators connected to the network, refer to the individual device’s Instruction Manual.



Trouble Shooting

If an error has occurred, it is possible to check the operation condition on the status LEDs on the front panel.

- **Status LED Displays of EtherCAT® Type** ○ : Illuminating, × : OFF, ☆ : Flashing

Name	Indication Color	Description
RUN	×	Initial condition (EtherCAT® communication in “INIT” condition) or the power is OFF
	○ (GN)	In normal operation (EtherCAT® communication in “OPERATION” condition)
	☆ (GN) (ON: 200ms/OFF: 200ms)	(EtherCAT® communication in “PRE-OPERATION” condition)
	☆ (GN) (ON: 200ms/OFF: 1000ms)	(EtherCAT® communication in “SAFE-OPERATION” condition)
	○ (OR)	Communication component (module) error
ERR	×	No abnormality or the power is OFF
	☆ (OR) (ON: 200ms/OFF: 200ms)	Construction information (settings) error (Information received from the master cannot be set)
	☆ (OR) (ON: 200ms × 2 times/ OFF: 1000ms)	Communication section circuit error (Watchdog timer timeout)
	○ (OR)	Communication component (module) error
Link/ Activity	×	Link status not detected or the power is OFF
	○ (GN)	Linked (No network congestion)
	☆ (GN) (ON: 50ms/OFF: 50ms)	Linked (Network in congestion)

● **Status LED Displays of EtherNet/IP Type** ○ : Illuminating, × : OFF, ☆ : Flashing

Name	Indication Color	Description	
NS	×	Power is OFF or IP addresses are not set	
	○ (GN)	Connection is established and the communication under normal condition.	
	☆ (GN)	Online but network connection is not yet established. Communication Stop (Network is normal). Check the conditions of master unit.	
	○ (RD)	Communication Error. Communication cannot be established due to the error detection such as IP address duplication.	Check the conditions of IP address settings, communication line, the power of hub units, noise prevention, etc.
	☆ (RD)	Communication Error. (Communication Time-out Detection)	
MS	×	Power OFF	
	○ (GN)	The machine is in the normal operation. The machine is under the control of the scanner (master)	
	☆ (GN)	The connection with the scanner (master) is not established. Check the construction information settings. Check if the scanner (master) is in the idle condition.	
	○ (RD)	Hardware Error. The replacement of the board is required. Please contact us.	
	☆ (RD)	There is an error occurred but is not critical such like a user setting error or configuration error. It can be recovered with a rebuild of the settings.	

● **Status LED Displays of PROFINET-IO Type** ○ : Illuminating, × : OFF, ☆ : Flashing

Name	Indication Color	Description
NS	×	The power is OFF or there is no connectable controller.
	○ (GN)	Connection is established, communication in normal condition (RUN status)
	☆ (GN)	Connection is established, but communication in pause (STOP status: network is in normal condition)
MS	×	Power OFF
	○ (GN)	The machine is in the normal operation.
	☆ (GN)	In diagnosis of communication system.
	○ (OR)	There is a hardware error (in EXCEPTION condition). The replacement of the board is required. Please contact us.
	☆ (RD)	There is an error in communication setting, IP address or station name setting.

When an error occurs, connect the teaching tool such as PC software or teaching pendant and check it using the status monitor.
All the alarms for the fieldbus related are described as follows. For other alarms, refer to the instruction manual for the controller body and remedy it.

Code	Error Name	ID (*1)	RES (*2)	Cause/Treatment
0F2	Fieldbus Module Error	05	×	Cause : An error is detected on Fieldbus module (circuit component) Treatment : Check the parameter.
0F3	Undetected Fieldbus Module Error	04	×	Cause : Fieldbus module (circuit component) cannot be detected Treatment : Turn ON the power again. If the error is not removed, contact our company.

(*1) ID → Simple Alarm Code
(*2) RES → Alarm Reset Available/Unavailable ○ : Alarm Reset Available/× : Alarm Reset Unavailable

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