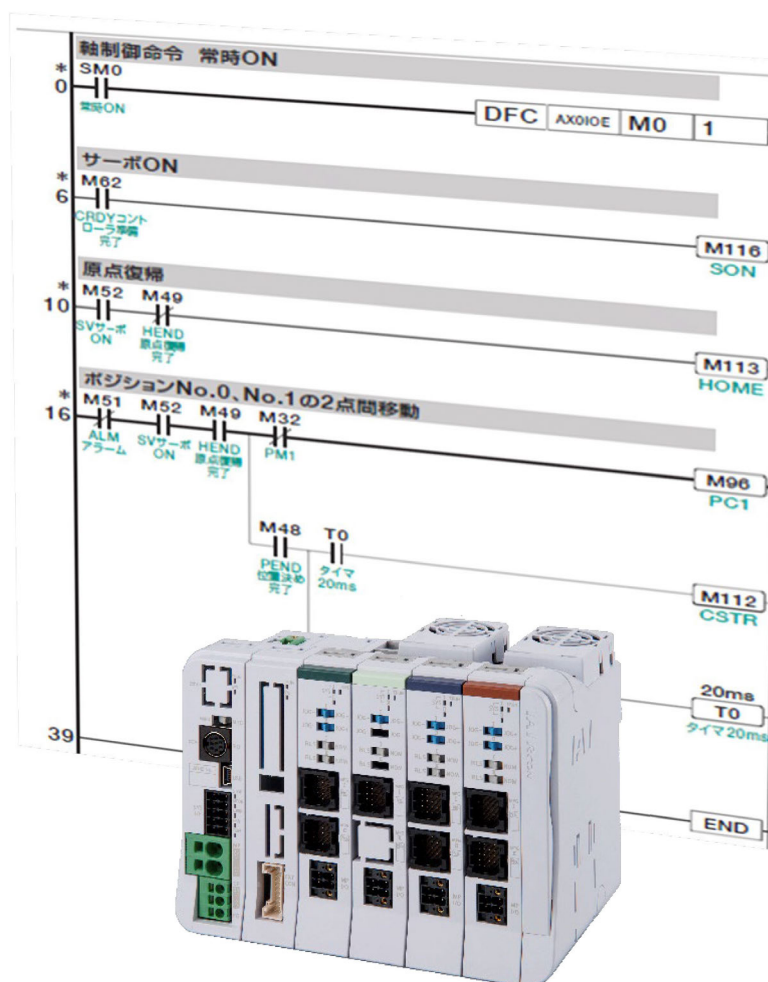


RCON-LC System

Instruction Manual First Edition ME0416-1A



RCON-LC System	Chapter 1
Specifications for unit	Chapter 2
Installation, Wiring, Configuration	Chapter 3
PLC Features	Chapter 4
Warranty	Chapter 5

This instruction manual describes contents regarding RCON-LC System about the PLC features and those different from RCON System. For those not described in this manual should refer to RCON System Instruction Manual (ME0384).

Please Read Before Use

Thank you for purchasing our product.

This instruction manual explains the handling methods, structure and maintenance of this product, providing the information you need in order to use the product safely.

Before using the product, be sure to read this manual and fully understand the contents explained herein to ensure safe use of the product.

The DVD enclosed with the product contains instruction manuals for IAI products. When using the product, refer to the necessary sections of the applicable instruction manual by printing them out or displaying them on a PC.

After reading the instruction manual, keep it in a convenient place so that whoever is handling the product can refer to it quickly when necessary.

[Important]

- This instruction manual is an original document dedicated for this product.
- This product cannot be used in ways not shown in this instruction manual. IAI shall not be liable for any result whatsoever arising from the use of the product in any other way than what is noted in the manual.
- The information contained in this instruction manual is subject to change without notice for the purpose of product improvement.
- If any issues arise regarding the information contained in this instruction manual, contact our customer center or the nearest sales office.
- Use or reproduction of this instruction manual in full or in part without permission is prohibited.
- The company names, names of products and trademarks of each company shown in the text are registered trademarks.

RCON-LC System Instruction Manual Configuration

Product name	Manual name	Control number
RCON-GW(G)/LC(G) Gateway Unit	First Step Guide	ME0384
RCON 24V Driver Unit	First Step Guide	ME0383
RCON 200V Power Supply / Driver Unit	First Step Guide	ME0397
SEL Unit, PIO Unit, PIO/SIO/SCON Extension unit	First Step Guide	ME0393
RCON-LC	Instruction Manual (this document)	ME0416
RCON System	Instruction Manual	ME0384
SCON-CB Controller	SCON-CB/CGB/LC/LCG Instruction Manual	ME0340
PC Software	RCM-101-MW/RCM-101-USB Instruction Manual	ME0155
PC Software	IA-OS First Step Guide For how to operate, refer to the guide feature stored in IA-OS	ME0391
Touch Panel Teaching Pendant	TB-02/02D Instruction Manual	ME0355
Touch Panel Teaching Pendant	TB-03 Instruction Manual	ME0376
24V Power Supply Unit	PSA-24 Instruction Manual	ME0379
LC System Programming Manual	Instruction Manual	ME0329
LC System Ladder Edit Software Manual	Instruction Manual	ME0330

Instruction Manual is available for download in IAI homepage.

URL: www.iai-robot.co.jp/data_dl/CAD_MANUAL/

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Safety Guide

The Safety Guide is intended to permit safe use of the product and thus to prevent risks and property damage.

Be sure to read it before handling the product.

Safety Precautions for Our Products

Common safety precautions for the use of robots in various operations are indicated here.

No.	Operation	Precautions
1	Model Selection	● This product is not intended or designed for applications where high levels of safety are required, and so cannot guarantee that human lives will be protected. Accordingly, do not use it in any of the following applications. (1) Medical equipment used to maintain, control or otherwise affect human life or physical health (2) Mechanisms or machinery designed for the purpose of moving or transporting people (vehicles, railway facilities, aviation facilities etc.) (3) Machinery components essential for safety (safety devices etc.) ● Do not use the product outside the range of the specifications. Otherwise, the product life may be drastically shortened, and product damage or facilities stoppage may occur. ● Do not use it in any of the following environments. (1) Locations with flammable gases, ignitable objects or explosives (2) Locations with potential exposure to radiation (3) Locations with ambient temperature or relative humidity exceeding the specifications range (4) Locations where radiant heat is applied by direct sunlight or other large heat source (5) Locations where condensation occurs due to abrupt temperature changes (6) Locations with corrosive gases (sulfuric acid, hydrochloric acid etc.) (7) Locations exposed to significant amounts of dust, salt or iron powder (8) Locations subject to direct vibration or impact ● For an actuator used in vertical orientation, select a model with brake. If a model without brake is selected, the moving parts may fall when the power is turned OFF, causing accidents such as injury or workpiece damage.

No.	Operation	Precautions
2	Transportation	● When transporting heavy objects, do the work with two or more persons or utilize equipment such as a crane. ● When working with two or more persons, make it clear who is to be in charge and communicate well with each other to ensure safety. ● During transportation, carefully consider the carrying positions, weight, and weight balance, and be careful to avoid collisions or dropping. ● Use appropriate transportation measures for transport. The actuators available for transportation with a crane have eyebolts attached or tapped holes to mount bolts. Follow the instructions in the instruction manual for each model. ● Do not climb onto the package. ● Do not put anything heavy that could deform the package on it. ● When using a crane with capacity of 1t or more, have an operator qualified for crane operation and sling work. ● When using a crane or equivalent equipment, make sure not to suspend loads exceeding the equipment's rated load. ● Use a hook that is suitable for the load. Consider the safety factor of the hook in such factors as shear strength. Also, check to make sure that the hook is free of damage. ● Do not climb on loads suspended from cranes. ● Do not leave loads suspended from cranes for long periods. ● Do not stand under loads suspended from cranes.
3	Storage and Preservation	● For the storage and preservation environment, see the installation environment. However, give especial consideration to the prevention of condensation. ● Store the products so as to prevent them from falling over or down in the case of natural disasters such as earthquakes.
4	Installation and Startup	(1) Installation of robot body and controller, etc. ● Be sure to securely hold and fix the product (including the workpiece). If the product falls over, is dropped, or operates abnormally, it may lead to damage and injury. Also, be equipped for falls over or down due to natural disasters such as earthquakes. ● Do not climb on or put anything on the product. Otherwise, this may lead to accidental falling, injury or damage to the product due to falling objects, product loss of function or performance degradation, or shortening of product life. ● When using the product in any of the places specified below, provide sufficient shielding. (1) Locations where electrical noise is generated (2) Locations with strong electrical or magnetic fields (3) Locations with mains or power lines passing nearby (4) Locations where the product may come in contact with water, oil or chemical spray

No.	Operation	Precautions
		(2) Cable wiring ● Use IAI genuine cables for connecting the actuator and controller, and for the teaching tools. ● Do not scratch cables, bend them forcibly, pull them, coil them, snag them, or place heavy objects on them. Otherwise, this may lead to fire, electric shock, or abnormal operation due to leakage or conduction malfunction. ● Perform the wiring for the product after turning OFF the power to the unit, and avoid miswiring. ● When wiring DC power (+24V), be careful with the positive/negative polarity. Incorrect connections may lead to fire, product breakdown or abnormal operation. ● Connect the cable connector securely so that there is no disconnection or looseness. Otherwise, this may lead to fire, electric shock, or abnormal operation of the product. ● Never cut or reconnect the cables supplied with the product for the purpose of extending or shortening the cable length. Otherwise, this may lead to fire or abnormal operation of the product. (3) Grounding ● Grounding must be performed, in order to prevent electric shocks or electrostatic charge, enhance noise-resistant performance and control unnecessary electromagnetic radiation. ● For the ground terminal on the AC power cable of the controller and the grounding plate in the control panel, be sure to use a twisted pair cable with wire thickness 0.5mm² (AWG20 or equivalent) or more for grounding work. For safeguard grounding, it is necessary to select an appropriate wire diameter for the load. Perform wiring that satisfies the specifications (electrical equipment technical standards). ● Perform Class D grounding (former Class 3 grounding, with ground resistance 100Ω or below).

No.	Operation	Precautions
4	Installation and Startup	(4) Safety measures ● When working with two or more persons, make it clear who is to be in charge and communicate well with each other to ensure safety. ● When the product is operating or in the ready mode, take safety measures (such as the installation of safety/protection fences) so that nobody can enter the area within the robot's movable range. Contact with an operating robot may lead to death or serious injury. ● Be sure to install an emergency stop circuit so that the unit can be stopped immediately in an emergency during operation. ● Take safety measures such that turning the power ON alone will not start up the unit. Otherwise, this may cause the product to start unexpectedly, leading to injury or product damage. ● Take safety measures such that emergency stop cancel or recovery after power failure alone will not start up the unit. Otherwise, this may lead to injury or equipment damage. ● When installation or adjustment operation is to be performed, display signs such as "Operating: No Power ON!" etc. Sudden power input may cause electric shock or injury. ● Take measures to prevent workpieces, etc. from falling during power failures or emergency stop. ● Wear protection gloves, goggles and safety shoes, as necessary, to secure safety. ● Do not insert fingers or objects into the openings in the product. Otherwise, this may lead to injury, electric shock, product damage, or fire. ● When releasing the brake on a vertically oriented actuator, be careful that it does not fall under its own weight, catching the operator's hand or damaging workpieces.
5	Teaching	● When working with two or more persons, make it clear who is to be in charge and communicate well with each other to ensure safety. ● Perform teaching operation from outside the safety/protection fence, if possible. If operation must be performed within the safety/protection fence, prepare "Work Regulations" and make sure that all the workers acknowledge and understand them well. ● When operation is to be performed inside the safety/protection fence, operators should have emergency stop switches available at hand so that the unit can be stopped at any time if abnormalities occur. ● When operation is to be performed inside the safety/protection fence, have a monitor standing by in addition to the operator(s) so that the unit can be stopped at any time if abnormalities occur. Also, keep watch on the operation so that a third party cannot operate the switches carelessly. ● Place a sign indicating "Operating" where it can be seen easily. ● When releasing the brake on a vertically oriented actuator, be careful that it does not fall under its own weight, catching the operator's hand or damaging workpieces. * Safety/protection fence: If there is no safety/protection fence, the movable range should be indicated.

No.	Operation	Precautions
6	Trial Operation	● When working with two or more persons, make it clear who is to be in charge and communicate well with each other to ensure safety. ● After teaching or programming, carry out trial operation step by step before switching to automatic operation. ● When trial operation is to be performed inside the safety/protection fence, use the same work procedure, determined in advance, as teaching operation. ● Be sure to confirm program operation at safe speeds. Otherwise, this may lead to accidents due to unexpected motion caused by program error, etc. ● Do not touch the terminal block or any of the various setting switches while the equipment is live. Otherwise, this may lead to electric shock or abnormal operation.
7	Automatic Operation	● Check before starting automatic operation or restarting after operation stop that there is nobody within the safety/protection fence. ● Before starting automatic operation, make sure that all peripheral equipment is ready for automatic operation and that there is no alarm indication. ● Be sure to start automatic operation from outside the safety/protection fence. ● If the product produces abnormal heat, smoke, odor, or noise, immediately stop it and turn OFF the power switch. Otherwise, this may lead to fire or damage to the product. ● When a power failure occurs, turn OFF the power switch. Otherwise, this may lead to injury or product damage due to unexpected product motion during recovery from the power failure.

No.	Operation	Precautions
8	Maintenance and Inspection	● When working with two or more persons, make it clear who is to be in charge and communicate well with each other to ensure safety. ● Perform the work outside the safety/protection fence, if possible. If operation must be performed within the safety/protection fence, prepare "Work Regulations" and make sure that all the workers acknowledge and understand them well. ● When work is to be performed inside the safety/protection fence, turn OFF the power switch as a rule. ● When operation is to be performed inside the safety/protection fence, operators should have emergency stop switches available at hand so that the unit can be stopped at any time if abnormalities occur. ● When operation is to be performed inside the safety/protection fence, have a monitor standing by in addition to the operator(s) so that the unit can be stopped at any time if abnormalities occur. Also, keep watch on the operation so that a third party cannot operate the switches carelessly. ● Place a sign indicating "Operating" where it can be seen easily. ● For the grease for the guide or ball screw, use appropriate grease according to the Instruction Manual for each model. ● Do not perform dielectric strength testing. Otherwise, this may lead to damage to the product. ● When releasing the brake on a vertically oriented actuator, be careful that it does not fall under its own weight, catching the operator's hand or damaging workpieces. ● The slider or rod may be misaligned from the stop position if the servo is turned OFF. Avoid injury or damage due to unnecessary operation. ● Be careful not to lose the cover or any removed screws, and be sure to return the product to the original condition after maintenance and inspection work. Otherwise, this may lead to product damage or injury due to incomplete mounting. * Safety/protection fence: If there is no safety/protection fence, the movable range should be indicated.
9	Modification and Disassembly	● Do not modify, disassemble/assemble, or use maintenance parts not specified on your own discretion.
10	Disposal	● When the product exceeds its useful life or is no longer needed, dispose of it properly as industrial waste. ● When removing the actuator for disposal, avoid dropping components when detaching screws. ● Do not put the product in a fire when disposing of it. The product may rupture or generate toxic gases.
11	Other	● If you are equipped with a medical device such as a pacemaker, do not approach the product or its wiring, as the device may be affected. ● See the Overseas Standard Compliance Manual to check compliance with overseas standards if necessary. ● For the handling of actuators and controllers, follow the dedicated instruction manual of each unit to ensure safety.

Precaution Indications

The safety precautions are divided into "Danger", "Warning", "Caution" and "Notice" according to the warning level, as follows, and described in the Instruction Manual for each model.

Level	Degree of risk to persons and property	Symbol
Danger	This indicates an imminently hazardous situation which, if the product is not handled correctly, will result in death or serious injury.	 Danger
Warning	This indicates a potentially hazardous situation which, if the product is not handled correctly, could result in death or serious injury.	 Warning
Caution	This indicates a potentially hazardous situation which, if the product is not handled correctly, may result in minor injury or property damage.	 Caution
Notice	This indicates a situation in which, while injury is not a likely result, the precautions should be observed in order to use the product appropriately.	 Notice

Description

In this manual, descriptions are expressed as shown below.

The system with the master unit constructed with RCON-GW/GWG is described as "RCON System".

The system with the master unit constructed with RCON-LC/LCG is described as "RCON-LC System".

Precautions for Handling

1. Make sure to follow the usage condition, environment and specification range of the product.
In case it is not secured, it may cause a drop in performance or malfunction of the product.
2. Use the correct teaching tool.
Refer to the following item and use compatible tools for PC software and teaching pendant usable for this controller.
[Refer to 1.7 Used Tools]
3. Back up data in order to be prepared for a breakdown.
Non-volatile memory is used for backup memory of this controller. Registered position data and parameters are written in this memory and backed up. Therefore, these data will normally not be lost even if the power is turned off. However, be sure to save the latest data to enable a quick recovery process in case this controller needs to be replaced with a substitute due to breakdown, etc.

How to save
 - (1) Save to an external memory or a hard disk using Teaching Tool
 - (2) Record position table and parameters in writing

4. External communication ports

The LC unit has 2 types of communication port.

- SIO port (RS485 round connector)
- USB port (USB mini-B connector)

Do not connect multiple ports and perform communication simultaneously.

This may result in following errors:

- Occurrence of communication error
- Occurrence of unpredictable operation



5. Other Remarks

Make sure to read also the caution notes in RCON System Instruction Manual.

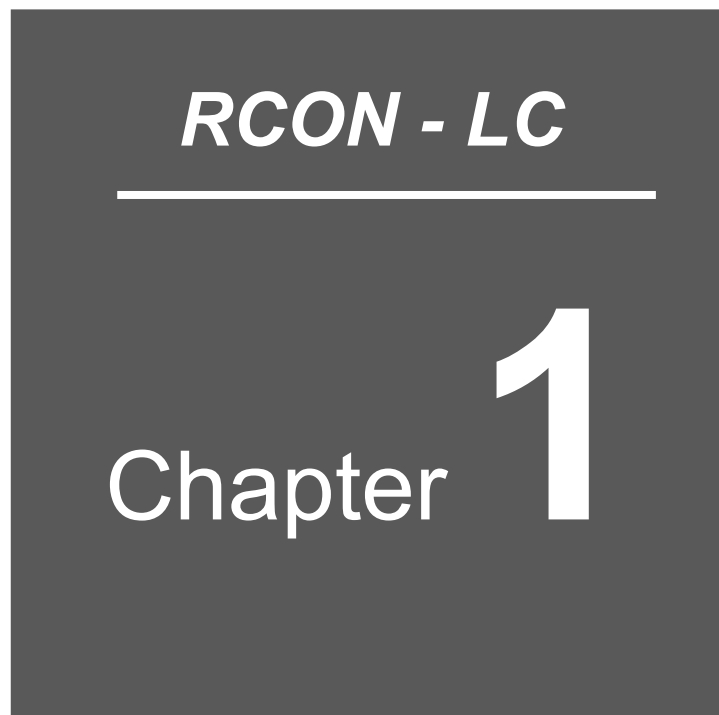
Operation in wrong manner could cause injury or damage on the product or equipment.

International Standard Compliance

This product complies with the following overseas standards.

Refer to the Overseas Standard Compliance Manual (ME0287) for more detailed information.

RoHS Directive	CE Marking	UL Certification
○	Not Planned to Comply	Not Planned to Comply



RCON-LC System

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1.1 Overview

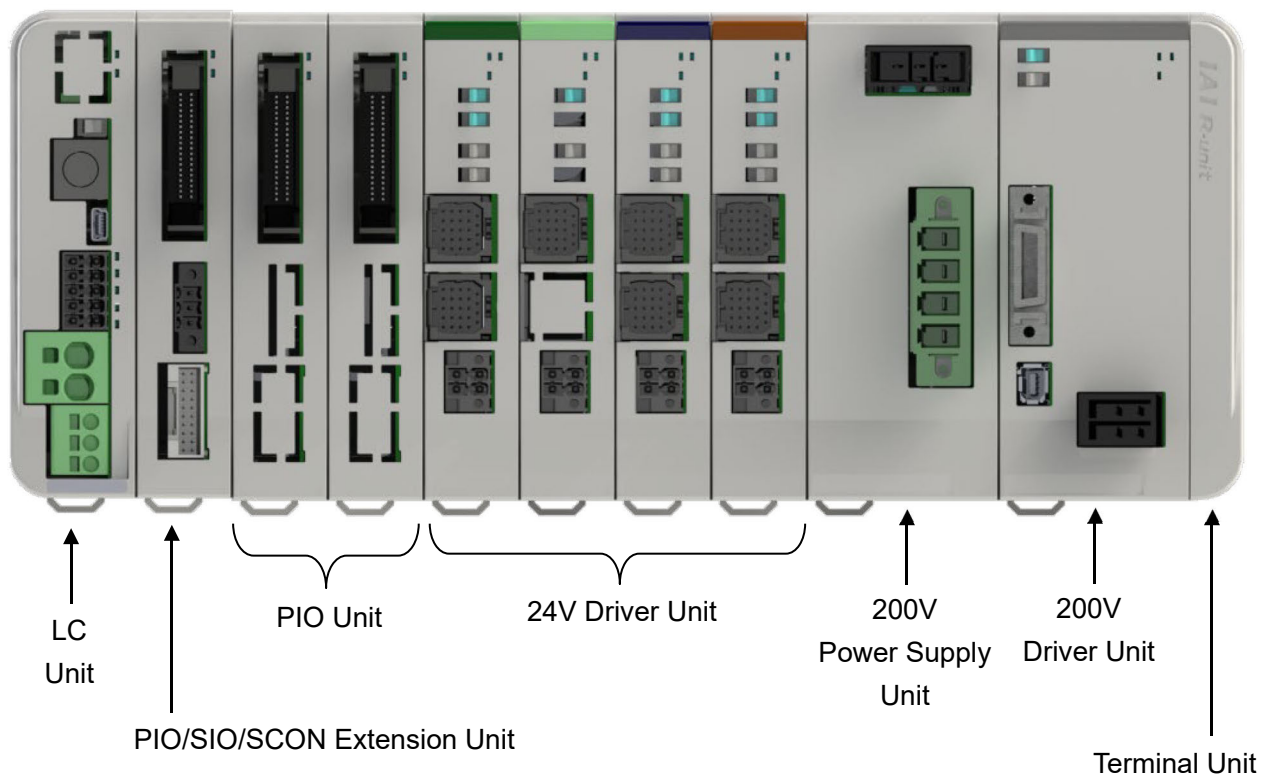
RCON-LC System is a controller that is capable of the ladder control to an actuator connected to a RCON System driver unit.

16 axis at the maximum can be controlled by constructing free combinations of the gateway unit which is an interface for the field network connectivity (hereinafter called LC Unit) and each type of driver unit.

It is available to connect five types of driver units, for RCP series, high-thrust RCP series, RCA series, RDC series and for 200V servomotor. Also, by using PIO/SIO/SCON extension unit or SCON extension unit, it is available to connect to SCON-CB of the RCON connection type.

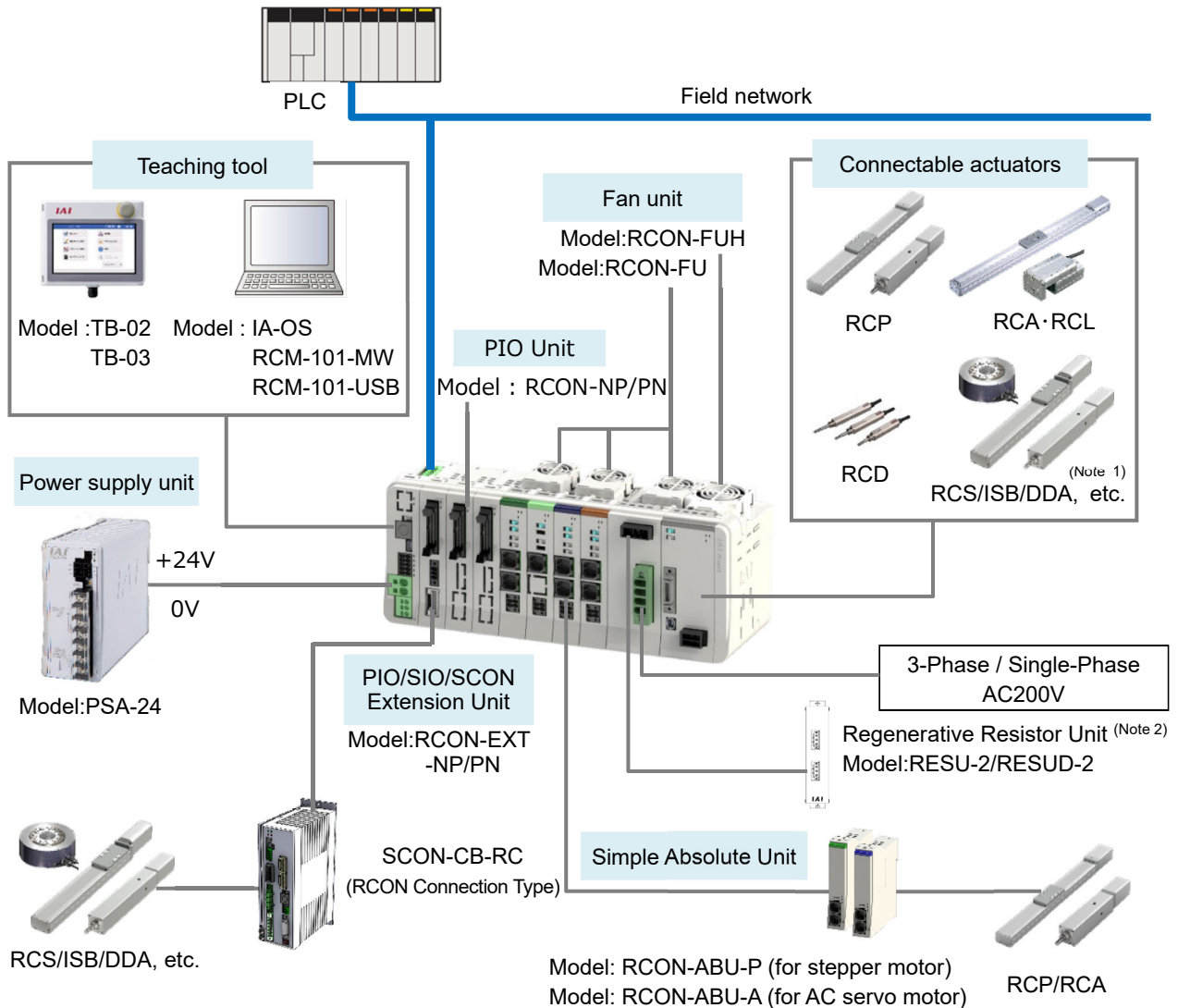
Parallel I/O is capable of using 128 points of input and 128 points of output at the maximum by connecting PIO/ISO/SCON extension unit or PIO unit. Serial communication with RS485 is also available by using PIO/SIO/SCON extension unit.

There are seven types of applicable field networks, CC-Link, CC-Link IE Field, DevicNet, EtherCAT, EtherNet/IP, PROFIBUS-DP and PROFINET IO, and operation is available in six modes (Direct Numerical Indication, Simple Direct, Positioner 1, Positioner 2, Positioner 3 and Positioner 5) regardless of the type of the field network.



1.2 System Configuration

The following shows the system configuration.



Note1: The following 200V servo-motor actuators cannot be connected to the 200V driver units.

- 1) Motor types other than those from 60W to 750W
- 2) Encoder types other than battery-less absolute, incremental, spurious absolute or index absolute type
- 3) For 3-Phase 200V Combination that exceeds 2400W for total wattage of actuators connected to 200V driver unit
- 4) For Single-Phase 200V ... Combination that exceeds 1600W for total wattage of actuators connected to 200V driver unit

- 5) Servo Press types
- 6) SCARA Robot
- 7) CT4 Series
- 8) ZR Series

When (1) to (4) above, use SCON extension unit and SCON-CB.

Also, DD/DDA and LSA-W21S are not applicable for the single-phase 200V.

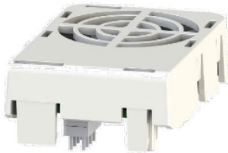
Note 2 There is a built-in regenerative resistor of 60W equipped in 200V driver unit and 200V power supply unit. The regenerative resistor is basically not necessary, but use an external regenerative resistor unit in case of shortage in regenerative resistor. By using the calculator software, the quantity of necessary regenerative resistor units can be figured out.

1.3 Unit list

1.3 Unit list

The units that configure the RCON-LC system are listed below.

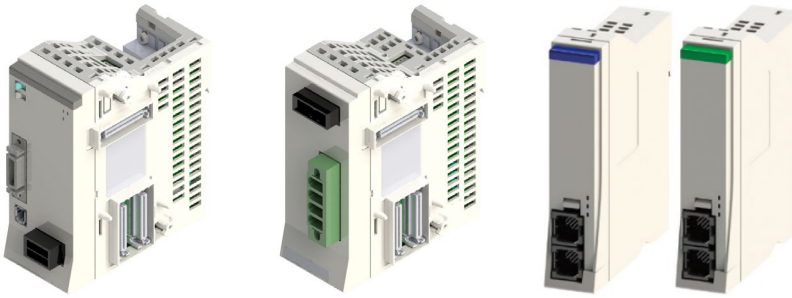
(1) LC unit, Terminal unit, Fan unit

Type	LC unit	Terminal unit (When Using Only 24V Unit)	For 200V Terminal unit
Model code	RCON-LC(G)- *	RCON-GW-TR	RCON-GW-TRS
External			
Maximum number of connected units	1 unit	1 unit	1 unit RCON-GW-TR/ RCON-GW-TRS Either one
Enclosure		Enclosed in LC unit	Enclosed in 200V Power supply unit
Type	Fan unit (Power Supply, Driver for 24V Unit)	Fan unit for 200V driver	
Model code	RCON-FU	RCON-FUH	
External			
Enclosure	Enclosed in 200V Power supply unit	Enclosed in 200V Driver unit	

(2) Driver unit, Power supply unit, Simple absolute unit

The driver unit is available to connect sixteen axes in total to the following units.

Type	Stepper motor	Compatible to stepper motor 56SP/60P/86P	24V AC servo motor	DC brushless motor
Model code	RCON-PC-1 RCON-PC-2	RCON-PCF-1	RCON-AC-1 RCON-AC-2	RCON-DC-1 RCON-DC-2
External				
Max. Axes Quantity	2 axis	1 axis	2 axis	2 axis

Type	200V AC servo motor	200V power supply unit	Simple absolute unit
Model code	RCON-SC-1	RCON-PS2-3	RCON-ABU-A RCON-ABU-P
External			
Max. Axes Quantity	1 axis	—	—
Enclosure	RCON-FUH enclosed RCON-FU enclosed		

* The simple absolute unit is to be connected to the driver unit.

1.3 Unit list

(3) Extension unit

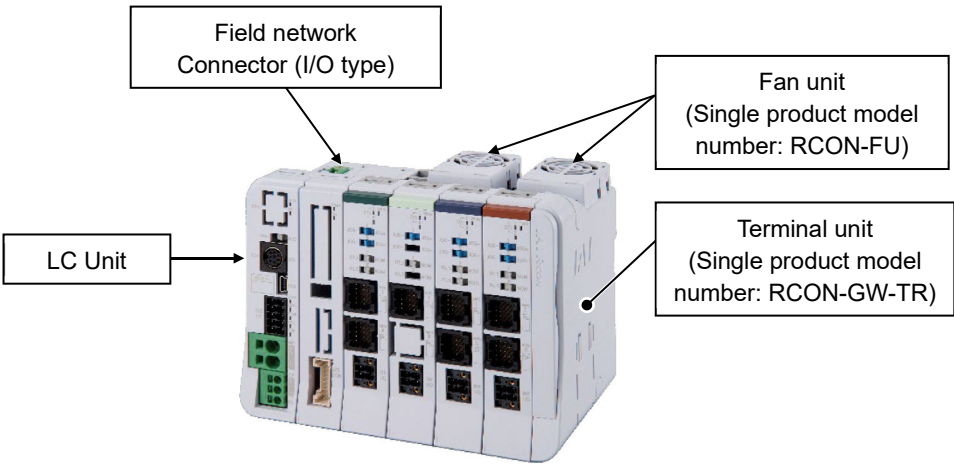
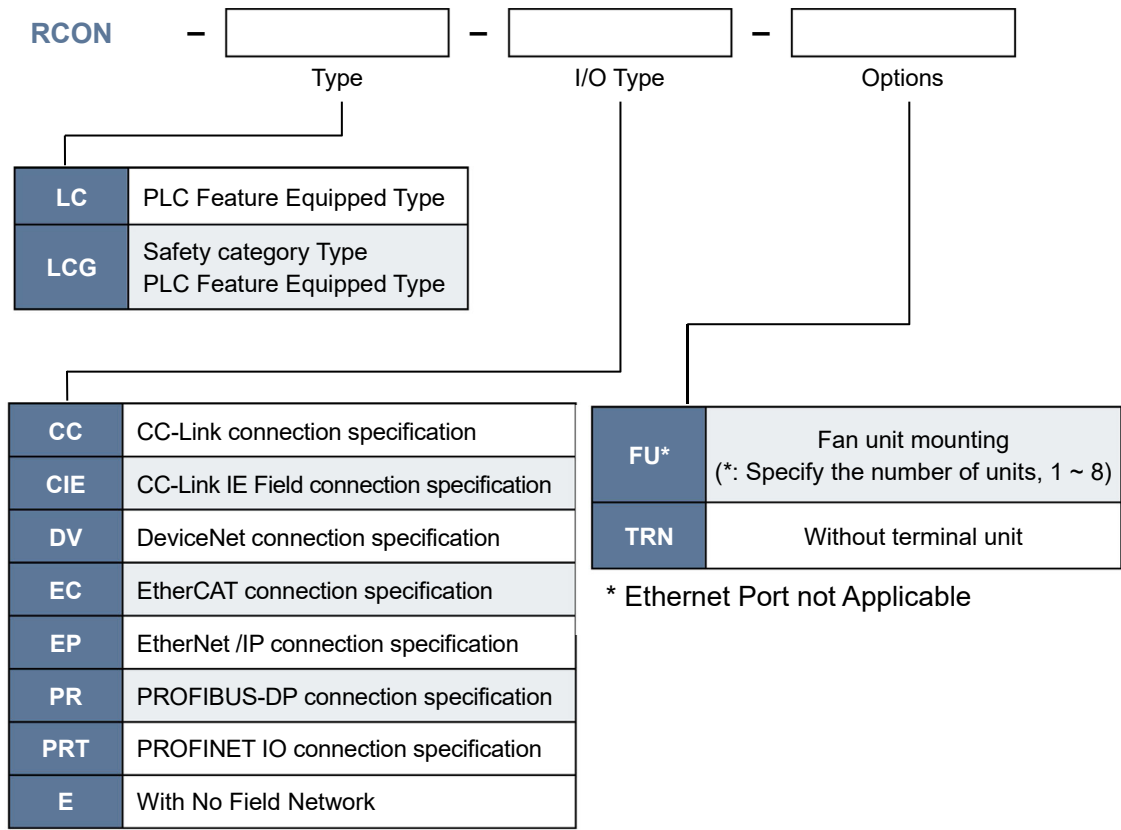
Type	SCON extension unit	PIO/SIO/SCON extension unit	PIO unit
Model code	RCON-EXT	RCON-EXT-NP-* RCON-EXT-PN-*	RCON-NP-* RCON-PN-*
Applications	• SCON connection	• SCON connection • 485 SIO port • PIO extension 16in/16out (NPN or PNP)	• PIO extension 16in/16out (NPN or PNP)
External			
Maximum number of connected units	1 unit PIO/SIO/SCON extension units cannot be connected together.	1 unit SCON extension units cannot be connected together.	8 units 8 units at max. including PIO/SIO/SCON extension units

Unit list

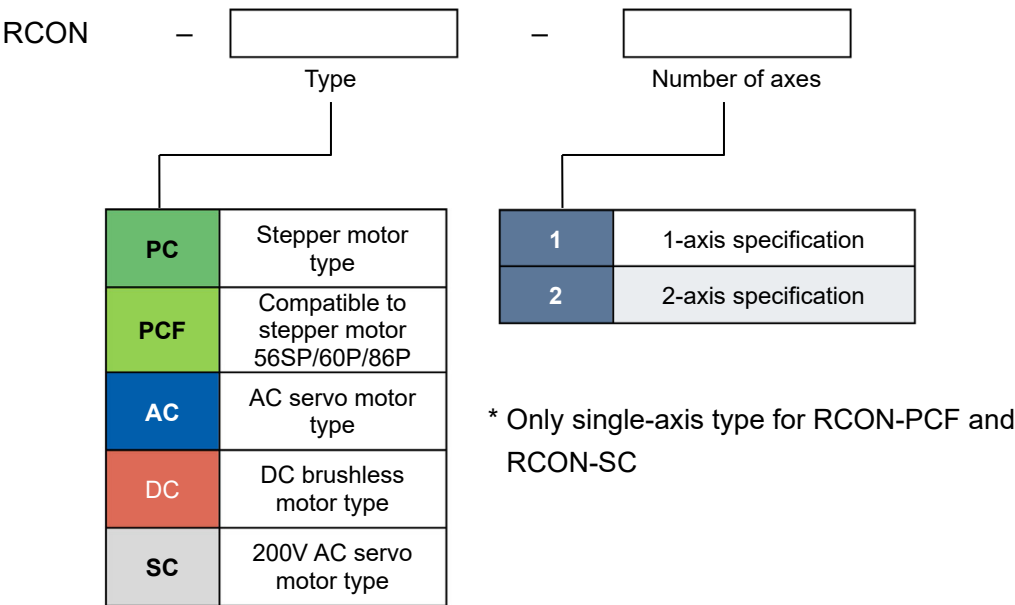
	Product name	Model code
LC unit	CC-Link connection type	RCON-LC(G)-CC
	CC-Link connection type	RCON-LC(G)-CIE
	DeviceNet connection type	RCON-LC(G)-DV
	EtherCAT connection type	RCON-LC(G)-EC
	EtherNet/IP connection type	RCON-LC(G)-EP
	PROFIBUS-DP connection type	RCON-LC(G)-PR
	PROFINET IO connection type	RCON-LC(G)-PRT
	With No Field Network	RCON-LC(G)-E
Driver unit	Stepper motor 1-axis specification	RCON-PC-1
	Stepper motor 2-axis specification	RCON-PC-2
	High-thrust stepper motor 1-axis specification	RCON-PCF-1
	AC servo motor 1-axis specification	RCON-AC-1
	AC servo motor stepper motor type 1-axis specification	RCON-AC-2
	DC brushless motor 1-axis specification	RCON-DC-1
	DC brushless motor 2-axis specification	RCON-DC-2
	200V AC servo motor 1-axis specification	RCON-SC-1
200V power supply unit	Power supply for 200V AC	RCON-PS2-3
Terminal unit	For 24V (enclosed in LC Unit)	RCON-GW-TR
	For 200V (enclosed in 200V power supply unit)	RCON-GW-TRS
SCON expansion unit	For SCON-CB connection	RCON-EXT
PIO/SIO/SCON expansion unit	SCON-CB connection, For PIO / SIO expansion (NPN)	RCON-EXT-NP
	SCON-CB connection, For PIO / SIO expansion (PNP)	RCON-EXT-PN
PIO unit	PIO expansion (NPN)	RCON-NP
	PIO expansion (PNP)	RCON-PN
Simple absolute unit (1-axis specification)	For RCON-PC	RCON-ABU-P
	For RCON-AC	RCON-ABU-A
Fan unit	(number of enclosed unit to be indicated in SEL unit) • For 24V driver unit • For 200V power supply unit (enclosed in 200V power supply unit)	RCON-FU
Fan unit for 200V driver	One unit to be installed for one unit of RCON-SC (enclosed in 200V driver unit)	RCON-FUH

1.4 Model

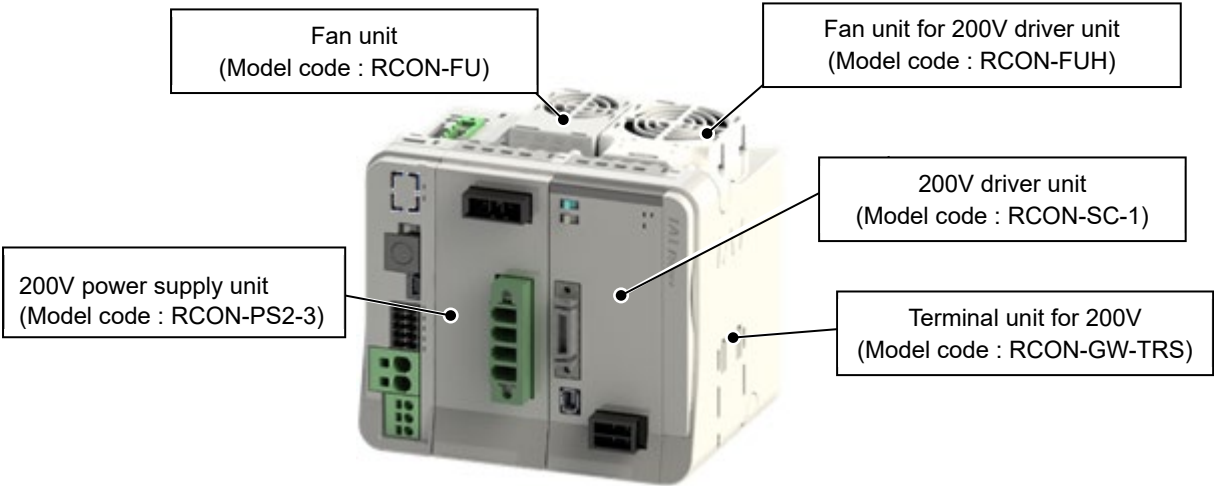
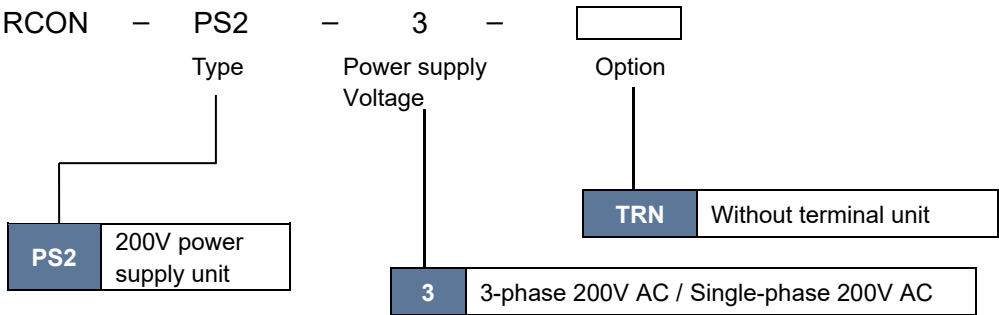
(1) LC Unit



(2) Driver unit



(3) 200V power supply unit



(4) SCON extension unit

RCON – EXT



(5) PIO/SIO/SCON extension unit

RCON – EXT – –

I/O specification

I/O cable length

NP	I/O NPN specification
PN	I/O PNP specification

0	Cable Without
2	2m (Standard)
3	3m
5	5m



(6) PIO unit

RCON – –

I/O specification

I/O cable length

NP	I/O NPN specification
PN	I/O PNP specification

0	Cable Without
2	2m (Standard)
3	3m
5	5m



(7) Simple absolute unit

RCON – ABU –

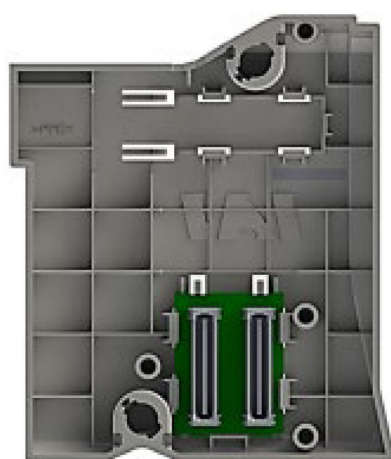
Motor types

P	Stepper motor type
A	AC servo motor type

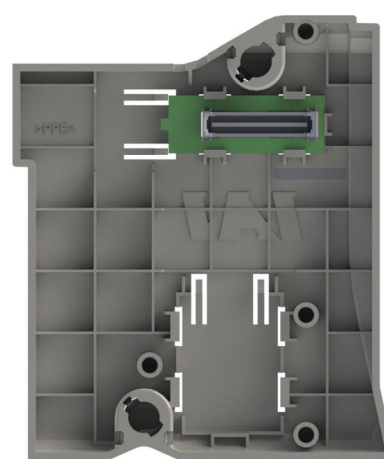


[Caution when Connecting Terminal Unit]

The terminal unit to be connected on the right end should differ depending on the cases when the system consists of only the 24V driver units and when it consists of the 200V driver units. When the 200V driver units are to be used, make sure to use the terminal unit for 200V (RCON-GW-TRS) enclosed in the 200V power supply unit. The terminal unit for 24V has a structure that does not allow itself connected to the 200V driver unit, however, it could be forcefully inserted, which could cause fire on the connector as well as damage on it.



Terminal Unit (for 24V)
RCON-GW-TR



Terminal Unit for 200V
RCON-GW-TRS

A terminal unit for 24V (RCON-GW-TR) is enclosed in LC Unit.

A terminal unit for 200V (RCON-GW-TRS) is enclosed in the 200V power supply unit.

1.5 Specifications

1.5.1 General specifications

The specifications regarding installation conditions are listed below.

Item	Specifications
Ambient operating temperature	0 to 55°C (0 to 40degC for Simple Absolute Unit and SCON-CB)
Ambient operating humidity	5%RH to 85%RH (There should be no water condensation or freeze)
Ambient storage temperature	– 20 to 70°C
Operating atmosphere	Avoid corrosive gas and in particular avoid excessive dust
Altitude	1,000m or less
Vibration resistance	Frequency: 10~57 Hz/Amplitude: 0.075mm, Frequency: 57~150 Hz/ Acceleration: 9.8m/s ² XYZ directions Sweep time: 10 minutes Number of sweeps: 10 times
Shock resistance	Drop height: 800mm 1 corner, 3 edges, 6 faces
Overvoltage category	I
Electric shock protection mechanism	24V System : Class III 200V System : Class I
Pollution degree	II
Degree of protection	IP20
Insulation withstanding voltage	DC500V 10MΩ(between power supply terminal and frame grounding)
Cooling method	Natural air cooling and forced air cooling by fan unit

The specifications regarding control are listed below.

Item	Specifications	
Number of controlled axes	1~16-axis	
Cable length	Motor/encoder cable: 20 m or less (10 m or less for RCD), Motor Cable for 200V Motor: 30m or less Encoder Cable for 200V Motor: 30m or less SCON connection cable: 3 m or less per cable, total length of 10 m or less EC Connection Cable: 10m or less	
Field network interface	CC-Link, CC-Link IE Field, DeviceNet, EtherCAT, EtherNet/IP, PROFIBUS-DP, PROFINET IO	
SIO interface (Teaching port)	Communication method	RS485
	Communication speed	9.6/19.2/38.4/57.6/115.2/230.4 kbps
SIO interface (USB port)	Communication method	USB
	Communication speed	12Mbps
Data recording device	FRAM 4Mbit (LC Unit) ^(Note 1) FRAM 256kbit (24V Driver Unit) SRAM 4Mbit (200V Driver Unit)	
Calendar function	Retention function: About 10 days Charging time: About 100 hours	
Safety category compatibility	B (The safety category specification can support up to 4 external circuits)	
Drive-source cutoff method	Internal Semiconductor Cutoff, External Lumping Axes Cutoff, External Axis-Specific Cutoff	
Protection functionality	Overcurrent, abnormal temperature, encoder disconnection, overload	
Preventive/ predictive maintenance functions	Low electrolytic capacitor capacity and low fan rotation speed	

Note 1: RCON-LC (G) is equipped with FRAM in larger capacity than RCON-GW (G).

The specifications regarding the PLC features are as shown below.

Item			Specifications
Programming Language			LD (Ladder Diagram : Ladder Diagram)
Program Memory			32768 step
Max. Control Axis Quantity			16 Axes
Data Retaining Applicable Items			Ladder Program, OM Comment, Label Comment
Types of Commands	Basic Commands		25 commands
	Application Commands		56 commands
	DFC Commands		35 commands
Calculation Process Speed	Basic Commands (LD: Contact)		0.416 μs
	Basic Commands (OUT: Output)		0.396 μs
	Application Commands (MOV: Transference)		1.916 μs
	Application Commands (B/: Division)		4.833 μs
Input and Output Points	Input Points		0 to 128 points
	Output Points		
	Remote I/O Points	CC-Link CC-Link IE Field	6 to 24 words (1 time 1 station to 4 stations) Input : 96 to 384 points Output : 96 to 384 points
		DeviceNet EtherCAT EtherNet/IP PROFIBUS-DP PROFINET IO	1 to 16 words Input : 16 to 256 points Output : 16 to 256 points
Device Memory	Input and Output Relays	Input Relay	X000 to X07F 128 points
		Output Relay	Y000 to Y07F 128 points
	Support Relays	For General	M0 to M3071 3072 points
		For Retaining	LM0 to LM255 256 points
		For Axis Control	AM0 to AM4095 4096 points
		For System	SM0 to SM127 128 points
	Timer	10ms (0.01 to 327.67 Second)	T0 to T63 64 points
	Counter	16-Bit Up (0 to 32767 counts)	C0 to C63 64 points
	Data Registration	16-Bit for General	D0 to D127 128points (32 bits in pair use)
		16-Bit for System	SD0 to SD63 64points
		16-Bit for Joint Indication	IX0 to IX1 2points
	Pointer	For JUMP and CALL Divergence	L0 to L255 256 points (For JE, JMP, CALL and CALLP Commands, L0 is initial routine, L255 is for END Jump)
Constant	Decimal Numbers		16 bits : -32765 to 32767 32 bits : -2.147.483.648 to +2.147.483.647
	Hexadecimal Numbers (H)		16 bits : 0 to FFFF 32 bits : 0 to FFFFFFFF

1.6 Power Capacity

[Power Capacity]

The current amperage and the current limit value for LC Unit are the same as those for RCON Gateway Unit.

Also the current amperages for the PIO/SIO/SCON extension unit and PIO unit are as shown below.

For the current amperage of RCON-LC System, refer to the current amperage in RCON System Instruction Manual (ME0384).

Current Amperage of LC Unit, PIO/SIO/SCON Extension Unit and PIO Unit

Item	Specifications	
Power supply voltage	DC24V $\pm$ 10% AC200V to 230V $\pm$ 10% (Power Supply Unit)	
Control power capacity (per unit)	LC unit (includes terminal unit)	0.8A
	PIO/SIO/SCON extension unit	0.1A
	PIO unit	0.1A

Current Limit Value of LC Unit

Item	Current limit values for selection calculation
Control power (CP)	9.0A or less
Motor power (MP)	37.5A or less

1.7 Used Tools

1.7 Used Tools

The applicable versions of the tools available for startup and operation of RCON-LC System are described as follows.

The gateway parameter setting tool is enclosed to the PC-dedicated teaching software.

Refer to the following instruction manuals for how to operate the PC-dedicated teaching software and teaching pendants. The instruction manual for IA-OS (fast step guide) introduces only the installation procedures and how to start up the software. For how to operate the software, follow the instruction or a help in windows.

Product Name	Model Code	Version Applied from	Feature		Instruction Manual	Remarks
			GW	OP		
PC dedicated teaching software	IA-OS	V5.00.00.00	○	○	ME0391	Available only in Japanese
	RCM-101-*	V13.01.00.00	×	○	ME0155	
Gateway Parameter Configuration Tool	—	V3.01.08.00	○	×	This document 3.3 Configuration	
Teaching Pendant	TB-02 (D)	Ver. 2.11	×	○	ME0355	
	TB-03	Ver. 2.11	×	○	ME0376	

Features GW: Gateway parameter settings, OP: Axis operation, monitor / parameter edit, etc.

Instruction Manual is available for download in IAI homepage.

URL: www.iai-robot.co.jp/data_dl/CAD_MANUAL/

The latest version of IA-OS (update) is available to download in IAI homepage.

URL: www.iai-robot.co.jp/download/pcsoft/

Refer to “Chapter4 PLC Features” for the ladder edit software, ladder edit software manual and ladder programming manual.

RCON - LC

Chapter 2

Specifications for unit

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2.1.5 External dimensions	2-6
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2.1 LC unit

2.1.1 Overview

LC Unit possesses the PLC features in addition to RCON Gateway Unit and is capable of controlling ROBO Cylinder and industrial robots using the LC ladder programs.

The host PLC field network is applicable for seven types of field networks (CC-Link, CC-Link IE Field, DeviceNet, EtherCAT, EtherNet/IP PROFIBUS-DP and PROFINET IO). In case of operation with only ladder programs without using the host PLC, it is available to select a LC unit not equipped with a field network connector.

It is capable of connecting 16 axes at the maximum of SCON-CB via the driver unit for RCON System (RCON-PC/PCF/AC/DC/SC), SCON Extension Unit or PIO/SIO/SCON Extension Unit.

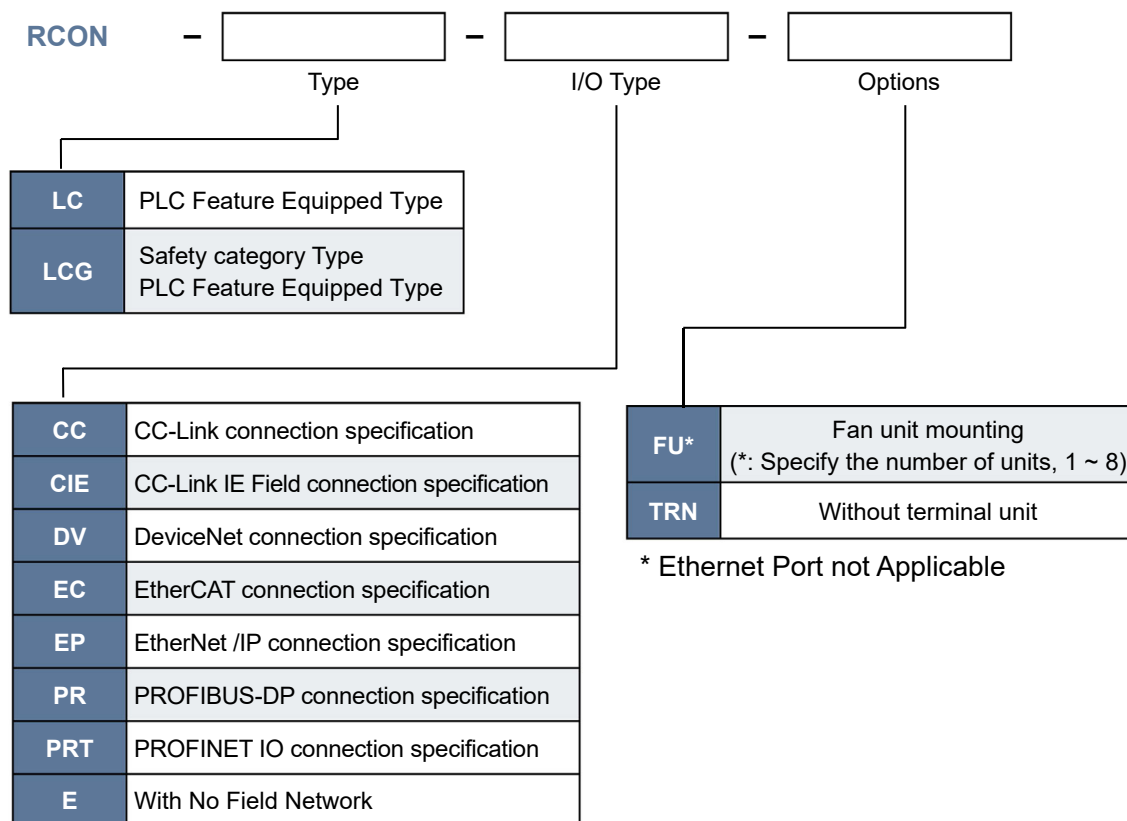


Point !

- Although it would generate an error when the number of connected axes exceeds 16 axes or the option units exceed eight units, it is available to operate when the number of connected axes is zero or the option unit is zero.

* Option Unit: PIO/SIO/SCON Extension Unit, PIO Unit

2.1.2 Model Code



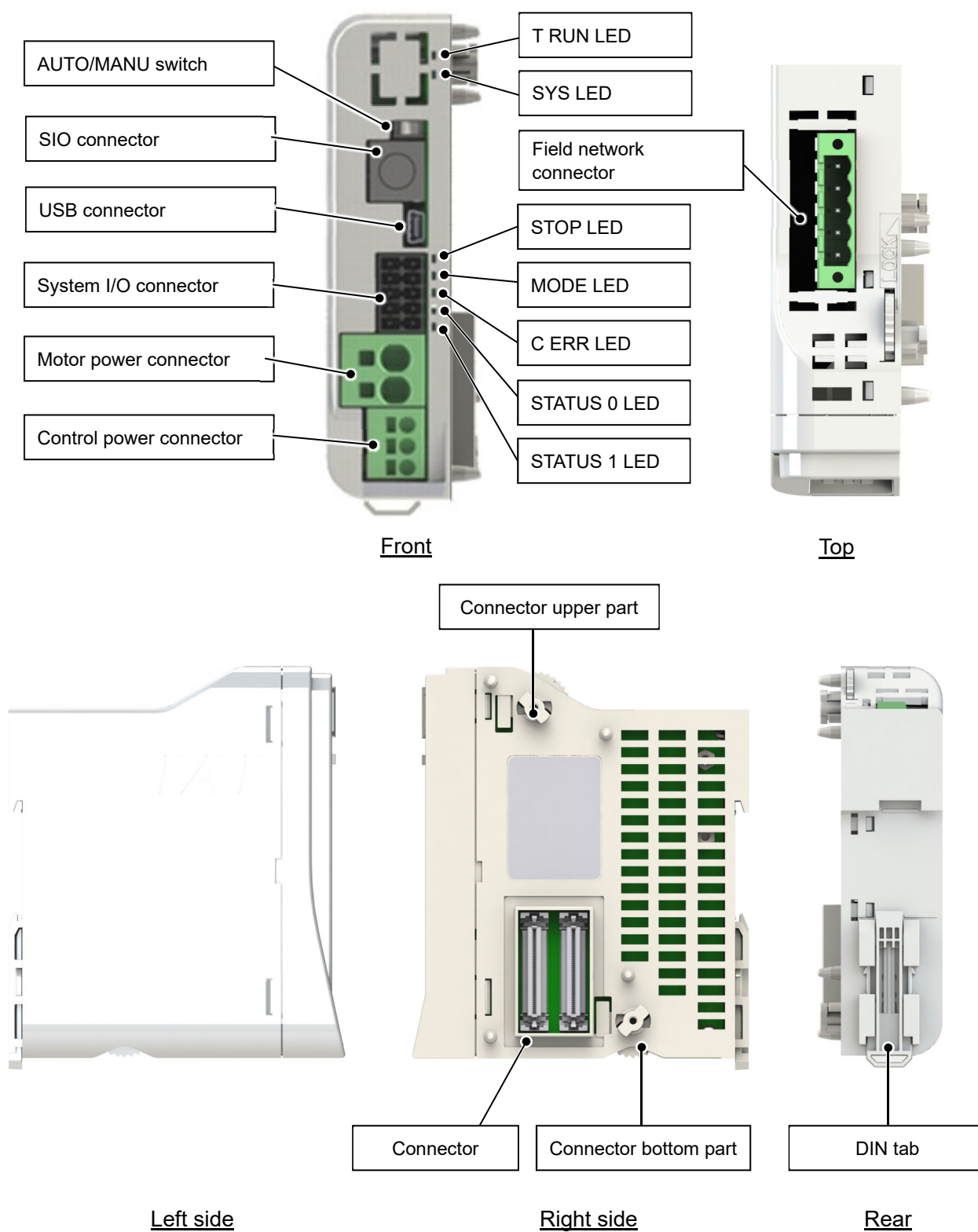
2.1.3 Components

The following table shows the product configuration for the standard specification.

See the packing list for the details of the enclosed components. In the unlikely case that any model number errors or missing parts come to light, contact your local IAI distributor.

Part name	Shape	Quantity	Remarks
LC unit		1	Model example: RCON-LC/LCG
Terminal unit		1	Single product model number: RCON-GW-TR (Not supplied with TRN specification)
System I/O connector		1	Single product model number: DFMC1.5/5-ST-3.5 (Phoenix Contact)
Field network connector		1	Depends on I/O type
Dummy plug		1	Model Name: DP-5 (Supplied with LCG specification)
First Step Guide		1	ME0382
Safety Guide		1	M0194
Instruction Manual DVD		1	

2.1.4 Part names/Functions



[AUTO/MANU switch]

The status of RUN/STOP in the LC features can be switched over with AUTO/MANU switch.

Symbol	Description
AUTO	LC: RUN Status
MANU	LC: STOP Status



[LED display]

LED for indicating LC unit status and field network status.

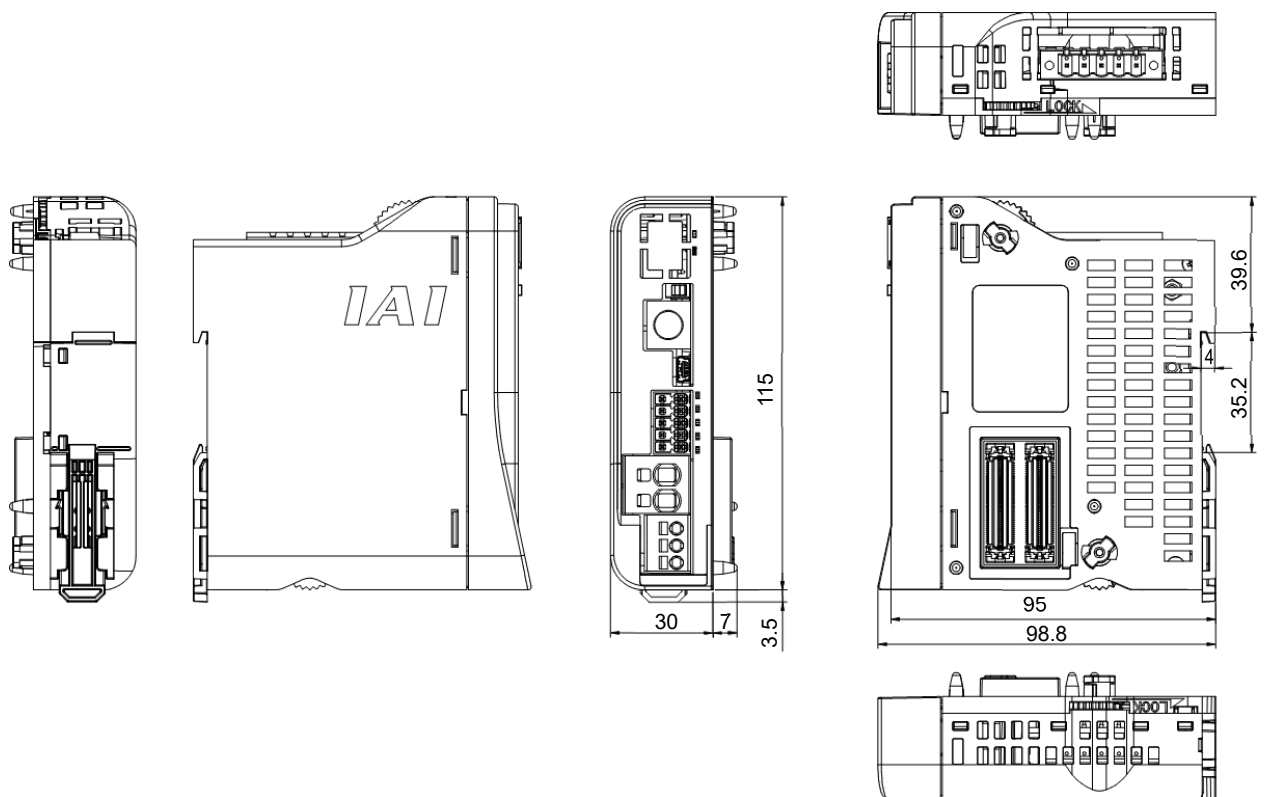
Panel notation	Display color	Status	Description
T RUN	Green	Light ON	Normal internal bus communication
		Blinking	Waiting for initialization signal
	Orange	Light ON	Bus communication error generated
SYS	Green	Light ON	Gateway normal operation
	Orange	Light ON	Gateway alarm triggered
STOP	Red	Light ON	With STOP Signal Input
		Light OFF	Without STOP Signal Input
MODE	Green	Light ON	AUTO mode ON : PLC RUN Status
		Light OFF	MANU mode ON : PLC STOP Status
C ERR	Orange	Light ON	Field network error generated
		Light OFF	Field network operating normally
STATUS 0	—	—	Differs with field network
STATUS 1	—	—	Differs with field network

The hardware specifications and software specifications in each type of field network should be the same as RCON System. Refer to RCON System Instruction Manual (ME0384).

2.1.5 External dimensions

The outer dimensions for LC Unit are the same as those for RCON Gateway Unit.

Item	Specifications
External dimensions	W 30 mm × H 115 mm × D 95 mm
Mass	About 170g
External view	See figure below



2.2 Extension unit (PIO/SIO/SCON extension unit, PIO unit)

2.2.1 Overview

In the extension units, there are three types, PIO/SIO/SCON Extension Unit, PIO Unit and SCON Extension Unit and they are equipped with connectors stated in the table below. For PIO/SIO/SCON Extension Unit and SCON Extension Unit, either one of them is available to be connected to one unit of RCON-LC System, and PIO Unit is available to be connected for eight units at the maximum including PIO/SIO/SCON Extension Unit (input 126 points and output 126 points). Connect necessary number of units considering the purpose of use.

Unit name	SCON cable connector	PIO cable connector	SIO cable connector
PIO/SIO/SCON extension unit	Equipped	Equipped	Equipped
PIO unit	Not Equipped	Equipped	Not Equipped
SCON extension unit	Equipped	Not Equipped	Not Equipped

In this section, describes PIO/SIO/SCON Extension Unit and PIO Unit not described in RCON System Instruction Manual. For details of SCON Extension Unit, refer to “Specification Edition Chapter 6 SCON Connection Unit” in RCON System Instruction Manual (ME0384).

[PIO/SIO/SCN Extension Unit]

PIO/SIO/SCON Extension Unit is equipped with the following three types of connectors.

- 1) SCON Connector (Connector to establish connectivity to SCON-CB Controller)
- 2) PIO Connector (Parallel I/O Connector with 16 points of input and 16 points of output)
- 3) SIO Connector (RS485 serial communication connector)

PIO/SIO/SCON Extension Unit should be used connecting on the right side of LC Unit.

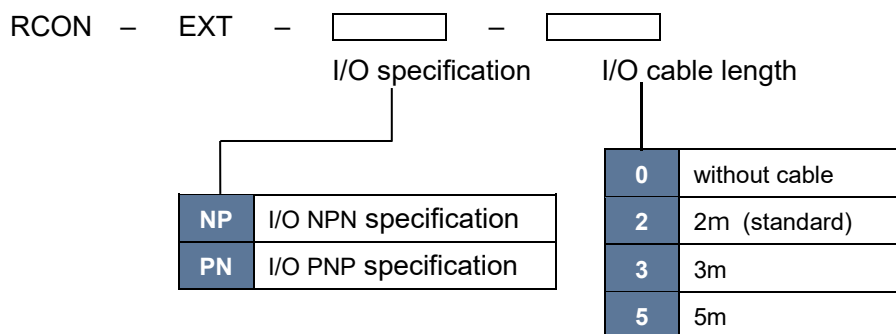
[PIO Unit]

PIO Unit is equipped with a PIO connector (parallel I/O Connector with 16 points of input and 16 points of output).

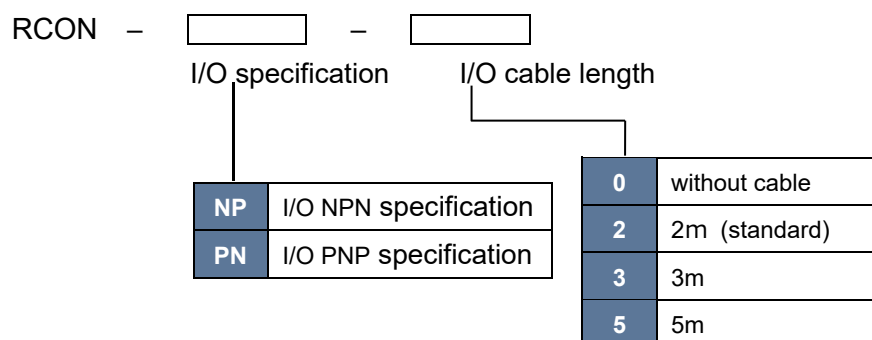
2.2.2 Model Code

(1) How to Read the Model Number

[PIO/SIO/SCON extension unit]

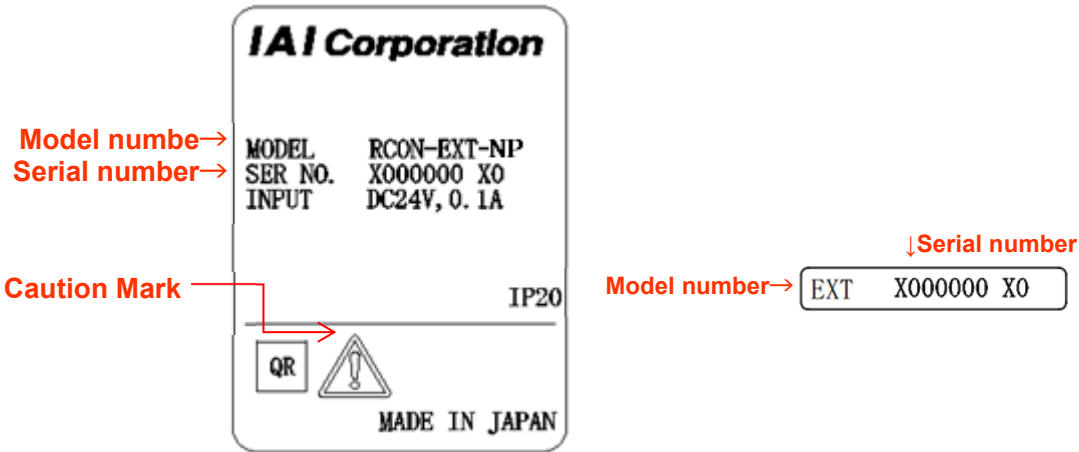


[PIO unit]



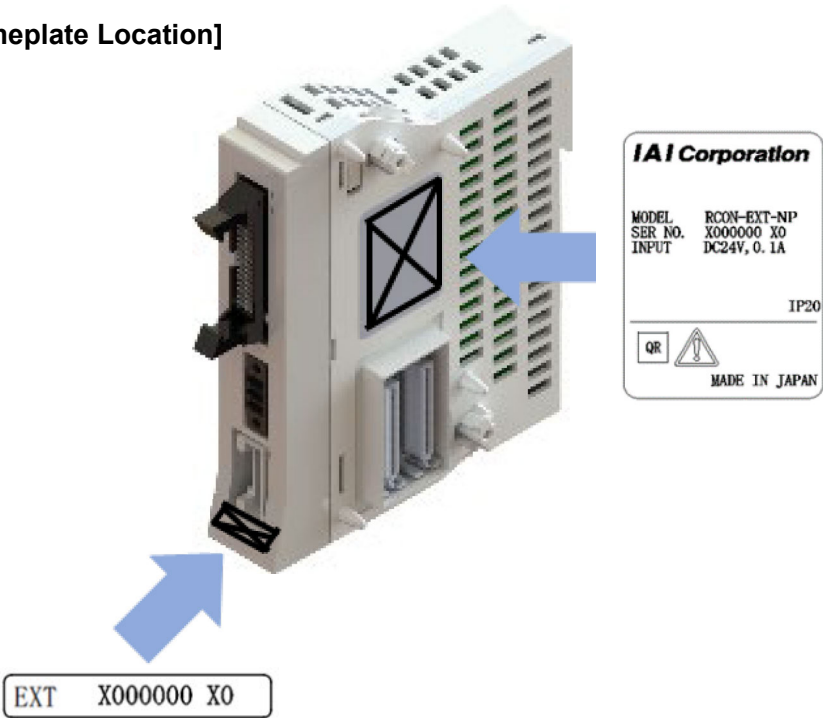
2.2 Extension unit (PIO/SIO/SCON extension unit, PIO unit)

(2) How to read the model nameplate



Mark	Explanation of Mark
	Use IAI specified cables only.

[Nameplate Location]

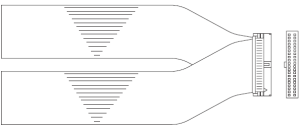


2.2.3 Components

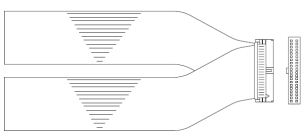
The following table shows the product configuration for the standard specification.

See the packing list for the details of the enclosed components. In the unlikely case that any model number errors or missing parts come to light, contact your local IAI distributor.

[PIO/SIO/SCON extension unit]

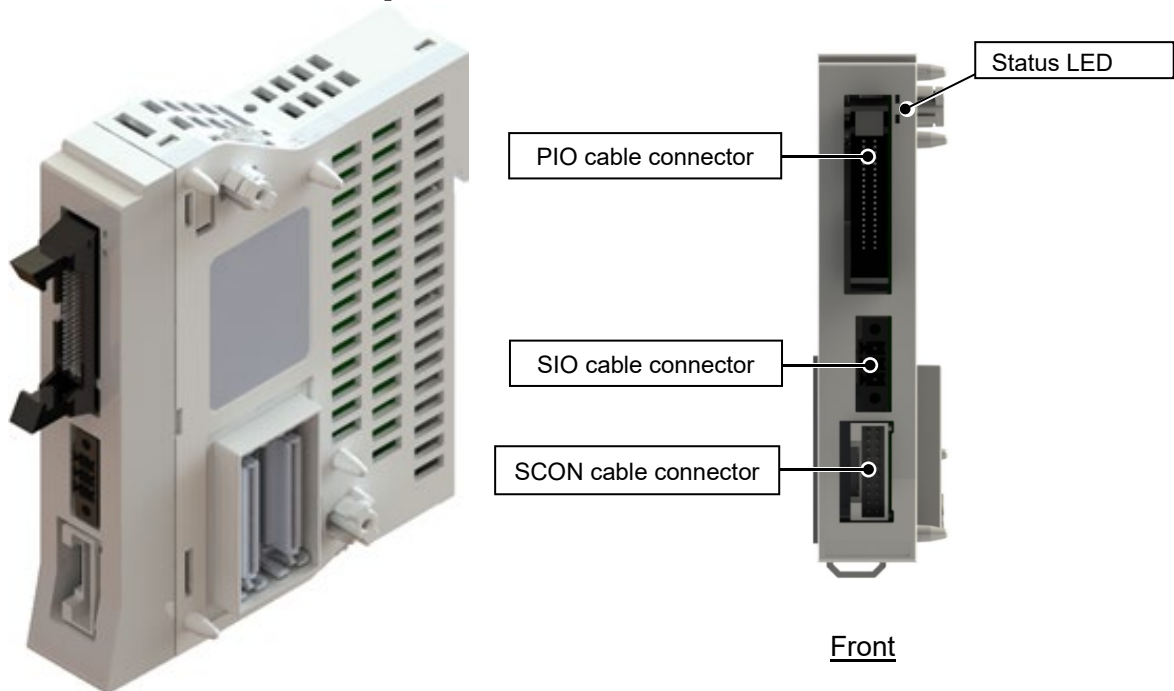
Part name	Shape	Quantity	Remarks
PIO/SIO/SCON extension unit		1	RCON-EXT-PN-* (PNP specifications) RCON-EXT-NP-* (NPN specifications)
Terminal connector		1	Single product model number: RCON-EXT-TR
PIO cable		1	CB-PAC-PIO***
Extension SIO port connector		1	FMC1.5/3-STF-3.5
First Step Guide		1	ME0393
Safety Guide		1	M0194

[PIO unit]

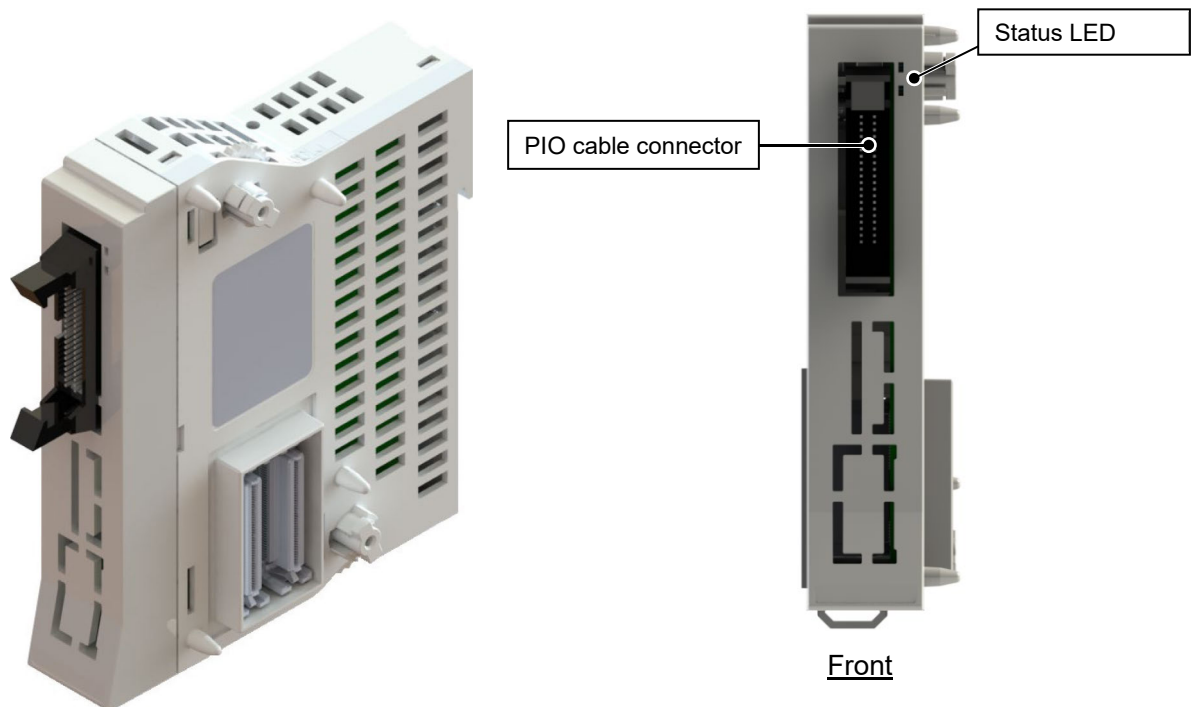
Part name	Shape	Quantity	Remarks
PIO unit		1	RCON-PN-* (PNP specifications) RCON-NP-* (NPN specifications)
PIO cable		1	CB-PAC-PIO***
First Step Guide		1	ME0393
Safety Guide		1	M0194

2.2.4 Part Names/Functions

[PIO/SIO/SCON extension unit]

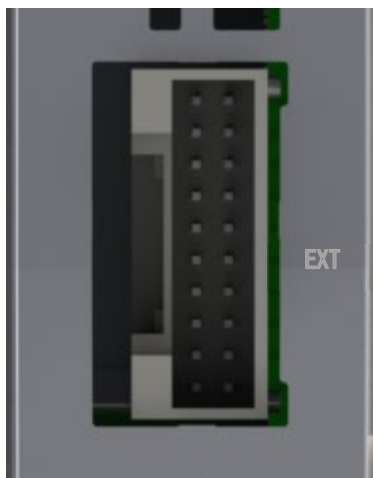


[PIO unit]



(1) SCON cable connector

A cable connector for connecting the SCON extension unit and SCON.

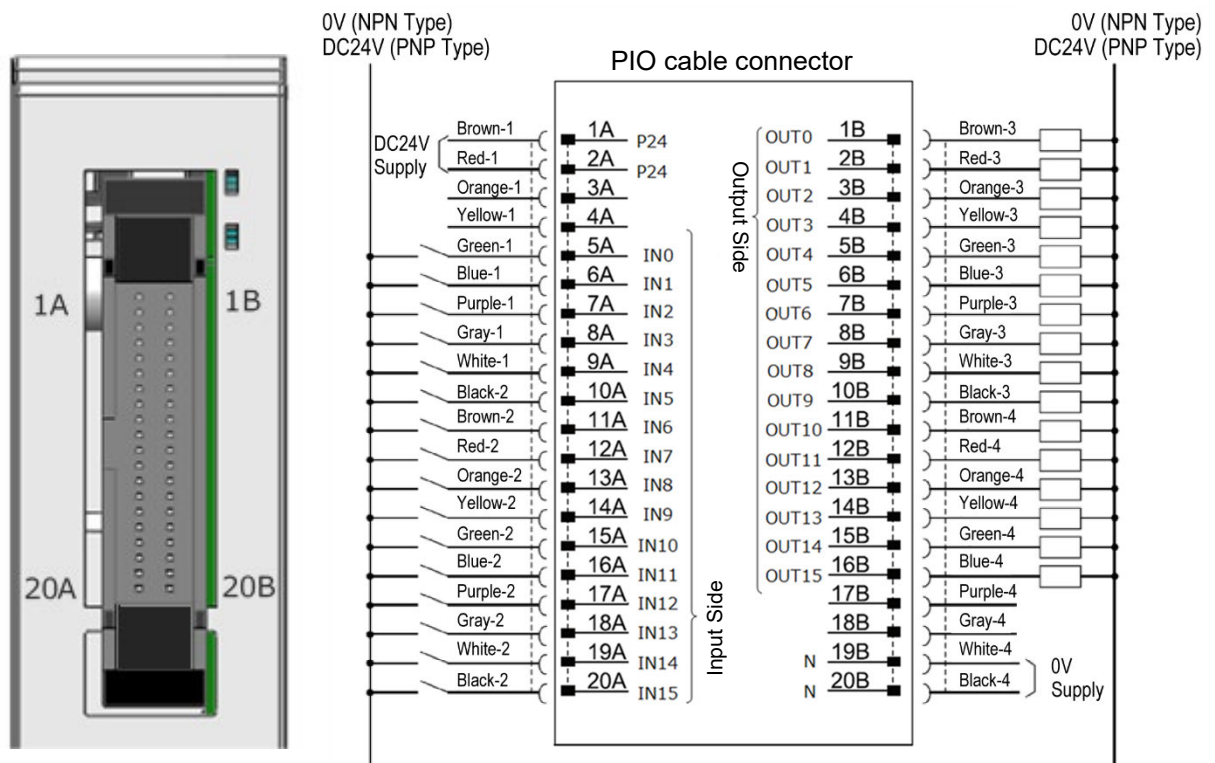


Pin No.	Signal name	Description
1	VP24	Expansion module 24 V power
2	GND	0V
3	DRV_DY	Driver dedicated internal bus signal differential transmit line +
4	DRV_RA	Driver dedicated internal bus signal differential receive line +
5	DRV_DZ	Driver dedicated internal bus signal differential transmit line -
6	DRV_RB	Driver dedicated internal bus signal differential receive line -
7	AM_SD+	MODBUS differential line +
8	AM_SD-	MODBUS differential line -
9	ACT_PULSE+	Driver signal timing notification signal differential line +
10	ACT_PULSE-	Driver signal timing notification signal differential line -
11	SYNC_PULSE+	Driver synchronizing signal differential line +
12	SYNC_PULSE-	Driver synchronizing signal differential line -
13	RTC_1Hz	1 Hz toggle signal
14	CONE_IN	Unit connection check signal
15	STOP	Stop signal
16	ENABLE	Enable signal
17	NC	Not connected
18	GW_RESET	Gateway reset signal
19	FG	Frame ground

For connection to SCON Controller, refer to “Specification Edition Chapter 6 SCON Connection Unit” in RCON System Instruction Manual (ME0384).

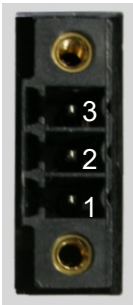
(2) PIO cable connector

Model	HIF6-40PA-1.27DS (71)
Manufacturer	Hirose Electric
Connector General Specifications	
Rated current	0.5A
Rated voltage	125V AC
Repeated Insertion Life	500 times



* Refer to 2.2.5 PIO Specifications for the assignment when using multiple PIO connectors.

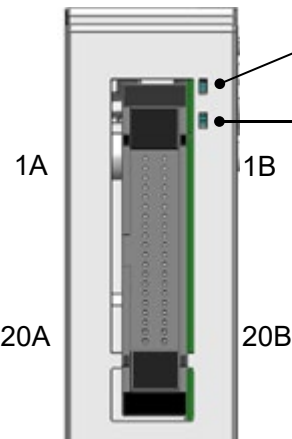
(3) SIO cable connector



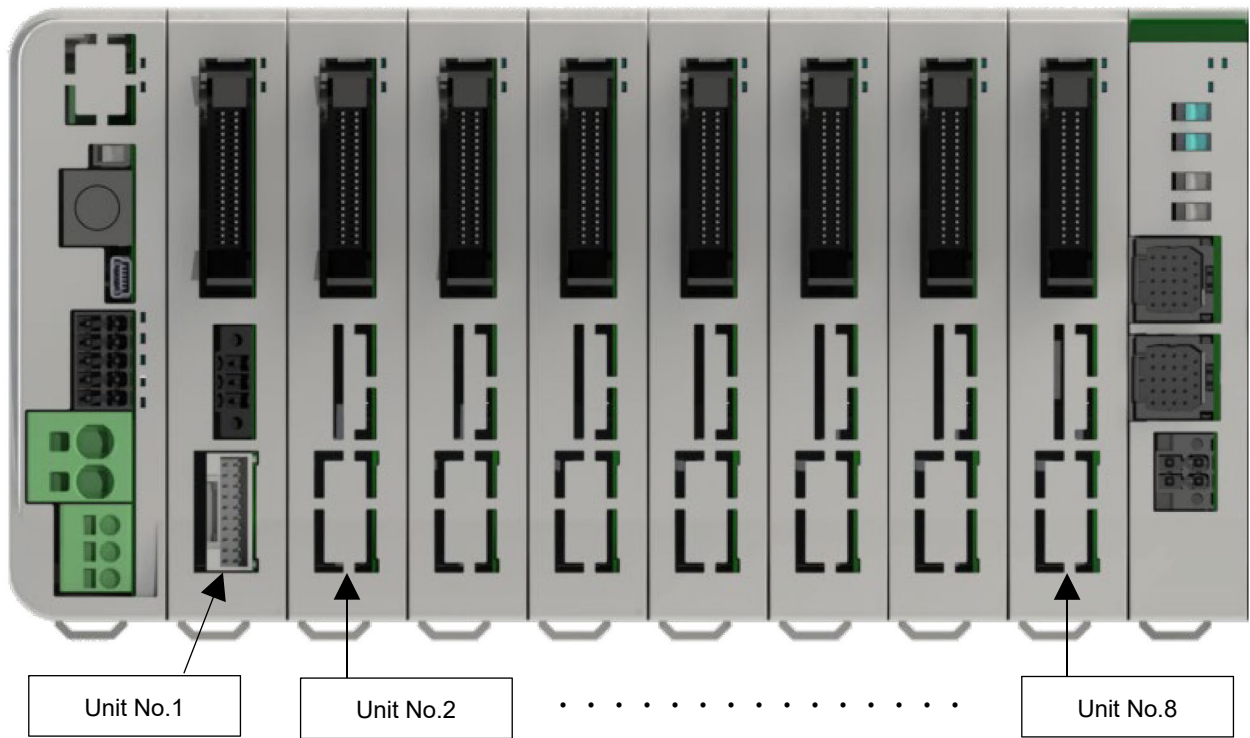
Item		Model	Manufacturer
PCB side connector		MC1.5/3-GF-3.5P26THR	PHOENIX CONTACT
Mating Connector		FMC1.5/3-STF-3.5	PHOENIX CONTACT
Pin No.	Signal name	Description	
1	ISO_GND	Grounding for extension communication	
2	ISO_SD-	Extended communication line -	
3	ISO_SD+	Extended communication line +	

2.2.5 PIO Specifications

The pin numbers are as shown in the figure below.
For the relation between pin numbers and input and output assignments, refer to the tables in the following pages.
Also, the status of the status LED lamps are as shown in the list.



LED name	Color		Status
	Green	Red	
Total frame communication status LED	Blinking	Light OFF	Configuration communication
	Light ON	Light OFF	Normal communication
	Light OFF	Light ON	Total frame communication error
	Light OFF	Light OFF	Updating
PIO unit status LED	Light ON	Light OFF	Normal communication
	Light OFF	Light ON	Control power supply voltage drop
	Light OFF	Light ON	I/O power supply voltage drop
	Blinking	Light OFF	Updating



Shown below is the input assignments and output assignments when eight units in link.

Unit No.	Pin No.	Category	Signal name	Assignment	Pin No.	Category	Signal name	Assignment
1	1A	24	P24	-	1B	Output	OUT0	Y000
	2A	24	P24	-	2B		OUT1	Y001
	3A	-	-	-	3B		OUT2	Y002
	4A	-	-	-	4B		OUT3	Y003
	5A	Input	IN0	X000	5B		OUT4	Y004
	6A		IN1	X001	6B		OUT5	Y005
	7A		IN2	X002	7B		OUT6	Y006
	8A		IN3	X003	8B		OUT7	Y007
	9A		IN4	X004	9B		OUT8	Y008
	10A		IN5	X005	10B		OUT9	Y009
	11A		IN6	X006	11B		OUT10	Y00A
	12A		IN7	X007	12B		OUT11	Y00B
	13A		IN8	X008	13B		OUT12	Y00C
	14A		IN9	X009	14B		OUT13	Y00D
	15A		IN10	X00A	15B		OUT14	Y00E
	16A		IN11	X00B	16B		OUT15	Y00F
	17A		IN12	X00C	17B	-	-	-
	18A		IN13	X00D	18B	-	-	-
	19A		IN14	X00E	19B	0	N	-
	20A		IN15	X00F	20B	0	N	-
2	1A	24	P24	-	1B	Output	OUT0	Y010
	2A	24	P24	-	2B		OUT1	Y011
	3A	-	-	-	3B		OUT2	Y012
	4A	-	-	-	4B		OUT3	Y013
	5A	Input	IN0	X010	5B		OUT4	Y014
	6A		IN1	X011	6B		OUT5	Y015
	7A		IN2	X012	7B		OUT6	Y016
	8A		IN3	X013	8B		OUT7	Y017
	9A		IN4	X014	9B		OUT8	Y018
	10A		IN5	X015	10B		OUT9	Y019
	11A		IN6	X016	11B		OUT10	Y01A
	12A		IN7	X017	12B		OUT11	Y01B
	13A		IN8	X018	13B		OUT12	Y01C
	14A		IN9	X019	14B		OUT13	Y01D
	15A		IN10	X01A	15B		OUT14	Y01E
	16A		IN11	X01B	16B		OUT15	Y01F
	17A		IN12	X01C	17B	-	-	-
	18A		IN13	X01D	18B	-	-	-
	19A		IN14	X01E	19B	0	N	-
	20A		IN15	X01F	20B	0	N	-

* The unit numbers are those numbered in order of 1, 2, ..., 8 next to the LC unit.

Unit No.	Pin No.	Category	Signal name	Assignment	Pin No.	Category	Signal name	Assignment
3	1A	24	P24	-	1B	Output	OUT0	Y020
	2A	24	P24	-	2B		OUT1	Y021
	3A	-	-	-	3B		OUT2	Y022
	4A	-	-	-	4B		OUT3	Y023
	5A	Input	IN0	X020	5B		OUT4	Y024
	6A		IN1	X021	6B		OUT5	Y025
	7A		IN2	X022	7B		OUT6	Y026
	8A		IN3	X023	8B		OUT7	Y027
	9A		IN4	X024	9B		OUT8	Y028
	10A		IN5	X025	10B		OUT9	Y029
	11A		IN6	X026	11B		OUT10	Y02A
	12A		IN7	X027	12B		OUT11	Y02B
	13A		IN8	X028	13B		OUT12	Y02C
	14A		IN9	X029	14B		OUT13	Y02D
	15A		IN10	X02A	15B		OUT14	Y02E
	16A		IN11	X02B	16B		OUT15	Y02F
	17A		IN12	X02C	17B	-	-	-
	18A		IN13	X02D	18B	-	-	-
	19A		IN14	X02E	19B	0	N	-
	20A		IN15	X02F	20B	0	N	-
4	1A	24	P24	-	1B	Output	OUT0	Y030
	2A	24	P24	-	2B		OUT1	Y031
	3A	-	-	-	3B		OUT2	Y032
	4A	-	-	-	4B		OUT3	Y033
	5A	Input	IN0	X030	5B		OUT4	Y034
	6A		IN1	X031	6B		OUT5	Y035
	7A		IN2	X032	7B		OUT6	Y036
	8A		IN3	X033	8B		OUT7	Y037
	9A		IN4	X034	9B		OUT8	Y038
	10A		IN5	X035	10B		OUT9	Y039
	11A		IN6	X036	11B		OUT10	Y03A
	12A		IN7	X037	12B		OUT11	Y03B
	13A		IN8	X038	13B		OUT12	Y03C
	14A		IN9	X039	14B		OUT13	Y03D
	15A		IN10	X03A	15B		OUT14	Y03E
	16A		IN11	X03B	16B		OUT15	Y03F
	17A		IN12	X03C	17B	-	-	-
	18A		IN13	X03D	18B	-	-	-
	19A		IN14	X03E	19B	0	N	-
	20A		IN15	X03F	20B	0	N	-

* The unit numbers are those numbered in order of 1, 2, ..., 8 next to the LC unit.

Unit No.	Pin No.	Category	Signal name	Assignment	Pin No.	Category	Signal name	Assignment
5	1A	24	P24	-	1B	Output	OUT0	Y040
	2A	24	P24	-	2B		OUT1	Y041
	3A	-	-	-	3B		OUT2	Y042
	4A	-	-	-	4B		OUT3	Y043
	5A	Input	IN0	X040	5B		OUT4	Y044
	6A		IN1	X041	6B		OUT5	Y045
	7A		IN2	X042	7B		OUT6	Y046
	8A		IN3	X043	8B		OUT7	Y047
	9A		IN4	X044	9B		OUT8	Y048
	10A		IN5	X045	10B		OUT9	Y049
	11A		IN6	X046	11B		OUT10	Y04A
	12A		IN7	X047	12B		OUT11	Y04B
	13A		IN8	X048	13B		OUT12	Y04C
	14A		IN9	X049	14B		OUT13	Y04D
	15A		IN10	X04A	15B		OUT14	Y04E
	16A		IN11	X04B	16B		OUT15	Y04F
	17A		IN12	X04C	17B	-	-	-
	18A		IN13	X04D	18B	-	-	-
	19A		IN14	X04E	19B	0	N	-
	20A		IN15	X04F	20B	0	N	-
6	1A	24	P24	-	1B	Output	OUT0	Y050
	2A	24	P24	-	2B		OUT1	Y051
	3A	-	-	-	3B		OUT2	Y052
	4A	-	-	-	4B		OUT3	Y053
	5A	Input	IN0	X050	5B		OUT4	Y054
	6A		IN1	X051	6B		OUT5	Y055
	7A		IN2	X052	7B		OUT6	Y056
	8A		IN3	X053	8B		OUT7	Y057
	9A		IN4	X054	9B		OUT8	Y058
	10A		IN5	X055	10B		OUT9	Y059
	11A		IN6	X056	11B		OUT10	Y05A
	12A		IN7	X057	12B		OUT11	Y05B
	13A		IN8	X058	13B		OUT12	Y05C
	14A		IN9	X059	14B		OUT13	Y05D
	15A		IN10	X05A	15B		OUT14	Y05E
	16A		IN11	X05B	16B		OUT15	Y05F
	17A		IN12	X05C	17B	-	-	-
	18A		IN13	X05D	18B	-	-	-
	19A		IN14	X05E	19B	0	N	-
	20A		IN15	X05F	20B	0	N	-

* The unit numbers are those numbered in order of 1, 2, ..., 8 next to the LC unit.

Unit No.	Pin No.	Category	Signal name	Assignment	Pin No.	Category	Signal name	Assignment
7	1A	24	P24	-	1B	Output	OUT0	Y060
	2A	24	P24	-	2B		OUT1	Y061
	3A	-	-	-	3B		OUT2	Y062
	4A	-	-	-	4B		OUT3	Y063
	5A	Input	IN0	X060	5B		OUT4	Y064
	6A		IN1	X061	6B		OUT5	Y065
	7A		IN2	X062	7B		OUT6	Y066
	8A		IN3	X063	8B		OUT7	Y067
	9A		IN4	X064	9B		OUT8	Y068
	10A		IN5	X065	10B		OUT9	Y069
	11A		IN6	X066	11B		OUT10	Y06A
	12A		IN7	X067	12B		OUT11	Y06B
	13A		IN8	X068	13B		OUT12	Y06C
	14A		IN9	X069	14B		OUT13	Y06D
	15A		IN10	X06A	15B		OUT14	Y06E
	16A		IN11	X06B	16B		OUT15	Y06F
	17A		IN12	X06C	17B	-	-	-
	18A		IN13	X06D	18B	-	-	-
	19A		IN14	X06E	19B	0	N	-
	20A		IN15	X06F	20B	0	N	-
8	1A	24	P24	-	1B	Output	OUT0	Y070
	2A	24	P24	-	2B		OUT1	Y071
	3A	-	-	-	3B		OUT2	Y072
	4A	-	-	-	4B		OUT3	Y073
	5A	Input	IN0	X070	5B		OUT4	Y074
	6A		IN1	X071	6B		OUT5	Y075
	7A		IN2	X072	7B		OUT6	Y076
	8A		IN3	X073	8B		OUT7	Y077
	9A		IN4	X074	9B		OUT8	Y078
	10A		IN5	X075	10B		OUT9	Y079
	11A		IN6	X076	11B		OUT10	Y07A
	12A		IN7	X077	12B		OUT11	Y07B
	13A		IN8	X078	13B		OUT12	Y07C
	14A		IN9	X079	14B		OUT13	Y07D
	15A		IN10	X07A	15B		OUT14	Y07E
	16A		IN11	X07B	16B		OUT15	Y07F
	17A		IN12	X07C	17B	-	-	-
	18A		IN13	X07D	18B	-	-	-
	19A		IN14	X07E	19B	0	N	-
	20A		IN15	X07F	20B	0	N	-

* The unit numbers are those numbered in order of 1, 2, ..., 8 next to the LC unit.

2.2.6 SIO Specifications

Using the SIO connector on PIO/SIO/SCON Extension Unit, establish connectivity to a touch panel display and data communication in Modbus should get available.

The specifications for SIO communication are as shown below.

Item	System/Condition
Interface	Conform to EIA RS485
Communication Protocol	Half Duplex Communication Start-Stop Synchronous
Connection Form	1:1 (Not applicable for Multidrop connection)
Protocol	Modbus
Transmission Mode	RTU (<u>ASCII not acceptable</u>)
Communication speed (bps)	115200 (Fixed)
Bit length	8 bits
Stop bit	1 bit
Parity	None

* Connectivity to IA-OS, PC-dedicated teaching software or LC-LADDER is not available

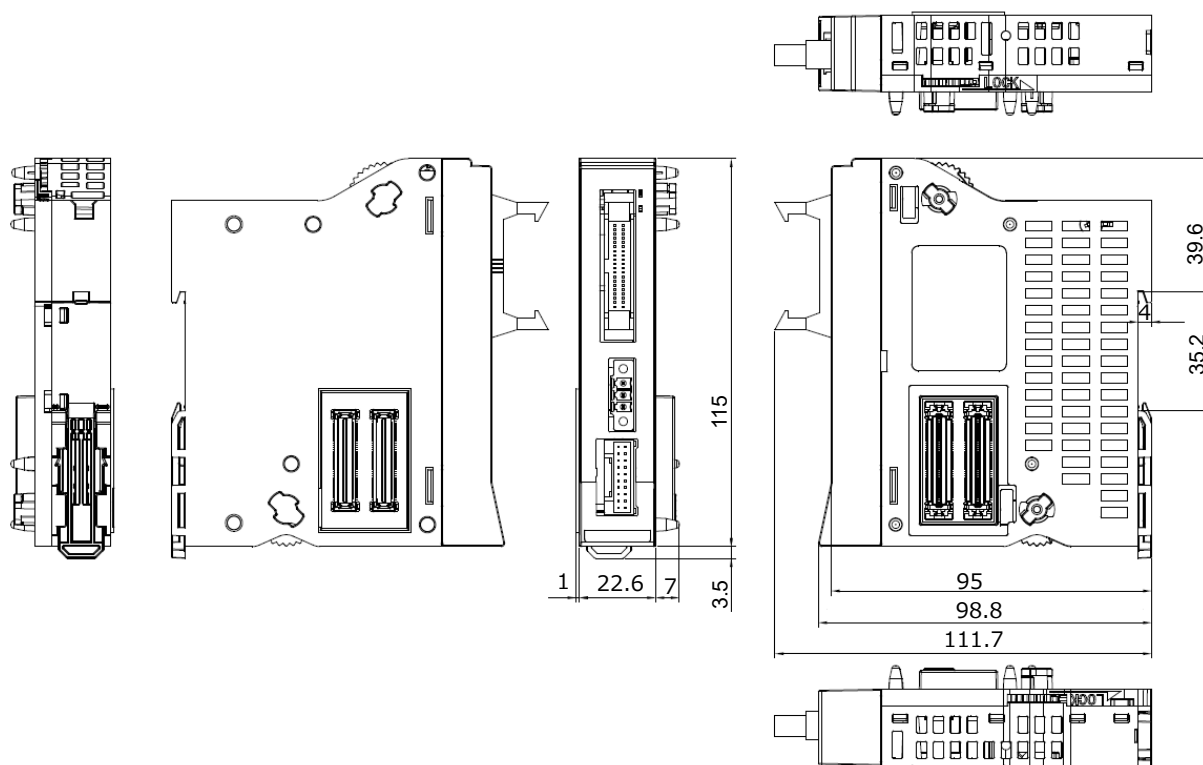
2.2.7 External dimensions

[PIO/SIO/SCON extension unit] RCON-EXT-NP/PN-*

[PIO unit] RCON-NP/PN-*

The appearance dimensions for PIO/SIO/SCON Extension Unit and PIO Unit are the same as those for SCON Extension Unit.

Item	Specifications
External dimensions	W22.6mm × H115mm × D95mm
Mass	Approx. 110g (PIO/SIO/SCON extension unit) Approx. 105g (PIO unit)
External view	See figure below



2.3 Other Units

2.3.1 24V Driver Unit

Refer to RCON instruction manual "Specification Section Chapter 4, 24V Driver Unit, EC Connection Unit".

2.3.2 200V Driver Unit, 200V Power Supply Unit

Refer to RCON instruction manual "Specification Section Chapter 5, 200V Driver Unit, 200V Power supply unit".

2.3.3 Simple Absolute Unit

Refer to RCON instruction manual "Specification Section Chapter 7, Simple Absolute Unit".

RCON - LC

Chapter 3

Installation, Wiring, Configuration

3.1 Installation	3-2
3.1.1 Installation and mounting	3-2
3.1.2 Noise countermeasures and mounting method	3-3
3.2 Wiring	3-5
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3.2.2 200V Power Supply Wiring to RCON System	3-7
3.2.3 Actuator connecting	3-9
3.2.4 Field network wiring	3-12
3.3 Configuration	3-14
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3.3.2 Gateway parameter configuration tool	3-17
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Regarding installation, wiring and setting establishment for RCON-LC System, it is basically the same as those for RCON System.

In this chapter, states the guideline of installation, wiring and procedures for setting.

For details, refer to RCON System Instruction Manual (ME0384).

Main Differences from RCON System

- Select RCON-LC when it is necessary to select a controller for tool use.
- 0 axis for number of axes to connect and 0 unit for option unit available to select
- The operation mode should be set in Axis Control Command in the DFC commands. (Refer to 3.4 Operation Mode)

3.1 Installation

3.1.1 Installation and mounting

Consider the size of the control panel, placement of the RCON-LC controller, cooling and the like when designing and manufacturing so that the ambient temperature is 0 to 55°C.

(If it has no fan unit, there is derating.)

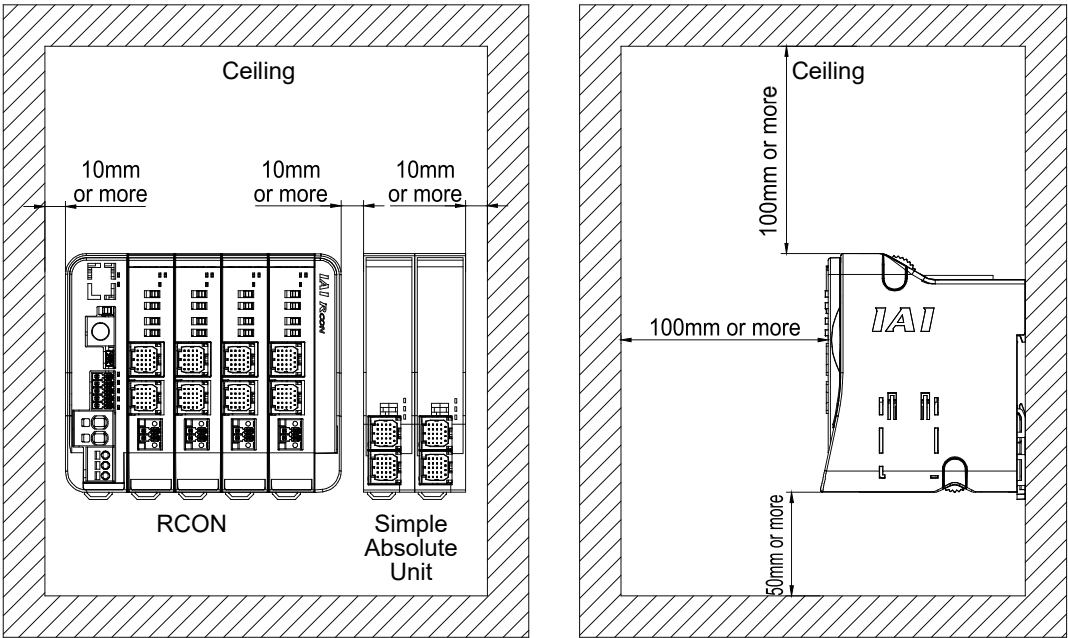
When installing a simple absolute unit or SCON on the same control panel, design and manufacture so that the ambient temperature is 0 to 40°C.

In particular, the performance may deteriorate when the temperature around the simple absolute unit (battery) is too low or too high. Make sure that the temperature is as close to room temperature as possible. (The recommended temperature is about 20°C.)

Item	Specifications
Installation direction	Vertical mounting (exhaust side on top)
Installation method	DIN rail mounting
Installation conditions	See figure below

Item		Specifications
Ambient operating temperature	With fan unit	0 to 55°C
	Without fan unit	0 to 55°C (Note 1)
Ground		Class D grounding

Note 1: If there is no fan unit, derating is available.

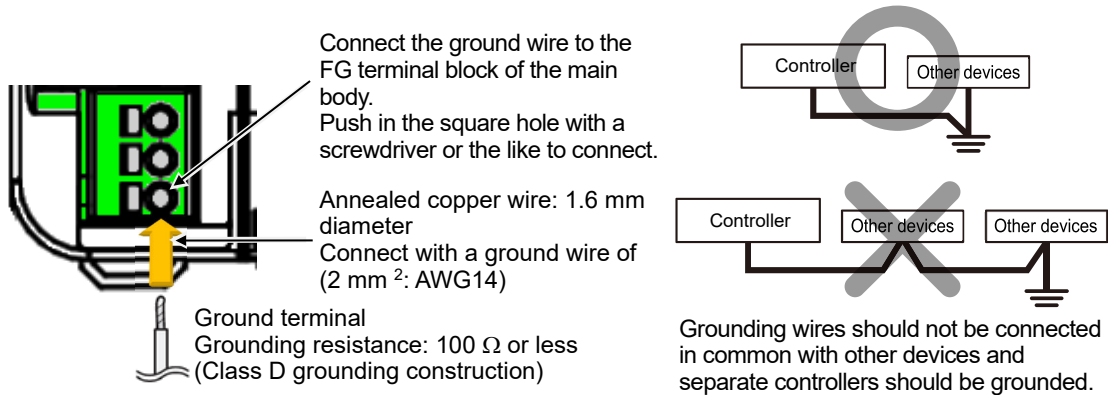


* Simple absolute units can be installed in close contact with each other.

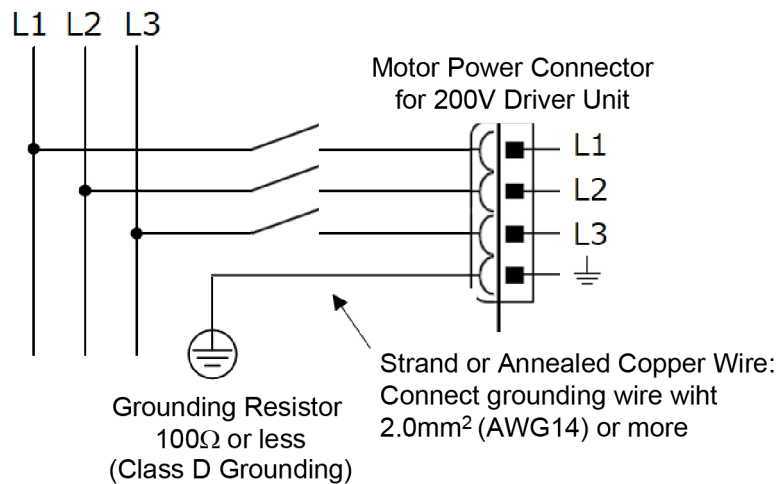
3.1.2 Noise countermeasures and mounting method

(1) Grounding for noise countermeasures (frame ground)

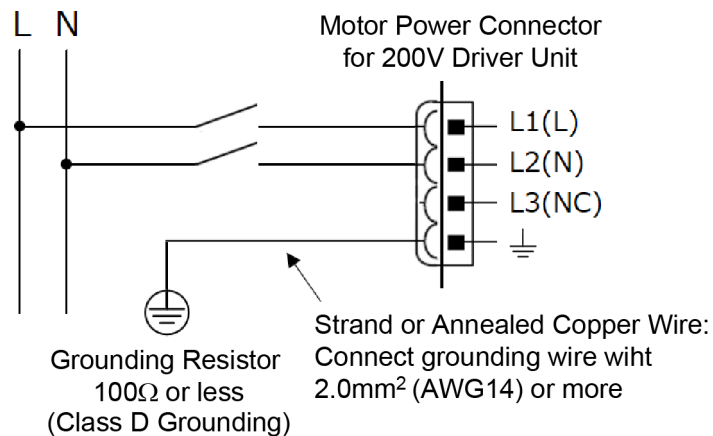
[24V DC]



[200V 3-Phase Type]



[200V Single-Phase Type]



(2) Notes on wiring method

- 1) Have the 24V DC power supply wires twisted.
- 2) Separate the wiring of signal wires and encoders from power supply lines and power lines.

(3) Noise sources and noise prevention

For the same power supply path and power supply device in the same device, take measures against noise.

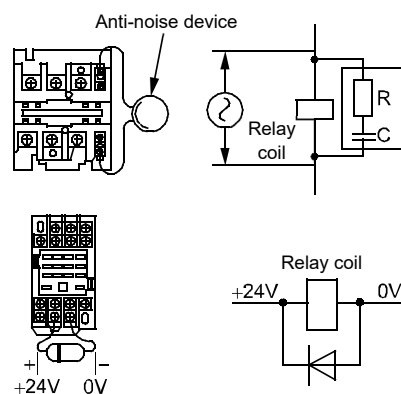
Countermeasure examples for noise sources are shown below.

1) AC solenoid valve / magnetic switch / relay

[Measure] Install an anti-noise device in parallel with the coil.

2) DC solenoid valve / magnetic switch / relay

[Measure] Install a diode in parallel with the coil or use the diode built-in type.



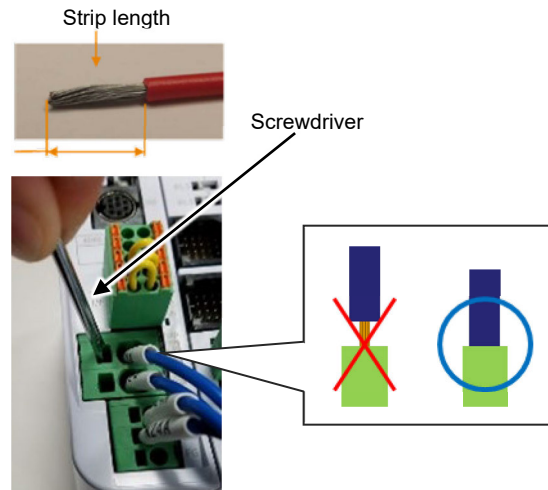
3.2 Wiring

3.2.1 Wiring of LC Unit Power Supply Connector

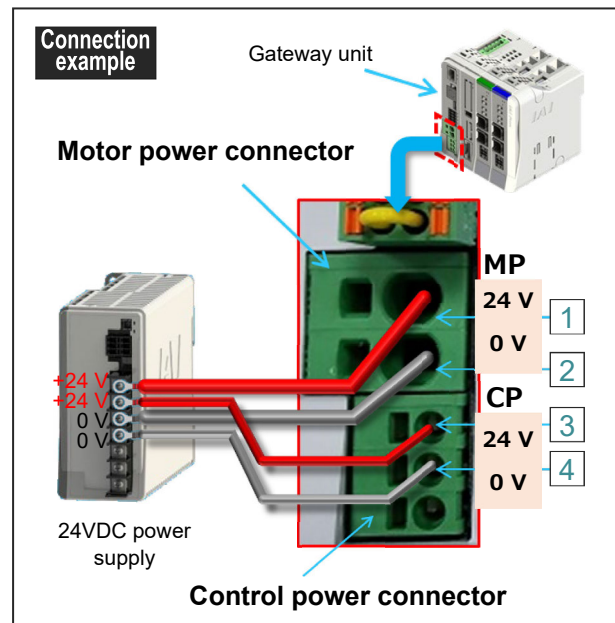
To supply power to the controller, mount the power connector and wire each terminal. Perform 1 to 4 with reference to the figure and connection diagram below.

[Wiring method to 24V power connector]

- (1) Refer to the next page for each wiring diameter.
- (2) The strip length of the wiring is
 - MP: 15 mm
 - CP: 10 mm
- (3) While have a slotted screwdriver inserted and kept in an inlet besides the power plug slots and put the power cables in the terminal inlets.
- (4) Remove the screwdriver.



- 1 Connect the "24 V" of MP (motor power connector) to the +24 V terminal of the 24 VDC power supply.
- 2 Connect the "0 V" of MP (motor power connector) to the 0 V terminal of the 24 VDC power supply.
- 3 Connect the "24 V" of CP (control power connector) to the +24 V terminal of the 24 VDC power supply.
- 4 Connect the "0 V" of CP (control power connector) to the 0 V terminal of the 24 VDC power supply.



[Electric wire diameter used for RCON-LC 24V power supply wiring]

For the wires to be connected to the power connector, use the following applicable wires.

Compatible wire

Signal name		Content	Compatible wire diameter
MP	24V	Motor drive power supply	AWG20 ~ 8 (Copper wire)
	0V		
CP	24V	Control power input	AWG24 ~ 12 (Copper wire)
	0V		
	FG	Frame ground	AWG14 ~ 12 (Copper wire)

* Use cables with their rated temperature on the isolation sheath at 60°C or higher.

The controller current consumption varies depending on the controller model and the motor type of the actuator to be connected. Refer to RCON System instruction manual "Specification Section Chapter 2, 2.3 Specifications/ Power supply capacity".

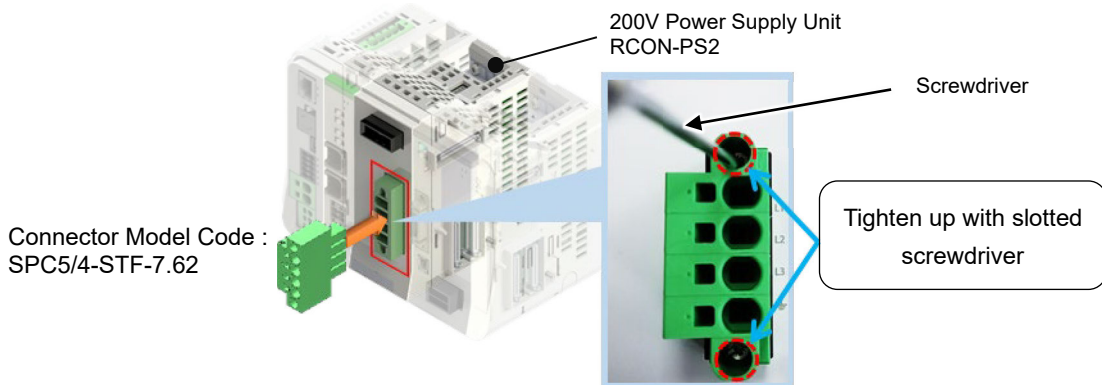
**Caution**

Using a cable with diameter less than the applicable cable diameter or wiring distance too long may cause an error due to the voltage drop or may drop the actuator performance. In such a case, have the output voltage of the power supply adjusted to 24V for the controller supply voltage.

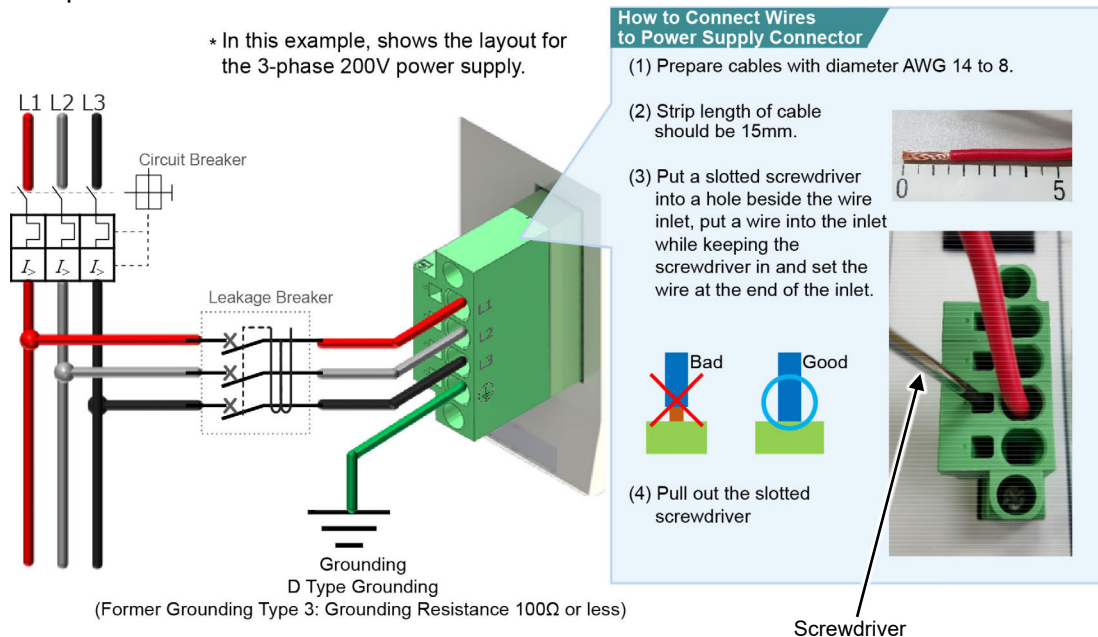
3.2.2 200V Power Supply Wiring to RCON-LC System

Join the power supply connector and connect wires to each terminal in order to supply motor power to the 200V driver unit. See the figure below and the following wiring diagram and have the processes in 1 to 2.

- 1** Insert the power supply connector to the 200V power supply unit (RCON-PS2).



- 2** Connect wires to each terminal. See the example of connection below to have the wiring process.



Caution

- The leakage current may vary depending on the connected motor capacity, cable length and other ambient environment. In case of leakage protection, measure the leakage current at the position to install a leakage breaker.
- A leakage breaker should be selected under a clear purpose such as protection from fire or protection for personnel. Select a leakage breaker applicable for higher harmonics (inverter).

[Electric wire diameter used for RCON-PS2 200V power supply wiring]

For the wires to be connected to the power connector, use the following applicable wires.

Compatible wire

Signal name		Content	Compatible wire
L1	Phase 1	Motor drive power supply	AWG14 ~ 8 (Copper wire)
L2	Phase 2		
L3	Phase 3		
	Protection Grounding		

* Use cables with their rated temperature on the isolation sheath at 60°C or higher.

The controller current consumption varies depending on the controller model and the motor type of the actuator to be connected. Refer to RCON System instruction manual "Specification Section Chapter 2, 2.3 Specifications/ Power supply capacity".

**Caution**

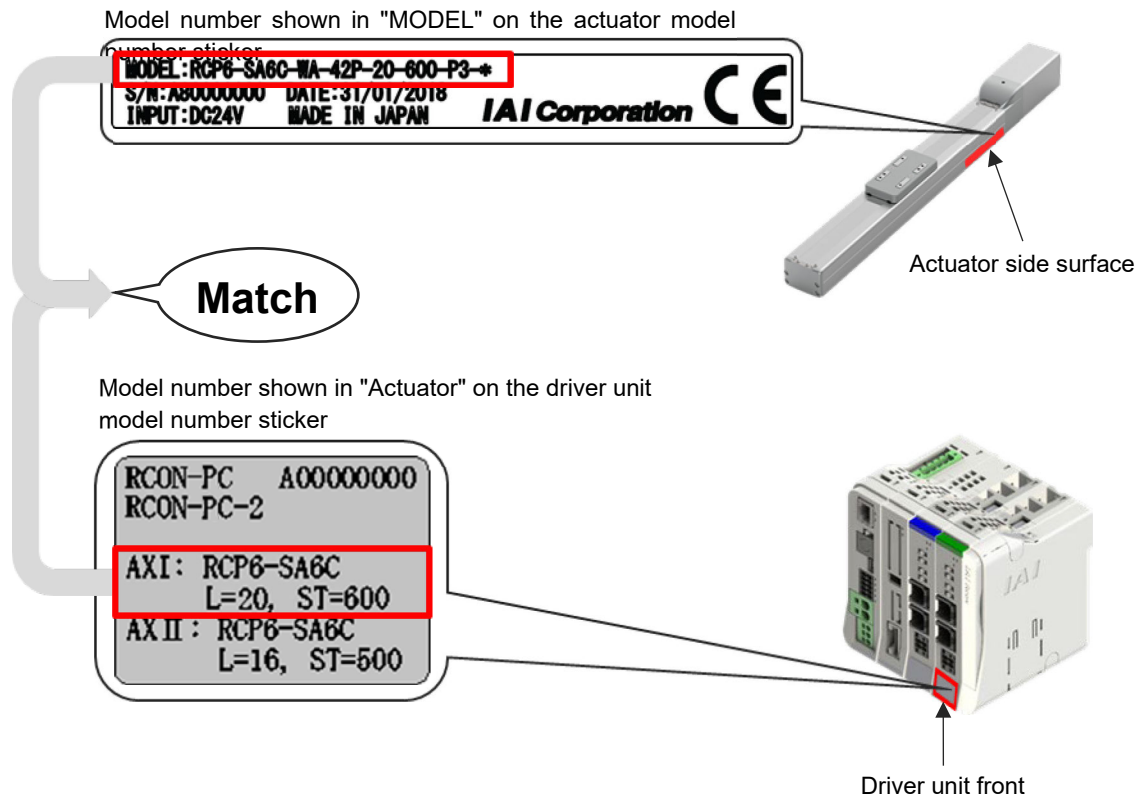
Use wires with diameter large enough for allowable current higher than the current actually used.

Smaller diameter of the cables than applicable could cause abnormal high heat when flowing current. This could melt the coating on cables and set a fire.

3.2.3 Actuator connecting

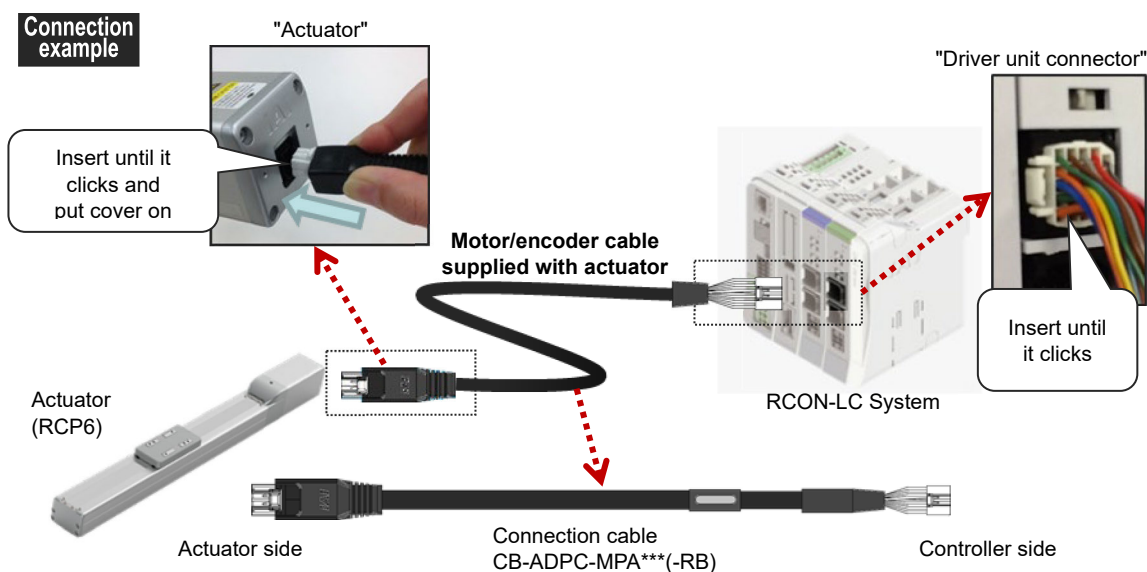
[Checking actuator and driver unit model numbers]

Before connecting the actuator, make sure that the combination with the controller is correct. Connectable actuator models are listed on the model number sticker on the left side of the controller.



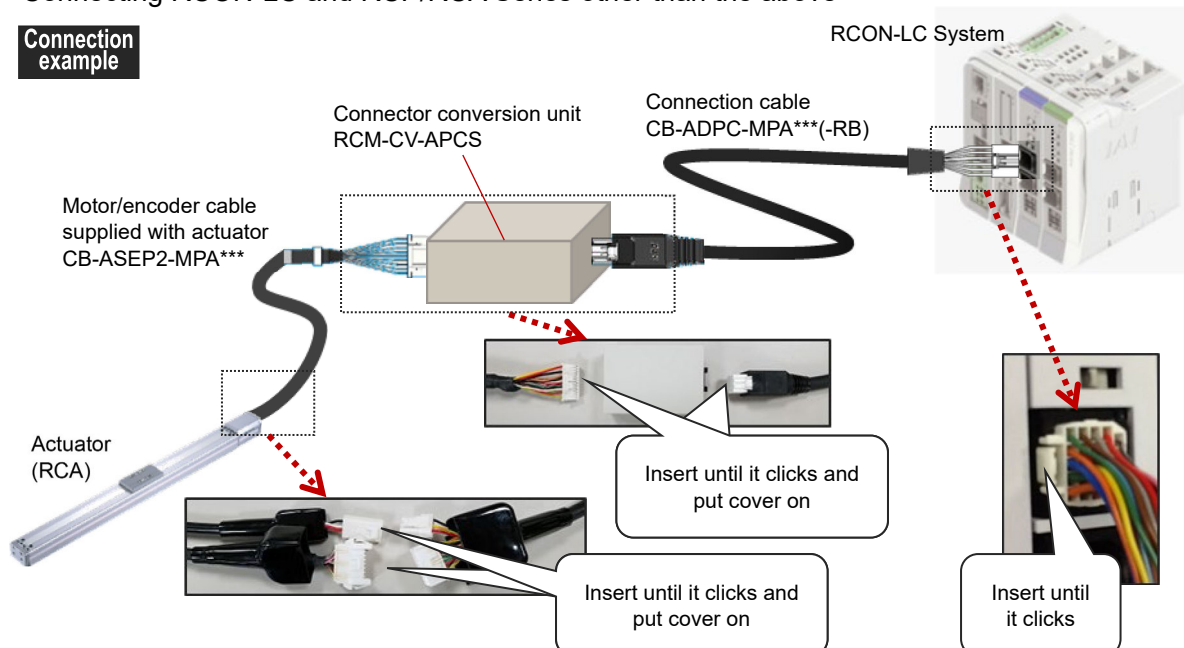
[Connecting motor/encoder cable]

- Connecting RCP6 (other than high thrust) / RCP5 (other than high thrust) / RCD series to RCON-LC

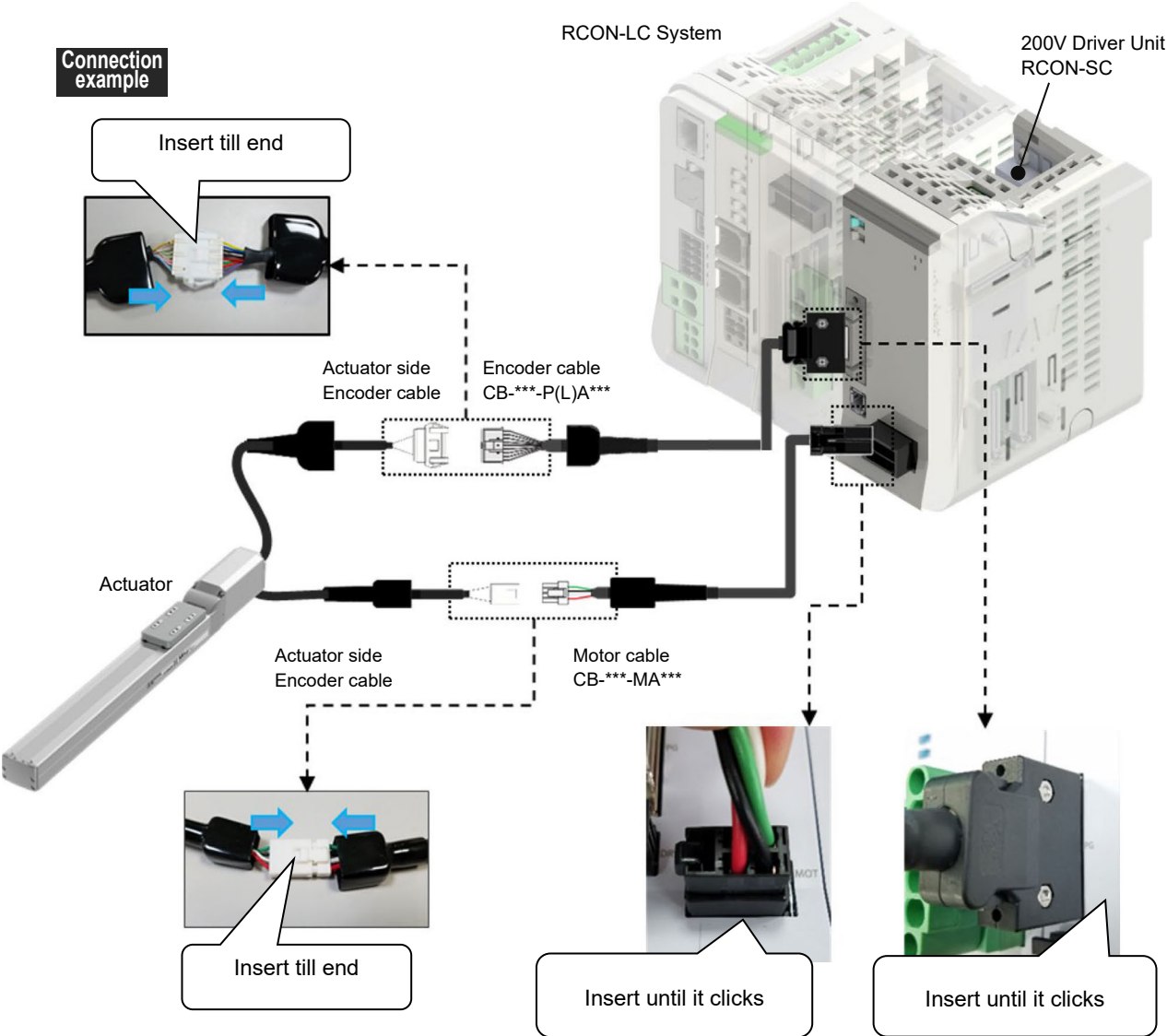
**Caution**

- Precautions when selecting a motor/encoder cable
Depending on the actuator model, conversion cable CB-CAN-AJ002 and connector conversion unit RCM-CV-APCS may be required to connect the driver unit and the simple absolute unit.

- Connecting RCON-LC and RCP/RCA Series other than the above



• Connection between 200V AC Servo-motor Actuator and 200V Driver Unit

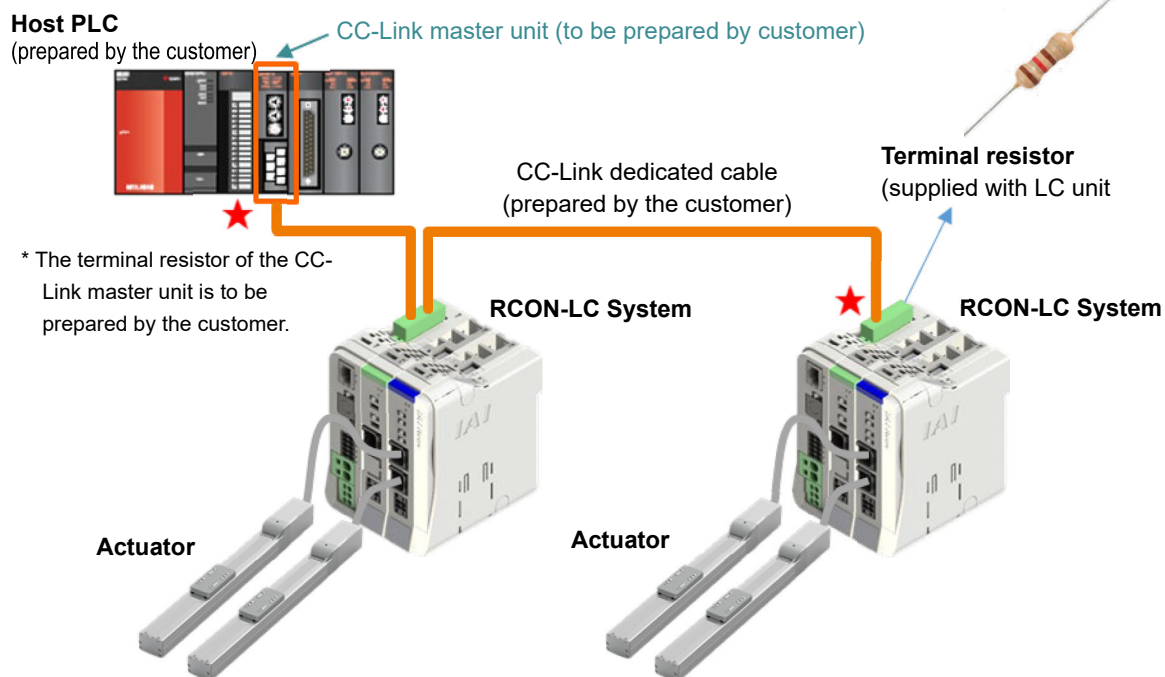


3.2.4 Field network wiring

This manual introduces the example of connecting with a CC-Link master unit with a Mitsubishi Electric PLC as the host PLC.

[Connecting the host PLC and two RCON-LC systems]

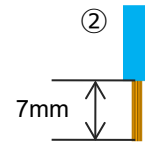
Connection example



[CC-Link dedicated cable and cable connector wiring method]

(1) Prepare a CC-Link dedicated cable.

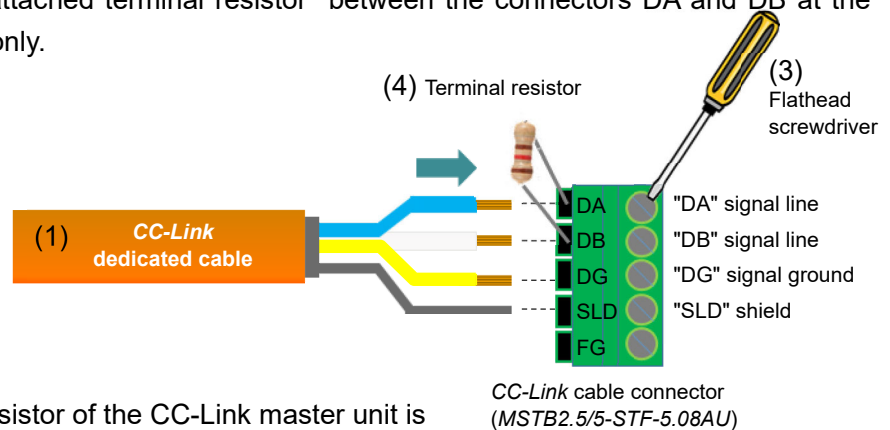
(2) Strip 7mm of insulation from each wire end.



(3) Insert the stripped wiring in the direction of the arrow → in the figure below to the back of the connector and tighten with a flathead screwdriver.

(4) (★ in "Connection image" above)

Attach the controller attached terminal resistor* between the connectors DA and DB at the network terminal end only.



* The terminal resistor of the CC-Link master unit is to be prepared by the customer.

(5) Other CC-Link dedicated cables are wired in the same manner as in (1) to (4).

Point !

- The terminal resistor to be used may differ depending on the CC-Link dedicated cable type.

Cable FANC-SBH (CC-Link dedicated high-performance cable): Terminal resistor: 130 Ω

Cable FANC-SB (CC-Link dedicated cable): Terminal resistor: 110 Ω

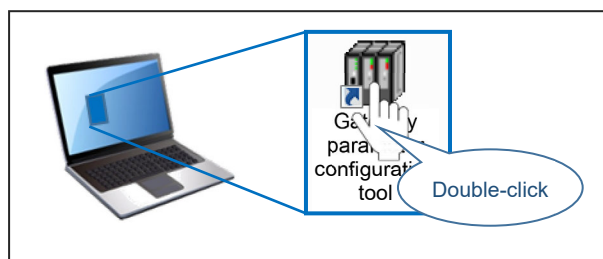
3.3 Configuration

3.3.1 Configuration for Gateway parameter

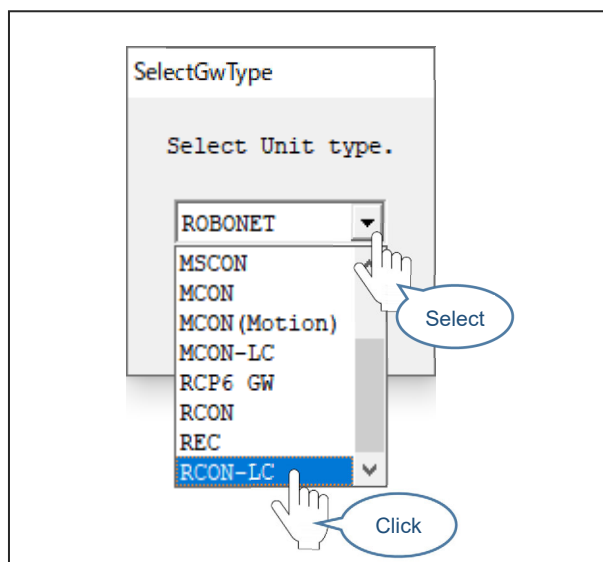
1

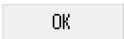
Start up the gateway parameter configuration tool.

- (1) Double click the "Gateway parameter configuration tool" icon.

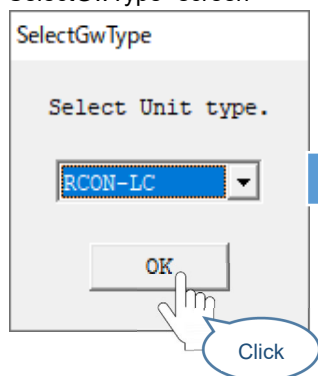


- (2) Select and click "RCON" from "SelectGwType" screen.

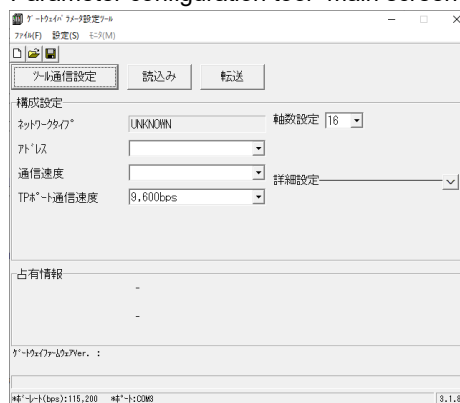


- (3) Clicking  will open the "Parameter configuration tool" main screen.

"SelectGwType" screen



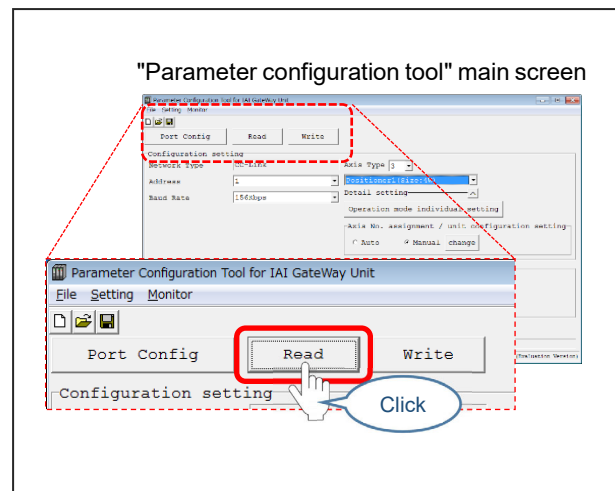
"Parameter configuration tool" main screen



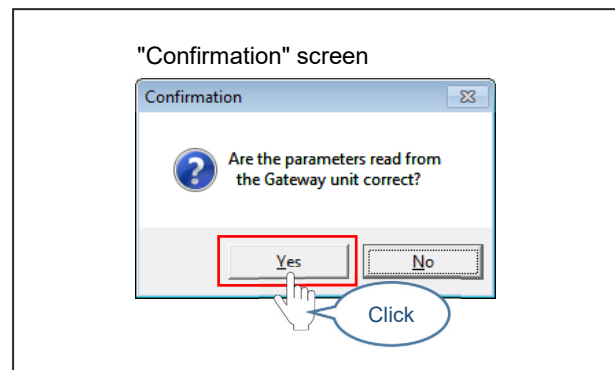
2

Import the parameters.

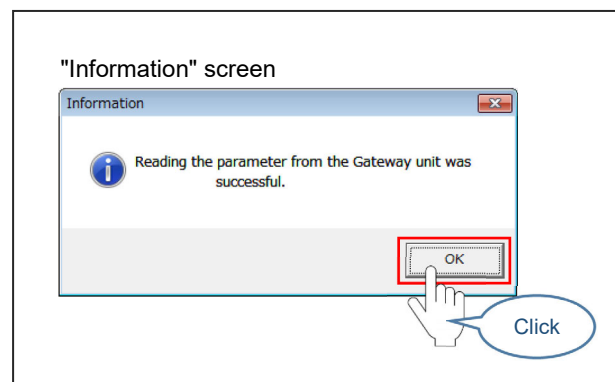
- (1) Click on the "Parameter configuration tool" main screen .



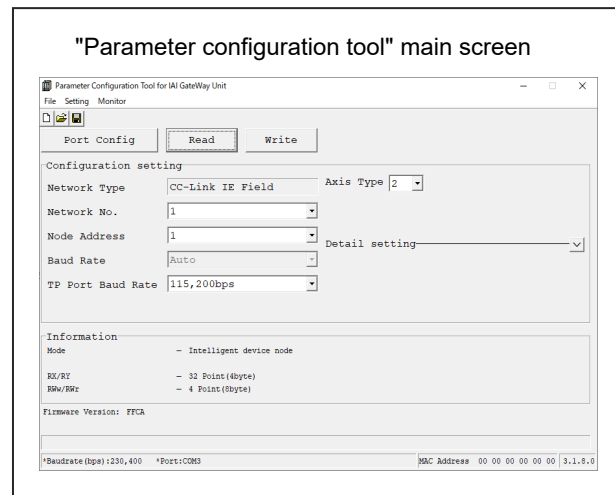
- (2) When the "Confirmation" screen appears, click .



- (3) When the "Information" screen appears, click .



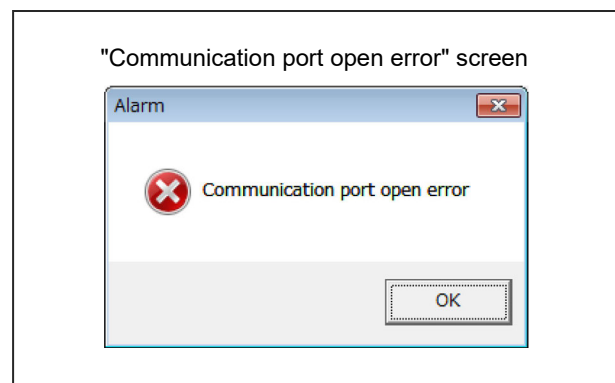
- (4) As shown in the figure on the right, if the parameters in the gateway unit are displayed on the "Parameter configuration tool" main screen, communication has been established.



- (5) If "Communication port open error" screen is displayed when importing parameters, communication connection has failed.

[Causes of communication connection failure]

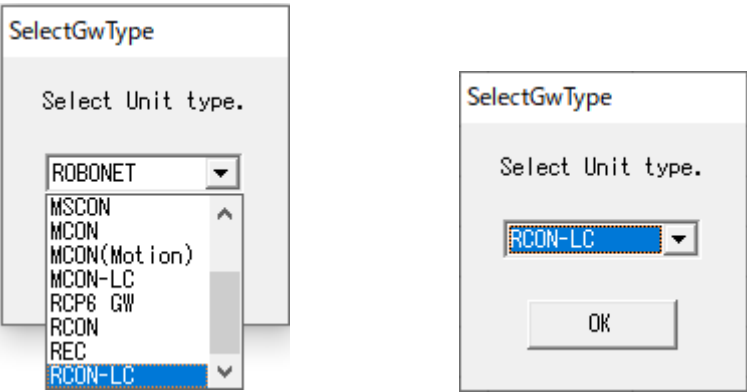
- Mismatched communication port
 - Disconnected communication cable
 - Connection problem of communication cable connector
 - Gateway unit side, PC side malfunction
 - PC software double startup
- may be possible causes.



3.3.2 Gateway parameter configuration tool

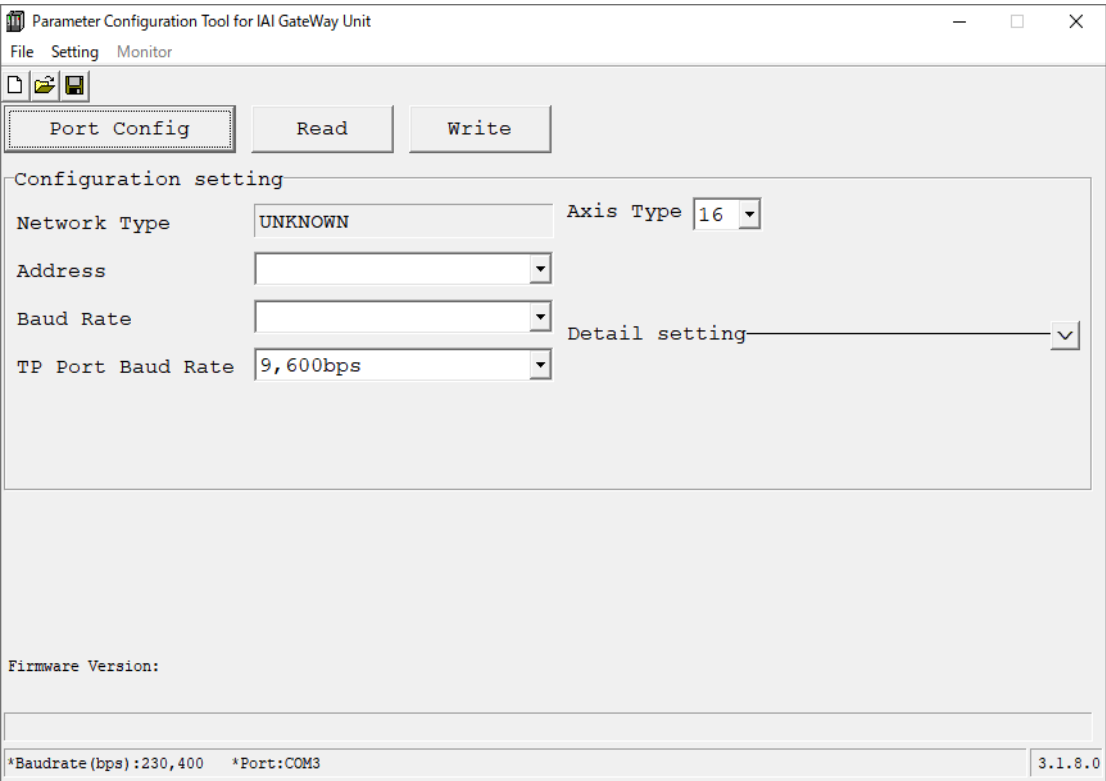
1. Selection of Controller

Open the gateway parameter setting tool.
Select “RCON-LC” and the window for RCON-LC should open.



2. Main Window Initial Display

Read in parameters in the main window (initial state) for RCON-LC selected.



(Figure shows the version V3.1.8.0)

3. Main Window (After Parameters Read in)

Main Window after Parameters (CC-Link IE Field) Read in

Parameter Configuration Tool for IAI GateWay Unit

File Setting Monitor

Port Config Read Write

Configuration setting

Network Type CC-Link IE Field Axis Type 2

Network No. 1

Node Address 1

Baud Rate Auto

TP Port Baud Rate 115,200bps

Detail setting

Information

Mode - Intelligent device node

RX/RX - 32 Point(4byte)

RWw/RWw - 4 Point(8byte)

Firmware Version: FFCA

*Baudrate(bps):230,400 *Port:COM3 MAC Address 00 00 00 00 00 00 3.1.8.0

Data of “Configuration setting” and “Occupation information” should be displayed.

Difference from RCON System

[Configuration setting]

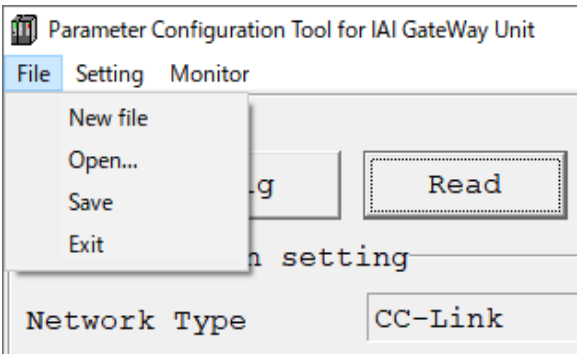
- Minimum axis quantity available to connect is 0
- Setting of TP port baud rate available
- Operation mode setting removed as it is to be set in DFC Commands
- Option unit are supported, but no setting for number of units (because gateway unit can automatically write in number of connected units)

[Occupation information]

- Displayed when read out from gateway in connection
(Should not be displayed when file edit)

4. File Menu

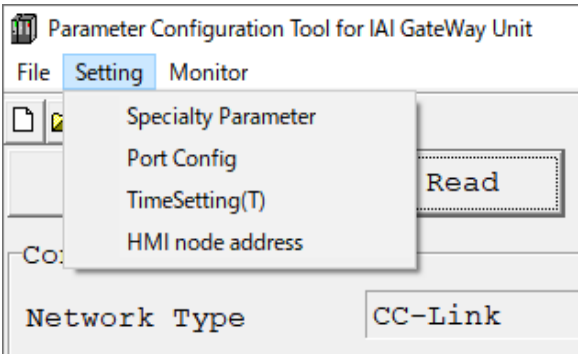
There is no difference from RCON System for the file menu.



5. Setting Menu

“Stations for Display (H)” should be added in the Setting menu.

Refer to 9. Stations for Display



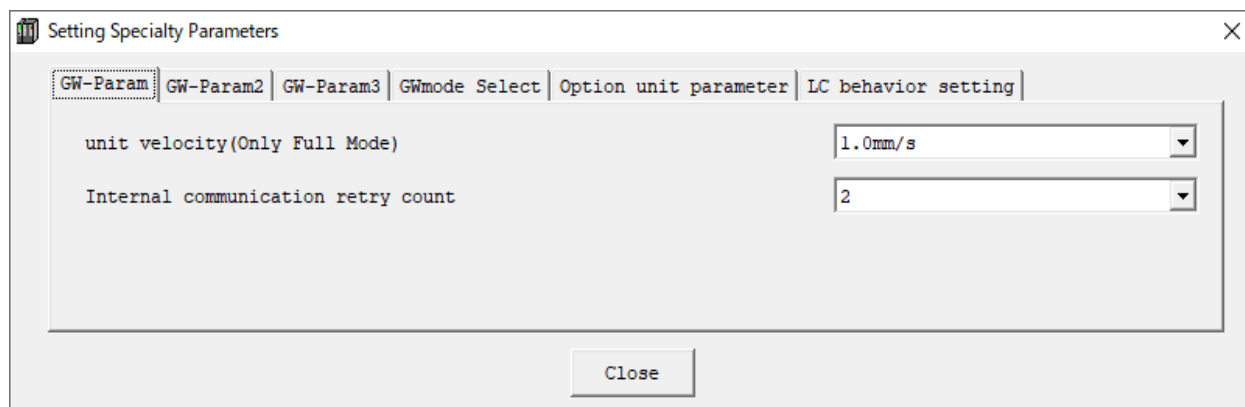
5-1. Special Parameters

The parameters added in RCON-LC System are the two shown below.

Tab/Parameter	Selection
[Option Unit Parameter] tab • Communication error option unit output status latch	[Inactivate] [Activate]
Select whether to clear the output data on PIO unit side [Inactivate] or to retain it [Activate] when an error occurred between LC Unit and PIO Unit (including PIO/SIO/SCON Connection Unit).	
[LC Operation Setting] tab • LC STOP OM domain output status latch	[Inactivate] [Activate]
Select whether to clear the OM Y Domain [bit memory: for output assignment] (refer to 4.1.2) [Inactivate] or to retain it [Activate] when PLC feature changed to STOP.	

Images of each tab in the special parameter window are shown in the following. (6 images)

[GWParameter]



Setting Specialty Parameters

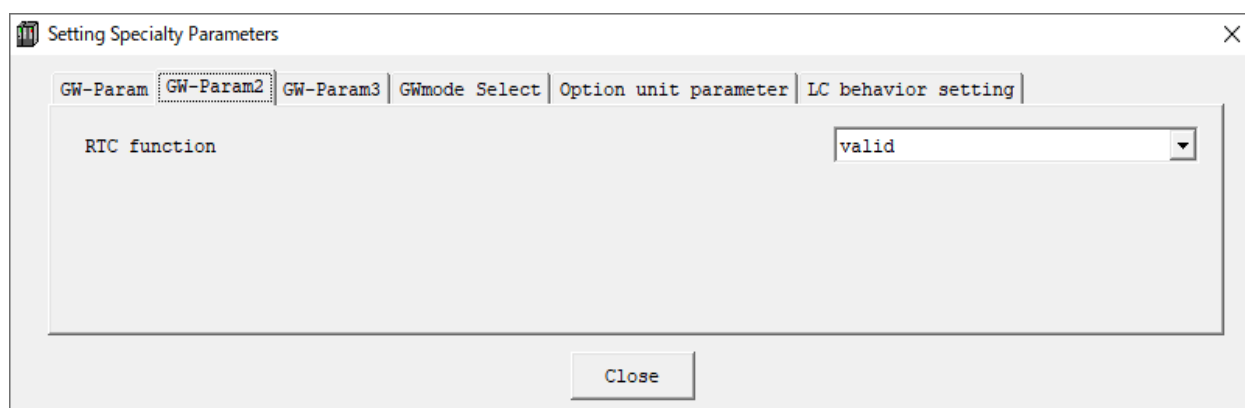
GW-Param | GW-Param2 | GW-Param3 | GWmode Select | Option unit parameter | LC behavior setting

unit velocity(Only Full Mode) 1.0mm/s

Internal communication retry count 2

Close

[GW Parameter 2]



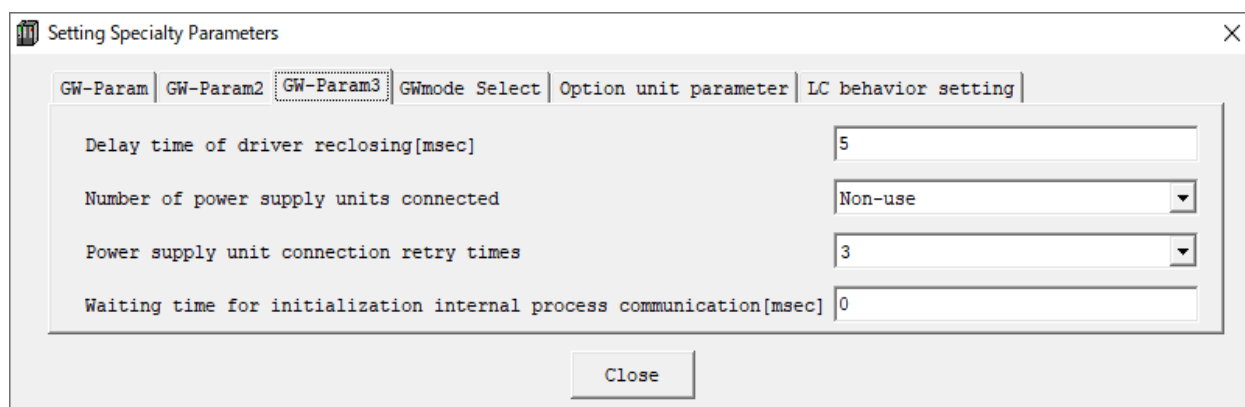
Setting Specialty Parameters

GW-Param | GW-Param2 | GW-Param3 | GWmode Select | Option unit parameter | LC behavior setting

RTC function valid

Close

[GW Parameter 3]



Setting Specialty Parameters

GW-Param | GW-Param2 | GW-Param3 | GWmode Select | Option unit parameter | LC behavior setting

Delay time of driver reclosing[msec] 5

Number of power supply units connected Non-use

Power supply unit connection retry times 3

Waiting time for initialization internal process communication[msec] 0

Close

[GW mode Select]

Setting Specialty Parameters

GW-Param

GW-Param2

GW-Param3

GWmode Select

Option unit parameter

LC behavior setting

Enable SW

invalid

BYTE swap

invalid

WORD swap in D-WORD Data

invalid

Close

[Option unit parameter]

Setting Specialty Parameters

GW-Param

GW-Param2

GW-Param3

GWmode Select

Option unit parameter

LC behavior setting

Option unit output status latch during communication error

invalid

Close

[LC behavior setting]

Setting Specialty Parameters

GW-Param

GW-Param2

GW-Param3

GWmode Select

Option unit parameter

LC behavior setting

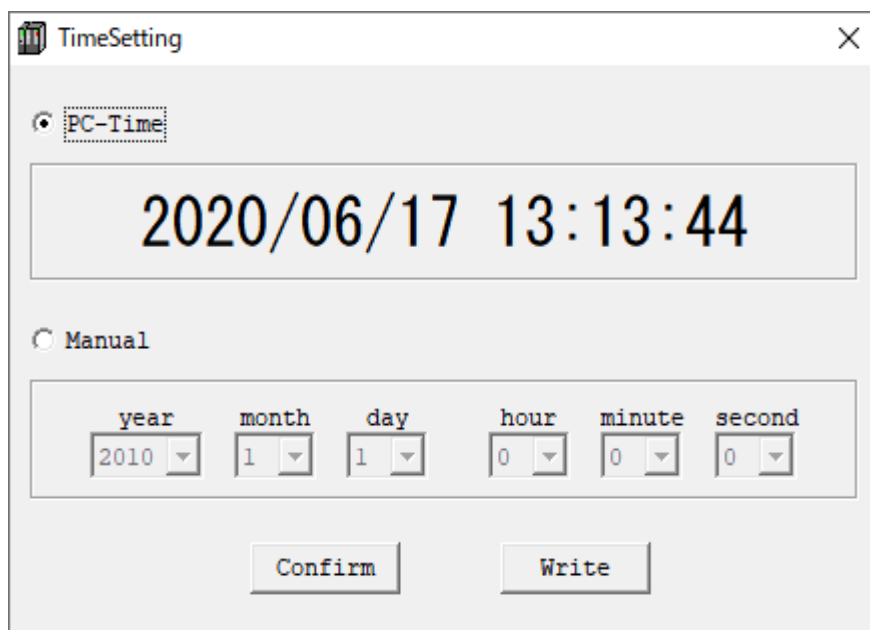
OM area output status latch at LC STOP

invalid

Close

5-2. Time setting

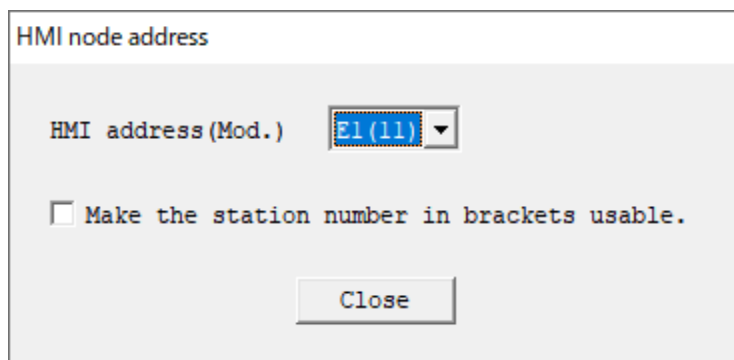
There is no difference from RCON System in the time setting window.



The TimeSetting window has a title bar with a close button. It contains two radio buttons: "PC-Time" (selected) and "Manual". Below "PC-Time" is a large display showing the date and time "2020/06/17 13:13:44". Below "Manual" are six dropdown menus for "year", "month", "day", "hour", "minute", and "second", with values "2010", "1", "1", "0", "0", and "0" respectively. At the bottom are "Confirm" and "Write" buttons.

5-3. HMI node address

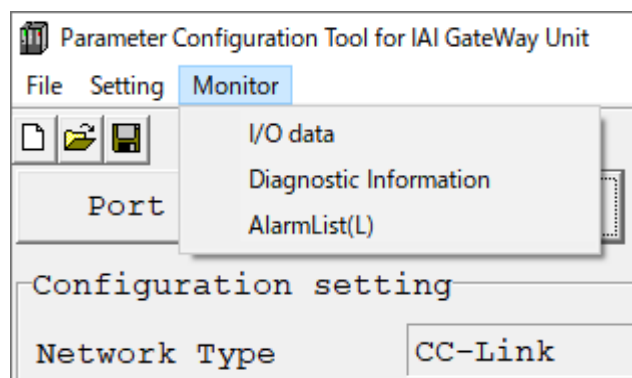
Setting is available only for RCON-LC System.



The HMI node address window has a title bar. It contains a label "HMI address (Mod.)" next to a dropdown menu showing "E1(11)". Below this is a checkbox labeled "Make the station number in brackets usable." which is unchecked. At the bottom is a "Close" button.

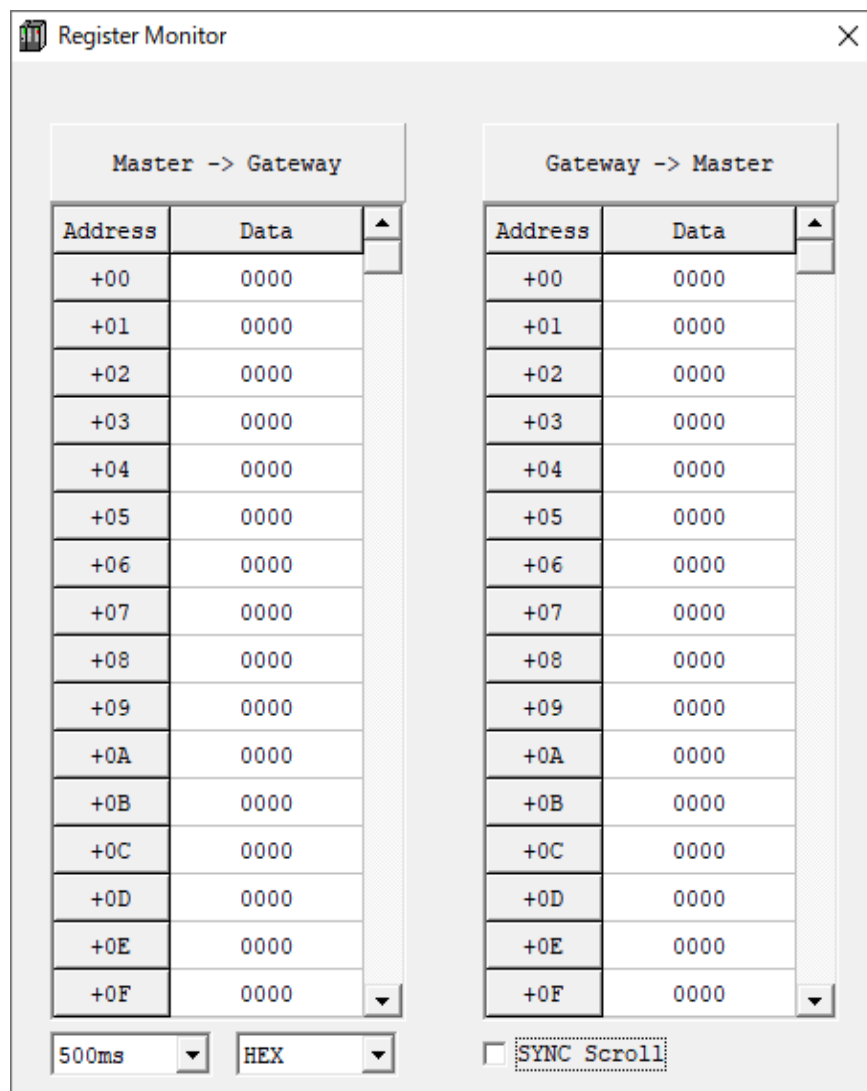
6. Monitor menu

There is no difference from RCON System in the monitor menu.



6-1. I/O data

There is no difference from RCON System in the register monitor window.



6-2. Diagnostic information

There is no difference from RCON System in the diagnostic information window.

Diagnostic Information

Driver Unit

scan time[msec]	1	Clear Clear Clear
ERR_T counter	0	
ERR_C counter	0	
EMG counter	1	

Option Unit

scan time[msec]	5
Number of times communication error occurred	0

6-2. AlarmList

There is no difference from RCON System in the alarm list window.

AlarmList

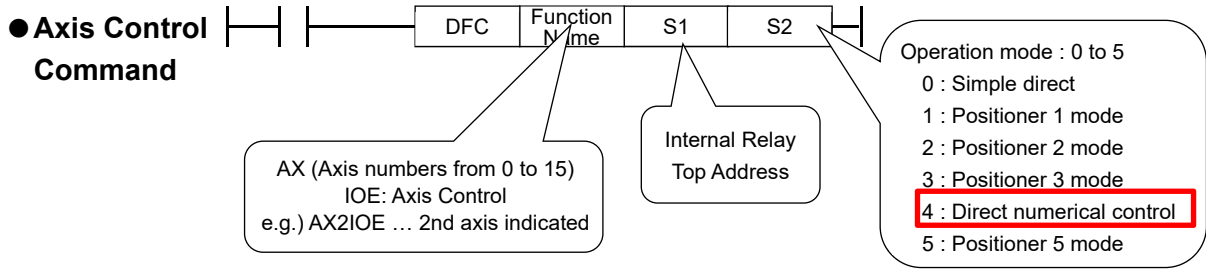
Record	Code	Content	Detail	Address	OccTime
0	8BA	Mismatch Number of axis / Operation mode.	----	----	2020/06/17 11:57:26
1	8BA	Mismatch Number of axis / Operation mode.	----	----	2020/06/15 6:52:41
2	FFF	Power up (not error)	----	----	2020/06/15 6:52:36
3	8BA	Mismatch Number of axis / Operation mode.	----	----	2020/06/15 6:51:34
4	8DE	Driver unit communication error	----	----	2020/06/10 15:59:52
5	8DD	Unit connection confirmation signal error	----	----	2020/06/10 15:59:52
6	8BA	Mismatch Number of axis / Operation mode.	----	----	2020/06/09 0:11:29
7	8BA	Mismatch Number of axis / Operation mode.	----	----	2020/06/09 0:05:50
8	8BA	Mismatch Number of axis / Operation mode.	----	----	2020/06/08 14:14:36
9	8BA	Mismatch Number of axis / Operation mode.	----	----	2020/06/07 23:25:18
10	8BA	Mismatch Number of axis / Operation mode.	----	----	2020/06/07 23:24:34
11	8BA	Mismatch Number of axis / Operation mode.	----	----	2020/06/07 23:23:41
12	8BA	Mismatch Number of axis / Operation mode.	----	----	2020/06/07 23:21:45
13	8BA	Mismatch Number of axis / Operation mode.	----	----	2020/06/07 16:39:33
14	8BA	Mismatch Number of axis / Operation mode.	----	----	2020/06/06 22:40:23
15	8BA	Mismatch Number of axis / Operation mode.	----	----	2020/06/05 14:56:48

Buttons: Refresh, Clear, Save

3.4 Operation mode

The operation mode should be set in Axis Control Command in the DFC commands. (Select from the six types below)

The way to set it up, refer to 4.2.3 (1) or Axis Control Command in LC System Programming Manual (ME0329).



S2	0	1	2	3	4	5
Mode	Simple direct	Positioner 1	Positioner 2	Positioner 3	Direct numerical control	Positioner 5
Number of positioning points	Unlimited	128 points	128points	128 points	Unlimited	16 points
Home return motion	○	○	○	○	○	○
Positioning operation	○	△	△	△	○	△
Speed, acceleration/ deceleration settings	△	△	△	△	○	△
Different acceleration and deceleration settings	△	△	△	△	×	△
Pitch feed (Incremental)	△	△	△	×	○	△
JOG operation	△	△	△	×	△	△
Position data Reading Signal	×	○	○	×	×	×
Push-motion operation	△	△	△	△	○	△
Speed changes while traveling	△	△	△	△	○	△
Pausing	○	○	○	○	○	○
Zone signal output	△ (2 points)	△ (2 points)	△ (2 points)	△ (1 points)	△ (2 points)	△ (2 points)
Position zone signal output	△	△	△	×	×	×
Overload warning output	○	○	○	×	○	○
Vibration control	△	△	△	△	×	△
Collision Detection Feature	△	△	△	△	×	△
Present position reading (Resolution)	○ (0.01mm)	○ (0.01mm)	×	×	○ (0.01mm)	○ (0.1mm)

* ○: Direct setting is possible, △: Position data or parameter input is required, ×: The operation is not supported.

RCON - LC

Chapter 4

PLC Features

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Refer to the following instruction manual for details of how to create a ladder program, basic commands, advanced commands and how to operate when operation is to be made with a ladder program on an actuator connected to the RCON-LC controller.

Product name	Manual name	Control number
LC System programming Manual	Instruction Manual	ME0329

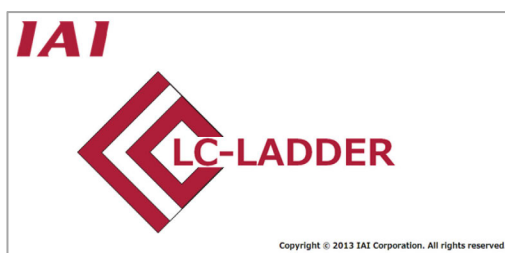


Also, refer to the following instruction manual for how to operate the ladder edit software.

Product name	Manual name	Control number
LC System Ladder Edit Software Manual	Instruction Manual	ME0330



[ladder edit software] LC-LADDER (LC-LDS-01)



The version applicable for RCON-LC in the ladder edit software is Ver. 1.05.000 or later.

The ladder edit software is available for download in IAI homepage.

Homepage Address: www.iai-robot.co.jp/download/pcsoft/click-ladder/

4.1 Device Memory

In RCON-LC, the device memories are called MO. MO should be classified to three types, bit memories, word memories and pointers. A bit memory has data volume of 1 bit while a word memory has that of 16 bits (2 bytes). A pointer does not have data. The number available for use in each MO and RCON-LC as well as the number available for use in existing models are as shown below.

Detail of OM and Numbers Available for Use in each Feature

OM Name	OM Type	Purpose	Memory Quantity (Decimal)
X	Bit Memory Data Volume: 1 Bit	For Input Assignment	128
Y		For Output Assignment	128
M		For General	3072
LM		For Retention	256
AM		For Axis Control Command Assignment	4096
SM		For System	128
TS		Timer Contact Status	64
TC		Timer Output Status	64
CS		Counter Contact Status	64
CC		Counter Output Status	64
IX	Word Memory Data Volume: 16 Bit	For Index	2
D		For General	128
SD		For System	64
TV		Timer Current Value	64
TP		Timer Setting Value	64
CV		Counter Current Value	64
CP		Counter Setting Value	64
L	Pointer Data Volume: None	For Indication of Destination to Jump for JE, JMP, CALL Commands	256

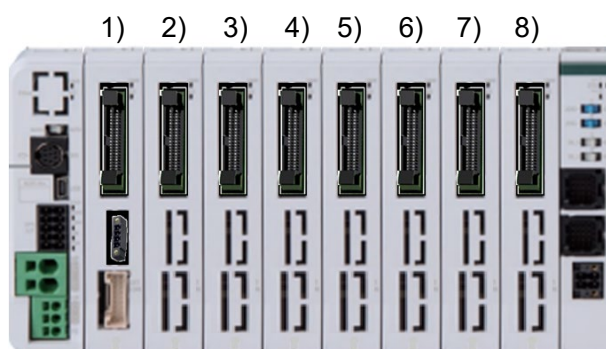
For details regarding the device memory and how to describe, refer to LC Programming Manual (ME0329) and Ladder Edit Software Manual (ME0330).

4.1.1 OM_X [Bit Memory : For Input Assignment]

OM_X is to be assigned with the extension PIO inputs. The order of assignments should be from the nearest to LS Unit. Assign from the nearest with no blank. The relation between X and PIO connector when assignment was made from the nearest to LC Unit to the PIO connector (input 16 points/ output 16 points) should be as shown below.

Relation between PIO Connector Position and X Assignment

Position	X Assignment (Hexadecimal)
1)	X000 to X00F
2)	X010 to X01F
3)	X020 to X02F
4)	X030 to X03F
5)	X040 to X04F
6)	X050 to X05F
7)	X060 to X06F
8)	X070 to X07F

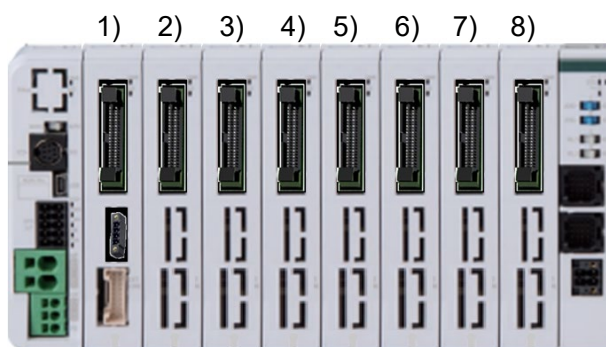


4.1.2 OM_Y [Bit Memory : For Output Assignment]

OM_Y is to be assigned with the extension PIO outputs. Alike OM-X, the order of assignments should be from the nearest to LS Unit. Assign from the nearest with no blank. The relation between Y and PIO connector when assignment was made from the nearest to LC Unit to the PIO connector (input 16 points/ output 16 points) should be as shown below.

Relation between PIO Connector Position and Y Assignment

Position	X Assignment (Hexadecimal)
1)	Y000 to Y00F
2)	Y010 to Y01F
3)	Y020 to Y02F
4)	Y030 to Y03F
5)	Y040 to Y04F
6)	Y050 to Y05F
7)	Y060 to Y06F
8)	Y070 to Y07F



4.1.3 OM_M [Bit Memory : For General]

OM_M is a bit memory that is free for use in purpose of e.g. each types of contacts and coils. There are 3072 points available from M0 to M3071.

4.1.4 OM_LM [Bit Memory : For Retention]

OM_LM is a bit memory that retains data even in power shutoff. Use in the same manner as M is available and there are 256 points available from LM0 to LM255. As a process to retain data is to be executed after one scan of the ladder program is completed, it is necessary to be aware that the data just before the power shutoff may be different from the retained data depending on the timing of the power shutoff.

4.1.5 OM_AM [Bit Memory : For Axis Control Command Assignment]

RCON-LC is capable to have the maximum number of connectable axis at 16 axes. When Axis Control Command in DFC Command is indicated to all of the 16 axes in the direct numerical mode, it is necessary to occupy $256 \text{ (number of bit OM points necessary for direct numerical indication assignment)} \times 16 \text{ (number of axes)} = 4096$ points of bit memories. As the number of axes is not enough with the existing M only, we newly prepared AM for RCON-LC. There are 4096 points available from AM0 to AM 4095. Although it is named as that for the axis control command, it is available for use in the same manner as M (general bit memories).

4.1.6 OM_SM [Bit Memory : For System]

Bit memories for system are to be assigned with system data as shown below. There are 128 points available from SM0 to SM127.

Relation between SM Signals and System Data Assignment (1/2)

Address (Decimal)	Assignment Details	Remarks
SM0	Always-on Flag	
SM1	1st Scan Flag	
SM2	Calculation Error Flag	Turns on when error occurred while ladder executed An error code should be stored in SD2 and error step in SD3.
SM3	Carry Flag	Turns on when STC Command used and off when CLC Command used
SM4-9	Reserved	
SM10	0.1-second Clock	Reversed every 0.1sec
SM11	0.2-second Clock	Reversed every 0.2sec
SM12	1-second Clock	Reversed every 1sec
SM13	User Clock	Gets reversed at the timing indicated in SD13
SM14-15	Reserved	
SM16	PIO Unit 0_I/O Power supply Voltage Drop	External I/O power supply voltage drop on 1st PIO unit counted from LC unit side: On
SM17	PIO Unit 1_I/O Power supply Voltage Drop	External I/O power supply voltage drop on 2nd PIO unit counted from LC unit side: On
SM18	PIO Unit 2_I/O Power supply Voltage Drop	External I/O power supply voltage drop on 3th PIO unit counted from LC unit side: On
SM19	PIO Unit 3_I/O Power supply Voltage Drop	External I/O power supply voltage drop on 4th PIO unit counted from LC unit side: On
SM20	PIO Unit 4_I/O Power supply Voltage Drop	External I/O power supply voltage drop on 5th PIO unit counted from LC unit side: On
SM21	PIO Unit 5_I/O Power supply Voltage Drop	External I/O power supply voltage drop on 6th PIO unit counted from LC unit side: On
SM22	PIO Unit 6_I/O Power supply Voltage Drop	External I/O power supply voltage drop on 7th PIO unit counted from LC unit side: On
SM23	PIO Unit 7_I/O Power supply Voltage Drop	External I/O power supply voltage drop on 8th PIO unit counted from LC unit side: On
SM24-31	Reserved	
SM32	Reserved	Setting is to be established in GW Parameter for RCON-LC while it was in the output retaining setting at stop (output retained at stop: on, output compulsorily off at stop: off) for previous models.
SM33-39	Reserved	
SM40	Power Supply Unit 0_Link Status	In link: On Turns on when the communication between RCON-LC and The power supply unit is established in normal condition and RCON-LC is identified as valid.
SM41	Power Supply Unit 1_Link Status	
SM42	Power Supply Unit 2_Link Status	
SM43	Power Supply Unit 3_Link Status	
SM44	Power Supply Unit 4_Link Status	
SM45-47	Reserved	
SM48	Power Supply Unit 0_Fan Warning	In Fan Warning: On The fan warning should occur when fan revolution is dropped by 30%.
SM49	Power Supply Unit 1_Fan Warning	
SM50	Power Supply Unit 2_Fan Warning	
SM51	Power Supply Unit 3_Fan Warning	
SM52	Power Supply Unit 4_Fan Warning	
SM53-55	Reserved	
SM56	Power Supply Unit 0_Fan Error	In Fan Error: On The fan error should occur when fan revolution is dropped by 50%.
SM57	Power Supply Unit 1_Fan Error	
SM58	Power Supply Unit 2_Fan Error	
SM59	Power Supply Unit 3_Fan Error	
SM60	Power Supply Unit 4_Fan Error	
SM61-63	Reserved	

Relation between SM Signals and System Data Assignment (2/2)

Address (Decimal)	Assignment Details	Remarks
SM64-71	Gateway Alarm	With SM71 on the top, the last two digits of gateway alarm code to be assigned
SM72	SEMG: System in Emergency Stop	Emergency stop by EMC terminal on gateway board
SM73	Reserved	
SM74	ALML: Gateway Board in Light Malfunction	Turns on when gateway alarm in level available to continue operation generated
SM75	ALMH: Gateway Board in Critical Malfunction	Turns on when gateway alarm in cold start level generated
SM76	RMDS: MODE Switch in MANU	MANU: On AUTO: Off
SM77	TER: Driver Communication Error Occurred	Turns on when gateway alarm 8DD or 8DE generated 8DD: Unit Connectivity Error 8DE: Driver Unit_Total Frame Irregular Communication Error
SM78	CER: Fieldbus Error Occurred	Turns on when gateway alarm 850 generated 850: Fieldbus Communication Error
SM79	On When Power Supplied	A bit with no special meaning, established to make it same specifications as MCON-LC
SM80	Axis 0 in Light Malfunction	Turns on when axis maintenance alarm generated The maintenance alarm indicates the driver board alarm codes 048, 04E, 04F and 06B.
SM81	Axis 1 in Light Malfunction	
SM82	Axis 2 in Light Malfunction	
SM83	Axis 3 in Light Malfunction	
SM84	Axis 4 in Light Malfunction	
SM85	Axis 5 in Light Malfunction	
SM86	Axis 6 in Light Malfunction	
SM87	Axis 7 in Light Malfunction	Turns on when an axis exists
SM88	Axis 0 in Link	
SM89	Axis 1 in Link	
SM90	Axis 2 in Link	
SM91	Axis 3 in Link	
SM92	Axis 4 in Link	
SM93	Axis 5 in Link	
SM94	Axis 6 in Link	Turns on when axis maintenance alarm generated The maintenance alarm indicates the driver board alarm codes 048, 04E, 04F and 06B.
SM95	Axis 7 in Link	
SM96	Axis 8 in Light Malfunction	
SM97	Axis 9 in Light Malfunction	
SM98	Axis 10 in Light Malfunction	
SM99	Axis 11 in Light Malfunction	
SM100	Axis 12 in Light Malfunction	
SM101	Axis 13 in Light Malfunction	Turns on when an axis exists
SM102	Axis 14 in Light Malfunction	
SM103	Axis 15 in Light Malfunction	
SM104	Axis 8 in Link	
SM105	Axis 9 in Link	
SM106	Axis 10 in Link	
SM107	Axis 11 in Link	
SM108	Axis 12 in Link	
SM109	Axis 13 in Link	
SM110	Axis 14 in Link	
SM111	Axis 15 in Link	
SM112-127	Reserved	

4.1.7 OM_IX [Word Memory : For Index]

OM_IX is a word memory to have the index indication. There are two points, IX0 and IX1 available for use.

<Example of Use>

If you describe D0IX0 and set 5 to IX0, D0IX0 should indicate D5.

4.1.8 OM_D [Word Memory : For General]

OM_D is a word memory available for each type commands. There are 128 points available for use from D0 to D127.

4.1.9 OM_SD [Word Memory : For System]

System data should be assigned to the word memories for system as shown below. There are 64 points from SD0 to SD63. SD numbers and assignment of system data are as shown below.

Relation between SD Numbers and Assignment of System Data

Address (Decimal)	Details of System Data Assignment	Remarks
SD0-1	Reserved	
SD2	Error Code	Set a value when SM2 turns on
SD3	Error Step	Set a value when SM2 turns on
SD4-9	Reserved	
SD10	Min. Scan Time (msec)	
SD11	Current Scan Time (mse)	
SD12	Max. Scan Time (msec)	
SD13	SM13 User Lock Pitch (× 10msec)	
SD14-15	Reserved	
SD16-63	DFC0 to 47 Completion Codes	Completed in normal condition: 1 When error occurred: Ladder program error code

4.1.10 OM_T [For Timer]

OM_T is a time-counting memory and there are 64 points of timer available in total from T0 to T63. All the points are a timer in a unit of 10ms. Time setting can be established in the range from 1 to 32767 (10ms to 327670ms). 327670ms should be approximately 5min 27sec.

Contact status can be confirmed in TS, coil status in TC, current value in TV and setting value in TP.

4.1.11 OM_C [For Counter]

OM_C is a count measuring memory and there are 64 points of counter available in total from C0 to C63. Counter setting can be established in the range from 1 to 32767.

Contact status can be confirmed in CS, coil status in CC, current value in CV and setting value in CP.

4.1.12 OM_L [For Indication of Destination to Jump for JE, JMP, CALL Commands]

It is the memories used to indicate the destination to jump in JE, JMP and CALL Commands. They do not have data. If L255 is indicated, it jumps to END Command. (L255 is not available in CALL Command.)

L0 indicates the initialization-dedicated routine, and if it is described in a ladder program, the first one scan executes only the routine indicated in L0.

4.1.13 OM Modbus Address

RCON-LC permits access to OM using Modbus.

The ranges of the register address and the coil address for each OM are as shown below. For the details of each address, refer to the address table for RCON-LC_Modbus.

OM_Modbus Address

OM Name	Register Address Range (Hexadecimal)	Coil Address Range (Hexadecimal)	Read/Write Type
X	1020 to 102F	1000 to 10FF	R
Y	1040 to 104F	1200 to 12FF	R/W
M	1100 to 11BF	1E00 to 29FF	R/W
LM	1200 to 120F	2E00 to 2EFF	R/W
AM	1600 to 16FF	4F00 to 5EFF	R/W
SM	1300 to 1307	3E00 to 3E7F	R
TS	1310 to 1313	3F00 to 3F3F	R
TC	1350 to 1353	4300 to 433F	R
CS	1390 to 1393	4700 to 473F	R
CC	13D0 to 13D3	4B00 to 4B3F	R
IX	1000 to 1001		R
D	1410 to 148F		R/W
SD	1490 to 14CF		R
TV	14D0 to 150F		R
TP	1510 to 154F		R
CV	1550 to 158F		R
CP	1590 to 15CF		R

For bit memories, coil addresses are set so access can be made bit by bit. Y, M, LM, AM and D are capable for writing. Other OM are capable only for reading. As L does not have a value, Modes address assignment is not capable.

4.2 Commands

RCON-LC has commands which are broadly divided into three types. One is the basic commands that are to have ladder contact and output operation, another is the application commands to process data and the other is DFC commands to perform processes related to axis control and FB. Shown below is about each command.

For the details of operation and how to describe for each command, refer to LC Programming Manual (ME0329).

4.2.1 Basic Commands

There are 25 types of the basic commands

List of Basic Commands

Command Type	Command Name
Contact Commands	LD, LDN, AND, ANDN, OR, ORN, LDP, LDF, ANDP, ANDF, ORP, ORF
Connection Commands	AND-BLK, OR-BLK, M-PUSH, M-READ, M-POP
Output Commands	OUT, SET, RST, PLS, PLSN, SFT
End Commands	END, ENDS

4.2.2 Application Commands

There are 56 types of the application commands.

List of Application Commands

Command Type	Command Name
Data Comparison	=, >=, <=, >, <, <>
Arithmetic Operation	+, -, *, /, B+, B-, B*, B/, INC, DEC
BCD-BIN Conversion	BCD, BIN
Transfer	MOV, MOVN, MCPY, MSET, XCHG
Diverge	JE, JMP, CALL, RET
Logical Operation	LAND, LOR, LXOR, LXNR, NEG
Rotation	ROR, RCR, ROL, RCL
Shift	SHR, SHL, BSHR, BSHL, WSHR, WSHL
Data Process	SUM, DECO, ENCO, BSET, BRST, DDV, DCV
FIFO	FIFW, FIFR
Loop	FOR, NEXT, BREAK
Carry Flag	STC, CLC

4.2.3 DFC Commands

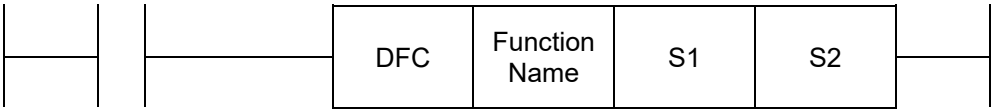
RCON-LC supports the DFC commands (Axis Control Command, Command Transfer between Axis and Driver Command, Fieldbus Communication Command and Positioning Command) and newly supports Fieldbus Communication Command 2. Because it is necessary to have command to each axis for Axis Control Command and Positioning Command, the DFC commands has increased as the number of connected axes increased. There are 34 DFC commands in RCON-LC.

Shown below is a list of relation between the DFC numbers, DFC command details and function names.

List of Relation between DFC Numbers and DFC Commands

DFC No.	Command Detail	Function Name (Default)	Support
0	Axis Control Command (Axis No. 0)	AX0IOE	○
1	Axis Control Command (Axis No. 1)	AX1IOE	○
2	Axis Control Command (Axis No. 2)	AX2IOE	○
3	Axis Control Command (Axis No. 3)	AX3IOE	○
4	Axis Control Command (Axis No. 4)	AX4IOE	○
5	Axis Control Command (Axis No. 5)	AX5IOE	○
6	Axis Control Command (Axis No. 6)	AX6IOE	○
7	Axis Control Command (Axis No. 7)	AX7IOE	○
8	Command Transfer between Axis and Driver Command	CMDIOE	-
9	Fieldbus Communication Command	NWXCHG	○
10	Positioning Command (Axis No. 0)	AX0MVP	○
11	Positioning Command (Axis No. 1)	AX1MVP	○
12	Positioning Command (Axis No. 2)	AX2MVP	○
13	Positioning Command (Axis No. 3)	AX3MVP	○
14	Positioning Command (Axis No. 4)	AX4MVP	○
15	Positioning Command (Axis No. 5)	AX5MVP	○
16	Positioning Command (Axis No. 6)	AX6MVP	○
17	Positioning Command (Axis No. 7)	AX7MVP	○
18	Axis Control Command (Axis No. 8)	AX8IOE	○
19	Axis Control Command (Axis No. 9)	AX9IOE	○
20	Axis Control Command (Axis No. 10)	AX10IOE	○
21	Axis Control Command (Axis No. 11)	AX11IOE	○
22	Axis Control Command (Axis No. 12)	AX12IOE	○
23	Axis Control Command (Axis No. 13)	AX13IOE	○
24	Axis Control Command (Axis No. 14)	AX14IOE	○
25	Axis Control Command (Axis No. 15)	AX15IOE	○
26	Positioning Command (Axis No. 8)	AX8MVP	○
27	Positioning Command (Axis No. 9)	AX9MVP	○
28	Positioning Command (Axis No. 10)	AX10MVP	○
29	Positioning Command (Axis No. 11)	AX11MVP	○
30	Positioning Command (Axis No. 12)	AX12MVP	○
31	Positioning Command (Axis No. 13)	AX13MVP	○
32	Positioning Command (Axis No. 14)	AX14MVP	○
33	Positioning Command (Axis No. 15)	AX15MVP	○
34	Fieldbus Communication Command 2	NWXCHG2	○
35~47	For Future Extension	-	-

Shown below is how to describe DFC Commands.

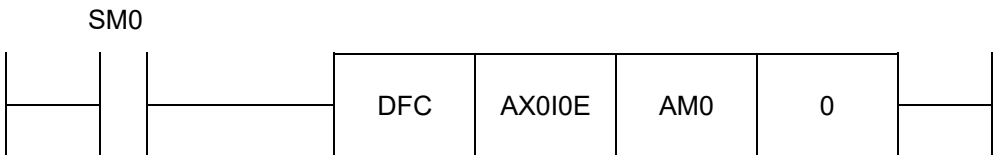


How to Describe DFC Command

[1] Axis Control Command

Axis Control Command assigns the input and output domains controlling the driver unit to the bit OM domains. By turning on and off the assigned bit OM, it is available to operate the applicable axes.

Shown below is an example of how to describe the command.



Example of How to Describe Axis Control Command

The range available for use of S1 and S2 is as shown below.

Axis Control Command Available Parameters and Available Range

	Bit							Word					Constant		Label	WL Indication	index
	X	Y	M	SM	AM	T	C	D	SD	T	C	IX	DEC	HEX	L		
S1			○		○												
S2													○	○			

* It is recommended to have AM set to S1.

With the bit memory set to S1 at the top, the input and output domains to the driver unit should be assigned. What operation mode to be assigned with should be set in S2.

Relation between S2 Setting Number and Operation Mode

Shown below describes the bit OM domain assignment when set to each operation mode. The input and output assignment when set to Simple Direct is as shown below.

Drv→LC

LC→Drv

e.g. • When AM0 is set to S1, the status signal PEND should be assigned to AM48.

- ME0416-1A

The input and output assignment when set to Positioned 1 is as shown below.

Input and Output Domain Assignment: Positioner 1

Drv→LC

Current Position (Lower)	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Current Position (Upper)	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Completion Position Number	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
Status Signal	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
Status Signal Name	EMGS	CRDY	ZONE2	ZONE1	PZONE	MODES	WEND	MEND	ALML	LOAD	PSFL	SV	ALM	MOVE	HEND	PEND

LC→Drv

(Not to be Used)	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64
(Not to be Used)	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80
Indication Position Number	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97	96
Control Signal	127	126	125	124	123	122	121	120	119	118	117	116	115	114	113	112
Control Signal Name	BKRL	-	-	-	-	MODE	PWRT	JOG+	JOG-	JVEL	JISL	SON	RES	STP	HOME	CSTR

The input and output assignment when set to Positioned 2 is as shown below.

Input and Output Domain Assignment: Positioner 2

Drv→LC

Completion Position Number	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Status Signal	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Status Signal Name	EMGS	CRDY	ZONE2	ZONE1	PZONE	MODES	WEND	MEND	ALML	LOAD	PSFL	SV	ALM	MOVE	HEND	PEND

LC→Drv

Indication Position Number	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
Control Signal	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
Control Signal Name	BKRL	-	-	-	-	MODE	PWRT	JOG+	JOG-	JVEL	JISL	SON	RES	STP	HOME	CSTR

The input and output assignment when set to Positioned 3 is as shown below.

Input and Output Domain Assignment: Positioner 3

Drv→LC

Status Signal Completion Position Number	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Status Signal Name	EMGS	ZONE1	PSFL	SV	ALM	MOVE	HEND	PEND	-	PM64	PM32	PM16	PM8	PM4	PM2	PM1

LC→Drv

Control Signal Indication Position Number	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Control Signal Name	BKRL	-	-	SON	RES	STP	HOME	CSTR	-	PC64	PC32	PC16	PC8	PC4	PC2	PC1

The input and output assignment when set to Direct Numerical Indication is as shown below.

Input and Output Domain Assignment: Direct Numerical Indication

Drv→LC

Current Position (Lower)	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Current Position (Upper)	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Command Current (Lower)	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
Command Current (Upper)	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
Current Velocity	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64
(Not to be Used)	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80
Alarm Code	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97	96
Status Signal	127	126	125	124	123	122	121	120	119	118	117	116	115	114	113	112
Status Signal Name	EMGS	CRDY	ZONE2	ZONE1	-	-	-	MEND	ALML	-	PSFL	SV	ALM	MOVE	HEND	PEND

LC→Drv

Target Position (Lower)	143	142	141	140	139	138	137	136	135	134	133	132	131	130	129	128
Target Position (Upper)	159	158	157	156	155	154	153	152	151	150	149	148	147	146	145	144
Positioning Band (Lower)	175	174	173	172	171	170	169	168	167	166	165	164	163	162	161	160
Positioning Band (Upper)	191	190	189	188	187	186	185	184	183	182	181	180	179	178	177	176
Velocity	207	206	205	204	203	202	201	200	199	198	197	196	195	194	193	192
Acceleration/Deceleration	223	222	221	220	219	218	217	216	215	214	213	212	211	210	209	208
Pressing Current Limit Value	239	238	237	236	235	234	233	232	231	230	229	228	227	226	225	224
Control Signal	255	254	253	252	251	250	249	248	247	246	245	244	243	242	241	240
Control Signal Name	BKRL	INC	DIR	PUSH	-	-	-	JOG+	JOG-	JVEL	JISL	SON	RES	STP	HOME	CSTR

The input and output assignment when set to Positioned 5 is as shown below.

Input and Output Domain Assignment: Positioner 5

Drv→LC

Current Position	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Status Signal Completion Position Number	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Status Signal Name	EMGS	CRDY	ZONE2	ZONE1	PM8	PM4	PM2	PM1	MEND	ALML	PSFL	SV	ALM	MOVE	HEND	PEND

LC→Drv

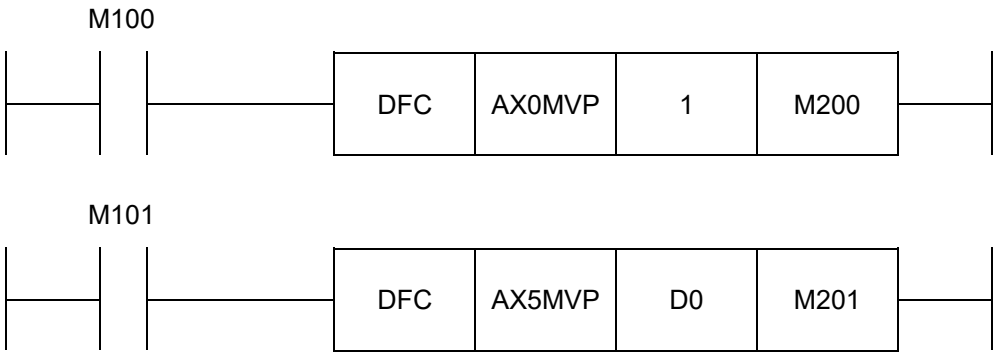
Indication Position Number	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
Control Signal	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
Control Signal Name	BKRL	-	-	-	-	-	-	JOG+	JOG-	JVEL	JISL	SON	RES	STP	HOME	CSTR

By turning on the bit OM that SON is assigned, the applicable axis can have the search on. Turn HOME on after the servo gets turned on and complete the home-return operation and turn CSTR on while the position number or the target position is set, operation to the target position should be available. Whether operation to the target position is complete can be confirmed in PEND, completion position number and current position.

[2] Positioning Command

Positioning Command is a command available for use when Axis Control Command is used and the operation mode is set to either of Positioner 1, Positioner 2, Positioner 3 or Positioner 5. Positioning operation is available easier than operating the input and output domains assigned in Axis Control Command.

Shown below is an example of how to describe the command.



Example of How to Describe Positioning Command

The range available for use of S1 and S2 is as shown below.

Positioning Command Available Parameters and Available Range

	Bit							Word					Constant		Label	WL Indication	index
	X	Y	M	SM	AM	T	C	D	SD	T	C	IX	DEC	HEX	L		
S1								○					○	○			
S2			○		○												

A position number that is desired to operate should be set to S1. A bit memory to output an on-signal after operation complete should be set to S2.

Values available to set in S1 are as shown below.

Positioning Command S1 Settable Range

Operation Mode	S1 Settable Range
Positioner 1	1 to 127 (Max. Position Number)
Positioner 2	
Positioner 3	
Positioner 4	1 to 15 (Max. Position Number)

When effective Positioning Command is executed with the applicable axis available for positioning, operation starts towards the target position set in the indicated position number. After the operation is complete, the bit OM set in S2 should turn on. By having the OM contact that got turned on as a trigger for another positioning command, it is available to have a continuous operation.

It is available to have the positioning commands for the number of position points available for use (127 maximum per axis).

[3] Command Transfer between Axis and Driver Command

RCON-LC does not support Command Transfer between Axis and Driver Command and will output LC Error Code [32: DFC Command Not Supported].

[4] Fieldbus Communication Command

Fieldbus Communication Command should assign the input and output domains available for communication with a host device (e.g. PLC) to the bit OM domains.

Shown below is an example of how to describe the command.



Example of How to Describe Fieldbus Communication Command

The input and output domain assignment for the fieldbus communication is as shown below.

Fieldbus Communication Command Available Parameters and Available Range

	Bit							Word					Constant		Label	WL	index
	X	Y	M	SM	AM	T	C	D	SD	T	C	IX	DEC	HEX	L	Indication	
S1			○		○												
S2													○	○			

* S2 does not have any function.

The input and output assignment for the fieldbus communication is as shown below.

Input and Output Domain Assignment for Fieldbus Communication: CC-Link, CC-Link IE

FB→LC

RY0	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
RY1	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
RWw0	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
RWw1	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
RWw2	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64
RWw3	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80

LC→FB

RX0	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97	96
RX1	127	126	125	124	123	122	121	120	119	118	117	116	115	114	113	112
RWr0	143	142	141	140	139	138	137	136	135	134	133	132	131	130	129	128
RWr1	159	158	157	156	155	154	153	152	151	150	149	148	147	146	145	144
RWr2	175	174	173	172	171	170	169	168	167	166	165	164	163	162	161	160
RWr3	191	190	189	188	187	186	185	184	183	182	181	180	179	178	177	176

For CC-Link and CC-Link IE Field, the assignment should be made in the order of RY, RWw, RX and RWr.

<Caution>

As RX1 is a system domain in CC-Link, turning on the applicable OM would not be reflected to the host PLC. When the communication with the host PLC is conducted in normal condition, the values at the RX1 memory assignment on the host PLC side should be on in Bit 11 (0x0B) and off in other bits. This Bit 11 is a remote READY flag for connection status confirmation.

Input and Output Domain Assignment for Fieldbus Communication: Other Networks

FB→LC

Output 0	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Output 1	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Output 2	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
Output 3	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48

LC→FB

Input 0	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64
Input 1	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80
Input 2	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97	96
Input 3	127	126	125	124	123	122	121	120	119	118	117	116	115	114	113	112

Described number added to the S1 setting number should be the applicable assignment position e.g. • When M0 is set to S1, the RXO should be assigned to M0W (from M0 to M15).

- When M512 is set to S1, the output 3 should be assigned to M624W (from M624 to M639).

Assignment should be fixed as shown below.

- CC-Link, CC-Link IE: Input 12 bytes / output 12 bytes
(Setting should be remote device 1 station 1 time for CC-Link)
- Other fieldbus networks: Input 8 bytes / output 8 bytes

[5] Fieldbus Communication Command 2

Even though it is available to have the fieldbus and data input and output domains set in Fieldbus Communication Command, the data domains available for setting was fixed assignment.

In RCON-LC, the maximum number of the controllable axes was revised to 16 axes and in MCON-LC it has been more than doubled from six axes. Due to this, when Fieldbus Communication Command is used, the data size for one axis has decreased. By setting Fieldbus Communication Command 2 that is available for setting the same or higher size data domains compared to the exiting, solves the data size issues.

Shown below is an example of how to describe the command.



Example of How to Describe Fieldbus Communication Command 2

The range available for use of S1 and S2 is as shown below.

Fieldbus Communication Command 2 Available Parameters and Available Range

	Bit							Word					Constant		Label	WL Indication	index
	X	Y	M	SM	AM	T	C	D	SD	T	C	IX	DEC	HEX	L		
S1			○		○												
S2													○	○			

The function of a value in S2 should differ in different types of field networks. It should be the assignment patterns in CC-Link and CC-Link IE Field and should be the number of words in the setting input and output domains for other types of networks.

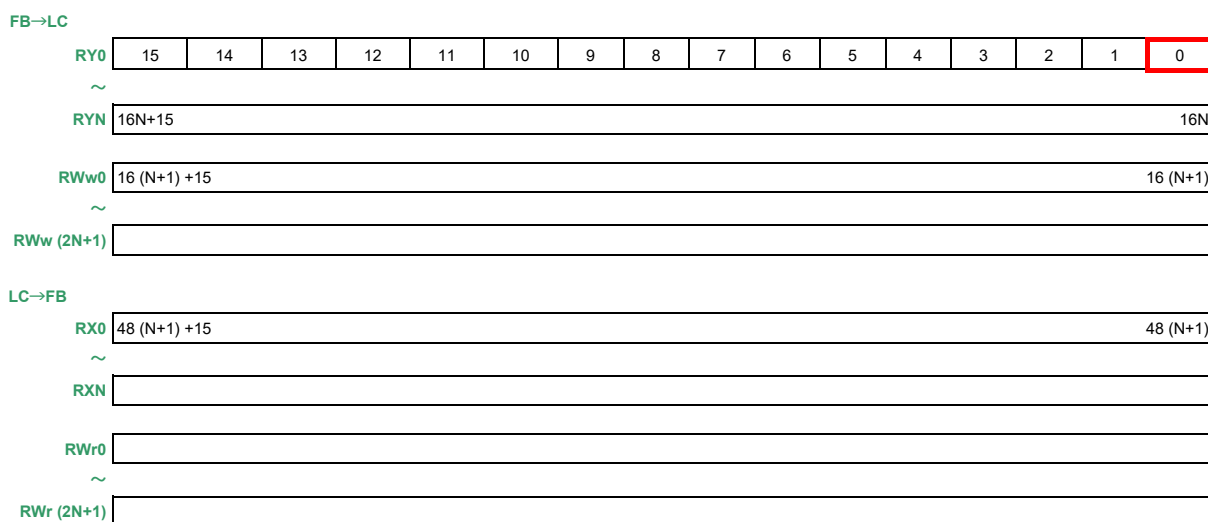
The assignment patterns in CC-Link and CC-Link IE Field and the CC-Link station times setting should be as shown below:

Input and Output Domain Assignment Pattern in CC-Link and CC-Link IE

S2 Setting	Axis Control Signal (Bit)		Control Data (Word)		Station Times Setting
	RX	RY	RWr	RWw	
1	32		4		1 Station 1 Time
2	64		8		2 Station 1 Time
3	96		12		3 Station 1 Time
4	128		16		4 Station 1 Time

The input and output domain assignment for the fieldbus communication is as shown below.

Input and Output Domain Assignment for Fieldbus Communication: CC-Link, CC-Link IE



$$N = (S2 \text{ Setting} \times 2) - 1$$

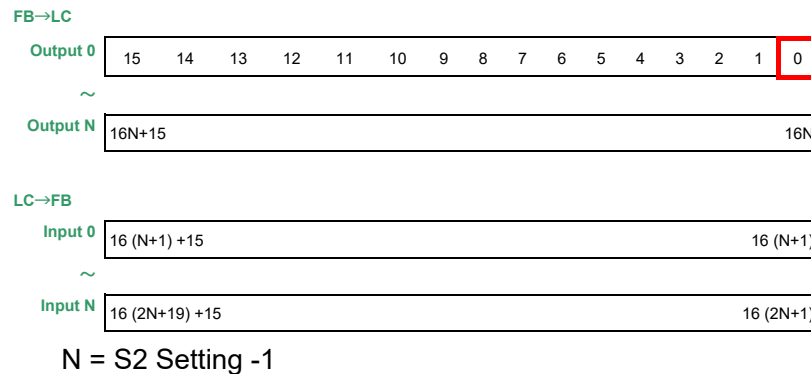
For CC-Link and CC-Link IE Field, the assignment should be made in the order of RY, RWw, RX and RWr.

<Caution>

As RXN is a system domain in CC-Link, turning on the applicable OM would not be reflected to the host PLC. When the communication with the host PLC is conducted in normal condition, the values at the RXN memory assignment on the host PLC side should be on in Bit 11 (0x0B) and off in other bits. This Bit 11 is a remote READY flag for connection status confirmation.

Assignment for other fieldbus types is as shown below:

Input and Output Domain Assignment for Fieldbus Communication: Other Networks



The range available for setting in S2 is as shown below.

S2 Settable Range in each Field Network

Network Type	S2 Setting	
	Min. Value	Max. Value
CC-Link	1	4
CC-Link IE		16
DeviceNet		
PROFIBUS-DP		
EtherNet/IP		
EtherCAT		
PROFINET-IO		

As shown above, the settable range of S2 should differ in each field network type. The input and output domains available for setting in each field network is as shown below.

Number of Max. Occupation in Input and Output Domains

Network Type	Output Domains		Output Domains		Bit Memories Max. Occupied Points
	Min. Value	Max. Value	Min. Value	Max. Value	
CC-Link	3 words	24 words	3 words	24 words	768 points
CC-Link IE					
DeviceNet	1 words	16 words	1 words	16 words	512 points
PROFIBUS-DP					
EtherNet/IP					
EtherCAT					
PROFINET-IO					

An error should be generated even when the setting in S2 is in the settable range if the value is out of the available range of the indicated OM.

- e.g. • When M0 is set to S1 and 16 to S2 in DeviceNet, domains of input 16 words / output 16 words should be assigned to M0 to M511 (M0 to M255 for input and M256 to M512 for output).
- When 1024 is set to S1 and 4 to S2 in CC-Link IE, domains of input 12 words / output 12 words should be assigned to M1024 to M1407 (M1024 to M1087 for input (RX), M1088 to 1215 for input (Rwr), M1216 to M1279 for output (RY) and M1280 to M1407 for output (Rww)).

As described above, Fieldbus Communication Command 2 covers the range of the fieldbus communication command and the equivalent function is available without using the fieldbus communication command, but it should be kept for compatibility at project model conversion.

Shown below is precaution when using Fieldbus Communication Command 2.

Caution in Use of Fieldbus Communication Command 2

No.	Caution	Reason
1	Reboot of GW required when changing S2	Input and output domains cannot be updated properly when S2 data size made larger than the size described previously. (Size setting process is conducted in the initializing process.)
2	Necessary to see a value of multiple of 16 such as AM0 and M384 in S1	OM range check is conducted in unit of words
3	Necessary to conduct memory assignment without duplication as duplication check is not conducted for domains occupied in S1	Proper value cannot be acquired when the used domain is duplicated with e.g. axis control command as multiple commands write in the same memory
4	Two or more descriptions cannot be made for Fieldbus Communication Command 2	There is a possibility of data size different from expected
5	Descriptions cannot be made both for Fieldbus Communication Command and Fieldbus Communication Command 2	There is a possibility of data size different from expected

4.3 Error Code

An error code should be generated when a calculation error has occurred during execution of a ladder program. An error code should be stored in OM_SD2 and an error step in OM_SD3. Shown below is a list of error codes to be generated in RCON-LC. There are error codes generated at the startup (when power turned or ladder program being written) and those during execution (during execution of a ladder program).

List of Error Codes

Code	Cause of Occurrence	Timing of Occurrence
1	Command code error	During Execution
2	There is no label indicated in JE, JMP or CALL (P) Command	
	L255 called in CALL (P) Command (index used)	
3	END (or ENDS) Command executed after CALL (P) Command executed before RET Command executed	
	RET Command executed before CALL (P) Command executed	
	END (or ENDS) Command executed after FOR Command executed before NEXT Command executed	
	NEXT Command executed before FOR Command executed	
	Number of FOR Command and number of NEXT command do not match with each other	
	BREAK Command executed in timing other than between FOR and NEXT Commands	
4	Access made to out of OM available range by inappropriate index value	
	Transfer range is out of OM available range in MCYP (P) or MSET (P) Command	
	Content of FIFO Table top address + Pointer is out of OM available range when FIFW (P) Command executed	
5	From position indicated in S in ENCO Command to 2n bit all 0	
	FIFR (P) Command executed while pointer is 0	
7	BCD, BIN Conversion Data Error	
8	Division by 0 executed	
11	Nesting of CALL (P) to RET Commands exceeded 8 layers	
	Nesting of FOR to NEXT Commands exceeded 5 layers	
21	Execution of DFC Command failed	
22	128 points or more of Positioning Command made in description to the same axis	At Startup
23	Inappropriate value set in S1 for Positioning Command	
24	Inappropriate value set in S2 for Positioning Command	During Execution
25	Value of D set in S1 for Positioning Command is 0 or below or exceeding maximum position number	
26	Positioning Command executed before executing Axis Control Command or with the operation mode setting inappropriate.	
27	Positioning Command executed with setting other than a positioner mode established in S2 for Axis Control Command	
28	Positioning Command executed with home-return operation incomplete	At Startup
29	Fieldbus Communication Command (DFC9) and Fieldbus Communication Command 2 described during program	
30	Fieldbus Communication Command 2 (DFC34) described several times during program	
31	Inappropriate value set in S2 for Fieldbus Communication Command 2 (DFC34)	At Startup
32	DFC Command not supported	
99	WDT Error	During Execution

RCON - LC

Chapter 5

Warranty

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5.2 Scope of the warranty	5-1
5.3 Honoring the warranty	5-1
5.4 Limited liability	5-2
5.5 Conformance with applicable standards/regulations, etc., and application conditions	5-2
5.6 Other items excluded from warranty	5-2

5.1 Warranty period

Whichever of the following periods is shorter:

- 18 months after shipment from IAI
- 12 months after delivery to a specified location
- 2,500 operational hours

5.2 Scope of the warranty

Our products are covered by warranty when all of the following conditions are met.

Faulty products covered by warranty will be replaced or repaired free of charge:

- (1) The breakdown or malfunction in question pertains to our product as delivered by IAI or our authorized dealer.
- (2) The breakdown or malfunction in question occurred during the warranty period.
- (3) The breakdown or malfunction in question occurred while the product was in use for an appropriate purpose under the operating conditions and operating environment specified in the instruction manual and catalog.
- (4) The breakdown or malfunction in question was caused by a specification defect, malfunction, or poor product quality.

Note that breakdowns due to any of the following reasons are excluded from the scope of warranty:

- (1) Anything other than our product
- (2) Modification or repair performed by a party other than IAI (unless approved by IAI)
- (3) Anything that could not be easily predicted with the level of science and technology available at the time of shipment from IAI
- (4) Natural disaster, unnatural disaster, incident or accident for which we are not liable
- (5) Natural fading of paint or other symptoms of aging
- (6) Wear, depletion or other expected results of use
- (7) Operation noise, vibration or other subjective sensations not affecting function or maintenance

Note that the warranty only covers our product as delivered and that any secondary loss arising from a breakdown of our product is excluded from the scope of warranty.

5.3 Honoring the warranty

As a rule, the product must be consigned to IAI for repair under warranty.

5.4 Limited liability

- (1) We assume no liability for any special damage, consequential loss or passive loss such as a loss of expected profit arising from or in connection with our product.
- (2) We assume no liability for any program or control method created by the customer to operate our product or for the results of any such program or control method.

5.5 Conformance with applicable standards/regulations, etc., and application conditions

- (1) If our product is combined with another product or any system, equipment, etc., used by the customer, the customer must first check the applicable standards, regulations and/or rules. The customer is also responsible for confirming that such combination with our product conforms to the applicable standards, etc.
In such a case we assume no liability for the conformance of our product with the applicable standards, etc.
- (2) Our product is for general industrial use. It is not intended or designed for the applications specified below, which require a high level of safety. Accordingly, as a rule our product cannot be used in these applications.

Contact IAI if you must use our product for any of these applications:

- (1) Medical equipment used to maintain, control or otherwise affect human life or physical health
 - (2) Mechanisms and machinery designed for the purpose of moving or transporting people (vehicles, railway facilities, aviation facilities etc.)
 - (3) Machinery components essential for safety (safety devices etc.)
 - (4) Equipment used to handle cultural assets, art or other irreplaceable items
- (3) Contact IAI in advance if our product is to be used in any condition or environment that differs from that specified in the catalog or instruction manual.

5.6 Other items excluded from warranty

The price of the product delivered to you does not include expenses associated with programming, the dispatch of engineers, etc. Accordingly, a separate fee will be charged in the following cases even during the warranty period:

- (1) Guidance for mounting/adjustment and witnessing of test operation
- (2) Maintenance and inspection
- (3) Technical guidance and education on operating/wiring methods, etc.
- (4) Technical guidance and education on programming and other items related to programs

Revision history

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Revision history



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