Applicable to Fieldbus

IAI
Quality and Innovation

PCON-CA/CFA/CB/CFB/CGB/CGFB/CBP/CGBP, ACON-CA/CB/CGB, DCON-CA/CB/CGB First Step Guide Eighth 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 change. 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.

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	I/O Flat Cable	CB-PAC-PIO□□□	□□□shows the cable length
3	Power Connector	FMC1.5/8-ST-3.5 (Supplier : PHOENIX CONTACT)	Recommended cable size AWG16 to 20 (1.25 to 0.5mm^2)
4	Dummy plug	DP-5	For the safety category compliant type
5	Absolute Battery (Option)	AB-7 or SEP-ABU*	If applicable for Simple Absolute Type
6	Serial Absolute Battery (Option)	AB-5	If applicable for Serial Absolute Type (for ACON only)
7	First Step Guide	ME0303	
8	Safety Guide	M0194	

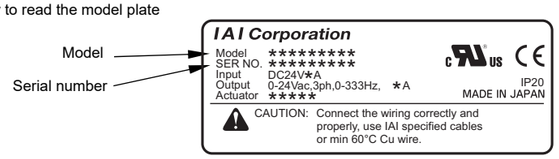
2. Teaching Tool (to be purchased separately)
A teaching tool, such as PC Software, is necessary when performing programming and commissioning, such as editing position data or parameters.
Please utilise any of the following teaching tools.
(Note) TB-01/01D/01DR are not applicable for CC-Link IE.

No.	Part Name	Model
1	PC teaching software (equipped with USB conversion adaptor + USB cable + external device communication cable)	IA-OS-C
2	PC teaching software (equipped with RS232C conversion adaptor + external device communication cable)	RCM-101-MW
3	PC teaching software (equipped with USB conversion adaptor + USB cable + external device communication cable)	RCM-101-USB
4	Touch Panel Teaching	TB-01/D/DR
5	Touch Panel Teaching	TB-02/02D
6	Data Setter	TB-03

3. Instruction Manuals related to this product

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 Contoroller, DCON-CB Series Contoroller Instruction Manual	ME0343
5	PC Software RCM-101-MW/RCM-101-USB Instruction Manual	ME0155
6	Touch Panel Teaching TB-01/TB-02/TB-03 Position Controller Instruction Manual	ME0324/ME0355/ME0376
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
16	MECHATROLINK-Ⅲ Instruction Manual	ME0317
17	CC-Link IE Instruction Manual	ME0389

4. How to read the model plate



5. How to read the model of the controller

● PCON

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

<Series>

<Type>
CA/CB : Standard Type
CFA/CFB : High-Thrust Actuator Connection Type
CGB : Safety Categories Complied Type
CGFB : High-Thrust Actuator Connection Safety Categories Complied Type
CBP : Pulse Pressing Connection Applicable Type
CGBP : Pulse Pressing Connection Safety 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

*PCON-CBP/CGBP is not applicable for the simple absolute type.

<I/O Type>
NP : NPN Type (Sync. Type) (Standard),
PN : PNP Type (Source Type),
PLN : Pulse Train Control NPN Type (Sync. Type PCON-CBP/CGBP Except)
PLP : Pulse Train Control PNP Type (Source Type PCON-CBP/CGBP Except)
DV : DeviceNet Connection Type, CC : CC-Link Connection Type
PR : PROFIBUS-DP Connection Type, CN : CompoNet Connection Type
PRT : PROFINET-IO Connection Type, EC : EtherCAT Connection Type
EP : EtherNet/IP Connection Type, ML : MECHATROLINK-Ⅰ/Ⅱ Connection Type
ML3 : MECHATROLINK-Ⅲ Connection Type (Except for PCON-CA/CFA/CBP/CGBP)

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

<Power-supply Voltage>
0 : 24V DC

<Applicable to Simplified Absolute Unit>
(Not Specified): Incremental / Battery-less Absolute
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)

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

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

● ACON

ACON-CA-30 I-DV-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 only)
I : Incremental A : Serial Absolute
[Option]
HA : High Acceleration/Deceleration Type
LA : Low Power Consumption Type
No description : Standard Type

<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, CC : CC-Link Connection Type
PR : PROFIBUS-DP Connection Type, CN : CompoNet Connection Type
PRT : PROFINET-IO Connection Type, EC : EtherCAT Connection Type
EP : EtherNet/IP Connection Type, ML : MECHATROLINK-Ⅰ/Ⅱ Connection Type
ML3 : MECHATROLINK-Ⅲ Connection Type (Except for ACON-CA)

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

<Power-supply Voltage>
0 : 24V DC

<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)

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

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

● DCON

DCON-CA-3 I-PR-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, CC : CC-Link Connection Type
PR : PROFIBUS-DP Connection Type, CN : CompoNet Connection Type
PRT : PROFINET-IO Connection Type, EC : EtherCAT Connection Type
EP : EtherNet/IP Connection Type, ML : MECHATROLINK-Ⅰ/Ⅱ Connection Type
ML3 : MECHATROLINK-Ⅲ Connection Type (Except for DCON-CA)

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

<Power-supply Voltage>
0 : 24V DC

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

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

Basic Specifications

PCON List of Specifications

Item				Description	
				PCON-CA/CB/CGB/CBP/CGBP	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	
			35P, 42P, 56P	MAX. 2.2A	
			60P, 86P		MAX. 6A
	RCP4 RCP5 RCP6	Motor Type	28P, 35P, 42P, 56P	High-thrust function is disabled: MAX.2.2A	
				High-thrust function is enabled: Rated 3.5A / MAX. 4.2A	
			56SP, 60P, 86P		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 Absolute Encoder Resolution 800pulse/rev	
	RCP6			Battery-less Absolute 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-Ⅰ/Ⅱ, EtherCAT, EtherNet/IP, PROFINET-IO, MECHATROLINK-Ⅲ (Except for PCON-CA/CFA/CBP/CGBP)	
Loadcell Interface (dedicated for PCON-CBP/CGBP)				RS485 Communication	
Data Setting and Input				PC Software, Touch Panel Teaching, Teaching Pendant, Data Setter	
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×69.6D DIN rail fixed type : 35W×185H×78.1D	Screw fixed type : 35W×190H×69.6D DIN rail fixed type : 35W×196.5H×78.1D
Environment	Surrounding Air Temperature			0 to 40°C	
	Surrounding Humidity			5%RH to 85%RH or less (There should be no condensation or freeze)	
	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 5ms 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 CA/CB/CGB Fieldbus Type. Add an additional 10g for CFA/CFB/CGFB Fieldbus 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 (It does not 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	4.0A		
	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				

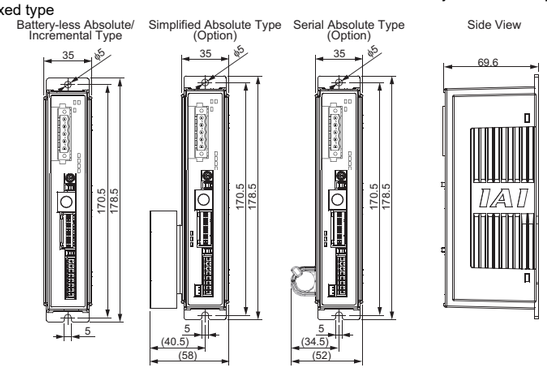
Item			Description	
			ACON-CA/CB/CGB	DCON-CA/CB/CGB
Transient Power Cutoff Durability			MAX. 500μs	
Motor Control System			Sinusoidal Waveform (AC) Drive	Rectangular Waveform (DC) Drive
Corresponding Encoder			Incremental Encoder Serial Absolute Encoder Battery-less Absolute Encoder	Incremental Encoder
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	MAX. 10m
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-Ⅰ/Ⅱ, EtherCAT, EtherNet/IP, PROFINET-IO, MECHATROLINK-Ⅲ*, CC-Link IE* (* Some types cannot connect it.)	
Data Setting and Input			PC Software, Touch Panel Teaching, Teaching Pendant, Data Setter	
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	
Environment	Surrounding Air Temperature		0 to 40°C	
	Surrounding Humidity		5%RH to 85%RH or less (There should be no condensation or freeze)	
	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/s² XYZ directions Sweep time : 10 minutes Number of sweep : 10 times	

Note1 Control power capacity is 0.3A.
Note2 In-rush current will flow for approximately 5ms 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)

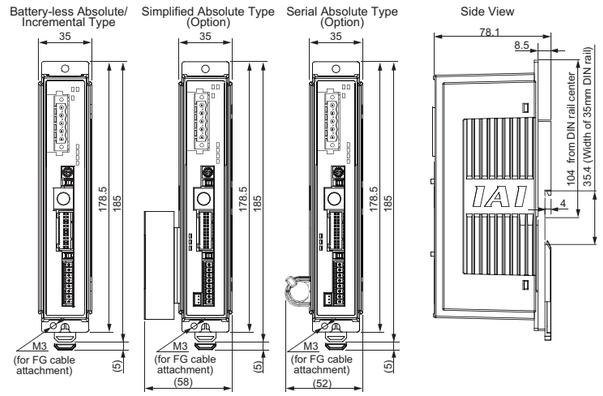
External Dimensions (ACON, DCON, PCON-CA/CB/CGB/CBP/CGBP)

* There is only Incremental Type in DCON.

● Screw fixed type

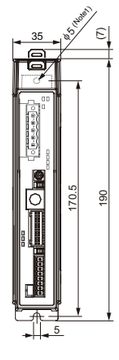


● DIN rail fixed type

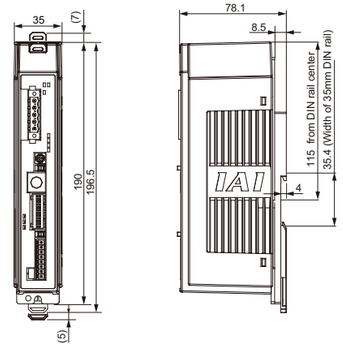


External Dimensions (PCON-CFA/CFB/CGFB)

● Screw fixed type



● DIN rail fixed



(Note1) Detach the fan unit before attaching screws to the main unit.

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)

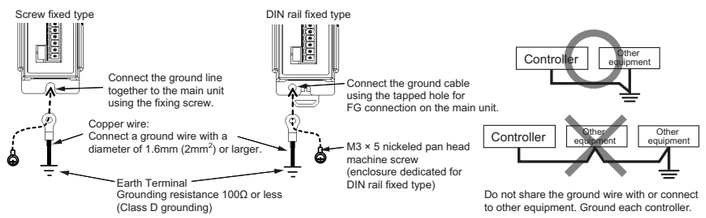
1. Installation Environment
Do not use this product in the following environment
- Location where the surrounding air temperature exceeds the range of 0 to 40°C
- Location where condensation occurs due to abrupt temperature changes
- Location where relative humidity exceeds 5%RH to 85%RH
- Location exposed 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]
- A place with its altitude more than 1000m

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.

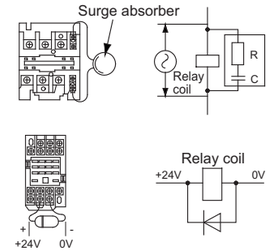
Installation and Noise Elimination

1. Noise Elimination Grounding (Frame Ground)

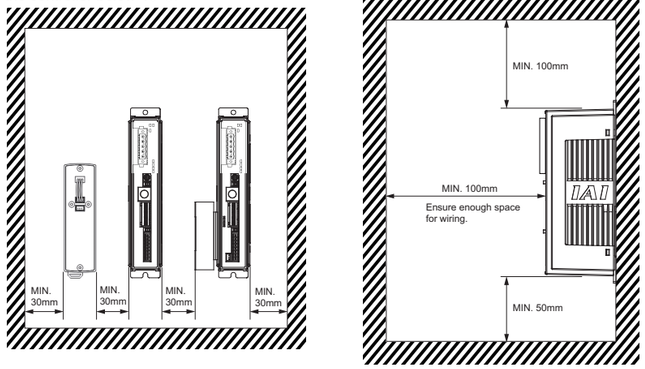


2. Precautions regarding wiring method
1) Wire is to be twisted for the 24V DC power supply.
2) Separate the signal and encoder lines from the power supply and power lines.

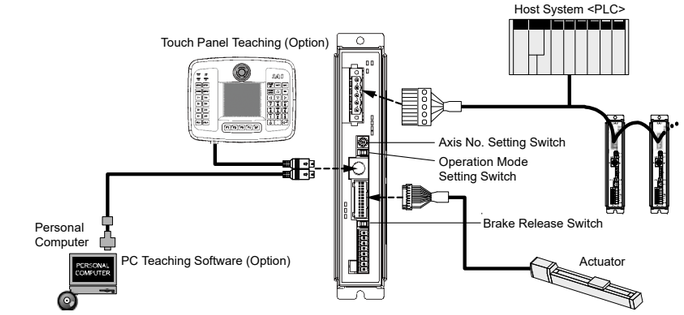
3. Noise Sources and Elimination
Carry out noise elimination measures for power devices on the same power path and in the same equipment.
The following are examples of measures to eliminate noise sources.
1) AC solenoid valves, magnet switches and relays
[Measure] Install a Surge absorber parallel with 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.



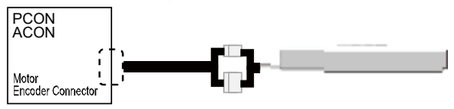
4. Heat Radiation and Installation
Design and Build the system considering the size of the controller box, location of the controller and cooling factors to keep the surrounding temperature around the controller below 40°C.



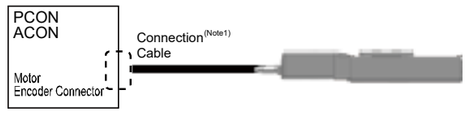
Connection Diagram



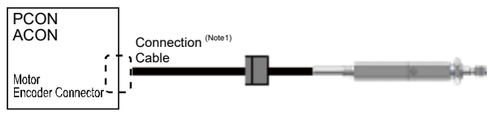
● Connection to RCP2 (High-Thrust), RCA and RCL Series



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



● Connection to RCD Series



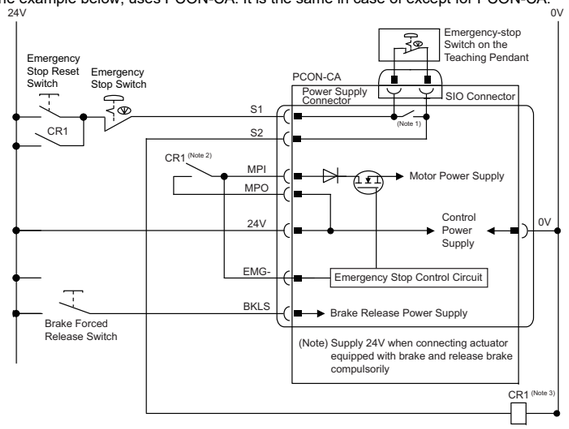
Note 1 Applicable Connection Cable Model Codes □□□ : Cable Length Example) 030 = 3m

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-CA-MPA□□□-RB	Robot cable from 0.5 to 20m (Note1)
		CB-CA-MPA□□□	Standard cable from 0.5 to 20m (Note1)
RCP4 (GR Type), RCP5, 6 (Including Pulse Press) RCD (Applicable Controller Symbol : D5)		CB-CAN-MPA□□□	Standard cable from 0.5 to 20m (Note1)
		CB-CAN-MPA□□□-RB	Robot cable from 0.5 to 20m (Note1)
High-Thrust	RCP2	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
	RCP4	CB-CFA2-MPA□□□	Standard cable for CFA type from 0.5 to 20m
		CB-CFA2-MPA□□□-RB	Robot cable for CFA type from 0.5 to 20m
	RCP5, RCP6	CB-CFA3-MPA□□□	Standard cable for CFA type from 0.5 to 20m
		CB-CFA3-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)		CB-APSEP-MPA□□□	Robot cable from 0.5 to 20m
RCA2			

(Note1) The length is up to 10m for RCD.

Power Supply and Emergency Stop Circuit

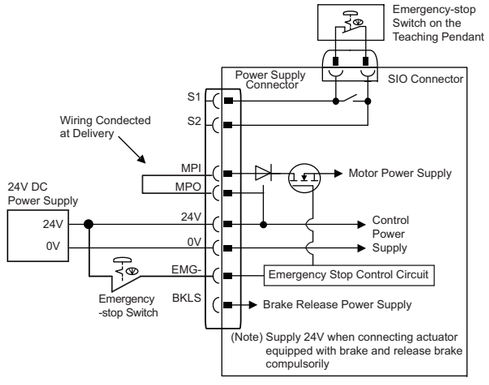
This shows the circuit example when the emergency stop switch in the teaching pendant is enabled on the emergency stop circuit to be built up by the client.
In the example below, uses PCON-CA. It is the same in case of except for PCON-CA.



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.



Loadcell (PCON-CBP/CGBP Dedicated Option)

It is a pressing force measurement unit used in the force control.
It should be used by connecting to an actuator applicable for the force control or servo pressing.
[Specification]

Item		Specification
Loadcell System		Strain Gauge
Rated Capacity [N]		600 | 2000
Total Accuracy [% F.S.]		±1
Allowable Overload [% F.S.]		200
Environmental Specifications	Surrounding Air Temperature	0 to 40 °C
	Surrounding Humidity	85%RH or less (non-condensing)
	Surrounding Environment	Should be no corrosive gas
	Surrounding Storage Temperature	-10 to 60 °C
	Ambient Humidity for Storage	90%RH less (non-condensing)
	Vibration Resistance	10 to 57Hz in X, Y and Z directions
Dielectric Withstanding Voltage [V]		DC50V

* F.S.(Withstand Load)
Note The number of actuators available to connect should differ depending on the rated capacity of a loadcell.
[Check in an instruction manual of an actuator for how to install and details of dimensions.]

Operation Modes and Functions (Except for MECHATROLINK-Ⅲ)

The machine can be operated selecting one mode from the following eight 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 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.
(6) Position/ Simple Direct mode 2 : The setting should be established when the force control is to be conducted in Position/Simple Direct Modes.
(7) Half Direct Value Mode : The setting should be established when the force control is to be conducted in Semi Direct Mode.
(8) Remote I/O Mode 3 : The setting should be established when the force control is to be conducted in Remote I/O Mode.

Operation Modes and Main Functions

Main Functions	Choice in Parameter No. 84 (Fieldbus Operation Mode)							
	0	1	2	3	4	5	6	7
	Remote I/O Mode	Position/Simple Direct Value Mode	Half Direct Value Mode	Full Direct Value Mode	Remote I/O Mode 2	Position/Simple Direct Value Mode 2	Half Direct Value Mode	Remote I/O Mode 3
No. of Occupied Channels (DeviceNet)	1	4	8	18	6	8	16	12
Number of occupied stations (CC-Link)	1	1	2	4	1			
No. of Occupied Bytes (PROFIBUS)	2	8	16	32	12			
No. of Occupied Bytes (CompoNet)	2	8	16	32	12			
Operation with the Position Data Specified	×	○(Note2)	○	○	×	○(Note2)	○	×
Speed and Acceleration Direct Setup	×	×	○	○	×	×	○	×
Pressing Operation	○	○	○	○	○	○	○	○
Current Position Read	×	○	○	○	○	○	○	○
Current Speed Read	×	×	○	○	×	×	○	×
Operation with the Position No. Specified	○	○	×	×	○	○	×	○
Completion Position No. Read	○	○	×	×	○	○	×	○
Max. Number of position table	512	768	Unused	Unused	512	768	Unused	512
Force Control (Note1)	△(Note3)	×	×		△(Note3)	○	○	△(Note3)

(Note1) The force control is a feature available for use only in the PCON-CBP/CGBP types.
(Note2) Position data except for data related to positions should indicate the position number to operate.
(Note3) It is available for use in the PCON-CBP/CGBP types when 6 or 7 is set in PIO Pattern.
(*)Position/Simple Direct Mode 2, Semi Direct Mode 2 and Remote I/O Mode 3 should be available to select only in PCON-CBP/CGBP.
(*)MECHATROLINK-I/II are not applicable for Full Direct Mode.

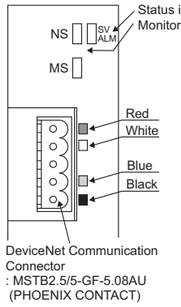
Address Map

Refer to an instruction manual of each field network to be used for the details of the address maps in a field network.

No.	Name	Manual No.
1	CC-Link Instruction Manual	ME0254
2	DeviceNet Instruction Manual	ME0256
3	PROFIBUS-DP Instruction Manual	ME0258
4	CompoNet Instruction Manual	ME0220
5	MECHATROLINK-Ⅰ/Ⅱ Instruction Manual	ME0221
6	MECHATROLINK-Ⅲ Instruction Manual	ME0317
7	CC-Link IE Field Instruction Manual	ME0389

DeviceNet

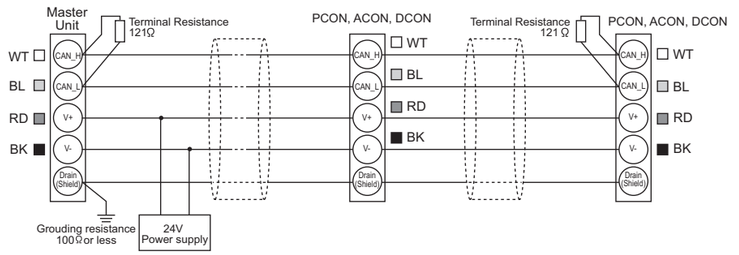
- Specification
  Refer to section DeviceNet instruction manual (ME0256).
- Interface Section



Status indicator LEDs
Monitor LED : The board operation status and network conditions can be obtained.

LED	color	Indication Status	Description
MS	GN	Illuminating	Normal operation
		Flashing	Hardware Error. It might be recovered with reconnect of the power.
	OR	Illuminating	Hardware Error. The replacement of the board is required.
		Flashing	It is a minor error such as a user setting error or configuration error. It can be recovered by re-setting, etc.
	–	OFF	The DeviceNet is being initialized, or the power is not supplied.
NS	GN	Illuminating	The connection has been established and the communication is being performed normally.
		Flashing	The machine is on-line, but the connection has not been established. Communication Stop (Network is normal).
	OR	Illuminating	Node address is duplicated or Busoff is detected. Communication Unavailable.
		Flashing	Communication Error (Communication Time-out Detection)
	–	OFF	The machine is not on-line. The power to the DeviceNet is not supplied.

- Wiring

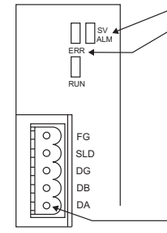


- Operation Mode Setting and Address Allocation
  The operation mode is set using the parameters.
  Set the mode change switch on the front of the board to “MANU” side and set the parameter No. 84 “FMOD: Fieldbus Operation Mode” using the Personal Computer Application Software for RC. [Refer to Address Map]
- Station No. Setting
  The station No. is set using specific parameters.
  Set the parameter No.85 “NADR: Fieldbus Node Address” using the Teaching tool.
  Settable Range:0 to 63 (It is set to “63” when the machine is delivered from the factory.)
- Communication Speed Setting
  The setting for the communication speed is not required because it automatically follows the master’s communication speed.

(Note) After the parameter setting, cycle the control power, and return the mode toggle switch on the front of the controller to “AUTO” side.

CC-Link

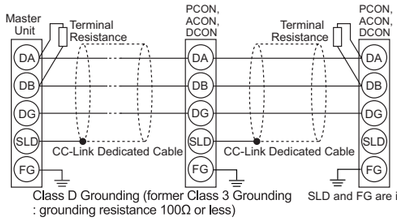
- Specification
  Refer to section CC-Link instruction manual (ME0254).
- Interface Section



Status indicator LEDs
Status LED : The board operation status and network conditions can be obtained.

LED	Color	Indication Status	Indication Description (Meaning of the Indication)
ERR	OR	Illuminating	• An error occurs. (CRC Error/Station No. (parameters) Setting Error/Baud Rate Setting (parameters) Error) • Period between the power injection or software reset and the CC-Link initialization completion
		OFF	• Under Normal Communication
		Flashing	• Station No. setting or communication speed setting is changed during the communication.
RUN	GN	Illuminating	• Under communication
		OFF	• Not communicated

- Wiring



Terminal resistor is required to be connected on the terminal.

The terminator varies according to the model name of the CC-Link compatible cable as follows:
·Cable FANC-SBH····130W1/2W (CC-Link dedicated high performance cable)
·Cable FANC-SB·····110W1/2W (CC-Link Dedicated Cable)

- Operation Mode Setting and Address Allocation
  The operation mode is set using the parameters.
  Set the mode change switch on the front of the board to “MANU” side and set the parameter No.84 “FMOD: Fieldbus Operation Mode” using the Personal Computer Application Software for RC.

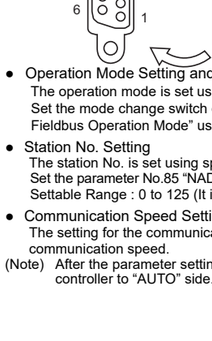
- Station No. Setting
  The station No. is set using specific parameters.
  Set the parameter No.85 “NADR: Fieldbus Node Address” using the Teaching tool.
  Settable Range : 1 to 64 (Already set in system delivery)
- Communication Speed Setting
  Set the parameter No.86 “FBRS: Fieldbus Communication Speed”using the Teaching tool.

Set Value	Communications speed
0 (Set in delivery)	156kbps
1	625kbps
2	2.5Mbps
3	5Mbps
4	10Mbps

(Note) Set the Station Data for the Master Station to “ver 1, Remote Device Station”.
(Note) After the parameter setting, cycle the control power, and return the mode toggle switch on the front of the controller to “AUTO” side.

PROFIBUS-DP

- Specification
  Refer to section PROFIBUS-DP instruction manual (ME0258).
- Interface Section



Status indicator LEDs
Status LED : The board operation status and network conditions can be obtained.

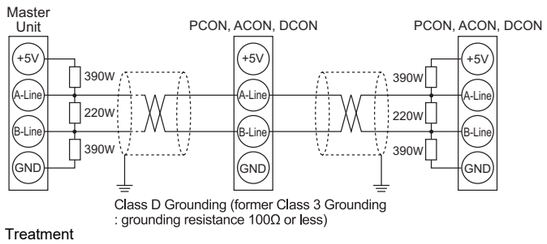
LED	Color	Indication Status	Indication Description (Meaning of the Indication)
NS	GN	Illuminating	The communication is being performed normally from the fieldbus in online mode.
		Flashing	The machine is in offline mode from the fieldbus
	OR	Flashing	A communication error is caused.
MS	GN	Illuminating	The machine is in the normal operation.
		Flashing	Preparation for the operation is performed.
	OR	Illuminating	A communication hardware error was detected in the operation preparation mode.

PROFIBUS-DP Communication Connector : 9 pin female D-sub

Pin No.	Description	Contents
3	B-Line	RxD·TxD(Communication Line on the Plus Terminal Side)
5	GND	Signal Cable Grounding (Insulated)
6	+5V	+5V Output (Insulated)
8	A-Line	/RxD·/TxD (Signal Line on the Minus Terminal Side)
Housing	Shield	Cable Shield (for Case and Connection)

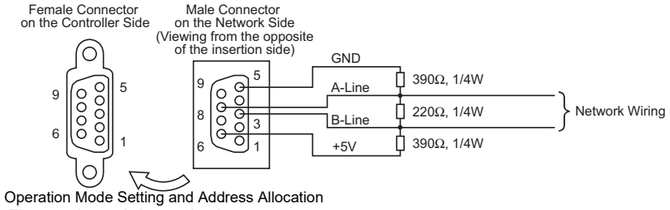
* Prepare for 9 pin male D-sub connector at Cable side connector.

- Wiring



Class D Grounding (former Class 3 Grounding
: grounding resistance 100Ω or less)

- Bus Terminal Treatment
  When the line is connected to the network terminal, connect the terminal resistance to the PROFIBUS-DP communication connector as shown in the following figure, or use the connector with the terminal resistance.
  - Example of using the connector with the terminal resistance : SUBCON-PLUS-PROFIB/AX/SC (PHOENIX CONTACT)
  - Connection of the Terminal Resistance

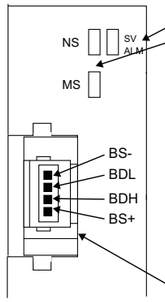


- Operation Mode Setting and Address Allocation
  The operation mode is set using the parameters.
  Set the mode change switch on the front of the board to “MANU” side and set the parameter No. 84 “FMOD : Fieldbus Operation Mode” using the Personal Computer Application Software for RC.
- Station No. Setting
  The station No. is set using specific parameters.
  Set the parameter No.85 “NADR: Fieldbus Node Address” using the Teaching tool.
  Settable Range : 0 to 125 (It is set to “1” when the machine is delivered from the factory.)
- Communication Speed Setting
  The setting for the communication speed is not required because it automatically follows the master’s communication speed.

(Note) After the parameter setting, cycle the control power, and return the mode toggle switch on the front of the controller to “AUTO” side.

CompoNet

- Specification
  Refer to section CompoNet instruction manual (ME0220).
- Interface Section

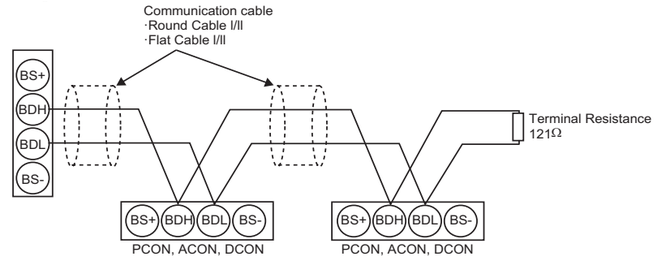


Status indicator LEDs
Monitor LED : The board operation status and network conditions can be obtained.

LED	Color	Indication Status	Description
MS	GN	Illuminating	In the normal operation
	RD	Illuminating	Hardware Error. The replacement of the board is required.
		Flashing	It is a minor error such as a user setting error or configuration error. It can be recovered by re-setting, etc.
	-	OFF	The CompoNet is being initialized, or the power is not supplied.
NS	GN	Illuminating	The connection has been established and the communication is being performed normally.
		Flashing	The machine is on-line, but the connection has not been established. Communication Stop (Network is normal).
	RD	Illuminating	A duplicated node address is considered.
		Flashing	Communication Error (Communication Time-out Detection)
	-	OFF	The machine is not on-line. The power is not supplied.

CompoNet Communication Connector : XW7D-PB4-R (OMRON)

- Wiring



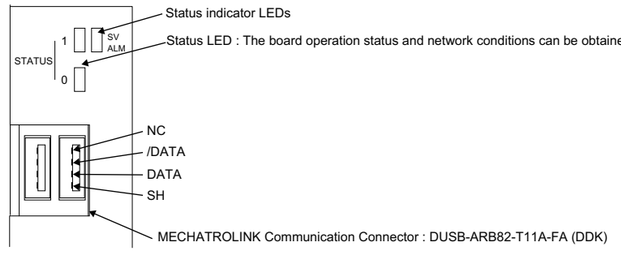
* Communication power is not required.
However, when multiple power supply is to be conducted to another slave, there would be no problem even if connecting to the communication power to BS+ and BS- terminals.

- Station No. Setting
  The station No. is set using specific parameters.
  Set the parameter No.85 “NADR: Fieldbus Node Address” using the Teaching tool.
  Settable Range : 0 to 63 (It is set to “0” when the machine is delivered from the factory.)

(Note) The setting for the communication speed is not required because it automatically follows the master’s communication speed.
(Note) After the parameter setting, cycle the control power, and return the mode toggle switch on the front of the controller to “AUTO” side.

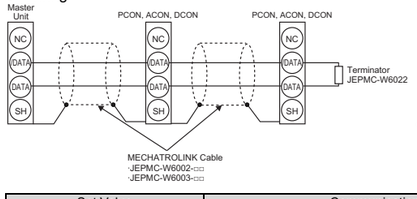
MECHATROLINK-Ⅰ/Ⅱ

- Specification
  Refer to section MECHATROLINK instruction manual (ME0221).
- Interface Section



Status indicator LEDs
Status LED : The board operation status and network conditions can be obtained.
MECHATROLINK Communication Connector : DUSB-ARB82-T11A-FA (DDK)

- Wiring



- Node Address Setting
  The node address is set using specific parameters.
  Set the parameter No.85 “NADR: Fieldbus Node Address” using the Teaching tool.
  Settable Range : 61 to 7F [hex]
  (It is set to “61” when the machine is delivered from the factory.)
- Communication Speed Setting
  Set the parameter No.86 “FBRS: Fieldbus Communication Speed”using the Teaching tool.

Set Value	Communications speed	Data Length
0	4 Mbps (MECHATROLINK-Ⅰ)	17 byte
1	10 Mbps (MECHATROLINK-Ⅱ)	17 byte
2 (Set in delivery)	10 Mbps (MECHATROLINK-Ⅱ)	32 byte

(Note) After the parameter setting, cycle the control power, and return the mode toggle switch on the front of the controller to “AUTO” side.

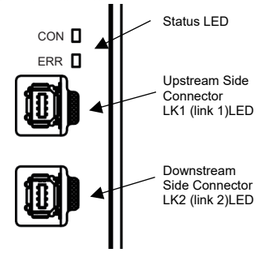
MECHATROLINK-Ⅲ (Dedicated for CB Type)

Since MECHATROLINK-III is applicable for the standard servo profile but not for the standard I/O profile, it is not applicable for the operation modes for other fieldbus products (such as Full Direct Mode).

- Specification
  Refer to the Instruction Manual (ME0317)
- Status LED

LED	Color	Illumination Status	Explanation
CON	GN	Illuminating	Receiving CONNECT (connected to master)
	–	Off	Connection is not established to master
ERR	OR	Illuminating	Illumination flashes when communication alarm or command alarm is generated (warning excepted). Illumination turned off when alarm is cancelled
	–	Off	In normal condition (no alarm generated)
LK1	GN	Illuminating	Illumination turns on when physically connected to another device applicable for MECHATROLINK-Ⅲ (for cable breakage check purpose)
LK2	GN	Illuminating	

- Interface Area



- Node Address Setting
  Node address can be set with the parameter.
  Set Parameter No. 85 “NADR : Fieldbus Node Address” with using the PC software for RC.
  Available range for Setting : 3 to 239 [hex] (setting at delivery : 3)
- Data Length Setting
  Establish the setting in Parameter No. 86 “FBRS : Fieldbus Communication Speed” in RC PC software considering the data length to be used.

Setting Value	Data Length	Baud Rate
0	32 bytes	100Mbps
1 (at the delivery)	48 bytes	

- Electronic Gear Ratio Setting
  Set the electronic gear numerator in Parameter No. 65 “CNUM : Electronic Gear Numerator” and the electronic gear denominator in No. 66 “CDEN : Electronic Gear Denominator”. In the RC PC software
  Establish the settings to satisfy the following condition:

$$\frac{\text{Stroke [mm]}}{\text{Ball Screw Lead Length [mm]}} \times \text{No. of Encoder Pulses} \times \frac{\text{Electronic Gear Ratio Denominator}}{\text{Electronic Gear Ratio Numerator}} \leq 2^{31}$$

- Pulse Count Direction Setting
  Set the value in Parameter No. 62 “FPIO : Pulse Count Direction” to be the same as what is set in No. 5 “ORG : Home-Return Direction” in the RC PC software.
  (Note) Reboot the power on the controller after the parameter settings are completed, and make sure to put the switchover switch on the front face of the controller back to the AUTO side.
- Wiring
  Wiring, please use the MECHATROLINK-Ⅲ dedicated cable.

(Note) After the parameter setting, cycle the control power, and return the mode toggle switch on the front of the controller to “AUTO” side.

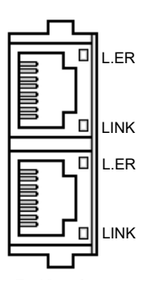
CC-Link IE (Except for PCON-CA/CFA, ACON-CA, DCON-CA)

- Specification
  Refer to the CC-Link IE Instruction Manual

- Status LED

LED	Color	Illumination Status	Explanation
MS	GN: RUN	Steady Light	Operation in normal conditions
		Off	Hardware error occurred, Power not supplied
	OR: ERR	Steady Light	Error being occurred (Node Error / Station Number Setting Error)
		Off	Operation in normal conditions, Power not supplied
NS	GN: D LINK	Steady Light	Cyclic transmission in process
		Blinking	Cyclic transmission paused
		Off	Cyclic transmission not conducted, parallel off, Power not supplied
	OR: L ERR	Steady Light	Received data in error (Lightened up together with L.ER)
		Off	Received data in normal conditions, Power not supplied
LINK	GN	Steady Light	Linkup in process
		Off	Link-down in process, Power not supplied
L.ER	OR	Steady Light	Received data in error
		Off	Received data in normal conditions, Power not supplied

- Interface Section

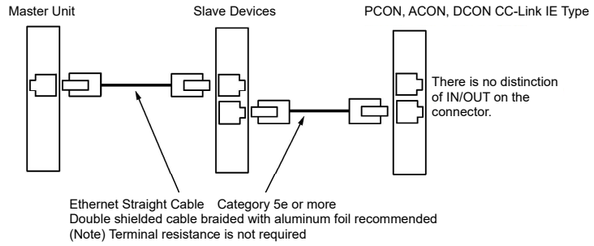


Top View of
Connector on
Controller side

Connector Name	CC-Link IE Connector	Remarks
Cable Side	Ethernet ANSI/TIA/EIA-568-B Category 5e and above 8P8C modular plug equipped with shield (RJ45)	Please prepare separately
Controller Side	Ethernet ANSI/TIA/EIA-568-B Category 5e and above 8P8C modular Jack equipped with shield (RJ45)	

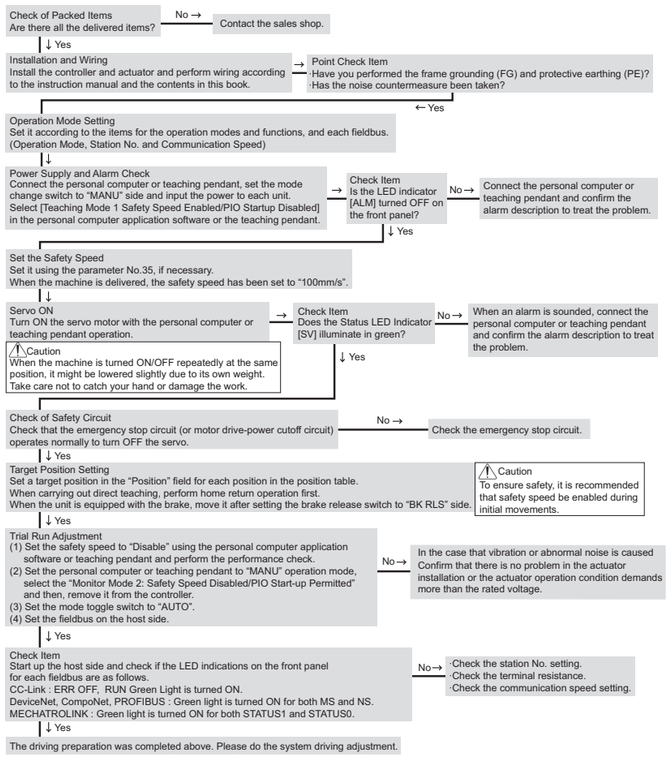
Pin No.	Signal Name	Description	Applicable cable diameter
1	TP0+	Data 0+	It is recommended to prepare a straight STP cable in Category 5e or above for the Ethernet cable.
2	TP0-	Data 0-	
3	TP1+	Data 1+	
4	TP2+	Data 2+	
5	TP2-	Data 2-	
6	TP1-	Data 1-	
7	TP3+	Data 3+	
8	TP3-	Data 3-	

- Wiring



Starting Procedure

When using this product for the first time, make sure to avoid mistakes and incorrect wiring by referring to the procedure below. An expression of PC in this section represents the PC teaching software.



Trouble Shooting

When using this product for the first time, make sure to avoid mistakes and incorrect wiring by referring to the procedure below. In case of an error occurred, connect a teaching tool such as the PC teaching software and check in the status monitor. An alarm related to the fieldbus should be either of those below. For alarms other than those below, refer to an instruction manual of a controller unit to take a countermeasure.

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

- Countermeasures in Errors
  These are the alarms you will often see during startup. Refer below to take a countermeasure action.
  For those other than below, refer to the instruction manual.

Error Code	Error Name	Cause and Countermeasure
069	Realtime Clock Vibration Generated Stop Detected	This shows that the calendar feature has stopped and the current clock data has been lost. Establish the clock setting again from a teaching tool.
0B8	Excitation Detection Error	The excitation detection should be performed at the first time to turn the servo on after the power gets supplied. This shows the condition that the detection has not completed even after a certain period of time (set in Parameter No. 29) has passed. ①Connection error or line breakage on the motor/encoder cable ②The brake is not released (for models equipped with a brake) ③Load of an external force on the motor is high ④The power was turned on with the actuator in contact on the mechanical end ⑤Sliding resistance on the actuator is high Such possibilities as described above should be concerned.
0E5	Encoder Reception Error	It shows that data from the encoder side was not replied in normal condition to the request from the controller. Check if there is any line breakage on the connector parts or the condition of connection. Shut off all the power supplies to the peripheral devices to operate this controller and the actuator. In case there is no error occurs, there may be a concern of noise influence.
0E8	A-, B-Phase Line Breakage	It is the condition that the encoder signals cannot be detected properly. Check if there is any line breakage on the connector parts or the condition of connection.
0EE	Absolute Encoder Error Detection 2	It shows the condition that the absolute encoder cannot detect the position data properly. The voltage on the absolute data battery has dropped. Check the battery alarm output on the PIO. If it is turned off, replace the battery. Conduct the absolute reset after the replacement. Check the connectivity of the encoder cable.
20A	Servo-off during Operation	It shows that a movement command was attempted to be issued while the servo is off. Turn the servo on before make operation.

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