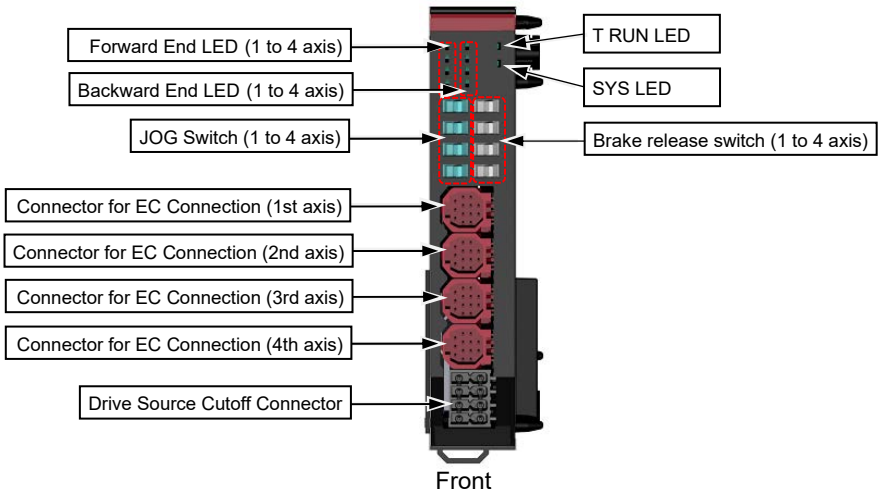
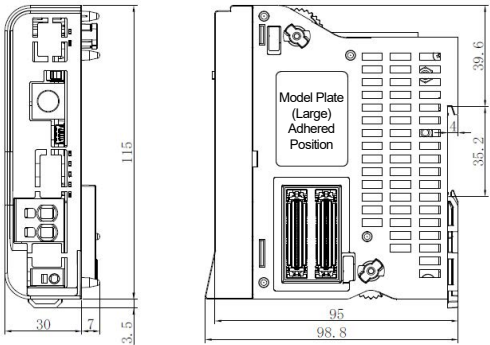


(2) EC Connection Unit

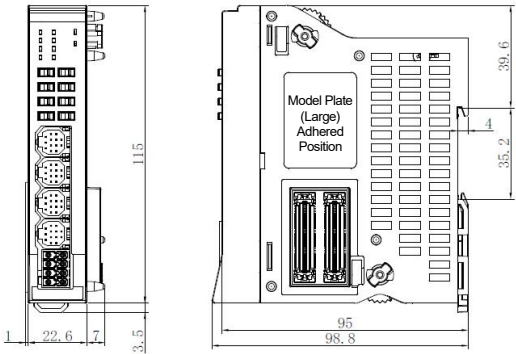


External Dimensions

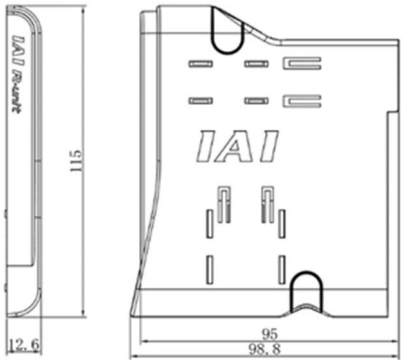
Item	Specification
1. EC Gateway Unit	
External Dimensions	30W × 115H × 95D [mm]
Mass	Approx. 135g



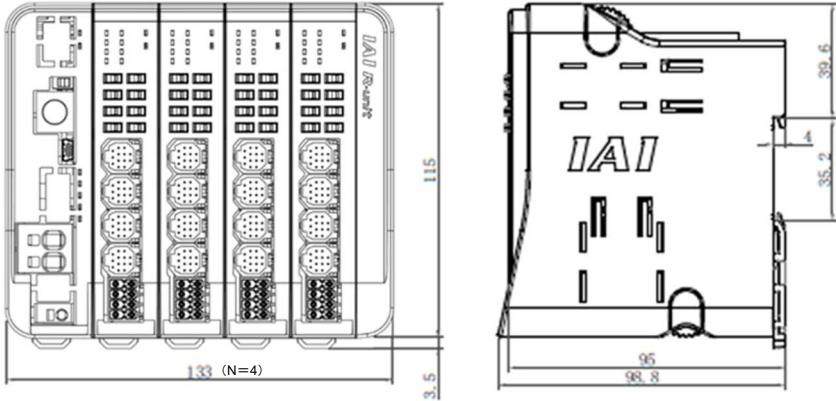
Item	Specification
2. EC Connection Unit	
External Dimensions	22.6W × 115H × 95D [mm]
Mass	Approx. 114g



Item	Specification
3. REC Terminal Unit	
External Dimensions	12.6W × 115H × 95D [mm]
Mass	Approx. 48g



Item	Specification
4. Linking Units	
External Dimensions	(42.6 + 22.6 × N) W × 115H × 95D [mm] N: Total number of EC Connection Units
Mass	Approx. (183 + 114 × N) g N: Number of EC Connection Units



Installation Environment

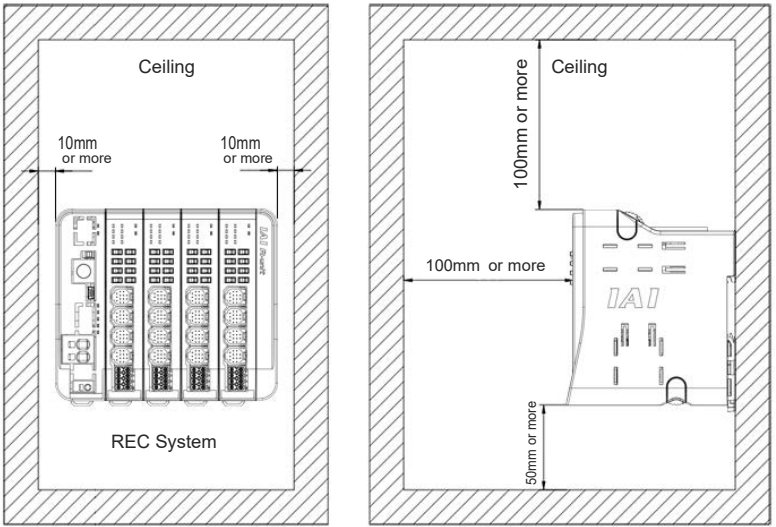
This product is capable for use in the environment of pollution degree 2¹ or equivalent.
*1 Pollution Degree 2: Environment that may cause non-conductive pollution or transient conductive pollution by frost (IEC60664-1)

1. Installation Environment
- Do not use this product in the following environment.
- Location where the ambient temperature is out of the range between 0 and 55°C
 - Location where condensation occurs due to abrupt temperature changes
 - Location where relative humidity is out of the range between 5%RH and 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]
 - Place with an altitude of 1,000m or more
- 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
- The storage and preservation environment should comply with the same standards as those for the installation environment.
- In particular, when the machine is to be stored for a long time, pay close attention to environmental conditions so that no condensation forms. Unless specially specified, moisture absorber protection is not included in the package when the machine is delivered. In the case that the machine is to be stored and preserved in an environment where condensation is anticipated, take the condensation preventive measures from outside of the entire package, or directly after opening the package.

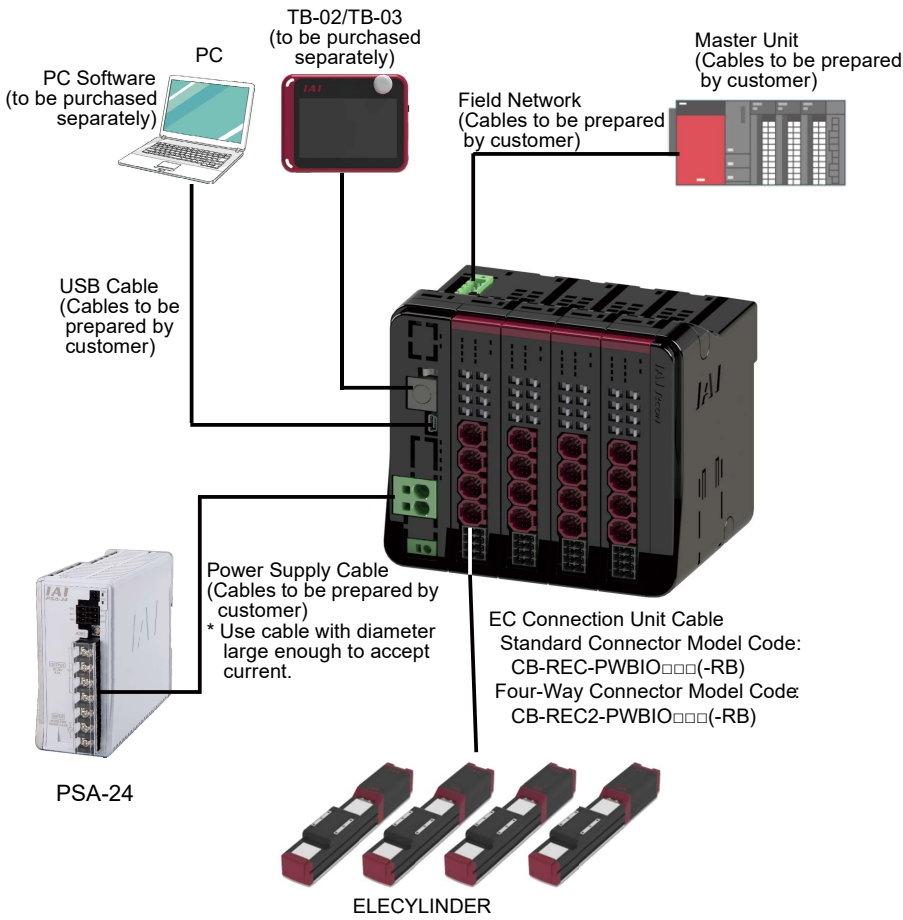
Installation and Noise Elimination

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 (2mm²: AWG 14, Copper Wire) 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] Consider whether to attach a diode in parallel to the coil or to use a diode built-in type.

Item	Specification	Item	Specification
4. Cooling Factors and Installation			
Follow the specifications and dimensions shown below when you design and build a control board.			
Installation Orientation	Vertical Orientation (Air outlet upwards)	Surrounding Air Temperature	0 to 55°C
Installation Method	Attached on DIN Rails	Grounding	Class D grounding
Installation Condition	See figure below		



Connection to Peripheral Devices (Overall Wiring Diagram)



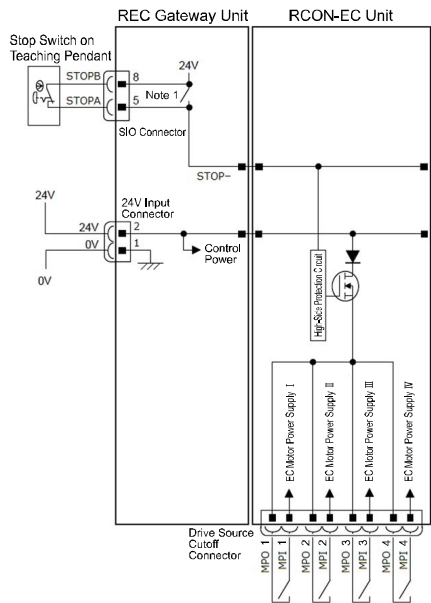
Caution: ELECYLINDER to be connected to the EC connection unit is not capable of use in the single solenoid system. ELECYLINDER may not operate as commanded by a host PLC if the setting is changed to the single solenoid system.

Power Supply and Stop Circuit (Example)

In the diagram below shows a circuit related to REC system drive source cutoff.

For REC system, 24V power is supplied from the EC Gateway Unit, but the circuit related to the drive-source cutoff is on the EC Connection Unit side.

- Each unit of EC Connection Unit possesses a drive cutoff circuit by semiconductor gathered for the four axes, and the motor power source is to be cut off by the stop switch on the teaching pendant. Also, the drive source cutoff circuit by semiconductor possesses features to detect the over current and to limit the in-rush current.
- Each driver unit possesses an interface (Drive source cutoff connector: MPI/MPO) available for external drive source cutoff prepared for each axis.



Note 1 If nothing is connected to the SIO connector, short-circuit should be made inside the controller.

- Note**
- When externally shutting off the motor drive source, connect a contact such as a relay to the wiring between the MPI* and MPO* terminals.
 - When supplying power by turning ON/OFF 24 VDC, leave 0 V connected and supply/cut off +24 V.
 - Make sure to have the right cable diameter and length that would not have the voltage dropped at the wiring of the drive cutoff connector.
 - There may be a case of an alarm being generated because of the voltage drop at the controller power supply due to inappropriate cable diameter or length. In such a case, adjust the output voltage of the power supply to keep 24V for the supply to the controller.

Warning : Note that the stop switch on the teaching pendant cannot have a stop for the system side even though it can have a stop for all the actuators connected to REC System.

Current Amperage

The current amperage should be divided into the control power capacity and motor power capacity. Each power supply should be input from the 24V power supply connector on the EC Gateway Unit. The necessary capacity of the current amperage should be figured out by [Total of control power capacity of used units] + [Total of motor power capacity of used actuators].

It is necessary that the rated current of 24V power supply satisfies the rated current of the motor power capacity and the peak current satisfies the maximum current of the motor power capacity. However, when several axes get connected, unless all the actuators operates at the same time, the rated current and maximum current would not flow at the same time, thus the calculation should not be simply the total of all the axes.

The specifications related to the power capacities should be as shown below.

Item	Specification			Supply Current
Power Supply Voltage	24V DC $\pm 10\%$			
Control Power Capacity (for one unit)	EC Gateway Unit (Terminal Unit Included)			0.8A
	EC Connection Unit			0.1A
Control Power capacity (1 axis per ELECYLINDER)	24V Type ELECYLINDER	Brake: Not equipped		0.3A
		Brake: Equipped		0.5A
	200V Type ELECYLINDER (Per 1 axis)	Brake: Not equipped		0.32A
		Brake: Equipped		0.54A
Motor power capacity (1 axis per ELECYLINDER)	Motor type		Rated Current	Max. current
	35P/42P/56P	When power-saving setting inactivated	2.3A	3.9A
		When power-saving setting activated	—	1.9A
	28P	S3□/RR3□ Type	—	1.9A
		Slim and Small Type	—	1.7A
In-Rush Current (Note)	40A (with in-rush current limiting circuit)			

Restrictions in Unit Connection

(1) Number of EC Connection Units to Connect

The maximum number of control axes to be connected to one EC Gateway Unit should be 16 axes. From the structural perspective of the unit, it can accept connection without any upper limit, but make it accept 4 units (for 16 axes) of EC Connection Units at the maximum. (One unit occupies domains and axis numbers for four axes regardless of whether to connect ELECYLINDER to the units or not.) Have two EC Gateway Units or more in the construction when it is necessary to control 17 axes or more of actuators.

(2) Current Restrictions

Shown below is the restricting values of current for selecting calculation.

Item	Restricting Value of Current for Selecting Calculation
Control Power Supply (CP)	9.0A or less
Motor Power Supply (MP)	37.5A or less

Shown below is some examples for calculation.

[Control Power Supply] * EC Gateway Unit should be excluded from the target for calculation.

For 24V type ELECYLINDER (Brake: Equipped) $\times 16$ axes: $0.5A \times 16$ axes = 8.0A

EC Connection Unit $0.1A \times 4 = 0.4A$ 8.4A total => OK

[Motor Power Supply]

For 24V type 35P ELECYLINDER (power saving setting disabled) $\times 16$ axes:

Rated current $2.3A \times 16$ axes = 36.8A => OK

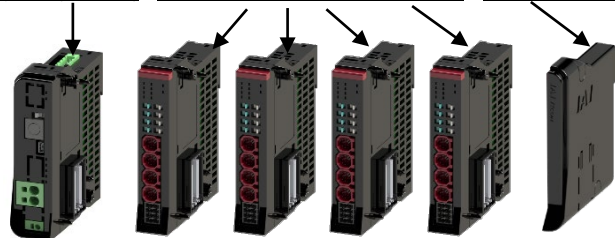
Note For the models with no description of the rated current for the motor current amperage, calculate with the maximum current.

Note When the operation pattern is to have all the axes operate acceleration and deceleration only and the operation duty is 100%, it is necessary that the calculation is done with the maximum current for the motor power supply.

Linking Units

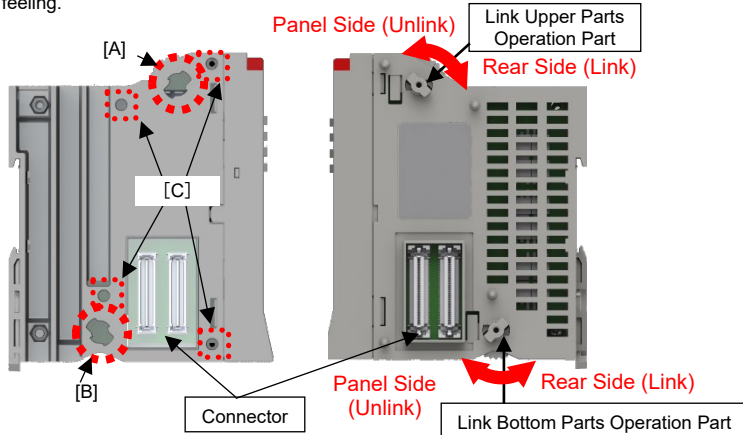
REC system is capable to link 4 units (for 16 axes) at the maximum with the EC Gateway Unit allocated at the left end as the interface for the field network connection and freely construct with combination of multiple EC Connection Units. There is an order of allocation for each unit.

EC Gateway Unit (Left End) — EC Connection Unit (No Order among) — REC Terminal Unit (Right End)



Each unit should be linked in the process shown below. (Make sure it gets linked before connected to the DIN rails.)

- Twist the operation parts of the link upper parts and the link bottom parts towards the panel side and place them at the panel side end.
- Adjust the position of two units so the link upper parts come to Point [A], link bottom parts to [B] and the four positioning bosses to [C] and all the six points fit to each other.
- Once positioning is done, firmly insert the connectors at two points.
- Twist the operation parts of the link upper parts and the link bottom parts towards the rear side till they make click feeling.

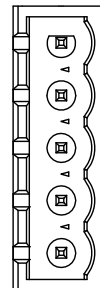


Field Network Wirings and Settings

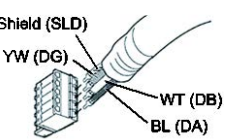
The field network connector is allocated on the top of the EC Gateway Unit. Refer to [Names for Each Part].

1. CC-Link (REC-GW-CC)

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

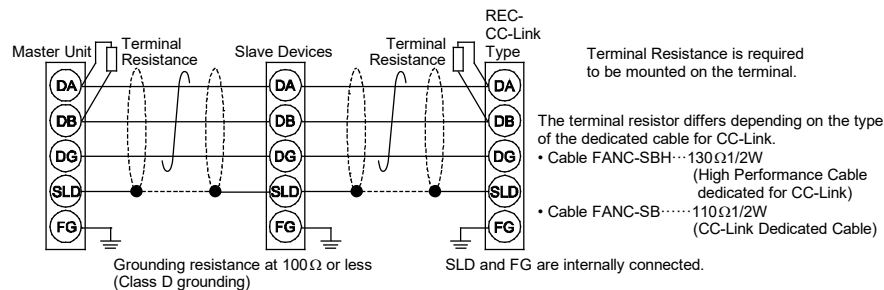


Top View of Connector on EC Gateway Unit side



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

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 Ground	
4	SLD	Connect the shield of the shielded cable (Connected inside to 5-pin FG and control power supply connector 1-pin FG)	
5	FG	Frame Ground (Connected inside to 4-pin SLD and control power supply connector 1-pin FG)	

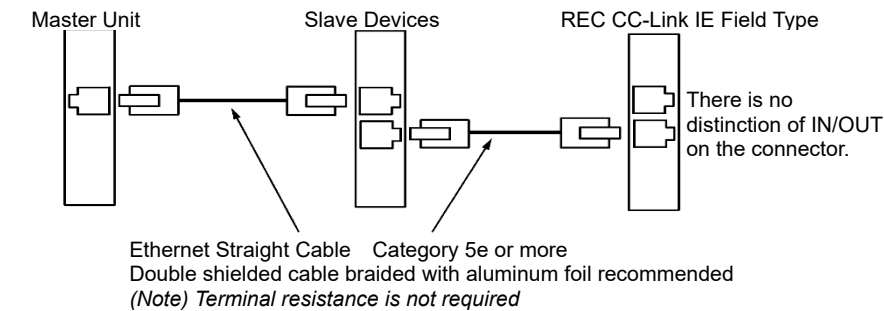


2. CC-Link IE Field (REC-GW-CIE)

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

Connector Name	CC-Link IE Field Connector	Remarks
Cable Side	Ethernet ANSI/TIA/EIA-568-B Category 5e and above 8P8C modular plug equipped with shield (RJ-45)	Please prepare separately
Controller Side	Ethernet ANSI/TIA/EIA-568-B Category 5e and above 8P8C modular Jack equipped with shield (RJ-45)	

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-	

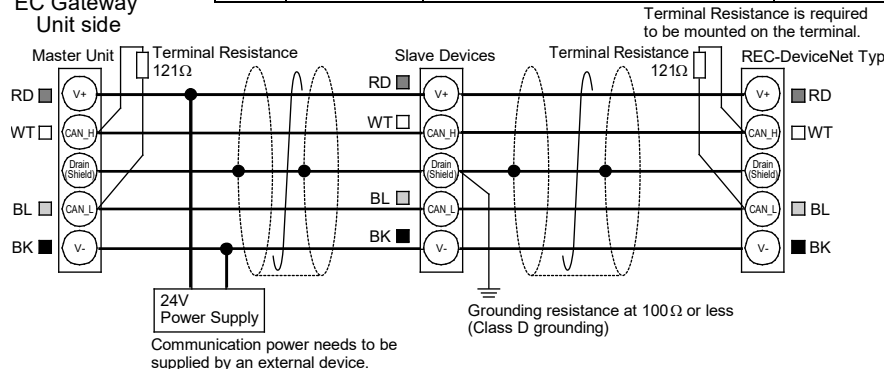


3. DeviceNet (REC-GW-DV)

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

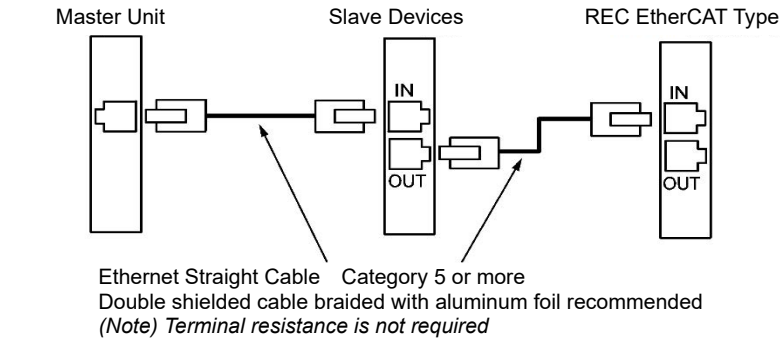
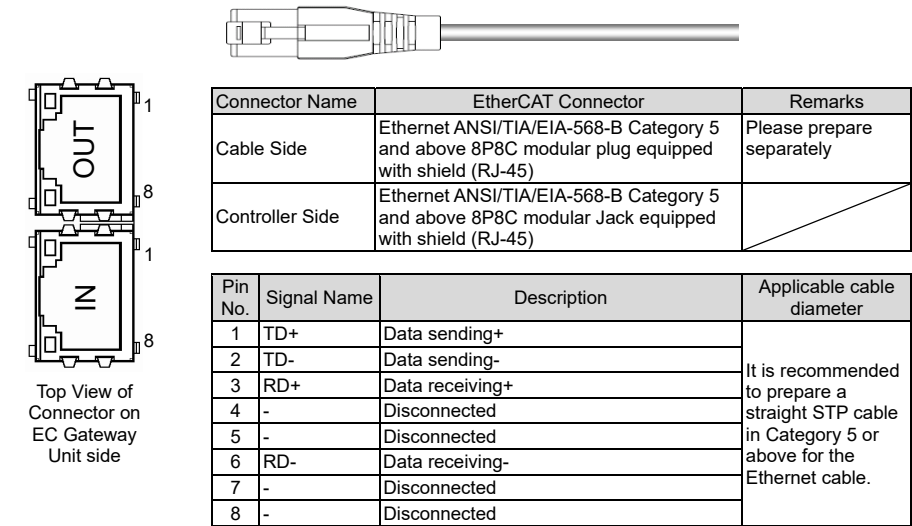
Connector Name	DeviceNet Connector	Remarks
Cable Side	MSTB2.5/5-STF-5.08 AU M (Manufactured by PHOENIX CONTACT)	Enclosed in standard package
Controller Side	MSTB2.5/5-GF-5.08 AU (Manufactured by PHOENIX CONTACT)	

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	
4	CAN H (WT)	Communication Data High Side	
5	V+ (RD)	Power Supply Cable Positive Side	



4. EtherCAT (REC-GW-EC)

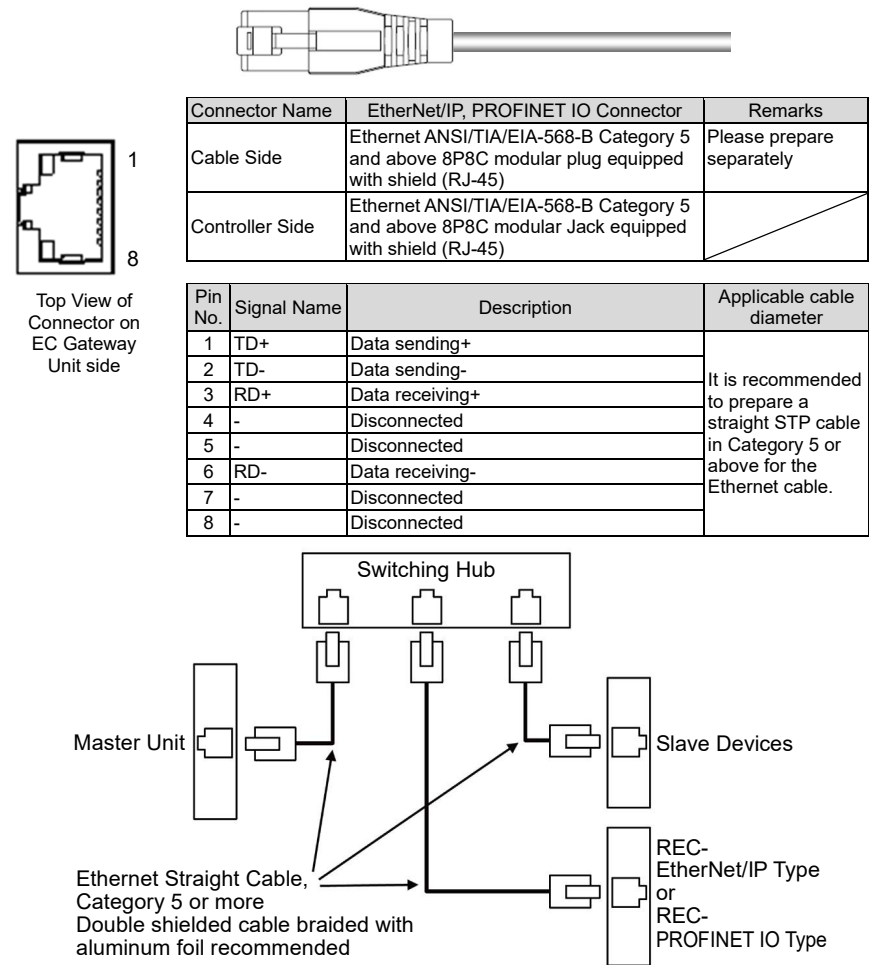
Refer to the instruction manuals for the master unit and PLC to connect for the details.



5. EtherNet/IP (REC-GW-EP)

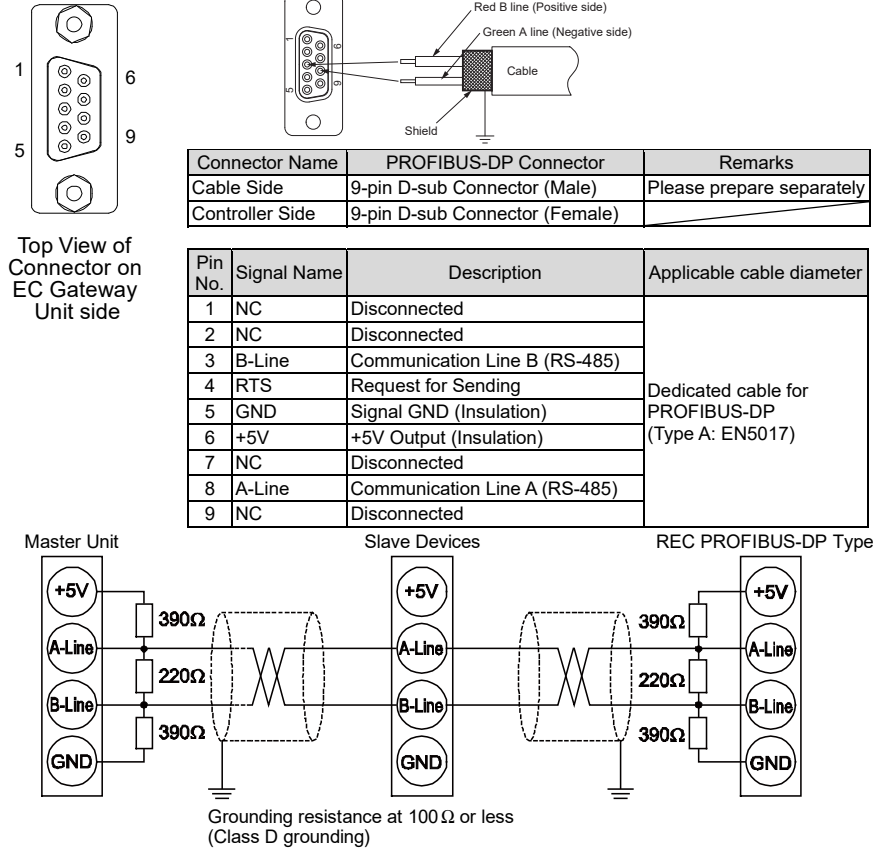
7. PROFINET IO (REC-GW-PRT)

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



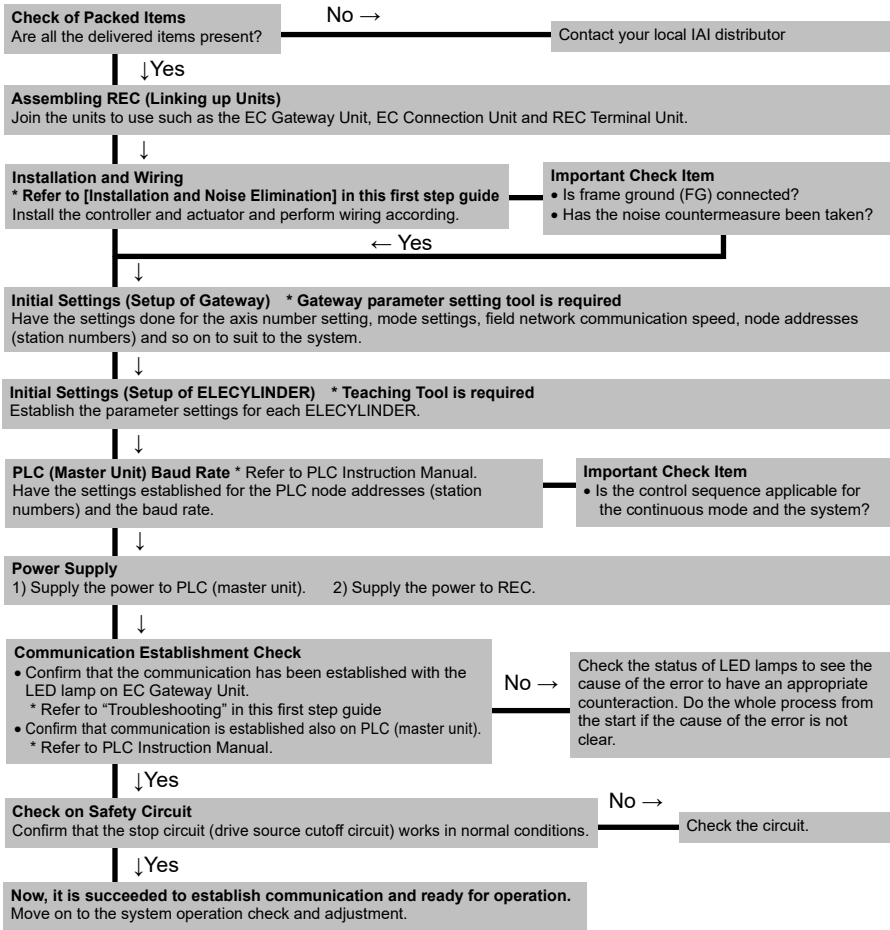
6. PROFIBUS-DP (REC-GW-PR)

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



Starting Procedures

When using this product for the first time, make sure to avoid mistakes and incorrect wiring by referring to the procedure below.
In this section, explains how to start up especially for REC system. Follow an instruction manual for each device for how to link to other devices, controllers and actuators that are linked in the network.



Troubleshooting (LED Display)

On REC Gateway Unit, there are the monitor LEDs for the field network and communication.
You can confirm the communication establishment and also communication errors on these LEDs.
Refer to [Names for Each Part] for the position and name of each LED lamp.

1. LED Display on EC Gateway Unit

Panel Display	Color	Status	Explanation
T RUN	GN	ILLuminating	Inside bus communication in normal conditions
		FLashing	Waiting for initializing communication
SYS	OR	ILLuminating	Inside bus communication in error
		ILLuminating	Operating in normal conditions
STOP	RD	ILLuminating	Stop switch on teaching pendant valid (while pressed and held)
		OFF	Stop switch on teaching pendant invalid
MODE	GN	ILLuminating	In AUTO (automatic operation) Mode
		OFF	In MANU (manual operation) Mode
C ERR	OR	ILLuminating	Error occurred in field network
		OFF	Field network operating in normal conditions
STATUS 0	-	-	Differs depending on field network (Refer to [Field Network Communication Conditions from 1 to 7])
STATUS 1	-	-	Differs depending on field network (Refer to [Field Network Communication Conditions from 1 to 7])

2. LED Display on EC Connection Unit

Panel Display	Color	Status	Explanation
T RUN	GN	ILLuminating	Inside bus communication in normal conditions
		FLashing	Waiting for initializing communication, Initializing communication failed
SYS	OR	ILLuminating	Inside bus communication in error
		ILLuminating	Servo ON
Forward End	GN	OFF	Servo OFF
		ILLuminating	Alarm being generated, stop switch on teaching pendant valid (while pressed and held)
Backward End	GN	ILLuminating	Movement to forward end completed
		OFF	Stop

[Field Network Communication Conditions]

1. CC-Link (REC-GW-CC)

Name	Panel Display	Color	Status	Explanation
STATUS 0	RUN	GN	ILLuminating	Succeeded in refresh and polling reception after getting into network, or succeeded in refresh reception
			OFF	1. Not in network 2. Carrier detected for channel 3. Timeover 4. In hardware reset
STATUS 1	ERR	OR	ILLuminating	1. CRC Error 2. Station number setting error at reset release (65 stations or more including 0 or occupied station number) 3. Baud rate setting error at reset release
			FLashing (Flash for 0.4sec)	Numbers changed from station numbers and baud rate setting numbers at reset release
			OFF	1. Communication in normal conditions 2. In hardware reset

2. CC-Link IE Field (REC-GW-CIE)

Name	Panel Display	Color	Status	Explanation
STATUS 0	MS	GN	Illuminating	Operation in normal conditions
			OFF	Hardware error occurred
		OR	Illuminating	Error being occurred
			OFF	Operation in normal conditions
STATUS 1	NS	GN	Illuminating	Cyclic transmission in process
			Flashing	Cyclic transmission paused
			OFF	Cyclic transmission not conducted, parallel off
		OR	Illuminating	Received data in error
			OFF	Received data in normal conditions
LINK	-	GN	Illuminating	Linkup in process
			OFF	Link-down in process
L.ER	-	OR	Illuminating	Received data in error
			OFF	Received data in normal conditions

3. DeviceNet (REC-GW-DV)

Name	Panel Display	Color	Status	Explanation
STATUS 0	MS	GN	Illuminating	Operation in normal conditions
			Flashing (1Hz)	There is no configuration information, or not complete, device trial run necessary
		OR	Illuminating	Malfunction with no opportunity for recovery
			Flashing (1Hz)	Malfunction with opportunity for recovery
		GN/OR	Illuminated by turns	Self - diagnosis
STATUS 1	NS	GN	Illuminating	Online, Connection established
			Flashing (1Hz)	Online, No connection established
		OR	Illuminating	Critical Error
			Flashing (1Hz)	Connection Timeout
		GN/OR	Illuminated by turns	Self - diagnosis
			OFF	Offline

4. EtherCAT (REC-GW-EC)

Name	Panel Display	Color	Status	Explanation
STATUS 0	ERR	OR	Illuminating	Communication component (module) error
			Flashing (continuously)	Construction information (setting) error ON: 200ms / OFF: 200ms
			Flashing (twice)	Communication part circuit error ON: 200ms × 2 / OFF: 1000ms
			OFF	In initializing process
STATUS 1	RUN	GN	Illuminating	In normal operation (OPERATION)
			Flashing (continuously)	In PRE-OPERATION condition ON: 200ms / OFF: 200ms
			Flashing (once)	In SAFE-OPERATION condition ON: 200ms / OFF: 1000ms
		OR	Flashing	Communication component (module) error

5. EtherNet/IP (REC-GW-EP)

Name	Panel Display	Color	Status	Explanation
STATUS 0	MS	GN	Illuminating	Operation in normal conditions
			Flashing	There is no configuration information, or scanner in idol condition
		OR	Illuminating	Malfunction with no opportunity for recovery
			Flashing	Malfunction with opportunity for recovery
STATUS 1	NS	GN	Illuminating	Online, connection established
			Flashing	Online, No connection established
		OR	Illuminating	Critical error, IP address duplicated error
			Flashing	Connection Timeout
		GN/OR	OFF	No IP address

6. PROFIBUS-DP (REC-GW-PR)

Name	Panel Display	Color	Status	Explanation
STATUS 0	MS	GN	Illuminating	Initialization completed
			Flashing	Initialization completed, there is a diagnosis event
		OR	Illuminating	Exception error
		GN/OR	OFF	Not initialized
STATUS 1	NS	GN	Illuminating	Online, data exchange
			Flashing	Online, cleared
		OR	Illuminating	Parameter error
			Flashing	Configuration error
		GN/OR	OFF	Offline

7. PROFINET IO (REC-GW-PRT)

Name	Panel Display	Color	Status	Explanation	
STATUS 0	MS	GN	Illuminating	Communication in normal conditions	
			Flashing (once)	In network diagnosis	
			Flashing (twice)	Engineering tools identifying nodes	
		OR	Illuminating	Exception error occurred (malfunction of hardware)	
			Flashing (once)	Mismatch of setting an actual network construction	
			Flashing (twice)	IP address not established	
			Flashing (three times)	Station name not established	
			Flashing (four times)	Internal error occurred	
			GN/OR	OFF	In initializing process
			STATUS 1	NS	GN
Flashing	Online (STOP)				
GN/OR	OFF	No connection			



IAI Corporation

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

Technical Support available in USA, Europe and China

IAI America, Inc.

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

IAI Industrieroboter GmbH

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

IAI (Shanghai) Co.,Ltd.

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

IAI Robot (Thailand) Co.,Ltd.

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