

RSEL System

Instruction Manual Fourth Edition ME0392-4C



IAI Corporation

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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.

Please download the user's manual from our website.

You can download it free of charge. User registration is required for the first time downloading.

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

When using the product, print out of the necessary portions of the relevant manual, or please display it on your computer, tablet terminal, etc. so that you can check it immediately.

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

[1] Instruction Manual

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
SEL Programming Support Tool	Instruction Manual	ME0396
6-axis Cartesian Robot	Instruction Manual	ME3792

[2] Quick Start Guide

“Japanese Only”

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- Revision History Post-1

Safety Guide

“Safety Guide” has been written to use the machine safely and so prevent personal injury or property damage beforehand. Make sure to read it before the operation of this product.

Safety Precautions for Our Products

The common safety precautions for the use of any of our robots in each operation.

No.	Operation Description	Description
1	Model Selection	<ul style="list-style-type: none"> ● This product has not been planned and designed for the application where high level of safety is required, so the guarantee of the protection of human life is impossible. Accordingly, do not use it in any of the following applications. <ol style="list-style-type: none"> 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 (For vehicle, railway facility or air navigation facility) 3) Important safety parts of machinery (Safety device, etc.) ● Do not use the product outside the specifications. Failure to do so may considerably shorten the life of the product. ● Do not use it in any of the following environments. <ol style="list-style-type: none"> 1) Location where there is any inflammable gas, inflammable object or explosive 2) Place with potential exposure to radiation 3) Location with the ambient temperature or relative humidity exceeding the specification range 4) Location where radiant heat is added from direct sunlight or other large heat source 5) Location where condensation occurs due to abrupt temperature changes 6) Location where there is any corrosive gas (sulfuric acid or hydrochloric acid) 7) Location exposed to significant amount of dust, salt or iron powder 8) Location subject to direct vibration or impact ● For an actuator used in vertical orientation, select a model which is equipped with a brake. If selecting a model with no brake, the moving part may drop when the power is turned OFF and may cause an accident such as an injury or damage on the work piece.

No.	Operation Description	Description
2	Transportation	<ul style="list-style-type: none"> ● When carrying a heavy object, do the work with two or more persons or utilize equipment such as crane. ● When the work is carried out with 2 or more persons, make it clear who is to be the “leader” and who to be the “follower(s)” and communicate well with each other to ensure the safety of the workers. ● When in transportation, consider well about the positions to hold, weight and weight balance and pay special attention to the carried object so it would not get hit or dropped. ● Transport it using an appropriate transportation measure. The actuators available for transportation with a crane have eyebolts attached or there are tapped holes to attach bolts. Follow the instructions in the instruction manual for each model. ● Do not step or sit on the package. ● Do not put any heavy thing that can deform the package, on it. ● When using a crane capable of 1t or more of weight, have an operator who has qualifications for crane operation and sling work. ● When using a crane or equivalent equipments, make sure not to hang a load that weighs more than the equipment’s capability limit. ● Use a hook that is suitable for the load. Consider the safety factor of the hook in such factors as shear strength. ● Do not get on the load that is hung on a crane. ● Do not leave a load hung up with a crane. ● Do not stand under the load that is hung up with a crane.
3	Storage and Preservation	<ul style="list-style-type: none"> ● The storage and preservation environment conforms to the installation environment. However, especially give consideration to the prevention of condensation. ● Store the products with a consideration not to fall them over or drop due to an act of God such as earthquake.
4	Installation and Start	<p>(1) Installation of Robot Main Body and Controller, etc.</p> <ul style="list-style-type: none"> ● Make sure to securely hold and fix the product (including the work part). A fall, drop or abnormal motion of the product may cause a damage or injury. Also, be equipped for a fall-over or drop due to an act of God such as earthquake. ● Do not get on or put anything on the product. Failure to do so may cause an accidental fall, injury or damage to the product due to a drop of anything, malfunction of the product, performance degradation, or shortening of its life. ● When using the product in any of the places specified below, provide a sufficient shield. <ol style="list-style-type: none"> 1) Location where electric noise is generated 2) Location where high electrical or magnetic field is present 3) Location with the mains or power lines passing nearby 4) Location where the product may come in contact with water, oil or chemical droplets

No.	Operation Description	Description
4	Installation and Start	<p>(2) Cable Wiring</p> <ul style="list-style-type: none"> ● Use our company's genuine cables for connecting between the actuator and controller, and for the teaching tool. ● Do not scratch on the cable. Do not bend it forcibly. Do not pull it. Do not coil it around. Do not insert it. Do not put any heavy thing on it. Failure to do so may cause a fire, electric shock or malfunction due to leakage or continuity error. ● Perform the wiring for the product, after turning OFF the power to the unit, so that there is no wiring error. ● When the direct current power (+24V) is connected, take the great care of the directions of positive and negative poles. If the connection direction is not correct, it might cause a fire, product breakdown or malfunction. ● Connect the cable connector securely so that there is no disconnection or looseness. Failure to do so may cause a fire, electric shock or malfunction of the product. ● Never cut and/or reconnect the cables supplied with the product for the purpose of extending or shortening the cable length. Failure to do so may cause the product to malfunction or cause fire. <p>(3) Grounding</p> <ul style="list-style-type: none"> ● The grounding operation should be performed to prevent an electric shock or electrostatic charge, enhance the noise-resistance ability and control the unnecessary electromagnetic radiation. ● For the ground terminal on the AC power cable of the controller and the grounding plate in the control panel, make sure for grounding work. For security grounding, it is necessary to select an appropriate wire thickness suitable for the load. Perform wiring that satisfies the specifications (electrical equipment technical standards). For detail, follow the description in an instruction manual of each controller or controller built-in actuator. ● Perform Class D Grounding (former Class 3 Grounding with ground resistance 100Ω or below).





No.	Operation Description	Description
4	Installation and Start	<p>(4) Safety Measures</p> <ul style="list-style-type: none"> ● When the work is carried out with 2 or more persons, make it clear who is to be the “leader” and who to be the “follower(s)” and communicate well with each other to ensure the safety of the workers. ● When the product is under operation or in the ready mode, take the safety measures (such as the installation of safety and protection fence) so that nobody can enter the area within the robot’s movable range. When the robot under operation is touched, it may result in death or serious injury. ● Make sure to install the emergency stop circuit so that the unit can be stopped immediately in an emergency during the unit operation. ● Take the safety measure not to start up the unit only with the power turning ON. Failure to do so may start up the machine suddenly and cause an injury or damage to the product. ● Take the safety measure not to start up the machine only with the emergency stop cancellation or recovery after the power failure. Failure to do so may result in an electric shock or injury due to unexpected power input. ● When the installation or adjustment operation is to be performed, give clear warnings such as “Under Operation; Do not turn ON the power!” etc. Sudden power input may cause an electric shock or injury. ● Take the measure so that the work part is not dropped in power failure or emergency stop. ● Wear protection gloves, goggle or safety shoes, as necessary, to secure safety. ● Do not insert a finger or object in the openings in the product. Failure to do so may cause an injury, electric shock, damage to the product or fire. ● When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity.
5	Teaching	<ul style="list-style-type: none"> ● When the work is carried out with 2 or more persons, make it clear who is to be the “leader” and who to be the “follower(s)” and communicate well with each other to ensure the safety of the workers. ● Perform the teaching operation from outside the safety protection fence, if possible. In the case that the operation is to be performed unavoidably inside the safety protection fence, prepare the “Stipulations for the Operation” and make sure that all the workers acknowledge and understand them well. ● When the operation is to be performed inside the safety protection fence, the worker should have an emergency stop switch at hand with him so that the unit can be stopped any time in an emergency. ● When the operation is to be performed inside the safety protection fence, in addition to the workers, arrange a watchman so that the machine can be stopped any time in an emergency. Also, keep watch on the operation so that any third person can not operate the switches carelessly. ● Place a sign “Under Operation” at the position easy to see. ● When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity. <p>* Safety protection Fence : In the case that there is no safety protection fence, the movable range should be indicated.</p>

No.	Operation Description	Description
6	Trial Operation	<ul style="list-style-type: none"> ● When the work is carried out with 2 or more persons, make it clear who is to be the “leader” and who to be the “follower(s)” and communicate well with each other to ensure the safety of the workers. ● After the teaching or programming operation, perform the check operation one step by one step and then shift to the automatic operation. ● When the check operation is to be performed inside the safety protection fence, perform the check operation using the previously specified work procedure like the teaching operation. ● Make sure to perform the programmed operation check at the safety speed. Failure to do so may result in an accident due to unexpected motion caused by a program error, etc. ● Do not touch the terminal block or any of the various setting switches in the power ON mode. Failure to do so may result in an electric shock or malfunction.
7	Automatic Operation	<ul style="list-style-type: none"> ● Check before starting the automatic operation or rebooting after operation stop that there is nobody in the safety protection fence. ● Before starting automatic operation, make sure that all peripheral equipment is in an automatic-operation-ready state and there is no alarm indication. ● Make sure to operate automatic operation start from outside of the safety protection fence. ● In the case that there is any abnormal heating, smoke, offensive smell, or abnormal noise in the product, immediately stop the machine and turn OFF the power switch. Failure to do so may result in a fire or damage to the product. ● When a power failure occurs, turn OFF the power switch. Failure to do so may cause an injury or damage to the product, due to a sudden motion of the product in the recovery operation from the power failure.

No.	Operation Description	Description
8	Maintenance and Inspection	<ul style="list-style-type: none"> ● When the work is carried out with 2 or more persons, make it clear who is to be the “leader” and who to be the “follower(s)” and communicate well with each other to ensure the safety of the workers. ● Perform the work out of the safety protection fence, if possible. In the case that the operation is to be performed unavoidably inside the safety protection fence, prepare the “Stipulations for the Operation” and make sure that all the workers acknowledge and understand them well. ● When the work is to be performed inside the safety protection fence, basically turn OFF the power switch. ● When the operation is to be performed inside the safety protection fence, the worker should have an emergency stop switch at hand with him so that the unit can be stopped any time in an emergency. ● When the operation is to be performed inside the safety protection fence, in addition to the workers, arrange a watchman so that the machine can be stopped any time in an emergency. Also, keep watch on the operation so that any third person can not operate the switches carelessly. ● Place a sign “Under Operation” at the position easy to see. ● For the grease for the guide or ball screw, use appropriate grease according to the instruction manual for each model. ● Do not perform the dielectric strength test. Failure to do so may result in a damage to the product. ● When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity. ● The slider or rod may get misaligned OFF the stop position if the servo is turned OFF. Be careful not to get injured or damaged due to an unnecessary operation. ● Pay attention not to lose the removed cover or screws, and make sure to put the product back to the original condition after maintenance and inspection works. Use in incomplete condition may cause damage to the product or an injury. <p>* Safety protection Fence : In the case that there is no safety protection fence, the movable range should be indicated.</p>
9	Modification and Dismantle	<ul style="list-style-type: none"> ● Do not modify, disassemble, assemble or use of maintenance parts not specified based at your own discretion.
10	Disposal	<ul style="list-style-type: none"> ● When the product becomes no longer usable or necessary, dispose of it properly as an industrial waste. ● When removing the actuator for disposal, pay attention to drop of components when detaching screws. ● Do not put the product in a fire when disposing of it. The product may burst or generate toxic gases.
11	Other	<ul style="list-style-type: none"> ● Do not come close to the product or the harnesses if you are a person who requires a support of medical devices such as a pacemaker. Doing so may affect the performance of your medical device. ● See Overseas Specifications Compliance Manual to check whether complies if necessary. ● For the handling of actuators and controllers, follow the dedicated instruction manual of each unit to ensure the safety.

Alert Indication

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 Danger and Damage	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 lower possibility for the injury, but should be kept to use this product properly.	 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.

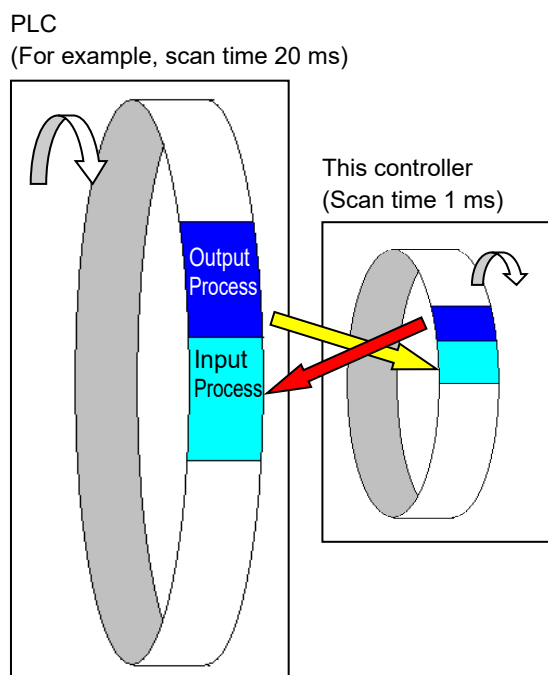
- (1) In jog or inching operation using teaching tools such as PC software, etc., the one-time command range enables a maximum of 360° in jog operation, or 1° in inching operation.
- (2) Pushing cannot be performed. For push torque, settings other than 0 cannot be made.
- (3) Do not repetitively execute 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.

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 $0.025 \times \text{lead length [mm]}$.

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.

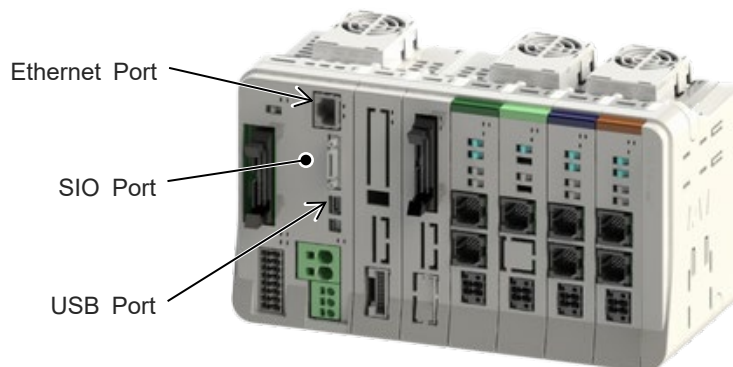
(4) If the initial servo ON is executed outside range of the software limit, no error will be output. After traveling within the range, monitoring of the software limit will start.

(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 4.8 to 4.10).

- 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 drive cutoff solid-state relay installed in this system requires a special care in handling. Use the product with narrow understanding to the following notes.

- The drive cutoff semiconductor relay built in RCON-SC is assumed in frequency of only limited use such as the case that an emergency stop of the device is needed, thus it is not assumed to activate frequently. 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.
- The number of ON/OFF operation cycles should be approximately 5 times at the most in one day for reference. Also, leave it for approximately 30 minutes for cooling time after the drive cutoff.
- Construct a circuit that STOP Signal for the system IO connector gets turned on and off at the same time as the drive power supply turned ON/OFF.

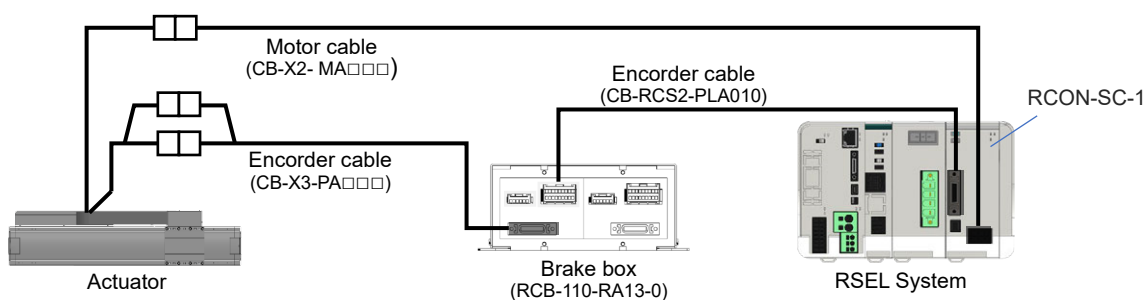
13. For actuators below with a brake equipped, make sure to use a brake box for the encoder cable connection.

(Note) No use of a brake box may cause a brake malfunction on the actuator.

There are two types of brake box models as stated below, and the brake box to use may differ depending on the actuator to connect.

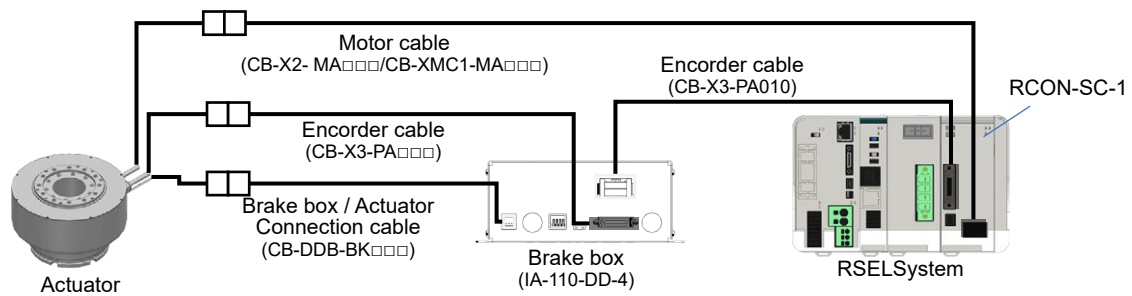
Brake box model: RCB-110-RA13-0

- MZMS/MZMM/LZMS/LZMM Types in Ball Screw Nut Rotation Type NS Series
- ROBO Cylinder Ultra High Thrust Rod Type RCS2-RA13R
- The special order of ISB/ISPB actuators using a motor equipped with a brake of 24V DC brake actuation voltage



Brake box model: IA-110-DD-4

- DDA Equipped with Brake



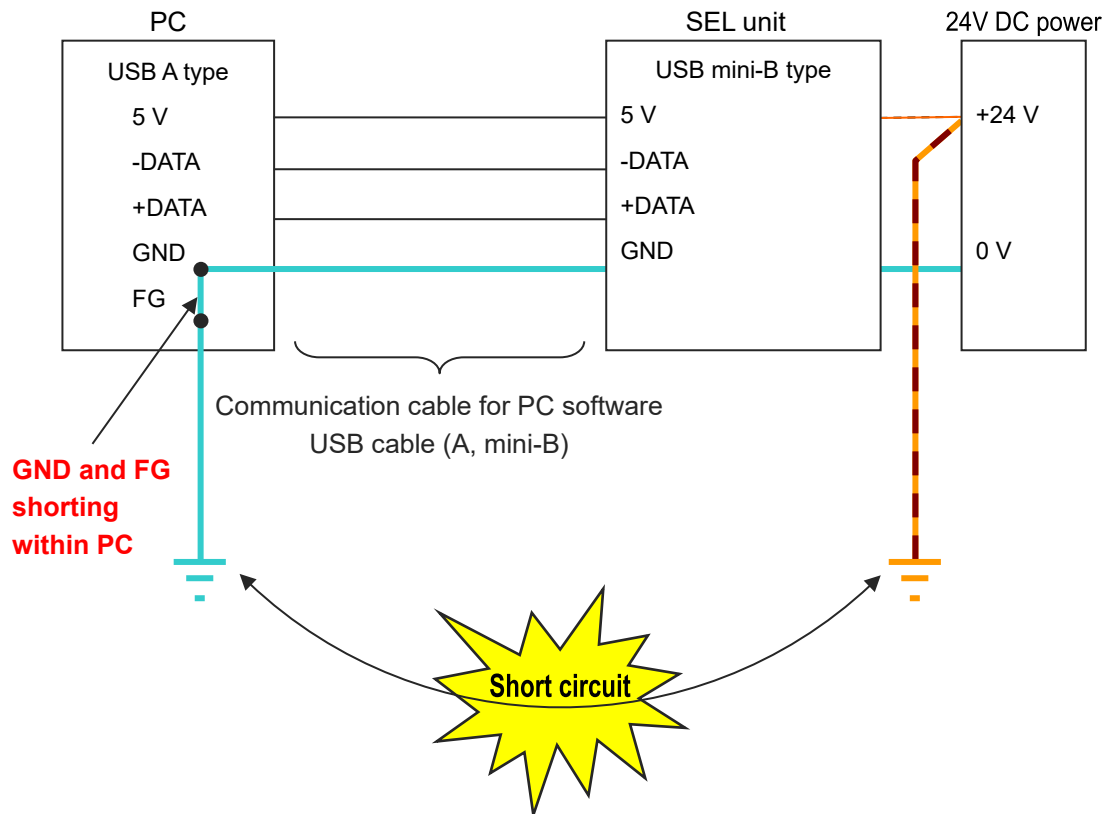
Refer to [4.7.2 Brake Box Wiring] for details for each wire layout.

- The RSEL system is not capable of operating ELECYLINDER in the single solenoid system. ELECYLINDER may not operate as commanded by a host system if Parameter No. 9 Select Electromagnetic Valve System (Operation System) is changed to Single.

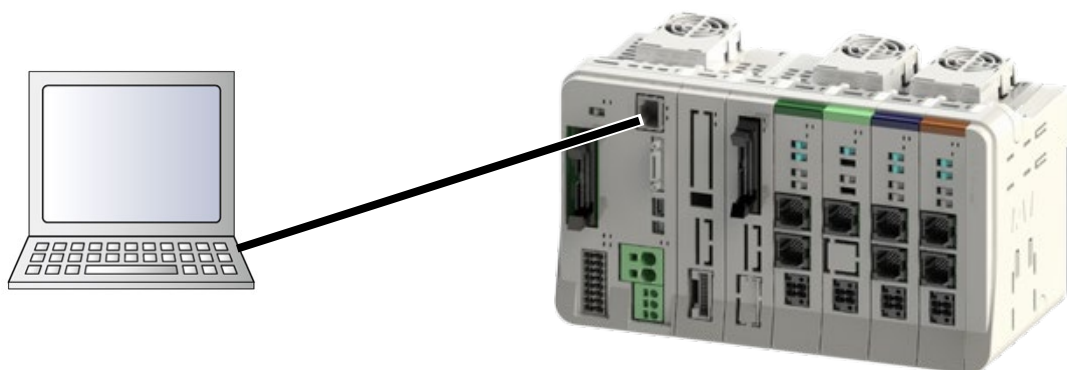
Precautions for PC connection to SEL unit grounded at positive terminal of 24V DC power supply

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

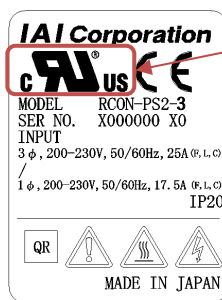
This product complies with the following overseas standards.

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

RoHS3 Directive	CE Marking	UL Certification
○	○	○ (Note 1)

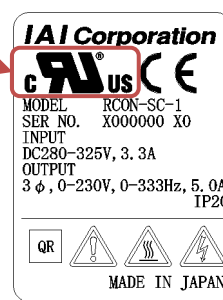
Note 1 In the driver units "RCON-SC-1" and "RCON-PS2-3", only the models with UL/cUL mark applied in the model code label are complied.

【200V Power supply unit】



UL/cUL mark

【200V Driver unit】



About UL/cUL

1. Environment of Use

- Use in an environment of Pollution Degree 2 is available.
- Use it in an environment with the peripheral temperature at 55°C or below.

2. Overload Protection

RCON-PS2-3, RCON-SC-1 is quipped with a built-in servomotor overload protection feature. The overload protection function activates at 115% of all the load current on the servomotor as a criteria.

3. Short Circuit Current Rating (SCCR : Short Circuit Current Rating)

This product should be used with connectivity to the power supply environment of 5,000Arms or less. Also, the maximum voltage available to use is as shown below:

- 230V AC

* The R-unit products except for RCON-PS2-3 and RCON-SC-1 should be connected to the power supply environment with 24V and 100A or less.

4. About Wiring Protection

The short-circuit protection circuit built in the product is for a purpose of the branch circuit protection. For the branch circuit protection, follow the NEC standards and regulations in each region to conduct.

5. About Circuit Breaker

In order to comply with the UL, it is necessary to figure out the power supply input current of the controller from the connected motor capacity and to use a circuit breaker certified as the UL listed.

* Circuit Breaker Used When RCON-SC Certified for UL

Supplier : Mitsubishi Electric Corporation

Model : NF50-SVFU330

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).

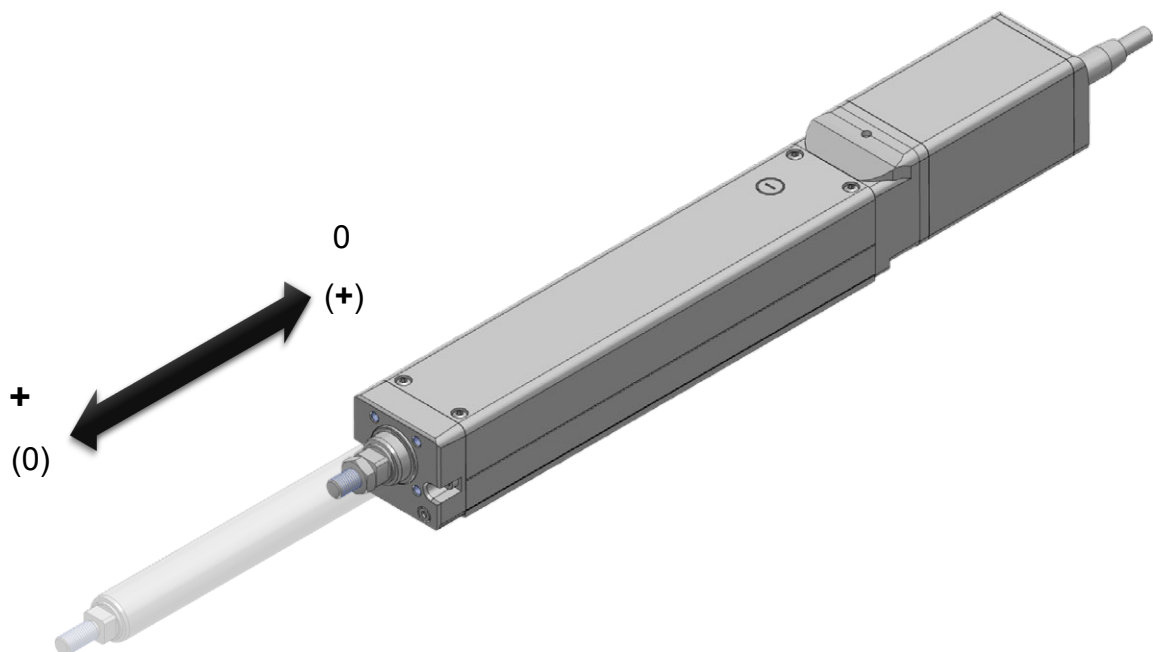


Caution

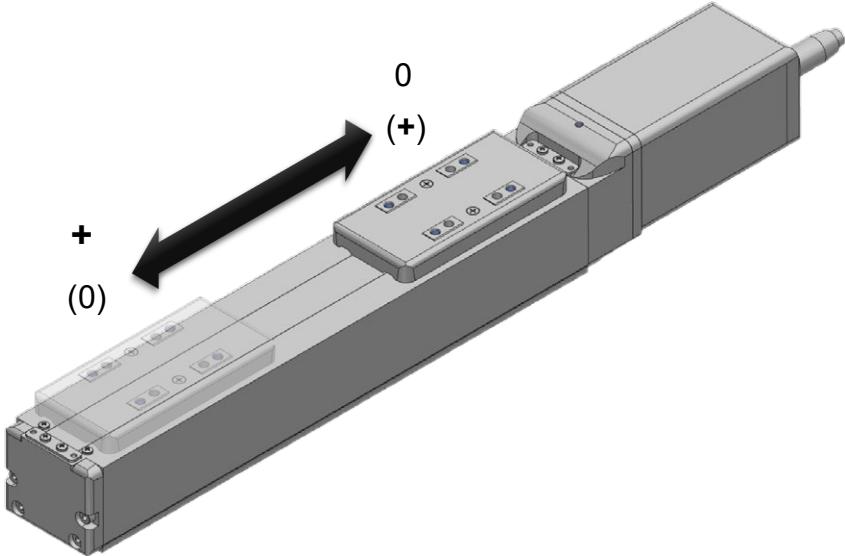
- Homing direction cannot be changed with some models.
- If it becomes necessary to reverse the homing direction after assembly to equipment, check the model of the applicable actuator to ensure that the homing direction is changeable.
- For models with which change is not possible, the actuator must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

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

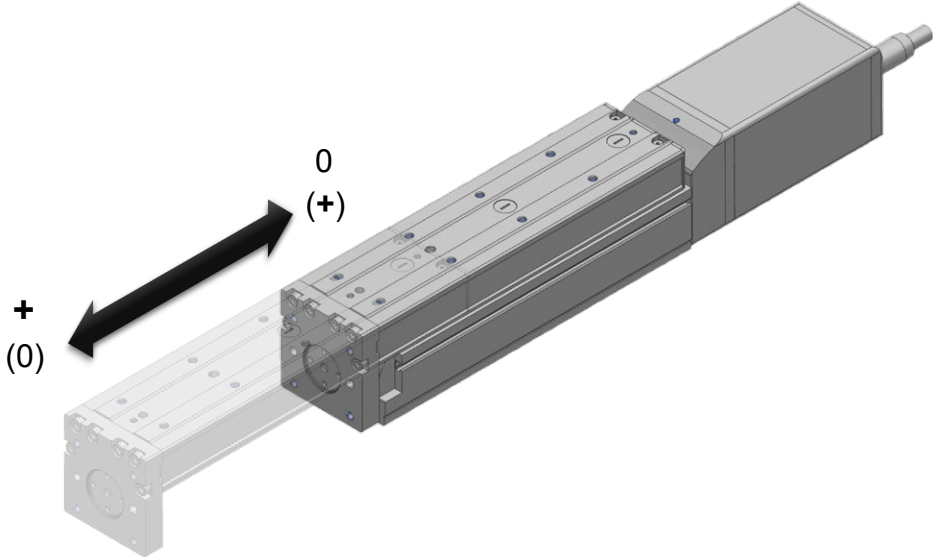
(1) Rod type



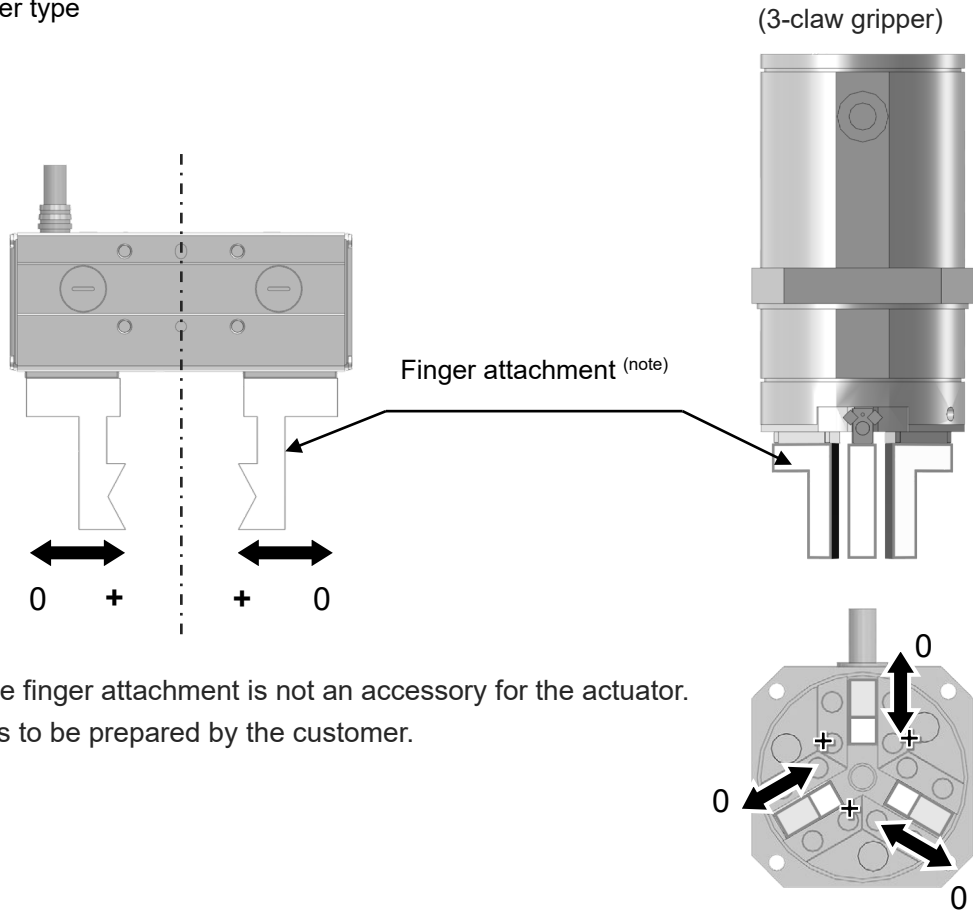
(2) Slider type



(3) Table type

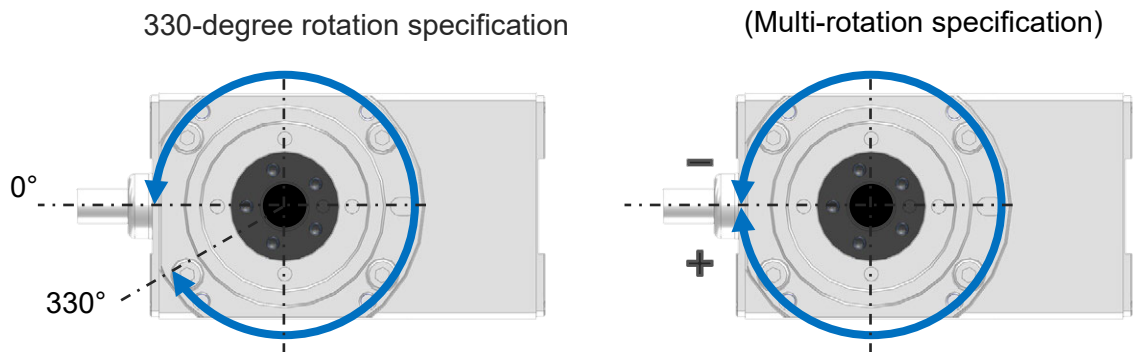


(4) Gripper type



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

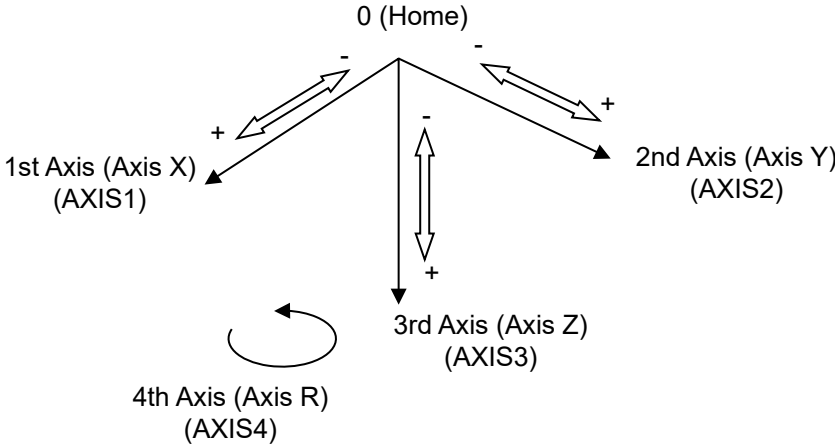
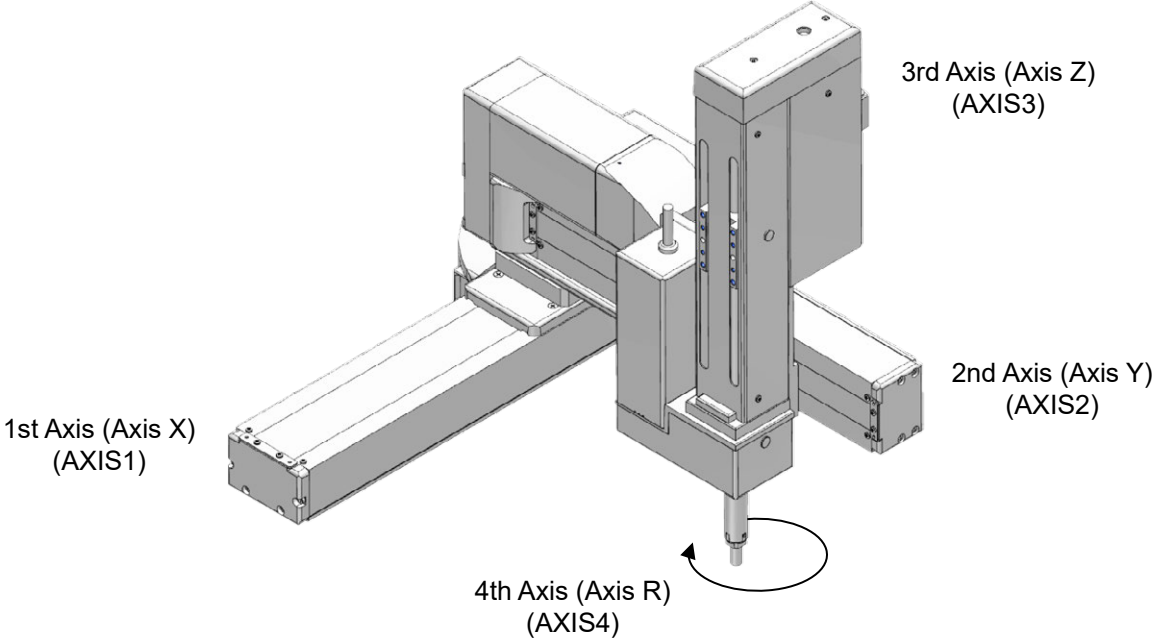
(5) Rotary type



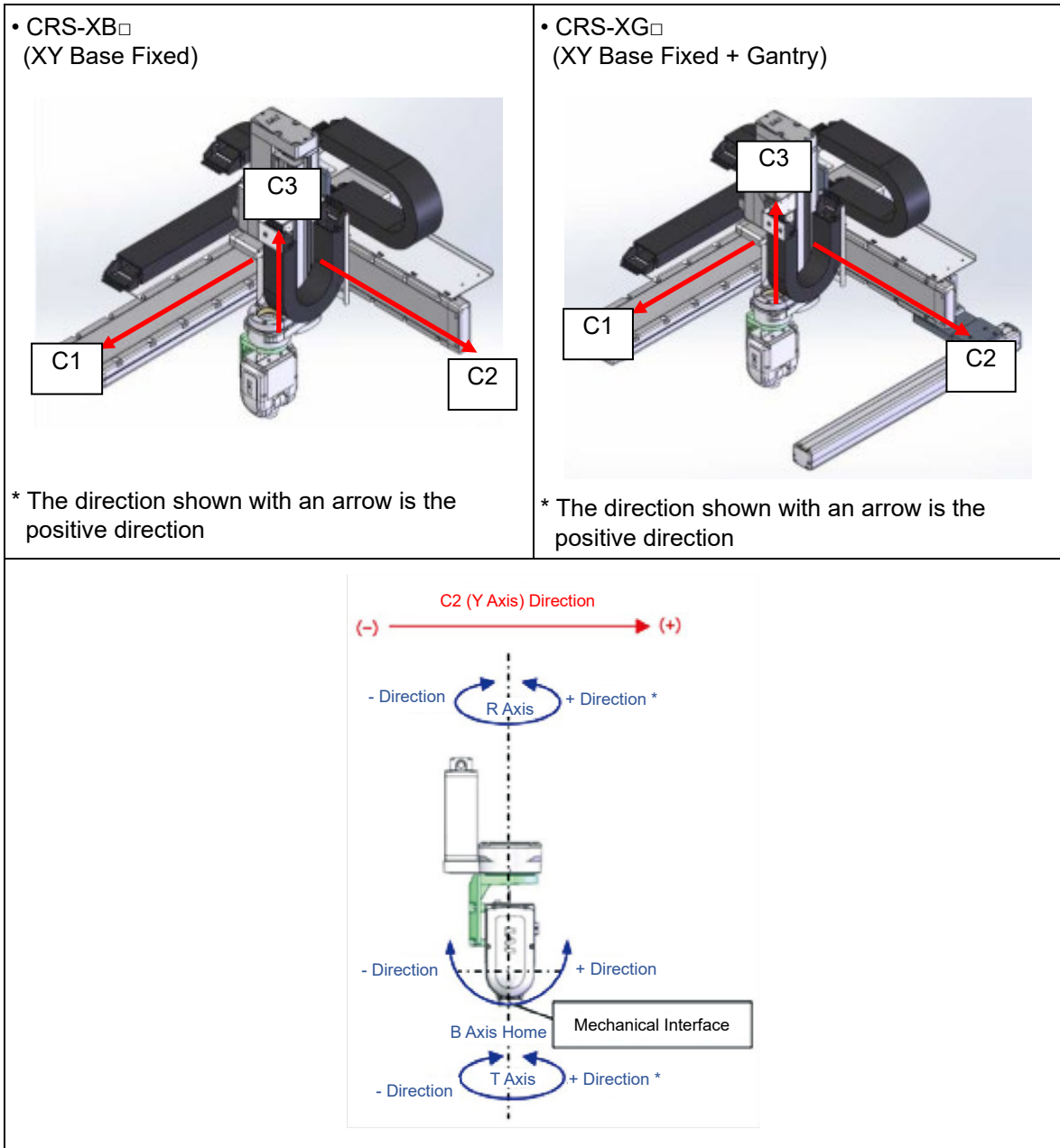
In the home reverse specification for the multi-rotation specification, the +/- directions are the reverse of the figure.

(6) Orthogonal Coordinate System
Orthogonal Robot (Single-Axis Robot Combined Axes)

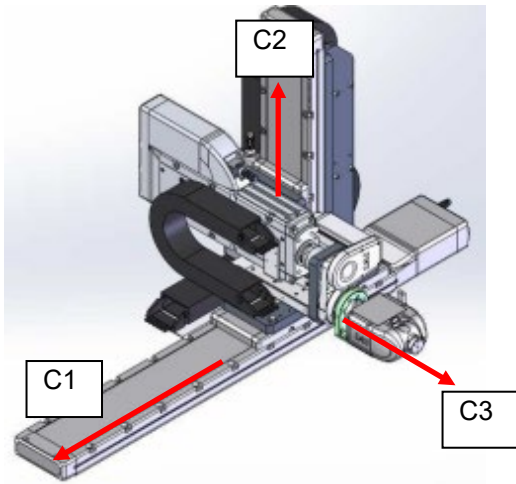
The coordinate system of the coordinate system definition unit in the Cartesian Robot (combination indicated for Controller P2 in IK2/IK3/IK4 Series and ICSB2/ICSB3) consists of four axes at the maximum of the coordinate axes (X-axis, Y-axis, Z-axis and R-axis).



Each axis coordinate system in the cartesian 6-axis robot is the coordinate system set as the axes constructed in the robot.

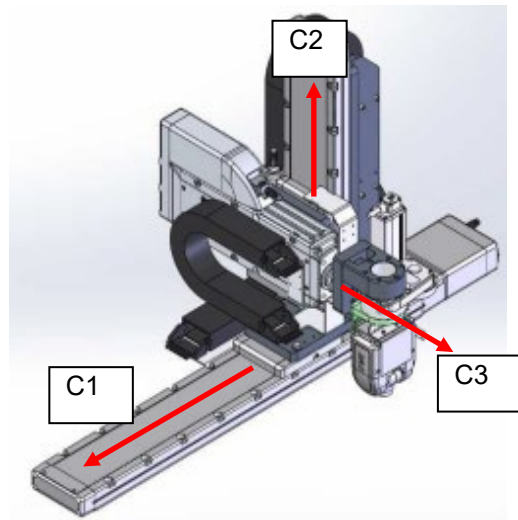


- CRS-XZ□Y
(XY Base Fixed + Horizontal Approach)

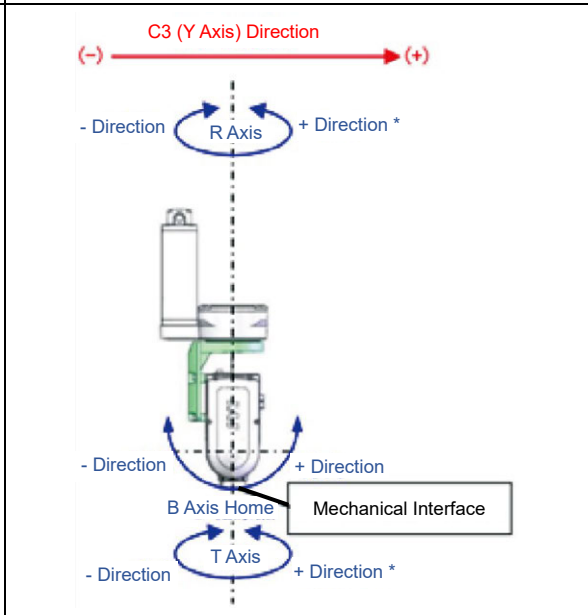
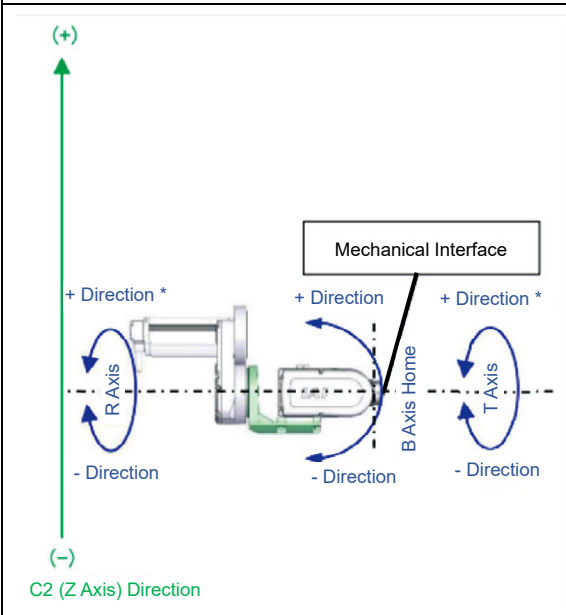


* The direction shown with an arrow is the positive direction

- CRS-XZ□Z
(XY Base Fixed + Vertical Approach)



* The direction shown with an arrow is the positive direction





RSEL System

1.1	Overview (About RSEL System)	1-1
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	1.3.1 General specifications	1-5
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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.

Also, by combining with an EC connection unit, it can be connected to an ELECYLINDER unit.

There are several ways to control, way to control with the SEL language without using a host programable 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.



5 driver units (8-axis type) + EC connection unit
+ 200V power supply unit equipped with fan unit

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

EC Connection Unit: RCON-EC-4

The maximum number of axes connectable to the driver unit is eight. With an EC connection unit included, there should be 16 axes at the maximum connectable. Also, the eight axes connected to a driver unit can be divided into two groups to control individually.

The number of axes available for the motion control such as intermediate operation in the SEL program is eight at the maximum.

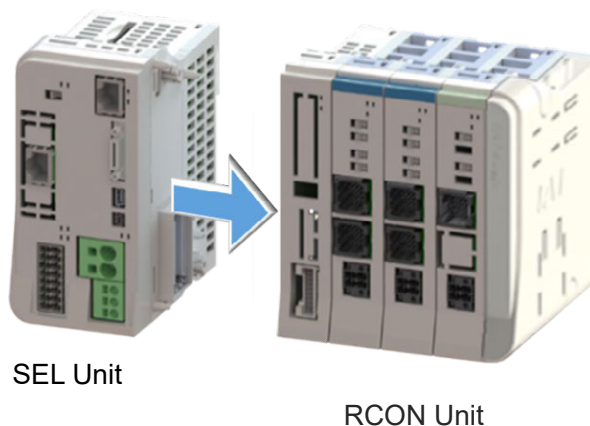
The control of ELECYLINDER should be the control by inputting and outputting signals only. It is not applicable for the motion control such as intermediate operation in the SEL program.

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.



SEL Unit

RCON Unit

(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

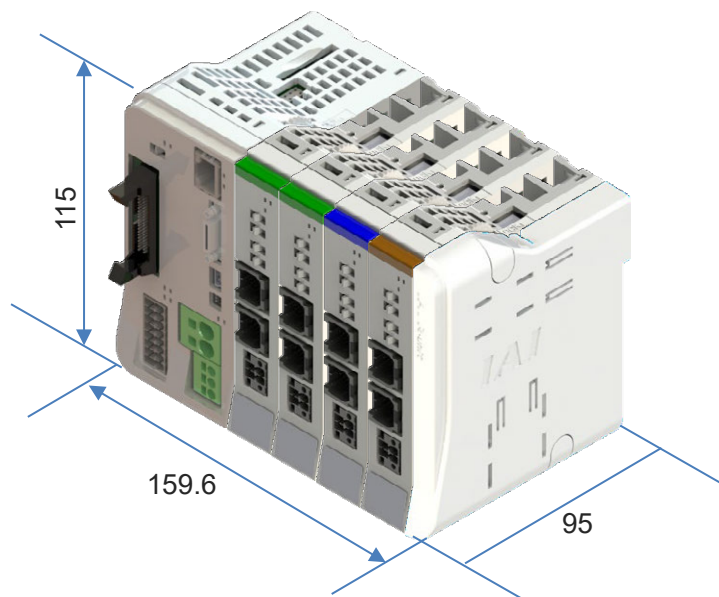
The system supports the operation of the orthogonal wrist unit. In addition, it supports the orthogonal coordinate system. Also, it supports the wrist unit operation as a part of the support to the 6-axis cartesian robot.

(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 PSA-24, 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.

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 \pm 10%
Power supply current	Differs with system configuration (Refer to [2.2 Power supply capacity (page 2-11)] for details)
Number of controlled axes	Driver unit control : 0 to 8 axes (driver unit can be freely combined) Connectable up to 16 axis at max. including EC connection unit control ^(*)
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-P high-thrust driver unit, RCON-SC power supply unit / driver unit, SCON extension unit, PIO/SIO/SCON extension unit, PIO unit, EC connection unit, simple absolute unit and terminal unit (Refer to [2.1.2 Configuration unit] for details)
Emergency stop/Enable operation	STOP Signal input on SEL unit applied to system at the same time
Regulation/standard	CE Marking, UL Certification
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 Connecting 16 axes is available for EC only.

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 details)
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	1,000m or less
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
Overvoltage category	I
Pollution degree	2
Degree of protection	IP20
Insulation withstanding voltage	500V DC 10MΩ
Generated heat	16.8W (SEL unit individually, Refer to [2.4 Generated heat] for details)
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.

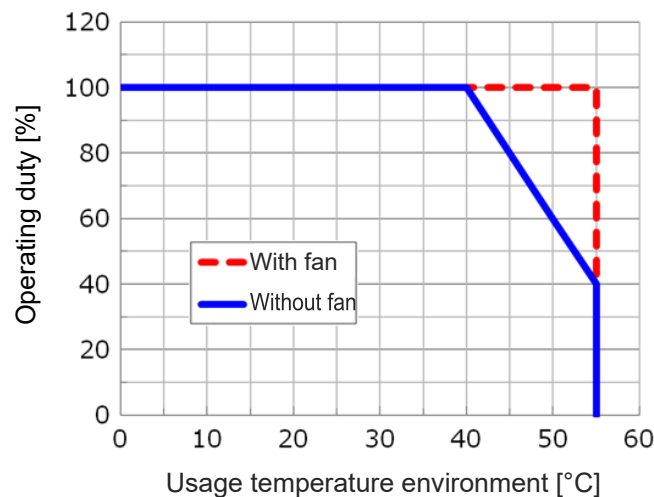
Item	Specifications
Safety circuit configuration	Available for duplication
Drive-source cutoff method	Internal semiconductor cutoff, external all axes lump-sum cutoff
Emergency-stop input	B contact input (Selectable from External power supply, duplication and internal power supply)
Enable input	B contact 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), PSA-24 communication USB port (Mini-B: 12Mbps Full speed) Ethernet (RJ-45), SIO connection connector (Max. 230.4kbps)
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, Alarm code : 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 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]
- Where the altitude exceeds 1,000m

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

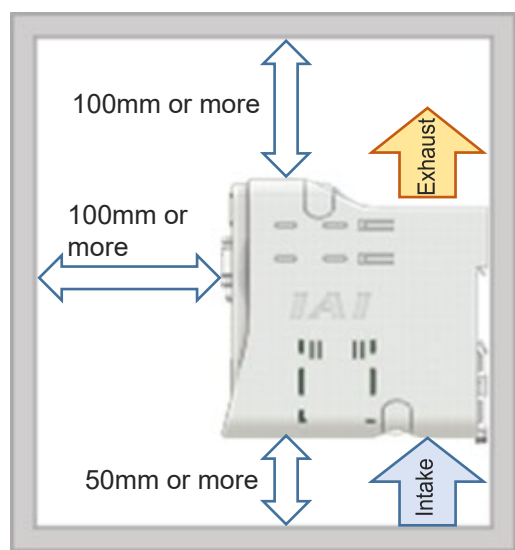
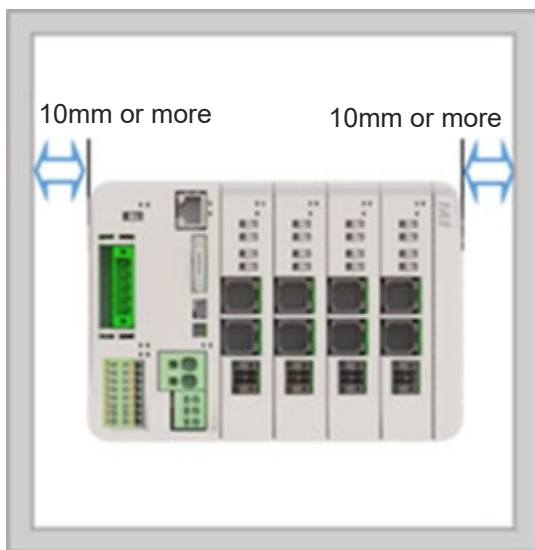
Consider the size of the control panel, placement of the RSEL system, cooling and the like when designing and manufacturing so that the ambient temperature is 0 to 55°C.

(If it has no fan unit, there is derating. Refer to [1.3.5 Usage Temperature Range (Page 1-8)] 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

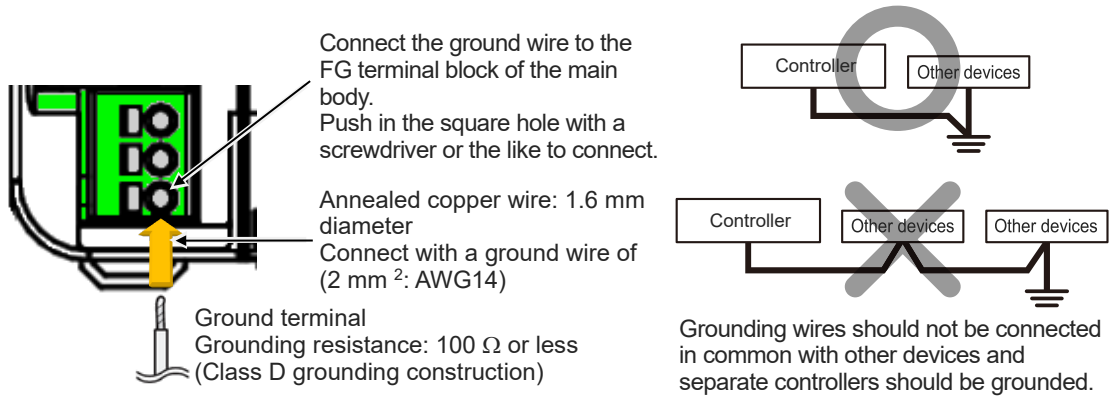


Make sure that several controllers are installed in vertical direction and the exhaust from the bottom controller does not get suctioned by the top controller.

1.4.3 Noise countermeasures and mounting method

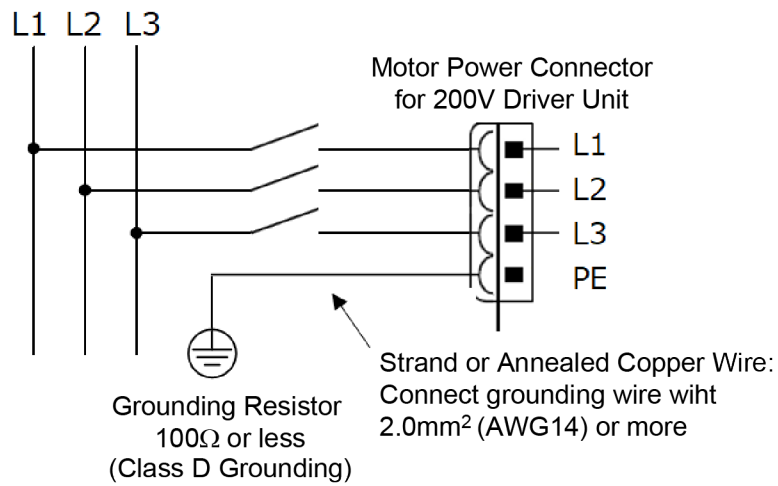
(1) Grounding for noise countermeasures (frame ground)

[24V DC]

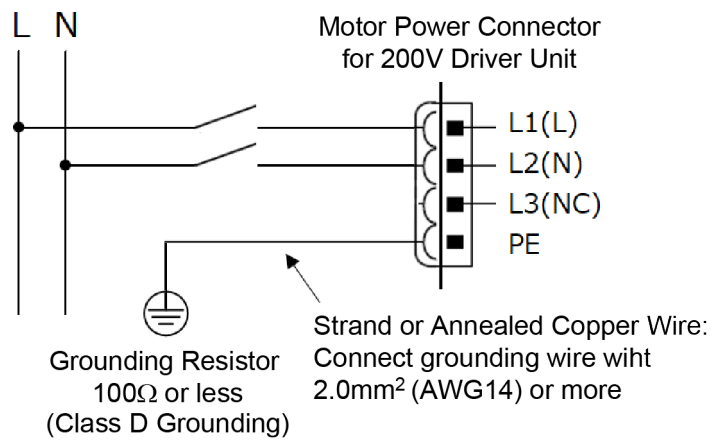


(2) Protective Grounding (Protective Earthing)

[200V 3-Phase Type]



[200V Single-Phase Type]



(3) 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.

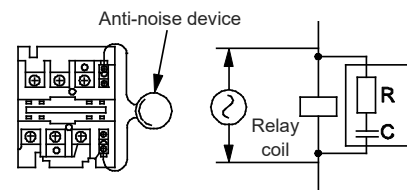
(4) Noise sources and noise prevention

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.

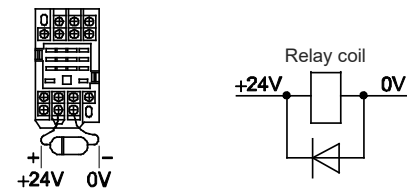
1) AC solenoid valve / magnetic switch / relay

[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

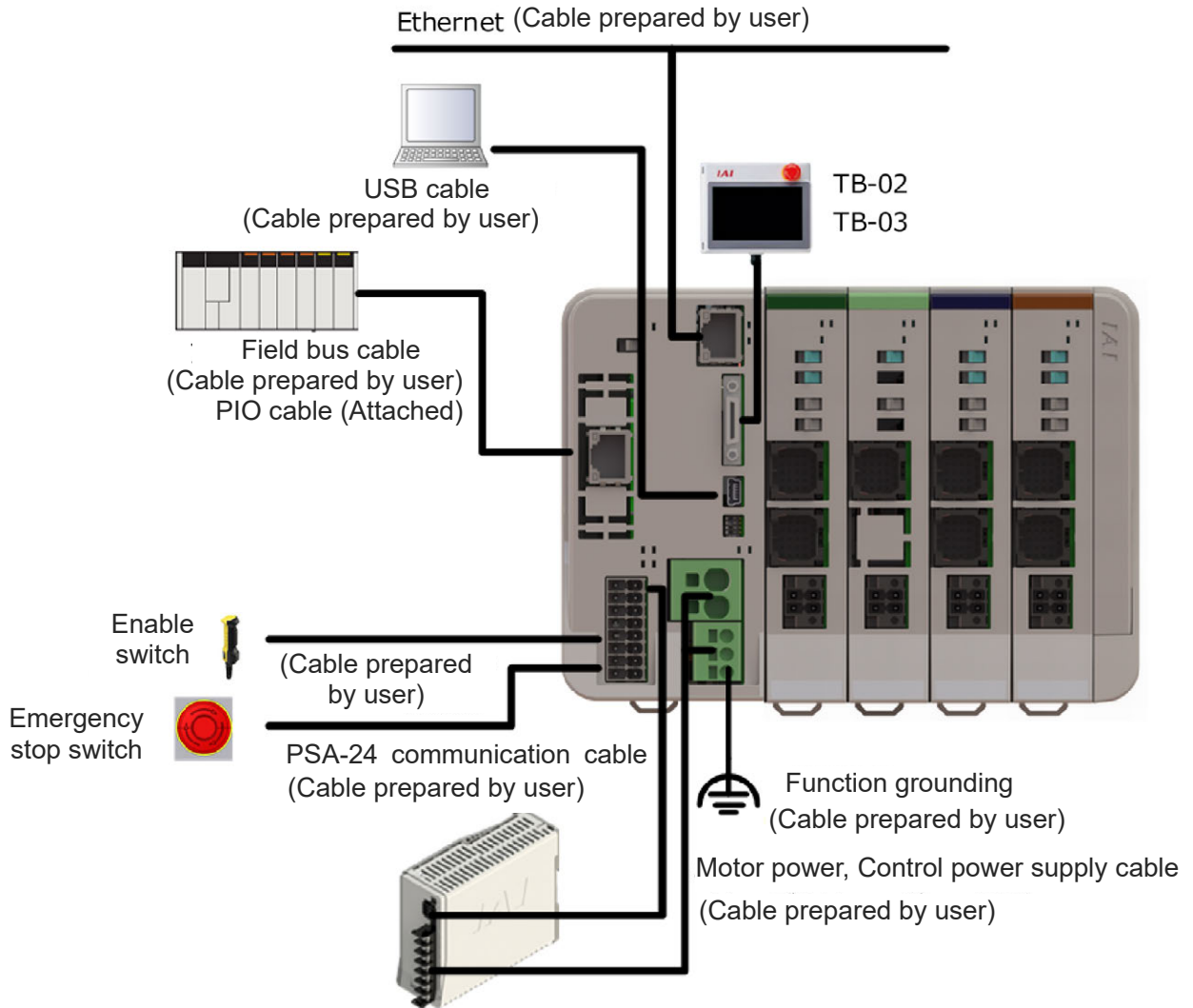
2.1	System Configuration	2-1
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2.1 System Configuration






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

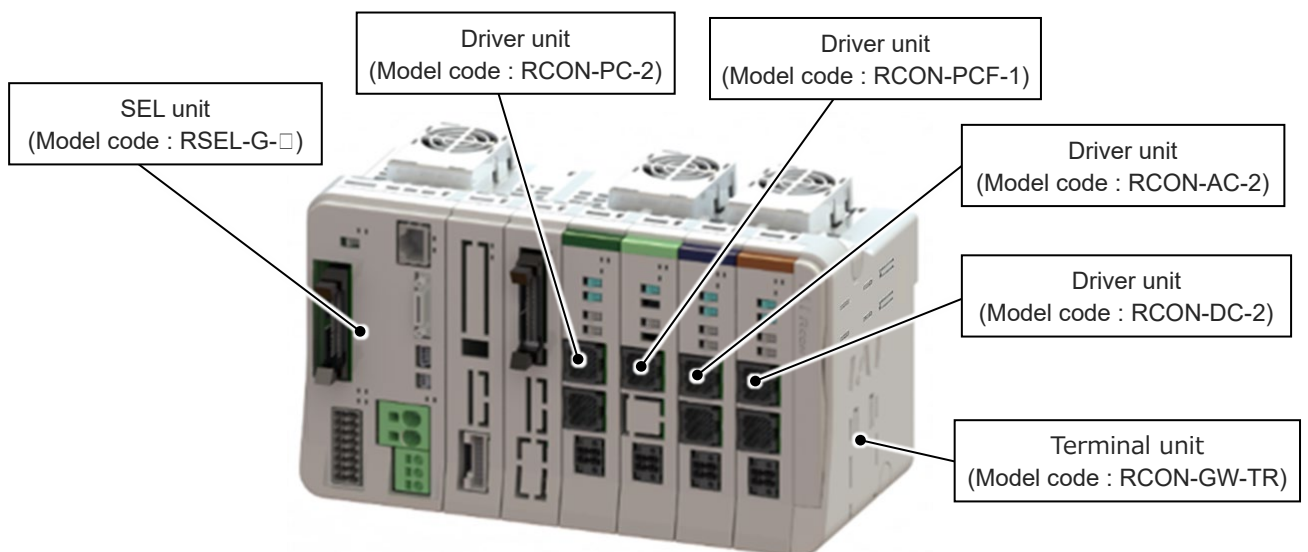
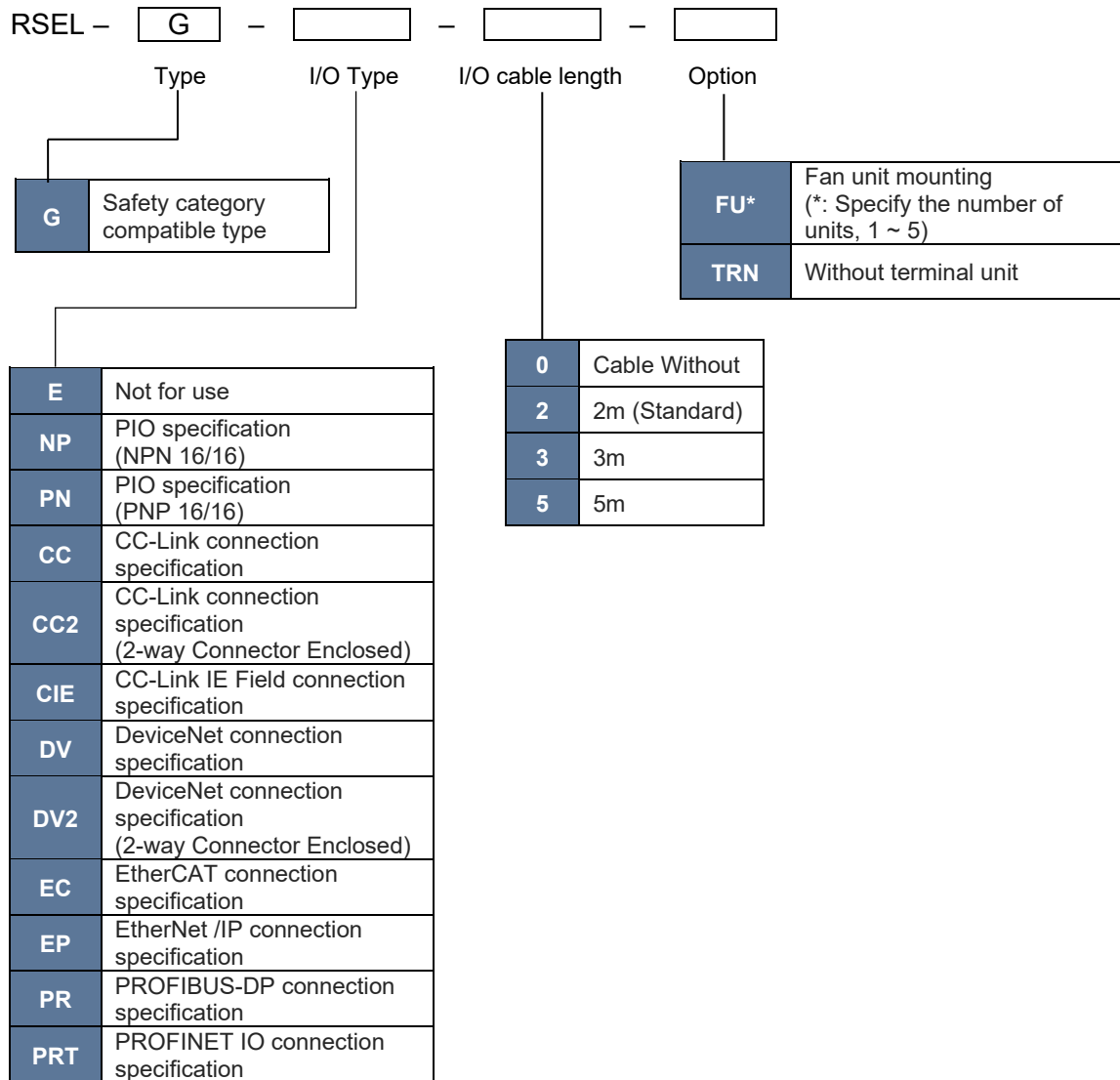
* The simple absolute unit is to be connected to the driver unit.

(3) Extension unit

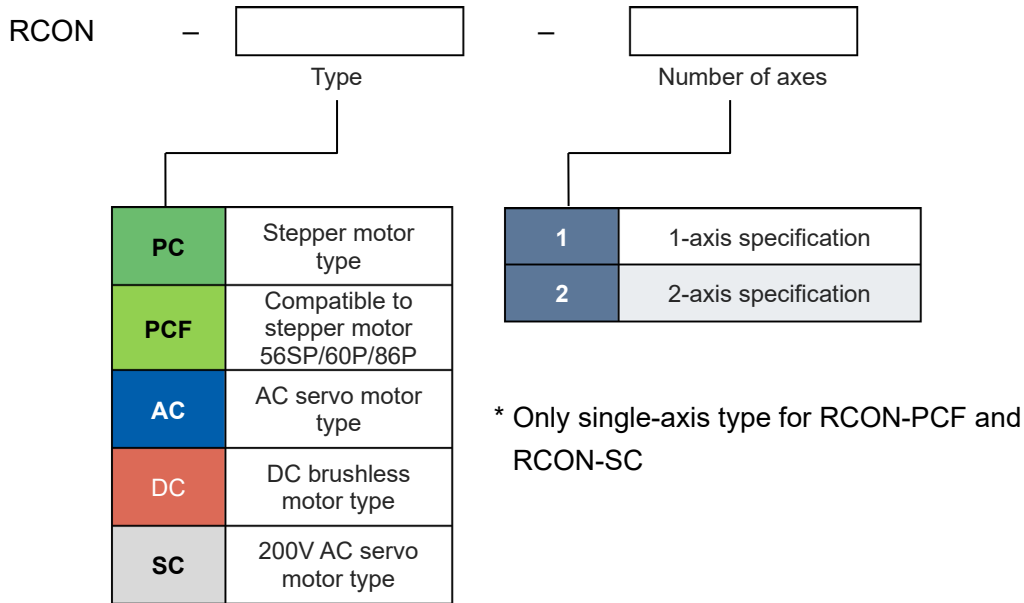
Type	SCON extension unit			PIO/SIO/SCON extension unit	PIO unit
Model code	RCON-EXT			RCON-EXT-NP-*	RCON-EXT-PN-*
Applications	<ul style="list-style-type: none"> • SCON connection 			<ul style="list-style-type: none"> • SCON connection • 485 SIO port • PIO extension 16in/16out (NPN or PNP) 	<ul style="list-style-type: 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
Type	EC connection unit				
Model code	RCON-EC-4				
Applications	<ul style="list-style-type: none"> • ELECYLINDER connection 				
External					
Maximum number of connected units	4 units				

2.1.3 Model code

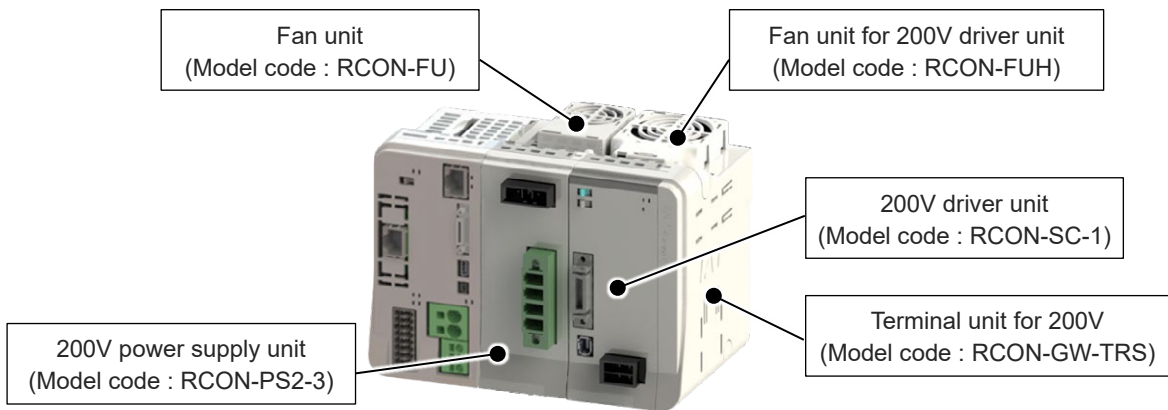
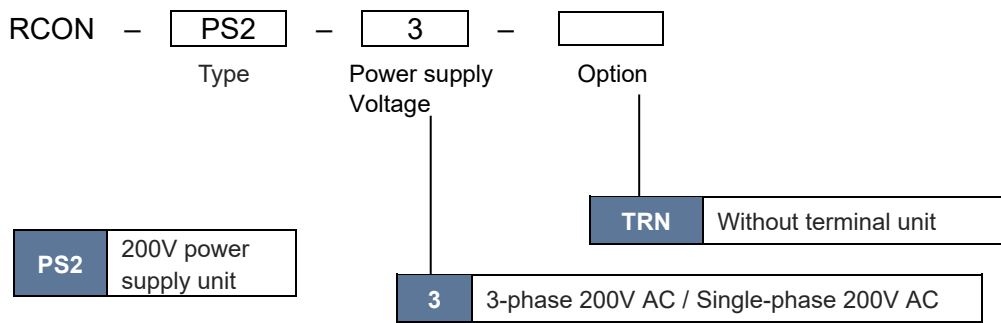
(1) SEL unit



(2) Driver unit



(3) 200V power supply unit



* The maximum number of connectable units is one unit.

(7) EC connection unit

RCON - EC - 4



(8) 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
EC connection unit	ELECYLINDER 4-axis specification	RCON-EC-4
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 - - - -



Type I/O Type I/O cable length Option

SXBA	For CRS-XBA
SXGA	For CRS-XGA
SXBB	For CRS-XBB
SXGB	For CRS-XGB
SXZCY	For CRS-XZCY
SXZCZ	For CRS-XZCZ
SXZDY	For CRS-XZDY
SXZDZ	For CRS-XZDZ
SXZEY	For CRS-XZEY
SXZEZ	For CRS-XZEZ

E	Not for use
NP	PIO specification (NPN 16/16)
PN	PIO specification (NPN 16/16)
CC	CC-Link connection specification
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

FN	Fan unit (For RCON-PC)
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-XZCY	CRS-XZCZ	CRS-XZDY	CRS-XZDZ	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 RS-232C 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-PS2-3).

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.

The current rating for 24V DC power must exceed the total current rating for motor power capacity, and the peak current must exceed the total motor power capacity. However, when multiple axes are connected, provided that not all of the actuators' operation timing is the same, the resulting value is not a simple total, because the rated current/maximum current do not flow simultaneously.

[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% (SEL 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
EC Connection Unit		0.1A	
Simple absolute unit (common to all types)		0.2A	

Note As the control supply current consumed in the 200V power supply unit is very little, it is not necessary to consider in the calculation

* The power supply of the fan unit (RCON-FU/RCON-FUH) should be included (approx. 50mA/unit) to the control current amperage of each unit to be connected.

[24V Driver unit 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 High output setting	0.8A	—	—	
			28P (Note 1)/35P/42P/56P		1.9A	—	—	
				28P/35P/42P/42SP/56P	High output setting disabled	1.9A	—	—
					High output setting enabled	2.3A	—	3.9A
		WU	28P/35P	High output setting enabled only	2.3A (Note 2)		3.9A (Note 2)	
	Stepper motor /RCON-PCF	RCP2 RCP4 RCP5 RCP6	56SP/60P/86P	Without High output setting	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

Note 2 One unit of WU (wrist unit) is equipped with two axes of motors. The values in the table are those for one axis.

[200V Motor power supply]

Item	Specifications	
Power supply voltage	200 to 230V AC $\pm 10\%$ (Power supply unit RCON-PS2-3)	
Wattage of actuator motor	Motor power capacity [VA]	Transient max. motor current amperage [VA]
30R (RS-30)	138	414
60	138	414
60 (RCS3-CTZ5)	197	591
100	234	702
100S (LSA)	283	851
150	328	984
200	421	1263
200S (DD (A))	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 (A))	1462	4386
750	1521	3042
750S	1521	4563

[ELECYLINDER Control Power /Motor power capacity of the stepper motor specification]

Item	Specifications			Power supply current		
Power supply voltage	24V DC $\pm 10\%$					
Control power capacity (per unit)	EC Connection Unit			0.1A		
Control power capacity (ELECYLINDER per axis)	24V Specification ELECYLINDER (per axis)	Brake: No		0.3A		
		Brake: Yes		0.5A		
	200V Specification ELECYLINDER (per axis)	Brake: No		0.32A		
		Brake: Yes	EC-S10□/S10X□	0.54A		
EC-S13□/S13X□	1.2A					
Motor power capacity (ELECYLINDER per axis)	Actuator / EC connection unit					
	Motor type	Series	Motor size	Type	Rated current	Max. current
	Pulse Motor	EC	35P/42P/56P	When power saving setting invalid	2.3A	3.9A
				When power saving setting disabled	–	1.9A
			28P	S3□/RR3□ type	–	1.9A
				Slim and small type	–	1.7A

[Motor Power Supply of the 200V ELECYLINDER]

Item	Actuator model code	Motor wattage	Motor power capacity [VA]	Transient max. motor current amperage [VA]
Motor power capacity (per axis)	EC-S10□, EC-S10X□	100	238	714
	EC-S13□, EC-S13X□	200	402	1206
	EC-S15□, EC-S15X□	400	772	2316

In order to drive the 200V ELECYLINDER, it is necessary to prepare the power supply for 200V ELECYLINDER drive (PSA-200).

The restrictions regarding the DC power supply (PSA-200) for drive a 200V ELECYLINDER are as shown below.

Specifications	Max. number of connectable axes	Max. motor wattage of connectable
100V AC power supply specifications	6 axes	800W
200V AC power supply specifications	6 axes	1,600W

Check that the number of axes of the 200V ELECYLINDER does not exceed the maximum number of the connectable axes and the motor wattage not exceed the maximum connectable motor wattage.

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 RSEL 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) $0.6A \times 4$ + 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) $0.4A \times 8$ + 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) $0.4A \times 8$ + Simple Absolute $0.2A \times 8$ + PIO/SIO/SCON Extension Unit $0.3A \times 1$ + 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) $0.5A \times 8$ + 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) $0.4A \times 7$ + Simple Absolute $0.2A \times 7$ + 200V Driver Unit (Equipped with Brake) $0.5A \times 1$ + PIO/SIO/SCO Extension Unit $0.3A \times 1$ + 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 × 6 + 2.3 × 2 = 38.8A ⇒ NG 5.7 × 6 + 1.3 × 2 = 36.8A ⇒ 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.

(2) Connection restrictions of 200V power supply unit (RCON-PS2-3)

When connecting a 200V actuator using RCON-SC-1, restrictions on motor power are as follows.

Item	Current limit values for selection calculation
200V Motor power (Single-Phase)	16,00W
200V Motor power (3-Phase)	24,00W

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

For the actuators listed below, have the motor wattages for calculation when you calculate the supplies.

Actuator model number	Motor wattage for calculation		Remarks
	3-Phase power supply	Single-Phase power supply	
LSA-S6S□/S8S□/S8H□/LSA(S)-N10S□	100	300	Per slider
LSA-S10S□/H8S□/H8H□/L15S□/N19SS LSA(S)-N15S□/N15H□/	200	600	Per slider
LSA-W21S□	400	Not available	Per slider
DD(A)-LT18(C) / T18(C)	200	Not available	
DD(A)-LH18(C) / H18(C)	600	Not available	
RCS3-CTZ5C	120	Not available	
RCS3-CT8C	800	Not available	

Limit in Number of Axes due to Input Power to 200V Power Supply Unit

For the actuators below, there should be a limit to the number of axes connectable due to the power supply provided to the 200V power supply unit connected to RCON-SC-1.

Item	200V Motor power supply	
	(3-Phase)	(Single-Phase)
DD (A)-LT18 (C) / T18 (C)	Max. 8-Axis (RSEL Max. number of axis)	Cannot Connect
DD (A)-LH18 (C) / H18 (C)	Max. 2-Axis	Cannot Connect
RCS3-CTZ5C	Max. 8-Axis (RSEL Max. number of axis)	Cannot Connect
RCS3-CT8C	Max. 3-Axis	Cannot Connect

If you would like to have more axes than the maximum number of axes to be connected, enlarge the capacity by connecting the connection type SCON-CB RCON to the extension unit.

Calculation examples are shown below.

[200V System Motor Power Supply]

Ex. 10	1 axis of actuator each of 200W, 300W and 600W motors
	$200W \times 1 \text{ axis} + 300W \times 1 \text{ axis} + 600W \times 1 \text{ axis} = 1,100W$ ⇒ Single-Phase OK , 3-Phase OK
Ex. 11	RCS-CTZ5 × 1 axis, actuator of 200W motor × 7 axes
	RCS3-CTZ5C is not capable of use in single-phase ⇒ Single-Phase NG , $120W + 200W \times 7 \text{ axes} = 1,520W$ ⇒ 3-Phase OK
Ex. 12	Actuator of 200W motor × 6 axes, LSA-S10SM (Multiple Slider) × 1 axis
	$200W \times 6 \text{ axes} + 600W \times 2 = 2,400W$ ⇒ Single-Phase NG , $200W \times 6 \text{ axes} + 200W \times 2 = 1,600W$ ⇒ 3-Phase OK
Ex. 13	Actuator of 400W motor × 8 axes
	$400W \times 8 \text{ axes} = 3,200W$ ⇒ Single-Phase NG , 3-Phase NG

(3) Number of Connectable Axes in 200V EC Type

For actuators with 200V EC specifications has restrictions regarding the DC power supply (PSA-200) for drive a motor are as shown below.

Specifications	Max. number of connectable axes	Max. motor wattage of connectable
100V AC power supply specifications	6 axes	800W
200V AC power supply specifications	6 axes	1,600W

The number of axes that the total of the motor wattage of connected ELECYLINDER would not exceed the restricted values in the table above can be connected. However, Max. number of connectable axes is 6 axes.

The motor wattage of ELECYLINDER should be as described below.

Model	Motor wattage
EC-S10□ EC-S10X□	100W
EC-S13□ EC-S13X□	200W
EC-S15□ EC-S15X□	400W

**Caution**

The maximum length of the motor power supply cable CB-EC-PW□□□-RB between the main unit of ELECYLINDER and the motor drive DC power supply PSA-200 is 10m.

Even though the maximum number of connectable axes is 6 axes, the motor power supply cable may not reach depending on the layout of the unit of ELECYLINDER.

Be aware that an additional unit of the DC power supply for motor drive PSA-200 is needed in case the cable does not reach.

2.3 In-Rush Current

The in-rush current should be as shown below.

Item	Specifications	
In-rush current (About 5 ms)	RCON-PC	8.3A
	RCON-PCF	10.0A
	RCON-AC	10.0A
	RCON-DC	10.0A
	RCON-SC	25A
	RCON-EC	Max. 40A ^(Note)

Note: When 4 axes max. of ELECYLINDER are connected

When multiple driver units are used, depending on the capacity of the 24V DC power source, a voltage drop might occur when the units are turned on.

In the RCON system, the timing can be adjusted with the following two parameters to reduce the risk of voltage drop due to inrush current. Inrush current lasts for about 5 ms per axis. Adjust the timing as warranted, within a range such that the offset does not affect operation.

[Driver shutdown release delay time]

The MC parameter is equipped with a function that offsets the release timing of the drive source cutoff circuit of each driver unit. It offsets the release timing, which allows it to suppress any possible voltage drops.

- 5 ms per axis has been set for the initial value.
- The minimum for each axis should be 50ms for the 200V driver unit.
- The release timing of the drive cutoff circuit for one unit (four axes) should be misaligned for the EC connection unit.

[Servo ON Delay Time Adjustment (MC Parameter No. 190)]

No.	Name	Unit	Input range	Default initial value setting
22	Driver Shutdown Release Latency	ms	0 to 60,000	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.

[DC Power Supply for Motor Drive (PSA-200)]

The inrush current the DC power supply (PSA-200) for drive a motor are as shown below.

Item	Specifications	
Motor power inrush current (Note 1)	40°C	50.0A
	55°C	70.0A
Control power Inrush current (Note 1)	40°C	40.0A
	55°C	60.0A

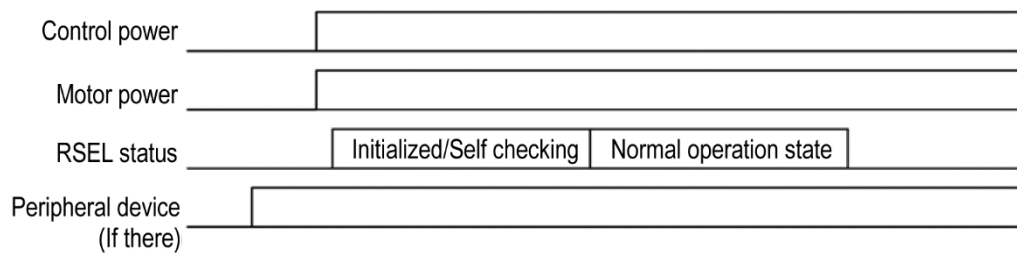
Note 1 Inrush current at the power connection continues for 20ms. The in-rush current could vary depending on the impedance and the internal element temperature (thermistor) in the power supply line.

2.4 Generated Heat

Item		Generated heat	
Generated heat (per unit)	SEL unit (RSEL-G-*)	–	16.8W
	RCON-PC	PowerCON: No	5.0W
		PowerCON: Yes	8.0W
	RCON-PCF	PowerCON: No	19.2W
	RCON-AC	Standard/High Acceleration/Deceleration/Power Saving	4.5W
	RCON-DC	Standard	3.0W
	RCON-SC	Standard	54.0W
	RCON-PS2	–	42.0W

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. • In case of turning the control power supply on in the condition of STOPIN and ENBIN inputs (status of operation prohibited), turn the motor power supply on at the same time as releasing STOPIN and ENBIN inputs (status of operation permitted).
Time to Turn Power on after off	<ul style="list-style-type: none"> • 24V DC Cutoff : 1s 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.



Caution

- The drive cutoff semiconductor relay mounted on IAI controllers is assumed in frequency of only limited use such as the case that an emergency stop of the device is needed, thus it is not assumed to activate frequently. Therefore, in case of high frequency of use of the drive cutoff relay such as switching on and off of the drive source repeatedly every time of setup change, the semiconductor may come to the end of life in early timing.
- The number of on/off operation cycles should be approximately 5 times at the most in one day for reference. Also, leave it for approximately 30 minutes for cooling time after the drive cutoff.
- Construct a circuit that STOP Signal for the system IO connector gets turned on and off at the same time as the drive power supply turned on and off for RCON-SC-1 (RCON-PS2-3).

2.6.1 Drive-source cutoff circuit specifications

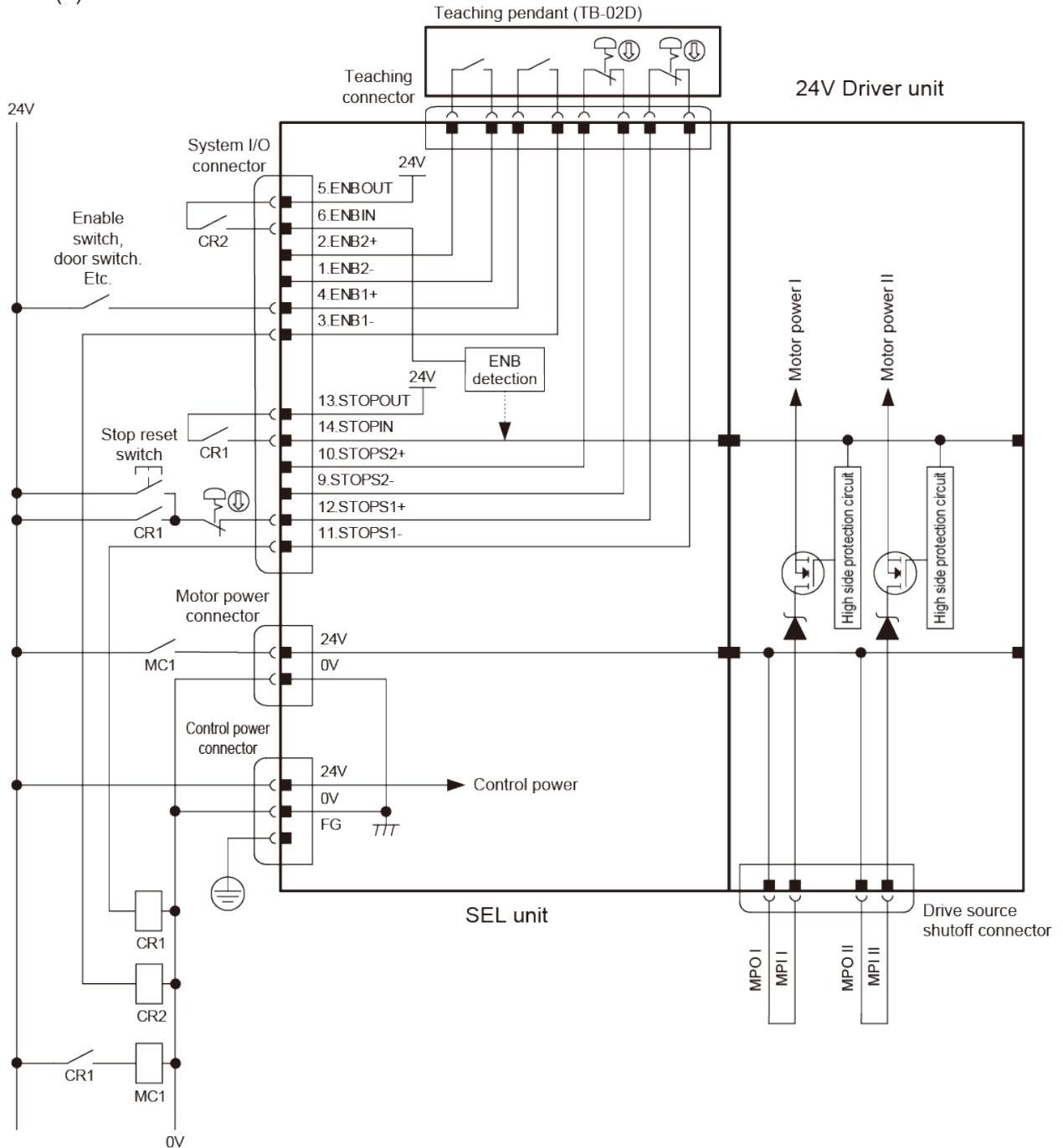
[Electrical Specifications]

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

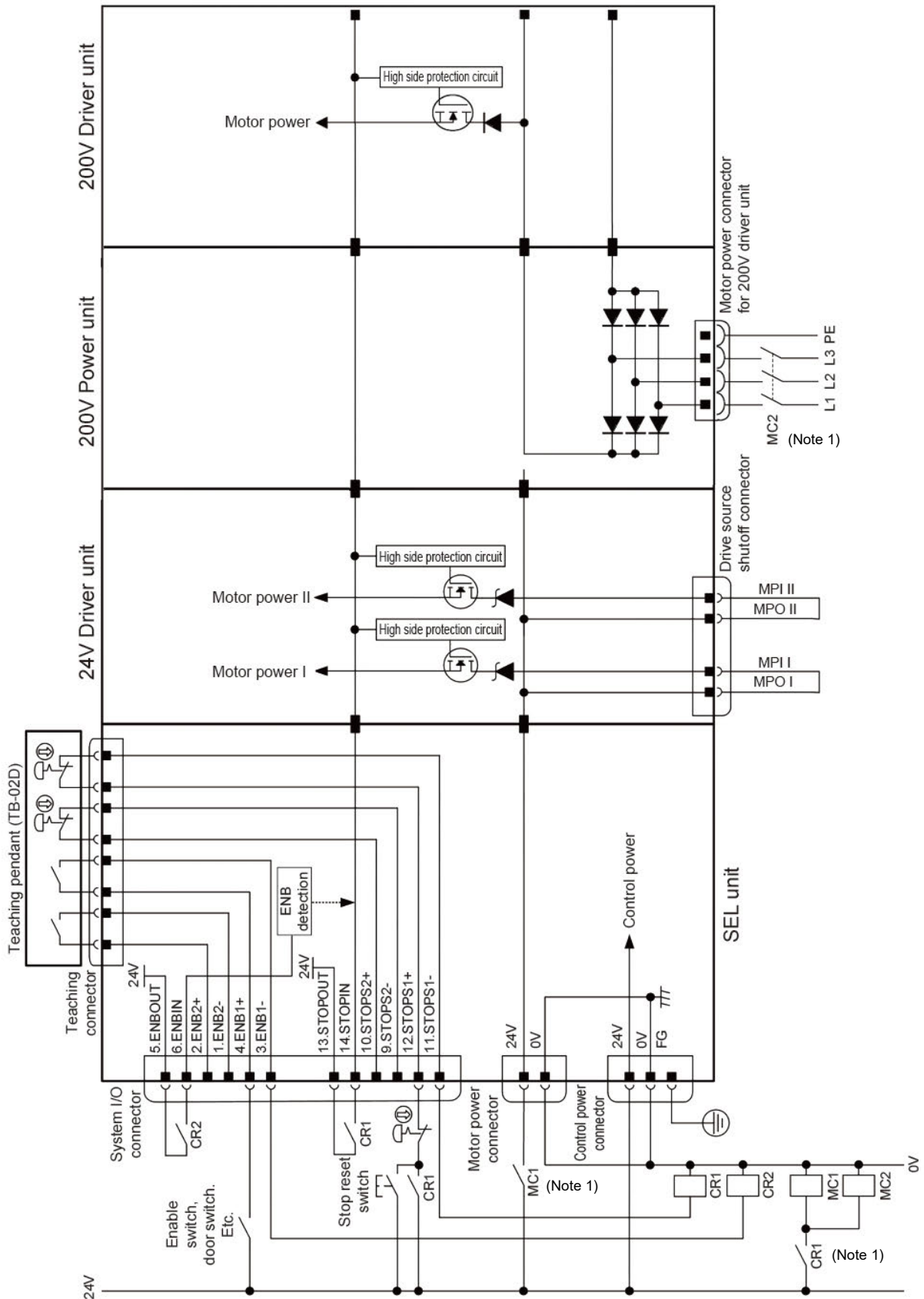
When the stop switch and enable (deadman's) switch on the teaching pendant is to be affected at equipment emergency stop.

(1) 24V Driver Unit



(Note) Construct the circuit to turn STOP Signal off at the same time as turning off the drive power supply provided to the drive cutoff connector.

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

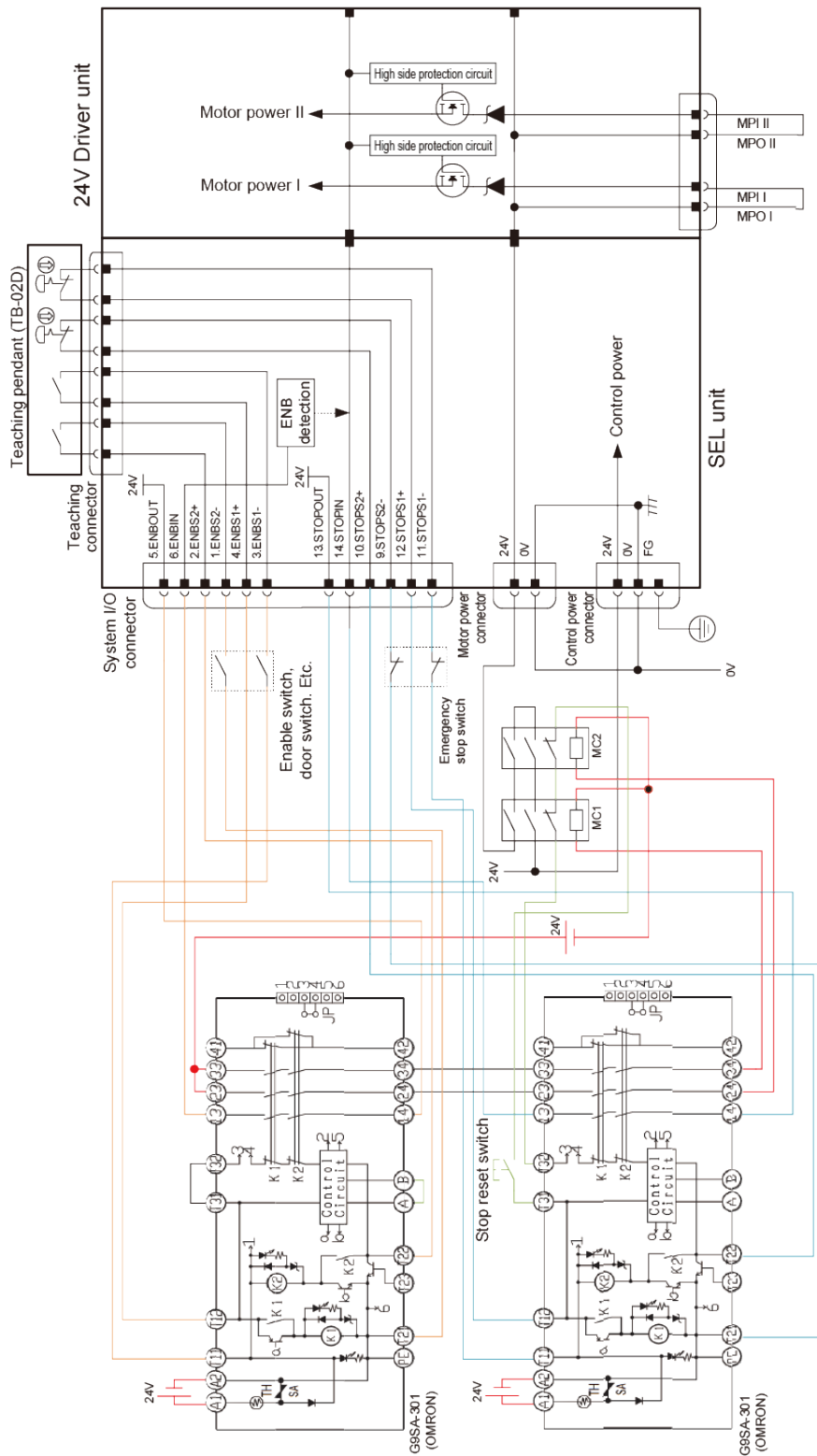


Note 1 Construct the circuit to turn STOP Signal off at the same time as turning off the drive power supply provided to the drive cutoff connector or the drive power supply connector.

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.)



RSEL

Chapter 3

Specifications of Each Unit

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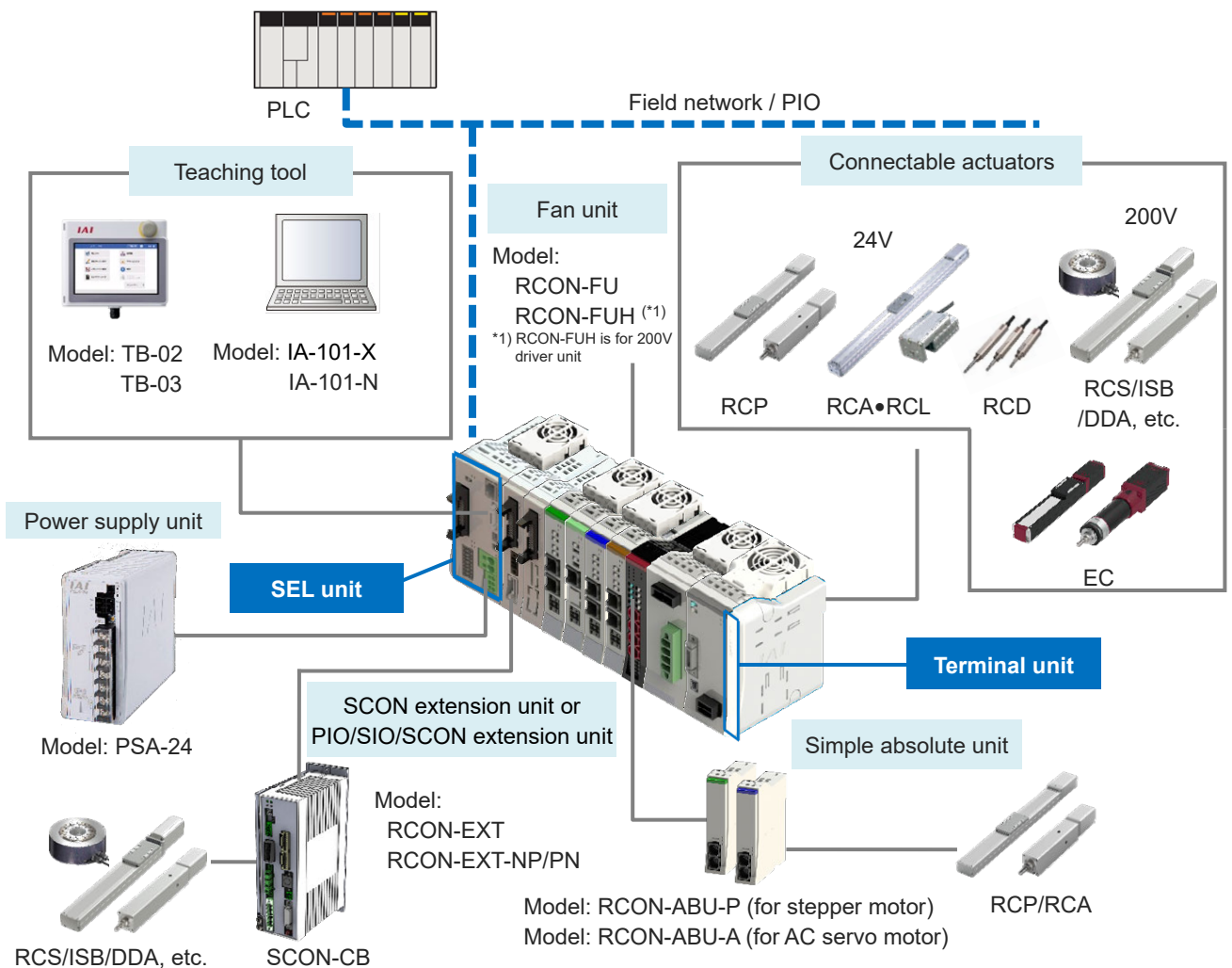
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3.1 SEL Unit, Terminal Unit

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).

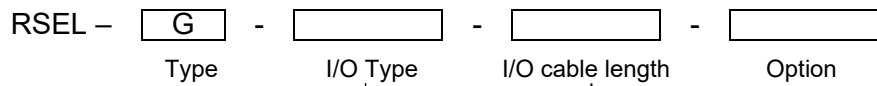
It is capable to connect eight axes of SCON-CB at the maximum via the driver unit for RSEL system (RCON-PC/PCF/AC/DC/SC) and SCON extension units. Also, by combining with an EC connection unit, it can be connected to an ELECYLINDER unit. It is capable not only to control individual connected actuators, 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]



G	Safety category compatible type
----------	---------------------------------

E	Not for use
NP	PIO specification (NPN 16/16)
PN	PIO specification (NPN 16/16)
CC	CC-Link connection specification
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

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

FU*	Fan unit mounting (*: Specify the number of units, 1 ~ 5)
TRN	Without terminal unit

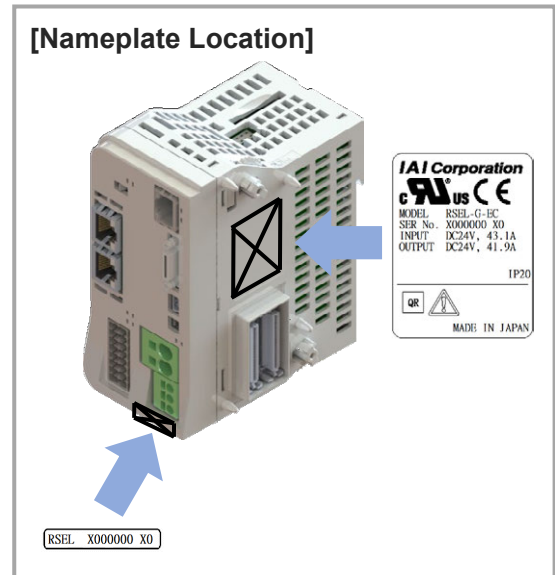
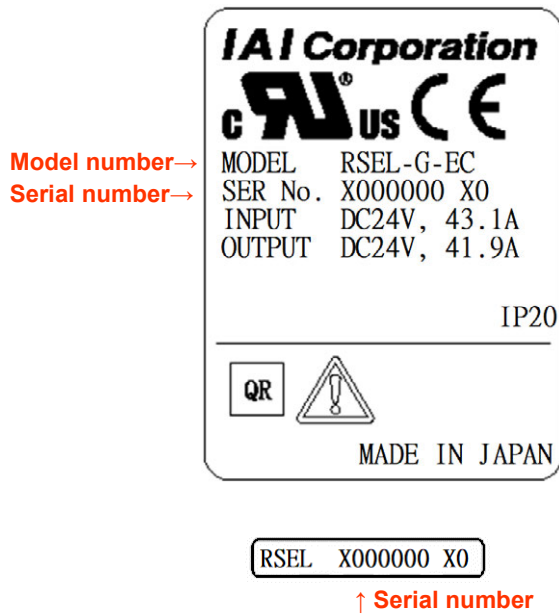


[Terminal unit]



(2) How to read the model nameplate

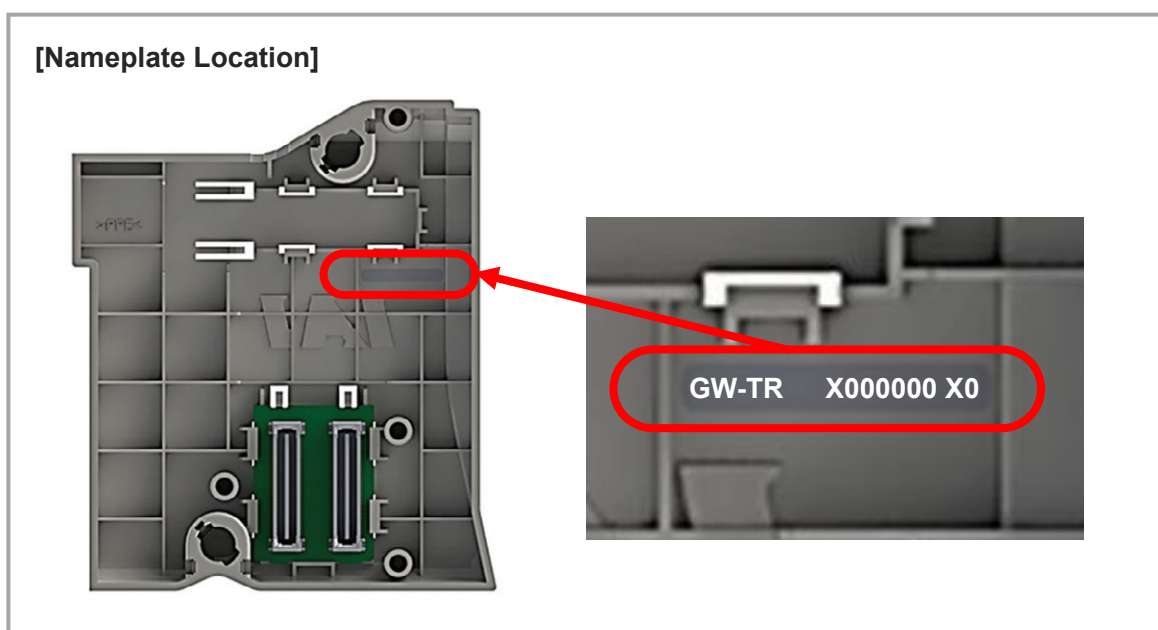
[SEL unit]



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







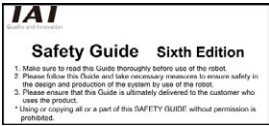
Mark	Explanation of Mark
	Use IAI specified cables only.

[Terminal Unit]



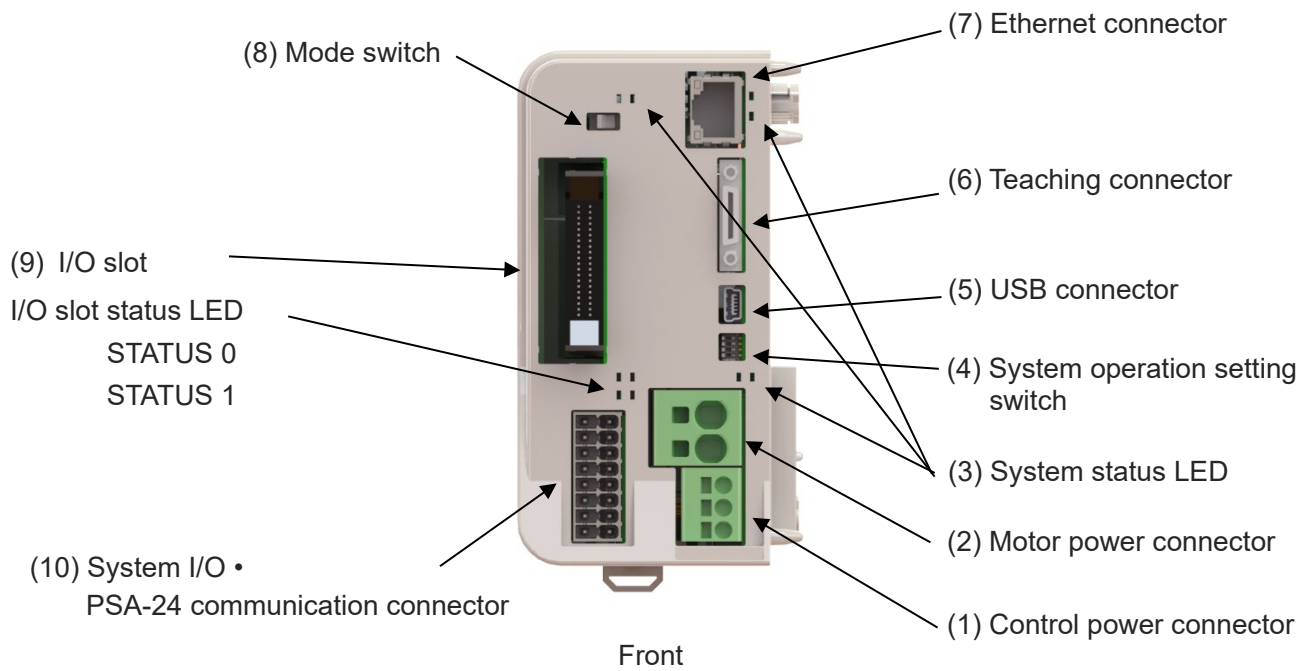
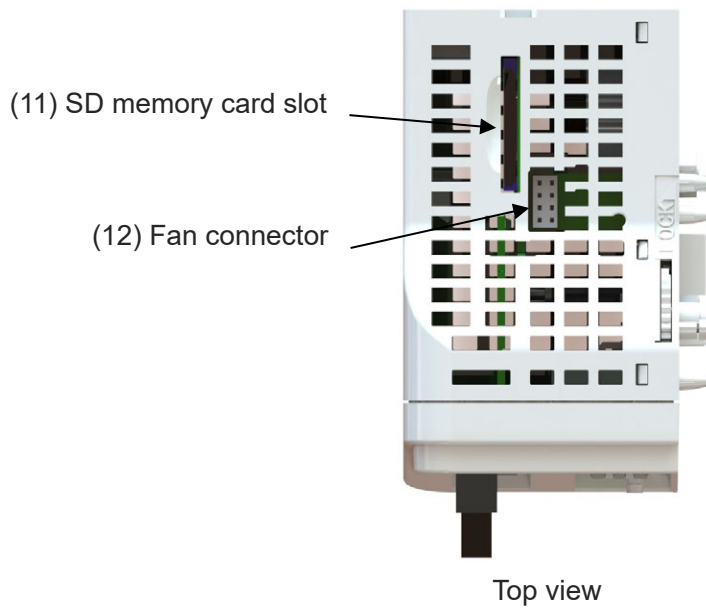
3.1.3 Component

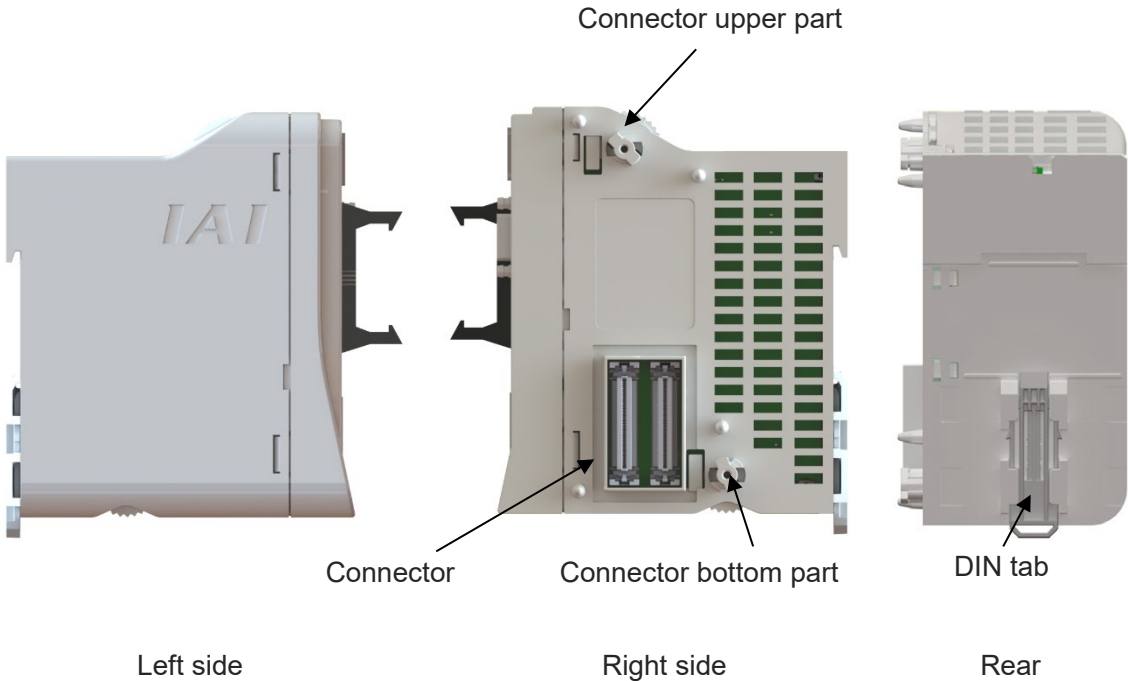
The following table shows the product configuration for the standard specification. See the packing list for the details of the enclosed components. In the unlikely case that any model number errors or missing parts come to light, contact your local IAI distributor.

	Part name	Shape	Quantity	Remarks
Body	SEL unit		1	Model example : RSEL-G-*
	Terminal unit		1	Single product model number : RCON-GW-TR (Not supplied with TRN specification)
Accessory	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
	First Step Guide		1	ME0393
	Safety Guide		1	M0194

3.1.4 Part names/Functions

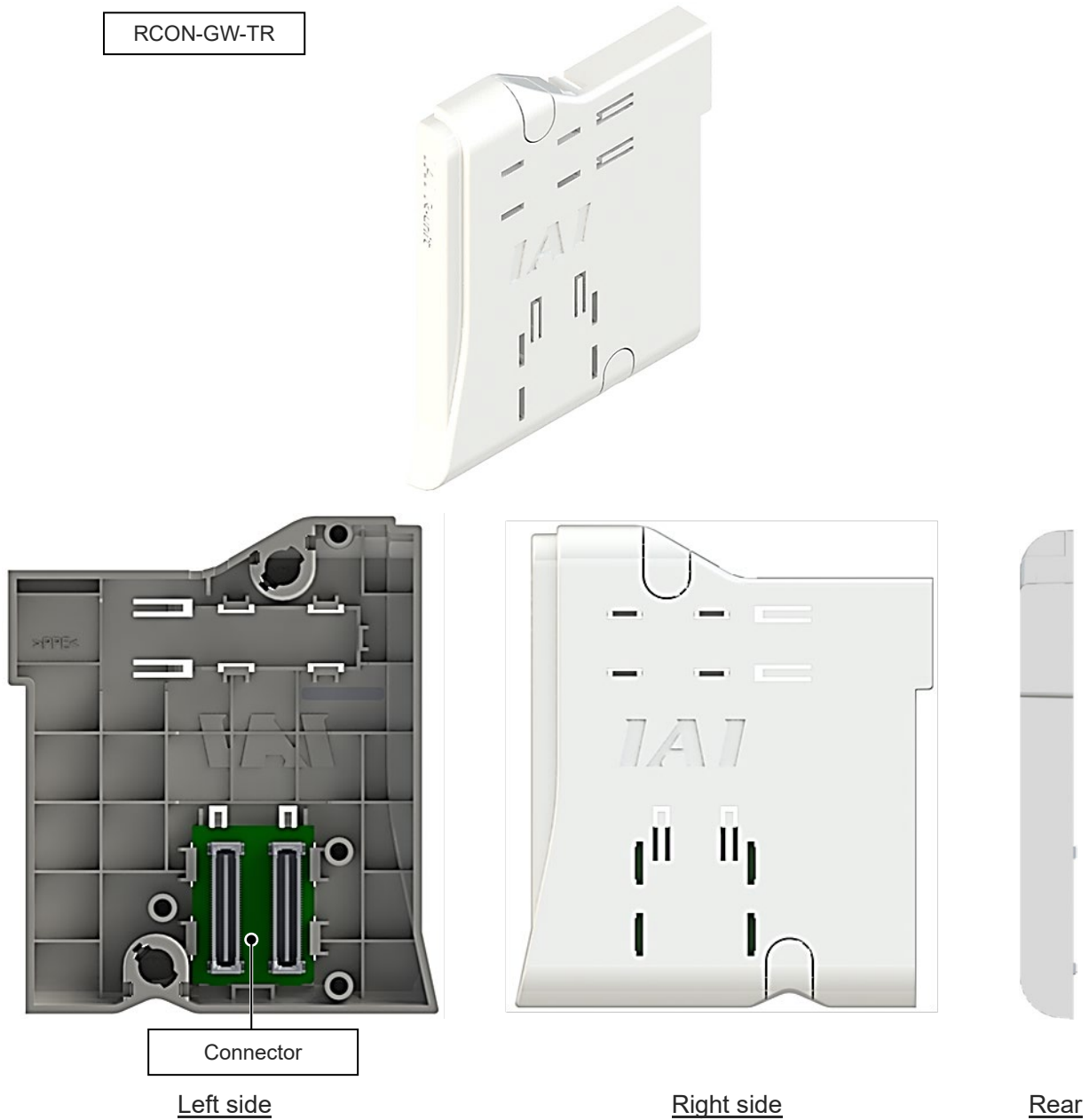
[SEL unit]





[Terminal unit]

RCON-GW-TR

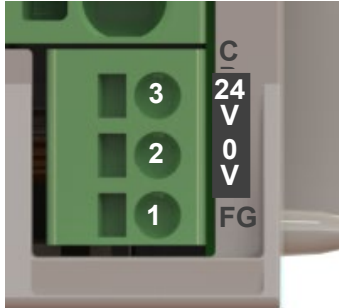
**Danger**

- 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]

(1) Control power connector

It is a connector for the control power supply (24V DC) and FG (frame grounding). It provides the control power supply to all the units linked to the SEL unit and also the power supply to the actuator brake.



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 ~ 3.5 mm ²)	
Strip length	10 mm	
Rated Temperature on Isolation Coatin	60°C or more	

- * 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. Cutting off on the 0V first when cutting off the both ends should make the electric potential unstable. It may lead to malfunction of components inside the controller.
- * 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

It is a connector for the motor power supply (24V DC). It provides the power supply to the 24V driver unit linked to the SEL unit and the motor in ELECYLINDER linked to the EC connection unit.



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	1,000V (II/2)	
Rated current	41A	
Connection cable specification		
Item	Specification	
Compatible wire	AWG20 ~ 8 (0.5 ~ 8 mm ²)	
Strip length	15 mm	
Rated Temperature on Isolation Coating	60°C or more	

- * 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 +24V. Cutting off on the 0V first when cutting off the both ends should make the electric potential unstable. It may lead to malfunction of components inside the controller.

(3) System status LED

It is a set of LED lamps to display the status of the SEL unit and field network.



Chapter 3 Specifications for each unit

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 OFF	Not Ready
		Blinking (2Hz)	Updating
		Blinking (0.5Hz)	Update Complete
		Light ON	Ready
	Orange	Light OFF	Not Alarm
		Light ON	Alarm
Blinking		Control power voltage drop detection	
MODE	Green	Light OFF	MANU (manual operation) mode ON
		Light ON	AUTO (automatic operation) mode ON
		Blinking	System-shutdown level error is present
PWR	Green	Light OFF	Power not Supplied, Startup Error
		Light ON	Power on normal condition
STOP	Red	Light OFF	STOP not Input
		Light ON	STOP under Input
ENB	Green	Light OFF	In Disable Status
		Light ON	Enable status

(4) System operation setting switch

It is a switch to set the system operation mode.



OFF ⇔ ON

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

It is a connector to be connected to the PC software.

For how to install the driver, refer to [PC software (RSEL) Instruction manual (ME0398)].



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

It is a connector to be connected to the PC software or teaching pendant.



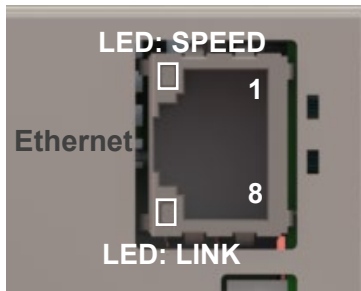
Model	HDR-EC26LFDT1-SLD+
Manufacturer	HONDA TSUSHIN KOGYO CO.,LTD
Rated voltage	AC125Vrms
Rated current	0.5A
Voltage Endurance	AC350Vrms
Contact Resistance	70mΩ or less

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

It is a connector for Ethernet communication.



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

Switches between automatic and manual operation.

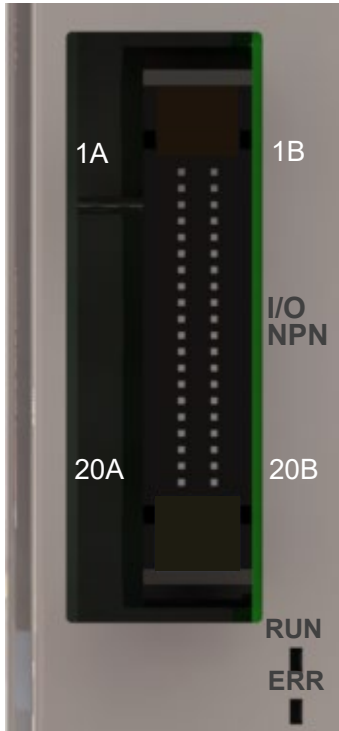


Model	CF-LD-1DC6-AG2W
Manufacturer	FUJISOKU
Setting	Signal name
MANU (Left side)	Operation mode
AUTO (Right side)	Automatic mode
Switch General Specifications	
Electrical Life	10,000 ~ 50,000 times

(9) I/O Slot

It is a slot to mount a connector to establish connectivity to PIO or field network.

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

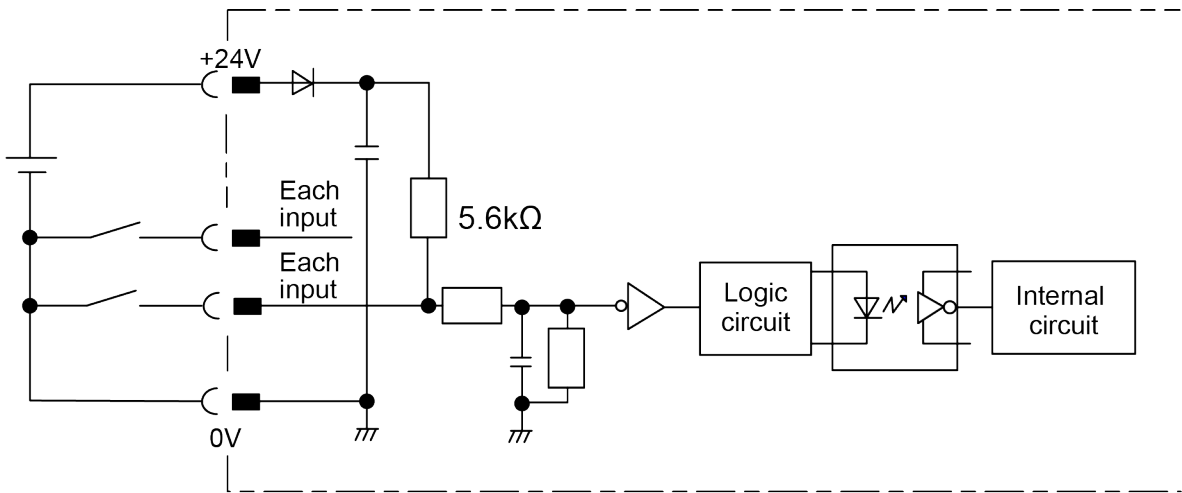
- LED specifications

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

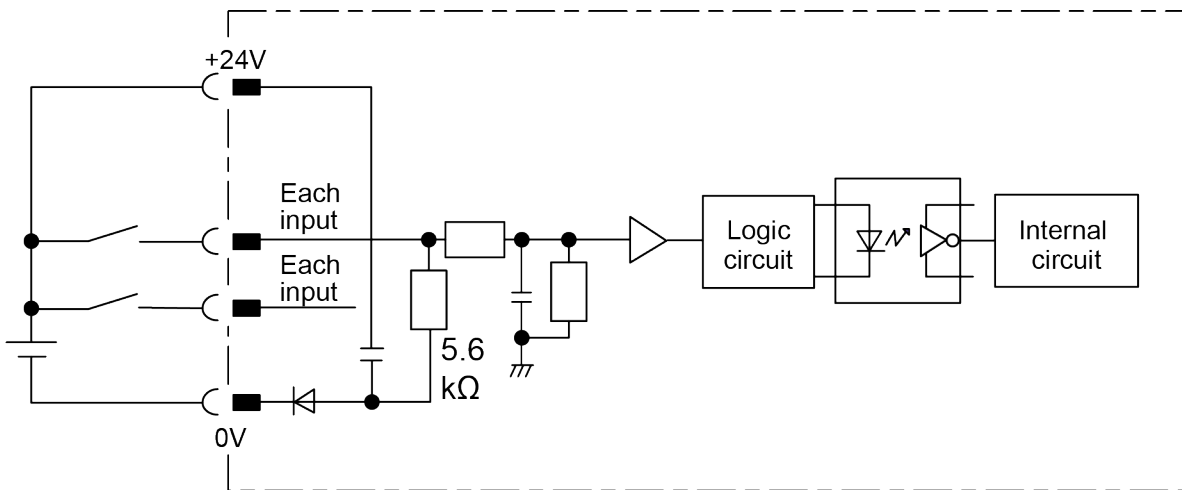
• External input specifications

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

[NPN specification]



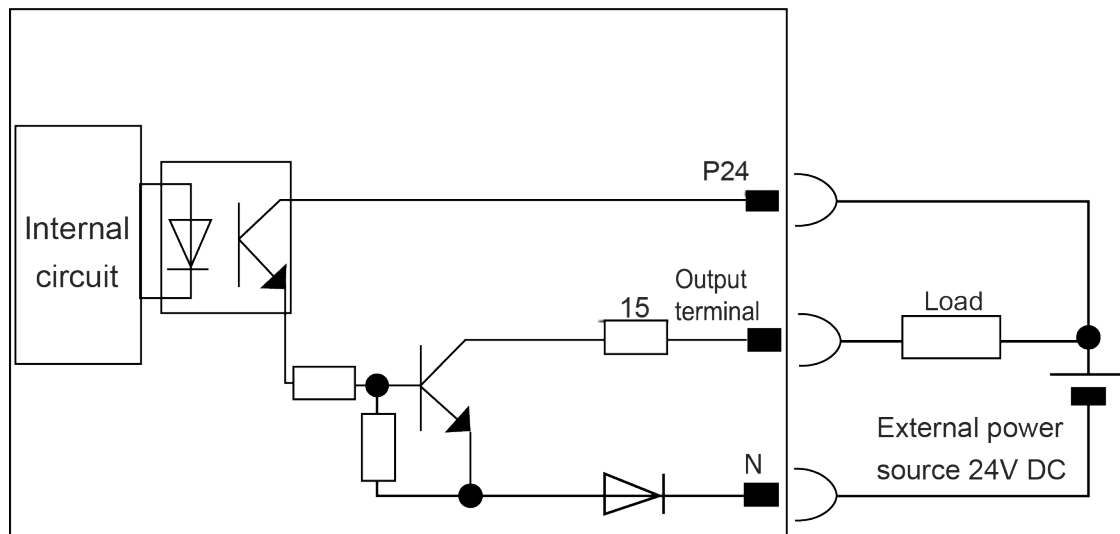
[PNP specification]



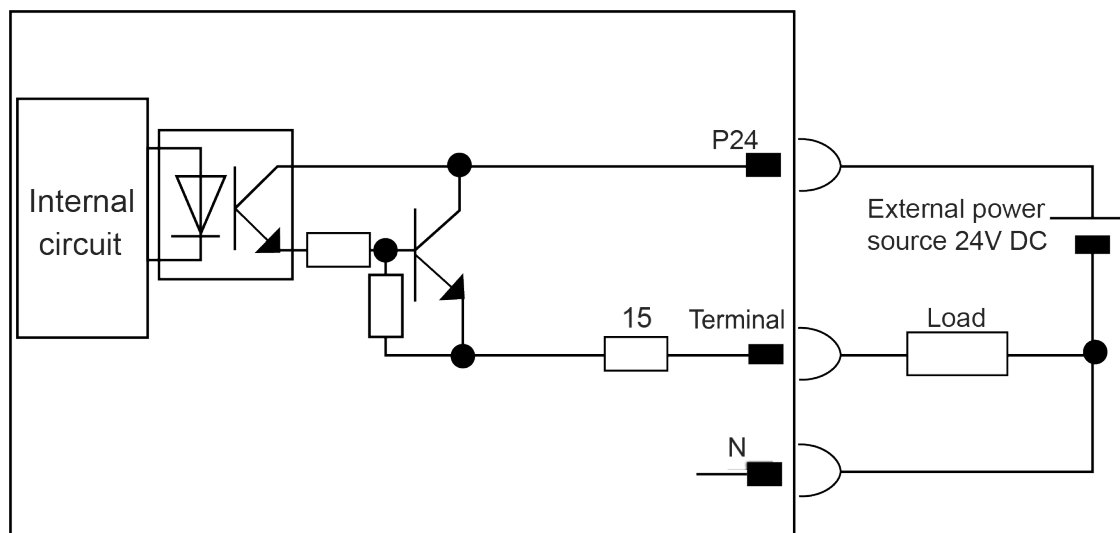
• External output specifications

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

[NPN specification]



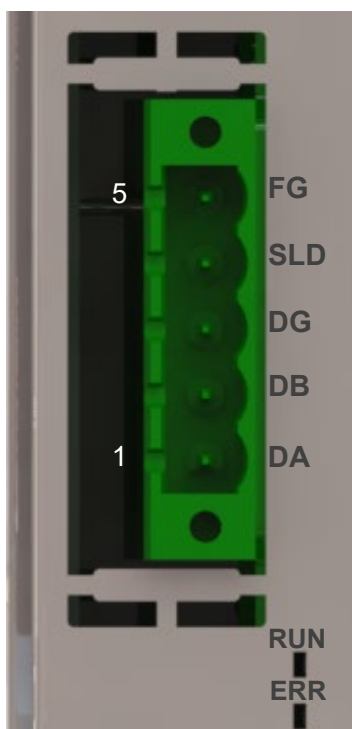
[PNP specification]



● Pin Assignment

Pin No.	Class	Assignment	Pin No.	Class	Assignment
1A	24	P24	1B	Output	OUT0
2A	24	P24	2B		OUT1
3A	–	–	3B		OUT2
4A	–	–	4B		OUT3
5A	Input	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		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

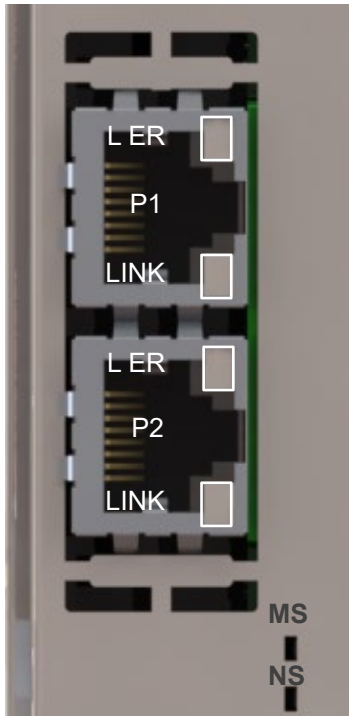


Model	MSTB2.5/5-GF-5.08AU	
Manufacturer	Phoenix contact	
Pin No.	Signal name	Description
1	DA	Signal line A
2	DB	Signal line B
3	DG	Digital GND
4	SLD	Connects the shield of shielded cables
5	FG	Frame ground
Connection cable specification		
Item	Specification	
Recommended Unsheathed Length	7 mm	
Mating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

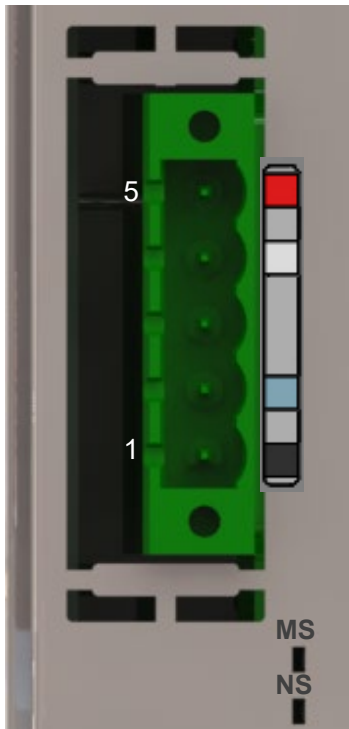


Chapter 3 Specifications for each unit

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)
		Light OFF	Receive data normal, Power not supplied

- DeviceNet

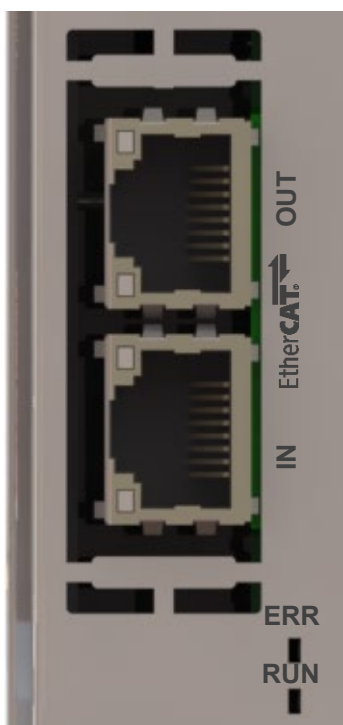


Model	MSTB2.5/5-GF-5.08AU	
Manufacturer	Phoenix contact	
Pin No.	Signal name	Description
1	Black	Power supply cable - side
2	Blue	Signal data Low side
3	-	Shield
4	White	Signal data High side
5	Red	Power supply cable + side
Connection cable specification		
Item	Specification	
Recommended Unsheathed Length	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

Chapter 3 Specifications for each unit

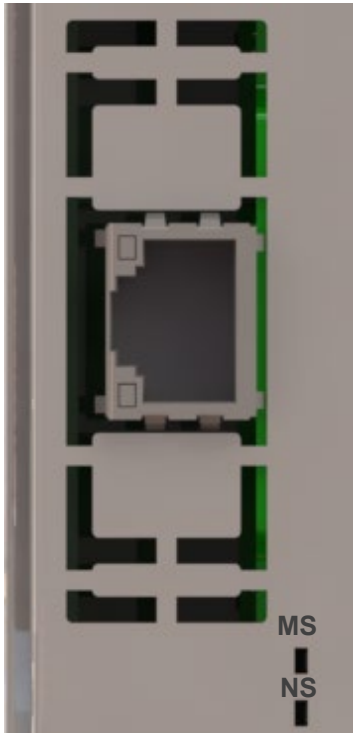
- EtherCAT



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	

• EtherNet/IP

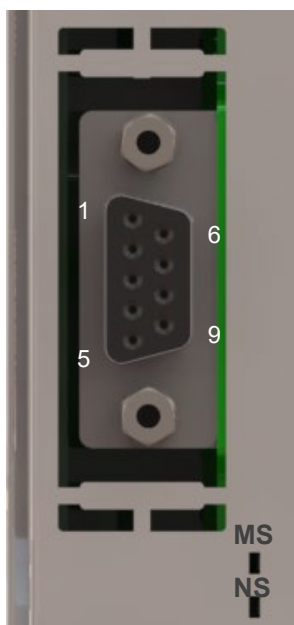


Chapter 3 Specifications for each unit

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
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

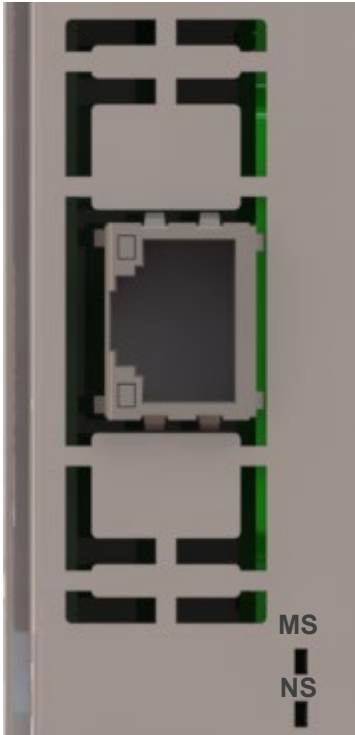
- PROFIBUS-DP



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)

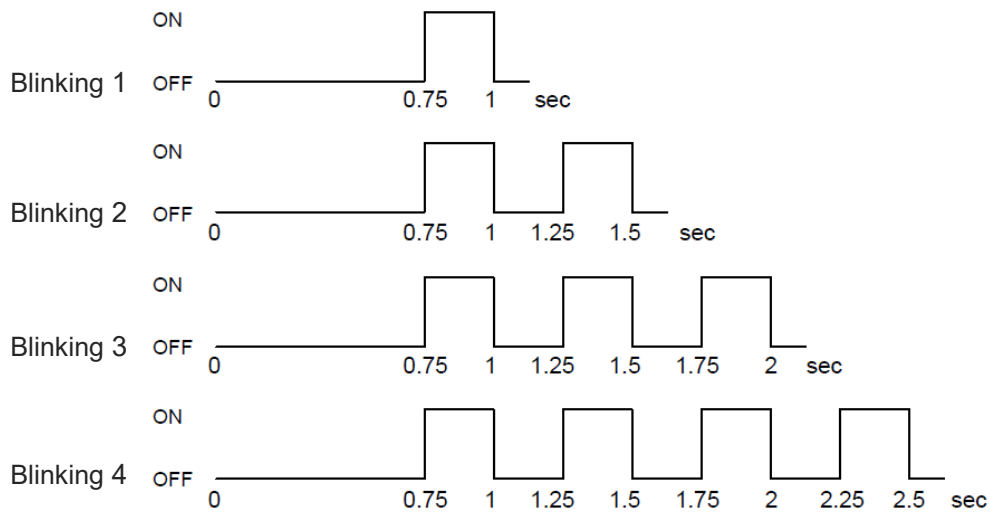
LED name	Color	Status	Content
MS	Green	Light ON	Initialization complete
		Blinking	Initialization complete (diagnosis event found)
	Orange	Light ON	Error occurrence (Exception error)
NS	Green	Light ON	Online status
		Blinking	Online status (clear status)
	Orange	Light ON	Error occurrence (Parameter error,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

- PROFINET IO



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

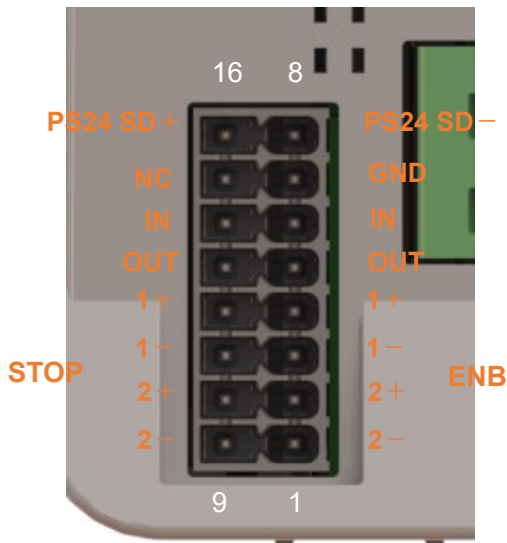
Chapter 3 Specifications for each unit



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

It is an input and output connector to manage the safety operation control of a controller. It is also equipped with the serial communication to the 24V power supply unit “PSA-24”.



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.

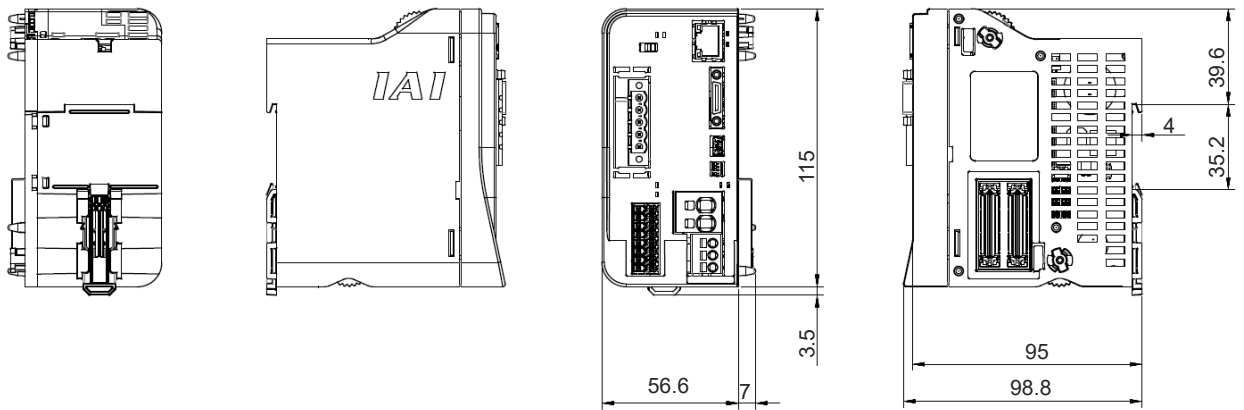
Chapter 3 Specifications for each unit

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 RS-485 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 RS-485 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 ~ 1.25 mm ²)	
Strip length		10 mm	

3.1.5 External dimensions

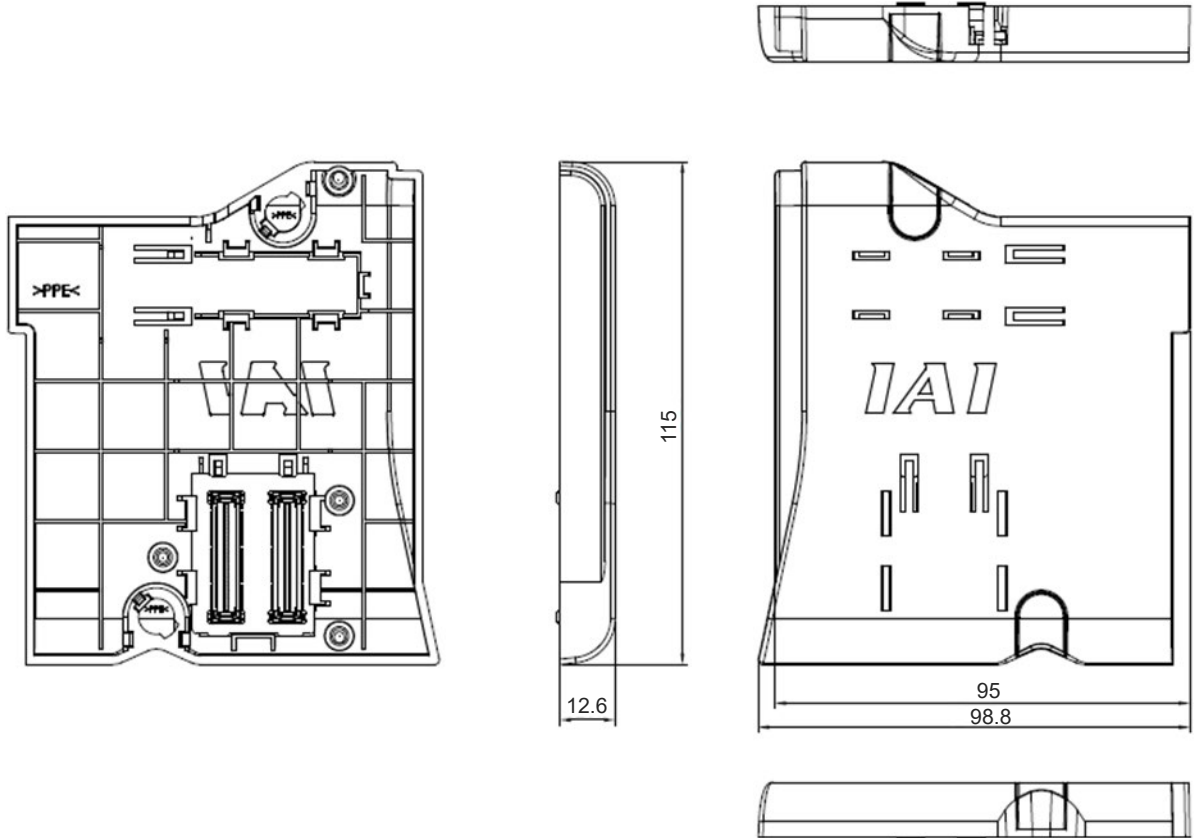
[SEL unit] RSEL-G-*

Item	Specification
External dimensions	W56.6 mm × H115 mm × D95 mm
Mass	Approx. 265g
External view	See figure below



[Terminal unit] RCON-GW-TR

Item	Specification
External dimensions	W12.6 mm × H115 mm × D95 mm
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.

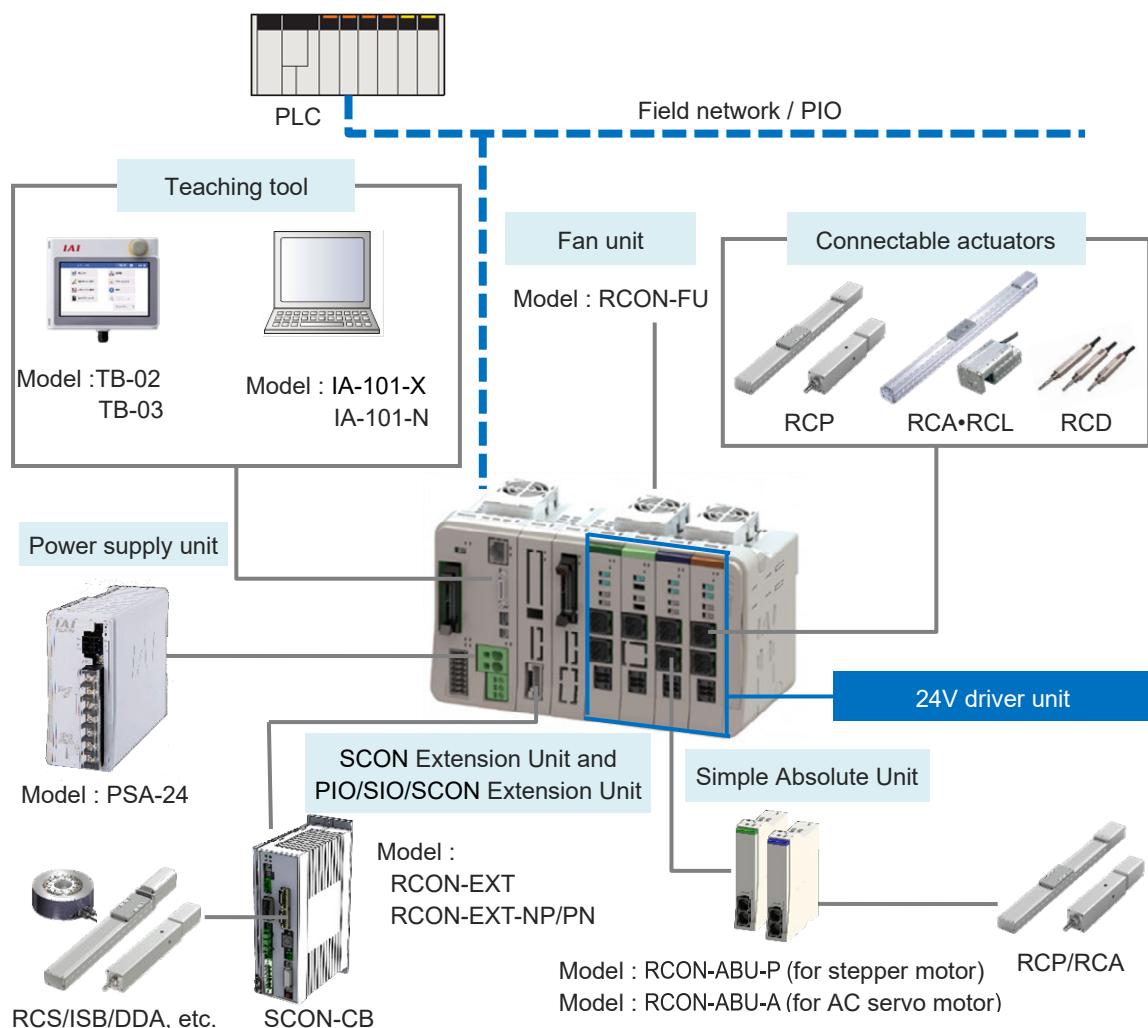
There are 4 types of driver unit available to suit the type of actuator motor controllable.

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

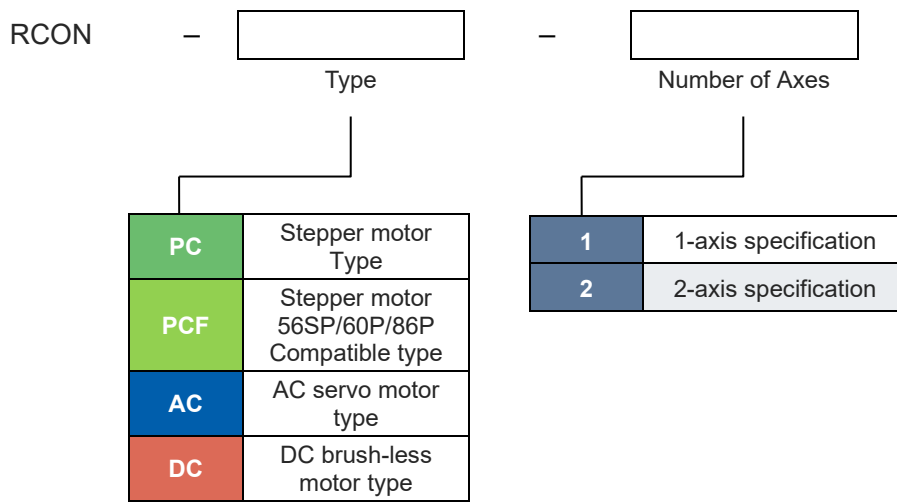
The model of the driver unit is as follows.

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

There is only one type.

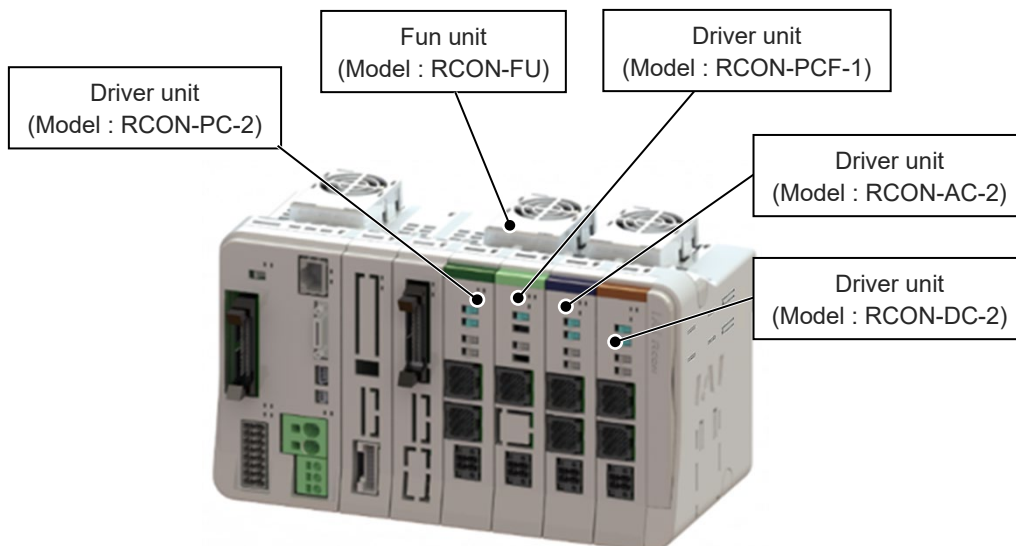
(1) How to Read the Model Number

[24V Driver unit]



[Fun unit]

RCON - FU



(2) How to read the model nameplate

[24V Driver unit]

[Nameplate Location]

Model number →
Serial number →

Caution Mark
High Temperature
Caution Mark

Type / Serial number →
Model Code →

Connecting actuator model number →
(AXI: 1st axis, AXII: 2nd axis)

IAI Corporation
c **UL** us **CE**

MODEL RCON-AC-2
SER NO. X000000 X0
INPUT DC24V, 3.2A
OUTPUT
AX I : 0-24Vac, 3ph, 0-333Hz, 1.6A
AX II : 0-24Vac, 3ph, 0-333Hz, 1.6A
IP20

MADE IN JAPAN

QR

RCON-AC X000000 X0
RCON-AC-2

AXI : RCA-SA6C
L=16, ST=500
AX II : RCA-SA6C
L=16, ST=500

IAI Corporation
c **UL** us **CE**

MODEL RCON-AC-2
SER NO. X000000 X0
INPUT DC24V, 3.2A
OUTPUT
AX I : 0-24Vac, 3ph, 0-333Hz, 1.6A
AX II : 0-24Vac, 3ph, 0-333Hz, 1.6A
IP20

QR

RCON-AC X000000 X0
RCON-AC-2

AXI : RCA-SA6C
L=16, ST=500
AX II : RCA-SA6C
L=16, ST=500



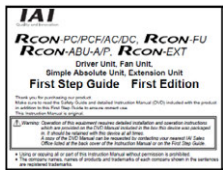
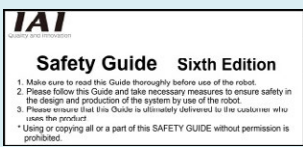
MADE IN JAPAN

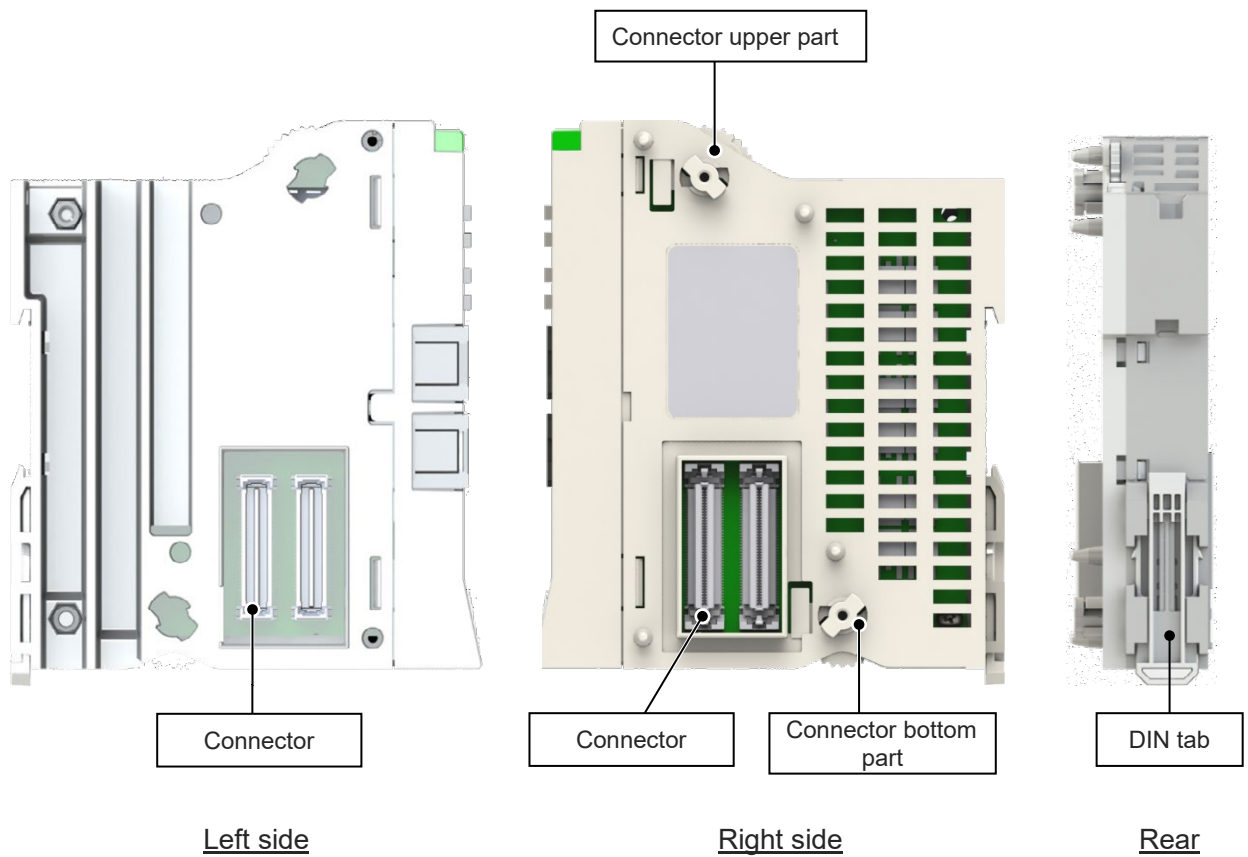
Mark	Explanation of Mark
	Use IAI specified cables only.
	Do not touch product when power is ON. Risk of burn.

3.2.3 Components

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

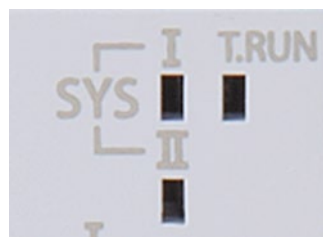
See the packing list for the details of the enclosed components. In the unlikely case that any model number errors or missing parts come to light, contact your local IAI distributor.

	Part name	Shape	Quantity	Remarks
Body	Driver unit		1	Model example : RCON-PC/PCF/AC/DC
Accessory	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



(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
	Orange	Light ON	Bus communication error generated
	Light OFF		Communication stop
SYS (I: 1st axis II: 2nd axis)	Green	Light ON	Servo ON
		Blinking	Not to use
	Red	Light ON	Alarm triggered. STOP signal input OFF (Drive source cutoff triggered)
		Blinking	Not to use
	Light OFF		Servo OFF, axis disable setting



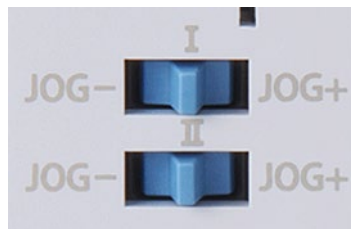
(3) Jog switch

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.



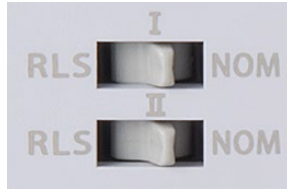
Symbol	Description
JOG +	Jog operation in + direction (home reverse direction)
JOG -	Jog operation in - direction (home direction)

**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 Axis setting] 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>R</u> elease)
NOM	Brake lock (<u>N</u> ormal)

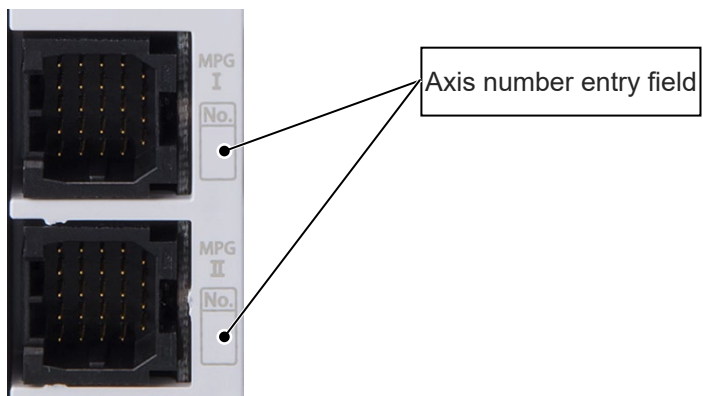


Warning

- 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/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 Axis setting]



RCON-PC/PCF Driver Unit

Pin No.	Signal name	Description
1	A+	Encoder phase A+ input
2	BK-	Brake release - side
3	ϕ A+	Motor drive line phase A+
4	ϕ A-	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	ϕ B+	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	ϕ B-	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

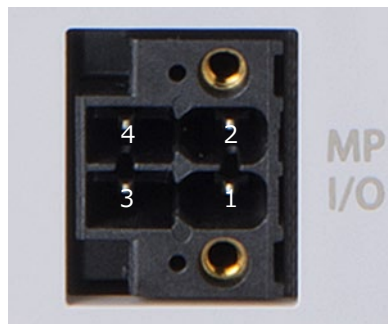
Pin No.	Signal name	Description
1	B+	Encoder phase B+ input
2	LS-	Limit switch - side
3	U	Motor drive line phase U
4	W	Motor drive line phase W
5	V	Motor drive line phase V
6	B-	Encoder phase B- input
7	GND	0V
8	BK+	Brake release + side
9	NC	Not connected
10	NC	Not connected
11	Z+ / ENC_SD+	Encoder phase 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)

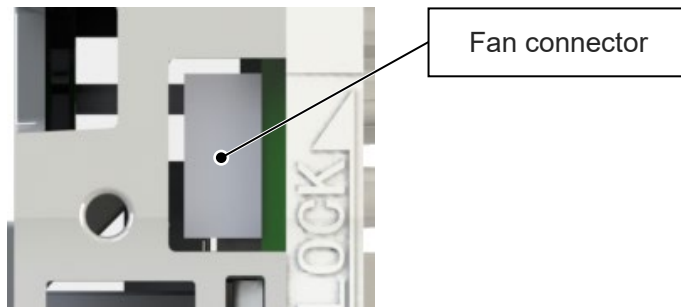
Pin No.	Signal name	Description
1	MPO_II	Motor power output (2nd axis)
2	MPO_I	Motor power output (1st axis)
3	MPI_II	Motor power input (2nd axis)
4	MPI_I	Motor power input (1st axis)

Cable side connector compatible wire

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

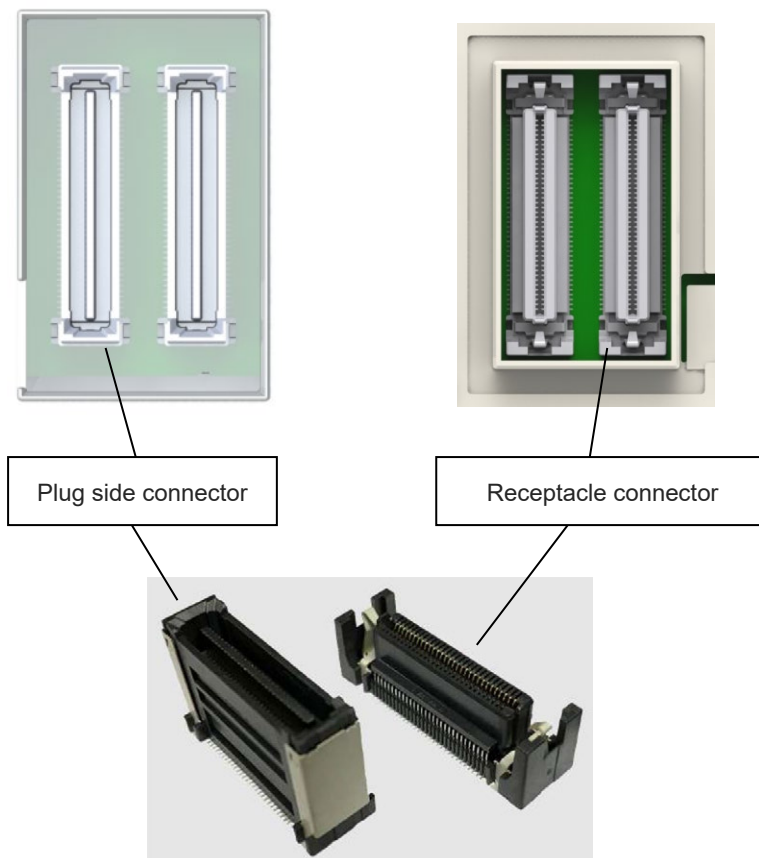
(7) Fan connector

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



(8) Connectors

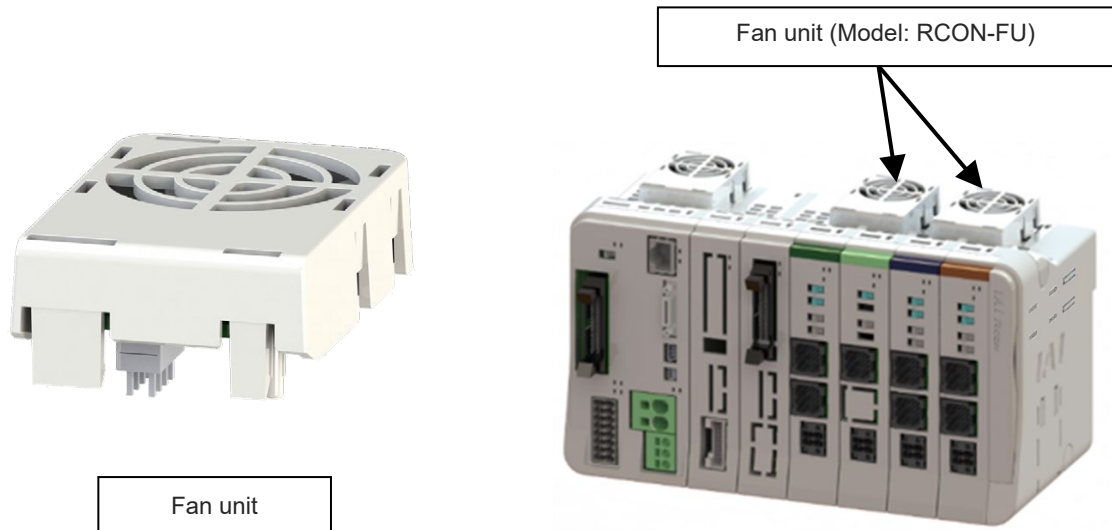
A connector for use between units. Two identical connectors are used. The connectors have a floating structure that absorbs connector misalignment due to housing mating or mounting misalignment between connectors.



(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.

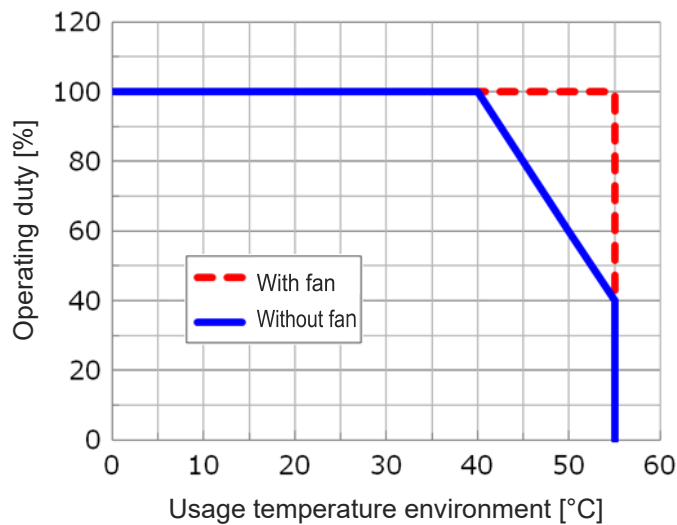


Chapter 3 Specifications for each unit

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.

(Alarm code : 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.

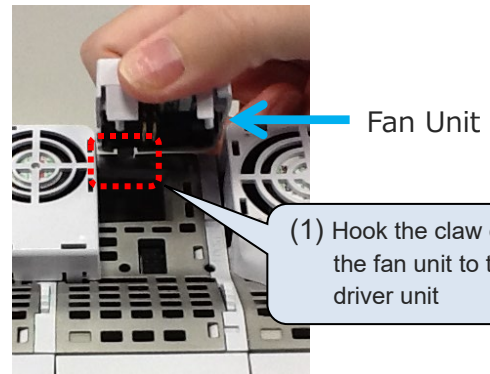


[How to Replace Fan Unit]

<Attaching Fan Unit>

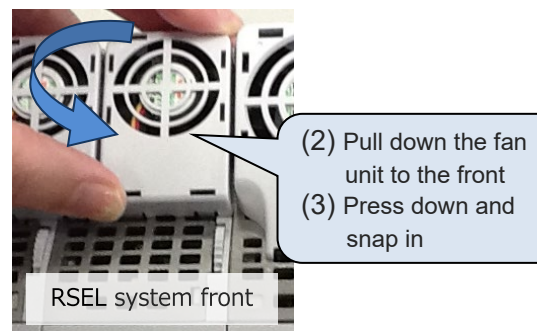
- (1) Adjust the installation orientation of the RSEL system and new fan unit.

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



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

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



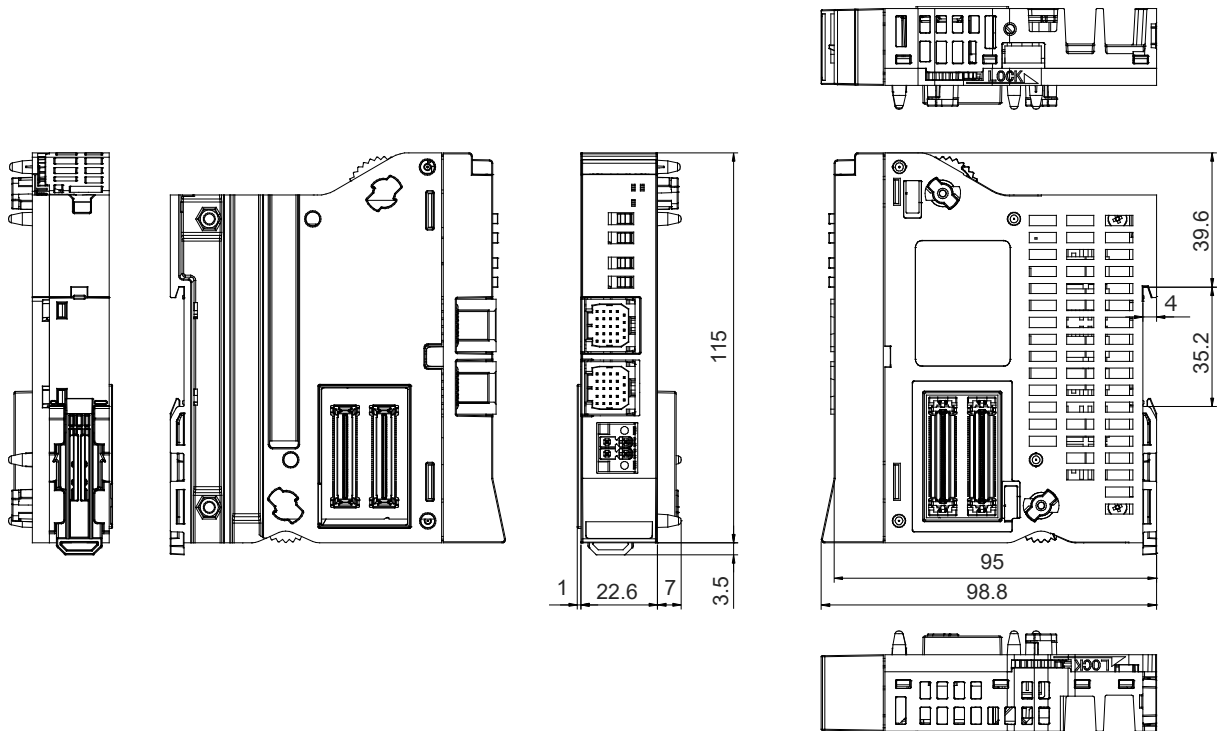
Regarding the how to replace fan unit, refer to [12.3.2 How to Exchange Fan Unit].

3.2.5 External dimensions

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

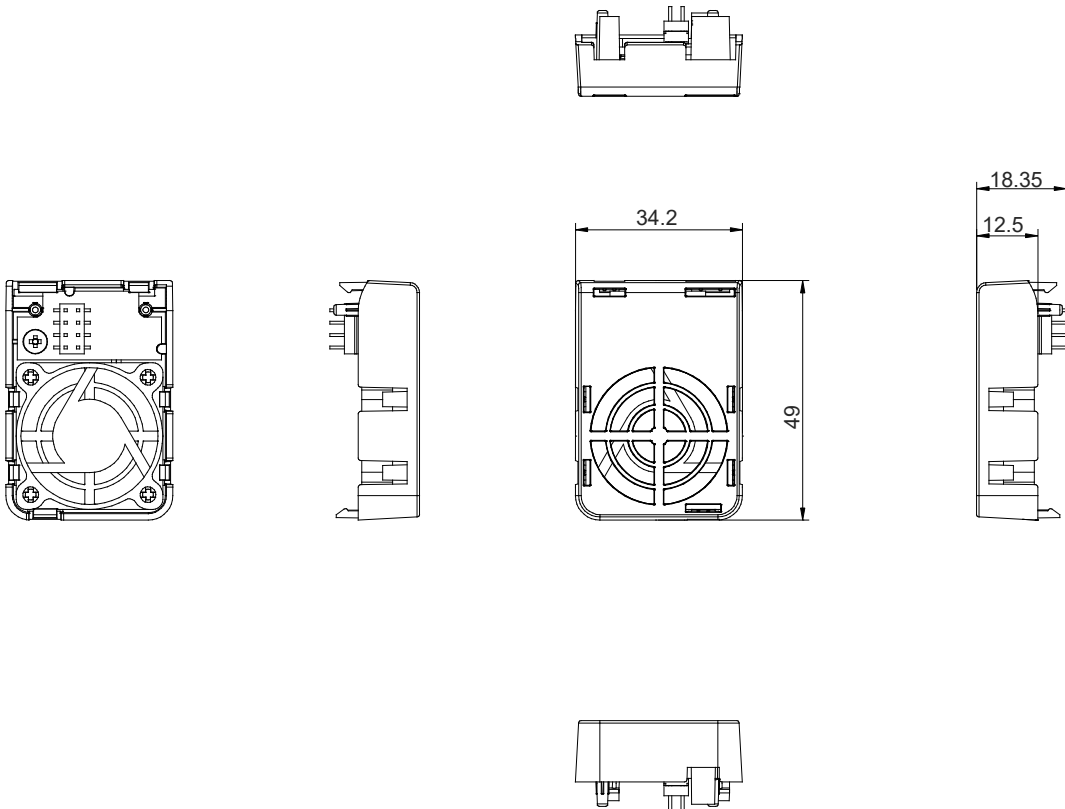
Item	Specifications
External dimensions	W22.6 mm × H115 mm × D95 mm
Mass	Approx. 180g (2-axis specification), Approx. 175g (1-axis specification)
External view	See figure below

Chapter 3 Specifications for each unit



[Fan unit] RCON-FU

Item	Specifications
External dimensions	W34.2 mm × H49 mm × D12.5 mm
Mass	Approx. 16g
External view	See figure below



3.3 200V Power Supply Unit, for 200V Terminal Unit

3.3.1 Overview

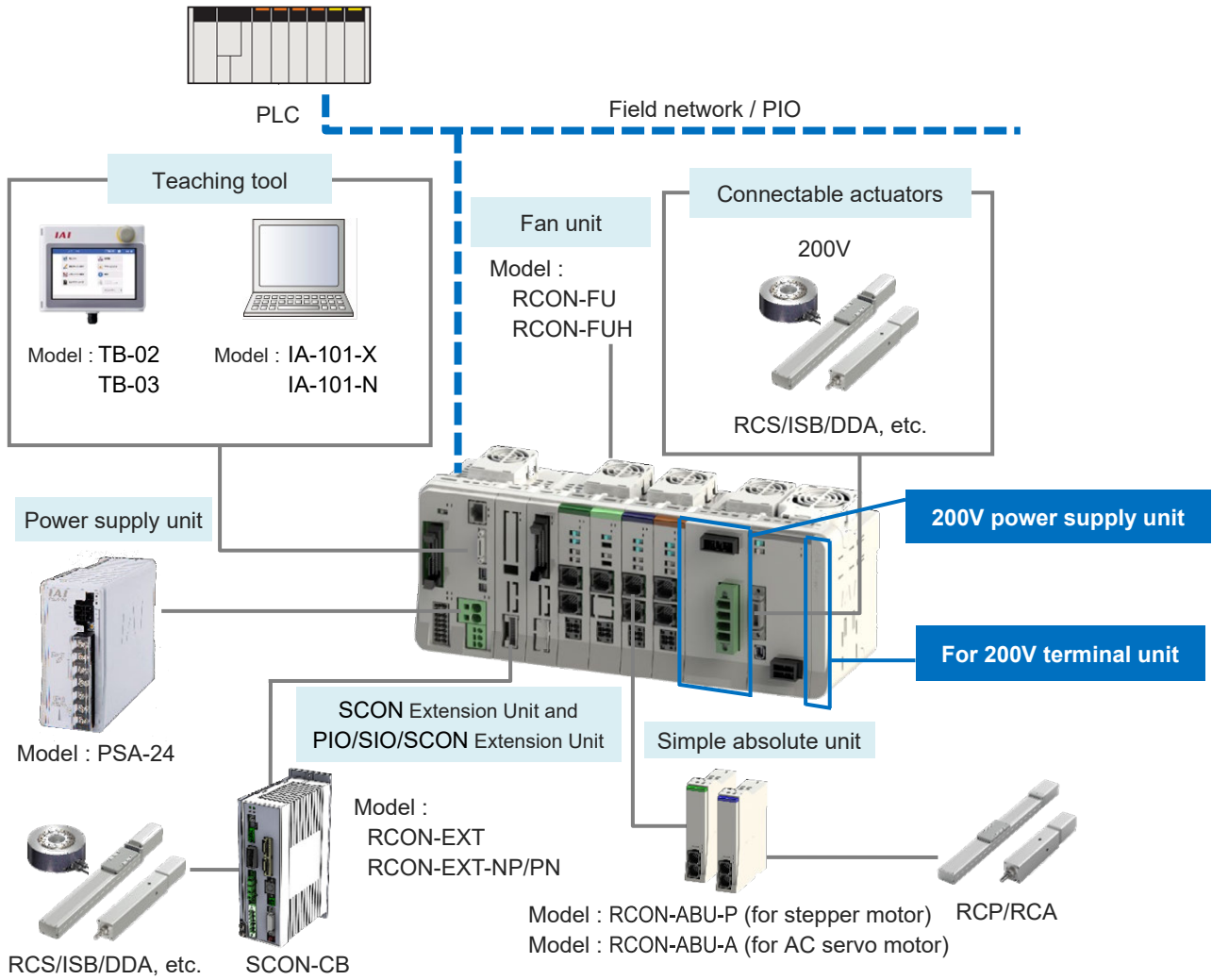
The power supply unit is dedicated for 200V AC (single-phase / 3-phase). It is necessary when using the 200V driver unit.

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.

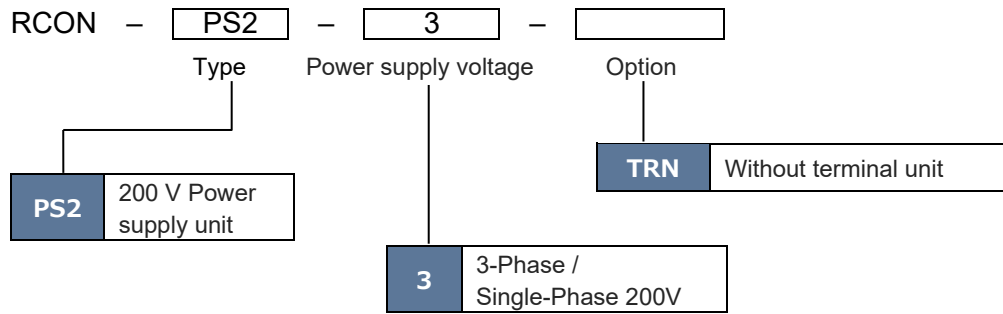


There is a built-in regenerative resistor of 60W equipped in 200V power unit, 200V driver unit. The regenerative resistor is basically not necessary, but use an external regenerative resistor unit in case of shortage in regenerative resistor. Refer to [4.6 Regenerative Resistor (Option)]

3.3.2 Model code

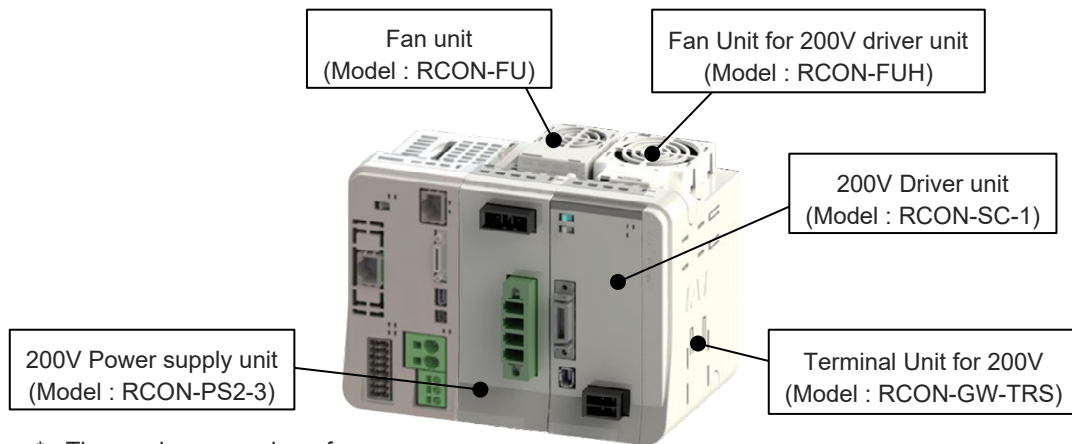
(1) How to Read the Model Number

[200V power supply unit]



[Terminal Unit for 200V]

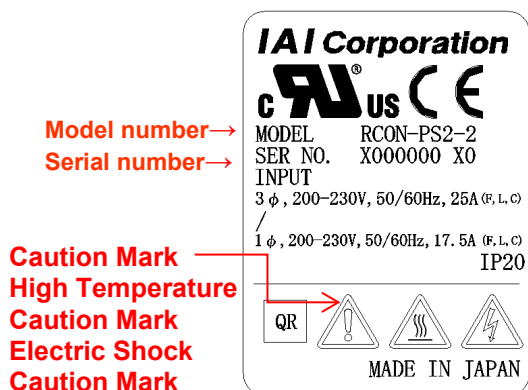
RCON - GW - TRS



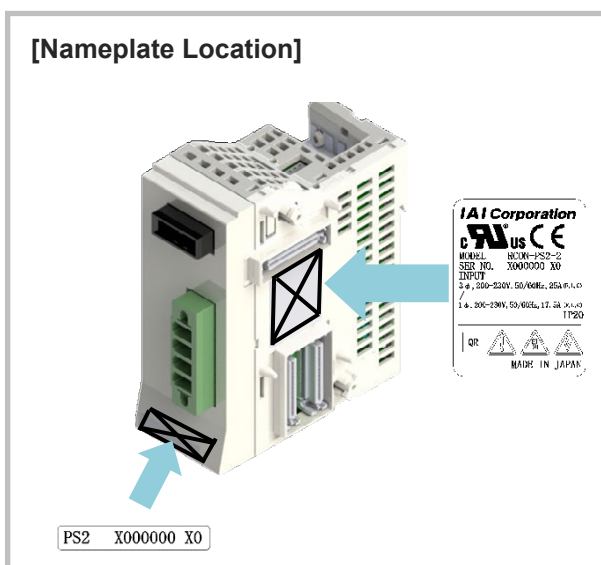
* The maximum number of connectable units is one unit.

(2) How to read the model nameplate

[200V Power Supply Unit]



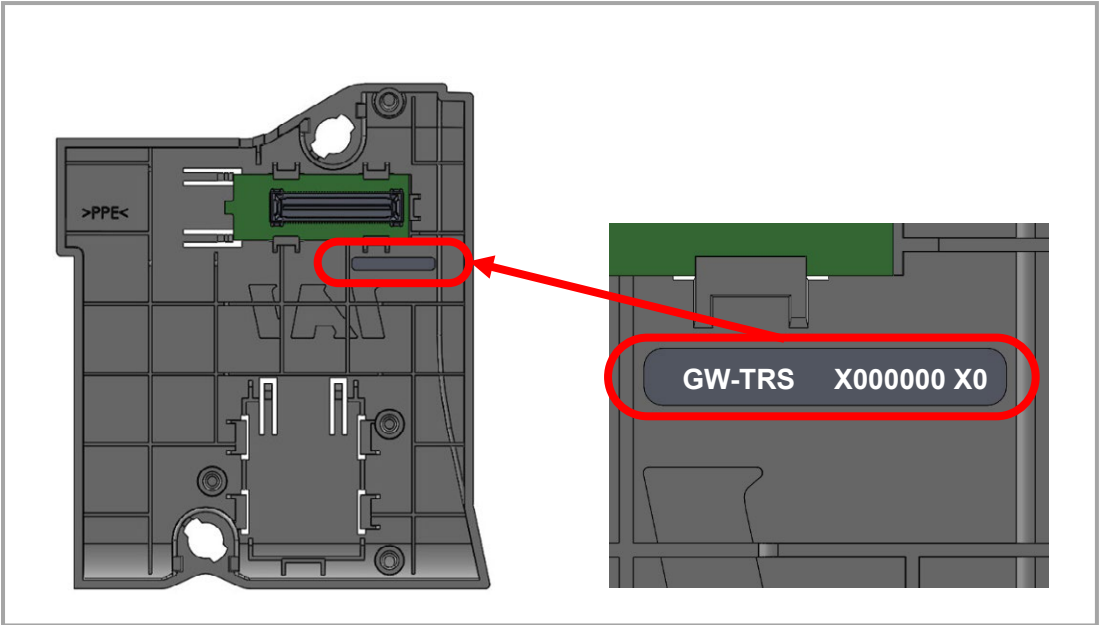
Type → PS2 X000000 X0
 ↑ Serial number



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

Mark	Explanation of Mark
	Use IAI specified cables only. 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.





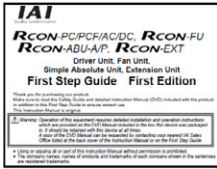
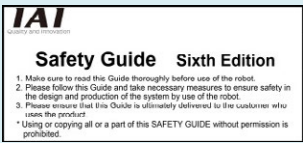
[Terminal Unit for 200V]



Chapter 3 Specifications for each unit

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
Body	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)
Accessory	Fan 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

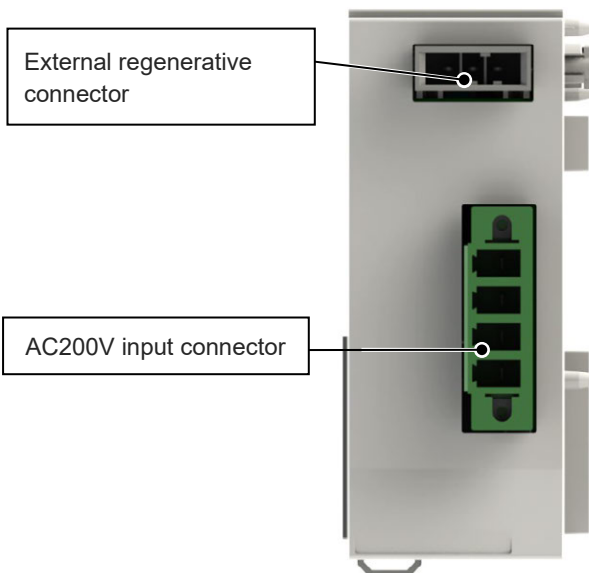


200V Power supply unit
RCON-PS2-3

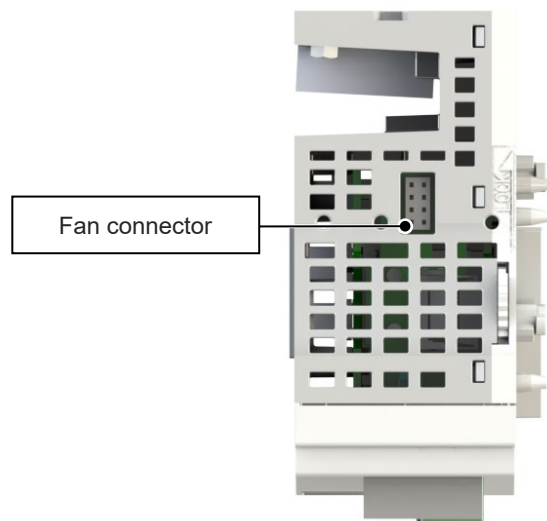


Terminal unit for 200V
RCON-GW-TRS

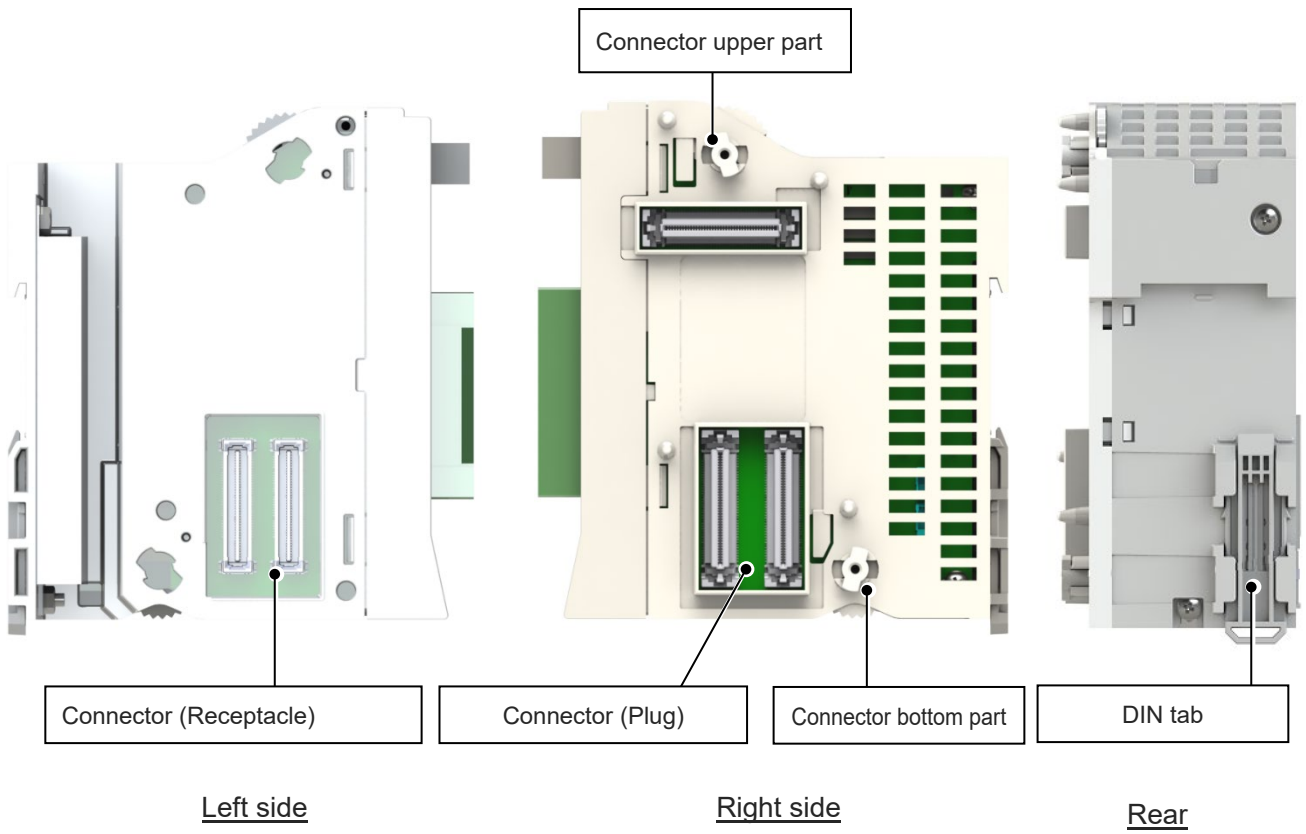
[200V Power Supply Unit]



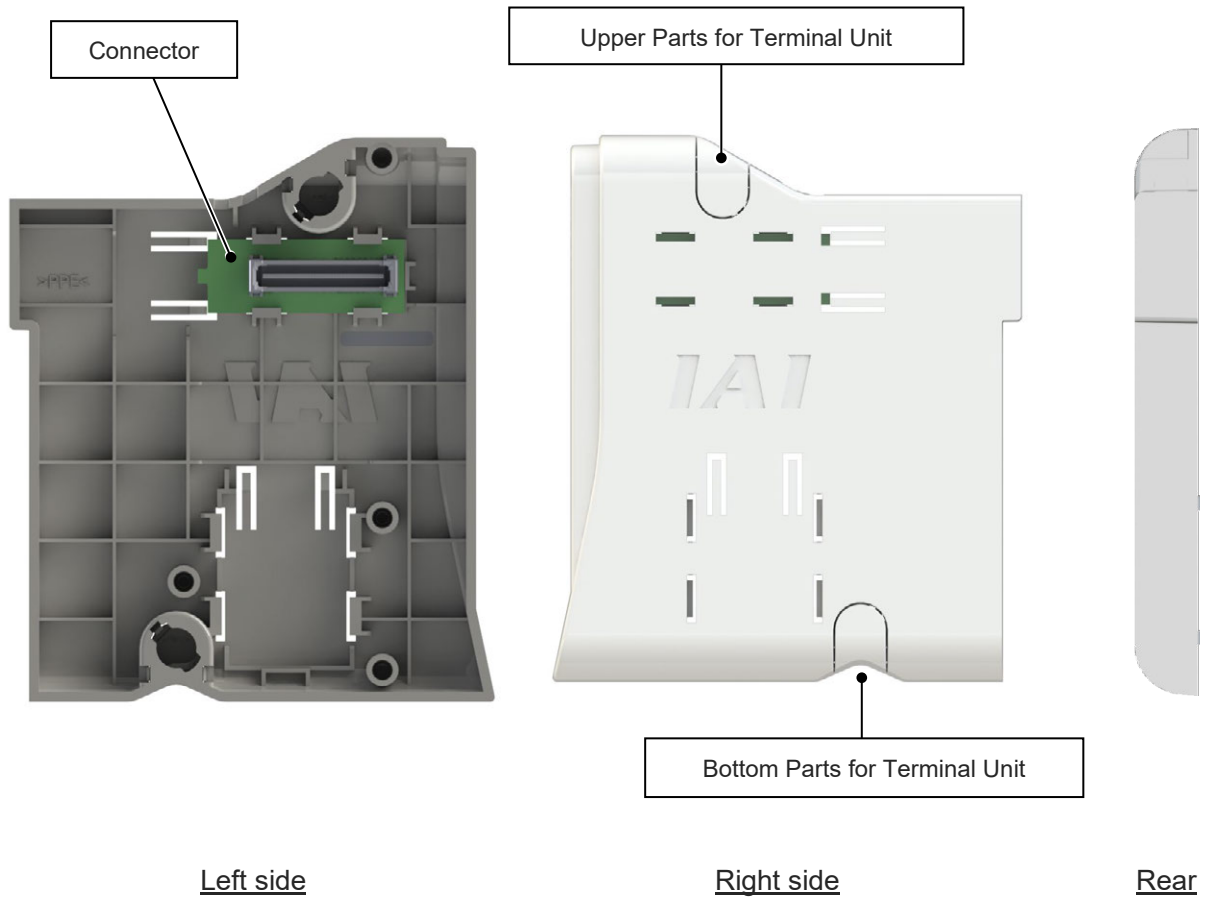
Front



Top



[Terminal Unit for 200V]



Chapter 3 Specifications for each unit



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.

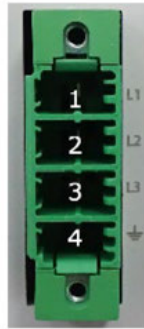


Pin No.	Signal name	Description
1	RB- (RB+)	Resistor
2	RB+ (RB-)	Resistor
3	⊕ (PE)	Protection grounding

Refer to [4.6 Regenerative Resistor (Optional)]

(3) 200V AC input connector

It is a connector for the 3-phase and single-phase 200V AC input. For three-phase AC200V, the total wattage that can be connected is 2,400W, and for single-phase AC200V, the total wattage is up to 1,600W.



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

3-Phase 200V

Pin No.	Signal name	Description	Remarks
1	L1	1st Phase	
2	L2	2nd Phase	
3	L3	3th Phase	
4	⊕	Protection Grounding	

Single-Phase 200V

Pin No.	Signal name	Description	Remarks
1	L1	Live	
2	L2	Neutral	
3	L3	No Connect	Not to be connected
4	⊕	Protection Grounding	

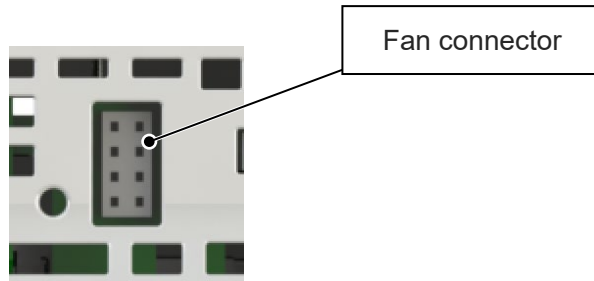
Cable side connector compatible wire

Item	Specifications
Compatible wire	AWG14 ~ 8 (Copper Wire)
Strip length	15.0 mm
Rated Temperature on Isolation Coating	60°C or more

(4) Fan connector

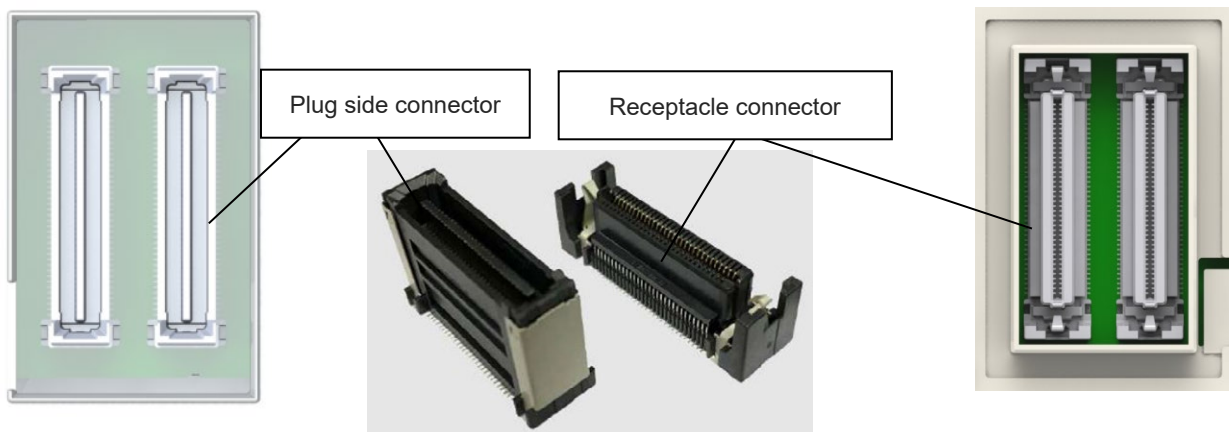
A connector to connect the fan unit. It is the same as the fan unit attached on the 24V driver unit.

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.

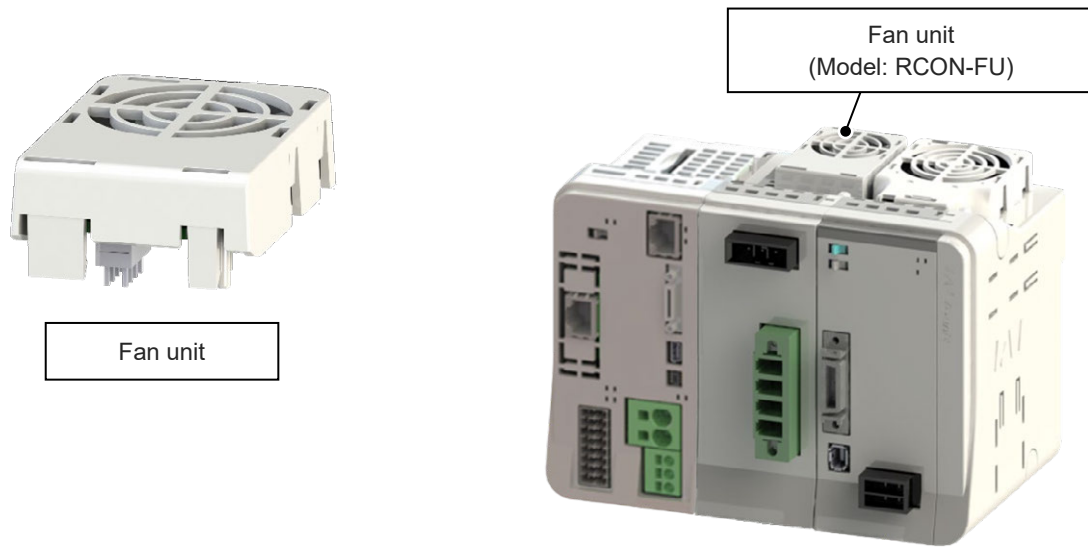


(6) Fan unit

It is an 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.

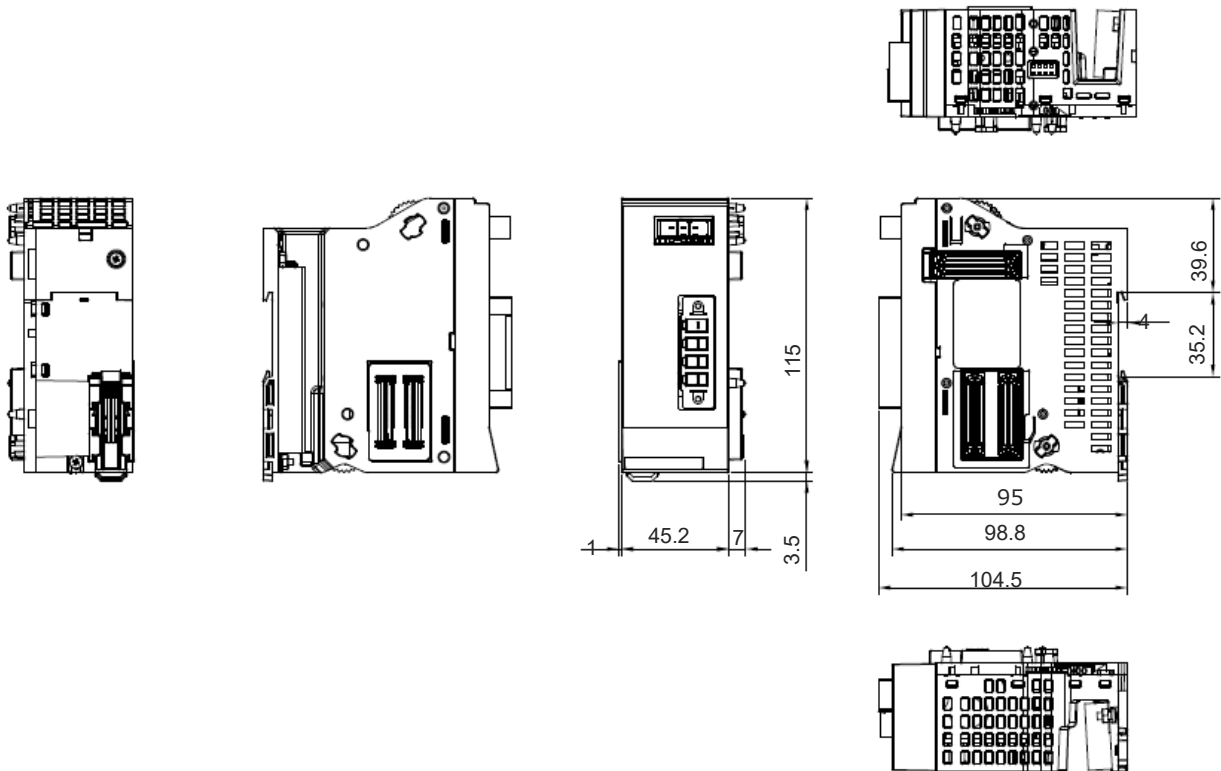


Refer to [3.2.4 (9) Fan unit] for more detailed information.

3.3.5 External dimensions

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

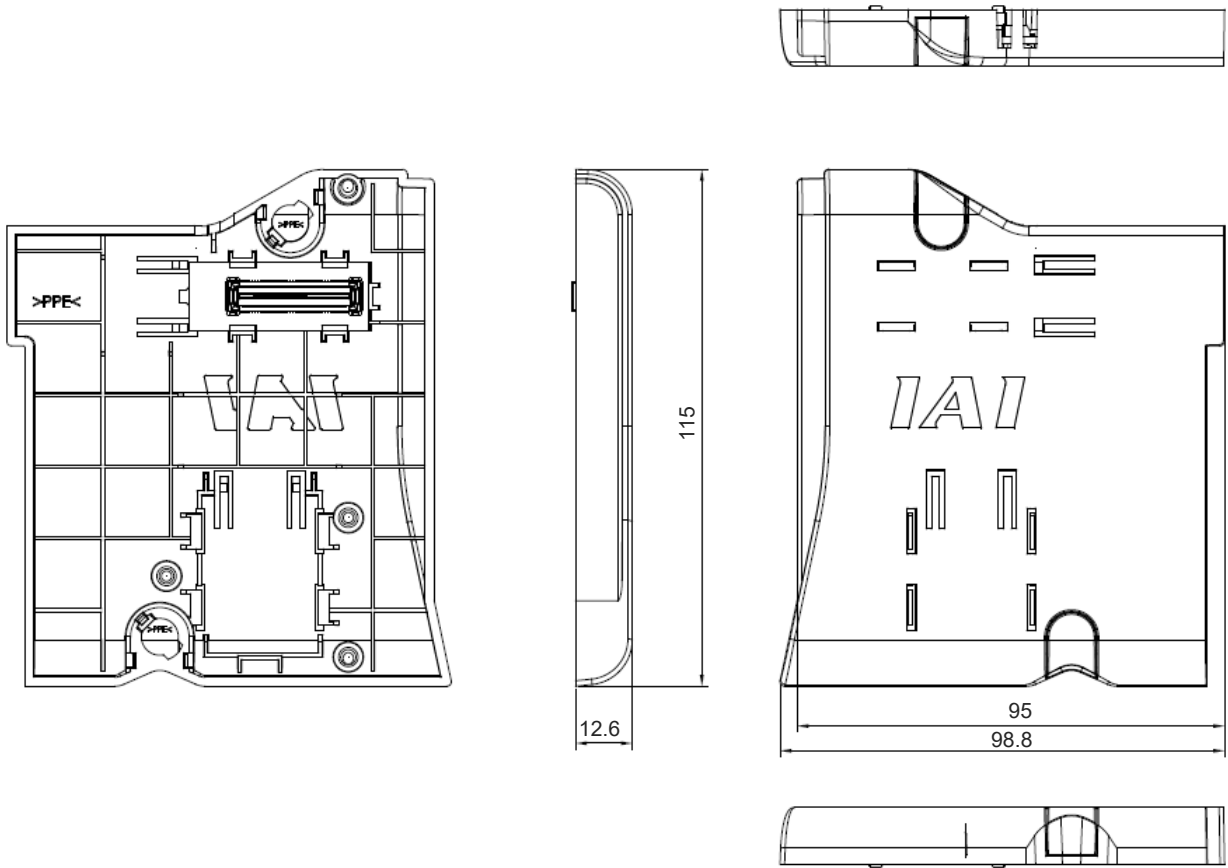
Item	Specifications
External dimensions	W45.2 mm × H115 mm × D95 mm
Mass	Approx. 395g
External view	See figure below



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

Item	Specifications
External dimensions	W12.6 mm × H115 mm × D95 mm
Mass	Approx. 40g
External view	See figure below

Chapter 3 Specifications for each unit



3.4 200V Driver Unit, Fan Unit for 200V Driver

3.4.1 Overview

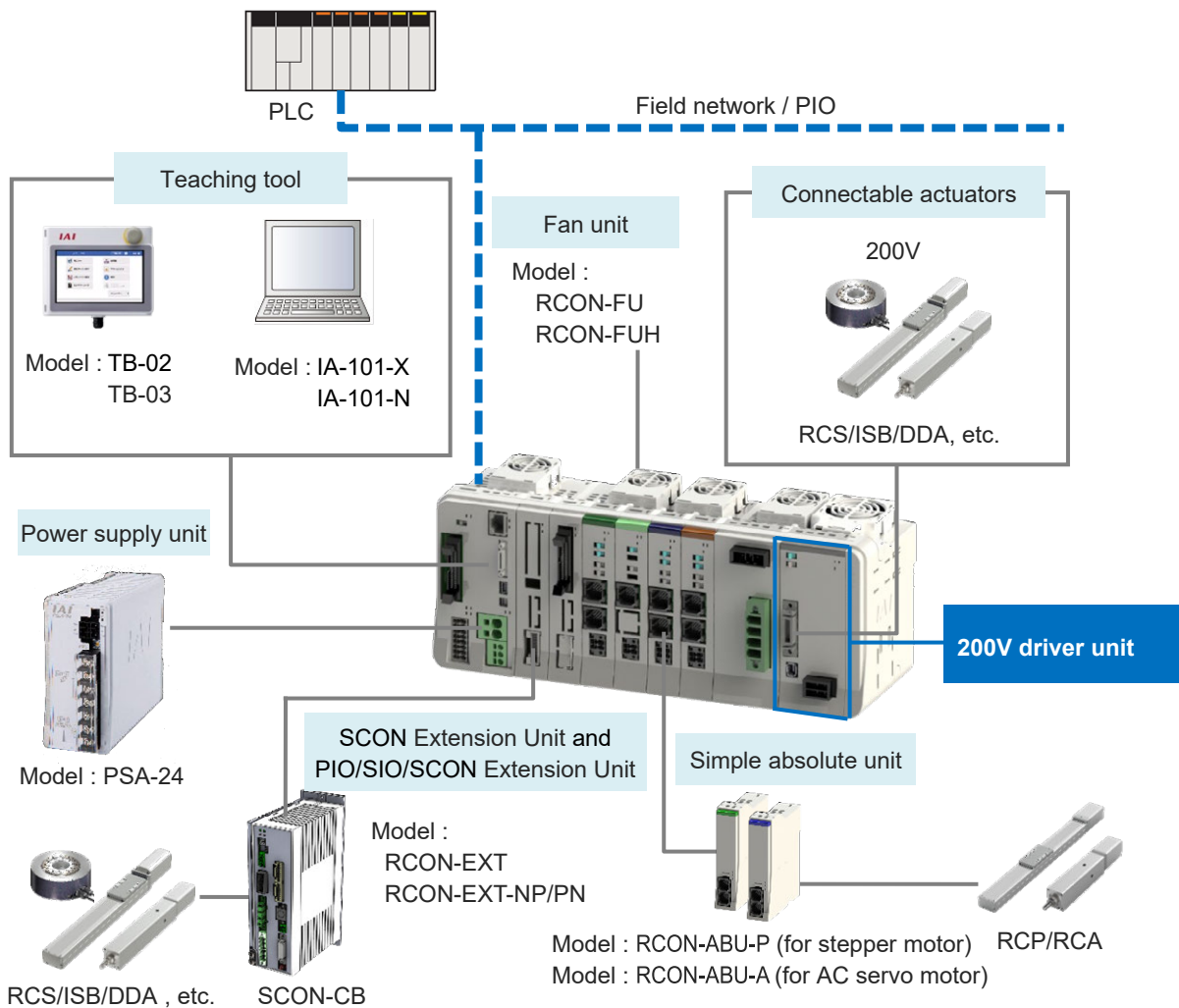
The 200V driver unit is a unit that connects and controls the 200V system actuators. The maximum number of axes available to control with one unit of the driver unit is one axis. It is a controller to perform control in the 200V actuator with SEL program via the SEL unit explained in 3.1.

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 60 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 16,00W max.
 - For 3-phase 200V·····Total wattage of actuators connected to RCON-SC should be 24,00W max.
- Direct link among driver units makes drastically simple wiring work.
- Installation on DIN rails makes it easy to install to a control board.



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 200VCombination that exceeds 2400W for total wattage of actuators connected to 200V driver unit
- 4) For Single-Phase 200VCombination 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.

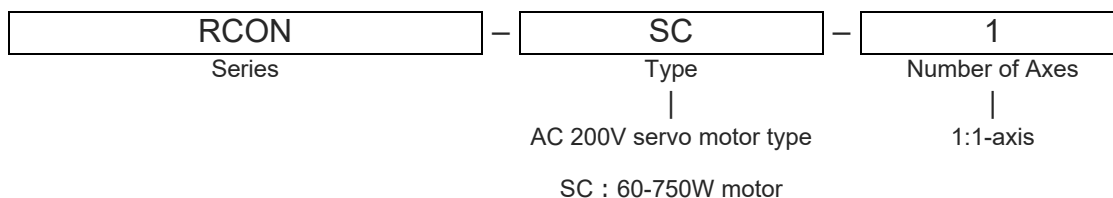
There is a built-in regenerative resistor of 60W equipped in 200V power unit, 200V driver unit. The regenerative resistor is basically not necessary, but use an external regenerative resistor unit in case of shortage in regenerative. Refer to [4.6 Regenerative Resistor (Option)]

3.4.2 Model code

(1) How to Read the Model Number

[Model Code for 200V Driver]

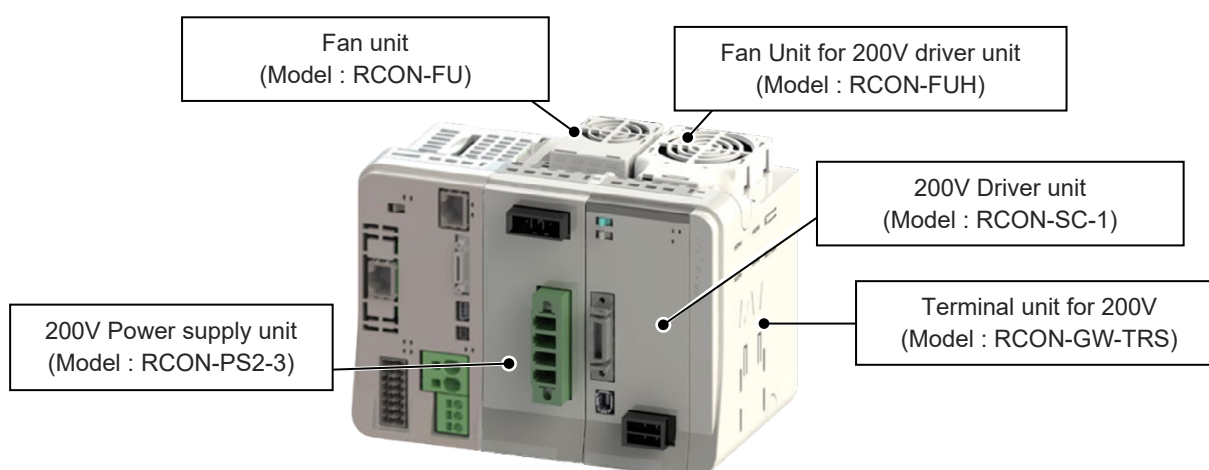
The model codes for 200V driver units are as described below.



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

[Fan unit for 200V driver]

RCON – FUH



(2) How to read the model nameplate

[200V Driver Unit]

[Nameplate Location]

Model number → MODEL RCON-SC-1
Serial number → SER NO. X000000 X0

Caution Mark
High Temperature
Caution Mark
Electric Shock
Caution Mark

Type / Serial number → RCON-SC 012345678
Model number → RCON-SC-1
Connecting actuator → AXI: RCS2-RA5C
model number → L=4, ST=250

IAI Corporation
C **UL** **US** **CE**
 MODEL RCON-SC-1
 SER NO. X000000 X0
 INPUT DC280-325V, 3.3A
 OUTPUT 3 φ, 0-230V, 0-333Hz, 5.0A
 IP20
 QR MADE IN JAPAN

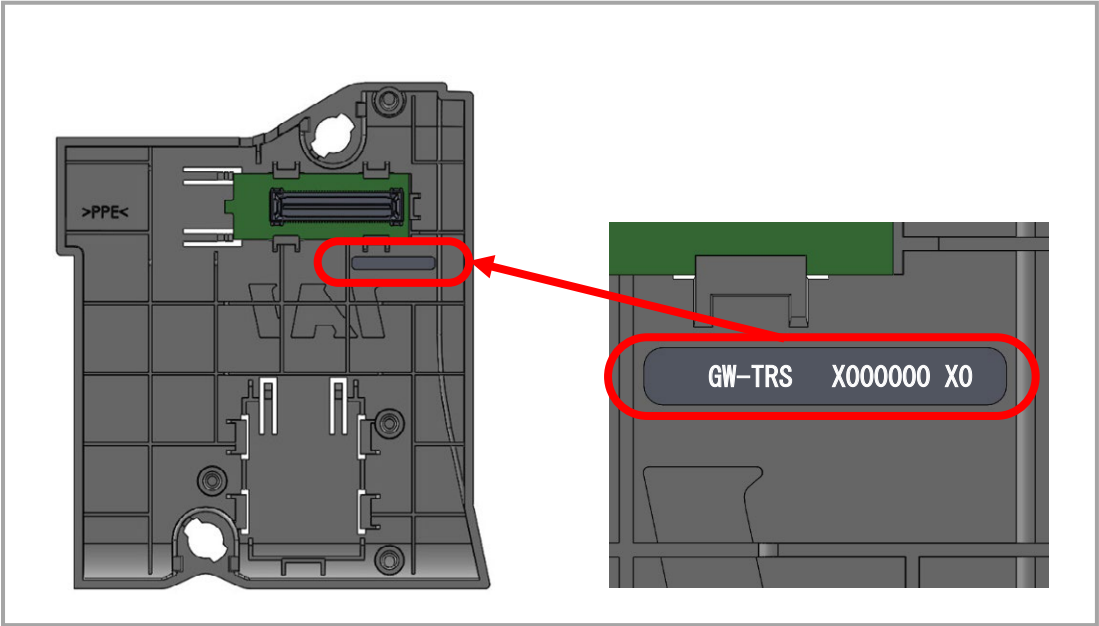
IAI Corporation
C **UL** **US** **CE**
 MODEL RCON-SC-1
 SER NO. X000000 X0
 INPUT DC280-325V, 3.3A
 OUTPUT 3 φ, 0-230V, 0-333Hz, 5.0A
 IP20
 QR MADE IN JAPAN

RCON-SC 012345678
 RCON-SC-1
 AXI: RCS2-RA5C
 L=4, ST=250

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





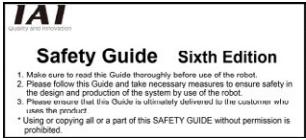
Mark	Explanation of Mark
	Use IAI specified cables only. Where residual-current-operated protective device (RCD) is used for protection in case of direct or indirect contact, only RCD of Type B is allowed on the supply side of this Electrotonic Equipment (EE).
	Do not touch terminals within 10 minutes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

[Terminal Unit for 200V]



3.4.3 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.

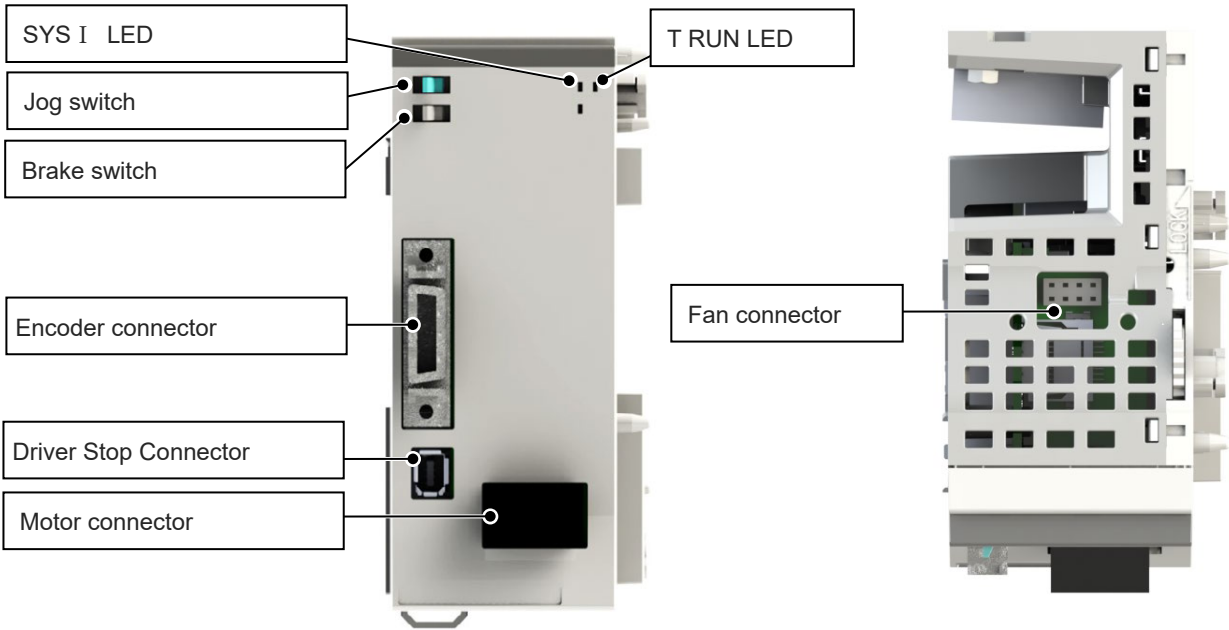
	Part name	Shape	Quantity	Remarks
Body	200V Driver unit		1	Model : RCON-SC-1
	Fan Unit for 200V Driver Unit		1	Single product model : RCON-FUH
Accessory	Dummy plug		1	Single product model : DP-6
	First Step Guide		1	ME0397
	Safety Guide		1	M0194

3.4.4 Part names/Functions

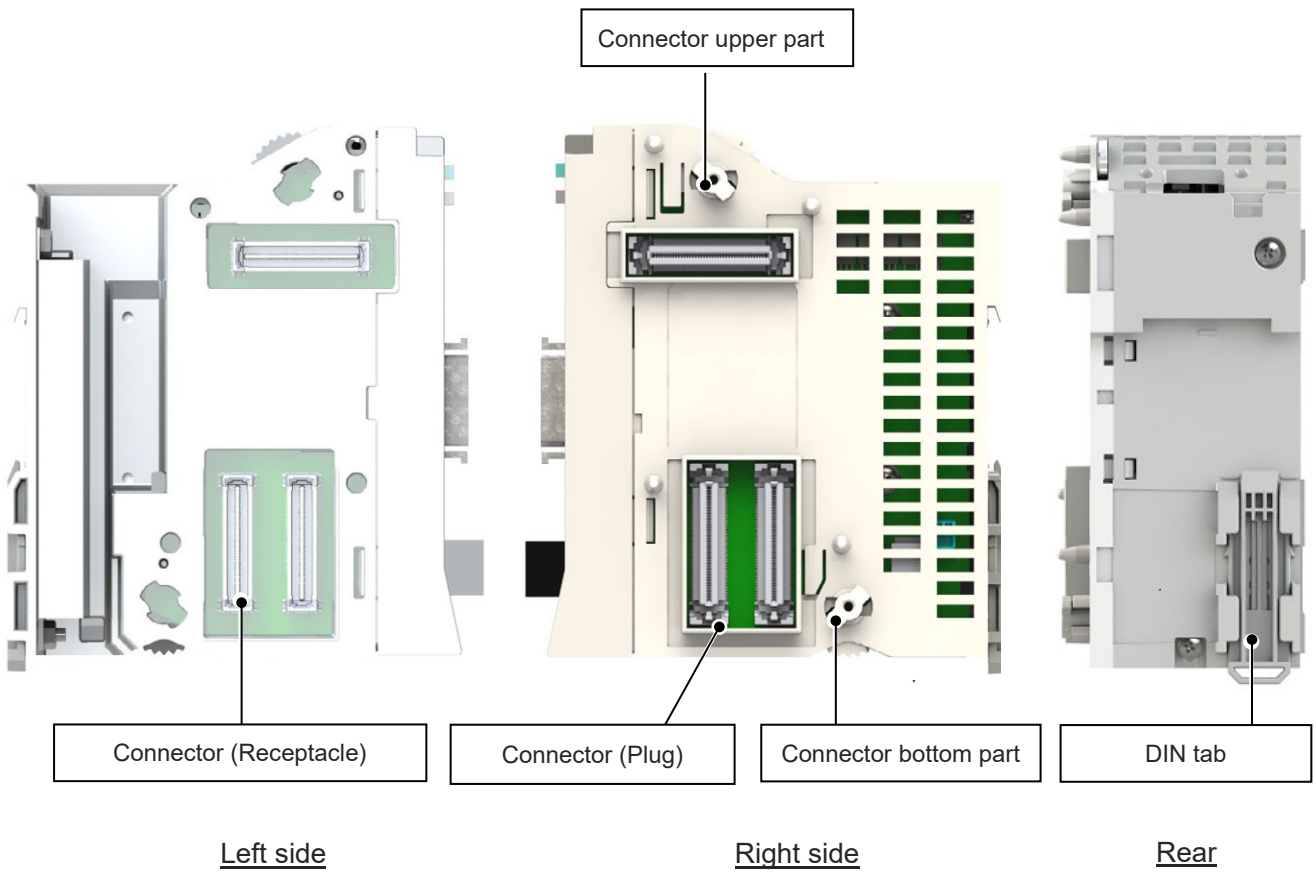
(1) Part names



RCON-SC



Chapter 3 Specifications for each unit



(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
	Orange	Light ON	Bus communication error generated
SYS	Green	Light ON	Servo ON
		Light OFF	Servo OFF
	Red	Light ON	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.)

(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	⊕ (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)

(7) Driver Stop Connector



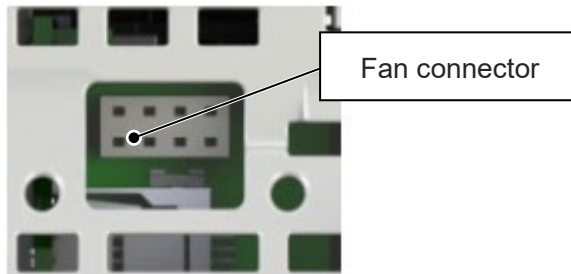
It is a connector to use the driver stop feature.

For details refer to [3.4.6 Driver Stop Circuit].

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

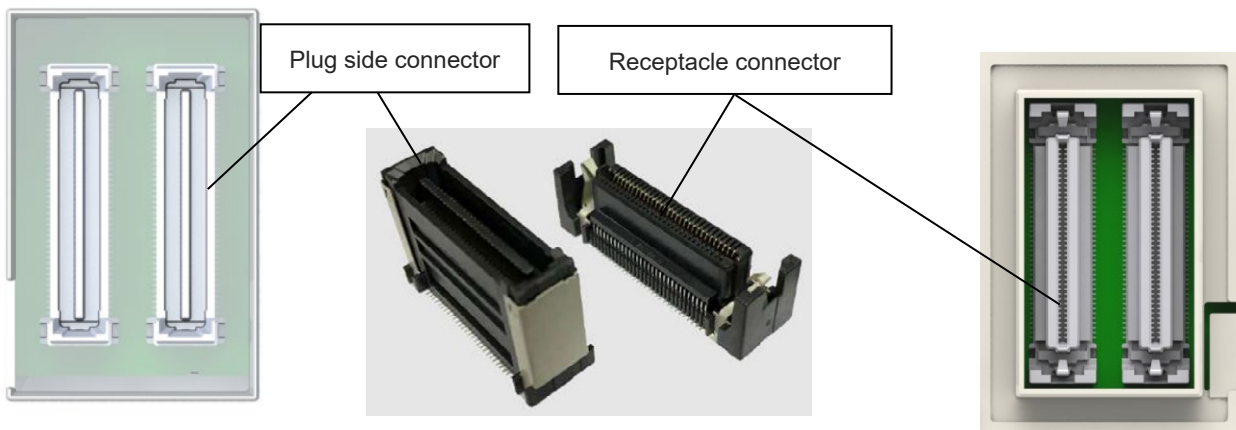
(8) Fan connector

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



(9) Connectors

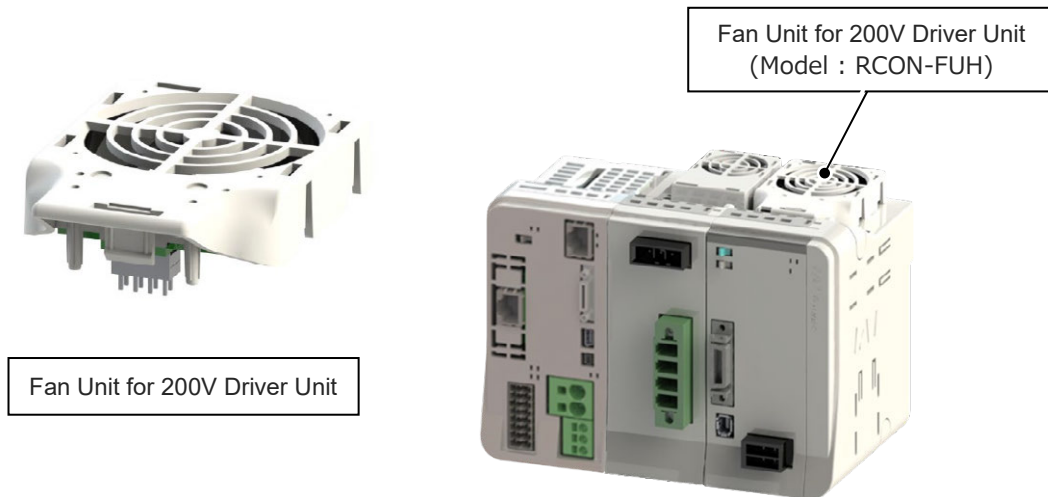
A connector for use between units. Two identical connectors are used. The connectors have a floating structure that absorbs connector misalignment due to housing mating or mounting misalignment between connectors.



(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.

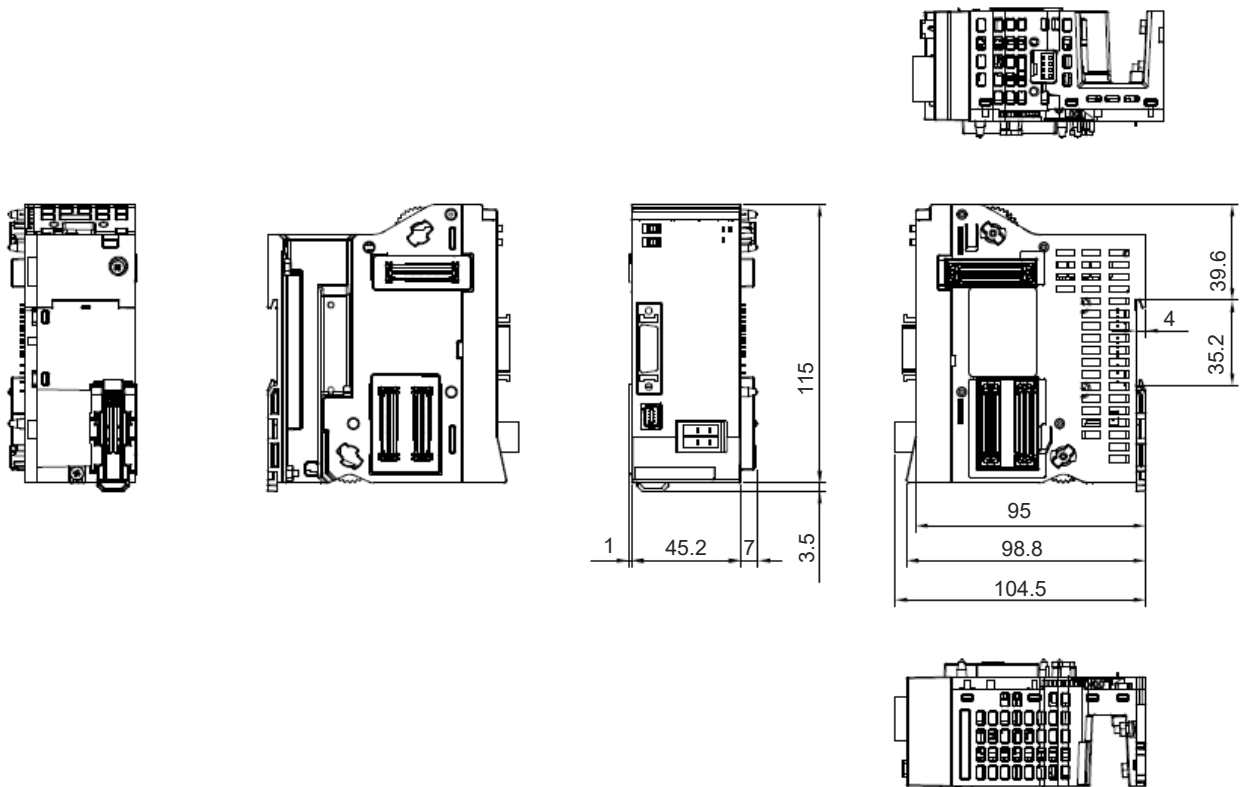


Regarding the how to replace fan unit, refer to [12.3.3 How to Replace Fan Unit for 200V Driver Unit].

3.4.5 External dimensions

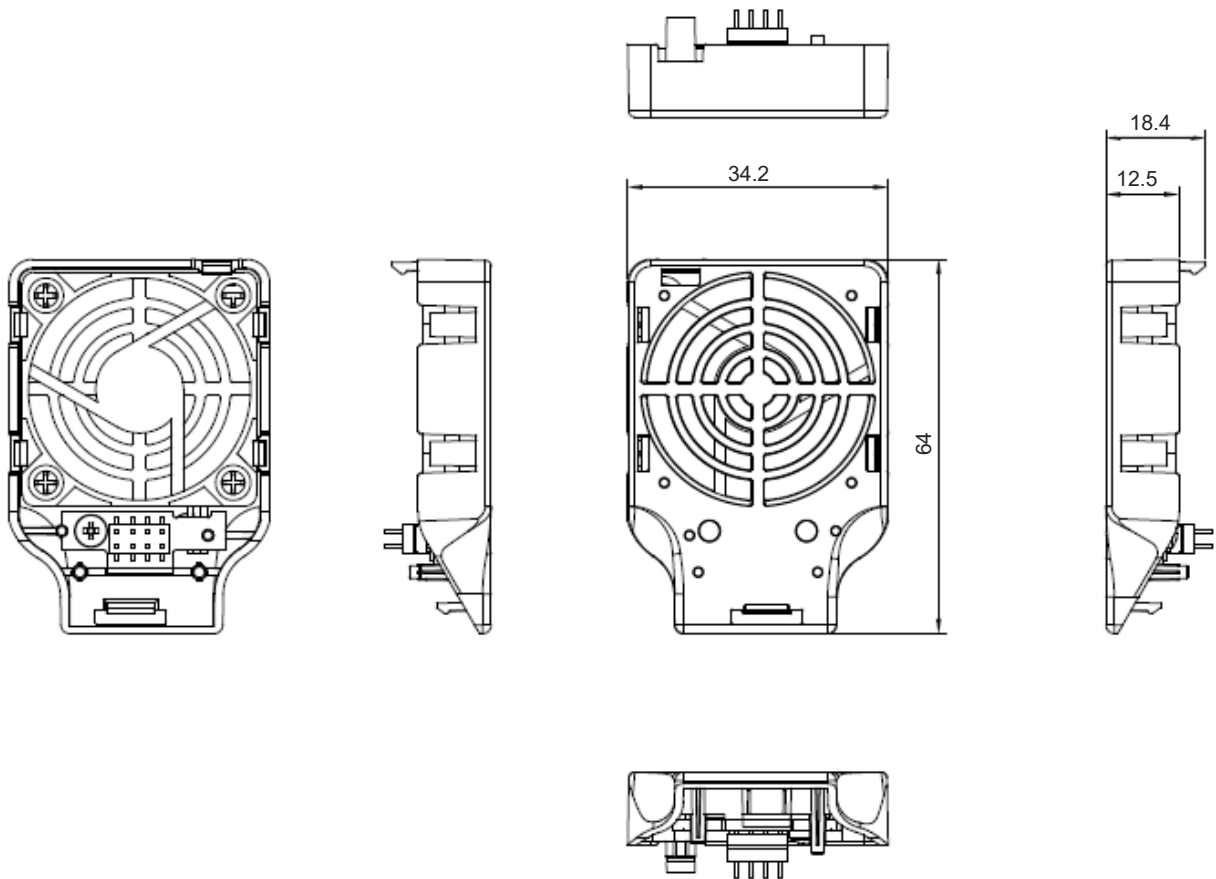
[200V Driver Unit] RCON-SC

Item	Specifications
External dimensions	W45.2 mm × H115 mm × D95 mm
Mass	Approx. 440g
External view	See figure below



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

Item	Specifications
External dimensions	W34.2 mm × H49 mm × D12.5 mm
Mass	Approx. 20g
External view	See figure below



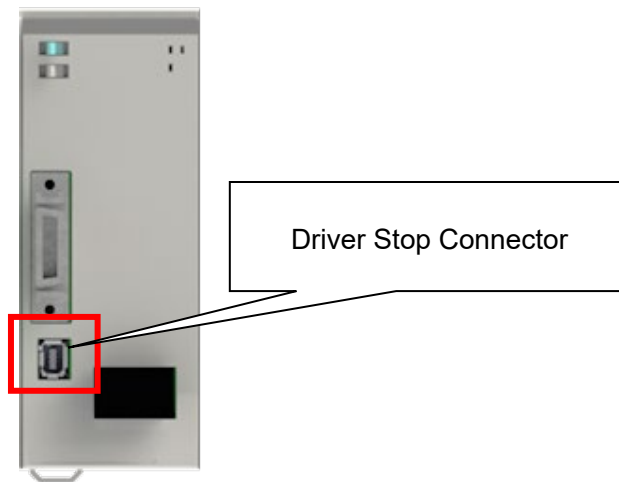
3.4.6 Driver stop circuit

The 200V driver unit (RCON-SC0) possesses a drive cutoff circuit and the driver stop circuit by the internal semiconductor instead of an external drive cutoff connector.

The driver stop circuit (DRV STOP) is a feature that cuts off the energy supply to the motor by the cutoff circuit in the controller after a reaction time (8ms or less) in response to the input signal and makes a safe stop.

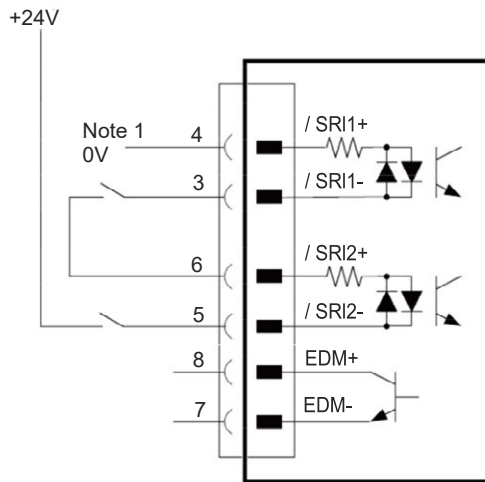
Shown below is an example for wiring for the driver stop feature.

[Connector Position]



Front View of RCON-SC

[Example for Wiring]



By wiring a shown in the diagram above, the driver features can be stopped when the switch is turned off.

Note 1: Have the 0V in common with the 24V power supply of the gateway unit.

[Signals on Driver Stop Connector]

Connector Name on Driver unit Side: 2294417-1 (Tyco Electronics)

Pin No.	Signal name	Name	Explanation
1	NC	—	Do not apply
2	NC	—	Do not apply
3	/SRI1-	Stop Input Signal 1	Stop input signal should be input. On: DRV STOP released Off: In DRV STOP (Motor current cutoff)
4	/SRI1+		
5	/SRI2-	Stop Input Signal 2	Stop input signal should be input. On: DRV STOP released Off: In DRV STOP (Motor current cutoff)
6	/SRI2+		
7	EDM-	External Device Monitor Output Signal	It is an output signal to show the stop feature is in operation with no failure.
8	EDM+		

[Electrical Specifications]

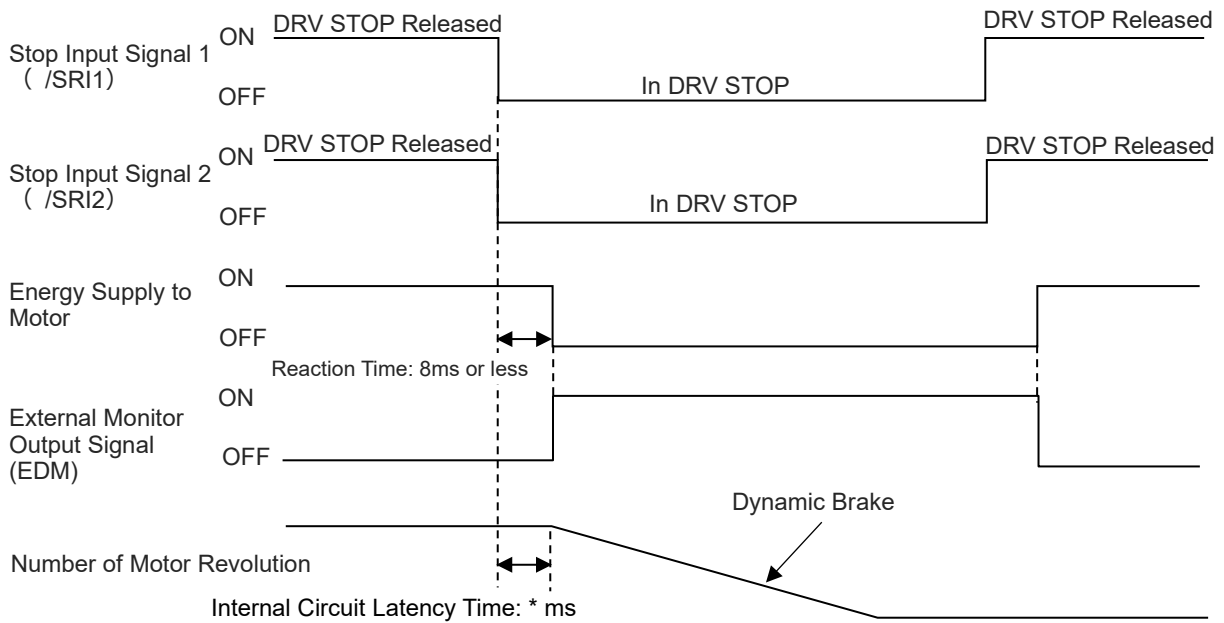
Item	Specifications	Remarks
Stop Input Signal (SRI)		
On Input Voltage Range	24V±10%	
Off Input Voltage Range	0-2V	
Input Current	7.6mA (Typ)	It is a value per 1ch.
Reaction Time	8ms or less	
External Device Monitor Output Signal (EDM)		
Voltage Range	24V±10%	
Output Current	100mA (Max)	

[Test Pulse of Stop Input Signal]

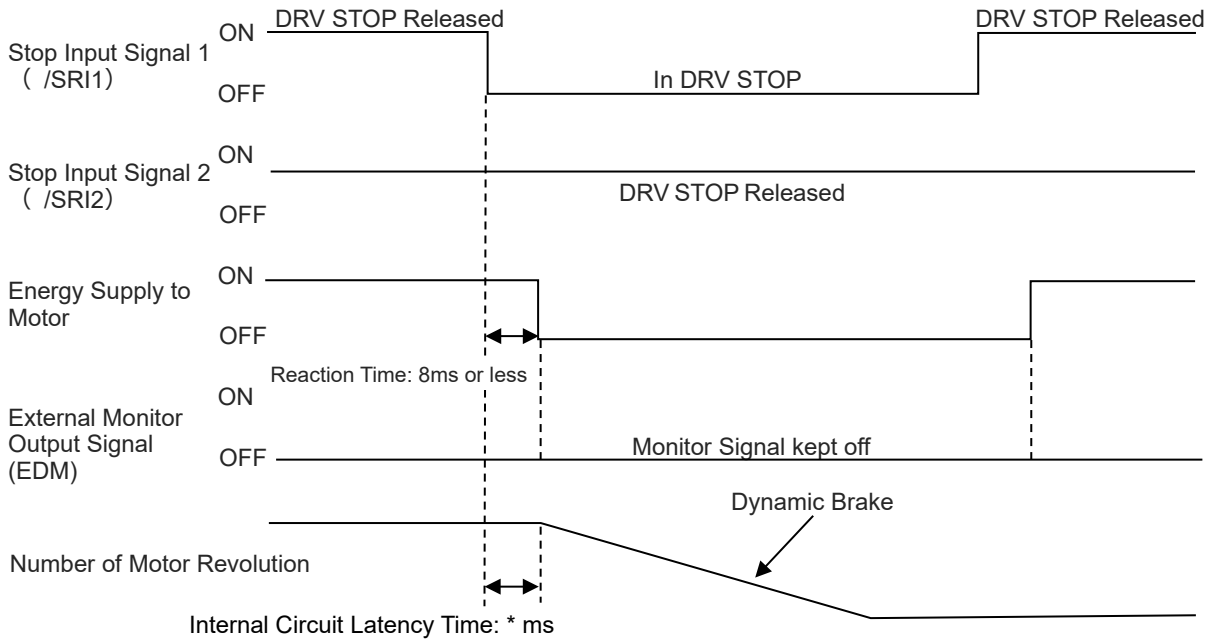
Set the test pulse off time input externally at 1ms or less.

[Operating Sequence]

- Normal Operation



●Operation in malfunction



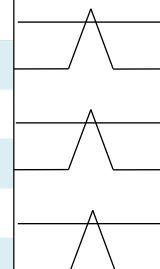
Operation in malfunction should be as shown in the diagram above when switches are reduplicated as shown in the example of wiring.
 When having one switch, the driver stop feature at malfunction should get invalid.

[Cable for Driver Stop Feature] (Sold separately)

Model Code	Cable Model	Wiring Diameter
CB-SC-STO□□□	2464C BIOS-CL3-2603P-B (BANDO DENSEN)	AWG26×3P



Controller Side Connector Name : 2013595-1 (Tyco Electronics)			
Pin No.	Signal Name	Wiring	Color
1	-	AWG26	-
2	-		-
3	/SRI1-		Black
4	/SRI1+		Black/ White
5	/SRI2-		Red
6	/SRI2+		Red/ White
7	EDM-		Green
8	EDM+		Green/ White



Chapter 3 Specifications for each unit

[Dummy Plug for Driver Stop Connector] (Enclosed)

It is a short-circuit plus to unable the function by connecting to the driver stop connector when the driver stop feature is not in use.

Model : DP-6

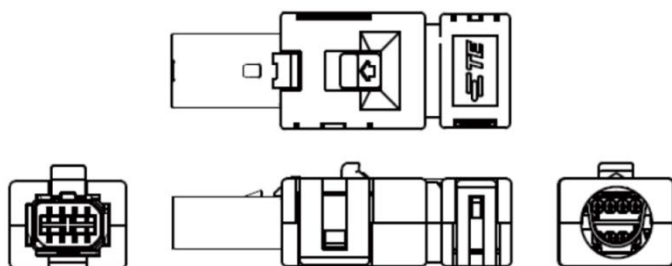


[Driver Stop Connector (Cable Side)] (To be prepared by user)

There is the following model code available for a connector unit on the cable side when a cable for driver stop feature is to be built up.

Manufacturer: Tyco Electronics

Model Code: 2013595-1 (Soldering Type) * There is cold-welding type also available.



Cramping Tool
2229737-1



It is necessary to have a cramping tool 2229737-1 (for both soldering and cold-welding types).

3.5 SCON Extension Unit, PIO/SIO/SCON Extension Unit, PIO Unit

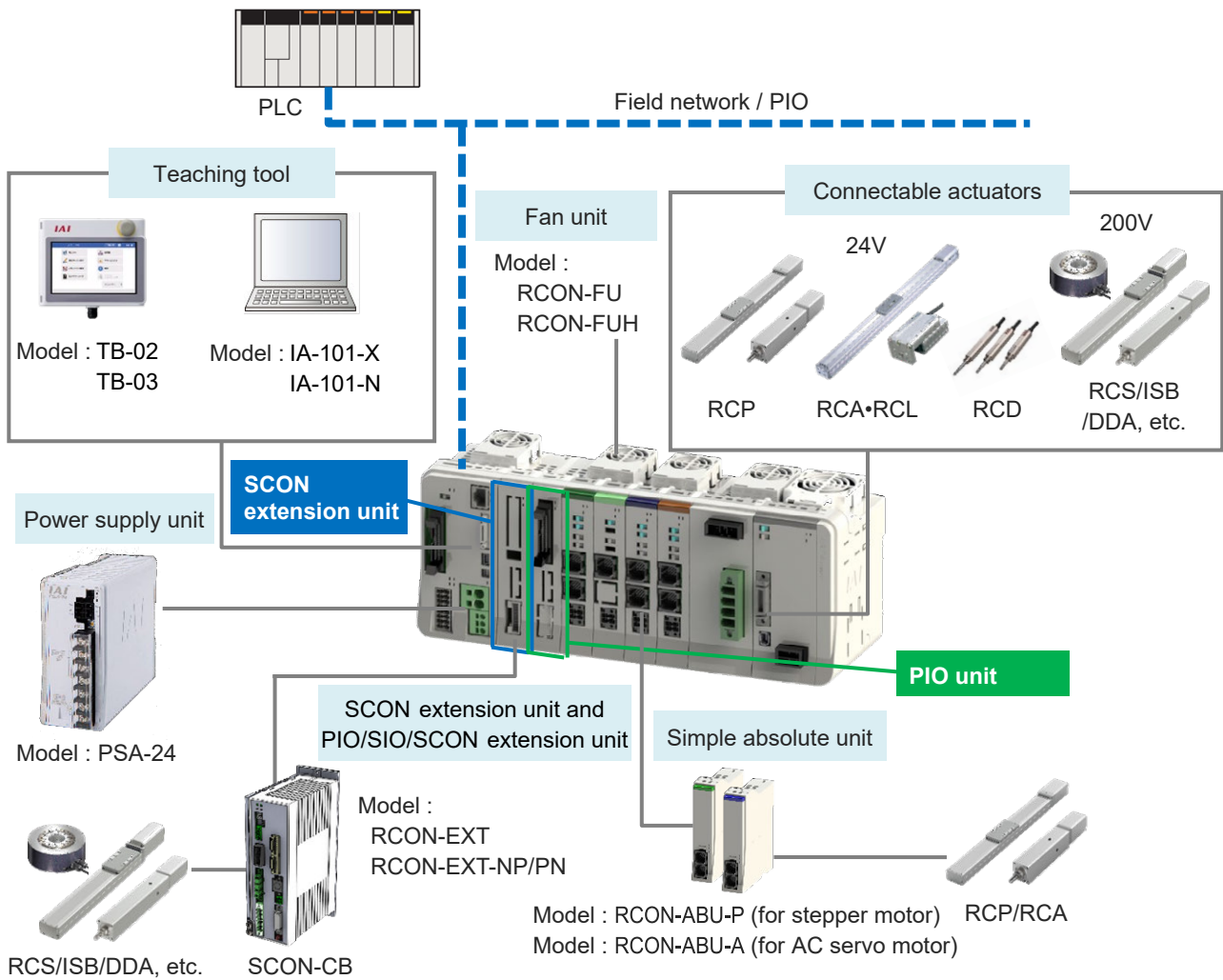
3.5.1 Overview

[SCON extension unit]

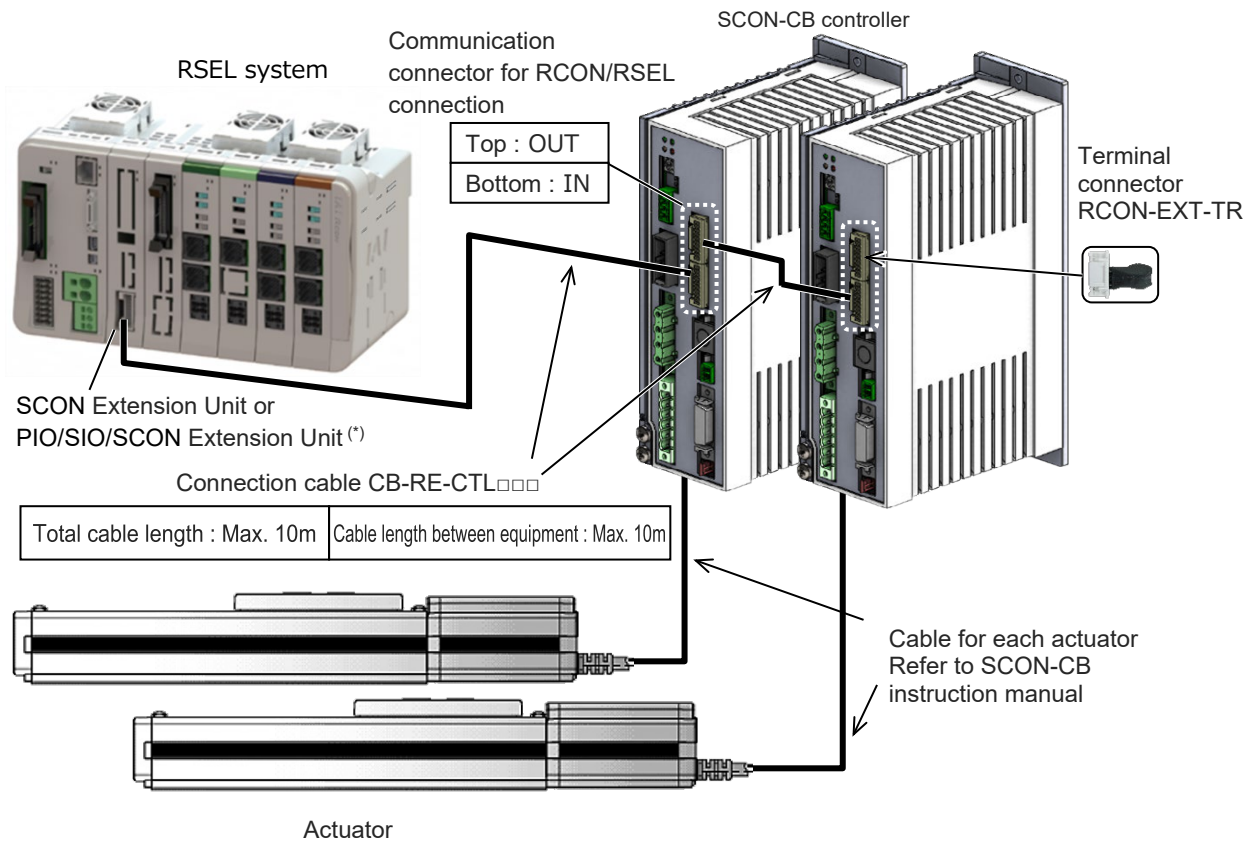
SCON extension unit is a unit to connect SCON-CB Controller to RSEL system.

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.



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 RS-485 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 Option 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 Option Units (I/O Parameter No. 186)]

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

3.5.2 Model code

(1) How to Read the Model Number

[SCON extension unit]

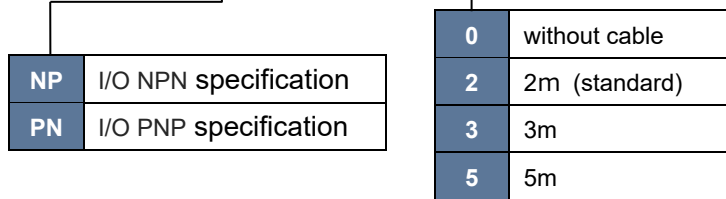
RCON - EXT

[PIO/SIO/SCON extension unit]

RCON - EXT - -

I/O specification

I/O cable length

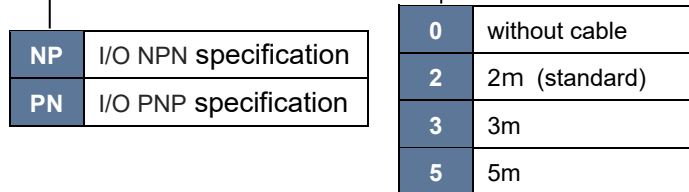


[PIO unit]

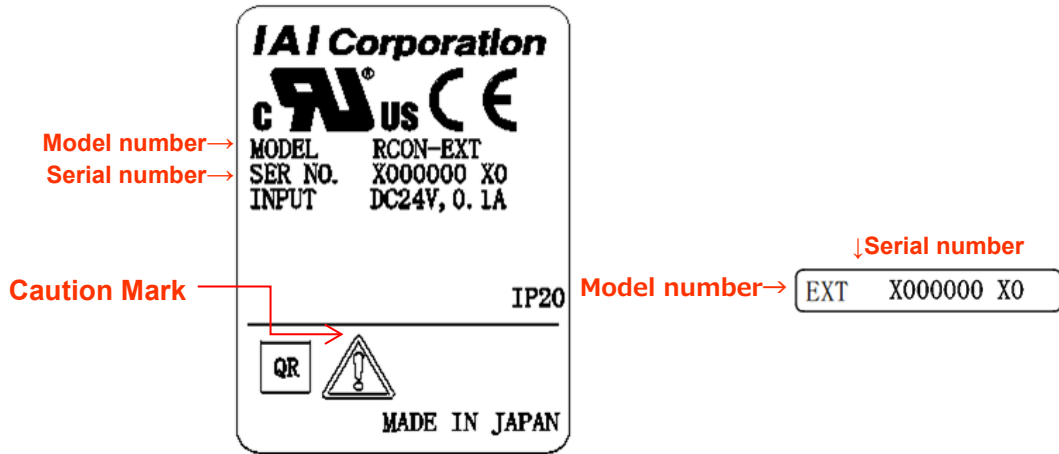
RCON - -

I/O specification


I/O cable length

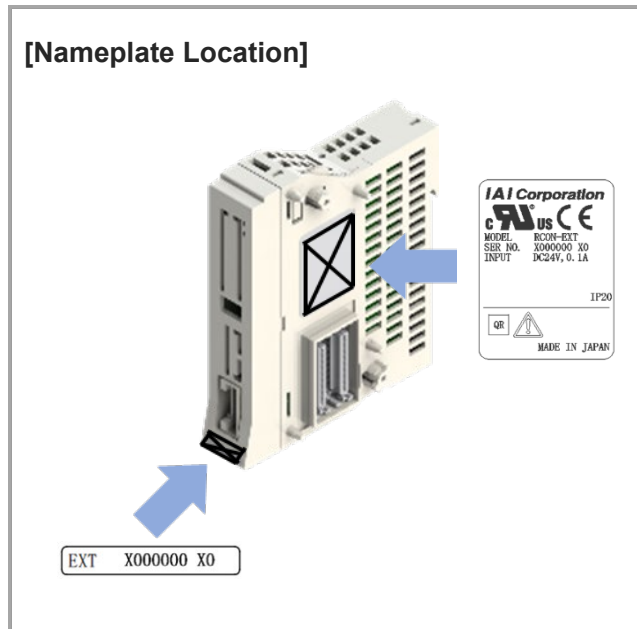


(2) How to read the model nameplate



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




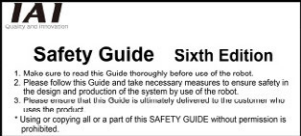
Mark	Explanation of Mark
	Use IAI specified cables only.





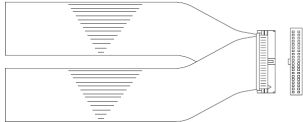


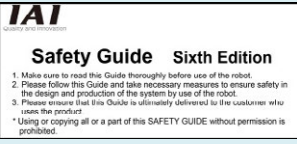
3.5.3 Components

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.


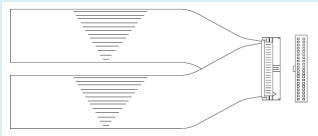
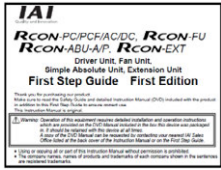
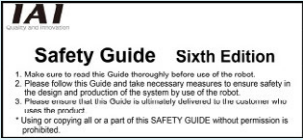
[SCON extension unit]

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

[PIO/SIO/SCON extension unit]

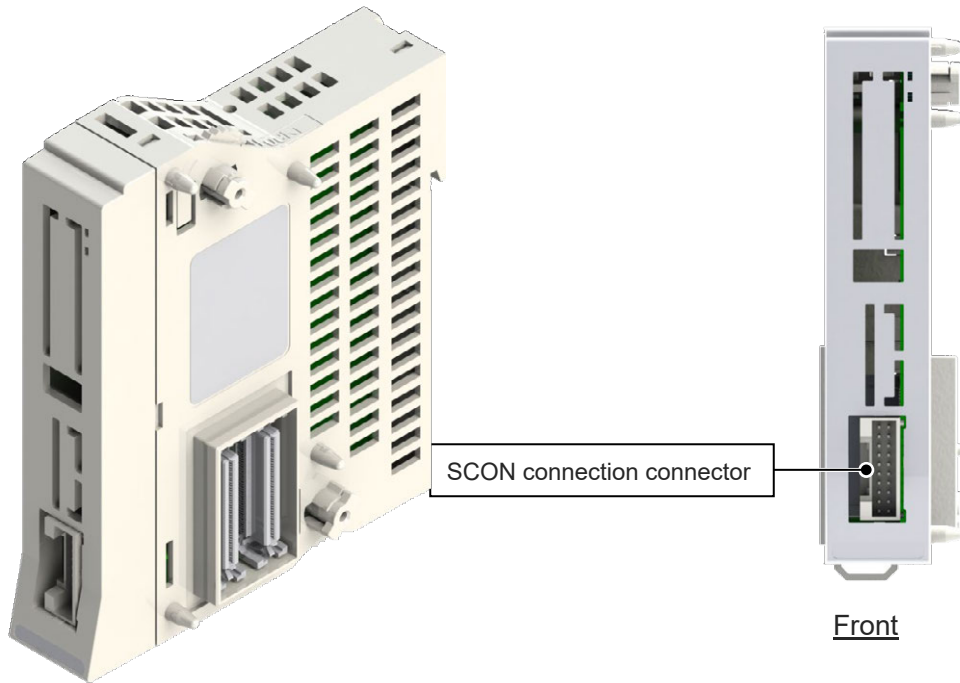
	Part name	Shape	Quantity	Remarks
Body	PIO/SIO/SCON extension unit		1	RCON-EXT-PN-* (PNP specifications)
				RCON-EXT-NP-* (NPN specifications)
Accessory	Terminal connector		1	Single product model number: RCON-EXT-TR
	PIO cable		1	CB-PAC-PIO***
	Extension SIO port connector		1	FMC1.5/3-STF-3.5
	First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

[PIO unit]

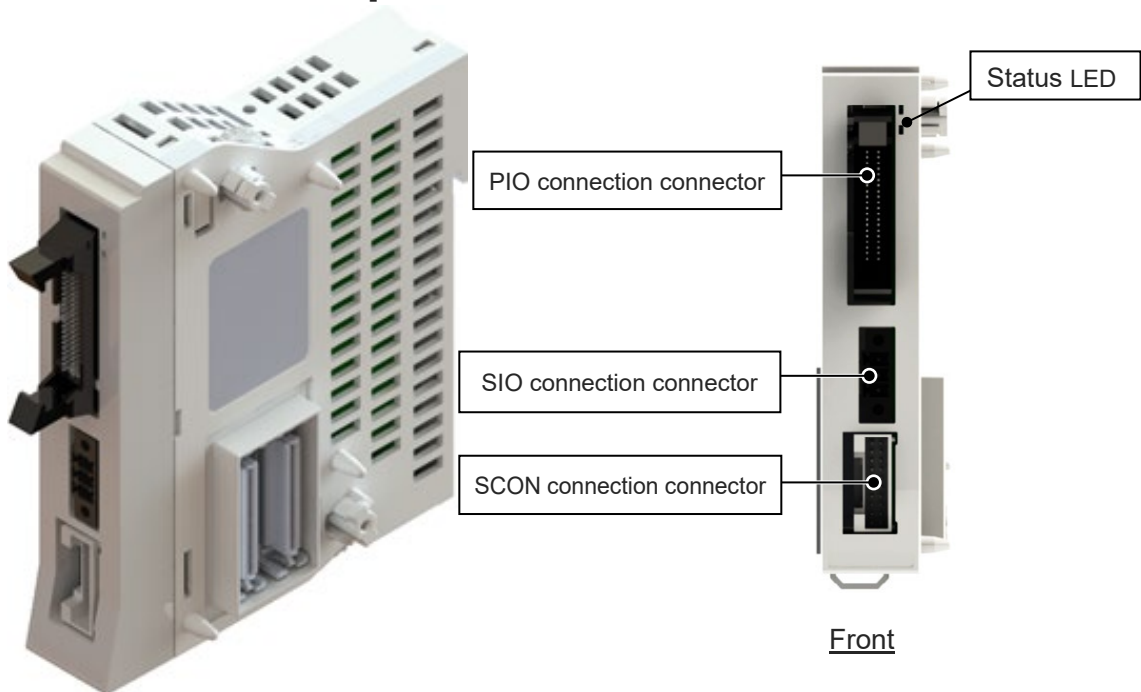
	Part name	Shape	Quantity	Remarks
Body	PIO unit		1	RCON-PN-* (PNP specifications)
				RCON-NP-* (NPN specifications)
Accessory	PIO cable		1	CB-PAC-PIO***
	First Step Guide		1	ME0393
	Safety Guide		1	M0194

3.5.4 Part names/Functions

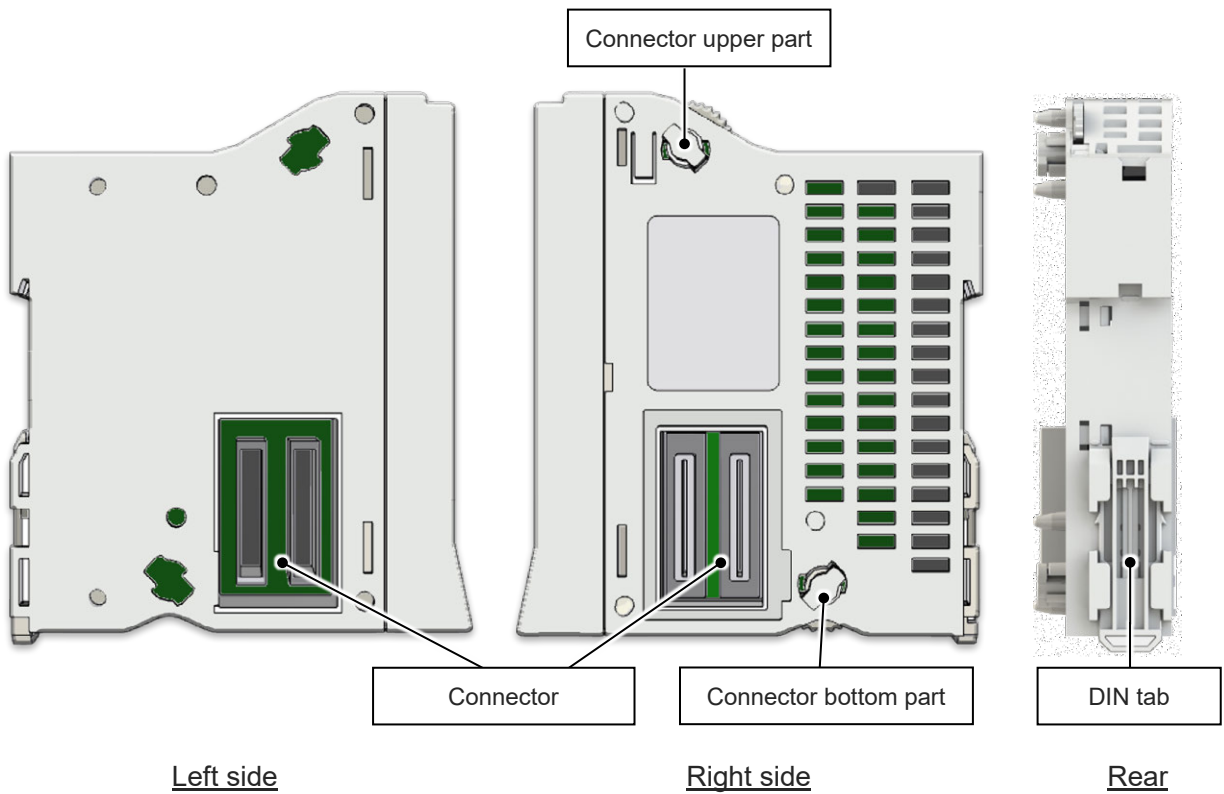
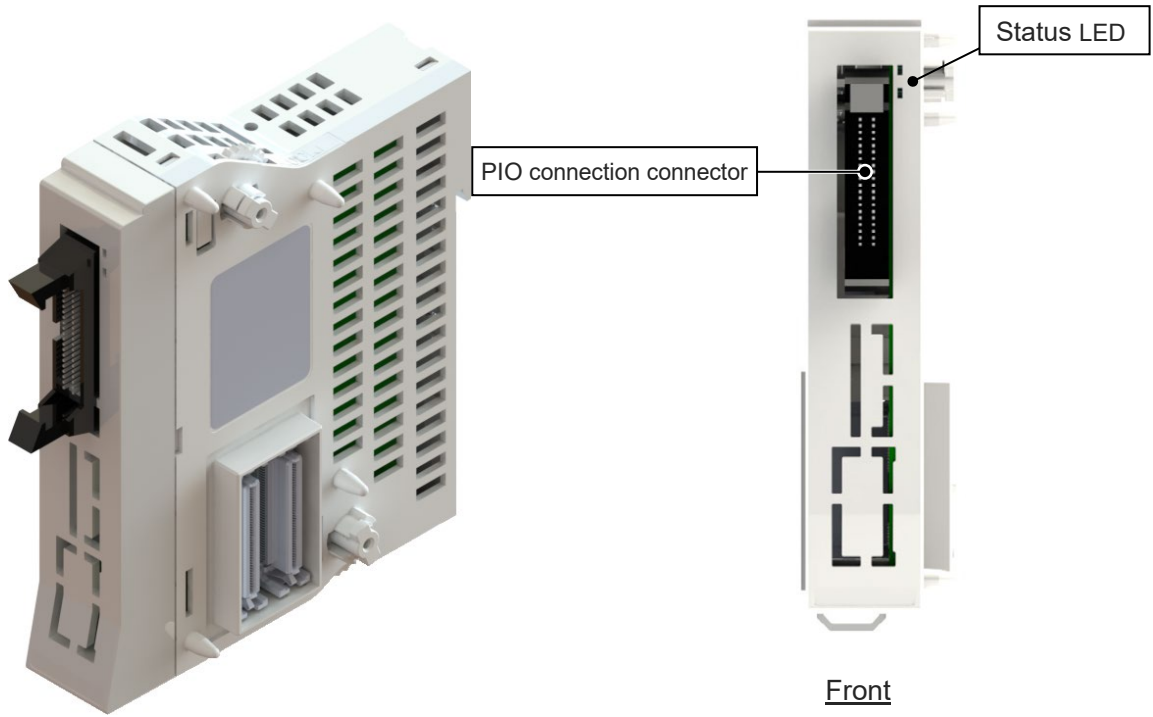
[SCON extension unit]



[PIO/SIO/SCON extension unit]

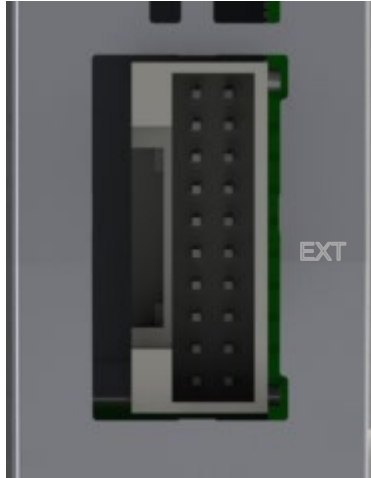


[PIO unit]



(1) SCON connection 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 connection 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 connection connector



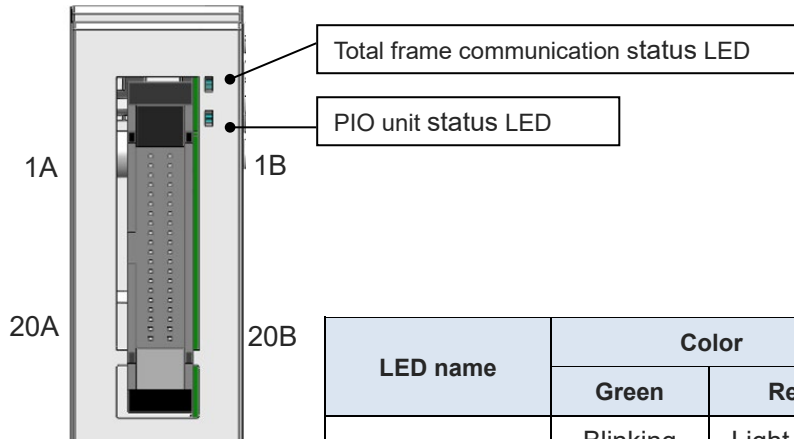
Item	Model	Manufacturer
PCB side connector	MC1.5/3-GF-3.5P26THR	Phoenix contact
Mating Connector	FMC1.5/3-STF-3.5	Phoenix contact
Pin No.	Signal name	Description
1	ISO_GND	Grounding for extension communication
2	ISO_SD-	Extended communication line -
3	ISO_SD+	Extended communication line +

3.5.5 PIO specifications

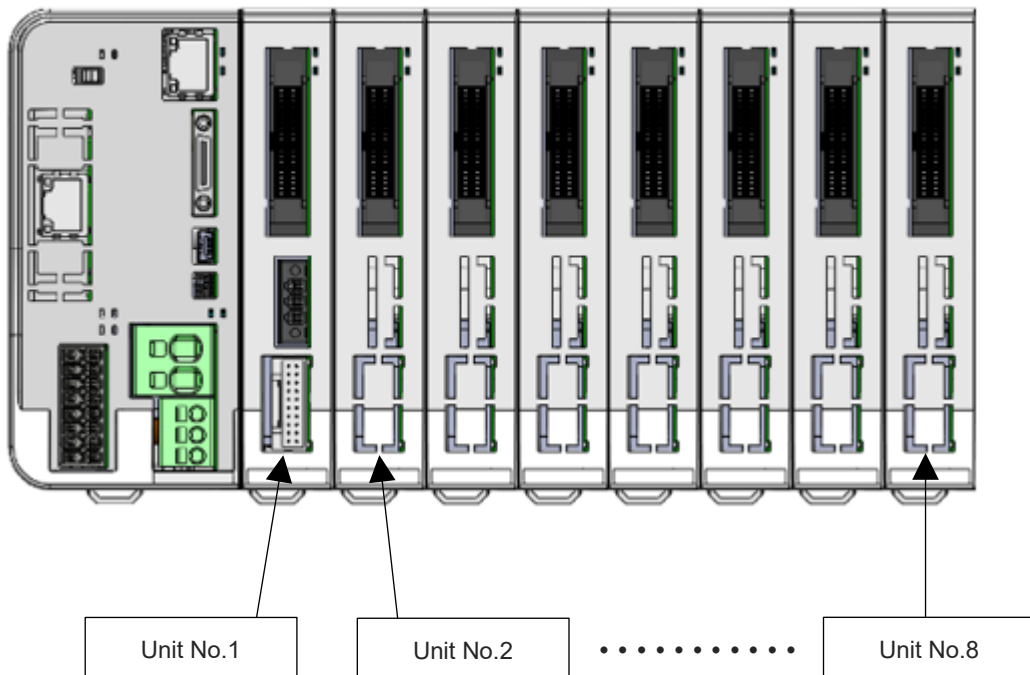
The pin numbers are as shown in the figure below.

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



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.

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

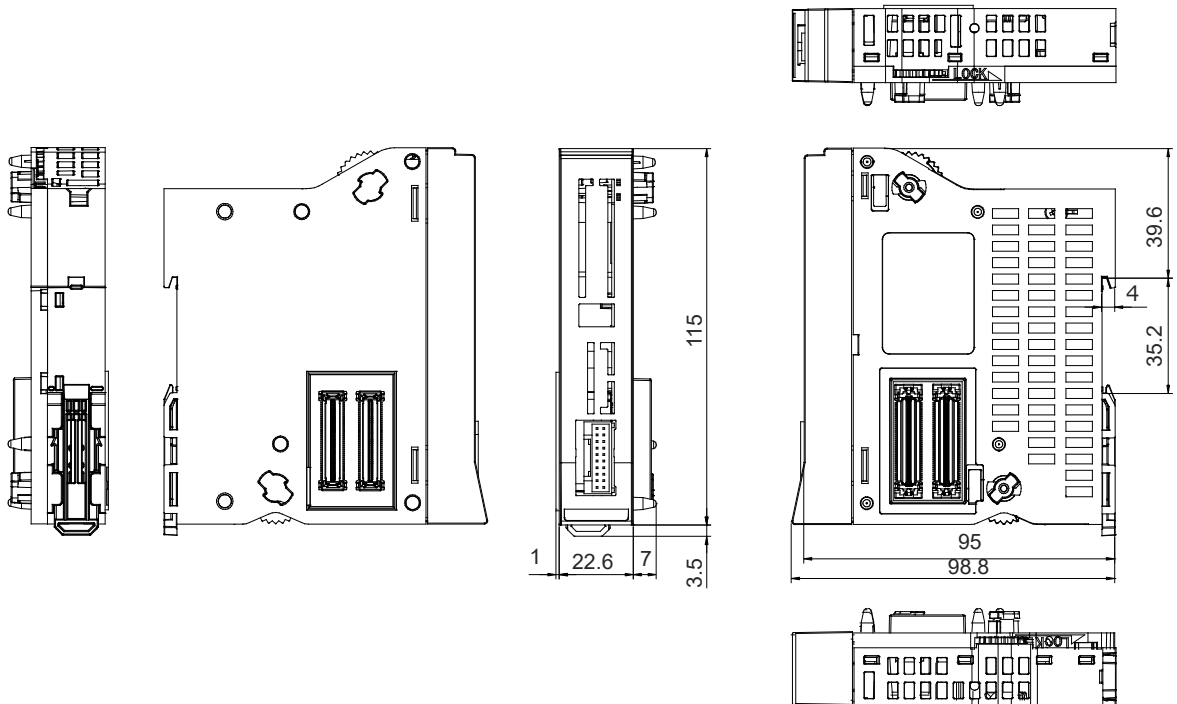
[SCON extension unit] RCON-EXT

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

[PIO unit] RCON-NP/PN-*

Item	Specifications
External dimensions	W22.6 mm × H115 mm × D95 mm
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 EC Connection Unit

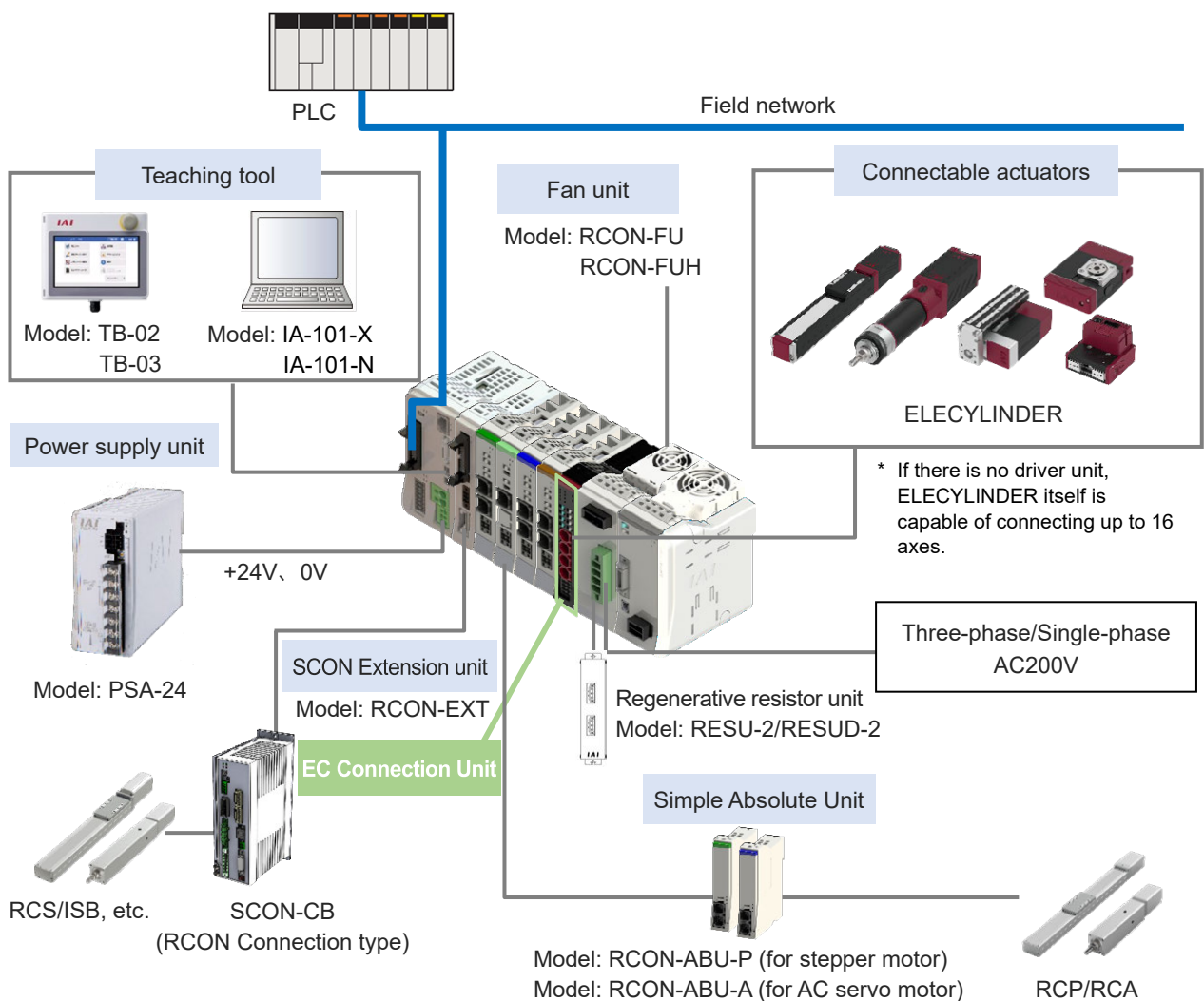
3.6.1 Overview

EC connection unit is the ELECYLINDER connection unit dedicated for R Unit.

Connecting RCON-EC connection type (Option: ACR) ELECYLINDER to RCON,

ELECYLINDER can be controlled in the field network communication. It is available to use both 24V and 200V driver units together. It is also available to construct only with ELECYLINDER.

Also, the maximum number of ELECYLINDER available to be connected to one unit of the EC connection unit should be four axes.



Caution

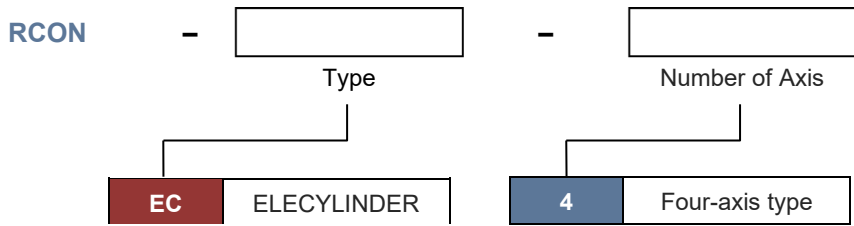
- ELECYLINDER is not available for operation in the single solenoid system. ELECYLINDER may not operate as commanded by a host system if the setting is changed to the single solenoid system.

3.6.2 Model code

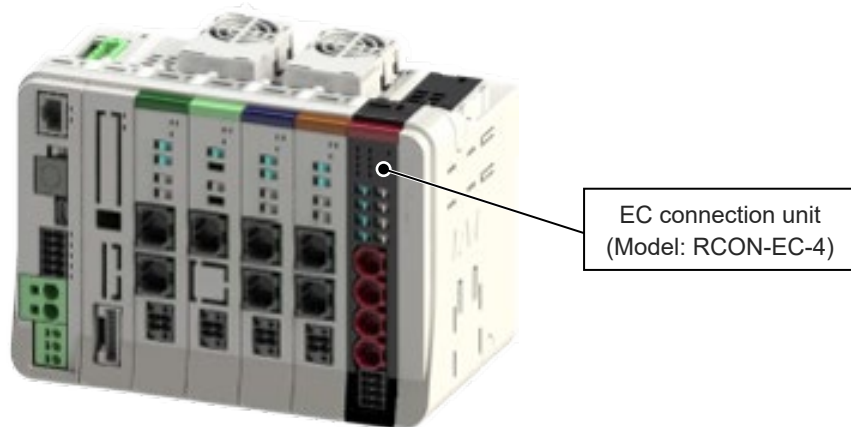
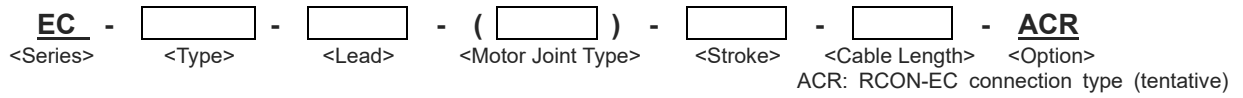
(1) How to Read the Model Number

The EC connection unit models are as follows.

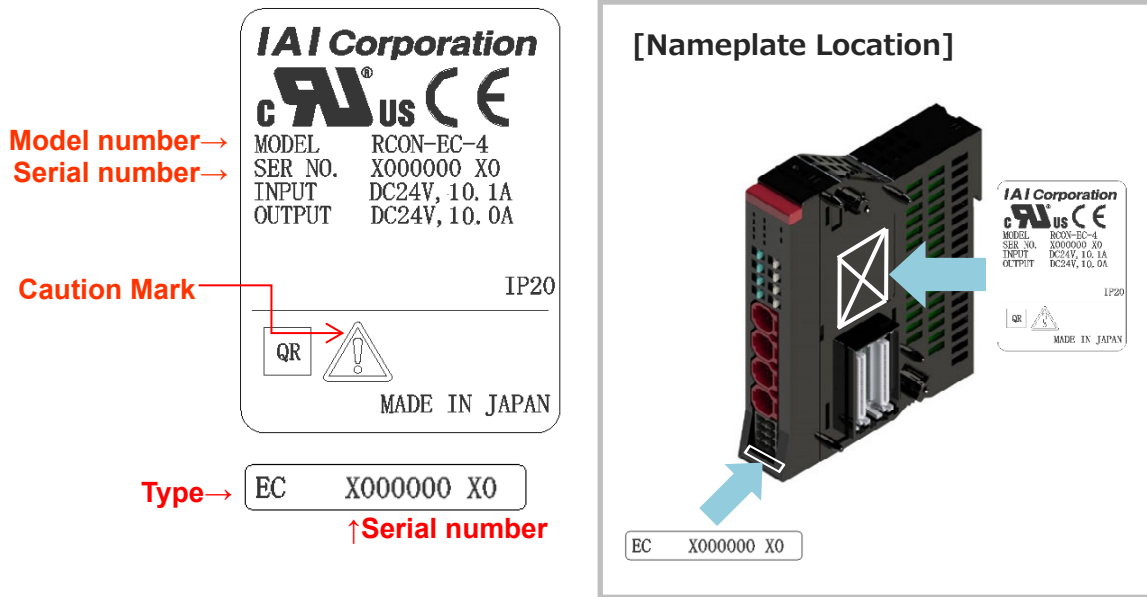
EC connection unit model



*ELECYLINDER capable to be connected to the EC connection unit is the option: ACR only.



(2) How to read the model nameplate




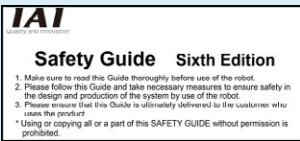


Chapter 3 Specifications for each unit

Mark	Explanation of Mark
	Use IAI specified cables only.

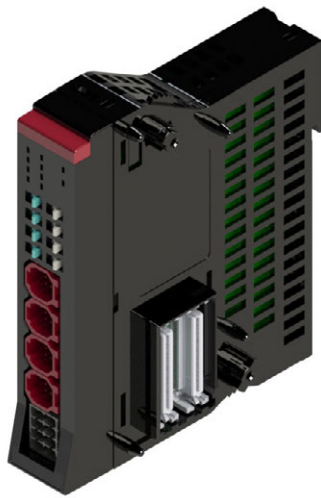
3.6.3 Components

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.

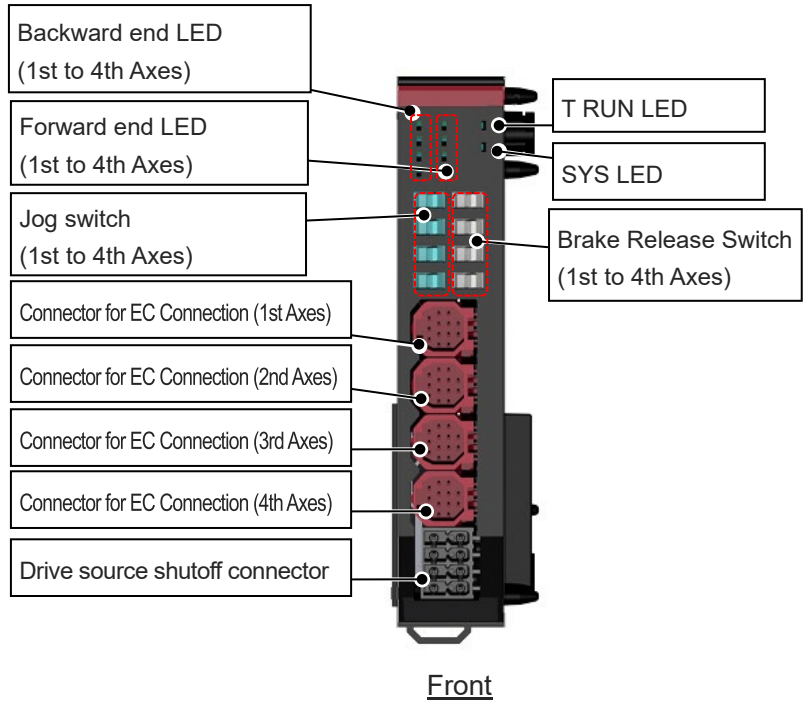
	Part name	Shape	Quantity	Remarks
Body	EC Connection Unit		1	Model example: RCON-EC
Accessory	Drive ource shutoff connector		1	Model: DFMC1.5/4-ST-3.5 *Supplied with EC Connection Unit
	First Step Guide		1	ME0395
	Safety Guide		1	M0194

3.6.4 Part names/Functions

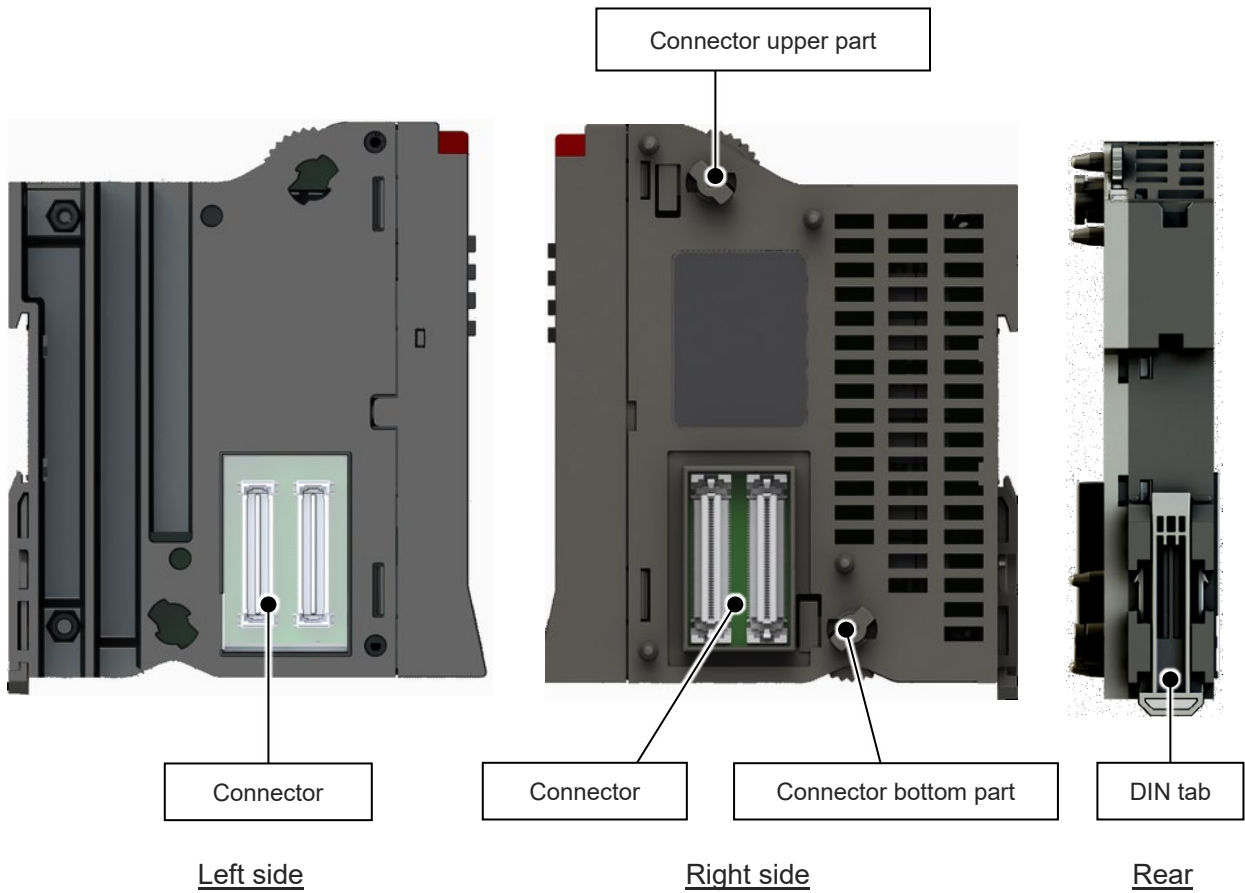
(1) Part names



RCON-EC



Chapter 3 Specifications for each unit



(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
	Orange	Light ON	Bus communication error generated
SYS	Green	Light ON	Normal operation
		Light OFF	Control power supply voltage drop, Motor power supply voltage drop, Emergency stop, Error occurred in regular communication with EC
	Red	Light ON	Control power supply voltage drop, Motor power supply voltage drop, Emergency stop, Error occurred in regular communication with EC
		Light OFF	Normal operation
LS1/ALM (I = 1st axes, II = 2nd axes, III = 3rd axes, IV = 4th axes)	Green	Light ON	Movement to Forward End Complete
		Light OFF	Stop
	Red	Light ON	Alarm triggered
LS0 (I = 1st axes, II = 2nd axes, III = 3rd axes, IV = 4th axes)	Green	Light ON	Movement to Backward End Complete
		Light OFF	Stop



(3) Jog switch

They are switches for the jog operation. It comes the switches for 1st, 2nd, 3rd and 4th axes from the top.

Set a switch to the JOG+ side and the jog operation to the positive direction (target position registered as the forward end in the position data) should be made and set it to the JOG- side and the jog operation to the negative side (target position registered as the backward end) to be made. The jog speed should be the velocity registered in the position data. If the switch gets released on the way, stop should be performed with the deceleration registered in the position data. However, if the home-return operation is incomplete, it should perform the home-return operation no matter which side the switch is set to. Releasing the switch one the way should cancel the home-return operation.

The operation on on the jog switch is valid only in MANU Mode. It should be invalid in AUTO Mode. Also, when a window to operate actuators is open on a teaching tool, the jog switch should be inactivated. If a window capable to operate actuators gets opened during operation with the jog switch, an actuator should decelerate and stop.

Setting "EC Connection Unit JOG Switch" I/O Parameter No.191 in "1: invalid" should make the jog switches on all the units of the EC connection unit connected to the SEL unit inactivated. (It is set to "Valid" in the initial setting.)



Symbol	Description
JOG+	Jog operation to positive direction (target position registered as forward end in position data)
JOG-	Jog operation to negative direction (target position registered as backward end in position data)

**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 REC system on again or perform software reset.

(4) Brake release switch

They are switches to release the brake compulsorily. It comes the switches for 1st, 2nd, 3rd and 4th axes from the top. 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)

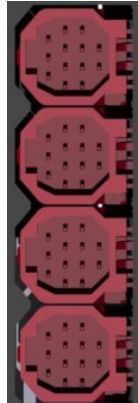
**Warning**

- 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) Connectors for EC connection

They are connectors to connect ELECYLINDER. It comes the connectors for 1st, 2nd, 3rd and 4th axes from the top.

The axis numbers should automatically be assigned after the axes connected to the driver unit and SCON extension unit. Also, axis numbers for four axes should be assigned to the EC connection unit even if ELECYLINDER is not connected to all of four. An axis number that an axis is not connected should not be pulled one number forward.



[RCON-EC]

Pin No.	Signal name	Description
1	24V (MP)	Motor power +24V
2	GND	0V
3	IN0	Input 0
4	IN1	Input 1
5	IN2	Input 2
6	SD+	Communication Line +
7	OUT0	Output 0
8	OUT1	Output 1
9	OUT2	Output 2
10	SD-	Communication Line -
11	BKRLS	Brake Release
12	24V (CP)	Control Power Supply +24V
13	FG	Frame Grounding

(6) Drive source shutoff connector

Drive-source cutoff input. Drive source can be cut off by individual axes.



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

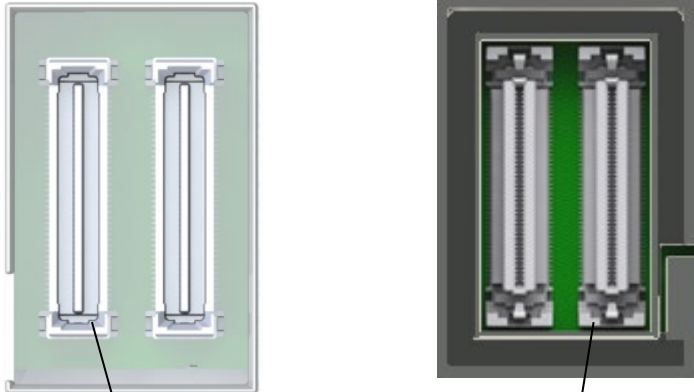
Pin No.	Signal name	Description
1	MPO_4	Motor power output 4th axes
2	MPO_3	Motor power output 3rd axes
3	MPO_2	Motor power output 2nd axes
4	MPO_1	Motor power output 1st axes
5	MPI_4	Motor power input 4th axes
6	MPI_3	Motor power input 3rd axes
7	MPI_2	Motor power input 2nd axes
8	MPI_1	Motor power input 1st axes

Cable side connector compatible wire

Item	Specifications
Compatible wire	AWG20 to 16 (Copper Wire)
Strip length	10.0 mm
Rated Temperature on Isolation Coating	60 °C or more

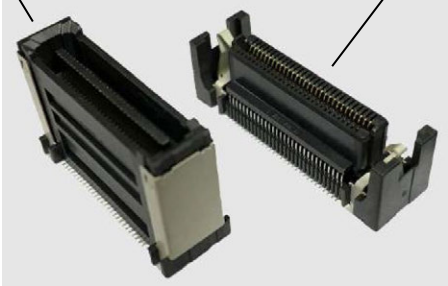
(7) Connectors

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.



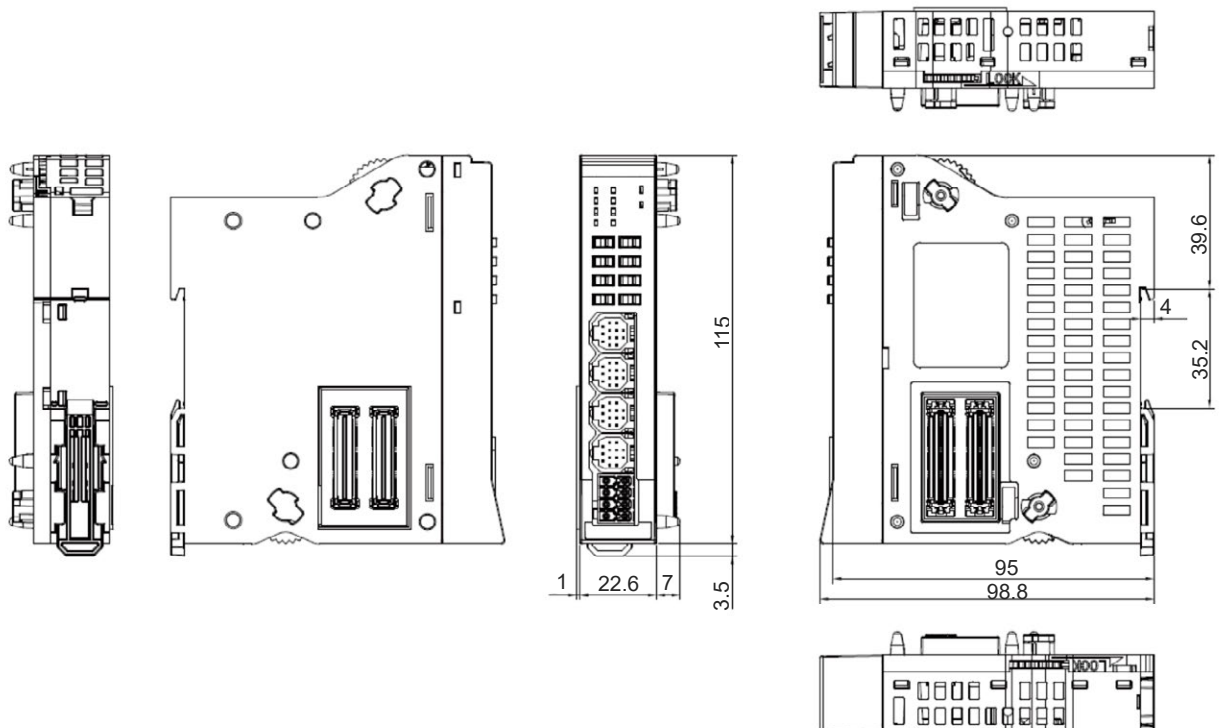
Plug side connector

Receptacle connector



3.6.5 External dimensions

Item	Specifications
External dimensions	W 22.6 mm × H 115 mm × D 95 mm
Mass	About 114g
External view	See figure below

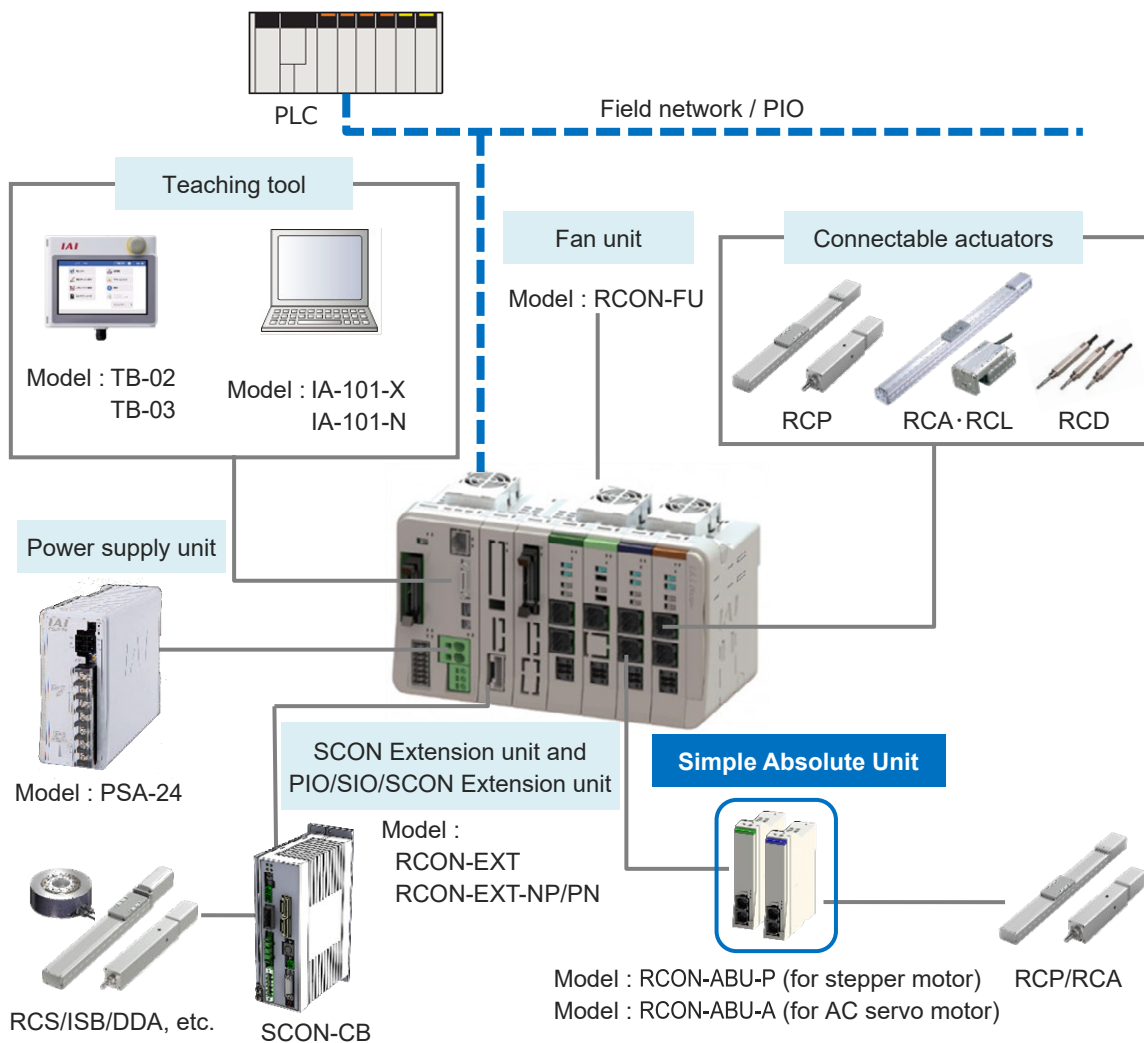


3.7 Simple Absolute Unit

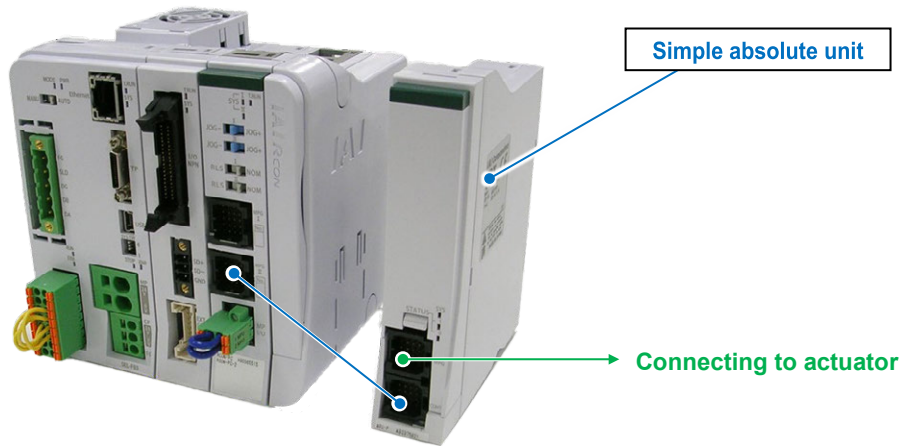
3.7.1 Overview

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.



3.7.2 Model code

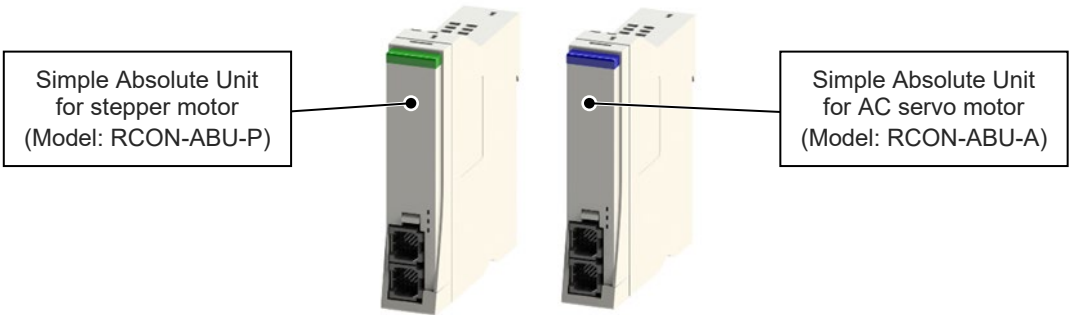
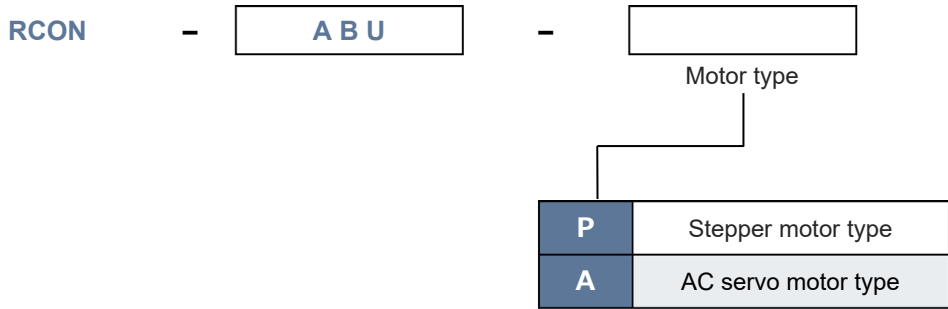
(1) How to Read the Model Number

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.

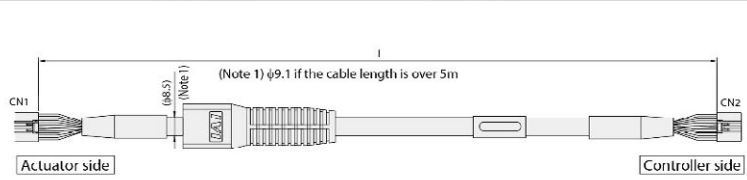
Simple absolute unit model



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

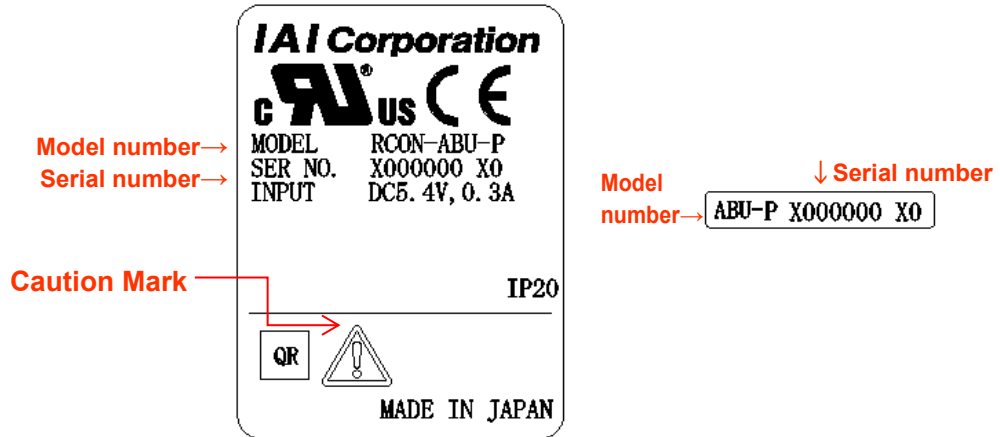
* Please indicate the cable length (L) in □□□, e.g.) 030 = 3m



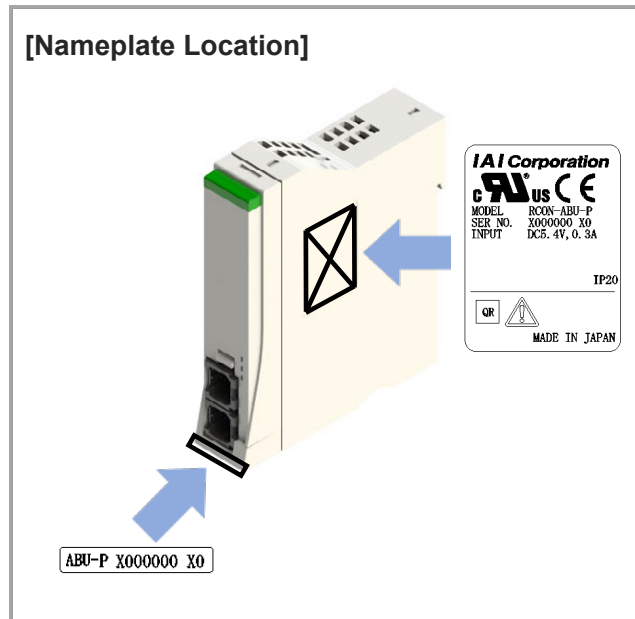
* The robot cable is designed for flex-resistance: Please use the robot cable if the cable needs to be installed through the cable track.
 * Please contact IAI if the cable length other than above is needed.

CN1					CN2				
Color	Signal name	Pin No.	Color	Signal name	Pin No.				
Blue (AWG22/19)	U	1	Blue (AWG22/19)	U	1				
Orange (AWG22/19)	V	2	Orange (AWG22/19)	V	2				
Gray (AWG22/19)	-	3	Gray (AWG22/19)	-	3				
White (AWG22/19)	W	4	White (AWG22/19)	W	4				
Black (AWG22/19)	-	5	Black (AWG22/19)	-	5				
Yellow (AWG22/19)	-	6	Yellow (AWG22/19)	-	6				
Red (AWG22/19)	-	7	Red (AWG22/19)	-	7				
Green (AWG22/19)	-	8	Green (AWG22/19)	-	8				
Brown (AWG22/19)	-	9	Brown (AWG22/19)	-	9				
Pink (AWG22/19)	-	10	Pink (AWG22/19)	-	10				
Light Blue (AWG22/19)	-	11	Light Blue (AWG22/19)	-	11				
Light Green (AWG22/19)	-	12	Light Green (AWG22/19)	-	12				
Light Orange (AWG22/19)	-	13	Light Orange (AWG22/19)	-	13				
Light Brown (AWG22/19)	-	14	Light Brown (AWG22/19)	-	14				
Light Gray (AWG22/19)	-	15	Light Gray (AWG22/19)	-	15				
Light Purple (AWG22/19)	-	16	Light Purple (AWG22/19)	-	16				
Light Yellow (AWG22/19)	-	17	Light Yellow (AWG22/19)	-	17				
Light Blue-Gray (AWG22/19)	-	18	Light Blue-Gray (AWG22/19)	-	18				
Light Green-Gray (AWG22/19)	-	19	Light Green-Gray (AWG22/19)	-	19				
Light Orange-Gray (AWG22/19)	-	20	Light Orange-Gray (AWG22/19)	-	20				
Light Brown-Gray (AWG22/19)	-	21	Light Brown-Gray (AWG22/19)	-	21				
Light Gray-Gray (AWG22/19)	-	22	Light Gray-Gray (AWG22/19)	-	22				
Light Purple-Gray (AWG22/19)	-	23	Light Purple-Gray (AWG22/19)	-	23				
Light Yellow-Gray (AWG22/19)	-	24	Light Yellow-Gray (AWG22/19)	-	24				

(2) How to read the model nameplate




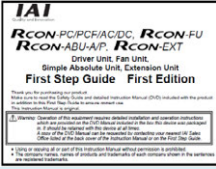
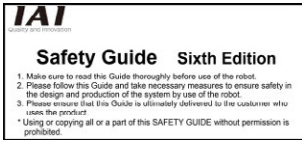


Mark	Explanation of Mark
	Use IAI specified cables only.



3.7.3 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
Body	Simple Absolute Unit		1	
Accessory	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	

3.7.4 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)
Mass	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

(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.

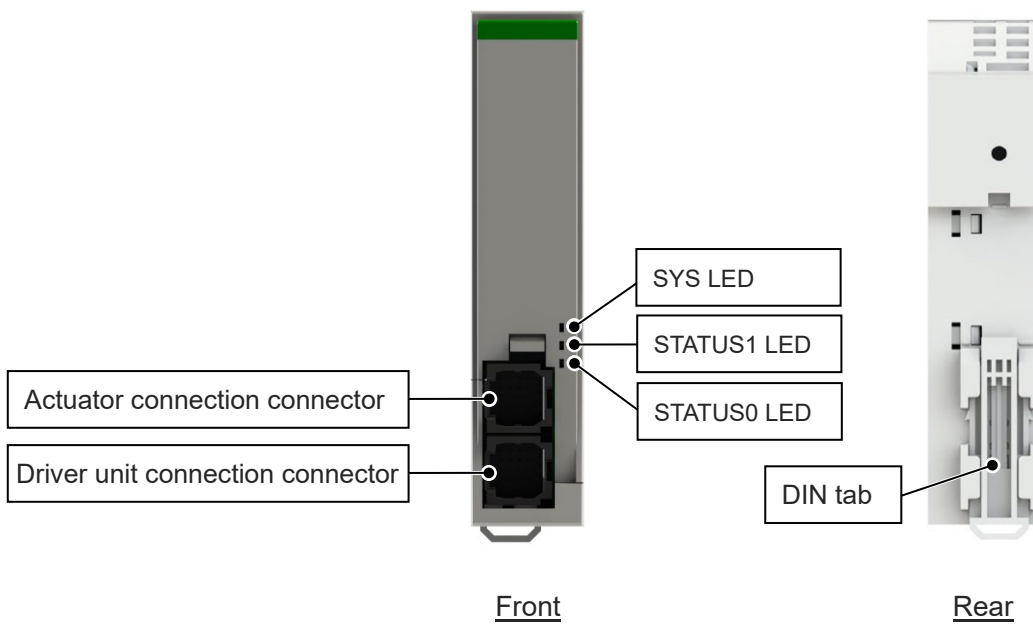
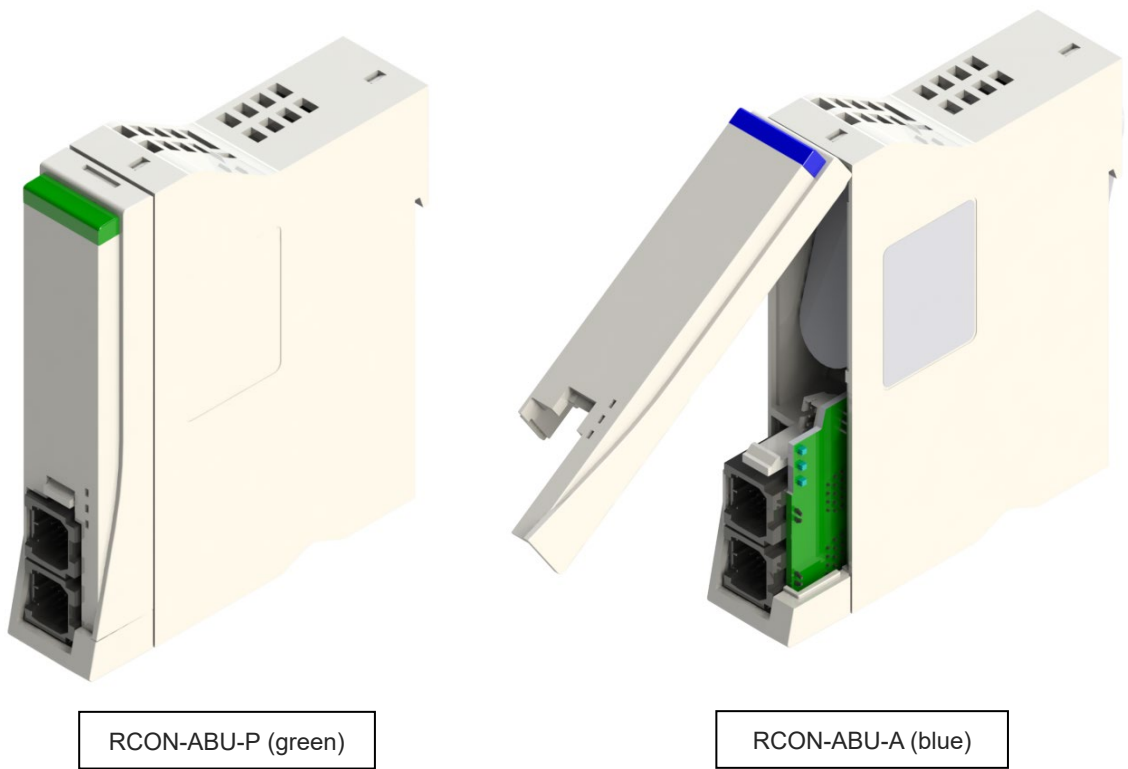
RSEL checks the battery voltage at power ON. Detection does not occur even if the battery voltage drops to the alarm level while RSEL is energized.

[How to Replace Absolute Battery]

Regarding the how to replace absolute battery, refer to [12.3.1 How to Replace Absolute Battery].

3.7.5 Part names/Functions

(1) Part names

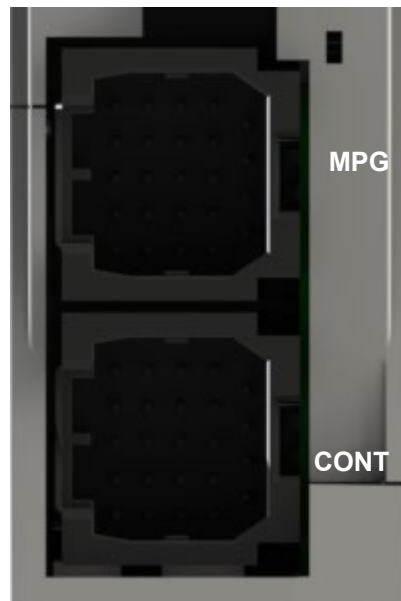


(2) LED display

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 connection connector/driver unit connection connector

Connect the simple absolute unit to an actuator using an actuator connection connector (MPG), and to a driver unit with the driver unit connection 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.

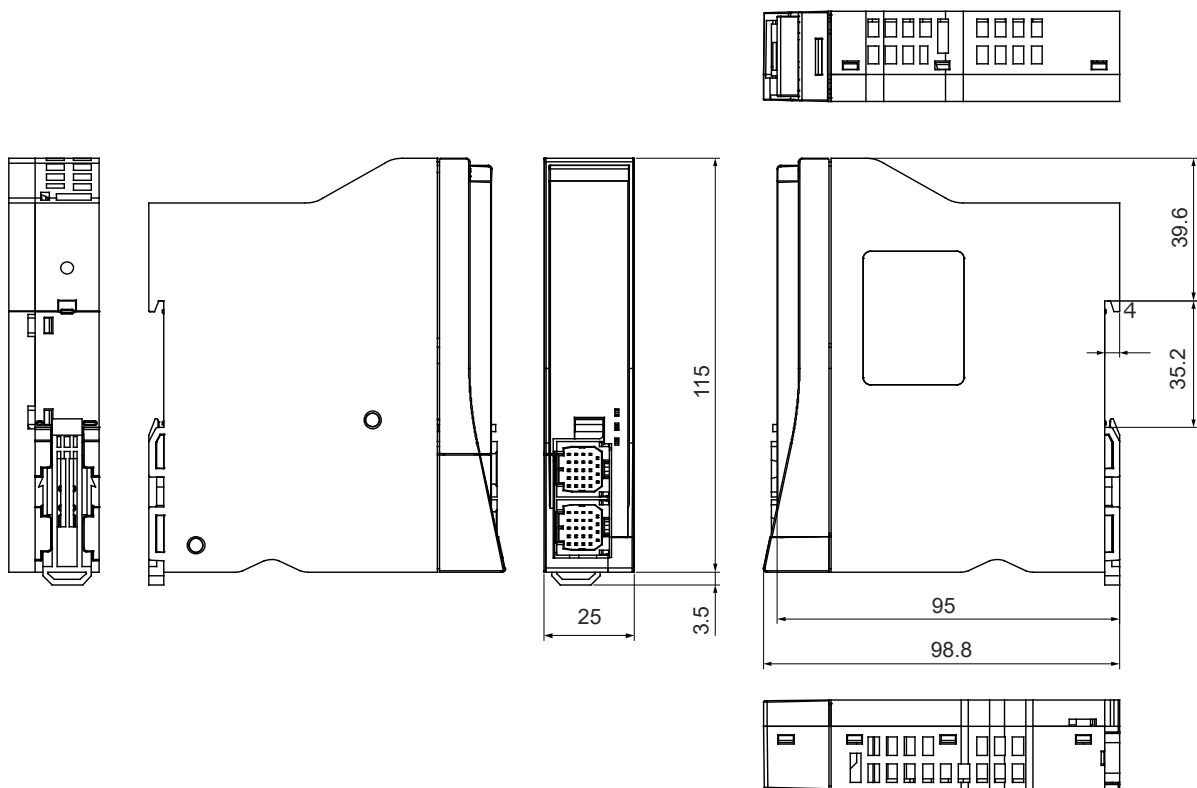


3.7.6 External dimensions

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

Item	Specifications
External dimensions	W25 mm × H115 mm × D95 mm
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.



3.7.7 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) Driver Unit Parameter No.5 “Homing direction”
- (2) Driver Unit Parameter No. 22 “Homing offset”
- (3) Driver Unit Parameter No. 77 “Ball screw lead length”
- (4) Driver Unit 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.

3.8 Unit Connection Restrictions

3.8.1 Motor power / control power capacity restrictions

Refer to [2.2 Power supply capacity]

3.8.2 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. EC connection unit

Connect it on the right of the SEL Unit, SCON Extension Unit, PIO/SIO/SCON Extension Unit PIO Unit and 24V Driver Unit.

7. 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.

8. RCON-SC unit

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

9. Terminal unit

Allocate the terminal unit on the right end.

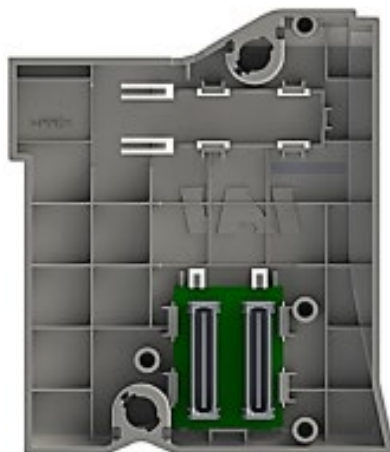
[Caution when Connecting Terminal Unit]

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.

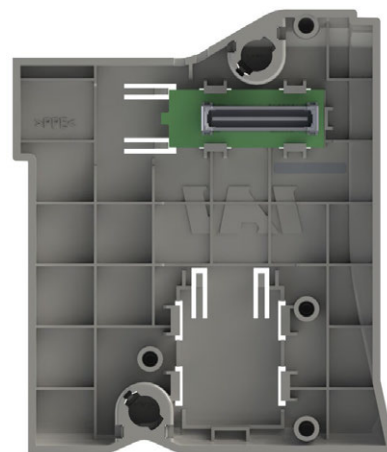
For the construction only with the 24V driver unit, use the 24V terminal unit (RCON-GW-TR) enclosed in the SEL unit.

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

RSEL

Chapter 4

Unit Connection / Installation and Wiring

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There is “Quick Start Guide” available in order to introduce the startup of the RSEL system from controller wiring work to execution of basic operations in the shortest time.

“Japanese Only”

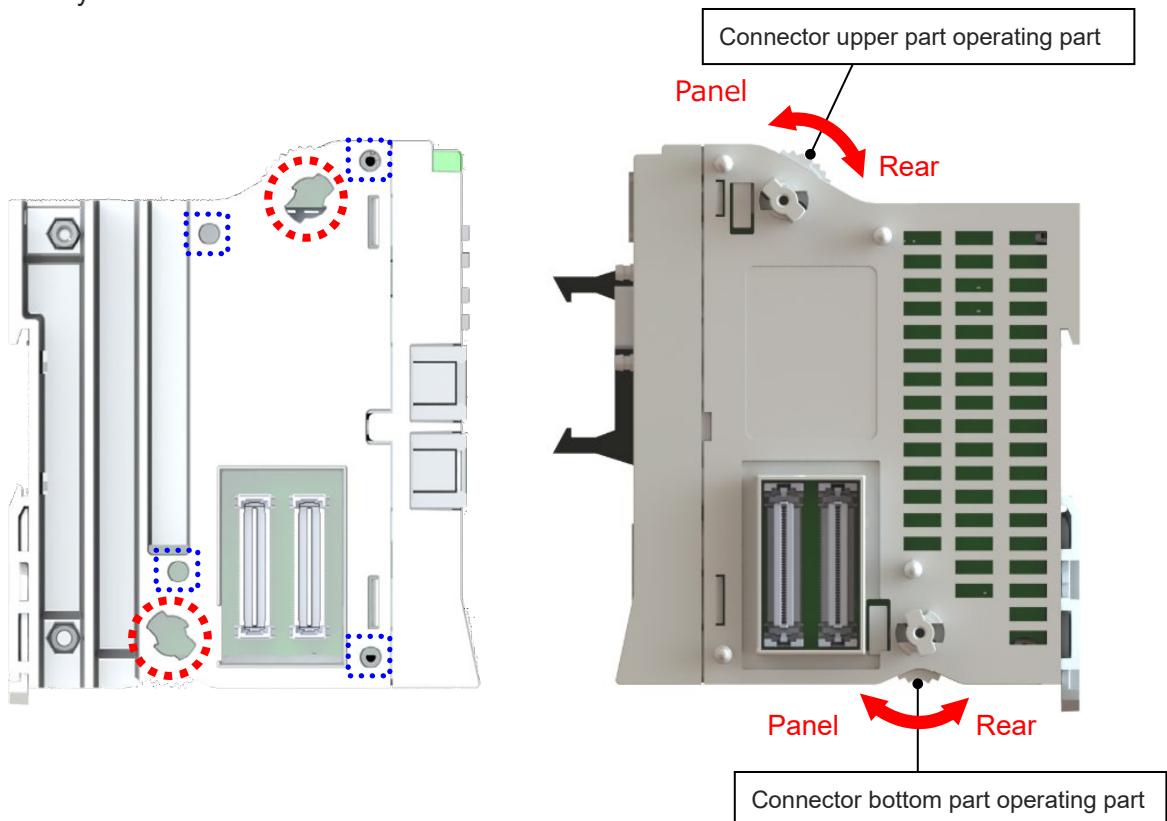
4.1 Unit Connection / Installation

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.

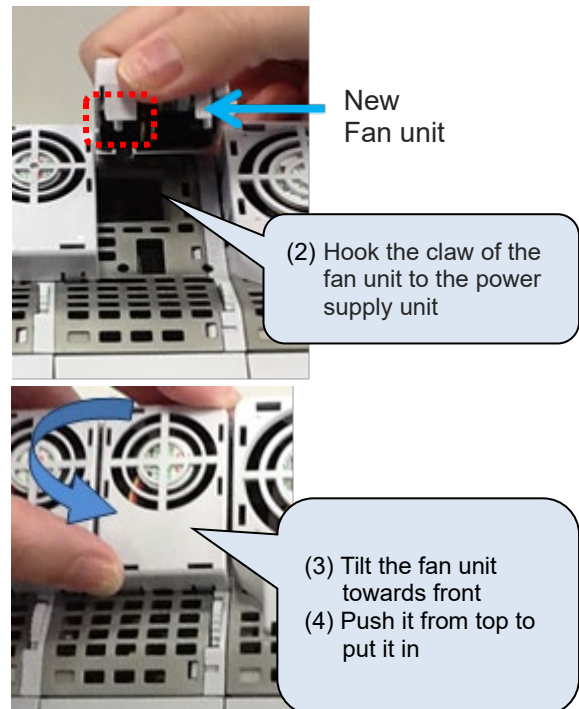


- (1) Turn the operating parts of the connector upper/bottom part towards the panel and position on the panel end.
- (2) The 2 sections circled with a dashed line and the 4 positioning bosses within the square dotted lines are used as a total of 6 mating sections for positioning 2 units.
- (3) When positioning is completed, insert the connection connectors $\times 2$ 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.



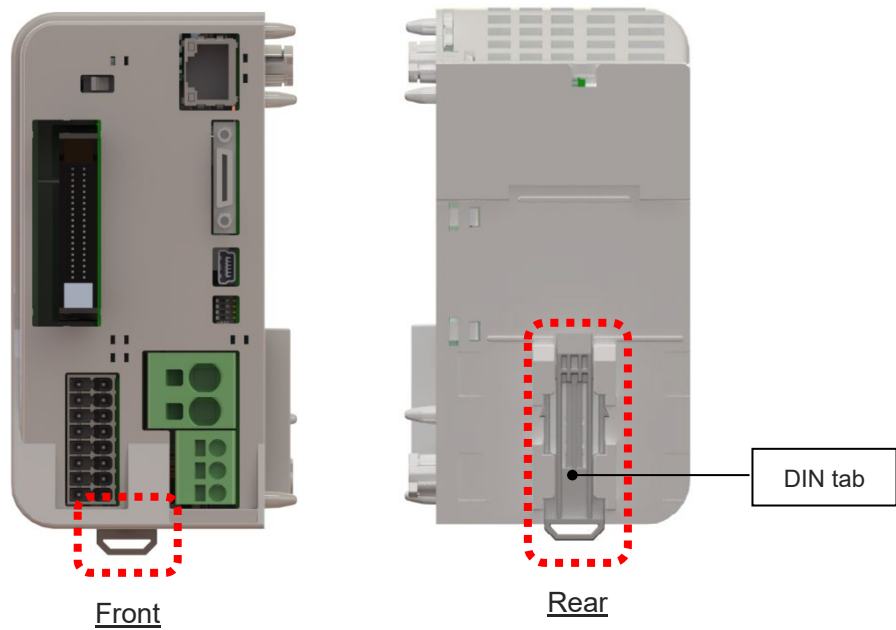
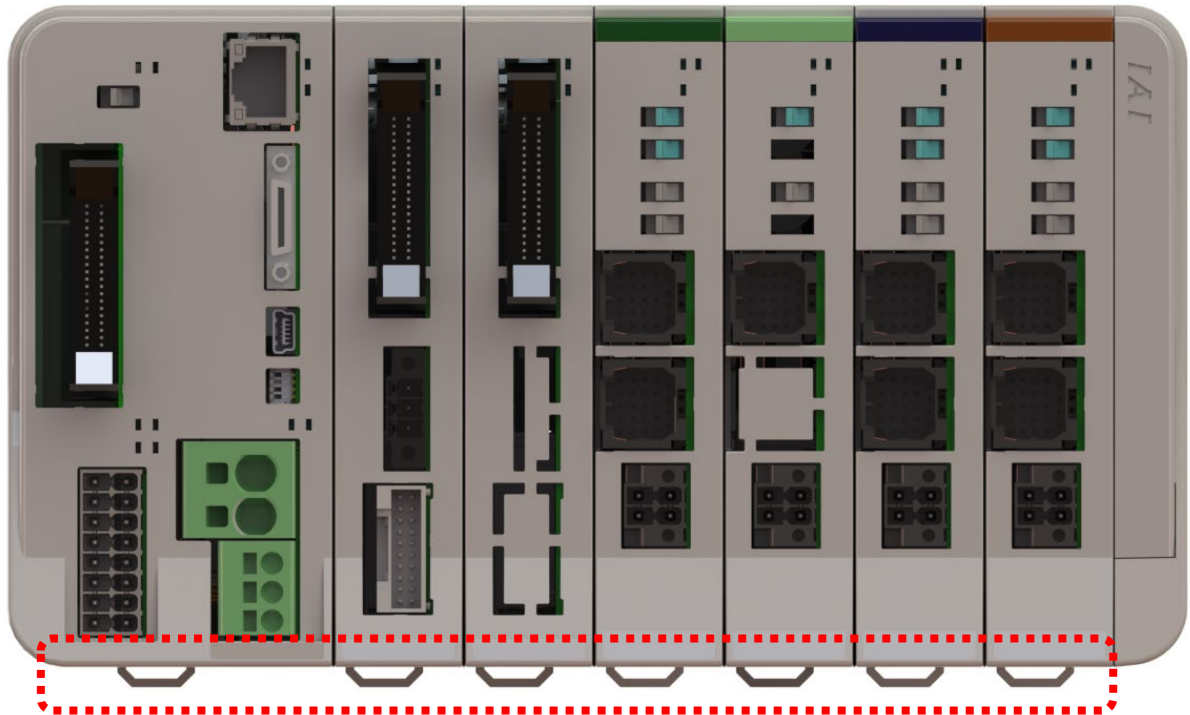
4.1.2 Fan installation

- (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.



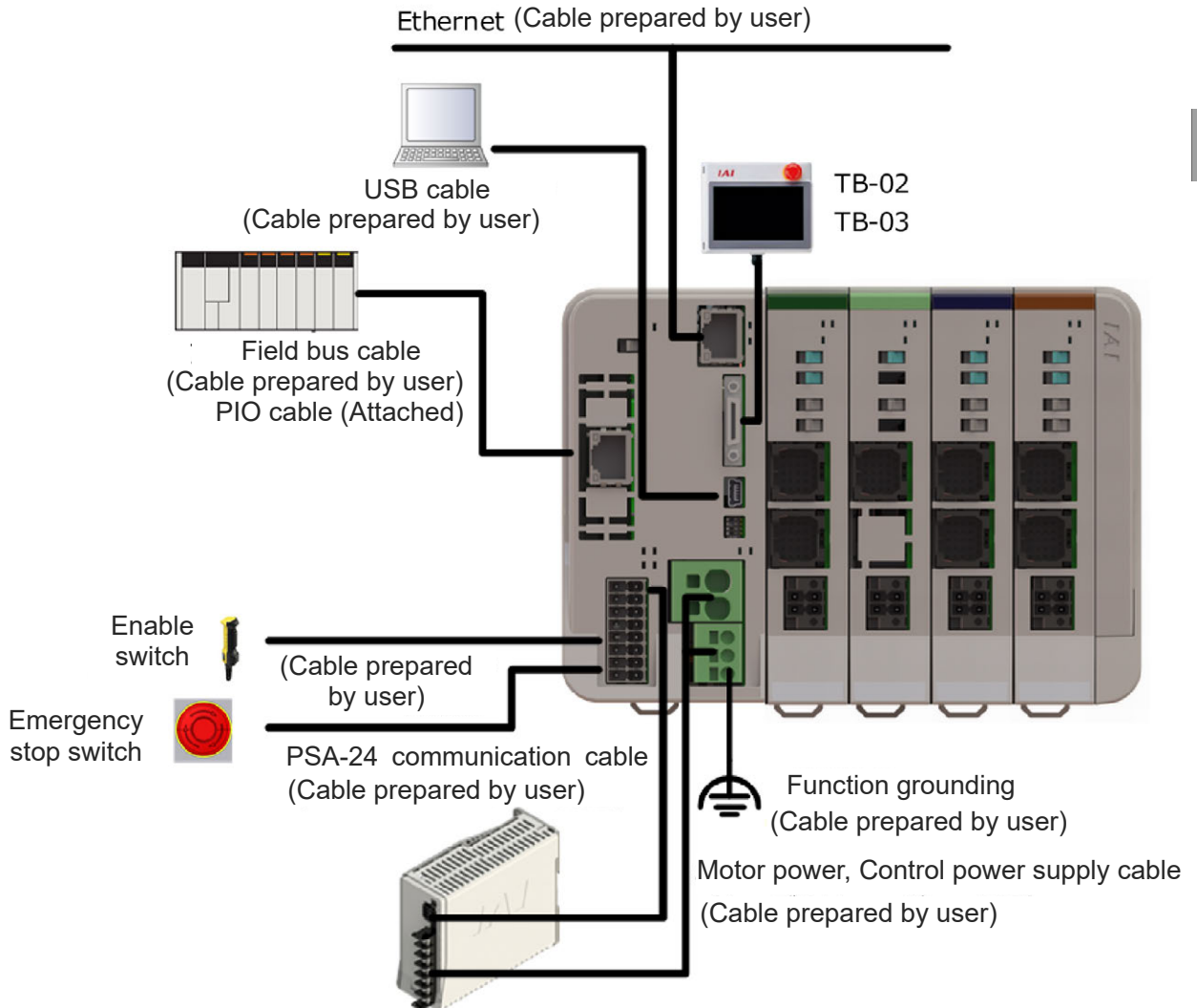
4.1.3 Unit mounting

RSEL System is available only with DIN rail installation. Pull down the DIN operation part that is visually accessible at the bottom of the back of the unit body (where shown with red dotted line in the figure below), and then attach the DIN rail. Push the DIN operation part back up after attaching the rail to lock it.



4.2 Wiring Diagram

4.2.1 Example connection of devices

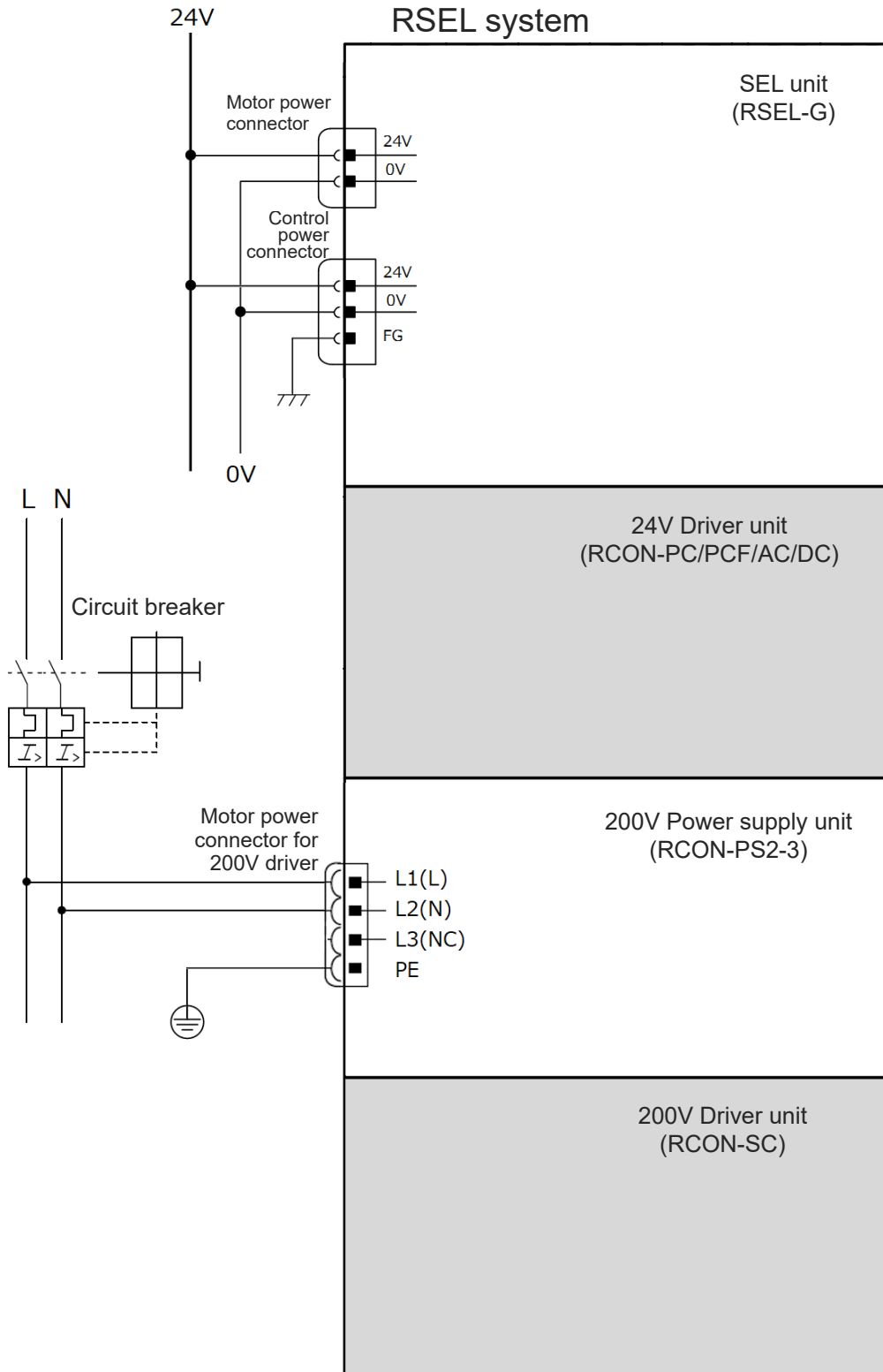


Reference for Example of Connections

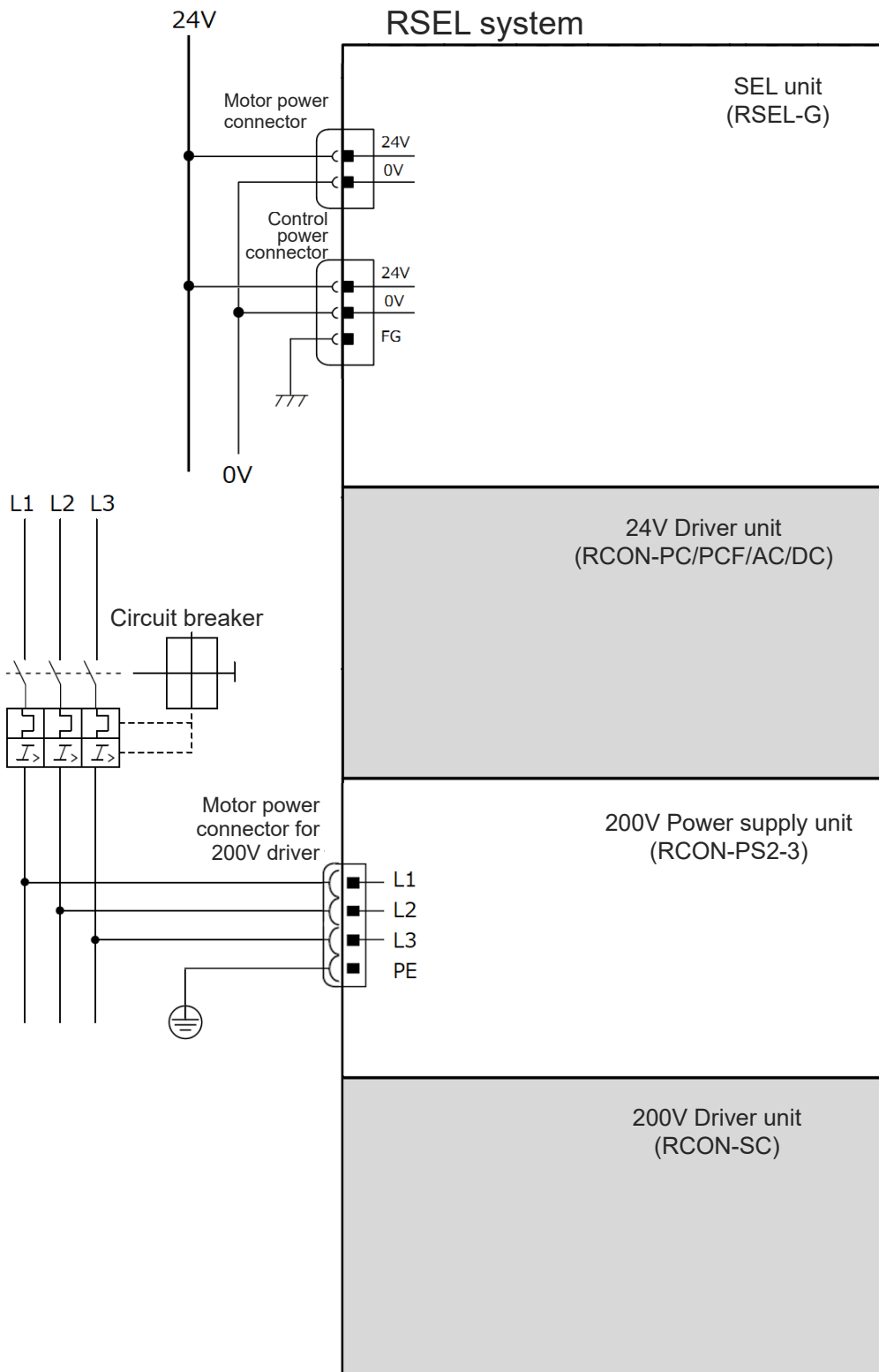
No.	Connector	Reference / Content	
1	(24V) Power connector	4.4.1	Power supply wiring to RSEL system
2	(200V) Power connector	4.4.2	200V power supply wiring to RSEL system
3	System I/O • PSA-24 communication connector	2.6.2 9.2	Drive-source cutoff circuit wiring example PSA-24 Communication Monitor
4	Driver Unit Connector	4.4.5	Actuator wiring
5	Driver Unit Connector (Simple Absolute Connection)	4.4.7	Simple Absolute Unit Wiring
6	Connector for each network	4.4.8	Field network wiring
7	Teaching connector	4.8	Connection the teaching connector
8	USB connector	4.9	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

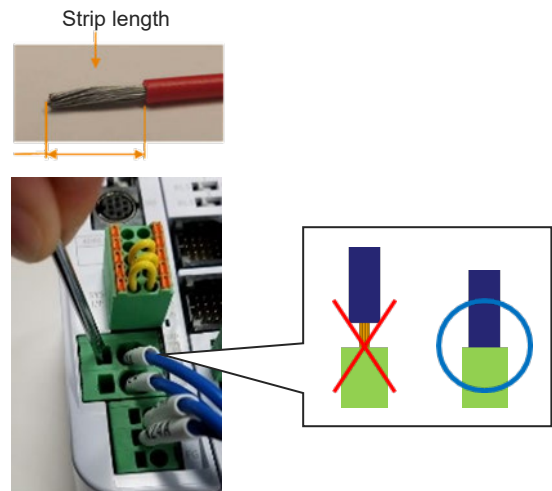
To supply power to the RSEL system, power supply wiring to the SEL unit is required. The example below shows the wiring of the SEL unit and the IAI 24V DC power supply unit PSA-24.

Items to prepare : RSEL system/wiring

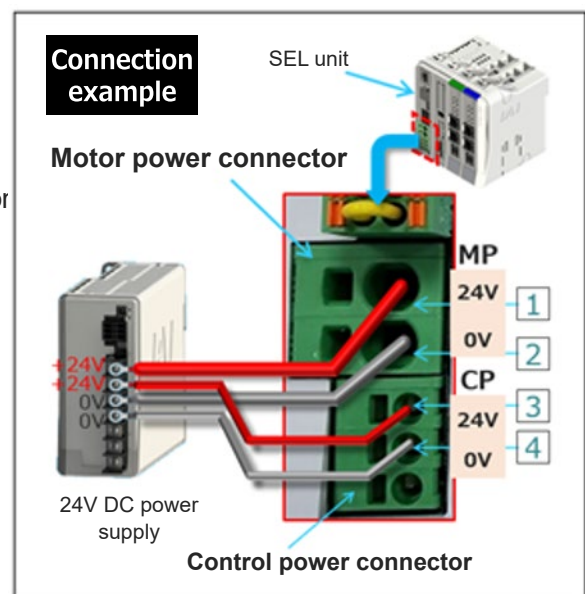
To supply power to the controller, mount the power connector and wire each terminal. Perform 1 to 4 with reference to the figure and connection diagram below.

[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 "24V" of MP (motor power connector) to the +24V terminal of the 24V DC power supply.
- 2 Connect the "0V" of MP (motor power connector) to the 0V terminal of the 24V DC power supply.
- 3 Connect the "24V" of CP (control power connector) to the +24V terminal of the 24V DC power supply.
- 4 Connect the "0V" of CP (control power connector) to the 0V 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	24V	Motor drive power supply	AWG20 ~ 8 (Copper wire)
	0V		
CP	24V	Control power input	AWG24 ~ 12 (Copper wire)
	0V		
	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.

Reference: Shown below is a list of the recommended products when using a rod terminal (ferrule terminal) for power supply wiring.

Model Code for Rod Terminal (Ferrule Terminal)	AWG	Allowable Current (Reference)	Remarks
AI 0.75-8 GY	18	10	
AI 1-8 RD	18	10	
IA 1.5-8 BK	16	13	
AI 2.5-8 BU	14	17	
AI 4-18 GY	12	23	Cut at 3 mm from tip of ferrule
AI 6-18 YE	10	31	Cut at 3 mm from tip of ferrule

Applicable crimping tool: CRIMPFOX 6 (supplied by Phoenix contact)

4.4.2 200V power supply wiring to RSEL system

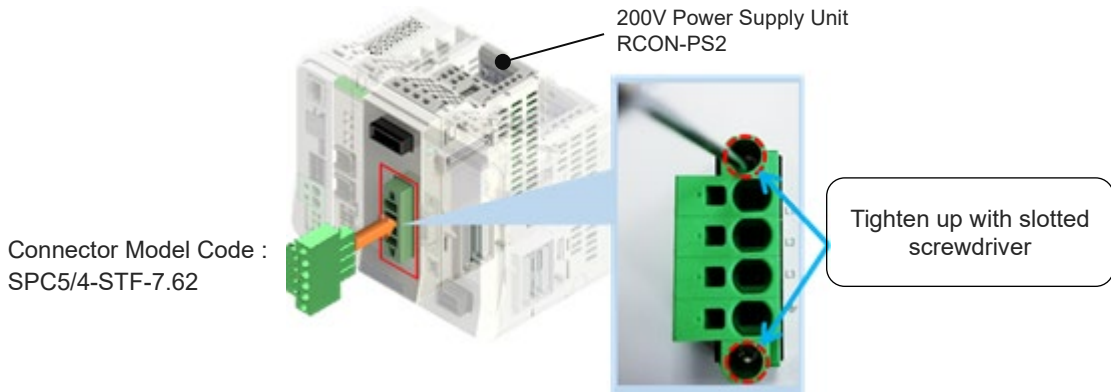
In order to supply motor power to a 200V driver unit (RCON-SC), it is necessary to connect wires to the 200V power supply unit (RCON-PS2).

Items to Prepare

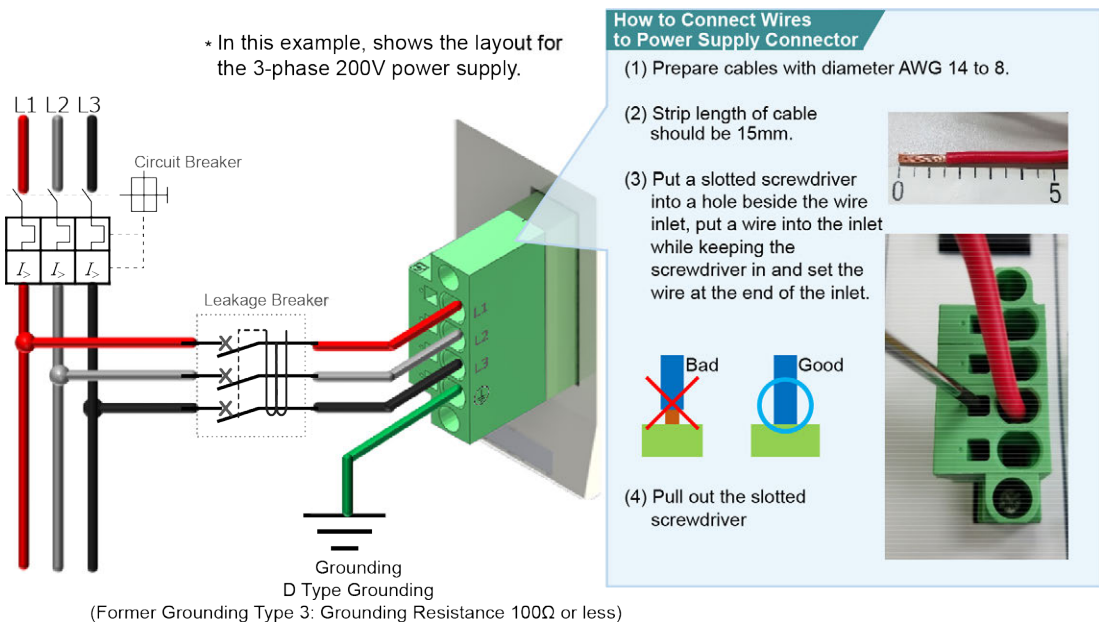
RCON System / Wire

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.





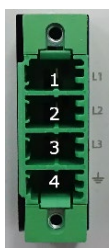
Caution

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

[Electric wire diameter used for “RCON-PS2-3” 200V power supply wiring]

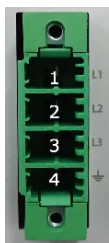
For the wires to be connected to the power connector, use the following applicable wires.

Compatible wire (3-Phase 200V)



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

Compatible wire (Single-Phase 200V)



Signal name		Content	Compatible wire diameter
L1 (L)	Live	Motor drive power supply	AWG14 ~ 8 (Copper wire)
L2 (N)	Neutral		
L3 (NC)	No Connect		
⊕	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

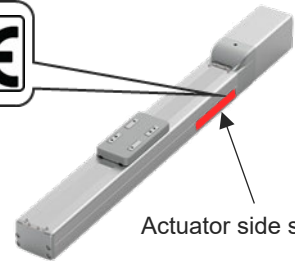
[Checking actuator and driver unit model numbers]

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

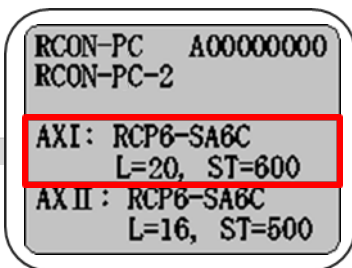
Model number shown in "MODEL" on the actuator model number sticker



Actuator side surface

Match

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



Driver unit front

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) SA8/WSA16/RA8/RA10/RRA8/RRA10	P6	CB-ADPC-MPA□□□(-RB) CB-CAN-AJ002 (conversion cable)	—	B
(3)		Gripper (GR*), ST4525E, SA3/RA3	P5	CB-ADPC-MPA□□□(-RB)	—	A
(4)	RCP4 RCP4CR RCP4W	High thrust type ^(Note 1) RCP4-RA6 (56SP)/RCP4W-RA7 (56SP)	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 (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)	RCP2 RCP2CR RCP2W	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) HS8/RA8/RA10	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 20 m at maximum regardless of the conversion unit.

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

- 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



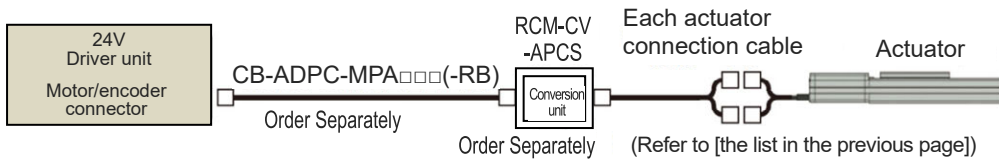
- Wiring diagram B**
- (2) RCP6/RCP6CR/RCP6W/RCP5/RCP5W high thrust type ^(Note 1)
 - (4) RCP4/RCP4W high thrust type ^(Note 1)
 - (5) RCP4/RCP4CR/RCP4W (gripper, ST4525E, SA3/RA3, other than high thrust type ^(Note 1))



- 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)

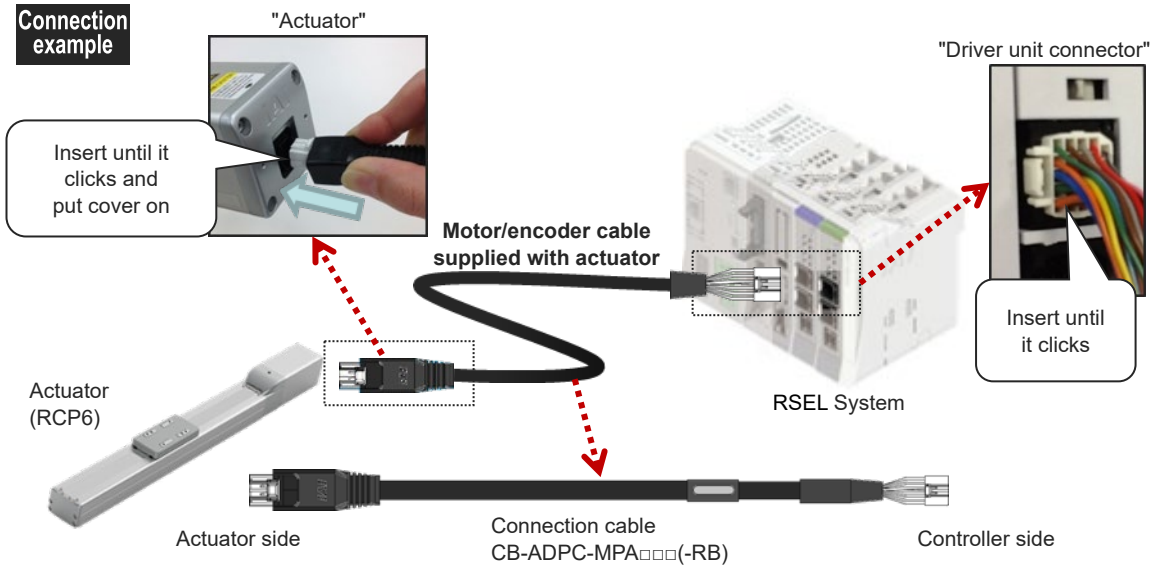
[200V Driver Unit Connection Cable]

No.	Actuator		Applicable Controller Symbol	RCN Connection Cable				
	Series	Applicable Type		Applicable controller code [m]	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□□□
(4)	RCS2	RA13R	T4	20	CB-RCC1-MA□□□	CB-X2-MA□□□	CB-RCS2-PLA□□□	CB-X2-PLA□□□
		RA13R Equipped with Brake (with brake box)					[From Actuator to Brake Box] CB-RCS2-PLA□□□	[From Actuator to Brake Box] CB-X2-PLA□□□
		RA13R Equipped with Brake (with no brake box)					[From Brake Box to Controller] CB-RCS2-PLA□□□	[From Brake Box to Controller] 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
							CB-X1-PLA□□□ *Cable length at 21m or more and 30m or less in battery-less absolute type should be CB-X1-PLA□□□-AWG24	
(6)	IS(P)A IS(P)DA IS(P)DACR SSPA SSPDACR IF FS RS	Option: Limit Switch Equipped Type (Note 1)	T4	30	—	CB-X2-MA□□□	—	CB-X1-PA□□□
							CB-X1-PLA□□□	
(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□□□
		Other than those above				CB-X2-MA□□□		CB-X3-PA□□□
(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)

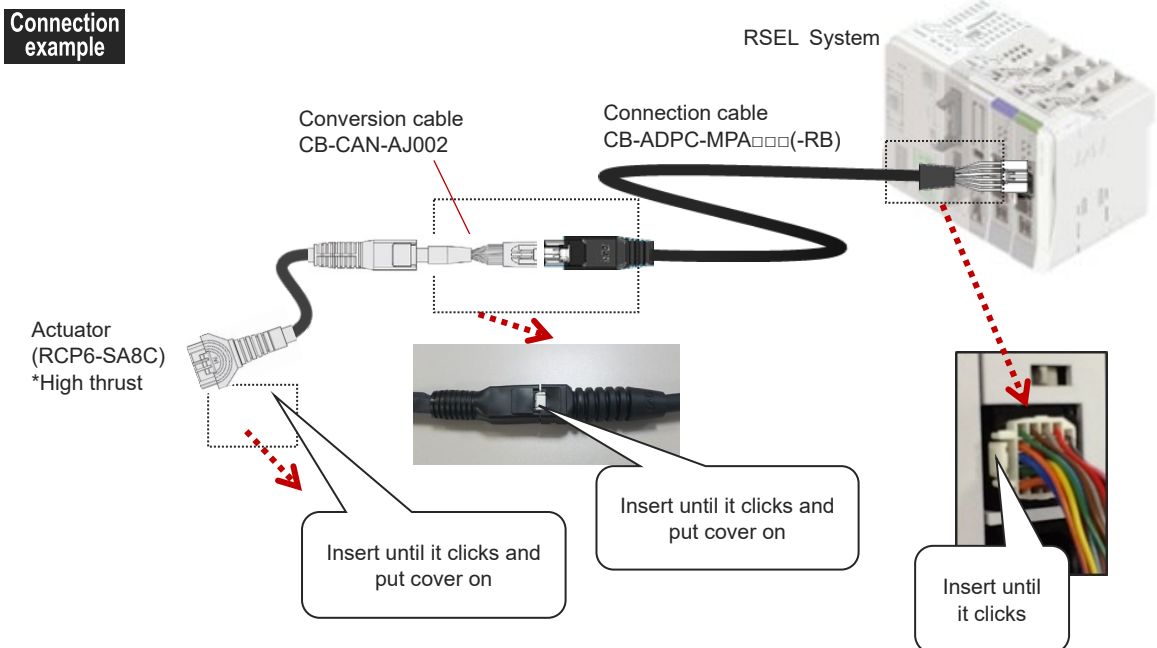
- (1) Connecting RCP6 (other than high thrust) / RCP5 (other than high thrust) / RCD series to RSEL
 [4.4.4 RSEL connection cable list Wiring diagram A and C]



Caution

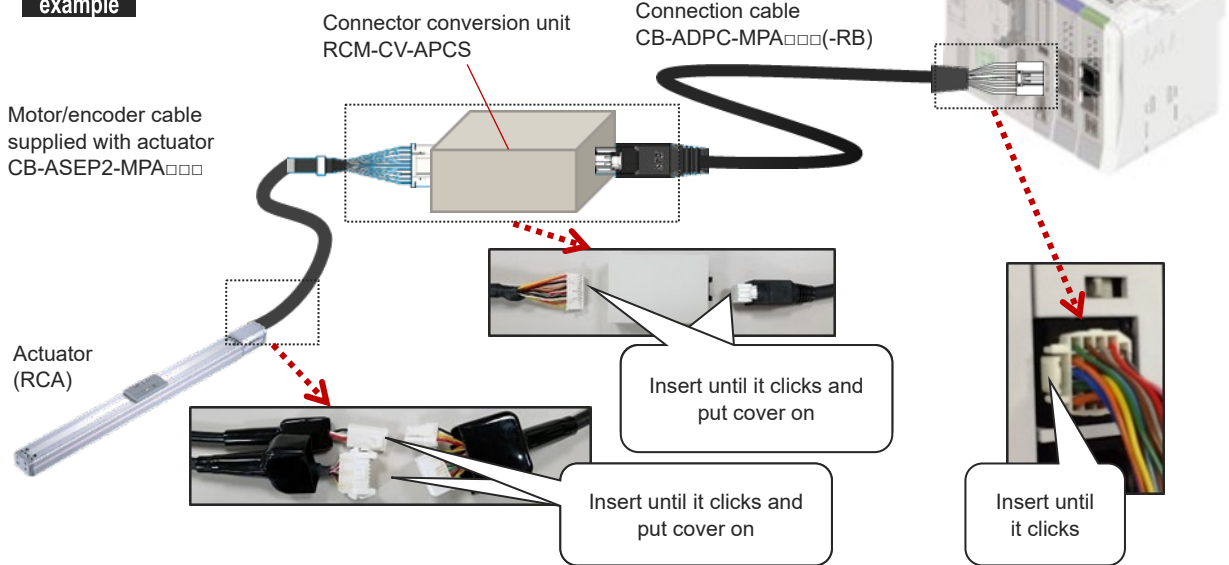
- Precautions when selecting a motor/encoder cable
 Depending on the actuator model, conversion cable CB-CAN-AJ002 and connector conversion unit RCM-CV-APCS may be required to connect the driver unit and the simple absolute unit.

- (2) Connecting RCP6 (high thrust) / RCP5 (high thrust) / RCP4 series to RSEL
 [4.4.4 RSEL connection cable list Wiring diagram B]



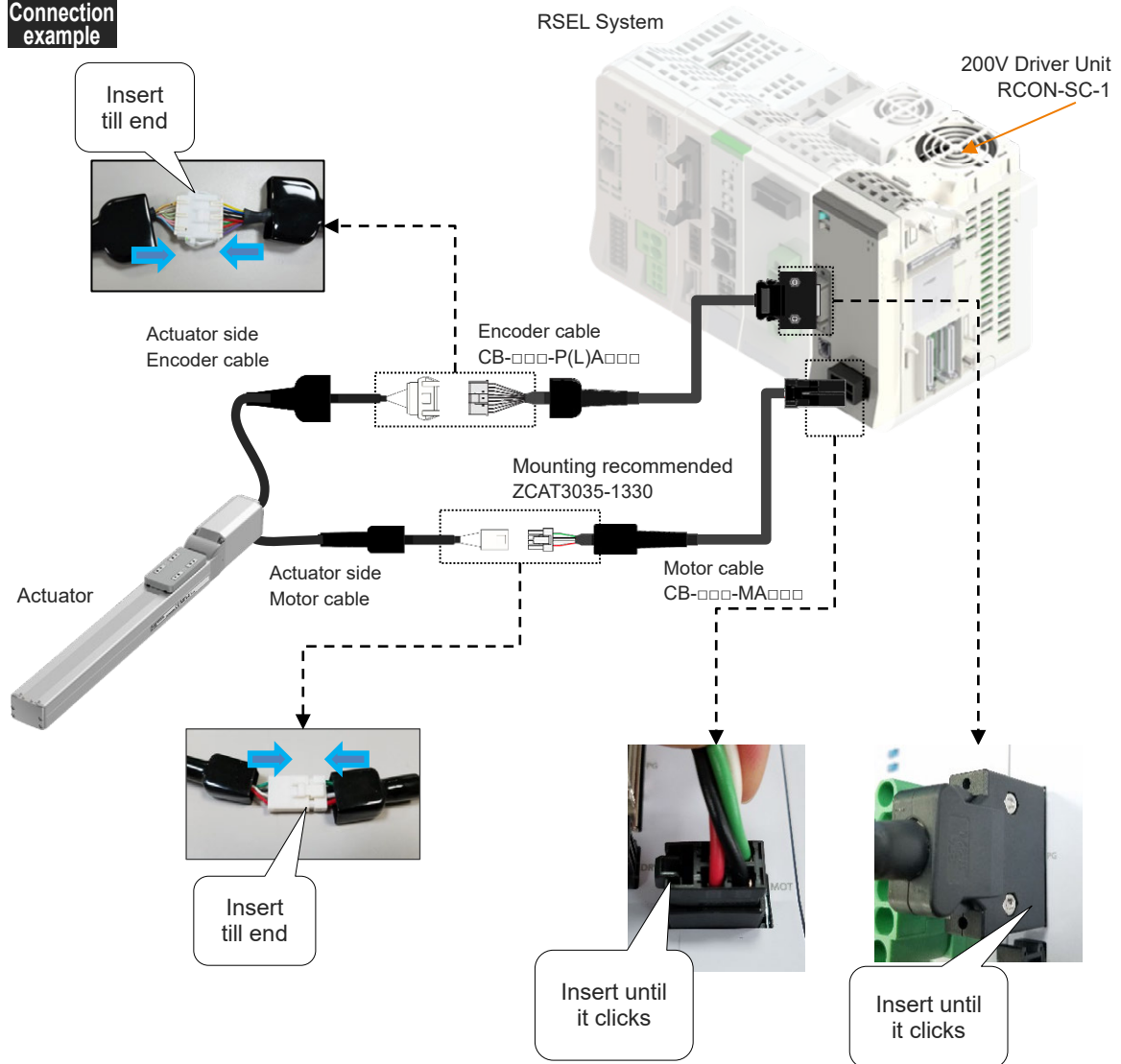
(3) Connecting RSEL and RCP/RCA Series other than the above
 [4.4.4 RSEL connection cable list Wiring diagram D]

Connection example



(4) Connection between 200V Servo-motor Actuator and RCON-SC-1

Connection example

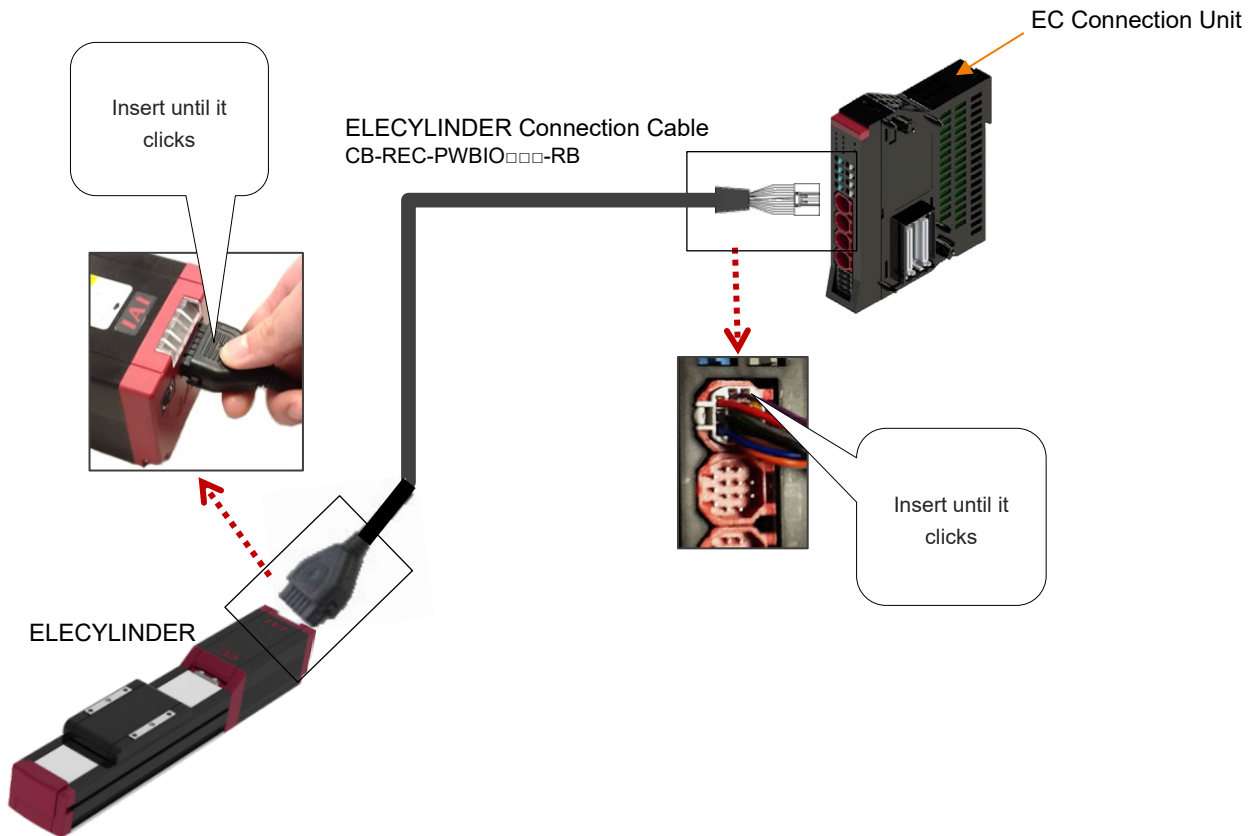


4.4.6 Wiring between EC connection unit and ELECYLINDER

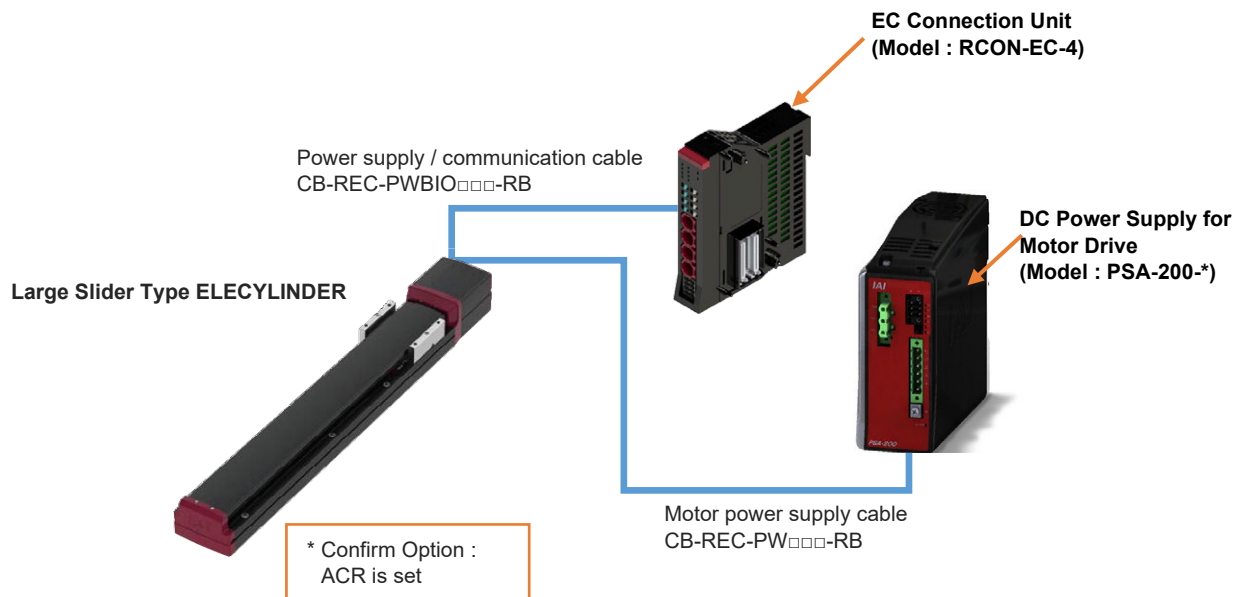
Refer to the example of connection below to insert the connectors to ELECYLINDER and the EC connection unit. Push the connectors inward till it makes “click” sound.

The axis number should be determined by the position of the connector on the EC connection unit.

(1) Connecting between ELECYLINDER and EC connection unit



(2) Connecting between large slider type ELECYLINDER and EC connection unit

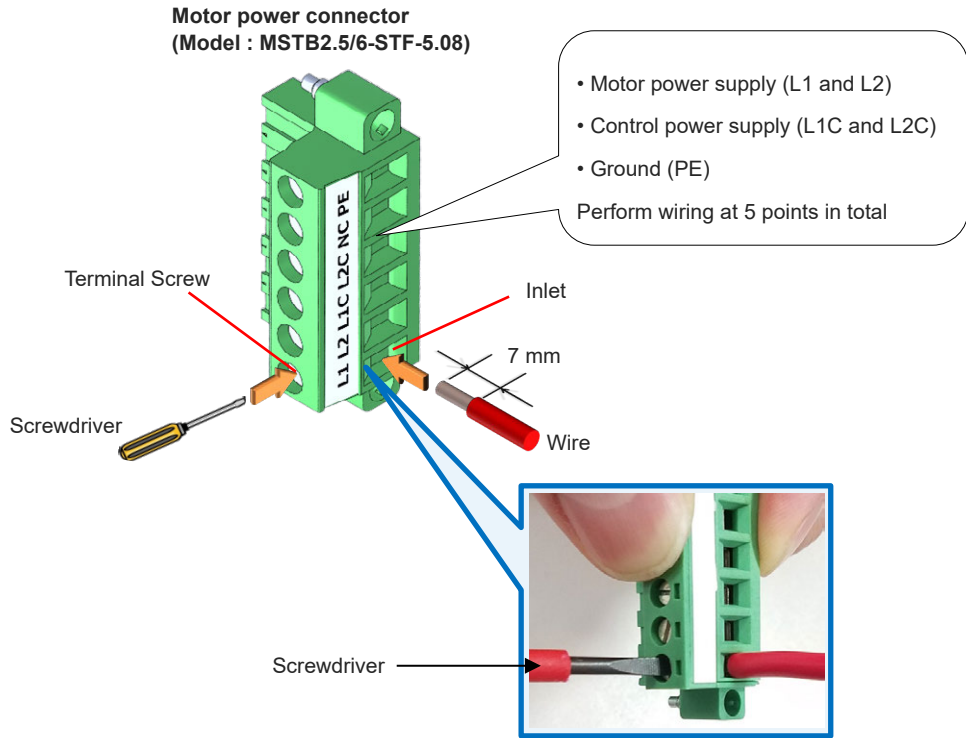
**Caution**

Make sure to confirm that option ACR (RCON-EC connection specifications) is selected for ELECYLINDER before connecting.

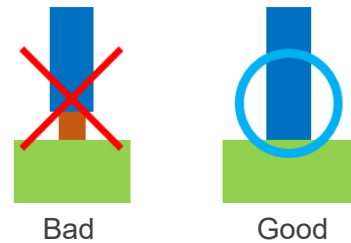
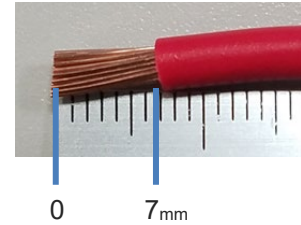
The actuator model code is described on the production label on the left side of the main unit.

For the detailed specifications for the DC power supply for motor drive, refer to [3.2 Electrical Specifications in ELECYLINDER Instruction Manual (ME3801)].

[1] Wiring to DC Power Supply for Motor Drive



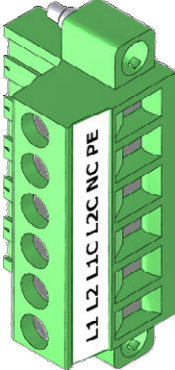
- (1) Refer to the table below for the wire diameter for each cable.
- (2) The stripped length on a cable should be 7 mm.
- (3) Insert wires to the inlet on the power supply connector. Inset the wires till they hit the end.
- (4) Tighten up the terminal screw with using a slotted screwdriver.



[Wire Diameters in Cables used for Power Supply Wiring on DC Power Supply for Motor Drive]

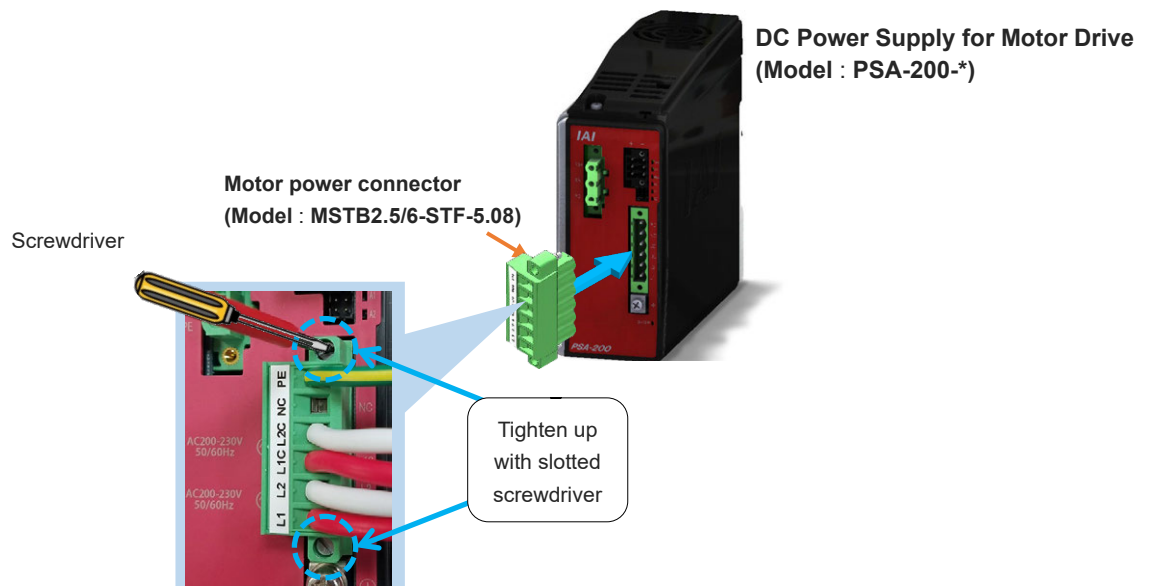
For the wires to be connected to the power connector, use the following applicable wires.

Compatible wire

Connector	Terminal name	Compatible wire Diameter
	PE	AWG 14 (Copper wire)
	NC	N/A
	L2C	AWG 18 (Copper wire)
	L1C	AWG 18 (Copper wire)
	L2	AWG 14 (Copper wire)
	L1	AWG 14 (Copper wire)

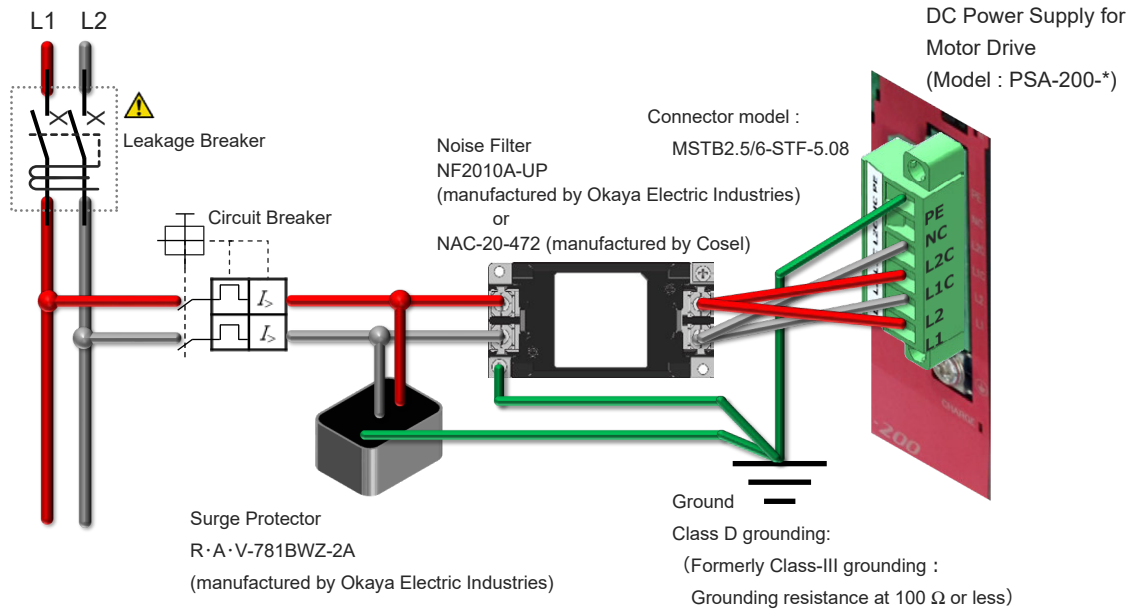
* Use cables with their rated temperature on the isolation sheath at 60°C or higher.

- (5) Join the power supply connector to the DC power supply for motor drive and tighten up the fixing screws on the flanges of the connector by using a slotted screwdriver.



[Installation of Noise Filter and Surge Protector on DC Power Supply for Motor Drive]

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



Caution

Leak current may vary depending on the motor capacity, cable length and ambient temperature.

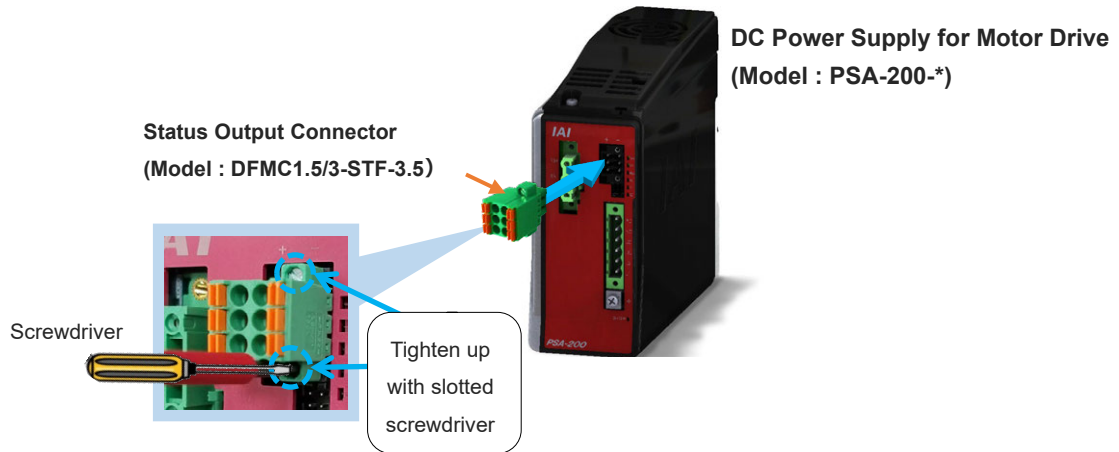
Therefore, it is required to measure leak current at the point of the leakage breaker installed when leakage protection is to be conducted.

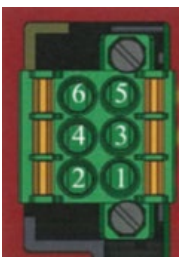
A clear purpose is necessary when selecting a leakage breaker such as to protect from fire or protection of personnel. For leakage breaker, use a high frequency applicable type (for inverter).

[2] Connectivity of Status Output Connector on DC Power Supply for Motor Drive

It should output the status of a DC power supply for motor drive. The output should be linked to LEDs for PWR, MP and ALM.

Refer below for how to attach the status output connector.



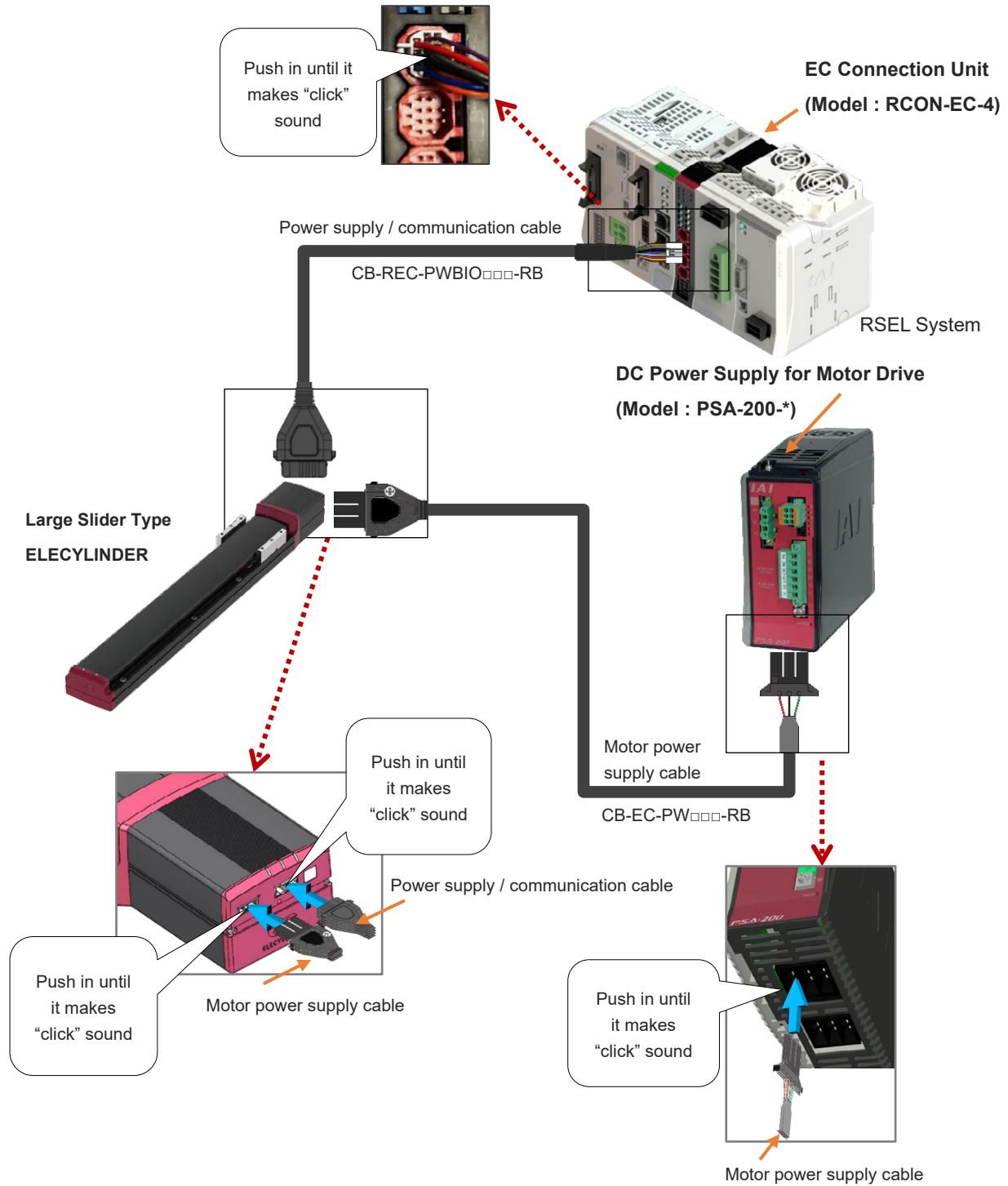
Connector	Pin No.	Signal name	Description	Remarks
	1	*ALM-	Alarm Contact Output	Photocoupler Insulation Open Collector Output
	2	*ALM+		
	3	MP-	Motor Power Supply Contact Output	
	4	MP+		
	5	PWR-	Control Power Supply Contact Output	
	6	PWR+		

Compatible wire diameter

Item	Specifications
Compatible wire	AWG24 to 16
Max. Cable length	10 m
Strip length	10.0 mm

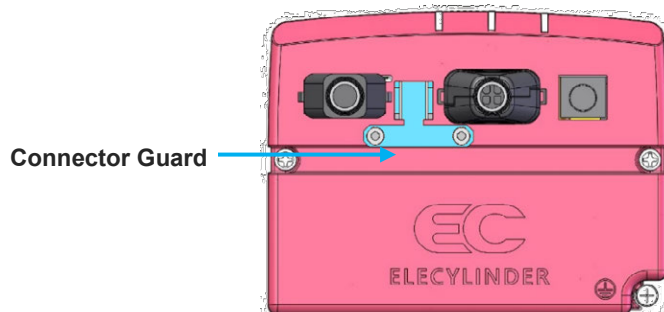
* Use cables with their rated temperature on the isolation sheath at 60°C or higher.

[3] Wiring between Actuator Unit and DC Power Supply for Motor Drive
 Establish connection among the main unit of the large slider type ELECYLINDER, REC System and a DC power supply for motor drive.

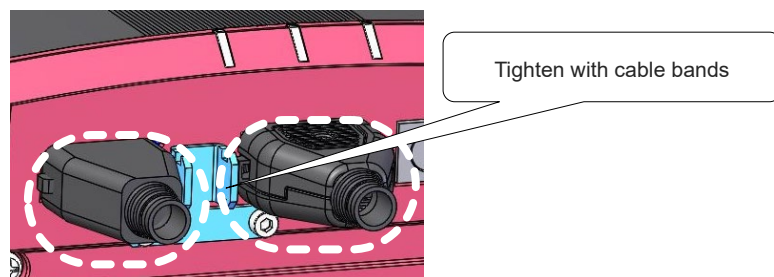


[How to Apply Connector Guard]

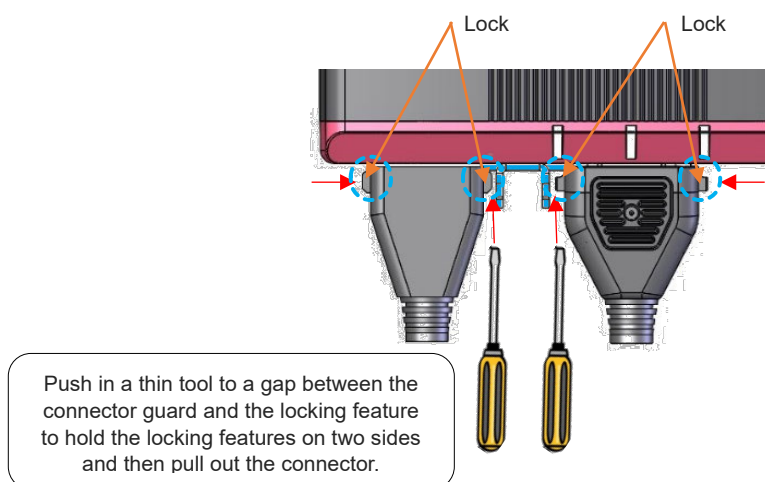
There is a connector guard equipped for the large slider type ELECYLINDER.
With the connector guard applied, a risk to accidentally pull off a cable can be avoided.



By tightening the matching parts of the connector guard and the connectors with a cable band, concern of contact error at the connectors caused by vibration on the cables can be reduced.



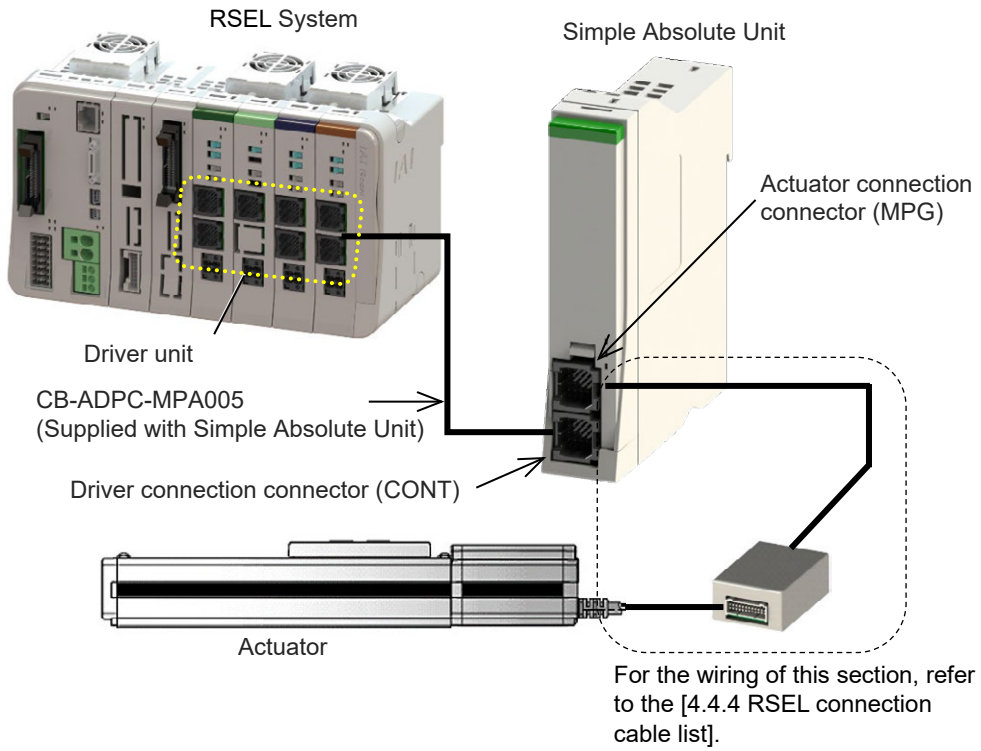
When pulling out the connector, insert a thin tool in a gap between the connector guard and the connector to hold the locking feature, hold the other side at the same time and then pull it out.



4.4.7 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”.

AC servo motor specification and
stepper motor specification only

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

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.

4.4.8 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 RSEL systems]

Connection example

Host PLC
(prepared by the customer)

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

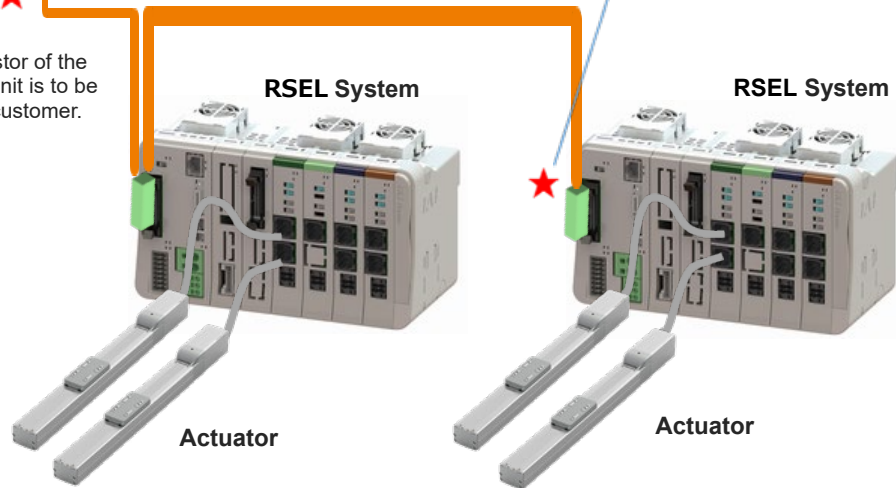


CC-Link dedicated cable
(prepared by the customer)

Terminal resistor
(supplied with SEL system)

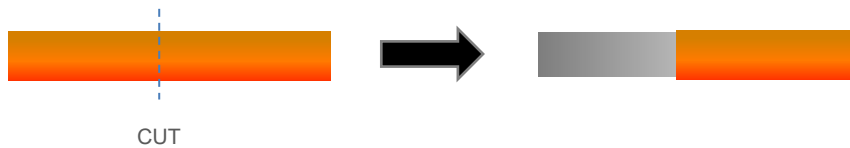


* The terminal resistor of the CC-Link master unit is to be prepared by the customer.

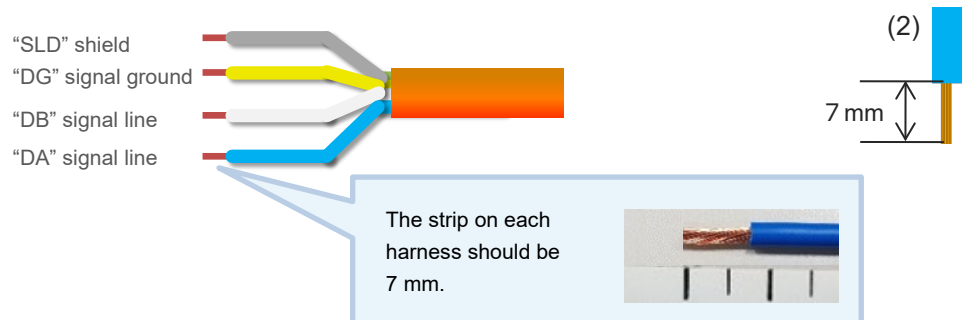


[CC-Link dedicated cable and connection connector wiring method]

(1) Prepare a CC-Link dedicated cable and remove the sheath.

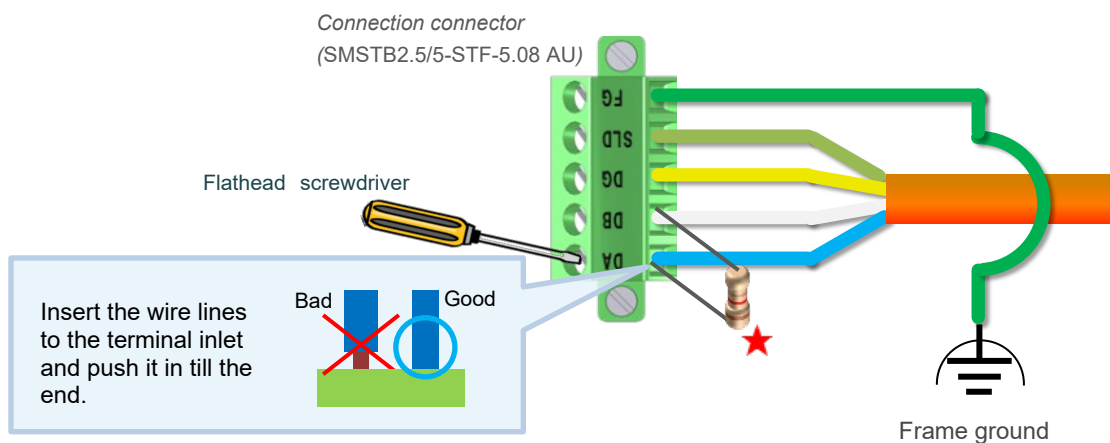


(2) Remove the sheath on each harness in the CC-Link dedicated cable.



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

Attach the controller attached terminal resistor between the connectors DA and DB at the network terminal end only. (★ in "Connection image" above)

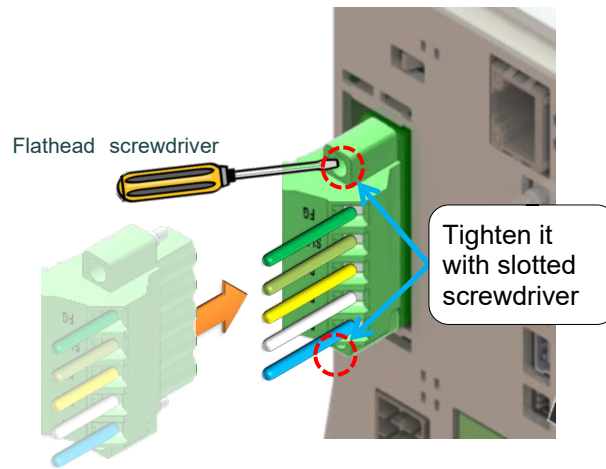
**Point !**

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

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

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

- (4) Have the connector wired in (3) put to the connector allocated on the CC-Link module on the main unit of RSEL, push the connector till the end, and then tighten it with a slotted screwdriver.



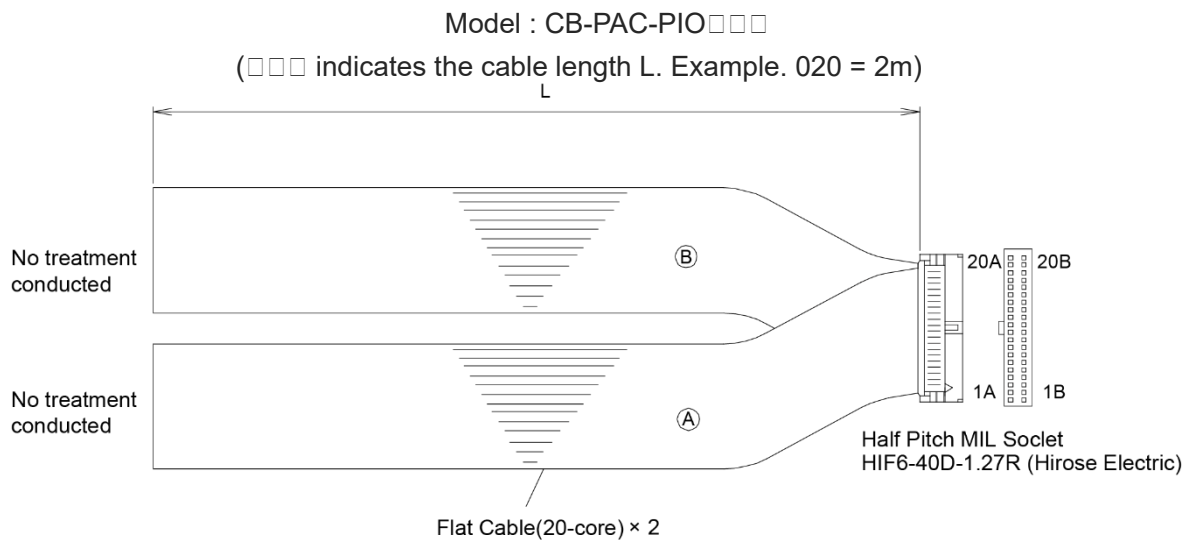
Caution

- Conduct the CC-Link wiring on the PLC side following the instruction for the PLC and master unit to be used.
-

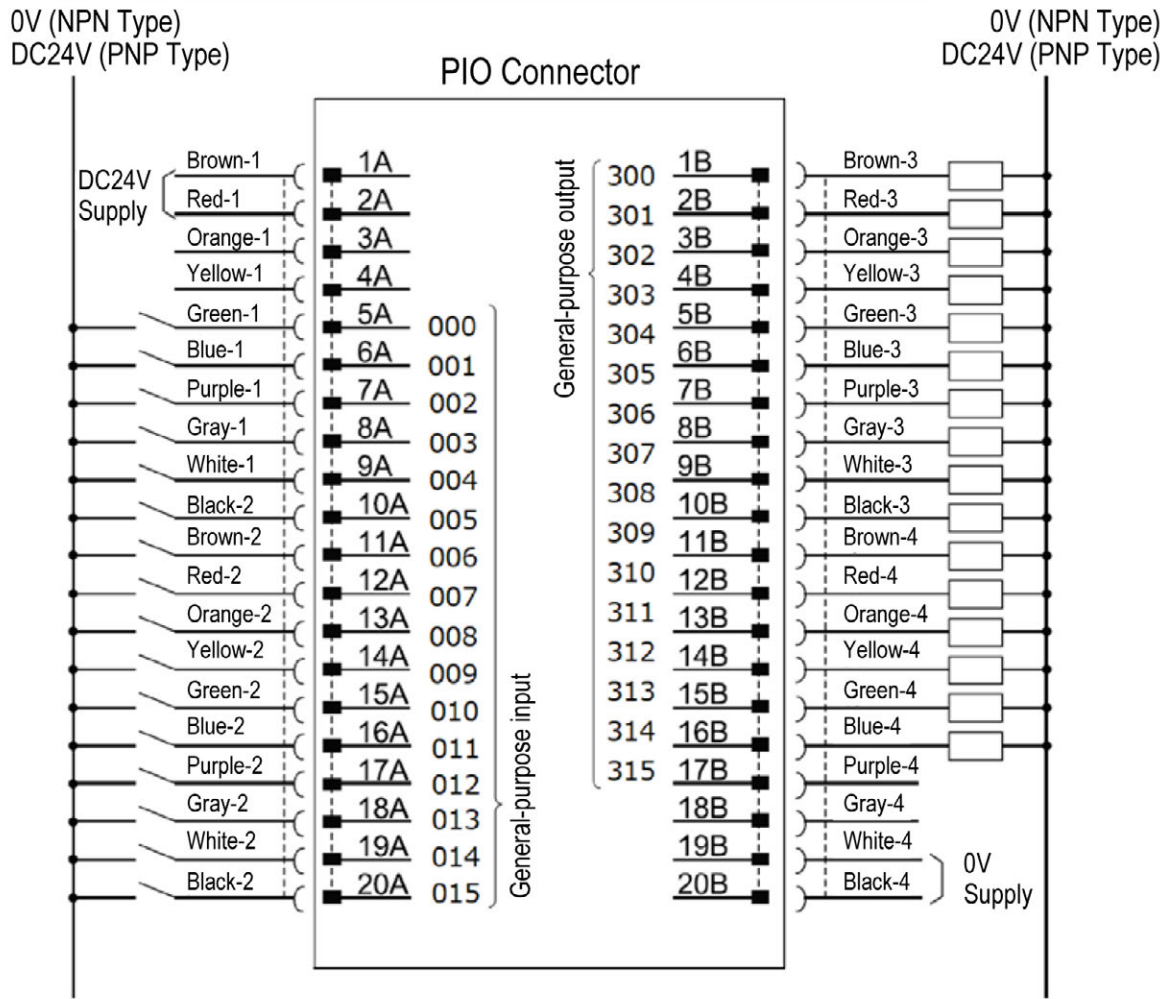
4.5 PIO Circuit

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 2 m for standard, 3 m and 5 m as an option. Up to 10 m 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 ① (Press Welding) AWG28	1B	BR-3	Flat Cable ② (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.

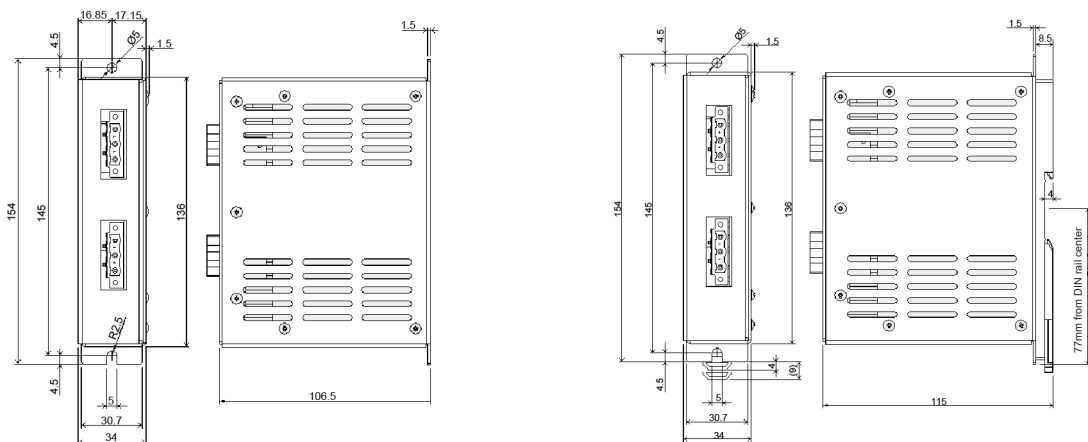
[Model, Accessories]

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

[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]



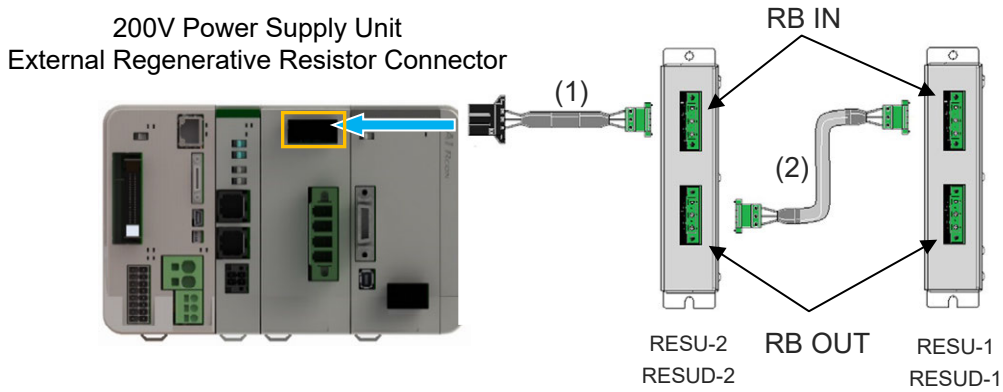
RESU-1, RESU-2 (Screw attachment small type) RESUD-1, RESUD-2 (DIN rail attachment small type)

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

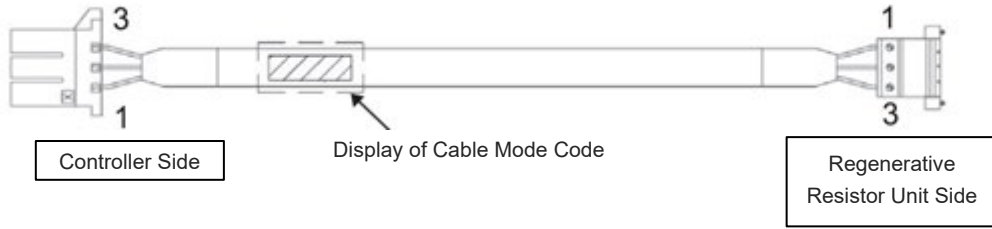
Item	Items and Model	
Connector Name	External Regenerative Resistor Connector (RB)	
Model	Controller side: 1-178138-5	Cable side: 1-178128-3

● 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	

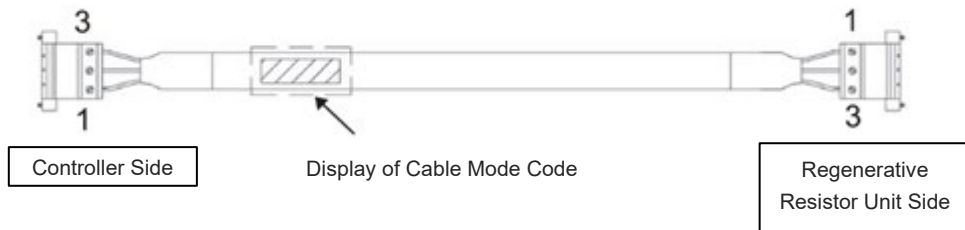
(1) 200V Driver Unit Connection Cable (CB-SC-REU□□□)

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



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

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



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

4.7 Brake Box (Option)

4.7.1 Specification for brake box

[1] Brake box (Model: RCB-110-R13-0)

It is necessary if the following actuators are equipped with a brake.

- MZMS/MZMM/LZMS/LZMM Types in Ball Screw Nut Rotation Type NS Series
- ROBO Cylinder Ultra High Thrust Rod Type RCS2-RA13R
- The special order of ISB/ISPB actuators using a motor equipped with a brake of 24V DC brake actuation voltage

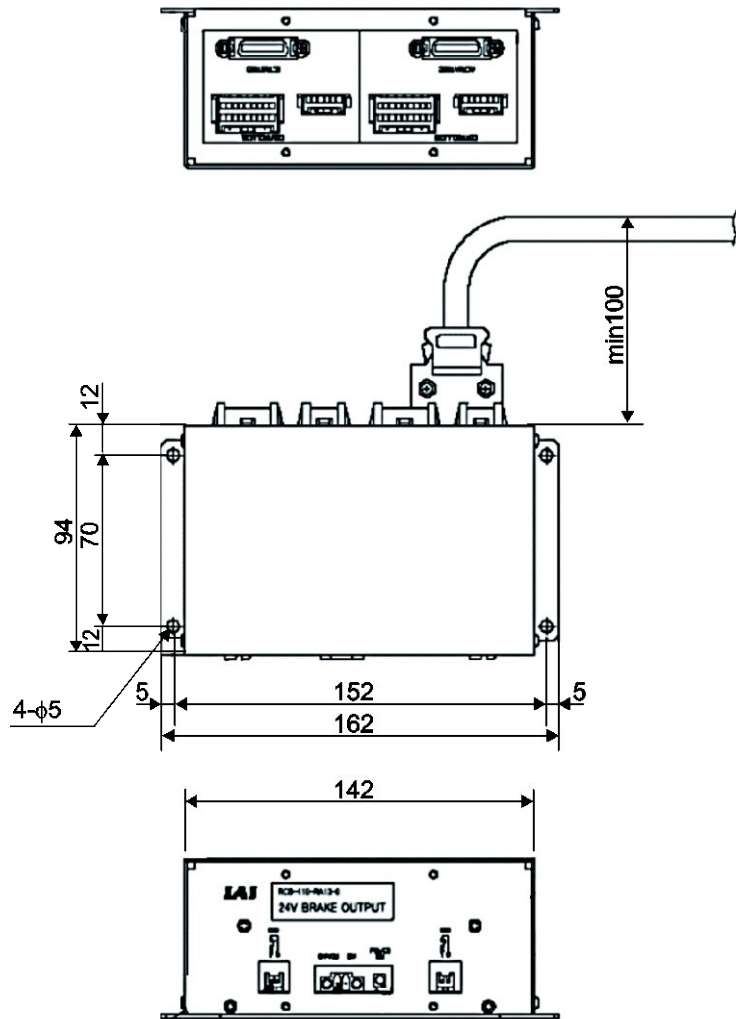
One unit of brake box is capable of brake control for two axes.

[Specification]

Item		Specifications
Input power supply voltage		DC24V 10%
Input power supply current		1 A
Generated heat		1.2 W
Connection cable (*1)		Encoder cable (Model: CB-RCS2-PLA010) 1 m
Environment	Ambient operating temperature	0 to +40°C
	Ambient operating humidity	85%RH or less (non-condensing)
	Ambient operating atmosphere	Refer to [1.4.1 Installation conditions]
	Ambient storage temperature	-20 to 70°C
	Ambient storage humidity	85%RH or less (non-condensing)
	Degree of protection	IP20
	Pollution degree	Pollution degree 2
External dimensions		162×94×65.5mm
Mass		0.8kg

*1 Enclosed in brake box (accessory cable model code: CB-RCS2-PLA010).

[Appearance]



[2] IA-110-DD-4

It is necessary if the following actuators are equipped with a brake.

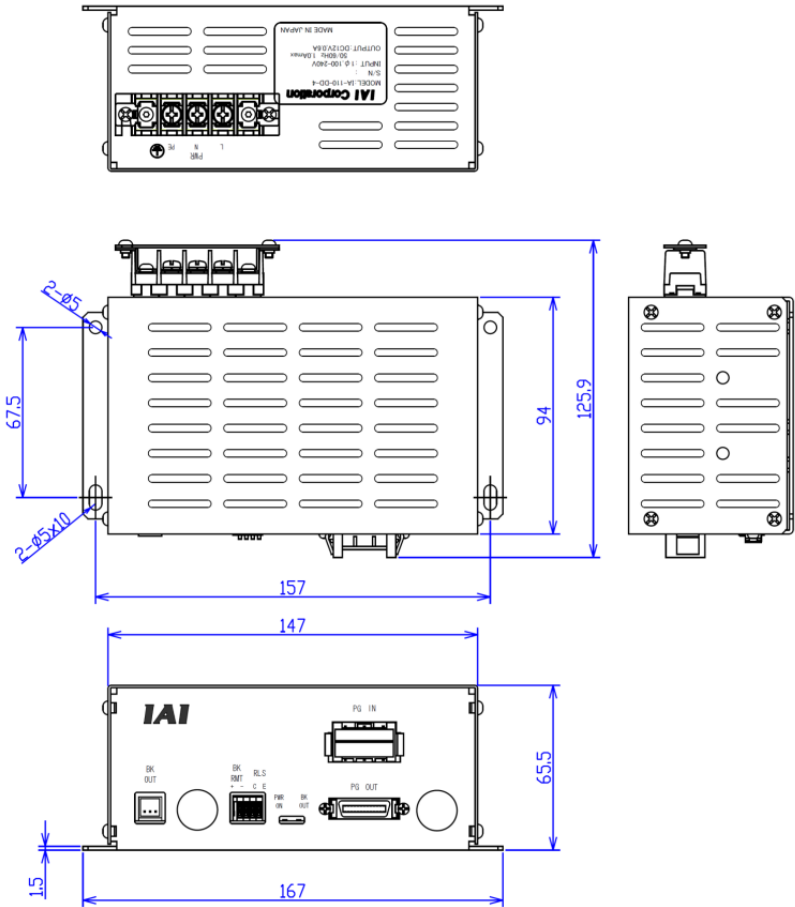
- MZMS/MZMM/LZMS/LZMM Types in Ball Screw Nut Rotation Type NS Series

One unit of brake box is capable of brake control for two axes.

[Specification]

Item		Specifications
Input power supply voltage		AC100-240V \pm 10%
Input power supply current	Rated excitation	AC100V: 0.25 A / AC200 V: 0.15 A
	Overexcitation	AC100V: 0.6 A / AC200 V: 0.3 A
Generated heat		6.0W (Rated excitation) / 10.0 W (Overexcitation)
Overexcitation time		1.2s \pm 0.2s
Connection cable		Encoder cable (Model code: CB-RCS2-PLA010) 1 m
Environment	Ambient operating temperature	0 to 40°C
	Ambient operating humidity	85%RH or less (non-condensing)
	Ambient operating atmosphere	Refer to [1.4.1 Installation conditions]
	Ambient storage temperature	-20 to 70°C
	Ambient storage humidity	85%RH or less (non-condensing)
	Degree of protection	IP20
	Pollution degree	Pollution degree 2
External dimensions		147×94×65.5mm (attachment parts excluded)
Mass		Approx. 0.4kg

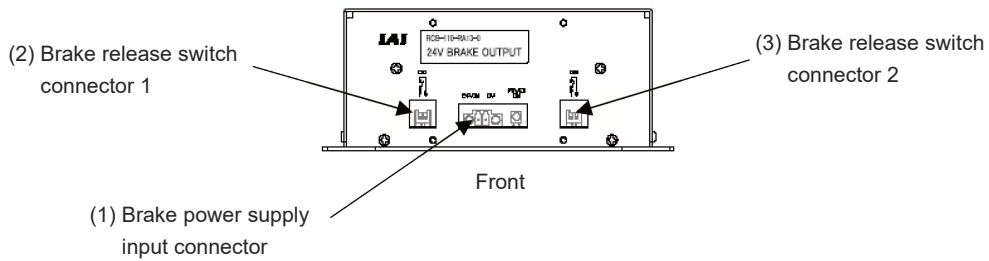
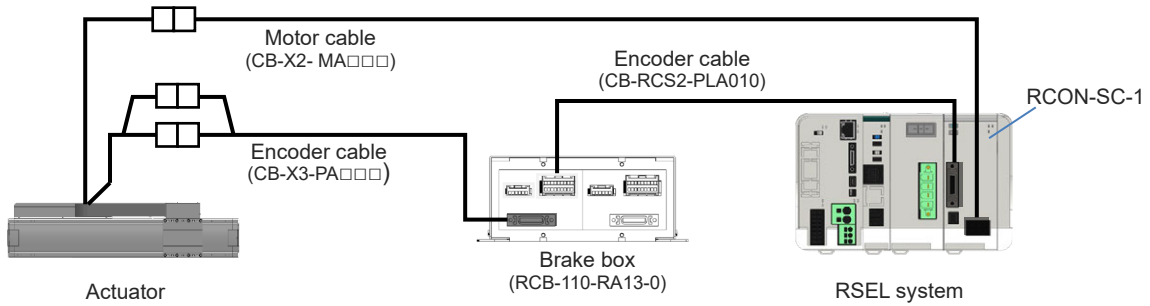
[Appearance]



4.7.2 Wiring for brake box

[1] RCB-110-RA13-0

Establish connectivity among the actuator, brake box and controller as shown in the figure.
(It is an example of connecting to the first axis.)

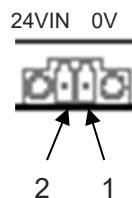


(1) Brake power supply input connector

Connector	Model	Remarks
Cable side	MC1.5/2-ST-3.5 (Phoenix Contact)	
Brake box side	MC1.5/2-GF-3.5 (Phoenix Contact)	

Pin No.	Signal Name	Contents	Applicable Wire Diameter
1	0V	Power supply ground	0.08 to 1.25 mm ² (AWG28 to 16)
2	24VIN	+ 24V Power supply	

1) Brake power supply input connector



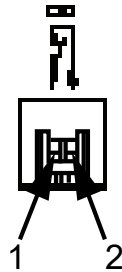
(2) Brake release switch connector 1 and 2

Connector	Model	Remarks
Cable side	XAP-02V-1 Contact BXA-001T-P0.6 (J.S.T. Mfg.)	
Connector used	S02B-XASS-1 (J.S.T. Mfg.)	

Pin No.	Signal Name	Contents	Applicable Wire Diameter
1	BKMRL	Brake release switch input	0.08 to 0.3 mm ² (AWG28 to 22)
2	COM	Common for brake release switch input	

2) and 3) Brake release connector 1 and 2

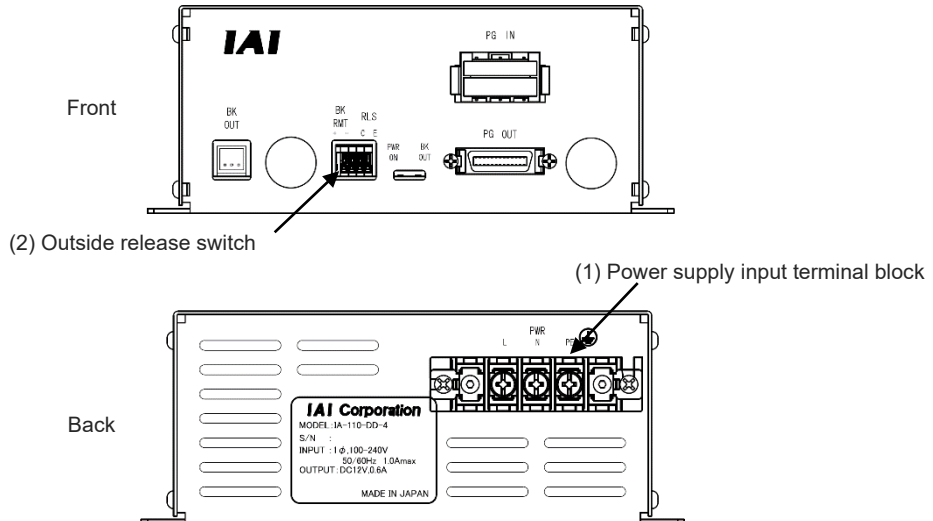
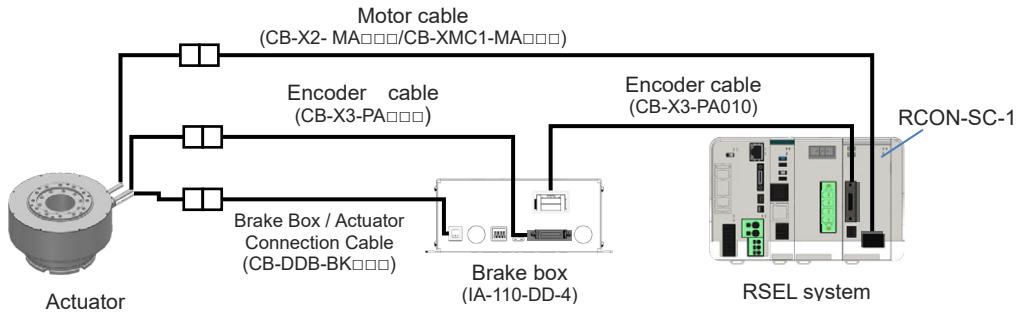
Use one with the switch rating 30V DC and 1.5 mA or more.



4.7 Brake Box (Option)

[2] IA-110-DD-4

Establish connectivity among the actuator, brake box and controller as shown in the figure.
(It is an example of connecting to the first axis.)



(1) Power supply input terminal block

In order to supply power to the brake box, conduct wiring to the power supply input terminal block.

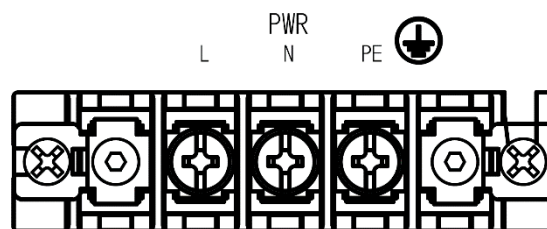
- Power Supply Input Terminal Block Names and Pin Assignments

Terminal block name: ML-50-S2FXS-3P (Sato Parts)		
Pin No.	Signal name	Description
1	L	AC power supply phase L
2	N	AC power supply phase N
3	PE	Protective earthing

- Recommended Power Supply Size and Solderless Terminals

Item	Description
Recommended Power Supply Size	L, N : AWG18 or less PE : AWG14 or less
Solderless Terminals	I.D.: $\phi 4.0$ mm or more O.D.: $\phi 8.5$ mm or less

- External view



(2) Outside release & release signal output connector

Pin 1 and Pin 2 are connectors to release the brake externally. Make Pin 1 and Pin 2 short-circuited and the brake compulsory release can be performed. When a switch is to be connected to the externally releasing connector, it is necessary to have 30V and 1.5 mA or more for the switch rating.

Pin 3 and Pin 4 are connectors to output the release signal. As inside Pin 3 and Pin 4 is an open collector connection using a photocoupler, Pin 3 and Pin 4 should be conducted once the brake voltage is output.

* Pin 3 and Pin 4 are isolated from inside of the brake box with the photocoupler.

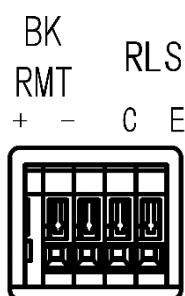
● Outside release & release signal output connector

Connector name: ML-700-NH-4P (Sato Parts)		
Pin No.	Signal name	Description
1	BKRMT +	Brake release input + side
2	BKRMT -	Brake release input - side
3	RLS-C	Open collector output collector side
4	RLS-E	Open collector output emitter side

● Connection cable specification

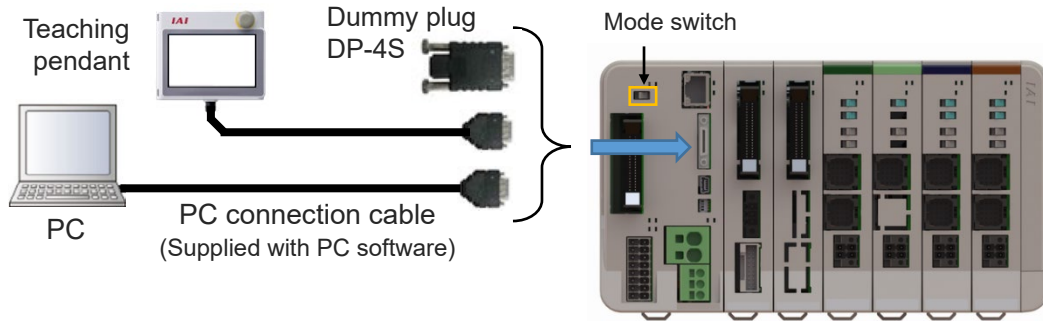
Item	Description
Wire Size	AWG22 to 28
Standard Strip Length	9 to 10 mm

● External view



4.8 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

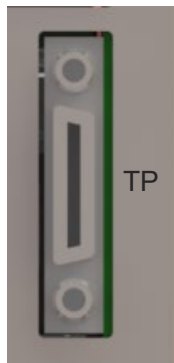
Teaching connector	Model	Remarks
Controller side	HDR-EC26LFDT1-SLD+	

- Pin Assignment

Pin No.	Signal Name	Items	Applicable cable diameter
1	GND	Signal Grounding	Cable dedicated for IAI products
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 CTS externally	
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

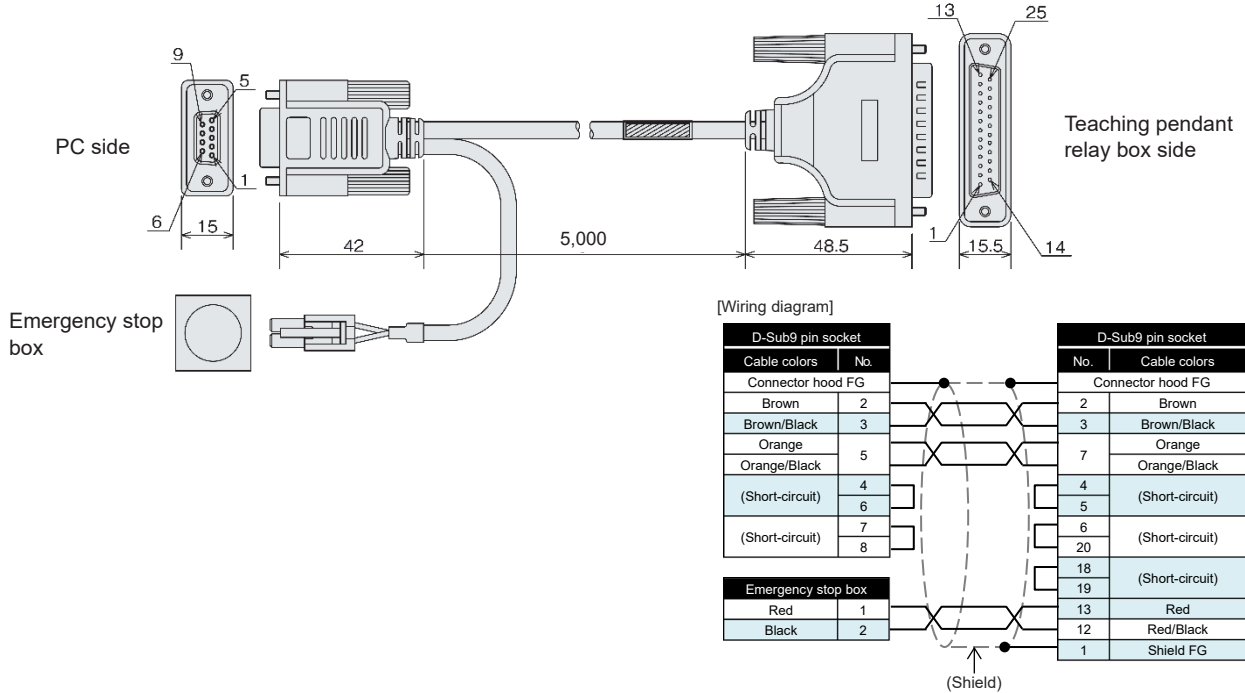
- Set "Operation Mode Setting Switch" to "MANU" side when a teaching tool is connected.
- Turn the power OFF before disconnecting a teaching tool.
- USB connector and teaching connector cannot be used at the same time. Teaching connector is prioritized.

● Cable Included in PC software, conversion units specifications

(1) PC connection cable 5 m + Emergency stop box

Model : CB-ST-E1MW050-EB (Cable only model : CB-ST-E1MW050)

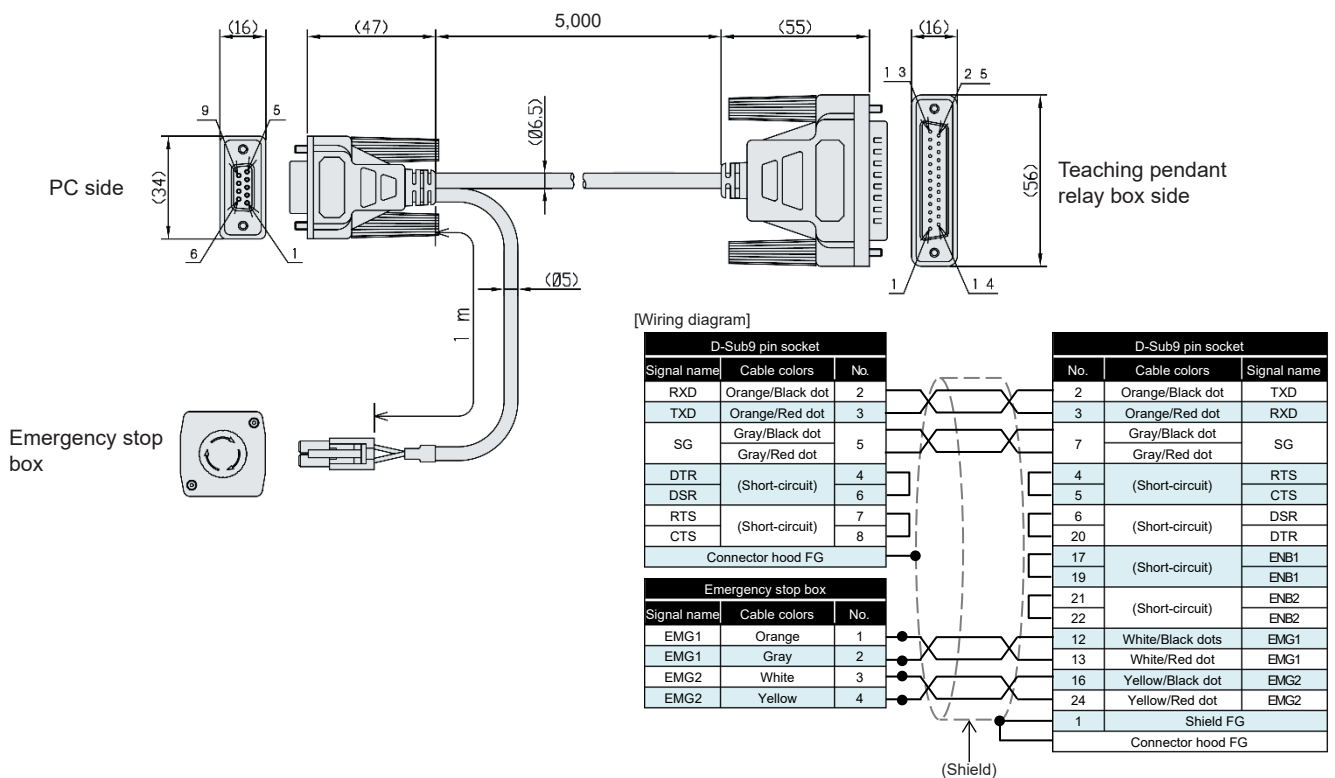
* It is attached to IA-101-XA-MW, IA-101-X-MW-JS and IA-101-X-USBMW.



(2) Conforming to Safety Category 4 PC connection cable 5m + Emergency stop box

Model : CB-ST-A2MW050-EB (Cable only model : CB-ST-A2MW050)

* It is attached to IA-101-XA-MW.

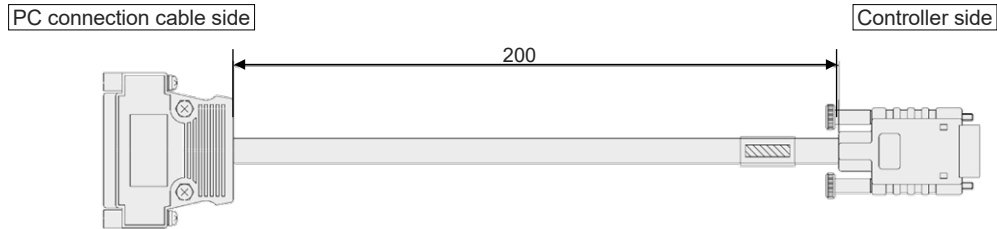


4.8 Connection the Teaching Connector

(3) Connector conversion cable

Model : CB-SEL-SJ002 (Cable length 0.2 m)

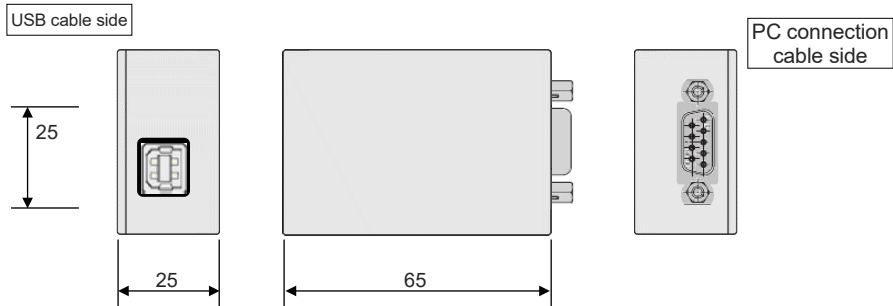
* It is attached to IA-101-X-USBMW.



(4) USB conversion adapter

Model : IA-CV-USB

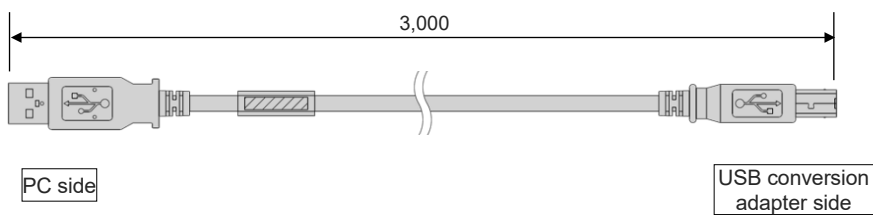
* It is attached to IA-101-X-USBMW.



(5) USB cable (3 m)

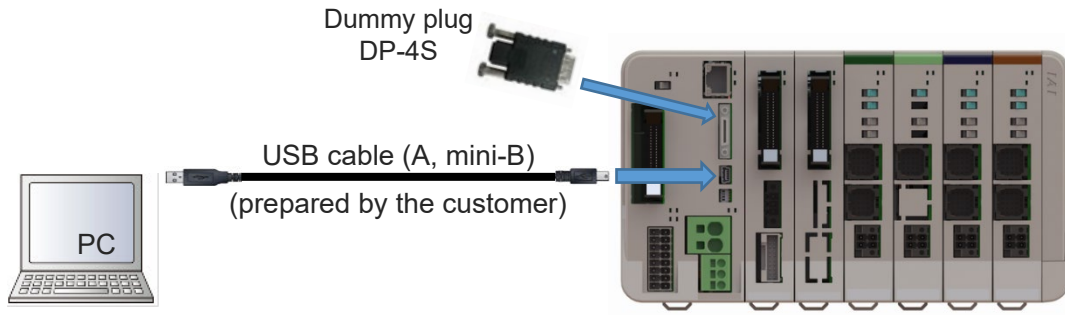
Model : CB-SEL-USB030

* It is attached to IA-101-X-USBMW.



4.9 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	5 m	
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 (identification) terminal (Open at cable end)
5	GND	Power supply ground

USB connection connector

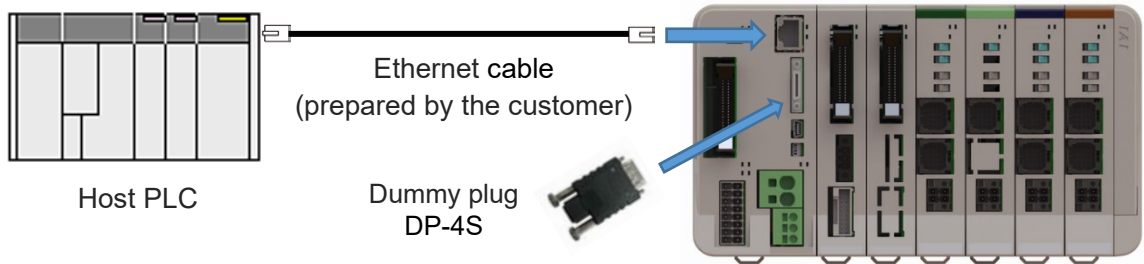


4.10 Connection the Ethernet Connector

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.

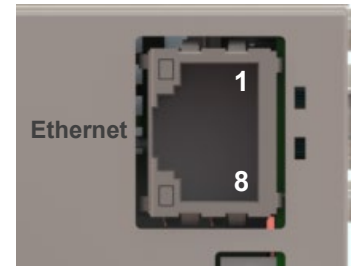
Refer to [Ethernet Instruction Manual (ME0140) provided separately]



● 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	-	

RSEL

Chapter 5

Operation

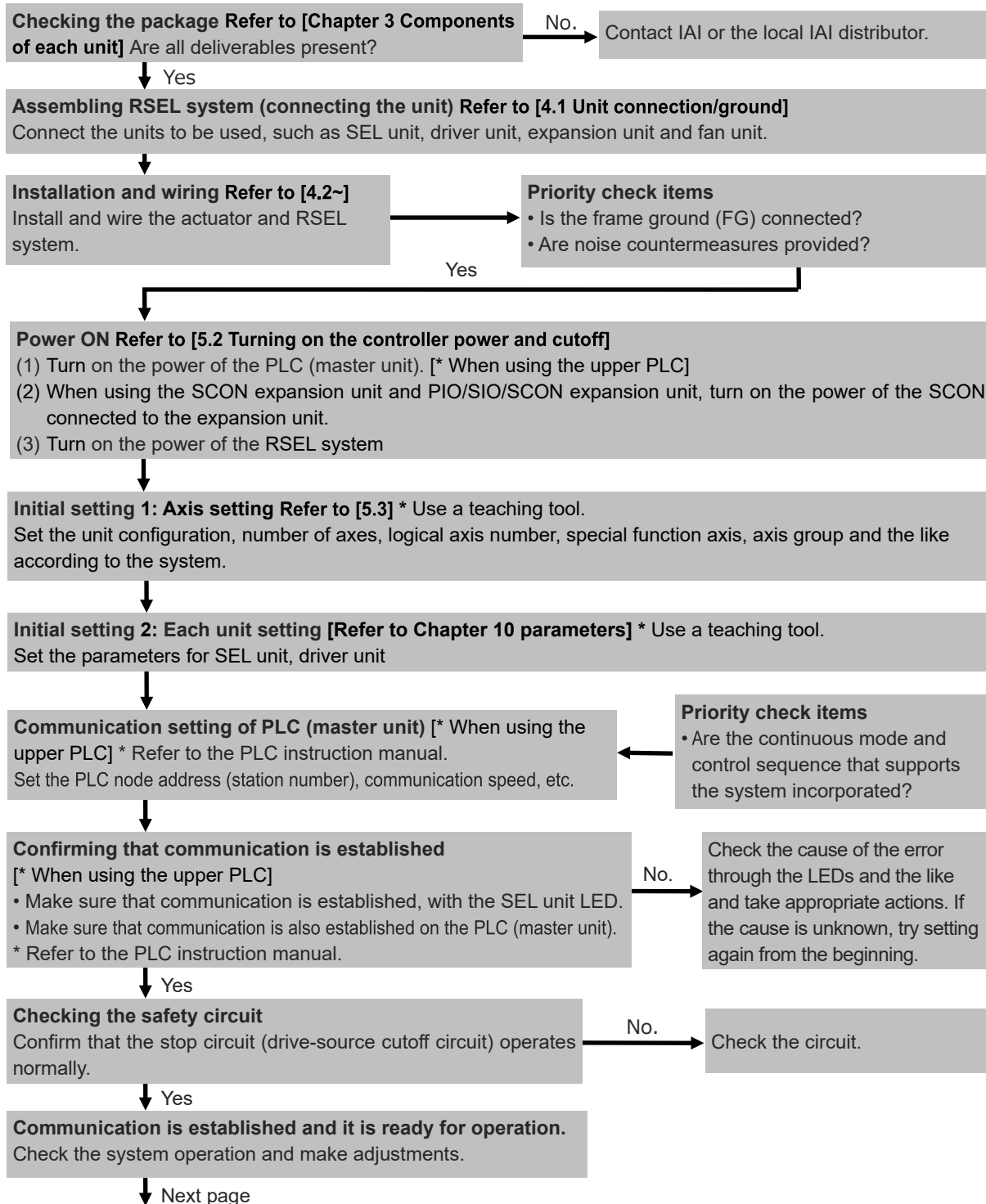
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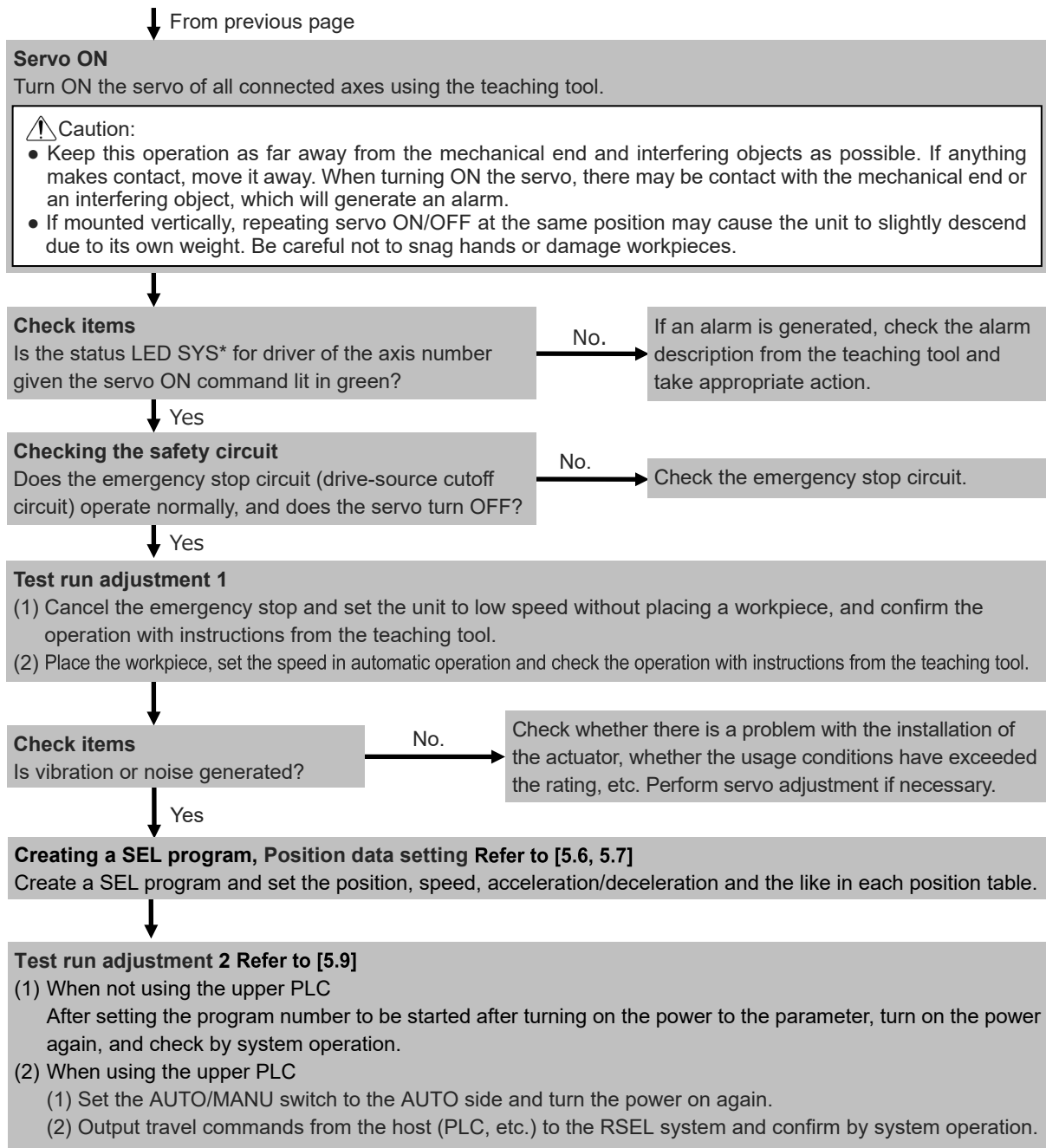
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5.1 Startup Procedure

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.





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 work 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.

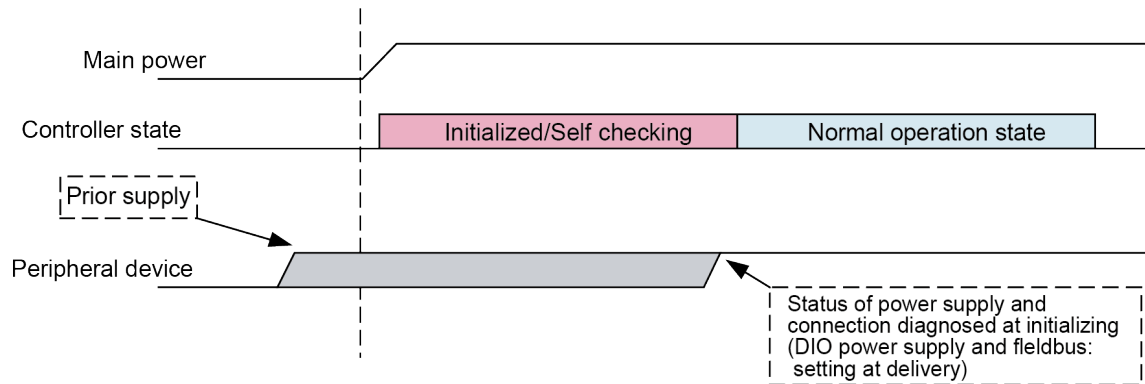
● Power on Procedure

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.

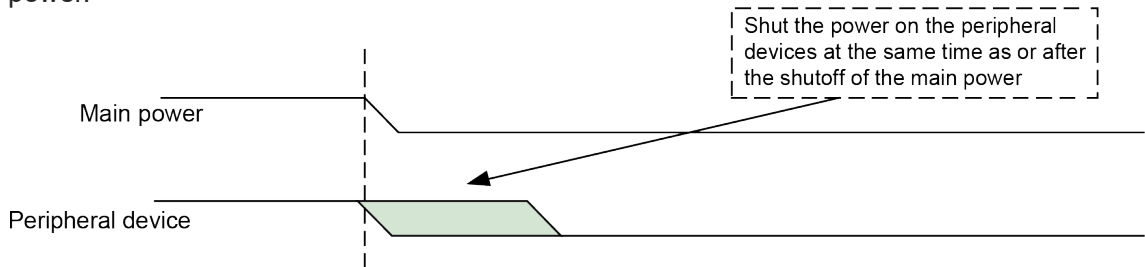


5.2.2 Power cutoff

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 Axis Setting

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)]

* When an EC connection unit is to be connected, assignment should be done in the I/O parameter settings.

Therefore, this feature should not be used. For details,

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 button.

To assign logical axes individually, click the button.

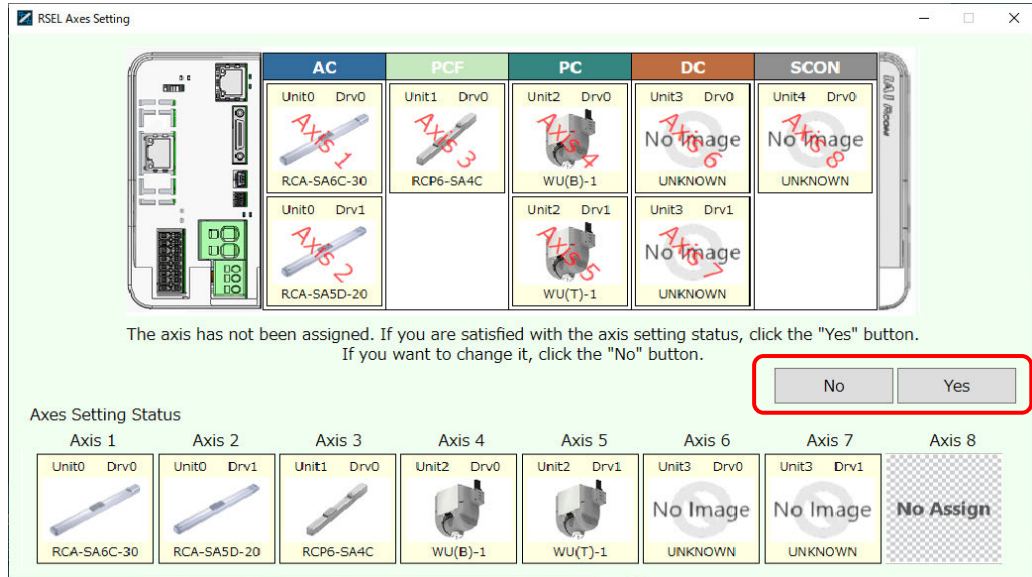


Figure 5.3-1 First startup screen

When [Yes] is pressed

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

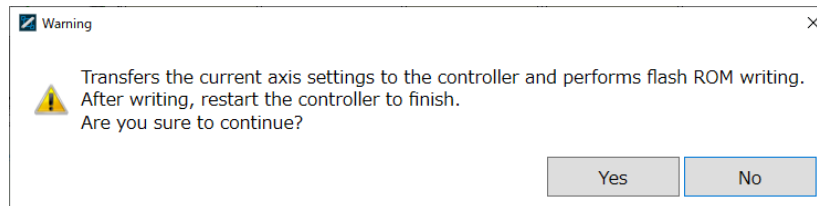


Figure 5.3-2 Confirmation screen for writing to controller



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 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 key

You can cancel with.

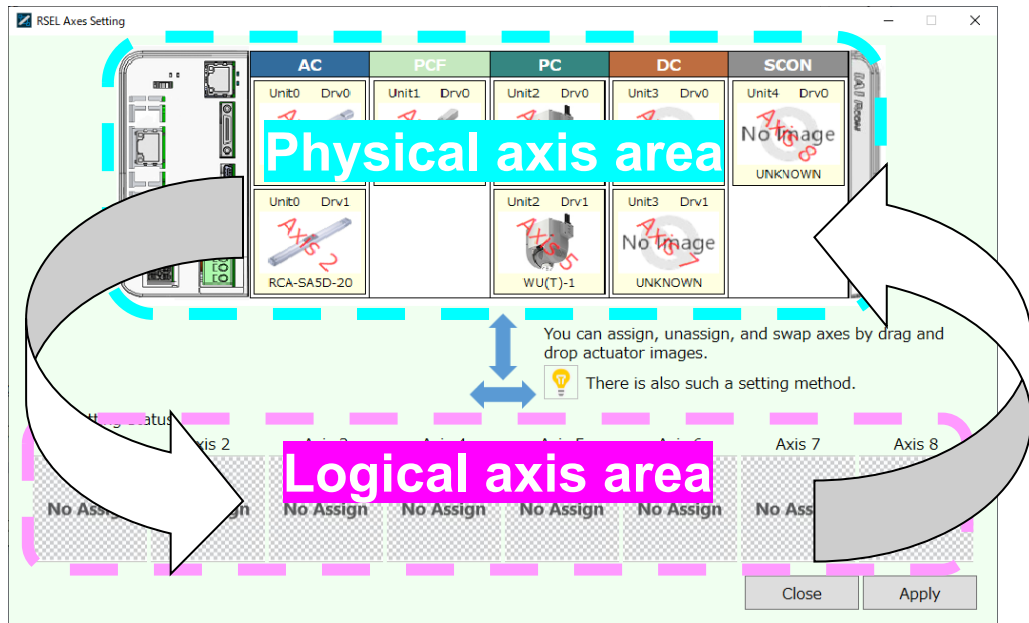


Figure 5.3-3 Axis reset screen

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

Press the 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.

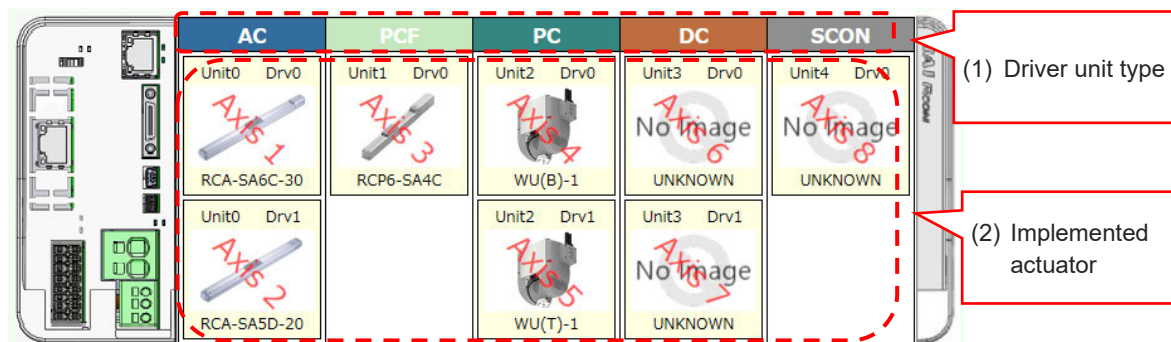


Figure 5.3-4 Physical area image (5 drivers connected)

(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.

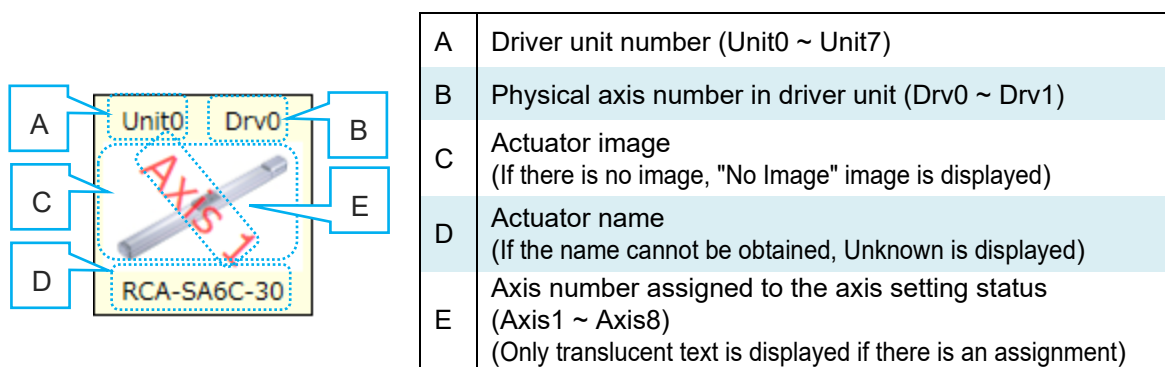


Figure 5.3-5 Implemented axis image

[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.

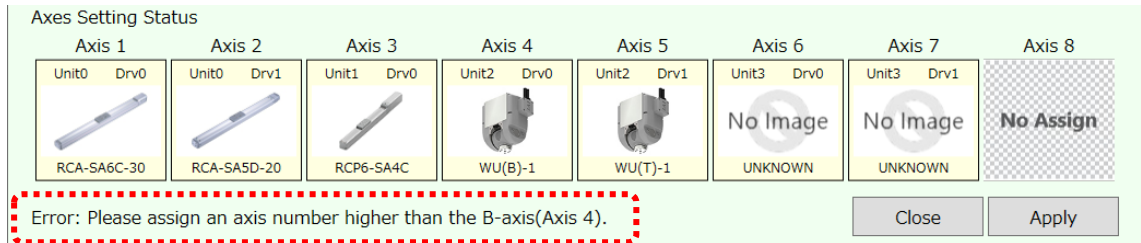


Figure 5.3-6 Axis setting status

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 :

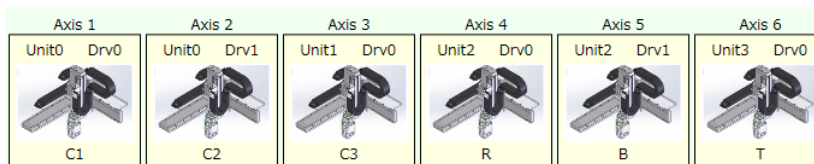
The message in the red dotted frame in Figure 5.3-6 is an error message that appears when trying to assign the axis image of Axis5 to Axis3.

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.

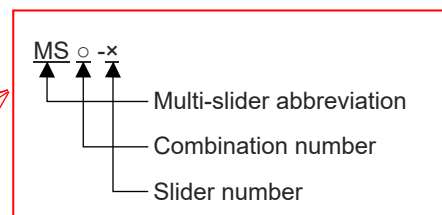
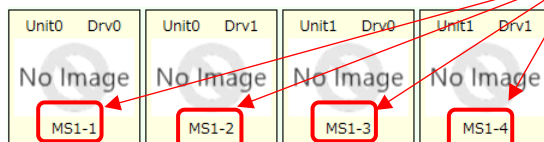
(1) 6-axis Cartesian Robot



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

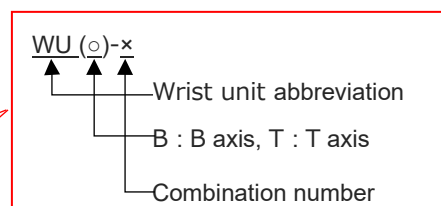
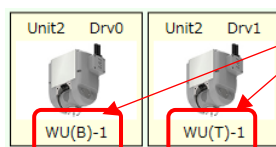
- Regardless of the order of driver units mounted, the logic axis numbers should be fixed.
- It is not available to assign or cancel axes (transfer between physical axis area and logical axis area)
- The actuator names should be C1, C2, C3, R, B and T.
- The figures of actuators are those of the 6-axis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

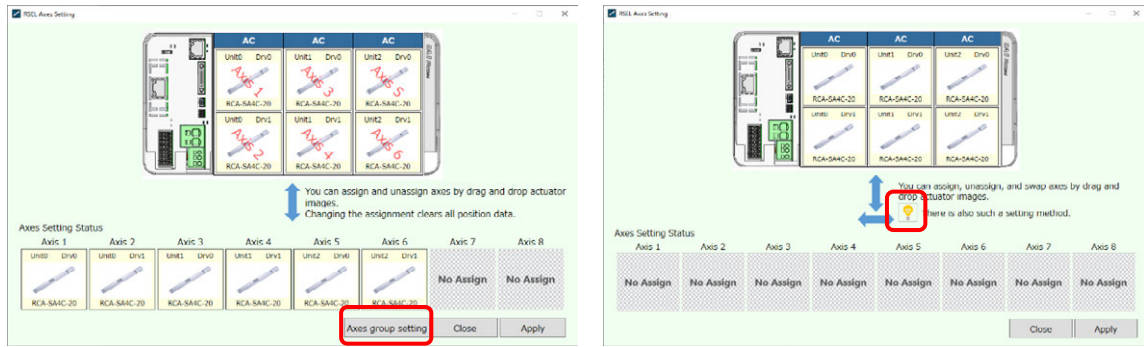


Figure 5.3-7 Axis group setting

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.

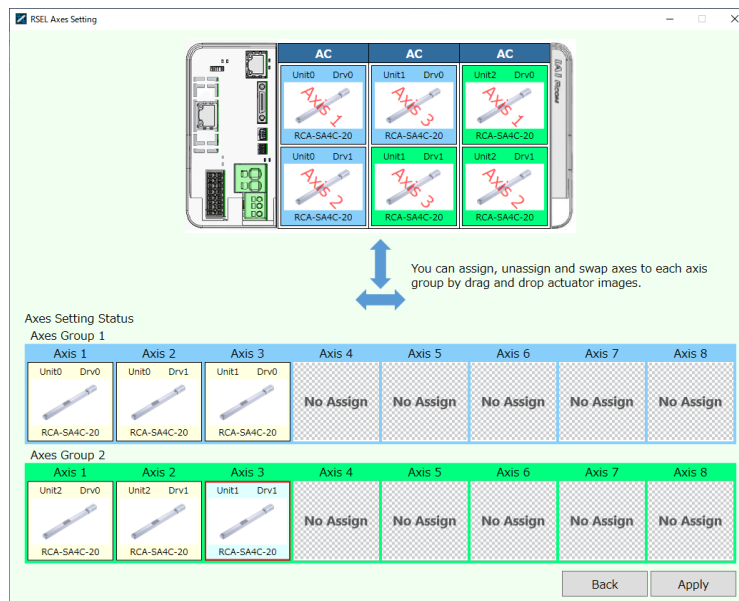


Figure 5.3-8 3-axis assigned to axis groups 1 and 2

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

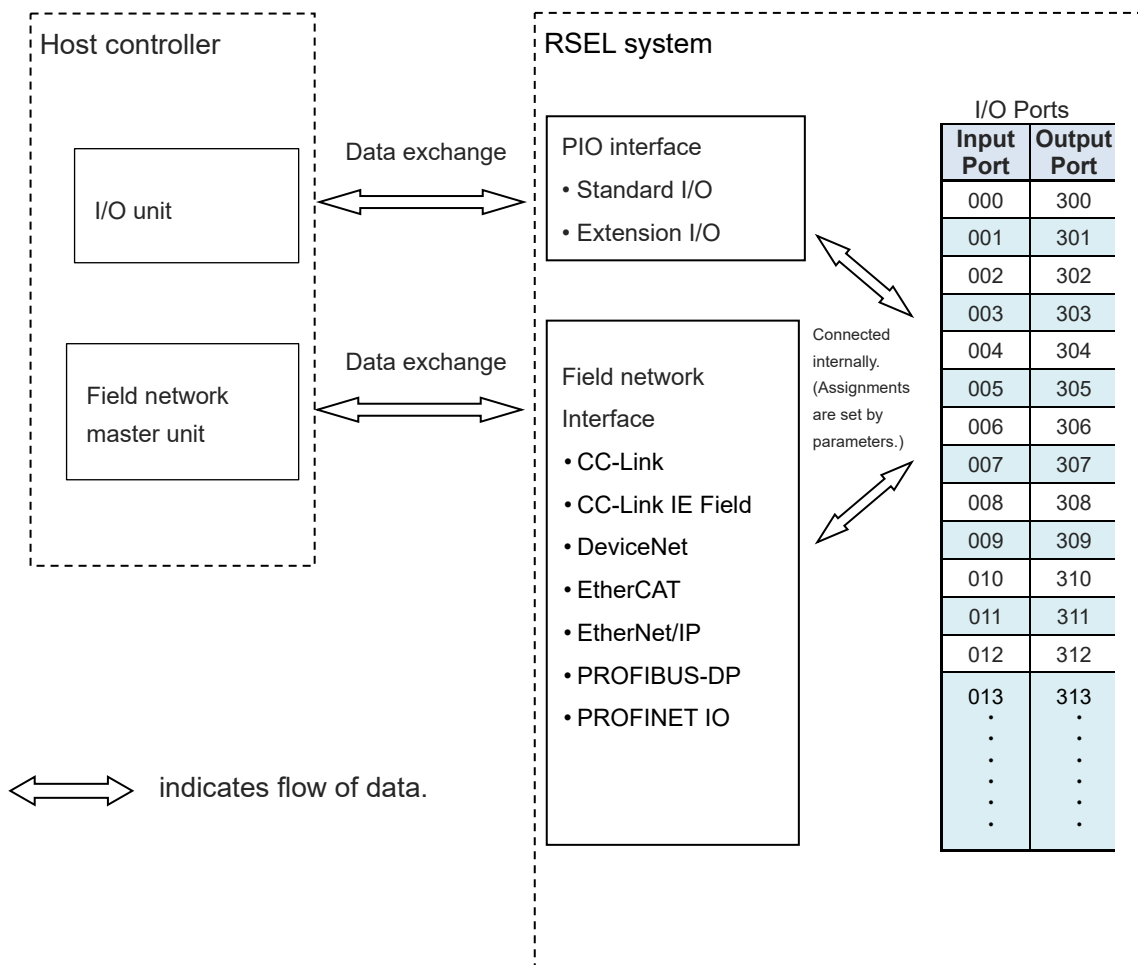
The I/O port can deliver the data with the RSEL controller and external signals through interface.

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

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

One port is capable of connection with only either one of PIO or field network.

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



Refer to [Section 3.5.5], [Section 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). 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). 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)). The port number to which each set function is assigned is specified, it can also be I/O parameters 315 to 330 and can also be set.

Input

No.	Electric Wire Color	Port No.	Function at Standard Setting (factory default)	Remarks		
1A 2A	Brown-1 Red-1		+24V input	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.		
5A	Green-1	000	Program start	Parameter No.	Parameter Name	Function
6A	Blue-1	001	General-purpose input	No.30	Input function select 000	0: General-purpose input 1: Program star signal (ON edge) (Input port No.007 to 014, BCD-specified program number) 2: Program star signal (ON edge) (Input port No.007 to 014, Binary-specified program number) 3: Program star signal (ON edge) (Input port No.008 to 014, BCD-specified program number)
7A	Purple-1	002	General-purpose input	No.31	Input function select 001	0: General-purpose input 1: Software reset signal (1 second ON)
8A	Gray-1	003	General-purpose input	No.32	Input function select 002	0: General-purpose input 1: Servo ON signal
9A	White-1	004	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
10A	Black-1	005	General-purpose input	No.34	Input function select 004	0: General-purpose input 1: All servo axis soft interlock (OFF level)
11A	Brown-2	006	General-purpose input	No.35	Input function select 005	0: General-purpose input 1: Operation-pause reset (ON edge)
12A	Red-2	007	Program No. select (LSB : 1st bit)	No.36	Input function select 006	0: General-purpose input 1: Operation-pause signal (OFF level)
13A	Orange-2	008	Program No. select (2nd bit)	No.37	Input function select 007	0: General-purpose input 1: Specified program number (LSB : 1st bit)
14A	Yellow-2	009	Program No. select (3rd bit)	No.38	Input function select 008	0: General-purpose input 1: Specified program number (2nd bit)
15A	Green-2	010	Program No. select (4th bit)	No.39	Input function select 009	0: General-purpose input 1: Specified program number (3rd bit)
16A	Blue-2	011	Program No. select (5th bit)	No.40	Input function select 010	0: General-purpose input 1: Specified program number (4th bit)
17A	Purple-2	012	Program No. select (6th bit)	No.41	Input function select 011	0: General-purpose input 1: Specified program number (5th bit)
18A	Gray-2	013	Program No. select (7th bit)	No.42	Input function select 012	0: General-purpose input 1: Specified program number (6th bit)
19A	White-2	014	General-purpose input	No.43	Input function select 013	0: General-purpose input 1: Specified program number (7th bit) 2: Error reset (ON edge)
20A	Black-2	015	General-purpose input	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)
				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)

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 ms 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)

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	36,000
2	18,000

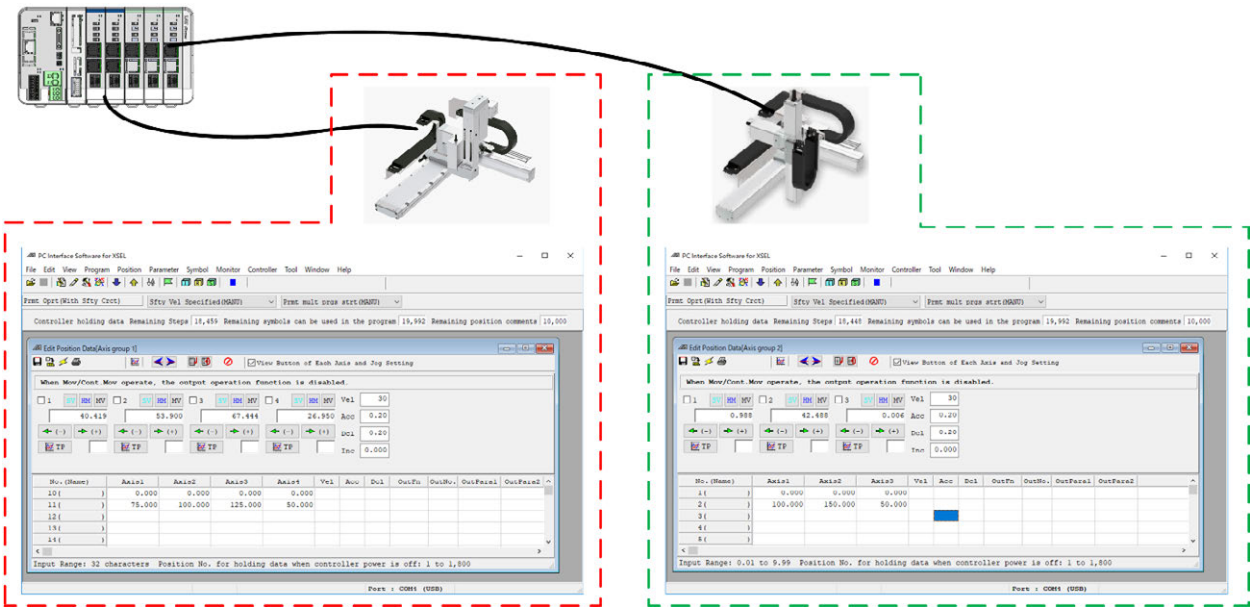
- About the axis group to be operated

(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	2,000
Number of uses	20,000
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

10,000 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

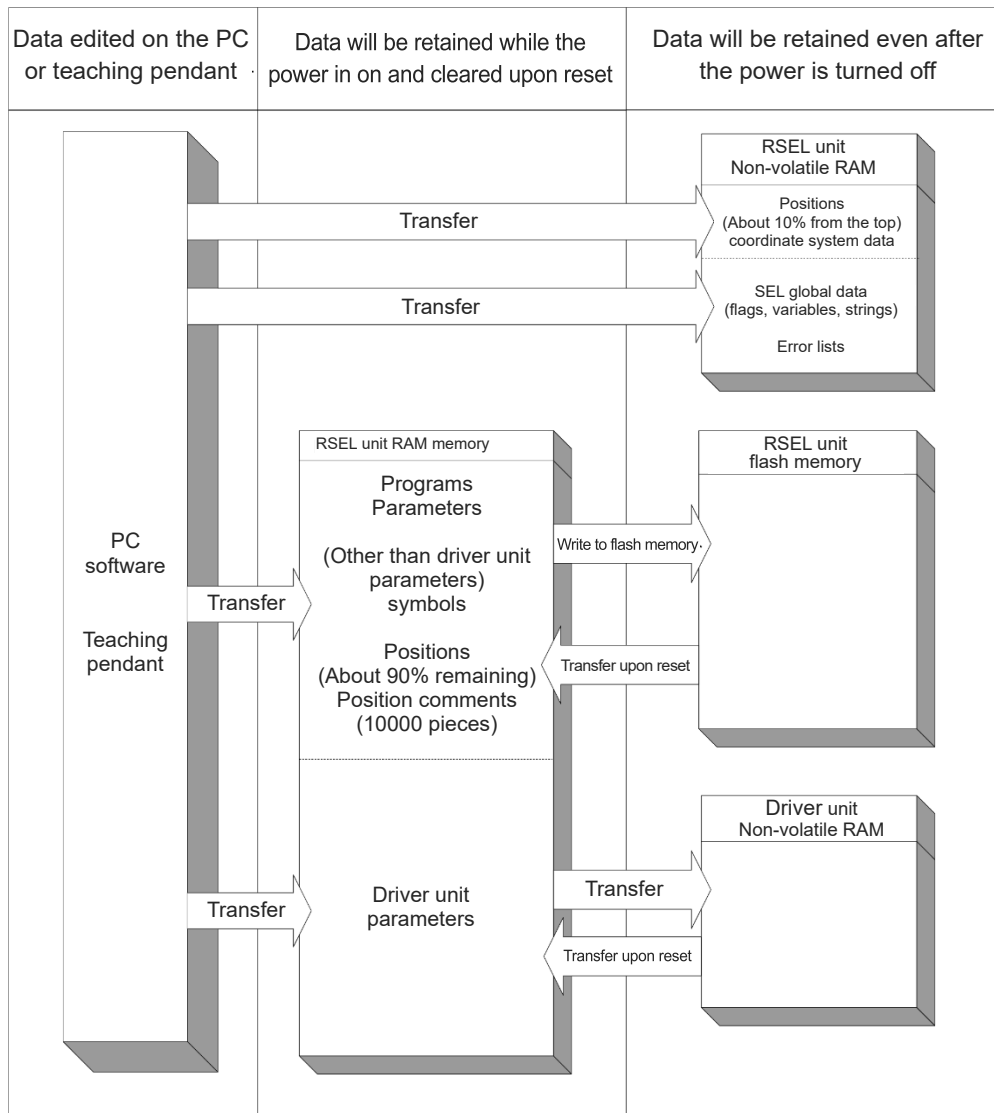
Function	Global region	Local region
Input port	000-299 (300)	—
Output port	300-599 (300)	—
Extension input port	1,000-3,999 (3,000)	—
Extension output port	4,000-6,999 (3,000)	—
Flag	600-899 (300)	900-999 (100)
Integer variables	200-299 (100)	1-99 (99)
	1,200-1,299 (100)	1,001-1,099 (99)
	2,000-2,799 (800)	
Real variables	300-399 (100)	100-199 (100)
	1,300-1,399 (100)	1,100-1,199 (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 : 36,000 Axis group count 2 : 18,000	—
Position comment (32 1-byte characters)	Max. 10,000 position	—
Program No.	1-512 (512)	—
Steps No.	1-20,000 (20,000)	—
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)	7,000-7,599 (600)	—
Symbol definition count	2,000	
Symbol usage count in command	20,000 (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)

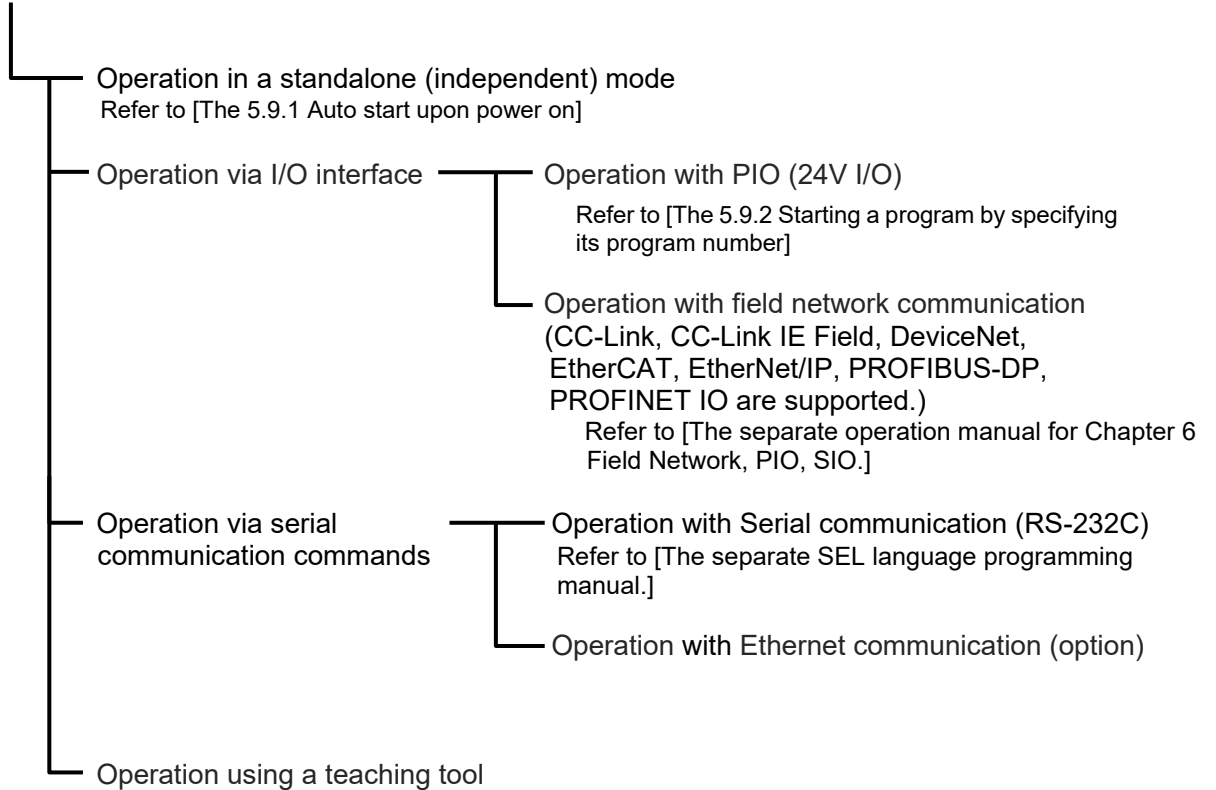
5.8 Types of Operations

The RSEL controller is a programming controller that can operate without a host controller (PLC).

Programming for this controller uses IAI's dedicated programming language (SEL language).

Refer to [The separate SEL Language Programming Manual (ME0224).]

Operation method



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.

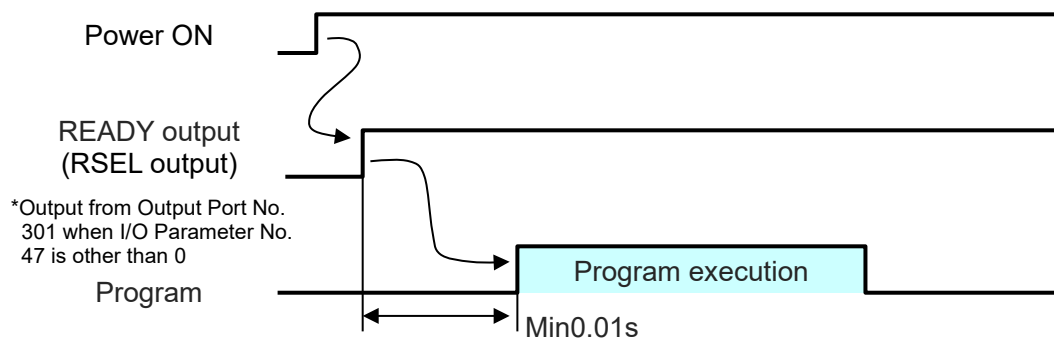
5.9.1 Auto start upon power on

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 "Input Function Select 003" to "1" and set the program No. to be started up in the parameter No. 1 "Auto start program No."

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.





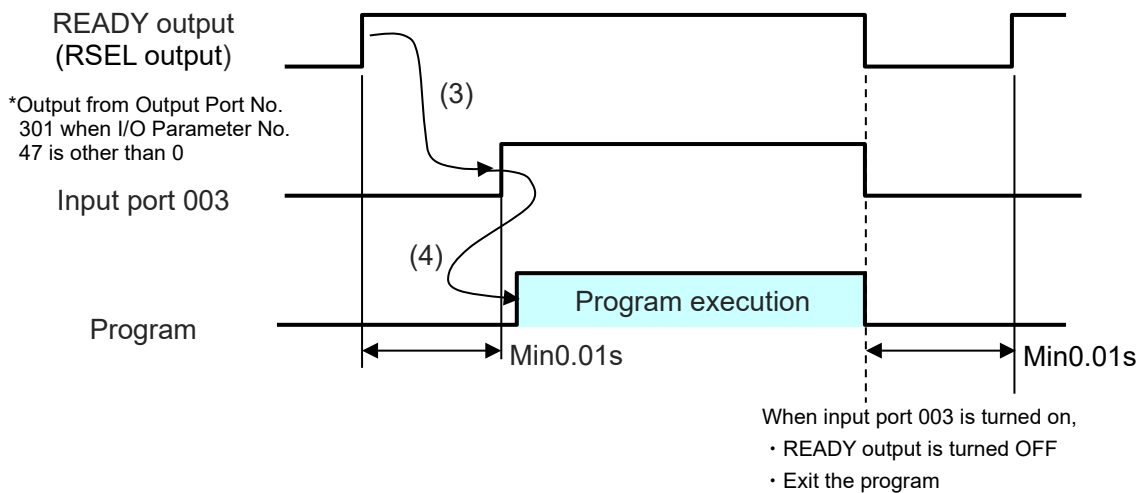
Caution

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 0.01s following the start of the RSEL controller (the RDY signal turns ON to indicate a successful start).
- (5) The specified program starts.
- (6) Turn Input Port 003 OFF and READY Output turns OFF, and then the program finishes.



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.

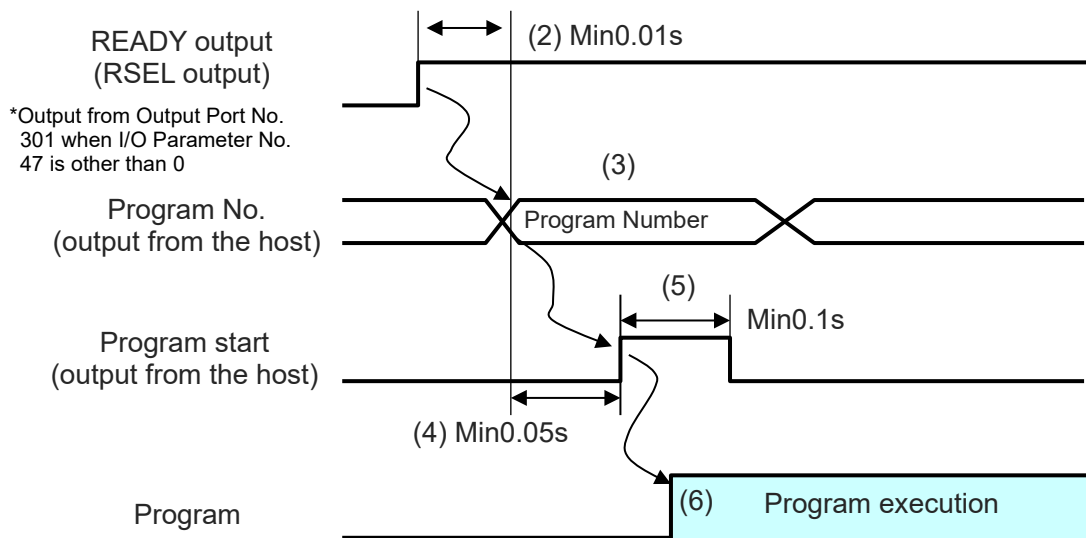
Parameter type and No.		Set Value	Description	Setting
I/O parameter No. 30		0	Input port 016 is designated as a general-purpose input.	1 or 4
		1 (factory default)	After the program number to be started up, is set in the input port 007 (LSB) to 014 (MSB) with BCD, turning ON the input port 000 starts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

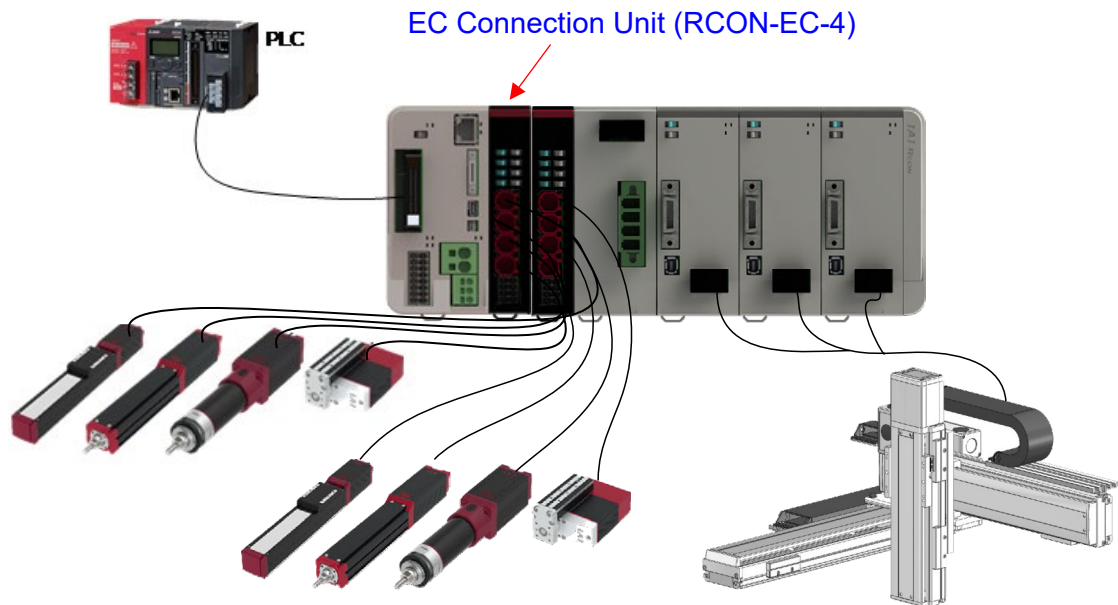
- (2) Input the program No. 0.01s or more after the RSEL controller is started up (after normal start-up = RDY signal ON).
- (3) Set in the input ports set by I/O parameter No. 30, the program number of the program you want to start.
- (4) Set the program No. and 0.05s. or more later, turn ON the input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



5.10 ELECYLINDER Operation

By connecting an EC connection unit to the SEL unit, control of ELECYLINDER unit gets available.

Operation in combination of ELECYLINDER with Cartesian Robot or ROBO Cylinder becomes available.



(*) RSEL System is capable of connecting 16 axes of ELECYLINDER units at the maximum.
4 units at the maximum are capable to connect for the EC connection unit.

5.10.1 Specification

Shown below is the specifications related to this feature.

Item	Contents
Control axis count	Driver unit control 8 axes max., together with EC connection unit 16 axes max. Limit in unit construction. EC connection unit defined as 4 axes for each unit. * 16 axes available only for EC.
Option unit count	Max. 8 units
EC axis number	<ul style="list-style-type: none"> • Assigned after driver unit • Assigns 4 axes fixed for 1 unit of EC connection unit * Even if EC connects only 1 axis, assignment should be 4 axes
Number of input / output points	16 points of input and output for 1 unit (4 points/axis for 4 axes)

(*) For details on the specifications of the EC connection unit, refer to [3.6 EC Connection Unit].

5.10.2 Applicable version

Shown below is the applicable versions for this feature.

Target	Version
SEL unit	V1.09 or later
PC software	V14.01.00.00 or later
TB-02/03	V3.40 or later

(Note) If the PC software or TB-02/03 are in a version not applicable, activate this feature and the communication may get cut.

5.10.3 ELECYLINDER control system

ELECYLINDER is capable of control with the I/O from a host device or the SEL program.

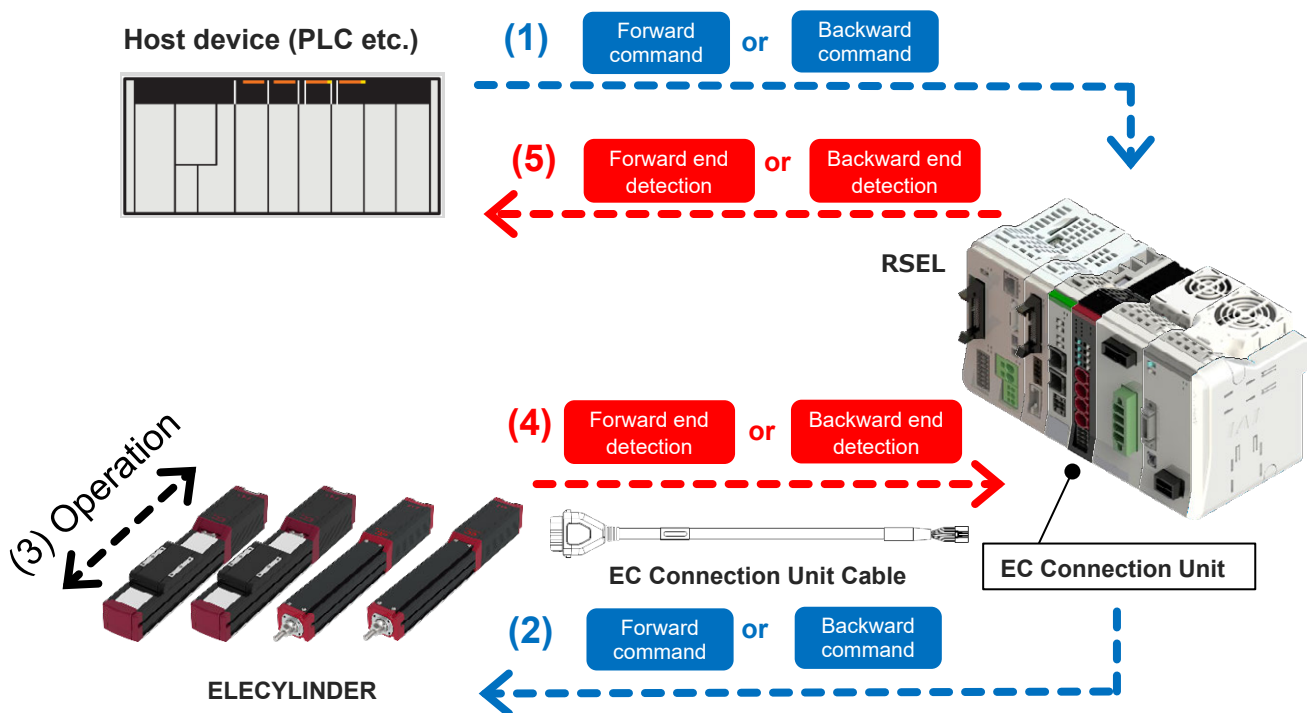
The setting which control system to be used should be established in parameters for each EC connection unit ^(Note 1).

Note 1: Change by each axis of ELECYLINDER is not available.

[1] ELECYLINDER Operation with I/O Control by Host Device

[Operation image]

- (1) Input a movement signal (forward or backward) from PLC to RSEL (EC connection unit).
- (2) Input the movement signal from RSEL (EC connection unit) to each unit of ELECYLINDER.
- (3) ELECYLINDER units start moving.
- (4) A position detection signal gets output from ELECYLINDER. (Forward end or backward end)
- (5) The position detection signal gets output from RSEL to PLC.



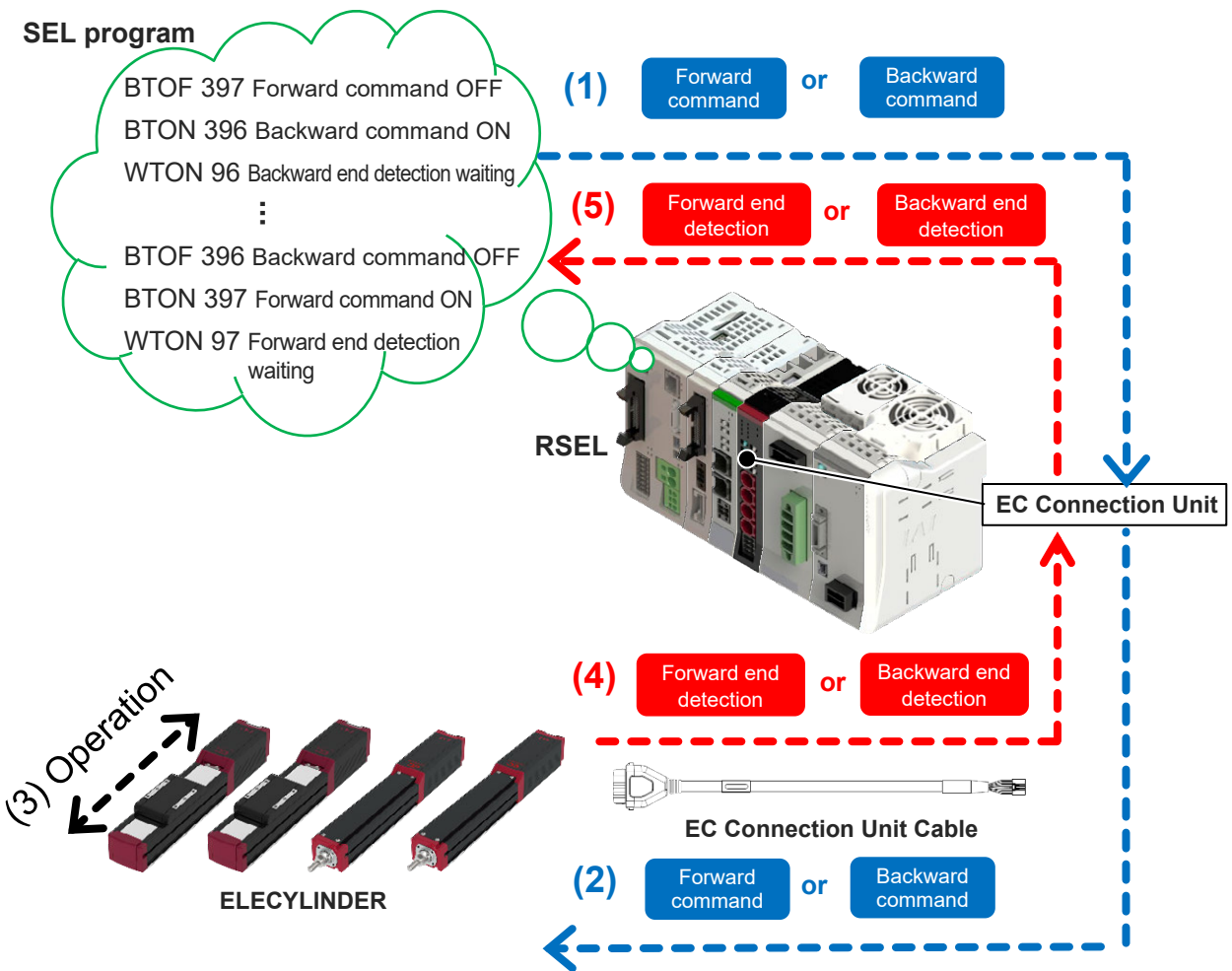
ELECYLINDER continues its operation while a movement command signal (ST0/ST1) is on, and a position detection signal (LS0/LS1) turns on after the operation is complete.

If the movement command signal gets turned off before the operation completes, the operation gets cancelled and an actuator decelerates and stops. The same even applies to the home return operation.

[2] Control Using SEL Program

[Operation image]

- (1) With using the SEL program, input the movement command signals to an EC connection unit. (Forward or backward)
- (2) Input the movement signal from EC connection unit to each unit of ELECYLINDER.
- (3) ELECYLINDER units start moving.
- (4) A position detection signal gets output from ELECYLINDER. (Forward end or backward end)
- (5) The position detection signal gets output from EC connection unit to PLC.



ELECYLINDER continues its operation while a movement command signal (ST0/ST1) is on, and a position detection signal (LS0/LS1) turns on after the operation is complete. If the movement command signal gets turned off before the operation completes, the operation gets cancelled and an actuator decelerates and stops. The same even applies to the home return operation.

5.10.4 Input and output signals and features of EC connection unit

There are the automatic assignment and fixed assignment in RSEL and the details are as follows.

- Automatic Assignment: Assignment in order of I/O slot and option unit
- Fixed Assignment: Top port numbers of I/O slot and option unit are to be set

Individual setting for each option unit is not available.

There are as described below for the option units and assignment should be made in order close to RSEL.

- PIO/SIO/SCON Extension unit
- PIO unit
- EC Connection unit



Caution

An EC connection unit should occupy 4 points of input and 4 points of output for 1 axis of ELECYLINDER unit and occupies 16 points of input and 16 points of output for 4 axes. It occupies for 4 axes (16 points) even if not all of the 4 axes are connected.

(1) Commands to EC

1 word = 16 bit															
b15	b14	b13	b12	b11	b10	b9	b8	7b	6b	5b	4b	3b	2b	1b	0b
—	RES	ST1	ST0	—	RES	ST1	ST0	—	RES	ST1	ST0	—	RES	ST1	ST0
Control signal (4th Axis)				Control signal (3rd Axis)				Control signal (2nd Axis)				Control signal (1st Axis)			

(2) Response from EC

1 word = 16 bit															
b15	b14	b13	b12	b11	b10	b9	b8	7b	6b	5b	4b	3b	2b	1b	0b
E3RD	*ALM	LS1/PE1	LS0/PE0	E2RD	*ALM	LS1/PE1	LS0/PE0	E1RD	*ALM	LS1/PE1	LS0/PE0	E0RD	*ALM	LS1/PE1	LS0/PE0
Status signal (4th Axis)				Status signal (3rd Axis)				Status signal (2nd Axis)				Status signal (1st Axis)			

[I/O Signal List] EC Connection Unit (ON = corresponding bit is "1", OFF = corresponding bit is "0")

Signal type	Bit	Signal name	Content	Details	
PLC output	Control signal (4th Axis)	b15	–	Not available	–
		b14	RES	Alarm Cancel [Alarm cancelled with on]	
		b13	ST1	Drive Forward [Drives forward with on (drives forward after home-return operation when home return not complete), decelerate and stop on the way with off]	
		b12	ST0	Drive Backward [Drives backward with on (drives backward after home-return operation when home return not complete), decelerate and stop on the way with off]	
	Control signal (3th Axis)	b11	–	Not available	
		b10	RES	Alarm Cancel [Alarm cancelled with on]	
		b9	ST1	Drive Forward [Drives forward with on (drives forward after home-return operation when home return not complete), decelerate and stop on the way with off]	
		b8	ST0	Drive Backward [Drives backward with on (drives backward after home-return operation when home return not complete), decelerate and stop on the way with off]	
	Control signal (2nd Axis)	b7	–	Not available	
		b6	RES	Alarm Cancel [Alarm cancelled with on]	
		b5	ST1	Drive Forward [Drives forward with on (drives forward after home-return operation when home return not complete), decelerate and stop on the way with off]	
		b4	ST0	Drive Backward [Drives backward with on (drives backward after home-return operation when home return not complete), decelerate and stop on the way with off]	
	Control signal (1st Axis)	b3	–	Not available	
		b2	RES	Alarm Cancel [Alarm cancelled with on]	
		b1	ST1	Drive Forward [Drives forward with on (drives forward after home-return operation when home return not complete), decelerate and stop on the way with off]	
		b0	ST0	Drive Backward [Drives backward with on (drives backward after home-return operation when home return not complete), decelerate and stop on the way with off]	

[I/O Signal List] EC Connection Unit (ON = corresponding bit is "1", OFF = corresponding bit is "0")

Signal type		Bit	Signal name	Content	Details
PLC input	Status signal (4th Axis)	b15	E3RD	Operation Ready [On: Operation ready (servo on)]	
		b14	*ALM	Alarm (break contact) [ON : No alarm、 OFF : Alarm generated]	
		b13	LS1/PE1	Driving Forward Complete / Pressing Complete [It turns on when an actuator gets in the detection range of the forward end. It turns on when pressing operation completes.]	
		b12	LS0/PE0	Driving Backward Complete / Pressing Complete [It turns on when an actuator gets in the detection range of the backward end. It turns on when pressing operation completes.]	
	Status signal (3th Axis)	b11	E2RD	Operation Ready [On: Operation ready (servo on)]	
		b10	*ALM	Alarm (break contact) [ON : No alarm、 OFF : Alarm generated]	
		b9	LS1/PE1	Driving Forward Complete / Pressing Complete [It turns on when an actuator gets in the detection range of the forward end. It turns on when pressing operation completes.]	
		b8	LS0/PE0	Driving Backward Complete / Pressing Complete [It turns on when an actuator gets in the detection range of the backward end. It turns on when pressing operation completes.]	
	Status signal (2nd Axis)	b7	E1RD	Operation Ready [On: Operation ready (servo on)]	
		b6	*ALM	Alarm (break contact) [ON : No alarm、 OFF : Alarm generated]	
		b5	LS1/PE1	Driving Forward Complete / Pressing Complete [It turns on when an actuator gets in the detection range of the forward end. It turns on when pressing operation completes.]	
		b4	LS0/PE0	Driving Backward Complete / Pressing Complete [It turns on when an actuator gets in the detection range of the backward end. It turns on when pressing operation completes.]	
	Status signal (1st Axis)	b3	E0RD	Operation Ready [On: Operation ready (servo on)]	
		b2	*ALM	Alarm (break contact) [ON : No alarm、 OFF : Alarm generated]	
		b1	LS1/PE1	Driving Forward Complete / Pressing Complete [It turns on when an actuator gets in the detection range of the forward end. It turns on when pressing operation completes.]	
		b0	LS0/PE0	Driving Backward Complete / Pressing Complete [It turns on when an actuator gets in the detection range of the backward end. It turns on when pressing operation completes.]	

The input and output signals for the EC connection unit are as shown below.
 On means the applicable bit is "1" while off means "0".

[1] Movement command input backward end/forward end (ST0/ST1) PLC output signal

The ST signal function automatically switches depending on whether the unit has completed home return or not.

Signal name	Signal abbreviation	Function overview by status	
		Home return: Not complete	Home return: Complete
Backward	ST0	Home return operation	Backward
Forward	ST1		Forward

[Home return status: Not complete]

- When the "ST0" signal is turned ON, home return operation begins.
- When the "ST1" signal is turned ON, as with the "ST0" signal, home return operation begins.
- Turning the ST signal OFF midway through home return operation will cause a gradual stop.

[Home return status: complete]

- When the ST signal is turned ON, the ELECYLINDER moves "Backward" or "Forward".
- While the ST signal is ON, operation will continue until the "Backward end" or "Forward end" is reached.
- Turning the ST signal OFF midway through operation will cause a gradual stop.



Caution

- If stopped when the LS or PE signals are not ON, the ELECYLINDER may be stopped on the way to the backward or forward end, or it may have stopped at the backward or forward end during pressing operation with no contact.
 We recommend first inputting the "ST0" signal and then performing the following actions after returning to the backward end.
- If battery-less absolute specification (option) is selected, the home return complete status is retained.
 However, if the "Change home return direction" or "Adjust home position" parameters are changed, home return status will be not-complete; perform homing (absolute reset).
- ELECYLINDER connected to RSEL is not capable for use in the single solenoid system.

[2] Alarm clear input (RES) PLC output signal

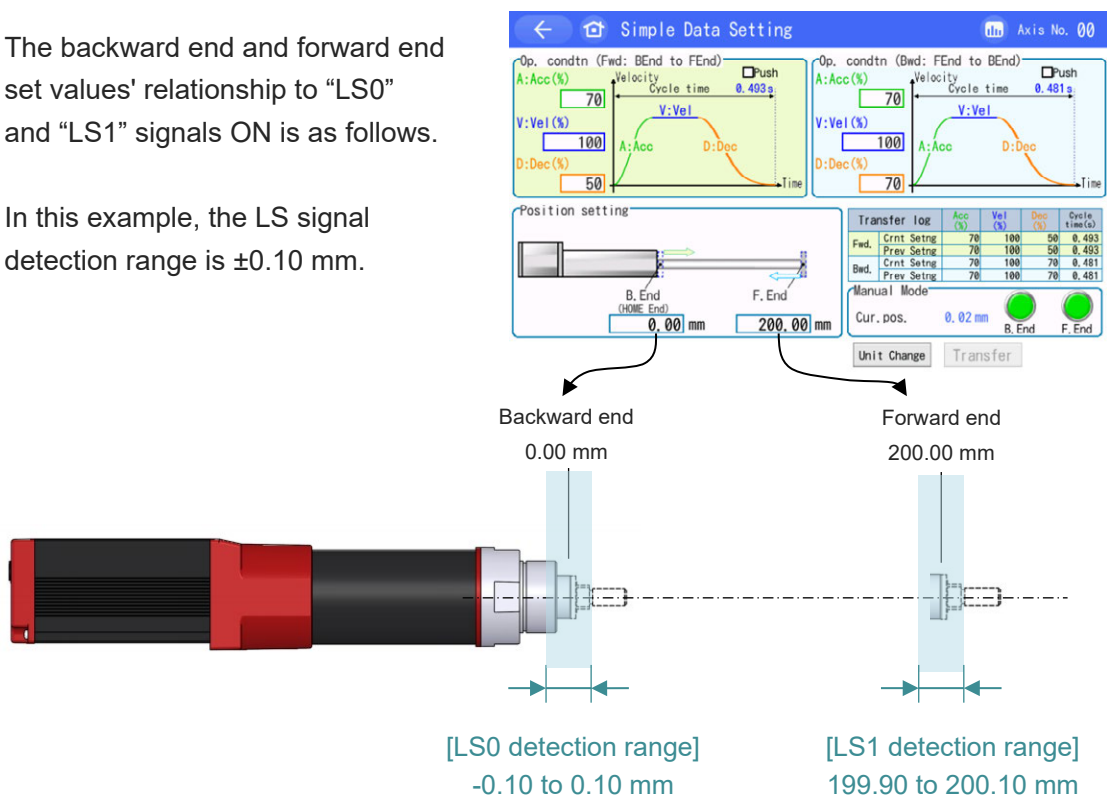
- When the “RES” signal is turned ON, the currently triggered alarm will be cleared.
- Alarm clear may not be possible depending on the alarm itself.
Refer to [Chapter 11 Troubleshooting] for detail.

[3] Position detection output backward end/forward end (LS0/LS1) PLC input signal

- The LS signals perform the same operation as an air cylinder automatic switch. They are not positioning complete signals.
- Once the current position of ELECYLINDER gets into the detection range set in the LS detection range adjustment in EC Parameter No.2, LS Signal should turn on.
- They turn ON when within the detection range regardless of whether the servo is ON or OFF.

The backward end and forward end set values' relationship to “LS0” and “LS1” signals ON is as follows.

In this example, the LS signal detection range is ± 0.10 mm.



To adjust the LS signal detection range, open the “Edit parameters window”.

Parameter No.2

“Auto switch “LS” signal detection range Adjustment” can be used to make adjustments.

Parameter		Axis No. 00
1. Operation Range Adjustment	Descrptn	200.00 mm
2. AutSwitch“LS” Signl Detctn Rng Adjst	Descrptn	0.10 mm
3. HOME Direction Change	Descrptn	<input type="radio"/> Opposite <input checked="" type="radio"/> Default
4. HOME Position Adjustment	Descrptn	3.00 mm
5. Smooth accel/decel Setting	Descrptn	<input checked="" type="radio"/> Invalid <input type="radio"/> Valid
6. Current control setting while stop	Descrptn	<input checked="" type="radio"/> Invalid <input type="radio"/> Valid
7. Reserve		
8. Reserve		

By touching Descrptn (Description) button, the description of the parameter will be displayed.

[4] Pressing complete output backward end/forward end (PE0/PE1) PLC input signal

- Turns ON when “pressing complete” is determined during pressing operation.
- Turns OFF if no contact can be made.

[5] Alarm output (*ALM) PLC input signal

- Turns ON when the ELECYLINDER is in normal status.
Turns OFF when an alarm occurs.
- Always monitor the *ALM signal using the master device.
If it turns OFF, immediately take safety countermeasures with the equipment as a whole.

[6] Operation ready (E*RD) PLC input signal

- It turns on when the operation is ready (servo on).
- “*” = 0: 1st axis on EC connection unit ready for operation
1: 2nd axis on EC connection unit ready for operation
2: 3rd axis on EC connection unit ready for operation
3: 4th axis on EC connection unit ready for operation

5.10.5 Assignment and operation system of EC signals

The operation of ELECYLINDER can be selected from I/O and SEL program, and the input and output port numbers available for operation should differ.

[1] Control by I/O

Without using the input and output ports assigned to an EC connection unit, the top input and output port numbers should be set in parameters for each unit.

Forward or backward command to an output port assigned to an EC connection unit should generate the following error.

Error Code 489 "System Output Operation Error"

- Related parameters

I/O parameters

No.	Parameter Name	Setting on Delivery	Input range	Unit	Remarks
186	Number of Option Unit Connected Units	0	0 to 8	unit	Number of input and output ports should be number of connected units x 16 for each

Option board parameters

No.	Parameter Name	Setting on Delivery	Input range	Unit	Remarks
1	Unit type	0	0 to 15	unit	0: PIO unit 1: EC connection unit
2	Control method	0	0 to 1		0: SEL program 1: Host device (PLC etc.)
3	Top Input Port Number from Host Device	0	0 to 3,999		When Control System = 1 (host device), setting is necessary. * Number of ports depends on unit type The setting should be established with the following conditions. • 0 + (Multiple of 8) (0 to 299) • 1,000 + (Multiple of 8) (1,000 to 3,999)
4	Top Output Port Number from Host Device	0	0 to 6,999		When Control System = 1 (host device), setting is necessary. * Number of ports depends on unit type The setting should be established with the following conditions. • 300 + (Multiple of 8) (300 to 599) • 4,000 + (Multiple of 8) (4,000 to 6,999)

<Example>

When 256 points are used for both input and output in the field network (such as EtherNet/IP) and the automatic assignment is selected, the input and output ports should be assigned as shown below.

- Input port: 0 to 255
- Output port: 300 to 555

In there, if the last 16 points in the field network is assigned to an EC connection unit, the setting should be as shown below.

- Option board parameters No.2 = "1: I/O control"
- Option board parameters No.3 = 240
- Option board parameters No.4 = 540

[2] Control of SEL program

The input and output ports assigned to the EC connection unit should be operated directly in the SEL program.

In order to stop ELECYLINDER on the way, turn ST0/ST1 Signals off.

ELECYLINDER would not stop with operations described below.

- HOLD, CANC Command
- "Operation Pause Signal" in input feature select
- Pause, program termination or all axes termination in PC software or TB-02 • 03

5.10.6 Timing for input and output signals

The maximum response time from the control signal gets turned on till it reaches ELECYLINDER and the status signal from ELECYLINDER returns to PLC when an actuator is operated in a PLC sequence program can be expressed with formulas shown below.

Also, PLC should be the master station and the gateway unit should be the remote I/O station.

PLC → Max. Response Time of ELECYLINDER : $Y_t + T_t + F_t$

ELECYLINDER → Max. Response Time of PLC : $G_t + T_t + X_t$

Y_t = "Master Station → Remote I/O Station" Transmission Latency

X_t = "Remote I/O Station → Master Station" Transmission Latency

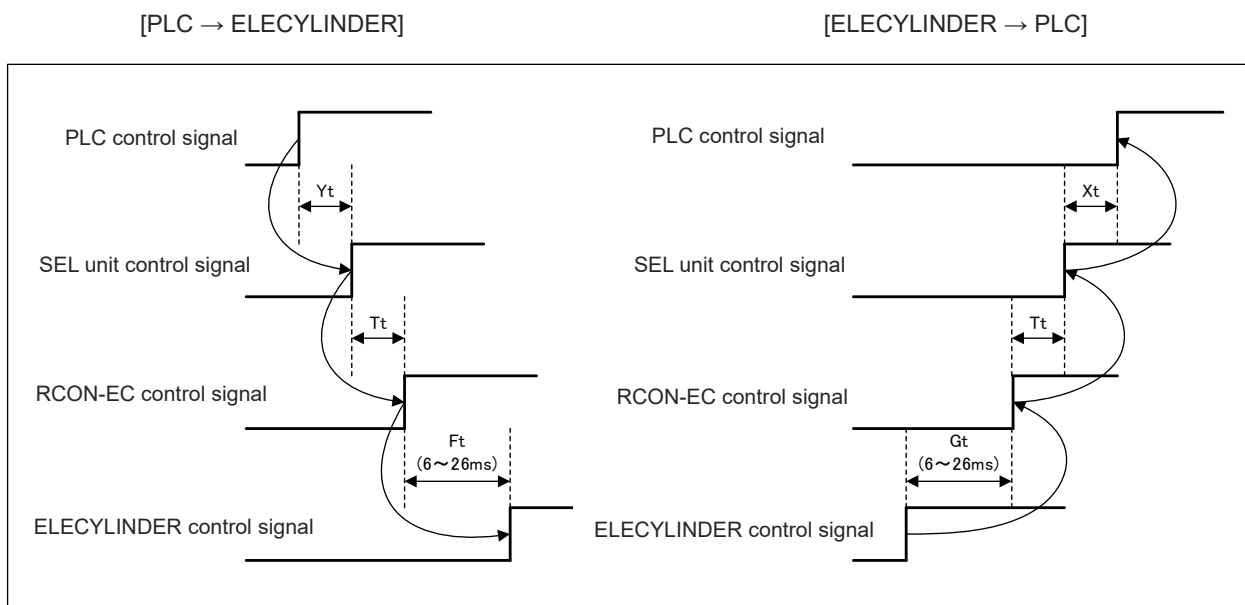
T_t = Process Time inside SEL Unit + Transmission Time (5 ms)

F_t = ELECYLINDER Input Filter (6 to 26 ms)

G_t = RCON-EC-4 Input Filter (6 to 26 ms)

* F_t or G_t may differ depending on the model of ELECYLINDER to be connected.

Refer to "an instruction manual of a PLC" installed to "each field network master unit" about the transmission latencies from the master station to the remote I/O station (Y_t) and from the remote I/O station to the master station (X_t).



5.10.7 Maintenance bit output for predictive maintenance

The maintenance bits can be output for predictive maintenance of ELECYLINDER. The content of Bits is ALML (alarm) bit for each axis of ELECYLINDER.

- Content of ALML (alarm) Bit for ELECYLINDER
It turns on when either one of below is satisfied.
 - Maintenance Alarm 1 and 2 (Total Travel Count, Total Travel Distance)
 - Maintenance Alarm 3 (Overload Alarm)

Also, ELECYLINDER should not cancel the operation and continue even with “Maintenance Alarm” generated.

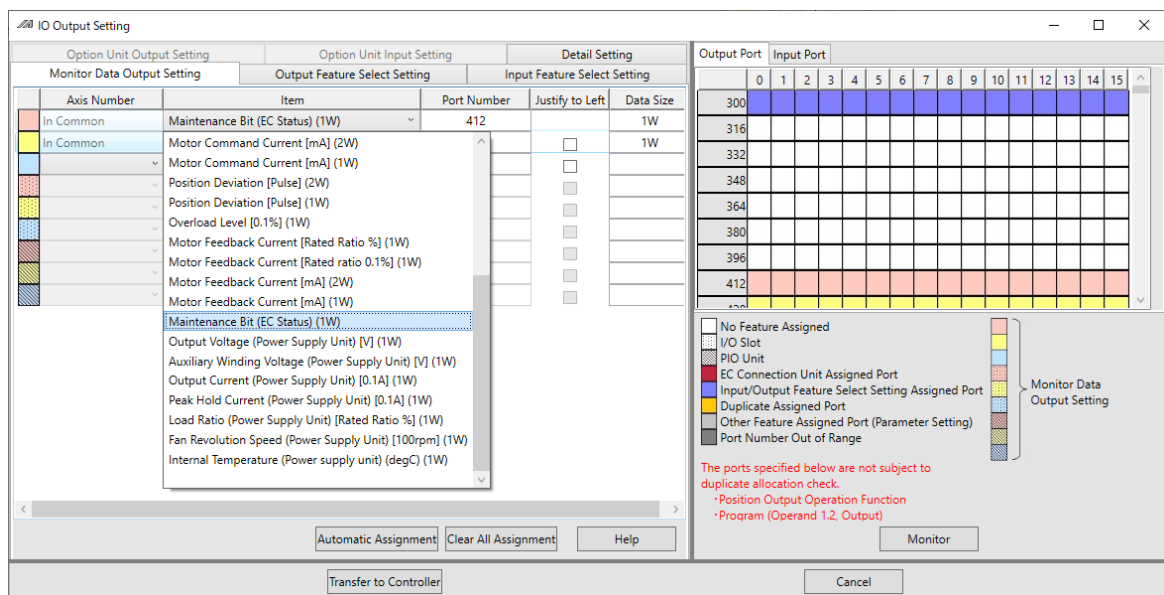
For this feature details refer to

Maintenance Alarm 1 and 2 (Total Travel Count, Total Travel Distance): [9.3.3 Maintenance Information]

Maintenance Alarm 3 (Overload Alarm): [9.4.2 Overload Alarm]

- Output setting of Maintenance Bit

Open “I/O Output Setting Monitor” from “Parameter (P)” → “I/O Output Setting (I)” in the XSEL PC software.



From the items in “Monitor Data Output Setting” in the I/O output setting window, select “Maintenance Bit (EC Status) (1W)” and establish the setting in the output port number.

The maintenance bit should be displayed in the order of the EC axis numbers. For example, in the case of EC9 axis, bit 9 should turn on.

For detailed refer to [XSEL PC Software (RSEL edition) 8.7 I/O Output Setting].

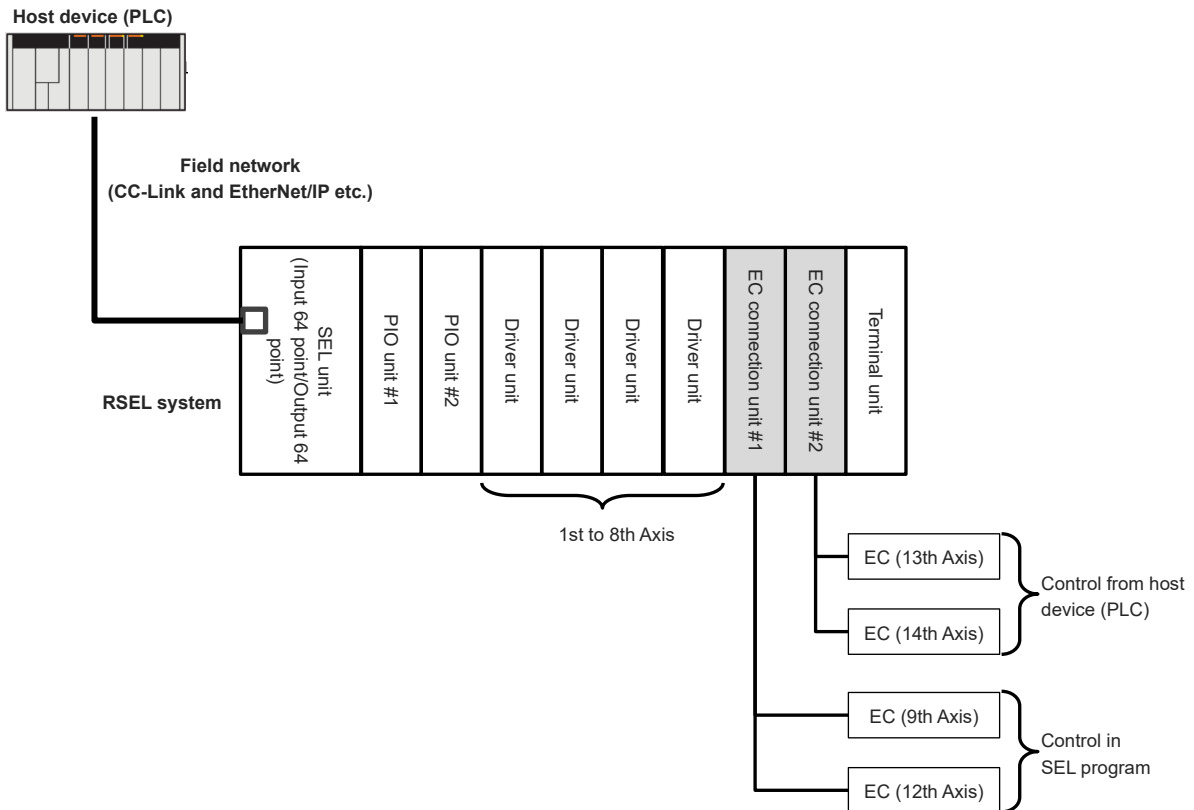
5.10.8 Configuration example

Here, explains an example of setting to connect an EC connection unit (RCON-EC-4) to the SEL unit and to operate an ELECYLINDER unit.

[1] RSEL System configuration and Input/Output port configuration example

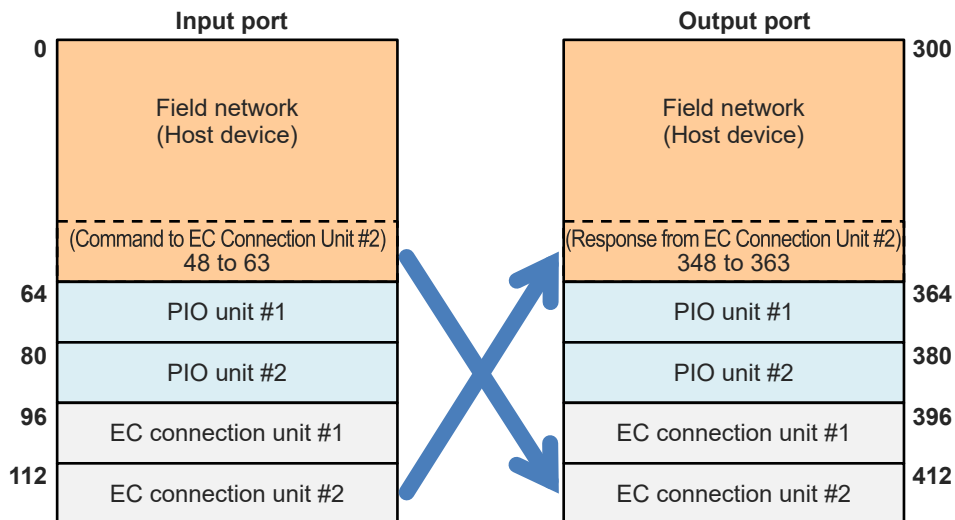
(1) RSEL System configuration

Unit configuration	Unit number	Setting contents etc.
RSEL unit	-	<ul style="list-style-type: none"> • Automatic Assignment • Fieldbus input 64 points / output 64 points enabled • Last 16 points of fieldbus for both input and output to be used for 2nd EC connection unit
24V driver unit	4	2 axes connected for each unit
PIO unit	2	
EC connection unit	2	2 axes connected for each unit (EC not connected for remaining 2 axes) EC connection unit #1: EC connected to 1st and 4th axes Control in SEL program EC connection unit #2: EC connected to 1st and 2nd axes Control from host device (PLC)



(2) Input/Output port configuration

As it is the automatic assignment setting, the fieldbus should be assigned for 64 points from the top, and PIO Unit #1 and #2 and EC Connection Unit #1 and #2 should be assigned for 16 points from closer order to RSEL.

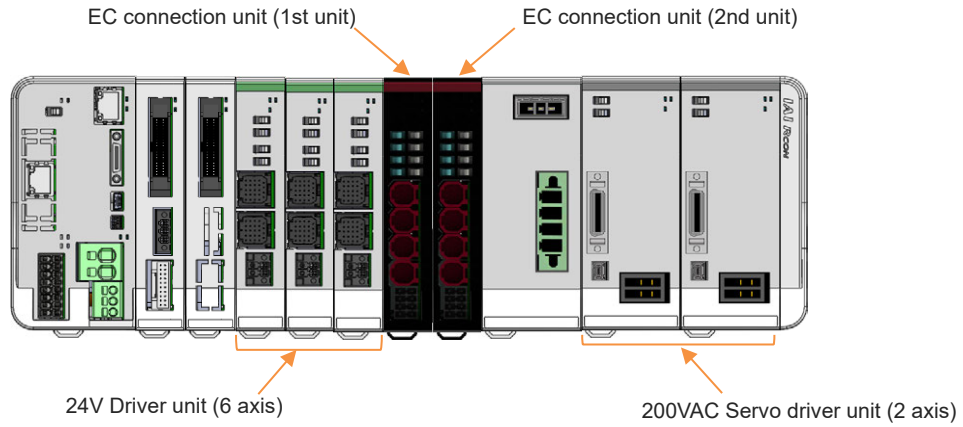


- EC connection unit #1
Operate EC with the following input and output ports in the SEL program.
Control: Output port No.396 to 411
Status: Input port No.96 to 111
- EC connection unit #2
Operate EC with the following input and output ports in the host device (PLC).
Control: Input port No.48 to 63
(Host device (PLC) → Input port No.48 to 63 → Output port No.412 to 427 → EC)
* Operating Output Port No. 412 to 427 in such as the SEL program should cause Error Code 489: "System Output Operation Error".

Status: Output port No.348 to 363
(EC → Input port No.112 to 127 → Output port No.348 to 363 → Host device (PLC))
* Do not attempt to set other input and output features (in input, Program Start Input / Software Reset Input / Remote Mode Control Input, etc. and for output, Error Output / READY Output / Output during Servo-on, etc.) to the input and output ports related to the EC connection unit. It should cause Error Code 62D: "Input and Output Feature Port Number Error" and so on.

[2] Connection of EC connection unit

An EC connection unit should be connected on the right side of the extension unit (PIO/SIO/SCON extension unit, PIO unit or SCON extension unit) and the 24V driver unit.



Shown below is the axis numbers of ELECYLINDER when exercised the example shown in the figure above.

Target	Version
9	RCON-EC (1st unit) 1st axis
10	RCON-EC (1st unit) 2nd axis
11	RCON-EC (1st unit) 3rd axis
12	RCON-EC (1st unit) 4th axis
13	RCON-EC (2nd unit) 1st axis
14	RCON-EC (2nd unit) 2nd axis
15	RCON-EC (2nd unit) 3rd axis
16	RCON-EC (2nd unit) 4th axis

(Note) The position to connect an EC connection unit is fixed. Any position other than the layout in the figure above should not be connected.

[3] Parameter setting

(1) I/O parameter setting

Set I/O Parameter No.1 “Input and Output Port Assignment Type”, No.14 “Number of Ports Used for I/O1 Fieldbus Remote Input”, No.15 “Number of Ports Used for I/O1 Fieldbus Remote Output” as shown below.

I/O parameter

No.	Parameter name	Setting value	Remarks
1	Input and Output Port Assignment Type	1	“Auto Assignment” Setting
14	Number of Ports Used for I/O1 Fieldbus Remote Input	64	
15	Number of Ports Used for I/O1 Fieldbus Remote Output	64	

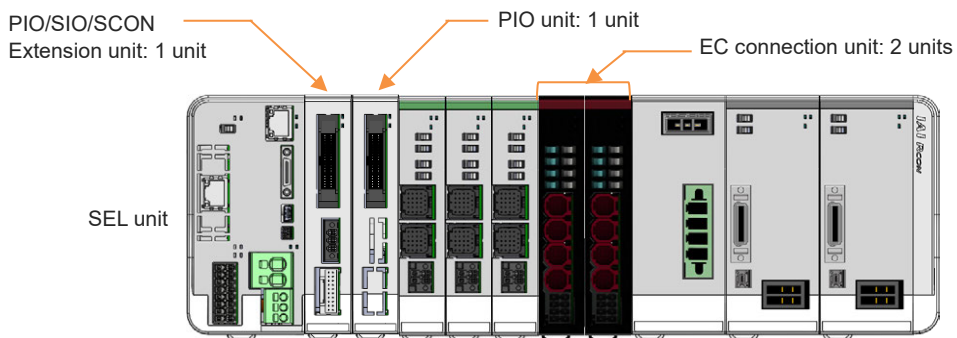
(2) Option Unit Activation Setting

Set the number of the option units (PIO/SIO/SCON extension unit, PIO unit and EC connection unit) to be connected to the SEL unit. Set the number of units in I/O Parameter No.186 “Number of Connected Option Units” using the PC teaching software or a teaching pendant (TB-02/03).

SCON extension unit (RCON-EXT) should not be included in the number of connected units.

Example: In the figure below, there are four option units (PIO/SIO/SCON extension unit = 1 unit, PIO unit = 1 unit, EC connection unit = 2 units).

Therefore, set “4” in I/O Parameter No.186 “Number of Connected Option Units”.



(3) Setting to Use EC Connection Unit

Select "EC Connection Unit" in the option board parameter.

(It should be separated into tabs depend on the connected units on a teaching tool)

Set "1 (EC Connection Unit)" in Option Board Parameter No.1 on each unit.

(*) It is the end of the process if ELECYLINDER is to be controlled in the SEL program.

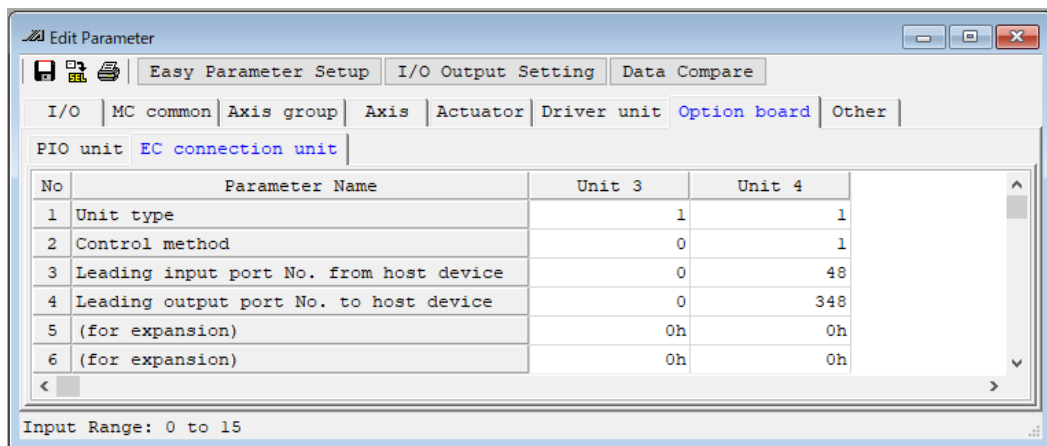
(4) When Controlling EC from I/O in Host Device

The following option board parameters should be set up to a unit controlled from I/O in a host device.

- Option Board Parameter No.2 (*1): Set to 1 (Host Device).
- Option Board Parameter No.3: Set the input port of the control signals sent from the host device to the EC connection unit.
- Option Board Parameter No.4: Set the output port of the control signals sent from the EC connection unit to the host device.

* This setting is necessary for establishing the input and output port relations for the input and output ports used in the fieldbus and the EC connection unit.

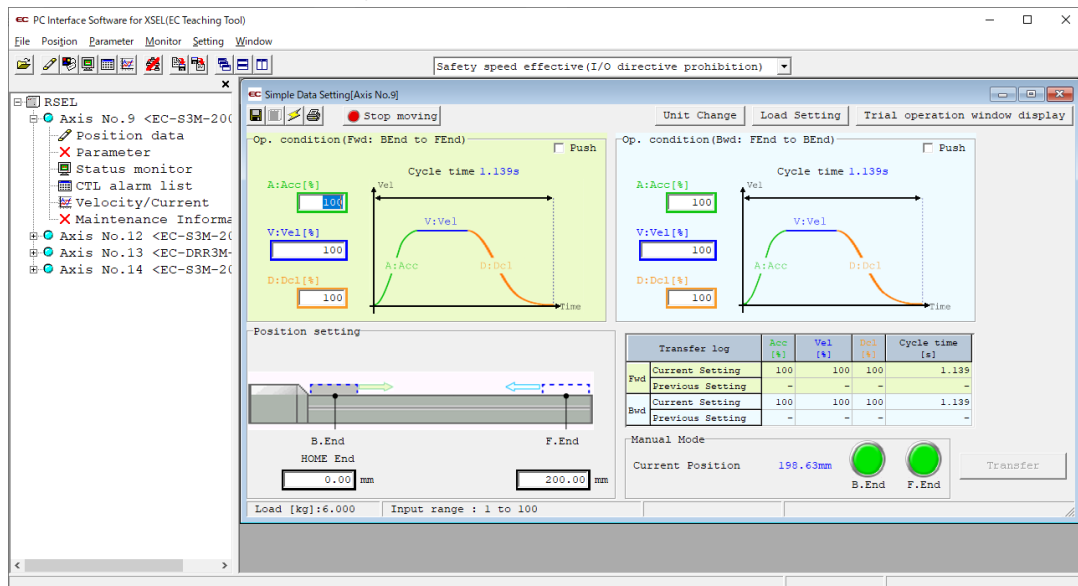
*1 Setting should be established in Option Board Parameter No.2 to determine if the control of ELECYLINDER to be conducted in "0: SEL Program" or "1: Host Device (such as PLC)".



Write the parameters to the flash ROM after the settings are finished and reboot the controller or have the software reset. This is the end of the parameter settings for RSEL.

[4] Setting to EC

Select Menu → EC (E) → Teaching Tool (T) in the PC software and the following EC teaching tool should be launched. Only the identified EC should be connected.



* Teaching of positions, parameter change and alarm list check should be available in the same manner as the PC teaching software for RCEC.

[5] Trial operation

In MANU Mode, ELECYLINDER would not accept any command on the input and output ports.

If you would like to have a trial run on the input and output ports in MANU Mode, establish the setting in the PC teaching software or a teaching pendant (TB-02/03).

- When Operating in PC Teaching Software

Select "Permit EC I/O Command" from the dropdown list in the toolbar.

By doing so, a trial run on the input and output ports should become available in MANU Mode.

Toolbar select	Contents
Prohibit EC I/O Command	I/O indication disabled Select this when teaching operation.
Permit EC I/O Command	I/O indication enabled Select this when trial run

5.10.9 Caution

The caution notes when operating ELECYLINDER with an EC connection unit (RCON-EC-4) being connected to the SEL unit.

- (1) ELECYLINDER connected to RSEL is not capable for use in the single solenoid system. Make sure to use it in the double solenoid system.
- (2) SIO connector (SIO connector equipped on the ELECYLINDER unit) on ELECYLINDER connected to the EC connection unit cannot be used.
- (3) The jog switch on the EC connection unit should perform forward end and rearward end movements with the data set in the position data. It should perform the home-return operation before an operation to both forward and rearward end movements if the home-return operation is not completed.
- (4) As the jog switch to be activated/inactivated should be set in the I/O parameter No.191 "EC Connection Unit JOG Switch", the setting should be reflected to all the EC connection units at once.
- (5) The EC connection unit occupies domains for four axes (one word) even though not all of four axes are connected. Also, an axis number that an axis is not connected should not be pulled one number forward.
- (6) When in "MANU Mode" and a teaching tool is set to "Permit EC I/O Command", any teaching operation of ELECYLINDER in the PC software is not available. (There should be Alarm 124 or 125 generated in the PC teaching software. Refer to [16.3 EC Teaching Tool Error List in XSEL PC Software (RSEL Edition)] for details.)
Set it to "Prohibit EC I/O Command" when having a teaching operation.
- (7) While an operation command is kept activated, if the setting is switched to "Permit EC I/O Command" in "MANU Mode" or "MANU Mode" is switched to "AUTO Mode", the ELECYLINDER may receive the operation command and may start operation.
Make sure to turn any operation command signal off before switching the setting to avoid any operation at the timing of switching.
- (8) ELECYLINDER equipped with a digital speed controller should show "tool in connection" while a teaching tool is connected or during communication in the XSEL serial communication protocol (Format B) with a host device (such as PLC and touch panel), and use of the digital speed controller should be disabled.
Passing approximately 5 seconds with no communication will enable use of the digital speed controller.
(Even while a teaching tool is connected, the digital speed controller may become available to use depending on windows.)

5.10.10 List of related parameters

The parameters related to this feature are as shown below.

● I/O parameter

No.	Parameter name	Setting on Delivery	Input range	Unit	Remarks
186	Number of Connected Option Units	0	0 to 8	unit	Number of input and output ports should be number of connected units x 16 for each
187	Input Port Start Number in Option Unit Fixed Assignment	-1	-1 to 3,999		0 + (Multiple to 8) (0 to 299) 1,000 + (Multiple to 8) (1,000 to 3,999) (Negative number invalid)
188	Output Port Start Number in Option Unit Fixed Assignment	-1	-1 to 6,999		300 + (Multiple to 8) (300 to 599) 4,000 + (Multiple to 8) (4,000 to 6,999) (Negative number invalid)
189	PIO Unit / PIO/SIO Unit Error Monitoring	1	0 to 5		0: No Monitoring 1: Monitor 2: Monitor (24V I/O power supply related errors not monitored) 3: Monitor (Monitors only 24V I/O power supply related errors) 4: Monitor (Make 24V I/O power supply related errors generated in message level) * Some exceptions should be applied
190	Option Unit Attribute 1	C800200H	0H to FFFFFFFFH		Bit 0-3: Select option unit output port data in TF communication error (0: Clear, 1: Hold) Bit 4-7: Select option unit input port data in TF communication error (0: Clear, 1: Hold) Bit 8-15: TF Communication link error check timer value (10 ms) Bit 16-19: For future extension Bit 20-31: Link timeout value at TF communication initialization (100 ms)
191	EC connection unit JOG switch	0	0 to 1		0: Enable 1: Disable (Main application part V1.09 or later)

No.	Parameter name	Setting on Delivery	Input range	Unit	Remarks
851	Data IO Output Setting 01 Data Specifications	0H	0H to FFFFFFFFH	-	<p>* Set 0 when output is disabled.</p> <p>Bit 00-03: Output data type (0: Output disable 1: Power supply status 2: Axis status 3: EC status (Main application part V1.09 or later))</p> <p>Bit 04-07: (Reserve)</p> <p>Bit 08-15: Output data item</p> <ul style="list-style-type: none"> ● Output data type (Bit 00-03) = "1: Power supply status" (0: Output voltage 1: Supportive coil voltage 2: Output current 3: Peak hold current 4: Load ratio 5: Fan revolution speed 6: Inside temperature (PCB temperature)) ● Output data type (Bit 00-03) = "2: Axis status" (0: Current position 1: Current speed 2: Alarm code 3: Axis motion status 4: Motor indication current (rating ratio) 5: Motor indication current (mA) 6: Position deviation 7: Over load level 8: Motor feedback current (rating ratio) 9: Motor feedback current (mA)) <p>Bit 16-19: Resolution (0: 1000, 1: 100, 2: 10, 3: 1 4: 1/10 (0.1), 5: 1/100 (0.01), 6: 1/1000 (0.001))</p> <p>Bit 20-23: (Reserve)</p> <p>Bit 24-27: Byte order (0: Big endian, 1: Middle endian 1 (PDP endian) 2: Middle endian 2 3: Little endian)</p> <p>Bit 28-31: Data size (0: 1byte 1: 2byte (1 word) 2: 4byte (2 word))</p>

● MC common parameter

No.	Parameter name	Setting on Delivery	Input range	Unit	Remarks
22	Driver Shutdown Release Latency	5	0 to 60000	ms	In case of an EC connection unit that adjust the timing of drive cutoff release for each axis, it should be the latency for an individual unit (four axes).

● Option board parameter

No.	Parameter name	Setting on Delivery	Input range	Unit	Remarks
1	Model (High Order) (Manufacturing Information)	0	0 to 15		0: PIO unit 1: EC connection unit
2	Model (Middle Order) (Manufacturing Information)	0	0 to 1		0: SEL Program 1: Host device (PLC etc.) * Dedicated for EC connection unit
3	Model (Low Order) (Manufacturing Information)	0	0 to 3,999		0 + (Multiple to 8) (0 to 299) 1,000 + (Multiple to 8) (1,000 to 3,999) Setting necessary when Control System = 1 (Host Device) (Number of ports depends on types of units) * Dedicated for EC connection unit
4	Manufacturing Data (Manufacturing Information)	0	0 to 6,999		300 + (Multiple to 8) (300 to 599) 4,000+ (Multiple to 8) (4,000 to 6,999) Setting necessary when Control System = 1 (Host Device) (Number of ports depends on types of units) * Dedicated for EC connection unit

Refer to [10.5 Parameter List (ELECYLINDER)] for the parameters of ELECYLINDER.

5.10.11 Related errors

The errors related to this feature are as shown below.

Error No.	Error name	Contents and Causes / Countermeasures
62D	Input and Output Feature Port Number Error	<p>[Contents and Causes]</p> <p>(1) A number out of the range of input and output port number is set (2) The input and output port number is set duplicated</p> <p>[Countermeasures]</p> <p>(1), (2) Check the settings in the following parameters</p> <ul style="list-style-type: none"> • Check the settings in I/O Parameter No.28, 29, 62 to 69, 76, 77, 79, 283 to 330 and so on.
642	Option Unit Communication Error	<p>[Contents and Causes]</p> <p>A communication error has been occurred in the communication with an option unit (units other than driver unit and power supply unit).</p> <p>(1) A connector is not connected properly. (2) Internal signal line is broken (3) Communication error caused by noise impact (4) There is no terminal unit mounted (5) There are 9 units or more of option units connected (6) There is an error in a parameter related to the option units (7) The connected option unit is different from what is set in the parameter (8) The total number of the driver axes and the EC axes exceeds 16. (9) A communication error has been occurred between an EC connection unit and EC</p> <p>[Countermeasures]</p> <p>(1) to (3) Check if the connection is established firmly between each unit. Disconnect the link between units once and then reconnect it. If the same phenomenon occurs even after the power reboot, consult with IAI.</p> <p>(4) Take off the terminal unit. (5) Have 8 units or less for the connected option units. (6) Check in I/O Parameter No.186 to 190 and so on. (7) Align Option Board Parameter No.1 to the option units. (8) Adjust the number of driver and EC axes to make it 16 or less. (9) Check the connection condition of the EC connection unit and the cable.</p>

RSEL

Chapter 6

Field Network, PIO, SIO

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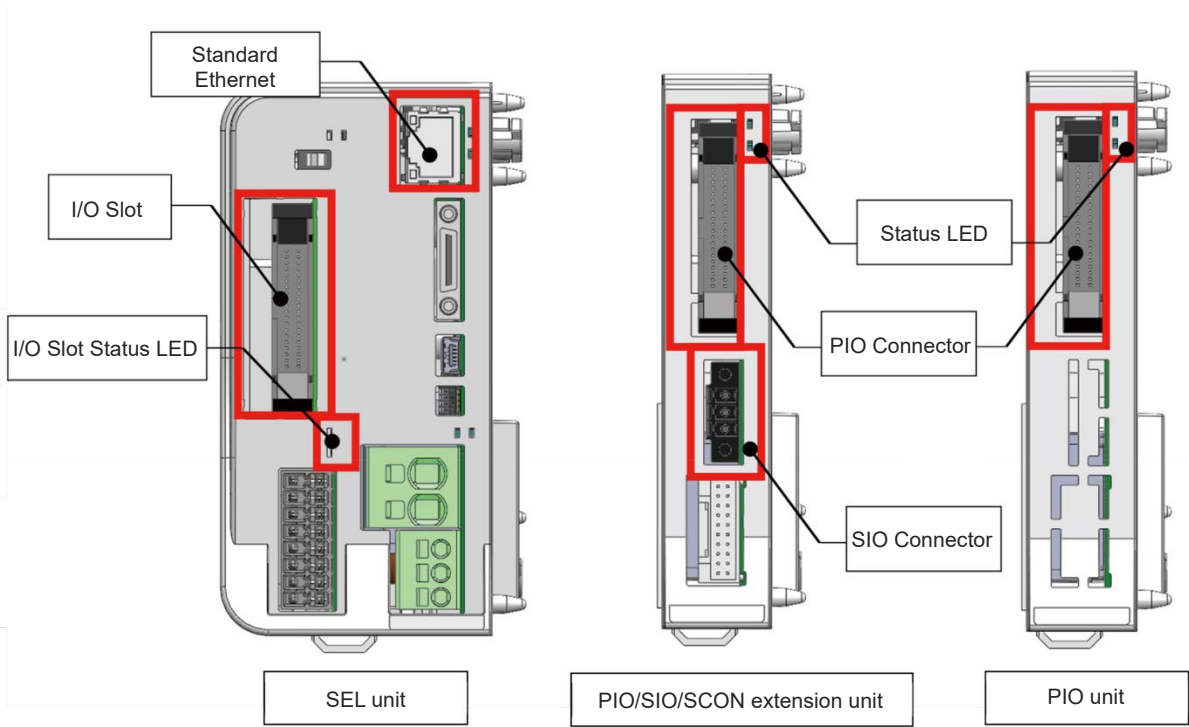
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6.5.4	Setup of EtherCAT network configuration	6-109
6.5.5	Changing PDO mapping setting	6-113
6.5.6	Data transfer to PLC	6-118

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.

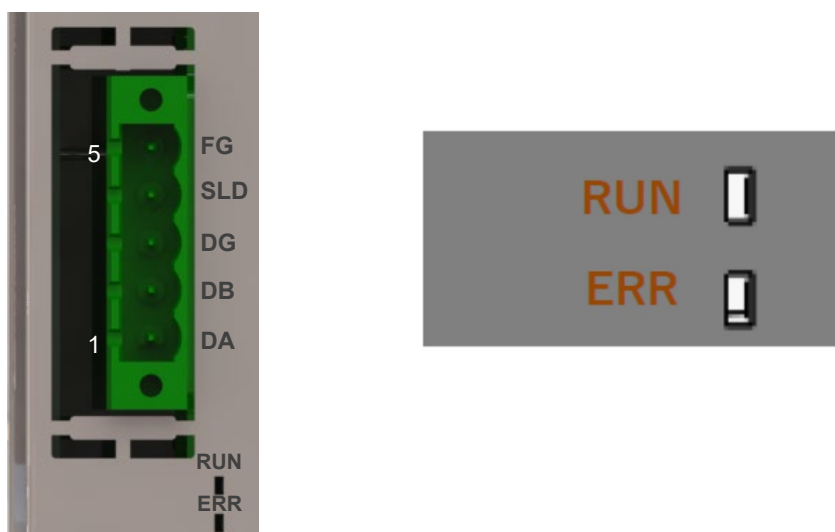
Model Code	Mounted Module	Remarks
RSEL-G-E	I/O slot Not Used	
RSEL-G-NP	PIO (NPN) type	NPN IN16/OUT16
RSEL-G-PN	PIO (PNP) type	PNP IN16/OUT16
RSEL-G-CC	CC-Link connection type	
RSEL-G-CC2	CC-Link connection type	Two-way connector enclosed
RSEL-G-CIE	CC-Link IE Field connection type	
RSEL-G-DV	DeviceNet 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



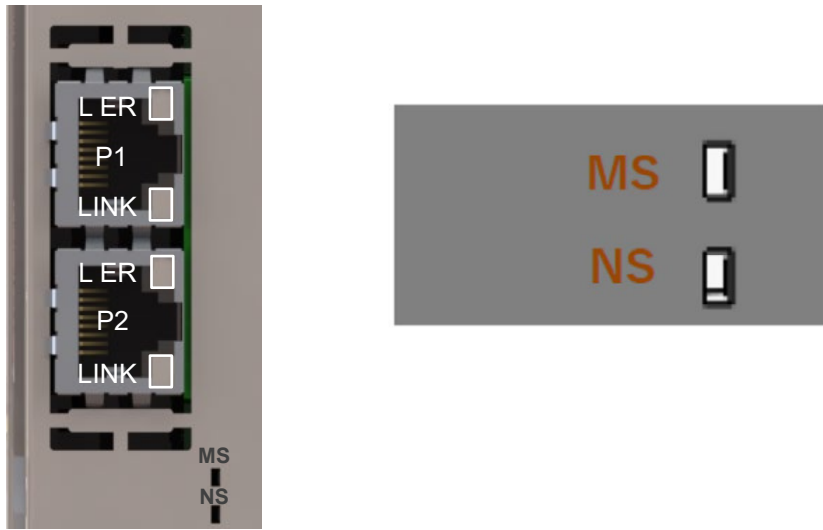
• Interface Specifications

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	Error Occurred (CRC Error / Station Number Setting Error / Baud Rate Setting Error)
		Blinking	Value of station number or baud rate setting changed when reset canceled

(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



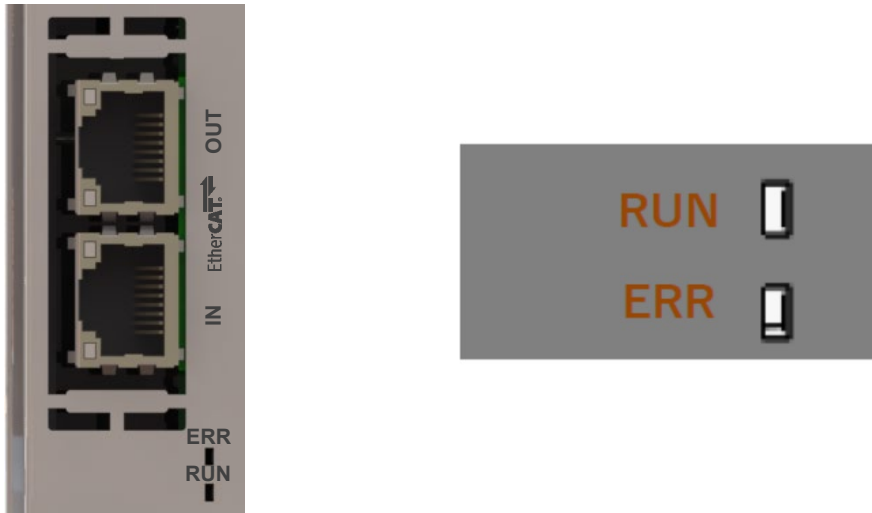
● DeviceNet interface specifications

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

(4) EtherCAT connection type



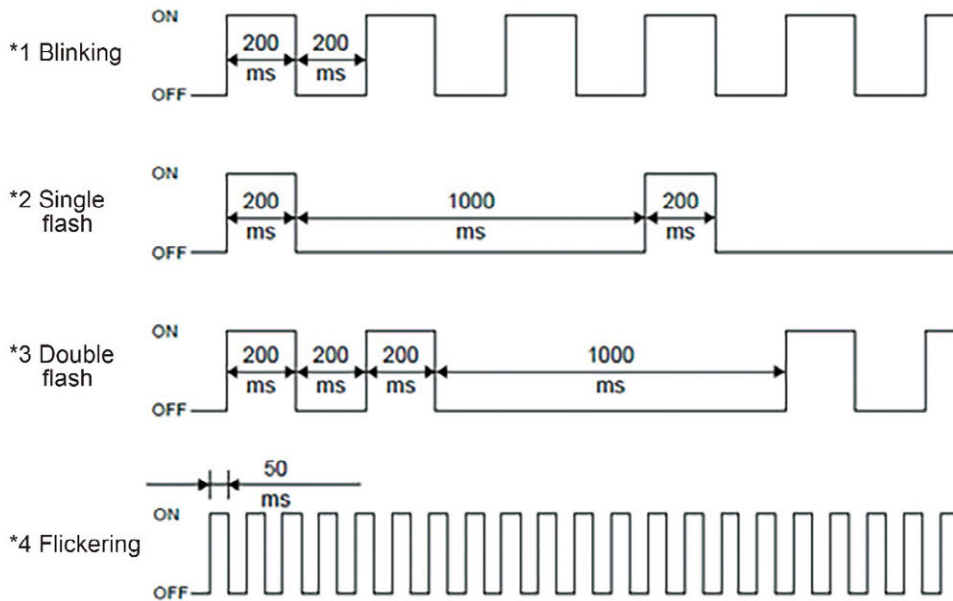
● EtherCAT interface specifications

Item	Description
Applicable profile	CoE (CAN over Ethernet)
Device type	I/O Device
Node address	1 to 65,535 (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



(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.

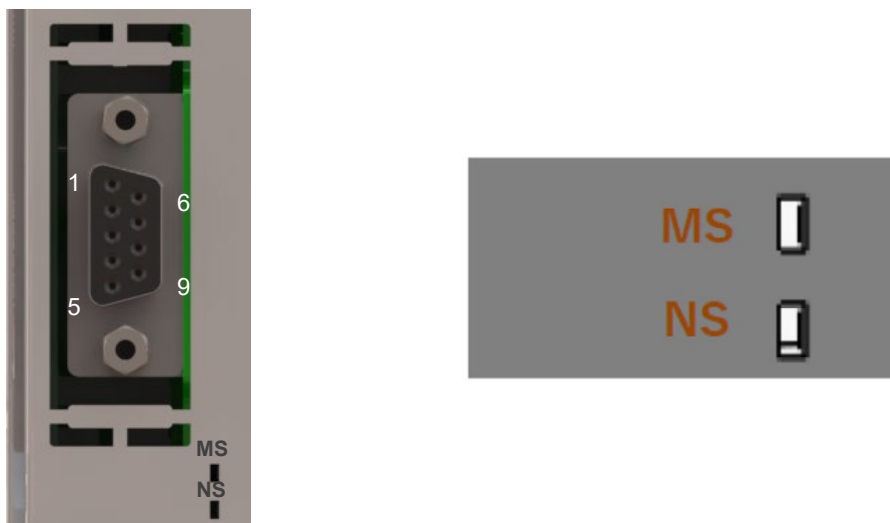
*2: It is the port numbers to be used in EtherNet/IP.

*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	Light ON	Power not supplied
			Light OFF	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	Light ON	Power not supplied
			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
	Orange	Light ON	Malfunction (Recovery impossible)
NS	Green	Light ON	Online status
		Blinking	Online status (Configuration setting not established)
	Orange	Blinking	Error occurrence

(7) PROFINET IO connection type

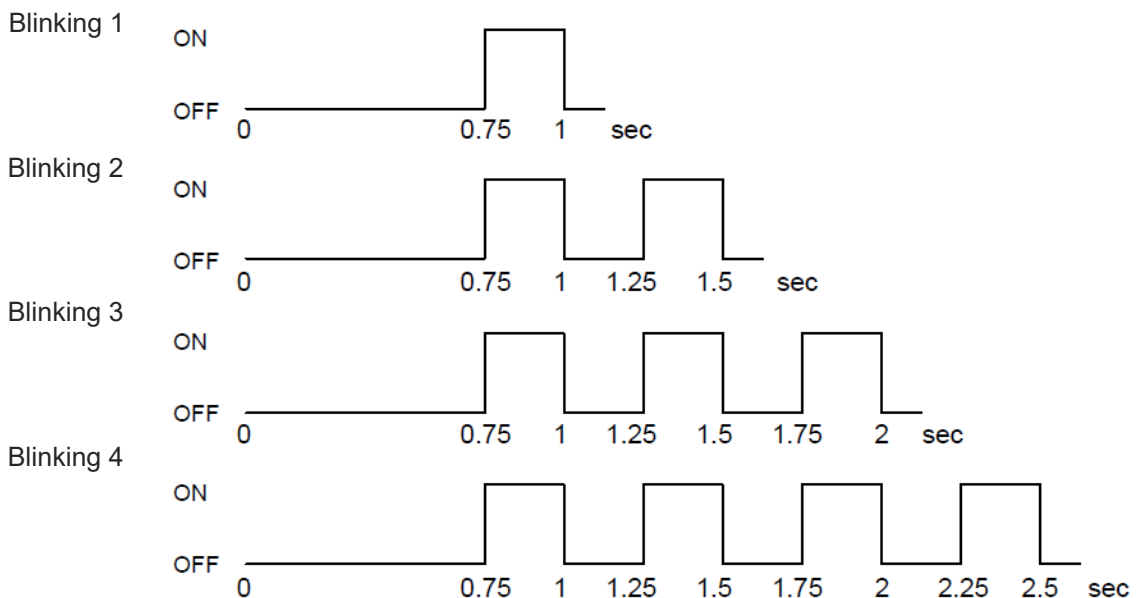


●PROFINET IO interface specifications

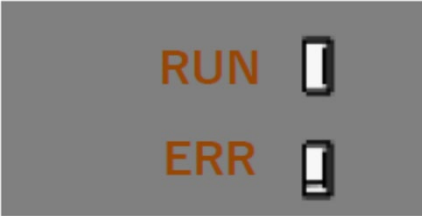
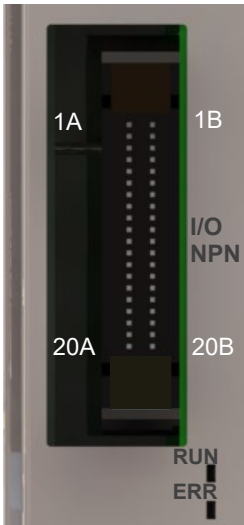
Item	Description
Applicable Protocol	PROFINET IO
Conformance Class	A (RT Communication)
Device Class	I/O Device
IP address	0.0.0.0 to 255.255.255.255 (Setting to be established from master via PROFINET network)
Communication speed	100Mbps
Communication mode	100BASE-TX
Cable	Category 5 or higher
Connector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



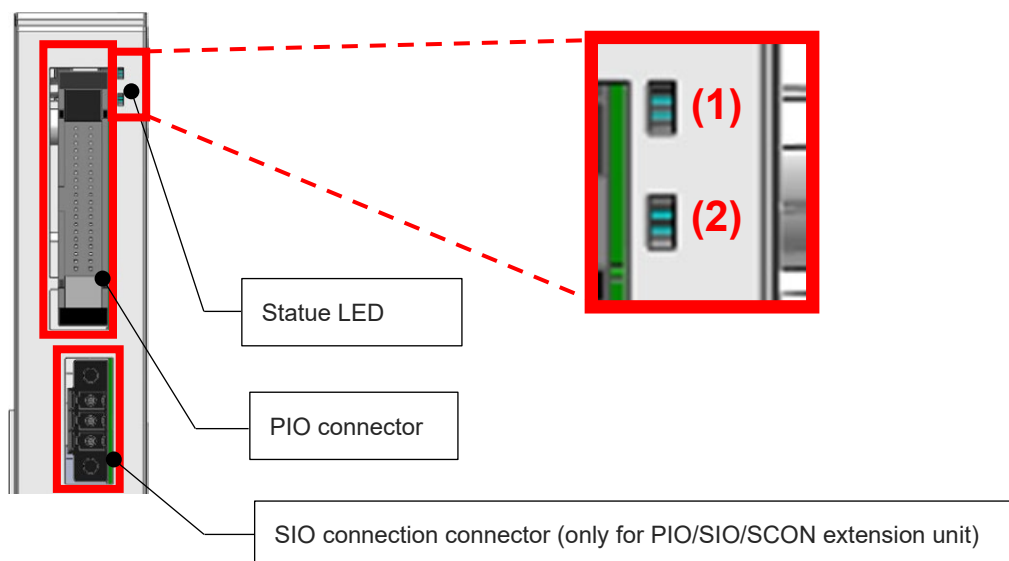
(8) PIO type



- 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	RS-485
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	○	○	x
Remote I/O	○	○	○	○	○	○	○	x	x	x
Serial Communication by SEL Program (RS-485)	x	x	x	x	x	x	x	x	x	○
XSEL Serial Communication Protocol (Format B) (RS-485)	x	x	x	x	x	x	x	x	x	○

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 1,024 points of input and 1,024 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. 1,000 to 3,999 and extension output ports from No. 4,000 to 6,999.
- 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 \Rightarrow 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. 1,000 of the extension input ports and No. 4,000 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	Assignment should be made from Port No. 0 in the order of the field network or PIO module → PIO/SIO/SCON extension unit / PIO unit.	
			1,000 to 3,999		
		Output port No.	300 to 599		Assignment should be made from Port No. 300 in the order of the field network or PIO module → PIO/SIO/SCON extension unit / PIO unit.
			4,000 to 6,999		
	Fixed Allocation	Input Port No.	0 to 299	Assignment should be made to these ports when the field network or PIO module and PIO/SIO/SCON extension unit / PIO unit are used.	
			1,000 to 3,999		Assignment should be made to these ports when the field network and PIO/SIO/SCON extension unit / PIO unit are used.
		Output port No.	300 to 599	Assignment should be made to these ports when the field network or PIO module and PIO/SIO/SCON extension unit / PIO unit are used.	
			4,000 to 6,999		Assignment should be made to these ports when the field network and PIO/SIO/SCON extension unit / PIO unit are used.
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), 1,000 to 1,727 (728 points)
	Output	300 to 595 (296 points), 4,000 to 4,727 (728 points)
PIO	Input	1,728 to 1,855 (128 points)
	Output	4,728 to 4,855 (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.

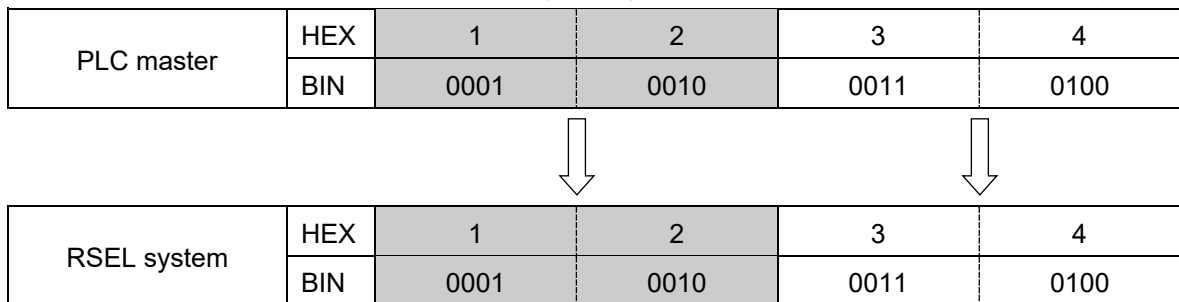
RSEL system	HEX	1	2	3	4
	BIN	0001	0010	0011	0100
		↓		↓	
PLC master	HEX	1	2	3	4
	BIN	0001	0010	0011	0100

[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]

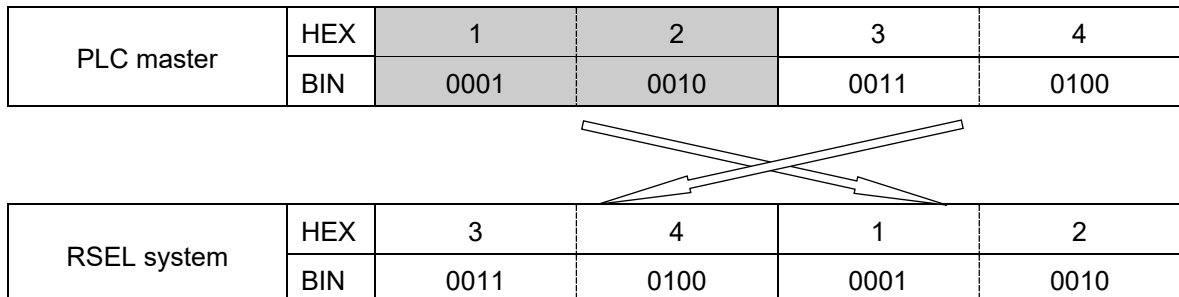
Shown below is an example of assignment to the PLC master side and RSEL system.

[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.



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 (RWr/RWw)	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 are 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)

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/RX) 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/RX) 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	RWw4	588 to 595	RWr4
1000 to 1007		4000 to 4007	
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/RX) and 64 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 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

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	1504 to 1519	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/R_Y) and remote resistor input and output domains (R_Wr/R_Ww) 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.

$$\begin{aligned} \text{Number of Remote Input Bit} &= \text{Number of Ports Used for Input (I/O Parameter No. 14)} \\ &\quad - \text{Number of Remote Resistor Input Words (I/O Parameter No. 184)} \times 16 \end{aligned}$$

- 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.

$$\begin{aligned} \text{Number of Remote Output Bit} &= \text{Number of Ports Used for Output (I/O Parameter No. 15)} \\ &\quad - \text{Number of Remote Resistor Output Words (I/O Parameter No. 185)} \times 16 \end{aligned}$$

- 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/R_Y)
- 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 (R_Xr/R_Ww).

[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

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

(2) Calculation for Number of Remote Output Bits

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/RX) size = 96.

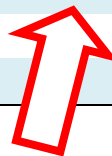
(4) Confirmation of Remote Resistor Input and Output Domain Size

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	Not available	RWr0
Not available	RWw1		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	1504 to 1519	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	Top CH+18	588 to 595	Top CH+18
1000 to 1007		4000 to 4007	
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 1,024 points and output 1,024 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 ⇒ 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)

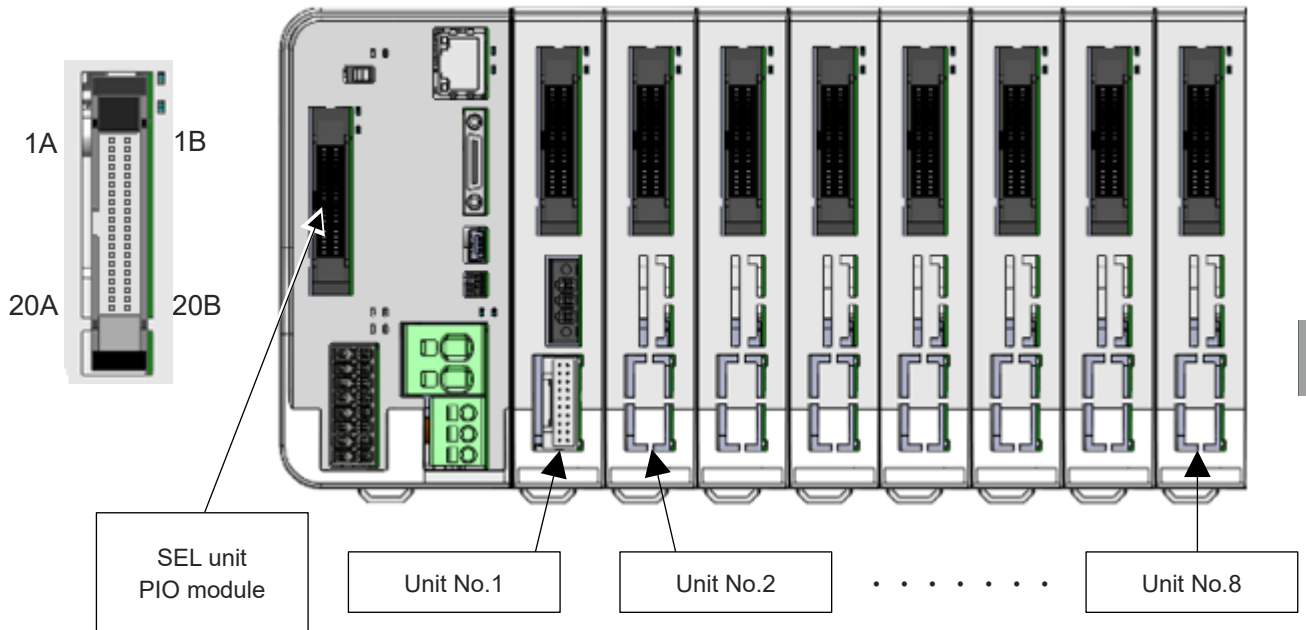
The relation between the RSEL I/O port numbers and the PLC addresses when it is automatic assignment, input 1,024 points and output 1,024 points is as shown below. The RSEL I/O port start numbers should be from No. 0 for input and from No. 300 for output, and the assignment on the PLC side should be 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	-	

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.

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. The general serial communication or the XSEL serial communication protocol (Format B) using the SEL languages below (*) are available.

The communication type requires settings established in the parameter (I/O Parameter No. 201 bit 12 to 15).

(It is set to the general serial communication on delivery)

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

* It is necessary to have the main application part V1.09 or later.

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 65,535

No.	Parameter Name	Input range	Unit	Remarks
226	I/O1 Fieldbus Node Address	0 to 99,999,999		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 65,535 • 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.

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 99,999,999		• 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) 1,000 + (Multiple of 8) (1,000 to 3,999) * 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) (4,000 to 6,999) * 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.

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 option unit	0 to 8	Units	The number of ports used for input and output should be number of connected units * 16 for each.
187	Option unit fix-allocated input port start No.	-1 to 3,999		0 + (Multiple of 8) (0 to 299) 1,000 + (Multiple of 8) (1,000 to 3,999) (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	Option unit fix-allocated output port start No.	-1 to 6,999		300 + (Multiple of 8) (300 to 599) 4,000 + (Multiple of 8) (4,000 to 6,999) (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 FFFFFFFH		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 (100 ms)

- 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)

6.3.3 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 1,024	Multiple of 8	
15	Number of Ports Used for I/O1 Fieldbus Remote Output	0	64	64	64	256	0	64	0	0 to 1,024	Multiple of 8	
16	I/O1fix-allocated input port start No.	-1	0	0	0	0	-1	0	-1	-1 to 3,999	0 + (Multiple of 8) (0 to 299) 1,000 + (Multiple of 8) (1,000 to 3,999) (Invalid if a negative value is set.) * 1,000 to 3,999 can be set only for Fieldbus 300 + (multiple of 8) (300 to 599) 400 + (multiple of 8) (4,000 to 6,999) (Invalid if a negative value is set.) * 4000 to 6999 can be set only for Fieldbus	
17	I/O1fix-allocated output port start No.	-1	300	300	300	300	-1	300	-1	-1 to 6,999	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.	
18	I/O1 error monitor	1	1	1	1	1	1	1	1	0 to 5	Input signal is recognized when the status is held for twice the period set by this parameter. * Valid only for PIO	
20	Input filtering periods	2	2	2	2	2	2	2	2	1 to 9	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)	
120	Network attribute 1	64 1001H	64 1001H	64 1001H	64 1001H	64 1001H	64 1001H	64 1001H	64 1001H	0H to FFFFFFFH	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)	
121	Network attribute 2	C8 0000H	C8 0000H	C8 0000H	C8 0000H	C8 0000H	C8 0000H	C8 0000H	C8 0000H	0H to FFFFFFFH	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 FFFFFFFH	Only lower two bytes are valid.	
131	I/O Fieldbus Own MAC address (L)	0H	0H	0H	0H	0H	0H	0H	0H	0H to FFFFFFFH		
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	

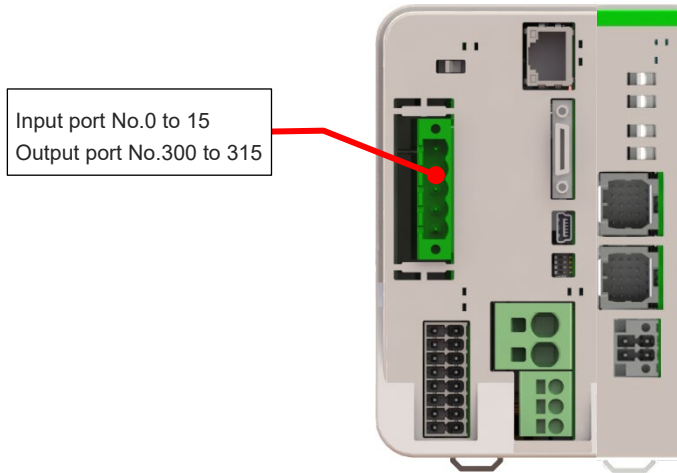
NP/PN: PIO module, CC: CC-Link, CIE: CC-Link IE Field, DV: DeviceNet, EC: EtherCAT, EP: EtherNet/IP, PRT:PROFINET IO, PR: PROFIBUS-DP

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 FFFFFFFH		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
226	I/O1 Fieldbus Node Address	0	1	1	0	0	0	1	0	0 to 99,999,999		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 65,535 At CC-Link IE: 1 to 120 * Setting establishment not necessary for EtherNet/IP and PROFINET IO
227	I/O1 Fieldbus communication speed	0	4	0	2	0	0	0	0	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)) * Setting establishment not necessary for PROFIBUS-DP, EtherCAT, PROFINET IO and CC-Link IE Field
228	I/O1 Fieldbus Network Number	0	0	1	0	0	0	0	0	0 to 99,999,999		<ul style="list-style-type: none"> For CC-Link IE Field: 1 to 239 * Not necessary to set for those other than CC-Link IE Field

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.



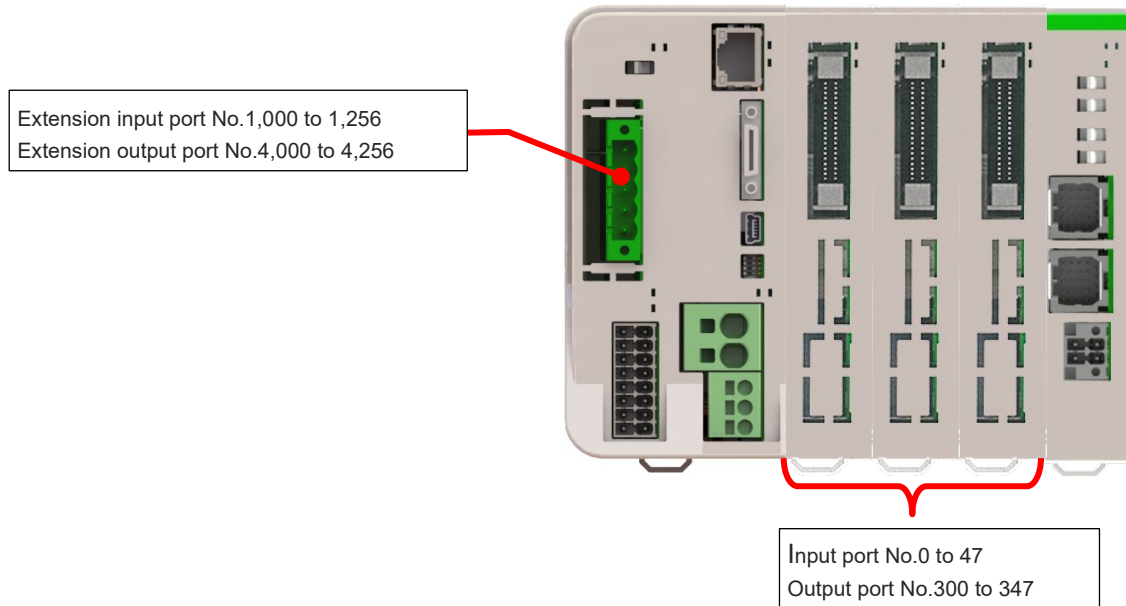
No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	0	0		0: Fixed assignment 1: Automatic assignment
14	Number of Ports Used for I/O1 Fieldbus Remote Input	64	16		Multiple of 8
15	Number of Ports Used for I/O1 Fieldbus Remote Output	64	16		Multiple of 8
16	I/O1 fix-allocated input port start No.	0	0		0 + (Multiple of 8) (0 to 299) 1,000 + (Multiple of 8) (1,000 to 3,999) (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) 4,000 + (multiple of 8) (4,000 to 6,999) (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 (10 ms) 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 (100 ms)
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

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	1,000		0 + (Multiple of 8) (0 to 299) 1,000 + (Multiple of 8) (1,000 to 3,999) (Invalid if a negative value is set.)
17	I/O1 fix-allocated output port start No.	300	4,000		300 + (multiple of 8) (300 to 599) 4,000 + (multiple of 8) (4,000 to 6,999) (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	ms	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 (10 ms) 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 (100 ms)
186	Number of Connected option unit	0	3	Units	The number of ports used for input and output should be number of connected units × 16 for each.
187	Option unit fix-allocated input port start No.	-1	0		0 + (Multiple of 8) (0 to 299) 1,000 + (Multiple of 8) (1,000 to 3,999) (Invalid if a negative value is set)

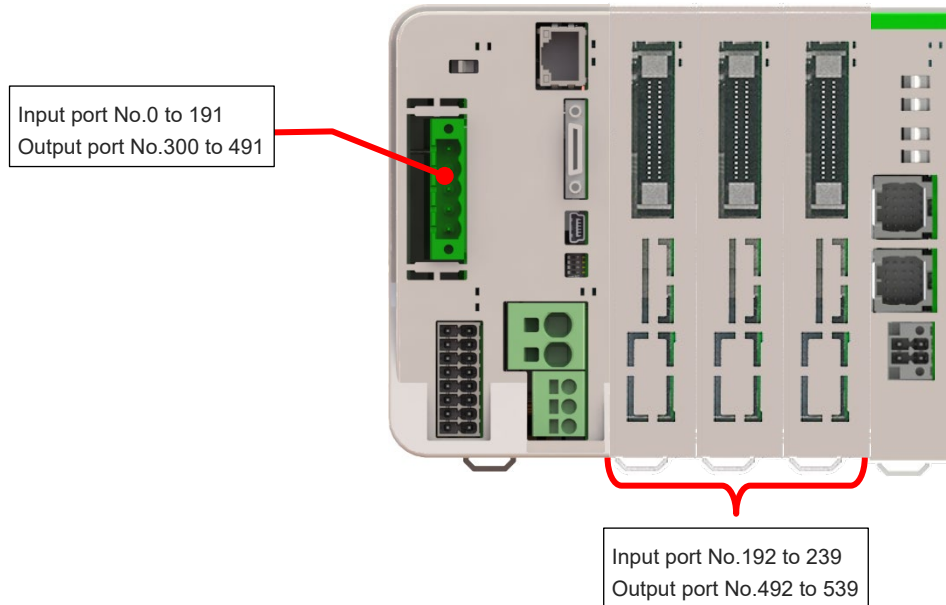
6.3 Parameter Configuration

No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
188	Option unit fix-allocated output port start No.	-1	300		300 + (Multiple of 8) (300 to 599) 4,000 + (Multiple of 8) (4,000 to 6,999) (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 (10 ms) Bits 16 to 19: For future extension use Bits 20 to 31: Link timeout value in TF communication initialization (100 ms)
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.



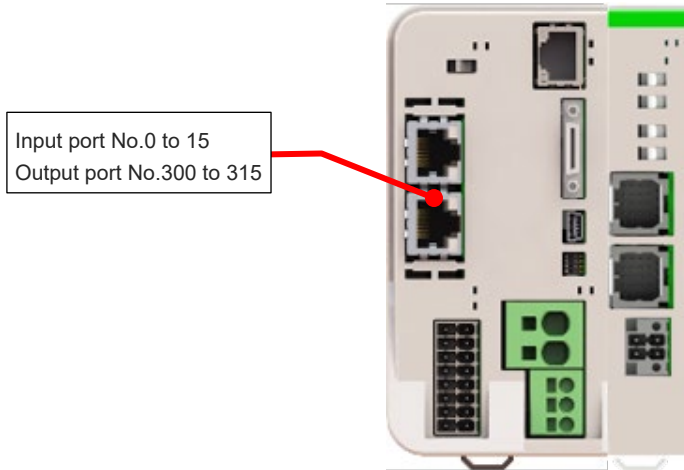
No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	0	1		0: Fixed assignment 1: Automatic assignment * Priority of I/O port assignment at automatic assignment (I/O1→PIO unit • PIO/SIO unit)
14	Number of Ports Used for I/O1 Fieldbus Remote Input	64	192		Multiple of 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) 1,000 + (Multiple of 8) (1,000 to 3,999) (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) 4,000 + (multiple of 8) (4,000 to 6,999) (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	ms	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 (10 ms) 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 (100 ms)
186	Number of Connected option unit	0	3	Units	The number of ports used for input and output should be number of connected units x 16 for each.
187	Option unit fix-allocated input port start No.	-1	-1		0 + (Multiple of 8) (0 to 299) 1,000 + (Multiple of 8) (1,000 to 3,999) (Invalid if a negative value is set)

6.3 Parameter Configuration

No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
188	Option unit fix-allocated output port start No.	-1	-1		300 + (Multiple of 8) (300 to 599) 4,000 + (Multiple of 8) (4,000 to 6,999) (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 (10 ms) Bits 16 to 19: For future extension use Bits 20 to 31: Link timeout value in TF communication initialization (100 ms)
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) 1,000 + (Multiple of 8) (1,000 to 3,999) (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) 4,000 + (multiple of 8) (4,000 to 6,999) (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	ms	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 (10 ms) 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 (100 ms)
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

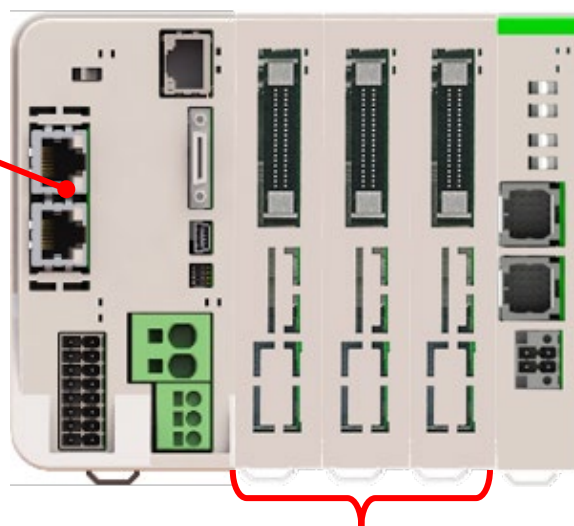
CC-Link IE Field + PIO

● 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.

Extension input port No.1,000 to 1,256
Extension output port No.4,000 to 4,256



Input port No.0 to 47
Output port No.300 to 347

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	1,000		0 + (Multiple of 8) (0 to 299) 1,000 + (Multiple of 8) (1,000 to 3,999) (Invalid if a negative value is set.)
17	I/O1 fix-allocated output port start No.	300	4,000		300 + (multiple of 8) (300 to 599) 4,000 + (multiple of 8) (4,000 to 6,999) (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	ms	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 (10 ms) 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 (100 ms)
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		

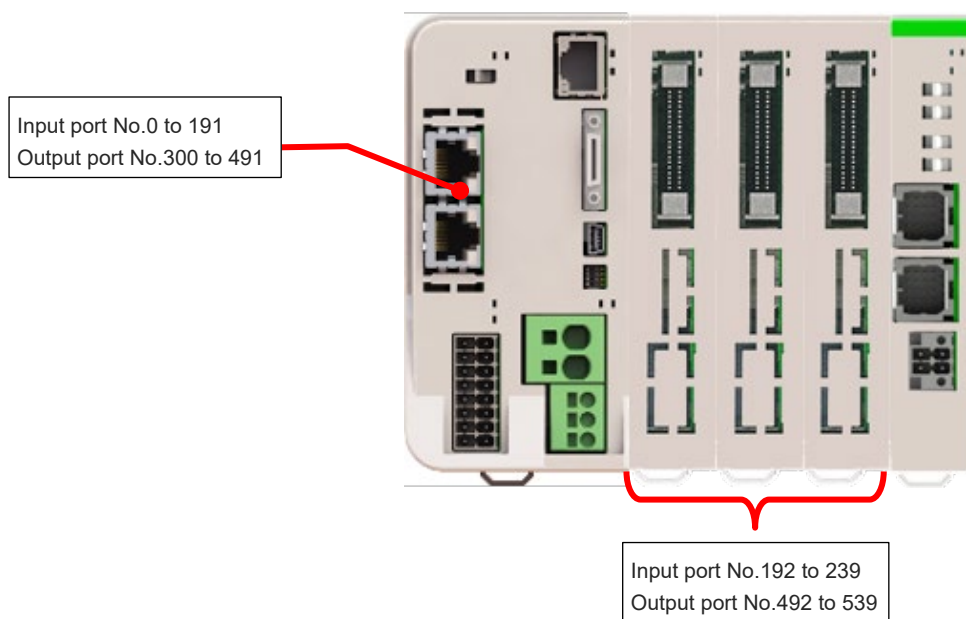
6.3 Parameter Configuration

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 option unit	0	3	unit	The number of ports used for input and output should be number of connected units × 16 for each.
187	Option unit fix-allocated input port start No.	-1	0		0 + (Multiple of 8) (0 to 299) 1,000 + (Multiple of 8) (1,000 to 3,999) (Invalid if a negative value is set)
188	Option unit fix-allocated output port start No.	-1	300		300 + (Multiple of 8) (300 to 599) 4,000 + (Multiple of 8) (4,000 to 6,999) (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 (10 ms) Bits 16 to 19: For future extension use Bits 20 to 31: Link timeout value in TF communication initialization (100 ms)
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.



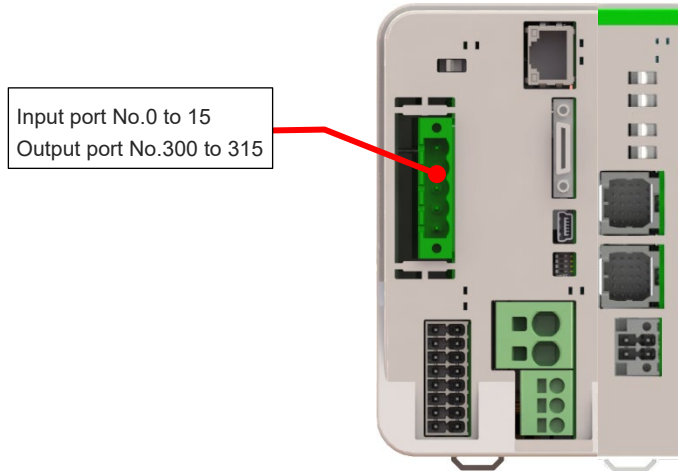
No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	0	1		0: Fixed assignment 1: Automatic assignment * Priority of I/O port assignment at automatic assignment (I/O1→PIO unit • PIO/SIO unit)
14	Number of Ports Used for I/O1 Fieldbus Remote Input	64	192		Multiple of 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) 1,000 + (Multiple of 8) (1,000 to 3,999) (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) 4,000 + (multiple of 8) (4,000 to 6,999) (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	ms	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 (10 ms) 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 (100 ms)
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 option unit	0	3	unit	The number of ports used for input and output should be number of connected units × 16 for each.
187	Option unit fix-allocated input port start No.	-1	-1		0 + (Multiple of 8) (0 to 299) 1,000 + (Multiple of 8) (1,000 to 3,999) (Invalid if a negative value is set)
188	Option unit fix-allocated output port start No.	-1	-1		300 + (Multiple of 8) (300 to 599) 4,000 + (Multiple of 8) (4,000 to 6,999) (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 (10 ms) Bits 16 to 19: For future extension use Bits 20 to 31: Link timeout value in TF communication initialization (100 ms)
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 ~).



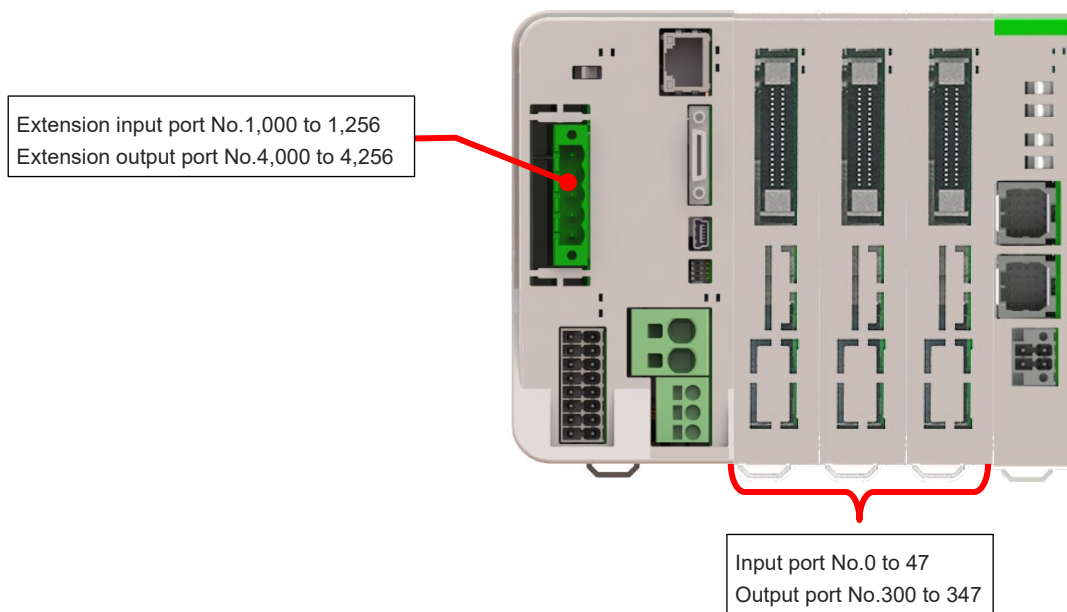
No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	0	0		0: Fixed assignment 1: Automatic assignment
14	Number of Ports Used for I/O1 Fieldbus Remote Input	64	16		Multiple of 8
15	Number of Ports Used for I/O1 Fieldbus Remote Output	64	16		Multiple of 8
16	I/O1 fix-allocated input port start No.	0	0		0 + (Multiple of 8) (0 to 299) 1,000 + (Multiple of 8) (1,000 to 3,999) (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) 4,000 + (multiple of 8) (4,000 to 6,999) (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 (10 ms) 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

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.



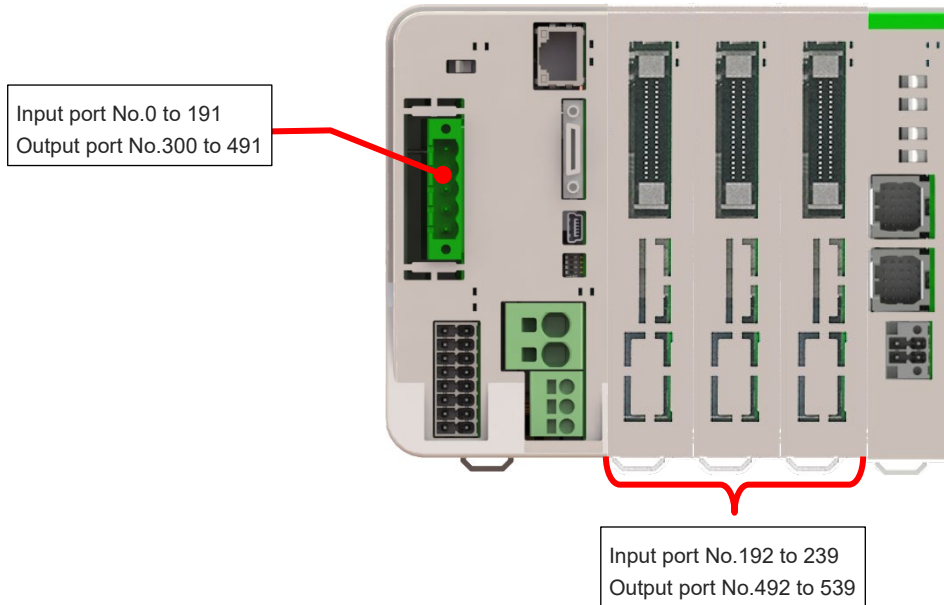
No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	0	0		0: Fixed assignment 1: Automatic assignment
14	Number of Ports Used for I/O1 Fieldbus Remote Input	64	256		Multiple of 8
15	Number of Ports Used for I/O1 Fieldbus Remote Output	64	256		Multiple of 8
16	I/O1 fix-allocated input port start No.	0	0		0 + (Multiple of 8) (0 to 299) 1,000 + (Multiple of 8) (1,000 to 3,999) (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) 4,000 + (multiple of 8) (4,000 to 6,999) (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	ms	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 (100 ms)
186	Number of Connected option unit	0	3	Units	The number of ports used for input and output should be number of connected units × 16 for each.
187	Option unit fix-allocated input port start No.	-1	0		0 + (Multiple of 8) (0 to 299) 1,000 + (Multiple of 8) (1,000 to 3,999) (Invalid if a negative value is set)

No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
188	Option unit fix-allocated output port start No.	-1	300		300 + (Multiple of 8) (300 to 599) 4,000 + (Multiple of 8) (4,000 to 6,999) (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 (10 ms) Bits 16 to 19: For future extension use Bits 20 to 31: Link timeout value in TF communication initialization (100 ms)
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

● 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.

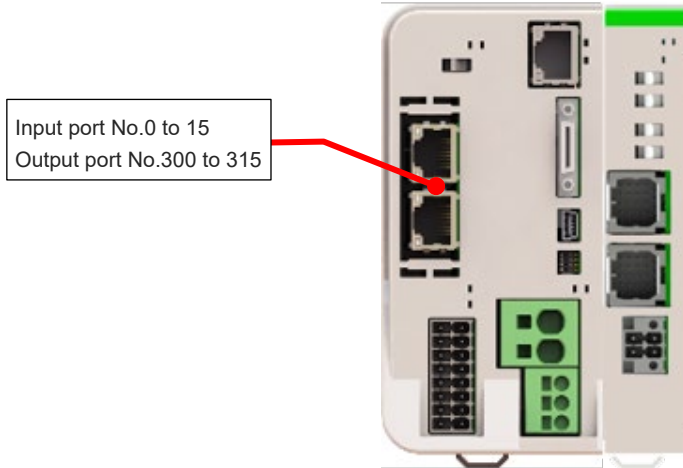


No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	0	1		0: Fixed assignment 1: Automatic assignment * Priority of I/O port assignment at automatic assignment (I/O1→PIO unit • PIO/SIO unit)
14	Number of Ports Used for I/O1 Fieldbus Remote Input	64	192		Multiple of 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) 1,000 + (Multiple of 8) (1,000 to 3,999) (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) 4,000 + (multiple of 8) (4,000 to 6,999) (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	ms	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 option unit	0	3	Units	The number of ports used for input and output should be number of connected units × 16 for each.
187	Option unit fix-allocated input port start No.	-1	-1		0 + (Multiple of 8) (0 to 299) 1,000 + (Multiple of 8) (1,000 to 3,999) (Invalid if a negative value is set)

No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
188	Option unit fix-allocated output port start No.	-1	-1		300 + (Multiple of 8) (300 to 599) 4,000 + (Multiple of 8) (4,000 to 6,999) (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 (10 ms) Bits 16 to 19: For future extension use Bits 20 to 31: Link timeout value in TF communication initialization (100 ms)
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

[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 ~).



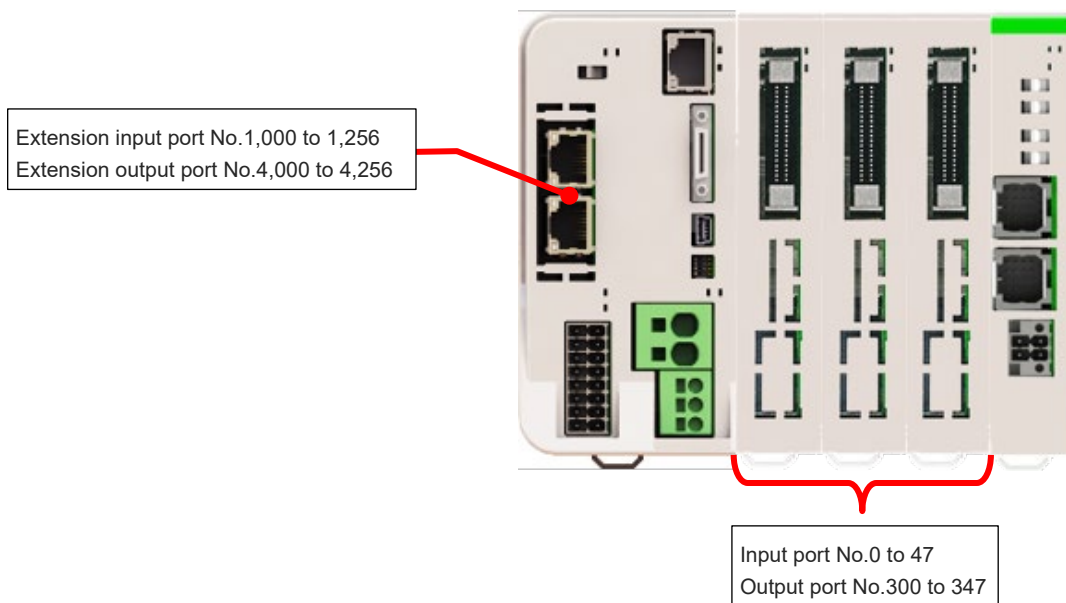
No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	0	0		0: Fixed assignment 1: Automatic assignment
14	Number of Ports Used for I/O1 Fieldbus Remote Input	256	16		Multiple of 8
15	Number of Ports Used for I/O1 Fieldbus Remote Output	256	16		Multiple of 8
16	I/O1 fix-allocated input port start No.	0	0		0 + (Multiple of 8) (0 to 299) 1,000 + (Multiple of 8) (1,000 to 3,999) (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) 4,000 + (multiple of 8) (4,000 to 6,999) (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 (100 ms) 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 65,535

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. 1,000 ~, No. 4,000 ~), 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	1,000		0 + (Multiple of 8) (0 to 299) 1,000 + (Multiple of 8) (1,000 to 3,999) (Invalid if a negative value is set.)
17	I/O1 fix-allocated output port start No.	300	4,000		300 + (multiple of 8) (300 to 599) 4,000 + (multiple of 8) (4,000 to 6,999) (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	ms	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 option unit	0	3	Units	The number of ports used for input and output should be number of connected units x 16 for each.
187	Option unit fix-allocated input port start No.	-1	0		0 + (Multiple of 8) (0 to 299) 1,000 + (Multiple of 8) (1,000 to 3,999) (Invalid if a negative value is set)

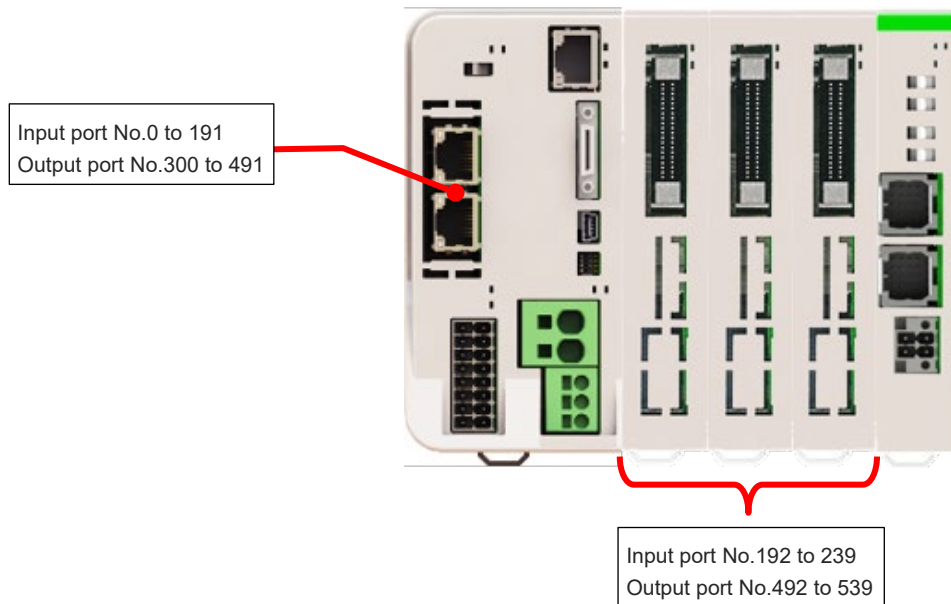
6.3 Parameter Configuration

No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
188	Option unit fix-allocated output port start No.	-1	300		300 + (Multiple of 8) (300 to 599) 4,000 + (Multiple of 8) (4,000 to 6,999) (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 (10 ms) Bits 20 to 31: Link timeout value in TF communication initialization (100 ms)
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 65,535

- 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.



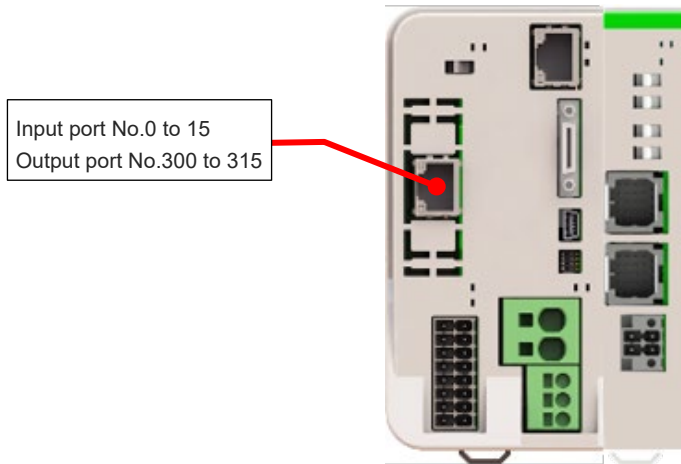
No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	0	1		0: Fixed assignment 1: Automatic assignment * Priority of I/O port assignment at automatic assignment (I/O1→PIO unit • PIO/SIO unit)
14	Number of Ports Used for I/O1 Fieldbus Remote Input	256	192		Multiple of 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) 1,000 + (Multiple of 8) (1,000 to 3,999) (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) 4,000 + (multiple of 8) (4,000 to 6,999) (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	ms	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 (10 ms) 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 option unit	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	Option 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	Option unit 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)
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 (10 ms) Bits 20 to 31: Link timeout value in TF communication initialization (100 ms)
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 65,535

[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) 1,000 + (Multiple of 8) (1,000 to 3,999) (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) 4,000 + (multiple of 8) (4,000 to 6,999) (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 (10 ms) 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 (100 ms)
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

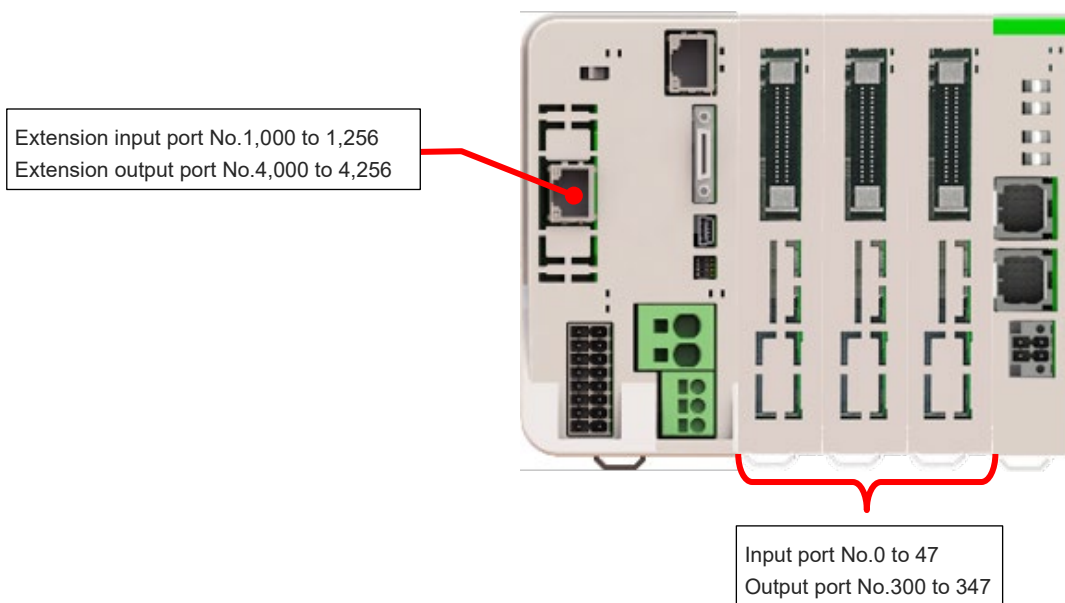
No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
140	I/O Fieldbus Default gateway (H)	0	Optional		
141	I/O Fieldbus Default gateway (MH)	0	Optional		
142	I/O Fieldbus Default gateway (ML)	0	Optional		
143	I/O Fieldbus Default gateway (L)	0	Optional		
225	I/O controller	7H	7H		Bits 0-7: Type 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. 1,000 ~, No. 4,000 ~), 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	1,000		0 + (Multiple of 8) (0 to 299) 1,000 + (Multiple of 8) (1,000 to 3,999) (Invalid if a negative value is set.)
17	I/O1 fix-allocated output port start No.	-1	4,000		300 + (multiple of 8) (300 to 599) 4,000 + (multiple of 8) (4,000 to 6,999) (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	ms	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 (10 ms) 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 (100 ms)
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		

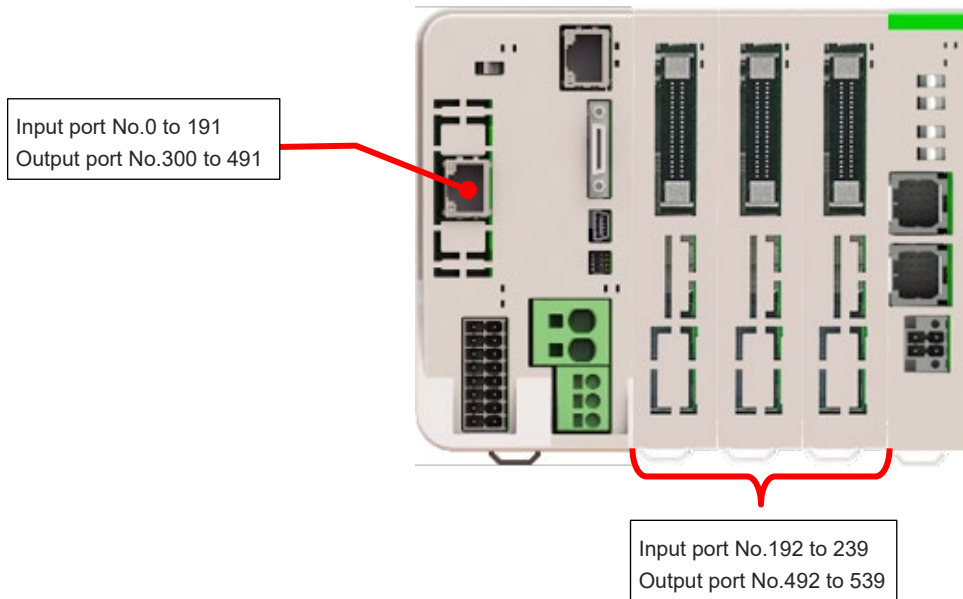
6.3 Parameter Configuration

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 option unit	0	3	unit	The number of ports used for input and output should be number of connected units × 16 for each.
187	Option unit fix-allocated input port start No.	-1	0		0 + (Multiple of 8) (0 to 299) 1,000 + (Multiple of 8) (1,000 to 3,999) (Invalid if a negative value is set)
188	Option unit fix-allocated output port start No.	-1	300		300 + (Multiple of 8) (300 to 599) 4,000 + (Multiple of 8) (4,000 to 6,999) (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 (10 ms) Bits 20 to 31: Link timeout value in TF communication initialization (100 ms)
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.



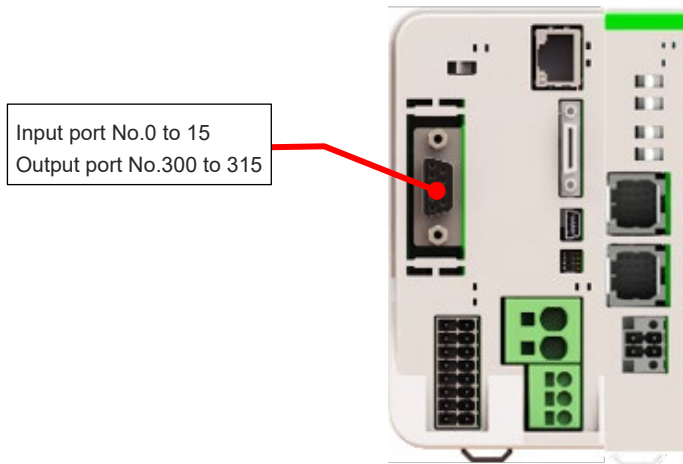
No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	1	1		0: Fixed assignment 1: Automatic assignment * Priority of I/O port assignment at automatic assignment (I/O1→PIO unit • PIO/SIO unit)
14	Number of Ports Used for I/O1 Fieldbus Remote Input	0	192		Multiple of 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) 1,000 + (Multiple of 8) (1,000 to 3,999) (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) 4,000 + (multiple of 8) (4,000 to 6,999) (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	ms	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 (10 ms) 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 (100 ms)
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 option unit	0	3	Units	The number of ports used for input and output should be number of connected units × 16 for each.
187	Option unit fix-allocated input port start No.	-1	-1		0 + (Multiple of 8) (0 to 299) 1,000 + (Multiple of 8) (1,000 to 3,999) (Invalid if a negative value is set)
188	Option unit fix-allocated output port start No.	-1	-1		300 + (Multiple of 8) (300 to 599) 4,000 + (Multiple of 8) (4,000 to 6,999) (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 (10 ms) Bits 20 to 31: Link timeout value in TF communication initialization (100 ms)
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 ~).



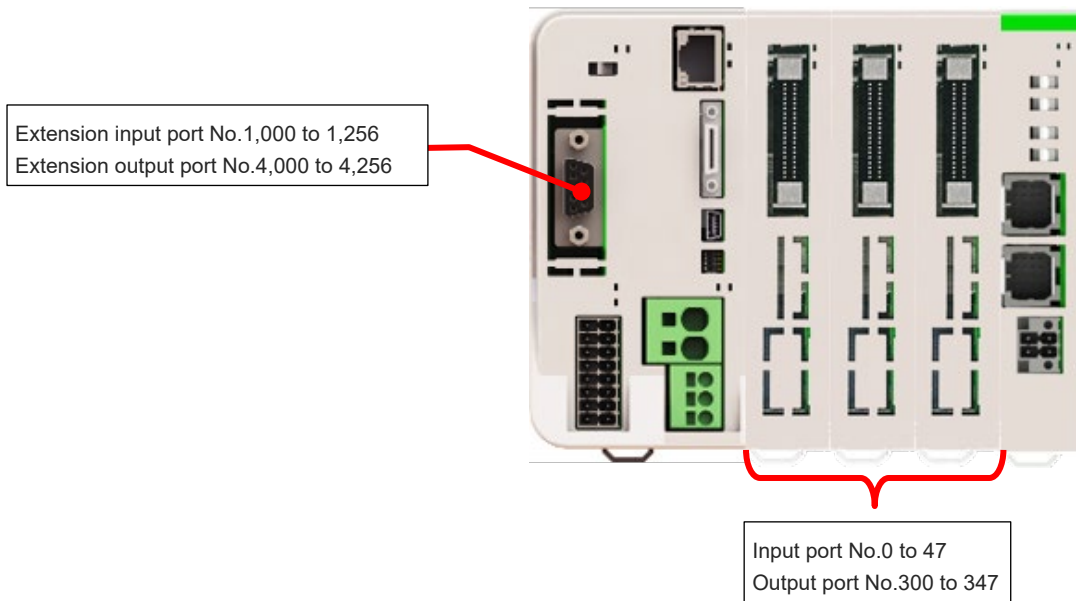
No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	0	0		0: Fixed assignment 1: Automatic assignment
14	Number of Ports Used for I/O1 Fieldbus Remote Input	64	16		Multiple of 8
15	Number of Ports Used for I/O1 Fieldbus Remote Output	64	16		Multiple of 8
16	I/O1 fix-allocated input port start No.	0	0		0 + (Multiple of 8) (0 to 299) 1,000 + (Multiple of 8) (1,000 to 3,999) (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) 4,000 + (multiple of 8) (4,000 to 6,999) (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 (10 ms) 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 (100 ms)
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

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. 1,000 ~, No. 4,000 ~), 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.



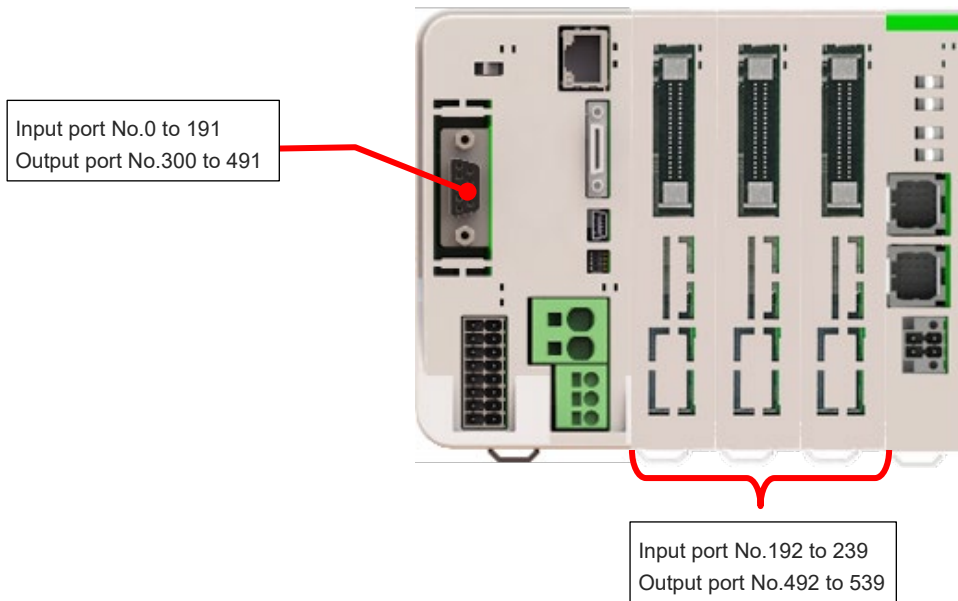
No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	0	0		0: Fixed assignment 1: Automatic assignment
14	Number of Ports Used for I/O1 Fieldbus Remote Input	64	256		Multiple of 8
15	Number of Ports Used for I/O1 Fieldbus Remote Output	64	256		Multiple of 8
16	I/O1 fix-allocated input port start No.	0	1,000		0 + (Multiple of 8) (0 to 299) 1,000 + (Multiple of 8) (1,000 to 3,999) (Invalid if a negative value is set.)
17	I/O1 fix-allocated output port start No.	300	4,000		300 + (multiple of 8) (300 to 599) 4,000 + (multiple of 8) (4,000 to 6,999) (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 (10 ms) 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 (100 ms)
186	Number of Connected option unit	0	3	unit	The number of ports used for input and output should be number of connected units * 16 for each.
187	Option unit fix-allocated input port start No.	-1	0		0 + (Multiple of 8) (0 to 299) 1,000 + (Multiple of 8) (1,000 to 3,999) (Invalid if a negative value is set)
188	Option unit fix-allocated output port start No.	-1	300		300 + (Multiple of 8) (300 to 599) 4,000 + (Multiple of 8) (4,000 to 6,999) (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

● 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.

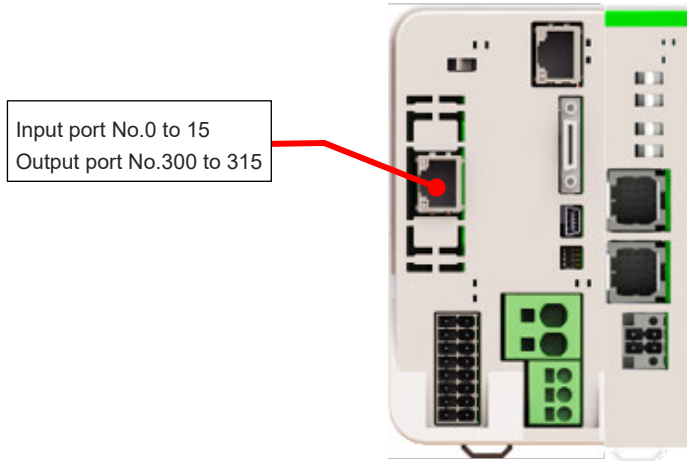


No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	0	1		0: Fixed assignment 1: Automatic assignment * Priority of I/O port assignment at automatic assignment (I/O1→PIO unit • PIO/SIO unit)
14	Number of Ports Used for I/O1 Fieldbus Remote Input	64	192		Multiple of 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) 1,000 + (Multiple of 8) (1,000 to 3,999) (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) 4,000 + (multiple of 8) (4,000 to 6,999) (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	ms	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 (10 ms) 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 (100 ms)
186	Number of Connected option unit	0	3	Units	The number of ports used for input and output should be number of connected units × 16 for each.
187	Option unit fix-allocated input port start No.	-1	-1		0 + (Multiple of 8) (0 to 299) 1,000 + (Multiple of 8) (1,000 to 3,999) (Invalid if a negative value is set)

No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
188	Option unit fix-allocated output port start No.	-1	-1		300 + (Multiple of 8) (300 to 599) 4,000 + (Multiple of 8) (4,000 to 6,999) (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 (10 ms) Bits 20 to 31: Link timeout value in TF communication initialization (100 ms)
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

[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 ~).



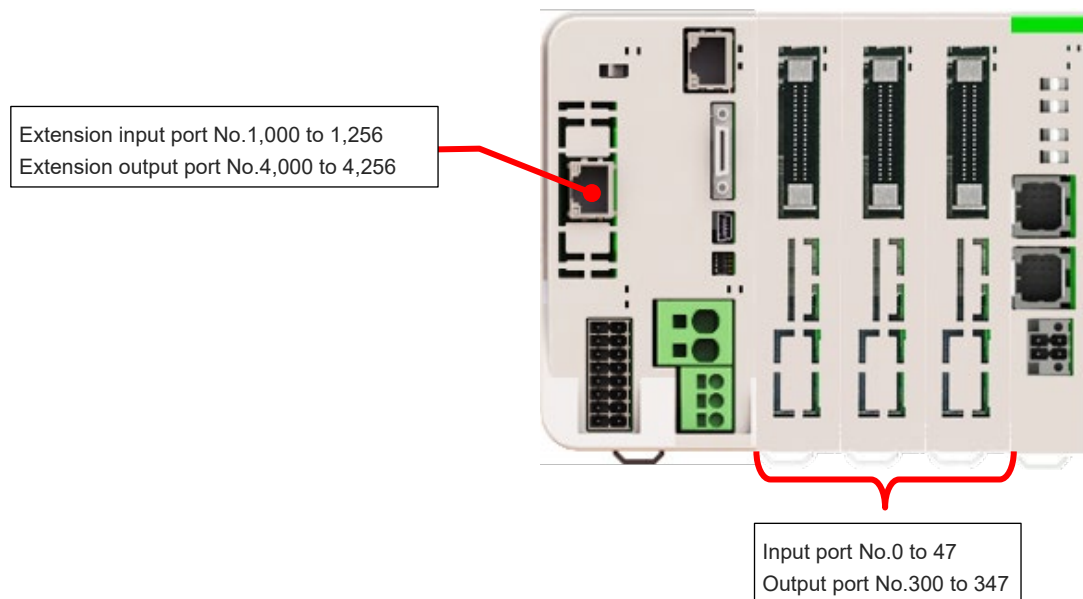
No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	1	1		0: Fixed assignment 1: Automatic assignment
14	Number of Ports Used for I/O1 Fieldbus Remote Input	0	16		Multiple of 8
15	Number of Ports Used for I/O1 Fieldbus Remote Output	0	16		Multiple of 8
16	I/O1 fix-allocated input port start No.	-1	-1		0 + (Multiple of 8) (0 to 299) 1,000 + (Multiple of 8) (1,000 to 3,999) (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) 4,000 + (multiple of 8) (4,000 to 6,999) (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 (10 ms) 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 (100 ms)
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. 1,000 ~, No. 4,000 ~), 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	1,000		0 + (Multiple of 8) (0 to 299) 1,000 + (Multiple of 8) (1,000 to 3,999) (Invalid if a negative value is set.)
17	I/O1 fix-allocated output port start No.	-1	4,000		300 + (multiple of 8) (300 to 599) 4,000 + (multiple of 8) (4,000 to 6,999) (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	ms	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 (10 ms) 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 (100 ms)
130	I/O Fieldbus Own MAC address (H)	0H	MAC address display		Only lower two bytes are valid.

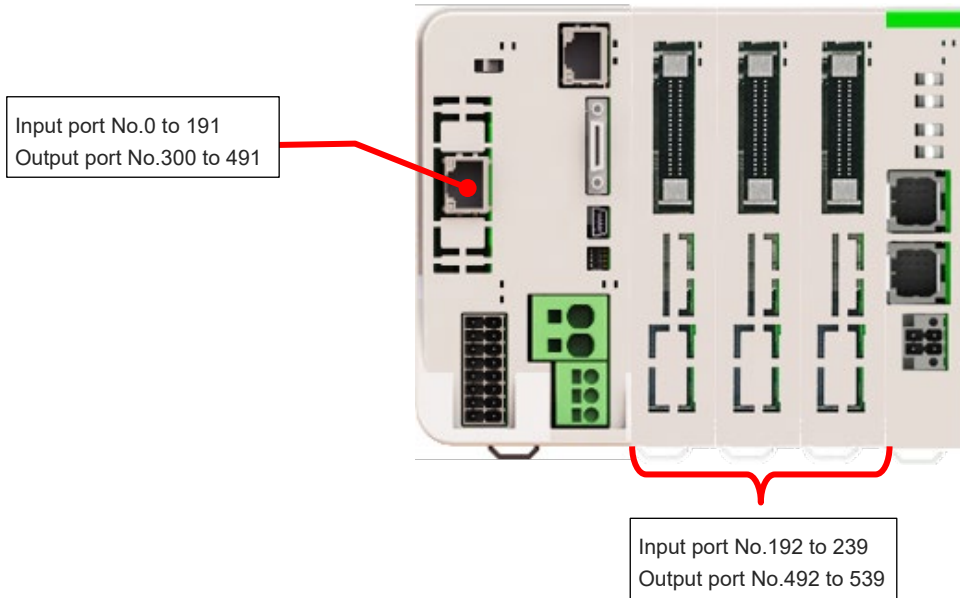
6.3 Parameter Configuration

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 option unit	0	3	Units	The number of ports used for input and output should be number of connected units × 16 for each.
187	Option unit fix-allocated input port start No.	-1	0		0 + (Multiple of 8) (0 to 299) 1,000 + (Multiple of 8) (1,000 to 3,999) (Invalid if a negative value is set)
188	Option unit fix-allocated output port start No.	-1	300		300 + (Multiple of 8) (300 to 599) 4,000 + (Multiple of 8) (4,000 to 6,999) (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 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 (10 ms) Bits 20 to 31: Link timeout value in TF communication initialization (100 ms)
190	Option Unit Attribute 1	C800200H	Optional		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	AH	AH		

● 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) 1,000 + (Multiple of 8) (1,000 to 3,999) (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) 4,000 + (multiple of 8) (4,000 to 6,999) (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	ms	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 (10 ms) 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 (100 ms)
130	I/O Fieldbus Own MAC address (H)	0H	MAC address display		Only lower two bytes are valid.

6.3 Parameter Configuration

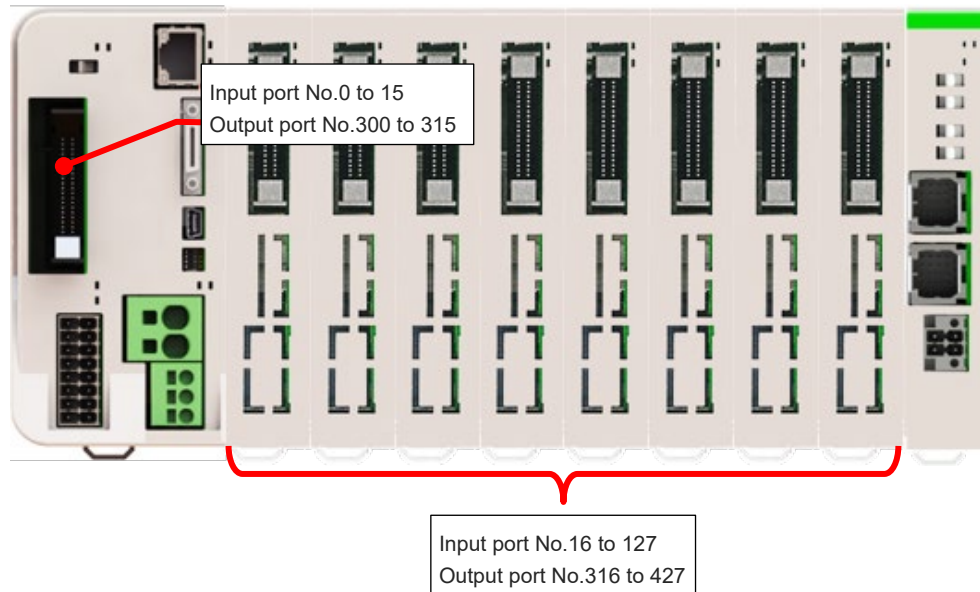
No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
131	I/O Fieldbus Own MAC address (L)	0H	MAC address display		
186	Number of Connected option unit	0	3	Units	The number of ports used for input and output should be number of connected units × 16 for each.
187	Option unit fix-allocated input port start No.	-1	-1		0 + (Multiple of 8) (0 to 299) 1,000 + (Multiple of 8) (1,000 to 3,999) (Invalid if a negative value is set)
188	Option unit fix-allocated output port start No.	-1	-1		300 + (Multiple of 8) (300 to 599) 4,000 + (Multiple of 8) (4,000 to 6,999) (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 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 (10 ms) Bits 20 to 31: Link timeout value in TF communication initialization (100 ms)
190	Option Unit Attribute 1	C800200H	Optional		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	AH	AH		

[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.



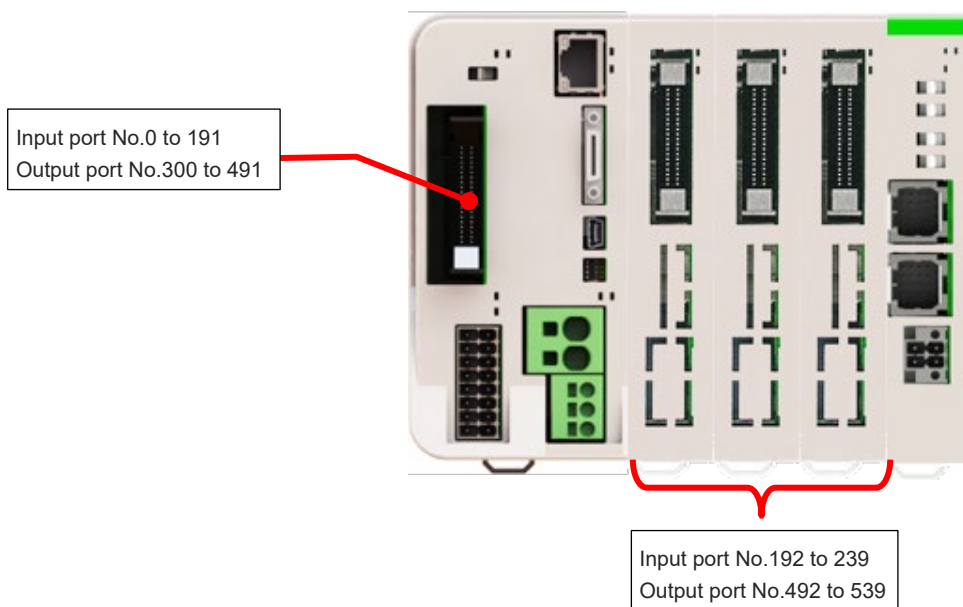
No.	Parameter Name	Setting at Delivery	Set Value	Unit	Remarks
1	I/O port assignment type	1	1		0: Fixed assignment 1: Automatic assignment * Priority of I/O port assignment at automatic assignment (I/O1→PIO unit • PIO/SIO unit)
16	I/O1 fix-allocated input port start No.	-1	-1		0 + (Multiple of 8) (0 to 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	ms	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 option unit	0	8	Units	The number of ports used for input and output should be number of connected units * 16 for each.
187	Option unit fix-allocated input port start No.	-1	-1		0 + (Multiple of 8) (0 to 299) 1,000 + (Multiple of 8) (1,000 to 3,999) (Invalid if a negative value is set)
188	Option unit fix-allocated output port start No.	-1	-1		300 + (Multiple of 8) (300 to 599) 4,000 + (Multiple of 8) (4,000 to 6,999) (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		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 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 (10 ms) Bits 20 to 31: Link timeout value in TF communication initialization (100 ms)
190	Option Unit Attribute 1	C800200H	Optional		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	9H	9H		

● 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.)
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	ms	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 option unit	0	3	unit	The number of ports used for input and output should be number of connected units × 16 for each.
187	Option unit fix-allocated input port start No.	-1	48		0 + (Multiple of 8) (0 to 299) 1,000 + (Multiple of 8) (1,000 to 3,999) (Invalid if a negative value is set)
188	Option unit fix-allocated output port start No.	-1	348		300 + (Multiple of 8) (300 to 599) 4,000 + (Multiple of 8) (4,000 to 6,999) (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

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 (10 ms) Bits 20 to 31: Link timeout value in TF communication initialization (100 ms)
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/>

6.4.2 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)
			1					Unit = Word
			0					Unit = Byte
			1					Consistency over the whole configured data block (Module)
			0					Consistency over one Unit (Byte/ Word)

- Special Identification Format

Special (extended) ID format								
Structure for one special configuration ID								
Special Configuration ID	Previous ID	ID Header	Length OUTP.	Length INPUT	Vendor spec. Data	next ID		
	x x 0 0 x x x x		only if outputs	only if inputs	(optional)			
Decoding table for special format								
Byte (octet) 1:	7	6	5	4	3	2	1 0	Bit
Configuration ID header			0	0				Special ID format (use decoding table for special format)
								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
			0	0				Empty module, module has no input or output configuration
			0	1				One length byte for Inputs follows
			1	0				One length byte for Outputs follows
			1	1				One length byte for <u>each</u> Outputs and Inputs follows
following Byte(s)	7	6	5	4	3	2	1 0	Bit
one length byte for outputs followed by the length byte for inputs, if both are defined.								Number of configured data (inputs/outputs):
								00 _{dec} (0 _{hex}) = 1 Unit (Byte/Word)
								63 _{dec} (3F _{hex}) = 64 Unit (Byte/Word)
			1					Unit = Word
			0					Unit = Byte
			1					Consistency over the whole configured data block (Module)
			0					Consistency over one Unit (Byte/ Word)
following Byte(s)	7	6	5	4	3	2	1 0	Bit
Vendor spec. data								Vendor specific config ID, defined by the device vendor
								00 - 255 _{DEC} (00 - FF _{HEX})

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. 2,222 (UDP Port) and 44,828 (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”.

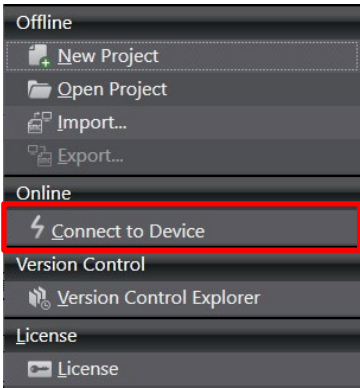


URL : <https://www.intelligentactuator.com/field-network-configuration-files-2/>

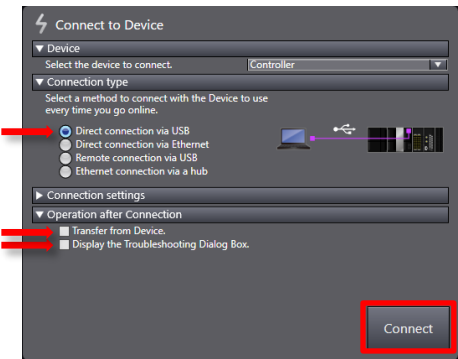
6.5.2 Sysmac studio startup and PLC communication connectivity

1 Double-click "Sysmac Studio" icon to launch the software.

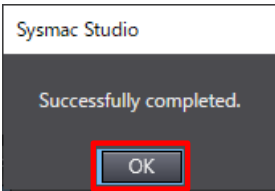
2 Click "Connect to Device".



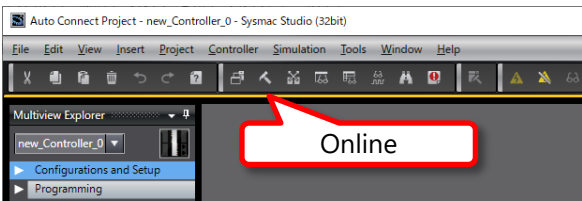
3 Connect to Device window shows up. Select "Direct connection via USB" in "Connection type". Also, remove the checkmarks on "Transfer from Device." and "Display the Troubleshooting Dialog Box." in "Operation after Connection". Click .



4 "Complete" dialog appears. Click .

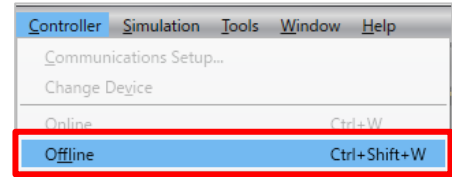


5 "Auto Connect Project" window should get displayed online. Once it gets online, a yellow frame should appear at the top in "Edit Window".

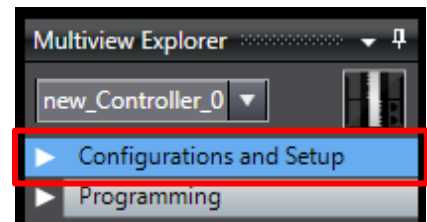


6.5.3 Installing setting file for network (ESI file)

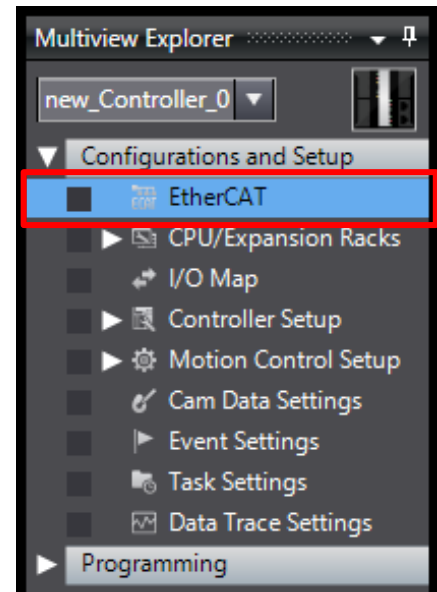
1 From the menu bar in “Auto Connect Project” window, click **Controller** → **Offline** to set the status offline.



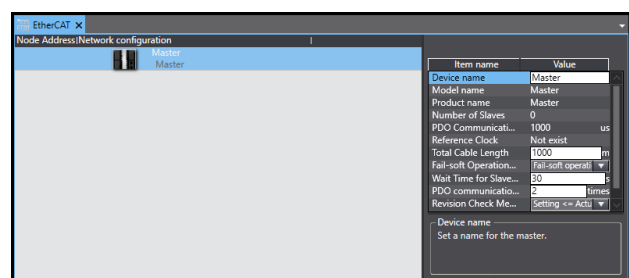
2 In “Auto Connect Project” window, click **Configurations and Setup** from “Multiview Explorer”.



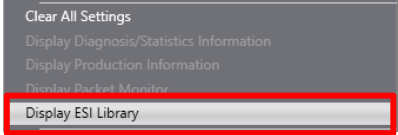
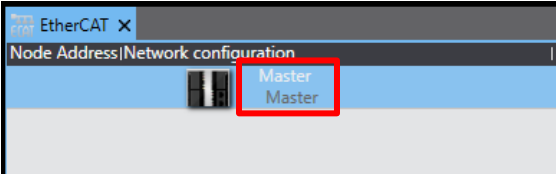
3 Double-click **EtherCAT** in **Configurations and Setup**.



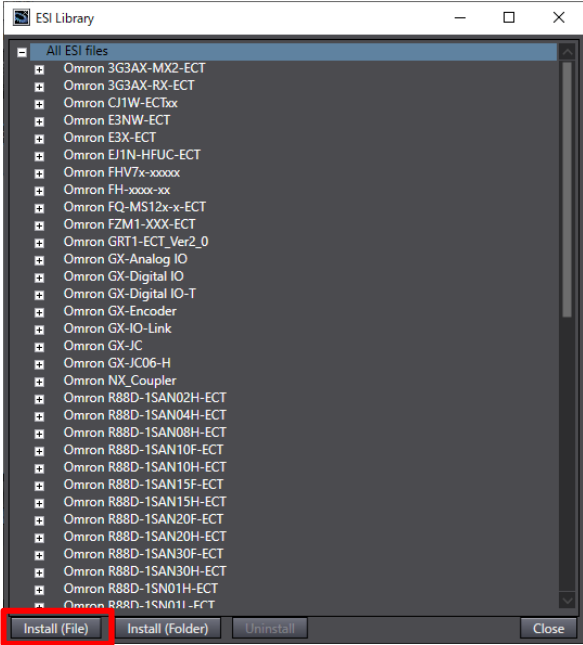
4 EtherCAT window should be shown in “Edit Window”.



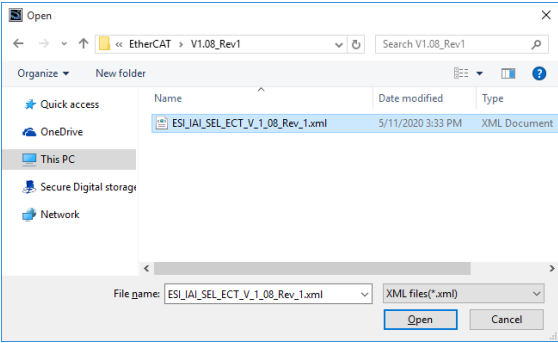
5 Right-click **Master** and select **Display ESI Library**.



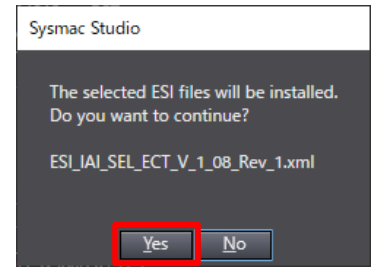
6 Click **Install (File)** in ESI Library window.



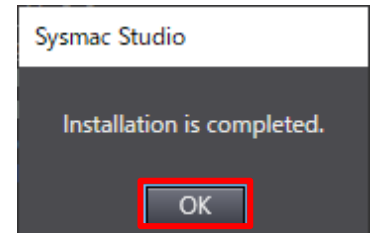
7 Select the ESI file that was downloaded from the IAI homepage and click **Open**.



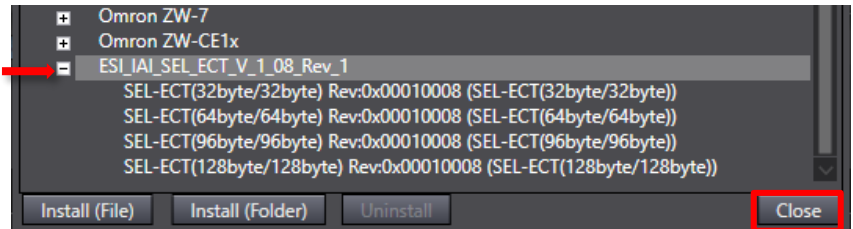
- 8 “Execute Installation” dialog should appear.
Confirm the content and click **Yes**.



- 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.

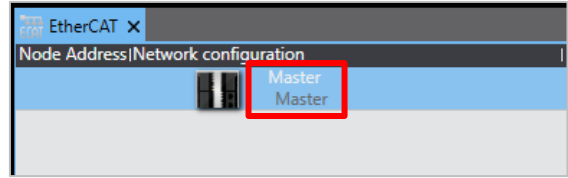


Click **Close**.

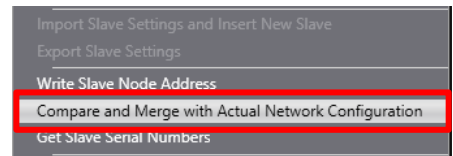
6.5.4 Setup of EtherCAT network configuration

[1] How to Set up Online (Merge Actual Network Configuration)

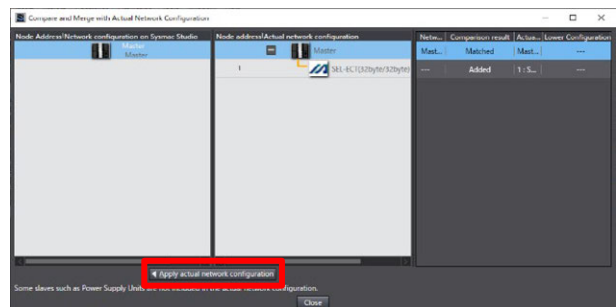
1 In EtherCAT tab in “Auto Connect Project”, right-click **Master**.



2 Click **Compare and Merge with Actual Network Configuration**.



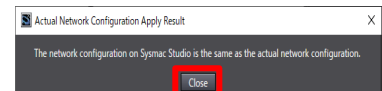
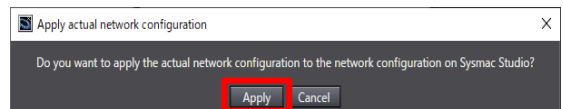
3 Click **Apply actual network configuration**.



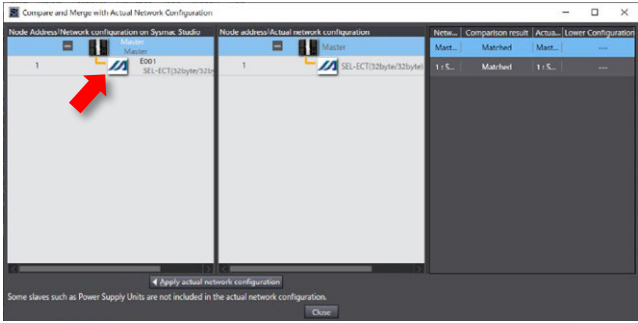
4 Apply actual network configuration window should appear.

Confirm the content and click **Apply**.

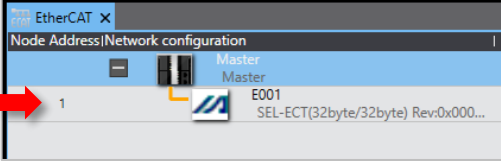
Once the execution result gets displayed, click **Close**.



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**.

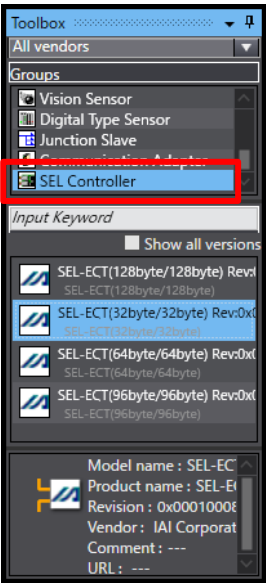


6 The slave should be added in “EtherCAT” tab in Auto Connect Project window.



[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.



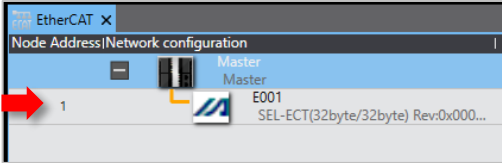
2 Double-click the applicable device in the list at the bottom of "Toolbox", or drag & drop to "Master" in "EtherCAT" tab.

Select the applicable device referring to the number of used EtherCAT input and output ports.

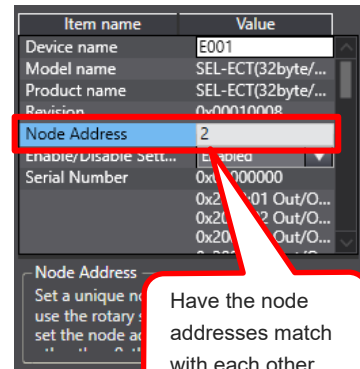
Number of Used EtherCAT Input and Output Ports	ESI File Applicable Device
8 to 256	SEL-ECT (32bytes/32bytes)
264 to 512	SEL-ECT (64bytes/64bytes)
520 to 768	SEL-ECT (96bytes/96bytes)
776 to 1,024	SEL-ECT (128bytes/128bytes)

* 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.

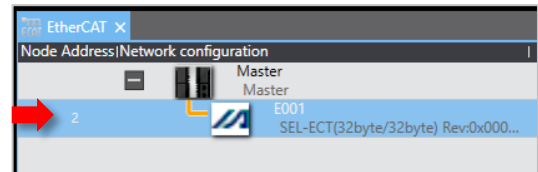


- 4 When the node address of the slave is to be assigned fixed (RSEL controller I/O Parameter No. 226 = 1 to 65535), select Slave in "EtherCAT" tab and change "Node Address" in the parameter setting window so it matches with the value in I/O Parameter No. 226 of RSEL Controller.



No.	Parameter Name	Set. Value
226	I/O1 fieldbus node address	2

- 5 The node address of the slave in "EtherCAT" tab in Auto Connect Project window should be updated.



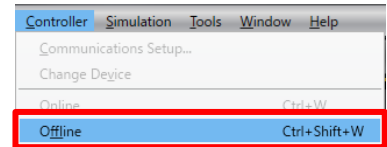
6.5.5 Changing PDO mapping setting

For the RSEL controllers with their setting in Parameter No. 121 “Network Atrbt2” Bits 28-31 “EtherCAT PDO Mapping Classification” = 0 (Variable), it is necessary to match the input and output settings in the master and slave.

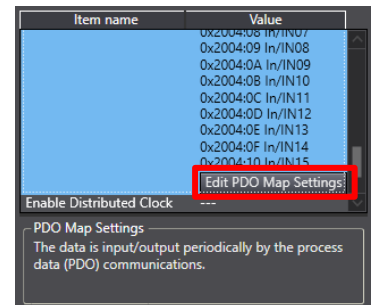
No.	Parameter Name	Set Value
121	Network Atrbt2	C80000h

Bits 28-31 = 0
(will not be shown upper 4 bits are 0)

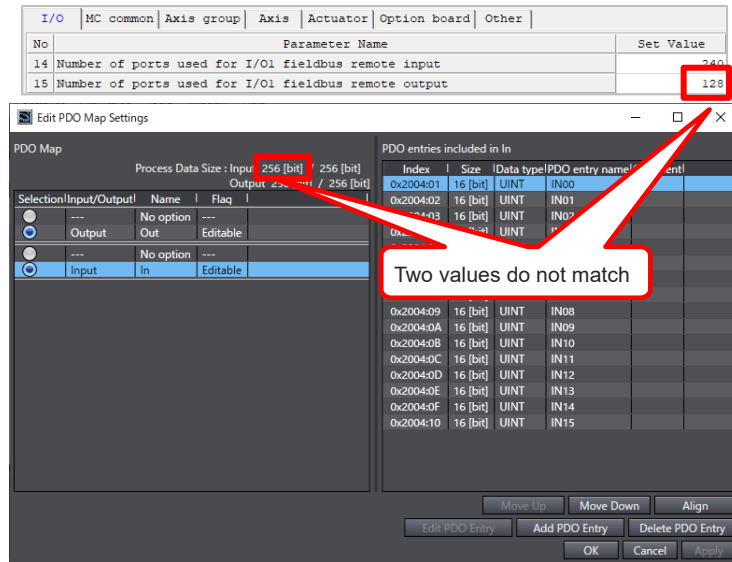
- 1 Confirm that it is in the state of PLC and offline.
If it is online, click **Controller** → **Offline** from the menu bar in “Auto Connect Project” window to set it offline.



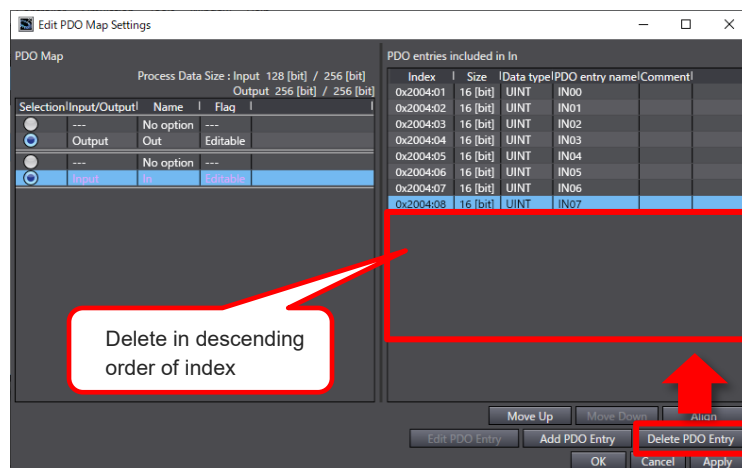
- 2 Select a slave subject to the change of PDO mapping setting in “EtherCAT” tab, and click **Edit PDO Map Settings** in the parameter setting window.



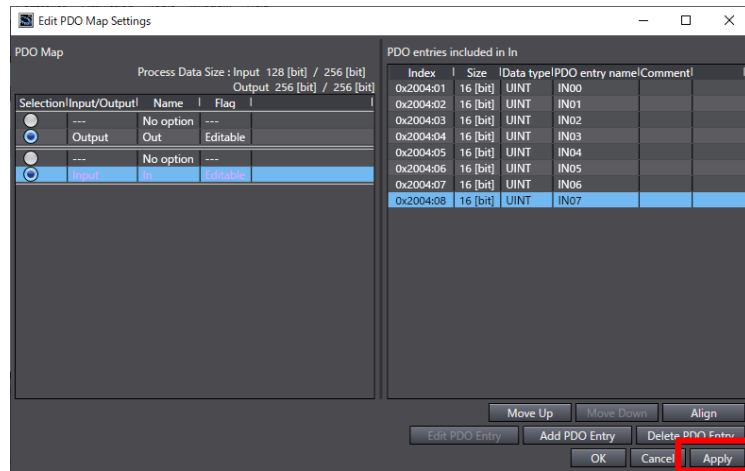
- 3 Edit the process data size of input and output in “Edit PDO Map Settings” window.
- When the input of the process data size do not match with the setting in I/O Parameter No. 15 (Number of ports used for I/O1 fieldbus remote output) of RSEL controller.



- (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**.

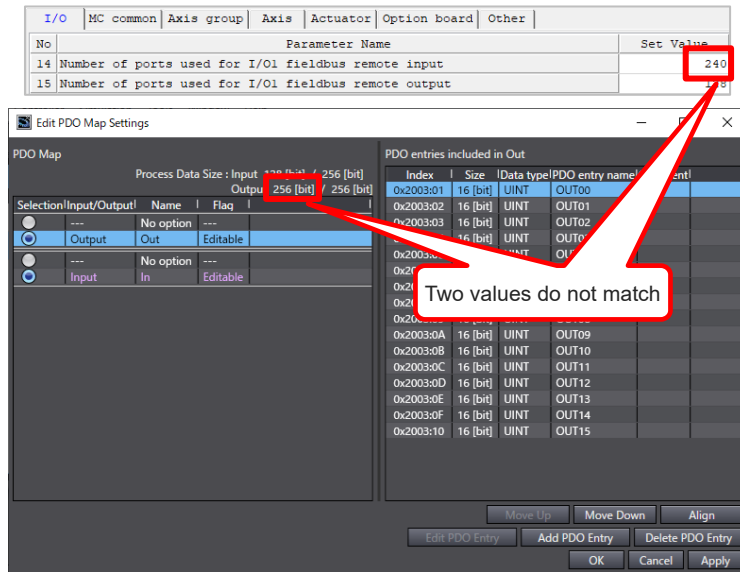


- (2) Once the input of the process data size matches with Parameter No. 15 “Number of ports used for I/O1 fieldbus remote output” in RSEL Controller, click **Apply**.

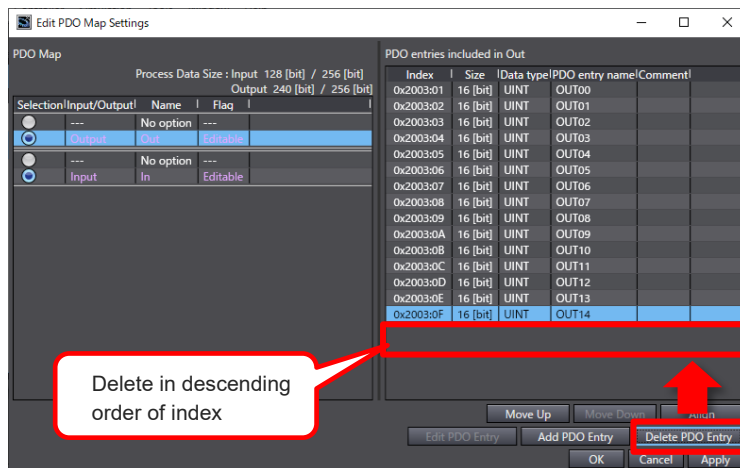


6.5 Example of Connectivity Setting

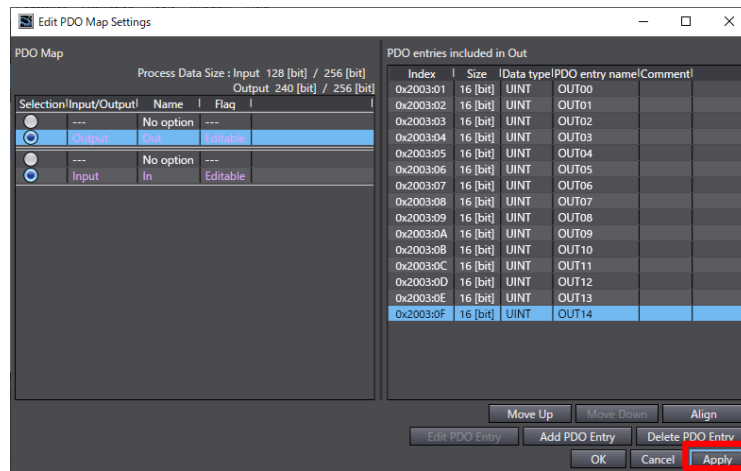
- When the output of the process data size do not match with the setting in I/O Parameter No. 14 (Number of ports used for I/O1 fieldbus remote input) Number of RSEL controller.



- 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**.

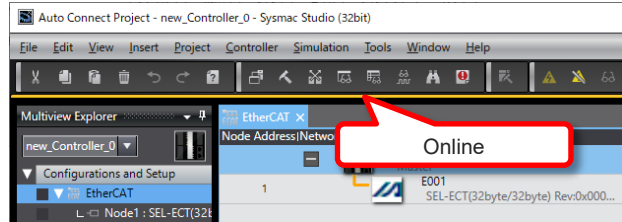


Once the process data size in both the input and the output matches with the number of used ports in the slave, click **OK** to finish the edit.

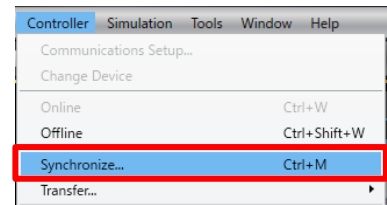
6.5.6 Data Transfer to PLC

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”.

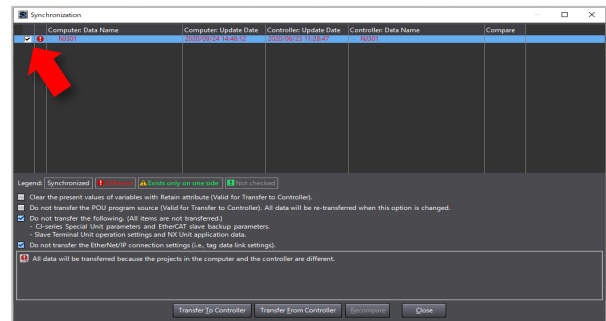
If it is offline, click **Controller** → **Online** from the menu bar in “Auto Connect Project” window to set it online.



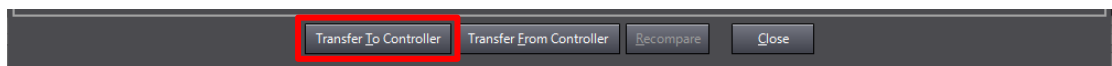
2 Click **Controller** → **Synchronize...** from the menu bar in Auto Connect Project window.



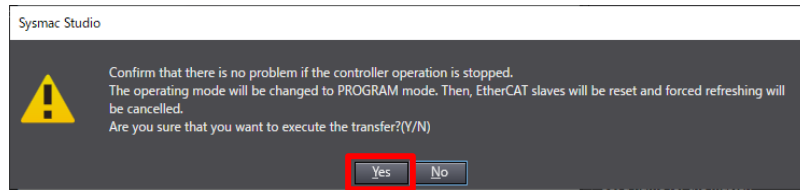
3 Synchronization window should appear. Put a checkmark on the data subject to transfer.



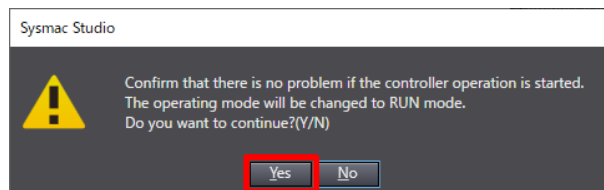
4 Click **Transfer To Controller**.



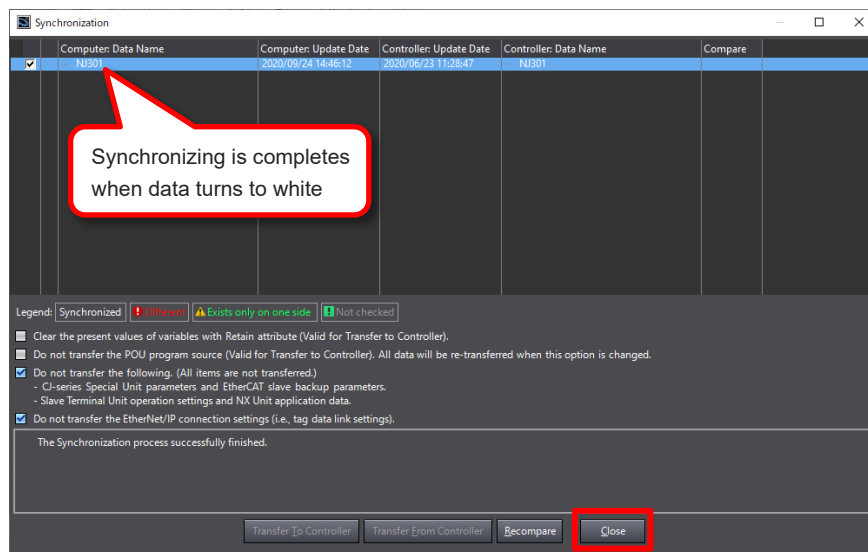
- 5 As the Transfer execution confirmation window appears, confirm that there is no problem if PLC operation stops, and click **Yes**.



- 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**.



RSEL

Chapter **7**

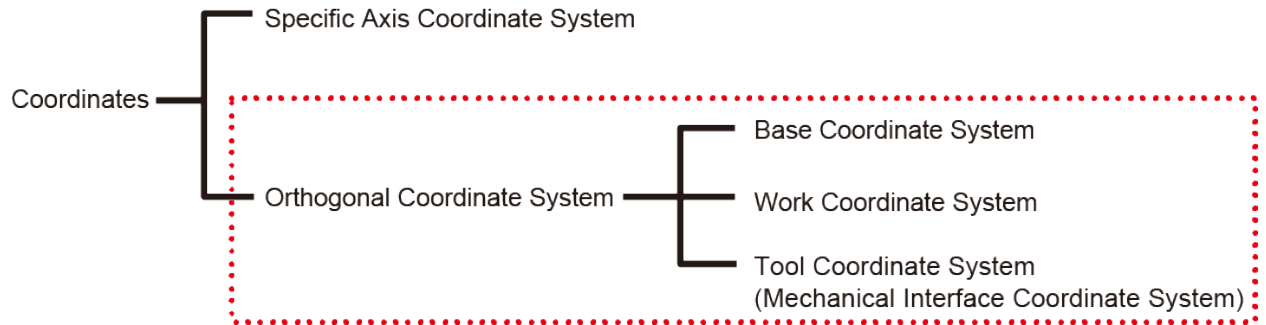
6-axis Cartesian Robot

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7.1 Guideline of Coordinate Systems

7.1.1 List of coordinate systems

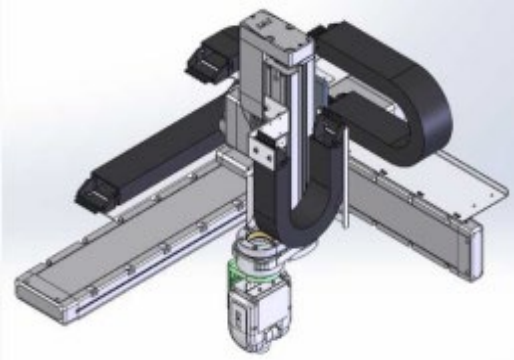
When the orthogonal coordinate system feature is valid in a 6-axis cartesian robot, the orthogonal coordinate system positioning feature should be added only for the 6-axis cartesian robot. Added axes are out of subject.



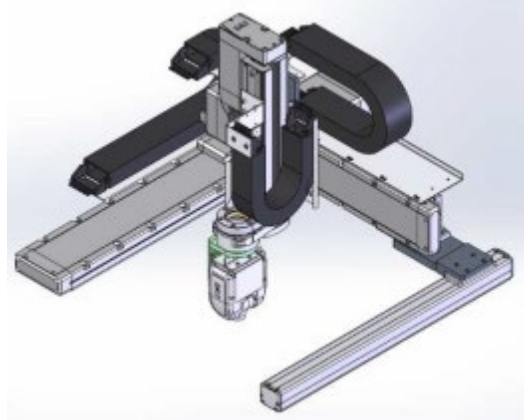
7.1.2 Applicable robots

The 6-axis cartesian robots applicable for use of the orthogonal coordinate system are as shown below:

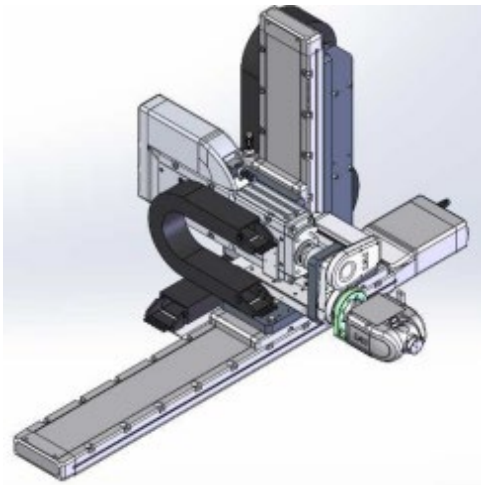
- CRS-XB□
(XY Base Fixed)



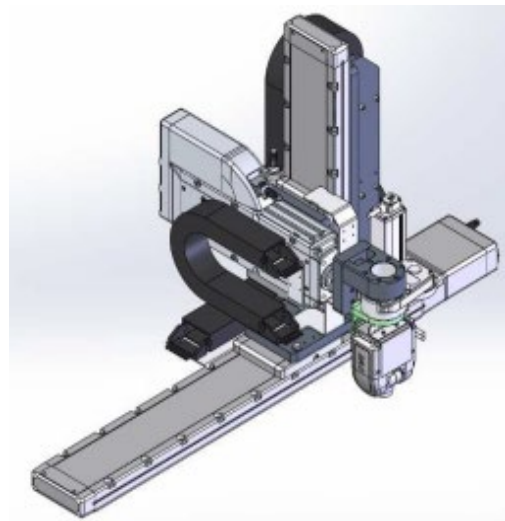
- CRS-XG□
(XY Base Fixed + Gantry)



- CRS-XZ□Y
(XY Base Fixed + Horizontal Approach)

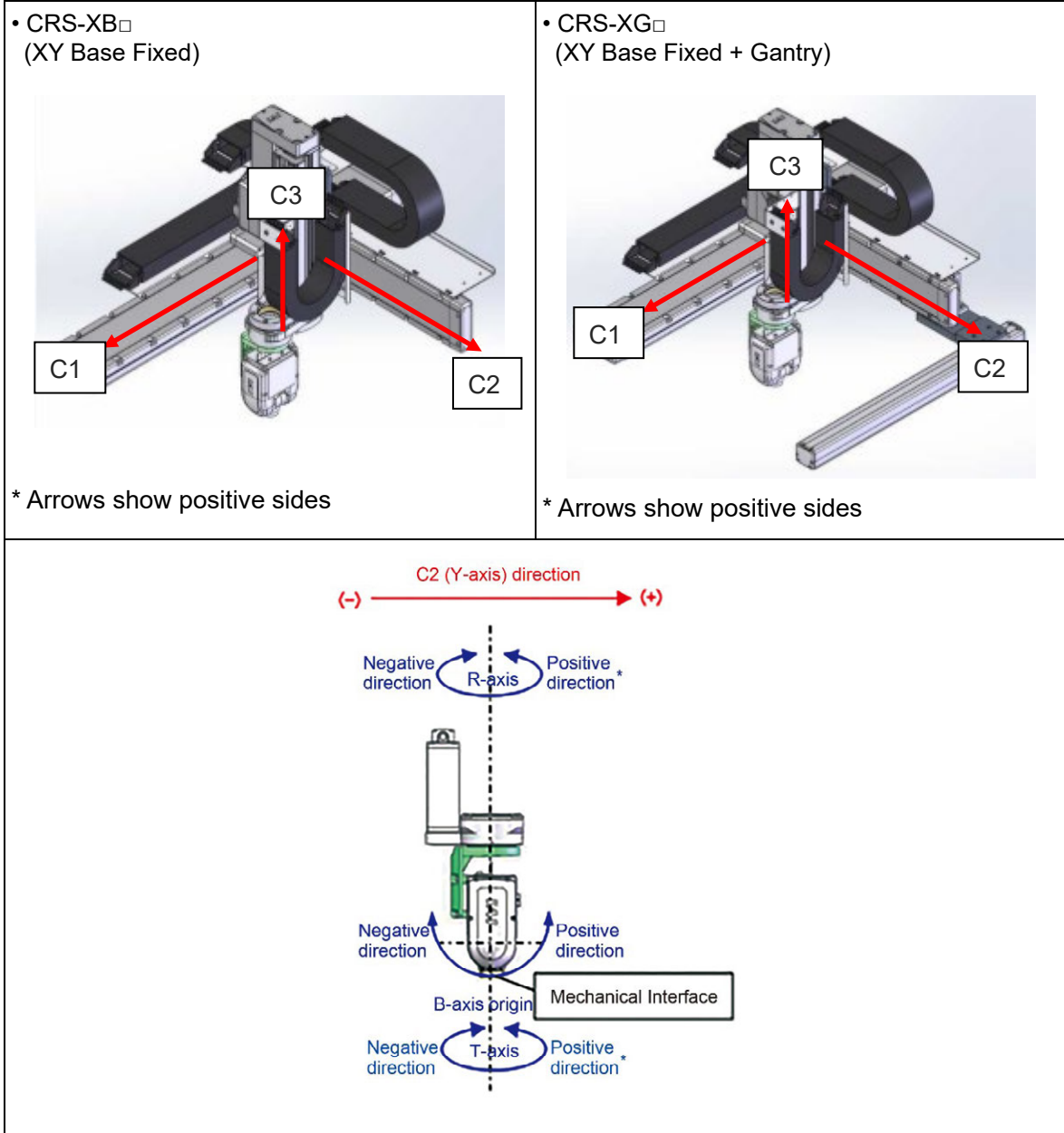


- CRS-XZ□Z
(XY Base Fixed + Vertical Approach)

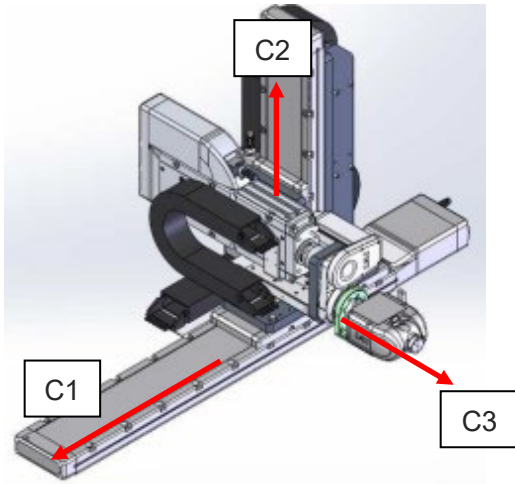


7.1.3 Specific axis coordinate system

The specific axis coordinate system of the 6-axis cartesian robot is a coordinate system set to the constructing axes of the robot.

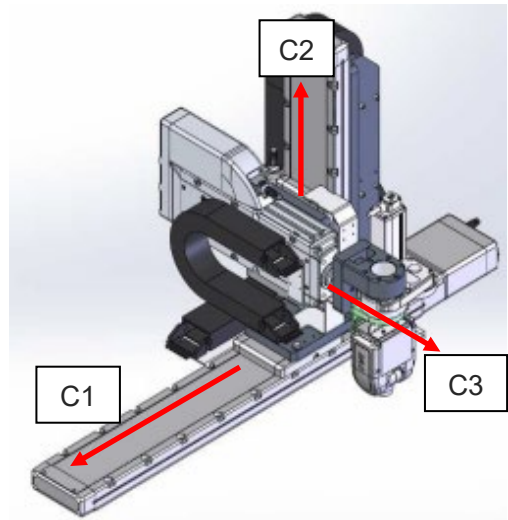


• CRS-XZ□Y
(XY Base Fixed + Horizontal Approach)

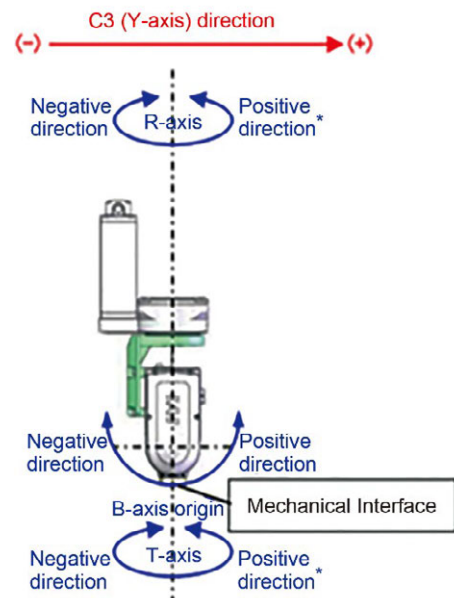
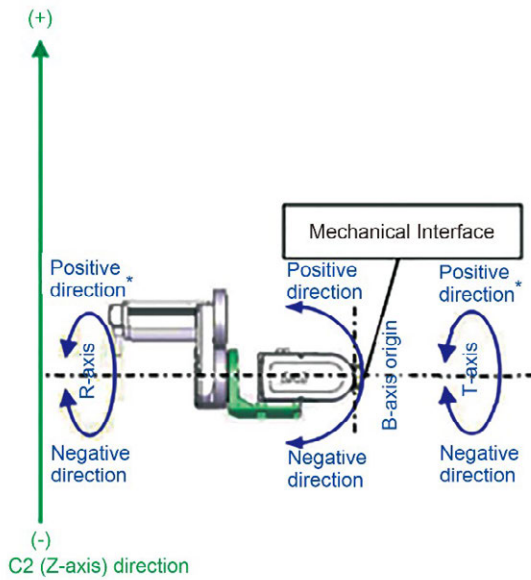


* Arrows show positive sides

• CRS-XZ□Z
(XY Base Fixed + Vertical Approach)



* Arrows show positive sides

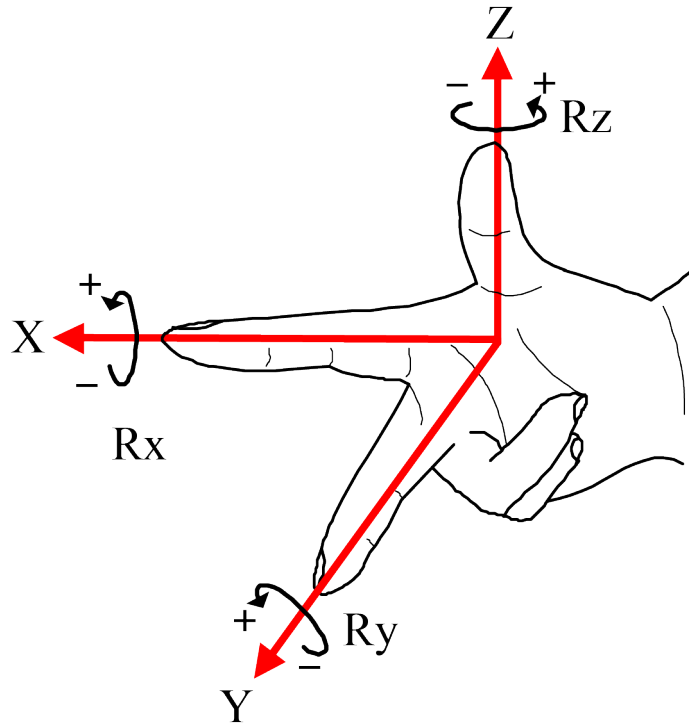


7.1.4 Orthogonal coordinate system

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.

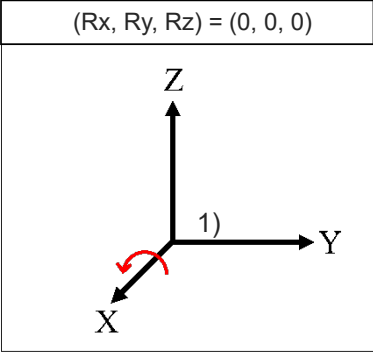
Six coordinates shown below should determine the position and posture.

- 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])

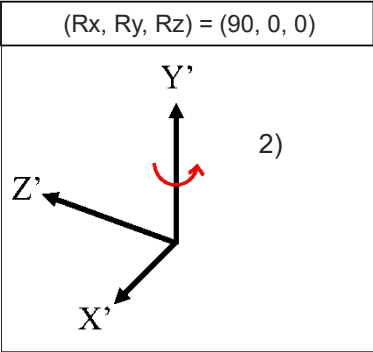


The posture data should show Rx: rotation around X coordinate direction, Ry: rotation around Y coordinate direction and Rz: rotation around Z coordinate direction and each turns in the order of (1) Rx → (2) Ry → (3) Rz. As it may result in a different posture with a change to the order for turn, it is necessary to have them turn in the order above.

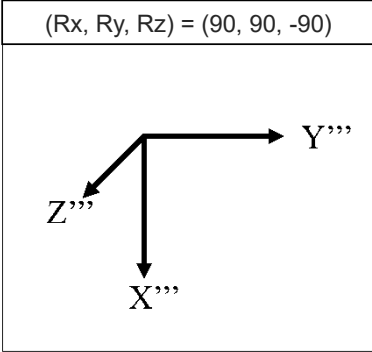
- For $(R_x, R_y, R_z) = (90\text{deg}, 90\text{deg}, -90\text{deg})$



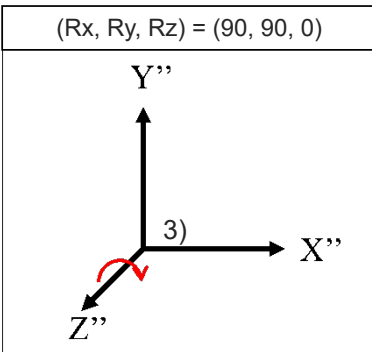
1) Turn in 90deg around X-axis



2) Turn in 90deg around Y'-axis

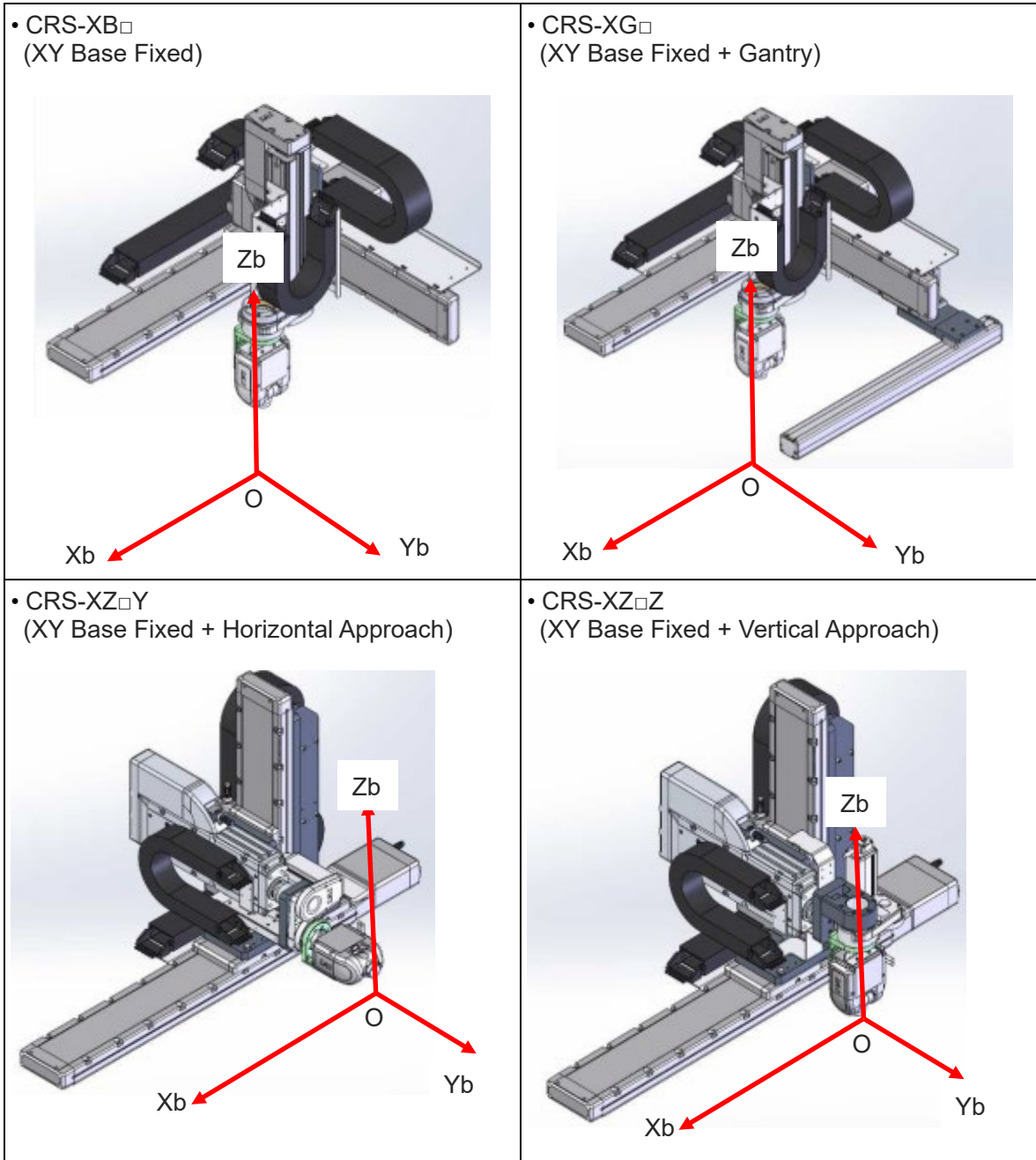


3) Turn in -90deg around Z''-axis

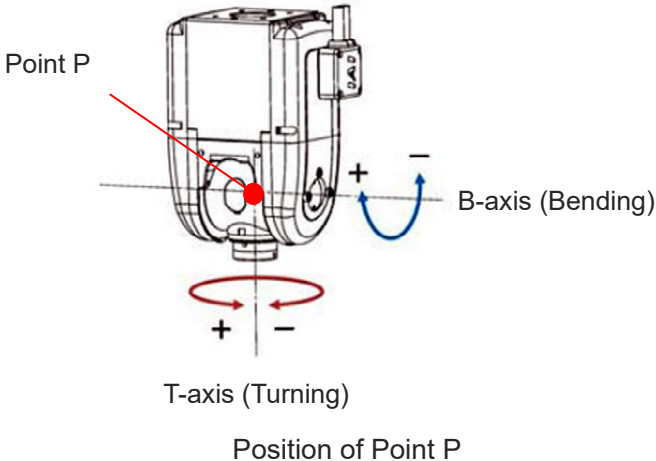


(1) Base Coordinate System

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.

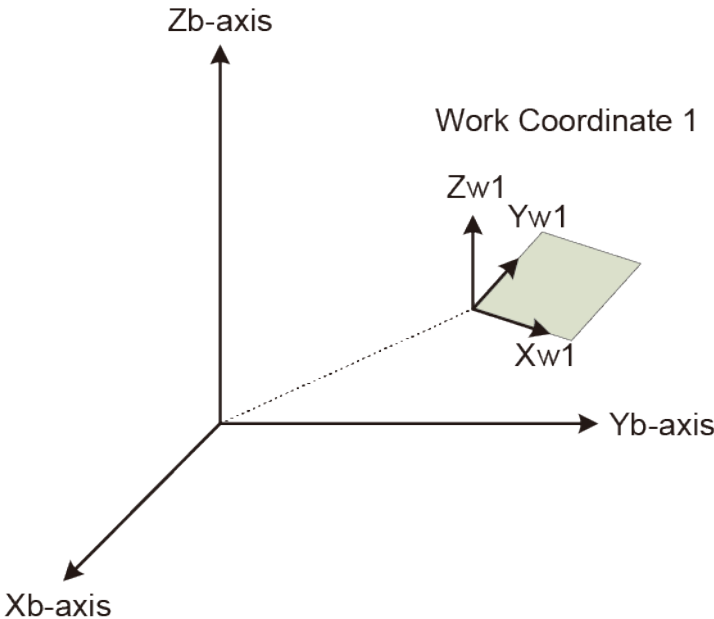


* Arrows show positive sides



(2) Work Coordinate System

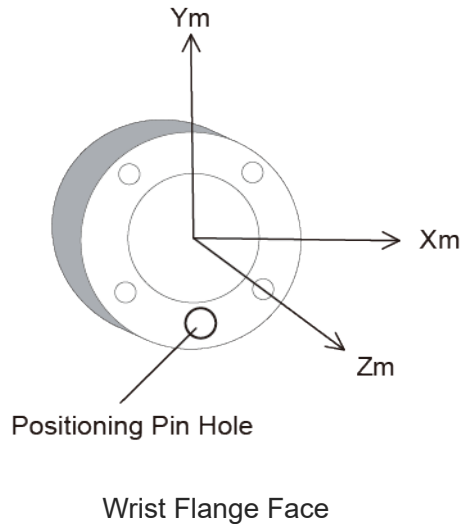
The work coordinate system is a three-dimensional coordinate system defined in each area of workspace for a workpiece. The origin can be defined at any position. The work coordinate system is to be defined with the coordinate origin offset (X, Y, Z) from the base coordinates and the rotary angles (Rx, Ry, Rz) 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.

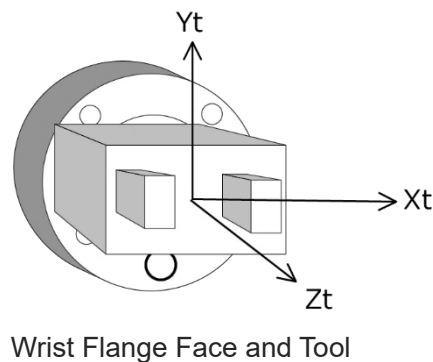


- Tool Coordinate System

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

0000011

[Example] When X- and Rx-axes are indicated in Orthogonal Coordinate System

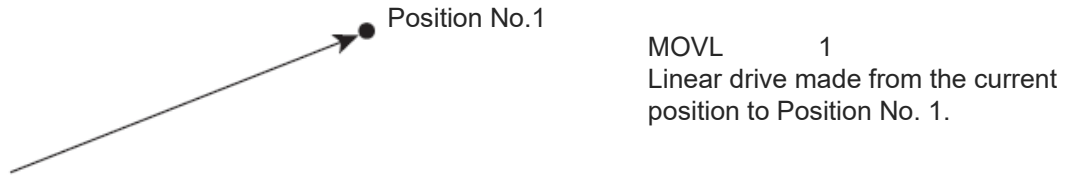
00001001

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 500 mm/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

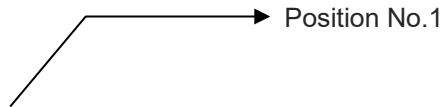
Refer to [SEL Language Programming Manual (ME0224)] for the detail of languages.

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)



```
MOV P      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 500 mm/s.
MOV P	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

MOVP MVPI

- PTP Operation Commands with Orthogonal Coordinate System (Rect) Available for Indication

MOVP MVPI TMPI

Refer to [SEL Language Programming Manual (ME0224)] for the detail of languages.

7.2.4 Wrist form and singularity

(1) Wrist Form

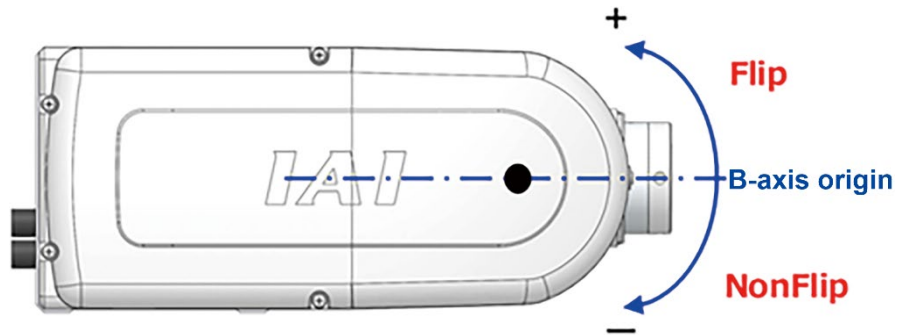
The form is a posture of the of the 6-axis cartesian robot unit. There are two types of forms to specify the orthogonal coordinates (X, Y, Z, Rx, Ry and Rz).

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]

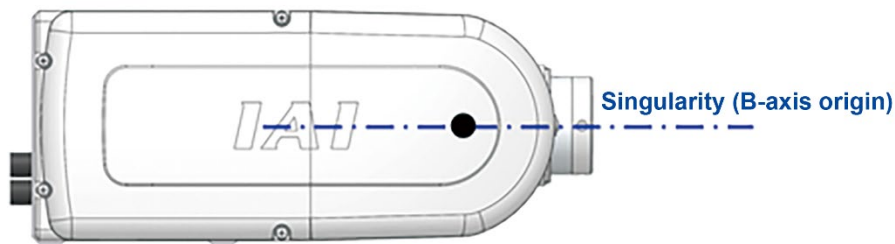
It is to be determined by the specific axis coordinates of the B-axis and;

- 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	Del
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.

No.	X [mm]	Y [mm]	Z [mm]	Rx [deg]	Ry [deg]	Rz [deg]
1	100.000	0.000	0.000	0.000	0.000	0.000
2	0.000	0.000	0.000	0.000	0.000	0.000
3	0.000	0.000	0.000	0.000	0.000	0.000
4	0.000	0.000	0.000	0.000	0.000	0.000
5	0.000	0.000	0.000	0.000	0.000	0.000
6	0.000	0.000	0.000	0.000	0.000	0.000
7	0.000	0.000	0.000	0.000	0.000	0.000
8	0.000	0.000	0.000	0.000	0.000	0.000
9	0.000	0.000	0.000	0.000	0.000	0.000
10	0.000	0.000	0.000	0.000	0.000	0.000
11	0.000	0.000	0.000	0.000	0.000	0.000
12	0.000	0.000	0.000	0.000	0.000	0.000
13	0.000	0.000	0.000	0.000	0.000	0.000
14	0.000	0.000	0.000	0.000	0.000	0.000
15	0.000	0.000	0.000	0.000	0.000	0.000

Input Range: -99,999.999 to 99,999.999

Input the contents indicated below in each cell.

Item	Contents inputted	Remarks
X	X-axis offset from base coordinate system	Indication of origin of work coordinates
Y	Y-axis offset from base coordinate system	
Z	Z-axis offset from base coordinate system	
Rx	X-axis rotation from base coordinate system	Indication of posture of work coordinates
Ry	Y-axis rotation from base coordinate system	
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.

No.	X[mm]	Y[mm]	Z[mm]	Rx[deg]	Ry[deg]	Rz[deg]
1	50.000	0.000	0.000	0.000	0.000	0.000
2	0.000	0.000	0.000	0.000	0.000	0.000
3	0.000	0.000	0.000	0.000	0.000	0.000
4	0.000	0.000	0.000	0.000	0.000	0.000
5	0.000	0.000	0.000	0.000	0.000	0.000
6	0.000	0.000	0.000	0.000	0.000	0.000
7	0.000	0.000	0.000	0.000	0.000	0.000
8	0.000	0.000	0.000	0.000	0.000	0.000
9	0.000	0.000	0.000	0.000	0.000	0.000
10	0.000	0.000	0.000	0.000	0.000	0.000
11	0.000	0.000	0.000	0.000	0.000	0.000
12	0.000	0.000	0.000	0.000	0.000	0.000
13	0.000	0.000	0.000	0.000	0.000	0.000
14	0.000	0.000	0.000	0.000	0.000	0.000
15	0.000	0.000	0.000	0.000	0.000	0.000

Input Range: -99,999.999 to 99,999.999

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	

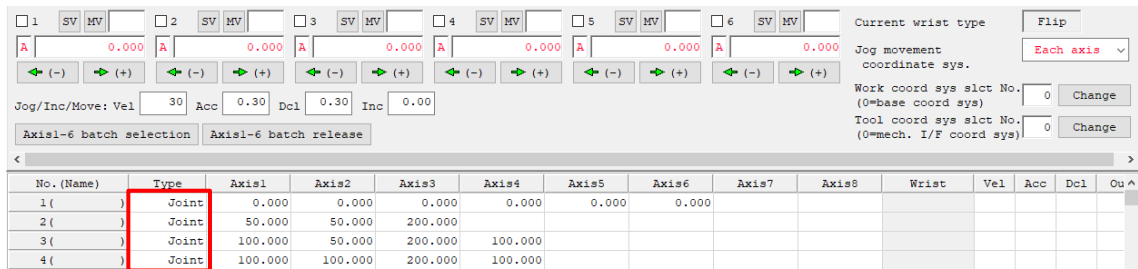
DFTL and GTTL Commands should be used when the tool coordinate system definition data is to be operated in a SEL program. Refer to [SEL Language Programming Manual (ME0224)] for the detail of languages.

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

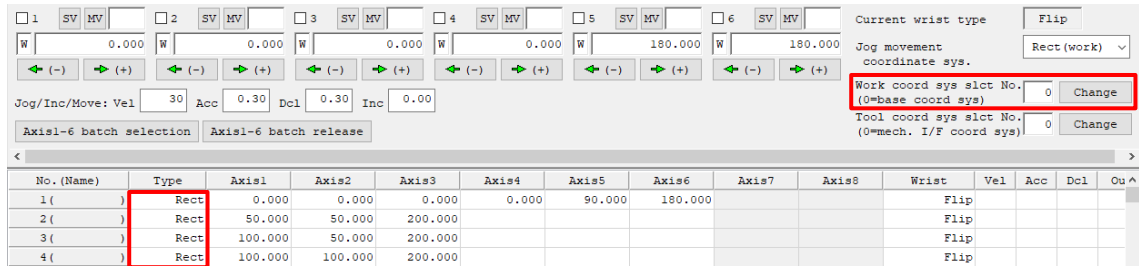
EXIT

(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

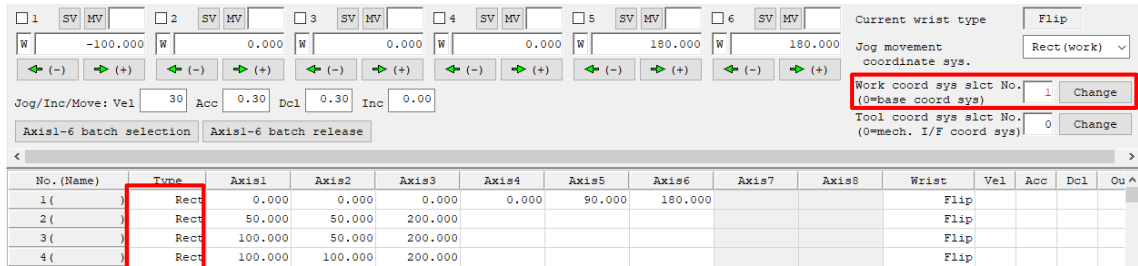
EXIT

(3) Work Coordinate System

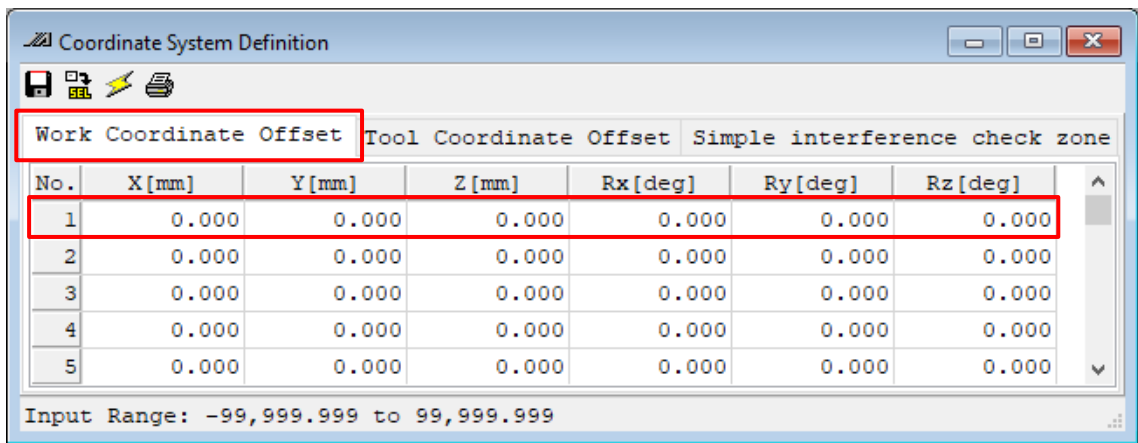
Position indicated movement commands should be executed with selecting a work coordinate system number to be used and Rect (Orthogonal) set in the position type.

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

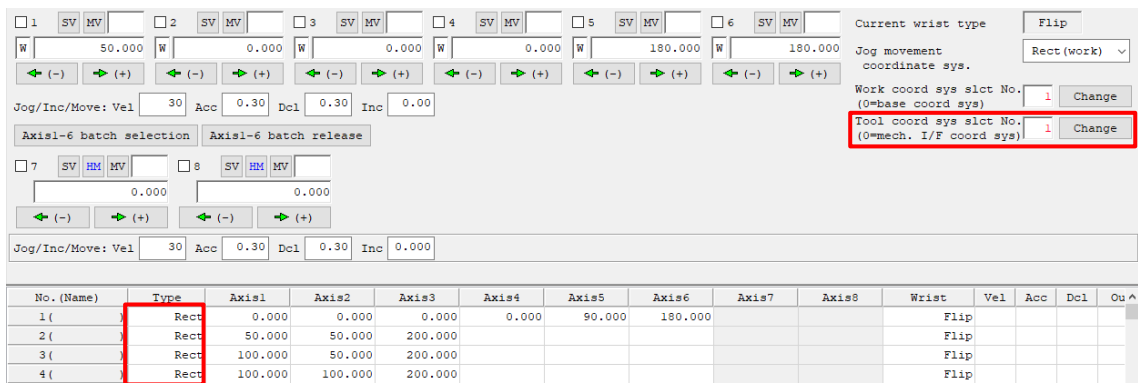
EXIT

(4) Tool Coordinate System

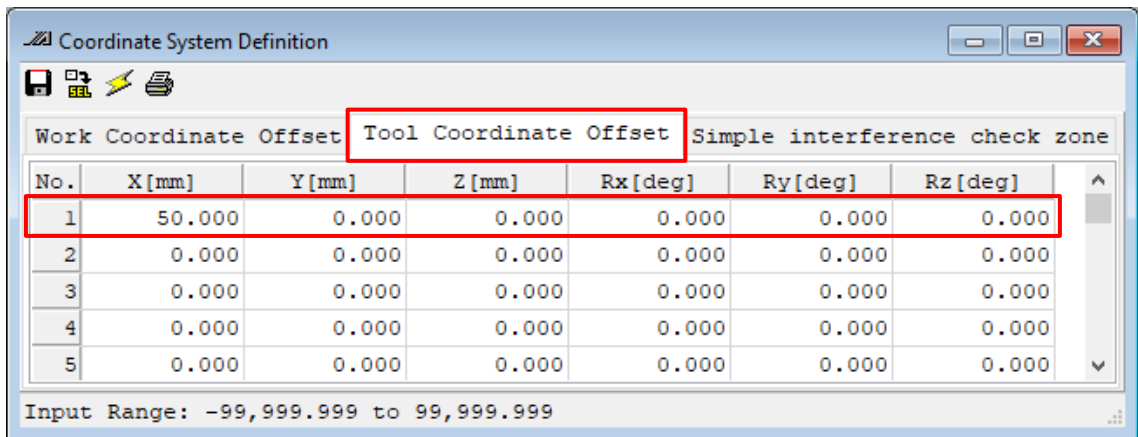
Position indicated movement commands should be executed with selecting a tool coordinate system number to be used and Rect (Orthogonal) set in the position type.

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

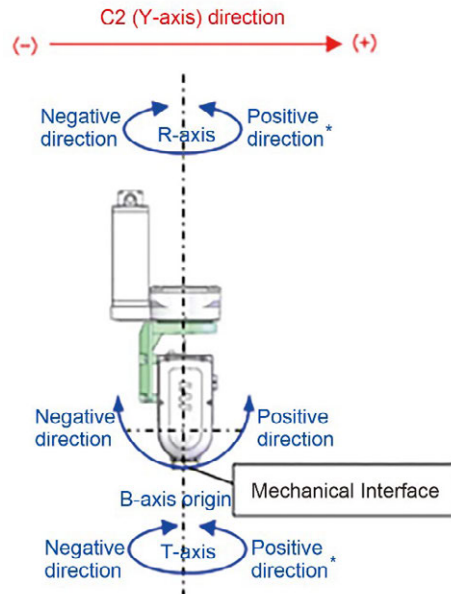
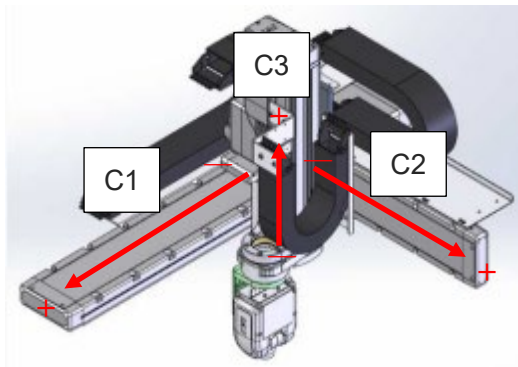
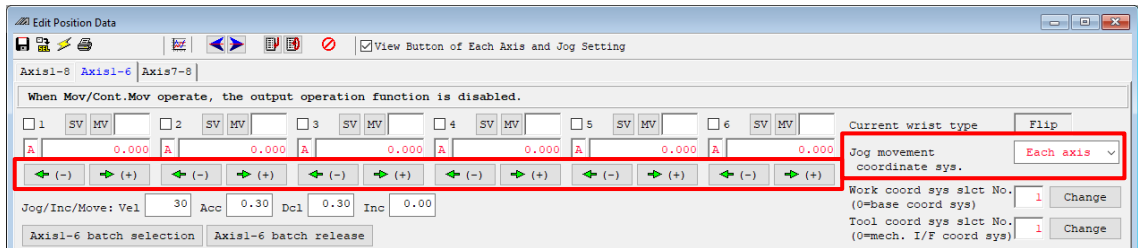
EXIT

7.2.8 Jog movement

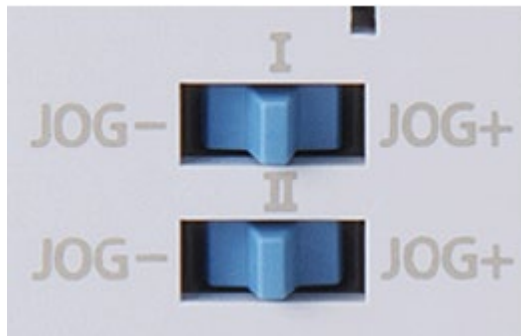
(1) Jog on Each Axis

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.



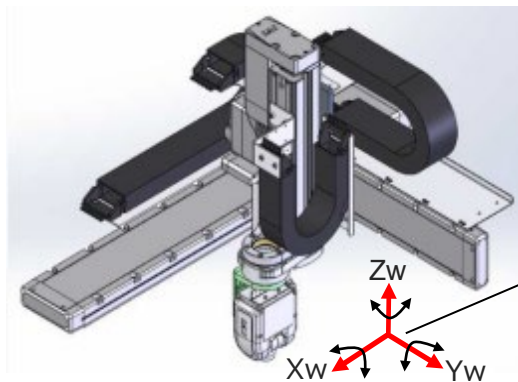
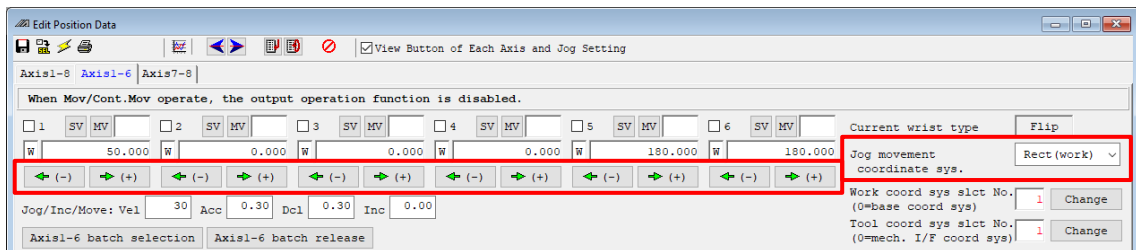
Jog operations with the jog switches are the specific axis jog.



(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.



Currently Selected Work Coordinate System

(3) Tool Coordinate Jog

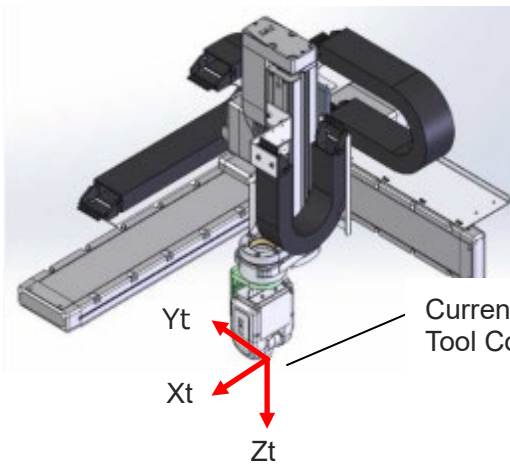
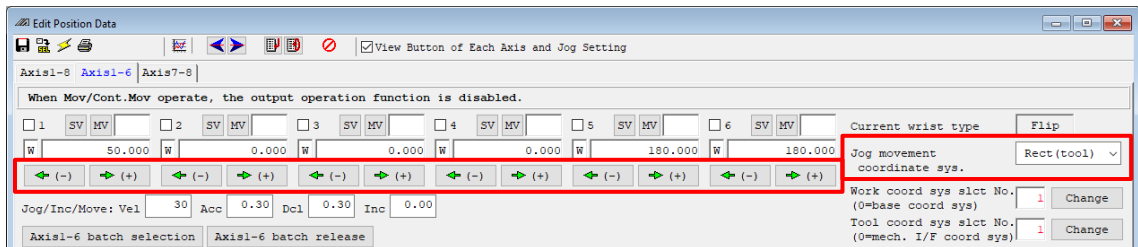
Pressing Axis1, Axis2 or Axis3 button should make a linear drive operation to the back and forth, right and left, and up and down directions on the currently selected tool coordinate system with the orientation of the hand being kept.

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.

Coordinate System Definition

Work Coordinate Offset | Tool Coordinate Offset | Simple interference check zone

Caution : Please input the simple interference check zone definition coordinates by work coordinate system selection No.0(= base coordinate system)

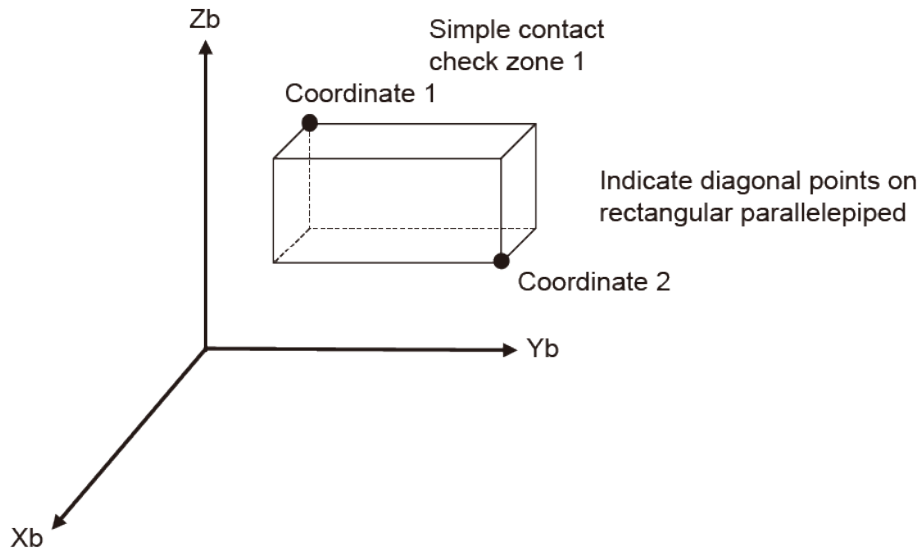
Error type when simple interference check zone invades :
0=No err processing, 1=Message level err, 2=Operation release level err

Zone No.	Crds No.	X[mm]	Y[mm]	Z[mm]	Phy,Ext.Output/ Global Flag	ErrType
Zone 1	Crds 1	100.000			600	0
	Crds 2	200.000				
Zone 2	Crds 1				0	0
	Crds 2					
Zone 3	Crds 1				0	0
	Crds 2					
Zone 4	Crds 1				0	0
	Crds 2					
Zone 5	Crds 1				0	0
	Crds 2					
Zone 6	Crds 1				0	0
	Crds 2					
Zone 7	Crds 1				0	0
	Crds 2					
Zone 8	Crds 1				0	0
	Crds 2					
Zone 9	Crds 1				0	0
	Crds 2					
Zone10	Crds 1				0	0
	Crds 2					

Input Range: -99,999.999 to 99,999.999

- 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 5 ms. Detection may not work unless the tip stays in the zone for 5 ms 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;
 - indicate the specific axis coordinate system and operate, or
 - 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.

RSEL

Chapter 8

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)	–	<ul style="list-style-type: none"> • 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)	–	<ul style="list-style-type: none"> • 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.

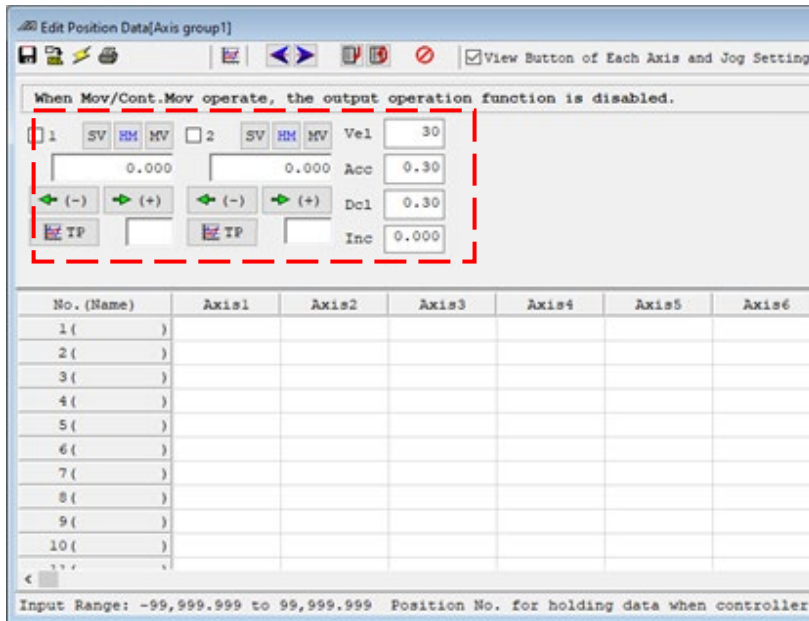
* For an axis connected with the simple absolute unit and used in the simple absolute type, change the driver unit parameter No. 83 "Absolute unit" to "1".

For details, refer to [4.4.7 Parameter Setting When Simple Absolute Unit Used].

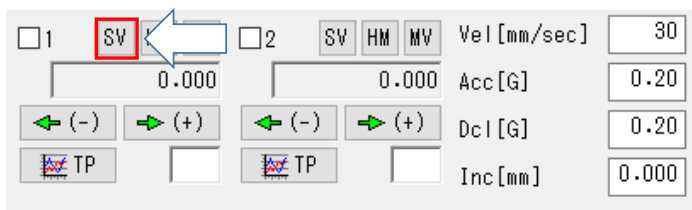
8.1.4 Absolute reset (home return) procedure

Absolute reset is performed by home return operation. (The following is for the first axis)

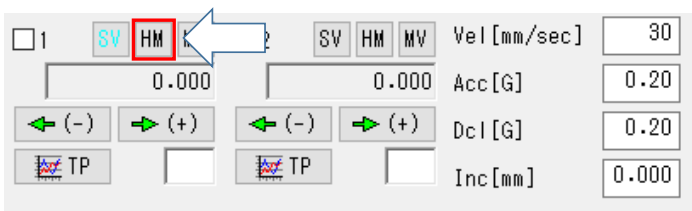
- (1) For PC software
 - 1) Connects PC software
 - 2) If an error has occurred, reset the error
 - 3) Open the position data edit window



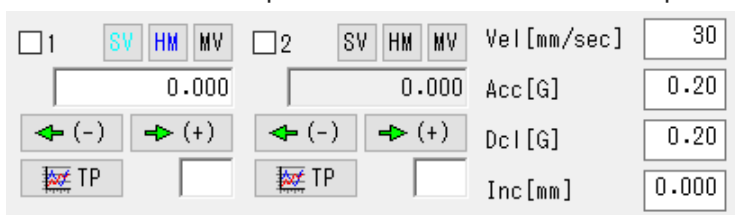
- 4) Press the “SV” button to turn on the servo



- 5) Press the “HM” button to perform home return operation

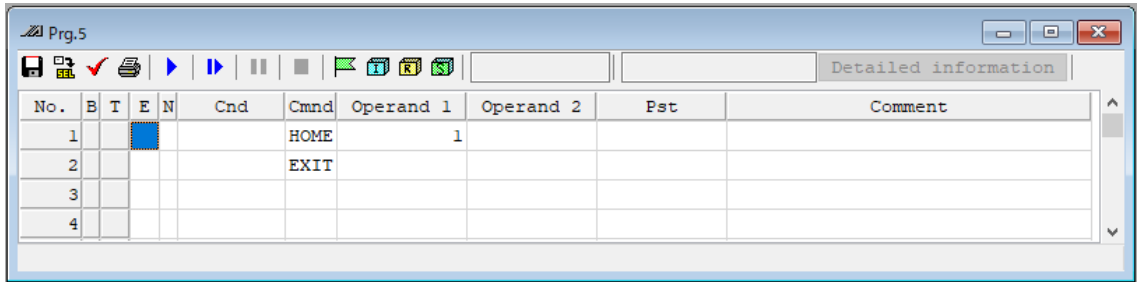


- 6) Absolute reset is completed when home return is completed.



(2) For SEL program

1) Specify the first axis with the HOME command.



No.	B	T	E	N	Cnd	Cmnd	Operand 1	Operand 2	Pst	Comment
1						HOME	1			
2						EXIT				
3										
4										

2) 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 : $\phi 4$ B Type Parallel Pin, Length 40mm, 1 piece
 $\phi 3$ B Type Parallel Pin, Length 40mm, 2 pieces
Size M : $\phi 4$ 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”

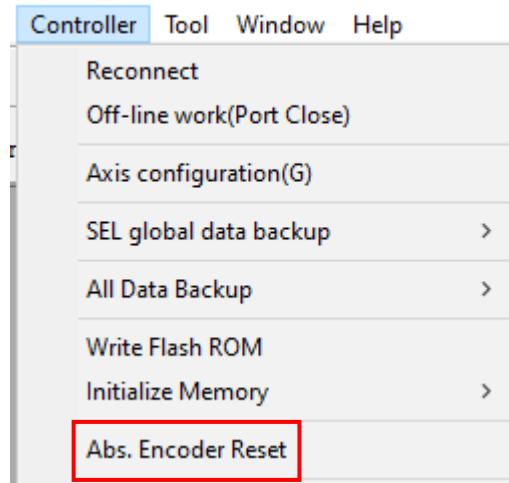


Figure 8.2-2 Menu selection

2) A warning message will be displayed. Confirm it and click and .

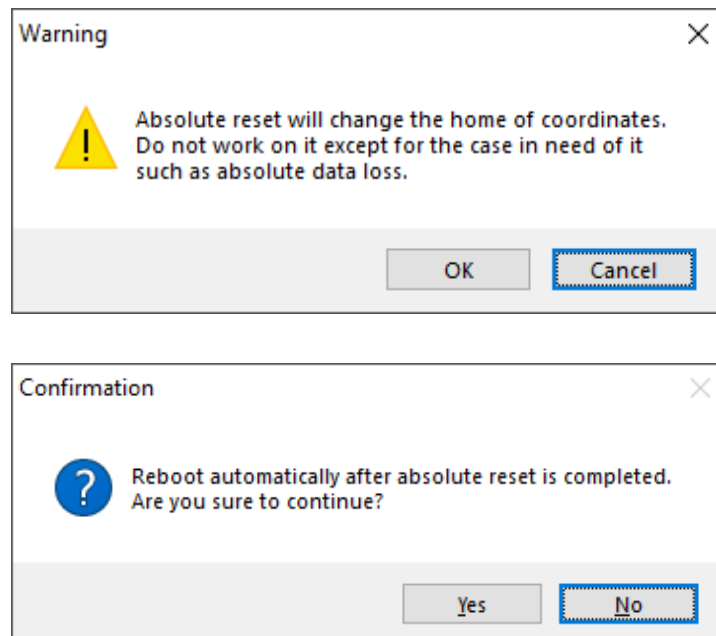


Figure 8.2-3 Warning message

- 3) Select the "Wrist Unit" tab, and select the Axis Group No. and Axis No. of the B-Axis for performing the absolute reset.

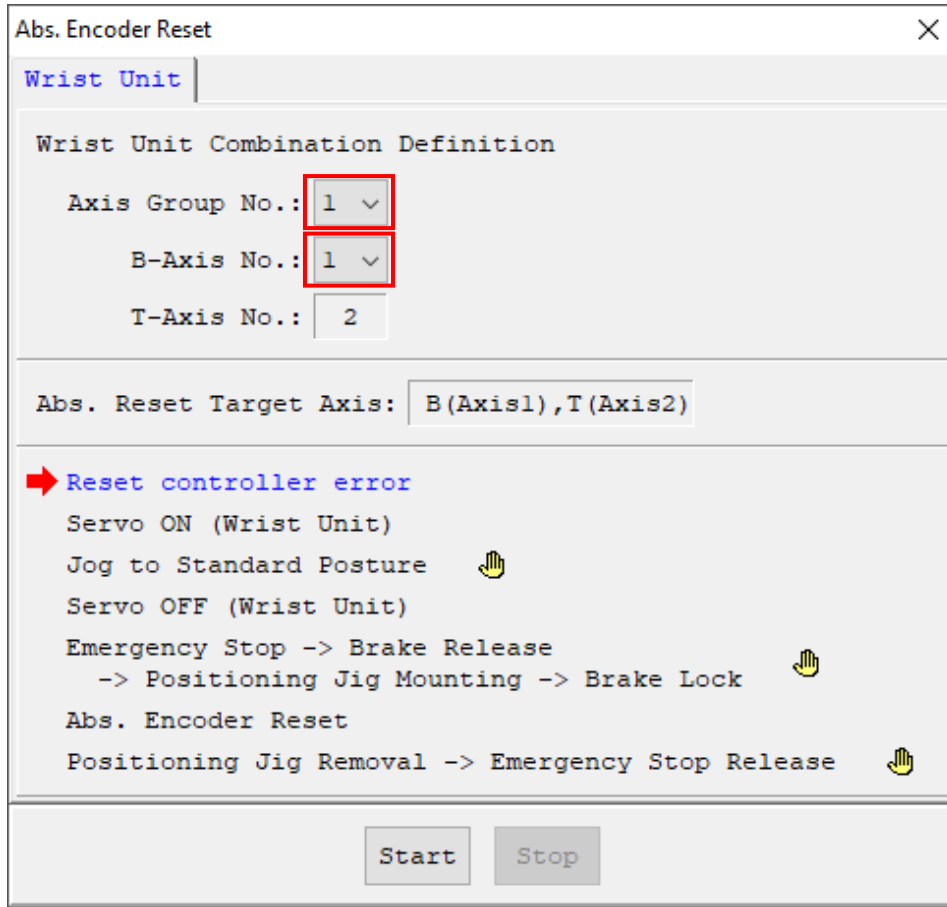


Figure 8.2-4 Abs. Encoder Reset window (Wrist Unit)

* Axis group No. selection is displayed only when axis group No. 2 is valid.

- 4) When you click , a warning message will be displayed. Check it and click .

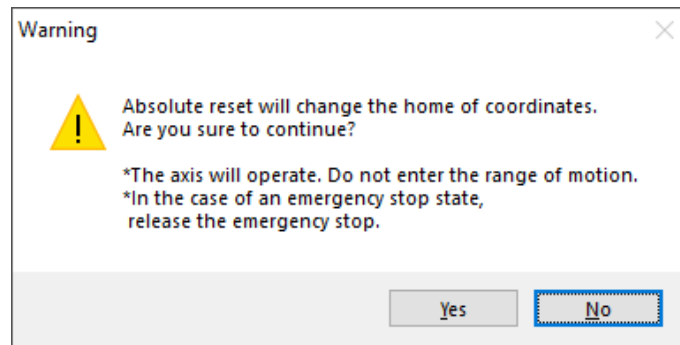


Figure 8.2-5 Warning message

- 5) The Jog to Interference Avoidance Posture screen is displayed. Click and 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 when it is near the standard posture. To manually approach the standard posture, just click .

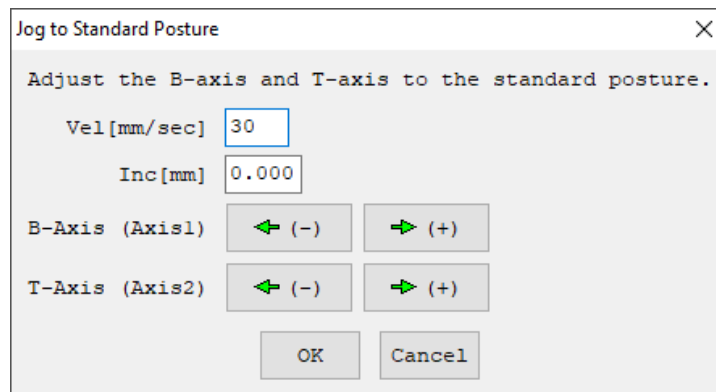


Figure 8.2-6 "Jog to Standard Posture" window

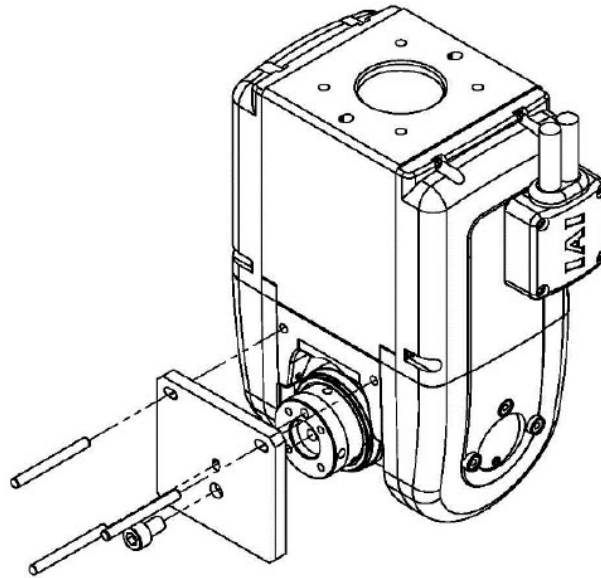


Figure 8.2-7 Wrist unit S / M standard posture

- 6) After making an emergency stop condition release the brake, 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 on the confirmation window.

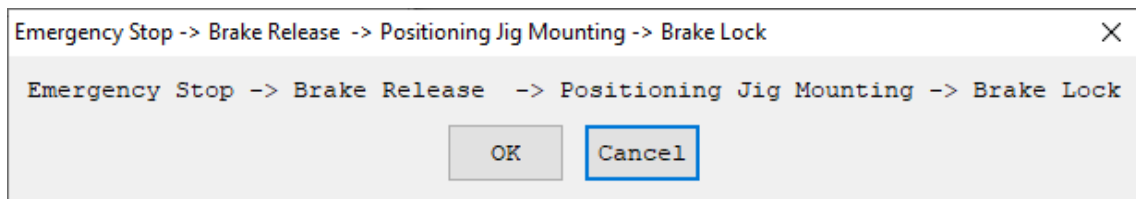


Figure 8.2-8 Confirmation window

- * Leave it in emergency stop condition when you click . If you click after the emergency stop is canceled, it should generate "24A: Undefined Error (Absolute Reset Execution Condition Unestablished Error)".

- 7) Remove the jig for absolute reset. Release the emergency stop with the jig for absolute reset removed, and click on the confirmation window.

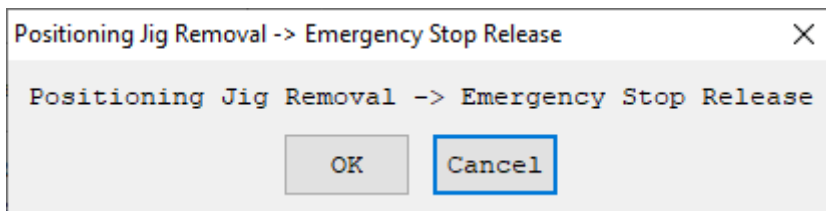


Figure 8.2-9 Confirmation window

- 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 Preparation].

8.3.2 X, Y, Z axis

1) Please select the following menu.

<Menu>

“Controller” → “Abs. Encoder Reset”

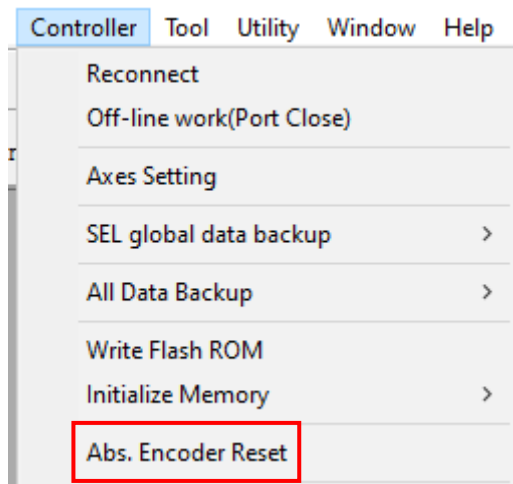


Figure 8.3-1 Menu selection

2) A warning message will be displayed. Confirm it and click and .

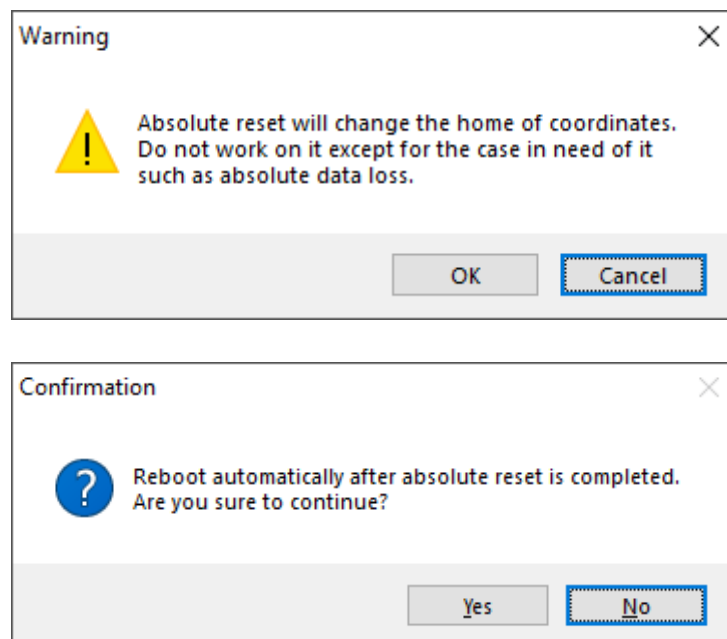


Figure 8.3-2 Warning message

3) Select “Z, Y, Z, R” tab, and set the absolute reset target axis to either of X-, Y- or Z-axis.

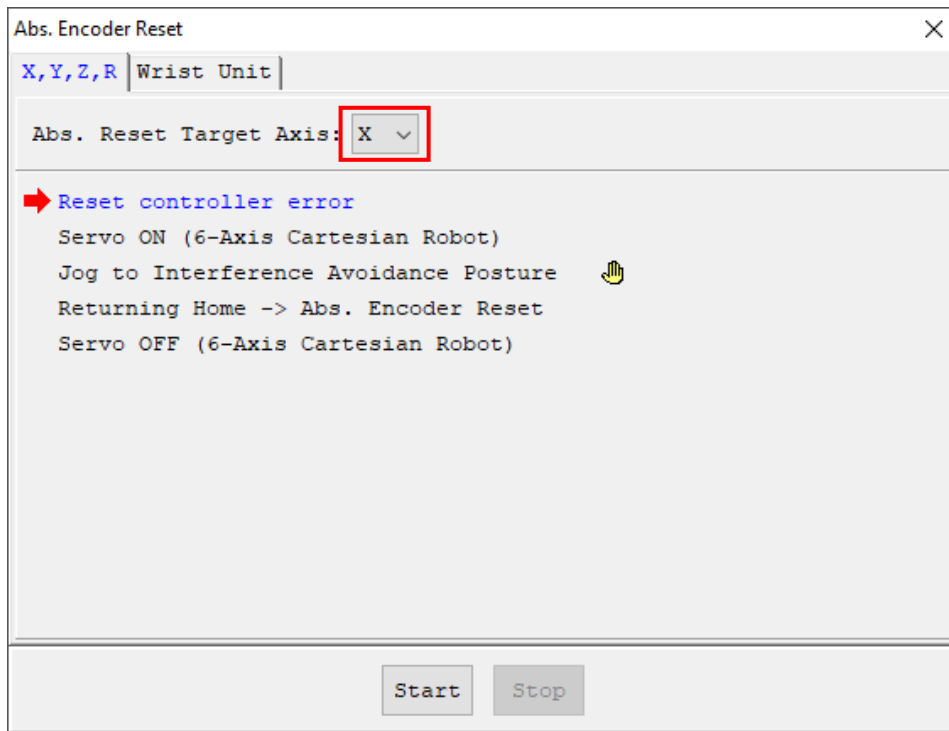


Figure 8.3-3 Abs. Encoder Reset window (6-axis Cartesian Robot)

4) When you click **Start**, a warning message will be displayed. Check it and click **Yes**.

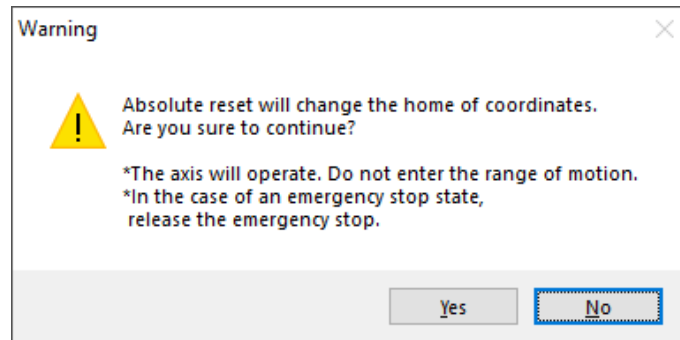


Figure 8.3-4 Warning message

- 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. Once the setup of the position / posture to avoid interference, click .

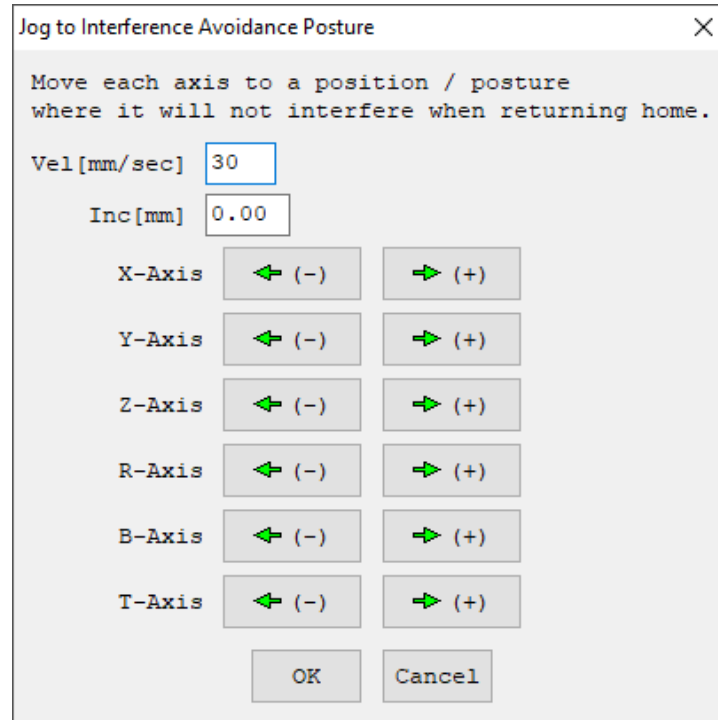


Figure 8.3-5 Jog to Interference Avoidance Posture window

- 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 [section 8.3.3] or [section 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**.

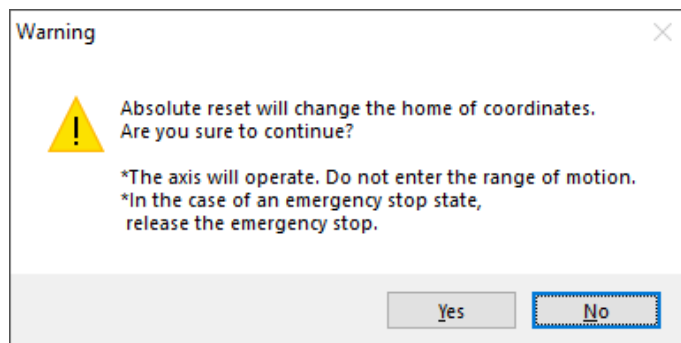


Figure 8.3-7 Warning message

- 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. Once the setup of the position / posture to avoid interference, click .

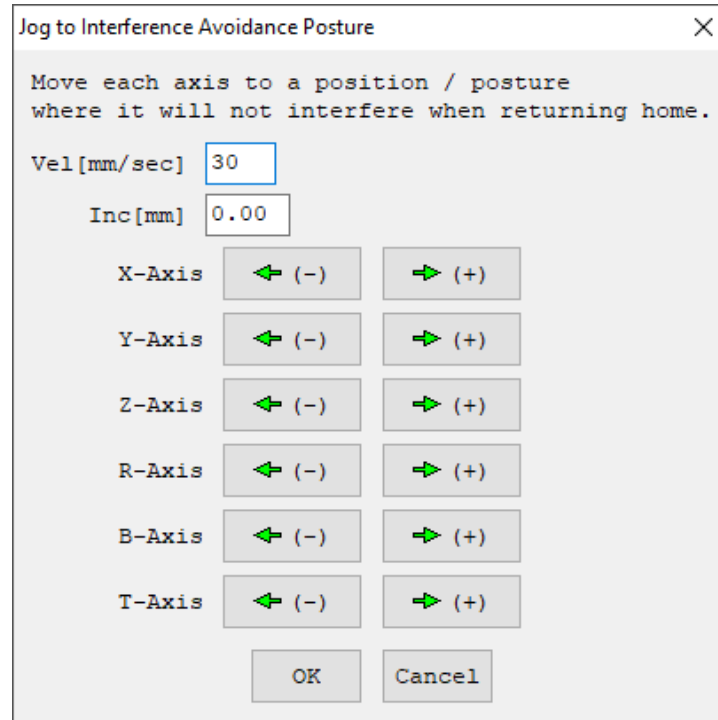


Figure 8.3-8 “Jog to Interference Avoidance Posture” window

- 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 in the confirmation window.

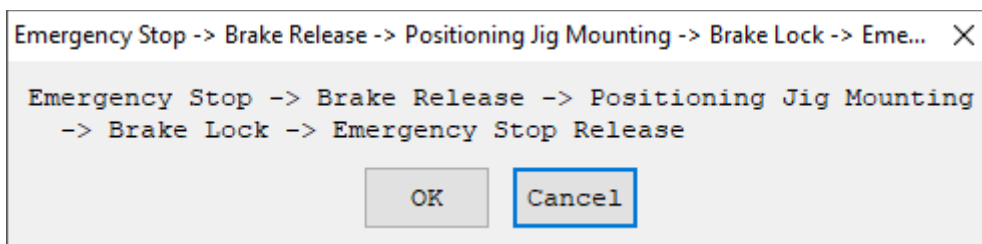


Figure 8.3-9 Confirmation window

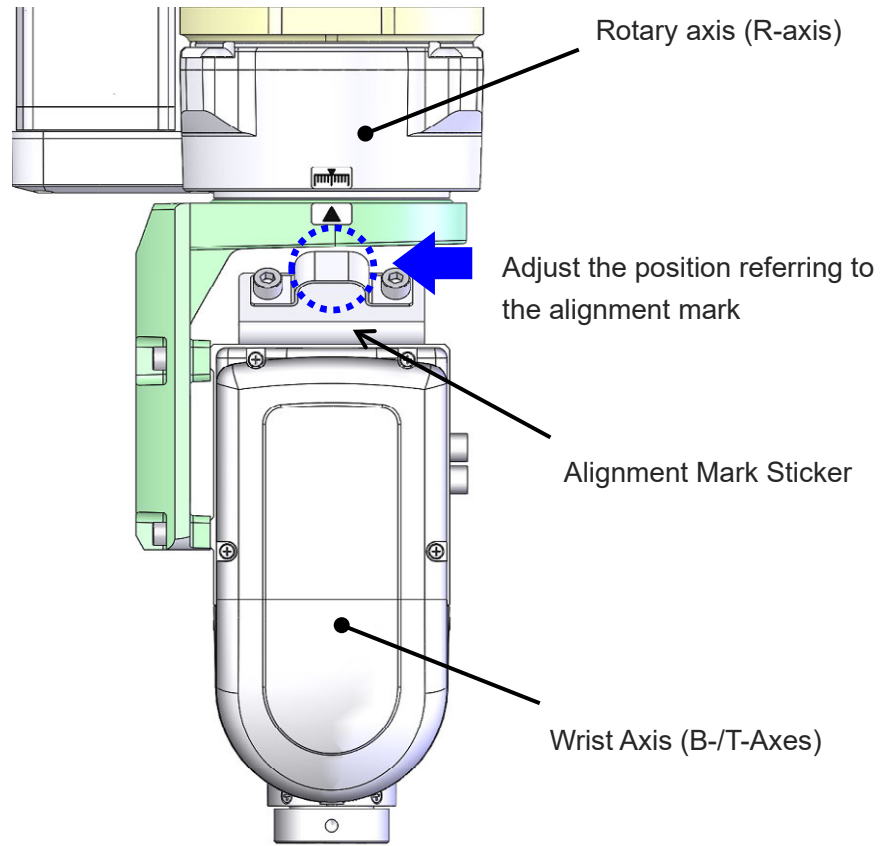


Figure 8.3-10 R-Axis Standard Posture

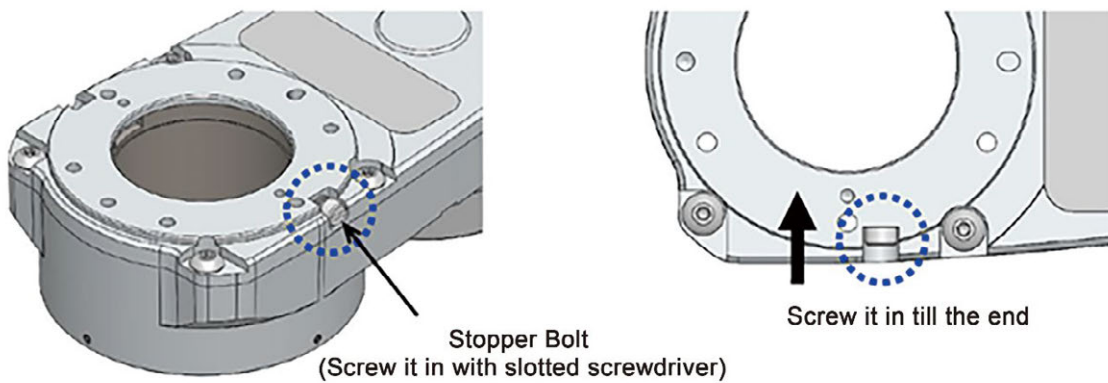


Figure 8.3-11 R-axis Stopper Bolt Attached

- 5) Click 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 in the confirmation window.

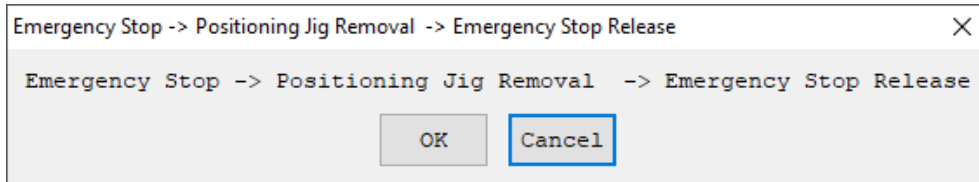


Figure 8.3-12 Confirmation window

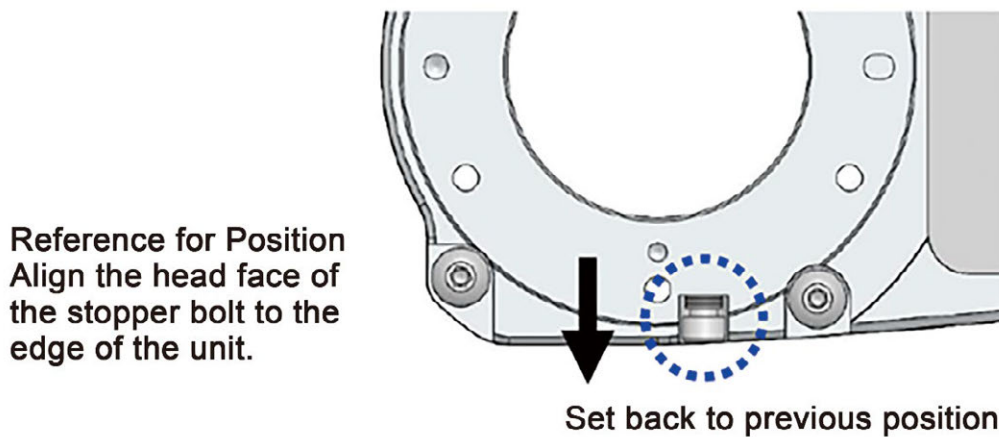


Figure 8.3-13 R-axis Stopper Bolt Removed

- 7) If the absolute reset is required on other axes, proceed to [section 8.3.2] or [section 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 [section 8.2.2 3)] and later.

The process is the same as [section 8.2.2 3)] and later, but the window in the figure below is slightly different from [section 8.2.2 3)] and later.

There is no selection of the axis number in [Figure 8.3-14].

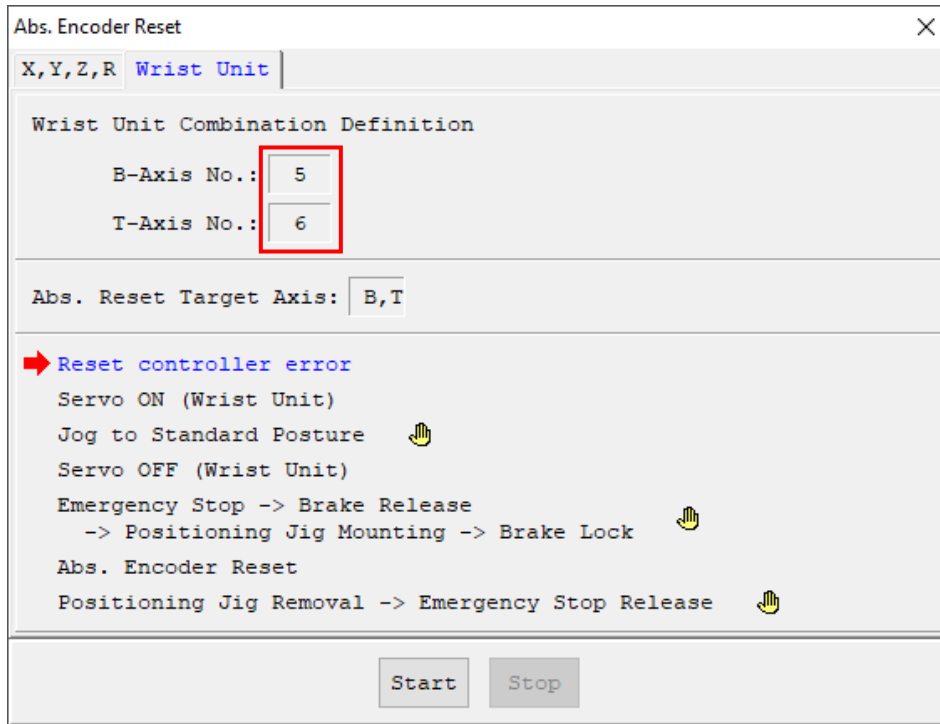


Figure 8.3-14 Abs. Encoder Reset window (6-axis Cartesian Robot)

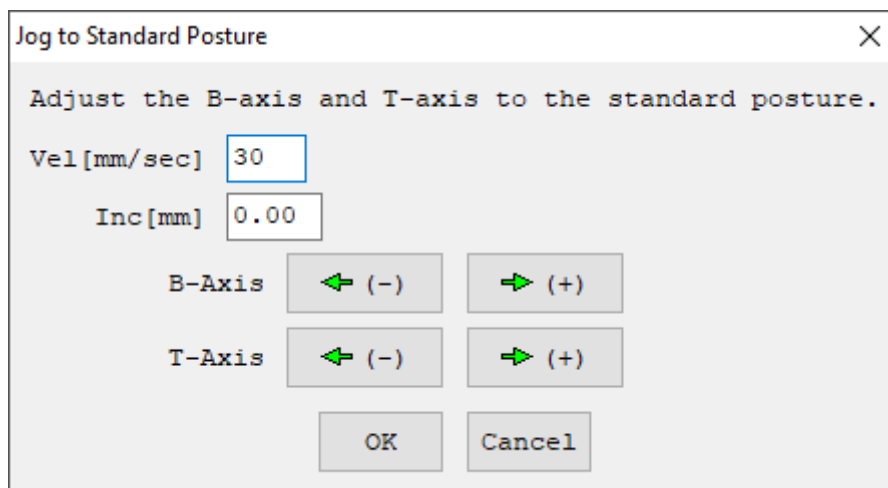


Figure 8.3-15 Jog to Standard Posture window

RSEL

Chapter 9

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.

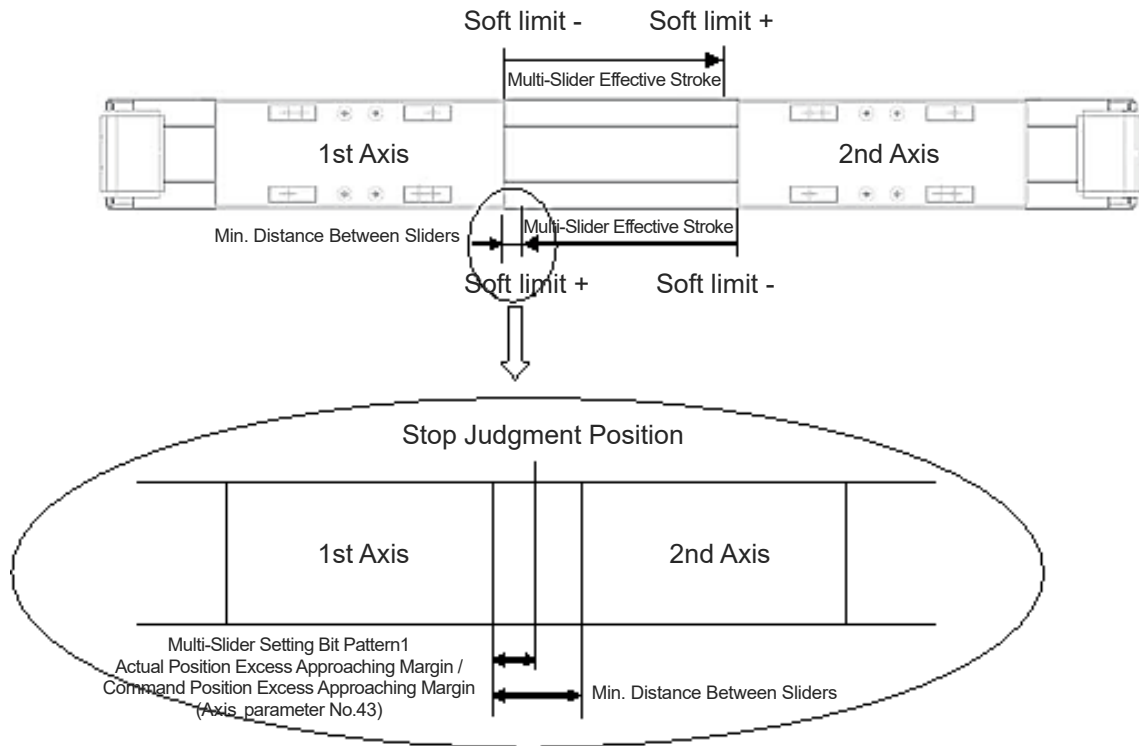
[It is described in the appearance drawing of the multi-slider type in the instruction manual and catalog.]

(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	Remarks
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 : 0.05 G
- [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 : 2 mm
- (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 : 1 mm
- [3] Multi-Slider Over Approach Detection Effective Stroke: Driver Unit Parameter No. 197
This means a position where Distance between sliders at the furthest ends [mm] - Distance between sliders [mm] 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> <p>* Necessity of mutual input with mating axis (The smaller axis number in a pair is the multi-slider master axis for convenience.)</p> <p>* Axes with same characteristics on resolution related are available to select.</p> <p>* Make sure to select the synchro-master axis when synchronizing type (forbidden to select synchro-slave axes).</p> <p>* Set to 0 when there is no slider close to the side of applicable movement of the self-axis coordinate.</p>
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
197	Multi-Slider Over Approach Detection 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. (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

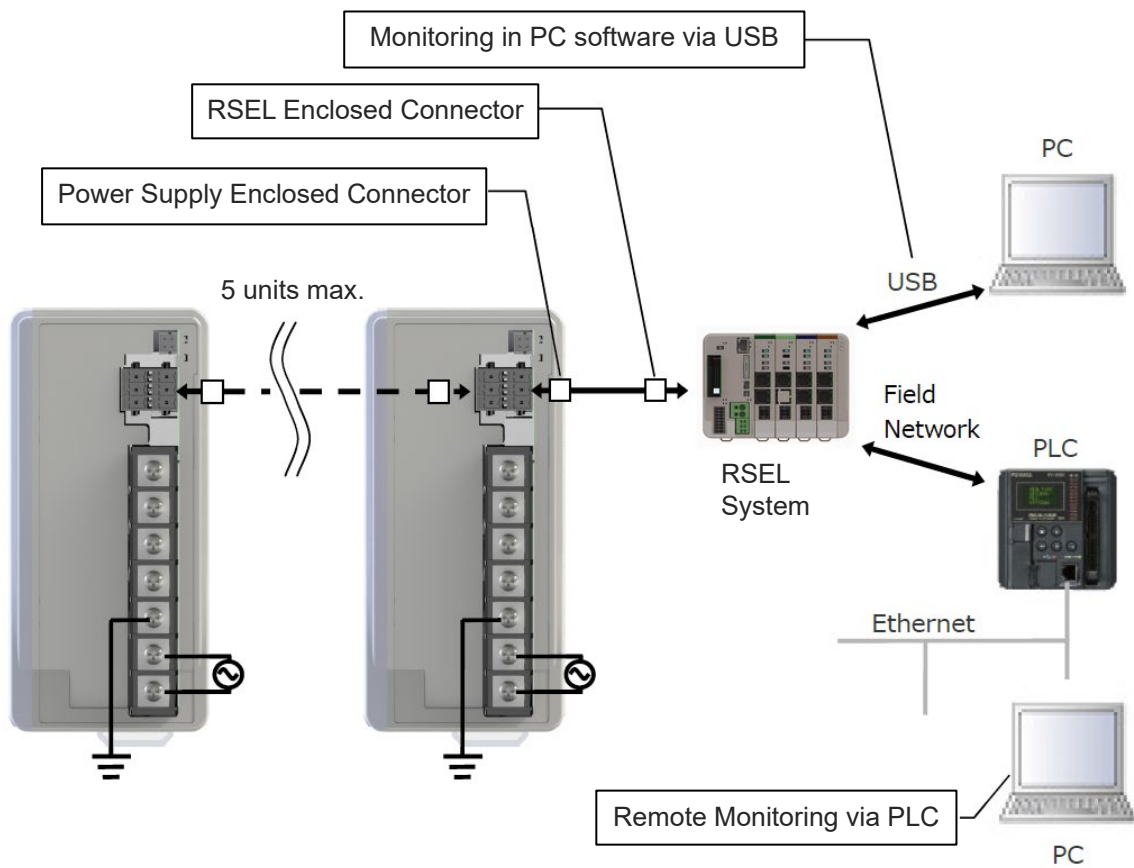
Power Supply Unit: PSA-24 possesses a feature to monitor the status data from a host device as a preventive maintenance feature in purpose of improving efficiency of management and maintenance for equipment.

For the preventive maintenance features equipped on PSA-24 other than status data monitor, refer to [PSA-24 Instruction Manual (ME0379)].

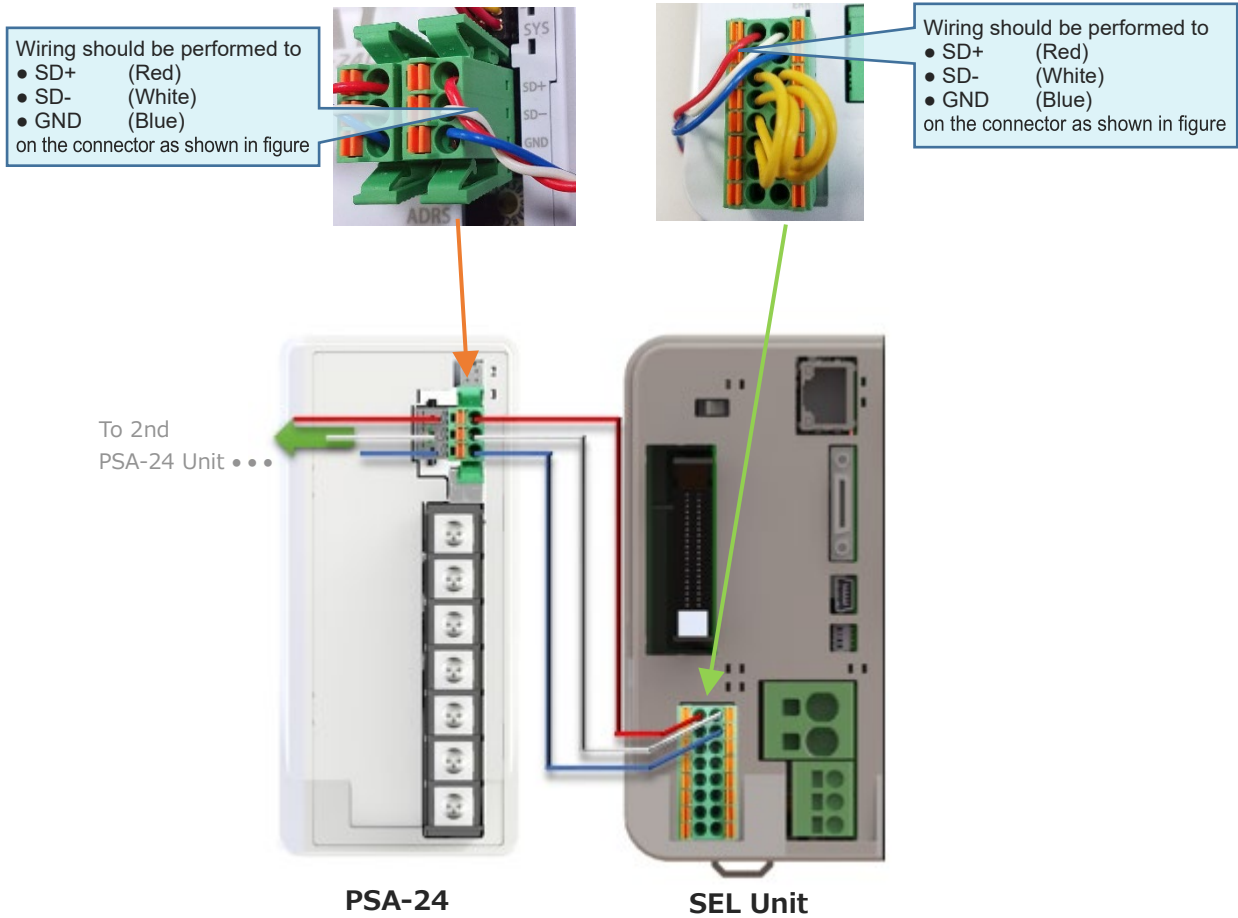
[How to Establish Connection]

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.

- A communication line on one unit of PSA-24 is not available for connecting to multiple SEL units.

Connecting to multiple units should generate the alarm of “22E Power Supply Unit Communication Error”.

- How to Connect with PSA-24

When it is necessary to connect PSA-24 and monitor the status data of the power supply via RSEL, setting of the number of PSA-24 unit to be connected should be established in Other Parameter No. 61 “Number of Power Supply Units”.

Other Parameters

No.	Parameter name	Initial setting	Input range	Unit	Remarks
61	Power Supply Unit Connected Number of Units	0	0 to 5		0: No connected 1 to 5: Power supply unit connected number of units

When using the PC teaching software, select “Monitor (M)” → “Power Supply Unit Data (P)” after the parameter setting is done, and the power supply unit data should be displayed.

	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

[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.

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

When it is necessary to output the monitoring information from the I/O, setting should be established in I/O Parameter No. 851 "Data I/O Output Setting 01 Data Specifications". Set the output data type in bit 00 to 03 (PSA-24: 1) and select the output data items in bit 08 to 15.

I/O Parameter

No.	Parameter name	Initial setting	Input range	Unit	Remarks
851	Data IO Output Setting 01 Data Type	0H	0H~ FFFFFFFF H	-	* Set 0 when output inactivated. Bits 00-03: Output data type (0: Output Invalid, 1: Power Supply Status, 2: Axis Status, 3: EC Status (Main application part V1.09 or later)) Bits 04-07: (Reserved) Bits 08-15: Output data item • Output data type (Bit 00-03) = "1: Power Supply Status" (0: Output Voltage, 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) = "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 16-19: Resolution (0: 1000, 1: 100, 2: 10, 3: 1, 4: 1/10 (0.1), 5: 1/100 (0.01), 6: 1/1000 (0.001)) Bits 20-23: (Reserved) Bits 24-27: Byte Order (0: Big Endian, 1: Middle Endian 1 (PDP Endian) 2: Middle Endian 2 3: Little Endian) Bits 28-31: Data Size (0: 1byte 1: 2byte (1word) 2: 4byte (2word))

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.

9.3.3 Maintenance Information

[For driver unit]

The following data should be integrated and recorded to the driver unit.

- Total moving count (The number of times the actuator has moved)

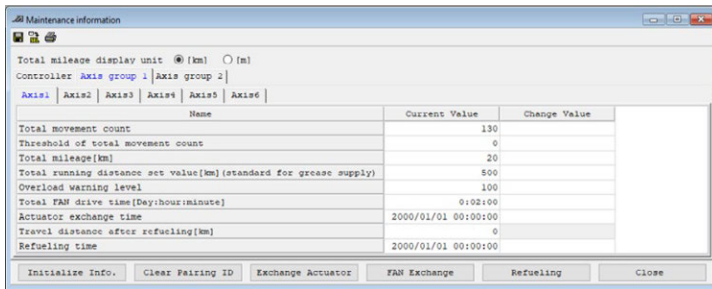
Name	Unit	Input range	Default initial value setting
Total moving count	time	0 to 999,999,999	0 (disabled setting)

- Total moving distance (The number of times the travel distance)

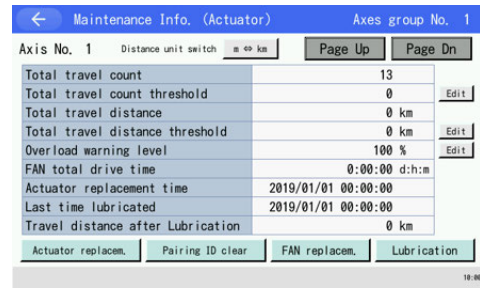
Name	Unit	Input range	Default initial value setting
Total moving distance	m km	0 to 999,999,999	0 (disabled setting)

If the set count or distance (Note 1) is exceeded, an alarm (Note 2) and external signal (Note 3) can be output. This enables checking the timing for lubrication and periodic inspection.

The recorded data should be able to be checked in a teaching tool.



PC Software Maintenance Information screen



TB-02 Maintenance Information

Note 1: Setting should be established in the following parameters or the maintenance information screen in the teaching tool.

- Parameter No. 147 “Total travel count target value”
- Parameter No. 148 “Total travel distance target value”

Note 2: Outputs a message level alarm “205 travel count target value exceeded” or “206 travel distance target value exceeded”.

For details, refer to [11.3 Error Table].

Note 3: Outputs a minor malfunction alarm (ALML).

[In case of EC connection unit (ELECYLINDER)]

“Total number of movements” and “Total distance traveled” can be set and managed as the maintenance information.

For ELECYLINDER, it is not in the parameters, but in the maintenance information screen in the teaching tool to set the maintenance information. When each setting values are exceeded, there should be a “maintenance warning” generated and the status LED on ELECYLINDER should flash in green and red in turns to notify.

Even if a “maintenance warning” is generated, the ELECYLINDER will continue to operate without interruption.

● / ● alternate blinking



All of maintenance warning LEDs from 1 to 3 on ELECYLINDER flash in green and red in turns.

- When the total travel count exceeds the set value, the user will be notified with “Maintenance warning 1”.
- When “Maintenance warning 1” is output, maintenance is recommended, such as greasing. Set the target value to a value larger than the present one and update.
- Setting it to “0 times” will disable this function.

- When the total travel distance exceeds the set value, the user will be notified with “Maintenance warning 2”.
- When “Maintenance warning 2” is output, maintenance is recommended, such as greasing. Set the target value to a value larger than the present one and update.
- Setting it to “0m” will disable this function.
- The displayed units can be switched. [m ↔ km]

[Maintenance Information Setting in Teaching Tool]

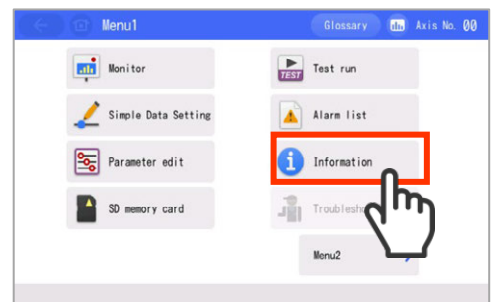
Maintenance information can be checked and set with the following procedures.

- TB-02/TB-03 [Monitor] → [Maintenance]
- TB-02/TB-03 [Information] → [Maintenance Information]
- PC software [Monitor (M)] → [Maintenance Information (I)] → Axis selection

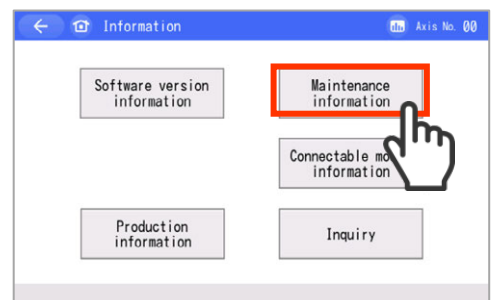
As a reference, shown below is how to operate using a teaching pendant TB-02. Refer to an instruction manual for each teaching tool for detail.

- Switchover to Maintenance Information Screen Using TB-02

1 Touch **Information** on the Menu 1 screen.
Action
 The screen will switch to the Information screen.
 If the TP operation mode is not Monitor mode, a confirmation screen will appear for switching to Monitor mode.



2 Touch **Maintenance information** on the Information screen.
Action
 The maintenance information screen opens.



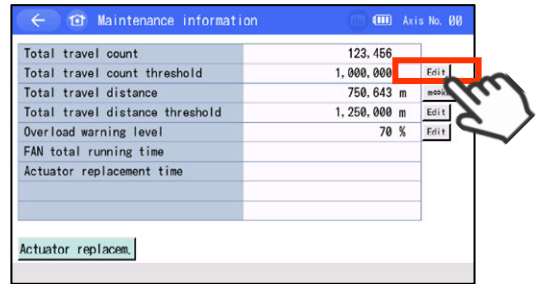
Maintenance information		Axis No. 00
Total travel count	123,456	
Total travel count threshold	1,000,000	Edit
Total travel distance	750,643 m	
Total travel distance threshold	1,250,000 m	Edit
Overload warning level	70 %	Edit
FAN total running time		
Actuator replacement time		
Actuator replacem.		

• Basic Operation in Maintenance Information Screen Using TB-02

1 To set the target value, touch the **Edit** button of the relevant item.

Action

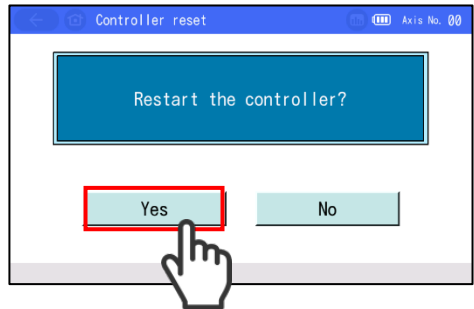
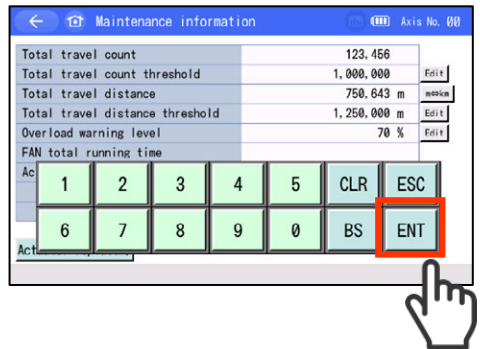
The set value will blink and Ten Key screen will open.



2 Enter the value with the Ten Key pad and touch the **ENT** key.

Action

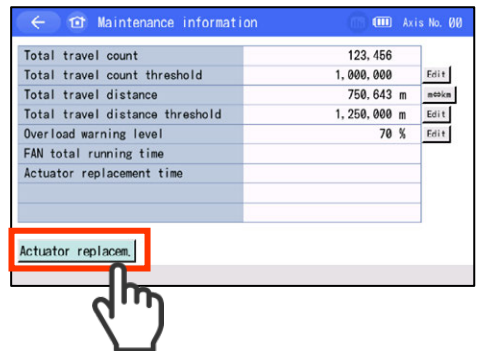
- The target value will change. If you touch **ESC**, the target value will not be changed and the original screen will return.
- A confirmation message will be displayed to reboot the controller when leaving the maintenance screen. The setting change will take effect after rebooting.



3 If the actuator has been replaced, touch the **Actuator replacement** button.

Action

“Total travel count” and “Total travel distance” will be cleared to “0”.



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.

Refer to the following for the replacement method.

- 24V Driver Unit

Refer to [12.3.2 How to Replace Fan Unit].

- 200V Driver Unit

Refer to [12.3.3 How to Replace Fan Unit for 200V Driver Unit].

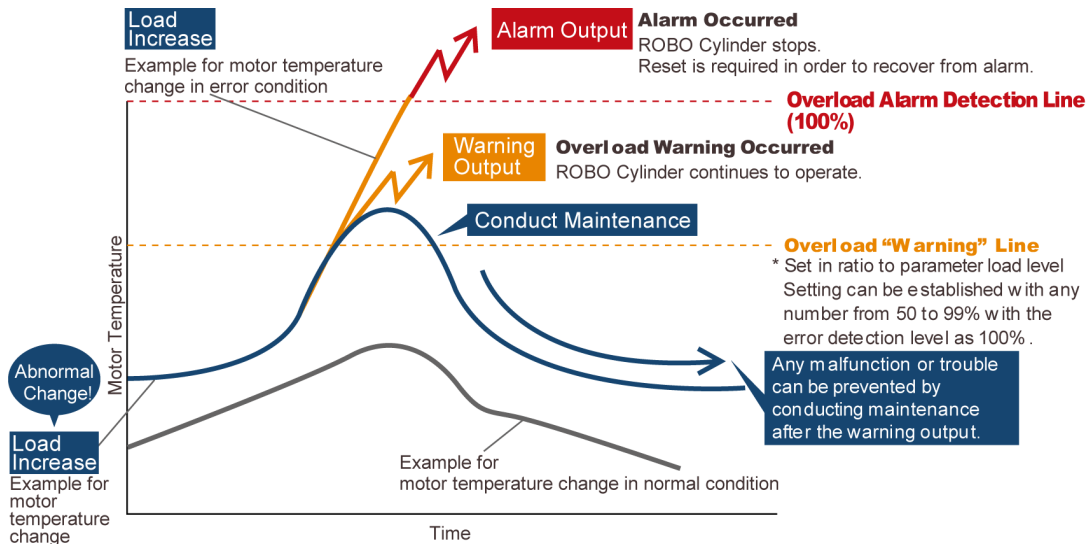
- 200V Power Supply Unit

Refer to [12.3.2 How to Replace Fan Unit].

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

[For driver unit]

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 Warning Output Number	0	0 to 6,999		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.

[In case of EC connection unit (ELECYLINDER)]

- For ELECYLINDER, it is not in the parameters, but in the maintenance information screen in the teaching tool to set the ratio. When each setting values are exceeded, there should be “Maintenance Warning 3” generated and the status LED on ELECYLINDER should flash in green and red in turns to notify.
- When the motor temperature rise value falls below the ratio set as “overload warning level”, “Maintenance warning 3” will be automatically cleared.
- When “Maintenance warning 3” is output, investigate the cause of the increase in load. Maintenance such as greasing or reviewing the operating conditions is recommended.
- Setting it to “100 %” will disable this function.

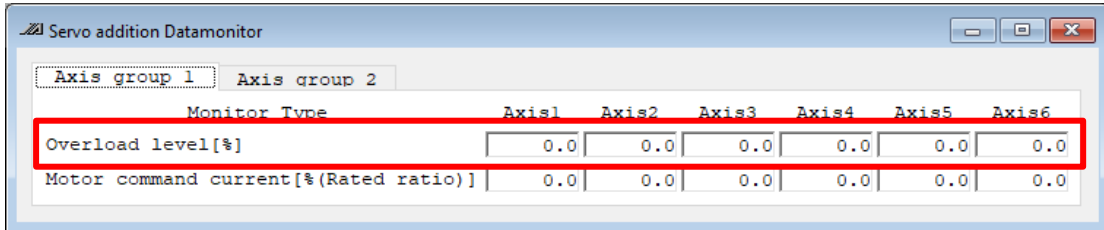
● / ● alternate blinking



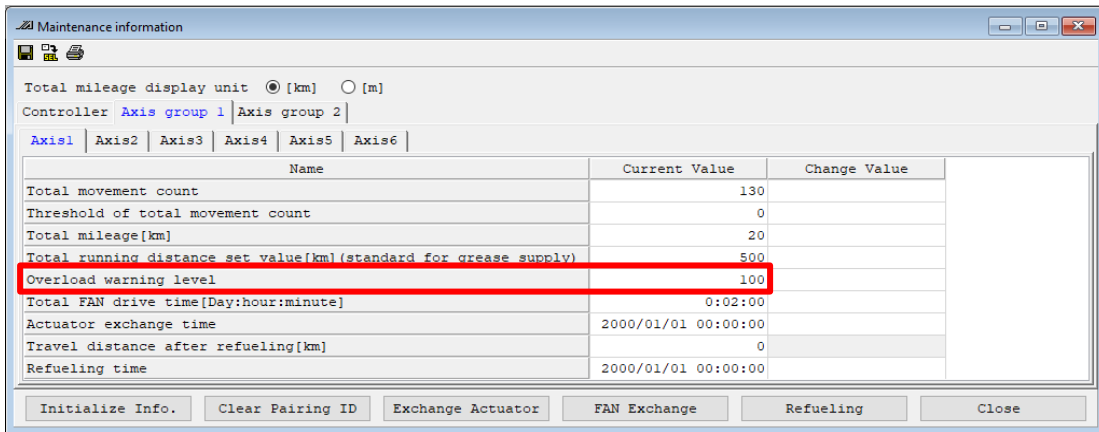
All of maintenance warning LEDs from 1 to 3 on ELECYLINDER flash in green and red in turns.

[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.

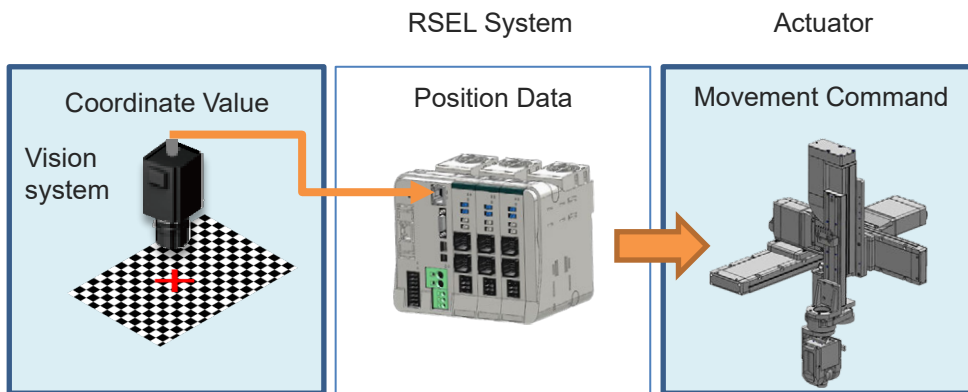
- PC dedicated teaching software instruction manual (ME0398)
- Touch Panel Teaching Pendant TB-02 instruction manual (ME0356)
- Touch Panel Teaching Pendant TB-03 instruction manual (ME0377)

9.5 Vision System Interface Function

9.5.1 About vision system interface function

The vision system interface (hereinafter described as Vision System I/F) feature is capable of storing the coordinate data of a workpiece sent from the vision system directly to the position data.

Refer to [Separate Volume Vision System I/F Feature Instruction Manual (ME0269)] for details.



9.5.2 Applicable function

This manual subjects to the controllers described below.

- RSEL System
- * Only the Each Axis Coordinate System (including combination with cartesian 6-axis robot) is applicable.

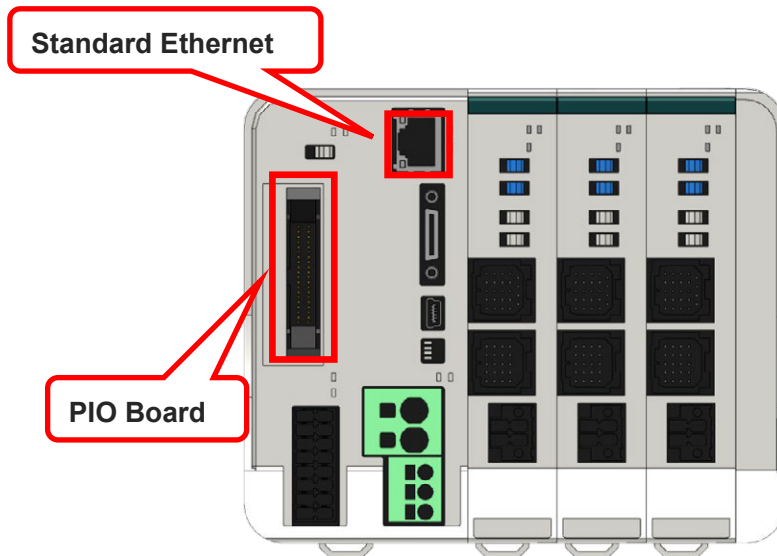
[1] Applicable Vision System

Company name	Product name	Interface
Cognex	In-Sight EZ-110 In-Sight5000 Series	Ethernet
Keyence	CV-3000, CV-5000, XG-7000	Ethernet

9.5.3 Interface specification

The connectivity between the controller part and the vision system should be done with both the parallel communication and the serial communication.

Item	Applications	Remarks
Parallel	PIO Input 1-point Vision system initialization complete Status input (To be used as necessary)	For handshaking with the vision system (It is necessary to select PIO board or to purchase PIO unit)
	PIO Output 1-point Capturing command output (* mandatory) to vision system	
Serial	Ethernet (TCP) Reception of captured work data (* mandatory)	Applicable for Ethernet in standard



9.5.4 Related parameters

Shown below is a list of the parameters related to Vision System I/F.

● 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)
14	Number of Ports Used for I/O1 Fieldbus Remote Input	Depends on Controller Construction	0 to 1,024		Multiple of 8
15	Number of Ports Used for I/O1 Fieldbus Remote Output	Depends on Controller Construction	0 to 1,024		Multiple of 8
16	I/O1fix-allocated input port start No.	Depends on Controller Construction	-1 to 3,999		0 + (Multiple of 8) (0 to 299) 1,000 + (Multiple of 8) (1,000 to 3,999) (Invalid if a negative value is set.) * Only fieldbus available for setting in 1,000 to 3,999
17	I/O1fix-allocated output port start No.	Depends on Controller Construction	-1 to 6,999		300 + (multiple of 8) (300 to 599) 400 + (multiple of 8) (4,000 to 6,999) (Invalid if a negative value is set.) * Only fieldbus available for setting in 4,000 to 6,999
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. 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 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.
123	Network attribute 4	0H	0H to FFFFFFFFH		

9.5 Vision System Interface Function

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
124	Network attribute5	0H	0H to FFFFFFFFH		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 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.
127	Network attribute8	5050214H	0H to FFFFFFFFH		EtherNet TCP/IP message communication attribute Bits 0 to 7: CONNECT_TIMEOUT (Change is prohibited) (Setting of "0" is prohibited) [s] Bits 8 to 15: Connection retry interval (IAI protocol B/TCP) [s] Bits 16 to 23: Send timeout value [s] Bits 24 to 31: IAI protocol B-SIO non-communication check timer setting [s] (IAI protocol B/TCP connection trigger)
129	Network attribute10	0H	0H to FFFFFFFFH		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)
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.)
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.
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
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.

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
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		
351	Vision System I/F 1 Function Selection 1	3105500H	0H to FFFFFFFFH		<p>Bits 0 to 3: Function Select (0: Not to use, 1: Use)</p> <p>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))</p> <p>Bits 8 to 11: Vision System I/F 1 response timeout value [s]</p> <p>Bits 12 to 19: Vision System I/F 1 capturing command disable delay timer value [ms]</p> <p>Bits 20 to 23: Vision System I/F 1 capturing delay prediction timer value [ms]</p> <p>Bits 24 to 31: Number of Vision System I/F 1 capturing command retries *No retry if 0</p>
352	Vision System I/F 1 Function Selection 2	0H	0H to FFFFFFFFH		<p>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)</p> <p>Bits 8 to 31: Reserved by the system</p>
353	Vision System I/F 1 Function Selection 3	54313C0DH	0H to FFFFFFFFH		<p>Bits 0 to 7: Vision System I/F 1 Communication Delimiter</p> <p>Bits 8 to 15: Vision System I/F 1 Communication Delimiter 1 *No header when 0</p> <p>Bits 16 to 31: Vision System I/F 1 Communication Delimiter 2 *No header when 0</p>
356	Vision System I/F 1 Initializing Complete Status Physical Input Port Number	0	0 to 299		* Invalid when set to "0".
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

(Note) I/O Parameter No. 132 to 143 should not be used as they are the TCP/IP settings (I/P Address Subnet Mask Default Gateway) for the Ethernet system field network.

● MC Common Parameters

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
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	-99,999,999 to 99,999,999	0.001mm	Robot coordinate X on Vision System I/F 1 coordinate (X = 0, Y = 0) * Setting is to be established at vision system I/F adjustment.
33	Vision system I/F 1 coordinate datum point offset Y	0	-99,999,999 to 99,999,999	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	-99,999,999 to 99,999,999	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	-99,999,999 to 99,999,999	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	-99,999 to 99,999	0.001mm	
37	Vision system I/F 1 Y-axis (GTVD acquirement data) adjustment offset	0	-99,999 to 99,999	0.001mm	
38	Vision system I/F 1 R-axis (GTVD acquirement data) adjustment offset	0	-360,000 to 360,000	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

9.5.5 Related error code

Shown below is a list of the parameters related to Vision System I/F.

● Operation Cancel Level Errors

Error No.	Error name	Content and Cause / Countermeasure
40D	Vision system error	<p>[Content & Cause] Parameter setting error 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] 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] There is no communication response confirmed from vision system 1) Parameter setting error 2) Setting error in vision system side</p> <p>[Countermeasure] 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] 1) An unsupported identification code was received from the vision system 2) Inappropriate data was received from the vision system</p> <p>[Countermeasure] 1), 2) Check that data sent from the vision system is correct</p>
410	Error of workpiece quantity received (vision system)	<p>[Content & Cause] 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] 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] 1) The workpiece status got busy for some reason 2) The workpiece information handling process fell timed out for some reason</p> <p>[Countermeasure] 1), 2) Reboot the power. Replace SEL unit in case it would not improve even with reboot</p>
412	Vision system command error	<p>[Content & Cause] 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] 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>

Error No.	Error name	Content and Cause / Countermeasure
413	Vision system I/F imaging location error	<p>[Content & Cause] 1) There was an error in the Z-axis position at GTVD Command being executed</p> <p>[Countermeasure] 1) Move the Z-axis to the right position before executing GTVD Command</p>
414	SIO unopened error	<p>[Content & Cause] 1) A channel open to another task was attempted to open again</p> <p>[Countermeasure] 1) Check if the channel required to use is open</p>
415	SIO other task in use error	<p>[Content & Cause] 1) Attempted to open again a channel already open in another task</p> <p>[Countermeasure] 1) Check a channel to release</p>
416	SIO communication mode error	<p>[Content & Cause] 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] 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] 1) WRIT Command was executed to one channel in several tasks at the same time</p> <p>[Countermeasure] 1) Check if data is sent to the same channel at the same timing</p>
430	Waiting timeout setting out of range	<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>
473	Ethernet unclosed socket open error	<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	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 < 1,025, Self port number > 65,535, Self port number duplicated or Connection destination port number at client <= 0 or Connection destination port number at client <= 0 or Connection destination port number at client > 65,535 or Connection destination port number at server < 0 or Connection destination port number at server > 65,535</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"

● Cold Start Level Errors

Error No.	Error name	Content and Cause / Countermeasure
60F	Vision system I/F parameter error	<p>[Content & Cause]</p> <p>Parameter setting error</p> <ol style="list-style-type: none"> 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>[Countermeasure]</p> <ol style="list-style-type: none"> 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"
613	PIO error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) IO power is not supplied (or voltage dropped below 21.6V) <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Check the power supply status to IO cable

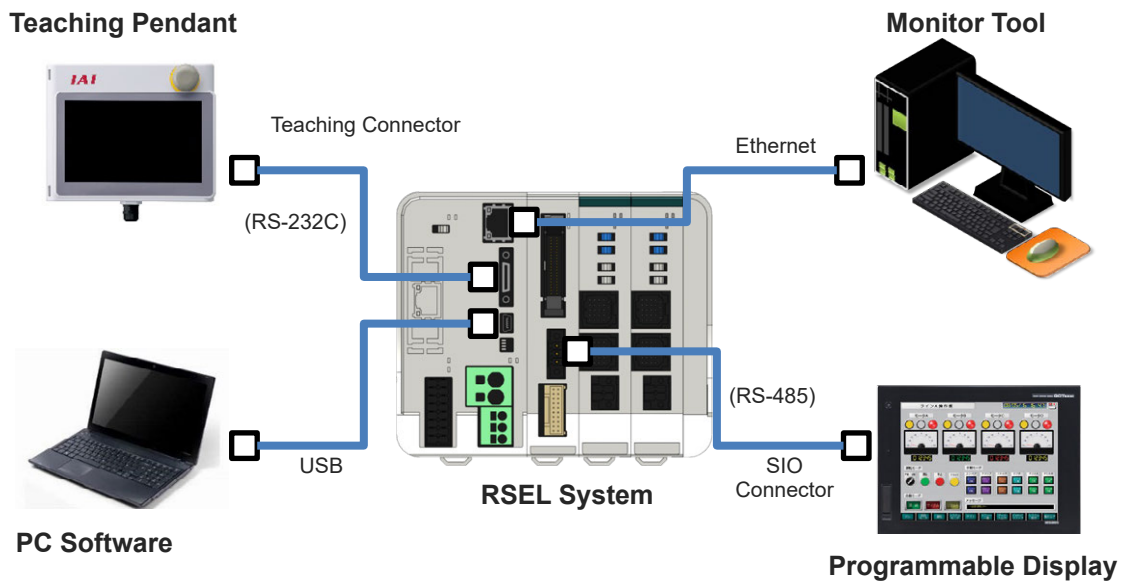
Error No.	Error name	Content and Cause / Countermeasure
632	I/O assignment parameter error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) An input (output) port start number and number of input (output) ports used are set as follows in the fixed assignment <ul style="list-style-type: none"> • A port number other than 0 to 299, 300 to 599, 1,000 to 3,999 or 4,000 to 6,999 • Not a multiple of 8 2) Duplicated assignment due to parameter setting error 3) Excess number of assignment due to parameter setting error <p>[Countermeasure]</p> <ol style="list-style-type: none"> 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 <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" 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 <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"

9.6 RSEL Serial Communication Multiple Channel Applicable Features

The RSEL serial communication is currently available only in one channel. But, this feature enables to have multiple channel communication.

It enables a use such as to connect the PC teaching software, a teaching pendant and a programmable display at the same time.

* This feature is set “inactivated” on delivery.



9.6.1 Applicable version

The applicable versions for this feature are as shown below.

Target	Version
SEL Unit	V1.09 or later
PC Software	V14.01.00.00 or later
TB-02/03	V3.40 or later

(Note) If the PC software or TB-02/03 is in a version not applicable, activating this feature may disconnect the communication.

9.6.2 Function details

This feature should activate by setting the parameters.

(Set 1 in I/O Parameter No. 116 bit 0 to 3)

(*) It is inactivated in standard delivery, and one channel is available for communication.

While the IAI protocol multiple channel communication is permitted, the operation should differ depending on the protocol command types.

The “inquiry commands (e.g. monitoring of current position and position data)” should be available in the multiple channel communication.

The “execution commands (e.g. editing of position data / SEL program / parameters and axis operations such as turning the servo on and home-return operation)” should be available for communication in one channel only.

For the command types (inquiry/execution) in each protocol, refer to the manual below.

[Program Type Controller Serial Communication (Format B) Protocol Specification Manual (ME0347)] ”Japanese Only”

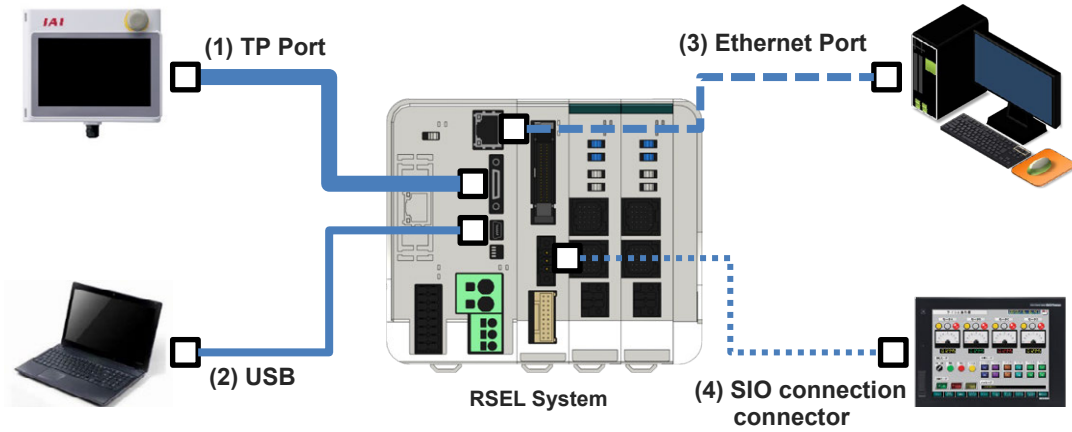
[1] About Execution Commands

The execution command reception channels for each operation mode are as shown below.

Operation mode	Execution Command Reception Channel Indication	Description
MANU	Priority as shown below (1 given to top priority) 1.Teaching Connector 2.USB 3.Ethernet Port 4.SIO connection connector	When an execution command is received from a communication channel with high priority in the channels in communication, the command in the high priority communication channel should get executed. And a command in a communication channel in low priority should get disposed and disregarded.
AUTO	Indicated in parameters I/O Parameter No. 116 bit 4 to 11	An execution command should be available only in one channel that was set. Receiving an execution command from any channel other than the execution command reception channels should dispose and disregard the command.

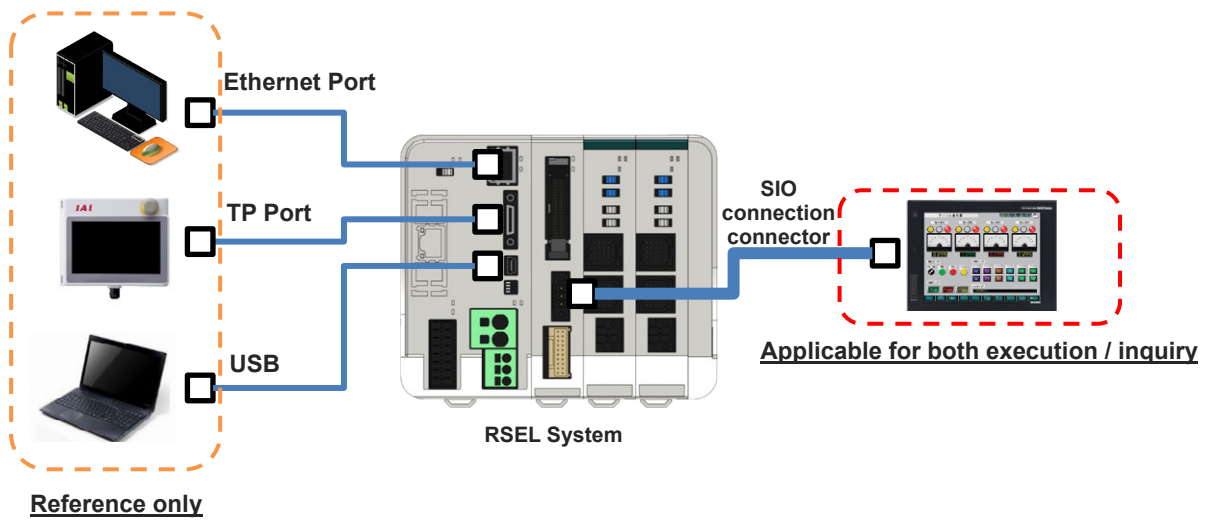
Shown below are some images of channels in communication for each operation mode.

Status of Execution Command Reception in “MANU”



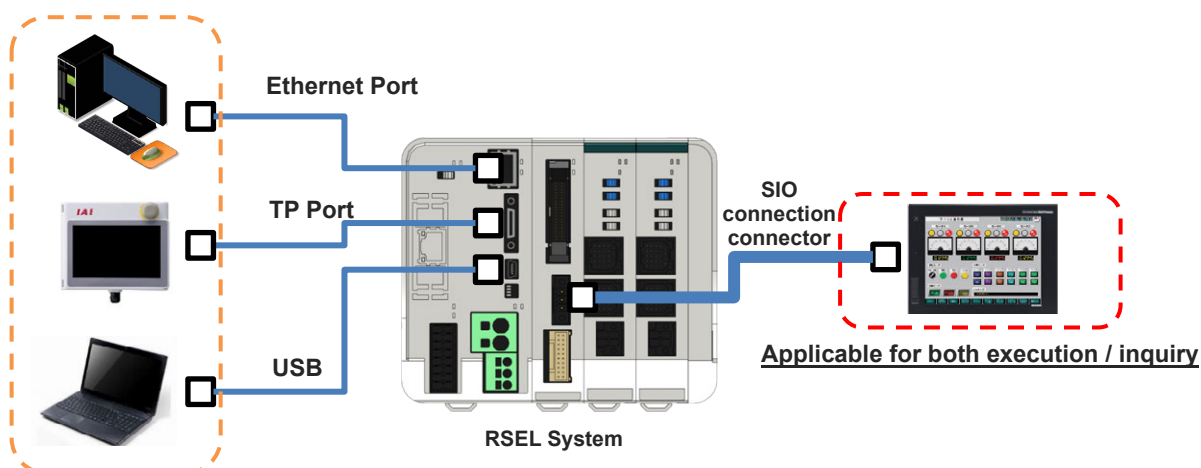
(1) to (4) are priorities in communication channels

**Status of Execution Command Reception in “AUTO”
(SIO connection connector set in I/O Parameter No. 116)**



[2] Setting example

Setting in I/O Parameter No. 116 “IAI Protocol Communication Attribute” should be established. When having the SIO connection connector for the execution command reception channel in AUTO Mode as shown in the following figure, the setting should be established as described below.



Reference only

No.	Parameter	Initial value	Input range	Unit
116	IAI Protocol Communication Attribute	0H	0H to FFFFFFFFH	None

Bits 0-3: Select Permission for IAI Protocol Multiple Channel Communication

→Select Permission (0: Not to Permit, **1: Permit**)

Bits 4-11: Select IAI Protocol Execution Command Communication Reception Channel in AUTO Mode

→Communication channel

(00H: Teaching connector **01H: SIO connection connector** 0AH: USB 26H: Ethernet)

With the settings above, the example this time set I/O Parameter No. 116 = 00000011H.

* When the SIO connection connector is to be used, also establish the settings introduced in [10.7.25 To Use SIO connection connector].

9.6.3 Restriction

When this feature is activated, the jog switch should be disabled on delivery regardless of the setting in Driver Unit Parameter No. 194.

It can be switched over in the parameter below.

MC Common Parameter No. 23 "Select Jog Switch"

0: Permit Job Switch (Setting on Delivery)

The jog switch should be disabled on all axes when the IAI protocol multiple channel communication is enabled.

1: Permit Jog Switch

Even though the jog switch is activated when the IAI protocol multiple channel communication is enabled, the jog switch may activate also when a window such as the edit position data window is open.

2: Prohibit Jog Switch on All Axes

9.6.4 Related parameters

Shown below is a list of the parameters related to Vision System I/F.

● I/O Parameter

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
116	IAI Protocol Communication Attribute	0H	0H to FFFFFFFFH		<p>Bits 0-3: Select Permission for IAI Protocol Multiple Channel Communication (0: Not to Permit Teaching connector > USB > Ethernet > Received in priorities in SIO connection connector. 1: Permit)</p> <p>Bits 4-11: Select IAI Protocol Execution Command Communication Reception Channel in AUTO Mode (00H: Teaching connector 01H: SIO connection connector 0AH: USB 26H: Ethernet)</p> <p>* Select Permission for IAI Protocol Multiple Channel Communication = Enabled when 1 (Permit).</p> <p>* Execution commands in MANU Mode to be received in priorities when feature disabled (Main application part V1.09 or later)</p>

● MC Common Parameters

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
23	Select Jog Switch Features	0	0 to 2		<p>0: Permit Jog Switch (Jog switch disabled for all axes when IAI protocol multiple channel communication permitted. Related data: I/O Parameter No. 116)</p> <p>1: Permit Jog Switch 2: Prohibit Jog Switch on All Axes</p> <p>* When setting = 0 or 1, enable/disable on each axis should follow Driver Unit Parameter No. 194. (Main application part V1.09 or later)</p>

RSEL

Chapter **10**

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.

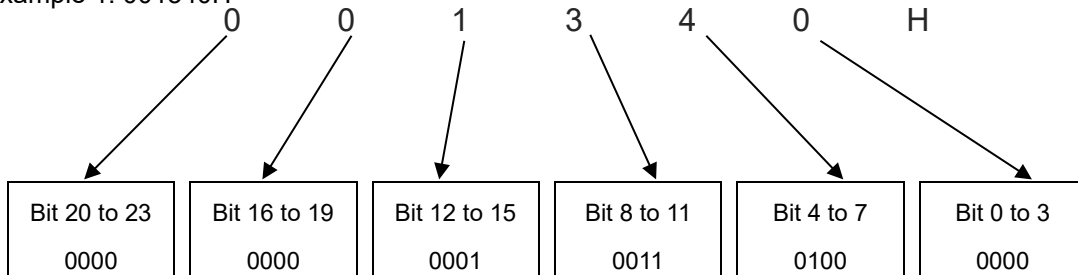
Decimal number	0	1	2	3	4	5	6	7	8	9	10
Binary number	0	1	10	11	100	101	110	111	1000	1001	1010

- Hexadecimal number

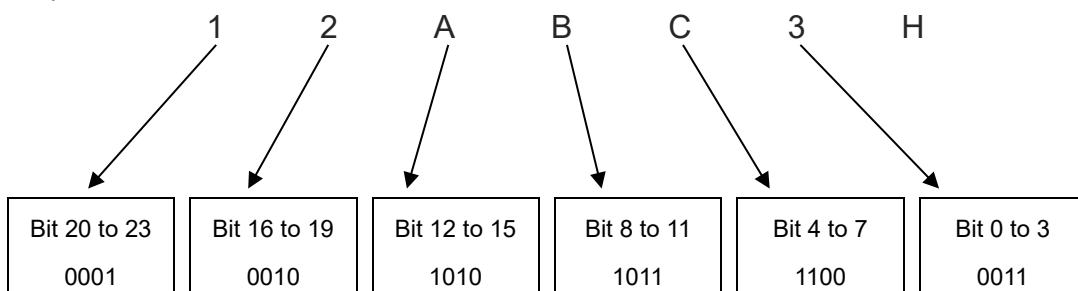
In the Hexadecimal number system, the figure is expressed using nine numerical characters (from 0 to 9) and alphabetical characters (from A to F). The figure is gradually increased from “0” to “1”, “2”, “3”, “4”, “5”, “6”, “7”, “8”, “9”, “A”, “B”, “C”, “D”, “E”, “F” and then moves on to the next digit 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

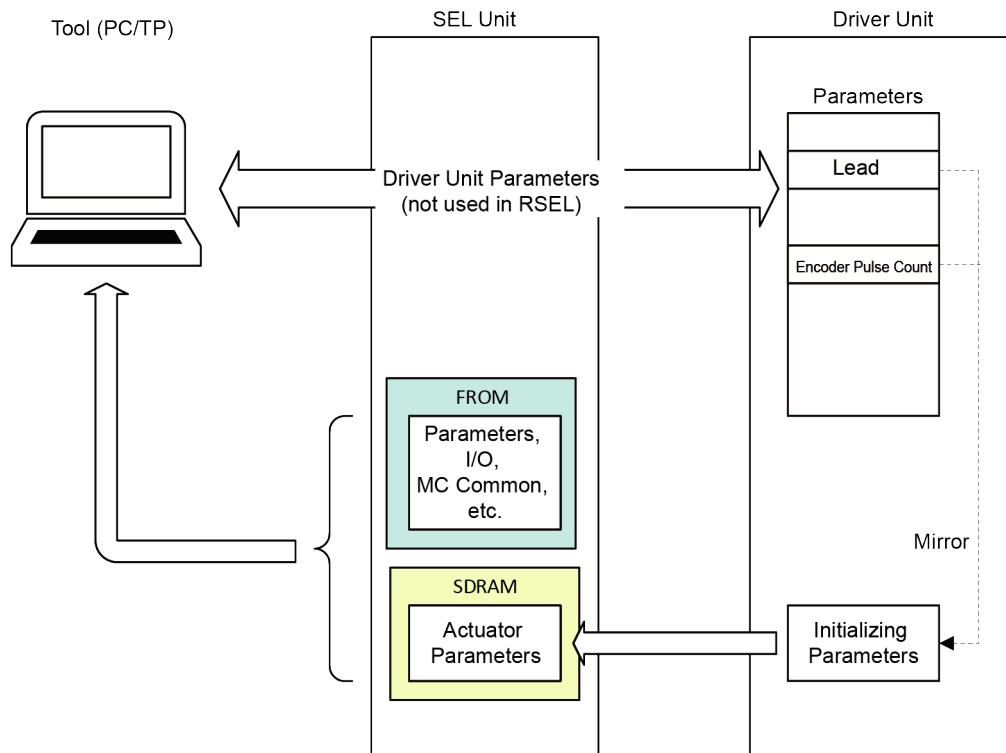
Example 1: 001340H



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 1,024		Multiple of 8
15	Number of Ports Used for I/O1 Fieldbus Remote Output	Depends on Controller Construction	0 to 1,024		Multiple of 8
16	I/O1fix-allocated input port start No.	Depends on Controller Construction	-1 to 3,999		0 + (Multiple of 8) (0 to 299) 1,000 + (Multiple of 8) (1,000 to 3,999) (Invalid if a negative value is set.) * Only fieldbus available for setting in 1,000 to 3,999
17	I/O1fix-allocated output port start No.	Depends on Controller Construction	-1 to 6,999		300 + (multiple of 8) (300 to 599) 400 + (multiple of 8) (4,000 to 6,999) (Invalid if a negative value is set.) * Only fieldbus available for setting in 4,000 to 6,999
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 99,999	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 6,999		Output port ON when I/O is ready (Invalid if "0" is set)
29	Reserved by the system	0	0 to 6,999		
30	Input function selection 000	1	0 to 5		<p>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." * When using this signal to start a program, make sure the signal remains ON for 100 ms 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."</p>
31	Input function selection 001	0	0 to 5		<p>0: General-purpose input 1: Software reset signal (1 s 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."</p>

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
32	Input function selection 002	0	0 to 5		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) 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."
33	Input function selection 003	1	0 to 5		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 ms so that the program will start without fail. 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."
34	Input function selection 004	0	0 to 5		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) 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."
35	Input function selection 005	0	0 to 5		0: General-purpose input 1: Operation-pause reset signal (ON edge) 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."
36	Input function selection 006	0	0 to 5		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. 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."
37	Input function selection 007	1	0 to 5		0: General-purpose input 1: Program number specified for program start (least significant bit) 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. 290, "Port number assigned to input function selection 007."
38	Input function selection 008	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. 291, "Port number assigned to input function selection 008."

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		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) 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."
46	Output function selection 300	2	0 to 20		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) 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."
47	Output function selection 301	3	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) 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."
48	Output function selection 302	2	0 to 20		0: General-purpose output 1: Emergency-stop output (ON) 2: Emergency-stop output (OFF) 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."
49	Output function selection 303	0	0 to 5		0: General-purpose output 1: AUTO mode output 2: Output during automatic operation (Other parameter No. 12) 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."
50	Output function selection 304	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 or home preset coordinate. 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."

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
51	Output function selection 305	0	0 to 5		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 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."
52	Output function selection 306	0	0 to 5		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 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."
53	Output function selection 307	0	0 to 5		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 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."
54	Output function selection 308	0	0 to 5		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 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."
55	Output function selection 309	0	0 to 5		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 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."
56	Output function selection 310	0	0 to 5		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 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."
57	Output function selection 311	0	0 to 5		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 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."

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 3,999		
70	Unaffected general-purpose output area number (MIN) when all operations/programs are aborted	0	0 to 6,999		* 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 6,999		
72	Unaffected general-purpose output area number (MIN) when all operations are paused (servo-axis soft interlock + output-port soft interlock)	300	0 to 6,999		* 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 6,999		
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 6,999		(Invalid if "0" is set)
77	Reserved by the system	0	0 to 3,999		
78	Reserved by the system	0	0B to 11111111B		
79	Input port number for remote mode control	0	0 to 3,999		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 FFFFFFFFH		
101	Reserved by the system	0	0H to FFFFFFFFH		
102	Reserved by the system	28100020H	0H to FFFFFFFFH		
103	Reserved by the system	0	0H to FFFFFFFFH		
104	Reserved by the system	28100010H	0H to FFFFFFFFH		
105	Reserved by the system	0	0H to FFFFFFFFH		
106	Reserved by the system	28100020H	0H to FFFFFFFFH		
107	Reserved by the system	0	0H to FFFFFFFFH		
108	Reserved by the system	28100010H	0H to FFFFFFFFH		
109	Reserved by the system	0	0H to FFFFFFFFH		
110	Reserved by the system	28100020H	0H to FFFFFFFFH		
111	Reserved by the system	0	0H to FFFFFFFFH		
112	Reserved by the system	28100030H	0H to FFFFFFFFH		
113	Reserved by the system	0	0H to FFFFFFFFH		
114	Reserved by the system	28100040H	0H to FFFFFFFFH		
115	Reserved by the system	0	0H to FFFFFFFFH		

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
116	IAI Protocol Communication Attribute	0H	0H to FFFFFFFFH		Bit 0-3: Select Permission of IAI Protocol Multiple Channel Communication (0: Not to Permit Received in priorities of Teaching connector > USB > Ethernet > SIO connection connector. 1: Permit) Bit 4-11: IAI Protocol Execution Command Communication Reception Channel Select in AUTO Mode (00H: Teaching connector 01H: SIO connection connector 0AH: USB 26H: Ethernet) * Select Permission of IAI Protocol Multiple Channel Communication = Enabled when 1 (Permit). * Execution commands in MANU Mode should be received in priorities when the features are inactivated. (Main application part V1.09 or later)
117 to 119	(For expansion)	0			
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 (10 ms) 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 (100 ms) Bits 28 to 31: EtherCAT PDO mapping type (0: Variable, 1: 32Byte Fixed)
122	Network attribute 3	0	0H to FFFFFFFFH		

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
123	Network attribute 4	0H	0H to FFFFFFFFH		<p>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</p> <p>Bits 4 to 7: EtherNet IAI Protocol B/TCP (MANU mode) Select existence check function (0: Not to use, 1: Use Keep Alive)</p> <p>Bits 8 to 11: EtherNet IAI Protocol B/TCP (MANU mode) Select existence check function (0: Not to use, 1: Use Keep Alive)</p> <p>Bits 12 to 15: EtherNet Free-for-User Channel 31 Select existence check function (0: Not to use, 1: Use Keep Alive)</p> <p>Bits 16 to 19: EtherNet Free-for-User Channel 32 Select existence check function (0: Not to use, 1: Use Keep Alive)</p> <p>Bits 20 to 23: EtherNet Free-for-User Channel 33 Select existence check function (0: Not to use, 1: Use Keep Alive)</p> <p>Bits 24 to 27: EtherNet Free-for-User Channel 34 Select existence check function (0: Not to use, 1: Use Keep Alive)</p> <p>Bits 28 to 31: EtherNet Tracking Vision System I/F Select existence check function (0: Not to use, 1: Use Keep Alive)</p> <p>* The connection may get cut if the mating device is not applicable for TCP Keep Alive Function.</p>
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</p> <p>* 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>

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
125	Network attribute6	31E32H	0H to FFFFFFFFH		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 [s]
126	Network attribute7	7D007D0H	0H to FFFFFFFFH		Reserved by the system
127	Network attribute8	5050214H	0H to FFFFFFFFH		EtherNet TCP/IP message communication attribute Bits 0 to 7: CONNECT_TIMEOUT (Change is prohibited) (Setting of "0" is prohibited) [s] Bits 8 to 15: Connection retry interval (IAI protocol B/TCP) [s] Bits 16 to 23: Send timeout value [s] Bits 24 to 31: IAI protocol B-SIO non-communication check timer setting [s] (IAI protocol B/TCP connection trigger)
128	Network attribute9	10000H	0H to FFFFFFFFH		EtherNet TCP/IP message communication attribute Bits 0 to 15: SEL server open timeout value [s] (No timeout check when "0" is set)
129	Network attribute10	0H	0H to FFFFFFFFH		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)
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
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 65,535		* 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 65,535		* 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 65,535		* 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 65,535		* 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.)

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
148	Channel 34 opened to user (TCP/IP): Own port number	64515	1025 to 65,535		* 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 65,535		* "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 65,535		* "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.
164	Vision System I/F Connected Port Number	64613	0 to 65,535		* 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 65,535		
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		

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
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	Option Unit Connected	0	0 to 8	Unit	The number of ports should be number of connected units x 16 for each input and output.
187	Option Unit fix-allocated input port start No.	-1	-1 to 3,999		0 + (Multiple of 8) (0 to 299) 1,000 + (Multiple of 8) (1,000 to 3,999) (Invalid if a negative value is set)
188	Option Unit fix-allocated output port start No.	-1	-1 to 6,999		300 + (Multiple of 8) (300 to 599) 4,000 + (Multiple of 8) (4,000 to 6,999) (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: Option unit output port data select in TF connection error (0: Clear, 1: Hold) Bits 4 to 7: Option unit input port data select in TF connection error (0: Clear, 1: Hold) Bits 8 to 15: TF communication link error check timer value (10 ms) Bits 16 to 19: For future extension use Bits 20 to 31: Link timeout value in communication initialization (100 ms)
191	EC connection unit JOG switch	0	0 to 1		0: Enable 1: Disable (Main application part V1.09 or later)

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
192 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: Communication mode (0: SEL program, 1: Reserved by the system, 2: XSEL Serial communication protocol (Format B)) (Main application part V1.09 or later) 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	Free-for-User Channel 1 IAI Protocol Response Min. Latency	0	0 to 999		(Main application part V1.09 or later)
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		

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
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
226	I/O1 Fieldbus Node Address	Depends on Controller Construction	0 to 99,999,999		Settable Range • At CC-Link: 1 to 64 • At DeviceNet: 0 to 63 • At PROFIBUS-DP: 0 to 125 • At EtherCAT: 0 to 65,535 • At CC-Link IE: 1 to 120 * Setting establishment not necessary for EtherNet/IP and PROFINET IO
227	I/O1 fieldbus communication speed	Depends on Controller Construction	0 to 9		• 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)) * Setting establishment not necessary for PROFIBUS-DP, EtherCAT, PROFINET IO and CC-Link IE
228	I/O1 Fieldbus Network Number	Depends on Controller Construction	0 to 99,999,999		• At CC-Link IE: 1 to 239 * Setting not necessary when other than CC-Link IE
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 3,999		
234	Reserved by the system	-1	-1 to 6,999		
235	Reserved by the system	1	0 to 5		
236	Reserved by the system	0H	Reference only 0H to FFFFFFFFH		
237	Reserved by the system	0	0 to 99,999,999		
238	Reserved by the system	0	0 to 9		
239	Reserved by the system	0	0 to 99,999,999		
240 to 282	(For expansion)	0			
283	Port number assigned to input function selection 000	-1	-1 to 3,999		Specify the port number to be assigned to the function of I/O parameter No. 30, "Input function selection 000." * If a negative value is set, the function will be assigned to input port No. 0.
284	Port number assigned to input function selection 001	-1	-1 to 3,999		Specify the port number to be assigned to the function of I/O parameter No. 31, "Input function selection 001." * If a negative value is set, the function will be assigned to input port No. 1.

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
285	Port number assigned to input function selection 002	-1	-1 to 3,999		Specify the port number to be assigned to the function of I/O parameter No. 32, "Input function selection 002." * If a negative value is set, the function will be assigned to input port No. 2.
286	Port number assigned to input function selection 003	-1	-1 to 3,999		Specify the port number to be assigned to the function of I/O parameter No. 33, "Input function selection 003." * If a negative value is set, the function will be assigned to input port No. 3.
287	Port number assigned to input function selection 004	-1	-1 to 3,999		Specify the port number to be assigned to the function of I/O parameter No. 34, "Input function selection 004." * If a negative value is set, the function will be assigned to input port No. 4.
288	Port number assigned to input function selection 005	-1	-1 to 3,999		Specify the port number to be assigned to the function of I/O parameter No. 35, "Input function selection 005." * 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 3,999		Specify the port number to be assigned to the function of I/O parameter No. 36, "Input function selection 006." * 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 3,999		Specify the port number to be assigned to the function of I/O parameter No. 37, "Input function selection 007." * 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. (Related information: I/O parameter No. 30, "Input function selection 000")
291	Port number assigned to input function selection 008.	-1	-1 to 3,999		Specify the port number to be assigned to the function of I/O parameter No. 38, "Input function selection 008." * 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 3,999		Specify the port number to be assigned to the function of I/O parameter No. 39, "Input function selection 009." * 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 3,999		Specify the port number to be assigned to the function of I/O parameter No. 40, "Input function selection 010." * 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.

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
294	Port number assigned to input function selection 011	-1	-1 to 3,999		Specify the port number to be assigned to the function of I/O parameter No. 41, "Input function selection 011." * 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.
295	Port number assigned to input function selection 012	-1	-1 to 3,999		Specify the port number to be assigned to the function of I/O parameter No. 42, "Input function selection 012." * 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 3,999		Specify the port number to be assigned to the function of I/O parameter No. 43, "Input function selection 013." * 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 3,999		Specify the port number to be assigned to the function of I/O parameter No. 44, "Input function selection 014." * 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. (Related information: I/O parameter No. 30, "Input function selection 000")
298	Port number assigned to input function selection 015	-1	-1 to 3,999		Specify the port number to be assigned to the function of I/O parameter No. 45, "Input function selection 015." * 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 6,999		Specify the port number to be assigned to the function of I/O parameter No. 46, "Output function selection 300." * 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 6,999		Specify the port number to be assigned to the function of I/O parameter No. 47, "Output function selection 301." * 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 6,999		Specify the port number to be assigned to the function of I/O parameter No. 48, "Output function selection 302." * 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 6,999		Specify the port number to be assigned to the function of I/O parameter No. 49, "Output function selection 303." * If 0 is set, the function will be assigned to output port No. 303.

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
303	Port number assigned to output function selection 304	0	0 to 6,999		Specify the port number to be assigned to the function of I/O parameter No. 50, "Output function selection 304." * 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 6,999		Specify the port number to be assigned to the function of I/O parameter No. 51, "Output function selection 305." * If 0 is set, the function will be assigned to output port No. 305.
305	Port number assigned to output function selection 306	0	0 to 6,999		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 6,999		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 6,999		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 6,999		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 6,999		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 6,999		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 6,999		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 6,999		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 6,999		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 6,999		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 6,999		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 6,999		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.

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
317	Port number assigned to output function selection 302 (area 2)	0	0 to 6,999		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 6,999		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.
319	Port number assigned to output function selection 304 (area 2)	0	0 to 6,999		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 6,999		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 6,999		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 6,999		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 6,999		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 6,999		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 6,999		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 6,999		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 6,999		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 6,999		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 6,999		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 6,999		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 MOV P 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 3,999		
349	Reserved by the system	0	0 to 6,999		
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 [s] Bits 12 to 19: Vision System I/F 1 capturing command disable delay timer value [ms] Bits 20 to 23: Vision System I/F 1 capturing delay prediction timer value [ms] 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 FFFFFFFFH		
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 6,999		(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 6,999		
382	Unaffected general-purpose output area 3 number (MIN) when all operations/programs are aborted	0	0 to 6,999		(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 6,999		
384	Unaffected general-purpose output area 4 number (MIN) when all operations/programs are aborted	0	0 to 6,999		(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 6,999		
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 6,999		(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 6,999		
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 6,999		(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 6,999		
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 6,999		(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 6,999		
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 3,999		
408	Reserved by the system	-1	-1 to 6,999		
409	Reserved by the system	1	0 to 5		
410	(For expansion)	0			
411	Reserved by the system	1256	1,000 to 3,999		
412	Reserved by the system	4256	4,000 to 6,999		
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 99,999	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 65,535		
464	Reserved by the system	0	0H to FFFFFFFFH		
465 to 467	Reserved by the system	0	0 to 65,535		
468	Reserved by the system	0	0H to FFFFFFFFH		
469 to 471	Reserved by the system	0	0 to 65,535		
472	Reserved by the system	0	0H to FFFFFFFFH		
473 to 475	Reserved by the system	0	0 to 65,535		

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 65,535		
480	Reserved by the system	0	0H to FFFFFFFFH		
481 to 483	Reserved by the system	0	0 to 65,535		
484	Reserved by the system	0	0H to FFFFFFFFH		
485 to 487	Reserved by the system	0	0 to 65,535		
488	Reserved by the system	0	0H to FFFFFFFFH		
489 to 491	Reserved by the system	0	0 to 65,535		
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	1,000 to 3,999		
505	Reserved by the system	4000	4,000 to 6,999		
506	Reserved by the system	3000	0 to 99,999	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 3,999		
527 to 528	(For expansion)	0			
529	Reserved by the system	00111111B	0B to 11111111B		
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 3,999		
536	Reserved by the system	0	0 to 6,999		
537	Reserved by the system	00000000H	0H to FFFFFFFFH		
538	Reserved by the system	0	0 to 3,999		
539	Reserved by the system	0	0 to 6,999		
540	Reserved by the system	00000000H	0H to FFFFFFFFH		
541	Reserved by the system	0	0 to 3,999		
542	Reserved by the system	0	0 to 6,999		
543	Reserved by the system	00000000H	0H to FFFFFFFFH		
544	Reserved by the system	0	0 to 3,999		
545	Reserved by the system	0	0 to 6,999		
546	Reserved by the system	00000000H	0H to FFFFFFFFH		
547	Reserved by the system	0	0 to 3,999		
548	Reserved by the system	0	0 to 6,999		

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 3,999		
551	Reserved by the system	0	0 to 6,999		
552	Reserved by the system	00000000H	0H to FFFFFFFFH		
553	Reserved by the system	0	0 to 3,999		
554	Reserved by the system	0	0 to 6,999		
555	Reserved by the system	00000000H	0H to FFFFFFFFH		
556	Reserved by the system	0	0 to 3,999		
557	Reserved by the system	0	0 to 6,999		
558	Reserved by the system	00000000H	0H to FFFFFFFFH		
559	Reserved by the system	0	0 to 3,999		
560	Reserved by the system	0	0 to 6,999		
561	Reserved by the system	00000000H	0H to FFFFFFFFH		
562	Reserved by the system	0	0 to 3,999		
563	Reserved by the system	0	0 to 6,999		
564	Reserved by the system	00000000H	0H to FFFFFFFFH		
565	Reserved by the system	0	0 to 3,999		
566	Reserved by the system	0	0 to 6,999		
567	Reserved by the system	00000000H	0H to FFFFFFFFH		
568	Reserved by the system	0	0 to 3,999		
569	Reserved by the system	0	0 to 6,999		
570	Reserved by the system	00000000H	0H to FFFFFFFFH		
571	Reserved by the system	0	0 to 3,999		
572	Reserved by the system	0	0 to 6,999		
573	Reserved by the system	00000000H	0H to FFFFFFFFH		
574	Reserved by the system	0	0 to 3,999		
575	Reserved by the system	0	0 to 6,999		
576	Reserved by the system	00000000H	0H to FFFFFFFFH		
577	Reserved by the system	0	0 to 3,999		
578	Reserved by the system	0	0 to 6,999		
579	Reserved by the system	00000000H	0H to FFFFFFFFH		
580	Reserved by the system	0	0 to 3,999		
581	Reserved by the system	0	0 to 6,999		
582	Reserved by the system	00000000H	0H to FFFFFFFFH		
583	Reserved by the system	0	0 to 3,999		
584	Reserved by the system	0	0 to 6,999		
585	Reserved by the system	00000000H	0H to FFFFFFFFH		
586	Reserved by the system	0	0 to 3,999		
587	Reserved by the system	0	0 to 6,999		
588 to 592	(For expansion)	0			
593	(Reserved by the system)	0	0 to 6,999	-	
594 to 596	(Reserved by the system)	0H	0H to FFFFFFFFH	-	
597	Reserved by the system	0	0 to 6,999	-	
598 to 600	Reserved by the system	0H	0H to FFFFFFFFH	-	
601	Reserved by the system	0	0 to 4		
602 to 603	Reserved by the system	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 FFFFFFFFH		
607	Reserved by the system	1	0 to 5		
608	Reserved by the system	F000000H	0H to FFFFFFFFH		
609	Reserved by the system	F05H	0H to FFFFFFFFH		
610	Reserved by the system	0H	0H to FFFFFFFFH		
611 to 612	(For expansion)	0	0H to FFFFFFFFH		
613 to 615	Reserved by the system	0H	0H to FFFFFFFFH		
616	Reserved by the system	0	0 to 99,999,999		
617 to 619	Reserved by the system	0H	0H to FFFFFFFFH		
620	Reserved by the system	0	0 to 99,999,999		
621 to 623	Reserved by the system	0H	0H to FFFFFFFFH		
624	Reserved by the system	0	0 to 99,999,999		
625 to 627	Reserved by the system	0H	0H to FFFFFFFFH		
628	Reserved by the system	0	0 to 99,999,999		
629 to 631	Reserved by the system	0H	0H to FFFFFFFFH		
632	Reserved by the system	0	0 to 99,999,999		
633 to 635	Reserved by the system	0H	0H to FFFFFFFFH		
636	Reserved by the system	0	0 to 99,999,999		
637 to 639	Reserved by the system	0H	0H to FFFFFFFFH		
640	Reserved by the system	0	0 to 99,999,999		
641 to 643	Reserved by the system	0H	0H to FFFFFFFFH		
644	Reserved by the system	0	0 to 99,999,999		
645 to 647	Reserved by the system	0H	0H to FFFFFFFFH		
648	Reserved by the system	0	0 to 99,999,999		
649 to 651	Reserved by the system	0H	0H to FFFFFFFFH		
652	Reserved by the system	0	0 to 99,999,999		
653 to 655	Reserved by the system	0H	0H to FFFFFFFFH		
656	Reserved by the system	0	0 to 99,999,999		

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
657 to 659	Reserved by the system	0H	0H to FFFFFFFFH		
660	Reserved by the system	0	0 to 99,999,999		
661 to 663	Reserved by the system	0H	0H to FFFFFFFFH		
664	Reserved by the system	0	0 to 99,999,999		
665 to 667	Reserved by the system	0H	0H to FFFFFFFFH		
668	Reserved by the system	0	0 to 99,999,999		
669 to 671	Reserved by the system	0H	0H to FFFFFFFFH		
672	Reserved by the system	0	0 to 99,999,999		
673 to 675	Reserved by the system	0H	0H to FFFFFFFFH		
676	Reserved by the system	0	0 to 99,999,999		
677 to 678	Reserved by the system	0H	0H to FFFFFFFFH		
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 3,999		
690	Reserved by the system	-1	-1 to 6,999		
691	Reserved by the system	-1	-1 to 3,999		
692	Reserved by the system	-1	-1 to 6,999		
693 to 700	Reserved by the system	0H	0H to FFFFFFFFH		
701	Reserved by the system	0	0 to 256		
702 to 704	(For expansion)	0			
705	Reserved by the system	0H	0H to FFFFFFFFH		
706	Reserved by the system	1H	0H to FH		
707	Reserved by the system	-1	-1 to 3,999		
708	Reserved by the system	-1	-1 to 6,999		
709	Reserved by the system	-1	-1 to 3,999		
710	Reserved by the system	-1	-1 to 6,999		
711	Reserved by the system	-1	-1 to 3,999		
712	Reserved by the system	-1	-1 to 6,999		
713	Reserved by the system	-1	-1 to 3,999		
714	Reserved by the system	-1	-1 to 6,999		
715	Reserved by the system	1	0 to 5		
716	Reserved by the system	0H	0H to FFFFFFFFH		
717 to 815	(For expansion)	0			
816 to 847	Reserved by the system	0	0 to 3,999		
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 FFFFFFFFH	-	<p>* Set 0 when output inactivated.</p> <p>Bits 00 to 03: Output data type (0: Output Invalid 1: Power Supply Status 2: Axis Status 3: EC status (Main application part V1.09 or later))</p> <p>Bits 04 to 07: (Reserved)</p> <p>Bits 08 to 15: Output data item</p> <ul style="list-style-type: none"> • Output data type (Bit 00 to 03) = "1: Power Supply Status" (0: Output Voltage, 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) = "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]) <p>Bits 16 to 19: Resolution (0:1000, 1:100, 2:10, 3:1 4:1/10(0.1), 5:1/100(0.01), 6:1/1000(0.001))</p> <p>Bits 20 to 23: (Reserved)</p> <p>Bits 24 to 27: Byte Order (0: Big Endian, 1: Middle Endian 1 (PDP Endian), 2: Middle Endian 3, Little Endian)</p> <p>Bits 28 to 31: Data Size (0:1 byte 1:2 byte (1 word) 2:4 byte (2 word))</p>
852	Data IO Output Setting 01 Unit Type	0H	0H to FFFFFFFFH	-	<p>* Set 0 when output inactivated.</p> <p>Bits 00 to 07: Axis Group Number (0: Invalid, 1 to 4: Valid)</p> <p>Bits 08 to 15: Axis Group Constructing Axis Numbers (0: Invalid, 1 to 8: Valid)</p> <p>Bits 16 to 31: Top Output Port Number (0: Invalid, 300 to 599 Physical Output Port 4,000 to 6,999 Extension Output Port)</p>
853	Data IO Output Setting 02 Data Type	0H	0H to FFFFFFFFH	-	(Same as I/O parameter No. 851)
854	Data IO Output Setting 02 Unit Type	0H	0H to FFFFFFFFH	-	(Same as I/O parameter No. 852)
855	Data IO Output Setting 03 Data Type	0H	0H to FFFFFFFFH	-	(Same as I/O parameter No. 851)
856	Data IO Output Setting 03 Unit Type	0H	0H to FFFFFFFFH	-	(Same as I/O parameter No. 852)
857	Data IO Output Setting 04 Data Type	0H	0H to FFFFFFFFH	-	(Same as I/O parameter No. 851)
858	Data IO Output Setting 04 Unit Type	0H	0H to FFFFFFFFH	-	(Same as I/O parameter No. 852)
859	Data IO Output Setting 05 Data Type	0H	0H to FFFFFFFFH	-	(Same as I/O parameter No. 851)
860	Data IO Output Setting 05 Unit Type	0H	0H to FFFFFFFFH	-	(Same as I/O parameter No. 852)
861	Data IO Output Setting 06	0H	0H to	-	(Same as I/O parameter No. 851)

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
	Data Type		FFFFFFFFH		
862	Data IO Output Setting 06 Unit Type	0H	0H to FFFFFFFFH	-	(Same as I/O parameter No. 852)
863	Data IO Output Setting 07 Data Type	0H	0H to FFFFFFFFH	-	(Same as I/O parameter No. 851)
864	Data IO Output Setting 07 Unit Type	0H	0H to FFFFFFFFH	-	(Same as I/O parameter No. 852)
865	Data IO Output Setting 08 Data Type	0H	0H to FFFFFFFFH	-	(Same as I/O parameter No. 851)
866	Data IO Output Setting 08 Unit Type	0H	0H to FFFFFFFFH	-	(Same as I/O parameter No. 852)
867	Data IO Output Setting 09 Data Type	0H	0H to FFFFFFFFH	-	(Same as I/O parameter No. 851)
868	Data IO Output Setting 09 Unit Type	0H	0H to FFFFFFFFH	-	(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 60,000	ms	For an EC connection unit that the drive shutoff release timing is to be adjusted for each axis, the latency should be that for one unit (four axes).
23					0: Permit Jog Switch (Jog switch disabled for all axes when IAI protocol multiple channel communication permitted. Related data: I/O Parameter No. 116) 1: Permit Jog Switch 2: Prohibit Jog Switch on All Axes * When setting = 0 or 1, enable/disable on each axis should follow Driver Unit Parameter No. 194. (Main application part V1.09 or later)
24 to 30	(For expansion)	0	to		

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
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	-99,999,999 to 99,999,999	0.001mm	Robot coordinate X on Vision System I/F 1 coordinate (X = 0, Y = 0) * Setting is to be established at vision system I/F adjustment.
33	Vision system I/F 1 coordinate datum point offset Y	0	-99,999,999 to 99,999,999	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	-99,999,999 to 99,999,999	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	-99,999,999 to 99,999,999	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	-99,999 to 99,999	0.001mm	
37	Vision system I/F 1 Y-axis (GTVD acquirement data) adjustment offset	0	-99,999 to 99,999	0.001mm	
38	Vision system I/F 1 R-axis (GTVD acquirement data) adjustment offset	0	-360,000 to 360,000	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 FFFFFFFFH		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 FFFFFFFFH		2nd axis valid setting and driver assignment setting (parameter definitions same as 1st axis)
3	3rd Axis Use Setting	0H	Reference only 0H to FFFFFFFFH		3rd axis valid setting and driver assignment setting (parameter definitions same as 1st axis)
4	4th Axis Use Setting	0H	Reference only 0H to FFFFFFFFH		4th axis valid setting and driver assignment setting (parameter definitions same as 1st axis)
5	5th Axis Use Setting	0H	Reference only 0H to FFFFFFFFH		5th axis valid setting and driver assignment setting (parameter definitions same as 1st axis)
6	6th Axis Use Setting	0H	Reference only 0H to FFFFFFFFH		6th axis valid setting and driver assignment setting (parameter definitions same as 1st axis)
7	7th Axis Use Setting	0H	Reference only 0H to FFFFFFFFH		7th axis valid setting and driver assignment setting (parameter definitions same as 1st axis)
8	8th Axis Use Setting	0H	Reference only 0H to FFFFFFFFH		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 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

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 9,999	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 9,999	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 99,999		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 3,999		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	-99,999,999 to 99,999,999	0.001mm	For coordinate adjustment between synchronizing master axis and slave axis Affective to slave axis only
18	Synchronizing Option Type	0H	0H to FFFFFFFH		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		
20	Total Moving Count Setting	0	0 to 99,999,999	回	For maintenance information alert feature Alert feature invalid when set to 0 "231: Moving Count Setting Exceeded" occurs when maintenance information "Total Moving Count" exceeds this parameter
21	Zone1 Positive Side	0	-99,999,999 to 99,999,999	0.001mm	Only Positive side > Negative side valid * Necessary to secure 3 ms or more for domain going-through time

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
22	Zone1 Negative Side	0	-99,999,999 to 99,999,999	0.001mm	Only Positive side > Negative side valid * Necessary to secure 3 ms or more for domain going-through time
23	Zone 1 Output No.	0	0 to 6,999		Physical output port or Global Flag or Extended Output Ports (Output invalid when set to 0, invalid when duplicated)
24	Zone2 Positive Side	0	-99,999,999 to 99,999,999	0.001mm	Only Positive side > Negative side valid * Necessary to secure 3 ms or more for domain going-through time
25	Zone2 Negative Side	0	-99,999,999 to 99,999,999	0.001mm	Only Positive side > Negative side valid * Necessary to secure 3 ms or more for domain going-through time
26	Zone 2 Output No.	0	0 to 6,999		Physical output port or Global Flag or Extended Output Ports (Output invalid when set to 0, invalid when duplicated)
27	Zone3 Positive Side	0	-99,999,999 to 99,999,999	0.001mm	Only Positive side > Negative side valid * Necessary to secure 3 ms or more for domain going-through time
28	Zone3 Negative Side	0	-99,999,999 to 99,999,999	0.001mm	Only Positive side > Negative side valid * Necessary to secure 3 ms or more for domain going-through time
29	Zone 3 Output No.	0	0 to 6,999		Physical output port or Global Flag or Extended Output Ports (Output invalid when set to 0, invalid when duplicated)
30	Zone4 Positive Side	0	-99,999,999 to 99,999,999	0.001mm	Only Positive side > Negative side valid * Necessary to secure 3 ms or more for domain going-through time
31	Zone4 Negative Side	0	-99,999,999 to 99,999,999	0.001mm	Only Positive side > Negative side valid * Necessary to secure 3 ms or more for domain going-through time
32	Zone 4 Output No	0	0 to 6,999		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 6,999		Physical output port or Extended Output Ports (Output invalid when set to 0, invalid when duplicated)
34	In-Position Output Number	0	0 to 6,999		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 6,999		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	(For expansion)	0	to		
45	NTCH 初期値	0	0 to 3		<p>Initial value in anti-vibration control parameter set number (Main application part V1.09 or later)</p> <ul style="list-style-type: none"> * Setting not available for axed not supporting anti-vibration control * The settings in master axis to be reflected to both master axis and slave axis when synchronizing control is activated
46 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 -999,999 to 999,999	0.01mm	
3	Soft limit - side	Depended to Actuator / Robot	Reference only -999,999 to 999,999	0.01mm	
5	Ball Screw Lead Length	Depended to Actuator / Robot	Reference only 1 to 99,999	0.01mm	Moving amount in one turn of motor
6	Software Limit Margin	Depended to Actuator / Robot	Reference only 0 to 999,999	0.01mm	
16	Pressing Stop Judgment Time	Depended to Actuator / Robot	Reference only 0 to 9,999	ms	
17	Position Gain	Depended to Actuator / Robot	Reference only 0 to 9,999	rad/s	
19	Initial Positioning Band	Depended to Actuator / Robot	Reference only 1 to 9,999	0.01mm	
25	Soft Limit + after Combination Unit Adjusted	Depended to Actuator / Robot	Reference only -99,999,999 to 99,999,999	0.001mm 0.001deg	
26	Soft Limit - after Combination Unit Adjusted	Depended to Actuator / Robot	Reference only -99,999,999 to 99,999,999	0.001mm 0.001deg	
29	Multiple Slider Excess Approach Detection Effective Stroke	Depended to Actuator / Robot	Reference only 0 to 99,999,999	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 FFFFFFFH		

10.2.6 Option board parameters

No.	Parameter name	Setting at Delivery	Input range	Unit	Remarks
1	Type (upper) (Manufacturing information)	0	0 to 15		0: PIO unit 1: EC connection unit
2	Type (middle) (Manufacturing information)	0	0 to 1		0: SEL Program 1: Host device (PLC etc.) * dedicated for EC connection unit
3	Type (lower) (Manufacturing information)	0	0 to 3,999		0 + (Multiple to 8) (0 to 299) 1,000 + (Multiple to 8) (1,000 to 3,999) Setting necessary when Control System = 1 (Host Device) (Number of ports depends on types of units) * dedicated for EC connection unit
4	Manufacturing data (Manufacturing information)	0	0 to 6,999		300 + (Multiple to 8) (300 to 599) 4,000+ (Multiple to 8) (4,000 to 6,999) Setting necessary when Control System = 1 (Host Device) (Number of ports depends on types of units) * dedicated for EC connection unit
7 to 100		0H	0000H to FFFFH		

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)
2	I/O processing program number at operation/program abort	0	0 to 512		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.
3	I/O processing program number at all operation pause	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.
4	Program abort type at error	0	0 to 5		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.
5	I/O processing program start type at operation/program abort	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)
6	PC/TP reconnection delay at software reset	14000	1 to 99999	ms	* The setting will become effective after the controller, PC or TP is restarted.
7 to 8	(For expansion)	0			
9	Reserved by the system (change is prohibited)	0	0 to 9		
10	Emergency Stop Recovery Type	0	0 to 4		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)

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 1,099		
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	-99,999,999 to 99,999,999		
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
55	PC/TP data protect setting 1	0H	0H to FFFFFFFFH		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
56	PC/TP data protect setting 2	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) (1,000's place, BCD) Bits 12 to 15: Protect range maximum number (Position) (10,000'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
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 359.999 deg inside in Index Mode	10-49
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 0 deg inside in Index Mode	10-49
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	10-50
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	10-51
7	Servo gain number	-	1 to 31	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	–	Refer to [10.6 Servo gain adjustment]	10-52
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	10-53
12	Current limit during positioning stop	%	0 to 70	<input type="radio"/>	–	–	–	–	Torque limit in Excitation Phase Fixed Mode	10-53
13	Current limit during homing	%	0 to 100 0 to 300	<input type="radio"/>	–	–	–	–	Not necessary to change in normal use	10-54 10-54
14	Dynamic brake	–	0 to 1	–	–	–	<input type="radio"/>	<input type="radio"/>	0: Disabled, 1: enabled	10-54
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	10-54
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	10-55
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	10-55
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.)	10-56
28	Excitation signal detection operation Initial travel direction	–	0 to 1	<input type="radio"/>	<input type="radio"/>	–	–	–	0: Opposite, 1: Original	10-57
29	Excitation signal detection time	ms	1 to 999 50 to 999	<input type="radio"/>	–	–	–	–	Not necessary to change in normal use	10-57

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	10-58
	Pole sense type	–	0 to 2	–	○	–	–	–	0: Current Control, 1: Distance Control 1, 2: Distance Control 2	10-58
31	Velocity loop proportional gain	–	1 to 99,999,999	○	○	○	○	○	Refer to [10.6 Servo gain adjustment]	10-59
32	Velocity loop integral gain	–	1 to 99,999,999	○	○	○	○	○	Refer to [10.6 Servo gain adjustment]	10-60
33	Torque filter constant	–	0 to 2,500	○	○	○	○	○	Refer to [10.6 Servo gain adjustment]	10-61
43	Home confirmation sensor input polarity	–	0 to 2	○	○	–	–	–	0: Not to be Used, 1: Albeit Contact, 2: Break Contact	10-61
54	Current control width number	–	0 to 15	–	○	○	○	○	Change only when instructed by us.	10-61
71	Position feed forward gain	–	0 to 100	○	○	○	○	○	Refer to [10.6 Servo gain adjustment]	10-62
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.	10-63
73	Encoder voltage level	–	0 to 3	–	–	–	○	○	Setting should depend on encoder cable length (Setting should already be established before shipped out)	10-63
75	Electromagnetic Brake Power Supply Monitoring	–	0 to 1	–	–	–	○	○	0: Disabled, 1: Enabled	10-64
76	Belt breaking sensor input polarity	–	0 to 2	–	–	–	○	○	0: Not to be Used, 1: Albeit Contact, 2: Break Contact	10-64
77	Lead size of ball screw	mm (deg)	0.01 to 999.99	○	○	○	○	○		10-65
78	Axis motion type	–	0 to 1	○	○	–	○	○	0: linear Axis 1: Rotary Axis (Angle Control)	10-65
79	Rotary axis mode select	–	0 to 1	○	○	–	○	○	0: Normal, 1: Index Mode	10-66
80	Rotary axis shortcut select	–	0 to 1	○	○	–	○	○	0: Not Selected 1: Selected (Valid only when in Index Mode with INC encoder)	10-67
83	Absolute unit	–	0 to 1	○	○	–	–	–	0: Incremental 1: Absolute (Battery-less absolute type / Simple absolute type)	10-67
88	Software limit margin	mm	0 to 9,999.99	○	○	○	○	○	For over error detection amount setting to soft limit set Driver Unit Parameter No. 3 and No. 4	10-67
139	Home preset value	mm	-9,999.99 to 9,999.99	–	○	–	○	○		10-68
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]	10-69

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	<input type="radio"/>						10-70
145	GS velocity loop proportional gain		1 to 99,999,999	<input type="radio"/>						10-70
146	GS velocity loop integral gain		1 to 99,999,999	<input type="radio"/>						10-71
148	Total travel distance threshold	m	0 to 999,999,999	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	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	10-71
150	Linear Absolute Home Preset Value	mm	-9,999.99 to 9,999.99	-	-	-	<input type="radio"/>	<input type="radio"/>	The home position should be set for spurious absolute type actuator	10-72
151	Minor malfunction alarm output select	-	0 to 1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	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.	10-73
152	High output setting	-	0 to 1	<input type="radio"/>	-	-	-	-	0: Disabled, 1: enabled	10-73
153	BU velocity loop proportional gain	-	1 to 27,661	<input type="radio"/>	-	-	-	-	Velocity Loop Proportional Gain when high output setting valid	10-73
154	BU velocity loop integral gain	-	1 to 217,270	<input type="radio"/>	-	-	-	-	Velocity Loop Integral Gain when high output setting valid	10-74
155	Absolute battery retention time	-	0 to 3	<input type="radio"/>	<input type="radio"/>	-	-	-	0: 20 Days, 1: 15 Days, 2: 10 Days, 3: 5 Days	10-74
158	Enabled/disabled axis select	-	0 to 1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	-	-	0: Enabled, 1: Disabled	10-75
165	Latency after Shutdown Cancelled Startup current limit expansion Function	ms	0 to 10,000	-	-	-	<input type="radio"/>	<input type="radio"/>	Set the latency before it gets available to turn the servo on after shutdown is released	10-75
166	Startup current limit expansion Function	-	0 to 1	<input type="radio"/>	-	-	-	-	0: Disabled, 1: Enabled	10-76
184	Regenerative Control Select	-	1 to 2	-	-	-	-	<input type="radio"/>	1: to 750W, 2: 3000W to	10-77
190	Servo ON delay time adjustment	ms	0 to 9,999	<input type="radio"/>	-	-	-	-		10-77
194	JOG switch	-	0 to 1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	0: Enabled, 1: Disabled	10-78
195	Virtual axis	mm	0 to 1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	0: Disabled, 1: Enabled	10-79
196	Virtual axis absolute initial position	mm	-9,999.99 to 9,999.99	<input type="radio"/>	<input type="radio"/>	-	<input type="radio"/>	<input type="radio"/>		10-79
197	Multiple slider excess approach detection activating stroke	mm	0 to 99,999.999	-	-	-	<input type="radio"/>	<input type="radio"/>		10-79

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.



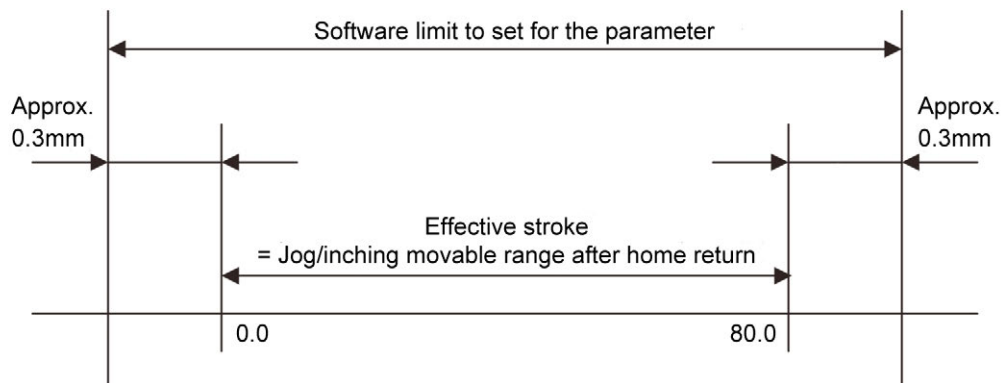
Caution

- 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-19)].



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.

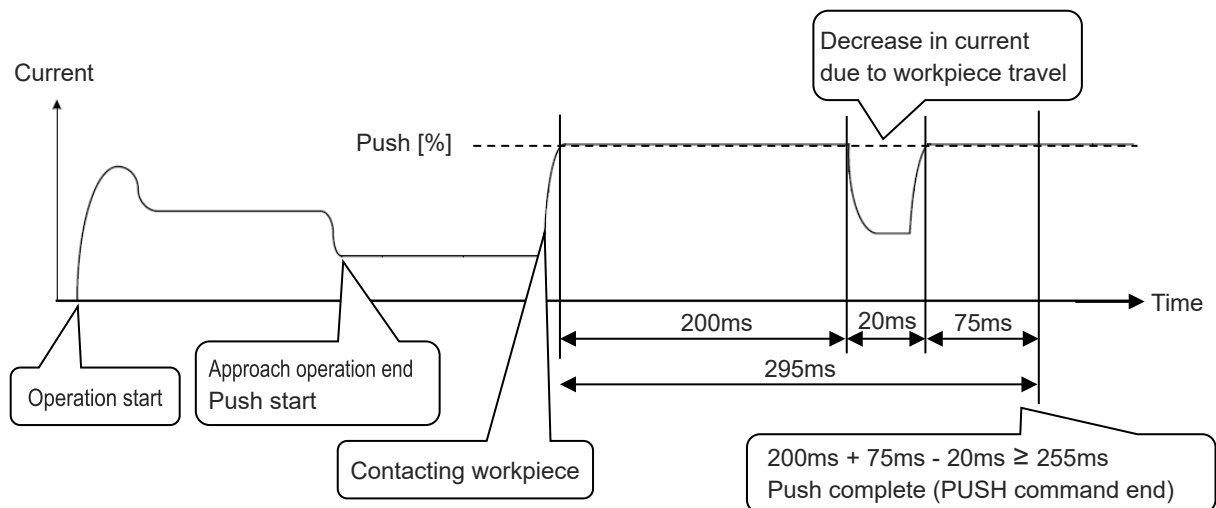
[Pushing Stop Recognition Time (Parameter No. 6)]

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 PENDING 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)



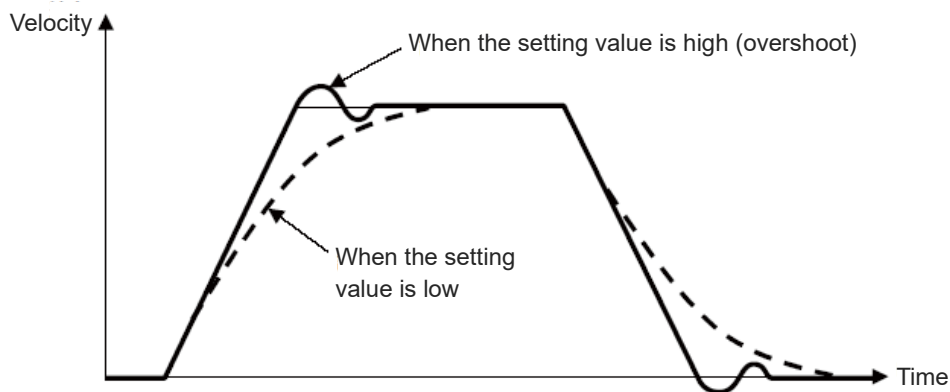
[Servo Gain Number (Parameter No. 7)]

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 PBNB 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.

$$\text{Minimum resolution [mm/pulse]} = \text{Actuator lead [mm/r]} / \text{Encoder resolution [pulse/r]}$$

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

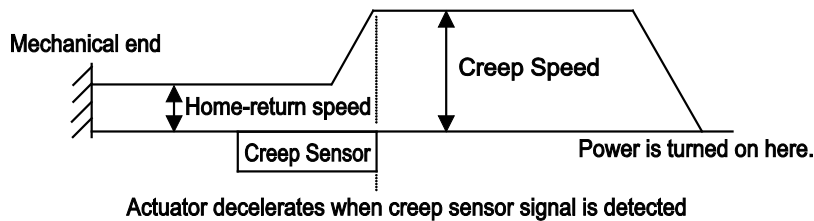
No.	Name	Unit	Input range	Default initial value setting
20	Creep sensor input polarity	–	0 to 2	In accordance with actuator

Even though the movement speed for most of the actuators at the home return is 20 mm/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
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[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
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[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

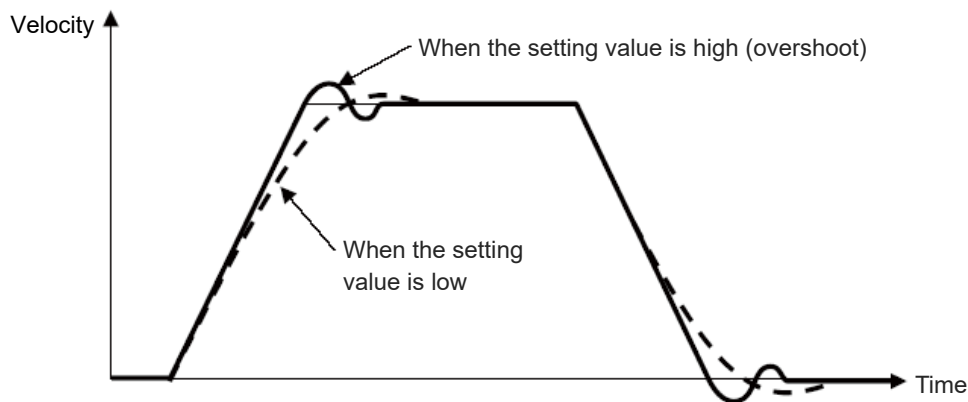
After turning the power ON, the first servo ON detects polarity. The operation method is set at this time.

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.

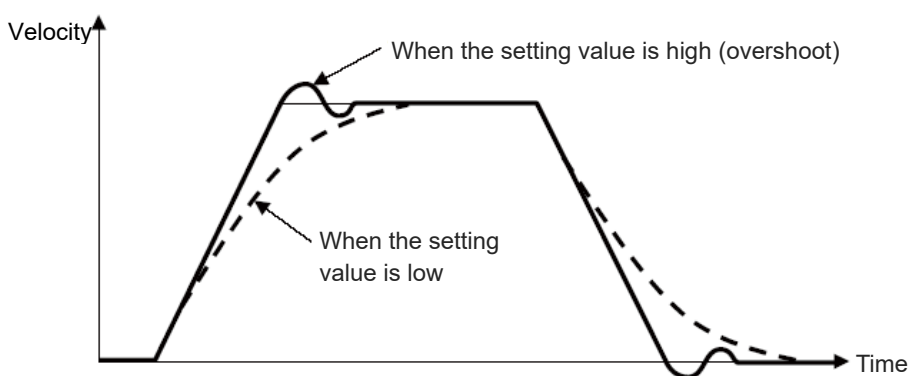
[Velocity Loop Integral Gain (Parameter No. 32)]

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).

24V AC servo motor specification and stepper motor specification only
--

[Home Confirmation Sensor Input Polarity (Parameter No. 43)]

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

AC Servo Motor Specification and DC brush-less motor specification only
--

[Current Control Width Number (Parameter No. 54)]

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

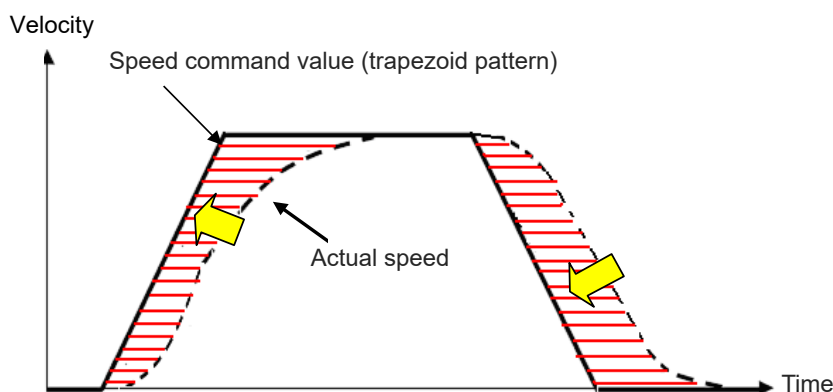
Sets the feed forward gain amount of the position control system.

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 10-80)].

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.

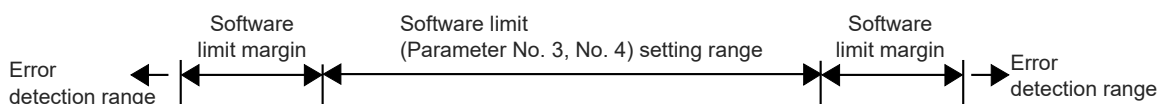
Battery-less absolute specification cannot be used in incremental specification.

[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.



AC servo motor specification only

[Home preset value (Parameter No.139)]

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 ± 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.

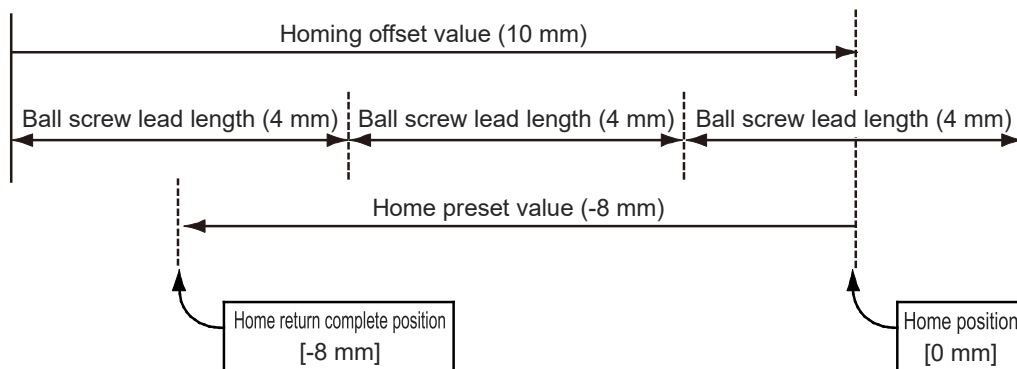


Caution

- 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 %.

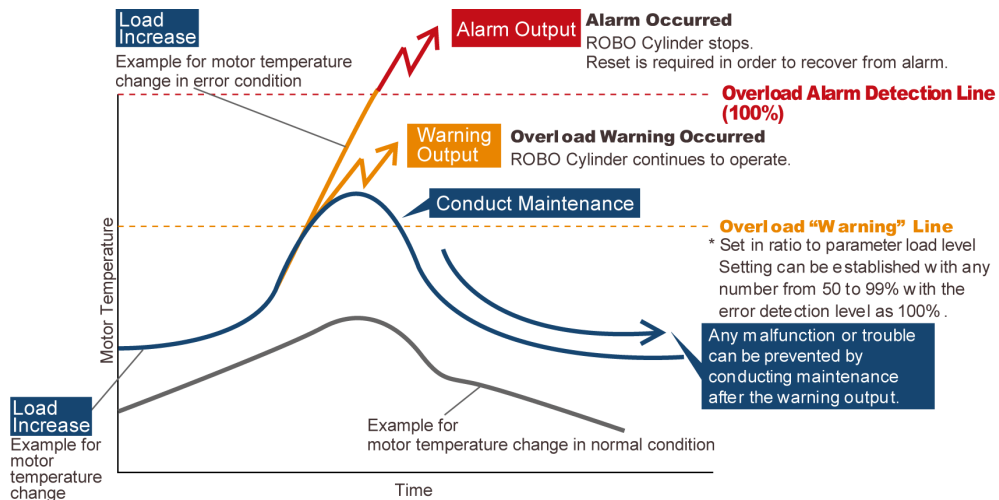
For details, refer to [9.4.2 Overload warning (page 9-17)].

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.



Warning output enables detection of items such as those below.

- Time to supply grease
- Time to replace components
- Time to implement mechanical tuning

[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 10-59)”.

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 10-60

[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 10-60)”.

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 10-60

[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.

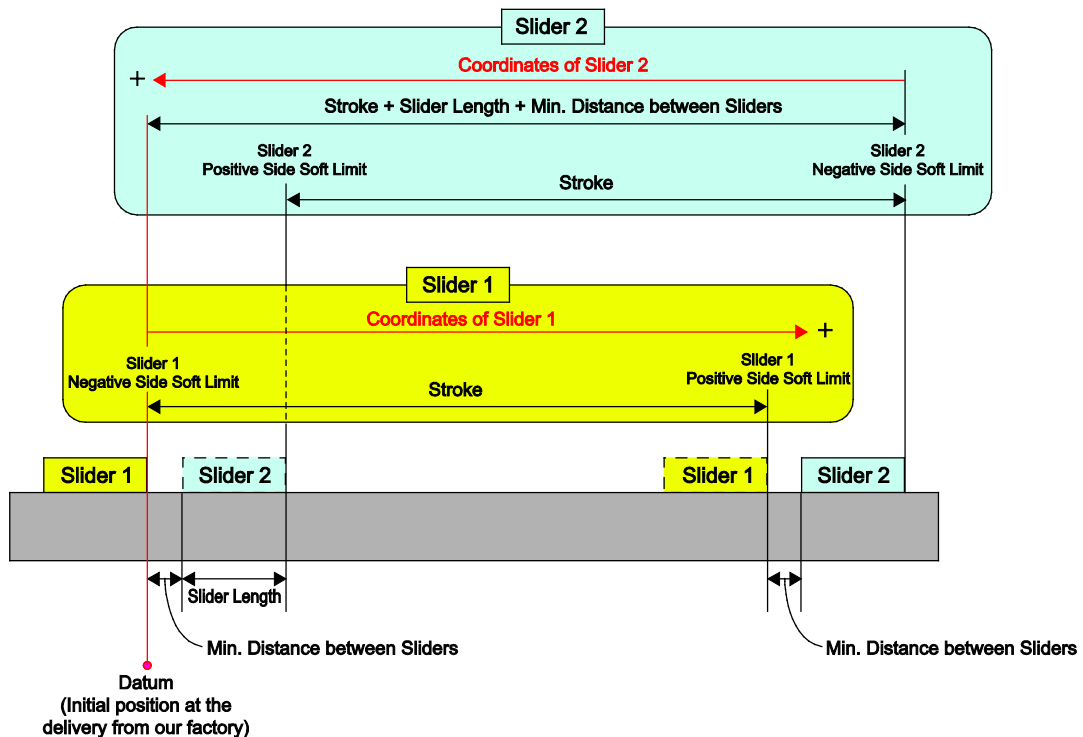
No judgment will be made when set as 0.

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 10-59)”.

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 10-60

[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 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 Integral Gain.

For details, refer to Parameter No. 32 “Velocity Loop Integral 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 10-60.

[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 [3.7.4 General Specifications (page 3-119)].

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
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[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.

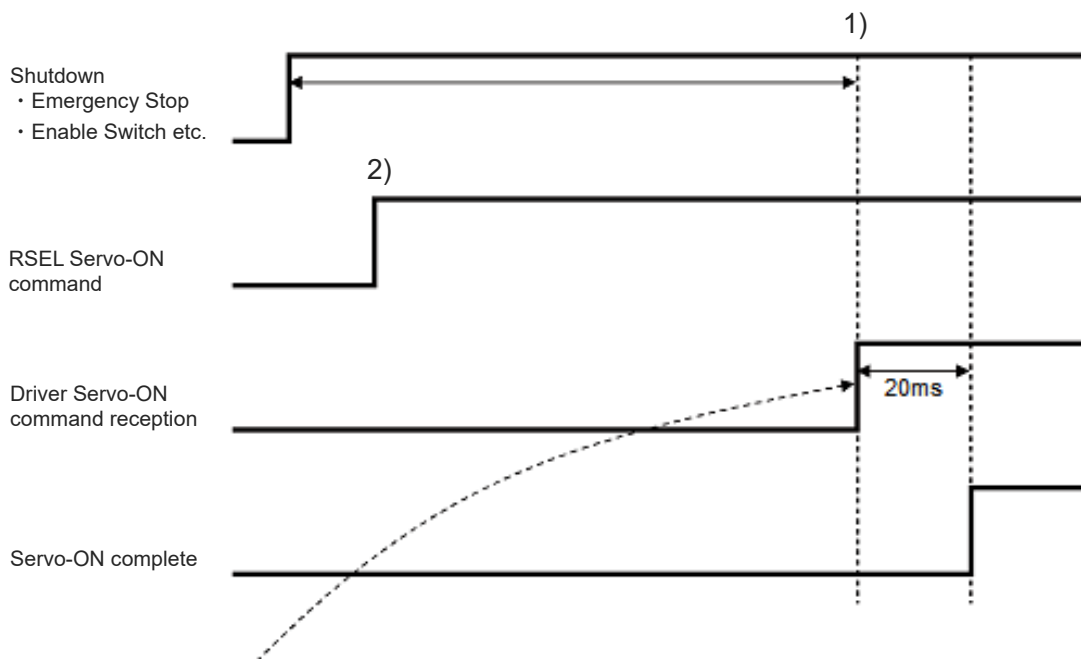
A disabled axis is not available to select in “RSEL Axis Setting”.

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

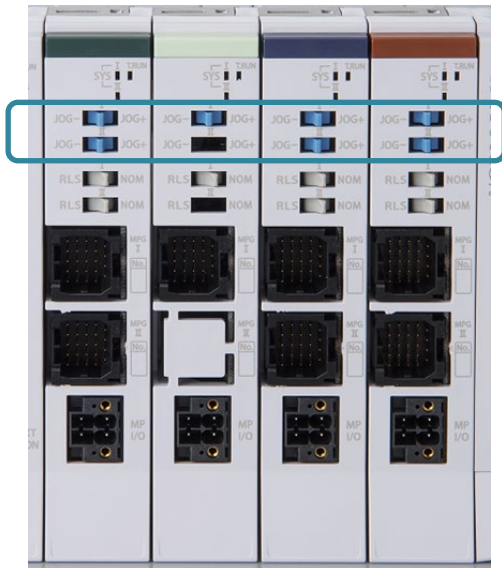
No.	Name	Unit	Input range	Default initial value setting
190	Servo ON delay time adjustment	ms	0 to 9,999	0

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.

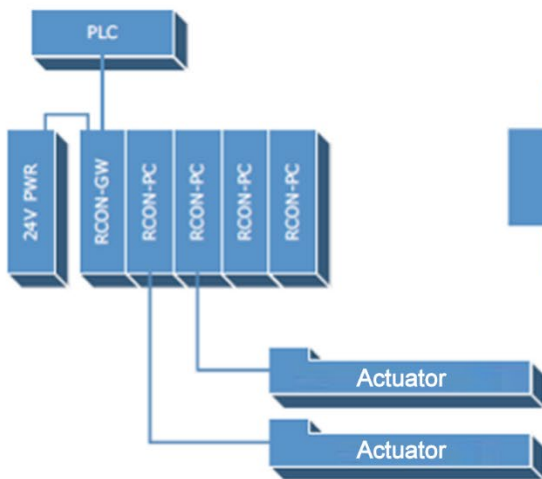


[Virtual Axis (Parameter No. 195)]

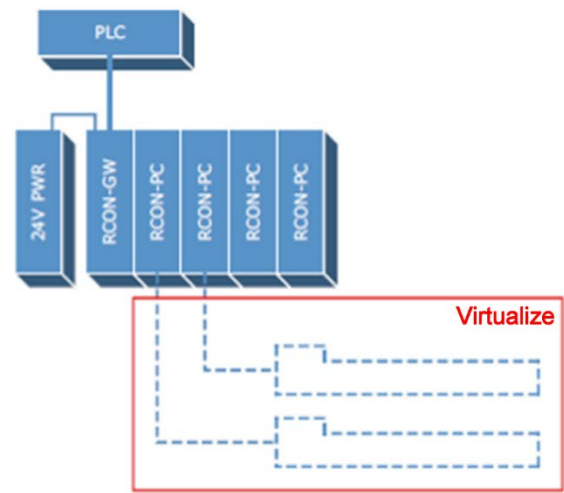
No.	Name	Unit	Input range	Default initial value setting
195	Virtual axis	–	0: Enabled 1: Disabled	0

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/s → deg/s Angular acceleration and deceleration G = 9807mm/s² → 9807deg/s² = 9807×2π/360 rad/s²
	1 (Index Mode)	0 (Shortcut control not selected) 1 (Shortcut control not selected)	×	○	0 to 359.999 (Rotary)	Disable (Fixed at 359.999 inside)	Disable (Fixed at 0.000 inside)	* "deg" shows the angle of a solid of revolution on the tip

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 Parameter List (ELECYLINDER)

10.5.1 Parameter list for ELECYLINDER

Shown below is a list of the parameters to ELECYLINDER.

No.	Name	Unit	Input range	Default setting at shipping	Reference Page
1	Operation range adjustment	mm	0 to 9,999.69	Maximum stroke	10-83
2	Auto switch "LS" signal detection range adjustment	mm	Actuator Depended to 9,999.99	0.10	10-84
3	Change home return direction	-	Reverse, forward	According to ELECYLINDER specifications	10-85
4	Home position adjustment	mm	0 to 9,999.99	According to ELECYLINDER specifications	10-86
5	Smooth accel/decel setting	-	Disabled, enabled	Disabled	10-87
6	Current control setting at stop	-	Disabled, Powerful stop Enabled, Energy-saving stop	Disabled	10-88
7	Wireless function setting	-	Disabled, enabled	Enabled	10-89
8	Power-saving setting	-	Disabled, enabled	Disabled	10-89
9	Select Electromagnetic Valve System (Operation System)	-	Double, Single	Double (Not Available for Change)	----



Caution

- No. 1/3/4 default factory settings differ according to ELECYLINDER specifications.
- No. 7 Wireless function setting parameter is not displayed on ELECYLINDERS without wireless circuit boards (no WL, WL2 in the Option model number).
- Do not attempt to change No. 9 Select Electromagnetic Valve System (Operation System) parameter from Double.

10.5.2 Parameter details of ELECYLINDER

[Operation range adjustment (Parameter No. 1)]

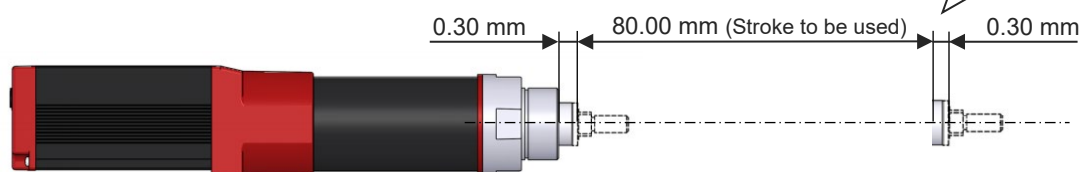
ELECYLINDER only

No.	Name	Unit	Input range	Default initial value setting
1	Operation range adjustment	mm	0 to 9,999.69	0

- The ELECYLINDER operation range can be adjusted to suit your system.
 - The minimum setting unit is 0.01 mm.
 - Set to your desired stroke length.
- The controller automatically adds 0.30 mm and controls/monitors the operation range.

Configuration example

Set the operating stroke between 0 and 80 mm by changing [Parameter No.1] to [80.00 mm].



Caution

- Set within the ELECYLINDER movable range.
Setting to a value that exceeds the maximum stroke will result in collision with the forward side mechanical stopper
- This may damage the ELECYLINDER, workpiece or peripheral devices.

ELECYLINDER only

[Auto switch “LS” signal detection range adjustment (Parameter No. 2)]

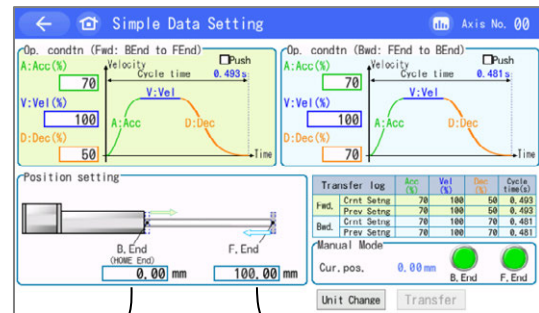
No.	Name	Unit	Input range	Default initial value setting
2	Auto switch “LS” signal detection range adjustment	mm	Actuator Depended to 9,999.99	0.10

- Sets the backward complete/forward complete ON trigger range relative to the backward end/forward end.
- When the ELECYLINDER enters the detection range, the backward complete or forward complete signal turns ON.
- The minimum setting unit is 0.01 mm.

Configuration example

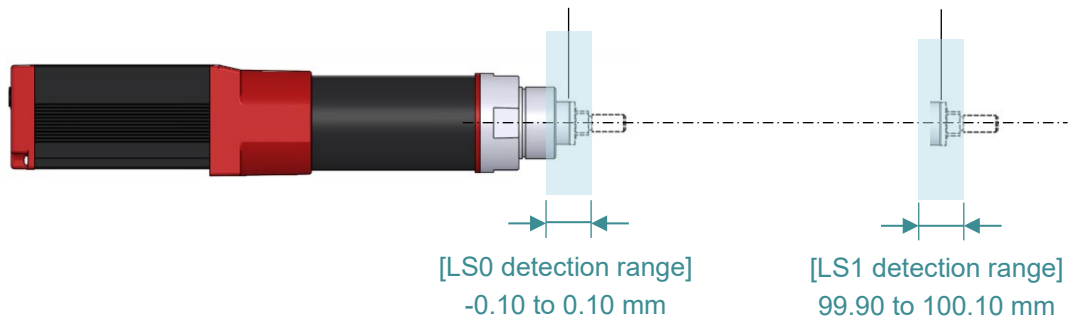
The LS signal detection range for the conditions below is shown in the figure.

Backward end: 0.00 mm
 Forward end: 100.00 mm
 Parameter No.2 : 0.10 mm



Backward end
0.00 mm

Forward end
100.00 mm



Caution

- A value smaller than the minimum resolution cannot be set.
 Minimum resolution [mm/p] = ball screw lead [mm/r] ÷ 800 [p/r]

[Change home return direction (Parameter No. 3)]

ELECYLINDER only

No.	Name	Unit	Input range	Default initial value setting
3	Change home return direction	–	Reverse, forward	According to ELECYLINDER specifications

- Setting is established at delivery based on the ELECYLINDER specifications. It is not necessary to adjust the setting in normal use.
- The home return operation direction can be selected.
- To set the opposite direction, switch to the opposite setting value. (“Forward” → “Reverse” or “Reverse” → “Forward”)
- For standard specification, the motor side is home.

Configuration example

If “Parameter No.3” is “Forward”



Home position: motor side

If “Parameter No.3” is “Reverse”

Home position: non-motor side**Caution**

- Changing the home return direction reverses the operation direction.
- After changing this parameter, always perform home return reset (absolute reset).
- Even if the operation direction is reversed, check that the moving parts do not interfere with any other objects.
If the moving parts collide, they may damage the ELECYLINDER, workpiece or peripheral devices.
- Changing the home return direction after purchasing will cause a mismatch with the ELECYLINDER model number. Make sure to change parameters again if the controller or body is replaced

[Home position adjustment (Parameter No. 4)]

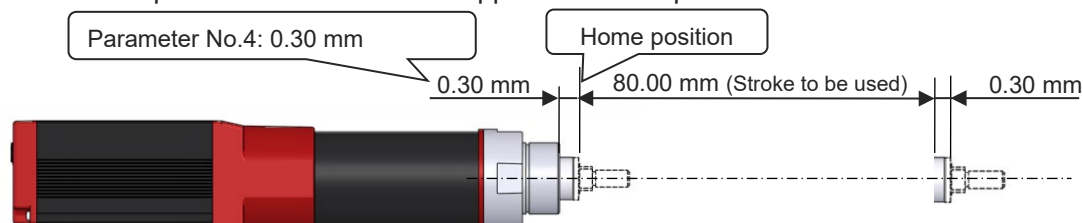
ELECYLINDER only

No.	Name	Unit	Input range	Default initial value setting
4	Home position adjustment	mm	0 to 9,999.99	According to ELECYLINDER specifications

- Setting is established at delivery based on the ELECYLINDER specifications. It is not necessary to adjust the setting in normal use.
- Sets the distance between the home side mechanical stopper and the home position.
- The minimum setting unit is 0.01 mm.
- Adjustment with this parameter is possible in the following situations.
 - (1) To match the ELECYLINDER home position and the mechanical home position after assembly into equipment.
 - (2) To adjust the new home position upon reversing the default home return direction after purchase.
 - (3) To eliminate a slight deviation from the previous home position generated after replacing the ELECYLINDER.

Configuration example

If [Parameter No.4] is [0.30 mm],
the relationship between mechanical stopper and home position is as follows.

**Caution**

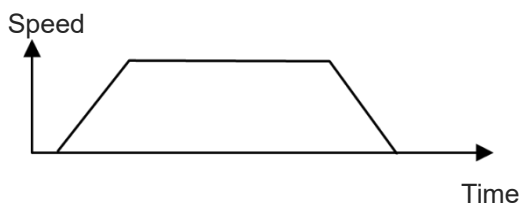
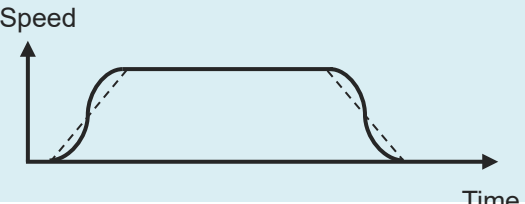
- If adjusting Parameter No.4, simultaneously adjust Parameter No.1.
Operation range adjustment with parameter No.1 uses the home position as the datum.
- Do not set Parameter No.4 to a value smaller than the default setting at shipping.
This may result in abnormal home return operation, alarm triggering or abnormal operation. If the value must be set small, please contact IAI.
- After changing this parameter, always perform home return reset (absolute reset).

[Smooth accel/decel setting (Parameter No. 5)]

ELECYLINDER only

No.	Name	Unit	Input range	Default initial value setting
5	Smooth accel/decel setting	–	Disabled, enabled	Disabled, enabled

- The movement waveform for ELECYLINDER operation can be selected.
- When [Enabled], accel/decel operation becomes smoother (less abrupt). This softens the shocks of acceleration/deceleration without delaying the operation time.
- If [Disabled], the above functionality is not enabled.

Setting	Acceleration/deceleration pattern	Operation waveform image
Disabled	Trapezoid	
Enabled	S-motion	

**Caution**

- For operation in which the acceleration time or deceleration time exceeds 2 seconds, do not [Enable] smooth accel/decel settings. Normal operation will not be possible.
- Avoid momentary stops during acceleration or deceleration operation. Sudden changes (acceleration) will occur, which may be dangerous.

[Current control setting at stop (Parameter No. 6)]

ELECYLINDER only

No.	Name	Unit	Input range	Default initial value setting
6	Current control setting at stop	–	Disabled : Powerful stop Enabled : Energy-saving stop	Disabled

- The control method for ELECYLINDER stop can be selected.
- If [Disabled], a constant current value will be transmitted to the motor, stopping it. This limits fine vibration when stopping, bringing the unit to a complete stop.
- If [Enabled], a current appropriate to the load will be transmitted to the motor, stopping it. This limits the amount of power consumed while stopping.
- If abnormal noise or vibration occurs during a gradual stop, setting to [Enabled] may fix the issue. Moreover, setting to [Enabled] can also fix issues in which the command position cannot quite be attained.

**Caution**

- If [Disabled], even if a pulse deviation within ± 2 from the target position remains, movement towards the target position will not continue.
- If [Enabled], if a pulse deviation of ± 1 or more from the target position remains, movement towards the target position will continue.

[Wireless function setting (Parameter No. 7)]

ELECYLINDER only

No.	Name	Unit	Input range	Default initial value setting
7	Wireless function setting	–	Disabled, Enabled	Enabled

- Either Enabled or Disabled can be selected for the ELECYLINDER wireless function.
- When [Enabled] is selected, wireless communication between the ELECYLINDER and the Touch Panel Teaching Pendant is possible.
- When [Disabled] is selected, wireless communication between the ELECYLINDER and the Touch Panel Teaching Pendant is not possible. There is no transmission or reception of wireless communication radio waves.

**Caution**

- This parameter is not displayed on ELECYLINDERS without wireless circuit boards (no WL, WL2 in the Option model number).

[Power-saving setting (Parameter No. 8)]

ELECYLINDER only

No.	Name	Unit	Input range	Default initial value setting
8	Power-saving setting	–	Disabled, Enabled	Disabled

- Either Enabled or Disabled can be selected for the ELECYLINDER power-saving setting.
- When “Enabled,” the power capacity can be reduced up to 40% compared to “Disabled” mode, but the maximum speed, maximum acceleration/deceleration, and payload decrease in comparison.
For details, refer to each ELECYLINDER instruction manual of “Lead and Payload (Power-saving: Enabled)”, “Stroke and Max. Speed (Power-saving: Enabled)”, and “Payload by Speed/Acceleration (Power-saving: Enabled)”
- When “Disabled,” the maximum speed, maximum acceleration/deceleration, and payload increase compared to “Enabled” mode.
For details, refer to each ELECYLINDER instruction manual of “Lead and Payload (Power-saving: Disabled)”, “Stroke and Max. Speed (Power-saving: Disabled)”, and “Payload by Speed/Acceleration (Power-saving: Disabled)”

10.6 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 to 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. <u>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.</u> Adjust “Servo Gain Number” first. When increasing “Velocity Loop Proportional Gain”, try to increase little by little <u>by approximately 20% to the initial setting.</u>
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 <u>little by 20% from the initial setting.</u>

No.	Problems	Adjustment method
4	<p>Abnormal noise is generated. It is desired to minimize high noise generated especially during stop or operation with low speed (50mm/s or less).</p>	<div style="border: 1px solid black; padding: 5px;"> <p>[Important]</p> <p>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. </div> <p>● 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.</p>
5	<p>Want to increase tracking accuracy</p> <hr style="border-top: 1px dashed black;"/> <p>Want to increase velocity constancy</p> <hr style="border-top: 1px dashed black;"/> <p>Want to increase response sensibility</p>	<p>● 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> <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	<p>It is desired to have the operation start quicker even with large static friction of the load</p> <hr style="border-top: 1px dashed black;"/> <p>It is desired to have the response at operation stop quicker even with large inertia of the load</p> <hr style="border-top: 1px dashed black;"/> <p>Shorter cycle time is desired</p>	<p>● 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> <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" 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
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2	<p>Abnormal noise In particular, high-pitched noise occurs when stopping or at low speed (20 mm/s or less)</p>	<p>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</p>																																																												

10.7 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	10.7.1
2	Would like to have an output to judge activation of automatic operation from RSEL controller	10.7.2
3	Would like to retain the current output status during an emergency stop	10.7.3
4	Would like to launch the emergency program	10.7.4
5	Would like to set up an automatic recovery (reboot) after an emergency stop is canceled	10.7.5
6	Would like to set up an automatic recovery (error reset) after an emergency stop is canceled	10.7.6
7	Would like to have a recovery from the status just before emergency stop was made	10.7.7
8	Would like to have RSEL controller reset externally	10.7.8
9	Would like to have the servo turned on externally	10.7.9
10	Would like to have the home-return operation conducted externally on all the single-axis actuators	10.7.10
11	Would like to have a program in RSEL controller activated externally	10.7.11
12	Would like to have a program activated externally by conducting a command in a program number in binary	10.7.12
13	Would like to have the RSEL controller paused externally	10.7.13
14	Would like to have an error reset conducted externally	10.7.14
15	Would like to release the brake on an actuator externally	10.7.15
16	Would like to toggle AUTO Mode and MANU Mode externally	10.6.16
17	Would like to have the input port assignment changed	10.7.17
18	Would like to output that all the single-axis actuators are at the home positions	10.7.18
19	Would like to output that all the single-axis actuators has completed the home return operation	10.7.19
20	Would like to output that a single-axis actuator has got in the set area (zone)	10.7.20
21	Would like to output an error level	10.7.21
22	Would like to output that an actuator is in an emergency stop	10.7.22
23	Would like to know the current operation mode	10.7.23
24	Would like to have the output port assignment changed	10.7.24
25	Would like to use SIO connection connectors	10.7.25

10.7.1 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

10.7.2 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

10.7.3 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

10.7.4 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)

10.7.5 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

10.7.6 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

10.7.7 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

10.7.8 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

10.7.9 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

10.7.10 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

10.7.11 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

10.7.12 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 devilry.

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

10.7.13 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

10.7.14 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

10.7.15 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	

10.7.16 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	
	OFF	MANU
	ON	

Parameter No.	Set Value	Description
I/O Parameter No.79	Mode Switchover Signal Input Port Number	

10.7.17 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.

10.7.18 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

10.7.19 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

10.7.20 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 3ms 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.	

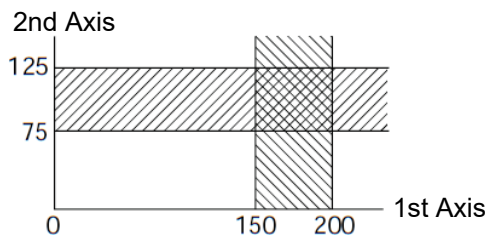
(Note) Duplicating indication in output ports is not accepted.

[Example of Setting]

Here shows an example of setting the following area (zone) to Zone 1.

1st Axis : Invaded in range from 150 to 200 mm and Output Port No. 311 turns on

2nd Axis : Invaded in range from 75 to 125 mm 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 0.001 mm.

10.7.21 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

10.7.22 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

10.7.23 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

10.7.24 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.

10.7.25 Would like to use SIO connection 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
- Communication mode : SEL program

Detail settings can be established in the parameter number described below.

Channel 1 → I/O Parameter No. 201 to 207

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 : Communication mode

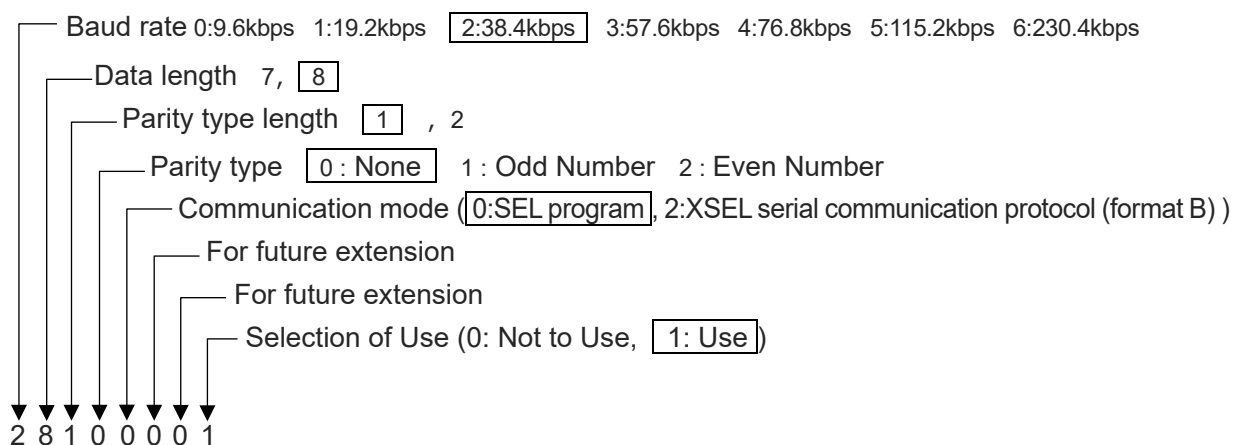
(0:SEL program, 2:XSEL serial communication protocol (format B))

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]



* The communication mode should be valid in V1.09 and later.

No.	Parameter Name	Initial setting	Input range	Unit
207	Free-for-User Channel 1 IAI Protocol Response Min. Latency	0	0 to 999	ms

In case “XSEL Serial Communication Protocol (Format B)” is to be set in the communication mode, the minimum latency setting from when the controller receives a command till the start of the response sending should be established.

The host should get ready for receiving within the set time after the command message sending is complete.

* This parameter should be valid in V1.09 and later.

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
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 • 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 • 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>

Secret

	Error No.	Error name	Content and Cause / Countermeasure
Secret	106	Input time-out status (while receiving IAI protocol)	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 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>[Countermeasure]</p> <ol style="list-style-type: none"> 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
Message	200	Fan error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) Fan malfunction <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Replace the fan unit
	201	Low fan speed warning	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) Fan malfunction <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Replace the fan unit
	202	Calender function error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 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>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Indicate the correct clock data in the communication message 2) Establish clock setting again 3) Reboot the power
	203	Estimated service life excess warning	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 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>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Replace SEL unit 2) Replace driver unit
	204	Maintenance information error	<p>[Content & Cause]</p> <p>An error due to Protocol B indication failure As it is an undisclosed protocol, there should not occur an error in normal condition.</p> <ol style="list-style-type: none"> 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>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Set the number of maintenance information changes to 1 2), 3) Correct setting to get in the range

	Error No.	Error name	Content and Cause / Countermeasure
Message	205	Target value of total times of motion exceeded	<p>[Content & Cause]</p> <p>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]</p> <p>1) Consider to have a maintenance work on the actuator.</p>
	206	Target travel distance exceeded	<p>[Content & Cause]</p> <p>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]</p> <p>1) Consider to have a maintenance work on the actuator.</p>
	207	Update error	<p>[Content & Cause]</p> <p>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]</p> <p>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>
	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: 1. Noise Applied 2. Malfunction of Flash ROM 2) Sum check error in code domain in flash ROM 3) Version information mismatched in code domain in flash ROM 4) Data writing to the flash ROM did not finish in normal condition due to the causes below: 1. Noise Applied 2. Malfunction of Flash ROM 5) Data delete in the flash ROM did not finish in normal condition due to the causes below: 1. Noise Applied 2. Malfunction of Flash ROM 6) Data was corrupted in the flash ROM due to the causes below: 1. Noise Applied 2. Malfunction of Flash ROM</p> <p>[Countermeasure]</p> <p>1) -1, 4) -1, 5) -1, 6) -1 Take a countermeasure to noise on controller (such as installing ferrite core) 1) -2, 4) -2, 5) -2, 6) -2 Replace SEL unit 2), 3) Rebooting</p>

	Error No.	Error name	Content and Cause / Countermeasure
Message	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 2)Flash ROM writing command was received again during flash ROM writing 3)Direct monitor was used during flash ROM writing 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 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 3)Wait till the flash ROM writing ends before executing the direct monitoring 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>
	20D	Position # error	<p>[Content & Cause]</p> <p>1)The position number is invalid.</p> <p>[Countermeasure]</p> <p>1)Check the position data and indicate a valid position number</p>
	20E	Position data # specification error	<p>[Content & Cause]</p> <p>1)The specified number of position data is invalid.</p> <p>[Countermeasure]</p> <p>1)Indicate the right number of the position data</p>

Error No.	Error name	Content and Cause / Countermeasure
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Message</p> <p>20F</p>	<p>Fieldbus FBRS link error</p>	<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)" * 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" 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)" * 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" 4) Take a countermeasure to noise on fieldbus connection cable (such as installing ferrite core)

	Error No.	Error name	Content and Cause / Countermeasure
Message	210	During non-AUTO mode, channel open error	<p>[Content & Cause]</p> <p>1)SIO channel was opened in a non-AUTO mode.</p> <p>[Countermeasure]</p> <p>1)Open free-to-user SIO channel in AUTO Mode</p>
	211	PIO error	<p>[Content & Cause]</p> <p>1)IO power is not supplied (or voltage dropped below 21.6V)</p> <p>[Countermeasure]</p> <p>1)Check the power supply status to IO cable</p>
	212	ECMD 300 command error	<p>[Content & Cause]</p> <p>1)User system error output command (ECMD300) was executed</p> <p>[Countermeasure]</p> <p>1)Check the programs using the user system error output command</p>
	213	Step # specification error	<p>[Content & Cause]</p> <p>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]</p> <p>1)Make sure to set a step number that start step + number of steps exist</p>
	214	Program # specification error	<p>[Content & Cause]</p> <p>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]</p> <p>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]</p> <p>1)Malfunction on SEL unit 2)Noise</p> <p>[Countermeasure]</p> <p>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]</p> <p>1)The specified program is not running.</p> <p>[Countermeasure]</p> <p>1)Indicate a program after executing it</p>
	217	Unexecuted program resuming error	<p>[Content & Cause]</p> <p>1)A resumption request was received for a program currently not running.</p> <p>[Countermeasure]</p> <p>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]</p> <p>1)A pause request was received for a program currently not running.</p> <p>[Countermeasure]</p> <p>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 (20,000 steps)</p> <p>[Countermeasure] 1) Revise the program to secure some free steps (by deleting blank lines, making some 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]</p> <p>1)Noise.</p> <p>[Countermeasure]</p> <p>1)Take a counteraction to noise</p>
	228	Command sum check error (while receiving IAI Protocol)	<p>[Content & Cause]</p> <p>1)The header in the received message is invalid. Invalid header position (message is 9 bytes or less) is suspected, among other reasons.</p> <p>2)Noise.</p> <p>[Countermeasure]</p> <p>1)Check the sending message in the destination of connection</p> <p>2)Take a counteraction to noise</p>
	229	Command header error (while receiving IAI Protocol)	<p>[Content & Cause]</p> <p>1)The station number in the received message is invalid.</p> <p>2)Noise.</p> <p>[Countermeasure]</p> <p>1)Check the sending message in the destination of connection</p> <p>2)Take a counteraction to noise</p>
	22A	Command node address error (while receiving IAI protocol)	<p>[Content & Cause]</p> <p>1)The ID in the received message is invalid.</p> <p>2)Noise.</p> <p>[Countermeasure]</p> <p>1)Check the sending message in the destination of connection</p> <p>2)ake a counteraction to noise</p>
	22B	Received command data error	<p>[Content & Cause]</p> <p>1) The received message does not match the message format or contains invalid data.</p> <p>2)Noise.</p> <p>[Countermeasure]</p> <p>1)Check the sending message in the destination of connection</p> <p>2)Take a counteraction to noise</p>
	22C	Motor drive control error	<p>[Content & Cause]</p> <p>1) The power input to the motor exceeded the upper overload warning load level</p> <p>2)Sliding resistance on the actuator is to high.</p> <p>[Countermeasure]</p> <p>1)Revise the following items;</p> <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) <p>2)If there is no problem with the payload, cut off the power and check sliding resistance by hand</p>
	22D	Driver unit related error	<p>[Content & Cause]</p> <p>1)Driver unit failure</p> <p>2)Noise.</p> <p>[Countermeasure]</p> <p>1)Replace driver unit</p> <p>2)Take a countermeasure to noise</p>

	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
Message	233	Software reset refusal error during operation	<p>[Content & Cause]</p> <p>1) Software reset (SIO) is prohibited during operation (program is running, servo is in use, etc.).</p> <p>[Countermeasure]</p> <p>1) Conduct the software reset with a program stopped and the servo off</p>
	234	PC/TP operation refusal error during AUTO mode	<p>[Content & Cause]</p> <p>1) Starting from the PC software / teaching pendant is prohibited in the AUTO mode.</p> <p>[Countermeasure]</p> <p>1) Set to MANU Mode when required to start from the PC software or a teaching pendant</p>
	235	Run mode error	<p>[Content & Cause]</p> <p>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]</p> <p>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>
	236	PC/TP servo motion command reception permit input OFF error	<p>[Content & Cause]</p> <p>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]</p> <p>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>
	237	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>
	238	Start condition insufficient error	<p>[Content & Cause]</p> <p>A program was launched in following conditions;</p> <p>1) Emergency stop. 2) Enable. 3) Drive-source cutoff. (such as error at system startup) 4) Flash ROM is being written.</p> <p>[Countermeasure]</p> <p>Remove following conditions before launching a program</p> <p>1) Emergency stop. 2) Enable. 3) Drive-source cutoff. (such as error at system startup) 4) Flash ROM is being written.</p>

	Error No.	Error name	Content and Cause / Countermeasure
Message	239	Illegal Request for Drive Power recovery	<p>[Content & Cause]</p> <p>1)The drive-source cutoff factor (error, deadman switch, safety gate, emergency stop, etc.) has not been removed.</p> <p>[Countermeasure]</p> <p>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]</p> <p>1) The all-operation-pause factor (drive-source cutoff, enable switch, safety gate, emergency stop, etc.) has not been removed.</p> <p>[Countermeasure]</p> <p>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]</p> <p>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]</p> <p>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]</p> <p>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]</p> <p>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]</p> <p>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]</p> <p>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]</p> <p>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]</p> <p>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> <ol 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> <ol 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 1,000 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

	Error No.	Error name	Content and Cause / Countermeasure
Message	240	IF register access error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 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>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Check the transmitted message. 2) Check the sending message with followings taken into account: <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 3) Check the sending message with followings taken into account: <ul style="list-style-type: none"> • If a valid address (category ID, field ID and index ID) is indicated 4) Check the sending message with followings taken into account: <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
	241	Number of position data comment definitions exceeded	<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	Coordinate system definition invalid error	<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	Sensor error detection	<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	Driver warning detection	<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]</p> <p>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]</p> <ol style="list-style-type: none"> 1), 2), 3), 4), 5) Revise the procedures to send and receive IAI Protocol for monitoring.
	246	Position data record format class error	<p>[Content & Cause]</p> <p>An unsupported position data record format type was indicated in IAI Protocol</p> <p>[Countermeasure]</p> <p>Set an appropriate value</p>
	247	Position data comment sum check Absolute-data backup battery voltage-low warning	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) Voltage drop (3.1V) on absolute encoder backup battery 2) Encoder cable error or connector contact error <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Check the voltage on absolute encoder backup battery and have it replaced if necessary. 2) Check the connection status of the encoder cable.
	248	EMG logic error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) Malfunction on SEL unit <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Replace SEL unit
	249	ENB logic error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) Malfunction on SEL unit <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Replace SEL unit
	24A	Undefined error	<p>[Content & Cause]</p> <p>Absolute Reset Execution Condition Unestablished Error</p> <p>[Countermeasure]</p> <p>Perform the absolute reset on the wrist unit in the appropriate orders.</p>
	300	SEL command input error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) Inappropriate data was input after SEL Command <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Input a correct SEL Command
	301	No operand input error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 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>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Input Operand 1 2) Input Operand 2 3) Input Operand 3

	Error No.	Error name	Content and Cause / Countermeasure
Message	302	Operand input prohibition error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 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>[Countermeasure]</p> <ol style="list-style-type: none"> 1)Avoid using Operand 1 2)Avoid using Operand 2 3)Avoid using Operand 3
	303	Operand data error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 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>[Countermeasure]</p> <ol style="list-style-type: none"> 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
	304	Undefined symbol usage for operand error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 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>[Countermeasure]</p> <ol style="list-style-type: none"> 1)Use a defined symbol in Operand 1 2)Use a defined symbol in Operand 2 3)Use a defined symbol in Operand 3
	305	Operand symbol type error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 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>[Countermeasure]</p> <ol style="list-style-type: none"> 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
	306	Running program editing error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1)An edit operation was attempted to a program currently not running. <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1)Stop the program and have an edit operation

	Error No.	Error name	Content and Cause / Countermeasure
Message	307	Symbol error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 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>[Countermeasure]</p> <ol style="list-style-type: none"> 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 (2,000) 6) Check the range of the symbol numbers that the controller supports and attempt to use it in the range
	308	Input condition undefined symbol usage error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) An undefined symbol is used in the input conditions in a SEL command <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) A defined symbol should be used in the input condition at the position where the error occurred
	309	Number of symbol use exceeding error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) There is not enough area to store the source symbols. <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Check the number of times source symbol can be used.
	30A	SD card error (TP: Teaching Pendant)	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 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>[Countermeasure]</p> <ol style="list-style-type: none"> 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

	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</p> <p>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</p> <p>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</p> <p>2)eaching operation was attempted with the home-return operation incomplete</p> <p>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</p> <p>2)Teaching operation should be conducted after the home-return operation is completed</p> <p>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>	

	Error No.	Error name	Content and Cause / Countermeasure
Message	319	Input condition no entry error	<p>[Content & Cause]</p> <p>1)The input condition is not input to a SEL command with the input conditions mandatory</p> <p>[Countermeasure]</p> <p>1)Check the program step that an error occurred and input the input conditions</p>
	31A	Execution condition unsatisfied error	<p>[Content & Cause]</p> <p>1)Absolute reset conducted at wrist combination failure 2)Synchronized slave absolute reset was executed when the synchronizing mater is not set to the absolute</p> <p>[Countermeasure]</p> <p>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]</p> <p>2)The number of breakpoints to be set exceeds the limit value.</p> <p>[Countermeasure]</p> <p>2)Check the program and make sure the breakpoint setting does not exceed the upper limit (10)</p>
	31C	Axis # error	<p>[Content & Cause]</p> <p>1)An axis number that is not valid was indicated</p> <p>[Countermeasure]</p> <p>1)A valid axis number should be indicated</p>
	31D	Valid axis unavailable error	<p>[Content & Cause]</p> <p>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]</p> <p>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]</p> <p>1)Read-in operation of the current position was conducted on each axis coordinate system</p> <p>[Countermeasure]</p> <p>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]</p> <p>There are inappropriate values input to the parameters “Software Limit Positive Side” and “Software Limit Negative Side” (data in pair)</p> <p>[Countermeasure]</p> <p>Correct the input values in the parameter edit window so they satisfy the following;</p> <p>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. <ul style="list-style-type: none"> ■ 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 [s]) 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] <ol style="list-style-type: none"> 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] <ol style="list-style-type: none"> 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] <ol style="list-style-type: none"> 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] <ol style="list-style-type: none"> 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] <ol style="list-style-type: none"> 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>

	Error No.	Error name	Content and Cause / Countermeasure
Message	325	Position type mismatched error	<p>[Content & Cause]</p> <p>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]</p> <ol style="list-style-type: none"> 1) For the individual read-in, make sure there is no mismatch to the position type 2) Conduct the read-in for all axes
	326	Feature Unsupported Error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 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>[Countermeasure]</p> <ol style="list-style-type: none"> 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
	327	Calender function error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 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>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Establish clock setting again 2) Replace batteries in a teaching tool 3) Reboot the power.
	328	Position error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) The number of position points is 0 2) There is an error in indication of data related to position output operation <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Initialize the position data 2) Indicate the correct data
	329	Blank step shortage error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) Steps used up till the upper limit (20,000 steps) <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Revise the program to secure some free steps (by deleting blank lines, making some processes to sub-routine, etc.)
	32A	During position data change motion /continuous motion prohibition error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) Movement or continuous movement operation was conducted before edited position data was written to a controller <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Write the edited position data before movement or continuous movement operation is conducted
32B	Internal process error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) Malfunction on SEL unit 2) Noise <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Replace SEL unit in case this error occurs after power reboot 2) Take a countermeasure to noise 	

	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)

	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	<p>Position data coordinate definition error</p> <p>[Content & Cause] 1)Not all coordinate value in the position data 2)The position data changed during continuous movement</p> <p>[Countermeasure] 1)Check the position data and input all the coordinate values 2)The position data should not be changed during continuous movement</p>
	40C	<p>Position output operation data designation error</p> <p>[Content & Cause] 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] 1)Revise the output setting at the position that the error occurred</p>
	40D	<p>Vision system error</p> <p>[Content & Cause] Parameter setting error 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] 1)Set I/O Parameter No. 351 "Vision System I/F1 Feature Select 1" to permitted to use ("1")</p>
	40E	<p>Vision system response timeout error</p> <p>[Content & Cause] There is no communication response confirmed from vision system 1)Parameter setting error 2)Setting error in vision system side</p> <p>[Countermeasure] 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	<p>Received command error (vision system)</p> <p>[Content & Cause] 1)An unsupported identification code was received from the vision system 2)Inappropriate data was received from the vision system</p> <p>[Countermeasure] 1), 2) Check that data sent from the vision system is correct</p>
	410	<p>Error of workpiece quantity received (vision system)</p> <p>[Content & Cause] 1)The number of workpieces received from the vision system has exceed the upper limit for the maximum number of workpieces in one time of capturing</p> <p>[Countermeasure] 1)Leave more space between workpieces on the conveyor to avoid exceeding the upper limit</p>
	411	<p>Vision system I/F internal process error</p> <p>[Content & Cause] 1)The workpiece status got busy for some reason 2)The workpiece information handling process fell timed out for some reason</p> <p>[Countermeasure] 1), 2) Reboot the power. Replace SEL unit in case it would not improve even with reboot</p>

	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</p> <p>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</p> <p>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</p> <p>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]</p> <p>1)Parameter setting error</p> <ul style="list-style-type: none"> • 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>[Countermeasure]</p> <p>1)Check the setting in I/O Parameter No. 90 Free-to-User SIO Channel Use</p> <p>0: SEL Program Release</p> <p>1: SEL Program Release (Common in devices PC/TP connection at CLOSE)</p> <p>2:IAI Protocol B (Slave)</p>
	41A	Error of communication channel# opened to users	<p>[Content & Cause]</p> <p>1)An unsupported channel number was indicated in OPEN Command</p> <p>[Countermeasure]</p> <p>1)A supported channel number should be indicated in OPEN Command</p> <p>SIO connection connector : Channel No. 0 or 1</p> <p>Ethernet connector : Channel No. 31 to 34</p>
	41B	SCHA command setting error	<p>[Content & Cause]</p> <p>1)Setting error in SCHA Command</p> <p>[Countermeasure]</p> <p>1)Check SCHA Command setting</p>
	41C	TPCD command setting error	<p>[Content & Cause]</p> <p>2)Setting error in TPCD Command</p> <p>[Countermeasure]</p> <p>1)Check TPCD Command setting</p>
	41D	SLEN command setting error	<p>[Content & Cause]</p> <p>1)Setting error in SLEN Command</p> <p>[Countermeasure]</p> <p>1)Check SLEN Command setting</p>
	41E	ECMD 300 command error	<p>[Content & Cause]</p> <p>1)User system error output command (ECMD300) was executed</p> <p>[Countermeasure]</p> <p>1)Check the programs using the user system error output command</p>
	41F	Error detail inquiry type error	<p>[Content & Cause]</p> <p>1)A command creation error from a host program such as touch panel</p> <p>[Countermeasure]</p> <p>1)Check the host program and send an appropriate command</p>
	420	Operand error	<p>[Content & Cause]</p> <p>1)Operand indication error</p> <p>2)Operand data is invalid</p> <p>3)Operand data type error</p> <p>[Countermeasure]</p> <p>1)Check the operand indication in the program step that the error occurred</p> <p>2)Check the operand data in the program step that the error occurred</p> <p>3)Check the operand data type in the program step that the error occurred</p>

	Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	421	No. of running programs exceeded the limit	<p>[Content & Cause]</p> <p>1) Programs exceeding the number of programs available to be executed at the same time were executed</p> <p>[Countermeasure]</p> <p>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]</p> <p>1) A program to be executed was started with BGSR</p> <p>[Countermeasure]</p> <p>1) Check the program and avoid starting it with BGSR</p>
	423	Executable step non-detection error	<p>[Content & Cause]</p> <p>1) The program specified for execution does not contain executable program steps.</p> <p>[Countermeasure]</p> <p>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]</p> <p>1) There was an error in a treatment to the branch instruction appeared previously</p> <p>2) EDIF, EDDO and EDSL were not found</p> <p>[Countermeasure]</p> <p>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]</p> <p>1) There was lack in EDSR corresponding to BGSR</p> <p>2) There was lack in BGSR corresponding to EDSR</p> <p>[Countermeasure]</p> <p>1), 2) Check the treatment of BGSR and EDSR</p>
	426	DO/IF/IS nesting step times error	<p>[Content & Cause]</p> <p>1) The number of nesting times in DO Command and IF/IS Commands has exceeded the limit</p> <p>[Countermeasure]</p> <p>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]</p> <p>1) The number of nesting times in SLCT Command has exceeded the limit</p> <p>[Countermeasure]</p> <p>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]</p> <p>1) The number of nesting times in the sub-routine call has exceeded the limit</p> <p>[Countermeasure]</p> <p>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	Error with next step of SLCT	<p>[Content & Cause]</p> <p>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]</p> <p>1)Set the program step next to SLCT to either of WHEQ, WHNE, WHGT, WHGE, WHLT, WHLE, WSEQ, WSNE, OTHE or EDSL</p>
	42A	BGPA, EDPA pair end mismatch error	<p>[Content & Cause]</p> <p>1)EDPA declared while BGPA not declared 2)BGPA declared without EDPA declared after BGPA declared</p> <p>[Countermeasure]</p> <p>1), 2) Check the program and see the treatment to BGPA and EDPA</p>
	42B	Stack format initialization failure	<p>[Content & Cause]</p> <p>1)Malfunction of controller</p> <p>[Countermeasure]</p> <p>1)Replace SEL unit</p>
	42C	Expansion condition code error	<p>[Content & Cause]</p> <p>1)Error in extension conditional codes</p> <p>[Countermeasure]</p> <p>1)Check the extension conditions in the program step that the error occurred</p>
	42D	Input condition CND insufficient error	<p>[Content & Cause]</p> <p>1)There was no necessary input conditions even in use of extension conditions</p> <p>[Countermeasure]</p> <p>1)Check the input conditions in the program step that the error occurred</p>
	42E	Actuator control declaration error	<p>[Content & Cause]</p> <p>1)There is an error in setting in actuator control declaration command</p> <p>[Countermeasure]</p> <p>1)Check the setting in the actuator control declaration command in the program step that the error occurred</p>
	42F	Timer setting out of range	<p>[Content & Cause]</p> <p>1)TIMW Command time setting is out of the range</p> <p>[Countermeasure]</p> <p>1)Check the timer setting in the program step that the error occurred Setting Range: 0.01 to 99 seconds</p>
	430	Waiting timeout setting out of range	<p>[Content & Cause]</p> <p>1)WT□□ command timeout setting is out of the range</p> <p>[Countermeasure]</p> <p>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	TSLP command setting range error	<p>[Content & Cause]</p> <p>1)A negative value was set in TSLP Command time setting</p> <p>[Countermeasure]</p> <p>1)Set a positive value in TSLP Command time setting</p>

	Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	432	DIV command divisor 0 error	<p>[Content & Cause]</p> <p>1)0 was indicated to the divisor (Operand 2) in DIV Command</p> <p>[Countermeasure]</p> <p>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]</p> <p>1)There is an error in SQR Command data (Operand 2)</p> <p>[Countermeasure]</p> <p>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]</p> <p>1)There is an error in the number of digits to display BCD</p> <p>[Countermeasure]</p> <p>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]</p> <p>1)The number of BTPN and BTPF timers operating at the same time in one program has exceeded the upper limit (16)</p> <p>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]</p> <p>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)</p> <p>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]</p> <p>1)Setting value in PTRQ is out of the range</p> <p>[Countermeasure]</p> <p>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]</p> <p>1)There is no definition in the sub-routine to be called</p> <p>2)Sub-routine is defined in several points in the same sub-routine number</p> <p>3)Sub-routine number setting is out of range</p> <p>[Countermeasure]</p> <p>1)Define a sub-routine to be called</p> <p>2)Check the program and avoid defining sub-routine in several points in the same sub-routine number</p> <p>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]</p> <p>1)The divisor was set to 0 in MOD Command</p> <p>[Countermeasure]</p> <p>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]</p> <p>1) There is an error in EDIF or EDDO position</p> <p>[Countermeasure]</p> <p>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]</p> <p>1) There is an error in EDSL position</p> <p>[Countermeasure]</p> <p>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]</p> <p>1) There is an error in EDSR position</p> <p>[Countermeasure]</p> <p>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]</p> <p>1) There is no program when editing, inquiring or executing a program in IAI protocol</p> <p>2) A number less than 1 was indicated as a program number</p> <p>3) A number exceeding the maximum number of support programs was indicated</p> <p>4) A program number not registered in PIO was indicated</p> <p>[Countermeasure]</p> <p>1) Conduct operation of program edit, inquiry or execution indicating a registered program</p> <p>2) A number less than 1 should not be indicated as a program number</p> <p>3) A number more than the maximum number of programs (512) should not be indicated</p> <p>4) A registered program number should be indicated</p>
	43D	Undefined delimiter error	<p>[Content & Cause]</p> <p>1) There is no end character defined when OPEN Command executed</p> <p>[Countermeasure]</p> <p>1) An end character should be indicated in SCHA Command before OPEN Command executed</p>
	43E	Excess command velocity	<p>[Content & Cause]</p> <p>Command speed exceeded the allowable value during operation</p> <p>1) Speed indicated for CP operation too high</p> <p>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]</p> <p>1) Decrease the indicated velocity by VEL Command or OVRD Command</p> <p>2) Change the operating position</p>
43F	Zone No. error	<p>[Content & Cause]</p> <p>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]</p> <p>1) Set the zone number in the range from 1 to 4</p>	

	Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	441	Insufficient blank steps error	<p>[Content & Cause]</p> <p>1)The number of program steps to be used has exceeded the upper limit (20000 steps)</p> <p>[Countermeasure]</p> <p>1)Revise the program and secure open program steps</p>
	442	AUTO program No. error	<p>[Content & Cause]</p> <p>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]</p> <p>1)Indicate a program number registered in Other Parameter No. 1: Automatic Start Program Number</p>
	443	String No. error	<p>[Content & Cause]</p> <p>1)A string number out of the range was indicated</p> <p>[Countermeasure]</p> <p>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]</p> <p>1)CHVL Command was executed to an operation axis using the S-shaped motion (SCRV Command)</p> <p>[Countermeasure]</p> <p>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]</p> <p>1)An axis number out of the range (out from 1 to 8) was indicated in a SEL command</p> <p>[Countermeasure]</p> <p>1) Indicate an axis number in the range (1 - 8) by SEL command</p>
	446	Axis pattern error	<p>[Content & Cause]</p> <p>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]</p> <p>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]</p> <p>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]</p> <p>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]</p> <p>1)The last position data was deleted during the calculation for continuous position movement or pressing in process</p> <p>[Countermeasure]</p> <p>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]</p> <p>1)An input and output port or flag number out of the setting range was indicated in a SEL command</p> <p>[Countermeasure]</p> <p>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]</p> <p>1)A flag number out of the range was indicated in a SEL program (such as TIMR Command)</p> <p>[Countermeasure]</p> <p>1)Set the flag number of the step that the error occurred in the range.</p>
	44C	Symbol search error	<p>[Content & Cause]</p> <p>1)A SEL program and the symbol definition are mismatched</p> <p>[Countermeasure]</p> <p>1)Match the SEL program and the symbol definition</p>
	44D	Excess number of symbol use times error	<p>[Content & Cause]</p> <p>1)There is not enough open area to store the source symbols</p> <p>[Countermeasure]</p> <p>1)Check the number of times of source symbol use</p>
	44E	Axis duplication error	<p>[Content & Cause]</p> <p>1)Acquirement of the right of use was attempted during the axis in use</p> <p>[Countermeasure]</p> <p>1) Acquirement 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]</p> <p>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]</p> <p>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]</p> <p>1)Malfunction on SEL unit 2)Operation failure due to noise or others</p> <p>[Countermeasure]</p> <p>1), 2) Contact IAI in case the error occurs again even after the power reboot.</p>

	Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	451	Prohibited axis specification error	<p>[Content & Cause]</p> <p>An axis not available for use in a SEL command or IAI protocol command is indicated.</p> <p>There should mainly be some causes as below:</p> <ol style="list-style-type: none"> 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>[Countermeasure]</p> <p>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</p> <p>Revise the axis indication when related to 1), 2) and 3)</p>
	452	No effective axis specification error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 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>[Countermeasure]</p> <ol style="list-style-type: none"> 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)
	453	Driver unit mismatch error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) A driver unit set valid is not installed <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Revise valid/invalid setting of the axis, or check that a driver unit is installed to the axis set valid
	455	Unsupported SEL function error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) A feature not supported was executed in SEL <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Check the applicable version of the main CPU
	456	Speed specification error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 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>[Countermeasure]</p> <ol style="list-style-type: none"> 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
	457	Axis motion type error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) A command (CIR, ARC CIR2, CIRS, ARCS, ARCD ro ARCC) was conducted on a rotary axis <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Change the program to avoid conducting arch movement command

	Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	458	Home sensor undetected error	<p>[Content & Cause] 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] 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] 1)A palletizing number out of the range was indicated in a SEL command (such as BGPA, PTNG and PINC)</p> <p>[Countermeasure] 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] 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] 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] 1)A number -1 or less is set in Operand 2 in PSLI Command</p> <p>[Countermeasure] 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] 1)A number 0 or less is set in Operand 1 or Operand 2 in PAPI Command</p> <p>[Countermeasure] 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] 1)None of PASE or PAPS setting is established in the palletizing setting command</p> <p>[Countermeasure] 1)Set either of PASE or PAPS in the palletizing setting command</p>
	45E	Palletize location no. error	<p>[Content & Cause] 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] 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] 1)Two axes in PX, PY and PZ for palletizing were indicated at the same time in the same axis</p> <p>[Countermeasure] 1)Indicate different axes for each of PX, PY and PZ for palletizing</p>

	Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	460	Palletize 3-point teaching position data error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) There is not 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>[Countermeasure]</p> <ol style="list-style-type: none"> 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
	461	Palletize 3-point teaching offset setting error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) Staggered offset was set when base point and PX-axis end point are the same in palletizing 3-point teaching setting <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Staggered offset should not be set when base point and PX-axis end point are the same in palletizing 3-point teaching setting
	462	Undeclared BGPA during palletize setting	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) Palletizing setting was conducted without BGPA declaration <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Have BGPA declared before palletizing setting is conducted
	463	Palletize point error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) There is no component other than the arch motion related Z-axis components in the position for palletizing or arch motion <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Check the position for palletizing or arch motion and set components other than the arch motion related Z-axis components also.
	464	Missing 3-point teaching setting during palletize angle acquisition	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) Palletizing angle was attempted to be acquired before establishing the palletizing 3-point teaching setting <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Change the program so the palletizing angle is acquired after establishing the palletizing 3-point teaching setting
	465	Reference/PX/PY axes mismatch during palletize angle acquisition	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) An axis number indicated in PARG Command is not either PX or PY set in the 3-point teaching <p>[Countermeasure]</p> <ol style="list-style-type: none"> 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

	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 2) Operation failure due to noise or others</p> <p>[Countermeasure]</p> <p>1) Replace SEL unit 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	Arch end-point / trigger swapped error	<p>[Content & Cause]</p> <p>1)The relation of coordinates at the arch motion between the end point and the end point arch trigger is reversed</p> <p>[Countermeasure]</p> <p>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	Arch trigger undeclared error	<p>[Content & Cause]</p> <p>1)There is no arch trigger declared</p> <p>[Countermeasure]</p> <p>1)Have the arch trigger declared by PTRG and ATRG</p>
	470	Variable number error	<p>[Content & Cause]</p> <p>1)A variable number out of the range was indicated for an operand in SEL Command</p> <p>[Countermeasure]</p> <p>1) Indicate a variable number in the range</p>
	471	Tag error	<p>[Content & Cause]</p> <p>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]</p> <p>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	Received message data error	<p>[Content & Cause]</p> <p>1)The message received at a controller does not match with the message format 2)Noise</p> <p>[Countermeasure]</p> <p>1)Check the sending message in the destination of connection 2)Take a counteraction to noise</p>
	473	Ethernet unclosed socket open error	<p>[Content & Cause]</p> <p>1)A socket was attempted to open again without closing</p> <p>[Countermeasure]</p> <p>1)Close the socket before opening it again</p>

Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation 474	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 < 1,025, Self port number > 65,535, Self port number duplicated or Connection destination port number at client <= 0 or Connection destination port number at client > 65,535 or Connection destination port number at server < 0 or Connection destination port number at server > 65,535</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]</p> <ol style="list-style-type: none"> 1)Malfunction on SEL unit 2)Noise <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1)Replace SEL unit in case this error occurs after power reboot 2)Take a countermeasure to noise
	476	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)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>[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 7)Replace driver unit
	477	Homing timeout 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

	Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	478	Driver unit actual speed exceeded	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 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>[Countermeasure]</p> <ol style="list-style-type: none"> 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
	479	Slave driver alarm detection	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1)An alarm on the driver was detected <p>[Countermeasure]</p> <ol style="list-style-type: none"> 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.
	47A	Positioning completion time-out error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 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>[Countermeasure]</p> <ol style="list-style-type: none"> 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
	47B	Coordinate system number error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 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>[Countermeasure]</p> <ol style="list-style-type: none"> 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

	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</p> <p>2) Malfunction on SEL unit</p> <p>[Countermeasure]</p> <p>1) Check the sending message and indicate the number correctly</p> <p>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</p> <p>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</p> <p>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</p> <p>2) Position data setting error</p> <p>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</p> <p>2) Check the position number in the step that the error occurred and set it in the operation range of the orthogonal coordinate system</p> <p>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</p> <p>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.</p> <p>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>

	Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	487	I/O process program # error during motion paused	<p>[Content & Cause]</p> <p>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]</p> <p>1) Set a value in the range (0 to 512) in Other Parameter No. 3 "I/O Process Program Number When All Operation Paused"</p> <p>* Feature inactivated when set to 0</p>
	488	Virtual IO operation error	<p>[Content & Cause]</p> <p>1) The virtual output port in the input attribute was attempted to be changed</p> <p>[Countermeasure]</p> <p>1) Check the virtual output port that was to be changed</p>
	489	System output operation error	<p>[Content & Cause]</p> <p>1) An output port set as the system output in the parameters was attempted to operate</p> <p>[Countermeasure]</p> <p>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]</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>
	48C	Home-return incomplete error	<p>[Content & Cause]</p> <p>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]</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>
	48D	Position# data size exceeded in response command	<p>[Content & Cause]</p> <p>1) The connected PC software or TP is not applicable for the extended position data</p> <p>[Countermeasure]</p> <p>1) Check the version of the PC software or TP in IAI homepage.</p>
	48E	Input port debug filter type error	<p>[Content & Cause]</p> <p>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]</p> <p>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 wrist) 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

	Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	493	Creep sensor undetected error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) Contact error at creep sensor connection connector on encoder cable 2) Cable breakage on encoder cable 3) Malfunction of sensor <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Check the condition of connection on the creep sensor connection connector on the encoder cable and connect again 2) Replace the encoder cable 3) Replace the sensor
	494	Positioning distance overflow error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) The absolute reset was not performed in the normal condition <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Perform the absolute reset again in the correct procedures
	495	Posture error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 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>[Countermeasure]</p> <ol style="list-style-type: none"> 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.
	496	Expansion condition LD simultaneous process # exceeded	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) The number of simultaneous processes in LD has exceeded the upper limit (32) <p>[Countermeasure]</p> <ol style="list-style-type: none"> 3) Set the number of simultaneous processes not to exceed the upper limit
	497	Expansion condition LD missing error 1	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) There is no input condition before steps of Extension Conditions A and O <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Input the input conditions before steps of Extension Conditions A and O
	498	Expansion condition LD insufficient error 2	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) There is no input condition before steps of Extension Conditions AB and OB <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Input the input conditions before steps of Extension Conditions AB and OB
	499	Unused LD detection error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 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>[Countermeasure]</p> <ol style="list-style-type: none"> 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

	Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	49A	Input condition usage with incompatible command	<p>[Content & Cause]</p> <p>1)An input condition was attempted to be used to an input condition prohibited command</p> <p>[Countermeasure]</p> <p>1)An input condition should not be used to an input condition prohibited command</p>
	49B	String variable data # specification error	<p>[Content & Cause]</p> <p>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]</p> <p>1)Use it not to have the number of string variable indication exceed the upper limit</p>
	49C	String-variable delimiter non-detection error	<p>[Content & Cause]</p> <p>1)There is no delimiter in the string variables</p> <p>[Countermeasure]</p> <p>1)Set a delimiter in the string variables</p>
	49D	String-variable copy size over error	<p>[Content & Cause]</p> <p>1)The string variables copy size is too large</p> <p>[Countermeasure]</p> <p>1)Make the string variables copy size small</p>
	49E	Character count non-detection error during string processing	<p>[Content & Cause]</p> <p>1)The length of the character string is not defined at string process</p> <p>[Countermeasure]</p> <p>1) Defined the length of the character string by SLEN Command before executing the string process</p>
	49F	Character-string length error during string processing	<p>[Content & Cause]</p> <p>1)The length of the character string is out of the range at string process</p> <p>[Countermeasure]</p> <p>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	Arch interpolation command angle indication error	<p>[Content & Cause]</p> <p>1)There is an error to a value of the center angle indicated by ARCC Command or ARCD Command</p> <p>[Countermeasure]</p> <p>1)Refer to the SEL programming manual and change the value to one that is available for indication</p>
	4A1	SEL language operand out of range error	<p>[Content & Cause]</p> <p>1)Data indicated in a SEL command is out of the range</p> <p>[Countermeasure]</p> <p>1)Check the program step that the error occurred and indicate the data in the range.</p>
	4A2	Multiple axes indication error	<p>[Content & Cause]</p> <p>1)PTP operation on each axis was indicated on multiple axes 2)Jog and inching were indicated on multiple axes</p> <p>[Countermeasure]</p> <p>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>

	Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	4A3	Condition unavailable axis used error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 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>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Use axis after drive cutoff canceled 2) Use axis after error canceled
	4A4	SCARA / linear axis simultaneous indication error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) SCARA and linear axes were indicated at the same time <p>[Countermeasure]</p> <ol style="list-style-type: none"> 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
	4A5	Push-motion axis multiple specification error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) Several axes were indicated in PUSH Command <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Check the program step that the error occurred and avoid indicating multiple axes in PUSH Command
	4A6	Push-motion approach distance/speed specification error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) A distance out of the range was indicated in PAPER Command 2) A speed out of the range was indicated in PAPER Command <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) A distance in the range should be indicated in PAPER Command 2) A speed in the range (at 70mm/s or below) should be indicated in PAPER Command
	4A7	Defective phase-Z position error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) Malfunction of encoder 2) Malfunction of home sensor 3) Contaminated inside actuator <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Replace encoder 2) Replace the home sensor 3) Remove the contamination from the actuator
	4A8	Servo-packet calculation logic error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) Malfunction on SEL unit 2) The absolute reset was not performed in the normal condition <ul style="list-style-type: none"> * In case 4AC "Actual Position Soft Limit Excess Error" being occurred in parallel 3) Noise <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Replace SEL unit 2) Perform the absolute reset again in the correct procedures 3) Take a counteraction to noise
	4A9	Circle/arc calculation logic error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) Malfunction on SEL unit 2) Noise <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Replace SEL unit 2) Take a counteraction to noise

	Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	4AA	Circle/arc calculation error	<p>[Content & Cause]</p> <p>1)Position data not available for arch movement was indicated</p> <p>[Countermeasure]</p> <p>1)Position data available for arch movement should be indicated</p>
	4AB	SEL data error	<p>[Content & Cause]</p> <p>1)The number of flash ROM erasing has exceeded the upper limit</p> <p>[Countermeasure]</p> <p>1)Replace SEL unit</p>
	4AC	Actual-position soft limit over error	<p>[Content & Cause]</p> <p>The current position has exceeded the soft limit</p> <p>1)An external force was applied when the servo is off</p> <p>2)An actuator was overshoot</p> <p>[Countermeasure]</p> <p>Set the current position back in the range of the soft limit</p> <p>1)Do not attempt to move it out of the range</p> <p>2)Have a gain adjustment conducted</p>
	4AD	Position data type error	<p>[Content & Cause]</p> <p>There is an error in the position data type.</p> <ul style="list-style-type: none"> • An appropriate type was indicated • Axis-specific coordinate system and orthogonal coordinate system existed together <p>[Countermeasure]</p> <p>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	Invalid feature used error	<p>[Content & Cause]</p> <p>A feature not available in the current setting is used in a SEL command or IAI Protocol command.</p> <p>[Countermeasure]</p> <p>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	Driver unsupported function error	<p>[Content & Cause]</p> <p>A feature not supported in the driver was attempted to be used</p> <p>1)An axis connected to RCON-DC was indicated as the target axis for NTCH Command</p> <p>[Countermeasure]</p> <p>1)Check the content of the SEL program</p>
	4B0	Acceleration/deceleration specification error	<p>[Content & Cause]</p> <p>There is an error in the acceleration/deceleration indication</p> <p>1)The indication of the acceleration/deceleration is 0 or less</p> <p>2)Orthogonal coordinate system movement was made with ACMX Command declared</p> <p>[Countermeasure]</p> <p>1), 2) Check the velocity indication in the SEL programs, IAI Protocol commands and position data.</p>

	Error No.	Error name	Content and Cause / Countermeasure
Operation-cancellation	4B1	Excess command acceleration/deceleration	<p>[Content & Cause]</p> <p>The command acceleration/deceleration has exceeded the allowable value during operation</p> <ol style="list-style-type: none"> 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>[Countermeasure]</p> <ol style="list-style-type: none"> 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
	500	Emergency stop	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) The emergency stop condition was detected <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Check the following if it is unexpected; <ul style="list-style-type: none"> • 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
Cold-start	600	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) 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>[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 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"
	601	Fan error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) Fan malfunction <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Replace the fan unit
	602	SEL global data error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) The power was cut off during the SEL global data initialization 2) The SEL global data was damaged due to noise apply <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Initialize the SEL global data 2) Take a countermeasure to noise on a controller (in case of high frequency)
	603	Controller update error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) Error in indicating controller name or unit name of the updating tools <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Indicate the controller names and unit names of the updating tools to perform update

	Error No.	Error name	Content and Cause / Countermeasure
Cold-start	604	Flash ROM error	<p>[Content & Cause] 1)Data delete in the flash ROM or writing to the flash ROM did not finish in normal condition due to the causes below: 1. Noise Applied 2. Malfunction of Flash ROM 2)Sum check error in code domain in flash ROM 3)Version information mismatched in code domain in flash ROM 4)Data writing to the flash ROM did not finish in normal condition due to the causes below: 1. Noise Applied 2. Malfunction of Flash ROM 5)Data delete in the flash ROM did not finish in normal condition due to the causes below: 1. Noise Applied 2. Malfunction of Flash ROM 6)Data was corrupted in the flash ROM due to the causes below: 1. Noise Applied 2. Malfunction of Flash ROM</p> <p>[Countermeasure] 1) -1, 4) -1, 5) -1, 6) -1 Take a countermeasure to noise on controller (such as installing ferrite core) 1) -2, 4) -2, 5) -2, 6) -2 Replace SEL unit 2),3) Reboot the power.</p>
	605	System construction definition ROM data error	<p>[Content & Cause] 1)Data is not written properly to the flash ROM 2)Malfunction of Flash ROM</p> <p>[Countermeasure] 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] 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>
	607	Parameter 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>
	608	SEL program 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>

	Error No.	Error name	Content and Cause / Countermeasure
Cold-start	609	Position data error	<p>[Content & Cause]</p> <p>1)The power was cut during flash ROM writing. 2)Malfunction of Flash ROM</p> <p>[Countermeasure]</p> <p>1)Transfer the backup data and conduct the flash ROM writing 2)Replace SEL unit</p>
	60A	Position error	<p>[Content & Cause]</p> <p>1)The number of axes groups was changed</p> <p>[Countermeasure]</p> <p>1)Initialize the position data</p>
	60B	Fieldbus error	<p>[Content & Cause]</p> <p>1)Operation failure due to noise or others 2) Concern of SEL unit malfunction</p> <p>[Countermeasure]</p> <p>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
Cold-start 60C	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)" * 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" 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)" * 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" 4) Take a countermeasure to noise on fieldbus connection cable (such as installing ferrite core)

	Error No.	Error name	Content and Cause / Countermeasure
Cold-start	60D	Fieldbus parameter error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 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 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 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 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 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 6)There is no fieldbus module mounted <p>[Countermeasure]</p> <ol style="list-style-type: none"> 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 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 65,535, For CC-Link IE: 0 to 120 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) 4)Check the value set in I/O Parameter No. 228 and set the correct value For CC-Link IE: 1 to 239 5)Check the values set in I/O parameters from No. 132 to 135 and set the correct values 6)Install a fieldbus module
	60E	CC-Link system domain use error	<p>[Content & Cause]</p> <p>The CC-Link system domain was used as the system output for those below;</p> <ol style="list-style-type: none"> 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>[Countermeasure]</p> <p>Check the following settings;</p> <ol style="list-style-type: none"> 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 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 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. 4)I/O Parameter No. 357 "Vision System I/F Capturing Command Physical Output Port Number"

	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>

	Error No.	Error name	Content and Cause / Countermeasure
Cold-start	613	PIO error	<p>[Content & Cause]</p> <p>1)IO power is not supplied (or voltage dropped below 21.6V)</p> <p>[Countermeasure]</p> <p>1)Check the power supply status to IO cable</p>
	614	Unsupported function error	<p>[Content & Cause]</p> <p>1)A feature that the driver part does not support was executed</p> <p>[Countermeasure]</p> <p>1)Check the driver applicable version</p>
	615	Unsupported card error	<p>[Content & Cause]</p> <p>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> <p>[Countermeasure]</p> <p>1)Contact IAI</p> <p>2)Check the firmware version</p>
	616	SD card error (controller)	<p>[Content & Cause]</p> <p>1)There is no Secure Digital memory card installed in a Secure Digital memory card slot</p> <p>2)There is no indicated file saved in the Secure Digital memory card</p> <p>3)An indicated file in the Secure Digital memory card is corrupted</p> <p>4)Malfunction of the Secure Digital memory card</p> <p>5)Malfunction on SEL unit</p> <p>[Countermeasure]</p> <p>1)Install a Secure Digital memory card</p> <p>2)Save a file that you would like to use in a Secure Digital memory card</p> <p>3)Save a file that you would like to use in a Secure Digital memory card again</p> <p>4)Replace the Secure Digital memory card</p> <p>5)Replace SEL unit</p>
	617	Ethernet parameter error	<p>[Content & Cause]</p> <p>1)An IP address in the system reservation was set</p> <p>[Countermeasure]</p> <p>1)Check the setting in I/O Parameter No. 172 to 175 "Ethernet I/F Self IP Address (*)"</p> <p>* H, MH, ML or L comes in * in order</p>
	618	Internal process error	<p>[Content & Cause]</p> <p>1)Malfunction on SEL unit</p> <p>2)Noise</p> <p>3)Malfunction of an I/O slot</p> <p>[Countermeasure]</p> <p>1)Replace SEL unit in case this error occurs after power reboot</p> <p>2)Take a countermeasure to noise</p> <p>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
	61C	Driver unit overcurrent error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) Malfunction of motor 2) Malfunction of driver unit <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> <ol style="list-style-type: none"> 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>[Countermeasure]</p> <ol style="list-style-type: none"> 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
	61E	Driver unit drive power error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1)Malfunction of motor 2)Malfunction of driver unit <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1)Replace the motor unit 2)Replace driver unit
	61F	Verification error during driver unit non-volatile memory writing	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1)Noise 2)Malfunction of driver unit <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1)Take a countermeasure to noise 2)Replace driver unit
	620	Driver unit related error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 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>[Countermeasure]</p> <ol style="list-style-type: none"> 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
	621	Slave unit communication error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1)A coupling connector or a SCON connection 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>[Countermeasure]</p> <ol style="list-style-type: none"> 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

	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" 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 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 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 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 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) 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
Cold-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 6,999) 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 6,999) 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> <ol style="list-style-type: none"> 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>[Countermeasure]</p> <ol style="list-style-type: none"> 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
	632	I/O assignment parameter error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) An input (output) port start number and number of input (output) ports used are set as follows in the fixed assignment <ul style="list-style-type: none"> • A port number other than 0 to 299, 300 to 599, 1,000 to 3,999 or 4,000 to 6,999 • Not a multiple of 8 2) Duplicated assignment due to parameter setting error 3) Excess number of assignment due to parameter setting error <p>[Countermeasure]</p> <ol style="list-style-type: none"> 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 <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" 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 <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> <ol style="list-style-type: none"> 1) The target type does not match with the actual unit 2) Noise <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Check the setting in the target type 2) Take a counteraction to noise
	634	Belt breakage error	<p>[Content & Cause]</p> <ol style="list-style-type: none"> 1) Malfunction of actuator (belt breakage) <p>[Countermeasure]</p> <ol style="list-style-type: none"> 1) Replace the belt (Contact IAI)

	Error No.	Error name	Content and Cause / Countermeasure
Cold-start	635	Brake ON/OFF timeout error	<p>[Content & Cause]</p> <p>1)The brake power is not supplied</p> <p>[Countermeasure]</p> <p>1)Supply the brake power</p>
	636	Dynamic brake ON/OFF timeout error	<p>[Content & Cause]</p> <p>1)Malfunction of driver unit 2)Noise</p> <p>[Countermeasure]</p> <p>1)Replace driver unit 2)Take noise prevention measure</p>
	637	Drive power cut-off relay error	<p>[Content & Cause]</p> <p>1)Malfunction with drive cutoff relay welded</p> <p>[Countermeasure]</p> <p>1)Replace driver unit</p>
	638	Motor power low voltage error	<p>[Content & Cause]</p> <p>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]</p> <p>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]</p> <p>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]</p> <p>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 connection 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 connection 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>

	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</p> <ol style="list-style-type: none"> 1) There is an error in a parameter 2) The axis data output port is duplicated 3) The system output port is duplicated <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</p> <ol style="list-style-type: none"> 1) The settings in Driver Unit Parameter No. 5 "Home-Return Direction" and No. 62 "Pulse Count Direction" are different <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).</p> <ol style="list-style-type: none"> 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 7) The connected option unit differs from what is set in the parameter. 8) The total of the number of driver axes and EC axes exceeds 16 axes. 9) There was an error occurred in communication between the EC connection unit and the EC. <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.</p> <ol style="list-style-type: none"> 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 7) Align the option unit and the setting in Option Board Parameter No. 1. 8) Arrange the number of driver or EC axes to be 16 axes or less. 9) Check the connectivity of the cable on the EC connection unit.
	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>

11.3 Error List

	Error No.	Error name	Content and Cause / Countermeasure
Cold-start	645	ENB logic error	<p>[Content & Cause]</p> <p>1)Malfunction on SEL unit</p> <p>[Countermeasure]</p> <p>1)Replace SEL unit</p>
	700	Communication error	<p>[Content & Cause]</p> <p>1)Noise 2)Malfunction on SEL unit 3)Malfunction of TP 4)A controller not supported is connected</p> <p>[Countermeasure]</p> <p>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.</p>
System-down	F00	System down error	<p>[Content & Cause]</p> <p>1)A system error was detected</p> <p>[Countermeasure]</p> <p>1)Reboot the power.</p>

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 motorRCP Series

A: 24V AC Servo motorRCA Series, RCL Series

D: DC brush-less motorRCD Series

S: 200V AC Servo motorRCS 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 [12.3.2 How to Replace Fan Unit or 12.3.3 How to Replace Fan Unit for 200V Driver Unit] 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 [12.3.2 How to Replace Fan Unit or 12.3.3 How to Replace Fan Unit for 200V Driver Unit] 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.

11.4 Alarm Codes of Driver Unit

Alarm code	Alarm name	Causes/countermeasures
06B	Maintenance information data error	Cause: Maintenance information (total travel count, total travel distance) has been lost. Countermeasure: Contact IAI.
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 connection 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						
OB6 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>						
OBA	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>						
OBE	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;"> <thead> <tr> <th>Detailed code</th> <th>Target operation</th> </tr> </thead> <tbody> <tr> <td>01</td> <td>Home return motion timeout</td> </tr> <tr> <td>02</td> <td>LS retreat operation timeout</td> </tr> </tbody> </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							
OBF 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.</p> <p>If this error occurred inside the effective stroke range, 3), 4), or 5) is a likely cause.</p> <p>If 3) is suspected, check the home position. Conduct the absolute reset again if it is the absolute type.</p> <p>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 $\pm 10\%$ 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 [12.3.2 How to Replace Fan Unit] and [12.3.3 How to Replace Fan Unit for 200V Driver Unit (page 12-8)] 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. How to replace refer to [12.3.1 How to Replace Absolute Battery] 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	Refer to [Teaching tool instruction manual]

(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.</p> <p>2) Influence of noise generated by a peripheral device</p> <p>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).</p> <p>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.</p> <p>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 [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 10-46)] 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>																																				


11.4 Alarm Codes of Driver Unit

Alarm code	Alarm name	Causes/countermeasures
0B3 S Driver limited	Spurious absolute error	<p>Cause: Home-return operation was not performed properly.</p> <ol 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.</p> <p><When detail code is 0000H> Position deviation counter has overflowed before Z-axis was detected.</p> <ol style="list-style-type: none"> 1) Operation unable due to external force 2) Sliding resistance on actuator itself is high <p><When detail code is 0001H> Z-phase was detected two times before the motor makes one turn.</p> <ol style="list-style-type: none"> 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> <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>

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. 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.</p>												
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. 2) Lower the ambient temperature of the RSEL system. 3) Confirm that there are no assembly errors in machine components.</p> <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> <table border="1"> <caption>Operating duty vs Usage temperature environment</caption> <thead> <tr> <th>Usage temperature environment [°C]</th> <th>Operating duty [%] (With fan)</th> <th>Operating duty [%] (Without fan)</th> </tr> </thead> <tbody> <tr> <td>0 - 40</td> <td>100</td> <td>100</td> </tr> <tr> <td>40 - 55</td> <td>100</td> <td>40</td> </tr> <tr> <td>55 - 60</td> <td>40</td> <td>40</td> </tr> </tbody> </table>	Usage temperature environment [°C]	Operating duty [%] (With fan)	Operating duty [%] (Without fan)	0 - 40	100	100	40 - 55	100	40	55 - 60	40	40
Usage temperature environment [°C]	Operating duty [%] (With fan)	Operating duty [%] (Without fan)												
0 - 40	100	100												
40 - 55	100	40												
55 - 60	40	40												

11.4 Alarm Codes of Driver Unit

Alarm code	Alarm name	Causes/countermeasures
0CB	Current sensor offset adjustment error	<p>Cause: During the current detection sensor status check conducted in the startup initialization process, a sensor error was found.</p> <ol style="list-style-type: none"> 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. <p>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.</p>
0CC	Control power supply voltage error	<p>Cause: Driver unit control power supply voltage has increased to or above 28.8V (120% of 24V DC).</p> <ol style="list-style-type: none"> 1) Control power supply voltage rise 2) Malfunction of parts inside the RSEL system <p>Countermeasure: 1) Confirm that voltage of 24V DC $\pm 10\%$ 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) Contact IAI.
0CD S Driver limited	Drive Cutoff Relay Welded Detection Error	<p>Cause: The solid-state relay for drive cutoff inside controller has broken.</p> <p>Countermeasure: The relay or driver unit must be replaced. Please contact IAI.</p>
0D3 S Driver limited	Motor power supply voltage low	<p>Cause: 1) If the power source is shut off in the controller external circuit, servo-on command was made during the power is shut.</p> <ol style="list-style-type: none"> 2) Overcurrent occurred on the 200V motor power supply line. 3) There is a concern of a malfunction of the controller internal components. <p>Countermeasure: 1) Check the controller external circuit.</p> <ol style="list-style-type: none"> 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	<p>Cause: 1) 24V Motor power input voltage (input to MPI terminal) is excessive.</p> <p>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.</p> <ol style="list-style-type: none"> 2) Overcurrent generated in 24V motor power line. <p>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.</p> <ol style="list-style-type: none"> 2) Check the wiring between the actuator and the driver unit. <p>If this error occurs frequently, contact IAI regarding the operating environment and operating conditions.</p>

Alarm code	Alarm name	Causes/countermeasures
OD5 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>
OD7 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>
OE0	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>
OE4 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
<p>0E5 P, A, S Driver limited</p>	<p>Encoder reception error</p>	<p>Cause: Data from the encoder was not normally received by the driver unit. 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). [Only for P Driver] 5) Initialization of battery-less absolute encoder incomplete (Detail code 000AH) 6) Communication error occurred to battery-less absolute encoder (Detail code 000CH) Countermeasure: 1) Check for any wire breakage on a connector and inspect the condition of the wire connections. 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. In case of 3), 4) or 5), replace the actuator (motor part) and/or the driver unit. 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. Contact IAI if the cause cannot be determined.</p>
<p>0E6 P, A, S Driver limited</p>	<p>Encoder count error</p>	<p>Cause: The encoder cannot detect location information properly. 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. Countermeasure: 1) Check for any wire breakage on a connector and inspect the condition of the wire connections. If there is no cable malfunction, encoder failure may be possible. Contact IAI.</p>
<p>0E7 S Driver limited</p>	<p>A-, B- and Z-phase wire breaking</p>	<p>Cause: Encoder signals cannot be detected correctly. 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. Countermeasure: 1) Check if any wire breakage on a connector and the condition of wire connections. 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. 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> <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. 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. 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. 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>

11.4 Alarm Codes of Driver Unit

Alarm code	Alarm name	Causes/countermeasures
0FA	CPU error	<p>Cause: CPU is not operating normally.</p> <ol 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>
0FC	Logic error (Controller part error)	<p>Cause: RSEL system interior is not working properly.</p> <ol 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.</p> <p>Contact IAI if the cause cannot be determined.</p>

11.5 Causes and Countermeasures for ELECYLINDER Alarms

11.5.1 ELECYLINDER Alarm Group

The alarm groups and warnings occurred in ELECYLINDER are as show below.

For details and countermeasures, refer to the next section, [Troubleshooting by alarm groups].

Alarm group	Content	Main content and typical countermeasures	
A	Overload alarm	[Content] [Countermeasure]	Moving parts stopped abnormally. Make sure that there are no obstructions or obstacles.
B	Motor error alarm	[Content] [Countermeasure]	Motor abnormality occurred. Replace the motor or controller.
C	ELECYLINDER control unit error alarm	[Content] [Countermeasure]	ELECYLINDER control unit abnormality occurred. Replace the ELECYLINDER control unit.
D	ELECYLINDER control unit-encoder abnormality alarm	[Content] [Countermeasure]	An abnormality occurred between the ELECYLINDER control unit and encoder. Turn the power off and then on again. If the unit still does not recover, replace the motor or ELECYLINDER control unit.
E	Power supply voltage/Power supply capacity error alarm	[Content] [Countermeasure]	ELECYLINDER control unit abnormality occurred. Check the power supply voltage for any abnormality.

Alarm group	Content	Main content and typical countermeasures	
Warning	Maintenance warning	[Content] [Countermeasure]	The "maintenance period" has come to an end. Perform maintenance for the unit.

11.5.2 Troubleshooting for ELECYLINDER alarm groups

ELECYLINDER alarms are classified into “alarms” and “warnings” depending on the content. “Alarms” are grouped into 5 types.

Alarm level	SV/ALM LED	* ALM signal	Situation when generated	Clearing method
Alarm	Red ON	OFF	Servo OFF after gradual stop	Cleared by resetting the alarm. If it cannot be cleared by resetting the alarm, turn off the power, then turn it on again.
Warning	Red/green alternate blinking	ON	Continued operation	<ul style="list-style-type: none"> • Maintenance Warnings 1/2 (Total travel count/Total travel distance) are cleared by updating the set values in the maintenance information window. • Maintenance Warning 3 (Overload warning) is cleared by resetting the alarm.



Caution

- Clear alarms only after investigating and resolving the cause.
- If the same alarm recurs after clearance, it is highly probable that the cause of the alarm has not been resolved.
- If the cause of the alarm cannot be resolved or the alarm cannot be cleared after resolving the cause, contact IAI.
- Set to the disable status on the deadman’s switch in the teaching pendant, and ELECYLINDER gets to the motor voltage drop condition (teaching pendant alarm: 203).

[Alarm group A: Overload alarm]

Moving parts of ELECYLINDER stopped abnormally while moving to the target position.

No.	Cause	Countermeasure
1	Operation may not be possible due to contact with or snagging on external obstacles.	Remove any external obstacles or other external loads.
2	The ELECYLINDER may be being used under conditions exceeding the specifications described in the catalog.	Check the specification values such as payload, acceleration/deceleration and speed, and adjust them appropriately.
3	Causes may include foreign matter, brake failure or motor failure.	<p>Visually check for the depletion of grease on the ball screw/guide inside the ELECYLINDER, intrusion of foreign matter, etc. If this is the case, clean the inside of the ELECYLINDER and replenish the grease.</p> <hr/> <p>Remove the motor and check the sliding movement of the ELECYLINDER body. If there is no abnormality in the sliding motion, there is a possibility of motor or brake failure. Replacement of the motor is recommended.</p>
4	The base may have been distorted when mounting the ELECYLINDER, increasing the sliding resistance of the guide.	The ELECYLINDER mounting surface should be a machined surface or a plane with similar accuracy, with flatness within 0.05mm/m. Refer to the [Instruction manual of each ELECYLINDER] for the recommended tightening torque of the bolt for fixing the base.
5	The peak power capacity of the 24V power supply is less than 4.2A.	Use a power supply with peak current of 4.2 A or higher (per axis).
6	As there is a contact error at the terminals on the EC connection unit cable, the peak current would not flow.	Check if there is any looseness, contact error or line breakage on the terminals or connectors of the EC connection unit cable.
7	The deceleration distance was insufficient and the calculation result of the arrival position exceeded the operation range of the ELECYLINDER due to the "next movement command" being issued too soon during operation with "Smooth accel/decel setting" enabled.	Adjust the timing of the "next movement command" so that the command will be given after the first movement is completed.
8	24V power was turned ON while the moving parts of the ELECYLINDER were immobilized or pressed against the mechanical stopper.	<p>Resolve the state of immobilization. If the unit is pressed against the mechanical stopper, move it at least 5 mm away, then turn on the power again.</p>

[Alarm group B: Motor abnormality alarm]

Motor abnormality occurred.

No.	Cause	Countermeasure
1	The internal temperature of the motor may be too high.	<p>Improve the surrounding environment of the motor so that the ambient temperature is 40 °C or less.</p> <p>If the abnormality is resolved upon turning the power back on after the ambient temperature is lowered, the internal temperature may have been excessive.</p> <p>[Countermeasure examples]</p> <p>Remove the heat source/turn OFF the heat source/install a fan/install a temperature shield/improve thermal conductivity of the base/install a heat dissipation fin, etc.</p>
2	The ELECYLINDER may be being used under conditions exceeding the specifications described in the catalog.	Check the specification values such as payload, acceleration/deceleration and speed, and adjust them appropriately.
3	If this alarm recurs after performing the inspection above and improving the power supply environment, it is highly likely that the motor has failed.	Replacement of the motor is required. For some models, the motor cannot be replaced by the customer. In that case, please contact IAI.

[Alarm group C: ELECYLINDER control unit abnormality alarm]

ELECYLINDER control unit abnormality occurred.

No.	Cause	Countermeasure
1	The ELECYLINDER control unit is affected by the noise of a peripheral device and cannot operate normally.	<p>Shut down the power supply of the peripheral device and operate only with the ELECYLINDER, then check to see whether this alarm persists.</p> <p>If it does not, there is a possibility that the ELECYLINDER is affected by the noise from the peripheral device.</p> <p>Reconsider the noise countermeasures (grounding, power line wiring, electrostatic shielding, etc.) for the peripheral device.</p>
2	If this alarm recurs after performing the inspection above and improving the power supply environment, it is highly likely that the ELECYLINDER control unit has failed.	<p>Replace the controller cover assembly of the ELECYLINDER.</p> <p>→ For the replacement method, refer to the [Instruction manual for each ELECYLINDER].</p>

[Alarm group D: ELECYLINDER control unit-encoder abnormality alarm]

An abnormality occurred between the ELECYLINDER control unit and encoder.

No.	Cause	Countermeasure
1	In case the alarm gets generated even after rebooting the power, it could be concerned that there is a contact error at a connector on the cable between the ELECYLINDER control part and the motor.	Shut the power down and take off the connectors on the cable inside ELECYLINDER, and insert again firmly till it stops. If this does not improve the situation, the cable may be disconnected, in which case the connection cable should be replaced.
2	The specifications of the replaced ELECYLINDER control unit and the motor may not match. [Example] An incremental-type motor and battery-less absolute spec ELECYLINDER control unit have been combined by mistake	Cut off the power supply and make sure that the specifications of the replaced motor and ELECYLINDER control unit are both “battery-less absolute specification” or “incremental specification”. → For the replacement method, refer to the [Instruction manual for each ELECYLINDER].
3	The communication between the ELECYLINDER control unit and encoder is affected by the noise of a peripheral device and cannot operate normally.	Shut down the power supply of the peripheral device and operate only with the ELECYLINDER, then check to see whether this alarm persists. If it does not, there is a possibility that the ELECYLINDER is affected by the noise from the peripheral device. Reconsider the noise countermeasures (grounding protection, power line wiring, electrostatic shielding, etc.) for the peripheral device.
4	If this alarm recurs after performing the inspection above and improving the power supply environment, it is highly likely that the motor or ELECYLINDER control unit has failed.	Replace the motor or ELECYLINDER controller cover assembly. For some models, the motor cannot be replaced by the customer. In that case, please contact IAI. → For the replacement method, refer to the [Instruction manual for each ELECYLINDER].

[Alarm group E: Supply voltage/power capacity abnormality alarm]

An abnormality occurred in the power supply voltage and capacity supplied to the rear of the ELECYLINDER.

No.	Cause	Countermeasure
1	The ELECYLINDER may be being used under conditions exceeding the specifications described in the catalog.	Check the specification values such as payload, acceleration/deceleration and speed, and adjust them appropriately.
2	The power supply voltage has been detected outside the range of 21.6V to 26.4V.	Inspect with a tester to see whether the power supply voltage is in the range of 21.6 V to 26.4 V. If it is out of range, the 24V DC power supply voltage has insufficient capacity. Refer to our catalog for the required capacity and improve the power supply environment.
3	If this alarm recurs after performing the inspection above and improving the power supply environment, it is highly likely that the ELECYLINDER control unit has failed.	Replace the controller cover assembly of the ELECYLINDER. → For the replacement method, refer to the [Instruction manual for each ELECYLINDER].

[Warning: Maintenance warning 1]

This is an alert that the target value of the "total travel count" set by the customer has been reached.

No.	Cause	Countermeasure
1	For safe use and long service life of the ELECYLINDER, periodic lubrication is recommended. * To disable this warning, change the target value to 0.	[Countermeasure 1] Perform maintenance and inspection such as greasing. → For how to grease, refer to the [Instruction manual for each ELECYLINDER]. [Countermeasure 2] When updating this function, be sure to set the target value to a value larger than the current value.

* For details on the maintenance warning settings, see [9.3.3 Maintenance Information].

[Warning: Maintenance warning 2]

This is an alert that the target value of the "total travel distance" set by the customer has been reached.

No.	Cause	Countermeasure
1	For safe use and long service life of the ELECYLINDER, periodic lubrication is recommended. * To disable this warning, change the target value to 0.	[Countermeasure 1] Perform maintenance and inspection such as greasing. → For how to grease, refer to the instruction manual for each ELECYLINDER. [Countermeasure 2] When updating this function, be sure to set the target value to a value larger than the current value.

* For details on the maintenance warning settings, see [9.3.3 Maintenance Information].

[Warning: Maintenance warning 3]

This is an alert that the target value of the “overload warning level” set by the customer has been reached.

No.	Content	Causes and countermeasures
1	<p>Before the ELECYLINDER stops operation due to the “overload alarm”, follow the troubleshooting procedure and conduct visual inspection and maintenance.</p> <p>* To disable this warning, change the “overload warning level” in “Maintenance Information” to 100%.</p>	<p>[Causes] The warning may be caused by the depletion of grease on the ball screw/guide inside the ELECYLINDER, intrusion of foreign matter, brake failure, motor failure, contact with peripheral equipment, etc.</p> <p>[Countermeasure 1] Visually check for the depletion of grease on the ball screw/guide inside the ELECYLINDER, intrusion of foreign matter, etc. If this is the case, clean the inside of the ELECYLINDER and replenish the grease. → Refer to the [Instruction manual of each ELECYLINDER] for the cleaning method.</p> <p>[Countermeasure 2] Remove the motor and check the sliding movement of the ELECYLINDER body. If there is no abnormality in the sliding motion, there is a possibility of motor or brake failure. Replacement of the motor is recommended. For some models, the motor cannot be replaced by the customer. In that case, please contact us.</p>

* For details on the maintenance warning settings, see [9.3.3 Maintenance Information].

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 \pm 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.

12.2 Periodic Inspection Items

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.

12.3.1 How to replace absolute battery

[How to Replace Absolute Battery]

In here, explains how to replace an absolute battery.

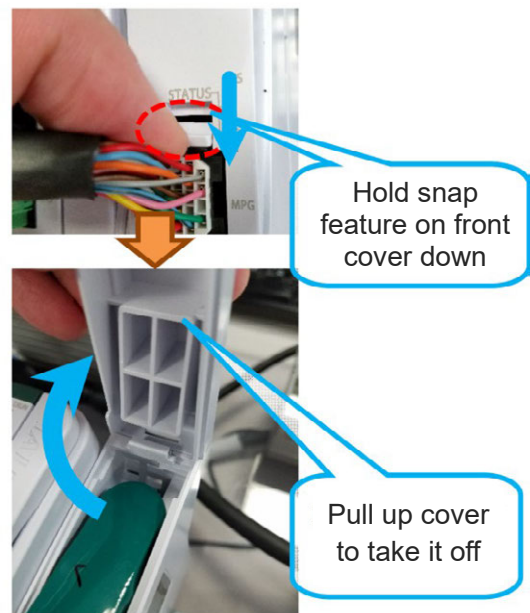
When you replace a battery, keep the power to the controller on during replacement work.

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.

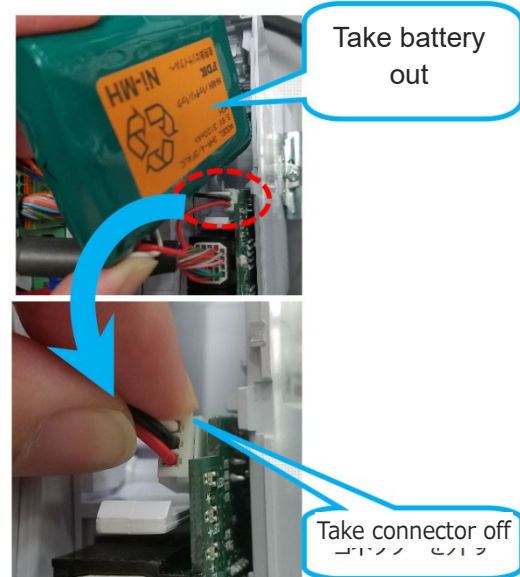
- 1 Press and hold down the snap feature on the front cover of the simple absolute unit, and pull the cover up towards you to take it off.

[1]



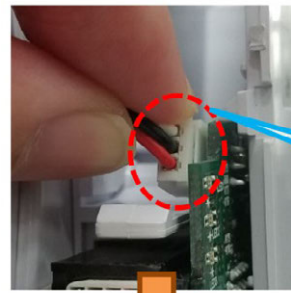
- 2 Take the battery out of the simple absolute unit, and take off the connector on the battery.

[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



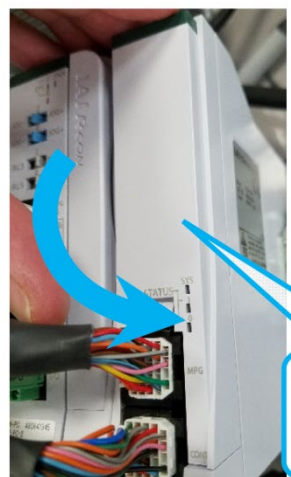
Put battery
inside

- 4** Put the cover on.

[4]



Hang snap
feature on
cover



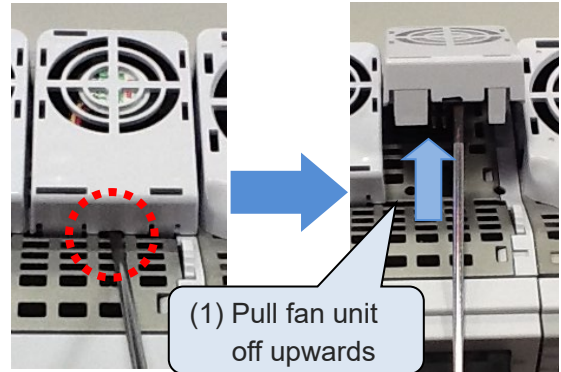
Lay cover down
towards front to
snap it in

This is the end of the absolute battery replacement work.

12.3.2 How to replace fan unit

<Detaching Fan Unit>

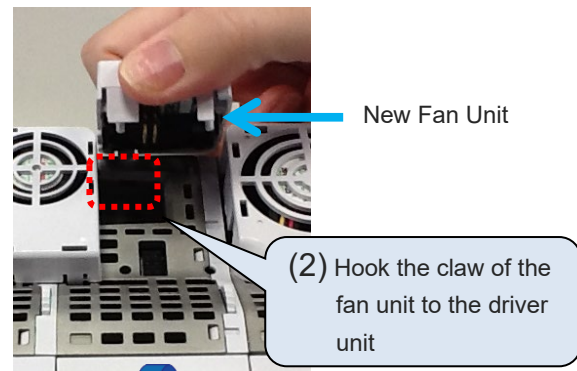
- (1) Insert a slotted screwdriver to the cutout (circled in red in figure on the right) on the fan unit and pull up the fan unit upwards to detach it.



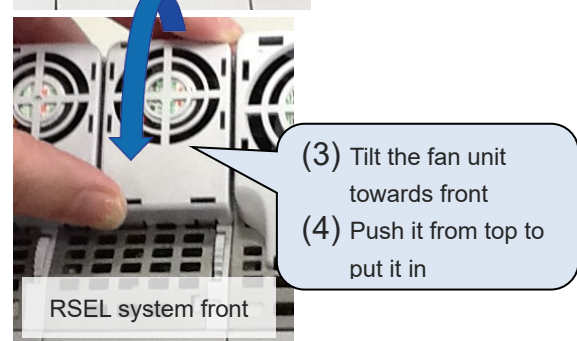
<Attaching Fan Unit>

- (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.

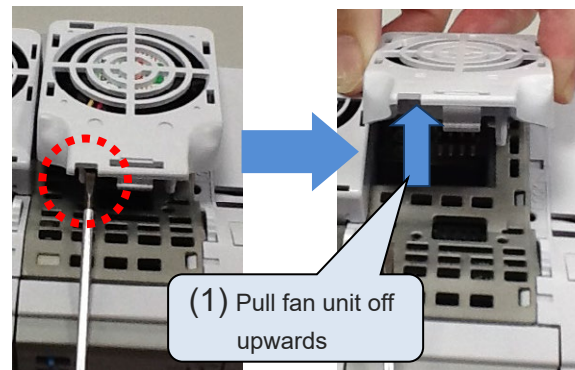


- (4) Press the fan unit from the top and snap in.

12.3.3 How to replace fan unit for 200V driver unit

<Detaching Fan Unit>

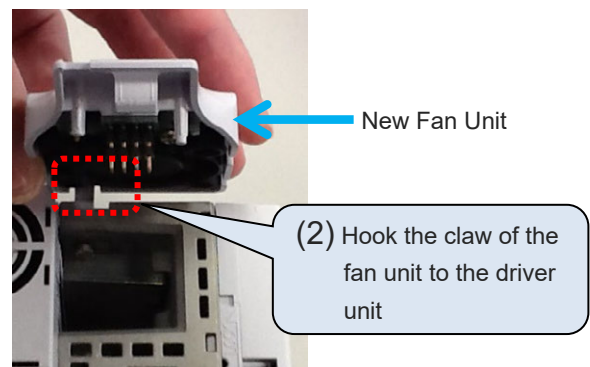
- (1) Insert a slotted screwdriver to the cutout (circled in red in figure on the right) on the fan unit and pull up the fan unit upwards to detach it.



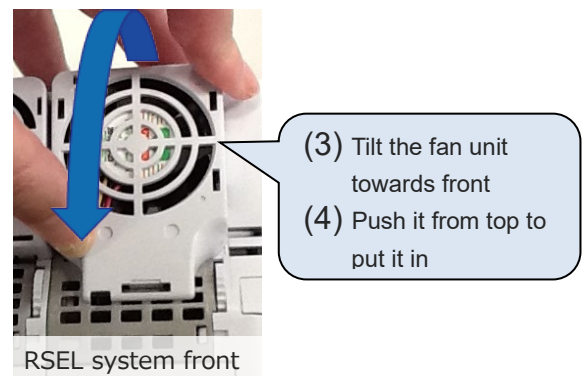
<Attaching Fan Unit>

- (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.



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

RSEL

Chapter **13**

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 type /Cleanroom 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	40				
					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							
	RCP6 RCP6CR (Slider type) Standard type /Cleanroom type	[Standard] SA6C SA6R [Cleanroom] SA6C	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) SA6R: 1280(at 50 to 500st) 1130(at 550st) 970(at 600st) 840(at 650st) 735(at 700st) 650(at 750st) 575(at 800st)	1	16	56	20			
						Vertical		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)	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 (Slider type) Standard type /Cleanroom type	[Standard] SA6C SA6R	Ball screw	8192	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	27	93	20	
					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) 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		
					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	53		185
						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]	
RCP6 RCP6CR (Slider type) Standard type (Cleanroom type)	[Standard] SA7C SA7R	Ball screw	8192	24	Horizontal	30	SA7C: 1200(at 50 to 600st) 1095(at 650st) 965(at 700st) 850(at 750st) 760(at 800st)	1	40	139	20	
					Vertical		SA7R: 1080(at 50 to 650st) 965(at 700st) 850(at 750st) 760(at 800st)	0.5				
	[Cleanroom] SA7C			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)	1	60	209		
					Vertical		SA7C: 840(at 50 to 550st) 830(at 600st) 720(at 650st) 635(at 700st) 560(at 750st) 500(at 800st)	0.5				
					8	Horizontal	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)	1	119		418
						Vertical		SA7R: 420(at 50 to 550st) 410(at 600st) 355(at 650st) 315(at 700st) 275(at 750st) 245(at 800st)	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 (Slider type)	[Standard] SA7C SA7R	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
	[Cleanroom] SA7C				SA7R: 210(at 50 to 550st) 205(at 600st) 175(at 650st) 155(at 700st) 135(at 750st) 120(at 800st)						
					Vertical		210(at 50 to 550st) 205(at 600st) 175(at 650st) 155(at 700st) 135(at 750st) 120(at 800st)	0.5			
Standard type /Cleanroom type	[Standard] SA8C SA8R	Ball screw	8192	30	Horizontal	38	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)	1	46	159	20
					Vertical		850(at 50 to 950st) 780(at 1000st) 715(at 1050st) 660(at 1100st)				
	[Cleanroom] SA8C	Horizontal	25	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	68	239				

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 type /Cleanroom type	[Standard] SA8C SA8R	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	20
					10		Horizontal				
	5			Horizontal		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)	1 0.5	273	956		
				Vertical	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				273	
	[Cleanroom] SA8C				5		Horizontal	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)	1 0.5		
				Vertical		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	273		956	
RCP6 RCP6CR (Wide slider type) Standard type /Cleanroom type	[Standard] WSA10C WSA10R	Ball screw	8192	16	Horizontal	20			840(at 50 to 400st) 775(at 450st) 660(at 500st)		1
					10		Horizontal	610(at 50 to 350st) 590(at 400st) 490(at 450st) 415(at 500st)	1	22	
	5			Horizontal		390(at 50 to 300st) 355(at 350st) 290(at 400st) 245(at 450st) 205(at 500st)	1 0.5	44			155
				Vertical	WSA10C: 350(at 50 to 350st) 290(at 400st) 245(at 450st) 205(at 500st)	0.5			44	155	
	[Cleanroom] WSA10C				5		WSA10R: 305(at 50 to 350st) 290(at 400st) 245(at 450st) 205(at 500st)	0.5			44
				WSA10C: 350(at 50 to 350st) 290(at 400st) 245(at 450st) 205(at 500st)		0.5	44		155		

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	
	[Cleanroom] WSA10C				Vertical		175(at 50 to 350st) 145(at 400st) 120(at 450st) 100(at 500st)					0.5
	RCP6 RCP6CR (Wide slider type) Standard type /Cleanroom type	[Standard] WSA12C WSA12R [Cleanroom] WSA12C	Ball screw	8192	6	Horizontal	25	800(at 50 to 600st) 740(at 650st) 650(at 700st) 580(at 750st) 520(at 800st)	1	16	56	20
								Horizontal				
						Horizontal	8		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	
								Vertical	4			
						Horizontal	4			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	
								Vertical	4	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)		
	[Standard] WSA14C WSA14R	Ball screw	8192	24	Horizontal	30	700(at 50 to 750st) 665(at 800st)			1	40	139
							[Cleanroom] WSA14C	16	Horizontal			

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] 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)	0.5			
				Horizontal	4	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)				
	Vertical	175(at 50 to 550st) 170(at 600st) 150(at 650st) 135(at 700st) 120(at 750st) 105(at 800st)	0.5								
	[Standard] [Cleanroom] WSA16C	Ball screw	8192	20	Horizontal	25	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	
							10				
				Vertical	240(at 50 to 1000st) 225(at 1050st) 205(at 1100st)	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] [Cleanroom] WSA16C	Ball screw	8192	5	Horizontal	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
					Vertical		170(at 50 to 800st) 160(at 850st) 145(at 900st) 130(at 950st) 120(at 1000st) 110(at 1050st) 100(at 1100st)				
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
					Vertical		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)				
				10	Horizontal	13	210(at 50 to 1050st) 205(at 1100st)	0.5			
					Vertical		170(at 50 to 800st) 160(at 850st) 145(at 900st) 130(at 950st) 120(at 1000st) 110(at 1050st) 100(at 1100st)		1		
				5	Horizontal	7	145(at 50 to 900st) 130(at 950st) 120(at 1000st) 110(at 1050st) 100(at 1100st)	0.5			
					Vertical		170(at 50 to 800st) 160(at 850st) 145(at 900st) 130(at 950st) 120(at 1000st) 110(at 1050st) 100(at 1100st)		1		
RCP6 (Rod type)	RA4C RA4R	Ball screw	8192	16	Horizontal	20	840	1	21	48	20
					Vertical			0.5			
				10	Horizontal	13	RA4C: 700 RA4R: 610	1	22	77	
					Vertical		0.5				
	5	Horizontal	7	350	1	44	155				
		Vertical			0.5						
	2.5	Horizontal	4	175	1	88	310				
		Vertical			0.5						
	RA6C RA6R	Ball screw	8192	20	Horizontal	25	800	1	16	56	20
					Vertical			0.5			
				12	Horizontal	15	700	1	26	93	
					Vertical			0.5			
6				Horizontal	8	450	1	53	185		
				Vertical			0.5				
3				Horizontal	4	225	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]
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			
				4	Horizontal	5	RA7C: 210 RA7R: 175	1	312	1094	
					Vertical		175	0.5			
	RA8C RA8R	Ball screw	8192	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				
5				Horizontal	7	RA8C: 150 RA8R: 100	0.1	667	2000		
				Vertical							
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	40
					Vertical		840	0.5			
				10	Horizontal	13	RRA4C: 700(at 60 to 360st) 685(at 410st) RRA4R: 610	1	22	77	
					Vertical		610	0.5			
				5	Horizontal	7	350(at 60 to 360st) 340(at 410st)	1	44	155	
					Vertical		340(at 410st)	0.5			
				2.5	Horizontal	4	175(at 60 to 360st) 170(at 410st)	1	89	310	
					Vertical		170(at 410st)	0.5			
	RRA6C RRA6R	Ball screw	8192	20	Horizontal	25	800	1	16	56	20
					Vertical		800	0.5			
				12	Horizontal	15	700	1	26	93	
					Vertical		700	0.5			
				6	Horizontal	8	450	1	53	185	
					Vertical		450	0.5			
				3	Horizontal	4	225(at 65 to 365st) 220(at 415st)	1	106	370	
					Vertical		220(at 415st)	0.5			
RRA7C RRA7R	Ball screw	8192	24	Horizontal	30	860	1	52	182	20	
				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		175	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
					Vertical		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)				
					Horizontal		13				
				Vertical	250(at 50 to 400st) 220(at 450st) 180(at 500st) 160(at 550st) 140(at 600st) 120(at 650st) 110(at 700st)						
				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)				
							RRA8R				
	10	Horizontal /Vertical	13					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
				10	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)	0.2	167	500	10
							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)				
				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	
					Vertical		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)				
				5	Horizontal	7	WRA16C: 130(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	

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		0.5				
					Horizontal		260	1			
					Vertical		(In ambient temp. 5degC or lower)	0.5			
				2.5	Horizontal	4	175	1	133	310	
					Vertical		150	0.5			
					Horizontal		130	1			
					Vertical		(In ambient temp. 5degC or lower)	0.5			
	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		370	0.5			
					Horizontal		315	1			
					Vertical		(In ambient temp. 5degC or lower)	0.5			
				3	Horizontal	4	210	1	159	370	
					Vertical		0.5				
					Horizontal		105	1			
					Vertical		(In ambient temp. 5degC or lower)	0.5			
RA7C RA7R	Ball screw	8192	16	Horizontal	20	420	1	117	273	20	
				Vertical		0.5					
				Horizontal		280	1				
				Vertical		(In ambient temp. 5degC or lower)	0.5				
			8	Horizontal	10	350	1	234	547		
				Vertical		280	0.5				
				Horizontal		140	1				
				Vertical		(In ambient temp. 5degC or lower)	0.5				
			4	Horizontal	5	140	1	469	1094		
				Vertical		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)				
					Horizontal /Vertical		100				
				5	Horizontal /Vertical	7	80	0.1	1000	2000	
					Horizontal /Vertical		80 (In ambient temp. 5degC or lower)				
					Horizontal /Vertical		80 (In ambient temp. 5degC or lower)				
RCP6W (Dust and drip proof radial cylinder)	RRA4C RRA4R	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)	1	66	155	
					Vertical		340(at 400st)	0.5			
					Horizontal		260	1			
					Vertical		260 (In ambient temp. 5degC or lower)	0.5			
				2.5	Horizontal	4	175(at 50 to 350st)	1	133	310	
					Vertical		150	0.5			
					Horizontal		105	1			
					Vertical		105 (In ambient temp. 5degC or lower)	0.5			
	RRA6C RRA6R	Ball screw	8192	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			
				6	Horizontal	8	420	1	79	185	
					Vertical		370	0.5			
					Horizontal		315	1			
					Vertical		315 (In ambient temp. 5degC or lower)	0.5			
				3	Horizontal	4	210	1	159	370	
					Vertical		105	0.5			
					Horizontal		105	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		280	0.5				
				Horizontal		280	1				
				Vertical		280 (In ambient temp. 5degC or lower)	0.5				
			8	Horizontal	10	350	1	234	547		
				Vertical		280	0.5				
				Horizontal		140	1				
				Vertical		140 (In ambient temp. 5degC or lower)	0.5				
			4	Horizontal	5	140	1	469	1094		
				Vertical		105	0.5				
				Horizontal		105	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
					Vertical		280(at 50st) 330(at 100 to 500st) 320(at 550st) 280(at 600st) 240(at 650st) 220(at 700st)				
					Horizontal /Vertical		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)				
				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)											
RCP6W (Dust and drip proof wide radial cylinder)	WRA10C WRA10R	Ball screw	8192	10	Horizontal	13	525(at 50 to 450st) 490(at 500st) 350 (In ambient temp. 5degC or lower)	1	33	77	20
							5				
				Vertical	215	0.5					
				Horizontal	215	1					
				Vertical	(In ambient temp. 5degC or lower)	0.5					
				2.5	Horizontal	4	175(at 50 to 400st) 145(at 450st) 120(at 500st)	1	133	310	
							Vertical	150(at 50 to 400st) 145(at 450st) 120(at 500st)			
					Horizontal	65 (In ambient temp. 5degC or lower)	1				
	Vertical	(In ambient temp. 5degC or lower)	0.5								
	WRA12C WRA12R	Ball screw	8192	12	Horizontal	15	560 320 (In ambient temp. 5degC or lower)	1	40	93	20

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)	WRA12C WRA12R	Ball screw	8192	6	Horizontal	8	400(at 50 to 450st) 375(at 500st)	1	79	185	20				
					Vertical		220	0.5							
					Horizontal		220	1							
					Vertical		(In ambient temp. 5degC or lower)	0.5							
				3	Horizontal	4	225(at 50 to 400st) 220(at 450st) 185(at 500st)	1	159	370					
					Vertical		140	0.5							
					Horizontal		80	1							
					Vertical		(In ambient temp. 5degC or lower)	0.5							
	WRA14C WRA14R	Ball screw	8192	16	Horizontal	20	420	1	117	273	20				
							(In ambient temp. 5degC or lower)					280			
				8	Horizontal	10	280	1	234	547					
							Vertical	210				0.5			
							Horizontal	140				1			
							Vertical	(In ambient temp. 5degC or lower)				0.5			
				4	Horizontal	5	130	1	469	1094					
							Vertical	70				0.5			
							Horizontal	(In ambient temp. 5degC or lower)				1			
							Vertical	(In ambient temp. 5degC or lower)				0.5			
				WRA16C WRA16R	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)														
	10	Vertical	13				160(at 50 to 550st) 145(at 600st) 125(at 650st) 110(at 700st) 100(at 750st) 90(at 800st)	0.2	500	1000					
							120(at 50 to 650st) 110(at 700st) 100(at 750st) 90(at 800st) (In ambient temp. 5degC or lower)								
							Horizontal /Vertical								

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) <small>(In ambient temp. 5degC or lower)</small>				
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		390	0.5			
				2.5	Horizontal	4	195	1	89	310	
					Vertical		195	0.5			
	TA4C TA4R (Double Block Type)	Ball screw	8192	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) 340(at 240st)	1	44	155	
					Vertical		390(at 40 to 190st) 340(at 240st)	0.5			
2.5				Horizontal	4	195(at 40 to 190st) 170(at 240st)	1	89	310		
				Vertical		195(at 40 to 190st) 170(at 240st)	0.5				
TA6C TA6R (Single Block Type)	Ball screw	8192	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		400	0.5				
			3	Horizontal	4	200	1	106	370		
				Vertical		200	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			0.5			
				3	Horizontal	4	200(at 45 to 220st) 185(at 270st) 140(at 320st)	1	106	370	
					Vertical			0.5			
	TA7C TA7R (Single Block Type)	Ball screw	8192	24	Horizontal	30	1080	1	40	139	
					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			
4	Horizontal	5	210	1	239	836					
	Vertical			0.5							
TA7C TA7R (Double Block Type)	Ball screw	8192	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			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	Trapezoid thread on right and left	8192	8	-	10	180 (In ambient temp. 5degC or lower)	0.3	100 (Both Ends)	340 (Both Ends)	
2				5		45	330 (Both Ends)		880 (Both Ends)		
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 type /Cleanroom 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	21	48	20	
					Vertical			0.5				
				10	Horizontal	13	785(at 50 to 400st) 675(at 450st) 555(at 500st)	1.0	22	77		
					Vertical			0.5				
				5	Horizontal	7	390(at 50 to 400st) 330(at 450st) 275(at 500st)	1.0	44	155		
					Vertical			0.5				
				2.5	Horizontal	4	195(at 50 to 400st) 165(at 450st) 135(at 500st)	1.0	88	310		
					Vertical			0.5				
	RCP5 RCP5CR (Slider type) Standard type /Cleanroom type	[Standard] SA6C SA6R [Cleanroom] SA6C	Ball screw	800	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) SA6R: 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		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		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]		
RCP5 RCP5CR (Slider type) Standard type /Cleanroom 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		
	Vertical				0.5								
	[Cleanroom] SA6C			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)	1.0	106	370			
	Vertical				0.5								
	RCP5CR (Slider type)	[Standard] SA7C SA7R	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	
						Vertical		SA7R: 1000(at 50 to 700st) 885(at 750st) 785(at 800st)	0.5				
		[Cleanroom] SA7C			16	Horizontal	20	SA7C: 980(at 50 to 550st) 875(at 600st) 755(at 650st) 660(at 700st) 585(at 750st) 520(at 800st)	1.0	60	209		
						Vertical		SA7R: 840(at 50 to 600st) 755(at 650st) 660(at 700st) 585(at 750st) 520(at 800st)	0.5				
					[Standard] SA7C SA7R	8	Horizontal	10	SA7C: 490(at 50 to 550st) 430(at 600st) 375(at 650st) 325(at 700st) 290(at 750st) 255(at 800st)	1.0	119		418
							Vertical		SA7R: 420(at 50 to 600st) 375(at 650st) 325(at 700st) 290(at 750st) 255(at 800st)	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]
RCP5 RCP5CR (Slider type) Standard type /Cleanroom type	[Standard] SA7C SA7R [Cleanroom] SA7C	Ball screw	800	4	Horizontal	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)	1.0	239	836	20
					Vertical		210(at 50 to 600st) 185(at 650st) 160(at 700st) 140(at 750st) 125(at 800st)	0.5			
RCP5 (Rod type)	RA4C RA4R	Ball screw	800	16	Horizontal	20	RA4C: 1120(at 60 to 360st) 1080(at 410st) RA4R: 840	1.0	21	48	20
					Vertical		0.5				
				10	Horizontal	13	RA4C: 700(at 60 to 360st) 685(at 410st) RA4R: 610	1.0	22	77	
					Vertical		0.5				
				5	Horizontal	7	350(at 60 to 360st) 340(at 410st)	1.0	44	155	
					Vertical		0.5				
				2.5	Horizontal	4	175(at 60 to 360st) 170(at 410st)	1.0	88	310	
					Vertical		0.5				
	RA6C RA6R	Ball screw	800	20	Horizontal	25	800	1.0	16	56	
					Vertical			0.5			
				12	Horizontal	15	700	1.0	26	93	
					Vertical			0.5			
				6	Horizontal	8	450	1.0	53	185	
					Vertical			0.5			
				3	Horizontal	4	225(at 65 to 365st) 220(at 415st)	1.0	106	370	
					Vertical		0.5				
RA7C RA7R	Ball screw	800	24	Horizontal	30	800	1.0	52	182		
				Vertical		600	0.5				
			16	Horizontal	20	RA7C: 700 RA7R: 560	1.0	78	273		
				Vertical		560	0.5				
			8	Horizontal	10	RA7C: 420 RA7R: 350	1.0	156	547		
				Vertical		350	0.5				
			4	Horizontal	5	RA7C: 210 RA7R: 175	1.0	312	1094		
				Vertical		175	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]			
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)	0.2	167	500	10			
					Vertical		RA8R: 280(at 50) 400(at 100 to 450st) 360(at 500st) 320(at 550st) 280(at 600st) 240(at 650st) 220(at 700st)							
				10	Horizontal	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)					0.2	333	1000
					Vertical		RA8R: 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 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	
				5	Horizontal /Vertical	7	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) 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 RA10R	Ball screw	800	10	Horizontal	13	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)	0.04	429	1500	10	
					Vertical		RA10C: 117(at 50st) 167(at 100 to 650st) 160(at 700st) 140(at 750st) 120(at 800st) RA10R: 117(at 50st) 140(at 100 to 750st) 120(at 800st)					
					5	Horizontal /Vertical	7	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)	0.02	857	3000 (at 550st) 2900 (at 600st) 2500 (at 650st) 2200 (at 700st) 2000 (at 750st) 1800 (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	6000 (at 700st) 5900 (at 750st) 5400 (at 800st)	
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			
					Vertical		300	0.5			
					Horizontal		300 (In ambient temp. 5degC or lower)	1			
					Vertical		300 (In ambient temp. 5degC or lower)	0.5			
	3	Horizontal	3.75	180	1						
		Vertical		150	0.5						
		Horizontal		150 (In ambient temp. 5degC or lower)	1						
		Vertical		150 (In ambient temp. 5degC or lower)	0.5						
	3 (Motor Type: 42SP)	Vertical	3.75	70	0.5	354	590				
	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				
				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				
				Vertical		140	0.5				
				Horizontal		170	1				
				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				
				4 (Motor Type: 56SP)	Vertical	5	80	0.5	515	1030		
	RA8C	Ball screw	800	20	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	10	
							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)
												Vertical
				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)						
				5	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
					Vertical		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
					Vertical		117(at 50st) 130(at 100 to 750st) 120(at 800st)				
					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)	
							Horizontal /Vertical			4	
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 type /Cleanroom type	[Standard] SA3C SA3R	Ball screw	800	6	Horizontal	8	420	1.0	16	58	20				
	Vertical				0.5										
	[Cleanroom] SA3C			2	Horizontal	3	140	1.0	49	173					
					Vertical			0.5							
	[Cleanroom] SA3C			2	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		
							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) SA5R: 1120(at 50 to 550st) 1045(at 600st) 900(at 650st) 785(at 700st) 690(at 750st) 610(at 800st)	0.5					
		[Standard] SA5C SA5R	Ball screw			800	12	Horizontal	15	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	26	93		
								Vertical		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) 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				
							[Cleanroom] SA5C	6	800	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
										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 type /Cleanroom type	[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)	1.0	106	370	20			
	[Cleanroom] SA5C				Vertical		105(at 700st) 90(at 750st) 80(at 800st)	0.5						
	[Standard] SA6C SA6R [Cleanroom] SA6C	Ball screw	800	20	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)	1.0	16	56	20			
							SA6R: 1280(at 50 to 500st) 1230(at 550st) 1045(at 600st) 905(at 650st) 785(at 700st) 690(at 750st) 615(at 800st)							
							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)							
					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	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)				0.5		
							Horizontal	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
							Vertical	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)				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 type /Cleanroom 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
					Vertical		SA7R: 1000(at 50 to 700st) 890(at 750st) 790(at 800st)	0.5			
				16	Horizontal	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	
					Vertical		SA7C: 840(at 50 to 600st) 750(at 650st) 655(at 700st) 580(at 750st) 515(at 800st)	0.5			
				8	Horizontal	10	SA7C: 490(at 50 to 550st) 430(at 600st) 375(at 650st) 325(at 700st) 290(at 750st) 255(at 800st)	1.0	119	418	
					Vertical		SA7R: 420(at 50 to 600st) 375(at 650st) 325(at 700st) 290(at 750st) 255(at 800st)	0.5			
	4	Horizontal	5	SA7C: 245(at 50 to 550st) 215(at 600st) 185(at 650st) 160(at 700st) 145(at 750st) 125(at 800st)	1.0	239	836				
		Vertical		SA7R: 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	
RCP4 (Rod type)	RA3C RA3R	Ball screw	800	16	Horizontal	20	1120	1.0	15	36	20
				Vertical	0.5						
				10	Horizontal	13	700	1.0	16	57	
				Vertical	0.5						
				5	Horizontal	7	350	1.0	33	114	
				Vertical	0.5						
				2.5	Horizontal	4	175	1.0	65	229	
				Vertical	0.5						
	RA5C RA5R	Ball screw	800	20	Horizontal	25	800	1.0	16	56	20
				Vertical	0.5						
				12	Horizontal	15	700	1.0	26	93	
				Vertical	0.5						
				6	Horizontal	8	450	1.0	53	185	
				Vertical	0.5						
				3	Horizontal	4	225	1.0	106	370	
				Vertical	0.5						
	3 (Motor Type: 42SP)	Vertical	4	80	0.5	370	750				
	RA6C RA6R	Ball screw	800	24	Horizontal	30	800	1.0	52	182	20
				Vertical	600		0.5				
				16	Horizontal	20	RA6C: 700	1.0	78	273	
				Vertical	RA6R: 560		0.5				
				8	Horizontal	10	420	1.0	156	547	
				Vertical	RA6C: 420		0.5				
				4	Horizontal	5	RA6C: 210	1.0	312	1094	
Vertical				RA6R: 175	0.5						
4 (Motor Type: 56SP)	Vertical	5	90	0.5	470	1106					
RCP4W (Dust and drip proof rod type)	RA6C	Ball screw	800	12	Horizontal	15	500(at 50st)	1.0	40	93	
					Vertical		560(at 100 to 400st)	0.5			
					Horizontal		450	1.0			
					Vertical		400	0.5			
				6	Horizontal	8	360	1.0	79	185	
					Vertical		300	0.5			
					Horizontal		300	1.0			
					Vertical		(In ambient temp. 5degC or lower)	0.5			
				3	Horizontal	4	180	1.0	159	370	
					Vertical		150	0.5			
					Horizontal		150	1.0			
					Vertical		(In ambient temp. 5degC or lower)	0.5			
				3 (Motor Type: 42SP)	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)								
GROLL	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			
					Vertical			0.2						
				4	Horizontal	5	200	0.3	25	45				
					Vertical			0.2						
				2	Horizontal /Vertical	3	100	0.2	50	90				
	SA4C SA4R	Ball screw	800	10	Horizontal	13	500	0.7	25	40	20			
					Vertical			0.3						
				5	Horizontal	7	250	0.7	50	80				
					Vertical			0.3						
				2.5	Horizontal	4	125	0.7	100	160				
					Vertical			0.3						
	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	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				

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						
RCP3 (Rod type)	RA2AC RA2AR	Lead screw	800	4	Horizontal	5	180(at 25st) 200(at 50 to 100st)	0.2	0.9	6.6	5			
					/Vertical				3	100		1.9	13.2	
									1	2		50	3.8	26.4
		Ball screw Standard type		4	Horizontal	5	180(at 25st) 200(at 50 to 100st)	0.3	3.6	12.6				
								Vertical				0.2		
					2			Horizontal				3	100	0.3
		Vertical		0.2										
		1		Horizontal	2	50	0.3	14.4	50.4					
							Vertical			0.2				
				4			Horizontal			5		180(at 25st) 200(at 50 to 100st)	0.3	6.6
		Vertical		0.2										
		2		Horizontal	3	100	0.3	13.2	46.2					
	Vertical	0.2												
	1	Horizontal	2	50			0.3			26.4	92.4			
	Vertical				0.2									
	RA2BC RA2BR	Lead screw			800	6	Horizontal	8	180(at 25st) 280(at 50st) 300(at 75 to 150st)			0.2	0.6	4.4
			/Vertical	5						180(at 25st) 200(at 50 to 150st)	0.9		6.6	
				2						3	100		1.9	13.2
			Ball screw Standard type	6		Horizontal	8	180(at 25st) 280(at 50st) 300(at 75 to 150st)	0.3	1.8	6.3			
									Vertical			0.2		
						4			Horizontal			5	180(at 25st) 200(at 50 to 150st)	0.3
		Vertical	0.2											
		2	Horizontal	3	100	0.3	7.2	25.2						
		Vertical				0.2								
1		Horizontal	2			50			0.3	14.4	50.4			
				Vertical	0.2									
		6		Horizontal	8		180(at 25st) 280(at 50st) 300(at 75 to 150st)	0.3	4.4			15.4		
Vertical	0.2													
4	Horizontal	5	180(at 25st) 200(at 50 to 150st)	0.3		6.6		23.1						
Vertical				0.2										
2	Horizontal			3	100		0.3		13.2	46.2				
Vertical		0.2												
1	Horizontal	2	50			0.3	26.4	92.4						
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			
				2	Horizontal	3	100	0.2	30	45	
					Vertical		67				
	TA4C TA4R	Ball screw	800	6	Horizontal	8	300	0.3	15	25	20
					Vertical			0.2			
				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			
				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				
					Vertical		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)					0.2			
				12	Horizontal	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					
					Vertical		0.3								
				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					
					Vertical		0.3								
				3	Horizontal	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					
					Vertical		0.3								
				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	-	-	-
								Vertical		0.2					
							6	Horizontal	8	300(at 50 to 550st) 270(at 600st) 230(at 650st) 200(at 700st) 180(at 750st) 150(at 800st)		0.3			
								Vertical		0.2					
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)	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						
					Vertical		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)					0.2					
					12		Horizontal						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
							Vertical							0.3			
				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							
					Vertical		0.3										
				3	Horizontal	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							
					Vertical		0.3										
				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	-	-	-		
								Vertical		0.2							
							6	Horizontal	8	300(at 50 to 550st) 270(at 600st) 230(at 650st) 200(at 700st) 180(at 750st) 150(at 800st)		0.3					
								Vertical		0.2							
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	90	250	20			
					Vertical			0.2						
				8	Horizontal	10	266(at 50 to 700st) 240(at 800st)	0.3	150	500				
					Vertical			0.2						
				4	Horizontal /Vertical	5	133(at 50 to 700st) 120(at 800st)	0.2	280	800				
					Vertical			0.2						
	SA7R	Ball screw	800	16	Horizontal	20	533(at 50 to 700st) 480(at 800st)	0.3	-	-	-			
					Vertical			400				0.2		
				8	Horizontal	10	266(at 50 to 700st) 240(at 800st)	0.3	-	-				
					Vertical			0.2						
				4	Horizontal /Vertical	5	133(at 50 to 700st) 120(at 800st)	0.2	-	-				
					Vertical			0.2						
	SS7C	Ball screw	800	12	Horizontal	15	600(at 50 to 500st) 470(at 600st)	0.3	40	115	20			
					Vertical			0.2						
				6	Horizontal	8	300(at 50 to 500st) 230(at 600st)	0.3	70	210				
					Vertical			0.2						
				3	Horizontal /Vertical	4	150(at 50 to 500st) 115(at 600st)	0.2	140	330				
					Vertical			0.2						
	SS7R	Ball screw	800	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	-	-				
					Vertical			0.2						
				3	Horizontal /Vertical	4	105	0.2	-	-				
					Vertical			0.2						
SS8C	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)			
			SS8R	Ball screw	800	20	Horizontal	25	600(at 50 to 900st) 515(at 1000st)		0.3	-	-	-
							Vertical				333			
						10	Horizontal	13	300(at 50 to 900st) 255(at 1000st)		0.3	-	-	
							Vertical				250			
						5	Horizontal	7	160(at 50 to 800st) 155(at 900st) 125(at 1000st)		0.2	-	-	
							Vertical							
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 /Vertical	4	114 93		50	156.8	
	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 /Vertical	4	125(at 50 to 200st) 118(at 250st) 87(at 300st) 114(at 50 to 250st) 87(at 300st)		150	358	
	RA6C RGS6C RGD6C	Ball screw	800	16	Horizontal /Vertical	20	450 400	0.2	75	240	20
				8	Horizontal /Vertical	10	210		130	470	
				4	Horizontal /Vertical	5	130		300	800	
	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	0.1	571	2000	
	RA10C	Ball screw	800	10	Horizontal /Vertical	10	250 167	0.04	500	1500	10
				5	Horizontal /Vertical	5	125	0.02	1000	3000	
				2.5	Horizontal /Vertical	1	63	0.01	3100	6000	
SRA4R SRGS4R SRGD4R	Ball screw	800	5	Horizontal /Vertical	7	250	0.3 0.2	32	112	20	
			2.5	Horizontal /Vertical	4	125	0.2	64	224		
RCP2W (Dust and drip proof rod type)	RA4C	Ball screw	800	10	Horizontal /Vertical	13	450(at 50 to 250st) 350(at 300st) 250	0.2	30	150	20
				5	Horizontal /Vertical	7	190(at 50 to 250st) 175(at 300st)		75	284	
				2.5	Horizontal /Vertical	4	125(at 50 to 200st) 115(at 250st) 85(at 300st) 115(at 50 to 250st) 85(at 300st)		150	358	

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				
		4	Horizontal /Vertical	5	100		300	800			
	RA10C	Ball screw	800	10	Horizontal	10	250	0.04	500	1500	10
					Vertical		167				
5				Horizontal /Vertical	5	125	0.02		1000	3000	
	2.5	Horizontal /Vertical	1	63	0.01	3100	6000				
RCP2 (Gripper type)	GRSS	-	800	1.57	-	5	78	-	4 (Both Ends)	14 (Both Ends)	5
	GRLS			12		5 (deg/s)	600 (deg/s)		1.8 (Both Ends)	6.4 (Both Ends)	20 (deg/s)
	GRS			1		5	33		9 (Both Ends)	21 (Both Ends)	5
	GRM			1.1		5	36		23 (Both Ends)	80 (Both Ends)	5
	GRHM			2		5	100		25 (Both Ends)	125 (Both Ends)	5
	GRHB			2		5	100		60 (Both Ends)	200 (Both Ends)	5
	GRST			1.05		5	34 (Standard Type)		15 (Both Ends)	40 (Both Ends)	5
				2.27		5	75 (High Speed Type)		7.5 (Both Ends)	20 (Both Ends)	5
	GR3SS			2.5		5	40		7 (Both Ends)	22 (Both Ends)	5
	GR3SM			3		5	50		30 (Both Ends)	102 (Both Ends)	5
	GR3LS			12		5 (deg/s)	200 (deg/s)		5 (Both Ends)	18 (Both Ends)	20 (deg/s)
	GR3LM			12		5 (deg/s)	200 (deg/s)		15 (Both Ends)	51 (Both Ends)	20 (deg/s)
RCP2CR RCP2W (Cleanroom type / Dust and drip proof gripper type)	GRSS	-	800	1.57	-	2	78	-	4 (Both Ends)	14 (Both Ends)	5
GRLS	12			15 (deg/s)		600 (deg/s)	1.8 (Both Ends)		6.4 (Both Ends)	5 (deg/s)	
GRS	1			2		33	9 (Both Ends)		21 (Both Ends)	5	
GRM	1.1			2		36	23 (Both Ends)		80 (Both Ends)	5	
GR3SS	2.5			4		40	7 (Both Ends)		22 (Both Ends)	5	
GR3SM	3			4		50	30 (Both Ends)		102 (Both Ends)	5	
RCP2 RCP2CR RCP2W (Rotary type)	RTBS RTBSL RTCS RTC SL	-	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)				
Standard type / Cleanroom type / Dust and drip proof type	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 $|B\text{-axis velocity} - T\text{-axis velocity}| > \text{minimum velocity in individual movement [deg/s]}$

WU-M Reversed Type : B-axis velocity > minimum velocity in individual movement and also $|B\text{-axis velocity} - T\text{-axis velocity}| > \text{minimum velocity in individual movement [deg/s]}$

(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			800(at 50 to 650st) 790(at 700st) 690(at 750st) 610(at 800st)	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				
					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			800(at 50 to 650st) 790(at 700st) 690(at 750st) 610(at 800st)
									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	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			
RCA2 RCA2CR RCA2W (Rod type)	[Standard] RN3NA RP3NA GS3NA GD3NA SD3NA	Ball screw	10	1048	4	Horizontal	4	200	0.3	-	-	-
						Vertical			0.2			
					2	Horizontal	2	100	0.3			
						Vertical			0.2			
					1	Horizontal	1	50	0.2			
						Vertical			0.2			
	[Cleanroom] [Dust and drip proof] RN3NB RP3NB GS3NB GD3NB SD3NB	Lead screw (Available to Select Only in Standard Type)	10	1048	4	Horizontal /Vertical	4	200	0.2	-	-	-
					1	1	50					
								6	Horizontal			
					4	Horizontal	4					
								2	Horizontal /Vertical			
6	Horizontal /Vertical	6	220(at 30st) 300(at 50st)	0.2								
					4	Horizontal	4	200	0.2			
2	Horizontal /Vertical	2	100	0.2								
					[Standard] RN4NA RP4NA GS4NA GD4NA	Ball screw	20	1048	6	Horizontal	6	270(at 30st) 300(at 50st)
4	Horizontal	4	200	0.3								
				2					Horizontal /Vertical	2	100	0.2
6	Horizontal /Vertical	6	220(at 30st) 300(at 50st)									0.2
				4					Horizontal	4	200	
2	Horizontal /Vertical	2	100									0.2
				[Standard] SD4NA	Ball screw	20	1048	6	Horizontal	6	240(at 25st) 300(at 50 to 75st)	
4	Horizontal	4	200									0.3
								2	Horizontal /Vertical	2	100	0.2
6	Horizontal	6	200(at 25st) 300(at 50 to 75st)									0.2
								4	Horizontal /Vertical	4	200	
2	Horizontal /Vertical	2	100									0.2
				[Cleanroom] [Dust and drip proof] SD4NB	Lead screw (Available to Select Only in Standard Type)	20	1048	6	Horizontal	6	200(at 25st) 300(at 50 to 75st)	
4	Horizontal	4	200									
								2	Horizontal /Vertical	2	100	
6	Horizontal	6	200(at 25st) 300(at 50 to 75st)									
								4	Horizontal /Vertical	4	200	
2	Horizontal /Vertical	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						
		1			Horizontal /Vertical	1	50	0.2				
		Lead screw			4	Horizontal /Vertical	4	200	0.2			
	2		100									
	1		50									
	TCA4NA TWA4NA TFA4NA	Ball screw	20	1048	6	Horizontal	6	270(at 30st) 300(at 50st)	0.3	-	-	-
								Vertical	220(at 30st) 300(at 50st)			
					4	Horizontal	4	200	0.3			
					Vertical	0.2						
		2			Horizontal /Vertical	2	100	0.2				
		Lead screw			6	Horizontal /Vertical	6	220(at 30st) 300(at 50st)	0.2			
	4		200									
	2		100									
	TA4C TA4R	Ball screw	10	800	6	Horizontal	8	300	0.3	-	-	-
									Vertical			
					4	Horizontal	5	200	0.3			
									Vertical			
					2	Horizontal /Vertical	3	100	0.2			
					TA5C TA5R	Ball screw	20	800	10			
		Vertical	400	0.2								
	5	Horizontal	7	250					0.3			
		Vertical							0.2			
2.5	Horizontal /Vertical	4	125	0.2								
TA6C TA6R	Ball screw	20	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				

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	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	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	20	Horizontal /Vertical	25 (Note 1)	1300	0.3 / 0.8 (Note 2)	-	-	-
					12		15 (Note 1)	800(at 50 to 450st) 760(at 500st)	0.3 / 0.8 (Note 2)			
					6	Horizontal /Vertical	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	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	20	Horizontal /Vertical	25 (Note 1)	1300(at 50 to 500st) 1160(at 550st) 990(at 600st)	0.3 / 1.0 (Note 2)	-	-	-
					12		15 (Note 1)	800(at 50 to 450st) 760(at 500st) 640(at 550st) 540(at 600st)	0.3 / 1.0 (Note 2)			
					6	Horizontal /Vertical	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	Ball screw	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	Ball screw	20	800	10	Horizontal /Vertical	13	500	0.3	-	-	-
					5		7	250	0.3			
					2.5		4	125	0.2			
[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 type / Dust and drip proof type	[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	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				
[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						
					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	42	300	Horizontal: 2G Vertical: 1G	0.75	2	20
	RA2L			855				340		1.5	4	
	RA3L			1145				450		3	8	
	SA1L			715		Horizontal		2	-	-	-	
	SA2L			855								
	SA3L			1145								
	SA4L SM4L			715								
	SA5L SM5L			855								
	SA6L SM6L			1145								
	1600											

(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	-	-	-
				24		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	-	-	-
				16		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	-	-	-
				8		500(at 50 to 500st) 475(at 550st) 410(at 600st) 355(at 650st) 315(at 700st) 275(at 750st) 245(at 800st)	1	-	-	-
				4		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	-	-	-
	SA8C	400	16384	48	Horizontal	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	-	-	-
				30	Horizontal /Vertical	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	-	-	-

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	-	-	-
				10		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	-	-	-
				5		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	-	-	-
				30	Horizontal /Vertical	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	-	-	-
				10		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	-	-	-
				5		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	-	-	-
[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			
	SA6C	100	16384	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	-	-	-

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	-	-	-
				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	-	-	-
	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	-	-	-
				16		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	-	-	-
				8		500(at 50 to 500st) 475(at 550st) 410(at 600st) 355(at 650st) 315(at 700st) 275(at 750st) 245(at 800st)	1	-	-	-
				4		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	-	-	-
	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	-	-	-
				5		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	-	-	-
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	-	-	-
				6		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	-	-	-
				3		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 WSA14R	200	16384	36	Horizontal	WSA14C: 1800(at 50 to 550st) 1590(at 600st) 1400(at 650st) 1240(at 700st) 1110(at 750st) 990(at 800st)	WSA14C:1.2 WSA14R:1	-	-	-
						WSA14R: 1710(at 50 to 550st) 1590(at 600st) 1400(at 650st) 1240(at 700st) 1110(at 750st) 990(at 800st)		-	-	-
				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)	WSA14C:1.2 WSA14R:1	-	-	-
						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	-	-	-

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	-	-	-
				4		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 WSA16R	400	16384	30	Horizontal /Vertical	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	-	-	-
				20		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	-	-	-
				10		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]
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	60	16384	16	Horizontal	960(at 50 to 350st) 930(at 400st) 775(at 450st) 660(at 500st)	1.2	-	-	-
				10	Horizontal /Vertical	600(at 50 to 350st) 590(at 400st) 490(at 450st) 415(at 500st)	1.2	-	-	-
				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	100	16384	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)	1.2	-	-
				12	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	-	-	-
				6	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	-	-	-
				3	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	-	-	-
				8		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	-	-	-
				4		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	-	-	-
						10	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)	1.2	-	-	-	
				10		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	-	-	-	
				5		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)	0.7	-	-	-	
	RRA8R	400	16384	30		Horizontal /Vertical	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	-	-	-
							20	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)	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 (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	-	-	-
				5		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)	0.7	-	-	-
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	-	-	-
				10		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)	1	-	-	-
				5		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	-	-	-
RCS4 (Table type)	TA4C (Single Block Type)	60	16384	16	Horizontal /Vertical	900	1.2	-	-	-
				10		600	1.2			
				5		300	1			
				2.5		150	0.7			
	TA4C (Double Block Type)	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
				10		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	-	-	-	
						5 (Only for 100W)					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)
	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	-	-	-
				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	-	-	-
[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	-	-	-
				20		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)	0.7	-	-	-
				10		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)	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	—	—	—
						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)	0.5	—	—	—
						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	-	-	-
				16		800(at 50 to 600st) 745(at 650st) 640(at 700st) 575(at 750st) 480(at 800st)	0.3 High Accel/ Deceleration Type: 1	-	-	-
				8		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	-	-	-
				4		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	-	-	-
				8		400(at 50 to 600st) 370(at 650st) 320(at 700st) 285(at 750st) 240(at 800st)	0.3	-	-	-
				4		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	-	-	-
				12		600(at 50 to 500st) 580(at 550st) 470(at 600st)	0.3			
				6		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	-	-	-
				6		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	Horizontal /Vertical	1000(at 50 to 600st) 960(at 700st) 765(at 800st) 625(at 900st) 515(at 1000st)	0.3	-	-	-
				10		500(at 50 to 600st) 480(at 700st) 380(at 800st) 310(at 900st) 255(at 1000st)	0.3			
	SS8R	100 150	16384	20	Horizontal /Vertical	1000(at 50 to 600st) 960(at 700st) 765(at 800st) 625(at 900st) 515(at 1000st)	0.3	-	-	-
				10		500(at 50 to 600st) 480(at 700st) 380(at 800st) 310(at 900st) 255(at 1000st)	0.3			
RCS2 (Rod Type)	RA5C	60	16384	16	Horizontal /Vertical	800(at 50 to 250st) 755(at 300st)	0.3	-	-	-
				8		400(at 50 to 250st) 377(at 300st)	0.3			
				4		200(at 50 to 250st) 188(at 300st)	0.2			
		16		800(at 50 to 250st) 755(at 300st)		0.3 High Accel/ Deceleration Type: 1				
		8		400(at 50 to 250st) 377(at 300st)		0.3 High Accel/ Deceleration Type: 1				
		4		200(at 50 to 250st) 188(at 300st)		0.2				
	RGS5C RGD5C	60	16384	16	Horizontal /Vertical	800(at 50 to 250st) 755(at 300st)	0.3	-	-	-
				8		400(at 50 to 250st) 377(at 300st)	0.3			
				4		200(at 50 to 250st) 188(at 300st)	0.2			
		16		800(at 50 to 250st) 755(at 300st)		0.3 High Accel/ Deceleration Type: 1				
		8		400(at 50 to 250st) 377(at 300st)		0.3 High Accel/ Deceleration Type: 1				
		4		200(at 50 to 250st) 188(at 300st)		0.2				
RA5R	60	16384	16	Horizontal /Vertical	800(at 50 to 250st) 755(at 300st)	0.3	-	-	-	
			8		400(at 50 to 250st) 377(at 300st)	0.3				
			4		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			
	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)
	300(at 50 to 250st) 250(at 300st)				0.1					
	3				150(at 50 to 250st) 125(at 300st)	0.05				
	100		12		600(at 50 to 250st) 505(at 300st)	0.2				
			6		300(at 50 to 250st) 250(at 300st)	0.1				
			SRA7BD SRGS7BD SRGD7BD		60	3072	16	Horizontal /Vertical		800
	8	400		0.25						
	4	200		0.15						
	100 150	16		800	0.4					
		8		400	0.3					
		4		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
						1.25	62	0.01	2000	19600
	[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		
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			
RCS2 (Rotary type)	RT6	60	16384	Deceleration ratio 1/18	–	500 deg/s	–	–	–	–
	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	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	-	-	-					
			100 (Only for ISB)	131072		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	-	-	-				
							SXL	60	Battery-less Absolute 131072	16	960(at 130 to 580st) 655(at 680st) 515(at 780st) 415(at 880st)	1.2	-	-	-
										8	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		-				-	-				
		100 (Only for ISB)	131072	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	30	Horizontal /Vertical	1800(at 100 to 700st) 1290(at 800st) 1045(at 900st) 860(at 1000st) 690(at 1100st)	1.2	-	-	-
				20		1200(at 100 to 700st) 860(at 800st) 695(at 900st) 570(at 1000st) 460(at 1100st)	Horizontal:1.2 Vertical:1	-	-	-
				10		600(at 100 to 700st) 430(at 800st) 345(at 900st) 280(at 1000st) 230(at 1100st)	Horizontal:0.7 Vertical:0.6	-	-	-
				5		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	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		Incremental 16384	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	Horizontal /Vertical	2400(at 100 to 800st) 1840(at 900st) 1530(at 1000st) 1290(at 1100st) 1100(at 1200st) 880(at 1300st)	1.2	-	-	-
				20		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	-	-	-
				10		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	Horizontal /Vertical	2400(at 120 to 770st) 1840(at 870st) 1530(at 970st) 1290(at 1070st) 1100(at 1170st) 880(at 1270st)	1.2	-	-	-
				20		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	-	-	-
				10		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	-	-	-
		200 400		Incremental 16384		20	Horizontal	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)	0.4	-
	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	-	-
		200 400		Incremental 16384		20	Horizontal	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)	0.4	-

ISB-W 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)	WXM	750	131072	50	Horizontal /Vertical	2500(at 100~900st) 2260(at 1000st) 1840(at 1100st) 1570(at 1200st) 1360(at 1300st)	Horizontal:1.2 Vertical:1.0	-	-	-
				25		1250(at 100~900st) 1130(at 1000st) 920(at 1100st) 785(at 1200st) 680(at 1300st)	Horizontal:1.2 Vertical:1.0	-	-	-
				10		600(at 100~800st) 460(at 900st) 380(at 1000st) 320(at 1100st) 270(at 1200st) 235(at 1300st)	Horizontal:0.6 Vertical:0.5	-	-	-
				10 High payload setting		600(at 100~800st) 460(at 900st) 380(at 1000st) 320(at 1100st) 270(at 1200st) 235(at 1300st)	Horizontal:0.6 Vertical:0.5	-	-	-
	WXXM	750	131072	50	Horizontal	2500(at 900~3000st)	1.2	-	-	-
				25		1250(at 900~3000st)	1.2	-	-	-

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			
		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			
		MX	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/ISPD 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/ ISPDACR (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	-	-	-
				20		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	-	-	-
				10		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	-	-	-
				25		1250(at 100 to 900st) 1050(at 1000st) 890(at 1100st) 760(at 1200st) 660(at 1300st)	Horizontal:1 Vertical:0.8	-	-	-
				40		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	-	-	-
	WX	600	16384	20	Horizontal	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/ISPD 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]	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	—	—	—
ISDACR/ ISPDACR (Slider type)				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	-	-	-
				8		400(at 100 to 500st) 380(at 600st)	0.3			
				4		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	-	-	-
				5		250(at 100 to 600st) 225(at 700st) 180(at 800st) 150(at 900st) 125(at 1000st)	0.15			
		200	16384	20	Horizontal	1000(at 100 to 600st) 915(at 700st) 735(at 800st) 600(at 900st) 500(at 1000st)	0.3	-	-	-
				10		500(at 100 to 600st) 455(at 700st) 365(at 800st) 300(at 900st) 250(at 1000st)	0.3			
	L	200	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	-	-	-
				10		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/SSPADACR/IF/IFA/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 (Note)	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	–	–	–
				20		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)	1	–	–	–
				10		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	–	–	–

(Note) The models with the type column shaded are applicable for offboard tuning function. (Except, if there is a setting applicable for the high acceleration, it is to be excluded.)

For the offboard tuning feature, refer to the [instruction manual Of the PC teaching software].

SSPA/SSPADACR/IF/IFA/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)	MXM (Note)	400	16384	40	Horizontal /Vertical	2400(at 100 to 700st) 2150(at 750st) 1930(at 800st) 1740(at 850st) 1580(at 900st) 1440(at 950st) 1320(at 1000st) 1210(at 1050st) 1120(at 1100st) 1030(at 1150st) 960(at 1200st) 890(at 1250st) 830(at 1300st)	1.2	-	-	-	
				20		1200(at 100 to 700st) 1070(at 750st) 960(at 800st) 870(at 850st) 790(at 900st) 720(at 950st) 660(at 1000st) 600(at 1050st) 560(at 1100st) 510(at 1150st) 480(at 1200st) 440(at 1250st) 410(at 1300st)	1	-	-	-	
				10		600(at 100 to 700st) 530(at 750st) 480(at 800st) 430(at 850st) 390(at 900st) 360(at 950st) 330(at 1000st) 300(at 1050st) 280(at 1100st) 250(at 1150st) 240(at 1200st) 220(at 1250st) 200(at 1300st)	Horizontal:0.7 Vertical:0.6	-	-	-	
	LXM (Note)	750	16384	50		Horizontal /Vertical	2500(at 100 to 900st) 2320(at 1000st) 1950(at 1100st) 1660(at 1200st) 1440(at 1300st) 1250(at 1400st) 1100(at 1500st)	1.2	-	-	-
				25			1250(at 100 to 900st) 1160(at 1000st) 970(at 1100st) 830(at 1200st) 720(at 1300st) 620(at 1400st) 550(at 1500st)	1.2	-	-	-

(Note) The models with the type column shaded are applicable for offboard tuning function. (Except, if there is a setting applicable for the high acceleration, it is to be excluded.)

For the offboard tuning feature, refer to the [instruction manual Of the PC teaching software].

SSPA/SSPADACR/IF/IFA/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]
[Cleanroom type] SSPDACR	S (Note)	200	16384	30	Horizontal /Vertical	1600(at 100 to 600st) 1450(at 650st) 1290(at 700st) 1160(at 750st) 1040(at 800st) 940(at 850st) 860(at 900st) 780(at 950st) 720(at 1000st) 660(at 1050st) 610(at 1100st)	1.2	-	-	-
				20		1100(at 100 to 550st) 1090(at 600st) 970(at 650st) 860(at 700st) 770(at 750st) 690(at 800st) 630(at 850st) 570(at 900st) 520(at 950st) 480(at 1000st) 440(at 1050st) 400(at 1100st)	1	-	-	-
				10		600(at 100 to 550st) 540(at 600st) 480(at 650st) 430(at 700st) 380(at 750st) 340(at 800st) 310(at 850st) 280(at 900st) 260(at 950st) 240(at 1000st) 220(at 1050st) 200(at 1100st)	Horizontal:0.7 Vertical:0.6	-	-	-

(Note) The models with the type column shaded are applicable for offboard tuning function. (Except, if there is a setting applicable for the high acceleration, it is to be excluded.)

For the offboard tuning feature, refer to the [instruction manual Of the PC teaching software].

SSPA/SSPADACR/IF/IFA/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]	
[Cleanroom type] SSPDACR	M (Note)	400	16384	40	Horizontal /Vertical	1600(at 100 to 800st) 1540(at 850st) 1410(at 900st) 1290(at 950st) 1180(at 1000st) 1100(at 1050st) 1010(at 1100st) 940(at 1150st) 880(at 1200st) 820(at 1250st) 760(at 1300st)	1.2	-	-	-	
				20		1100(at 100 to 650st) 1040(at 700st) 940(at 750st) 850(at 800st) 770(at 850st) 700(at 900st) 640(at 950st) 590(at 1000st) 550(at 1050st) 500(at 1100st) 470(at 1150st) 440(at 1200st) 410(at 1250st) 380(at 1300st)	1	-	-	-	
				10		600(at 100 to 600st) 580(at 650st) 520(at 700st) 470(at 750st) 420(at 800st) 380(at 850st) 350(at 900st) 320(at 950st) 290(at 1000st) 270(at 1050st) 250(at 1100st) 230(at 1150st) 220(at 1200st) 200(at 1250st) 190(at 1300st)	Horizontal:0.7 Vertical:0.6	-	-	-	
	L (Note)	750	16384	50		Horizontal /Vertical	1600(at 100 to 1100st) 1550(at 1200st) 1340(at 1300st) 1170(at 1400st) 1040(at 1500st)	1.2	-	-	-
				25			1100(at 100 to 900st) 1060(at 1000st) 900(at 1100st) 770(at 1200st) 670(at 1300st) 580(at 1400st) 520(at 1500st)	1.2	-	-	-

(Note) The models with the type column shaded are applicable for offboard tuning function. (Except, if there is a setting applicable for the high acceleration, it is to be excluded.)

For the offboard tuning feature, refer to the [instruction manual Of the PC teaching software].

SSPA/SSPADACR/IF/IFA/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]
IF	SA	60 100	16384	35	Horizontal	1750	0.3	-	-	-
	MA	200 400	16384	35	Horizontal	1750	0.3			
IFA	SA	100	131072	Equivalent to 28	Horizontal	2000	2.0	-	-	-
	MA	200 400	131072	Equivalent to 42	Horizontal	3000	2.0	-	-	-
FS	NM	60 100	16384	25	Horizontal	1250	0.3	-	-	-
	WM	100 200	16384	25	Horizontal	1250	0.3			
	LM	400	16384	25	Horizontal	1250	1			
	HM	400	16384	40	Horizontal	2000	0.3			
RS	60	60	16384	Gear Ratio 1/50	Horizontal /Vertical	360	0.2			
				Gear Ratio 1/100		180				

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				
LXMXS	400	16384	40	Horizontal	2400	0.3	–	–	–	
			20		1300	0.3				
LZMS LZMM	400	16384	20	Vertical	1000	0.8	–	–	–	
NSA	MXMS MXMM	200	131072	30	Horizontal	1800	0.5	–	–	–
				20		1200	0.6			
	LXMS LXMM	400	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							
	LH18CS	600	131072			1440 deg/s	9.99	–	–	–
	LH18CP		1048576							
[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.

RSEL

Chapter **14**

Warranty

14.1 Warranty Period	14-1
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14.1 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

14.2 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.

14.3 Honoring the Warranty

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

14.4 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.

14.5 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.

14.6 Other Items Excluded from Warranty

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

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

Revision History

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 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 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
2021.07	<p>Edition 3B</p> <ul style="list-style-type: none"> ● Prelims: International Standard Compliance Contents in table changed in accordance with RCON-SC-1, RCON-PS2-3 and RCON-EC-4 complying with UL About UL/cUL of model nameplate and detail page added
2021.08	<p>Fourth Edition</p> <p>General: Applied to EIECYLINDER connection unit Features applied for multiple channels in RSEL serial communication protocol added</p> <ul style="list-style-type: none"> ● Prelims: Change made to RSEL System Instruction Manual Configuration Precautions for Handling 12 Handling of Built-in Drive Cutoff Relay and Cautions in Caution in Handling added

Revision date	Revised content
2021.08	<p>13 Precautions regarding the brake box added</p> <p>Note added for caution related to ELECYLINDER use when RSEL is connected</p> <p>Warranty items deleted, Chapter made separate as Chapter 14</p> <p>Changed the Actuator Coordinate System, illustration and Each axis coordinate system of the orthogonal 6-axis robot added</p> <ul style="list-style-type: none"> ● 1.3: Revised in notation each specification ● 1.4: Place where altitude exceeds 1,000m added in installation conditions ● 2.2.1 Description revised, current amperage added for ELECYLINDER ● 2.2.2 Restrictions for 200V power supply unit added ● 2.3 Description revised, explanation added for driver shutdown release latency ● 2.4 Driver unit added in heat radiation table ● 2.6 Note added for caution at drive cutoff ● Chapter 3: Layout changed in construction table <ul style="list-style-type: none"> Explanations added to names for each part ● 3.2.4 Process how to replace fan unit deleted, instruction how to attach added ● 3.8.2 Description changed for unit layout restrictions ● 4.4.1 Recommended model code added for rod terminal (ferrule terminal) ● 4.7 Brake box (option) added ● 5.3 Driver configuration changed to axis setting ● 9.1 Correction made to parameters ● 9.2 Parameter setting added for PSA-24 communication monitoring ● 9.4 Change made to destination for reference for how to replace fan unit ● 9.5 Vision system interface features added ● Chapter 10: Description revised for parameters, parameters added in relation to addition of features ● Chapter 11: Contents of alarms revised, alarms added in relation to addition of features ● 12.3.1 Change made to place of description for how to replace absolute battery ● General: Correction made, terms unified
2021.11	<p>Edition 4B</p> <ul style="list-style-type: none"> ● 1.2 One sentence deleted in (9) ● 2.2.1 Table swapped, explanation added ● 2.2.2 Table swapped, explanation added, correction made in (2) Section of (3) Number of Connectable Axes in EC200V Type added ● 2.3 Contents added for PSA-200 ● 3.5.1 Change made to parameter names (same names changed in sections hereinafter)

Revision History

Revision date	Revised content
2021.11	<ul style="list-style-type: none"> ● 4.8 PC software enclosed cables, etc. added ● 6.3.4 Change made to parameter names ● 13.2.1 Change made and added to actuator specifications
2021.12	<p>Edition 4C</p> <ul style="list-style-type: none"> ● 8.2.2 Note added for 6) absolute reset ● 11.3 Error numbers No.107, 4B2, 4B3, 4B4 and 646 deleted from Error List ● 13.2 ISB-WXM/WXMX and IFA added in Connectable Actuators List



Revision history



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