IAI
Quality and Innovation

Applicable Fieldbus
(DeviceNet, CC-Link, PROFIBUS-DP, CompoNet, EtherNet/IP, EtherCAT, PROFINET IO, CC-Link IE Field, SSCNETⅢ/H, MECHATROLINK-Ⅲ, EtherCAT Motion)

MCON-C/CG

First Step Guide Fourth 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

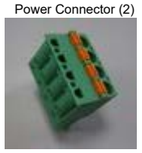
This product is comprised of the following parts if it is of standard configuration.
If you find any fault in the contained model or any missing parts, contact us or our distributor.

1. Parts

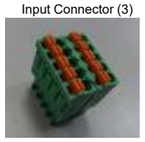
No.	Part Name	Model	Number	Remarks
1	Controller Main Body	Refer to "How to read the model plate", "How to read the model No."	1	
	Accessories			
2	Power Connector	FKC2.5HC/4-ST-5.08 (Supplier : PHOENIX CONTACT)	1	Recommended Cable Size • Control Power Supply 0.5 to 0.3mm² (AWG20 to 22) • Motor Driving Power Supply 3.5 to 0.75mm² (AWG12 to 18) *
3	External Brake Input Connector	FMCD1.5/5-ST-3.5 (Supplier : PHOENIX CONTACT)	1	Recommended cable size 0.5 to 0.2mm² (AWG20 to 24)
4	Drive Cutoff/Emergency Stop Input Connector	FMCD1.5/8-ST-3.5 (Supplier : PHOENIX CONTACT)	1	Recommended Cable Size • Emergency Stop 0.5 to 0.2mm² (AWG20 to 24) • Motor Power External Input 1.25 to 0.5mm² (AWG16 to 20)
5	System I/O Connector	FMCD1.5/4-ST-3.5 (Supplier : PHOENIX CONTACT)	1	Recommended cable size 0.5 to 0.2mm² (AWG20 to 24)
6	Dummy Plug	DP-5	1	For the safety category compliant type
7	DeviceNet Connector (For DeviceNet Type)	MSTB2.5/5-STF-5.08 AU M (Supplier : PHOENIX CONTACT)	1	Prepare a terminal resistance separately if this controller is to be allocated at the terminal.
8	CC-Link Connector (For CC-Link Type)	MSTB2.5/5-STF-5.08 AU (Supplier : PHOENIX CONTACT)	1	Terminal Resistance (130Ω1/2W, 110Ω1/2W) enclosed one unit each
9	Absolute Battery Box (Option)	MSEP-ABB (Battery AB-7 Please purchase separately)	1	For Simple Absolute Type
10	First Step Guide	ME0344	1	
11	Safety Guide	M0194	1	

* Select the cable thickness allowable for the current figured out in the <Calculation of 24V DC Power Capacity>.

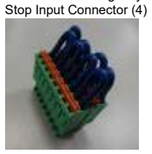
Power Connector (2)



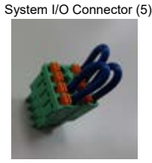
External Brake Input Connector (3)



Drive Cutoff/Emergency Stop Input Connector (4)



System I/O Connector (5)



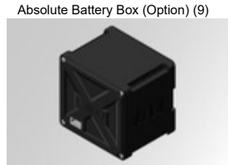
DeviceNet Connector (7)

CC-Link Connector (8)

CC-Link Connector Enclosed Terminal Resistance (8)

Dummy Plug DP-5 (6)

Absolute Battery Box (Option) (9)



Please purchase separately Absolute Battery AB-7 (9)

2. Teaching Tool (Please purchase 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 (Includes RS232C Exchange Adapter + Peripheral Communication Cable)	RCM-101-MW
2	PC Software (Includes USB Exchange Adapter + USB Cable + Peripheral Communication Cable)	RCM-101-USB
3	Touch Panel Teaching Pendant TB-01 (Standard/with dead-man switch attached on the left/with dead-man switch attached on the right)	TB-01/01D/01DR
4	Touch Panel Teaching Pendant TB-02 (Standard/with dead-man switch attached on the left)	TB-02/02D
5	Touch Panel Teaching Pendant TB-03	TB-03

3. Instruction manuals related to this product

No.	Name	Manual No.
1	MCON Controller Instruction Manual	ME0341
2	PC Software RCM-101-MW/RCM-101-USB Instruction Manual	ME0155
3	Touch Panel Teaching TB-01 Applicable for Position Controller Instruction Manual	ME0324
4	Touch Panel Teaching TB-02/TB-03 Applicable for Position Controller/ELECYLINDER Instruction Manual	ME0355/ME0376
5	SSCNETⅢ/H Applicable for Controller Instruction Manual	ME0352
6	MECHATROLINK-Ⅲ Applicable for Controller Instruction Manual	ME0317
7	EtherCAT Motion Applicable for Controller Instruction Manual	ME0367

4. How to read the model plate

Model →
Manufactured date →
Manual No. →
Input power supply →
Information of the connected axes → (Axis No. 0 to 7)

MODEL		MCON-C-5-20PWAI-PWAI-20WAI-20WAI-3DI-N-DV-0-0-ABB
PRODUCT DATE		2015/09/01
MANUAL No.		
CP INPUT		24V DC 2.0A
MP INPUT		24V DC 7.6A
AXIS No. /OUTPUT		
0		24V DC 1.2A
1		
2		24V DC 1.6A
3		24V DC 1.6A
4		24V DC 0.4A
5		
6		
7		

CAUTION : Connect the wiring correctly and properly. use IAI Corporation specified cables.

Made In Japan

5. How to read controller model code
(Example) Consists of 5 axes: 1st axis Pulse motor type, 2nd axis Ineffective axis, 3rd, 4th axis Servo motor type, 5th Brushless DC motor and 6th No connected axis

MCON-C-5-20PWAI-PWAI-20WAI-20WAI-3DI-N -DV-0-0-ABB-**

<Series>
<Type>
C : Standard Type
CG : Safety Category Compliant Type
<Connected Axes>
1 to 8: Number of driver axes
<Detail of Connected Axis>
[Pulse 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
P : Ineffective axis (Pulse motor)
D : Ineffective axis (brushless DC motor)
[Servo Motor Type]
2 : 2W servo motor
5 : 5W servo motor
5S : 5W servo motor
10 : 10W servo motor
20 : 20W servo motor
20S : 20W servo motor
30 : 30W servo motor
3D : 3W brushless DC electric motor
A : Ineffective axis (Servo motor)
N : Not connected
[Encoder Type]
WAI : Incremental / Battery-less Absolute Shared (Pulse Motor/Servo Motor Type)
I : Incremental (Brushless DC Motor)
SA : Simple Absolute (Pulse Motor / Servo Motor Type)
[Option]
HA : High Acceleration/Deceleration Type (when servo motor selected)
LA : Low Power Consumption Type (when servo motor selected)
T : High-Output Setting Type (when actuator selected))
<Identification for IAI use only>
* There is no identification in some cases
<Applicable for Simple Absolute Type>
ABB : Simple Absolute Type (with absolute battery)
ABBN : Simple Absolute Type (with no absolute battery)
No indication : Incremental/ Battery-less Absolute
<Power Voltage>
0 : 24V DC
<I/O Cable Length>
0 : No cable
<I/O Type>
CC : CC-Link Type
CIE : CC-Link IE Field Type
CN : CompoNet Type
DV : DeviceNet Type
EC : EtherCAT Type
EP : EtherNet/IP Type
PR : PROFIBUS-DP Type
PRT : PROFINET IO Type
SSN : SSCNETⅢ/H Type
ML3 : MECHATROLINK-Ⅲ Type
ECM : EtherCAT Motion Type

Basic Specifications

List of Specifications

Specification Item	Specification Contents
Number of Controlled Axes	8 axes MAX.
Control/Motor Power Supply Voltage	24V DC ±10%
Brake Release Power Supply Current Consumption	0.15A × Number of axes
Control Power Current Consumption	1.0A
Control Power In-Rush Current	MAX. 5A 30ms or less
Motor Current Consumption	Refer to the section "Motor Current Consumption"
Motor Power In-Rush Current	Number of slots × MAX. 10A 5ms or less
Heat Generation	26W Max.
Control System	Driver for Pulse Motor : Weak field-magnet vector control Driver for Servo Motor : Vector control Driver for Brushless DC Motor : Rectangular waveform drive
Encoder Resolution	Refer to the section "Encoder Resolution"
Motor/Encoder Cable Length	MAX. 20m *(Note) It is 10m at maximum for Simple Absolute Type and when connecting to RCD.*
Serial Communication Interface (SIO Port: Only for teaching)	RS485 1CH (based on Modbus Protocol) Speed 9.6 to 230.4kbps
External Interface	DeviceNet, CC-Link, PROFIBUS-DP, CompoNet, EtherNet/IP, EtherCAT, PROFINET IO, CC-Link IE Field, SSCNETⅢ/H, MECHATROLINK-Ⅲ, EtherCAT Motion
Data Setting and Input	PC Software, Touch Panel Teaching, Gateway Parameter Setting Tool
Data Retention Memory	Position data and parameters are saved in the nonvolatile memory. (There is no limitation in number of writing)
Number of Positioning Points	256 points (There is no limit for simple direct and direct indication modes) (The number of positioning points differs depending on the operation mode select by the parameter setting.)
LED Display (Mounted on Front Panel)	Status LED for driver 8 points (for each driver board) Status LED for fieldbus 7 points
Electromagnetic Brake Compulsory Release	Brake release available for each axis by compulsory release signal input (24V DC input)
Protective functions (Note1)	Overcurrent Protection (Equipped with a built-in cutoff circuit using a semiconductor for each slot)
Protection Function against Electric Shock	Class I basic insulation
Insulation Resistance	500V DC 10MΩ
Mass	Incremental Type : 620g, Absolute Type : 690g, Absolute Battery box : 1950g
Cooling Method	Forced air-cooling
External Dimensions	123W × 115H × 95D
Oversea Certifications	CE Mark, UL Standards
Environment: Surrounding Air Temperature	0 to 40°C
Environment: Surrounding Humidity	85%RH or less (non-condensing)
Environment: Surrounding Environment	Refer to Installation Environment
Environment: Surrounding Storage Temperature	-20 to 70°C 0 to 40°C for absolute battery
Environment: Surrounding storage humidity	85%RH or less (non-condensing)
Environment: Usable Altitude	1000m or lower above sea level
Environment: Vibration Durability	Frequency 10 to 57Hz/ Swing width : 0.075mm Frequency 57 to 150Hz/ Acceleration : 9.8m/s² XYZ Each direction Sweep time: 10 min. Number of sweep: 10 times
Environment: Shock Resistance	Dropping height 800mm, 1 corner, 3 edges and 6 surfaces
Environment: Protection Class	IP20

Note 1 For servo-motor, the protection is triggered with the current greater in 1.4 times than the maximum load current.

<Motor Current Consumption> See below for the motor current consumption of the connectable actuators. (Rated current, Max. current)

Actuator Type				Rated Current [A]	Max. Current [A] Power Saving Type	Max. Current [A] Standard Type
Pulse Motor (Note 2)	RCP2, 3	20P to 28P				2.0
		28SP to 56P				2.0
	RCP4, 5, 6	28P to 56P	High output invalid			2.0
			High-Output Type (Note 3)	3.5		4.2
Servo Motor (Note 4)	2W			0.8		4.6
	5W			1.0		6.4
	10W (RCL)			1.3		6.4
	10W (RCA, RCA2)			1.3	2.5	4.4
	20W			1.3	2.5	4.4
	20W (20S Type)			1.7	3.4	5.1
	30W			1.3	2.2	4.4
Brushless DC Motor	3W			0.7		1.5

Note 2 The current is maximized at the excitation phase detection conducted in the first servo ON process after the power is supplied (ordinary 100ms).
Note 3 High-output type driver board can control one axis per board.
Note 4 The current becomes maximum when the excitation phase of the servo-motor is detected, which is performed during the initial servo ON processing after the power is injected. (Normal: Approx. 1 to 2 sec, MAX.: 10 sec).

<Calculation of 24V DC Power Capacity>
For the calculation of 24V DC power capacity, figure out the numbers for (1) to (6) below, and then follow Step (7).
(1) Control Power Current Consumption: 1.0A ····· 1)
(2) Current Consumption of Motor Power Supply:
Total of motor current consumption of connected actuator ····· 2)
(3) Current Consumption at Excitation Phase Detection:
Maximum current in the total of maximum motor current to turn the servo ON at the same time ····· 3)
(4) Control Power In-Rush Current: 5A ····· 4)
(5) Motor Power In-Rush Current: Number of slots × 10A ····· 5)
(6) Brake Release Power Supply Current Consumption: Number of actuators with brake × 0.15A ····· 6)
(7) Selection of Power Supply:
Usually, the rated current is to be approximately 1.3 times higher than 1) + 2) + 6) above considering approximately 30% of margin to the load current. However, considering the current of 3) to 5), even though it is a short time, select a power supply with "peak load corresponding" type or that with enough capacity. Avoid current of 3) to 5) from occurring at the same time by having the timing of emergency stop release (turning the motor power on) and timing to turn the servo on shifted (Note 5) from each other and so on. Huge current flow of the same time may cause a transient voltage drop. Be careful especially when selecting a power source equipped with remote sensing.
Note 5 The timing to turn the servo ON can be shifted in Driver Shutdown Release Delay Time in the gateway parameter setting tool.
(Note) Make short-circuit on 0V side when separate power sources are used for the control power and motor power.

(Reference) Selection of Power Supply Protection Circuit Breaker
It is recommended that the power supply protection is conducted on the primary side (AC power side) of the 24V DC power supply unit.
Pay attention to the in-rush current of 24V DC power supply unit and rated cutoff current of the circuit breaker.
- Rated Breaking Current > Short-circuit Current = Primary Power Supply Capacity/Power Voltage
- (Reference) In-rush Current of IAI Power Supply Unit PS241 = 50 to 60A, 3msec

<Encoder Resolution>　See below for the resolution of encoders mounted on the connectable actuators.

Actuator Type			Encoder Resolution
Pulse Motor	RCP2 to 5	All Types	800 pulse/rev
	RCP6	All Types	8192 pulse/rev
Servo Motor	RCA	Incremental Encoder	800 pulse/rev
		Battery-less Absolute Encoder	16383 pulse/rev
	RCA2	RCA2-□□□N(A)	1048 pulse/rev
		Except for RCA2-□□□N(A)	800 pulse/rev
	RCL	RA1L・SA1L・SA4L・SM4L	715 pulse/30.03 mm
		RA2L・SA2L・SA5L・SM5L	855 pulse/35.91 mm
		RA3L・SA3L・SA6L・SM6L	1145 pulse/48.09 mm
Brushless DC Motor	RCD	RA1D・GRSN	400 pulse/rev
		RA1DA・GRSNA	480 pulse/rev

● Specifications of DeviceNet Interface

Item	Specification			
Communication Protocol	DeviceNet 2.0, Group 2 Dedicated Server, Network-Powered Insulation Node			
Baud Rate, Communication System	Automatically follows the master, Master-Slave System (Polling)			
Number of Occupied Channels, Number of Occupied Node	MAX. 72CH (Input, Output), 1 node			
Communication Cable Length (Note 1)	Baud Rate	Max. Network Length	Total Branch Line Length	Max. Branch Line Length
	500kbps	100m	39m	6m
	250kbps	250m	78m	
	125kbps	500m	156m	
Communications Cable	Use the dedicated cable.			
Connector (Note 2)	MSTB2.5/5-GF-5.08 AU (Manufactured by PHOENIX CONTACT or equivalent)			
Communication Power Supply, Consumption Current	24V DC (Supplied from DeviceNet), 60mA			

Note 1　For T branch communication, refer to the Instruction Manuals for the master unit and programmable controller (PLC) to be mounted.
Note 2　The cable-side connector is a standard accessory. [Refer to Product Check 1.Parts]

● Specifications of CC-Link Interface

Item	Specification					
Communication Protocol	CC-Link ver 1.10 or ver 2.00					
Station Type	Remote Device Station (MAX. four stations occupied)					
Baud Rate, Communication System	10M/5M/2.5M/625k/156kbps, Broadcast Polling System					
Number of Connectable Stations	MAX. 63 stations					
Communication Cable Length (Note 1)	Baud Rate (bps)	10M	5M	2.5M	625k	156k
	Total Cable Length (m)	100	160	400	900	1200
Communications Cable	Use the dedicated cable.					
Connector (Note 2)	MSTB2.5/5-GF-5.08 AU (Manufactured by PHOENIX CONTACT or equivalent)					

Note 1　For T branch communication, refer to the Instruction Manuals for the master unit and programmable PLC to be mounted.
Note 2　The cable-side connector is a standard accessory. [Refer to Product Check 1.Parts]

● Specifications of PROFIBUS-DP Interface

Item	Specification		
Communication Protocol	PROFIBUS-DP		
Baud Rate, Communication System	Automatically follows the master, Hybrid System (Master-Slave System or Token Passing System)		
Occupied Domain	MAX. 144 byte (Input, Output)		
Number of Connectable Stations	MAX. 32 stations/segments　available up to 126 stations with repeater		
Communication Cable Length (Note 2)	MAX. Total Network	Baud Rate	Cable Type
	100m	3,000/6,000/12,000kbps	Type A Cable
	200m	1,500kbps	
	400m	500kbps	
	1000m	187.5kbps	
	1200m	9.6/19.2/93.75kbps	
Communications Cable	STP cable AWG18		
Connector (Note 1)	9-pin female D-sub Connector		
Transmission Path Format	Bus/Tree/Star		

Note 1　Please prepare a 9-pin male D-sub connector for the cable-end connector.

● Specifications of CompoNet Interface

Item	Specification
Communication System	CompoNet dedicated protocol
Communication Type, Baud Rate	Remote I/O communication, Automatically follows the master
Communication Cable Length	Follows CompoNet specifications
Slave Type	Word-Mixed Slave
Available Node Addresses for Setting	0 to 63 (Setting conducted on controller parameter)
Communications Cable (To be prepared by User)	Round Cable (JIS C3306, VCTF2-core) Flat cable I (with no sheathed) Flat cable II (sheathed)
Connector (Controller Side)	XW7D-PB4-R (Manufactured by OMRON or equivalent)

● Specifications of EtherNet/IP Interface

Item	Specification
Communication Protocol	IEC61158 (IEEE802.3)
Baud Rate	10BASE-T/100BASE-T (Autonegotiation setting is recommended)
Communication Cable Length	Follows EtherNet/IP specifications (Distance between hub and each node: 100m max.)
Number of Connection	Master Unit
Available Node Addresses for Setting	0.0.0.0 to 255.255.255.255
Communications Cable (To be prepared by User)	Category 5 or more (Double shielded cable braided with aluminum foil recommended)
Connector	RJ45 Connector × 1pc

● Specifications of EtherCAT Interface

Item	Specification
Communication Protocol	IEC61158 type 12
Physical Layer	100Base-TX (IEEE802.3)
Baud Rate	Automatically follows the master
Communication Cable Length	Follows EtherCAT® specifications (Distance between each node: 100m max.)
Slave Type	I/O slave
Available Node Addresses for Setting	0 to 127
Communications Cable (To be prepared by User)	Category 5 or more (Double shielded cable braided with aluminum foil recommended)
Connector	RJ45 Connector × 2pcs (Input × 1, Output × 1)
Connect	Daisy chain only

● Specifications of PROFINET IO Interface

Item	Specification
Communication Protocol	IEC61158 (IEEE802.3), IEC61784
Baud Rate	100Mbps
Communication Cable Length	Distance between each segment: 100m Max.
Number of Connection	Master Unit
Available Node Addresses for Setting	0.0.0.0 to 255.255.255.255
Communications Cable (To be prepared by User)	Category 5 or more (Double shielded cable braided with aluminum foil recommended)
Connector	RJ45 Connector × 1pc
GSDML File Version	Ver 2.3

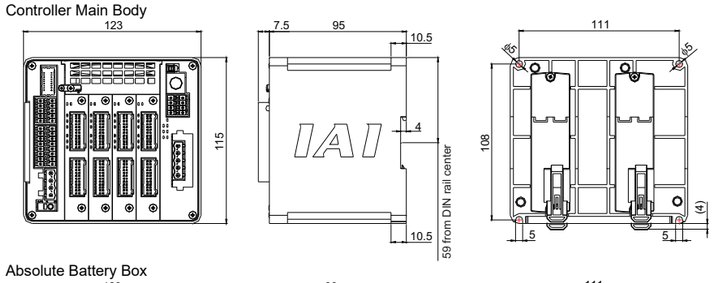
● Specifications of CC-Link IE Field Interface

Item	Specification
Communication Protocol, Baud Rate	Conforms to IEEE802.3ab (1000BASE-T), 1Gbps
Communication System	Token Passing System
Communication Cable Length	Distance between each segment: 100m Max.
Max. Number of Connected Units, Max. Networks	254units (Total of master and slave stations), 239networks
Communications Cable (To be prepared by User)	Category 5e or more (Double shielded cable braided with aluminum foil recommended)
Connector	RJ45 Connector × 2pcs
Cyclic Communication	RX (Slave → Master): 16384bits, RY (Master → Slave): 16384bits RWr (Slave → Master): 8192words, RWw (Master → Slave): 8192words

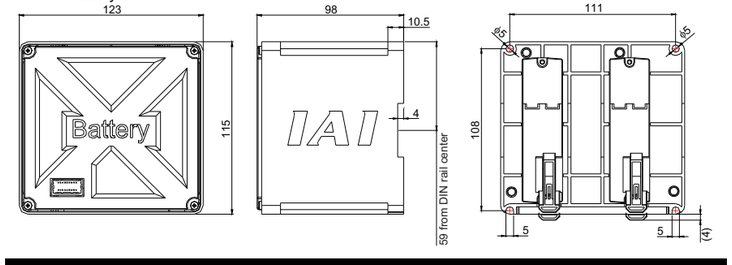
- Refer to SSCNETⅢ/H interface specifications, SSCNETⅢ/H Applicable for Controller Instruction Manual (ME0352).
- Refer to MECHATROLINK-Ⅲ interface specifications, MECHATROLINK-Ⅲ Applicable for Controller Instruction Manual (ME0317).
- Refer to EtherCAT Motion interface specifications, EtherCAT Motion Applicable for Controller Instruction Manual (ME0367).

External Dimensions

Controller Main Body



Absolute Battery Box



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).

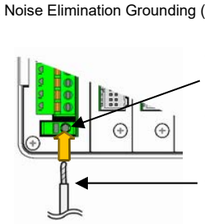
1. Installation Environment
Do not use this product in the following environment.
- Location where the surrounding air temperature exceeds the range of 0 to 40°C
- Location where condensation occurs due to abrupt temperature changes
- Location where relative humidity exceeds 85%RH
- Location exposed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

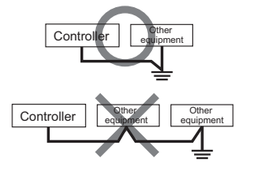
1. Noise Elimination Grounding (Frame Ground)



Connect the ground line to the FG terminal block on the controller unit.
Put a tool such as a screwdriver into the square slot and connect the line.

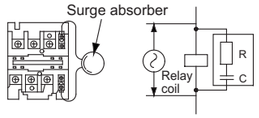
Copper wire: Connect a ground wire with a diameter of 1.6 mm ($2mm^2$: AWG 14) or larger.

Earth Terminal
Grounding resistance at 100Ω or less (Class D grounding)

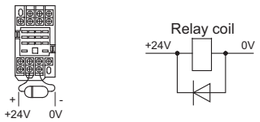


Do not share the ground wire with or connect to other equipment. Ground each controller.

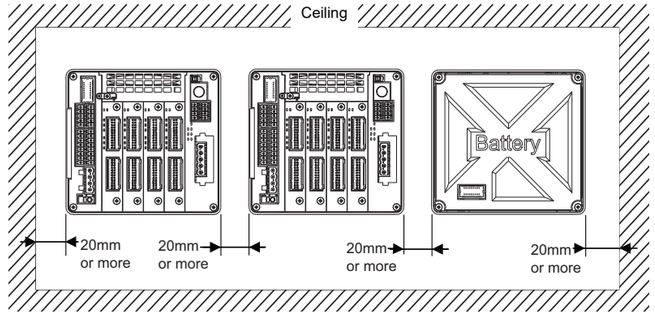
2. Precautions regarding wiring method
1) Wire is to be twisted for the 24V DC power supply.
2) Separate the signal and encoder lines from the power supply and power lines.

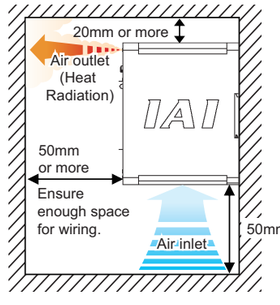


3. Noise Sources and Elimination
Carry out noise elimination measures for electrical devices on the same power path and in the same equipment.
The following are examples of measures to eliminate noise sources.
1) AC solenoid valves, magnet switches and relays
[Measure]　Install a Surge absorber parallel with the coil.
2) DC solenoid valves, magnet switches and relays
[Measure]　Mount the windings and diodes in parallel. Select a diode built-in type for the DC relay.

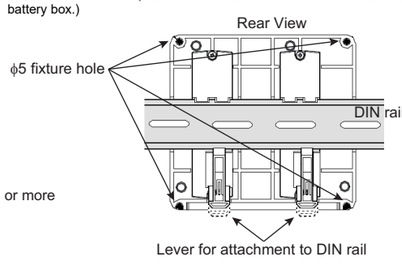


4. Cooling Factors and Installation
Design and Build the system considering the size of the controller box, location of the controller and cooling factors to keep the surrounding temperature around the controller below 40°C.
Pay a special attention to the battery unit since the performance of it would drop both in the low and high temperatures. Keep it in an environment in the room temperature as much as possible. (Approximately 20°C is the recommended temperature.)

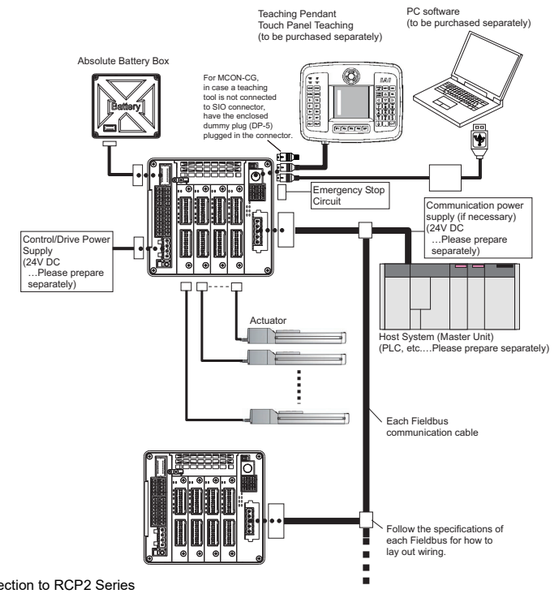




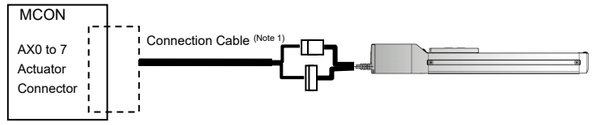
For the attachment of the unit, use the fixture holes on the four corners or attach on the DIN rail. (Attachment should be the same for the absolute battery box.)



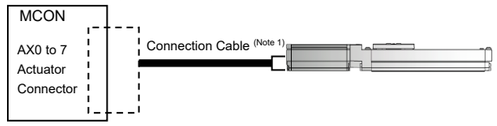
Wiring



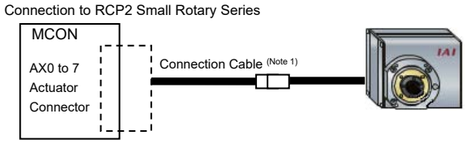
1) Connection to RCP2 Series



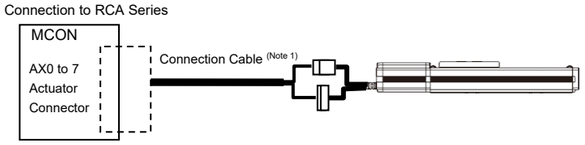
2) Connection to RCP6, RCP5, RCP4, RCP3, RCA2 RCD and RCL Series



3) Connection to RCP2 Small Rotary Series



4) Connection to RCA Series



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

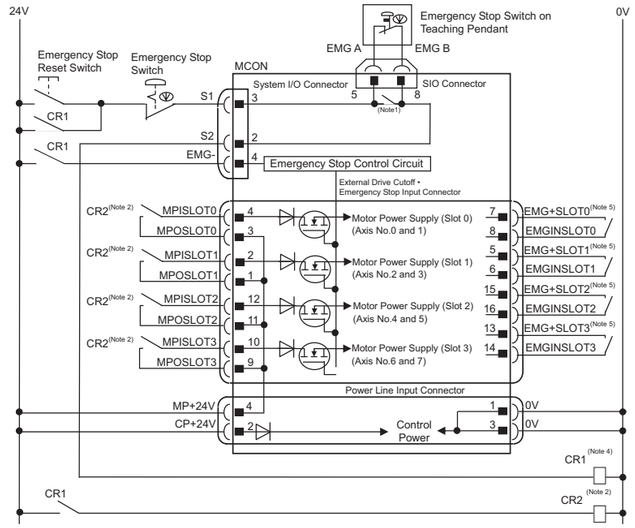
Model	Cable Model	Remarks
RCP2 other than rotary small type	CB-PSEP-MPA□□□	Robot cable from 0.5 to 20m
RCP2 rotary small type (RTBS/RTCS/RTBSL/RTCSL)	CB-RPSEP-MPA□□□	Robot cable from 0.5 to 20m
RCA	CB-ASEP2-MPA□□□	Robot cable from 0.5 to 20m
RCP3, RCA2, RCL	CB-APSEP-MPA□□□	Robot cable from 0.5 to 20m
	CB-APSEP-MPA□□□-LC	Standard cable from 0.5 to 20m
RCP4 (Other than SA3/RA3), RCD-RA1DA(-D3) (Note 2)	CB-CA-MPA□□□-RB	Robot cable from 0.5 to 20m (Note 3)
	CB-CA-MPA□□□	Standard cable from 0.5 to 20m (Note 3)
RCP6, RCP5, RCP4(SA3/RA3), RCD-RA1DA(-D5) (Note 2)/ GRSNA Gripper/Rotary of RCP2CR, RCP2W	CB-CAN-MPA□□□-RB	Robot cable from 0.5 to 20m (Note 3)
	CB-CAN-MPA□□□	Standard cable from 0.5 to 20m (Note 3)

Note 2 -D3/-D5 in brackets ( ) for RCD show the symbols for the applicable controllers.
Note 3 The maximum cable length for RCD is 10m for both the standard cable and robot cable.

Caution: Follow the content described in the model code record card inserted to the controller when connecting. Wrong connection will issue an error such as the encoder wire breakage.

Power Supply and Emergency Stop Circuit

The following diagram shows an example of how the emergency stop switch for the teaching pendant may be included in the emergency stop circuit you may construct.



Note 1 MCON-C: When there is nothing plugged in the SIO connector, S1 and S2 are short-circuited inside the controller.
MCON-CG: When there is nothing plugged in the SIO connector, S1 and S2 are not short-circuited inside the controller.
When the short-circuited, the enclosed dummy plug DP-5 plugged in the SIO connector.
Note 2 When the motor driving source is cut off externally for a compliance with the safety category, relay a contact such as a contactor to the wires between MPISLOT∗ and MPOSLOT∗.
Note 3 The rating for the emergency stop signal (EMG-) to turn ON/OFF at contact CR1 is 24V DC and 10mA.
Note 4 For CR1, select the one with coil current 0.1A or less.
Note 5 By cutting out the connection between EMG+SLOT∗ and EMGINSLOT∗, only the disconnected slot number can be made in the condition of an emergency stop. (∗: Slot Number)
(Note) 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).

Operation Mode Selected (Other than Motion Network)

(Note) SSCNET Ⅲ/H type, MECHATROLINK-III type and EtherCAT Motion type of Motion Network is not applicable for the operation modes listed below.

This controller possesses 7 types of operation mode to select from as the fieldbus specification.
The settings are to be established with Gateway Parameter Setting Tool.

● Operation Patterns of Fieldbus Specification

Operation Mode	Contents
Simple Direct Mode	The target position can be indicated directly by inputting a value. Also, monitoring of the current position is available in 0.01mm unit. Those other than the target position are to be indicated in the position table, and the setting can be done for 256 points at maximum.
Positioner 1 Mode	The 256 points of position data can be registered at the maximum and is able to stop at the registered positions. Also, monitoring of the current position is available in 0.01mm unit.
Direct Indication Mode	The target position, speed acceleration/deceleration and pressing current limit can be indicated with inputting a number. Monitoring of not only the current position, but also the current speed and indicated current are available.
Positioner 2 Mode	This is the operation mode of the position data of 256 points at maximum set in the position table. The monitoring of the current position is not available. This mode is that the transferred data is reduced from Positioner 1 Mode.
Positioner 3 Mode	This is the operation mode of the position data of 256 points at maximum set in the position table. The monitoring of the current position is not available This is the mode to control with the minimized number of signals to perform the positioning operation by reducing the amount of sent and received data from Positioner 2 Mode.
Positioner 5 Mode	This is the operation mode of the position data of 16 points at maximum set in the position table. It is a mode that enabled to monitor the current position in 0.1mm unit by reducing the number of position table from Positioner 2 Mode.
Remote I/O Mode	It is the operation mode to control with ON/OFF of bits like PIO (24V input and output). Control with five patterns, PIO Pattern 0, 1, 2, 4 and 5, is available. (Refer to Remote I/O Operation Patterns below.)

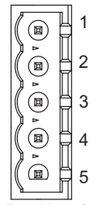
● Remote I/O Operation Patterns (PIO patterns are to be switched over in driver board parameter No.25.)

PIO Pattern	Operation Mode	I/O Type
0	Positioning Mode	Number of positions 64 points Zone signal output 1 point (Note 1) Position zone signal output (Note 2) 1 point
1	Teaching Mode	Number of positions 64 points Position zone signal output (Note 2) 1 point JOG operation available Writing of current position to indicated position available
2	256points Mode	Number of positions 256 points Position zone signal output (Note 2) 1 point
3	-	Cannot be used. Make any setting will cause parameter error.
4	Electromagnetic Mode 1	Number of positions 7 points Zone signal output 1 point (Note 1) Position zone signal output (Note 2) 1 point Operation indication available only by indicating position number
5	Electromagnetic Mode 2	Number of positions 64 points Zone signal output 1 point (Note 1) Position zone signal output (Note 2) 1 point Operation with moving forward / moving backward / intermediate position indications Signal output equivalent to limit switch available for complete signal

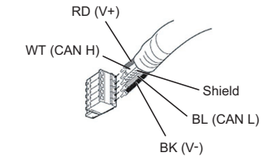
Note 1: Set the range of the zone in parameter. It becomes constantly valid once the home-return operation is complete.
Note 2: The range of the zone is to be set in the position table, and is activated only when that position number is indicated. It is invalid in other position number commands. The position zone signal can be switched over to the zone signal with the setting of Parameter No.149.

DeviceNet Type

Refer to the instruction manuals for each fieldbus master unit and mounted PLC for the details.

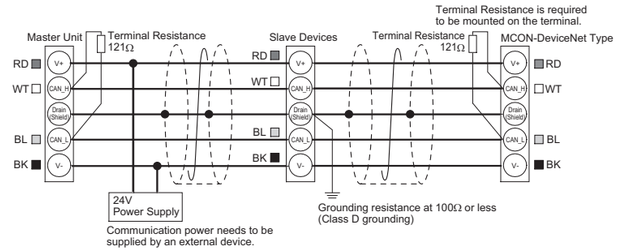


Front View of Connector on Controller side



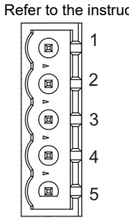
Connector Name	DeviceNet Connector	
Cable Side	MSTB2.5/5-STF-5.08 AU M	Enclosed in standard package Manufactured by PHOENIX CONTACT
Controller Side	MSTB2.5/5-GF-5.08 AU	

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	

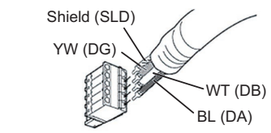


CC-Link Type

Refer to the instruction manuals for each fieldbus master unit and mounted PLC for the details.

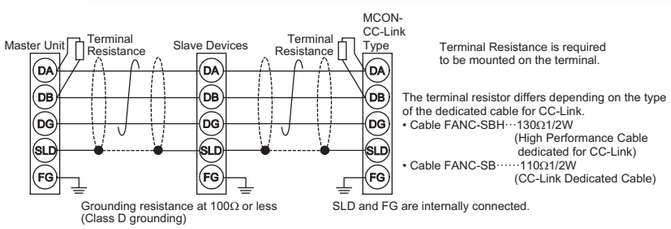


Front View of Connector on Controller side



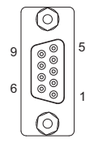
Connector Name	CC-Link Connector	
Cable Side	MSTB2.5/5-STF-5.08 AU	Enclosed in standard package Manufactured by PHOENIX CONTACT
Controller Side	MSTB2.5/5-GF-5.08 AU	

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 (Connect the FG of the 5 pins and controller FG internally)	
5	FG	Frame Ground (Connect the SLD of the 4 pins and controller FG internally)	

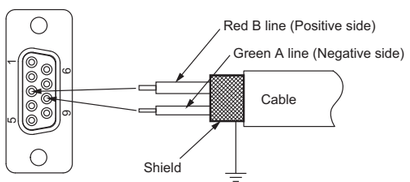


PROFIBUS-DP Type

Refer to the instruction manuals for each fieldbus master unit and mounted PLC for the details.

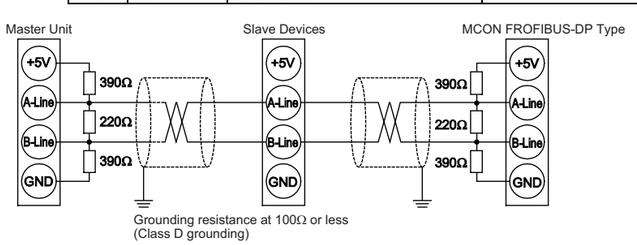


Front View of Connector on Controller side



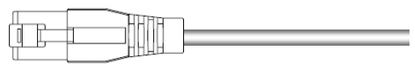
Connector Name	PROFIBUS-DP Connector	
Cable Side	9-pin D-sub Connector (Male)	Please prepare separately
Controller Side	9-pin D-sub Connector (Female)	

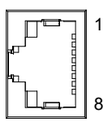
Pin No.	Signal Name	Description	Applicable cable diameter
1	NC	Disconnected	PROFIBUS-DP Dedicated Cable (Type A : EN5017)
2	NC	Disconnected	
3	B-Line	Communication Line B (RS485)	
4	RTS	Request for Sending	
5	GND	Signal GND (Insulation)	
6	+5V	+5V Output (Insulation)	
7	NC	Disconnected	
8	A-Line	Communication Line A (RS485)	
9	NC	Disconnected	



EtherNet/IP Type

Refer to the instruction manuals for fieldbus master unit and mounted PLC for the details.

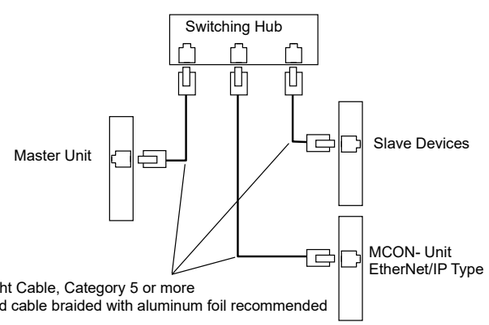




Front View of Connector on Controller side

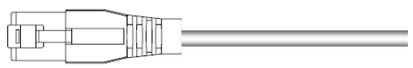
Connector Name	EtherNet/IP Connector	
Cable Side	8P8C Modular Plug	Please prepare separately
Controller Side	8P8C Modular Jack	

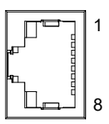
Pin No.	Signal Name	Description	Applicable cable diameter
1	TD+	Data sending +	For Ethernet cable, use a straight STP cable that possesses the performance of Category 5 or more.
2	TD-	Data sending -	
3	RD+	Data receiving +	
4	–	Disconnected	
5	–	Disconnected	
6	RD-	Data receiving -	
7	–	Disconnected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



PROFINET IO Type

Refer to the instruction manuals for fieldbus master unit and mounted PLC for the details.

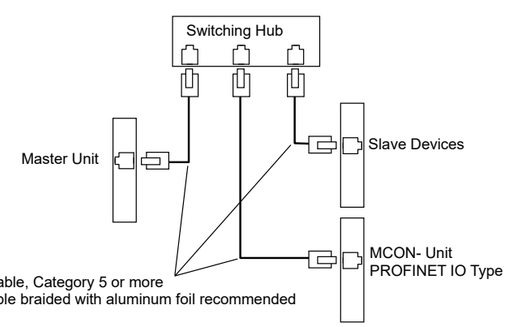




Front View of Connector on Controller side

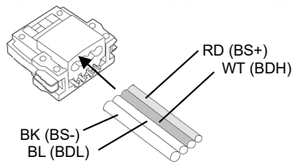
Connector Name	PROFINET IO Connector	
Cable Side	8P8C Modular Plug	Please prepare separately
Controller Side	8P8C Modular Jack	

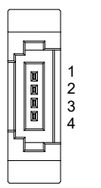
Pin No.	Signal Name	Description	Applicable cable diameter
1	TD+	Data sending +	For Ethernet cable, use a straight STP cable that possesses the performance of Category 5 or more.
2	TD-	Data sending -	
3	RD+	Data receiving +	
4	–	Disconnected	
5	–	Disconnected	
6	RD-	Data receiving -	
7	–	Disconnected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



CompoNet Type

Refer to the instruction manuals for fieldbus master unit and mounted PLC for the details.



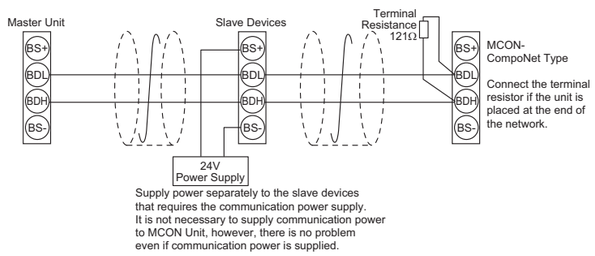


Front View of Connector on Controller side

Connector Name	CompoNet Connector	
Cable Side	Prepare a connector complied with CompoNet standards.	
Controller Side	XW7D-PB4-R	Produced by OMRON

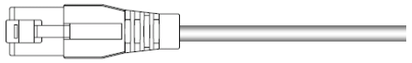
Pin No.	Signal Name (Color)	Description	Applicable cable diameter
1	BS+ (RD)	Communication Power Supply + (Note 1)	CompoNet Dedicated Cable
2	BDH (WT)	Signal line H side	
3	BDL (BL)	Signal line L side	
4	BS- (BK)	Communication Power Supply - (Note 1)	

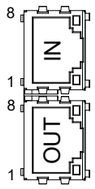
Note 1 It is not necessary to supply the communication power. (Internal power source is used.)
If conducting multi power supply to other slave devices via communication cables, there is no problem with connecting the power supply to BS+ and BS- terminals.



EtherCAT Type, EtherCAT Motion Type

Refer to the instruction manuals for fieldbus master unit and mounted PLC for the details.

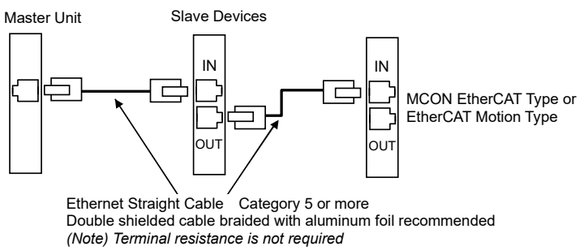




Front View of Connector on Controller side

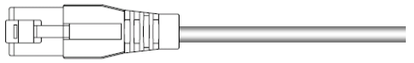
Connector Name	EtherCAT Connector, EtherCAT Motion Connector	
Cable Side	8P8C Modular Plug	Please prepare separately
Controller Side	8P8C Modular Jack	

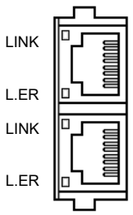
Pin No.	Signal Name	Description	Applicable cable diameter
1	TD+	Data sending +	For Ethernet cable, use a straight STP cable that possesses the performance of Category 5 or more.
2	TD-	Data sending -	
3	RD+	Data receiving +	
4	–	Disconnected	
5	–	Disconnected	
6	RD-	Data receiving -	
7	–	Disconnected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



CC-Link IE Field Type

Refer to the instruction manuals for each fieldbus master unit and mounted PLC for the details.



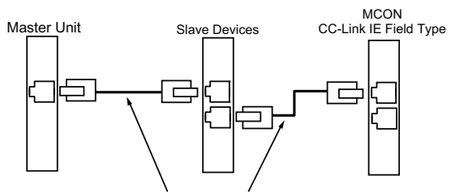


Front View of Connector on Controller side

Connector Name	CC-Link IE Field Connector	
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)	

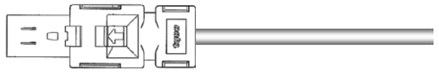
Pin No.	Signal Name	Description	Applicable cable diameter
1	TP0 +	Data 0 +	It is recommended to prepare a straight STP cable in Category 5e or above for the Ethernet cable.
2	TP0 -	Data 0 -	
3	TP1 +	Data 1 +	
4	TP2 +	Data 2 +	
5	TP2 -	Data 2 -	
6	TP1 -	Data 1 -	
7	TP3 +	Data 3 +	
8	TP3 -	Data 3 -	

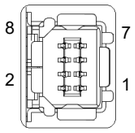
(Note) There is no definition of IN or OUT on the communication ports.



MECHATROLINK-Ⅲ Type

Refer to the instruction manuals for fieldbus master unit and mounted PLC for the details.

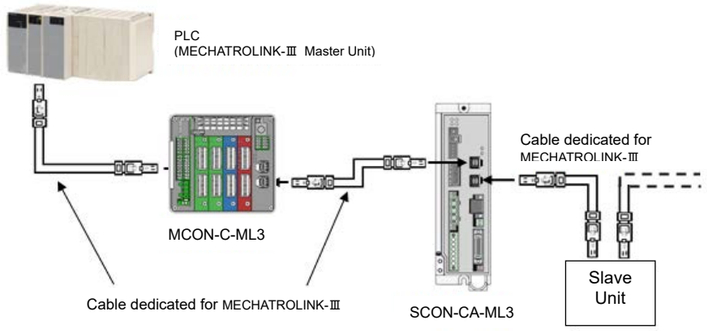




Industrial Mini I/O Connector (Controller side)

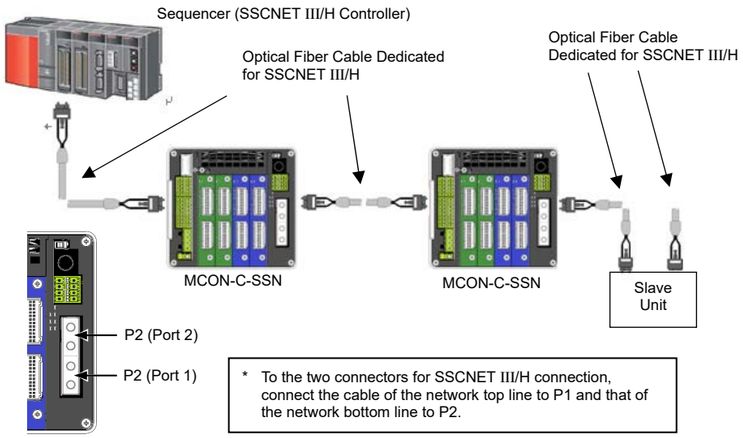
Connector Name	MECHATROLINK-Ⅲ Connector	
Cable Side	Industrial Mini I/O Plug	Please prepare separately
Controller Side	Industrial Mini I/O Receptacle	

Pin No.	Signal Name	Description	Applicable cable diameter
1	TXD+	Data sending +	Use a dedicated cable of MECHATROLINK-Ⅲ.
2	TXD -	Data sending -	
3	RXD+	Data receiving +	
4	-	Disconnected	
5	-	Disconnected	
6	RXD-	Data receiving -	
7	-	Disconnected	
8	-	Disconnected	



SSCNETⅢ/H Type

Refer to the instruction manuals of the fieldbus master unit and mounted PLC for details



* To the two connectors for SSCNET Ⅲ/H connection, connect the cable of the network top line to P1 and that of the network bottom line to P2.

Starting Procedures

When using this product for the first time, make sure to avoid mistakes and incorrect wiring by referring to the procedure below. “PC” stated in this section means “PC software”.

Check of Packed Items
Are all the delivered items present? — No → Contact your local IAI distributor.

↓ Yes

Installation and Wiring
Install the controller and actuator and perform wiring according.

↓

Important Check Item
• Is frame ground (FG) connected? • Has the noise countermeasure been taken?

↓

Power Supply and Alarm Check
Connect the PC software, set the operation mode setting switch to “MANU” side and turn the power ON.
Select [Teaching Mode 1 Safety Speed Activated / Prohibit PIO Startup] in the PC software.

↓

Check Item
Is SYS in Status LEDs turned ON in green? — No → Check the details of the alarm in the PC software to have a counteraction.

↓ Yes

Initial Setting
1) Have the fieldbus and operation mode setting conducted with the gateway parameter setting tool.
2) Set up the parameters (operation patterns) for each axis on the PC software.

↓

Servo ON
Turn the servo ON for all the connected axes by operating the PC.

> ⚠ *Caution*
> *Please perform this process with the actuator away from the mechanical end or interfering objects as much as possible. Move the actuator away from interfering surroundings. It may generate an alarm if the actuator hit the mechanical end or interfering objects 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
Is SYS* on the status LED display for the driver on the axis number indicated for the servo-on turned ON in green? — No → If an alarm is generated, check the detail of the alarm on the PC and have an appropriate treatment.

↓ Yes

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

↓ Yes

Setting of Position Data [Except for direct numerical specification mode]
Set the position (*), velocity and acceleration/deceleration in each position table. * Setting is unnecessary in simple direct mode

↓

Test Run Adjustment 1
1) Cancel the emergency stop, do not put a work piece on, set to low speed and check the operation with commands from the PC.
2) Put on a work piece, set to the automatic operation speed, and then check the operation with the command from the PC.

↓

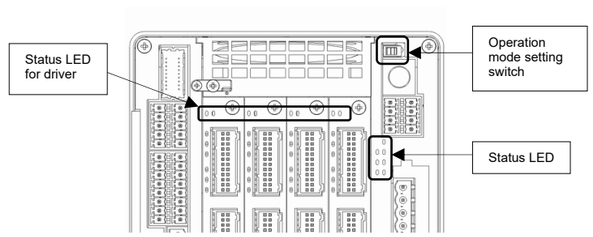
Check Item
Any vibration or abnormal noise? — No → Check if there is any problem with the installation of the actuator and the condition of the actuator use exceeds the ranges of the rated values. Adjust the servo if necessary.

↓ Yes

Establish Link to Fieldbus
1) Assign MCON as the host controller [Refer to the instruction manual of the master unit].
2) Put the operation mode setting switch on the front panel to AUTO side, and reboot the power.
3) Once the link with the master unit is established, turn ON MON signal in the gateway control signals.
(While MON Signal is ON, control from fieldbus is available.)

↓

Test Run Adjustment 2
Output an operation command from the host (such as PLC) to check by the system operation.



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