

R SEL System

Instruction Manual Third Edition ME0392-3A



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IAI Corporation

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.

RSEL System Instruction Manual Configuration

Product name	Instruction manual name	Control number
SEL Unit	First Step Guide	ME0393
RCON 24V Driver Unit	First Step Guide	ME0383
RCON 200V Power Supply / Driver Unit	First Step Guide	ME0397
RSEL System	Instruction Manual (this document)	ME0394
SCON-CB Controller	SCON-CB/CGB/LC/LCG Instruction Manual	ME0340
PC Software	XSEL PC Software (RSEL) Instruction Manual	ME0398
Touch Panel Teaching Pendant TB-02	TB-02/02D Program Controller Applicable Instruction Manual	ME0356
Touch Panel Teaching Pendant TB-03	TB-03 Wired Program Controller Applicable Instruction Manual	ME0377
24V Power Supply Unit	PSA-24 Instruction Manual	ME0379
Calculator	Calculator Instruction Manual	ME0381
SEL Programming Support Tool	Instruction Manual	ME0396
6-axis Cartesian Robot	Instruction Manual	ME3792

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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	<ul style="list-style-type: none"> ● 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. <ul style="list-style-type: none"> (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. <ul style="list-style-type: none"> (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	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● 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	<p>(1) Installation of robot body and controller, etc.</p> <ul style="list-style-type: none"> ● 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. <ul style="list-style-type: none"> (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
4		<p>(2) Cable wiring</p> <ul style="list-style-type: none"> ● 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. <p>(3) Grounding</p> <ul style="list-style-type: none"> ● 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	<p>(4) Safety measures</p> <ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● 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. <p>* Safety/protection fence: If there is no safety/protection fence, the movable range should be indicated.</p>

No.	Operation	Precautions
6	Trial Operation	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● 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. <p>* Safety/protection fence: If there is no safety/protection fence, the movable range should be indicated.</p>
9	Modification and Disassembly	<ul style="list-style-type: none"> ● Do not modify, disassemble/assemble, or use maintenance parts not specified on your own discretion.
10	Disposal	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● 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

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 RSEL system.

[Refer to 2.1.6 Teaching tool (Option)]

3. Back up data in order to be prepared for a breakdown.

This system possesses a save area in the hold memory and a save area in the flash memory. Transferring data to the PC software or a teaching pendant enables only to write it in the memory and the data should be deleted when the power is turned off or the controller is reset. In order to certainly store data, the data that you would prefer to save should be written in the flash memory.

[Refer to 5.7.6 Memory map]

Also, keep the data updated to the latest so recovery process can be rapidly carried out when it is necessary to replace this controller with a substitute in case such as malfunction.

How to save

- (1) To save data to an external memory device or hard disk via a teaching tool such as the PC software.
- (2) Record position table and parameters in writing

4. Perform initial operation setting.

This controller complies with seven types of field networks and PIO controls.

Establish settings suitable to the system to use at the startup.

[Refer to Chapter 6 Field Network, PIO, SIO]



Warning

- It is dangerous if operation settings of the control sequence and field network are not matched, as it will not only prevent normal operation but can also lead to unpredictable operation.
-

5. Calendar function time setting

Therefore may be a case that "Error Code 202 Calendar Features Error" gets generated at the first time of turning the power on after delivery. In that case, set the current time with the teaching tool.

When fully charged, time data can be retained approximately 10 days after the power is turned OFF.

At shipment, time will be set but the unit will not be fully charged. Therefore, even if the above-mentioned number of days has not passed from shipment, the time data may be lost.

6. Be careful of rubbing or twisting when using the through hole of the rotary actuator.

If using a rotary actuator with rotational center through hole, with cables, etc. inserted to the through hole, take measures against wear due to rubbing, or wire disconnection due to twisting.

Be particularly cautious if the actuator is 360-degree specification, as it can infinitely rotate in the same direction.

7. There are restrictions on index mode operation of the rotary actuator.

With use of Driver unit Parameter No. 79 "Rotary Axis Mode Select", rotary actuators with 360-degree specification allow selection of normal mode which provides limited rotation operation, or index mode which enables multi-rotation control.

[Refer to Chapter 10 Parameter]

The index mode has the following restrictions.

- (1) In jog or inching operation using teaching tools such as PC software, etc., the one-time command range enables a maximum of 360° in jog operation, or 1° in inching operation.
- (2) Pushing cannot be performed. For push torque, settings other than 0 cannot be made.
- (3) Do not repetitively execute positioning commands around 0 degree numerous times while traveling in the vicinity of 0 degree. The rotation direction may switch, or operation may become unstable.
- (4) Software stroke limit is disabled in index mode.

8. PIO Signal Sending and Receiving

Pay attention to the followings when sending and receiving PIO signals.

If exchanging data between devices with different scan time, the length of time required for a reliable signal reading process is greater than the longer scan time. (In order to safely perform the reading process on the PLC side, we recommend using a timer set value of at least twice the longer scan time.)

● Operational image

As shown in the diagram, if exchanging data between 2 devices with different scan time, obviously the I/O timing will not match.

When the signal of this controller turns ON, there is no guarantee that the PLC will read it immediately.

In cases like this, in order to achieve reliable reading, set the PLC side to read after a period greater than the longer scan time has passed. This also applies when the reading is performed on the controller side.

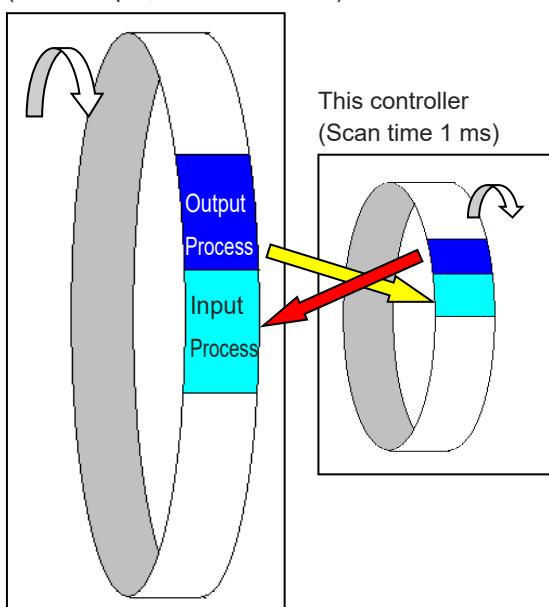
On this occasion, make sure the safety factor of the timer setting is 2 to 4 times or more of the scan time.

As the timer is also processed within the scanning process, setting below the scan time is dangerous.

The example shown in the diagram indicates that even if this controller performs output process once every 1 ms, the PLC can only recognize once every 20 ms.

The PLC only performs the output process once every 20 ms, meaning that it keeps recognizing the same output status for that period.

PLC
(For example, scan time 20 ms)



Also, if reading is performed while the other device is rewriting output, incorrect signals may be read at times. Wait until the rewriting is completely finished (allow interval of 2 scans or more), then perform reading. In terms of the output-side device, do not allow its output to change until the other device finishes the reading. Additionally, an input constant is set for the input component to prevent mistaken detection of noise, etc. so it only accepts signals that last more than a certain period of time. It is necessary to add this period of time as well.

9. PLC timer setting

The PLC timer setting should not be at minimum set value.

If "1" is set, some PLCs turn ON somewhere between 0 and 100 ms with a 100 ms timer, or between 0 and 10 ms with a 10 ms timer.

Consequently, the process which will be performed is the same as when a timer is not set, which may lead to failures such as failing to position to a specified position No. in positioner mode, etc.

The minimum set value of the 10 ms timer should be "2", and when required to set to 100 ms, use the 10 ms timer and set it to "10".

10. Battery-less absolute specification actuators

(1) For stepper motor specification, driver unit parameter setting allows switching between absolute specification and incremental specification.

- Driver unit parameter No.83 "Absolute Unit"

0: Not in use (incremental specification), 1: In use (absolute specification)

(2) RCP5 series actuators will perform slight position adjustment operation due to characteristics of the stepper motor during initial servo ON only, after the power is turned ON.

Maximum travel during position adjustment operation is $0.025 \times$ lead length [mm].

Additionally, until servo turns ON, the present position displayed on the teaching tool will be the coordinates prior to the adjustment operation.

(3) After the power is turned ON followed by the initial servo ON, home return complete signal will be output.

(4) If the initial servo ON is executed outside range of the software limit, no error will be output.
After traveling within the range, monitoring of the software limit will start.

(5) If the motor unit is removed from the actuator for motor replacement, etc., be sure to perform home return motion (absolute reset).

11. External communication connector

The SEL unit has 3 types of communication connector (refer to 4.7 to 4.9).

- Teaching connector
- USB connector (USB mini-B connector)
- Ethernet connector

Do not connect multiple connector and perform communication simultaneously.

This may result in following errors:

- Occurrence of communication error
- Occurrence of unpredictable operation

12. Handling of Built-in Drive Cutoff Relay and Cautions in Caution in Handling

The product equips a built-in drive cutoff relay, and it is necessary to be careful in handling.

Use the product with narrow understanding to the following notes.

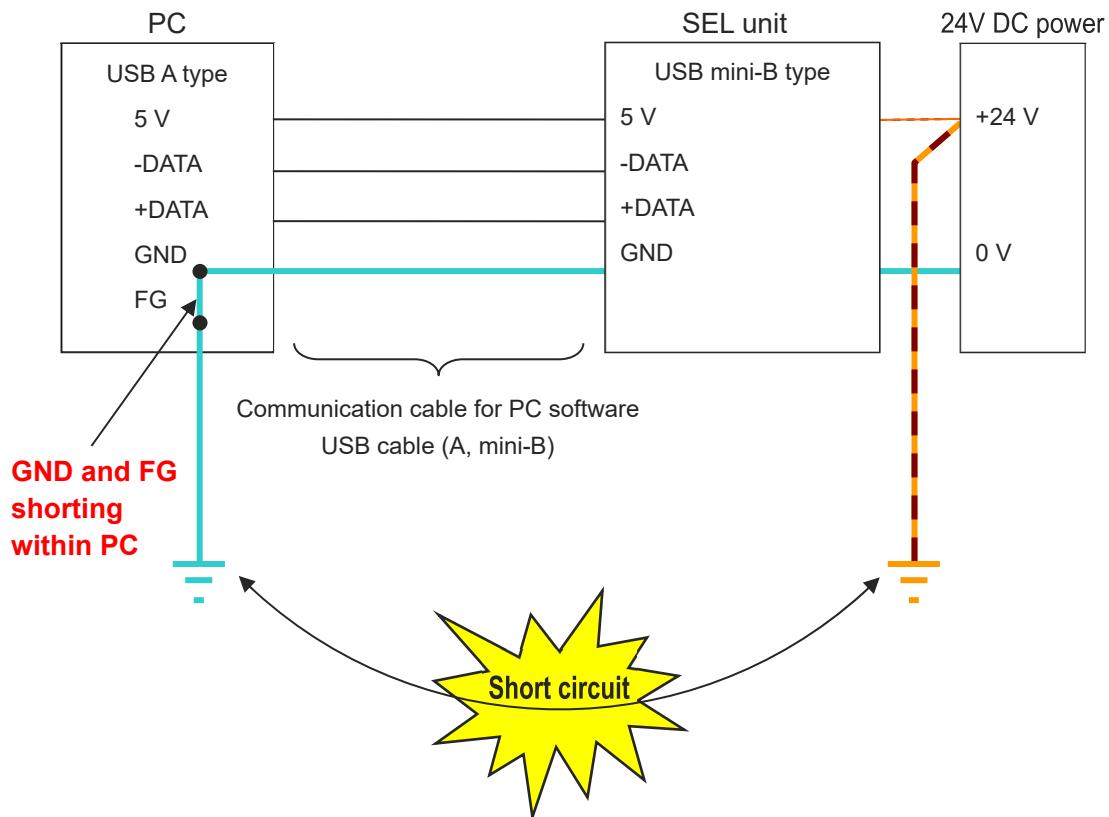
- The drive cutoff relay built in our controllers is designed under assumption of limited frequency of use such as a case to require emergency stop of a system, and frequent operation is not considered. Therefore, in a condition to require high frequency of use of the drive cutoff relay such as a case to turn OFF/ON the driving source in every setup change, the life of the relay may reach to the end in early stage.

As a reference, it is preferred to have approximately 30 minutes for cooling after the driving source being cut off.

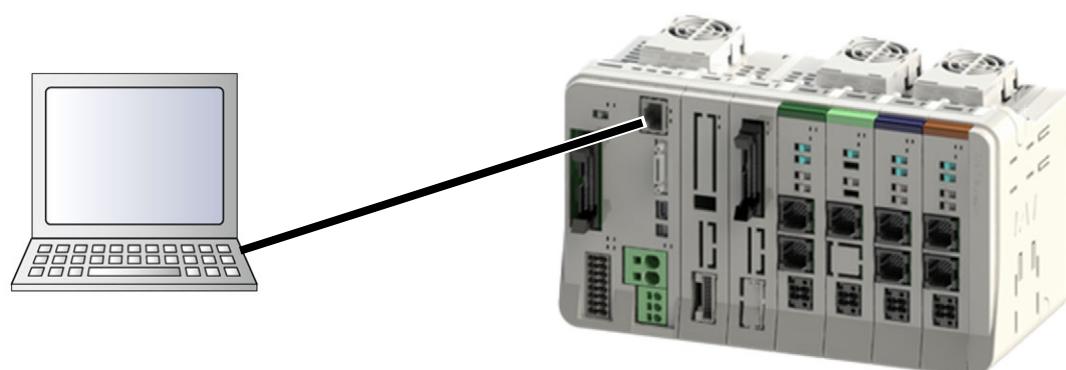
Precautions for PC connection to SEL unit grounded at positive terminal of 24V DC power supply

If the SEL unit is grounded at the positive terminal of the 24V DC power supply, a PC cannot be connected to the USB connector (mini-B) of the SEL unit.

If connected directly, short-circuiting of the power will occur as shown in the diagram below, causing malfunction of the PC.



If the positive side of the 24V DC supply on SEL Unit is grounded, use the Ethernet port to connect to the PC. The Ethernet port is isolated from 24V or 0V of the internal power source.



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
○	○	Will be supported

Warranty

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

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.

3. Honoring the warranty

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

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. 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.

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

Actuator Coordinate System

Unless indicated as home reverse specification (option), the direction of home return for the linear axis is on the motor side, the rotary axis is on the counterclockwise side, and the gripper is on the outside (open side).

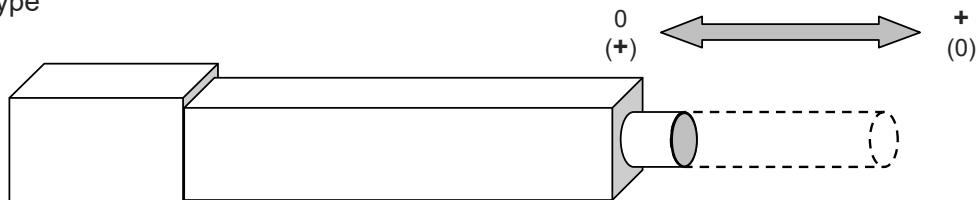


Caution

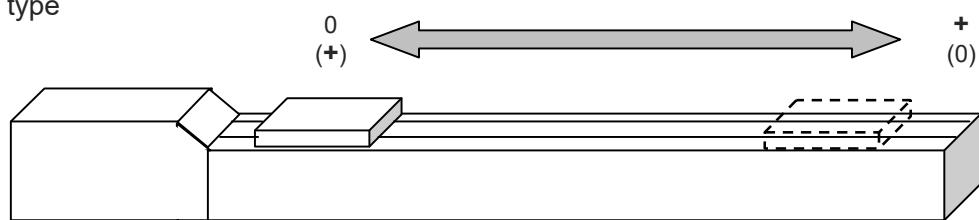
- Homing direction cannot be changed with some models.
- If it becomes necessary to reverse the homing direction after assembly to equipment, check the model of the applicable actuator to ensure that the homing direction is changeable.
- For models with which change is not possible, the actuator must be replaced. Contact IAI if anything is unclear.

The 0 in the figure below shows home. The parentheses show home reverse specification.

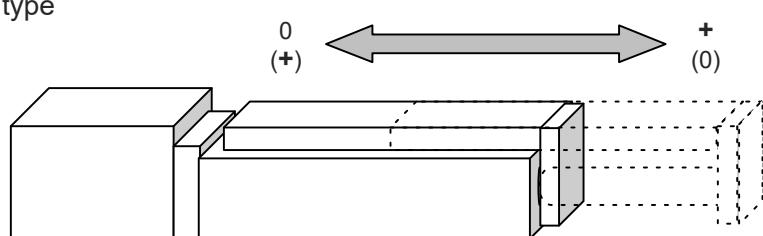
(1) Rod type



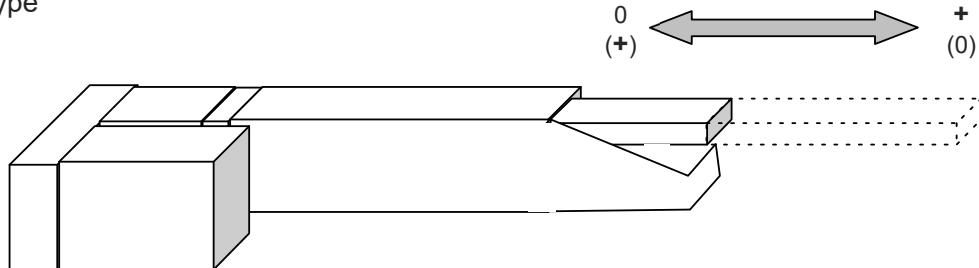
(2) Slider type



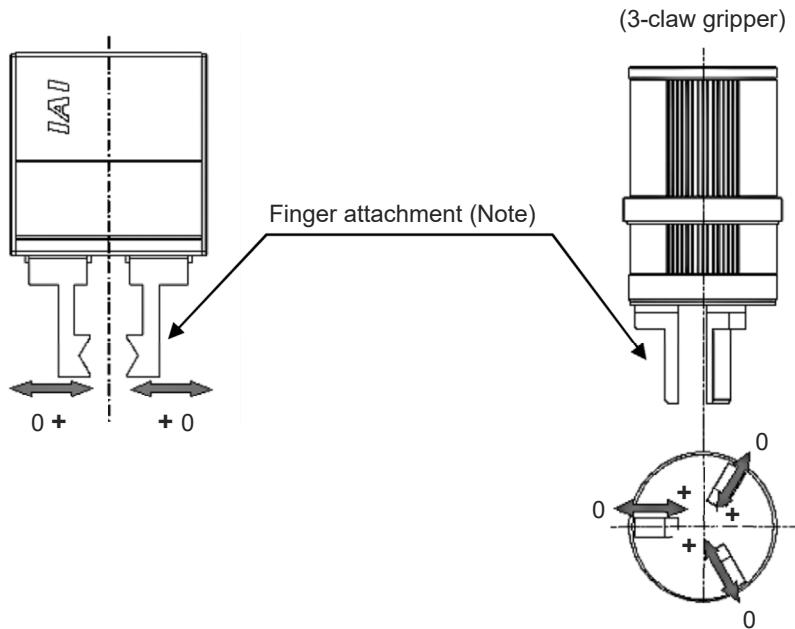
(3) Table type



(4) Arm type

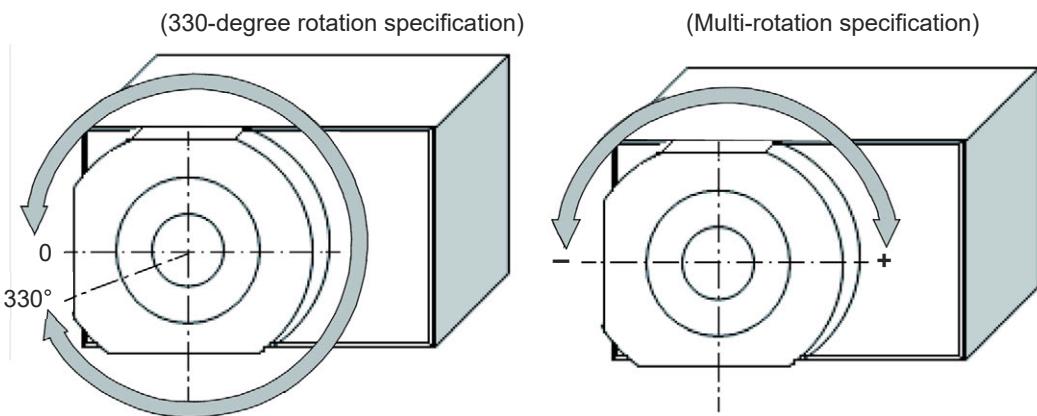


(5) Gripper type



Note: The finger attachment is not an accessory for the actuator. It is to be prepared by the customer.

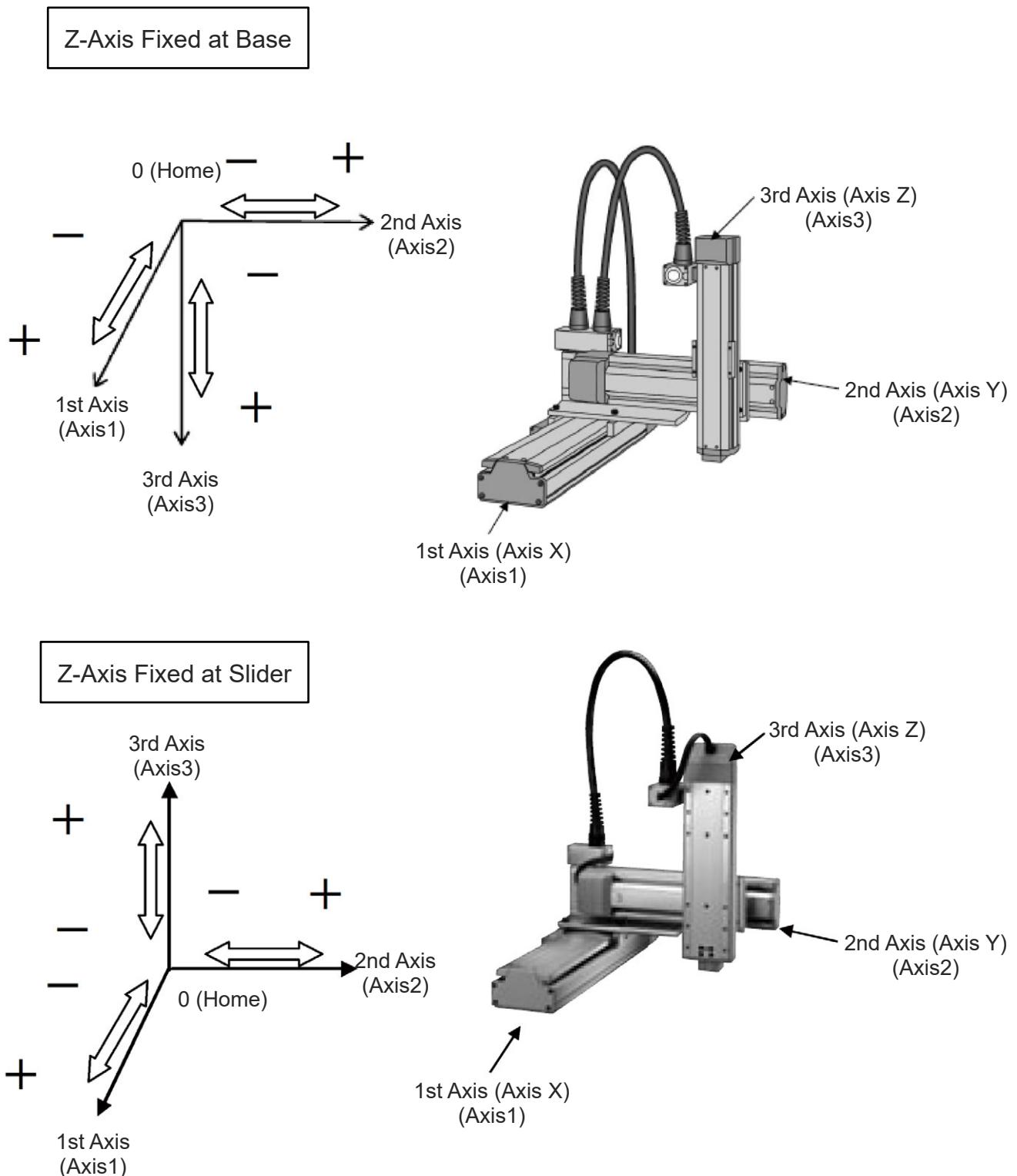
(6) Rotary type



In the home reverse specification for the multi-rotation specification, the +/- directions are the reverse of the figure.

(7) Orthogonal Coordinate System

Orthogonal Robot (Single-Axis Robot Combined Axes)





RSEL System

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1.1 Overview (About RSEL system)

1.1 Overview (About RSEL system)

RSEL System is a generic name of a group of the dedicated controllers applicable for SEL language and each SEL feature in the coupled system of the 24V motor driver and the 200V motor driver, and linear and arch interpolation operations of the wrist unit and orthogonal robot.

There are five types of driver units available for link, for RCP Series, for the high-thrust RCP Series, for RCA Series, for RCD Series and RCS/ISB/DDA Series. 1 SEL unit set serves as the field network connection interface to which multiple driver units can be freely configured for control of up to 8 axes.

There are several ways to control, way to control with the SEL language without using a host programmable controller (hereinafter described as PLC) and a way to control from the PLC via PIO or the field network.

There are seven types of applicable field networks, CC-Link, CC-Link IE Field, DeviceNet, EtherCAT, EtherNet /IP, PROFIBUS-DP and ROFINET IO.



1.2 Features

(1) Modular connections with excellent expansibility

By selecting driver units and option units freely and connect them to SEL unit, it is available to construct a system equipped with the multiple SEL controller features.

In the selection of the driver units, it is available to have the standard/high-thrust pulse motors, 24V/200V AC servomotors and DC brush-less motors together.

- Driver Unit and Option Units Available to Connect

Driver unit: RCON-AC/PC/PCF/DC/SC, SCON-CB (via an extension unit)

Power supply unit for 200V servomotor: RCON-PS2 (when connected to RCON-SC)

Simple absolute unit: RCON-ABU-A/P

Extension Unit: RCON-EXT

PIO unit: RCON-NP/PN

PIO/SIO Extension Unit: RCON-EXT-NP/PN

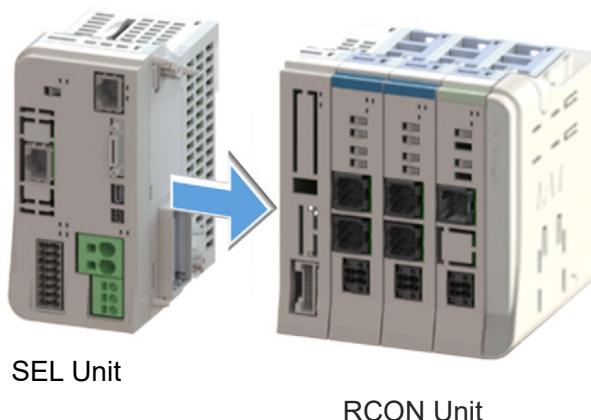
The maximum number of connectable axes is eight. Also, it is available to divide the eight axes into two groups to control.

[Refer to "5.6 Position data (Position table)"]

(2) Driver Units and Option Units Used in Common

The driver units and option units are in common with RCON System.

The driver units are in common hardware and common firmware.



1.2 Features

(3) Low Price System

We achieved to optimize the cost balance with selection of necessary number of driver units to connect and standardization of each unit to offer you lower price.

(4) Application to Orthogonal Coordinate System and Wrist Unit

The system supports the operation of the orthogonal wrist unit. In addition, it supports the orthogonal coordinate system. Also, it supports the wrist unit operation as a part of the support to the 6-axis cartesian robot.

(5) Ultra-compact size

Driver units have an ultra-compact size of width 30 mm/22.6 mm x height 115 mm x depth 95 mm.

The smallest combination with 8 axes connected has width 159.6 mm x height 115 mm x depth 95 mm.

This contributes to control panel miniaturization.

(6) High performance

A high-heat dissipation structure is adopted to support ambient temperatures up to 55°C. Duty cycle is restricted at 55°C environments, but there is no duty restriction with a fan unit mounted.

Also, the ambient temperature range of SCON-CB connected via the simple absolute unit or extension unit should be up to 40°C. (Refer to "1.3.5 Usage Temperature Range (Page 1-7)" for detail)

(7) Improved usability

Equipped with a USB port as standard. Connection to a PC is possible using a commercial USB cable. An Ethernet port is also equipped in standard.

A JOG switch and brake switch are equipped on the front of the driver unit. Operation is easy even without a teaching tool.

(8) Troubleshooting feature

Details of error contents and counteractions get displayed on the teaching pendant TB-02/03.

The display is considered to see easily by grouping similar errors.

(9) Enhanced preventive and predictive maintenance functions

The present position and motor current value can be monitored, as well as the travel count, travel distance, and motor overload status. Also, it is available to acquire data of the output voltage from the IAI 24V power supply unit, the status of the fan and so on.

In addition, there are functions for predicting the life using the internal capacitor temperature and operation time, and for monitoring decreases in fan rotation speed.

The actuator body can register individual actuator information. The individual information can be checked at IAI even if the actuator is removed from the controller and returned.

1.3 Specifications

1.3.1 General Specifications

The basic specification of RSEL System is as shown below.

Item	Specifications
Power supply voltage	24V DC±10%
Power supply current	Differs with system configuration (refer to "2.2 Power supply capacity (page 2-11)" for details)
Number of controlled axes	1 to 8 axes (driver unit can be freely combined)
Supported field networks	CC-Link, CC-Link IE Field, DeviceNet, EtherCAT, EtherNet/IP, PROFIBUS-DP, PROFINET IO (slave station)
Configuration units	RCON-A driver unit, RCON-D driver unit, RCON-P driver unit, RCON-R high-thrust driver unit, RCON-SC power supply unit / driver unit, SCON extension unit, PIO/SIO/SCON extension unit, PIO unit, simple absolute unit and terminal unit
Emergency stop/Enable operation	STOP Signal input on SEL unit applied to system at the same time
Regulation/standard	CE Marking, UL Certification (To be certified soon)
External dimensions	Differ with system configuration
Connections between each unit	Unit connection method (refer to "4.1.1 Unit connection (page 4-1)" for details)
Installation/mounting method	DIN rail (35 mm) mounting

1.3.2 Environmental Conditions

The environmental specifications of RSEL System is as shown below.

Item	Specifications
Ambient operating temperature	0 to 55°C, except simple absolute unit and SCON are 0 to 40°C (Refer to "1.3.5 Use Temperature Range (from page 1-7) for detail"
Ambient operating humidity	5% RH to 85% RH (non-condensing or freezing)
Ambient storage temperature	-20 to 70°C
Atmosphere	Avoid corrosive gas and in particular avoid excessive dust
Altitude	1000m
Vibration resistance	Frequency: 10 to 57 Hz / Amplitude: 0.075mm, Frequency: 57 to 150 Hz / Acceleration: 9.8m/s ² XYZ directions Sweep time: 10 minutes Number of sweeps: 10 times
Ovvoltage category	I
Pollution degree	2
Degree of protection	IP20
Insulation withstanding voltage	500V DC 10MΩ
Generated heat	16.8W
Cooling method	Natural air cooling and forced air cooling by fan unit

1.3.3 Supper Source Specifications

Item	Specifications
Power input voltage range	24V DC±10% (for both motor power supply input and control power supply)
Power supply current	Refer to "2.2 Power supply capacity"
Power source frequency range	-
Current amperage	-
In-rush current	Refer to "2.3 Rush current"
Instantaneous power outage durability	By 24V power source
Electric shock protection	Class III

1.3.4 Specifications at Control Part

The specifications at the control part of RSEL System is as shown below.

Item	Specifications
Safety circuit configuration	Available for duplication
Drive-source cutoff method	Internal semiconductor cutoff, external all axes lump-sum cutoff
Emergency-stop input	B contact input (Selectable from External power supply, duplication and internal power supply)
Enable input	B contact input (Selectable from External power supply, duplication and internal power supply)
Speed setting	From 1mm/s The upper limit depends on the specifications of actuator
Accel/decel setting	From 0.01G The upper limit depends on the specifications of actuator
Number of axes groups	2 (8 axes max. In 1 group)
Program specification	Super SEL language
Number of programs	512 (Indication available up to 99 with BCD indication and 255 with binary indication in input signals.)
Number of program steps	20,000 steps
Number of multitask programs	16 programs
Number of positions	36,000 positions (Variable due to number of axes groups)
Number symbol definitions	2,000
Number of symbols to use	20,000
Number of symbol characters	40 1-byte characters, 20 2-byte characters
Number of letters for step comment	32 1-byte characters, 16 2-byte characters
Data memory cell	Flash ROM + Non-volatile RAM (FRAM) (Battery not necessary)
Data input	teaching pendant or PC software
Applicable Teaching Pendant	TB-02/TB-03
Applicable PC Software	XSEL PC software
Standard Input and Output	(When I/O slot selected) 16IN/16OUT PIO board (NPN/PNP)
Extension Input and Output	8 units max. of PIO unit connection
Serial communication feature	Teaching port (Max. 115.2kbps) USB port (Mini-B: 12Mbps Full speed) Ethernet (RJ-45), PSA-24 communication
Supported field networks	CC-Link, CC-Link IE Field, DeviceNet, EtherCAT, EtherNet/IP, PROFIBUS-DP, PROFINET IO (slave station)
Ethernet	10/100BASE-T (RJ-45 connector) XSEL Serial communication protocol (Format B) ^{*1} , SEL message communication
USB	USB2.0 (Mini-B), XSEL Serial communication protocol (Format B) ^{*1}
Calendar Feature	Retention time: Approx. 10 days, Charging time: Approx. 100 hours
SD card	SD/SDHC (uses updating feature only)

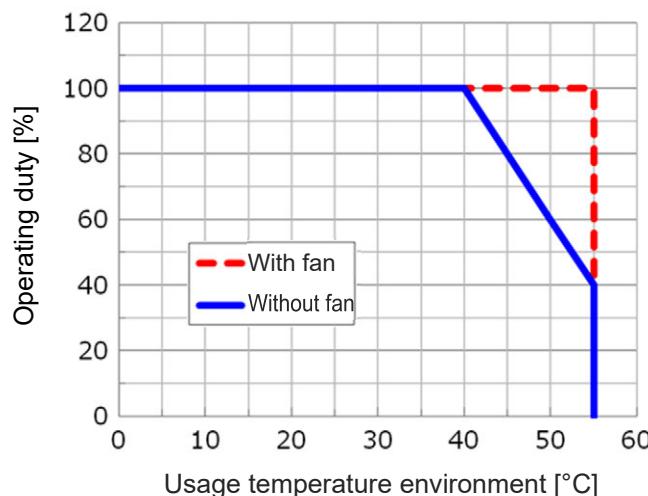
*1: XSEL Serial communication protocol (Format B) is available for communication only at one port.

Priority should be given to the teaching port (priority: high), USB and Ethernet (priority: low), and should give no response to low priority.

1.3.5 Usage Temperature Range

The range of temperatures to use the units except for SCON-CB in connectivity to the simple absolute unit and the extension unit should be from 0 to 55°C.

However, the 24V driver unit should require the temperature derating due to with or without a fan unit. In case without a fan unit, it should not be necessary to have the derating to operate in the range from 0 to 40°C, however, it should be required to drop the operating duty by 20% in every 5°C in the range from 40 to 55°C. In case with a fan unit, it should require no derating up to 55°C.



SEL unit requires a fan unit installed when it is to be used in an ambient with the temperature at 40°C or higher.

The 200V driver unit and the 200V power supply unit are equipped with a fan unit with no exception.



Caution

- Under conditions where the temperature is higher than 55°C, the unit cannot be used, regardless of the operating duty.
- When used under unsuitable conditions, “479 Slave Driver Alarm Detection” (Info.1=CAh) may be generated, causing the actuator to stop.
- The operating temperature of the simple absolute unit and SCON controller is within the range of 0 to 40°C. It cannot be used under conditions where the temperature is higher than 40°C.

1.3.6 General Specifications

Refer to “12.4 Consumable Parts” for the consumable parts.

1.4 Installation

1.4.1 Installation conditions

[Installation Environment]

Usage is possible in environments of pollution degree 2^{*1} or equivalent.

*1 Pollution degree 2: Environment in which generally only nonconductive pollution occurs, but temporary conductive pollution may occur due to condensation. (IEC60664-1)

(1) Installation environment

Avoid the following locations for installation.

- Where the ambient temperature exceeds the range of 0 to 55°C
(If there is no fan unit, derating is available.)
For simple absolute units and SCON, where the ambient temperature exceeds the range of 0 to 40°C
- Where the temperature changes rapidly and condensation occurs
- Where the relative humidity exceeds the range of 5%RH to 85%RH
- Where the unit is exposed to odorous or combustible gases
- Where the unit is exposed to significant amounts of dust, salt or iron powder
- Where the unit is subject to direct vibration or impact
- Where the unit receives direct sunlight
- Where the unit may come in contact with water, oil or chemical spray
- Where vents are blocked [see the section for installation and noise countermeasures]

If the unit is used in any of the following locations, provide sufficient shielding measures:

- Where noise is generated due to static electricity, etc.
- Where there are strong electrical or magnetic fields
- Where mains or power lines pass nearby

(2) Storage/preservation environment

For the storage and preservation environment, see the installation environment. However, give especial consideration to the prevention of condensation.

Unless especially specified, desiccant is not included in the package at shipping. If the product is to be stored/preserved in an environment where condensation is anticipated, take condensation preventive measures for the package overall from the exterior, or directly after opening the package.

1.4.2 Installation and mounting

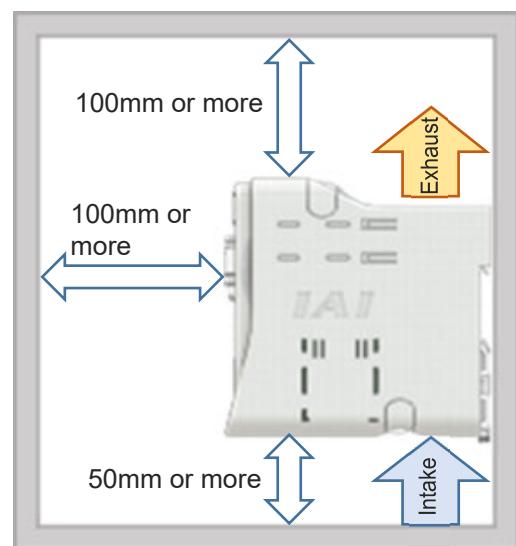
Consider the size of the control panel, placement of the RSEL system, cooling and the like when designing and manufacturing so that the ambient temperature is 0 to 55°C.

(If it has no fan unit, there is derating. Refer to "1.3.5 Usage Temperature Range (Page 1-7)" for detail)

However, when the system is installed in the same control panel as SCON connected to the simple absolute unit or extension unit, consider to design and build the control panel to fall in the ambient temperature from 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	Installation direction	Vertical mounting (exhaust side on top)
	Installation method	DIN rail mounting
	Installation conditions	See figure below
Ground		Only for Functional Grounding

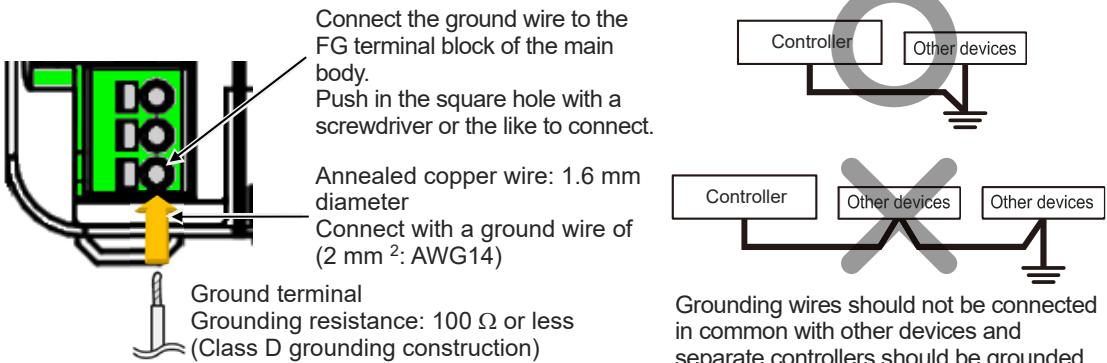


Make sure that several controllers are installed in vertical direction and the exhaust from the bottom controller does not get suctioned by the top controller.

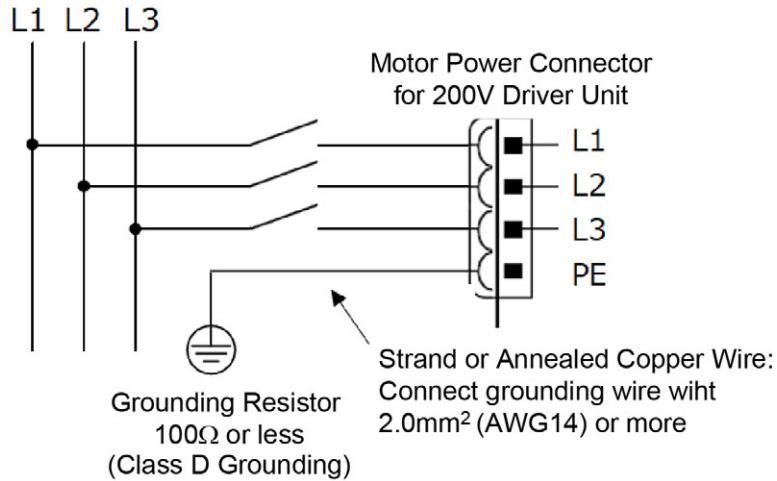
1.4.3 Noise countermeasures and mounting method

(1) Grounding for noise countermeasures (frame ground)

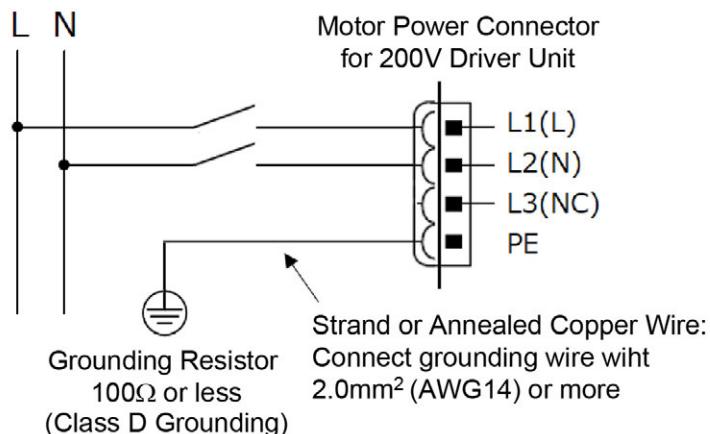
[24V DC]



[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.

1.4 Installation

(3) Noise sources and noise prevention

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

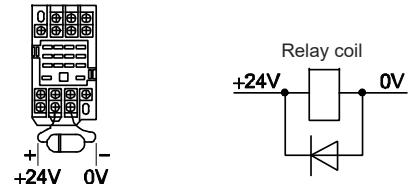
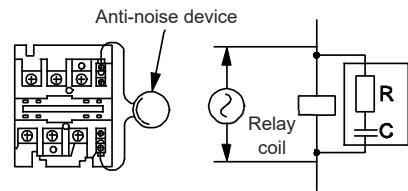
Countermeasure examples for noise sources are shown below.

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.



RSEL

Chapter 2

System Configuration and Power Specifications

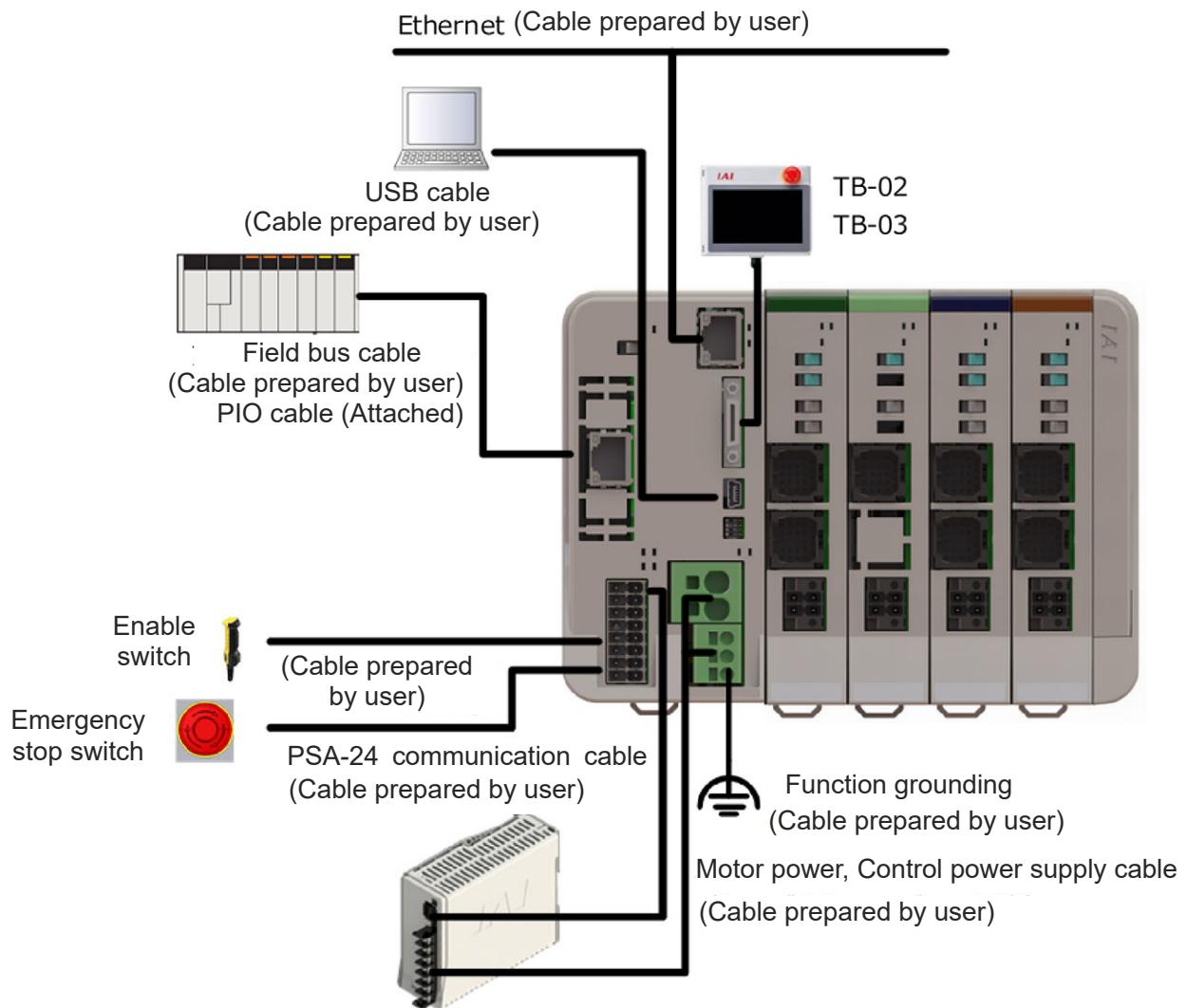
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2.1 System Configuration

2.1.1 System Configuration Diagram

The following shows the system configuration.



2.1.2 Configuration unit

(1) SEL unit, Terminal unit, Fan unit

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

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

The driver unit is available to connect eight axes in total to the following units.
(Requires firmware compatible with the RSEL system.)

Applicable Version List

V0007 or later for RCON-PC, RCON-PCF and RCON-AC, V0004 or later for RCON-DC, V0011 or later for SCON-CB, and V0001 or later for RCON-SC

Type	Stepper motor RCON-PC-1 RCON-PC-2	Compatible to stepper motor 56SP/60P/86P RCON-PCF-1	24V AC servo motor RCON-AC-1 RCON-AC-2	DC brushless motor RCON-DC-1 RCON-DC-2
Model code				
External				
Maximum number of connected units	Driver unit 8 axes in total	Driver unit 8 axes in total	Driver unit 8 axes in total	Driver unit 8 axes in total
Type	200V AC servo motor RCON-SC-1	200V power supply unit RCON-PS2-3	Simple absolute unit RCON-ABU-A RCON-ABU-P	
Model code				
External				
Maximum number of connected units	Driver unit 8 axes in total	1 unit		

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

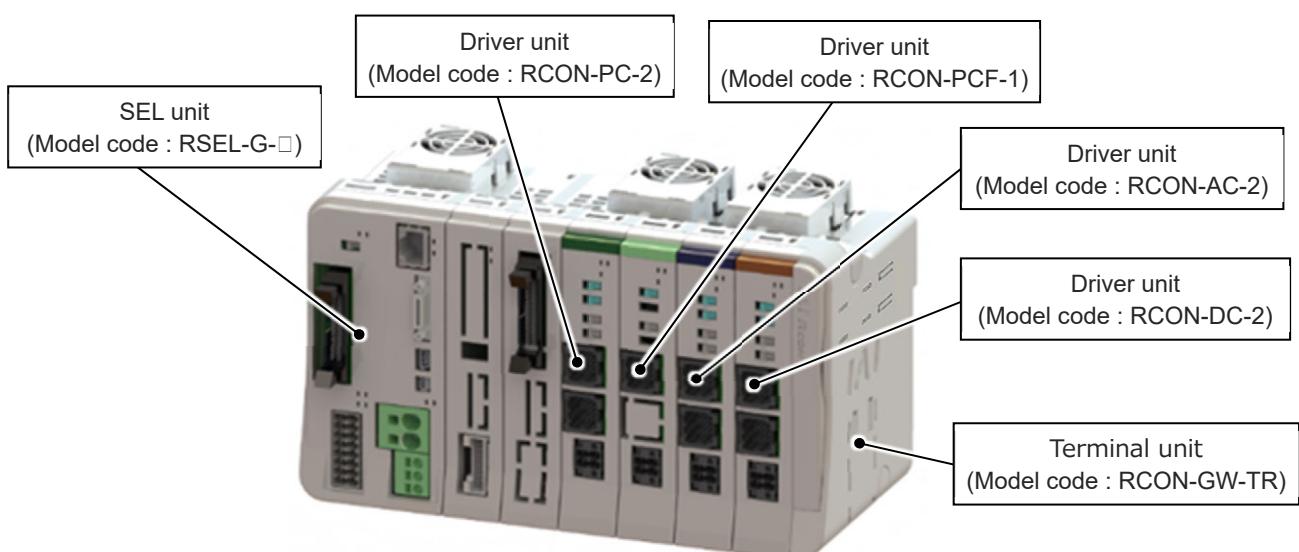
(3) Extension unit

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	<ul style="list-style-type: none"> • SCON connection • 485 SIO port • PIO extension 16in/16out (NPN or PNP) 	<ul style="list-style-type: none"> • 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

2.1.3 Model code

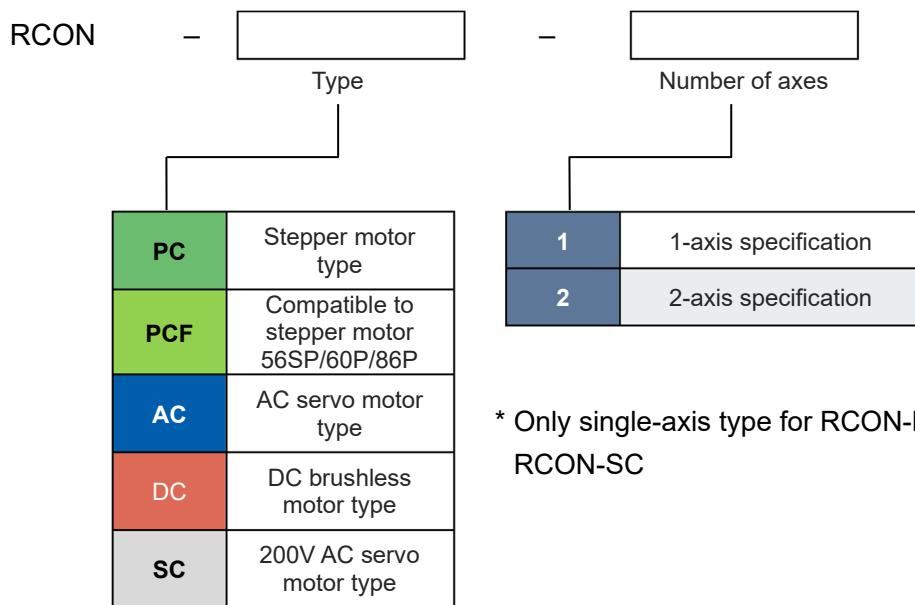
(1) SEL unit

RSEL -	G	-	I/O Type	I/O cable length	Option	
	Type		I/O Type	I/O cable length	Option	
	G	Safety category compatible type			FU*	Fan unit mounting (*: Specify the number of units, 1 ~ 5)
					TRN	Without terminal unit
E	Not for use			0	Cable Without	
NP	PIO specification (NPN 16/16)			2	2m (Standard)	
PN	PIO specification (PNP 16/16)			3	3m	
CC	CC-Link connection specification			5	5m	
CC2	CC-Link connection specification (2-way Connector Enclosed)					
CIE	CC-Link IE Field connection specification					
DV	DeviceNet connection specification					
DV2	DeviceNet connection specification (2-way Connector Enclosed)					
EC	EtherCAT connection specification					
EP	EtherNet /IP connection specification					
PR	PROFIBUS-DP connection specification					
PRT	PROFINET IO connection specification					

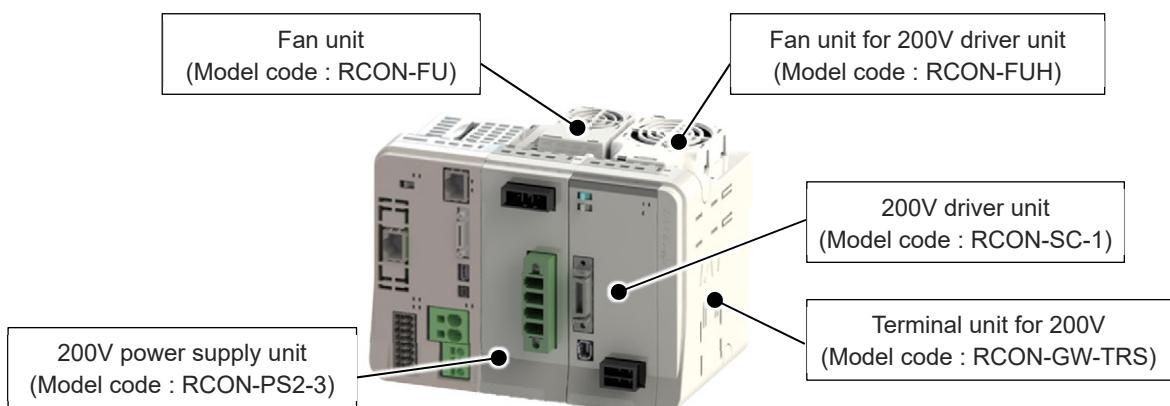
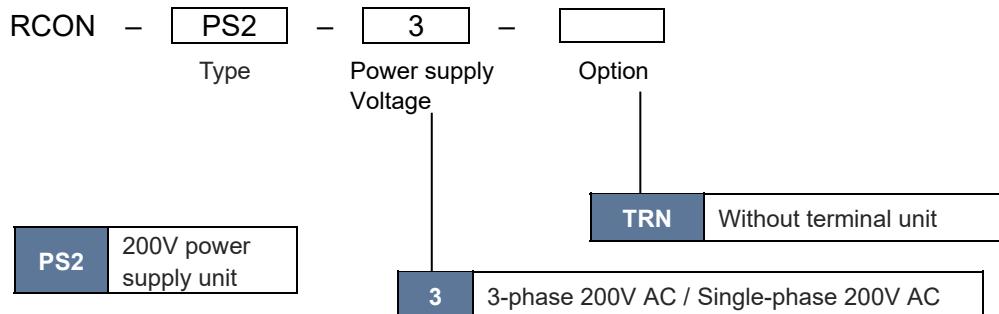


2.1 System Configuration

(2) Driver unit



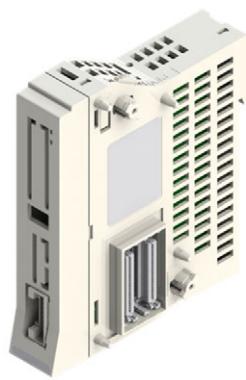
(3) 200V power supply unit



* The maximum number of connectable units is one unit.

(4) SCON extension unit

RCON - EXT



(5) PIO/SIO/SCON extension unit

RCON - EXT - [] - []

I/O specification

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

I/O cable length

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



2.1.4 Unit list

	Product name	Model code
SEL unit	Not for use	RSEL-G-E
	PIO type (NPN 16/16)	RSEL-G-NP
	PIO type (NPN 16/16)	RSEL-G-PN
	CC-Link connection type (2-way Connector Enclosed)	RSEL-G-CC (CC2)
	CC-Link connection type	RSEL-G-CIE
	DeviceNet connection type (2-way Connector Enclosed)	RSEL-G-DV (DV2)
	EtherCAT connection type	RSEL-G-EC
	EtherNet/IP connection type	RSEL-G-EP
	PROFIBUS-DP connection type	RSEL-G-PR
	PROFINET IO connection type	RSEL-G-PRT
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 SEL 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 • For SEL unit	RCON-FU
Fan unit for 200V driver	One unit to be installed for one unit of RCON-SC (enclosed in RCON-SC)	RCON-FUH

2.1.5 Set Model Code for 6-axis Cartesian Robot (CRS Series)

It is available to order in a set model code when preparing a controller for a 6-axis cartesian robot.

(1) Set Model Code

RSEL -	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>
	Type	I/O Type	I/O cable length		Option		
SXBA	For CRS-XBA	E	Not for use		FN	Fan unit (For RCON-PC)	
SXGA	For CRS-XGA	NP	PIO specification (NPN 16/16)				
SXBB	For CRS-XBB	PN	PIO specification (NPN 16/16)				
SXGB	For CRS-XGB	CC	CC-Link connection specification				
SXZCY	For CRS-XZCY	CC2	CC-Link connection specification (2-way Connector Enclosed)				
SXZCZ	For CRS-XCZ	CIE	CC-Link IE Field connection specification				
SXZDY	For CRS-XZDY	DV	DeviceNet connection specification				
SXZDZ	For CRS-XZDZ	DV2	DeviceNet connection specification (2-way Connector Enclosed)				
SXZEY	For CRS-XZEY	EC	EtherCAT connection specification				
SXZEZ	For CRS-XZEZ	EP	EtherNet /IP connection specification				
		PR	PROFIBUS-DP connection specification				
		PRT	PROFINET IO connection specification				
						0 Cable Without	
						2 2m (Standard)	
						3 3m	
						5 5m	

(2) Type List

Type (Model)	SXBA	SXGA	SXZCY	SXZCZ	SXZDY	SXZDZ	SXBB	SXGB	SXZEY	SXZEZ
Model Code for Connected 6-axis Cartesian Robot	CRS-XBA	CRS-XGA	CRS-XZCZ	CRS-XZCY	CRS-XZDZ	CRS-XZDY	CRS-XBB	CRS-XGB	CRS-XZEY	CRS-XZEZ
Appearance (Front View)										
Connected Driver Unit	RCON-PC-2 [3 units]					RCON-PC-1 [1 unit] RCON-PC-2 [1 unit] RCON-SC-1 [3 units]				

* Refer to "6-axis Cartesian Robot Instruction Manual (ME3792)" for the detail of 6-axis cartesian robot.

(3) Additional Axes

It is available to have two more axes of driver unit connected in addition to six axes on the 6-axis cartesian robot (CRS Series). It is necessary to prepare the driver units separately for additional connection.

2.1.6 Teaching tool (Option)

It is necessary to have a teaching tool (PC software or teaching pendant) in order to make the setup operations such as creating programs, position settings by eg. teaching and parameter settings.

Please prepare either of the following teaching tools.

No.	Part Name	Model
1	PC software with RS232C Cable + Connector Conversion Cable • with Emergency Stop Box	IA-101-X-MW-JS
2	PC software DVD only (There is no cable enclosed)	IA-101-N
3	Teaching Pendant (standard /with a dead man's switch)	TB-02/TB-02D
4	Teaching Pendant	TB-03

2.2 Power supply capacity

Power capacity is divided into two parts, control power capacity and motor power capacity.

24V DC power supply is to be input from the control power supply connector and the motor power supply connector on the gateway unit. The user must make sure that 0 V of the control and motor power is used in common.

The motor power supply to the 200V AC actuator is to be input from the 200V power supply unit (RCON-PS2).

The necessary power capacity is calculated from adding the "total control power capacity of the unit in use" and the "total motor power capacity of the connected actuator". However, the 200V driver unit is to be calculated from the "sum-up of the control current amperage of used units" and separated from the motor power supply.

Also, for the 24V system, "Calculator Software" is available that enables

to automatically

calculate the necessary current amperage as soon as the actuator

operation conditions and

operation patterns are set up.

Refer to "Calculator Instruction Manual (ME0381)" for details such as how to operate.



(Reference) Selection of Circuit Breaker for Power Supply Protection

[For 24V System]

It is recommended that protection of the power supply is performed on the primary side (AC power source side) in the 24V DC power supply unit.

Be mindful of the in-rush current of the 24V DC power supply unit and the rated interrupting current of the circuit breaker when select.

Rated Interrupting Current > Short-Circuit Current = Primary Side Current Amperage / Power Supply Voltage

2.2 Power supply capacity

[In-Rush Current of IAI Power Supply Unit PSA-24]

Item	Conditions	Specifications	
In-Rush Current	At Cold Start (25°C)	100V AC	17A (typ)
		200V AC	34A (typ)
	At Cold Start (40°C)	100V AC	27.4A (typ)
		200V AC	54.8A (typ)

The pulse width that the in-rush current flows in is 5ms or less. Also, in parallel operation, the in-rush current is added for number of units. Confirm the characteristics when select so the breaker would not work at the in-rush current.

[For 200V System]

For selection of the circuit breaker, follow the instructions below.

- Three times higher current than the rated flows to the controller at acceleration / deceleration.
Select a breaker that would not trip when this much current flows. In case it trips, it is necessary to select a breaker with rated current one rank higher. (Check with the operation characteristic curves shown in a catalog provided by the manufacturer.)
- Select a breaker that would not trip with the in-rush current. (Check with the operation characteristic curves shown in a catalog provided by the manufacturer.)
- Select the rated cutoff current that surely cuts off the current even when short-circuit current flows.

Rated Cutoff Current > Short-Circuit Current = Primary Current Amperage / Power Voltage
Have enough margin to the rated current when you select a circuit breaker.

For Single-Phase 200V AC:

Rated Current of Circuit Breaker > Motor Current Amperage (VA) / AC Input Voltage × Margin (1.2 ~ 1.4)

For 3-Phase 200V AC:

Rated Current of Circuit Breaker > Motor Current Amperage (VA) / AC Input Voltage × Margin (1.2 ~ 1.4) / $\sqrt{3}$

*Selection of Leakage Breaker

- It is necessary to clarify the purpose such as fire protection and human protection when selecting a leakage breaker.
- The leakage current may vary depending on the wattage of motor, cable length and other ambient environment. In case of leakage protection, measure the leakage current at the position to install a leakage breaker.
- Select a leakage breaker applicable for higher harmonics.

2.2.1 Power supply capacity

The specifications regarding power capacity are listed below.

[Control unit]

Item	Specifications		
Power supply voltage	24V DC±10% 200V AC to 230V±10% (Power Supply Unit)		
Control power Capacity (per unit)	SEL unit (includes terminal unit)		1.2A
	24V Driver unit (common to all types)	Brake: No	0.2A
		Brake: Yes (1-axis specification)	0.4A
		Brake: Yes (2-axis specification)	0.6A
	200V Driver unit (Includes 200V Power Supply Unit)	Brake: No	0.2A
		Brake: Yes	0.5A
	SCON extension unit		0.1A
	PIO/SIO/SCON extension units		0.1A
	PIO unit		0.1A
	Simple absolute unit (common to all types)		0.2A

[24V Motor power supply]

Item	Actuator / Driver Unit				Rated Current	Max. current	
		Series	Motor type			When Energy-saving is set	
Motor power capacity (1 axis per actuator)	Stepper motor /RCON-PC	RCP2 RCP3	20P/20SP/28P	Without PowerCON	0.8A	—	—
			28P (Note 1)/35P/42P/56P		1.9A	—	—
		RCP4 RCP5 RCP6	28P/35P/42P/42SP/56P	Without PowerCON	1.9A	—	—
				With PowerCON	2.3A	—	3.9A
		Stepper motor /RCON-PCF	RCP2 RCP4 RCP5 RCP6	56SP/60P/86P	Without PowerCON	5.7A	—
		—	—				
	AC servo motor /RCON-AC	RCA RCA2	5W	Standard / Hiaccel./ decel.	1.0A	—	3.3A
			10W	Standard / Hiaccel./ decel. / Energy-saving	1.3A	2.5A	4.4A
			20W		1.3A	2.5A	4.4A
			20W (20S)		1.7A	3.4A	5.1A
			30W		1.3A	2.2A	4.0A
		RCL	2W	Standard / Hiaccel./ decel.	0.8A	—	4.6A
			5W		1.0A	—	6.4A
			10W		1.3A	—	6.4A
	DC brush-less motor /RCON-DC	RCD	3W	Standard	0.7A	—	1.5A

Note 1 Applicable Models: RCP2-RA3, RCP2-RGD3

[200V Motor power supply]

Wattage of Actuator Motor	Motor power capacity [VA]	Transient Max. Motor Current Amperage [VA]
60	138	414
60 (RCS3-CTZ5)	197	591
100	234	702
100S (LSA)	283	851
150	328	984
200	421	1263
200S (DD)	503	1509
200S (Other LSA (S) - N15H)	486	1458
200S (LSA (S) - N15H)	773	2319
300S (LSA)	662	1986
400	920	2760
400 (RCS3-CT8)	1230	3690
600	1164	2328
600 (DD)	1462	4386
750	1521	3042
750S	1521	4563

2.2.2 Unit connection restrictions

(1) Current limit values

The current limit values used for selection calculation are listed below.

Item	Current limit values for selection calculation
Control power (CP)	9.0A or less
24V Motor power (MP)	37.5A or less

Based on the RCON system configuration, make sure for each unit that the calculated result for control power and motor power does not exceed the current limit value for selection calculation.

Note that the SEL unit is not included in the calculations.

Calculation examples are shown below.

[Control power] * The SEL unit is not included in the calculations.

Ex. 1	24V System Actuator × 8-Axis, All Axes Equipped with Brake (2 axes/unit), All Axes Simple Absolute 24V Driver Unit (Equipped with Brake) $0.6A \times 4 + \text{Simple Absolute } 0.2A \times 8 = 4.0A \Rightarrow \text{OK}$
Ex. 2	24V System Actuator × 8-Axis, All Axes Equipped with Brake (1 axes/unit), All Axes Simple Absolute 24V Driver Unit (Equipped with Brake) $0.4A \times 8 + \text{Simple Absolute } 0.2A \times 8 = 4.8A \Rightarrow \text{OK}$
Ex. 3	24V System Actuator × 8-Axis, All Axes Equipped with Brake (1 axes/unit), All Axes Simple Absolute PIO/SIO/SCON Extension Unit 1 unit, PIO unit 7 units 24V Driver Unit (Equipped with Brake) $0.4A \times 8 + \text{Simple Absolute } 0.2A \times 8 + \text{PIO/SIO/SCON Extension Unit } 0.3A \times 1 + \text{PIO Unit } 0.2A \times 7 = 6.5A \Rightarrow \text{OK}$
Ex. 4	200V System Actuator × 8-Axis, All Axes Equipped with Brake, PIO unit × 8 Driver Unit (Equipped with Brake) $0.5A \times 8 + \text{PIO unit } 0.2A \times 8 = 5.6A \Rightarrow \text{OK}$
Ex. 5	24V System Actuator × 7-Axis, All Axes Equipped with Brake (1 axes/unit), All Axes Simple Absolute 200V System Actuator × 1-Axis, All Axes Equipped with Brake PIO/SIO/SCON Extension Unit × 1 unit, PIO Unit × 7 units 24V Driver Unit (Equipped with Brake) $0.4A \times 7 + \text{Simple Absolute } 0.2A \times 7 + 200V \text{ Driver Unit (Equipped with Brake)} 0.5A \times 1 + \text{PIO/SIO/SCON Extension Unit } 0.3A \times 1 + \text{PIO Unit } 0.2A \times 7 = 6.4A \Rightarrow \text{OK}$

[24V System Motor Power Supply]

Ex. 6	RCON-PC (with PowerCON) × 8 axe RCON-PC (with PowerCON) rated current 2.3A × 8 axes = 18.4A ⇒ OK
Ex. 7	For RCON-PCF × 7 axes or 6 axes RCON-PCF rated current 5.7 A × 7 axes = 39.9A ⇒ NG RCON-PCF rated current 5.7 A × 6 axes = 34.2A ⇒ OK
Ex. 8	RCON-PC (without PowerCON), RCON-AC, RCON-DC The rated voltage of all units is low, and even 8 axes do not exceed the current limit value. ⇒ OK
Ex. 9	RCON-PCF × 6 axes, PC (with PowerCON) × 2 axes, or RCON-PCF × 6 axes, RCON-AC × 2 axes $5.7 \times 6 + 2.3 \times 2 = 38.8A \Rightarrow \text{NG}$ $5.7 \times 6 + 1.3 \times 2 = 36.8A \Rightarrow \text{OK}$

**Caution**

- Supposing that the operation pattern is that all axes only perform acceleration/deceleration simultaneously, and operating duty is 100%, the motor power must be calculated by using the maximum current value.
- When it is necessary to calculate the motor current in detail, use “Calculator Software”. When the operating conditions and the operating pattern of the actuator are set, the necessary power capacity can be calculated automatically.

(2) 200V maximum connection axis

When connecting a 200V actuator using RCON-SC, restrictions on motor power are as follows.

Item	Current limit values for selection calculation
200V Motor power (Single-Phase)	1600W
200V Motor power (3-Phase)	2400W

The confirm that the total motor wattage on the connected actuators would not exceed the limit of the calculation for selection.

For the actuators below, calculate with the motor wattage for calculation

Actuator Model Number	Motor Wattage for Calculation
RCS3-CTZ5	120W
LSA-S6S□/S8S□/S8H□/N10S□	300W / 1 slider
LSA-S10SM/H8SM/H8HM/L15SM/N15SM/N15HM/N19SM	400W / 1 slider
LSA-S10SS/S10HS/H8SS/H8HS/L15SS/N15SS/N15HS/N19SS	600W
LSA-W21S□, RCS3-CT8	800W / 1 slider

Calculation examples are shown below.

[200V System Motor Power Supply]

Ex. 10	1 axis of actuator each of 200W, 300W and 600W motors
	$200W \times 1 \text{ axis} + 300W \times 1 \text{ axis} + 600W \times 1 \text{ axis} = 1100W$ ⇒ Single-Phase OK , 3-Phase OK
Ex. 11	RCS-CTZ5 × 1 axis, actuator of 200W motor × 7 axes
	$120W + 200W \times 7 \text{ axes} = 1520W$ ⇒ Single-Phase OK , 3-Phase OK
Ex. 12	Actuator of 200W motor × 6 axes, LSA-S10SM (Multiple Slider) × 1 axis
	$200W \times 6 \text{ axes} + 400W \times 2 = 2000W$ ⇒ Single-Phase NG , 3-Phase OK
Ex. 13	Actuator of 400W motor × 8 axes
	$400W \times 8 \text{ axes} = 3200W$ ⇒ Single-Phase NG , 3-Phase NG

2.3 Rush current

The in-rush current should be as shown below.

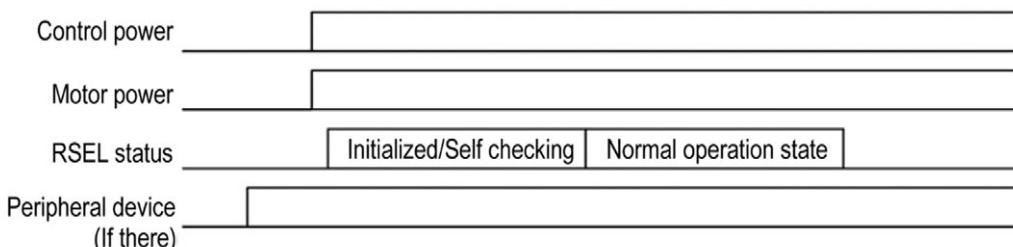
Item		Interrupting Current	
Control power	SEL unit	4.3A	
Motor power	P driver unit RCON-P	C	8.3A
		CF	10A
	A driver unit RCON-AC		10A
	D driver unit RCON-DC		10A
	S driver unit RCON-SC		25A

2.4 Generated heat

Item	Generated heat
SEL unit	16.8W

2.5 Rush current sequence

Item	Specification
Order to Turn Power on	<ul style="list-style-type: none"> Turn the control over on after turning on the power to the peripheral devices when there is any peripheral device such as a PLC. The control power and motor power should basically be turned on at the same time. When the power is to be turned on with STOPIN and ENBIN being input, turn the motor power on at the same time to cancel STOPIN and ENBIN inputs.
Time to Turn Power on after off	<ul style="list-style-type: none"> 24V DC Cutoff : 1sec or more
Startup Time (from turning power on to initialization finish)	<ul style="list-style-type: none"> Depend on System Construction



2.6 Drive-source cutoff

Although RSEL System is to get the motor power supplied from the SEL unit and the 200V power supply unit, the drive cutoff circuit is installed in the driver unit.

Each driver unit possesses a drive cutoff circuit by the semiconductor. The motor power supply should be cut off by STOP Signal. The drive source cutoff circuit via semiconductor has a high-side overcurrent detection function and an inrush current restriction function.

2.6.1 Drive-source cutoff circuit specifications

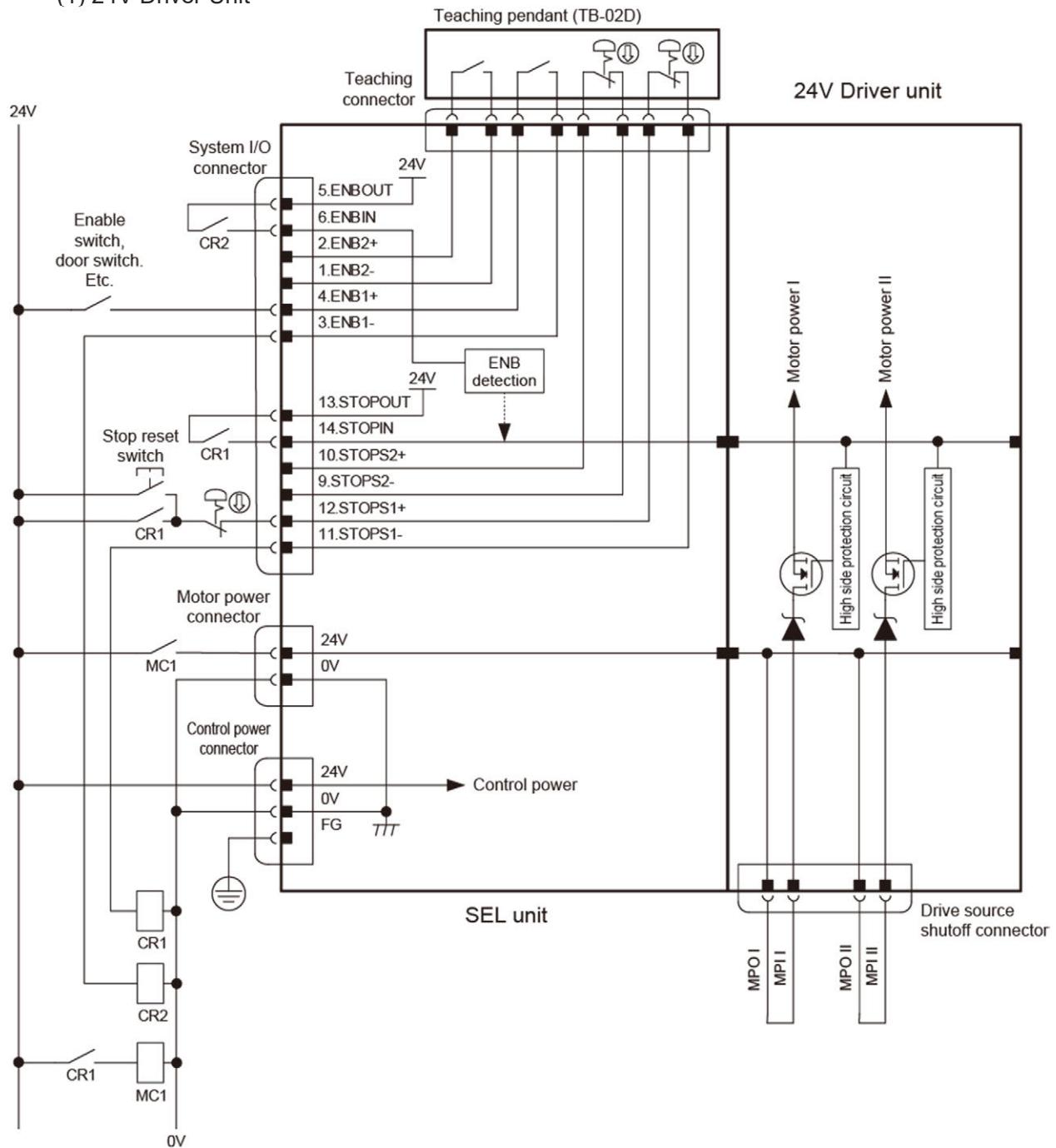
[Electrical Specifications]

Item	Specification
STOPIN Input, ENBIN Input	24V DC±10% / 10mA or less
S1, S2	24V DC±10% / 0.1A or less

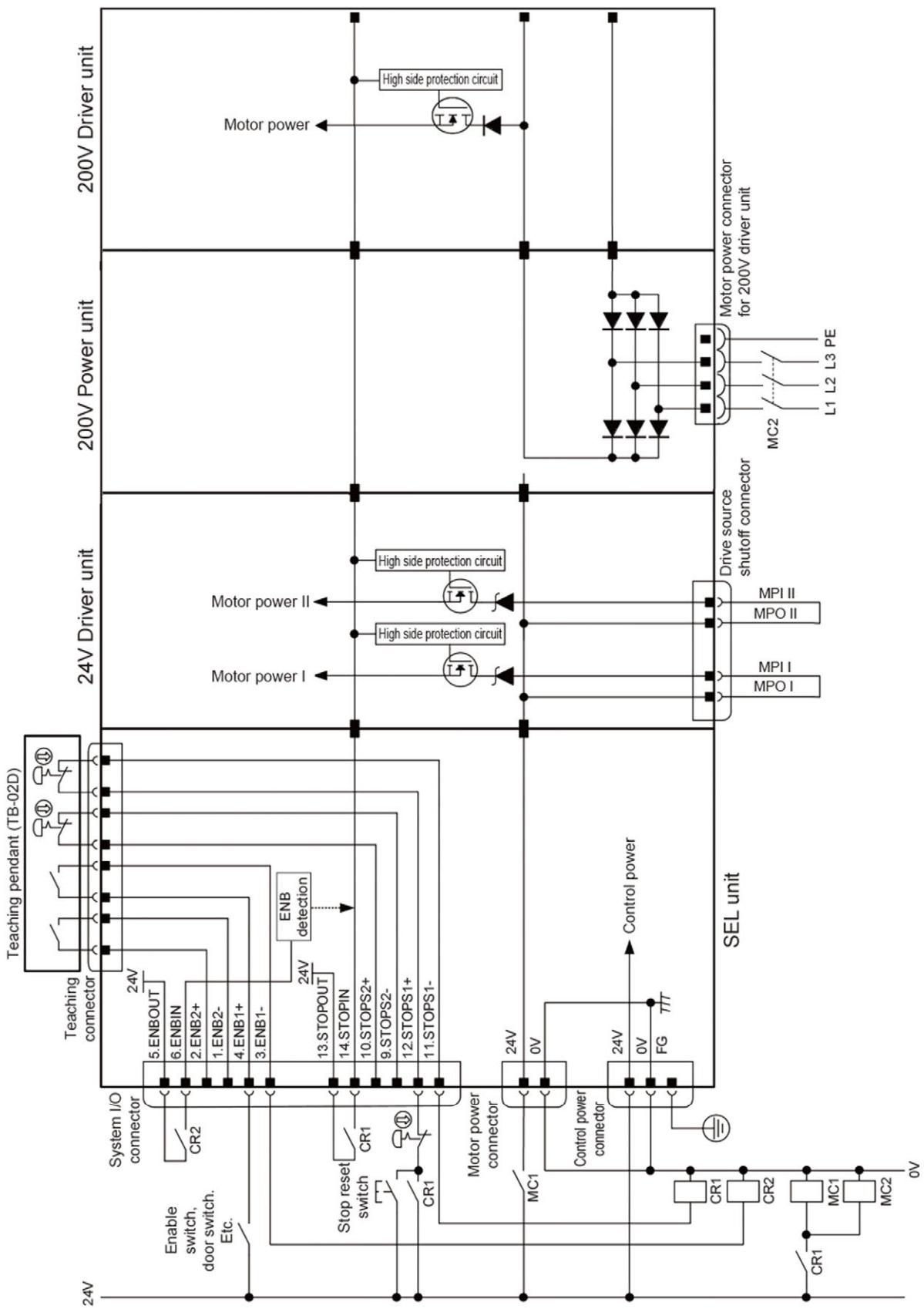
2.6.2 Drive-source cutoff circuit wiring example

When the stop switch and enable (deadman's) switch on the teaching pendant is to be affected at equipment emergency stop.

(1) 24V Driver Unit



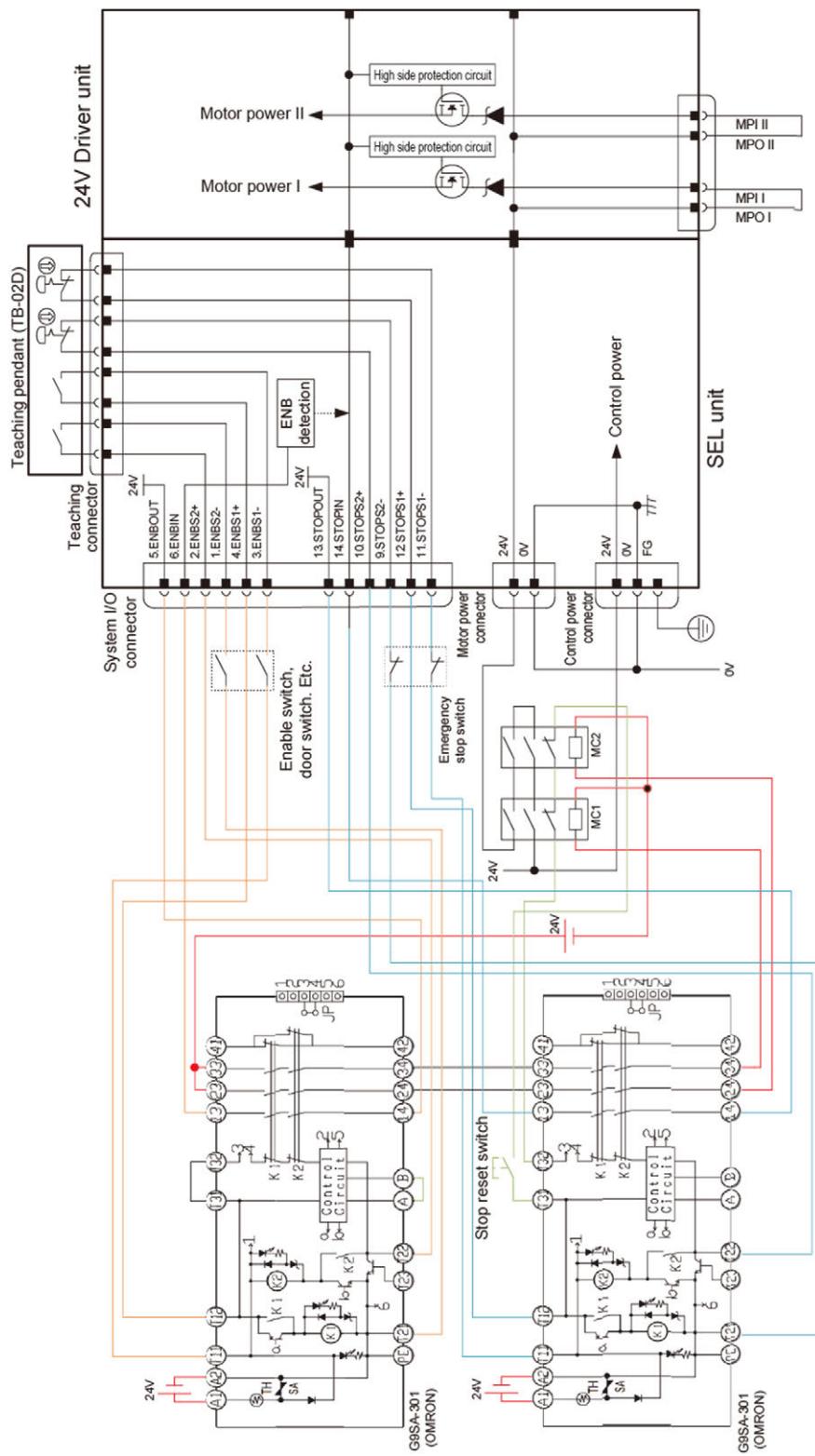
(2) 24V Driver Unit and 200V Driver Unit Used in Parallel

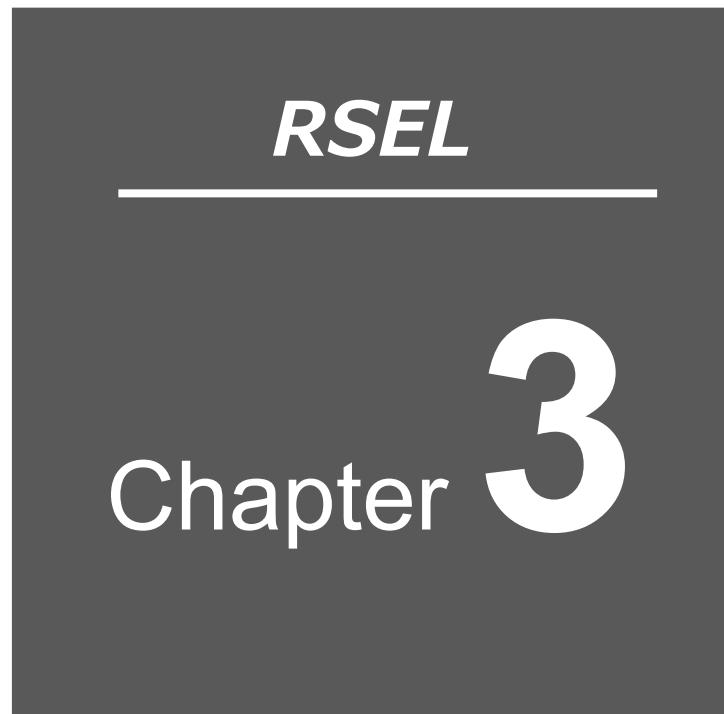


2.6.3 Category 3 or category 4 configuration example

An example of construction category 3 is shown below.

When Category 4 is to be secured, use only one of either the emergency stop switch on the teaching pendant or the external emergency stop switch so the safety feature would not be lost even with accumulation of malfunctions. (e.g. Connect the dummy plug DP-4S on the teaching pendant to avoid using it.)





Specifications for per unit

3.1 SEL unit, Terminal unit	3-1
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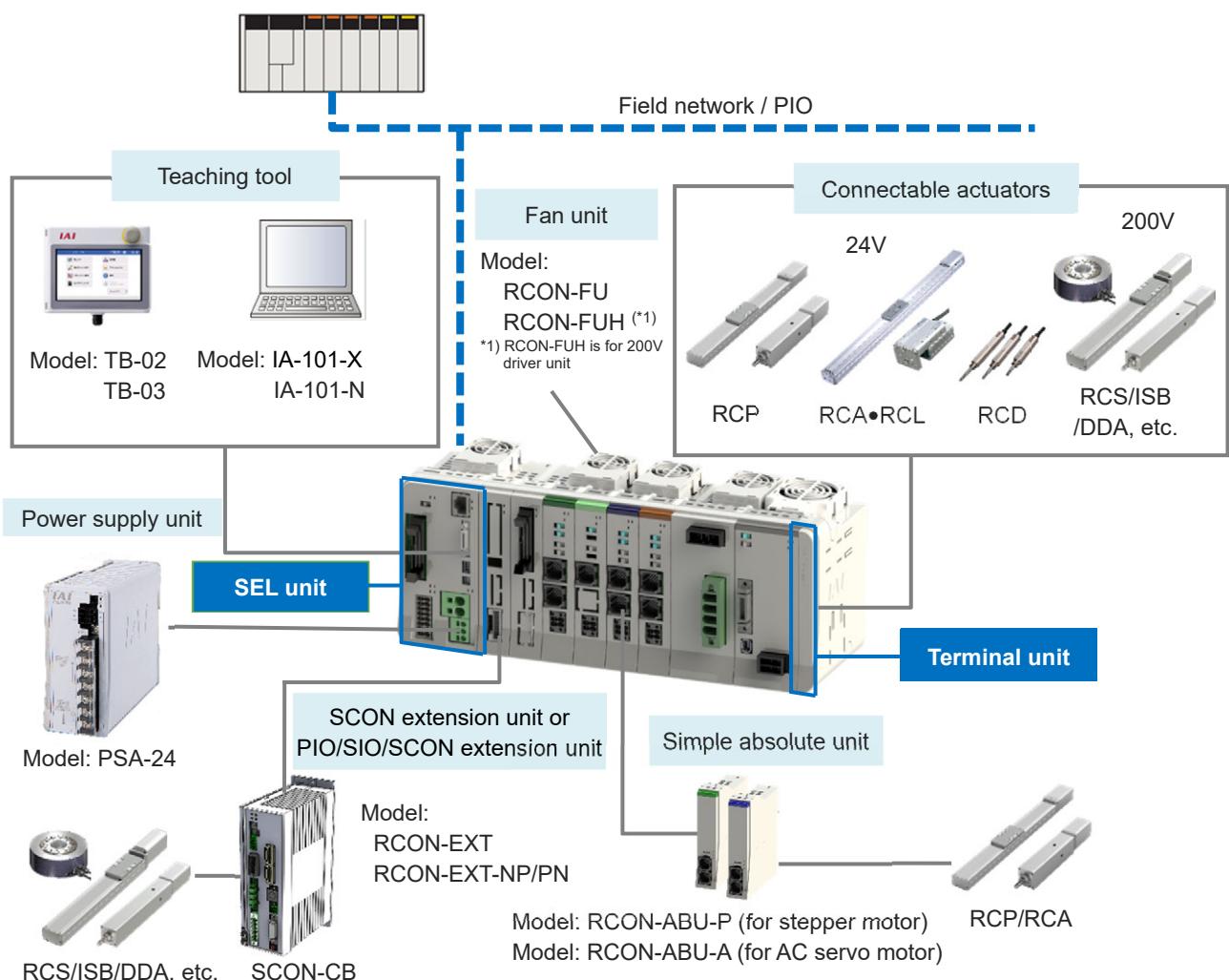
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3.1 SEL unit, Terminal unit

3.1.1 Overview

SEL unit is a master unit that enables to control ROBO Cylinder and other industrial robots with SEL programs created with SEL language of IAI. It is equipped with the gateway feature applicable for the field networks of the host PLC, and is applicable for seven types of field networks (CC-Link, CC-Link IE Field, DeviceNet, EtherCAT, EtherCAT/IP, PROFIBUS-DP and PROFINET IO).

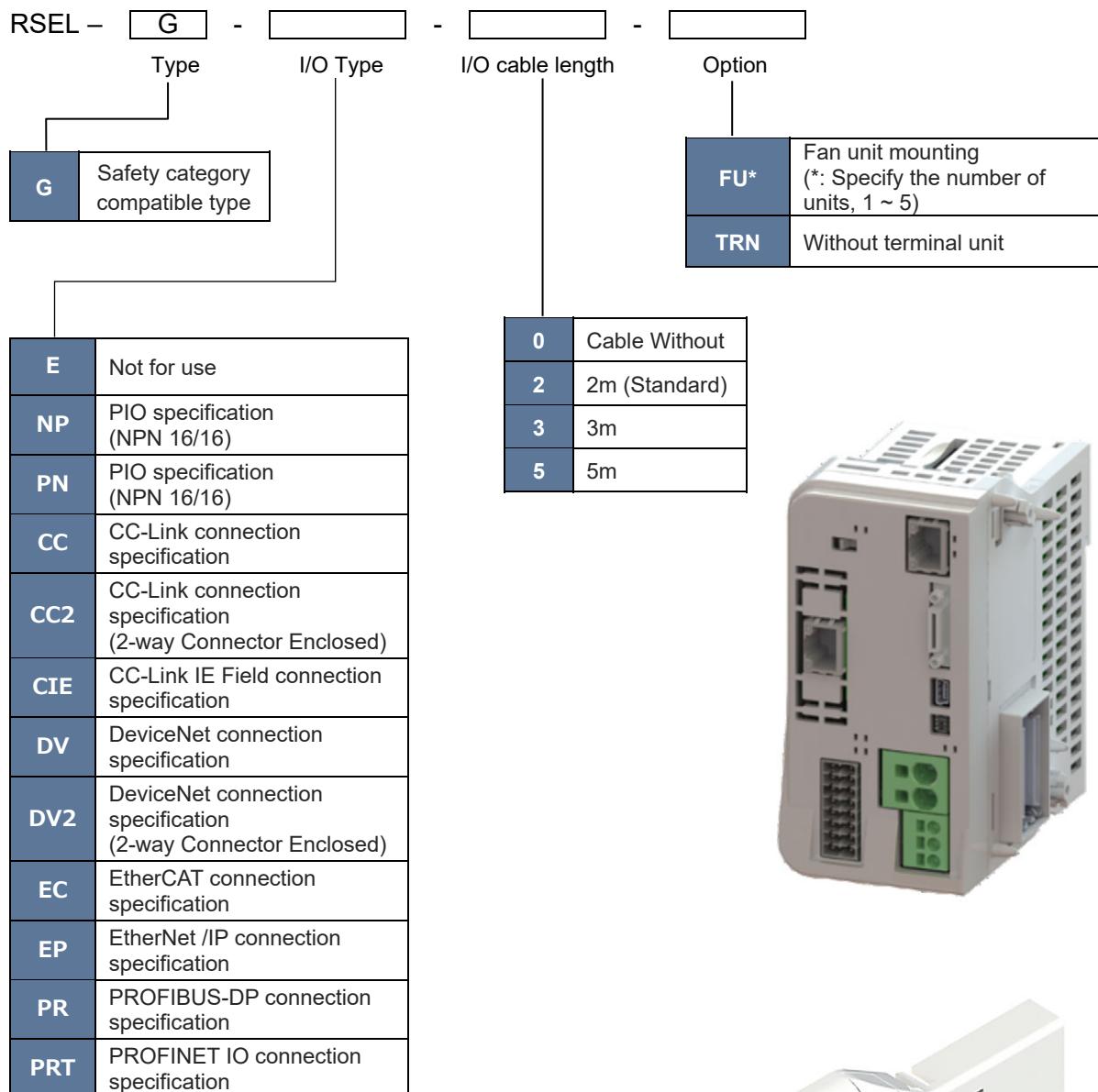
It is capable to connect eight axes of SCON-CB at the maximum via the driver units (RCON-PC/PCF/AC/DC/SC) and SCON extension units. It is capable not only to control individual connected actuators, but also capable to monitor the operating conditions and variety of types of information.



3.1.2 Model Code

(1) How to Read the Model

[SEL unit]

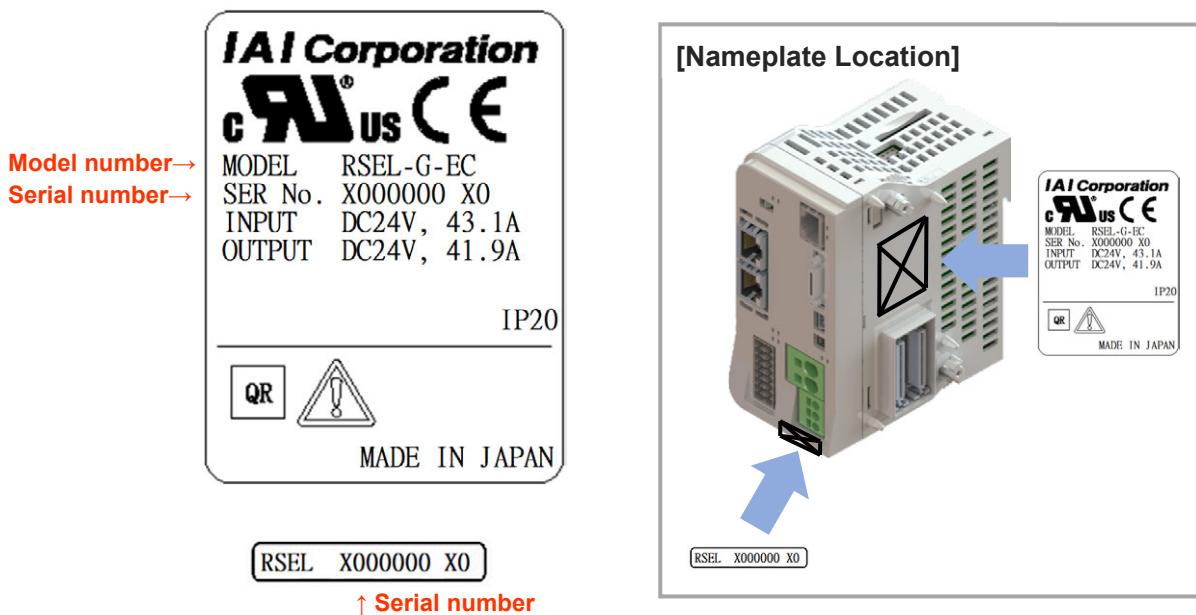


[Terminal unit]

RCON - GW - TR

(2) How to read the model nameplate

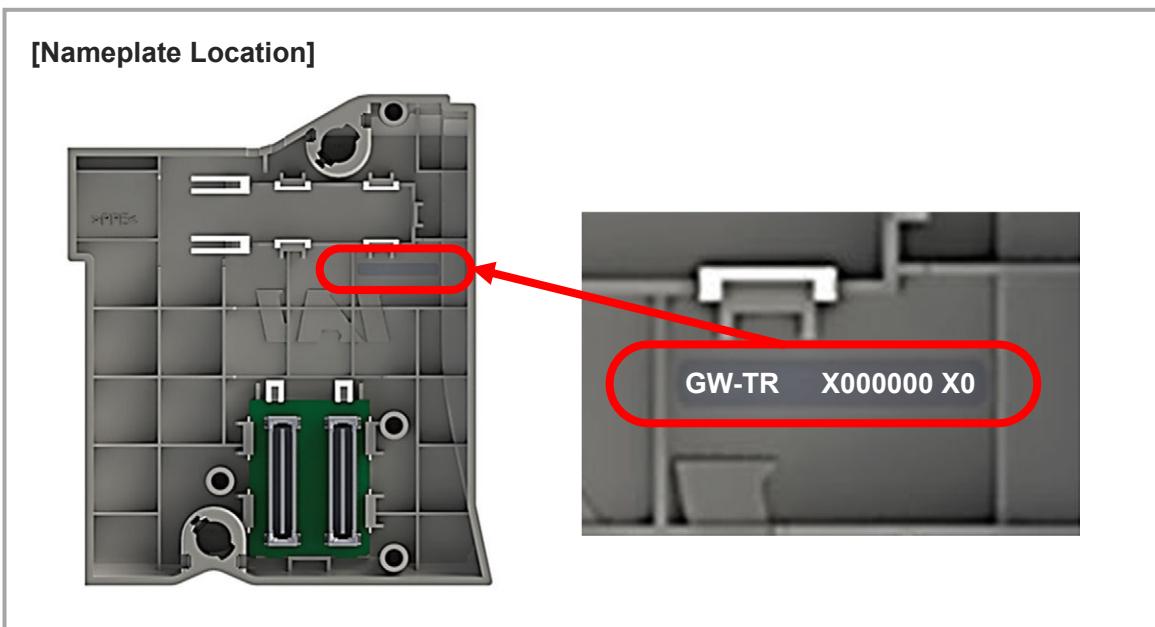
[SEL unit]



* This design is after being certified with UL/CE.

Mark	Explanation of Mark
⚠	Use IAI specified cables only.

[Terminal Unit]



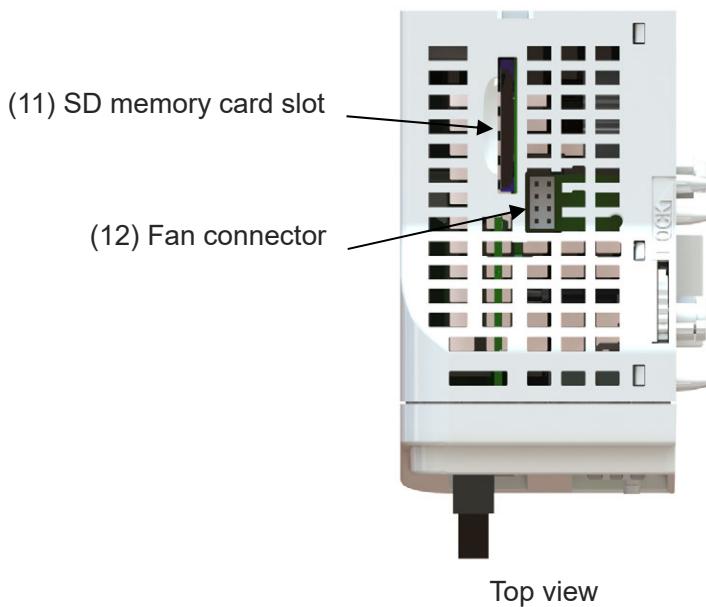
3.1.3 Component

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.

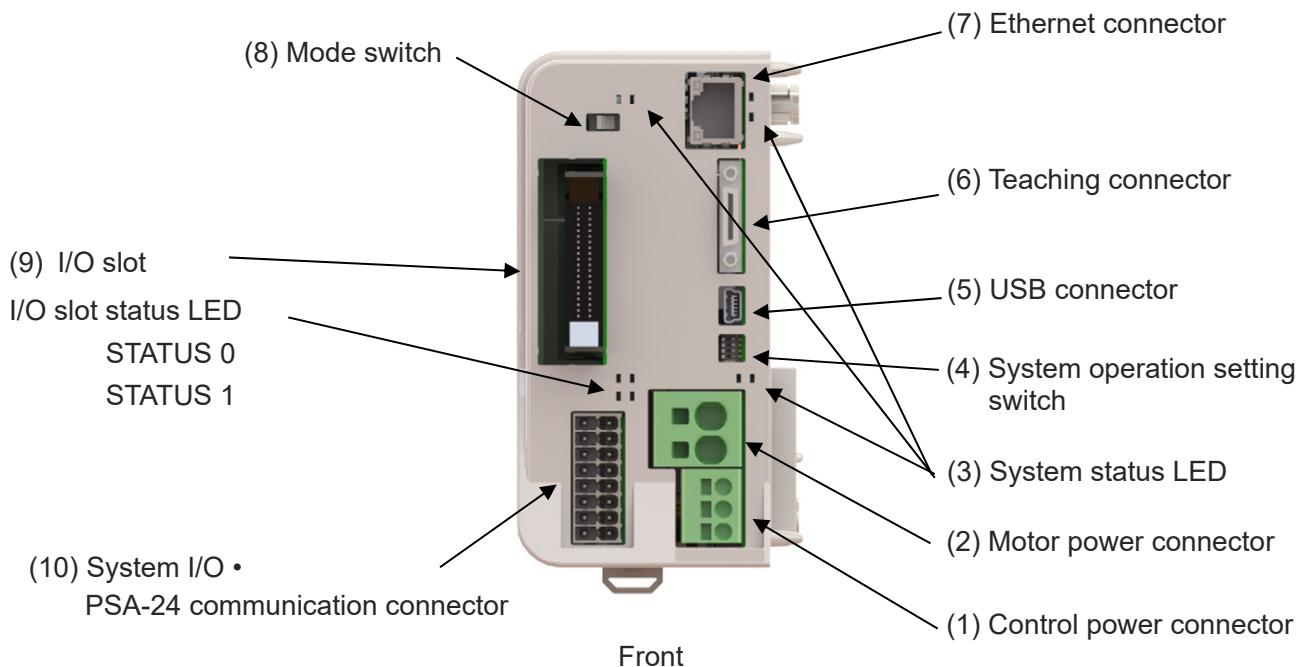
Part name	Shape	Quantity	Remarks
SEL unit		1	Model example : RSEL-G-*
Terminal unit		1	Single product model number : RCON-GW-TR (Not supplied with TRN specification)
System I/O connector		1	Model : DFMC1.5/8-ST-3.5 (RSEL) * Supplied with SEL unit
Field network connector		1	Depends on I/O type
Dummy plug		1	Single product model number : DP-4S
Instruction Manual DVD		1	
First Step Guide		1	ME0393
Safety Guide		1	M0194

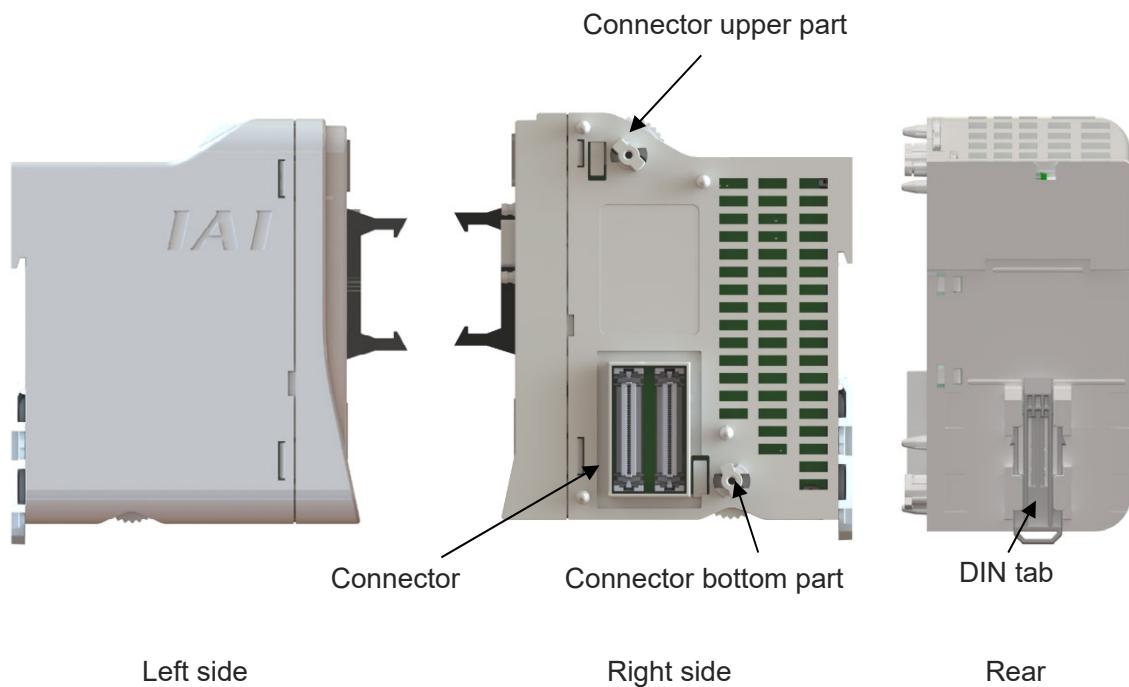
3.1.4 Part names/Functions

[SEL unit]



Top view





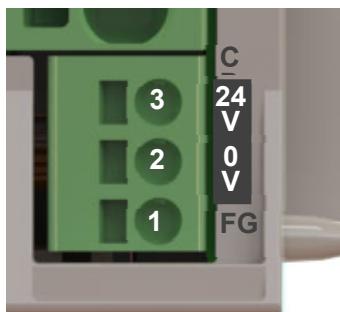
[Terminal unit]**Danger**

- The terminal unit to be used should differ depending on the cases when the 200V driver unit is not connected and when it is. The terminal unit (RCON-GW-TR) shown in this page is a terminal unit for 24V that is to be used when the 200V driver unit is not to be connected.

When the 200V driver units are to be connected, make sure to use the terminal unit for 200V (RCON-GW-TRS) enclosed in the 200V power supply unit. This 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. [Refer to 3-56]

3.1 SEL unit, Terminal unit

(1) Control power connector

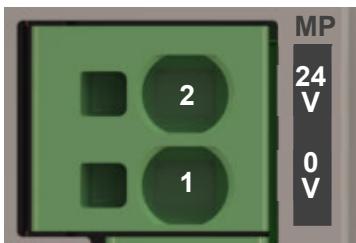


Model	SPT2.5/3-H-5.0	
Manufacturer	Phoenix contact	
Pin No.	Signal name	Description
3	24V	Control power +24 V input
2	0V	0V input
1	FG ^(Note 1)	Frame ground
Rated voltage	630V (II/2)	
Maximum load current	24A	
Connection cable specification		
Item	Specification	
Compatible wire	AWG24 ~ 12 (0.2 ~ 3.5mm ²)	
Strip length	10 [mm]	

- * Select a diameter allowable for the current figured out in the control power supply calculation.
- * When supplying power by turning ON/OFF 24V DC, leave 0 V connected and supply/cut off +24 V.
- * The destination for the motor power supply on the driver unit. Maximum allowable current as the system is 30A.

Note 1 Refer to 1.4.3 Noise countermeasures and mounting method of the frame grounding.

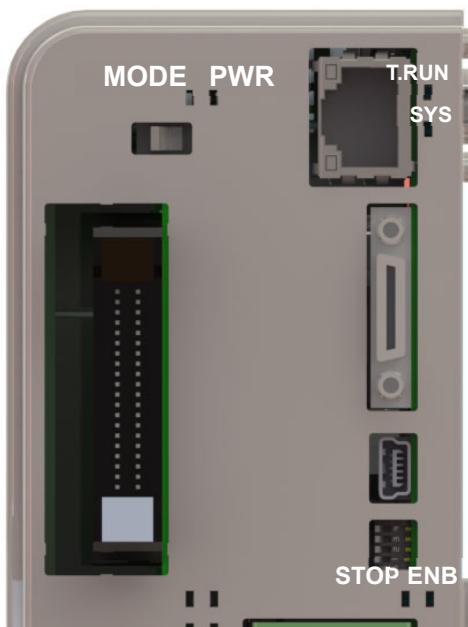
(2) Motor power connector



Model	SPT5/2-H-7.5-ZB	
Manufacturer	Phoenix contact	
Pin No.	Signal name	Description
2	24V	Motor power +24 V input
1	0V	0V input
Rated voltage	1000V (II/2)	
Rated current	41A	
Connection cable specification		
Item	Specification	
Compatible wire	AWG20 ~ 8 (0.5 ~ 8mm ²)	
Strip length	15 [mm]	

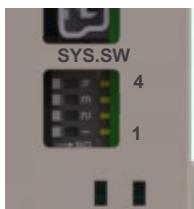
- * Select a diameter allowable for the current figured out in the motor power supply calculation.
- * When supplying power by turning ON/OFF 24V DC, leave 0 V connected and supply/cut off +24 V.

(3) System status LED



LED display specifications			
LED name	Color	Status	Content
T RUN	Green	Light ON	Normal internal bus communication
		Blinking	Waiting for initialization signal
	Orange	Light ON	Bus communication error generated
SYS	Green	Light OF	Not Ready
		Blinking (2Hz)	Updating
		Blinking (0.5Hz)	Update Complete
		Light ON	Ready
	Orange	Light OF	Not Alarm
		Light ON	Alarm
		Blinking	Control power voltage drop detection
MODE	Green	Light OF	MANU (manual operation) mode ON
		Light ON	AUTO (automatic operation) mode ON
		Blinking	System-shutdown level error is present
PWR	Green	Light OF	Power not Supplied, Startup Error
		Light ON	STOP not Input
STOP	Red	Light OF	STOP not Input
		Light ON	STOP under Input
ENB	Green	Light OF	In Disable Status
		Light ON	Enable status

(4) System operation setting switch



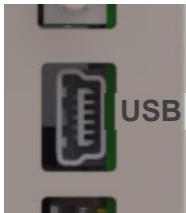
OFF ⇔ ON

It is a switch to set the system operation mode.

Set all off in the normal use.

(Operation may not be performed in the normal condition with any of them set on)

(5) USB connector



Connector type	Mini-B	
Model	51387-0530	
Manufacturer	Molex	
Pin No.	Signal name	Description
5	GND	Power supply ground
4	ID	USB ID (dentification) terminal
3	D+	USB Differential transmitted/received data + side
2	D-	USB Differential transmitted/received data - side
1	Vbus	USB Power supply input
Shell	GND	Power supply ground

(6) Teaching connector

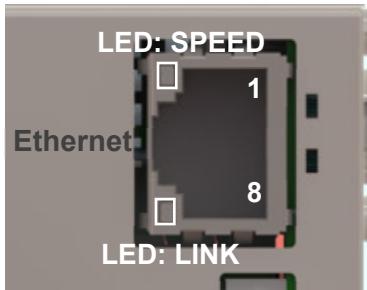


Model	HDR-EC26LFDT1-SLD+	
Manufacturer	HONDA TSUSHIN KOGYO CO.,LTD	
Rated voltage	AC125Vrms	
Rated current	0.5A	
Voltage Endurance	AC350Vrms	
Contact Resistance	70mΩ or less	

Pin No.	Signal name	Description	Pin No.	Signal name	Description
1	GND	Signal Grounding	14	CTS	Connected to RTS externally. Connector connection detection input.
2	EMGS	Stop status output	15	TXD	Transmit data
3	VCC	6.5V power input connector	16	RXD	Receive data
4	DTR	Terminal ready (Connected to DSR inside)	17	DSR	Equipment ready (Connected to DTR inside)
5	STOPS2+	Stop contact output 2+	18	NC	Unconnected
6	STOPS2-	Stop contact output 2-	19	NC	Unconnected
7	NC	Unconnected	20	NC	Unconnected (RSVTBX1)
8	RSVVCC	24V power input connector	21	NC	Unconnected (RSVTBX2)
9	STOPS1-	Stop contact output 1-	22	ENBS2+	Enable contact output 2 +
10	NC	Unconnected	23	ENBS1 -	Enable contact output 1 -
11	NC	Unconnected	24	ENBS1+	Enable contact output 1 +
12	STOPS1+	Stop contact output 1+	25	ENBS2 -	Enable contact output 2 -
13	RTS	Connected to CTS externally	26	GND	Signal Grounding

* If this connector is not connected, it should get in condition of STOP being input and in disable status. It is necessary that the dummy plug: DP-4S is connected when operation of an actuator is to be performed with the PC cable and the teaching pendant not connected.

(7) Ethernet connector



Connector type	8P8C modular connector		
Model	TM11R-5M2-88-LP (02)		
Manufacturer	Hirose Electric		
Pin No.	Signal name	Description	
1	TX+	Transmit +	
2	TX-	Transmit -	
3	RX+	Receive +	
4	-		
5	-		
6	RX-	Receive -	
7	-		
8	-		
LED display specifications			
LED name	Color	Status	Content
SPEED	Orange	Light ON	100Mbps connection
LINK	Green	Blinking	Link not Established
		Light ON	Link Detected
Cable specifications			
Item	Specification		
Specifications	Category 5 or more		
Connector General Specifications			
Durability	Repeated Insertion Life 200 times		

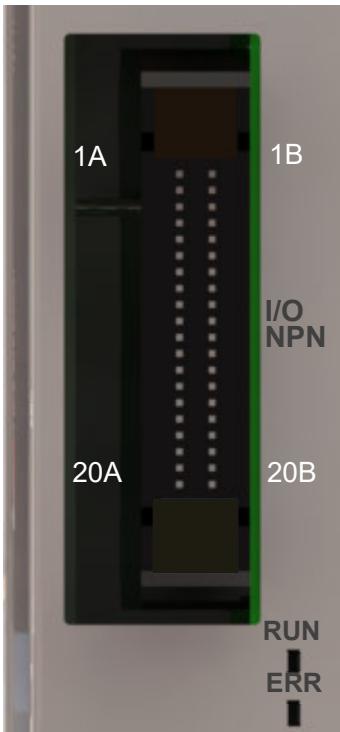
(8) Mode switch



Model	CF-LD-1DC6-AG2W
Manufacturer	FUJISOKU
Setting	Signal name
MANU (Left side)	Operation mode
AUTO (Right side)	Automatic mode
Switch General Specifications	
Electrical Life	10,000 ~ 50,000 times

(9) I/O Slot

PIO (NPN/PNP)



• Connector specifications

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

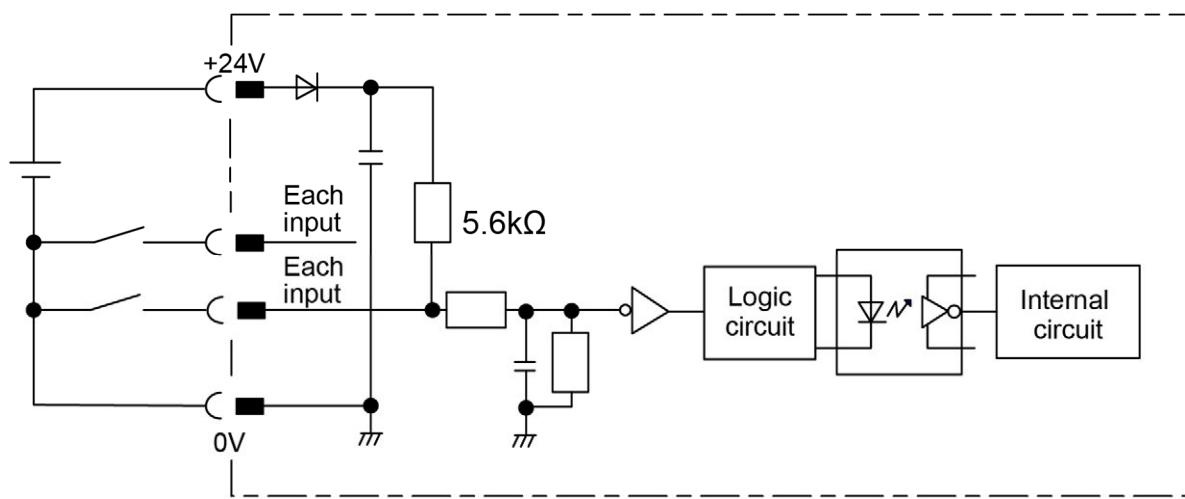
• LED specifications

LED name	Color	Status	Content
RUN	Green	Light ON	Flashes when initialization completes, in the normal operation.
ERR	Orange	Light ON	PIO power (24V DC) voltage drop error

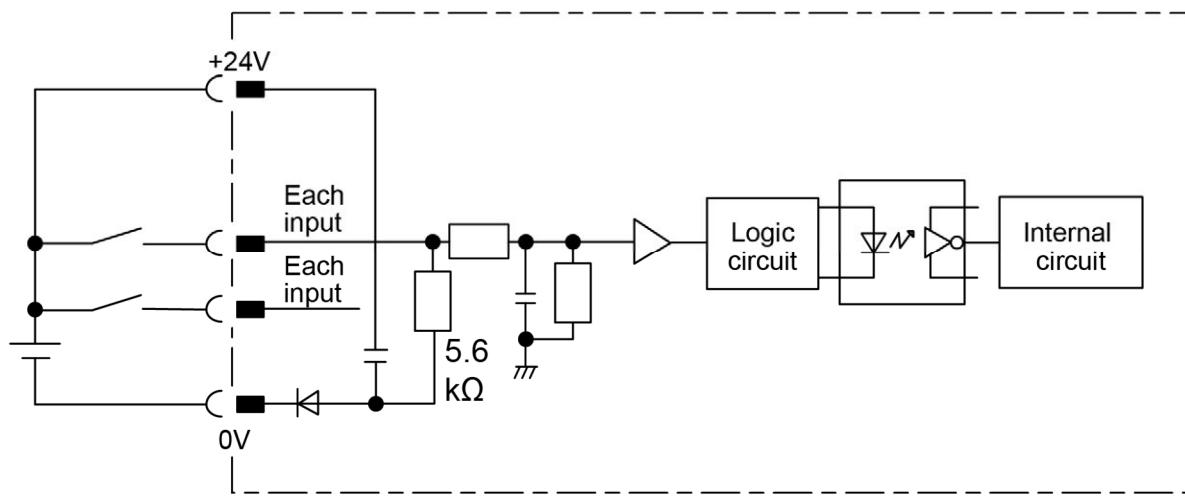
- External input specifications

Item	Specification
Output point	16 points
Input voltage	24V DC±10%
Input current	4mA/1 circuit
ON/OFF voltage	ON voltage : Min. 18V DC (3.5mA) OFF voltage : Max. 6V DC (1mA)
Insulation type	Photocoupler insulation

[NPN specification]



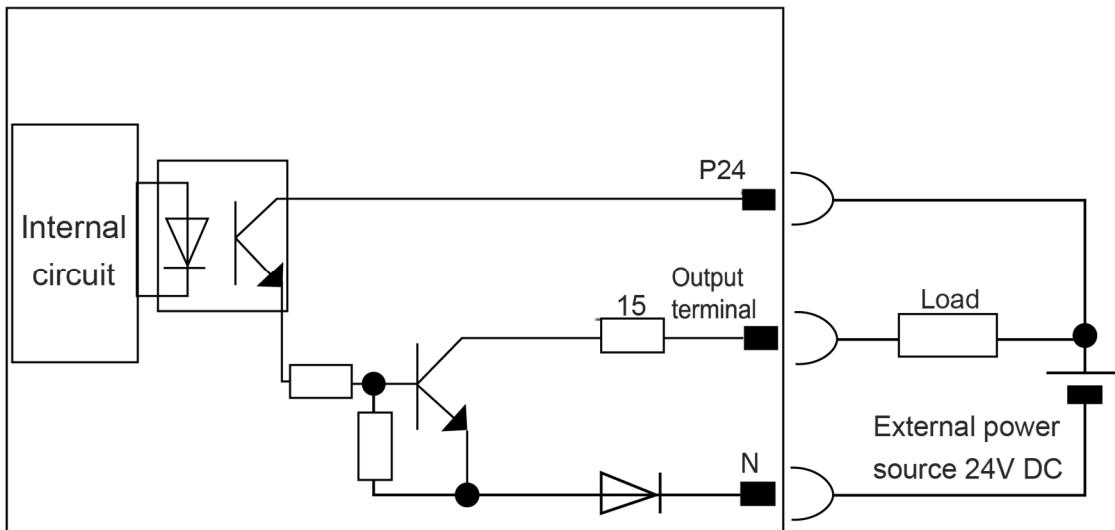
[PNP specification]



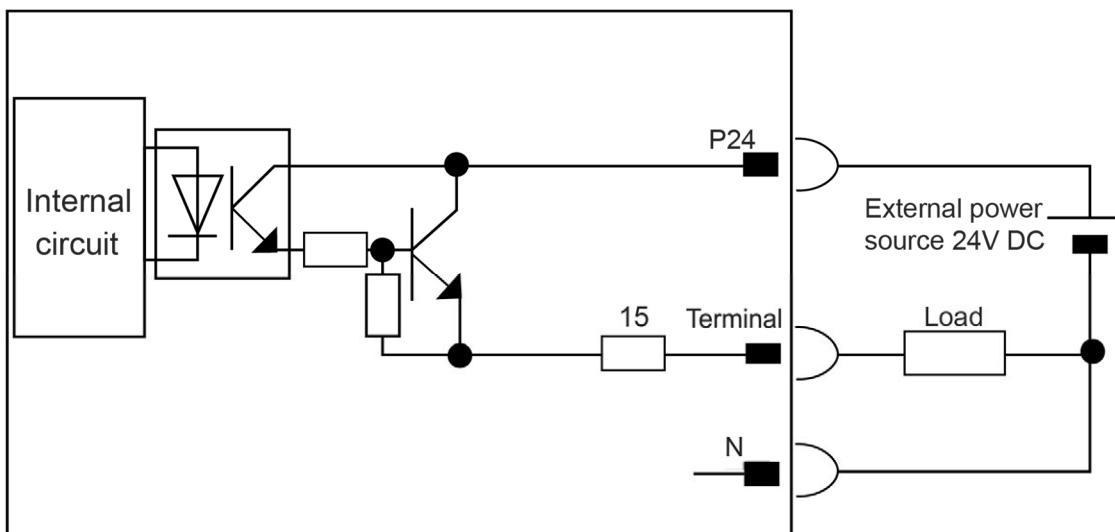
- External output specifications

Item	Specification
Output point	16 points
Rated load voltage	24V DC±10%
Maximum current	50mA/1 circuit
Insulation type	Photocoupler insulation

[NPN specification]



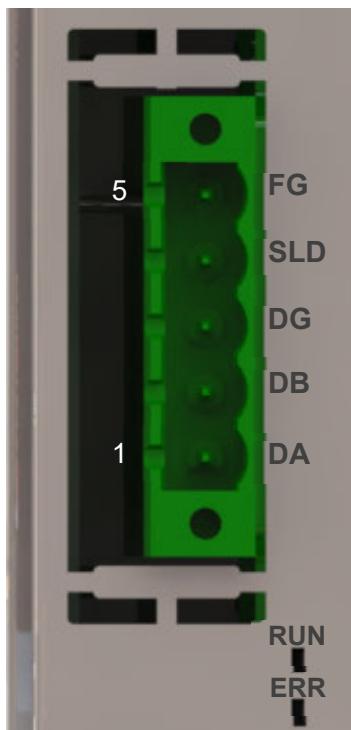
[PNP specification]



- Pin Assignment

Pin No.	Class	Assignment	Pin No.	Class	Assignment
1A	24	P24	1B		OUT0
2A	24	P24	2B		OUT1
3A	—	—	3B		OUT2
4A	—	—	4B		OUT3
5A		IN0	5B		OUT4
6A		IN1	6B		OUT5
7A		IN2	7B		OUT6
8A		IN3	8B		OUT7
9A		IN4	9B		OUT8
10A		IN5	10B		OUT9
11A		IN6	11B		OUT10
12A	Input	IN7	12B		OUT11
13A		IN8	13B		OUT12
14A		IN9	14B		OUT13
15A		IN10	15B		OUT14
16A		IN11	16B		OUT15
17A		IN12	17B	—	—
18A		IN13	18B	—	—
19A		IN14	19B	0	N
20A		IN15	20B	0	N

- CC-Link

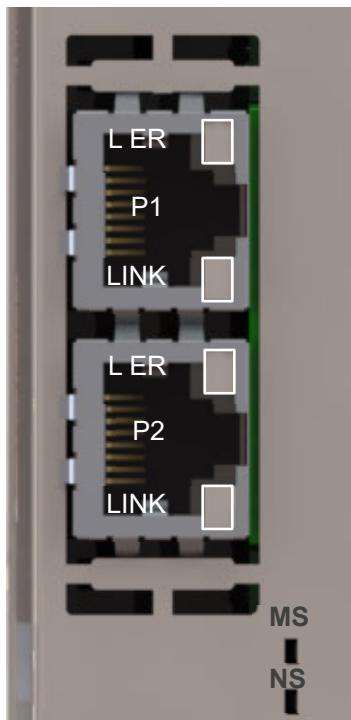


Model	MSTB2.5/5-GF-5.08AU	
Manufacturer	Phoenix contact	
Pin No.	Signal name	Description
1	DA	Signal line A
2	DB	Signal line B
3	DG	Digital GND
4	SLD	Connects the shield of shielded cables
5	FG	Frame ground
Connection cable specification		
Item	Specification	
Recommended Unsheathed Length	7 [mm]	
Mating Connector (Signal Name Label Attached)		
Model	MSTB2.5/5-STF-5.08 AU	
Model	TMSTBP2.5/5-STF-5.08 AU (2-way Connector product)	

* The model code of the mating connector is the one before signal name label attached

LED name	Color	Status	Content
RUN	Green	Light ON	After joining the network, refresh & poll normal reception or refresh normal reception
ERR	Orange	Light ON	Error occurrence (CRC error / Station setting error / Baud rate setting error)
		Blinking	Change made to station number and baud rate setting at reset cancel

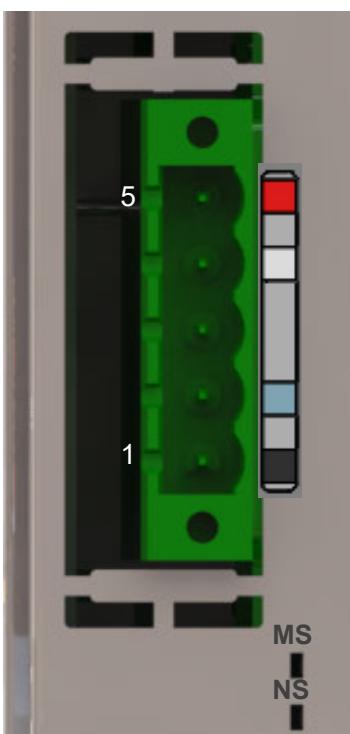
- CC-Link IE Field



Connector type	8P8C modular connector		
Cable recommended	Enhanced Category 5 or above		
LED name	Color	Status	Content
LINK	Green	Blinking	Link up
		Light ON	Link down, Power not supplied
L ER	Yellow	Light ON	Receive data error
		Light OFF	Receive data normal, Power not supplied

LED name	Color	Status	Content
MS	Green	Light ON	Normal operation
		Light OFF	Hardware error generated, Power not supplied
	Orange	Light ON	Error generated (Node Error / Station Number Setting Error)
		Light OFF	Normal operation, Power not supplied
NS	Green	Light ON	Cyclic transmission ON
		Blinking	Cyclic transmission OFF
		Light OFF	Cyclic transmission not yet implemented, Fragmented, Power not supplied
	Orange	Light ON	Receive data error (Turned on with L.ER turned on)
	Orange	Light OFF	Receive data normal, Power not supplied

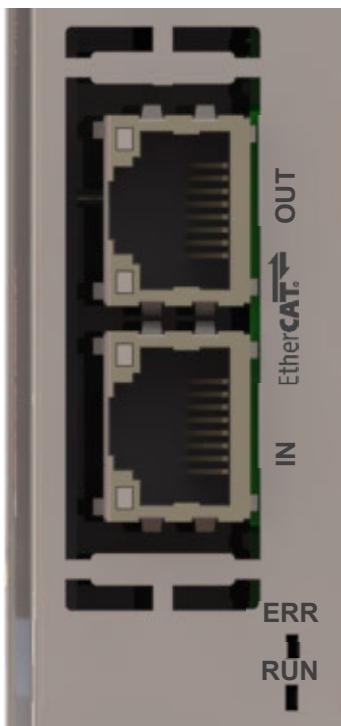
- DeviceNet



Model	MSTB2.5/5-GF-5.08AU	
Manufacturer	Phoenix contact	
Pin No.	Signal name	Description
1	Black	Power supply cable - side
2	Blue	Signal data Low side
3	-	Shield
4	White	Signal data High side
5	Red	Power supply cable + side
Connection cable specification		
Item	Specification	
Recommended Unsheathed Length	7 [mm]	
Mating Connector		
Model	MSTB2.5/5-STF-5.08 AU M	
Model	TMSTBP2.5/5-STF-5.08 AU M (2-way product)	

LED name	Color	Status	Content
MS	Green	Light ON	Normal operation
		Blinking	No configuration information, incomplete information
	Orange	Light ON	Fault (Non-recoverable)
		Blinking	Fault (Recoverable)
	Green/orange	Alternate blinking	Self-diagnosis
	NS	Green	Light ON
			Online status
		Blinking	Online status (Connection not established)
	Orange	Light ON	Error occurrence
		Blinking	Timeout in connection on one or more
	Green/orange	Alternate blinking	In Self Diagnosis

- EtherCAT

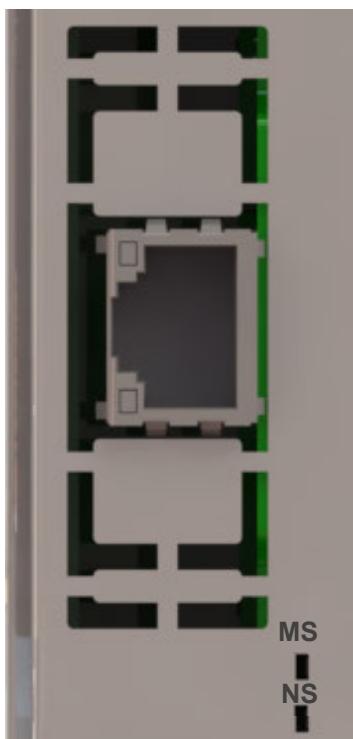


Connector type	8P8C modular connector
Cable recommended	Enhanced Category 5 or above

LED name	Color	Status	Content
ERR	Orange	Light ON	Module error
		Blinking ON : 200ms/OFF : 200ms	Configuration information error (Information received from the master cannot be configured.)
		Blinking ON : 200ms × 2 times / OFF : 1000ms	Watchdog timer timeout
		Light OFF	No error, or the power is turned off.
RUN	Green	Light ON	Operation ("OPERATION" status of EtherCAT communication)
		Blinking ON : 200ms / OFF : 200ms	"PRE-OPERATION" status of EtherCAT communication
		Blinking ON : 200ms × 2 times / OFF : 1000ms	"SAFE-OPERATION" status of EtherCAT communication
	Orange	Light ON	Module error
	Green/orange	Light OFF	Initial status ("INIT" status of EtherCAT communication), or the power is turned off

3.1 SEL unit, Terminal unit

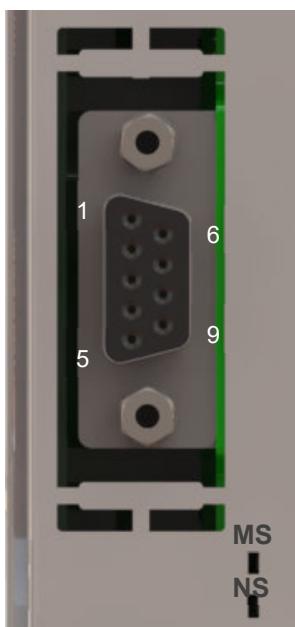
- EtherNet/IP



Connector type	8P8C modular connector
Cable recommended	Enhanced Category 5 or above

LED name	Color	Status	Content
MS	Green	Light ON	In operation condition and under control of scanner (master)
		Blinking	Setting of construction information incomplete, or scanner (master) in idling condition
	Orange	Light ON	Fatal malfunction (exception condition or critical error)
		Blinking	Light malfunction possible to recover
	Green/orange	Light OFF	Turned off.
NS	Green	Light ON	Online status (Connection established on one or more)
		Blinking	Online status (connection not being established)
	Orange	Light ON	Critical error such as IP address duplication
		Blinking	Timeout in connection on one or more
	Green/orange	Light OFF	Turned off, IP address not set

- PROFIBUS-DP

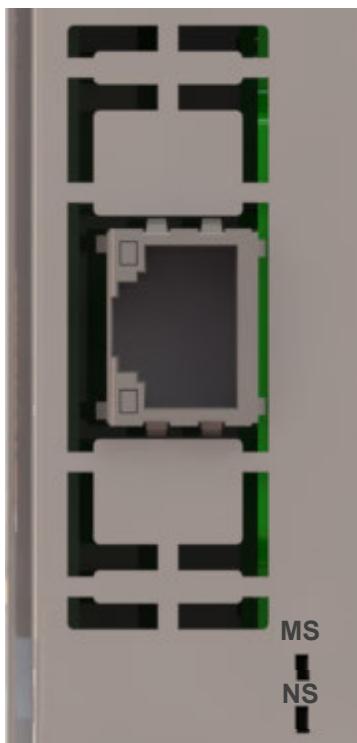


Connector type	D-sub Connector 9-pin (Socket)	
Pin No.	Signal name	Description
1	NC	Not connected
2	NC	Not connected
3	B-Line	Signal line B (RS-485)
4	RTS	Transmission request
5	GND	Signal GND (insulation)
6	+5V	+5 V output (isolated)
7	NC	Not connected
8	A-Line	Signal line A (RS-485)
9	NC	Not connected
Housing	Shield	Cable shield (Connected with FG inside controller)

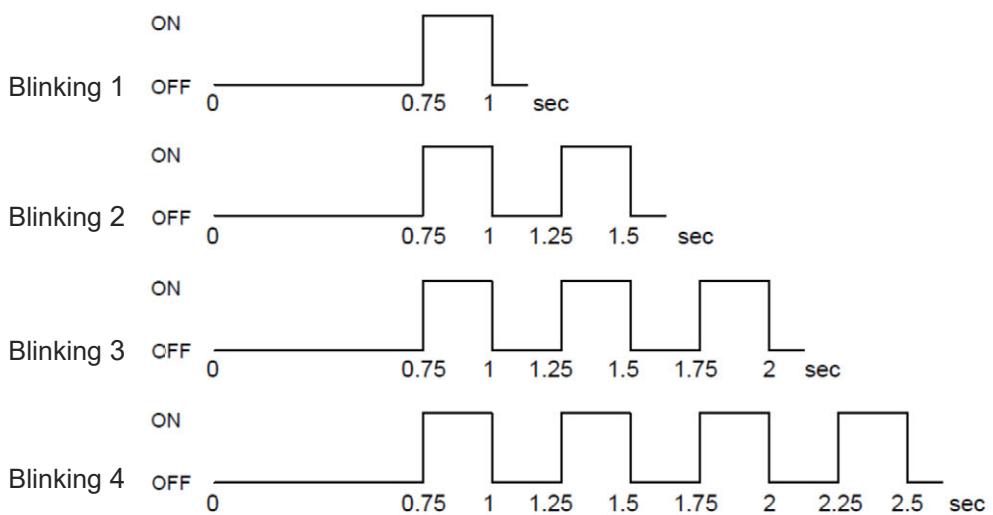
LED name	Color	Status	Content
MS	Green	Light ON	Initialization complete
		Blinking	Initialization complete (diagnosis event found)
NS	Orange	Light ON	Error occurrence (Exception error)
	Green	Light ON	Online status
		Blinking	Online status (clear status)
	Orange	Light ON	Error occurrence (Parameter error, PROFIBUS Configuration information error)

3.1 SEL unit, Terminal unit

- PROFINET IO

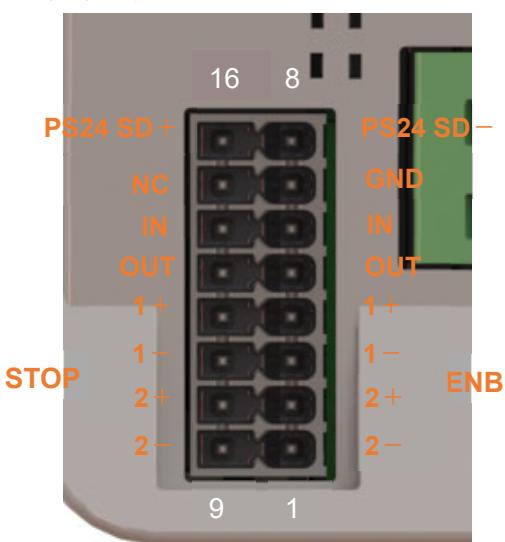


Connector type	8P8C modular connector
Cable recommended	Enhanced Category 5 or above



LED name	Color	Status	Content
MS	Green	Light ON	Normal communication
		Blinking 1	Diagnosis event existed
		Blinking 2	Engineering tool is identifying the node
	Orange	Light ON	In critical malfunction (EXCEPTION)
		Blinking 1	Configuration error
		Blinking 2	IP address error (IP address not set)
		Blinking 3	Station name error (Station name not set)
		Blinking 4	Internal critical malfunction error
	Green/Orange	Light ON	Power off status, Module in setup / in initializing
NS	Green	Light ON	Communication established, RUN status
		Blinking	Communication established, STOP status
	Green/Orange	Light OFF	Power off, no connection

(10) System I/O, PSA-24 Communication connector



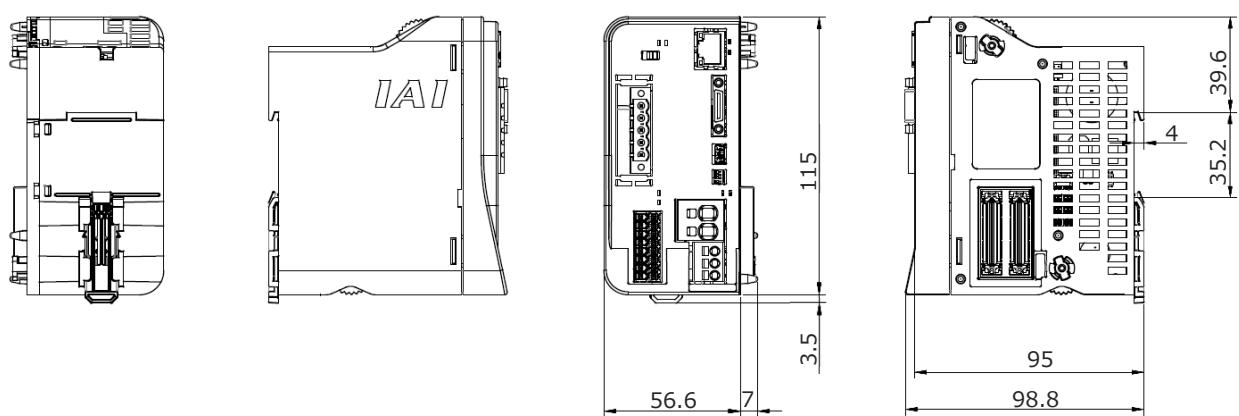
Refer to “2.6.2 Drive-source cutoff circuit wiring example” for the example of connections using the stop contact and enable contact on this connector.

Item	Model		Manufacturer		
PCB side connector	DMC1.5/8-G1-3.5P20THR		Phoenix contact		
Mating connector	DFMC1.5/8-ST-3.5 (RSEL)		Phoenix contact		
Pin No.	Signal name	Description			
16	PS24 SD+	Differential signal positive side on RS485 for PSA-24			
15	NC	Not connected			
14	STOPIN	Stop input			
13	STOPOUT	24V Output for stop			
12	STOPS1+	Stop contact output 1			
11	STOPS1-	Stop contact output 1			
10	STOPS2+	Stop contact output 2			
9	STOPS2-	Stop contact output 2			
8	PS24 SD-	Differential signal minus side on RS485 for PSA-24			
7	GND	Signal Grounding			
6	ENBIN	Enable input			
5	ENBOUT	24V output for enable			
4	ENBS1+	Enable contact output 1			
3	ENBS1-	Enable contact output 1			
2	ENBS2+	Enable contact output 2			
1	ENBS2--	Enable contact output 2			
Mating Connector Cable specifications					
Item	Specification				
Compatible wire	AWG22 ~ 16 (0.3 ~ 1.25mm ²)				
Strip length	10 [mm]				

3.1.5 External dimensions

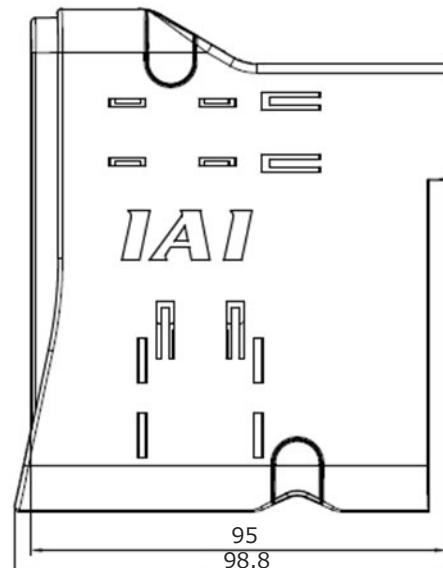
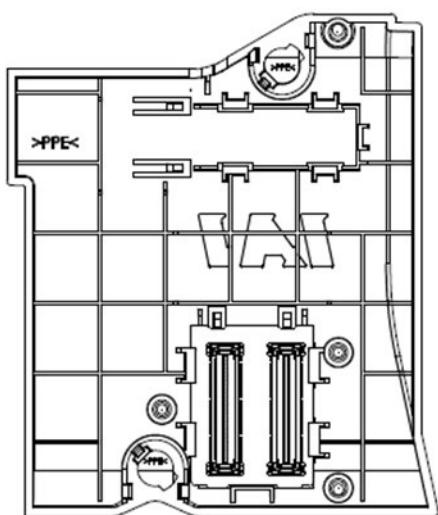
[SEL unit] RSEL-G-*

Item	Specification
External dimensions	W56.6mm × H115mm × D95mm
Mass	Approx. 265g
External view	See figure below



[Terminal unit] RCON-GW-TR

Item	Specification
External dimensions	W12.6mm × H115mm × D95mm
Mass	Approx. 48g
External view	See figure below



3.2 24V Driver unit, Fun unit

3.2.1 Overview

The 24V driver unit is a unit that connects and controls the 24V system actuators.

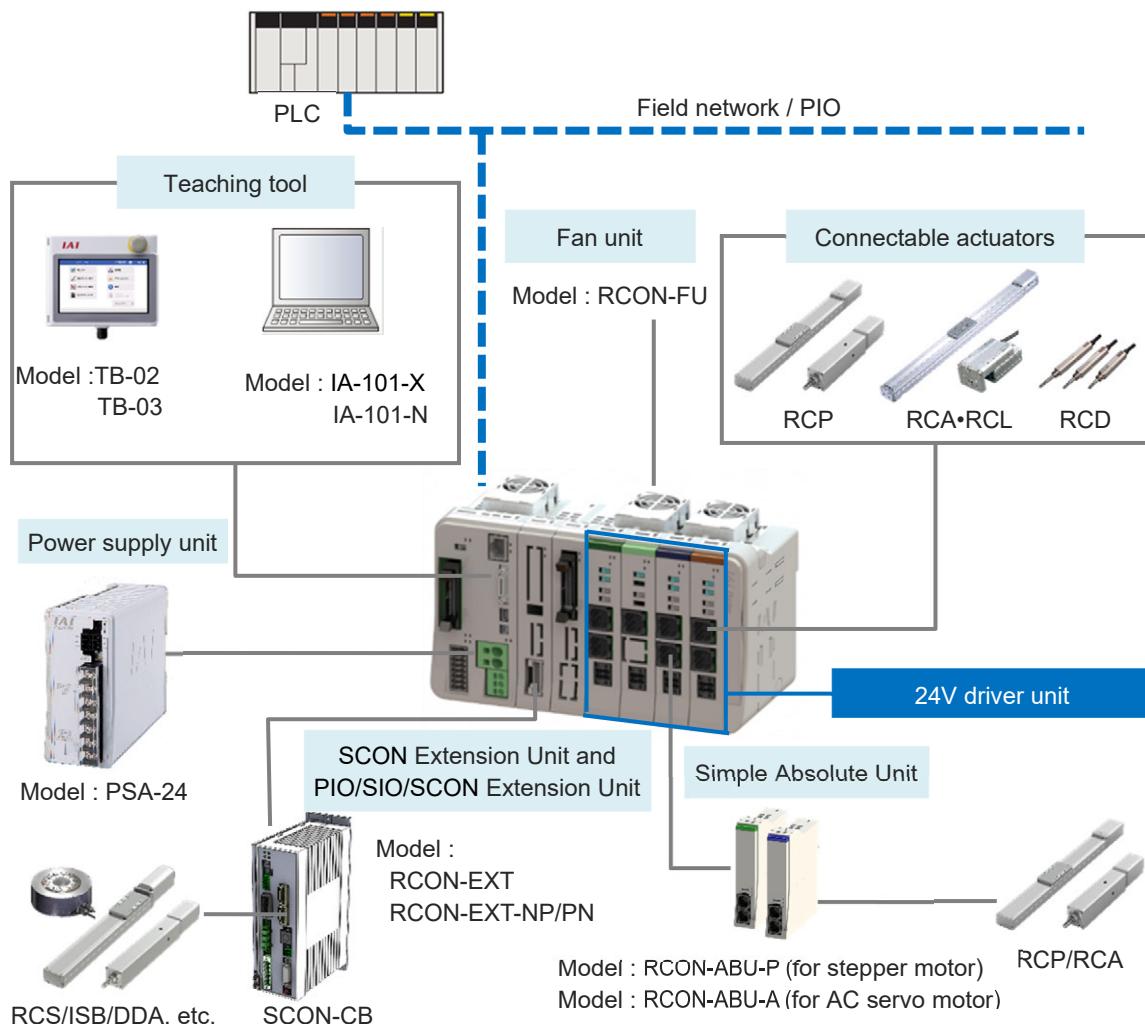
There are 4 types of driver unit available to suit the type of actuator motor controllable.

Additionally, up to 2 axes are controllable by a single driver unit. (one axis maximum for RCON-PCF) Basic functions and performance are the same as PCON/ACON/DCON controllers.

It controls the 24V system actuators with the SEL programs via SEL units explained in 3.1.

[Features]

- Compatible with battery-less absolute specification and incremental specification. Additionally, connection of a simple absolute unit allows support for simple absolute specification.
- Compatible with stepper motor PowerCON specification and high thrust specification.
- Driver units are directly connected so that the hassles of wiring can be significantly reduced.
- DIN rail mounting makes it easy to mount onto control boards, etc.



3.2.2 Model Code

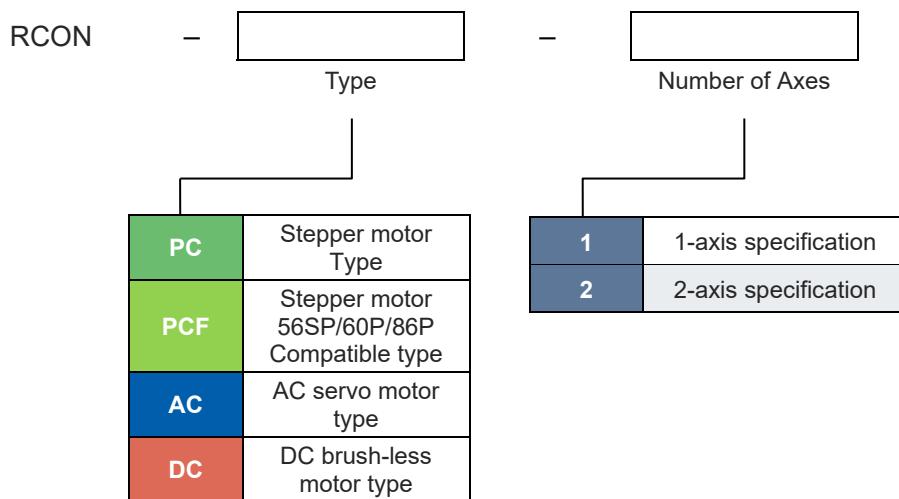
The model of the driver unit is as follows.

1-axis specification or 2-axis specification can be selected for RCON-PC/AC/DC.

There is only one type.

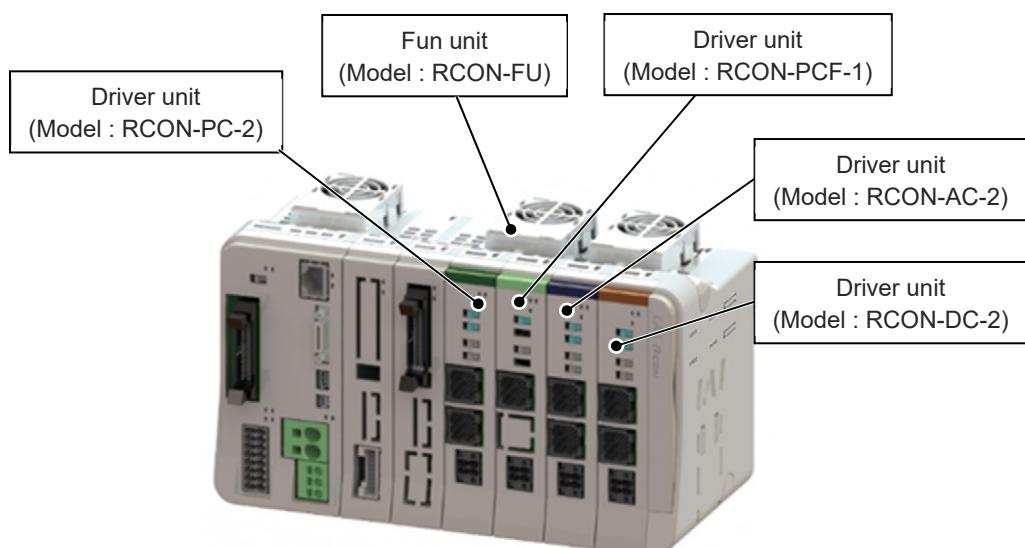
(1) How to Read the Model Number

[24V Driver unit]



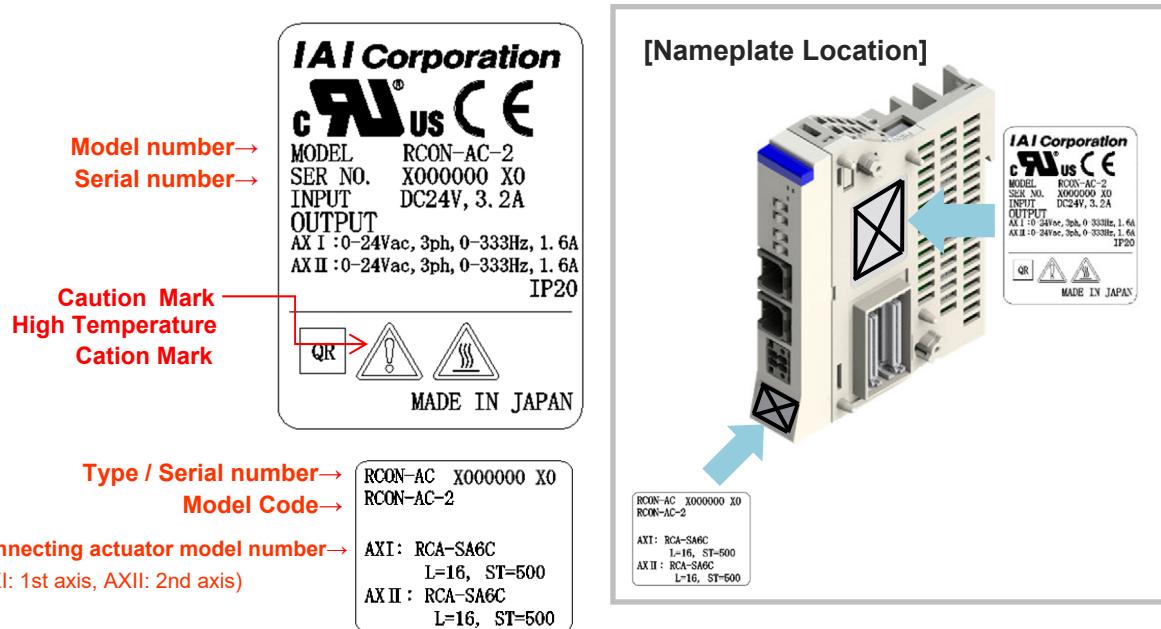
[Fun unit]

RCON – FU



(2) How to read the model nameplate

[24V Driver unit]



Mark	Explanation of Mark
!	Use IAI specified cables only.
!	Do not touch product when power is ON. Risk of burn.

3.2.3 Components

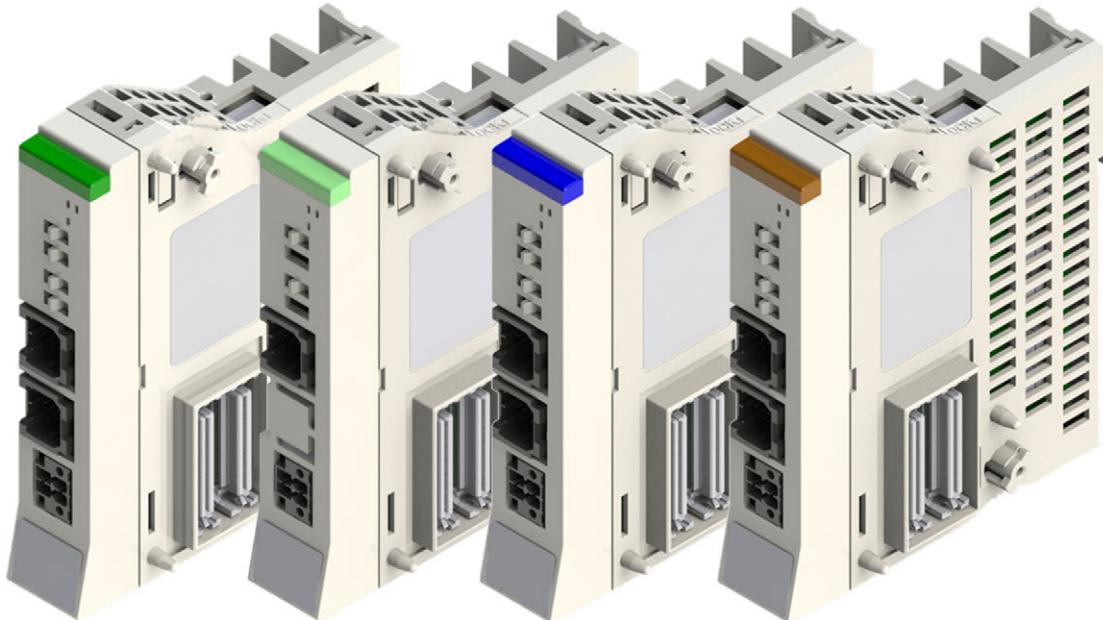
The following table shows the product configuration for the standard specification.

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.

Part name	Shape	Quantity	Remarks
Driver unit		1	Model example : RCON-PC/PCF/AC/DC
Drive source shutoff connector		1	Model : DFMC1.5/2-STF-3.5 * Supplied with driver unit
First Step Guide		1	ME0383
Safety Guide		1	M0194

3.2.4 Part names/Functions

(1) Part names

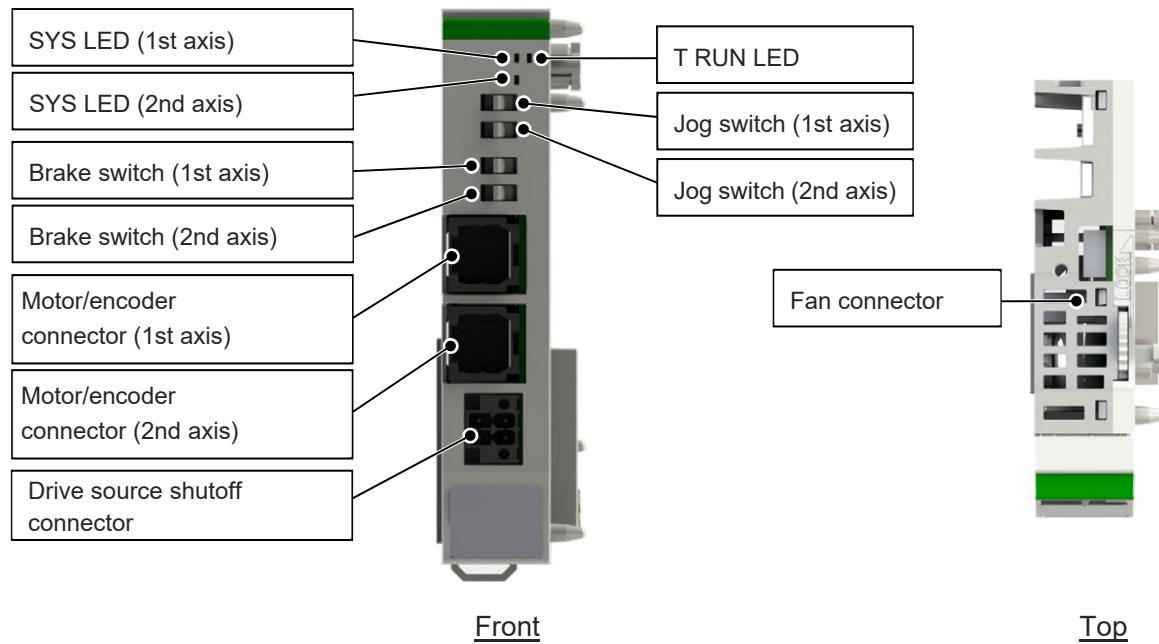


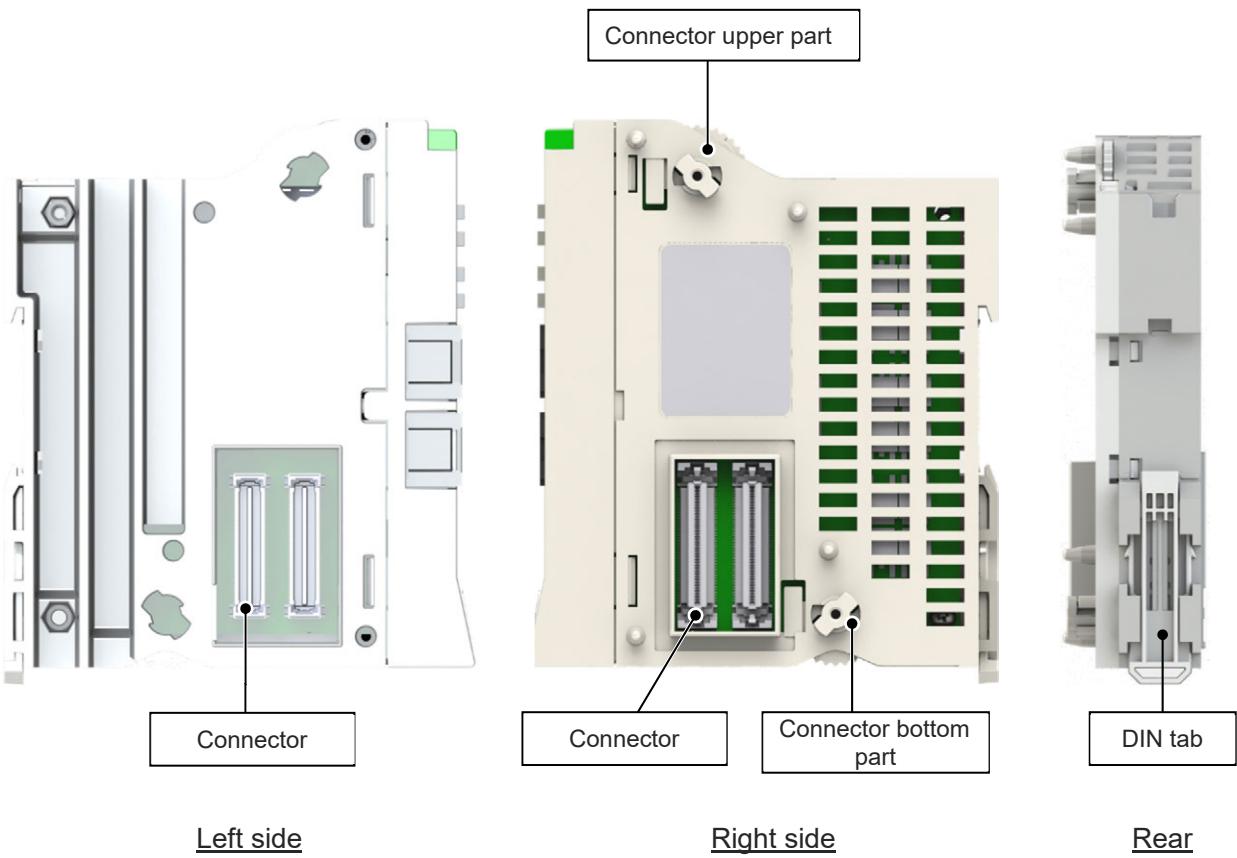
RCON-PC (green)

RCON-PCF (light green)

RCON-AC (blue)

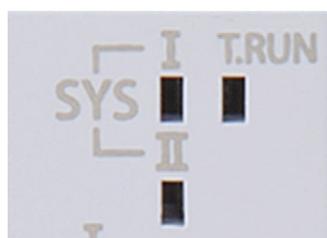
RCON-DC (brown)





(2) LED display

Panel notation	Display color	Status	Description
T RUN	Green	Light ON	Normal internal bus communication
		Blinking	Normal internal bus communication
	Orange	Light ON	Waiting for initialization signal, initialization communication failed
		Light OFF	Communication stop
SYS (I: 1st axis II: 2nd axis)	Green	Light ON	Servo ON
		Blinking	Not to use
	Red	Light ON	STOP signal input OFF (Drive source cutoff triggered)
		Blinking	Not to use
	Light OFF		Servo OFF, axis disable setting



(3) Jog switch

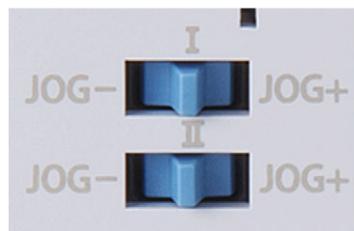
A switch for jog operation. I indicates the 1st axis, and II indicates the 2nd axis.

If driver unit parameter No. 194 "JOG Switch" is set to "0", this switch will be enabled.
(Initial setting is "0: Valid".)

Tilt the switch to the JOG+ side to perform jog operation in the + direction, and to the JOG- side for jog operation in the - direction. Tilting the switch further increases the jog speed step by step. However, if home return is not complete, The jog speed should be set to that in Maximum JOG speed at home return incomplete (MC Common Parameter No. 3).

When performing jog operation with the JOG switch with servo ON, the servo will be ON even after completion; with servo OFF, perform jog operation after servo ON and the servo will be OFF after completion.

The jog switch operations should be valid only in Manual Mode. It is disabled in AUTO mode. The jog switch is also disabled when opening the screen in which the actuator can be operated with the teaching tool. When opening the screen in which operation can be done with the jog switch, the actuator will decelerate and stop.



Symbol	Description
JOG +	Jog operation in + direction (home reverse direction)
JOG -	Jog operation in - direction (home direction)



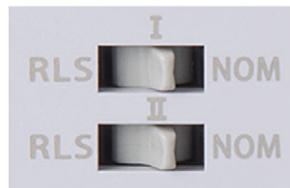
Caution

- The jog switch is disabled when the communication with the teaching tool is disconnected while the screen in which the actuator can be operated with the teaching tool is opened.
- To enable jog switch operation again, turn the RCON system on again or perform software reset.
- It is necessary to establish the RSEL axis settings in order to have the jog switch operations. (Refer to "5.3 Driver configuration" for detail.)

(4) Brake release switch

A switch for forced brake release. I indicates the 1st axis, and II indicates the 2nd axis.

Should be on NOM side during normal operation. On NOM side, the brake will be released by servo ON and locked by servo OFF. On RLS side, there will be forced release regardless of servo ON/OFF (except when control power is OFF).



Symbol	Description
RLS	Brake release (Brake <u>Release</u>)
NOM	Brake lock (<u>Normal</u>)



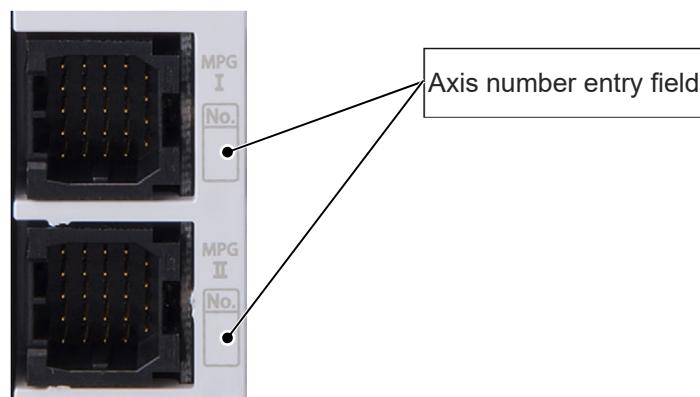
Warning

- Be careful when releasing the brake. Releasing carelessly may cause injury or damage to the actuator body, workpiece or surrounding devices due to the slider or rod falling.
- After releasing the brake, be sure to return the brake to the enabled status. It is very dangerous to operate with the brake released. It may cause injury or damage to the actuator body, workpiece or surrounding devices due to the slider or rod falling.

(5) Motor/encoder connector

A connector to connect to the actuator. I indicates the 1st axis, and II indicates the 2nd axis.

In the RSEL system, it is necessary to establish the axis number settings on a teaching pendant before use. [Refer to 5.3 Driver configuration]



RCON-PC/PCF Driver Unit

Pin No.	Signal name	Description
1	A+	Encoder phase A+ input
2	BK-	Brake release - side
3	φA+	Motor drive line phase A+
4	φA-	Motor drive line phase A-
5	VMM	Motor power line
6	A-	Encoder phase A- input
7	GND	0V
8	LS+	Limit switch + side
9	VMM	Motor power line
10	φB+	Motor drive line phase B+
11	B+	Encoder phase B+ input
12	ENC_SD+	Battery-less absolute signal line +
13	LS_GND	Ground for limit switch
14	LS-	Limit switch - side
15	φB-	Motor drive line phase B-
16	B-	Encoder phase B- input
17	ENC_SD-	Battery-less absolute signal line -
18	VPS	Encoder line driver enable output
19	NC	Not connected
20	BK+	Brake release + side
21	VCC	Encoder for motor power 5V
22	CF_VCC	Encoder for high-thrust motor power 5V
23	NC	Not connected
24	FG	Frame ground

RCON-AC Driver Unit

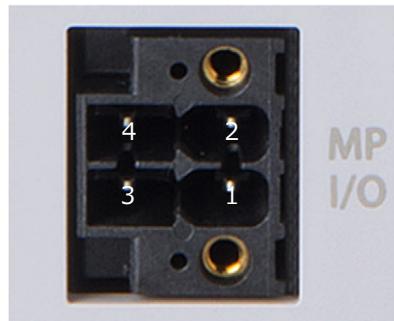
Pin No.	Signal name	Description
1	B+	Encoder phase B+ input
2	LS-	Limit switch - side
3	U	Motor drive line phase U
4	W	Motor drive line phase W
5	V	Motor drive line phase V
6	B-	Encoder phase B- input
7	GND	0V
8	BK+	Brake release + side
9	NC	Not connected
10	NC	Not connected
11	Z+ / ENC_SD+	Encoder phase Z+ input / Battery-less absolute signal line +
12	A+	Encoder phase A+ input
13	LSGND	Ground for limit switch
14	BK-	Brake release - side
15	NC	Not connected
16	Z- / ENC_SD-	Encoder phase Z- input / Battery-less absolute signal line -
17	A-	Encoder phase A- input
18	VPS	Encoder line driver enable output
19	NC	Not connected
20	LS+	Limit switch + side
21	VCC	Encoder power 5V
22	NC	Not connected
23	NC	Not connected
24	FG	Frame ground

RCON-DC Driver Unit

Pin No.	Signal name	Description
1	B+	Encoder phase B+ input
2	LS-	Limit switch - side
3	U	Motor drive line phase U
4	W	Motor drive line phase W
5	V	Motor drive line phase V
6	B-	Encoder phase B- input
7	GND	0V
8	BK+	Brake release + side
9	NC	Not connected
10	NC	Not connected
11	HS_U	Hall sensor phase U
12	A+	Encoder phase A+ input
13	HS_W	Hall sensor phase W
14	BK-	Brake release - side
15	NC	Not connected
16	HS_V	Hall sensor phase V
17	A-	Encoder phase A- input
18	VPS	Encoder line driver enable output
19	NC	Not connected
20	LS+	Limit switch + side
21	VCC	Encoder power 5V
22	NC	Not connected
23	NC	Not connected
24	FG	Frame ground

(6) Drive source shutoff connector

Drive-source cutoff input.



Cable connector name: DFMC1.5/2-STF-3.5 (Phoenix Contact)

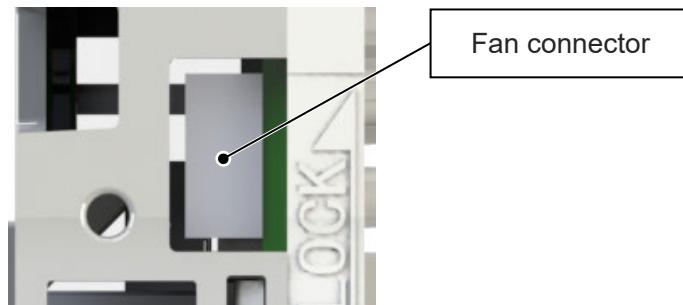
Pin No.	Signal name	Description
1	MPO_II	Motor power output (2nd axis)
2	MPO_I	Motor power output (1st axis)
3	MPI_II	Motor power input (2nd axis)
4	MPI_I	Motor power input (1st axis)

Cable side connector compatible wire

Item	Specifications
Compatible wire	AWG24 ~ 16 (0.2 ~ 1.25mm ²)
Strip length	10.0mm

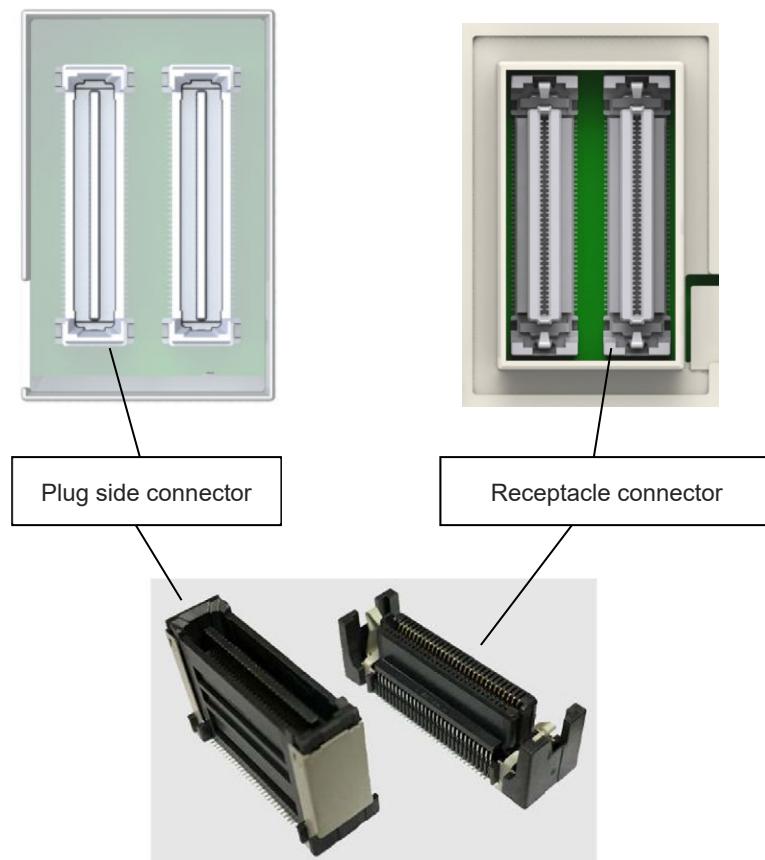
(7) Fan connector

A connector to connect the fan unit. It connects to the fan board connector on the fan unit side.



(8) Connectors

A connector for use between units. Two identical connectors are used. The connectors have a floating structure that absorbs connector misalignment due to housing mating or mounting misalignment between connectors.

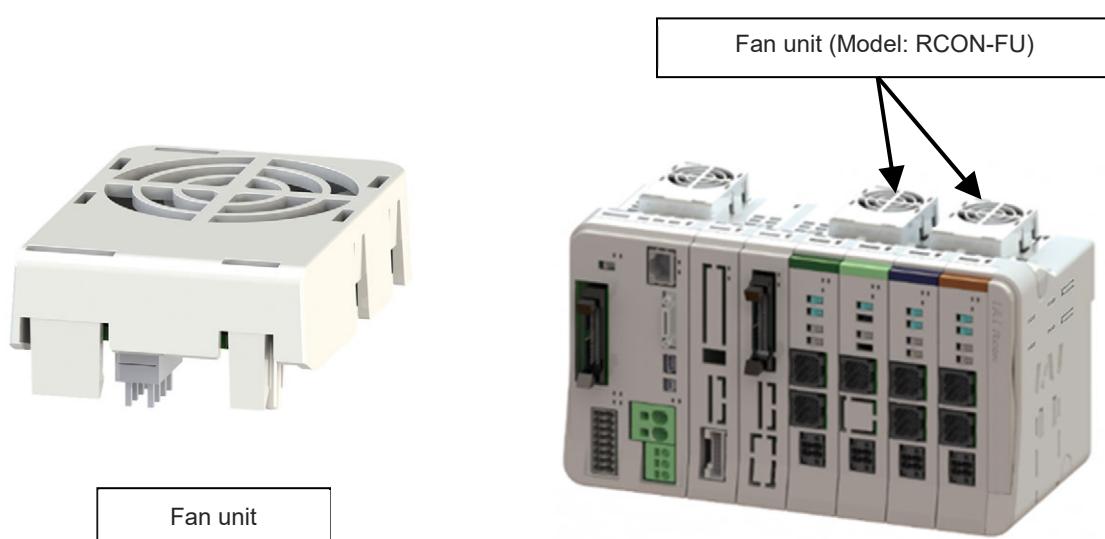


3.2 24V Driver unit, Fan unit

(9) Fan unit

An option for forced air cooling of the driver unit. Use by connecting to the fan connector on the driver unit side. 1 fan unit to be used per 2 driver units.

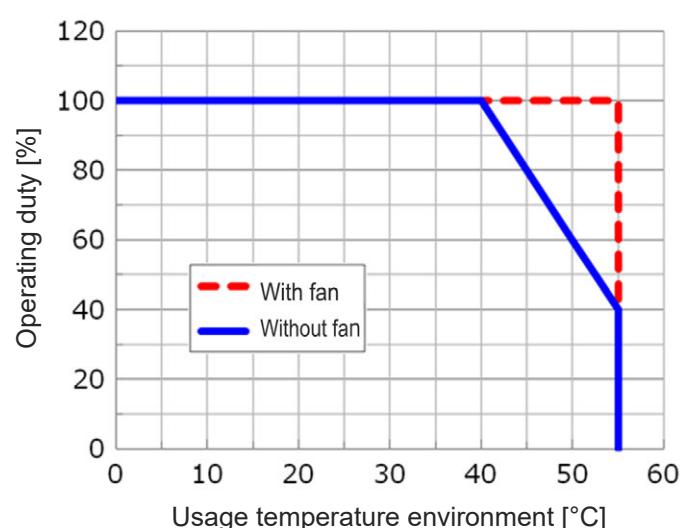
The fan rotates when the driver unit internal temperature rises and stops when the temperature falls.



Operation without derating is possible without a fan unit at 0-40°C; however, at 40-55°C, actuator operating duty must be reduced by 20% every 5°C.

(“479 Slave Driver Alarm Detection” (Info.1=CAh) should be generated if operation is performed without decreasing the operation duty.)

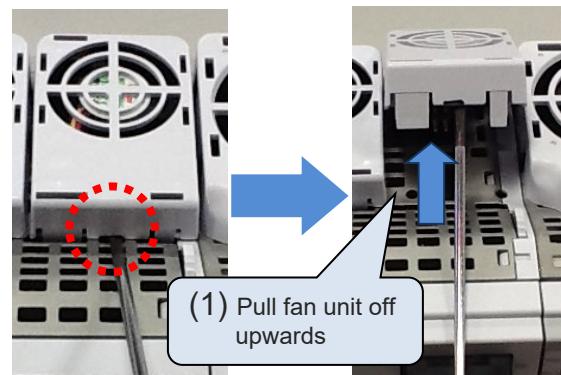
With fan unit, operation is possible up to 55°C without derating.



[How to Replace Fan Unit]

<Detaching Fan Unit>

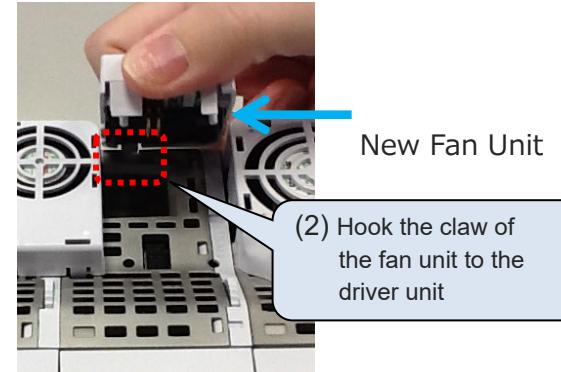
- (1) Insert a slotted screwdriver to the cutout (circled in red in figure on the right) on the fan unit and pull up the fan unit upwards to detach it.



<Attaching Fan Unit>

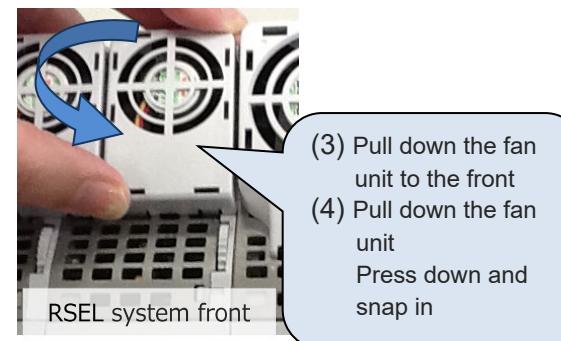
- (2) Adjust the installation orientation of the RSEL system and new fan unit.

Hook the claw of the fan unit to the driver unit as shown in the figure on the right.



- (3) Pull down the fan unit to the front of the RSEL system.

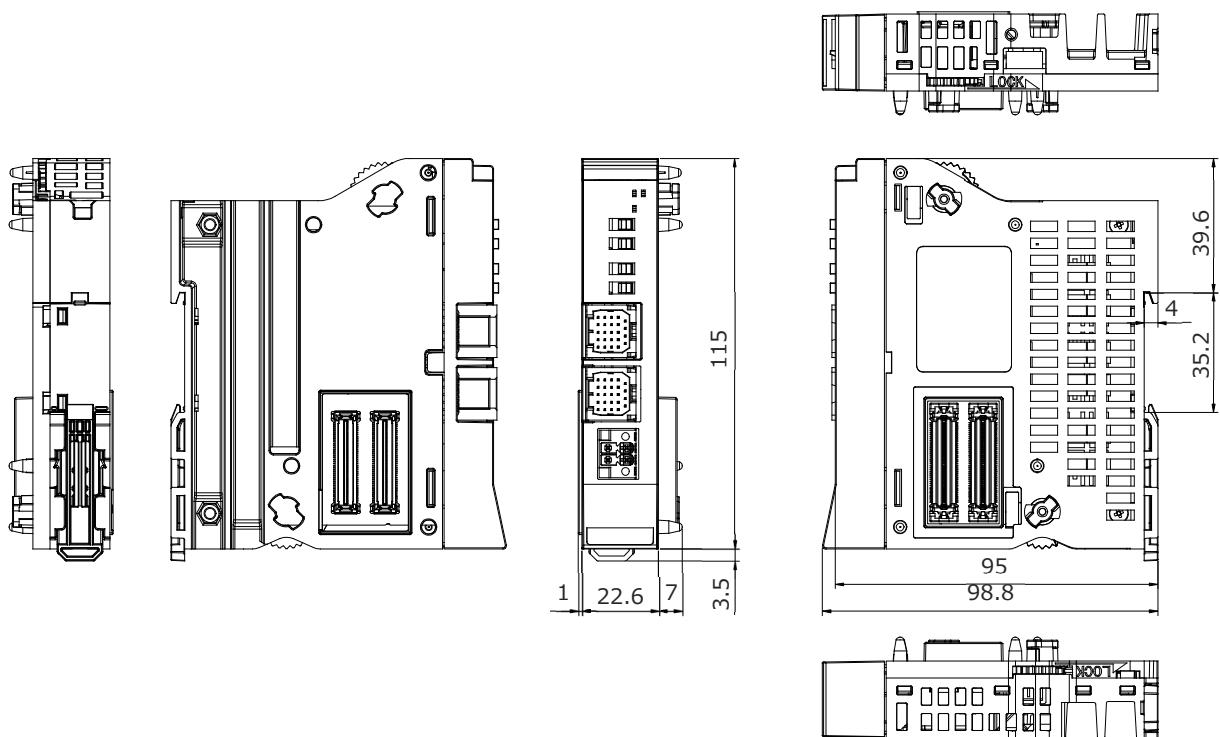
- (4) Press the fan unit from the top and snap in.



3.2.5 External dimensions

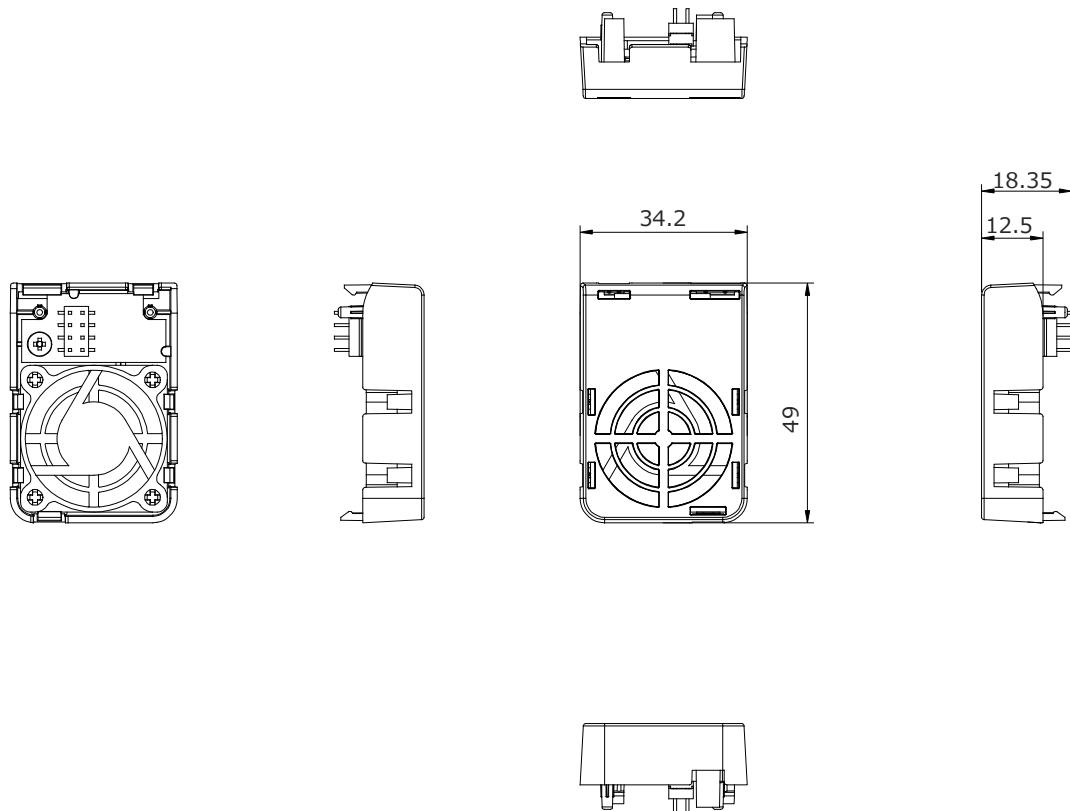
[24V Driver unit] RCON-PC/PCF/AC/DC

Item	Specifications
External dimensions	W22.6mm × H115mm × D95mm
Mass	Approx. 180g (2-axis specification), Approx. 175g (1-axis specification)
External view	See figure below



[Fan unit] RCON-FU

Item	Specifications
External dimensions	W34.2mm × H49mm × D12.5mm
Mass	Approx. 16g
External view	See figure below



3.3 200V power supply unit, for 200V terminal unit

3.3.1 Overview

The power supply unit is dedicated for 200V AC (single-phase / 3-phase). It is necessary when using the 200V driver unit.

Allocate it on the right side next to the 24V driver unit. In case of using the 200V driver unit only, allocate it on the right next to the SEL unit (or on the right side of the very right end of the SCON extension unit and PIO/SIO/SCON extension unit or a PIO units if any used).

Also, there is a fan unit and terminal unit for 200V enclosed to the power supply unit.

[Characteristics]

■ It is applicable for single-phase 200V and 3-phase 200V.

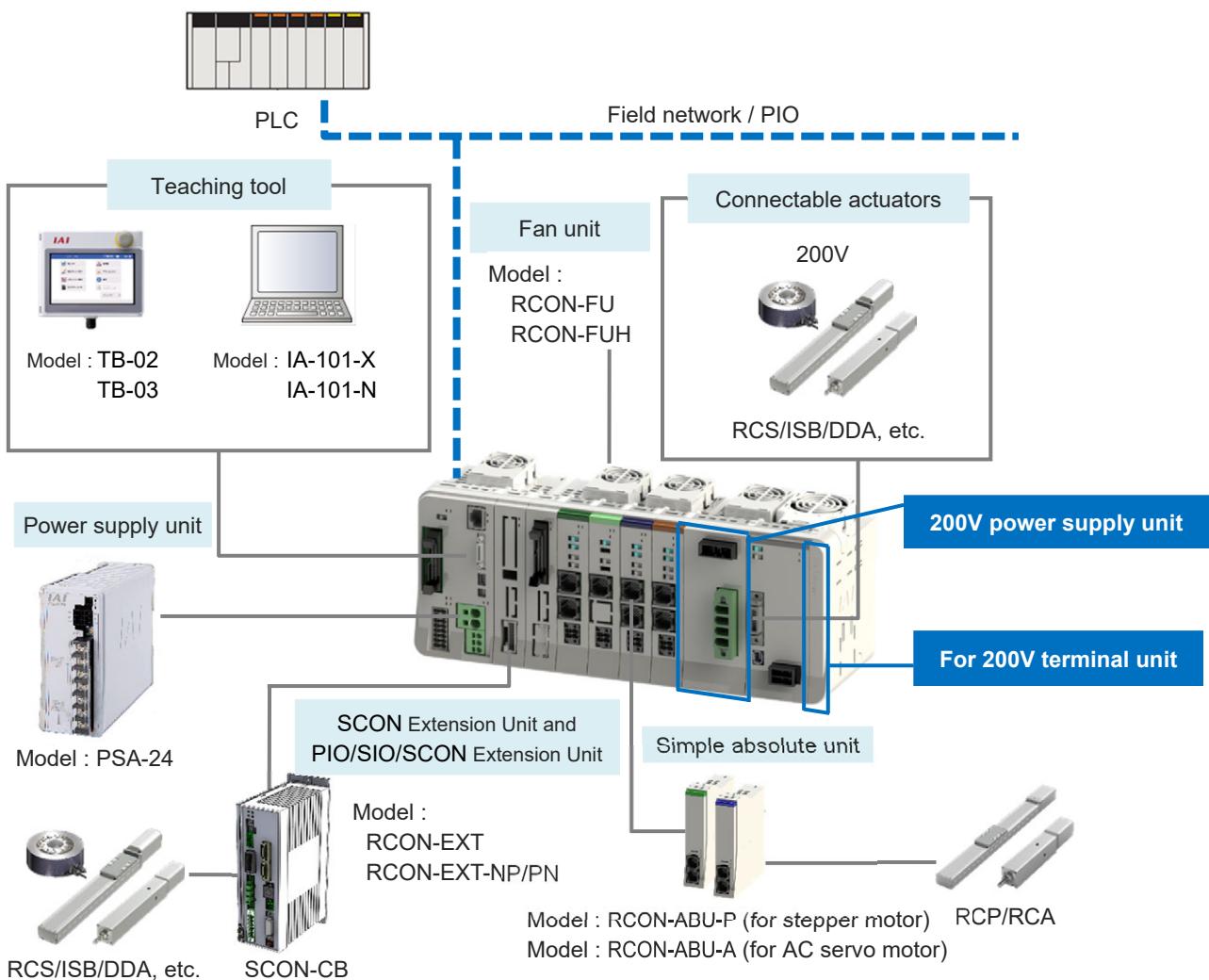
■ The wattage connectable is as shown below;

For single-phase 200V····· Total wattage of actuators connected to RCON-SC should be
1600W max

For 3-phase 200V····· Total wattage of actuators connected to RCON-SC should be
2400W max.

■ Direct link with other units makes drastically simple wiring work.

■ Installation on DIN rails makes it easy to install to a control board.



There is a built-in regenerative resistor of 60W equipped in 200V power unit, 200V driver unit.

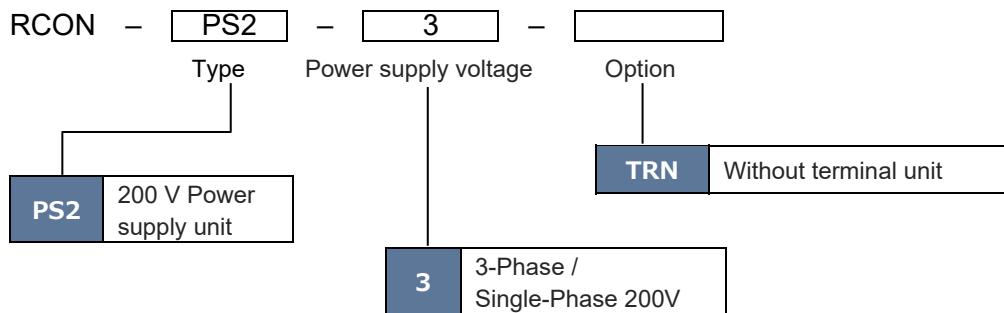
The regenerative resistor is basically not necessary, but use an external regenerative resistor unit in case of shortage in regenerative resistor. [Refer to 4.6 Regenerative Resistor (Option)]

3.3 200V power supply unit, for 200V terminal unit

3.3.2 Model Code

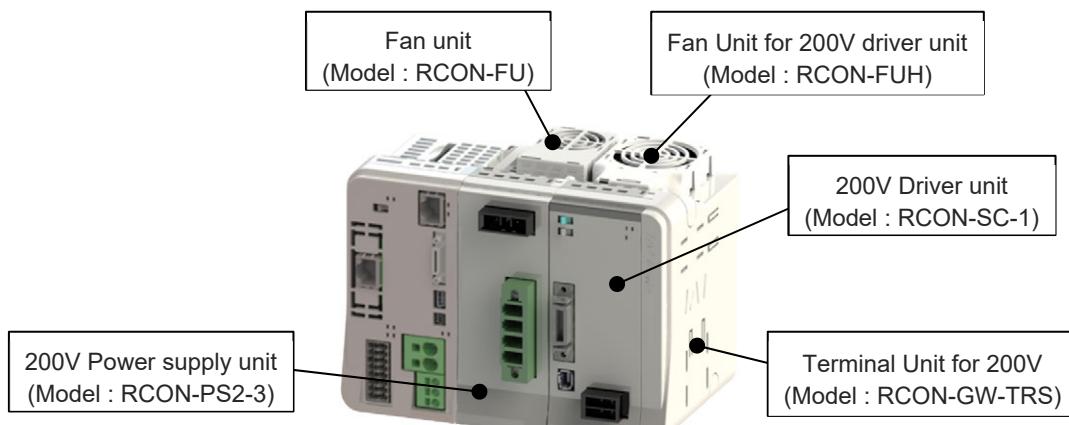
(1) How to Read the Model Number

[200V power supply unit]



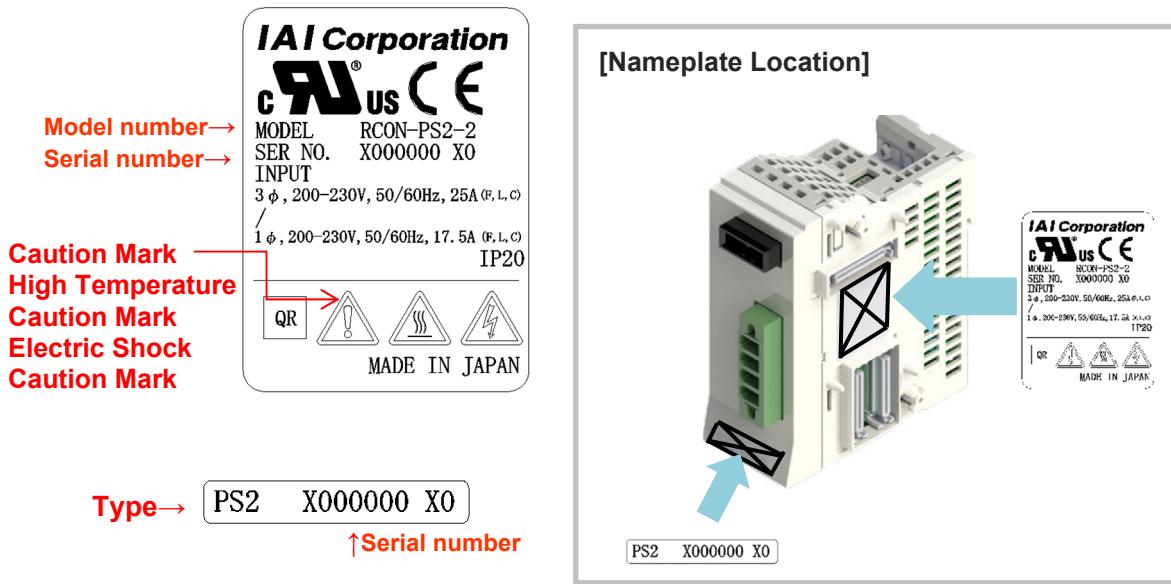
[Terminal Unit for 200V]

RCON - GW - TRS



* The maximum number of connectable units is one unit.

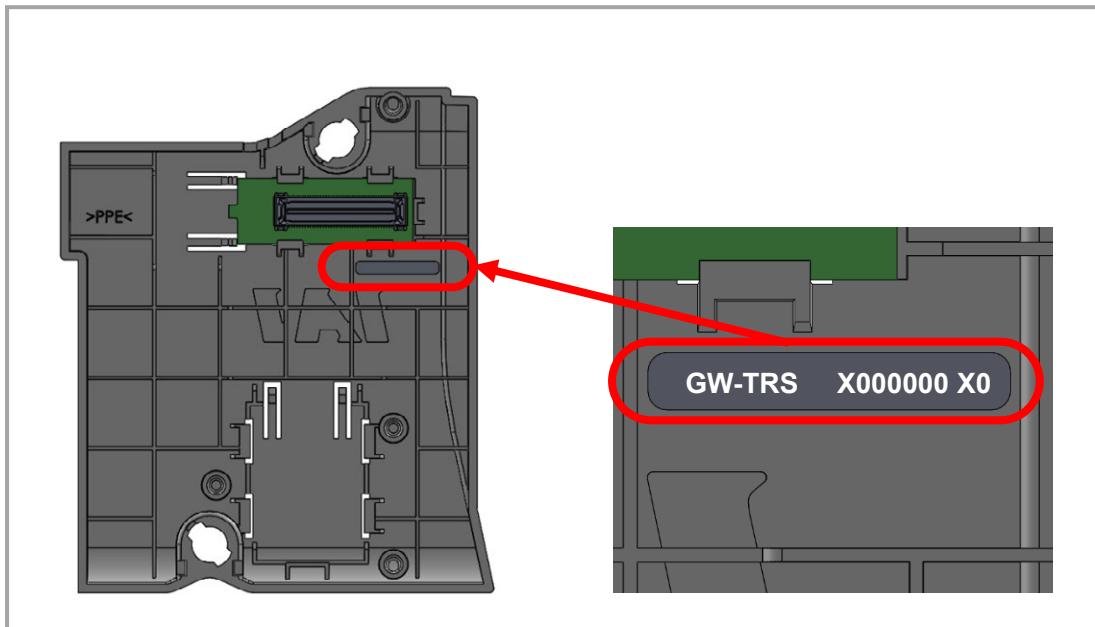
(3) How to read the model nameplate

[200V Power Supply Unit]

* This design is after being certified with UL/CE.

Mark	Explanation of Mark
!	Where residual-current-operated protective device (RCD) is used for protection in case of direct or indirect contact, only RCD of Type B is allowed on the supply side of this Electroonic Equipment (EE).
⚡	Do not touch terminals within 10 minutes after disconnect the power. Risk of electric shock.
⚠	Do not touch product when power is ON. Risk of burn.

[Terminal Unit for 200V]



3.3.3 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
200V Driver unit		1	Model : RCON-PS2-3 (The maximum number of connectable units is one unit.)
Terminal Unit for 200V		1	Single product model : RCON-GW-TRS (Not supplied with TRN specification)
Fun Unit		1	Single product model : RCON-FU
Power Connector		1	Single product model : SPC5/4-STF-7.62 (Phoenix Contact)
First Step Guide		1	ME0397
Safety Guide		1	M0194

3.3.4 Part names/Functions

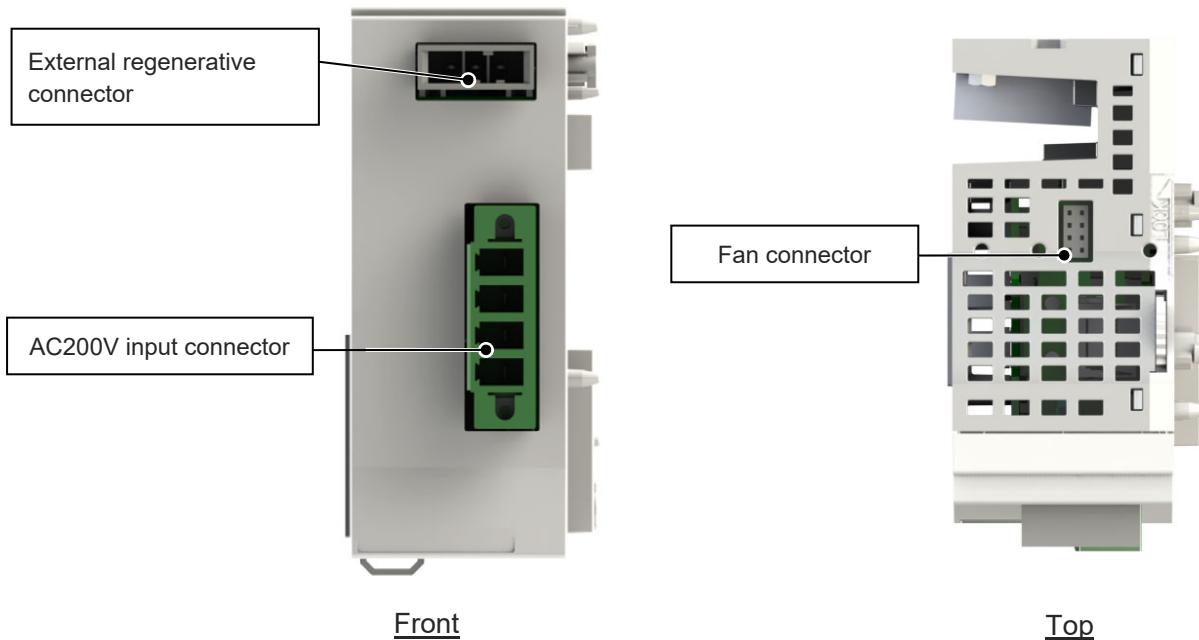
(1) Part names

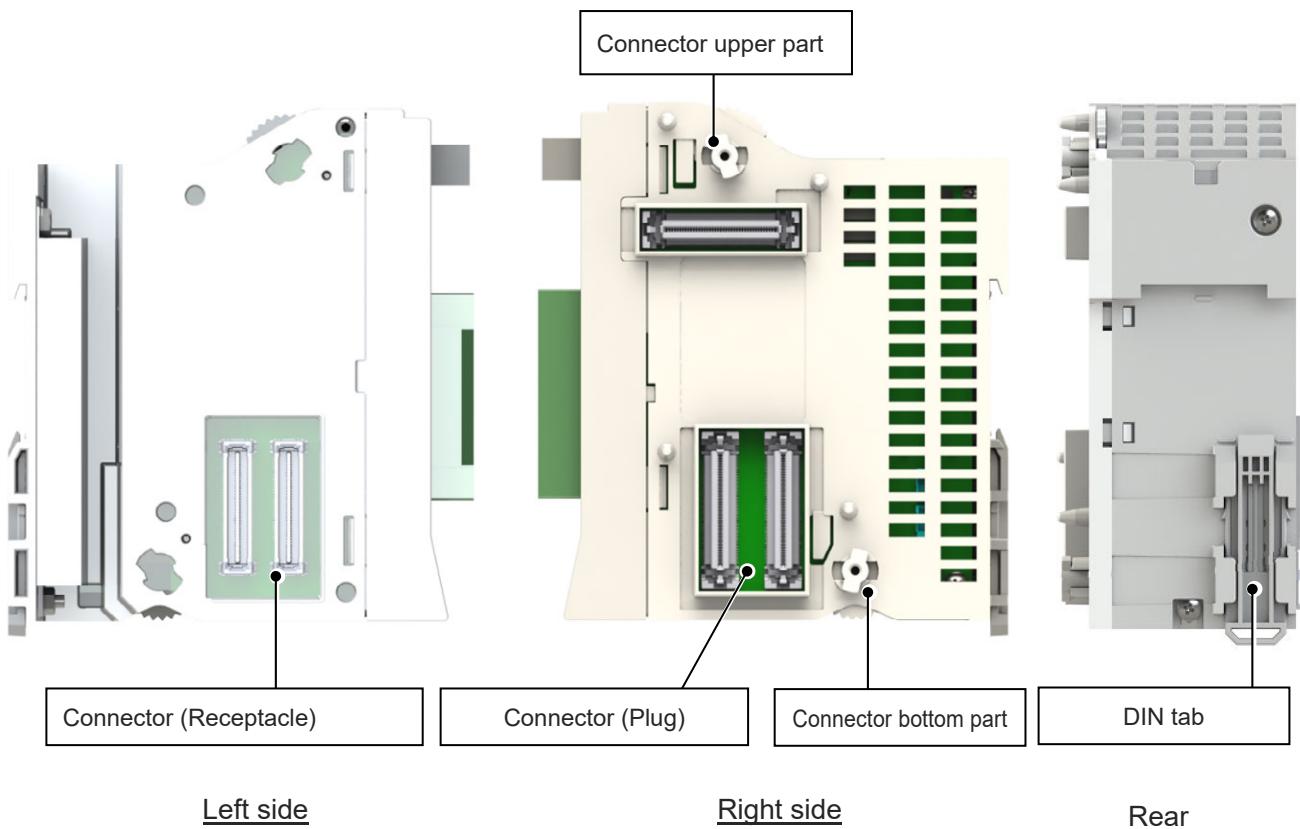


200V Power supply unit
RCON-PS2-3

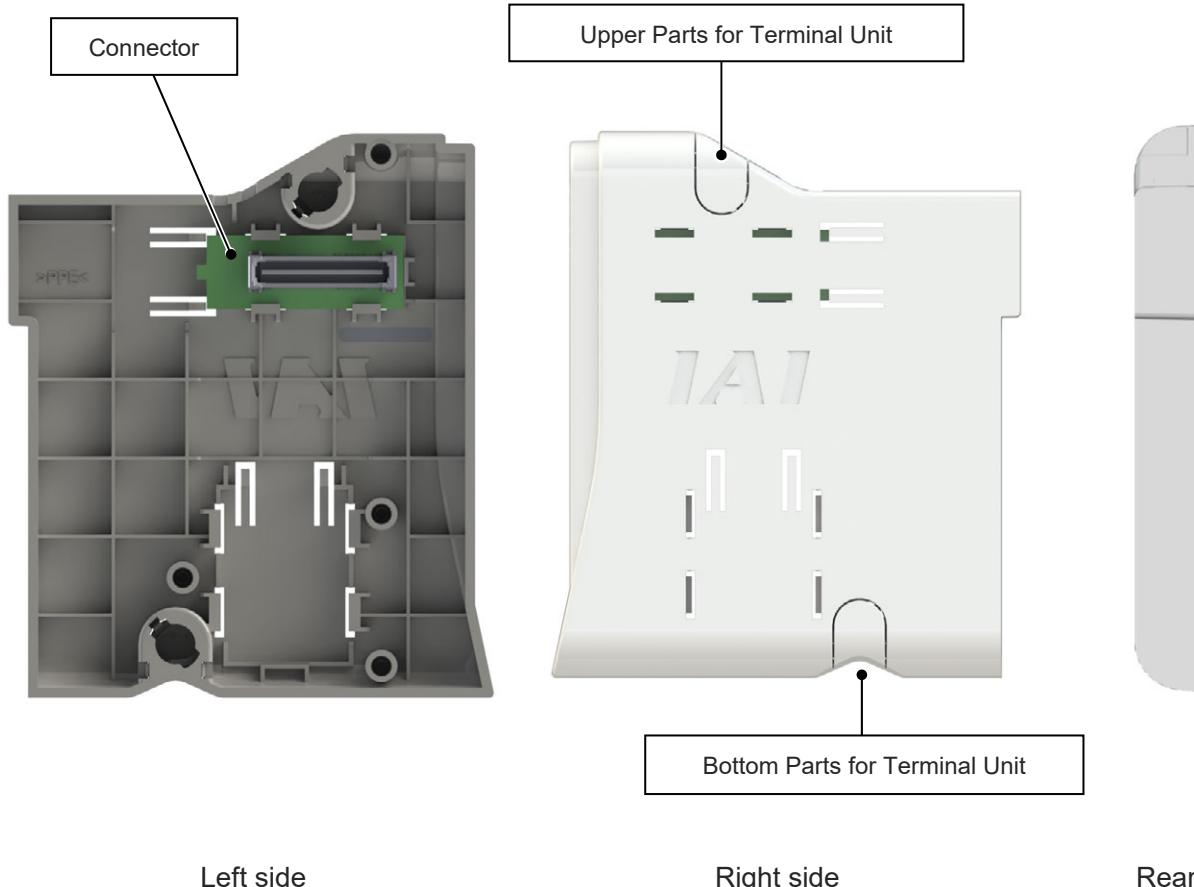
Terminal unit for 200V
RCON-GW-TRS

[200V Power Supply Unit]





[Terminal Unit for 200V]



Danger

- When 200V units are to be connected, 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.

(2) External Regenerative Resistor Connector

200V power supply unit and driver unit for 200V are equipped with a built-in 60W regenerative resistor. This connector is to be used to expand the existing regenerative resistor units (model code: RESU-2/RESUD-2) in case the resistance is not enough.



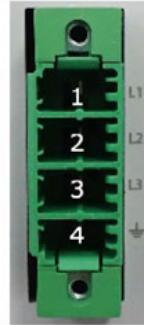
Pin No.	Signal name	Description
1	RB- (RB+)	Resistor
2	RB+ (RB-)	Resistor
3	⊕ (PE)	Protection grounding

[Refer to 4.6 Regenerative Resistor (Optional)]

3.3 200V power supply unit, for 200V terminal unit

(3) 200V AC input connector

It is a connector for the 3-phase and single-phase 200V AC input. The total wattage connectable to a motor differs for the 3-phase and the single-phase. It should be 2,400W in total for the 3-phase 200V AC, and 1,600W in total for the single-phase 200V AC.



Cable connector name:SPC5/4-GF-7,62 (Phoenix Contact)

Pin No.	Signal name	Description
1	L1 (R)	1st Phase
2	L2 (S)	2nd Phase
3	L3 (T)	3rd Phase
4	⏚ (PE)	Protection grounding

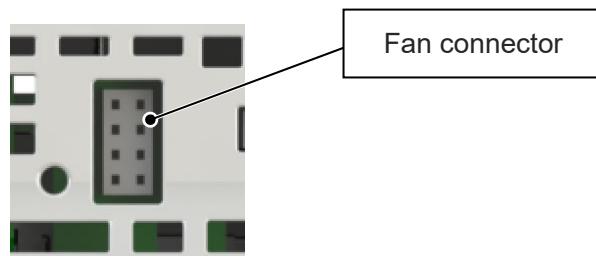
Cable side connector compatible wire

Item	Specifications
Compatible wire	AWG14 ~ 8 (2 ~ 8mm ²)
Strip length	15.0mm

(4) Fan connector

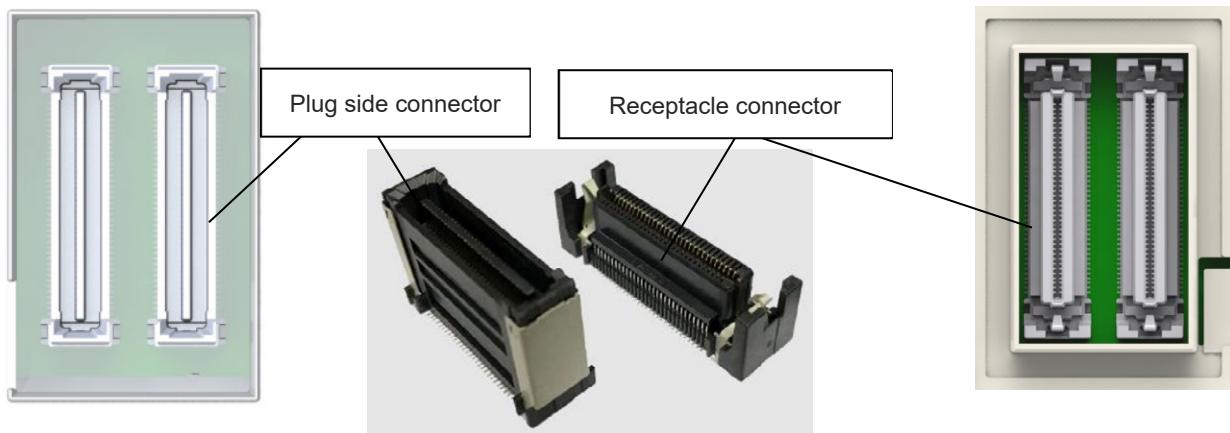
A connector to connect the fan unit. It is the same as the fan unit attached on the 24V driver unit.

It connects to the fan board connector on the fan unit side.



(5) Connectors

A connector for use between units. Two identical connectors are used. The connectors have a floating structure that absorbs connector misalignment due to housing mating or mounting misalignment between connectors.



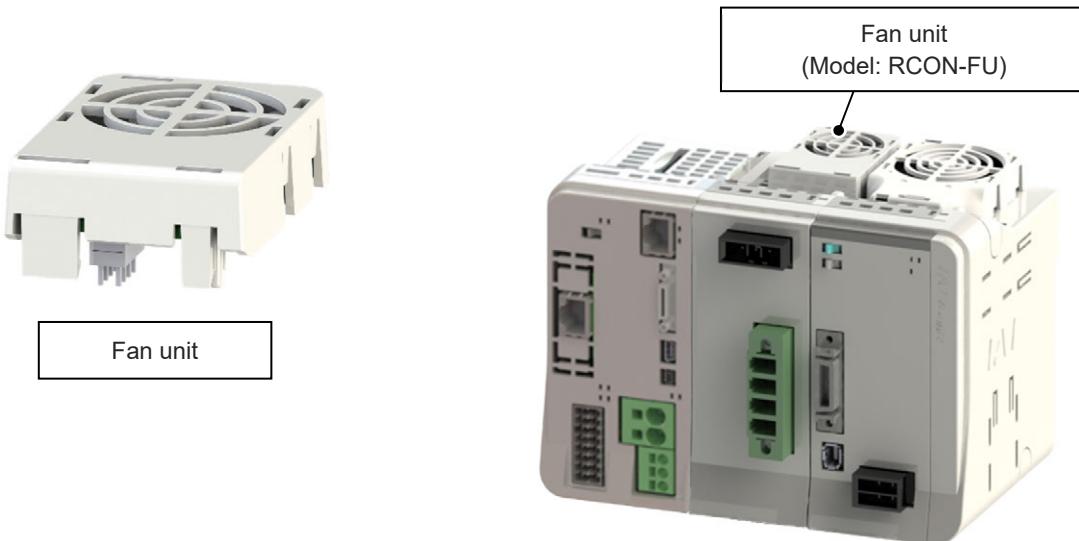
3.3 200V power supply unit, for 200V terminal unit

(6) Fan unit

It is a option to have forced air cooling on the power supply unit.

It is the same as the fan unit attached on the 24V driver unit. Use the unit by connecting to the fan connector on the power supply unit side. One unit of the Power Supply Unit uses one unit of the fan unit.

The fan starts turning if the temperature inside of the power supply unit gets high, and stops when the temperature drops.

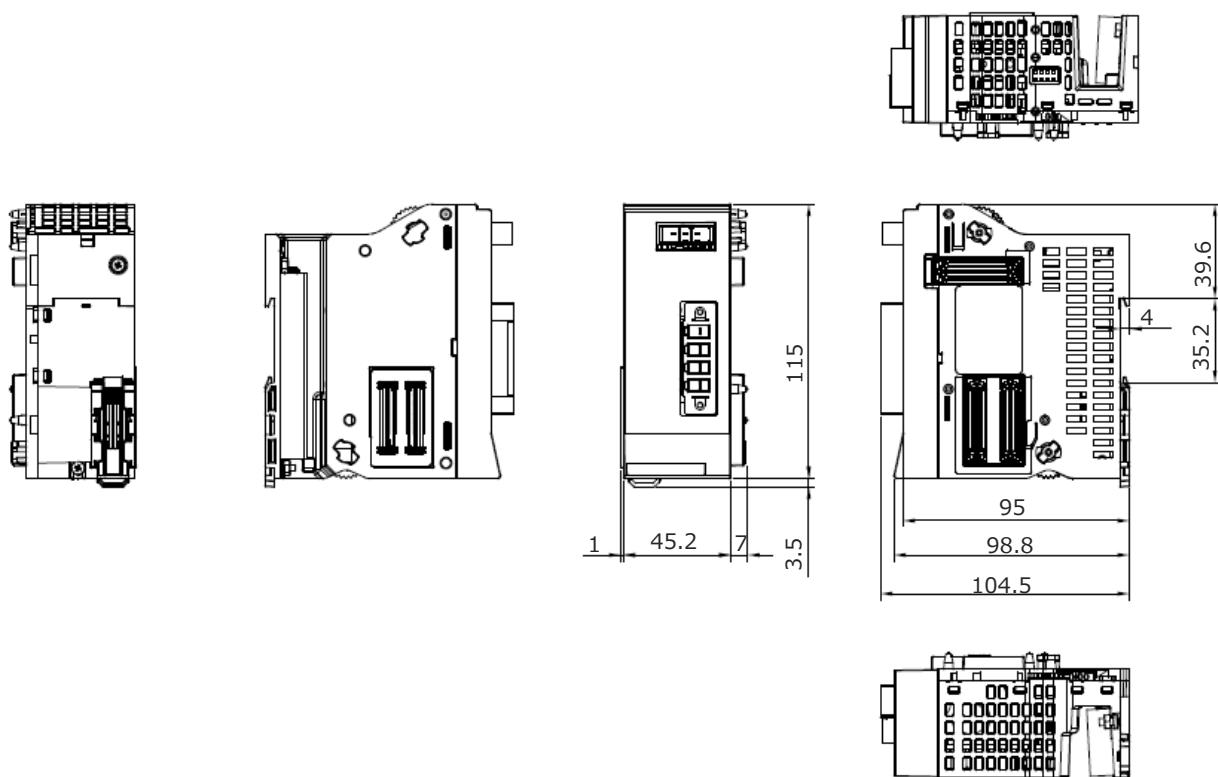


Refer to 3.2.4 (9) Fan unit for more detailed information.

3.3.5 External dimensions

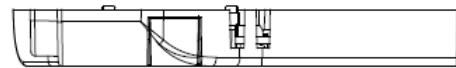
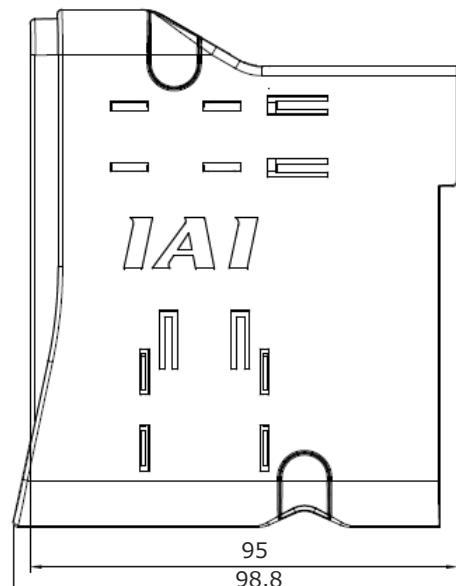
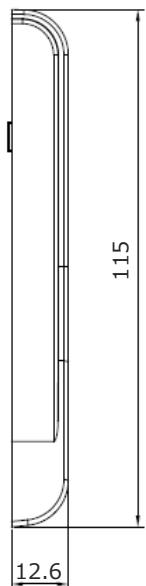
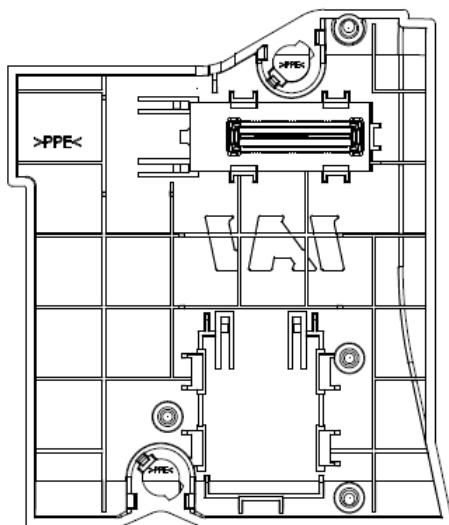
[200V Power Supply Unit] RCON-PS2-3

Item	Specifications
External dimensions	W45.2mm × H115mm × D95mm
Mass	Approx. 395g
External view	See figure below



[Terminal Unit for 200V] RCON-GW-TRS

Item	Specifications
External dimensions	W12.6mm × H115mm × D95mm
Mass	Approx. 40g
External view	See figure below



3.4 200V driver unit, fan unit for 200V driver

3.4.1 Overview

The 200V driver unit is a unit that connects and controls the 200V system actuators.

The maximum number of axes available to control with one unit of the driver unit is one axis.

It is a controller to perform control in the 200V actuator with SEL program via the SEL unit explained in 3.1.

The unit is to be installed on the right from the front view of the 200V power supply unit. It is available to perform control 8 axes at the maximum in combination with the 24V driver unit. ^(Note) Also, there is a 200V fan unit enclosed to the driver unit.

Note: There is a limit to the wattage connectable. Refer to [Characteristics] for details.

[Characteristics]

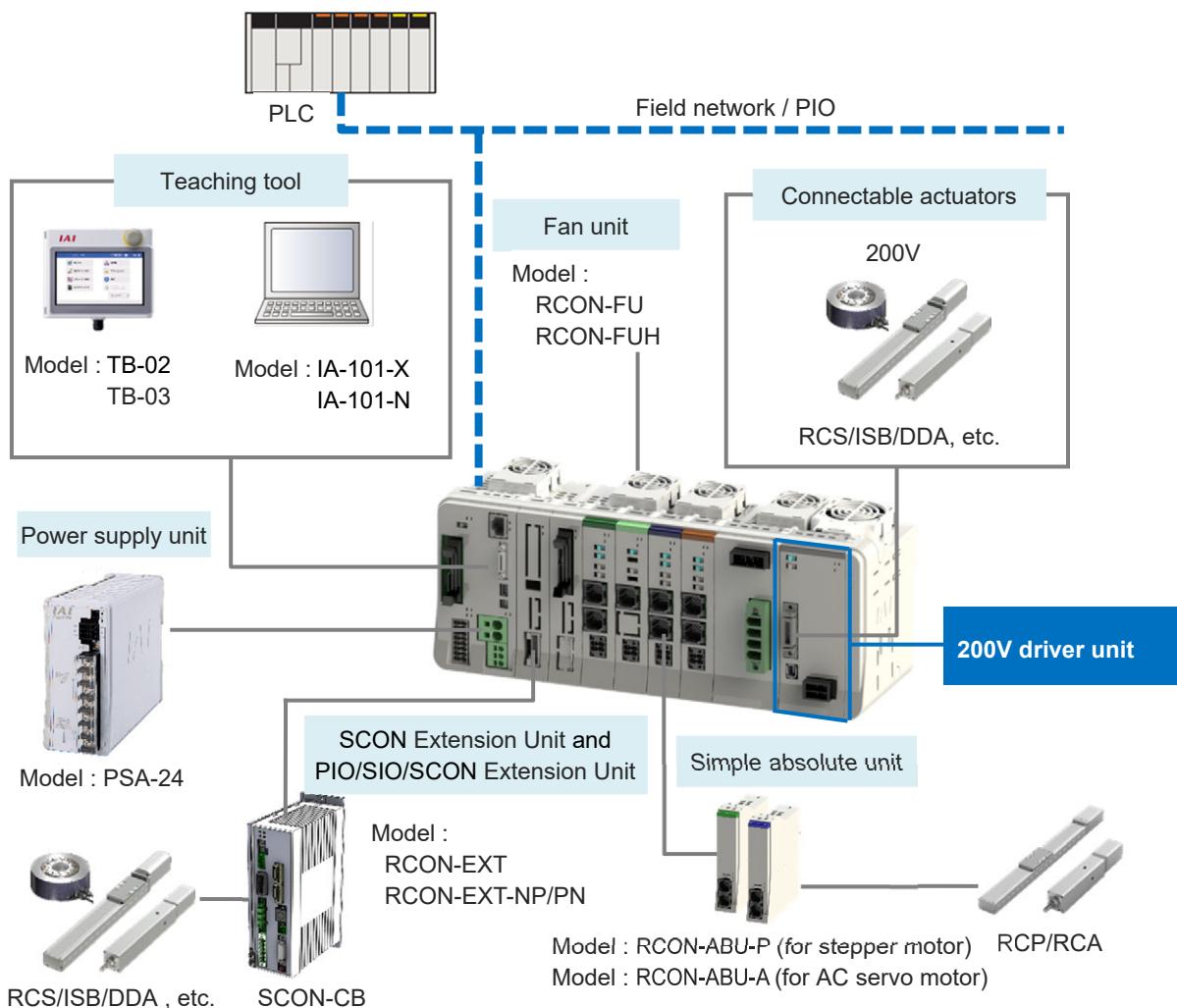
- The unit is applicable for the battery-less absolute type, incremental type, index absolute type and spurious absolute type.
- One unit of the driver unit can be applied to wattages from 60W to 750W.
- As it is equipped with a built-in regenerative resistor, there is basically no need of external regenerative resistor.
- The wattage connectable is as shown below;

For single-phase 200V.....Total wattage of actuators connected to RCON-SC should be
1600W max.

For 3-phase 200V.....Total wattage of actuators connected to RCON-SC should be
2400W max.

- Direct link among driver units makes drastically simple wiring work.
- Installation on DIN rails makes it easy to install to a control board.

3.4 200V driver unit, fan unit for 200V driver



The following 200V servo-motor actuators cannot be connected to the RCON-SC.

- 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 connecting the actuators described in (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.

There is a built-in regenerative resistor of 60W equipped in 200V power unit, 200V driver unit.

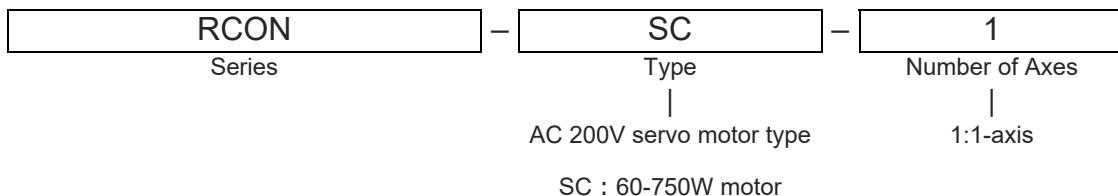
The regenerative resistor is basically not necessary, but use an external regenerative resistor unit in case of shortage in regenerative. [Refer to 4.6 Regenerative Resistor (Option)]

3.4.2 Model Code

(1) How to Read the Model Number

[Model Code for 200V Driver]

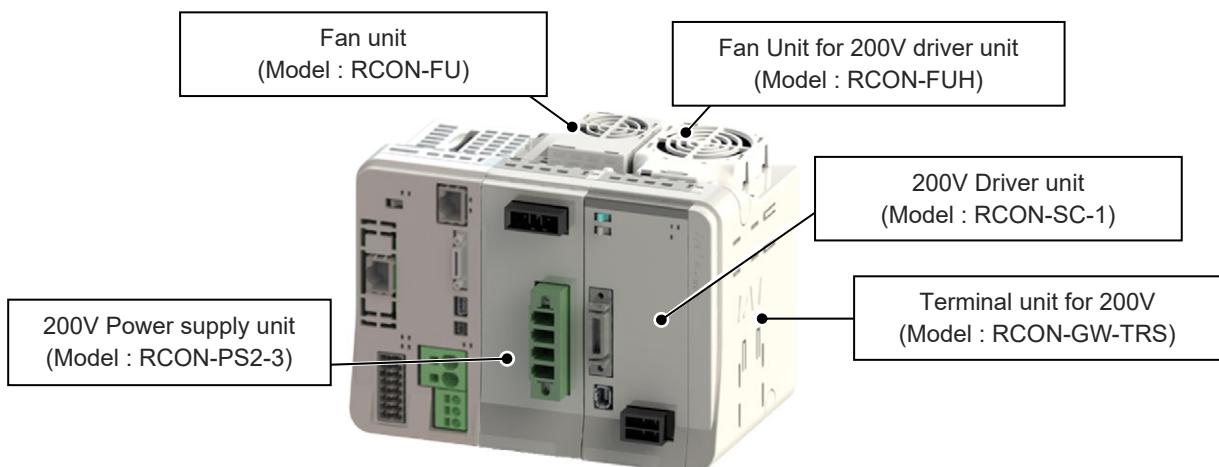
The model codes for 200V driver units are as described below.



Type : SC 60-750W motor 1-axis	60	60W servo motor
	100	100W servo motor
	100S	100W servo motor (For LSA)
	150	150W servo motor
	200	200W servo motor
	200S	200W servo motor (For LSA, DD)
	300S	300W servo motor (For LSA)
	400	400W servo motor
	600	600W servo motor
	750	750W servo motor

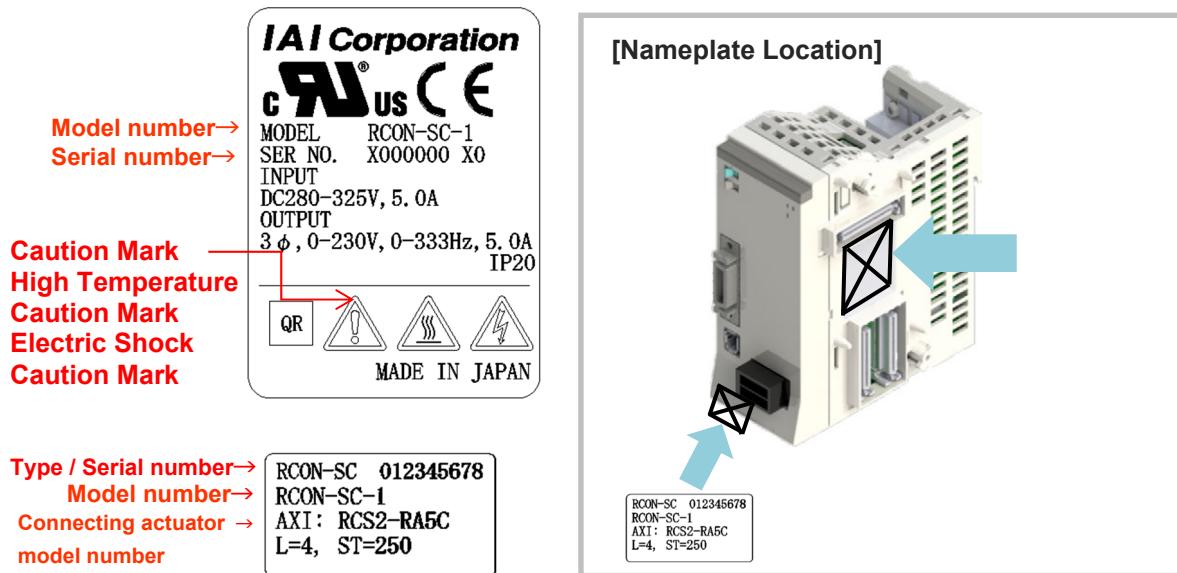
[Fan unit for 200V driver]

RCON – FUH



3.4 200V driver unit, fan unit for 200V driver

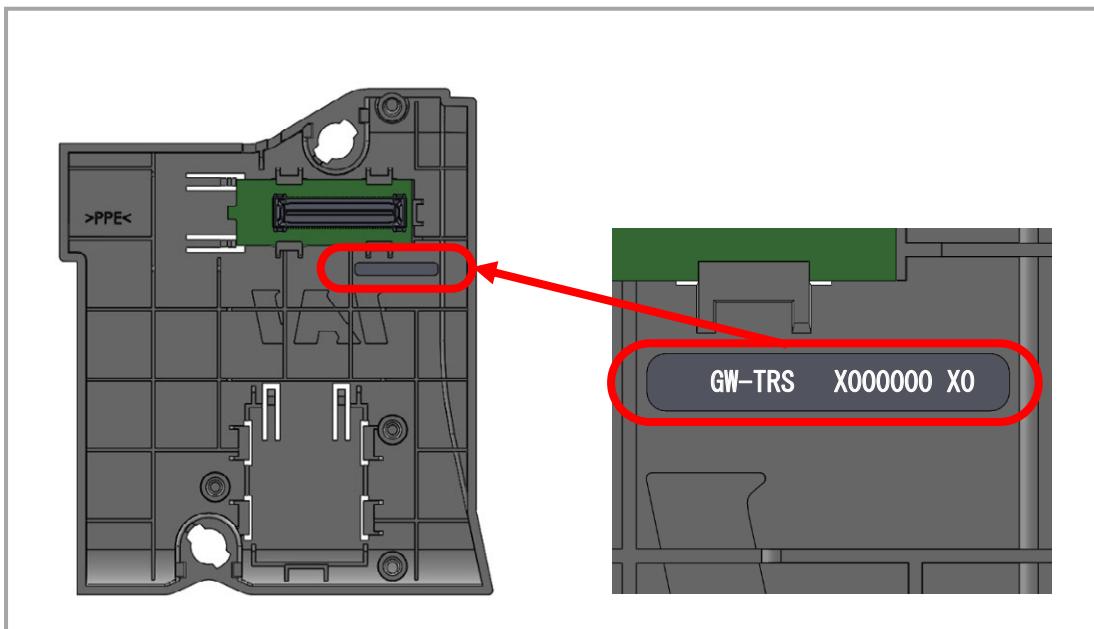
(2) How to read the model nameplate

[200V Driver Unit]

* This design is after being certified with UL/CE.

Mark	Explanation of Mark
!	Where residual-current-operated protective device (RCD) is used for protection in case of direct or indirect contact, only RCD of Type B is allowed on the supply side of this Electrotonic Equipment (EE).
⚡	Do not touch terminals within 10 minutes after disconnect the power. Risk of electric shock.
⚠️	Do not touch product when power is ON. Risk of burn.

[Terminal Unit for 200V]



3.4 200V driver unit, fan unit for 200V driver

3.4.3 Components

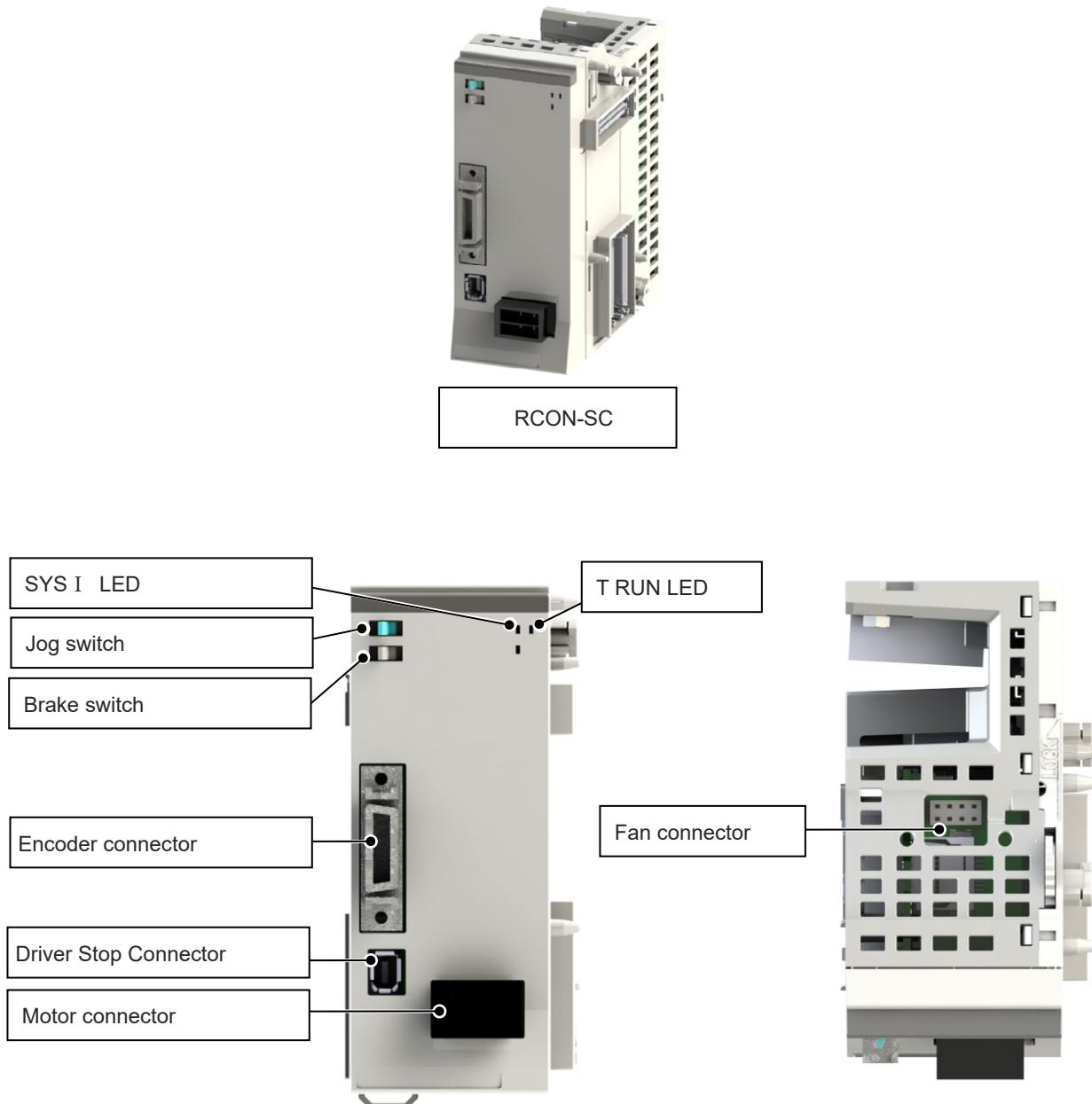
The following table shows the product configuration for the standard specification.

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.

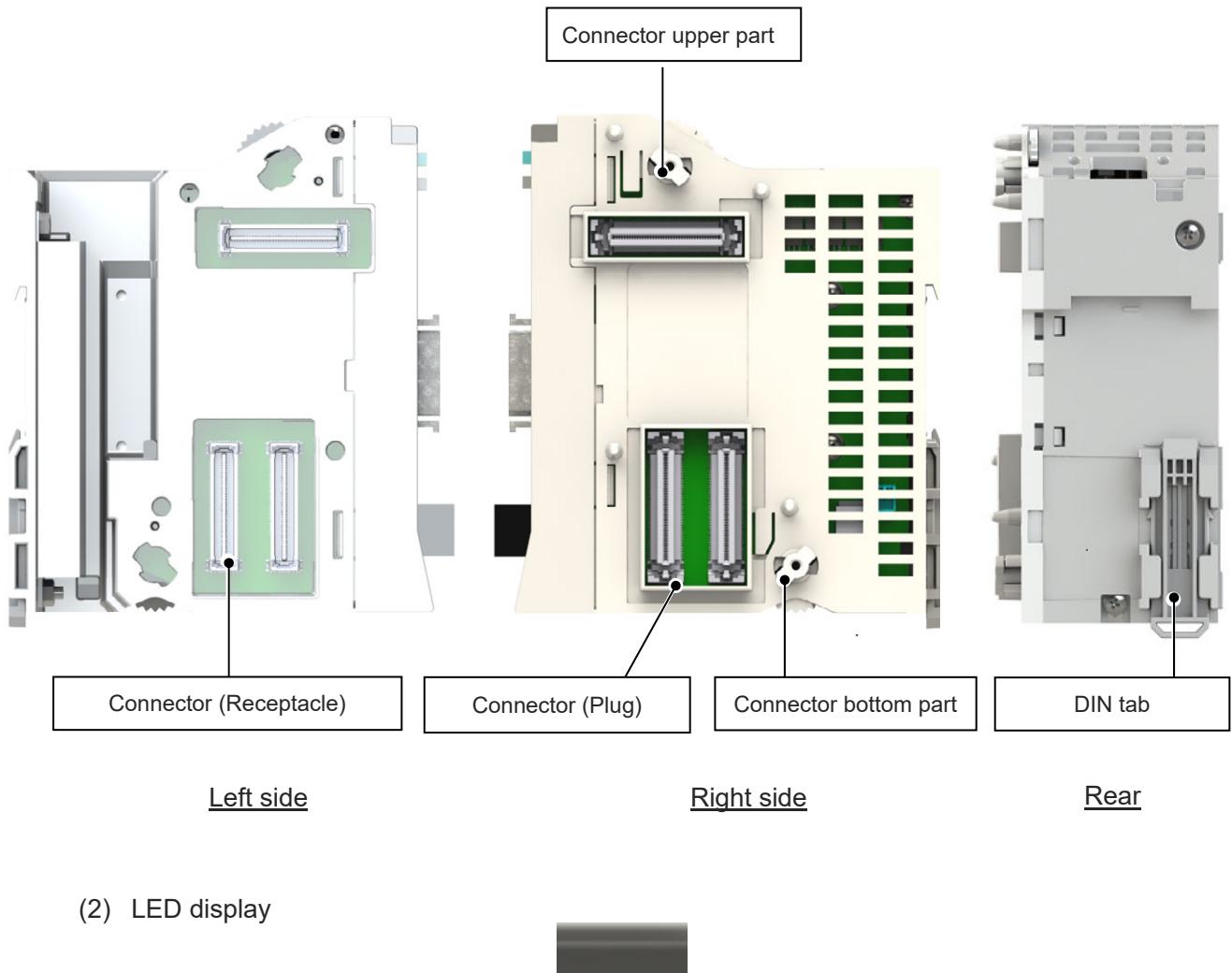
Part name	Shape	Quantity	Remarks
200V Driver unit		1	Model : RCON-SC-1
Fan Unit for 200V Driver Unit		1	Single product model : RCON-FUH
Dummy plug		1	Single product model : DP-6
First Step Guide		1	ME0397
Safety Guide		1	M0194

3.4.4 Part names/Functions

(1) Part names



3.4 200V driver unit, fan unit for 200V driver



(2) LED display



Panel notation	Display color	Status	Description
T RUN	Green	Light ON	Normal internal bus communication
		Blinking	Waiting for initialization signal, initialization communication failed
SYS	Green	Light ON	Bus communication error generated
		Light OFF	Servo ON
	Red	Light ON	Servo OFF
			Alarm triggered, Stop Signal Input On

(3) Jog switch

A switch for jog operation.

If driver unit parameter No. 194 "JOG Switch" is set to "0", this switch will be enabled.
(Initial setting is "0: Valid".)

Tilt the switch to the JOG+ side to perform jog operation in the + direction, and to the JOG- side for jog operation in the - direction. Tilting the switch further increases the jog speed step by step. However, if home return is not complete, The jog speed should be set to that in Maximum JOG speed at home return incomplete (MC Common Parameter No. 3).

When performing jog operation with the JOG switch with servo ON, the servo will be ON even after completion; with servo OFF, perform jog operation after servo ON and the servo will be OFF after completion.

The jog switch operations should be valid only in Manual Mode. It is disabled in AUTO mode. The jog switch is also disabled when opening the screen in which the actuator can be operated with the teaching tool. When opening the screen in which operation can be done with the jog switch, the actuator will decelerate and stop.



Symbol	Description
JOG+	Jog operation in + direction (home reverse direction)
JOG-	Jog operation in - direction (home direction)



Caution

- The jog switch is disabled when the communication with the teaching tool is disconnected while the screen in which the actuator can be operated with the teaching tool is opened.
- To enable jog switch operation again, turn the RSEL system on again or perform software reset.
- It is necessary to establish the RSEL axis settings in order to have the jog switch operations. (Refer to "5.3 Driver configuration" for detail.)

3.4 200V driver unit, fan unit for 200V driver

(4) Brake release switch

A switch for forced brake release.

Should be on NOM side during normal operation. On NOM side, the brake will be released by servo ON and locked by servo OFF. On RLS side, there will be forced release regardless of servo ON/OFF (except when control power is OFF).



Symbol	Description
RLS	Brake release (Brake <u>R</u> elease)
NOM	Brake lock (<u>N</u> ormal)

**Warning**

- Be careful when releasing the brake. Releasing carelessly may cause injury or damage to the actuator body, workpiece or surrounding devices due to the slider or rod falling.
- After releasing the brake, be sure to return the brake to the enabled status. It is very dangerous to operate with the brake released. It may cause injury or damage to the actuator body, workpiece or surrounding devices due to the slider or rod falling.

(5) Motor connector

It is a connector to connect to the motor cable on an actuator.



Pin No.	Signal name	Description
A1	W	Motor drive line phase W
A2	\ominus (PE)	Protection grounding
B1	U	Motor drive line phase U
B2	V	Motor drive line phase V

(6) Encoder connector

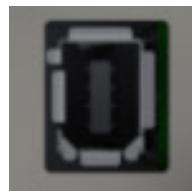
It is a connector to connect to the encoder cable on an actuator.



Pin No.	Signal name	Description
1	A+	Encoder phase A+ input
2	A-	Encoder phase A- input
3	B+	Encoder phase B+ input
4	B-	Encoder phase B- input
5	Z+	Encoder phase Z+ input
6	Z-	Encoder phase Z- input
7	SRD+	Send & Receive Data +
8	SRD-	Send & Receive Data -
9	-	
10	-	
11	NC	Not to be connected
12	24VOUT	Sensor Power Supply Output
13	0V	24V Power Supply GND
14	-	
15	-	
16	VCC	Encoder Power Supply
17	GND	GND
18	-	
19	-	
20	BK-	Brake Release Output Signal -
21	BK+	Brake Release Output Signal +
22	NC	Not to be connected
23	RSV	Sensor input (Reserve)
24	OT	Sensor input (Over Travel)
25	CLEEP	Sensor input (Creeping Sensor)
26	LS	Sensor input (Limit Switch)

3.4 200V driver unit, fan unit for 200V driver

(7) Driver Stop Connector

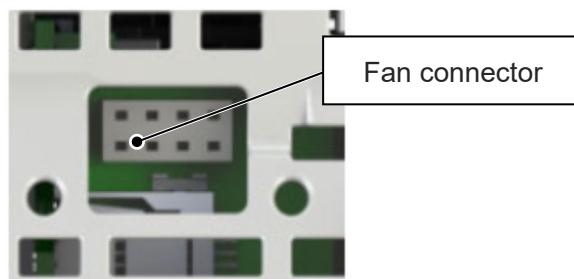


It is a connector to use the driver stop feature.

Keep the enclosed dummy plug (model code: DP-6) on when this feature is not to be used.

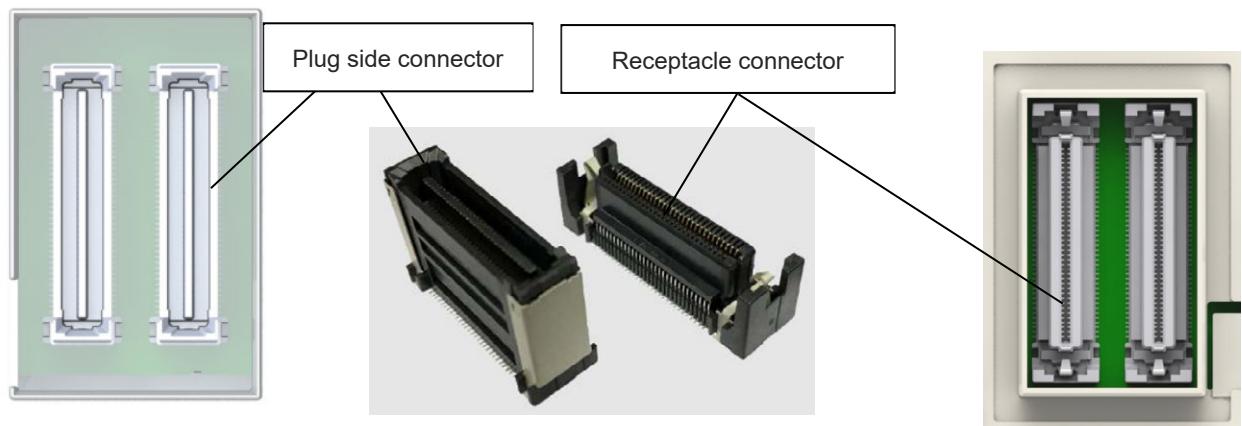
(8) Fan connector

A connector to connect the Fan Unit. It connects to the fan board connector on the fan unit side.



(9) Connectors

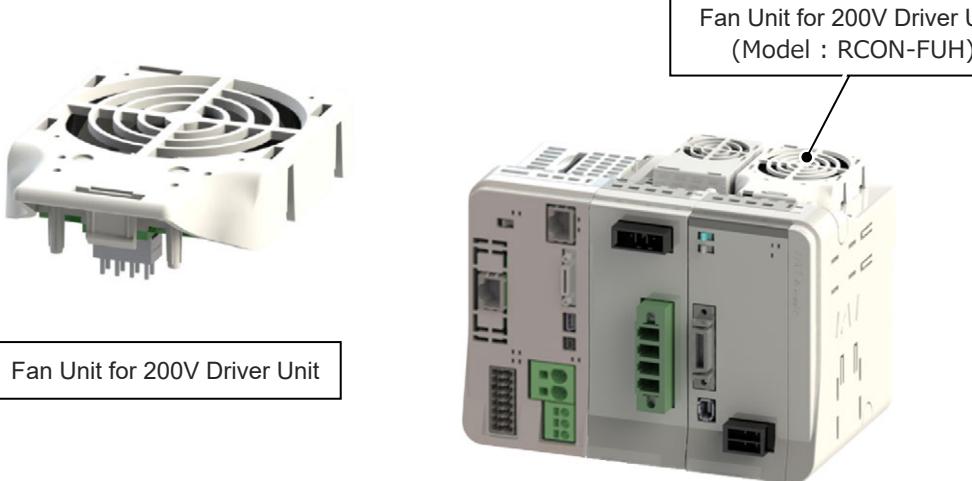
A connector for use between units. Two identical connectors are used. The connectors have a floating structure that absorbs connector misalignment due to housing mating or mounting misalignment between connectors.



(10) Fan Unit for 200V Driver Unit

It is a fan to have forced air cooling on the driver unit. Use by connecting to the fan connector on the driver unit side. One unit of the 200V driver unit requires one unit of the Fan Unit for 200V Driver Unit.

The fan rotates when the driver unit internal temperature rises and stops when the temperature falls.

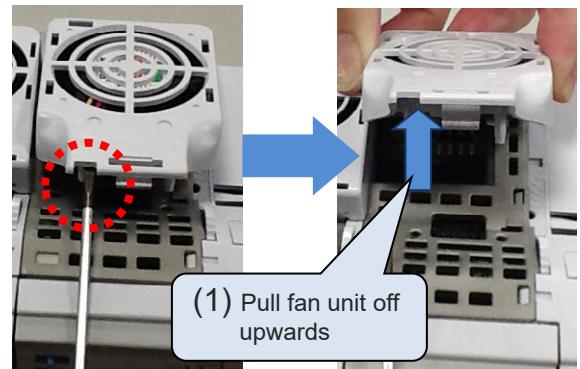


3.4 200V driver unit, fan unit for 200V driver

[How to Replace Fan Unit for 200V Driver Unit]

<Detaching Fan Unit>

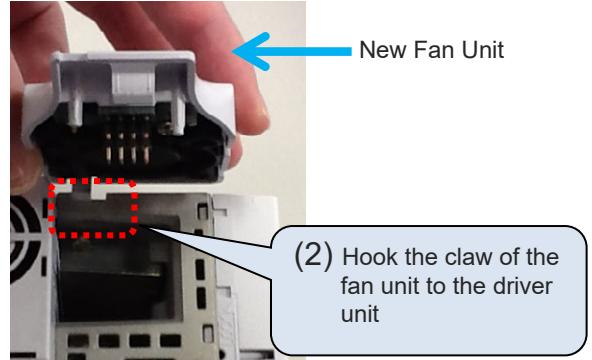
- (1) Insert a slotted screwdriver to the cutout (circled in red in figure on the right) on the fan unit and pull up the fan unit upwards to detach it.



<Attaching Fan Unit>

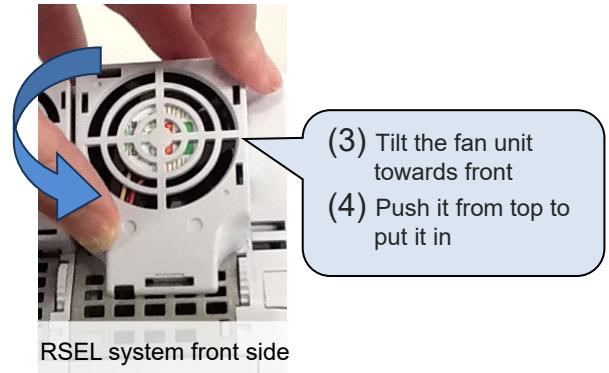
- (2) Adjust the installation orientation of the RSEL system and new fan unit.

Hook the claw of the fan unit to the driver unit as shown in the figure on the right.



- (3) Pull down the fan unit to the front of the RSEL system.

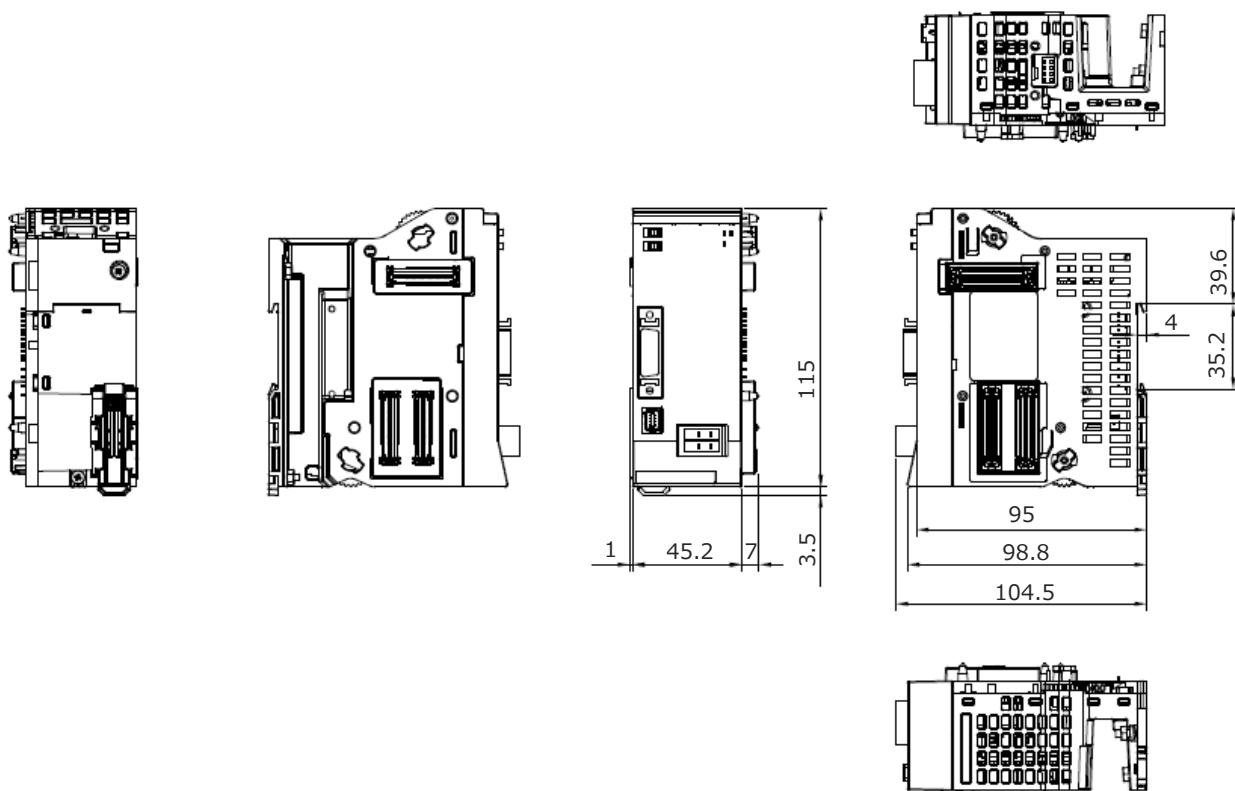
- (4) Press the fan unit from the top and snap in.



3.4.5 External dimensions

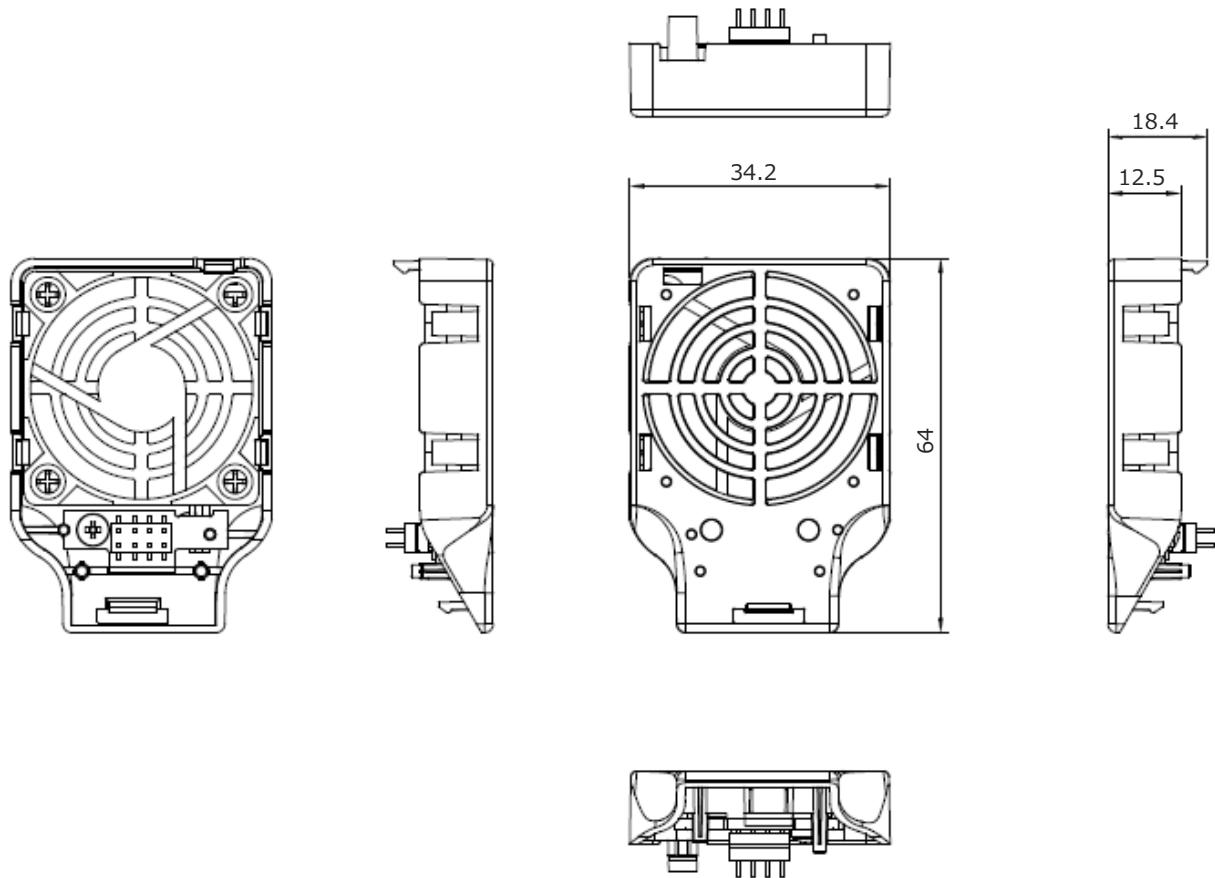
[200V Driver Unit] RCON-SC

Item	Specifications
External dimensions	W45.2mm × H115mm × D95mm
Mass	Approx. 440g
External view	See figure below



[Fan Unit for 200V Driver Unit] ROCN-FUH

Item	Specifications
External dimensions	W34.2mm × H49mm × D12.5mm
Mass	Approx. 20g
External view	See figure below



3.5 SCON extension unit, PIO/SIO/SCON extension unit, PIO unit

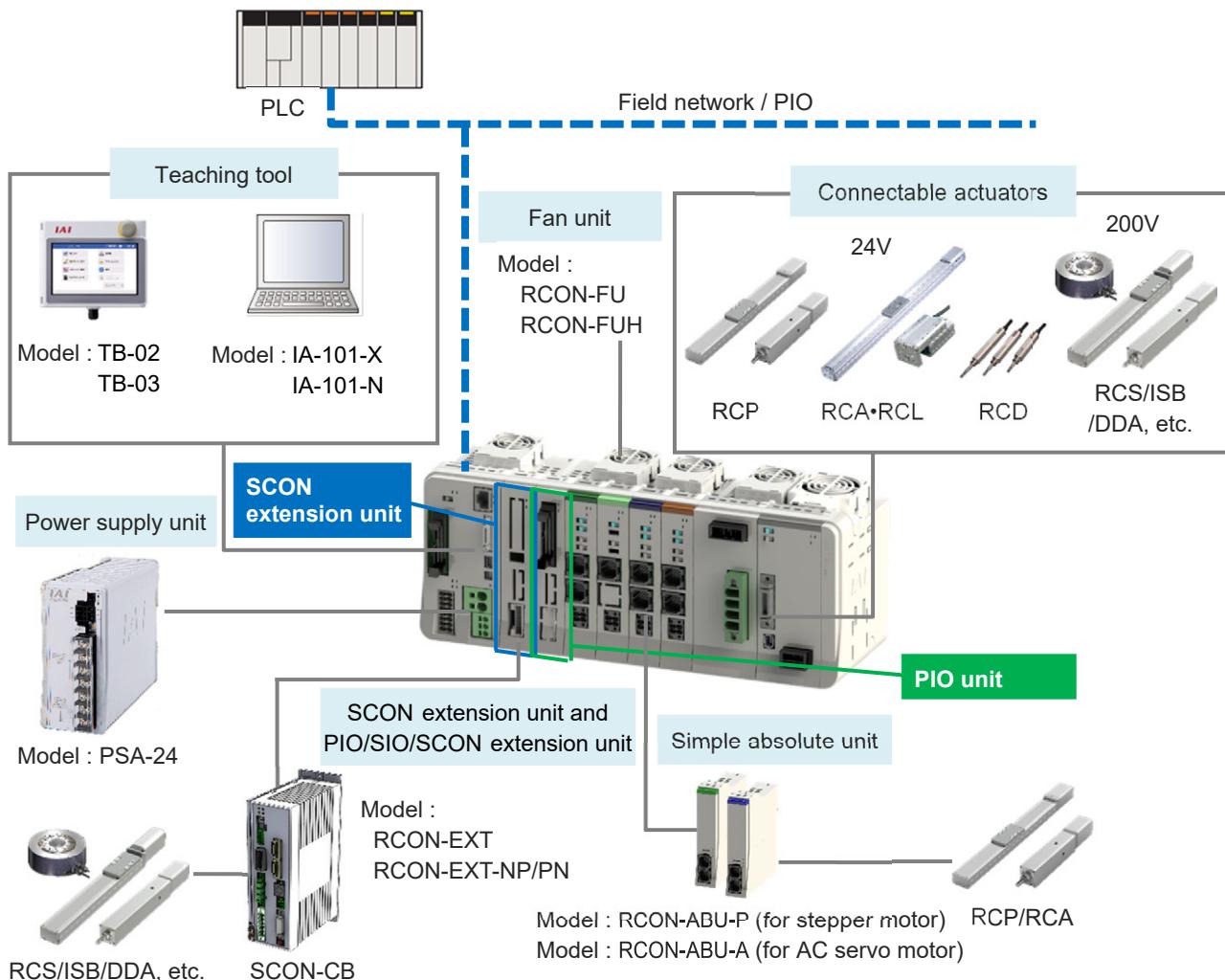
3.5.1 Overview

[SCON extension unit]

SCON extension unit is a unit to connect SCON-CB Controller to RSEL system.

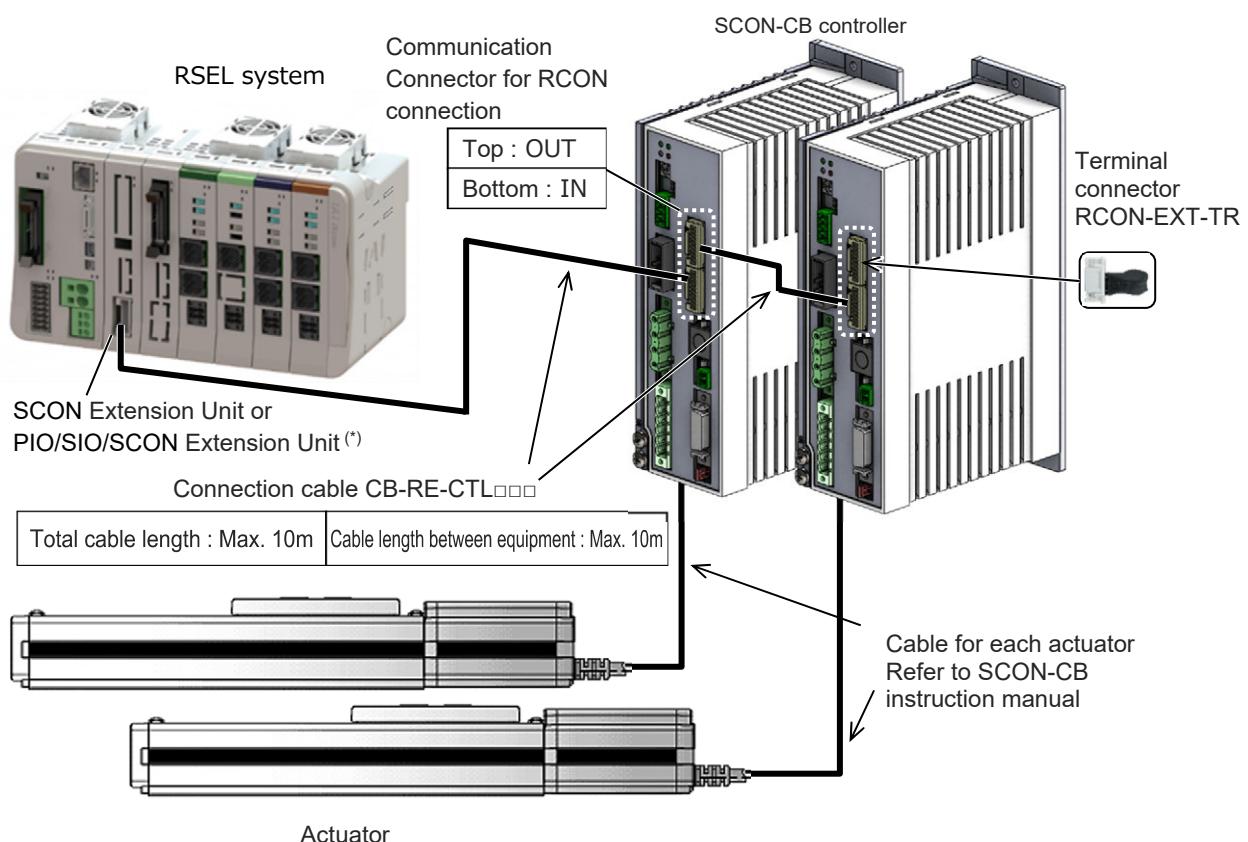
Using the SCON extension unit and SCON-CB Controller should enable to connect actuators that are not capable to connect with the 200V driver unit (RCON-SC) .

As seen from the front, the SEL unit is placed to the left end of the RSEL system, while the expansion unit is located on the right side of the SEL unit during use.



3.5 SCON extension unit, PIO/SIO/SCON extension unit, PIO unit

The SCON extension unit and the SCON-CB controller are connected with a dedicated cable (model: CB-RE-CTL□□□). When connecting two or more SCON-CB controllers, connect the SCON-CB units together with a dedicated cable. Up to 16 axes can be controlled by combining with a driver unit.



- * In RSEL System, it is available to connect only either the SCON extension units or PIO/SIO/SCON extension units.

[PIO/SIO/SCON Extension Unit]

PIO/SIO/SCON extension unit is equipped with a connector to link SCON-CB controller as well as SCON extension unit does.

It is also equipped with the parallel I/O connector with 16 points of input and 16 points of output and RS485 serial communication connector.

PIO/SIO/SCON extension units are also available to use by allocating on the right of the SEL unit.

[PIO unit]

PIO unit is equipped with the parallel I/O connector with 16 points of input and 16 points of output. Expansion is available up to eight at the maximum (144 points of input and 144 points of output) including PIO/SIO/SCON extension units.

● Parameter Setting When PIO/SIO/SCON Extension Unit and PIO Unit Used

The setting in I/O Parameter No. 186 “Number of Connected PIO Units / PIO/SIO Units” is 0 at the delivery from our production plant in RSEL System

When PIO input and output are to be used with PIO/SIO/SCON extension units or PIO units connected, set the total number of PIO/SIO/SCON extension units and PIO units connected in the parameter.

[Number of Connected PIO Units / PIO/SIO Units (I/O Parameter No. 186)]

No.	Name	Unit	Input range	Default initial value setting
186	Number of Connected PIO Units / PIO/SIO Units	-	0 ~ 8	0

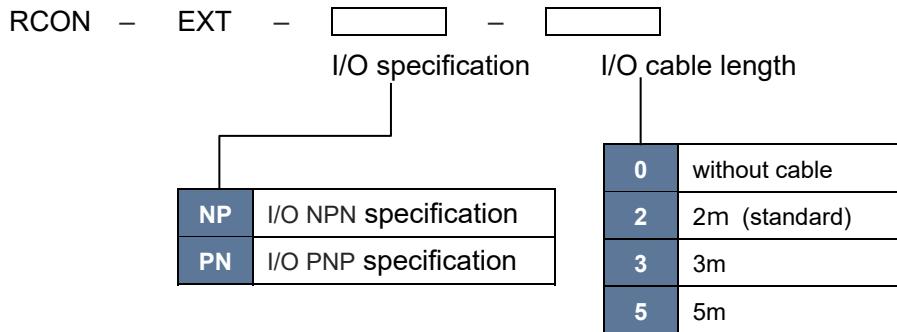
3.5.2 Model Code

(1) How to Read the Model Number

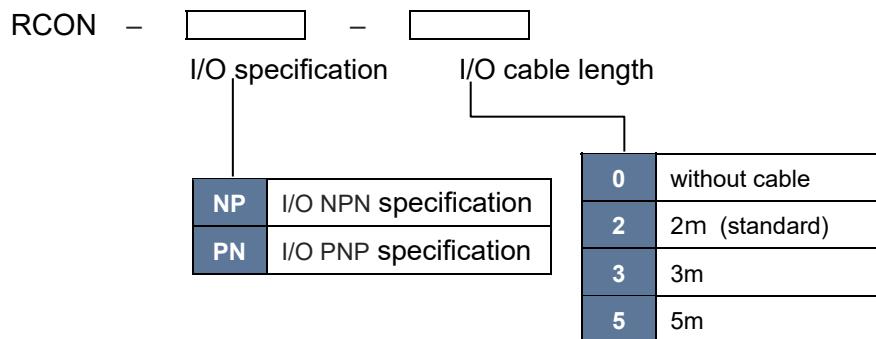
[SCON extension unit]

RCON – EXT

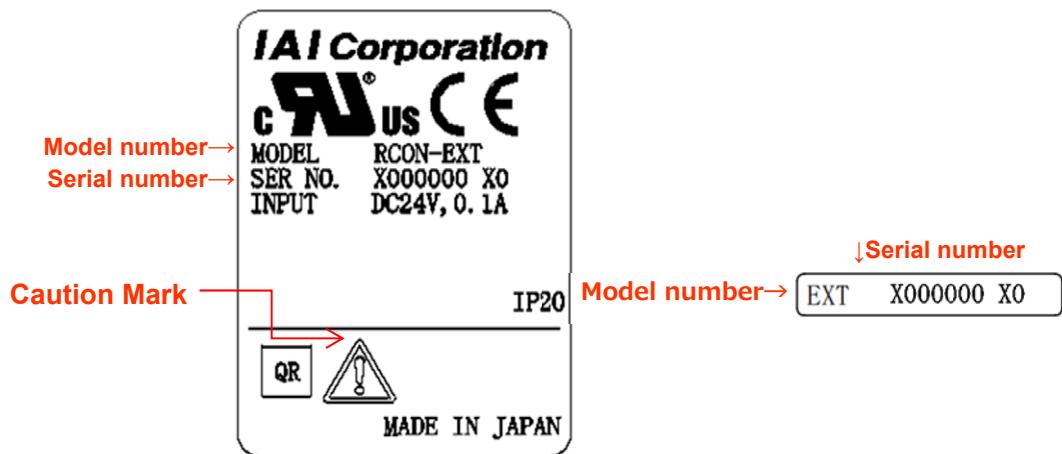
[PIO/SIO/SCON extension unit]



[PIO unit]

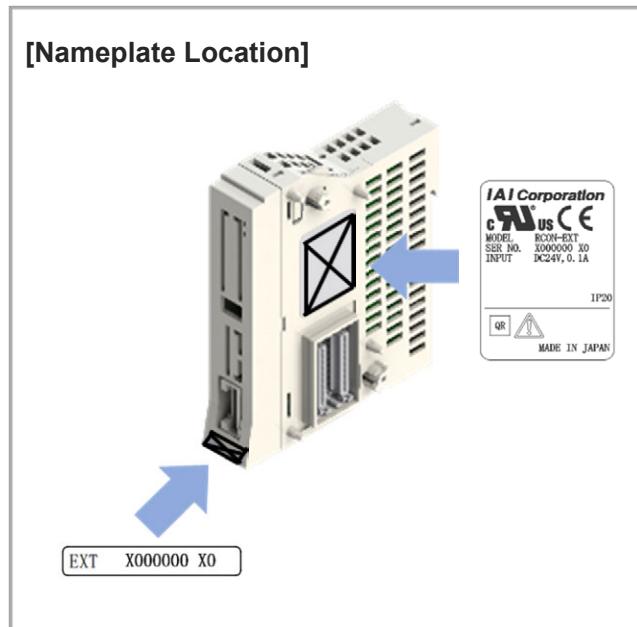


(2) How to read the model nameplate



* This design is after being certified with UL/CE.

Mark	Explanation of Mark
⚠	Use IAI specified cables only.



3.5.3 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.

[SCON extension unit]

Part name	Shape	Quantity	Remarks
SCON extension unit		1	RCON-EXT
Terminal connector		1	Single product model number: RCON-EXT-TR
First Step Guide		1	ME0393
Safety Guide		1	M0194

[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

3.5 SCON extension unit, PIO/SIO/SCON extension unit, PIO unit

[PIO unit]

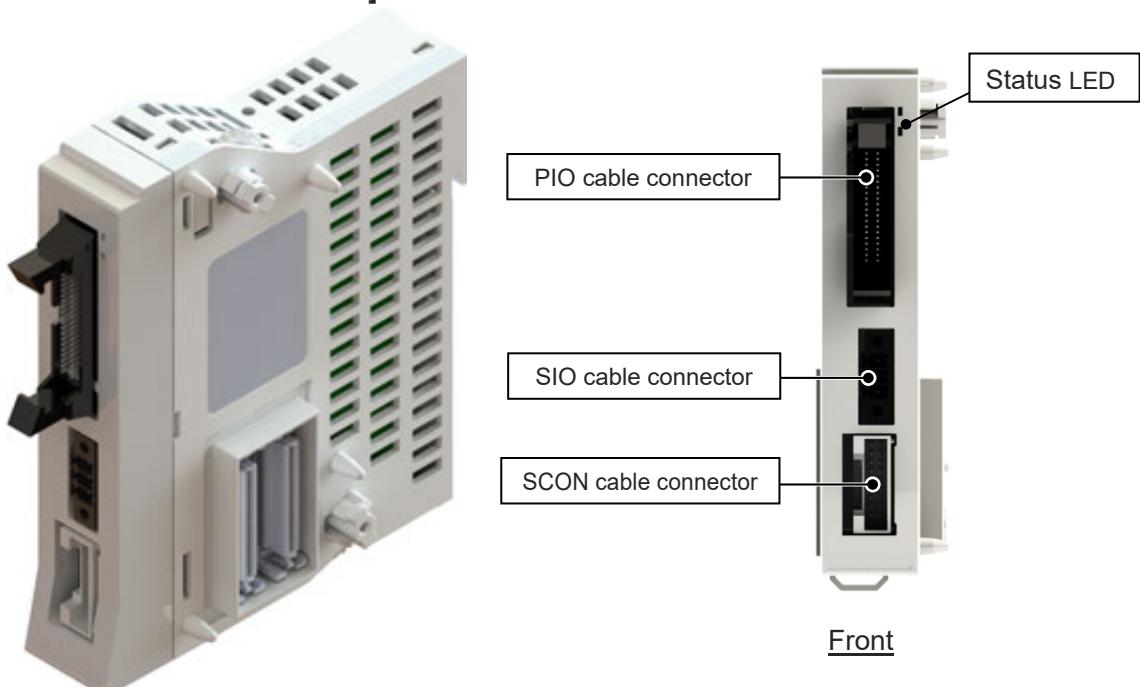
Part name	Shape	Quantity	Remarks
PIO unit		1	RCON-PN-* (PNP specifications) RCON-NP-* (NPN specifications)
PIO cable		1	CB-PAC-PIO***
First Step Guide		1	ME0393
Safety Guide		1	M0194

3.5.4 Part Names/Functions

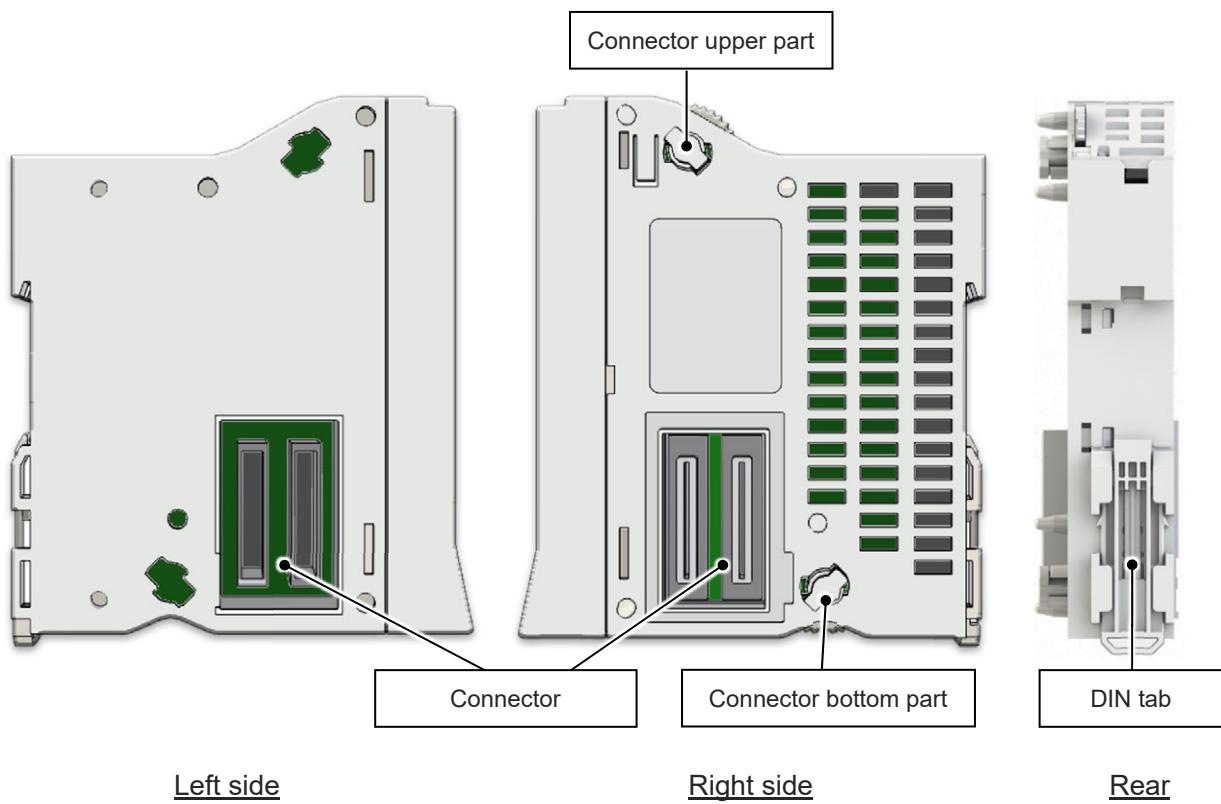
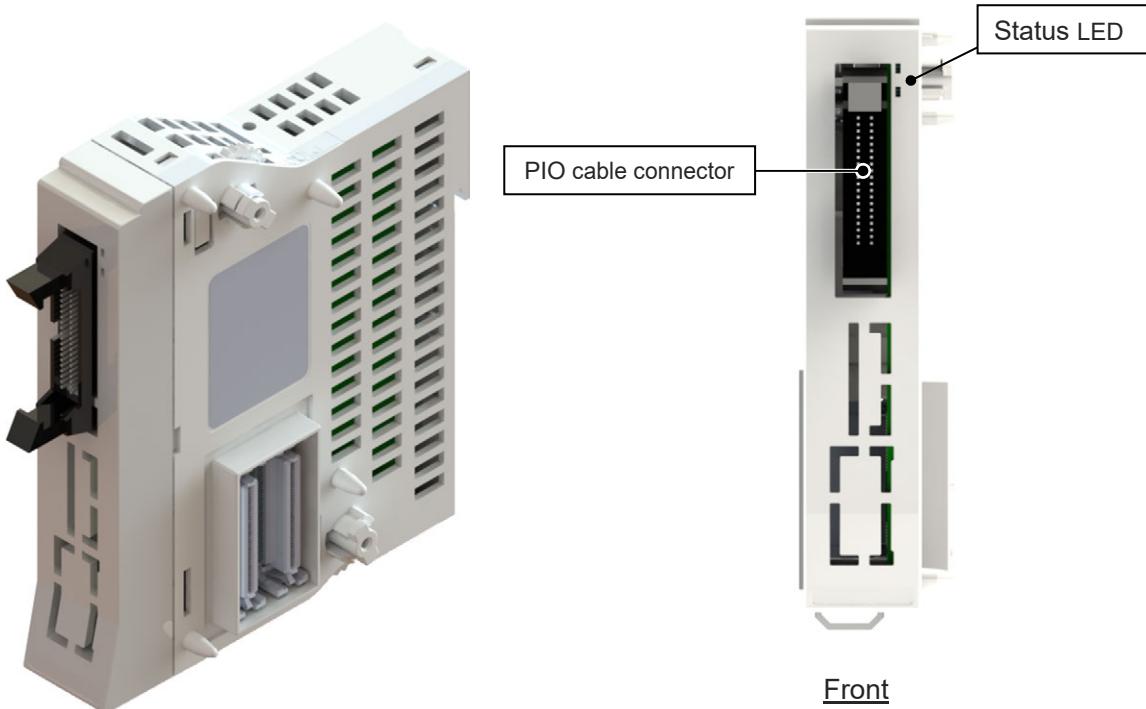
[SCON extension unit]



[PIO/SIO/SCON extension unit]

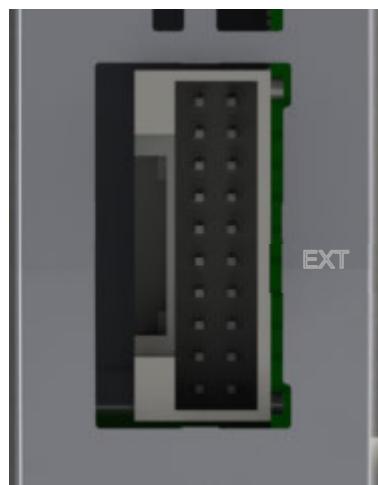


[PIO unit]



(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

(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 3.5.5 PIO Specifications for pin assignment

(3) SIO cable connector



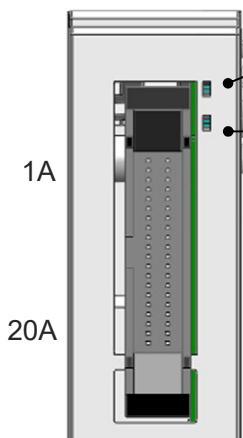
Item	Model	Manufacturer
PCB side connector	MC1.5/3-GF-3.5P26THR	PHOENIX CONTACT
Mating Connector	FMC1.5/3-STF-3.5	PHOENIX CONTACT
Pin No.	Signal name	Description
1	ISO_GND	Grounding for extension communication
2	ISO_SD-	Extended communication line -
3	ISO_SD+	Extended communication line +

3.5.5 PIO Specifications

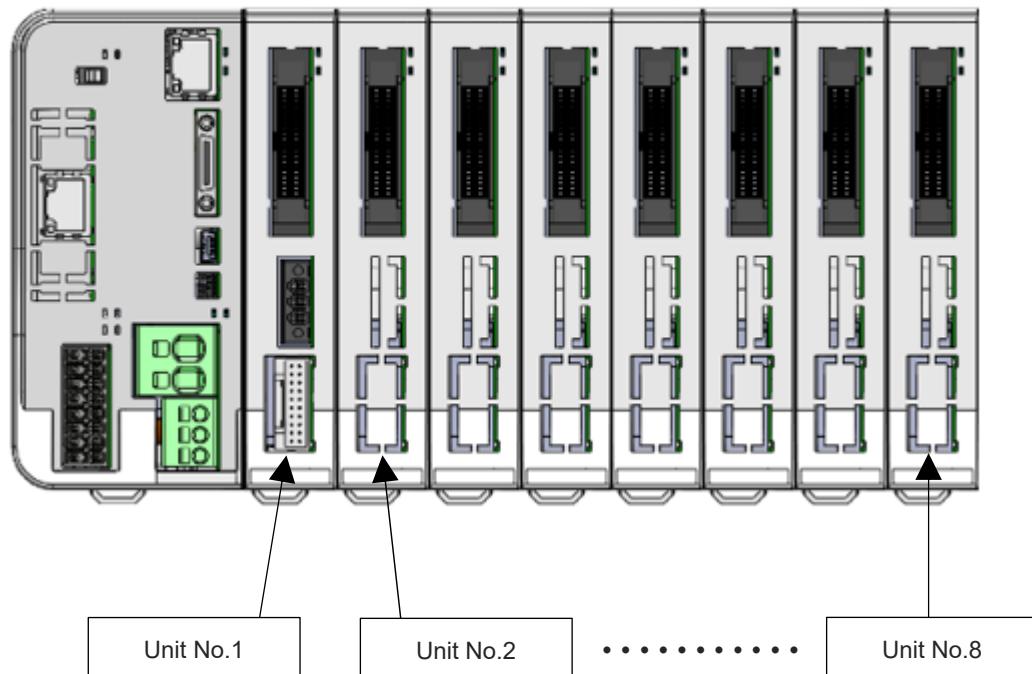
The pin numbers are as shown in the figure below.

Refer to the lists in the following pages for the relation between pin numbers and port numbers.

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



3.5 SCON extension unit, PIO/SIO/SCON extension unit, PIO unit

The port numbers should be as shown in the list below when the input start port number is set 000 and the output start port number is set 300 in the automatic assignment or fixed assignment when the I/O slot module is not mounted and eight units are linked together.

Unit No.	Pin No.	Category	Signal name	Port No.	Pin No.	Category	Signal name	Port
1	1A	24	P24	–	1B	Output	OUT0	300
	2A	24	P24	–	2B		OUT1	301
	3A	–	–	–	3B		OUT2	302
	4A	–	–	–	4B		OUT3	303
	5A	Input	IN0	000	5B		OUT4	304
	6A		IN1	001	6B		OUT5	305
	7A		IN2	002	7B		OUT6	306
	8A		IN3	003	8B		OUT7	307
	9A		IN4	004	9B		OUT8	308
	10A		IN5	005	10B		OUT9	309
	11A		IN6	006	11B		OUT10	310
	12A		IN7	007	12B		OUT11	311
	13A		IN8	008	13B		OUT12	312
	14A		IN9	009	14B		OUT13	313
	15A		IN10	010	15B		OUT14	314
	16A		IN11	011	16B		OUT15	315
	17A		IN12	012	17B		–	–
	18A		IN13	013	18B		–	–
	19A		IN14	014	19B		0	N
	20A		IN15	015	20B		0	N
2	1A	24	P24	–	1B	Output	OUT0	316
	2A	24	P24	–	2B		OUT1	317
	3A	–	–	–	3B		OUT2	318
	4A	–	–	–	4B		OUT3	319
	5A	Input	IN0	016	5B		OUT4	320
	6A		IN1	017	6B		OUT5	321
	7A		IN2	018	7B		OUT6	322
	8A		IN3	019	8B		OUT7	323
	9A		IN4	020	9B		OUT8	324
	10A		IN5	021	10B		OUT9	325
	11A		IN6	022	11B		OUT10	326
	12A		IN7	023	12B		OUT11	327
	13A		IN8	024	13B		OUT12	328
	14A		IN9	025	14B		OUT13	329
	15A		IN10	026	15B		OUT14	330
	16A		IN11	027	16B		OUT15	331
	17A		IN12	028	17B		–	–
	18A		IN13	029	18B		–	–
	19A		IN14	030	19B		0	N
	20A		IN15	031	20B		0	N

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

Unit No.	Pin No.	Category	Signal name	Port No.	Pin No.	Category	Signal name	Port
3	1A	24	P24	–	1B	Output	OUT0	332
	2A	24	P24	–	2B		OUT1	333
	3A	–	–	–	3B		OUT2	334
	4A	–	–	–	4B		OUT3	335
	5A	Input	IN0	032	5B		OUT4	336
	6A		IN1	033	6B		OUT5	337
	7A		IN2	034	7B		OUT6	338
	8A		IN3	035	8B		OUT7	339
	9A		IN4	036	9B		OUT8	340
	10A		IN5	037	10B		OUT9	341
	11A		IN6	038	11B		OUT10	342
	12A		IN7	039	12B		OUT11	343
	13A		IN8	040	13B		OUT12	344
	14A		IN9	041	14B		OUT13	345
	15A		IN10	042	15B		OUT14	346
	16A		IN11	043	16B		OUT15	347
	17A		IN12	044	17B		–	–
	18A		IN13	045	18B		–	–
	19A		IN14	046	19B		0	N
	20A		IN15	047	20B		0	N
4	1A	24	P24	–	1B	Output	OUT0	348
	2A	24	P24	–	2B		OUT1	349
	3A	–	–	–	3B		OUT2	350
	4A	–	–	–	4B		OUT3	351
	5A	Input	IN0	048	5B		OUT4	352
	6A		IN1	049	6B		OUT5	353
	7A		IN2	050	7B		OUT6	354
	8A		IN3	051	8B		OUT7	355
	9A		IN4	052	9B		OUT8	356
	10A		IN5	053	10B		OUT9	357
	11A		IN6	054	11B		OUT10	358
	12A		IN7	055	12B		OUT11	359
	13A		IN8	056	13B		OUT12	360
	14A		IN9	057	14B		OUT13	361
	15A		IN10	058	15B		OUT14	362
	16A		IN11	059	16B		OUT15	363
	17A		IN12	060	17B		–	–
	18A		IN13	061	18B		–	–
	19A		IN14	062	19B		0	N
	20A		IN15	063	20B		0	N

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

3.5 SCON extension unit, PIO/SIO/SCON extension unit, PIO unit

Unit No.	Pin No.	Category	Signal name	Port No.	Pin No.	Category	Signal name	Port
5	1A	24	P24	–	1B	Output	OUT0	364
	2A	24	P24	–	2B		OUT1	365
	3A	–	–	–	3B		OUT2	366
	4A	–	–	–	4B		OUT3	367
	5A	Input	IN0	064	5B		OUT4	368
	6A		IN1	065	6B		OUT5	369
	7A		IN2	066	7B		OUT6	370
	8A		IN3	067	8B		OUT7	371
	9A		IN4	068	9B		OUT8	372
	10A		IN5	069	10B		OUT9	373
	11A		IN6	070	11B		OUT10	374
	12A		IN7	071	12B		OUT11	375
	13A		IN8	072	13B		OUT12	376
	14A		IN9	073	14B		OUT13	377
	15A		IN10	074	15B		OUT14	378
	16A		IN11	075	16B		OUT15	379
	17A		IN12	076	17B		–	–
	18A		IN13	077	18B		–	–
	19A		IN14	078	19B		0	N
	20A		IN15	079	20B		0	N
6	1A	24	P24	–	1B	Output	OUT0	380
	2A	24	P24	–	2B		OUT1	381
	3A	–	–	–	3B		OUT2	382
	4A	–	–	–	4B		OUT3	383
	5A	Input	IN0	080	5B		OUT4	384
	6A		IN1	081	6B		OUT5	385
	7A		IN2	082	7B		OUT6	386
	8A		IN3	083	8B		OUT7	387
	9A		IN4	084	9B		OUT8	388
	10A		IN5	085	10B		OUT9	389
	11A		IN6	086	11B		OUT10	390
	12A		IN7	087	12B		OUT11	391
	13A		IN8	088	13B		OUT12	392
	14A		IN9	089	14B		OUT13	393
	15A		IN10	090	15B		OUT14	394
	16A		IN11	091	16B		OUT15	395
	17A		IN12	092	17B		–	–
	18A		IN13	093	18B		–	–
	19A		IN14	094	19B		0	N
	20A		IN15	095	20B		0	N

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

Unit No.	Pin No.	Category	Signal name	Port No.	Pin No.	Category	Signal name	Port
7	1A	24	P24	–	1B	Output	OUT0	396
	2A	24	P24	–	2B		OUT1	397
	3A	–	–	–	3B		OUT2	398
	4A	–	–	–	4B		OUT3	399
	5A	Input	IN0	096	5B		OUT4	400
	6A		IN1	097	6B		OUT5	401
	7A		IN2	098	7B		OUT6	402
	8A		IN3	099	8B		OUT7	403
	9A		IN4	100	9B		OUT8	404
	10A		IN5	101	10B		OUT9	405
	11A		IN6	102	11B		OUT10	406
	12A		IN7	103	12B		OUT11	407
	13A		IN8	104	13B		OUT12	408
	14A		IN9	105	14B		OUT13	409
	15A		IN10	106	15B		OUT14	410
	16A		IN11	107	16B		OUT15	411
	17A		IN12	108	17B		–	–
	18A		IN13	109	18B		–	–
	19A		IN14	110	19B		0	N
	20A		IN15	111	20B		0	N
8	1A	24	P24	–	1B	Output	OUT0	412
	2A	24	P24	–	2B		OUT1	413
	3A	–	–	–	3B		OUT2	414
	4A	–	–	–	4B		OUT3	415
	5A	Input	IN0	112	5B		OUT4	416
	6A		IN1	113	6B		OUT5	417
	7A		IN2	114	7B		OUT6	418
	8A		IN3	115	8B		OUT7	419
	9A		IN4	116	9B		OUT8	420
	10A		IN5	117	10B		OUT9	421
	11A		IN6	118	11B		OUT10	422
	12A		IN7	119	12B		OUT11	423
	13A		IN8	120	13B		OUT12	424
	14A		IN9	121	14B		OUT13	425
	15A		IN10	122	15B		OUT14	426
	16A		IN11	123	16B		OUT15	427
	17A		IN12	124	17B		–	–
	18A		IN13	125	18B		–	–
	19A		IN14	126	19B		0	N
	20A		IN15	127	20B		0	N

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

3.5.6 SIO Specifications

It is a serial communication feature in a SEL program using Free-to-User Channel No. 1. It is available to have a general serial communication using the SEL commands below.

Category	Conditions	Command	Operation 1	Operation 2	Output	Function
Timer	Freely	TIMC	Program No.	Prohibited	CP	Standby canceled
Communication	Freely	OPEN	Channel No.	Prohibited	CP	Channel open
	Freely	CLOS	Channel No.	Prohibited	CC	Channel closed
	Freely	READ	Channel No.	Column number	CC	Input to channel
	Freely	TMRW	Lead time	(Light Timer Duration)	CC	Setting READ/WRIT timeout value
	Freely	WRIT	Channel No.	Column number	CP	Output to channel
	Freely	SCHA	Character code	Prohibited	CP	Character set for end of sending and receiving

3.5.7 External dimensions

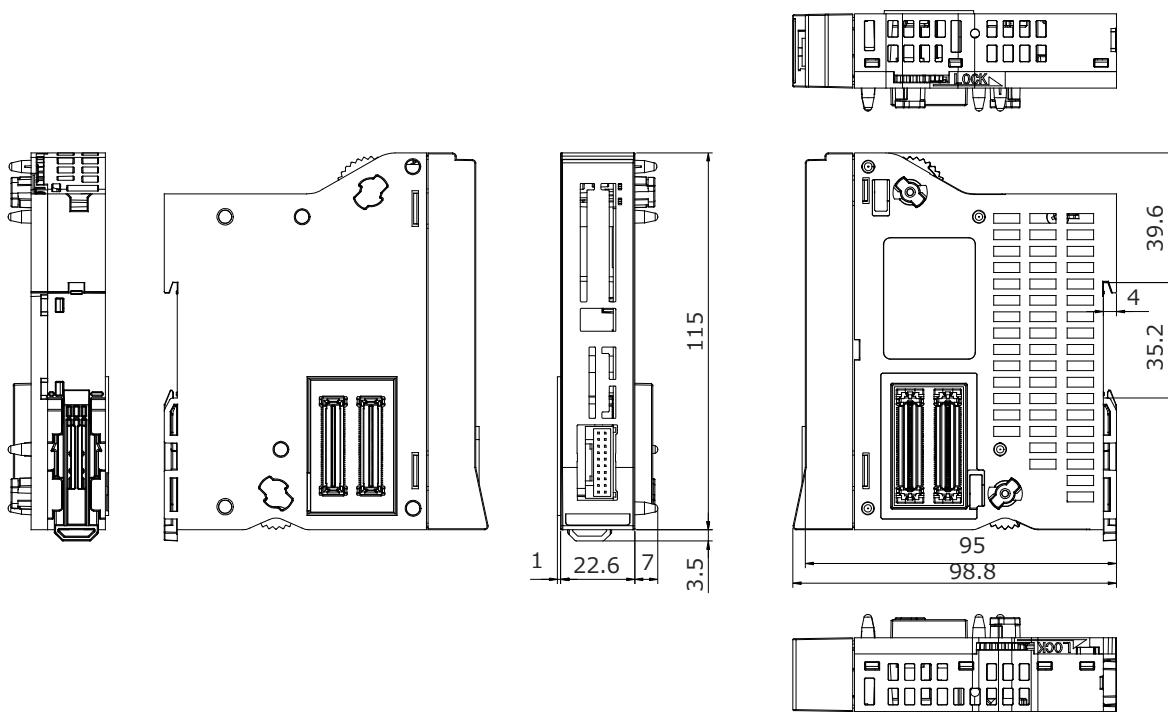
[SCON extension unit] RCON-EXT

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

[PIO unit] RCON-NP/PN-*

Item	Specifications
External dimensions	W22.6mm × H115mm × D95mm
Mass	Approx. 96g (SCON extension unit) Approx. 110g (PIO/SIO/SCON extension unit) Approx. 105g (PIO unit)
External view	See figure below

* The appearance dimensions for SCON extension units, PIO/SIO/SCON extension units and PIO units should be the same.

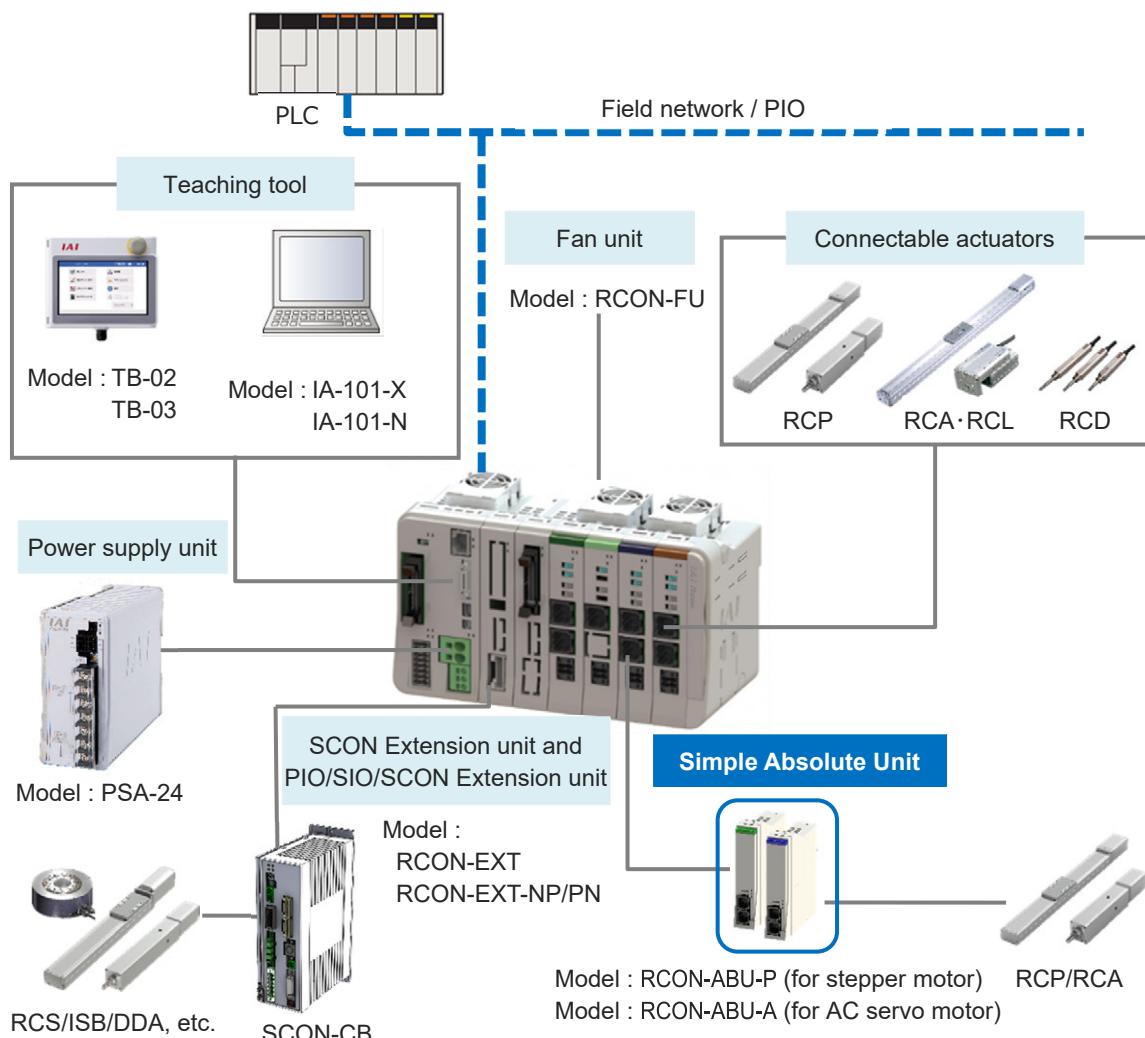


3.6 Simple absolute unit

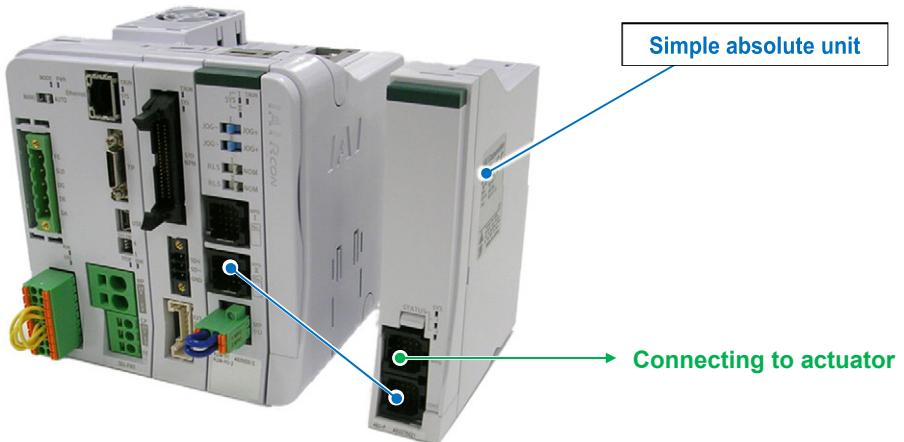
3.6.1 Overview

Incremental specification actuators can be used as absolute specification models by adding a simple absolute unit to the 24V driver unit.

After absolute reset, home return motion is not required even if turning the control power supply OFF and then ON again.



However, simple absolute units do not have a unit-connectable structure. Connect to the 24V driver unit with a cable after securing to a DIN rail.



3.6.2 Model Code

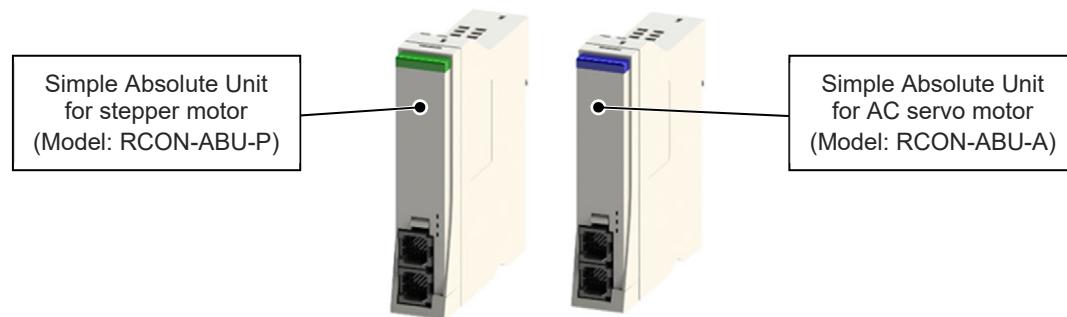
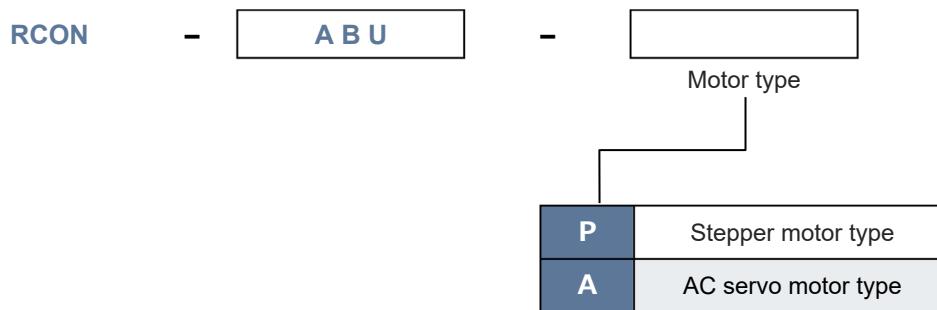
(1) How to Read the Model Number

The simple absolute unit models are as follows.

1 simple absolute unit is required for each actuator axis.

Also, the applicable driver units should be the 24 pulse motor type (RCON-PC) and the 24V AC servo-motor type (RCON-AC) only.

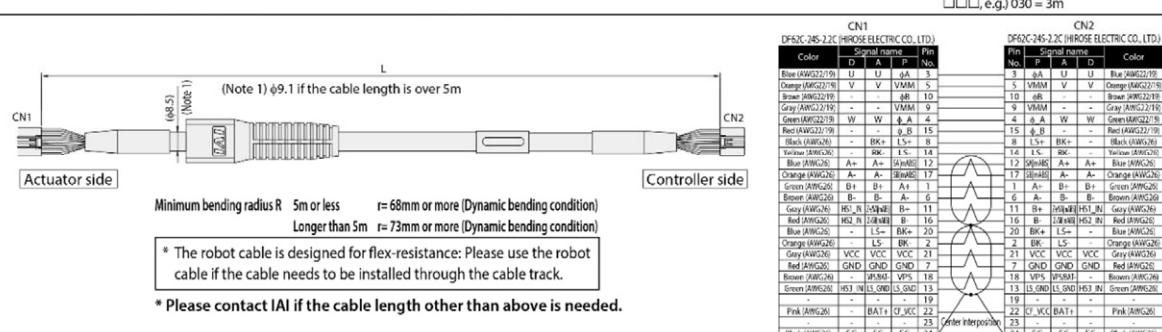
Simple absolute unit model



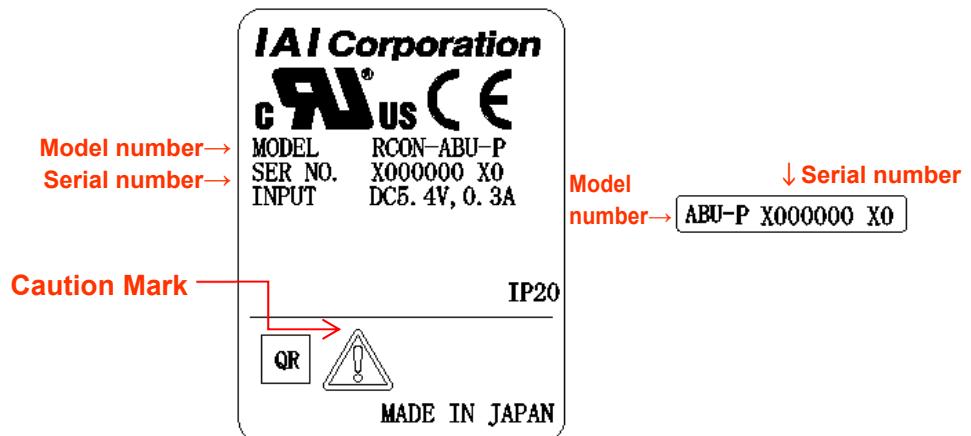
A cable (model: CB-ADPC-MPA005, length 50 cm) is included for connection to the driver unit. Cables of lengths other than 50 cm must be prepared separately as needed. The cable length should be selected based on the driver unit and simple absolute unit installation positions.

Model Number CB-ADPC-MPA□□□/CB-ADPC-MPA□□□-RB

* Please indicate the cable length (L) in
□□□, e.g.) 030 = 3m

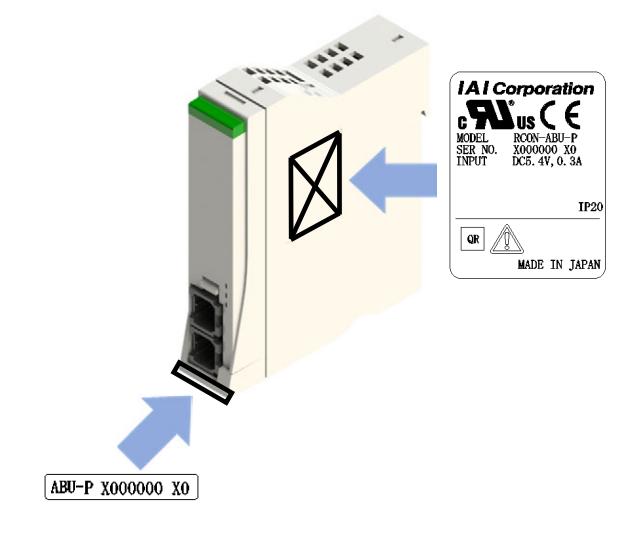


(2) How to read the model nameplate



Mark	Explanation of Mark
!	Use IAI specified cables only.

[Nameplate Location]



3.6.3 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
Simple Absolute Unit		1	
Absolute battery		1	Model Name : AB-7
Motor/encoder cable		1	Model Name: CB-ADPC-MPA005 * Supplied with Simple Absolute Unit
First Step Guide		1	
Safety Guide		1	

3.6.4 General Specifications

[Absolute Battery Specifications]

Item	Specifications
Type	Cylindrical sealed nickel-metal hydride battery
Manufacturer	FDK Corporation
Model	AB-7
Nominal voltage	3.6V
Rated capacity	3,100mAh
Nominal capacity	3,700mAh
Average life	Approx. 3 years (varies widely with operating conditions)
Weight	190 g
Charging time	Approx. 72 hours

[Absolute Battery Charging]

Charge for at least 72 hours continuously if using for the first time, after replacing the battery, and when power has been turned off for extended periods. The battery is charged while 24V DC is supplied to SEL.

If SEL power is turned OFF beyond the data retention time, the data will be lost, so charge regularly.

The battery has a limited lifetime that gradually decreases data retention time. Replace the battery when the retention time decreases significantly even if properly charged.

Data retention time (approximate time when battery is new)

Parameter No.155 settings	Upper limit of encoder rotation speed when power is OFF [r/min]		Battery retaining time guideline [days]	Retaining time per 1 hour of charge time (guideline) [h]
	If connected actuator is not RCA2-***NA	If connected actuator is RCA2-***NA		
0	100	75	20	6.6
1	200	150	15	5.0
2	400	300	10	3.3
3	800	600	5	1.6

3.6 Simple absolute unit

(Example) When used under the following conditions: "Monday ~ Friday: 8 hours charging / 16 hours discharging per day, Saturdays and Sundays: discharging"

Connected axis: When not RCA2-***NA

(1) If Driver unit parameter No. 155 is set to 3...

Total charge: 8 [h] operation per day x 1.6 [h] retention time per 1 hour charge x 5 [days] weekdays = 64 [h]

Total discharge: Nightly down time 16 [h] x weekdays 5 [days] + weekend down time 48 [h] = 128 [h]

→ If starting on Monday from a fully charged state, the total discharge amount exceeds the total charge amount by 64 [h] in one week, so the full charge amount decreases by 64 [h] each week. Accordingly, a full charge is required every 10 days.

(2) If Driver unit parameter No. 155 is set to 2...

Total charge: 8 [h] operation per day x 3.3 [h] retention time per 1 hour charge x 5 [days] weekdays = 132 [h]

Total discharge: Nightly down time 16 [h] x weekdays 5 [days] + weekend down time 48 [h] = 128 [h]

→ If starting on Monday, the total charge amount exceeds the total discharge amount, so there is no need to maintain continuous full charge. Charge increases by 4 [h] each week.

[Absolute Battery Voltage Drop Detection]

If the absolute battery voltage drops, error detection is performed in accordance with the voltage.

Voltage	Alarm code
2.5V ±8% or less	402 "Absolute encoder error detection 2" or 403 "Absolute encoder error detection 3"

If an alarm occurs, absolute reset must be performed after replacing the battery.

RSEL checks the battery voltage at power ON. Detection does not occur even if the battery voltage drops to the alarm level while RSEL is energized.

[How to Replace Absolute Battery]

In here, explains how to replace an absolute battery.

When you replace a battery, keep the power to the controller on during replacement work.

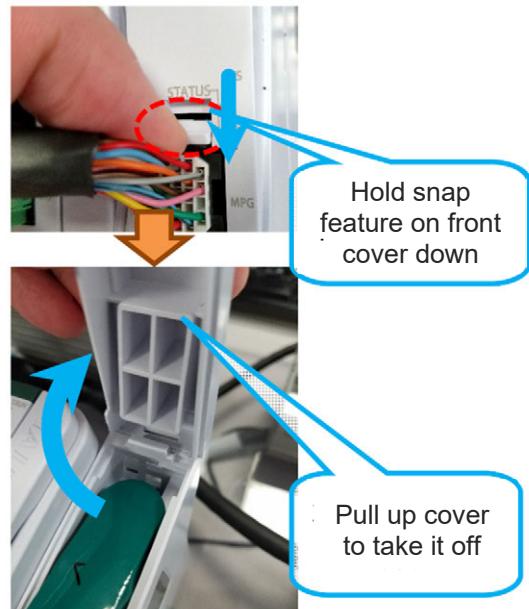
If you have the power off during replacement, the encoder position data would not be retained.

Also, the work can be performed with the cables left joined to the connectors on the simple absolute unit.

1

Press and hold down the snap feature on the front cover of the simple absolute unit, and pull the cover up towards you to take it off.

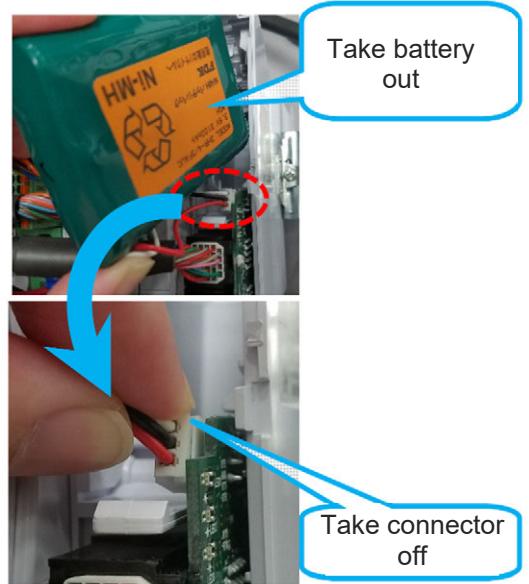
①



2

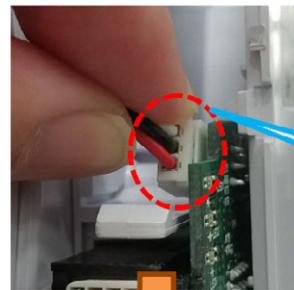
Take the battery out of the simple absolute unit, and take off the connector on the battery.

②



3

Join the connector on a new battery to the PC board and put the battery in the simple absolute unit.

③

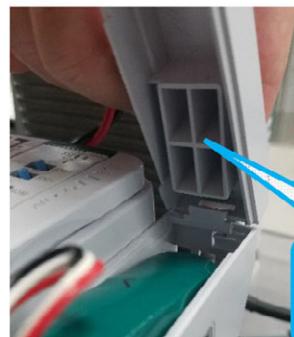
Join connectors



Put battery inside

4

Put the cover on.

④

Hang snap feature on cover

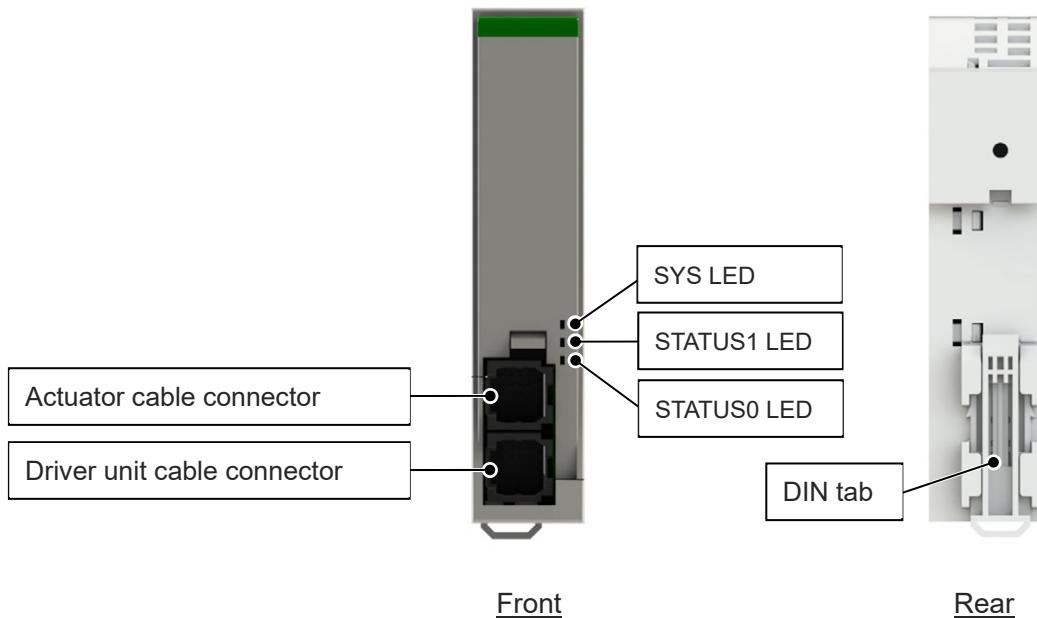
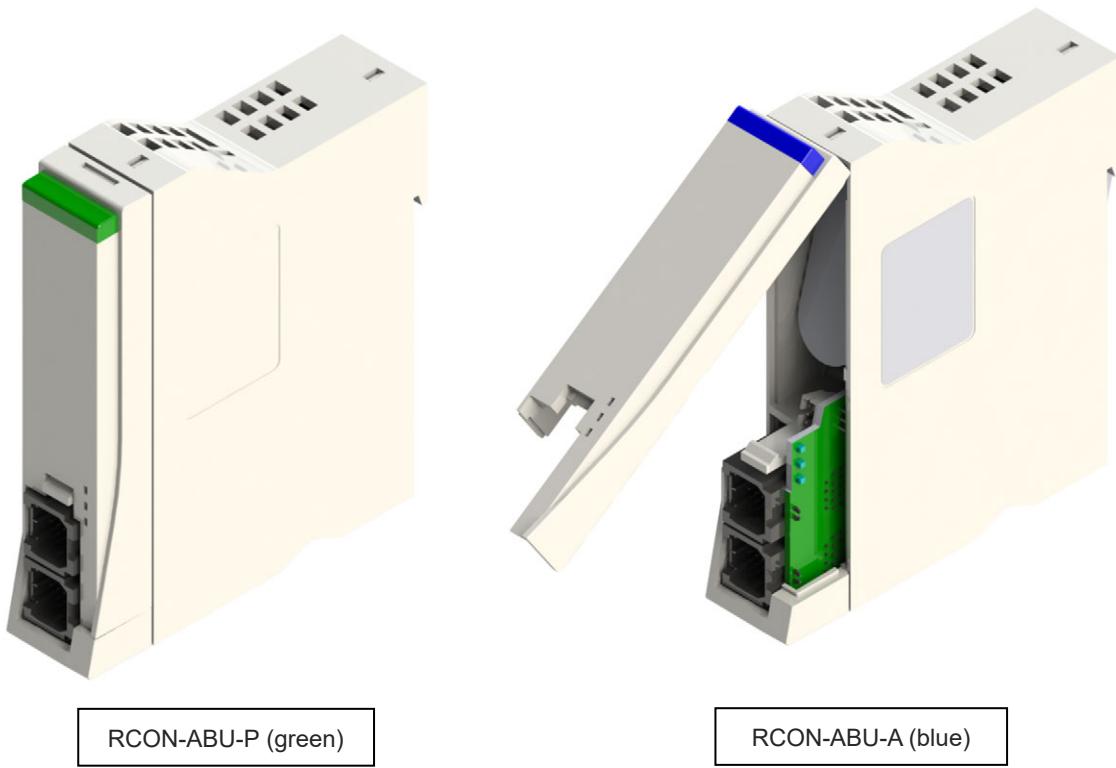


Lay cover down towards front to snap it in

This is the end of the absolute battery replacement work.

3.6.5 Part names/Functions

(1) Part names



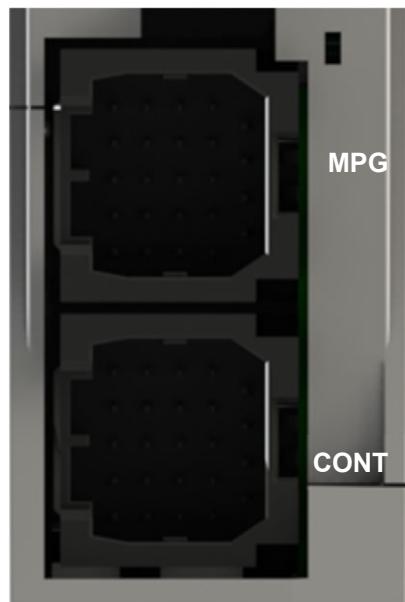
3.6 Simple absolute unit

(2) LED display

Panel notation	Display color	Status	Description
SYS	Green	Light ON	Normal operation
	Red	Light ON	Alarm triggered
STATUS1	Green	Light ON	Home return complete
	Red	Light ON	Home return not complete
STATUS0	Green	Light ON	Battery fully charged
	Red	Light ON	Battery not connected
	Orange (Green/Red)	Light ON	Battery charging

(3) Actuator cable connector/driver unit cable connector

Connect the simple absolute unit to an actuator using an actuator cable connector (MPG), and to a driver unit with the driver unit cable connector (CONT). There are two types, one for stepper motors and one for AC servo motors, as the pin arrangement of the MPG connector differs. A color panel can be used for identification, as with the driver unit.

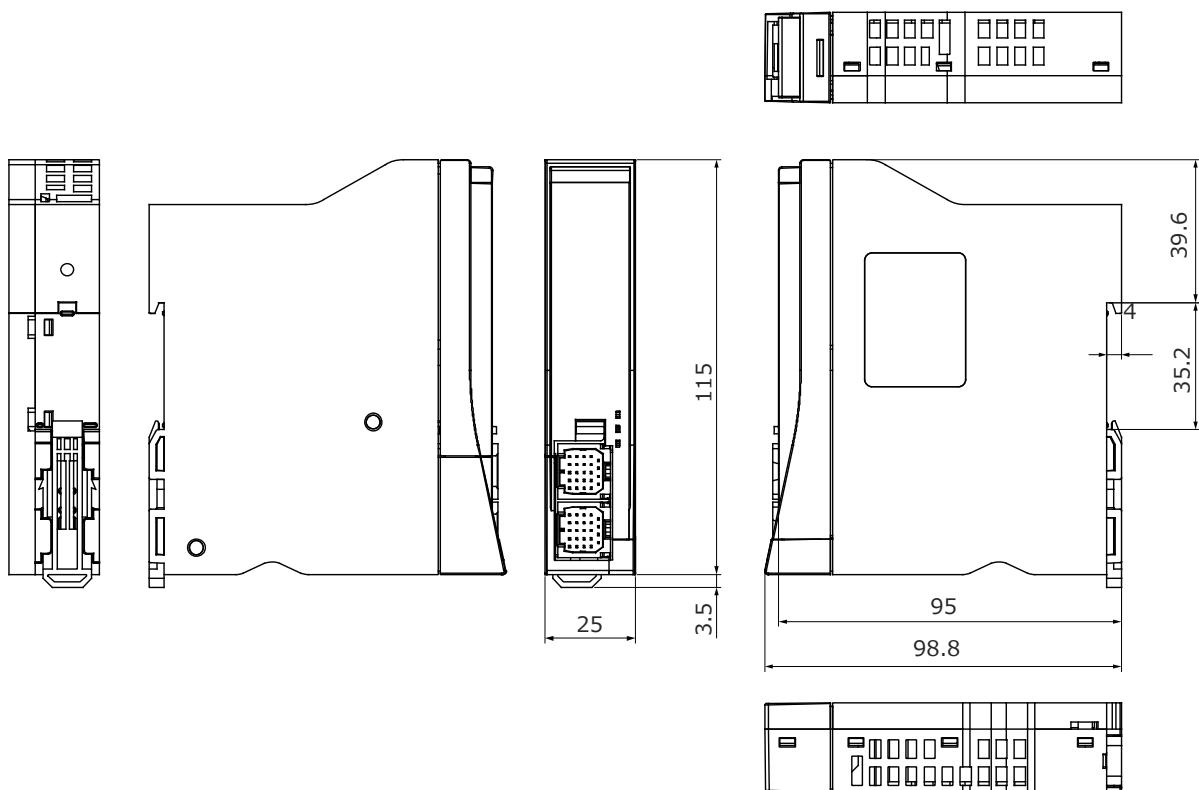


3.6.6 External dimensions

[Simple absolute unit] RCON-ABU-A/P

Item	Specifications
External dimensions	W25mm × H115mm × D95mm
Mass	Approx. 270g (of which 183 g is the battery)
External view	See figure below

- * The appearance dimensions for the pulse motor type and the AC servomotor type should be the same.



3.6.7 Precautions

[Precautions when Changing Parameters]

If the following parameters are changed, an absolute error will occur. After changing the parameters, absolute reset must be performed once again.

- (1) Parameter No.5 "Homing direction"
- (2) Parameter No. 22 "Homing offset"
- (3) Parameter No. 77 "Ball screw lead length"
- (4) Parameter No. 78 "Axis motion type"

[Absolute Battery Handling]

Always observe the following safety precautions.

- (1) Do not disassemble under any circumstances. The electrolyte is a strong alkali solution.
It is harmful to skin and clothing.
- (2) Never short the electrodes out (never directly connect + and - electrodes). Devices may be damaged, or the generated heat may cause burns.
- (3) Never place into fire, as it may burst.
Also do not submerge underwater, as the battery will cease to function.
- (4) Do not solder directly.
The safety mechanism may explode due to damage to the safety valve in the battery cap.
- (5) If the power remains shut OFF for an extended period of time with the connector connected, deep discharge will take place, leakage may occur and the performance/life of the battery may be significantly lowered.
Unplug the connector when shutting OFF the power for extended periods of time due to equipment relocation, remodeling, etc.
- (6) When disposing, take measures such as the use of an appropriate collection box installed at a recycling center.

3.7 Unit connection restrictions

3.7.1 Motor power / control power capacity restrictions

[Refer to 2.2 Power supply capacity]

3.7.2 Unit arrangement restrictions

RSEL is the unit-linked type. Units available for linking to each other have the same connectors, and they can be laid out freely. However, the units described below are restricted in layout. The explanations are described assuming facing the RSEL system from the front.

1. SEL unit

Allocate the SEL unit on the left end.

2. SCON extension unit

SCON extension unit is to be connected on the right next to the SEL unit. It is not available to use it together with the PIO/SIO/SCON extension unit.

3. PIO/SIO/SCON extension unit

PIO.SIO/SCON extension unit is to be connected on the right next to the SEL unit. It is not available to use it together with the SCON extension unit.

4. PIO unit

PIO unit is to be connected on the right side of the unit at the very right end in the SEL unit, SCON extension unit and PIO/SIO/SCON extension unit.

It is available to connect up to eight units including the SCON extension units or PIO/SIO/SCON extension units.

5. 24V driver unit

Connect it on the right of the SEL Unit, SCON Extension Unit, PIO/SIO/SCON Extension Unit and PIO Unit.

There is no restriction in order of the pulse motor type, AC servomotor type and DC brush-less motor type.

6. 200V power supply unit

The 200V power supply unit is to be connected at the right side of the 24V driver unit at the very right end for only one unit.

7. RCON-SC unit

RCON-SC driver unit is to be connected on the right next to the 200V power supply unit.

3.7 Unit connection restrictions

8. Terminal unit

Allocate the terminal unit on the right end.

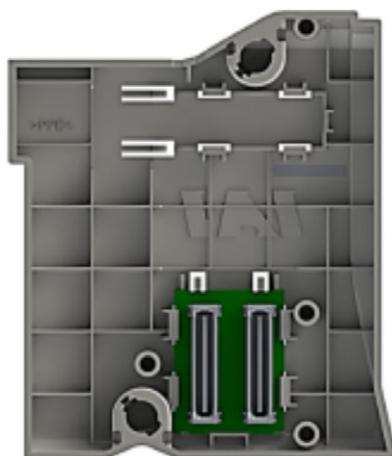
[Caution when Connecting Terminal Unit]

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.

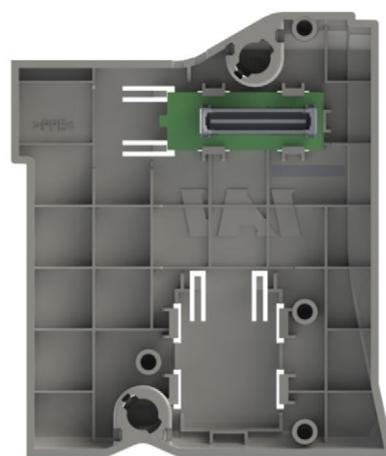
For the construction only with the 24V driver unit, use the 24V terminal unit (RCON-GW-TR) enclosed in the SEL unit.

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.

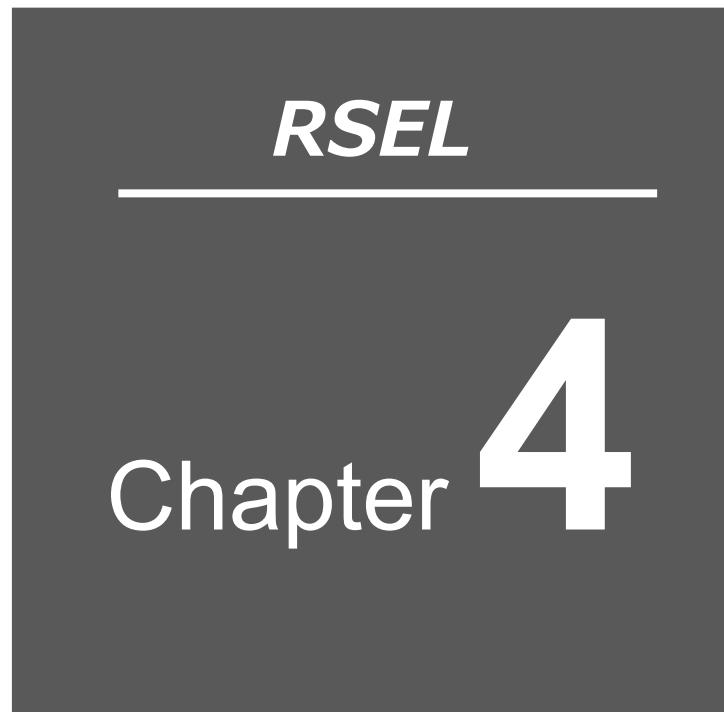
The terminal unit for 24V (RCON-GW-TR) has a structure that does not allow itself connected to the 200V driver unit, however, it could be forcefully inserted, which could cause fire on the connector as well as damage on it.



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



Terminal Unit for 200V
RCON-GW-TRS



Unit connection / Installation and Wiring

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4.8 Connection the USB connector	4-28
4.9 Connection the Ethernet connector	4-29

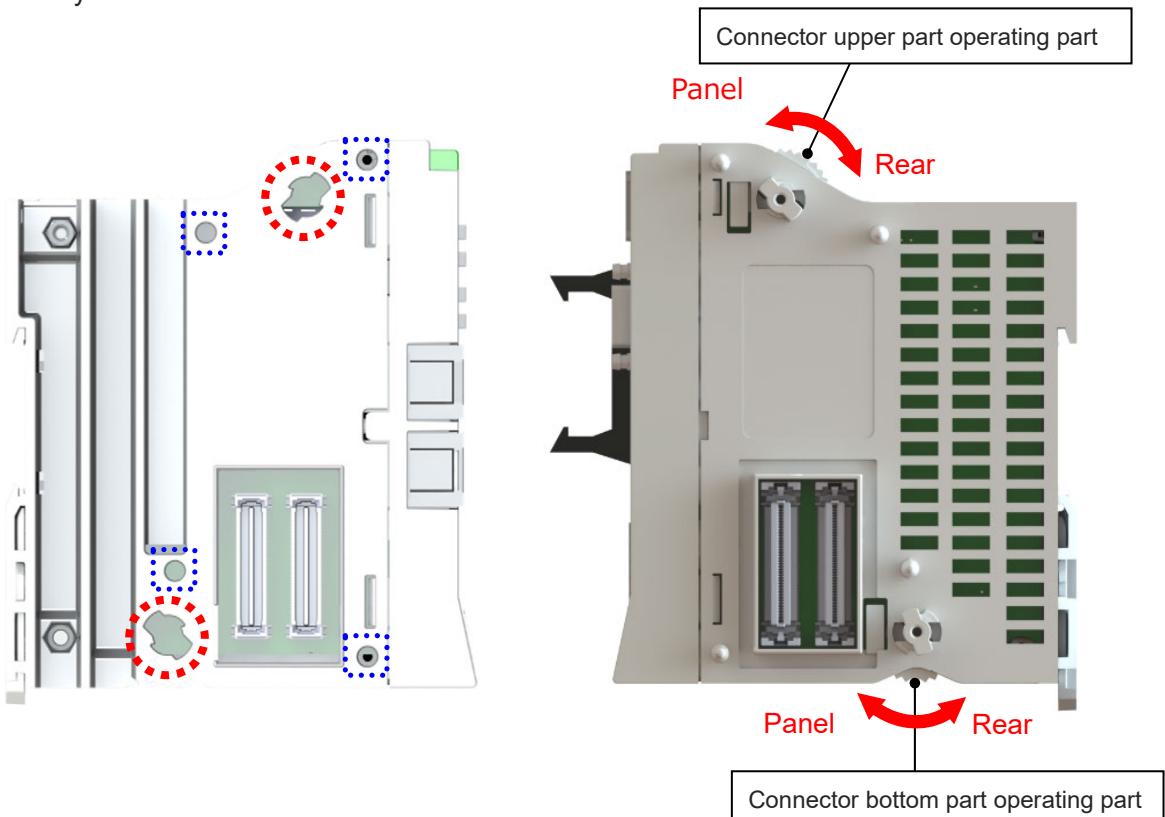
4.1 Unit connection / Installation

4.1.1 Unit connection

In here, describes how to link units in RSEL system. It is recommended that the unit link is established before connected to DIN rails.



- (1) Turn the operating parts of the connector upper/bottom part towards the panel and position on the panel end.
- (2) The 2 sections circled with a dashed line and the 4 positioning bosses within the square dotted lines are used as a total of 6 mating sections for positioning 2 units.
- (3) When positioning is completed, insert the cable connectors × 2 so that they are firmly connected.
- (4) Turn the operating parts of the connector upper/bottom part towards the rear, rotating firmly until you feel a click.



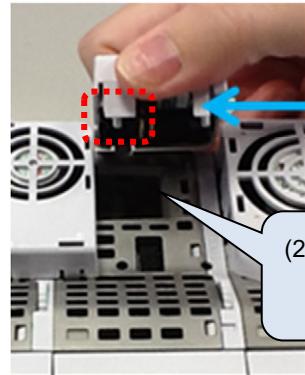
4.1.2 Fan installation

(1) Adjust the installation orientation of the RCON system and fan unit.

(2) Hook the claw of the fan unit to the power supply unit as shown in the figure on the right.

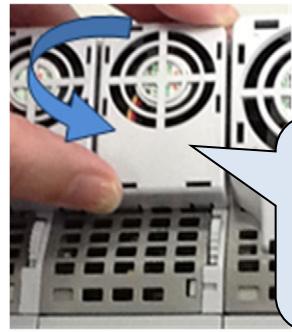
(3) Pull down the fan unit to the front of the RSEL system.

(4) Press the fan unit from the top and snap in.



New Fan unit

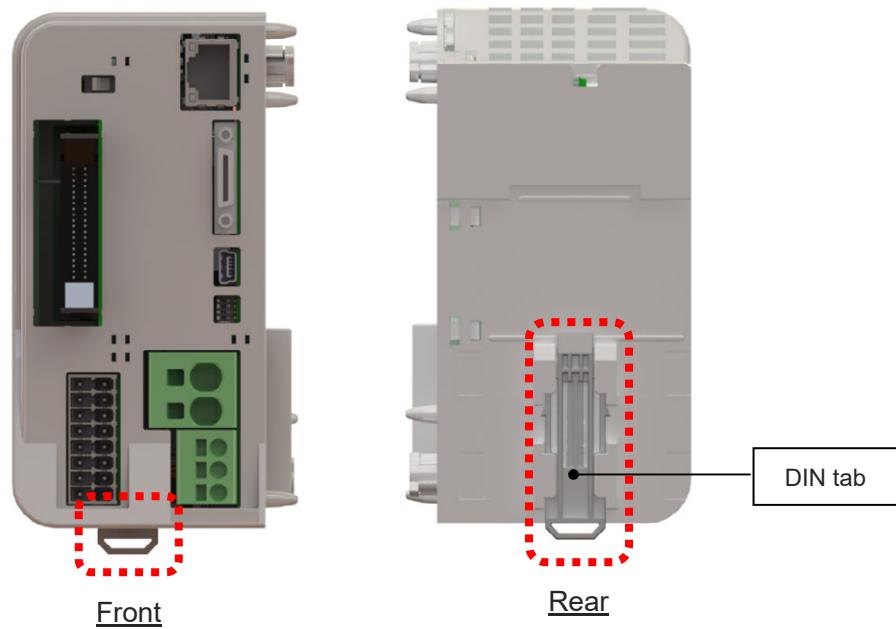
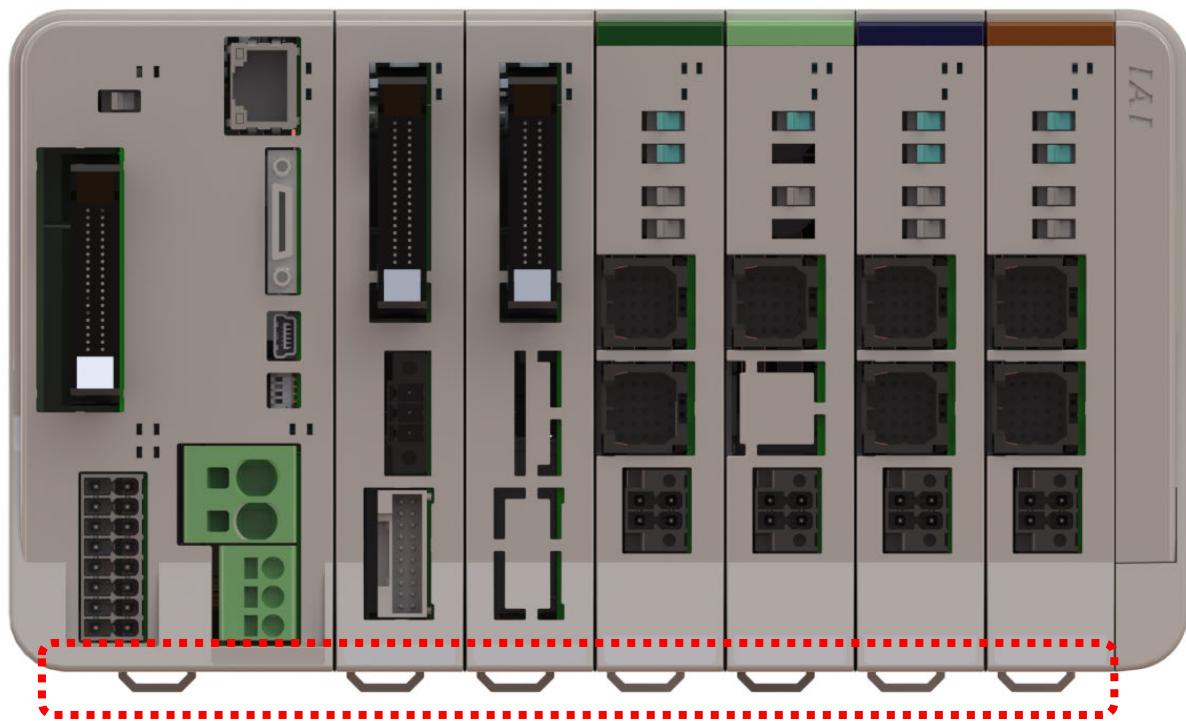
(2) Hook the claw of the fan unit to the power supply unit



(3) Tilt the fan unit towards front
(4) Push it from top to put it in

4.1.3 Unit mounting

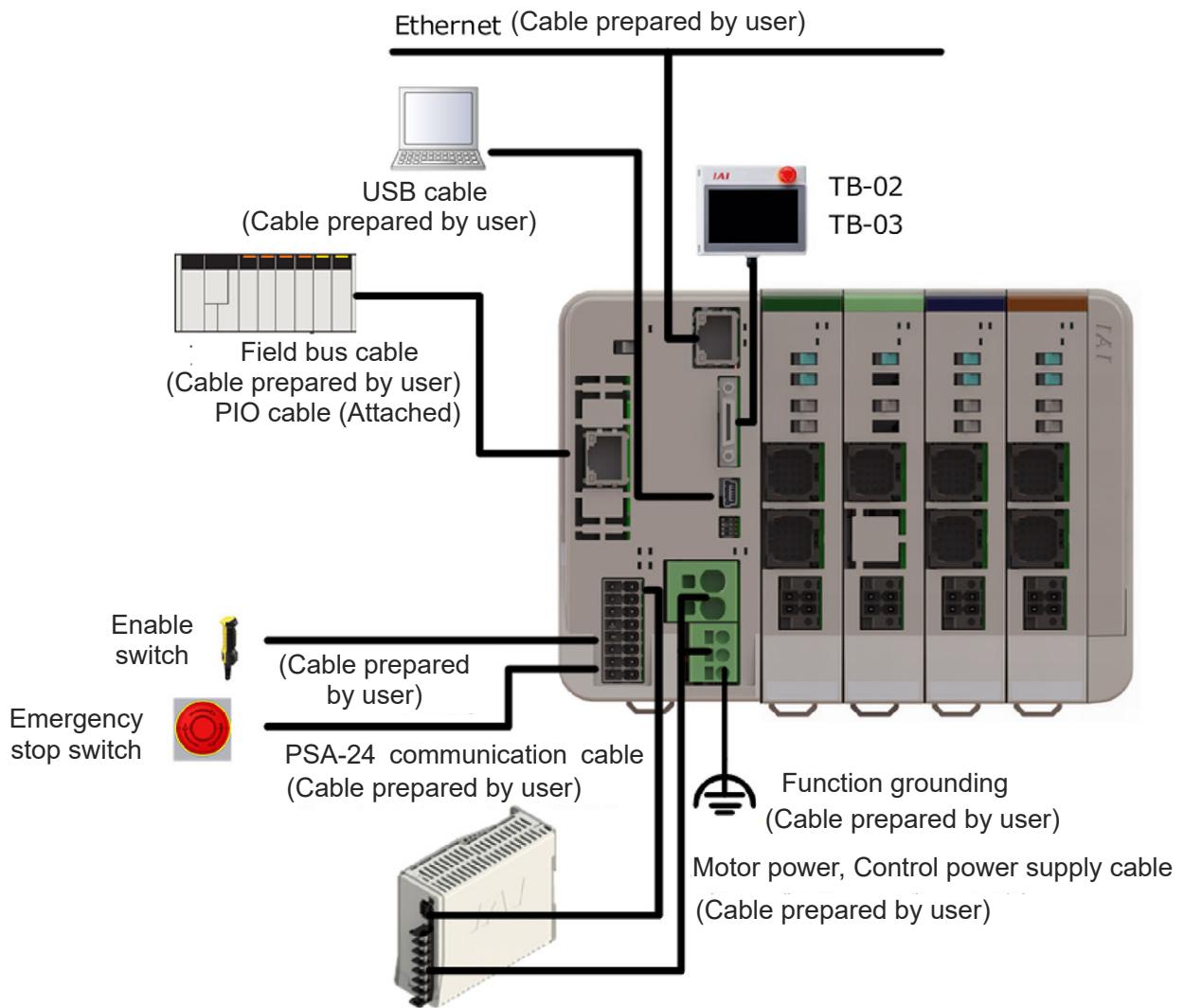
RSEL System is available only with DIN rail installation. Pull down the DIN tab visible from the lower part of the housing rear (red color part in a dashed line in the figure below), mount on the DIN rail, then push the DIN operating part upward to lock it.



4.2 Wiring diagram

4.2 Wiring diagram

4.2.1 Example connection of devices

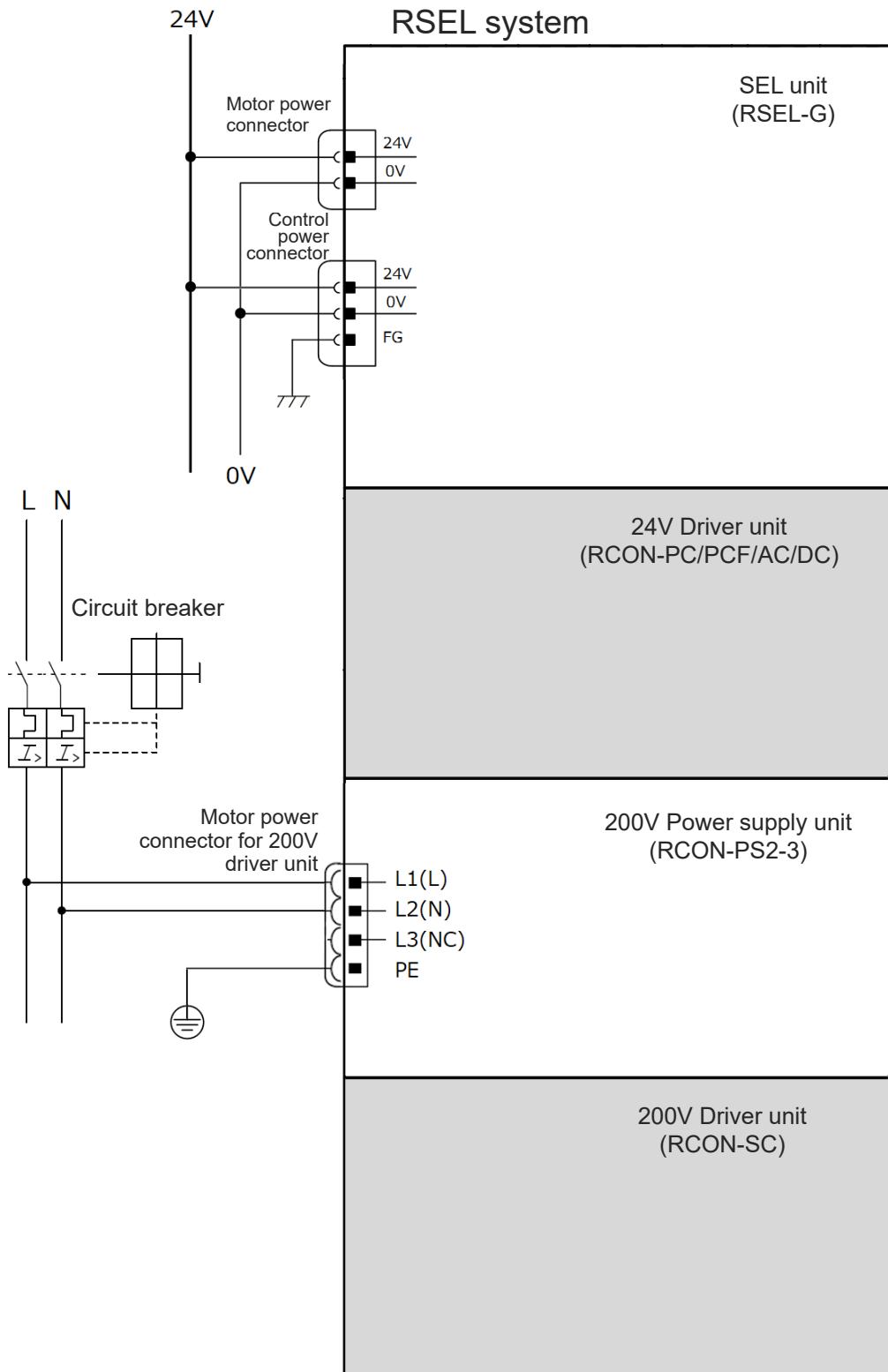


Reference for Example of Connections

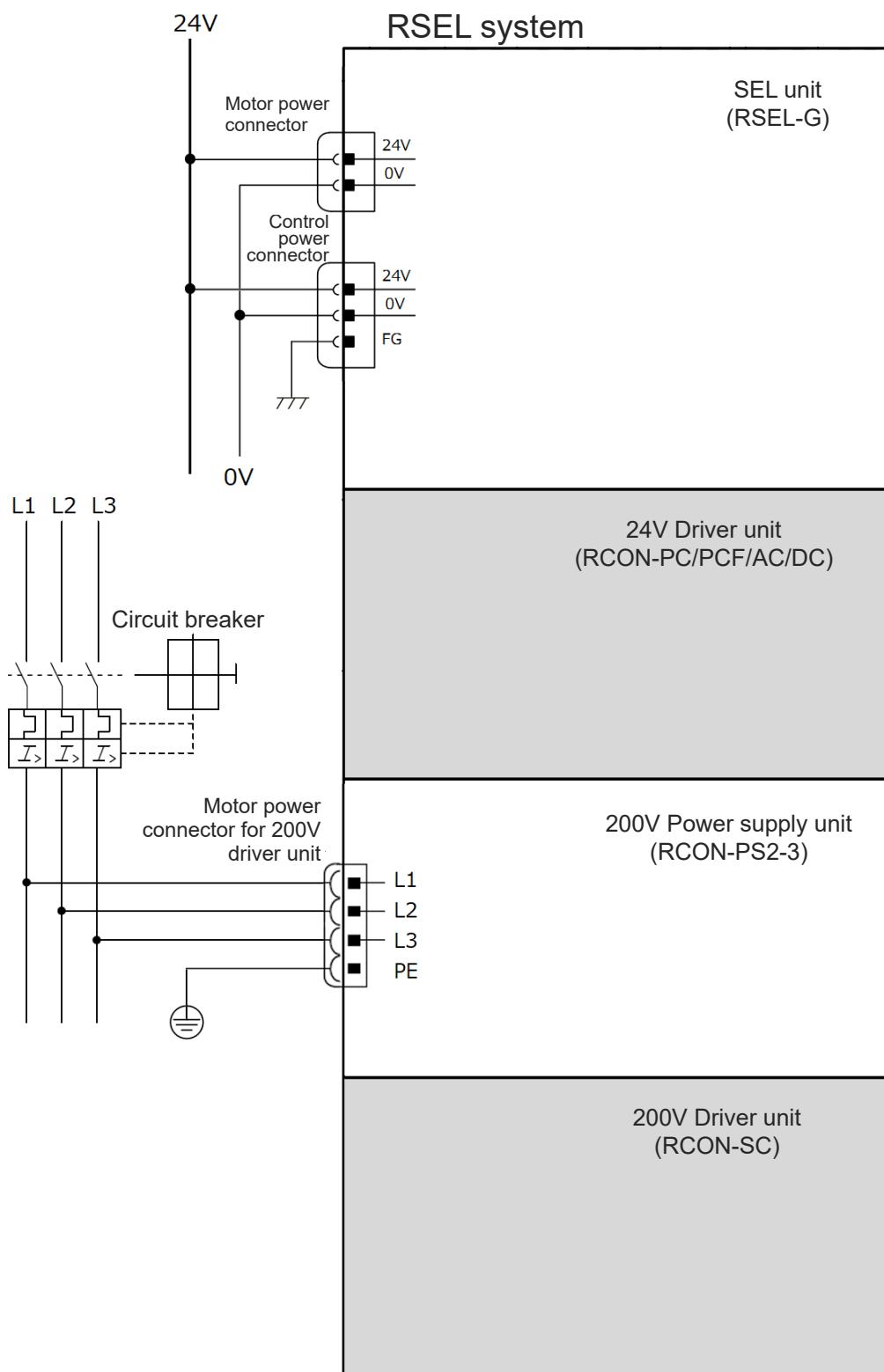
No.	Connector	Reference / Content	
1	(24V) Power connector	4.4.1	Power supply wiring to RSEL system
2	(200V) Power connector	4.4.2	200V power supply wiring to RSEL system
3	System I/O • PSA-24 communication connector	2.6.2 9.1	Drive-source cutoff circuit wiring example PSA-24 Communication Monitor
4	Driver Unit Connector	4.4.5	Actuator wiring
5	Driver Unit Connector (Simple Absolute Connection)	4.4.6	Simple Absolute Unit Wiring
6	Connector for each network	4.4.7	Field network wiring
7	Teaching connector	4.7	Connection the teaching connector
8	USB connector	4.8	Connection the USB connector

4.3 Circuit diagram (Example)

4.3.1 Single-phase type power supply circuit



4.3.2 3-Phase type power supply circuit



4.4 Wiring method

4.4.1 Power supply wiring to RSEL system

To supply power to the RSEL system, power supply wiring to the SEL unit is required.

The example below shows the wiring of the SEL unit and the IAI 24V DC power supply unit PSA-24.

Items to prepare : RSEL system/wiring

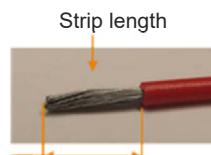
To supply power to the controller, mount the power connector and wire each terminal.

Perform 1 to 4 with reference to the figure and connection diagram below.

[Wiring method to power connector]

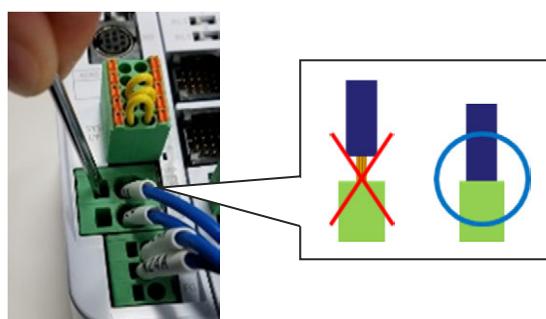
(1) Refer to the next page for each wiring

diameter.



(2) The strip length of the wiring is

- MP: 15 mm
- CP: 10 mm



(3) Insert the wire all the way into the terminal port while pushing the flathead screwdriver into the hole next to the wire insertion port.

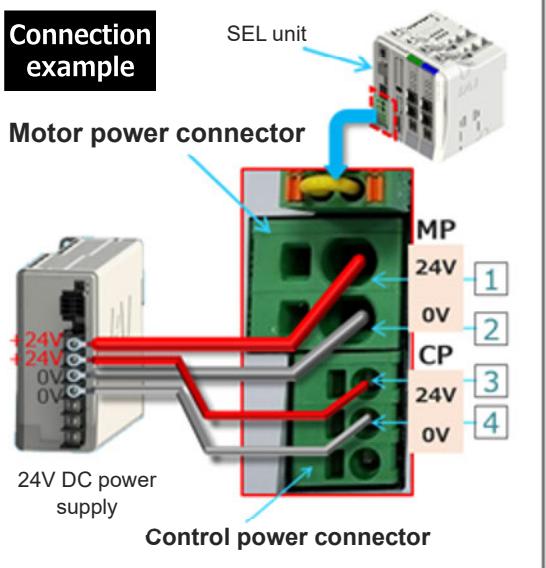
(4) Remove the screwdriver.

1 Connect the "24 V" of MP (motor power connector) to the +24 V terminal of the 24V DC power supply.

2 Connect the "0 V" of MP (motor power connector) to the 0 V terminal of the 24V DC power supply.

3 Connect the "24 V" of CP (control power connector) to the +24 V terminal of the 24V DC power supply.

4 Connect the "0 V" of CP (control power connector) to the 0 V terminal of the 24V DC power supply.



[Electric wire diameter used for SEL unit 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
MP	24 V	Motor drive power supply	AWG20 ~ 8 (Copper wire)
	0 V		
CP	24 V	Control power input	AWG24 ~ 12 (Copper wire)
	0 V		
	FG	Frame Grounding	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 "2.2.1. 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.

4.4.2 200V power supply wiring to RSEL system

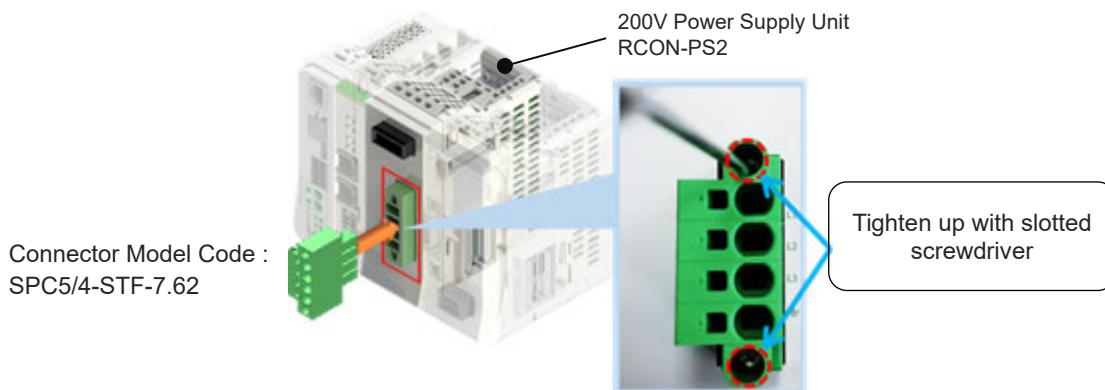
In order to supply motor power to a 200V driver unit (RCON-SC), it is necessary to connect wires to the 200V power supply unit (RCON-PS2).

Items to Prepare

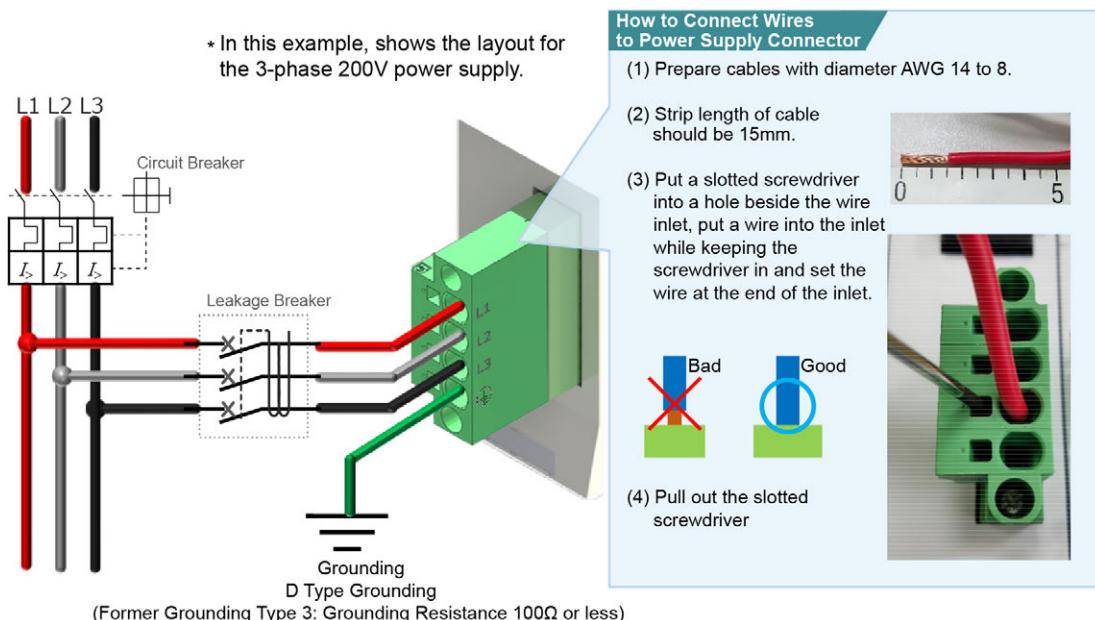
RCON System / Wire

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.



[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 "2.2.1. 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.

4.4.3 Checking actuator model numbers

[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.

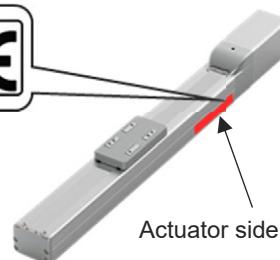
Items to prepare

RSEL unit/actuator/motor encoder cable

Model number shown in "MODEL" on the actuator model number sticker

MODEL: RCP6-SA6C-WA-42P-20-600-P3-*
S/N: A80000000 DATE: 31/01/2018
INPUT: DC24V MADE IN JAPAN

IAI Corporation



Actuator side surface

Match

Model number shown in "Actuator" on the driver unit model number sticker

RCON-PC	A00000000
RCON-PC-2	
AXI: RCP6-SA6C	L=20, ST=600
AX II : RCP6-SA6C	L=16, ST=500



Driver unit front

4.4 Wiring method

4.4.4 RSEL connection cable list

[24V Driver unit connection cable]

No.	Actuator		Applicable controller code	RCON connection cable ^(Note 2) (-RB: Robot cable) [Each actuator connection cable]	Conversion unit	Wiring diagram
	Series	Target type				
(1)	RCP6 RCP6CR RCP6W	Other than high thrust type ^(Note 1)	P5	CB-ADPC-MPA□□□(-RB)	—	A
(2)	RCP5 RCP5CR RCP5W	High thrust type ^(Note 1)	P6	CB-ADPC-MPA□□□(-RB) CB-CAN-AJ002 (conversion cable)	—	B
(3)	RCP4 RCP4CR RCP4W	Gripper (GR*), ST4525E, SA3/RA3	P5	CB-ADPC-MPA□□□(-RB)	—	A
(4)		High thrust type ^(Note 1)	P6	CB-ADPC-MPA□□□(-RB) CB-CAN-AJ002 (conversion cable)	—	B
(5)		Other than (3), (4)	P5	CB-ADPC-MPA□□□(-RB) CB-CAN-AJ002 (conversion cable)	—	B
(6)	RCP3		P5	CB-RCAPC-MPA□□□(-RB)	—	—
(7)	RCP2 RCP2CR RCP2W	RCP2 (standard type) Rotary compact type RCP2-RTBS/RTBSL/RTCS/RTCSL	P5	CB-ADPC-MPA□□□(-RB) [CB-RPSEP-MPA□□□]	Required	D
(8)		RCP2CR (clean room type), RCP2W (dust-proof/splash-proof type) Rotary (RT*) of above types GRS/GRM/GR3SS/GR3SM of above types	P5	CB-ADPC-MPA□□□(-RB)	—	A
(9)		All (standard / clean room / dust-proof/splash-proof) types of GRSS/GRLS/GRST/GRHM/GRHB Short type (RCP2 only) RCP2-SRA4R/SRGS4R/SRGD4R	P5	CB-RCAPC-MPA□□□(-RB)	—	C
(10)		High thrust type ^(Note 1)	P6	CB-ADPC-MPA□□□(-RB) [CB-CFA-MPA□□□(-RB)]	Required	D
(11)		Other than (7) to (10)	P5	CB-ADPC-MPA□□□(-RB) [CB-PSEP-MPA□□□]	Required	D
(12)	RCA2/RCA2CR/RCA2W, RCL		A6	CB-RCAPC-MPA□□□(-RB)	—	C
(13)	RCA2/RCA2CR/RCA2W Small connector type (CNS option)		A6	CB-ADPC-MPA□□□(-RB)	—	A
(14)	RCA RCACR	Short type (RCA only) RCA-SRA4R/SRGS4R/SRGD4R	A6	—	—	C
(15)	RCAW	Other than (14)	A6	CB-ADPC-MPA□□□(-RB) [CB-ASEP2-MPA□□□]	Required	D
(16)	RCD	RCD-RA1DA, RCD-GRSNA	D6	CB-ADPC-MPA□□□(-RB)	—	A
(17)	WU	WU-S, WU-M	PM2	CB-ADPC-MPA□□□(-RB)	—	A

Note 1: Actuators using high-thrust pulse motor (56SP, 60P and 86P)

Note 2: The cable length from each driver unit to actuators should be 20m at maximum regardless of the conversion unit.

However, the maximum length from the driver unit (RCOND) to RCD actuator should be 10m.

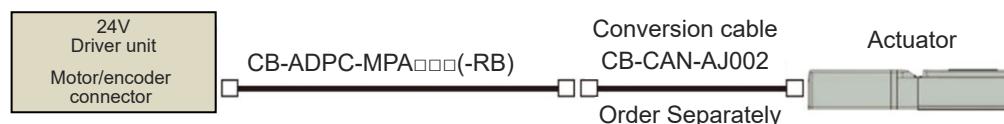
**Wiring diagram
A**

- (1) RCP6/RCP6CR/RCP6W/RCP5/RCP5CR/RCP5W (other than high thrust type ^(Note 1))
- (3) RCP4 Gripper (GR*), ST4525E, SA3/RA3
- (8) RCP2CR/RCP2W rotary (RT*) and GRS/GRM/GR3SS/GR3SM
- (13) RCA2/RCA2CR/RCA2W (CNS option)
- (16) RCD-RA1DA, RCD-GRSNA
- (17) WU-S/M



**Wiring diagram
B**

- (2) RCP6/RCP6CR/RCP6W/RCP5/RCP5W high thrust type ^(Note 1)
- (4) RCP4/RCP4W high thrust type ^(Note 1)
- (5) RCP4/RCP4CR/RCP4W (gripper, ST4525E, SA3/RA3, other than high thrust type ^(Note 1))



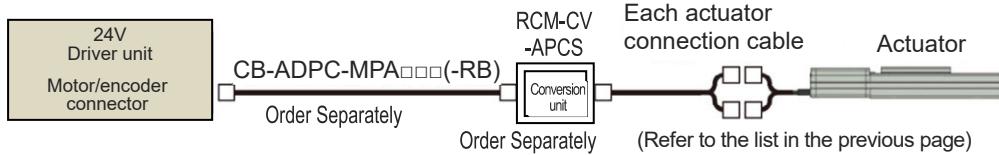
**Wiring diagram
C**

- (6) RCP3
- (9) RCP2/RCP2CR/RCP2W-GRSS/GRLS/GRST/GRHM/GRHB,
RCP2-SRA4R/SRGS4R/SRGD4R
- (12) RCA2/RCA2CR/RCA2W, RCL
- (14) RCA short type (RCA-SRA4R/SRGS4R/SRGD4R)



**Wiring diagram
D**

- (7) RCP2-RTBS/RTBSL/RTCS/RTCSL
- (10) RCP2/RCP2CR/RCP2W high thrust type ^(Note 1)
- (11) RCP2/RCP2CR/RCP2W, excluding some (Refer to the list in the previous page for details)
- (15) RCA/RCACR/RCAW (other than RCA-SRA4R/SRGS4R/SRGD4R)



Note 1: Actuators using high-thrust pulse motor (56SP, 60P and 86P)

4.4 Wiring method

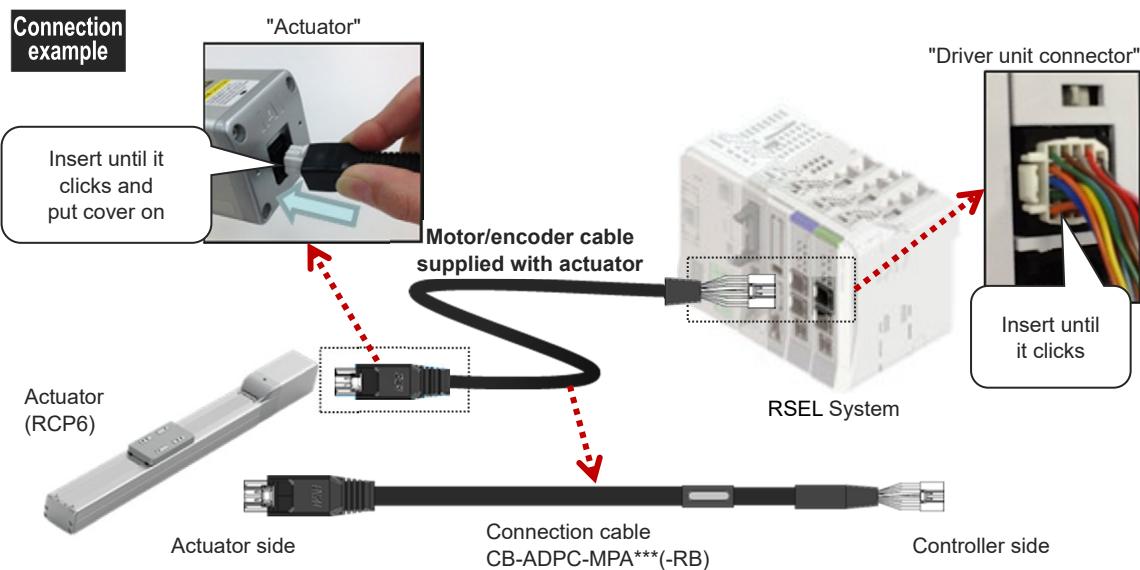
[200V Driver Unit Connection Cable]

No.	Actuator		Applicable Controller Symbol	RCON Connection Cable				
	Series	Applicable Type		Applicable controller code	Motor Cable	Motor Robot Cable	Encoder Cable	Encoder Robot Cable
(1)	RCS4 RCS4CR		T4	20	CB-RCC1-MA□□□	CB-X2-MA□□□	—	CB-X1-PA□□□
(2)	RCS3(P) RCS3(P)CR	CTZ5C CT8C	T4	20	CB-RCC1-MA□□□	CB-X2-MA□□□	—	CB-X1-PA□□□
		Other than those above					CB-RCS2-PA□□□	CB-X3-PA□□□
(3)	RCS2 RCS2CR RCS2W	RTC□L RT6	T4	20	CB-RCC1-MA□□□	CB-X2-MA□□□	CB-RCS2-PLA□□□	CB-X2-PLA□□□
		Other than those above					CB-RCS2-PA□□□	CB-X3-PA□□□
		RA13R					CB-RCS2-PLA□□□	CB-X2-PLA□□□
(4)	RCS2	With no Loadcell	T4	20	CB-RCC1-MA□□□	CB-X2-MA□□□	[From Actuator to Brake Box] CB-RCS2-PLA□□□	[From Actuator to Brake Box] CB-X2-PLA□□□
		RA13R Equipped with Brake (with brake box)					[From Brake Box to Controller] CB-RCS2-PLA□□□	[From Brake Box to Controller] CB-X2-PLA□□□
		RA13R Equipped with Brake (with no brake box)					[From Actuator to Brake Box] CB-RCS2-PLA□□□	[From Actuator to Brake Box] CB-X2-PLA□□□
(5)	IS(P)B IS(P)DB IS(P)DBCR	Option: Limit Switch Equipped Type ^(Note 1)	T4	30	—	CB-X2-MA□□□	—	CB-X1-PA□□□ *Cable length at 21m or more and 30m or less in battery-less absolute type should be CB-X1-PA□□□-AWG24
(6)	IS(P)A IS(P)DA IS(P)DPCR SSPA SSPDACR IF FS RS	Option: Limit Switch Equipped Type ^(Note 1)	T4	30	—	CB-X2-MA□□□	—	CB-X1-PLA□□□ *Cable length at 21m or more and 30m or less in battery-less absolute type should be CB-X1-PLA□□□-AWG24
(7)	NSA		T4	30	—	CB-X2-MA□□□	—	CB-X1-PA□□□
(8)	NS	Option: Limit Switch Equipped Type ^(Note 1)	T4	30	—	CB-X2-MA□□□	—	CB-X3-PA□□□ CB-X2-PLA□□□
(9)	DD(A) DD(A)CR DDW	T18□ LT18□	T4	30	—	CB-X2-MA□□□	—	CB-X3-PA□□□
		H18□ LH18□				CB-XMC1-MA□□□		
(10)	LSA	W□□□	T4	20	—	CB-XMC1-MA□□□	—	CB-X2-PLA□□□ CB-X3-PA□□□
		Other than those above				CB-X2-MA□□□		
(11)	LSAS		T4	20	—	CB-X2-MA□□□	—	CB-X1-PA□□□
(12)	IS(P)WA		T4	30	—	CB-XEU1-MA□□□	—	CB-X1-PA□□□-WC

Note 1: When it is required to operate an actuator equipped with a limit switch, it should be the cable equipped with a limit switch. (It has a limit switch built inside.)

4.4.5 Actuator wiring (Connecting motor/encoder cable)

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

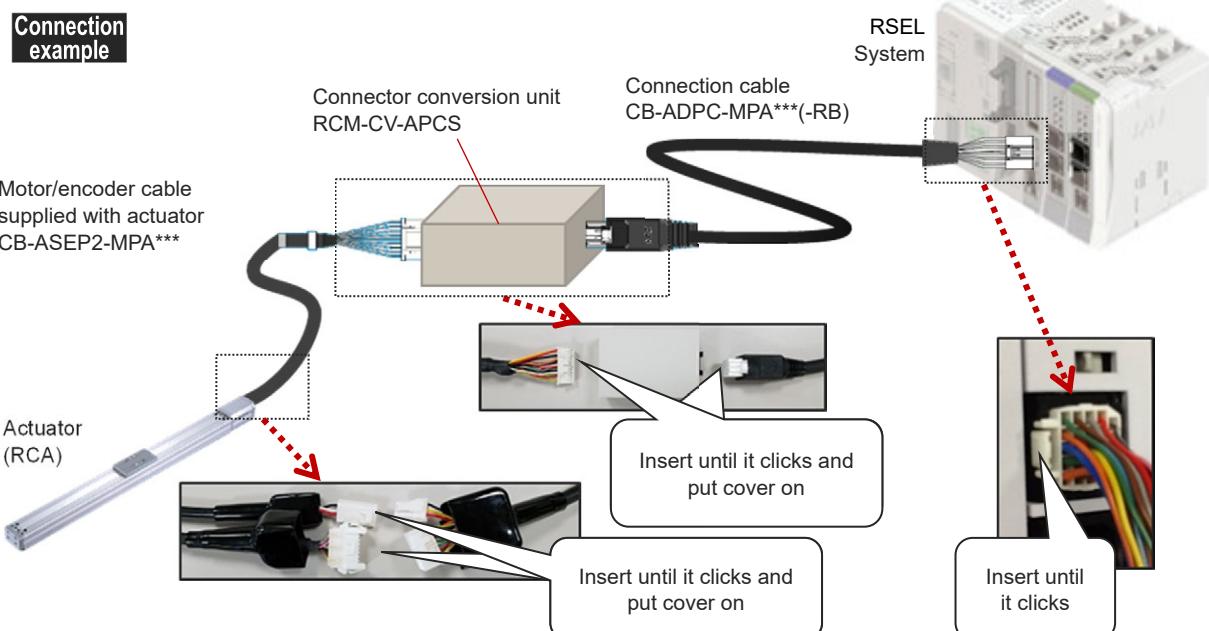


Caution

- 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.

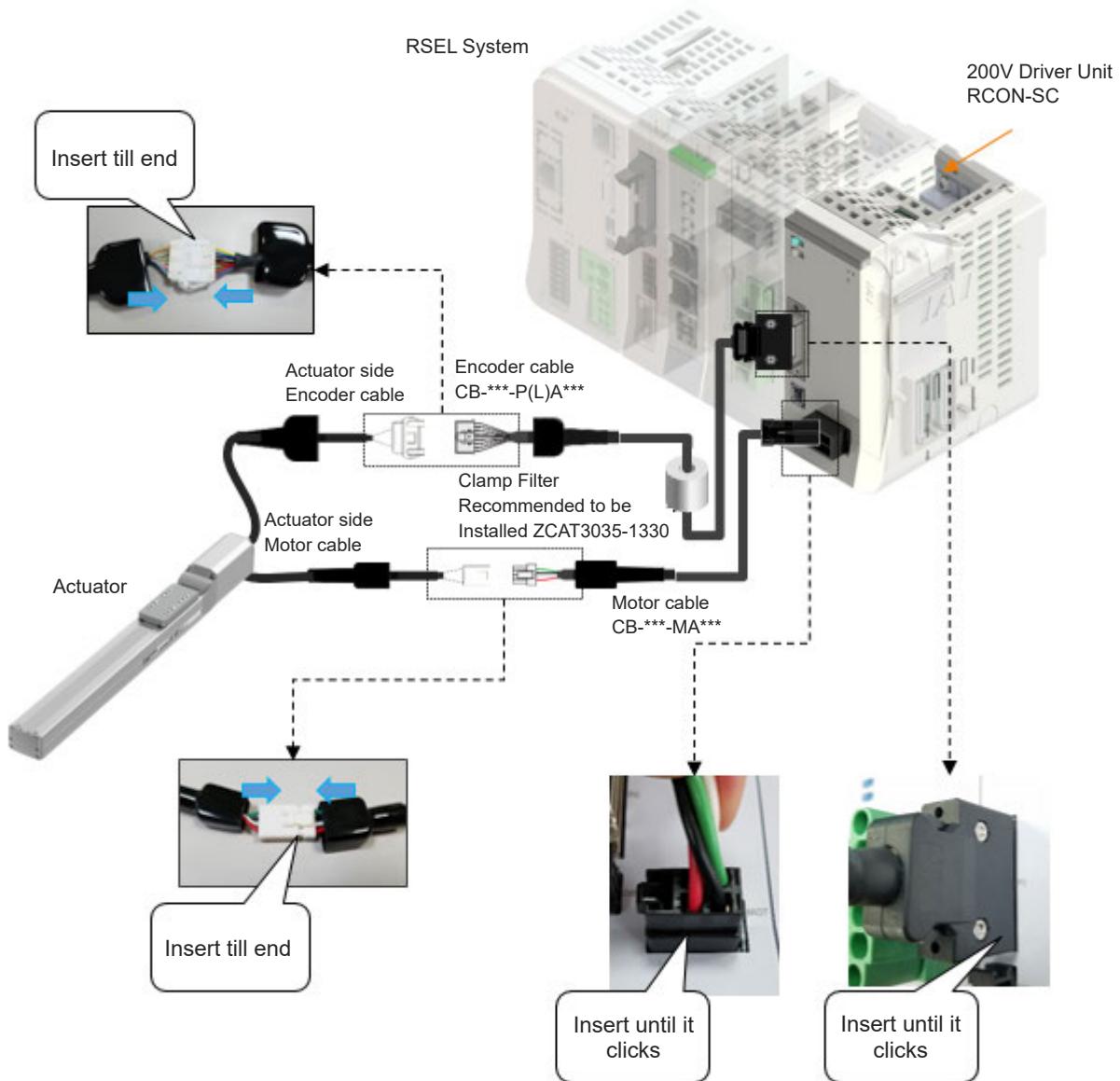
(2) Connecting RSEL and RCP/RCA Series other than the above



4.4 Wiring method

(3) Connection between 200V AC Servo-motor Actuator and RCON-SC

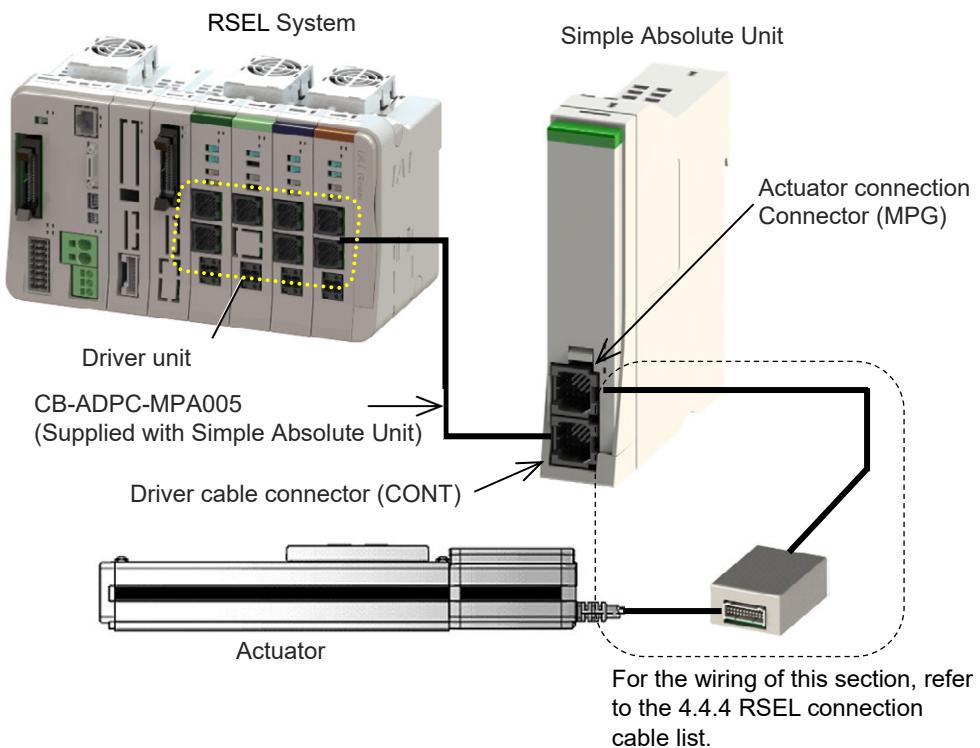
Connection example



4.4.6 Simple Absolute Unit Wiring

When using a simple absolute unit, perform wiring as shown below.

1 simple absolute unit is required for each actuator.



● Parameter Setting When Simple Absolute Unit Used

In the RSEL system, the factory default setting of the driver unit parameter No. 83 "Absolute unit" is "0".

For an axis connected with the simple absolute unit and used in the simple absolute type, change this parameter to "1".

[Absolute unit (Driver unit parameter No. 83)]

AC servo motor specification and
stepper motor specification only

No.	Name	Unit	Input range	Default initial value setting
83	Absolute Unit	—	0: Not in use 1: In use	0

For stepper motor specification

Set 1 for simple absolute specification.

For the battery-less absolute specification, the factory default value is 1. Change the setting to 0 when using in incremental specification.

For servo motor specification

Set 1 for simple absolute specification.

Battery-less absolute specification cannot be used in incremental specification.

4.4.7 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 systems]

Connection example

Host PLC

(prepared by the customer) CC-Link master unit (to be prepared by customer)

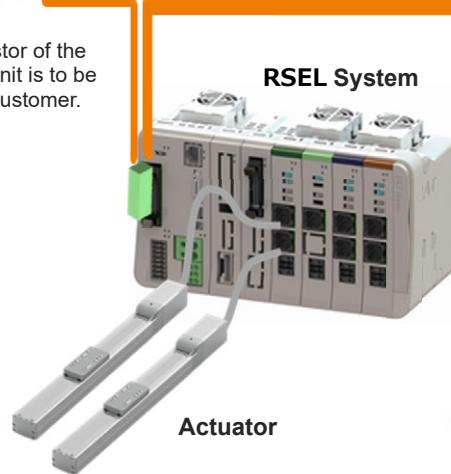


* The terminal resistor of the CC-Link master unit is to be prepared by the customer.

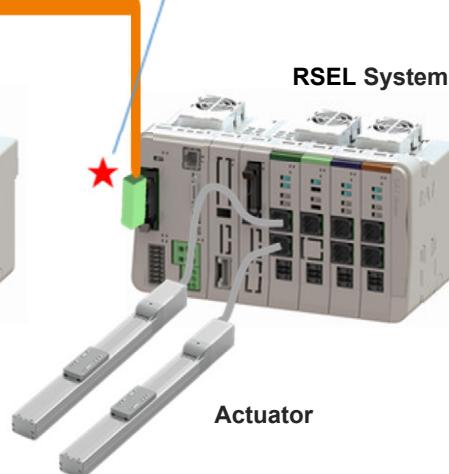
CC-Link dedicated cable
(prepared by the customer)

★ Terminal resistor
(supplied with SEL system)

RSEL System



RSEL System

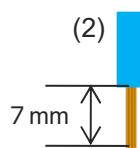


4.4 Wiring method

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

(1) Prepare a CC-Link dedicated cable.

(2)

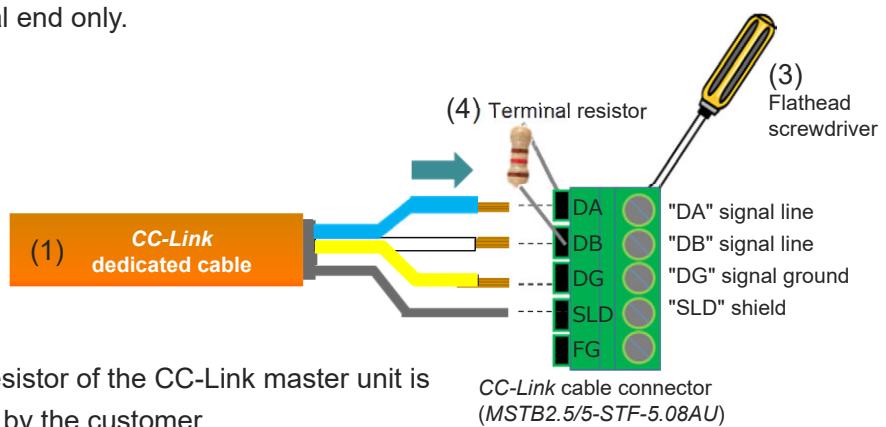


(2) Strip 7mm of insulation from each wire end.

(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 (Note 1) 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.

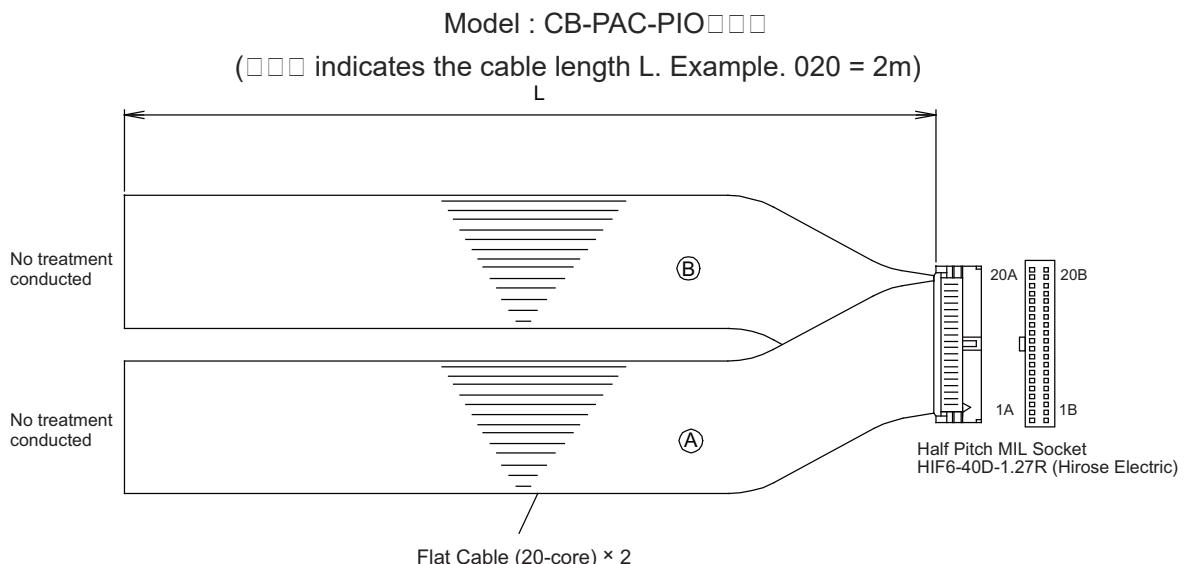
Cable FANC-SBH (CC-Link dedicated high-performance cable): Terminal resistor: 130Ω

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

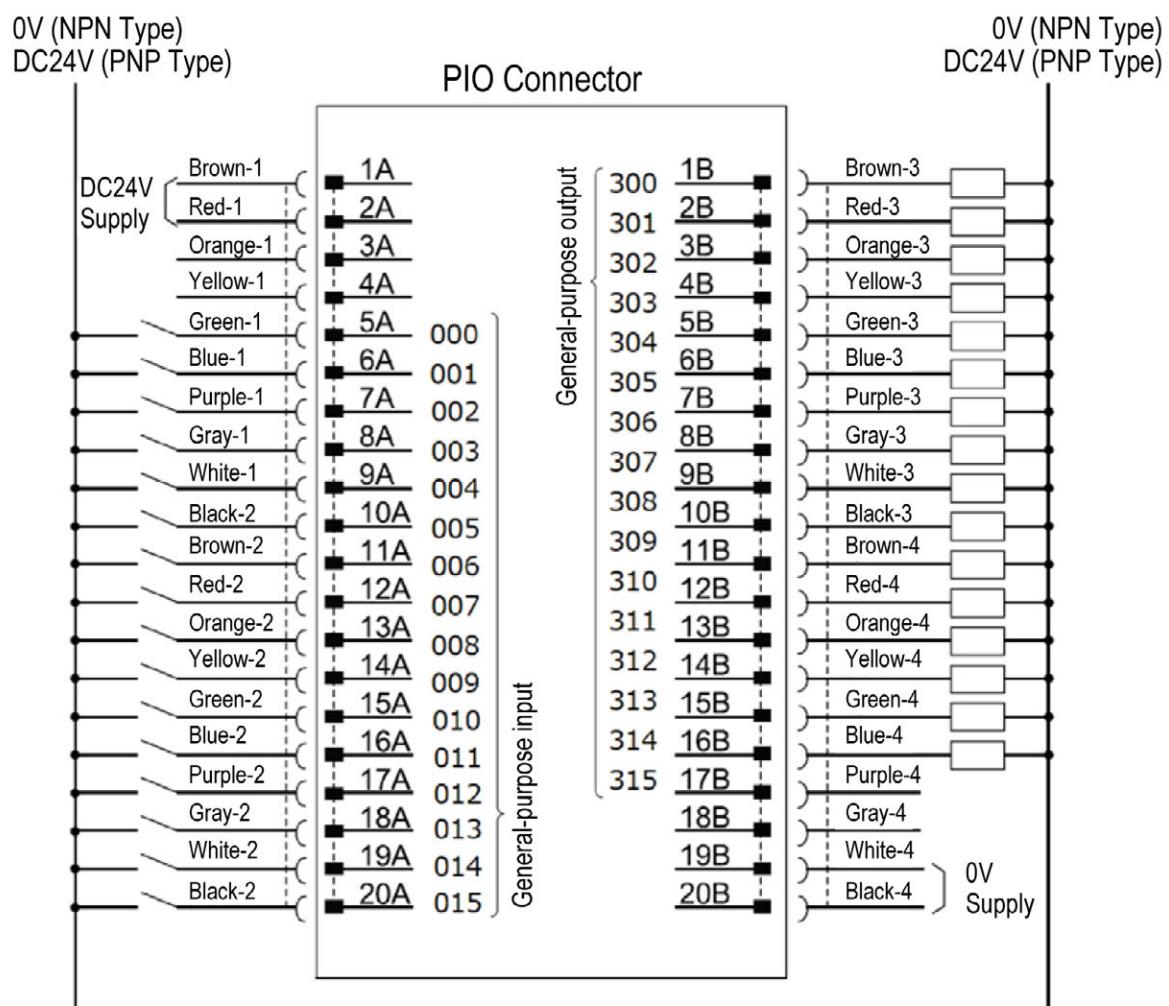
4.5 PIO Circuit

The connection of I/O to the controller is to be carried out using the dedicated I/O cable. The cable length is shown in the model code of the controller. Please check the controller model code. There are 2m for standard, 3m and 5m as an option. Up to 10m can be enabled sold separately.

Also, the end of the cable harness to be connected to the host controller (PLC, etc.) is just cut and no treatment is conducted so the wiring layout can be performed freely.



No.	Cable Color	Wiring	No.	Cable Color	Wiring
1A	BR-1	Flat Cable Ⓢ (Press Welding) AWG28	1B	BR-3	Flat Cable Ⓣ (Press Welding) AWG28
2A	RD-1		2B	RD-3	
3A	OR-1		3B	OR-3	
4A	YW-1		4B	YW-3	
5A	GN-1		5B	GN-3	
6A	BL-1		6B	BL-3	
7A	PL-1		7B	PL-3	
8A	GY-1		8B	GY-3	
9A	WT-1		9B	WT-3	
10A	BK-1		10B	BK-3	
11A	BR-2		11B	BR-4	
12A	RD-2		12B	RD-4	
13A	OR-2		13B	OR-4	
14A	YW-2		14B	YW-4	
15A	GN-2		15B	GN-4	
16A	BL-2		16B	BL-4	
17A	PL-2		17B	PL-4	
18A	GY-2		18B	GY-4	
19A	WT-2		19B	WT-4	
20A	BK-2		20B	BK-4	



4.6 Regenerative Resistor (Option)

4.6.1 Regenerative resistor unit specifications

It is a unit to convert the regenerative current generated at the deceleration of the motor into heat.

In RSEL system, the 200V power supply unit and the 200V driver unit have built-in 60W regenerative resistors and they are shared among in the system. In case the resistance is not enough, install this regenerative resistor unit externally.

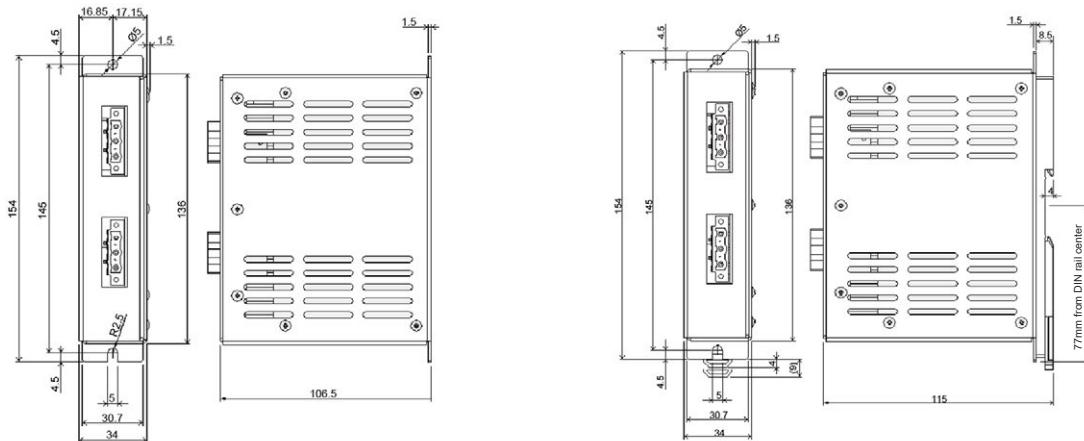
[Model, Accessories]

Item			Enclosed Items	
Model	First Unit	Screw attachment small type DIN rail attachment small type	RESU-2 RESUD-2	200V Driver Unit Connection Cable (Model code: CB-SC-REU010) 1m enclosed
	2nd unit or later	Screw attachment small type DIN rail attachment small type	RESU-1 RESUD-1	Regenerative resistor unit connection cable (Model code: CB-ST-REU010) 1m enclosed

[Specification]

	RESU-1, RESU-2	RESUD-1, RESUD-2
Body Size [mm]	W34 × H154 × D106.5	W34 × H158 × D115
Body Mass		Approx. 0.4kg
Internal Regenerative Resistor		235Ω 80W

[Appearance]



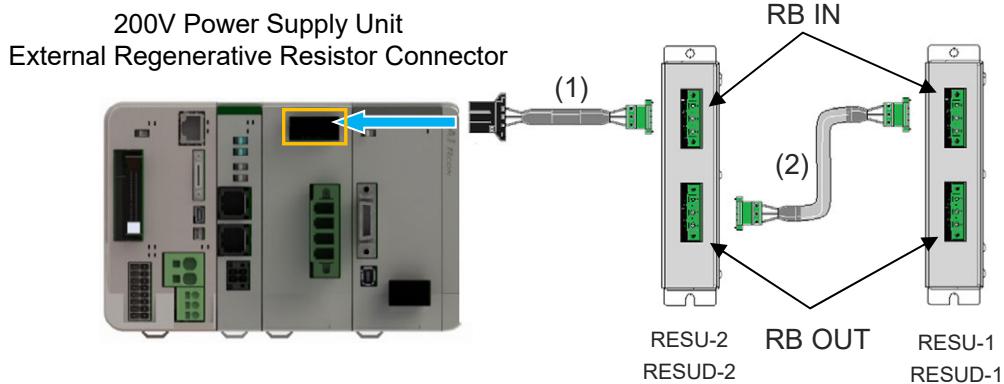
RESU-1, RESU-2 (Screw attachment small type) RESUD-1, RESUD-2 (DIN rail attachment small type)

4.6.2 Wiring for Regenerative Resistor Unit

Connect the regenerative resistor units as shown in the figure below with using the cables enclosed to the regenerative resistor units.

- (1) Connecting 1 Unit: Connect RESU(D)-2 with enclosed cable (CB-SC-REU)
- (2) Connecting 2 or More: Connect RESU(D)-1 with enclosed cable (CB-ST-REU)

- **Wiring Image**



- **External Regenerative Resistor Connector Specifications**

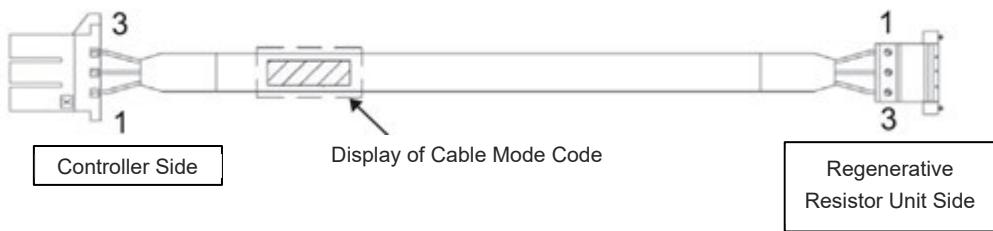
Item	Items and Model	
Connector Name	External Regenerative Resistor Connector (RB)	
Model	Controller side: 1-178138-5	Cable side: 1-178128-3

- **Pin Assignment**

Pin No.	Signal Name	Items	Applicable cable diameter
1	RB+	Regeneration Resistor + (Motor drive DC voltage)	Dedicated Cable Enclosed to Regenerative Resistor Unit
2	RB-	Regeneration Resistor -	
3	PE	Ground Terminal	

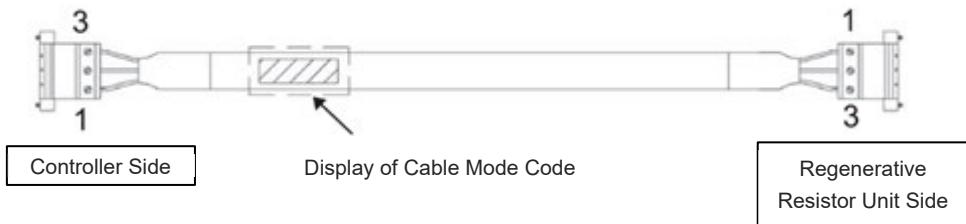
(1) 200V Driver Unit Connection Cable (CB-SC-REU□□□)

□□□ indicates the cable length (Example) 010 = 1m



(2) Regenerative Resistor Unit Connection Cable (CB-ST-REU□□□)

□□□ indicates the cable length (Example) 010 = 1m

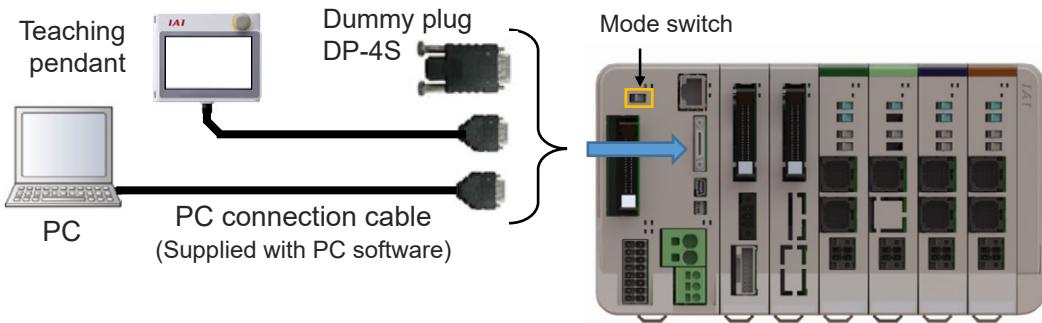


Wiring	Color	Signal	No.
KIV 1.0mm ² (AWG17)	Light Blue	RB+	1
	Brown	RB-	2
	Green/Yellow	PE	3

No.	Signal	Color	Wiring
1	RB+	Light Blue	KIV
2	RB-	Brown	1.0mm ²
3	PE	Green/Yellow	(AWG17)

4.7 Connection the teaching connector

Connect a teaching pendant such as the PC software.



An actuator would not operate without having nothing inserted to this connector.

When operation is to be made on the actuator without connecting a teaching tool, connect the dummy plug (DP-4S).

- Teaching connector specification

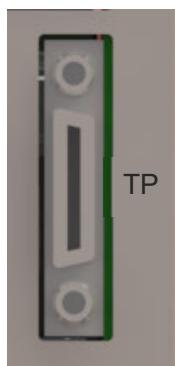
Teaching connector	Model	Remarks
Controller side	HDR-EC26LFDT1-SLD+	

- Pin Assignment

Pin No.	Signal Name	Items	Applicable cable diameter
1	GND	Signal Grounding	
2	EMGS	Stop status output	
3	VCC	6.5V power input connector	
4	DTR	Terminal ready (Connected to DSR inside)	
5	STOPS2+	Stop contact output 2+	
6	STOPS2-	Stop contact output 2-	
7	NC	Not connected	
8	RSVVCC	24V power input connector	
9	STOPS1-	Stop contact output 1-	
10	NC	Not connected	
11	NC	Not connected	
12	STOPS1+	Stop contact output 1+	
13	RTS	Connected to DSR externally	Cable dedicated for IAI products
14	CTS	Connected to RTS externally, connector connection detection input.	

Pin No.	Signal Name	Items	Applicable cable diameter
15	TXD	Transmit data	Cable dedicated for IAI products
16	RXD	Receive data	
17	DSR	Equipment ready (Connected to DSR inside)	
18	NC	Not connected	
19	NC	Not connected	
20	NC	Not connected	
21	NC	Not connected	
22	ENBS2+	Enable contact output 2 +	
23	ENBS1-	Enable contact output 1 -	
24	ENBS1+	Enable contact output 1 +	
25	ENBS2-	Enable contact output 2 -	
26	GND	Signal Grounding	

Teaching connector



Mode switch

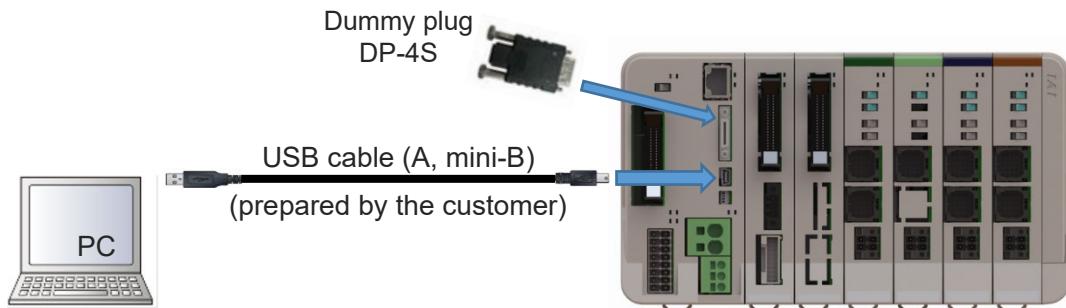
**Caution**

- Set “Operation Mode Setting Switch” to “MANU” side when a teaching tool is connected.
- Turn the power OFF before disconnecting a teaching tool.
- USB connector and teaching connector cannot be used at the same time. Teaching connector is prioritized.

4.8 Connection the USB connector

It is available to use the PC software by connecting a PC to a USB port.

In order to operate an actuator, insert the dummy plug (DP-4S) to the teaching connector.



- USB connection connector specification

Connector to be Used	USB mini-B	51387-0530 (Molex)
Connector name	USB	
Communication Specification	Conformed to USB 2.0	12Mbps (Full Speed)
Maximum connection distance	5m	
Connected unit	PC (USB port)	
Connection cable	USB cable	Controller side : mini-B

- Pin Assignment

Pin No.	Signal Name	Signal content
1	Vbus	USB Power supply input (+5V)
2	D-	USB Differential transmitted/received data - side
3	D+	USB Differential transmitted/received data + side
4	ID	USB ID (dentification) terminal (Open at cable end)
5	GND	Power supply ground

USB connection connector

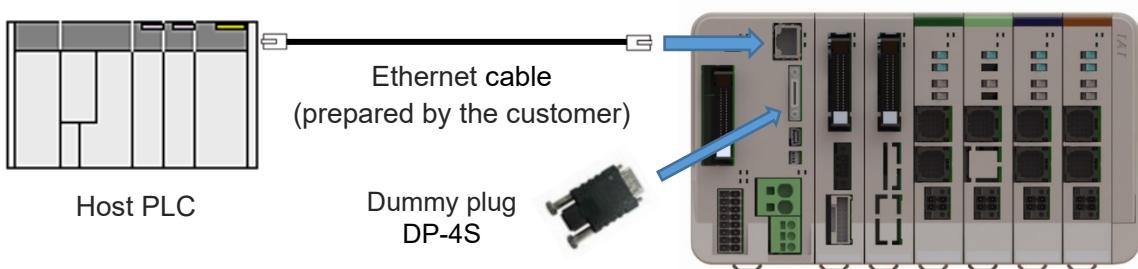


4.9 Connection the Ethernet connector

It is a communication port available to control with SEL language and to set the message format conformed to various types of host controllers.

Also, it is available to use the PC software. In order to operate an actuator, insert the dummy plug (DP-4S) to the teaching connector.

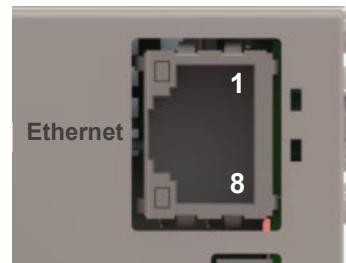
[Refer to Ethernet Instruction Manual (ME0140) provided separately]



- Ethernet connection connector specification

Connector to be Used	RJ-45 connector (8 pin)	HR911130C (HANRUN)
Connector name	10/100BASE-T	
Communication speed	10/100Mbps	Auto negotiation
Connected unit	PC, etc. (Ethernet)	
Connection cable	Ethernet (LAN) cable	Recommended Cable : STP cable (manufactured by 3M) Category 5 or more

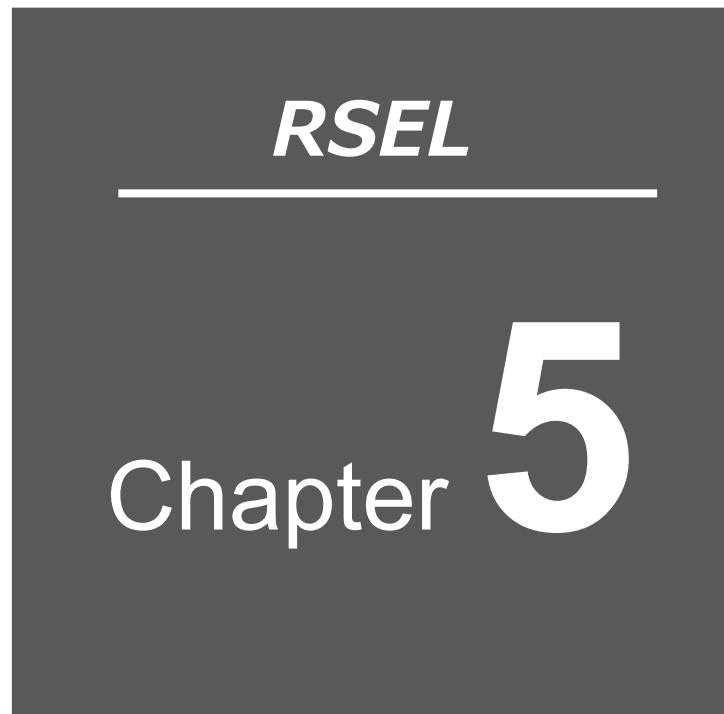
Ethernet connection connector



- Pin Assignment

Pin No.	Signal Name	Signal content
1	TX+	Transmit data+
2	TX-	Transmit data-
3	RX+	Receiving+
4	-	
5	-	
6	RX-	Receiving-
7	-	
8	-	

4.9 Connection the Ethernet connector



Operation

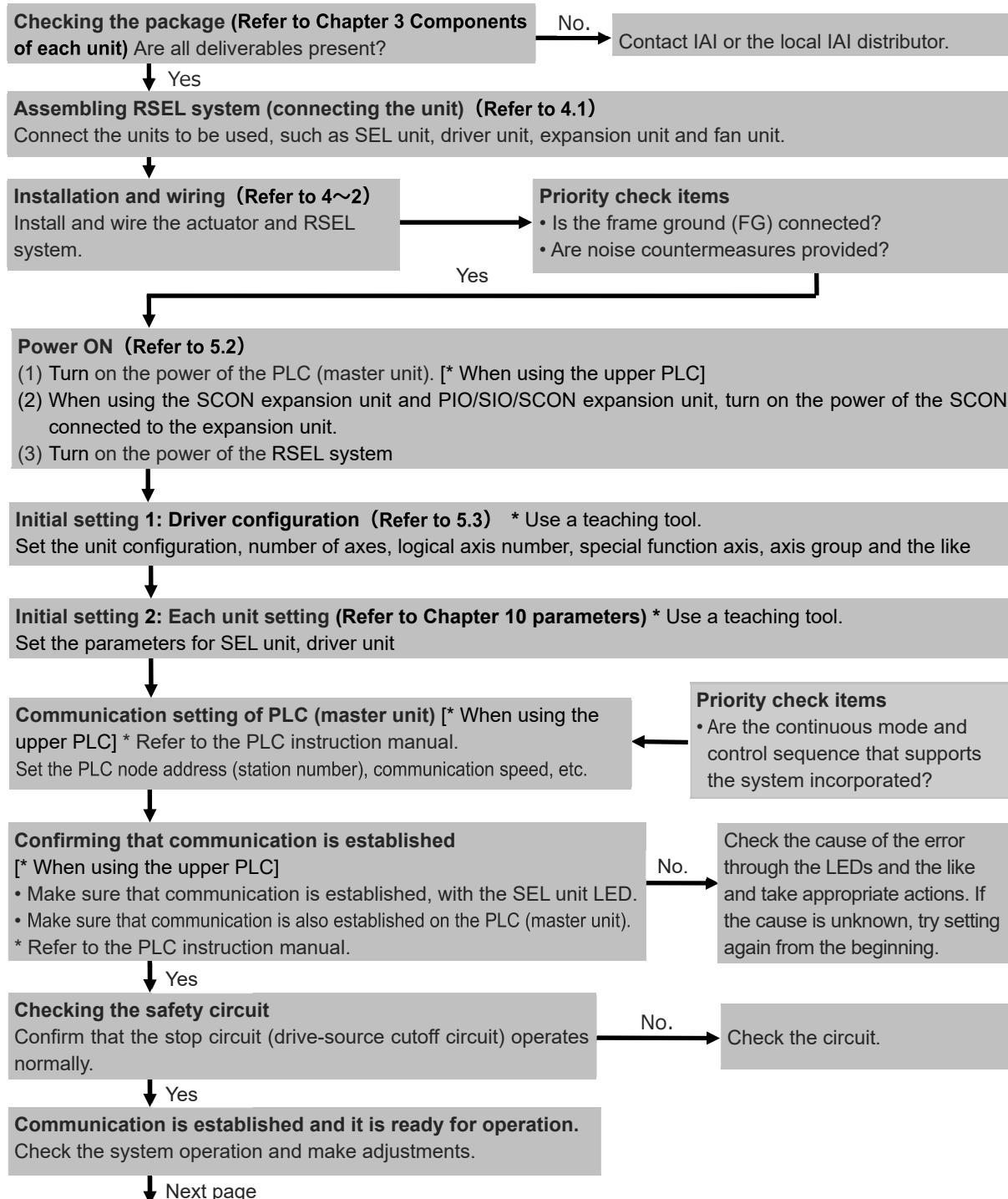
5.1	Startup Procedure	5-1
5.2	Turning on the controller power and cutoff	5-3
5.2.1	Power On.....	5-3
5.2.2	Power Cutoff.....	5-4
5.3	Driver configuration.....	5-5
5.3.1	RSEL axis setting	5-5
5.3.2	Starting method	5-5
5.3.3	Simple setting method	5-5
5.3.4	Description of each area	5-8
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5.7.1 SEL command word list.....	5-17
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5.7.6 Memory map	5-19
5.8 Types of Operations.....	5-21
5.9 How to operate	5-22
5.9.1 Auto start upon power on	5-22
5.9.2 Starting a program by specifying its program number	5-24

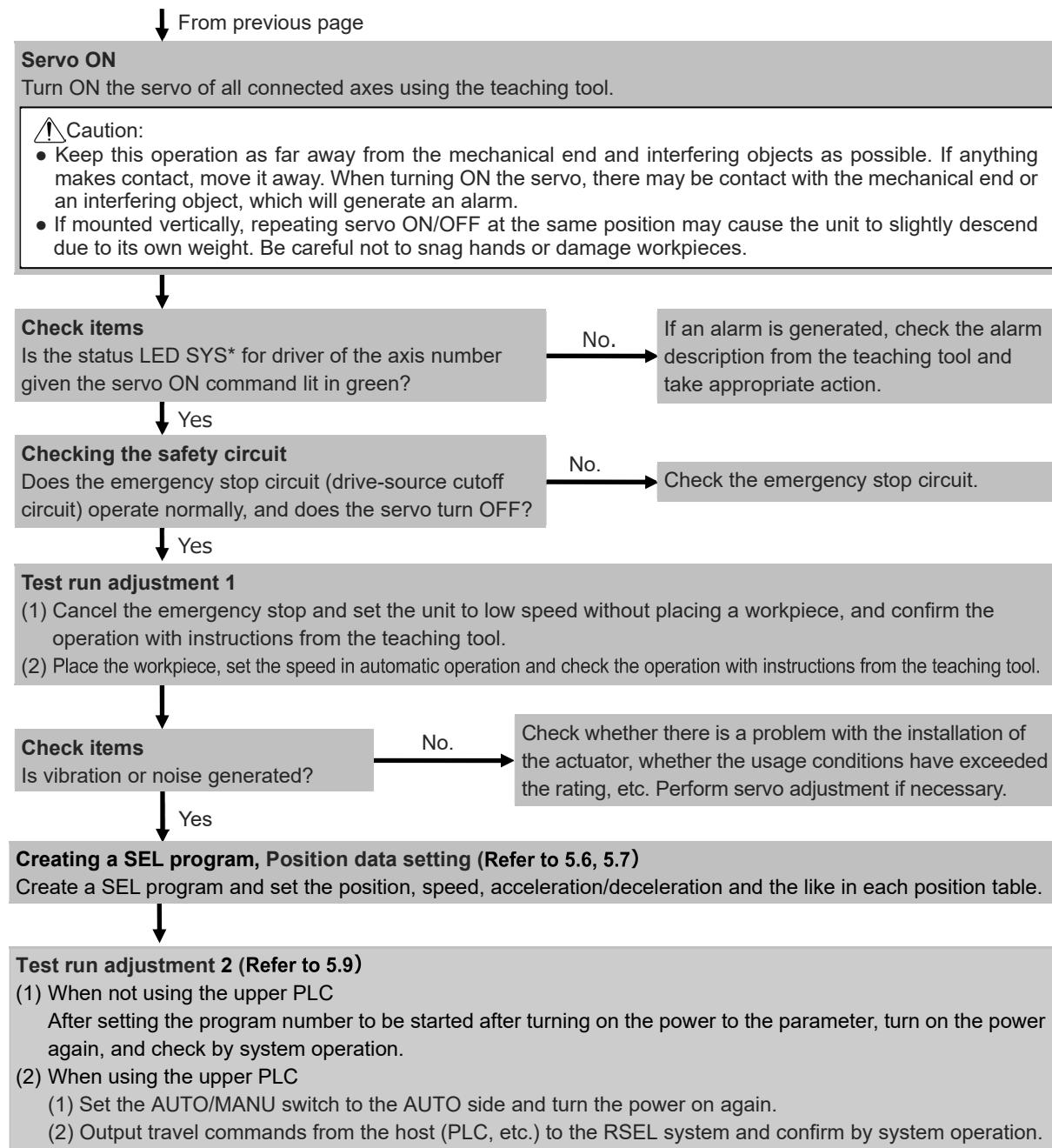
5.1 Startup Procedure

When using this product for the first time, refer to the following procedure and pay attention so as to avoid checking or wiring errors.

This section describes the startup procedure of the RSEL system. For installation and wiring of miscellaneous devices connected to the network, controllers and actuators, follow the respective instruction manuals (DVDs).



5.1 Startup Procedure

**Caution**

- To ensure safety, it is recommended that safety speed be enabled during initial movements.
- When putting the brake release switch to “RLS” side on a robot installed vertically, pay attention not to pinch fingers or damage a hand by the actuator dropped by its own weight.

5.2 Turning on the controller power and cutoff

5.2.1 Power On

Supply power to the RSEL system.

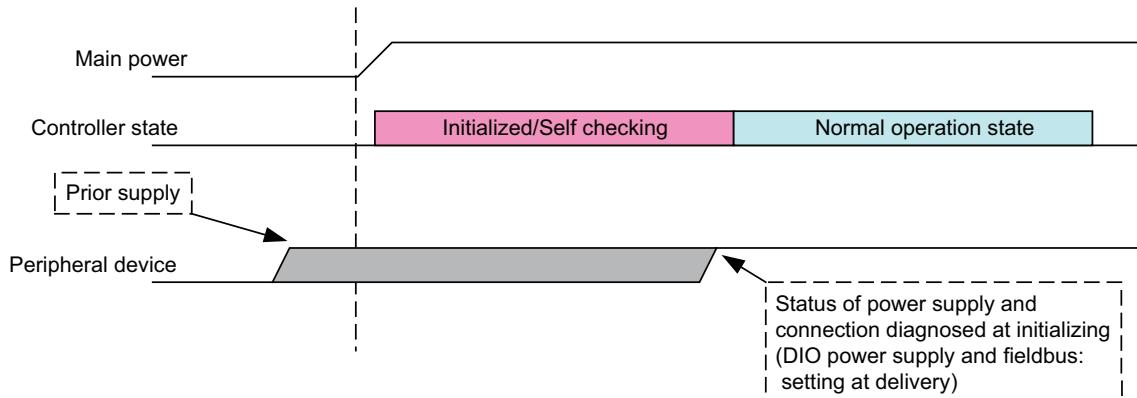
- Power on Procedure

The following procedure is applied for cases where the parameters are the same as those at delivery, and the unit is not in the error occurrence mode or emergency stop mode.

Also, the number allocation for the I/O ports is shown as the same as the delivery in this description.

- (1) After confirming that the wirings are performed properly, supply power to the peripheral devices. If PIO is in use, supply 24V DC for PIO. In the case that it is not used, the power supply is not required, but, set I/O Parameter No. 18 and No. 189 to “0: Unmonitored”.
- (2) Supply the main power.
- (3) Once the startup of the controller (CPU startup) is held in normal condition, I/O Port No. 301 turns ON.

A timing chart of the above operation is shown below.

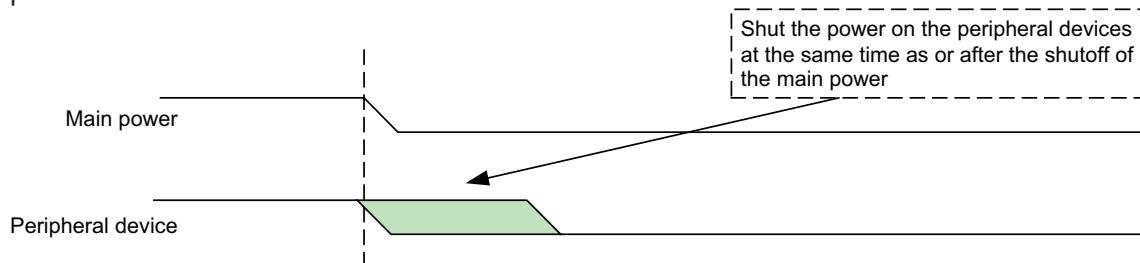


5.2.2 Power Cutoff

Power cut off to the RSEL system

- Power Cutoff on Procedure

Shut the power on the peripheral devices at the same time as or after the shutoff of the main power.



Caution

Leave it for 1 second or more after shutting the power off when you turn it back on.

5.3 Driver configuration

5.3.1 RSEL axis setting

The RSEL axis setting is a function to set the currently connected axis configuration in the RSEL unit.

Assign a physical axis (driver) to any logical axis (SEL program management).

In this section, explains how to operate in the PC software.

For how to operate in a teaching tool, refer to the following.

16.17 Axis Number Assignment in TB-02 Programming Controller Applicable Instruction Manual (ME0356)

15.17 Axis Number Assignment in TB-03 Programming Controller Wired Connection Instruction Manual (ME0377)

5.3.2 Starting method

If the axis is not set, the RSEL axis setting dialog is automatically displayed when the PC software is started.

If displayed from the menu, select Controller (C) → RSEL axis setting (G).

5.3.3 Simple setting method

At the first startup, logical axes are assigned in the order of physical axes in the installed driver unit.

If you do not need to make any changes, press the "Yes" button.

To assign logical axes individually, click the "No" button.

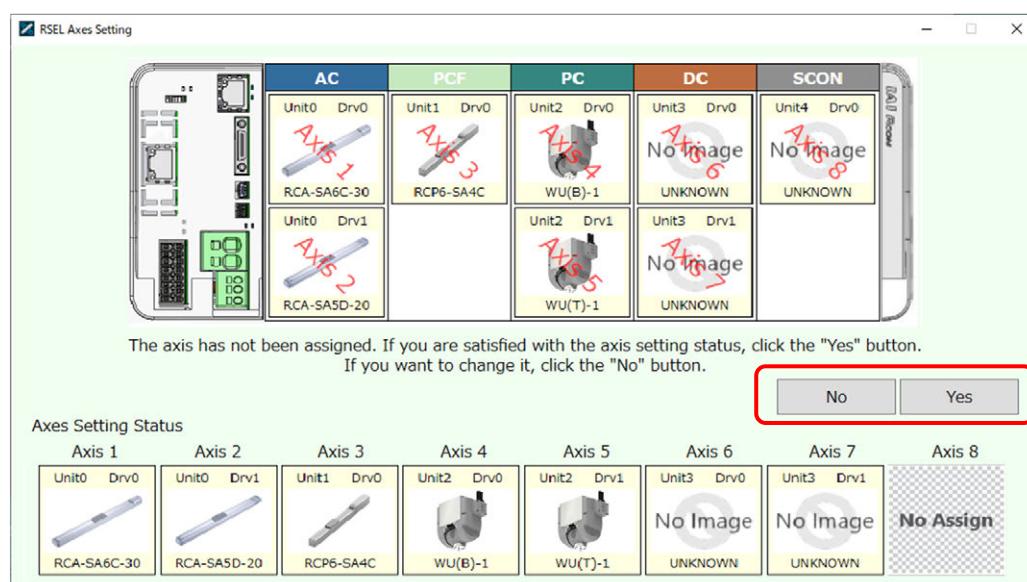


Figure 5.3-1 First startup screen

When [Yes] is pressed

The following message will be displayed. Press "Yes" if you like.

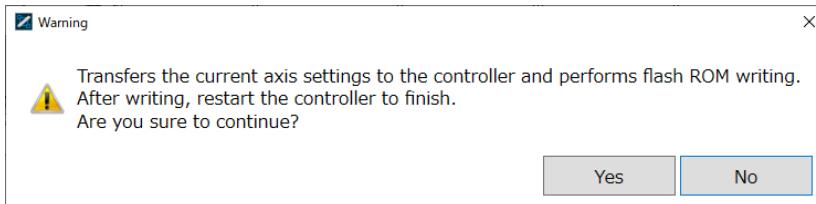


Figure 5.3-2 Confirmation screen for writing to controller



Caution

When writing to the flash ROM, the position data is also initialized.

When [No] is pressed

The screen changes to the screen shown in Figure 5.3-2.

Axis assignment can be performed by dragging the actuator image (hereinafter referred to as axis image) arranged in the physical axis area at the top of the screen and dropping it in the logical axis area.

To release the axis image assigned in the logical axis area,

- Drag the axis image and drop it in the physical axis area
- Select the axis image and right-click → "Unassign" or "Delete" key input
If you want to release them all at once,
 - Right-click in the logical axis area → " Unassign All"
 - In the logical axis area, after selecting all with Ctrl + A, press the "Delete" key

You can cancel with.

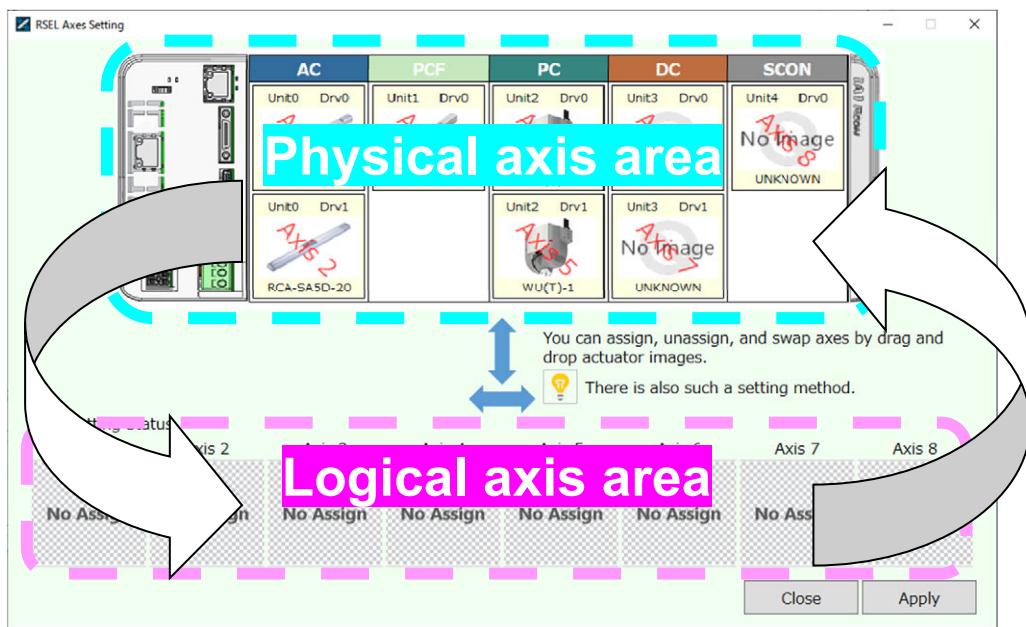


Figure 5.3-3 Axis reset screen

When the assignment is completed, press the "OK" button and the screen shown in Figure 5.3-2 will be displayed.

Press the "Close" button to exit without setting.

5.3.4 Description of each area

[1] Physical axis area

In the physical area, the driver unit and mounted axis images are displayed.

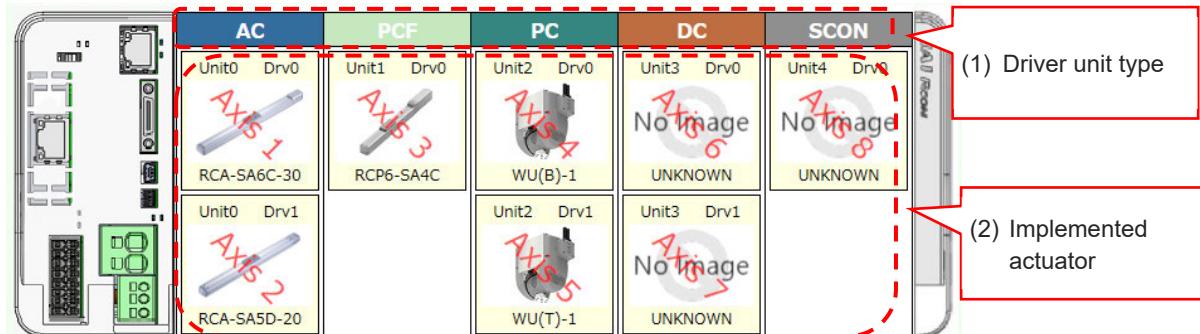


Figure 5.3-4 Physical area image (5 drivers connected)

(1) Driver unit type

They are displayed in the order in which the driver units are implemented.
However, SCON is always displayed as the last driver unit.

(2) Implemented axis image

The following information is displayed on the implemented axis image.

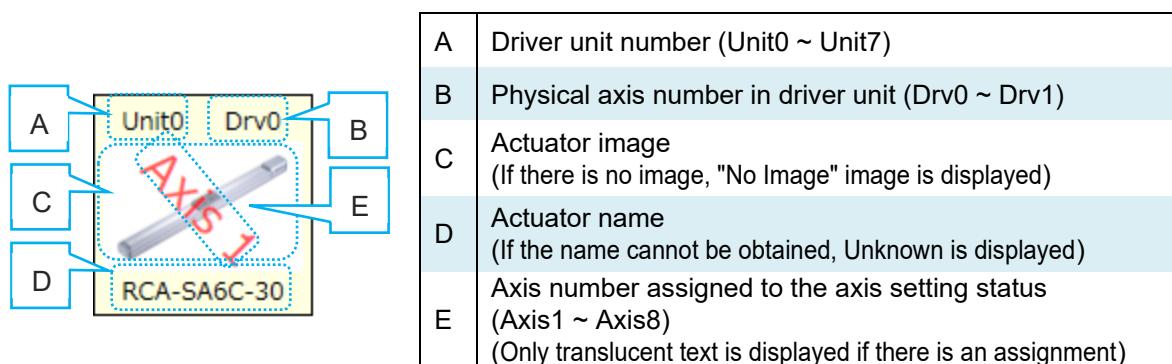


Figure 5.3-5 Implemented axis image

[2] Logical axis area

The assigned axis image is displayed in the logical axis area.

Eight axis slots are always displayed (Axis1 to Axis8), and "Not assigned" is displayed for slots with no axis assigned.

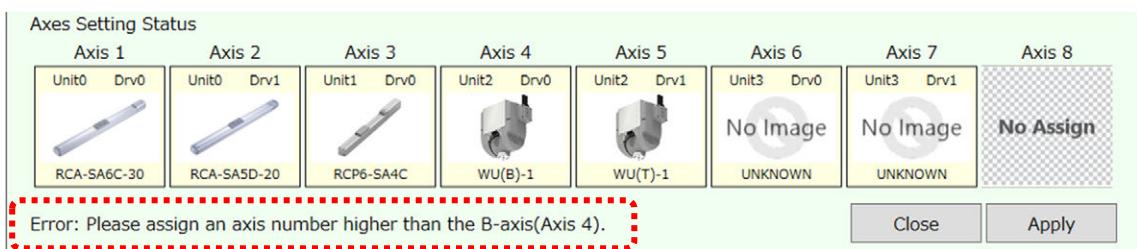


Figure 5.3-6 Axis setting status

Axis images can be moved within the logical axis area.

Note, however, that there are restrictions on the logical axis order for special mechanism axes, so movement of the axes may be restricted.

Example :

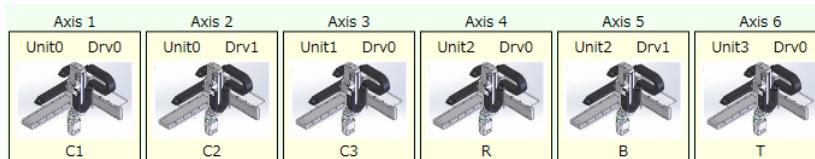
The message in the red dotted frame in Figure 5.3-6 is an error message that appears when trying to assign the axis image of Axis5 to Axis3.

5.3.5 Special mechanism axis

A special mechanism axis is a general term for axes that have a special mechanism as a function of an actuator.

There are the following three types of special mechanism axes.

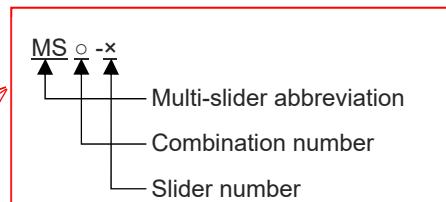
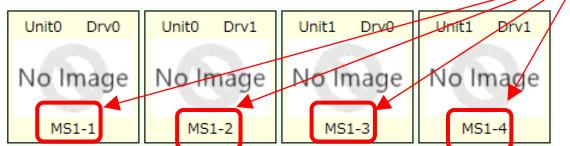
(1) 6-axis Cartesian Robot



There are some restrictions as shown below when a 6-axis Cartesian robot is connected.

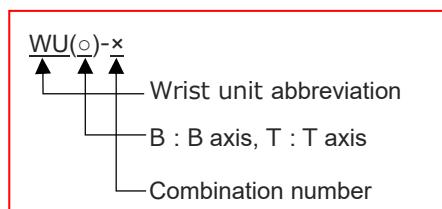
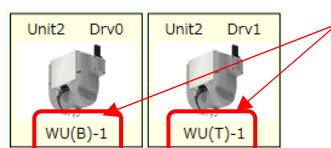
- Regardless of the order of driver units mounted, the logic axis numbers should be fixed.
- It is not available to assign or cancel axes (transfer between physical axis area and logical axis area)
- The actuator names should be C1, C2, C3, R, B and T.
- The figures of actuators are those of the 6-axis cartesian robot.

(2) Multi slider axis



When dragging and dropping the multi-slider axis from the physical axis area to the logical axis area, the axes to be paired (in the above case, MS1-1 to MS1-4) also move.

(3) Wrist unit



When dragging and dropping the wrist unit from the physical axis area to the logical axis area, the axes that are paired also move together. Also, in the logical axis area, the B axis must be assigned to a logical axis number that is always lower than the T axis.

5.3.6 Axis group setting

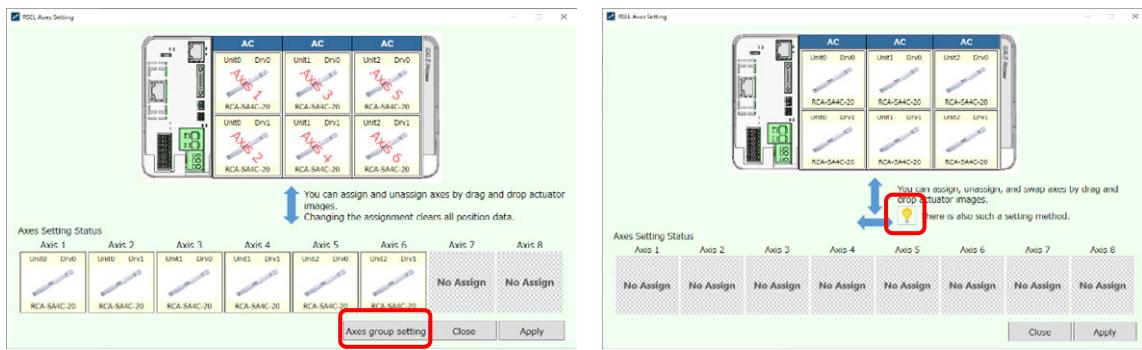


Figure 5.3-7 Axis group setting

With axis group setting, multiple axes can be managed in the unit of "axis group" and independent position data can be set for each axis.

Therefore, if there are two same axis configurations, they can be moved with the same position data. Also, since the position data of the combined axis and the additional axis can be held separately, management becomes easier to understand. If there are two 3-axis combinations, the previous position data was input using Axis1 to Axis6, but by grouping, you can now have two 3-axis position data. In the SEL program, declare the group to be used and specify the position data to be used.

If you click the "Axis group setting" button in Fig. 5.3-7, two groups are displayed in the logical axis area as shown in Fig. 5.3-8, and you can assign axis images to each group.

* For the same axis group, the background color of the axis image in the physical axis area is the same.

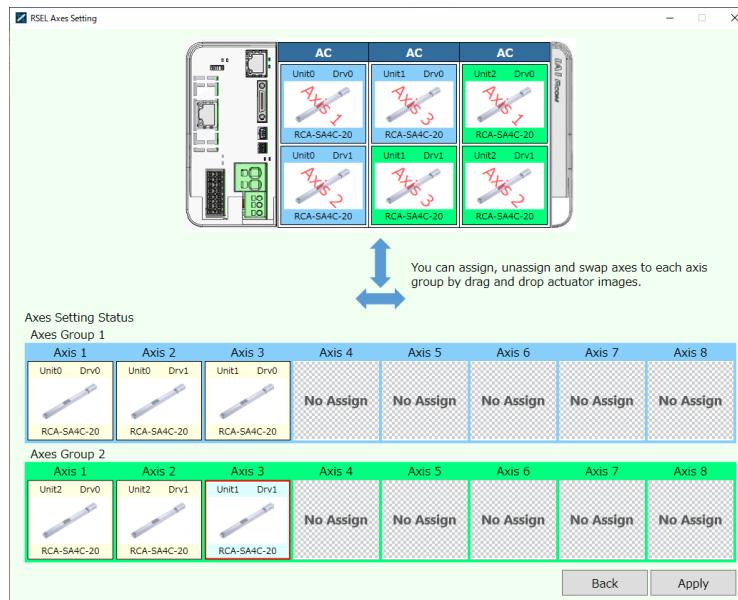


Figure 5.3-8 3-axis assigned to axis groups 1 and 2

5.4 Receiving and Forwarding of I/O Signals Necessary for Operation

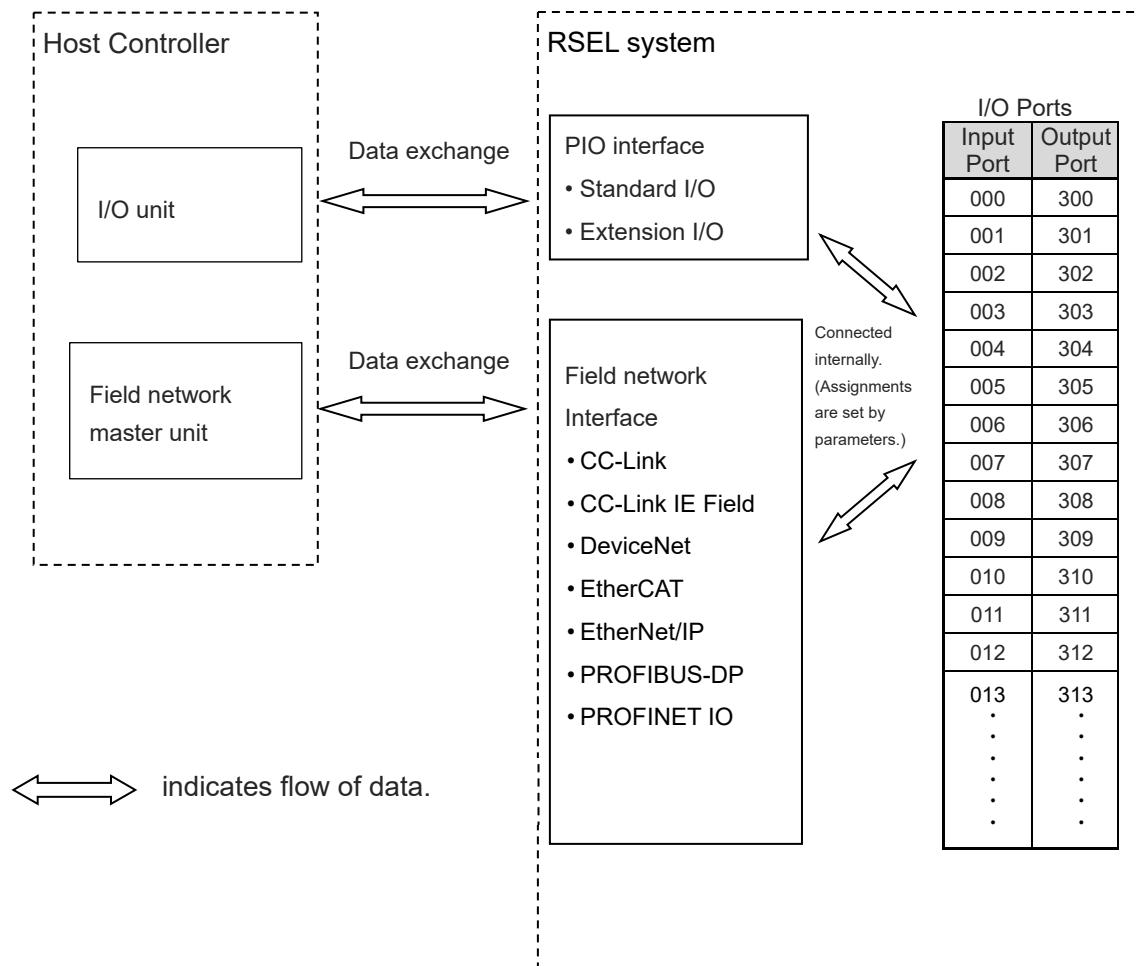
The I/O port can deliver the data with the RSEL controller and external signals through interface.

One port can exchange data for one contact (1 bit).

Data is exchanged via PIOs (24V I/Os) or over a fieldbus.

Either a PIO or field network can connect to each port at a time.

Whether to use PIO or field network is set by a parameter.



Refer to Section 3.5.5, 4.5 for the PIO interface
For each field network, refer to Chapter 6.

5.5 I/O port

[1] I/O port

The RSEL controller can arbitrarily assign each input function and output function to input ports and output ports.

For the input port, set the input function with I/O parameters 30 to 45 (input function selection 000 to 015), and set the port number to assign each set function with I/O parameters 283 to 298.

For the output port, set the output function with I/O parameters 46 to 61 (output function selection 300 to 315), and set the port number to assign each set function with I/O parameters 299 to 314.

Also, the output function is set with I/O parameters 331 to 346 (output function selection 300 (area 2) to 315 (area 2)), and the port number to which each set function is assigned is specified, it can also be I/O parameters 315 ~ 330 and can also set.

Input

No.	Electric Wire Color	Port No.	Function at Standard Setting (factory default)	Remarks
				The input is set as shown in the table at the time of shipment, but the input function can be changed by setting the I/O parameters.
Parameter No.	Parameter Name	Function		
1A 2A	Brown-1 Red-1	/	+24V input	No.30 Input function select 000 0: General-purpose input 1: Program star signal (ON edge) (Input portNo.007 to 014, BCD-specified program number) 2: Program star signal (ON edge) (Input portNo.007 to 014, Binary-specified program number) 3: Program star signal (ON edge) (Input portNo.008 to 014, BCD-specified program number)
5A	Green-1	000	Program start	No.31 Input function select 001 0: General-purpose input 1: Software reset signal (1 second ON)
6A	Blue-1	001	General-purpose input	No.32 Input function select 002 0: General-purpose input 1: Servo ON signal
7A	Purple-1	002	General-purpose input	No.33 Input function select 003 0: General-purpose input 1: Start the program auto start upon power-ON reset/software reset in the AUTO mode 2: Auto-start program signal
8A	Gray-1	003	General-purpose input	No.34 Input function select 004 0: General-purpose input 1: All servo axis soft interlock (OFF level)
9A	White-1	004	General-purpose input	No.35 Input function select 005 0: General-purpose input 1: Operation-pause reset (ON edge)
10A	Black-1	005	General-purpose input	No.36 Input function select 006 0: General-purpose input 1: Operation-pause reset (OFF level)
11A	Brown-2	006	General-purpose input	No.37 Input function select 007 0: General-purpose input 1: Specified program number (LSB : 1st bit)
12A	Red-2	007	Program No. select (LSB : 1st bit)	No.38 Input function select 008 0: General-purpose input 1: Specified program number (2nd bit)
13A	Orange-2	008	Program No. select (2nd bit)	No.39 Input function select 009 0: General-purpose input 1: Specified program number (3rd bit)
14A	Yellow-2	009	Program No. select (3rd bit)	No.40 Input function select 010 0: General-purpose input 1: Specified program number (4th bit)
15A	Green-2	010	Program No. select (4th bit)	No.41 Input function select 011 0: General-purpose input 1: Specified program number (5th bit)
16A	Blue-2	011	Program No. select (5th bit)	No.42 Input function select 012 0: General-purpose input 1: Specified program number (6th bit)
17A	Purple-2	012	Program No. select (6th bit)	No.43 Input function select 013 0: General-purpose input 1: Specified program number (7th bit) 2: Error reset (ON edge)
18A	Gray-2	013	Program No. select (7th bit)	No.44 Input function select 014 0: General-purpose input 1: Driving source cut-off cancellation input (ON edge) 2: Specified program number (MSB : 8th bit)
19A	White-2	014	General-purpose input	No.45 Input function select 015 0: General-purpose input 1: Home return for all valid axes (ON edge) 2: Home-return operation on all the incremental effective axes (ON edge)
20A	Black-2	015	General-purpose input	

5.5 I/O port

Output

No.	Electric Wire Color	Port No.	Function at Standard Setting (factory default)	Remarks		
				Parameter No.	Parameter Name	Function
1B	Brown-3	300	Operation-cancellation level or higher error output (OFF)	No.46 No.331	Output function select 300 Output function select 300 (Area 2)	0: General-purpose output 1: Operation-cancellation level or higher error output (ON) 2: Operation-cancellation level or higher error output (OFF) 3: Operation-cancellation level or higher error output + emergency stop output (ON) 4: Operation-cancellation level or higher error output + emergency stop output (OFF) 5: Cold-start level or higher error output (ON) 6: Cold-start level or higher error output (OFF) 7: Output of an error of maintenance information alert function related message level (Error No. 205 or 206) (ON) 8: Output of an error of maintenance information alert function related message level (Error No. 205 or 206) (OFF)
2B	Red-3	301	READY output (PIO trigger program operation enabled AND absence of cold-start level or higher error)	No.47 No.332	Output function select 301 Output function select 301 (Area 2)	0: General-purpose output 1: READY output (PIO trigger program operation available) 2: READY output (PIO trigger program operation available) and without occurrence of any error at the operation cancellation level or more 3: READY output (PIO trigger program operation available, and without occurrence of any error at the cold start level or more)
3B	Orange-3	302	Emergency stop output (OFF)	No.48 No.333	Output function select 302 Output function select 302 (Area 2)	0: General-purpose output 2: Emergency-stop output (ON) 3: Emergency-stop output (OFF)
4B	Yellow-3	303	General-purpose output	No.49 No.334	Output function select 303 Output function select 303 (Area 2)	0: General-purpose output 1: AUTO mode output 2: Output during automatic operation (When other parameter No. 12 is set to "1")
5B	Green-3	304	General-purpose output	No.50 No.335	Output function select 304 Output function select 304 (Area 2)	0: General-purpose output 1: Output if all valid axes are at home (= 0) 2: Output if all valid axes completed home return (coordinates confirmed)
6B	Blue-3	305	General-purpose output	No.51 No.336	Output function select 305 Output function select 305 (Area 2)	0: General-purpose output 1: Axis 1 in-position output (OFF if the work part is missed during push-motion operation) 2: Output when axis-1 servo is ON 3: System reservation
7B	Purple-3	306	General-purpose output	No.52 No.337	Output function select 306 Output function select 306 (Area 2)	0: General-purpose output 1: Axis 2 in-position output (OFF if the work part is missed during push-motion operation) 2: Output when axis-2 servo is ON 3: System reservation
8B	Gray-3	307	General-purpose output	No.53 No.338	Output function select 307 Output function select 307 (Area 2)	0: General-purpose output 1: Axis 3 in-position output (OFF if the work part is missed during push-motion operation) 2: Output when axis-3 servo is ON 3: System reservation
9B	White-3	308	General-purpose output	No.54 No.339	Output function select 308 Output function select 308 (Area 2)	0: General-purpose output 1: Axis 4 in-position output (OFF if the work part is missed during push-motion operation) 2: Output when axis-4 servo is ON 3: System reservation
10B	Black-3	309	General-purpose output	No.55 No.340	Output function select 309 Output function select 309 (Area 2)	0: General-purpose output 1: Axis 5 in-position output (OFF if the work part is missed during push-motion operation) 2: Output when axis-5 servo is ON 3: System reservation
11B	Brown-4	310	General-purpose output	No.56 No.341	Output function select 310 Output function select 310 (Area 2)	0: General-purpose output 1: Axis 6 in-position output (OFF if the work part is missed during push-motion operation) 2: Output when axis-6 servo is ON 3: System reservation
12B	Red-4	311	General-purpose output	No.57 No.342	Output function select 311 Output function select 311 (Area 2)	0: General-purpose output 1: Axis 7 in-position output (OFF if the work part is missed during push-motion operation) 2: Output when axis-7 servo is ON (System monitored task output) 3: System reservation
13B	Orange-4	312	General-purpose output	No.58 No.343	Output function select 312 Output function select 312 (Area 2)	0: General-purpose output 1: Axis 8 in-position output (OFF if the work part is missed during push-motion operation) 2: Output when axis-8 servo is ON (System monitored task output) 3: System reservation
14B	Yellow-4	313	General-purpose output	No.59 No.344	Output function select 313 Output function select 313 (Area 2)	0: General-purpose output 1: System reservation
15B	Green-4	314	General-purpose output	No.60 No.345	Output function select 314 Output function select 314 (Area 2)	0: General-purpose output 1: System reservation
16B	Blue-4	315	General-purpose output	No.61 No.346	Output function select 315 Output function select 315 (Area 2)	0: General-purpose output
19B 20B	White-4 Black-4		0V output			

- At the default settings, the controller recognizes the ON/OFF durations of input signals if they are approx. 4 msec or longer.
- The ON/OFF duration settings can also be changed using I/O parameter No. 20 (input filtering frequency).



5.6 Position data (Position table)

5.6 Position data (Position table)

Create a position data.

Perform teaching (teaching), etc., and register the coordinates required for the operation in the position data.

Write the position table to the RSEL system.

[Refer to the separate PC teaching software (ME0398)]

- Axis group

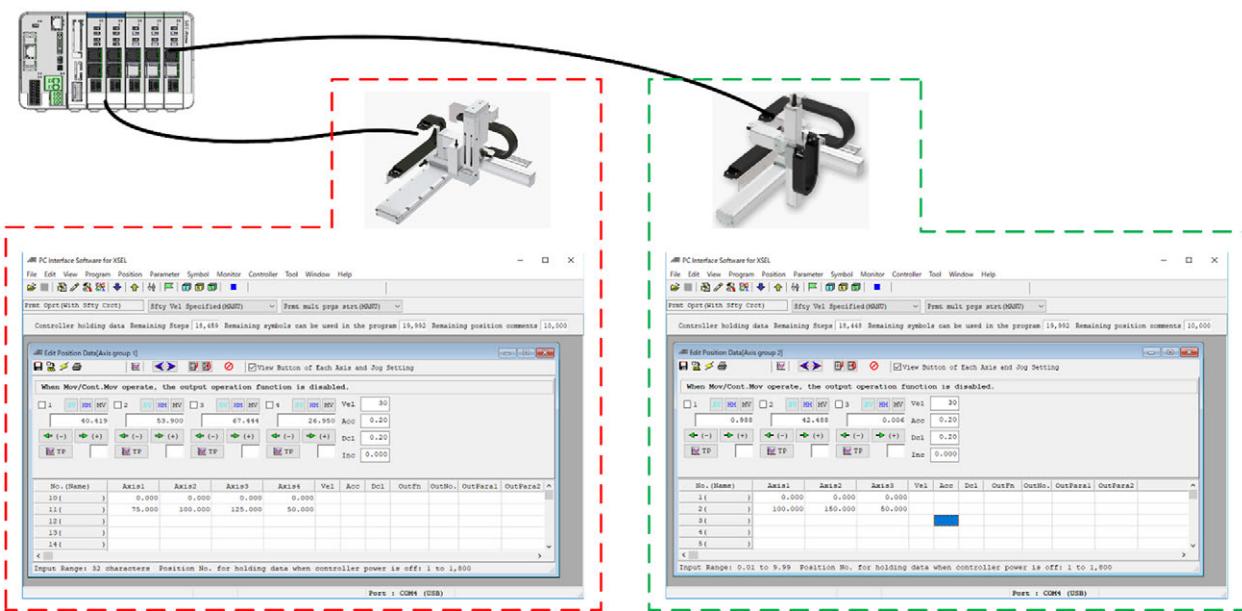
- In the RSEL system, eight controllable axes can be divided into two groups for control.
- Position data is set for each axis group. The number of positions is equally divided by the number of groups.

Number of axis groups.	Number of position data
1	36000
2	18000

- About the axis group to be operated

- (1) Set the initial value for each SEL program. If not set, it is axis group 1.
 - (2) Select the axis group using the dedicated SEL instruction (AGRn).
- * Refer to [5.3.6 Axis group setting] for axis group assignment settings.

- Image



Group 1: 4-axis combination

Group 2: 3-axis combination

5.7 Programming

Create a program in SEL language.

[Refer to the separate SEL language programming manual (ME0224)]

After creating the program, write the program to the RSEL system.

[Refer to the separate PC teaching software (ME0398)]

5.7.1 SEL command word list

[Refer to the separate SEL language programming manual (ME0224)]

5.7.2 Symbol extension

Supports the number of symbol definitions / uses, the number of symbol characters, and full width.

	RSEL system
Number of definitions	2000
Number of uses	20000
Character count	40 1-byte characters, 20 2-byte characters

5.7.3 Step comment number of characters

The following comment character count are available:

	RSEL system
Comment character count	32 1-byte characters, 16 2-byte characters

5.7.4 Position data comment

10000 positions can be saved (Flash ROM).

	RSEL system
Comment character count	32 1-byte characters, 16 2-byte characters

5.7.5 SEL data list

Function	Global region	Local region
Input port	000-299 (300)	—
Output port	300-599 (300)	—
Extension input port	1000-3999 (3000)	—
Extension output port	4000-6999 (3000)	—
Flag	600-899 (300)	900-999 (100)
Integer variables	200-299 (100)	1-99 (99)
	1200-1299 (100)	1001-1099 (99)
	2000-2799 (800)	
Real variables	300-399 (100)	100-199 (100)
	1300-1399 (100)	1100-1199 (100)
String	300-999 (700)	1-299 (299)
Tag No.	—	1- 256 (256)
Sub-routine No.	—	1-99 (99)
Work coordinate system No.	0-15 (16)	—
Tool coordinate system No.	0-15 (16)	—
Simple interference check zone No.	1-10 (10)	—
Zone No.	1-4 (4)	—
Palletize No.	—	—
Axis No.	1-8 (8)	—
Axis pattern	0-11111111	—
Axis group No.	1 – 2	—
Position-data count	Axis group count 1 : 36000 Axis group count 2 : 18000	—
Position comment (32 1-byte characters)	Max. 10000 position	—
Program No.	1-512 (512)	—
Steps No.	1-20000 (20000)	—
Task level	NORMAL/HIGH (2)	—
SIO channel No.	1 (1)	—
WAIT timer	—	1
1-shot-pulse timer (Simultaneous operation possible)	—	16
Ladder timer	—	Local flag (100)
Virtual input and output port ^(Note 1)	7000-7599 (600)	—
Symbol definition count	2000	
Symbol usage count in command	20000 (Together with literals)	
Error history count	400	

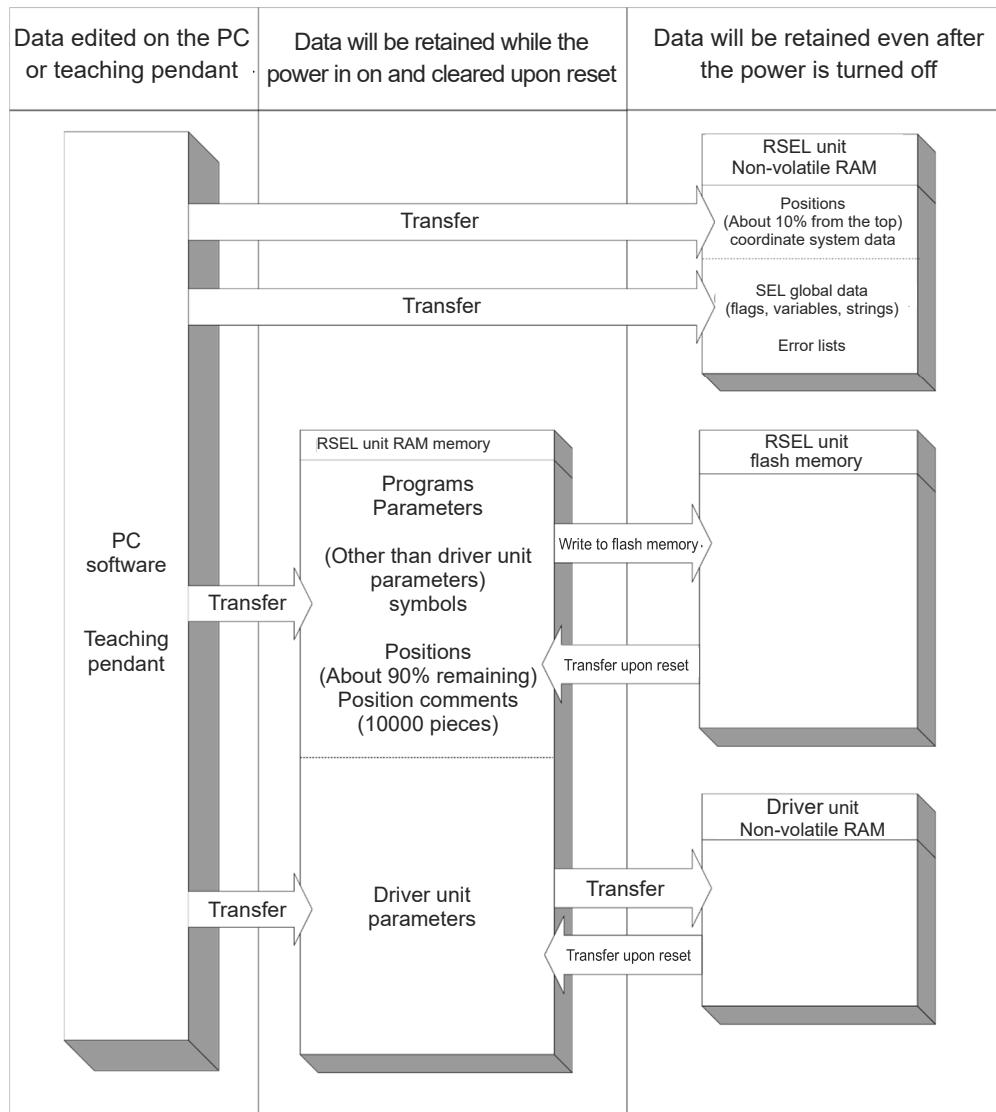
Note 1 For the detail of the virtual input and output ports, refer to 2.1.10 RSEL Controller [2]
Virtual Input and Output Ports in SEL Language Programming Manual (ME0224).

5.7.6 Memory map

The RSEL has a storage area by holding memory and a storage area by flash memory.

When data is transferred from the PC software or teaching pendant to the controller, the data is only written to the main CPU memory as shown in the diagram below and will be erased once the controller is powered down or reset.

For important data, always write to the flash memory so that they will not be lost.



Since the programs, parameters and symbols are read from the flash memory at restart, the data in the temporary memory will remain the same as the original data before edit unless the edited data are written to the flash memory.

The controller always operates in accordance with the data in the main CPU memory (excluding the parameters).

Note: The first 10% of the position data is stored in non-volatile RAM and the rest in flash memory.

Comments for each position data can be used for up to 10,000 positions regardless of the position number, and are saved in flash memory.



Caution

•Point to note when transferring data and writing to the flash memory

Never turn off the main power while data is being transferred or written to the flash memory. The data will be lost and the controller operation may be disabled.

•Point to note when saving parameters to a file

The driver unit parameters are stored in the driver unit itself
(Unlike other parameters, they are not stored in the RSEL unit).

The driver unit parameters will be read from the driver unit when the power is turned on or upon software reset. Therefore, if no driver unit is connected, the driver unit parameters will not be saved.

•Point to note when transferring a parameter file to the controller

When a parameter file is transferred to the controller, the driver unit parameters will be transferred to the driver unit. Therefore, when transferring the driver unit parameters, use the same driver unit configuration as when the parameter file was saved.

•About saving position data

The storage area for position data is 10% non-volatile RAM from the beginning and flash memory for the rest.

Position data comments are stored in flash memory. Therefore, if the power is turned off or software reset is performed without writing to the flash ROM, 90% of the position data and the position data comment are erased, and the data from the previous flash ROM writing is read. If you want to keep the data, write to flash ROM.

•About memory initialization

The position data, maintenance information data and SEL global data are not initialized even if an error is detected (abnormal data remains), so do not use the data as it is. To clear the error, initialize the memory of the data for which an error was detected.

In the case of position data, write to the flash ROM after initialization.

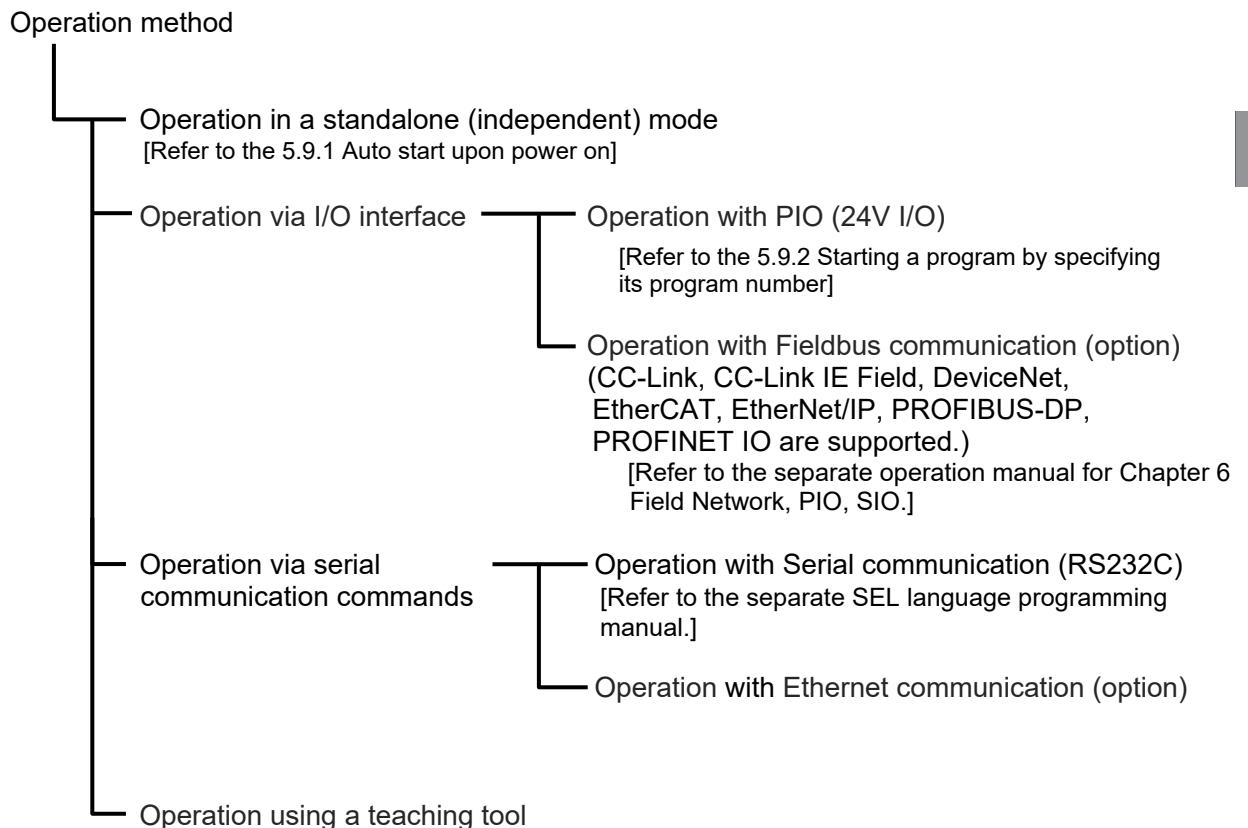
(Reference) Memory initialization method using PC software.

- Position data : [Controller] → [Memory initialization] → [Position]
- SEL global data : [Controller] → [Memory initialization] → [Global variables / flag]
- Maintenance information data : [Monitor] → [Maintenance information] → [Information initialization]

(Can be initialized when error No.405 occurs)

5.8 Types of Operations

The RSEL controller is a programming controller that can operate without a host controller. Programming for this controller uses IAI's dedicated programming language (SEL language). [Refer to the separate SEL Language Programming Manual.]



5.9 How to operate

For the operation there are two ways of start-up. One is the automatic start-up of the set program No. and the other is to start up with the program No. selected externally.

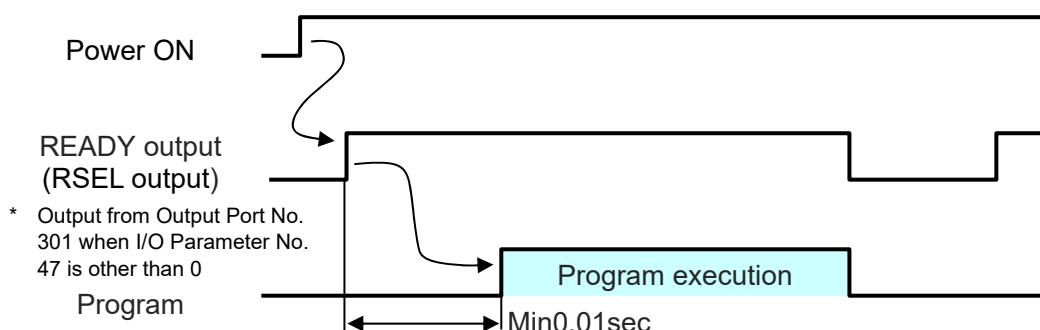
5.9.1 Auto start upon power on

After the power is turned ON, the program with its No. registered in the RSEL controller, can be automatically started up.

- (1) Connect the teaching tool and set the I/O parameter No. 33 to "1" and set the program No. to be started up in the parameter No. 1.

Parameter type and No.	Set Value	Description
I/O parameter No. 33	0	Input port 003 is designated as a general-purpose input.
	1 (factory default)	In the AUTO mode, when the power is turned ON or the software reset is performed, the program No. set in parameter No. 1 (for others) is executed. The input port 003 can be used as a universal input port.
	2	When input port 003 is turned ON, the program whose number is set in other parameter No. 1 is executed. When this port is turned OFF, all currently running programs stop.
I/O parameter No. 286	-1 (factory default)	Indicate the port number to assign the feature in I/O Parameter No. 33 "Input Function Select 003"
Other parameter No. 1	1 to 512	Set the program number of the program you want to start automatically.

- (2) Set the operation mode setting switch on the RSEL controller to the AUTO position.
- (3) Turn off the power and then turn it back on.
- (4) The RSEL controller is restarted (the RDY signal turns ON to indicate a successful start), after which the specified program starts.





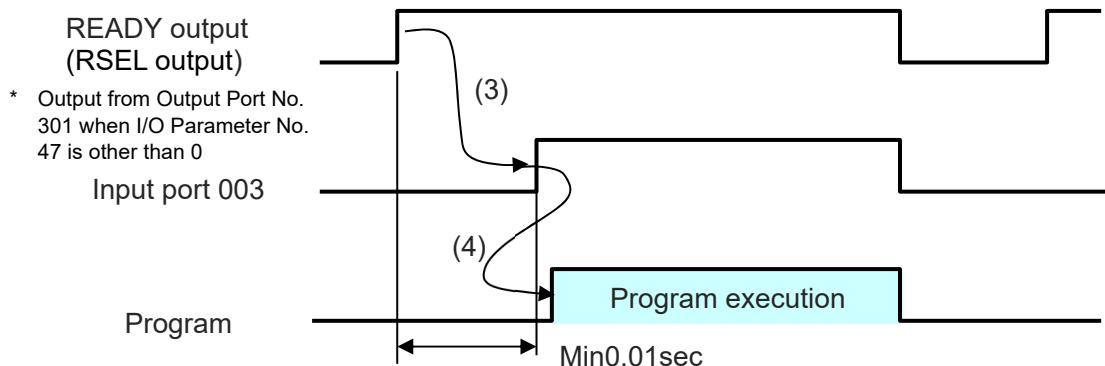
Caution

After the power is turned on, unexpected movements of the robot may create dangerous situations.

For safety, provide an interlock whereby the program is started only after a start confirmation signal has been input from a pushbutton switch, etc.

An example of operation is given below.

- (1) Set the parameter No. 33 to "2". The program starts when input port 003 is turned ON, and stops when the port is turned OFF.
- (2) Set the operation mode setting switch on the RSEL controller to the AUTO position.
- (3) Turn off the power and then turn it back on.
- (4) Make sure input port 003 is turned ON after a wait time of 0.01 sec following the start of the RSEL controller (the RDY signal turns ON to indicate a successful start).
- (5) The specified program starts.



5.9.2 Starting a program by specifying its program number

The program to be started up, can be started with its number specified externally and start-up signal input.

(1) Connect the teaching tool and perform the setting, referring to the set values in the following table.

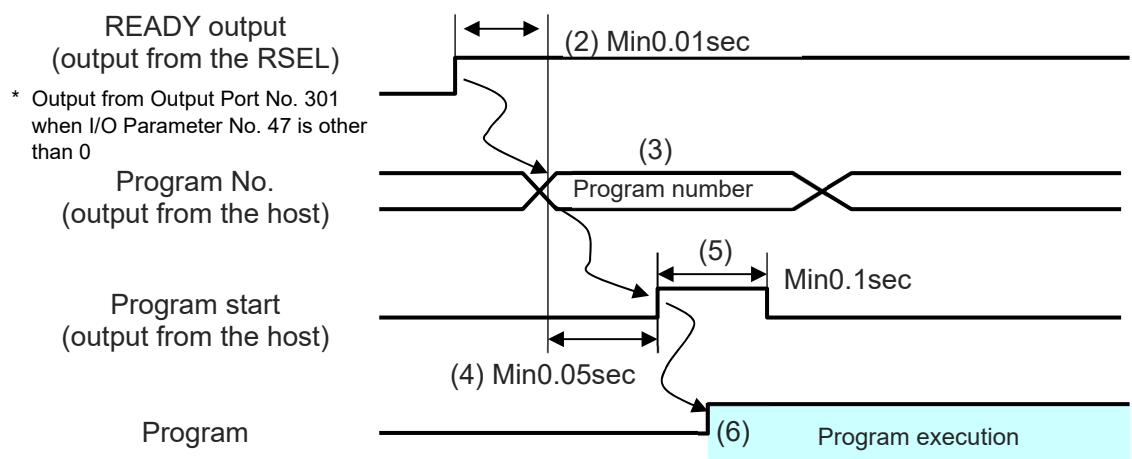
Parameter type and No.	Set Value	Description	Setting
I/O parameter No. 30	0	Input port 016 is designated as a general-purpose input.	1 or 4
	1 (factory default)	After the program number to be started up, is set in the input port 007 (LSB) to 014 (MSB) with BCD, turning ON the input port 000 starts up the program. Turning ON the input port 000 for 0.1 sec or more.	
	2	After the program number to be started up, is set in the input port 023 (LSB) to 030 (MSB) with BCD, turning ON the input port 016 starts up the binary. Turning ON the input port 016 for 0.1 sec or more.	
	3	After the program number to be started up, is set in the input port 008 (LSB) to 014 (MSB) with BCD, turning ON the input port 000 starts up the program. Turning ON the input port 000 for 0.1 sec or more.	
	4	After the program number to be started up, is set in the input port 008 (LSB) to 014 (MSB) with BCD, turning ON the input port 000 starts up the binary. Turning ON the input port 000 for 0.1 sec or more.	
No. 30 = 1 or 2	I/O parameters No. 37 to 43	0 Input ports 007 to 013 are set as general-purpose inputs. 1 (No.44= "2") Input ports 007 to 013 are set as start program number specification ports.	1 (No.44= "2")
	I/O parameters No. 38 to 44	0 Input ports 008 to 014 are set as general-purpose inputs. 1 Input ports 008 to 014 are set as start program number specification ports.	
I/O parameter No. 283	-1 (factory default)	Indicate the port number to assign the feature in I/O Parameter No. 30 "Input Function Select 000"	

Caution



The maximum number of programs is 512. However, the programs able to start up with the BCD Code indication are from No. 1 to No.99. To start up No. 100 to No. 512 when using BCD Code, start them up with using the automatic start program startup or the program startup command "EXPG".

- (2) Input the program No. 0.01sec or more after the RSEL controller is started up (after normal start-up = RDY signal ON).
- (3) Set in the input ports set by I/O parameter No. 30, the program number of the program you want to start.
- (4) Set the program No. and 0.05 sec. or more later, turn ON the input port 000 (program start).
- (5) Turn ON input port 000 (program start) and keep it ON for 0.1 sec.
- (6) The specified program starts.





Field Network, PIO, SIO

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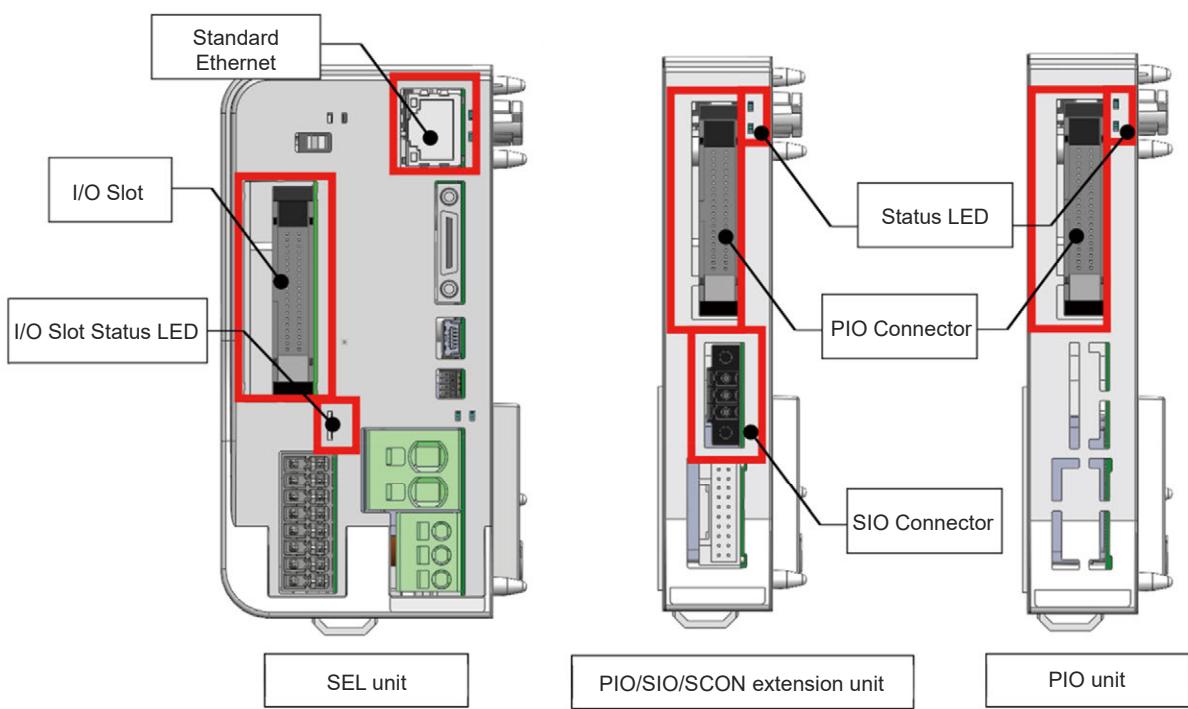
6.1 Interface Specifications

It is available to mount the PIO module or each type of the field network modules to the I/O slot. The model codes mounted are as shown below.

Model Code	Mounted Module	Remarks
RSEL-G-E	I/O slot Not Used	
RSEL-G-NP	PIO (NPN) type	NPN IN16/OUT16
RSEL-G-PN	PIO (PNP) type	PNP IN16/OUT16
RSEL-G-CC	CC-Link connection type	
RSEL-G-CC2	CC-Link connection type	Two-way connector enclosed
RSEL-G-CIE	CC-Link IE Field connection type	
RSEL-G-DV	DeviceNet connection type	
RSEL-G-DV2	DeviceNet connection type	Two-way connector enclosed
RSEL-G-EC	EtherCAT connection type	
RSEL-G-EP	EtherNet/IP connection type	
RSEL-G-PR	PROFIBUS-DP connection type	
RSEL-G-PRT	PROFINET IO connection type	

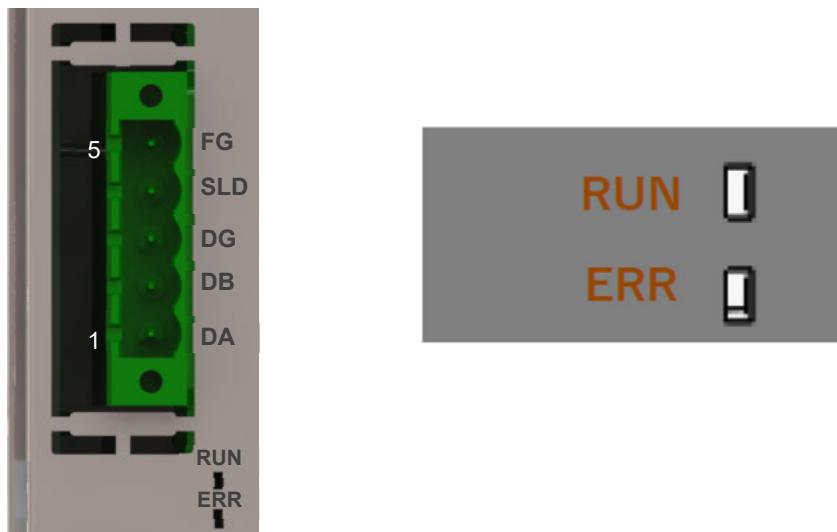
Also, by linking the PIO/SIO/SCON extension unit or PIO unit to SEL unit, it comes available to extend the number of PIO points or to use the field network and PIO in parallel.

One unit of PIO/SIO/SCON extension unit and eight units of PIO unit (seven units if PIO/SIO/SCON extension unit is used) at the maximum can be linked in line.



6.1.1 I/O Slot

(1) CC-Link connection type



- Interface Specifications

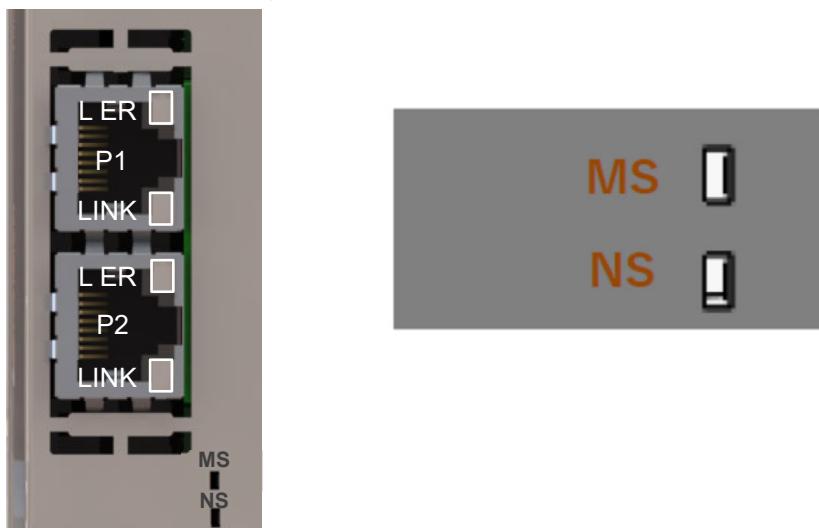
Item	Description
CC-Link version	Ver.1.10/Ver.2.00 (Determined by number of I/O points used in CC-Link)
By station type	Remote device station
Number of occupied stations	1 to 4 Station (Determined by number of I/O points used in CC-Link)
Extended Cyclic Setting	1/2/4 times (Determined by number of I/O points used in CC-Link)
station number	1 to 64 (Software setting by I/O parameters)
Communication speed	10M/5M/2.5M/625k/156kbps (Software setting by I/O parameters)

- I/O Slot Status LED

LED name	Color	Status	Description
RUN	Green	Light ON	After joining the network, refresh & poll normal reception or refresh normal reception
ERR	Orange	Light ON Blinking	Error Occurred (CRC Error / Station Number Setting Error / Baud Rate Setting Error) Value of station number or baud rate setting changed when reset canceled

6.1 Interface Specifications

(2) CC-Link IE Field connection type



- Interface Specifications

Item	Description
Ethernet Standard	Conform to IEEE802.3ab (100BASE-T)
Communication speed	1Gbps
Communication Control System	Token-Passing Method
Topology (Connection Form)	Line, Star, Ring and Mixed Star and Line
By station type	Intelligent Device Station
Max. Connectable Units	254 Units (Total of Master and Slave Stations)
Max. Networks	239 Networks
Max. Distance between Stations	100 mm

- I/O Slot Status LED

LED name	Color	Status	Description
NS	Green	Light ON	Normal operation
		Light OFF	Hardware error occurred, Power not supplied
	Orange	Light ON	Error occurred (Node Error / Station Number Setting Error)
		Light OFF	Operation in Normal Condition, Power not supplied
NS	Green	Light ON	Cyclic transmission ON
		Blinking	Cyclic transmission OFF
		Light OFF	Cyclic Transmission not Conducted, In parallel off, Power not supplied
	Orange	Light ON	Receive data error (Lit simultaneously with L ER)
		Light OFF	Received data in normal condition, Power not supplied
LINK	Green	Light ON	Link up
		Light OFF	In link down, Power not supplied
L ER	Yellow	Light ON	Receive data error
		Light OFF	Received data in normal condition, Power not supplied

(3) DeviceNet connection type



• DeviceNet interface specifications

Item	Description
Communication Protocol	DeviceNet2.0 Group 2 Only Server
Communication Method	<ul style="list-style-type: none"> • Bit Strobing • Polling • Cyclic / Change of State
Number of Occupied Nodes	1
Node Address	0 to 63 (Software setting by I/O parameters)
Communication speed	500k/250k/125kbps (Software setting by I/O parameters)

• I/O Slot Status LED

LED name	Color	Status	Description
MS	Green	Light ON	Normal operation
		Blinking	There is no configuration information or incomplete
	Orange	Light ON	Malfunction (Recovery impossible)
		Blinking	Malfunction (Recovery possible)
	Green /Orange	Alternate	In self diagnosis
NS	Green	Light ON	Online status
		Blinking	Online status (No connection established)
	Orange	Light ON	Error occurred
		Blinking	Timeout on one or more connections
	Green /Orange	Alternate	In self diagnosis

(4) EtherCAT connection type



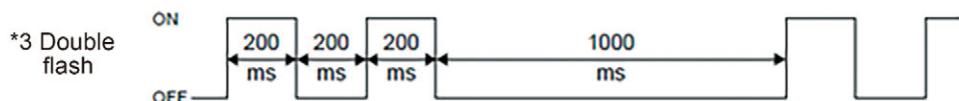
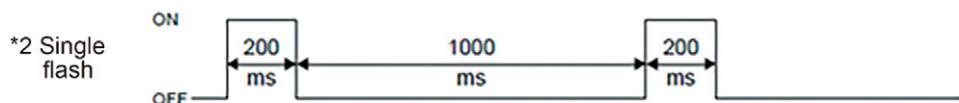
• EtherCAT interface specifications

Item	Description
Applicable Profile	CoE (CAN over Ethernet)
Device Type	I/O Device
Node Address	1 to 65535 (Setting to be established from master or software setting by I/O parameters)
Communication speed	100Mbps
Communication mode	100BASE-TX (Full duplex)
Cable	Category 5e or higher
Connector	RJ45 × 2

* As it is not applicable for the distribution clock in EtherCAT (R), synchronizing control cannot be performed.

- I/O Slot Status LED

LED name	Color	Status	Description
RUN	Green	Light ON	EtherCAT Communication In "OPERATION" condition
		Blinking*1	EtherCAT Communication In "PRE-OPERATION" condition
		Single flash*2	EtherCAT Communication In "SAFE-OPERATION" condition
	Orange	Light ON	Malfunction (Recovery impossible)
	-	Light OFF	EtherCAT communication in "INIT" condition Power not supplied
ERR	Orange	Light ON	Unrecoverable error
		Blinking*1	Network construction error
		Double flash*3	Watchdog timeout
	-	Light OFF	No error detected Power not supplied
Link/Activity	Green	Light ON	In link (Communication traffic not detected)
		Flickering*4	In link (Communication traffic detected)
	-	Light OFF	No link detected Power not supplied



6.1 Interface Specifications

(5) EtherNet/IP connection type



• EtherNet/IP interface specifications

Item	Description
Applicable Protocol	CIP, TCP/IP
Device Type	Generic Device
IP address	1.0.0.1 to 254.255.255.254 (*1) (Software setting by I/O parameters)
Port Number	2222 (UDP) (*2) 44818 (TCP/UDP) (*2)
Communication speed	10/100Mbps (Software setting by I/O parameters)
Communication mode	10BASE-T/100BASE-TX (Half duplex / Full duplex) (Software setting by I/O parameters)
Cable	Category 5 or higher (*3)
Connector	RJ45×1

*1: As 1st Octet = 127 or 4th Octet = 0 and 225 are reserved addresses, they are not available for use.

*2: It is the port numbers to be used in EtherNet/IP.

*3: STP cable is recommended

• I/O Slot Status LED

LED name	Color	Status	Description
NS	Green	Light ON	Online status, In the normal communication
		Blinking	Online status, No connection
	Orange	Light ON	IP addresses duplicated Critical link error
		Blinking	Connection timeout
	—	Light OFF	Power not supplied IP address setting not established
NS	Green	Light ON	Normal operation
		Blinking	Configuration setting not established, incomplete or trial run needed
	Orange	Light ON	Error impossible to recover
		Blinking	Error possible to recover
	—	Light OFF	Power not supplied

(6) PROFIBUS-DP connection type



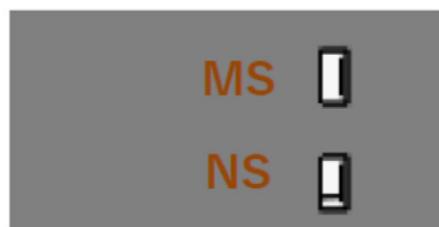
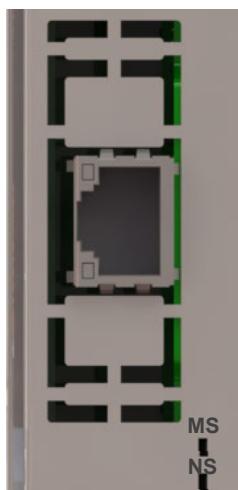
• PROFIBUS-DP interface specifications

Item	Description
Communication protocol	PROFIBUS-DP
Number of occupied stations	1
Station Address	0 to 125 (Software setting by I/O parameters)
Communication speed	12M/6M/1.5M/500k/187.5k/93.75k/45.45k/19.2k/9.6kbps (automatic recognition)

• I/O Slot Status LED

LED name	Color	Status	Description
MS	Green	Light ON	Normal operation
		Blinking	There is no configuration information or incomplete
NS	Orange	Light ON	Malfunction (Recovery impossible)
	Green	Light ON	Online status
		Blinking	Online status (Configuration setting not established)
	Orange	Blinking	Error occurrence

(7) PROFINET IO connection type

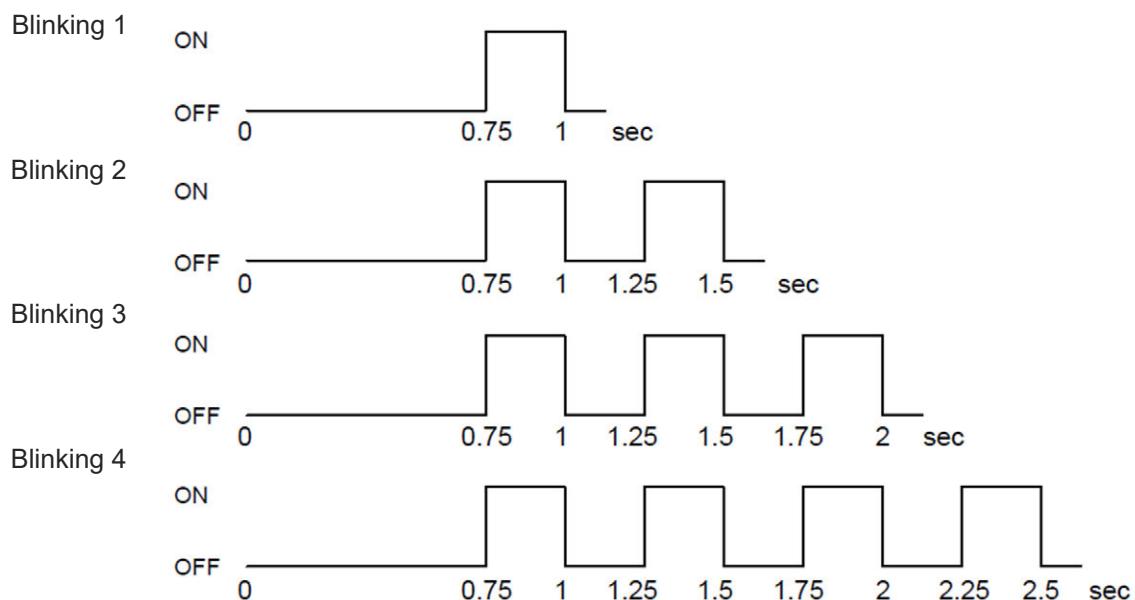


•PROFINET IO interface specifications

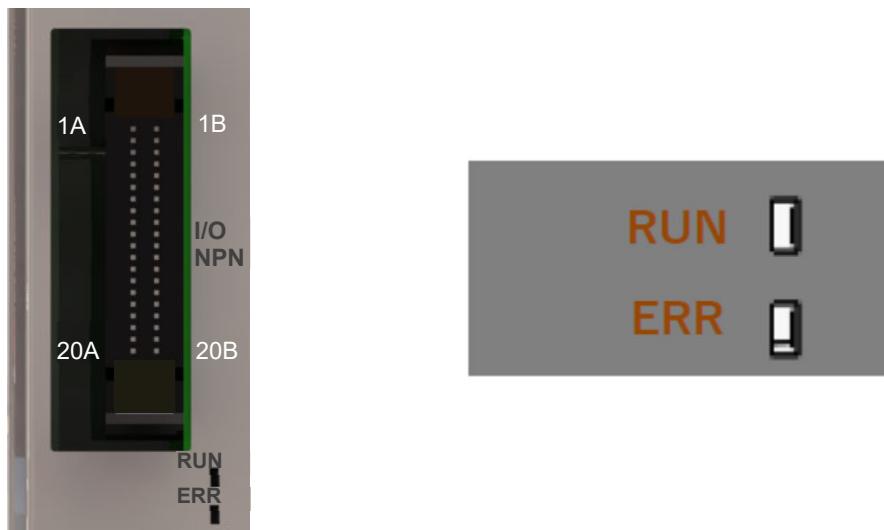
Item	Description
Applicable Protocol	PROFINET IO
Conformance Class	A (RT Communication)
Device Class	I/O Device
IP address	0.0.0.0 to 255.255.255.255 (Setting to be established from master via PROFINET network)
Communication speed	100Mbps
Communication mode	100BASE-TX
Cable	Category 5 or higher
Connector	RJ45 x 1

- I/O Slot Status LED

LED name	Color	Status	Description
NS	Green	Light ON	Normal operation
		Blinking 1	In diagnosis event
		Blinking 2	Node identification in process for engineering tool
	Orange	Light ON	Exception error
		Blinking 1	Configuration error
		Blinking 2	IP address error (IP address setting not established)
		Blinking 3	Station name error
		Blinking 4	Internal error
	—	Light OFF	Power turned off or initialization incomplete
NS	Green	Light ON	Online (RUN) (Host IO controller in RUN status)
		Blinking	Online (STOP) (Host IO controller in STOP status)
	—	Light OFF	Offline (Power turned off or connection to host IO controller not established)
Link/Activity	Green	Light ON	Link established (no communication)
		Blinking	Link established (in communication)
	—	Light OFF	Link not established



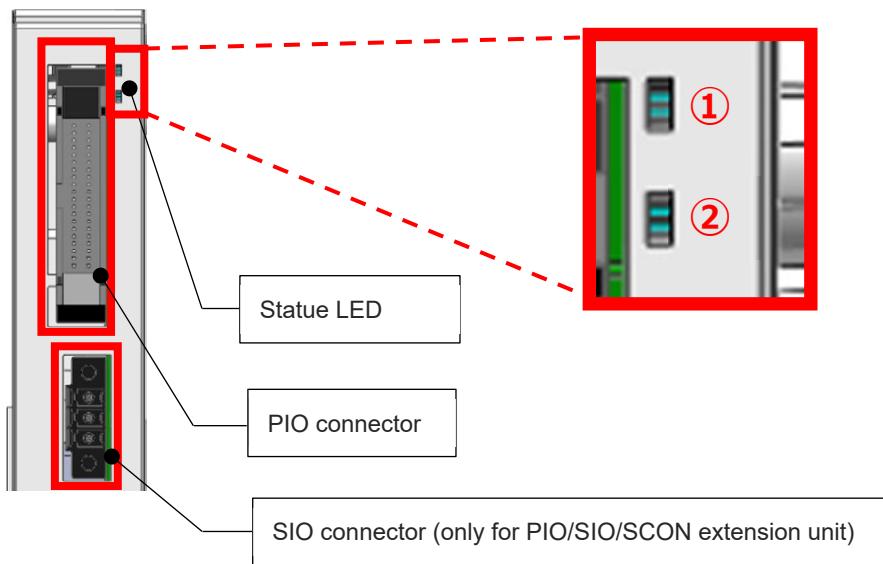
(8) PIO type



- I/O Slot Status LED

LED name	Color	Status	Description
RUN	Green	Light ON	Turns on when initialization complete, Operation in normal condition
ERR	Orange	Light ON	PIO power supply (24V DC) voltage drop error

6.1.2 PIO/SIO/SCON extension unit, PIO unit



- Interface Specifications

	LED name	Color		Status
		Green	Red	
(1)	Total Frame Communication Status LED	Blinking	Light OFF	In configuration communication
		Light ON	Light OFF	In normal communication
		Light OFF	Light ON	Total frame communication error
		Light OFF	Light OFF	Updating
(2)	PIO Unit Status LED	Light ON	Light OFF	Normal operation
		Light OFF	Light ON	Control power supply voltage dropped
		Light OFF	Light ON	IO power voltage dropped
		Blinking	Light OFF	Updating

- SIO interface specifications

Item	Description
Interface standards	RS485
Communication Method	Start-Stop Synchronous Half Duplex Communication
Baud Rate (bps)	9.6k/19.2k/38.4k/57.6k/115.2k/230.4k
Data length	7 or 8 bits
Start bit	1 bit
Stop bit	None, Odd or even

6.2 Functional Specifications

6.2.1 List of Applicable Devices

The features applicable for each I/O interface are as shown in the list below.

O: Applicable, X: Not Applicable

Function	Field Network / PIO module								PIO unit / PIO/SIO/SCON extension unit	
	CC	CIE	DV	EC	EP	PR	PRT	NP/ PN	PIO	SIO
Parallel I/O	x	x	x	x	x	x	x	o	o	x
Remote I/O	o	o	o	o	o	o	o	x	x	x
Serial Communication by SEL Program (RS485)	x	x	x	x	x	x	x	x	x	o

CC : CC-Link, CIE : CC-Link IE Field, DV : DeviceNet, EC : EtherCAT, EP : EtherNet/IP,

PR : PROFIBUS-DP, PRT : PROFINET IO, NP/PN : PIO module

6.2.2 Parallel I/O and Remote I/O

(1) I/O Points

- PIO Type

There should be 16 points of input and 16 points of output. (Change in number of used points not available unlike field network)

By linking the PIO/SIO/SCON extension unit and PIO unit to PIO type SEL unit, it is available to have PIO to use 144 points of input and 144 points of output at the maximum.

* Number of input and output points available to use when N units of PIO unit linked in line:

$$16 \text{ points} + 16 \text{ points} \times N \text{ units}$$

• Field Network Type

By establishing the setting by I/O parameters, it is available to use 1024 points of input and 1024 points of output at the maximum. (Number of points to use should be indicated in 8 points as one unit)

(2) Input and Output Port Assignment

- I/O used in PIO (except for PIO modules) and the field networks should be assigned to the input ports from No. 0 to 299, output ports from No. 300 to 599, extension input ports from No. 1000 to 3999 and extension output ports from No. 4000 to 6999.
- I/O used in PIO (PIO modules) should be assigned to the input ports from No. 0 to 299 and output ports from No. 300 to 599.
- The priority in the automatic assignment should provide the order of the field network or PIO module ⇒ PIO/SIO/SCON extension unit / PIO unit. Also, among PIO/SIO/SCON unit and PIO unit, assignment should be given from units closer to SEL unit.
- In the fixed assignment, assignment for PIO/SIO/SCON extension unit and PIO unit should be available in the input ports/extension input ports and output ports / extension output ports. PIO module is available only of assignment to the input ports and output ports.

• Divided Assignment Feature

In response to the number of used I/O points in the field network, PIO/SIO/SCON extension unit or PIO unit, assignment should be available divided to both ports of the input ports / extension input ports and output ports / extension output ports.

[Specification]

- The last assignment port numbers on the input and output port side are No. 295 for the input ports and No. 595 for the output ports, and the remaining should be assigned from No. 1000 of the extension input ports and No. 4000 of the extension output ports. The input ports from No. 296 to 299 and the output ports from No 596 to 599 are the area not to be used.
- The minimum number of assignment points on the input and output port side should be eight points for the field network and 16 points for PIO/SIO/SCON extension unit / PIO unit. (For PIO/SIO/SCON extension unit / PIO unit, it is necessary to secure number of points used in one unit.) When assignment is to be made from the input and output port side to the start port number in the fixed assignment, make sure to have the port number capable to secure the minimum number of assignment points. An error should occur if not possible to secure.

Item		Specification	Remarks
Assigned Input and Output Ports	Automatic Allocation	Input port No.	0 to 299 1000 to 3999
		Output port No.	300 to 599 4000 to 6999
	Fixed Allocation	Input Port No.	0 to 299 1000 to 3999
		Output port No.	300 to 599 4000 to 6999
Error Monitoring Feature (Line Breakage Detection Feature)	Equipped		
Input Port Data Select Feature in Line Breakage	Equipped		Selection from RSEL input data clear / hold in line breakage
Divided Assignment Feature	Equipped		

[Reference] •When using 1024 points in field network and 128 points in PIO by automatic assignment

I/O specifications	Input and Output	Assigned Port Number
Field Network	Input	0 to 295 (296 points), 1000 to 1727 (728 points)
	Output	300 to 595 (296 points), 4000 to 4727 (728 points)
PIO	Input	1728 to 1855 (128 points)
	Output	4728 to 4855 (128 points)

6.2.3 I/O Ports and Reading and Writing of Data

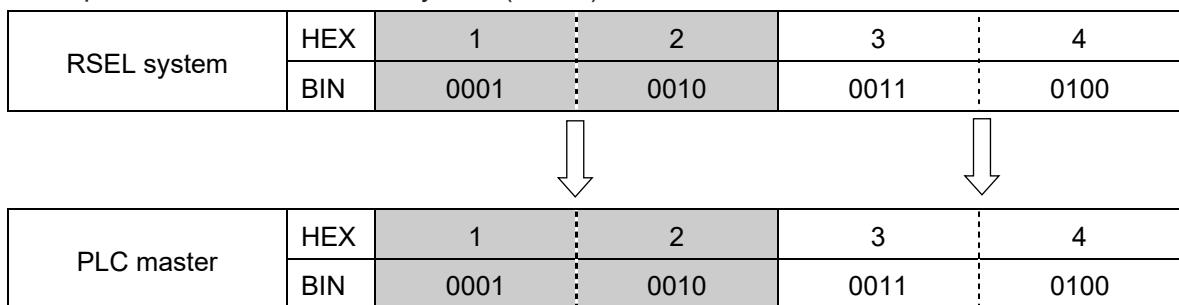
The initial setting in the RSEL system is set to conduct reading/writing without swapping the data in the SEL language commands to operate I/O (input and output) ports.

Shown below is an example of assignment to the RSEL system side and to the master side of each field network (hereinafter described as PLC master).

[RSEL System Side Output Domains ⇒ PLC Master Side Input Domains]

Address	Bit7 (MSB)	6	5	4	3	2	1	0 (LSB)
RSEL system side Output port number	307	306	305	304	303	302	301	300
PLC Master Side Input Word Address	0 (Low byte)							
RSEL system side Output port number	315	314	313	312	311	310	309	308
PLC Master Side Input Word Address	0 (High byte)							
RSEL system side Output port number	323	322	321	320	319	318	317	316
PLC Master Side Input Word Address	1 (Low byte)							
RSEL system side Output port number	331	330	329	328	327	326	325	324
PLC Master Side Input Word Address	1 (High byte)							
· · ·								

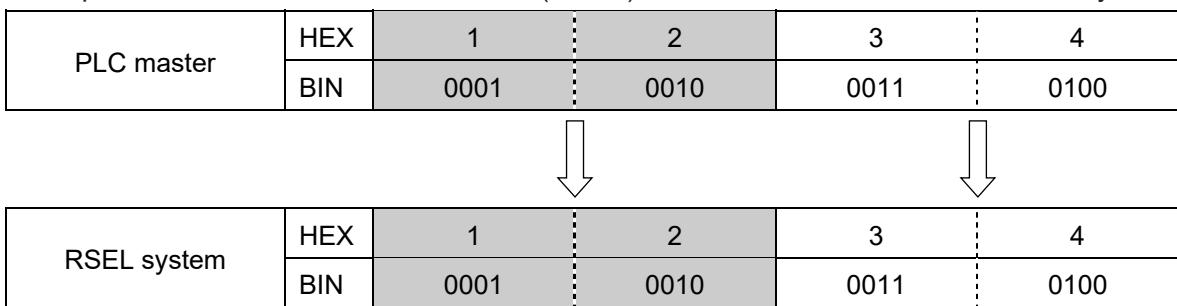
- Example Data from the RSEL system (1234h) should become 1234h in the PLC master side.



[PLC Master Side Output Domains ⇒ RSEL System Side Input Domains]

Address	Bit7 (MSB)	6	5	4	3	2	1	0 (LSB)
RSEL system side Input port number	7	6	5	4	3	2	1	0
PLC Master Side Output Word Address	0 (Low byte)							
RSEL system side Input port number	15	14	13	12	11	10	9	8
PLC Master Side Output Word Address	0 (High byte)							
RSEL system side Input port number	23	22	21	20	19	18	17	16
PLC Master Side Output Word Address	1 (Low byte)							
RSEL system side Input port number	31	30	29	28	27	26	25	24
PLC Master Side Output Word Address	1 (High byte)							
. . .								

- Example Data from the PLC master side (1234h) should become 1234h in the RSEL system.



[Reference] •System to read and write by swapping the top 8 bits and bottom 8 bits in every 16 bits data

1 When having to read and write by swapping the top 8 bits and bottom 8 bits in every 16 bits data, set the format type (to swap top 8 bits and bottom 8 bits in every 16 bits data) in FMIO Command before executing an input and output port operation command such as OUT Command.

[Refer to SEL Language Programming Manual Instruction Manual (ME0224) provided separately]

Shown below is an example of assignment to the PLC master side and RSEL system.

[RSEL Master Side Output Domains ⇒ PLC System Side Input Domains]

Address	Bit7 (MSB)	6	5	4	3	2	1	0 (LSB)
RSEL system side Input port number	307	306	305	304	303	302	301	300
PLC Master Side Output Bit Address	15	14	13	12	11	10	9	8
PLC Master Side Output Word Address	0 (High byte)							
RSEL system side Input port number	315	314	313	312	311	310	309	308
PLC Master Side Output Bit Address	7	6	5	4	3	2	1	0
PLC Master Side Output Word Address	0 (Low byte)							
RSEL system side Input port number	323	322	321	320	319	318	317	316
PLC Master Side Output Bit Address	31	30	29	28	27	26	25	24
PLC Master Side Output Word Address	1 (High byte)							
RSEL system side Input port number	331	330	329	328	327	326	325	324
PLC Master Side Output Bit Address	23	22	21	20	19	18	17	16
PLC Master Side Output Word Address	1 (Low byte)							
.								
.								
.								

•Example Data from the PLC master side (1234h) should become 3412h in the RSEL system.

PLC master	HEX	1	2	3	4
	BIN	0001	0010	0011	0100
RSEL system	HEX	3	4	1	2
	BIN	0011	0100	0001	0010

6.2.4 Example of Use of Each Network, PIO, SIO

[1] CC-Link connection type

Here describes the relation between the number of CC-Link occupied stations and the number of ports used in the RSEL system.

When using 392 points or more, it is necessary to update the CC-Link version to Ver.2.00 and set up the extended cyclic.

Number of Ports used in RSEL System	CC-Link version	Number of occupied stations :	Extended Cyclic Setting	Remote Input and Output (RX/RY)	Remote Resistor (RW _r /RW _w)	Total	Remarks
8 to 96	Ver.1.00	1	—	32bit	4word	12byte	
104 to 192		2	—	64bit	8word	24byte	
200 to 288		3	—	96bit	12word	36byte	
296 to 384		4	—	128bit	16word	48byte	
392 to 1024	Ver.2.00	4	4	448bit	64word	184byte	

* The last 16 bits of remote input and output are prohibited to use as they are system domains for CC-Link.

CC-Link in the RSEL system is a remote device station, and the user domain and system domains are specified in the remote input and output domains RX/RY. The RSEL system is applicable only for the remote station ready in the system domains.

Link Input	Signal Name	Link Output	Signal Name
RXm0	User Domains	RYm0	User Domains
RXm1		RYm1	
RXm2		RYm2	
RXm3		RYm3	
RXm4		RYm4	
RXm5		RYm5	
RXm6		RYm6	
RXm7		RYm7	
RXm8		RYm8	
RXm9		RYm9	
RXmA		RYmA	
RXmB		RYmB	
RXmC		RYmC	

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Link Input	Signal Name	Link Output	Signal Name
RXmD	User Domains	RYmD	User Domains
RXmE		RYmE	
RXmF		RYmF	
:	:	:	:
:	:	:	:
:	:	:	:
RX (m+n) 0	Not to use	RY (m+n) 0	Not to use
RX (m+n) 1		RY (m+n) 1	
RX (m+n) 2		RY (m+n) 2	
RX (m+n) 3		RY (m+n) 3	
RX (m+n) 4		RY (m+n) 4	
RX (m+n) 5		RY (m+n) 5	
RX (m+n) 6		RY (m+n) 6	
RX (m+n) 7		RY (m+n) 7	
RX (m+n) 8	Initial data press demand flag (Not to use)	RY (m+n) 8	Initial process complete flag (Not to use)
RX (m+n) 9	Initial data setting complete flag (Not to use)	RY (m+n) 9	Initial setting demand flag (Not to use)
RX (m+n) A	Error status flag (Not to use)	RY (m+n) A	Error reset demand flag (Not to use)
RX (m+n) B	Remote station Ready	RY (m+n) B	Not to use
RX (m+n) C	Not to use	RY (m+n) C	
RX (m+n) D		RY (m+n) D	
RX (m+n) E		RY (m+n) E	
RX (m+n) F		RY (m+n) F	

* The shaded area show the system domains.

* m: Resistor number lead by top station number

* n: Last resistor number of occupied points (1, 3, 5, 7 or 27 in RSEL system)

6.2 Functional Specifications

Example of Use (1)

The relation between the RSEL I/O port numbers and the PLC addresses when it is automatic assignment, input 48 points and output 32 points is as shown below. The RSEL I/O port start numbers should be from No. 0 for input and from No. 300 for output, and one station should be occupied (32 bits of the remote input and output (RX/RY) and 4 words of the remote register (RWr/RWw)) on the PLC side.

RSEL side input port No.	PLC side address (OUT)	RSEL side output port No.	PLC side address (IN)
0 to 15	RY0 to RYF	300 to 315	RX0 to RXF
16 to 31	RY10 to RY1F	316 to 331	RX10 to RX1F
32 to 48	RWw0	Not available	RWr0
Not available	RWw1		RWr1
	RWw2		RWr2
	RWw3		RWr3

* The shaded part is the system domain for CC-Link, thus not available as I/O.

Example of Use (2)

The relation between the RSEL I/O port numbers and the PLC addresses when it is fixed assignment, input 256 points and output 256 points is as shown below. The RSEL I/O port start numbers should be from No. 128 for input and from No. 428 for output. Three stations should be occupied (96 bits of the remote input and output (RX/RY) and 12 words of the remote register (RWr/RWw)) on the PLC side.

RSEL side input port No.	PLC side address (OUT)	RSEL side output port No.	PLC side address (IN)
128 to 143	RY0 to RYF	428 to 443	RX0 to RXF
144 to 159	RY10 to RY1F	444 to 459	RX10 to RX1F
160 to 175	RY20 to RY2F	460 to 475	RX20 to RX2F
176 to 191	RY30 to RY3F	476 to 491	RX30 to RX3F
192 to 207	RY40 to RY4F	492 to 507	RX40 to RX4F
208 to 223	RY50 to RY5F	508 to 523	RX50 to RX5F
224 to 239	RWw0	524 to 539	RWr0
240 to 255	RWw1	540 to 555	RWr1
256 to 271	RWw2	556 to 571	RWr2
272 to 287	RWw3	572 to 587	RWr3
288 to 295 1000 to 1007	RWw4	588 to 595 4000 to 4007	RWr4
1008 to 1023	RWw5	4008 to 4023	RWr5
1024 to 1039	RWw6	4024 to 4039	RWr6
1040 to 1055	RWw7	4040 to 4055	RWr7
1056 to 1071	RWw8	4056 to 4071	RWr8
1072 to 1087	RWw9	4072 to 4087	RWr9
Not available	RWwA	Not available	RWrA
	RWwB		RWrB

* The shaded part is the system domain for CC-Link, thus not available as I/O.

Example of Use (3)

The relation between the RSEL I/O port numbers and the PLC addresses when it is automatic assignment, input 1024 points and output 1024 points is as shown below. The RSEL I/O port start numbers should be from No. 0 for input and from No. 300 for output, and four stations should be occupied and set to Extension Cyclic Setting 4 (448 bits of the remote input and output (RX/RY) and 64 words of the remote register (RW_r/RW_w) on the PLC side.

RSEL side input port No.	PLC side address (OUT)	RSEL side output port No.	PLC side address (IN)
0 to 15	RY0 to RYF	300 to 315	RX0 to RXF
16 to 31	RY10 to RY1F	316 to 331	RX10 to RX1F
32 to 47	RY20 to RY2F	332 to 347	RX20 to RX2F
48 to 63	RY30 to RY3F	348 to 363	RX30 to RX3F
64 to 79	RY40 to RY4F	364 to 379	RX40 to RX4F
80 to 95	RY50 to RY5F	380 to 395	RX50 to RX5F
96 to 111	RY60 to RY6F	396 to 411	RX60 to RX6F
112 to 127	RY70 to RY7F	412 to 427	RX70 to RX7F
128 to 143	RY80 to RY8F	428 to 443	RX80 to RX8F
144 to 159	RY90 to RY9F	444 to 459	RX90 to RX9F
160 to 175	RYA0 to RYAF	460 to 475	RXA0 to RXAF
176 to 191	RYB0 to RYBF	476 to 491	RXB0 to RXBF
192 to 207	RYC0 to RYCF	492 to 507	RXC0 to RXCF
208 to 223	RYD0 to RYDF	508 to 523	RXD0 to RXDF
224 to 239	RYE0 to RYEF	524 to 539	RXE0 to RXEF
240 to 255	RYF0 to RYFF	540 to 555	RXF0 to RXFF
256 to 271	RY100 to RY10F	556 to 571	RX100 to RX10F
272 to 287	RY110 to RY11F	572 to 587	RX110 to RX11F
288 to 295 1000 to 1007	RY120 to RY12F	588 to 595 4000 to 4007	RX120 to RX12F
1008 to 1023	RY130 to RY13F	4008 to 4023	RX130 to RX13F
1024 to 1039	RY140 to RY14F	4024 to 4039	RX140 to RX14F
1040 to 1055	RY150 to RY15F	4040 to 4055	RX150 to RX15F
1056 to 1071	RY160 to RY16F	4056 to 4071	RX160 to RX16F
1072 to 1087	RY170 to RY17F	4072 to 4087	RX170 to RX17F
1088 to 1103	RY180 to RY18F	4088 to 4103	RX180 to RX18F
1104 to 1119	RY190 to RY19F	4104 to 4119	RX190 to RX19F
1120 to 1135	RY1A0 to RY1AF	4120 to 4135	RX1A0 to RX1AF
1136 to 1151	RY1B0 to RY1BF	4136 to 4151	RX1B0 to RX1BF
1152 to 1167	RWw0	4152 to 4167	RWr0
1168 to 1183	RWw1	4168 to 4183	RWr1
1184 to 1199	RWw2	4184 to 4199	RWr2
1200 to 1215	RWw3	4200 to 4215	RWr3
1216 to 1231	RWw4	4216 to 4231	RWr4
1232 to 1247	RWw5	4232 to 4247	RWr5
1248 to 1263	RWw6	4248 to 4263	RWr6

6.2 Functional Specifications

RSEL side input port No.	PLC side address (OUT)	RSEL side output port No.	PLC side address (IN)
1264 to 1279	RWw7	4264 to 4279	RWr7
1280 to 1295	RWw8	4280 to 4295	RWr8
1296 to 1311	RWw9	4296 to 4311	RWr9
1312 to 1327	RWwA	4312 to 4327	RWrA
1328 to 1343	RWwB	4328 to 4343	RWrB
1344 to 1359	RWwC	4344 to 4359	RWrC
1360 to 1375	RWwD	4360 to 4375	RWrD
1376 to 1391	RWwE	4376 to 4391	RWrE
1392 to 1407	RWwF	4392 to 4407	RWrF
1408 to 1423	RWw10	4408 to 4423	RWr10
1424 to 1439	RWw11	4424 to 4439	RWr11
1440 to 1455	RWw12	4440 to 4455	RWr12
1456 to 1471	RWw13	4456 to 4471	RWr13
1472 to 1487	RWw14	4472 to 4487	RWr14
1488 to 1503	RWw15	4488 to 4503	RWr15
1504 to 1519	RWw16	4504 to 4519	RWr16
1520 to 1535	RWw17	4520 to 4535	RWr17
1536 to 1551	RWw18	4536 to 4551	RWr18
1552 to 1567	RWw19	4552 to 4567	RWr19
1568 to 1583	RWw1A	4568 to 4583	RWr1A
1584 to 1599	RWw1B	4584 to 4599	RWr1B
1600 to 1615	RWw1C	4600 to 4615	RWr1C
1616 to 1631	RWw1D	4616 to 4631	RWr1D
1632 to 1647	RWw1E	4632 to 4647	RWr1E
1648 to 1663	RWw1F	4648 to 4663	RWr1F
1664 to 1679	RWw20	4664 to 4679	RWr20
1680 to 1695	RWw21	4680 to 4695	RWr21
1696 to 1711	RWw22	4696 to 4711	RWr22
1712 to 1727	RWw23	4712 to 4727	RWr23
Not available	RWw24	Not available	RWr24
	:		:
	:		:
	RWw3F		RWr3F

* The shaded part is the system domain for CC-Link, thus not available as I/O.

[2] CC-Link IE Field Connection Type

Set the size of remote input and output domains (RX/RY) and remote resistor input and output domains (RWr/RWw) following the calculation described below in the configuration of the master.

[Calculation]

- 1) Substitute the number of ports used for input (I/O Parameter No. 14) and the number of remote resistor input words (I/O Parameter No. 184) to the formula below to figure out the number of the remote input bits.

$$\text{Number of Remote Input Bit} = \text{Number of Ports Used for Input (I/O Parameter No. 14)}$$

$$- \text{Number of Remote Resistor Input Words (I/O Parameter No. 184)} \times 16$$

- 2) Substitute the number of ports used for output (I/O Parameter No. 15) and the number of remote resistor output words (I/O Parameter No. 185) to the formula below to figure out the number of the remote output bits.

$$\text{Number of Remote Output Bit} = \text{Number of Ports Used for Output (I/O Parameter No. 15)}$$

$$- \text{Number of Remote Resistor Output Words (I/O Parameter No. 185)} \times 16$$

- 3) In Table A below, look for the size with range that includes the bigger from the number of remote input bits and the number of the remote output bits. The result should be the size for the remote input and output domains (RX/RY)

- 4) In Table B below, compare the number of remote resistor input words and the number of remote resistor output words, and look for the size with range that includes the bigger. The result should be the size for the remote resistor input and output domains (RWr/RWw).

[Table A: Remote Input and Output Domain Size]

Number of Remote Input (Output) Bits	Remote Input and Output Domain Size	Number of Remote Input (Output) Bits	Remote Input and Output Domain Size	Number of Remote Input (Output) Bits	Remote Input and Output Domain Size	Number of Remote Input (Output) Bits	Remote Input and Output Domain Size
0 to 16	16	257 to 272	272	513 to 528	528	769 to 784	784
17 to 32	32	273 to 288	288	529 to 544	544	785 to 800	800
33 to 48	48	289 to 304	304	545 to 560	560	801 to 816	816
49 to 64	64	305 to 320	320	561 to 576	576	817 to 832	832
65 to 80	80	321 to 336	336	577 to 592	592	833 to 848	848
81 to 96	96	337 to 352	352	593 to 608	608	849 to 864	864
97 to 112	112	353 to 368	368	609 to 624	624	865 to 880	880
113 to 128	128	369 to 384	384	625 to 640	640	881 to 896	896
129 to 144	144	385 to 400	400	641 to 656	656	897 to 912	912
145 to 160	160	401 to 416	416	657 to 672	672	913 to 928	928
161 to 176	176	417 to 432	432	673 to 688	688	929 to 944	944
177 to 192	192	433 to 448	448	689 to 704	704	945 to 960	960
193 to 208	208	449 to 464	464	705 to 720	720	961 to 976	976
209 to 224	224	465 to 480	480	721 to 736	736	977 to 992	992
225 to 240	240	481 to 496	496	737 to 752	752	993 to 1008	1008
241 to 256	256	497 to 512	512	753 to 768	768	1009 to 1024	1024

[Table B: Remote Resistor Input and Output Domain Size]

Number of Remote Resistor Input (Output) Words	Remote Resistor Input and Output Domain Size	Number of Remote Resistor Input (Output) Words	Remote Resistor Input and Output Domain Size	Number of Remote Resistor Input (Output) Words	Remote Resistor Input and Output Domain Size	Number of Remote Resistor Input (Output) Words	Remote Resistor Input and Output Domain Size
0 to 4	4	17 to 20	20	33 to 36	36	49 to 52	52
5 to 8	8	21 to 24	24	37 to 40	40	53 to 56	56
9 to 12	12	25 to 28	28	41 to 44	44	57 to 60	60
13 to 16	16	29 to 32	32	45 to 48	48	61 to 64	64

[Example]

When number of ports used for input (I/O Parameter No. 14) = 128 points, number of ports used for output (I/O Parameter No. 15) = 64 points, number of remote resistor input words (I/O Parameter No. 184) = 2 words and number of remote resistor output words (I/O Parameter No. 185) = 1 word;

(1) Calculation for Number of Remote Input Bits

$$\text{Number of Remote Input Bits} = 128 = 2 \times 16 = 96$$

(2) Calculation for Number of Remote Output Bits

$$\text{Number of Remote Output Bits} = 64 = 1 \times 16 = 48$$

(3) Confirmation of Remote Input and Output Domain Size

Remote Input and Output Domain => Number of Remote Input and Output Bits = 96

As shown in the figure below, the remote input and output domain (RX/RY) size = 96.

(4) Confirmation of Remote Resistor Input and Output Domain Size

Remote Resistor Input and Output Domain => Number of Remote Resistor Input Words = 2

As shown in the figure below, the remote resistor input and output domain (RWr/RWw) size = 4.

Number of Remote Input (Output) Bits	Remote Input and Output Domain Size
0 to 16	16
17 to 32	32
33 to 48	48
49 to 64	64
65 to 80	80
81 to 96	96
97 to 112	112
113 to 128	128

Number of Remote Resistor Input (Output) Words	Remote Resistor Input and Output Domain Size
0 to 4	4
5 to 8	8
9 to 12	12
13 to 16	16



As a result of comparison, the remote input and output domain size = 96, remote resistor input and output domain size = 4.

Example of Use (1)

The relation between the RSEL I/O port numbers and the PLC addresses when it is automatic assignment, input 48 points, output 32 points and remote register input 1 word is as shown below. The RSEL I/O port start numbers should be from No. 0 for input and from No. 300 for output.

RSEL side input port No.	PLC side address (OUT)	RSEL side output port No.	PLC side address (IN)
0 to 15	RY0 to RYF	300 to 315	RX0 to RXF
16 to 31	RY10 to RY1F	316 to 331	RX10 to RX1F
32 to 48	RWw0		RWr0
Not available	RWw1	Not available	RWr1
	RWw2		RWr2
	RWw3		RWr3

Example of Use (2)

The relation between the RSEL I/O port numbers and the PLC addresses when it is fixed assignment, input 256 points, output 256 points and remote register input 10 words is as shown below. The RSEL I/O port start numbers should be from No. 128 for input and from No. 428 for output.

RSEL side input port No.	PLC side address (OUT)	RSEL side output port No.	PLC side address (IN)
128 to 143	RY0 to RYF	428 to 443	RX0 to RXF
144 to 159	RY10 to RY1F	444 to 459	RX10 to RX1F
160 to 175	RY20 to RY2F	460 to 475	RX20 to RX2F
176 to 191	RY30 to RY3F	476 to 491	RX30 to RX3F
192 to 207	RY40 to RY4F	492 to 507	RX40 to RX4F
208 to 223	RY50 to RY5F	508 to 523	RX50 to RX5F
224 to 239	RWw0	524 to 539	RWr0
240 to 255	RWw1	540 to 555	RWr1
256 to 271	RWw2	556 to 571	RWr2
272 to 287	RWw3	572 to 587	RWr3
288 to 295 1000 to 1007	RWw4	588 to 595 4000 to 4007	RWr4
1008 to 1023	RWw5	4008 to 4023	RWr5
1024 to 1039	RWw6	4024 to 4039	RWr6
1040 to 1055	RWw7	4040 to 4055	RWr7
1056 to 1071	RWw8	4056 to 4071	RWr8
1072 to 1087	RWw9	4072 to 4087	RWr9
Not available	RWwA	Not available	RWrA
	RWwB		RWrB

Example of Use (3)

The relation between the RSEL I/O port numbers and the PLC addresses when it is automatic assignment, input 1024 points, output 1024 points and remote register input 36 words is as shown below. The RSEL I/O port start numbers should be from No. 0 for input and from No. 300 for output.

RSEL side input port No.	PLC side address (OUT)	RSEL side output port No.	PLC side address (IN)
0 to 15	RY0 to RYF	300 to 315	RX0 to RXF
16 to 31	RY10 to RY1F	316 to 331	RX10 to RX1F
32 to 47	RY20 to RY2F	332 to 347	RX20 to RX2F
48 to 63	RY30 to RY3F	348 to 363	RX30 to RX3F
64 to 79	RY40 to RY4F	364 to 379	RX40 to RX4F
80 to 95	RY50 to RY5F	380 to 395	RX50 to RX5F
96 to 111	RY60 to RY6F	396 to 411	RX60 to RX6F
112 to 127	RY70 to RY7F	412 to 427	RX70 to RX7F
128 to 143	RY80 to RY8F	428 to 443	RX80 to RX8F
144 to 159	RY90 to RY9F	444 to 459	RX90 to RX9F
160 to 175	RYA0 to RYAF	460 to 475	RXA0 to RXAF
176 to 191	RYB0 to RYBF	476 to 491	RXB0 to RXBF
192 to 207	RYC0 to RYCF	492 to 507	RXC0 to RXCF
208 to 223	RYD0 to RYDF	508 to 523	RXD0 to RXDF
224 to 239	RYE0 to RYEF	524 to 539	RXE0 to RXEF
240 to 255	RYF0 to RYFF	540 to 555	RXF0 to RXFF
256 to 271	RY100 to RY10F	556 to 571	RX100 to RX10F
272 to 287	RY110 to RY11F	572 to 587	RX110 to RX11F
288 to 295 1000 to 1007	RY120 to RY12F	588 to 595 4000 to 4007	RX120 to RX12F
1008 to 1023	RY130 to RY13F	4008 to 4023	RX130 to RX13F
1024 to 1039	RY140 to RY14F	4024 to 4039	RX140 to RX14F
1040 to 1055	RY150 to RY15F	4040 to 4055	RX150 to RX15F
1056 to 1071	RY160 to RY16F	4056 to 4071	RX160 to RX16F
1072 to 1087	RY170 to RY17F	4072 to 4087	RX170 to RX17F
1088 to 1103	RY180 to RY18F	4088 to 4103	RX180 to RX18F
1104 to 1119	RY190 to RY19F	4104 to 4119	RX190 to RX19F
1120 to 1135	RY1A0 to RY1AF	4120 to 4135	RX1A0 to RX1AF
1136 to 1151	RY1B0 to RY1BF	4136 to 4151	RX1B0 to RX1BF
1152 to 1167	RWw0	4152 to 4167	RWr0
1168 to 1183	RWw1	4168 to 4183	RWr1
1184 to 1199	RWw2	4184 to 4199	RWr2
1200 to 1215	RWw3	4200 to 4215	RWr3
1216 to 1231	RWw4	4216 to 4231	RWr4
1232 to 1247	RWw5	4232 to 4247	RWr5
1248 to 1263	RWw6	4248 to 4263	RWr6
1264 to 1279	RWw7	4264 to 4279	RWr7

RSEL side input port No.	PLC side address (OUT)	RSEL side output port No.	PLC side address (IN)
1280 to 1295	RWw8	4280 to 4295	RWr8
1296 to 1311	RWw9	4296 to 4311	RWr9
1312 to 1327	RWwA	4312 to 4327	RWrA
1328 to 1343	RWwB	4328 to 4343	RWrB
1344 to 1359	RWwC	4344 to 4359	RWrC
1360 to 1375	RWwD	4360 to 4375	RWrD
1376 to 1391	RWwE	4376 to 4391	RWrE
1392 to 1407	RWwF	4392 to 4407	RWrF
1408 to 1423	RWw10	4408 to 4423	RWr10
1424 to 1439	RWw11	4424 to 4439	RWr11
1440 to 1455	RWw12	4440 to 4455	RWr12
1456 to 1471	RWw13	4456 to 4471	RWr13
1472 to 1487	RWw14	4472 to 4487	RWr14
1488 to 1503	RWw15	4488 to 4503	RWr15
1504 to 1519	RWw16	4504 to 4519	RWr16
1520 to 1535	RWw17	4520 to 4535	RWr17
1536 to 1551	RWw18	4536 to 4551	RWr18
1552 to 1567	RWw19	4552 to 4567	RWr19
1568 to 1583	RWw1A	4568 to 4583	RWr1A
1584 to 1599	RWw1B	4584 to 4599	RWr1B
1600 to 1615	RWw1C	4600 to 4615	RWr1C
1616 to 1631	RWw1D	4616 to 4631	RWr1D
1632 to 1647	RWw1E	4632 to 4647	RWr1E
1648 to 1663	RWw1F	4648 to 4663	RWr1F
1664 to 1679	RWw20	4664 to 4679	RWr20
1680 to 1695	RWw21	4680 to 4695	RWr21
1696 to 1711	RWw22	4696 to 4711	RWr22
1712 to 1727	RWw23	4712 to 4727	RWr23

[3] DeviceNet connection type

Example of Use (1)

The relation between the RSEL I/O port numbers and the PLC addresses when it is automatic assignment, input 48 points and output 32 points is as shown below. The RSEL I/O port start numbers should be from No. 0 for input and from No. 300 for output, and the assignment on the PLC side should be made in order from the top CH (in 1 word unit).

RSEL side input port No.	PLC side address (OUT)	RSEL side output port No.	PLC side address (IN)
0 to 15	Top CH	300 to 315	Top CH
16 to 31	Top CH+1	316 to 331	Top CH+1
32 to 48	Top CH+2	Not available	Top CH+2

Example of Use (2)

The relation between the RSEL I/O port numbers and the PLC addresses when it is fixed assignment, input 256 points and output 256 points is as shown below. The RSEL I/O port start numbers should be from No. 128 for input and from No. 428 for output, and the assignment on the PLC side should be made in order from the top CH (in 1 word unit).

RSEL side input port No.	PLC side address (OUT)	RSEL side output port No.	PLC side address (IN)
128 to 143	Top CH	428 to 443	Top CH
144 to 159	Top CH+1	444 to 459	Top CH+1
160 to 175	Top CH+2	460 to 475	Top CH+2
176 to 191	Top CH+3	476 to 491	Top CH+3
192 to 207	Top CH+4	492 to 507	Top CH+4
208 to 223	Top CH+5	508 to 523	Top CH+5
224 to 239	Top CH+6	524 to 539	Top CH+6
240 to 255	Top CH+7	540 to 555	Top CH+7
256 to 271	Top CH+8	556 to 571	Top CH+8
272 to 287	Top CH+9	572 to 587	Top CH+9
288 to 295 1000 to 1007	Top CH+10	588 to 595 4000 to 4007	Top CH+10
1008 to 1023	Top CH+11	4008 to 4023	Top CH+11
1024 to 1039	Top CH+12	4024 to 4039	Top CH+12
1040 to 1055	Top CH+13	4040 to 4055	Top CH+13
1056 to 1071	Top CH+14	4056 to 4071	Top CH+14
1072 to 1087	Top CH+15	4072 to 4087	Top CH+15

Example of Use (3)

The relation between the RSEL I/O port numbers and the PLC addresses when it is automatic assignment, input 1024 points and output 1024 points is as shown below. The RSEL I/O port start numbers should be from No. 0 for input and from No. 300 for output, and the assignment on the PLC side should be made in order from the top CH (in 1 word unit).

RSEL side input port No.	PLC side address (OUT)	RSEL side output port No.	PLC side address (IN)
0 to 15	Top CH	300 to 315	Top CH
16 to 31	Top CH+1	316 to 331	Top CH+1
32 to 47	Top CH+2	332 to 347	Top CH+2
48 to 63	Top CH+3	348 to 363	Top CH+3
64 to 79	Top CH+4	364 to 379	Top CH+4
80 to 95	Top CH+5	380 to 395	Top CH+5
96 to 111	Top CH+6	396 to 411	Top CH+6
112 to 127	Top CH+7	412 to 427	Top CH+7
128 to 143	Top CH+8	428 to 443	Top CH+8
144 to 159	Top CH+9	444 to 459	Top CH+9
160 to 175	Top CH+10	460 to 475	Top CH+10
176 to 191	Top CH+11	476 to 491	Top CH+11
192 to 207	Top CH+12	492 to 507	Top CH+12
208 to 223	Top CH+13	508 to 523	Top CH+13
224 to 239	Top CH+14	524 to 539	Top CH+14
240 to 255	Top CH+15	540 to 555	Top CH+15
256 to 271	Top CH+16	556 to 571	Top CH+16
272 to 287	Top CH+17	572 to 587	Top CH+17
288 to 295 1000 to 1007	Top CH+18	588 to 595 4000 to 4007	Top CH+18
1008 to 1023	Top CH+19	4008 to 4023	Top CH+19
1024 to 1039	Top CH+20	4024 to 4039	Top CH+20
1040 to 1055	Top CH+21	4040 to 4055	Top CH+21
1056 to 1071	Top CH+22	4056 to 4071	Top CH+22
1072 to 1087	Top CH+23	4072 to 4087	Top CH+23
1088 to 1103	Top CH+24	4088 to 4103	Top CH+24
1104 to 1119	Top CH+25	4104 to 4119	Top CH+25
1120 to 1135	Top CH+26	4120 to 4135	Top CH+26
1136 to 1151	Top CH+27	4136 to 4151	Top CH+27
1152 to 1167	Top CH+28	4152 to 4167	Top CH+28
1168 to 1183	Top CH+29	4168 to 4183	Top CH+29
1184 to 1199	Top CH+30	4184 to 4199	Top CH+30
1200 to 1215	Top CH+31	4200 to 4215	Top CH+31
1216 to 1231	Top CH+32	4216 to 4231	Top CH+32
1232 to 1247	Top CH+33	4232 to 4247	Top CH+33
1248 to 1263	Top CH+34	4248 to 4263	Top CH+34
1264 to 1279	Top CH+35	4264 to 4279	Top CH+35

RSEL side input port No.	PLC side address (OUT)	RSEL side output port No.	PLC side address (IN)
1280 to 1295	Top CH+36	4280 to 4295	Top CH+36
1296 to 1311	Top CH+37	4296 to 4311	Top CH+37
1312 to 1327	Top CH+38	4312 to 4327	Top CH+38
1328 to 1343	Top CH+39	4328 to 4343	Top CH+39
1344 to 1359	Top CH+40	4344 to 4359	Top CH+40
1360 to 1375	Top CH+41	4360 to 4375	Top CH+41
1376 to 1391	Top CH+42	4376 to 4391	Top CH+42
1392 to 1407	Top CH+43	4392 to 4407	Top CH+43
1408 to 1423	Top CH+44	4408 to 4423	Top CH+44
1424 to 1439	Top CH+45	4424 to 4439	Top CH+45
1440 to 1455	Top CH+46	4440 to 4455	Top CH+46
1456 to 1471	Top CH+47	4456 to 4471	Top CH+47
1472 to 1487	Top CH+48	4472 to 4487	Top CH+48
1488 to 1503	Top CH+49	4488 to 4503	Top CH+49
1504 to 1519	Top CH+50	4504 to 4519	Top CH+50
1520 to 1535	Top CH+51	4520 to 4535	Top CH+51
1536 to 1551	Top CH+52	4536 to 4551	Top CH+52
1552 to 1567	Top CH+53	4552 to 4567	Top CH+53
1568 to 1583	Top CH+54	4568 to 4583	Top CH+54
1584 to 1599	Top CH+55	4584 to 4599	Top CH+55
1600 to 1615	Top CH+56	4600 to 4615	Top CH+56
1616 to 1631	Top CH+57	4616 to 4631	Top CH+57
1632 to 1647	Top CH+58	4632 to 4647	Top CH+58
1648 to 1663	Top CH+59	4648 to 4663	Top CH+59
1664 to 1679	Top CH+60	4664 to 4679	Top CH+60
1680 to 1695	Top CH+61	4680 to 4695	Top CH+61
1696 to 1711	Top CH+62	4696 to 4711	Top CH+62
1712 to 1727	Top CH+63	4712 to 4727	Top CH+63

[4] EtherCAT connection type

Example of Use (1)

The relation between the RSEL I/O port numbers and the PLC addresses when it is automatic assignment, input 48 points and output 32 points is as shown below. The RSEL I/O port start numbers should be from No. 0 for input and from No. 300 for output, and the assignment on the PLC side should be made in order from the top address (in 1 word unit).

RSEL side input port No.	PLC side address (OUT)	RSEL side output port No.	PLC side address (IN)
0 to 15	Top address	300 to 315	Top address
16 to 31	Top address+1	316 to 331	Top address+1
32 to 48	Top address+2	Not available	Top address+2

Example of Use (2)

The relation between the RSEL I/O port numbers and the PLC addresses when it is fixed assignment, input 256 points and output 256 points is as shown below. The RSEL I/O port start numbers should be from No. 128 for input and from No. 428 for output, and the assignment on the PLC side should be made in order from the top address (in 1 word unit).

RSEL side input port No.	PLC side address (OUT)	RSEL side output port No.	PLC side address (IN)
128 to 143	Top address	428 to 443	Top address
144 to 159	Top address+1	444 to 459	Top address+1
160 to 175	Top address+2	460 to 475	Top address+2
176 to 191	Top address+3	476 to 491	Top address+3
192 to 207	Top address+4	492 to 507	Top address+4
208 to 223	Top address+5	508 to 523	Top address+5
224 to 239	Top address+6	524 to 539	Top address+6
240 to 255	Top address+7	540 to 555	Top address+7
256 to 271	Top address+8	556 to 571	Top address+8
272 to 287	Top address+9	572 to 587	Top address+9
288 to 295 1000 to 1007	Top address+10	588 to 595 4000 to 4007	Top address+10
1008 to 1023	Top address+11	4008 to 4023	Top address+11
1024 to 1039	Top address+12	4024 to 4039	Top address+12
1040 to 1055	Top address+13	4040 to 4055	Top address+13
1056 to 1071	Top address+14	4056 to 4071	Top address+14
1072 to 1087	Top address+15	4072 to 4087	Top address+15

Example of Use (3)

The relation between the RSEL I/O port numbers and the PLC addresses when it is automatic assignment, input 1024 points and output 1024 points is as shown below. The RSEL I/O port start numbers should be from No. 0 for input and from No. 300 for output, and the assignment on the PLC side should be made in order from the top address (in 1 word unit).

RSEL side input port No.	PLC side address (OUT)	RSEL side output port No.	PLC side address (IN)
0 to 15	Top address	300 to 315	Top address
16 to 31	Top address+1	316 to 331	Top address+1
32 to 47	Top address+2	332 to 347	Top address+2
48 to 63	Top address+3	348 to 363	Top address+3
64 to 79	Top address+4	364 to 379	Top address+4
80 to 95	Top address+5	380 to 395	Top address+5
96 to 111	Top address+6	396 to 411	Top address+6
112 to 127	Top address+7	412 to 427	Top address+7
128 to 143	Top address+8	428 to 443	Top address+8
144 to 159	Top address+9	444 to 459	Top address+9
160 to 175	Top address+10	460 to 475	Top address+10
176 to 191	Top address+11	476 to 491	Top address+11
192 to 207	Top address+12	492 to 507	Top address+12
208 to 223	Top address+13	508 to 523	Top address+13
224 to 239	Top address+14	524 to 539	Top address+14
240 to 255	Top address+15	540 to 555	Top address+15
256 to 271	Top address+16	556 to 571	Top address+16
272 to 287	Top address+17	572 to 587	Top address+17
288 to 295 1000 to 1007	Top address+18	588 to 595 4000 to 4007	Top address+18
1008 to 1023	Top address+19	4008 to 4023	Top address+19
1024 to 1039	Top address+20	4024 to 4039	Top address+20
1040 to 1055	Top address+21	4040 to 4055	Top address+21
1056 to 1071	Top address+22	4056 to 4071	Top address+22
1072 to 1087	Top address+23	4072 to 4087	Top address+23
1088 to 1103	Top address+24	4088 to 4103	Top address+24
1104 to 1119	Top address+25	4104 to 4119	Top address+25
1120 to 1135	Top address+26	4120 to 4135	Top address+26
1136 to 1151	Top address+27	4136 to 4151	Top address+27
1152 to 1167	Top address+28	4152 to 4167	Top address+28
1168 to 1183	Top address+29	4168 to 4183	Top address+29
1184 to 1199	Top address+30	4184 to 4199	Top address+30
1200 to 1215	Top address+31	4200 to 4215	Top address+31
1216 to 1231	Top address+32	4216 to 4231	Top address+32
1232 to 1247	Top address+33	4232 to 4247	Top address+33
1248 to 1263	Top address+34	4248 to 4263	Top address+34
1264 to 1279	Top address+35	4264 to 4279	Top address+35

RSEL side input port No.	PLC side address (OUT)	RSEL side output port No.	PLC side address (IN)
1280 to 1295	Top address+36	4280 to 4295	Top address+36
1296 to 1311	Top address+37	4296 to 4311	Top address+37
1312 to 1327	Top address+38	4312 to 4327	Top address+38
1328 to 1343	Top address+39	4328 to 4343	Top address+39
1344 to 1359	Top address+40	4344 to 4359	Top address+40
1360 to 1375	Top address+41	4360 to 4375	Top address+41
1376 to 1391	Top address+42	4376 to 4391	Top address+42
1392 to 1407	Top address+43	4392 to 4407	Top address+43
1408 to 1423	Top address+44	4408 to 4423	Top address+44
1424 to 1439	Top address+45	4424 to 4439	Top address+45
1440 to 1455	Top address+46	4440 to 4455	Top address+46
1456 to 1471	Top address+47	4456 to 4471	Top address+47
1472 to 1487	Top address+48	4472 to 4487	Top address+48
1488 to 1503	Top address+49	4488 to 4503	Top address+49
1504 to 1519	Top address+50	4504 to 4519	Top address+50
1520 to 1535	Top address+51	4520 to 4535	Top address+51
1536 to 1551	Top address+52	4536 to 4551	Top address+52
1552 to 1567	Top address+53	4552 to 4567	Top address+53
1568 to 1583	Top address+54	4568 to 4583	Top address+54
1584 to 1599	Top address+55	4584 to 4599	Top address+55
1600 to 1615	Top address+56	4600 to 4615	Top address+56
1616 to 1631	Top address+57	4616 to 4631	Top address+57
1632 to 1647	Top address+58	4632 to 4647	Top address+58
1648 to 1663	Top address+59	4648 to 4663	Top address+59
1664 to 1679	Top address+60	4664 to 4679	Top address+60
1680 to 1695	Top address+61	4680 to 4695	Top address+61
1696 to 1711	Top address+62	4696 to 4711	Top address+62
1712 to 1727	Top address+63	4712 to 4727	Top address+63

[5] EtherNet/IP connection type

Example of Use (1)

The relation between the RSEL I/O port numbers and the PLC addresses when it is automatic assignment, input 48 points and output 32 points is as shown below. The RSEL I/O port start numbers should be from No. 0 for input and from No. 300 for output, and the assignment on the PLC side should be made in order from the top address (in 1 byte unit).

RSEL side input port No.	PLC side address (OUT)	RSEL side output port No.	PLC side address (IN)
0 to 15	Top address	300 to 315	Top address
16 to 31	Top address+2	316 to 331	Top address+2
32 to 48	Top address+4	Not available	Top address+4

Example of Use (2)

The relation between the RSEL I/O port numbers and the PLC addresses when it is fixed assignment, input 256 points and output 256 points is as shown below. The RSEL I/O port start numbers should be from No. 128 for input and from No. 428 for output, and the assignment on the PLC side should be made in order from the top address (in 1 byte unit).

RSEL side input port No.	PLC side address (OUT)	RSEL side output port No.	PLC side address (IN)
128 to 143	Top address	428 to 443	Top address
144 to 159	Top address+2	444 to 459	Top address+2
160 to 175	Top address+4	460 to 475	Top address+4
176 to 191	Top address+6	476 to 491	Top address+6
192 to 207	Top address+8	492 to 507	Top address+8
208 to 223	Top address+10	508 to 523	Top address+10
224 to 239	Top address+12	524 to 539	Top address+12
240 to 255	Top address+14	540 to 555	Top address+14
256 to 271	Top address+16	556 to 571	Top address+16
272 to 287	Top address+18	572 to 587	Top address+18
288 to 295 1000 to 1007	Top address+20	588 to 595 4000 to 4007	Top address+20
1008 to 1023	Top address+22	4008 to 4023	Top address+22
1024 to 1039	Top address+24	4024 to 4039	Top address+24
1040 to 1055	Top address+26	4040 to 4055	Top address+26
1056 to 1071	Top address+28	4056 to 4071	Top address+28
1072 to 1087	Top address+30	4072 to 4087	Top address+30

Example of Use (3)

The relation between the RSEL I/O port numbers and the PLC addresses when it is automatic assignment, input 1024 points and output 1024 points is as shown below. The RSEL I/O port start numbers should be from No. 0 for input and from No. 300 for output, and the assignment on the PLC side should be made in order from the top address (in 1 byte unit).

RSEL side input port No.	PLC side address (OUT)	RSEL side output port No.	PLC side address (IN)
0 to 15	Top address	300 to 315	Top address
16 to 31	Top address+2	316 to 331	Top address+2
32 to 47	Top address+4	332 to 347	Top address+4
48 to 63	Top address+6	348 to 363	Top address+6
64 to 79	Top address+8	364 to 379	Top address+8
80 to 95	Top address+10	380 to 395	Top address+10
96 to 111	Top address+12	396 to 411	Top address+12
112 to 127	Top address+14	412 to 427	Top address+14
128 to 143	Top address+16	428 to 443	Top address+16
144 to 159	Top address+18	444 to 459	Top address+18
160 to 175	Top address+20	460 to 475	Top address+20
176 to 191	Top address+22	476 to 491	Top address+22
192 to 207	Top address+24	492 to 507	Top address+24
208 to 223	Top address+26	508 to 523	Top address+26
224 to 239	Top address+28	524 to 539	Top address+28
240 to 255	Top address+30	540 to 555	Top address+30
256 to 271	Top address+32	556 to 571	Top address+32
272 to 287	Top address+34	572 to 587	Top address+34
288 to 295 1000 to 1007	Top address+36	588 to 595 4000 to 4007	Top address+36
1008 to 1023	Top address+38	4008 to 4023	Top address+38
1024 to 1039	Top address+40	4024 to 4039	Top address+40
1040 to 1055	Top address+42	4040 to 4055	Top address+42
1056 to 1071	Top address+44	4056 to 4071	Top address+44
1072 to 1087	Top address+46	4072 to 4087	Top address+46
1088 to 1103	Top address+48	4088 to 4103	Top address+48
1104 to 1119	Top address+50	4104 to 4119	Top address+50
1120 to 1135	Top address+52	4120 to 4135	Top address+52
1136 to 1151	Top address+54	4136 to 4151	Top address+54
1152 to 1167	Top address+56	4152 to 4167	Top address+56
1168 to 1183	Top address+58	4168 to 4183	Top address+58
1184 to 1199	Top address+60	4184 to 4199	Top address+60
1200 to 1215	Top address+62	4200 to 4215	Top address+62
1216 to 1231	Top address+64	4216 to 4231	Top address+64
1232 to 1247	Top address+66	4232 to 4247	Top address+66
1248 to 1263	Top address+68	4248 to 4263	Top address+68
1264 to 1279	Top address+70	4264 to 4279	Top address+70

RSEL side input port No.	PLC side address (OUT)	RSEL side output port No.	PLC side address (IN)
1280 to 1295	Top address+72	4280 to 4295	Top address+72
1296 to 1311	Top address+74	4296 to 4311	Top address+74
1312 to 1327	Top address+76	4312 to 4327	Top address+76
1328 to 1343	Top address+78	4328 to 4343	Top address+78
1344 to 1359	Top address+80	4344 to 4359	Top address+80
1360 to 1375	Top address+82	4360 to 4375	Top address+82
1376 to 1391	Top address+84	4376 to 4391	Top address+84
1392 to 1407	Top address+86	4392 to 4407	Top address+86
1408 to 1423	Top address+88	4408 to 4423	Top address+88
1424 to 1439	Top address+90	4424 to 4439	Top address+90
1440 to 1455	Top address+92	4440 to 4455	Top address+92
1456 to 1471	Top address+94	4456 to 4471	Top address+94
1472 to 1487	Top address+96	4472 to 4487	Top address+96
1488 to 1503	Top address+98	4488 to 4503	Top address+98
1504 to 1519	Top address+100	4504 to 4519	Top address+100
1520 to 1535	Top address+102	4520 to 4535	Top address+102
1536 to 1551	Top address+104	4536 to 4551	Top address+104
1552 to 1567	Top address+106	4552 to 4567	Top address+106
1568 to 1583	Top address+108	4568 to 4583	Top address+108
1584 to 1599	Top address+110	4584 to 4599	Top address+110
1600 to 1615	Top address+112	4600 to 4615	Top address+112
1616 to 1631	Top address+114	4616 to 4631	Top address+114
1632 to 1647	Top address+116	4632 to 4647	Top address+116
1648 to 1663	Top address+118	4648 to 4663	Top address+118
1664 to 1679	Top address+120	4664 to 4679	Top address+120
1680 to 1695	Top address+122	4680 to 4695	Top address+122
1696 to 1711	Top address+124	4696 to 4711	Top address+124
1712 to 1727	Top address+126	4712 to 4727	Top address+126

[6] PROFIBUS-DP connection type

Example of Use (1)

The relation between the RSEL I/O port numbers and the PLC addresses when it is automatic assignment, input 48 points and output 32 points is as shown below. The RSEL I/O port start numbers should be from No. 0 for input and from No. 300 for output, and the assignment on the PLC side should be made in order from the top address (in 1 byte unit).

RSEL side input port No.	PLC side address (OUT)	RSEL side output port No.	PLC side address (IN)
0 to 15	Top address	300 to 315	Top address
16 to 31	Top address+2	316 to 331	Top address+2
32 to 48	Top address+4	Not available	Top address+4

Example of Use (2)

The relation between the RSEL I/O port numbers and the PLC addresses when it is fixed assignment, input 256 points and output 256 points is as shown below. The RSEL I/O port start numbers should be from No. 128 for input and from No. 428 for output, and the assignment on the PLC side should be made in order from the top address (in 1 byte unit).

RSEL side input port No.	PLC side address (OUT)	RSEL side output port No.	PLC side address (IN)
128 to 143	Top address	428 to 443	Top address
144 to 159	Top address+2	444 to 459	Top address+2
160 to 175	Top address+4	460 to 475	Top address+4
176 to 191	Top address+6	476 to 491	Top address+6
192 to 207	Top address+8	492 to 507	Top address+8
208 to 223	Top address+10	508 to 523	Top address+10
224 to 239	Top address+12	524 to 539	Top address+12
240 to 255	Top address+14	540 to 555	Top address+14
256 to 271	Top address+16	556 to 571	Top address+16
272 to 287	Top address+18	572 to 587	Top address+18
288 to 295 1000 to 1007	Top address+20	588 to 595 4000 to 4007	Top address+20
1008 to 1023	Top address+22	4008 to 4023	Top address+22
1024 to 1039	Top address+24	4024 to 4039	Top address+24
1040 to 1055	Top address+26	4040 to 4055	Top address+26
1056 to 1071	Top address+28	4056 to 4071	Top address+28
1072 to 1087	Top address+30	4072 to 4087	Top address+30

Example of Use (3)

The relation between the RSEL I/O port numbers and the PLC addresses when it is automatic assignment, input 1024 points and output 1024 points is as shown below. The RSEL I/O port start numbers should be from No. 0 for input and from No. 300 for output, and the assignment on the PLC side should be made in order from the top address (in 1 byte unit).

RSEL side input port No.	PLC side address (OUT)	RSEL side output port No.	PLC side address (IN)
0 to 15	Top address	300 to 315	Top address
16 to 31	Top address+2	316 to 331	Top address+2
32 to 47	Top address+4	332 to 347	Top address+4
48 to 63	Top address+6	348 to 363	Top address+6
64 to 79	Top address+8	364 to 379	Top address+8
80 to 95	Top address+10	380 to 395	Top address+10
96 to 111	Top address+12	396 to 411	Top address+12
112 to 127	Top address+14	412 to 427	Top address+14
128 to 143	Top address+16	428 to 443	Top address+16
144 to 159	Top address+18	444 to 459	Top address+18
160 to 175	Top address+20	460 to 475	Top address+20
176 to 191	Top address+22	476 to 491	Top address+22
192 to 207	Top address+24	492 to 507	Top address+24
208 to 223	Top address+26	508 to 523	Top address+26
224 to 239	Top address+28	524 to 539	Top address+28
240 to 255	Top address+30	540 to 555	Top address+30
256 to 271	Top address+32	556 to 571	Top address+32
272 to 287	Top address+34	572 to 587	Top address+34
288 to 295 1000 to 1007	Top address+36	588 to 595 4000 to 4007	Top address+36
1008 to 1023	Top address+38	4008 to 4023	Top address+38
1024 to 1039	Top address+40	4024 to 4039	Top address+40
1040 to 1055	Top address+42	4040 to 4055	Top address+42
1056 to 1071	Top address+44	4056 to 4071	Top address+44
1072 to 1087	Top address+46	4072 to 4087	Top address+46
1088 to 1103	Top address+48	4088 to 4103	Top address+48
1104 to 1119	Top address+50	4104 to 4119	Top address+50
1120 to 1135	Top address+52	4120 to 4135	Top address+52
1136 to 1151	Top address+54	4136 to 4151	Top address+54
1152 to 1167	Top address+56	4152 to 4167	Top address+56
1168 to 1183	Top address+58	4168 to 4183	Top address+58
1184 to 1199	Top address+60	4184 to 4199	Top address+60
1200 to 1215	Top address+62	4200 to 4215	Top address+62
1216 to 1231	Top address+64	4216 to 4231	Top address+64
1232 to 1247	Top address+66	4232 to 4247	Top address+66
1248 to 1263	Top address+68	4248 to 4263	Top address+68
1264 to 1279	Top address+70	4264 to 4279	Top address+70

RSEL side input port No.	PLC side address (OUT)	RSEL side output port No.	PLC side address (IN)
1280 to 1295	Top address+72	4280 to 4295	Top address+72
1296 to 1311	Top address+74	4296 to 4311	Top address+74
1312 to 1327	Top address+76	4312 to 4327	Top address+76
1328 to 1343	Top address+78	4328 to 4343	Top address+78
1344 to 1359	Top address+80	4344 to 4359	Top address+80
1360 to 1375	Top address+82	4360 to 4375	Top address+82
1376 to 1391	Top address+84	4376 to 4391	Top address+84
1392 to 1407	Top address+86	4392 to 4407	Top address+86
1408 to 1423	Top address+88	4408 to 4423	Top address+88
1424 to 1439	Top address+90	4424 to 4439	Top address+90
1440 to 1455	Top address+92	4440 to 4455	Top address+92
1456 to 1471	Top address+94	4456 to 4471	Top address+94
1472 to 1487	Top address+96	4472 to 4487	Top address+96
1488 to 1503	Top address+98	4488 to 4503	Top address+98
1504 to 1519	Top address+100	4504 to 4519	Top address+100
1520 to 1535	Top address+102	4520 to 4535	Top address+102
1536 to 1551	Top address+104	4536 to 4551	Top address+104
1552 to 1567	Top address+106	4552 to 4567	Top address+106
1568 to 1583	Top address+108	4568 to 4583	Top address+108
1584 to 1599	Top address+110	4584 to 4599	Top address+110
1600 to 1615	Top address+112	4600 to 4615	Top address+112
1616 to 1631	Top address+114	4616 to 4631	Top address+114
1632 to 1647	Top address+116	4632 to 4647	Top address+116
1648 to 1663	Top address+118	4648 to 4663	Top address+118
1664 to 1679	Top address+120	4664 to 4679	Top address+120
1680 to 1695	Top address+122	4680 to 4695	Top address+122
1696 to 1711	Top address+124	4696 to 4711	Top address+124
1712 to 1727	Top address+126	4712 to 4727	Top address+126

[7] PROFINET IO connection type

Use the 4-word (= 8 bytes) module in the configuration of the master.

Also registration is required in the order of Input module \Rightarrow Output module.

Number of Points Used in Input and Output	Registered Module on PLC Side	Number of Points Used in Input and Output	Registered Module on PLC Side
0	—	0	—
8 to 64	Input 4Word×1	8 to 64	Output 4Word×1
72 to 128	Input 4Word×2	72 to 128	Output 4Word×2
136 to 192	Input 4Word×3	136 to 192	Output 4Word×3
200 to 256	Input 4Word×4	200 to 256	Output 4Word×4
264 to 320	Input 4Word×5	264 to 320	Output 4Word×5
328 to 384	Input 4Word×6	328 to 384	Output 4Word×6
392 to 448	Input 4Word×7	392 to 448	Output 4Word×7
456 to 512	Input 4Word×8	456 to 512	Output 4Word×8
520 to 576	Input 4Word×9	520 to 576	Output 4Word×9
584 to 640	Input 4Word×10	584 to 640	Output 4Word×10
648 to 704	Input 4Word×11	648 to 704	Output 4Word×11
712 to 768	Input 4Word×12	712 to 768	Output 4Word×12
776 to 832	Input 4Word×13	776 to 832	Output 4Word×13
840 to 896	Input 4Word×14	840 to 896	Output 4Word×14
904 to 960	Input 4Word×15	904 to 960	Output 4Word×15
968 to 1024	Input 4Word×16	968 to 1024	Output 4Word×16

[Example]

When 208 points of input and 400 points of output are used;

Number of Input 4-word modules use : $208 / 64 = 3.25 \rightarrow 4$

Number of Output 4-word modules use : $400 / 64 = 6.25 \rightarrow 7$

Therefore, the registered module on the PLC side uses 4 of input 4-word and 7 of output 4-word.

Example of Use (1)

The relation between the RSEL I/O port numbers and the PLC addresses when it is automatic assignment, input 48 points and output 32 points is as shown below. The RSEL I/O port start numbers should be from No. 0 for input and from No. 300 for output, and the assignment on the PLC side should be made in order from the top address (in 4 words unit).

RSEL side input port No.	PLC side address (OUT)	RSEL side output port No.	PLC side address (IN)
0 to 15	Top address	300 to 315	Top address
16 to 31		316 to 331	
32 to 48		Not to use	
Not to use		Not to use	

Example of Use (2)

The relation between the RSEL I/O port numbers and the PLC addresses when it is fixed assignment, input 256 points and output 256 points is as shown below. The RSEL I/O port start numbers should be from No. 128 for input and from No. 428 for output, and the assignment on the PLC side should be made in order from the top address (in 4 words unit).

RSEL side input port No.	PLC side address (OUT)	RSEL side output port No.	PLC side address (IN)
128 to 143	Top address	428 to 443	Top address
144 to 159		444 to 459	
160 to 175		460 to 475	
176 to 191		476 to 491	
192 to 207	Top address+1	492 to 507	Top address+1
208 to 223		508 to 523	
224 to 239		524 to 539	
240 to 255		540 to 555	
256 to 271	Top address+2	556 to 571	Top address+2
272 to 287		572 to 587	
288 to 295		588 to 595	
1000 to 1007		4000 to 4007	
1008 to 1023	Top address+3	4008 to 4023	Top address+3
1024 to 1039		4024 to 4039	
1040 to 1055		4040 to 4055	
1056 to 1071		4056 to 4071	
1072 to 1087		4072 to 4087	

Example of Use (3)

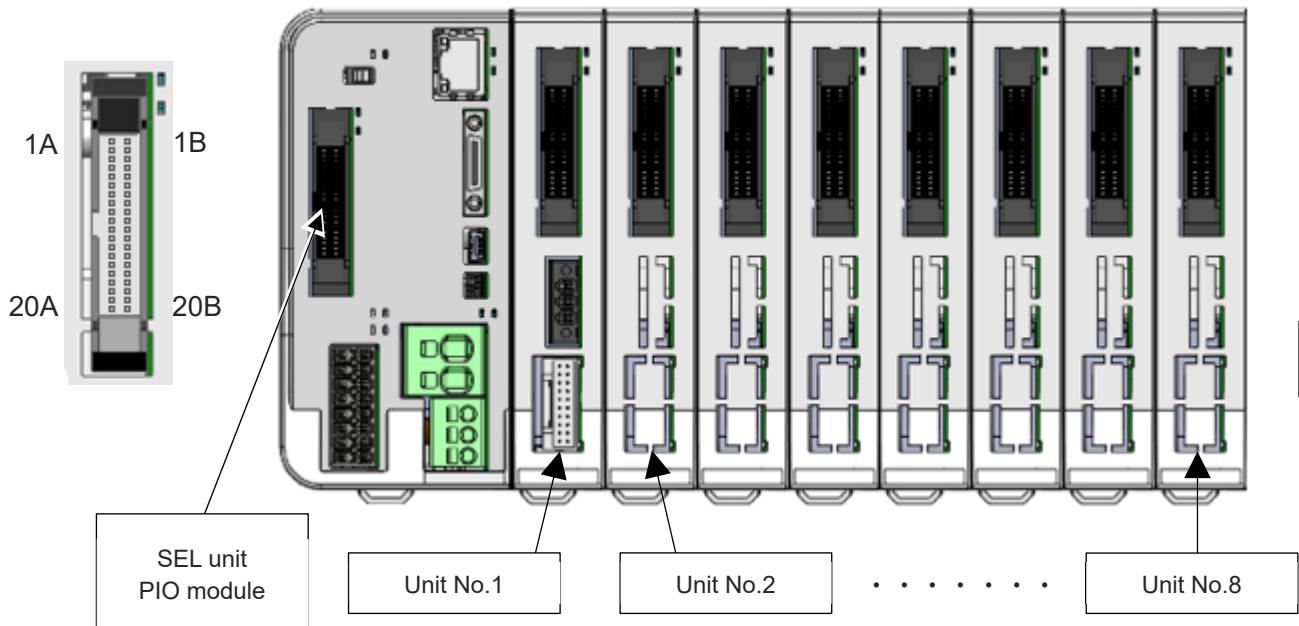
The relation between the RSEL I/O port numbers and the PLC addresses when it is automatic assignment, input 1024 points and output 1024 points is as shown below. The RSEL I/O port start numbers should be from No. 0 for input and from No. 300 for output, and the assignment on the PLC side should be made in order from the top address (in 4 words unit).

RSEL side input port No.	PLC side address (OUT)	RSEL side output port No.	PLC side address (IN)
0 to 15	Top address	300 to 315	Top address
16 to 31		316 to 331	
32 to 47		332 to 347	
48 to 63		348 to 363	
64 to 79	Top address+1	364 to 379	Top address+1
80 to 95		380 to 395	
96 to 111		396 to 411	
112 to 127		412 to 427	
128 to 143	Top address+2	428 to 443	Top address+2
144 to 159		444 to 459	
160 to 175		460 to 475	
176 to 191		476 to 491	
192 to 207	Top address+3	492 to 507	Top address+3
208 to 223		508 to 523	
224 to 239		524 to 539	
240 to 255		540 to 555	
256 to 271	Top address+4	556 to 571	Top address+4
272 to 287		572 to 587	
288 to 295		588 to 595	
1000 to 1007		4000 to 4007	
1008 to 1023		4008 to 4023	
1024 to 1039	Top address+5	4024 to 4039	Top address+5
1040 to 1055		4040 to 4055	
1056 to 1071		4056 to 4071	
1072 to 1087		4072 to 4087	
1088 to 1103	Top address+6	4088 to 4103	Top address+6
1104 to 1119		4104 to 4119	
1120 to 1135		4120 to 4135	
1136 to 1151		4136 to 4151	
1152 to 1167	Top address+7	4152 to 4167	Top address+7
1168 to 1183		4168 to 4183	
1184 to 1199		4184 to 4199	
1200 to 1215		4200 to 4215	
1216 to 1231	Top address+8	4216 to 4231	Top address+8
1232 to 1247		4232 to 4247	
1248 to 1263		4248 to 4263	
1264 to 1279		4264 to 4279	

RSEL side input port No.	PLC side address (OUT)	RSEL side output port No.	PLC side address (IN)
1280 to 1295	Top address+9	4280 to 4295	Top address+9
1296 to 1311		4296 to 4311	
1312 to 1327		4312 to 4327	
1328 to 1343		4328 to 4343	
1344 to 1359	Top address+10	4344 to 4359	Top address+10
1360 to 1375		4360 to 4375	
1376 to 1391		4376 to 4391	
1392 to 1407		4392 to 4407	
1408 to 1423	Top address+11	4408 to 4423	Top address+11
1424 to 1439		4424 to 4439	
1440 to 1455		4440 to 4455	
1456 to 1471		4456 to 4471	
1472 to 1487	Top address+12	4472 to 4487	Top address+12
1488 to 1503		4488 to 4503	
1504 to 1519		4504 to 4519	
1520 to 1535		4520 to 4535	
1536 to 1551	Top address+13	4536 to 4551	Top address+13
1552 to 1567		4552 to 4567	
1568 to 1583		4568 to 4583	
1584 to 1599		4584 to 4599	
1600 to 1615	Top address+14	4600 to 4615	Top address+14
1616 to 1631		4616 to 4631	
1632 to 1647		4632 to 4647	
1648 to 1663		4648 to 4663	
1664 to 1679	Top address+15	4664 to 4679	Top address+15
1680 to 1695		4680 to 4695	
1696 to 1711		4696 to 4711	
1712 to 1727		4712 to 4727	

[8] PIO type

By linking PIO/SIO/SCON extension unit / PIO unit to PIO type SEL unit, PIO comes available to use 144 points of input and 144 points of output at the maximum.



When the input start port number is assigned in 000 and output start port number in 300 in the automatic assignment or fixed assignment with eight units linked to PIO type SEL unit, the port numbers should be as shown in the table below.

Unit No.	Pin No.	Category	Signal name	Port No.	Pin No.	Category	Signal name	Port No.
SEL unit PIO module	1A	24	P24	-	1B	Output	OUT0	300
	2A	24	P24	-	2B		OUT1	301
	3A	-	-	-	3B		OUT2	302
	4A	-	-	-	4B		OUT3	303
	5A	Input	IN0	000	5B		OUT4	304
	6A		IN1	001	6B		OUT5	305
	7A		IN2	002	7B		OUT6	306
	8A		IN3	003	8B		OUT7	307
	9A		IN4	004	9B		OUT8	308
	10A		IN5	005	10B		OUT9	309
	11A		IN6	006	11B		OUT10	310
	12A		IN7	007	12B		OUT11	311
	13A		IN8	008	13B		OUT12	312
	14A		IN9	009	14B		OUT13	313
	15A		IN10	010	15B		OUT14	314
	16A		IN11	011	16B	OUT15	315	
	17A		IN12	012	17B	-	-	-
	18A		IN13	013	18B	-	-	-
	19A		IN14	014	19B	0	N	-
	20A		IN15	015	20B	0	N	-

6.2 Functional Specifications

Unit No.	Pin No.	Category	Signal name	Port No.	Pin No.	Category	Signal name	ポート No.
1	1A	24	P24	-	1B	Output	OUT0	316
	2A	24	P24	-	2B		OUT1	317
	3A	-	-	-	3B		OUT2	318
	4A	-	-	-	4B		OUT3	319
	5A	Input	IN0	016	5B		OUT4	320
	6A		IN1	017	6B		OUT5	321
	7A		IN2	018	7B		OUT6	322
	8A		IN3	019	8B		OUT7	323
	9A		IN4	020	9B		OUT8	324
	10A		IN5	021	10B		OUT9	325
	11A		IN6	022	11B		OUT10	326
	12A		IN7	023	12B		OUT11	327
	13A		IN8	024	13B		OUT12	328
	14A		IN9	025	14B		OUT13	329
	15A		IN10	026	15B		OUT14	330
	16A		IN11	027	16B		OUT15	331
	17A		IN12	028	17B		-	-
	18A		IN13	029	18B		-	-
	19A		IN14	030	19B		0	N
	20A		IN15	031	20B		0	N
2	1A	24	P24	-	1B	Output	OUT0	332
	2A	24	P24	-	2B		OUT1	333
	3A	-	-	-	3B		OUT2	334
	4A	-	-	-	4B		OUT3	335
	5A	Input	IN0	032	5B		OUT4	336
	6A		IN1	033	6B		OUT5	337
	7A		IN2	034	7B		OUT6	338
	8A		IN3	035	8B		OUT7	339
	9A		IN4	036	9B		OUT8	340
	10A		IN5	037	10B		OUT9	341
	11A		IN6	038	11B		OUT10	342
	12A		IN7	039	12B		OUT11	343
	13A		IN8	040	13B		OUT12	344
	14A		IN9	041	14B		OUT13	345
	15A		IN10	042	15B		OUT14	346
	16A		IN11	043	16B		OUT15	347
	17A		IN12	044	17B		-	-
	18A		IN13	045	18B		-	-
	19A		IN14	046	19B		0	N
	20A		IN15	047	20B		0	N

* Unit numbers are the numbers named in order 1, 2, ... 8 from the next of SEL unit.

Unit No.	Pin No.	Category	Signal name	Port No.	Pin No.	Category	Signal name	Port No.
3	1A	24	P24	-	1B	Output	OUT0	348
	2A	24	P24	-	2B		OUT1	349
	3A	-	-	-	3B		OUT2	350
	4A	-	-	-	4B		OUT3	351
	5A	Input	IN0	048	5B		OUT4	352
	6A		IN1	049	6B		OUT5	353
	7A		IN2	050	7B		OUT6	354
	8A		IN3	051	8B		OUT7	355
	9A		IN4	052	9B		OUT8	356
	10A		IN5	053	10B		OUT9	357
	11A		IN6	054	11B		OUT10	358
	12A		IN7	055	12B		OUT11	359
	13A		IN8	056	13B		OUT12	360
	14A		IN9	057	14B		OUT13	361
	15A		IN10	058	15B		OUT14	362
	16A		IN11	059	16B		OUT15	363
	17A		IN12	060	17B		-	-
	18A		IN13	061	18B		-	-
	19A		IN14	062	19B		0	N
	20A		IN15	063	20B		0	N
4	1A	24	P24	-	1B	Output	OUT0	364
	2A	24	P24	-	2B		OUT1	365
	3A	-	-	-	3B		OUT2	366
	4A	-	-	-	4B		OUT3	367
	5A	Input	IN0	064	5B		OUT4	368
	6A		IN1	065	6B		OUT5	369
	7A		IN2	066	7B		OUT6	370
	8A		IN3	067	8B		OUT7	371
	9A		IN4	068	9B		OUT8	372
	10A		IN5	069	10B		OUT9	373
	11A		IN6	070	11B		OUT10	374
	12A		IN7	071	12B		OUT11	375
	13A		IN8	072	13B		OUT12	376
	14A		IN9	073	14B		OUT13	377
	15A		IN10	074	15B		OUT14	378
	16A		IN11	075	16B		OUT15	379
	17A		IN12	076	17B		-	-
	18A		IN13	077	18B		-	-
	19A		IN14	078	19B		0	N
	20A		IN15	079	20B		0	N

* Unit numbers are the numbers named in order 1, 2, ... 8 from the next of SEL unit.

6.2 Functional Specifications

Unit No.	Pin No.	Category	Signal name	Port No.	Pin No.	Category	Signal name	Port No.
5	1A	24	P24	-	1B	Output	OUT0	380
	2A	24	P24	-	2B		OUT1	381
	3A	-	-	-	3B		OUT2	382
	4A	-	-	-	4B		OUT3	383
	5A	Input	IN0	080	5B		OUT4	384
	6A		IN1	081	6B		OUT5	385
	7A		IN2	082	7B		OUT6	386
	8A		IN3	083	8B		OUT7	387
	9A		IN4	084	9B		OUT8	388
	10A		IN5	085	10B		OUT9	389
	11A		IN6	086	11B		OUT10	390
	12A		IN7	087	12B		OUT11	391
	13A		IN8	088	13B		OUT12	392
	14A		IN9	089	14B		OUT13	393
	15A		IN10	090	15B		OUT14	394
	16A		IN11	091	16B		OUT15	395
	17A		IN12	092	17B		-	-
	18A		IN13	093	18B		-	-
	19A		IN14	094	19B		0	N
	20A		IN15	095	20B		0	N
6	1A	24	P24	-	1B	Output	OUT0	396
	2A	24	P24	-	2B		OUT1	397
	3A	-	-	-	3B		OUT2	398
	4A	-	-	-	4B		OUT3	399
	5A	Input	IN0	096	5B		OUT4	400
	6A		IN1	097	6B		OUT5	401
	7A		IN2	098	7B		OUT6	402
	8A		IN3	099	8B		OUT7	403
	9A		IN4	100	9B		OUT8	404
	10A		IN5	101	10B		OUT9	405
	11A		IN6	102	11B		OUT10	406
	12A		IN7	103	12B		OUT11	407
	13A		IN8	104	13B		OUT12	408
	14A		IN9	105	14B		OUT13	409
	15A		IN10	106	15B		OUT14	410
	16A		IN11	107	16B		OUT15	411
	17A		IN12	108	17B		-	-
	18A		IN13	109	18B		-	-
	19A		IN14	110	19B		0	N
	20A		IN15	111	20B		0	N

* Unit numbers are the numbers named in order 1, 2, ... 8 from the next of SEL unit.

Unit No.	Pin No.	Category	Signal name	Port No.	Pin No.	Category	Signal name	Port No.
7	1A	24	P24	-	1B	Output	OUT0	412
	2A	24	P24	-	2B		OUT1	413
	3A	-	-	-	3B		OUT2	414
	4A	-	-	-	4B		OUT3	415
	5A	Input	IN0	112	5B		OUT4	416
	6A		IN1	113	6B		OUT5	417
	7A		IN2	114	7B		OUT6	418
	8A		IN3	115	8B		OUT7	419
	9A		IN4	116	9B		OUT8	420
	10A		IN5	117	10B		OUT9	421
	11A		IN6	118	11B		OUT10	422
	12A		IN7	119	12B		OUT11	423
	13A		IN8	120	13B		OUT12	424
	14A		IN9	121	14B		OUT13	425
	15A		IN10	122	15B		OUT14	426
	16A		IN11	123	16B		OUT15	427
	17A		IN12	124	17B		-	-
	18A		IN13	125	18B		-	-
	19A		IN14	126	19B		0	N
	20A		IN15	127	20B		0	N
8	1A	24	P24	-	1B	Output	OUT0	428
	2A	24	P24	-	2B		OUT1	429
	3A	-	-	-	3B		OUT2	430
	4A	-	-	-	4B		OUT3	431
	5A	Input	IN0	128	5B		OUT4	432
	6A		IN1	129	6B		OUT5	433
	7A		IN2	130	7B		OUT6	431
	8A		IN3	131	8B		OUT7	435
	9A		IN4	132	9B		OUT8	436
	10A		IN5	133	10B		OUT9	437
	11A		IN6	134	11B		OUT10	438
	12A		IN7	135	12B		OUT11	439
	13A		IN8	136	13B		OUT12	440
	14A		IN9	137	14B		OUT13	441
	15A		IN10	138	15B		OUT14	442
	16A		IN11	139	16B		OUT15	443
	17A		IN12	140	17B		-	-
	18A		IN13	141	18B		-	-
	19A		IN14	142	19B		0	N
	20A		IN15	143	20B		0	N

* Unit numbers are the numbers named in order 1, 2, ... 8 from the next of SEL unit.

[9] SIO type

It is the serial communication feature by the SEL program using Free-to-User Channel No. 1.

General serial communications using the following SEL commands are available.

Category	Condition	Command	Operand 1	Operand 2	Output	Function
Timer	Optional	TIMC	Program No.	Prohibited	CP	Standby Canceled
Communication	Optional	OPEN	Channel No.	Prohibited	CP	Channel Open
	Optional	CLOS	Channel No.	Prohibited	CC	Channel Closed
	Optional	READ	Channel No.	Column Number	CC	Input from Channel
	Optional	TMRW	Lead Time	(Light Timer)	CC	REA/WRIT Timeout Setting
	Optional	WRIT	Channel No.	Column Number	CP	Output to Channel
	Optional	SCHA	Character Codes	Prohibited	CP	Determination Character Setting for Data Sending and Receiving

6.3 Parameter Configuration

6.3.1 Basic Setting

(1) I/O slot

- Module Type and Communication Setting

1) Setting Check in Used Network

Check in I/O Parameter No 225.

No.	Parameter Name	Input range	Unit	Remarks
225	I/O controller	0H to FFFFFFFFH		Bits 0 to 7: Type of Network I/F Module Control 1 (0H: Not mounted, 1H: CC-Link, 2H: DeviceNet, 3H: PROFIBUS-DP, 4 to 5H: Reserved by the system, 6H: EtherCAT, 7H: EtherNet/IP, 8H: Reserved by the system, 9H: PIO, AH: PROFINET IO, B to CH: Reserved by the system, DH:CC-Link IE Field)

* This parameter is already set at delivery.

2) Node Address and TCP/IP Settings

Set the node address in I/O Parameter No. 226 for CC-Link, CC-Link IE Field, DeviceNet, EtherCAT and PROFIBUS-DP.

For EtherCAT, set as shown below.

- When having automatic assignment of node address from master: Set 0 (setting at delivery)
- When having fixed assignment of node address: Set 1 to 65535

No.	Parameter Name	Input range	Unit	Remarks
226	I/O1 Fieldbus Node Address	0 to 99999999		Settable Range • At CC-Link: 1 to 64 • At DeviceNet: 0 to 63 • At PROFIBUS-DP: 0 to 125 • At EtherCAT: 0 to 65535 • At CC-Link IE: 1 to 120 * Setting establishment not necessary for EtherNet/IP and PROFINET IO

* The range available for setting should differ depending on the network type to be installed. “60D: Fieldbus Parameter Error” should occur when a number out of the settable range is indicated.

6.3 Parameter Configuration

Set the TCP/IP setting (I/P address, subnet mask and default gateway) of the RSEL system in I/O Parameter No. 132 to 143 for EtherNet/IP.

No.	Parameter Name	Input range	Unit	Remarks
132	I/O Fieldbus Own IP address (H)	1 to 255		*Setting of "0" and "127" is prohibited. * Setting establishment not necessary for PROFINET IO
133	I/O Fieldbus Own IP address (MH)	0 to 255		* Setting establishment not necessary for PROFINET IO
134	I/O Fieldbus Own IP address (ML)	0 to 255		* Setting establishment not necessary for PROFINET IO
135	I/O Fieldbus Own IP address (L)	1 to 254		*Setting of "0" and "255" is prohibited. * Setting establishment not necessary for PROFINET IO
136	I/O Fieldbus Subnet mask (H)	0 to 255		* Setting establishment not necessary for PROFINET IO
137	I/O Fieldbus Subnet mask (MH)	0 to 255		* Setting establishment not necessary for PROFINET IO
138	I/O Fieldbus Subnet mask (ML)	0 to 255		* Setting establishment not necessary for PROFINET IO
139	I/O Fieldbus Subnet mask (L)	0 to 255		* Setting establishment not necessary for PROFINET IO
140	I/O Fieldbus Default gateway (H)	0 to 255		* Setting establishment not necessary for PROFINET IO
141	I/O Fieldbus Default gateway (MH)	0 to 255		* Setting establishment not necessary for PROFINET IO
142	I/O Fieldbus Default gateway (ML)	0 to 255		* Setting establishment not necessary for PROFINET IO
143	I/O Fieldbus Default gateway (L)	0 to 255		* Setting establishment not necessary for PROFINET IO

Set the network number in I/O Parameter No. 228 as well as the node address for CC-Link IE Field.

No.	Parameter Name	Input range	Unit	Remarks
228	I/O1 Fieldbus Network Number	0 to 99999999		• For CC-Link IE Field: 1 to 239 * Not necessary to set for those other than CC-Link IE Field

* It is not necessary to set up for the PIO module and PROFINET IO.

3) Communication Speed Setting

Set the communication speed in I/O Parameter No. 227 for CC-Link, DeviceNet and EtherNet/IP.

No.	Parameter Name	Input range	Unit	Remarks
227	I/O2 Fieldbus communication speed	0 to 9		<ul style="list-style-type: none"> At CC-Link: (0:156kbps, 1:625kbps, 2:2.5Mbps, 3:5Mbps, 4:10Mbps) At DeviceNet: (0:125kbps, 1:250kbps, 2:500kbps) At EtherNet/IP: (0: Autonegotiation 1:10Mbps (Half-Duplex), 2:10Mbps (Full-Duplex), 3:100Mbps (Half-Duplex), 4:100Mbps (Full-Duplex)) <p>* Setting establishment not necessary for PROFIBUS-DP, EtherCAT, PROFINET IO and CC-Link IE Field</p>

- * The range available for setting should differ depending on the network type to be installed. “60D: Fieldbus Parameter Error” should occur when a number out of the settable range is indicated.
- * It is necessary to set the communication speed to the master setting.
- * It is not necessary to set up for CC-Link IE Field, EtherCAT, PROFIBUS-DP, PROFINET IO and PIO module.

● I/O Settings

Set the assignment types and assignment port numbers in the following I/O parameters. For the field network, set the number of ports to be used in addition.

No.	Parameter Name	Input range	Unit	Remarks
1	I/O port assignment type	0 to 20		0: Fixed assignment 1: Automatic assignment
14	Number of Ports Used for I/O1 Fieldbus Remote Input	0 to 1024	Points	Multiple of 8
15	Number of Ports Used for I/O1 Fieldbus Remote Output	0 to 1024	Points	Multiple of 8
16	I/O1 fix-allocated input port start No.	-1 to 3999		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) * Setting not necessary for PIO (Invalid if a negative value is set.)
17	I/O1 fix-allocated output port start No.	-1 to 6999		300 + (multiple of 8) (300 to 599) 400 + (multiple of 8) (4000 to 6999) * Setting not necessary for PIO (Invalid if a negative value is set.)

- * The input and output port assignment types for PIO/SIO/SCON extension unit and PIO unit should be in common.

6.3 Parameter Configuration

No.	Parameter Name	Input range	Unit	Remarks
184	CC-Link IE Number of Remote Resistor (Input) Words (RWw)	0 to 64	Word	Number of remote resistor words for CC-Link IE Field (input in view of slave station)
185	CC-Link IE Number of Remote Resistor (Output) Words (RWr)	0 to 64	Word	Number of remote resistor words for CC-Link IE Field (output in view of slave station)

(2) PIO/SIO/SCON Extension Unit and PIO Unit

- I/O Settings

Set the assignment types, assignment port numbers and the number of used ports in the following I/O parameters.

No.	Parameter Name	Input range	Unit	Remarks
1	I/O port assignment type	0 to 20		0: Fixed assignment 1: Automatic assignment
186	Number of Connected Units of PIO Unit / PIO/SIO Unit	0 to 8	Units	The number of ports used for input and output should be number of connected units * 16 for each.
187	PIO Unit • PIO/SIO Unit fix-allocated input port start No.	-1 to 3999		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set) * The number set in this parameter should be the port start number of a unit next to the SEL unit.
188	Output Port Start Number in Fixed Assignment for PIO Unit / PIO/SIO Unit	-1 to 6999		300 + (Multiple of 8) (300 to 599) 4000 + (Multiple of 8) (4000 to 6999) (Invalid if a negative value is set) * The number set in this parameter should be the port start number of a unit next to the SEL unit.

- * The input and output port assignment types should be in common with the field network or PIO module.

- Serial Communication by SEL Program

Set up the communication specifications in the following I/O parameter.

No.	Parameter Name	Input range	Unit	Remarks
201	Attribute 1 of SIO channel 1 opened to user	0H to FFFFFFFFFFFH		Bits 28 to 31: Baud rate type (0:9.6, 1:19.2, 2:38.4, 3:57.6, 4:76.8, 5:115.2, 6:230.4kbps) Bits 24 to 27: Data length (7 to 8) Bits 20 to 23: Stop bit length (1 to 2) Bits 16 to 19: Parity type (0: None, 1: Odd Number, 2: Even Number) Bits 4 to 15: For future extension Bits 0 to 3: Selection of Use (0: Not to Use, 1: Use) * Used in application level

6.3.2 Other Settings

- Link Standby Time Adjustment in Controller Startup

The standby time for link to the master at the startup of a controller can be adjusted in the following I/O parameter. For instant, standby for the establishment of a link to the master for approximately 20s at the maximum is set up after the network I/F initializing is complete for the setting C8H. This feature is to be used to adjust the time in case such as when “20F/60C: Fieldbus Error (FBRS Link Error)” occurs because the RSEL system gets launched earlier than the network master.

No.	Parameter Name	Input range	Unit	Remarks
121	Network attribute 2	0H to FFFFFFFFH		Bits 16 to 27: Link timeout value in Fieldbus initialization (100ms)

- Input Port Data Select in Link Error (Remote I/O Communication)

Selection can be made whether to clear or hold (maintain) the input port data in the RSEL system in a link error. For instance, the input port data in the RSEL system should be 0 for the use of the applicable network in a link error for the setting 0H.

No.	Parameter Name	Input range	Unit	Remarks
120	Network attribute 1	0H to FFFFFFFFH		Bits 28 to 31: Input Port Data Select in I/O1 Fieldbus Link Error (0: Clear, 1: Hold)

6.3 Parameter Configuration

6.3.3 Examples of Parameter Settings at Delivery

● I/O Parameter

NP/PN: PIO module, CC: CC-Link, CIE: CC-Link IE Field, DV: DeviceNet, EC: EtherCAT, EP: EtherNet/IP, PRT:PROFINET IO, PR: PROFIBUS-DP

No.	Parameter Name	Example of factory setting								Input range	Unit	Remarks
		NP/PN	CC	CIE	DV	EC	EP	PR	PRT			
1	I/O port assignment type	1	0	0	0	0	1	0	1	0 to 20		0: Fixed assignment 1: Automatic assignment * Priority of I/O port assignment at automatic assignment (I/O1→PIO unit • PIO/SIO unit)
14	Number of Ports Used for I/O1 Fieldbus Remote Input	0	64	64	64	256	0	64	0	0 to 1024		Multiple of 8
15	Number of Ports Used for I/O1 Fieldbus Remote Output	0	64	64	64	256	0	64	0	0 to 1024		Multiple of 8
16	I/O1fix-allocated input port start No.	-1	0	0	0	0	-1	0	-1	-1 to 3999		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set.) *1000 to 3999 can be set only for Fieldbus
17	I/O1fix-allocated output port start No.	-1	300	300	300	300	-1	300	-1	-1 to 6999		300 + (multiple of 8) (300 to 599) 400 + (multiple of 8) (4000 to 6999) (Invalid if a negative value is set.) *4000 to 6999 can be set only for Fieldbus
18	I/O1 error monitor	1	1	1	1	1	1	1	1	0 to 5		0: Do not monitor 1: Monitor 2: Monitor (Do not monitor 24-V I/O power errors) 3: Monitor (Monitor 24-V I/O power errors) 4: Monitor (Make 24V I/O power errors to message level) * 2 to 4 can be set only for PIO * Some exceptions apply.
20	Input filtering periods	2	2	2	2	2	2	2	2	1 to 9		Input signal is recognized when the status is held for twice the period set by this parameter. * Valid only for PIO
120	Network attribute 1	64 1001H	64 1001H	64 1001H	64 1001H	64 1001H	64 1001H	64 1001H	64 1001H	0H to FFFFFFFFFFH		Bits 0 to 3: Reserved by the system Bits 4 to 11: I/O1 Fieldbus link error confirmation timer value (10ms) Bits 12 to 15: During PROFINET IO configuration, registered module data size type (0:1 word, 1:4 word) Bits 16 to 27: Reserved by the system Bits 28 to 31: Input Port Data Select in I/O1 Fieldbus Link Error (0: Clear, 1: Hold)
121	Network attribute 2	C8 0000H	C8 0000H	C8 0000H	C8 0000H	C8 0000H	C8 0000H	C8 0000H	C8 0000H	0H to FFFFFFFFFH		Bits 0 to 15: Reserved by the system Bits 16 to 27: Link timeout value in Fieldbus initialization (100ms) Bits 28 to 31: EtherCAT PDO mapping type (0: Variable, 1: 32Byte Fixed)
130	I/O Fieldbus Own MAC address (H)	0H	0H	0H	0H	0H	0H	0H	0H	0H to FFFFFFFFFH		Only lower two bytes are valid.
131	I/O Fieldbus Own MAC address (L)	0H	0H	0H	0H	0H	0H	0H	0H	0H to FFFFFFFFFH		
132	I/O Fieldbus Own IP address (H)	192	192	192	192	192	192	192	192	1 to 255		* Setting of "0" and "127" is prohibited. * Setting establishment not necessary for PROFINET IO
133	I/O Fieldbus Own IP address (MH)	168	168	168	168	168	168	168	168	0 to 255		* Setting establishment not necessary for PROFINET IO
134	I/O Fieldbus Own IP address (ML)	0	0	0	0	0	0	0	0	0 to 255		* Setting establishment not necessary for PROFINET IO
135	I/O Fieldbus Own IP address (L)	1	1	1	1	1	1	1	1	1 to 254		* Setting of "0" and "255" is prohibited. * Setting establishment not necessary for PROFINET IO
136	I/O Fieldbus Subnet mask (H)	255	255	255	255	255	255	255	255	0 to 255		* Setting establishment not necessary for PROFINET IO
137	I/O Fieldbus Subnet mask (MH)	255	255	255	255	255	255	255	255	0 to 255		* Setting establishment not necessary for PROFINET IO
138	I/O Fieldbus Subnet mask (ML)	255	255	255	255	255	255	255	255	0 to 255		* Setting establishment not necessary for PROFINET IO
139	I/O Fieldbus Subnet mask (L)	0	0	0	0	0	0	0	0	0 to 255		* Setting establishment not necessary for PROFINET IO
140	I/O Fieldbus Default gateway (H)	0	0	0	0	0	0	0	0	0 to 255		* Setting establishment not necessary for PROFINET IO
141	I/O Fieldbus Default gateway (MH)	0	0	0	0	0	0	0	0	0 to 255		* Setting establishment not necessary for PROFINET IO
142	I/O Fieldbus Default gateway (ML)	0	0	0	0	0	0	0	0	0 to 255		* Setting establishment not necessary for PROFINET IO
143	I/O Fieldbus Default gateway (L)	0	0	0	0	0	0	0	0	0 to 255		* Setting establishment not necessary for PROFINET IO

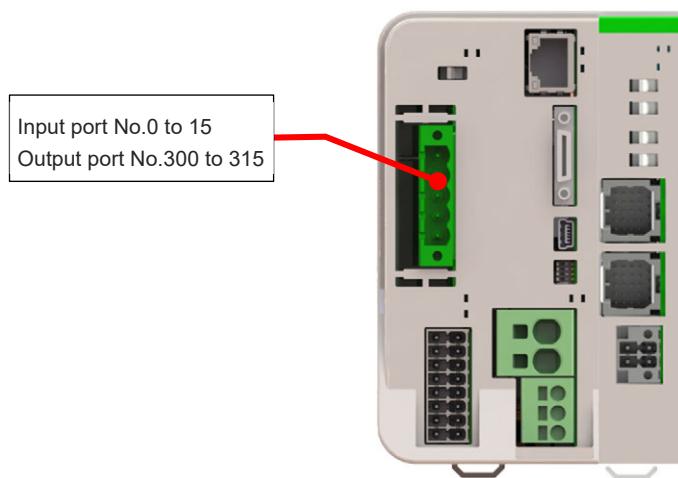
NP/PN: PIO module, CC: CC-Link, CIE: CC-Link IE Field, DV: DeviceNet, EC: EtherCAT, EP: EtherNet/IP, PRT:PROFINET IO, PR: PROFIBUS-DP

No.	Parameter Name	Example of factory setting								Input range	Unit	Remarks
		NP/PN	CC	CIE	DV	EC	EP	PR	PRT			
184	CC-Link IE Number of Remote Resistor (Input) Words (RWw)	0	0	2	0	0	0	0	0	0 to 64		Number of remote resistor words for CC-Link IE Field (input in view of slave station)
185	CC-Link IE Number of Remote Resistor (Output) Words (RWr)	0	0	2	0	0	0	0	0	0 to 64		Number of remote resistor words for CC-Link IE Field (output in view of slave station)
225	I/O controller	9H	1H	DH	2H	6H	7H	3H	AH	0H to FFFFFFFFH		Bits 0 to 7: Type of Network I/F Module Control 1 (0H: Not mounted, 1H: CC-Link, 2H: DeviceNet, 3H: PROFIBUS-DP, 4 to 5H: Reserved by the system, 6H: EtherCAT, 7H: EtherNet/IP, 8H: Reserved by the system, 9H: PIO, AH: PROFINET IO, B to CH: Reserved by the system, DH: CC-Link IE) Bits 8 to 31: Reserved by the system Settable Range <ul style="list-style-type: none"> • At CC-Link: 1 to 64 • At DeviceNet: 0 to 63 • At PROFIBUS-DP: 0 to 125 • At EtherCAT: 0 to 65535 • At CC-Link IE: 1 to 120 * Setting establishment not necessary for EtherNet/IP and PROFINET IO
226	I/O1 Fieldbus Node Address	0	1	1	0	0	0	1	0	0 to 99999999		<ul style="list-style-type: none"> • At CC-Link: (0:156kbps, 1:625kbps, 2:2.5Mbps, 3:5Mbps, 4:10Mbps) • At DeviceNet: (0:125kbps, 1:250kbps, 2:500kbps) • At EtherNet/IP: (0: Autonegotiation 1:10Mbps (Half-Duplex), 2:10Mbps (Full-Duplex), 3:100Mbps (Half-Duplex), 4:100Mbps (Full-Duplex)) * Setting establishment not necessary for PROFIBUS-DP, EtherCAT, PROFINET IO and CC-Link IE Field • For CC-Link IE Field: 1 to 239 * Not necessary to set for those other than CC-Link IE Field
227	I/O1 Fieldbus communication speed	0	4	0	2	0	0	0	0	0 to 9		
228	I/O1 Fieldbus Network Number	0	0	1	0	0	0	0	0	0 to 99999999		

6.3.4 Example of Use of Each Network and Parameter

[1] CC-Link only

It is the setting when CC-Link is to be used for 16 points of each input and output from No. 0 and from No. 300 of the input and output ports.



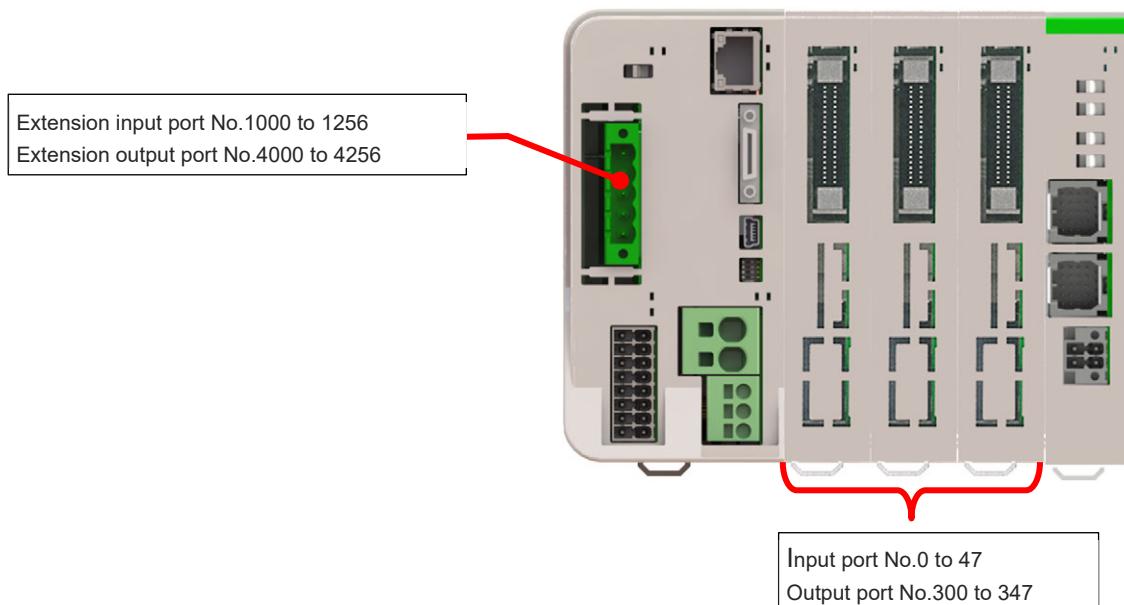
No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	0	0		0: Fixed assignment 1: Automatic assignment
14	Number of Ports Used for I/O1 Fieldbus Remote Input	64	16		Multiple of 8
15	Number of Ports Used for I/O1 Fieldbus Remote Output	64	16		Multiple of 8
16	I/O1 fix-allocated input port start No.	0	0		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set.)
17	I/O1 fix-allocated output port start No.	300	300		300 + (multiple of 8) (300 to 599) 4000 + (multiple of 8) (4000 to 6999) (Invalid if a negative value is set.)
18	I/O1 error monitor	1	1		0: Do not monitor 1: Monitor * Some exceptions apply.
120	Network attribute 1	641001H	Optional		Bits4-11: I/O1 Fieldbus link error confirmation timer value (10ms) Bits28-31: Input Port Data Select in I/O1 Fieldbus Link Error (0: Clear, 1: Hold)
121	Network attribute 2	C80000H	Optional		Bits 16-27: Link timeout value in Fieldbus initialization (100ms) Bits 0-7: Type of Network I/F Module Control 1 (0H : Not mounted, 1H : CC-Link, 2H : DeviceNet, 3H : PROFIBUS-DP, 6H : EtherCAT, 7H : EtherNet/IP, 9H : PIO, AH : PROFINET IO, DH: CC-Link IE)
225	I/O controller	1H	1H		
226	I/O1 Fieldbus Node Address	1	Optional		Settable Range 1 to 64
227	I/O1 Fieldbus communication speed	4	Optional		0: 156kbps, 1: 625kbps, 2: 2.5Mbps, 3: 5Mbps, 4: 10Mbps

CC-Link + PIO

• Example of Use (1)

It is the setting when CC-Link is to be used for 256 points of each input and output from the top of the extension input and output ports (No. 1000 ~, No. 4000 ~), and PIO is to be used for 48 points of each input and output from the top of the input and output ports (No. 0 ~, No. 300 ~).

In this case, three units of PIO units (16 points x 3 units = 48 points) should be used.



No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	0	0		0: Fixed assignment 1: Automatic assignment
14	Number of Ports Used for I/O1 Fieldbus Remote Input	64	256		Multiple of 8
15	Number of Ports Used for I/O1 Fieldbus Remote Output	64	256		Multiple of 8
16	I/O1 fix-allocated input port start No.	0	1000		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set.)
17	I/O1 fix-allocated output port start No.	300	4000		300 + (multiple of 8) (300 to 599) 4000 + (multiple of 8) (4000 to 6999) (Invalid if a negative value is set.)
18	I/O1 error monitor	1	1		0: Do not monitor 1: Monitor * Some exceptions apply.
20	Input filtering periods	2	Optional	msec	Input signal is recognized when the status is held for twice the period set by this parameter. * Valid only for PIO, PIO unit / PIO/SIO unit
120	Network attribute 1	641001H	Optional		Bits4-11: I/O1 Fieldbus link error confirmation timer value (10ms) Bits28-31: Input Port Data Select in I/O1 Fieldbus Link Error (0: Clear, 1: Hold)
121	Network attribute 2	C80000H	Optional		Bits 16-27: Link timeout value in Fieldbus initialization (100ms)
186	Number of Connected PIO Units / PIO/SIO Units	0	3	Units	The number of ports used for input and output should be number of connected units × 16 for each.
187	PIO Unit • PIO/SIO Unit fix-allocated input port start No.	-1	0		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set)

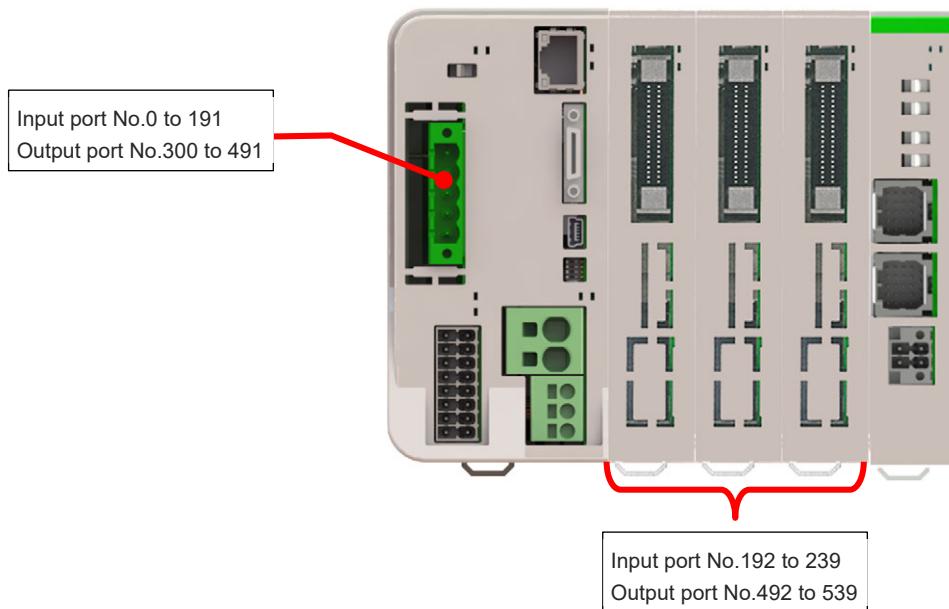
6.3 Parameter Configuration

No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
188	Output Port Start Number in Fixed Assignment for PIO Unit / PIO/SIO Unit	-1	300		300 + (Multiple of 8) (300 to 599) 4000 + (Multiple of 8) (4000 to 6999) (Invalid if a negative value is set)
189	PIO Unit / PIO/SIO Unit Error Monitor	1	1		0: Not monitored 1: Monitored 2: Monitored (24V I/O power supply related errors not monitored) 3: Monitored (only 24V I/O power supply related errors monitored) 4: Monitored (24V I/O power supply related errors output as message level) * Some exceptions apply
190	Option Unit Attribute 1	C800200H	Optional		Bits 0 to 3: PIO unit output port data select in TF connection error (0: Clear, 1: Hold) Bits 4 to 7: PIO unit input port data select in TF connection error (0: Clear, 1: Hold) Bits 8 to 15: TF communication link error check timer value (10ms) Bits 16 to 19: For future extension use Bits 20 to 31: Link timeout value in TF communication initialization (100ms)
225	I/O controller	1H	1H		Bits 0-7: Type of Network I/F Module Control 1 (0H : Not mounted, 1H : CC-Link, 2H : DeviceNet, 3H : PROFIBUS-DP, 6H : EtherCAT, 7H : EtherNet/IP, 9H : PIO, AH : PROFINET IO, DH: CC-Link IE)
226	I/O1 Fieldbus Node Address	1	Optional		Settable Range 1 to 64
227	I/O1 Fieldbus communication speed	4	Optional		0: 156kbps, 1: 625kbps, 2: 2.5Mbps, 3: 5Mbps, 4: 10Mbps

- Example of Use (2)

It is the setting when using 192 points each of input and output for CC-Link and 48 points each of input and output for PIO in a row from the top of the input and output ports (from No. 0 and from No. 300).

In this case, three units of PIO units (16 points x 3 units = 48 points) should be used, and the input and output ports should be from No. 192 and from No. 492.



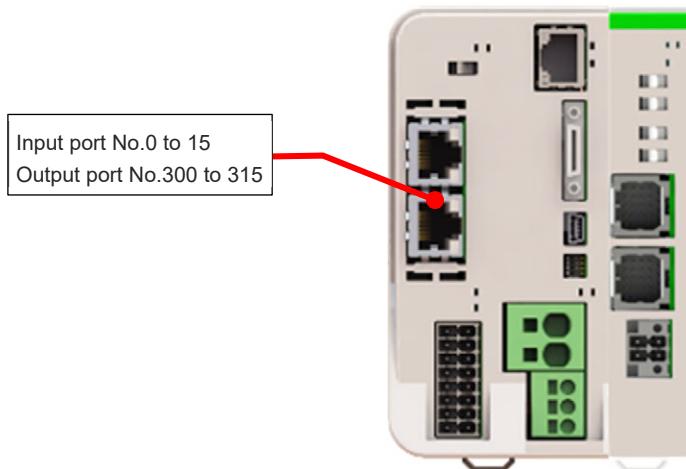
No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	0	1		0: Fixed assignment 1: Automatic assignment * Priority of I/O port assignment at automatic assignment (I/O1→PIO unit • PIO/SIO unit)
14	Number of Ports Used for I/O1 Fieldbus Remote Input	64	192		Multiple of 8
15	Number of Ports Used for I/O1 Fieldbus Remote Output	64	192		Multiple of 8
16	I/O1 fix-allocated input port start No.	0	-1		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set.)
17	I/O1 fix-allocated output port start No.	300	-1		300 + (multiple of 8) (300 to 599) 4000 + (multiple of 8) (4000 to 6999) (Invalid if a negative value is set.)
18	I/O1 error monitor	1	1		0: Do not monitor 1: Monitor * Some exceptions apply.
20	Input filtering periods	2	Optional	msec	Input signal is recognized when the status is held for twice the period set by this parameter. * Valid only for PIO, PIO unit / PIO/SIO unit
120	Network attribute 1	641001H	Optional		Bits4-11: I/O1 Fieldbus link error confirmation timer value (10ms) Bits28-31: Input Port Data Select in I/O1 Fieldbus Link Error (0: Clear, 1: Hold)
121	Network attribute 2	C80000H	Optional		Bits 16-27: Link timeout value in Fieldbus initialization (100ms)
186	Number of Connected PIO Units / PIO/SIO Units	0	3	Units	The number of ports used for input and output should be number of connected units × 16 for each.
187	PIO Unit • PIO/SIO Unit fix-allocated input port start No.	-1	-1		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set)

6.3 Parameter Configuration

No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
188	Output Port Start Number in Fixed Assignment for PIO Unit / PIO/SIO Unit	-1	-1		300 + (Multiple of 8) (300 to 599) 4000 + (Multiple of 8) (4000 to 6999) (Invalid if a negative value is set)
189	PIO Unit / PIO/SIO Unit Error Monitor	1	1		0: Not monitored 1: Monitored 2: Monitored (24V I/O power supply related errors not monitored) 3: Monitored (only 24V I/O power supply related errors monitored) 4: Monitored (24V I/O power supply related errors output as message level) * Some exceptions apply
190	Option Unit Attribute 1	C800200H	Optional		Bits 0 to 3: PIO unit output port data select in TF connection error (0: Clear, 1: Hold) Bits 4 to 7: PIO unit input port data select in TF connection error (0: Clear, 1: Hold) Bits 8 to 15: TF communication link error check timer value (10ms) Bits 16 to 19: For future extension use Bits 20 to 31: Link timeout value in TF communication initialization (100ms)
225	I/O controller	1H	1H		Bits 0-7: Type of Network I/F Module Control 1 (0H : Not mounted, 1H : CC-Link, 2H : DeviceNet, 3H : PROFIBUS-DP, 6H : EtherCAT, 7H : EtherNet/IP, 9H : PIO, AH : PROFINET IO, DH: CC-Link IE)
226	I/O1 Fieldbus Node Address	1	Optional		Settable Range 1 to 64
227	I/O1 Fieldbus communication speed	4	Optional		0: 156kbps, 1: 625kbps, 2: 2.5Mbps, 3: 5Mbps, 4: 10Mbps

[2] CC-Link IE Field only

It is the setting when CC-Link IE Field is to be used for 16 points of each input and output (remote register not used) from the top of the input and output ports (No. 0 ~, No. 300 ~).



No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	0	0		0: Fixed assignment 1: Automatic assignment
14	Number of Ports Used for I/O1 Fieldbus Remote Input	64	16		Multiple of 8
15	Number of Ports Used for I/O1 Fieldbus Remote Output	64	16		Multiple of 8
16	I/O1 fix-allocated input port start No.	0	0		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set.)
17	I/O1 fix-allocated output port start No.	300	300		300 + (multiple of 8) (300 to 599) 4000 + (multiple of 8) (4000 to 6999) (Invalid if a negative value is set.)
18	I/O1 error monitor	1	1		0: Do not monitor 1: Monitor * Some exceptions apply.
20	Input filtering periods	2	2	msec	Input signal is recognized when the status is held for twice the period set by this parameter. * Valid only for PIO, PIO unit / PIO/SIO unit Bits4-11: I/O1 Fieldbus link error confirmation timer value (10ms)
120	Network attribute 1	641001H	Optional		Bits12-15: Registered module data size type in PROFINET IO configuration (0:1 word, 1:4 word) Bits28-31: Input Port Data Select in I/O1 Fieldbus Link Error (0: Clear, 1: Hold)
121	Network attribute 2	C80000H	Optional		Bits 16-27: Link timeout value in Fieldbus initialization (100ms)
130	I/O Fieldbus Own MAC address (H)	0H	MAC address display		Only lower two bytes are valid.
131	I/O Fieldbus Own MAC address (L)	0H	MAC address display		
184	Number of CC-Link IE Remote Registration (Input) Words (RWw)	2	0		Number of the remote registration words (Inputs in view from the slave station)
185	Number of CC-Link IE Remote Registration (Output) Words (RWr)	2	0		Number of the remote registration words (Outputs in view from the slave station)

6.3 Parameter Configuration

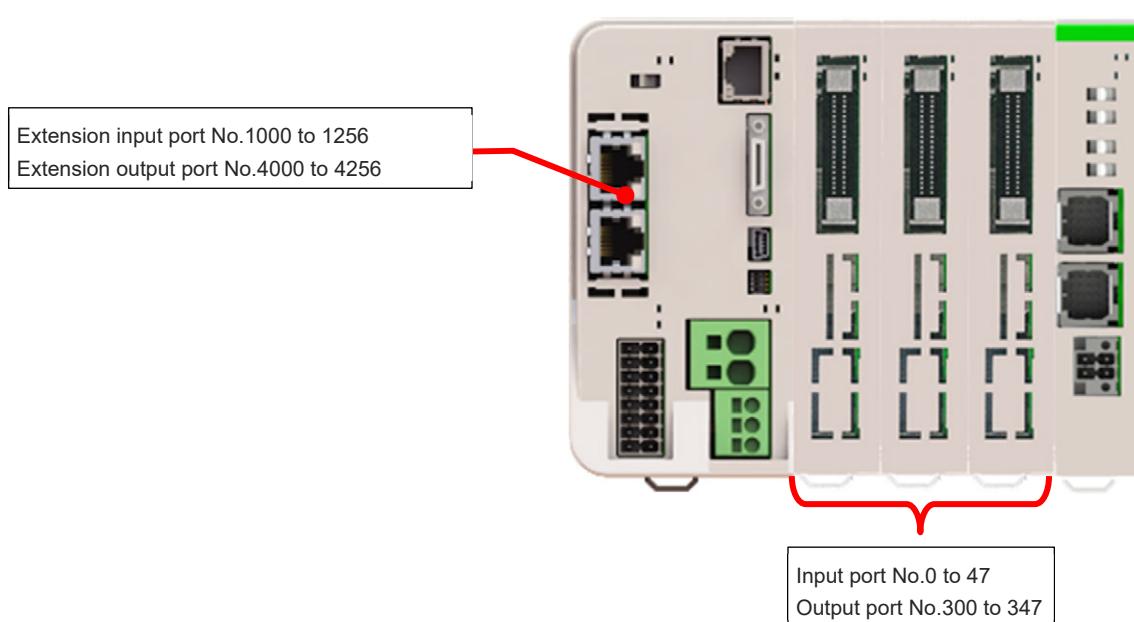
No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
225	I/O controller	1H	1H		Bits 0-7: Type of Network I/F Module Control 1 (0H : Not mounted, 1H : CC-Link, 2H : DeviceNet, 3H : PROFIBUS-DP, 6H : EtherCAT, 7H : EtherNet/IP, 9H : PIO, AH: PROFINET IO, DH: CC-Link IE)
226	I/O1 Fieldbus Node Address	1	Optional		Settable Range 1 to 120
228	I/O1 Fieldbus Network Number	1	Optional		Settable Range 1 to 239

CC-Link IE Field + PIO

• Example of Use (1)

It is the setting when CC-Link IE is to be used for 256 points (10 words in it are for remote register) of each input and output from the top of the extension input and output ports (No. 1000 ~, No. 4000 ~), and PIO is to be used for 48 points of each input and output from the top of the input and output ports (No. 0 ~, No. 300 ~).

In this case, three units of PIO units (16 points x 3 units = 48 points) should be used.



No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	0	0		0: Fixed assignment 1: Automatic assignment
14	Number of Ports Used for I/O1 Fieldbus Remote Input	64	256		Multiple of 8
15	Number of Ports Used for I/O1 Fieldbus Remote Output	64	256		Multiple of 8
16	I/O1 fix-allocated input port start No.	0	1000		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set.)
17	I/O1 fix-allocated output port start No.	300	4000		300 + (multiple of 8) (300 to 599) 4000 + (multiple of 8) (4000 to 6999) (Invalid if a negative value is set.)
18	I/O1 error monitor	1	1		0: Do not monitor 1: Monitor * Some exceptions apply.
20	Input filtering periods	2	Optional	msec	Input signal is recognized when the status is held for twice the period set by this parameter. * Valid only for PIO, PIO unit / PIO/SIO unit
120	Network attribute 1	641001H	Optional		Bits4-11: I/O1 Fieldbus link error confirmation timer value (10ms) Bits28-31: Input Port Data Select in I/O1 Fieldbus Link Error (0: Clear, 1: Hold)
121	Network attribute 2	C80000H	Optional		Bits 16-27: Link timeout value in Fieldbus initialization (100ms)
130	I/O Fieldbus Own MAC address (H)	0H	MAC address display		Only lower two bytes are valid.
131	I/O Fieldbus Own MAC address (L)	0H	MAC address display		

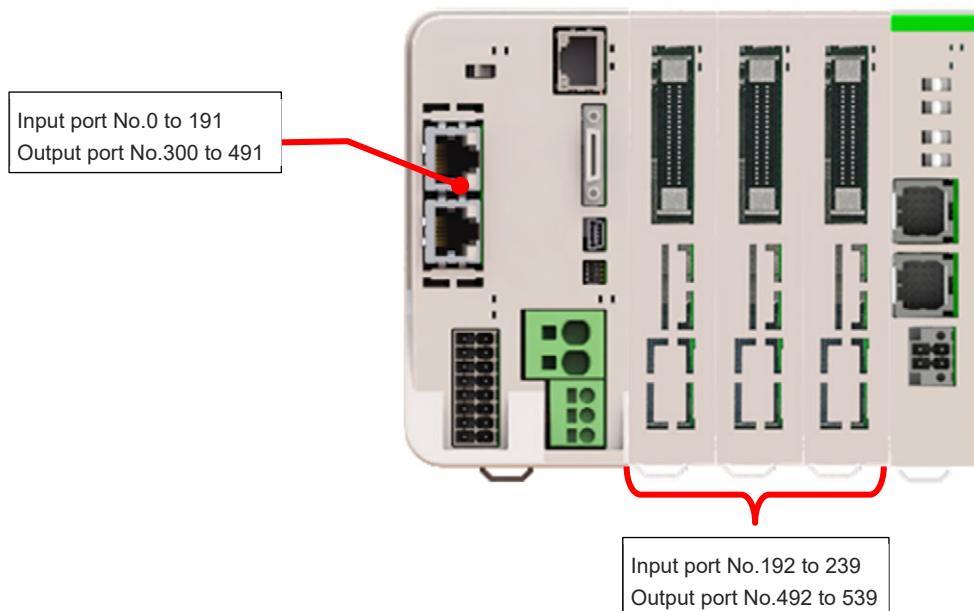
6.3 Parameter Configuration

No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
184	Number of CC-Link IE Remote Registration (Input) Words (RWw)	2	10		Number of the remote registration words (Inputs in view from the slave station)
185	Number of CC-Link IE Remote Registration (Output) Words (RWr)	2	10		Number of the remote registration words (Outputs in view from the slave station)
186	Number of Connected PIO Units / PIO/SIO Units	0	3	unit	The number of ports used for input and output should be number of connected units × 16 for each. 0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set)
187	PIO Unit • PIO/SIO Unit fix-allocated input port start No.	-1	0		300 + (Multiple of 8) (300 to 599) 4000 + (Multiple of 8) (4000 to 6999) (Invalid if a negative value is set)
188	Output Port Start Number in Fixed Assignment for PIO Unit / PIO/SIO Unit	-1	300		0: Not monitored 1: Monitored 2: Monitored (24V I/O power supply related errors not monitored) 3: Monitored (only 24V I/O power supply related errors monitored) 4: Monitored (24V I/O power supply related errors output as message level) * Some exceptions apply
189	PIO Unit / PIO/SIO Unit Error Monitor	1	1		Bits 0 to 3: PIO unit output port data select in TF connection error (0: Clear, 1: Hold) Bits 4 to 7: PIO unit input port data select in TF connection error (0: Clear, 1: Hold) Bits 8 to 15: TF communication link error check timer value (10ms) Bits 16 to 19: For future extension use Bits 20 to 31: Link timeout value in TF communication initialization (100ms)
225	I/O controller	DH	DH		Bits 0-7: Type of Network I/F Module Control 1 (0H : Not mounted, 1H : CC-Link, 2H : DeviceNet, 3H : PROFIBUS-DP, 6H : EtherCAT, 7H : EtherNet/IP, 9H : PIO, AH : PROFINET IO, DH: CC-Link IE)
226	I/O1 Fieldbus Node Address	1	Optional		Settable Range 1 to 120
228	I/O1 Fieldbus Network Number	1	Optional		Settable Range 1 to 239

- Example of Use (2)

It is the setting when using 192 points each of input and output for CC-Link IE (8 words for remote register in it) and 48 points each of input and output for PIO in a row from the top of the input and output ports (from No. 0 and from No. 300).

In this case, three units of PIO units (16 points x 3 units = 48 points) should be used, and the input and output ports should be from No. 192 and from No. 492.



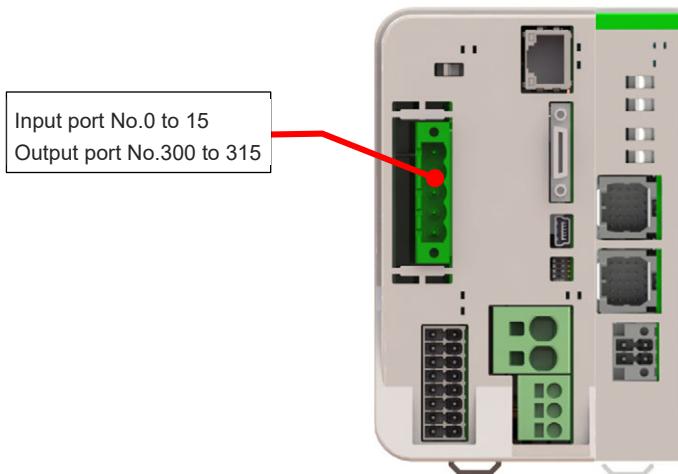
No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	0	1		0: Fixed assignment 1: Automatic assignment * Priority of I/O port assignment at automatic assignment (I/O1→PIO unit • PIO/SIO unit)
14	Number of Ports Used for I/O1 Fieldbus Remote Input	64	192		Multiple of 8
15	Number of Ports Used for I/O1 Fieldbus Remote Output	64	192		Multiple of 8
16	I/O1 fix-allocated input port start No.	0	-1		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set.)
17	I/O1 fix-allocated output port start No.	300	-1		300 + (multiple of 8) (300 to 599) 4000 + (multiple of 8) (4000 to 6999) (Invalid if a negative value is set.)
18	I/O1 error monitor	1	1		0: Do not monitor 1: Monitor * Some exceptions apply.
20	Input filtering periods	2	Optional	msec	Input signal is recognized when the status is held for twice the period set by this parameter. * Valid only for PIO, PIO unit / PIO/SIO unit
120	Network attribute 1	641001H	Optional		Bits4-11: I/O1 Fieldbus link error confirmation timer value (10ms) Bits28-31: Input Port Data Select in I/O1 Fieldbus Link Error (0: Clear, 1: Hold)
121	Network attribute 2	C80000H	Optional		Bits 16-27: Link timeout value in Fieldbus initialization (100ms)
130	I/O Fieldbus Own MAC address (H)	0H	MAC address display		Only lower two bytes are valid.

6.3 Parameter Configuration

No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
131	I/O Fieldbus Own MAC address (L)	0H	MAC address display		
184	Number of CC-Link IE Remote Registration (Input) Words (RWw)	2	8		Number of the remote registration words (Inputs in view from the slave station)
185	Number of CC-Link IE Remote Registration (Output) Words (RWr)	2	8		Number of the remote registration words (Outputs in view from the slave station)
186	Number of Connected PIO Units / PIO/SIO Units	0	3	unit	The number of ports used for input and output should be number of connected units × 16 for each. 0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set)
187	PIO Unit • PIO/SIO Unit fix-allocated input port start No.	-1	-1		
188	Output Port Start Number in Fixed Assignment for PIO Unit / PIO/SIO Unit	-1	-1		300 + (Multiple of 8) (300 to 599) 4000 + (Multiple of 8) (4000 to 6999) (Invalid if a negative value is set)
189	PIO Unit / PIO/SIO Unit Error Monitor	1	1		0: Not monitored 1: Monitored 2: Monitored (24V I/O power supply related errors not monitored) 3: Monitored (only 24V I/O power supply related errors monitored) 4: Monitored (24V I/O power supply related errors output as message level) * Some exceptions apply
190	Option Unit Attribute 1	C800200H	Optional		Bits 0 to 3: PIO unit output port data select in TF connection error (0: Clear, 1: Hold) Bits 4 to 7: PIO unit input port data select in TF connection error (0: Clear, 1: Hold) Bits 8 to 15: TF communication link error check timer value (10ms) Bits 16 to 19: For future extension use Bits 20 to 31: Link timeout value in TF communication initialization (100ms)
225	I/O controller	DH	DH		Bits 0-7: Type of Network I/F Module Control 1 (0H : Not mounted, 1H : CC-Link, 2H : DeviceNet, 3H : PROFIBUS-DP, 6H : EtherCAT, 7H : EtherNet/IP, 9H : PIO, AH : PROFINET IO, DH: CC-Link IE)
226	I/O1 Fieldbus Node Address	1	Optional		Settable Range 1 to 120
228	I/O1 Fieldbus Network Number	1	Optional		Settable Range 1 to 239

[3] DeviceNet only

It is the setting when DeviceNet is to be used for 16 points of each input and output from top of the input and output ports (No. 0 ~, No. 300 ~).



No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	0	0		0: Fixed assignment 1: Automatic assignment
14	Number of Ports Used for I/O1 Fieldbus Remote Input	64	16		Multiple of 8
15	Number of Ports Used for I/O1 Fieldbus Remote Output	64	16		Multiple of 8
16	I/O1 fix-allocated input port start No.	0	0		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set.)
17	I/O1 fix-allocated output port start No.	300	300		300 + (multiple of 8) (300 to 599) 4000 + (multiple of 8) (4000 to 6999) (Invalid if a negative value is set.)
18	I/O1 error monitor	1	1		0: Do not monitor 1: Monitor * Some exceptions apply.
120	Network attribute 1	641001H	Optional		Bits4-11: I/O1 Fieldbus link error confirmation timer value (10ms) Bits28-31: Input Port Data Select in I/O1 Fieldbus Link Error (0: Clear, 1: Hold)
121	Network attribute 2	C80000H	Optional		Bits16-27: Link timeout value in Fieldbus initialization (100ms)
225	I/O controller	2H	2H		Bits 0-7: Type of Network I/F Module Control 1 (0H : Not mounted, 1H : CC-Link, 2H : DeviceNet, 3H : PROFIBUS-DP, 6H : EtherCAT, 7H : EtherNet/IP, 9H : PIO, AH : PROFINET IO, DH: CC-Link IE)
226	I/O1 Fieldbus Node Address	0	Optional		Settable Range 0 to 63
227	I/O1 Fieldbus communication speed	4	Optional		0: 125kbps, 1: 250kbps, 2: 500Mbps

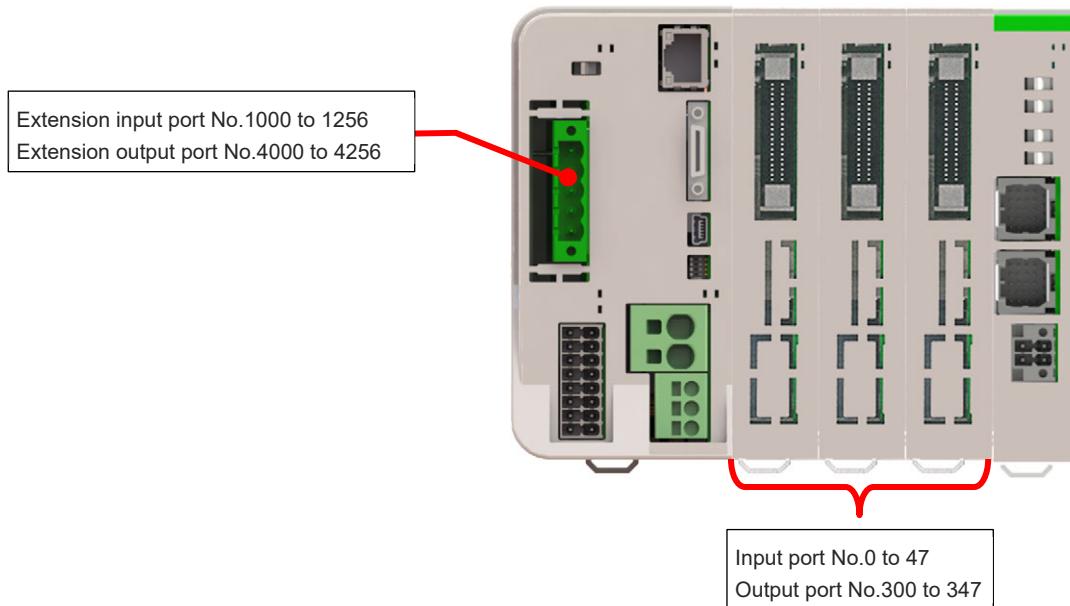
6.3 Parameter Configuration

DeviceNet + PIO

- Example of Use (1)

It is the setting when DeviceNet is to be used for 256 points of each input and output from the top of the extension input and output ports (No. 1000 ~, No. 4000 ~), and PIO is to be used for 48 points of each input and output from the top of the input and output ports (No. 0 ~, No. 300 ~).

In this case, three units of PIO units (16 points x 3 units = 48 points) should be used.



No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	0	0		0: Fixed assignment 1: Automatic assignment
14	Number of Ports Used for I/O1 Fieldbus Remote Input	64	256		Multiple of 8
15	Number of Ports Used for I/O1 Fieldbus Remote Output	64	256		Multiple of 8
16	I/O1 fix-allocated input port start No.	0	0		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set.)
17	I/O1 fix-allocated output port start No.	300	300		300 + (multiple of 8) (300 to 599) 4000 + (multiple of 8) (4000 to 6999) (Invalid if a negative value is set.)
18	I/O1 error monitor	1	1		0: Do not monitor 1: Monitor * Some exceptions apply.
20	Input filtering periods	2	2	msec	Input signal is recognized when the status is held for twice the period set by this parameter. * Valid only for PIO, PIO unit / PIO/SIO unit
120	Network attribute 1	641001H	Optional		Bits4-11: I/O1 Fieldbus link error confirmation timer value (10ms) Bits28-31: Input Port Data Select in I/O1 Fieldbus Link Error (0: Clear, 1: Hold)
121	Network attribute 2	C80000H	Optional		Bits 16-27: Link timeout value in Fieldbus initialization (100ms)
186	Number of Connected PIO Units / PIO/SIO Units	0	3	Units	The number of ports used for input and output should be number of connected units × 16 for each.
187	PIO Unit • PIO/SIO Unit fix-allocated input port start No.	-1	0		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set)

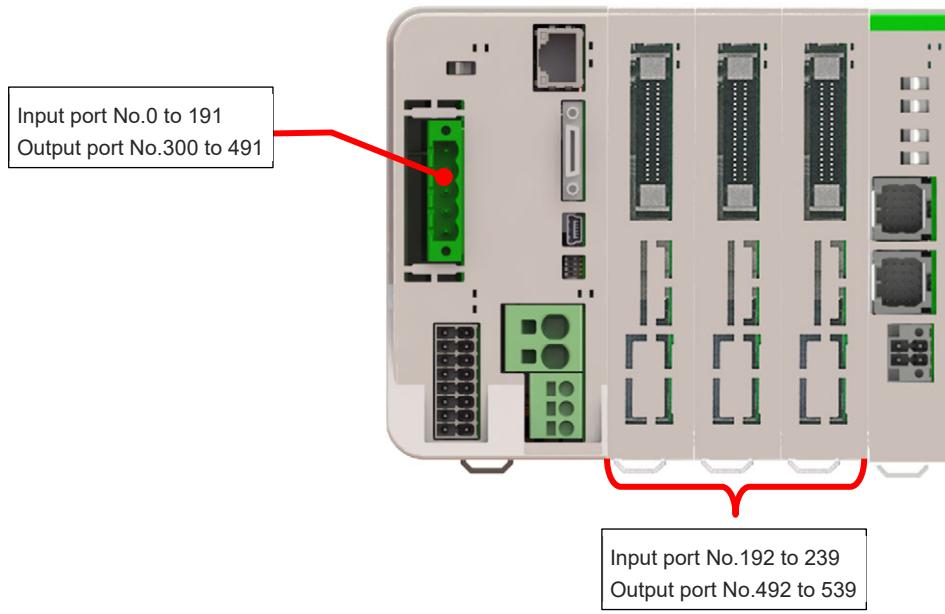
No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
188	Output Port Start Number in Fixed Assignment for PIO Unit / PIO/SIO Unit	-1	300		300 + (Multiple of 8) (300 to 599) 4000 + (Multiple of 8) (4000 to 6999) (Invalid if a negative value is set)
189	PIO Unit / PIO/SIO Unit Error Monitor	1	1		0: Not monitored 1: Monitored 2: Monitored (24V I/O power supply related errors not monitored) 3: Monitored (only 24V I/O power supply related errors monitored) 4: Monitored (24V I/O power supply related errors output as message level) * Some exceptions apply
190	Option Unit Attribute 1	C800200H	Optional		Bits 0 to 3: PIO unit output port data select in TF connection error (0: Clear, 1: Hold) Bits 4 to 7: PIO unit input port data select in TF connection error (0: Clear, 1: Hold) Bits 8 to 15: TF communication link error check timer value (10ms) Bits 16 to 19: For future extension use Bits 20 to 31: Link timeout value in TF communication initialization (100ms)
225	I/O controller	2H	2H		Bits 0-7: Type of Network I/F Module Control 1 (0H : Not mounted, 1H : CC-Link, 2H : DeviceNet, 3H : PROFIBUS-DP, 6H : EtherCAT, 7H : EtherNet/IP, 9H : PIO, AH : PROFINET IO, DH: CC-Link IE)
226	I/O1 Fieldbus Node Address	0	Optional		Settable Range 0 to 63
227	I/O1 Fieldbus communication speed	2	Optional		0: 125kbps, 1: 250kbps, 2: 500kbps

6.3 Parameter Configuration

- Example of Use (2)

It is the setting when using 192 points each of input and output for DeviceNet and 48 points each of input and output for PIO in a row from the top of the input and output ports (from No. 0 and from No. 300).

In this case, three units of PIO units (16 points x 3 units = 48 points) should be used, and the input and output ports should be from No. 192 and from No. 492.



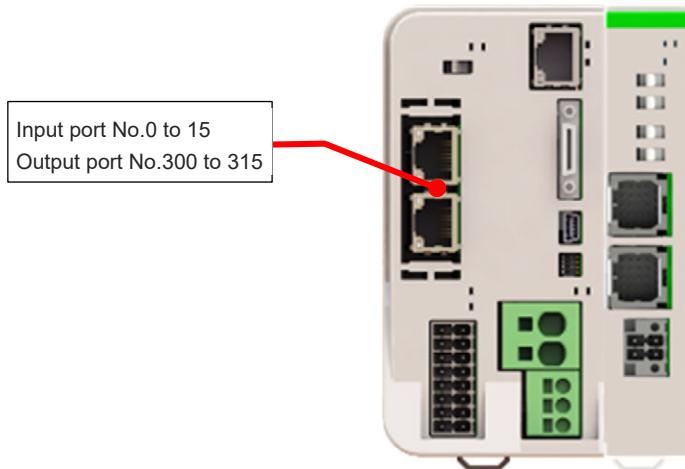
No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	0	1		0: Fixed assignment 1: Automatic assignment * Priority of I/O port assignment at automatic assignment (I/O1→PIO unit • PIO/SIO unit)
14	Number of Ports Used for I/O1 Fieldbus Remote Input	64	192		Multiple of 8
15	Number of Ports Used for I/O1 Fieldbus Remote Output	64	192		Multiple of 8
16	I/O1 fix-allocated input port start No.	0	-1		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set.)
17	I/O1 fix-allocated output port start No.	300	-1		300 + (multiple of 8) (300 to 599) 4000 + (multiple of 8) (4000 to 6999) (Invalid if a negative value is set.)
18	I/O1 error monitor	1	1		0: Do not monitor 1: Monitor * Some exceptions apply.
20	Input filtering periods	2	Optional	msec	Input signal is recognized when the status is held for twice the period set by this parameter. * Valid only for PIO, PIO unit / PIO/SIO unit
120	Network attribute 1	641001H	Optional		Bits4-11: I/O1 Fieldbus link error confirmation timer value (10ms) Bits28-31: Input Port Data Select in I/O1 Fieldbus Link Error (0: Clear, 1: Hold)
121	Network attribute 2	C80000H	Optional		Bits 16-27: Link timeout value in Fieldbus initialization (100ms)
186	Number of Connected PIO Units / PIO/SIO Units	0	3	Units	The number of ports used for input and output should be number of connected units × 16 for each.
187	PIO Unit • PIO/SIO Unit fix-allocated input port start No.	-1	-1		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set)

No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
188	Output Port Start Number in Fixed Assignment for PIO Unit / PIO/SIO Unit	-1	-1		300 + (Multiple of 8) (300 to 599) 4000 + (Multiple of 8) (4000 to 6999) (Invalid if a negative value is set)
189	PIO Unit / PIO/SIO Unit Error Monitor	1	1		0: Not monitored 1: Monitored 2: Monitored (24V I/O power supply related errors not monitored) 3: Monitored (only 24V I/O power supply related errors monitored) 4: Monitored (24V I/O power supply related errors output as message level) * Some exceptions apply
190	Option Unit Attribute 1	C800200H	Optional		Bits 0 to 3: PIO unit output port data select in TF connection error (0: Clear, 1: Hold) Bits 4 to 7: PIO unit input port data select in TF connection error (0: Clear, 1: Hold) Bits 8 to 15: TF communication link error check timer value (10ms) Bits 16 to 19: For future extension use Bits 20 to 31: Link timeout value in TF communication initialization (100ms)
225	I/O controller	2H	2H		Bits 0-7: Type of Network I/F Module Control 1 (0H : Not mounted, 1H : CC-Link, 2H : DeviceNet, 3H : PROFIBUS-DP, 6H : EtherCAT, 7H : EtherNet/IP, 9H : PIO, AH : PROFINET IO, DH: CC-Link IE)
226	I/O1 Fieldbus Node Address	0	Optional		Settable Range 0 to 63
227	I/O1 Fieldbus communication speed	2	Optional		0: 125kbps, 1: 250kbps, 2: 500kbps

6.3 Parameter Configuration

[4] EtherCAT only

It is the setting when EtherCAT is to be used for 16 points of each input and output from the top of the input and output ports (No. 0 ~, No. 300 ~).



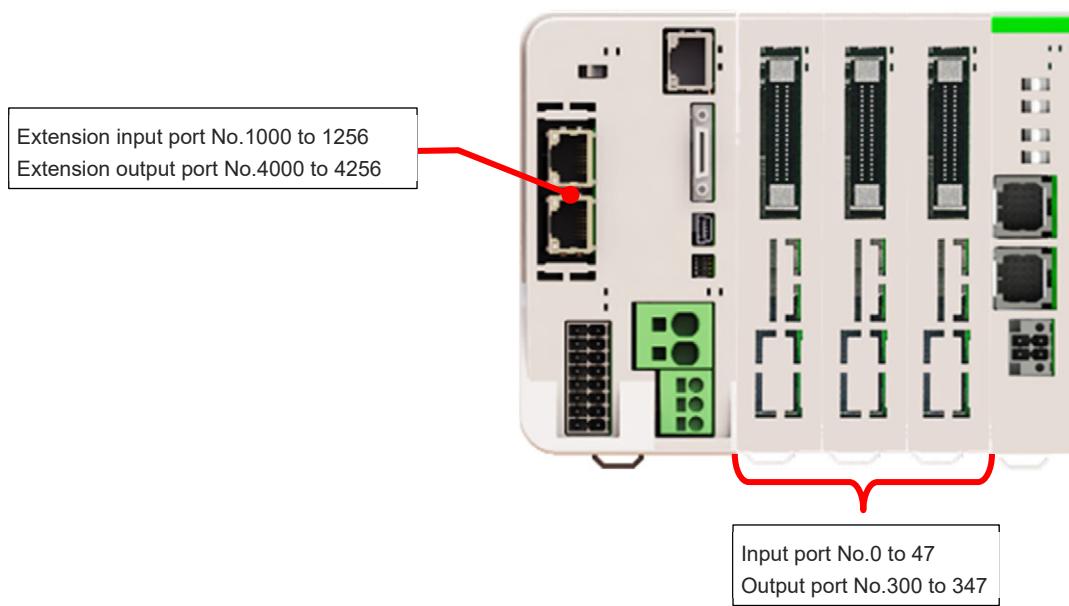
No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	0	0		0: Fixed assignment 1: Automatic assignment
14	Number of Ports Used for I/O1 Fieldbus Remote Input	256	16		Multiple of 8
15	Number of Ports Used for I/O1 Fieldbus Remote Output	256	16		Multiple of 8
16	I/O1 fix-allocated input port start No.	0	0		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set.)
17	I/O1 fix-allocated output port start No.	300	300		300 + (multiple of 8) (300 to 599) 4000 + (multiple of 8) (4000 to 6999) (Invalid if a negative value is set.)
18	I/O1 error monitor	1	1		0: Do not monitor 1: Monitor * Some exceptions apply.
120	Network attribute 1	641001H	Optional		Bits4-11: I/O1 Fieldbus link error confirmation timer value (10ms) Bits28-31: Input Port Data Select in I/O1 Fieldbus Link Error (0: Clear, 1: Hold)
121	Network attribute 2	C80000H	Optional		Bits 16-27: Link timeout value in Fieldbus initialization (100ms) Bits 28-31: EtherCAT PDO mapping type (0: Variable, 1: 32Byte Fixed)
225	I/O controller	6H	6H		Bits 0-7: Type of Network I/F Module Control 1 (0H : Not mounted, 1H : CC-Link, 2H : DeviceNet, 3H : PROFIBUS-DP, 6H : EtherCAT, 7H : EtherNet/IP, 9H : PIO, AH : PROFINET IO, DH: CC-Link IE)
226	I/O1 Fieldbus Node Address	0	Optional		Settable Range 0 to 65535

EtherCAT + PIO

• Example of Use (1)

It is the setting when EtherCAT is to be used for 256 points of each input and output from the top of the extension input and output ports (No. 1000 ~, No. 4000 ~), and PIO is to be used for 48 points of each input and output from the top of the input and output ports (No. 0 ~, No. 300 ~).

In this case, three units of PIO units (16 points x 3 units = 48 points) should be used.



No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	0	0		0: Fixed assignment 1: Automatic assignment
14	Number of Ports Used for I/O1 Fieldbus Remote Input	256	256		Multiple of 8
15	Number of Ports Used for I/O1 Fieldbus Remote Output	256	256		Multiple of 8
16	I/O1 fix-allocated input port start No.	0	1000		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set.)
17	I/O1 fix-allocated output port start No.	300	4000		300 + (multiple of 8) (300 to 599) 4000 + (multiple of 8) (4000 to 6999) (Invalid if a negative value is set.)
18	I/O1 error monitor	1	1		0: Do not monitor 1: Monitor * Some exceptions apply.
20	Input filtering periods	2	Optional	msec	Input signal is recognized when the status is held for twice the period set by this parameter. * Valid only for PIO, PIO unit / PIO/SIO unit
120	Network attribute 1	641001H	Optional		Bits4-11: I/O1 Fieldbus link error confirmation timer value (10ms) Bits28-31: Input Port Data Select in I/O1 Fieldbus Link Error (0: Clear, 1: Hold)
121	Network attribute 2	C80000H	Optional		Bits 16-27: Link timeout value in Fieldbus initialization (100ms) Bits 28-31: EtherCAT PDO mapping type (0: Variable, 1: 32Byte Fixed)
186	Number of Connected PIO Units / PIO/SIO Units	0	3	Units	The number of ports used for input and output should be number of connected units × 16 for each.
187	PIO Unit • PIO/SIO Unit fix-allocated input port start No.	-1	0		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set)

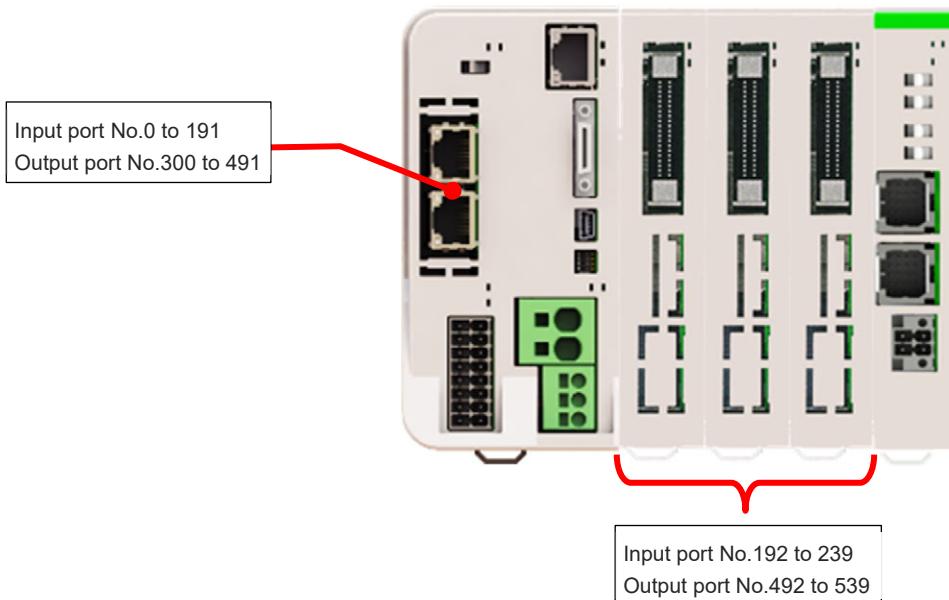
6.3 Parameter Configuration

No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
188	Output Port Start Number in Fixed Assignment for PIO Unit / PIO/SIO Unit	-1	300		300 + (Multiple of 8) (300 to 599) 4000 + (Multiple of 8) (4000 to 6999) (Invalid if a negative value is set)
189	PIO Unit / PIO/SIO Unit Error Monitor	1	1		0: Not monitored 1: Monitored 2: Monitored (24V I/O power supply related errors not monitored) 3: Monitored (only 24V I/O power supply related errors monitored) 4: Monitored (24V I/O power supply related errors output as message level) * Some exceptions apply
190	Option Unit Attribute 1	C800200H	Optional		Bits 0 to 3: PIO unit output port data select in TF connection error (0: Clear, 1: Hold) Bits 4 to 7: PIO unit input port data select in TF connection error (0: Clear, 1: Hold) Bits 8 to 15: TF communication link error check timer value (10ms) Bits 20 to 31: Link timeout value in TF communication initialization (100ms)
225	I/O controller	6H	6H		Bits 0-7: Type of Network I/F Module Control 1 (0H : Not mounted, 1H : CC-Link, 2H : DeviceNet, 3H : PROFIBUS-DP, 6H : EtherCAT, 7H : EtherNet/IP, 9H : PIO, AH : PROFINET IO, DH: CC-Link IE)
226	I/O1 Fieldbus Node Address	0	Optional		Settable Range 0 to 65535

- Example of Use (2)

It is the setting when using 192 points each of input and output for EtherCAT and 48 points each of input and output for PIO in a row from the top of the input and output ports (from No. 0 and from No. 300).

In this case, three units of PIO units (16 points x 3 units = 48 points) should be used, and the input and output ports should be from No. 192 and from No. 492.



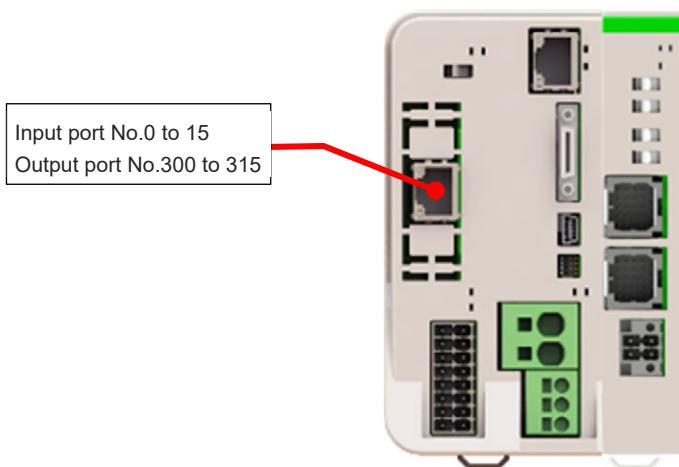
No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	0	1		0: Fixed assignment 1: Automatic assignment * Priority of I/O port assignment at automatic assignment (I/O1→PIO unit • PIO/SIO unit)
14	Number of Ports Used for I/O1 Fieldbus Remote Input	256	192		Multiple of 8
15	Number of Ports Used for I/O1 Fieldbus Remote Output	256	192		Multiple of 8
16	I/O1 fix-allocated input port start No.	0	-1		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set.)
17	I/O1 fix-allocated output port start No.	300	-1		300 + (multiple of 8) (300 to 599) 4000 + (multiple of 8) (4000 to 6999) (Invalid if a negative value is set.)
18	I/O1 error monitor	1	1		0: Do not monitor 1: Monitor * Some exceptions apply.
20	Input filtering periods	2	Optional	msec	Input signal is recognized when the status is held for twice the period set by this parameter. * Valid only for PIO, PIO unit / PIO/SIO unit
120	Network attribute 1	641001H	Optional		Bits4-11: I/O1 Fieldbus link error confirmation timer value (10ms) Bits28-31: Input Port Data Select in I/O1 Fieldbus Link Error (0: Clear, 1: Hold)
121	Network attribute 2	C80000H	Optional		Bits 16-27: Link timeout value in Fieldbus initialization (100ms) Bits 28-31: EtherCAT PDO mapping type (0: Variable, 1: 32Byte Fixed)
186	Number of Connected PIO Units / PIO/SIO Units	0	3	Units	The number of ports used for input and output should be number of connected units × 16 for each.

6.3 Parameter Configuration

No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
187	PIO Unit • PIO/SIO Unit fix-allocated input port start No.	-1	-1		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set)
188	Output Port Start Number in Fixed Assignment for PIO Unit / PIO/SIO Unit	-1	-1		300 + (Multiple of 8) (300 to 599) 4000 + (Multiple of 8) (4000 to 6999) (Invalid if a negative value is set)
189	PIO Unit / PIO/SIO Unit Error Monitor	1	1		0: Not monitored 1: Monitored 2: Monitored (24V I/O power supply related errors not monitored) 3: Monitored (only 24V I/O power supply related errors monitored) 4: Monitored (24V I/O power supply related errors output as message level) * Some exceptions apply
190	Option Unit Attribute 1	C800200H	Optional		Bits 0 to 3: PIO unit output port data select in TF connection error (0: Clear, 1: Hold) Bits 4 to 7: PIO unit input port data select in TF connection error (0: Clear, 1: Hold) Bits 8 to 15: TF communication link error check timer value (10ms) Bits 20 to 31: Link timeout value in TF communication initialization (100ms) Bits 0-7: Type of Network I/F Module Control 1 (0H : Not mounted, 1H : CC-Link, 2H : DeviceNet, 3H : PROFIBUS-DP, 6H : EtherCAT, 7H : EtherNet/IP, 9H : PIO, AH : PROFINET IO, DH: CC-Link IE)
225	I/O controller	6H	6H		Settable Range 0 to 65535
226	I/O1 Fieldbus Node Address	0	Optional		

[5] EtherNet/IP only

It is the setting when EtherNet/IP is to be used for 16 points of each input and output from the top of the input and output ports (No. 0 ~, No. 300 ~).



No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	1	1		0: Fixed assignment 1: Automatic assignment
14	Number of Ports Used for I/O1 Fieldbus Remote Input	0	16		Multiple of 8
15	Number of Ports Used for I/O1 Fieldbus Remote Output	0	16		Multiple of 8
16	I/O1 fix-allocated input port start No.	-1	-1		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set.)
17	I/O1 fix-allocated output port start No.	-1	-1		300 + (multiple of 8) (300 to 599) 4000 + (multiple of 8) (4000 to 6999) (Invalid if a negative value is set.)
18	I/O1 error monitor	1	1		0: Do not monitor 1: Monitor * Some exceptions apply.
120	Network attribute 1	641001H	Optional		Bits4-11: I/O1 Fieldbus link error confirmation timer value (10ms) Bits28-31: Input Port Data Select in I/O1 Fieldbus Link Error (0: Clear, 1: Hold)
121	Network attribute 2	C80000H	Optional		Bits 16-27: Link timeout value in Fieldbus initialization (100ms)
130	I/O Fieldbus Own MAC address (H)	0H	MAC address display		Only lower two bytes are valid.
131	I/O Fieldbus Own MAC address (L)	0H	MAC address display		
132	I/O Fieldbus Own IP address (H)	192	Optional		* Setting of "0" and "127" is prohibited.
133	I/O Fieldbus Own IP address (MH)	168	Optional		
134	I/O Fieldbus Own IP address (ML)	0	Optional		
135	I/O Fieldbus Own IP address (L)	1	Optional		* Setting of "0" and "255" is prohibited.
136	I/O Fieldbus Subnet mask (H)	255	Optional		
137	I/O Fieldbus Subnet mask (MH)	255	Optional		
138	I/O Fieldbus Subnet mask (ML)	255	Optional		
139	I/O Fieldbus Subnet mask (L)	0	Optional		

6.3 Parameter Configuration

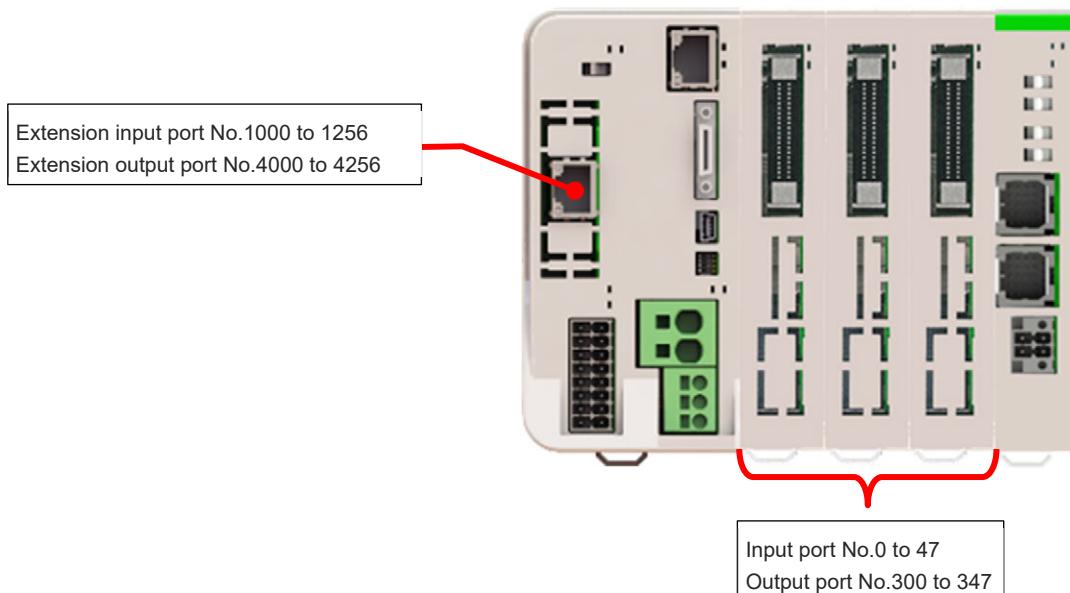
No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
140	I/O Fieldbus Default gateway (H)	0	Optional		
141	I/O Fieldbus Default gateway (MH)	0	Optional		
142	I/O Fieldbus Default gateway (ML)	0	Optional		
143	I/O Fieldbus Default gateway (L)	0	Optional		
225	I/O controller	7H	7H		Bits 0-7: Type of Network I/F Module Control 1 (0H : Not mounted, 1H : CC-Link, 2H : DeviceNet, 3H : PROFIBUS-DP, 6H : EtherCAT, 7H : EtherNet/IP, 9H : PIO, AH : PROFINET IO, DH: CC-Link IE)
227	I/O1 Fieldbus communication speed	0	Optional		0: Autonegotiation, 1: 10Mbps (Half-Duplex), 2: 10Mbps (Full-Duplex), 3: 100Mbps (Half-Duplex), 4: 100Mbps (Full-Duplex)

EtherNet/IP + PIO

• Example of Use (1)

It is the setting when EtherNet/IP is to be used for 256 points of each input and output from the top of the extension input and output ports (No. 1000 ~, No. 4000 ~), and PIO is to be used for 48 points of each input and output from the top of the input and output ports (No. 0 ~, No. 300 ~).

In this case, three units of PIO units (16 points x 3 units = 48 points) should be used.



No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	1	0		0: Fixed assignment 1: Automatic assignment
14	Number of Ports Used for I/O1 Fieldbus Remote Input	0	256		Multiple of 8
15	Number of Ports Used for I/O1 Fieldbus Remote Output	0	256		Multiple of 8
16	I/O1 fix-allocated input port start No.	-1	1000		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set.)
17	I/O1 fix-allocated output port start No.	-1	4000		300 + (multiple of 8) (300 to 599) 4000 + (multiple of 8) (4000 to 6999) (Invalid if a negative value is set.)
18	I/O1 error monitor	1	1		0: Do not monitor 1: Monitor * Some exceptions apply.
20	Input filtering periods	2	Optional	msec	Input signal is recognized when the status is held for twice the period set by this parameter. * Valid only for PIO, PIO unit / PIO/SIO unit
120	Network attribute 1	641001H	Optional		Bits 4-11: I/O1 Fieldbus link error confirmation timer value (10ms) Bits 28-31: Input Port Data Select in I/O1 Fieldbus Link Error (0: Clear, 1: Hold)
121	Network attribute 2	C80000H	Optional		Bits 16-27: Link timeout value in Fieldbus initialization (100ms)
130	I/O Fieldbus Own MAC address (H)	0H	MAC address display		Only lower two bytes are valid.
131	I/O Fieldbus Own MAC address (L)	0H	MAC address display		

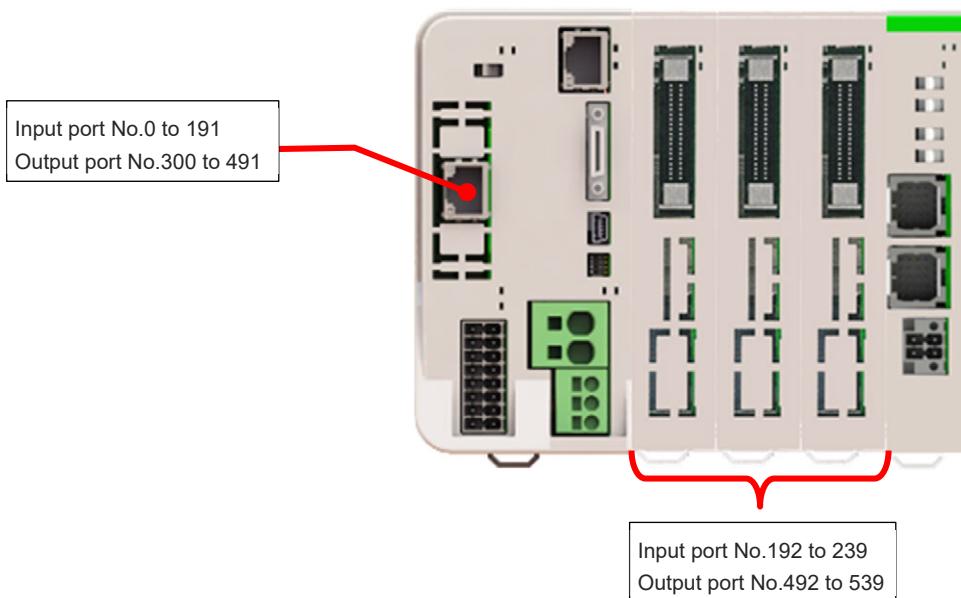
6.3 Parameter Configuration

No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
132	I/O Fieldbus Own IP address (H)	192	Optional		* Setting of "0" and "127" is prohibited.
133	I/O Fieldbus Own IP address (MH)	168	Optional		
134	I/O Fieldbus Own IP address (ML)	0	Optional		
135	I/O Fieldbus Own IP address (L)	1	Optional		* Setting of "0" and "255" is prohibited.
136	I/O Fieldbus Subnet mask (H)	255	Optional		
137	I/O Fieldbus Subnet mask (MH)	255	Optional		
138	I/O Fieldbus Subnet mask (ML)	255	Optional		
139	I/O Fieldbus Subnet mask (L)	0	Optional		
140	I/O Fieldbus Default gateway (H)	0	Optional		
141	I/O Fieldbus Default gateway (MH)	0	Optional		
142	I/O Fieldbus Default gateway (ML)	0	Optional		
143	I/O Fieldbus Default gateway (L)	0	Optional		
186	Number of Connected PIO Units / PIO/SIO Units	0	3	unit	The number of ports used for input and output should be number of connected units × 16 for each. 0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set)
187	PIO Unit • PIO/SIO Unit fix-allocated input port start No.	-1	0		300 + (Multiple of 8) (300 to 599) 4000 + (Multiple of 8) (4000 to 6999) (Invalid if a negative value is set)
188	Output Port Start Number in Fixed Assignment for PIO Unit / PIO/SIO Unit	-1	300		
189	PIO Unit / PIO/SIO Unit Error Monitor	1	1		0: Not monitored 1: Monitored 2: Monitored (24V I/O power supply related errors not monitored) 3: Monitored (only 24V I/O power supply related errors monitored) 4: Monitored (24V I/O power supply related errors output as message level) * Some exceptions apply
190	Option Unit Attribute 1	C800200H	Optional		Bits 0 to 3: PIO unit output port data select in TF connection error (0: Clear, 1: Hold) Bits 4 to 7: PIO unit input port data select in TF connection error (0: Clear, 1: Hold) Bits 8 to 15: TF communication link error check timer value (10ms) Bits 20 to 31: Link timeout value in TF communication initialization (100ms)
225	I/O controller	7H	7H		Bits 0-7: Type of Network I/F Module Control 1 (0H : Not mounted, 1H : CC-Link, 2H : DeviceNet, 3H : PROFIBUS-DP, 6H : EtherCAT, 7H : EtherNet/IP, 9H : PIO, AH : PROFINET IO, DH : CC-Link IE)
227	I/O1 Fieldbus communication speed	0	Optional		0: Autonegotiation, 1: 10Mbps (Half-Duplex), 2: 10Mbps (Full-Duplex), 3: 100Mbps (Half-Duplex), 4: 100Mbps (Full-Duplex)

- Example of Use (2)

It is the setting when using 192 points each of input and output for EtherNet/IP and 48 points each of input and output for PIO in a row from the top of the input and output ports (from No. 0 and from No. 300).

In this case, three units of PIO units (16 points x 3 units = 48 points) should be used, and the input and output ports should be from No. 192 and from No. 492.



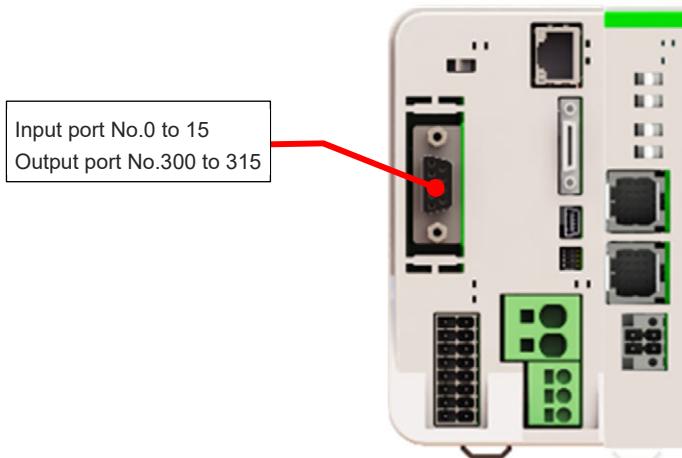
No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	1	1		0: Fixed assignment 1: Automatic assignment * Priority of I/O port assignment at automatic assignment (I/O1→PIO unit • PIO/SIO unit)
14	Number of Ports Used for I/O1 Fieldbus Remote Input	0	192		Multiple of 8
15	Number of Ports Used for I/O1 Fieldbus Remote Output	0	192		Multiple of 8
16	I/O1 fix-allocated input port start No.	-1	-1		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set.)
17	I/O1 fix-allocated output port start No.	-1	-1		300 + (multiple of 8) (300 to 599) 4000 + (multiple of 8) (4000 to 6999) (Invalid if a negative value is set.)
18	I/O1 error monitor	1	1		0: Do not monitor 1: Monitor * Some exceptions apply.
20	Input filtering periods	2	2	msec	Input signal is recognized when the status is held for twice the period set by this parameter. * Valid only for PIO, PIO unit / PIO/SIO unit
120	Network attribute 1	641001H	Optional		Bits4-11: I/O1 Fieldbus link error confirmation timer value (10ms) Bits28-31: Input Port Data Select in I/O1 Fieldbus Link Error (0: Clear, 1: Hold)
121	Network attribute 2	C80000H	Optional		Bits 16-27: Link timeout value in Fieldbus initialization (100ms)
130	I/O Fieldbus Own MAC address (H)	0H	MAC address display		Only lower two bytes are valid.
131	I/O Fieldbus Own MAC address (L)	0H	MAC address display		

6.3 Parameter Configuration

No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
132	I/O Fieldbus Own IP address (H)	192	Optional		* Setting of "0" and "127" is prohibited.
133	I/O Fieldbus Own IP address (MH)	168	Optional		
134	I/O Fieldbus Own IP address (ML)	0	Optional		
135	I/O Fieldbus Own IP address (L)	1	Optional		* Setting of "0" and "255" is prohibited.
136	I/O Fieldbus Subnet mask (H)	255	Optional		
137	I/O Fieldbus Subnet mask (MH)	255	Optional		
138	I/O Fieldbus Subnet mask (ML)	255	Optional		
139	I/O Fieldbus Subnet mask (L)	0	Optional		
140	I/O Fieldbus Default gateway (H)	0	Optional		
141	I/O Fieldbus Default gateway (MH)	0	Optional		
142	I/O Fieldbus Default gateway (ML)	0	Optional		
143	I/O Fieldbus Default gateway (L)	0	Optional		
186	Number of Connected PIO Units / PIO/SIO Units	0	3	Units	The number of ports used for input and output should be number of connected units × 16 for each.
187	PIO Unit • PIO/SIO Unit fix-allocated input port start No.	-1	-1		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set)
188	Output Port Start Number in Fixed Assignment for PIO Unit / PIO/SIO Unit	-1	-1		300 + (Multiple of 8) (300 to 599) 4000 + (Multiple of 8) (4000 to 6999) (Invalid if a negative value is set)
189	PIO Unit / PIO/SIO Unit Error Monitor	1	1		0: Not monitored 1: Monitored 2: Monitored (24V I/O power supply related errors not monitored) 3: Monitored (only 24V I/O power supply related errors monitored) 4: Monitored (24V I/O power supply related errors output as message level) * Some exceptions apply
190	Option Unit Attribute 1	C800200H	Optional		Bits 0 to 3: PIO unit output port data select in TF connection error (0: Clear, 1: Hold) Bits 4 to 7: PIO unit input port data select in TF connection error (0: Clear, 1: Hold) Bits 8 to 15: TF communication link error check timer value (10ms) Bits 20 to 31: Link timeout value in TF communication initialization (100ms)
225	I/O controller	7H	7H		Bits 0-7: Type of Network I/F Module Control 1 (0H : Not mounted, 1H : CC-Link, 2H : DeviceNet, 3H : PROFIBUS-DP, 6H : EtherCAT, 7H : EtherNet/IP, 9H : PIO, AH : PROFINET IO, DH: CC-Link IE)
227	I/O1 Fieldbus communication speed	0	Optional		0: Autonegotiation, 1: 10Mbps (Half-Duplex), 2: 10Mbps (Full-Duplex), 3: 100Mbps (Half-Duplex), 4: 100Mbps (Full-Duplex)

[6] PROFIBUS-DP only

It is the setting when PROFIBUS-DP is to be used for 16 points of each input and output from the top of the input and output ports (No. 0 ~, No. 300 ~).



No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	0	0		0: Fixed assignment 1: Automatic assignment
14	Number of Ports Used for I/O1 Fieldbus Remote Input	64	16		Multiple of 8
15	Number of Ports Used for I/O1 Fieldbus Remote Output	64	16		Multiple of 8
16	I/O1 fix-allocated input port start No.	0	0		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set.)
17	I/O1 fix-allocated output port start No.	300	300		300 + (multiple of 8) (300 to 599) 4000 + (multiple of 8) (4000 to 6999) (Invalid if a negative value is set.)
18	I/O1 error monitor	1	1		0: Do not monitor 1: Monitor * Some exceptions apply.
120	Network attribute 1	641001H	Optional		Bits4-11: I/O1 Fieldbus link error confirmation timer value (10ms) Bits28-31: Input Port Data Select in I/O1 Fieldbus Link Error (0: Clear, 1: Hold)
121	Network attribute 2	C80000H	Optional		Bits 16-27: Link timeout value in Fieldbus initialization (100ms)
225	I/O controller	3H	3H		Bits 0-7: Type of Network I/F Module Control 1 (0H : Not mounted, 1H : CC-Link, 2H : DeviceNet, 3H : PROFIBUS-DP, 6H : EtherCAT, 7H : EtherNet/IP, 9H : PIO, AH : PROFINET IO, DH: CC-Link IE)
226	I/O1 Fieldbus Node Address	0	Optional		Settable Range 1 to 125

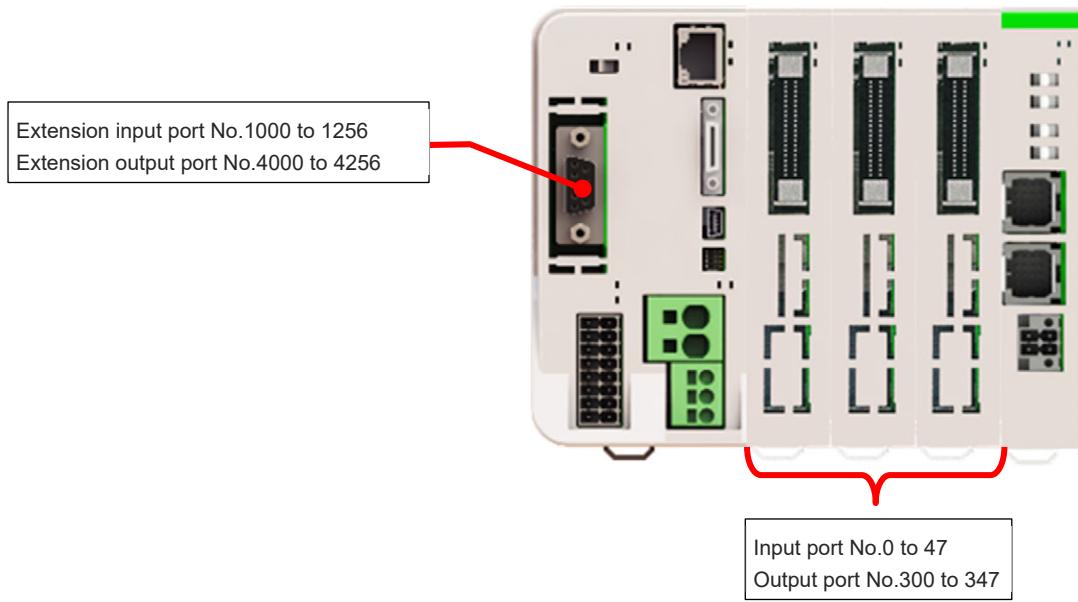
6.3 Parameter Configuration

PROFIBUS-DP + PIO

- Example of Use (1)

It is the setting when PROFIBUS-DP is to be used for 256 points of each input and output from the top of the extension input and output ports (No. 1000 ~, No. 4000 ~), and PIO is to be used for 48 points of each input and output from the top of the input and output ports (No. 0 ~, No. 300 ~).

In this case, three units of PIO units (16 points x 3 units = 48 points) should be used.



No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	0	0		0: Fixed assignment 1: Automatic assignment
14	Number of Ports Used for I/O1 Fieldbus Remote Input	64	256		Multiple of 8
15	Number of Ports Used for I/O1 Fieldbus Remote Output	64	256		Multiple of 8
16	I/O1 fix-allocated input port start No.	0	1000		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set.)
17	I/O1 fix-allocated output port start No.	300	4000		300 + (multiple of 8) (300 to 599) 4000 + (multiple of 8) (4000 to 6999) (Invalid if a negative value is set.)
18	I/O1 error monitor	1	1		0: Do not monitor 1: Monitor * Some exceptions apply.
20	Input filtering periods	2	Optional	msec	Input signal is recognized when the status is held for twice the period set by this parameter. * Valid only for PIO, PIO unit / PIO/SIO unit
120	Network attribute 1	641001H	Optional		Bits 4-11: I/O1 Fieldbus link error confirmation timer value (10ms) Bits 28-31: Input Port Data Select in I/O1 Fieldbus Link Error (0: Clear, 1: Hold)
121	Network attribute 2	C80000H	Optional		Bits 16-27: Link timeout value in Fieldbus initialization (100ms)
186	Number of Connected PIO Units / PIO/SIO Units	0	3	unit	The number of ports used for input and output should be number of connected units * 16 for each.
187	PIO Unit • PIO/SIO Unit fix-allocated input port start No.	-1	0		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set.)
188	Output Port Start Number in Fixed Assignment for PIO Unit / PIO/SIO Unit	-1	300		300 + (Multiple of 8) (300 to 599) 4000 + (Multiple of 8) (4000 to 6999) (Invalid if a negative value is set)

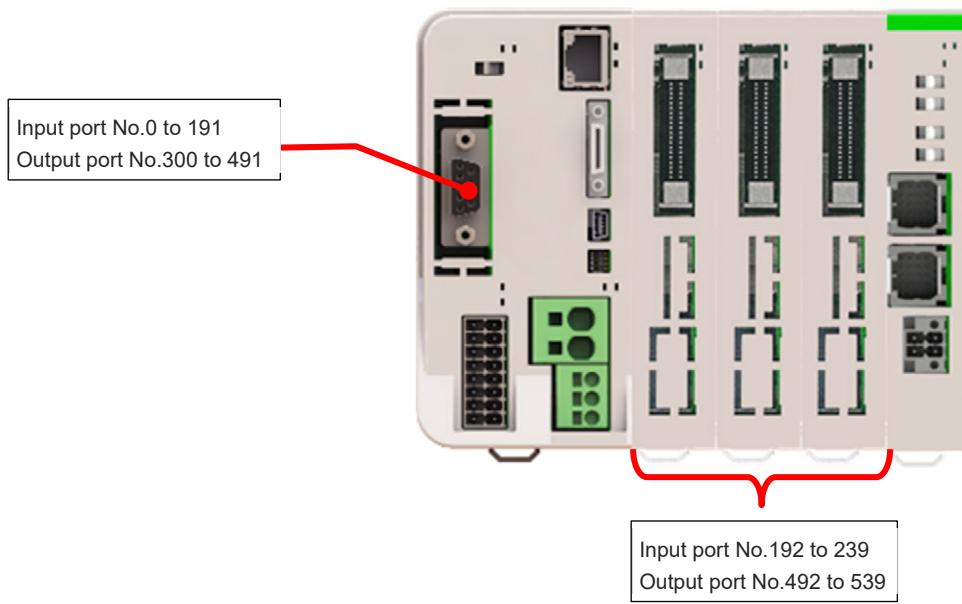
No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
189	PIO Unit / PIO/SIO Unit Error Monitor	1	1		0: Not monitored 1: Monitored 2: Monitored (24V I/O power supply related errors not monitored) 3: Monitored (only 24V I/O power supply related errors monitored) 4: Monitored (24V I/O power supply related errors output as message level) * Some exceptions apply
190	Option Unit Attribute 1	C800200H	Optional		Bits 0 to 3: PIO unit output port data select in TF connection error (0: Clear, 1: Hold) Bits 4 to 7: PIO unit input port data select in TF connection error (0: Clear, 1: Hold) Bits 8 to 15: TF communication link error check timer value (10ms) Bits 20 to 31: Link timeout value in TF communication initialization (100ms)
225	I/O controller	3H	3H		Bits 0-7: Type of Network I/F Module Control 1 (0H : Not mounted, 1H : CC-Link, 2H : DeviceNet, 3H : PROFIBUS-DP, 6H : EtherCAT, 7H : EtherNet/IP, 9H : PIO, AH : PROFINET IO, DH: CC-Link IE)
226	I/O1 Fieldbus Node Address	1	Optional		Settable Range 0 to 125

6.3 Parameter Configuration

- Example of Use (2)

It is the setting when using 192 points each of input and output for PROFIBUS-DP and 48 points each of input and output for PIO in a row from the top of the input and output ports (from No. 0 and from No. 300).

In this case, three units of PIO units (16 points x 3 units = 48 points) should be used, and the input and output ports should be from No. 192 and from No. 492.



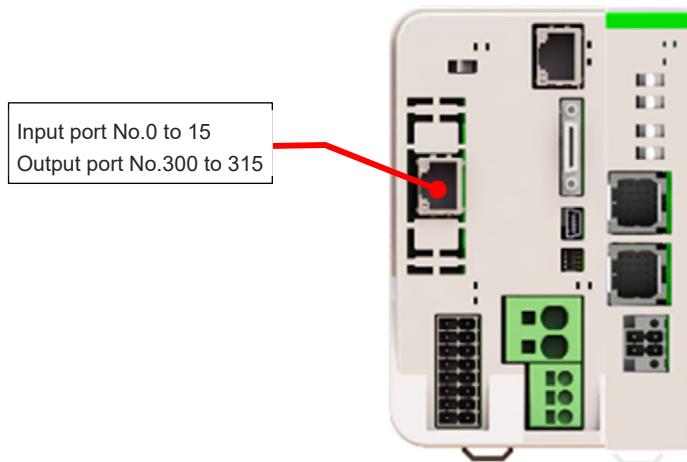
No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	0	1		0: Fixed assignment 1: Automatic assignment * Priority of I/O port assignment at automatic assignment (I/O1→PIO unit • PIO/SIO unit)
14	Number of Ports Used for I/O1 Fieldbus Remote Input	64	192		Multiple of 8
15	Number of Ports Used for I/O1 Fieldbus Remote Output	64	192		Multiple of 8
16	I/O1 fix-allocated input port start No.	0	-1		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set.)
17	I/O1 fix-allocated output port start No.	300	-1		300 + (multiple of 8) (300 to 599) 4000 + (multiple of 8) (4000 to 6999) (Invalid if a negative value is set.)
18	I/O1 error monitor	1	1		0: Do not monitor 1: Monitor * Some exceptions apply.
20	Input filtering periods	2	Optional	msec	Input signal is recognized when the status is held for twice the period set by this parameter. * Valid only for PIO, PIO unit / PIO/SIO unit
120	Network attribute 1	641001H	Optional		Bits 4-11: I/O1 Fieldbus link error confirmation timer value (10ms) Bits 28-31: Input Port Data Select in I/O1 Fieldbus Link Error (0: Clear, 1: Hold)
121	Network attribute 2	C80000H	Optional		Bits 16-27: Link timeout value in Fieldbus initialization (100ms)
186	Number of Connected PIO Units / PIO/SIO Units	0	3	Units	The number of ports used for input and output should be number of connected units × 16 for each.
187	PIO Unit • PIO/SIO Unit fix-allocated input port start No.	-1	-1		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set)

No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
188	Output Port Start Number in Fixed Assignment for PIO Unit / PIO/SIO Unit	-1	-1		300 + (Multiple of 8) (300 to 599) 4000 + (Multiple of 8) (4000 to 6999) (Invalid if a negative value is set)
189	PIO Unit / PIO/SIO Unit Error Monitor	1	1		0: Not monitored 1: Monitored 2: Monitored (24V I/O power supply related errors not monitored) 3: Monitored (only 24V I/O power supply related errors monitored) 4: Monitored (24V I/O power supply related errors output as message level) * Some exceptions apply
190	Option Unit Attribute 1	C800200H	Optional		Bits 0 to 3: PIO unit output port data select in TF connection error (0: Clear, 1: Hold) Bits 4 to 7: PIO unit input port data select in TF connection error (0: Clear, 1: Hold) Bits 8 to 15: TF communication link error check timer value (10ms) Bits 20 to 31: Link timeout value in TF communication initialization (100ms)
225	I/O controller	3H	3H		Bits 0-7: Type of Network I/F Module Control 1 (0H : Not mounted, 1H : CC-Link, 2H : DeviceNet, 3H : PROFIBUS-DP, 6H : EtherCAT, 7H : EtherNet/IP, 9H : PIO, AH : PROFINET IO, DH: CC-Link IE)
226	I/O1 Fieldbus Node Address	1	Optional		Settable Range 0 to 125

6.3 Parameter Configuration

[7] PROFINET IO only

It is the setting when PROFINET IO is to be used for 16 points of each input and output from the top of the input and output ports (No. 0 ~, No. 300 ~).



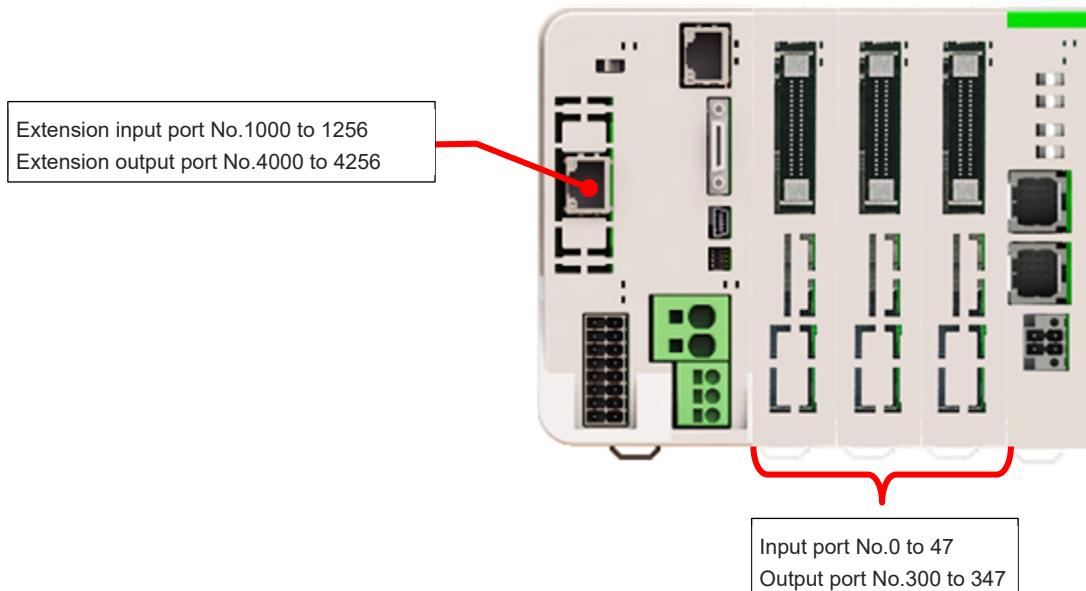
No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	1	1		0: Fixed assignment 1: Automatic assignment
14	Number of Ports Used for I/O1 Fieldbus Remote Input	0	16		Multiple of 8
15	Number of Ports Used for I/O1 Fieldbus Remote Output	0	16		Multiple of 8
16	I/O1 fix-allocated input port start No.	-1	-1		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set.)
17	I/O1 fix-allocated output port start No.	-1	-1		300 + (multiple of 8) (300 to 599) 4000 + (multiple of 8) (4000 to 6999) (Invalid if a negative value is set.)
18	I/O1 error monitor	1	1		0: Do not monitor 1: Monitor * Some exceptions apply.
120	Network attribute 1	641001H	Optional		Bits 4-11: I/O1 Fieldbus link error confirmation timer value (10ms) Bits 12-15: Registered module data size type in PROFINET IO configuration (0:1 word, 1:4 words) Bits 28-31: Input Port Data Select in I/O1 Fieldbus Link Error (0: Clear, 1: Hold)
121	Network attribute 2	C80000H	Optional		Bits 16-27: Link timeout value in Fieldbus initialization (100ms)
130	I/O Fieldbus Own MAC address (H)	0H	MAC address display		Only lower two bytes are valid.
131	I/O Fieldbus Own MAC address (L)	0H	MAC address display		
225	I/O controller	AH	AH		Bits 0-7: Type of Network I/F Module Control 1 (0H : Not mounted, 1H : CC-Link, 2H : DeviceNet, 3H : PROFIBUS-DP, 6H : EtherCAT, 7H : EtherNet/IP, 9H : PIO, AH : PROFINET IO, DH : CC-Link IE)

PROFINET IO + PIO

• Example of Use (1)

It is the setting when PROFINET IO is to be used for 256 points of each input and output from the top of the extension input and output ports (No. 1000 ~, No. 4000 ~), and PIO is to be used for 48 points of each input and output from the top of the input and output ports (No. 0 ~, No. 300 ~).

In this case, three units of PIO units (16 points x 3 units = 48 points) should be used.



No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	1	0		0: Fixed assignment 1: Automatic assignment
14	Number of Ports Used for I/O1 Fieldbus Remote Input	0	256		Multiple of 8
15	Number of Ports Used for I/O1 Fieldbus Remote Output	0	256		Multiple of 8
16	I/O1 fix-allocated input port start No.	-1	1000		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set.)
17	I/O1 fix-allocated output port start No.	-1	4000		300 + (multiple of 8) (300 to 599) 4000 + (multiple of 8) (4000 to 6999) (Invalid if a negative value is set.)
18	I/O1 error monitor	1	1		0: Do not monitor 1: Monitor * Some exceptions apply.
20	Input filtering periods	2	2	msec	Input signal is recognized when the status is held for twice the period set by this parameter. * Valid only for PIO, PIO unit / PIO/SIO unit Bits 4-11: I/O1 Fieldbus link error confirmation timer value (10ms) Bits 12-15: Registered module data size type in PROFINET IO configuration (0:1 word, 1:4 words) Bits 28-31: Input Port Data Select in I/O1 Fieldbus Link Error (0: Clear, 1: Hold)
120	Network attribute 1	641001H	Optional		Bits 16-27: Link timeout value in Fieldbus initialization (100ms)
121	Network attribute 2	C80000H	Optional		Only lower two bytes are valid.
130	I/O Fieldbus Own MAC address (H)	0H	MAC address display		

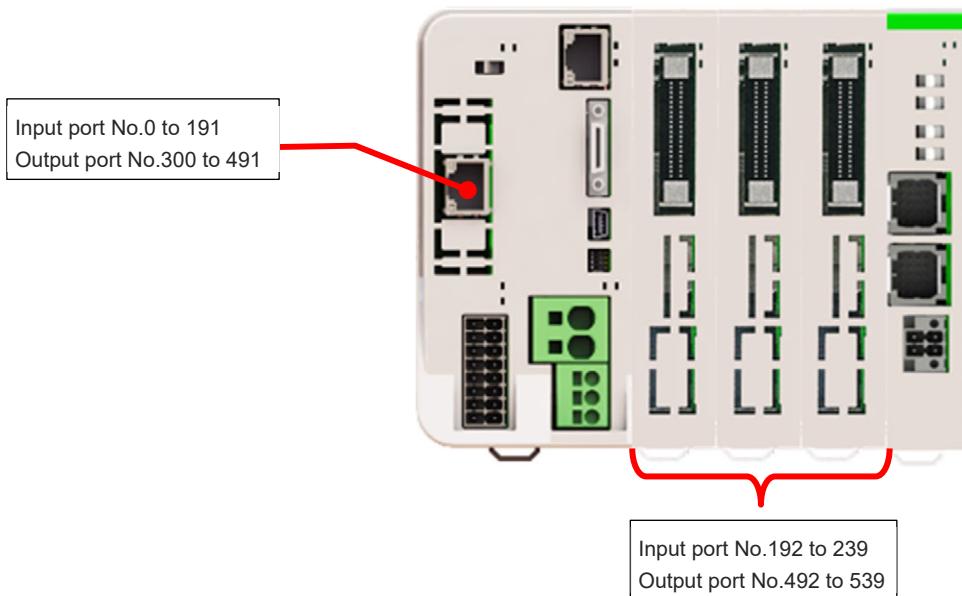
6.3 Parameter Configuration

No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
131	I/O Fieldbus Own MAC address (L)	0H	MAC address display		
186	Number of Connected PIO Units / PIO/SIO Units	0	3	Units	The number of ports used for input and output should be number of connected units × 16 for each.
187	PIO Unit • PIO/SIO Unit fix-allocated input port start No.	-1	0		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set)
188	Output Port Start Number in Fixed Assignment for PIO Unit / PIO/SIO Unit	-1	300		300 + (Multiple of 8) (300 to 599) 4000 + (Multiple of 8) (4000 to 6999) (Invalid if a negative value is set)
189	PIO Unit / PIO/SIO Unit Error Monitor	1	1		0: Not monitored 1: Monitored 2: Monitored (24V I/O power supply related errors not monitored) 3: Monitored (only 24V I/O power supply related errors monitored) 4: Monitored (24V I/O power supply related errors output as message level) * Some exceptions apply
190	Option Unit Attribute 1	C800200H	Optional		Bits 0 to 3: PIO unit output port data select in TF connection error (0: Clear, 1: Hold) Bits 4 to 7: PIO unit input port data select in TF connection error (0: Clear, 1: Hold) Bits 8 to 15: TF communication link error check timer value (10ms) Bits 20 to 31: Link timeout value in TF communication initialization (100ms)
225	I/O controller	AH	AH		Bits 0-7: Type of Network I/F Module Control 1 (0H : Not mounted, 1H : CC-Link, 2H : DeviceNet, 3H : PROFIBUS-DP, 6H : EtherCAT, 7H : EtherNet/IP, 9H : PIO, AH: PROFINET IO, DH: CC-Link IE)

- Example of Use (2)

It is the setting when using 192 points each of input and output for PROFINET IO and 48 points each of input and output for PIO in a row from the top of the input and output ports (from No. 0 and from No. 300).

In this case, three units of PIO units (16 points x 3 units = 48 points) should be used, and the input and output ports should be from No. 192 and from No. 492.



No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	1	1		0: Fixed assignment 1: Automatic assignment * Priority of I/O port assignment at automatic assignment (I/O1→PIO unit • PIO/SIO unit)
14	Number of Ports Used for I/O1 Fieldbus Remote Input	0	192		Multiple of 8
15	Number of Ports Used for I/O1 Fieldbus Remote Output	0	192		Multiple of 8
16	I/O1 fix-allocated input port start No.	-1	-1		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set.)
17	I/O1 fix-allocated output port start No.	-1	-1		300 + (multiple of 8) (300 to 599) 4000 + (multiple of 8) (4000 to 6999) (Invalid if a negative value is set.)
18	I/O1 error monitor	1	1		0: Do not monitor 1: Monitor * Some exceptions apply.
20	Input filtering periods	2	2	msec	Input signal is recognized when the status is held for twice the period set by this parameter. * Valid only for PIO, PIO unit / PIO/SIO unit
120	Network attribute 1	641001H	Optional		Bits 4-11: I/O1 Fieldbus link error confirmation timer value (10ms) Bits 12-15: Registered module data size type in PROFINET IO configuration (0:1 word, 1:4 words) Bits 28-31: Input Port Data Select in I/O1 Fieldbus Link Error (0: Clear, 1: Hold)
121	Network attribute 2	C80000H	Optional		Bits 16-27: Link timeout value in Fieldbus initialization (100ms)
130	I/O Fieldbus Own MAC address (H)	0H	MAC address display		Only lower two bytes are valid.

6.3 Parameter Configuration

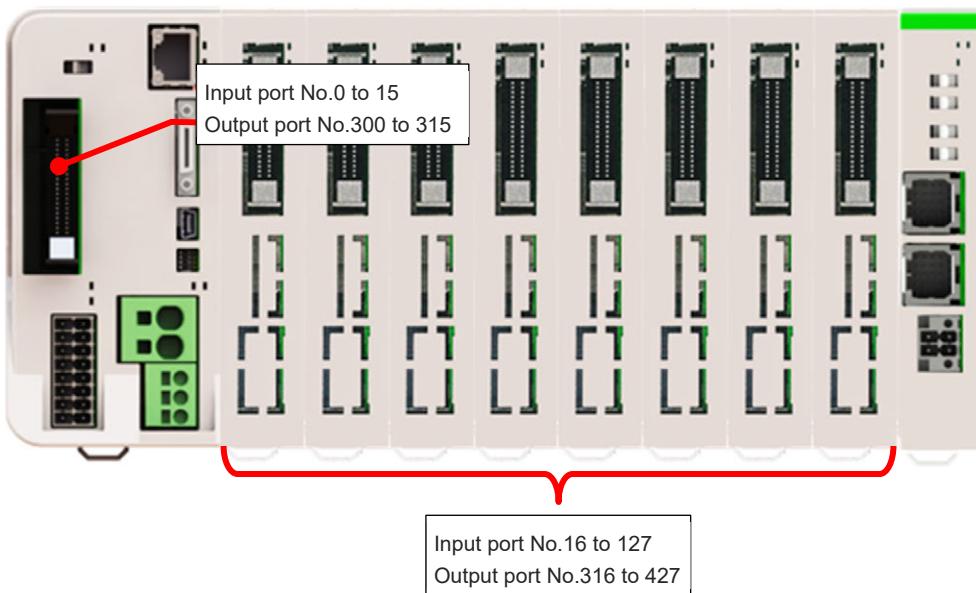
No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
131	I/O Fieldbus Own MAC address (L)	0H	MAC address display		
186	Number of Connected PIO Units / PIO/SIO Units	0	3	Units	The number of ports used for input and output should be number of connected units × 16 for each.
187	PIO Unit • PIO/SIO Unit fix-allocated input port start No.	-1	-1		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set)
188	Output Port Start Number in Fixed Assignment for PIO Unit / PIO/SIO Unit	-1	-1		300 + (Multiple of 8) (300 to 599) 4000 + (Multiple of 8) (4000 to 6999) (Invalid if a negative value is set)
189	PIO Unit / PIO/SIO Unit Error Monitor	1	1		0: Not monitored 1: Monitored 2: Monitored (24V I/O power supply related errors not monitored) 3: Monitored (only 24V I/O power supply related errors monitored) 4: Monitored (24V I/O power supply related errors output as message level) * Some exceptions apply
190	Option Unit Attribute 1	C800200H	Optional		Bits 0 to 3: PIO unit output port data select in TF connection error (0: Clear, 1: Hold) Bits 4 to 7: PIO unit input port data select in TF connection error (0: Clear, 1: Hold) Bits 8 to 15: TF communication link error check timer value (10ms) Bits 20 to 31: Link timeout value in TF communication initialization (100ms)
225	I/O controller	AH	AH		Bits 0-7: Type of Network I/F Module Control 1 (0H : Not mounted, 1H : CC-Link, 2H : DeviceNet, 3H : PROFIBUS-DP, 6H : EtherCAT, 7H : EtherNet/IP, 9H : PIO, AH : PROFINET IO, DH: CC-Link IE)

[8] Module + PIO unit

- Example of Use (1)

It is the setting when PIO is to be used for 144 points of each input and output from the top of the input and output ports (No. 0 ~, No. 300 ~).

In this case, eight units of PIO modules and PIO units (16 points x 8 units = 128 points) should be used.



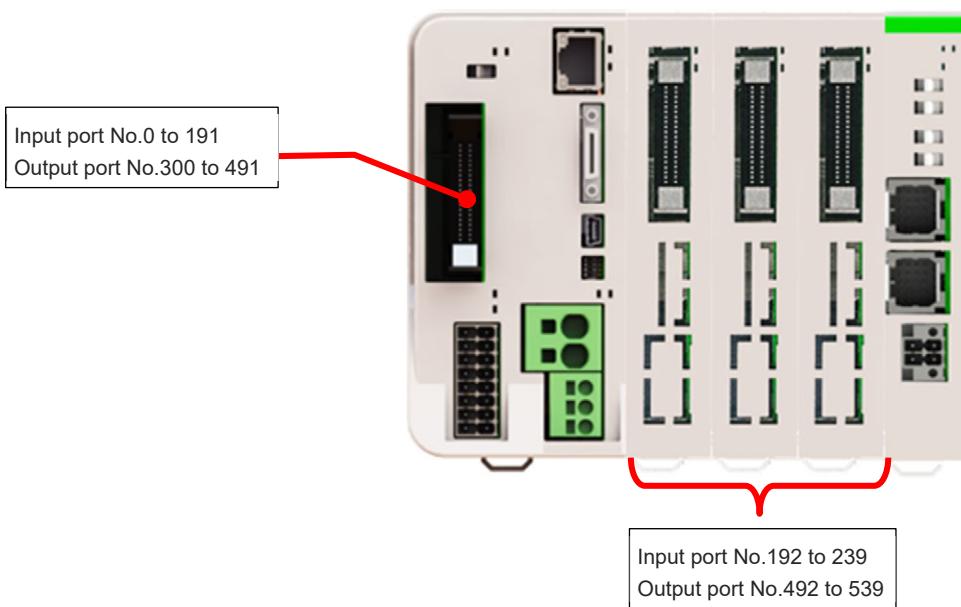
No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	1	1		0: Fixed assignment 1: Automatic assignment * Priority of I/O port assignment at automatic assignment (I/O1 → PIO unit • PIO/SIO unit)
16	I/O1 fix-allocated input port start No.	-1	-1		0 + (Multiple of 8) (0 to 299) (Invalid if a negative value is set.)
17	I/O1 fix-allocated output port start No.	-1	-1		300 + (multiple of 8) (300 to 599) (Invalid if a negative value is set.)
18	I/O1 error monitor	1	1		0: Not monitored 1: Monitored 2: Monitored (24V I/O power supply related errors not monitored) 3: Monitored (only 24V I/O power supply related errors monitored) 4: Monitored (24V I/O power supply related errors output as message level) * Only PIO available for setting in 2 to 4 * Some exceptions apply
20	Input filtering periods	2	Optional	msec	Input signal is recognized when the status is held for twice the period set by this parameter. * Valid only for PIO, PIO unit / PIO/SIO unit
186	Number of Connected PIO Units / PIO/SIO Units	0	8	Units	The number of ports used for input and output should be number of connected units * 16 for each.
187	PIO Unit • PIO/SIO Unit fix-allocated input port start No.	-1	-1		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set)
188	Output Port Start Number in Fixed Assignment for PIO Unit / PIO/SIO Unit	-1	-1		300 + (Multiple of 8) (300 to 599) 4000 + (Multiple of 8) (4000 to 6999) (Invalid if a negative value is set)

6.3 Parameter Configuration

No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
189	PIO Unit / PIO/SIO Unit Error Monitor	1	1		<p>0: Not monitored 1: Monitored 2: Monitored (24V I/O power supply related errors not monitored) 3: Monitored (only 24V I/O power supply related errors monitored) 4: Monitored (24V I/O power supply related errors output as message level)</p> <p>* Some exceptions apply</p>
190	Option Unit Attribute 1	C800200H	Optional		<p>Bits 0 to 3: PIO unit output port data select in TF connection error (0: Clear, 1: Hold) Bits 4 to 7: PIO unit input port data select in TF connection error (0: Clear, 1: Hold) Bits 8 to 15: TF communication link error check timer value (10ms) Bits 20 to 31: Link timeout value in TF communication initialization (100ms)</p>
225	I/O controller	9H	9H		<p>Bits 0-7: Type of Network I/F Module Control 1 (0H : Not mounted, 1H : CC-Link, 2H : DeviceNet, 3H : PROFIBUS-DP, 6H : EtherCAT, 7H : EtherNet/IP, 9H : PIO, AH: PROFINET IO, DH: CC-Link IE)</p>

- Example of Use (2)

It is the setting when PIO is to be used for 64 points of each input and output from the top of the input and output ports (No. 0 ~, No. 300 ~). The following setting is an example of not using a PIO module and using three units of PIO units (16 points x 3 units = 48 points) should be used.



No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	1	0		0: Fixed assignment 1: Automatic assignment
16	I/O1 fix-allocated input port start No.	-1	16		0 + (Multiple of 8) (0 to 299) (Invalid if a negative value is set.)
17	I/O1 fix-allocated output port start No.	-1	316		300 + (multiple of 8) (300 to 599) (Invalid if a negative value is set.) 0: Not monitored 1: Monitored 2: Monitored (24V I/O power supply related errors not monitored) 3: Monitored (only 24V I/O power supply related errors monitored) 4: Monitored (24V I/O power supply related errors output as message level) * Only PIO available for setting in 2 to 4 * Some exceptions apply
18	I/O1 error monitor	1	1		Input signal is recognized when the status is held for twice the period set by this parameter. * Valid only for PIO, PIO unit / PIO/SIO unit
20	Input filtering periods	2	Optional	msec	
186	Number of Connected PIO Units / PIO/SIO Units	0	3	unit	The number of ports used for input and output should be number of connected units × 16 for each.
187	PIO Unit • PIO/SIO Unit fix-allocated input port start No.	-1	48		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set)
188	Output Port Start Number in Fixed Assignment for PIO Unit / PIO/SIO Unit	-1	348		300 + (Multiple of 8) (300 to 599) 4000 + (Multiple of 8) (4000 to 6999) (Invalid if a negative value is set) 0: Not monitored 1: Monitored 2: Monitored (24V I/O power supply related errors not monitored) 3: Monitored (only 24V I/O power supply related errors monitored) 4: Monitored (24V I/O power supply related errors output as message level) * Some exceptions apply
189	PIO Unit / PIO/SIO Unit Error Monitor	1	1		

6.3 Parameter Configuration

No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
190	Option Unit Attribute 1	C800200H	Optional		Bits 0 to 3: PIO unit output port data select in TF connection error (0: Clear, 1: Hold) Bits 4 to 7: PIO unit input port data select in TF connection error (0: Clear, 1: Hold) Bits 8 to 15: TF communication link error check timer value (10ms) Bits 20 to 31: Link timeout value in TF communication initialization (100ms)
225	I/O controller	9H	9H		Bits 0-7: Type of Network I/F Module Control 1 (0H : Not mounted, 1H : CC-Link, 2H : DeviceNet, 3H : PROFIBUS-DP, 6H : EtherCAT, 7H : EtherNet/IP, 9H : PIO, AH : PROFINET IO, DH: CC-Link IE)

6.4 Caution

6.4.1 Network Setting Files

The RSEL network setting files are as shown below.

Type	File name
CC-Link	0x0226_SEL controller_A_ja.cspp
DeviceNet	EDS_IANP3801_DN0_V_2_3.eds
PROFIBUS-DP	IAI_0CEF.gsd
EtherCAT	ESI_IAI_SEL_ECT_V_1_08_Rev_1.xml
EtherNet/IP	IANP3802-EP0_V_2_1.eds
PROFINET IO	GSDML-V2.3-IAI-IAI-PRT-20130807.xml
CC-Link IE Field	0x0226_RSEL-G-CIE_1.0.0_ja.cspp

- * The version of file names (numbers in the latter part in a file name) should be changed in version updates.

URL : <http://www.iai-robot.co.jp/download/network/>

6.4 Caution

6.4.2 PROFIBUS-DP

The configuration data format is applicable for the both formats of standard and special identifications. However, it is necessary to have the configuration data size in the RSEL system and the I/O size used in PROFIBUS-DP aligned.

- Standard Identification Format

Normal (compact) ID format (one byte)									
Byte (octet) 1:	7	6	5	4	3	2	1	0	Bit
			0	1					ID defines <u>only</u> Input configuration
			1	0					ID defines <u>only</u> Output configuration
			1	1					ID defines Input and Output configuration
			0	0					Special ID format (use decoding table for special format)
					00 - 15 _{DEC} (0 - F _{HEX})				Number of configured data (inputs/outputs):
									00 _{DEC} (0 _{HEX}) = 1 Unit (Byte/Word)
									15 _{DEC} (F _{HEX}) = 16 Units (Byte/Word)
									Unit = Word
									Unit = Byte
									Consistency over the whole configured data block (Module)
									Consistency over one Unit (Byte/ Word)

- Special Identification Format

Special (extended) ID format									
Structure for one special configuration ID									
Special Configuration ID	Previous ID	Configuration ID header	Length OUTP.	Length INPUT	Vendor spec. Data	next ID			
			x x 0 0 x x x	only if outputs	only if inputs	(optional)			
<u>Decoding table for special format</u>									
Byte (octet) 1: Configuration ID header	7	6	5	4	3	2	1	0	Bit
			0	0					Special ID format (use decoding table for special format)
					00 - 15 _{DEC} (0 - F _{HEX})				Number of vendor specific config ID data at the end
									00 _{DEC} (0 _{HEX}) = no vendor specific data
									14 _{DEC} (E _{HEX}) = 14 vendor specific data
									15 _{DEC} (F _{HEX}) = no vendor specific data
									Empty module, module has no input or output configuration
									One length byte for Inputs follows
									One length byte for Outputs follows
									One length byte for <u>each</u> Outputs and Inputs follows
following Byte(s) one length byte for outputs followed by the length byte for inputs, if both are defined.	7	6	5	4	3	2	1	0	Bit
				00 - 63 _{DEC} (00 - 3F _{HEX})					Number of configured data (inputs/outputs):
									00 _{DEC} (0 _{HEX}) = 1 Unit (Byte/Word)
									63 _{DEC} (3F _{HEX}) = 64 Unit (Byte/Word)
									Unit = Word
									Unit = Byte
									Consistency over the whole configured data block (Module)
									Consistency over one Unit (Byte/ Word)
following Byte(s) Vendor spec. data	7	6	5	4	3	2	1	0	Bit
				00 - 255 _{DEC} (00 - FF _{HEX})					Vendor specific config ID, defined by the device vendor

6.4.3 EtherCAT

In case of use of EtherCAT master supporting only the slave specified fixed PDO mapping such as CJ1W-NC□81 / NC□82 manufactured by Omron, set the bits 28 to 31 to 1h in the parameter below. (e.g. C80000h → 10C80000h)

However, the maximum number of points should be 256 points for input and 256 points for output.

No.	Parameter Name	Input range	Unit	Remarks
121	Network attribute 2	C80000H		Bits 28 to 31: EtherCAT PDO mapping type (0: Variable,1: 32Byte Fixed)

6.4.4 EtherNet/IP

- In EtherNet/IP communication, it cannot be used when the used Port No. 2222 (UDP Port) and 44828 (TCP Port and UDP Port) are blocked by the firewall in the communication path.
- There is a concern that stable communication cannot be established if a repeater hub is used to have the cyclic (remote I/O) communication in EtherNet/IP because it could increase the communication load in the network and could cause collision frequently. Use a switching hub.

6.5 Example of Connectivity Setting

EtherCAT Master (NJ Series) Connectivity Setting

In here, describes the connectivity setting between the EtherCAT type RSEL controller and EtherCAT Master (NJ Series) manufactured by Omron.

6.5.1 Downloading Setting File for Network (ESI File)

Go to "Download" page in the IAI homepage and download the applicable ESI file from "Field Network Setting File PLC Function Block".

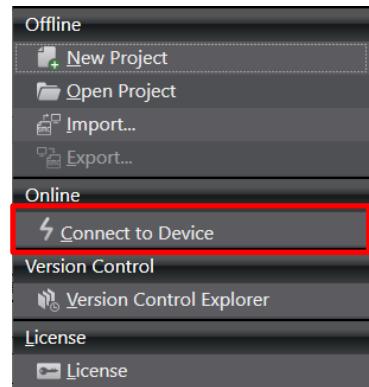


URL : <https://www.intelligentactuator.com/field-network-configuration-files-2/>

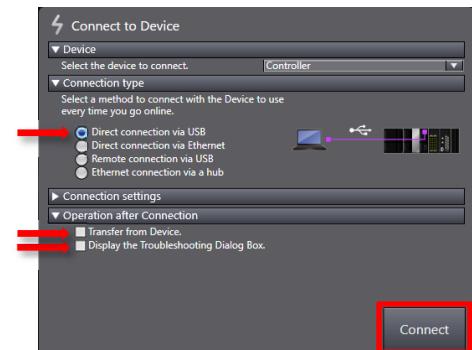
6.5.2 Sysmac Studio Startup and PLC Communication Connectivity

1 Double-click "Sysmac Studio" icon to launch the software.

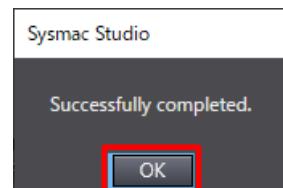
2 Click "Connect to Device".



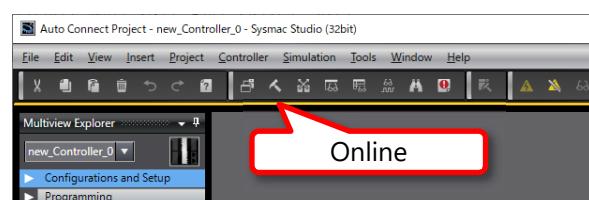
3 "Connect to Device" window shows up.
Select "Direct connection via USB" in "Connection type".
Also, remove the checkmarks on "Transfer from Device." and "Display the Troubleshooting Dialog Box." in "Operation after Connection".
Click "Connection type".



4 "Complete" dialog appears.
Click "OK".



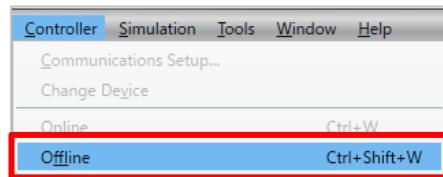
5 "Auto Connect Project" window should get displayed online. Once it gets online, a yellow frame should appear at the top in "Edit Window".



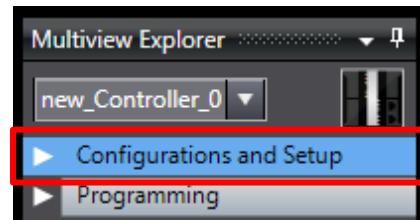
6.5 Example of Connectivity Setting

6.5.3 Installing Setting File for Network (ESI File)

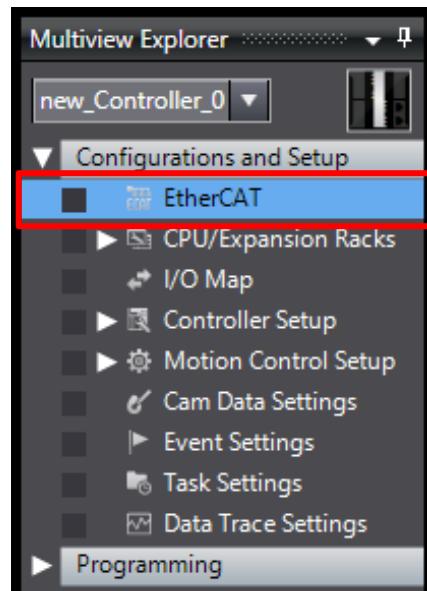
- 1** From the menu bar in "Auto Connect Project" window, click "Controller" → "Offline" to set the status offline.



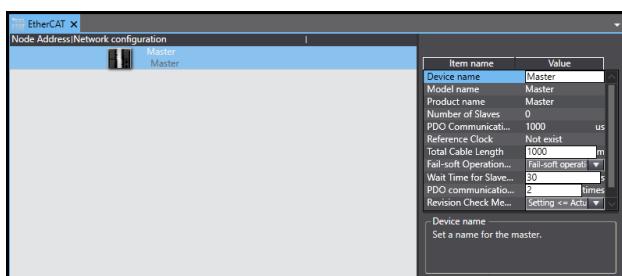
- 2** In "Auto Connect Project" window, click "Configurations and Setup" from "Multiview Explorer".



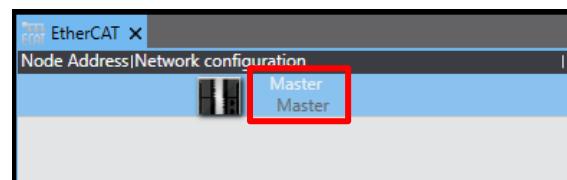
- 3** Double-click "EtherCAT" in "Configurations and Setup".



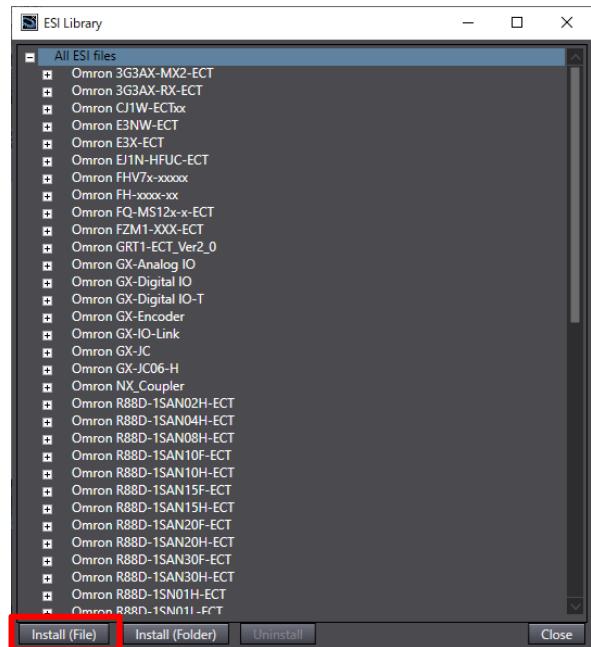
- 4** "EtherCAT" window should be shown in "Edit Window".



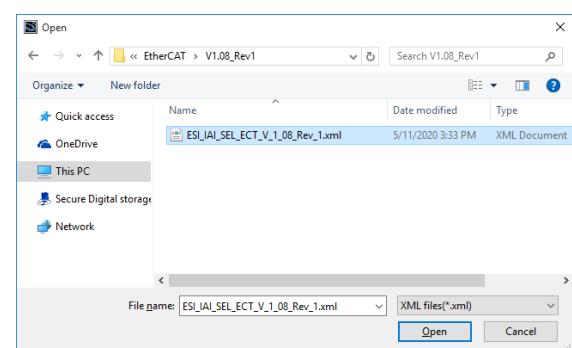
- 5** Right-click "Master" and select "Display ESI Library".



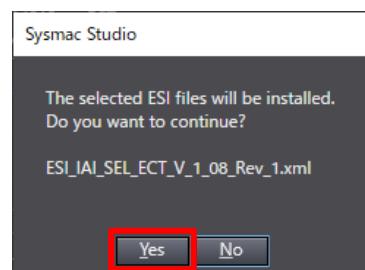
- 6** Click "Install (File)" in "ESI Library" window.



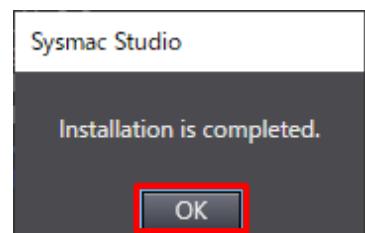
- 7** Select the ESI file that was downloaded from the IAI homepage and click "Open".



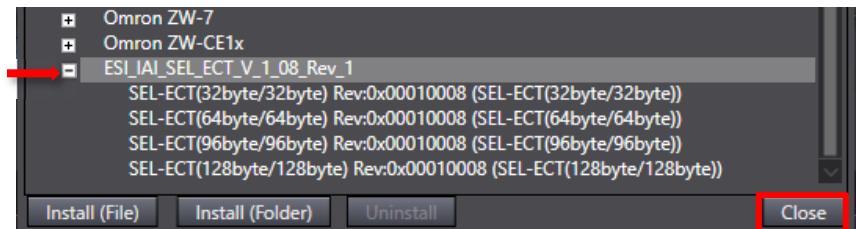
- 8 "Execute Installation" dialog should appear.
Confirm the content and click "Yes".



- 9 "Installation Complete" dialog should appear.
Click "OK".



- 10 The installed ESI file should get added in "ESI Library" window.
Click the plus icon to confirm that devices get displayed.

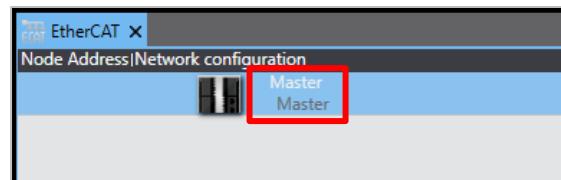


Click "Close".

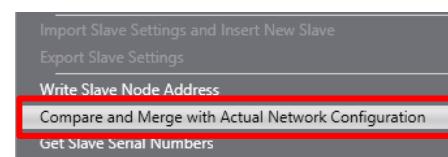
6.5.4 Setup of EtherCAT Network Configuration

[1] How to Set up Online (Merge Actual Network Configuration)

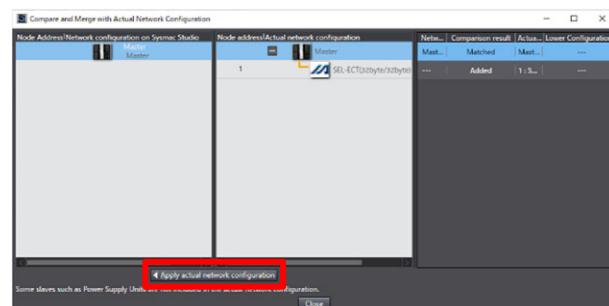
- 1 In "EtherCAT" tab in "Auto Connect Project", right-click "Master".



- 2 Click "Compare and Merge with Actual Network Configuration".



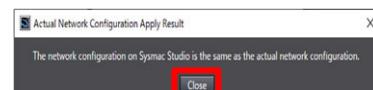
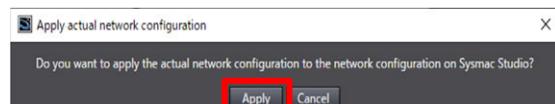
- 3 Click "Apply actual network configuration".



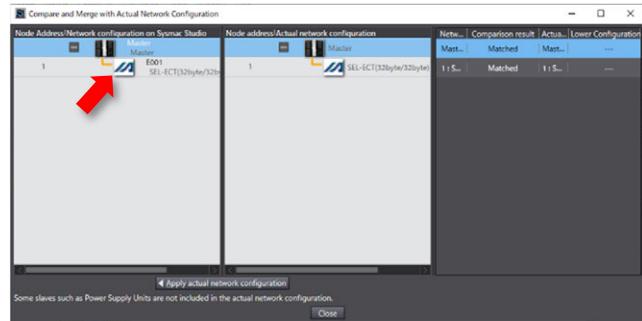
- 4 "Apply actual network configuration" window should appear.

Confirm the content and click "Apply".

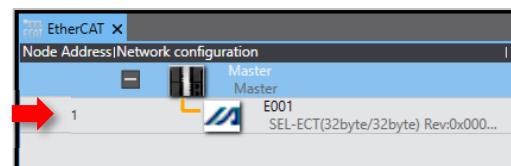
Once the execution result gets displayed, click "Close".



- 5** The slave should be added to "Network configuration on Sysmac Studio" in "Compare and Merge with Actual Network Configuration" window.
Confirm that it is added and click "Close".

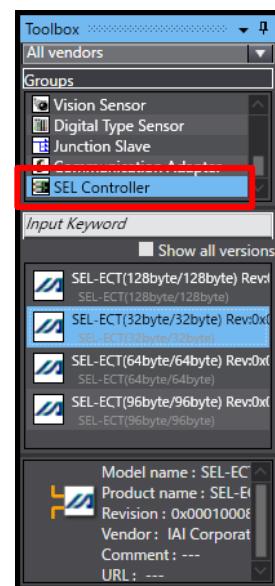


- 6** The slave should be added in "EtherCAT" tab in "Auto Connect Project" window.



[2] How to Set up Offline (To be selected from the tool box)

- 1** Click "SEL Controller" from "Groups" in "Toolbox" in "Auto Connect Project" window.



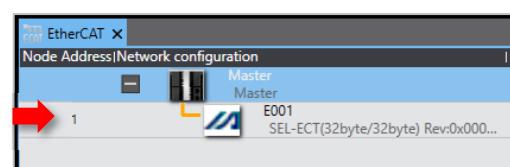
- 2** Double-click the applicable device in the list at the bottom of "Toolbox", or drag & drop to "Master" in "EtherCAT" tab.

Select the applicable device referring to the number of used EtherCAT input and output ports.

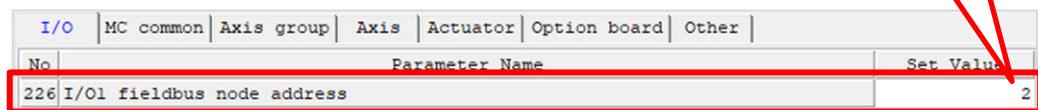
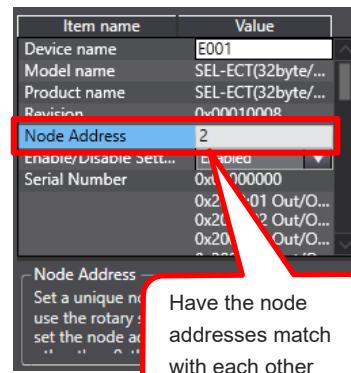
Number of Used EtherCAT Input and Output Ports	ESI File Applicable Device
8 to 256	SEL-ECT (32bytes/32bytes)
264 to 512	SEL-ECT (64bytes/64bytes)
520 to 768	SEL-ECT (96bytes/96bytes)
776 to 1024	SEL-ECT (128bytes/128bytes)

* As the applicable device should differ depending on the number of ports used for input and output, a device with larger number of ports should be applied.

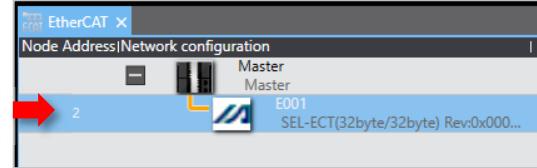
- 3** The slave should be added in "EtherCAT" tab in "Auto Connect Project" window.



- 4** When the node address of the slave is to be assigned fixed (RSEL controller I/O Parameter No. 226 = 1 to 65535), select Slave in "EtherCAT" tab and change "Node Address" in the parameter setting window so it matches with the value in I/O Parameter No. 226 of RSEL Controller.

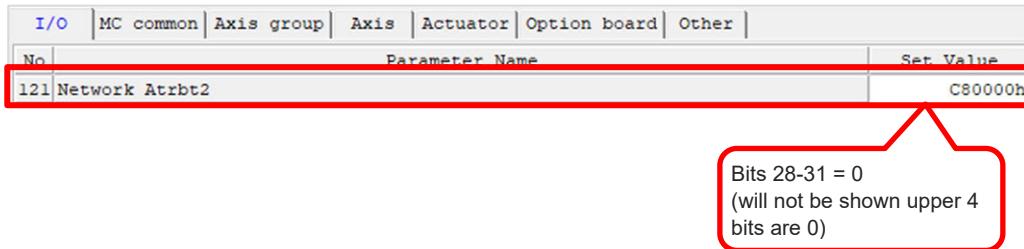


- 5** The node address of the slave in "EtherCAT" tab in "Auto Connect Project" window should be updated.

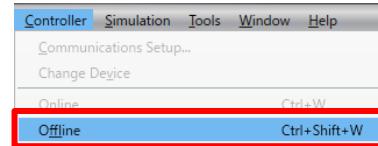


6.5.5 Changing PDO Mapping Setting

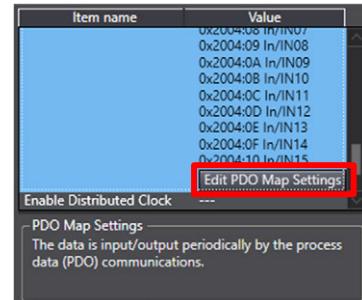
For the RSEL controllers with their setting in Parameter No. 121 "Network Attrbt2" Bits 28-31 "EtherCAT PDO Mapping Classification" = 0 (Variable), it is necessary to match the input and output settings in the master and slave.



- 1** Confirm that it is in the state of PLC and offline.
If it is online, click "Controller" → "Offline" from the menu bar in "Auto Connect Project" window to set it offline.

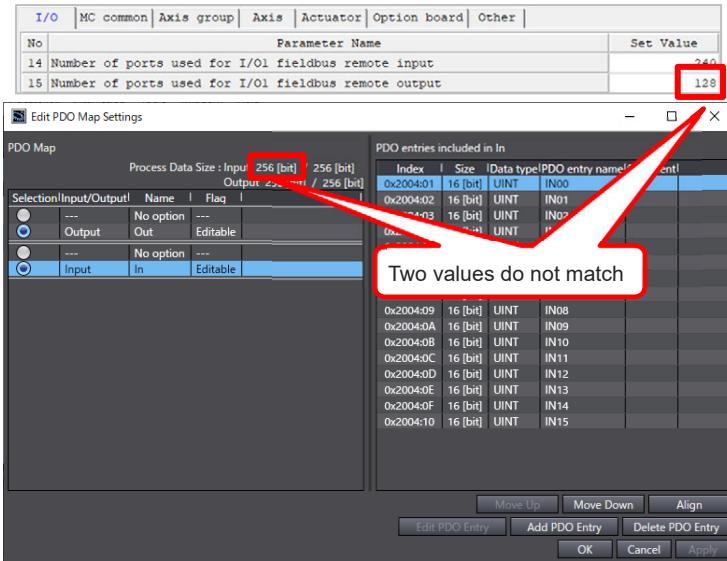


- 2** Select a slave subject to the change of PDO mapping setting in "EtherCAT" tab, and click "Edit PDO Map Settings" in the parameter setting window.



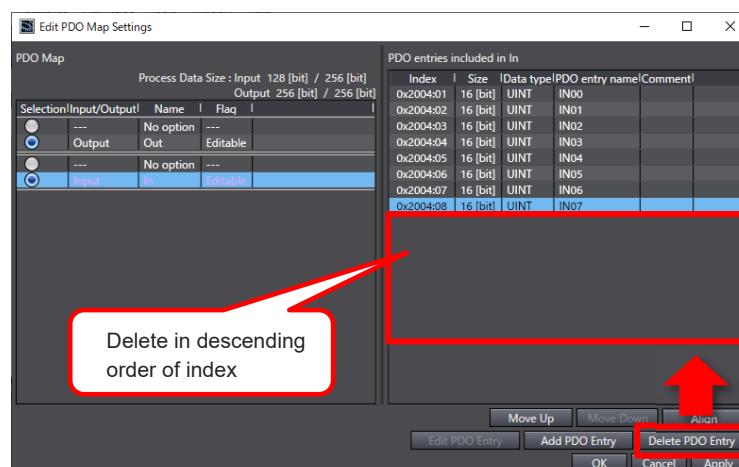
6.5 Example of Connectivity Setting

- 3** Edit the process data size of input and output in "Edit PDO Map Settings" window.
- When the input of the process data size do not match with the setting in I/O Parameter No. 15 (Number of ports used for I/O1 fieldbus remote output) of RSEL controller.

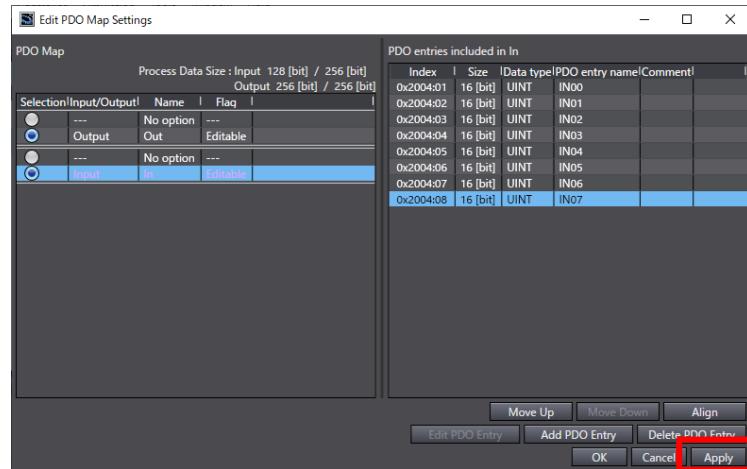


(1) Select "Input" from the PDO mapping list, and delete the PDO entries till the input of the process data size matches with Parameter No. 15 "Number of ports used for I/O1 fieldbus remote output" in RSEL Controller.

Select the PDO entries in the descending order of the index from "PDO entries included in In", and click "Delete PDO Entry".

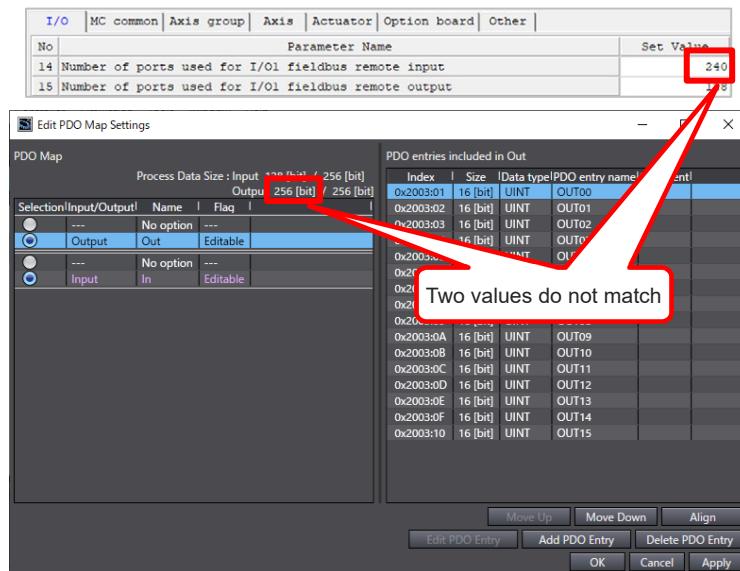


- (2) Once the input of the process data size matches with Parameter No. 15 "Number of ports used for I/O1 fieldbus remote output" in RSEL Controller, click "Apply".

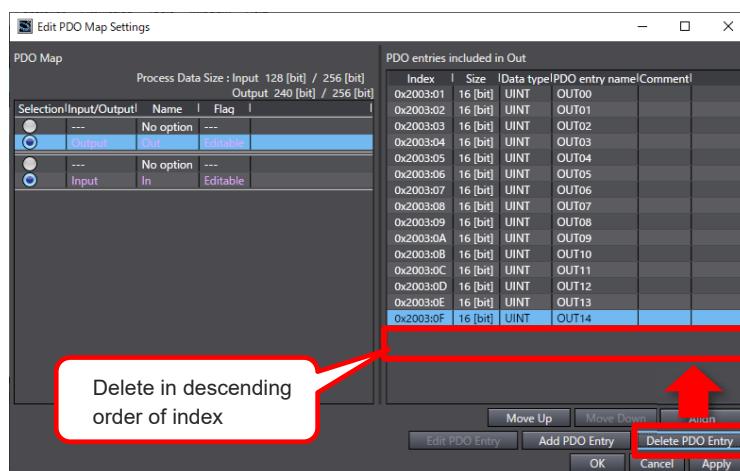


6.5 Example of Connectivity Setting

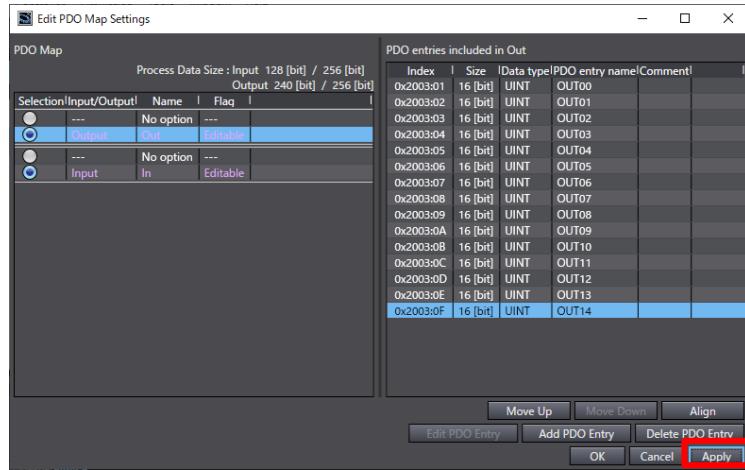
- When the output of the process data size do not match with the setting in I/O Parameter No. 14 (Number of ports used for I/O1 fieldbus remote input) Number of RSEL controller.



- Select "Output" from the PDO mapping list, and delete the PDO entries till the output of the process data size matches with Parameter No. 14 " Number of ports used for I/O1 fieldbus remote input " in RSEL Controller.
- Select the PDO entries in the descending order of the index from "PDO entries included in Out", and click "Delete PDO Entry".



- (2) Once the input of the process data size matches with Parameter No. 14 " Number of ports used for I/O1 fieldbus remote input " in RSEL Controller, click "Apply".



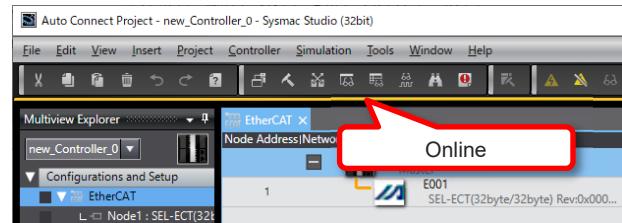
Once the process data size in both the input and the output matches with the number of used ports in the slave, click "OK" to finish the edit.

6.5 Example of Connectivity Setting

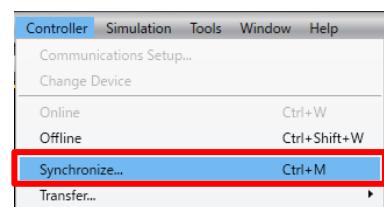
6.5.6 Data Transfer to PLC

1 Confirm that it is in the state of PLC and online. If it is online, a yellow frame should be displayed at the top in "Edit Window".

If it is offline, click "Controller" → "Online" from the menu bar in "Auto Connect Project" window to set it online.

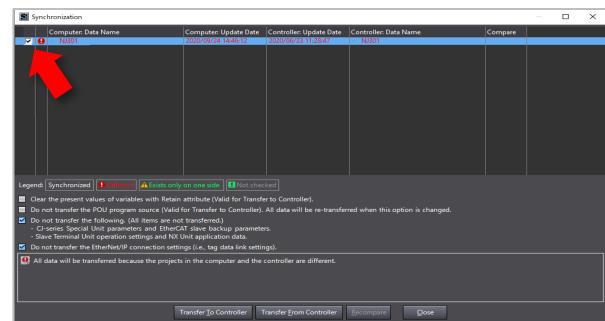


2 Click "Controller" → "Synchronize..." from the menu bar in "Auto Connect Project" window.

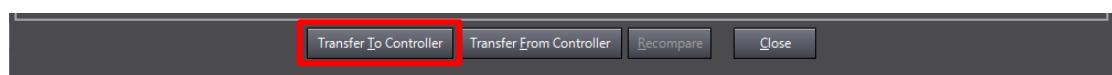


3 "Synchronization" window should appear.

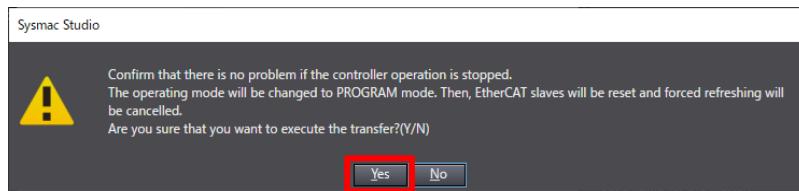
Put a checkmark on the data subject to transfer.



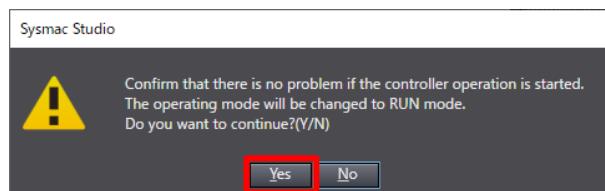
4 Click "Transfer To Controller".



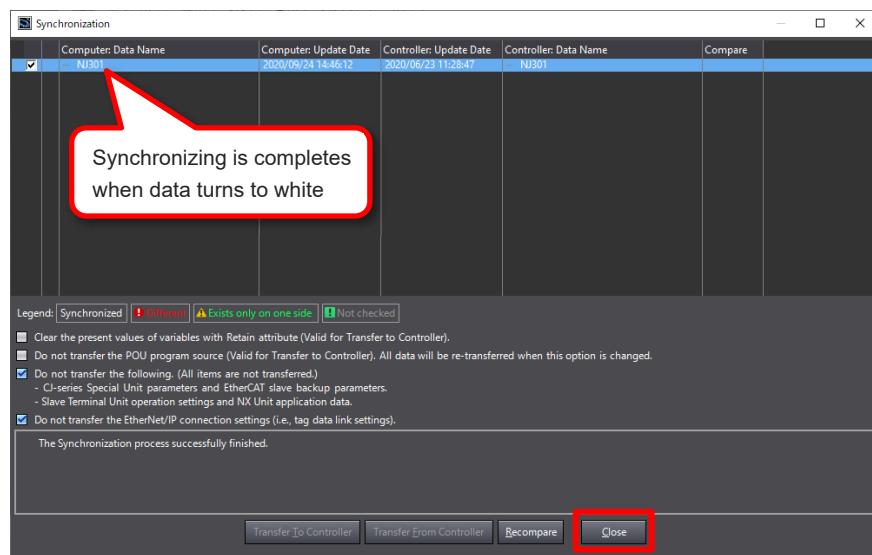
- 5** As the "Transfer execution confirmation" window appears, confirm that there is no problem if PLC operation stops, and click "Yes".

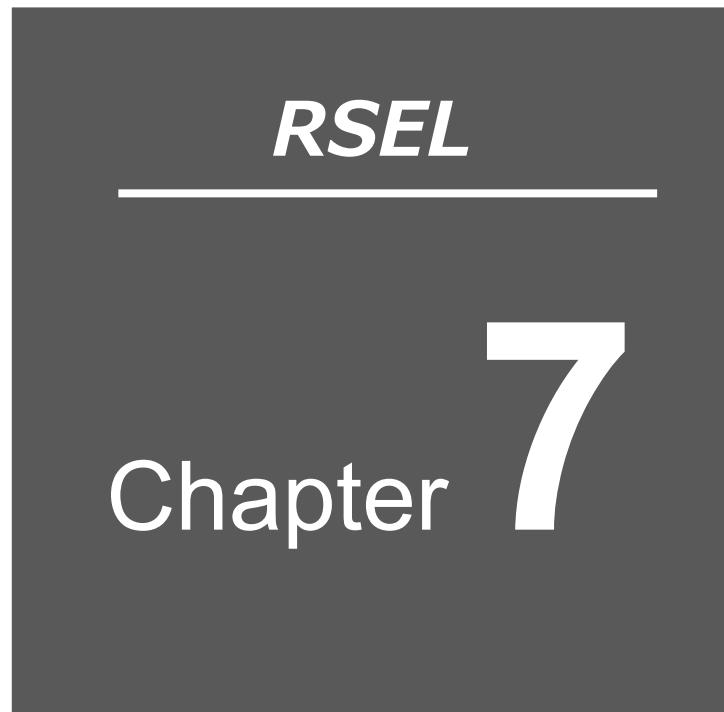


- 6** As the "Operation mode change confirmation" window appears, confirm that there is no problem if PLC operation stops, and click "Yes".



- 7** Confirm that "Synchronization" is complete and click "Close".





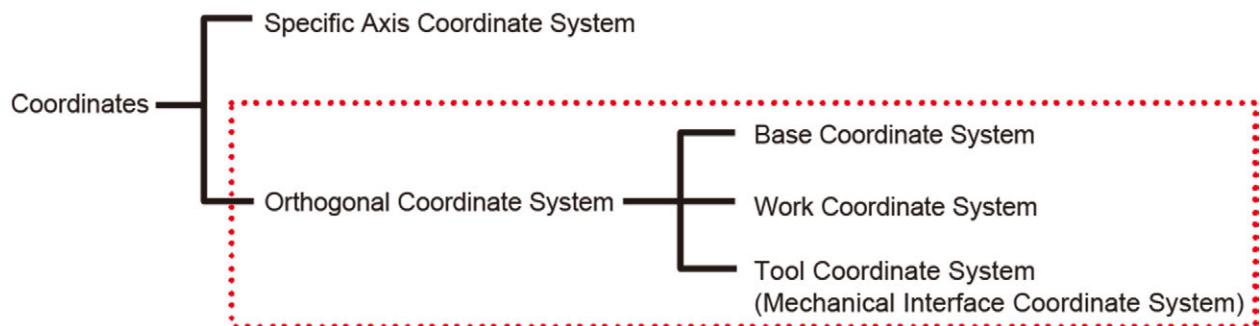
6-axis Cartesian Robot

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7.1 Guideline of Coordinate Systems

7.1.1 List of Coordinate Systems

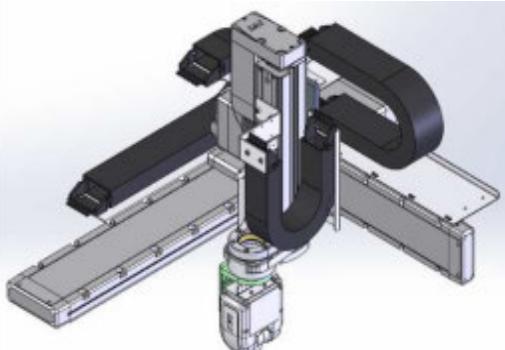
When the orthogonal coordinate system feature is valid in a 6-axis cartesian robot, the orthogonal coordinate system positioning feature should be added only for the 6-axis cartesian robot. Added axes are out of subject.



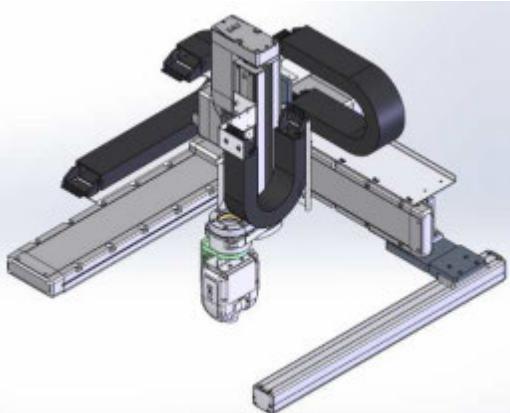
7.1.2 Applicable Robots

The 6-axis cartesian robots applicable for use of the orthogonal coordinate system are as shown below:

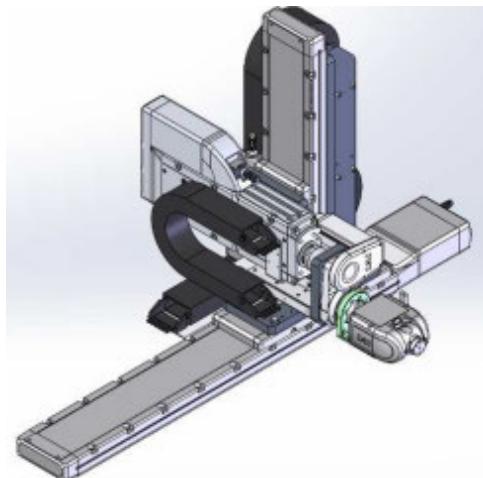
- CRS-XB□
(XY Base Fixed)



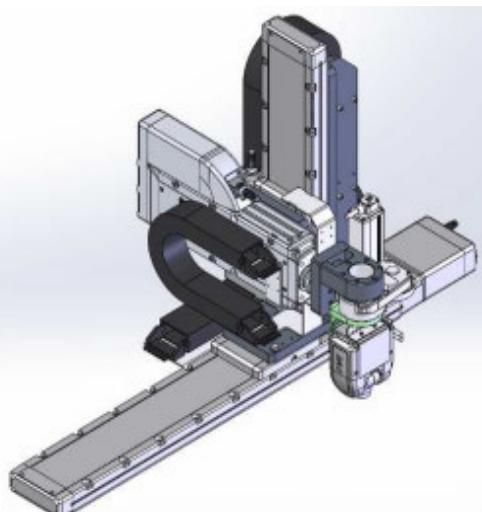
- CRS-XG□
(XY Base Fixed + Gantry)



- CRS-XZ□Y
(XY Base Fixed + Horizontal Approach)



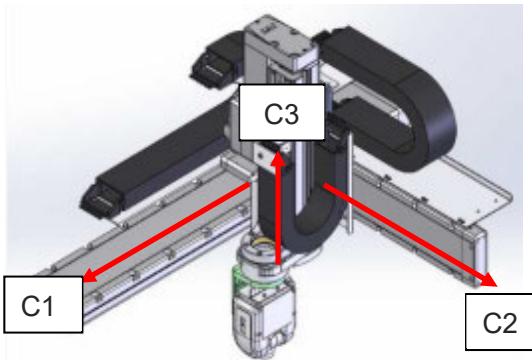
- CRS-XZ□Z
(XY Base Fixed + Vertical Approach)



7.1.3 Specific Axis Coordinate System

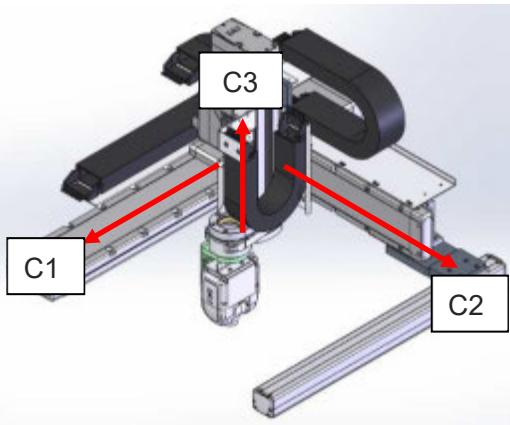
The specific axis coordinate system of the 6-axis cartesian robot is a coordinate system set to the constructing axes of the robot.

- CRS-XB□
(XY Base Fixed)

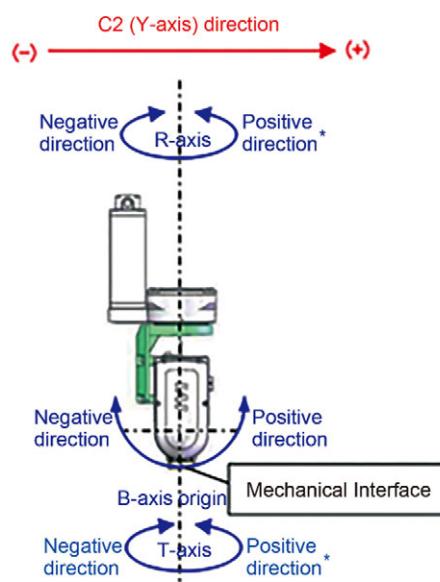


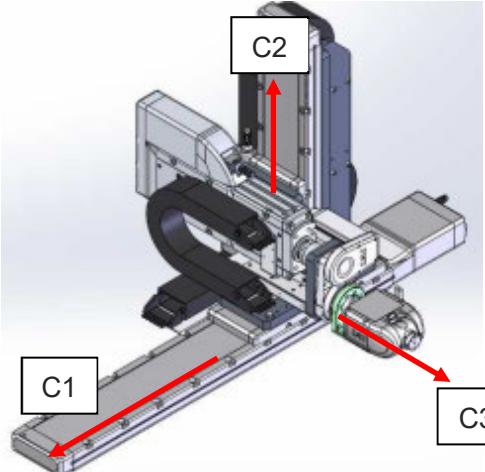
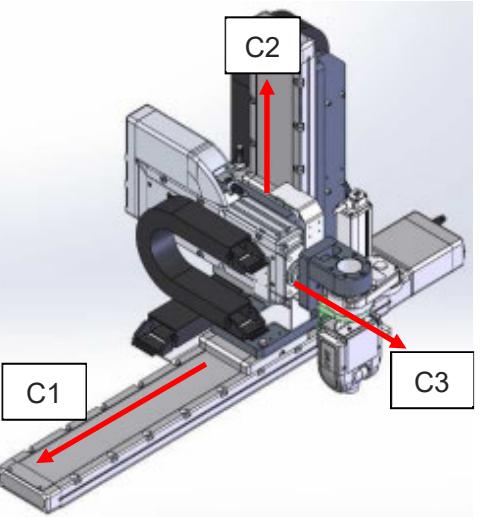
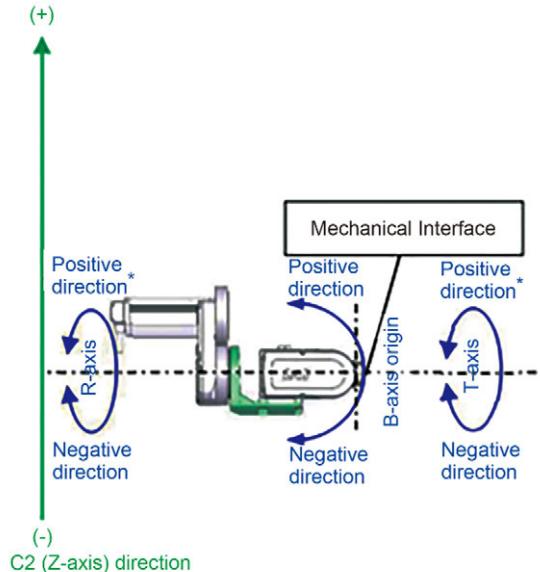
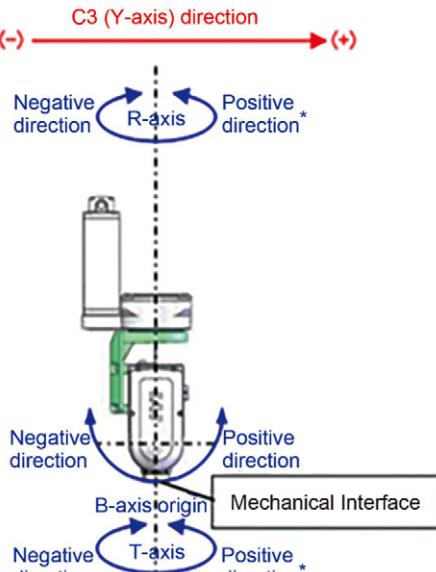
* Arrows show positive sides

- CRS-XG□
(XY Base Fixed + Gantry)



* Arrows show positive sides



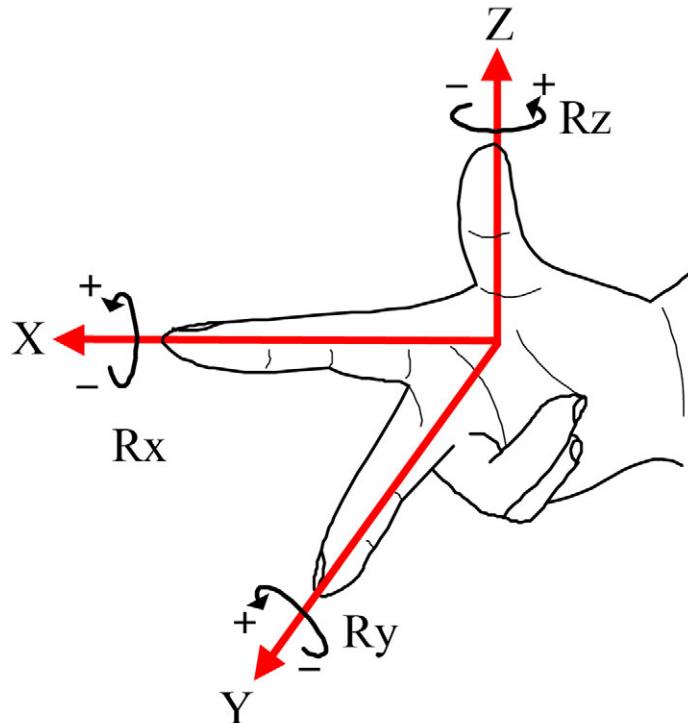
<ul style="list-style-type: none"> • CRS-XZ□Y (XY Base Fixed + Horizontal Approach)  <p>* Arrows show positive sides</p>	<ul style="list-style-type: none"> • CRS-XZ□Z (XY Base Fixed + Vertical Approach)  <p>* Arrows show positive sides</p>
	

7.1.4 Orthogonal Coordinate System

The orthogonal coordinate system should be defined as shown in the figure below with the right-handed system to determine the direction of the right-handed screw on each axis to go along as the positive rotation directions.

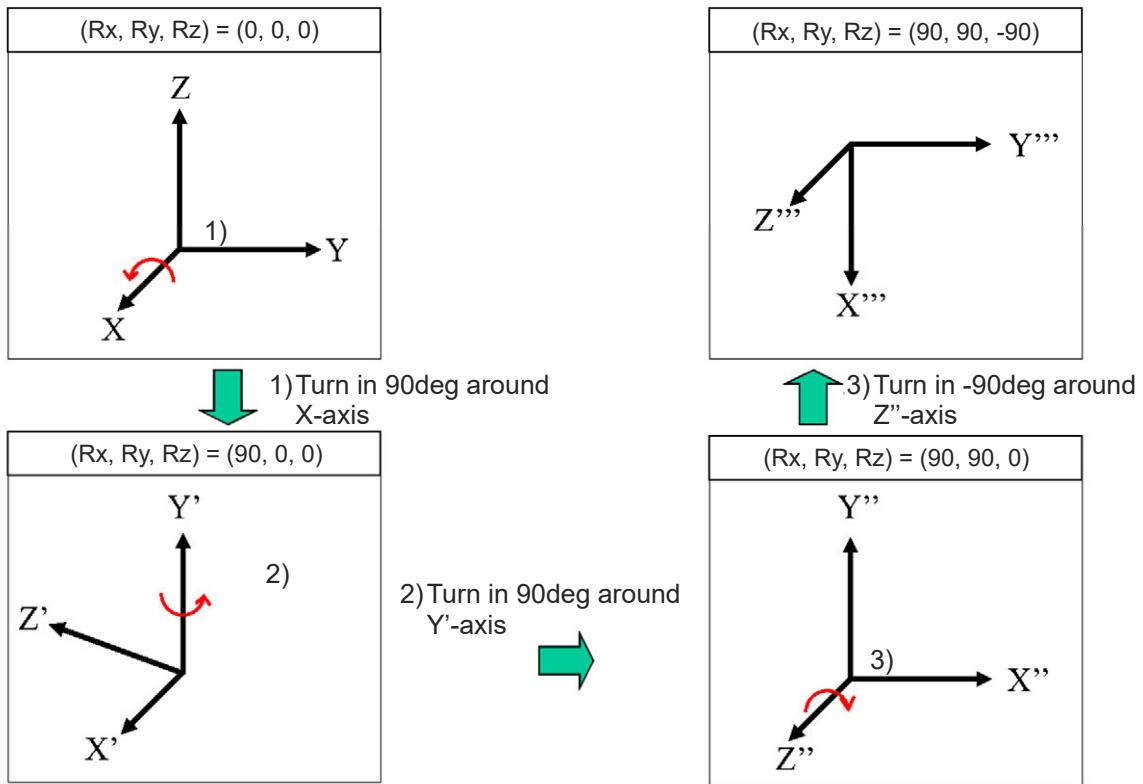
Six coordinates shown below should determine the position and posture.

- X, Y, Z : Coordinates to present the positions on the X-, Y- and Z-axes (Unit: mm)
- Rx, Ry, Rz : Coordinates to present posture (Unit: deg)



The posture data should show Rx: rotation around X coordinate direction, Ry: rotation around Y coordinate direction and Rz: rotation around Z coordinate direction and each turns in the order of (1) Rx → (2) Ry → (3) Rz. As it may result in a different posture with a change to the order for turn, it is necessary to have them turn in the order above.

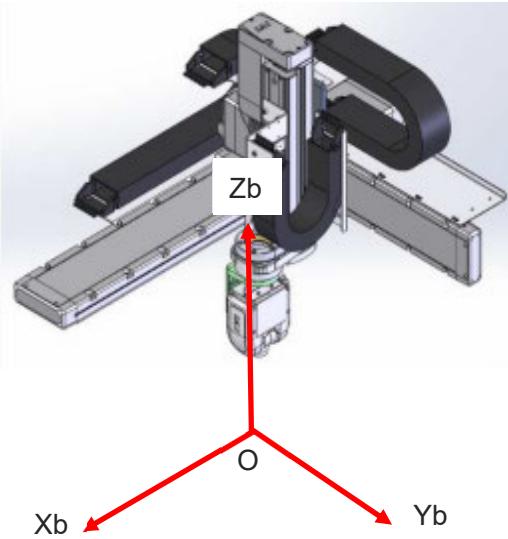
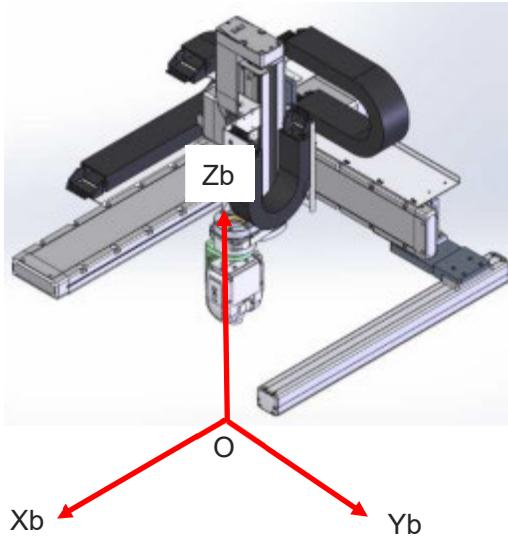
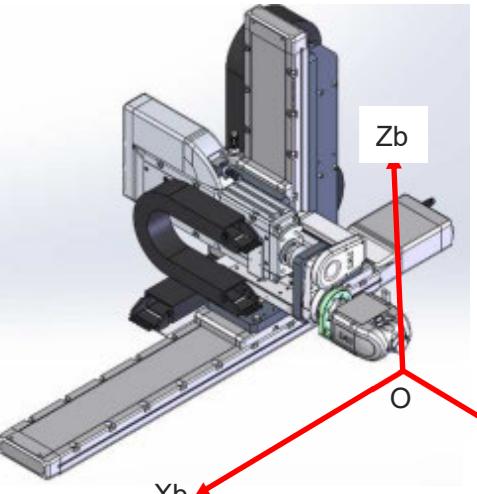
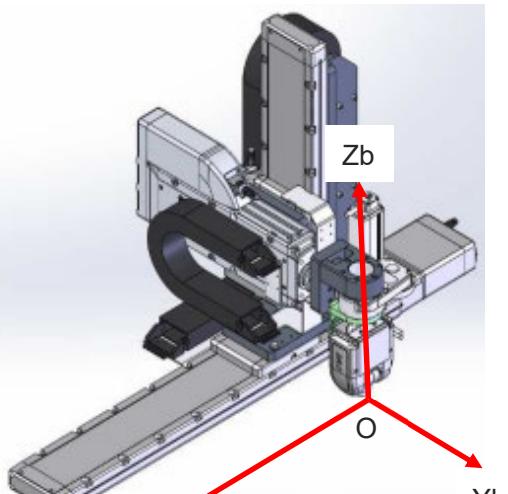
- For $(Rx, Ry, Rz) = (90\text{deg}, 90\text{deg}, -90\text{deg})$



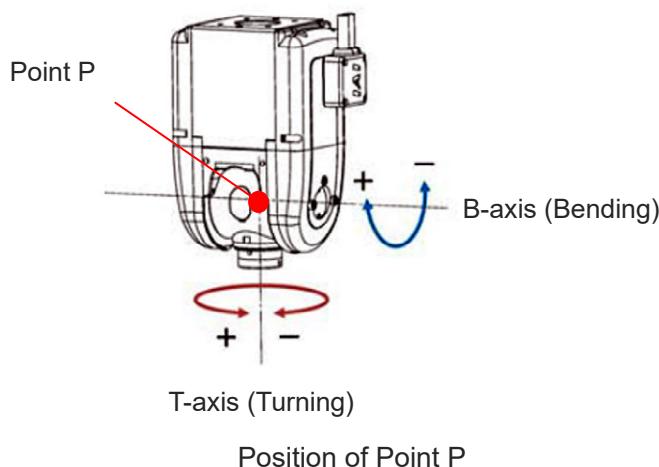
(1) Base Coordinate System

The base coordinate systems for each type of the 6-axis cartesian robot are as shown below.

The origin of the base coordinates should be the position of Point P (crossing point of B-axis rotary axis and T-axis rotary axis) when $(C1, C2, C3) = (0, 0, 0)$ in each axis coordinate.

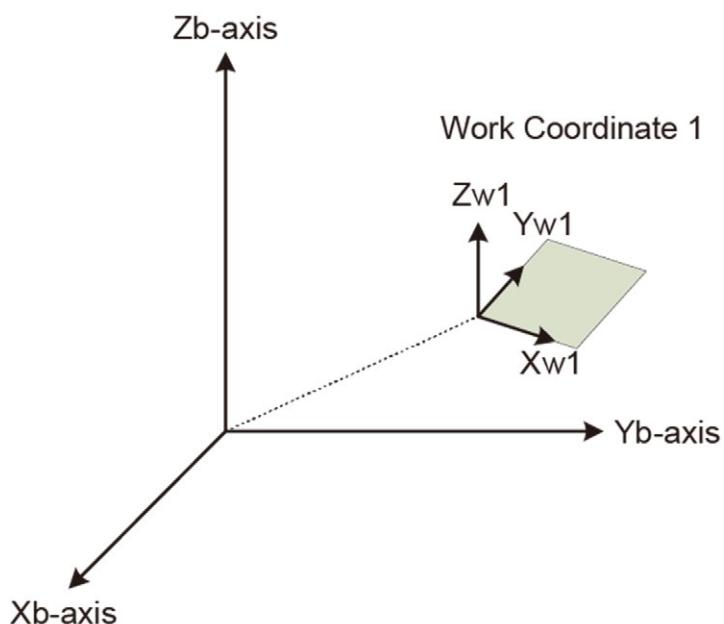
<ul style="list-style-type: none"> • CRS-XB□ (XY Base Fixed) 	<ul style="list-style-type: none"> • CRS-XG□ (XY Base Fixed + Gantry) 
<ul style="list-style-type: none"> • CRS-XZ□Y (XY Base Fixed + Horizontal Approach) 	<ul style="list-style-type: none"> • CRS-XZ□Z (XY Base Fixed + Vertical Approach) 

* Arrows show positive sides



(2) Work Coordinate System

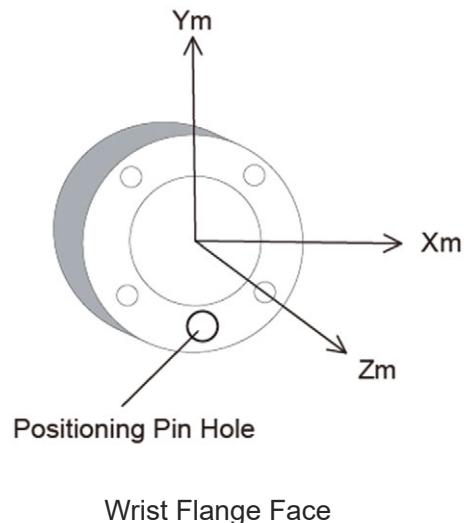
The work coordinate system is a three-dimensional coordinate system defined in each area of workspace for a workpiece. The origin can be defined at any position. The work coordinate system is to be defined with the coordinate origin offset (X , Y , Z) from the base coordinates and the rotary angles (R_x , R_y , R_z) around the X -, Y - and Z -axes on the base coordinates. The work coordinate system equals to the base coordinate system when it is not defined.



(3) Tool Coordinate System (Mechanical Interface Coordinate System)

- Mechanical Interface Coordinate System

It is a coordinate system that takes the center of the mechanical interface (on Wrist Flange) on a robot as the origin. The direction outwards against the flange face is positive. The X-axis on the mechanical interface coordinate system should be determined as X_m , Y-axis as Y_m and Z-axis as Z_m . The direction from the positioning pin hole to the center of the flange is the Y_m -axis. This coordinate system is a datum to set the tool coordinate system.

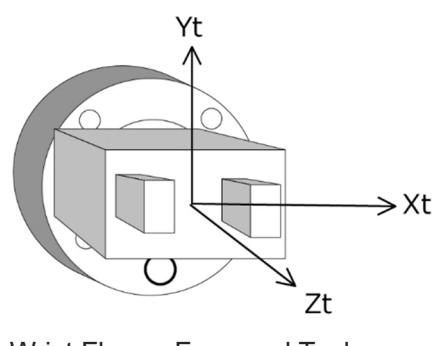


- Tool Coordinate System

The tool coordinate system is a system to determine the position of the tool tip and the tool posture, and is to be indicated by the offset (X , Y , Z) from the mechanical interface coordinate origin and the posture (R_x , R_y , R_z).

The X-axis on the tool coordinate system should be determined as X_t , Y-axis as Y_t and Z-axis as Z_t .

The tool tip is used to teach the position of the position data. The tool posture is necessary to conduct the tool posture control.



The tool coordinate system equals to the mechanical interface coordinate system when it is not defined.

7.2 Caution When Using Orthogonal Coordinate System Features

7.2.1 Relation between Axis Numbers and Axis Patterns

(1) Axis number

Axis		Axis No.
Specific Axis Coordinate System	Orthogonal Coordinate System	
6-axis Cartesian Robot C1-Axis	6-axis Cartesian Robot X-Axis	1
6-axis Cartesian Robot C2-Axis	6-axis Cartesian Robot Y-Axis	2
6-axis Cartesian Robot C3-Axis	6-axis Cartesian Robot Z-Axis	3
6-axis Cartesian Robot R-Axis	6-axis Cartesian Robot Rx-Axis	4
6-axis Cartesian Robot B-Axis	6-axis Cartesian Robot Ry-Axis	5
6-axis Cartesian Robot T-Axis	6-axis Cartesian Robot Rz-Axis	6
Added Axis No. 7	—	7
Added Axis No. 8	—	8

(2) Axis pattern

		(Upper)								(lower)	
Axis	Specific Axis Coordinate System	8-axis	7-axis	T-axis	B-axis	R-axis	C3-axis	C2-axis	C1-axis		
	Orthogonal Coordinate System	—	—	Rz-axis	Ry-axis	Rx-axis	Z-axis	Y-axis	X-axis		
Used		1	1	1	1	1	1	1	1		
Not Used		0	0	0	0	0	0	0	0		

[Example] When C1- and C2-axes are indicated in Specific Axis Coordinate System
00000011

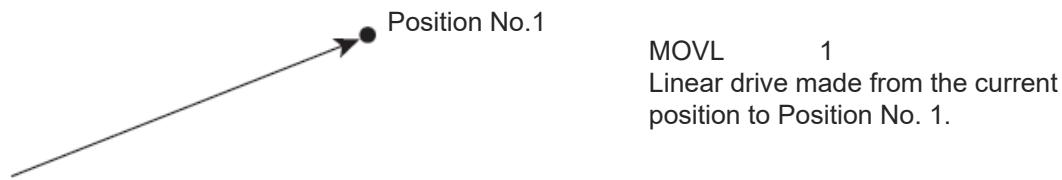
[Example] When X- and Rx-axes are indicated in Orthogonal Coordinate System
00001001

7.2.2 CP operation

- Tracks

An actuator drives towards the target position while each axis interpolate with each other. The tracks during the drive can be specified with command languages. (linear, circle, arc, path move, etc.)

(Example)



- * In case indication of a track of the tool tip on a robot is required, it is necessary to indicate the position on the orthogonal coordinates. When a position on the specific axis coordinates is indicated, the constructing axes performs the interpolating operation, however, it is not available to indicate a track of the tool tip except for the case that the R-, B- and T-axes are not operated.

- Velocity and Acceleration/Deceleration Settings in CP Operation

The velocity and acceleration/deceleration settings of the CP operation should be established in advance in a program with control declaration commands.

Velocity Setting Command "VEL" in unit [mm/s]

Acceleration Setting Command "ACC" in unit [G]

Deceleration Setting Command "DCL" in unit [G]

(Example)

ACC 0.5 The acceleration in CP operation is set at 0.5G.

DCL 0.5 The deceleration in CP operation is set at 0.5G.

VEL 500 The velocity in CP operation is set at 500mm/s.

MOVL 2 Makes a linear drive operation to Position No. 2.

The velocity and acceleration/deceleration settings are also available to be established in the VEL, ACC and DCL boxes in the position data.

Setting to the position data should be established for each position number. If settings are established in VEL, ACC and DCL boxes in the position data, the movement to that position number should be prioritized to the "VEL", "ACC" and "DCL" of the command language in the program.

- Position Setting in CP Operation

The coordinate systems (position types) available for indication should differ depending on the command languages.

- CP Operation Commands with Specific Axis Coordinate System (Joint) Available for Indication

MOVL MVLI PATH PSPL CIR ARC CIR2 ARC2 ARCC ARCD ARCS CIRS PUSH ARCH

- CP Operation Commands with Orthogonal Coordinate System (Rect) Available for Indication

MOVL MVLI TMLI PATH PSPL ARCS CIRS ARCH

Refer to SEL Language Programming Manual (ME0224) for the detail of languages.

7.2.3 PTP operation

- Driving Tracks

Each axis drives to the target position with the indicated velocity. The track during the drive cannot be specified with command languages.

(Example)



MOVP 1

Drive in PTP operation made from the current position to Position No. 1.

- Velocity and Acceleration/Deceleration Settings in PTP Operation

The velocity and acceleration/deceleration settings of the PTP operation should be established in advance in a program with control declaration commands.

Velocity Setting Command “VEL” in unit [mm/s]

Acceleration Setting Command “ACC” in unit [G]

Deceleration Setting Command “DCL” in unit [G]

(Example)

ACC 0.5 The acceleration in PTP operation is set at 0.5G.

DCL 0.5 The deceleration in PTP operation is set at 0.5G.

VEL 500 The velocity in PTP operation is set at 500mm/s.

MOVP 2 Makes a drive in PTP operation to Position No. 2.

The velocity and acceleration/deceleration settings are also available to be established in the VEL, ACC and DCL boxes in the position data.

Setting to the position data should be established for each position number. If settings are established in VEL, ACC and DCL boxes in the position data, the movement to that position number should be prioritized to the “VEL”, “ACC” and “DCL” of the command language in the program.

- Position Setting in PTP Operation

The coordinate systems (position types) available for indication should differ depending on the command languages.

- PTP Operation Commands with Specific Axis Coordinate System (Joint) Available for Indication
MOV_P MV_PI

- PTP Operation Commands with Orthogonal Coordinate System (Rect) Available for Indication
MOV_P MV_PI TM_PI

Refer to SEL Language Programming Manual (ME0224) for the detail of languages.

7.2.4 Wrist Form and Singularity

(1) Wrist Form

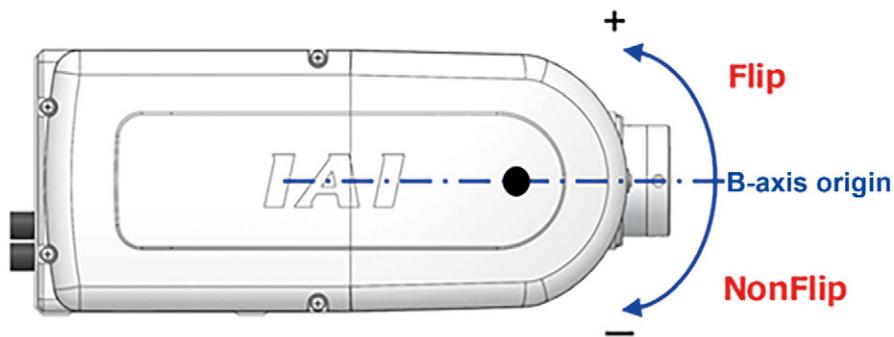
The form is a posture of the 6-axis cartesian robot unit. There are two types of forms to specify the orthogonal coordinates (X, Y, Z, Rx, Ry and Rz).

When the orthogonal coordinates of the 6-axis cartesian robot are to be indicated, it is necessary to indicate the Flip/NonFlip of the wrist form.

[Flip/NonFlip]

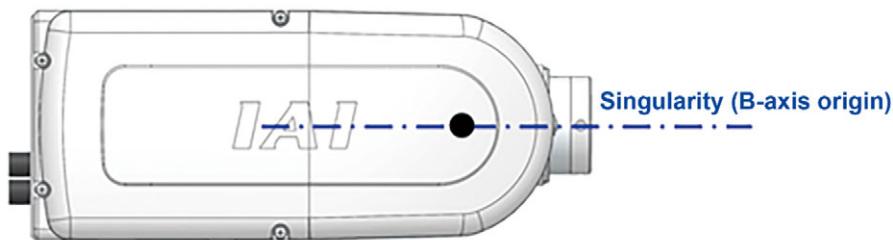
It is to be determined by the specific axis coordinates of the B-axis and;

- It is Flip when positive side from the rotary center (specific axis coordinate at 0deg) and
- It is NonFlip when negative side from the rotary center (specific axis coordinate at 0deg)



(2) Singularity

The boundary of the robot's wrist shape is called a singularity.



- It is not available to have indication of the orthogonal coordinate system to pass the vicinity of singularity or to make positioning at singularity vicinity. It generates 48F "Singularity Error" when a CP operation including singularity vicinity is made. Try to avoid it by means shown below.
- A robot would not operate if the start or end point is at the singularity vicinity in the CP operation (linear, circle/arc, spline move, path move, jog mode on orthogonal coordinate, etc.) indicating the orthogonal coordinate system.
Set it away from the singularity or use the specific-axis operations.
- Passing through the singularity vicinity in the path of the CP operation (linear, circle/arc, spline move, path move, jog mode on orthogonal coordinate, etc.) indicating the orthogonal coordinate system would not be made.
In case of passing through the singularity (including the vicinity) in the path, use the specific-axis operations.
- The current position and the target position in a CP operation indicated in the orthogonal coordinate system need to be in the same form. Current position and target position in different forms is because it falls into the subject to (1) and is necessary to pass through the singularity in the path.
495 "Form Error" would occur when the current position and the target position are in different forms.
Have the current position and the target position of a CP operation in the same form.

7.2.5 Position data

Shown below is the data format.

No. (Name)	Type	Axis1	Axis2	Axis3	Axis4	Axis5	Axis6	Axis7	Axis8	Wrist	Vel	Acc	Dcl
1 ()													
2 ()													
3 ()													
4 ()													
5 ()													
6 ()													
7 ()													

- Type: Position Type (Coordinate System)

Input either Rect (Orthogonal) or Joint (Specific Axis).

* A blank (not set) should be taken as Joint (Specific Axis).

* Please be aware that, when a position type is changed with SEL Command, the coordinate values and forms already registered should be deleted.

- Axis1 to 8: Position (Coordinates)

Input coordinate values.

The relation between Axis * in each type (position type) and the coordinates is as shown below.

Type	Axis1	Axis2	Axis3	Axis4	Axis5	Axis6	Axis7	Axis8
Rect	6-axis Cartesian Robot X-Axis Coordinate [mm]	6-axis Cartesian Robot Y-Axis Coordinate [mm]	6-axis Cartesian Robot Z-Axis Coordinate [mm]	6-axis Cartesian Robot Rx-Axis Coordinate [deg]	6-axis Cartesian Robot Ry-Axis Coordinate [deg]	6-axis Cartesian Robot Rz-Axis Coordinate [deg]	—	
Joint	6-axis Cartesian Robot C1-Axis Coordinate [mm]	6-axis Cartesian Robot C2-Axis Coordinate [mm]	6-axis Cartesian Robot C3-Axis Coordinate [mm]	6-axis Cartesian Robot R-Axis Coordinate [deg]	6-axis Cartesian Robot B-Axis Coordinate [deg]	6-axis Cartesian Robot T-Axis Coordinate [deg]	Added Axis Coordinate [mm or Deg]	Added Axis Coordinate [mm or Deg]

* Axis7 and Axis8 are not available for input in the position type Rect (Orthogonal).

- Wrist: Wrist Form

Input the wrist form Flip/NonFlip only when the type is Rect (Orthogonal).

Refer to "7.2.4 (1) Wrist Form".

- Vel (Velocity) • Acc (Acceleration) • Dcl (Deceleration)

- Vel: Input velocity in unit mm/s
- Acc: Input acceleration in unit G
- Dcl: Input deceleration in unit G

The velocity, acceleration and deceleration should take the effective values in the priority below.

Priority	Velocity	Acceleration (Deceleration)
1	Position Data Setting	Position Data Setting
2	VEL Command Setting	ACC (DCL) Command Setting
3	–	MC Common Parameters No.11 "Default acceleration" MC Common Parameters No.12 "Default deceleration"

Unit mm for velocity and acceleration/deceleration set in [Rx, Ry, Rz] in the rotary drive axes of the added axes and the orthogonal coordinate system should be handled in unit deg.

- Velocity 1mm/s → 1 deg/s
- Acceleration/Deceleration 1G = 9807mm/s² → 9807 deg/s²

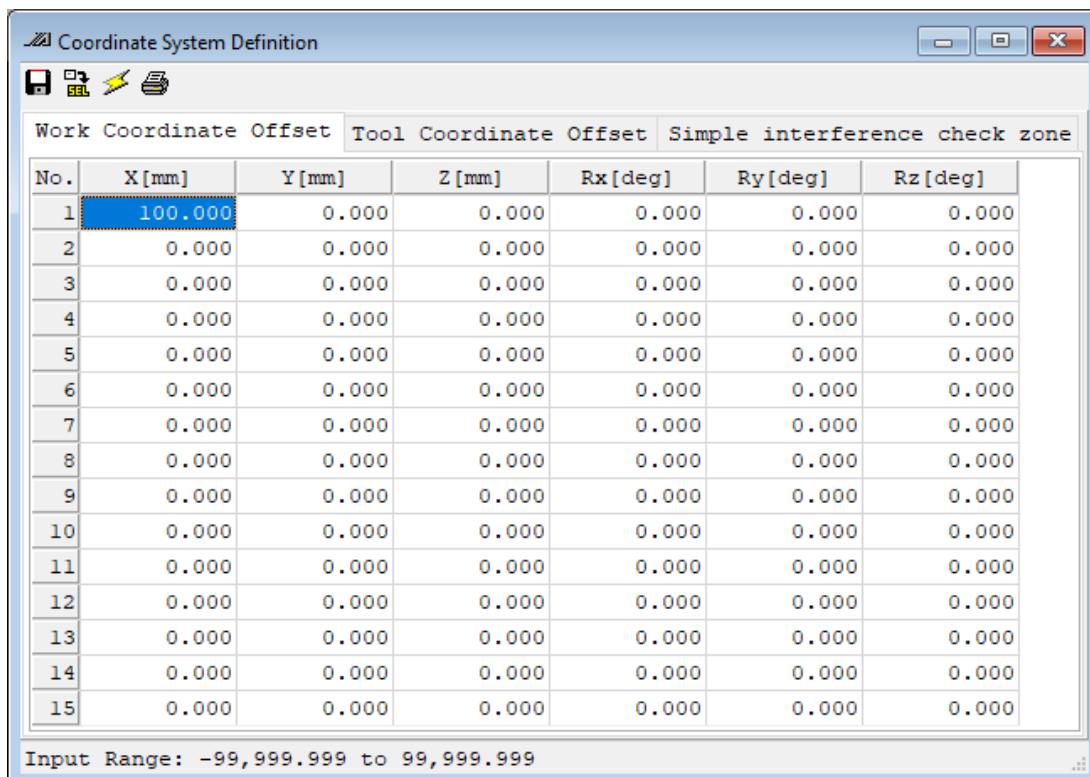
- * In case of performing an operation indicating the orthogonal coordinate system in the 6-axis cartesian robot, indication of velocity and acceleration/deceleration with VLMX Command or ACMX Command cannot be made. 456 “Velocity Indication Error” or 4B0 “Acceleration/Deceleration Indication Error” should occur when it is indicated. Set up the velocity and acceleration/deceleration with VEL, ACC and DCL Commands.

7.2.6 Coordinate System Definition Data

(1) Work Coordinate System Definition Data

15 types of the work coordinate system definitions can be registered. Coordinate System No. 0 is selected, operation should be made with no work coordinates indicated (= base coordinate system).

The format for the work coordinate system definition data is as shown below.



Input the contents indicated below in each cell.

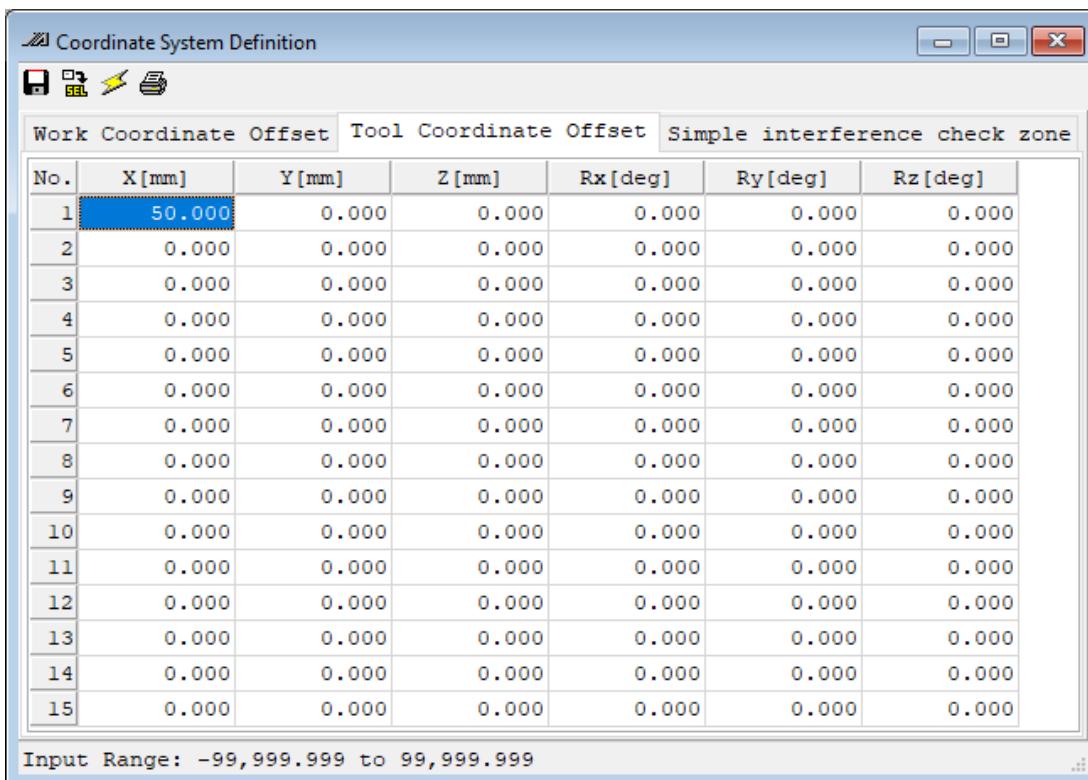
Item	Contents inputted	Remarks
X	X-axis offset from base coordinate system	
Y	Y-axis offset from base coordinate system	Indication of origin of work coordinates
Z	Z-axis offset from base coordinate system	
Rx	X-axis rotation from base coordinate system	
Ry	Y-axis rotation from base coordinate system	Indication of posture of work coordinates
Rz	Z-axis rotation from base coordinate system	

DFWK and GTWK Commands should be used when the work coordinate system definition data is to be operated in a SEL program. Refer to SEL Language Programming Manual (ME0224) for the detail of languages.

(2) Tool Coordinate System Definition Data

15 types of the tool coordinate system definitions can be registered. When Tool Coordinate System No. 0 is selected, operation should be made with no tool coordinates indicated (= mechanical interface coordinate system).

Shown below is the data format.



Input the contents indicated below in each cell.

Item	Contents inputted	Remarks
X	X-axis offset from mechanical interface coordinate system	Indication of origin of tool coordinates
Y	Y-axis offset from mechanical interface coordinate system	
Z	Z-axis offset from mechanical interface coordinate system	
Rx	X-axis rotation from mechanical interface coordinate system	Indication of posture of tool coordinates
Ry	Y-axis rotation from mechanical interface coordinate system	
Rz	Z-axis rotation from mechanical interface coordinate system	

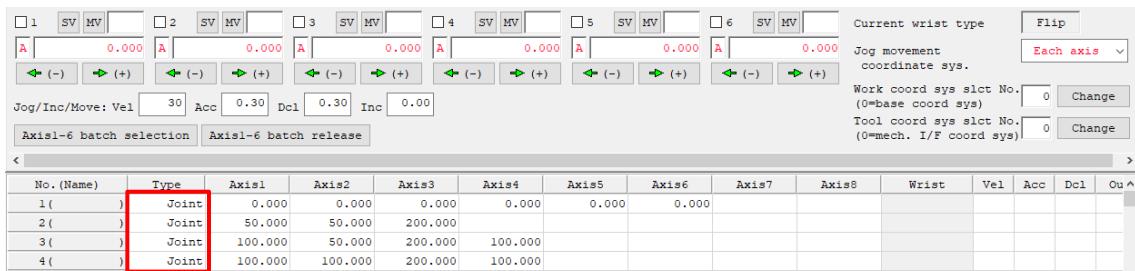
DFTL and GTTL Commands should be used when the tool coordinate system definition data is to be operated in a SEL program. Refer to SEL Language Programming Manual (ME0224) for the detail of languages.

7.2.7 Positioning in Each Coordinate System

(1) Specific Axis Coordinate System

Position indicated movement commands should be executed with Joint (Specific Axis) set in the position type.

In operation in the specific axis coordinate system, the selected numbers in the work coordinate system and the tool coordinate system should not impact the robot arrival position.



[Example in SEL Program]

VEL 100 Velocity 100mm/s

ACC 0.3 Acceleration 0.3G

DCL 0.3 Deceleration 0.3G

MOVP 1 Makes a drive in PTP operation to Position No. 1

MOVP 2 Makes a drive in PTP operation to Position No. 2

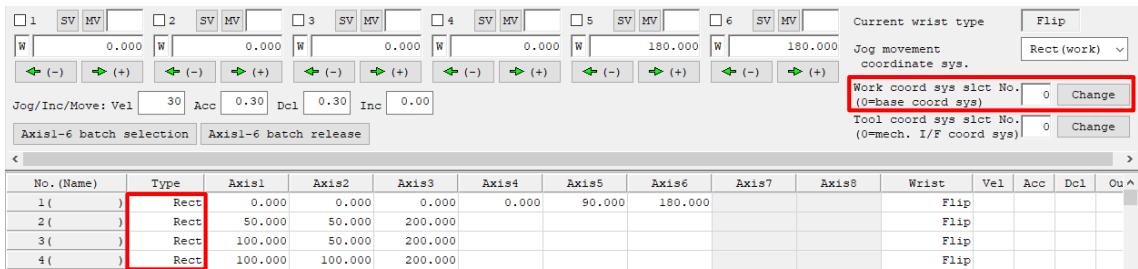
EXIT

(2) Base Coordinate System

Position indicated movement commands should be executed with selecting Work Coordinate System No. 0 and Rect (Orthogonal) set in the position type.

Use SLWK Command when selecting a work coordinate system number in a SEL program.

Validity of the selected work coordinate system select number should continue after finishing a program or after rebooting the power.



[Example in SEL Program]

VEL 100 Velocity 100mm/s
ACC 0.3 Acceleration 0.3G
DCL 0.3 Deceleration 0.3G

SLWK 0 Selects Work Coordinate System No. 0 (= base coordinate system)

MOVP 1 Makes a drive in PTP operation to Position No. 1
MOVP 2 Makes a drive in PTP operation to Position No. 2

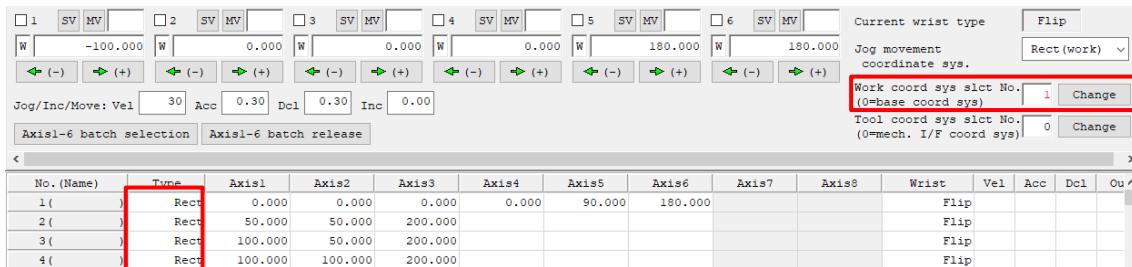
EXIT

(3) Work Coordinate System

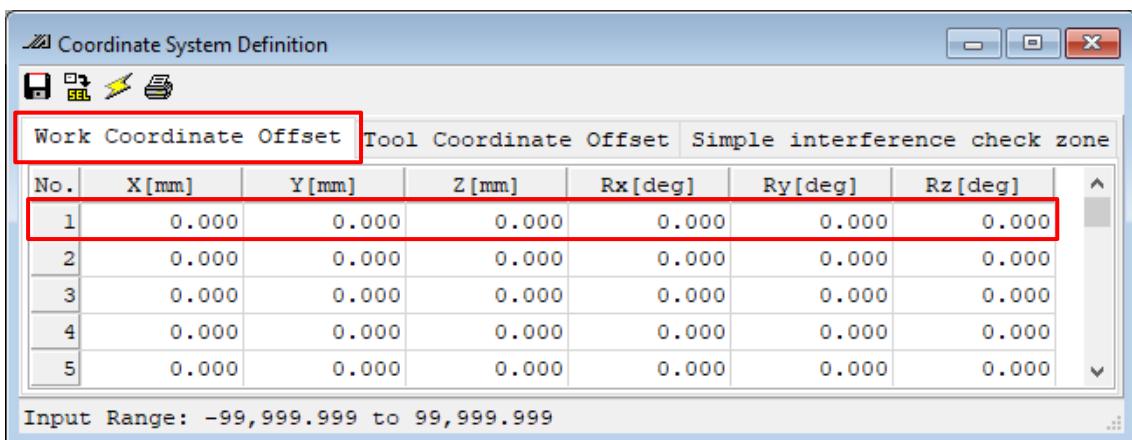
Position indicated movement commands should be executed with selecting a work coordinate system number to be used and Rect (Orthogonal) set in the position type.

Use SLWK Command when selecting a work coordinate system number in a SEL program.

Validity of the selected work coordinate system select number should be retained after rebooting the power.



Use the DFWK Command to set the work coordinate system offset amount in the SEL program.



[Example in SEL Program]

VEL	100	Velocity 100mm/s
ACC	0.3	Acceleration 0.3G
DCL	0.3	Deceleration 0.3G

SLWK	1	Selects Work Coordinate System No. 1
------	---	--------------------------------------

MOVP	1	Makes a drive in PTP operation to Position No. 1
MOVP	2	Makes a drive in PTP operation to Position No. 2

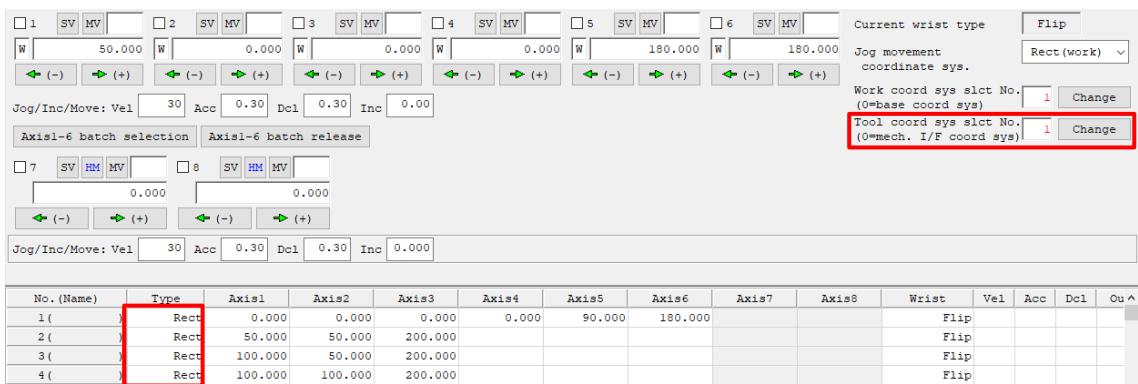
EXIT

(4) Tool Coordinate System

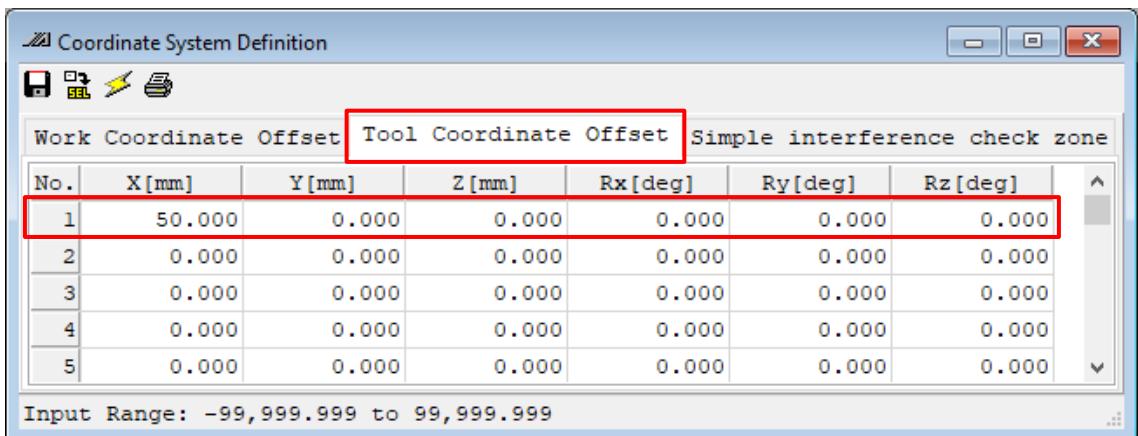
Position indicated movement commands should be executed with selecting a tool coordinate system number to be used and Rect (Orthogonal) set in the position type.

Use SLTL Command when selecting a tool coordinate system number in a SEL program.

Validity of the selected tool coordinate system select number should be retained after rebooting the power.



Use the DFTL Command to set the tool coordinate system offset amount in the SEL program.



[Example in SEL Program]

VEL 100 Velocity 100mm/s

ACC 0.3 Acceleration 0.3G

DCL 0.3 Deceleration 0.3G

SLTL 1 Selects Tool Coordinate System No. 1

SLWK 1 Selects Work Coordinate System No. 1

MOVP 1 Makes a drive in PTP operation to Position No. 1

MOVP 2 Makes a drive in PTP operation to Position No. 2

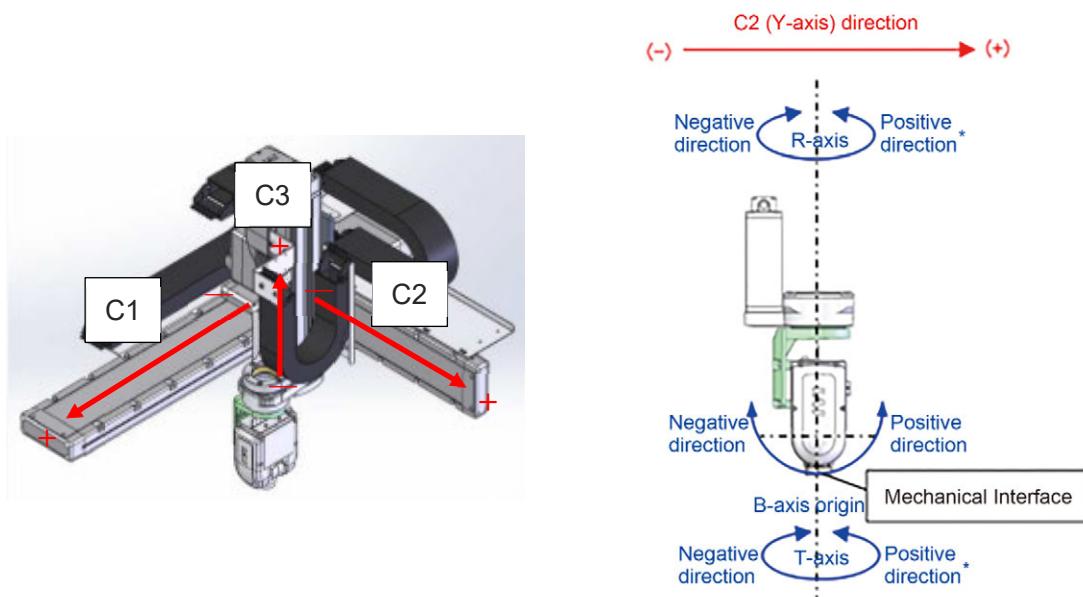
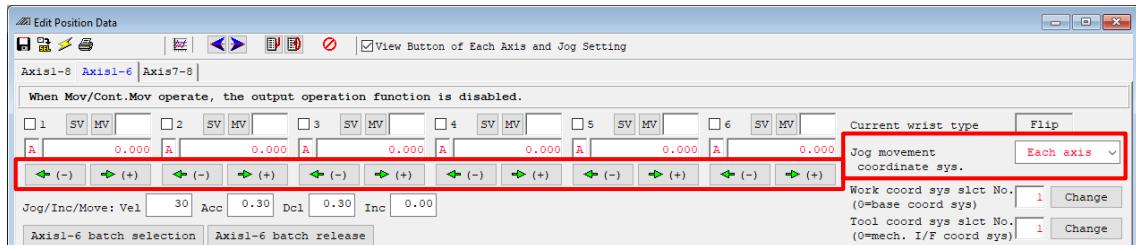
EXIT

7.2.8 Jog Movement

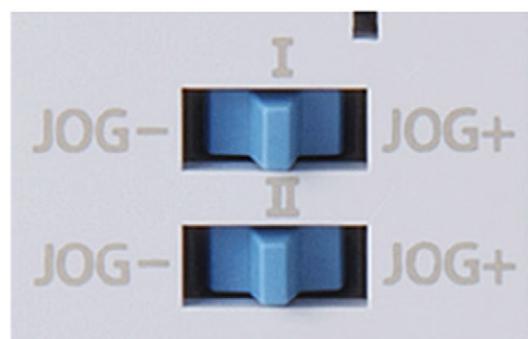
(1) Jog on Each Axis

Each axis should be operated individually in accordance with coordinate systems on each axis.

Axis1 should apply to C1-axis, Axis2 to C2-axis, Axis3 to C3-axis, Axis4 to R-axis, Axis5 to B-axis and Axis6 to T-axis.



Jog operations with the jog switches are the specific axis jog.



(2) Work Coordinate Jog

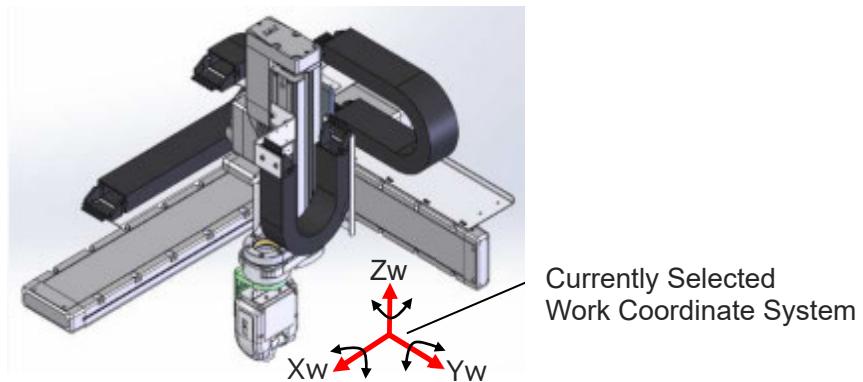
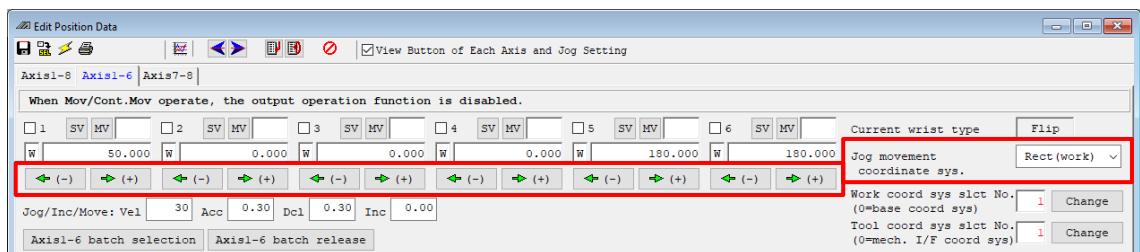
Pressing Axis1, Axis2 or Axis3 button should make a linear drive operation with the hand kept in the orientation in X-, Y- and Z-axes in the currently selected work coordinate system.

Axis1 should apply to the X direction while Axis2 to Y and Axis3 to the Z direction.

Pressing Axis4, Axis5 or Axis6 button should make a turn around the X-, Y- or Z-axis to change the orientation of the hand. The tip position should be fixed.

Axis4 should apply to the Rx direction while Axis5 to Ry and Axis6 to the Rz direction.

- * Drive operation should be made on the base coordinate system if the work coordinate system currently selected is 0.



(3) Tool Coordinate Jog

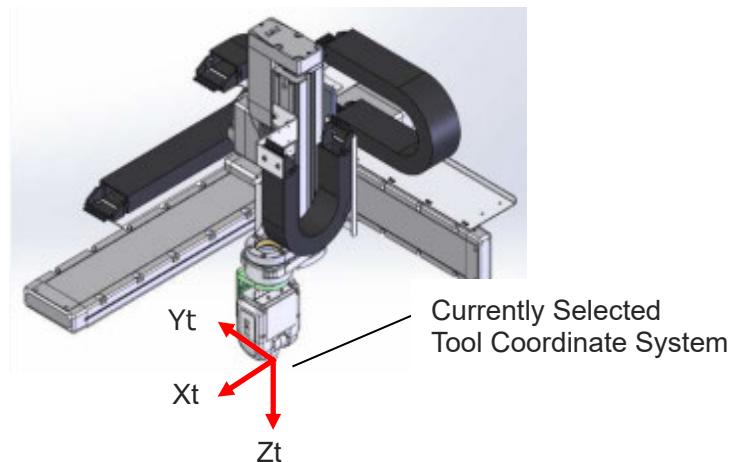
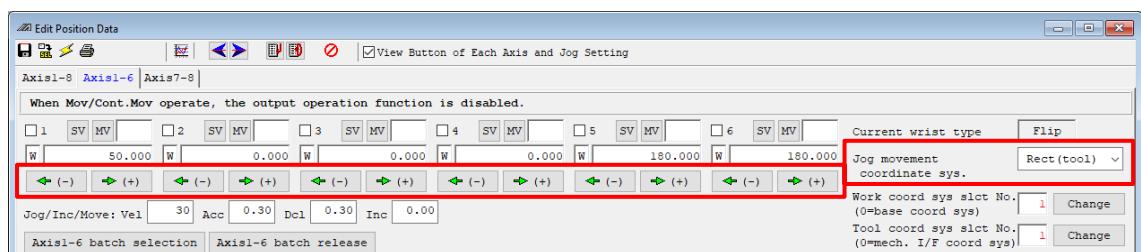
Pressing Axis1, Axis2 or Axis3 button should make a linear drive operation to the back and forth, right and left, and up and down directions on the currently selected tool coordinate system with the orientation of the hand being kept.

Axis1 should apply to the X direction while Axis2 to Y and Axis3 to the Z direction.

Pressing Axis4, Axis5 or Axis6 button should make a turn around the X-, Y- or Z-axis to change the orientation of the hand. The tip position should be fixed. However, it is necessary to set up the offset properly in the tool coordinate system definition data.

Axis4 should apply to the Rx direction while Axis5 to Ry and Axis6 to the Rz direction.

- * Drive operation should be made on the mechanical interface coordinate system if the tool coordinate system currently selected is 0.

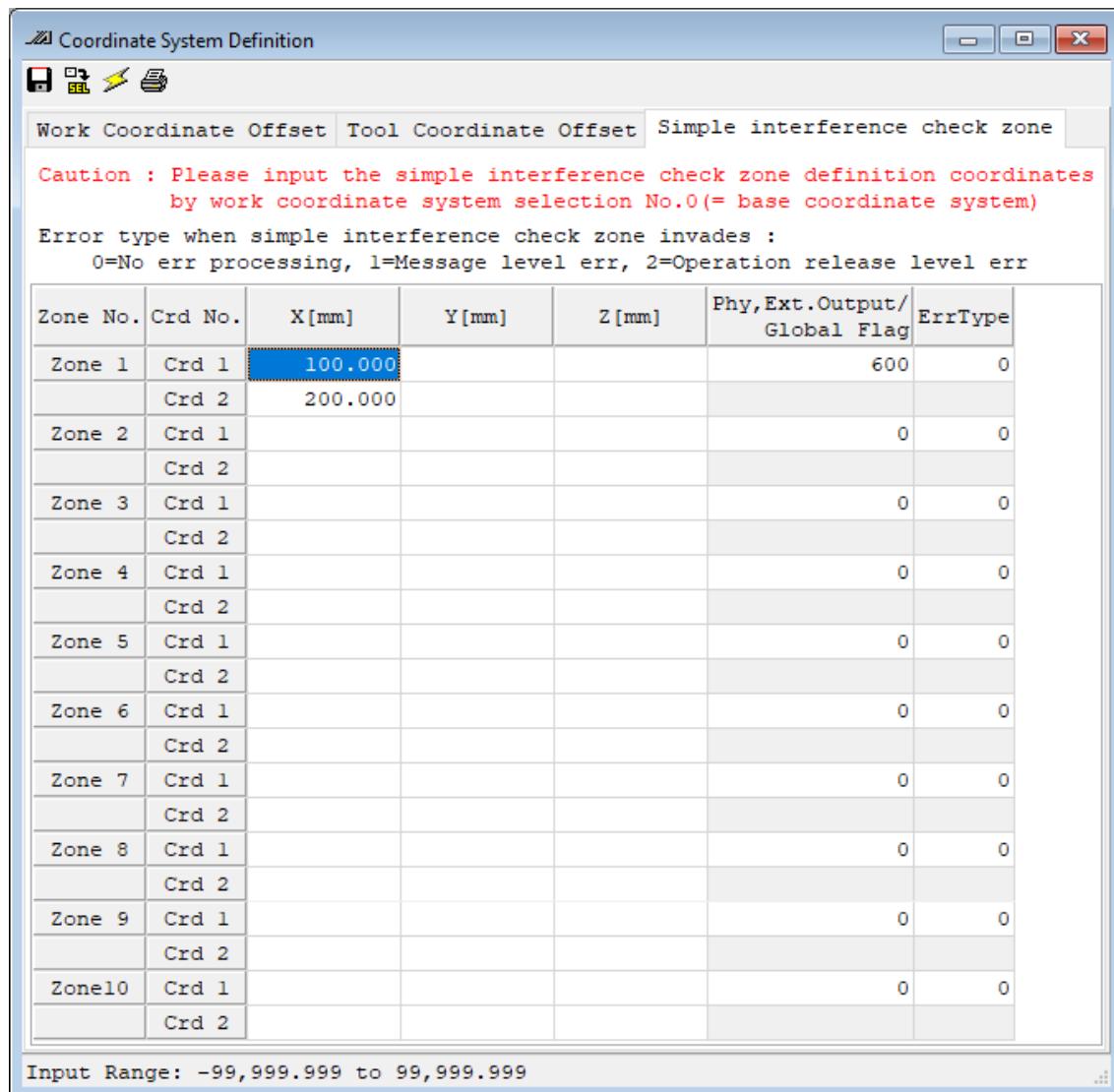


7.2.9 Simple contact check zone

It is a feature to prevent interfere with external output or error output when a tool tip (the center of the flange face when Tool Coordinate System No. 0 is selected) gets into the simple contact check zone.

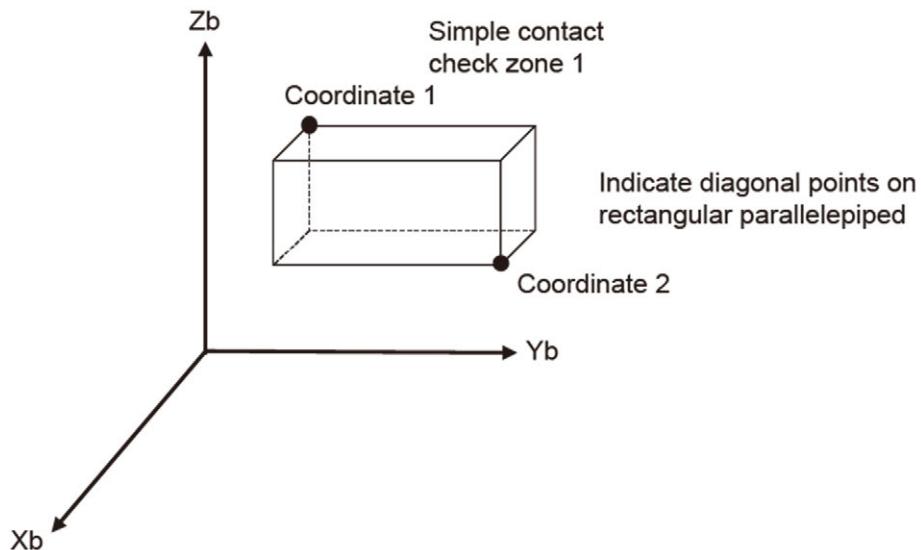
Approach of anything else other than the tool tip should not be detected.

Shown below is the data format.



- X, Y, Z

Set Coordinate 1 and Coordinate 2 with values that configure diagonal points on a rectangular parallelepiped in the base coordinate system.



- Output port/Global flag No.

Set a value in ranges of 300 ~ 599 / 4000 ~ 6999 / 600 ~ 899.

With it is set with a number, it turns on while the 6-axis cartesian robot tool tip is in the zone and off when out of the zone.

* It is not available to indicate a number duplicated with the system output port or flag number (output feature select, zone, etc.).

- Error Type

0 = No error setup during approach

1 = Message level error during approach

2 = Operation cancelation level error during approach

Set one from above.

DFIF, SOIF, SEIF or GTIF Command is to be used when the simple contact check zone is to be operated in a SEL program. Refer to SEL Language Programming Manual (ME0224) for the detail of languages.

- Caution
 - As the operation cancelation level error during approach starts deceleration and stop at the timing of the tooling tip getting into the simple contact check zone, the actual position of the robot stop should be in the zone. It is recommended to have the range of the zone set relatively large considering the tool size and the distance for deceleration and stop.
 - The simple contact check zone activates after the absolute coordinate being confirmed. Note that the contact check would not be performed with the absolute coordinate unconfirmed.
 - The frequency of approach monitoring should be every 5ms. Detection may not work unless the tip stays in the zone for 5ms or more. It is recommended to have the range of the zone set relatively large considering the tool size and the non-detected duration. It may take 5ms before the setting change reflected for the simple contact check zone. It is recommended to have the setting change of the simple contact check zone while the robot is paused.
 - The tool tip to conduct the approach monitoring should be determined by the tool coordinate system definition data and the tool coordinate system number currently selected. It is necessary to establish the settings in the tool coordinate system definition data and the tool coordinate system number currently selected.

7.2.10 Restriction

- When the orthogonal coordinate system features in the 6-axis cartesian robot are to be used, operation cannot be recovered from the emergency stop or a stop with the enable switch. If 2 is set in the following parameters, 643 "Emergency Stop / Enable SW Recovery Type Parameter Error" should occur. Set a value other than 2.

■ Other Parameter

No.	Parameter name	Default value	Input range	Unit	Remarks
10	Emergency-stop recovery type	0	0 to 4		0: Abort operations/programs 1: Recovery after reset 2: Operation continued (Only during automatic operation.) 3: Abort operations/programs (Software reset when the emergency stop is reset. The home-return completion status of incremental-encoder axes will be reset (EG approximation swap).) 4: Abort operations/programs (Error reset (only with an error of operation-cancellation level or lower) and auto-start program start)
11	Enable switch (deadman/enable switch) recovery type	0	0 to 2		0: Abort operations/programs 1: Recovery after reset 2: Operation continued (Only during automatic operation.)

- When the orthogonal coordinate system features of the are used, the axes constructing the 6-axis cartesian robot cannot use the multi slider over approach detection feature. 625 "Multi Slider Parameter Error" should occur. Set the following parameter to the setting in 0H.

■ Axis Parameters

No.	Parameter name	Default value	Input range	Unit	Remarks
41	Target axis specification for multiple-slider near-miss detection	0H	0H to FFFFFFFFH		Bits 0 to 3: Mating axis number of near-miss detection target (on the positive side of the coordinate system of the target axis) Bits 4 to 7: Mating axis number of near-miss detection target (on the negative side of the coordinate system of the target axis)

- Drive with the orthogonal coordinate system being indicated is available only to an individual 6-axis cartesian robot.

In case of operating an 6-axis cartesian robot and an added axis in parallel, it is necessary to;

(i) indicate the specific axis coordinate system and operate, or

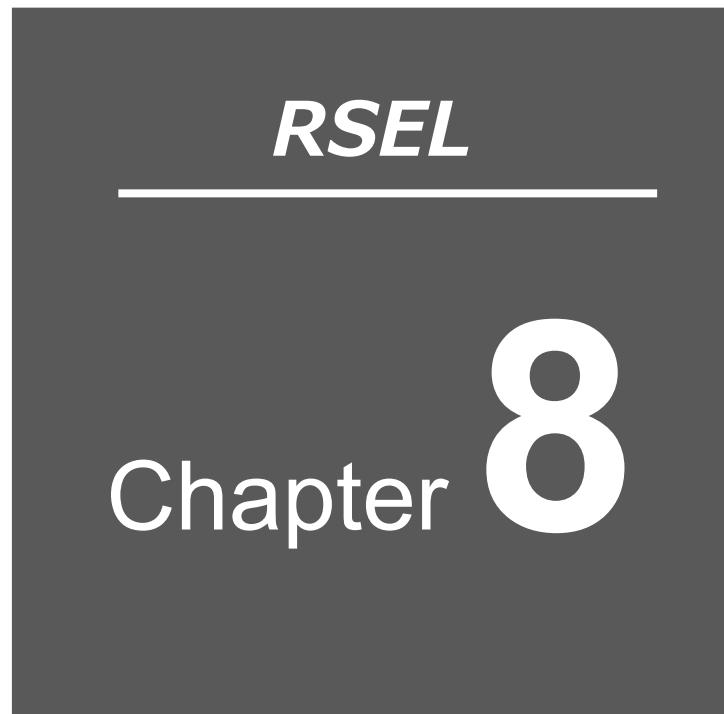
(ii) operate the added axis in another SEL program than the operation program for the 6-axis cartesian robot.

- When the orthogonal coordinate system features in the 6-axis cartesian robot are to be used, the rotary axis index mode cannot be used on the axes constructing the 6-axis cartesian robot.
- The zone features (Axis Parameters No 21 to 32) perform monitoring on the current position in the specific axis coordinate system.
- The vision system I/F features should read in the work position coordinates as the specific axis coordinate system position data. They would not be read in as the orthogonal coordinate system position data.
- When the orthogonal coordinate system features in the 6-axis cartesian robot are to be used, do not attempt to change the following parameters on the constructing axes from the settings at the delivery from factory.

■ Driver Unit Parameter

No.	Name	Unit	Input range	Default initial value setting
5	Homing direction	–	0: Reverse, 1: Forward	In accordance with actuator
22	Homing offset	mm (deg)	0.00 to 9,999.99	In accordance with actuator

- When the orthogonal coordinate system features in the 6-axis cartesian robot are to be used, synchronizing features cannot be used on the axes constructing the 6-axis cartesian robot.



Home Return / Absolute Reset

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8.1 Home-Return / Absolute Reset for Single-axis

There are three types for the encoder to measure the current position of the actuator.

- 1) For Incremental Type, it is necessary to conduct home-return operation when the power is turned on.
- 2) For Battery-less Absolute Type, it is necessary to absolute reset (home-return operation) only when in motor replacement and in an occurrence of an absolute error.
- 3) The coordinate data is retained in the battery backup for Simple Absolute Type. Even though it is not necessary to performance a home-return operation each time, it is necessary to have an absolute reset (home-return operation) conducted in the first time to start up the system or after replacing the battery.

Encoder Type	Mounted Actuator Series	Timing to Have Home-Return and Absolute Reset		Driver Unit Parameter No.83	Section to Pick Up
		Home-Return	Absolute Reset		
Incremental	RCP2 to 4, RCA, RCA2, RCD, RCS2 to 3, ISA, ISB, SSPA, FS, RS, NS, NSA (Linear, rotary axis and grippers)	When power is turned on	–	0	8.1.1 8.1.4
Battery-less Absolute	RCP5 to 6, RCA, RCS2 to 4, ISB, NSA (Linear, rotary axis and grippers)	–	•At motor replacement •When absolute error generated	1	8.1.2 8.1.4
Simple Absolute	RCP2 to 4, RCA, RCA2 (Linear, rotary axis and grippers)	–	•At initial startup •When the power to the RSEL system is turned OFF and battery is replaced •When the encoder cable is taken off the driver unit	1	8.1.3 8.1.4

Described below is the procedure for each.

(In this manual, states the procedure for the PC software. For how to treat and process on a teaching pendant, refer to an instruction manual for each product)

8.1.1 Incremental Specification

In the incremental specification, it is necessary to perform home return operation when the power is turned on.

The operation of home return is the same as the absolute reset of the battery-less absolute specification and simple absolute specification.

Refer to 8.1.4 for the operation method.

8.1.2 Battery-less absolute specification

The battery-less absolute specification retains the encoder position information even when the power is turned off. Therefore, there is no need to perform home return every time at startup.

For the battery-less absolute specification, it is necessary to perform absolute reset and register the origin in the following cases (1) and (2).

- (1) When replacing motor
- (2) When absolute error occurs

Absolute reset is performed by home return operation. Refer to 8.1.4 for the operation method.

8.1.3 Simple absolute specification

The simple absolute specification retains the encoder position information even when the power is turned off with the battery of the simple absolute unit. Therefore, there is no need to perform home return every time at startup.

For the Simple absolute specification, it is necessary to perform absolute reset and register the origin in the following cases (1) to (3).

- (1) Initial startup
- (2) When the power of RSEL system is turned off and the battery of the simple absolute unit is replaced
- (3) When the motor/encoder cable is removed from the simple absolute unit

Absolute reset is performed by home return operation. Refer to 8.1.4 for the operation method.

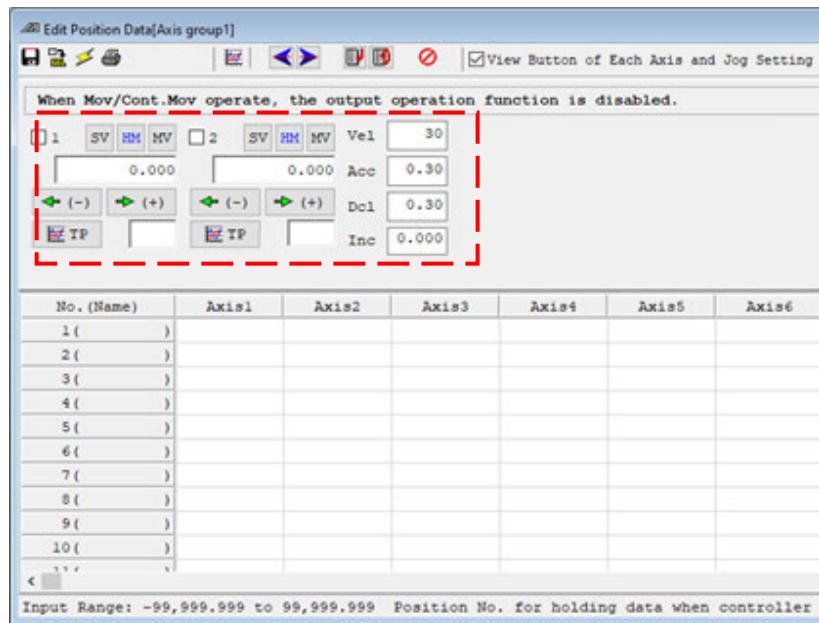
- * For an axis connected with the simple absolute unit and used in the simple absolute type, change the driver unit parameter No. 83 "Absolute unit" to "1".
For details, refer to "4.4.6 Parameter Setting When Simple Absolute Unit Used".

8.1.4 Absolute Reset (Home Return) Procedure

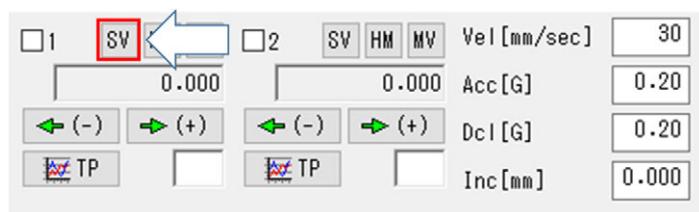
Absolute reset is performed by home return operation. (The following is for the first axis)

(1) For PC software

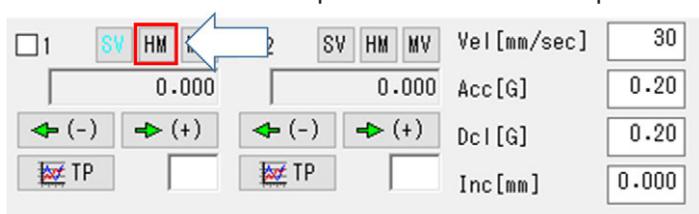
- 1) Connects PC software
- 2) If an error has occurred, reset the error
- 3) Open the position data edit window



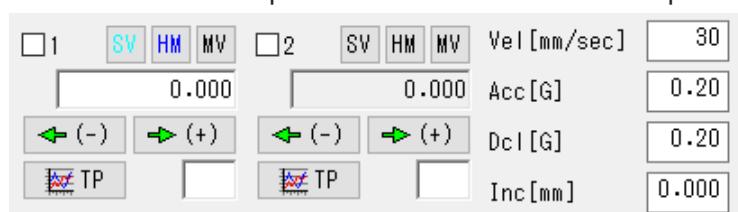
- 4) Press the "SV" button to turn on the servo



- 5) Press the "HM" button to perform home return operation

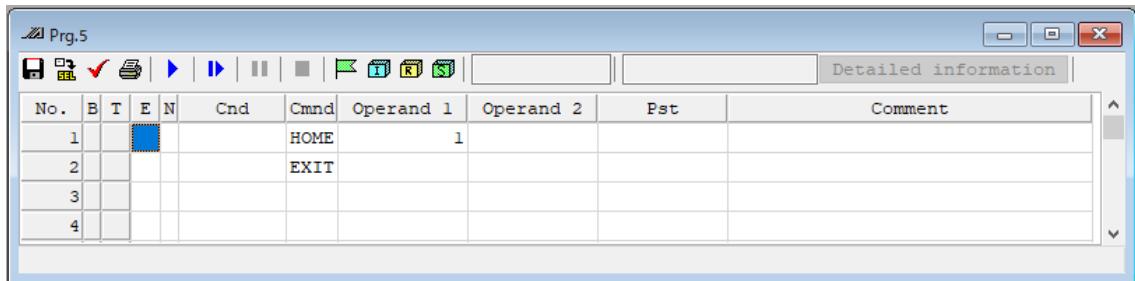


- 6) Absolute reset is completed when home return is completed.



(2) For SEL program

- Specify the first axis with the HOME command.



- Absolute reset is completed when the HOME command is completed.

8.2 Procedures for Wrist Unit Absolute Reset

This manual describes the procedure on the dedicated window of the PC software. For the teaching pendant procedure, refer to each instruction manual.

8.2.1 Preparation

- What you need for absolute reset
- Jig for Absolute Reset

Model Number : For S Type JG-WUS

For M Type JG-WUM

(Note) The model numbers stated above are those that an absolute reset jig, screws and pins come in a set.

- Jig for Absolute Reset (in common for S Type and M Type)
- Bolt Size S : Hexagonal Socket Head Bolt, M6 × 6, 1 piece
Size M : Hexagonal Socket Head Bolt, M6 × 10, 1 piece
- Pin Size S : φ4 B Type Parallel Pin, Length 40mm, 1 piece
φ3 B Type Parallel Pin, Length 40mm, 2 pieces
Size M : φ4 B Type Parallel Pin, Length 40mm, 3 pieces



Figure 8.2-1 Jig for Absolute Reset for wrist unit S / M

- Parameter backup

Back up the parameters before executing.

Select the following menu and save the parameters to a file.

<Menu>

“Parameter” → “Edit” → “Save file as”

8.2.2 B, T axis

- 1) Please select the following menu.

<Menu>

“Controller” → “Abs. Encoder Reset”

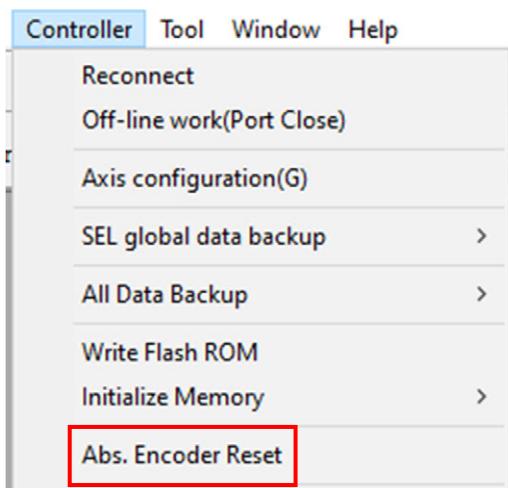


Figure 8.2-2 Menu selection

- 2) A warning message will be displayed. Confirm it and click “OK” and “Yes”.

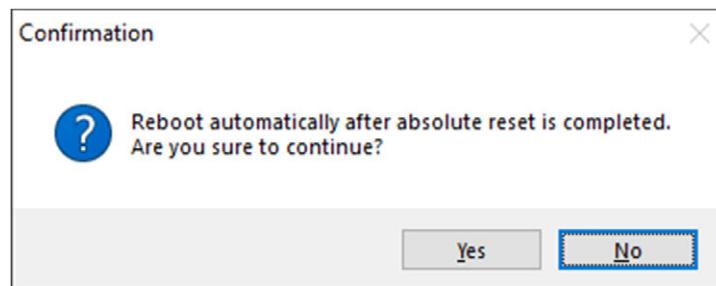
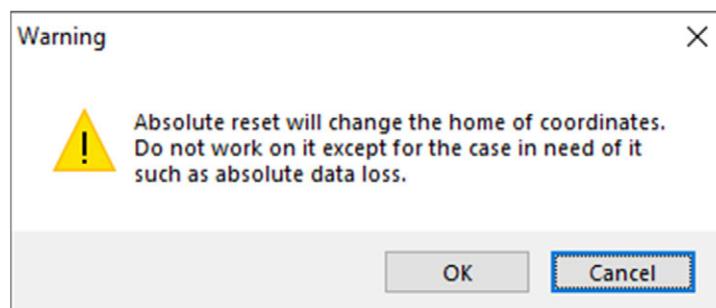


Figure 8.2-3 Warning message

- 3) Select the "Wrist Unit" tab, and select the Axis Group No. and Axis No. of the B-Axis for performing the absolute reset.

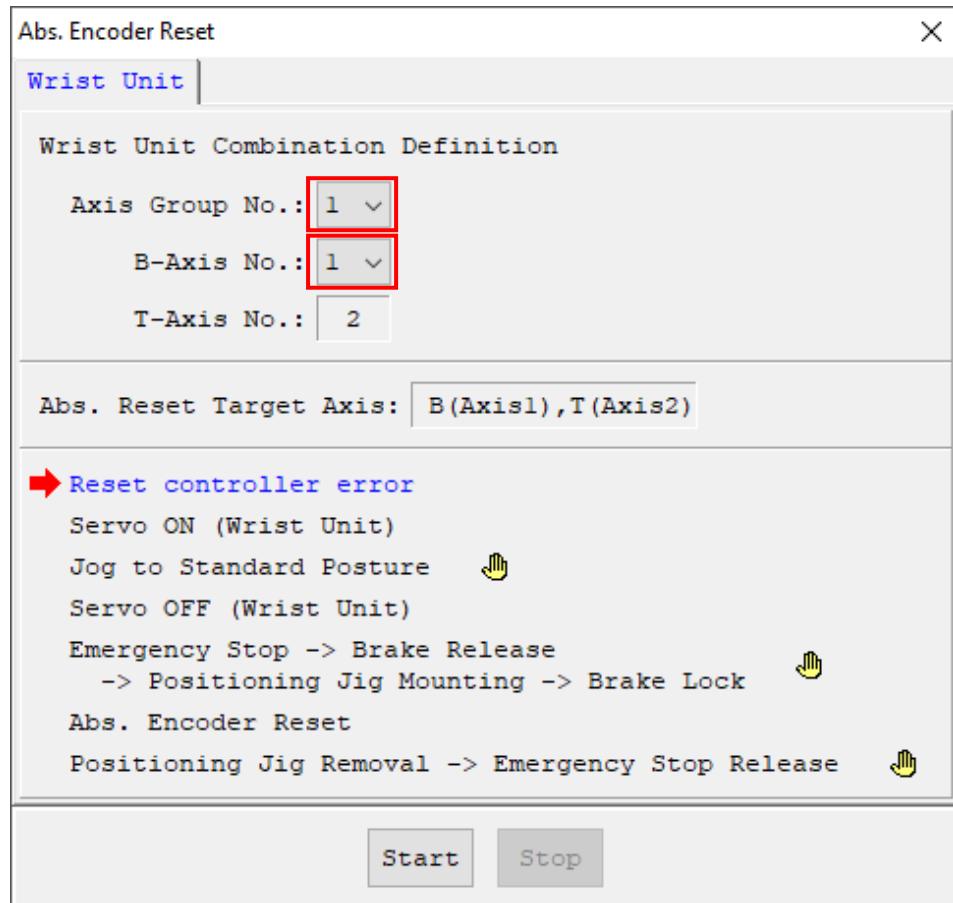


Figure 8.2-4 Abs. Encoder Reset window (Wrist Unit)

* Axis group No. selection is displayed only when axis group No. 2 is valid.

- 4) When you click "Start", a warning message will be displayed. Check it and click "Yes".

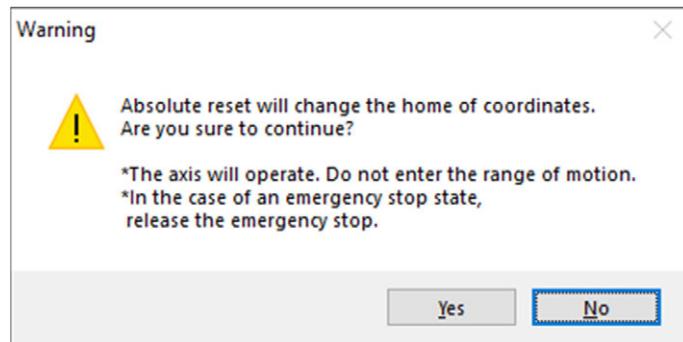


Figure 8.2-5 Warning message

- 5) The "Jog to Standard Posture" screen is displayed. Click " \leftarrow (-)" and " \rightarrow (+)" to move the B and T axes closer to the reference posture. Refer to Fig. 8.2-7 for the standard posture of the B and T axes. Also, change "Vel" and "Inc" as necessary. Click "OK" when it is near the standard posture. To manually approach the standard posture, just click "OK".

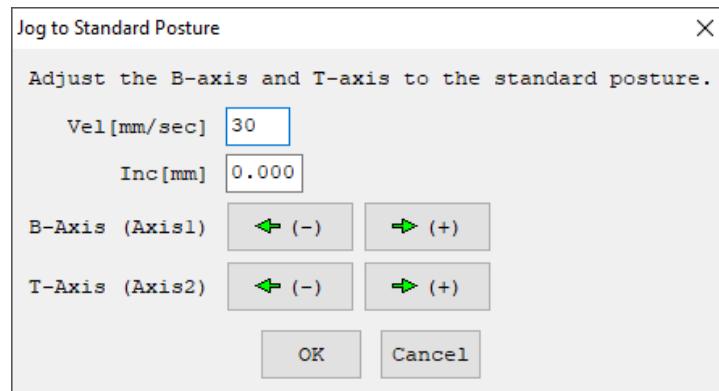


Figure 8.2-6 "Jog to Standard Posture" window

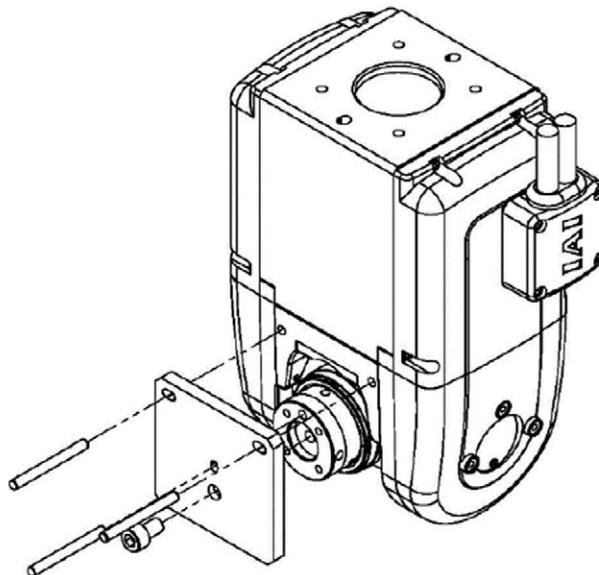


Figure 8.2-7 Wrist unit S / M standard posture

- 6) Perform emergency stop and brake release, and mount the jig for absolute reset in the standard posture of the B and T axes. Lock the brake with the jig for absolute reset attached, and click “OK” on the confirmation window.

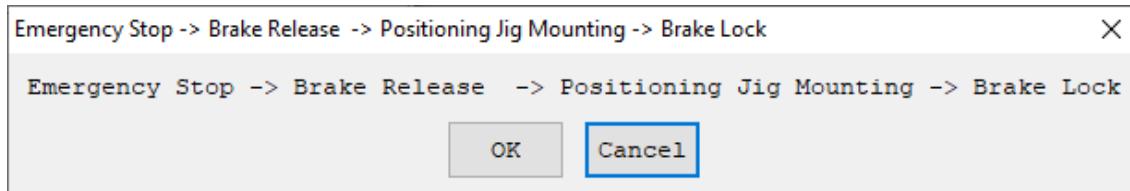


Figure 8.2-8 Confirmation window

- 7) Remove the jig for absolute reset. Release the emergency stop with the jig for absolute reset removed, and click “OK” on the confirmation window.

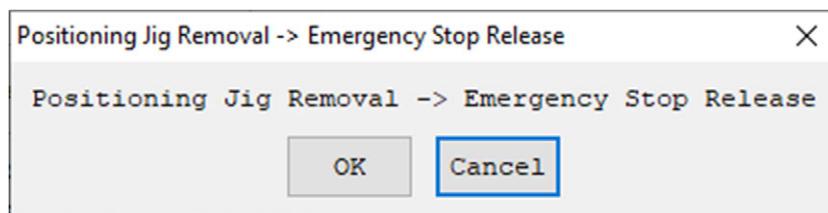


Figure 8.2-9 Confirmation window

- 8) Close the absolute reset window. Software reset is performed automatically when the absolute reset screen is closed.

8.3 Procedures for 6-axis Cartesian Robot Absolute Reset

8.3.1 Preparation

Refer to 8.2.1.

8.3.2 X, Y, Z axis

- 1) Please select the following menu.

<Menu>

“Controller” → “Abs. Encoder Reset”

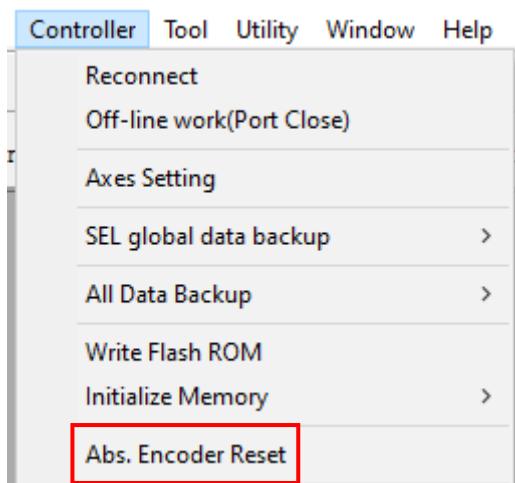


Figure 8.3-1 Menu selection

- 2) A warning message will be displayed. Confirm it and click “OK” and “Yes”.

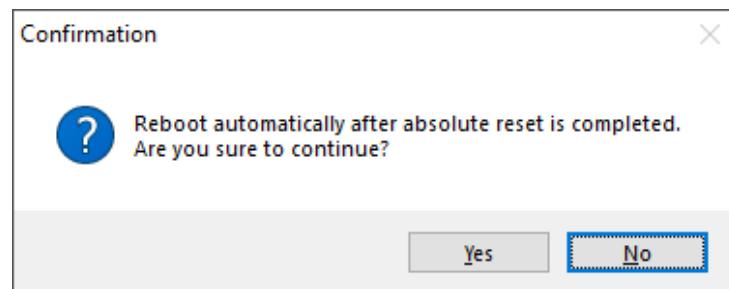
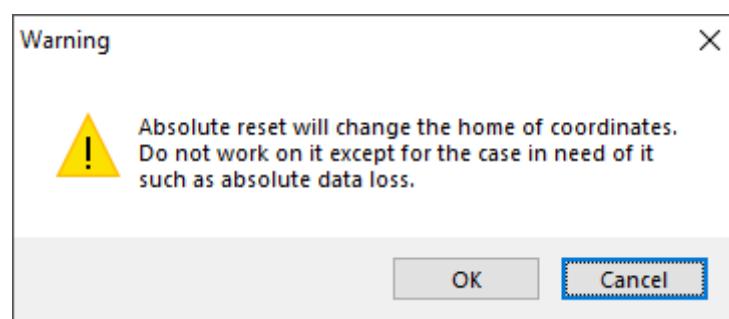


Figure 8.3-2 Warning message

- 3) Select "Z, Y, Z, R" tab, and set the absolute reset target axis to either of X-, Y- or Z-axis.

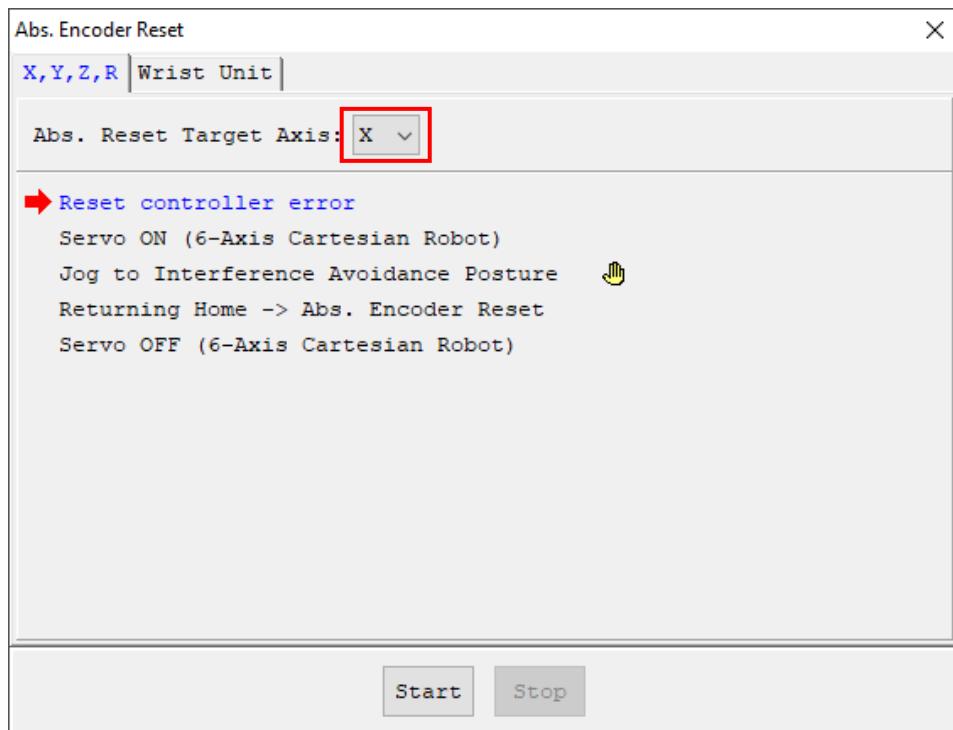


Figure 8.3-3 Abs. Encoder Reset window (6-axis Cartesian Robot)

- 4) When you click "Start", a warning message will be displayed. Check it and click "Yes".

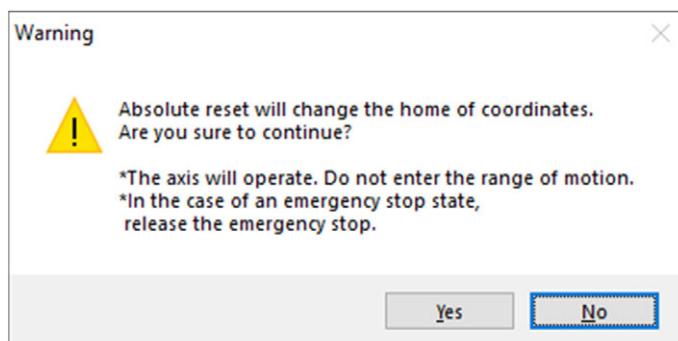


Figure 8.3-4 Warning message

- 5) “Jog to Interference Avoidance Posture” window comes up. Click “← (-)” or “→ (+)” to move to the position / posture that would not cause interference at home-return operation. Change “Vel” and “Inc” as necessary. Click “OK” when it is near the standard posture. Once the setup of the position / posture to avoid interference, click “OK”.

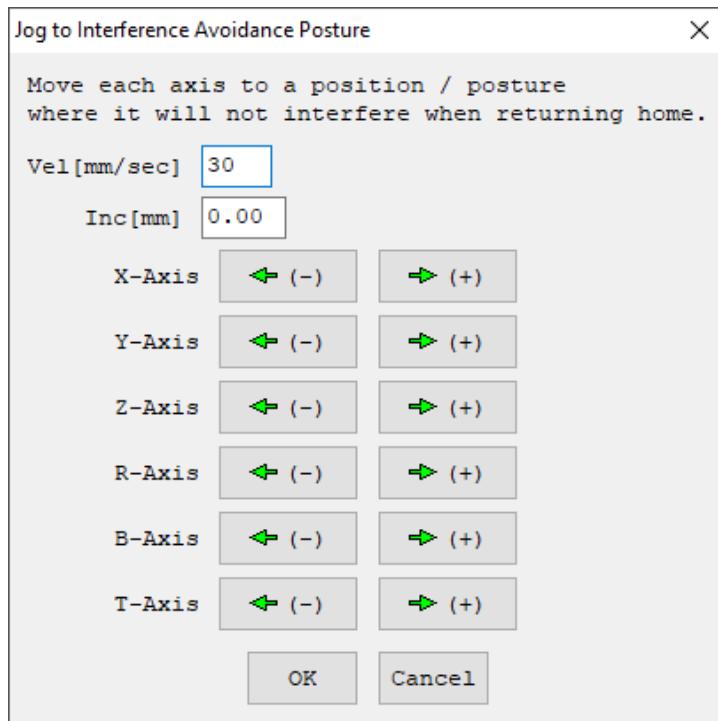


Figure 8.3-5 “Jog to Interference Avoidance Posture” window

- 6) Home-return operation of the axis target for the absolute reset should start. Once the home-return operation is finished, the absolute reset should complete.
- 7) If it is required to have the absolute reset conducted on the rest of X-, Y- and Z-axes, repeat the process from 3). If the absolute reset is required on other axes, proceed to 8.3.3 or 8.3.4. Close the absolute reset window if no more required. The software reset should automatically start once the absolute reset window gets closed.

8.3.3 R axis

(1) 1,2kg Payload Type

- 1) Select "Z, Y, Z, R" tab, and set the absolute reset target axis to R-axis.



Figure 8.3-6 Abs. Encoder Reset window (6-axis Cartesian Robot)

- 2) When you click "Start", a warning message will be displayed. Check it and click "Yes".

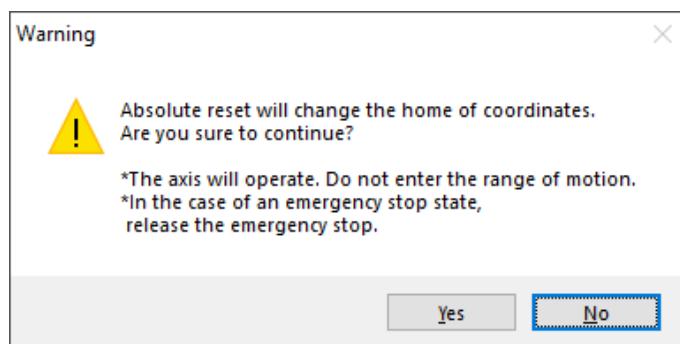


Figure 8.3-7 Warning message

- 3) “Jog to Interference Avoidance Posture” window comes up. Click “← (-)” or “→ (+)” to move to the position / posture that would not cause interference at home-return operation. Change “Vel” and “Inc” as necessary. Click “OK” when it is near the standard posture. Once the setup of the position / posture to avoid interference, click “OK”.

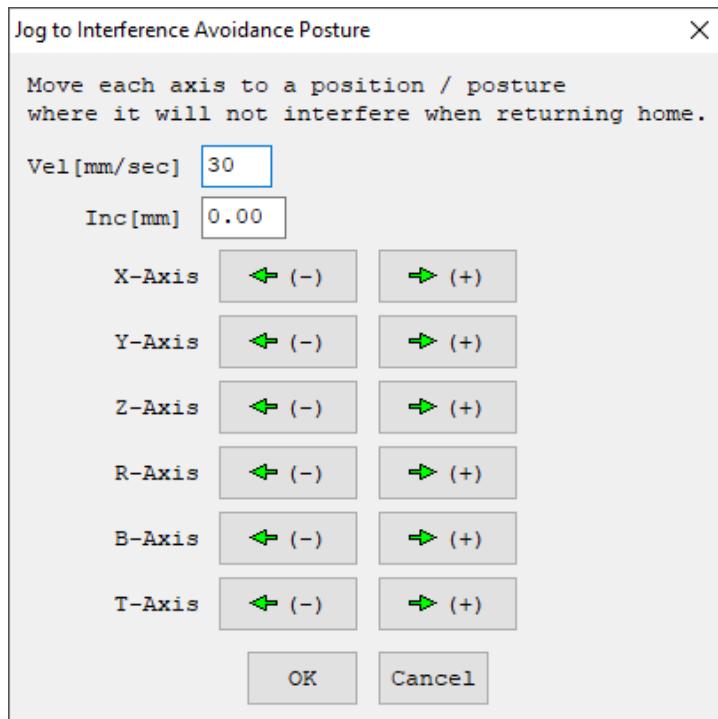


Figure 8.3-8 “Jog to Interference Avoidance Posture” window

- 4) Conduct emergency stop and brake release, and approach near the standard posture of the R-axis. Refer to Figure 8.3-10 for the standard posture of the R-axis. Attach the stopper bolt at the standard posture (Figure 8.3-11). With the stopper bolt being applied, conduct the brake lock and release the emergency stop, and click “OK” in the confirmation window.

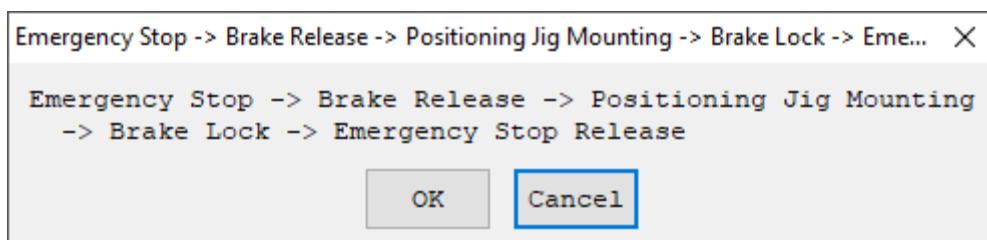


Figure 8.3-9 Confirmation window

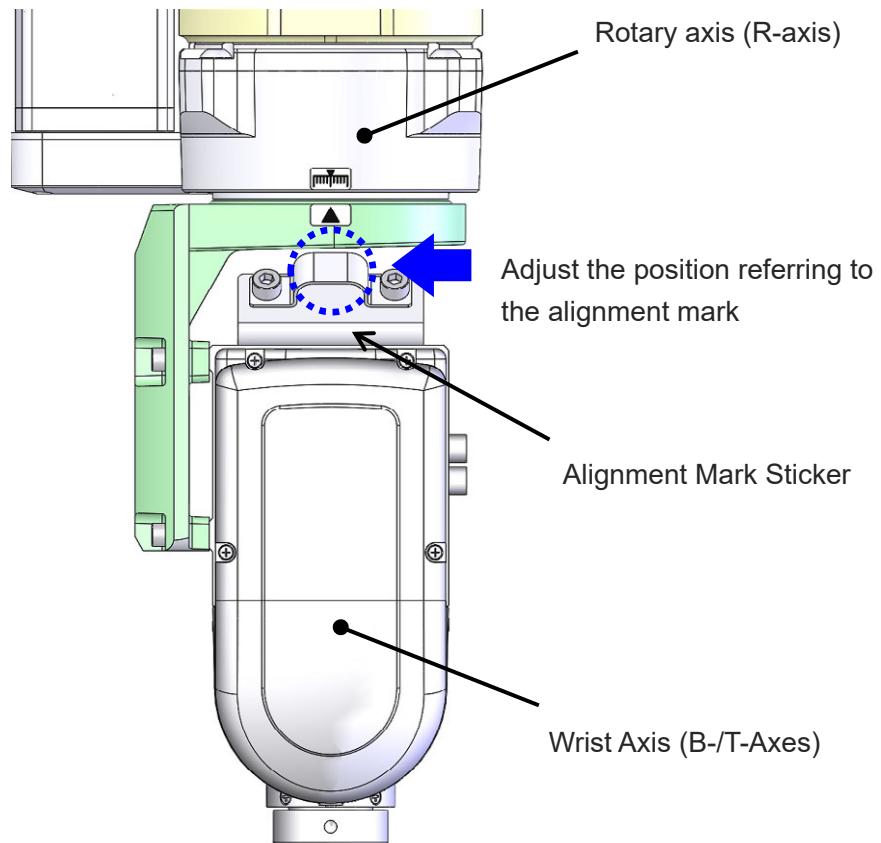


Figure 8.3-10 R-Axis Standard Posture

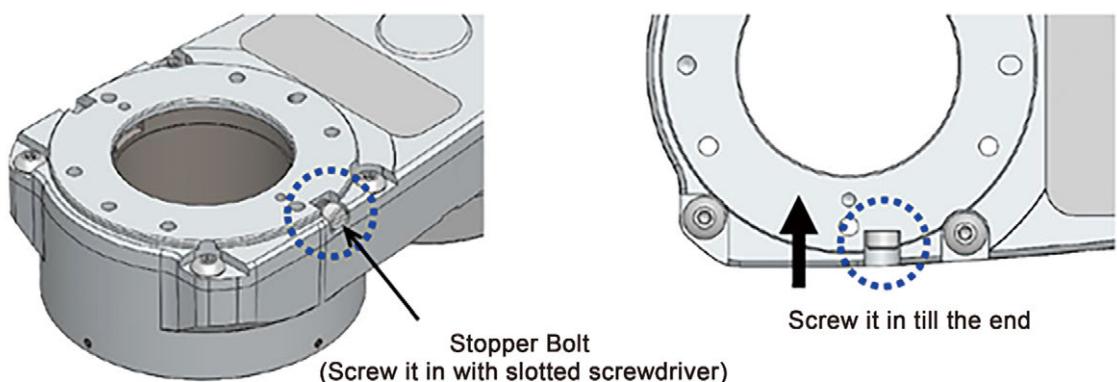


Figure 8.3-11 R-axis Stopper Bolt Attached

- 5) Click “OK” and the home-return operation of the R-axis should start. Once the home-return operation is finished, the absolute reset should complete.
- 6) Have the emergency stop conducted and take the stopper bolt off (Figure 8.3-13). With the stopper bolt taken off, release the emergency stop and click “OK” in the confirmation window.

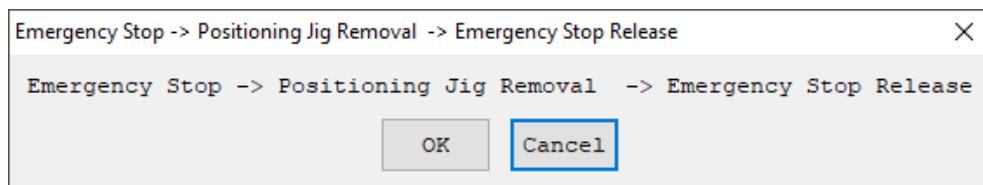


Figure 8.3-12 Confirmation window

**Reference for Position
Align the head face of
the stopper bolt to the
edge of the unit.**

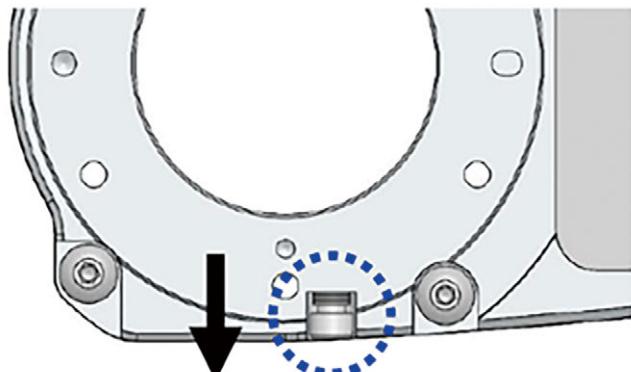


Figure 8.3-13 R-axis Stopper Bolt Removed

- 7) If the absolute reset is required on other axes, proceed to 8.3.2 or 8.3.4 Close the absolute reset window if no more required. The software reset should automatically start once the absolute reset window gets closed.

8.3.4 B, T axis

Refer to 8.2.2 3) and later.

The process is the same as 8.2.2 3) and later, but the window in the figure below is slightly different from 8.2.2 3) and later.

There is no selection of the axis number in Figure 8.3-14.

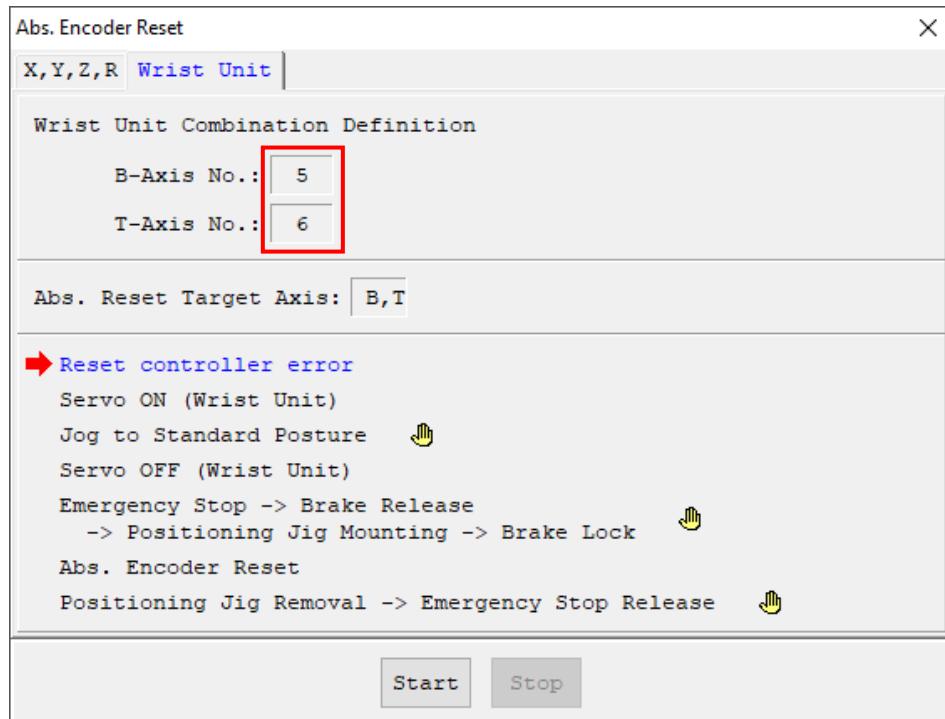


Figure 8.3-14 Abs. Encoder Reset window (6-axis Cartesian Robot)

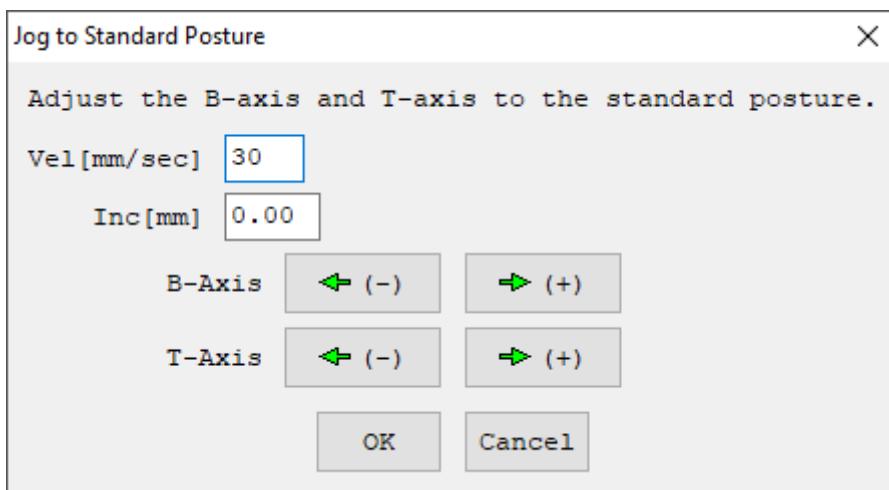
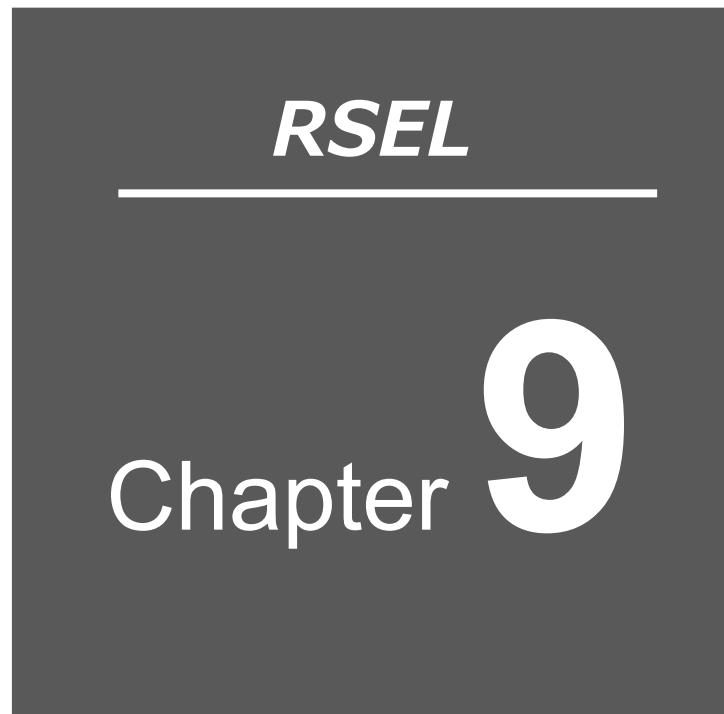


Figure 8.3-15 "Jog to Standard Posture" window



Special Functions

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9.1 Multi-Slider Excess Approaching Detection (Collision Prevention) Feature

It is a feature to prevent the multi-sliders from colliding to each other when they are used in the jog operation or position operation. Excess approaching of the multi-sliders can be detected by establishing the parameter settings.

An error should be generated and the sliders should decelerate and stop when the approaching distance between the first axis and the second axis gets to the distance that violates the minimum distance between sliders ^(Note 1) and further more the distance that violates the multi-slider actual position excess approaching detection margin / command position excess approaching margin as shown in the figure below. The servo should be turned off after the stop.

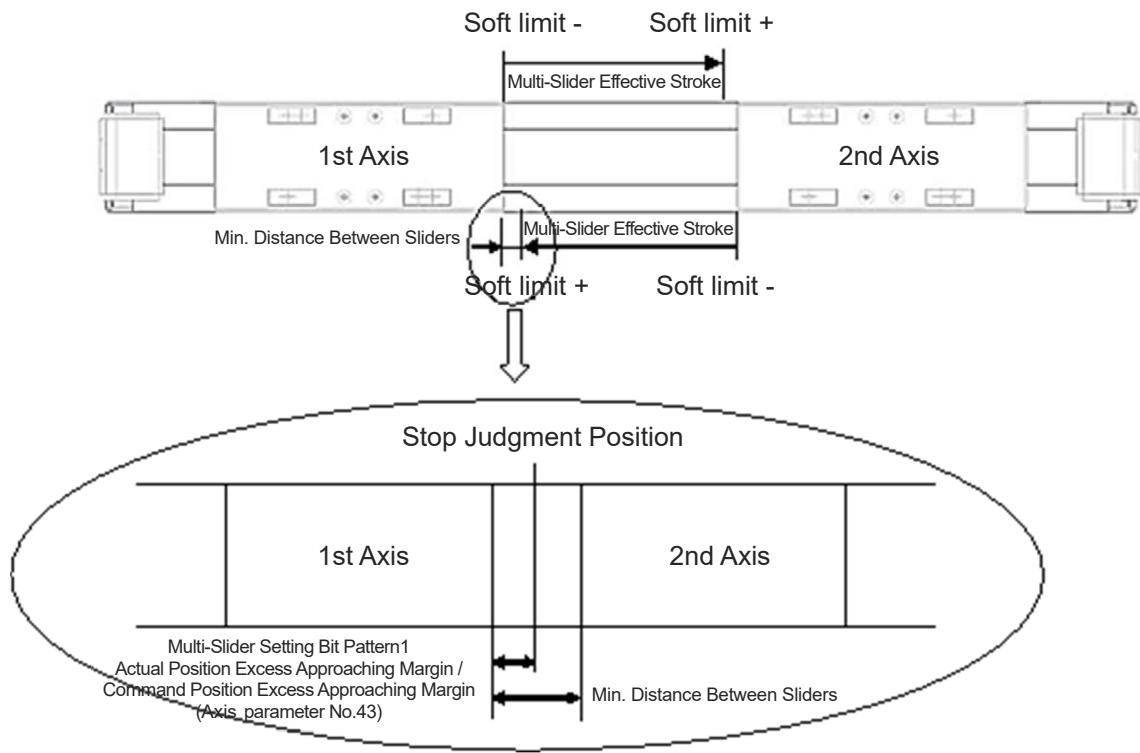
Note 1: It is the distance the sliders approach to each other the most.

[It is described in the appearance drawing of the multi-slider type in the instruction manual and catalog.]

- (Note) Get out of the approaching point with using e.g. jog after the excess approaching is detected. (Jog operation towards the direction to get out should be available)
- (Note) The multi-slider excess approaching (collision prevention) feature should activate after the coordinates of both of the target axes (mutual axes) are confirmed. This feature should get disabled in such cases of an error related to an encoder being occurred or in the condition that the home-return operation incomplete for the incremental encoder type.

[Error contents]

Error No.	Name	Content
No.481	Multi-Slider Excess Approaching Error	When it is judged performing a stop is not feasible within the minimum distance between the multi-sliders and further more within the distance approaching to the multi-slider command position excess approaching detection margin if an emergency stop is made in the excess approaching by issuing a movement command
		When the approaching distance between the first axis and the second axis after movement figured out from the current position violates the minimum distance between sliders and further more it approaches the multi-slider actual position excess approach detection margin



9.1.1 Setting Method

Establish the RSEL axis settings.

This operation should set the multi-slider excess approach detection feature enabled.
(Axis Parameter No.41 Multiple Slider Excess Approach Detection Target Axis Indication)

9.1.2 Related Parameter

The following parameters are the related parameters. There is no need of changing the initial parameters set at delivery.

- [1] Emergency Deceleration Margin at Multi-Slider Over Approach : Axis parameter No. 42
Judgment should be made with this margin added to the deceleration in the judgment whether stop is available within the multi-slider command position excess approaching detection margin if an emergency stop is with excess approaching by issuing a movement command.
This is valid only in the parameter on the master axis of the multi-sliders (The smaller axis number).
 - Initial setting : 0.05G
- [2] Multi-Slider Setting Bit Pattern 1 : Axis parameter No. 43
 - (1) Bits 0-3: Multi-slider actual position over approach detection margin (mm)
It is used for judgment of the multi-slider actual position excess approaching error. An error should be generated when approach was made for the distance set from the minimum distance between sliders.
It is necessary to establish the setting of distance shorter than the minimum distance between sliders.
This is valid only in the parameter on the master axis of the multi-sliders (The smaller axis number).
 - Initial setting : 2mm
 - (2) Bits 4-7: Multi-slider commanded position over approach detection margin (mm)
It is used for judgment for the multi-slider command position excess approaching error. It should generate an error when judgment is made that it cannot be stopped before approaching from the minimum distance between sliders further to the set distance.
It is necessary to establish the setting of distance shorter than the minimum distance between sliders.
This is valid only in the parameter on the master axis of the multi-sliders (The smaller axis number).
 - Initial setting : 1mm
- [3] Multi-Slider Effective Stroke Driver Unit Parameter No. 105
This means a position where Distance between sliders at the furthest ends [mm] - Distance between sliders at the closest position, and the setting is established to the most optimum at delivery.
Set it lower and an error should be generated with sliders at further positions.

Related parameter

No.	Parameter name	Initial setting (Reference)	Input range	Unit	Remarks
41	Axis Select for Appliance of Multi-Slider Over Approach Detection	0H	0H to FFFFFFFFH		<p>Bits 0 to 3: Mating axis number to apply over approach detection (self-axis coordinate positive movement side)</p> <p>Bits 4 to 7: Mating axis number to apply over approach detection (self-axis coordinate negative movement side)</p> <ul style="list-style-type: none"> * Necessity of mutual input with mating axis (The smaller axis number in a pair is the multi-slider master axis for convenience.) * Axes with same characteristics on resolution related are available to select. * Make sure to select the synchro-master axis when synchronizing type (forbidden to select synchro-slave axes). * Set to 0 when there is no slider close to the side of applicable movement of the self-axis coordinate.
42	Emergency Deceleration Margin at Multi-Slider Over Approach	5	0 to 999	0.01G	
43	Multi-Slider Setting Bit Pattern 1	12H	0H to FFFFFFFFH		<p>Bits 0 to 3: Multi-slider actual position over approach detection margin (mm) (Valid only on multi-slider master axis parameters)</p> <p>Bits 4 to 7: Multi-slider commanded position over approach detection margin (mm) (Valid only on multi-slider master axis parameters)</p>

Related parameter (Driver unit parameter)

No.	Parameter name	Initial setting (Reference)	Input range	Unit	Remarks
105	Multi-Slider Effective Stroke	0	0 to 99,999,999	0.001mm	<p>Establish the setting of [Distance between sliders at the furthest positions accepted] - [Distance between sliders at the closest positions accepted] in the operation ranges of both of the axes target for the multi-slider excess approaching detection.</p> <p>(This is valid only in the parameter on the master axis of the multi-sliders.)</p>

9.1.3 How to Check

Check that this feature works by having the following operation after confirming the coordinates (and performing the home-return operation for the incremental type) on both of the target axes.

- 1) Move the sliders towards each other in low speed with the jog operation until an error gets generated.
- 2) Check if the sliders stop at a position ahead in a few millimeters of the multi-slider command position excess approaching margin (initially set at 1mm) or near it.

9.2 PSA-24 Communication Monitor

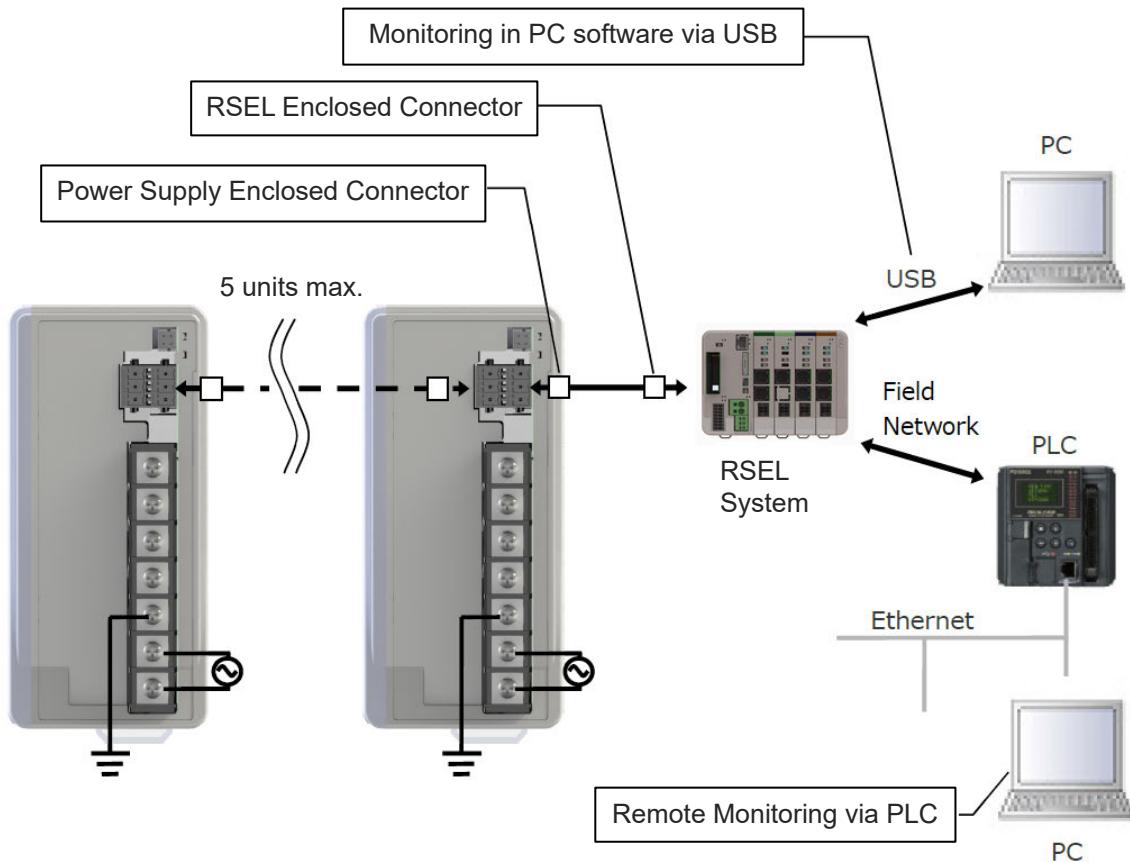
Power Supply Unit: PSA-24 possesses a feature to monitor the status data from a host device as a preventive maintenance feature in purpose of improving efficiency of management and maintenance for equipment.

For the preventive maintenance features equipped on PSA-24 other than status data monitor, refer to "PSA-24 Instruction Manual (ME0379)".

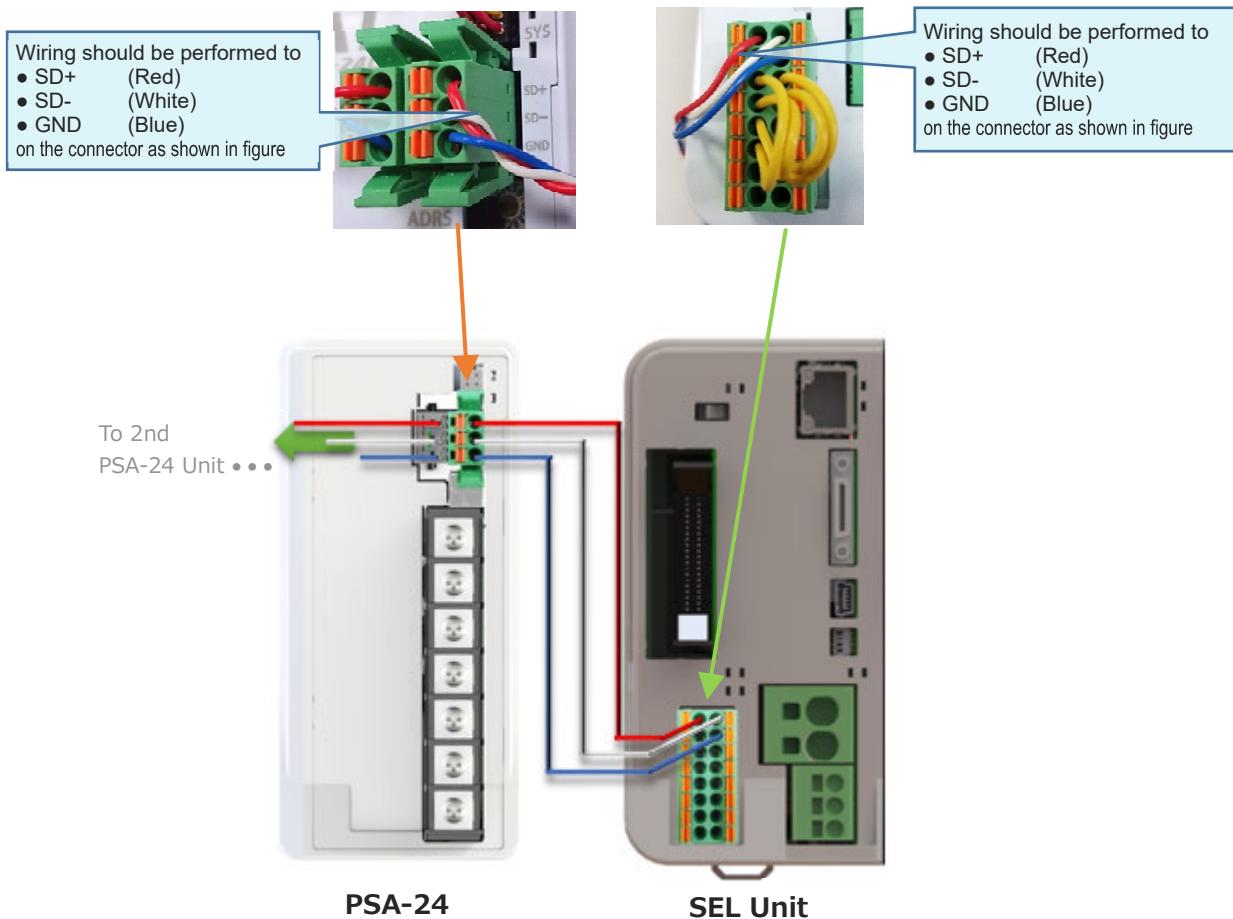
[How to Establish Connection]

SEL Unit to PSA-24 in order to monitor the status data of the power source via RSEL.

If it is preferred to monitor the status data using the PC software establish the connection using the USB interface on RSEL.



- How to Connect with PSA-24



* Use the following complied cables for PSA-24 communication wiring.

Item	Specifications
Compatible wire	AWG 22 to 20 (0.3 to 0.5 mm ²)
Stripped length	10.0 mm



Caution

- Use cables with cable diameter that has larger allowable current than the current volume to be used.

There could be a concern of communication failure if using thinner cables than the complied cable diameter. Also, make sure to use twisted pair cables for the differential lines.

[Status data]

The status data available for monitoring is as listed below.

Item	Details
Output Voltage	Output voltage AD converted value. As this power source fluctuates the output voltage, the output voltage monitored value changes from moment to moment. Note that it is not an error.
Supplement Coil Voltage	Control power voltage inside power source AD converted value. It changes in response to the load on output voltage side as it does for the output voltage, which is not an error.
Peak Hold Voltage	Output voltage AD converted value. Comparison is performed every time AD conversion is executed and the maximum voltage is saved.
Output Current	Output current AD converted value. It shows the transient value.
Peak Hold Current	Output current peak value. Comparison is performed every time AD conversion is executed and the maximum current is saved.
Load Ratio	It is the value expressed in percentage for the ratio of output current integral value and the rated output current used for overload judgment internally. If this value exceeds 100%, an overload error should be generated and output voltage will be cut off.
Peak Hold Load Ratio	Comparison is performed every time overload calculation is executed and the maximum load ratio is saved.
Fan Revolution Speed	It is the value of number of fan revolution calculated by pulse signal input from the fan.
PCB Temperature	It is the AD converted value of the temperature sensor around the secondary side output capacitor.
Total Conducting Time	It is the time the values saved in the internal memory regularly were integrated by conducting time was counted in CPU.

Power supply unit information					
	No.0	No.1	No.2	No.3	No.4
Output voltage [V]	25.4	25.5	25.6	25.7	25.8
Auxiliary winding voltage [V]	24.7	24.8	24.9	9.8	9.7
Peak hold voltage [V]	26.4	26.5	26.6	26.7	26.8
Output current [A]	0.30	0.29	0.28	0.27	0.26
Peak hold current [A]	0.31	0.30	0.29	0.28	0.27
Load factor[%]	1	2	3	0	1
Peak hold load factor [%]	2	2	4	1	2
Fan rotating speed[rpm]	0	0	0	0	0
PCB Temp.[deg C]	70	69	68	71	69
Total weld time[Day:Hour]	0:11	0:10	0:10	0:10	0:11

The background color should change depending on the status of the acquired status of the power supply unit.

- Auxiliary winding voltage : Yellowish green when 15V or more and white when 10V or less
- Load factor : Yellowish green when 330W with fan equipped and white when 220W with no fan equipped
- Fan rotating speed : Gray when no fan equipped, white when fan in normal operation, yellow when in warning and red when error

For the operation of teaching tool, refer to the following instruction manual.

- PC dedicated teaching software instruction manual (ME0398)
- Touch Panel Teaching Pendant TB-02 instruction manual (ME0356)
- Touch Panel Teaching Pendant TB-03 instruction manual (ME0377)

9.3 Preventive Maintenance Function

9.3.1 Electrolytic Capacitor Life Prediction

The temperature on the electrolytic capacitor in the RSEL unit can be monitored and the life can be calculated.

There should be a message level alarm (Alarm Code 203 “Presumed Life Passed Warning”) generated when the capacitance of the electrolytic capacitor has dropped by 20%. When an alarm is generated, although the capacity of the capacitor is not zero (dried-out), we recommend replacing it as soon as possible.

9.3.2 Capacitor for Calendar Feature Life Prediction

The temperature of the capacitor for the RSEL unit calendar function is monitored to calculate the service life.

There should be a message level alarm (Alarm Code 203 “Presumed Life Passed Warning”) generated when the capacitance of the capacitor has dropped by 50% for the calendar feature. When an alarm is generated, although the capacity of the capacitor is not zero (dried-out), we recommend replacing it as soon as possible.

9.4 Predictive Maintenance Function

9.4.1 Monitoring on Fan Unit Revolution

The fan rotation speed of the fan unit attached to the RSEL unit is monitored.

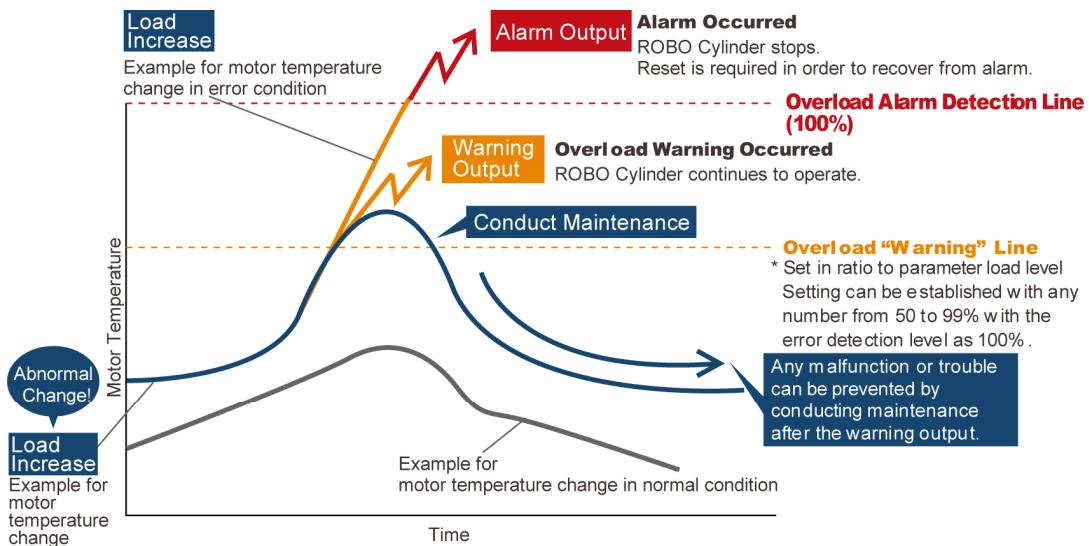
There should be a message level alarm (Alarm Code 201 "Fan Revolution Drop Warning") generated when the number of the fan revolution dropped by 20%. When an alarm is generated, although the fan will not have stopped completely, we recommend replacing it as soon as possible.

Note that if the fan rotation speed drops 30%, an operation cancel level alarm (alarm code 404 "Fan error") is generated, and the actuator stops. Replace the fan and reset the alarm to resume operation.

9.4.2 Overload warning

Using this function enables monitoring of motor temperature changes caused by dried-up grease or wear and tear on parts. A warning is output when the preset value is exceeded. This enables detection of abnormalities before a breakdown or a malfunction occurs.

<Operational image>



Warning output enables detection of items such as those below.

- Time to supply grease
- Time to replace components
- Time to implement mechanical tuning

The driver overload warning (message level error) should be detected when the ratio of the load assuming the presumed motor raised temperature that could generate the driver overload error as 100% (hereinafter described as overload level) has exceeded the value set in the parameter. By setting a parameter separately, the driver overload warning can be output to a port.

The indication of the ratio above and the output port should be done in the parameters below.

(1) Driver Unit Parameter No. 143 “Overload Warning Loading Level Ratio”

The ratio should be set to detect Error No. 22C “Motor Drive Control Error” assuming the overload level (driver overload error loading level) to detect Error No. 61A “Overload Error” (cold start level error) as 100 (%).

The setting range should be “50 to 100 (%)" and if 100 (%) or a number out of the range is set, the driver overload warning and the driver overload warning output should get invalid.

● Driver Unit Parameter

No.	Parameter Name	Setting at Delivery	Input range	Unit	Remarks
143	Overload Warning Loading Level Ratio	100	50 to 100	%	Set in % from Driver overload error loading level (invalid at 100)

(2) Axis Parameter No. “Driver Overload Warning Output Number”

A port number to conduct the driver overload warning output (break contact) should be set. If an output port number other than 0 is set in this parameter, the driver overload warning output activates. When 0 or a number out of the range is set, the driver overload warning output should get invalid.

● Axis Parameter

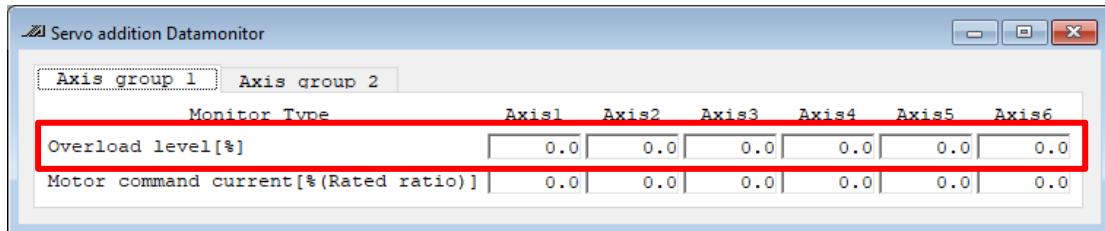
No.	Parameter Name	Setting at Delivery	Input range	Unit	Remarks
37	Driver Overload Waring Output Number	0	0 to 6999		Physical output port or extension output port (Output invalid at 0, duplicated indication invalid) * Break Contact

* Both (1) and (2) are set invalid at the delivery.

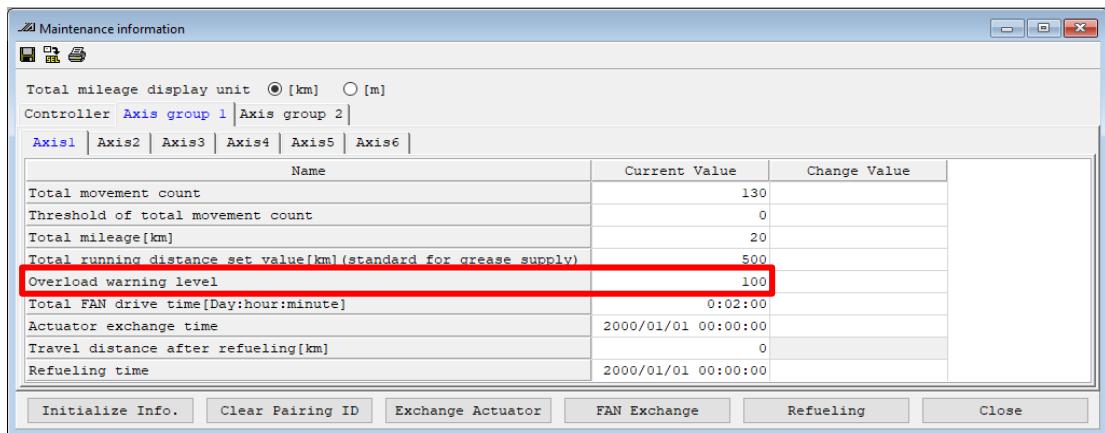
[Reference] Check of Overload Level

The overload level on a motor in operation can be checked in a teaching tool.

All the monitoring types supported in RSEL System should be monitored in one screen.



The setting in Driver Unit Parameter No. 143 “Overload Warning Loading Level Ratio” can be checked in the maintenance information window.



For the operation of teaching tool, refer to the following instruction manual.

- PC dedicated teaching software instruction manual (ME0398)
- Touch Panel Teaching Pendant TB-02 instruction manual (ME0356)
- Touch Panel Teaching Pendant TB-03 instruction manual (ME0377)



Parameter

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10.1 Overview

Parameter data should be set appropriately according to the application requirements. When a change is required to the parameters, make sure to back up the data before the change so the settings can be returned anytime.

With the PC software, it is available to have a backup in a PC. With a teaching pendant, it is available to have a backup in a Secure Digital memory card.

Also, for the purpose of rapid recovery after the investigation of failure unit or replacing the controller, keep data backup or memo also after the parameter change.

The change to the parameters will be activated after they are edited, written to the flash ROM, then either software reset or reboot of the power. It will not be active only with writing on the teaching tool.

The initial settings (reference) described in the tables in the sections from 6.1 I/O Parameters to 6.7 Other Parameters differ depending of the actuator.

The input ranges are the limitations for the input in the teaching pendant and PC software. For the actual setting, input the values defined in the remarks.

The values other than those defined in the remarks are for the system reservation. Do not attempt to input the values other than those defined in the remarks.



Warning

Establishment of parameter setting gives a great influence to operation.

Wrongly established setting could cause not only an operation error or malfunction, but also it is very dangerous.

Settings at the delivery enable the product to operate standardly.

Understand very well about the control logic of controller if making a change or performing a setting suitable to the system. Please contact us if you have anything unclear.

Do not turn off the power to the controller during the parameter writing.

◎ Parameters Set in Bits

- How to Use Bits

Refer below for how to turn on the bits (in case the last digit of the set value is H).

Set the value of hexadecimal number transformed from the binary number.

- Binary number

In the Binary number system, the figure is expressed using two (0 and 1) numerical characters. The figure increases from "0", and then "1" and moves on to the next digit to "10", "11", etc.

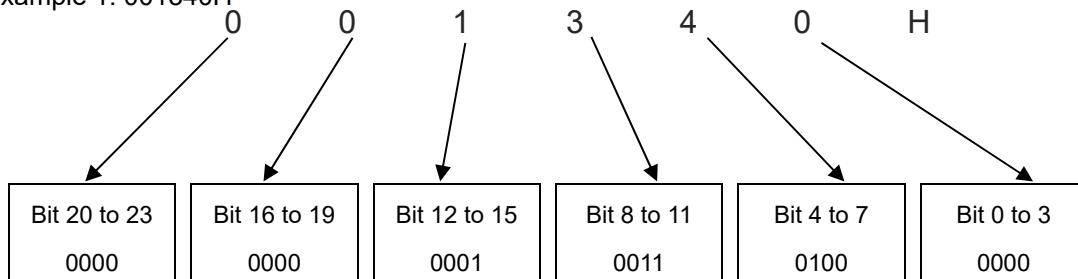
Decimal number	0	1	2	3	4	5	6	7	8	9	10
Binary number	0	1	10	11	100	101	110	111	1000	1001	1010

- Hexadecimal number

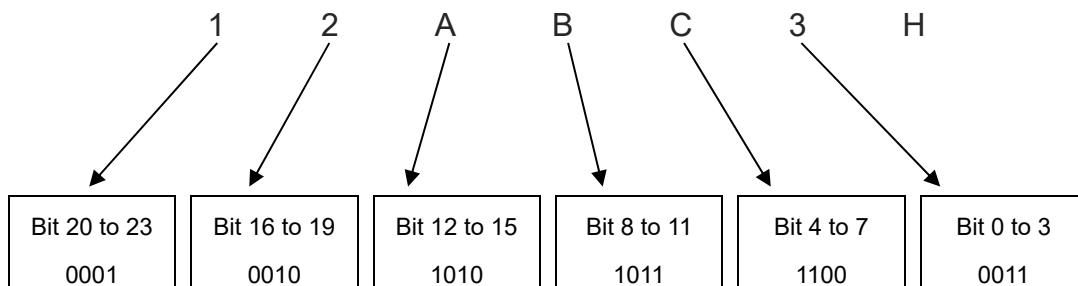
In the Hexadecimal number system, the figure is expressed using nine numerical characters (from 0 to 9) and alphabetical characters (from A to F). The figure is gradually increased from "0" to "1", "2", "3", "4", "5", "6", "7", "8", "9", "A", "B", "C", "D", "E", "F" and then moves on to the next digit to "10", "11", etc.

Decimal number	0 to 9 (Same expression in the decimal number system and the hexadecimal number system)		10	11	12	13	14	15	16
Hexadecimal number			A	B	C	D	E	F	10

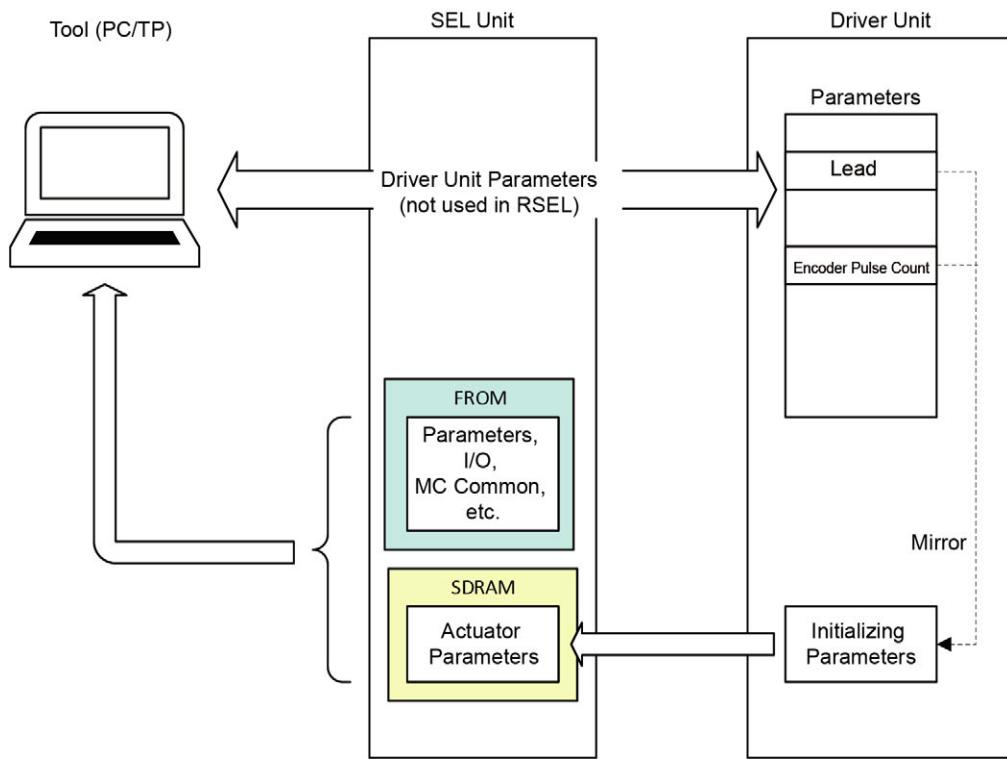
Example 1: 001340H



Example 2: 12ABC3H



■ Image of Parameter Management



- The parameters related to the axis control should be managed on the driver unit side.
- The parameters necessary in the axis control for the SEL unit should be acquired from the driver unit as the initializing parameters.
- The driver unit parameters should be those for parameter management in the driver unit and not used in the SEL unit

10.2 Parameter list (SEL Unit)

10.2.1 I/O Parameter

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
1	I/O port assignment type	Depends on Controller Construction	0 to 20		0: Fixed assignment 1: Automatic assignment * Priority of I/O port assignment at automatic assignment (I/O1→PIO unit • PIO/SIO unit)
2 to 13	Reserved by the system	0H	0H to FFFFFFFFH		
14	Number of Ports Used for I/O1 Fieldbus Remote Input	Depends on Controller Construction	0 to 1024		Multiple of 8
15	Number of Ports Used for I/O1 Fieldbus Remote Output	Depends on Controller Construction	0 to 1024		Multiple of 8
16	I/O1fix-allocated input port start No.	Depends on Controller Construction	-1 to 3999		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set.) * Only fieldbus available for setting in 1000 to 3999
17	I/O1fix-allocated output port start No.	Depends on Controller Construction	-1 to 6999		300 + (multiple of 8) (300 to 599) 400 + (multiple of 8) (4000 to 6999) (Invalid if a negative value is set.) * Only fieldbus available for setting in 4000 to 6999
18	I/O1 error monitor	Depends on Controller Construction	0 to 5		0: Do not monitor 1: Monitor 2: Monitor (Do not monitor 24-V I/O power errors) 3: Monitor (Monitor 24-V I/O power errors) 4: Monitor (Make 24V I/O power errors to message level) * Only PIO available for setting in 2 to 4 * Some exceptions apply.
19	(For expansion)	0			
20	Input filtering periods	2	1 to 9	ms	Input signal is recognized when the status is held for twice the period set by this parameter.
21	Reserved by the system (change is prohibited)	0	1 to 9		
22	Reserved by the system	2000	0 to 99999	ms	
23	Reserved by the system	0H	0H to FFFFFFFFH		
24	I/O setting bit pattern 1 (global specification)	10000H	0H to FFFFFFFFH		Bits 0-3: Reserved by the system Bits 4 to 7: RDY LED function selection (0: Program can be run 1: Error of operation-cancellation level or higher is not present 2: Error of cold-start level or * SYS LED prioritizes ALM flash condition Bits 8-19: Reserved by the system Bits 20 to 23: ALM LED function selection (0: An error higher than message level has occurred 1: An error higher than operation cancel level has occurred 2: An error higher than cold-start level has occurred 3: An error higher than system shutoff level has occurred) Bits 24-27: Reserved by the system
25	I/O setting bit pattern 2 (global specification)	0H	0H to FFFFFFFFH		Bits 0-3: Reserved by the system Bits 4-7: Reserved by the system Bits 8-11: Reserved by the system

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
26 to 27	(For expansion)	0			
28	I/O ready output port number	0	0 to 6999		Output port ON when I/O is ready (Invalid if "0" is set)
29	Reserved by the system	0	0 to 6999		0: General-purpose input 1: Program start signal (ON edge) (Input ports 007 to 014, BCD-specified program number) 2: Program start signal (ON edge) (Input ports 007 to 014, binary-specified program number) 3: Program start signal (ON edge) (Input ports. 008 to 014, BCD-specified program number) Note: The function of "I/O parameter No. 44, Input function selection 014" (relating to drive-source cutoff reset) is assigned to "I/O parameter No. 37, Input function selection 007," while the function of "I/O parameter No. 43, Input function selection 013" (error reset, program number specified for program start) is assigned to "I/O parameter No. 44, Input function selection 014." To specify a program number of 7 bit long, "1: Program number specified for program start" must be set for "I/O parameter No. 38, Input function selection 008" through "I/O parameter No. 44, "Input function selection 014." 4: Program start signal (ON edge) (Input ports. 008 to 014, binary-specified program number) Note: The function of "I/O parameter No. 44, Input function selection 014" (relating to drive-source cutoff reset) is assigned to "I/O parameter No. 37, Input function selection 007," while the function of "I/O parameter No. 43, Input function selection 013" (error reset, program number specified for program start) is assigned to "I/O parameter No. 44, Input function selection 014." To specify a program number of 7 bit long, "1: Program number specified for program start" must be set for "I/O parameter No. 38, Input function selection 008" through "I/O parameter No. 44, "Input function selection 014."
30	Input function selection 000	1	0 to 5		* When using this signal to start a program, make sure the signal remains ON for 100 msec or longer so that the program will start without fail. * Program Nos. 1 to 99 can be started via BCD specification, while program Nos. 1 to 255 can be started via binary specification. Note: The port number assigned to this function can be changed using I/O parameter No. 283, "Port number assigned to input function selection 000."
31	Input function selection 001	0	0 to 5		0: General-purpose input 1: Software reset signal (1 sec ON) * If continued operation is specified as the action upon emergency stop, enable the software reset signal (to provide a means of canceling the operation). Note: The port number assigned to this function can be changed using I/O parameter No. 284, "Port number assigned to input function selection 001."

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
32	Input function selection 002	0	0 to 5		<p>0: General-purpose input 1: Servo ON * ON edge: Equivalent to the all-valid-axis servo ON command, OFF edge: Equivalent to the all-valid-axis servo OFF command (A minimum interval of 1.5 seconds is required) (Must be executed in non-operating condition)</p> <p>Note: The port number assigned to this function can be changed using I/O parameter No. 285, "Port number assigned to input function selection 002."</p>
33	Input function selection 003	1	0 to 5		<p>0: General-purpose input 1: General-purpose input (Start the auto-start program upon power-ON reset/software reset in the AUTO mode) 2: Auto-start program start signal (ON edge: Start, OFF edge: Abort all operations/programs (excluding the I/O processing program at operation/program abort)) * If this parameter is used as an auto-start program start signal, turn ON the signal for at least 100 msec so that the program will start without fail.</p> <p>Note: The port number assigned to this function can be changed using I/O parameter No. 286, "Port number assigned to input function selection 003."</p>
34	Input function selection 004	0	0 to 5		<p>0: General-purpose input 1: All servo axis soft interlock (OFF level) (Valid for all commands other than the servo OFF command) (Operation is held upon interlock actuation during automatic operation; operation is terminated upon interlock in non-AUTO mode)</p> <p>Note: The port number assigned to this function can be changed using I/O parameter No. 287, "Port number assigned to input function selection 004."</p>
35	Input function selection 005	0	0 to 5		<p>0: General-purpose input 1: Operation-pause reset signal (ON edge)</p> <p>Note: The port number assigned to this function can be changed using I/O parameter No. 288, "Port number assigned to input function selection 005."</p>
36	Input function selection 006	0	0 to 5		<p>0: General-purpose input 1: Operation-pause signal (OFF level) (Valid only during automatic operation) * Cancel pause when an operation-pause reset signal is received.</p> <p>Note: The port number assigned to this function can be changed using I/O parameter No. 289, "Port number assigned to input function selection 006."</p>
37	Input function selection 007	1	0 to 5		<p>0: General-purpose input 1: Program number specified for program start (least significant bit)</p> <p>Note: The assignment changes depending on the value set in "I/O parameter No. 30, Input function selection 000."</p> <p>Note: The port number assigned to this function can be changed using I/O parameter No. 290, "Port number assigned to input function selection 007."</p>
38	Input function selection 008	1	0 to 5		<p>0: General-purpose input 1: Program number specified for program start</p> <p>Note: The assignment changes depending on the value set in "I/O parameter No. 30, Input function selection 000."</p> <p>Note: The port number assigned to this function can be changed using I/O parameter No. 291, "Port number assigned to input function selection 008."</p>

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
39	Input function selection 009	1	0 to 5		0: General-purpose input 1: Program number specified for program start Note: The assignment changes depending on the value set in "I/O parameter No. 30, Input function selection 000." Note: The port number assigned to this function can be changed using I/O parameter No. 292, "Port number assigned to input function selection 009."
40	Input function selection 010	1	0 to 5		0: General-purpose input 1: Program number specified for program start Note: The assignment changes depending on the value set in "I/O parameter No. 30, Input function selection 000." Note: The port number assigned to this function can be changed using I/O parameter No. 293, "Port number assigned to input function selection 010."
41	Input function selection 011	1	0 to 5		0: General-purpose input 1: Program number specified for program start Note: The assignment changes depending on the value set in "I/O parameter No. 30, Input function selection 000." Note: The port number assigned to this function can be changed using I/O parameter No. 294, "Port number assigned to input function selection 011."
42	Input function selection 012	1	0 to 5		0: General-purpose input 1: Program number specified for program start Note: The assignment changes depending on the value set in "I/O parameter No. 30, Input function selection 000." Note: The port number assigned to this function can be changed using I/O parameter No. 295, "Port number assigned to input function selection 012."
43	Input function selection 013	1	0 to 5		0: General-purpose input 1: Program number specified for program start 2: Error reset (ON edge) Note: The assignment changes depending on the value set in "I/O parameter No. 30, Input function selection 000." Note: The port number assigned to this function can be changed using I/O parameter No. 296, "Port number assigned to input function selection 013."
44	Input function selection 014	0	0 to 5		0: General-purpose input 1: Drive-source cutoff reset input (ON edge) (Valid when cancelling cause) 2: Program number specified for program start * Valid only when setting I/O Parameter No. 30 Input Function Select 000 = 1 or 2 * Cutoff will be cancelled by cancelling cause of drive-source cutoff when a mode other than "1: Drive-source cutoff reset input (on-edge)" is set. * Drive-source cutoff reset control is not available for axes whose motor-drive power unit is not housed inside this controller or whose drive-source cutoff circuit is not controlled by this controller. Note: The assignment changes depending on the value set in "I/O parameter No. 30, Input function selection 000." Note: The port number assigned to this function can be changed using I/O parameter No. 297, "Port number assigned to input function selection 014."

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
45	Input function selection 015	0	0 to 5		<p>0: General-purpose input 1: All Effective Axes Homing (ON edge) (Servo on required in advance = I/O Parameter No.32, Axis Parameter No.11) 2: Home return for all incremental linear sliding axes (ON edge) (Servo on required in advance = I/O Parameter No.32, Axis Parameter No.11)</p> <p>Note: The port number assigned to this function can be changed using I/O parameter No. 298, "Port number assigned to input function selection 015."</p>
46	Output function selection 300	2	0 to 20		<p>0: General-purpose output 1: Output error of operation-cancellation level or higher (ON) 2: Output error of operation-cancellation level or higher (OFF) 3: Output error of operation-cancellation level or higher + emergency stop (ON) 4: Output error of operation-cancellation level or higher + emergency stop (OFF) 5: Output error of cold start level or higher (ON) 6: Output error of cold start level or higher (OFF) 7: Error output of maintenance information alert function related message level (Error No. 231 to 232) (ON) 8: Error output of maintenance information alert function related message level (Error No. 231 to 232) (OFF)</p> <p>Note: The port number assigned to this function can be changed using I/O parameter No. 299, "Port number assigned to output function selection 300."</p>
47	Output function selection 301	3	0 to 20		<p>0: General-purpose output 1: READY output (PIO trigger program can be run) 2: READY output (PIO trigger program can be run and error of operation-cancellation level or higher is not present) 3: READY output (PIO trigger program can be run and error of cold-start level or higher is not present)</p> <p>Note: The port number assigned to this function can be changed using I/O parameter No. 300, "Port number assigned to output function selection 301."</p>
48	Output function selection 302	2	0 to 20		<p>0: General-purpose output 1: Emergency-stop output (ON) 2: Emergency-stop output (OFF)</p> <p>Note: The port number assigned to this function can be changed using I/O parameter No. 301, "Port number assigned to output function selection 302."</p>
49	Output function selection 303	0	0 to 5		<p>0: General-purpose output 1: AUTO mode output 2: Output during automatic operation (Other parameter No. 12)</p> <p>Note: The port number assigned to this function can be changed using I/O parameter No. 302, "Port number assigned to output function selection 303."</p>
50	Output function selection 304	0	0 to 5		<p>0: General-purpose output 1: Output at the time of "All Effective Linear Sliding Axes Homing (=0)" 2: Output when all the effective linear sliding axes homing is completed (Coordinates determined)</p> <p>* Use MOVP Command, not HOME Command, if moving the ABS encoder linear sliding axes to the coordinate 0 or home preset coordinate.</p> <p>Note: The port number assigned to this function can be changed using I/O parameter No. 303, "Port number assigned to output function selection 304."</p>

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
51	Output function selection 305	0	0 to 5		<p>0: General-purpose output 1: 1st axis in-position output (turned OFF when pressing missed) 2: Output when axis-1 servo is ON (System monitor task output) 3: Reserved by the system</p> <p>Note: The port number assigned to this function can be changed using I/O parameter No. 304, "Port number assigned to output function selection 305."</p>
52	Output function selection 306	0	0 to 5		<p>0: General-purpose output 1: 2nd axis in-position output (turned OFF when pressing missed) 2: Output when axis-2 servo is ON (System monitor task output) 3: Reserved by the system</p> <p>Note: The port number assigned to this function can be changed using I/O parameter No. 305, "Port number assigned to output function selection 306."</p>
53	Output function selection 307	0	0 to 5		<p>0: General-purpose output 1: 3rd axis in-position output (turned OFF when pressing missed) 2: Output when axis-3 servo is ON (System monitor task output) 3: Reserved by the system</p> <p>Note: The port number assigned to this function can be changed using I/O parameter No. 306, "Port number assigned to output function selection 307."</p>
54	Output function selection 308	0	0 to 5		<p>0: General-purpose output 1: 4th axis in-position output (turned OFF when pressing missed) 2: Output when axis-4 servo is ON (System monitor task output) 3: Reserved by the system</p> <p>Note: The port number assigned to this function can be changed using I/O parameter No. 307, "Port number assigned to output function selection 308."</p>
55	Output function selection 309	0	0 to 5		<p>0: General-purpose output 1: 5th axis in-position output (turned OFF when pressing missed) 2: Output when axis-5 servo is ON (System monitor task output) 3: Reserved by the system</p> <p>Note: The port number assigned to this function can be changed using I/O parameter No. 308, "Port number assigned to output function selection 309."</p>
56	Output function selection 310	0	0 to 5		<p>0: General-purpose output 1: 6th axis in-position output (turned OFF when pressing missed) 2: Output when axis-6 servo is ON (System monitor task output) 3: Reserved by the system</p> <p>Note: The port number assigned to this function can be changed using I/O parameter No. 309, "Port number assigned to output function selection 310."</p>
57	Output function selection 311	0	0 to 5		<p>0: General-purpose output 1: 7th axis in-position output (turned OFF when pressing missed) 2: Output when axis-7 servo is ON (System monitor task output) 3: Reserved by the system</p> <p>Note: The port number assigned to this function can be changed using I/O parameter No. 310, "Port number assigned to output function selection 311."</p>

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
58	Output function selection 312	0	0 to 5		0: General-purpose output 1: 8th axis in-position output (turned OFF when pressing missed) 2: Output when axis-8 servo is ON (System monitor task output) 3: Reserved by the system Note: The port number assigned to this function can be changed using I/O parameter No. 311, "Port number assigned to output function selection 312."
59	Output function selection 313	0	0 to 5		0: General-purpose output 1: Reserved by the system Note: The port number assigned to this function can be changed using I/O parameter No. 312, "Port number assigned to output function selection 313."
60	Output function selection 314	0	0 to 5		0: General-purpose output 1: Reserved by the system Note: The port number assigned to this function can be changed using I/O parameter No. 313, "Port number assigned to output function selection 314."
61	Output function selection 315	0	0 to 5		0: General-purpose output Note: The port number assigned to this function can be changed using I/O parameter No. 314, "Port number assigned to output function selection 315."
62 to 69	Reserved by the system	0	0 to 3999		
70	Unaffected general-purpose output area number (MIN) when all operations/programs are aborted	0	0 to 6999		* Important: Outputs in this area must be operated under the responsibility of user programs including the "I/O processing program at operation/program abort." Outputs outside this area will be forcibly turned OFF. (Invalid if "0" is set)
71	Unaffected general-purpose output area number (MAX) when all operations/programs are aborted	0	0 to 6999		
72	Unaffected general-purpose output area number (MIN) when all operations are paused (servo-axis soft interlock + output-port soft interlock)	300	0 to 6999		* Important: Outputs in this area must be operated (including recovery) under the responsibility of user programs including the "I/O processing program at all operations pause." Outputs outside this area will be forcibly turned OFF, reflecting/holding the results of operations performed while all operation pause is effective (only during automatic operation). (Invalid if "0" is set)
73	Unaffected general-purpose output area number (MAX) when all operations are paused (servo-axis soft interlock + output-port soft interlock)	599	0 to 6999		
74	Number of TP user output ports used (hand, etc.)	0	0 to 8		Referenced by TP. (Invalid if "0" is set)
75	TP user output port start number (hand, etc.)	0	0 to 599		Referenced by TP.
76	AUTO mode physical output port number	0	0 to 6999		(Invalid if "0" is set)
77	Reserved by the system	0	0 to 3999		
78	Reserved by the system	0	0B to 11111111B		
79	Input port number for remote mode control	0	0 to 3999		System mode = MANU if specified DI = ON or AUTO/MANU-SW = MANU. (Invalid if "0" is set) * Debug filter is invalid for the remote-mode control input port
80	(PC/TP SIO usage)	1	1 to 1		

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
81	(PC/TP SIO station code)	153	Reference only 153 to 153		Fixed to 153 (99H).
82 to 89	(PC/TP SIO reservation)	0			
90	Usage of SIO channel 0 opened to user (AUTO mode)	1	0 to 9		0: Open SEL program 1: Open SEL program (Connect PC/TP when both devices are closed) 2: IAI protocol B (Slave)
91	Station code of SIO channel 0 opened to user	153	0 to 255		Valid only with IAI protocol.
92	Baud rate type of SIO channel 0 opened to user	0	0 to 5		0:9.6 1:19.2 2:38.4 3:57.6 4:76.8 5:115.2
93	Data length of SIO channel 0 opened to user	8	7 to 8		
94	Stop bit length of SIO channel 0 opened to user	1	1 to 2		
95	Parity type of SIO channel 0 opened to user	0	0 to 2		0: None 1: Odd 2:Even
96	Reserved by the system	0	0 to 1		
97	IAI-protocol minimum response delay for SIO channel 0 opened to user	0	0 to 999	ms	Valid only with IAI protocol.
98 to 99	(Reservation of SIO channel 0 opened to user)	0			
100	Reserved by the system	28100010H	0H to FFFFFFFH		
101	Reserved by the system	0	0H to FFFFFFFH		
102	Reserved by the system	28100020H	0H to FFFFFFFH		
103	Reserved by the system	0	0H to FFFFFFFH		
104	Reserved by the system	28100010H	0H to FFFFFFFH		
105	Reserved by the system	0	0H to FFFFFFFH		
106	Reserved by the system	28100020H	0H to FFFFFFFH		
107	Reserved by the system	0	0H to FFFFFFFH		
108	Reserved by the system	28100010H	0H to FFFFFFFH		
109	Reserved by the system	0	0H to FFFFFFFH		
110	Reserved by the system	28100020H	0H to FFFFFFFH		
111	Reserved by the system	0	0H to FFFFFFFH		
112	Reserved by the system	28100030H	0H to FFFFFFFH		
113	Reserved by the system	0	0H to FFFFFFFH		
114	Reserved by the system	28100040H	0H to FFFFFFFH		
115	Reserved by the system	0	0H to FFFFFFFH		
116 to 119	(For expansion)	0			

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
120	Network attribute 1	641001H	0H to FFFFFFFFH		Bits 0 to 3: Reserved by the system Bits 4 to 11: I/O1 fieldbus link error check timer value (10ms) Bits 12 to 15: Registered module data size type in PROFINET IO configuration (0:1 word, 1:4 word) Bits 16 to 27: Reserved by the system Bits 28 to 31: Input port data select in I/O1 fieldbus link error (0: Clear, 1: Hold)
121	Network attribute 2	C80000H	0H to FFFFFFFFH		Bits 0 to 15: Reserved by the system Bits 16 to 27: Link timeout value in fieldbus initialization (100ms) Bits 28 to 31: EtherCAT PDO mapping type (0: Variable, 1: 32Byte Fixed)
122	Network attribute 3	0	0H to FFFFFFFFH		Bits 0 to 3: EtherNet TCP/IP message communication Selection whether to permit 0.0.0.0 (IP address of connection destination can be ignored) as IP address of connection destination on server (0: Do not permit 1: Permit (not recommended)) *Note: Number of clients that can be connected simultaneously to one server port channel = 1
123	Network attribute 4	0H	0H to FFFFFFFFH		Bits 4 to 7: EtherNet IAI Protocol B/TCP (MANU mode) Select existence check function (0: Not to use, 1: Use Keep Alive) Bits 8 to 11: EtherNet IAI Protocol B/TCP (MANU mode) Select existence check function (0: Not to use, 1: Use Keep Alive) Bits 12 to 15: EtherNet Free-for-User Channel 31 Select existence check function (0: Not to use, 1: Use Keep Alive) Bits 16 to 19: EtherNet Free-for-User Channel 32 Select existence check function (0: Not to use, 1: Use Keep Alive) Bits 20 to 23: EtherNet Free-for-User Channel 33 Select existence check function (0: Not to use, 1: Use Keep Alive) Bits 24 to 27: EtherNet Free-for-User Channel 34 Select existence check function (0: Not to use, 1: Use Keep Alive) Bits 28 to 31: EtherNet Tracking Vision System I/F Select existence check function (0: Not to use, 1: Use Keep Alive) * The connection may get cut if the mating device is not applicable for TCP Keep Alive Function.

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
124	Network attribute5	0H	0H to FFFFFFFFH		<p>EtherNet TCP/IP message communication attribute EtherNet client/server type (0: Not in use 1: Client (Automatic assignment of own port number) 2: System Reservation 3: Server (Specification of own port number)) * Note: Number of clients that can be connected simultaneously to one server port channel = 1</p> <p>Bits 0 to 3: IAI protocol B/TCP (MANU mode) Bits 4 to 7: IAI protocol B/TCP (AUTO mode) Bits 8 to 11: Channel 31 opened to user Bits 12 to 15: Channel 32 opened to user Bits 16 to 19: Channel 33 opened to user Bits 20 to 23: Channel 34 opened to user * If the parameter settings for own port number, client/server type, IP address of connection destination and port number of connection destination do not match completely between the IAI protocol B/TCP MANU and AUTO modes, the connection will be cut off when the MANU/AUTO mode is switched.</p>
125	Network attribute6	31E32H	0H to FFFFFFFFH		<p>Bits 0 to 7: System Reservation Bits 8 to 15: System Reservation Bits 16 to 23: Increment of "PC/TP reconnection delay at software reset" when EtherNet is used (sec)</p>
126	Network attribute7	7D007D0H	0H to FFFFFFFFH		Reserved by the system
127	Network attribute8	5050214H	0H to FFFFFFFFH		<p>EtherNet TCP/IP message communication attribute Bits 0 to 7: CONNECT_TIMEOUT (Change is prohibited) (Setting of "0" is prohibited) (sec) Bits 8 to 15: Connection retry interval (IAI protocol B/TCP) (sec) Bits 16 to 23: Send timeout value (sec) Bits 24 to 31: IAI protocol B-SIO non-communication check timer setting (sec) (IAI protocol B/TCP connection trigger)</p>
128	Network attribute9	10000H	0H to FFFFFFFFH		<p>EtherNet TCP/IP message communication attribute Bits 0 to 15: SEL server open timeout value (sec) (No timeout check when "0" is set)</p>
129	Network attribute10	0H	0H to FFFFFFFFH		<p>EtherNet operation requirement Bits 0 to 3: System Reservation Bits 4 to 7: TCP/IP message communication (0: Not in use, 1: Use) Bits 8 to 31: Reserved (Operation requirement)</p>
130	I/O FIELDBUS Own MAC address (H)	0H	Reference only (HEX)		Only lower two bytes are valid.
131	I/O FIELDBUS Own MAC address (L)	0H	Reference only (HEX)		
132	I/O FIELDBUS Own IP address (H)	192	1 to 255		* Setting of "0" and "127" is prohibited. * Setting establishment not necessary for PROFINET IO
133	I/O FIELDBUS Own IP address (MH)	168	0 to 255		* Setting establishment not necessary for PROFINET IO
134	I/O FIELDBUS Own IP address (ML)	0	0 to 255		* Setting establishment not necessary for PROFINET IO
135	I/O FIELDBUS Own IP address (L)	1	1 to 254		* Setting of "0" and "255" is prohibited. * Setting establishment not necessary for PROFINET IO
136	I/O FIELDBUS Subnet mask (H)	255	0 to 255		* Setting establishment not necessary for PROFINET IO
137	I/O FIELDBUS Subnet mask (MH)	255	0 to 255		* Setting establishment not necessary for PROFINET IO
138	I/O FIELDBUS Subnet mask (ML)	255	0 to 255		* Setting establishment not necessary for PROFINET IO
139	I/O FIELDBUS Subnet mask (L)	0	0 to 255		* Setting establishment not necessary for PROFINET IO
140	I/O FIELDBUS Default gateway (H)	0	0 to 255		* Setting establishment not necessary for PROFINET IO

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
141	I/O FIELDBUS Default gateway (MH)	0	0 to 255		* Setting establishment not necessary for PROFINET IO
142	I/O FIELDBUS Default gateway (ML)	0	0 to 255		* Setting establishment not necessary for PROFINET IO
143	I/O FIELDBUS Default gateway (L)	0	0 to 255		* Setting establishment not necessary for PROFINET IO
144	IAI protocol B/TCP: Own port number (MANU mode)	64511	1025 to 65535		* Important note: Always set a unique number for each port number. (Duplication of port numbers is permitted only in the IAI protocol B/TCP MANU/AUTO modes.)
145	Channel 31 opened to user (TCP/IP): Own port number	64512	1025 to 65535		* Important note: Always set a unique number for each port number. (Duplication of port numbers is permitted only in the IAI protocol B/TCP MANU/AUTO modes.)
146	Channel 32 opened to user (TCP/IP): Own port number	64513	1025 to 65535		* Important note: Always set a unique number for each port number. (Duplication of port numbers is permitted only in the IAI protocol B/TCP MANU/AUTO modes.)
147	Channel 33 opened to user (TCP/IP): Own port number	64514	1025 to 65535		* Important note: Always set a unique number for each port number. (Duplication of port numbers is permitted only in the IAI protocol B/TCP MANU/AUTO modes.)
148	Channel 34 opened to user (TCP/IP): Own port number	64515	1025 to 65535		* Important note: Always set a unique number for each port number. (Duplication of port numbers is permitted only in the IAI protocol B/TCP MANU/AUTO modes.)
149	IAI protocol B/TCP: IP address of connection destination (MANU mode) (H)	192	0 to 255		*Setting of "0" and "127" is prohibited.
150	IAI protocol B/TCP: IP address of connection destination (MANU mode) (MH)	168	0 to 255		
151	IAI protocol B/TCP: IP address of connection destination (MANU mode) (ML)	0	0 to 255		
152	IAI protocol B/TCP: IP address of connection destination (MANU mode) (L)	100	0 to 254		*Setting of "0" and "255" is prohibited.
153	IAI protocol B/TCP: Port number of connection destination (MANU mode)	64611	0 to 65535		* "0" can be set in the case of a server. 0 = Port number of connection destination is ignored (only the IP address is checked) * "0" cannot be set in the case of a client.
154	IAI protocol B/TCP: IP address of connection destination (AUTO mode) (H)	192	0 to 255		*Setting of "0" and "127" is prohibited.
155	IAI protocol B/TCP: IP address of connection destination (AUTO mode) (MH)	168	0 to 255		
156	IAI protocol B/TCP: IP address of connection destination (AUTO mode) (ML)	0	0 to 255		
157	IAI protocol B/TCP: IP address of connection destination (AUTO mode) (L)	100	0 to 254		*Setting of "0" and "255" is prohibited.
158	IAI protocol B/TCP: Port number of connection destination (AUTO mode)	64611	0 to 65535		* "0" can be set in the case of a server. 0 = Port number of connection destination is ignored (only the IP address is checked) * "0" cannot be set in the case of a client.
159	IAI protocol B/TCP: Own port number (AUTO mode)	64516	1025 to 65535		* Important note: Always set a unique number for each port number. (Duplication of port numbers is permitted only in the IAI protocol B/TCP MANU/AUTO modes.)
160	Vision System I/F connected IP address (H)	192	0 to 255		*Setting of "0" and "127" is prohibited.
161	Vision System I/F connected IP address (MH)	168	0 to 255		
162	Vision System I/F connected IP address (ML)	0	0 to 255		
163	Vision System I/F connected IP address (L)	102	0 to 254		*Setting of "0" and "255" is prohibited.

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
164	Vision System I/F Connected Port Number	64613	0 to 65535		* Vision System I/F is dedicated for the specifications of the client on IAI controller side (Self-Port Number Automatic Assignment) * Setting of 0 forbidden
165 to 167	Reserved by the system	0	0 to 255		
168	Reserved by the system	0	0 to 254		
169	Reserved by the system	0	0 to 65535		
170	EtherNet I/F Own MAC address (H)	0H	Reference only (HEX)		Only lower two bytes are valid.
171	EtherNet I/F Own MAC address (L)	0H	Reference only (HEX)		
172	EtherNet I/F Own IP address (H)	192	1 to 255		*Setting of "0" and "127" is prohibited.
173	EtherNet I/F Own IP address (MH)	168	0 to 255		
174	EtherNet I/F Own IP address (ML)	0	0 to 255		
175	EtherNet I/F Own IP address (L)	1	1 to 254		*Setting of "0" and "255" is prohibited.
176	EtherNet I/F Subnet mask (H)	255	0 to 255		
177	EtherNet I/F Subnet mask (MH)	255	0 to 255		
178	EtherNet I/F Subnet mask (ML)	255	0 to 255		
179	EtherNet I/F Subnet mask (L)	0	0 to 255		
180	EtherNet I/F Default gateway (H)	0	0 to 255		
181	EtherNet I/F Default gateway (MH)	0	0 to 255		
182	EtherNet I/F Default gateway (ML)	0	0 to 255		
183	EtherNet I/F Default gateway (L)	0	0 to 255		
184	Number of CC-Link IE Remote Registration (Input) Words (RWw)	Depends on Controller Construction	0 to 64		Number of the remote registration words (Inputs in view from the slave station)
185	Number of CC-Link IE Remote Registration (Output) Words (RWr)	Depends on Controller Construction	0 to 64		Number of the remote registration words (Outputs in view from the slave station)
186	Number of PIO Units / PIO/SIO Units Connected	0	0 to 8	Unit	The number of ports should be number of connected units x 16 for each input and output.
187	PIO Unit / PIO/SIO Unit fix-allocated input port start No.	-1	-1 to 3999		0 + (Multiple of 8) (0 to 299) 1000 + (Multiple of 8) (1000 to 3999) (Invalid if a negative value is set)
188	PIO Unit / PIO/SIO Unit fix-allocated output port start No.	-1	-1 to 6999		300 + (Multiple of 8) (300 to 599) 4000 + (Multiple of 8) (4000 to 6999) (Invalid if a negative value is set)
189	PIO Unit / PIO/SIO Unit Error Monitor	1	0 to 5		0: Not monitored 1: Monitored 2: Monitored (24V I/O power supply related errors not monitored) 3: Monitored (only 24V I/O power supply related errors monitored) 4: Monitored (24V I/O power supply related errors output as message level) * Some exceptions apply.
190	Option Unit Attribute 1	C800200H	0H to FFFFFFFFH		Bits 0 to 3: PIO unit output port data select in TF connection error (0: Clear, 1: Hold) Bits 4 to 7: PIO unit input port data select in TF connection error (0: Clear, 1: Hold) Bits 8 to 15: TF communication link error check timer value (10ms) Bits 16 to 19: For future extension use Bits 20 to 31: Link timeout value in communication initialization (100ms)

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
191 to 200	(For expansion)	0			
201	Attribute 1 of SIO channel 1 opened to user	28100001H	0H to FFFFFFFFH		Bits 28 to 31: Baud rate type (0:9.6, 1:19.2, 2:38.4, 3:57.6, 4:76.8, 5:115.2, 6:230.4kbps) Bits 24 to 27: Data length (7 to 8) Bits 20 to 23: Stop bit length (1 to 2) Bits 16 to 19: Parity type (0: None, 1: Odd numbers, 2: Even numbers) Bits 12 to 15: For future extension use Bits 8 to 11: For future extension use Bits 4 to 7: For future extension use Bits 0 to 3: Use select (0: Not to be Used, 1: Used) * Used in application level
202	Attribute 2 of SIO channel 1 opened to user	00000001H	0H to FFFFFFFFH		
203	Attribute 3 of SIO channel 1 opened to user	01118040H	0H to FFFFFFFFH		
204	Attribute 4 of SIO channel 1 opened to user	00000000H	0H to FFFFFFFFH		
205	Attribute 5 of SIO channel 1 opened to user	00000000H	0H to FFFFFFFFH		
206	Attribute 6 of SIO channel 1 opened to user	00000000H	0H to FFFFFFFFH		
207	Attribute 7 of SIO channel 1 opened to user	00000000H	0H to FFFFFFFFH		
208	Attribute 8 of SIO channel 1 opened to user	00000000H	0H to FFFFFFFFH		
209	Attribute 9 of SIO channel 1 opened to user	00000000H	0H to FFFFFFFFH		
210	Attribute 10 of SIO channel 1 opened to user	00000000H	0H to FFFFFFFFH		
211	Attribute 11 of SIO channel 1 opened to user	00000000H	0H to FFFFFFFFH		
212	Attribute 12 of SIO channel 1 opened to user	00000000H	0H to FFFFFFFFH		
213	Reserved by the system	28100001H	0H to FFFFFFFFH		
214	Reserved by the system	00000001H	0H to FFFFFFFFH		
215	Reserved by the system	01118040H	0H to FFFFFFFFH		
216	Reserved by the system	00000000H	0H to FFFFFFFFH		
217 to 218	Reserved by the system	0B	0B to 11111111B		
219 to 224	Reserved by the system	00000000H	0H to FFFFFFFFH		
225	I/O controller	Depends on Controller Construction	Reference only 0H to FFFFFFFFH		Bits 0 to 7: Type of Network I/F Module Control 1 (0H: Not mounted, 1H: CC-Link, 2H: DeviceNet, 3H: PROFIBUS-DP, 4 to 5H: Reserved by the system, 6H: EtherCAT, 7H: EtherNet/IP, 8H: Reserved by the system, 9H: PIO, AH: PROFINET IO, B to CH: Reserved by the system, DH: CC-Link IE) Bits 8 to 31: Reserved by the system

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
226	I/O1 Fieldbus Node Address	Depends on Controller Construction	0 to 99999999		<p>Settable Range</p> <ul style="list-style-type: none"> • At CC-Link: 1 to 64 • At DeviceNet: 0 to 63 • At PROFIBUS-DP: 0 to 125 • At EtherCAT: 0 to 65535 • At CC-Link IE: 1 to 120 <p>* Setting establishment not necessary for EtherNet/IP and PROFINET IO</p>
227	I/O1 fieldbus communication speed	Depends on Controller Construction	0 to 9		<ul style="list-style-type: none"> • At CC-Link: (0:156kbps, 1:625kbps, 2:2.5Mbps, 3:5Mbps, 4:10Mbps) • At DeviceNet: (0:125kbps, 1:250kbps, 2:500kbps) • At EtherNet/IP: (0: Auto negotiation 1:10Mbps (Half-Duplex), 2:10Mbps (Full-Duplex), 3:100Mbps (Half-Duplex), 4:100Mbps (Full-Duplex)) <p>* Setting establishment not necessary for PROFIBUS-DP, EtherCAT, PROFINET IO and CC-Link IE</p>
228	I/O1 Fieldbus Network Number	Depends on Controller Construction	0 to 99999999		<ul style="list-style-type: none"> • At CC-Link IE: 1 to 239 <p>* Setting not necessary when other than CC-Link IE</p>
229 to 230	(For expansion)	0			
231 to 232	Reserved by the system	0	0 to 256		
233	Reserved by the system	-1	-1 to 3999		
234	Reserved by the system	-1	-1 to 6999		
235	Reserved by the system	1	0 to 5		
236	Reserved by the system	0H	Reference only 0H to FFFFFFFFFFH		
237	Reserved by the system	0	0 to 99999999		
238	Reserved by the system	0	0 to 9		
239	Reserved by the system	0	0 to 99999999		
240 to 282	(For expansion)	0			
283	Port number assigned to input function selection 000	-1	-1 to 3999		<p>Specify the port number to be assigned to the function of I/O parameter No. 30, "Input function selection 000."</p> <p>* If a negative value is set, the function will be assigned to input port No. 0.</p>
284	Port number assigned to input function selection 001	-1	-1 to 3999		<p>Specify the port number to be assigned to the function of I/O parameter No. 31, "Input function selection 001."</p> <p>* If a negative value is set, the function will be assigned to input port No. 1.</p>
285	Port number assigned to input function selection 002	-1	-1 to 3999		<p>Specify the port number to be assigned to the function of I/O parameter No. 32, "Input function selection 002."</p> <p>* If a negative value is set, the function will be assigned to input port No. 2.</p>
286	Port number assigned to input function selection 003	-1	-1 to 3999		<p>Specify the port number to be assigned to the function of I/O parameter No. 33, "Input function selection 003."</p> <p>* If a negative value is set, the function will be assigned to input port No. 3.</p>
287	Port number assigned to input function selection 004	-1	-1 to 3999		<p>Specify the port number to be assigned to the function of I/O parameter No. 34, "Input function selection 004."</p> <p>* If a negative value is set, the function will be assigned to input port No. 4.</p>

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
288	Port number assigned to input function selection 005	-1	-1 to 3999		<p>Specify the port number to be assigned to the function of I/O parameter No. 35, "Input function selection 005."</p> <ul style="list-style-type: none"> * If a negative value is set, the function will be assigned to input port No. 5.
289	Port number assigned to input function selection 006	-1	-1 to 3999		<p>Specify the port number to be assigned to the function of I/O parameter No. 36, "Input function selection 006."</p> <ul style="list-style-type: none"> * If a negative value is set, the function will be assigned to input port No. 6.
290	Port number assigned to input function selection 007	-1	-1 to 3999		<p>Specify the port number to be assigned to the function of I/O parameter No. 37, "Input function selection 007."</p> <ul style="list-style-type: none"> * If a negative value is set, the function will be assigned to input port No. 7. * If "Program number specified for program start" has been specified for input function selection 007, specify in this parameter an input port number whose LSB contains the next higher value to the LSB of the program number specified for program start. <p>(Related information: I/O parameter No. 30, "Input function selection 000")</p>
291	Port number assigned to input function selection 008.	-1	-1 to 3999		<p>Specify the port number to be assigned to the function of I/O parameter No. 38, "Input function selection 008."</p> <ul style="list-style-type: none"> * If a negative value is set, the function will be assigned to input port No. 8. * If "Program number specified for program start" has been specified for input function selection 008, specify in this parameter an input port number whose LSB contains the next higher value to the LSB of the program number specified for program start.
292	Port number assigned to input function selection 009	-1	-1 to 3999		<p>Specify the port number to be assigned to the function of I/O parameter No. 39, "Input function selection 009."</p> <ul style="list-style-type: none"> * If a negative value is set, the function will be assigned to input port No. 9. * If "Program number specified for program start" has been specified for input function selection 009, specify in this parameter an input port number whose LSB contains the next higher value to the LSB of the program number specified for program start.
293	Port number assigned to input function selection 010	-1	-1 to 3999		<p>Specify the port number to be assigned to the function of I/O parameter No. 40, "Input function selection 010."</p> <ul style="list-style-type: none"> * If a negative value is set, the function will be assigned to input port No. 10. * If "Program number specified for program start" has been specified for input function selection 010, specify in this parameter an input port number whose LSB contains the next higher value to the LSB of the program number specified for program start.
294	Port number assigned to input function selection 011	-1	-1 to 3999		<p>Specify the port number to be assigned to the function of I/O parameter No. 41, "Input function selection 011."</p> <ul style="list-style-type: none"> * If a negative value is set, the function will be assigned to input port No. 11. * If "Program number specified for program start" has been specified for input function selection 011, specify in this parameter an input port number whose LSB contains the next higher value to the LSB of the program number specified for program start.

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
295	Port number assigned to input function selection 012	-1	-1 to 3999		<p>Specify the port number to be assigned to the function of I/O parameter No. 42, "Input function selection 012."</p> <ul style="list-style-type: none"> * If a negative value is set, the function will be assigned to input port No. 12. * If "Program number specified for program start" has been specified for input function selection 012, specify in this parameter an input port number whose LSB contains the next higher value to the LSB of the program number specified for program start.
296	Port number assigned to input function selection 013	-1	-1 to 3999		<p>Specify the port number to be assigned to the function of I/O parameter No. 43, "Input function selection 013."</p> <ul style="list-style-type: none"> * If a negative value is set, the function will be assigned to input port No. 13. * If "Program number specified for program start" has been specified for input function selection 013, specify in this parameter an input port number whose LSB contains the next higher value to the LSB of the program number specified for program start.
297	Port number assigned to input function selection 014	-1	-1 to 3999		<p>Specify the port number to be assigned to the function of I/O parameter No. 44, "Input function selection 014."</p> <ul style="list-style-type: none"> * If a negative value is set, the function will be assigned to input port No. 14. * If "Program number specified for program start" has been specified for input function selection 014, specify in this parameter an input port number whose LSB contains the next higher value to the LSB of the program number specified for program start. <p>(Related information: I/O parameter No. 30, "Input function selection 000")</p>
298	Port number assigned to input function selection 015	-1	-1 to 3999		<p>Specify the port number to be assigned to the function of I/O parameter No. 45, "Input function selection 015."</p> <ul style="list-style-type: none"> * If a negative value is set, the function will be assigned to input port No. 15.
299	Port number assigned to output function selection 300	0	0 to 6999		<p>Specify the port number to be assigned to the function of I/O parameter No. 46, "Output function selection 300."</p> <ul style="list-style-type: none"> * If 0 is set, the function will be assigned to output port No. 300.
300	Port number assigned to output function selection 301	0	0 to 6999		<p>Specify the port number to be assigned to the function of I/O parameter No. 47, "Output function selection 301."</p> <ul style="list-style-type: none"> * If 0 is set, the function will be assigned to output port No. 301.
301	Port number assigned to output function selection 302	0	0 to 6999		<p>Specify the port number to be assigned to the function of I/O parameter No. 48, "Output function selection 302."</p> <ul style="list-style-type: none"> * If 0 is set, the function will be assigned to output port No. 302.
302	Port number assigned to output function selection 303	0	0 to 6999		<p>Specify the port number to be assigned to the function of I/O parameter No. 49, "Output function selection 303."</p> <ul style="list-style-type: none"> * If 0 is set, the function will be assigned to output port No. 303.
303	Port number assigned to output function selection 304	0	0 to 6999		<p>Specify the port number to be assigned to the function of I/O parameter No. 50, "Output function selection 304."</p> <ul style="list-style-type: none"> * If 0 is set, the function will be assigned to output port No. 304.
304	Port number assigned to output function selection 305	0	0 to 6999		<p>Specify the port number to be assigned to the function of I/O parameter No. 51, "Output function selection 305."</p> <ul style="list-style-type: none"> * If 0 is set, the function will be assigned to output port No. 305.

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
305	Port number assigned to output function selection 306	0	0 to 6999		Specify the port number to be assigned to the function of I/O parameter No. 52, "Output function selection 306." * If 0 is set, the function will be assigned to output port No. 306.
306	Port number assigned to output function selection 307	0	0 to 6999		Specify the port number to be assigned to the function of I/O parameter No. 53, "Output function selection 307." * If 0 is set, the function will be assigned to output port No. 307.
307	Port number assigned to output function selection 308	0	0 to 6999		Specify the port number to be assigned to the function of I/O parameter No. 54, "Output function selection 308." * If 0 is set, the function will be assigned to output port No. 308.
308	Port number assigned to output function selection 309	0	0 to 6999		Specify the port number to be assigned to the function of I/O parameter No. 55, "Output function selection 309." * If 0 is set, the function will be assigned to output port No. 309.
309	Port number assigned to output function selection 310	0	0 to 6999		Specify the port number to be assigned to the function of I/O parameter No. 56, "Output function selection 310." * If 0 is set, the function will be assigned to output port No. 310.
310	Port number assigned to output function selection 311	0	0 to 6999		Specify the port number to be assigned to the function of I/O parameter No. 57, "Output function selection 311." * If 0 is set, the function will be assigned to output port No. 311.
311	Port number assigned to output function selection 312	0	0 to 6999		Specify the port number to be assigned to the function of I/O parameter No. 58, "Output function selection 312." * If 0 is set, the function will be assigned to output port No. 312.
312	Port number assigned to output function selection 313	0	0 to 6999		Specify the port number to be assigned to the function of I/O parameter No. 59, "Output function selection 313." * If 0 is set, the function will be assigned to output port No. 313.
313	Port number assigned to output function selection 314	0	0 to 6999		Specify the port number to be assigned to the function of I/O parameter No. 60, "Output function selection 314." * If 0 is set, the function will be assigned to output port No. 314.
314	Port number assigned to output function selection 315	0	0 to 6999		Specify the port number to be assigned to the function of I/O parameter No. 61, "Output function selection 315." * If 0 is set, the function will be assigned to output port No. 315.
315	Port number assigned to output function selection 300 (area 2)	0	0 to 6999		Specify the port number to be assigned to the function of I/O parameter No. 331, "Output function selection 300 (area 2)." * If 0 is set, the function will not be assigned to any port.
316	Port number assigned to output function selection 301 (area 2)	0	0 to 6999		Specify the port number to be assigned to the function of I/O parameter No. 332, "Output function selection 301 (area 2)." * If 0 is set, the function will not be assigned to any port.
317	Port number assigned to output function selection 302 (area 2)	0	0 to 6999		Specify the port number to be assigned to the function of I/O parameter No. 333, "Output function selection 302 (area 2)." * If 0 is set, the function will not be assigned to any port.
318	Port number assigned to output function selection 303 (area 2)	0	0 to 6999		Specify the port number to be assigned to the function of I/O parameter No. 334, "Output function selection 303 (area 2)." * If 0 is set, the function will not be assigned to any port.

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
319	Port number assigned to output function selection 304 (area 2)	0	0 to 6999		Specify the port number to be assigned to the function of I/O parameter No. 335, "Output function selection 304 (area 2)." * If 0 is set, the function will not be assigned to any port.
320	Port number assigned to output function selection 305 (area 2)	0	0 to 6999		Specify the port number to be assigned to the function of I/O parameter No. 336, "Output function selection 305 (area 2)." * If 0 is set, the function will not be assigned to any port.
321	Port number assigned to output function selection 306 (area 2)	0	0 to 6999		Specify the port number to be assigned to the function of I/O parameter No. 337, "Output function selection 306 (area 2)." * If 0 is set, the function will not be assigned to any port.
322	Port number assigned to output function selection 307 (area 2)	0	0 to 6999		Specify the port number to be assigned to the function of I/O parameter No. 338, "Output function selection 307 (area 2)." * If 0 is set, the function will not be assigned to any port.
323	Port number assigned to output function selection 308 (area 2)	0	0 to 6999		Specify the port number to be assigned to the function of I/O parameter No. 339, "Output function selection 308 (area 2)." * If 0 is set, the function will not be assigned to any port.
324	Port number assigned to output function selection 309 (area 2)	0	0 to 6999		Specify the port number to be assigned to the function of I/O parameter No. 340, "Output function selection 309 (area 2)." * If 0 is set, the function will not be assigned to any port.
325	Port number assigned to output function selection 310 (area 2)	0	0 to 6999		Specify the port number to be assigned to the function of I/O parameter No. 341, "Output function selection 310 (area 2)." * If 0 is set, the function will not be assigned to any port.
326	Port number assigned to output function selection 311 (area 2)	0	0 to 6999		Specify the port number to be assigned to the function of I/O parameter No. 342, "Output function selection 311 (area 2)." * If 0 is set, the function will not be assigned to any port.
327	Port number assigned to output function selection 312 (area 2)	0	0 to 6999		Specify the port number to be assigned to the function of I/O parameter No. 343, "Output function selection 312 (area 2)." * If 0 is set, the function will not be assigned to any port.
328	Port number assigned to output function selection 313 (area 2)	0	0 to 6999		Specify the port number to be assigned to the function of I/O parameter No. 344, "Output function selection 313 (area 2)." * If 0 is set, the function will not be assigned to any port.
329	Port number assigned to output function selection 314 (area 2)	0	0 to 6999		Specify the port number to be assigned to the function of I/O parameter No. 345, "Output function selection 314 (area 2)." * If 0 is set, the function will not be assigned to any port.
330	Port number assigned to output function selection 315 (area 2)	0	0 to 6999		Specify the port number to be assigned to the function of I/O parameter No. 346, "Output function selection 315 (area 2)." * If 0 is set, the function will not be assigned to any port.

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
331	Output function selection 300 (area 2)	0	0 to 20		0: General-purpose output 1: Output of operation-cancellation level or higher error (ON) 2: Output of operation-cancellation level or higher error (OFF) 3: Output of operation-cancellation level or higher error + emergency stop (ON) 4: Output of operation-cancellation level or higher error + emergency stop (OFF) 5: Output error of cold start level or higher (ON) 6: Output error of cold start level or higher (OFF) 7: Error output of maintenance information alert function related message level (Error No. 231 to 232) (ON) 8: Error output of maintenance information alert function related message level (Error No. 231 to 232) (OFF)
332	Output function selection 301 (area 2)	0	0 to 20		0: General-purpose output 1: READY output (PIO trigger program can be run) 2: READY output (PIO trigger program can be run and error of operation-cancellation level or higher is not present) 3: READY output (PIO trigger program can be run and error of cold-start level or higher is not present)
333	Output function selection 302 (area 2)	0	0 to 20		0: General-purpose output 1: Emergency stop output (ON) 2: Emergency stop output (OFF)
334	Output function selection 303 (area 2)	0	0 to 5		0: General-purpose output 1: AUTO mode output 2: Automatic operation in-progress output (other parameter No. 12)
335	Output function selection 304 (area 2)	0	0 to 5		0: General-purpose output 1: Output at the time of "All Effective Linear Sliding Axes Homing (=0)" 2: Output when all the effective linear sliding axes homing is completed (Coordinates determined) * Use MOVP Command, not HOME Command, if moving the ABS encoder linear sliding axes to the coordinate 0.
336	Output function selection 305 (area 2)	0	0 to 5		0: General-purpose output 1: 1st axis in-position output (turned OFF when pressing missed) 2: Axis 1 servo currently-ON output (system-monitored task output) 3: Reserved by the system
337	Output function selection 306 (area 2)	0	0 to 5		0: General-purpose output 1: 2nd axis in-position output (turned OFF when pressing missed) 2: Axis 2 servo currently-ON output (system-monitored task output) 3: Reserved by the system
338	Output function selection 307 (area 2)	0	0 to 5		0: General-purpose output 1: 3rd axis in-position output (turned OFF when pressing missed) 2: Axis 3 servo currently-ON output (system-monitored task output) 3: Reserved by the system
339	Output function selection 308 (area 2)	0	0 to 5		0: General-purpose output 1: 4th axis in-position output (turned OFF when pressing missed) 2: Axis 4 servo currently-ON output (system-monitored task output) 3: Reserved by the system
340	Output function selection 309 (area 2)	0	0 to 5		0: General-purpose output 1: 5th axis in-position output (turned OFF when pressing missed) 2: Axis 5 servo currently-ON output (system-monitored task output) 3: Reserved by the system

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
341	Output function selection 310 (area 2)	0	0 to 5		0: General-purpose output 1: 6th axis in-position output (turned OFF when pressing missed) 2: Axis 6 servo currently-ON output (system-monitored task output) 3: Reserved by the system
342	Output function selection 311 (area 2)	0	0 to 5		0: General-purpose output 1: 7th axis in-position output (turned OFF when pressing missed) 2: Axis 7 servo currently-ON output (system-monitored task output) 3: Reserved by the system
343	Output function selection 312 (area 2)	0	0 to 5		0: General-purpose output 1: 8th axis in-position output (turned OFF when pressing missed) 2: Axis 8 servo currently-ON output (system-monitored task output) 3: Reserved by the system
344	Output function selection 313 (area 2)	0	0 to 5		0: General-purpose output 1: Reserved by the system
345	Output function selection 314 (area 2)	0	0 to 5		0: General-purpose output 1: Reserved by the system
346	Output function selection 315 (area 2)	0	0 to 5		0: General-purpose output
347	(For expansion)	0			
348	Reserved by the system	-1	-1 to 3999		
349	Reserved by the system	0	0 to 6999		
350	(For expansion)	0			
351	Vision System I/F 1 Function Selection 1	3105500H	0H to FFFFFFFFH		Bits 0 to 3: Function Select (0: Not to use, 1: Use) Bits 4 to 7: Communication Device Selection (0: Reserved by the system 1: Reserved by the system 2: EtherNet Ch31 3: EtherNet Ch32 4: EtherNet Ch33 5: EtherNet Ch34 (Related I/O Parameters No.124, 129 to 143, 145 to 148)) Bits 8 to 11: Vision System I/F 1 response timeout value (sec) Bits 12 to 19: Vision System I/F 1 capturing command disable delay timer value (msec) Bits 20 to 23: Vision System I/F 1 capturing delay prediction timer value (msec) Bits 24 to 31: Number of Vision System I/F 1 capturing command retries *No retry if 0
352	Vision System I/F 1 Function Selection 2	0H	0H to FFFFFFFFH		Bits 0 to 7: Vision System I/F 1 communication format select (0: Format D 1: Format O 2: Format K) (Related I/O Parameter No.353) Bits 8 to 31: Reserved by the system
353	Vision System I/F 1 Function Selection 3	54313C0DH	0H to FFFFFFFFH		Bits 0 to 7: Vision System I/F 1 Communication Delimiter Bits 8 to 15: Vision System I/F 1 Communication Delimiter 1 *No header when 0 Bits 16 to 31: Vision System I/F 1 Communication Delimiter 2 *No header when 0
354 to 355	Reserved by the system	0			
356	Vision System I/F 1 Initializing Complete Status Physical Input Port Number	0	0 to 299		* Invalid when set to "0".

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
357	Vision System I/F 1 Image-Capture Command Physical Output Number	0	0 to 599		* Setting may be necessary depending on type of system
358 to 360	(For expansion)	0			
361 to 363	Reserved by the system	0H	0H to FFFFFFFFFFH		
364 to 365	Reserved by the system	0			
366	Reserved by the system	0	0 to 299		
367	Reserved by the system	0	0 to 599		
368 to 379	(For expansion)	0			
380	Unaffected general-purpose output area 2 number (MIN) when all operations/programs are aborted	0	0 to 6999		(Same as I/O parameter No. 70)
381	Unaffected general-purpose output area 2 number (MAX) when all operations/programs are aborted	0	0 to 6999		
382	Unaffected general-purpose output area 3 number (MIN) when all operations/programs are aborted	0	0 to 6999		(Same as I/O parameter No. 70)
383	Unaffected general-purpose output area 3 number (MAX) when all operations/programs are aborted	0	0 to 6999		
384	Unaffected general-purpose output area 4 number (MIN) when all operations/programs are aborted	0	0 to 6999		(Same as I/O parameter No. 70)
385	Unaffected general-purpose output area 4 number (MAX) when all operations/programs are aborted	0	0 to 6999		
386 to 389	(For expansion)	0			
390	Unaffected general-purpose output area 2 number (MIN) when all operations are paused (servo-axis soft interlock + output-port soft interlock)	4000	0 to 6999		(Same as I/O parameter No. 72)
391	Unaffected general-purpose output area 2 number (MAX) when all operations are paused (servo-axis soft interlock + output-port soft interlock)	6999	0 to 6999		
392	Unaffected general-purpose output area 3 number (MIN) when all operations are paused (servo-axis soft interlock + output-port soft interlock)	0	0 to 6999		(Same as I/O parameter No. 72)
393	Unaffected general-purpose output area 3 number (MAX) when all operations are paused (servo-axis soft interlock + output-port soft interlock)	0	0 to 6999		
394	Unaffected general-purpose output area 4 number (MIN) when all operations are paused (servo-axis soft interlock + output-port soft interlock)	0	0 to 6999		(Same as I/O parameter No. 72)

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
395	Unaffected general-purpose output area 4 number (MAX) when all operations are paused (servo-axis soft interlock + output-port soft interlock)	0	0 to 6999		
396 to 399	(For expansion)	0			
400	Reserved by the system	1	0 to 20		
401 to 404	(For expansion)	0			
405 to 406	Reserved by the system	512	0 to 512		
407	Reserved by the system	-1	-1 to 3999		
408	Reserved by the system	-1	-1 to 6999		
409	Reserved by the system	1	0 to 5		
410	(For expansion)	0			
411	Reserved by the system	1256	1000 to 3999		
412	Reserved by the system	4256	4000 to 6999		
413	Reserved by the system	0	0 to 512		
414	Reserved by the system	0	0 to 512		
415	Reserved by the system	-1	-1 to 299		
416	Reserved by the system	-1	-1 to 599		
417 to 419	(For expansion)	0			
420	Reserved by the system	0H	0H to FFFFFFFFH		
421	Reserved by the system	1003000H	0H to FFFFFFFFH		
422	Reserved by the system	FF007530H	0H to FFFFFFFFH		
423	Reserved by the system	2H	0H to FFFFFFFFH		
424 to 429	Reserved by the system	0H	0H to FFFFFFFFH		
430	Reserved by the system	4000	0 to 99999	ms	
431 to 447	Reserved by the system	0H	0H to FFFFFFFFH		
448	Reserved by the system	4BH	0H to FFFFFFFFH		
449 to 459	(For expansion)	0			
460	Reserved by the system	0	0H to FFFFFFFFH		
461 to 463	Reserved by the system	0	0 to 65535		
464	Reserved by the system	0	0H to FFFFFFFFH		
465 to 467	Reserved by the system	0	0 to 65535		
468	Reserved by the system	0	0H to FFFFFFFFH		
469 to 471	Reserved by the system	0	0 to 65535		
472	Reserved by the system	0	0H to FFFFFFFFH		
473 to 475	Reserved by the system	0	0 to 65535		

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
476	Reserved by the system	0	0H to FFFFFFFFH		
477 to 479	Reserved by the system	0	0 to 65535		
480	Reserved by the system	0	0H to FFFFFFFFH		
481 to 483	Reserved by the system	0	0 to 65535		
484	Reserved by the system	0	0H to FFFFFFFFH		
485 to 487	Reserved by the system	0	0 to 65535		
488	Reserved by the system	0	0H to FFFFFFFFH		
489 to 491	Reserved by the system	0	0 to 65535		
492 to 500	(For expansion)	0			
501	Reserved by the system	128	0 to 512		
502	Reserved by the system	0	0 to 15		
503	Reserved by the system	0	0 to 512		
504	Reserved by the system	1000	1000 to 3999		
505	Reserved by the system	4000	4000 to 6999		
506	Reserved by the system	3000	0 to 99999	ms	
507	Reserved by the system	8030H	0H to FFFFFFFFH		
508 to 510	(For expansion)	0			
511 to 526	Reserved by the system	0	0 to 3999		
527 to 528	(For expansion)	0			
529	Reserved by the system	0011111B	0B to 1111111B		
530	Reserved by the system	128	0 to 512		
531	Reserved by the system	0	0 to 31		
532	Reserved by the system	0	0 to 512		
533 to 534	Reserved by the system	00000000H	0H to FFFFFFFFH		
535	Reserved by the system	0	0 to 3999		
536	Reserved by the system	0	0 to 6999		
537	Reserved by the system	00000000H	0H to FFFFFFFFH		
538	Reserved by the system	0	0 to 3999		
539	Reserved by the system	0	0 to 6999		
540	Reserved by the system	00000000H	0H to FFFFFFFFH		
541	Reserved by the system	0	0 to 3999		
542	Reserved by the system	0	0 to 6999		
543	Reserved by the system	00000000H	0H to FFFFFFFFH		
544	Reserved by the system	0	0 to 3999		
545	Reserved by the system	0	0 to 6999		
546	Reserved by the system	00000000H	0H to FFFFFFFFH		
547	Reserved by the system	0	0 to 3999		
548	Reserved by the system	0	0 to 6999		

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
549	Reserved by the system	00000000H	0H to FFFFFFFFH		
550	Reserved by the system	0	0 to 3999		
551	Reserved by the system	0	0 to 6999		
552	Reserved by the system	00000000H	0H to FFFFFFFFH		
553	Reserved by the system	0	0 to 3999		
554	Reserved by the system	0	0 to 6999		
555	Reserved by the system	00000000H	0H to FFFFFFFFH		
556	Reserved by the system	0	0 to 3999		
557	Reserved by the system	0	0 to 6999		
558	Reserved by the system	00000000H	0H to FFFFFFFFH		
559	Reserved by the system	0	0 to 3999		
560	Reserved by the system	0	0 to 6999		
561	Reserved by the system	00000000H	0H to FFFFFFFFH		
562	Reserved by the system	0	0 to 3999		
563	Reserved by the system	0	0 to 6999		
564	Reserved by the system	00000000H	0H to FFFFFFFFH		
565	Reserved by the system	0	0 to 3999		
566	Reserved by the system	0	0 to 6999		
567	Reserved by the system	00000000H	0H to FFFFFFFFH		
568	Reserved by the system	0	0 to 3999		
569	Reserved by the system	0	0 to 6999		
570	Reserved by the system	00000000H	0H to FFFFFFFFH		
571	Reserved by the system	0	0 to 3999		
572	Reserved by the system	0	0 to 6999		
573	Reserved by the system	00000000H	0H to FFFFFFFFH		
574	Reserved by the system	0	0 to 3999		
575	Reserved by the system	0	0 to 6999		
576	Reserved by the system	00000000H	0H to FFFFFFFFH		
577	Reserved by the system	0	0 to 3999		
578	Reserved by the system	0	0 to 6999		
579	Reserved by the system	00000000H	0H to FFFFFFFFH		
580	Reserved by the system	0	0 to 3999		
581	Reserved by the system	0	0 to 6999		
582	Reserved by the system	00000000H	0H to FFFFFFFFH		
583	Reserved by the system	0	0 to 3999		
584	Reserved by the system	0	0 to 6999		
585	Reserved by the system	00000000H	0H to FFFFFFFFH		
586	Reserved by the system	0	0 to 3999		
587	Reserved by the system	0	0 to 6999		
588	to (For expansion)	0			
592					
593	(Reserved by the system)	0	0 to 6999	-	
594	to (Reserved by the system)	0H	0H to FFFFFFFFH	-	
596					
597	Reserved by the system	0	0 to 6999	-	
598	to 600	0H	0H to FFFFFFFFH	-	
601	Reserved by the system	0	0 to 4		
602	to 603	0	0 to 63		
604	Reserved by the system	63	1 to 63		

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
605 to 606	Reserved by the system	0H	0h to FFFFFFFH		
607	Reserved by the system	1	0 to 5		
608	Reserved by the system	F000000H	0H to FFFFFFFH		
609	Reserved by the system	F05H	0H to FFFFFFFH		
610	Reserved by the system	0H	0H to FFFFFFFH		
611 to 612	(For expansion)	0	0H to FFFFFFFH		
613 to 615	Reserved by the system	0H	0H to FFFFFFFH		
616	Reserved by the system	0	0 to 99999999		
617 to 619	Reserved by the system	0H	0H to FFFFFFFH		
620	Reserved by the system	0	0 to 99999999		
621 to 623	Reserved by the system	0H	0H to FFFFFFFH		
624	Reserved by the system	0	0 to 99999999		
625 to 627	Reserved by the system	0H	0H to FFFFFFFH		
628	Reserved by the system	0	0 to 99999999		
629 to 631	Reserved by the system	0H	0H to FFFFFFFH		
632	Reserved by the system	0	0 to 99999999		
633 to 635	Reserved by the system	0H	0H to FFFFFFFH		
636	Reserved by the system	0	0 to 99999999		
637 to 639	Reserved by the system	0H	0H to FFFFFFFH		
640	Reserved by the system	0	0 to 99999999		
641 to 643	Reserved by the system	0H	0H to FFFFFFFH		
644	Reserved by the system	0	0 to 99999999		
645 to 647	Reserved by the system	0H	0H to FFFFFFFH		
648	Reserved by the system	0	0 to 99999999		
649 to 651	Reserved by the system	0H	0H to FFFFFFFH		
652	Reserved by the system	0	0 to 99999999		
653 to 655	Reserved by the system	0H	0H to FFFFFFFH		
656	Reserved by the system	0	0 to 99999999		

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
657 to 659	Reserved by the system	0H	0H to FFFFFFFH		
660	Reserved by the system	0	0 to 99999999		
661 to 663	Reserved by the system	0H	0H to FFFFFFFH		
664	Reserved by the system	0	0 to 99999999		
665 to 667	Reserved by the system	0H	0H to FFFFFFFH		
668	Reserved by the system	0	0 to 99999999		
669 to 671	Reserved by the system	0H	0H to FFFFFFFH		
672	Reserved by the system	0	0 to 99999999		
673 to 675	Reserved by the system	0H	0H to FFFFFFFH		
676	Reserved by the system	0	0 to 99999999		
677 to 678	Reserved by the system	0H	0H to FFFFFFFH		
679 to 686	(For expansion)	0			
687 to 688	Reserved by the system	0	0 to 8	Unit	
689	Reserved by the system	-1	-1 to 3999		
690	Reserved by the system	-1	-1 to 6999		
691	Reserved by the system	-1	-1 to 3999		
692	Reserved by the system	-1	-1 to 6999		
693 to 700	Reserved by the system	0H	0H to FFFFFFFH		
701	Reserved by the system	0	0 to 256		
702 to 704	(For expansion)	0			
705	Reserved by the system	0H	0H to FFFFFFFH		
706	Reserved by the system	1H	0H to FH		
707	Reserved by the system	-1	-1 to 3999		
708	Reserved by the system	-1	-1 to 6999		
709	Reserved by the system	-1	-1 to 3999		
710	Reserved by the system	-1	-1 to 6999		
711	Reserved by the system	-1	-1 to 3999		
712	Reserved by the system	-1	-1 to 6999		
713	Reserved by the system	-1	-1 to 3999		
714	Reserved by the system	-1	-1 to 6999		
715	Reserved by the system	1	0 to 5		
716	Reserved by the system	0H	0H to FFFFFFFH		
717 to 815	(For expansion)	0			
816 to 847	Reserved by the system	0	0 to 3999		
848 to 850	(For expansion)	0			

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
851	Data IO Output Setting 01 Data Type	0H	0H to FFFFFFFFFH	-	<ul style="list-style-type: none"> * Set 0 when output inactivated. Bits 00 to 03: Output data type <ul style="list-style-type: none"> (0: Output Invalid 1: Power Supply Status 2: Axis Status) Bits 04 to 07: (Reserved) Bits 08 to 15: Output data item <ul style="list-style-type: none"> • Output data type (Bit 00 to 03) = <ul style="list-style-type: none"> "1: Power Supply Status" (0: Output Voltage, <ul style="list-style-type: none"> 1: Auxiliary Winding Voltage, 2: Output Current, 3: Peak Hold Current, 4: Load Ratio, 5: Fan Revolution Speed, 6: Internal Temperature (PCB Temperature)) • Output data type (Bit 00 to 03) = <ul style="list-style-type: none"> "2: Axis Status" (0: Current Position, 1: Current Speed, 2: Alarm Code, 3: Axis Operation Status, 4: Motor Indicated Current (Percentage to Rated), 5: Motor Indicated Current (mA), 6: Position Difference, 7: Overload Level, 8: Motor Feedback Current (Percentage to Rated), 9: Motor Feedback Current (mA)) Bits 16 to 19: Resolution <ul style="list-style-type: none"> (0:1000, 1:100, 2:10, 3:1 4:1/10(0.1), 5:1/100(0.01), 6:1/1000(0.001)) Bits 20 to 23: (Reserved) Bits 24 to 27: Byte Order <ul style="list-style-type: none"> (0: Big Endian, 1: Middle Endian 1 (PDP Endian), 2: Middle Endian 3: Little Endian) Bits 28 to 31: Data Size <ul style="list-style-type: none"> (0:1 byte 1:2 byte (1 word) 2:4 byte (2 word))
852	Data IO Output Setting 01 Unit Type	0H	0H to FFFFFFFFFH	-	<ul style="list-style-type: none"> * Set 0 when output inactivated. Bits 00 to 07: Axis Group Number <ul style="list-style-type: none"> (0: Invalid, 1 to 4: Valid) Bits 08 to 15: Axis Group Constructing Axis Numbers <ul style="list-style-type: none"> (0: Invalid, 1 to 8: Valid) Bits 16 to 31: Top Output Port Number <ul style="list-style-type: none"> (0: Invalid, 300 to 599 Physical Output Port 4000 to 6999 Extension Output Port)
853	Data IO Output Setting 02 Data Type	0H	0H to FFFFFFFFFH	-	(Same as I/O parameter No. 851)
854	Data IO Output Setting 02 Unit Type	0H	0H to FFFFFFFFFH	-	(Same as I/O parameter No. 852)
855	Data IO Output Setting 03 Data Type	0H	0H to FFFFFFFFFH	-	(Same as I/O parameter No. 851)
856	Data IO Output Setting 03 Unit Type	0H	0H to FFFFFFFFFH	-	(Same as I/O parameter No. 852)
857	Data IO Output Setting 04 Data Type	0H	0H to FFFFFFFFFH	-	(Same as I/O parameter No. 851)
858	Data IO Output Setting 04 Unit Type	0H	0H to FFFFFFFFFH	-	(Same as I/O parameter No. 852)
859	Data IO Output Setting 05 Data Type	0H	0H to FFFFFFFFFH	-	(Same as I/O parameter No. 851)
860	Data IO Output Setting 05 Unit Type	0H	0H to FFFFFFFFFH	-	(Same as I/O parameter No. 852)
861	Data IO Output Setting 06 Data Type	0H	0H to FFFFFFFFFH	-	(Same as I/O parameter No. 851)

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
862	Data IO Output Setting 06 Unit Type	0H	0H to FFFFFFFH	-	(Same as I/O parameter No. 852)
863	Data IO Output Setting 07 Data Type	0H	0H to FFFFFFFH	-	(Same as I/O parameter No. 851)
864	Data IO Output Setting 07 Unit Type	0H	0H to FFFFFFFH	-	(Same as I/O parameter No. 852)
865	Data IO Output Setting 08 Data Type	0H	0H to FFFFFFFH	-	(Same as I/O parameter No. 851)
866	Data IO Output Setting 08 Unit Type	0H	0H to FFFFFFFH	-	(Same as I/O parameter No. 852)
867	Data IO Output Setting 09 Data Type	0H	0H to FFFFFFFH	-	(Same as I/O parameter No. 851)
868	Data IO Output Setting 09 Unit Type	0H	0H to FFFFFFFH	-	(Same as I/O parameter No. 852)
869 to 999	(For expansion)	0			

10.2.2 MC Common Parameters

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
1	Default override	100	1 to 100		Used if not specified in program. (Invalid for SIO operation)
2	Valid selection when operation position data deceleration is 0	0	0 to 5		0: "Deceleration = Acceleration" when the deceleration in the operation position data is "0" 1: "Deceleration = 0" when the deceleration in the operation position data is "0"
3	Maximum JOG speed at home return incomplete	30	1 to 250	mm/s	
4	Process type at constant (non-pressing) torque limit excess	0	0 to 9		0: Operation Cancel Level Errors (Recommended) 1: Cancel operation (SEL command output is off) * Priority on overload driver error
5	Reserved by the system	150	0 to 1200	0.1deg	
6	Default division distance	0	0 to 10000	mm	
7	Arch trigger start point check type	0	0 to 5		0: Operated amount and actual position checks 1: Check only operated amount * Valid only for arch motion with each axis coordinate indicated
8	CP safety speed in manual mode	250	1 to 250	mm/s	* All-valid-axis are treated as values that are less than the minimum value of "Axis parameter No. 1 VLMX speed".
9	Reserved by the system	0	to		
10	Default speed	30	1 to 250	mm/s	
11	Default acceleration	0	0 to 200	0.01G	Operation made with the lowest rated acceleration/deceleration speed in axis group when set to 0 * It may differ from the actual rated acceleration in some conditions of the actuator installation.
12	Default deceleration	0	0 to 200	0.01G	Operation made with the lowest rated acceleration/deceleration speed in axis group when set to 0 * It may differ from the actual rated acceleration in some conditions of the actuator installation.
13	Operation Continuous Recovery Speed	30	1 to 250	mm/s (deg/s)	
14	Operation Continuous Recovery Acceleration	30	1 to 200	0.01G	
15	Operation Continuous Recovery Deceleration	30	1 to 200	0.01G	
16	Servo ON check time	150	1 to 999	100ms	Time between acquirement of servo-on start response and status transition to operation ready
17	Positioning Complete Check Time	100	1 to 999	100ms	Time between positioning command issue complete and positioning complete signal turned on ("4C3 Positioning Complete Timeout" occurs when the condition of positioning command 0 and position difference > positioning band exceeds this setting)
18	(For expansion)	0	to		
19	Alarm Reset Signal Output Time	50	1 to 99	ms	
20	(For expansion)	0	to		
21	Home-Return Complete Signal Off Wait Time	50	1 to 99	ms	
22	Driver Shutdown Release Latency	5	0 to 60000	ms	
23 to 30	(For expansion)	0	to		
31	Vision System I/F1 Coordinate Axis Definition	4321H	0H to FFFFFFFFH		Bits 0 to 3: X Direction Axis Number Bits 4 to 7: Y Direction Axis Number Bits 8 to 11: Z Direction Axis Number Bits 12 to 15: R Direction Axis Number Bits 16 to 31: Spare * Valid only for Axis Group No. 1
32	Vision system I/F 1 coordinate datum point offset X	0	-99999999 to 99999999	0.001mm	Robot coordinate X on Vision System I/F coordinate (X = 0, Y = 0) * Setting is to be established at vision system I/F adjustment.

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
33	Vision system I/F 1 coordinate datum point offset Y	0	-99999999 to 99999999	0.001mm	Robot coordinate Y on Vision System I/F 1 coordinate (X = 0, Y = 0) * Setting is to be established at vision system I/F adjustment.
34	Vision system I/F 1 coordinate offset angle	0	-99999999 to 99999999	0.001deg	Rotation angle of Vision System I/F 1 coordinate when robot coordinate is taken as the datum * Setting is to be established at vision system I/F adjustment.
35	Vision system I/F 1 Z-axis direction vision system position judgment datum	0	-99999999 to 99999999	0.001mm	(Related Information: All Axes Parameter No. 130 "Vision System I/F 1 Control 2")
36	Vision system I/F 1 X-axis (GTVD acquirement data) adjustment offset	0	-99999 to 99999	0.001mm	
37	Vision system I/F 1 Y-axis (GTVD acquirement data) adjustment offset	0	-99999 to 99999	0.001mm	
38	Vision system I/F 1 R-axis (GTVD acquirement data) adjustment offset	0	-360000 to 360000	0.001deg	
39	Vision system I/F 1 control 1	0H	0H to FFFFFFFFH		Bits 0 to 3: Reserved by the system Bits 4 to 11: Reserved by the system Bits 12 to 19: Reserved by the system Bits 20 to 23: R-axis adjustment sign reverse (0: Not to reverse code 1: Reverse code) Bits 24 to 31: Reserved
40	Vision system I/F 1 control 2	0H	0H to FFFFFFFFH		Bits 0 to 7: Position judgment datum distance in Z-axis direction [0.1mm] (In installation with robot on top, invalid when set to "0") Bits 8 to 11: Vision Installation Type (0: Solid installation (not installed on robot)) 1: Installation on robot) * Setting is to be established at vision system I/F adjustment Bits 12 to 31: Reserved
41 to 200	(For expansion)	0	to		

10.2.3 Axis Group Parameters

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
1	1st Axis Use Setting	0H	Reference only 0H to FFFFFFFH		1st axis valid setting and driver assignment setting Bits 0 to 3: Axis valid setting 0: Invalid 1: Valid (Driver Connected Axis) 2: Valid (Virtual Driver Axis) Bits 4 to 7: Reserved by the system Bits 8 to 15: Driver Unit Number (1 to 8) * 0 virtual driver axis can be set Bits 16 to 23: Axis Number in Driver Unit (0 to 1) Bits 24 to 31: Reserved by the system
2	2nd Axis Use Setting	0H	Reference only 0H to FFFFFFFH		2nd axis valid setting and driver assignment setting (parameter definitions same as 1st axis)
3	3rd Axis Use Setting	0H	Reference only 0H to FFFFFFFH		3rd axis valid setting and driver assignment setting (parameter definitions same as 1st axis)
4	4th Axis Use Setting	0H	Reference only 0H to FFFFFFFH		4th axis valid setting and driver assignment setting (parameter definitions same as 1st axis)
5	5th Axis Use Setting	0H	Reference only 0H to FFFFFFFH		5th axis valid setting and driver assignment setting (parameter definitions same as 1st axis)
6	6th Axis Use Setting	0H	Reference only 0H to FFFFFFFH		6th axis valid setting and driver assignment setting (parameter definitions same as 1st axis)
7	7th Axis Use Setting	0H	Reference only 0H to FFFFFFFH		7th axis valid setting and driver assignment setting (parameter definitions same as 1st axis)
8	8th Axis Use Setting	0H	Reference only 0H to FFFFFFFH		8th axis valid setting and driver assignment setting (parameter definitions same as 1st axis)
9	Reserved by the system	0	Reference only 0 to 8		
10	Orthogonal Coordinate Conversion Setting	Depended to Actuator / Robot	0 to 9		0: No Orthogonal Coordinate 1: CRS-XB□/XG□ 2: CRS-XZ□Y□ 3: CRS-XZ□Z□ 4: Reserved by the system * Valid only for Axis Group No. 1
11	PC/TP Position Data Protect Setting 1	0	0H to FFFFFFFH		Bits 0 to 3: Protect type (0: Read/write 1: Read only 2: No read/write) Bits 4 to 7: Protect release method (0: Special operation) * Referenced by the PC/TP

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
12	PC/TP Position Data Protect Setting 2	0H	0H to FFFFFFFFH		Bits 0 to 3: Protection Range Max. Position Data Number (10's place, BCD) Bits 4 to 7 Protection Range Max. Position Data Number (100's place, BCD) Bits 8 to 11: Protection Range Max. Position Data Number (1000's place, BCD) Bits 12 to 15: Protection Range Max. Position Data Number (10000's place, BCD) Bits 16 to 19: Protection Range Min. Position Data Number (10's place, BCD) Bits 20 to 23: Protection Range Min. Position Data Number (100's place, BCD) Bits 24 to 27: Protection Range Min. Position Data Number (1000's place, BCD) Bits 28 to 31: Protection Range Min. Position Data Number (10000's place, BCD) * Digit in Protection Range 1 treated as 0 * Referenced by the PC/TP
13	PC/TP Work Coordinate System Data Protection Setting	0H	0H to FFFFFFFFH		Bits 0 to 3: Protect type (0: Read/write 1: Read only 2: No read/write) Bits 4 to 7: Protect release method (0: Special operation) * Referenced by the PC/TP
14	PC/TP Tool Coordinate System Data Protection Setting	0H	0H to FFFFFFFFH		Bits 0 to 3: Protect type (0: Read/write 1: Read only 2: No read/write) Bits 4 to 7: Protect release method (0: Special operation) * Referenced by the PC/TP
15	PC/TP Simple Interference Check Zone Data Protection Setting	0H	0H to FFFFFFFFH		Bits 0 to 3: Protect type (0: Read/write 1: Read only 2: No read/write) Bits 4 to 7: Protect release method (0: Special operation) * Referenced by the PC/TP
16	Orthogonal Coordinate System CP Operation Max. Speed	Depended to Actuator / Robot	Reference only 1 to 9999	mm/s	
17	Orthogonal Coordinate System CP Operation Max. Acceleration	Depended to Actuator / Robot	Reference only 1 to 300	0.01G	
18	Orthogonal Coordinate System CP Operation Max. Deceleration	Depended to Actuator / Robot	Reference only 1 to 300	0.01G	
19	Orthogonal Coordinate System CP Operation Min. Deceleration at Emergency Stop	Depended to Actuator / Robot	Reference only 1 to 300	0.01G	
20 to 100	(For expansion)	0	to		

10.2.4 Axis Parameters

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
1	VLMX speed	0	0 to 9999	mm/s	It should be the rated acceleration set in the driver unit when set to 0. (* It may differ from the actual rated acceleration in some conditions of the actuator installation.)
2	Axis-Specific Min. Deceleration in Emergency	0	0 to 999	0.01G	It should be the rated acceleration set in the driver unit when set to 0. (* It may differ from the actual rated acceleration in some conditions of the actuator installation.)
3	ACMX + Acceleration 1	30	1 to 999	0.01G	Acceleration speed when ACMX Command is executed. · Acceleration of movement in positive direction of the cooperate system · Deceleration of movement in negative direction of the cooperate system Setting is established based on transported weight, installation condition, etc.
4	ACMX - Acceleration 1	30	1 to 999	0.01G	Acceleration speed when ACMX Command is executed. · Acceleration of movement in negative direction of the cooperate system · Deceleration of movement in positive direction of the cooperate system Setting is established based on transported weight, installation condition, etc.
5	ACMX + Acceleration 2	30	1 to 999	0.01G	Same as Axis Parameter No. 3
6	ACMX - Acceleration 2	30	1 to 999	0.01G	Same as Axis Parameter No. 4
7	ACMX + Acceleration 3	30	1 to 999	0.01G	Same as Axis Parameter No. 3
8	ACMX - Acceleration 3	30	1 to 999	0.01G	Same as Axis Parameter No. 4
9	ACMX + Acceleration 4	30	1 to 999	0.01G	Same as Axis Parameter No. 3
10	ACMX - Acceleration 4	30	1 to 999	0.01G	Same as Axis Parameter No. 4
11	SIO and PIO home-return order	0	0 to 16		Executed from smaller
12	Pressing Compulsory Complete Deviation Ratio	5000	1 to 99999		Comparison of deviation to Pressing speed steady deviation + Pressing speed pulse speed * compulsory complete deviation ratio
13	Pressing Current Initial Value	70	1 to 300	%	Current at pressing operation Limited with maximum pressing current
14	Brake Compulsory Release Input Port Number	0	0 to 3999		Brake compulsorily unlocked when applicable port turned on (pay attention to drop) * Invalid when 0 (invalid when Input Port No. 0 indicated)
15	Combination Unit Number	0	0 to 4		Combination number of combination units should be indicated * Axes with same number to be a pair * Wrist unit and ZR units are subject to target
16	Synchronizing Combination Number	0	0 to 4		Combination number for synchronizing setting should be indicated Axes with same number should be a pair for synchronizing
17	Synchronized Slave Axis Offset	0	-99999999 to 99999999	0.001mm	For coordinate adjustment between synchronizing master axis and slave axis Affective to slave axis only
18	Synchronizing Option Type	0H	0H to FFFFFFFFH		Bits 0 to 3: Slave axis integrator valid indication (0: Integrator Valid, 1: Integrator Invalid, Affective to slave axis only)
19	(For expansion)	0	to		For maintenance information alert feature Alert feature invalid when set to 0
20	Total Moving Count Setting	0	0 to 99999999	回	"231: Moving Count Setting Exceeded" occurs when maintenance information "Total Moving Count" exceeds this parameter
21	Zone1 Positive Side	0	-99999999 to 99999999	0.001mm	Only Positive side > Negative side valid * Necessary to secure 3msc or more for domain going-through time

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
22	Zone1 Negative Side	0	-99999999 to 99999999	0.001mm	Only Positive side > Negative side valid * Necessary to secure 3msec or more for domain going-through time
23	Zone 1 Output No.	0	0 to 6999		Physical output port or Global Flag or Extended Output Ports (Output invalid when set to 0, invalid when duplicated)
24	Zone2 Positive Side	0	-99999999 to 99999999	0.001mm	Only Positive side > Negative side valid * Necessary to secure 3msec or more for domain going-through time
25	Zone2 Negative Side	0	-99999999 to 99999999	0.001mm	Only Positive side > Negative side valid * Necessary to secure 3msec or more for domain going-through time
26	Zone 2 Output No.	0	0 to 6999		Physical output port or Global Flag or Extended Output Ports (Output invalid when set to 0, invalid when duplicated)
27	Zone3 Positive Side	0	-99999999 to 99999999	0.001mm	Only Positive side > Negative side valid * Necessary to secure 3msec or more for domain going-through time
28	Zone3 Negative Side	0	-99999999 to 99999999	0.001mm	Only Positive side > Negative side valid * Necessary to secure 3msec or more for domain going-through time
29	Zone 3 Output No.	0	0 to 6999		Physical output port or Global Flag or Extended Output Ports (Output invalid when set to 0, invalid when duplicated)
30	Zone4 Positive Side	0	-99999999 to 99999999	0.001mm	Only Positive side > Negative side valid * Necessary to secure 3msec or more for domain going-through time
31	Zone4 Negative Side	0	-99999999 to 99999999	0.001mm	Only Positive side > Negative side valid * Necessary to secure 3msec or more for domain going-through time
32	Zone 4 Output No	0	0 to 6999		Physical output port or Global Flag or Extended Output Ports (Output invalid when set to 0, invalid when duplicated)
33	Output Number while Servo-on	0	0 to 6999		Physical output port or Extended Output Ports (Output invalid when set to 0, invalid when duplicated)
34	In-Position Output Number	0	0 to 6999		Physical output port or Extended Output Ports (Output invalid when set to 0, invalid when duplicated) * Output off when pressing missed
35	(For expansion)	0	to		
36	Reserved by the system	100	50 to 100	%	
37	OLWNO Driver overload warning output No	0	0 to 6999		Physical output port or Extended Output Ports (Output invalid when set to 0, invalid when duplicated) * Contact b
38 to 40	(For expansion)	0	to		

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
41	Axis Select for Appliance of Multi-Slider Over Approach Detection	0H	0H to FFFFFFFFH		<p>Bits 0 to 3: Mating axis number to apply over approach detection (self-axis coordinate positive movement side)</p> <p>Bits 4 to 7: Mating axis number to apply over approach detection (self-axis coordinate negative movement side)</p> <ul style="list-style-type: none"> * Necessity of mutual input with mating axis (The smaller axis number in a pair is the multi-slider master axis for convenience.) * Axes with same characteristics on resolution related are available to select. * Make sure to select the synchro-master axis when synchronizing type (forbidden to select synchro-slave axes). * Set to 0 when there is no slider close to the side of applicable movement of the self-axis coordinate.
42	Emergency Deceleration Margin at Multi-Slider Over Approach	5	0 to 999	0.01G	
43	Multi-Slider Setting Bit Pattern 1	12H	0H to FFFFFFFFH		<p>Bits 0 to 3: Multi-slider actual position over approach detection margin (mm) (Valid only on multi-slider master axis parameters)</p> <p>Bits 4 to 7: Multi-slider commanded position over approach detection margin (mm) (Valid only on multi-slider master axis parameters)</p>
44 to 200	(For expansion)	0	to		

10.2.5 Actuator Parameters

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
1	Axis operation type	Depended to Actuator / Robot	Reference only		Bits 8: Operation Type (TYPE) 0: Linear Axis 1: Rotary Axis Bits 9: Rotary Axis Operation Mode (MODE) 0: Normal Mode 1: Index Mode Bits 10: Shortcut Select (NARO) 0: Not Selected 1: Selected
2	Soft limit + side	Depended to Actuator / Robot	Reference only -999999 to 999999	0.01mm	
3	Soft limit - side	Depended to Actuator / Robot	Reference only -999999 to 999999	0.01mm	
5	Ball Screw Lead Length	Depended to Actuator / Robot	Reference only 1 to 99999	0.01mm	Moving amount in one turn of motor
6	Software Limit Margin	Depended to Actuator / Robot	Reference only 0 to 999999	0.01mm	
16	Pressing Stop Judgment Time	Depended to Actuator / Robot	Reference only 0 to 9999	ms	
17	Position Gain	Depended to Actuator / Robot	Reference only 0 to 9999	rad/s	
19	Initial Positioning Band	Depended to Actuator / Robot	Reference only 1 to 9999	0.01mm	
25	Soft Limit + after Combination Unit Adjusted	Depended to Actuator / Robot	Reference only -99999999 to 99999999	0.001mm 0.001deg	
26	Soft Limit - after Combination Unit Adjusted	Depended to Actuator / Robot	Reference only -99999999 to 99999999	0.001mm 0.001deg	
29	Multiple Slider Excess Approach Detection Effective Stroke	Depended to Actuator / Robot	Reference only 0 to 99999999	0.001mm	
30	Position Feed Forward Gain	Depended to Actuator / Robot	Reference only 0 to 100		
32 to 100	(For expansion)	0H	Reference only 0H to FFFFFFFFH		

10.2.6 Option Board Parameters

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
1	Type (upper) (Manufacturing information)		Reference only Four-digit ASCII code		For manufacturer use for adjustment
2	Type (middle) (Manufacturing information)		Reference only Four-digit ASCII code		For manufacturer use for adjustment
3	Type (lower) (Manufacturing information)		Reference only Four-digit ASCII code		For manufacturer use for adjustment
4 to 7	Manufacturing data (Manufacturing information)		Reference only 4 digits ' ' ~ 'z'		For manufacturer use for adjustment
8	Board type (Function information)	8	Reference only 0 to 255		For manufacturer use for adjustment
9	Function information 01 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
10	Function information 02 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
11	Function information 03 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
12	Function information 04 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
13	Function information 05 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
14	Function information 06 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
15	Function information 07 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
16	Function information 08 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
17	Function information 09 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
18	Function information 10 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
19	Function information 11 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
20	Function information 12 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
21	Function information 13 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
22	Function information 14 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
23 to 52	Device parameter (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
53	Query information 01 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
54	Query information 02 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
55	Query information 03 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
56	Query information 04 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
57	Query information 05 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
58	Query information 06 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
59	Query information 07 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
60	Query information 08 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
61	Query information 09 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
62	Query information 10 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
63	Query information 11 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
64	Query information 12 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
65	Query information 13 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
66	Query information 14 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
67	Query information 15 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
68	Query information 16 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
69	Query information 17 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
70	Query information 18 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
71	Query information 19 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
72	Query information 20 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
73	Query information 21 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
74	Query information 22 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
75	Query information 23 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
76	Query information 24 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
77	Query information 25 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
78	Query information 26 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
79	Query information 27 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
80	Query information 28 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
81	Query information 29 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
82	Query information 30 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
83	Query information 31 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
84	Query information 32 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
85	Query information 33 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
86	Query information 34 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
87	Query information 35 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
88	Query information 36 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
89	Query information 37 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
90	Query information 38 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
91	Query information 39 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
92	Query information 40 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
93	Query information 41 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
94	Query information 42 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
95	Query information 43 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
96	Query information 44 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
97	Query information 45 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
98	Query information 46 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
99	Query information 47 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment
100	Query information 48 (by board type)	0000H	Reference only 0000H to FFFFH		For manufacturer use for adjustment

10.2.7 Other Parameters

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
1	Auto-start program number	0	0 to 512		(Invalid if "0" is set) The start trigger is determined from the "I/O processing program start type at operation/program abort." (Note: This program will be started before confirming an abort of other programs.) (Invalid if "0" is set) * If the setting is valid, the number of user program tasks that can be used will decrease by 1.
2	I/O processing program number at operation/program abort	0	0 to 512		This program will be started when an all-operation-pause command is issued due to an all-operation-pause factor. (Only when a program is running) (Invalid if "0" is set) * If the setting is valid, the number of user program tasks that can be used will decrease by 1.
3	I/O processing program number at all operation pause	0	0 to 512		0: Cancel only the program in which an error of operation-cancellation level or higher has generated. (If the error requires the drive source to be cut off or a servo-OFF or all-axis servo-OFF request to be issued, all programs other than the "I/O processing program at operation/program abort" will be cancelled.) 1: Cancel all programs other than the "I/O processing program at operation/program abort" when an error of operation-cancellation level or higher has generated.
4	Program abort type at error	0	0 to 5		0: When all-operation-cancellation factor has generated (Only when a program is running) 1: When all-operation-cancellation factor has generated (Always) 2: All-operation-cancellation factor + Error of operation-cancellation level or higher ("Other parameter No. 4 = 0" is considered) (Only when a program is running) 3: All-operation-cancellation factor + Error of operation-cancellation level or higher ("Other parameter No. 4 = 0" is considered) (Always)
5	I/O processing program start type at operation/program abort	0	0 to 5		* The setting will become effective after the controller, PC or TP is restarted.
6	PC/TP reconnection delay at software reset	14000	1 to 99999	ms	
7 to 8	(For expansion)	0			
9	Reserved by the system (change is prohibited)	0	0 to 9		0: Abort operations/programs 1: Recovery after reset 2: Operation continued (Only during automatic operation). * Operation commands from the PC software/TP will be aborted on the PC software/TP side.) 3: Abort operations/programs (Software reset when the emergency stop is reset. The home-return completion status of incremental-encoder axes will be reset (EG approximation swap).) 4: Abort operations/programs (Error reset (only with an error of operation-cancellation level or lower) and auto-start program start (only if AUTO mode AND I/O parameter No. 33 = 1 AND I/O parameter No. 44 ≠ 1 AND all-operation-cancellation factor is not present) when the emergency stop is reset). There must be a minimum interval of 1 second after an emergency stop is actuated before it is reset. Remaining INC encoder axis home-return complete)
10	Emergency Stop Recovery Type	0	0 to 4		

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
11	Enable switch (deadman/enable switch) recovery type	0	0 to 2		0: Abort operations/programs 1: Recovery after reset 2: Operation continued (Only during automatic operation. * Operation commands from the PC/TP will be aborted on the PC/TP side.)
12	Automatic operation recognition type	0	0 to 3		0: Program is running and all-operation-cancellation factor is not present 1: [Program is running or in AUTO mode] and all-operation-cancellation factor is not present
13 to 19	(For expansion)	0			
20	Reserved by the system	2	0 to 2		
21	Manual mode type	Depending on destination of delivery	0 to 5		0: Always enable edit and SIO/PIO start (Initial condition after connection = With safety speed) 1: Select edit and start (with password) (EU, etc.) 2: Always enable edit and SIO/PIO start (Initial condition after connection = Without safety speed (cancellation)) * Referenced by the PC/TP.
22	Control use region	0	0 to 99		0: J, 1: E, 2: EU
23	PSIZ command function type	0	0 to 5		0: Maximum number of position data areas 1: Number of position data used
24	Local variable number for storing SEL communication command return code	99	1 to 99, 1001 to 1099		
25 to 29	(For expansion)	0			
30	Option Password 00	0H	0H to FFFFFFFFH		Reserved (change is prohibited) * Change is prohibited unless instructed by the manufacturer.
31	Option Password 01	0H	0H to FFFFFFFFH		Reserved (change is prohibited) * Change is prohibited unless instructed by the manufacturer.
32	Option Password 02	0H	0H to FFFFFFFFH		Reserved (change is prohibited) * Change is prohibited unless instructed by the manufacturer.
33 to 35	(For expansion)	0H	0H to FFFFFFFFH		
36 to 39	Reserved by the system	0H	0H to FFFFFFFFH		
40	Reserved by the system	83H	Reference only 0H to FFFFFFFFH		
41	Reserved by the system	0H	Reference only 0H to FFFFFFFFH		
42	Reserved by the system	6H	Reference only 0H to FFFFFFFFH		
43	Reserved by the system	0H	0H to FFFFFFFFH		
44	(For expansion)	0			

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
45	Special start condition setting	0	0H to FFFFFFFFH		<p>Bits 0 to 3: Enable start from PC/TP in AUTO mode = Used exclusively by the manufacturer (0: Do not enable, 1: Enable)</p> <p>Bits 4 to 7: PIO program start (input port 000) Single Startup selected (0: Normal, 1: Single Startup) * If set to Single Startup, the next PIO program start (Input Port 000) will not be accepted while the program of the same number as the program which had PIO program start (Input Port 0000) previously is being executed.</p> <p>Bits 8 to 11: Permission of auto program start when all-operation-cancellation factor is present (0: Do not permit, 1: Permit)</p> <p>Bits 12 to 15: Permission of ON edge acceptance for PIO program start (input port 000) when all-operation-cancellation factor is present (0: Do not permit, 1: Permit) * This parameter specifies an ON-edge acceptance condition. If the starting condition is not satisfied, an "Error No. A1E: Start condition non-satisfaction error" will generate.</p>
46	Other setting bit pattern 1	2001H	0H to FFFFFFFFH		<p>Bits 0 to 3: Reserved by the system</p> <p>Bits 4 to 7: Decimal-place rounding selection for real-number → integer-variable assignment in LET/TRAN commands (0: Do not round, 1: Round)</p> <p>Bits 8 to 11: Reserved by the system</p> <p>Bits 12 to 15: Selection of processing to be performed when subroutine first step input condition is not specified when TPCD command = 1 (0: Do not execute, 1: Execute, 2: Error)</p> <p>Bits 16 to 19: Reserved by the system</p> <p>Bits 20 to 23: Continuous recovery movement/operation resumption timing type (0: Resume operation after completion of continuous recovery movement of all axes using the same task (same as before), 1: Hold resumption of operation while any axis is performing continuous recovery operation (This does not mean the system will wait for completion of continuous recovery movement.))</p> <p>Bits 24 to 27: Reserved by the system</p> <p>Bits 28 to 31: Reserved by the system</p>
47	Other setting bit pattern 2	1H	0H to FFFFFFFFH		<p>Bits 0 to 3: Select if using calendar function (0: Not to use 1: Use 2: Not to use (using passed time after having reset)) 3: Reserved by the system * Clear all in the error list after a change is made.</p> <p>Bits 4 to 7: Reserved by the system</p> <p>Bits 8 to 11: Reserved by the system</p> <p>Bits 12 to 31: For future extension</p>
48	(For expansion)	0			
49	Reserved by the system	0	0 to 9		
50	Reserved by the system	0	-99999999 to 99999999		
51	(For expansion)	0			

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
52	Reserved by the system	0			
53	Fan condition monitoring setting 1	1H	0H to FFFFFFFFH		Bit 0: Fan 1 condition monitored (0: Disable, 1: Enable) Bits 1 to 31: Reserved by the system
54	Fan condition monitoring setting 2	20000H	0H to FFFFFFFFH		Bits 0 to 15: Reserved by the system Bits 16 to 19: Fan condition monitoring error level (0: Message level, 1: Cold start level) Bits 20 to 31: Reserved by the system Bits 0 to 3: Protect type (Program) (0: Read/write 1: Read only 2: No read/write) Bits 4 to 7: Protect release method (Program) (0: Special operation) Bits 8 to 11: Reserved by the system Bits 12 to 15: Reserved by the system Bits 16 to 19: Protect type (Symbol) (0: Read/write 1: Read only 2: No read/write) Bits 20 to 23: Protect release method (Symbol) (0: Special operation) Bits 24 to 27: Protect type (Parameter) (0: Read/write 1: Read only 2: No read/write) Bits 28 to 31: Protect release method (Parameter) (0: Special operation) * Referenced by the PC/TP
55	PC/TP data protect setting 1	0H	0H to FFFFFFFFH		Bits 0 to 3: Protect range maximum number (Position) (10's place, BCD) Bits 4 to 7: Protect range maximum number (Position) (100's place, BCD) Bits 8 to 11: Protect range maximum number (Position) (1000's place, BCD) Bits 12 to 15: Protect range maximum number (Position) (10000's place, BCD) Bits 16 to 19: Protect range minimum number. (Position) (10's place, BCD) Bits 20 to 23: Protect range minimum number. (Position) (100's place, BCD) Bits 24 to 31: Reserved by the system * Referenced by the PC/TP
56	PC/TP data protect setting 2	0H	0H to FFFFFFFFH		
57 to 60	Reserved by the system	0H	0H to FFFFFFFFH		
61	Number of Connected Power Supply Unit	0	0 to 5		0: Not Connected 1 to 5: Number of Power Supply Unit Connected
62	Power Supply Unit Communication Retry Count	3	0 to 255		
63 to 200	(For expansion)	0			

10.3 Parameter list (Driver Unit)

10.3.1 Driver Unit Parameter

No.	Parameter name	Unit (Note 1)	Input range	Compatible motor Type (Note 2)					Remarks	Detail page
				P	A	D	S	SC ON		
3	Soft limit - side	mm (deg)	-9,999.99 to 9,999.99	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Fixed at 359.999deg inside in Index Mode	10-50
4	Soft limit - side	mm (deg)	-9,999.99 to 9,999.99	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Fixed at 0deg inside in Index Mode	10-50
5	Homing direction	-	0 to 1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	0: Opposite, 1: Original	10-51
6	Pushing stop recognition time	ms	1 to 9,999	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Used for pressing check in PUSH Command	10-52
7	Servo gain number	-	1 to 31	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	-	Refer to 10.5 Servo gain adjustment	10-53
10	Positioning band initial value	mm (deg)	0.01 to 9,999.99	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Used when not indicated in program	10-54
12	Current limit during positioning stop	%	0 to 70	<input type="radio"/>	-	-	-	-	Torque limit in Excitation Phase Fixed Mode	10-54
13	Current limit during homing	%	0 to 100 0 to 300	<input type="radio"/>	-	-	-	-	Not necessary to change in normal use	10-55 10-55
14	Dynamic brake	-	0 to 1	-	-	-	<input type="radio"/>	<input type="radio"/>	0: Disabled, 1: enabled	10-55
18	Home sensor polarity	-	0 to 2	<input type="radio"/>	<input type="radio"/>	-	<input type="radio"/>	<input type="radio"/>	0: Not to be Used, 1: Albeit Contact, 2: Break Contact	10-55
19	Overrun sensor input polarity	-	0 to 2	-	-	-	<input type="radio"/>	<input type="radio"/>	0: Not to be Used, 1: Albeit Contact, 2: Break Contact	10-56
20	Creep sensor input polarity	-	0 to 2	-	-	-	<input type="radio"/>	<input type="radio"/>	0: Not to be Used, 1: Albeit Contact, 2: Break Contact	10-56
22	Homing offset	mm (deg)	-9,999.99 to 9,999.99	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Offset distance from Z-phase ideal position (positive = direction against end) * Caution for ABS encoder: When a value near multiple of Z-phase distance integer (offset distance 0 included) is set, there is a concern that a coordinate gets misaligned for the amount of Z-phase pulse as the servo gets locked on the Z-phase at ABS reset. Do not attempt to set a value near multiple of Z-phase distance integer. (Secure enough margin to the servo system amplitude.)	10-57
28	Excitation signal detection operation Initial travel direction	-	0 to 1	<input type="radio"/>	<input type="radio"/>	-	-	-	0: Opposite, 1: Original	10-58
29	Excitation signal detection time	ms	1 to 999 50 to 999	<input type="radio"/>	-	-	-	-	Not necessary to change in normal use	10-58

Note 1 The unit (deg) is applicable to the rotary actuator or lever-type gripper. It will be displayed as (mm) on the teaching tool.

Note 2 P: Stepper motor specification, A: AC servo motor specification, D: DC brush-less motor specification, S: 200V AC servo motor specification

The setting at delivery for in each parameter differs depending on the type of actuators. The settings are established based on the specifications before shipped out from our manufacturing plants.

No.	Parameter name	Unit (Note 1)	Input range	Compatible motor Type (Note 2)					Remarks	Detail page
				P	A	D	S	SC ON		
30	Excitation detection type	—	0 to 2	○	—	—	—	—	0: Old System, 1: New System 1, 2: New System 2	10-59
	Pole sense type	—	0 to 2	—	○	—	—	—	0: Current Control, 1: Distance Control 1, 2: Distance Control 2	10-59
31	Velocity loop proportional gain	—	1 to 99,999,999	○	○	○	○	○	Refer to 10.5 Servo gain adjustment	10-60
32	Velocity loop integral gain	—	1 to 99,999,999	○	○	○	○	○	Refer to 10.5 Servo gain adjustment	10-61
33	Torque filter constant	—	0 to 2,500	○	○	○	○	○	Refer to 10.5 Servo gain adjustment	10-62
43	Home confirmation sensor input polarity	—	0 to 2	○	○	—	—	—	0: Not to be Used, 1: Albeit Contact, 2: Break Contact	10-62
54	Current control width number	—	0 to 15	—	○	○	○	○	Change only when instructed by us.	10-62
71	Position feed forward gain	—	0 to 100	○	○	○	○	○	Refer to 10.5 Servo gain adjustment	10-63
72	Drive Cutoff Relay Welding Monitoring Timer	ms	0 to 60,000	—	—	—	—	○	The time in timer to detect welding of motor drive cutoff relay should be set When the value is set in 0 to 9, detection of welding should not be held.	10-64
73	Encoder voltage level	—	0 to 3	—	—	—	○	○	Setting should depend on encoder cable length (Setting should already be established before shipped out)	10-64
75	Electromagnetic Brake Power Supply Monitoring	—	0 to 1	—	—	—	○	○	0: Disabled, 1: Enabled	10-65
76	Belt breaking sensor input polarity	—	0 to 2	—	—	—	○	○	0: Not to be Used, 1: Albeit Contact, 2: Break Contact	10-65
77	Lead size of ball screw	mm (deg)	0.01 to 999.99	○	○	○	○	○		10-66
78	Axis motion type	—	0 to 1	○	○	—	○	○	0: linear Axis 1: Rotary Axis (Angle Control)	10-66
79	Rotary axis mode select	—	0 to 1	○	○	—	○	○	0: Normal, 1: Index Mode	10-67
80	Rotary axis shortcut select	—	0 to 1	○	○	—	○	○	0: Not Selected 1: Selected (Valid only when in Index Mode with INC encoder) 0: Incremental 1: Absolute (Battery-less absolute type / Simple absolute type)	10-68
83	Absolute unit	—	0 to 1	○	○	—	—	—	For over error detection amount setting to soft limit set Driver Unit Parameter No. 3 and No. 4	10-68
88	Software limit margin	mm	0 to 9,999.99	○	○	○	○	○		10-68
139	Home preset value	mm	-9,999.99 to 9,999.99	—	○	—	○	○		10-69
143	Overload load level ratio	%	50 to 100	○	○	○	○	○	Set in % from driver overload error load level (invalid when 100) Refer to 9.4.2 Overload warning	10-70

Note 1 The unit (deg) is applicable to the rotary actuator or lever-type gripper. It will be displayed as (mm) on the teaching tool.

Note 2 P: Stepper motor specification, A: AC servo motor specification, D: DC brush-less motor specification, S: 200V AC servo motor specification

The setting at delivery for in each parameter differs depending on the type of actuators. The settings are established based on the specifications before shipped out from our manufacturing plants.

10.3 Parameter list (Driver Unit)

No.	Parameter name	Unit (Note 1)	Input range	Compatible motor Type (Note 2)					Remarks	Detail page
				P	A	D	S	SC ON		
144	GS magnification upper limit	%	0 to 1,023	○					—	10-71
145	GS velocity loop proportional gain		1 to 99,999,999	○					—	10-71
146	GS velocity loop integral gain		1 to 99,999,999	○					—	10-72
148	Total travel distance threshold	m	0 to 999,999,999	○	○	○	○	○	For maintenance information alert feature Alert feature invalid when set to 0 “206: Target travel distance exceeded” occurs when maintenance information “Total Drive Distance” exceeds this parameter	10-72
150	Linear Absolute Home Preset Value	mm	-9,999.99 to 9,999.99	—	—	—	○	○	The home position should be set for spurious absolute type actuator	10-73
151	Minor malfunction alarm output select	—	0 to 1	○	○	○	○	○	0: Output in Overload Warning 1: Message Level Alarm Output * Set this parameter to 1 when it is required to detect message level alarms occurred on the driver unit in the SEL unit.	10-74
152	High output setting	—	0 to 1	○	—	—	—	—	0: Disabled, 1: enabled	10-74
153	BU velocity loop proportional gain	—	1 to 27,661	○	—	—	—	—	Velocity Loop Proportional Gain when high output setting valid	10-74
154	BU velocity loop integral gain	—	1 to 217,270	○	—	—	—	—	Velocity Loop Integral Gain when high output setting valid	10-75
155	Absolute battery retention time	—	0 to 3	○	○	—	—	—	0: 20 Days, 1: 15 Days, 2: 10 Days, 3: 5 Days	10-75
158	Enabled/disabled axis select	—	0 to 1	○	○	○	—	—	0: Enabled, 1: Disabled	10-76
165	Latency after Shutdown Cancelled	ms	0 to 10,000	—	—	—	○	○	Set the latency before it gets available to turn the servo on after shutdown is released	10-76
166	Startup current limit expansion Function	—	0 to 1	○	—	—	—	—	0: Disabled, 1: Enabled	10-77
184	Regenerative Control Select	—	1 to 2	—	—	—	—	○	1: to 750W, 2: 3000W to	10-78
190	Servo ON delay time adjustment	ms	0 to 9,999	○	—	—	—	—		10-78
194	JOG switch	—	0 to 1	○	○	○	○	○	0: Enabled, 1: Disabled	10-79
195	Virtual axis	mm	0 to 1	○	○	○	○	○	0: Disabled, 1: Enabled	10-80
196	Virtual axis absolute initial position	mm	-9,999.99 to 9,999.99	○	○	—	○	○		10-80
197	Multiple slider excess approach detection activating stroke	mm	0 to 99,999.999	—	—	—	○	○		10-80

Note 1 The unit (deg) is applicable to the rotary actuator or lever-type gripper. It will be displayed as (mm) on the teaching tool.

Note 2 P: Stepper motor specification, A: AC servo motor specification, D: DC brush-less motor specification, S: 200V AC servo motor specification

The setting at delivery for in each parameter differs depending on the type of actuators. The settings are established based on the specifications before shipped out from our manufacturing plants.

10.3.2 Details of Driver Unit Parameter



Caution

- After changing (writing) parameters, perform a software reset or power reboot so that the set values can be reflected.
- The unit (deg) is applicable to the rotary actuator or lever-type gripper. Note that it will be displayed as mm on the teaching tool.

[Soft Limit + Side, Soft Limit - Side (Parameter No. 3, No. 4)]

No.	Name	Unit	Input range	Default initial value setting
3	Soft limit + side	mm (deg)	-9,999.99 to 9,999.99	Actual stroke on + side
4	Soft limit - side	mm (deg)	-9,999.99 to 9,999.99	Actual stroke on - side

0.3 mm (deg) is added to the outside of the effective actuator stroke for the default setting. Change as required to prevent collision when there are obstacles, or when used slightly above effective stroke within the movable range.

The minimum setting unit is 0.01 mm.



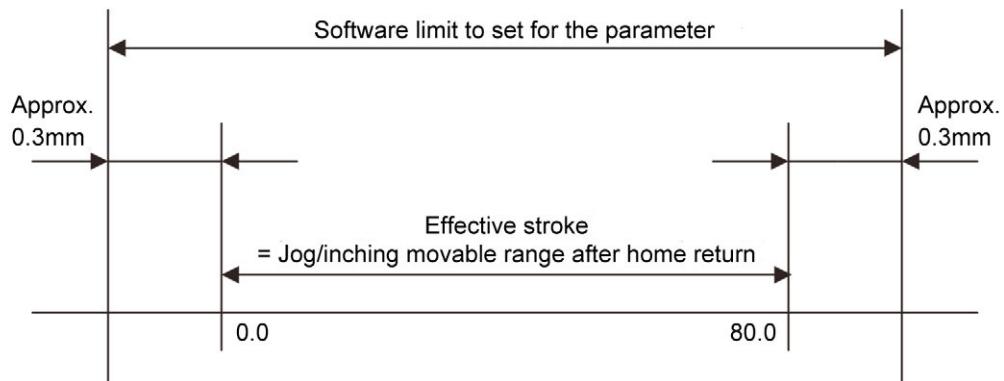
Caution

- At this time, take extra care not to set incorrect values as this will lead to a collision with the mechanical end.
- If changing, set a value extended by 0.3 mm to the outside of the effective stroke.

Example) To set the effective stroke between 0.0 mm and 80.0 mm

Parameter No.3 (+ side) 80.3

Parameter No.4 (- side) -0.3



The movable range of jog or inching after home return will be 0.2 mm inside the set value. Error code 4AC "Actual-position soft limit over error" occurs when the set value exceeds the value set in parameter No. 88 " Software limit margin" (default setting = 0). If parameter No. 88 is not set, the value set for this parameter will become a detection value of the error code 4AC "Actual-position soft limit over error."

[Homing Direction (Parameter No.5)]

No.	Name	Unit	Input range	Default initial value setting
5	Homing direction	—	0: Reverse, 1: Forward	In accordance with actuator

Unless indicated as home reverse specification (option), the direction of home return for the linear axis is on the motor side, the rotary axis is on the counterclockwise side, and the gripper is on the outside (open side).

For details, refer to "Actuator coordinate system (page Intro-17)".



Caution

- Homing direction cannot be changed with some models.
- If it becomes necessary to reverse the homing direction after assembly to equipment, check the model of the applicable actuator to ensure that the homing direction is changeable.
- For models with which change is not possible, the actuator must be replaced. Contact IAI if anything is unclear.

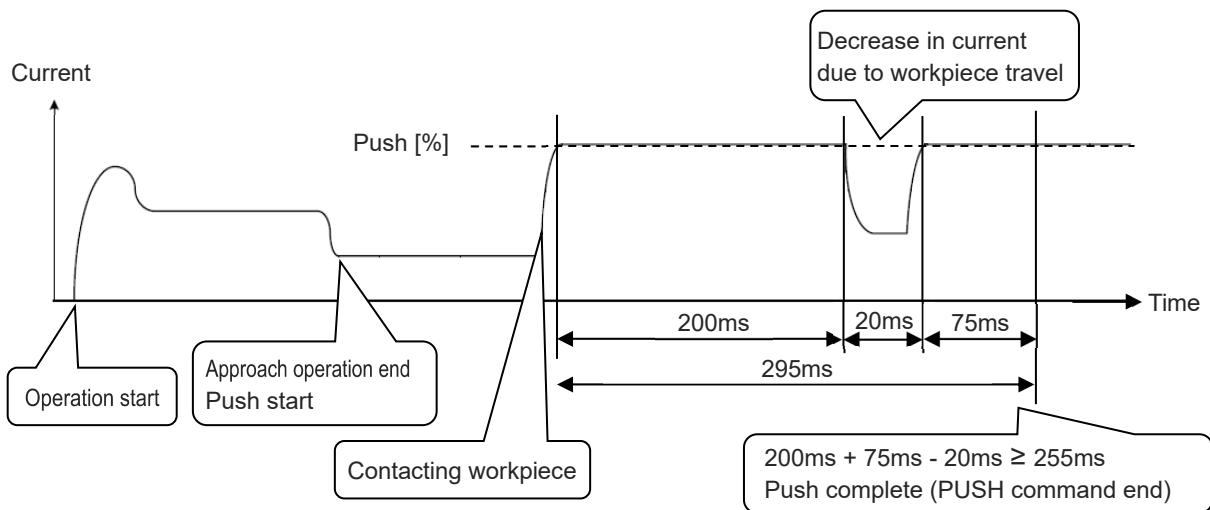
[Pushing Stop Recognition Time (Parameter No. 6)]

No.	Name	Unit	Input range	Default initial value setting
6	Pushing stop recognition time	ms	0 to 9,999	In accordance with actuator

A parameter to set completion judgment time of push-motion operation.

The torque (current limit value) set in % in "Pushing" in the position table is monitored, and the pushing complete signal PEND turns ON when the load current reaches the following conditions during push-motion operation. PUSH command signal turns ends when the conditions are satisfied even if the workpiece is not stopped.

(Accumulated time in which current has reached push value [%]) - (accumulated time in which current is less than push value [%])
 $\geq 255\text{ms}$ (Parameter No.6)



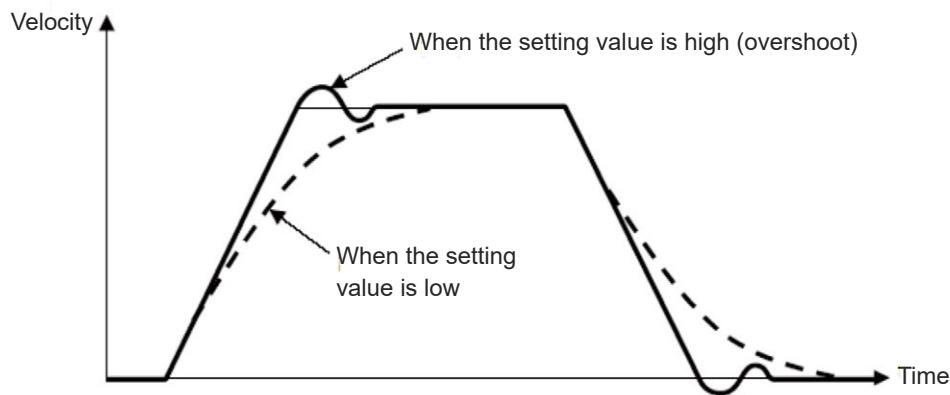
[Servo Gain Number (Parameter No. 7)]

No.	Name	Unit	Input range	Default initial value setting
7	Servo gain number	—	0 to 31	In accordance with actuator

Called position loop gain, position control system proportional gain, etc., this is the parameter that sets the response of the position control loop. The increased set value improves tracking of position command. If it is too high, overshoot may occur.

If the setting value is low, tracking performance with respect to the position command becomes worse, and positioning takes time.

In systems with low mechanical rigidity and systems with low natural frequency, mechanical resonance occurs when the setting value is increased, and this may cause not only vibration and noise, but also overload malfunctions.



[Positioning Band (In-Position) Initial Value (Parameter No. 10)]

No.	Name	Unit	Input range	Default initial value setting
10	Positioning band initial value	mm (deg)	0.01 ^(Note 1) to 999.99	In accordance with actuator

This value should be the initial value for the positioning band width at the movement complete with a movement command (e.g. MOVP Command).

Change is available to make in PBND Command.

**Caution**

For the initial positioning band width, set a value of or higher than the minimum positioning band width.

The minimum resolution can be calculated with the equation below.

Minimum resolution [mm/pulse] = Actuator lead [mm/r] / Encoder resolution [pulse/r]

For RCP2/3/4/5 Series, a value 3 times the minimum resolution will be the minimum positioning width.

Note 1 For RCP4 and RCP5 Series actuators, the minimum setting should be the value for the minimum positioning band width.

[Current Limit During Positioning Stop (Parameter No. 12)]

Stepper motor specification only

No.	Name	Unit	Input range	Default initial value setting
12	Current limit during positioning stop	%	0 to 70	In accordance with actuator

By increasing the value, torque retention during stop will be increased.

There is normally no need to make changes. If significant external force is applied during the stop, it is necessary to increase the set value. Contact IAI.

[Current Limit During Homing (Parameter No. 13)]

No.	Name	Unit	Input range	Default initial value setting	Specifications
13	Current limit during homing	%	0 to 100	In accordance with actuator	Stepper motor specification
			0 to 300		AC servo motor specification DC brush-less motor specification

A current value suited to the actuator standard specifications is set at shipment.

By increasing the value, home return torque will be increased.

There is normally no need to make changes. During vertical use, if home return motion completes before the normal position due to the fixing method or load bearing conditions, it is necessary to increase the set value. Contact IAI.

[Dynamic brake (Parameter No. 14)]

200V AC servo motor specification only

No.	Name	Unit	Input range	Default initial value setting
14	Dynamic brake	–	0 : Disabled, 1 : Enabled	1

This parameter defines whether the dynamic brake is enabled or disabled while the actuator is at standstill.

Normally it need not be changed.

[Home Sensor Polarity (Parameter No. 18)]

AC servo motor specification and stepper motor specification only

No.	Name	Unit	Input range	Default initial value setting
18	Home sensor polarity	–	0 to 2	In accordance with actuator

A parameter to select input polarity of the home sensor.

Home sensor is optional.

Set value	Content
0	Standard specification (home sensor not in use)
1	Input is a contact
2	Input is b contact

[Overrun sensor input polarity (Parameter No. 19)]

200V AC servo motor specification only

No.	Name	Unit	Input range	Default initial value setting
19	Overrun sensor input polarity	—	0 to 2	In accordance with actuator

This parameter is set properly prior to the shipment according to the specification of the actuator.

Set value	Content
0	Standard specification without sensor
1	Over travel detection sensor input is a contact
2	Over travel detection sensor input is b contact

[Creep sensor input polarity (Parameter No. 20)]

200V AC servo motor specification only

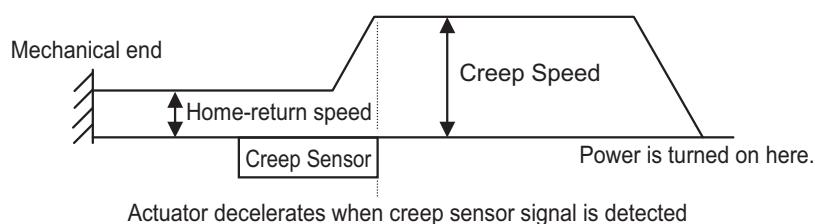
No.	Name	Unit	Input range	Default initial value setting
20	Creep sensor input polarity	—	0 to 2	In accordance with actuator

Even though the movement speed for most of the actuators at the home return is 20mm/s, there are some actuators with other settings. Refer to the instruction manual of each actuator.

Even though the actuator with long stroke requires time to home-return if the power is shut at a point far from the home position, the required time can be improved with using the creep sensor. The actuator moves at the creep speed (100mm/s or less) until a creep sensor signal is detected, upon which the actuator will decelerate to the home return speed.

Creep sensor is an option for the line axis type.

This parameter is set properly prior to the shipment according to the specification of the actuator.



Set value	Content
0	Not to use
1	Input is a contact
2	Input is b contact

[Homing offset (Parameter No. 22)]

No.	Name	Unit	Input range	Default initial value setting
22	Homing offset	mm (deg)	0.00 to 9,999.99	In accordance with actuator

Sets the distance from the mechanical end to the home position.

Home is adjustable in the following cases.

- To match the actuator home position and the mechanical home position after assembly into equipment.
- To set a new home position after reversing the default home direction.
- To eliminate a slight deviation from the previous home position generated after replacing the actuator.

Adjustment process

- (1) Perform home return motion.
- (2) Check amount of deviation.
- (3) Change the parameter.
- (4) After setting, repeat home return motion several times to confirm that the actuator always returns to the same home position.

**Caution**

- If the homing offset has been changed, the software limit parameter also needs to be reviewed.
If the value must be set above the default setting, contact IAI.
- For the absolute specification, if a value close to an integral multiplication of the lead length (including homing offset 0) is set for the homing offset, servo lock status may ensue in the Z-phase during the absolute reset, and coordinates may deviate by the lead length.
- For absolute specification, never set a value close to an integral multiplication of the lead length. Secure sufficient margin.

24V AC servo motor specification
and stepper motor specification only**[Excitation Signal Detection Operation Travel Direction (Parameter No. 28)]**

No.	Name	Unit	Input range	Default initial value setting
28	Excitation signal detection operation travel direction	—	0: Reverse 1: Forward	In accordance with actuator

After turning the power ON, the first servo ON detects excitation. Operation direction during detection is set.

There is normally no need to make changes. Set in a direction which makes movement of the motor easy if the mechanical end or an obstacle is contacted when power is turned ON.

If the direction without contact is the same as the home return direction, set the same value as Parameter No. 5 "Home Return Direction." If the direction is opposite, set the value opposite to that of Parameter No. 5 (1 if No. 5 is 0, 0 if No. 5 is 1).

For simple absolute specification and RCP5 Series, it detects excitation upon home return motion complete.

24V AC servo motor specification
and stepper motor specification only**[Excitation Signal Detection Time (Parameter No. 29)]**

No.	Name	Unit	Input range	Default initial value setting	Specifications
29	Excitation signal detection time	ms	1 to 999	10	Stepper motor specification
			50 to 999	128	24V AC servo motor specification

After turning the power ON, the first servo ON detects excitation. Set this detection time.

There is normally no need to make changes. Adjustment of this parameter can be effective at times when an excitation detection error or abnormal operation has occurred.

Contact IAI when changing this parameter.

For simple absolute specification and RCP5 Series, it detects excitation upon home return motion complete.

[Excitation Detection Type (Parameter No. 30)]

Stepper motor specification only

No.	Name	Unit	Input range	Default initial value setting
30	Excitation detection type	—	0: Conventional mode 1: New mode 1 (For vertical mount) 2: New mode 2 (For horizontal mount)	1

After turning the power ON, the first servo ON detects excitation. The new mode makes this operation smooth and quiet.

For example, if the actuator is mounted vertically, setting new mode 2 (for horizontal mount) may cause the slider or rod to fall during excitation detection operation. Be sure to mount in the designated direction. Set new mode 1 if anything falls even if mounted in the designated direction.

For simple absolute specification and RCP5 Series, it detects excitation upon home return motion complete.

[Pole Sense Type (Parameter No. 30)]

24V AC servo motor specification only

No.	Name	Unit	Input range	Default initial value setting
30	Pole sense type	—	0: Current control 1: Distance control 1 2: Distance control 2	1

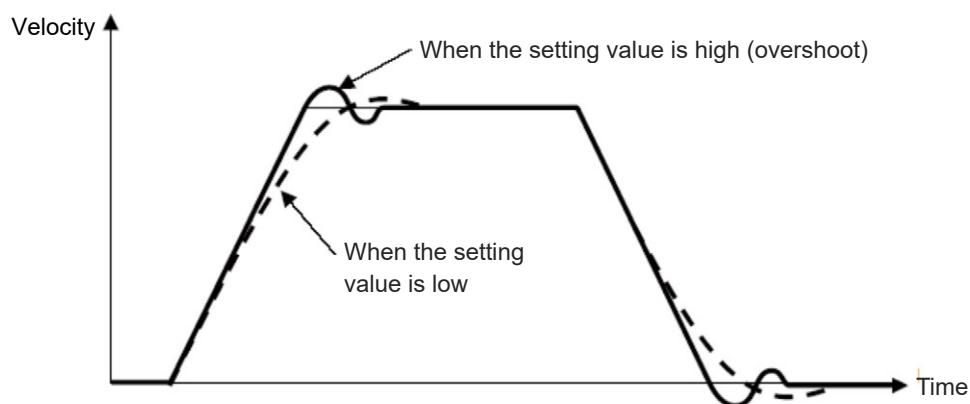
After turning the power ON, the first servo ON detects polarity. The operation method is set at this time.

There is normally no need to make changes.

[Velocity Loop Proportional Gain (Parameter No. 31)]

No.	Name	Unit	Input range	Default initial value setting
31	Velocity loop proportional gain	—	1 to 99,999,999	In accordance with actuator

This parameter determines the response of the velocity loop. The increased set value improves tracking of speed command. The higher the setting value, the greater the load inertia becomes. If it is too high, overshoot and oscillation, as well as vibration in the mechanical system may occur.



For the conditions for using this item in the stepper motor specification, refer to [Selection and use of Velocity Loop Proportional Gain and Velocity Loop Integral Gain] at the bottom of the following page.

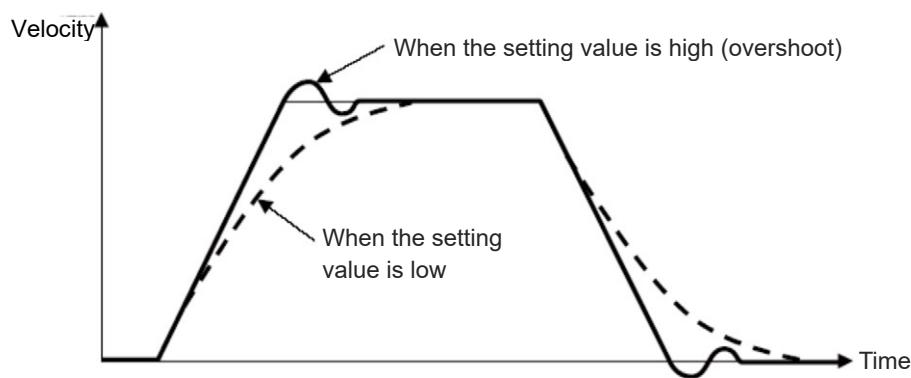
[Velocity Loop Integral Gain (Parameter No. 32)]

No.	Name	Unit	Input range	Default initial value setting
32	Velocity loop integral gain	—	1 to 99,999,999	In accordance with actuator

Machines have friction. "Velocity Loop Integral Gain" is the parameter which corresponds to deviation caused by external factors, such as friction. The increased set value improves the repulsive force against load fluctuation.

If it is too high, overshoot and oscillation, as well as vibration in the mechanical system may occur.

Adjust appropriately while observing the response.



For the conditions for using this item in the stepper motor specification, refer to [Selection and use of Velocity Loop Proportional Gain and Velocity Loop Integral Gain] below.

[Selection and use of Velocity Loop Proportional Gain and Velocity Loop Integral Gain]

Each of the 3 parameters - No. 31, 145, and 153 for Velocity Loop Proportional Gain and Parameters No. 32, 146, and 154 for Velocity Loop Integral Gain - of the stepper motor specification can be set, but only 1 of them will be enabled at the time of operation.

The conditions for selecting which parameter No. setting value is enabled are shown below.

Enabled Parameter No.

		High Output Setting (Parameter No.152)	
		0 (Disabled)	1 (Enabled)
Gain scheduling (Parameter No.144)	~ 100 (Disabled)	Parameters No.31, 32	Parameters No.153, 154
	101 ~ (Enabled)	Parameters No.145, 146	Parameters No.145, 146

[Torque Filter Constant (Parameter No. 33)]

No.	Name	Unit	Input range	Default initial value setting
33	Torque filter constant	—	0 to 2,500	In accordance with actuator

This parameter sets the filter time constant for the torque command. This parameter may prevent resonance if vibration or noise is generated during operation due to mechanical resonance. It is effective for torsional resonance of the ball screw (several hundred Hz).

[Home Confirmation Sensor Input Polarity (Parameter No. 43)]

 24V AC servo motor specification
and stepper motor specification only

No.	Name	Unit	Input range	Default initial value setting
43	Home confirmation sensor input polarity	—	0: Sensor not in use 1: a contact 2: b contact	In accordance with actuator

Sets input signal polarity of the home confirmation sensor (optional).

The home confirmation sensor is mounted on the mechanical end. If inverted before reaching the mechanical end due to interference, etc. it will be recognized as a positioning diversion and alarm code 458 "Home sensor undetected error" will be output.

There is normally no need to make changes.

Set value	Content
0	Home confirmation sensor not in use
1	Sensor polarity is a contact
2	Sensor polarity is b contact

[Current Control Width Number (Parameter No. 54)]

 AC Servo Motor Specification and
DC brush-less motor specification only

No.	Name	Unit	Input range	Default initial value setting
54	Current control width number	—	0 to 15	In accordance with actuator

This parameter is a manufacturer adjustment parameter that determines the responsiveness of the current loop control. Therefore, it must not be changed. The stability of the control system may be impaired, which is extremely dangerous.

[Positional Feedforward Gain (Parameter No. 71)]

No.	Name	Unit	Input range	Default initial value setting	Specifications
71	Positional feed forward gain	–	0 to 100	0	AC servo motor specification Stepper motor specification
				50	DC brush-less motor specification

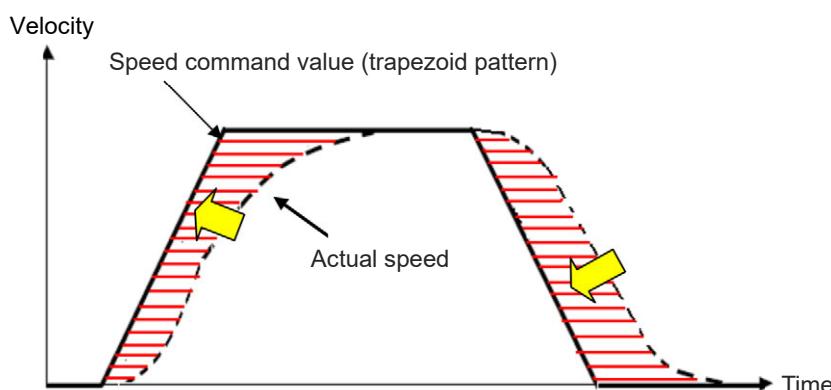
Sets the feed forward gain amount of the position control system.

Performing this setting increases the servo gain and improves responsiveness of the position control loop. Properly adjust Parameter No. 7 "Servo Gain Number" and Parameter No. 31 "Velocity Loop Proportional Gain", etc., to further improve the tact time and following performance. As a result, positioning time can be shortened.

Gain adjustment of position, speed, and current loop in the feedback control directly changes the response of the servo control system, so affecting the stability of the control system due to inappropriate setting may cause vibration and abnormal noise. However, this parameter only changes the speed command value, so it is irrelevant to the servo loop, and it does not make the control system unstable or generate persistent vibration and noise. However, if the setting is excessive, every time it operates, vibration and noise may be generated until the machine follows the command value.

For the trapezoidal operation pattern, the value obtained by multiplying speed command by "feed forward gain" is added to the speed command so as to reduce the following delay of the speed and the position deviation.

Control delay occurs in feedback control that performs control according to the results. In contrast, compensation control independent of control delay is performed.

**Caution**

- Vibration damping control function cannot be used when using feed forward gain (setting other than 0).

[Timer period for emergency stop relay fusing monitor (Parameter No. 72)]

No.	Name	Unit	Input range	Default initial value setting
72	Timer period for emergency stop relay fusing monitor	msec	0 to 60,000	3,000

This parameter defines the timer period in which fusing of the emergency stop relay for cutting off the motor drive power is detected.

If the motor AC power is not cut off after elapse of the timer period set by this parameter following the cutoff of the driver power, the control will recognize that the relay has been fused and generate an alarm.

Normally this parameter need not be changed. When a value between 0 and 9 is set, no fusing is detected.

[Encoder voltage level (Parameter No. 73)]

200V AC servo motor specification only

No.	Name	Unit	Input range	Default initial value setting
73	Encoder voltage level	-	0 to 3	Depending on encoder cable length

To stabilize encoder detection signals, this parameter defines the voltage supplied to the encoder circuit to one of four levels in accordance with the encoder type and the length of the encoder relay cable.

Normally this parameter need not be changed. If you have changed the length of the encoder relay cable after the shipment, the value of the parameter may be changed.

If you wish to change this parameter, always consult us in advance. If the setting is not optimum, it may cause an operation error of the actuator or malfunction of the encoder.

[Electromagnetic brake power monitor (Parameter No. 75)]

No.	Name	Unit	Input range	Default initial value setting
75	Electromagnetic brake power monitor	–	0: Disabled 1: Enabled	In accordance with actuator

A power monitor function is provided to prevent actuator malfunction or breakdown of parts caused by an abnormal voltage of the 24V DC brake power supply when an actuator with brake is used.

Normally this parameter need not be changed because it has been set properly prior to the shipment in accordance with the actuator, i.e. whether or not the actuator is equipped with brake.

Set value	Content
0	Disabled (no brake)
1	Enabled (with brake)

**Caution**

- If this parameter is set to “Disabled”, no brake control is provided.

[Belt breaking sensor input polarity (Parameter No. 76)]

200V AC servo motor specification only

No.	Name	Unit	Input range	Default initial value setting
76	Belt breaking sensor input polarity	–	0 to 2	In accordance with actuator

Set the sensor input polarity for Alarm Code 634 “Belt breakage error” for Ultra-High Thrust Type RCS2-RA13R.

Set value	Content
0	not used
1	Input is a contact
2	Input is b contact

[Lead Size of Ball Screw (Parameter No. 77)]

No.	Name	Unit	Input range	Default initial value setting
77	Ball screw lead length	mm	0.01 to 999.99	In accordance with actuator

Sets ball screw lead length.

A value suited to the actuator characteristics is set at shipment.

**Caution**

- Changing the setting will not only make operation at the instructed speed, acceleration/deceleration or travel distance impossible but also cause an alarm or malfunction to occur.

[Axis Motion Type (Parameter No. 78)]

No.	Name	Unit	Input range	Default initial value setting
78	Axis motion type	—	0: Linear axis 1: Rotary axis	In accordance with actuator

Sets the type of actuator to use.

Connecting actuator	Set value	Remarks
Linear axis	0	Actuator other than rotary type
Rotary axis	1	Rotary type actuator

**Caution**

- Do not attempt to change the setting. This may lead to alarms or malfunctions.

[Rotary Axis Mode Select (Parameter No. 79)]

No.	Name	Unit	Input range	Default initial value setting
79	Rotary axis mode select	—	0: Normal mode 1: Index mode	In accordance with actuator

Sets rotary axis mode.

When parameter No. 78 "Axis Motion Type" is set to "1: Rotary axis," the present value expression will be fixed to 0 ~ 359.99 by selecting index mode. Selection of the index mode will enable shortcut control.

Set value	Content
0	Normal mode
1	Index mode

Index mode cannot be specified with an absolute specification actuator.

**Caution**

- Push-motion operation is not available during index mode. Even if data is input for the push-motion of position data, it will become invalid and normal travel will be executed. Also, the positioning width will be the parameter positioning width initial value.
- When changing the index mode setting to normal mode, the software limit value should also be changed. If the software limit value is set to 0, a parameter data error will occur. Value extended by 0.3mm to the outside of the effective stroke should be set.
- In DD motor, switchover between the normal mode and the index mode cannot be made in this parameter. Do not attempt to change the settings.

[Rotary Axis Shortcut Select (Parameter No. 80)]

No.	Name	Unit	Input range	Default initial value setting
80	Rotary axis shortcut select	—	0: Disabled, 1: Enabled	In accordance with actuator

Sets whether to enable or disable shortcut when positioning other than relative position travel with multi-rotation specification rotary actuator.

Shortcut refers to performing an operation in a direction that requires less travel towards the next positioning.

Set value	Content
0	Shortcut disabled
1	Shortcut enabled

For details, refer to "10.4 Parameters for Linear / Rotation Controls (page 10-81)".

24V AC servo motor specification and
stepper motor specification only

[Absolute Unit (Parameter No.83)]

No.	Name	Unit	Input range	Default initial value setting
83	Absolute unit	—	0: Not in use, 1: Used	0 (not in use)

For stepper motor specification

Set 1 for simple absolute specification.

For the battery-less absolute specification, the factory default value is 1. Change the setting to 0 when using in incremental specification.

For 24V AC servo motor specification

Set 1 for simple absolute specification.

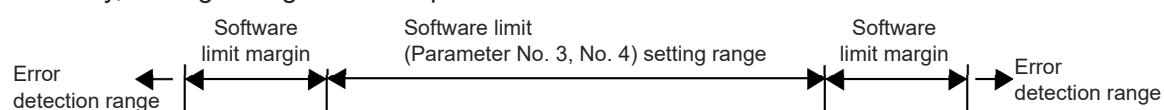
Battery-less absolute specification cannot be used in incremental specification.

[Software Limit Margin (Parameter No. 88)]

No.	Name	Unit	Input range	Default initial value setting
88	Software limit margin	mm (deg)	0 to 9,999.99	0

A parameter for over error detection setting with regard to the values set for Parameter No. 3 and Parameter No. 4.

Normally, setting change is not required.



[Home preset value (Parameter No.139)]

AC servo motor specification only

No.	Name	Unit	Input range	Default initial value setting
139	Home preset value	mm	-9,999.99 to 9,999.99	In accordance with actuator

When using an actuator of absolute specification, set "homing offset value+ this parameter set value" within the range of "0 to ball screw lead length". (Z-phase near the mechanical end must be registered as reference)

The allowable values are multiples of \pm ball screw lead length including 0.00.

(0.00 if the homing offset value is within the range of 0 to ball screw lead length)

Also, if a value other than 0.00 is set to this parameter, the home return complete position will not be 0.00, but the home position + this parameter position.

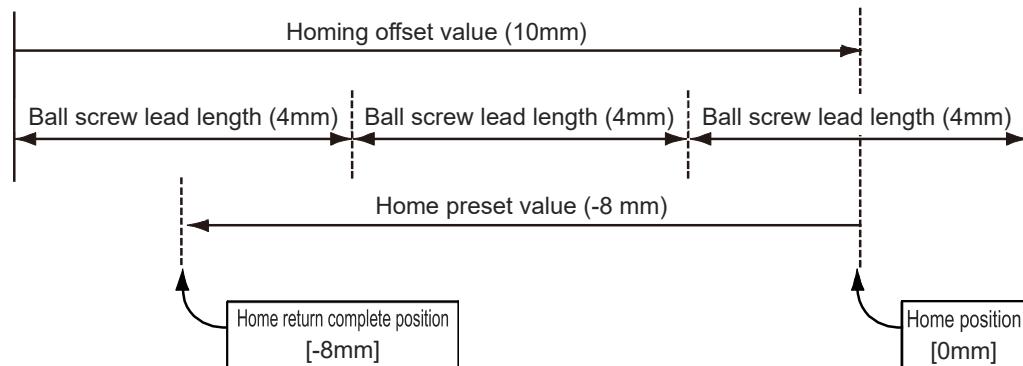
For the incremental specification actuator, be sure to set to 0.00.

**Caution**

- If the homing offset value and this parameter setting do not meet the above conditions, the home position may be shifted by the multiple of the ball screw lead length when restarted after home return.

< Example of Setting 1>

For ball screw lead length of 4 mm and homing offset of 10 mm, set this parameter to -8 mm.



[Overload Load Level Ratio (Parameter No.143)]

No.	Name	Unit	Input range	Default initial value setting
143	Overload load level ratio	%	50 to 100	100

Outputs error code 22C "Motor drive control error" (message level) when motor temperature exceeds the ratio set in this parameter if motor temperature under rated operation is set as 100%.

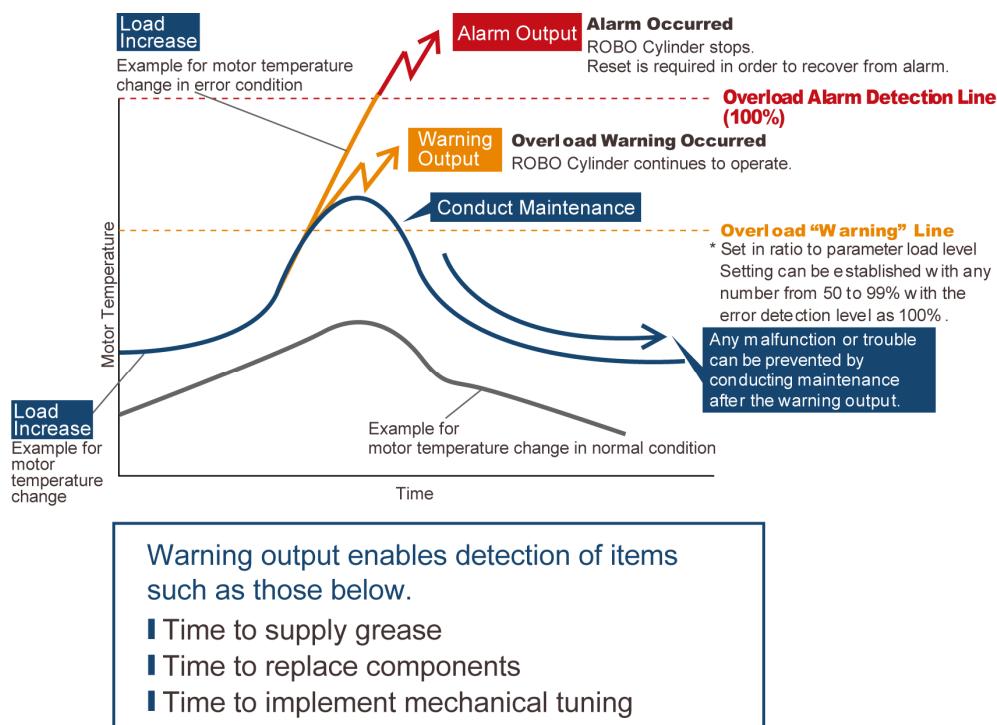
For details, refer to "9.4.2 Overload warning (page 9-10)".

No judgment will be made when set as 100%.

Using this function enables monitoring of motor temperature changes caused by dried-up grease or wear and tear on parts.

A warning is output when the preset value is exceeded.

This enables detection of abnormalities before a breakdown or a malfunction occurs.



[GS Magnification Upper Limit (Parameter No.144)]

No.	Name	Unit	Input range	Default initial value setting
144	GS magnification upper limit	%	0 to 1,023	0 (Disabled)

Gain scheduling is a function that changes the gain according to the operation speed.

For this parameter, set the high magnification to change the gain.

The set value of GS Velocity Loop Proportional Gain (Parameter No. 145) and GS Velocity Loop Integral Gain (Parameter No. 146) changes at the set magnification.

Set value	Description
100 or less	Gain scheduling disabled
101 to 1,023	Gain scheduling enabled (Recommended value 300)

[GS Velocity Loop Proportional Gain (Parameter No. 145)]

Stepper motor specification only

No.	Name	Unit	Input range	Default initial value setting
145	GS velocity loop proportional gain	—	1 to 99,999,999	In accordance with actuator

When Parameter No. 144 "GS Magnification Upper Limit" is set to 101 or higher, the setting of this parameter becomes valid for the Velocity Loop Proportional Gain.

For details, refer to Parameter No. 31 "Velocity Loop Proportional Gain (page 10-60)".

For the conditions for using this item, refer to [Selection and use of Velocity Loop Proportional Gain and Velocity Loop Integral Gain] on the bottom of page 10-61.

[GS Velocity Loop Integral Gain (Parameter No. 146)]

Stepper motor specification only

No.	Name	Unit	Input range	Default initial value setting
146	GS velocity loop integral gain	—	1 to 99,999,999	In accordance with actuator

When Parameter No. 144 "GS Magnification Upper Limit" is set to 101 or higher, the setting of this parameter becomes valid for the Velocity Loop Integral Gain.

For details, refer to Parameter No. 32 "Velocity Loop Integral Gain (page 10-61)".

For the conditions for using this item, refer to [Selection and use of Velocity Loop Proportional Gain and Velocity Loop Integral Gain] on the bottom of page 10-61.

[Total Travel Distance Threshold (Parameter No. 148)]

No.	Name	Unit	Input range	Default initial value setting
148	Total travel distance threshold	m	0 to 999,999,999	0 (Disabled)

When total travel distance exceeds the set value of this parameter, error code 206 "Target travel distance exceeded" will send a notification.

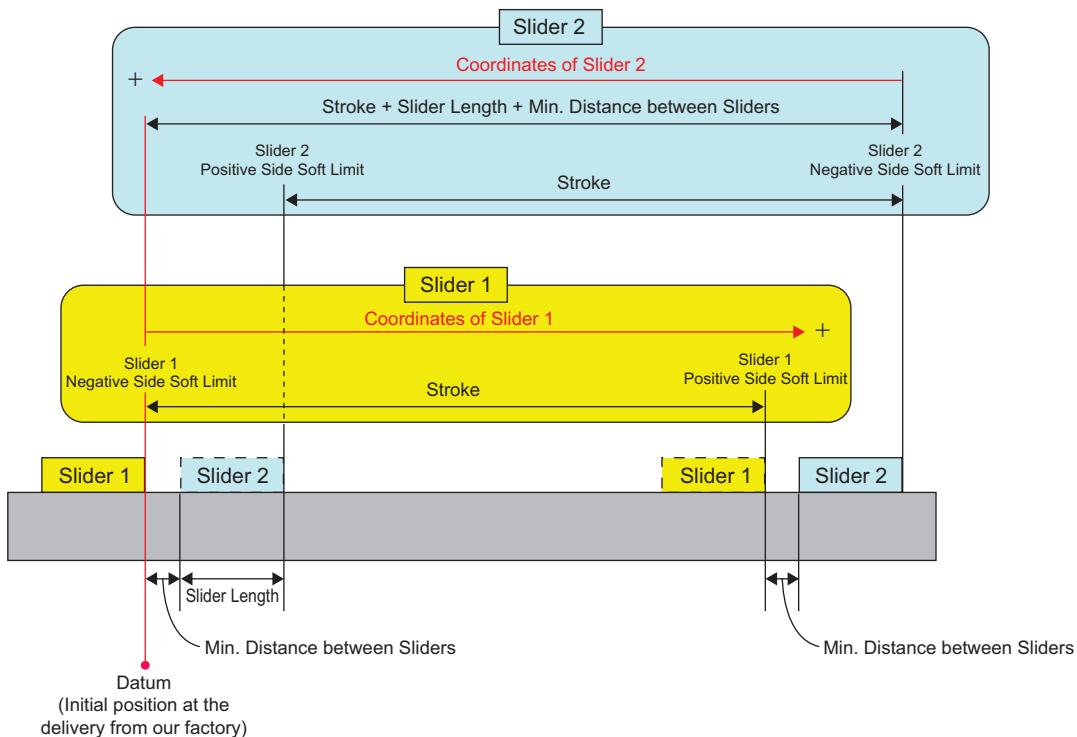
No judgment will be made when set as 0.

200V AC servo motor specification only

[Linear Absolute Home Preset Value (Parameter No. 150)]

No.	Name	Unit	Input range	Default initial value setting
150	Linear Absolute Home Preset Value	mm	-9,999.99 to 9,999.99	In accordance with actuator

This can set the home position of the actuator for Spurious Absolute Type. The diagram below shows the position of each part related to the datum (the initial position at the delivery from our factory):

**Caution**

- Note the initial parameter at the delivery from our factory in a memo before changing the settings.
- Take the initial parameter at the delivery from our factory as the datum when giving a change to the settings.
- After having a change to the settings, make sure to have an operation check with low speed.
- For the spurious absolute type actuator, No.22: Home-return Offset Value and No.139: Home Preset Value are invalid.

[Minor Trouble Alarm Output Select (Parameter No. 151)]

No.	Name	Unit	Input range	Default initial value setting
151	Minor trouble alarm output select	—	0: Overload warning output 1: Message level alarm output	1

If 0 is set, when parameter No. 143 "Overload Load Level Ratio" is exceeded, the minor malfunction alarm signal *ALML will be output.

If 1 is set, when a message level alarm is generated, *ALML signal will be output.

[High Output Setting (Parameter No.152)]

Stepper motor specification only

No.	Name	Unit	Input range	Default initial value setting
152	High output setting	—	0: Disabled 1: Enabled	In accordance with actuator

Set if high output function is to be used. However, it is necessary to connect an actuator that supports high output.

(Actuators that support high output: RCP4, RCP5 and RCP6 Series)

[BU Velocity Loop Proportional Gain (Parameter No. 153)]

Stepper motor specification only

No.	Name	Unit	Input range	Default initial value setting
153	BU velocity loop proportional gain	—	1 to 99,999,999	In accordance with actuator

When Parameter No. 152 "High Output Setting" is enabled and Parameter No. 144 "GS Magnification Upper Limit" is set to 100 or less, the setting of this parameter is enabled for Velocity Loop Proportional Gain.

For details, refer to Parameter No. 31 "Velocity Loop Proportional Gain (page 10-60)".

For the conditions for using this item, refer to [Selection and use of Velocity Loop Proportional Gain and Velocity Loop Integral Gain] on the bottom of page 10-61.

[BU Velocity Loop Integral Gain (Parameter No. 154)]

Stepper motor specification only

No.	Name	Unit	Input range	Default initial value setting
154	BU velocity loop integral gain	—	1 to 99999999	In accordance with actuator

When Parameter No. 152 "High Output Setting" is enabled and Parameter No. 144 "GS Magnification Upper Limit" is set to 100 or less, the setting of this parameter is enabled for Velocity Loop Integral Gain.

For details, refer to Parameter No. 32 "Velocity Loop Integral Gain (page 10-61)".

For the conditions for using this item, refer to [Selection and use of Velocity Loop Proportional Gain and Velocity Loop Integral Gain] on the bottom of page 10-61.

[ABS Battery Retaining Time (Parameter No. 155)]

24V AC servo motor specification and stepper motor specification only

No.	Name	Unit	Input range	Default initial value setting
155	ABS battery retaining time	—	0: 20 days 1: 15 days 2: 10 days 3: 5 days	0

This function is limited to the simple absolute specification. Set encoder positional data retention time after turning the power supply to the actuator OFF. The setting is available in 4 levels. The lower the motor rotation speed setting is, the longer the retention time of the positional data can be. If there is a possibility of external force moving the workpiece conveying components of the actuator such as the slider or rod while power is OFF, refer to the following table and calculate motor revolution based on movement speed and set the value of this parameter faster. If the motor revolution exceeds the set value, positional data will be lost.

The motor rotation speed can be calculated with the equation below.

$$\text{Motor revolution [r/min]} = \text{Movement speed [mm/s]} / \text{Actuator lead [mm]} \times 60 \text{ [s/min]}$$

For details, refer to "3.6 Simple absolute unit 3.6.4 General Specifications (page 3-103)".

Parameter No.155 settings	Upper limit of encoder rotation speed when power is OFF [r/min]		Battery retaining time guideline [days]	Retaining time per 1 hour of charge time (guideline) [h]
	If connected actuator is not RCA2-***NA	If connected actuator is RCA2-***NA		
0	100	75	20	6.6
1	200	150	15	5.0
2	400	300	10	3.3
3	800	600	5	1.6

24V AC servo motor specification,
DC brush-less motor specification
and Stepper motor specification only

[Enabled/Disabled Axis Select (Parameter No. 158)]

No.	Name	Unit	Input range	Default initial value setting
158	Enabled/disabled axis select	—	0: Enabled 1: Disabled	0

Set this parameter disabled when an operation is required with number of axes less than that of purchased.

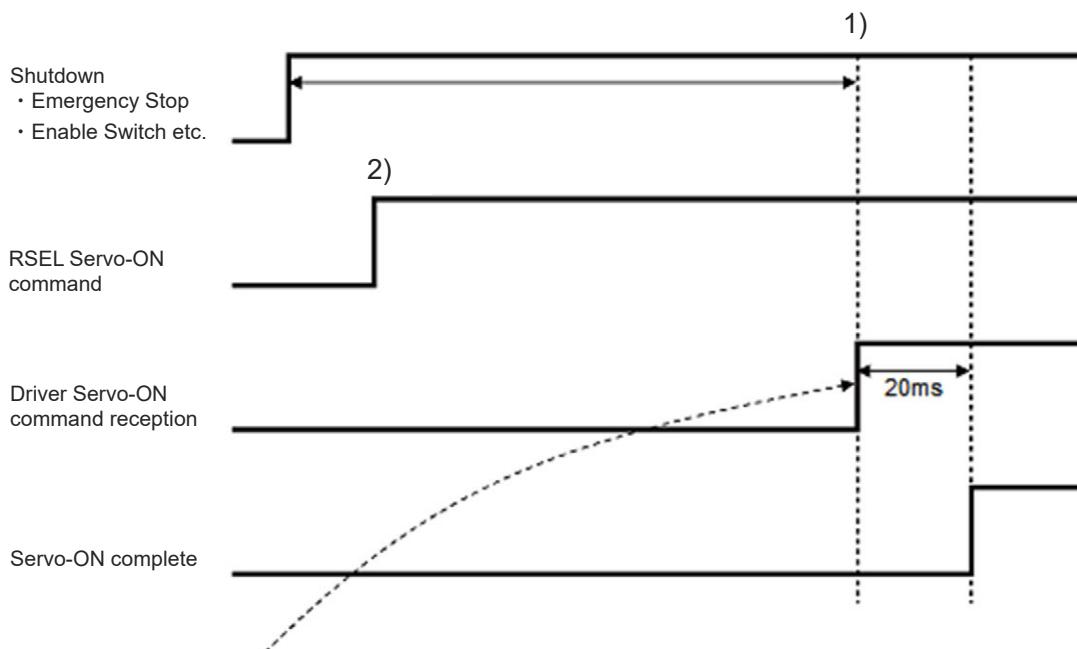
A disabled axis is not available to select in "RSEL Axis Setting".

Disabling an axis after the RSEL axis setting is established should require establishment of the RSEL axis setting again.

[Delay Time after Shutdown Release (Parameter No. 165)]

No.	Name	Unit	Input range	Default initial value setting
165	Delay Time after Shutdown Release	ms	0 to 10,000	0

The setting should be established for the duration till it gets available to have the servo on when it takes time for the rising of the cutoff source due to such a reason as the external drive cutoff circuit at the cancellation of the emergency stop. There is no need of making a change when having a drive cutoff only on an internal drive cutoff relay in a controller.



If the on-edge 2) of external servo-ON command came after the point of passing SDDT time 1), the condition becomes reception of controller internal servo-ON command at the point of 2).

[Startup Current Limit Expansion Function (Parameter No. 166)]

Stepper motor specification only

No.	Name	Unit	Input range	Default initial value setting
166	Startup current limit expansion function	—	0: Disabled 1: Enabled	0 (Disabled)

Change the setting when this feature is necessary in the models stated below.

Applicable Models: RCP2-GRS/GRSS/GRST/GRM/GR3□S/GRLS

When the load is high at the start of movement to the target point, by having high current flowed for a certain period of time, the actuator operates with large force. It is expected to work well on an actuator with high static friction of load such as a condition of getting sticky.

Warning


Do not attempt to set this parameter valid unless necessary.

Make sure to confirm the followings when it is to be changed.

- As it generates high force in case also of load other than static friction, it may cause injury, damage on a workpiece or influence to the actuator life.
 - As current higher than usual flows, it may require higher current amperage.
-

Also, note that this feature would not activate at the start of movement for following situations even if this parameter is set valid.

- 1) Home return
- 2) Operation resumed by cancelling pause
- 3) When movement command is issued during operation
- 4) Movement backward or forward by the actuator pushed due to such as deformation of a workpiece in a condition after pressing operation is finished and there is no next movement command

[Regenerative Control Selection (Parameter No. 184)]

No.	Name	Unit	Input range	Default initial value setting
184	Regenerative Control Selection	—	1: to 750W 2: 30,00W to	In accordance with actuator

Check the motor output of the connected actuator and establish the setting.

Set value	Motor Output
0	to 750W
1	30,00W to

[Servo ON Delay Time Adjustment (Parameter No. 190)]

Stepper motor specification only

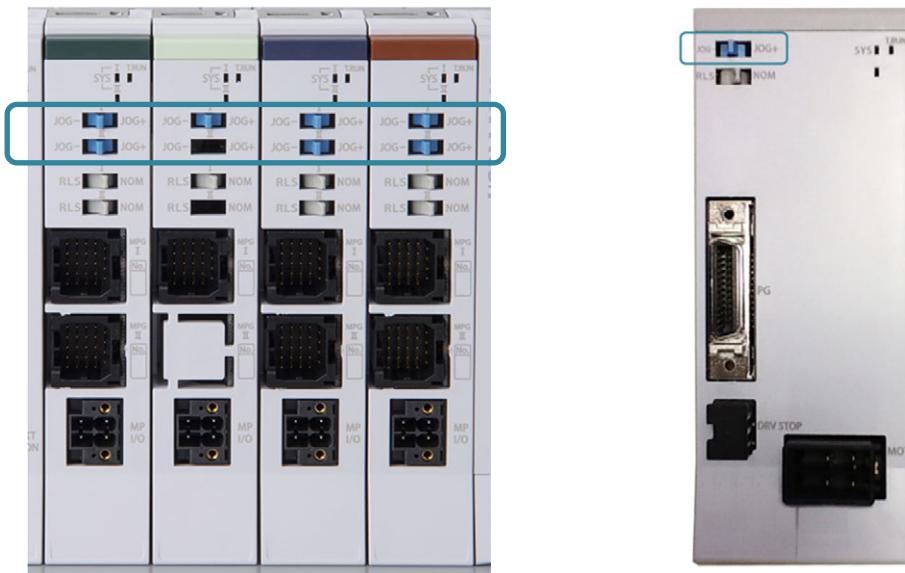
No.	Name	Unit	Input range	Default initial value setting
190	Servo ON delay time adjustment	ms	0 to 9,999	0

This parameter adjusts the time from when servo ON command signal SON is input until servo ON. By shifting the timing of each actuator, instantaneous power can be suppressed when the servo ON command is applied at the same time.

[JOG Switch (Parameter No. 194)]

No.	Name	Unit	Input range	Default initial value setting
194	JOG Switch	—	0: Enabled 1: Disabled	0 (Enabled)

Either Enabled or Disabled can be selected for the JOG switch on the front of the driver unit. When Disabled is selected with this parameter, the actuator does not operate even if the JOG switch is operated.

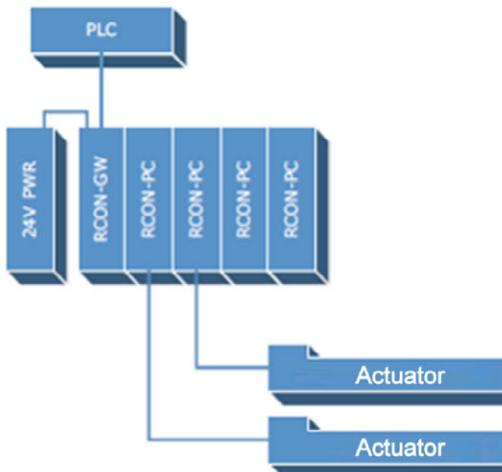


[Virtual Axis (Parameter No. 195)]

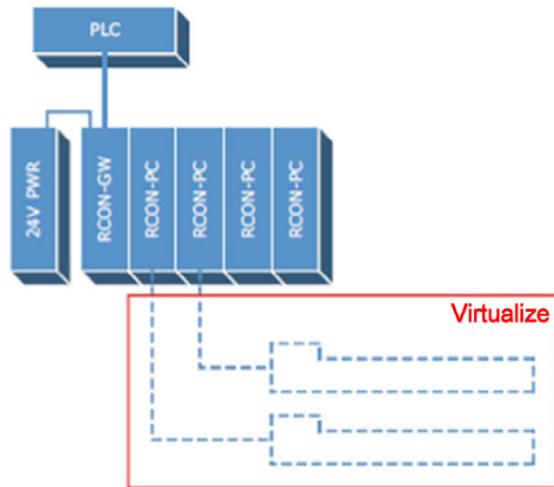
No.	Name	Unit	Input range	Default initial value setting
195	Virtual axis	—	0: Enabled 1: Disabled	0

Status data such as the current position and the current velocity should be generated "as if there was an axis connected".

■ When use with this feature disabled



■ When use with this feature enabled



[Virtual Axis Absolute Initial Position (Parameter No. 196)]

No.	Name	Unit	Input range	Default initial value setting
196	Virtual axis absolute initial position	—	-9,999.99 to 9,999.99	0

The absolute initial position setting of the feature capable of operation simulation without connecting an axis should be established.

* The unit should be [deg] for the rotary.

[Multiple Slider Excess Approach Detection Effective Stroke (Parameter No. 197)]

No.	Name	Unit	Input range	Default initial value setting
197	Multiple slider excess approach detection effective stroke	—	1 to 999,999,999	In accordance with actuator

The setting should be established for the distance between sliders when the target sliders are mostly distanced while the multi-slider too close function is enabled.

10.4 Parameters for Linear / Rotation Controls

Shown in the list below are the combinations of parameters for linear and rotation controls.

O: Available, X: Not Available

Driver Unit Parameter No.78 Axis operation type	Driver Unit Parameter No.79 Rotary Axis Mode Select	Driver Unit Parameter No.80 Rotary Axis Shortcut Control Select	Encoder Process Type Accepted/Un accepted		Current Position Expression (Approximately)	Driver Unit Parameter No.3 Soft limit + side	Driver Unit Parameter No.4 Soft limit - side	Input Unit
			ABS	INC				
0 (linear movement axis)	Disable	Disable	○	○	Counter Range	Enable	Enable	<ul style="list-style-type: none"> • Distance mm • Speed mm/sec • Acceleration/Deceleration G
1 (rotation movement axis)	0 (Normal Mode)	0 (Shortcut control not selected) * Do not set any value except for 0 in normal	○	○	Counter Range	Enable	Enable	<ul style="list-style-type: none"> • angle mm → deg • Angular velocity mm/sec → deg/sec
	1 (Index Mode)	0 (Shortcut control not selected)	x (Note)	○	0 to 359.999 (Rotary)	Disable (Fixed at 359.999 inside)	Disable (Fixed at 0.000 inside)	<ul style="list-style-type: none"> • Angular acceleration and deceleration G = 9807mm/sec² → 9807deg/sec² = 9807×2π/360 rad/sec² <p>* "deg" shows the angle of a solid of revolution on the tip</p>
	1 (Shortcut control not selected)							

Note: Available (O) only for DD(A) motor

[Parameters Related to Rotary Axis Movement]

● Rotary Axis Mode Select (Driver Unit Parameter No.79)

Set the rotation axis mode.

The current value expression should be fixed in 0 to 359.999 if Index Mode is deleted when the setting in Axis Operation Type (Driver Unit Parameter No. 78) is 1: Rotary Axis.

The shortcut control is available when Index Mode is selected.

Set Value	Description
0	Normal Mode
1	Index Mode

● Rotary Axis Shortcut Control Select (Driver Unit Parameter No.80)

Make a setting whether to valid or invalid the shortcut at positioning except for the relative position movement for the multi-rotary type rotary actuator.

Shortcut defines a movement in rotational direction with smaller movement amount to the next positioning operation.

Set Value	Description
0	Disable
1	Enable

10.5 Servo gain adjustment

At shipment from factory, parameters are set so that operation at rated load (maximum) is within the payload capacity of the actuator and with stable operating characteristics.

However, it is difficult to always have the ideal load in the actual site of use. In such cases, it may be necessary to have the servo adjustment.

This section explains the basic servo adjustment method.



Caution

- It is dangerous to make excessive settings suddenly. Damage to the equipment or the actuator or injury may occur, so proceed with caution.
- Also, make sure to keep a record as you work so that it can be restored at any time.
- If you face problems which cannot be resolved, contact IAI.

- Adjustment of stepper motor and AC servo motor

No.	Problems	Adjustment method
1	Shorter cycle time is desired Positioning accuracy is appropriate	<ul style="list-style-type: none"> ● Increase the setting in Driver Unit Parameter No. 7 "Servo Gain Number". By increasing the setting, the trackability to position commands should improve. Reference for setting is between 3 and 10, and should be 15 at maximum. Setting it too high could cause to overshoot easily, which may leads to noise and vibration. When "Servo Gain Number" is increased, adjust also Driver Unit Parameter No. 31 "Velocity Loop Proportional Gain" in increasing wise in order to secure stability of the control system. Adjust "Servo Gain Number" first. When increasing "Velocity Loop Proportional Gain", try to increase little by little by approximately 20% to the initial setting.
2	It is desired to minimize the vibration during acceleration/deceleration	<ul style="list-style-type: none"> ● It is concerned "Acceleration/Deceleration Setting" is too extreme or the structure on the device that the actuator is mounted is too weak. Reinforce the whole device first if possible. ● Decrease "Acceleration/Deceleration Setting". ● Decrease the setting in Driver Unit Parameter No. 7 "Servo Gain Number". By decreasing the setting too much, it could take time to determine.
3	Speed accuracy is appropriate It is desired to minimize the inconstancy in velocity during an operation	<ul style="list-style-type: none"> ● Increase Driver Unit Parameter No. 31 "Velocity Loop Proportional Gain". By setting a bigger number, the follow-up ability to the speed command becomes better. Setting the value too big makes the mechanical components easy to vibrate. As a reference for the setting, increase the value little by little by 20% from the initial setting.

No.	Problems	Adjustment method
4	Abnormal noise is generated. It is desired to minimize high noise generated especially during stop or operation with low speed (50mm/sec or less).	<p>[Important] This phenomenon is likely to occur when the stiffness of the mechanical components is not sufficient. The actuator itself may also resonate if its stroke is over 600mm or it is belt-driven type. Before having an servo adjustment, check if:</p> <ol style="list-style-type: none"> 1) Check if Driver Unit Parameter No. 7 "Servo Gain Number" or Driver Unit Parameter No. 31 "Velocity Loop Proportional Gain" is set in surplus. Check if Driver Unit Parameter No. 31 "Velocity Loop Proportional Gain" is set too low. 2) Check if the stiffness of the load is secured as much as possible. Check if any looseness or play on the attachments. 3) Is the actuator body installed solidly with specified torque? 4) Check if there is any warpage on the actuator attachment base surface. <ul style="list-style-type: none"> ● Input Driver Unit Parameter No. 33 "Torque Filter Time Constant". Try to increase by 50 as a reference for the setting. If the setting is too large, it may cause a loss of control system stability and lead the generation of vibration.
5	Want to increase tracking accuracy Want to increase velocity constancy Want to increase response sensibility	<ul style="list-style-type: none"> ● Adjust the parameters in Driver Unit Parameter No 7 "Servo Gain Number" and Driver Unit Parameter No. 31 "Velocity Loop Proportional Gain" following the adjustment procedures from No. 1 to 3 described above to have the condition optimized. <p>[Reference]</p> <p>Selection of an actuator (motor) is the most important element. Servo is very sensitive to the amount of load inertia. For a servo motor, if the moment of inertia on the load side (load inertia) is too big to the moment of inertia of the motor itself (motor inertia), the motor gets swung by the load, thus the control will become unstable. Therefore, it is necessary to make the load inertia ratio small in order to improve the accuracy in tracking, positioning, velocity constancy or response sensibility.</p> <p>It is recommended to have the lead on the ball screw for the actuator as small as possible and have the actuator with one rank higher motor capacity if accuracy is expected in tracking, velocity constancy or response sensibility for such purpose as painting. The best way is to calculate the load inertia and select the mostly suited actuator.</p>
6	It is desired to have the operation start quicker even with large static friction of the load It is desired to have the response at operation stop quicker even with large inertia of the load Shorter cycle time is desired	<ul style="list-style-type: none"> ● Set Driver Parameter No. 71 "Position Field Forward Gain". As a reference for the setting, it should be from 10 to 50, and as the setting gets high, the deviation gets small, thus the response gets improved. <p>Vibration or noise may get generated if the setting is too high. This setting should be established when it is required to improve the response even more after making an adjustment to Driver Unit Parameter No. 7 "Servo Gain Number" and Driver Unit Parameter No. 31 "Velocity Loop Proportional Gain".</p>

- Adjustment of DC brush-less motor

No.	Problems	Adjustment method																																																												
1	<ul style="list-style-type: none"> • Hunting occurs when positioning stops • Speed irregularity occurs during travel • Speed accuracy is insufficient 	<p>Set the parameters following the procedure below and check the operation. When the motion improves, end the adjustment. There is no need to proceed to the next step.</p> <p>Step 1: Change Driver Unit Parameter No. 32 "Velocity Loop Integral Gain", set the following 5 values in order and check the operation.</p> <table border="1"> <thead> <tr> <th>Setting order</th><th>Velocity loop integral gain setting value</th></tr> </thead> <tbody> <tr> <td>1</td><td>411</td></tr> <tr> <td>2</td><td>592</td></tr> <tr> <td>3</td><td>925</td></tr> <tr> <td>4</td><td>1,645</td></tr> <tr> <td>5</td><td>3,700</td></tr> </tbody> </table> <p>If the operation does not improve, perform step 2.</p> <p>Step 2: Change Driver Unit Parameter No. 31 "Velocity Loop Proportional Gain" and Driver Unit Parameter No. 32 "Velocity Loop Integral Gain"</p> <p>Set the following 6 values in order and check the operation.</p> <table border="1"> <thead> <tr> <th colspan="3">• Load is 0.2 kg or less</th></tr> <tr> <th>Setting order</th><th>Velocity loop proportional gain setting value</th><th>Velocity loop integral gain setting value</th></tr> </thead> <tbody> <tr> <td>1</td><td>42</td><td>382</td></tr> <tr> <td>2</td><td>42</td><td>520</td></tr> <tr> <td>3</td><td>42</td><td>749</td></tr> <tr> <td>4</td><td>42</td><td>1,171</td></tr> <tr> <td>5</td><td>42</td><td>2,081</td></tr> <tr> <td>6</td><td>42</td><td>4,683</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="3">• Load is heavier than 0.2 kg</th></tr> <tr> <th>Setting order</th><th>Velocity loop proportional gain setting value</th><th>Velocity loop integral gain setting value</th></tr> </thead> <tbody> <tr> <td>1</td><td>32</td><td>231</td></tr> <tr> <td>2</td><td>32</td><td>315</td></tr> <tr> <td>3</td><td>32</td><td>453</td></tr> <tr> <td>4</td><td>32</td><td>708</td></tr> <tr> <td>5</td><td>32</td><td>1,259</td></tr> <tr> <td>6</td><td>32</td><td>2,833</td></tr> </tbody> </table> <p>If the operation does not improve, contact IAI.</p>	Setting order	Velocity loop integral gain setting value	1	411	2	592	3	925	4	1,645	5	3,700	• Load is 0.2 kg or less			Setting order	Velocity loop proportional gain setting value	Velocity loop integral gain setting value	1	42	382	2	42	520	3	42	749	4	42	1,171	5	42	2,081	6	42	4,683	• Load is heavier than 0.2 kg			Setting order	Velocity loop proportional gain setting value	Velocity loop integral gain setting value	1	32	231	2	32	315	3	32	453	4	32	708	5	32	1,259	6	32	2,833
Setting order	Velocity loop integral gain setting value																																																													
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2	Abnormal noise In particular, high-pitched noise occurs when stopping or at low speed (20 mm/s or less)	Change Driver Unit Parameter No. 31 "Velocity Loop Proportional Gain" and Driver Unit Parameter No. 32 "Velocity Loop Integral Gain" to the following values and confirm. Velocity Loop Proportional Gain: 32 Velocity Loop Integral Gain: 231																																																												

10.6 Parameter Configuration (Advanced Use)

Making a change to parameters should enable to add features and set dedicated features to the input and output ports.

Shown below are some examples of setting in each operational conditions.

Make a change to the parameter settings on a table in the described pages when having a required operation.

Make sure to read the applicable sections in the parameter list before proceeding to a change to parameters.

Required Operation		Section to Pick Up
1	Would like to have a temporary run without using I/O	10.6.1
2	Would like to have an output to judge activation of automatic operation from RSEL controller	10.6.2
3	Would like to retain the current output status during an emergency stop	10.6.3
4	Would like to launch the emergency program	10.6.4
5	Would like to set up an automatic recovery (reboot) after an emergency stop is canceled	10.6.5
6	Would like to set up an automatic recovery (error reset) after an emergency stop is canceled	10.6.6
7	Would like to have a recovery from the status just before emergency stop was made	10.6.7
8	Would like to have RSEL controller reset externally	10.6.8
9	Would like to have the servo turned on externally	10.6.9
10	Would like to have the home-return operation conducted externally on all the single-axis actuators	10.6.10
11	Would like to have a program in RSEL controller activated externally	10.6.11
12	Would like to have a program activated externally by conducting a command in a program number in binary	10.6.12
13	Would like to have the RSEL controller paused externally	10.6.13
14	Would like to have an error reset conducted externally	10.6.14
15	Would like to release the brake on an actuator externally	10.6.15
16	Would like to toggle AUTO Mode and MANU Mode externally	10.6.16
17	Would like to have the input port assignment changed	10.6.17
18	Would like to output that all the single-axis actuators are at the home positions	10.6.18
19	Would like to output that all the single-axis actuators has completed the home return operation	10.6.19
20	Would like to output that a single-axis actuator has got in the set area (zone)	10.6.20
21	Would like to output an error level	10.6.21
22	Would like to output that an actuator is in an emergency stop	10.6.22
23	Would like to know the current operation mode	10.6.23
24	Would like to have the output port assignment changed	10.6.24
25	Would like to use SIO connectors	10.6.25

10.6.1 Would like to have a temporary run without using I/O

Have the error monitoring in I/O and the fieldbus disabled when a trial run is required before wiring the I/O or the fieldbus.

Parameter No.	Set Value	Description
I/O Parameter No.18	0	Disable I/O Slot Error Monitoring
I/O Parameter No.189	0	Disable PIO Unit / PSIO/SIO Unit Error Monitoring

10.6.2 Would like to have an output to judge activation of automatic operation from RSEL controller

An output to judge whether in automatic operation is available to set in Output Port 303.

Identification of the automatic operation could differ depending on the setting in Other Parameter No. 12.

Parameter No.	Set Value	Description
I/O Parameter No.49	2	Turn on Output Port 303 during automatic operation
Other Parameter No.12	0	Set program under execution to automatic operation
Other Parameter No.12	1	Set program under execution or in AUTO Mode to automatic operation

10.6.3 Would like to retain the current output status during an emergency stop

When you require to retain the current output status after an emergency stop input or a safety gate open, it is necessary to set the range of the input port to be retained.

Parameter No.	Set Value	Description
I/O Parameter No.70	Lower Limit Output Port Number	Set the lower limit the output port to be retained
I/O Parameter No.71	Upper Limit Output Port Number	Set the upper limit the output port to be retained

10.6.4 Would like to launch the emergency program

In order to activate an emergency program after an emergency stop input or a safety gate open, it is necessary to set the emergency program number and the range of the output port to be used.

- * The programs available for operation are only the programs for the I/O process that would not require any movement of an actuator.

Parameter No.	Set Value	Description
Other Parameter No.2	Emergency Program Number	
I/O Parameter No.70	Lower Limit Output Port Number	Set the lower limit the output port to be retained
I/O Parameter No.71	Upper Limit Output Port Number	Set the upper limit the output port to be retained

Also, an emergency program is to be determined for a launch by the following parameters in Other Parameter No. 5 "I/O Process Program Startup Type at Operation / Program Cease".

Parameter No.	Description
Other Parameter No.5	0 : When all operation cancellation cause occurred during program execution 1 : When all-operation-cancellation factor has generated (Launched no matter of program execution) 2 : When all operation cancellation cause occurred during program execution or when error at operation level or higher occurred 3 : When all operation cancellation cause occurred when error at operation level or higher occurred (Launched no matter of program execution)

10.6.5 Would like to set up an automatic recovery (reboot) after an emergency stop is canceled

Execution of a program is available by having an automatic reboot (software reset) conducted after an emergency stop released.

Parameter No.	Set Value	Description
Other Parameter No.1	Execution Program Number	
Other Parameter No.10	3	Conduct reboot (software reset) after emergency stop released
I/O Parameter No.33	1	Execute program after reboot in AUTO Mode

10.6.6 Would like to set up an automatic recovery (error reset) after an emergency stop is canceled

Execution of a program is available by having an automatic error reset conducted after an emergency stop released.

Parameter No.	Set Value	Description
Other Parameter No.1	Execution Program Number	
Other Parameter No.10	4	Conduct error reset after emergency stop released
I/O Parameter No.33	1	Execute program after error reset in AUTO Mode
I/O Parameter No.44	0	Recover drive cutoff after drive cutoff cause (emergency stop) released

10.6.7 Would like to have a recovery from the status just before emergency stop was made

Only [Other Parameter No. 12 Reference] during automatic operation is available for operation continued after an emergency stop was released with the condition just before the emergency stop was input.

Input the on-edge (off → on) to Input Port 005 after the emergency stop switch is released.

Parameter No.	Set Value	Description
Other Parameter No.10	2	Operation Continued after Emergency Stop Released
I/O Parameter No.31	1	Set Input Port 001 as Soft Reset Signal Input Port
I/O Parameter No.35	1	Set Input Port 005 as Operation Pause Release Signal Input Port

10.6.8 Would like to have RSEL controller reset externally

Input On Signal for one second or more to Input Port 001, and reboot (software reset) becomes available.

Parameter No.	Set Value	Description
I/O Parameter No.31	1	Set Input Port 001 as Soft Reset Signal Input Port

10.6.9 Would like to have the servo turned on externally

Input the on-edge (off → on) to Input Port 002 and the servo turns on, and input the off-edge (on → off) and the servo turns off.

Parameter No.	Set Value	Description
I/O Parameter No.32	1	Set Input Port 001 as Servo on Signal Input Port

10.6.10 Would like to have the home-return operation conducted externally on all the single-axis actuators

Input the on-edge (off → on) to Input Port 015 and the single-axis actuator starts the home-return operation.

(The home-return operation should not be performed on the 6-axis cartesian robot.)

Parameter No.	Set Value	Description
I/O Parameter No.45	1	Set Input Port 015 as Home-Return Signal Input Port and home-return operation conducted on all axes
	2	Set Input Port 015 as Home-Return Signal Input Port and home-return operation conducted on all increment axes

10.6.11 Would like to have a program in RSEL controller activated externally

Input the on-edge (off → on) to Input Port 003 and a program gets executed, and input the off-edge (on → off) and the program stops.

In order to secure firm operation, make sure to keep it on for 100ms or more.

Parameter No.	Set Value	Description
Other Parameter No.1	Execution Program Number	
I/O Parameter No.33	2	Set Input Port 003 as Automatic Start Program Startup Input Port

10.6.12 Would like to have a program activated externally by conducting a command in a program number in binary

Set I/O Parameter No. 30 to 2 and the indication on a program number gets conducted in binary and the program gets executed. The program number is to be in Input Port No. 007 to 013.

The indication is set to that in the program number in BCD on devily.

Parameter No.	Set Value	Description
I/O Parameter No.30	2	Set Input Port 000 for conducting indication of program number in binary and executing program

10.6.13 Would like to have the RSEL controller paused externally

Input Off to Input Port 006 and the RSEL Controller pauses.

In order to cancel the pause, turn Input Port 006 on and input the on-edge (off → on) to Input Port 005.

Parameter No.	Set Value	Description
I/O Parameter No.35	1	Set Input Port 005 as Pause Cancellation Signal Input Port
I/O Parameter No.36	1	Set Input Port 006 as Pause Signal Input Port

10.6.14 Would like to have an error reset conducted externally

Input the on-edge (off → on) to Input Port 013 and all the errors except for those in the cold start level should be canceled.

Parameter No.	Set Value	Description
I/O Parameter No.43	2	Set Input Port 013 as Error Reset Signal Input Port

10.6.15 Would like to release the brake on an actuator externally

Set a port to input the brake release signal to each axis and turn the applicable input port on, and a brake on an actuator can be compulsorily released. (It is not available on SCARA Robot.)

Parameter No.	Set Value	Description
Axis Parameters No.14	Brake Release Input Port Number	

10.6.16 Would like to toggle AUTO Mode and MANU Mode externally

Set a port to input the mode switchover signal.

The mode should be determined depending on the current condition of the mode switch and the condition of the set port as follows;

Mode	Condition of Set Port	Condition of Mode Switch
AUTO	OFF	AUTO
MANU	ON	
MANU	OFF	MANU
	ON	

Parameter No.	Set Value	Description
I/O Parameter No.79	Mode Switchover Signal Input Port Number	

10.6.17 Would like to have the input port assignment changed

Select the input feature in I/O Parameter No. 30 to 45, and that will become available for assignment to any input port required.

Parameter No.	Set Value	Description
I/O Parameter No.283	Input port number to assign Input Feature Select 000	
I/O Parameter No.284	Input port number to assign Input Feature Select 001	
\$		
I/O Parameter No.297	Input port number to assign Input Feature Select 014	
I/O Parameter No.298	Input port number to assign Input Feature Select 015	

Here shows an example of assigning Input Feature Select 000 (Start) set in "Input Feature Select 000" to another input port.

Set the physical input port number for Input Feature Select 000 (Start) in I/O Parameter No. 283 "Input Feature Select 000 Physical Input Port Number". For instance, if "016" is set, the feature of Input Feature 000 (Start) should be assigned in "Input Port No. 016".

The signal input port for Input Feature Select 000 (Start) should be Input Port 016.

"Input Port No. 000" after change made to assignment becomes a general input port.

(Note) It is available to establish settings to any input port number individually, but in case of duplicated setting or setting "Program Start Indication Program Numbers" to discontinuous port numbers, Error No. 62D "Input and Output Feature Port Number Error" should occur.

10.6.18 Would like to output that all the single-axis actuators are at the home positions

It can be checked that all single-axis actuators are in the home positions.

Status	Output Port 304
Home-Return Operation Completed	ON
Home-Return Operation Incomplete	OFF

Parameter No.	Set Value	Description
I/O Parameter No.50	1	Set as output with all single-axis actuators completing home-return operation

10.6.19 Would like to output that all the single-axis actuators has completed the home return operation

It can be checked that all single-axis actuators have completed the home-return operation.

Status	Output Port 304
Home-Return Operation Completed	ON
Home-Return Operation Incomplete	OFF

Parameter No.	Set Value	Description
I/O Parameter No.50	2	Set as output with all single-axis actuators completing home-return operation

10.6.20 Would like to output that a single-axis actuator has got in the set area (zone)

Setting four areas (zones) and output port to each axis of single-axis actuators is available.

It can be checked that the set area (zone) was invaded.

The signal will not be output (turn on) unless an actuator stays for 3msec or more.

However, SCARA Robot has a simple interference check zone different from this setting.

[Refer to SEL Language Programming Manual]

Current Position	Output Port: Set in Axis-Specific Parameter No. 88
Zone 1 Invaded	ON
Zone 1 not invaded	OFF

Current Position	Output Port: Set in Axis-Specific Parameter No. 91
Zone 2 Invaded	ON
Zone 2 not invaded	OFF

Current Position	Output Port: Set in Axis-Specific Parameter No. 94
Zone 3 Invaded	ON
Zone 3 not invaded	OFF

Current Position	Output Port: Set in Axis-Specific Parameter No. 97
Zone 4 Invaded	ON
Zone 4 not invaded	OFF

Parameter No.	Set Value	Description
Axis-Specific Parameter No. 86	Max. Value in Zone 1	
Axis-Specific Parameter No. 87	Min. Value in Zone 1	
Axis-Specific Parameter No. 88	Zone 1 Output Ports No.	
Axis-Specific Parameter No. 89	Max. Value in Zone 2	
Axis-Specific Parameter No. 90	Min. Value in Zone 2	
Axis-Specific Parameter No. 91	Zone 2 Output Ports No.	
Axis-Specific Parameter No. 92	Max. Value in Zone 3	
Axis-Specific Parameter No. 93	Min. Value in Zone 3	
Axis-Specific Parameter No. 94	Zone 3 Output Ports No.	
Axis-Specific Parameter No. 95	Max. Value in Zone 4	
Axis-Specific Parameter No. 96	Min. Value in Zone 4	
Axis-Specific Parameter No. 97	Zone 4 Output Ports No.	

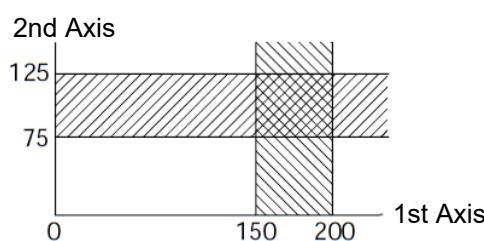
(Note) Duplicating indication in output ports is not accepted.

[Example of Setting]

Here shows an example of setting the following area (zone) to Zone 1.

1st Axis : Invaded in range from 150mm to 200mm and Output Port No. 311 turns on

2nd Axis : Invaded in range from 75mm to 125mm and Output Port No. 312 turns on



Axis-Specific Parameter	1st axis	2nd axis
No.86	200,000	125,000
No.87	150,000	75,000
No.88	311	312

The unit for setting maximum value and minimum value is 0.001mm.

10.6.21 Would like to output an error level

Showing an error level being occurred is available with the status of Output Port 300 and 301.

Error Level	Output Port 300	Output Port 301
At message level or below	ON	ON
Operation cancel level	OFF	ON
Cold start level	OFF	OFF

Parameter No.	Set Value	Description
I/O Parameter No.46	2	Setting of turning Output Port 300 on only in message level
I/O Parameter No.47	3	Setting of turning Output Port 301 on in message level and operation cancel level

10.6.22 Would like to output that an actuator is in an emergency stop

Checking if in an emergency stop or not is available with the status of Output Port 302.

Current Status	Output Port 302
Not in Emergency Stop	ON
In Emergency Stop	OFF

Parameter No.	Set Value	Description
I/O Parameter No.48	2	Setting of turning Output Port 302 off during emergency stop

10.6.23 Would like to know the current operation mode

Checking the current operation mode is available with the status of Output Port 303.

Current Operation Mode	Output Port 303
AUTO	ON
MANU	OFF

Parameter No.	Set Value	Description
I/O Parameter No.49	1	Setting of turning Output Port on in AUTO Mode

10.6.24 Would like to have the output port assignment changed

Select the output feature in I/O Parameter No. 46 to 61 and that will become available for assignment to any output port required.

Parameter No.	Set Value	Description
I/O Parameter No.299	Output port number to assign Input Feature Select 300	
I/O Parameter No.300	Output port number to assign Input Feature Select 301	
↓		
I/O Parameter No.313	Output port number to assign Input Feature Select 314	
I/O Parameter No.314	Output port number to assign Input Feature Select 315	

Here shows an example of assigning Output Feature Select 300 (ALM) set in "Output Feature Select 300" to another output port.

Set the physical output port number for Output Feature Select 300 (ALM) in I/O Parameter No. 299 "Output Feature Select 300 Physical Output Port Number".

For instance, if "316" is set, the feature of Input Feature 300 (ALM) should be assigned in "Output Port No. 316".

The signal output port for Output Feature Select 300 (ALM) should be Output Port 316.

"Output Port No. 300" after change made to assignment becomes a general output port.

(Note) It is available to establish settings to any output port number individually, but in case of duplicated setting, Error No. 62D "Input and Output Feature Port Number Error" should occur.

10.6.25 Would like to use SIO connectors

The setting in Channel 1 should be established as follows on delivery.

Setting at Delivery

Baud rate : 38.4kbps

Data length : 8

Stop bit : 1

Parity : None

Detail settings can be established in the parameter number described below.

Channel 1 → I/O Parameter No. 201 to 203

I/O Parameter Setting Detail (Reference)

No.	Parameter Name	Initial setting	Input range	Unit
201	Attribute 1 of SIO channel 1 opened to user	28100001H	0H to FFFFFFFFH	None

Bits 28-31 : Baud rate type

(0:9.6 1:19.2 2:38.4 3:57.6 4:76.8 5:115.2 6:230.4kbps)

Bits 24-27 : Data length (7: 7bits, 8: 8bits)

Bits 20-23 : Stop bit length (1: 1bit, 2: 2bits)

Bits 16-19 : Parity type (0: None, 1: Odd Number, 2: Even Number)

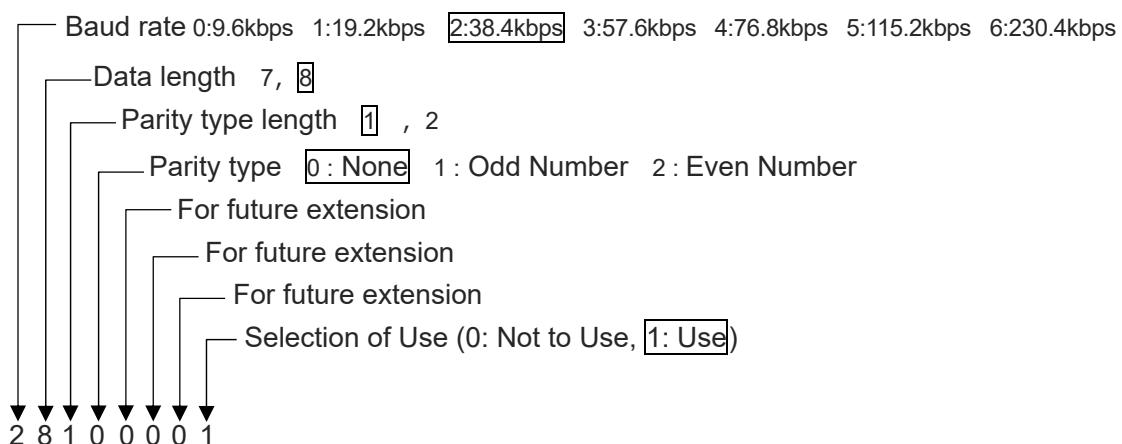
Bits 12-15 : For future extension

Bits 8-11 : For future extension

Bits 4-7 : For future extension

Bits 0-3 : Select to Use General Protocol Communication (0: Not to Use, 1: Use)

[Initial Setting on Delivery]



RSEL

Chapter 11

Troubleshooting

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11.1 Troubleshooting

If a problem occurs, check the following points first in order to ensure quick recovery and prevent recurrence of the problem.

- (1) Check the status LED of each RSEL system device
Check the SCON controller LED status for each master unit, driver unit, simple absolute unit, SCON expansion unit or PIO/SIO/SCON expansion unit connected.
- (2) Check for abnormality in the host device (PLC, etc.)
- (3) Check the control power supply, motor power supply and field network power supply voltages
Check for momentary power failure, voltage drop, power failure, etc.
- (4) Confirm the generated alarm
Check the alarm information with the teaching tool.
- (5) Check the connectors for disconnection or incomplete connection
- (6) Check the cables for connection error, disconnection or snagging.
Cut off the main power supply of the equipment (to avoid electric shock) and remove the cables around the measurement point (to avoid conductivity through the surrounding circuit) before checking the conductivity.
- (7) Check the network terminal resistor mounting status and resistance
- (8) Check the I/O signals
Use a teaching pendant to check for inconsistency or abnormality in the input/output signal status of the host device and RSEL system.
- (9) Check the noise elimination measures (grounding, connection of noise suppressor, etc.)
- (10) Check the events leading to the occurrence of the problem, as well as the operating conditions at the time of occurrence
- (11) Analyze the cause
- (12) Countermeasures



Caution

- When proceeding with troubleshooting, exclude normally functioning parts from the targets to narrow down the causes.
- First, check (1) to (12) so that countermeasures can be taken swiftly.

11.2 Error Level Control

There are five levels of alarms depending on the contents of error.

- Message level
- Operation cancel level
- Cold start level
- System-shutdown level
- Secret level
 - * Secret-level errors are not actual errors. Internal statuses are registered in an error list as secret-level errors, when deemed necessary, in order to facilitate error analysis.

Error level	Occurrence Source	Error No. (HEX)
Secret level (S)	Controller	100 to 1AF
	TP/PC	1B0 to 1FF
Message (M)	Controller	200 to 2FF
	TP/PC	300 to 3FF
Operation-cancellation level (A)	Controller	400 to 4FF
	TP/PC	500 to 5FF
Cold-start level (C)	Controller	600 to 6FF
	TP/PC	700 to 7FF
System-down level (D)	Controller	F00 to FCF
	TP/PC	FD0 to FFF

PC: PC software, TP: Teaching pendant

11.3 Error List

	Error No.	Error name	Content and Cause / Countermeasure
Secret	100	Flash ROM error	<p>[Content & Cause] 1) The power was cut during flash ROM writing.</p> <p>[Countermeasure] 1) Turn the power back on, have the same setting established again and conduct the flash ROM writing.</p>
	101	Controller power-on log	<p>[Content & Cause] It is the log for time when the controller power is turned on.</p> <p>[Countermeasure] Not error.</p>
	102	Controller software reset log	<p>[Content & Cause] It is the log for time of controller software reset.</p> <p>[Countermeasure] Not error.</p>
	103	Serial communication error	<p>[Content & Cause] 1) Contact Error at SIO Cable Connector 2) SIO Cable Breakage 3) Communication Setting Error <ul style="list-style-type: none"> • Baud Rate Setting Mismatch • Stop Bit Setting Mismatch • Parity Setting Mismatch 4) Noise Applied to SIO Cable</p> <p>[Countermeasure] 1) Check SIO cable connection status and connect again 2) Replace SIO cable 3) Revise communication settings <ul style="list-style-type: none"> • Check if baud rate setting is matched • Check if parity setting is matched • Check if stop bit setting is matched 4) Take a countermeasure to noise on SIO cable (such as installing ferrite core)</p>
	104	Ethernet control status	<p>[Content & Cause] It is for use of EtherNet control log.</p> <p>[Countermeasure] Not error.</p>
	105	Power off status during slave parameter writing	<p>[Content & Cause] 1) The power was cut during parameter writing to slave unit.</p> <p>[Countermeasure] 1) Write parameters again to the slave unit.</p>

	Error No.	Error name	Content and Cause / Countermeasure
Slave	106	Input time-out status (while receiving IAI protocol)	<p>[Content & Cause]</p> <p>1) Connector contact error on cable connecting between controller and a connected device 2) Cable breakage on cable connecting between controller and a connected device 3) Connected device malfunction 4) Noise applied to cable connecting between controller and a connected device</p> <p>[Countermeasure]</p> <p>1) Check the cable connecting between controller and a connected device 2) Replace the cable connecting between controller and a connected device 3) Replace the connected device 4) Take a countermeasure to noise on cable connecting between controller and a connected device</p>
	107	Slave SVP Reset Cause Log Detection	<p>[Content & Cause]</p> <p>The previous reset cause log of the slave SVP was detected.</p> <p>[Countermeasure]</p> <p>Not error.</p>
Message	200	Fan error	<p>[Content & Cause]</p> <p>1) Fan malfunction</p> <p>[Countermeasure]</p> <p>1) Replace the fan unit</p>
	201	Low fan speed warning	<p>[Content & Cause]</p> <p>1) Fan malfunction</p> <p>[Countermeasure]</p> <p>1) Replace the fan unit</p>
	202	Calender function error	<p>[Content & Cause]</p> <p>1) There is an error in the clock data indicated in communication message 2) Clock data lost due to voltage drop on RTC backup battery 3) Clock data failed to be acquired in internal process</p> <p>[Countermeasure]</p> <p>1) Indicate the correct clock data in the communication message 2) Establish clock setting again 3) Reboot the power</p>
	203	Estimated service life excess warning	<p>[Content & Cause]</p> <p>1) Capacity drop of electrolytic capacitor (by 20%) or capacity drop of electric double layer capacitor (by 50%) in the SEL unit 2) Volume dropped (to less than 20%) in capacitor for driver unit motor power supply</p> <p>[Countermeasure]</p> <p>1) Replace SEL unit 2) Replace driver unit</p>

	Error No.	Error name	Content and Cause / Countermeasure
Message	204	Maintenance information error	<p>[Content & Cause] An error due to Protocol B indication failure As it is an undisclosed protocol, there should not occur an error in normal condition. 1) Number of maintenance information changes indicated to 2 or more 2) A maintenance information type out of the range was indicated 3) A maintenance information number out of the range was indicated</p> <p>[Countermeasure] 1) Set the number of maintenance information changes to 1 2), 3) Correct setting to get in the range</p>
	205	Target value of total times of motion exceeded	<p>[Content & Cause] 1) The total times of axis operation has exceeded the times set in Each Axis Parameter No. 20 "Total travel count threshold".</p> <p>[Countermeasure] 1) Consider to have a maintenance work on the actuator.</p>
	206	Target travel distance exceeded	<p>[Content & Cause] 1) The total distance of axis operation has exceeded the distance set in Each Axis Parameter No. 148 "Total travel distance threshold".</p> <p>[Countermeasure] 1) Consider to have a maintenance work on the actuator.</p>
	207	Update error	<p>[Content & Cause] 1) Update command was received when in a mode other than Update Mode. 2) The name of the update program file selected in the update mode is invalid. 3) The update program file is invalid. 4) The system application received an updating target specification command. 5) There is an error in the password received from the updating tool. 6) When updating, a flash-ROM write command was received before a flash-ROM erase command.</p> <p>[Countermeasure] 1) Rebooting 2) Update command was received when in a mode other than Update Mode. 2), 3), 6) Select the correct file and have an update again from the beginning. 4) Reboot the power and conduct the update again. 5) Check if the updating tool is applicable.</p>

Error No.	Error name	Content and Cause / Countermeasure
Message	208 Flash ROM error	<p>[Content & Cause]</p> <p>1) Data delete in the flash ROM or writing to the flash ROM did not finish in normal condition due to the causes below:</p> <ol style="list-style-type: none"> 1. Noise Applied 2. Malfunction of Flash ROM <p>2) Sum check error in code domain in flash ROM</p> <p>3) Version information mismatched in code domain in flash ROM</p> <p>4) Data writing to the flash ROM did not finish in normal condition due to the causes below:</p> <ol style="list-style-type: none"> 1. Noise Applied 2. Malfunction of Flash ROM <p>5) Data delete in the flash ROM did not finish in normal condition due to the causes below:</p> <ol style="list-style-type: none"> 1. Noise Applied 2. Malfunction of Flash ROM <p>6) Data was corrupted in the flash ROM due to the causes below:</p> <ol style="list-style-type: none"> 1. Noise Applied 2. Malfunction of Flash ROM <p>[Countermeasure]</p> <p>1) -1, 4) -1, 5) -1, 6) -1 Take a countermeasure to noise on controller (such as installing ferrite core)</p> <p>1) -2, 4) -2, 5) -2, 6) -2 Replace SEL unit</p> <p>2), 3) Rebooting</p>
	209 Flash ROM writing refusal error during program running	<p>[Content & Cause]</p> <p>1) Flash ROM writing was conducted while a program was being executed.</p> <p>[Countermeasure]</p> <p>1) Stop the program and write data to the flash ROM</p>
	20A Data change refusal error during flash ROM writing	<p>[Content & Cause]</p> <p>1) Data changed during the flash ROM writing</p> <p>2) Flash ROM writing command was received again during flash ROM writing</p> <p>3) Direct monitor was used during flash ROM writing</p> <p>4) Software reset was conducted during flash ROM writing or slave parameter writing</p> <p>[Countermeasure]</p> <p>1) Wait till the flash ROM writing ends before making a change to data</p> <p>2) Attempt not to send or receive the flash ROM writing commands during flash ROM writing * For users disclosing the flash ROM related protocols in special</p> <p>3) Wait till the flash ROM writing ends before executing the direct monitoring</p> <p>4) Wait till the flash ROM writing or slave parameter writing ends before having a software reset</p>
	20B Position error	<p>[Content & Cause]</p> <p>1) The power was shut off or the software reset was performed without flash ROM writing after editing the position data comment</p> <p>[Countermeasure]</p> <p>1) Conduct the flash ROM writing after editing the position data comment</p>

11.3 Error List

	Error No.	Error name	Content and Cause / Countermeasure
Message	20D	Position # error	<p>[Content & Cause] 1) The position number is invalid.</p> <p>[Countermeasure] 1) Check the position data and indicate a valid position number</p>
	20E	Position data # specification error	<p>[Content & Cause] 1) The specified number of position data is invalid.</p> <p>[Countermeasure] 1) Indicate the right number of the position data</p>

Error No.	Error name	Content and Cause / Countermeasure
20F Message	Fieldbus FBRS link error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) Contact error on fieldbus connection cable 2) Cable breakage on fieldbus connection cable 3) Following data does not match the setting on the PLC side <ul style="list-style-type: none"> • I/O Parameter No. 14 “Number of I/O Fieldbus Remote Input Used Ports” • I/O Parameter No. 15 “Number of I/O Fieldbus Remote Output Used Ports” • I/O Parameters from No. 132 to 135 “I/O Fieldbus Self IP Addresses (x)” <ul style="list-style-type: none"> * x in brackets () represents H, MH, ML or L in the order from smaller parameter number • I/O Parameter from No. 136 to 139 “I/O Fieldbus Subnet Mask (x)” <ul style="list-style-type: none"> * x in brackets () represents H, MH, ML or L in the order from smaller parameter number • I/O Parameters from No. 140 to 143 “I/O Fieldbus Default Gateway (x)” <ul style="list-style-type: none"> * x in brackets () represents H, MH, ML or L in the order from smaller parameter number • I/O Parameter No. 184 “Number of CC-Link IE Remote Register (Input) Words (RWw)” • I/O Parameter No. 184 “Number of CC-Link IE Remote Register (Output) Words (RWr)” • I/O Parameter No. 226 “I/O1 Fieldbus Node Address” • I/O Parameter No. 227 “I/O1 Fieldbus Baud Rate” • I/O Parameter No. 228 “I/O1 Fieldbus Network Number” 4) Noise <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Check the connection status of fieldbus connection cable and connect again 2) Replace fieldbus connection cable 3) Check the following parameters and establish the controller parameter settings or change the settings on the PLC side. <ul style="list-style-type: none"> • I/O Parameter No. 14 “Number of I/O Fieldbus Remote Input Used Ports” • I/O Parameter No. 15 “Number of I/O Fieldbus Remote Output Used Ports” • I/O Parameters from No. 132 to 135 “I/O Fieldbus Self IP Addresses (x)” <ul style="list-style-type: none"> * x in brackets () represents H, MH, ML or L in the order from smaller parameter number • I/O Parameter from No. 136 to 139 “I/O Fieldbus Subnet Mask (x)” <ul style="list-style-type: none"> * x in brackets () represents H, MH, ML or L in the order from smaller parameter number • I/O Parameters from No. 140 to 143 “I/O Fieldbus Default Gateway (x)” <ul style="list-style-type: none"> * x in brackets () represents H, MH, ML or L in the order from smaller parameter number • I/O Parameter No. 184 “Number of CC-Link IE Remote Register (Input) Words (RWw)” • I/O Parameter No. 184 “Number of CC-Link IE Remote Register (Output) Words (RWr)” • I/O Parameter No. 226 “I/O1 Fieldbus Node Address” • I/O Parameter No. 227 “I/O1 Fieldbus Baud Rate” • I/O Parameter No. 228 “I/O1 Fieldbus Network Number” 4) Take a countermeasure to noise on fieldbus connection cable (such as installing ferrite core)

11.3 Error List

	Error No.	Error name	Content and Cause / Countermeasure
Message	210	During non-AUTO mode, channel open error	<p>[Content & Cause] 1)SIO channel was opened in a non-AUTO mode.</p> <p>[Countermeasure] 1)Open free-to-user SIO channel in AUTO Mode</p>
	211	PIO error	<p>[Content & Cause] 1)IO power is not supplied (or voltage dropped below 21.6V)</p> <p>[Countermeasure] 1)Check the power supply status to IO cable</p>
	212	ECMD 300 command error	<p>[Content & Cause] 1>User system error output command (ECMD300) was executed</p> <p>[Countermeasure] 1)Check the programs using the user system error output command</p>
	213	Step # specification error	<p>[Content & Cause] 1>Edit or inquiry was conducted to a step not existed during edit / inquiry to a step (one line in program) in SEL program</p> <p>[Countermeasure] 1)Make sure to set a step number that start step + number of steps exist</p>
	214	Program # specification error	<p>[Content & Cause] 1)A program number larger than the valid program number was indicated in the program clear or inquiry of number of steps (one line in program) to several SEL programs</p> <p>[Countermeasure] 1)Make sure to have the start step + number of programs is less than the maximum program number</p>
	215	Internal process error	<p>[Content & Cause] 1)Malfunction on SEL unit 2)Noise</p> <p>[Countermeasure] 1)Replace SEL unit in case this error occurs after power reboot 2)Take a countermeasure to noise</p>
	216	Non-program running error	<p>[Content & Cause] 1>The specified program is not running.</p> <p>[Countermeasure] 1)Indicate a program after executing it</p>
	217	Unexecuted program resuming error	<p>[Content & Cause] 1>A resumption request was received for a program currently not running.</p> <p>[Countermeasure] 1)Check the program number indicated in the program step that the error occurred and have the program resume to the program in progress</p>
	218	Unexecuted program pausing error	<p>[Content & Cause] 1>A pause request was received for a program currently not running.</p> <p>[Countermeasure] 1)Check the program number indicated in the program step that the error occurred and have the pause demand executed to the program number in process</p>

	Error No.	Error name	Content and Cause / Countermeasure
Message	219	Duplicated program execution error	<p>[Content & Cause] 1) An attempt was made to start a program currently running.</p> <p>[Countermeasure] 1) Check the program number indicated in the program step that the error occurred and have the program in progress not to execute the demand of program startup</p>
	21A	Error warning of # of characters for SCPY command copying	<p>[Content & Cause] 1) Number of characters not indicated in SLEN Command when SCPY Command executed (Number of copy characters is 0)</p> <p>[Countermeasure] 1) Indicate the number of characters (other than 0) by SLEN Command before executing SCPY Command</p>
	21B	IN/OUT command port flag error warning	<p>[Content & Cause] 1) The number of I/O ports (flags) may have exceeded 32.</p> <p>[Countermeasure] 1) Check the program and confirm that the number of the input and output ports (flags) does not exceed 32</p>
	21C	Program # error	<p>[Content & Cause] 1) There is no program when editing, inquiring or executing a program in IAI protocol 2) A number less than 1 was indicated as a program number 3) A number exceeding the maximum number of support programs was indicated</p> <p>[Countermeasure] 1) Conduct operation of program edit, inquiry or execution indicating a registered program 2) A number less than 1 should not be indicated as a program number 3) A number more than the maximum number of programs (512) should not be indicated</p>
	21D	Multiple programs simultaneous running prohibition error	<p>[Content & Cause] 1) Multiple programs were attempted to start up in a state of the multiple-program simultaneous start prohibition in Manual Mode.</p> <p>[Countermeasure] 1) Permit the simultaneous start in the multiple-program simultaneous start setting in PC software or TP when it is required to have several programs started.</p>
	21E	I/O port/flag number error	<p>[Content & Cause] 1) An input and output port or flag number out of the setting range was indicated in the IAI protocol</p> <p>[Countermeasure] 1) Check the sending message and make sure to set the input and output port or flag number in the range</p>
	21F	Input/output port / flag # specification error—	<p>[Content & Cause] 1) A number of input and output ports and flags out of the range was indicated when a user used Protocol B and change or inquire the input and output ports or flags</p> <p>[Countermeasure] 1) Check the sending message and make sure to set the number of input and output ports or flags in the range</p>

	Error No.	Error name	Content and Cause / Countermeasure
Message	220	Flag No. error	<p>[Content & Cause] 1)A flag number out of the range was indicated when a user used Protocol B and change or inquire the flags</p> <p>[Countermeasure] 1)Check the sending message and make sure to set the flag number in the range</p>
	221	Symbol definition table # error	<p>[Content & Cause] 1)A symbol definition table number out of the range was indicated when changing or inquiring the symbol definition table</p> <p>[Countermeasure] 1)Revise the table number indication in IAI Protocol B Communication</p>
	222	Single axis multiple use error	<p>[Content & Cause] 1)An attempt was made to acquire the control right to an axis already in use.</p> <p>[Countermeasure] 1)Axis in use should not be used</p>
	223	IN/OUT command port flag error warning	<p>[Content & Cause] 1) A variable number out of the range was indicated in IAI Protocol B communication</p> <p>[Countermeasure] 1)Indicate a variable number in the range</p>
	224	Variable # error	<p>[Content & Cause] 1)Steps used up till the upper limit (20000 steps)</p> <p>[Countermeasure] 1)Revise the program to secure some free steps (by deleting blank lines, making same processes to sub-routine, etc.)</p>
	225	Insufficient blank steps error	<p>[Content & Cause] 1)Variable 99 may be a negative value. 2)A value in one place is larger than 9 (1001b)</p> <p>[Countermeasure] 1)A negative number should not be set to the value for Variable 99 2)Set the value in one place less than 9 (1001b)</p>
	226	BCD error warning	<p>[Content & Cause] 1)A letter other than a number is input to the conversion source in VAL Command 2)A negative number is input to the conversion source in VAL Command 3)The converted character string length (indicated by SLE Command) is set 0 in VAL or VALH Command 4)The converted length is 19 characters or more in VAL or VALH Command</p> <p>[Countermeasure] 1)Check the step that has an error occurred and input nothing but a number to the conversion source in VAL Command 2)Check the step that has an error occurred and attempt not to input a negative number to the conversion source in VAL Command 3)Attempt not to set 0 to the converted character string length (indicated by SLE Command) in VAL or VALH Command 4)Attempt to set 18 characters or less in the converted length in VAL or VALH Command</p>

Error No.	Error name	Content and Cause / Countermeasure
Message	227 Character string → value conversion error warning	<p>[Content & Cause] 1) Noise.</p> <p>[Countermeasure] 1) Take a counteraction to noise</p>
	228 Command sum check error (while receiving IAI Protocol)	<p>[Content & Cause] 1) The header in the received message is invalid. Invalid header position (message is 9 bytes or less) is suspected, among other reasons. 2) Noise.</p> <p>[Countermeasure] 1) Check the sending message in the destination of connection 2) Take a counteraction to noise</p>
	229 Command header error (while receiving IAI Protocol)	<p>[Content & Cause] 1) The station number in the received message is invalid. 2) Noise.</p> <p>[Countermeasure] 1) Check the sending message in the destination of connection 2) Take a counteraction to noise</p>
	22A Command node address error (while receiving IAI protocol)	<p>[Content & Cause] 1) The ID in the received message is invalid. 2) Noise.</p> <p>[Countermeasure] 1) Check the sending message in the destination of connection 2) Take a counteraction to noise</p>
	22B Received command data error	<p>[Content & Cause] 1) The received message does not match the message format or contains invalid data. 2) Noise.</p> <p>[Countermeasure] 1) Check the sending message in the destination of connection 2) Take a counteraction to noise</p>
	22C Motor drive control error	<p>[Content & Cause] 1) The power input to the motor exceeded the upper overload warning load level 2) Sliding resistance on the actuator is too high.</p> <p>[Countermeasure] 1) Revise the following items;<ul style="list-style-type: none">• Velocity setting• Acceleration/deceleration setting• Payload• Setting in Driver Unit Parameter No. 143 "Overload Warning Load Level Ratio" (when a number other than 100 is set)2) If there is no problem with the payload, cut off the power and check sliding resistance by hand</p>
		<p>[Content & Cause] 1) Driver unit failure 2) Noise.</p> <p>[Countermeasure] 1) Replace driver unit 2) Take a countermeasure to noise</p>
	22D Driver unit related error	

11.3 Error List

Error No.	Error name	Content and Cause / Countermeasure
Message	22E Power supply unit communication error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) Contact error on connector of PSA-24 communication cable 2) Cable breakage on PSA-24 communication cable 3) Error in setting of number of connected units of PSA-24 4) Setting error on PSA-24 communication address switch (duplicated with another device) 5) Noise applied to PSA-24 communication cable 6) Malfunction on SEL unit 7) PSA-24 unit malfunction <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Check PSA-24 communication cable connection status and connect again 2) Replace PSA-24 communication cable 3) Check the setting of the number of connected units in XSEL PC software 4) Change the setting to avoid duplication to other devices 5) Take a countermeasure to noise on PSA-24 communication cable (such as installing ferrite core) 6) REPLACE SEL UNIT 7) Replace PSA-24 unit
	22F Coordinate system type # specification error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) A wrong number (other than 2) was indicated when indicating the coordinate system type in Protocol B 0: Work Coordinate System, 1: Tool Coordinate System 2) Malfunction on SEL unit <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Check the sending message and indicate the number correctly 2) Replace SEL unit
	230 Simple interference check zone error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) A simple interference check zone number out of the range (number out of 1 to 10) was indicated in IAI Protocol <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Check the sending message and set the simple interference check zone number in the range.
	231 Simple interference check zone entry detection	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) The specified number of simple contact check zone data is invalid. <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Change the operation conditions or operation patterns to avoid irruption to the simple interference check zone
	232 Monitor/write prohibited address area incorrect access error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) Direct writing was conducted to the monitoring / writing prohibited address domain 2) Direct monitoring was conducted to the monitoring / writing prohibited address domain <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Do not attempt to conduct the direct writing to the monitoring / writing prohibited address domain 2) Do not attempt to conduct the direct monitoring to the monitoring / writing prohibited address domain

Error No.	Error name	Content and Cause / Countermeasure
233 234 235 236 237 238	Software reset refusal error during operation PC/TP operation refusal error during AUTO mode Run mode error PC/TP servo motion command reception permit input OFF error Servo-control-right error Start condition insufficient error	<p>[Content & Cause] 1) Software reset (SIO) is prohibited during operation (program is running, servo is in use, etc.).</p> <p>[Countermeasure] 1) Conduct the software reset with a program stopped and the servo off</p> <p>[Content & Cause] 1) Starting from the PC software / teaching pendant is prohibited in the AUTO mode.</p> <p>[Countermeasure] 1) Set to MANU Mode when required to start from the PC software or a teaching pendant</p> <p>[Content & Cause] 1) A parameter was set to the program startup not allowed condition in Other Parameter No. 21 "Manual Operation Type" while in MANU Mode 2) Setting is established "Not to allow" (standard setting) in Other Parameter No. 45 Bit 0-3 "PC/TP Startup Permission in AUTO Mode" while in AUTO Mode</p> <p>[Countermeasure] 1) A parameter should not be set to the program startup not allowed condition in Other Parameter No. 21 "Manual Operation Type" while in MANU Mode 2) Set to "Allow" in Other Parameter No. 45 Bit 0-3 "PC/TP Startup Permission in AUTO Mode" while in AUTO Mode</p> <p>[Content & Cause] 1) Turn on the input indicated in I/O Parameter No. 77 "PC/TP Servo Operation Command Reception Permitting Input Port Number" and issue an applicable axis movement command in PC/TP</p> <p>[Countermeasure] 1) Turn on the input indicated in I/O Parameter No. 77 "PC/TP Servo Operation Command Reception Permitting Input Port Number" and issue an applicable axis movement command in PC/TP</p> <p>[Content & Cause] 1) Malfunction on SEL unit 2) Noise.</p> <p>[Countermeasure] 1) Replace SEL unit 2) In case the error occurs even after rebooting the power, take a countermeasure to noise</p> <p>[Content & Cause] A program was launched in following conditions; 1) Emergency stop. 2) Enable. 3) Drive-source cutoff. (such as error at system startup) 4) Flash ROM is being written.</p> <p>[Countermeasure] Remove following conditions before launching a program 1) Emergency stop. 2) Enable. 3) Drive-source cutoff. (such as error at system startup) 4) Flash ROM is being written.</p>

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	Error No.	Error name	Content and Cause / Countermeasure
Message	239	Illegal Request for Drive Power recovery	<p>[Content & Cause] 1)The drive-source cutoff factor (error, deadman switch, safety gate, emergency stop, etc.) has not been removed.</p> <p>[Countermeasure] 1)The cause of drive cutoff (error, deadman's switch safety gate, emergency stop, etc.) is not solved</p>
	23A	Motion pause clear request refusal error	<p>[Content & Cause] 1) The all-operation-pause factor (drive-source cutoff, enable switch, safety gate, emergency stop, etc.) has not been removed.</p> <p>[Countermeasure] 1)Solve the cause of pause at all axes (drive cutoff, enable switch, safety gate, emergency stop, etc.)</p>
	23B	Positioning motion type error	<p>[Content & Cause] 1)A number other than those representing PTP or CP was set in "Operation Type" in IAI Protocol 0 = PTP / 1 = CP</p> <p>2)A number other than those representing relative or absolute was set in "Coordinate Type" in IAI Protocol</p> <p>[Countermeasure] 1)Check the indication in "Operation Type" in IAI Protocol 2)Check the indication in "Coordinate Type" in IAI Protocol</p>
	23C	IAI Protocol B received data out of range error	<p>[Content & Cause] 1)A number of position comment characters or symbol definition data size out of the range was indicated in IAI Protocol B</p> <p>[Countermeasure] 1)A number of position comment characters or symbol definition data size in the range should be indicated in IAI Protocol B</p>
	23D	Deviation excess warning	<p>[Content & Cause] 1)Sliding resistance on the actuator is too high. 2)The operation condition is out of the range of specifications 3)Grease dried up</p> <p>[Countermeasure] 1)If there is no problem with the payload, cut off the power and check sliding resistance by hand 2)Revise the operation conditions 3)Supply grease</p>
	23E	IAI Protocol B unacceptable error	<p>[Content & Cause] 1)A program-area reorganization operation was attempted while a program was running. 2)An edit operation was attempted to a program currently not running. 3)Parameters cannot be changed during operation (Program is running, servo is in use, etc.). 4)An attempt was made to change a parameter whose change is not permitted while the servo is ON. 5)An attempt was made to change data whose change is prohibited during operation (program is running, servo is in use, etc.).</p> <p>[Countermeasure] 1)Finish a program in process before having the program area reconstruction operation 2)Finish a program in process before having the edit operation 3)Stop an operation before changing parameters 4)Turn the servo off before changing applicable parameters 5)Stop an operation before changing applicable data</p>

Error No.	Error name	Content and Cause / Countermeasure
Message 23F	IAI Protocol B out of range specification error	<p>[Content & Cause]</p> <ul style="list-style-type: none"> 1) Two or more parameters were changed in one time of parameter change 2) A parameter type not defined in IAI Protocol was indicated 3) A parameter number out of the range was indicated in parameter inquiry or change in IAI Protocol 4) An axes group number or number of axes groups out of the range was indicated in IAI Protocol 5) A global variable or parameter number out of the range was indicated at the memory initialization in IAI Protocol 6) A unit out of the range was indicated in the version inquiry in IAI Protocol 7) A SEL writing data type out of the range was indicated when the flash ROM writing was executed in IAI Protocol 8) Direct monitoring to P0 or P3 domain was conducted 9) The number of symbol definition exceeded the upper limit 10)The number of variable data exceeded the upper limit For instance, when set to a number of variable data from the start number, data exceeded the maximum data number 11)An unsupported feature such as conveyor tracking was attempted to be used 12)A feature disclosed only to the manufacturer such as conveyor tracking was attempted to be used 13)A parameter number out of the range was indicated in parameter inquiry or change in IAI Protocol <p>[Countermeasure]</p> <ul style="list-style-type: none"> 1) Two or more parameters should not be changed in one time of parameter change 2) A parameter type not defined in IAI Protocol should not be indicated 3) Check the indicated parameter number in IAI Protocol 4) An axes group number or number of axes groups out of the range should not be indicated in IAI Protocol 5) A global variable or parameter number out of the range should not be indicated at the memory initialization in IAI Protocol 6) A unit out of the range should not be indicated in the version inquiry in IAI Protocol 7) A SEL writing data type out of the range should not be indicated when the flash ROM writing was executed in IAI Protocol 8) Direct monitoring should not be conducted to P0 or P3 domain 9) The number of symbol definition should be at 1000 or below 10)The number of variable data should not exceed the upper limit For instance, when set to a number of variable data from the start number, data exceeded the maximum data number 11)An unsupported feature should not be used 12)A feature disclosed only to the manufacturer should not be used 13)Check the indicated parameter number in IAI Protocol

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Error No.	Error name	Content and Cause / Countermeasure
240	IF register access error	<p>[Content & Cause]</p> <p>1) There was an error occurred at an access to the interface resistor. 2) An access out of the specifications was attempted at an access to the interface resistor. 3) An access was attempted to an inappropriate address of the interface resistor. 4) The changed value of the interface resistor is abnormal.</p> <p>[Countermeasure]</p> <p>1) Check the transmitted message. 2) Check the sending message with followings taken into account:</p> <ul style="list-style-type: none"> • If the format of the sending message is correct (if following the specifications in each feature code) • If there is an access exceeding the sending buffer size or reception buffer size of the controller <p>3) Check the sending message with followings taken into account:</p> <ul style="list-style-type: none"> • If a valid address (category ID, field ID and index ID) is indicated <p>4) Check the sending message with followings taken into account:</p> <ul style="list-style-type: none"> • If the changed value is set following the interface resistor specifications that is subject to • If the continuous change is not made to a resistor prohibited to have continuous change
Message	241	<p>Number of position data comment definitions exceeded</p> <p>[Content & Cause]</p> <p>The number of the position comments exceeded the upper limit</p> <p>[Countermeasure]</p> <p>Delete unnecessary position comments</p>
	242	<p>Coordinate system definition invalid error</p> <p>[Content & Cause]</p> <p>It was attempted to execute an operation related to the coordinate system definition when the coordinate system definition is ineffective.</p> <p>[Countermeasure]</p> <p>Have an operation related to the coordinate system definition when the coordinate system definition is effective.</p>
	243	<p>Sensor error detection</p> <p>[Content & Cause]</p> <p>There was an error detected by a sensor (such as thermal sensor) inside RSEL unit</p> <p>[Countermeasure]</p> <p>Attempt to turn on/off the power to the controller. Contact IAI in case the error occurs again.</p>
	244	<p>Driver warning detection</p> <p>[Content & Cause]</p> <p>There was a warning detected in the driver unit.</p> <p>[Countermeasure]</p> <p>The alarm code detected in the driver unit should be displayed in Info.1 in the axis error information window. Check the detail of the applicable alarm code in "11.4 Alarm Codes of Driver Unit" in order to take a counteraction.</p>

	Error No.	Error name	Content and Cause / Countermeasure
Message	245	Monitoring indication error	<p>[Content & Cause] An inappropriate operation or setting was attempted in IAI Protocol for monitoring</p> <ol style="list-style-type: none"> 1) Monitor setting was attempted while in monitoring 2) Monitoring was attempted to start again while in monitoring 3) Monitoring was attempted to start without any monitor setting 4) There is an error in indication of target axis in axis related data monitoring 5) There is an error in indication of ports and flags in the I/O monitoring <p>[Countermeasure] 1), 2), 3), 4), 5) Revise the procedures to send and receive IAI Protocol for monitoring.</p>
	246	Position data record format class error	<p>[Content & Cause] An unsupported position data record format type was indicated in IAI Protocol</p> <p>[Countermeasure] Set an appropriate value</p>
	247	Position data comment sum check Absolute-data backup battery voltage-low warning	<p>[Content & Cause] 1) Voltage drop (3.1V) on absolute encoder backup battery 2) Encoder cable error or connector contact error</p> <p>[Countermeasure] 1) Check the voltage on absolute encoder backup battery and have it replaced if necessary. 2) Check the connection status of the encoder cable.</p>
	248	EMG logic error	<p>[Content & Cause] 1) Malfunction on SEL unit</p> <p>[Countermeasure] 1) Replace SEL unit</p>
	249	ENB logic error	<p>[Content & Cause] 1) Malfunction on SEL unit</p> <p>[Countermeasure] 1) Replace SEL unit</p>
	300	SEL command input error	<p>[Content & Cause] 1) Inappropriate data was input after SEL Command</p> <p>[Countermeasure] 1) Input a correct SEL Command</p>
	301	No operand input error	<p>[Content & Cause] 1) Operand 1 is not input in a step that Operand 1 is mandatory 2) Operand 2 is not input in a step that Operand 2 is mandatory 3) Operand 3 is not input in a step that Operand 3 is mandatory</p> <p>[Countermeasure] 1) Input Operand 1 2) Input Operand 2 3) Input Operand 3</p>

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	Error No.	Error name	Content and Cause / Countermeasure
Message	302	Operand input prohibition error	<p>[Content & Cause]</p> <p>1) Operand 1 is used in a step that Operand 1 is prohibited 2) Operand 2 is used in a step that Operand 2 is prohibited 3) Operand 3 is used in a step that Operand 3 is prohibited</p> <p>[Countermeasure]</p> <p>1) Avoid using Operand 1 2) Avoid using Operand 2 3) Avoid using Operand 3</p>
	303	Operand data error	<p>[Content & Cause]</p> <p>1) An appropriate data is input in Operand 1 2) An appropriate data is input in Operand 2 3) An appropriate data is input in Operand 3 4) A value out of the range available for input is input in Operand 1 5) A value out of the range available for input is input in Operand 2 6) A value out of the range available for input is input in Operand 3</p> <p>[Countermeasure]</p> <p>1) Input an appropriate value in Operand 1 2) Input an appropriate value in Operand 2 3) Input an appropriate value in Operand 3 4) Input a value in the range available for input in Operand 1 5) Input a value in the range available for input in Operand 2 6) Input a value in the range available for input in Operand 3</p>
	304	Undefined symbol usage for operand error	<p>[Content & Cause]</p> <p>1) An undefined symbol is used in Operand 1 2) An undefined symbol is used in Operand 2 3) An undefined symbol is used in Operand 3</p> <p>[Countermeasure]</p> <p>1) Use a defined symbol in Operand 1 2) Use a defined symbol in Operand 2 3) Use a defined symbol in Operand 3</p>
	305	Operand symbol type error	<p>[Content & Cause]</p> <p>1) A symbol in a type not permitted or out of the scope is used in Operand 1 2) A symbol in a type not permitted or out of the scope is used in Operand 2 3) A symbol in a type not permitted or out of the scope is used in Operand 3</p> <p>[Countermeasure]</p> <p>1) Use a symbol in a permitted type or in the scope in Operand 1 2) Use a symbol in a permitted type or in the scope in Operand 2 3) Use a symbol in a permitted type or in the scope in Operand 3</p>
	306	Running program editing error	<p>[Content & Cause]</p> <p>1) An edit operation was attempted to a program currently not running.</p> <p>[Countermeasure]</p> <p>1) Stop the program and have an edit operation</p>

Error No.	Error name	Content and Cause / Countermeasure
Message	307 Symbol error	<p>[Content & Cause]</p> <p>1)A symbol in a type not permitted or out of the scope is used in the input conditions in a SEL command 2)There is an inappropriate character used at the top or in the character string of a symbol 3)The same symbol is defined duplicated 4)The symbol definition value is not input 5)The number of symbol definition exceeded the upper limit 6)A controller attempted to edit a symbol out of the range of supported numbers</p> <p>[Countermeasure]</p> <p>1)A symbol in a type not permitted or out of the scope should not be used in the input conditions in a SEL command 2)An inappropriate character should not be used at the top or in the character string of a symbol 3)A symbol should not be defined duplicated 4)The symbol definition value should be input 5)Set the number symbol definition not to exceed the upper limit (2000) 6)Check the range of the symbol numbers that the controller supports and attempt to use it in the range</p>
	308 Input condition undefined symbol usage error	<p>[Content & Cause]</p> <p>1)An undefined symbol is used in the input conditions in a SEL command</p> <p>[Countermeasure]</p> <p>1)A defined symbol should be used in the input condition at the position where the error occurred</p>
	309 Number of symbol use exceeding error	<p>[Content & Cause]</p> <p>1)There is not enough area to store the source symbols.</p> <p>[Countermeasure]</p> <p>1)Check the number of times source symbol can be used.</p>
	30A SD card error (TP: Teaching Pendant)	<p>[Content & Cause]</p> <p>1)There is no indicated file saved in the Secure Digital memory card 2)An indicated file in the Secure Digital memory card is corrupted 3)Malfunction of the Secure Digital memory card 4)Malfunction of the teaching printed circuit board 5)There is no Secure Digital memory card installed in a Secure Digital memory card slot 6)The protection switch is activated for writing protection on the Secure Digital memory card</p> <p>[Countermeasure]</p> <p>1)Save a file that you would like to use in a Secure Digital memory card 2)Save a file that you would like to use in a Secure Digital memory card again 3)Replace the Secure Digital memory card 4)Replace the teaching tool (printed circuit board) 5)Install a Secure Digital memory card 6)Set the protection switch to permit writing on the Secure Digital memory card</p>

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	Error No.	Error name	Content and Cause / Countermeasure
Message	30B	Battery abnormality (TP)	<p>[Content & Cause]</p> <p>1)A battery cannot be detected or connected. 2)A battery is in condition unavailable for charging at rapid charging (connecting AC adapter) 3)Malfunction of the teaching printed circuit board</p> <p>[Countermeasure]</p> <p>1)Connect the battery (AB-7). 2)Replace the battery (AB-7). 3)Replace the teaching tool (printed circuit board)</p>
	30C	No valid axes group error	<p>[Content & Cause]</p> <p>1)There is no axes group available for restoring at the position data file restoration</p> <p>[Countermeasure]</p> <p>1)Perform the axis number assignment and make the axes group applicable for restoration valid</p>
	30D	Data edit error during non-manual mode	<p>[Content & Cause]</p> <p>1)Data edit was attempted in a non-manual mode (AUTO Mode)</p> <p>[Countermeasure]</p> <p>1)Data edit should not be attempted in a non-manual mode (AUTO Mode)</p>
	30E	Input data error	<p>[Content & Cause]</p> <p>1)Data that was input was out of the range 2)Combination of input data is inappropriate 3>A character prohibited to use was used in the file name at backup</p> <p>[Countermeasure]</p> <p>1)Make an input in the range 2)Make an appropriate combination for input 3>Avoid using \ : * ? < > </p>
	30F	Input value too small	<p>[Content & Cause]</p> <p>1)A value that goes below the range available for input was input</p> <p>[Countermeasure]</p> <p>1)Make an input in the range</p>
	310	Input value too large	<p>[Content & Cause]</p> <p>1)A value that goes above the range available for input was input</p> <p>[Countermeasure]</p> <p>1)Make an input in the range</p>
	311	Protected data error	<p>[Content & Cause]</p> <p>1)An operation attempted to read/copy/move to data prohibited to read out 2)An operation attempted to write/move/clear to data prohibited to write in</p> <p>[Countermeasure]</p> <p>1)An operation should not be attempted to read/copy/move to data prohibited to read out 2)An operation should not be attempted to write/move/clear to data prohibited to write in</p>

	Error No.	Error name	Content and Cause / Countermeasure
Message	312	Coordinate 1 / coordinate 2 effective axis pattern error	<p>[Content & Cause]</p> <p>1)The axis pattern indicated in Coordinate [1] and Coordinate [2] do not match with each other in the simple interference check zone definition data 2)No coordinate value is input in the simple interference check zone definition data</p> <p>[Countermeasure]</p> <p>1)Have the axis pattern indicated in Coordinate [1] and Coordinate [2] match with each other in the simple interference check zone definition data 2)Input a coordinate value in the simple interference check zone definition data</p>
	313	Password error	<p>[Content & Cause]</p> <p>1)An inappropriate password was input</p> <p>[Countermeasure]</p> <p>1)Input An appropriate password</p>
	314	Homing incomplete error	<p>[Content & Cause]</p> <p>1)Movement was attempted with the home-return operation incomplete 2)eaching operation was attempted with the home-return operation incomplete 3)Operation was attempted without conducting software reset or power rebooting after conducting absolute reset encoder error reset</p> <p>[Countermeasure]</p> <p>1)Movement should be conducted after the home-return operation is completed 2)Teaching operation should be conducted after the home-return operation is completed 3)Operation should be conducted after conducting software reset or power rebooting after conducting absolute reset encoder error reset</p>
	315	Servo OFF during motion	<p>[Content & Cause]</p> <p>1)A movement command was executed to an axis with the servo off</p> <p>[Countermeasure]</p> <p>1) Have a movement command executed with the servo on</p>
	316	Input condition entry prohibition error	<p>[Content & Cause]</p> <p>1)Input conditions were input to a SEL command not permitted for input condition use</p> <p>[Countermeasure]</p> <p>1)Check the program step that an error occurred and avoid inputting any input condition to a SEL command not permitted to use any input condition</p>
	317	Input condition data error	<p>[Content & Cause]</p> <p>1)There is inappropriate data input in the input conditions</p> <p>[Countermeasure]</p> <p>1)Input appropriate data in the input conditions</p>
	318	Input condition entry out of range error	<p>[Content & Cause]</p> <p>1)A value out of the range was input in the input conditions</p> <p>[Countermeasure]</p> <p>1)Check the program step that an error occurred and indicate a value in the range of the input conditions</p>

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	Error No.	Error name	Content and Cause / Countermeasure
Message	319	Input condition no entry error	<p>[Content & Cause] 1)The input condition is not input to a SEL command with the input conditions mandatory</p> <p>[Countermeasure] 1)Check the program step that an error occurred and input the input conditions</p>
	31A	Execution condition unsatisfied error	<p>[Content & Cause] 1)Absolute reset conducted at wrist combination failure 2>Synchronized slave absolute reset was executed when the synchronizing master is not set to the absolute</p> <p>[Countermeasure] 1)Do not attempt absolute reset at wrist combination failure 2)Do not attempt synchronized slave absolute reset when the synchronizing master is not set to the absolute (incremental)</p>
	31B	# of break point setting excess error	<p>[Content & Cause] 2)The number of breakpoints to be set exceeds the limit value.</p> <p>[Countermeasure] 2)Check the program and make sure the breakpoint setting does not exceed the upper limit (10)</p>
	31C	Axis # error	<p>[Content & Cause] 1)An axis number that is not valid was indicated</p> <p>[Countermeasure] 1)A valid axis number should be indicated</p>
	31D	Valid axis unavailable error	<p>[Content & Cause] 1)The number of axes set and actually connected do not match with each other 2)There is no valid axis existed</p> <p>[Countermeasure] 1)Have the axis configuration conducted 2)Check the driver unit construction</p>
	31E	With individual axis system selected, teaching prohibition error	<p>[Content & Cause] 1)Read-in operation of the current position was conducted on each axis coordinate system</p> <p>[Countermeasure] 1)Read-in operation of the current position should not be conducted on each axis coordinate system</p>
	31F	Deviation overflow error	<p>[Content & Cause] There are inappropriate values input to the parameters “Software Limit Positive Side” and “Software Limit Negative Side” (data in pair)</p> <p>[Countermeasure] Correct the input values in the parameter edit window so they satisfy the following; 1)+0.90mm or more in the parameters “Software Limit Positive Side” and “Software Limit Negative Side” 2>-0.90mm or less in the parameters “Software Limit Negative Side” and “Software Limit Positive Side”</p>

Error No.	Error name	Content and Cause / Countermeasure
Message	320 Absolute value excessively small	<p>[Content & Cause] An inappropriate value was input in the “positioning band width”.</p> <p>[Countermeasure] Input a value greater than the minimum actuator positioning band width to the “positioning band width”. The minimum positioning band width can be figured out as shown below. ■ Min. Positioning Band Width [mm] = Ball Screw Lead Length [mm] / Number of Actuator Encoder Pulses [pulse] * Coefficient (PCON System = 3, ACON and SCON Systems = 1)</p>
	321 Input below min. velocity warning	<p>[Content & Cause] A velocity below the “minimum velocity” determined by the actuator ball screw lead and the encoder resolution was input. (It is not an alarm.)</p> <p>[Countermeasure] It is recommended to set to a velocity that this warning would not be output (higher than minimum velocity). (Min. velocity [mm/sec] = Actuator ball screw lead [mm] / Number of actuator encoder pulse [pulse] / 0.001 [sec]) Also, note that the operation of an actuator below the minimum velocity should be unstable and could cause abnormal noise or vibration.</p>
	322 Communication error (related to driver unit)	<p>[Content & Cause] 1)Noise 2)TP version is old 3)Malfunction on SEL unit 4>Contact error on driver unit 5)Malfunction of driver unit</p> <p>[Countermeasure] 1)In case the error occurs even after rebooting the power, take a countermeasure to noise 2)Check the latest version of the teaching tool in IAI homepage. 3)Replace SEL unit 4)Check the condition of driver unit connection 5)Replace driver unit</p>
	323 I/O feature indication error	<p>[Content & Cause] 1)The monitoring data output display was attempt without conducting any monitoring data output setting 2)There is an error in the input and output data assignment</p> <p>[Countermeasure] 1)Set up the monitoring data output setting 2)Establish the input and output data assignment properly</p>
	324 Excess number of position data comment definitions (TP/PC)	<p>[Content & Cause] 1)The number of position comments by the position data edit has exceeded the upper limit. 2)The number of position comments by the position data copy has exceeded the upper limit. 3)The number of position comments by the position data file restore has exceeded the upper limit.</p> <p>[Countermeasure] Delete unnecessary position comments</p>

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	Error No.	Error name	Content and Cause / Countermeasure
Message	325	Position type mismatched error	<p>[Content & Cause] Following has occurred in an operation to read in individually the coordinate data to the teaching window and the existing position data;</p> <ul style="list-style-type: none"> • Position data = Orthogonal coordinates, Jog coordinate system = Axis-specified coordinates • Position data = Axis-specific coordinates, Jog coordinate system = Work / tool coordinates <p>[Countermeasure] 1)For the individual read-in, make sure there is no mismatch to the position type 2)Conduct the read-in for all axes</p>
	326	Feature Unsupported Error	<p>[Content & Cause] 1)Home-return operation was executed on a 6-axis cartesian robot 2)All-axis jog was executed on an 6-axis cartesian robot 3)Single-axis servo on/off was executed on a 6-axis cartesian robot</p> <p>[Countermeasure] 1)Home-return operation should not be executed on a 6-axis cartesian robot 2)All-axis jog should not be executed on a 6-axis cartesian robot 3)Single-axis servo on/off should not be executed on a 6-axis cartesian robot</p>
	327	Calender function error	<p>[Content & Cause] 1)Clock data lost due to voltage drop on RTC backup battery 2)Voltage drop on RTC backup battery 3)Clock data failed to be acquired in internal process</p> <p>[Countermeasure] 1)Establish clock setting again 2)Replace batteries in a teaching tool 3)Reboot the power.</p>
	328	Position error	<p>[Content & Cause] 1)The number of position points is 0 2)There is an error in indication of data related to position output operation</p> <p>[Countermeasure] 1)Initialize the position data 2)Indicate the correct data</p>
	329	Blank step shortage error	<p>[Content & Cause] 1)Steps used up till the upper limit (20000 steps)</p> <p>[Countermeasure] 1)Revise the program to secure some free steps (by deleting blank lines, making same processes to sub-routine, etc.)</p>
	32A	During position data chagne motion /continuous motion prohivition error	<p>[Content & Cause] 1)Movement or continuous movement operation was conducted before edited position data was written to a controller</p> <p>[Countermeasure] 1)Write the edited position data before movement or continuous movement operation is conducted</p>
	32B	Internal process error	<p>[Content & Cause] 1)Malfunction on SEL unit 2>Noise</p> <p>[Countermeasure] 1)Replace SEL unit in case this error occurs after power reboot 2)Take a countermeasure to noise</p>

Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	400 Encoder error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) Contact error at connector of actuator connection cable 2) Cable breakage on actuator connection cable 3) The brake is not released. <ul style="list-style-type: none"> • Malfunction of brake • Contact error in brake wiring 4) Detection operation is disturbed by an external force applied to an actuator 5) Sliding resistance on the actuator is too high. 6) Encoder failure. 7) Noise applied on actuator connection cable <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1), 2) Replace the actuator connection cable 3) Replace the motor unit (or replace brake), check condition of brake cable wiring, and then brake operation check manually 4) Revise condition of assembly 5) If there is no problem with the payload, cut off the power and check sliding resistance by hand 6) Replace encoder (or replace motor unit) 7) Take a countermeasure to noise on actuator connection cable (such as installing ferrite core)
	401 Driver unit absolute encoder error detection 1	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) Change to the current position made during absolute data read-in or saving <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Make sure vibration would not get applied to actuator
	402 Driver unit absolute encoder error detection 2	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) Absolute reset is not conducted 2) Absolute Battery Voltage Drop 3) Contact error on connector part of actuator connection cable 4) Cable breakage on actuator connection cable 5) Change made to parameter in driver unit <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1), 5) Conduct absolute reset 2) Charging Absolute Battery 3) Check actuator connection cable connection status and connect again 4) Replace the actuator connection cable
	403 Driver unit absolute encoder error detection 3	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) Current position changed with speed more than the rotation speed setting due to external cause during the power cutoff <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Change the rotation speed setting to higher
	404 Fan error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) Fan failure <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Replace the fan unit
	405 Maintenance information error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) Maintenance information data corrupted due to noise <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) -1 Initialize the maintenance information 1) -2 Take a countermeasure to noise on the controller (if frequently occurs)

11.3 Error List

Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	406 Flash ROM error	<p>[Content & Cause]</p> <p>1) Data delete in the flash ROM or writing to the flash ROM did not finish in normal condition due to the causes below:</p> <ol style="list-style-type: none"> 1. Noise Applied 2. Malfunction of Flash ROM <p>2) Sum check error in code domain in flash ROM</p> <p>3) Version information mismatched in code domain in flash ROM</p> <p>4) Data writing to the flash ROM did not finish in normal condition due to the causes below:</p> <ol style="list-style-type: none"> 1. Noise Applied 2. Malfunction of Flash ROM <p>5) Data delete in the flash ROM did not finish in normal condition due to the causes below:</p> <ol style="list-style-type: none"> 1. Noise Applied 2. Malfunction of Flash ROM <p>6) Data was corrupted in the flash ROM due to the causes below:</p> <ol style="list-style-type: none"> 1. Noise Applied 2. Malfunction of Flash ROM <p>[Countermeasure]</p> <p>1) -1, 4) -1, 5) -1, 6) -1 Take a countermeasure to noise on controller (such as installing ferrite core)</p> <p>1) -2, 4) -2, 5) -2, 6) -2 Replace SEL unit</p> <p>2), 3) Reboot the power.</p>
	407 Symbol definition table error	<p>[Content & Cause]</p> <p>1) The power was cut during flash ROM writing.</p> <p>2) Malfunction of Flash ROM</p> <p>[Countermeasure]</p> <p>1) Turn the power back on, have the same setting established again and conduct the flash ROM writing.</p> <p>2) Replace SEL unit</p>
	408 SEL program source symbol error	<p>[Content & Cause]</p> <p>1) The power was cut during flash ROM writing.</p> <p>2) Malfunction of Flash ROM</p> <p>[Countermeasure]</p> <p>1) Turn the power back on, have the same setting established again and conduct the flash ROM writing.</p> <p>2) Replace SEL unit</p>
	409 Position data comment error	<p>[Content & Cause]</p> <p>1) The power was cut during flash ROM writing.</p> <p>2) Malfunction of Flash ROM</p> <p>[Countermeasure]</p> <p>1) Turn the power back on, have the same setting established again and conduct the flash ROM writing.</p> <p>2) Replace SEL unit</p>
40A	Position number error	<p>[Content & Cause]</p> <p>1) There is an error in the position number</p> <p>[Countermeasure]</p> <p>1) Check the position data and indicate a valid position number</p>

Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	40B Position data coordinate definition error	<p>[Content & Cause]</p> <p>1) Not all coordinate value in the position data 2) The position data changed during continuous movement</p> <p>[Countermeasure]</p> <p>1) Check the position data and input all the coordinate values 2) The position data should not be changed during continuous movement</p>
	40C Position output operation data designation error	<p>[Content & Cause]</p> <p>1) The position output operation data was indicated in a SEL command that "Indicated Distance Passed on/off" and "Indicated Rate Passed on/off" are invalid</p> <p>[Countermeasure]</p> <p>1) Revise the output setting at the position that the error occurred</p>
	40D Vision system error	<p>[Content & Cause]</p> <p>Parameter setting error</p> <p>1) Setting in I/O Parameter No. 351 "Vision System I/F1 Feature Select 1" is set to not permitted to use ("0")</p> <p>[Countermeasure]</p> <p>1) Set I/O Parameter No. 351 "Vision System I/F1 Feature Select 1" to permitted to use ("1")</p>
	40E Vision system response timeout error	<p>[Content & Cause]</p> <p>There is no communication response confirmed from vision system</p> <p>1) Parameter setting error 2) Setting error in vision system side</p> <p>[Countermeasure]</p> <p>1) -1 Check that the value in I/O Parameter No. 129 Bit 4-7: TCP/IP Message Communication is set to 1 (To Use) 1) -2 Check that the values set in I/O Parameter No. 160 to 163 Vision System I/F Connection Destination IP Address are correct 1) -3 Check that the value set in I/O Parameter No. 164 Vision System I/F Connection Destination Port Number is correct 2) Check that the vision system sends data to the capturing command</p>
	40F Received command error (vision system)	<p>[Content & Cause]</p> <p>1) An unsupported identification code was received from the vision system 2) Inappropriate data was received from the vision system</p> <p>[Countermeasure]</p> <p>1), 2) Check that data sent from the vision system is correct</p>
	410 Error of workpiece quantity received (vision system)	<p>[Content & Cause]</p> <p>1) The number of workpieces received from the vision system has exceeded the upper limit for the maximum number of workpieces in one time of capturing</p> <p>[Countermeasure]</p> <p>1) Leave more space between workpieces on the conveyor to avoid exceeding the upper limit</p>
	411 Vision system I/F internal process error	<p>[Content & Cause]</p> <p>1) The workpiece status got busy for some reason 2) The workpiece information handling process fell timed out for some reason</p> <p>[Countermeasure]</p> <p>1), 2) Reboot the power. Replace SEL unit in case it would not improve even with reboot</p>

11.3 Error List

Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	412 Vision system command error	<p>[Content & Cause]</p> <p>1)The vision system I/F that will be used differ from the vision system I/F in use 2)The indicated vision system I/F is in use in another task</p> <p>[Countermeasure]</p> <p>1)Release the vision system I/F in use before indicating the vision system I/F to be used Release = SLVS Command operation 2)Use the vision system after the use in another task is finished</p>
	413 Vision system I/F imaging location error	<p>[Content & Cause]</p> <p>1)There was an error in the Z-axis position at GTVD Command being executed</p> <p>[Countermeasure]</p> <p>1)Move the Z-axis to the right position before executing GTVD Command</p>
	414 SIO unopened error	<p>[Content & Cause]</p> <p>1)A channel open to another task was attempted to open again</p> <p>[Countermeasure]</p> <p>1)Check if the channel required to use is open</p>
	415 SIO other task in use error	<p>[Content & Cause]</p> <p>1)Attempted to open again a channel already open in another task</p> <p>[Countermeasure]</p> <p>1)Check a channel to release</p>
	416 SIO communication mode error	<p>[Content & Cause]</p> <p>1)The vision system command (SLVS) was executed to a channel in use for communication in a command such as OPEN, CLOS, READ and WRIT Commands 2)A communication command (such as OPEN, CLOS, READ and WRIT Command) attempt to be executed to a channel in use for vision system I/F feature</p> <p>[Countermeasure]</p> <p>1), 2) Attempt not to execute a communication command (such as OPEN, CLOS, READ and WRIT Commands) and a vision system command (such as SLVS) to one channel at the same time</p>
	417 SIO multiple WRIT execution error	<p>[Content & Cause]</p> <p>1)WRIT Command was executed to one channel in several tasks at the same time</p> <p>[Countermeasure]</p> <p>1)Check if data is sent to the same channel at the same timing</p>
	418 SIO unused channel selection error	<p>[Content & Cause]</p> <p>1)A use of a channel set not to use in the parameter was attempted to use</p> <p>[Countermeasure]</p> <p>1)Check the values in I/O Parameter No. 201 Bit 0-3 and set them to "1" if it is "0".</p>

	Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	419	SIO incorrect OPEN command usage error	<p>[Content & Cause] 1)Parameter setting error • There is a mismatch between the setting in I/O Parameter No. 90 Free-to-User SIO Channel Use and the actual way to use</p> <p>[Countermeasure] 1)Check the setting in I/O Parameter No. 90 Free-to-User SIO Channel Use 0: SEL Program Release 1: SEL Program Release (Common in devices PC/TP connection at CLOSE) 2:IAI Protocol B (Slave)</p>
	41A	Error of communication channel# opened to users	<p>[Content & Cause] 1)An unsupported channel number was indicated in OPEN Command</p> <p>[Countermeasure] 1)A supported channel number should be indicated in OPEN Command SIO connector : Channel No. 0 or 1 Ethernet connector : Channel No. 31 to 34</p>
	41B	SCHA command setting error	<p>[Content & Cause] 1)Setting error in SCHA Command</p> <p>[Countermeasure] 1)Check SCHA Command setting</p>
	41C	TPCD command setting error	<p>[Content & Cause] 2)Setting error in TPCD Command</p> <p>[Countermeasure] 1)Check TPCD Command setting</p>
	41D	SLEN command setting error	<p>[Content & Cause] 1)Setting error in SLEN Command</p> <p>[Countermeasure] 1)Check SLEN Command setting</p>
	41E	ECMD 300 command error	<p>[Content & Cause] 1>User system error output command (ECMD300) was executed</p> <p>[Countermeasure] 1)Check the programs using the user system error output command</p>
	41F	Error detail inquiry type error	<p>[Content & Cause] 1)A command creation error from a host program such as touch panel</p> <p>[Countermeasure] 1)Check the host program and send an appropriate command</p>
	420	Operand error	<p>[Content & Cause] 1)Operand indication error 2)Operand data is invalid 3)Operand data type error</p> <p>[Countermeasure] 1)Check the operand indication in the program step that the error occurred 2)Check the operand data in the program step that the error occurred 3)Check the operand data type in the program step that the error occurred</p>

11.3 Error List

Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	421 No. of running programs exceeded the limit	<p>[Content & Cause] 1) Programs exceeding the number of programs available to be executed at the same time were executed</p> <p>[Countermeasure] 1) Check the programs and avoid exceeding the number of programs available to be executed at the same time</p>
	422 Program 1st step BGSR error	<p>[Content & Cause] 1) A program to be executed was started with BGSR</p> <p>[Countermeasure] 1) Check the program and avoid starting it with BGSR</p>
	423 Executable step non-detection error	<p>[Content & Cause] 1) The program specified for execution does not contain executable program steps.</p> <p>[Countermeasure] 1) Execute a program with available program steps or register available program steps to a program number that is to be executed</p>
	424 DW/IF/IS/SL pair end error	<p>[Content & Cause] 1) There was an error in a treatment to the branch instruction appeared previously 2) EDIF, EDDO and EDSL were not found</p> <p>[Countermeasure] 1), 2) Check the treatment to IF/IS Commands and EDIF Check the treatment to DO Command and EDDO Check the treatment to SLCT Command and EDSL</p>
	425 BGSR pair end insufficient error	<p>[Content & Cause] 1) There was lack in EDSR corresponding to BGSR 2) There was lack in BGSR corresponding to EDSR</p> <p>[Countermeasure] 1), 2) Check the treatment of BGSR and EDSR</p>
	426 DO/IF/IS nesting step times error	<p>[Content & Cause] 1) The number of nesting times in DO Command and IF/IS Commands has exceeded the limit</p> <p>[Countermeasure] 1) Check the program and see if there is an excess number of nesting times or branch into the grammatical construction or out of the grammatical construction in GOTO Command</p>
	427 SLCT nesting steps exceeded	<p>[Content & Cause] 1) The number of nesting times in SLCT Command has exceeded the limit</p> <p>[Countermeasure] 1) Check the program and see if there is an excess number of nesting times or branch into the grammatical construction or out of the grammatical construction in GOTO Command</p>
	428 Sub-routine nesting time exceeded	<p>[Content & Cause] 1) The number of nesting times in the sub-routine call has exceeded the limit</p> <p>[Countermeasure] 1) Check the program and see if there is an excess number of nesting times or branch into the grammatical construction or out of the grammatical construction in GOTO Command</p>

Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	429	<p>[Content & Cause] 1)The program step next to SLCT was not either of WHEQ, WHNE, WHGT, WHGE, WHLT, WHLE, WSEQ, WSNE, OTHE or EDSL</p> <p>[Countermeasure] 1)Set the program step next to SLCT to either of WHEQ, WHNE, WHGT, WHGE, WHLT, WHLE, WSEQ, WSNE, OTHE or EDSL</p>
	42A	<p>[Content & Cause] 1)EDPA declared while BGPA not declared 2)BGPA declared without EDPA declared after BGPA declared</p> <p>[Countermeasure] 1), 2) Check the program and see the treatment to BGPA and EDPA</p>
	42B	<p>[Content & Cause] 1)Malfunction of controller</p> <p>[Countermeasure] 1)Replace SEL unit</p>
	42C	<p>[Content & Cause] 1)Error in extension conditional codes</p> <p>[Countermeasure] 1)Check the extension conditions in the program step that the error occurred</p>
	42D	<p>[Content & Cause] 1)There was no necessary input conditions even in use of extension conditions</p> <p>[Countermeasure] 1)Check the input conditions in the program step that the error occurred</p>
	42E	<p>[Content & Cause] 1)There is an error in setting in actuator control declaration command</p> <p>[Countermeasure] 1)Check the setting in the actuator control declaration command in the program step that the error occurred</p>
	42F	<p>[Content & Cause] 1)TIMW Command time setting is out of the range</p> <p>[Countermeasure] 1)Check the timer setting in the program step that the error occurred Setting Range: 0.01 to 99 seconds</p>
	430	<p>[Content & Cause] 1)WT□□ command timeout setting is out of the range</p> <p>[Countermeasure] 1)Check the timeout setting in WT□□ Command in the program step that the error occurred Setting Range: 0.01 to 99 seconds</p>
	431	<p>[Content & Cause] 1)A negative value was set in TSLP Command time setting</p> <p>[Countermeasure] 1)Set a positive value in TSLP Command time setting</p>

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Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	432 DIV command divisor 0 error	<p>[Content & Cause] 1)0 was indicated to the divisor (Operand 2) in DIV Command</p> <p>[Countermeasure] 1)Check the divisor (Operand 2) in DIV Command in the program step that the error occurred and set a value other than 0</p>
	433 SQR command range error	<p>[Content & Cause] 1)There is an error in SQR Command data (Operand 2)</p> <p>[Countermeasure] 1)Check the data (Operand 2) in SQR Command in the program step that the error occurred and set up a value more than 0</p>
	434 BCD display digits range error	<p>[Content & Cause] 1)There is an error in the number of digits to display BCD</p> <p>[Countermeasure] 1)Set the number of digits to display to 1 or more and 8 or less in the program step that the error occurred</p>
	435 No. of 1-shot pulse outputs used simultaneously exceeded the limit	<p>[Content & Cause] 1)The number of BTPN and BTPF timers operating at the same time in one program has exceeded the upper limit (16) 2)The number of output at the same time in a position output operation feature (output during delay and pulse output included) has exceeded the upper limit (16)</p> <p>[Countermeasure] 1)Have the number of BTPN and BTPF timers operating at the same time in the program that the error occurred not to exceed the upper limit (16) 2)Check the SEL program or position number that the error occurred and avoid exceeding the upper limit (16) of the number of output at the same time in the position output operation feature</p>
	436 SEL language PTRQ command preparation process error	<p>[Content & Cause] 1)Setting value in PTRQ is out of the range</p> <p>[Countermeasure] 1)Check if the setting in PTRQ is out of the range in the program step that the error occurred</p>
	437 Sub-routine error	<p>[Content & Cause] 1)There is no definition in the sub-routine to be called 2)Sub-routine is defined in several points in the same sub-routine number 3)Sub-routine number setting is out of range</p> <p>[Countermeasure] 1)Define a sub-routine to be called 2)Check the program and avoid defining sub-routine in several points in the same sub-routine number 3)Indicate a sub-routine number in the setting range (1 to 99)</p>
	438 Error with the divisor 0 when MOD commanded	<p>[Content & Cause] 1)The divisor was set to 0 in MOD Command</p> <p>[Countermeasure] 1)Check the divisor in MOD Command in the program step that the error occurred and set it to a number other than 0</p>

Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	439 DO, IF, IS nesting error	<p>[Content & Cause] 1) There is an error in EDIF or EDDO position</p> <p>[Countermeasure] 1) Check the treatment of IF/IS Commands and EDIF, DO Command and EDDO, and check if there is branch into the grammatical construction or out of the grammatical construction in GOTO Command</p>
	43A SLCT nesting step number error	<p>[Content & Cause] 1) There is an error in EDSL position</p> <p>[Countermeasure] 1) Check the treatment of SLCT and EDSL, and check if there is branch into the grammatical construction or out of the grammatical construction in GOTO Command</p>
	43B Sub-routine nesting times error	<p>[Content & Cause] 1) There is an error in EDSR position</p> <p>[Countermeasure] 1) Check the treatment of BGSR and EDSR, and check if there is branch into the grammatical construction or out of the grammatical construction in GOTO Command</p>
	43C Program number error	<p>[Content & Cause] 1) There is no program when editing, inquiring or executing a program in IAI protocol 2) A number less than 1 was indicated as a program number 3) A number exceeding the maximum number of support programs was indicated 4) A program number not registered in PIO was indicated</p> <p>[Countermeasure] 1) Conduct operation of program edit, inquiry or execution indicating a registered program 2) A number less than 1 should not be indicated as a program number 3) A number more than the maximum number of programs (512) should not be indicated 4) A registered program number should be indicated</p>
	43D Undefined delimiter error	<p>[Content & Cause] 1) There is no end character defined when OPEN Command executed</p> <p>[Countermeasure] 1) An end character should be indicated in SCHA Command before OPEN Command executed</p>
	43E Excess command velocity	<p>[Content & Cause] Command speed exceeded the allowable value during operation 1) Speed indicated for CP operation too high 2) Motor rotation with high speed became necessary to maintain speed and operation posture in the CP operation in orthogonal coordinate indication</p> <p>[Countermeasure] 1) Decrease the indicated velocity by VEL Command or OVRD Command 2) Change the operating position</p>
	43F Zone No. error	<p>[Content & Cause] 1) A value out of definition was indicated in the zone number by a linear axis dedicated zone related command (WZNA, WANO, WZFA or WZFO)</p> <p>[Countermeasure] 1) Set the zone number in the range from 1 to 4</p>

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Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	441 Insufficient blank steps error	<p>[Content & Cause] 1)The number of program steps to be used has exceeded the upper limit (20000 steps)</p> <p>[Countermeasure] 1)Revise the program and secure open program steps</p>
	442 AUTO program No. error	<p>[Content & Cause] 1)An error in parameter setting, a program number not registered in Other Parameter No. 1: Automatic Start Program Number was indicated</p> <p>[Countermeasure] 1)Indicate a program number registered in Other Parameter No. 1: Automatic Start Program Number</p>
	443 String No. error	<p>[Content & Cause] 1)A string number out of the range was indicated</p> <p>[Countermeasure] 1)Indicate a string number in the range Global domains: 300 to 999, local domains: 1 to 299</p>
	444 Speed change condition error	<p>[Content & Cause] 1)CHVL Command was executed to an operation axis using the S-shaped motion (SCRV Command)</p> <p>[Countermeasure] 1)Change the program to avoid CHVL Command being executed to an operation axis using the S-shaped motion (SCRV Command)</p>
	445 Axis number error	<p>[Content & Cause] 1)An axis number out of the range (out from 1 to 8) was indicated in a SEL command</p> <p>[Countermeasure] 1) Indicate an axis number in the range (1 - 8) by SEL command</p>
	446 Axis pattern error	<p>[Content & Cause] 1)The axis patterns set in two sets of the position data in a row indicated in DFIF Command do not match with each other 2)0 was indicated in an axis pattern in HOME Command</p> <p>[Countermeasure] 1)Change the program so the axis patterns set in two sets of the position data in a row indicated in DFIF Command match with each other 2)0 was indicated in an axis pattern in HOME Command</p>
	447 Operation axis was added while command executed	<p>[Content & Cause] 1)An operation axis in the position data was added during the calculation for continuous position movement or pressing operation in process</p> <p>[Countermeasure] 1)An operation axis in the position data should not be added during the calculation for continuous position movement or pressing operation in process</p>
	448 Position deleted during command execution	<p>[Content & Cause] 1)The last position data was deleted during the calculation for continuous position movement or pressing in process</p> <p>[Countermeasure] 1)The last position data should not be deleted during the calculation for continuous position movement or pressing in process</p>

	Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	449	I/O port/flag number error	<p>[Content & Cause] 1) An input and output port or flag number out of the setting range was indicated in a SEL command</p> <p>[Countermeasure] 1) Check the SEL command and set input and output ports and flag numbers in the setting range</p>
	44A	Flag No. error	<p>[Content & Cause] 1) A flag number out of the range was indicated in a SEL program (such as TIMR Command)</p> <p>[Countermeasure] 1) Set the flag number of the step that the error occurred in the range.</p>
	44C	Symbol search error	<p>[Content & Cause] 1) A SEL program and the symbol definition are mismatched</p> <p>[Countermeasure] 1) Match the SEL program and the symbol definition</p>
	44D	Excess number of symbol use times error	<p>[Content & Cause] 1) There is not enough open area to store the source symbols</p> <p>[Countermeasure] 1) Check the number of times of source symbol use</p>
	44E	Axis duplication error	<p>[Content & Cause] 1) Acquisition of the right of use was attempted during the axis in use</p> <p>[Countermeasure] 1) Acquisition of the right of use should not be attempted during the axis in use</p>
	44F	Axis command exceeded the actual max connectable axes #	<p>[Content & Cause] 1) A number of mounted axes exceeded the actual number of the mountable axes as a result of shifting among the axes in the base command</p> <p>[Countermeasure] 1) Revise the program so the shift would not occur exceeding the actual number of the mountable axes in the base command</p>
	450	Motion position # exceeded	<p>[Content & Cause] 1) Malfunction on SEL unit 2) Operation failure due to noise or others</p> <p>[Countermeasure] 1), 2) Contact IAI in case the error occurs again even after the power reboot.</p>

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Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	451 Prohibited axis specification error	<p>[Content & Cause] An axis not available for use in a SEL command or IAI protocol command is indicated. There should mainly be some causes as below: 1)A home-return operation command (such as HOME) or pressing operation command (PUSH) was conducted to the synchronized axes or wrist unit 2)A home-return operation command (such as Home) or the velocity change command (CHVL) was conducted to those other than combined robot. 3)A command related to the orthogonal coordinate system (such as movement command, position data operation, etc.) was made to an axis other than those for a combination robot</p> <p>[Countermeasure] Check the SEL command programming manual or the serial communication protocol specification sheets, and make correction to axis indication to a SEL program or IAI protocol command Revise the axis indication when related to 1), 2) and 3)</p>
	452 No effective axis specification error	<p>[Content & Cause] 1)There is no position data setting established 2)There is an error in indicating a position data number 3)A wrong axis number was indicated accidentally 4)An indicated axis is not activated</p> <p>[Countermeasure] 1)Set the target position to the position data 2), 3) Check that there is no failure in the SEL program setting 4)Set the axis number to be indicated activated (Use configuration tool)</p>
	453 Driver unit mismatch error	<p>[Content & Cause] 1)A driver unit set valid is not installed</p> <p>[Countermeasure] 1)Revise valid/invalid setting of the axis, or check that a driver unit is installed to the axis set valid</p>
	455 Unsupported SEL function error	<p>[Content & Cause] 1)A feature not supported was executed in SEL</p> <p>[Countermeasure] 1)Check the applicable version of the main CPU</p>
	456 Speed specification error	<p>[Content & Cause] 1)Neither of "Position data Velocity Setting" or "VEL Command Velocity Setting" is set 2)VLMX Command was declared and Cartesian coordinates indication movement was made</p> <p>[Countermeasure] 1)Either of "Position data Velocity Setting" or "VEL Command Velocity Setting" should be set 2)Use VEL Command instead of VLMX Command for Cartesian coordinates indication movement</p>
	457 Axis motion type error	<p>[Content & Cause] 1)A command (CIR, ARC CIR2, CIRS, ARCS, ARCD ro ARCC) was conducted on a rotary axis</p> <p>[Countermeasure] 1)Change the program to avoid conducting arch movement command</p>

	Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	458	Home sensor undetected error	<p>[Content & Cause]</p> <p>1)A workpiece interferes with peripheral during the home-return operation 2)The sliding resistance on an actuator is high 3)Home sensor installation error</p> <p>[Countermeasure]</p> <p>1)Check if there is an interference of a workpiece to peripheral 2)Shut the power source and move the actuator by hand to check the sliding resistance 3)Replace the actuator</p>
	459	Palletize # error	<p>[Content & Cause]</p> <p>1)A palletizing number out of the range was indicated in a SEL command (such as BGPA, PTNG and PINC)</p> <p>[Countermeasure]</p> <p>1)Check the program and indicate a palletizing number in the range (1 to 32)</p>
	45A	Palletize base point effective axis mismatch error	<p>[Content & Cause]</p> <p>1)The PX and PY (and PZ) axes set by PASE and PCHZ at palletizing are not set valid in the axis pattern of the base position data set by PAST</p> <p>[Countermeasure]</p> <p>1)The PX and PY (and PZ) axes set by PASE and PCHZ at palletizing should be set valid in the axis pattern of the base position data set by PAST</p>
	45B	Palletize zig-zag even row # setting error	<p>[Content & Cause]</p> <p>1)A number -1 or less is set in Operand 2 in PSLI Command</p> <p>[Countermeasure]</p> <p>1)Set a number 0 or more in Operand 2 in PSLI Command</p>
	45C	Incorrect setting of palletize axis direction place points	<p>[Content & Cause]</p> <p>1)A number 0 or less is set in Operand 1 or Operand 2 in PAPI Command</p> <p>[Countermeasure]</p> <p>1)Set a number 1 or more in Operand 1 or Operand 2 in PAPI Command</p>
	45D	Palletize PASE/PAPS undeclared error	<p>[Content & Cause]</p> <p>1)None of PASE or PAPS setting is established in the palletizing setting command</p> <p>[Countermeasure]</p> <p>1)Set either of PASE or PAPS in the palletizing setting command</p>
	45E	Palletize location no. error	<p>[Content & Cause]</p> <p>1)A number out of the range of the set palletizing pattern was indicated 2)An indicated value of the palletizing position number has exceeded the position number figured out in the current palletizing setting</p> <p>[Countermeasure]</p> <p>1)Indicate a number in the range of the set palletizing pattern 2)Check the relation between the palletizing position number set in the step that the error occurred and the total number of palletizes</p>
	45F	Same axis setting error for palletize PX/PY/PZ axes	<p>[Content & Cause]</p> <p>1)Two axes in PX, PY and PZ for palletizing were indicated at the same time in the same axis</p> <p>[Countermeasure]</p> <p>1)Indicate different axes for each of PX, PY and PZ for palletizing</p>

11.3 Error List

Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	460 Palletize 3-point teaching position data error	<p>[Content & Cause]</p> <p>1) There is no enough number of the valid axes available in the position data for palletizing 3-point teaching 2) There is excess number of the valid axes available in the position data for palletizing 3-point teaching 3) The position setting on each axis in the range from the position data indicated in Operand 2 to the position data indicated in Operand 2+2 (+3 for 4-point teaching) in PAPS Command do not match with each other in PAPS Command</p> <p>[Countermeasure]</p> <p>1), 2) When there is the PZ-axis declared, set the number of the valid axes for those other than the PZ-axis for two axes, when there is the PZ-axis not declared, set the number of the valid axes for two axes or 3 axes 3) Confirm the position setting on each axis in the range from the position data indicated in Operand 2 to the position data indicated in Operand 2+2 (+3 for 4-point teaching) indicated in PAPS Command</p>
	461 Palletize 3-point teaching offset setting error	<p>[Content & Cause]</p> <p>1) Staggered offset was set when base point and PX-axis end point are the same in palletizing 3-point teaching setting</p> <p>[Countermeasure]</p> <p>1) Staggered offset should not be set when base point and PX-axis end point are the same in palletizing 3-point teaching setting</p>
	462 Undeclared BGPA during palletize setting	<p>[Content & Cause]</p> <p>1) Palletizing setting was conducted without BGPA declaration</p> <p>[Countermeasure]</p> <p>1) Have BGPA declared before palletizing setting is conducted</p>
	463 Palletize point error	<p>[Content & Cause]</p> <p>1) There is no component other than the arch motion related Z-axis components in the position for palletizing or arch motion</p> <p>[Countermeasure]</p> <p>1) Check the position for palletizing or arch motion and set components other than the arch motion related Z-axis components also.</p>
	464 Missing 3-point teaching setting during palletize angle acquisition	<p>[Content & Cause]</p> <p>1) Palletizing angle was attempted to be acquired before establishing the palletizing 3-point teaching setting</p> <p>[Countermeasure]</p> <p>1) Change the program so the palletizing angle is acquired after establishing the palletizing 3-point teaching setting</p>
	465 Reference/PX/PY axes mismatch during palletize angle acquisition	<p>[Content & Cause]</p> <p>1) An axis number indicated in PARG Command is not either PX or PY set in the 3-point teaching</p> <p>[Countermeasure]</p> <p>1) Set either of the two axes constructing PX and PY axes indicated in the three-point teaching to the axis number set in PARG Command</p>

	Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	466	Base-point / PX axis end-point identical error during palletize angle acquisition	<p>[Content & Cause]</p> <p>1) Angle calculation cannot be held as the data other than the PZ-axis components at the base point of the 3-point teaching and the PX-axis end point are the same</p> <p>[Countermeasure]</p> <p>1) Check that the data other than the PZ-axis components at the base point of the 3-point teaching and the PX-axis end point are not the same</p>
	467	Palletize motion calculation error	<p>[Content & Cause]</p> <p>1) Malfunction on SEL unit</p> <p>2) Operation failure due to noise or others</p> <p>[Countermeasure]</p> <p>1) Replace SEL unit</p> <p>2) Take a counteraction to noise</p>
	468	Palletize motion PZ axis pattern undetected error	<p>[Content & Cause]</p> <p>1) There is no PZ-axis component in an axis pattern in the palletizing movement</p> <p>[Countermeasure]</p> <p>1) Set the PZ-axis components in an axis pattern in the palletizing movement</p>
	469	Arch motion related Z-axis undeclared error	<p>[Content & Cause]</p> <p>1) The arch motion Z-axis is not declared</p> <p>[Countermeasure]</p> <p>1) Have the Z-axis Declaration performed by PCHZ or ACHZ</p>
	46A	Arch top end Z-axis pattern undetected error	<p>[Content & Cause]</p> <p>1) There is no peak point arch motion related Z-axis component in an axis pattern in the arch motion</p> <p>[Countermeasure]</p> <p>1) Set the peak point arch motion related Z-axis components in an axis pattern in the arch motion</p>
	46B	Arch trigger Z-axis pattern undetected error	<p>[Content & Cause]</p> <p>1) There is no arch motion related Z-axis component in an axis pattern in the arch trigger declaration data</p> <p>[Countermeasure]</p> <p>1) Set the arch motion related Z-axis components in an axis pattern in the arch trigger declaration data</p>
	46C	Arch highest point & end point swapped error	<p>[Content & Cause]</p> <p>1) The relation of coordinates at the arch motion between the peak point and end point is reversed</p> <p>[Countermeasure]</p> <p>1) Check that the relation of coordinates between the peak point and end point is not reversed in the position data</p>
	46D	Arch start point & trigger swapped error	<p>[Content & Cause]</p> <p>1) The relation of coordinates at the arch motion between the start point and the start point arch trigger is reversed</p> <p>[Countermeasure]</p> <p>1) Check that the relation of coordinates between the start point and the start point arch trigger is not reversed in the position data</p>

Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	46E	<p>[Content & Cause] 1)The relation of coordinates at the arch motion between the end point and the end point arch trigger is reversed</p> <p>[Countermeasure] 1)Check that the relation of coordinates between the end point and the end point arch trigger is not reversed in the position data</p>
	46F	<p>[Content & Cause] 1)There is no arch trigger declared</p> <p>[Countermeasure] 1)Have the arch trigger declared by PTRG and ATRG</p>
	470	<p>[Content & Cause] 1)A variable number out of the range was indicated for an operand in SEL Command</p> <p>[Countermeasure] 1) Indicate a variable number in the range</p>
	471	<p>[Content & Cause] 1)A tag is defined at several places to the same tag number 2)There is no tag defined for the destination of jump for GOTO Command 3)A tag number out of the range (other than 1 to 256) was indicated</p> <p>[Countermeasure] 1)Check the program and avoid defining a tag at several places to the same tag number 2)Define a tag of a tag number indicated in GOTO Command 3)Check the program step that the error occurred and indicate a tag number in the range</p>
	472	<p>[Content & Cause] 1)The message received at a controller does not match with the message format 2)Noise</p> <p>[Countermeasure] 1)Check the sending message in the destination of connection 2)Take a counteraction to noise</p>
	473	<p>[Content & Cause] 1)A socket was attempted to open again without closing</p> <p>[Countermeasure] 1)Close the socket before opening it again</p>

Error No.	Error name	Content and Cause / Countermeasure
474 Operation-cancellation	Ethernet communication error	<p>[Content & Cause]</p> <p>1) OPEN Command or SLVS Command was used while the parameters are set as follows;</p> <ul style="list-style-type: none"> • TCP/IP message communication is invalid • I/O Parameter No. 129 Bit 4 to 7 = 0 • I/O Parameter No. 124 with the client server set to "Not to Use" • Bit 8 to 11: Free-to-User Channel 31 = 0 • Bit 12 to 15: Free-to-User Channel 32 = 0 • Bit 16 to 19: Free-to-User Channel 33 = 0 • Bit 20 to 23: Free-to-User Channel 34 = 0 <p>2) Reached to conditions below in normal use; When expressing from IP Address (H) (1st Octet) to IP Address (L) (4th Octet) as IP_H, IP_MH, IP_ML and IP_L, each of them should be as follows; IP_H<=0 or IP_H=127 or IP_H>255 or IP_MH<0 or IP_MH>255 or IP_ML<0 or IP_ML>255 or IP_L<=0 or IP_L>255</p> <p>3) Condition as shown below; Self port number < 1025, Self port number > 65535, Self port number duplicated or Connection destination port number at client <= 0 or Connection destination port number at client > 65535 or Connection destination port number at server < 0 or Connection destination port number at server > 65535</p> <p>[Countermeasure]</p> <p>1) With the parameters set as shown below;</p> <ul style="list-style-type: none"> • I/O Parameter No. 129 Bit 4 to 7 = 0 • I/O Parameter No. 124 with the client server set to "Not to Use" • Bit 8 to 11: Free-to-User Channel 31 = 0 • Bit 12 to 15: Free-to-User Channel 32 = 0 • Bit 16 to 19: Free-to-User Channel 33 = 0 • Bit 20 to 23: Free-to-User Channel 34 = 0 <p>2) Check the following parameters;</p> <ul style="list-style-type: none"> • I/O Parameter No. 132 to 135 "I/O Fieldbus Self IP Address (*)" * H, MH, ML or L comes in * in order • I/O Parameter No. 149 to 152 "IAI Protocol B/TCP Connection Destination IP Address (MANU Mode) (*)" * H, MH, ML or L comes in * in order • I/O Parameter No. 154 to 157 "IAI Protocol B/TCP Connection Destination IP Address (AUTO Mode) (*)" * H, MH, ML or L comes in * in order • I/O Parameter No. 160 to 183 "Vision System I/F Connection Destination IP Address (*)" * H, MH, ML or L comes in * in order Or, check the connection destination IP address in the integer variables indicated by IPCN Command <p>3) Check the following parameter so the parameter setting would not be an error condition</p> <ul style="list-style-type: none"> • I/O Parameter No. 144 "IAI Protocol B/TCP Self Port Number (MANU Mode)" • I/O Parameter No. 145-148 "Free-to-User Channel 3 * (TCP/IP) Self Port Number" * 1, 2, 3 or 4 comes in * in order • I/O Parameter No. 153 "IAI Protocol B/TCP Connection Destination Port Number (MANU Mode)" • I/O Parameter No. 158 "IAI Protocol B/TCP Connection Destination Port Number (AUTO Mode)" • I/O Parameter No. 159 "IAI Protocol B/TCP Self Port Number (AUTO Mode)" • I/O Parameter No. 164 "Vision System I/F Connection Destination Port Number"

Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	475 Internal process error	<p>[Content & Cause] 1) Malfunction on SEL unit 2) Noise</p> <p>[Countermeasure] 1) Replace SEL unit in case this error occurs after power reboot 2) Take a countermeasure to noise</p>
	476 Motor drive control error	<p>[Content & Cause] 1) Contact error at connector of actuator connection cable 2) Cable breakage on actuator connection cable 3) An external force was applied to an actuator 4) The sliding resistance on an actuator is high 5) The brake cannot be released 6) Malfunction of motor 7) Malfunction of driver unit</p> <p>[Countermeasure] 1) Check actuator connection cable connection status and connect again 2) Replace the actuator connection cable 3) Revise condition of assembly 4) If there is no problem with the payload, cut off the power and check sliding resistance by hand 5) Check condition of brake cable wiring, and then brake operation check manually 6) Replace the motor 7) Replace driver unit</p>
	477 Homing timeout error	<p>[Content & Cause] 1) Contact error at connector of actuator connection cable 2) Cable breakage on actuator connection cable 3) An external force was applied to an actuator 4) The sliding resistance on an actuator is high 5) The brake cannot be released 6) Malfunction of motor / encoder 7) Malfunction of driver unit</p> <p>[Countermeasure] 1) Check actuator connection cable connection status and connect again 2) Replace the actuator connection cable 3) Revise condition of assembly 4) If there is no problem with the payload, cut off the power and check sliding resistance by hand 5) Check condition of brake cable wiring, and then brake operation check manually 6) Replace the motor unit 7) Replace driver unit</p>

Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	478 Driver unit actual speed exceeded	<p>[Content & Cause]</p> <p>1) An external force was applied to an actuator 2) The sliding resistance on an actuator is high 3) The brake cannot be released 4) Malfunction of encoder 5) Malfunction of driver unit</p> <p>[Countermeasure]</p> <p>1) Revise condition of assembly 2) If there is no problem with the payload, cut off the power and check sliding resistance by hand 3) Check condition of brake cable wiring, and then brake operation check manually 4) Replace the motor unit (encoder) 5) Replace driver unit</p>
		<p>[Content & Cause]</p> <p>1) An alarm on the driver was detected</p> <p>[Countermeasure]</p> <p>1) The error numbers on the driver unit should be display in the detailed information Info1. Check the detail of the applicable alarm code in "11.4 Alarm Codes of Driver Unit" in order to take a counteraction.</p>
	47A Positioning completion time-out error	<p>[Content & Cause]</p> <p>1) An external force was applied to an actuator 2) The sliding resistance on an actuator is high 3) The brake cannot be released 4) Malfunction of encoder 5) Malfunction of driver unit 6) Contact error at connector of actuator connection cable 7) Cable breakage on actuator connection cable</p> <p>[Countermeasure]</p> <p>1) Revise condition of assembly 2) If there is no problem with the payload, cut off the power and check sliding resistance by hand 3) Check condition of brake cable wiring, and then brake operation check manually 4) Replace the motor unit (encoder) 5) Replace driver unit 6) Check actuator connection cable connection status and connect again 7) Replace the actuator connection cable</p>
	47B Coordinate system number error	<p>[Content & Cause]</p> <p>1) A coordinate system number out of the range was indicated in a SEL command <ul style="list-style-type: none"> • Out of Work Coordinate System No 0 to 15 • Out of Tool Coordinate System No. 0 to 15 2) Offset of Work Coordinate System No. 0 or Tool Coordinate System No. 0 was changed or inquired</p> <p>[Countermeasure]</p> <p>1) Indicate a coordinate number in the range in a SEL command <ul style="list-style-type: none"> • Work Coordinate System No 0 to 15 • Tool Coordinate System No. 0 to 15 2) Offset of Work Coordinate System No. 0 or Tool Coordinate System No. 0 should not be changed or inquired</p>

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Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	47C Coordinate system type error	<p>[Content & Cause]</p> <p>1)A wrong number (other than 2) was indicated when indicating the coordinate system type in Protocol B 0: Work Coordinate System, 1: Tool Coordinate System 2)Malfunction on SEL unit</p> <p>[Countermeasure]</p> <p>1)Check the sending message and indicate the number correctly 2)Replace SEL unit</p>
	47D Coordinate system data change prohibition error during servo use	<p>[Content & Cause]</p> <p>1)Work coordinate system number or tool coordinate system number in use of the servo system was attempted to be changed 2)Work coordinate system or tool coordinate system offset in use of the servo system was attempted to be changed</p> <p>[Countermeasure]</p> <p>1)Correct the SEL program so it is not necessary to change the coordinate system number selected during the axis operation 2)Correct the SEL program so it does not change the offset in the work coordinate system or tool coordinate system currently selected during the axis operation</p>
	47E Simple interference check zone entry detection	<p>[Content & Cause]</p> <p>1)Irruption to the simple interference check zone was detected</p> <p>[Countermeasure]</p> <p>1)Change the operation conditions or operation patterns to avoid irruption to the simple interference check zone</p>
	47F Axes group indication error	<p>[Content & Cause]</p> <p>1)The indicated axes group is invalid</p> <p>[Countermeasure]</p> <p>1)A valid axes group should be indicated</p>
	480 Out of target track range error	<p>[Content & Cause]</p> <p>1)Position data setting error 2)Position data setting error 3)Position data setting error</p> <p>[Countermeasure]</p> <p>1)Check the position number in the step that the error occurred and set it in the operation range of the orthogonal coordinate system 2)Check the position number in the step that the error occurred and set it in the operation range of the orthogonal coordinate system 3)Check the position number in the step that the error occurred and set it out of the CP operation limited band</p>
	481 Multi-slider too close detection error	<p>[Content & Cause]</p> <p>1)Multiple slider servo command position excess approach area irruption was detected 2)Multiple slider servo current position excess approach area irruption was detected</p> <p>[Countermeasure]</p> <p>1)Perform the following operation after escaping from the over-approaching position by jog, etc. 2)Perform the following operation after escaping from the over-approaching position by jog, etc.</p>

Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	482 Incorrect control type transition command error	<p>[Content & Cause] 1)NTCH Command was executed during an axis operation (servo is on and positioning incomplete)</p> <p>[Countermeasure] 1)NTCH Command should not be executed during an axis operation (servo is on and positioning incomplete)</p>
	483 In-use axis servo OFF error	<p>[Content & Cause] 1)The servo was turned off at an axis in use 2)The servo was turned off at the adjusted axis during the feature adjustment (for the wrist unit)</p> <p>[Countermeasure] 1)The servo should not be turned off at the axis in use 2)The servo should not be turned off at the adjusted axis during the feature adjustment</p>
	484 Synchro slave-axis command error	<p>[Content & Cause] 1)An axis command (such as servo on/off, movement command, etc.) was issued to a synchronized slave axis</p> <p>[Countermeasure] 1)An axis command (such as servo on/off, movement command, etc.) should not be issued to a synchronized slave axis An axis command (such as servo on/off, movement command, etc.) should be issued to a master axis</p>
	485 SEL command return code error	<p>[Content & Cause] 1)OPEN, READ or WRIT Command was executed with a value out of the range (other than 1 to 99 and 1001 to 1099) set in Other Parameter No. 24 "SEL Communication Command Return Code Storage Local Variable Number"</p> <p>[Countermeasure] 1)OPEN, READ or WRIT Command should be executed with a value in the range (1 to 99 and 1001 to 1099) set in Other Parameter No. 24 "SEL Communication Command Return Code Storage Local Variable Number"</p>
	486 When aborting operation, I/O process program # error	<p>[Content & Cause] 1)A value set in Other Parameter No. 2 "I/O Process Program Number When Operation / Program Discontinued" is out of the range</p> <p>[Countermeasure] 1)Set a value in the range (0 to 512) in Other Parameter No. 2 "I/O Process Program Number When Operation / Program Discontinued" * Feature inactivated when set to 0</p>

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Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	487 I/O process program # error during motion paused	<p>[Content & Cause] 1)A value set in Other Parameter No. 3 "I/O Process Program Number When All Operation Paused" is out of the range</p> <p>[Countermeasure] 1)Set a value in the range (0 to 512) in Other Parameter No. 3 "I/O Process Program Number When All Operation Paused" * Feature inactivated when set to 0</p>
	488 Virtual IO operation error	<p>[Content & Cause] 1)The virtual output port in the input attribute was attempted to be changed</p> <p>[Countermeasure] 1)Check the virtual output port that was to be changed</p>
	489 System output operation error	<p>[Content & Cause] 1)An output port set as the system output in the parameters was attempted to operate</p> <p>[Countermeasure] 1)An output port set as the system output in the parameters should not be operated</p>
	48B Servo-control-right error (all-operation-cancellation)	<p>[Content & Cause] 1)Malfunction on SEL unit 2)Noise</p> <p>[Countermeasure] 1)Replace SEL unit 2)In case the error occurs even after rebooting the power, take a countermeasure to noise</p>
	48C Home-return incomplete error	<p>[Content & Cause] 1)Movement was attempted with the home-return operation incomplete 2)Teaching operation was attempted with the home-return operation incomplete 3)Operation was attempted without conducting software reset or power rebooting after conducting absolute reset encoder error reset</p> <p>[Countermeasure] 1)Movement should be conducted after the home-return operation is completed 2)Teaching operation should be conducted after the home-return operation is completed 3)Operation should be conducted after conducting software reset or power rebooting after conducting absolute reset encoder error reset</p>
	48D Position# data size exceeded in response command	<p>[Content & Cause] 1)The connected PC software or TP is not applicable for the extended position data</p> <p>[Countermeasure] 1)Check the version of the PC software or TP in IAI homepage.</p>
	48E Input port debug filter type error	<p>[Content & Cause] 1)Input port debug filter setting data out of the range was indicated in IAI Protocol (Other than those below) 0 = Off Filter / 1 = On Filter / 2 = Penetrated (No debug filter)</p> <p>[Countermeasure] 1)Input port debug filter setting data in the range should be indicated in IAI Protocol 0 = Off Filter / 1 = On Filter / 2 = Penetrated (No debug filter)</p>

Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	48F Singular point error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1)Position data setting error 2)Position data setting error 3)Device (such as robot or workpiece) position error 4)Error on origin of axes constructing 6-axis cartesian robot (such as wrest) 5)Position data setting error <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1)Check the position number in the step that the error occurred and set it not to get close to the singularity in CP operation 2)Check the position number in the step that the error occurred and set it not to be a position near the singularity 3)Check the relation of the device positions and adjust the positions to avoid being a position near the singularity 4)Execute absolute reset 5)Check the position number in the step that the error occurred and set it not to be at the singularity
	490 Servo OFF during motion	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1)An operation command was executed while the servo is off 2>An axis with the servo off was attempted to be used <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1)An operation command was executed while the servo is off 2>An axis with the servo off was attempted to be used
	491 Deviation overflow error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1)Contact error at connector of actuator connection cable 2>Cable breakage on actuator connection cable 3>The brake cannot be released 4>An external force was applied to an actuator 5>The sliding resistance on an actuator is high 6>Malfunction of encoder 7>Malfunction of driver unit <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1), 2) Replace the actuator connection cable 3)Check condition of brake cable wiring, and then brake operation check manually 4)Revise condition of assembly 5>If there is no problem with the payload, cut off the power and check sliding resistance by hand 6)Replace the motor unit (encoder) 7)Replace driver unit
	492 Overrun error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1)Position data setting error 2>Sensor error 3>An actuator moved to the sensor detection area when home-return operation incomplete 4>Noise <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1)Set up the position so the actuator would not violate 2)Replace the sensor

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Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	493 Creep sensor undetected error	<p>[Content & Cause] 1) Contact error at creep sensor connector on encoder cable 2) Cable breakage on encoder cable 3) Malfunction of sensor</p> <p>[Countermeasure] 1) Check the condition of connection on the creep sensor connector on the encoder cable and connect again 2) Replace the encoder cable 3) Replace the sensor</p>
	494 Positioning distance overflow error	<p>[Content & Cause] 1) The absolute reset was not performed in the normal condition</p> <p>[Countermeasure] 1) Perform the absolute reset again in the correct procedures</p>
	495 Posture error	<p>[Content & Cause] 1) There is an error in the posture setting. 2) The posture at the current position and the target position in CP operation are different.</p> <p>[Countermeasure] 1) Check the posture indications in SEL Command and IAI Protocol Command and correct the values for indicating the posture 2) Have the posture at the current position and the target position in CP operation set the same.</p>
	496 Expansion condition LD simultaneous process # exceeded	<p>[Content & Cause] 1) The number of simultaneous processes in LD has exceeded the upper limit (32)</p> <p>[Countermeasure] 3) Set the number of simultaneous processes not to exceed the upper limit</p>
	497 Expansion condition LD missing error 1	<p>[Content & Cause] 1) There is no input condition before steps of Extension Conditions A and O</p> <p>[Countermeasure] 1) Input the input conditions before steps of Extension Conditions A and O</p>
	498 Expansion condition LD insufficient error 2	<p>[Content & Cause] 1) There is no input condition before steps of Extension Conditions AB and OB</p> <p>[Countermeasure] 1) Input the input conditions before steps of Extension Conditions AB and OB</p>
	499 Unused LD detection error	<p>[Content & Cause] 1) A command was executed without using the input conditions saved by using LD several times in Extension Condition AB or OB 2) An input condition prohibited command was set during the nest process of the input conditions</p> <p>[Countermeasure] 1) A command should not be executed without using the input conditions saved by using LD several times in Extension Condition AB or OB 2) An input condition prohibited command should not be indicated during the nest process of the input conditions</p>

Error No.	Error name	Content and Cause / Countermeasure
Operation-cauculation	49A	<p>[Content & Cause] 1) An input condition was attempted to be used to an input condition prohibited command</p> <p>[Countermeasure] 1) An input condition should not be used to an input condition prohibited command</p>
	49B	<p>[Content & Cause] 1) The number of string variable indication has exceeded the upper limit [Upper Limit] 700 of global domain and 299 of local domain</p> <p>[Countermeasure] 1) Use it not to have the number of string variable indication exceed the upper limit</p>
	49C	<p>[Content & Cause] 1) There is no delimiter in the string variables</p> <p>[Countermeasure] 1) Set a delimiter in the string variables</p>
	49D	<p>[Content & Cause] 1) The string variables copy size is too large</p> <p>[Countermeasure] 1) Make the string variables copy size small</p>
	49E	<p>[Content & Cause] 1) The length of the character string is not defined at string process</p> <p>[Countermeasure] 1) Defined the length of the character string by SLEN Command before executing the string process</p>
	49F	<p>[Content & Cause] 1) The length of the character string is out of the range at string process</p> <p>[Countermeasure] 1) Check the length of the character string set in the step that the error occurred and set the value in the range</p>
	4A0	<p>[Content & Cause] 1) There is an error to a value of the center angle indicated by ARCC Command or ARCD Command</p> <p>[Countermeasure] 1) Refer to the SEL programming manual and change the value to one that is available for indication</p>
	4A1	<p>[Content & Cause] 1) Data indicated in a SEL command is out of the range</p> <p>[Countermeasure] 1) Check the program step that the error occurred and indicate the data in the range.</p>
	4A2	<p>[Content & Cause] 1) PTP operation on each axis was indicated on multiple axes 2) Jog and inching were indicated on multiple axes</p> <p>[Countermeasure] 1) PTP operation on each axis should be indicated on one axis only 2) Jog and inching should be indicated on one axis only</p>

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Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	4A3 Condition unavailable axis used error	<p>[Content & Cause]</p> <p>1) An axis with the drive source shut off was attempted to be used 2) An axis with an error being occurred was attempted to be used</p> <p>[Countermeasure]</p> <p>1) Use axis after drive cutoff canceled 2) Use axis after error canceled</p>
	4A4 SCARA / linear axis simultaneous indication error	<p>[Content & Cause]</p> <p>1) SCARA and linear axes were indicated at the same time</p> <p>[Countermeasure]</p> <p>1) Check the program step that the error occurred and change the setting not to indicate the SCARA and linear axes at the same time in axis patterns and position data</p>
	4A5 Push-motion axis multiple specification error	<p>[Content & Cause]</p> <p>1) Several axes were indicated in PUSH Command</p> <p>[Countermeasure]</p> <p>1) Check the program step that the error occurred and avoid indicating multiple axes in PUSH Command</p>
	4A6 Push-motion approach distance/speed specification error	<p>[Content & Cause]</p> <p>1) A distance out of the range was indicated in PAPR Command 2) A speed out of the range was indicated in PAPR Command</p> <p>[Countermeasure]</p> <p>1) A distance in the range should be indicated in PAPR Command 2) A speed in the range (at 70mm/s or below) should be indicated in PAPR Command</p>
	4A7 Defective phase-Z position error	<p>[Content & Cause]</p> <p>1) Malfunction of encoder 2) Malfunction of home sensor 3) Contaminated inside actuator</p> <p>[Countermeasure]</p> <p>1) Replace encoder 2) Replace the home sensor 3) Remove the contamination from the actuator</p>
	4A8 Servo-packet calculation logic error	<p>[Content & Cause]</p> <p>1) Malfunction on SEL unit 2) The absolute reset was not performed in the normal condition * In case 4AC "Actual Position Soft Limit Excess Error" being occurred in parallel 3) Noise</p> <p>[Countermeasure]</p> <p>1) Replace SEL unit 2) Perform the absolute reset again in the correct procedures 3) Take a counteraction to noise</p>
	4A9 Circle/arc calculation logic error	<p>[Content & Cause]</p> <p>1) Malfunction on SEL unit 2) Noise</p> <p>[Countermeasure]</p> <p>1) Replace SEL unit 2) Take a counteraction to noise</p>

Error No.	Error name	Content and Cause / Countermeasure
Operation-deceleration	4AA	<p>[Content & Cause] 1)Position data not available for arch movement was indicated</p> <p>[Countermeasure] 1)Position data available for arch movement should be indicated</p>
	4AB	<p>[Content & Cause] 1)The number of flash ROM erasing has exceeded the upper limit</p> <p>[Countermeasure] 1)Replace SEL unit</p>
	4AC	<p>[Content & Cause] The current position has exceeded the soft limit 1)An external force was applied when the servo is off 2)An actuator was overshot</p> <p>[Countermeasure] Set the current position back in the range of the soft limit 1)Do not attempt to move it out of the range 2)Have a gain adjustment conducted</p>
	4AD	<p>[Content & Cause] There is an error in the position data type. • An appropriate type was indicated • Axis-specific coordinate system and orthogonal coordinate system existed together</p> <p>[Countermeasure] Check the indication of the position data type referring to the SEL command programming manual and correct the value indicated in the position data type</p>
	4AE	<p>[Content & Cause] A feature not available in the current setting is used in a SEL command or IAI Protocol command.</p> <p>[Countermeasure] Check in the SEL command programming manual or the serial communication protocol specification document and correct the SEL program or IAI Protocol Command.</p>
	4AF	<p>[Content & Cause] A feature not supported in the driver was attempted to be used 1)An axis connected to RCON-DC was indicated as the target axis for NTCH Command</p> <p>[Countermeasure] 1)Check the content of the SEL program</p>
	4B0	<p>[Content & Cause] There is an error in the acceleration/deceleration indication 1)The indication of the acceleration/deceleration is 0 or less 2)Orthogonal coordinate system movement was made with ACMX Command declared</p> <p>[Countermeasure] 1), 2) Check the velocity indication in the SEL programs, IAI Protocol commands and position data.</p>

11.3 Error List

Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	4B1 Excess command acceleration/deceleration	<p>[Content & Cause] The command acceleration/deceleration has exceeded the allowable value during operation 1) Indicated velocity and/or acceleration/deceleration in CP operation are/is too high 2) It came to need a motor rotation with high acceleration/deceleration in order to retain the velocity and operation posture in a CP operation with the cartesian coordinates indicated</p> <p>[Countermeasure] 1) Decrease the indicated velocity in a command such as VEL Command or OVRD Command, and acceleration/deceleration in ACC Command or DCL Command 2) Change the operation position</p>
Emergency stop	500 Emergency stop	<p>[Content & Cause] 1) The emergency stop condition was detected</p> <p>[Countermeasure] 1) Check the following if it is unexpected; • If there is a contact error on the system I/O connector • If the wiring on the system I/O connector is correct • If the emergency stop is constructed in an external circuit, check if there is any problem in the external circuit</p>
Encoder error	600 Encoder error	<p>[Content & Cause] 1) Contact error at connector of actuator connection cable 2) Cable breakage on actuator connection cable 3) Malfunction of encoder 4) Malfunction of driver unit 5) Noise applied on actuator connection cable 6) Parameter No. 158 "Valid/Invalid Axis Select" on an axis not connected is set to "0: Valid"</p> <p>[Countermeasure] 1) Check actuator connection cable connection status and connect again 2) Replace the actuator connection cable 3) Replace encoder (or replace motor unit) 4) Replace driver unit 5) Take a countermeasure to noise on actuator connection cable (such as installing ferrite core) 6) Set Parameter No. 158 "Valid/Invalid Axis Select" on an axis not connected to "1: Invalid"</p>
Fan error	601 Fan error	<p>[Content & Cause] 1) Fan malfunction</p> <p>[Countermeasure] 1) Replace the fan unit</p>
SEL global data error	602 SEL global data error	<p>[Content & Cause] 1) The power was cut off during the SEL global data initialization 2) The SEL global data was damaged due to noise apply</p> <p>[Countermeasure] 1) Initialize the SEL global data 2) Take a countermeasure to noise on a controller (in case of high frequency)</p>
Controller update error	603 Controller update error	<p>[Content & Cause] 1) Error in indicating controller name or unit name of the updating tools</p> <p>[Countermeasure] 1) Indicate the controller names and unit names of the updating tools to perform update</p>

Error No.	Error name	Content and Cause / Countermeasure
Cold-start	604 Flash ROM error	<p>[Content & Cause]</p> <p>1) Data delete in the flash ROM or writing to the flash ROM did not finish in normal condition due to the causes below:</p> <ol style="list-style-type: none"> 1. Noise Applied 2. Malfunction of Flash ROM <p>2) Sum check error in code domain in flash ROM</p> <p>3) Version information mismatched in code domain in flash ROM</p> <p>4) Data writing to the flash ROM did not finish in normal condition due to the causes below:</p> <ol style="list-style-type: none"> 1. Noise Applied 2. Malfunction of Flash ROM <p>5) Data delete in the flash ROM did not finish in normal condition due to the causes below:</p> <ol style="list-style-type: none"> 1. Noise Applied 2. Malfunction of Flash ROM <p>6) Data was corrupted in the flash ROM due to the causes below:</p> <ol style="list-style-type: none"> 1. Noise Applied 2. Malfunction of Flash ROM <p>[Countermeasure]</p> <p>1) -1, 4) -1, 5) -1, 6) -1 Take a countermeasure to noise on controller (such as installing ferrite core)</p> <p>1) -2, 4) -2, 5) -2, 6) -2 Replace SEL unit</p> <p>2),3) Reboot the power.</p>
	605 System construction definition ROM data error	<p>[Content & Cause]</p> <p>1) Data is not written properly to the flash ROM</p> <p>2) Malfunction of Flash ROM</p> <p>[Countermeasure]</p> <p>1), 2) Replace the SEL unit in case it occurs again even after the power reboot</p>
	606 Symbol definition table error	<p>[Content & Cause]</p> <p>1) The power was cut during flash ROM writing.</p> <p>2) Malfunction of Flash ROM</p> <p>[Countermeasure]</p> <p>1) Transfer the backup data and conduct the flash ROM writing</p> <p>2) Replace SEL unit</p>
	607 Parameter error	<p>[Content & Cause]</p> <p>1) The power was cut during flash ROM writing.</p> <p>2) Malfunction of Flash ROM</p> <p>[Countermeasure]</p> <p>1) Transfer the backup data and conduct the flash ROM writing</p> <p>2) Replace SEL unit</p>
	608 SEL program error	<p>[Content & Cause]</p> <p>1) The power was cut during flash ROM writing.</p> <p>2) Malfunction of Flash ROM</p> <p>[Countermeasure]</p> <p>1) Transfer the backup data and conduct the flash ROM writing</p> <p>2) Replace SEL unit</p>

11.3 Error List

	Error No.	Error name	Content and Cause / Countermeasure
Cold-start	609	Position data error	<p>[Content & Cause] 1) The power was cut during flash ROM writing. 2) Malfunction of Flash ROM</p> <p>[Countermeasure] 1) Transfer the backup data and conduct the flash ROM writing 2) Replace SEL unit</p>
	60A	Position error	<p>[Content & Cause] 1) The number of axes groups was changed</p> <p>[Countermeasure] 1) Initialize the position data</p>
	60B	Fieldbus error	<p>[Content & Cause] 1) Operation failure due to noise or others 2) Concern of SEL unit malfunction</p> <p>[Countermeasure] 1) Take a countermeasure to noise on controller (such as installing ferrite core) 2) Replace SEL unit</p>

Error No.	Error name	Content and Cause / Countermeasure
60C Cold-start	Fieldbus FBRS link error	<p>[Content & Cause]</p> <p>1) Contact error on fieldbus connection cable 2) Cable breakage on fieldbus connection cable 3) Following data does not match the setting on the PLC side</p> <ul style="list-style-type: none"> • I/O Parameter No. 14 “Number of I/O Fieldbus Remote Input Used Ports” • I/O Parameter No. 15 “Number of I/O Fieldbus Remote Output Used Ports” • I/O Parameters from No. 132 to 135 “I/O Fieldbus Self IP Addresses (x)” * x in brackets () represents H, MH, ML or L in the order from smaller parameter number • I/O Parameter from No. 136 to 139 “I/O Fieldbus Subnet Mask (x)” * x in brackets () represents H, MH, ML or L in the order from smaller parameter number • I/O Parameters from No. 140 to 143 “I/O Fieldbus Default Gateway (x)” * x in brackets () represents H, MH, ML or L in the order from smaller parameter number • I/O Parameter No. 184 “Number of CC-Link IE Remote Register (Input) Words (RWw)” • I/O Parameter No. 184 “Number of CC-Link IE Remote Register (Output) Words (RWr)” • I/O Parameter No. 226 “I/O1 Fieldbus Node Address” • I/O Parameter No. 227 “I/O1 Fieldbus Baud Rate” • I/O Parameter No. 228 “I/O1 Fieldbus Network Number” <p>4) Noise</p> <p>[Countermeasure]</p> <p>1) Check the connection status of fieldbus connection cable and connect again 2) Replace fieldbus connection cable 3) Check the following parameters and establish the controller parameter settings or change the settings on the PLC side.</p> <ul style="list-style-type: none"> • I/O Parameter No. 14 “Number of I/O Fieldbus Remote Input Used Ports” • I/O Parameter No. 15 “Number of I/O Fieldbus Remote Output Used Ports” • I/O Parameters from No. 132 to 135 “I/O Fieldbus Self IP Addresses (x)” * x in brackets () represents H, MH, ML or L in the order from smaller parameter number • I/O Parameter from No. 136 to 139 “I/O Fieldbus Subnet Mask (x)” * x in brackets () represents H, MH, ML or L in the order from smaller parameter number • I/O Parameters from No. 140 to 143 “I/O Fieldbus Default Gateway (x)” * x in brackets () represents H, MH, ML or L in the order from smaller parameter number • I/O Parameter No. 184 “Number of CC-Link IE Remote Register (Input) Words (RWw)” • I/O Parameter No. 184 “Number of CC-Link IE Remote Register (Output) Words (RWr)” • I/O Parameter No. 226 “I/O1 Fieldbus Node Address” • I/O Parameter No. 227 “I/O1 Fieldbus Baud Rate” • I/O Parameter No. 228 “I/O1 Fieldbus Network Number” <p>4) Take a countermeasure to noise on fieldbus connection cable (such as installing ferrite core)</p>

Error No.	Error name	Content and Cause / Countermeasure
60D	Fieldbus parameter error	<p>[Content & Cause]</p> <p>1) Parameter setting error There is a mismatch in the value in I/O Parameter No. 225 I/O Control and the type of the fieldbus module actually mounted</p> <p>2) A node address out of the range was set The value in I/O Parameter No. 226 I/O1 Fieldbus Node Address is out of the range</p> <p>3) A baud rate out of the range was set The value in I/O Parameter No. 227 I/O1 Fieldbus Baud Rate is out of the range</p> <p>4) A fieldbus network number out of the range was set The value in I/O Parameter No. 228 I/O1 Fieldbus Network Number is out of the range</p> <p>5) The self IP address in the system reservation was set There is an error in the value set in I/O parameters from No. 132 to 135</p> <p>6) There is no fieldbus module mounted</p> <p>[Countermeasure]</p> <p>1) Check the value in I/O Parameter No. 225 and set it to match with the fieldbus module board actually mounted Not installed: 0, CC-Link: 1, DeviceNet: 2, PROFIBUS-DP: 3, EtherCAT: 6, EtherNet/IP: 7, PIO: 9, PROFINET IO: A, CC-Link IE: D</p> <p>2) Check the value set in I/O Parameter No. 226 and set the correct value For CC-Link: 1 to 64, For DeviceNet: 0 to 63, For PROFIBUS-DP: 0 to 125, For EtherCAT: 0 to 65535, For CC-Link IE: 0 to 120</p> <p>3) Check the value set in I/O Parameter No. 227 and set the correct value For CC-Link: 0:156kbps, 1:625kbps, 2:2.5Mbps, 3:5Mbps, 4:10Mbps For DeviceNet: 0:125kbps, 1:250kbps, 2:500kbps For EtherNet/IP: 0: Automatic negotiation, 1: 10Mbps (half duplex), 2: 10Mbps (full duplex), 3: 100Mbps (half duplex), 4: 100Mbps (full duplex)</p> <p>4) Check the value set in I/O Parameter No. 228 and set the correct value For CC-Link IE: 1 to 239</p> <p>5) Check the values set in I/O parameters from No. 132 to 135 and set the correct values</p> <p>6) Install a fieldbus module</p> <p>[Content & Cause]</p> <p>The CC-Link system domain was used as the system output for those below;</p> <p>1) Input and output feature select port number. 2) Zone output port number. 3) Simple interference check zone output port number. 4) Vision system I/F capturing indication physical output port number.</p> <p>[Countermeasure]</p> <p>Check the following settings;</p> <p>1) I/O Parameter No. 299 to 314 "Output Feature Select 3xx Assignment Port Number" I/O Parameter No. 315 to 330 "Output Feature Select 3xx (Area 2) Assignment Port Number" * xx in " " represents a parameter number from 00 to 15 in ascending order</p> <p>2) Axis Parameter 23, 26, 29 and 32 "Zone x Output Number" * x in " " represents a parameter number from 1 to 4 in ascending order</p> <p>3) Simple interference check zone output port number. A physical output port number in the simple interference check zone setting window in the PC software and so on.</p> <p>4) I/O Parameter No. 357 "Vision System I/F Capturing Command Physical Output Port Number"</p>
60E	CC-Link system domain use error	

Error No.	Error name	Content and Cause / Countermeasure
Cold-start	60F Vision system I/F parameter error	<p>[Content & Cause] Parameter setting error 1) An error in I/O Parameter No. 351 "Vision System I/F Feature Select 1" Bit 4 to 7 settings <When communication to vision is to be established with Ethernet> There is a mismatch to the channel number set in I/O Parameter No. 124 "Network Attribute 5" 2) There is an error in the setting in I/O Parameter No. 352 "Vision System I/F1 Feature Select 2" Bit 0 to 7 3) There is an error in the setting in I/O Parameter No. 356 "Vision System I/F1 Initial Complete Status Physical Input Port Number" 4) A port number set in I/O Parameter 357 "Vision System I/F1 Capturing Command Physical Output Port Number" is duplicated with another feature or a port number out of the range is indicated 5) A value set in MC Common Parameter No. 31 "Vision System I/F1 Coordinate Axis Definition" is out of the range or there is no setting established of X and Y axes</p> <p>[Countermeasure] 1) Set Parameter No. 351 "Vision System I/F Feature Select 1" Bit 4 to 7 as follows; <When communication to vision is to be established with Ethernet> Set in the channel number set in I/O Parameter No. 124 "Network Attribute 5" 2) Set a value in the range from 0 to 2 in I/O Parameter No. 352 "Vision System I/F1 Feature Select 2" Bit 0 to 7 3) Set a value in the range available to indicate for the setting in I/O Parameter No. 356 "Vision System I/F1 Initial Complete Status Physical Input Port Number" 4) Check the port number set in I/O Parameter 357 "Vision System I/F1 Capturing Command Physical Output Port Number" and avoid duplicating with another feature or set a port number in the range 5) Set a coordinate axis to MC Common Parameter No. 31 "Vision System I/F1 Coordinate Axis Definition"</p>
	610 SIO initialization error	<p>[Content & Cause] 1) There was a failure in the serial communication initialization</p> <p>[Countermeasure] 1) Reboot the power.</p>
	611 SIO input buffer overflow error	<p>[Content & Cause] 1) Excess data received 2) Contact Error at SIO Cable Connector 3) SIO Cable Breakage 4) Noise Applied to SIO Cable</p> <p>[Countermeasure] 1) Check the sent data from connected devices 2) Check SIO cable connection status and connect again 3) Replace SIO cable 4) Take a countermeasure to noise on SIO cable (such as installing ferrite core)</p>
	612 During non-AUTO mode, channel open error (during servo on)	<p>[Content & Cause] 1) SIO channel got open while it is not in AUTO Mode and also the servo is in use</p> <p>[Countermeasure] 1) Open free-to-user SIO channel in AUTO Mode</p>

11.3 Error List

Error No.	Error name	Content and Cause / Countermeasure
Cold-start	613 PIO error	<p>[Content & Cause] 1)IO power is not supplied (or voltage dropped below 21.6V)</p> <p>[Countermeasure] 1)Check the power supply status to IO cable</p>
	614 Unsupported function error	<p>[Content & Cause] 1)A feature that the driver part does not support was executed</p> <p>[Countermeasure] 1)Check the driver applicable version</p>
	615 Unsupported card error	<p>[Content & Cause] 1)A network I/F type not supported was set in I/O Parameter No. 225 "I/O Control"</p> <p>2)An I/O module not supported is mounted to an I/O slot</p>
	616 SD card error (controller)	<p>[Countermeasure] 1)Contact IAI 2)Check the firmware version</p> <p>[Content & Cause] 1)There is no Secure Digital memory card installed in a Secure Digital memory card slot 2)There is no indicated file saved in the Secure Digital memory card 3)An indicated file in the Secure Digital memory card is corrupted 4)Malfunction of the Secure Digital memory card 5)Malfunction on SEL unit</p>
	617 Ethernet parameter error	<p>[Countermeasure] 1)Install a Secure Digital memory card 2)Save a file that you would like to use in a Secure Digital memory card 3)Save a file that you would like to use in a Secure Digital memory card again 4)Replace the Secure Digital memory card 5)Replace SEL unit</p> <p>[Content & Cause] 1)An IP address in the system reservation was set</p>
	618 Internal process error	<p>[Countermeasure] 1)Check the setting in I/O Parameter No. 172 to 175 "Ethernet I/F Self IP Address (*)" * H, MH, ML or L comes in * in order</p>
		<p>[Content & Cause] 1)Malfunction on SEL unit 2)Noise 3)Malfunction of an I/O slot</p>
		<p>[Countermeasure] 1)Replace SEL unit in case this error occurs after power reboot 2)Take a countermeasure to noise 3)Replace the I/O slot in case it occurs again even after the power reboot</p>

Error No.	Error name	Content and Cause / Countermeasure
Cold start	619 Motor drive control error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) Contact error at connector of actuator connection cable 2) Cable breakage on actuator connection cable 3) Malfunction of driver unit 4) Motor power supply voltage drop <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Check actuator connection cable connection status and connect again 2) Replace the actuator connection cable 3) Replace driver unit 4) Check the voltage on the motor power supply
	61A Driver overload error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) The input power to the motor has exceeded the upper limit 2) The sliding resistance on an actuator is high <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Revise the following items; <ul style="list-style-type: none"> • Velocity setting • Acceleration/deceleration setting • Payload 2) If there is no problem with the payload, cut off the power and check sliding resistance by hand
	61B Excitation detection error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) Contact error at connector of actuator connection cable 2) Cable breakage on actuator connection cable 3) An external force was applied to an actuator 4) The sliding resistance on an actuator is high 5) The brake cannot be released 6) Malfunction of motor / encoder 7) Malfunction of driver unit <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Check actuator connection cable connection status and connect again 2) Replace the actuator connection cable 3) Revise condition of assembly 4) If there is no problem with the payload, cut off the power and check sliding resistance by hand 5) Check condition of brake cable wiring, and then brake operation check manually 6) Replace the motor unit 7) Replace driver unit <p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) Malfunction of motor 2) Malfunction of driver unit
	61C Driver unit overcurrent error	<p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Replace the motor unit 2) Replace driver unit

	Error No.	Error name	Content and Cause / Countermeasure
Cold-start	61D	Driver unit current sensor error	<p>[Content & Cause]</p> <p>1) An external force was applied to an actuator 2) The sliding resistance on an actuator is high 3) The brake cannot be released 4) Malfunction of driver unit</p> <p>[Countermeasure]</p> <p>1) Revise condition of assembly 2) If there is no problem with the payload, cut off the power and check sliding resistance by hand 3) Check condition of brake cable wiring, and then brake operation check manually 4) Replace driver unit</p>
	61E	Driver unit drive power error	<p>[Content & Cause]</p> <p>1) Malfunction of motor 2) Malfunction of driver unit</p> <p>[Countermeasure]</p> <p>1) Replace the motor unit 2) Replace driver unit</p>
	61F	Verification error during driver unit non-volatile memory writing	<p>[Content & Cause]</p> <p>1) Noise 2) Malfunction of driver unit</p> <p>[Countermeasure]</p> <p>1) Take a countermeasure to noise 2) Replace driver unit</p>
	620	Driver unit related error	<p>[Content & Cause]</p> <p>1) An external force was applied to an actuator 2) The sliding resistance on an actuator is high 3) The brake cannot be released 4) Malfunction of driver unit 5) Noise 6) Controller HW is not applicable for the set actuator (motor)</p> <p>[Countermeasure]</p> <p>1) Revise condition of assembly 3) If there is no problem with the payload, cut off the power and check sliding resistance by hand 3) Check condition of brake cable wiring, and then brake operation check manually 4) Replace driver unit 5) Take a countermeasure to noise 6) Contact IAI in case it occurs again</p>
	621	Slave unit communication error	<p>[Content & Cause]</p> <p>1) A coupling connector or a SCON connector is not properly joined 2) There is a line breakage on an internal signal line or an SCON connection cable 3) There is no terminal unit or terminal connector (for SCON) installed 4) Noise</p> <p>[Countermeasure]</p> <p>1), 2) Check that each unit is joined with another firmly Disconnect the link among the units once and connect them again 3) Attach a terminal unit or terminal connector 4) Take a counteraction to noise</p>

Error No.	Error name	Content and Cause / Countermeasure
Cold-start	622 Driver unit control power voltage low	<p>[Content & Cause]</p> <p>1) Voltage error on 24V DC power supply 2) Malfunction on SEL unit</p> <p>[Countermeasure]</p> <p>1) Check the power voltage and replace the 24V DC power supply in case of an error 2) Replace SEL unit</p>
	623 Coordinate system error	<p>[Content & Cause]</p> <p>1) The coordinate system definition data has been destroyed due to noise being applied 2) Malfunction on SEL unit</p> <p>[Countermeasure]</p> <p>1)-1 Initialize the coordinate system definition data 1)-2 Take a counteraction against noise on the controller (if happens often) 2) Replace SEL unit</p>
	624 Simple interference check zone error	<p>[Content & Cause]</p> <p>1) A value as shown below was indicated to the zone irruption output number (indicated in the simple interference check zone edit window in SOIF Command, PC software and TP) for the simple interference check zone;</p> <ul style="list-style-type: none"> • A value other than the output port or global flag number (0 is acceptable) • A number duplicated with the output number indicated in the system output (such as output feature select, linear axis zone, etc.) <p>2) A simple interference check zone number out of the range (other than from 1 to 10) was indicated in a SEL command</p>
		<p>[Countermeasure]</p> <p>1) Check the zone irruption output number for the simple interference zone and indicate a value following those below;</p> <ul style="list-style-type: none"> • Output port • Indicate a global flag number or 0 • Avoid indicating an output port indicated in the system output <p>2) Check the simple interference check zone number indicated in the program step that the error occurred and indicate a value in the range available for input</p>
	625 Multi-slider parameter error	<p>[Content & Cause]</p> <p>1) Setting error in Axis Parameter No. 41 “Multiple Slider Excess Approach Detection Target Axis Indication”</p> <ul style="list-style-type: none"> • An inappropriate axis number was indicated • Two slider axis numbers mutual indication error • A next axis number physically impossible considering the structure of the linear axes was indicated • A synchronized slave number indicated <p>[Countermeasure]</p> <p>1) Check the setting in Axis Parameter No. 41 “Multiple Slider Excess Approach Detection Target Axis Indication” and revise it</p>

Error No.	Error name	Content and Cause / Countermeasure
Cold-start	626 Overload warning parameter error	<p>[Content & Cause] Setting error in Axis Parameter No. 37 “OLWNO Driver Overload Warning Output Number”</p> <p>1)A number other than an output port / extension output port number is input (0 acceptable) 2)Indication is duplicated with an output port / extension output port number indicated in another feature 3)A number duplicated with an output number indicated to the system output in the output feature of an I/O parameter was indicated Applicable parameters I/O parameter numbers from No. 46 to 61 and from 299 to 330</p> <p>[Countermeasure] Check the setting in Axis Parameter No. 37 “OLWNO Driver Overload Warning Output Number” and revise it</p> <p>1)Indicate an output port / extension output port number 2)Avoid Indicating a number duplicated with an output port / extension output port number indicated in another feature 3)Avoid indicating a number duplicated with an output number indicated to the system output in the output feature of an I/O parameter</p>
	627 Zone parameter error	<p>[Content & Cause] Setting error in Axis Parameter No. 23/26/29/32 “Zone * Output Number” * 1, 2, 3 or 4 comes in * in ascending order</p> <p>1)A value other than an output port global flag number is input (0 acceptable) 2)Indication is duplicated with a number indicated in another feature 3)A number duplicated with an output number indicated to the system output in the output feature of an I/O parameter was indicated Applicable parameters I/O parameter numbers from No. 46 to 61 and from 299 to 330</p> <p>[Countermeasure] 1)Indicate output ports, extension ports and global flags 2)Avoid Indicating a number duplicated with an output port / extension output port number indicated in another feature 3)Avoid indicating a number duplicated with an output number indicated to the system output in the output feature of an I/O parameter</p>
	628 Synchronizing parameter error	<p>[Content & Cause] Setting error in a synchronizing related parameter</p> <p>1)A synchronized mating axis is an invalid axis 2)Setting error in Axis Parameter No. 16 (Synchronizing Combination Number) <ul style="list-style-type: none"> • A number out of the setting range (from 0 to 4) is set • Combination number is not two axes </p> <p>3)The master axis and slave axes are not the actuators in the same type (mismatch in motor, encoder, ball screw lead length, maximum speed or linear / rotary axis setting)</p> <p>4)It is not an actuator equipped with the battery-less absolute encoder (RCP5 or earlier used for pulse motor)</p> <p>[Countermeasure] 1), 2), 3), 4) Revise the actuator type and establish again the settings in the configuration tool. If the configuration tool is not used, check the type of the actuators and set the same values for the master and slave axes in Axis Parameter No. 16 (Synchronizing Combination Number)</p>

Error No.	Error name	Content and Cause / Countermeasure
Code-start	629 Stroke parameter error	<p>[Content & Cause]</p> <p>1)Setting error in driver unit parameters</p> <ul style="list-style-type: none"> The lead length acquired from the driver unit was 0 or less The soft limit + and - acquired from the driver unit are the same or soft limit - is larger <p>[Countermeasure]</p> <p>1)Check if the following setting in the parameter settings for the driver unit is established correctly</p> <ul style="list-style-type: none"> Lead length Positive side and negative side of soft limits
	62A Resolution related parameter error	<p>[Content & Cause]</p> <p>1)Parameter setting error in driver unit</p> <p>[Countermeasure]</p> <p>1)Contact IAI</p>
	62B Driver parameter data error	<p>[Content & Cause]</p> <p>Parameter setting is inappropriate</p> <p>1)Relation between Driver Unit Parameter No. 3 "Soft Limit Positive Side" and Driver Unit Parameter No. 4 "Soft Limit Negative Side" is inappropriate</p> <p>[Countermeasure]</p> <p>1)Set the values so it comes Soft limit positive side > Soft limit negative side</p>
	62C No operation output # error	<p>[Content & Cause]</p> <p>1)A value other than an output number (other than from 0 to 6999) was input to the following parameters</p> <ul style="list-style-type: none"> I/O Parameter No. 70 "Min. Non-Operated General Output Area Number When All Axes / Programs Discontinued" I/O Parameter No. 71 "Max. Non-Operated General Output Area Number When All Axes / Programs Discontinued" I/O Parameter No. 72 "Min. Non-Operated General Output Area Number When All Axes Paused (Servo Axis Soft Interlock + Output Port Soft Interlock)" I/O Parameter No. 73 "Max. Non-Operated General Output Area Number When All Axes Paused (Servo Axis Soft Interlock + Output Port Soft Interlock)" <p>[Countermeasure]</p> <p>1)Input an output port number (from 0 to 6999) to the following parameters</p> <ul style="list-style-type: none"> I/O Parameter No. 70 "Min. Non-Operated General Output Area Number When All Axes / Programs Discontinued" I/O Parameter No. 71 "Max. Non-Operated General Output Area Number When All Axes / Programs Discontinued" I/O Parameter No. 72 "Min. Non-Operated General Output Area Number When All Axes Paused (Servo Axis Soft Interlock + Output Port Soft Interlock)" I/O Parameter No. 73 "Max. Non-Operated General Output Area Number When All Axes Paused (Servo Axis Soft Interlock + Output Port Soft Interlock)"

	Error No.	Error name	Content and Cause / Countermeasure
Cold-start	62D	Input/output function selection port # error	<p>[Content & Cause]</p> <p>1)A value out of the range is set in an input and output port number 2)An input and output port number is set duplicated</p> <p>[Countermeasure]</p> <p>1), 2) Check the setting in the following parameters</p> <ul style="list-style-type: none"> • Check in I/O Parameters No. 28, 29, 62 to 69, 76, 77, 79, 283 to 330, etc.
	62F	Servo-control-right error	<p>[Content & Cause]</p> <p>1)Malfunction on SEL unit 2)Noise</p> <p>[Countermeasure]</p> <p>1)Replace SEL unit 2)In case the error occurs even after rebooting the power, take a countermeasure to noise</p>
	630	Waiting for SEL unit to recover	<p>[Content & Cause]</p> <p>1)The enable switch is not released 2)A cause of drive cutoff (such as error, enable switch, safety gate or emergency stop) is not cancelled 3)The emergency stop is not cancelled 4)The safety gate is open</p> <p>[Countermeasure]</p> <p>1)Reboot the power after releasing the enable switch 2)Cancel the cause of drive cutoff (such as error, enable switch, safety gate or emergency stop) 3)Cancel the emergency stop and restart 4)Close the safety gate and reboot the power</p>

Error No.	Error name	Content and Cause / Countermeasure
Cold start	631 Overrun error	<p>[Content & Cause]</p> <p>1)Position data setting error 2)An actuator moved to the sensor detection area when home-return operation incomplete 3)Sensor error 4)Noise</p> <p>[Countermeasure]</p> <p>1)Set up the position so the actuator would not violate 2)Move an actuator to the sensor detection area after the home-return operation performed 3)Replace the sensor 4)Take a counteraction to noise</p>
	632 I/O assignment parameter error	<p>[Content & Cause]</p> <p>1)An input (output) port start number and number of input (output) ports used are set as follows in the fixed assignment</p> <ul style="list-style-type: none"> • A port number other than 0 to 299, 300 to 599, 1000 to 3999 or 4000 to 6999 • Not a multiple of 8 <p>2)Duplicated assignment due to parameter setting error 3)Excess number of assignment due to parameter setting error</p> <p>[Countermeasure]</p> <p>1)Set an appropriate value to the input (output) port start number and number of input (output) ports used in the fixed assignment 2)Check in the numbers of input and output ports used and the input and output port start numbers set in the parameters below and confirm that there is no duplication</p> <ul style="list-style-type: none"> • I/O Parameter No.14 to 15 “Number of I/O Fieldbus Remote Input (Output) Used Ports” • I/O Parameter No.16 to 17 “Input (Output) Port Start Number in I/O1 Fixed Assignment” • I/O Parameter No.187 to 188 “Input (Output) Port Start Number in PIO Unit / PIO/SIO Unit Fixed Assignment” <p>3)Check in the numbers of input and output ports used and the input and output port start numbers set in the parameters below and confirm that there is excess number of assignment to the specifications</p> <ul style="list-style-type: none"> • I/O Parameter No.14 to 15 “Number of I/O Fieldbus Remote Input (Output) Used Ports” • I/O Parameter No.16 to 17 “Input (Output) Port Start Number in I/O1 Fixed Assignment” • I/O Parameter No.187 to 188 “Input (Output) Port Start Number in PIO Unit / PIO/SIO Unit Fixed Assignment”
	633 Target type error	<p>[Content & Cause]</p> <p>1)The target type does not match with the actual unit 2)Noise</p> <p>[Countermeasure]</p> <p>1)Check the setting in the target type 2)Take a counteraction to noise</p>
	634 Belt breakage error	<p>[Content & Cause]</p> <p>1)Malfunction of actuator (belt breakage)</p> <p>[Countermeasure]</p> <p>1)Replace the belt (Contact IAI)</p>

	Error No.	Error name	Content and Cause / Countermeasure
Cold-start	635	Brake ON/OFF timeout error	<p>[Content & Cause] 1)The brake power is not supplied</p> <p>[Countermeasure] 1)Supply the brake power</p>
	636	Dynamic brake ON/OFF timeout error	<p>[Content & Cause] 1)Malfunction of driver unit 2)Noise</p> <p>[Countermeasure] 1)Replace driver unit 2)Take noise prevention measure</p>
	637	Drive power cut-off relay error	<p>[Content & Cause] 1)Malfunction with drive cutoff relay welded</p> <p>[Countermeasure] 1)Replace driver unit</p>
	638	Motor power low voltage error	<p>[Content & Cause] 1)Servo was turned on in drive cutoff condition 2) Malfunction of external drive cutoff relay 3) Motor power supply cable connection error 4)Replace driver unit</p> <p>[Countermeasure] 1)Cancel the drive cutoff before turning the servo on 2) Check external drive cutoff relay 3) Check connection of motor power supply cable 4)Replace driver unit</p>
	639	Deviation overflow error (when home return is not yet completed)	<p>[Content & Cause] 1)Contact error at connector of actuator connection cable 2)Cable breakage on actuator connection cable 3)The brake cannot be released 4)An external force was applied to an actuator 5)The sliding resistance on an actuator is high 6)Malfunction of encoder 7)Malfunction of driver unit</p> <p>[Countermeasure] 1), 2) Replace the actuator connection cable 3)Check condition of brake cable wiring, and then brake operation check manually 4)Revise condition of assembly 5)If there is no problem with the payload, cut off the power and check sliding resistance by hand 6)Replace the motor unit (encoder) 7)Replace driver unit</p>

Error No.	Error name	Content and Cause / Countermeasure
Cold-start	63A Axis Feature Definition Parameter Error	<p>[Content & Cause] There is an error in the parameter setting related to the combination unit (such as wrist unit)</p> <ol style="list-style-type: none"> 1) There is an error in a value set in the unit type (such as wrist unit) or unit axis indication (such as B and T-axes) 2) There is an error in a value set in the unit number (from 0 to 4) 3) An item not supported by the unit such as the axis operation type, encoder type and home-return system is set 4) An item not supported by the unit such as synchronizing and multiple slider is set <p>[Countermeasure] 1), 3) Change the value to an appropriate in the parameters in the driver unit 2), 4) Establish the settings again in the configuration tool. If the configuration tool is not used, change the values appropriately in the following parameters</p> <ul style="list-style-type: none"> • Axis Parameter No. 15 (Combination Unit Number) • Axis Parameter No.16 (Synchronizing Combination Number) • Axis Parameter No.41 (Multiple Slider Excess Approach Detection Target Axis Indication)
	63B Coordinate system definition setting error	<p>[Content & Cause] It is a combination of actuators not to use the coordinate system features</p> <p>[Countermeasure] Set it to 0 (No Orthogonal Coordinates) in Axes Group Parameter No. 10</p>
	63C Axis construction parameter error	<p>[Content & Cause] An error was detected in a parameter (Axes Group Parameter No. 1 to 8) related to the axis construction</p> <ol style="list-style-type: none"> 1) Connection of the driver unit axis indicated was not detected 2) A value set in the parameter is out of the range 3) The number of axes to be used exceeded the upper limit (8) 4) An axis was indicated duplicated <p>[Countermeasure] 1) When an error related to the communication with the driver unit (such as 621 and 63E) is generated at the same time take a countermeasure to each error. If the driver unit was taken off, conduct the configuration again. 2), 3), 4) Conduct the configuration again and set the correct parameters</p>
	63D Unit linkage error	<p>[Content & Cause] There is a concern that each unit is not linked correctly to each other.</p> <ol style="list-style-type: none"> 1) A coupling connector or a SCON connector is not properly joined 2) There is a line breakage on an internal signal line or an SCON connection cable 3) There is no terminal unit or terminal connector (for SCON) installed <p>[Countermeasure] 1), 2) Confirm that each unit is linked together firmly with each other. Disconnect the link between each unit once and reconnect the link again. If the error occurs again even after the power reboot, contact IAI. 3) Install a terminal unit or terminal connector</p>
	63E Number of driver axes error	<p>[Content & Cause] 1) Driver units are connected for nine axes or more</p> <p>[Countermeasure] 1) Have the driver units connected for eight axes or less</p>

11.3 Error List

Error No.	Error name	Content and Cause / Countermeasure
Cold-start	640 Data Output Parameter Error	<p>[Content & Cause] There is an error described below in the data output related parameter settings 1)There is an error in a parameter 2)The axis data output port is duplicated 3)The system output port is duplicated</p> <p>[Countermeasure] 1), 2), 3) Establish the output data setting again in the IO output setting window.</p>
	641 Parameter mismatch error	<p>[Content & Cause] There are parameters with the settings mismatched 1)The settings in Driver Unit Parameter No. 5 "Home-Return Direction" and No. 62 "Pulse Count Direction" are different</p> <p>[Countermeasure] 1)In case the home-return direction has been changed, change the pulse count direction setting at the same time.</p>
	642 Option unit communication error	<p>[Content & Cause] There is a communication error occurred in the communication with an option unit (unit other than driver unit or power supply unit). 1)Connectors are not joined properly 2)There is a breakage on a signal line inside 3)Communication error due to influence of noise 4)There is no terminal unit installed 5>Nine units or more option units are connected 6)There is an error in an option unit related parameter</p> <p>[Countermeasure] 1) to 3) Confirm that each unit is linked together firmly with each other. Disconnect the link between each unit once and reconnect the link again. If the error occurs again even after the power reboot, contact IAI. 4)Install a terminal unit. 5)Have the connected option units for 8 units or less. 6)Check in I/O Parameter No. 186 to 190</p>
	643 Emergency-stop, enable switch recovery type parameter error	<p>[Content & Cause] An emergency stop or enable switch recovery type not available in the robot currently connect is set</p> <p>[Countermeasure] Set a value other than "2: Operation Continuous Recovery" to Other Parameter No. 10 and 11.</p>
	644 EMG logic error	<p>[Content & Cause] 1)Malfunction on SEL unit</p> <p>[Countermeasure] 1)Replace SEL unit</p>
	645 ENB logic error	<p>[Content & Cause] 1)Malfunction on SEL unit</p> <p>[Countermeasure] 1)Replace SEL unit</p>

Content and Cause / Countermeasure		
Error No.	Error name	
Cold-start System-down	700	<p>Communication error</p> <p>[Content & Cause]</p> <ul style="list-style-type: none"> 1) Noise 2) Malfunction on SEL unit 3) Malfunction of TP 4) A controller not supported is connected <p>[Countermeasure]</p> <ul style="list-style-type: none"> 1) In case the error occurs even after rebooting the power, take a countermeasure to noise 2) Replace SEL unit 3) Replace the TP 4) Check the version of the teaching in IAI homepage.
	F00	<p>System down error</p> <p>[Content & Cause]</p> <ul style="list-style-type: none"> 1) A system error was detected <p>[Countermeasure]</p> <ul style="list-style-type: none"> 1) Reboot the power.

11.4 Alarm Codes of Driver Unit

If corresponding driver units are limited, a symbol for the type of the corresponding driver unit is indicated in the alarm code column. Alarm codes with no symbols indicated are common to all driver units.

- P: Stepper motor RCP2, RCP3, RCP4, RCP5, and RCP6 Series
- A: 24V AC Servo motor RCA, RCA2, and RCL Series
- D: DC brush-less motor RCD Series
- S: 200V AC Servo motor RCS and ISB Series etc.

(1) Message level

Alarm code	Alarm name	Causes/countermeasures
047 P, A, D Driver limited	Deviation exceeded warning	Cause: Present operating conditions or high actuator sliding resistance may be causing excess deviation. Countermeasure: Lower the acceleration/deceleration setting. Perform maintenance such as greasing, etc.
048	Driver overload warning	Cause: The load current value exceeds the setting of Parameter No. 143 "Overload Load Level Ratio". This alarm retains alarm status until it is reset. This alarm turns ON when the load current value exceeds the setting. Countermeasure: Lower the acceleration/deceleration setting. Or increase the pause ratio.
04A	Estimated life exceeded warning	Cause: Driver unit motor power capacitor power capacitance has decreased by 20%. Countermeasure: Replace the driver unit as soon as possible.
04C	Low fan rotation speed	Cause: The number of revolution of the fan in the fan unit mounted on the driver unit has dropped by 30%. Countermeasure: Replace the fan unit as soon as possible. Refer to "3.2.4 [How to replace Fan unit] (page 3-45)" for how to make replacement.
04D	Fan total running time exceeded	Cause: Fan total running time has exceeded the replacement guidelines. Countermeasure: The alarm can be canceled without replacing the fan unit, but we recommend replacing the fan unit before it breaks down as an aspect of preventive maintenance. Refer to "3.2.4 [How to replace Fan unit] (page 3-45)" for how to make replacement.
04E	Travel count target value exceeded	Cause: The total travel count set by Parameter No.147 "Total Travel Count Target Value" has been exceeded.
04F	Travel distance target value exceeded	Cause: The total travel distance set by Parameter No.148 "Total Travel Distance Target Value" has been exceeded.
068 S Driver limited	SRAM access error	Cause: Servo monitor is not operated in the normal condition because of noise or malfunction of consisting parts. Countermeasure: 1) Take proper measures against noise. 2) When the servo monitoring function is not used, set parameter No.112 "Monitoring mode" to "0". 3) If the operation is not improved in use of the servo monitoring function in spite of measures against noise, Please contact IAI.
06B	Maintenance information data error	Cause: Maintenance information (total travel count, total travel distance) has been lost. Countermeasure: Contact IAI.

Alarm code	Alarm name	Causes/countermeasures
100~ 1FF	Teaching tool alarm	[Refer to teaching tool instruction manual]

(2) Operation cancel level

Alarm code	Alarm name	Causes/countermeasures
080	Travel command during servo OFF	Cause: Travel command was issued in servo OFF status. Countermeasure: Execute travel commands after confirming servo ON status (servo ON signal SV or positioning complete signal PEND is ON).
082	Position travel command in homing incomplete status	Cause: Position travel command was input with home return status incomplete. Countermeasure: Execute travel commands after confirming the home return complete signal HEND is ON.
083	Numerical command with homing incomplete	Cause: Absolute position numerical command was issued in incomplete home return status. (Direct numerical command via field network, etc.) Countermeasure: Perform home return motion, confirm the home return complete signal HEND, and then perform numerical command.
084	Travel command during home return execution	Cause: Travel command was issued during home return execution. Countermeasure: Perform home return motion, confirm the home return complete signal HEND, and then perform travel command.
085	Position No. error during travel	Cause: Position number that does not exist (invalid) in positioner mode was specified. Countermeasure: Check the position table again and specify a valid position number.
090	Software reset command in servo ON status	Cause: A software reset command was issued in servo ON status. Countermeasure: Check that servo is in OFF status (SV signal is OFF status) and issue a software reset command.
091	Position No. error during teaching	Cause: Position number outside the range was specified during teaching. Countermeasure: Set the specified position number to 128 or less in positioner 1/2/3 mode, or 16 or less in positioner 5 mode.
092	PWRT signal detected while traveling	Cause: Input was performed while the present position write signal PWRT was carrying out jog operation. Countermeasure: Input after making sure that JOG+/- signal is not ON and the unit has stopped (moving signal MOVE is OFF).
093	Homing incomplete status PWRT signal detected	Cause: The present position write signal PWRT was input while home return was incomplete. Countermeasure: Input the home return signal HOME first, perform home return, confirm that home return is complete (HEND signal is ON) and then input the signal.
09F	Cyclic synchronization error	Cause: Communication error generated in total frame communication. 1) Connector or SCON cable connector is not correctly connected. 2) Interior signal line or SCON connection cable is disconnected. 3) Terminal unit or terminal connector (for SCON) has not been mounted. 4) Communication error due to noise Countermeasure: 1) 2) Confirm that units are firmly connected together. Disconnect the units and then connect them again. Contact IAI if this reoccurs even after turning ON the power again. 3) Mount the terminal unit or terminal connector. 4) Take measures against noise, such as changing cable arrangements.

Alarm code	Alarm name	Causes/countermeasures																
0A2	Position data error	<p>Cause: 1) Travel command for position No. with target position not set in position table position field was issued. 2) Target position value in "Position" field exceeds Parameter No. 3, 4 "Software Limit Setting Value". 3) Push-motion operation was specified while the damping control function was enabled.</p> <p>Countermeasure: 1) Set the target position. 2) Bring the target position value within the software limit set value. 3) The damping control function and push-motion operation cannot be used at the same time. Set so that only one of the functions is enabled.</p>																
0A3	Position command information data error	<p>Cause: 1) The command value at direct numerical command exceeds the set maximum value. 2) Push-motion operation was specified while the damping control function was enabled.</p> <p>Countermeasure: 1) The code of the command item exceeding the detailed address is displayed. Refer to these values and enter the appropriate values.</p> <table border="1"> <thead> <tr> <th>Detailed address (Command item code)</th><th>Command item</th></tr> </thead> <tbody> <tr> <td>0F00</td><td>Target position</td></tr> <tr> <td>0F02</td><td>Command speed</td></tr> <tr> <td>0F04</td><td>Acceleration</td></tr> <tr> <td>0F06</td><td>Deceleration</td></tr> <tr> <td>0F08</td><td>Positioning width</td></tr> <tr> <td>0F0C</td><td>Pushing current limit value</td></tr> <tr> <td>0F0D</td><td>Control signal</td></tr> </tbody> </table> <p>2) The damping control function and push-motion operation cannot be used at the same time. Set so that only one of the functions is enabled.</p>	Detailed address (Command item code)	Command item	0F00	Target position	0F02	Command speed	0F04	Acceleration	0F06	Deceleration	0F08	Positioning width	0F0C	Pushing current limit value	0F0D	Control signal
Detailed address (Command item code)	Command item																	
0F00	Target position																	
0F02	Command speed																	
0F04	Acceleration																	
0F06	Deceleration																	
0F08	Positioning width																	
0F0C	Pushing current limit value																	
0F0D	Control signal																	
0A7	Command deceleration error	<p>Cause: Insufficient deceleration distance when deceleration has been reduced during travel. The software limit has been exceeded when decelerating from the current position after the change.</p> <p>This occurs because the timing of the next travel command when changing the speed during travel is delayed.</p> <p>Countermeasure: Set the travel command timing for deceleration change faster.</p>																
0B5 A Driver limited	Z-phase position error	<p>Cause: The position where Z-phase was detected during home return was outside the specified range. There is a possibility of encoder failure.</p> <p>Countermeasure: Contact IAI.</p>																

Alarm code	Alarm name	Causes/countermeasures						
0B6 A Driver limited	Z-phase detection timeout	<p>Cause: With simple absolute specification, Z-phase could not be detected at the first servo ON or home return after turning the power on.</p> <ol style="list-style-type: none"> 1) Contact failure or disconnection of the connector part of the actuator connecting cable. 2) For models with brake, the brake cannot be released. 3) External force is applied and the motor cannot perform detection. 4) The sliding resistance of the actuator itself is excessive. <p>Countermeasure: 1) Check the wiring status of the actuator connecting cable. 2) Check the wiring condition of the brake cable and whether the brake part makes "clicking" sounds when toggling the brake release switch. If not, confirm that power is supplied to the brake. 3) Confirm that there are no assembly errors. 4) If the loading weight is normal, turn OFF the power and then move by hand to check the sliding resistance. If the cause is in the actuator itself, contact IAI.</p>						
0BA	Home sensor not detected	<p>Cause: Indicates that the home return motion of an actuator with home sensor has not completed normally.</p> <ol style="list-style-type: none"> 1) The workpiece interferes with the surroundings during home return. 2) The sliding resistance of the actuator is excessive. 3) Poor mounting, malfunction, or disconnection of the home sensor. <p>Countermeasures: If the workpiece does not interfere with the surroundings, 2) and 3) should be considered. Contact IAI.</p>						
0BE	Home return timeout	<p>Cause: Home return motion has not completed within a given period of time from the start.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <th>Detailed code</th><th>Target operation</th></tr> <tr> <td>01</td><td>Home return motion timeout</td></tr> <tr> <td>02</td><td>LS retreat operation timeout</td></tr> </table> <p>Countermeasure: This does not occur in normal operation. The combination of driver unit and actuator may be incorrect. Contact IAI.</p>	Detailed code	Target operation	01	Home return motion timeout	02	LS retreat operation timeout
Detailed code	Target operation							
01	Home return motion timeout							
02	LS retreat operation timeout							
0BF S Driver limited	Creep sensor not detected	<p>Cause: This indicates the actuator detected the creep sensor (option) before detecting the origin sensor (option except for rotary actuator), or the actuator reached the mechanical end (or the actuator cannot move anymore because the load is too large).</p> <ol style="list-style-type: none"> 1) The position to apply the creep sensor is not appropriate. 2) The creep sensor is faulty. 3) The cable is disconnected or the connector is not plugged in properly. 4) The actuator cannot move due to heavy load caused by interference. <p>Countermeasure: 1) Readjust the sensor installation position. 2) Replace the creep sensor. 3) Perform continuity check to see if the connector is plugged in properly. 4) Check the interference and the transportable weight and make sure there is no external force applied.</p>						

Alarm code	Alarm name	Causes/countermeasures
0C0	Excessive actual speed	<p>Cause: Motor rotation speed exceeded the allowable rotation speed.</p> <ol style="list-style-type: none"> 1) The sliding resistance of the actuator is locally excessive. 2) External force is applied momentarily. <p>A sudden speed increase may have occurred before detecting the servo error.</p> <p>Countermeasure: This does not occur in normal operation, so confirm that there are no assembly errors. Also, confirm whether external force is applied in the direction of travel.</p>
0C1	Servo error	<p>Cause: 2 or more seconds have passed without being able to move after receiving the travel command.</p> <ol style="list-style-type: none"> 1) Connection failure or disconnection of the actuator connecting cable. 2) The brake cannot be released (for models with brake). 3) The load on the motor is large due to external force. 4) The sliding resistance of the actuator is excessive. <p>Countermeasure: 1) Check the wiring status of the actuator connecting cable.</p> <ol style="list-style-type: none"> 2) If there is no problem with the 24V DC power supplied to the control power connector of the gateway unit, the RSEL system may be faulty. Contact IAI. 3) Confirm that there are no assembly errors in machine components. 4) If the load weight is within the specifications, turn OFF the power supply and manually check the sliding resistance.
0C2 S Driver limited	Overrun sensor detected	<p>Cause: This indicates that a signal from the OT sensor (option) installed at the mechanical end is detected.</p> <ol style="list-style-type: none"> 1) The actuator was moved by hand or received external force while the servo was OFF (normal detection). 2) A jog operation was made under a condition that the home coordinates are not established and the soft stroke limit would not work properly. 3) The home position achieved by home return is not correct, or in the case of an absolute type controller the coordinates have shifted due to an inappropriate absolute reset position. 4) There is a mismatch between the sensor characteristics and the setting in Parameter No.19 "Overrun sensor input polarity", or the wiring layout is wrong. 5) There is a mistake in the combination of the controller and actuators, or the setting in Parameter No. 3 and 4 "Soft Limit" or Parameter No. 77 "Ball Screw Lead Length" is inappropriate. <p>Countermeasure: If 1) or 2) is suspected, move the actuator in the opposite direction by hand. If this error occurred inside the effective stroke range, 3), 4), or 5) is a likely cause. If 3) is suspected, check the home position. Conduct the absolute reset again if it is the absolute type. If 4) or 5) is suspected, please contact IAI.</p>
0C5 A Driver limited	Unauthorized control system transition command	<p>Cause: 1) Operation was switched to normal position control operation during "damping control" operation.</p> <ol style="list-style-type: none"> 2) Operation was switched to "damping control" operation during normal position control operation. <p>Countermeasure: For both 1) and 2), change the sequence so that the next operation is performed after confirming that positioning complete signal PEND is ON.</p>

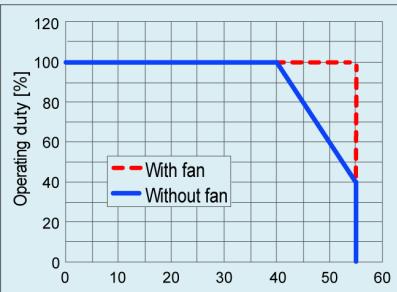
Alarm code	Alarm name	Causes/countermeasures
0CE	Control power supply voltage drop	<p>Cause: Gateway unit control power supply voltage has dropped to or below 16.8V (70% of 24V DC).</p> <ol style="list-style-type: none"> 1) Control power supply voltage drop 2) 24V DC power supply capacity is insufficient 3) The power supply voltage has dropped. 4) Malfunction of parts inside the RSEL system <p>Countermeasure: 1) Confirm that voltage of 24V DC ±10% is being applied to the gateway unit control power connector. If the voltage is low, the 24V DC power supply may have failed.</p> <ol style="list-style-type: none"> 2) Insufficient power capacity for actuator drive. Confirm the required power capacity in the instruction manual and replace the 24 VDC power supply. 3) 4) Contact IAI.
0D2 A, D Driver limited	Excessive motor power supply voltage	<p>Cause: There is a possibility of component failure inside the RSEL system.</p> <p>Countermeasure: If it occurs frequently, the probability of RSEL system failure is high. Contact IAI.</p>
0D6	Fan error detection	<p>Cause: 1) The number of revolution of the fan in the fan unit mounted on the driver unit has dropped by 50%.</p> <ol style="list-style-type: none"> 2) The number of revolution of the fan unit mounted on the 200V system power supply unit has dropped by 50%. (When detail code is 0001H in the alarm list in the teaching tool) <p>Countermeasure: 1) 2) Replace the fan unit. Refer to "3.2.4 [How to replace Fan unit] (page 3-45) and 3.4.4 [How to Replace Fan Unit for 200V Driver Unit] (page 3-76)" for how to make replacement.</p>
0D8	Deviation overflow	<p>Cause: The position deviation counter overflowed.</p> <ol style="list-style-type: none"> 1) The unit decelerated or stopped due to the influence of external force or overload during travel. 2) The excitation detection operation after power ON is unstable. 3) The power supply voltage has dropped. 4) The servo gain number is too low. <p>Countermeasure: 1) This occurs when the actuator cannot operate according to commands. Check the load condition, such as whether the workpiece is interfering with surrounding objects, whether the brake is released, etc., and resolve the cause.</p> <ol style="list-style-type: none"> 2) There may be an overload, so review the payload and start home return again. 3) Check power supply voltage. 4) Adjust the servo gain number.
0D9	Software stroke limit over error	<p>Cause: The present position of the actuator exceeds the software stroke limit</p> <p>Countermeasure: Return to the software stroke limit range.</p>
0DC	Push-motion operation range exceeded error	<p>Cause: 1) The push-back force was too strong after pushing was completed, pushing back to the push-motion start setting position.</p> <ol style="list-style-type: none"> 2) The workpiece was pushed during the approach operation before shifting to push-motion. <p>Countermeasures: 1) Re-set and reduce the push-back force.</p> <ol style="list-style-type: none"> 2) Correct the push-motion start setting position to the front and shorten the approach distance.
0ED P, A Driver limited	Absolute encoder error detection 1	<p>Cause: The present position changed while reading or saving absolute data.</p> <p>Countermeasures: Do not apply vibration to the actuator.</p>

Alarm code	Alarm name	Causes/countermeasures
0EE P, A Driver limited	Absolute encoder error detection 2	<p>Cause: The encoder cannot detect position information normally with battery-less absolute specification or simple absolute specification.</p> <ol style="list-style-type: none"> 1) The first time power is turned ON after replacing the motor with battery-less absolute specification, or with simplified absolute specification. (Before executing absolute reset) 2) Absolute battery voltage drop. (Simple absolute specification) (When the detail code in the teaching tool alarm list is 0001H) 3) Disconnection of the actuator connection cable, actuator side attached cable, connector connection failure, or cable insertion/removal. (Detail code 0002H) 4) Driver unit parameters have been changed. <p>Countermeasure: 2) After supplying power for 72 hours or more, charge the battery, then perform absolute reset. If it seems to occur frequently even when sufficiently charged, the battery life may be the problem. Replace the battery. [Refer to Chapter 3 3.6.4 How to Replace Absolute Battery in the General Specifications] For (1), (3), and (4), perform absolute reset. [Refer to Chapter 8 Home Return / Absolute Rese]</p>
0EF P, A Driver limited	Absolute encoder error detection 3	<p>Cause: The encoder cannot detect position information normally with simple absolute specification. (Encoder overspeed error) The present position changed at a speed higher than the rotation speed setting due to an external factor at power cutoff.</p> <p>Countermeasure: Set the rotation speed setting so that it supports higher rotation speeds than the current rotation speed setting. If it occurs again, absolute reset is required. [Refer to Chapter 8 Home Return / Absolute Rese]</p>
0F5 P, A, D Driver limited	Non-volatile memory write verify error	<p>Cause: When data is written to the non-volatile memory, comparison (verification) is performed to confirm whether the data in the memory matches the write data. At this time, a mismatch was detected. (Failure of non-volatile memory)</p> <p>Countermeasure: Contact IAI if this reoccurs even after turning ON the power again.</p>
200~ 2FF	Teaching tool alarm	<p>[Refer to teaching tool instruction manual]</p>

(3) Cold start level

Alarm code	Alarm name	Causes/countermeasures																																				
09B P Driver limited	Internal communication error	<p>Cause: There was an internal communication error occurred between the gateway unit and driver unit.</p> <p>1) Installation error or contact error on the link connector between gateway unit and driver unit. 2) Influence of noise generated by a peripheral device 3) Malfunction of gateway unit or driver unit</p> <p>Countermeasure: 1) Disconnect and then connect the link between the gateway unit and driver unit to see if the alarm gets generated. If it does, check (2) and (3). 2) Shut down the power on peripheral devices and operate only with the controller and actuators to see if this alarm gets generated again. If the alarm does not get generated, there is a concern of influence of noise from a peripheral device. Revise the noise prevention on peripheral devices such as grounding and electrostatic shielding. 3) Replace the gateway unit or driver unit. The driver unit number to be replaced can be checked in the table below based on the detail address displayed in the alarm list.</p> <table border="1"> <thead> <tr> <th>Detail address</th><th>driver unit number</th><th>Detail address</th><th>driver unit number</th></tr> </thead> <tbody> <tr><td>0001</td><td>0</td><td>0801</td><td>8</td></tr> <tr><td>0101</td><td>1</td><td>0901</td><td>9</td></tr> <tr><td>0201</td><td>2</td><td>0A01</td><td>10</td></tr> <tr><td>0301</td><td>3</td><td>0B01</td><td>11</td></tr> <tr><td>0401</td><td>4</td><td>0C01</td><td>12</td></tr> <tr><td>0501</td><td>5</td><td>0D01</td><td>13</td></tr> <tr><td>0601</td><td>6</td><td>0E01</td><td>14</td></tr> <tr><td>0701</td><td>7</td><td>0F01</td><td>15</td></tr> </tbody> </table>	Detail address	driver unit number	Detail address	driver unit number	0001	0	0801	8	0101	1	0901	9	0201	2	0A01	10	0301	3	0B01	11	0401	4	0C01	12	0501	5	0D01	13	0601	6	0E01	14	0701	7	0F01	15
Detail address	driver unit number	Detail address	driver unit number																																			
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0501	5	0D01	13																																			
0601	6	0E01	14																																			
0701	7	0F01	15																																			
09C P, A Driver limited	Servo ON command after encoder FRAM read/write	<p>Cause: After inputting a memo using the user memo edit function (a function that enables to save memos on the actuator side), servo was turned on without executing RSEL system reboot or reboot of the power supply.</p> <p>Countermeasure: Reboot the RSEL system or the power supply.</p>																																				
0A1	Parameter data error	<p>Cause: Data input range of parameter domain is not appropriate.</p> <p>(Example 1) This error occurs when the magnitude correlation is obviously inappropriate, such as when 300 mm was incorrectly input as the value of the software limit negative side while the value of the software limit positive side was 200.3 mm.</p> <p>(Example 2) For rotary axis, this error is generated when the index mode is changed to the normal mode and the software limit negative side is 0. Set the software limit negative side to the -0.3 mm value added to the outside of the effective stroke. [Refer to Chapter 10 10.3.1 Driver Unit Parameter]</p> <p>(Example 3) It occurs when the initial positioning band value [refer to 10.3 Parameter list (page 10-47)] is smaller than the minimum positioning band width when an actuator in RCP2, RCP3, RCP4 or RCP5 Series is connected. Set the initial positioning band value to the minimum positioning band width (lead length ÷ number of encoder pulse: 800) × 3 or more.</p> <p>Countermeasure: Change to an appropriate value.</p>																																				
0A8	Motor/encoder type not supported	<p>Cause: A motor or encoder type not supported by this driver unit is connected.</p> <p>Countermeasure: Contact IAI if this alarm is generated with an actuator being controlled, or in case it reoccurs even after reboot.</p>																																				

Alarm code	Alarm name	Causes/countermeasures
0B3 S Driver limited	Spurious absolute error	<p>Cause: Home-return operation was not performed properly.</p> <ul style="list-style-type: none"> 1) Work is interfering with peripheral equipment in the middle of home return. 2) Encoder Error <p>Countermeasure: 1) Remove the interference. 2) Please contact IAI.</p>
0B4 A Driver limited	Electrical angle mismatch	<p>Cause: An error was detected during the electromagnetic phase detection operation when the servo was turned on after the power was supplied. <When detail code is 0000H> Position deviation counter has overflowed before Z-axis was detected.</p> <ul style="list-style-type: none"> 1) Operation unable due to external force 2) Sliding resistance on actuator itself is high <When detail code is 0001H> Z-phase was detected two times before the motor makes one turn. 3) Malfunction of encoder PCB or disc <p>Countermeasure: 1) Check if there is any failure in actuator installation. 2) If the payload is in normal condition, shut off the power and move the slider manually with hand to see the sliding resistance. In case there is a cause on the actuator, contact IAI. 3) The motor requires to be replaced. Contact IAI.</p>
0B7 A Driver limited	Magnetic pole uncertain	<p>Cause: When magnetic pole phase detection (carried out even with simple absolute specification) was performed in the first servo ON process after power ON, magnetic pole phase could not be detected after a given period of time.</p> <ul style="list-style-type: none"> 1) Contact failure or disconnection of the connector part of the actuator connecting cable. 2) For models with brake, the brake cannot be released. 3) External force is applied and the motor cannot perform detection. 4) The sliding resistance of the actuator itself is excessive. <p>Countermeasure: 1) Check the wiring status of the actuator connecting cable. 2) Check the wiring condition of the brake cable and whether the brake part makes "clicking" sounds when toggling the brake release switch. If not, confirm that power is supplied to the brake. 3) Confirm that there are no assembly errors. 4) If the loading weight is normal, turn OFF the power and then move by hand to check the sliding resistance. If the cause is in the actuator itself, contact IAI.</p>

Alarm code	Alarm name	Causes/countermeasures
0B8 P Driver limited	Excitation detection error	<p>Cause: When excitation detection was performed in the first servo ON process after power ON, excitation detection operation did not complete after a given period of time.</p> <ol style="list-style-type: none"> 1) Connection failure or disconnection of the actuator connecting cable. 2) The brake cannot be released (for models with brake). 3) The load on the motor is large due to external force. 4) The power was turned ON while in contact with the mechanical end. 5) The sliding resistance of the actuator is excessive. <p>Countermeasure: 1) Check the wiring status of the actuator connecting cable.</p> <ol style="list-style-type: none"> 2) If there is no problem with the 24V DC power supplied to the control power connector of the gateway unit, the RSEL system may be faulty. Contact IAI. 3) Confirm that there are no assembly errors in machine components. 4) Move the slider or the rod tip to a point where it will not hit the mechanical end and reboot the power. 5) If the load weight is within the specifications, turn OFF the power supply and manually check the sliding resistance.
0C4 S Driver limited	Exceeded allowable time of exceeding torque allowing continuous pressing	<p>Cause: The continuous pressing time exceeds the time set for parameter No.89 "Allowable time of exceeding torque allowing continuous pressing".</p> <p>Countermeasure: Check the sequence again. Set the pressing time to be within the setting time.</p>
0C8	Overcurrent	<p>Cause: The output current of the power supply circuit was abnormally high.</p> <p>Countermeasure: This does not normally occur. There may be insulation deterioration of the motor coil, RSEL system failure, etc. Contact IAI.</p>
0C9 P Driver limited	Overvoltage	<p>Cause: The power regenerative circuit voltage reached the judgment value or higher.</p> <p>Countermeasure: There may be an RSEL system failure. Contact IAI.</p>
0CA	Overheating	<p>Cause: The temperature of the controller internal parts has exceeded the temperature defined for each actuator.</p> <ol style="list-style-type: none"> 1) Operating with load conditions exceeding the specified range. 2) The ambient temperature is high. 3) The load on the motor is large due to external force. 4) Defective parts inside the RSEL system. <p>(When detail code is 0008H or 0009H in the alarm list in the teaching tool, it is an error of the 200V power supply unit)</p> <p>Countermeasure: 1) Revise the operation conditions, such as decreasing the acceleration/deceleration speed.</p> <ol style="list-style-type: none"> 2) Lower the ambient temperature of the RSEL system. 3) Confirm that there are no assembly errors in machine components. <p>Note: This error does not normally occur. If it occurs, confirm that it is not (1) to (3) above. If the same problem reoccurs, there may be an RSEL system failure. Contact IAI.</p> 

Alarm code	Alarm name	Causes/countermeasures
0CB	Current sensor offset adjustment error	Cause: During the current detection sensor status check conducted in the startup initialization process, a sensor error was found. 1) Failure of the current detection sensor and peripheral components. 2) Offset adjustment failure. 3) An external force was applied to the actuator at power ON. Countermeasure: If the same error occurs even after rebooting the power with the actuator stationary, replace the circuit board or adjust the offset. Contact IAI.
0CC	Control power supply voltage error	Cause: Driver unit control power supply voltage has increased to or above 28.8V (120% of 24V DC). 1) Control power supply voltage rise 2) Malfunction of parts inside the RSEL system Countermeasure: 1) Confirm that voltage of 24V DC ±10% is being applied to the gateway unit control power connector. If the voltage is low, the 24V DC power supply may have failed. 2) Contact IAI.
0CD S Driver limited	Drive Cutoff Relay Welded Detection Error	Cause: The solid-state relay for drive cutoff inside controller has broken. Countermeasure: The relay or driver unit must be replaced. Please contact IAI.
0D3 S Driver limited	Motor power supply voltage low	Cause: 1) If the power source is shut off in the controller external circuit, servo-on command was made during the power is shut. 2) Overcurrent occurred on the 200V motor power supply line. 3) There is a concern of a malfunction of the controller internal components. Countermeasure: 1) Check the controller external circuit. 2) Check the wiring between actuators and the driver unit. In case it occurs frequently, contact IAI and tell the environment of use and operating conditions. 3) If this error occurs often, there is a concern of a controller malfunction. Please contact us.
0D4 P, A, D Driver limited	Drive source error	Cause: 1) 24V Motor power input voltage (input to MPI terminal) is excessive. During acceleration/deceleration or servo ON, etc., consumption current rises momentarily. When remote sensing function is used with power of barely sufficient capacity, overvoltage may occur in response to the current change. 2) Overcurrent generated in 24V motor power line. Countermeasure: 1) Check power supply voltage being input to MPI terminal. Consider using a power supply with sufficient capacity, or avoid using the remote sensing function. 2) Check the wiring between the actuator and the driver unit. If this error occurs frequently, contact IAI regarding the operating environment and operating conditions.

Alarm code	Alarm name	Causes/countermeasures
0D5 P Driver limited	Deviation counter overflow in homing incomplete status	<p>Cause: The position deviation counter overflowed.</p> <ol style="list-style-type: none"> 1) Impact of external force, etc. or collision with mechanical end during JOG operation, or overload during travel caused the unit to decelerate or stop. 2) The excitation detection operation after power ON is unstable. <p>Countermeasure: 1) This occurs when the actuator cannot operate according to commands. Check the load condition, such as whether the workpiece is interfering with surrounding objects, whether the brake is released, etc., and resolve the cause.</p> <p>2) There may be an overload, so review the payload.</p>
0D7 S Driver limited	Belt breaking sensor detected	<p>Cause: The belt of the ultra-high thrust RCS2-RA13R is broken.</p> <p>Countermeasure: Belt must be replaced. Please contact IAI.</p>
0E0	Overload	<p>Cause: 1) The workpiece weight exceeds the rated weight, or an external force is applied and the load increased.</p> <ol style="list-style-type: none"> 2) The brake is not released. (With brake) 3) The sliding resistance of the actuator is locally excessive. <p>Countermeasure: 1) Review the workpiece and its surroundings and remove the cause.</p> <ol style="list-style-type: none"> 2) If there is no problem with the 24V DC power supplied to the control power connector of the gateway unit, the RSEL system may be faulty. If not released, there may be brake failure, cable disconnection, or RSEL system failure. Contact IAI. 3) Move the workpiece by hand if possible and check for any location with excessive sliding resistance. Check for any distortions on the mounting surface. If this error occurs even with a single actuator, contact IAI. <p> Caution Make sure to resolve the cause before resuming operation. If you cannot judge whether the cause has been fully resolved, wait at least 30 minutes before switching the power ON to prevent motor coil burnout.</p>
0E4 P, A Driver limited	Encoder transmission error	<p>Cause: Data transmission and reception between the driver unit and encoder is conducted by serial communication. This error indicates that the data sent from the driver unit was not received properly at the encoder side.</p> <ol style="list-style-type: none"> 1) Encoder cable is partially disconnected, or connector is not connected properly. 2) Influence from noise. 3) Failure of communication IC mounted on the encoder circuit board. 4) Failure of communication IC mounted on the driver unit circuit board. <p>Countermeasure: 1) Confirm that there is no failure in the cable and connector coupler.</p> <ol style="list-style-type: none"> 2) Try turning OFF power to all peripheral devices and moving only the driver unit and actuator. If no error is generated, the culprit may be noise. Take measures against noise. <p>If 3) or 4) is the case, replace the encoder or driver unit.</p> <p>Contact IAI if the cause cannot be determined.</p>

Alarm code	Alarm name	Causes/countermeasures
0E5 P, A, S Driver limited	Encoder reception error	<p>Cause: Data from the encoder was not normally received by the driver unit.</p> <ol style="list-style-type: none"> 1) Encoder cable line breakage or connector connection failure (when the detail code in the teaching tool alarm list is 0002H) 2) Influence from noise (Detail code 0001H). 3) Actuator internal part malfunction (communication part). 4) Driver unit internal part malfunction (communication part). <p>[Only for P Driver]</p> <ol style="list-style-type: none"> 5) Initialization of battery-less absolute encoder incomplete (Detail code 000AH) 6) Communication error occurred to battery-less absolute encoder (Detail code 000CH) <p>Countermeasure: 1) Check for any wire breakage on a connector and inspect the condition of the wire connections.</p> <ol style="list-style-type: none"> 2) Try turning OFF power to all peripheral devices and moving only the driver unit and actuator. If no error is generated, the culprit may be noise. Take measures against noise. <p>In case of 3), 4) or 5), replace the actuator (motor part) and/or the driver unit.</p> <ol style="list-style-type: none"> 6) Check the encoder cable line breakage and connection at connectors. For the high-resolution battery-less absolute encoder, check the capacity of the 24V DC power source and connection at the power supply cables. <p>Contact IAI if the cause cannot be determined.</p>
0E6 P, A, S Driver limited	Encoder count error	<p>Cause: The encoder cannot detect location information properly.</p> <ol style="list-style-type: none"> 1) Disconnection of the encoder relay cable or actuator side attached cable, or connector connection failure. 2) Failure of the encoder itself. 3) An error response status was received during initial communication with battery-less absolute encoder. <p>Countermeasure: 1) Check for any wire breakage on a connector and inspect the condition of the wire connections.</p> <p>If there is no cable malfunction, encoder failure may be possible. Contact IAI.</p>
0E7 S Driver limited	A-, B- and Z-phase wire breaking	<p>Cause: Encoder signals cannot be detected correctly.</p> <ol style="list-style-type: none"> 1) The encoder relay cable or supplied actuator cable is disconnected or its connector is not plugged in correctly. 2) The encoder itself is faulty. <p>Countermeasure: 1) Check if any wire breakage on a connector and the condition of wire connections.</p> <p>If the cables are normal, faulty encoder is suspected. Please contact IAI.</p>

Alarm code	Alarm name	Causes/countermeasures
0E8 P, A, D Driver limited	A- and B-phase disconnection	<p>Cause: The encoder signal cannot be detected normally.</p> <ol style="list-style-type: none"> 1) Disconnection of the actuator connection cable, actuator side attached cable, or connector connection failure. 2) Failure of the encoder itself. 3) Disconnected axis parameter No. 158 "Enabled/Disabled Axis Select" is 0: Enabled. <p>Countermeasure: 1) Check for any wire breakage on a connector and inspect the condition of the wire connections.</p> <ol style="list-style-type: none"> 2) If there is no cable malfunction, encoder failure may be possible. Contact IAI. 3) Parameter No. 158 "Enabled/Disabled Axis Select" 1: Disabled. <p>* When the actuator is not connected, this alarm is generated just by setting the reserved axis in the gateway parameter configuration tool or setting the driver unit to "Not set".</p>
0EB P, A Driver limited	Battery-less Absolute Encoder error detected	<p>Cause: Battery-less absolute encoder cannot detect location information normally.</p> <p>Countermeasure: Check for any wire breakage on a connector and inspect the condition of the wire connections.</p> <p>If there is no cable malfunction, encoder failure may be possible. Contact IAI.</p>
0EC D Driver limited	PS-phase disconnection	<p>Cause: The encoder signal cannot be detected normally.</p> <ol style="list-style-type: none"> 1) Disconnection of the actuator connection cable, actuator side attached cable, or connector connection failure. 2) Failure of the encoder itself. <p>Countermeasure: 1) Check for any wire breakage on a connector and inspect the condition of the wire connections.</p> <p>If there is no cable malfunction, encoder failure may be possible. Contact IAI.</p>
0F0 A, D Driver limited	Driver logic error	<p>Cause: Excessive load, parameter (motor type) mismatch, noise, RSEL system failure, etc.</p> <p>Countermeasure: Contact IAI.</p>
0F4 P, A Driver limited	PCB mismatch	<p>Cause: The circuit board is not supported by the connection motor at startup check.</p> <p>There may be a mismatch between the actuator and driver unit. Check the model numbers.</p> <p>Countermeasure: Contact IAI if this error occurs.</p>
0F5 S Driver limited	Non-volatile memory write verify error	<p>Cause: When data is written to the non-volatile memory, comparison (verification) is performed to confirm whether the data in the memory matches the write data. At this time, a mismatch was detected. (Failure of non-volatile memory)</p> <p>Countermeasure: Contact IAI if this reoccurs even after turning ON the power again.</p>
0F6	Non-volatile memory write timeout	<p>Cause: There is no response within the specified time during the data writing to the non-volatile memory. (Failure of non-volatile memory)</p> <p>Countermeasure: Contact IAI if this reoccurs even after turning ON the power again.</p>
0F8	Non-volatile memory data destruction	<p>Cause: Abnormal data was detected by non-volatile memory check at startup. (Failure of non-volatile memory)</p> <p>Countermeasure: Contact IAI if this reoccurs even after turning ON the power again.</p>

Alarm code	Alarm name	Causes/countermeasures
OFA	CPU error	<p>Cause: CPU is not operating normally.</p> <ul style="list-style-type: none"> 1) CPU malfunction. 2) Malfunction caused by noise. <p>Countermeasure: Contact IAI if this reoccurs even after turning ON the power again.</p>
OFC	Logic error (Controller part error)	<p>Cause: RSEL system interior is not working properly.</p> <ul style="list-style-type: none"> 1) Malfunction due to noise or other causes. 2) Failure of a peripheral circuit component. <p>Countermeasure: Reboot the power.</p> <p>If the error occurs again, check for presence of noise. If a spare driver unit is available, replace it and try again. A recurring error with the spare controller suggests presence of noise. Contact IAI if the cause cannot be determined.</p>

RSEL

Chapter 12

Maintenance and Inspection

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12.1 Periodic Inspection

In order to use the RSEL system functions in the best possible condition, it is necessary to perform daily or periodic inspections.

Danger



- Do not touch the terminal while live. This may result in electric shock.
- Connect the absolute battery correctly. Do not charge, disassemble, heat, throw into fire, short-circuit or solder. Incorrect handling of the absolute battery may cause injury or fire due to heating, rupturing or ignition.
- Always shut off the RSEL system power supply before cleaning or assembling/disassembling the unit. Electric shocks may result if the power is not shut off.
- Malfunctions may result if the unit connections are tightened loosely.

Caution



- Do not disassemble or modify any unit. This may result in breakdowns, malfunctions, injury or fire.
- Always shut off the RSEL system power supply before attaching or removing modules or motor/encoder cables. If not shut off, module breakdowns or malfunctions may result.
- Do not apply shocks to or drop the absolute battery.
Drops and shocks can damage the absolute battery, causing the liquid inside to leak. If the absolute battery is dropped or suffers impact, do not use and instead discard.
- Before touching a unit, always touch a grounded metallic part to discharge any static electricity accumulated on the body. If static electricity is not discharged, module breakdowns or malfunctions may result.

12.2 Periodic inspection items

The RSEL systems contain electronic components that may degrade due to the operating environment and require periodic inspection.

It is standard to conduct periodic inspection once every 6 months to one year, but the interval should be shortened in accordance with operating environment.

No.	Inspection items	Inspection details	Judgment criteria	Countermeasures
1	Power supply	Measure between the power supply terminal block to check that the voltage fluctuation is within the reference range	Within voltage fluctuation range 24 V ±10%	Adjust so that the power supply voltage falls within the judgment criteria.
2	Operating environment	Ambient temperature (If used in a panel, the panel temperature is the ambient temperature)	0 to 55°C	Measure the operating temperature with a thermometer and adjust the environment so that it falls within the ambient operating temperature. However, simple absolute units and SCON controllers are 0 to 40°C.
		Operating humidity (Panel humidity if using in a panel)	85% RH or less, non-condensing	Measure the operating humidity with a hygrometer and adjust the environment so that it falls within the ambient operating humidity.
		Atmosphere	No corrosive or flammable gas	Check with an odor or gas sensor.
			No splatters of water, oil, or chemicals	Remove and shield.
			No accumulated dust, debris, salt, or metal powder	Remove and shield.
		Directly exposed to sunlight?	Out of direct sunlight	Shield.
		Subjected to direct vibrations or impacts?	Vibration damping and shock-resistant specifications should be within the range	Install a cushion, etc., for vibration damping and shock resistance.
		Close to a noise source?	None	Move the noise source further away or take shielding countermeasures.
3	Mounting status	Mounting state on each DIN rail	No slack in unit mounting	Re-attach and lock.
4	Connection status	Units firmly connected?	The connector should be tightened firmly	Tighten so that it is no longer loose.
		Cable between simple absolute unit and driver unit securely inserted?	Insert completely	Insert again.

No.	Inspection items	Inspection details	Judgment criteria	Countermeasures
4	Connection status	Wiring connectors loose? (motor/encoder cable, field network cable, stop circuit, etc.)	No looseness	Insert until the lock engages.
		Wiring cable frayed?	No visual abnormalities	Check visually and replace the cable.
5	Absolute battery	Simple absolute unit's absolute battery (AB-7) beyond expiry date or lifespan?	The expiry date is 3 years and should not exceed the date written on a sticker adhered to the battery body	Even if the absolute battery is free of errors, replace it if the expiry date has passed. Refer to "Chapter 8 Home Return / Absolute Reset" for how to make replacement.
6	Preventive/predictive maintenance function	Preventive/predictive maintenance alarms generated?	No alarm generated	Refer to "9.3 Preventive Maintenance Function" and "9.4 Predictive Maintenance Function" for countermeasures.

12.3 Replacing Units

Pay attention to the following precautions when replacing units after discovering a fault during inspection.

- Unit replacement should be conducted with the power off.
- After replacement, check that the new unit does not have any errors.
- If returning a faulty unit for repairs, write out the nature of the error in as much detail as possible and attach it to the product.
- Be sure to back up position data, parameters and PLC data just in case something goes wrong.

[Items for Reference]

- How to Replace Absolute Battery

Refer to "Chapter 3, 3.6.4 General specifications [How to Replace Absolute Battery]".

- How to Replace Fan Unit

SEL Unit, 24V Driver Unit

Refer to "Chapter 3, 3.2.4 Part names/Functions (9) [How to Replace Fan Unit]".

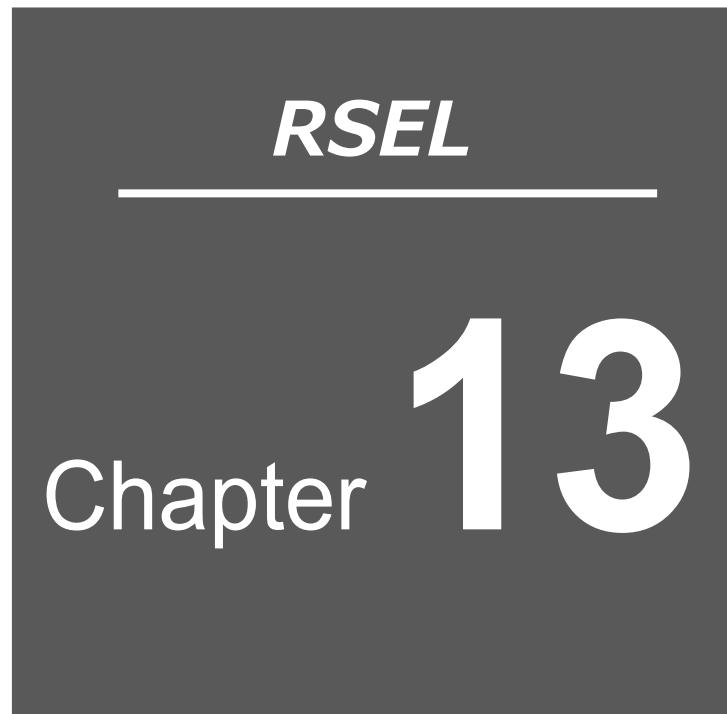
200V Driver Unit

Refer to "Chapter 3, 3.4.4 Part names/Functions (10) [How to Replace Fan Unit for 200V Driver Unit]".

12.4 Consumable Parts

The life of components used in the RSEL system is as follows. Refer to "9.3 Preventive Maintenance Function" and "9.4 Predictive Maintenance Function" for information about preventive and predictive maintenance.

Item	Guidelines for life	Preventative maintenance function	Predictive maintenance function	Condition
Electrolytic capacitor	5 years	○	—	Ambient temperature 40°C, rated operating mode
Backup capacitor for calendar functions	5 years	○	—	12 h/day ON time at 40°C environment 12 h 20°C environment when stopped (power OFF)
Simple absolute battery	3 years	—	—	Ambient temperature 40°C
Fan unit	3 years	—	○	Ambient temperature 40°C



Appendix

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13.1 Stopping Method and Recovery

13.1.1 Stopping Method

Actuator operation can be stopped in two methods: normal operation stop and emergency stop.

1) Normal operation stop

Normal position control is active: Set a deceleration operation plan and cause the actuator to decelerate to a stop, according to the plan, under normal position control

2) Emergency stop (Stop with immediate servo-off)

Cancel the operation plan and immediately turn off the servo (power supply to the motor is cut off).

How operation is stopped in each condition is explained below.

Stop command, Condition	Stopping method	Remarks
Pause	1)	
Servo OFF	1)	
Emergency stop	1)	Since the motor drive source is cut off by hardware means, the deceleration operation plan may have to be forcibly stopped beforehand.
SEL program command	1)	Stop is made when the following four commands are issued. HOLD, CANC, STOP, ABPG
Errors not described in list	1)	
Errors in list	2)	

Error of stop with immediate servo OFF in 2)

Error No.	Error name
400	Encoder error
401	Absolute encoder error detection 1
402	Absolute encoder error detection 2
403	Absolute encoder error detection 3
404	Fan error (For cases of cause of driver unit)
458	Home position undetected error
477	Home-return timeout error
478	Excessive actual speed
47A	Servo error
48C	Home-return incomplete error
491	Deviation overflow error
492	Overrun error
493	Creep sensor non-detection error
4A7	Z-phase position problem error
4AC	Actual position soft limit excess error
600	Encoder error
61A	Overload error
61B	Excitation detection error
61C	Overcurrent error
61D	Current sensor error
61E	Drive source error
61F	Non-volatile memory write verify error
620	Driver related error
621	Slave unit communication error
622	Driver control power supply voltage error
634	Belt breakage error
637	Drive-source cutoff relay error
638	Motor power supply low voltage error
639	Deviation overflow (home return not yet complete)
F00	System down error

13.1.2 Recovery

[1] Drive-source recovery request

(1) Method of drive-source recovery request

Recovery of drive source can be requested by one of the following methods:

- Set I/O parameter No. 44 to “1” (input selection function 014 = drive-source cutoff reset input), and then turn ON input port No. 14 (a request is issued at the ON edge).
- Click Controller (C) from the menu of the PC software and then select Drive-source Recovery Request (P).

(2) Situation where recovery of drive source must be requested

Recovery of drive source must be requested only in the following situation:

- A cause that cut off the drive source occurred when I/O parameter No. 44 was set to “1,” after which you have removed the cause and now want to restore the drive source.

[2] Operation-pause reset request

(1) Method of operation-pause reset request

Reset of operation pause can be requested by one of the following methods:

- Set I/O parameter No. 35 to “1” (input selection function 005 = operation-pause reset signal), and then turn ON input port No. 5 (a request is issued at the ON edge).
- Click Controller (C) from the menu of the PC software and then select Operation-pause Reset Request (L).

(2) Situation where reset of operation pause must be requested

Reset of operation pause must be requested only in the following situations:

- When other parameter No. 10 was set to “2 (emergency stop recovery type = recovery with continued operation (only during auto operation)),” after which you have cancelled the emergency stop and now want to restore the operation (reset the operation pause).
- Was stopped with the deadman switch or enable switch when other parameter No. 11 was set to “2 (deadman/enable switch recovery type = recovery with continued operation (only during auto operation)),” after which you have cancelled the stop and now want to restore the operation (reset the operation pause).
- A signal to turn OFF input port No. 6 was input (operation was paused) during auto operation when I/O parameter No. 36 was set to “1 (input selection function 006 = operation pause signal),” after which a signal to turn ON input port No. 6 was input and now you want to restore the operation (reset the operation pause).

* When the driving source cancel demand and the pause cancel demand are issued at the same time, it is necessary to have the driving source recovery demand first, and then make the operation pause cancel demand.

13.2 Connectable Actuators

13.2.1 List of Actuator Specifications

(1) Specifications for Pulse Motor Type Actuator

RCP6 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration/deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]	
RCP6 RCP6CR (Slider type)	[Standard] SA4C SA4R [Cleanroom] SA4C	Ball screw	8192	16	Horizontal	20	1260(at 50 to 400st) 1060(at 450st) 875(at 500st)	1	21	48	20	
					Vertical		SA4C: 1260(at 50 to 400st) 1060(at 450st) 875(at 500st) SA4R: 1120(at 50 to 400st) 1060(at 450st) 875(at 500st)	0.5				
				10	Horizontal	13	785(at 50 to 400st) 675(at 450st) 555(at 500st)	1	22	77		
					Vertical		0.5					
				5	Horizontal	7	390(at 50 to 400st) 330(at 450st) 275(at 500st)	1	44	155		
					Vertical		0.5					
				2.5	Horizontal	4	195(at 50 to 400st) 165(at 450st) 135(at 500st)	1	89	310		
					Vertical		0.5					
	Standard type / Cleanroom type	Ball screw	8192	20	Horizontal	25	SA6C: 1440(at 50 to 450st) 1335(at 500st) 1130(at 550st) 970(at 600st) 840(at 650st) 735(at 700st) 650(at 750st) 575(at 800st)	1	16	56		
							SA6R: 1280(at 50 to 500st) 1130(at 550st) 970(at 600st) 840(at 650st) 735(at 700st) 650(at 750st) 575(at 800st)					
							SA6C: 1280(at 50 to 500st) 1130(at 550st) 970(at 600st) 840(at 650st) 735(at 700st) 650(at 750st) 575(at 800st)					
							SA6R: 1120(at 50 to 550st) 970(at 600st) 840(at 650st) 735(at 700st) 650(at 750st) 575(at 800st)					

Note The values of the maximum velocity and maximum acceleration/deceleration for RCP6/RCP6CR/RCP6W are the ones when the high-output feature is activated. (There are also some models that are not related to the high-output setting.)

RCP6 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration/deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
					Horizontal		900(at 50 to 400st) 885(at 450st) 735(at 500st) 620(at 550st) 535(at 600st) 460(at 650st) 405(at 700st) 355(at 750st) 315(at 800st)	1	27	93	
				12	Vertical	15	SA6C: 900(at 50 to 400st) 885(at 450st) 735(at 500st) 620(at 550st) 535(at 600st) 460(at 650st) 405(at 700st) 355(at 750st) 315(at 800st) SA6R: 800(at 50 to 450st) 735(at 500st) 620(at 550st) 535(at 600st) 460(at 650st) 405(at 700st) 355(at 750st) 315(at 800st)	0.5	27	93	20
RCP6 RCP6CR (Slider type)	[Standard] SA6C SA6R	Ball screw	8192		Horizontal	8	450(at 50 to 400st) 435(at 450st) 365(at 500st) 305(at 550st) 265(at 600st) 230(at 650st) 200(at 700st) 175(at 750st) 155(at 800st)	1	53	185	
Standard type /Cleanroom type	[Cleanroom] SA6C			6	Vertical			0.5			
				3	Horizontal	4	225(at 50 to 400st) 215(at 450st) 180(at 500st) 150(at 550st) 130(at 600st) 115(at 650st) 100(at 700st) 85(at 750st) 75(at 800st)	1	106	370	
					Vertical			0.5			

Note The values of the maximum velocity and maximum acceleration/deceleration for RCP6/RCP6CR/RCP6W are the ones when the high-output feature is activated. (There are also some models that are not related to the high-output setting.)

RCP6 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration/deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
				24	Horizontal Vertical	30	SA7C: 1200(at 50 to 600st) 1095(at 650st) 965(at 700st) 850(at 750st) 760(at 800st) SA7R: 1080(at 50 to 650st) 965(at 700st) 850(at 750st) 760(at 800st)	1 0.5	40	139	
RCP6 RCP6CR (Slider type)	[Standard] SA7C SA7R	Ball screw	8192	16	Horizontal	20	SA7C: 980(at 50 to 500st) 965(at 550st) 830(at 600st) 720(at 650st) 635(at 700st) 560(at 750st) 500(at 800st) SA7R: 840(at 50 to 550st) 830(at 600st) 720(at 650st) 635(at 700st) 560(at 750st) 500(at 800st)	1	60	209	20
Standard type /Cleanroom type	[Cleanroom] SA7C				Vertical		SA7C: 840(at 50 to 550st) 830(at 600st) 720(at 650st) 635(at 700st) 560(at 750st) 500(at 800st) SA7R: 700(at 50 to 650st) 635(at 700st) 560(at 750st) 500(at 800st)	0.5			
				8	Horizontal Vertical	10	SA7C: 490(at 50 to 500st) 475(at 550st) 410(at 600st) 355(at 650st) 315(at 700st) 275(at 750st) 245(at 800st) SA7R: 420(at 50 to 550st) 410(at 600st) 355(at 650st) 315(at 700st) 275(at 750st) 245(at 800st)	1 0.5	119	418	

Note The values of the maximum velocity and maximum acceleration/deceleration for RCP6/RCP6CR/RCP6W are the ones when the high-output feature is activated. (There are also some models that are not related to the high-output setting.)

RCP6 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration/deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]	
RCP6 RCP6CR (Slider type)	[Standard] SA7C SA7R [Cleanroom] SA7C	Ball screw	8192	4	Horizontal	5	SA7C: 245(at 50 to 500st) 235(at 550st) 205(at 600st) 175(at 650st) 155(at 700st) 135(at 750st) 120(at 800st)	1	239	836	20	
							SA7R: 210(at 50 to 550st) 205(at 600st) 175(at 650st) 155(at 700st) 135(at 750st) 120(at 800st)					
							210(at 50 to 550st) 205(at 600st) 175(at 650st) 155(at 700st) 135(at 750st) 120(at 800st)					
							1200(at 50 to 750st) 1155(at 800st) 1040(at 850st) 940(at 900st) 855(at 950st) 780(at 1000st) 715(at 1050st) 660(at 1100st)					20
							850(at 50 to 950st) 780(at 1000st) 715(at 1050st) 660(at 1100st)					
	Standard type /Cleanroom type	Ball screw	8192	30	Horizontal	38	1000(at 50 to 650st) 950(at 700st) 860(at 750st) 770(at 800st) 695(at 850st) 630(at 900st) 570(at 950st) 520(at 1000st) 480(at 1050st) 440(at 1100st)	1	46	159		
							850(at 50 to 950st) 780(at 1000st) 715(at 1050st) 660(at 1100st)					
							1000(at 50 to 650st) 950(at 700st) 860(at 750st) 770(at 800st) 695(at 850st) 630(at 900st) 570(at 950st) 520(at 1000st) 480(at 1050st) 440(at 1100st)					
							1000(at 50 to 650st) 950(at 700st) 860(at 750st) 770(at 800st) 695(at 850st) 630(at 900st) 570(at 950st) 520(at 1000st) 480(at 1050st) 440(at 1100st)					
							1000(at 50 to 650st) 950(at 700st) 860(at 750st) 770(at 800st) 695(at 850st) 630(at 900st) 570(at 950st) 520(at 1000st) 480(at 1050st) 440(at 1100st)					

Note The values of the maximum velocity and maximum acceleration/deceleration for RCP6/RCP6CR/RCP6W are the ones when the high-output feature is activated. (There are also some models that are not related to the high-output setting.)

RCP6 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration/deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
RCP6 RCP6CR (Slider type)	[Standard] SA8C SA8R [Cleanroom] SA8C	Ball screw	8192	20	Vertical	25	800(at 50 to 750st) 770(at 800st) 695(at 850st) 630(at 900st) 570(at 950st) 520(at 1000st) 480(at 1050st) 440(at 1100st)	0.5	68	239	
Standard type /Cleanroom type				10	Horizontal	13	500(at 50 to 650st) 480(at 700st) 430(at 750st) 385(at 800st) 345(at 850st) 310(at 900st) 285(at 950st) 260(at 1000st) 235(at 1050st) 220(at 1100st)	1	137	478	20
				5	Vertical		SA8C: 250(at 50 to 650st) 240(at 700st) 215(at 750st) 190(at 800st) 175(at 850st) 155(at 900st) 140(at 950st) 130(at 1000st) 120(at 1050st) 110(at 1100st) SA8R: 250(at 50 to 650st) 240(at 700st) 215(at 750st) 190(at 800st) 175(at 850st) 155(at 900st) 145(at 950st) 130(at 1000st) 120(at 1050st) 110(at 1100st)	0.5			
RCP6 RCP6CR (Wide slider type)	[Standard] WSA10C WSA10R [Cleanroom] WSA10C	Ball screw	8192	16	Horizontal	20	840(at 50 to 400st) 775(at 450st) 660(at 500st)	1	21	48	
Standard type /Cleanroom type				10	Horizontal	13	610(at 50 to 350st) 590(at 400st) 490(at 450st) 415(at 500st)	1	22	77	
				5	Horizontal	7	390(at 50 to 300st) 355(at 350st) 290(at 400st) 245(at 450st) 205(at 500st)	1	44	155	20
				5	Vertical		WSA10C: 350(at 50 to 350st) 290(at 400st) 245(at 450st) 205(at 500st) WSA10R: 305(at 50 to 350st) 290(at 400st) 245(at 450st) 205(at 500st)	0.5			

Note The values of the maximum velocity and maximum acceleration/deceleration for RCP6/RCP6CR/RCP6W are the ones when the high-output feature is activated. (There are also some models that are not related to the high-output setting.)

RCP6 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration/deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]						
RCP6 RCP6CR (Wide slider type) Standard type /Cleanroom type	[Standard] WSA10C WSA10R	Ball screw	8192	2.5	Horizontal	4	195(at 50 to 300st) 175(at 350st) 145(at 400st) 120(at 450st) 100(at 500st)	1	89	310	20						
							175(at 50 to 350st) 145(at 400st) 120(at 450st) 100(at 500st)	0.5									
	[Cleanroom] WSA10C						800(at 50 to 600st) 740(at 650st) 650(at 700st) 580(at 750st) 520(at 800st)	1	16	56	20						
							600(at 50 to 500st) 535(at 550st) 465(at 600st) 405(at 650st) 355(at 700st) 315(at 750st) 285(at 800st)	1	27	93							
							450(at 50 to 350st) 435(at 400st) 365(at 450st) 310(at 500st) 265(at 550st) 230(at 600st) 200(at 650st) 175(at 700st) 155(at 750st) 140(at 800st)	1	53	185							
							400(at 50 to 400st) 365(at 450st) 310(at 500st) 265(at 550st) 230(at 600st) 200(at 650st) 175(at 700st) 155(at 750st) 140(at 800st)	0.5									
							225(at 50 to 350st) 215(at 400st) 180(at 450st) 150(at 500st) 130(at 550st) 115(at 600st) 100(at 650st) 85(at 700st) 75(at 750st) 70(at 800st)	1	106	370							
							560(at 50 to 650st) 550(at 700st) 490(at 750st) 440(at 800st)	0.5									
	[Standard] WSA14C WSA14R	Ball screw	8192	24	Horizontal	30	700(at 50 to 750st) 665(at 800st)	1	40	139	20						
				16	Horizontal	20	560(at 50 to 650st) 550(at 700st) 490(at 750st) 440(at 800st)	1	60	209							

Note The values of the maximum velocity and maximum acceleration/deceleration for RCP6/RCP6CR/RCP6W are the ones when the high-output feature is activated. (There are also some models that are not related to the high-output setting.)

RCP6 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration/deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]	
RCP6 RCP6CR (Wide slider type)	[Standard] WSA14C WSA14R [Cleanroom] WSA14C	Ball screw	8192	8	Horizontal	10	420(at 50 to 500st) 400(at 550st) 350(at 600st) 305(at 650st) 270(at 700st) 240(at 750st) 215(at 800st)	1	119	418	20	
					Vertical		350(at 50 to 600st) 305(at 650st) 270(at 700st) 240(at 750st) 215(at 800st)					
				4	Horizontal	5	WSA14C: 210(at 50 to 500st) 200(at 550st) 170(at 600st) 150(at 650st) 135(at 700st) 120(at 750st) 105(at 800st)	1	239	836		
							WSA14R: 175(at 50 to 550st) 170(at 600st) 150(at 650st) 135(at 700st) 120(at 750st) 105(at 800st)					
				20	Vertical	5	175(at 50 to 550st) 170(at 600st) 150(at 650st) 135(at 700st) 120(at 750st) 105(at 800st)	0.5	68	239		
	Standard type /Cleanroom type	Ball screw	8192				720(at 50 to 750st) 715(at 800st) 645(at 850st) 590(at 900st) 535(at 950st) 490(at 1000st) 450(at 1050st) 415(at 1100st)	1	68	239	20	
			10	Horizontal	13	450(at 50 to 650st) 440(at 700st) 395(at 750st) 355(at 800st) 320(at 850st) 290(at 900st) 265(at 950st) 240(at 1000st) 225(at 1050st) 205(at 1100st)	137		478			
						240(at 50 to 1000st) 225(at 1050st) 205(at 1100st)						

Note The values of the maximum velocity and maximum acceleration/deceleration for RCP6/RCP6CR/RCP6W are the ones when the high-output feature is activated. (There are also some models that are not related to the high-output setting.)

RCP6 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration/deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
RCP6 RCP6CR (Wide slider type)	[Standard] [Cleanroom] Standard type/ Cleanroom type	Ball screw WSA16C	8192	5	Horizontal Vertical	7	195(at 50 to 750st) 175(at 800st) 160(at 850st) 145(at 900st) 130(at 950st) 120(at 1000st) 110(at 1050st) 100(at 1100st)	1	273	956	20
							170(at 50 to 800st) 160(at 850st) 145(at 900st) 130(at 950st) 120(at 1000st) 110(at 1050st) 100(at 1100st)	0.5			
RCP6 (Wide slider type)	[Standard] WSA16R	Ball screw	8192	20	Horizontal	25	600(at 50 to 850st) 590(at 900st) 535(at 950st) 490(at 1000st) 450(at 1050st) 415(at 1100st)	1	68	239	20
					Horizontal	13	365(at 50 to 750st) 355(at 800st) 320(at 850st) 290(at 900st) 265(at 950st) 240(at 1000st) 225(at 1050st) 205(at 1100st)	1	137	478	
RCP6 (Rod type)	RA4C RA4R	Ball screw	8192	16	Horizontal Vertical	20	840	1 0.5	21	48	20
					Horizontal Vertical		RA4C: 700 RA4R: 610	1 0.5	22	77	
		Ball screw	8192	10	Horizontal Vertical	13	350	1 0.5	44	155	20
					Horizontal Vertical			1 0.5	88	310	
RCP6 (Rod type)	RA6C RA6R	Ball screw	8192	5	Horizontal Vertical	7	175	1 0.5	16	56	20
					Horizontal Vertical			1 0.5			
		Ball screw	8192	2.5	Horizontal Vertical	4	800	1 0.5	26	93	20
					Horizontal Vertical			1 0.5			
				6	Horizontal Vertical	8	700	1 0.5	53	185	
				3	Horizontal Vertical	4	450	1 0.5	106	370	
Note The values of the maximum velocity and maximum acceleration/deceleration for RCP6/RCP6CR/RCP6W are the ones when the high-output feature is activated. (There are also some models that are not related to the high-output setting.)											

Note The values of the maximum velocity and maximum acceleration/deceleration for RCP6/RCP6CR/RCP6W are the ones when the high-output feature is activated. (There are also some models that are not related to the high-output setting.)

RCP6 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration/deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]	
RCP6 (Rod type)	RA7C RA7R	Ball screw	8192	24	Horizontal	30	RA7C: 860 RA7R: 800	1	52	182	20	
					Vertical		640	0.5				
				16	Horizontal	20	RA7C: 700 RA7R: 560	1	78	273		
					Vertical		560	0.5				
				8	Horizontal	10	420	1	156	547		
					Vertical		350	0.5				
	RA8C RA8R	Ball screw	8192	4	Horizontal	5	RA7C: 210 RA7R: 175	1	312	1094		
					Vertical		175	0.5				
				20	Horizontal	25	RA8C: 600 RA8R: 400	0.2	167	500	10	
					Vertical		RA8C: 450 RA8R: 400					
				10	Horizontal	13	RA8C: 300 RA8R: 200	0.2	333	1000		
					Vertical		RA8C: 250 RA8R: 200					
RCP6 (Radial cylinder)	RRA4C RRA4R	Ball screw	8192	16	Horizontal	20	RRA4C: 1120(at 60 to 360st) 1080(at 410st) RRA4R: 840	1	21	48	20	
					Vertical		0.5					
				10	Horizontal	13	RRA4C: 700(at 60 to 360st) 685(at 410st) RRA4R: 610	1	22	77		
					Vertical		0.5					
				5	Horizontal	7	350(at 60 to 360st) 340(at 410st)	1	44	155		
					Vertical		0.5					
	RRA6C RRA6R	Ball screw	8192	2.5	Horizontal	4	175(at 60 to 360st) 170(at 410st)	1	89	310	20	
					Vertical		0.5					
				20	Horizontal	25	800	1	16	56		
					Vertical		0.5					
				12	Horizontal	15	700	1	26	93		
					Vertical		0.5					
	RRA7C RRA7R	Ball screw	8192	6	Horizontal	8	450	1	53	185	20	
					Vertical		0.5					
				3	Horizontal	4	225(at 65 to 365st) 220(at 415st)	1	106	370		
					Vertical		0.5					
				24	Horizontal	30	860	1	52	182		
					Vertical		640	0.5				
				16	Horizontal	20	RRA7C: 700 RRA7R: 560	1	78	273		
					Vertical		560	0.5				
				8	Horizontal	10	420	1	156	547		
					Vertical		RRA7C: 420 RRA7R: 350	0.5				
				4	Horizontal	5	RRA7C: 210 RRA7R: 175	1	312	1094		
					Vertical		0.5					

Note The values of the maximum velocity and maximum acceleration/deceleration for RCP6/RCP6CR/RCP6W are the ones when the high-output feature is activated. (There are also some models that are not related to the high-output setting.)

RCP6 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration/deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]	
RCP6 (Radial cylinder)	RRA8C	Ball screw	8192	20	Horizontal	25	280(at 50st) 405(at 100st) 505(at 150st) 585(at 200st) 600(at 250 to 350st) 520(at 400st) 440(at 450st) 360(at 500st) 320(at 550st) 280(at 600st) 240(at 650st) 220(at 700st)	0.2	167	500	10	
							280(at 50st) 405(at 100st) 450(at 150 to 400st) 440(at 450st) 360(at 500st) 320(at 550st) 280(at 600st) 240(at 650st) 220(at 700st)					
				10	Vertical	13	280(at 50st) 300(at 100 to 350st) 260(at 400st) 220(at 450st) 180(at 500st) 160(at 550st) 140(at 600st) 120(at 650st) 110(at 700st)		333	1000		
							250(at 50 to 400st) 220(at 450st) 180(at 500st) 160(at 550st) 140(at 600st) 120(at 650st) 110(at 700st)					
	RRA8R	Ball screw	8192	5	Horizontal/Vertical	7	150(at 50 to 350st) 130(at 400st) 110(at 450st) 90(at 500st) 80(at 550st) 70(at 600st) 60(at 650st) 55(at 700st)	0.1	667	2000	10	
							280(at 50st) 400(at 100 to 450st) 360(at 500st) 320(at 550st) 280(at 600st) 240(at 650st) 220(at 700st)					
				20	Horizontal/Vertical	25	200(at 50 to 450st) 180(at 500st) 160(at 550st) 140(at 600st) 120(at 650st) 110(at 700st)		333	1000		
							200(at 50 to 450st) 180(at 500st) 160(at 550st) 140(at 600st) 120(at 650st) 110(at 700st)					

Note The values of the maximum velocity and maximum acceleration/deceleration for RCP6/RCP6CR/RCP6W are the ones when the high-output feature is activated. (There are also some models that are not related to the high-output setting.)

RCP6 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]	
RCP6 (Radial cylinder)	RRA8R	Ball screw	8192	5	Horizontal /Vertical	7	100(at 50 to 450st) 90(at 500st) 80(at 550st) 70(at 600st) 60(at 650st) 55(at 700st)	0.1	667	2000	10	
RCP6 (Wide radial cylinder)	WRA10C WRA10R	Ball screw	8192	16	Horizontal	20	700	WRA10C: 1 WRA10R: 0.7	21	48	20	
					Horizontal	13	525(at 50 to 450st) 490(at 500st)	1	22	77		
				5	Horizontal	7	350(at 50 to 400st) 290(at 450st) 240(at 500st)	1	44	155		
					Vertical		260(at 50 to 450st) 240(at 500st)	0.5				
				2.5	Horizontal	4	175(at 50 to 400st) 145(at 450st) 120(at 500st)	1	89	310		
					Vertical		WRA10C: 175(at 50 to 400st) 145(at 450st) 120(at 500st) WRA10R: 150(at 50 to 400st) 145(at 450st) 120(at 500st)	0.5				
	WRA12C WRA12R	Ball screw	8192	20	Horizontal	25	800	1	16	56	20	
				12	Horizontal	15	560	1	26	93		
				6	Horizontal	8	400(at 50 to 450st) 375(at 500st)	1	53	185		
					Vertical		WRA12C: 340 WRA12R: 280	0.5				
				3	Horizontal	4	225(at 50 to 400st) 220(at 450st) 185(at 500st)	1	106	370		
					Vertical		200(at 50 to 450st) 185(at 500st)	0.5				
	WRA14C WRA14R	Ball screw	8192	24	Horizontal	30	630	1	52	182	20	
				16	Horizontal	20	560	1	78	273		
				8	Horizontal	10	WRA14C: 420(at 50 to 550st) 395(at 600st) WRA14R: 350	1	156	547		
					Vertical		210	0.5				
				4	Horizontal	5	WRA14C: 210(at 50 to 550st) 195(at 600st) WRA14R: 175	1	312	1094		
					Vertical		130	0.5				

Note The values of the maximum velocity and maximum acceleration/deceleration for RCP6/RCP6CR/RCP6W are the ones when the high-output feature is activated. (There are also some models that are not related to the high-output setting.)

RCP6 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration/deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
RCP6 (Wide radial cylinder)	WRA16C WRA16R	Ball screw	8192	20	Horizontal	25	WRA16C: 280(at 50st) 405(at 100st) 450(at 150 to 450st) 400(at 500st) 340(at 550st) 295(at 600st) 260(at 650st) 225(at 700st) 200(at 750st) 180(at 800st) WRA16R: 280(at 50st) 405(at 100st) 420(at 150 to 450st) 400(at 500st) 340(at 550st) 295(at 600st) 260(at 650st) 225(at 700st) 200(at 750st) 180(at 800st)	0.2	167	500	10
				10	Horizontal	13	240(at 50 to 400st) 230(at 450st) 195(at 500st) 165(at 550st) 145(at 600st) 125(at 650st) 110(at 700st) 100(at 750st) 90(at 800st)	0.2	333	1000	
				5	Vertical	7	WRA16C: 200(at 50 to 450st) 195(at 500st) 165(at 550st) 145(at 600st) 125(at 650st) 110(at 700st) 100(at 750st) 90(at 800st) WRA16R: 180(at 50 to 450st) 195(at 500st) 165(at 550st) 145(at 600st) 125(at 650st) 110(at 700st) 100(at 750st) 90(at 800st)	0.1	667	2000	

Note The values of the maximum velocity and maximum acceleration/deceleration for RCP6/RCP6CR/RCP6W are the ones when the high-output feature is activated. (There are also some models that are not related to the high-output setting.)

RCP6 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration/deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]	
RCP6 (Wide radial cylinder)	WRA16C WRA16R	Ball screw	8192	5	Horizontal	7	WRA16R: 120(at 50 to 400st) 115(at 450st) 95(at 500st) 80(at 550st) 70(at 600st) 60(at 650st) 55(at 700st) 50(at 750st) 45(at 800st)	0.1	667	2000	10	
					Vertical		100(at 50 to 450st) 95(at 500st) 80(at 550st) 70(at 600st) 60(at 650st) 55(at 700st) 50(at 750st) 45(at 800st)					
RCP6W (Dust and drip proof rod type)	RA4C RA4R	Ball screw	8192	10	Horizontal	13	525	1	33	77	20	
					Vertical		435	0.5				
					Horizontal		435	1				
					Vertical		(In ambient temp. 5degC or lower)	0.5				
				5	Horizontal	7	350	1	66	155		
					Vertical		(In ambient temp. 5degC or lower)	0.5				
					Horizontal		260	1				
					Vertical		(In ambient temp. 5degC or lower)	0.5				
				2.5	Horizontal	4	175	1	133	310		
					Vertical		(In ambient temp. 5degC or lower)	0.5				
					Horizontal		150	0.5				
					Vertical		(In ambient temp. 5degC or lower)	0.5				
RCP6W (Dust and drip proof rod type)	RA6C RA6R	Ball screw	8192	12	Horizontal	15	630	1	40	93	20	
					Vertical		525	0.5				
					Horizontal		525	1				
					Vertical		(In ambient temp. 5degC or lower)	0.5				
				6	Horizontal	8	420	1	79	185		
					Vertical		(In ambient temp. 5degC or lower)	0.5				
					Horizontal		370	1				
					Vertical		(In ambient temp. 5degC or lower)	0.5				
				3	Horizontal	4	315	1	159	370		
					Vertical		(In ambient temp. 5degC or lower)	0.5				
					Horizontal		210	1				
					Vertical		(In ambient temp. 5degC or lower)	0.5				
RCP6W (Dust and drip proof rod type)	RA7C RA7R	Ball screw	8192	16	Horizontal	20	420	1	117	273	20	
					Vertical		(In ambient temp. 5degC or lower)	0.5				
					Horizontal		280	1				
					Vertical		(In ambient temp. 5degC or lower)	0.5				
				8	Horizontal	10	350	1	234	547		
					Vertical		(In ambient temp. 5degC or lower)	0.5				
					Horizontal		280	1				
					Vertical		(In ambient temp. 5degC or lower)	0.5				
RCP6W (Dust and drip proof rod type)	RA7C RA7R	Ball screw	8192	4	Horizontal	5	140	1	469	1094	20	
					Vertical		(In ambient temp. 5degC or lower)	0.5				
					Horizontal		140	1				
					Vertical		(In ambient temp. 5degC or lower)	0.5				
					Horizontal		105	1				
					Vertical		(In ambient temp. 5degC or lower)	0.5				

Note The values of the maximum velocity and maximum acceleration/deceleration for RCP6/RCP6CR/RCP6W are the ones when the high-output feature is activated. (There are also some models that are not related to the high-output setting.)

RCP6 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration/deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]	
RCP6W (Dust and drip proof rod type)	RA8C RA8R	Ball screw	8192	20	Horizontal	25	350	0.2	250	500	10	
					Vertical		330					
					Horizontal/Vertical		300 (In ambient temp. 5degC or lower)					
				10	Horizontal/Vertical	13	200	0.2	500	1000		
					Horizontal/Vertical		170 (In ambient temp. 5degC or lower)					
	RRA4C RRA4R	Ball screw	8192	10	Horizontal/Vertical	7	100	0.1	1000	2000		
					Horizontal/Vertical		80 (In ambient temp. 5degC or lower)					
					Horizontal/Vertical		100 (In ambient temp. 5degC or lower)					
					Horizontal/Vertical		80 (In ambient temp. 5degC or lower)					
RCP6W (Dust and drip proof radial cylinder)	RRA6C RRA6R	Ball screw	8192	10	Horizontal	13	525	1	33	77	20	
					Vertical		435	0.5				
					Horizontal		435	1				
					Vertical		435 (In ambient temp. 5degC or lower)	0.5				
				5	Horizontal	7	350(at 50 to 350st) 340(at 400st)	1	66	155		
					Vertical		340(at 400st)	0.5				
					Horizontal		260 (In ambient temp. 5degC or lower)	1				
					Vertical		260 (In ambient temp. 5degC or lower)	0.5				
	RRA7C RRA7R	Ball screw	8192	2.5	Horizontal	4	175(at 50 to 350st) 170(at 400st)	1	133	310		
					Vertical		150	0.5				
					Horizontal		105 (In ambient temp. 5degC or lower)	1				
					Vertical		105 (In ambient temp. 5degC or lower)	0.5				
				12	Horizontal	15	630	1	40	93	20	
					Vertical		525	0.5				
					Horizontal		525	1				
					Vertical		525 (In ambient temp. 5degC or lower)	0.5				
	RRA7C RRA7R	Ball screw	8192	6	Horizontal	8	420	1	79	185		
					Vertical		370	0.5				
					Horizontal		315 (In ambient temp. 5degC or lower)	1				
					Vertical		315 (In ambient temp. 5degC or lower)	0.5				
				3	Horizontal	4	210	1	159	370		
					Vertical		210	0.5				
					Horizontal		105 (In ambient temp. 5degC or lower)	1				
					Vertical		105 (In ambient temp. 5degC or lower)	0.5				
	RRA7C RRA7R	Ball screw	8192	16	Horizontal	20	420	1	117	273	20	
					Vertical		420	0.5				
					Horizontal		280 (In ambient temp. 5degC or lower)	1				
					Vertical		280 (In ambient temp. 5degC or lower)	0.5				
				8	Horizontal	10	350	1	234	547		
					Vertical		280	0.5				
					Horizontal		140 (In ambient temp. 5degC or lower)	1				
					Vertical		140 (In ambient temp. 5degC or lower)	0.5				
	RRA7C RRA7R	Ball screw	8192	4	Horizontal	5	140	1	469	1094		
					Vertical		140	0.5				
					Horizontal		105 (In ambient temp. 5degC or lower)	1				
					Vertical		105 (In ambient temp. 5degC or lower)	0.5				

Note The values of the maximum velocity and maximum acceleration/deceleration for RCP6/RCP6CR/RCP6W are the ones when the high-output feature is activated. (There are also some models that are not related to the high-output setting.)

RCP6 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]			
RCP6W (Dust and drip proof radial cylinder)	RRA8C RRA8R	Ball screw	8192	20	Horizontal	25	280(at 50st) 350(at 100 to 500st) 320(at 550st) 280(at 600st) 240(at 650st) 220(at 700st)	0.2	250	500	10			
							280(at 50st) 330(at 100 to 500st) 320(at 550st) 280(at 600st) 240(at 650st) 220(at 700st)							
							210 (In ambient temp. 5degC or lower)							
				10	Horizontal /Vertical	13	200(at 50 to 450st) 180 (at 500st) 160(at 550st) 140(at 600st) 120(at 650st) 110(at 700st)	0.2	500	1000				
							130(at 50 to 600st) 120(at 650st) 110(at 700st) (In ambient temp. 5degC or lower)							
	WRA10C WRA10R	Ball screw	8192	5	Horizontal /Vertical	7	100(at 50 to 450st) 90(at 500st) 80(at 550st) 70(at 600st) 60(at 650st) 55(at 700st)	0.1	1000	2000				
							60(at 50 to 650st) 55(at 700st) (In ambient temp. 5degC or lower)							
				10	Horizontal	13	525(at 50 to 450st) 490(at 500st)	1	33	77	20			
							350 (In ambient temp. 5degC or lower)							
						7	350(at 50 to 400st) 290(at 450st) 240(at 500st)	1	66	155				
							215							
							215 (In ambient temp. 5degC or lower)							
				2.5	Horizontal	4	175(at 50 to 400st) 145(at 450st) 120(at 500st)	1	133	310				
							150(at 50 to 400st) 145(at 450st) 120(at 500st)							
							65 (In ambient temp. 5degC or lower)							
	WRA12C WRA12R	Ball screw	8192			15	560	1	40	93	20			
							320 (In ambient temp. 5degC or lower)							

Note The values of the maximum velocity and maximum acceleration/deceleration for RCP6/RCP6CR/RCP6W are the ones when the high-output feature is activated. (There are also some models that are not related to the high-output setting.)

RCP6 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]						
WRA12C WRA12R	Ball screw	8192	6	Horizontal Vertical Horizontal Vertical	8	400(at 50 to 450st) 375(at 500st)	1	79	185	20							
						220	0.5										
						220 (In ambient temp. 5degC or lower)	1										
						0.5											
			3	Horizontal Vertical Horizontal Vertical	4	225(at 50 to 400st) 220(at 450st) 185(at 500st)	1	159	370								
						140	0.5										
						80 (In ambient temp. 5degC or lower)	1										
						0.5											
WRA14C WRA14R	Ball screw	8192	16	Horizontal	20	420 280 (In ambient temp. 5degC or lower)	1	117	273	20							
						280	1										
			8	Horizontal Vertical Horizontal Vertical	10	210 140 (In ambient temp. 5degC or lower)	0.5 1 0.5	234	547								
						140	1										
			4	Horizontal Vertical Horizontal Vertical	5	130 70 (In ambient temp. 5degC or lower)	1 0.5 1 0.5	469	1094								
						70	1										
						0.5											
RCP6W (Dust and drip proof wide radial cylinder)	Ball screw	8192	20	Horizontal	25	280(at 50st) 360(at 100 to 500st) 340(at 550st) 295(at 600st) 260(at 650st) 225(at 700st) 200(at 750st) 180(at 800st)	0.2	250	500	10							
						240(at 50 to 650st) 225(at 700st) 200(at 750st) 180(at 800st) (In ambient temp. 5degC or lower)											
						220(at 50 to 450st) 195(at 500st) 165(at 550st) 145(at 600st) 125(at 650st) 110(at 700st) 100(at 750st) 90(at 800st)		500	1000								
						160(at 50 to 550st) 145(at 600st) 125(at 650st) 110(at 700st) 100(at 750st) 90(at 800st)											
						120(at 50 to 650st) 110(at 700st) 100(at 750st) 90(at 800st) (In ambient temp. 5degC or lower)											
WRA16C WRA16R	Ball screw	8192	10	Horizontal	13	220(at 50 to 450st) 195(at 500st) 165(at 550st) 145(at 600st) 125(at 650st) 110(at 700st) 100(at 750st) 90(at 800st)	0.2	500	1000								
						160(at 50 to 550st) 145(at 600st) 125(at 650st) 110(at 700st) 100(at 750st) 90(at 800st)											
				Vertical Horizontal /Vertical													
				120(at 50 to 650st) 110(at 700st) 100(at 750st) 90(at 800st) (In ambient temp. 5degC or lower)													

Note The values of the maximum velocity and maximum acceleration/deceleration for RCP6/RCP6CR/RCP6W are the ones when the high-output feature is activated. (There are also some models that are not related to the high-output setting.)

RCP6 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]	
RCP6W (Dust and drip proof wide radial cylinder)	WRA16C WRA16R	Ball screw	8192	5	Horizontal	7	110(at 50 to 450st) 95(at 500st) 80(at 550st) 70(at 600st) 60(at 650st) 55(at 700st) 50(at 750st) 45(at 800st)	0.1	1000	2000	10	
					Vertical		90(at 50 to 500st) 80(at 550st) 70(at 600st) 60(at 650st) 55(at 700st) 50(at 750st) 45(at 800st)					
					Horizontal/Vertical		80(at 50 to 550st) 70(at 600st) 60(at 650st) 55(at 700st) 50(at 750st) 45(at 800st) (In ambient temp. 5degC or lower)					
RCP6 (Table type)	TA4C TA4R (Single Block Type)	Ball screw	8192	16	Horizontal	20	980	1	21	48	20	
					Vertical		700	0.5				
				10	Horizontal	13	785	1	22	77		
					Vertical		700	0.5				
				5	Horizontal	7	390	1	44	155		
					Vertical			0.5				
	TA4C TA4R (Double Block Type)	Ball screw	8192	2.5	Horizontal	4	195	1	89	310	20	
					Vertical			0.5				
				10	Horizontal	13	TA4C: 785(at 40 to 190st) 680(at 240st) TA4R: 700(at 40 to 190st) 680(at 240st)	1	22	77		
					Vertical		TA4C: 700(at 40 to 190st) 680(at 240st) TA4R: 525	0.5				
				5	Horizontal	7	390(at 40 to 190st)	1	44	155		
					Vertical		340(at 240st)	0.5				
	TA6C TA6R (Single Block Type)	Ball screw	8192	2.5	Horizontal	4	195(at 40 to 190st)	1	89	310	20	
					Vertical		170(at 240st)	0.5				
				20	Horizontal	25	1120	1	16	56		
					Vertical		800	0.5				
				12	Horizontal	15	800	1	26	93		
					Vertical		TA6C : 800 TA6R : 680	0.5				
				6	Horizontal	8	400	1	53	185		
					Vertical		300	0.5				
				3	Horizontal	4	200	1	106	370		
					Vertical		150	0.5				

Note The values of the maximum velocity and maximum acceleration/deceleration for RCP6/RCP6CR/RCP6W are the ones when the high-output feature is activated. (There are also some models that are not related to the high-output setting.)

RCP6 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]		
RCP6 (Table type)	TA6C TA6R (Double Block Type)	Ball screw	8192	12	Horizontal	15	800(at 45 to 220st) 735(at 270st) 575(at 320st)	1	26	93	20		
					Vertical		680(at 45 to 270st) 575(at 320st)	0.5					
				6	Horizontal	8	400(at 45 to 220st) 365(at 270st) 285(at 320st)	1	53	185			
					Vertical		200(at 45 to 220st) 185(at 270st) 140(at 320st)	0.5					
	TA7C TA7R (Single Block Type)	Ball screw	8192	24	Horizontal	30	1080	1	40	139	20		
					Vertical		860	0.5					
				16	Horizontal	20	700	1	60	209			
					Vertical		560	0.5					
				8	Horizontal	10	420	1	119	418			
					Vertical		350	0.5					
	TA7C TA7R (Double Block Type)	Ball screw	8192	4	Horizontal	5	210	1	239	836	20		
					Vertical		140	0.5					
				16	Horizontal	20	700(at 40 to 340st) 600(at 390st)	1	60	209			
					Vertical		560	0.5					
				8	Horizontal	10	420(at 40 to 290st) 365(at 340st) 300(at 390st)	1	119	418			
					Vertical		350(at 40 to 340st) 300(at 390st)	0.5					
				4	Horizontal	5	210(at 40 to 290st) 180(at 340st) 150(at 390st)	1	239	836			
					Vertical		140	0.5					
RCP6 (Gripper type)	GRT7A	—	8192	1 (Note 1)	—	1.25	75	0.3	34 (Both Ends)	120 (Both Ends)	5		
	GRT7B			1.6 (Note 1) (Gear Ratio Pattern 1)		2	120		42 (Both Ends)	150 (Both Ends)			
				0.8 (Note 1) (Gear Ratio Pattern 2)		1	60		86 (Both Ends)	300 (Both Ends)			
	GRST6C GRST6R	Trapezoid thread on right and left	8192	8	—	10	180	0.3	30 (Both Ends)	110 (Both Ends)	Lead 8: 10 Lead 2: 5		
				2		5	45		110 (Both Ends)	310 (Both Ends)			
	GRST7C GRST7R			8		180	140 (In ambient temp. 5degC or lower)		100 (Both Ends)	340 (Both Ends)			
				2		5	45		330 (Both Ends)	880 (Both Ends)			
				—		15 (deg/s)	800(deg/s)		—	—			
RCP6 (Rotary type)	RTFML	—	8192	12 deg (Gear Ratio 1/30)	—	15 (deg/s)	800(deg/s)	0.7	—	—	—		
RCP6 (Rotary Chuck) * Rotary part	RTCKSPE RTCKSPI RTCKSRE RTCKSRI	—	8192	90 deg (Gear Ratio 1/4)	—	113 (deg/s)	1800(deg/s)	3	—	—	—		
	RTCKMPE RTCKMPI RTCKMRE RTCKMRI	—	8192	72 deg (Gear Ratio 1/5)	—	90 (deg/s)	1800(deg/s)	3	—	—	—		

Note The values of the maximum velocity and maximum acceleration/deceleration for RCP6/RCP6CR/RCP6W are the ones when the high-output feature is activated. (There are also some models that are not related to the high-output setting.)

Note 1 It is the lead length converted value including the pulley gear ratio.

RCP5 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration/deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]	
RCP5 RCP5CR (Slider type)	[Standard] SA4C SA4R [Cleanroom] SA4C	Ball screw	800	16	Horizontal	20	1260(at 50 to 400st) 1060(at 450st) 875(at 500st)	1.0 0.5	21	48	20	
					Vertical		785(at 50 to 400st) 675(at 450st) 555(at 500st)	1.0 0.5				
				10	Horizontal	13	390(at 50 to 400st) 330(at 450st) 275(at 500st)	1.0 0.5	22	77		
					Vertical		195(at 50 to 400st) 165(at 450st) 135(at 500st)	1.0 0.5				
				5	Horizontal	7	SA6C: 1440(at 50 to 450st) 1335(at 500st) 1130(at 550st) 970(at 600st) 840(at 650st) 735(at 700st) 650(at 750st) 575(at 800st)	1.0	44	155		
					Vertical		SA6R: 1280(at 50 to 500st) 1130(at 550st) 970(at 600st) 840(at 650st) 735(at 700st) 650(at 750st) 575(at 800st)	0.5				
	Standard type / Cleanroom type	Ball screw	800	20	Horizontal	25	1280(at 50 to 500st) 1130(at 550st) 970(at 600st) 840(at 650st) 735(at 700st) 650(at 750st) 575(at 800st)	1.0	16	56	20	
					Vertical		1280(at 50 to 500st) 1130(at 550st) 970(at 600st) 840(at 650st) 735(at 700st) 650(at 750st) 575(at 800st)	0.5				
				12	Horizontal	15	900(at 50 to 400st) 885(at 450st) 735(at 500st) 620(at 550st) 535(at 600st) 460(at 650st) 405(at 700st) 355(at 750st) 315(at 800st)	1.0	26	93		
					Vertical		SA6C: 900(at 50 to 400st) 885(at 450st) 735(at 500st) 620(at 550st) 535(at 600st) 460(at 650st) 405(at 700st) 355(at 750st) 315(at 800st)	0.5				
					SA6R: 800(at 50 to 450st) 735(at 500st) 620(at 550st) 535(at 600st) 460(at 650st) 405(at 700st) 355(at 750st) 315(at 800st)							

Note The values of the maximum velocity and maximum acceleration/deceleration for RCP5/RCP5CR/RCP5W are the ones when the high-output feature is activated. (There are also some models that are not related to the high-output setting.)

RCP5 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration/deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]	
RCP5 RCP5CR (Slider type)	[Standard] SA6C SA6R	Ball screw	800	6	Horizontal	8	450(at 50 to 400st) 435(at 450st) 365(at 500st) 305(at 550st) 265(at 600st) 230(at 650st) 200(at 700st) 175(at 750st) 155(at 800st)	1.0	53	185	20	
				3	Vertical	4	225(at 50 to 400st) 215(at 450st) 180(at 500st) 150(at 550st) 130(at 600st) 115(at 650st) 100(at 700st) 85(at 750st) 75(at 800st)	0.5	106	370		
	Standard type /Cleanroom type	Ball screw	800	24	Horizontal	30	SA7C: 1200(at 50 to 600st) 1145(at 650st) 1000(at 700st) 885(at 750st) 785(at 800st)	1.0	40	139	20	
				16	Vertical	20	SA7R: 1000(at 50 to 700st) 885(at 750st) 785(at 800st)	0.5	60	209		
	[Standard] SA7C SA7R	Ball screw	800	8	Horizontal	10	SA7C: 980(at 50 to 550st) 875(at 600st) 755(at 650st) 660(at 700st) 585(at 750st) 520(at 800st)	1.0	119	418	20	
				8	Vertical	10	SA7R: 840(at 50 to 600st) 755(at 650st) 660(at 700st) 585(at 750st) 520(at 800st)	0.5	60	209		

Note The values of the maximum velocity and maximum acceleration/deceleration for RCP5/RCP5CR/RCP5W are the ones when the high-output feature is activated. (There are also some models that are not related to the high-output setting.)

RCP5 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
RCP5 RCP5CR (Slider type) Standard type /Cleanroom type	[Standard] SA7C SA7R [Cleanroom] SA7C	Ball screw	800	4	Horizontal Vertical	5	SA7C: 245(at 50 to 550st) 215(at 600st) 185(at 650st) 160(at 700st) 140(at 750st) 125(at 800st) SA7R: 210(at 50 to 600st) 185(at 650st) 160(at 700st) 140(at 750st) 125(at 800st) 210(at 50 to 600st) 185(at 650st) 160(at 700st) 140(at 750st) 125(at 800st)	1.0 0.5	239	836	20
RCP5 (Rod type)	RA4C RA4R	Ball screw	800	16 10 5 2.5	Horizontal Vertical Horizontal Vertical Horizontal Vertical	20 13 7 4	RA4C: 1120(at 60 to 360st) 1080(at 410st) RA4R: 840 RA4C: 700(at 60 to 360st) 685(at 410st) RA4R: 610 350(at 60 to 360st) 340(at 410st) 175(at 60 to 360st) 170(at 410st)	1.0 0.5 1.0 0.5 1.0 0.5 1.0 0.5	21 22 44 88	48 77 155 310	20
RCP5 (Rod type)	RA6C RA6R	Ball screw	800	20 12 6 3	Horizontal Vertical Horizontal Vertical Horizontal Vertical	25 15 8 4	800 700 450 225(at 65 to 365st) 220(at 415st)	1.0 0.5 1.0 0.5 1.0 0.5 1.0 0.5	16 26 53 106	56 93 185 370	20
RCP5 (Rod type)	RA7C RA7R	Ball screw	800	24 16 8 4	Horizontal Vertical Horizontal Vertical Horizontal Vertical	30 20 10 5	800 600 RA7C: 700 RA7R: 560 560 RA7C: 420 RA7R: 350 RA7C: 210 RA7R: 175	1.0 0.5 1.0 0.5 1.0 0.5 1.0 0.5	52 78 156 312	182 273 547 1094	20

Note The values of the maximum velocity and maximum acceleration/deceleration for RCP5/RCP5CR/RCP5W are the ones when the high-output feature is activated. (There are also some models that are not related to the high-output setting.)

RCP5 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration/deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
RCP5 (Rod type)	RA8C RA8R	Ball screw	800	20	Horizontal	25	RA8C: 280(at 50) 405(at 100st) 505(at 150st) 585(at 200st) 600(at 250 to 350st) 520(at 400st) 440(at 450st) 360(at 500st) 320(at 550st) 280(at 600st) 240(at 650st) 220(at 700st) RA8R: 280(at 50) 400(at 100 to 450st) 360(at 500st) 320(at 550st) 280(at 600st) 240(at 650st) 220(at 700st)	0.2	167	500	10
				10	Vertical	13	RA8C: 280(at 50) 300(at 100 to 350st) 260(at 400st) 220(at 450st) 180(at 500st) 160(at 550st) 140(at 600st) 120(at 650st) 110(at 700st) RA8R: 200(at 50 to 450st) 180(at 500st) 160(at 550st) 140(at 600st) 120(at 650st) 110(at 700st)	0.2	333	1000	
							RA8C: 250(at 50 to 400st) 220(at 450st) 180(at 500st) 160(at 550st) 140(at 600st) 120(at 650st) 110(at 700st)				

Note The values of the maximum velocity and maximum acceleration/deceleration for RCP5/RCP5CR/RCP5W are the ones when the high-output feature is activated. (There are also some models that are not related to the high-output setting.)

RCP5 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]	
RCP5 (Rod type)	RA8C RA8R	Ball screw	800	10	Vertical	13	RA8R: 200(at 50 to 450st) 180(at 500st) 160(at 550st) 140(at 600st) 120(at 650st) 110(at 700st)	0.2	333	1000	10	
							RA8C: 150(at 50 to 350st) 130(at 400st) 110(at 450st) 90(at 500st) 80(at 550st) 70(at 600st) 60(at 650st) 55(at 700st)					
				5	Horizontal /Vertical	7	RA8R: 100(at 50 to 450st) 90(at 500st) 80(at 550st) 70(at 600st) 60(at 650st) 55(at 700st)	0.1	667	2000		
							RA10C: 117(at 50st) 167(at 100st) 200(at 150st) 250(at 200 to 500st) 220(at 550st) 200(at 600st) 180(at 650st) 160(at 700st) 140(at 750st) 120(at 800st)					
							RA10R: 117(at 50st) 167(at 100st) 200(at 150 to 600st) 180(at 650st) 160(at 700st) 140(at 750st) 120(at 800st)					
	RA10C RA10R	Ball screw	800	10	Horizontal	13	RA10C: 117(at 50st) 167(at 100 to 650st) 160(at 700st) 140(at 750st) 120(at 800st)	0.04	429	1500	10	
							RA10R: 117(at 50st) 140(at 100 to 750st) 120(at 800st)					
							RA10C: 83(at 50st) 125(at 100 to 400st) 110(at 450st) 90(at 500st) 80(at 550st) 70(at 600st) 60(at 650st) 55(at 700st) 50(at 750st) 45(at 800st)					
				5	Vertical	7	RA10R: 117(at 50st) 140(at 100 to 750st) 120(at 800st)	0.02	857	3000 (at 550st) 2900 (at 600st) 2500 (at 650st) 2200 (at 700st) 2000 (at 750st) 1800 (at 800st)		
							RA10C: 83(at 50st) 125(at 100 to 400st) 110(at 450st) 90(at 500st) 80(at 550st) 70(at 600st) 60(at 650st) 55(at 700st) 50(at 750st) 45(at 800st)					

Note The values of the maximum velocity and maximum acceleration/deceleration for RCP5/RCP5CR/RCP5W are the ones when the high-output feature is activated. (There are also some models that are not related to the high-output setting.)

RCP5 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration/deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]		
RCP5 (Rod type)	RA10C RA10R	Ball screw	800	5	Horizontal/Vertical	7	RA10R: 83(at 50st) 100(at 100 to 450st) 90(at 500st) 80(at 550st) 70(at 600st) 60(at 650st) 55(at 700st) 50(at 750st) 45(at 800st)	0.02	857	3000 (at 550st) 2900 (at 600st) 2500 (at 650st) 2200 (at 700st) 2000 (at 750st) 1800 (at 800st)	10		
				2.5	Horizontal/Vertical	4	RA10C: 63(at 50 to 500st) 55(at 550st) 50(at 600st) 45(at 650st) 40(at 700st) 35(at 750st) 30(at 800st) RA10R: 50(at 50 to 600st) 45(at 650st) 40(at 700st) 35(at 750st) 30(at 800st)	0.01	1714				
RCP5W (Dust and drip proof rod type)	RA6C	Ball screw	800	12	Horizontal	15	500(at 50st) 560(at 100 to 400st)	1	40	93	20		
					Vertical		500	0.5					
					Horizontal		450 (In ambient temp. 5degC or lower)	1					
					Vertical		400 (In ambient temp. 5degC or lower)	0.5					
				6	Horizontal	7.5	360	1	79	185			
					Vertical		0.5						
					Horizontal		300 (In ambient temp. 5degC or lower)	1					
					Vertical		0.5						
				3	Horizontal	3.75	180	1	159	370			
					Vertical		0.5						
					Horizontal		150 (In ambient temp. 5degC or lower)	1					
					Vertical		0.5						
RA7C	RA7C	Ball screw	800	16	Horizontal	20	500(at 50st) 560(at 100 to 500st)	1	94	219	20		
					Vertical		500(at 50st) 400(at 100 to 500st)	0.5					
					Horizontal		450 (In ambient temp. 5degC or lower)	1					
					Vertical		300 (In ambient temp. 5degC or lower)	0.5					
				8	Horizontal	10	340	1	187	437			
					Vertical		280	0.5					
					Horizontal		300 (In ambient temp. 5degC or lower)	1					
					Vertical		250 (In ambient temp. 5degC or lower)	0.5					
				4	Horizontal	5	170	1	375	875			
					Vertical		140	0.5					

Note The values of the maximum velocity and maximum acceleration/deceleration for RCP5/RCP5CR/RCP5W are the ones when the high-output feature is activated. (There are also some models that are not related to the high-output setting.)

RCP5 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]	
RCP5W (Dust and drip proof rod type)	RA7C	Ball screw	800	4	Horizontal	5	150 (In ambient temp. 5degC or lower)	1	375	875	20	
					Vertical		125 (In ambient temp. 5degC or lower)	0.5				
	RA8C	Ball screw	800	20	Vertical	5	80	0.5	515	1030	10	
					Horizontal	25	280(at 50st) 405(at 100st) 480(at 150 to 400st) 440(at 450st) 360(at 500st) 320(at 550st) 280(at 600st) 240(at 650st) 220(at 700st)	0.2	167	500		
					Vertical		280(at 50st) 360(at 100 to 500st) 320(at 550st) 280(at 600st) 240(at 650st) 220(at 700st)					
					Horizontal	13	240(at 50 to 400st) 220(at 450st) 180(at 500st) 160(at 550st) 140(at 600st) 120(at 650st) 110(at 700st)	0.2	333	1000		
					Vertical		200(at 50 to 450st) 180(at 500st) 160(at 550st) 140(at 600st) 120(at 650st) 110(at 700st)					
					Horizontal		210(at 50 to 450st) 180(at 500st) 160(at 550st) 140(at 600st) 120(at 650st) 110(at 700st) (In ambient temp. 5degC or lower)					
					Vertical		175(at 50 to 500st) 160(at 550st) 140(at 600st) 120(at 650st) 110(at 700st) (In ambient temp. 5degC or lower)					
					Horizontal	7	120(at 50 to 400st) 110(at 450st) 90(at 500st) 80(at 550st) 70(at 600st) 60(at 650st) 55(at 700st)	0.1	667	2000		
					Vertical		100(at 50 to 450st) 90(at 500st) 80(at 550st) 70(at 600st) 60(at 650st) 55(at 700st)					

Note The values of the maximum velocity and maximum acceleration/deceleration for RCP5/RCP5CR/RCP5W are the ones when the high-output feature is activated. (There are also some models that are not related to the high-output setting.)

RCP5 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]	
RCP5W (Dust and drip proof rod type)	RA8C	Ball screw	800	5	Horizontal	7	100(at 50 to 450st) 90(at 500st) 80(at 550st) 70(at 600st) 60(at 650st) 55(at 700st) (In ambient temp. 5degC or lower)	0.1	667	2000	10	
							75(at 50 to 550st) 70(at 600st) 60(at 650st) 55(at 700st) (In ambient temp. 5degC or lower)					
	RA10C	Ball screw	800	10	Horizontal	13	117(at 50st) 167(at 100st) 200(at 150 to 600st) 180(at 650st) 160(at 700st) 140(at 750st) 120(at 800st)	0.04	429	1500	10	
							117(at 50st) 130(at 100 to 750st) 120(at 800st)					
				5	Horizontal /Vertical	7	83(at 50st) 100(at 100 to 450st) 90(at 500st) 80(at 550st) 70(at 600st) 60(at 650st) 55(at 700st) 50(at 750st) 45(at 800st)	0.02	857	3000 (at 550st) 2900 (at 600st) 2500 (at 650st) 2200 (at 700st) 2000 (at 750st) 1800 (at 800st)		
							50(at 50 to 600st) 45(at 650st) 40(at 700st) 35(at 750st) 30(at 800st)					
	RCP5 (Belt type)	BA4 BA4U	Belt	800	Equivalent to 48	Horizontal	150	890(at 300st) 1040(at 400st) 1120(at 500st) 1160(at 600st) 1200(at 700 to 1200st)	0.5	—	—	—
		BA6 BA6U	Belt	800	Equivalent to 48	Horizontal	60	890(at 300st) 1070(at 400st) 1220(at 500st) 1340(at 600st) 1400(at 700st) 1440(at 800st) 1500(at 900 to 2200st)	0.5	—	—	—
		BA7 BA7U	Belt	800	Equivalent to 48	Horizontal	100	890(at 300st) 1070(at 400st) 1220(at 500st) 1340(at 600st) 1450(at 700st) 1520(at 800st) 1550(at 900st) 1600(at 1000 to 2600st)	0.5	—	—	—

Note The values of the maximum velocity and maximum acceleration/deceleration for RCP5/RCP5CR/RCP5W are the ones when the high-output feature is activated. (There are also some models that are not related to the high-output setting.)

RCP4 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration/deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]	
RCP4 RCP4CR (Slider type)	[Standard] SA3C SA3R [Cleanroom] SA3C	Ball screw	800	6	Horizontal	8	420	1.0	16	58	20	
					Vertical			0.5				
				4	Horizontal	5	280	1.0	25	86		
					Vertical			0.5				
				2	Horizontal	3	140	1.0	49	173		
					Vertical			0.5				
	Standard type /Cleanroom type	Ball screw	800	20	Horizontal	25	1440(at 50 to 500st) 1225(at 550st) 1045(at 600st) 900(at 650st) 785(at 700st) 690(at 750st) 610(at 800st)	1.0	16	56	20	
					Vertical		SA5C: 1280(at 50 to 500st) 1225(at 550st) 1045(at 600st) 900(at 650st) 785(at 700st) 690(at 750st) 610(at 800st)	0.5				
				12	Horizontal	15	SA5R: 1120(at 50 to 550st) 1045(at 600st) 900(at 650st) 785(at 700st) 690(at 750st) 610(at 800st)	1.0	26	93		
					Vertical		900(at 50 to 450st) 795(at 500st) 665(at 550st) 570(at 600st) 490(at 650st) 425(at 700st) 375(at 750st) 330(at 800st)	0.5				
				6	Horizontal		SA5C: 900(at 50 to 450st) 795(at 500st) 665(at 550st) 570(at 600st) 490(at 650st) 425(at 700st) 375(at 750st) 330(at 800st)	1.0	53	185		
					Vertical		SA5R: 800(at 50 to 450st) 795(at 500st) 665(at 550st) 570(at 600st) 490(at 650st) 425(at 700st) 375(at 750st) 330(at 800st)	0.5				

Note The values of the maximum velocity and maximum acceleration/deceleration for RCP4/RCP4CR/RCP4W are the ones when the high-output feature is activated. (There are also some models that are not related to the high-output setting.)

RCP4 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration/deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
	[Standard] SA5C SA5R	Ball screw	800	3	Horizontal	4	225(at 50 to 450st) 195(at 500st) 165(at 550st) 140(at 600st) 120(at 650st) 105(at 700st) 90(at 750st) 80(at 800st)	1.0	106	370	20
	[Cleanroom] SA5C				Vertical		0.5				
RCP4 RCP4CR (Slider type)					Horizontal	25	SA6C: 1440(at 50 to 500st) 1230(at 550st) 1045(at 600st) 905(at 650st) 785(at 700st) 690(at 750st) 615(at 800st) SA6R: 1280(at 50 to 500st) 1230(at 550st) 1045(at 600st) 905(at 650st) 785(at 700st) 690(at 750st) 615(at 800st)	1.0	16	56	20
Standard type /Cleanroom type	[Standard] SA6C SA6R	Ball screw	800		Vertical		SA6C: 1280(at 50 to 500st) 1230(at 550st) 1045(at 600st) 905(at 650st) 785(at 700st) 690(at 750st) 615(at 800st) SA6R: 1120(at 50 to 550st) 1045(at 600st) 905(at 650st) 785(at 700st) 690(at 750st) 615(at 800st)	0.5			
	[Cleanroom] SA6C				Horizontal	15	900(at 50 to 450st) 795(at 500st) 670(at 550st) 570(at 600st) 490(at 650st) 430(at 700st) 375(at 750st) 335(at 800st)	1.0	26	93	
					Vertical		0.5				
				12	Horizontal	8	450(at 50 to 450st) 395(at 500st) 335(at 550st) 285(at 600st) 245(at 650st) 215(at 700st) 185(at 750st) 165(at 800st)	1.0	53	185	
				6	Vertical		0.5				
				3	Horizontal	4	225(at 50 to 450st) 195(at 500st) 165(at 550st) 140(at 600st) 120(at 650st) 105(at 700st) 90(at 750st) 80(at 800st)	1.0	106	370	
					Vertical		0.5				

Note The values of the maximum velocity and maximum acceleration/deceleration for RCP4/RCP4CR/RCP4W are the ones when the high-output feature is activated. (There are also some models that are not related to the high-output setting.)

RCP4 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]			
RCP4 RCP4CR (Slider type)	[Standard] SA7C SA7R	Ball screw	800	24	Horizontal	30	SA7C: 1200(at 50 to 600st) 1155(at 650st) 1010(at 700st) 890(at 750st) 790(at 800st)	1.0	40	139	20			
							SA7R: 1000(at 50 to 700st) 890(at 750st) 790(at 800st)	0.5						
				16	Vertical	20	SA7C: 980(at 50 to 550st) 865(at 600st) 750(at 650st) 655(at 700st) 580(at 750st) 515(at 800st)	1.0	60	209				
							SA7R: 840(at 50 to 600st) 750(at 650st) 655(at 700st) 580(at 750st) 515(at 800st)							
	[Cleanroom] SA7C			8	Horizontal	10	SA7C: 840(at 50 to 600st) 750(at 650st) 655(at 700st) 580(at 750st) 515(at 800st)	0.5	119	418				
							SA7R: 700(at 50 to 650st) 655(at 700st) 580(at 750st) 515(at 800st)							
				4	Vertical	5	SA7C: 490(at 50 to 550st) 430(at 600st) 375(at 650st) 325(at 700st) 290(at 750st) 255(at 800st)	1.0	239	836				
							SA7R: 420(at 50 to 600st) 375(at 650st) 325(at 700st) 290(at 750st) 255(at 800st)	0.5						
							SA7C: 245(at 50 to 550st) 215(at 600st) 185(at 650st) 160(at 700st) 145(at 750st) 125(at 800st)	1.0						
							SA7R: 210(at 50 to 600st) 185(at 650st) 160(at 700st) 145(at 750st) 125(at 800st)							
							210(at 50 to 600st) 185(at 650st) 160(at 700st) 145(at 750st) 125(at 800st)	0.5						

Note The values of the maximum velocity and maximum acceleration/deceleration for RCP4/RCP4CR/RCP4W are the ones when the high-output feature is activated. (There are also some models that are not related to the high-output setting.)

RCP4 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration/deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]	
RCP4W (Dust and drip proof slider type)	SA5C	Ball screw	800	10	Horizontal	13	330	0.6	38.2	66.9	20	
				5	Horizontal	7	165		42.3	147.9		
	SA6C	Ball screw	800	12	Horizontal	15	400	0.6	35.5	82.8	20	
				6	Horizontal	8	200		51.3	179.5		
	SA7C	Ball screw	800	16	Horizontal	20	530	0.6	60	209	20	
				8	Horizontal	10	265		119	418		
	RA3C RA3R	Ball screw	800	16	Horizontal Vertical	20	1120	1.0 0.5	15	36	20	
				10	Horizontal Vertical	13	700	1.0 0.5	16	57		
				5	Horizontal Vertical	7	350	1.0 0.5	33	114		
				2.5	Horizontal Vertical	4	175	1.0 0.5	65	229		
				20	Horizontal Vertical	25	800	1.0 0.5	16	56		
				12	Horizontal Vertical	15	700	1.0 0.5	26	93		
				6	Horizontal Vertical	8	450	1.0 0.5	53	185		
				3	Horizontal Vertical	4	225	1.0 0.5	106	370		
RCP4 (Rod type)	RA5C RA5R	Ball screw	800	3	Vertical	4	80	0.5	370	750	20	
				24	Horizontal Vertical	30	800 600	1.0 0.5	52	182		
				16	Horizontal Vertical	20	RA6C: 700 RA6R: 560	1.0	78	273		
							560	0.5				
				8	Horizontal Vertical	10	420 RA6C: 420 RA6R: 350	1.0 0.5	156	547		
				4	Horizontal Vertical	5	RA6C: 210 RA6R: 175	1.0 0.5				
				4	Vertical	5	90	0.5	312	1094		
									470	1106		
	RA6C RA6R	Ball screw	800	12	Horizontal Vertical	15	500(at 50st) 560(at 100 to 400st)	1.0	40	93	20	
							500	0.5				
							450 (In ambient temp. 5degC or lower)	1.0				
							400 (In ambient temp. 5degC or lower)	0.5				
				6	Horizontal Vertical	8	360	1.0 0.5	79	185		
							300 (In ambient temp. 5degC or lower)	1.0 0.5				
				3	Horizontal Vertical		180	1.0 0.5		159	370	
							150 (In ambient temp. 5degC or lower)	1.0 0.5				
				3	Vertical	4	70	0.5	354	590		

Note The values of the maximum velocity and maximum acceleration/deceleration for RCP4/RCP4CR/RCP4W are the ones when the high-output feature is activated. (There are also some models that are not related to the high-output setting.)

RCP4 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]	
RCP4W (Dust and drip proof rod type)	RA7C	Ball screw	800	16	Horizontal	20	500(at 50st) 560(at 100 to 500st)	1.0	94	219	20	
					Vertical		500(at 50st) 400(at 100 to 500st)	0.5				
					Horizontal		450 (In ambient temp. 5degC or lower)	1.0				
					Vertical		300 (In ambient temp. 5degC or lower)	0.5				
				8	Horizontal	10	340	1.0	187	437		
					Vertical		280	0.5				
					Horizontal		300 (In ambient temp. 5degC or lower)	1.0				
					Vertical		250 (In ambient temp. 5degC or lower)	0.5				
				4	Horizontal	5	170	1.0	375	875		
					Vertical		140	0.5				
					Horizontal		150 (In ambient temp. 5degC or lower)	1.0				
					Vertical		125 (In ambient temp. 5degC or lower)	0.5				
				4 (Motor Type: 56SP)	Vertical	5	80	0.5	515	1030		
RCP4 (Gripper type)	GRSML	-	800	1.88	-	5	94	0.3	25 (Both Ends)	87 (Both Ends)	5	
	GRSLL			2.52		5	125		40 (Both Ends)	140 (Both Ends)		
	GRSWL			3.14		5	157		50 (Both Ends)	220 (Both Ends)		
	GRLM			12	-	20 (deg/s)	600 (deg/s)		10 (Both Ends)	35 (Both Ends)		
	GRLL			12		20 (deg/s)	600 (deg/s)		10 (Both Ends)	60 (Both Ends)		
	GRLW			12.86		20 (deg/s)	643 (deg/s)		23 (Both Ends)	90 (Both Ends)		

Note The values of the maximum velocity and maximum acceleration/deceleration for RCP4/RCP4CR/RCP4W are the ones when the high-output feature is activated. (There are also some models that are not related to the high-output setting.)

RCP3 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]		
RCP3 (Slider type)	SA2AC SA2AR	Lead screw	800	4	Horizontal	5	180(at 25st) 200(at 50 to 100st)	0.2	—	—	—		
				2		3	100						
				1		2	50						
	SA2BC SA2BR	Lead screw	800	6	Horizontal	8	180(at 25st) 280(at 50st) 300(at 75 to 150st)	0.2	—	—	—		
				4		5	180(at 25st) 200(at 50 to 150st)						
				2		3	100						
	SA3C SA3R	Ball screw	800	6	Horizontal	8	300	0.3	16	30	20		
				4		5	200	0.2					
				2	Vertical	3	100	0.2	50	90			
	SA4C SA4R	Ball screw	800	10	Horizontal	13	500	0.7	25	40	20		
				5		7	250	0.3					
				2.5	Vertical	4	125	0.7	100	160			
	SA5C SA5R	Ball screw	800	20 (Only for SA5C)	Horizontal	25	1000(at 50 to 600st) 910(at 650st) 790(at 700st) 690(at 750st) 610(at 800st)	0.7	20	34	20		
				Vertical			0.2						
				12	Horizontal	15	600(at 50 to 550st) 570(at 600st) 490(at 650st) 425(at 700st) 370(at 750st) 330(at 800st)	0.7	40	58			
				Vertical			0.3						
				6	Horizontal	8	300(at 50 to 550st) 285(at 600st) 245(at 650st) 210(at 700st) 185(at 750st) 165(at 800st)	0.7	80	115			
				Vertical			0.3						
				3	Horizontal	4	150(at 50 to 550st) 140(at 600st) 120(at 650st) 105(at 700st) 90(at 750st) 80(at 800st)	0.7	160	230			
				Vertical			0.3						
	SA6C SA6R	Ball screw	800	20 (Only for SA6C)	Horizontal	25	1000(at 50 to 600st) 910(at 650st) 790(at 700st) 690(at 750st) 610(at 800st)	0.7	20	34	20		
				Vertical			0.2						
				12	Horizontal		600(at 50 to 550st) 570(at 600st) 490(at 650st) 425(at 700st) 370(at 750st) 330(at 800st)	0.7	40	58			
				Vertical			0.3						

RCP3 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]	
RCP3 (Slider type)	SA6C SA6R	Ball screw	800	6	Horizontal	8	300(at 50 to 550st) 285(at 600st) 245(at 650st) 210(at 700st) 185(at 750st) 165(at 800st)	0.7	80	115	20	
					Vertical			0.3				
				3	Horizontal	4	150(at 50 to 550st) 140(at 600st) 120(at 650st) 105(at 700st) 90(at 750st) 80(at 800st)	0.7	160	230		
					Vertical			0.3				
RA2AC RA2AR	Lead screw	Standard type	800	4	Horizontal	5	180(at 25st) 200(at 50 to 100st)	0.2	0.9	6.6	5	
				2	Vertical	3	100		1.9	13.2		
				1		2	50		3.8	26.4		
				4	Horizontal	5	180(at 25st) 200(at 50 to 100st)	0.3	3.6	12.6		
				4	Vertical			0.2				
	Ball screw High thrust type	Standard type	800	2	Horizontal	3	100	0.3	7.2	25.2		
				2	Vertical			0.2				
				1	Horizontal	2	50	0.3	14.4	50.4		
				1	Vertical			0.2				
				4	Horizontal	5	180(at 25st) 200(at 50 to 100st)	0.3	6.6	23.1		
				4	Vertical			0.2				
RCP3 (Rod type)	Lead screw	Standard type	800	2	Horizontal	3	100	0.3	13.2	46.2	5	
				2	Vertical			0.2				
				1	Horizontal	2	50	0.3	26.4	92.4		
				1	Vertical			0.2				
	Ball screw High thrust type	Standard type	800	6	Horizontal	8	180(at 25st) 280(at 50st) 300(at 75 to 150st)	0.2	0.6	4.4		
				4	Vertical		180(at 25st) 200(at 50 to 150st)		0.9	6.6		
				2			100		1.9	13.2		
				6	Horizontal	8	180(at 25st) 280(at 50st) 300(at 75 to 150st)	0.3	1.8	6.3		
				6	Vertical			0.2				
	Ball screw High thrust type	Standard type	800	4	Horizontal	5	180(at 25st) 200(at 50 to 150st)	0.3	3.6	12.6		
				4	Vertical			0.2				
				2	Horizontal	3	100	0.3	7.2	25.2		
				2	Vertical			0.2				
				1	Horizontal	2	50	0.3	14.4	50.4		
				1	Vertical			0.2				
	Ball screw High thrust type	High thrust type	800	6	Horizontal	8	180(at 25st) 280(at 50st) 300(at 75 to 150st)	0.3	4.4	15.4		
				6	Vertical			0.2				
				4	Horizontal	5	180(at 25st) 200(at 50 to 150st)	0.3	6.6	23.1		
				4	Vertical			0.2				
				2	Horizontal	3	100	0.3	13.2	46.2		
				2	Vertical			0.2				
				1	Horizontal	2	50	0.3	26.4	92.4		
				1	Vertical			0.2				

RCP3 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]			
RCP3 (Table type)	TA3C TA3R	Ball screw	800	6	Horizontal	8	300	0.3	10	15	20			
					Vertical		200	0.2						
				4	Horizontal	5	200	0.3	15	22				
					Vertical		133	0.2						
	TA4C TA4R			2	Horizontal	3	100	0.2	30	45				
					Vertical		67							
				6	Horizontal	8	300	0.3	15	25	20			
				Vertical				0.2						
	TA4C TA4R			4	Horizontal	5	200	0.3	22	37				
					Vertical			0.2						
				2	Horizontal /Vertical	3	100	0.2	45	75				
	TA5C TA5R	Ball screw	800	10	Horizontal	13	465	0.3	21	34	20			
					Vertical		400	0.2						
				5	Horizontal	7	250	0.3	41	68				
				Vertical				0.2						
				2.5	Horizontal /Vertical	4	125	0.2	82	136				
	TA6C TA6R	Ball screw	800	12	Horizontal	15	560	0.3	35	60	20			
					Vertical		500	0.2						
				6	Horizontal	8	300	0.3	70	110				
				Vertical				0.2						
				3	Horizontal /Vertical	4	150	0.2	140	189				
	TA7C TA7R	Ball screw	800	12	Horizontal	15	600	0.3	35	60	20			
					Vertical		580	0.2						
				6	Horizontal	8	300	0.3	70	110				
				Vertical				0.2						
				3	Horizontal /Vertical	4	150	0.2	140	189				

RCP2 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]			
RCP2 (Slider type)	SA5C	Ball screw	800	20	Horizontal	25	380(at 50st) 540(at 100st) 660(at 150st) 770(at 200st) 860(at 250st) 940(at 300st) 1000(at 350 to 550st) 980(at 600st) 850(at 650st) 740(at 700st) 650(at 750st) 580(at 800st)	0.7	11	39	20			
							380(at 50st) 540(at 100st) 660(at 150st) 770(at 200st) 800(at 250 to 600st) 740(at 700st) 650(at 750st) 580(at 800st)							
				12	Vertical	15	600(at 50 to 550st) 540(at 600st) 460(at 650st) 400(at 700st) 360(at 750st) 300(at 800st)	0.7	40	115				
							300(at 50 to 550st) 270(at 600st) 230(at 650st) 200(at 700st) 180(at 750st) 150(at 800st)							
				6	Horizontal	8	150(at 50 to 550st) 135(at 600st) 115(at 650st) 100(at 700st) 90(at 750st) 75(at 800st)	0.7	70	210				
							150(at 50 to 550st) 135(at 600st) 115(at 650st) 100(at 700st) 90(at 750st) 75(at 800st)							
	SA5R	Ball screw	800	12	Horizontal	15	600(at 50 to 550st) 540(at 600st) 460(at 650st) 400(at 700st) 360(at 750st) 300(at 800st)	0.3	140	330	-			
							300(at 50 to 550st) 270(at 600st) 230(at 650st) 200(at 700st) 180(at 750st) 150(at 800st)							
				6	Vertical	8	150(at 50 to 550st) 135(at 600st) 115(at 650st) 100(at 700st) 90(at 750st) 75(at 800st)	0.2						
							150(at 50 to 550st) 135(at 600st) 115(at 650st) 100(at 700st) 90(at 750st) 75(at 800st)							

RCP2 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]			
RCP2 (Slider type)	SA6C	Ball screw	800	20	Horizontal	25	380(at 50st) 540(at 100st) 660(at 150st) 770(at 200st) 860(at 250st) 940(at 300st) 1000(at 350 to 550st) 980(at 600st) 850(at 650st) 740(at 700st) 650(at 750st) 580(at 800st)	0.7	11	39	20			
							380(at 50st) 540(at 100st) 660(at 150st) 770(at 200st) 800(at 250 to 600st) 740(at 700st) 650(at 750st) 580(at 800st)							
				12	Vertical	15	600(at 50 to 550st) 540(at 600st) 460(at 650st) 400(at 700st) 360(at 750st) 300(at 800st)	0.7	40	115				
							600(at 50 to 550st) 540(at 600st) 460(at 650st) 400(at 700st) 360(at 750st) 300(at 800st)							
				6	Horizontal	8	300(at 50 to 550st) 270(at 600st) 230(at 650st) 200(at 700st) 180(at 750st) 150(at 800st)	0.7	70	210				
							300(at 50 to 550st) 270(at 600st) 230(at 650st) 200(at 700st) 180(at 750st) 150(at 800st)							
				3	Vertical	4	150(at 50 to 550st) 135(at 600st) 115(at 650st) 100(at 700st) 90(at 750st) 75(at 800st)	0.7	140	330				
							150(at 50 to 550st) 135(at 600st) 115(at 650st) 100(at 700st) 90(at 750st) 75(at 800st)							
	SA6R	Ball screw	800	12	Horizontal	15	600(at 50 to 550st) 540(at 600st) 460(at 650st) 400(at 700st) 360(at 750st) 300(at 800st)	0.3	-	-	-			
							600(at 50 to 550st) 540(at 600st) 460(at 650st) 400(at 700st) 360(at 750st) 300(at 800st)							
				6	Vertical	8	300(at 50 to 550st) 270(at 600st) 230(at 650st) 200(at 700st) 180(at 750st) 150(at 800st)	0.3						
							300(at 50 to 550st) 270(at 600st) 230(at 650st) 200(at 700st) 180(at 750st) 150(at 800st)							
				3	Horizontal / Vertical	4	150(at 50 to 550st) 135(at 600st) 115(at 650st) 100(at 700st) 90(at 750st) 75(at 800st)	0.2						

RCP2 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]	
RCP2 (Slider type)	SA7C	Ball screw	800	16	Horizontal	20	533(at 50 to 700st) 480(at 800st)	0.3 0.2	90	250	20	
					Vertical							
				8	Horizontal	10	266(at 50 to 700st) 240(at 800st)	0.3 0.2	150	500		
					Vertical							
	SA7R	Ball screw	800	4	Horizontal /Vertical	5	133(at 50 to 700st) 120(at 800st)	0.2	280	800	20	
				16	Horizontal	20	533(at 50 to 700st) 480(at 800st)	0.3	-	-		
					Vertical		400	0.2		-		
	SS7C	Ball screw	800	8	Horizontal	10	266(at 50 to 700st) 240(at 800st)	0.3 0.2		-		
					Vertical							
				4	Horizontal /Vertical	5	133(at 50 to 700st) 120(at 800st)	0.2				
	SS7R	Ball screw	800	12	Horizontal	15	600(at 50 to 500st) 470(at 600st)	0.3 0.2	40	115	20	
					Vertical							
				6	Horizontal	8	300(at 50 to 500st) 230(at 600st)	0.3 0.2	70	210		
					Vertical							
	SS8C	Ball screw	800	3	Horizontal /Vertical	4	150(at 50 to 500st) 115(at 600st)	0.2	140	330	20	
				12	Horizontal	15	600(at 50 to 500st) 470(at 600st)	0.3	-	-		
					Vertical		440	0.2		-		
				6	Horizontal	8	250(at 50 to 500st) 230(at 600st)	0.3 0.2		-		
					Vertical							
				3	Horizontal /Vertical	4	105	0.2				
	SS8R	Ball screw	800	20	Horizontal	25	666(at 50 to 800st) 625(at 900st) 515(at 1000st)	0.3	50	180	20	
					Vertical		600(at 50 to 900st) 515(at 1000st)	0.2				
				10	Horizontal	13	333(at 50 to 800st) 310(at 900st) 255(at 1000st)	0.3	95	320		
					Vertical		300(at 50 to 900st) 255(at 1000st)	0.2				
				5	Horizontal	7	165(at 50 to 800st) 155(at 900st) 125(at 1000st)	0.2	180	630		
					Vertical		150(at 50 to 900st) 125(at 1000st)					
				20	Horizontal	25	600(at 50 to 900st) 515(at 1000st)	0.3	-	-		
					Vertical		333	0.2		-		
				10	Horizontal	13	300(at 50 to 900st) 255(at 1000st)	0.3		-		
					Vertical		250	0.2		-		
				5	Horizontal	7	160(at 50 to 800st) 155(at 900st) 125(at 1000st)	0.2		-		
					Vertical		140			-		
	HS8C HS8R	Ball screw	800	30	Horizontal	100	1200(at 50 to 800st) 1000(at 900st) 800(at 1000st)	0.5	-	-		
	Vertical	750	0.2	-								

RCP2 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
RCP2W (Dust and drip proof slider type)	SA16C	Ball screw	800	8	Horizontal	10	180	0.2	—	—	—
				4		5	133				
RCP2 (Belt type)	BA6 BA6U	Belt	800	Equivalent to 54	Horizontal	100	1000	0.5	—	—	—
	BA7 BA7U	Belt	800	Equivalent to 54	Horizontal	100	1500	0.5	—	—	—
RCP2 (Rod type)	RA2C (Note 1)	Ball screw	800	1	Horizontal /Vertical	2	25	0.05	50	100	3
	RA3C	Ball screw	800	5	Horizontal /Vertical	7	187	0.2	21	73.5	20
				2.5	Horizontal /Vertical	4	114		50	156.8	
	RGD3C	Ball screw	800	5	Horizontal /Vertical	7	187	0.2	21	73.5	20
				2.5	Horizontal	4	114		50	156.8	
				2.5	Vertical	4	93				
	RA4C RGS4C RGD4C	Ball screw	800	10	Horizontal /Vertical	13	458(at 50 to 250st) 350(at 300st)	0.2	30	150	20
				5	Horizontal /Vertical	7	250(at 50 to 200st) 237(at 250st) 175(at 300st)		75	284	
				2.5	Horizontal	4	125(at 50 to 200st) 118(at 250st) 87(at 300st)		150	358	
				2.5	Vertical	4	114(at 50 to 250st) 87(at 300st)				
	RA6C RGS6C RGD6C	Ball screw	800	16	Horizontal	20	450	0.2	75	240	20
				16	Vertical		400		130	470	
				8	Horizontal /Vertical	10	210		300	800	
				4	Horizontal /Vertical	5	130				
	RA8C RA8R	Ball screw	800	10	Horizontal /Vertical	13	RA8C:300 RA8R:200	0.2	286	1000	10
				5	Horizontal /Vertical	7	RA8C:150 RA8R:100		571	2000	
	RA10C	Ball screw	800	10	Horizontal	10	250	0.04	500	1500	10
				10	Vertical		167		1000	3000	
				5	Horizontal /Vertical	5	125		3100	6000	
				2.5	Horizontal /Vertical	1	63				
	SRA4R SRGS4R SRGD4R	Ball screw	800	5	Horizontal	7	250	0.3 0.2	32	112	20
				5	Vertical				64	224	
				2.5	Horizontal /Vertical	4	125	0.2			
				2.5	Vertical	4	115(at 50 to 250st) 85(at 300st)		150	358	
RCP2W (Dust and drip proof rod type)	RA4C	Ball screw	800	10	Horizontal	13	450(at 50 to 250st) 350(at 300st)	0.2	30	150	20
				10	Vertical		250		75	284	
				5	Horizontal /Vertical	7	190(at 50 to 250st) 175(at 300st)				
				2.5	Horizontal	4	125(at 50 to 200st) 115(at 250st) 85(at 300st)				
				2.5	Vertical		115(at 50 to 250st) 85(at 300st)				

Note 1 For RCP2-RA2C, a ball screw with its lead length 1mm and a speed reducer with its gear ratio 1/2 are joined directly.

RCP2 Series

Actuator series	Type	Feed screw	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]				
RCP2W (Dust and drip proof rod type)	RA6C	Ball screw	800	16	Horizontal	20	320	0.2	75	240	20				
					Vertical		265								
				8	Horizontal /Vertical	10	200		130	470					
					Horizontal /Vertical		100								
	RA10C	Ball screw	800	10	Horizontal	10	250	0.04	500	1500	10				
					Vertical		167								
				5	Horizontal /Vertical	5	125	0.02	1000	3000					
					Horizontal /Vertical		63								
				GRSS GRLS GRS GRM GRHM GRHB GRST GR3SS GR3SM GR3LS GR3LM	800	1.57 12 1 1.1 2 2 1.05 2.27 2.5 3 12 12	5 5 (deg/s) 5 5 5 5 5 5 5 5 5 (deg/s) 5 (deg/s)	78 600 (deg/s) 33 36 100 100 34 (Standard Type) 75 (High Speed Type) 40 50 200 (deg/s) 200 (deg/s)	4 (Both Ends) 1.8 (Both Ends) 9 (Both Ends) 23 (Both Ends) 25 (Both Ends) 60 (Both Ends) 15 (Both Ends) 7.5 (Both Ends) 7 (Both Ends) 30 (Both Ends) 5 (Both Ends) 15 (Both Ends)	14 (Both Ends) 6.4 (Both Ends) 21 (Both Ends) 80 (Both Ends) 125 (Both Ends) 200 (Both Ends) 40 (Both Ends) 20 (Both Ends) 22 (Both Ends) 102 (Both Ends) 18 (Both Ends) 51 (Both Ends)	5 20 (deg/s) 5 5 5 5 5 5 5 20 (deg/s) 20 (deg/s)				
RCP2CR RCP2W (Cleanroom type / Dust and drip proof gripper type)	GRSS GRLS GRS GRM GR3SS GR3SM	-	800	1.57 12 1 1.1 2.5 3	-	2 15 (deg/s) 2 2 4 4	78 600 (deg/s) 33 36 40 50	-	4 (Both Ends) 1.8 (Both Ends) 9 (Both Ends) 23 (Both Ends) 7 (Both Ends) 30 (Both Ends)	14 (Both Ends) 6.4 (Both Ends) 21 (Both Ends) 80 (Both Ends) 22 (Both Ends) 102 (Both Ends)	5 5 (deg/s) 5 5 5 5				
RCP2 RCP2CR RCP2W (Rotary type)	RTBS RTBLS RTCS RTCSL	-	800	12 deg (Gear ratio: 1/30)	-	15 (deg/s)	400 (deg/s)	-	-	-	-				
				8 deg (Gear ratio: 1/45)	-	10 (deg/s)	266 (deg/s)								
	RTB RTBL RTC RTCL RTBB RTBBL RTCB RTCBL	-	800	18 deg (Gear ratio: 1/20)	-	23 (deg/s)	600 (deg/s)	-	-	-	-				
				12 deg (Gear ratio: 1/30)	-	15 (deg/s)	400 (deg/s)								

WU Series

Actuator series	Type	Axis	Motor type	No. of encoder pulses	Lead [mm]	Minimum speed ^(Note 1) [deg/s]	Maximum speed [deg/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
WU	S	B-axis Oscillation	28P	8192	Deceleration ratio 16	28 (In individual operation)	750 (In individual operation) 600 (In simultaneous operation)	0.7 (With no load torque) 0.3 (With load torque)	—	—	—
		T-axis Rotation	28P		Deceleration ratio 16	28 (In individual operation)	1200 (In individual operation) 600 (In simultaneous operation)	0.7 (With no load torque) 0.3 (With load torque)			
	M	B-axis Oscillation	35P	8192	Deceleration ratio 20	22 (In individual operation)	900 (In individual operation) 600 (In simultaneous operation)	0.7 (With no load torque) 0.3 (With load torque)	—	—	—
		T-axis Rotation	35P		Deceleration ratio 20	22 (In individual operation)	1200 (In individual operation) 600 (In simultaneous operation)	0.7 (With no load torque) 0.3 (With load torque)			

Note 1 As the wrist unit has the B-axis and T-axis interlocked with each other inside, when operating the axes at the same time, operation is available with the following conditions satisfied.

WU-S, WU-M Standard Type : B-axis velocity > minimum velocity in individual movement and also |B-axis velocity - T-axis velocity| > minimum velocity in individual movement [deg/s]

WU-M Reversed Type : B-axis velocity > minimum velocity in individual movement and also |B-axis velocity - T-axis velocity| > minimum velocity in individual movement [deg/s]

(Calculate with negative values for rotation to negative coordinate direction. | | show absolute values)

(2) 24V AC Servo Motor Type

RCA2 Series

Actuator series	Type	Feed screw	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
RCA2 (Slider type)	SA3C SA3R	Ball screw	10	800	6	Horizontal	8	300	0.3	-	-	-
						Vertical			0.2			
					4	Horizontal	5	200	0.3			
						Vertical			0.2			
					2	Horizontal /Vertical	3	100	0.2			
	SA4C SA4R	Ball screw	20	800	10	Horizontal	13	500	0.3	-	-	-
						Vertical			0.2			
					5	Horizontal	7	250	0.3			
						Vertical			0.2			
					2.5	Horizontal /Vertical	4	125	0.2			
	SA5C SA5R	Ball screw	20	800	20 (Only for SA5C)	Horizontal	25	1000(at 50 to 600st) 910(at 650st) 790(at 700st) 690(at 750st) 610(at 800st)	0.3	-	-	-
						Vertical		0.2				
					12	Horizontal	15	600(at 50 to 550st) 570(at 600st) 490(at 650st) 425(at 700st) 370(at 750st) 330(at 800st)	0.3			
						Vertical		0.2				
					6	Horizontal	8	300(at 50 to 550st) 285(at 600st) 245(at 650st) 210(at 700st) 185(at 750st) 165(at 800st)	0.3			
						Vertical		0.2				
					3	Horizontal /Vertical	4	150(at 50 to 550st) 140(at 600st) 120(at 650st) 105(at 700st) 90(at 750st) 80(at 800st)	0.2			
						Horizontal		0.2				
	SA6C SA6R	Ball screw	30	800	20 (Only for SA6C)	Horizontal	25	1000(at 50 to 600st) 910(at 650st) 790(at 700st) 690(at 750st) 610(at 800st)	0.3	-	-	-
						Vertical		0.2				
					12	Horizontal	15	600(at 50 to 550st) 570(at 600st) 490(at 650st) 425(at 700st) 370(at 750st) 330(at 800st)	0.3			
						Vertical		0.2				

RCA2 Series

Actuator series	Type	Feed screw	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
RCA2 (Slider type)	SA6C SA6R	Ball screw	30	800	6	Horizontal Vertical	8	300(at 50 to 550st) 285(at 600st) 245(at 650st) 210(at 700st) 185(at 750st) 165(at 800st)	0.3 0.2	-	-	-
					3	Horizontal /Vertical	4	150(at 50 to 550st) 140(at 600st) 120(at 650st) 105(at 700st) 90(at 750st) 80(at 800st)	0.2			
[Standard] RN3NA RP3NA GS3NA GD3NA SD3NA		Ball screw			4	Horizontal Vertical	4	200	0.3 0.2			
[Cleanroom] [Dust and drip proof] RN3NB RP3NB GS3NB GD3NB SD3NB		Lead screw (Available to Select Only in Standard Type)	10	1048	2	Horizontal Vertical	2	100	0.3 0.2	-	-	-
					1	Horizontal Vertical	1	50	0.2			
					4		4	200				
					2	Horizontal /Vertical	2	100	0.2			
					1		1	50				
RCA2 RCA2CR RCA2W (Rod type)	[Standard] RN4NA RP4NA GS4NA GD4NA	Ball screw			6	Horizontal Vertical	6	270(at 30st) 300(at 50st) 220(at 30st) 300(at 50st)	0.3 0.2			
Standard type /Cleanroom type / Dust and drip proof type	[Cleanroom] [Dust and drip proof] RN4NB RP4NB GS4NB GD4NB	Lead screw (Available to Select Only in Standard Type)	20	1048	4	Horizontal Vertical	4	200	0.3 0.2	-	-	-
					2	Horizontal /Vertical	2	100	0.2			
					6	Horizontal /Vertical	6	220(at 30st) 300(at 50st)				
					4	Horizontal Vertical	4	200	0.2			
					2	Horizontal /Vertical	2	100				
					6		6	240(at 25st) 300(at 50 to 75st)	0.3			
						Vertical	6	200(at 25st) 300(at 50 to 75st)	0.2			
					4	Horizontal Vertical	4	200	0.3 0.2			
					2	Horizontal /Vertical	2	100	0.2	-	-	-
					6		6	200(at 25st) 300(at 50 to 75st)				
					4	Horizontal /Vertical	4	200	0.2			
					2		2	100				
					6		6	200(at 25st) 300(at 50 to 75st)				
					4		4	200	0.2			
					2		2	100				

RCA2 Series

Actuator series	Type	Feed screw	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]				
RCA2 (Table type)	TCA3NA TWA3NA TFA3NA	Ball screw	10	1048	4	Horizontal	4	200	0.3	-	-	-				
						Vertical			0.2							
					2	Horizontal	2	100	0.3							
						Vertical			0.2							
	TCA4NA TWA4NA TFA4NA	Lead screw	20	1048	1	Horizontal /Vertical	1	50	0.2	-	-	-				
						4	4	200	0.2							
					2	Horizontal /Vertical	2	100	0.2							
					1		1	50	0.2							
	TA4C TA4R	Ball screw	10	800	6	Horizontal	6	270(at 30st) 300(at 50st)	0.3	-	-	-				
						Vertical		220(at 30st) 300(at 50st)	0.2							
					4	Horizontal	4	200	0.3							
						Vertical			0.2							
		Lead screw	2		2	Horizontal /Vertical	2	100	0.2							
						6	6	220(at 30st) 300(at 50st)	0.2							
					4	Horizontal /Vertical	4	200	0.2							
						2										
	TA5C TA5R	Ball screw	20	800	6	Horizontal	8	300	0.3	-	-	-				
						Vertical			0.2							
					4	Horizontal	5	200	0.3							
						Vertical			0.2							
		Ball screw	2		2	Horizontal /Vertical	3	100	0.2							
					10	Horizontal	13	465	0.3	-	-	-				
						Vertical		400	0.2							
	TA6C TA6R	Ball screw	20	800	5	Horizontal	7	250	0.3							
						Vertical			0.2							
					2.5	Horizontal /Vertical	4	125	0.2							
	TA7C TA7R	Ball screw	30	800	12	Horizontal	15	560	0.3	-	-	-				
						Vertical		500	0.2							
					6	Horizontal	8	300	0.3							
						Vertical			0.2							
					3	Horizontal /Vertical	4	150	0.2							
	TA7C TA7R	Ball screw	30	800	12	Horizontal	15	600	0.3	-	-	-				
						Vertical		580	0.2							
					6	Horizontal	8	300	0.3							
						Vertical			0.2							
					3	Horizontal /Vertical	4	150	0.2							

13.2 Connectable Actuators

RCA Series

Actuator series	Type	Feed screw	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
RCA RCACR (Slider type) Standard type /Cleanroom type	[Standard] [Cleanroom] SA4C	Ball screw	20	Incremental 800 Battery-less Absolute 16384	10	Horizontal /Vertical	13 (Note 1)	665	0.3 / 1.0 (Note 2)	-	-	-
					5		7 (Note 1)	330	0.3 / 1.0 (Note 2)			
					2.5		4 (Note 1)	165	0.2			
	[Standard] SA4D	Ball screw	20	Incremental 800 (Note 3)	10	Horizontal /Vertical	13	665	0.3	-	-	-
					5		7	330	0.3			
					2.5		4	165	0.2			
	[Standard] SA4R	Ball screw	20	Incremental 800 Battery-less Absolute 16384	10	Horizontal /Vertical	13 (Note 1)	665	0.3	-	-	-
					5		7 (Note 1)	330	0.3			
					2.5		4 (Note 1)	165	0.2			
	[Standard] [Cleanroom] SA5C	Ball screw	20	Incremental 800 Battery-less Absolute 16384	20	Horizontal /Vertical	25 (Note 1)	1300	0.3 / 0.8 (Note 2)	-	-	-
							800	0.2				
					12	Horizontal /Vertical	15 (Note 1)	800(at 50 to 450st) 760(at 500st)	0.3 / 0.8 (Note 2)			
					6		8 (Note 1)	400(at 50 to 450st) 380(at 500st)	0.3 / 0.8 (Note 2)			
					3		4 (Note 1)	200(at 50 to 450st) 190(at 500st)	0.2			
	[Standard] SA5D	Ball screw	20	Incremental 800 (Note 3)	12	Horizontal /Vertical	15	800(at 50 to 450st) 760(at 500st)	0.3	-	-	-
					6		8	400(at 50 to 450st) 380(at 500st)	0.3			
					3		4	200(at 50 to 450st) 190(at 500st)	0.2			
	[Standard] SA5R	Ball screw	20	Incremental 800 Battery-less Absolute 16384	12	Horizontal /Vertical	15 (Note 1)	800(at 50 to 450st) 760 (at 500st)	0.3	-	-	-
					6		8 (Note 1)	400(at 50 to 450st) 380(at 500st)	0.3			
					3		4 (Note 1)	200(at 50 to 450st) 190(at 500st)	0.2			
	[Standard] [Cleanroom] SA6C	Ball screw	30	Incremental 800 Battery-less Absolute 16384	20	Horizontal /Vertical	25 (Note 1)	1300(at 50 to 500st) 1160(at 550st) 990(at 600st)	0.3 / 1.0 (Note 2)	-	-	-
							800	0.2				
					12	Horizontal /Vertical	15 (Note 1)	800(at 50 to 450st) 760(at 500st) 640(at 550st) 540(at 600st)	0.3 / 1.0 (Note 2)			
					6		8 (Note 1)	400(at 50 to 450st) 380(at 500st) 320(at 550st) 270(at 600st)	0.3 / 1.0 (Note 2)			
					3		4 (Note 1)	200(at 50 to 450st) 190(at 500st) 160(at 550st) 135(at 600st)	0.2			

Note 1 It is the velocity with the incremental encoder.

Note 2 It is the maximum acceleration/deceleration when the option "High Acceleration/Deceleration Application (Model code: HA)" which is available to select only in the standard type is added.

Note 3 Connection is available only with Incremental Type.

RCA Series

Actuator series	Type	Feed screw	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
RCA RCACR (Slider type)	[Standard] [Cleanroom] SA6D	Ball screw	30	Incremental 800 (Note 3)	12	Horizontal /Vertical	15	800(at 50 to 450st) 760(at 500st) 640(at 550st) 540(at 600st)	0.3	—	—	—
					6		8	400(at 50 to 450st) 380(at 500st) 320(at 550st) 270(at 600st)	0.3			
					3		4	200(at 50 to 450st) 190(at 500st) 160(at 550st) 135(at 600st)	0.2			
	Standard type /Cleanroom type	[Standard] SA6R	30	Incremental 800 Battery-less Absolute 16384	12	Horizontal /Vertical	15 (Note 1)	800(at 50 to 450st) 760(at 500st) 640(at 550st) 540(at 600st)	0.3	—	—	—
					6		8 (Note 1)	400(at 50 to 450st) 380(at 500st) 320(at 550st) 270(at 600st)	0.3			
					3		4 (Note 1)	200(at 50 to 450st) 190(at 500st) 160(at 550st) 135(at 600st)	0.2			
RCA RCAW (Rod type)	[Standard] [Dust and drip proof] RA3C	Ball screw	20	800	10	Horizontal /Vertical	13	500	0.3 / 1.0 (Note 2)	—	—	—
					5		7	250	0.3 / 1.0 (Note 2)			
					2.5		4	125	0.2			
	[Standard] RGS3C RGD3C	Ball screw	20	800	10	Horizontal /Vertical	13	500	0.3 / 1.0 (Note 2)	—	—	—
					5		7	250	0.3 / 1.0 (Note 2)			
					2.5		4	125	0.2			
	[Standard] [Dust and drip proof] RA3D RA3R [Standard] RGS3D RGD3D RGD3R	Ball screw	20	800	10	Horizontal /Vertical	13	500	0.3	—	—	—
					5		7	250	0.3			
					2.5		4	125	0.2			
	[Standard] [Dust and drip proof] RA4C	Ball screw	20 30	Incremental 800 (Note 3)	12	Horizontal /Vertical	15	600	0.3 / 1.0 (Note 2)	—	—	—
					6		8	300	0.3 / 1.0 (Note 2)			
					3		4	150	0.2			
	[Standard] RGS4C RGD4C	Ball screw	20 30	Incremental 800 (Note 3)	12	Horizontal /Vertical	15	600	0.3 / 1.0 (Note 2)	—	—	—
					6		8	300	0.3 / 1.0 (Note 2)			
					3		4	150	0.2			
	[Standard] [Dust and drip proof] RA4D RA4R [Standard] RGS4D RGD4D RGD4R	Ball screw	20 30	Incremental 800 (Note 3)	12	Horizontal /Vertical	15	600	0.3	—	—	—
					6		8	300	0.3			
					3		4	150	0.2			

Note 1 It is the velocity with the incremental encoder.

Note 2 It is the maximum acceleration/deceleration when the option "High Acceleration/Deceleration Application (Model code: HA)" which is available to select only in the standard type is added.

Note 3 Connection is available only with Incremental Type.

RCA Series

Actuator series	Type	Feed screw	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
RCA (Rod type)	SRA4R SRGS4R SRGD4R	Ball screw	20	800	5	Horizontal	7	250	0.3	—	—	—
						Vertical			0.2			
					2.5	Horizontal /Vertical	4	125	0.2			
RCA (Arm type) (Note 3)	A4R	Ball screw	20	800	10	Horizontal	13	330	0.2	—	—	—
					5	/Vertical	7	165				
	A5R	Ball screw	20	800	12	Horizontal	15	400	0.2	—	—	—
					6	/Vertical	8	200				
	A6R	Ball screw	30	800	12	Horizontal	15	400	0.2	—	—	—
					6	/Vertical	8	200				

Note 3 Connection is available only with Incremental Type.

RCL Series

Actuator series	Type	Feed screw	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
RCL	RA1L	Linear	—	715	—	Horizontal /Vertical	—	300	Horizontal: 2G Vertical: 1G	0.75	2	20
	RA2L			855				340		1.5	4	
	RA3L			1145				450		3	8	
	SA1L			715	—	Horizontal	42	420	2	—	—	—
	SA2L			855				460				
	SA3L			1145				600				
	SA4L			715				1200				
	SM4L			855				1400				
	SA5L			1145				1600				
	SM5L											
	SA6L											
	SM6L											

(3) Specifications for Brushless DC Electric Motor Actuator

RCD Series

Actuator series	Type	Feed screw	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Minimum speed [mm/s]	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
RCD	RA1DA	Lead screw	3	480	2	Horizontal \Vertical	5	300	1	0.41	2.6	5
	GRSNA			480		Horizontal \Vertical		67		2.1	10 (Both Ends)	

(4) Specifications for 200V AC Servo Motor Type Actuator

RCS4 Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration/deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
RCS4 (Slider type)	SA4C SA4R	60	16384	16	Horizontal /Vertical	960(at 50 to 450st) 875(at 500st)	SA4C:1.2 SA4R:1	-	-	-
				10		600(at 50 to 450st) 555(at 500st)	SA4C:1.2 SA4R:1			
				5		300(at 50 to 450st) 275(at 500st)	1			
				2.5		150(at 50 to 450st) 135(at 500st)	0.7			
	SA6C SA6R	100	16384	30	Horizontal /Vertical	1600(at 50 to 550st) 1450(at 600st) 1260(at 650st) 1100(at 700st) 970(at 750st) 860(at 800st)	SA6C:1.2 SA6R:1	-	-	-
				20		1200(at 50 to 500st) 1130(at 550st) 970(at 600st) 840(at 650st) 735(at 700st) 650(at 750st) 575(at 800st)	SA6C:1.2 SA6R:1			
				12		720(at 50 to 500st) 620(at 550st) 535(at 600st) 460(at 650st) 405(at 700st) 355(at 750st) 315(at 800st)	SA6C:1.2 SA6R:1			
				6		360(at 50 to 500st) 305(at 550st) 265(at 600st) 230(at 650st) 200(at 700st) 175(at 750st) 155(at 800st)	1	-	-	-
				3		180(at 50 to 500st) 150(at 550st) 130(at 600st) 115(at 650st) 100(at 700st) 85(at 750st) 75(at 800st)	0.7			

RCS4 Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]	
RCS4 (Slider type)	SA7C SA7R	200	16384	36	Horizontal /Vertical	1800(at 50 to 600st) 1620(at 650st) 1420(at 700st) 1260(at 750st) 1120(at 800st)	SA7C:1.2 SA7R:1	—	—	—	
						1500(at 50 to 500st) 1440(at 550st) 1240(at 600st) 1095(at 650st) 965(at 700st) 850(at 750st) 760(at 800st)	SA7C:1.2 SA7R:1	—	—	—	
				24		1000(at 50 to 500st) 965(at 550st) 830(at 600st) 720(at 650st) 635(at 700st) 560(at 750st) 500(at 800st)	SA7C:1.2 SA7R:1	—	—	—	
						500(at 50 to 500st) 475(at 550st) 410(at 600st) 355(at 650st) 315(at 700st) 275(at 750st) 245(at 800st)	1	—	—	—	
				16		240(at 50 to 500st) 235(at 550st) 205(at 600st) 175(at 650st) 155(at 700st) 135(at 750st) 120(at 800st)	0.7	—	—	—	
						2200(at 50 to 700st) 2180(at 750st) 1950(at 800st) 1760(at 850st) 1590(at 900st) 1450(at 950st) 1320(at 1000st) 1210(at 1050st) 1110(at 1100st)	1.2	—	—	—	
	SA8C	400	16384	48	Horizontal	1800(at 50 to 600st) 1640(at 650st) 1440(at 700st) 1280(at 750st) 1155(at 800st) 1040(at 850st) 940(at 900st) 855(at 950st) 780(at 1000st) 715(at 1050st) 660(at 1100st)	1.2	—	—	—	
						1800(at 50 to 600st) 1640(at 650st) 1440(at 700st) 1280(at 750st) 1155(at 800st) 1040(at 850st) 940(at 900st) 855(at 950st) 780(at 1000st) 715(at 1050st) 660(at 1100st)					

RCS4 Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
RCS4 (Slider type)	SA8C	400	16384	20	Horizontal /Vertical	1200(at 50 to 600st) 1090(at 650st) 960(at 700st) 860(at 750st) 770(at 800st) 695(at 850st) 630(at 900st) 570(at 950st) 520(at 1000st) 480(at 1050st) 440(at 1100st)	1.2	—	—	—
						600(at 50 to 600st) 540(at 650st) 480(at 700st) 430(at 750st) 385(at 800st) 345(at 850st) 310(at 900st) 285(at 950st) 260(at 1000st) 235(at 1050st) 220(at 1100st)	1	—	—	—
						300(at 50 to 600st) 270(at 650st) 240(at 700st) 215(at 750st) 190(at 800st) 175(at 850st) 155(at 900st) 140(at 950st) 130(at 1000st) 120(at 1050st) 110(at 1100st)	0.7	—	—	—
	SA8R	400	16384	48	Horizontal	2100(at 50 to 750st) 1950(at 800st) 1760(at 850st) 1590(at 900st) 1450(at 950st) 1320(at 1000st) 1210(at 1050st) 1110(at 1100st)	1	—	—	—
						1800(at 50 to 600st) 1640(at 650st) 1440(at 700st) 1280(at 750st) 1155(at 800st) 1040(at 850st) 940(at 900st) 855(at 950st) 780(at 1000st) 715(at 1050st) 660(at 1100st)	1	—	—	—

RCS4 Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]					
RCS4 (Slider type)	SA8R	400	16384	20	Horizontal /Vertical	1200(at 50 to 600st) 1090(at 650st) 960(at 700st) 860(at 750st) 770(at 800st) 695(at 850st) 630(at 900st) 570(at 950st) 520(at 1000st) 480(at 1050st) 440(at 1100st)	1	—	—	—					
						600(at 50 to 600st) 540(at 650st) 480(at 700st) 430(at 750st) 385(at 800st) 345(at 850st) 310(at 900st) 285(at 950st) 260(at 1000st) 235(at 1050st) 220(at 1100st)									
						300(at 50 to 600st) 270(at 650st) 240(at 700st) 215(at 750st) 190(at 800st) 175(at 850st) 155(at 900st) 140(at 950st) 130(at 1000st) 120(at 1050st) 110(at 1100st)		0.7	—	—					
				10											
				5											
[Cleanroom type] RCS4CR (Slider type)	SA4C	60	16384	16	Horizontal /Vertical	960(at 50 to 450st) 875(at 500st)	1.2	—	—	—					
				10		600(at 50 to 450st) 555(at 500st)	1.2								
				5		300(at 50 to 450st) 275(at 500st)	1								
				2.5		150(at 50 to 450st) 135(at 500st)	0.7								
				20	Horizontal /Vertical	1200(at 50 to 500st) 1130(at 550st) 970(at 600st) 840(at 650st) 735(at 700st) 650(at 750st) 575(at 800st)	1.2	—	—	—					
				12		720(at 50 to 500st) 620(at 550st) 535(at 600st) 460(at 650st) 405(at 700st) 355(at 750st) 315(at 800st)	1.2								
				12											

RCS4 Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration/deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]	
[Cleanroom type] RCS4CR (Slider type)	SA6C	100	16384	6	Horizontal /Vertical	360(at 50 to 500st) 305(at 550st) 265(at 600st) 230(at 650st) 200(at 700st) 175(at 750st) 155(at 800st)	1	—	—	—	
						180(at 50 to 500st) 150(at 550st) 130(at 600st) 115(at 650st) 100(at 700st) 85(at 750st) 75(at 800st)	0.7	—	—	—	
	SA7C	200	16384	24	Horizontal /Vertical	1500(at 50 to 500st) 1440(at 550st) 1240(at 600st) 1095(at 650st) 965(at 700st) 850(at 750st) 760(at 800st)	1.2	—	—	—	
						1000(at 50 to 500st) 965(at 550st) 830(at 600st) 720(at 650st) 635(at 700st) 560(at 750st) 500(at 800st)	1.2	—	—	—	
				16		500(at 50 to 500st) 475(at 550st) 410(at 600st) 355(at 650st) 315(at 700st) 275(at 750st) 245(at 800st)	1	—	—	—	
						240(at 50 to 500st) 235(at 550st) 205(at 600st) 175(at 650st) 155(at 700st) 135(at 750st) 120(at 800st)	0.7	—	—	—	
				8		1200(at 50 to 600st) 1090(at 650st) 960(at 700st) 860(at 750st) 770(at 800st) 695(at 850st) 630(at 900st) 570(at 950st) 520(at 1000st) 480(at 1050st) 440(at 1100st)	1.2	—	—	—	
						1200(at 50 to 600st) 1090(at 650st) 960(at 700st) 860(at 750st) 770(at 800st) 695(at 850st) 630(at 900st) 570(at 950st) 520(at 1000st) 480(at 1050st) 440(at 1100st)	1.2	—	—	—	
	SA8C	400	16384	20	Horizontal /Vertical	1200(at 50 to 600st) 1090(at 650st) 960(at 700st) 860(at 750st) 770(at 800st) 695(at 850st) 630(at 900st) 570(at 950st) 520(at 1000st) 480(at 1050st) 440(at 1100st)	1.2	—	—	—	

RCS4 Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
[Cleanroom type] RCS4CR (Slider type)	SA8C	400	16384	10	Horizontal /Vertical	600(at 50 to 600st) 540(at 650st) 480(at 700st) 430(at 750st) 385(at 800st) 345(at 850st) 310(at 900st) 285(at 950st) 260(at 1000st) 235(at 1050st) 220(at 1100st)	1	—	—	—
						300(at 50 to 600st) 270(at 650st) 240(at 700st) 215(at 750st) 190(at 800st) 175(at 850st) 155(at 900st) 140(at 950st) 130(at 1000st) 120(at 1050st) 110(at 1100st)				
RCS4 (Wide slider type)	WSA10C WSA10R	60	16384	16	Horizontal	960(at 50 to 350st) 930(at 400st) 775(at 450st) 660(at 500st)	WSA10C:1.2 WSA10R:1	—	—	—
				10	Horizontal /Vertical	600(at 50 to 350st) 590(at 400st) 490(at 450st) 415(at 500st)	WSA10C:1.2 WSA10R:1	—	—	—
				5		300(at 50 to 350st) 290(at 400st) 245(at 450st) 205(at 500st)	1	—	—	—
				2.5		150(at 50 to 350st) 145(at 400st) 120(at 450st) 100(at 500st)	0.7	—	—	—
	WSA12C WSA12R	100	16384	30	Horizontal	1600(at 50 to 500st) 1450(at 550st) 1260(at 600st) 1100(at 650st) 970(at 700st) 860(at 750st) 770(at 800st)	WSA12C:1.2 WSA12R:1	—	—	—
				20	Horizontal /Vertical	1200(at 50 to 450st) 1130(at 500st) 970(at 550st) 840(at 600st) 740(at 650st) 650(at 700st) 580(at 750st) 520(at 800st)	WSA12C:1.2 WSA12R:1	—	—	—

RCS4 Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
RCS4 (Wide slider type)	WSA12C WSA12R	100	16384	12	Horizontal /Vertical	720(at 50 to 450st) 610(at 500st) 535(at 550st) 465(at 600st) 405(at 650st) 355(at 700st) 315(at 750st) 285(at 800st)	WSA12C:1.2 WSA12R:1	—	—	—
						360(at 50 to 450st) 310(at 500st) 265(at 550st) 230(at 600st) 200(at 650st) 175(at 700st) 155(at 750st) 140(at 800st)				
						180(at 50 to 450st) 150(at 500st) 130(at 550st) 115(at 600st) 100(at 650st) 85(at 700st) 75(at 750st) 70(at 800st)	0.7	—	—	—
						WSA14C: 1800(at 50 to 550st) 1590(at 600st) 1400(at 650st) 1240(at 700st) 1110(at 750st) 990(at 800st)				
	WSA14C WSA14R	200	16384	36	Horizontal	WSA14R: 1710(at 50 to 550st) 1590(at 600st) 1400(at 650st) 1240(at 700st) 1110(at 750st) 990(at 800st)	WSA14C:1.2 WSA14R:1	—	—	—
						1440(at 50 to 450st) 1420(at 500st) 1220(at 550st) 1060(at 600st) 930(at 650st) 830(at 700st) 740(at 750st) 665(at 800st)				
				24	Horizontal /Vertical	960(at 50 to 450st) 920(at 500st) 790(at 550st) 690(at 600st) 610(at 650st) 550(at 700st) 490(at 750st) 440(at 800st)	WSA14C:1.2 WSA14R:1	—	—	—
						WSA14C:1.2 WSA14R:1				

RCS4 Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]		
RCS4 (Wide slider type)	WSA14C WSA14R	200	16384	8	Horizontal /Vertical	480(at 50 to 450st) 460(at 500st) 400(at 550st) 350(at 600st) 305(at 650st) 270(at 700st) 240(at 750st) 215(at 800st)	1	—	—	—		
						240(at 50 to 450st) 230(at 500st) 200(at 550st) 170(at 600st) 150(at 650st) 135(at 700st) 120(at 750st) 105(at 800st)	0.7	—	—	—		
				4		1800(at 50 to 550st) 1680(at 600st) 1480(at 650st) 1320(at 700st) 1180(at 750st) 1060(at 800st) 960(at 850st) 870(at 900st) 790(at 950st) 730(at 1000st) 670(at 1050st) 620(at 1100st)	WSA16C:1.2 WSA16R:1	—	—	—		
						1200(at 50 to 550st) 1120(at 600st) 990(at 650st) 880(at 700st) 780(at 750st) 715(at 800st) 645(at 850st) 590(at 900st) 535(at 950st) 490(at 1000st) 450(at 1050st) 415(at 1100st)	WSA16C:1.2 WSA16R:1	—	—	—		
	WSA16C WSA16R	400	16384	30	Horizontal /Vertical	600(at 50 to 550st) 560(at 600st) 490(at 650st) 440(at 700st) 395(at 750st) 355(at 800st) 320(at 850st) 290(at 900st) 265(at 950st) 240(at 1000st) 225(at 1050st) 205(at 1100st)	1	—	—	—		
				20								
				10								

RCS4 Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
RCS4 (Wide slider type)	WSA16C WSA16R	400	16384	5	Horizontal /Vertical	300(at 50 to 550st) 280(at 600st) 240(at 650st) 220(at 700st) 195(at 750st) 175(at 800st) 160(at 850st) 145(at 900st) 130(at 950st) 120(at 1000st) 110(at 1050st) 100(at 1100st)	0.7	—	—	—
[Cleanroom type] RCS4CR (Wide slider type)	WSA10C WSA12C	60 100	16384	16 10 5 2.5	Horizontal	960(at 50 to 350st) 930(at 400st) 775(at 450st) 660(at 500st)	1.2	—	—	—
						600(at 50 to 350st) 590(at 400st) 490(at 450st) 415(at 500st)	1.2	—	—	—
						300(at 50 to 350st) 290(at 400st) 245(at 450st) 205(at 500st)	1	—	—	—
						150(at 50 to 350st) 145(at 400st) 120(at 450st) 100(at 500st)	0.7	—	—	—
				20 12 6 3	Horizontal /Vertical	1200(at 50 to 450st) 1130(at 500st) 970(at 550st) 840(at 600st) 740(at 650st) 650(at 700st) 580(at 750st) 520(at 800st)	1.2	—	—	—
						720(at 50 to 450st) 610(at 500st) 535(at 550st) 465(at 600st) 405(at 650st) 355(at 700st) 315(at 750st) 285(at 800st)	1.2	—	—	—
						360(at 50 to 450st) 310(at 500st) 265(at 550st) 230(at 600st) 200(at 650st) 175(at 700st) 155(at 750st) 140(at 800st)	1	—	—	—
						180(at 50 to 450st) 150(at 500st) 130(at 550st) 115(at 600st) 100(at 650st) 85(at 700st) 75(at 750st) 70(at 800st)	0.7	—	—	—

RCS4 Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]	
[Cleanroom type] RCS4CR (Wide slider type)	WSA14C	200	16384	24	Horizontal /Vertical	1440(at 50 to 450st) 1420(at 500st) 1220(at 550st) 1060(at 600st) 930(at 650st) 830(at 700st) 740(at 750st) 665(at 800st)	1.2	—	—	—	
						960(at 50 to 450st) 920(at 500st) 790(at 550st) 690(at 600st) 610(at 650st) 550(at 700st) 490(at 750st) 440(at 800st)	1.2	—	—	—	
				16		480(at 50 to 450st) 460(at 500st) 400(at 550st) 350(at 600st) 305(at 650st) 270(at 700st) 240(at 750st) 215(at 800st)	1	—	—	—	
						240(at 50 to 450st) 230(at 500st) 200(at 550st) 170(at 600st) 150(at 650st) 135(at 700st) 120(at 750st) 105(at 800st)	0.7	—	—	—	
	WSA16C	400	16384	20	Horizontal /Vertical	1200(at 50 to 550st) 1120(at 600st) 990(at 650st) 880(at 700st) 780(at 750st) 715(at 800st) 645(at 850st) 590(at 900st) 535(at 950st) 490(at 1000st) 450(at 1050st) 415(at 1100st)	1.2	—	—	—	
						600(at 50 to 550st) 560(at 600st) 490(at 650st) 440(at 700st) 395(at 750st) 355(at 800st) 320(at 850st) 290(at 900st) 265(at 950st) 240(at 1000st) 225(at 1050st) 205(at 1100st)	1	—	—	—	

RCS4 Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
[Cleanroom type] RCS4CR (Wide slider type)	WSA16C	400	16384	5	Horizontal /Vertical	300(at 50 to 550st) 280(at 600st) 240(at 650st) 220(at 700st) 195(at 750st) 175(at 800st) 160(at 850st) 145(at 900st) 130(at 950st) 120(at 1000st) 110(at 1050st) 100(at 1100st)	0.7	—	—	—
RCS4 (Rod type)	RA4C RA4R	60	16384	16	Horizontal /Vertical	800	RA4C:1.2 RA4R:1	—	—	—
				10		500	RA4C:1.2 RA4R:1			
				5		250	1			
				2.5		125	0.7			
	RA6C RA6R	100	16384	20	Horizontal /Vertical	1000	RA6C:1.2 RA6R:1	—	—	—
				12		600	RA6C:1.2 RA6R:1			
				6		300	1			
				3		150	0.7			
	RA7C RA7R	200	16384	24	Horizontal /Vertical	1200	RA7C:1.2 RA7R:1	—	—	—
				16		800	RA7C:1.2 RA7R:1			
				8		400	1			
				4		200	0.7			
	RA8C RA8R	400	16384	20	Horizontal /Vertical	1000	RA8C:1.2 RA8R:1	—	—	—
				10		500	1			
				5		250	0.7			
RCS4 (Radial cylinder)	RRA4C RRA4R	60	16384	16	Horizontal /Vertical	960	RRA4C:1.2 RRA4R:1	—	—	—
				10		600	RRA4C:1.2 RRA4R:1			
				5		300	1			
				2.5		150	0.7			
	RRA6C RRA6R	100	16384	20	Horizontal /Vertical	1200	RRA6C:1.2 RRA6R:1	—	—	—
				12		720	RRA6C:1.2 RRA6R:1			
				6		360	1			
				3		180	0.7			
	RRA7C RRA7R	200	16384	24	Horizontal /Vertical	1440	RRA7C:1.2 RRA7R:1	—	—	—
				16		960	RRA7C:1.2 RRA7R:1			
				8		480	1			
				4		240	0.7			

RCS4 Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]	
RCS4 (Radial cylinder)	RRA8C	400	16384	30	Horizontal /Vertical	1500(at 50 to 300st) 1230(at 350st) 970(at 400st) 790(at 450st) 650(at 500st) 540(at 550st) 460(at 600st) 400(at 650st) 350(at 700st)	1.2	—	—	—	
						1100(at 50 to 250st) 1070(at 300st) 820(at 350st) 650(at 400st) 520(at 450st) 430(at 500st) 360(at 550st) 310(at 600st) 260(at 650st) 230(at 700st)					
				20		550(at 50 to 250st) 520(at 300st) 400(at 350st) 310(at 400st) 250(at 450st) 210(at 500st) 180(at 550st) 150(at 600st) 130(at 650st) 110(at 700st)	1	—	—	—	
						275(at 50 to 250st) 250(at 300st) 190(at 350st) 150(at 400st) 120(at 450st) 100(at 500st) 80(at 550st) 70(at 600st) 60(at 650st) 55(at 700st)					
				10		1300(at 50 to 300st) 1230(at 350st) 970(at 400st) 790(at 450st) 650(at 500st) 540(at 550st) 460(at 600st) 400(at 650st) 350(at 700st)	0.7	—	—	—	
	RRA8R	400	16384			1000(at 50 to 300st) 820(at 350st) 650(at 400st) 520(at 450st) 430(at 500st) 360(at 550st) 310(at 600st) 260(at 650st) 230(at 700st)					
						1300(at 50 to 300st) 1230(at 350st) 970(at 400st) 790(at 450st) 650(at 500st) 540(at 550st) 460(at 600st) 400(at 650st) 350(at 700st)		1	—	—	
			5			1000(at 50 to 300st) 820(at 350st) 650(at 400st) 520(at 450st) 430(at 500st) 360(at 550st) 310(at 600st) 260(at 650st) 230(at 700st)					
						1300(at 50 to 300st) 1230(at 350st) 970(at 400st) 790(at 450st) 650(at 500st) 540(at 550st) 460(at 600st) 400(at 650st) 350(at 700st)					

RCS4 Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]	
RCS4 (Radial cylinder)	RRA8R	400	16384	10	Horizontal /Vertical	550(at 50 to 250st) 520(at 300st) 400(at 350st) 310(at 400st) 250(at 450st) 210(at 500st) 180(at 550st) 150(at 600st) 130(at 650st) 110(at 700st)	1	—	—	—	
						275(at 50 to 250st) 250(at 300st) 190(at 350st) 150(at 400st) 120(at 450st) 100(at 500st) 80(at 550st) 70(at 600st) 60(at 650st) 55(at 700st)					
RCS4 (Wide radial cylinder)	WRA10C WRA10R	60	16384	16	Horizontal	800(at 50 to 450st) 770(at 500st)	WRA10C:1.2 WRA10R:1	—	—	—	
				10	Horizontal /Vertical	600(at 50 to 400st) 580(at 450st) 490(at 500st)	WRA10C:1.2 WRA10R:1	—	—	—	
				5		300(at 50 to 400st) 290(at 450st) 240(at 500st)	1	—	—	—	
				2.5		150(at 50 to 400st) 145(at 450st) 120(at 500st)	0.7	—	—	—	
	WRA12C WRA12R	100	16384	20	Horizontal /Vertical	1000	WRA12C:1.2 WRA12R:1	—	—	—	
				12		720	WRA12C:1.2 WRA12R:1				
				6		360	1				
				3		180	0.7				
	WRA14C WRA14R	200	16384	24	Horizontal /Vertical	1200	WRA14C:1.2 WRA14R:1	—	—	—	
				16		800	WRA14C:1.2 WRA14R:1				
				8		480(at 50 to 500st) 450(at 550st) 390(at 600st)	1				
				4		240(at 50 to 500st) 220(at 550st) 190(at 600st)	0.7				
	WRA16C WRA16R	400	16384	30	Horizontal /Vertical	1300(at 50 to 300st) 1050(at 350st) 860(at 400st) 710(at 450st) 600(at 500st) 510(at 550st) 440(at 600st) 390(at 650st) 340(at 700st) 300(at 750st) 270(at 800st)	WRA16C:1.2 WRA16R:1	—	—	—	—

RCS4 Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
RCS4 (Wide radial cylinder)	WRA16C WRA16R	400	16384	20	Horizontal /Vertical	1000(at 50 to 250st) 880(at 300st) 700(at 350st) 570(at 400st) 470(at 450st) 400(at 500st) 340(at 550st) 295(at 600st) 260(at 650st) 225(at 700st) 200(at 750st) 180(at 800st)	WRA16C:1.2 WRA16R:1	-	-	-
						500(at 50 to 250st) 430(at 300st) 340(at 350st) 280(at 400st) 230(at 450st) 195(at 500st) 165(at 550st) 145(at 600st) 125(at 650st) 110(at 700st) 100(at 750st) 90(at 800st)				
						250(at 50 to 250st) 210(at 300st) 170(at 350st) 130(at 400st) 115(at 450st) 95(at 500st) 80(at 550st) 70(at 600st) 60(at 650st) 55(at 700st) 50(at 750st) 45(at 800st)		0.7	-	-
	TA4C (Single Block Type)	60	16384	16		900	1.2	-	-	-
				10		600	1.2			
				5		300	1			
				2.5		150	0.7			
		60	16384	10	Horizontal /Vertical	600	1.2	-	-	-
				5		300	1			
				2.5		150	0.7			
	TA6C (Single Block Type)	100	16384	20	Horizontal /Vertical	1100	1.2	-	-	-
				12		720	1.2			
				6		360	1			
				3		180	0.7			
	TA6C (Double Block Type)	100	16384	12	Horizontal /Vertical	720(at 45 to 270st) 575(at 320st)	1.2	-	-	-
				6		360(at 45 to 270st) 285(at 320st)	1			
				3		180(at 45 to 270st) 140(at 320st)	0.7			
	TA7C (Single Block Type)	200	16384	24	Horizontal /Vertical	1300	1.2	-	-	-
				16		960	1.2			
				8		480	1			
				4		240	0.7			

RCS4 Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
RCS4 (Table type)	TA7C (Double Block Type)	200	16384	16	Horizontal /Vertical	960(at 40 to 290st) 730(at 340st) 600(at 390st)	1.2	-	-	-
				8		480(at 40 to 290st) 365(at 340st) 300(at 390st)	1			
				4		240(at 40 to 290st) 180(at 340st) 150(at 390st)	0.7			
	TA4R (Single Block Type)	60	16384	16	Horizontal /Vertical	800	1	-	-	-
				10		600	1			
				5		300	1			
				2.5		150	0.7			
	TA4R (Double Block Type)	60	16384	10	Horizontal /Vertical	600	1	-	-	-
				5		300	1			
				2.5		150	0.7			
	TA6R (Single Block Type)	100	16384	20	Horizontal /Vertical	1000	1	-	-	-
				12		720	1			
				6		360	1			
				3		180	0.7			
	TA6R (Double Block Type)	100	16384	12	Horizontal /Vertical	720(at 45 to 270st) 575(at 320st)	1	-	-	-
				6		360(at 45 to 270st) 285(at 320st)	1			
				3		180(at 45 to 270st) 140(at 320st)	0.7			
	TA7R (Single Block Type)	200	16384	24	Horizontal /Vertical	1200	1	-	-	-
				16		960	1			
				8		480	1			
				4		240	0.7			
	TA7R (Double Block Type)	200	16384	16	Horizontal /Vertical	960(at 40 to 290st) 730(at 340st) 600(at 390st)	1	-	-	-
				8		480(at 40 to 290st) 365(at 340st) 300(at 390st)	1			
				4		240(at 40 to 290st) 180(at 340st) 150(at 390st)	0.7			

RCS3 Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
RCS3/ RCS3P (Slider type)	SA8C SA8R	100 150	16384	30	Horizontal /Vertical	1800(at 50 to 650st) 1610(at 700st) 1420(at 750st) 1260(at 800st) 1120(at 850st) 1010(at 900st) 910(at 950st) 830(at 1000st) 760(at 1050st) 690(at 1100st)	Horizontal:1 Vertical:0.7	—	—	—
						1200(at 50 to 650st) 1070(at 700st) 940(at 750st) 840(at 800st) 750(at 850st) 670(at 900st) 610(at 950st) 550(at 1000st) 500(at 1050st) 460(at 1100st)	0.7	—	—	—
				20		600(at 50 to 650st) 530(at 700st) 470(at 750st) 410(at 800st) 370(at 850st) 340(at 900st) 310(at 950st) 270(at 1000st) 250(at 1050st) 230(at 1100st)	0.5	—	—	—
				10		300(at 50 to 650st) 260(at 700st) 230(at 750st) 200(at 800st) 180(at 850st) 170(at 900st) 150(at 950st) 135(at 1000st) 120(at 1050st) 110(at 1100st)	0.3	—	—	—
	SS8C SS8R	100 150	16384	30	Horizontal /Vertical	1800(at 50 to 600st) 1660(at 650st) 1460(at 700st) 1295(at 750st) 1155(at 800st) 1035(at 850st) 935(at 900st) 850(at 950st) 775(at 1000st)	Horizontal:1 Vertical:0.7	—	—	—

RCS3 Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]	
RCS3/ RCS3P (Slider type)	SS8C SS8R	100 150	16384	20	Horizontal /Vertical	1200(at 50 to 600st) 1105(at 650st) 970(at 700st) 860(at 750st) 770(at 800st) 690(at 850st) 625(at 900st) 565(at 950st) 515(at 1000st)	0.7	—	—	—	
						600(at 50 to 600st) 550(at 650st) 485(at 700st) 430(at 750st) 385(at 800st) 345(at 850st) 310(at 900st) 280(at 950st) 255(at 1000st)					
						300(at 50 to 600st) 275(at 650st) 240(at 700st) 215(at 750st) 190(at 800st) 170(at 850st) 150(at 900st) 140(at 950st) 125(at 1000st)					
[Cleanroom type] RCS3CR/ RCS3PCR (Slider type)	SA8C	100 150	16384	30	Horizontal /Vertical	1800(at 50 to 650st) 1510(at 700st) 1340(at 750st) 1190(at 800st) 1070(at 850st) 960(at 900st) 870(at 950st) 790(at 1000st) 720(at 1050st) 660(at 1100st)	Horizontal:1 Vertical:0.7	—	—	—	
						1200(at 50 to 650st) 1010(at 700st) 890(at 750st) 790(at 800st) 710(at 850st) 640(at 900st) 580(at 950st) 530(at 1000st) 480(at 1050st) 440(at 1100st)					
						600(at 50 to 650st) 500(at 700st) 440(at 750st) 390(at 800st) 350(at 850st) 320(at 900st) 290(at 950st) 260(at 1000st) 240(at 1050st) 220(at 1100st)					
				20		1800(at 50 to 650st) 1510(at 700st) 1340(at 750st) 1190(at 800st) 1070(at 850st) 960(at 900st) 870(at 950st) 790(at 1000st) 720(at 1050st) 660(at 1100st)	0.7	—	—	—	
				10		1200(at 50 to 650st) 1010(at 700st) 890(at 750st) 790(at 800st) 710(at 850st) 640(at 900st) 580(at 950st) 530(at 1000st) 480(at 1050st) 440(at 1100st)	0.5	—	—	—	

RCS3 Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
[Cleanroom type] RCS3CR/ RCS3PCR (Slider type)	SA8C	100 150	16384	5 (Only for 100W)	Horizontal /Vertical	300(at 50 to 650st) 250(at 700st) 220(at 750st) 190(at 800st) 170(at 850st) 160(at 900st) 140(at 950st) 130(at 1000st) 120(at 1050st) 110(at 1100st)	0.3	-	-	-
	SS8C	100 150	16384	30	Horizontal /Vertical	1800(at 50 to 600st) 1660(at 650st) 1460(at 700st) 1295(at 750st) 1155(at 800st) 1035(at 850st) 935(at 900st) 850(at 950st) 775(at 1000st)	Horizontal:1 Vertical:0.7	-	-	-
				20		1200(at 50 to 600st) 1105(at 650st) 970(at 700st) 860(at 750st) 770(at 800st) 690(at 850st) 625(at 900st) 565(at 950st) 515(at 1000st)	0.7	-	-	-
				10		600(at 50 to 600st) 550(at 650st) 485(at 700st) 430(at 750st) 385(at 800st) 345(at 850st) 310(at 900st) 280(at 950st) 255(at 1000st)	0.5	-	-	-
				5 (Only for 100W)		300(at 50 to 600st) 275(at 650st) 240(at 700st) 215(at 750st) 190(at 800st) 170(at 850st) 150(at 900st) 140(at 950st) 125(at 1000st)	0.3	-	-	-
RCS3 (High-speed type)	CTZ5C	60	16384	10	Horizontal /Vertical	833	3.2	-	-	-
	CT8C	400	16384	30	Horizontal	2500	3.2	-	-	-

RCS2 Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
RCS2 (Slider type)	SA7C	60	16384	24	Horizontal /Vertical	1200(at 50 to 600st) 1150(at 650st) 960(at 700st) 890(at 750st) 720(at 800st)	0.3 High Accel/ Deceleration Type: 0.8	—	—	—
						800(at 50 to 600st) 745(at 650st) 640(at 700st) 575(at 750st) 480(at 800st)	0.3 High Accel/ Deceleration Type: 1	—	—	—
						400(at 50 to 600st) 370(at 650st) 320(at 700st) 285(at 750st) 240(at 800st)	0.3 High Accel/ Deceleration Type: 0.8	—	—	—
						200(at 50 to 600st) 185(at 650st) 160(at 700st) 140(at 750st) 120(at 800st)	0.2	—	—	—
	SA7R	60	16384	16	Horizontal /Vertical	800(at 50 to 600st) 745(at 650st) 640(at 700st) 575(at 750st) 480(at 800st)	0.3	—	—	—
						400(at 50 to 600st) 370(at 650st) 320(at 700st) 285(at 750st) 240(at 800st)	0.3	—	—	—
						200(at 50 to 600st) 185(at 650st) 160(at 700st) 140(at 750st) 120(at 800st)	0.2	—	—	—
	SS7C	60	16384	20	Horizontal /Vertical	1000(at 50 to 550st) 830(at 600st)	0.3	—	—	—
						600(at 50 to 500st) 580(at 550st) 470(at 600st)	0.3			
						300(at 50 to 500st) 290(at 550st) 230(at 600st)	0.3			
	SS7R	60	16384	12	Horizontal /Vertical	600(at 50 to 500st) 580(at 550st) 470(at 600st)	0.3	—	—	—
						300(at 50 to 500st) 290(at 550st) 230(at 600st)	0.3			

RCS2 Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]	
RCS2 (Slider type)	SS8C	100 150	16384	20 10	Horizontal /Vertical	1000(at 50 to 600st) 960(at 700st) 765(at 800st) 625(at 900st) 515(at 1000st)	0.3	-	-	-	
						500(at 50 to 600st) 480(at 700st) 380(at 800st) 310(at 900st) 255(at 1000st)	0.3				
	SS8R	100 150	16384	20 10	Horizontal /Vertical	1000(at 50 to 600st) 960(at 700st) 765(at 800st) 625(at 900st) 515(at 1000st)	0.3	-	-	-	
						500(at 50 to 600st) 480(at 700st) 380(at 800st) 310(at 900st) 255(at 1000st)	0.3				
	RA5C	60	16384	16 8 4	Horizontal /Vertical	800(at 50 to 250st) 755(at 300st)	0.3	-	-	-	
						400(at 50 to 250st) 377(at 300st)	0.3				
						200(at 50 to 250st) 188(at 300st)	0.2				
				16 8 4		800(at 50 to 250st) 755(at 300st)	0.3 High Accel/ Deceleration Type: 1	-	-	-	
						400(at 50 to 250st) 377(at 300st)	0.3 High Accel/ Deceleration Type: 1				
						200(at 50 to 250st) 188(at 300st)	0.2				
	RGS5C RGD5C	60	16384	16 8 4	Horizontal /Vertical	800(at 50 to 250st) 755(at 300st)	0.3	-	-	-	
						400(at 50 to 250st) 377(at 300st)	0.3				
						200(at 50 to 250st) 188(at 300st)	0.2				
				16 8 4		800(at 50 to 250st) 755(at 300st)	0.3 High Accel/ Deceleration Type: 1	-	-	-	
						400(at 50 to 250st) 377(at 300st)	0.3 High Accel/ Deceleration Type: 1				
						200(at 50 to 250st) 188(at 300st)	0.2				
	RA5R	60	16384	16 8 4	Horizontal /Vertical	800(at 50 to 250st) 755(at 300st)	0.3	-	-	-	
	400(at 50 to 250st) 377(at 300st)	0.3									
	200(at 50 to 250st) 188(at 300st)	0.2									

RCS2 Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]	
RCS2 (Rod Type)	RN5N RP5N GS5N GD5N	60	Incremental 1600	10	Horizontal	380(at 75st) 280(at 50st)	0.3	-	-	-	
					Vertical	330(at 75st) 230(at 50st)	0.2				
				5	Horizontal	250	0.3				
					Vertical	250(at 75st) 230(at 50st)	0.2				
				2.5	Horizontal /Vertical	125	0.2				
	SD5N	60	1600	10	Horizontal	380(at 75st) 280(at 50st)	0.3	-	-	-	
					Vertical	330(at 75st) 230(at 50st)	0.2				
				5	Horizontal	250	0.3				
					Vertical	250(at 75st) 230(at 50st)	0.2				
				2.5	Horizontal /Vertical	125	0.2				
	RA7AD RGS7AD RGD7AD	60	3072	12	Horizontal /Vertical	600(at 50 to 250st) 505(at 300st)	0.15	-	-	-	
						300(at 50 to 250st) 250(at 300st)	0.1				
						150(at 50 to 250st) 125(at 300st)	0.05				
				12		600(at 50 to 250st) 505(at 300st)	0.2				
						300(at 50 to 250st) 250(at 300st)	0.1				
	SRA7BD SRGS7BD SRGD7BD	60	3072	16	Horizontal	800	0.35	-	-	-	
						400	0.25				
						200	0.15				
				8	Horizontal /Vertical	800	0.4				
						400	0.3				
						200	0.2				
	RA13R	750	16384	2.5	Horizontal /Vertical	85(at 50st) 120(at 100st) 125(at 150 to 200st)	0.02	1000	9800	10	
						62	0.01				
[Cleanroom type] [Dust and drip proof type] RCS2CR/ RCS2W (Rod type)	RN5NB RP5NB GS5NB GD5NB SD5NB	60	Incremental 1600	10	Horizontal	380(at 75st) 280(at 50st)	0.3	-	-	-	
					Vertical	330(at 75st) 230(at 50st)	0.2				
				5	Horizontal	250	0.3				
					Vertical	250(at 75st) 230(at 50st)	0.2				
				2.5	Horizontal /Vertical	125	0.2				
RCS2 (Table type)	TCA5N TWA5N TFA5N	60	Incremental 1600	10	Horizontal	380(at 75st) 280(at 50st)	0.3	-	-	-	
					Vertical	330(at 75st) 230(at 50st)	0.2				
				5	Horizontal	250	0.3				
					Vertical	250(at 75st) 230(at 50st)	0.2				
				2.5	Horizontal /Vertical	125	0.2				

RCS2 Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
RCS2 (Gripper type)	GR8	60	16384	Deceleration ratio 1/5	-	400	0.3	-	-	-
RCS2 (Flat type)	F5D	60 100	16384	16	Horizontal /Vertical	800	0.3	-	-	-
				8		400	0.3			
				4		200	0.2			
	RT6	60	16384	Deceleration ratio 1/18	-	500 deg/s	-	-	-	-
RCS2 (Rotary type)	RT6R	60	16384	Deceleration ratio 1/18	-	500 deg/s	-	-	-	-
	RT7R	60	16384	Deceleration ratio 1/4	-	500 deg/s	-	-	-	-
	RTC10L	60	16384	Deceleration ratio 1/15	-	1200 deg/s	0.3	-	-	-
				Deceleration ratio 1/24		750 deg/s				
	RTC12L	150	16384	Deceleration ratio 1/18	-	800 deg/s	0.3	-	-	-
	Deceleration ratio 1/30	600 deg/s								

ISB/ISPB Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
ISB/ISPB (Slider type)	SXM	60	Battery-less Absolute 131072 Incremental 16384	16	Horizontal /Vertical	960(at 100 to 600st) 655(at 700st) 515(at 800st) 415(at 900st)	Horizontal:1.2 Vertical:0.8	—	—	—
				8		480(at 100 to 600st) 330(at 700st) 260(at 800st) 210(at 900st)	Horizontal:0.7 Vertical:0.6	—	—	—
				4		240(at 100 to 600st) 165(at 700st) 130(at 800st) 100(at 900st)	Horizontal:0.5 Vertical:0.4	—	—	—
				36		1100(at 100st) 1425(at 150st) 1700(at 200st) 1925(at 250st) 2075(at 300st) 2125(at 350st) 2160(at 400 to 550st) 2000(at 600st) 1740(at 650st) 1520(at 700st) 1340(at 750st) 1190(at 800st) 1065(at 850st) 960(at 900st) 865(at 950st) 790(at 1000st) 721(at 1050st) 660(at 1100st)	Horizontal:2 Vertical:1.6	—	—	—
				16		960(at 130 to 580st) 655(at 680st) 515(at 780st) 415(at 880st)	1.2	—	—	—
	SXL	60	Battery-less Absolute 131072 Incremental 16384	8	Horizontal /Vertical	480(at 130 to 580st) 330(at 680st) 260(at 780st) 210(at 880st)	0.7	—	—	—
				4		240(at 130 to 580st) 165(at 680st) 130(at 780st) 100(at 880st)	0.5	—	—	—
				36		1425(at 130st) 1700(at 180st) 1925(at 230st) 2075(at 280st) 2125(at 330st) 2160(at 380 to 530st) 2000(at 580st) 1740(at 630st) 1520(at 680st) 1340(at 730st) 1190(at 780st) 1065(at 830st) 960(at 880st) 865(at 930st) 790(at 980st) 721(at 1030st) 660(at 1080st)	Horizontal:2 Vertical:1.6	—	—	—

ISB/ISPB Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]	
ISB/ISPB (Slider type)	MXM	100 200	Battery-less Absolute 131072 Incremental 16384	30	Horizontal /Vertical	1800(at 100 to 700st) 1290(at 800st) 1045(at 900st) 860(at 1000st) 690(at 1100st)	1.2	—	—	—	
						1200(at 100 to 700st) 860(at 800st) 695(at 900st) 570(at 1000st) 460(at 1100st)	Horizontal:1.2 Vertical:1	—	—	—	
				20		600(at 100 to 700st) 430(at 800st) 345(at 900st) 280(at 1000st) 230(at 1100st)	Horizontal:0.7 Vertical:0.6	—	—	—	
						300(at 100 to 700st) 215(at 800st) 170(at 900st) 140(at 1000st) 115(at 1100st)	Horizontal:0.5 Vertical:0.4	—	—	—	
		400 (Only for ISB)	131072	48		1025(at 100st) 1325(at 150st) 1575(at 200st) 1825(at 250st) 2025(at 300st) 2200(at 350st) 2350(at 400st) 2400(at 450st) 2500(at 500 to 700st) 2270(at 750st) 2030(at 800st) 1825(at 850st) 1645(at 900st) 1495(at 950st) 1365(at 1000st) 1250(at 1050st) 1150(at 1100st) 1060(at 1150st) 980(at 1200st) 910(at 1250st) 845(at 1300st)	Horizontal:2 Vertical:1.6	—	—	—	

ISB/ISPB Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
ISB/ISPB (Slider type)	MXL	100 200	Battery-less Absolute 131072 Incremental 16384	30	Horizontal /Vertical	1800(at 120 to 670st) 1290(at 770st) 1045(at 870st) 860(at 970st) 690(at 1070st)	1.2	—	—	—
				20		1200(at 120 to 670st) 860(at 770st) 695(at 870st) 570(at 970st) 460(at 1070st)	Horizontal:1.2 Vertical:1	—	—	—
				10		600(at 120 to 670st) 430(at 770st) 345(at 870st) 280(at 970st) 230(at 1070st)	Horizontal:0.7 Vertical:0.6	—	—	—
				5		300(at 120 to 670st) 215(at 770st) 170(at 870st) 140(at 970st) 115(at 1070st)	Horizontal:0.5 Vertical:0.4	—	—	—
		400 (Only for ISB)	131072	48	Horizontal /Vertical	1325(at 120st) 1575(at 170st) 1825(at 220st) 2025(at 270st) 2200(at 320st) 2350(at 370st) 2400(at 420st) 2500(at 470 to 670st) 2270(at 720st) 2030(at 770st) 1825(at 820st) 1645(at 870st) 1495(at 920st) 1365(at 970st) 1250(at 1020st) 1150(at 1070st) 1060(at 1120st) 980(at 1170st) 910(at 1220st) 845(at 1270st)	Horizontal:2 Vertical:1.6	—	—	—

ISB/ISPB Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration/deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
ISB/ISPB (Slider type)	MXMX	200	Battery-less Absolute 131072	30	Horizontal	1800(at 800 to 1100st) 1650(at 1150st) 1500(at 1250st) 1425(at 1350st) 1200(at 1450st) 1050(at 1550st) 900(at 1650st) 825(at 1750st) 750(at 1850st) 675(at 1950st)	0.4	-	-	-
			Incremental 16384	20		1200(at 800 to 1100st) 1100(at 1150st) 1000(at 1250st) 950(at 1350st) 800(at 1450st) 700(at 1550st) 600(at 1650st) 550(at 1750st) 500(at 1850st) 450(at 1950st)	0.4	-	-	-
		400 (Only for ISB)	131072	48		1700(at 800st) 1750(at 850st) 1800(at 900st) 1850(at 950st) 1900(at 1000st) 1950(at 1050st) 2000(at 1100st) 2050(at 1150st) 2100(at 1200st) 2150(at 1250st) 2200(at 1300st) 2065(at 1350st) 1925(at 1400st) 1805(at 1450st) 1690(at 1500st) 1590(at 1550st) 1495(at 1600st) 1410(at 1650st) 1335(at 1700st) 1265(at 1750st) 1195(at 1800st) 1135(at 1850st) 1080(at 1900st) 1025(at 1950st) 980(at 2000st)	0.4	-	-	-

ISB/ISPB Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
ISB/ISPB (Slider type)	LXM	200 400	Battery-less Absolute 131072 Incremental 16384	40 20 10	Horizontal /Vertical	2400(at 100 to 800st) 1840(at 900st) 1530(at 1000st) 1290(at 1100st) 1100(at 1200st) 880(at 1300st)	1.2	—	—	—
						1200(at 100 to 800st) 920(at 900st) 765(at 1000st) 645(at 1100st) 550(at 1200st) 440(at 1300st)	Horizontal:1.2 Vertical:1	—	—	—
						600(at 100 to 800st) 460(at 900st) 380(at 1000st) 320(at 1100st) 270(at 1200st) 220(at 1300st)	Horizontal:0.7 Vertical:0.6	—	—	—
	LXL	200 400	Battery-less Absolute 131072 Incremental 16384	40 20 10	Horizontal /Vertical	2400(at 120 to 770st) 1840(at 870st) 1530(at 970st) 1290(at 1070st) 1100(at 1170st) 880(at 1270st)	1.2	—	—	—
						1200(at 120 to 770st) 920(at 870st) 765(at 970st) 645(at 1070st) 550(at 1170st) 440(at 1270st)	Horizontal:1.2 Vertical:1	—	—	—
						600(at 120 to 770st) 460(at 870st) 380(at 970st) 320(at 1070st) 270(at 1170st) 220(at 1270st)	Horizontal:0.7 Vertical:0.6	—	—	—

ISB/ISPB Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration/deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]		
ISB/ISPB (Slider type)	LXMX	400	Battery-less Absolute 131072	40	Horizontal	2400(at 1000 to 1200st) 2300(at 1300st) 2000(at 1400st) 1900(at 1500st) 1660(at 1600st) 1480(at 1700st) 1300(at 1800st) 1180(at 1900st) 1080(at 2000st) 980(at 2100st) 900(at 2200st) 820(at 2300st) 740(at 2400st) 680(at 2500st)	0.4	—	—	—		
						1200(at 1000 to 1200st) 1150(at 1300st) 1000(at 1400st) 950(at 1500st) 830(at 1600st) 740(at 1700st) 650(at 1800st) 590(at 1900st) 540(at 2000st) 490(at 2100st) 460(at 2200st) 410(at 2300st) 370(at 2400st) 340(at 2500st)						
		200 400		20		1200(at 1000 to 1200st) 1150(at 1300st) 1000(at 1400st) 950(at 1500st) 830(at 1600st) 740(at 1700st) 650(at 1800st) 590(at 1900st) 540(at 2000st) 490(at 2100st) 460(at 2200st) 410(at 2300st) 370(at 2400st) 340(at 2500st)						
						1200(at 1000 to 1200st) 1150(at 1300st) 1000(at 1400st) 950(at 1500st) 830(at 1600st) 740(at 1700st) 650(at 1800st) 590(at 1900st) 540(at 2000st) 490(at 2100st) 460(at 2200st) 410(at 2300st) 370(at 2400st) 340(at 2500st)						
	LXUWX	400	Battery-less Absolute 131072	40	Horizontal	2400(at 1000 to 1200st) 2300(at 1300st) 2000(at 1400st) 1900(at 1500st) 1660(at 1600st) 1480(at 1700st) 1300(at 1800st) 1180(at 1900st) 1080(at 2000st) 980(at 2100st) 880(at 2200st) 840(at 2300st) 740(at 2400st) 680(at 2500st)	0.4	—	—	—		
						1200(at 1000 to 1200st) 1150(at 1300st) 1000(at 1400st) 950(at 1500st) 830(at 1600st) 740(at 1700st) 650(at 1800st) 590(at 1900st) 540(at 2000st) 490(at 2100st) 440(at 2200st) 430(at 2300st) 370(at 2400st) 340(at 2500st)						
		200 400		20		1200(at 1000 to 1200st) 1150(at 1300st) 1000(at 1400st) 950(at 1500st) 830(at 1600st) 740(at 1700st) 650(at 1800st) 590(at 1900st) 540(at 2000st) 490(at 2100st) 440(at 2200st) 430(at 2300st) 370(at 2400st) 340(at 2500st)						
						1200(at 1000 to 1200st) 1150(at 1300st) 1000(at 1400st) 950(at 1500st) 830(at 1600st) 740(at 1700st) 650(at 1800st) 590(at 1900st) 540(at 2000st) 490(at 2100st) 440(at 2200st) 430(at 2300st) 370(at 2400st) 340(at 2500st)						

ISDA/ISPDA Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
ISDA(CR)/ISPDA(CR) (Slider type) * Including cleanroom type	S	60	16384	16	Horizontal /Vertical	800(at 100 to 500st) 760(at 600st)	Horizontal:1 Vertical:0.7	-	-	-
				8		400(at 100 to 500st) 380(at 600st)	Horizontal:0.6 Vertical:0.5			
				4		200(at 100 to 500st) 190(at 600st)	Horizontal:0.5 Vertical:0.3			
	M	100	16384	20	Horizontal /Vertical	1000(at 100 to 600st) 915(at 700st) 735(at 800st) 600(at 900st) 500(at 1000st)	Horizontal:1 Vertical:0.8	-	-	-
				10		500(at 100 to 600st) 455(at 700st) 365(at 800st) 300(at 900st) 250(at 1000st)	Horizontal:0.6 Vertical:0.5		-	-
				5		250(at 100 to 600st) 225(at 700st) 180(at 800st) 150(at 900st) 125(at 1000st)	Horizontal:0.5 Vertical:0.3			
	MX	200	16384	20	Horizontal /Vertical	1000(at 100 to 600st) 915(at 700st) 735(at 800st) 600(at 900st) 500(at 1000st)	Horizontal:1 Vertical:0.8	-	-	-
				10		500(at 100 to 600st) 455(at 700st) 365(at 800st) 300(at 900st) 250(at 1000st)	Horizontal:0.6 Vertical:0.5			
	L	200	16384	20	Horizontal	1000(at 800 to 1300st) 950(at 1400st) 800(at 1500st) 700(at 1600st)	0.3	-	-	-
	L	200	16384	20	Horizontal /Vertical	1000(at 100 to 700st) 930(at 800st) 765(at 900st) 640(at 1000st) 545(at 1100st) 465(at 1200st)	Horizontal:1 Vertical:0.8	-	-	-
				10		500(at 100 to 700st) 465(at 800st) 380(at 900st) 320(at 1000st) 270(at 1100st) 230(at 1200st)	Horizontal:0.6 Vertical:0.5			
	400	16384	20	Horizontal /Vertical	1000(at 100 to 700st) 930(at 800st) 765(at 900st) 640(at 1000st) 545(at 1100st) 465(at 1200st)	Horizontal:1 Vertical:0.8	-	-	-	-
	LX	200 400	16384	20	Horizontal	1000(at 1000 to 1400st) 950(at 1500st) 830(at 1600st)	0.3	-	-	-

ISDA/ISPDA Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]	
[Cleanroom type] ISDACR/ ISPDAKR (Slider type)	W	600	16384	40	Horizontal /Vertical	2000(at 100 to 700st) 1965(at 800st) 1605(at 900st) 1335(at 1000st) 1130(at 1100st) 970(at 1200st) 840(at 1300st)	1	-	-	-	
						1000(at 100 to 700st) 980(at 800st) 800(at 900st) 665(at 1000st) 565(at 1100st) 485(at 1200st) 420(at 1300st)	Horizontal:1 Vertical:0.8	-	-	-	
						500(at 100 to 700st) 490(at 800st) 400(at 900st) 330(at 1000st) 280(at 1100st) 240(at 1200st) 210(at 1300st)	Horizontal:0.6 Vertical:0.5	-	-	-	
		750	16384	50		2000(at 100 to 1000st) 1780(at 1100st) 1525(at 1200st) 1320(at 1300st)	1	-	-	-	
						1250(at 100 to 900st) 1050(at 1000st) 890(at 1100st) 760(at 1200st) 660(at 1300st)	Horizontal:1 Vertical:0.8	-	-	-	
	WX	600	16384	40	Horizontal	2000(at 900 to 1300st) 1965(at 1400st) 1725(at 1500st) 1530(at 1600st) 1365(at 1700st) 1225(at 1800st) 1110(at 1900st) 1005(at 2000st) 915(at 2100st) 840(at 2200st) 770(at 2300st) 710(at 2400st) 655(at 2500st)	0.3	-	-	-	
						1000(at 900 to 1300st) 980(at 1400st) 860(at 1500st) 765(at 1600st) 680(at 1700st) 610(at 1800st) 555(at 1900st) 500(at 2000st) 455(at 2100st) 420(at 2200st) 385(at 2300st) 355(at 2400st) 325(at 2500st)	0.3	-	-	-	

ISDA/ISPDA Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
[Cleanroom type] ISDACR/ ISPDAKR (Slider type)	WX	750	16384	50	Horizontal	2000(at 900 to 1700st) 1930(at 1800st) 1740(at 1900st) 1580(at 2000st) 1440(at 2100st) 1320(at 2200st) 1210(at 2300st) 1115(at 2400st) 1035(at 2500st)	0.3	—	—	—
				25		1250(at 900 to 1500st) 1200(at 1600st) 1075(at 1700st) 965(at 1800st) 870(at 1900st) 790(at 2000st) 720(at 2100st) 660(at 2200st) 605(at 2300st) 555(at 2400st) 515(at 2500st)	0.3	—	—	—

ISWA/ISPWA Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
[Dust and drip proof type] ISWA/ ISPWA (Slider type)	S	60	16384	16	Horizontal	800(at 100 to 500st) 760(at 600st)	0.3	-	-	-
						400(at 100 to 500st) 380(at 600st)	0.3			
						200(at 100 to 500st) 190(at 600st)	0.15			
	M	100	16384	10	Horizontal	500(at 100 to 600st) 455(at 700st) 365(at 800st) 300(at 900st) 250(at 1000st)	0.3	-	-	-
						250(at 100 to 600st) 225(at 700st) 180(at 800st) 150(at 900st) 125(at 1000st)	0.15	-	-	-
						1000(at 100 to 600st) 915(at 700st) 735(at 800st) 600(at 900st) 500(at 1000st)	0.3	-	-	-
	L	200	16384	20	Horizontal	500(at 100 to 600st) 455(at 700st) 365(at 800st) 300(at 900st) 250(at 1000st)	0.3	-	-	-
						1000(at 100 to 700st) 930(at 800st) 765(at 900st) 640(at 1000st) 545(at 1100st) 465(at 1200st)	0.3	-	-	-
						500(at 100 to 700st) 465(at 800st) 380(at 900st) 320(at 1000st) 270(at 1100st) 230(at 1200st)	0.3	-	-	-
		400	16384	20	Horizontal	1000(at 100 to 700st) 930(at 800st) 765(at 900st) 640(at 1000st) 545(at 1100st) 465(at 1200st)	0.3	-	-	-

SSPA/FS/RS Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
SSPA (Slider type)	SXM	200	16384	30	Horizontal /Vertical	1800(at 100 to 600st) 1680(at 650st) 1480(at 700st) 1320(at 750st) 1180(at 800st) 1060(at 850st) 960(at 900st) 870(at 950st) 790(at 1000st) 730(at 1050st) 670(at 1100st)	1.2	—	—	—
						1200(at 100 to 600st) 1120(at 650st) 990(at 700st) 880(at 750st) 780(at 800st) 710(at 850st) 640(at 900st) 580(at 950st) 530(at 1000st) 480(at 1050st) 440(at 1100st)				
				20		600(at 100 to 600st) 560(at 650st) 490(at 700st) 440(at 750st) 390(at 800st) 350(at 850st) 320(at 900st) 290(at 950st) 260(at 1000st) 240(at 1050st) 220(at 1100st)	Horizontal:0.7 Vertical:0.6	—	—	—

NS/NSA Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
NS	SXMS SXMM	60	Incremental 2400	12	Horizontal	720	0.8	—	—	—
	SZMS SZMM	60	Incremental 2400	12	Vertical	600	0.7	—	—	—
	MXMS MXMM	200	16384	30	Horizontal	1800	1	—	—	—
				20		1200	0.8			
	MXMXS	200	16384	30	Horizontal	1800	0.3	—	—	—
				20		1200	0.3			
	MZMS MZMM	200	16384	20	Vertical	1000	0.5	—	—	—
	LXMS LXMM	400	16384	40	Horizontal	2400	1	—	—	—
				20		1300	1			
NSA	LXMS LXMM	400	16384	40	Horizontal	2400	0.3	—	—	—
				20		1300	0.3			
	LZMS LZMM	400	16384	20	Vertical	1000	0.8	—	—	—
	WXMS WXMM	750	131072	30	Horizontal	1800	0.5	—	—	—
				20		1200	0.6			
NSA	WXMS WXMM	750	131072	40	Horizontal	2400	0.8	—	—	—
				20		1300	0.9			
	WXMS WXMM	750	131072	50	Horizontal	2500	0.9	—	—	—
				25		1300	1			

LSA/LSAS Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
LSA (Note)	S6SS S6SM	100	48000	48	Horizontal	2500	3	—	—	—
	S8SS S8SM S8HS S8HM	100	60000	60	Horizontal	2500	3	—	—	—
	S10SS S10SM	200	90000	90	Horizontal	2500	3	—	—	—
	S10HS S10HM	200S	90000	90	Horizontal	2500	3	—	—	—
	H8SS H8SM H8HS H8HM	200	50000	50	Horizontal	2500	3	—	—	—
	N10SS N10SM	100S	50000	50	Horizontal	2500	3	—	—	—
	L15SS L15SM	200	50000	50	Horizontal	2500	3	—	—	—
	N15SS N15SM N15HS N15HM	200S	50000	50	Horizontal	2500	3	—	—	—
	N19SS N19SM	300S	72000	72	Horizontal	2500	3	—	—	—
	W21SS W21SM	400	45000	45	Horizontal	2500	3	—	—	—
LSAS	N10SS N10SM	100S	50000	50	Horizontal	2500	3	—	—	—
	N15SS N15SM N15HS N15HM	200S	50000	50	Horizontal	2500	3	—	—	—

(Note) When connecting the RCON-SC, LSA-W21S are not applicable for the single-phase 200V.

DD/DDA Series

Actuator series	Type	Motor output [W]	No. of encoder pulses	Lead [mm]	Mounting direction	Maximum speed [mm/s]	Maximum acceleration /deceleration [G]	Minimum push force [N]	Maximum push force [N]	Rated push speed [mm/s]
DD(CR) * Including cleanroom type (Note)	LT18S LT18CS	200	131072	Deceleration ratio 1/1	Horizontal /Vertical	1800 deg/s	—	—	—	—
	LT18P LT18CP	200	1048576	Deceleration ratio 1/1		1800 deg/s	—	—	—	—
	LH18S LH18CS	600	131072	Deceleration ratio 1/1		1440 deg/s	—	—	—	—
	LH18P LH18CP	600	1048576	Deceleration ratio 1/1		1440 deg/s	—	—	—	—
DDA(CR) * Including cleanroom type (Note)	LT18CS	200	131072	Deceleration ratio 1/1	Horizontal /Vertical	1800 deg/s	9.99	—	—	—
	LT18CP		1048576			1440 deg/s	9.99	—	—	—
	LH18CS	600	131072		Horizontal /Vertical	1440 deg/s	9.99	—	—	—
	LH18CP		1048576			1440 deg/s	9.99	—	—	—
[Dust and drip proof type] DDW (Note)	LH18CS	600	131072	Deceleration ratio 1/1	Horizontal /Vertical	1440 deg/s	9.99	—	—	—
	LH18CP		1048576							

(Note) When connecting the RCON-SC, not applicable for the single-phase 200V. Also, Multi-rotation absolute type (encoder type: AM) are not applicable.

Revision history

Revision date	Revised content
2020.02	First Edition
2020.03	Edition 1B <ul style="list-style-type: none"> • Prelims: (7) Orthogonal Coordinate System revised in actuator coordinate systems • 1.4.3: Noise countermeasures and mounting method correction made in Circuit Diagram for 200V Type • Chapter 3: Notes added in specifications for each unit and how to read model code label • 8.3: Information management features deleted • 12.2: connectable actuators revised
2020.04	Edition 1C <ul style="list-style-type: none"> • Prelims 11.: About External communication connector description changed from port to connector • 1.3.5: Usage Temperature Range contents revised • 1.4.3: Noise countermeasures and mounting method correction made in Circuit Diagram for 200V Type • 2.1: Change made to title • 2.2: Selection of Power supply capacity and Leakage Breaker contents added • 2.2.2: Limitation in Unit connection restrictions changed in Example 13 for 200V system motor power supply • 3.1.1: Overview change made to diagram in example for connection • 3.1.4: Part names/Functions (9) External input specifications symbols corrected in Circuit Diagram • 3.3.4: Part names/Functions (3) 200V AC input connector contents revised • 4.4.2: 200V power supply wiring to RSEL system Procedure 2 change made to illustration • 5.7.6: Memory Map correction made to process how to initialize memory in Caution • 5.9.1: Auto start upon by power on of correction made in Timing Chart Diagram • 7.1: Mounted Actuator Series added • General: Correction made, terms unified

Revision history

Revision date	Revised content
2020.06	<p>Second Edition</p> <ul style="list-style-type: none">● General: Applied to 6-axis Cartesian Robot and Wrist unit● 2.6.2: Drive-source cutoff circuit wiring example (2) 24V/200V Drivers Use in Parallel added● 5.3.5: Change made to contents in Special mechanism axis● 8.1: Synchro Function deleted● General: Reference added, correction made
2020.10	<p>Third Edition</p> <p>Table of Overall Contents deleted</p> <ul style="list-style-type: none">● Prelims: Precautions for Handling<ul style="list-style-type: none">12 Handling of Built-in Drive Cutoff Relay and Cautions in Caution in Handling added● 1.3 to 1.4: Environmental specifications contents revised● 2.1.2: Maximum number of connected units in the Configuration unit added● 6.2.4: Example of Use of Each Network, PIO, SIO added● 6.3.4: Example of Use of Each Network and Parameter added● 6.5: Example of Connectivity Setting added● 9.1: Multi-Slider Excess Approaching Detection (Collision Prevention) Feature added● 10.3: SCON and Detail page added<ul style="list-style-type: none">Parameter No.144, 145, 146, 195, 196 added● 10.3.2: Details of Driver Unit Parameter added● 10.6: Parameter Configuration (Advanced Use) added● 11.3: Error List contents revised● 11.4: Alarm Codes of Driver Unit added● General: Correction made, terms unified



IAI Corporation

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

Technical Support available in USA, Europe and China

IAI America, Inc.

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

IAI Industrieroboter GmbH

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

IAI (Shanghai) Co., Ltd.

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

IAI Robot (Thailand) Co., Ltd.

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