Cat. No. I231E-EN-02A

SCARA Robots
YRCX Series

YRCX Robot Controller

USER'S MANUAL

OMRON

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Warranty

The OMRON robot and/or related product you have purchased are warranted against the defects or malfunctions as described below.

Warranty description

If a failure or breakdown occurs due to defects in materials or workmanship in the genuine parts constituting this OMRON robot and/or related product within the warranty period, then OMRON shall supply free of charge the necessary replacement/repair parts.

Warranty period

The warranty period ends 24 months after the date of manufacturing as shown on the products.

Exceptions to the warranty

This warranty will not apply in the following cases:

1. Fatigue arising due to the passage of time, natural wear and tear occurring during operation (natural fading of painted or planted surfaces, deterioration of parts subject to wear, etc.)
2. Minor natural phenomena that do not affect the capabilities of the robot and/or related product (noise from computers, motors, etc.)
3. Programs, point data and other internal data were changed or created by the user.

Failures resulting from the following causes are not covered by warranty.

1. Damage due to earthquakes, storms, floods, thunderbolt, fire or any other natural or man-made disaster.
2. Troubles caused by procedures prohibited in this manual.
3. Modifications to the robot and/or related product not approved by OMRON or OMRON sales representative.
4. Use of any other than genuine parts and specified grease and lubricant.
5. Incorrect or inadequate maintenance and inspection.
6. Repairs by other than authorized dealers.

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON. OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NONINFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUERIMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR COMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE OR INAPPROPIATE MODIFICATION OR REPAIR.

Important information before reading this manual

Introduction

Our sincere thanks for your purchase of this OMRON robot controller.

Be sure to read this manual carefully as well as related manuals and comply with their instructions for using the OMRON robot controller safely and correctly.

About this manual

Warnings and cautions listed in this manual relate to OMRON robot controllers. To ensure safety of the user's final system that includes OMRON robots and controllers, please take appropriate safety measures as required by the user's individual system.

Industrial robots are highly programmable machines that provide a large degree of freedom in movement.
To use OMRON robots and controllers safely and correctly, be sure to comply with the safety instructions and precautions described in this manual.
Failure to take necessary safety measures or incorrect handling may result not only in trouble or damage to the robot and controller, but also in serious accidents involving injury or death to personnel (robot installer, operator, or service personnel). Observe the precautions given in each Chapter.

To use OMRON robots and controllers safely and correctly, **first read "Safety Instructions" in this manual** and always comply with the safety rules and instructions.
Please note, however, this manual cannot cover all items regarding safety.
So it is extremely important that the operator or user have knowledge of safety and make correct decisions regarding safety.

Safety precautions

Warnings and cautions listed in this manual relate to OMRON YRCX robot controllers. To ensure safety of the user's final system that includes OMRON robots and controllers, please take appropriate safety measures as required by the user's individual system.

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Please note, however, this manual cannot cover all items regarding safety.
So it is extremely important that the operator or user have knowledge of safety and make correct decisions regarding safety.

1.1 Signal words used in this manual

This manual uses the following safety alert symbols and signal words to provide safety instructions that must be observed and to describe handling precautions, prohibited actions, and compulsory actions. Make sure you understand the meaning of each symbol and signal word and then read this manual.

DANGER

THIS INDICATES AN IMMEDIATELY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, WILL RESULT IN DEATH OR SERIOUS INJURY.

WARNING

THIS INDICATES A POTENTIALLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN DEATH OR SERIOUS INJURY.

CAUTION

This indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury, or damage to the equipment.

NOTE

Explains the key point in the operation in a simple and clear manner.

Overview of the YRCX

The OMRON YRCX robot controllers were developed based on years of OMRON experience and proven achievements in robotics and electronics. These controllers are specifically designed to operate OMRON industrial robots efficiently and accurately.
Despite their compact size, the YRCX controllers operate efficiently as multi-axis controllers with a variety of functions.
Major features and functions are:

1. Multi-task function

Up to 16 tasks* can be executed simultaneously by specifying the priority. However, low priority tasks are halted while high priority tasks are running.
Programs are processed in parallel to efficiently perform various operations. Additionally, the operation efficiency of the total robot system including peripheral units is greatly improved.
*Refer to "Multi-tasking" in the YRCX programming manual for more details on tasks.

2. Robot language

The YRCX series controller comes with a BASIC-like high-level robot language that conforms to the industrial robot programming language SLIM*. This robot language allows easy programming even of complex movements such as multi-task operations.
*Standard Language for Industrial Manipulators

3. Robot control

Up to four robots can be controlled.
Versatile motion functions are incorporated and these functions can be executed by multiple robots.

4. Applicable robots

Software servo control provides unit standardization.
The YRCX can be connected to almost all OMRON SCARA robots.

5. CE marking

The YRCX series robot controller is designed to conform to machinery directives and EMC (Electromagnetic compatibility) directives as a OMRON robot series product.
For details about CE marking compliance, refer to the "Safety standards application guide". Additionally, to make the system applicable to the CE marking, select the YRCX CE specifications.

This manual explains how to handle and operate the OMRON robot controllers correctly and effectively, as well as I/O interface connections.
Read this manual carefully before installing and using the robot controller.
Also refer to the separate YRCX programming manual and robot user's manual as needed.

♥

Before using the robot controller (Be sure to read the following notes)

Please be sure to perform the following tasks before using the robot controller.
Failing to perform these tasks will require the return-to-origin for setting the origin position each time the power is turned on or may cause abnormal operation (vibration, noise).

[1] When connecting the power supply to the robot controller

Always make a secure connection to the ground terminal on the robot controller to ensure safety and prevent malfunctions due to noise.

TIP

Refer to "3.1. Power supply and ground terminals" in Chapter 3 for detailed information.

[2] When connecting the battery cable to the robot controller

The absolute battery connector has not been connected to the controller at shipment to prevent discharge. After installing the controller, be sure to connect the absolute battery connector while referring to "4. Connecting the absolute battery" in Chapter 3 before connecting the robot connection cables.
An error is always issued and the origin position cannot be detected if the robot controller power is turned on without connecting the absolute batteries. This means the robot connected to this controller cannot be used with absolute specifications.

[3] When connecting robot cables to the robot controller

Be sure to keep robot cables separate from the robot controller power connection lines and other equipment power lines. Using in close contact with lines carrying power may cause malfunctions or abnormal operation.

TIP

Performing return-to-origin is always required when the robot controller power is first turned on after connecting the robot cable to the robot controller. Refer to the operator's manual.
Additionally, when the robot connection cable is disconnected form the controller and connected again, it is also required to perform return-to-origin.

[4] Setting the maximum speed

When operating a ball screw driven robot, the ball screw's free length will increase as the movement stroke increases, and the resonant frequency will drop. This may cause the ball screw to resonate and vibrate severely depending on the motor rotation speed. (The speed at which resonance occurs is called the critical speed.)
To prevent this resonance, the maximum speed must be reduced depending on the robot model when the movement stroke increases.

CAUTION

Continuous operation while the ball screw is resonating may cause the ball screw to wear out prematurely.

[5] Duty

To lengthen the service life of robots, the robots must be operated within the allowable duty (50%).
The duty is calculated as follows:

$$\text{Duty (\%)} = \frac{\text{Operation time}}{\text{Operation time+ Non-operation time}} \times 100$$

If the robot duty is too high, an error such as "overload" or "overheat" occurs. In this case, increase the non-operation time to reduce the duty.

Chapter 1 Using the robot safely

1. Emergency action when a person is caught by robot

If a person should get caught between the robot and mechanical part such as the installation base, or get captured by the robot, free the person by following the instructions below.

1. For axis not equipped with a brake

Put the robot into the emergency stop status to shut off the motor power to the robot. Then move the axis by pushing it with hands.

2. For axis equipped with a brake

Although the power to the robot can be shut off by putting the controller into the emergency stop status, the axis cannot be moved due to the action of the brake. Release the brake by following the procedure below, then move the axis by pushing it with hands.

WARNING

The vertical axis of the vertical use robot will slide down when the brake is released, causing a hazardous situation.

- **Prop up the vertical axis with a support stand before releasing the brake.**
- **Be careful not to let your body get caught between the vertical axis and the support stand when releasing the brake.**

Step 1 *Press QUICK MENU on the programming box to display the "QUICK MENU" screen.*

Step 2 *Use the cursor keys (▲/▼) to select [Servo Operation], and then press ENTER.*

Step 3 *Press F1 (SEP) on the "SERVO OPERATION (ALL)" screen.*

The screen will change to the "SERVO OPERATION (SEP)" screen.

Step 4 *On the "SERVO OPERATION (SEP)" screen, select the axis to release the brake or select [FREE] for all axes with the cursor keys (▲/▼/◀/▶), and then press ENTER.*

The brake release confirmation screen will appear.

Step 1 "QUICK MENU" screen

Step 2 "SERVO OPERATION (ALL)" screen

Step 4 "SERVO OPERATION (SEP)" screen

Step 5 *Use the cursor keys (◀/▶) to select [OK] and press ENTER to release the brake.*

For the vertical axis, when the brake is released, the vertical axis may drop. Therefore, check that the vertical axis is supported by the table, etc., and then release the brake.
To apply the brake again, select (OFF) on the "SERVO OPERATION" screen.

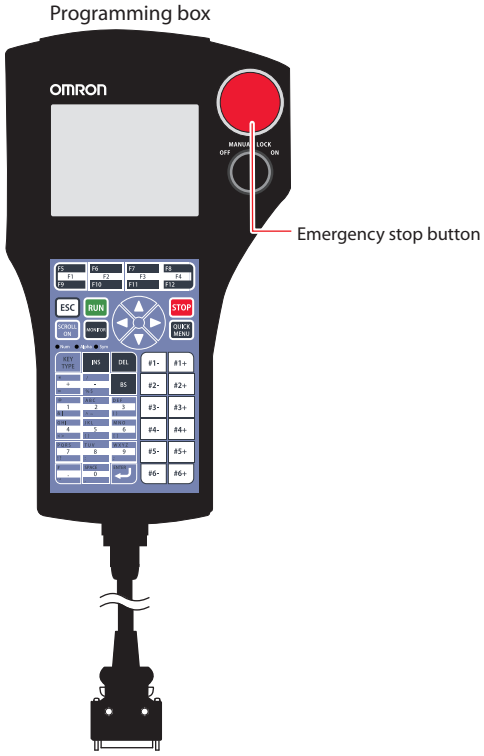
▶ **Step 5** Brake release confirmation screen

2. Emergency stop

To stop the robot immediately in case of emergency during operation, press the emergency stop button on the programming box.
Pressing the emergency stop button cuts off power to the robot.

CAUTION

In addition to the emergency stop button on the programming box, the SAFETY connector has terminals for external dedicated input (emergency stop). Refer to Chapter 5, "SAFETY I/O interface" for details.



2.1 Emergency stop release and alarm reset

To return to normal status after emergency stop, release the emergency stop button and reset the alarm.

NOTE

- Emergency stop can also be triggered by an emergency stop input from the SAFETY I/O interface. To releasel the emergency stop status, refer to Chapter 5, "SAFETY I/O interface".
- Origin positions are retained even when emergency stop is triggered, therefore the robot can be restarted by releasing emergency stop without absolute reset or return-to-origin operation.

Step 1 ***Turn the emergency stop button clockwise to release the emergency stop status.***

Step 2 ***Reset the alarm.***

Press QUICK MENU on the programming box. The "QUICK MENU" screen will appear.
Use the cursor keys (▲/▼) to select (Alarm Reset), and then press ENTER. The confirmation pop-up screen will appear.
Use the cursor keys (▲/▼) to select (YES), and then press ENTER.
The alarm status is then reset.

NOTE
The serious alarm cannot be reset. In this case, it is necessary to turn off the controller power, and then turn it on again.

To turn on the motor power, follow the Steps below.

Step 3 ***Display the "SERVO OPERATION (ALL)" screen.***

Press QUICK MENU on the programming box. The "QUICK MENU" screen will appear.
Use the cursor keys (▲/▼) to select (Servo Operation), and then press ENTER.

Step 4 ***Turn on the motor power and servo.***

Use the cursor keys (◀/▶) to select (ON), and then press ENTER to turn on the servo.

NOTE
Select (ON) on the "SERVO OPERATION (ALL)" screen using the cursor keys and press the ENTER key to turn on the servo of all the robot axes connected to the controller. To avoid turning the servo on of all axes, select "POWER" using the cursor keys and press the ENTER key to turn on the motor. Press the F1 key (SEP) to display "SERVO OPERATION (SEP)" screen. Select (ON) of the axis to turn the servo on or all axes and press the ENTER key to turn the servo on.
Refer to the YRCX operator's manual for details about servo on operation.

Step 5 ***Press ESC to return to the initial screen.***

▶ **Step 2** **"QUICK MENU" screen**

▶ **Step 2** **Alarm reset confirmation screen**

▶ **Step 3** **"QUICK MENU" screen**

▶ **Step 4** **"SERVO OPERATION (ALL)" screen**

3. Power-ON procedures

This section describes the procedures from turning on the controller power to performing return-to-origin of the robot.

CAUTION

To connect the programming box to the controller, always use the dedicated cable and connector that come supplied with the programming box. Do not modify the cable and do not connect a relay to the cable.

NOTE

- After turning off the robot controller, wait at least 5 seconds until turning the power back on again. If power is turned on again too quickly after the power was turned off, the controller might not start up correctly.
- Do not turn off the robot controller during program execution. Doing so may cause errors in the internal system data and the program may not restart correctly when the power is again turned on. Always quit or stop the program before turning off the robot controller.
- When the "Servo on when power on" parameter is set to "INVALID", the controller always starts with the robot servo turned off when power is turned on, regardless of serial I/O settings. Refer to "1.11.1 From the controller power on to servo on" in Chapter 4 for details.

Step 1 ***Check the setup and connections.***

Make sure that the necessary setup and connections are correctly completed according to the instructions in the user's manual.

Step 2 ***Activate emergency stop.***

Press the emergency stop button on the programming box to activate emergency stop.

Step 3 ***Turn on the power.***

The power is supplied to the power terminal on the front panel of the controller. The "PWR" LED and 7-segment LED are lit and the initial screen appears on the programming box. (It takes maximum 7 seconds to start the controller correctly after the "PWR" LED has been lit.)

Step 4 ***Release emergency stop status.***

Turn the emergency stop button on the programming box clockwise to release emergency stop status.

Step 5 ***Turn on the servo.***

Refer to the YRCX operator's manual for details about servo on operation.

Step 6 ***Perform return-to-origin.***

Refer to the YRCX operator's manual for details on return-to-origin.

NOTE

If the warning message "c50: Memory backup battery low" appears when turning on the power, replace the lithium battery (service life is about 4 years) inside the controller. Refer to "5. Replacing the memory battery" in Chapter 8 for details.

4. Usage environments

Operating temperature

Operating temperature	0°C to 40°C

The ambient temperature should be maintained within a range of 0 to 40°C during operation.
This is the range in which continuous operation of the robot controller is guaranteed according to the initial specifications. If the robot controller is installed in a narrow space, then heat generated from the controller itself and from peripheral equipment may drive the temperature above the allowable operating temperature range.
This may result in thermal runaway or malfunctions and may lower component performance along with shortening their useful service life. So be sure to install the controller in locations with a vent having a natural air flow. If this proves insufficient, provide forced air-cooling.

Storage temperature

Storage temperature	-10°C to 65°C

The controller should be stored in a location at an ambient temperature between -10 and +65°C when not being used. If the robot controller is stored in a location at high temperatures for extended periods, deterioration of the electronic components may occur and the memory backup time may decrease.

Operating humidity

Operating humidity	35% to 85% RH (no condensation)

The ambient humidity of the robot controller should be 35% to 85% RH (no condensation) in order to guarantee continuous operation within the initial specifications. Installing the robot controller inside an air-conditioned or cooling unit is recommended when the ambient humidity is higher than 85% or when condensation occurs.

Storage humidity

Storage humidity	Below 95% RH (no condensation)

The controller should be stored in a location at an ambient humidity below 95% RH (no condensation) when not being used. If the robot controller is stored in a location at high humidity for an extended period of time, rust may form on the electronic components.

Vibration and shock

Do not apply strong shocks to the controller. Do not install the controller in locations subject to large vibrations or shocks. The controller may malfunction or break down if subjected to large vibrations or shocks.

Environments

The controller is not designed to meet explosion-proof, dust-proof, and drip-proof specifications, and so do not use it in the following locations. If used in these locations, component corrosion, improper installation, or fire may result.

1) Environments containing combustible gases or dust particles, or flammable liquids, etc.
2) Environments where conductive substances such as metal cutting chips are present.
3) Environments where water, cutting water, oils, dust, metal particles, or organic solvents are present.
4) Environments containing corrosive gases or substances such as acid or alkali.
5) Environments containing mist such as cutting fluids or grinding fluids.
6) Environment containing silicon gas that leads to contact failure of the electrical contact point.

If using the controller in locations where dust particles of gases may generate, it is recommended to install the controller in a box with a cooling unit.

Installation location

Always install the robot controller indoors, at a height of less than 2000 meters above sea level.
Install the controller in a control panel with a structure that does not allow water, oil, carbon or dust particles to penetrate it. Do not install the controller in the following locations:

1) Near devices which may be a source of electrical noise, such as large inverters, high output high-frequency generators, large contactors, and welding machines.
2) Locations where electrostatic noise is generated.
3) Locations subject to radio frequency interference.
4) Locations where there is a possibility of exposure to radioactivity.
5) Locations where dangerous items such as ignitable, flammable or explosive materials are present.
6) Near combustible materials.
7) Environments exposed to direct sunlight.
8) Narrow space where tasks (teaching, inspections, etc.) cannot be performed safely.

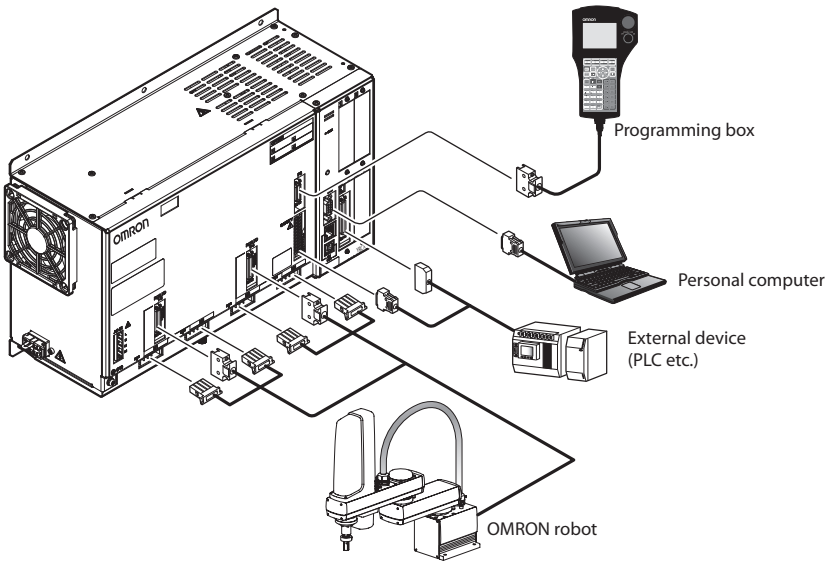
Chapter 2 System overview

1. I/O interface overview

1.1 Main system configuration

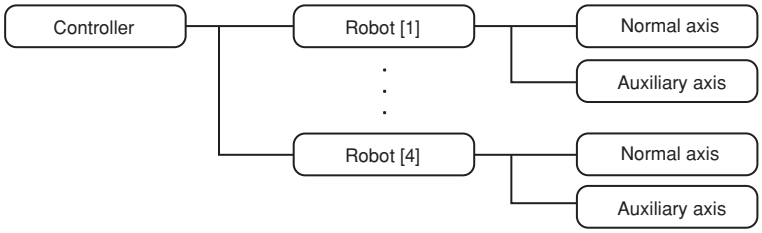
■ Configuration: System for controlling one robot

Example: R6YXG500
All the axes on the robot controller are used as axes of the robot 1.



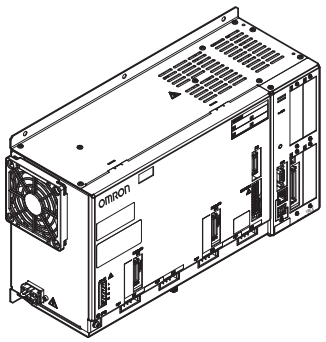
1.2 Axis configuration for the YRCX

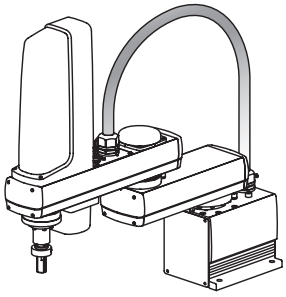
The axis configuration for the OMRON YRCX robot controller is shown below.



Robot [1 to 4]	An aggregate of axes making up one robot. Up to four robots can be controlled.
Normal axes	Indicate the axes composing the main robot. These can be moved with the robot language MOVE command.
Auxiliary axes	Indicate the single axes composing the main group. These cannot be moved with the robot language MOVE command. Use the DRIVE command to move these axes.

Example 1: 4-axis SCARA robot, 1 unit



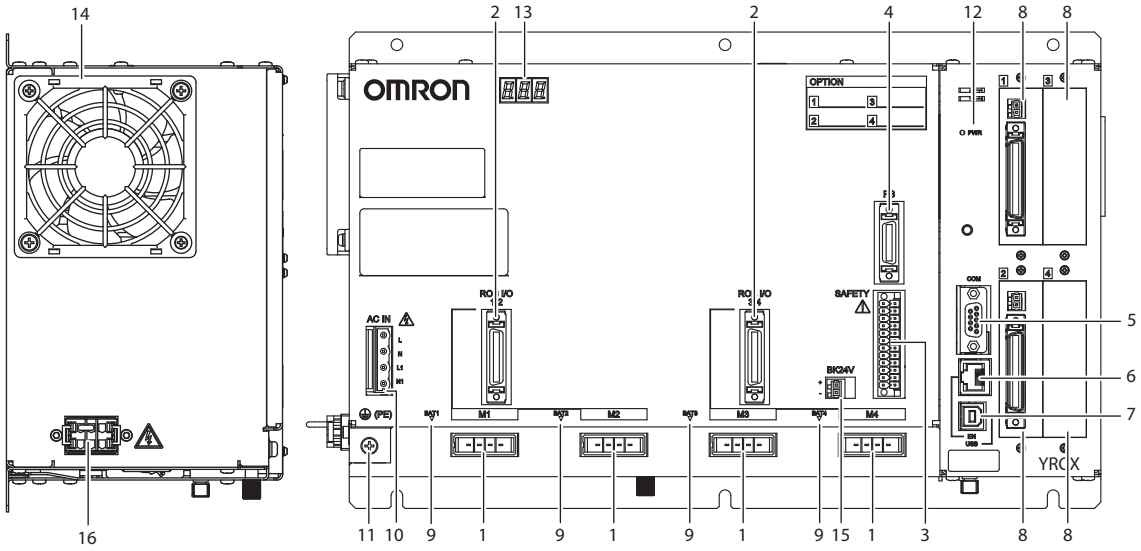


Robot number	Robot type	M1	M2	M3	M4
1	SCARA robot	X	Y	Z	R

2. Name of each part and control system

The YRCX external view and the control system basic diagram are shown below.

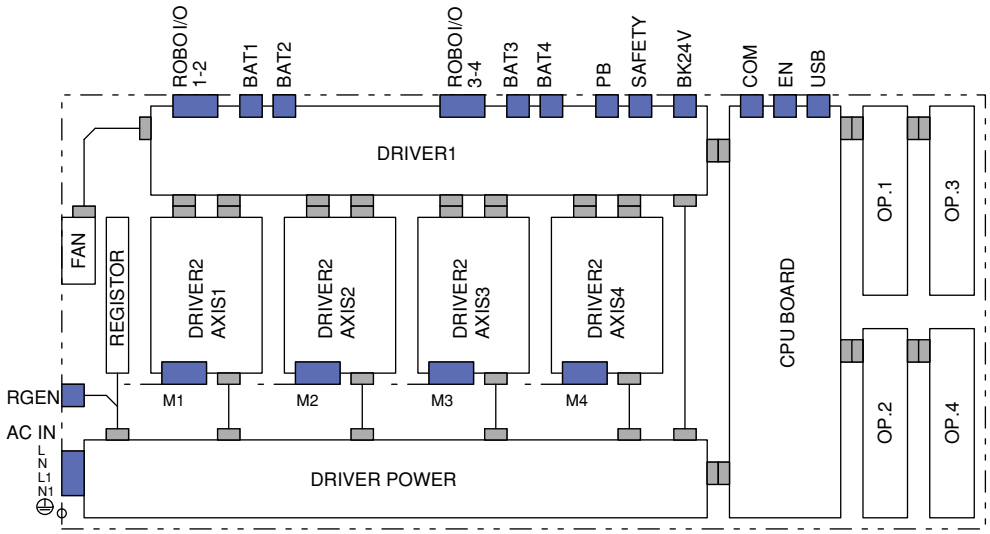
2.1 YRCX external view



	Panel display (name)	Function
1	M1/M2/M3/M4	These connectors are used to drive the servo motor.
2	ROB I/O [1-2/3-4]	These connectors are used for the servo motor position signal, origin sensor signal and brake control.
3	SAFETY	This safety I/O connector is used for emergency stop and so on.
4	PB	This connector is used for the programming box.
5	COM	This connector is used for the RS-232C.
6	EN	This connector is used for the Ethernet.
7	USB	This connector is used for the USB.
8	(OP.) 1/2/3/4	These are option ports. Up to four option boards can be installed on them.
9	BAT [1/2/3/4]	These connectors are used for the absolute backup batteries.
10	AC IN [L/N/L1/N1]	These I/O connectors are used for the control power or main power supply (motor drive power supply).
11	⏚ (PE)	This is the ground terminal. Class D grounding is required.
12	"PWR" LED	This lights up when the power is turned ON.
13	7SEG LED	This indicates the controller or robot status.
14	FAN	This fan ensures that the temperature inside the controller is kept at a fixed level. When installing the controller, keep a clearance of 50 mm or more not to close the fan opening.
15	BK24V	This is an external 24 V input power connector for the brake when using two or more axes as brakes.
16	RGEN	This is a regenerative unit connector for the expansion. For the standard specifications, connect the thermal sensor shorting connector.

2.2 Controller system

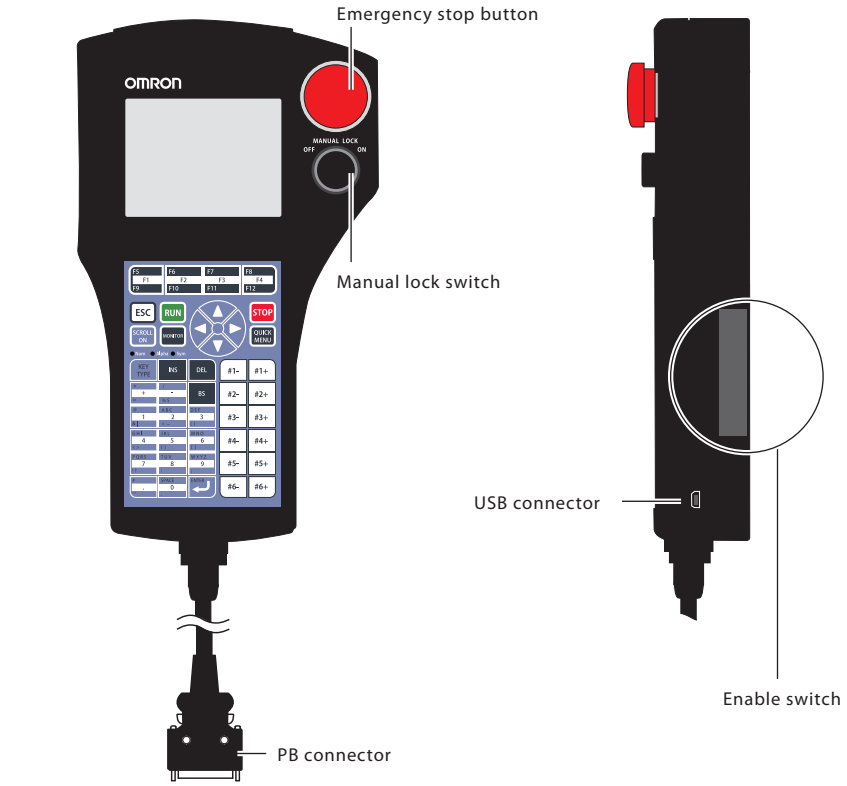
Basic block diagram



3. Optional devices

3.1 Programming box

Use of this programming box makes it possible to perform the robot manual operation, program input and editing, teaching, and parameter settings.



3.2 Basic key operation

Keys with three lines allow three kinds of entries.

Alpha: Alphabet entry
Num: Number entry
Sym: Symbol entry

KEY TYPE

When pressing this key, the character type to be input will change. Additionally, the LED indication showing the key status will also change.

■ LED indication (when "Alpha" is selected)

Num Alpha Sym

For details about key operation, refer to the YRCX operator's manual.

3.3 Expansion I/O board

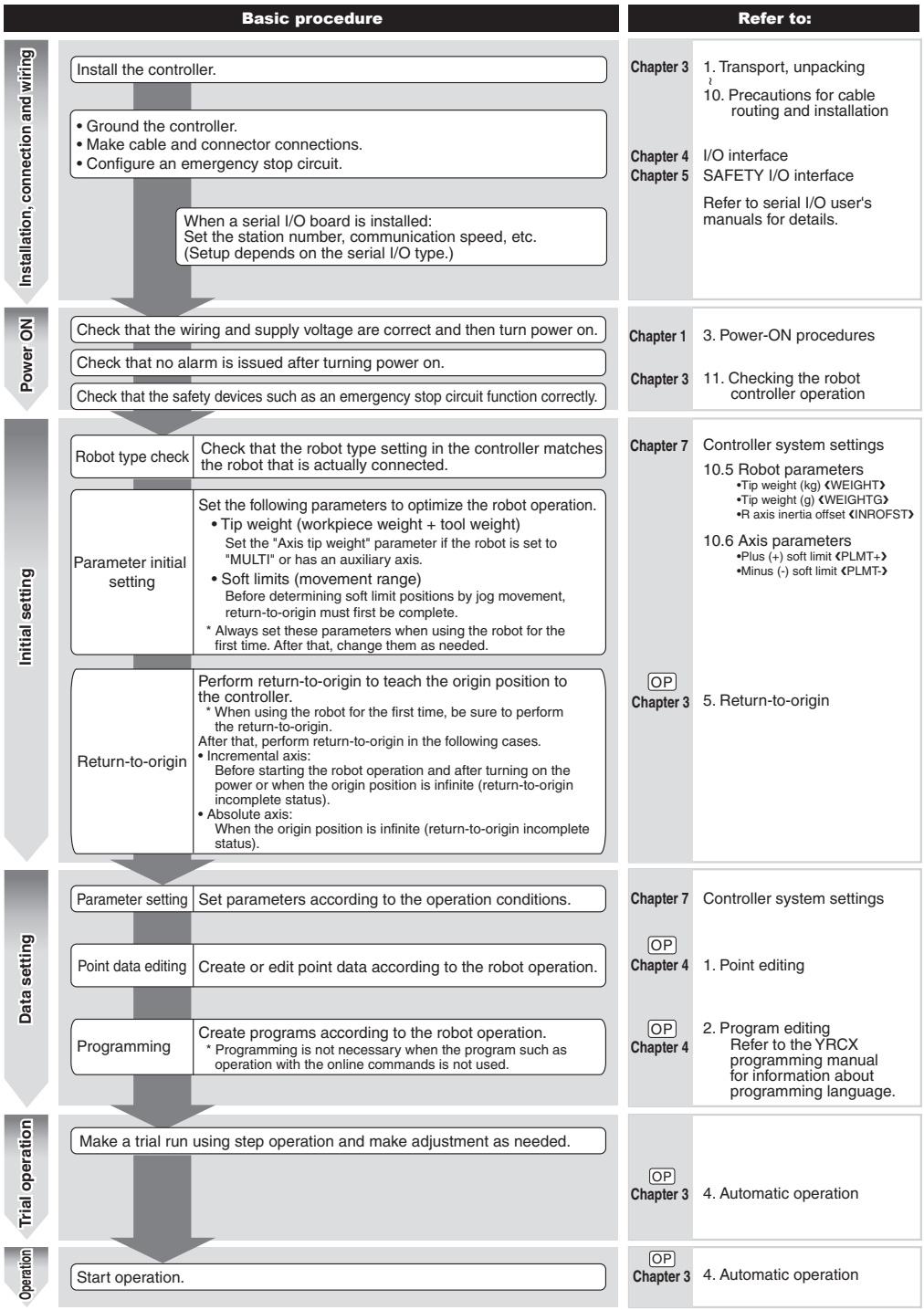
The expansion I/O board used in the robot controller has 24 general-purpose input points and 16 general-purpose output points.

NOTE

Refer to Chapter 4, "I/O interface" for details on expansion I/O boards.

4. Basic sequence from installation to operation

OP ... Operator's manual



Chapter 3 Installation

1. Transport, unpacking

The robot controller is high precision equipment and is carefully packed in a cardboard box to avoid shocks and vibrations.
If the packing box is seriously damaged or dented, please notify your distributor before unpacking.
Transport the robot controller carefully with a trolley to prevent damage caused by dropping.
Take sufficient care not to apply shocks to the equipment when unpacking. After unpacking, check the accessories to make sure that nothing is missing.

CAUTION

The robot and controller are very heavy. Take sufficient care not to drop them during unpacking as this may damage the equipment or cause bodily injury.

	Accessories	
Standard	Power supply connector	1
	SAFETY connector	1
	PB terminator	1
	Connector guard for COM connector	1
	Connector guard for Ethernet connector	1
	USB Connector guard	1
Option	Programming box	1
	Absolute battery	1 to 4
	I/O connector (A dedicated connector for the selected I/O option is provided.)	1 set
	Communication cable	1
	External power connector brake	1
	License sheet along with the USB key	1

* Accessories other than those listed above may be provided depending on the selected options.

2. Installing the robot controller

2.1 Installation conditions

Take note of the following points when installing the robot controller.

■ Installation location

Use the screws to secure the controller to the installation plate inside the control panel so that it is in a horizontal position. Be sure to use the metallic installation plate.

■ Operating temperature and humidity

Always use the controller under the following temperature and humidity conditions.

- Ambient temperature: 0 to 40 ºC
- Ambient humidity: 35 to 85% RH (there should be no condensation)

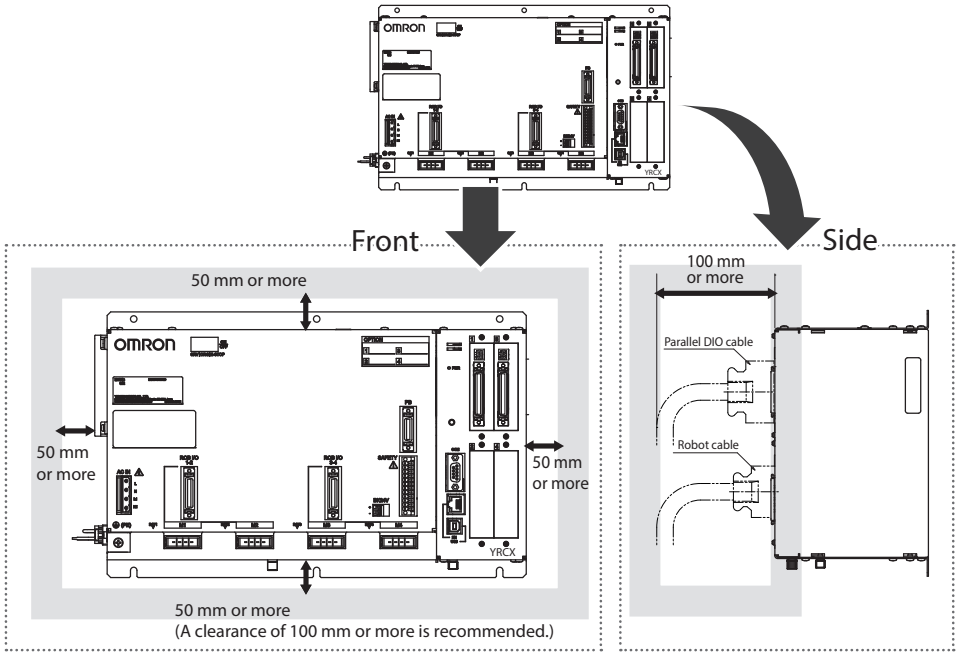
■ Operating environments to be avoided

The controller should never be used in the following environments in order to ensure normal status.

- Atmosphere with flammable gas, inflammable liquids, etc.
- Atmosphere with flying conductive material such as shavings generated during metal machining
- Atmosphere with corrosive acid or alkaline gases
- Mist atmosphere containing cutting fluid, grinding fluid
- Near electrical noise sources such as large inverters, high-output high-frequency transmitters, large contactors, welding machines
- Environments exposed to oil or water
  If the controller is to be used under such adverse conditions, place it in a watertight box equipped with a cooling unit.
- Locations subject to excessive vibrations
- Environment with controller installed on its side or end, or in an inverted position
- Environment in which controller connector cables are subject to impact or loads

Surrounding clearance

Install the controller in a well ventilated area, and ensure sufficient clearance on all sides. (See the figure below.)

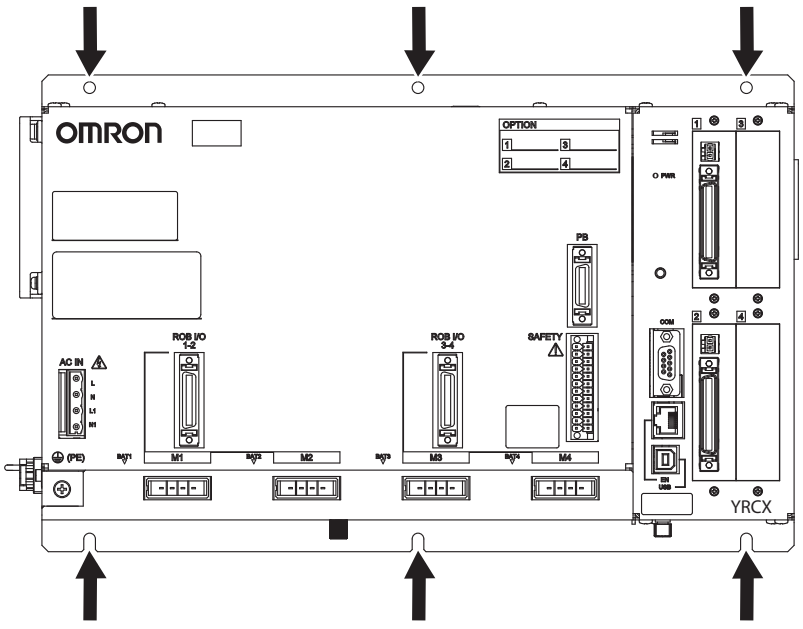


CAUTION

- **To prevent degradation or breakdowns, never use the controller in other than the specified installation conditions.**
- **For the bottom clearance, take the battery replacement workability into consideration. (A clearance of 100 mm or more is recommended.)**
- **Make a space at least 100 mm on the front side in consideration of cable routing. For details, see "10. Precautions for cable routing and installation" in this chapter.**

2.2 Installation methods

Use the screws to secure the controller to the installation plate inside the control panel so that it is in a horizontal position. To secure the controller, use the M5 screws (6 pcs.). (See the figure below.)
Be sure to use the metallic installation plate.



3. Connecting to the power

Attach the power connector to the power cable and insert it into the "AC IN" connector on the front panel of the controller.

3.1 Power supply and ground terminals

CAUTION

Before connecting the power cable, be sure to check that the power supply voltage matches the power specifications of your controller.

■ Power supply terminals

Input terminal		Wiring	Name	Remarks
L	Live	200 to 230 V	Main power supply (for motor power)	Wire cross-section 2.0 sq* or more
N	Neutral	200 to 230 V		
L1	Live	200 to 230 V	Control power supply	Wire cross-section 1.25 sq* or more
N1	Neutral	200 to 230 V		

■ Ground terminal

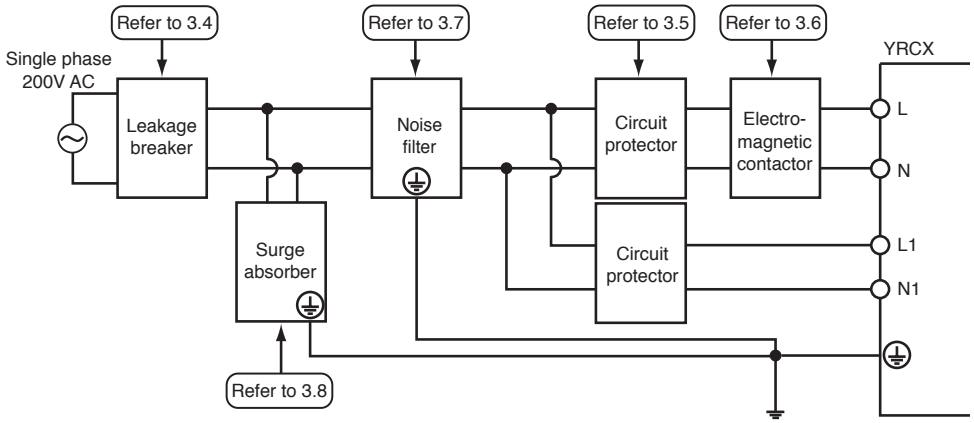
Terminal symbol	Name	Remarks
⏚ (PE)	Ground (Class D grounding)	Wiring material: 2.0 sq* or more, Tightening torque: 1.4 N•m Ground resistance: 100 ohms or less

*sq (square) is a unit used to indicate the cross-sectional area of stranded wires, with 1sq indicating 1 square millimeter.

WARNING

- **To prevent electrical shocks or faulty operation caused by noise, the earth terminal (protective conductor) must be grounded properly.**
- **Class D grounding is required.**
- **To prevent electrical shocks, never touch the AC IN terminals when power is supplied to the robot controller.**

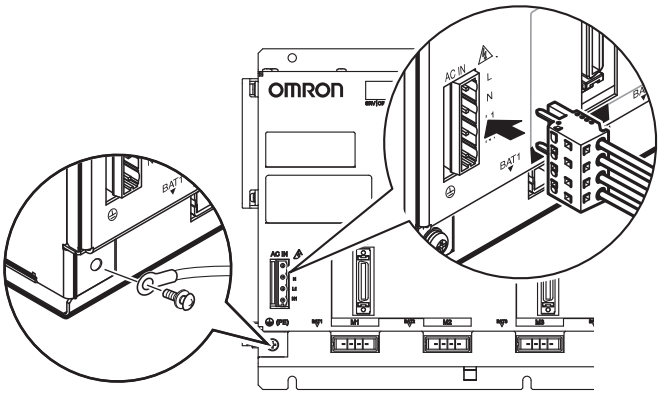
■ Connection example



CAUTION

To prevent break downs, do not mistake the terminal connection locations.

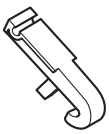
■ AC IN and ground terminals



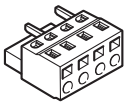
3.2 AC power connector wiring

■ Requirements

Prepare the following to wire power connectors.



Connection lever (provided) or flat-blade screwdriver.



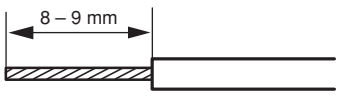
Connector (provided)

Wire

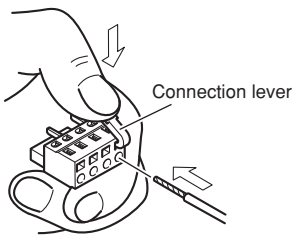
■ Wiring methods

Strip the wire sheath to expose 8 to 9 mm of bare lead.
Use either of the methods shown below to insert the wire core into the opening in the power connector, and then ensure that the wire does not come out.

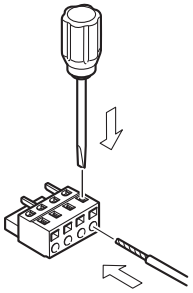
Strip 8 to 9 mm of sheath.



If using connection lever provided.



If using flat-blade screwdriver.



The wire can be inserted while using the flat-blade screwdriver to press down the spring from the opening on the top of the connector.

CAUTION

As a rule, only connect a single wire to each wire opening.

3.3 Considering power capacity and generated heat amount

The required power capacity and generated heat amount depend on the robot model and the number of axes to be controlled.

CAUTION

The power supply voltage for the robot controller must always be regulated within ±10%.
If the voltage drops, the controller detects the voltage drop error to trigger the robot emergency stop.
In contrast, operation at a voltage higher than specified may damage the robot controller or trigger emergency stop due to detecting an excessive motor power supply voltage.

Use the following tables as a guide to prepare a power supply and to determine the control panel size, controller installation method, and cooling means.

Controller: YRCX

Robot model				Power capacity (VA)	Generated heat amount (W)
Standard type	Clean type	Dust-proof & drip-proof type	Wall-mount & inverse type		
R6YXG120 R6YXG150				300	58
R6YXG180 R6YXG220	R6YXC180 R6YXC220			500	63
R6YXE(T/S)400 R6YXGL250 R6YXGL350 R6YXGL400 R6YXGL500 R6YXGL600	R6YXGLC250 R6YXGLC350 R6YXGLC400 R6YXGLC500 R6YXGLC600	R6YXGLP250 R6YXGLP350 R6YXGLP400 R6YXGLP500 R6YXGLP600	R6YXGS300 R6YXGS400	1000	75
	R6YXC500 R6YXC600			1500	88
R6YXE610 R6YXE710 R6YXG500 R6YXG600 R6YXGL700		R6YXGP500 R6YXGP600	R6YXGS500 R6YXGS600	1700	93
	R6YXC700 R6YXC800 R6YXC1000			2000	100
R6YXGH600 R6YXG700 R6YXG800 R6YXG900 R6YXG1000 R6YXX1200		R6YXGHP600 R6YXGP700 R6YXGP800 R6YXGP900 R6YXGP1000	R6YXGS700 R6YXGS800 R6YXGS900 R6YXGS1000	2500	113

3.4 Installing an external leakage breaker

Since leakage current flows at high frequencies in the robot controller, always equip the robot controller power connection with an earth leakage current breaker for safety. It is important to choose the optimum sensitivity current rating (IΔn).
(Check the leakage breaker manufacturer's data sheets to select the optimum product compatible with inverters.)

3.4.1 Selecting condition

The leakage current value is 2.7 mA (MAX.) in total of the control power and main power supply. The value was measured with a leak tester (Hioki Electric 3283) with a low-pass filter turned on (100Hz).

CAUTION

1. When using two or more controllers, sum the leakage current of each controller.
2. Make sure that the controller is securely grounded.
3. Stray capacitance between the cable and FG may vary depending on the cable installation condition, causing the leakage current to fluctuate.

3.5 Installing a circuit protector

Always equip the robot controller power connection with an earth leakage current breaker for safety.
An inrush current, which might be from several to nearly 20 times higher than the rated current, flows at the instant that the controller is turned on or the robot motors start to operate. Therefore, select a medium to slow response circuit protector with an inertial delay function.

Example

	Rated current	Operating characteristics
YRCX control power supply (L1, N1)	5 A	Slow response type with inertia delay
YRCX main power supply (L, N)	15 A	

3.6 Installing an electromagnetic contactor

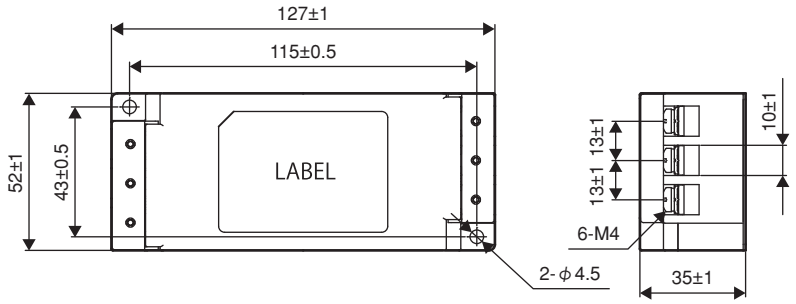
In controlling the power on/off operation of the controller using an external device, such as PLC, an electromagnetic contactor should be installed on the AC power supply line for the controller. Select one that falls under the required safety category and control the open/close operation using a circuit that meets the category. In this case, separate the control power supply line from the main, and install the electromagnetic contactor on the main power supply side.
To control the operation using emergency stop, turn the main power on and off.

3.7 Installing a noise filter

Installation of a noise filter is recommended in order to suppress power line noise.

■ Dimensional outlines of recommended noise filter

Manufacturer : TDK-Lambda Corporation
Type number : RSHN-2016

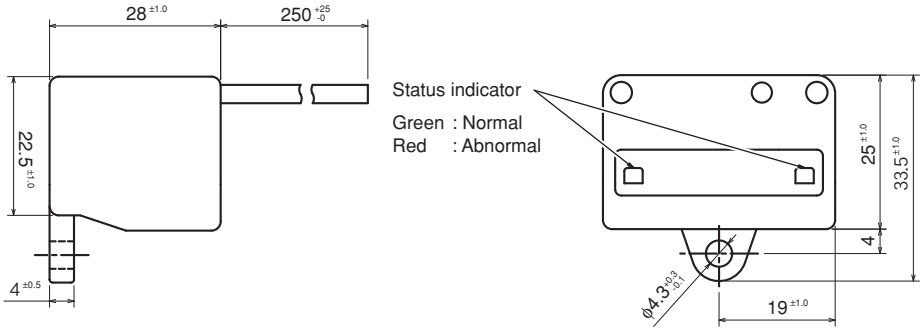


3.8 Installing a surge absorber

It is recommended to install a surge absorber so as to increase the resistance against the surge noise generated by lightning.

■ Dimensional outlines of recommended surge absorber

Manufacturer : SOSHIN ELECTRIC CO., LTD.
Type number : LT-C12G801WS



4. Connecting the absolute battery

The absolute battery has not been connected to the controller at shipment to prevent discharge.
After the controller has been installed, be sure to connect the absolute battery before connecting the robot connection cables.
Connect the absolute battery to the BAT connector corresponding to the axis used as an absolute type axis.

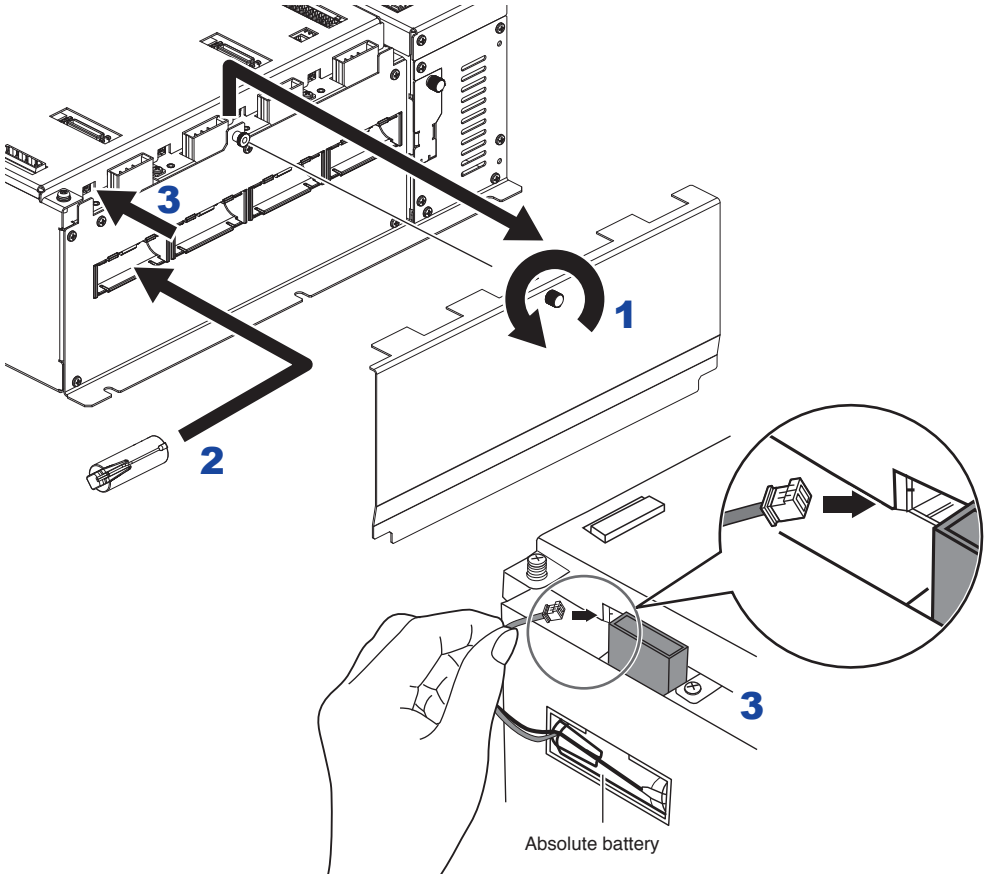
■ Installing the absolute battery

Step 1 ***Loosen the knob on the bottom and remove the bottom cover.***

Step 2 ***Fit each absolute battery to the battery case on the bottom to install it.***

Step 3 ***Connect each absolute battery to the BAT connector.***

* Replace the absolute battery in the same manner.



CAUTION

Do not process or extend the cable, or abnormal operation or malfunction may occur.

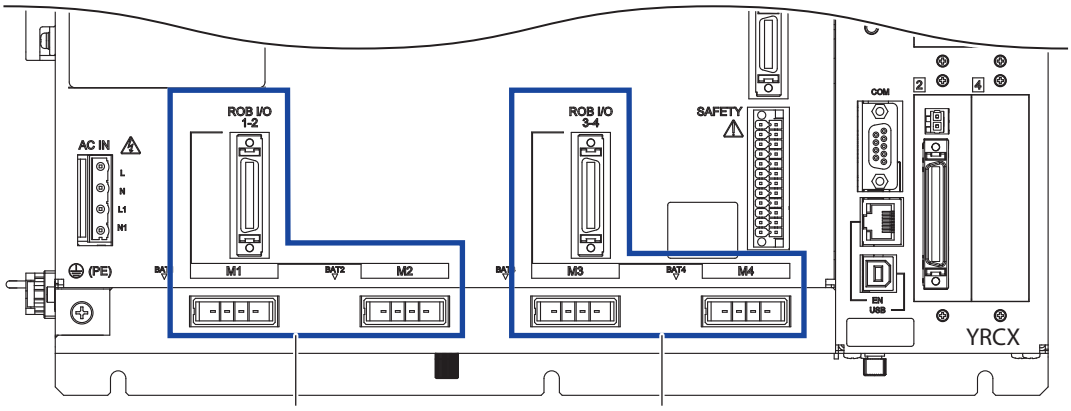
NOTE

- If the absolute battery is disconnected from the BAT connector with the power turned off, the robot enters the return-to-origin incomplete status.
  Since the absolute battery connector has not been connected to the controller at shipment to prevent discharge, the alarm message showing the return-to-origin incomplete status is always displayed when turning on the power for the first time. This alarm message does not show the controller or robot failure.
- When the controller power is turned off for a period of time exceeding the backup retention time, the battery needs to be replaced.
- When storing the controller for an extended period of time, disconnect the absolute battery from the BAT connector to suppress the consumption of the absolute battery.

5. Robot connections

5.1 Connecting the robot cables

Connect the cables to the "M1", "M2", "M3", "M4", "ROB I/O 1-2", and "ROB I/O 3-4" connectors on the front of the controller.
The "M1" and "M2" connectors and the "ROB I/O 1-2" connector are intended for axis 1 and 2. Additionally, the "M3" and "M4" connectors and the "ROB I/O 3-4" connector are intended for axis 3 and 4.



The robot connection cable specification may vary depending on the robot. For details, refer to the robot manual.

WARNING

The power to the controller must be off when connecting the robot cables.
The "M1", "M2", "M3", and "M4" connectors and the ROB I/O connector (1-2/3-4) have the same shape. Be careful not to make incorrect connections. Otherwise, the robot may malfunction.
Keep the robot cables separate from the power cables and other equipment power lines. Failure to follow this instruction may cause malfunctions.

CAUTION

Always securely connect the robot cables. If they are not securely connected and fail to make good contact, the robot may malfunction. Before turning on the controller, make sure again that the cables are securely connected.
Additionally, ground the robot securely. For details about grounding, refer to the robot manual.

NOTE

Make sure there are no bent or broken connector pins and no cable damage before connecting.

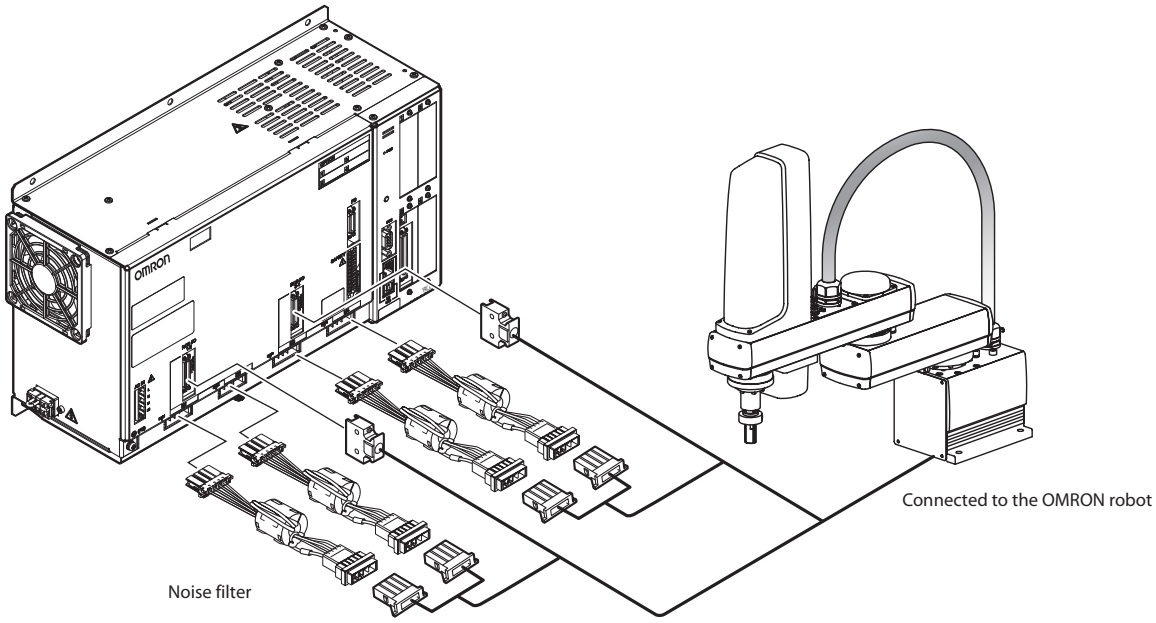
5.2 Noise countermeasures

Cables to be connected to the "M1", "M2", "M3", and "M4" connectors are motor cables for the motor drive. Since the motor cable produces switching noise by motor control, do not install the sensor, etc. close to it. Otherwise, the robot may malfunction. In this case, take noise preventive measures described below.

1. Install the sensor, etc., further away from the motor cable.
2. Use a shielded cable for the sensor, etc., and ground the shield.
3. Install a noise filter in the cable which connects the controller to the robot.

■ Noise filter

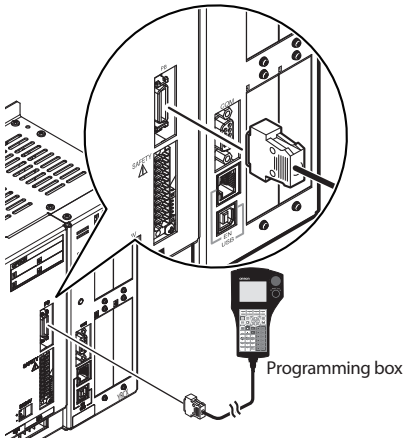
Model KBG-M6563-00 (for M1, M3)
Model KBG-M6563-10 (for M2, M4)



6. Connecting the programming box

Connect the programming box to the PB connector on the front of the robot controller.

CAUTION
The PB connector must be connected in the right direction, and therefore caution is required. The programming box may break down if connected incorrectly.



If not connecting the programming box, plug the terminator provided into the PB connector.

Name	Type number
PBX terminator (Dummy connector plug)	KFR-M5163-00

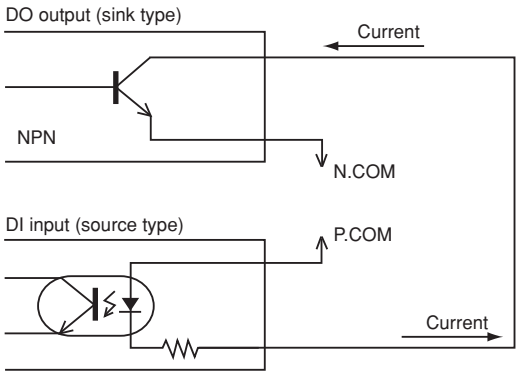
CAUTION
Since the programming box is equipped with a B-contact (normally closed) type emergency stop button, the emergency stop function is triggered when the programming box is disconnected from the robot controller. Plug the terminator into the PB connector to avoid such emergency stop conditions.

7. I/O connections

The various input/output (I/O) signals from peripheral equipment can be connected to the robot controller. Each I/O is set with a number, and the I/O connector to be used depends on that number.
For more detailed information on inputs and outputs, refer to Chapter 4, "I/O interface" or Chapter 5, "SAFETY I/O interface". The terms used in the manual are described as follows.

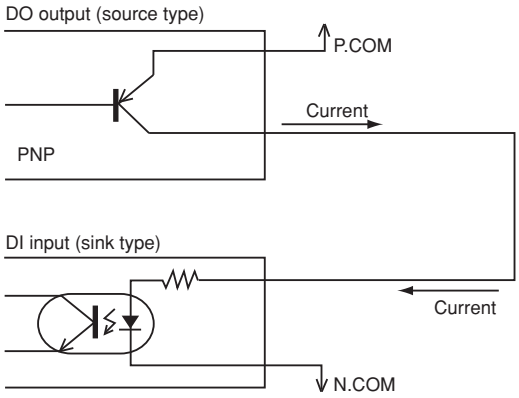
NPN specifications

NPN specifications indicate that a DO (digital output) type NPN open-collector transistor is used for the I/O port having a transistor and photo-coupler, and a corresponding DI (digital input) is also used. NPN specifications therefore make use of a sink output and a source input (see the figure below).



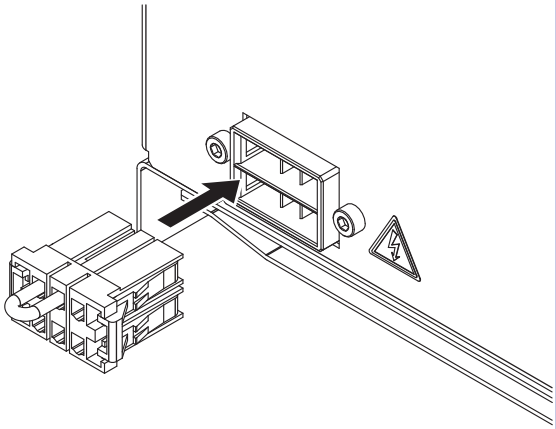
PNP specifications

PNP specifications indicate that a DO (digital output) type PNP open-collector transistor is used for the I/O port having a transistor and photo-coupler, and a corresponding DI (digital input) is also used. PNP specifications therefore make use of a source output and a sink input (see the figure below).



8. Connecting the regenerative shorting connector

A regenerative unit is incorporated.
To disable the temperature error monitor of expanded regenerative unit, connect the shorting connector.



9. Connecting the brake power supply

When there are two or more brake axes, an external brake power supply is needed. Prepare a 24 V 10 W power supply for each axis.

NOTE

The brake power shares with the power source supplied to the parallel I/O board.
For details, refer to "1.2 Power supply" and "1.3 Power connector wiring work" in Chapter 4.

10. Precautions for cable routing and installation

10.1 Wiring methods

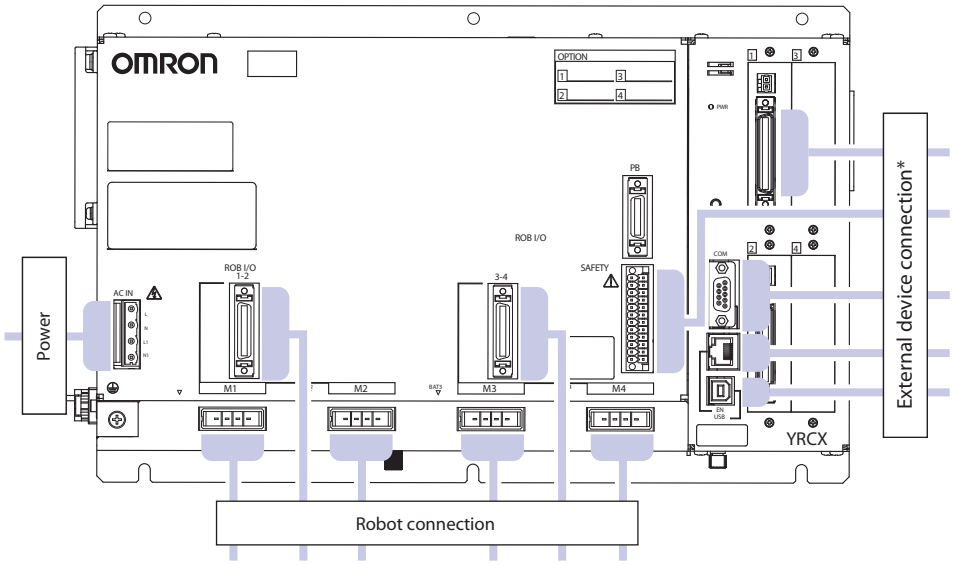
When performing the cable wiring to the controller, strictly observe the following cautions to prevent malfunction due to noise.

CAUTION

As a general guide keep the specified cables separated at least 100 mm from each other.

1. **Keep the external device cable, robot cables, power cable and other equipment power lines away from each other. Never bundle them together.**
2. **The wiring of electromagnetic contactors, induction motors, solenoid valves or brake solenoids should be separate from the external device cable and robot cable. Never pass them through the same conduit or bundle them together.**
3. **The ground wire should be short.**

For each cable name, see the figure below.



* External devices: DIO, SAFFTY, COM, Ethernet, and USB, etc.

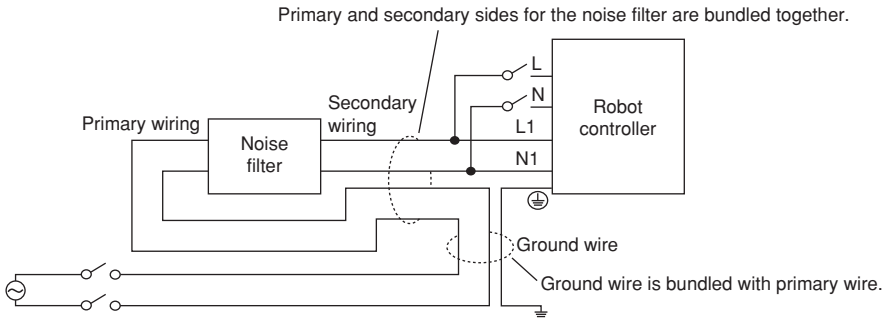
10.2 Methods of preventing malfunctions

To prevent malfunctions due to noise, take into account the following points.

1. Place a noise filter and ferrite core at a point near the robot controller.
   Do not bundle the primary wiring and secondary wiring of the noise filter together.

■ Noise filter installation

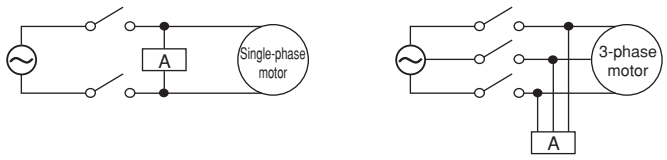
Bad example:



2. Always attach a surge absorber to the coil of inductive loads (induction motor, solenoid valve, brake solenoid, relay and so on) located near the robot controller.

■ Example of surge absorber circuit

For induction motor



A: Surge killer

For solenoid valve, solenoid

DC type
B: Diode, varistor, CR elements

AC type
C: Varistor, CR elements

11. Checking the robot controller operation

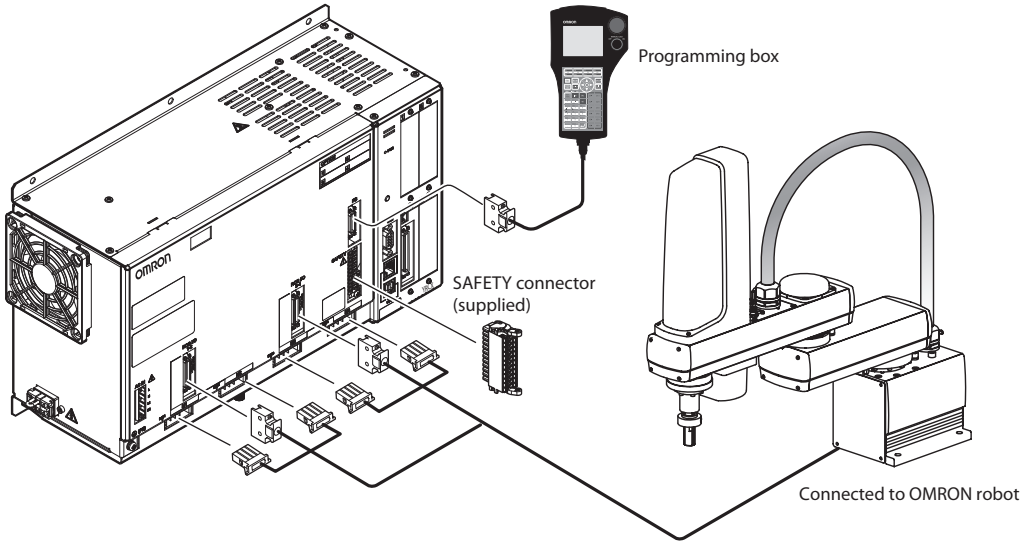
This section explains how to check the controller operation using a special connector that comes with the controller and an applicable robot.

11.1 Controller wiring

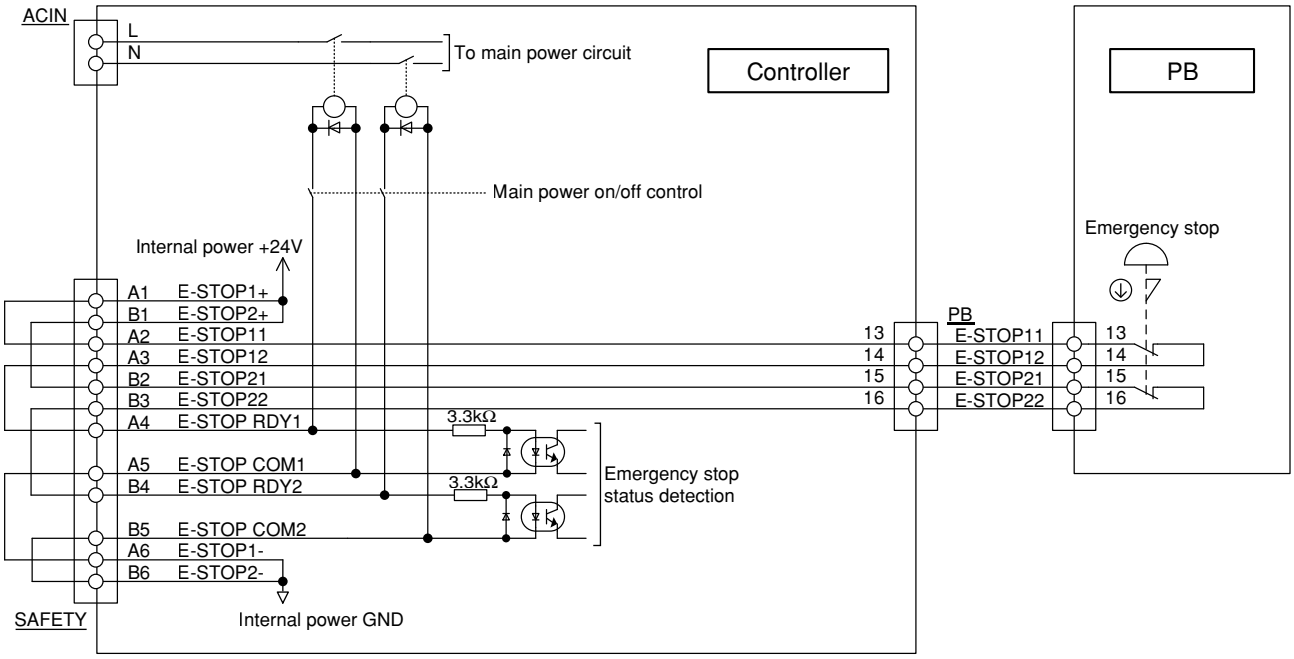
Make the connections to the controller as described below.

- Power supply (Do not supply power until you actually begin the operation check.)
- Robot cable
- Programming box
- Absolute battery (absolute type only)
- Regenerative unit (if needed)
- SAFETY connector (supplied)
  Short-circuit the following pins of the SAFETY connector supplied with the controller.

SAFETY connector
A1 – A2
A3 – A4
A5 – A6
B1 – B2
B3 – B4
B5 – B6



11.2 Wiring example of emergency stop circuit for operation check



The emergency stop button contacts of the programming box are output from the A2, A3, B2, and B3 pins of the SAFETY connector through the PB connector.

11.3 Operation check

Supply the power to the controller after connecting the controller, robot, and supplied connector.

NOTE

When the option boards are installed without wiring, it goes in abnormal status, such as error occurring and emergency stop. To check the operation, set the option boards "Valid" temporarily. Refer to "10.8 Option board related parameters" in Chapter 7 for details.

Normal status

· The "PWR" LED on the front of the controller is lit and the 7-segment LED displays as follows.
(Servo off, return-to-origin incomplete, emergency stop released)

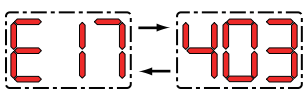
Abnormal status

· The "PWR" LED on the front of the controller is lit and the 7-segment LED displays the alarm code.

· Check the alarm message shown on the programming box and take corrective actions while referring to the troubleshooting.

(Example) Display if an alarm occurs.

"E + alarm group number" and "alarm classification number" are displayed alternately.



* For details about alarm contents shown by each alarm code, refer to "Troubleshooting".

Chapter 4 I/O interface

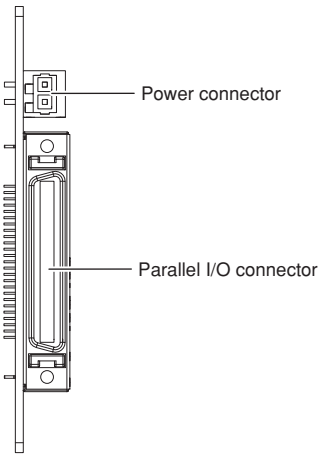
1. I/O interface overview

To make the robot applicable to the customer's system, the dedicated or general-purpose I/O interface can be selected for the controller. Add an optional parallel I/O board to the controller to use the I/O interface. The parallel I/O board can select the standard specifications that include the dedicated I/O or the expanded specifications that have only the general-purpose I/O. Up to four boards can be installed.
The standard/expanded specifications and the PNP/NPN specifications of the parallel I/O board are determined at shipment.
Additionally, when the serial I/O is selected, dedicated inputs other than DI06 (Stop) of the parallel I/O board become invalid.
For details about the definitions of the NPN and PNP specifications, refer to "7. I/O connections" in Chapter 3. In the following descriptions, the input signal and output signal are expressed as "DI" and "DO", respectively.

NOTE
The dedicated inputs are limited to ensure the safety during manual operation of the robot.

Specifications			Connector name	Connector type number	Wire thickness
Standard specifications	Input	Dedicated 8	STD.DIO	Shell: 10350-52A0-008 Plug: 10150-3000PE Manufacturer: SUMITOMO 3M	AWG30 to 24
		General-purpose 16			
	Output	Dedicated 9			
		General-purpose 8			
Expanded specifications	Input	24 (Max. 96)	EXP.DIO		
	Output	16 (Max. 64)			

■ Parallel I/O board



1.1 ID settings

Parallel I/O board IDs (1 to 4) are automatically allocated from the board connection position (in the option slot number order).
The option slot numbers are shown on the option slots of the controller main body in the order like "upper left → lower left → upper right → lower right".
The parallel I/O board IDs can be set using the parameters as well. However, when the board has the standard specifications, the ID is always "1".

ID		General-purpose I/O	Dedicated I/O
1	Standard specifications	DI20-DI37 / DO20-DO27	Provided*1
	Expanded specifications	DI10-DI37 / DO10-DO27	None
2		DI40-DI67 / DO30-DO47	None
3		DI70-DI117 / DO50-DO67	None
4		DI120-DI147 / DO70-DO107	None

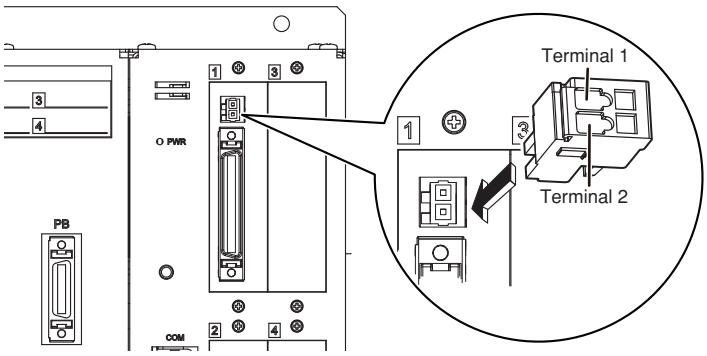
*1 To enable the dedicated input, it is necessary to short-circuit CHK1 (pin number 4) and CHK2 (pin number 40) of the I/O.

NOTE
- Standard specifications/expanded specifications are determined at shipment.
- Only one standard specification board can be used.
- When changing the ID, it is necessary to turn off the controller power, and then turn it on again.
- If the ID setting is mismatched, all parallel I/O board IDs are initialized.

1.2 Power supply

When using the I/O interface, it is necessary to connect an external 24 V power supply.
Perform the wiring of the power connector of the parallel I/O board, and then connect the 24 V power supply.

■ Power connector



CAUTION
Make sure the direction to insert the power connector.

Connector type number: 734-102 Manufacturer: WAGO JAPAN

Terminal	Input	Electric wire to be used
1	24 V DC	AWG22~18
2	GND	AWG22~18

CAUTION
When the controller main body is turned off, do not supply an external 24 V DC power to the parallel I/O interface. Otherwise, the controller may malfunction.

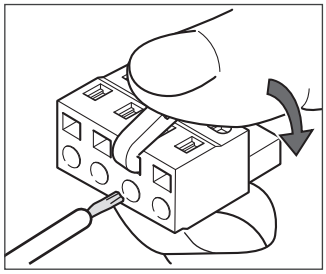
1.3 Power connector wiring work

■ Stripping the electric wire

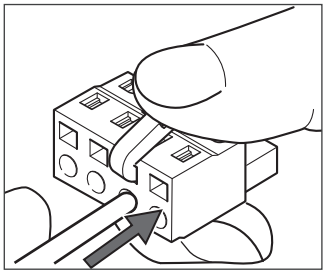
Strip the electric wire sheath 7 mm.

Perform the work while referring to the figures shown below.

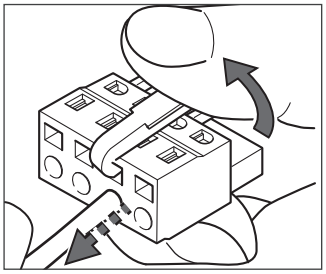
■ When using the finger operation lever



1. Push the finger operation lever installed on the top by finger to push down the spring.

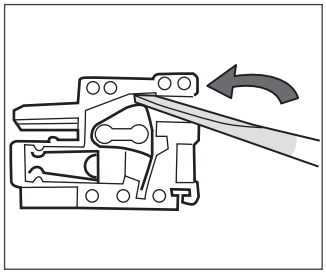


2. Insert the electric wire all the way from the insertion port while pushing the operation lever.

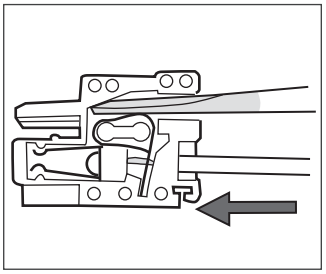


3. Release the operation lever. To check the connection, lightly pull the electric wire.

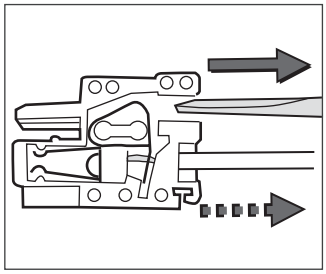
■ When using a screwdriver (front entry)



1. Insert a screwdriver into the operation slot (square hole). When the screwdriver is inserted correctly, it is then held.



2. Insert the electric wire that has been stripped correctly all the way to the wire hole (round hole).



3. Remove the screwdriver. To check the connection, lightly pull the electric wire.

1.4 Connector I/O signals

1.4.1 Standard specification I/O connector signal list

NOTE

- "CHK1" and "CHK2" are connection check inputs of the standard specification I/O connector. When the ID is set at "1", be sure to short-circuit these inputs.
- When the serial I/O is enabled, the dedicated inputs of the option DIO are disabled.

Pin	I/O No.	Signal name	Remarks
1	DI 01	Dedicated input: Servo ON input	
2	DI 10	Dedicated input: Sequence control	
3	DI 03	Spare	Do not use.
4	CHK 1	Check signal 1	Short-circuit with CHK2.
5	DI 05	Spare	Do not use.
6	DI 06	Dedicated input: Stop	
7	DI 07	Spare	Do not use.
8	DI 20	General-purpose input 20	
9	DI 21	General-purpose input 21	
10	DI 22	General-purpose input 22	
11	DI 23	General-purpose input 23	
12	DI 24	General-purpose input 24	
13	DI 25	General-purpose input 25	
14	DI 26	General-purpose input 26	
15	DI 27	General-purpose input 27	
16	DO 00	Spare	Do not use.
17	DO 01	Dedicated output CPU OK	
18	DO 10	Dedicated output AUTO mode output	
19	DO 11	Dedicated output Return-to-origin complete	
20	DO 12	Dedicated output Sequence program-in-progress	
21	DO 13	Dedicated output Robot program-in-progress	
22	DO 14	Dedicated output Program reset status output	
23	DO 15	Dedicated output Warning output	
24	DO 16	Spare	Do not use.
25	DO 17	Spare	Do not use.
26	DI 12	Dedicated input: Automatic operation start	
27	DI 13	Spare	Do not use.
28	DI 14	Dedicated input: Return-to-origin (for INC axis)	
29	DI 15	Dedicated input: Program reset input	
30	DI 16	Dedicated input: Alarm reset input	
31	DI 17	Dedicated input: Return-to-origin (for ABS axis)	
32	DI 30	General-purpose input 30	
33	DI 31	General-purpose input 31	
34	DI 32	General-purpose input 32	
35	DI 33	General-purpose input 33	
36	DI 34	General-purpose input 34	
37	DI 35	General-purpose input 35	
38	DI 36	General-purpose input 36	
39	DI 37	General-purpose input 37	
40	CHK 2	Check signal 2	Short-circuit with CHK1.
41	DO 02	Dedicated output: Servo ON output	
42	DO 03	Dedicated output: Alarm output	
43	DO 20	General-purpose output 20	
44	DO 21	General-purpose output 21	
45	DO 22	General-purpose output 22	
46	DO 23	General-purpose output 23	
47	DO 24	General-purpose output 24	
48	DO 25	General-purpose output 25	
49	DO 26	General-purpose output 26	
50	DO 27	General-purpose output 27	

1.4.2 Expanded specification I/O connector signal list

The IDs are set using the parameter.

Pin	I/O No. (ID=1)	I/O No. (ID=2)	I/O No. (ID=3)	I/O No. (ID=4)	Signal name
1	---	---	---	---	Reserved
2	DI 10	DI 40	DI 70	DI 120	General-purpose input 10,40,70,120
3	---	---	---	---	Reserved
4	DI 11	DI 41	DI 71	DI 121	General-purpose input 11,41,71,121
5	---	---	---	---	Reserved
6	---	---	---	---	Reserved
7	---	---	---	---	Reserved
8	DI 20	DI 50	DI 100	DI 130	General-purpose input 20,50,100,130
9	DI 21	DI 51	DI 101	DI 131	General-purpose input 21,51,101,131
10	DI 22	DI 52	DI 102	DI 132	General-purpose input 22,52,102,132
11	DI 23	DI 53	DI 103	DI 133	General-purpose input 23,53,103,133
12	DI 24	DI 54	DI 104	DI 134	General-purpose input 24,54,104,134
13	DI 25	DI 55	DI 105	DI 135	General-purpose input 25,55,105,135
14	DI 26	DI 56	DI 106	DI 136	General-purpose input 26,56,106,136
15	DI 27	DI 57	DI 107	DI 137	General-purpose input 27,57,107,137
16	---	---	---	---	Reserved
17	---	---	---	---	Reserved
18	DO 10	DO 30	DO 50	DO 70	General-purpose output 10,30,50,70
19	DO 11	DO 31	DO 51	DO 71	General-purpose output 11,31,51,71
20	DO 12	DO 32	DO 52	DO 72	General-purpose output 12,32,52,72
21	DO 13	DO 33	DO 53	DO 73	General-purpose output 13,33,53,73
22	DO 14	DO 34	DO 54	DO 74	General-purpose output 14,34,54,74
23	DO 15	DO 35	DO 55	DO 75	General-purpose output 15,35,55,75
24	DO 16	DO 36	DO 56	DO 76	General-purpose output 16,36,56,76
25	DO 17	DO 37	DO 57	DO 77	General-purpose output 17,37,57,77
26	DI 12	DI 42	DI 72	DI 122	General-purpose input 12,42,72,122
27	DI 13	DI 43	DI 73	DI 123	General-purpose input 13,43,73,123
28	DI 14	DI 44	DI 74	DI 124	General-purpose input 14,44,74,124
29	DI 15	DI 45	DI 75	DI 125	General-purpose input 15,45,75,125
30	DI 16	DI 46	DI 76	DI 126	General-purpose input 16,46,76,126
31	DI 17	DI 47	DI 77	DI 127	General-purpose input 17,47,77,127
32	DI 30	DI 60	DI 110	DI 140	General-purpose input 30,60,110,140
33	DI 31	DI 61	DI 111	DI 141	General-purpose input 31,61,111,141
34	DI 32	DI 62	DI 112	DI 142	General-purpose input 32,62,112,142
35	DI 33	DI 63	DI 113	DI 143	General-purpose input 33,63,113,143
36	DI 34	DI 64	DI 114	DI 144	General-purpose input 34,64,114,144
37	DI 35	DI 65	DI 115	DI 145	General-purpose input 35,65,115,145
38	DI 36	DI 66	DI 116	DI 146	General-purpose input 36,66,116,146
39	DI 37	DI 67	DI 117	DI 147	General-purpose input 37,67,117,147
40	---	---	---	---	Reserved
41	---	---	---	---	Reserved
42	---	---	---	---	Reserved
43	DO 20	DO 40	DO 60	DO 100	General-purpose output 20,40,60,100
44	DO 21	DO 41	DO 61	DO 101	General-purpose output 21,41,61,101
45	DO 22	DO 42	DO 62	DO 102	General-purpose output 22,42,62,102
46	DO 23	DO 43	DO 63	DO 103	General-purpose output 23,43,63,103
47	DO 24	DO 44	DO 64	DO 104	General-purpose output 24,44,64,104
48	DO 25	DO 45	DO 65	DO 105	General-purpose output 25,45,65,105
49	DO 26	DO 46	DO 66	DO 106	General-purpose output 26,46,66,106
50	DO 27	DO 47	DO 67	DO 107	General-purpose output 27,47,67,107

For details regarding the definition of NPN and PNP specifications, refer to "7. I/O connections" in Chapter 3.

1.5 Connector pin assignment lists

1.5.1 Standard specification I/O connector

2	DI10	SEQ enable	1	DI01	Servo ON	27	DI13	(Spare)	26	DI12	RUN
4	CHK1	Check input 1	3	DI03	(Spare)	29	DI15	RESET	28	DI14	ORIGIN (for INC axis)
6	DI06	STOP	5	DI05	(Spare)	31	DI17	ORIGIN (for ABS axis)	30	DI16	ALMRST
8	DI20	General-purpose input	7	DI07	(Spare)	33	DI31	General-purpose input	32	DI30	General-purpose input
10	DI22	General-purpose input	9	DI21	General-purpose input	35	DI33	General-purpose input	34	DI32	General-purpose input
12	DI24	General-purpose input	11	DI23	General-purpose input	37	DI35	General-purpose input	36	DI34	General-purpose input
14	DI26	General-purpose input	13	DI25	General-purpose input	39	DI37	General-purpose input	38	DI36	General-purpose input
16	DO00	Emergency stop contact monitor	15	DI27	General-purpose input	41	DO02	SERVO	40	CHK2	Check input 2
18	DO10	AUTO	17	DO01	CPUOK	43	DO20	General-purpose output	42	DO03	ALARM
20	DO12	SEQRUN	19	DO11	ORGOK	45	DO22	General-purpose output	44	DO21	General-purpose output
22	DO14	RESET	21	DO13	RUN	47	DO24	General-purpose output	46	DO23	General-purpose output
24	DO16	(Spare)	23	DO15	WARNING	49	DO26	General-purpose output	48	DO25	General-purpose output
			25	DO17	(Spare)				50	DO27	General-purpose output

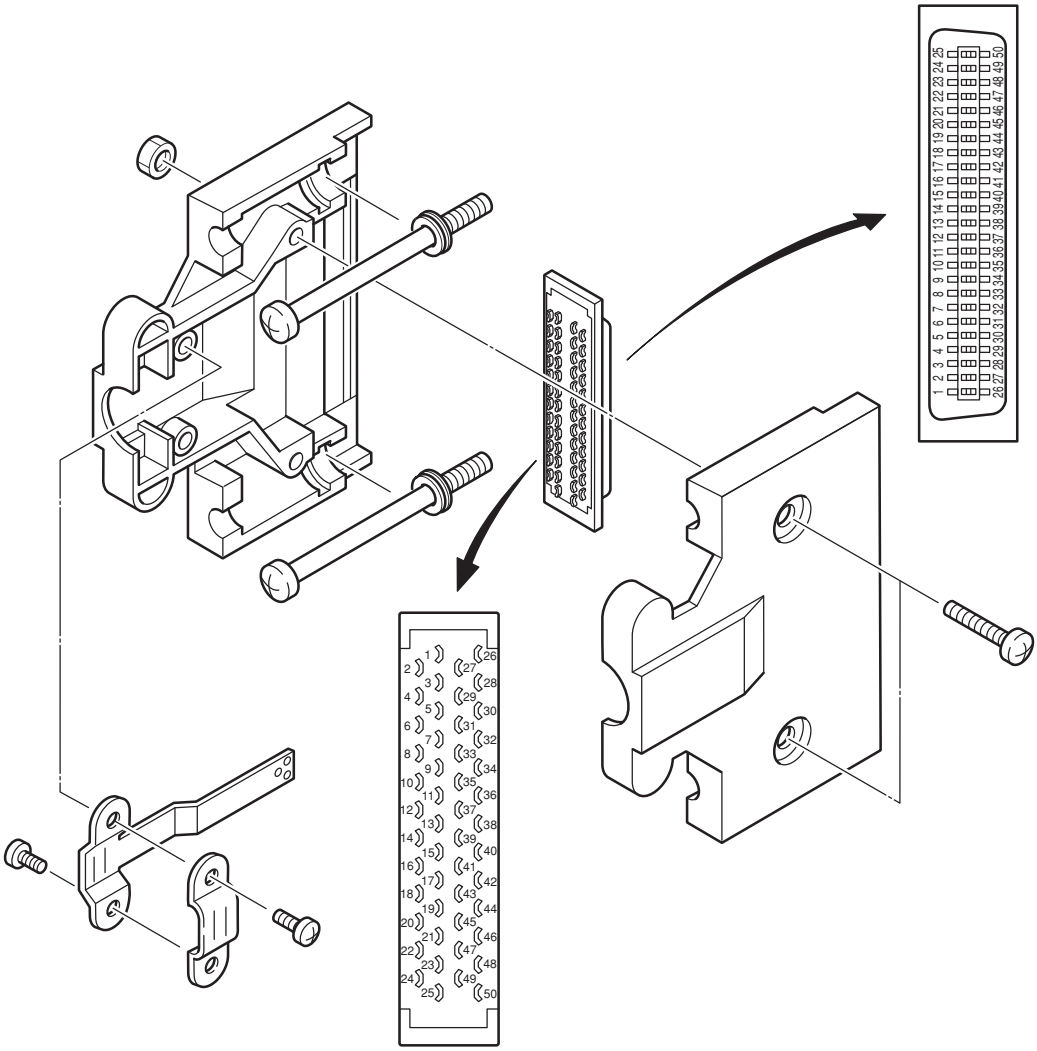
1.5.2 Expanded specification I/O connector

The following shows the expanded specification I/O connector pin assignment list when the ID is "2".
For details about pin assignments other than those with the ID set at "2", refer to the I/O connector signal list.

2	DI40	General-purpose input	1	–	Do not use.	27	DI43	General-purpose input	26	DI42	General-purpose input
4	DI41	General-purpose input	3	–	Do not use.	29	DI45	General-purpose input	28	DI44	General-purpose input
6	–	Do not use.	5	–	Do not use.	31	DI47	General-purpose input	30	DI46	General-purpose input
8	DI50	General-purpose input	7	–	Do not use.	33	DI61	General-purpose input	32	DI60	General-purpose input
10	DI52	General-purpose input	9	DI51	General-purpose input	35	DI63	General-purpose input	34	DI62	General-purpose input
12	DI54	General-purpose input	11	DI53	General-purpose input	37	DI65	General-purpose input	36	DI64	General-purpose input
14	DI56	General-purpose input	13	DI55	General-purpose input	39	DI67	General-purpose input	38	DI66	General-purpose input
16	–	Do not use.	15	DI57	General-purpose input	41	–	Do not use.	40	–	Do not use.
18	DO30	General-purpose output	17	–	Do not use.	43	DO40	General-purpose output	42	–	Do not use.
20	DO32	General-purpose output	19	DO31	General-purpose output	45	DO42	General-purpose output	44	DO41	General-purpose output
22	DO34	General-purpose output	21	DO33	General-purpose output	47	DO44	General-purpose output	46	DO43	General-purpose output
24	DO36	General-purpose output	23	DO35	General-purpose output	49	DO46	General-purpose output	48	DO45	General-purpose output
			25	DO37	General-purpose output				50	DO47	General-purpose output

1.6 Connector pin numbers

■ Figure when viewed in the cable connector soldering direction

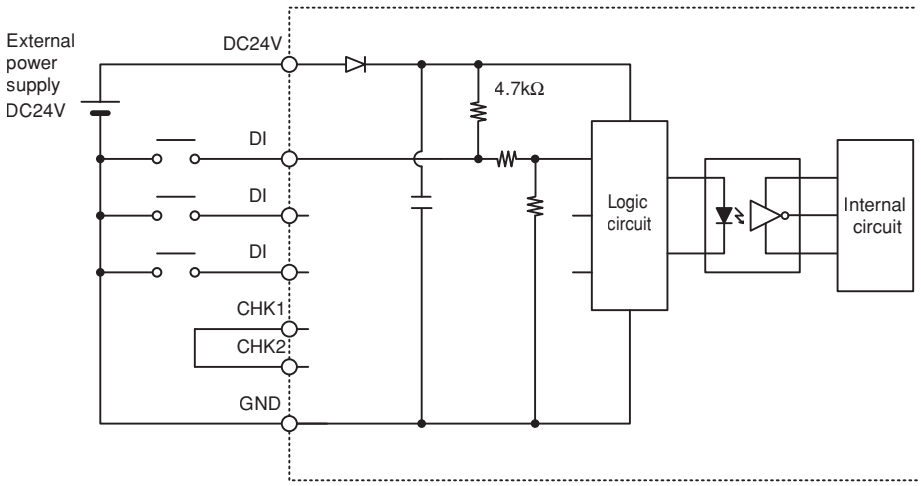


Connector shell type number	10350-52A0-008	SUMITOMO 3M
Connector plug type number	10150-3000PE	SUMITOMO 3M

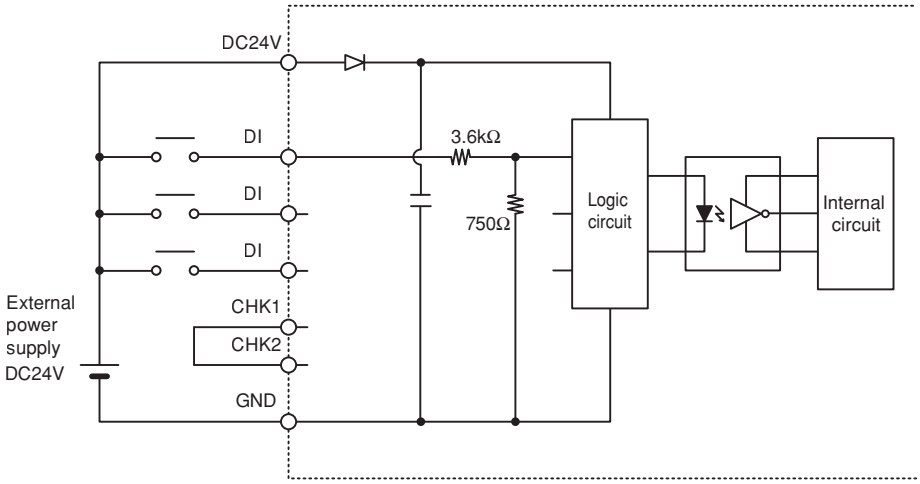
1.7 Typical input signal connection

For details regarding the definition of NPN and PNP specifications, refer to "7. I/O connections" in Chapter 3.

■ NPN specifications



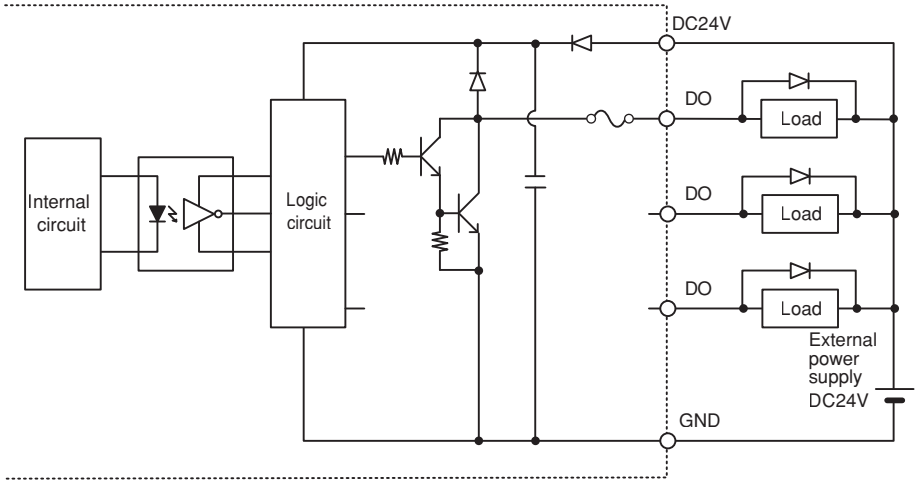
■ PNP specifications



1.8 Typical output signal connection

For details regarding the definition of NPN and PNP specifications, refer to "7. I/O connections" in Chapter 3.

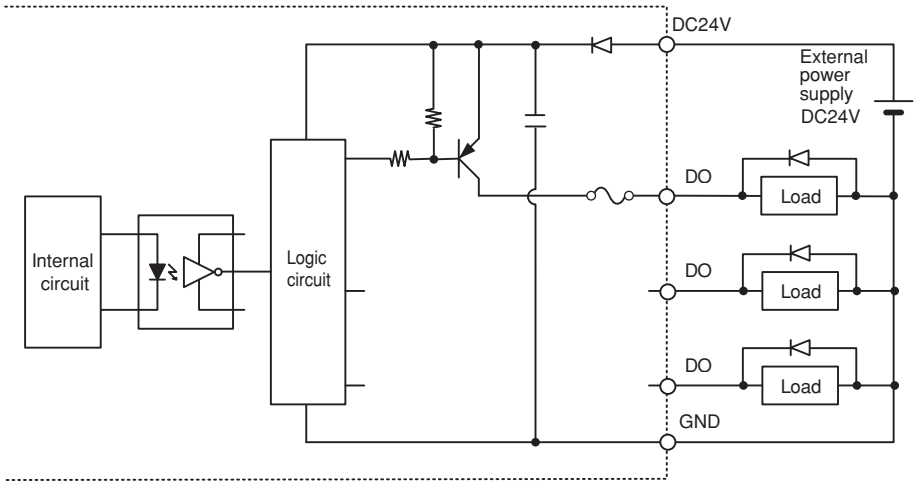
■ NPN specifications



CAUTION

- **In connecting an inductive load (solenoid, relay, etc.), connect a diode in parallel to the load as a surge killer.**
- **For the NPN specifications, do not short-circuit DO and 24 V DC. Otherwise, this may cause the circuit to break.**

■ PNP specifications



CAUTION

For the PNP specifications, do not short-circuit DO and GND. Otherwise, this may cause the circuit to break.

1.9 Dedicated input signal description

NOTE
- Do not input several dedicated inputs at the same time. When inputting continuously, make sure to provide an interval of 100 ms or more between input pulses.
- Keep 100 ms or more pulses for the pulse input signal width.
- The dedicated inputs are valid when the controller is in the AUTO mode and the control setting is "RELEASE".

1. DI01 Servo ON input (Pulse input signal)

DI01 is used to release the emergency stop status and turn the servo on.
When the DI01 contact is closed (ON), the servo turns on at the signal rise.

NOTE
- To use this function, it is necessary that no alarm occurs and the emergency stop input is closed.

2. DI06 Stop

DI06 is used to pause the program or robot operation during program execution or manual robot movement operation.
When the DI06 contact is open (OFF), the program and robot operation stop. Additionally, the program execution and manual robot movement operation cannot be performed in the DI06 contact open status.

WARNING
The stop signal is not a safety input. Therefore, do not use this signal for the safety purpose.
Even when the stop signal is turned on, the servo does not turn off.

3. DI10 Sequence control

DI10 is used to execute a sequence program.
When the DI10 contact is closed (ON), a sequence program is executed.
DO12 (Sequence program-in-progress) is output while a sequence program is executed.

NOTE
When an external 24 V power is not supplied to the parallel I/O board, the robot always enters the stop status.
The stop status is released when the parallel I/O board setting is "INVALID".

4. DI12 Automatic operation start

DI12 is used to start execution of the program.
When the DI12 contact is closed (ON) in AUTO mode, the robot program starts as the signal pulse is established. DO13 (Robot program-in-progress) is output when the robot program is executed.

CAUTION
When the program execution is stopped by a signal such as DI06 (Stop), the program re-executes the command that has stopped.

5. DI14 Return-to-origin (for INC axis)

DI14 is used to perform return-to-origin of the incremental type axis. For the incremental type axis, when return-to-origin is executed, the return-to-origin operation is performed.
When the DI14 contact is closed (ON), the axes will start returning to their origin positions at the rising edge of the signal pulse, in the return-to-origin sequence specified by parameter.
When there are no incremental type axis, "6.309: INC. motor disconnected" alarm occurs.
This input signal is only for the axes whose return-to-origin method is set to "SENSOR" or "TORQUE" (stroke end).

6. DI15 Program reset input

DI15 is used to reset the program.
When DI15 is input in the program execution stop status, the robot program is then reset.
At this point, all general-purpose outputs and dynamic variables (refer to the YRCX programming manual for details) are reset.
DO14 (Program reset status output) is output when the program is correctly reset.

7. DI16 Alarm reset input

DI16 is used to reset the alarm.
If an alarm occurs, remove the cause and execute this command to reset the alarm.

* Some alarms cannot be reset. In this case, shut down the control power and reset the alarm.

8. DI17 Return-to-origin (for ABS axis)

The operation may vary depending on the setting of the I/O parameter "DI17 mode".

1. When the "DI17 Mode" parameter is set to "ABS"

DI17 is used to perform return-to-origin dedicated to the absolute type axis.
When the DI17 contact is closed (ON), the axes will start returning to their origin positions at the signal, in the sequence specified by the parameter.
When there is no absolute type axis, "6.310: ABS. motor disconnected" alarm occurs. DI17 is intended only for the axis with the return-to-origin method set at "SENSOR" or "TORQUE" (stroke end). Absolute reset cannot be performed when return-to-origin is incomplete on axes whose return-to-origin method is set to "MARK".

2. When the "DI17 Mode" parameter is set to "ABS/ORG"

DI17 is used to perform return-to-origin commonly for the absolute type axis and incremental type axis.

1) Absolute type axis
For details about operation, refer to "1. When the 'DI17 Mode' parameter is set to 'ABS'" described above.

2) Incremental type axis
For details about operation, refer to "5. DI14 Return-to-origin (for INC axis)" described eralier in this section.
When the absolute type axis and incremental type axis are mixed, return-to-origin for the absolute type axis precedes for the incremental type axis.

CAUTION
In most cases, do not use this setting. Use this setting only when the return-to-origin signal must be input to DI17.

NOTE
The return-to-origin (for INC axis) and return-to-origin (for ABS axis) inputs do not execute the absolute reset for the axis with the mark method.

CAUTION
DI01, DI12, DI14, DI15, DI16 and DI17 inputs are invalid while the program is being executed. Input these signals only after the program is halted.

1.10 Dedicated output signal description

1. DO00 Emergency stop contact monitor

This signal monitors the status of Emergency stop ready input within SAFETY I/O signals. The signal turns on while Emergency stop ready input is OFF.

You won't clear the emergency stop status even if you operate to clear the status with Emergency stop ready input OFF.

2. DO01 CPU_OK

This is always on during normal controller operation. In the following cases this output turns off.

- Serious malfunction has occurred.
- When the power supply voltage has dropped to lower than the specified value.

If this signal is once turned off, turn the power supply on again.

3. DO02 Servo ON output

This output turns on when all the axes of the robot are in the servo on status.

4. DO03 Alarm

This output turns on in the following cases.

1) When the emergency stop input contact is open in the servo on status.

2) When a driver unit detects a serious malfunction such as an overload.

3) When the host CPU has stopped due to a serious abnormality or other causes.

4) When the battery is not connected.

When the alarm is on, the alarm number is displayed on the 7-segment LED on the front of the controller simultaneously. In the above cases, turn off the alarm as described below.

In the case of 1)
After closing the emergency stop input contact, turn on DI16 (alarm reset input) of the I/O interface.
The alarm can also be reset as the power is turned off, and then it is turned on again.

In the case of 2)
Turn on DI16 (alarm reset input) of the I/O interface to turn off the alarm. Additionally, when the alarm is reset from the programming box, the alarm is turned off.

* Some alarms cannot be reset. In this case, shut down the control power and reset the alarm.

In the case of 3)
Since the CPU has stopped, the alarm cannot be turned off and operation cannot be reset unless the power supply is turned on again. If the alarm remains on even after the power has been turned off and then turned back on, the controller needs to be replaced.

In the case of 4)
When a battery abnormality is detected, the alarm cannot be turned off until the power supply is turned on again. If the alarm remains on even after the power has been turned on again, check the battery connection or replace the battery as necessary.

5. DO10 AUTO mode output

DO10 is always on when the controller is in the AUTO mode and the control setting is "RELEASE".

6. DO11 Return-to-origin complete

DO11 is always on when return-to-origin is complete on all axes.

7. DO12 Sequence program-in-progress

DO12 is always on when the sequence program is being executed.

8. DO13 Robot program-in-progress

DO13 is always on when the robot program is being executed or when program instruction commands are executed individually.

9. DO14 Program reset status output

DO14 is always on when the robot program is in its reset status. DO14 turns off when robot program is executed.

10. DO15 Warning output

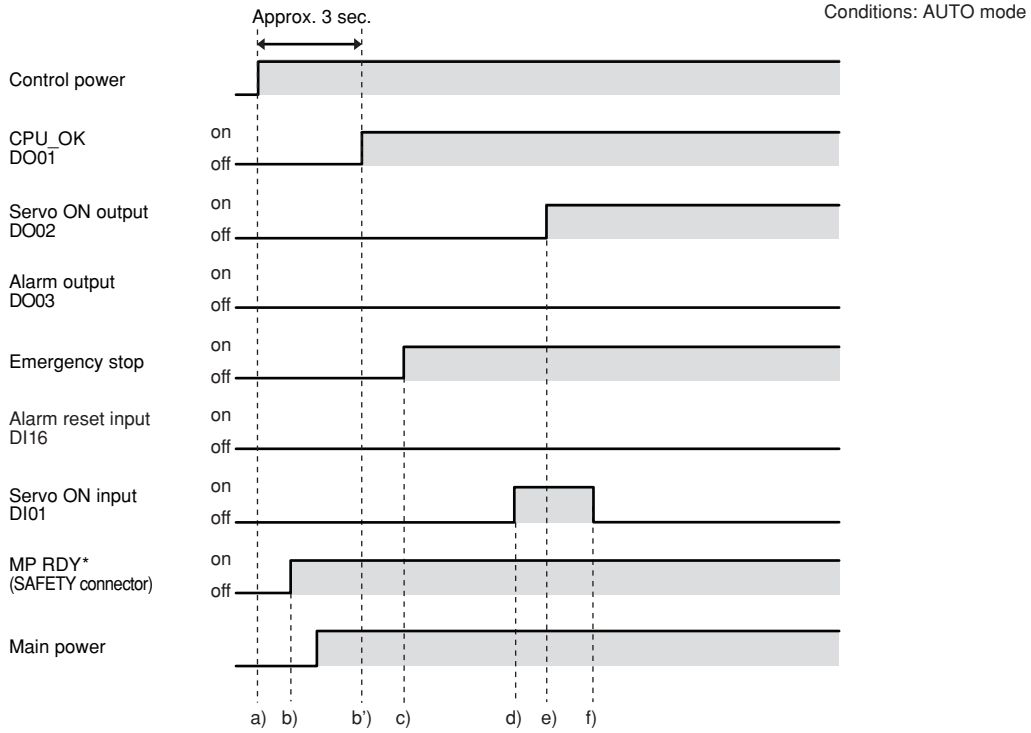
DO15 turns on if a warning occurs, for example, the controller detects the battery voltage drop.

NOTE
DO15 is for all warnings. Refer to "(c) Warning" in Troubleshooting (the appendix) for details.

1.11 Dedicated I/O signal timing chart

1.11.1 From the controller power on to servo on

From the controller power on to servo on



*For details on MP RDY signal, refer to Chapter 5, "SAFETY I/O interface".

CAUTION

It will take about 3 seconds until the CPU_OK output status is confirmed after the power is turned on.

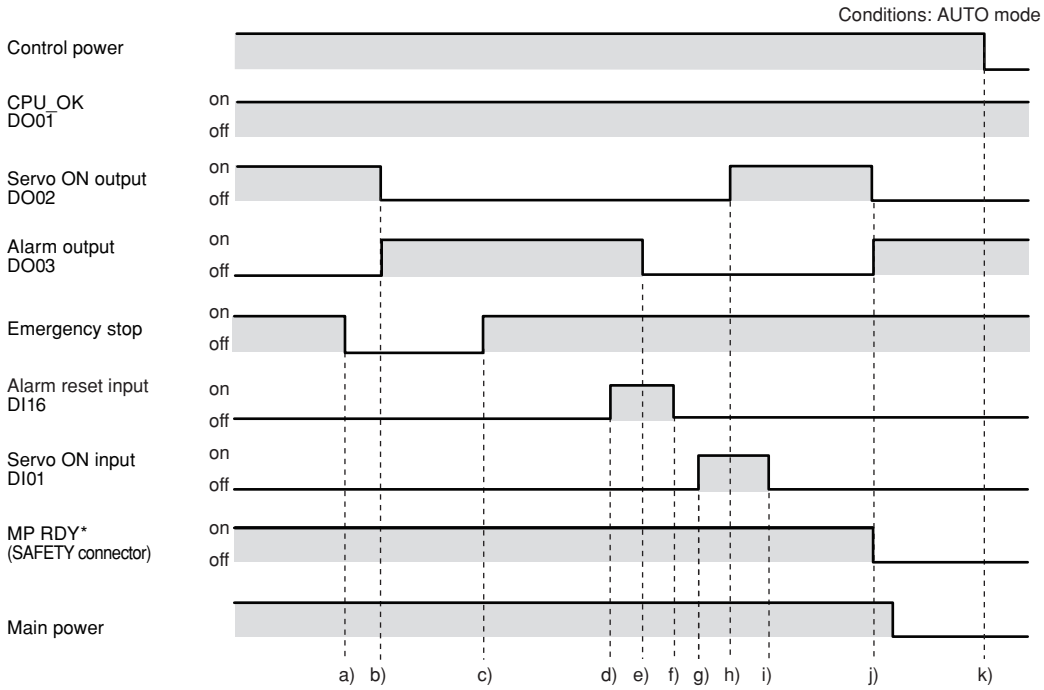
Initial servo on process after turning the power on

a) Control power turns on.
b) MP RDY output turns on. (Main power turns on after MP RDY output turns on.)
b') CPU_OK output turns on.
c) Emergency stop input turns on.
d) Servo ON input turns on.
e) Servo ON output turns on.
f) Servo ON input turns off after checking that servo ON output turns on.

* When processing with dedicated inputs, use I/O signals to perform handshake processing. If handshake processing is impossible, input a signal for 100 ms or more.
* An external circuit shall be constructed so that main power is supplied when MP RDY turns on.

1.11.2 Controller emergency stop and servo on reset

Emergency stop and servo on reset from servo on status



Emergency stop

a) Emergency stop input turns off.

b) Alarm output turns on and servo ON output turns off.

Shifting from emergency stop to servo on

c) Emergency stop input turns on.

d) Alarm reset input turns on.

e) Alarm output turns off.

f) Alarm reset input turns off after checking that the alarm output turns off.

g) Servo ON input turns on.

h) Servo ON output turns on.

i) Servo ON input turns off after checking that servo ON output turns on.

* When processing with dedicated inputs, use I/O signals to perform handshake processing. If handshake processing is impossible, input a signal for 100 ms or more.

Serious alarm occurring

j) Alarm output turns on, servo ON output turns off, and MP RDY output turns off.

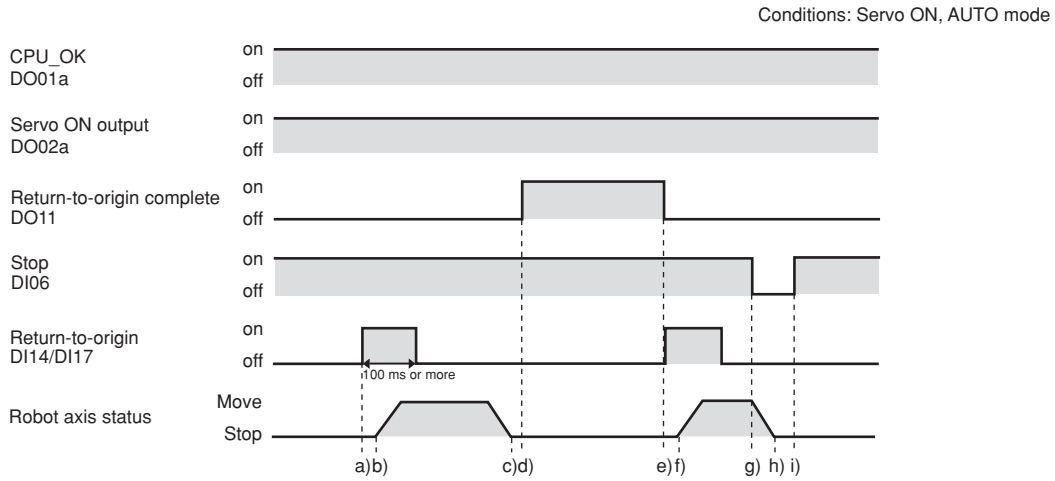
k) Control power turns off.

* If a serious alarm occurs (alarm classification number 900s), the alarm reset cannot be performed.

* An external circuit shall be constructed so that main power is shut down when MP RDY turns off.

1.11.3 Return-to-origin

Return-to-origin



Return-to-origin

a) Return-to-origin input turns on. (pulse width: 100 ms or more)

b) Robot axis starts moving to origin position.

c) Robot axis reaches origin position and stops moving.

d) Return-to-origin complete output turns on.

Stop during return-to-origin

e) Return-to-origin input turns on (pulse width: 100 ms or more) and return-to-origin complete output turns off.

f) Robot axis starts moving to origin position.

g) Stop input turns off.

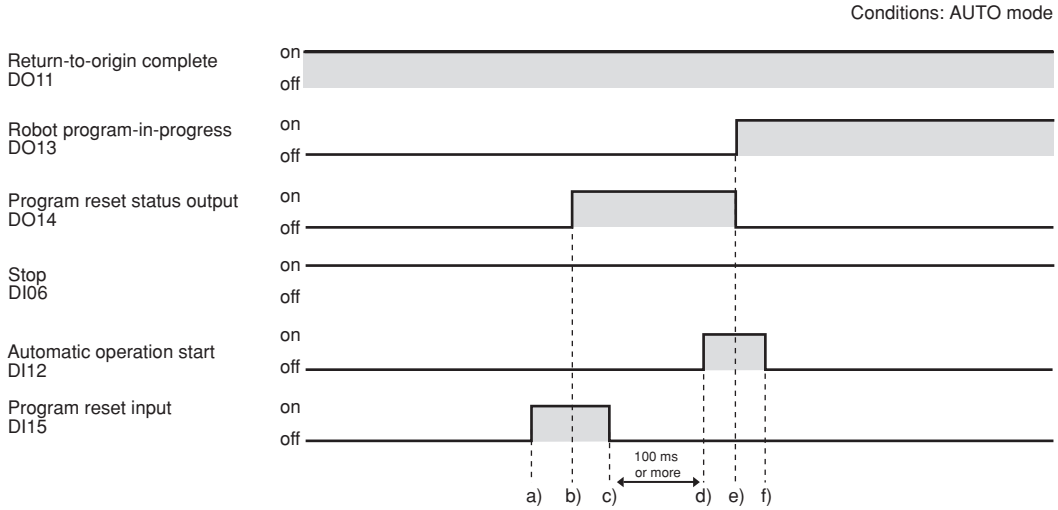
h) On-going robot axis movement stops.

i) Stop input turns on.

* When the return-to-origin complete output is on, return-to-origin does not have to be performed.
* Return-to-origin complete output keeps on until performing return-to-origin is required.
* Return-to-origin cannot be executed unless the robot is in the servo on status.
* When the return-to-origin input is on, the return-to-origin complete output is off.
* When turning on the controller with the incremental type axes, the robot enters the return-to-origin incomplete status. Therefore, the return-to-origin complete output turns off.
* When the robot consists of only the absolute type axes, it starts up in the return-to-origin complete output on status if the position information alarm does not occur at turning on the controller.
* When the "DI17 mode" parameter is set to "ABS/ORG", return-to-origin can also be performed with DI17. For description of DI14 and DI17, refer to "1.9 Dedicated input signal description" in this Chapter.

1.11.4 Program reset and program execution

■ Program reset and program execution



Program reset

a) Program reset input turns on.

b) Program reset status output turns on.

c) Program reset input turns off after checking program reset status output turns on.

Program execution

d) Automatic operation start input turns on.

e) Program reset status output turns off, and robot program-in-progress output turns on.

f) Automatic operation start input turns off after checking robot program-in-progress output turns on.

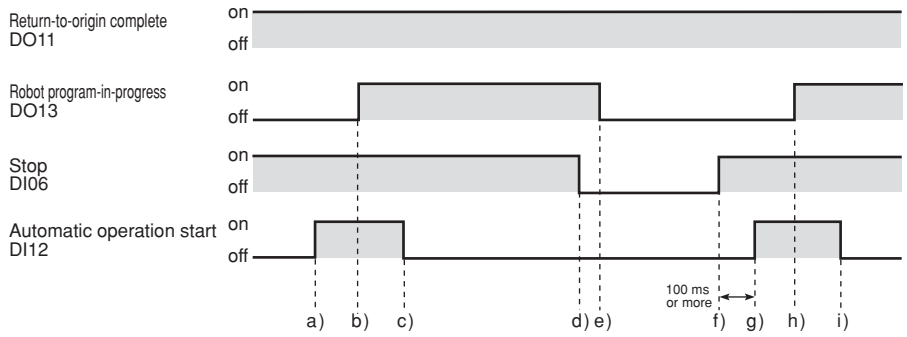
* Program cannot be executed when the emergency stop input and stop input are off.

* The AUTO mode input of the SAFETY connector is a function that is intended only for the controller with the CE specifications.

1.11.5 Stopping by program stop

Stopping by program stop

Conditions: AUTO mode



Program execution

a) Automatic operation start input turns on.

b) Robot program-in-progress output turns on.

c) Automatic operation start input turns off after checking that the robot program-in-progress output turns on.

Program stop process by stop input

d) Stop input turns off.

e) Robot program-in-progress output turns off.

Program execution process after program stop by stop input

f) Stop input turns on.

g) Automatic operation start input turns on.

h) Robot program-in-progress output turns on.

i) Automatic operation start input turns off after checking that the robot program-in-progress output turns on.

* Switching to emergency stop status will cause the program to stop. Alarm output turns on and the servo ON output turns off. It is required that the servo turns on to execute the program again.

WARNING

The stop signal is not a safety input. Therefore, do not use this signal for the safety purpose.
Even when the stop signal is turned on, the servo does not turn off.

CAUTION

If the program execution is stopped halfway by the stop input, it is executed again from the command that stops the program.
When the program execution is stopped during robot movement, the robot movement is started by executing the program again. Therefore, take great care when executing the program again.

1.12 General-purpose I/O signals

1.12.1 General-purpose input signals

The standard specifications provide 16 points in total, DI20 to DI27 and DI30 to DI37 while the expanded specifications provide 24 points in total, DI10 to DI17, DI20 to DI27, and DI30 to DI37.
These general-purpose inputs can be used arbitrarily. They can be connected to components such as push button switches and sensors. The input status of these can be read in the robot program or sequence program.

CAUTION

For input signals, input on/off signals with 6 ms or longer.

1.12.2 General-purpose output signals

The standard specifications provide 8 points in total, DO20 to DO27, while the expanded specifications provide 16 points in total, DO10 to DO17 and DO20 to DO27.
These general-purpose outputs can be used arbitrarily. The output status of these can be changed in the robot program or sequence program.

All output signals are initialized and turned off when the controller power is turned on.
Additionally, the area check outputs can be allocated to the general-purpose outputs.

1.12.3 General-purpose output signal reset (off)

All general-purpose output signals are reset (off) in the following cases.

- When "ALL RESET" is executed on the "AUTO OPE" screen.
- When the dedicated input signal DI15 (Program reset input) was turned on in AUTO mode while the program was stopped.
  (Refer to "1.9 Dedicated input signal description" in this Chapter.)
- When any of the following initialization is performed on the "INITIAL" screen ([System] → [Initialize]).
  1. ALL: All data
  2. PGM: Program data
- When the online commands @RESET, @INIT PGM, @INIT MEM, or @INIT ALL were executed.
- When the HALTALL statement was executed in the program.

2. Ratings

For details regarding the definition of NPN and PNP specifications, refer to "7. I/O connections" in Chapter 3.

2.1 Input

	NPN specifications	PNP specifications
Method	DC input (positive common type) Photo-coupler insulation method	DC input (negative common type) Photo-coupler insulation method
Input power	24 V DC ±10%, 5.1 mA/point	24 V DC ±10%, 5.5 mA/point
Load	ON voltage: 4.0 Vmax (4.2 mA)	ON voltage: 11.6 Vmin (2.7 mA)
	OFF voltage: 9.9 Vmin (3.0 mA)	OFF voltage: 4.6 Vmax (1.1 mA)
Response time	2 ms or longer, or 4 ms*1 or longer	2 ms or longer, or 4 ms*1 or longer

*1 When three or more optional I/O interface boards are installed.

2.2 Output

	NPN specifications	PNP specifications
Method	NPN open-collector (negative common type) Photo-coupler insulation method	PNP open-collector (positive common type) Photo-coupler insulation method
Load	24 V DC ±10%, 50 mA/point (resistance load)	24 V DC ±10%, 50 mA/point (resistance load)
Residual voltage	1.0V	1.0 V
Response time	2 ms or longer, or 4 ms*1 or longer	2 ms or longer, or 4 ms*1 or longer

*1 When three or more optional I/O interface boards are installed.

3. Caution items

1. When using a dual-lead proximity sensor as an input signal, check that the electrical specifications of the sensor output signal are within the input signal specifications of the controller. For example, if the residual voltage is large at turn on/off, this may cause malfunction.

2. Take noise countermeasures when using an inductive load such as a solenoid valve as an output load. For example, connect a diode (high-speed type) in parallel at both ends of a load, as a surge killer to protect against noise.

3. If a short occurs in the load or an excessive current flows, the over-current protective circuit shuts off the interface circuit. Once this circuit is activated, it may be required to replace parts in order to restore it to its previous state.
   Furthermore, be sure to perform the operation within the rated load, or heat generated inside may lead to burning damage.

4. As noise countermeasures, keep the machine power cables separate or make sure wires are well shielded.

5. When the controller main body is turned off, do not supply the external 24 V DC power to the I/O interface continuously. Otherwise, the controller may malfunction.

Chapter 5 SAFETY I/O interface

1. SAFETY I/O interface overview

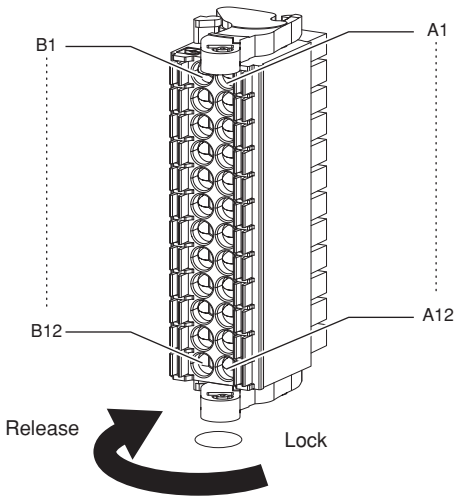
A SAFETY I/O interface is prepared to construct a robot safety circuit. Use the terminals to construct a safety circuit so that the system including the controller operates toward the safe side. Additionally, connect the I/O terminals correctly and effectively, and then start the operation after checking the operation of the safety circuit sufficiently.

Connector name	Connector type number	Wire thickness
SAFETY	DFMC 1,5/12-ST-3,5-LR BK 2BD Manufacturer: Phoenix Contact	AWG24-16

1.1 Power

The emergency stop input uses either the controller's internal power for emergency stop, or external 24 V power. Additionally, the AUTO mode input (valid only for the CE specifications) uses the external 24 V power.

1.2 Connector I/O signals



PIN	I/O No.	PIN	I/O No.	Name	Remarks
B1	E-STOP2+	A1	E-STOP1+	Internal power (+) for emergency stop	
B2	E-STOP21	A2	E-STOP11	Emergency stop contact output	
B3	E-STOP22	A3	E-STOP12		
B4	E-STOP RDY2	A4	E-STOP RDY1	Emergency stop ready input	+24 V/45 mA
B5	E-STOP COM2	A5	E-STOP COM1		
B6	E-STOP2-	A6	E-STOP1-	Internal power (-) for emergency stop	
B7	ENABLE2+	A7	ENABLE1+	Enable switch contact output	1 A/30 Vmax Valid only when PBEX is connected.
B8	ENABLE2-	A8	ENABLE1-		
B9	AUTO2+	A9	AUTO1+	AUTO mode input	7 mA at24 V Valid only for the CE specifications
B10	AUTO COM2	A10	AUTO COM1		
B11	MP RDY2+	A11	MP RDY1+	Motor power ready output	30 V DC/300 mAmax (MOS FET contact)
B12	MP RDY2-	A12	MP RDY1-		

The I/O signals have two systems; line A and line B of the connector.

CAUTION

- **Construct a physical emergency stop circuit so that the system including the controller operates toward the safe side.**
- **Do not connect any external power to "E-STOP+/-" of the internal power for the emergency stop. Additionally, do not use "E-STOP+/-" for a purpose other than the emergency stop.**

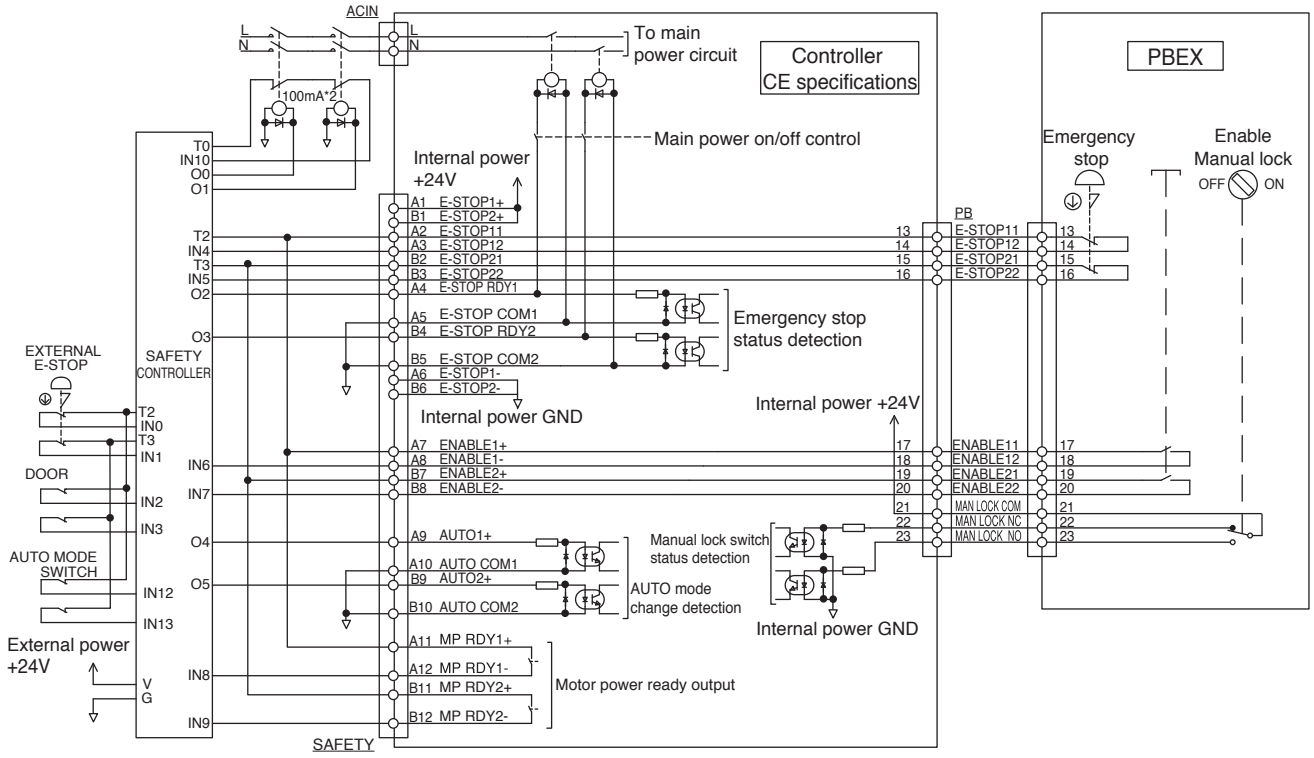
For details regarding the definition of NPN and PNP specifications, refer to "7. I/O connections" in Chapter 3.

1.3 Connection example combining the programming box with external emergency stop circuit

CAUTION

- **Construct an external emergency stop circuit so that the emergency stop function of the overall system including the controller operates securely.**
- **"E-STOPRDY*" needs a relay or photocoupler drive current of 45 mA or more.**

1.3.1 Connection example of controller with CE specifications and PBEX



■ Operation description

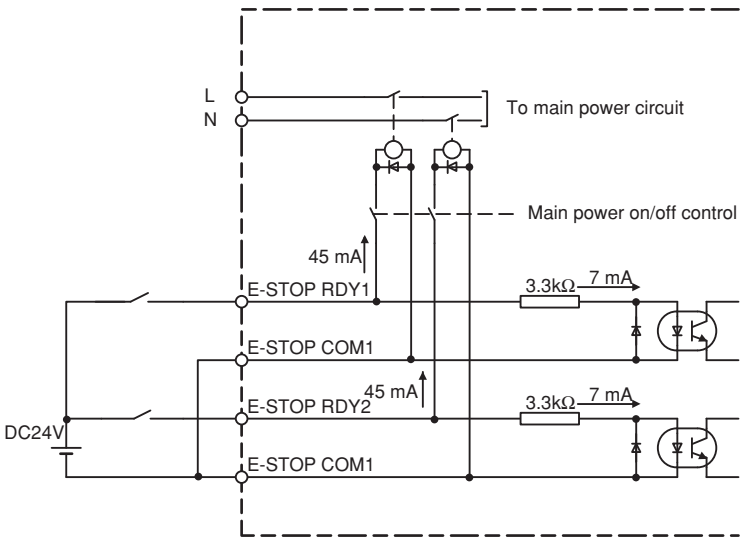
- This example does not use the internal power for the emergency stop. Use the external power and do not connect "E-STOP*+" and "E-STOP*-".
- The safety controller monitors the emergency stop and enable switch status of two systems. If any contact is open, the main power is shut down by the external contactor to put the robot in the emergency stop status.
- The safety controller operates the external main power according to the safety protection door open/close status, AUTO mode switch, and MP RDY* signal status of two systems. Additionally, the safety controller judges "E-STOP RDY*" and "AUTO*+" and outputs this judgment signal to the controller.
- To restart the external main power of the controller, it is necessary to input RESET to the safety controller.
- When the programming box and SAFETY connector are removed, the controller enters the emergency stop status.
- The following PB connector pins of the PB terminator supplied with the controller are short-circuited and the automatic operation is ready to start.

PB connector
13 pin - 14 pin
15 pin - 16 pin
17 pin - 18 pin
19 pin - 20 pin
21 pin - 22 pin

* For details about the CE specifications, refer to the "Safety standards application guide".

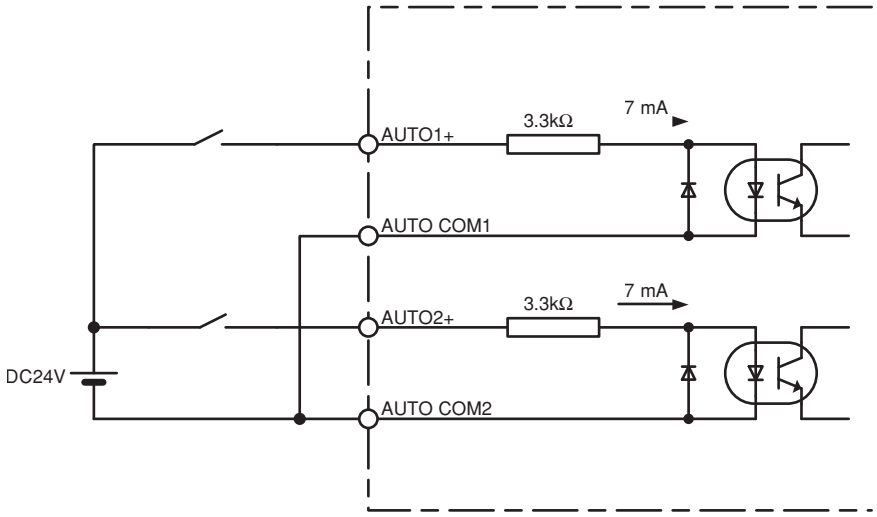
1.4 Connections example of dedicated input signal

1.4.1 Emergency stop inputs (E-STOP RDY*, E-STOP COM*)



The emergency stop inputs are used to construct a physical emergency stop circuit as a safety protection function of the overall system including the controller.
To operate the robot, the emergency stop input contact needs to be closed.
When the emergency stop input contact is closed (ON), the servo power can be turned on. When any emergency stop input contact is open (OFF), the servo power cannot be turned on.
To drive the internal power relay that is connected in parallel, E-STOP RDY*/E-STOP COM* needs 45-mA current.

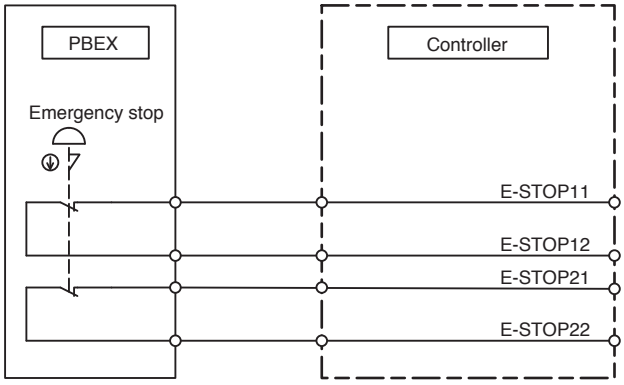
1.4.2 AUTO mode inputs (AUTO*+, AUTO COM*)



The AUTO mode inputs are valid only for the controller with the CE specifications.
They can change the external safety circuit of the controller to the AUTO mode and inform that the robot is in the automatic operation ready status. When either AUTO mode input turns off, the controller changes to the MANUAL mode. For the controller with the standard specifications, the operation mode can be changed only from the manual lock switch on the programming box.

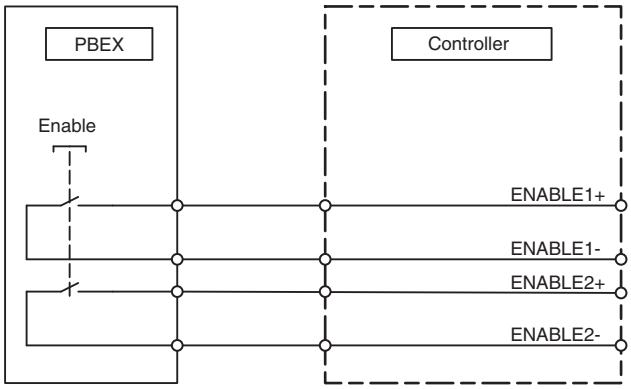
1.5 Connection example of dedicated output signal

1.5.1 Emergency stop contact outputs (E-STOP*1, E-STOP*2)



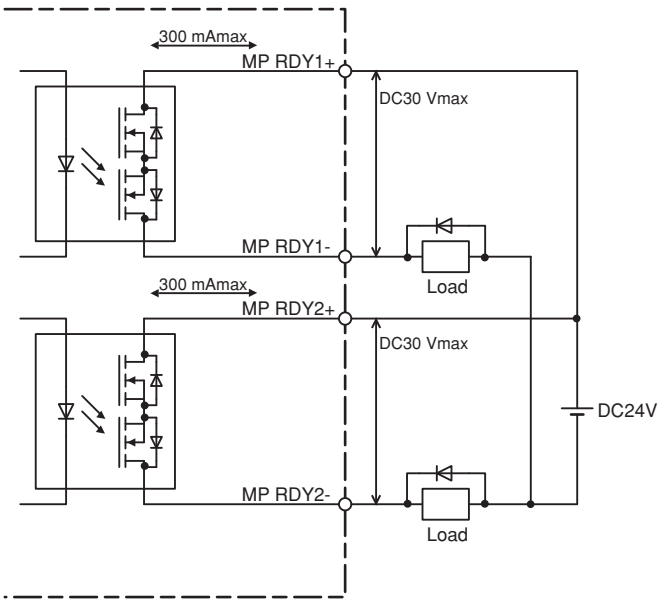
The emergency stop contact outputs are used to construct a physical emergency stop circuit as a safety protection function of the system including the controller. To operate the robot, the contact needs to be closed. The emergency stop switch contacts are connected to that of the programming box.

1.5.2 Enable switch contact outputs (ENABLE*1, ENABLE*2)



The enable switch contact outputs are connected to the enable switch contacts of the programming box. Three-position enable switch status is informed to the external system as a safety protection function of the system including the controller.
Construct an external system so that it monitors the enable switch status (always on) in the MANUAL mode to permit the main power supply to the controller.

1.5.3 Motor power ready outputs (MP RDY*+, MP RDY*-)



This signal turns on when the controller can receive the external main power supply. When this signal turns on, this means that the servo on operation can be performed by supplying the main power and operating the servo on input signal.
If a serious alarm (alarm classification number 900s) that needs to turn off the power and turn it on again so as to reset the alarm, turn off the motor power ready output. This signal is connected to the PLC or external device and used to judge the main power supply on/off conditions.
The output current is up to 300 mA.

Chapter 6 External communication interface

1. Overview

1.1 Communication overview

To perform the communication between the controller and external device, a communication port (RS-232C interface or Ethernet interface) is used to directly send the robot communication command (SEND command) or send the command through the communication port.
As these communications are used individually or together, the robot is applicable to applications using an external communication.

1. Robot language command (SEND command) is used.

Example: SEND A TO CMU ... Sends the value of variable A to an external device through the RS-232C port.
SEND CMU TO P100 ... Receives the point data P100 through the RS-232C port.
SEND ETH TO ALL ... Receives the memory data of all systems through the Ethernet port.

The controller sends or receives the data corresponding to these commands.

* When using the RS-232C port and Ethernet port, specify "CMU" and "ETH", respectively.

2. Various commands are directly sent from the external device through the communication port.

These commands are called "online commands".
When using this function, a part of the controller operation can be performed from an external device.

Example: @RUN ... Executes the program.
@READ PNT ... Reads out all of point data.
@MOVE P,P123,SPEED=30... Moves the robot 1 to point 123 at 30%-speed.

NOTE
All online commands can be used only when the controller is in the AUTO mode and the control authority is released externally.
When the controller is not in the AUTO mode, some commands, such as "@MOVE", cannot be executed.

1.2 ONLINE and OFFLINE modes

The controller provides two communication modes, ONLINE mode and OFFLINE mode.

1. OFFLINE mode

In OFFLINE mode, the communication between the robot and external device is executed with SEND commands in the program.
When using the RS-232C port and Ethernet port, specify "CMU" and "ETH", respectively.

• SEND command (robot → external device)

```
SEND <source file> TO CMU
SEND <source file> TO ETH
```

• SEND command (external device → robot)

```
SEND CMU TO <destination file>
SEND ETH TO <destination file>
```

2. ONLINE mode

In ONLINE mode, commands can be directly sent to the robot from the external device.
Commands to be sent directly from the external device are called "online commands".
The SEND command in the robot program is valid even in ONLINE mode.
To set ONLINE mode, select "ONLINE" as a communication parameter. The ONLINE statement in the program can also be used to set ONLINE mode.

• ONLINE command format

```
@ [_] <online command> [<_command option>] <termination code>
```

[ ] shows optional arguments.

@..... Start code (=40h)

_ ..... Blank

<online command>..... Refer to the YRCX programming manual.

<command option> ..... Refer to the YRCX programming manual.

<termination code> ..... CRLF(= 0Dh + 0Ah) code

- Robot control commands start with the start code "@"(=40h) and are executed by sending a statement that the termination code CRLF ((= 0Dh +0Ah) code) is put at its end. As exceptions, the control codes, such as "^C" or "^V", do not need the start code and termination code.
- One line consists of up to 255 characters except for the termination code ((CRLF(= 0Dh + 0Ah) code).
- The communication command consists of <online command> and <command option> parts. Some commands have no <command option> part or multiple <command option> parts.
- Character codes to be used are JIS8 unit system codes (KATAKANA characters are added to the ASCII codes). For details about the character code table, refer to "1.3 Character code" in this Chapter.
- One or more space must be put between the <online command> and <command option> parts.
- The <command option> part is specified by the user. Check the details of each communication command, and then input appropriate data.

NOTE

- In OFFLINE mode, online commands from external devices cannot be received.
- When using online commands, be sure to switch to ONLINE mode.
- In the OFFLINE mode, the controller cannot be connected from the support software "SCARA-YRCX Studio". Therefore, when connecting the controller using the support software, be sure to put the controller in the ONLINE mode.

1.3 Character code

HEX.	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0			SP	0	@	P		p				―	タ	ミ		
-1		XON	!	1	A	Q	a	q			。	ア	チ	ム		
-2			"	2	B	R	b	r			「	イ	ツ	メ		
-3	STOP	XOFF	#	3	C	S	c	s			」	ウ	テ	モ		
-4			$	4	D	T	d	t			、	エ	ト	ヤ		
-5			%	5	E	U	e	u			・	オ	ナ	ユ		
-6			&	6	F	V	f	v			ヲ	カ	ニ	ヨ		
-7			'	7	G	W	g	w			ァ	キ	ヌ	ラ		
-8	BS		(	8	H	X	h	x			ィ	ク	ネ	リ		
-9	TAB		)	9	I	Y	i	y			ゥ	ケ	ノ	ル		
-A	LF	EOF	*	:	J	Z	j	z			ェ	コ	ハ	レ		
-B			+	;	K	[	k	{			ォ	サ	ヒ	ロ		
-C			,	<	L	¥	l	|			ャ	シ	フ	ワ		
-D	CR		-	=	M	]	m	}			ュ	ス	ヘ	ン		
-E			.	>	N	^	n	~			ョ	セ	ホ	"		
-F			/	?	O		o				ッ	ソ	マ	。		

Note 1: The above character codes are written in hexadecimal.

Note 2: SP indicates a blank space.

Note 3: Only capital letters can be used for robot language.
Small letters are used for program comments and so on.
However, these cannot be input on the programming box.

Note 4: BS deletes the preceding character in the receive buffer.

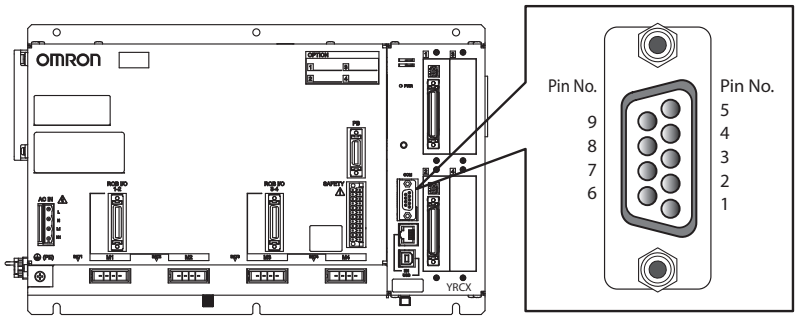
Note 5: TAB is replaced with one space.

2. RS-232C

2.1 Connectors and cables

The RS-232C interface connector is located on the front panel of the robot controller as shown below.

RS-232C interface



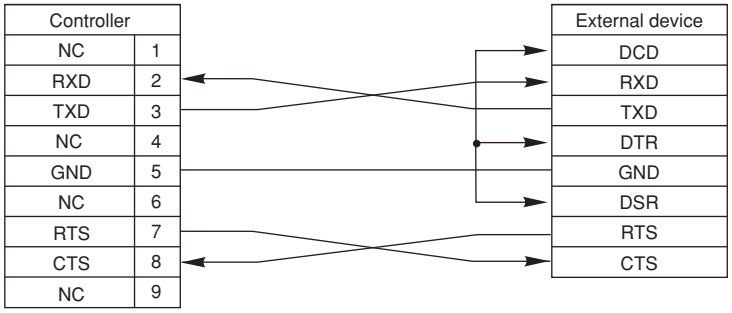
Pin No.	Name	Description	I/O
1	NC	Not used	
2	RXD	Receive data	Input
3	TXD	Send data	Output
4	NC	Not used	
5	GND	GND	
6	NC	Not used	
7	RTS	Request to send	Output
8	CTS	Permission to send	Input
9	NC	Not used	

NOTE

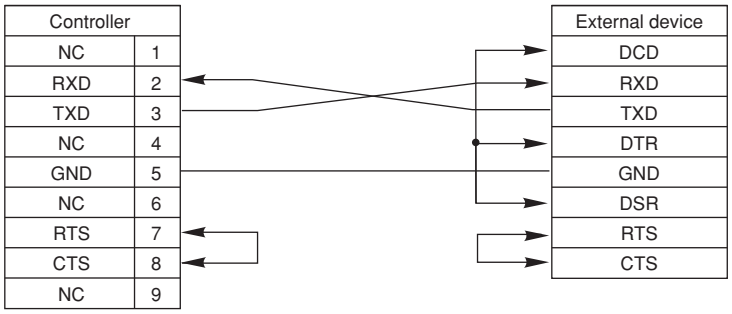
The controller connector is a 9-pin D-Sub female type. Use male type for the connection cable.

■ Cable wiring for connections

a. Cable of hardware busy control



b. Cable without using control wires



* When arranging signal wiring on an external device, be sure to refer to the manufacturers manual.

2.2 Communication specifications

Transmission mode	Full duplex
Synchronous system	Start-stop synchronization
Baud rate [bps]	4800, 9600, [19200], 38400, 57600, 115200
Character length [bit]	7, [8]
Stop bit [bit]	[1], 2
Parity	None, [odd], even
Termination code	CR, [CRLF]
Flow control	None, [XON/XOFF], RTC/CTS
Receive buffer	1024 bytes
Transmit buffer	1024 bytes

Numbers or items in [ ] indicate the initial setting.

NOTE

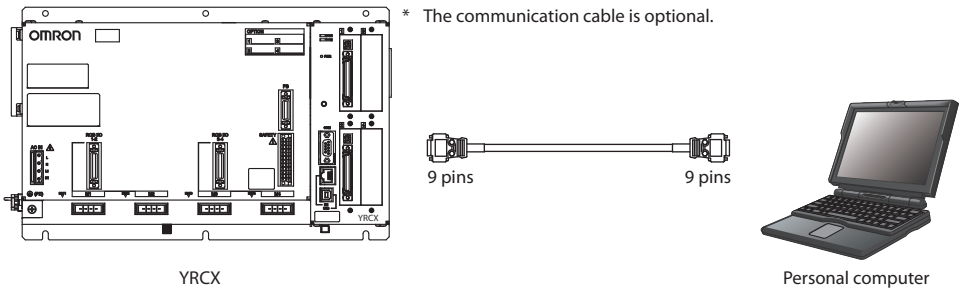
1) Termination code
   - **Robot transmit**
     When CRLF (carriage return + line feed) is selected:
     Transmits data with a CR code (0xDH) and LF code (0xAH) added at the end of a line.
     When CR (carriage return) is selected:
     Transmits data with a CR code (0xDH) added at the end of a line.
   - **Robot receive**
     Receives data by treating entries made up to the CR code as 1 line and ignoring the LF code, regardless of which termination code is selected.
2) If the "Display language" parameter is set to "JAPANESE" in SYSTEM mode, then set the character length to 8 bits. Katakana letters (Japanese phonetic) cannot be output from the communication port if set to 7 bits.

2.3 Connections

The following are examples of connecting to a personal computer using the OMRON communication cable.

1. Using the PC's COM port

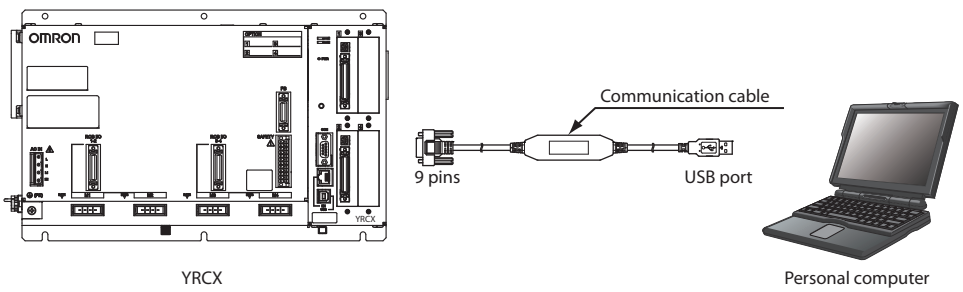
COM port



Communication cable	Length	Cable type number.
9 pins ↔ 9 pins	5 m	R6YACCC005

2. Using the PC's USB port

USB port



Communication cable	Length	Cable type number.
9 pins ↔ USB Port	5 m	R6YACUSB005

2.4 Communication parameter setting

Parameters and communication mode related to the communication that uses the RS-232C interface are set. There are seven communication parameters.

Communication parameter set values

	Item name	Set value	Initial value	Remarks
1	LINE	ONLINE, OFFLINE	ONLINE	Sets the mode of the communication with the computer (ONLINE/ OFFLINE). The online command can be executed only in the ONLINE mode.
2	Baud Rate	9600, 19200, 38400, 57600, 115200	19200	Sets the communication speed. When the communication speed is set at a high speed, the communication error occurs easily. If the error occurs frequently, set the communication speed to a low speed.
3	Length	7, 8	8	Sets the data bit length. When the data bit length is set at "7 bits", KATAKANA characters cannot be sent.
4	Stop Bits	1, 2	1	Sets the stop bit length. If the communication error occurs frequently, set the stop bit length to "2 bits".
5	Parity	0: None, 1: Odd 2: Even	1	Sets the parity check. Use the parity check as much as possible.
6	Flow	0: None 1: Xon/Xoff 2: RTS/CTS	1	Sets whether or not the data flow control using the XON/XOFF code or RTS/CTS signal is performed. When the data flow control is not performed, data missing may occur. So, set the data flow control as much as possible.
7	Eof	0:CRLF 1:CR	0	Sets the line feed code.

■ Setting the communication mode and parameters

Step 1 *Select [System] - [Communication Setting] from the initial screen.*

Step 2 *Set the communication mode.*
Press the F2 (ONLINE) or F3 (OFFLINE) key on the "RS-232C" screen to change the setting to (ONLINE) or (OFFLINE).

Step 3 *Set the communication parameters.*
Use the cursor keys to select the set value to edit, input a numeric value, and then press the ENTER key.
To set the data, press the ENTER key until the cursor selects the numeric value in (Baud Rate).

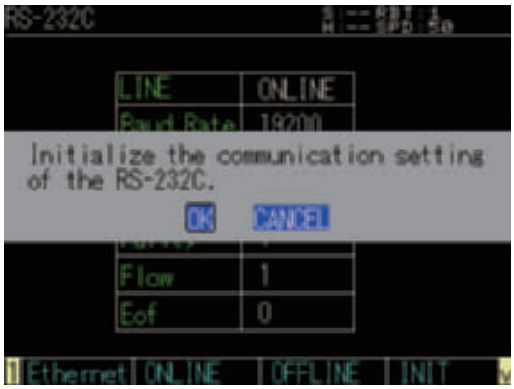
* When pressing the ESC key halfway, the edited contents are canceled.

* Pressing the F4 key (INIT) initializes the communication parameters.

Step 4 *Press the ESC key to exit the data editing.*

▶ **Step 1** Setting the RS-232C communication mode and parameters

Parameter initialization



NOTE
When using offline commands or connecting to the controller by support software, be sure to set the mode to the ONLINE mode.

2.5 Communication flow control

Software flow control (XON/XOFF) and hardware flow control (RTS/CTS) can be set.

2.5.1 Flow control during transmit

Flow Control	Description
0: None	XON (11H) and XOFF (13H) do not affect transmission even when they are received. Stops transmission while CTS is OFF.
1: XON/XOFF	Temporarily stops transmission when XOFF is sent from the other party. Resumes transmission when XON is sent.
2: RTS/CTS	Stops transmission while CTS is OFF.

NOTE

1. Transmission stops when transmission is invalid in either of XON/XOFF or RTS/CTS flow control.
2. CTS must be on during transmission regardless of flow control When RTS/CTS is set to "None", the CTS should always be set on. However, if CTS is connected to RTS of the other party, CTS may not always be on causing the transmission to halt, depending on the other party specifications.

2.5.2 Flow control during receive

To prevent overflow when receiving data, XON/XOFF and RTS are used to notify the other party whether or not it is possible to receive data.

Flow Control	Description
0: None	XON and XOFF are not transmitted. XON and XOFF are ignored if received. RTS is always on.
1: XON/XOFF	Transmits XOFF when available space in receive buffer falls below a certain capacity. Transmits XON when receive buffer is empty.
2: RTS/CTS	Turns RTS off when available space in receive buffer falls below a certain capacity. Turns RTS on when receive buffer is empty.

NOTE

"XON/XOFF" and "RTS/CTS" operate individually. For example, when all flow controls are set valid, XOFF is sent and RTS is turned off if the free space of the receive buffer becomes insufficient. After that, when the free space of the receive buffer is recovered, XON is sent and RTS is turned on.

2.6 Other caution items

1) The controller allows receiving data as long as the receive buffer has capacity.
The receive buffer is cleared in the following cases.

- When the power was turned off and turned back on.
- When the program was reset.
- When an ONLINE CMU statement or OFFLINE CMU statement was executed according to the robot language.
- When the communication parameter was changed or the initialization was executed.

2) Turning on an external device might sent incorrect data to the robot controller which is readying to receive data when the power is turned on. That incorrect data might then be stored in the receive buffer if the controller is turned on prior to the external device and cause communication errors. In such a case, clear the buffer.

3) When the external device does not support the flow control, the data processing speed becomes slower than the communication speed. In this case, take countermeasures such as reducing the communication speed (baud rate).

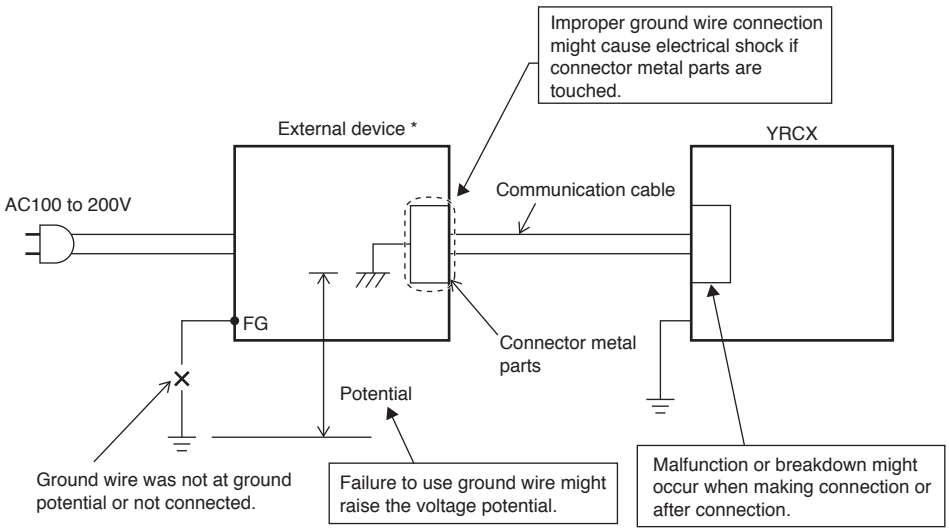
4) When the communication speed is set at a high rate, communication errors may occur due to external noise. In this case, take countermeasures such as reducing the communication speed.

5) "0.5: Busy" alarm occurs if the command transmitted from the external device cannot be executed such as during point trace execution. After the execution has been completed, retransmit the command from the external device.

6) Electrical shock, malfunction, or breakdown of the controller or external device may occur depending on the external device specifications and usage conditions.
Always comply with the following points when connecting an external device.

1. When the external device has a ground wire, be sure to ground it properly.
2. If using an external device that does not have a ground wire, check whether or not its structure is designed to protect from electrical shock. Be sure to use an external device that is designed to protect from electrical shocks.

Example problems caused by poor connections



* External device: Notebook computer using an AC adapter, etc.

3. Ethernet

■ Features of Ethernet

The YRCX controller adopts the TCP/IP protocol. Therefore, the YRCX controller can exchange the data with a TCP/IP protocol built-in device.

CAUTION

Connect the Ethernet port of the YRCX only to another controller or personal computer, and do not connect this port to the public telephone line.

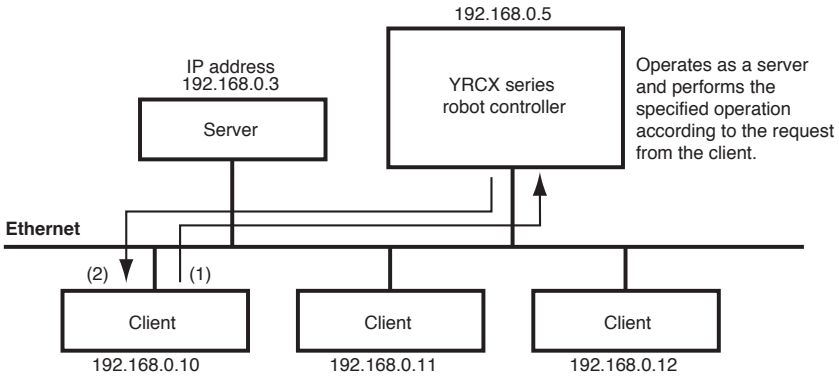
- As the 100BASE-TX specifications are adopted, cables to be used are UTP cables (shield-less twist pair cable) or STP cables (shielded twist pair cable).
- Multiple controllers can be connected to the same network and all of the information can be controlled from the specific personal computer.
- Since the robot controller operates as a TELNET (socket) server, you can easily access the robot controller from the TELNET terminal, such as a personal computer. (For details about how to install TELNET of the personal computer, refer to the manual for relevant product.)

For details about other device, such as network setting on the personal computer, also refer to the manual for relevant product. Furthermore, for details about robot programming, refer to the YRCX programming manual.

* Ethernet is a registered trademark of Xerox in the United States.

■ Communication mechanism

TCP/IP can identify each device uniquely by assigning the number unique to each device called "IP address" to each device connected to the network.
Therefore, the connection process is performed first by specifying the IP address of a robot controller to be communicated with, and then is disconnected after exchanging the data.
At this time, the controller operates as a server, monitors the connection request from the client (mating device, such as personal computer), and performs the specified operation according to the request from the client.



Device such as a personal computer becomes a client and connects to the server to give the instruction so as to perform a specified operation.

(1) The connection process is performed by specifying the IP address of a robot controller to be communicated with. (Above example shows the client 192.168.0.10 has specified the robot controller 192.168.0.5 and made a connection.)

(2) After making the connection, the robot controller runs a specific series of actions according to instructions from the client.

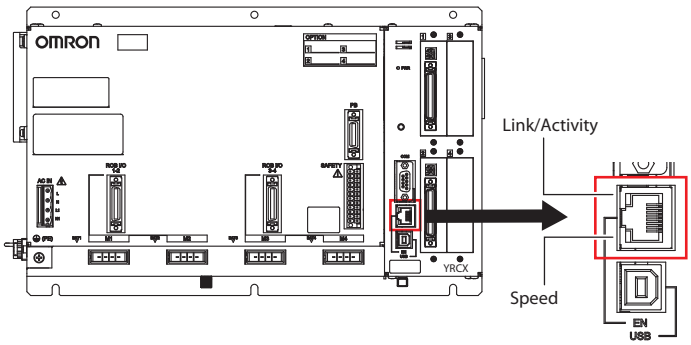
NOTE

During multitasking by the client, one client can connect to multiple robot controllers at the same time.
Only one client can make a simultaneous connection to one robot controller unit.
The IP address or subnet mask is set from the programming box.

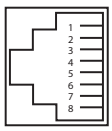
3.1 Connectors and cables

The Ethernet interface is located at the position shown in the figure below.

Ethernet interface



Modular connector



Pin number	Signal name
1	TD+
2	TD-
3	RD+
4	Not use
5	Not use
6	RD-
7	Not use
8	Not use

*Pin numbers 4, 5, 7, and 8 are not used.

The Ethernet cable is standardized in ANSI/TIA/EIA568A. To avoid misconnection or malfunction, be sure to use a cable that complies with this standard. Additionally, 100BASE-TX needs transmission characteristics category 5 or higher.

■ Straight cable

This cable is used to connect the robot controller or mating device to the hub.
For devices applicable to Auto MDI/MDI-X, the straight cable can be used when the controller and mating device are connected directly.

T-568A pin assignments

Signal name	Wiring color	Pin number
TD+	Green/white	1
TD-	Green	2
RD+	Orange/white	3
Not use	Blue	4
Not use	Blue/white	5
RD-	Orange	6
Not use	Brown/white	7
Not use	Brown	8

T-568A pin assignments

Pin number	Wiring color	Signal name
1	Green/white	TD+
2	Green	TD-
3	Orange/white	RD+
4	Blue	Not use
5	Blue/white	Not use
6	Orange	RD-
7	Brown/white	Not use
8	Brown	Not use

* 100BASE-TX does not use the wiring of 4, 5, 7, and 8 pins.
* There is a straight cable with T-568B pin assignments wired.

■ Cross cable

This cable is used to directly connect the robot controller and mating device. Additionally, when the hub does not have any cascade port, this cable is used for the cascade connection of the hub.

T-568A pin assignments

Signal name	Wiring color	Pin number
TD+	Green/white	1
TD-	Green	2
RD+	Orange/white	3
Not use	Blue	4
Not use	Blue/white	5
RD-	Orange	6
Not use	Brown/white	7
Not use	Brown	8

T-568A pin assignments

Pin number	Wiring color	Signal name
1	Orange/white	TD+
2	Orange	TD-
3	Green/white	RD+
4	Blue	Not use
5	Blue/white	Not use
6	Green	RD-
7	Brown/white	Not use
8	Brown	Not use

* 100BASE-TX does not use the wiring of 4, 5, 7, and 8 pins.

3.2 Communication specifications

Specification item \ Type	Ethernet applicable unit
Network specifications	In conformity with Ethernet (IEEE802.3)
Communication speed	100 Mbps (100BASE-TX)
Connector specifications	RJ-45 connector (8 modular connectors)
Cable specifications	UTP cable (non-shielded twist pair cable) or STP cable (shielded twist pair cable) applicable to category 5 or higher
Maximum cable length	100 m (between hub and controller)
Communication mode	Full duplex
Network protocol	Application layer : TELNET Transport layer : TCP Network layer : IP, ICMP, ARP Data link layer : CSMA/CD Physical layer : 100BASE-TX
Number of simultaneous log-in cycles	1
IP address setting	Setting is made from the programming box or support software "SCARA-YRCX Studio".
Monitor LED	Link/Activity, Speed
IP address initial value	192.168.0.2
Subnet mask initial value	255.255.255.0
Default gateway initial value	192.168.0.254

CAUTION

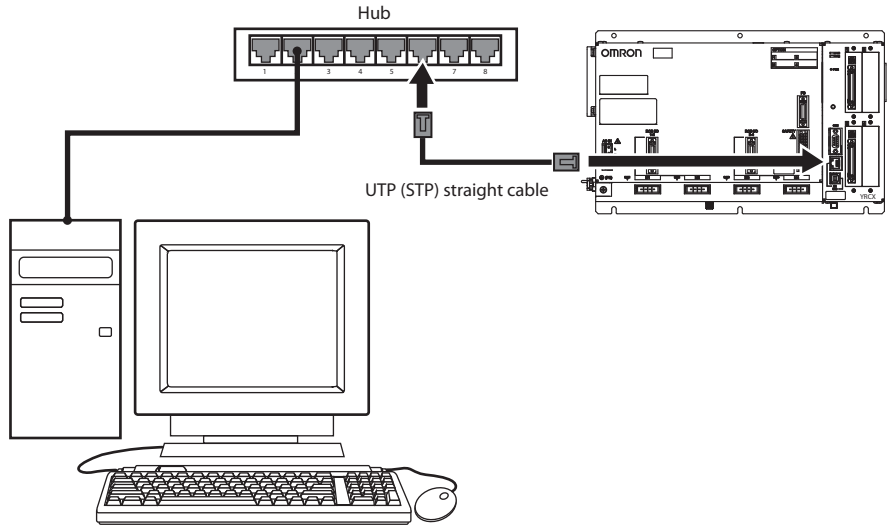
OMRON uses FL HUB (PHOENIX CONTACT) for the operation check. When incorporating a system, it is recommended to use this hub. It is not assumed to use general consumer hubs at factory. Such hubs may have low noise immunity.

NOTE

Refer to the SCARA-YRCX Studio manual for details on how to set the IP address.

3.3 Connections

The UTP cable (non-shielded twist pair cable) or STP cable (shielded twist pair cable) applicable to category 5 or higher is used for the connections. The wiring type uses the straight type.
To make the connections, insert the modular jack of the cable into the modular connector of the controller until a click sounds. In the same manner, insert also the modular jack into the modular connector of the hub.



CAUTION

OMRON uses FL HUB (PHOENIX CONTACT) for the operation check. When incorporating a system, it is recommended to use this hub.
It is not assumed to use general consumer hubs at factory. Such hubs may have low noise immunity. Therefore, note that OMRON does not warrant the operation of a hub other than that specified above.
Be sure to connect a hub with high noise immunity to the controller.

CAUTION

The maximum cable length between the hub and controller is 100 m.
When making the connections, be sure to refer to the manuals for mating device (personal computer, etc.) or peripheral device (hub, etc.).
Set it to "100 Mbps/Full duplex" when the communication mode of the hub can be set manually.

NOTE

To connect to the mating device, it is recommended to make connections using the straight cable through the hub. It is also possible to directly connect to the mating device using the cross cable without using the hub. In this case, the communication may not be performed depending on the LAN adapter of the mating device.

3.4 Parameter setting on controller (server)

It is necessary for the controller to set the IP address, subnet mask, and gateway port number. These settings are performed from the programming box.

Communication parameter set values on controller (server)

	Item name	Initial value	Remarks
1	LINE	ONLINE	Set value: ONLINE, OFFLINE Sets the communication mode with the computer (ONLINE/OFFLINE). The online command can be executed only in the ONLINE mode.
2	IP Address	192.168.0.2	Sets the IP address. This IP address is a number unique to each device that is assigned to identify multiple devices connected to the network. Therefore, set and control the IP address so that it is not duplicated with that of other device.
3	Subnet Mask	255.255.255.0	Selects the subnet mask. The subnet mask is used to finely separate the network.
4	Default Gateway	192.168.0.254	Sets the gateway. Actually, specify the IP address of the router. This router is a device that relays the information from a certain network to others when there are multiple networks.
5	PORT*	23 (TELNET port)	Sets the TCP port number of the controller. Specify the port number that is set here together with the IP address when the client connects to the robot controller.

*If a setting other than TELNET port (23) is made, the negotiation using the TELNET protocol is not attempted.
(The communication becomes the simple socket communication.)
*When changing the port, it is recommended to use a port number other than "Well-Known Port (0 to 1023)".

CAUTION

When connecting the robot controller to the existing network, be sure to check with the network administrator regarding the settings, such as IP address, subnet mask, and gateway.

NOTE

The IP address is separated into network address and host address sections. The network address section is extracted from the IP address by AND processing with the subnet mask. The remaining portion is the host address section. Devices belonging to the same network must all be set to have the same network address. The host address, however, should be different for every device and set so that no two devices have the same number. The first and the last host address numbers are reserved for the system so be sure not to set these as the IP address.
When the IP address, for example, is 192.168.0.10 and the subnet mask is 255.255.255.0, the network address section is found to be 192.168.0 and the host address section to be 10 by means of AND processing with the subnet mask. In this case, the network address section of all other devices belonging to that network must all be 192.168.0. The host address section of those other devices on the other hand, must be set to a number other than 10. The number 0 and 255 are reserved, so do not use them for setting the host address.
Therefore, when a device having an IP address of 192.168.0.10 and a subnet mask of 255.255.255.0 belongs to a particular network and to add another device to that network, then the IP address is assigned from among 192.168.0.1 to 192.168.0.9 and 192.168.0.11 to 192.168.0.254.

NOTE

Since the YRCX is not applicable to IP address auto acquisition functions such as DHCP and BOOTP, make sure to set the IP address manually.

3.4.1 Setting the communication mode and parameters

Step 1 ***Display the "Ethernet" screen.***
Select (System) - (Communication Setting) from the initial screen and press the F1 key (Ethernet).

Step 2 ***Set the communication mode.***
Press the F2 (ONLINE) or F3 (OFFLINE) key on the "Ethernet" screen to change the setting to (ONLINE) or (OFFLINE).

Step 3 ***Set the communication parameters.***
Use the cursor keys to select the set value to edit, input a numeric value, and then press the ENTER key.

To set the edited data, press the ENTER key until the cursor selects the numeric value in (IP Address).

* When pressing the ESC key halfway, the edited contents are canceled.

* Pressing the F4 key (INIT) initializes the communication parameters.

Refer to "3.4.2 Initializing communication parameters" in this Chapter.

Step 4 ***Press the ESC key to exit the data editing.***

▶ **Step 1** **Setting the Ethernet communication mode and parameters**

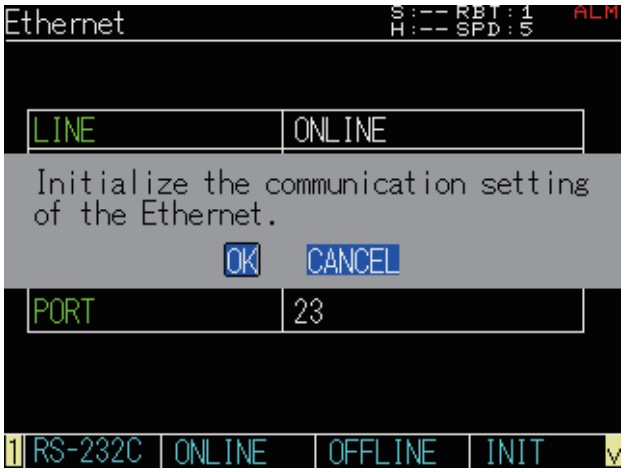
NOTE

- External offline commands are not accepted in the OFFLINE mode.
- When using online commands, be sure to put the controller in the ONLINE mode.
- In the OFFLINE mode, the controller cannot be connected from the support software "SCARA-YRCX Studio". Therefore, when connecting the controller using the support software, be sure to put the controller in the ONLINE mode.

3.4.2 Initializing communication parameters

Press the F4 key (INIT) on the "Ethernet" screen to display a pop-up screen.
Select [OK] with the cursor keys and press the ENTER key to initialize all the Ethernet parameters.
To return to the previous screen without initialization, press the ESC key or select [CANCEL].

■ **Parameter initialization**



3.5 System setting on personal computer (client)

The following describes the basic setting procedure by using Windows7 as an example. For details about other OS or device, refer to the relevant manual.
For details about setting procedure, refer to the first step guide supplied with Windows7.
Additionally, the set values, such as IP address, need to be changed appropriately according to the customer's network environment.
* Windows7 is a registered trade mark of Microsoft in the United States.

3.5.1 Setting the TCP/IP protocol

Step 1 *Open the "Control Panel" window.*

Step 2 *Click the [Network and Sharing Center] icon in the "Control Panel" window.*

Step 3 *Click [Change adapter settings] in the "Network and Sharing Center" window.*

Step 4 *Right-click the [Local Area Connection] icon to open the "Local Area Connection Properties" window.*

Step 5 *Confirm that [Client for Microsoft Networks] and [Internet Protocol Version 4 (TCP/IPv4)] are shown in the "Networking" tab window.*

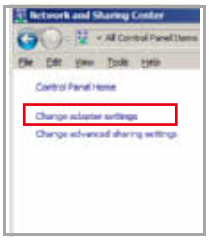
Step 6 *Check on [Internet Protocol Version 4 (TCP/IPv4)] and click the [Properties] button.*

Step 7 *According to the operating conditions, input the IP address, subnet mask, and gateway on the personal computer side in the "Internet Protocol Version 4 (TCP/IPv4) Properties" window.*
Set the DNS server according to the operating conditions.

Step 8 *Click the [OK] button to close the setting window.*

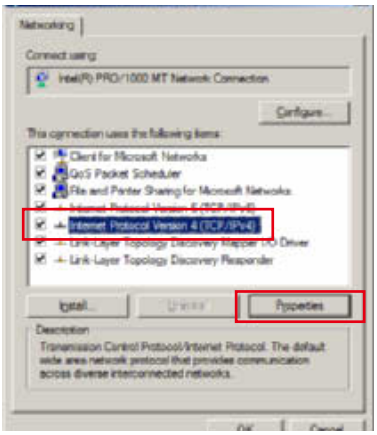
Step 2 [Network and Sharing Center] icon

Step 3 [Change adapter settings] icon



Step 4 [Local Area Connection] icon

Step 5 "Local Area Connection Properties" window



Step 7 Inputting the IP address, etc. on the personal computer side

3.6 Connection check using "Ping"

After the network has been set, check using "ping" if the communication can be performed correctly. "Ping" is a network diagnosis tool that is incorporated into OS as a standard accessory.
The following describes how to use "ping" that is incorporated into Windows7. For details about other OS or device, refer to the relevant manual.

Step 1 ***From the [Start] button, select [All Programs] -> [Accessories] -> [Command Prompt] to display the "Command Prompt" window.***

Step 1 "Command Prompt" window

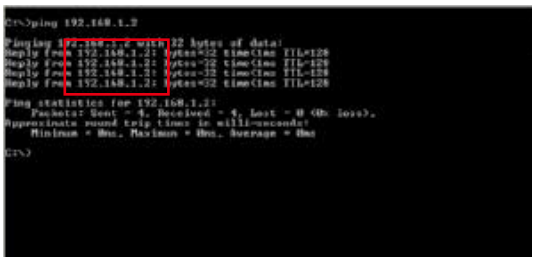
Step 2 ***Execute "ping".***
Input "ping xxx.xxx.xxx.xxx" next to ">", and then press the ENTER key. At this time, input the IP address of the controller in the "xxx.xxx.xxx.xxx" portion.

Step 2 Executing "ping"

Step 3 ***Check the "ping" results.***
When communicated successfully, the display becomes as follows.
Reply from xxx.xxx.xxx.xxx: bytes=32 time<1ms TTL=64
(See the figure (1).)

If the communication failed, "Request timed out." is displayed. (See the figure (2).)
In this case, review the network device, controller setting, and wiring to solve the problem.

Step 3 (1) Communication success



(2) Communication failure

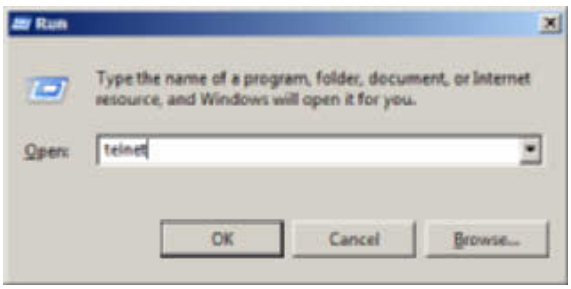
3.7 Communication example using "TELNET.EXE"

The following describes how to make the connections using "TELNET.EXE". For details about how to install TELNET in the personal computer, refer to the manual for relevant product. It is preconditioned that the IP address of the robot is set at "92.168.0.2" and the port number is set at "23".

Step 1 ***From the [Start] button, select [Accessories] -> [Run] to display the "Run" window.***

Step 2 ***After inputting "telnet" in the "Open" field, click the [OK] button to start.***

Step 2 "Run" window



Step 3 ***Input "open xxx.xxx.xxx.xxx" next to ">", and then press the ENTER key.***

Input the IP address of the controller in the "xxx.xxx.xxx.xxx" portion. The controller is then connected and the message "Welcome to YRCX" will appear.

Step 4 ***To cancel the connection with the controller, input "LOGOUT" or "BYE", and then press the ENTER key.***

Step 5 ***The message appears and the connection is then canceled.***

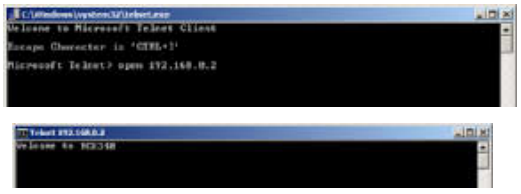
Press any key to return to Step 3.

Step 6 ***To exit "telnet", input "quit", and then press the ENTER key.***

NOTE

To control multiple robot controllers at the same time, run multiple TELNET.EXE.

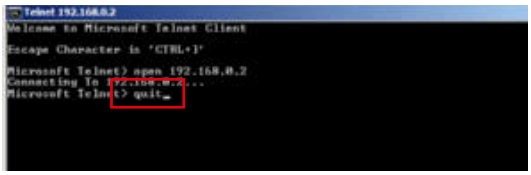
▶ **Step 3** "Telnet" window (1)



▶ **Step 4** "Telnet" window (2)

▶ **Step 5** "Telnet" window (3)

▶ **Step 6** "Telnet" window (4)



3.8 Appendix

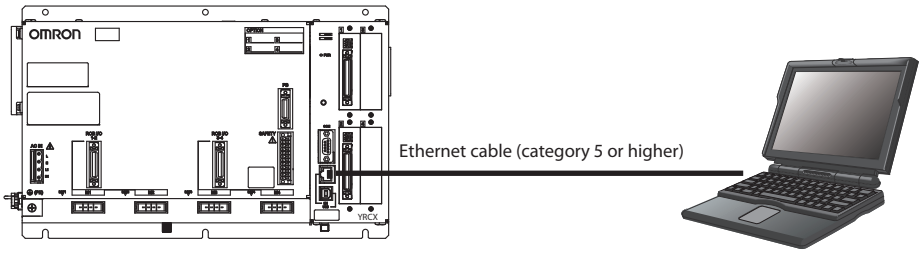
3.8.1 Example of network system configuration

CAUTION

The network system configuration may vary depending on the user's network scale. For details, be sure to consult the system administrator.

■ Configuration example 1

One controller is controlled by one personal computer.



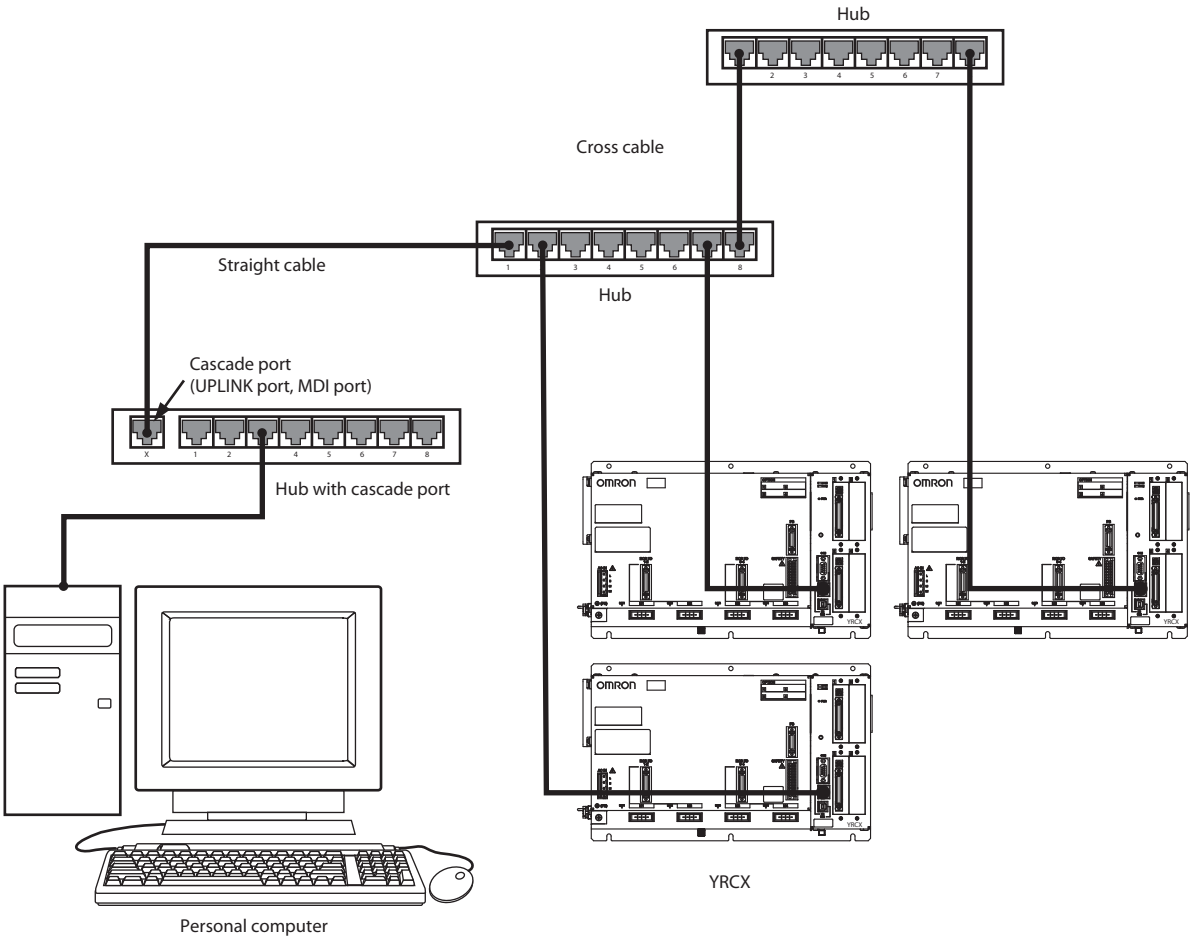
YRCX　　Personal computer

System setting example

	IP address	Subnet mask	Gateway
Personal computer	192.168.0.2	255.255.255.0	192.168.0.1
Controller 1	192.168.0.3	255.255.255.0	192.168.0.1

■ Configuration example 2

Multiple controllers are controlled by performing the cascade connection of the hubs.

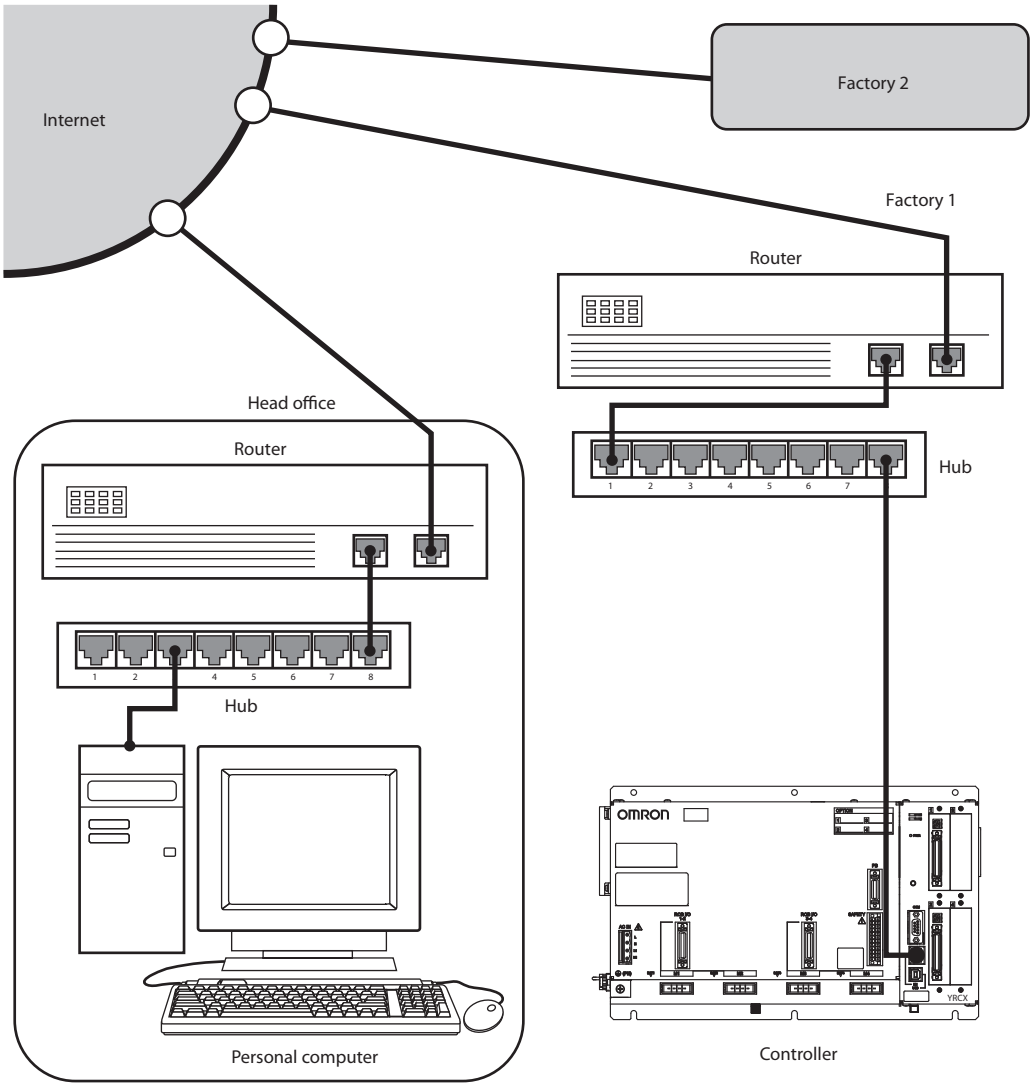


* Similar network can be configured by performing the stack connection of the stackable hubs. In this case, multiple hubs that are connected through the stack connection are recognized as a single large hub from the network. Therefore, unlike the cascade connection, the number of connection hubs is not limited.
* Be sure to use the Ethernet cable with category 5 or higher.

System setting example

	IP address	Subnet mask	Gateway
Personal computer	192.168.0.2	255.255.255.0	192.168.0.1
Controller 1	192.168.0.3	255.255.255.0	192.168.0.1
Controller 2	192.168.0.4	255.255.255.0	192.168.0.1
:	:	:	:
Controller 9	192.168.0.11	255.255.255.0	192.168.0.1
Controller 10	192.168.0.12	255.255.255.0	192.168.0.1

■ Configuration example 3



For security, it is recommended to construct a firewall (illegal access prevention mechanism).

System setting example

	IP address	Subnet mask	Gateway
Router in head office	133.215.0.2	255.255.255.0	
Personal computer	133.215.0.3	255.255.255.0	133.215.0.1
Router at factory 1	133.215.1.1	255.255.255.0	
Controller 1	133.215.1.2	255.255.255.0	133.215.1.1
Router at factory 2	133.215.2.1	255.255.255.0	
Controller 1	133.215.2.2	255.255.255.0	133.215.2.1

* Set the routers appropriately.
* Set the global address for the IP address to connect to the Internet.
* Since duplicated addresses are not permitted, the customer cannot use the addresses shown in the setting examples above. Be sure to use the customer's unique addresses. Note that the address allocation and control are performed by NIC (JPNIC in Japan).

3.8.2 Glossary

TCP/IP

TCP/IP is a general term for a group of standard protocols for carrying out communications over the Internet around TCP and IP protocols. Computers capable of accessing the Internet all use TCP/IP protocols.
The YRCX incorporates the TCP, IP, ICMP, ARP, and TELNET protocols of the TCP/IP protocols.

Ethernet

One of the network related hardware standards.
This Ethernet is a network that was developed by Xerox in the United States at the beginning of 1970s. Presently, the Ethernet is standardized internationally as IEE802.3. According to the transmission cable type, the Ethernet is classified into 100BASE-T2, 100BASE-T5, and 100BASE-TX, etc. The maximum cable length or the maximum number of connections may vary depending on the classification.
The YRCX adopts the 100BASE-TX specifications.
Protocols that are generally used on the Ethernet are NetBEUI and IPX/SPX in addition to the TCP/IP protocols.
The CSMA/CD data transmission method is also the features of the Ethernet.

CSMA/CD (Carrier Sense Multiple Access with Collision Detection)

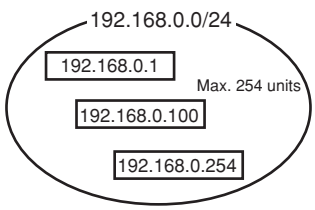
CSMA/CD is a method of sending signals, developed by combining a CSMA data transmission method with a transmission error handling method called CD.
CSMA refers to joint use of one transmission cable by many devices connected over a network. CSMA is therefore a method for checking network status beforehand and then transmitting the data after verifying that transmission is possible.
CD is a method for handling data collisions that occur on the network. In this method, when a data collision occurs, that data is re-transmitted after a randomly selected time period has elapsed.
Many devices can be connected to the Ethernet by using these CSMA/CD methods. However, performance cannot be guaranteed in real-time because of transmission standby (time awaiting transmission) and retransmissions.

IP address

This IP address is a number unique to each device that is assigned to each device so that the numbers are not duplicated with each other so as to identify the device on the network. (More precisely, the IP address is assigned to each network interface since multiple network interfaces may be installed into one personal computer.) In the TCP/IP protocols, the data transmission source or communication destination is specified by this IP address. The IP address is a 32bit-(4byte)-numeric value. Normally, the IP address is separated 1-byte by 1-byte by a dot (".") and expressed in decimal notation. For example, an IP address of "0xC0A80002" is expressed as "192.168.0.2".
The IP address consists of two address parts. One is a network address part that shows the address of the network's own address. The other is a host address part that shows the address to identify each device.
N bits from the beginning of the IP address are used as a network address. Bits from the "N+1"th bit to 32th bit are used as a host address. (The value of "N" is determined by the subnet mask.)

For example, when the IP address is "192.168.0.2" and the value of "N" (network length) is 24 bits, the network address part is "192.168.0" and the host address part is "2". Generally, to express the network address, set "0" for the host address part and describe "/" and the network length next to the address. In the example shown above, the network address is expressed as "192.168.0.0/24".

One network can be connected with as many devices as there are addresses to identify them. However, host address bits having all zeroes (0), or all ones (1) are reserved and so cannot be used. Therefore, in the example shown above, the host address can identify 256 units. However, since "0" and "255" cannot be used, the maximum number of units that can be connected is 254.



The host address can be set freely by each company (organization). However, when connecting to the Internet, it is necessary to make an application to the NIC (JPNIC in Japan) for a network address to get the acquisition. Note that the network address can also be set freely by each company (organization) in the environment where the network is not connected to the Internet in the same manner as the host address.

In the environment where the network is not connected to the Internet, it is permitted to freely use the addresses shown below. These addresses are called "private address".

10.0.0.0 to 10.255.255.255	(1 unit of class A)
172.16.0.0 to 172.31.255.255	(16 units of class B)
192.168.0.0 to 192.168.255.255	(256 units of class C)

An address acquired by making application to NIC on the other hand is referred to as a global address.

Subnet mask

This subnet mask is used to separate the IP address into a network address part and host address part. The network address bits are set to "1" and the host address bits are set to "0".
In the same manner as the IP address, the subnet mask is a 32bit-(4byte)-numeric value. The subnet mask is separated 1-byte by 1-byte by a dot (".") and expressed in decimal notation.
Therefore, when the subnet mask is "255.255.255.0", the network address part becomes 24 bits.

Generally, when making an application to the NIC for an IP address, only one network address is allocated to each company (organization). Any of class A to class C is allocated depending on the scale of each company (organization). For example, since the network length is 16 bits in class B, one network address that can connect up to 65533 units is allocated. However, when using this network address as it is, the efficiency of the management or process becomes poor. Normally, the subnet mask is set appropriately to separate the network into multiple networks.
For example, when a subnet mask of 255.255.255.0 is set for the class B network, 256 networks, each of which can control up to 254 units, can be set.

MAC address (Media Access Control Address)

This MAC address is also called "Ethernet address" and shows a hardware identification number (6-byte numeric value) set for each network interface. Since the MAC address is set for each unit in the manufacture phase, users do not need to set it.
The Ethernet system identifies the connected unit from this MAC address. That is, even when the communication is performed using the TCP/IP protocols, the communication is performed while the IP address is automatically converted into the MAC address.

HUB

HUB is a device used to connect the personal computer and each unit. This is equipped with multiple ports to connect the modular jacks. A unit is connected to this port using the twist pair cable with the modular jack.

Router

A router is a device used to connect multiple networks with each other. This sends the external data transmitted from the internal network to the external network or sends the data transmitted from the external network to the internal network. Additionally, specific data is disposed of through the filtering process to ensure the network safety.

The IP address of the router is set for each network unit as a gateway address. As this setting is made, each unit can correctly receive or send the data among the networks.

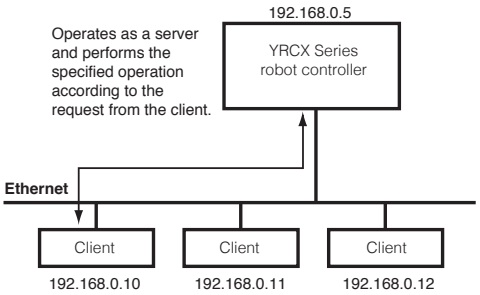
4. General Ethernet port (GEP)

■ Features of GEP

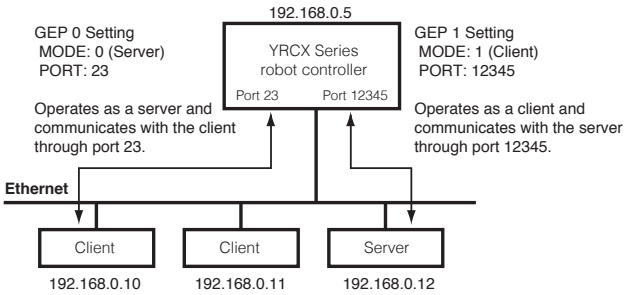
GEP function enables YRCX Ethernet port to communicate with several devices at the same time by allocating maximum eight IP addresses or port. In addition, there are differences below between GEP and YRCX Ethernet function.

- GEP can be used in OFFLINE mode.
- GEP function enables the controller to be specified as either of a client or server. (Ethernet function can be specified only as a server.)

■ Ethernet function: Only as a server



■ General Ethernet Port function: Both as a server and a client



Ethernet port specification and connecting method are the same as Ethernet function. Refer to "3.1 Connectors and cables", "3.2 Communication specifications", and "3.3 Connections" in this Chapter for details.

CAUTION

Connect the Ethernet port of the YRCX only to a computer for development, other controller or personal computer. Do not connect this port to the public telephone line.

4.1 GEP parameter setting

Press the F5 key (GEP) in the "Ethernet" screen, and the "GEP setting" screen appears.
There are five communication parameters.

GEP set values

	Name	Setting value	Initial value	Remarks
1	MODE	0: Server 1: Client	0	Specifies the controller as a server or client.
2	IPADRS	0.0.0.0 to 255.255.255.0	192.168.0.2	Specifies an IP address. An IP address is a number uniquely assigned to each device to recognize several devices connecting to the network. Therefore, IP addresses should be specified and managed so that other devices will not overlap.
3	PORT	1 to 65535	40	Specifies a TPC port number. When a robot connects to the server or client, specify this port number with the IP address.
4	EOL	0: CRLF 1: CR	0	Specifies a line feed code.
5	TYPE	0: TCP	0	Specifies a port type. Make sure to set "0".

NOTE

- It is recommended to use other than the "Well-Known Port (0 to 1023)" for the port number.
- Make sure not to overlap other GPE settings or Ethernet function with both IP address and port number when setting the GEP. (Refer to below examples.)

Example: Setting communication parameter on GEP 0 and GEP 1

GEP 0 IP address: 192.168.0.3	Port No.: 23	Same IP address and different port numbers: Possible to set
GEP 1 IP address: 192.168.0.3	Port No.: 2345	
GEP 0 IP address: 192.168.0.3	Port No.: 23	Same port number and different IP addresses: Possible to set
GEP 1 IP address: 192.168.0.7	Port No.: 23	
GEP 0 IP address: 192.168.0.3	Port No.: 23	Same IP address and same port number: Impossible to set
GEP 1 IP address: 192.168.0.3	Port No.: 23	

- In the case of specifying the MODE "0: Server", set the IP address the same value as that of the Ethernet function and set the port number the different value.
- Do not input except "0" for the port type.

4.2 GEP parameter setting method

Step 1 ***Select a GEP number with cursor keys.***

Pressing the F2 key (INIT) initializes all the GEP communication parameter.
Refer to "4.3 Initializing communication parameters" in this Chapter for details.

Step 2 ***Press the F1 key (EDIT) to display GEP edit screen.***

Step 3 ***Set the parameters.***

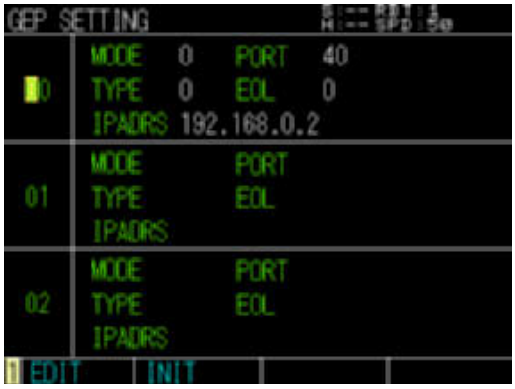
Press the F1 key (CREATE) to set a new GEP parameter, and a pop-up screen appears. Input a TCP port number to set and press (OK), and a new GEP parameter will be created.
Select the items to edit, input the setting values and press the ENTER key.

NOTE

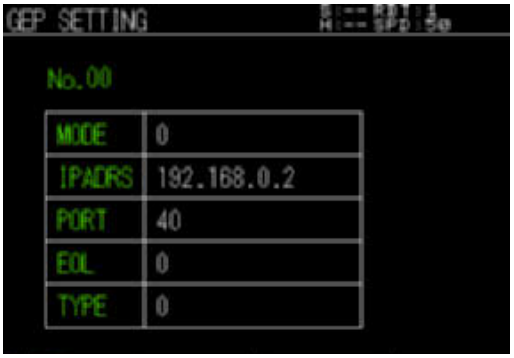
- It is not necessary to create new parameters when editing GEP parameters already set.
- Pressing the ESC key halfway cancels the edited contents.

Step 4 ***Press the ESC key to exit the data editing.***

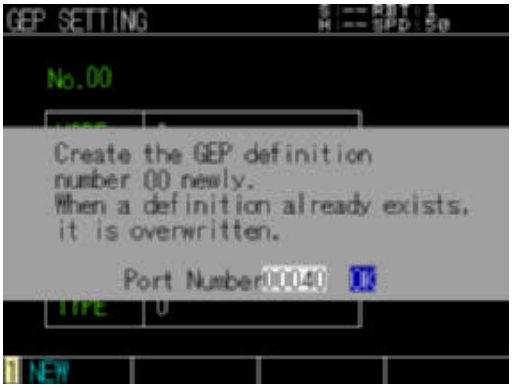
▶ **Step 1** Selecting the GEP number



▶ **Step 2** Editing the GEP



▶ **Step 3** Creating new GEP

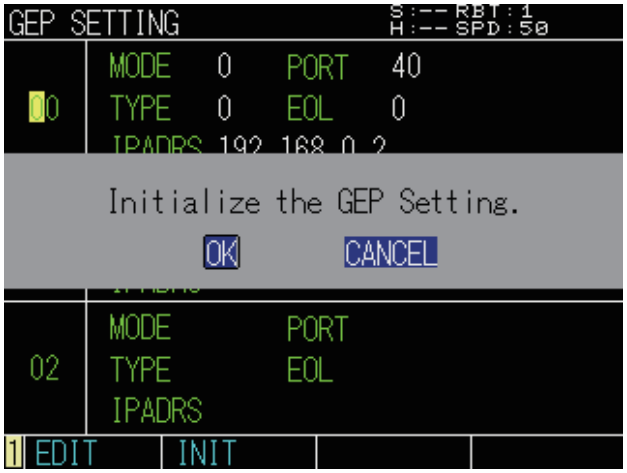


4.3 Initializing communication parameters

Step 1 ***Display the pop-up screen.***
Press the F2 key (INIT) on the "GEP SETTING" screen to display a pop-up screen.

Step 2 ***Initialize the communication parameters.***
Select (OK) with the cursor keys and press the ENTER key to initialize all the GEP communication parameters.

■ **Parameter initialization**



NOTE
Press the ESC key or select [CANCEL] and press the ENTER key to return to the previous screen without initialization.

Chapter 7 Controller system settings

1. Overview

To operate the robot, various settings corresponding to the customer's operation are needed.
This Chapter describes how to make the various controller settings and display the information.
Additionally, system settings other than the robot operation settings are also described.

	Item	Description
2	History	Displays the alarm history data.
3	Check	Checks if an alarm occurs in the controller.
4	Property	Displays the information of the controller.
5	USB Memory Operation	Saves or restores various data using the USB memory.
6	Execution Level	Sets the operating level (operable range).
7	Safety Setting	Sets the safety parameters.
8	Initialize	Initializes various data.
9	Generation	Makes the settings corresponding to specifications of the axis and the robot to be connected.
10	Parameter	Sets the parameters.

2. History

When selecting [System] - [History] from the initial screen, the "HISTORY" screen will appear.
The "HISTORY" screen displays five past alarm history records from the latest. Up to 500 records are saved.

The alarm display format is shown below.

Number	Alarm occurrence date and time
	Alarm number: Alarm occurrence location

The display is scrolled one line with the cursor keys. When pressing the "SCROLL ON" key to set the scroll function ON, the display is scrolled one screen with the cursor keys.

■ **"HISTORY" screen**

CAUTION

The alarm history data is very important information when taking the robot troubleshooting measures. Therefore, do not initialize the alarm history data carelessly.

NOTE

- When the number of alarm history records exceeds 500, the oldest history record is deleted.
- The same alarm as the previous alarm in the same occurrence place occurs is not recorded.
- When the alarm classification is between 0 and 99, such alarms are not recorded.
- Alarms with the classification number between 200 and 399 on the online or remote commands are not recorded.

3. Check

When selecting [System] - [Check] from the initial screen, the "CHECK" screen will appear.
The controller is diagnosed. If an error is detected, relevant message will appear.

■ **"CHECK" screen**

NOTE
Even when the 24 V DC power is not supplied to the option DIO, the alarm always occurs.

4. Property

When selecting [System] - [Property] from the initial screen, the property screen will appear.
The property screen displays the robot information, option information, clock, and version.

4.1 Robot information

The robot names connected to the controller are displayed.
To display the "ROBOT" screen, select [Menu] → [System] → [Property] or press the F1 key (ROBOT) on other information screen.
Select the robot (Robot 1 to Robot 4) using the cursor keys and press the ENTER key to switch to the screen displaying the axis name connected to the robot.

■ **ROBOT name**

■ **ROBOT axis name**

4.2 Option information

When pressing the F2 key (OPTION), the "OPTION" screen displays the type and version of the option boards connected to the option slot of the controller.

Display	Unit name
DIO_Nm*	Displays that the option DIO with the NPN specifications is installed. (S: Standard DIO, 1 to 4: Expanded DIO2)
DIO_Pm*	Displays that the option DIO with the PNP specifications is installed. (S: Standard DIO, 1 to 4: Expanded DIO2)
D_Net	DeviceNet unit
ENet_IP	EtherNet/IP unit
Profi_B	PROFIBUS unit
Profi_N	PROFINET unit
YCLnkE_M	YC-Link/E master unit
YCLnkE_S	YC-Link/E slave unit
Tracking	Tracking System unit

*"m" shows the specifications.

■ **"OPTION" screen**

4.3 Clock

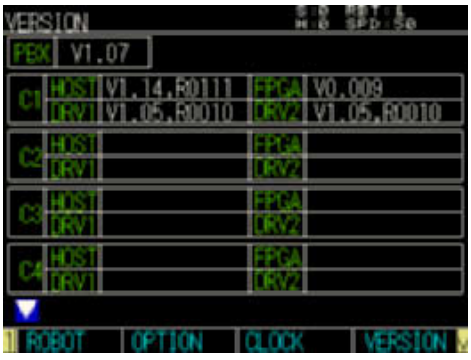
When pressing the F3 key (CLOCK), the controller built-in clock will appear.

■ **"CLOCK" screen**

4.4 Version

When pressing the F4 key (VERSION), various versions inside the controller and the version of the programming box are displayed.

■ **"VERSION" screen**



4.5 Configuration

When pressing the F5 (CONFIG) key to display each controller setting.

* The F5 is shown by switching the KEYTYPE.

Display	Meaning
Type	Displays the controller type. YRCX is displayed.
Method	Displays controller specification. Global: CE specification, Local: Normal specification
Node	Displays YC-Link/E settings. Blank: Master, 1 to 99: Slave station number
Memory	Displays controller memory size.
Brake	Displays the brake power settings. Internal (power supply) / External (power supply)
MAC	Displays the MAC address of the Ethernet port.

■ "CONFIG" screen

5. USB memory operation

Various data in the memory inside the controller can be saved into the USB memory. Additionally, the saved data can be reloaded to the controller.

Select [System] - [USB Memory] from the initial screen, to display the "USB MEMORY" screen.

NOTE

It is recommended to save the internal data when robot controller setting is completed.

■ "USB MEMORY" screen

CAUTION

- If a trouble (data corruption, error, etc.) occurs in the USB memory or saved data, the data cannot be loaded. Be sure to save the data into an external storage device, such as personal computer.
- If an abnormal process, such as power shutdown occurs while the data is being saved or loaded, the data is not guaranteed.

5.1 Saving the data

The internal data of the controller is saved into the USB memory. The data will be saved into the "OMRON" folder immediately beneath the USB memory.

Step 1 ***Select [System] - [USB Memory] - [SAVE] from the initial screen.***

Use the cursor keys to select the type of the data to save, then press the F1 key (CHOOSE) to show the list of the data files to be saved.

▶ **Step 1** Selecting the data to save

Step 2 ***Select the file to save.***

To save the file newly:
Press the F1 key (CHOOSE) and input the file name in the next Step.
To save the file in the overwrite mode:
Use the cursor keys to select the file to save, and then press the F1 key (CHOOSE) or ENTER key.
When many files are saved:
Press the F2 key (NEXT) to scroll the file list.

Step 3 ***Save the file.***

Input the file name of the data to save.
To save into a new file, input a new file name.
Input a new file name or input an existing file name to overwrite.
Press the ESC key to cancel the data saving.
"Now Saving" message will appear during data saving.

5.2 Loading the data

The data saved in the USB memory is restored to the internal memory of the controller.
It is required to the data to have been saved into the "OMRON" folder immediately beneath the USB memory.

Step 1 ***Select [System] - [USB Memory] - [LOAD] from the initial screen.***

Use the cursor keys to select the type of the data to load, then press the F1 key (CHOOSE) to show the list of the data files which can be loaded.

Step 2 ***Select the file to load.***

Use the cursor keys to select the data file to load, then press the F1 key (CHOOSE). The confirmation message will appear.
When many files are saved, press the F2 key (NEXT) to scroll the file list.

Step 3 ***Load the data.***

Press the ENTER key to load the data from the file.
Press the ESC key to cancel the data loading. The message, "Now Loading", will appear during data loading.

Step 1 Selecting the data to save

CAUTION

When loading the data as ALL file or parameter file, the controller must be put in the servo off status. Additionally, after the data has been loaded, the robot is put in the origin return incomplete status.

6. Execution level

The controller can be set to operating levels that permit or prohibit changing programs and point data. The three-digit access-level value specifies the function to limit.

Access level			Level Value	Description
Level 0: Maintainer level Ones place is "0".			**0	All operations can be performed. To move to this level, a password is required.
Level 1: Operator level Ones place is "1".			**1	Only the manual operation and automatic operation can be performed. Programs with hidden attribute cannot be loaded.
	Partial Permission	Permission: Editing coordinate system data Tens place is "1".	*11	Editable area: Coordinate system data such as point data in addition to normal operator level permission
		Permission: Editing parameter Hundreds place is "1".	1*1	Editable area: Parameter data in addition to normal operator level permission

NOTE

- When any of the following conditions arises, the access level is forcibly set to "Level 0".
  1. All of the data are initialized. (Refer to "8. Initialize" in this Chapter.)
  2. The alarm message "9.723: Controller status data destroyed" appears.
- Host CPU software version for setting the partial permission: Ver.1.46 or later

6.1 Changing the access level

To change the access level, follow the procedure below.

Step 1 ***Display the "ACCESS LEVEL" screen.***

Use the cursor keys to select (System) on the initial screen, and then press the ENTER key. Next, select (Execution Level), and then press the ENTER key. The "ACCESS LEVEL" screen will appear.

Step 2 ***Input the access level to set.***

Input the access level and press the ENTER key. Select (SET) and press the ENTER key.

To set "0 (Maintainer level)":
Perform the operation stated in Step 3.

To set "1 (Operator level)":
Press the ENTER key again to determine the setting you have input.

Step 3 ***Input the password.***

Input the password in the password entry field, and then press the ENTER key.

* If an incorrect password is input, "6.235: Password error" alarm occurs.

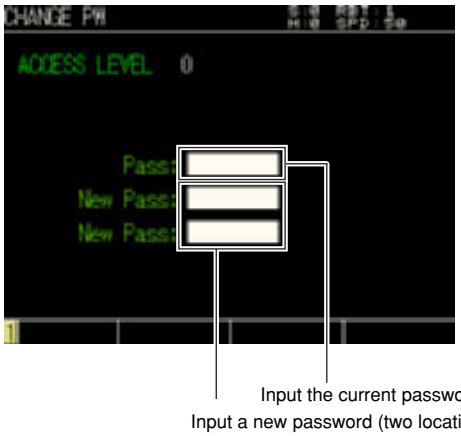
▶ **Step 2** Setting the ACCESS LEVEL

■ Changing the password

Step 1 ***Press the F1 key (CHANGE PW) on the "ACCESS LEVEL" screen.***
The "CHANGE PW" screen will appear.

Step 2 ***Set a new password.***
Input the current password in (Pass), and then press the ENTER key. Next, input a new password in (New Pass) at two locations, and then press the ENTER key.

▶ **Step 2** **Changing the password**



Input the current password.
Input a new password (two locations).

7. Safety setting

The safety parameters are set to safely perform the work with the programming box within the movement range (the safety enclosure) of the system using the robot.

WARNING

- **In "Safety setting", changing the settings from their default values is likely to increase hazards to the robot operator during maintenance or operation. Although customers can change these settings based on their own responsibility, adequate consideration should first be given to safety.**
- **Set the control setting "GET" to enable the SAFETY SETTING.**

On the "SAFETY SETTING" screen, you can set five items described below.

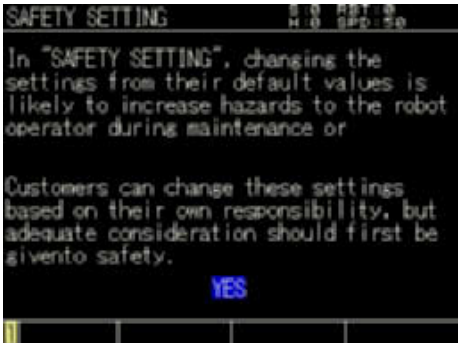
	Item name	Setting	Remarks
1	Hold to Run For Auto	VALID/INVALID	The robot operation (including the program execution) is executed while holding down the key on the programming box.
2	Deceleration Control	VALID/INVALID	When set VALID, the maximum robot movement speed is limited to its 3%.
3	Exclusive IO	VALID/INVALID	Sets the dedicated input of the I/O interface VALID or INVALID. * Even when set INVALID, the general-purpose inputs and outputs can be used.
4	RS-232C	VALID/INVALID	Sets the RS-232C interface VALID or INVALID.
5	Ethernet	VALID/INVALID	Sets the Ethernet interface VALID or INVALID.

■ Setting procedure

Step 1 ***Select [System] - [Safety Setting] from the initial screen.***

When the warning screen appears, agree to the contents and press the ENTER key.

Step 1 Warning message

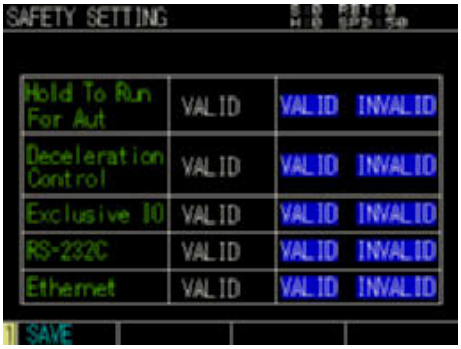


Step 2 ***Set [VALID] or [INVALID].***

Use the cursor keys to select (VALID) or (INVALID) of the item to set, and then press the ENTER key.

To set the setting valid even after the power shut-down, perform the operation stated in Step 3.

Step 2 Setting the safety parameters



Step 3 ***Save the settings.***

When pressing the F1 key (SAVE) on the "SAFETY SETTING" screen, the setting save confirmation screen will appear.
Select (OK), and then press the ENTER key to save the settings.
When selecting (Cancel), the settings are not saved.
This setting will be valid after turning on the power again.

Step 3 Saving the safety parameters

8. Initialize

When selecting [System] - [Initialize] from the initial screen, the "Initialize" screen will appear. On this screen, you can initialize the data managed by the controller. Use the F1 key (ALL DATA) to F11 (CLOCK) to select the item to initialize.

■ **"INITIALIZE" screen**

Valid keys and submenu descriptions on the "INITIALIZE" screen are shown below.

Valid keys	Menu	Function
F1	ALL	Initializes all data.
F2	PGM	Deletes the program data.
F3	PNT	Deletes the point data.
F4	PNM	Deletes the point name data.
F5	SFT	Deletes the shift coordinate data.
F6	HND	Deletes the hand definition data.
F7	PRM	Initializes the parameter data.
F8	PLT	Deletes the pallet definition data.
F9	ION	Deletes the I/O name data.
F10	LOG	Deletes the alarm history data.
F11	CLOCK	Sets the clock.

8.1 Initializing the data

Programs, point data, point names, shift coordinates, hand definitions, parameters, pallet definitions, IO names, and alarm history data are initialized or deleted.
Before executing the initialization process, carefully check that the currently input data is unnecessary.

NOTE
- Once the memory is initialized, the external data needs to be input to restore the data.
- If the memory is corrupted for some reason, the memory needs to be initialized.

Valid keys and submenu descriptions on the "INITIALIZE" screen are shown below.

Valid keys	Menu	Function
F1	ALL	Initializes all data.
F2	PGM	Deletes the program data.
F3	PNT	Deletes the point data.
F4	PNM	Deletes the point name data.
F5	SFT	Deletes the shift coordinate data.
F6	HND	Deletes the hand definition data.
F7	PRM	Initializes the parameter data.
F8	PLT	Deletes the pallet definition data.
F9	ION	Deletes the I/O name data.
F10	LOG	Deletes the alarm history data.

Step 1 ***Use the function keys to select the item to initialize.***

Use the F1 key (ALL) to F10 key (LOG) to select items to initialize.
The initialization execution confirmation screen will appear.

Step 2 ***Execute the initialization process.***

Select the (OK) button and press the ENTER key to execute the initialization process.
Select the (CANCEL) button, and then press the ENTER key to cancel the initialization process.

Step 1 **Confirming the initialization execution**

8.2 Setting the clock

The controller is equipped with the clock function, allowing you to set the date and time.

CAUTION

The clock used inside the controller has an error when compared to the actual time.
If an error occurs, make the setting again.

Step 1 ***Press the F11 key (CLOCK) on the "INITIALIZE" screen.***

The current date and time will appear.

Step 2 ***Input the date.***

Select the date (year/month/day) using the cursor keys, input a value using the 0 to 9 keys, and then press the ENTER key.
Subsequently, use the cursor keys to select (SET), and then press the ENTER key.
The date is then set in the controller.

Step 3 ***Input the time.***

Select the date (hour: minute: second) using the cursor keys, input a value using the 0 to 9 keys, and then press the ENTER key.
Subsequently, use the cursor keys to select (SET), and then press the ENTER key. The time is then set in the controller.

9. Generation

The system generation of the controller has been set at shipment corresponding to the specification of robot to be connected and axis. So, the system generation setting by the customer is not needed.
If the system generation related memory is corrupted by serious trouble or if the robot or axis to be connected to the controller is changed, the system generation setting is needed.
For details about how to operate the system generation, contact your distributor.

CAUTION

- **If the system generation is changed by mistake, this may adversely affect the robot operation or cause serious hazard to the operator. When the system generation needs to be changed, contact your distributor.**
- **If the system generation is changed without consulting your distributor, OMRON shall not be held responsible for any trouble arising from this change.**

10. Parameters

There are six kinds of parameters available; controller setting related parameters, robot operation related parameters, axis related parameters, control related parameters, I/O related parameters, and option board related parameters.
When selecting [Edit] - [Parameter] from the initial screen, the "PARAMETER" screen will appear.

10.1 Parameter setting conditions

Set the parameters in the following cases.

- The system generation is performed.
- The robot in the factory shipment status is installed and operated.
- The robot or axis movement range is changed.
- The robot or axis transfer conditions are changed.

CAUTION

- **The parameters are important data to match the robot specifications to the controller specifications. If the parameters are set incorrectly, this may cause alarm or malfunction. So, be sure to set the parameters correctly.**
- **Save the data files (program, point, point comment, parameter, shift, hand, and pallet, etc.) saved inside the YRCX to an external storage device, such as personal computer before and after setting the parameters.**
- **If incorrect parameter setting is changed, this may adversely affect the robot operation or cause serious hazard to the operator. Before changing the parameters, contact your distributor.**
- **Absolute reset or return-to-origin may be required as the parameters are changed.**
- **Some parameters require turning off and on the power to be valid.**

10.2 Setting the parameters

The robot operation and controller setting related parameters are set.

Step 1 ***Press the F1 key (CONT) to F10 key (TRACKING) to select the category.***
The "PARAMETER" screen for the selected category will appear.

Step 1 "PARAMETER" screen

Valid keys and submenu descriptions on the "PARAMETER" category screen are shown below.

Valid keys	Menu	Function
F1	CONT	Sets the controller setting related parameters.
F2	ROBOT	Sets the robot operation related parameters.
F3	AXIS	Sets the axis related parameters.
F4	DRIVER	Sets the driver related parameters.(Contact your distributor for changing this parameter.)

Valid keys	Menu	Function
F5	IO	Sets the I/O related parameters.
F6	OPTION	Sets the option board related parameters.
F7	GRIPPER	Sets the gripper related parameters.*
F10	TRACKING	Sets the tracking system related parameters.*
ESC		Returns to the previous screen.

* Refer to the each manual for details.

Step 2 *Select the parameter.*

Use the cursor keys to select the parameter. Input the parameter number on the pop-up screen that is displayed by pressing the F2 key (JUMP) to select the parameter otherwise.
Press the F1 key (EDIT) to select.

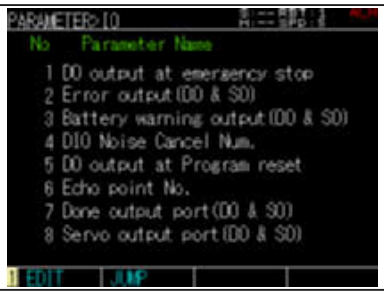
"PARAMETER>CONT" screen

"PARAMETER>ROBOT" screen

"PARAMETER>AXIS" screen

"PARAMETER>DRIVER" screen

"PARAMETER>IO" screen



"PARAMETER>OPTION" screen

* The screen setting depends on the robots and options to use.

NOTE

Changing the driver parameters might influence to robot control even though they can be selected.
Contact your distributor for changing them.

Valid keys and submenu descriptions on each parameter setting screen are shown below.

Valid keys	Menu	Function
▲ / ▼		Moves up or down the cursor.
F1	EDIT	Edits the parameter.
F2	JUMP	Moves the cursor to the specified number.
SCROLL ON		Switches ON/OFF of the scroll function.
ESC		Returns to the previous screen.

Step 3 *Press the ESC key to exit the parameter editing.*

10.3 Parameter list

Controller parameters

For details about parameters, refer to "10.4 Controller parameters" in this Chapter.

Name	Identifier	Setting range	Initial value	Unit
Incremental Mode control	INCMOD	0: INVALID, 1: VALID	0	–
MOVEI/DRIVEI start pos.	MOVIMD	0: KEEP, 1: RESET	0	–
MOVET start pos.	MOVTMD	0: KEEP, 1: RESET	0	–
Servo on when power on	SRVOON	0: INVALID, 1: VALID	0	–
Sequence flag*1	SEQFLG	0: INVALID, 1: VALID 3: VALID & EMG-Reset	0	–
Safe mode flag*1	SAFEMODE	-2147483648 to 2147483647	-1	–
Permission to start program in origin non-completion	RUNINOIC	0: INVALID, 1: VALID	0	–
Permission to reset at controller boot	RSTATBOT	0: INVALID, 1: VALID	0	–
Permission to reset at program start	RSTATRUN	0: INVALID, 1: VALID	0	–
Current program no.	CRNTPG	0 to 100	0	–
Main program no.	MAINPG	0 to 100	0	–
INPUT/PRINT using channel	STDPRN	1: PB, 2: CMU, 3: ETH	1	–
Emergency time*1*2	EMGTIM	0 to 2000	1000	ms
Emergency time 2*1*2	EMGTIM2	0 to 2000	300	ms
Debug start mode	DBGSTAMD	0: LOAD, 1: START	0	–
Break point stop mode	BRKSTPMD	0: HOLD, 1: HALDALL	1	–
Shift on area check out	SFTONACO	0: INVALID, 1: VALID	1	–

*1 Contact your distributor for changing these parameters as editing them may influence the robot control.
*2 New setting values will be valid after turning off and on the power.

NOTE
This manual describes the controller parameters shown above.
Others are normally write-protected. When such parameters need to be changed, contact your distributor.

Robot parameters

For details about parameters, refer to "10.5 Robot parameters" in this Chapter.

Name	Identifier	Setting range	Initial value	Unit
Tip weight (kg)	WEIGHT	0 to 500	Depends on the model.	kg
Tip weight (g)	WEIGHTG	0 to 500000	Depends on the model.	g
Origin sequence	ORGORD	0 to 654321	312456	–
R axis orientation	RORIEN	0: KEEP, 1: FREE	0	–
Arm type at reset	ARMTYP	0: NONE, 1: RIGHT, 2: LEFT	0	–
MOVE L coef.	CPACRAT	1 to 100	100	%
R axis inertia	SCRINR	0 to 32767	0	10^{-4}kgm^2
R axis inertia offset	INROFST	0 to 32767	0	0.001 mm
MOVE L max speed*1	CPVMAX	1 to 32767	750	mm/s
MOVE L accel.*1	CPACCL	1 to 32767	500	mm/s^2
MOVE L comp. curve*1	CPCMPCRV	0 to 255	0	–
MOVE L comp. velocity*1	CPCMPVL	1 to 32767	500	mm/s

Name	Identifier	Setting range	Initial value	Unit
Zone control*1	ZONCTRL	0: INVALID, 1: VALID	0	–
XY axis accel. rate*1	SCRACC	1 to 500	100	%
XY axis velocity rate*1	SCRVEL	1 to 500	100	%
R axis velocity rate	SCRRVEL	1 to 500	Depends on the model.	%
Inner side circle minimum radius*1	MINRAD	10 to 100000	5000	0.001mm
Speed limit radius 1*1	CERAD1	10 to 100000	30000	0.001mm
Speed limit radius 2*1	CERAD2	10 to 100000	5000	0.001mm
Speed limit 1*1	SPLMT1	1 to 100	10	%
Speed limit 2*1	SPLMT2	1 to 100	1	%
Outer CP prohibited range	SCROPHR	0 to 9999999	Depends on the model.	0.001mm
Outer Jogging CP velocity limited range	SCROVLR	0 to 9999999	Depends on the model.	0.001mm
Outer Jogging CP velocity limit	SCROVL	1 to 100	5	%
Custom robot*1	CSTMRBT	0: INVALID, 1: VALID	0	–

*1 Contact your distributor for changing these parameters as editing them may influence the robot control.

Axis parameters

For details about parameters, refer to "10.6 Axis parameters" in this Chapter.

Name	Identifier	Setting range	Initial value	Unit
+ Soft limit	PLMT+	-9999999 to 9999999	Depends on the model.	pulse
- Soft limit	PLMT-	-9999999 to 9999999	Depends on the model.	pulse
Accel. coefficient	ACCEL	1 to 100	100	%
Decel. rate	DECRAT	1 to 100	100	%
Tolerance	TOLE	1 to value depending on the model	80	pulse
OUT position	OUTPOS	1 to 9999999	2000	pulse
CONT pulse	CONTPLS	0 to 9999999	0	pulse
Arch pulse 1	ARCHP1	0 to 9999999	9999999	pulse
Arch pulse 2	ARCHP2	0 to 9999999	9999999	pulse
Push speed	PSHSPD	1 to 100	10	%
Push force	PSHFRC	-1000 to 1000	100	ms
Push time	PSHTIME	1 to 32767	1000	ms
Push judge speed	PSHJGSP	0 to 100	0	%
Push method	PSHMTD	0: NORMAL, 1: RESET	0	–
Manual accel	MANACC	1 to 100	100	%
Origin speed 1	ORGVEL1	1 to 1000	200	pulse/10ms
Origin speed 2	ORGVEL2	1 to 100	50	pulse/10ms
Speed after origin	ORGMVS	1 to 100	20	%
Move position	ORGMVP	-9999999 to 9999999	0	pulse
Origin shift	ORGSFT	-9999999 to 9999999	0	pulse
Dual offset	DOFSET	-9999999 to 9999999	0	pulse
Origin method	ORGMTD	0: MARK, 1: SENSOR, 2: TORQUE, 3: ZR_TORQUE	Depends on the model.	–
Origin direction	ORGDIR	0: MINUS, 1: PLUS	0	–
Motor direction	MOTDIR	0: CW, 1: CCW	Depends on the model.	–

Name	Identifier	Setting range	Initial value	Unit
Arm length	ARMLEN	0 to 9999999	0	0.001mm, 0.001 deg.
Offset pulse	OFFSET	-9999999 to 9999999	0	pulse

- Set the workpiece weight held at the robot tip for the tip weight of the robot parameters.
- The value of the arm length parameter may affect the acceleration. The effective stroke value of each axis needs to be input for the arm length.

I/O parameters

For details about parameters, refer to "10.7 I/O parameters" in this Chapter.

Name	Identifier	Setting range	Initial value
DO output at emergency stop	EMGCDO	0: IO_RESET, 1: IO_HOLD	1
Error output (DO & SO)*	ERPORT	0 to 0277 (Octal)	0
Battery warning output (DO & SO)*	BTALRM	0 to 0277 (Octal)	0
DIO Noise Cancel Num.	DIOCAN	0 to 7	1
DO output at program reset	RESCDO	0: IO_RESET, 1: IO_HOLD	0
Remote command	RMTCMD	0: INVALID, 1: VALID	1
DI17 mode	DI17MD	0: ABS, 1: ABS_ORG	0
Indiv. Origin	IOORGMD	0: INVALID, 1: VALID	0
Axes sel. port (DI & SI)	IOORGIN	2 to 027 (Octal)	2
Done output port (DO & SO)*	IOORGOUT	0 to 027 (Octal)	0
Servo output port (DO & SO)*	IOSRVOUT	0 to 027 (Octal)	0
Gripper origin axes select port (DI & SI)*	GRPORGIN	0 to 027 (Octal)	0
Real time output	RTOENBL	0: INVALID, 1: VALID	0

* New setting values will be valid after turning off and on the power.

Option parameters

For details about parameters, refer to "10.8 Option board related parameters" in this Chapter.

Name	Identifier	Setting range	Initial value	Separate manual
Option board enable*	OPTENBL	0: INVALID, 1: VALID	1	–
Parallel IO ID*	DIOID	1234 to 4321	1234	–
PROFIBUS station address*	PBUSADD	1 to 125	125	✔
Gripper servo when emergency stop	GEMGMD	0: OFF, 1: ON	1	✔
Include Gripper in Origin	GORGMD	0: NO, 1: YES	1	✔
Manual Holding of Gripper	GMHLMD	0: INVALID, 1: VALID	1	✔
Gripper origin sequence	GORGORD	1234 to 4321	1234	✔
Gripper origin priority	GORGPRI	0: AFTER, 1: BEFORE	0	✔
DeviceNet address ID	DEVADD	0 to 63	0	✔
DeviceNet baudrate	DEVCOM	0:125K, 1:250K, 2: 500K, 3: AUTO	0	✔
DeviceNet I/O type	DEVTYP	0: NORMAL, 1: COMPACT	0	✔
EtherNet/IP IP address	EIPADD	0.0.0.0 to 255.255.255.255	0.0.0.0	✔
EtherNet/IP subnet mask	EIPSUB	0.0.0.0 to 255.255.255.255	0.0.0.0	✔
EtherNet/IP default gateway	EIPDEF	0.0.0.0 to 255.255.255.255	0.0.0.0	✔
EtherNet/IP DHCP enable	EIPDHCP	0: INVALID, 1: VALID	0	✔
SIOW extension*	SIOWEXT	0: INVALID, 1: VALID	0	✔

* New setting values will be valid after turning off and on the power.

10.4 Controller parameters

Incremental mode control ‹INCMOD›

This parameter sets whether or not the robot is always put in the return-to-origin incomplete status when starting up this controller. Set "0: INVALID" in the case that there are axes whose return-to-origin method are set to "Mark". When this parameter is initialized, "0: INVALID" is set.

Setting	Meaning
0: INVALID	Holds the origin position information on absolute type axes even when the power is shut down.
1: VALID	Puts all axes in the return-to-origin incomplete status when turning on the power.

NOTE

- When this parameter is set to "VALID", all axes are always put in the return-to-origin incomplete status when turning on the controller.
- When using the absolute type axes without installing the absolute battery, set this parameter to "VALID".

MOVEI/DRIVEI start pos. ‹MOVIMD›

This parameter sets the operation when executing the relative motion command again after it has been stopped by the interlock or emergency stop. When this parameter is initialized, "0: KEEP" is set.

Setting	Meaning
0: KEEP	The previous motion continues. The target position before executing again does not change. When executing return-to-origin or absolute reset, the target position after the relative motion stop is reset.
1: RESET	The relative motion is newly performed from the current position. The target position before executing again will change.

MOVET start pos. ‹MOVTMD›

This parameter sets the operation when executing the MOVET command again after it has been stopped by the interlock or emergency stop. When this parameter is initialized, "0: KEEP" is set.

Setting	Meaning
0: KEEP	The previous motion continues. The target position before executing again does not change. When executing return-to-origin or absolute reset, the target position after the relative motion stop is reset.
1: RESET	The relative motion is newly performed from the current position. The target position before executing again will change.

Servo on when power on ‹SRVOON›

This parameter sets whether the controller starts in the servo on status or servo off status when starting up the controller. When this parameter is initialized, "0: INVALID" is set.

Setting	Meaning
0: INVALID	The controller always starts in the servo on status.
1: VALID	The controller starts in the servo on status. However, when the control authority is not released or the serial I/O setting is enabled, the controller starts in the servo on status.

Sequence flag ‹SEQFLG›

This parameter sets whether the controller executes the sequence program. When this parameter is initialized, "0: INVALID" is set.

Setting	Meaning
0: INVALID	The sequence program execution is not allowed.
1: VALID	The sequence program execution is allowed.
3: VALID & EMG-Reset	The sequence program execution, program reset and emergency stop release are allowed.

Safe mode flag ‹SAFEMODE›

The setting value saved in "7. Safety setting" in this Chapter will be stored into this parameter. As editing this may influence the robot setting, do not attempt to edit.

Permission to start program in origin non-completion ‹RUNINOIC›

This parameter sets whether the controller allows to execute the program in origin incomplete status. When this parameter is initialized, "0: INVALID" is set.

Setting	Meaning
0: INVALID	The program cannot be executed.
1: VALID	The program can be executed.

Permission to reset at controller boot ‹RSTATBOT›

This parameter sets whether the controller performs program reset when it starts. When this parameter is initialized, "0: INVALID" is set.

Setting	Meaning
0: INVALID	The program reset is not performed.
1: VALID	The program reset is performed.

Permission to reset at program start ‹RSTATRUN›

This parameter sets whether the controller performs program reset when the program starts. When this parameter is initialized, "0: INVALID" is set.

Setting	Meaning
0: INVALID	The program reset is not performed.
1: VALID	The program reset is performed.

Current program no. ‹CRNTPG›

This parameter sets the program number last executed to the task 1. When this parameter is initialized, "0" is set.

NOTE

Current program is the one that was executed last at task 1. Setting this number allows to register any programs. Furthermore, it is registered to task 1 at program resetting when the main program number is "0".

Main program no. ‹MAINPG›

This parameter sets the program number that is registered to the task 1 first at program resetting. When this parameter is initialized, "0" is set.

NOTE

Main program is the one that is registered to task 1 first at program resetting.
When the main program number is "0", the current program number is registered to the task 1 at program resetting.

INPUT/PRINT using channel ‹STDPRN›

This parameter sets the PRINT statement output destination channel and INPUT statement input origin channel. When this parameter is initialized, "1: PB" is set.

Setting	Meaning
1: PB	Programming box
2: CMU	RS232C port
3: ETH	Ethernet port

Emergency time ‹EMGTIM›

This parameter sets the longest servo control time at emergency stop. As editing this may influence the robot setting, do not attempt to edit.

Emergency time2 ‹EMGTIM2›

This parameter sets the longest servo control time when the power is shut off. As editing this may influence the robot setting, do not attempt to edit.

Debug start mode ‹DBGSTAMD›

This parameter sets whether the started program should be executed or stopped when the START statement is executed on the program step execution (debug). When this parameter is initialized, "0: LOAD" is set.

Setting	Meaning
0: LOAD	The started program is in stop status on the first line.
1: START	The started program is in executed status.

Break point stop mode ‹BRKSTPMD›

This parameter sets whether the break point stops only the relevant program or all the programs. When this parameter is initialized, "1: HOLD ALL" is set.

Setting	Meaning
0: HOLD	The program with the break point stops.
1: HOLD ALL	All the programs stop.

10.5 Robot parameters

Tip weight (kg) ‹WEIGHT›

The tip weight (workpiece weight + tool weight) of the robot is set in "kg" units. However, when the robots for which the tip weight is set are R6YXG120, R6YXG150, R6YXG180 or R6YXG220, the tip weight is set in "0.1kg" units.
The maximum value is determined by the robot model that has been set. When this parameter is initialized, the maximum value is set.
The acceleration value, etc., is set to the optimal valve according to the value of this parameter.

CAUTION

When a value lower than the actual tip weight is set, this may adversely affect the robot main body. Therefore, be sure to input a correct value.

NOTE

- The tip weight of the axes specified as auxiliary axis are set on the axis tip weight of the axis parameter.
- If both of Tip weight parameters; <WEIGHT> and <WEIGHTG> are set, a total value will be set.
  Example: WEIGHT = 2, WEIGHTG = 500; Tip weight = 2.5 kg (2500 g)

Tip weight (g) ‹WEIGHTG›

The tip weight (workpiece weight + tool weight) of the robot is set in "g" units.
When this parameter is initialized, the value of the tip weight will be set depending on the robot model.The maximum value is determined by the robot model that has been set.

CAUTION

When a value lower than the actual tip weight is set, this may adversely affect the robot main body. Therefore, be sure to input a correct value.

NOTE

- The tip weight of the axes specified as auxiliary axis are set on the axis tip weight of the axis parameter.
- If both of Tip weight parameters; <WEIGHT> and <WEIGHTG> are set, a total value will be set.
  Example: WEIGHT = 2, WEIGHTG = 500; Tip weight = 2.5 kg (2500 g

■ Origin sequence ‹ORGORD›

This parameter sets the order of return-to-origin operation using the axis number (1 to 6).
Axes perform return-to-origin operation in order from the left end. Axes that are not set finally perform return-to-origin operation at the same time. When this parameter is initialized, "312456" is set.

CAUTION

When performing return-to-origin of three or more axes with the return-to-origin method set at the stroke end method, the emergency stop may be activated.
At this time, change the stroke end return-to-origin method to simultaneous two axes or return-to-origin of each axis.

NOTE

- Perform return-to-origin operation from an axis that may interfere with a peripheral device.
- This order includes the robot axis and axillary axis.

When different position detection methods (absolute specifications or incremental specifications) are mixed in one robot, the order of return-to-origin operations may vary depending on the return-to-origin method.

Example:
Robot axis configuration: Axis 1, axis 2, axis 3, axis 4
Return-to-origin order setting: 312456
Position detection method of each axis: Axis 1, axis 2 ⇒ Incremental specifications
Axis 3, axis 4 ⇒ Absolute specifications

1. Return-to-origin operations of only the absolute type axes are performed.
Return-to-origin operations of only the absolute type axes are performed from the left end of the return-to-origin order setting in order.

3	→	1	→	2	→	4	→	5	→	6
Axis 3 operation		Axis 1 cancel		Axis 2 cancel		4 operation		Axis 5 cancel		Axis 6 cancel

2. Return-to-origin operations of only the incremental type axes are performed.
Return-to-origin operations of only the incremental type axes are performed from the left end of the return-to-origin order setting in order.

3	→	1	→	2	→	4	→	5	→	6
Axis 3 cancel		Axis 1 operation		Axis 2 operation		Axis 4 cancel		Axis 5 cancel		Axis 6 cancel

3. Return-to-origin operations of both the absolute type and incremental type axes are performed.
First, return-to-origin operations of the absolute type axes are performed from the left end of the return-to-origin order setting in order.
Subsequently, return-to-origin operations of the incremental type axes are performed in the same manner.

3	→	1	→	2	→	4	→	5	→	6
Axis 3 operation		Axis 1 cancel		Axis 2 cancel		Axis 4 operation		Axis 5 cancel		Axis 6 cancel
3	→	1	→	2	→	4	→	5	→	6
Axis 3 cancel		Axis 1 operation		Axis 2 operation		Axis 4 cancel		Axis 5 cancel		Axis 6 cancel

The actual example of return-to-origin operation is shown below.

	Programming box operation	PGM execution	IO operation	
	Key operation	Command *1	Input port	DI17 mode *2
Absolute specifications only	Impossible (possible by-axis)	ORIGIN 0, 2	DI17	ABS
Incremental specifications only	Impossible (possible by-axis)	ORIGIN 0, 1	DI14	ABS
Both specifications at the same time	"ALL"	ORIGIN 0, 0	DI17	ABS/ORG

*1 For details about ORIGIN command, refer to the YRCX programming manual.
*2 This is the DI17 mode setting of the control parameters.

R-axis orientation ‹RORIEN›

This parameter sets whether or not the R-axis orientation (posture) is held when performing jog operation on the Cartesian coordinates in the SCARA robot. When this parameter is initialized, "0: KEEP" is set.
When the orientation set at "KEEP", the R-axis automatically rotates to hold the current orientation if jog movement is performed on the Cartesian coordinates.

Setting	Meaning
0: KEEP	Keeps the R-axis orientation (posture).
1: FREE	Does not keep the R-axis orientation (posture).

NOTE
This parameter is invalid when the R-axis is set at the auxiliary axis.

Arm type at reset ‹ARMTYP›

This parameter sets the hand system that is selected at program reset. When this parameter is initialized, "0: NONE" is set.
When moving on the Cartesian coordinates in the SCARA robot or when performing coordinate conversion (pulse coordinates ⇔ Cartesian coordinates), the hand system setting becomes important.

Setting	Meaning
0: NONE	Keeps the hand system that was set before performing program reset.
1: RIGHT	Sets the hand system to the right-handed.
2: LEFT	Sets the hand system to the left-handed.

MOVE L coef. ‹CPACRAT›

This parameter sets the acceleration/ deceleration at linear interpolation, circular interpolation and PATH movement of the SCARA robots between 1 to 100%. When this parameter is initialized, "100" is set.
This coefficient obtains optimum efficiency when set to "100%" to the tip weight and SCARA R-axis moment of inertia.

CAUTION
If decreasing the acceleration coefficient, a period of stop time in response to the stop command by the STOP key or stop signal may become long.

NOTE
When the tip swings during robot movement acceleration/ deceleration, decrease this value to suppress the swing.

R axis inertia ‹SCRINR›

This parameter sets the moment of inertia for the R-axis of the SCARA robot. The unit is "kgm2 × 10-4".
When this parameter is initialized, "0" is set.

R axis inertia offset for SCARA ‹INROFST›

This parameter sets the distance that is offset from the rotation center of the R-axis to the gravity center of the tip weight. The unit is "0.001 mm".
This parameter is invalid for robots other than R6YXE series.
When this parameter is initialized, "0" is set.

10.6 Axis parameters

■ Plus (+) soft limit ‹PLMT+› Minus (-) soft limit ‹PLMT-›

This parameter sets the axis movement range using the upper limit value [plus (+) soft limit] and lower limit value [minus (-) soft limit]. When this parameter is initialized, the value unique to the model is set.
When performing point teaching or automatic operation, check that the specified point data is within the soft limit range.

WARNING

Be sure to set the soft limit inside the mechanical movement range (mechanical stopper) of the axis.

CAUTION

- **Since this parameter is important to determine the operating range, be sure to set the correct value.**
- **For the X-axis and Y-axis of the SCARA robot, make the setting so that the total of the plus (+) and minus (-) soft limit absolute values does not exceed 360 degrees. Otherwise, an error may occur in the coordinate conversion results.**
- **When return-to-origin is incomplete, the soft limits become invalid. Therefore, take great care when performing jog movement.**

NOTE

Input the soft limit value with the 0 to 9 keys, "." key, and "-" key.
When the value that is input with the keys is a real number (numeric value including a period), the unit is automatically converted into the pulse value.

■ Acceleration coefficient ‹ACCEL›

This parameter sets the acceleration/ deceleration during robot movement in a range of 1 to 100%. When this parameter is initialized, "100" is set.

CAUTION

When decreasing the acceleration coefficient, a period of stop time in response to the stop command by the STOP key or stop signal may become long. Take great care when using the robot with the acceleration coefficient decreased extremely.

NOTE

When the tip swings during robot movement acceleration/ deceleration, decrease this value to suppress the swing.

■ Deceleration rate ‹DECRAT›

This parameter sets the deceleration rate during robot movement in a range of 1 to 100% and sets the deceleration as the rate to acceleration. When this parameter is initialized, the value unique to the model is set.

CAUTION

When decreasing the deceleration rate, a period of stop time in response to the stop command by the STOP key or stop signal may become long. Take great care when using the robot with the deceleration rate decreased extremely.

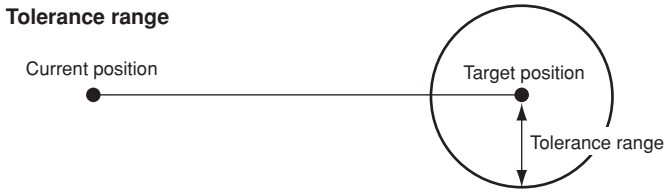
NOTE

- Set this parameter for changing only deceleration without decreasing acceleration.
- When the tip swings during robot movement deceleration, decrease this value to suppress the swing.

■ Tolerance ‹TOLE›

This parameter sets the positioning completion range to the target position when the robot moves. When this parameter is initialized, the value unique to the model is set.
When the current position of the robot enters the specified range, this is judged to the positioning completion.

NOTE
Input the tolerance value with the 0 to 9 keys, "." key, and "-" key.
When the value that is input with the keys is a real number (numeric value including a period), the unit is automatically converted into the pulse value.

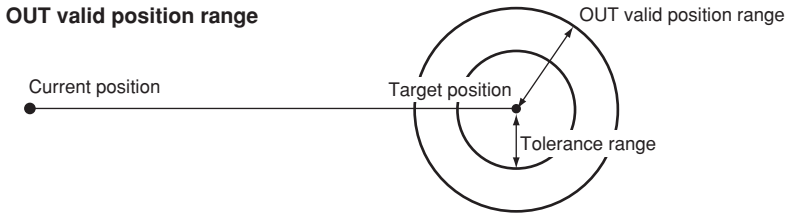


CAUTION
If the tolerance value is made small, a variation in robot positioning time may occur.

■ OUT position ‹OUTPOS›

This parameter sets the execution completion range to the target position when a movement command is executed. However, it applies to only the PTP motion.
When the current position of the robot enters the specified range, this is judged to the movement command execution completion. However, the movement to the target position continues. The larger the value is, the shorter the time until the next command executed is.
When executing the movement command continuously, the next movement command cannot be executed until the positioning is completed even when the previous movement command line has been completed.
When this parameter is initialized, the value unique to the model is set.

NOTE
Input the OUT valid position with the 0 to 9 keys, "." key, and "-" key. When the value input with the keys is a real number (numeric value including a period), the unit is converted into the pulse value.



CAUTION
If the tolerance value is larger than the OUT valid position value, both the command execution and positioning are completed when it enters the OUT valid position range.

■ CONT pulse ‹CONTPLS›

This parameter sets the execution completion range to the target position when the movement command specified as CONT option is executed in the program. However, this parameter applies to only the PTP motion. When this parameter is initialized, the value unique to the model is set.
When the current position of the robot enters the specified range, this is judged to the movement command execution completion. However, the movement to the target position continues. The larger the value is, the shorter the time until the next command execution is.
When executing the movement command continuously, the next movement command cannot be executed until the positioning is completed even when the previous movement command line has been completed.

CAUTION
The movement command is judged by the OUT valid position value when the CONT pulse value is "0". If the tolerance value is larger than the OUT valid position value, both the command execution and positioning are completed when it enters the OUT valid position range.

NOTE

Input the OUT valid position with the 0 to 9 keys, "." key, and "-" key. When the value input with the keys is a real number (numeric value including a period), the unit is converted into the pulse value.

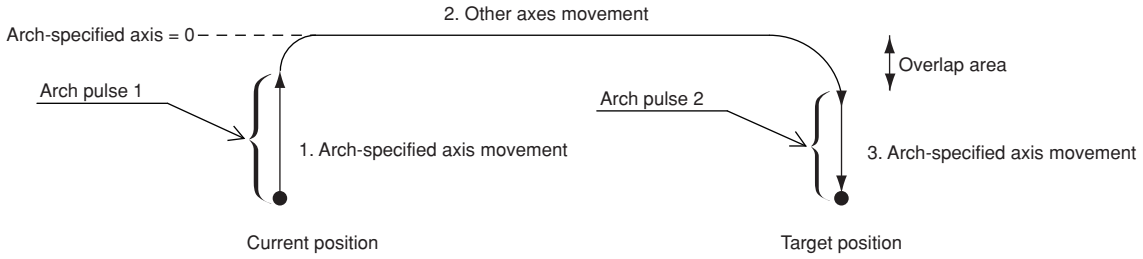
■ Arch pulse 1 ‹ARCHP1› Arch pulse 2 ‹ARCHP2›

This parameter sets the overlap area of the arch-specified axis and other axis movement when executing the arch motion that is an option of the PTP motion. When this parameter is initialized, "9999999" is set.
The smaller the value, the larger the overlap area during axis movement. As a result, the movement execution time can be reduced.
The value whose unit of the selected axis setting value was converted is shown.

NOTE

Input the arch pulse 1 and arch pulse 2 with the 0 to 9 keys, "." key, and "-" key. When the value input with the keys is a real number (numeric value including a period), the unit is converted into the pulse value.

Arch pulse



1. The arch-specified axis starts moving to the position specified by the option. ("1" shown in the figure above)
2. When the arch-specified axis moves arch pulse 1 value or more, other axes move to their target positions. ("2" shown in the figure above)
3. The arch-specified axis moves to the target position so that the remaining distance becomes arch pulse 2 when the movement of other axes is completed. ("3" shown in the figure above)
4. When all axes enter the OUT valid position range, the command is completed.

CAUTION

The tracking of the arch motion may vary depending on the movement speed. Check the interference check at actual robot operation speed.

■ Push speed ‹PSHSPD›

This parameter sets the movement speed rate in 1 to 100 [%] at executing PUSH statement.
• Neither "S" nor "DS" is set as an option in the PUSH statement:
Max. speed of a robot (mm/s or deg./s) x Pushing movement speed (%) x Auto. movement speed (%)
• "S" is set as an option in the PUSH statement:
Max. speed of a robot (mm/s or deg./s) x Pushing movement speed (%) x Auto. movement speed (%) x Program movement speed (%)
• "DS" is set as an option in the PUSH statement:
Max. speed of a robot (mm/s or deg./s) x Pushing movement speed (%) x Movement speed of an axis (%)
* Refer to the YRCX programming manual for details regarding the option settings of the PUSH statement.
When this parameter is initialized, "10" is set.

■ Push force ‹PSHFRC›

This parameter sets the pushing thrust in -1000 to 1000 [%] at executing PSHFRC statement.
Actual pushing thrust is as follows:
• Rated thrust x <pushing thrust> / 100
When this parameter is initialized, "100" is set.

■ Push time ‹PSHTIME›

This parameter sets the pushing time within 0 to 32767 [ms] at executing PSHTIME statement. Pushing time is counted in conditions as follows:
• The pushing time reaches the specified value.
• The axis movement speed lowers the pushing detection speed threshold.
When this parameter is initialized, "1000" is set.

Push judge speed ‹PSHJGSP›

The pushing time counting starts when the current axis movement speed lowers the rate specified in this parameter against command movement speed. When "0" is set, the judgement is invalid.
When this parameter is initialized, "0" is set.

Push method ‹PSHMTD›

This parameter sets the pushing control end detection at executing PUSH statement as follows:

0: The time for the pushing thrust to reach the specified value is totalized to execute the pushing control end detection.

1: The pushing control end detection is executed only when the pushing thrust continuously reaches the specified value. If the pushing thrust is lower than the specified value, the elapsed time is reset to "0".

When this parameter is initialized, "0: NORMAL" is set.

Manual acceleration ‹MANACC›

This parameter sets the acceleration coefficient during robot movement with the manual operation in a range of 1 to 100 [%]. When this parameter is initialized, "100" is set.

CAUTION

When decreasing the acceleration coefficient, a period of stop time in response to the stop command by the STOP key or stop signal may become long. Take great care when using the robot with the acceleration coefficient decreased extremely.

NOTE

When the tip swings during acceleration of the manual movement, decrease this value to suppress the swing.

Origin speed 1 ‹ORGVEL1›

This parameter sets the movement speed when performing return-to-origin. When this parameter is initialized, the value unique to the model is set for the incremental type axis and absolute type axis.

Origin speed 2 ‹ORGVEL2›

This parameter sets the stop speed in performing return-to-origin. When this parameter is initialized, the value unique to the model is set.

Speed after origin ‹ORGMVS›

This parameter sets the movement speed when moving to the return-to-origin position in a range of 1 to 100 [%]. When this parameter is initialized, the value unique to the model is set.

CAUTION

Actual movement speed is:
Maximum speed command (rpm) x Automatic operation speed (%) x Speed after origin (%)

Move position ‹ORGMVP›

This parameter sets the movement position after performing return-to-origin. When this parameter is initialized, the value unique to the model is set.

CAUTION

The axes that are set as mark method move to the "move position" after performing absolute reset in servo on status. After performing absolute reset in servo off status, they do not move to the "move position".

■ Origin shift ‹ORGSFT›

This parameter is used to correct the deviation amount of each axis if the work position deviates after the motor has been replaced and an impact has been applied. When this parameter is initialized, "0" is set.
Set the electrical deviation origin position amount to the mechanical origin position of the robot. The value of this parameter becomes the current motor position immediately after return-to-origin operation.
Example:
When the current position after moved to the work position before positional deviation is expressed by "A" pulse and the current position after moved to the work position after positional deviation is expressed by "B" pulse, input the value (A - B).

CAUTION
- **This parameter is important to determine the robot position.**
- **When this parameter is changed, the robot is put in the origin return incomplete status.**
- **This parameter is valid after performing absolute reset or return-to-origin.**
- **Setting incorrect values may cause of robot collision.**

■ Dual offset ‹DOFSET›

The dual offset is the function that controls two motor axes of the same models with one motor axis and adjusts the origin position of the sub axis to the main one. Refer to the YRCX operator's manual for details. When this parameter is initialized, "0" is set.

CAUTION
This parameter is used only for the robots which are prepared to use dual offset function.

■ Origin method ‹ORGMTD›

This parameter sets the return-to-origin method of the robot. When this parameter is initialized, the value unique to the model is set.

0: Mark method ..... Method to set the origin position, such as match mark by the user
1: Sensor method ..... Origin position detection method by inputting sensor
2: TORQUE (Stroke end method) ... Origin position detection method by the robot stroke end
3: ZR_TORQUE (ZR-stroke end method) ...
Origin position detection method by the specific robot stroke end
The origin position is detected by combining the Z and R-axis return-to-origin methods.

CAUTION
- **If the setting is changed without consulting, your distributor shall not be held responsible for any trouble arising from this setting change.**
- **When this parameter is changed, the robot is put in the origin return incomplete status.**

■ Origin direction ‹ORGDIR›

This parameter sets the movement direction when the robot performs return-to-origin. When this parameter is initialized, the value unique to the model is set.

0: Minus ... The minus (-) direction of the motor position is the return-to-origin direction.
1: Plus ... The plus (+) direction of the motor position is the return-to-origin direction.

CAUTION

• When any of the conditions shown below is satisfied, do not change the factory setting.

Conditions	Problem at setting change
The model is the F14H lead 5 mm.	When performing stroke end return-to-origin on the non-motor side, the origin position becomes unstable.

When the setting needs to be changed, contact your distributor.

• If the setting is changed without consulting, your distributor shall not be held responsible for any trouble arising from this setting change.

• When this parameter is changed, the robot is put in the origin return incomplete status.

■ Motor direction ‹MOTDIR›

This parameter sets the direction, in which the robot moves. When this parameter is initialized, the value unique to the model is set.

0: CW ... The motor CW direction is the minus (-) direction of the axis.
1: CCW ... The motor CCW direction is the minus (-) direction of the axis.

This parameter cannot be changed in the servo on status. To change the parameter, turn the servo off.
For details on the movement direction when the robot is operated to the minus direction by jog movement and the motor axis polarity is set to "0", refer to "Robot operation direction list" mentioned later in this Chapter.

CAUTION

• When any of the conditions shown below is satisfied, do not change the factory setting.

Conditions	Problem at setting change
The model is the F14H lead 5 mm.	When performing stroke end return-to-origin on the non-motor side, the origin position becomes unstable.

When the setting needs to be changed, contact your distributor.

• If the setting is changed without consulting, your distributor shall not be held responsible for any trouble arising from this setting change.

• When this parameter is changed, the robot is put in the origin return incomplete status.

■ Arm length ‹ARMLEN›

For SCARA type robots, this parameter sets the X and Y-arm lengths.
When this parameter is initialized, the unique value to the model is set. Additionally, this parameter is set automatically when setting the standard coordinates.

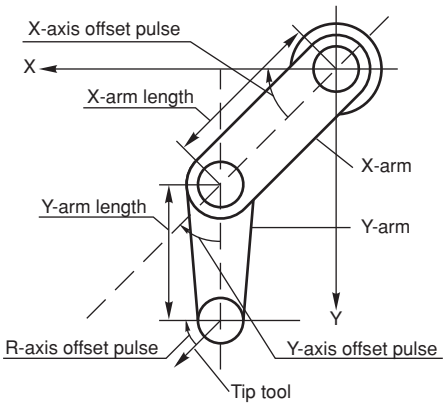
■ Offset pulse ‹OFFSET›

This parameter sets the angle to the arm posture or standard coordinate axis in the status where the X, Y, and R-axis motor positions of the SCARA robots are located at their "0"-pulse positions.

- X-axis offset pulse
  ... Angle formed by the plus (+) X-axis direction of the standard coordinates and the X-arm. (Unit: pulse)
- Y-axis offset pulse
  ... Angle formed by the X-arm and Y-arm. (Unit: pulse)
- R-axis offset pulse
  ... Angle formed by the plus (+) X-axis direction of the standard coordinates and the R-axis tip tool. (Unit: pulse)

When this parameter is initialized, "0" is set. Additionally, this parameter is set automatically when setting the standard coordinates.

"Offset pulse" setting



CAUTION

- **For SCARA type robots, coordinate conversion to the Cartesian coordinates is performed using the arm length and offset pulse. Therefore, be sure to set the correct offset pulse.**
- **When the data is input using this parameter (press in the input cursor display status), the standard coordinates are set.**

10.7 I/O parameters

DO at emergency stop ‹EMGCDO›

This parameter sets the DO/MO/LO/TO/SO port outputs to RESET/HOLD when the emergency stop is input. When this parameter is initialized, "1: IO_HOLD" is set.

Setting	Meaning
0: IO_RESET	Turns the DO/MO/LO/TO/SO port outputs OFF when the emergency stop is input to the controller.
1: IO_HOLD	Holds the DO/MO/LO/TO/SO port outputs when the emergency stop is input to the controller.

Error output (DO & SO) ‹ERPORT›

This parameter sets error outputs to the general-purpose output ports when an error occurred on the controller. The port number between 0 and 0277 (octal) can be used as an error output port. When this parameter is initialized, "0" is set.
Example: Set "0027" for inputting to DO27.
New setting value will be valid after turning off and on the power.

NOTE
- The alarms with category of message (alarm classification number is between 0 and 199) are excluded.
- The alarms that occur in online command or remote command with category of operation error (alarm classification number is between 200 and 399) are excluded.

Setting	Meaning
0	Outputs no error.
1 to 0277 (Octal)	Outputs an error from the port specified by DO or SO.

The general-purpose output used in error output is OFF in any case of follows:
1. Servo was turned on.
2. Program reset was executed.
3. Step execution, skip or next execution started.
4. Return-to-origin started.
5. Remote command was send.
6. Jog movement started with the programming box in manual mode.
7. Online command was executed.

Battery warning output (DO & SO) ‹BTALRM›

This parameter sets alarm outputs to the general-purpose output ports when an alarm related to memory battery or absolute battery occurs on the controller. The port number between 0 and 0277 (octal) can be used as an alarm output port. When this parameter is initialized, "0" is set.
New setting value will be valid after turning off and on the power.

Setting	Meaning
0	Outputs no battery alarm.
1 to 0277 (Octal)	Outputs a battery alarm from the port specified by DO or SO.

DIO noise cancel Num. ‹DIOCAN›

This parameter cancels the short pulse shape external input signals (dedicated input signals and general-purpose input signals). Unintended input signals, such as noise are prevented. Signals with length that does not satisfy the conditions (specified cycle x 0.25 ms) are determined to noise to be canceled. When this parameter is initialized, "1" is set.
* For input signals, input signals with 6 ms or longer on or off signal.

DO output at program reset ‹RESCDO›

This parameter sets the DO/MO/LO/TO/SO port outputs to RESET/HOLD when all programs are reset or the HALT ALL statement is executed. When this parameter is initialized, "0: IO_RESET" is set.

Setting	Meaning
0: IO_RESET	The DO/MO/LO/TO/SO port outputs are reset when executing any of the following operations. • All reset (RESETALL) is performed during automatic operation. • Dedicated input signal DI15 or SI15 (program reset) is turned on during program stop. • Any of the following data is initialized by selecting [System] → [Initialize]. ALL: All data PGM: Program data • Online command @RESET, @INIT PGM, @INIT ALL, @INIT MEM, or @SWI is executed. • HALTALL is executed in the program.
1: IO_HOLD	Even when any of the operations shown above is executed, the DO/MO/LO/TO/SO port outputs are not reset.

Remote command ‹RMTCMD›

This parameter sets VALID/INVALID of the remote command. When the option parameter "DeviceNet I/O type" is set to "COMPACT", the remote command cannot be used even when this parameter is set to "VALID". When this parameter is initialized, "1: VALID" is set.

Setting	Meaning
0: INVALID	Remote command cannot be used.
1: VALID	Remote command can be used.

DI17 mode ‹DI17MD›

This parameter sets the operation of the dedicated input DI17/SI17. When this parameter is initialized, "0: ABS" is set.

Setting	Meaning
0: ABS	When the DI17/SI17 signal is input, return-to-origin of the absolute type motor axis is performed For the incremental specifications, return-to-origin is performed by the DI14/SI14 input.
1: ABS_ORG	When the DI17/SI17 signal is input, return-to-origin of the absolute and incremental type axes is performed.

Indiv. Origin ‹IOORGMD›

This parameter sets axes to perform return-to-origin; all axes with return-to-origin input DI14 (for incremental axes) / DI17 (for absolute axes), or only specified axes. When this parameter is initialized, "0: INVALID" is set.

Setting	Meaning
0: INVALID	Performs return-to-origin on all axes.
1: VALID	Performs return-to-origin on the axes specified by "Axes sel. port (DI & SI)" or "Gripper origin axes select port (DI & SI)" parameter and the gripper only.

Axes sel. port (DI & SI) ‹IOORGIN›

This parameter sets ports which specify axes to perform return-to-origin when the "Indiv. Origin" parameter is set to "VALID". Axis 1 of robot 1 is "0" pit of specified port, then axes are allocated subsequently. When the number of axes exceeds 8, the next port is used to specify 16 axes maximum. When this parameter is initialized, "2" is set.

■ Done output port (DO & SO) ‹IOORGOUT›

This parameter sets ports to output the return-to-origin status of each axis. When the number of axes exceeds 8, the next port is used to specify 16 axes maximum. When this parameter is initialized, "0" is set. The return-to-origin status is not output when "0" is set.
New setting value will be valid after turning off and on the power.

■ Servo output port (DO & SO) ‹IOSRVOUT›

This parameter sets ports to output the servo status of each axis. When the number of axes exceeds 8, the next port is used to specify 16 axes maximum. When this parameter is initialized, "0" is set. The servo status is not output when "0" is set.
New setting value will be valid after turning off and on the power.

■ Gripper origin axes select port (DI & SI) ‹GRPORGIN›

This parameter sets ports which specify grippers to perform return-to-origin when the "Indiv. Origin" parameter is set to "VALID". When this parameter is initialized, "0" is set. Individual gripper return-to-origin is not performed when "0" is set.
New setting value will be valid after turning off and on the power.

■ Real time output ‹RTOENBL›

This parameter sets the real time output function enabled or disabled.
When this parameter is enabled, items registered in the real time output file are output into the word output area SOW(24) to (127). Update cycle is 10 ms.
Only EtherNet/IP and PROFINET support this function.
To use this parameter, the word IO area should be extended beforehand; set the option board parameter "SIOW extension" to "1: VALID"
Note that the realtime output setting (the registration int the real time output file) is performed on the editor of SCARA-YRCX Studio or via the remote commands.
When this parameter is initialized, "0: INVALID" is set.

NOTE
For details about the real time output function, refer to the remote I/O manual.

Setting	Meaning
0: INVALID	Disables the real time output function.
1: VALID	Enables the real time output function.

10.8 Option board related parameters

■ Option board enable ‹OPTENBL›

This parameter sets the option DIO (PNP specifications and NPN specifications) enabled or disabled. When this parameter is initialized, "1: VALID" is set.
New setting value will be valid after turning off and on the power.

Setting	Meaning
0: INVALID	Disables the option DIO.
1: VALID	Enables the option DIO.

Parallel IO ID ‹DIOID›

This parameter sets allocate order to DIO in numeric value when several parallel I/O boards are inserted. When this parameter is initialized, "1234" is set.
The numbers 1 to 4 correspond to the inserted parallel I/O board ID in the option board number order. The board corresponded the number allocates ID to DIO in order from the left. In the case of normal I/O board, the ID is always "1" no matter what is set.
Example:

Option board configuration	1: Dedicated parallel I/O board 2: General-purpose parallel I/O board 1 4: General-purpose parallel I/O board 2
Parallel I/O ID setting	3214
DI0 to DI3, DO0 to DO2	Dedicated parallel I/O board
DI4 to DI7, DO3 to DO5	General-purpose parallel I/O board 2
DI8 to DI11, DO6 to DO8	General-purpose parallel I/O board 1

PROFIBUS station address ‹PBUSADD›

This parameter sets the station number (the identifier to each node of the PROFIBUS) of the PROFIBUS-corresponding unit. The setting range is between 1 and 125. When this parameter is initialized, "125" is set.
New setting value will be valid after turning off and on the power.

Gripper servo when emergency stop ‹GEMGMD›

This parameter sets the gripper servo status when the emergency stop button is pressed. When this parameter is initialized, "1: ON" is set.

Setting	Meaning
0: OFF	The remote command cannot be used.
1: ON	The gripper servo is not turned off when the emergency button is pressed. Therefore, the gripper keeps to grip the workpiece.

Include Gripper in Origin ‹GORGMD›

This parameter sets whether the gripper is added to the axes when return-to-origin operation of the entire robot. When this parameter is initialized, "1: YES" is set.
The following operations enable this parameter:

- Return-to-origin by DI14 or DI17
- Return-to-origin by the programming language (ORIGIN)
- Return-to-origin by remote command

Setting	Meaning
0: NO	The gripper is not added to the axes to be performed return-to-origin. * Executes the online command @GORIGIN to perform return-to-origin of the gripper.
1: YES	The gripper is added to the axes to be performed return-to-origin.

Manual Holding of Gripper ‹GMHLMD›

This parameter sets whether the gripper holds the workpiece by the jog movement online command (@GJOG, @GJOGXY). When this parameter is initialized, "1: VALID" is set.

Setting	Meaning
0: INVALID	The jog movement online command (@GJOG, @GJOGXY) is INVALID. If the gripper holds the workpiece, "26.801: Gripper over load" alarm occurs.
1: VALID	The jog movement online command (@GJOG, @GJOGXY) is VALID.

Gripper origin sequence ‹GORGORD›

This parameter sets the order of return-to-origin for the gripper to decide the motor position. When this parameter is initialized, "1234" is set, and each number is corresponding to the gripper numbers.
Return-to-origin operations of the grippers are performed from the left end of the return-to-origin order setting in order. The grippers without setting perform return-to-origin simultaneously at last.

Gripper origin priority ‹GORGPRI›

This parameter sets the timing of performing return-to-origin of the gripper. When this parameter is initialized, "0: AFTER" is set.

Setting	Meaning
0: AFTER	Return-to-origin of the gripper is performed after all the robots return-to-origin.
1: BEFORE	Return-to-origin of the gripper is performed before all the robots return-to-origin.

DeviceNet address ID ‹DEVADD›

This parameter sets the DeviceNet station number. When this parameter is initialized, "0" is set.

DeviceNet baudrate ‹DEVCOM›

This parameter sets the DeviceNet baud rate. When this parameter is initialized, "0: 125kbps" is set.

Setting	Meaning
0	125kbps
1	250kbps
2	500kbps
3	Auto

DeviceNet I/O type ‹DEVTYP›

This parameter selects the number of channels shared by the DeviceNet applicable unit from "Normal" or "Compact".
When "Normal" is selected, each of the input and output shares 24CH (I/O including word data).
When "Compact" is selected, each of the input and output shares 2CH (dedicated/ general-purpose I/O).
When this parameter is initialized, "0: DEV_NORMAL" is set.

Setting	Meaning
0	DEV_NORMAL
1	DEV_COMPACT

EtherNet/IP IP address ‹EIPADD›

This parameter sets the IP address. When this parameter is initialized, "0.0.0.0" is set.

EtherNet/IP subnet mask ‹EIPSUB›

This parameter sets the subnet mask. When this parameter is initialized, "0.0.0.0" is set.

EtherNet/IP default gateway ‹EIPDEF›

This parameter sets the gateway. When this parameter is initialized, "0.0.0.0" is set.

EtherNet/IP DHCP enable ‹EIPDHCP›

This parameter sets the DHCP function VALID or INVALID.
Set this parameter to "VALID" when assigning the IP address, etc. from the host unit. When this parameter is initialized, "0: INVALID" is set.

Setting	Meaning
0	INVALID
1	VALID

* When the DHCP function is valid, the setting value of IP address, subnet mask and gateway is "0.0.0.0".

SIOW extension ‹SIOWEXT›

This parameter sets the SIOW extension enabled od disabled.
When this parameter is enabled, the word IO area in the field network is extended to use SIW(24)-(127) and SOW(24)-(127) as the general IO ports.
Only EtherNet/IP and PROFINET support this function.
When this parameter is initialized, "0: INVALID" is set.

NOTE

- To use the real time output function, enable this paramenter and extend the word IO area.
- For details about the SIOW extension function, refer to the relevant field network manual.

CAUTION

- **When using the unsupported field network, this parameter is not shown on SCARA-YRCX Studio.**
- **Even if you use the field network that supports the SIOW extension, the communication cannot be established unless you use the setting file that supports SIOW extension and set the PLC correctly.**

Setting	Meaning
0	INVALID
1	VALID

Chapter 8 Periodic inspection

1. Before carrying out work

In order to operate the robot system safely and more efficiently, carry out the periodic inspection and maintenance. This section describes how to carry out periodic inspections on the controller. Before carrying out the inspection, carefully read and follow the instructions in this chapter and in Chapter 1 "Using the robot safely".

2. Maintenance parts

■ Consumable parts

Part name	Part No.	Remarks
Fan filter	KCX-M427G-00	5 pieces / bag
Absolute battery	KCA-M53G0-01	3.6 V 2750 mAh
Memory battery	KAS-M53G0-01	3.0 V 850 mAh

3. Periodic inspections

3.1 Daily inspections

The following inspections must be performed on a daily basis before and after robot operation.

1. Inspections carried out with the power turned off

WARNING
- **Turn off the power source when performing inspections.**
- **Display such as "During operation" sign to warn other users not to turn on the controller power.**

Inspect the below items.

Inspection item	Inspection details
Ground terminal	Verify that the terminal is not loose. Tighten where necessary.
Power connector	Check that the power connector is not loose. Tighten and connect securely where necessary.
Power cable	Check that the power cable is securely connected to the power connector. Connect securely where necessary.
Robot cable	Check that the robot cable is securely connected to the controller. Connect securely where necessary.
Other cables	Check for damage to cables, excessive bending and loose connectors.

2. Inspections carried out with the power turned on

WARNING
- **Check that no one is inside the robot movement range before turning the controller power on.**
- **Display such as "During operation" sign to warn other users not to use the controller, programming box or control panel.**

Inspect the below items from outside the safety enclosure.

Inspection area	Inspection details
Safety enclosure	Check if it is in the correct position. Is an emergency stop executed when the door is opened?
Emergency stop device	Check if an emergency stop is executed when the device is operated.
Mode switching device	Check if the mode switches correctly when the device is operated.
Robot motion	Check for unusual motion, vibrations or sounds.

3.2 Three-month inspections

Check the fan filter on the back of the controller for dirt and damage.

WARNING

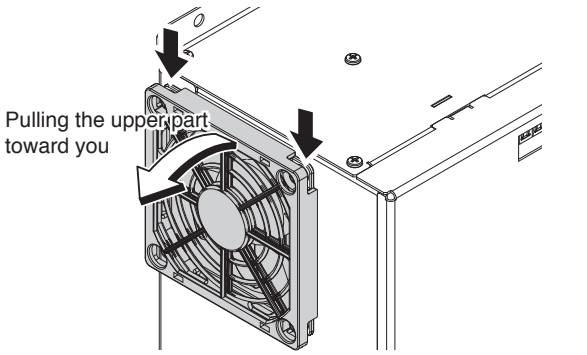
Turn off the primary power source or the power on the controller inside the control panel.

Step 1 ***Remove the filter cover.***
The filter cover is fixed to the controller with nails in four places.
Insert fingers into the two gaps located in the upper corners of the filter and pull towards you.

Step 2 ***Check the fan filter for dirt and damage.***
Replace the filter if it is dirty or is damaged.

Step 3 ***Attach the filter cover.***
After attaching the filter cover, check that the all four of the fixing nails are fastened securely.

Step 1 Removing the filter cover



CAUTION

Do not loosen the screws that secure the fan cover, otherwise malfunction may occur.

4. Replacing the absolute battery

The absolute battery is a consumable part. If a sign of low battery (warning message) occurs, this is determined as expiration of the battery service life, and replace the absolute battery.
Depending on the operating conditions, the reference for battery replacement is that the total power off time after the battery has been connected to the controller reaches about 8,000 hours (about one year).

WARNING

To avoid danger, never replace the absolute battery in servo on status. Otherwise electrical shock, robot abnormal operation or controller malfunction may occur.

NOTE

For details about how to replace the absolute battery, refer to "4. Connecting the absolute battery" in Chapter 3.

5. Replacing the memory battery

The memory battery is a consumable part. If a trouble occurs in the backup data retention, this is determined as expiration of the battery service life, and replace the memory battery.
Depending on the operating conditions, the reference for battery replacement is that the total power off time reaches about four years.

CAUTION

- **If the memory battery is removed, the data files (program, point, point comment, parameter, shift, hand, and pallet, etc.) saved inside the controller will be lost. Therefore, be sure to save the data into an external storage device before performing the replacement work.**
- **After the battery replacement work has been completed, load the data that has been saved into the external storage device into the controller.**
- **When replacing the memory battery, the robot is put in the return-to-origin incomplete status. Be sure to perform return-to-origin after the battery replacement**

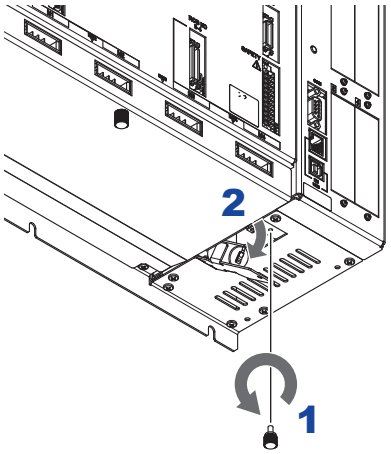
■ Replacing the memory battery

Step 1 *Loosen the knob on the bottom.*

Step 2 *Remove the bottom cover, to which the memory battery is secured.*

Step 3 *Disconnect the memory battery connector from the controller main body.*

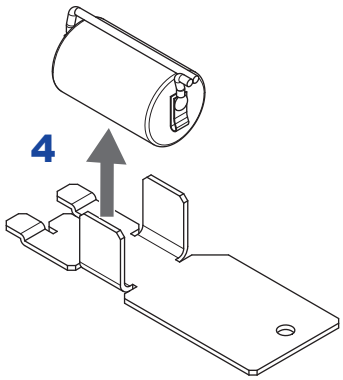
▶ **Step 1-2**



Step 4 *Remove the memory battery from the bottom cover and replace it with a new one.*

Step 5 *Install the new battery in the reverse order of removal.*

▶ **Step 4**



Chapter 9 Specifications

1. Controller

1.1 Specifications

Basic specifications	Connected motor capacity		1600 W or less (in total for 4 axes)
	Power capacity		2500 VA
	Dimensions		W355 × H195 × D130 (main unit)
	Weight		6.2kg (main unit)
	Power supply voltage		Single phase 200 to 230 V AC ±10%, 50/60 Hz
Axis control	Number of controllable axes		4 axes maximum (simultaneous control: 6 axes) Up to 16 axes (4 robots) can be expanded through the controller link.
	Drive method		AC full digital servo
	Position detection method		Resolver, Magnetic linear scale
	Control method		PTP motion (Point to Point), ARCH motion, linear interpolation, circular interpolation
	Coordinate systems		Joint coordinates, Cartesian coordinates
	Position display units		Pulses, millimeters (1/1000 increments), degrees (1/1000 increments)
	Speed setting		0.01-100%, (setting for less than 1% possible with the commands execution)
	Acceleration/deceleration setting		Optimization based on robot model and tip weight parameter Setting with accel coefficient and decel. rate parameters (1% steps) *Can be changed by programming. Zone control (Optimum acceleration setting matching SCARA robot arm position)
Programming	Program language		PSEUDO-BASIC (conforming to JIS B8439 (SLIM language))
	Multitask		16 tasks maximum
	Sequence program		1 program
	Memory size		2.1 MB (Total of program and point data) (Available size for program when the maximum of point is used: 300 KB)
	Program		100 programs (maximum number of programs) 9999 lines (maximum lines per program)
	Point		30000 points (maximum number of points)
	Point teaching		MDI (coordinate value input), direct teaching, teaching playback, offline teaching (data input from external device)
	System backup (Internal memory backup)		Lithium battery (service life about 4 years at 0 to 40°C)
	Internal flash memory		512 KB
External I/O	SAFETY	Input	Emergency stop input, 2 systems AUTO mode input, 2 systems (valid only for the CE specifications)
		Output	Emergency stop contact output, 2 systems Enable contact output, 2 systems (valid only when using the PBEX) Motor power ready output, 2 systems
	Break output		Transistor output (PNP open-collector)
	Origin sensor input		Connectable to 24 V DC NC contact (normally closed) sensor
	External communications		RS-232C : 1 CH (D-SUB 9-pin female connector) Ethernet : 1CH (IEEE802.3u/IEEE802.3 compliance) 100Mbps/10Mbps (100BASE-TX/10BASE-T) Applicable to Auto Negotiation RS-422 : 1CH (dedicated to the programming box)
General specifications	Operating temperature		0 to 40 °C
	Storage temperature		-10 to 65 °C
	Operating humidity		35 to 85% RH (no condensation)
	Noise immunity		Conforms to IEC61000-4-4 Level 3
	Protective structure		IP20
	Protection class		I

Option	Option board*	Parallel I/O board	Standard specifications	Dedicated input 8 points, dedicated output 9 points General-purpose input 16 points, general-purpose output 8 points (Max. 1 board, NPN/PNP specifications)
			Expanded specifications	General-purpose input 24 points, general-purpose output 16 points (Max. 4 boards, NPN/PNP specifications)
		DeviceNet board		Remote I/O Dedicated I/O: 16 points each General-purpose I/O: 96 points each Remote register I/O: 16 words each
		EtherNet I/P board		
		PROFIBUS board		
		PROFINET board		
		YC-Link/E board (Master/Slave)		Communication cycle: 1ms, Control cycle: Min. 1ms/Max. 8ms, Max. number of robots: 4 Max. number of controllable axes: 16 in total (including 4 axes of the master controller) Max. 12 only when using the slave
		Tracking board		Number of connected encoders: Max. 2, Applicable encoder: 26LS31/26C31 or equivalent line driver (RS422 compliance) Encoder power supply: 5VDC (Total of less than 500mA for both channels) (Supplied from controller)
	Programming box			PBEX (with enable switch)
	Absolute battery			3.6 V, 2750 mAH/axis Backup retention time: about 1 year
	PC software			SCARA-YRCX Studio

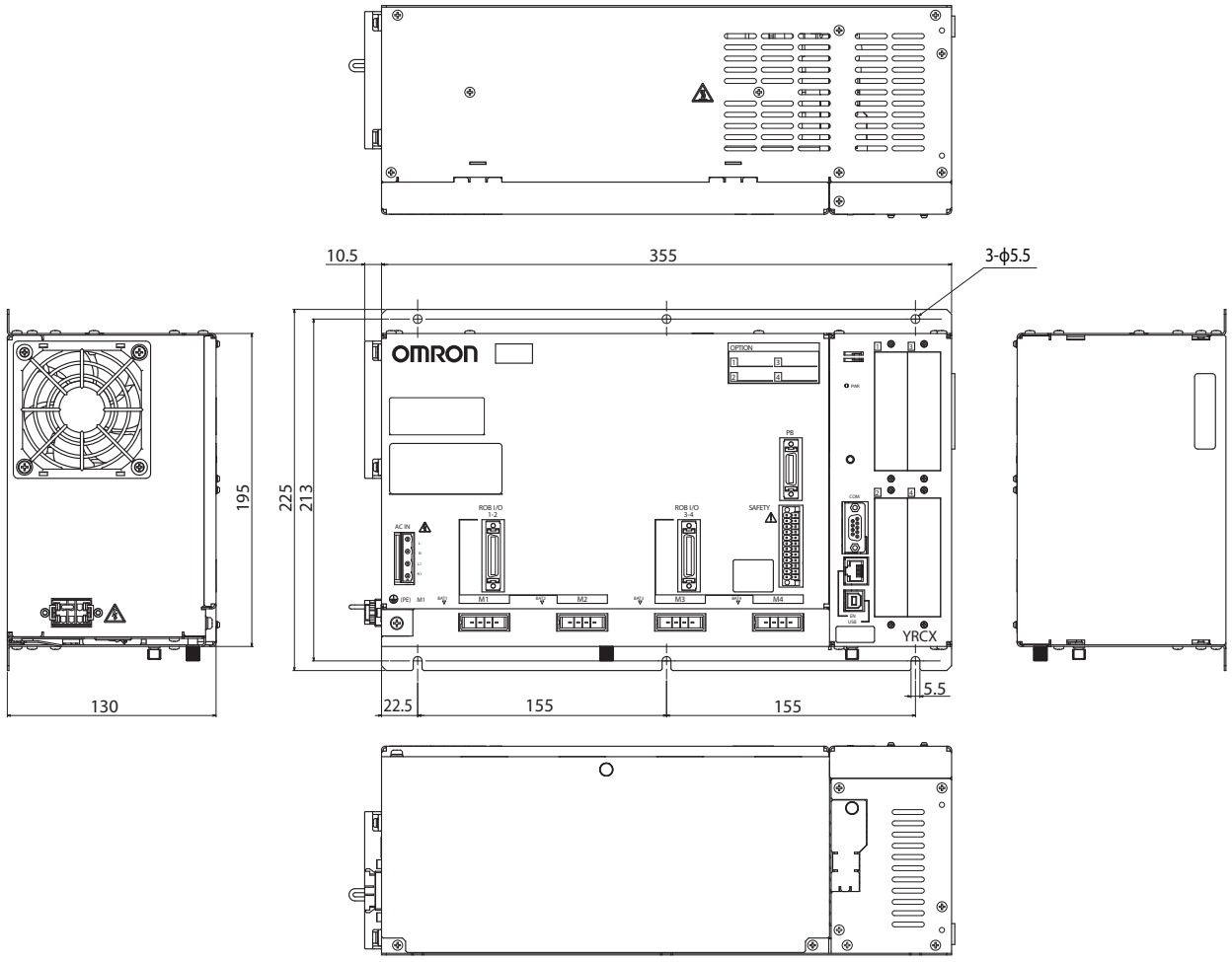
*The number of the option board slots which can be attached is max.4.

1.2 Basic functions

Function	Description
Operation modes	AUTO mode (Major functions: program creation, program execution, step execution, etc.) MANUAL mode (Major functions: jog movement, point data teaching, parameter editing, etc.)
Commands	Array declaration commands (DIM statement) Assignment commands (Numeric assignment, character string assignment, point definition statements, etc.) Movement commands (MOVE, DRIVE, PMOVE statements, etc.) Conditional branching commands (IF, FOR, WHILE statements, etc.) External output commands (DO, MO, LO, TO, SO statements) Parameter commands (ACCEL, OUTPOS, TOLE statements, etc.) Condition wait command (WAIT statement) Task related commands (START, SUSPEND, CUT statements, etc.) etc.
Functions	Arithmetic functions (SIN, COS, TAN functions, etc.) Character string functions (STR$, LEFT$, MID$, RIGHT$ functions, etc.) Point functions (WHERE, JTOXY, XYTOJ functions, etc.) Parameter functions (ACCEL, OUTPOS, TOLE statements, etc.) etc.
Variables	Simple variables (integer variables, real variables, character variables) Array variables (integer variables, real variables, character variables) Point variables Shift variables I/O variables etc.
Arithmetic operation	Arithmetic operators (+, -, *, /, MOD) Logic operators (AND, OR, XOR) Relational operators (=, <, >, <>, <=, >=)
Monitor	I/O status monitor (200 ms intervals)
Online commands	Program operation commands (RUN, STOP, RESET, STEP, etc.) Utility commands (COPY, ERA, INIT, etc.) Data handling commands (READ, WRITE, etc.) Robot language commands (independent-executable commands)
Data files	Program, point, parameter, shift, hand, all, error history etc.
Internal timer	Timer count variable (TCOUNTER), 1 ms interval
Program break points	Max. 32 points

1.3 External view

YRCX external view



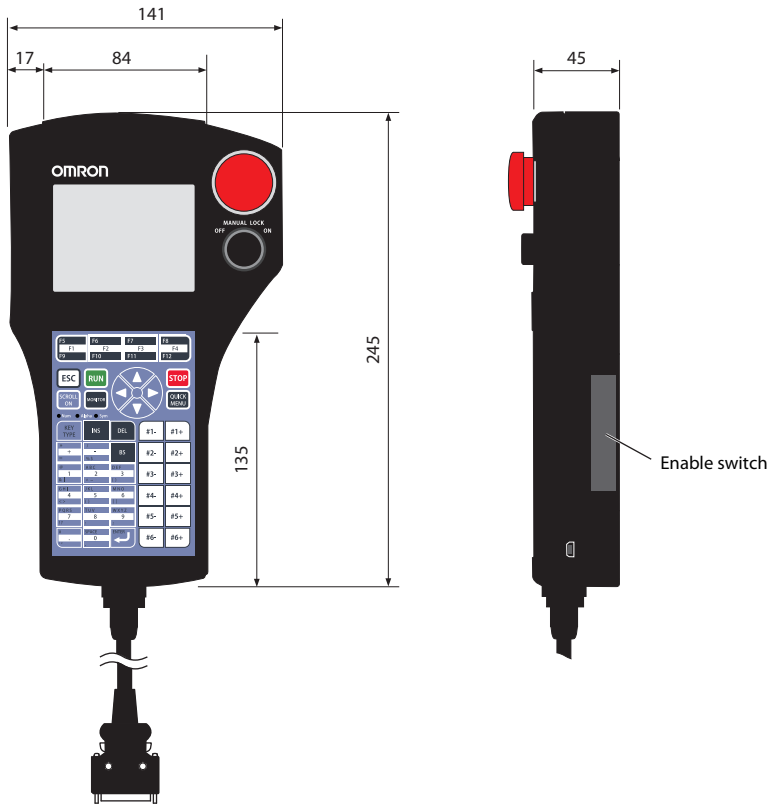
2. Programming box

2.1 Basic specifications

■ Programming box basic specifications

Item	PBEX
Display screen	Color LCD (320 × 240 dot)
Emergency stop button	Normally-closed contract (with lock function)
Enable switch	3-position type
Manual lock selector switch	90°, 2-notch
Power	+12 VDC
Operating environment	Ambient temperature for use: 0 to 40 °C, Ambient temperature for storage: -10 to 60 °C, Humidity: 35% to 80% (no condensation)
Dimensions (mm)	W141 × H245 × D45 (excluding projecting parts)
Cable length	5 m or 12 m（Select either）
Weight	460 g (excluding the cable)

2.2 External view



Troubleshooting

1. When trouble occurs

Please contact your distributor and report the following items in as much detail as possible.

Item	Description
What happened	• Controller model name and serial number example: YRCX • Robot model name and serial number example: R6YXG500 • Controller version No. example: V1.46
When	• Date of purchase example: January 2020 • Period of use example: Since delivery, about 1 year
Under what conditions	• Usage conditions example: when power is turned on when creating program during jog movement when robot is moved to particular location during program operation
Current status is	• Programming box screen status example: Nothing is displayed on screen Error message appears on screen • Robot servo status example: Servo won't turn on. Abnormal sound occurs when robot is moved. Return-to-origin is incomplete. • Programming box operating status example: Keys won't function. Response after pressing key is slow. Only the emergency stop button functions. etc.
How often it happens	• How often above problem occurs example: Always occurs when power is turned on. Occurs at particular line during program operation. Only occurs once, then does not occur again.

NOTE

When the programming box is connected, the error message appearing on the screen is a valuable source of information for troubleshooting.

2. Acquiring the alarm information

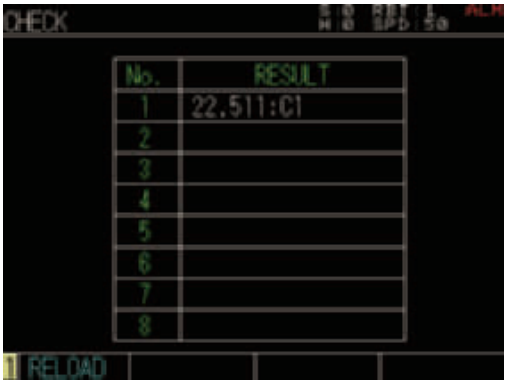
The controller stores the alarm information in its inside. You can check the current controller error status and past alarm history data.

2.1 Checking the alarm occurrence status

■ Checking the alarm with the programming box

Select [System] - [Check] from the initial screen.
If an alarm occurs, relevant alarm code will appear.

Checking the alarm occurrence status



■ Checking the alarm through the RS-232C or Ethernet

Step 1 ***Connect the controller and personal computer.***

Connect the controller and personal computer with the RS-232C cable or Ethernet cable (category 5 or higher) and set the communication conditions so that the online command can be set.

Step 2 ***Check the alarm status.***

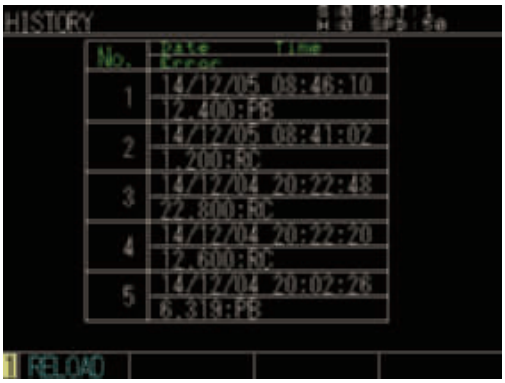
Send the command "@READ SCK" from the personal computer.
The alarm code is received when an alarm occurs. No alarm code is received when any alarm does not occur.

2.2 Checking the alarm history

■ Checking the alarm history with the programming box

Select [System] - [History] from the initial screen.

Checking the alarm history



The alarms that occurred past will appear.
Up to 500 alarm records can be checked.

■ Checking the alarm through the RS-232C or Ethernet

Step 1 ***Connect the controller and personal computer.***

Connect the controller and personal computer with the RS-232C cable or Ethernet cable (category 5 or higher) and set the communication conditions so that the online command can be set.

Step 2 ***Check the alarm status.***

Send the command "@READ LOG" from the personal computer, and the alarm status is received when an alarm occurs.
Up to 500 alarm records can be checked.

3. Troubleshooting checkpoints

3.1 Installation and power supply

	Symptom	Possible cause	Check items	Corrective action
1	The controller was not turned on even though the power was supplied.	• Power is not supplied. • Problem occurred in the controller internal power supply.	• Check power input terminal connection (L/N/L1/N1). • Check power input terminal voltage (L/N/L1/N1). • Check if "PWR" LED on front panel is lit.	• Connect the power input terminal correctly. • Supply the specified power voltage. • Replace the controller.
2	The programming box is not displayed even though the controller is turned on.	• The programming box is not connected. • The programming box connection is incorrect. • Malfunction occurred in the programming box. • Problem occurred in controller internal power supply.	• Check the PB connector. • Check how the PB connector is inserted. • Replace the programming box and check operation.	• Plug in the PB connector correctly. • Replace the programming box. • Replace the controller.
3	Although the controller turns on, the alarm number is displayed on the 7-segment LED on the front.	• The controller is now in emergency stop status.	• Connect the programming box and check the alarm using self-diagnosis. • Check the DO00 (Output of emergency stop input status) on the "MONITOR" screen displayed on the programming box.	• Release the emergency stop button on the programming box. • Connect the PB connector. • Connect the emergency stop terminal of the SAFETY connector.
		• An alarm with alarm group number 17 occurred.	• Connect the programming box and check the alarm using self-diagnosis.	• Check the axis from the alarm information. • Check the cause from the alarm information. • Take the corrective action.
		• An alarm with alarm group number 21 or 22 occurred.	• Connect the programming box and check the alarm using self-diagnosis.	• Check the cause from the alarm information. • Take the corrective action.

3.2 Robot operation

	Symptom	Possible cause	Check items	Corrective action
1	Although the controller turns on, program and jog movement cannot be executed.	• Stop signal is in the open status.	• Check the I/O interface connector stop signal and 24V-power supply connections. • Check DI06 (stop) on the "MONITOR" screen displayed on the programming box.	• Connect the power input terminal correctly. • Supply the specified power voltage. • Replace the controller.
		• The controller is now in emergency stop status.	• Connect the programming box and check the alarm using self-diagnosis. • Check DO00 (Output of emergency stop input status) on the "MONITOR" screen displayed on the programming box.	• Release the emergency stop button on the programming box. • Connect the PB connector. • Connect the emergency stop terminal of the SAFETY connector.
		• An alarm occurred.	• Connect the programming box and check the alarm using self-diagnosis. • Check the 7-segment LED display on the front of the controller.	• Check the cause from the alarm information. • Take the corrective action.
2	An abnormal sound or vibration occurred.	• The robot or axis type setting is incorrect.	• Connect the programming box and check the robot settings in SYSTEM mode. • Check if the robot and controller are compatible.	• Correct the robot or axis type setting. • Make sure the robot and controller are compatible.
		• The tip weight or acceleration settings is incorrect.	• Check the tip weight parameter setting in EDIT. • Check the acceleration parameter setting in SYSTEM. • Check the command setting of changing the tip weight or acceleration in program language.	• Set a correct tip weight parameter. • Set a correct acceleration parameter. • Make a correct setting in the program language.
		• A mechanical problem occurred.	• Check for resonance in the robot frame. • Check for the loose screws on robot cover. • Check for warping or damage on guides or ball screws.	• Reinforce the robot frame. • Tighten the robot cover screws. • Remove foreign matter if found. • Replace guides or ball screws if warping or damage is found.
		• The controller is defective.	• Replace with another controller and check operation.	• Replace the controller if operation is normal.
3	A position deviation occurred.*	• The position sensor device is defective. • The cable is defective.	• Move the axis in emergency stop and check the pulse count.	• Replace the motor if count is incorrect. • Replace the cable if found to be defective.
		• A position detection error due to noise.	• Check grounding of the robot and controller. • Check the robot periphery for noise. • Check for noise sources around ROB I/O cable.	• Ground the robot and controller. • Isolate from the noise sources around the robot. • Isolate from the noise sources around ROB I/O cable.
		• A mechanical error occurred.	• Check the belt tension. • Check for warping or damage on the guides or ball screws.	• Adjust to correct tension if necessary. • Remove the foreign matter if found. • Replace the guides or ball screws if warping or damage is found.
		• The controller is defective.	• Replace the controller and check operation.	• Replace the controller if operation is normal.

* There are two main types of position deviation.
1. Electrical position deviation 2. Mechanical position deviation
In the case of 1, the robot can move back to the original position by return-to-origin operation after position deviation, which does not correspond in the case of 2.

3.3 I/O

	Symptom	Possible cause	Check items	Corrective action
1	The command does not work even when the dedicated input signal is supplied.	• No 24 V DC is supplied.	• Check the I/O interface connector stop signal and 24V-power supply connections. • Check DI06 (stop) on the "MONITOR" screen displayed on the programming box.	• Supply 24 V DC.
		• A problem in signal connection occurred.	• Check the I/O interface connector wiring.	• Correct the I/O interface connector wiring.
		• An alarm occurred.	• Connect the programming box and check the alarm by using self-diagnosis. • Check the 7-segment LED display on the front of the controller.	• Check the cause from the alarm information. • Take the corrective action.
2	The dedicated output signal is not output.	• No 24 V DC is supplied.	• Check the I/O interface connector 24V-power supply connections. • Check DI04 on the "MONITOR" screen displayed on the programming box.	• Supply 24 V DC.
		• A problem in signal connection occurred.	• Check the I/O interface connector wiring.	• Correct the I/O interface connector wiring.
		• An alarm occurred.	• Connect the programming box and check the alarm by using self-diagnosis. • Check the 7-segment LED display on the front of the controller.	• Check the cause from the alarm information. • Take the corrective action.
3	The general-purpose I/O signal is not output.	• No 24 V DC is supplied.	• Check the I/O interface connector 24V-power supply connections. • Check DI04 on the "MONITOR" screen displayed on the programming box. • Check the I/O interface 24V-power supply connection.	• Supply 24 V DC.
		• A problem in signal connection occurred.	• Check the I/O interface connector wiring.	• Correct the I/O interface connector wiring.
		• A problem in I/O interface setting occurred.	• Check the ID setting of the I/O interface.	• Correct the ID setting of the I/O interface.
		• An alarm occurred.	• Connect the programming box and check the alarm by using self-diagnosis. • Check the 7-segment LED display on the front of the controller.	• Check the cause from the alarm information. • Take the corrective action.

4. Alarm messages

When an alarm occurs, an alarm code (alarm group number, alarm classification number and occurrence location) and an alarm message) is displayed on the programming box screen.
The 7-segment LED on the front of the controller alternately displays "E+ alarm group number" and "alarm classification number"

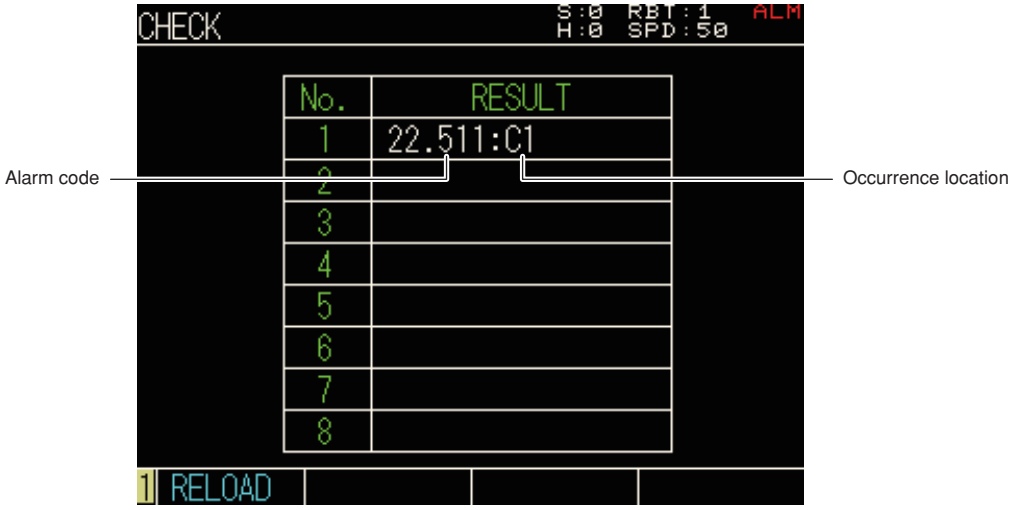
The alarm code consists of two elements, "group" and "classification". Each code is classified as follows.

XX. YYY

Classification number ・・・Classified by the axis operation or resetting procedure if an alarm occurs.

Group number ・・・Classified into groups [0] to [30] according to the alarm contents.

■ Checking the alarm occurrence status



1. Alarm group number list

The alarm message is classified into groups [0] to [30] according to the alarm contents.
The contents of each group are shown below.

Group number	Contents
[0]	Operation messages
[1]	System events
[2]	Alarm related to the robot movement range
[3]	Alarm related to the program file operation
[4]	Alarm related to the data input
[5]	Operation alarm related to the syntax of the robot language (compile)
[6]	Alarm related to the robot language execution
[7]	(Not used.)
[8]	(Not used.)
[9]	Alarm related to the memory
[10]	Alarm related to the environment and general hardware
[11]	(Not used.)
[12]	Alarm related to the option board
[13]	(Not used.)
[14]	Alarm related to the communication
[15]	(Not used.)
[16]	(Not used.)
[17]	Alarm related to the motor control
[18]	(Not used.)
[19]	Alarm related to the YC-Link/E
[20]	(Not used.)
[21]	Serious software alarm
[22]	Serious hardware alarm
[23]	(Not used.)
[24]	(Not used.)
[25]	(Not used.)
[26]	Alarm related to the gripper
[27]	(Not used.)
[28]	Alarm related to the driver I/F
[29]	(Not used.)
[30]	(Not used.)

2. Alarm classification number list

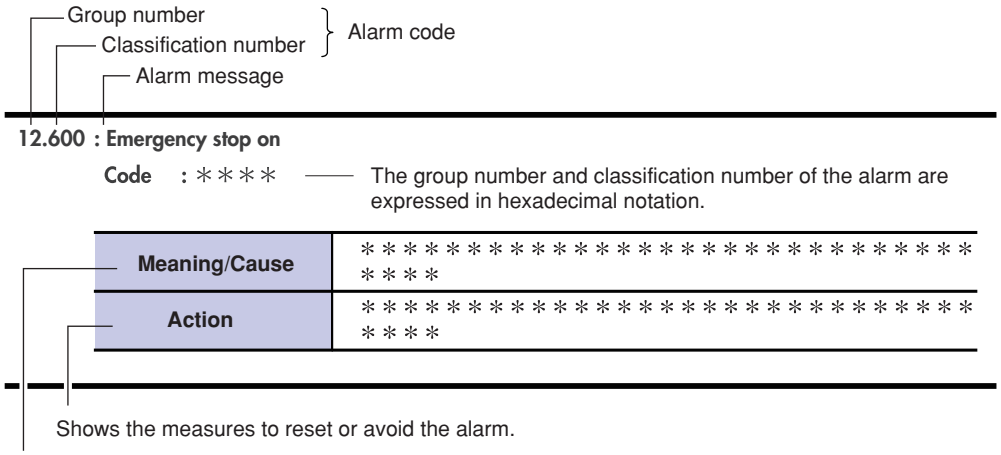
Alarm code	Type	Axis operation in case of error	History	LED display	Reset method	Example
0	Correct	–	–	Not displayed	–	–
1 to 99	Message				Restart operation	HALT, HOLD, Break point, Key release
100 to 199			Save			CPU start
200 to 399	Operation error	Individual operation stop			Restart corresponding operation	No point
400 to 499		Operation stop		Display		Interlock
500 to 599	External error				Reset command	PIO24V off, SIO link error
600 to 699		Servo brake				Emergency stop, Main power off
700 to 799	Internal error	Operation stop				Fan error
800 to 899		Servo brake				Overload
900 to 999		Immediate servo off			Restart system	Over-current, Driver communication failure

3. Alarm occurrence location list

T*	Task *... Task number
SYS	Startup, memory check, generation
ONL	Online command
RMT	Remote command
SEQ	Sequence program
SIN	Standard input
C*	Controller *... Controller number
C*O*	Option board *... Controller number, option slot number
R*/R*A*	Robot, axis *... Robot number, axis number
M*/C*M*	Physical motor *... Controller number, motor number

For example, when "17.403:M1" is displayed, this shows that the position reset position error occurs in motor 1. In the same manner, when "14.400:T02" is displayed, this shows that the communication shutdown error occurs in task 2.

[Display format]



* The alarm occurrence status and alarm history can be checked from the programming box. Information on the alarm occurrence location (axis, option unit, and so on) may be added.

[0] Operation messages

0.0 : OK

Code : &H0000 &H0000

Meaning/Cause	Correct status. No alarm occurs.
Action	—

0.2 : Running

Code : &H0000 &H0002

Meaning/Cause	A program or command is running.
Action	—

0.5 : Busy

Code : &H0000 &H0005

Meaning/Cause	The data is being saved.
Action	—

0.8 : Try again

Code : &H0000 &H0008

Meaning/Cause	The operation failed.
Action	Try again.

0.19 : Can't edit

Code : &H0000 &H0013

Meaning/Cause	The read-only file is being edited.
Action	Change the file attribute.

0.20 : Illegal command in this mode

Code : &H0000 &H0014

Meaning/Cause	The specified online command cannot be executed in the current mode.
Action	Change the mode.

0.21 : No control right

Code : &H0000 &H0015

Meaning/Cause	The operation cannot be executed because of the control setting.
Action	Change the control setting properly with the programming box.

0.22 : Not be execute by the safety setting

Code : &H0000 &H0016

Meaning/Cause	The command cannot be executed since the SAFETY setting is "INVALID".
Action	Set the target item in the SAFETY setting to "VALID".

0.23 : No right of PRINT/INPUT

Code : &H0000 &H0017

Meaning/Cause	The "PRINT/INPUT" statement was executed without setting.
Action	Change the setting of "PRINT/INPUT using channel" of the controller parameter.

[1] System events

1.1 : Program terminated by "CUT"

Code : &H0001 &H0001

Meaning/Cause	The program execution was terminated by the "CUT" command.
Action	—

1.2 : Program terminated by "EXIT TASK"

Code : &H0001 &H0002

Meaning/Cause	The program execution was terminated by the "EXIT TASK" command.
Action	—

1.3 : Program terminated by "HALTALL"

Code : &H0001 &H0003

Meaning/Cause	The program execution was terminated by the "HALTALL" command.
Action	—

1.4 : Program ended by "HALTALL"

Code : &H0001 &H0004

Meaning/Cause	The program execution was terminated by the "HALTALL" command.
Action	—

1.5 : Program ended by "HALT"

Code : &H0001 &H0005

Meaning/Cause	The program execution was terminated by the "HALT" command.
Action	—

1.6 : Program stopped by "HOLDALL"

Code : &H0001 &H0006

Meaning/Cause	The program execution was stopped by the "HOLDALL" command.
Action	The stop status is canceled by pressing the RUN key and the program execution restarts from the next command.

1.7 : Program stopped by "HOLD"

Code : &H0001 &H0007

Meaning/Cause	The program execution was stopped by the "HOLD" command.
Action	The stop status is canceled by pressing the RUN key and the program execution restarts from the next command.

1.8 : Stop executed

Code : &H0001 &H0008

Meaning/Cause	The program/command execution was stopped by external stop command.
Action	—

1.9 : Arrived at debug

Code : &H0001 &H0009

Meaning/Cause	• The program in execution reached the break point and stopped. • The program executed by the "RUNTO" command reached the specified line and stopped. • One line of the program was executed and stopped by the "STEP/NEXT" command.
Action	—

1.10 : Changed control right

Code : &H0001 &H000A

Meaning/Cause	The operation stopped since the control setting was changed.
Action	Change the control setting to "RELEASE" with the programming box.

1.12 : Program stopped by key release

Code : &H0001 &H000C

Meaning/Cause	The RUN key was released in the "Hold To Run" enable status.
Action	—

1.13 : Changed PRINT/INPUT right

Code : &H0001 &H000D

Meaning/Cause	The operation stopped since the "PRINT/INPUT using channel" was changed.
Action	Change the setting of "PRINT/INPUT channel in use" of the controller parameter.

1.100 : CPU normal start

Code : &H0001 &H0064

Meaning/Cause	Start-up checks and initialization ended and controller operation started normally.
Action	—

[2] Alarm related to the robot operation

2.300 : Std. coord. doesn't exist

Code : &H0002 &H012C

Meaning/Cause	The standard coordinates are not set.
Action	• Set the standard coordinates. • Set the "Arm length" and "Offset pulse" of the axis parameter.

2.301 : Coordinate cal. failed

Code : &H0002 &H012D

Meaning/Cause	a. The standard coordinate setting is not correct. b. The operating position is out of the movement range.
Action	a. Set the standard coordinates correctly. b. Change the operating position within the movement range.

2.303 : Shift cal. failed

Code : &H0002 &H012F

Meaning/Cause	Preset calculation for the shift setting is not functioning.
Action	Set the shift coordinates correctly.

2.304 : Hand cal. failed

Code : &H0002 &H0130

Meaning/Cause	a. Preset calculation for the hand definition setting is not functioning. b. Multiple axes with the same coordinate attribute were operated simultaneously when specifying the hand R.
Action	a. Set the hand definitions correctly. b. Set the specified axis of the movement command correctly when specifying the hand R.

2.305 : Illegal Pallet parameter

Code : &H0002 &H0131

Meaning/Cause	Preset calculation for the pallet setting is not functioning.
Action	Set the pallet definition correctly.

2.306 : Movable range cal. failed

Code : &H0002 &H0132

Meaning/Cause	a. Preset calculation for the movement path setting is not functioning. b. The current position is not within the movement range.
Action	a. Change to the correct movement point. b. Change the current position to within the movement range.

2.307 : Overlap soft limit

Code : &H0002 &H0133

Meaning/Cause	On SCARA type robots, the total of the absolute values of the X or Y-axis plus soft limit and minus soft limit becomes the value to move the arm one or more rotation.
Action	Set the soft limit values so that the arm movement range becomes one rotation or less.

2.308 : X exceeded shift coord. range

Code : &H0002 &H0134

Meaning/Cause	X-axis exceeded the shift coordinate range.
Action	• Change the operation position to the inside of the shift coordinate range. • Change the shift coordinate range.

2.309 : Y exceeded shift coord. range

Code : &H0002 &H0135

Meaning/Cause	Y-axis exceeded the shift coordinate range.
Action	• Change the operation position to the inside of the shift coordinate range. • Change the shift coordinate range.

2.310 : Z exceeded shift coord. range

Code : &H0002 &H0136

Meaning/Cause	Z-axis exceeded the shift coordinate range.
Action	• Change the operation position to the inside of the shift coordinate range. • Change the shift coordinate range.

2.311 : R exceeded shift coord. range

Code : &H0002 &H0137

Meaning/Cause	R-axis exceeded the shift coordinate range.
Action	• Change the operation position to the inside of the shift coordinate range. • Change the shift coordinate range.

2.314 : Arch condition bad

Code : &H0002 &H013A

Meaning/Cause	The arch position and arch distance of the arch option are set in “mm” units on the arch motion command for X and Y-axis on SCARA type robots.
Action	Set the arch position and arch distance of the arch option in "pulse" units.

2.318 : Arm length is 0

Code : &H0002 &H013E

Meaning/Cause	The arm length is set is "0" on SCARA type robots.
Action	• Set the standard coordinates. • Set the "Arm length" of the axis parameter.

2.319 : Cannot move (RIGHTY to LEFTY)

Code : &H0002 &H013F

Meaning/Cause	The interpolation movement to the target point whose hand system is set to "LEFT" was attempted when the hand system is set to "RIGHT" on the SCARA type robots.
Action	Check the current hand system and hand system flag of the point data.

2.320 : Cannot move (LEFTY to RIGHTY)

Code : &H0002 &H0140

Meaning/Cause	The interpolation movement to the target point whose hand system is set to "RIGHT" was attempted when the hand system is set to "LEFT" on the SCARA type robots.
Action	Check the current hand system and hand system flag of the point data.

2.321 : Cannot use TOOL coord.

Code : &H0002 &H0141

Meaning/Cause	The hand data is not set.
Action	Set the hand data.

2.326 : Exceeded velocity

Code : &H0002 &H0146

Meaning/Cause	The interpolation operation speed exceeded the specified level.
Action	Change the specified speed.

2.327 : Circular arc cal. failed

Code : &H0002 &H0147

Meaning/Cause	The circular interpolation operation point is incorrect.
Action	• Set the correct point data. • Specify the correct circular arc plane option of the circular interpolation movement. • Set the correct specified axis of the circular interpolation movement.

2.328 : Circular arc restart failed

Code : &H0002 &H0148

Meaning/Cause	Stop position of the "MOVE C" command was different from the restart position.
Action	Set the stop position same as the restart position.

2.329 : Same point exists

Code : &H0002 &H0149

Meaning/Cause	• Two or three points of the “MOVE C” command three points are same. • Same points are consecutive on the path of PATH motion.
Action	Set the correct points.

2.330 : 3 points on line

Code : &H0002 &H014A

Meaning/Cause	Three points of one "MOVE C" command were placed on a straight line.
Action	Change the three points of the "MOVE C" command so that they are not on the same straight line.

2.331 : Circular arc radius too small

Code : &H0002 &H014B

Meaning/Cause	The "MOVE C" command radius is less than 0.1 mm.
Action	Change the "MOVE C" command to 0.1 mm or more for circular arc radius.

2.332 : Circular arc radius too large

Code : &H0002 &H014C

Meaning/Cause	The "MOVE C" command radius exceeded 5000 mm (5 meters).
Action	Change the "MOVE C" command to within 5000 mm (5 meters) for circular arc radius.

2.333 : Too low speed

Code : &H0002 &H014D

Meaning/Cause	The movement time exceeded 60 minutes since the specified speed was too low.
Action	Increase the specified speed or shorten the distance so that the movement time becomes within 60 minutes.

2.334 : Over soft limit

Code : &H0002 &H014E

Meaning/Cause	The value of the target position exceeded the soft limit specified in the parameter.
Action	• Change the operating position to within the soft limits. • Change the soft limit value.

2.335 : Over movable range

Code : &H0002 &H014F

Meaning/Cause	There is a point outside the movement range on the movement path.
Action	Specify the movement path to be within the movement range.

2.336 : ZR Torque origin failed

Code : &H0002 &H0150

Meaning/Cause	Return-to-origin with ZR-stroke end method failed.
Action	Change the R-axis dog length.

2.337 : Illegal DRIVE XY axes

Code : &H0002 &H0151

Meaning/Cause	X or Y-axis point is not specified when using the XY designation option of the "DRIVE" command.
Action	Specify the X or Y-axis point when using the XY designation option of the "DRIVE" command.

2.338 : PATH execute error

Code : &H0002 &H0152

Meaning/Cause	a. The PATH motion cannot be executed. b. The acceleration/deceleration zone distance is too short. c. The speed is too high at the position where the direction changes.
Action	a. Reduce the speed setting. b. Lengthen the straight line or circular arc distance containing acceleration/deceleration. c. Set the speed so that the direction at the connection point of straight lines does not change greatly.

2.339 : Start position changed by other task

Code : &H0002 &H0153

Meaning/Cause	The start position was changed by other tasks.
Action	Check the start position of the target task and change the position as needed.

2.340 : Target position changed by other task

Code : &H0002 &H0154

Meaning/Cause	The target position was changed by other tasks.
Action	Check the target position of the target task and change the position as needed.

2.341 : Illegal axes (R axis shift exist)

Code : &H0002 &H0155

Meaning/Cause	The operation was executed with specifying either X or Y-axis while selecting the shift coordinates for the R-axis rotation.
Action	Change the program so that the operation is executed with specifying both X and Y-axis.

2.342 : Illegal hand type

Code : &H0002 &H0156

Meaning/Cause	The hand definition of R-axis attachment was used to the robot without R-axis attachment.
Action	• Change to the hand definition of Y-axis attachment. • Quit to use the hand definition.

2.343 : Illegal axes (R selected hand)

Code : &H0002 &H0157

Meaning/Cause	a. Tool coordinate jog operation was executed for the auxiliary axis. b. Tool coordinate jog operation was executed while "R-axis orientation hold" is invalid.
Action	a. The auxiliary axis cannot be jog-operated on tool coordinate. b. Set "R-axis orientation hold" of the robot parameter to "VALID".

2.346 : Illegal axes (tracking)

Code : &H0002 &H015A

Meaning/Cause	a. Tracking cannot be executed with this axis configuration. b. "CTDRIVE" or "CTMOVE" command with specifying the Z-axis operation command was executed for the robot without Z-axis.
Action	a. Check the robot axis configuration. b. Change the program so that "CTDRIVE" or "CTMOVE" command with specifying the Z-axis operation command cannot be executed for the robot without Z-axis.

2.347 : Not tracking status

Code : &H0002 &H015B

Meaning/Cause	"CTDRIVE" command was executed for the robot without following the conveyor.
Action	Change the program so that "CTDRIVE" command is executed after following the conveyor by "CTMOVE" command.

2.348 : Over tracking area

Code : &H0002 &H015C

Meaning/Cause	• The robot cannot be operated since the elements of position monitoring queue specified by "CTMOVE" command was out of the work area. • The elements of position monitoring queue in following moved out of the work area.
Action	• Review the robot program so that the elements of position monitoring queue specified by "CTMOVE" command is in the work area. • Reduce the setting value of the tracking end margin of the tracking parameter. • Change the program so that the next command or "CTSTOP" command execute before moving out of the work area.

2.349 : Can't execute CTMOVE

Code : &H0002 &H015D

Meaning/Cause	"CTMOVE" command was not executed since it was in deceleration control.
Action	"CTMOVE" command cannot be executed in MANUAL mode.

2.352 : SCARA outer CP prohibited range

Code : &H0002 &H0160

Meaning/Cause	The CP (Continuous Path) motion of SCARA robot has been executed within the prohibited range of the outer CP motion.
Action	• The CP motion cannot be executed within the range. • Move the robot to outside of the range with the servo-off status or with the PTP motion.

2.700 : System error (EXCEPTION)

Code : &H0002&H02BC

Meaning/Cause	Error occurred in software.
Action	Contact your distributor.

2.701 : System error (Robot Type)

Code : &H0002&H02BD

Meaning/Cause	Error occurred in software.
Action	Contact your distributor.

2.702 : System error (Robot No)

Code : &H0002&H02BE

Meaning/Cause	Error occurred in software.
Action	Contact your distributor.

2.703 : System error (Axis No)

Code : &H0002&H02BF

Meaning/Cause	Error occurred in software.
Action	Contact your distributor.

2.704 : System error (Arm Type)

Code : &H0002&H02C0

Meaning/Cause	Error occurred in software.
Action	Contact your distributor.

2.705 : System error (OPTION)

Code : &H0002&H02C1

Meaning/Cause	Error occurred in software.
Action	Contact your distributor.

2.706 : System error (PATH)

Code : &H0002&H02C2

Meaning/Cause	Error occurred in software.
Action	Contact your distributor.

2.707 : AXSWEI over

Code : &H0002&H02C3

Meaning/Cause	The axis weight exceeds the input range.
Action	Set the axis weight within the input range.

2.708 : System error (Tracking)

Code : &H0002&H02C4

Meaning/Cause	Error occurred in software.
Action	Contact your distributor.

[3] Alarm related to the program file operation

3.201 : Too many programs

Code : &H0003 &H00C9

Meaning/Cause	A new program was created over 100 programs.
Action	Create a new program after deleting an unnecessary program. (Make a backup if necessary.)

3.202 : Program already exists

Code : &H0003 &H00CA

Meaning/Cause	A program with the same name of a registered program was created, copied, or renamed.
Action	Use a different program name to create, copy, or rename.

3.203 : Program doesn't exist

Code : &H0003 &H00CB

Meaning/Cause	A registered program of the specified name does not exist.
Action	Input a program name that is registered.

3.204 : Writing prohibited

Code : &H0003 &H00CC

Meaning/Cause	The specified program is write-protected.
Action	Make the program not write-protected.

3.206 : Too many breakpoints

Code : &H0003 &H00CE

Meaning/Cause	More than 32 break points were set.
Action	Delete unnecessary programs and then set new ones. (32 or less break points can be set per program.)

3.207 : Breakpoint doesn't exist

Code : &H0003 &H00CF

Meaning/Cause	The break point was not found during search.
Action	Set break points if necessary.

3.208 : Current program doesn't exist

Code : &H0003 &H00D0

Meaning/Cause	As the current program does not exit, Reset can not be executed.
Action	LOAD the program once or set MAINPG once, then reset again.

3.218 : Duplicated Breakpoint

Code : &H0003 &H00DA

Meaning/Cause	Break points were already set on the line.
Action	To set the break point, specify the line on which break point has not been set yet.

3.219 : Illegal program no

Code : &H0003 &H00DB

Meaning/Cause	A program number exceeding 1 to 100 was set.
Action	Specify a program number between 1 and 100.

3.220 : Program step doesn't exist

Code : &H0003 &H00DC

Meaning/Cause	The number of lines exceeding the number registered in the program was specified.
Action	Specify lines registered in the program.

3.221 : Reading prohibited

Code : &H0003 &H00DD

Meaning/Cause	The program with the hidden attribute was browsed.
Action	Make the relevant program readable.

3.237 : Program has been already loaded

Code : &H0003 &H00ED

Meaning/Cause	The program that is already in the executable status was loaded.
Action	—

3.238 : Program is already running

Code : &H0003 &H00EE

Meaning/Cause	The program is already running.
Action	—

3.239 : Sequence program is already running

Code : &H0003 &H00EF

Meaning/Cause	The sequence program to revise or delete is running.
Action	Stop the sequence program.

[4] Alarm related to the data input

4.201 : Point number error

Code : &H0004 &H00C9

Meaning/Cause	A point number exceeding P29999 was input.
Action	Input a correct point number.

4.202 : Input format error

Code : &H0004 &H00CA

Meaning/Cause	The format used to input the data is incorrect.
Action	Input the data in correct format.

4.204 : Undefined robot number

Code : &H0004 &H00CC

Meaning/Cause	The specified robot number does not exist.
Action	Input a correct robot number.

4.205 : Undefined axis number

Code : &H0004 &H00CD

Meaning/Cause	The specified axis number does not exist.
Action	Input a correct axis number.

4.206 : Invalid input number

Code : &H0004 &H00CE

Meaning/Cause	a. Invalid data was input. b. Invalid data was input in the area check output port number.
Action	Input a port number that can be used

4.208 : Parameter range error

Code : &H0004 &H00D0

Meaning/Cause	The parameter to set exceeds the range that can be input.
Action	Set the parameter within the range that can be input.

4.209 : Point name doesn't exist

Code : &H0004 &H00D1

Meaning/Cause	The specified point name does not exist.
Action	• Input a point name that can be used. • Register a new point name.

4.210 : Illegal point name

Code : &H0004 &H00D2

Meaning/Cause	The specified point name is incorrect.
Action	• Input a point name that can be used. • Save a new point name.

4.211 : Illegal I/O port

Code : &H0004 &H00D3

Meaning/Cause	The specified port number is incorrect.
Action	Input a correct port number.

4.212 : Data not enough

Code : &H0004 &H00D4

Meaning/Cause	The specified data does not exist.
Action	• Input a point name that can be used. • Create and save new data.

4.213 : Undefined controller number

Code : &H0004 &H00D5

Meaning/Cause	The specified controller number does not exist.
Action	Input a correct controller number.

4.214 : Undefined motor number

Code : &H0004 &H00D6

Meaning/Cause	The specified motor number does not exist.
Action	Input a correct motor number.

[5] Alarm related to the syntax of the robot language (compile)

5.201 : Syntax error

Code : &H0005 &H00C9

Meaning/Cause	The syntax error was found in program.
Action	Input a correct syntax.

5.202 : Data error

Code : &H0005 &H00CA

Meaning/Cause	The input data format is incorrect.
Action	Use a correct data format.

5.203 : Number error

Code : &H0005 &H00CB

Meaning/Cause	a. The input number is incorrect. b. The input expression value is incorrect.
Action	a. Input a correct number. b. Input a correct expression value.

5.204 : Bit number error

Code : &H0005 &H00CC

Meaning/Cause	The specified bit number is not within 0 to 7.
Action	Specify a correct bit number.

5.206 : Digit number error

Code : &H0005 &H00CE

Meaning/Cause	a. Binary number has exceeded 8 digits (places). b. Octal number has exceeded 6 digits (places). c. Decimal number has exceeded the specified range. d. Hexadecimal number has exceeded 8 digits (places). e. Cartesian coordinate point data has more than 3 decimal places.
Action	• Change to the correct number of digits (places). • Specify the Cartesian coordinate point data of up to 3 decimal places.

5.207 : Illegal axis name

Code : &H0005 &H00CF

Meaning/Cause	The input robot axis name is incorrect.
Action	Input a correct axis name.

5.208 : Illegal order

Code : &H0005 &H00D0

Meaning/Cause	The bit order specified for I/O port is incorrect.
Action	Input in descending order starting from left.

5.212 : Stack overflow

Code : &H0005 &H00D4

Meaning/Cause	The stack area for execution overflowed.
Action	• Shorten the expression (for example, by dividing). • Reduce nesting of "GOSUB", "CALL" and "FOR to NEXT" statement. • Reduce argument of "CALL" statement.

5.213 : Illegal variable

Code : &H0005 &H00D5

Meaning/Cause	A variable other than a global variable was used in "SEND/@READ/@WRITE" commands.
Action	Input a global variable.

5.214 : Type mismatch

Code : &H0005 &H00D6

Meaning/Cause	a. Expression types are not equal on both sides. b. An incorrect type constant/variable/expression is used.
Action	a. Use the same expression type on both sides. b. Use a correct type constant/variable/expression.

5.215 : FOR variable error

Code : &H0005 &H00D7

Meaning/Cause	The variable name for "NEXT" statement differs from that for the corresponding "FOR" statement.
Action	Use the corresponding variable names.

5.216 : WEND without WHILE

Code : &H0005 &H00D8

Meaning/Cause	There is no "WHILE" statement corresponding to the "WEND" statement.
Action	• Delete the "WEND" statement. • Add a "WHILE" statement corresponding to the "WEND" statement.

5.217 : WHILE without WEND

Code : &H0005 &H00D9

Meaning/Cause	There is no "WEND" statement corresponding to the "WHILE" statement.
Action	• Delete the "WHILE" statement. • Add a "WEND" statement corresponding to the "WHILE" statement.

5.218 : NEXT without FOR

Code : &H0005 &H00DA

Meaning/Cause	a. There is no "FOR" statement corresponding to the "NEXT" statement. b. "NEXT" command was executed without executing "FOR" command.
Action	a-1. Delete the "NEXT" statement. a-2. Add "FOR" statement corresponding to the "NEXT" statement. b. Confirm execution of "FOR" command.

5.219 : FOR without NEXT

Code : &H0005 &H00DB

Meaning/Cause	There is no "NEXT" statement corresponding to the "FOR" statement.
Action	• Delete the "FOR" statement. • Add "NEXT" statement corresponding to the "FOR" statement.

5.220 : ENDIF without IF

Code : &H0005 &H00DC

Meaning/Cause	There is no "IF" statement corresponding to the "ENDIF" statement.
Action	• Delete the "ENDIF" statement. • Add IF statement corresponding to the "ENDIF" statement.

5.221 : ELSE without IF

Code : &H0005 &H00DD

Meaning/Cause	There is no "IF" statement corresponding to the "ELSE" statement.
Action	• Delete the "ELSE" statement. • Add IF statement corresponding to the "ELSE" statement.

5.222 : IF without ENDIF

Code : &H0005 &H00DE

Meaning/Cause	There is no "ENDIF" statement corresponding to the "IF" statement.
Action	• Delete the "IF" statement. • Add "ENDIF" statement corresponding to the "IF" statement.

5.223 : ELSE without ENDIF

Code : &H0005 &H00DF

Meaning/Cause	There is no "ENDIF" statement corresponding to the "ELSE" statement.
Action	• Delete the "ELSE" statement. • Add "ENDIF" statement corresponding to the "ELSE" statement.

5.224 : END SUB without SUB

Code : &H0005 &H00E0

Meaning/Cause	a. There is no "SUB" statement corresponding to the "END SUB" statement. b. "END SUB" command was executed without "SUB" command.
Action	a-1. Delete the END SUB statement. a-2. b-1. Add SUB statement corresponding to the END SUB statement. b-2. Confirm execution of "SUB" command.

5.225 : SUB without END SUB

Code : &H0005 &H00E1

Meaning/Cause	There is no "END SUB" statement corresponding to the "SUB" statement.
Action	• Delete the "SUB" statement. • Add "END SUB" statement corresponding to the "SUB" statement.

5.226 : Duplicated variable

Code : &H0005 &H00E2

Meaning/Cause	Two or more array variables were defined with the same name.
Action	Delete the definition statement for the array variables with the same name or define other array valuables.

5.227 : Duplicated identifier

Code : &H0005 &H00E3

Meaning/Cause	Two or more identifiers were defined with the same name.
Action	Define identifiers with the different name.

5.228 : Duplicated label

Code : &H0005 &H00E4

Meaning/Cause	The labels were defined with the same name.
Action	Define the labels with different name.

5.229 : Undefined array

Code : &H0005 &H00E5

Meaning/Cause	Assignment/reference was made for an undeclared array.
Action	Declare the array.

5.230 : Undefined identifier

Code : &H0005 &H00E6

Meaning/Cause	An undefined identifier was used.
Action	Define the undefined identifier.

5.231 : Undefined label

Code : &H0005 &H00E7

Meaning/Cause	An undefined label was used.
Action	Define the undefined label.

5.232 : Undefined user function

Code : &H0005 &H00E8

Meaning/Cause	Undefined function was called.
Action	Define the undefined function.

5.233 : Undefined HAND

Code : &H0005 &H00E9

Meaning/Cause	The specified hand is not defined.
Action	• Specify a correct hand. • Define the hand.

5.234 : Too many dimensions

Code : &H0005 &H00EA

Meaning/Cause	An array exceeding 3 dimensions was declared.
Action	Change array to within 3 dimensions.

5.235 : Dimension mismatch

Code : &H0005 &H00EB

Meaning/Cause	The array dimension number does not correspond to that declared.
Action	Make the array dimension numbers correspond to each other.

5.236 : Argument mismatch

Code : &H0005 &H00EC

Meaning/Cause	The number of "SUB" statement arguments does not correspond to that of "CALL" statement arguments.
Action	Make the number of "SUB" statements correspond to that of "CALL" statements.

5.238 : Illegal option

Code : &H0005 &H00EE

Meaning/Cause	The command option is incorrect.
Action	Input a correct option.

5.239 : Illegal identifier

Code : &H0005 &H00EF

Meaning/Cause	A reserved word was used as an identifier.
Action	Use an identifier name other than a reserved word. Refer to the programming manual.

5.240 : Illegal command in procedure

Code : &H0005 &H00F0

Meaning/Cause	The command cannot be executed inside the procedure (between "SUB to END SUB" statements).
Action	Delete the target command.

5.241 : Illegal command outside procedure

Code : &H0005 &H00F1

Meaning/Cause	The command cannot be executed outside the procedure (between "SUB to END SUB" statements).
Action	Delete the target command.

5.242 : Illegal command inside IF

Code : &H0005 &H00F2

Meaning/Cause	The command cannot be executed in simple "IF" statement.
Action	• Input a command that can be executed in simple "IF" statement. • Input a block "IF" statement.

5.243 : Illegal direct

Code : &H0005 &H00F3

Meaning/Cause	The command cannot be executed independently.
Action	• Change the execution according to program. • Change it to a command that can be executed independently.

5.244 : Cannot use external label

Code : &H0005 &H00F4

Meaning/Cause	The command cannot use an external label.
Action	• Change to an internal label. • Change the execution command.

5.245 : Illegal program name

Code : &H0005 &H00F5

Meaning/Cause	a. When transmitting a program file by "SEND" command, the "NAME" statement was not defined on beginning line of the program data. b. Characters other than alphanumeric and " _ " (underscore) were used in the program name. c. Program name has more than 32 characters.
Action	a. Define the "NAME" statement on beginning line of program data. b. Use only alphanumeric and " _ " (underscore) characters in the program name. c. Use 32 characters or less in the program name.

5.246 : Too many identifiers

Code : &H0005 &H00F6

Meaning/Cause	There are too many identifiers.
Action	Reduce the number of identifiers. (An array variable or character string consume more memory than a numeric variable.)

5.247 : CASE without SELECT

Code : &H0005 &H00F7

Meaning/Cause	There is no "SELECT" statement corresponding to the "CASE" statement.
Action	• Delete the "CASE" statement. • Add a SELECT statement corresponding to the "CASE" statement.

5.248 : END SELECT without SELECT

Code : &H0005 &H00F8

Meaning/Cause	There is no "SELECT" statement corresponding to the "END SELECT" statement.
Action	• Delete the "END SELECT" statement. • Add a "SELECT" statement corresponding to the "END SELECT" statement.

5.249 : SELECT without END SELECT

Code : &H0005 &H00F9

Meaning/Cause	There is no "END SELECT statement corresponding to the "SELECT" statement.
Action	• Delete the "SELECT" statement. • Add an "END SELECT" statement corresponding to the "SELECT" statement.

5.250 : CASE without END SELECT

Code : &H0005 &H00FA

Meaning/Cause	There is no "END SELECT" statement corresponding to the "CASE" statement.
Action	• Delete the "CASE" statement. • Add an "END SELECT" statement corresponding to the "CASE" statement.

5.251 : Illegal command line

Code : &H0005 &H00FB

Meaning/Cause	The command cannot be executed since it is between "SELECT" and "CASE" statements.
Action	Delete the command between "SELECT" and "CASE" statements.

5.252 : Command doesn't exist

Code : &H0005 &H00FC

Meaning/Cause	There is a line which does not have a command.
Action	• Add a command. • Delete the line.

5.253 : Compile failure

Code : &H0005 &H00FD

Meaning/Cause	An error occurred in software.
Action	Contact your distributor.

5.254 : ELSEIF without IF

Code : &H0005 &H00FE

Meaning/Cause	There is no "IF" statement corresponding to the "ELSEIF" statement.
Action	• Delete the "ELSEIF" statement. • Add an "IF" statement corresponding to the "ELSEIF" statement.

5.255 : ELSEIF without ENDIF

Code : &H0005 &H00FF

Meaning/Cause	There is no "ENDIF" statement corresponding to the "ELSEIF" statement.
Action	• Delete the "ELSEIF" statement. • Add an "ENDIF" statement corresponding to the "ELSEIF" statement.

5.256 : Subscript mismatch

Code : &H0005 &H0100

Meaning/Cause	The numbers of the array declared by DIM and the subscript do not correspond.
Action	• Make the number of the subscript correspond to that of declared array. • Change the number of the subscript specified by the array declaration. • Check if there is an array with the same name and different subscript in other program.

5.300 : Identifier already exists

Code : &H0005 &H012C

Meaning/Cause	The specified identifier already exists.
Action	Specify an identifier that does not exist.

5.301 : EXIT FOR without FOR

Code : &H0005 &H012D

Meaning/Cause	There is no "FOR" statement corresponding to the "EXIT FOR" statement.
Action	• Delete the "EXIT FOR" statement. • Add a "FOR" statement corresponding to the "EXIT FOR" statement.

5.302 : EXIT SUB without SUB

Code : &H0005 &H012E

Meaning/Cause	There is no "SUB" statement corresponding to the "EXIT SUB" statement.
Action	• Delete the "EXIT SUB" statement. • Add a "SUB" statement corresponding to the "EXIT SUB" statement.

5.303 : Can't open communicate file

Code : &H0005 &H012F

Meaning/Cause	The communication file was specified in the "READ/WRITE" command.
Action	Use the "SEND" command.

[6] Alarm related to the robot language execution

6.201 : Illegal command

Code : &H0006 &H00C9

Meaning/Cause	Non-supported or non-executable command was executed.
Action	Change to a command that can be executed.

6.202 : Illegal function call

Code : &H0006 &H00CA

Meaning/Cause	The <expression> of "ON <expression> GOTO" or "ON <expression> GOSUB" command was a negative value.
Action	Change the <expression> to a positive value.

6.203 : Division by 0

Code : &H0006 &H00CB

Meaning/Cause	A command to divide by 0 was executed.
Action	Change the command to divide by 0.

6.204 : Point doesn't exist

Code : &H0006 &H00CC

Meaning/Cause	Assignment, movement or reference to an undefined point was attempted.
Action	Define the point.

6.205 : Coordinate type error

Code : &H0006 &H00CD

Meaning/Cause	a. Arithmetic operations of joint coordinate point data and Cartesian coordinate point data were attempted. b. Joint coordinate system exists in the "MOVE C" command point data. c. Joint coordinate system exists in the "PMOVE" command point data.
Action	a. Change to the same coordinate system. b, c. Change to the Cartesian coordinate system.

6.206 : Subscript out of range

Code : &H0006 &H00CE

Meaning/Cause	A subscript of an array variable has exceeded the declared range.
Action	Change the subscript of array variable to within the defined range.

6.207 : RETURN without GOSUB

Code : &H0006 &H00CF

Meaning/Cause	The "RETURN" command was executed without executing the "GOSUB" command.
Action	Confirm the execution of "GOSUB "command.

6.208 : END SUB without CALL

Code : &H0006 &H00D0

Meaning/Cause	The "END SUB" command was executed without executing the "CALL" command.
Action	Confirm the execution of "SUB" command.

6.209 : EXIT SUB without CALL

Code : &H0006 &H00D1

Meaning/Cause	The "EXIT SUB" command was executed without executing the "CALL" command.
Action	Confirm the execution of "SUB" command.

6.210 : SUSPEND without START

Code : &H0006 &H00D2

Meaning/Cause	The "SUSPEND" command was executed for a task not executed by the "START" command.
Action	Confirm the execution of "START" command.

6.211 : CUT without START

Code : &H0006 &H00D3

Meaning/Cause	The "CUT" command was executed for a task not executed by the "START" command.
Action	Confirm the execution of "START" command.

6.212 : RESTART without START

Code : &H0006 &H00D4

Meaning/Cause	The "RESTART" command was executed for a task not executed by the "START" command.
Action	Confirm the execution of "START" command.

6.213 : RESTART without SUSPEND

Code : &H0006 &H00D5

Meaning/Cause	The "RESTART" command was executed for a task not executed by the "SUSPEND" command.
Action	Confirm the execution of "SUSPEND" command.

6.214 : Task number error

Code : &H0006 &H00D6

Meaning/Cause	a. Task number is outside the range from 1 to 16. b. "START", "CUT", "SUSPEND" or "RESTART" command was executed for task 1 (main task). c. "START", "CUT", "SUSPEND" or "RESTART" command was executed for its own task.
Action	a. Specify a correct task number. b. Delete the task command for task 1. c. Delete the command for its own task.

6.215 : Task running

Code : &H0006 &H00D7

Meaning/Cause	The "START" command was executed for a task currently in operation.
Action	Delete or correct the "START" command.

6.216 : Task suspending

Code : &H0006 &H00D8

Meaning/Cause	The "START" or "SUSPEND" command was executed for a task in pause (suspend) condition.
Action	Delete or correct the "START" or "SUSPEND" command.

6.217 : Illegal command in error routine

Code : &H0006 &H00D9

Meaning/Cause	The command could not be executed within an error processing routine.
Action	Delete the command.

6.218 : EXIT FOR without FOR

Code : &H0006 &H00DA

Meaning/Cause	The "EXIT FOR" command was executed without executing the "FOR" command.
Action	Confirm the execution of "FOR" command.

6.219 : SUB without CALL

Code : &H0006 &H00DB

Meaning/Cause	The "SUB" command was executed without executing the "CALL" command.
Action	Confirm the execution of "CALL" command.

6.220 : Not execute CALL

Code : &H0006 &H00DC

Meaning/Cause	The "CALL" command was not executed.
Action	Confirm the execution of "CALL" command.

6.225 : No sufficient memory for OUT

Code : &H0006 &H00E1

Meaning/Cause	Since 17 or more the "OUT" commands were executed in parallel, the command cannot be executed because of insufficient memory.
Action	The maximum number of "OUT" commands that can be run in parallel is 16.

6.226 : PATH without SET

Code : &H0006 H00E2

Meaning/Cause	Either of the "PATH L", "PATH C" or "PATH END" command was executed without executing the "PATH SET" command.
Action	First execute the "PATH SET" command when setting a path.

6.227 : PATH without END

Code : &H0006 &H00E3

Meaning/Cause	The "PATH START" command was executed without executing the "PATH END" command.
Action	Execute the "PATH END" command to end the path setting and then execute the "PATH START" command.

6.228 : No PATH data

Code : &H0006 &H00E4

Meaning/Cause	a. No path is set for PATH motion. b. The previously set path was lost for the following reasons: • When "PATH SET" command is executed. • When the program is changed. • When the program is reset. • When the controller power is turned off.
Action	Set a path with the "PATH L" and "PATH C" commands.

6.229 : Too many PATH data

Code : &H0006 &H00E5

Meaning/Cause	The number of PATH motion paths exceeded 1000.
Action	Reduce the number of PATH motion paths to 1000 or less in total of the "PATH L" and "PATH C" commands.

6.230 : Not PATH start position

Code : &H0006 &H00E6

Meaning/Cause	The robot's current position is not the start position of PATH motion.
Action	Move the robot to the start position specified with the "PATH SET" command and then execute the "PATH START" command.

6.232 : ABS of MARK incomplete

Code : &H0006 &H00E8

Meaning/Cause	Absolute reset was performed with the "ORIGIN" statement or dedicated input while axes of "Mark" method are in the origin-incomplete status.
Action	Perform the absolute reset of the axis with the "Mark" method first.

6.233 : MARK method is not allowed

Code : &H0006 &H00E9

Meaning/Cause	Return-to-origin was performed by "ORIGIN" statement or dedicated input while the return-to-origin method for incremental type axes or semi-absolute type axes are set to "Mark".
Action	Change the return-to-origin method.

6.234 : Port number error

Code : &H0006 &H00EA

Meaning/Cause	• The port numbers for the DO, DI, MO, SI, and SO ports were not specified within the range of 0 to 7, 10 to 17, and 20 to 27. • The port numbers specified for the LO and TO ports were other than 0. • The output to port 0 or port 1 was specified for the DO, MO, and SO ports.
Action	Specify the correct port numbers.

6.235 : Password error

Code : &H0006 &H00EB

Meaning/Cause	The password is not correct.
Action	Input the correct password.

6.236 : Undefined pallet

Code : &H0006 &H00EC

Meaning/Cause	Data is not defined in the specified pallet number.
Action	• Specify another pallet number. • Define the pallet.

6.237 : Specification mismatch

Code : &H0006 &H00ED

Meaning/Cause	The command is non-executable in the current robot specifications.
Action	Change the execution command.

6.238 : Too many point data

Code : &H0006 &H00EE

Meaning/Cause	More than 32 values of point data are specified for movement command.
Action	Specify 32 or less values of point data for one movement command line.

6.239 : Illegal PATH task no

Code : &H0006 &H00EF

Meaning/Cause	The "PATH L", "PATH C", or "PATH END" command was executed in different task from that executed the "PATH SET" command.
Action	Execute commands from the "PATH SET" to the "PATH END" in the same task.

6.251 : Stack underflow

Code : &H0006 &H00FB

Meaning/Cause	a. The "RESUME" statement was executed outside the alarm routine. b. Error occurred in software.
Action	a. Use the "RESUME" statement within the alarm routine declared in "ON ERROR GOTO". b. Contact your distributor.

6.252 : Data out of range

Code : &H0006 &H00FC

Meaning/Cause	The specified value is out of the input range.
Action	Specify the value within the input range.

6.253 : Illegal point no

Code : &H0006 &H00FD

Meaning/Cause	The specified point number is out of the range; between 0 and 29999.
Action	Specify a point number between 0 and 29999.

6.254 : Illegal shift no

Code : &H0006 &H00FE

Meaning/Cause	The specified shift number is out of the range; between 0 and 39.
Action	Specify a shift number between 0 and 39.

6.255 : Illegal hand no

Code : &H0006 &H00FF

Meaning/Cause	The specified hand number is out of the range; between 0 and 31.
Action	Specify a hand number between 0 and 31.

6.256 : Illegal pallet no

Code : &H0006 &H0100

Meaning/Cause	The specified pallet number is out of the range; between 0 and 39.
Action	Specify a pallet number between 0 and 39.

6.257 : Illegal axis no

Code : &H0006 &H0101

Meaning/Cause	The specified axis number is out of the range; between 1 and 6.
Action	Specify an axis number between 1 and 6.

6.258 : Illegal robot no

Code : &H0006 &H0102

Meaning/Cause	The specified robot number is out of the range; between 1 and 4.
Action	Specify a robot number between 1 and 4.

6.259 : Illegal task no

Code : &H0006 &H0103

Meaning/Cause	The specified task number is out of the range; between 1 and 16.
Action	Specify a task number between 1 and 16.

6.260 : Too many characters

Code : &H0006 &H0104

Meaning/Cause	a. The number of defined character constants exceeds 255. b. The number of addition characters exceeds 255.
Action	a. Define the number of character constants within 255. b. Set the number of additional characters within 255.

6.261 : Task stopped

Code : &H0006 &H0105

Meaning/Cause	The task is in stop status.
Action	Restart the task by "RESTART" statement.

6.262 : Task doesn't exist

Code : &H0006 &H0106

Meaning/Cause	The task is not executed.
Action	Start the task by "START" statement.

6.263 : Too many Tasks

Code : &H0006 &H0107

Meaning/Cause	The number of programs has exceeded the upper limit (16).
Action	Release the task by "EXIT TASK" statement or "CUT" statement, then register a task.

6.264 : Type mismatch

Code : &H0006 &H0108

Meaning/Cause	a. Expression types are not equal on both sides. b. Prohibited type constant/variable/expression was used.
Action	a. Use the same expression type on both sides. b. Use a correct type of constant/variable/expression.

6.265 : Timeout

Code : &H0006 &H0109

Meaning/Cause	a. Servo off/free of the axis has not completed. b. Mark setting has not completed. c. Servo on/off of the gripper has not completed.
Action	a. Check the axis connection. b. Check the mark axis connection. c. Check the gripper connection.

6.266 : All axes completed

Code : &H0006 &H010A

Meaning/Cause	Return-to-origin has completed on all axes.
Action	It is not necessary to perform return-to-origin.

6.267 : Access level error

Code : &H0006 &H010B

Meaning/Cause	The operation cannot be executed at the present access level.
Action	Change the access level so that the operation can be executed.

6.270 : Can't calculate

Code : &H0006 &H010E

Meaning/Cause	The position that cannot be calculated is taught during wizard.
Action	Teach again at the correct position.

6.271 : Can't be in hand use

Code : &H0006 &H010F

Meaning/Cause	The hand data to change is in use.
Action	Release the setting of the robot and specify the correct hand setting.

6.272 : Can't be in shift use

Code : &H0006 &H0110

Meaning/Cause	The shift data to change is in use.
Action	Release the setting of the robot and specify the correct shift setting.

6.280 : Illegal command Operating

Code : &H0006 &H0118

Meaning/Cause	The online command was executed during data editing.
Action	After completing data editing, execute the online command.

6.281 : Illegal command Running

Code : &H0006 &H0119

Meaning/Cause	The non-executable online command was executed during program running.
Action	After stopping the program, execute the online system command.

6.282 : Illegal command Moving

Code : &H0006 &H011A

Meaning/Cause	The non-executable online command was executed during axis operation.
Action	After stopping the axis operation, execute the online system command.

6.283 : Illegal work no

Code : &H0006 &H011B

Meaning/Cause	The specified work number is out of the range; between 0 and 39.
Action	Specify a work number between 0 and 39.

6.300 : Motor power off

Code : &H0006 &H012C

Meaning/Cause	The movement command was executed in the motor power off status.
Action	Put the robot in the motor and servo on status.

6.301 : Servo off

Code : &H0006 &H012D

Meaning/Cause	The movement command was executed in the servo off status.
Action	Put the robot in the servo on status.

6.302 : Origin incomplete

Code : &H0006 &H012E

Meaning/Cause	● Without performing return-to-origin, operations shown below were performed in the origin incomplete status. • Program or command execution • Point teaching • Cartesian coordinate movement ● The robot puts into the origin-incomplete status by the following reasons. • The absolute batteries were removed from the controller or retained position became unstable by absolute battery voltage drop. • ROB I/O cable was disconnected. • Return-to-origin operation was stopped halfway. • System generation was changed, parameters were initialized or parameters to determine the origin return direction, axis polarity, or origin position were changed. (Writing ALL and PRM files into the controller is also included.)
Action	Perform absolute reset or return-to-origin operation to put the robot in the return-to-origin complete status.

6.309 : INC. motor disconnected

Code : &H0006 &H0135

Meaning/Cause	Return-to-origin command was executed without incremental type or absolute type axes.
Action	Refer to "DI14 Return-to-origin (for INC axis)" of "1.9 Dedicated input signal description" in Chapter 4.

6.310 : ABS. motor disconnected

Code : &H0006 &H0136

Meaning/Cause	Return-to-origin command was executed without absolute type axes.
Action	Refer to "DI14 Return-to-origin (for INC axis)" of "1.9 Dedicated input signal description" in Chapter 4.

6.312 : ABS. reset position incomplete

Code : &H0006 &H0138

Meaning/Cause	Absolute reset was executed at a position where the absolute reset cannot be performed.
Action	Move to a position where the absolute reset can be performed.

6.313 : MRK. motor disconnected

Code : &H0006 &H0139

Meaning/Cause	Return-to-origin was executed without mark-specified axes.
Action	Check the system generation data.

6.314 : Can't execute while servo on

Code : &H0006 &H013A

Meaning/Cause	Writing in "ALL" or "PRM" files was attempted in servo on status.
Action	Turn off the servo before writing files.

6.315 : ZR torque origin incorrect setting

Code : &H0006 &H013B

Meaning/Cause	a. Simultaneous return-to-origin was performed while the ZR-stroke end method was set. b. R-axis stack was not set for the Z-axis. c. Either Z or R-axis return-to-origin method was not set to the ZR-stroke end method. d. Multiple Z-axis (or R-axis) return-to-origin methods were set to the ZR-stroke end method.
Action	a. Set the return-to-origin order correctly. (Simultaneous return-to-origin cannot be performed.) b. Set the R-axis stack correctly. c. Set both Z and R-axis return-to-origin methods to the ZR-stroke end method. d. Set Z and R-axis one each for the ZR-stroke end method.

6.316 : Can't execute while motor power on

Code : &H0006 &H013C

Meaning/Cause	The parameter that cannot be written in motor power off status was saved.
Action	Turn off the motor, and then save the parameter.

6.317 : Illegal origin method

Code : &H0006 &H013D

Meaning/Cause	a. Performing return-to-origin (mark method) was attempted. b. Only one of Z or R-axis is set to ZR-stroke end method.
Action	a. Perform absolute reset for axes of “Mark" method using the programming box or support software. b. Set both Z and R-axis at "ZR-stroke end method".

6.319 : Can't change hand data

Code : &H0006 &H013F

Meaning/Cause	a. Changing the hand setting that another robot is using was attempted. b. Specifying the hand R for the robot without R-axis was attempted.
Action	a. Release the hand setting of the other robot. b. Set blank for the fourth parameter of the target parameter.

6.321 : Illegal option slot no

Code : &H0006 &H0141

Meaning/Cause	The specified option slot number is out of the range; between 1 and 4.
Action	Specify an option slot number between 1 and 4.

6.322 : Illegal calibration no

Code : &H0006 &H0142

Meaning/Cause	The specified calibration number is out of the range; between 0 and 31.
Action	Specify a calibration number between 0 and 31.

6.399 : Can't execute while alarm

Code : &H0006 &H018F

Meaning/Cause	The program cannot be executed while an alarm is occurring.
Action	Clear the alarm cause and reset alarm or restart the controller as necessary.

6.999 : Interpreter runtime system error

Code : &H0006 &H03E7

Meaning/Cause	Error occurred in software.
Action	Contact your distributor.

[9] Alarm related to the memory

9.300 : Memory full

Code : &H0009 &H012C

Meaning/Cause	There is no available space in the program or point data area.
Action	Delete unnecessary programs or points.

9.301 : Program too big

Code : &H0009 &H012D

Meaning/Cause	The program size exceeded the permissible size.
Action	Compress the program size.

9.400 : Gripper origin data destroyed

Code : &H0009 &H0190

Meaning/Cause	Part or all of the data that saved after performing return-to-origin of gripper has been destroyed.
Action	Perform return-to-origin of the gripper.

9.701 : Program destroyed

Code : &H0009 &H02BD

Meaning/Cause	a. Part or all of the program data has been destroyed. b. This error message is sometimes issued due to a major error or the power being turned off during rewrite of program data.
Action	a. Delete that program during selection. b. Initialize the program data.

9.702 : Point data destroyed

Code : &H0009 &H02BE

Meaning/Cause	• Part or all of the point data has been destroyed. • This error message is sometimes issued due to a major error or the power being turned off during rewriting point data.
Action	Initialize the point data.

9.704 : Parameter destroyed

Code : &H0009 &H02C0

Meaning/Cause	Part or all of the parameter data has been destroyed.
Action	Initialize the parameter data.

9.706 : Shift data destroyed

Code : &H0009 &H02C2

Meaning/Cause	Part or all of the shift data has been destroyed.
Action	Initialize the shift data.

9.707 : Hand data destroyed

Code : &H0009 &H02C3

Meaning/Cause	Part or all of the hand data has been destroyed.
Action	Initialize the hand data.

9.709 : Pallet data destroyed

Code : &H0009 &H02C5

Meaning/Cause	Part or all of the pallet definition data was destroyed.
Action	Initialize the pallet definition data.

9.710 : Break point data destroyed

Code : &H0009 &H02C6

Meaning/Cause	Part or all of the break point has been destroyed.
Action	Initialize the break point.

9.711 : IO name data destroyed

Code : &H0009 &H02C7

Meaning/Cause	Part or all of the name of I/O has been destroyed.
Action	Initialize the name of I/O

9.712 : Area checkout data destroyed

Code : &H0009 &H02C8

Meaning/Cause	Part or all of the area check output has been destroyed.
Action	Initialize the area check output.

9.713 : Calibration data destroyed

Code : &H0009 &H02C9

Meaning/Cause	Part or all of the calibration output has been destroyed.
Action	Initialize the calibration.

9.714 : Conveyor data destroyed

Code : &H0009 &H02CA

Meaning/Cause	Error occurred in the conveyor calibration data.
Action	Initialize the conveyor calibration data.

9.715 : Alarm log destroyed

Code : &H0009 &H02CB

Meaning/Cause	Part or all of the alarm history has been destroyed.
Action	Initialize the alarm history.

9.716 : Variable data destroyed

Code : &H0009 &H02CC

Meaning/Cause	Part or all of the variable data has been destroyed.
Action	Initialize the controller.

9.717 : Program register data destroyed

Code : &H0009 &H02CD

Meaning/Cause	Part or all of the program register has been destroyed.
Action	Initialize the program.

9.718 : Communicate setting destroyed

Code : &H0009 &H02CE

Meaning/Cause	Part or all of the controller status data has been destroyed.
Action	Initialize the communication setting.

9.722 : Global EtherNet Port setting destroyed

Code : &H0009 &H02D2

Meaning/Cause	Part or all of the communication setting of general-purpose Ethernet has been destroyed.
Action	Initialize the communication setting of general-purpose Ethernet.

9.723 : Controller status data destroyed

Code : &H0009 &H02D3

Meaning/Cause	Part or all of the controller status data has been destroyed.
Action	Initialize the controller status.

9.724 : Robot status data destroyed

Code : &H0009 &H02D4

Meaning/Cause	Part or all of the robot status data has been destroyed.
Action	• Initialize the robot status. • Reset the standard coordinates in the case of SCARA type robots.

9.725 : Axis status data destroyed

Code : &H0009 &H02D5

Meaning/Cause	Part or all of the axis status data has been destroyed.
Action	Initialize the axis status.

9.726 : Motor status data destroyed

Code : &H0009 &H02D6

Meaning/Cause	Part or all of the motor status data has been destroyed.
Action	• Initialize the motor status. • Re-perform return-to-origin.

9.727 : Out status data destroyed

Code : &H0009 &H02D7

Meaning/Cause	Part or all of the out status data has been destroyed.
Action	Reset the output port.

9.729 : Sequence object destroyed

Code : &H0009 &H02D9

Meaning/Cause	Part or all of the sequence object program has been destroyed.
Action	Re-compile the sequence program.

9.730 : Gripper status data destroyed

Code : &H0009 &H02DA

Meaning/Cause	Part or all of the data for the gripper operation has been destroyed. Data for the gripper operation was initialized.
Action	Re-perform the gripper generation.

9.731 : Trace setting destroyed

Code : &H0009 &H02DB

Meaning/Cause	Part or all of the trace setting was destroyed.
Action	Initialize the trace setting.

9.732 : Counter status data destroyed

Code : &H0009 &H02DC

Meaning/Cause	Error occurred in the tracking counter status data. Status specified on "CCOND" and "CTVISION" commands will be initialized.
Action	Re-execute "CCOND" and "CTVISION" commands.

9.900 : Sys. generation destroyed

Code : &H0009 &H0384

Meaning/Cause	Part or all of the system generation data has been destroyed.
Action	Back up the current data, then send/load the data that is proper for the target robot and controller.

9.901 : Sys. generation mismatch

Code : &H0009 &H0385

Meaning/Cause	The robot type or axis number designation in the system generation data is incorrect.
Action	Back up the current data, then send/load the data that is proper for the target robot and controller.

[10] Alarm related to the environment and general hardware

10.201 : Robot disconnected

Code : &H000A &H00C9

Meaning/Cause	The system generation is not set.
Action	• Back up the current data, then send/load the data that is proper for the target robot and controller. • Contact your distributor.

10.205 : Illegal robot type

Code : &H000A &H00CD

Meaning/Cause	The specified robot type is incorrect.
Action	• Check the robot type data. • Back up the current data, then send/load the data that is proper for the target robot and controller. • Contact your distributor.

10.208 : Cannot set auxiliary axis

Code : &H000A &H00D0

Meaning/Cause	An auxiliary axis was set on an axis that cannot be set as so.
Action	• Do not set an auxiliary axis. • Contact your distributor.

10.209 : Cannot set no axis

Code : &H000A &H00D1

Meaning/Cause	"No axis" was set on an axis which cannot accept "no axis" setting.
Action	• Do not set "no-axis" on the axis. • Contact your distributor.

10.213 : Cannot set Dualdrive

Code : &H000A &H00D5

Meaning/Cause	"Dual drive" was set on an axis that cannot be set to "Dual drive".
Action	• Do not set "Dual drive" on the axis. • Contact your distributor.

10.214 : Undefined parameter found

Code : &H000A &H00D6

Meaning/Cause	a. The parameter name is incorrect. b. Undefined and non-corresponded parameter data was written because the controller data of different controller version was used.
Action	a-1. Input the parameter name correctly. a-2. Write the correct parameter data. b. Set the "PRM SKIP" parameter to "VALID".

10.219 : Illegal axis type

Code : &H000A &H00DB

Meaning/Cause	This axis type cannot be set.
Action	• Check the axis setting. • Back up the current data, then send/load the data that is proper for the target robot and controller. • Contact your distributor.

10.223 : Axis disconnected

Code : &H000A &H00DF

Meaning/Cause	No axis is set.
Action	• Check the axis setting. • Back up the current data, then send/load the data that is proper for the target robot and controller. • Contact your distributor.

10.225 : Controller disconnected

Code : &H000A &H00E1

Meaning/Cause	No controller is connected.
Action	• Check the system generation data. • Re-perform the system generation.

10.226 : Motor disconnected

Code : &H000A &H00E2

Meaning/Cause	No motor is connected.
Action	• Check the system generation data. • Re-perform the system generation.

10.231 : Driver overlap assign

Code : &H000A &H00E7

Meaning/Cause	The driver assignments are overlapping.
Action	Assign the drivers not to overlap.

10.232 : Can't release driver-assign by using

Code : &H000A &H00E8

Meaning/Cause	The driver registration to release is in use.
Action	Release the driver registration after deleting the robot setting.

10.233 : Illegal robot configuration

Code : &H000A &H00E9

Meaning/Cause	The robot configuration is specified incorrect.
Action	• Check the system generation data. • Re-perform the system generation.

10.700 : Illegal safe mode

Code : &H000A &H02BC

Meaning/Cause	The safe mode setting is incorrect.
Action	Reset the safe mode.

10.701 : Real time clock data failed

Code : &H000A &H02BD

Meaning/Cause	Gaining real time clock data failed.
Action	Reset the real time clock.

10.900 : Turn on power again

Code : &H000A &H0384

Meaning/Cause	• System generation was performed because of changing robot and so on. • Parameters were changed through the communication. • System generation data was destroyed. • The controller is abnormal.
Action	Turn the power off and then on again.

10.901 : Illegal driver setting

Code : &H000A &H0385

Meaning/Cause	The driver configuration cannot be specified.
Action	• Check the system generation data. • Re-perform the system generation.

[12] Alarm related to the option board

12.75 : Illegal remote command

Code : &H000C &H004B

Meaning/Cause	The remote command or command data is incorrect.
Action	Check the remote command or command data.

12.76 : Disable remote command

Code : &H000C &H004C

Meaning/Cause	The "Remote command" of the I/O parameter is set to "INVALID".
Action	Set the "Remote command" parameter to "VALID".

12.100 : EtherNet/IP DHCP enabled

Code : &H000C &H0064

Meaning/Cause	The DHCP setting of the communication parameter was changed from "INVALID" to "VALID".
Action	—

12.200 : Tracking disabled

Code : &H000C &H00C8

Meaning/Cause	a. No tracking board is connected to the option slot. b. The tracking board is set to "INVALID".
Action	a. Check that the tracking board is connected. b. Set the tracking board to "VALID".

12.201 : Tracking counter not enabled

Code : &H000C &H00C9

Meaning/Cause	a. The tracking counter status is set "INVALID". b. The value of counter pulse did not change during calibration.
Action	a. Check the counter status and set "VALID". b. Check if the counter value can be read.

12.202 : Tracking vision not enabled

Code : &H000C &H00CA

Meaning/Cause	Tasks or counters which did not execute the "CTVISION" command were specified when executing the "CADDQUEV" command.
Action	Execute the "CTVISION" command on the tasks or counters beforehand.

12.203 : Tracking calibration incomplete

Code : &H000C &H00CB

Meaning/Cause	Tracking function was executed with the robot or counter on which calibration was not executed.
Action	• Execute calibration. • Write the calibration data. • Set the different calibration data at upstream and downstream positions.

12.204 : Tracking counter number error

Code : &H000C &H00CC

Meaning/Cause	The specified counter number was neither 1 nor 2.
Action	Specify the correct value.

12.205 : Tracking queue element number error

Code : &H000C &H00CD

Meaning/Cause	The position monitor queue element number that is out of specifiable range was specified. Between 0 and 79 can be specified.
Action	Specify the value within the range.

12.206 : Tracking queue element doesn't exist

Code : &H000C &H00CE

Meaning/Cause	The queue element specified by the position monitoring queue does not exist.
Action	• Add the queue element to the position monitoring queue. • Check the specified queue element.

12.207 : Tracking queue element being used

Code : &H000C &H00CF

Meaning/Cause	The "CRMVQUE" command was executed during tracking operation.
Action	Execute the command after tracking operation has completed.

12.208 : Tracking queue element over run

Code : &H000C &H00D0

Meaning/Cause	The queue element registered on the position monitoring queue exceeded the monitoring range.
Action	• Delete the queue elements that are not used by the "CRMVQUE" command. • Check the queue elements to register.

12.300 : Incorrect Indiv. Origin setting

Code : &H000C &H012C

Meaning/Cause	• Multiple axes were specified for the "Axes sel. port (DI & SI)" parameter. • No axis was specified for the "Axes sel. port (DI & SI)" parameter. • Axis which is not present was specified for the "Axes sel. port (DI & SI)" parameter.
Action	Specify one axis each.

12.400 : Standard in stop on

Code : &H000C &H0190

Meaning/Cause	a. Program execution or axis movement was attempted in the stop status. b. The robot was put in the stop status during program execution or axis movement. c. 24V-power for I/O is not supplied to the DIO connector. d. The DIO connector is not connected.
Action	a, b. Cancel the stop status, and then execute the program or move the axis. c. Supply 24V-power for I/O. d. Connect the DIO connector. * Set the "Option board enable" parameter INVALID when DIO is not used.

12.401 : Arm locked

Code : &H000C &H0191

Meaning/Cause	The arm was moved while the arm lock variable LO was ON.
Action	Set the arm lock variable LO off.

12.500 : Changed operation mode input

Code : &H000C &H01F4

Meaning/Cause	The robot in operation stopped since the operation mode was changed.
Action	Check the status, reset the alarm, and restart operating the robot.

12.520 : PIO DC24V low voltage

Code : &H000C &H0208

Meaning/Cause	a. 24V power is not supplied to the PIO board. b. The power voltage supplying to the PIO board has dropped.
Action	a. Supply 24V power. b. Check if any device with over voltage source capacity is connected or how power supply state is.

12.521 : PIO DC24V over voltage

Code : &H000C &H0209

Meaning/Cause	Exceeding 24V power is supplied to the PIO board.
Action	Supply power at 24V.

12.522 : PIO STD DC24V low voltage

Code : &H000C &H020A

Meaning/Cause	a. 24V power is not supplied to the PIO STD board. b. The power supply voltage supplying to the PIO STD board has dropped.
Action	a. Supply 24V power. b. Check if any device with over voltage source capacity is connected or how power supply state is.

12.541 : DeviceNet link error

Code : &H000C &H021D

Meaning/Cause	a. Error occurred on the cable for DeviceNet system. b. The communication setting of the DeviceNet system is incorrect. c. Power for communication is not supplied. d. The master module power is turned off, has stopped operating or is damaged. e. The DeviceNet compatible module is damaged.
Action	a. Check for a break disconnection, wiring error, short circuit on the DeviceNet cable or the specifications (cable length, etc.). b. Check the communication settings. c. Check that the communication power is supplied. d. Check that the master module operates correctly. e. Replace the DeviceNet compatible module.

12.542 : DeviceNet overtime error

Code : &H000C &H021E

Meaning/Cause	a. Communication error occurred by noise, etc. in the DeviceNet system. b. The master module power is turned off or has stopped operating. c. The cable is broken or unconnected.
Action	a. Take the noise preventive actions for the cable of the DeviceNet system and the controller. b. Check that the master module operates correctly. c. Check the DeviceNet cable connection.

12.551 : EtherNet/IP link error

Code : &H000C &H0227

Meaning/Cause	a. Error occurred on the cable for EtherNet/IP system. b. The communication setting of the EtherNet/IP system is incorrect. c. The master module power is turned off, has stopped operating or is damaged. d. The EtherNet/IP compatible module is damaged.
Action	a. Check for a break disconnection, wiring error, short circuit on the EtherNet/IP cable or the specifications (cable length, etc.). b. Check the communication setting. c. Check that the master module operates correctly. d. Replace the EtherNet/IP compatible module.

12.552 : EtherNet/IP overtime error

Code : &H000C &H0228

Meaning/Cause	a. Communication error occurred by noise, etc. in the EtherNet/IP system. b. The master module power is turned off or has stopped operating. c. The cable is broken or unconnected.
Action	a. Take the noise preventive actions for the cable of the EtherNet/IP system and the controller. b. Check that the master module operates correctly. c. Check the EtherNet/IP cable connection.

12.561 : PROFIBUS link error

Code : &H000C &H0231

Meaning/Cause	a. Error occurred in cable for PROFIBUS system. b. The communication setting of the PROFIBUS system was incorrect. c. The master module power is turned off, has stopped operating or is damaged. d. The PROFIBUS compatible module is damaged.
Action	a. Check for a break disconnection, wiring error, short circuit on the PROFIBUS cable or the specifications (cable length, etc.). b. Check the communication setting. c. Check that the master module operates correctly. d. Replace the PROFIBUS compatible module.

12.562 : PROFIBUS overtime error

Code : &H000C &H0232

Meaning/Cause	a. Communication error occurred by noise, etc. in the PROFIBUS system. b. Master module power is turned off or has stopped operating. c. The cable is broken or unconnected.
Action	a. Take the noise preventive actions for the cable of the PROFIBUS system and the controller. b. Check that the master module operates correctly. c. Check the PROFIBUS cable connection.

12.571 : PROFINET link error

Code : &H000C &H023B

Meaning/Cause	a. Error occurred in cable for PROFINET system. b. The communication setting of the PROFINET system incorrect. c. The master module power is turned off, or the PLC has stopped operating, or is broken. d. The PROFINET compatible module is breakdown.
Action	a. Check for a break disconnection, wiring error, short circuit on the PROFINET cable or the specifications (cable length, etc.). b. Check the communication setting. c. Check that the master module operates correctly. d. Replace the PROFINET compatible module.

12.572 : PROFINET overtime error

Code : &H000C &H0232

Meaning/Cause	a. Communication error occurred by noise, etc. in the PROFINET system. b. Master module power is turned off or has stopped operating. c. The cable is broken or unconnected.
Action	a. Take the noise preventive actions for the cable and controller of the PROFINET system. b. Check that the master module operates correctly. c. Check the PROFINET cable connection.

12.581 : Counter1 wire breakage

Code : &H000C &H0245

Meaning/Cause	The encoder cable connected to the counter 1 is broken. The break detection is available when the counter 1 is set to "VALID".
Action	• Set the counter status to "INVALID" if the encoder is not connected to the counter 1. • Check the encoder cable of the counter 1. • Check if the encoder works normally.

12.582 : Counter2 wire breakage

Code : &H000C &H0246

Meaning/Cause	The encoder cable connected to the counter 2 is broken. The break detection is available when the counter 2 is set to "VALID".
Action	• Set the counter status to "INVALID" if the encoder is not connected to the counter 2. • Check the encoder cable of the counter 2. • Check if the encoder works normally.

12.583 : Tracking watchdog error

Code : &H000C &H0247

Meaning/Cause	There is no response from the tracking board for a certain time.
Action	• Check the tracking board connection status. • Check if the tracking board is recognized on the programming box. • Turn the power off and on again.

12.600 : Emergency stop on

Code : &H000C &H0258

Meaning/Cause	a. The programming box emergency stop button was pressed. b. The emergency stop terminal on the SAFETY connector is open (emergency stop status). c. The programming box or terminator is not connected to the PB connector. d. The SAFETY connector is not connected.
Action	a. Release the emergency stop button on the programming box. b. Close the emergency stop terminal on SAFETY connector. c. Connect the programming box or terminator to the PB connector. d. Attach the SAFETY connector.

12.601 : Illegal operation mode input

Code : &H000C &H0259

Meaning/Cause	a. The programming box or terminator is not connected to the PB connector, b. Settings of the MANUAL LOCK of the programming box and AUTO MODE of the SAFETY connector are incorrect in the case of a CE specification controller.
Action	a. Connect the programming box or terminator to the PB connector. b. Check the AUTO MODE connection of the SAFETY connector in the case of a CE specification controller.

12.700 : Option board changed

Code : &H000C &H02BC

Meaning/Cause	The option board configuration was changed.
Action	Initialize the option board setting.

12.705 : Parallel I/O board assign changed

Code : &H000C &H02C1

Meaning/Cause	a. The PIO board was pulled out, or new one was inserted. b. "Option board enable" parameter was changed. c. "Parallel IO ID" parameter was changed. d. PIO board is damaged.
Action	a. Check if the PIO board configuration is correct. b. Check if the option board configuration is correct. c. Check the PIO board IDs are correct. d. Check unrecognizable PIO boards and replace them.

12.706 : PIO board I/O stop

Code : &H000C &H02C2

Meaning/Cause	a. PIO board power is turned off or has stopped operation. b. The PIO board is broken.
Action	a. Check if power for the PIO board is supplied normally. b. Replace the PIO board.

12.734 : POS.OUT Point not exist

Code : &H000C &H02DE

Meaning/Cause	Comparison point data does not exist.
Action	Set the comparison point data correctly.

12.735 : POS.OUT Point unit error

Code : &H000C &H02DF

Meaning/Cause	Comparison points 1 and 2 do not use the same unit system.
Action	Change them to the same unit system.

12.750 : PIO board Flash error

Code : &H000C &H02EE

Meaning/Cause	The PIO board is breakdown.
Action	Replace the PIO board.

12.751 : PIO STD. board connector error

Code : &H000C &H02EF

Meaning/Cause	a. The standard PIO board cable is not connected. b. The standard PIO board connector is half-plugged. c. The standard PIO board wiring is incorrect.
Action	a. Connect the standard PIO board cable. b. Re-insert the standard PIO board connector. c. Check the wiring of the standard PIO board.

12.761 : DeviceNet initialize error

Code : &H000C &H02F9

Meaning/Cause	Initializing the DeviceNet option board failed.
Action	Contact your distributor.

12.762 : EtherNet/IP initialize error

Code : &H000C &H02FA

Meaning/Cause	Initializing the EtherNet/IP option board failed
Action	Contact your distributor.

12.763 : EtherNet/IP parameter mismatch

Code : &H000C &H02FB

Meaning/Cause	Parameters set in the controller do not correspond to those set in the option board.
Action	Initialize the EtherNet/IP option parameters.

12.764 : PROFIBUS initialize error

Code : &H000C &H02FC

Meaning/Cause	Initializing the PROFIBUS option board failed.
Action	Contact your distributor.

12.765 : PROFINET initialize error

Code : &H000C &H02FD

Meaning/Cause	Initializing the PROFINET option board failed.
Action	Contact your distributor.

12.900 : Incorrect option setting

Code : &H000C &H0384

Meaning/Cause	a. Error occurred in ID setting on the option module. b. Option modules that cannot be mixed were installed. c. The installed option module cannot be identified.
Action	a. Check the ID setting of the option module. b. Install the correct option modules. c. Replace the option module. • Replace the controller.

12.901 : PIO internal error

Code : &H000C &H0385

Meaning/Cause	a. The PIO board cable is abnormal. b. The PIO board power is turned off, or has stopped operation. c. The PIO board is breakdown.
Action	a. Check for a break disconnection, wiring error, short circuit on the PIO cable or the specifications (cable length, etc.). b. Check if power for the PIO board is supplied normally. c. Replace the PIO board.

12.903 : PIO option setting error

Code : &H000C &H0387

Meaning/Cause	The PIO board installed incorrectly.
Action	• Remove the PIO board for correct configuration. • Set the PIO board INVALID for correct configuration.

12.904 : SIO option board initialize error

Code : &H000C &H0388

Meaning/Cause	Initializing the SIO option board failed.
Action	Contact your distributor.

12.905 : Option board overlapped

Code : &H000C &H0389

Meaning/Cause	The installed option board cannot be overlapped.
Action	Remove the option board that cannot be overlapped.

12.906 : Undefined option board

Code : &H000C &H038A

Meaning/Cause	The installed option board inapplicable.
Action	Contact your distributor.

[14] Alarm related to the communication

14.201 : Communication error

Code : &H000E &H00C9

Meaning/Cause	a. Error occurred in the external communication. b. The external device was turned on or off with connecting to the communication cable.
Action	• Prevent putting noise generation source close to the robot so as to improve the communication environment. • Replace the communication cable. • Check the communication parameter settings.

14.211 : Receive buffer overflow

Code : &H000E &H00D3

Meaning/Cause	The communication receive buffer exceeded permissible capacity.
Action	• Decrease the communication parameter speed (baud rate). • Change communication parameter so that the flow control is enabled.

14.212 : CMU is not ready

Code : &H000E &H00D4

Meaning/Cause	Sending the data from controller failed because the receiving prohibition status of the external device continued for 10 or more seconds.
Action	• Replace the communications cable. • Check that the flow control is normal in software processing for the external device.

14.220 : Too many Command characters

Code : &H000E &H00DC

Meaning/Cause	a. The online command character string in 1 line exceeded 255 characters. b. The command statement created with a remote command exceeded 255 characters.
Action	a. Limit the number of characters in 1 line for an online command to 255 or less. b. Check the command data of the remote command.

14.221 : No return code(C/R)

Code : &H000E &H00DD

Meaning/Cause	a. The character string in 1 line exceeded 255 characters. b. C/R code (0Dh) was not added at the end of a single line.
Action	a. Limit the number of characters in 1 line to 255. b. Add a C/R code (0Dh) at the end of a single line.

14.222 : No start code (@)

Code : &H000E &H00DE

Meaning/Cause	Starting code "@" is not added at beginning of a single line in the online command.
Action	Add starting code "@" at the beginning of the online command.

14.228 : Illegal port type

Code : &H000E &H00E4

Meaning/Cause	The communication port is not specified.
Action	Contact your distributor.

14.229 : Command stop timeout

Code : &H000E &H00E5

Meaning/Cause	Timeout occurred during sending/receiving through the communication port.
Action	• Check the communication port settings. • Check the communication cable connection.

14.230 : Port is already open

Code : &H000E &H00E6

Meaning/Cause	The communication port is open.
Action	Check if the communication port has already been opened.

14.231 : Port open failed

Code : &H000E &H00E7

Meaning/Cause	Opening the communication port failed.
Action	• Check the communication port settings. • Check the communication cable. • Check if the communication port has already been opened.

14.233 : Parameter error

Code : &H000E &H00E9

Meaning/Cause	The parameter exceeded the range that can be input.
Action	Set the parameters within the range.

14.400 : Communicate disconnected

Code : &H000E &H0190

Meaning/Cause	a. Error occurred on the external communication. b. Overrun error or framing error occurred. c. External device power was turned on/off with connecting to the external device by the communication cable.
Action	• Prevent putting noise generation source close to the robot so as to improve the communication environment. • Check the connection of the communication cable. • Replace the communication cable. • Check the communication parameter settings.

14.441 : EtherNet link error

Code : &H000C &H01B9

Meaning/Cause	Error occurred on the EtherNet option board.
Action	Contact your distributor.

14.500 : Data send error

Code : &H000E &H0190

Meaning/Cause	Error occurred on the external communication by RS-232C during sending.
Action	Check the communication parameter settings.

14.501 : Data receive error

Code : &H000E &H01F5

Meaning/Cause	Error occurred on the external communication by RS-232C during receiving.
Action	Check the communication parameter settings.

14.502 : Framing error

Code : &H000E &H01F6

Meaning/Cause	Error occurred on the external communication by RS-232C.
Action	Check the communication parameter settings.

14.503 : Parity error

Code : &H000E &H01F7

Meaning/Cause	Error occurred on the external communication by RS-232C.
Action	Check the communication parameter settings.

14.504 : Over run error

Code : &H000E &H01F8

Meaning/Cause	Error occurred on the external communication by RS-232C.
Action	Check the communication parameter settings.

14.505 : Break

Code : &H000E &H01F9

Meaning/Cause	Error occurred in external communication by RS-232C.
Action	Check the communication parameter settings.

14.700 : Can't be initialized

Code : &H000E &H02BC

Meaning/Cause	Initializing the communication port failed.
Action	Check the communication port settings.

[17] Alarm related to the motor control

17.400 : PZ failure

Code : &H0011 &H0190

Meaning/Cause	a. The motor is defective. b. The resolver signal wire is broken.
Action	a. Replace the motor. b. Replace the ROB I/O cable.

17.401 : Pole search error

Code : &H0011 &H0191

Meaning/Cause	The motor magnetic pole was not detected when the servo was turned on. a. The servo wire is broken or incorrectly connected. b. The position sensor cable is incorrectly wired. c. Axis parameter settings related to motor control is incorrect.
Action	a. Check the connection of the servo wire. b. Check the connection of the position sensor cable. c. Set the parameter setting correctly.

17.402 : ABS. data error

Code : &H0011 &H0192

Meaning/Cause	a. The linear scale length setting is incorrect. b. Z-phase was detected incorrectly.
Action	a. Set the correct value for the linear scale length. b-1. Replace the ROB/IO cable. b-2. Replace the robot.

17.403 : Position reset malposition

Code : &H0011 &H0193

Meaning/Cause	a. "ABSINIT" statement was executed at a position where the current position cannot be reset. b. Absolute reset was executed at a position where it cannot be executed.
Action	a. Move to a position where the current position can be reset, and then execute the "ABSINIT" statement. b. Move the axis to a position (machine reference is 44 to 56%) where the absolute reset can be executed.

17.404 : Moving distance error

Code : &H0011 &H0194

Meaning/Cause	The movement distance exceeded the specified value by return-to-origin.
Action	Re-perform the system generation.

17.410 : ABS. battery error

Code : &H0011 &H019A

Meaning/Cause	During the controller power-off... a. The absolute battery cable is breakdown. b. The absolute battery cable is not connected. c. The absolute battery voltage has dropped.
Action	This alarm occurs every time the power is turned on until the absolute reset is completed. a. Replace the absolute battery. b. Connect the absolute battery. c. Set the "Incremental mode control" parameter to "VALID" for use in incremental mode.

17.411 : ABS. encoder error

Code : &H0011 &H019B

Meaning/Cause	• Resolver signal line was disconnected or breakdown during the controller power-off. (Same as when ROB I/O connector is removed.) • The controller was restarted after the resolver signal line had been disconnected during power-on. (Same as when ROB I/O connector is removed.) Even after turning off the power, the controller still memorizes the disconnection and this is displayed as an error when the controller is restarted.
Action	Perform absolute reset.

17.412 : ABS. count error

Code : &H0011 &H019C

Meaning/Cause	The movement speed is too high during the controller power-off.
Action	Perform absolute reset.

17.413 : ABS. overflow error

Code : &H0011 &H019D

Meaning/Cause	The number of motor rotation exceeded 4096 during the controller power-off.
Action	• Do not rotate motor more than necessary during the controller power-off. • Perform absolute reset.

17.414 : ABS. mixing error 1

Code : &H0011 &H019E

Meaning/Cause	The position data count is inconsistent. (The electrical resolver position data deviated from the mechanical during the controller power-off.)
Action	Perform absolute reset.

17.500 : Origin sensor failure

Code : &H0011 &H01F4

Meaning/Cause	a. The origin sensor is defective. b. The origin sensor wiring is breakdown.
Action	a. Replace the origin sensor. b. Replace the ROB I/O cable.

17.800 : Motor overload

Code : &H0011 &H0320

Meaning/Cause	a. The robot drive section mechanically locked. b. The motor current exceeded its rated value due to a motor overload. c. The motor acceleration is excessive. d. The system generation setting is incorrect. e. The motor cable wiring is broken or wiring is incorrect. f. The vertical axes electromagnetic brake is defective. g. Wiring is incorrect or disconnected on the vertical axes electromagnetic brake. h. The SAFETY connector is not used correctly.
Action	a. Perform robot service and maintenance. b. Decrease the load on motor. c. Lower the motor acceleration. d. Redo the system generation. e-1. Wire the motor cable correctly. e-2. Replace the motor cable. f. Replace the vertical axes electromagnetic brake. g. Replace the ROB I/O cable. h. Do not use 24 V DC from the SAFETY connector as power source for external loads.

17.801 : Driver overload

Code : &H0011 &H0321

Meaning/Cause	a. The robot drive section mechanically locked. b. The motor current exceeded its rated value due to a motor overload. c. The motor acceleration is excessive. d. The system generation setting is incorrect. e. The motor cable wiring is broken or wiring is incorrect. f. The vertical axes electromagnetic brake is defective. g. Wiring is incorrect or disconnected on the vertical axes electromagnetic brake. h. The SAFETY connector is not used correctly.
Action	a. Perform robot service and maintenance. b. Decrease the load on motor. c. Lower the motor acceleration. d. Redo the system generation. e-1. Wire the motor cable correctly. e-2. Replace the motor cable. f. Replace the vertical axes electromagnetic brake. g. Replace the ROB I/O cable. h. Do not use 24 V DC from the SAFETY connector as power source for external loads.

17.802 : Current limit error

Code : &H0011 &H0322

Meaning/Cause	a. The robot drive section mechanically locked. b. The system generation setting is wrong. c. The motor cable wiring is broken or wiring is incorrect. d. The vertical axes electromagnetic brake is defective. e. Wiring is incorrect or disconnected on the vertical axes electromagnetic brake. f. The SAFETY connector is not used correctly.
Action	a. Perform robot service and maintenance. b. Redo the system generation. c-1. Wire the motor cable correctly. c-2. Replace the motor cable. d. Replace the vertical axes electromagnetic brake. e. Replace the ROB I/O cable. f. Do not use 24 V DC from the SAFETY connector as power source for external loads.

17.900 : AC power down

Code : &H0011 &H0384

Meaning/Cause	a. AC supply voltage of control power supply dropped below 85% of rated voltage. b. The power source has insufficient capacity.
Action	a-1. Check the AC supply voltage. a-2, b-1. Check if the supply voltage drops during robot operation. b-2. Lower the robot duty cycle.

17.901 : Over voltage

Code : &H0011 &H0385

Meaning/Cause	a. Output voltage for motor power supply exceeded 420 V. b. The regenerative unit safety device was triggered due to temperature rise (120 °C or more) in regeneration damping resistor. c. The regenerative unit is defective. d. The SAFETY connector is used incorrectly.
Action	a, b-1. Check the power supply voltage. b-2, c. Lower the robot duty cycle. d. Do not supply 24 V DC to the SAFETY connector from external source.

17.902 : IPM error

Code : &H0011 &H0386

Meaning/Cause	• The power module overheated. • The power module or motor drew excessive current.
Action	Lighten the load on the robot.

17.905 : Resolver wire breakage

Code : &H0011 &H0389

Meaning/Cause	a. The resolver signal wire is broken. b. The motor malfunction occurred. c. The controller malfunction occurred.
Action	a. Replace the ROB I/O cable. b. Replace the motor. c. Replace the controller.

17.906 : ABS. mixing error 2

Code : &H0011 &H038A

Meaning/Cause	The position data count is not consistent while the controller power is on.
Action	• Replace the ROB/IO cable. • Replace the controller.

17.910 : Position deviation error

Code : &H0011 &H038E

Meaning/Cause	a. The robot drive section mechanically locked. b. The motor acceleration is excessive. c. The system generation setting is incorrect. d. The motor cable wiring is broken or wiring is incorrect. e. The vertical axes electromagnetic brake is defective. f. Wiring is incorrect or disconnected on the vertical axes electromagnetic brake. g. The SAFETY connector is not used correctly.
Action	a. Perform robot service and maintenance. b. Lower the motor acceleration. c. Redo the system generation. d-1. Wire the motor cable correctly. d-2. Replace the motor cable. e. Replace the vertical axes electromagnetic brake. f. Replace the ROB I/O cable. g. Do not use 24 V DC from the SAFETY connector as power source for external loads.

17.911 : Velocity deviation error

Code : &H0011 &H038F

Meaning/Cause	a. The robot drive section mechanically locked. b. The motor acceleration is excessive. c. The system generation setting is incorrect. d. The motor cable wiring is broken or wiring is incorrect. e. The vertical axes electromagnetic brake is defective. f. Wiring is incorrect or disconnected on the vertical axes electromagnetic brake.
Action	a. Perform robot service and maintenance. b. Lower the motor acceleration. c. Redo the system generation. d-1. Wire the motor cable correctly. d-2. Replace the motor cable. e. Replace the vertical axes electromagnetic brake. f. Replace the ROB I/O cable.

17.912 : Current deviation error

Code : &H0011 &H0390

Meaning/Cause	a. The motor cable wiring was broken. b. The controller was defective.
Action	a. Replace the motor cable. b. Replace the controller.

17.913 : Dual position deviation error

Code : &H0011 &H0391

Meaning/Cause	On a dual-drive axis, the position differential between the main axis and sub axis is too large. a. Friction in the robot drive section is too large. b. The motor brake wiring is broken.
Action	a. Check the drive sections for assembled condition and lubrication to ensure smooth movement. b. Check that the motor brake works properly.

17.914 : Overspeed

Code : &H0011 &H0392

Meaning/Cause	a. The robot drive unit was pushed by external force and its speed exceeded the specified value. b. The system generation setting is incorrect.
Action	a. Remove the external force. b. Re-perform the system generation.

17.915 : Motor over current

Code : &H0011 &H0393

Meaning/Cause	a. The robot drive section mechanically locked. b. The motor current exceeded its rated value due to a motor overload. c. The motor acceleration is excessive. d. The system generation setting is incorrect. e. The motor cable wiring is broken or wiring is incorrect. f. The vertical axes electromagnetic brake is defective. g. Wiring is incorrect or disconnected on the vertical axes electromagnetic brake. h. The SAFETY connector is not used correctly.
Action	a. Perform robot service and maintenance. b. Decrease load on motor. c. Lower the motor acceleration. d. Redo the system generation. e-1. Wire the motor cable correctly. e-2. Replace the motor cable. f. Replace the vertical axes electromagnetic brake. g. Replace the ROB I/O cable. h. Do not use 24 V DC from the SAFETY connector as power source for external loads.

17.916 : Feedback error1

Code : &H0011 &H0394

Meaning/Cause	Wiring of the motor cable or ROB I/O cable is incorrect.
Action	• Rewire the motor cable or ROB I/O cable correctly. • Replace the motor cable or ROB I/O cable.

17.920 : EMG. stop Input error

Code : &H0011 &H0398

Meaning/Cause	a. The driver unit malfunctioned by external noise. b. The controller is defective.
Action	a. Turn the power off and then on again. b. Contact your distributor.

17.921 : Reference velocity error

Code : &H0011 &H0399

Meaning/Cause	a. The driver unit malfunctioned by external noise. b. The controller is defective.
Action	a. Turn the power off and then on again. b. Contact your distributor.

17.922 : Command error

Code : &H0011 &H039A

Meaning/Cause	a. The driver unit malfunctioned by external noise. b. The controller is defective.
Action	a. Turn the power off and then on again. b. Contact your distributor.

17.923 : Parameter data error

Code : &H0011 &H039B

Meaning/Cause	a. The driver unit malfunctioned by external noise. b. The controller is defective.
Action	a. Turn the power off and then on again. b. Contact your distributor.

17.990 : Watchdog error 1

Code : &H0011 &H03DE

Meaning/Cause	a. The driver unit malfunctioned by external noise. b. The controller is defective.
Action	a. Turn the power off and then on again. b. Contact your distributor.

17.991 : Watchdog error 2

Code : &H0011 &H03DF

Meaning/Cause	a. The driver unit malfunctioned by external noise. b. The controller is defective.
Action	a. Turn the power off and then on again. b. Contact your distributor.

17.992 : System error 1

Code : &H0011 &H03E0

Meaning/Cause	Error occurred in software for driver unit.
Action	Contact your distributor.

17.993 : System error 2

Code : &H0011 &H03E1

Meaning/Cause	Error occurred in software for driver unit.
Action	Contact your distributor.

17.994 : System error 3

Code : &H0011 &H03E2

Meaning/Cause	Error occurred in software for driver unit.
Action	Contact your distributor.

17.995 : System error 4

Code : &H0011 &H03E3

Meaning/Cause	Error occurred in software for driver unit.
Action	Contact your distributor.

17.996 : Mode error 1

Code : &H0011 &H03E4

Meaning/Cause	Error occurred in software for driver unit.
Action	Contact your distributor.

17.997 : Mode error 2

Code : &H0011 &H03E5

Meaning/Cause	Error occurred in software for driver unit.
Action	Contact your distributor.

17.999 : Undefined

Code : &H0011 &H03E7

Meaning/Cause	Undefined system error.
Action	Contact your distributor.

[19] Alarm related to the YC-Link/E

19.400 : YC/E slave connecting retry

Code : &H0013 &H0190

Meaning/Cause	The YC-Link/E slave is retrying the connection establishment with the master.
Action	Please wait while retrying the connection.

19.500 : YC/E master port open fail

Code : &H0013 &H01F4

Meaning/Cause	The communication port of the YC-Link/E master board does not open within a certain period of time (about 20 seconds).
Action	• Check that the master and slave are connected with the cables. • Check the slave power is turned on.

19.501 : YC/E communicate initialize fail

Code : &H0013 &H01F5

Meaning/Cause	The communication failed in the initialization process of the YC-Link/E connection.
Action	• Restart the controller. • Take noise preventive measures. • Replace the slave option board.

19.502 : YC/E slave port wrong

Code : &H0013 &H01F6

Meaning/Cause	The IN port and OUT port of the YC-Link/E slave are used incorrectly.
Action	• Check the connection. • Reconnect the cable into the correct port.

19.800 : YC/E send data checksum error

Code : &H0013 &H0320

Meaning/Cause	The checksum error occurred in the data sent from the YC-Link/E master.
Action	• Check the cable connection. • Replace the cable. • Take noise preventive measures. • Replace the controller.

19.801 : YC/E receive data checksum error

Code : &H0013 &H0321

Meaning/Cause	The checksum error occurred in the data received by the YC-Link/E master (Host check).
Action	• Check the cable connection. • Replace the cable. • Take noise preventive measures. • Replace the controller.

19.802 : YC/E working counter error

Code : &H0013 &H0322

Meaning/Cause	a. The YC-Link/E master could not send the data correctly. b. The slave could not receive the data correctly.
Action	• Check the cable connection. • Replace the cable. • Replace the master board and slave board.

19.805 : YC/E master receive checksum error

Code : &H0013 &H0325

Meaning/Cause	The checksum error occurred in the data received by the YC-Link/E master. (Master check)
Action	• Check the cable connection. • Replace the cable. • Take noise preventive measures. • Replace the controller.

19.900 : YC/E master board watchdog error

Code : &H0013 &H0384

Meaning/Cause	The data was not sent from the master board of the YC-Link/E for a certain period of time.
Action	• Check the LAN cable for disconnection. • Take noise preventive measures. • Replace the master board.

19.901 : YC/E master interrupt fail

Code : &H0013 &H0385

Meaning/Cause	The master board of the YC-Link/E could not receive the data from the HOST CPU for a certain period of time.
Action	• Check the LAN cable for disconnection. • Take noise preventive measures. • Replace the master board.

19.902 : YC/E master data send fail

Code : &H0013 &H0386

Meaning/Cause	The master board of the YC-Link/E could not send the data for a certain period of time.
Action	• Check the LAN cable for disconnection. • Take noise preventive measures. • Replace the master board.

19.903 : YC/E master data receive fail

Code : &H0013 &H0387

Meaning/Cause	The return of the data packet sent from the master board of the YC-Link/E could not be received for a certain period of time.
Action	• Check the LAN cable for disconnection. • Take noise preventive measures. • Replace the master board.

19.904 : YC/E master send data destroy

Code : &H0013 &H0388

Meaning/Cause	The return of the data packet sent from the master board of the YC-Link/E was different from its sent status.
Action	• Take noise preventive measures. • Replace the master board.

19.905 : YC/E master receive data destroy

Code : &H0013 &H0389

Meaning/Cause	The format of the data received by the master board of the YC-Link/E was faulty.
Action	• Take noise preventive measures. • Replace the master board.

19.906 : YC/E invalid slave exist

Code : &H0013 &H038A

Meaning/Cause	Slave that cannot be used exists in the slaves of the YC-Link/E.
Action	Remove the inapplicable slave.

19.907 : YC/E slave unconformity

Code : &H0013 &H038B

Meaning/Cause	The controller mode setting on the master controller of the YC-Link/E is different from that on the slave controller.
Action	Replace the controller.

19.908 : YC/E slave config mismatch

Code : &H0013 &H038C

Meaning/Cause	The number of controllers set in the master of the YC-Link/E is different from the number of actually connected controllers.
Action	Change the parameter setting or turn off the power, and turn it on again after matching the number of slaves to the setting.

19.909 : YC/E slave power low

Code : &H0013 &H038D

Meaning/Cause	The control power voltage of the YC-Link/E slave dropped.
Action	Check the power supply of the slave, and turn off both the master and slave, and turn them on again.

19.910 : YC/E system power turn on again

Code : &H0013 &H038E

Meaning/Cause	The slave of the YC-Link/E does not communicate. Only the master might be turned off, and then it might be turned on again.
Action	Turn off all the controllers that are connected with the YC-Link/E, and turn them on again.

19.920 : YC/E master slave loose connection

Code : &H0013 &H0398

Meaning/Cause	The connection between the master and slave of the YC-Link/E has broken.
Action	• Check the cable connection. • Replace the cable. • Take noise preventive measures. • Replace the controller.

19.993 : YC/E master fatal error

Code : &H0013 &H03E1

Meaning/Cause	An unknown error occurred in the YC-Link/E.
Action	Contact your distributor.

[21] Serious alarm related to software

21.900 : System error (EXCEPTION)

Code : &H0015 &H0384

Meaning/Cause	Software error occurred.
Action	Contact your distributor.

21.903 : System error (TaskID)

Code : &H0015 &H0387

Meaning/Cause	Software error occurred.
Action	Contact your distributor.

21.912 : System error (RTOS)

Code : &H0015 &H0390

Meaning/Cause	Software error occurred.
Action	Contact your distributor.

21.915 : System error (NULL access)

Code : &H0015 &H0393

Meaning/Cause	Software error occurred.
Action	Contact your distributor.

21.999 : System error (UNDEFINED)

Code : &H0015 &H03E7

Meaning/Cause	Software error occurred.
Action	Contact your distributor.

[22] Serious alarm related to hardware

22.504 : Abnormal drop in voltage

Code : &H0016 &H01F8

Meaning/Cause	a. Output voltage for motor power supply dropped below 140V. b. Power supply has insufficient capacity. c. The vertical axes electromagnetic brake is defective. d. The SAFETY connector is used incorrectly.
Action	a. Check the power supply voltage. b-1. Check if supply voltage drops during robot operation. b-2. Lower the robot duty cycle. c. Replace the vertical axes electromagnetic brake. d-1. Do not supply 24 V DC to the SAFETY connector from external source. d-2. Do not use 24 V DC from the SAFETY connector as power source for driving external loads.

22.507 : Driver over heat

Code : &H0016 &H01FB

Meaning/Cause	The driver unit temperature increased to approximately 60 °C or more.
Action	• Improve the installation environment. • Check that the cooling fan operates correctly. • Replace or clean the cooling fan filter. • Decrease the robot duty cycle to reduce the amount of heat generated. • Replace the controller.

22.508 : Regen. over heat

Code : &H0016 &H01FC

Meaning/Cause	The regenerative unit heated up abnormally.
Action	• Improve the installation environment. • Check that the cooling fan operates correctly. • Replace or clean the cooling fan filter. • Decrease the robot duty cycle to reduce the amount of heat generated. • Replace the controller.

22.509 : Internal 24V power abnormal

Code : &H0016 &H01FD

Meaning/Cause	Internal 24V-power voltage dropped. a. The SAFETY connector wiring was incorrect. b. The brake cable was short-circuited. c. The controller malfunctioned.
Action	a. Perform the wiring of the SAFETY connector correctly. b. Replace the robot cable. c. Replace the controller.

22.511 : Fan stop error

Code : &H0016 &H01FF

Meaning/Cause	Power was not supplied to the controller cooling fan. a. The controller cooling fan cable wiring was broken. b. ROB I/O cable was short-circuited. c. The controller malfunctioned. d. Error occurred in the controller cooling fan. e. The controller cooling fan malfunctioned.
Action	a. Replace the controller cooling fan cable. b. Replace the ROB/IO cable. c. Replace the controller. d, e. Replace the controller cooling fan.

22.516 : Controller over heat

Code : &H0016 &H0204

Meaning/Cause	The environmental temperature inside the controller increased to approximately 60 °C or more.
Action	• Improve the installation environment. • Check that the cooling fan operates correctly. • Replace the controller.

22.600 : Motor power off

Code : &H0016 &H0258

Meaning/Cause	The main power voltage dropped in the servo on or servo off status.
Action	Check that the main power is input.

22.800 : Control power off

Code : &H0016 &H0320

Meaning/Cause	a. The AC supply voltage of control power supply dropped below 85% of rated voltage. b. The power source has insufficient capacity.
Action	a-1. Check the AC supply voltage. a-2. Check if supply voltage drops during robot operation. b. Lower the robot duty cycle.

CAUTION

This error always occurs when the power is cut off.

22.807 : Driver over heat

Code : &H0016 &H0327

Meaning/Cause	The driver unit temperature increased to approximately 60 °C or more.
Action	• Improve the installation environment. • Check that the cooling fan operates correctly. • Replace or clean the cooling fan filter. • Decrease the robot duty cycle to reduce the amount of heat generated. • Replace the controller.

22.808 : Regen. over heat

Code : &H0016 &H0328

Meaning/Cause	The regenerative unit heated up abnormally.
Action	• Improve the installation environment. • Check that the cooling fan operates correctly. • Replace or clean the cooling fan filter. • Decrease the robot duty cycle to reduce the amount of heat generated. • Replace the controller.

22.816 : Controller over heat

Code : &H0016 &H0330

Meaning/Cause	The environmental temperature inside the controller increased to approximately 60 °C or more.
Action	• Improve the installation environment. • Check that the cooling fan operates correctly. • Replace the controller.

22.901 : CT type mismatch

Code : &H0016 &H0385

Meaning/Cause	The correct current sensor controller is not used for the set robot.
Action	Replace the current sensor controller with a correct one.

22.902 : Position sensor type mismatch

Code : &H0016 &H0386

Meaning/Cause	The correct position sensor is not set for the set robot correctly.
Action	Contact your distributor.

22.903 : Driver unit disconnected

Code : &H0016 &H0387

Meaning/Cause	The CPU unit did not recognize the driver unit.
Action	Replace the controller.

22.904 : Driver2 board disconnected

Code : &H0016 &H0388

Meaning/Cause	The CPU unit did not recognize the driver 2 board.
Action	Replace the controller.

22.905 : Abnormal over voltage

Code : &H0016 &H0389

Meaning/Cause	a. Output voltage for motor power supply exceeded 420 V. b. The regenerative unit safety device triggered due to temperature rise in regeneration damping resistor. c. The regenerative unit is defective. d. The SAFETY connector is used incorrectly.
Action	• Check the power supply voltage. • Lower the robot duty cycle. • Do not supply 24 V DC to the SAFETY connector from external source.

22.906 : Break 24V power abnormal

Code : &H0016 &H038A

Meaning/Cause	The brake power voltage dropped. a. Power was not supplied to BK 24 V. b. Brake cable was short-circuited. c. Controller malfunctioned.
Action	a. Supply the brake power. b. Replace the robot cable. c. Replace the controller.

[26] Alarm related to the gripper

26.97 : Undefined gripper type number

Code : &H001A &H0061

Meaning/Cause	The specified type number gripper does not exist.
Action	Input the correct gripper number.

26.98 : Gripper overlap assign

Code : &H001A &H0062

Meaning/Cause	a. A different gripper in an option slot for which generation settings were already made was registered. b. A different option slot to a gripper for which generation settings were already made was assigned.
Action	a. Change the option slot number. b. Stop making gripper settings.

26.99 : Gripper undefined error

Code : &H001A &H0063

Meaning/Cause	Undefined error was detected on the gripper control board.
Action	Contact your distributor.

26.332 : Gripper soft limit over

Code : &H001A &H014C

Meaning/Cause	The operating position exceeds the software limit value specified by the parameter.
Action	• Change the operating position to be within the software limit. • Change the software limit value. • Change the limit width.

26.336 : Gripper servo off

Code : &H001A &H0150

Meaning/Cause	A movement command was executed in the servo OFF status.
Action	Turn the servo ON.

26.337 : Gripper stop signal on

Code : &H001A &H0151

Meaning/Cause	It was attempted to execute the program or move the gripper while the gripper's stop signal was ON.
Action	Contact your distributor.

26.350 : Gripper data error

Code : &H001A &H015E

Meaning/Cause	Option data such as a movement command sent to the gripper control board exceeds the input range.
Action	Contact your distributor.

26.351 : Gripper type error

Code : &H001A &H015F

Meaning/Cause	The gripper generation is set using an undefined type number.
Action	Contact your distributor.

26.395 : Gripper type isn't assigned

Code : &H001A &H018B

Meaning/Cause	The gripper type number is not assigned.
Action	Use system generation settings to assign the gripper type number.

26.396 : Gripper cannot get error

Code : &H001A &H018C

Meaning/Cause	Obtaining an error generated by the gripper itself failed.
Action	Contact your distributor.

26.397 : Gripper disconnected

Code : &H001A &H018D

Meaning/Cause	a. The specified gripper is not connected. b. Generation is incomplete for the specified gripper.
Action	a. Connect the gripper. b. Make gripper settings.

26.398 : Illegal gripper no

Code : &H001A &H018E

Meaning/Cause	A gripper number outside the range from 1 to 4 was specified.
Action	Specify a gripper number between 1 and 4.

26.399 : Gripper timeout error

Code : &H001A &H018F

Meaning/Cause	Execution of a command sent to the gripper control board ended in timeout.
Action	Contact your distributor.

26.435 : Gripper origin incomplete

Code : &H001A &H01B3

Meaning/Cause	Return-to-origin has not been performed.
Action	Perform return-to-origin so that the gripper is in the return-to-origin complete status.

26.604 : Gripper 24V power supply voltage low

Code : &H001A &H025C

Meaning/Cause	The 24 V DC power supply voltage is less than 80% of the rated value.
Action	Check the power supply capacity, and if it is insufficient, adjust the power supply voltage to be within the rated range.

26.608 : Gripper 24V power off

Code : &H001A &H0260

Meaning/Cause	a. The 24 V DC power supply is not wired. b. The 24 V DC power supply is not being provided. c. The 24 V DC power supply cable is disconnected.
Action	a. Check the wiring of the 24 V DC power supply. b. Check the 24 V DC power supply. c. Check the 24 V DC power supply cable.

26.612 : Gripper over voltage

Code : &H001A &H0264

Meaning/Cause	The 24 V DC power supply voltage is greater than 130% of the rated value. a. Power supply voltage increased due to regeneration b. The DC24V power supply voltage is incorrect.
Action	a. Decrease the duty of the mechanism. b. Check the 24 V DC power supply voltage and adjust it to be within the rated range.

26.801 : Gripper over load

Code : &H001A &H0321

Meaning/Cause	Motor overload a. Motor is defective. b. Parameters are incorrect. c. Power supply line capacity is insufficient. d. Excessive friction within the mechanism itself.
Action	a. If there are problems such as excessively heavy motion when moving the motor manually, replace the motor. b. Initialize the parameters. c. Check the power supply capacity, and if it is insufficient, adjust the power supply voltage to be within the rated range. d. Check the moving parts of the mechanism for heavy motion. If motion is excessively heavy, make readjustments.

26.802 : Gripper over current

Code : &H001A &H0322

Meaning/Cause	Motor over current a. Motor wiring is shorted. b. Gripper control board is defective. c. Parameters are incorrect.
Action	a. Test the conductivity of the motor wiring, and if a fault is found, replace the motor. b. Replace the gripper control board. c. Initialize the parameters.

26.803 : Gripper machine reference over

Code : &H001A &H0323

Meaning/Cause	The encoder Z-phase position deviated from the initial value stored in the controller. • The gripper main body was replaced. • A finger was replaced with the origin set to the close side. • The CPU board of the controller was replaced. • The CPU software version of the controller was changed. • An obstacle was struck while returning to the origin point. • The encoder Z-phase has broken or has malfunctioned. • The gripper drive section or transmission section has malfunctioned.
Action	• Perform return-to-origin again. • Remove the obstacle and perform return-to-origin again. • Replace the gripper main body.

26.806 : Gripper position deviation error

Code : &H001A &H0326

Meaning/Cause	a. Mechanical lock occurred in the gripper drive section. b. Motor cable is broken or wired incorrectly. c. Parameters are incorrect.
Action	a. Check the gripper drive section for mechanical lock. b. Check the motor cable and encoder cable connections. c. Initialize the parameters.

26.807 : Gripper internal fault

Code : &H001A &H0327

Meaning/Cause	Error occurred within the gripper control board.
Action	Contact your distributor.

26.809 : Gripper watchdog error

Code : &H001A &H0329

Meaning/Cause	The software input a runaway state due to external noise.
Action	Contact your distributor.

26.810 : Gripper feedback error 1

Code : &H001A &H032A

Meaning/Cause	a. External force caused the finger to overrun the software limit. b. External noise caused the encoder to miscount.
Action	a. Turn on the power and check that no external force is applied to the finger, and perform return-to-origin. b. Contact your distributor.

26.811 : Gripper encoder wire breakage

Code : &H001A &H032B

Meaning/Cause	a. The encoder cable is disconnected. b. The guide block is locked.
Action	a. Check the encoder cable connection. b. Unlock the guide block.

26.814 : Gripper current deviation error

Code : &H001A &H032E

Meaning/Cause	The motor cable is broken or wired incorrectly.
Action	Check the motor cable connection.

26.899 : Gripper parameter send fail

Code : &H001A &H0383

Meaning/Cause	Sending the gripper parameter to the gripper control board failed.
Action	Contact your distributor.

[28] Alarm related to the driver I/F

28.900 : Driver version mismatch

Code : &H001C &H0384

Meaning/Cause	The software version of the driver unit was not appropriate.
Action	Update the software version of the driver unit.

28.902 : DMA transfer timeout

Code : &H001C &H0386

Meaning/Cause	Time-out occurred in the communication process between the CPU unit and driver unit.
Action	Contact your distributor.

28.903 : Driver interrupt timeout

Code : &H001C &H0387

Meaning/Cause	Time-out occurred in the communication process between the CPU unit and driver unit.
Action	Contact your distributor.

28.904 : RTOS fail

Code : &H001C &H0388

Meaning/Cause	Software error occurred.
Action	Contact your distributor.

28.905 : Send checksum fail

Code : &H001C &H0389

Meaning/Cause	The driver unit received abnormal data.
Action	Contact your distributor.

28.906 : Receive checksum fail

Code : &H001C &H038A

Meaning/Cause	The CPU unit received abnormal data.
Action	Contact your distributor.

28.999 : Driver I/F undefined error

Code : &H001C &H03E7

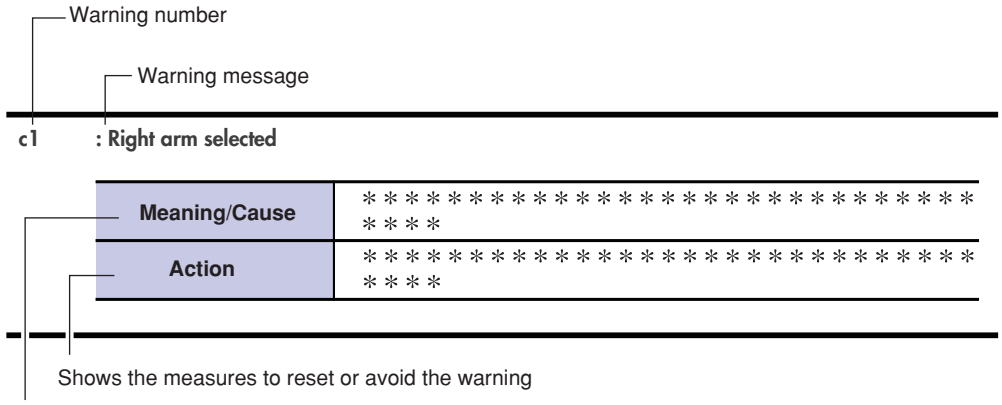
Meaning/Cause	Undefined errors were detected in the communication process between the CPU unit and driver unit.
Action	Contact your distributor.

5. Warning number

The 7-segment LED on the front of the controller displays "C+ warning number" for 2 seconds when a warning occurs. After that, warning numbers and normal display are displayed alternately at 1-second intervals.

Warning number	Type	Axis operation in case of error	History	LED display	Reset method	Example
c1 to c99	General warning	–	–	Warning ⇔ Status	Remove the warning cause.	Overload warning

[Warning meaning display format]



[c] Warning

c1 : Right arm selected

Meaning/Cause	On SCARA type robots, the arm uses the right-handed system for starting interpolation movement.
Action	• Stop the axis immediately when the robot moves unexpectedly. • Operate carefully when the robot moves as expected.

c2 : Left arm selected

Meaning/Cause	On SCARA type robots, the arm uses the left-handed system for starting interpolation movement.
Action	• Stop the axis immediately when the robot moves unexpectedly. • Operate carefully when the robot moves as expected.

c3 : Jogging speed limited

Meaning/Cause	The speed is limited since the robot is within the jogging speed limited range.
Action	The speed limit is released if the robot goes out the range.

c50 : Memory backup battery low

Meaning/Cause	The memory battery voltage dropped.
Action	Replace the memory battery.

c70 : Motor overload

Meaning/Cause	The motor was overloaded. Alarm might occur.
Action	Reduce the load to the motor.

c71 : Driver overload

Meaning/Cause	The driver was overloaded. Alarm might occur.
Action	Reduce the load to the driver.

c72 : Motor over current

Meaning/Cause	The motor drew excessive current. Alarm might occur.
Action	Reduce the load to the motor.

c73 : Absolute battery low voltage

Meaning/Cause	The ABS battery voltage was 3.1 V or less.
Action	Replace the ABS battery.

6. Alarm messages related to the programming box

If a hardware or software error occurs in the programming box, relevant message appears on the screen.

NO PANEL DATA

Meaning/Cause : Screen data could not be downloaded during upgrading.
Action : Perform the upgrading again.

Receiving Error.

Meaning/Cause : Error occurred during data receiving.
Specified communication was not performed within the specified period of time.
Action : Check the communication cable for abnormality.
Check that the connector is inserted correctly.

Sending Error.

Meaning/Cause : Error occurred during data sending.
CTS signal did not turn on for 5 seconds during data sending.
Action : Check the communication cable for abnormality.
Check that the connector is inserted correctly.

Receiving timeout.

Meaning/Cause : Error occurred during data receiving.
Specified communication was not performed within the specified period of time.
Action : Check the communication cable for abnormality.
Check that the connector is inserted correctly.

NG=xx.xxx

Meaning/Cause : Alarm occurred in the controller.
Action : Check the alarm contents and perform the alarm reset.

No breakpoint set.

Meaning/Cause : Break point was not set in the program debug.
Action : Set a break point.

USB IO ERROR

Meaning/Cause : USB memory device was not supported.
Action : Replace the USB memory device with a correct one.

USB Not Connect

Meaning/Cause : USB memory device was not connected or a device other than the USB memory device was connected.
Action : Connect the USB memory device correctly.

Bad Format

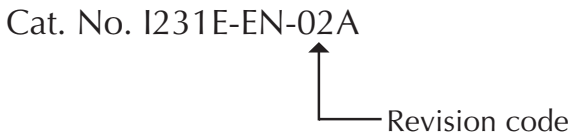
Meaning/Cause : Format of the USB memory device was incorrect.
Action : Change the format of the USB memory device to FAT16 or FAT32.

Not FAT16 Format

Meaning/Cause : Format of the USB memory device was NTFS.
Action : Change the format of the USB memory device to FAT16 or FAT32.

Revision history

A manual revision code appears as a suffix to the catalog number on the front cover manual.



The following table outlines the changes made to the manual during each revision.

Revision code	Date	Description
01	June 2016	Original production
01A	February 2018	Small corrections were applied
01B	August 2019	Small corrections were applied
02	April 2020	The section '2.1 Installation conditions' from the 'Chapter 3. Installation' was updated. PB connector reference was added to the section '6. Connecting the programming box' from 'Chapter 3. Installation'. Electrical diagram from the section '1.5.2 Enable switch contact outputs' of the 'Chapter 5. SAFETY I/O interface' was updated. The section '6. Execution level' from the 'Chapter 7. Controller system settings' was updated. Robot parameters were updated. Information related to new WEIGHTG, INROFST, RTOENBL and SIOWEXT commands were added. Information related to 'DO00 Emergency stop contact monitor' was added. The 'Troubleshooting' chapter was updated.
02A	June 2020	The section '3.3 Considering power capacity and generated heat amount' from the 'Chapter 3. Installation' was updated.

OMRON

Authorized Distributor:

Cat. No. I231E-EN-02A

Note: Specifications subject to change without notice.

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