

EPSON

ROBOT CONTROLLER

RC180

Rev.17

EM164C3205F

ROBOT CONTROLLER RC180 Rev.17

ROBOT CONTROLLER

RC180

Rev.17

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FOREWORD

Thank you for purchasing our robot products.

This manual contains the information necessary for the correct use of the robot controller.

Please carefully read this manual and other related manuals before installing the robot system.

Keep this manual handy for easy access at all times.

WARRANTY

The robot system and its optional parts are shipped to our customers only after being subjected to the strictest quality controls, tests, and inspections to certify its compliance with our high performance standards.

Product malfunctions resulting from normal handling or operation will be repaired free of charge during the normal warranty period. (Please ask your Regional Sales Office for warranty period information.)

However, customers will be charged for repairs in the following cases (even if they occur during the warranty period):

1. Damage or malfunction caused by improper use which is not described in the manual, or careless use.
2. Malfunctions caused by customers' unauthorized disassembly.
3. Damage due to improper adjustments or unauthorized repair attempts.
4. Damage caused by natural disasters such as earthquake, flood, etc.

Warnings, Cautions, Usage:

1. If the robot system associated equipment is used outside of the usage conditions and product specifications described in the manuals, this warranty is void.
2. If you do not follow the WARNINGS and CAUTIONS in this manual, we cannot be responsible for any malfunction or accident, even if the result is injury or death.
3. We cannot foresee all possible dangers and consequences. Therefore, this manual cannot warn the user of all possible hazards.

TRADEMARKS

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TRADEMARK NOTATION IN THIS MANUAL

Microsoft® Windows® XP Operating system

Microsoft® Windows® Vista Operating system

Microsoft® Windows® 7 Operating system

Microsoft® Windows® 8 Operating system

Throughout this manual, Windows XP, Windows Vista, Windows 7 and Windows 8 refer to above respective operating systems. In some cases, Windows refers generically to Windows XP, Windows Vista, Windows 7 and Windows 8.

NOTICE

No part of this manual may be copied or reproduced without authorization.

The contents of this manual are subject to change without notice.

Please notify us if you should find any errors in this manual or if you have any comments regarding its contents.

MANUFACTURER

SEIKO EPSON CORPORATION

Before Reading This Manual

NOTE



Do not connect the followings to the TP/OP port of RC180. Connecting to the followings may result in malfunction of the device since the pin assignments are different.

OPTIONAL DEVICE dummy plug

Operation Pendant OP500

Operator Pendant OP500RC

Jog Pad JP500

Teaching Pendant TP-3**

NOTE



For RC180, be sure to install the EPSON RC+5.0 to the development PC first, then connect the development PC and RC180 with the USB cable.

If RC180 and the development PC are connected without installing the EPSON RC+5.0 to the development PC, [Add New Hardware Wizard] appears. If this wizard appears, click the <Cancel> button.

NOTE



Concerning the security support for the network connection:

The network connecting function (Ethernet) on our products assumes the use in the local network such as the factory LAN network. Do not connect to the external network such as Internet.

In addition, please take security measure such as for the virus from the network connection by installing the antivirus software.

NOTE



Security support for the USB memory:

Make sure the USB memory is not infected with virus when connecting to the Controller.

NOTE



Every data of the Controller is stored to the Compact Flash inside the Controller. When you execute the commands listed below, data is written to the Compact Flash. Frequent data writing to the Compact Flash may shorten the Compact Flash life. It is recommended to use the following commands only when it is necessary.

- Renew the Point files (SavePoints)
- Change the Robot parameters (Base, Local, LocalClr, CalPIs, Calib, Hofs, ArmSet, ArmClr, HomeSet, HomeClr, Hordr, MCOder, Weight, JRange, Range, XYLim, TLSet, TLCI, Arm, Tool, Inertia, EcpSet, EcpClr, Box, BoxClr, Plane, PlaneClr)

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Setup & Operation

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Safety

This section contains information for safety of the Robot System.

1. Safety

Installation and transportation of robots and robotic equipment shall be performed by qualified personnel and should conform to all national and local codes.

Please read this manual and other related manuals before installing the robot system or before connecting cables. Keep this manual in a handy location for easy access at all times.

Read the Safety chapter in *EPSON RC+ 5.0 User's Guide* and confirm *Safety-related requirements*.

2. Conventions

Important safety considerations are indicated throughout the manual by the following symbols. Be sure to read the descriptions shown with each symbol.

| | |
|--|--|
|  WARNING | This symbol indicates that a danger of possible serious injury or death exists if the associated instructions are not followed properly. |
|  WARNING | This symbol indicates that a danger of possible harm to people caused by electric shock exists if the associated instructions are not followed properly. |
|  CAUTION | This symbol indicates that a danger of possible harm to people or physical damage to equipment and facilities exists if the associated instructions are not followed properly. |

3. Safety Precautions

Only trained personnel should design and install the robot system.

Trained personnel are defined as those who have taken robot system training class held by the manufacturer, dealer, or local representative company, or those who understand the manuals thoroughly and have the same knowledge and skill level as those who have completed the training courses.

The following items are safety precautions for qualified design or installation personnel:

| | |
|---|---|
|  WARNING | <ul style="list-style-type: none"> ■ Personnel who design and/or construct the robot system with this product must read the Safety chapter in User's Guide to understand the safety requirements before designing and/or constructing the robot system. Designing and/or constructing the robot system without understanding the safety requirements is extremely hazardous, may result in serious bodily injury and/or severe equipment damage to the robot system, and may cause serious safety problems. ■ The Manipulator and the Controller must be used within the environmental conditions described in their respective manuals. This product has been designed and manufactured strictly for use in a normal indoor environment. Using the product in an environment that exceeds the specified environmental conditions may not only shorten the life cycle of the product but may also cause serious safety problems. ■ The robot system must be used within the installation requirements described in the manuals. Using the robot system outside of the installation requirements may not only shorten the life cycle of the product but also cause serious safety problems. ■ The interlock of the Safety Door must be functioning when the robot system is operated. Do not operate the system under the condition that the switch cannot be turned ON/OFF. (I.E. the condition where the switch is disabled) (Example: Tape is put around the switch to hold it closed.) Operating the robot system when the switch is not functioning properly is extremely hazardous and may cause serious safety problems as the Safety Door input cannot fulfill its intended function. ■ Connect input signal wires for Emergency Stop and Safety Door to the EMERGENCY connector so that the Emergency Stop switch in the Operator Panel or Teach Pendant connected to the TP/OP port always functions. (Refer to the typical application diagram in Setup & Operation 9.4 Circuit Diagrams.) |
|---|---|

The following items are safety precautions for qualified design or installation personnel: (cont.)

| | |
|--|--|
|  WARNING | <ul style="list-style-type: none"> ■ Do not open the cover(s) of the Controller except while maintaining it. Opening the cover(s) of the Controller is extremely hazardous and may result in electric shock even when its main power is OFF because of the high voltage charge inside the Controller. ■ Make sure that the power to the Controller is turned OFF before connecting or disconnecting any cables. Connecting or disconnecting any cables with the power ON is extremely hazardous and may result in electric shock and/or malfunction of the Controller. ■ Be sure to connect the cables properly. Do not allow unnecessary strain on the cables. (Do not put heavy objects on the cables. Do not bend or pull the cables forcibly.) The unnecessary strain on the cables may result in damage to the cables, disconnection, and/or contact failure. Damaged cables, disconnection, or a contact failure is extremely hazardous and may result in electric shock and/or improper function of the system. ■ When connecting the plug to fit the outlet in your factory, make sure that it is done by qualified personnel. When connecting the plug, be sure to connect the earth wire of the AC power cable colored green/yellow on the Controller to the earth terminal of the factory power supply. The equipment must be grounded properly at all times to avoid the risk of electric shock. Always use a power plug and receptacle. Never connect the Controller directly to the factory power supply. (Field wiring) |
|--|--|

| | |
|--|--|
|  CAUTION | <ul style="list-style-type: none"> ■ The serial number of the Manipulator that should be connected is indicated on the Connection Check Label on the Controller. Connect the Controller and the Manipulator correctly. Improper connection between the Controller and the Manipulator may cause improper function of the robot system and also safety problems. ■ When using remote I/O, always make sure of the following. Using the robot system under unsatisfactory conditions may cause malfunction of the system and/or safety problems. <ul style="list-style-type: none"> - Assign remote functions to inputs/outputs correctly and wire correctly when setting up remote I/O signals. - Make sure that the functions correspond to the correct input/output signals before turning ON the system. - When verifying the robot system operation, prepare for failures with initial settings or wiring. If the Manipulator functions unusually by the failures with initial settings or wiring, press the Emergency Stop switch immediately to stop the Manipulator. |
|--|--|

The following items are safety precautions for qualified operator personnel:

| | |
|--|---|
|  <p>WARNING</p> | <ul style="list-style-type: none">■ The interlock of the Safety Door must be functioning when the robot system is operated. Do not operate the system under the condition that the switch cannot be turned ON/OFF. (I.E. the condition where the switch is disabled) (Example: Tape is put around the switch to hold it closed.) Operating the robot system when the switch is not functioning properly is extremely hazardous and may cause serious safety problems as the Safety Door input cannot fulfill its intended function. |
|--|---|

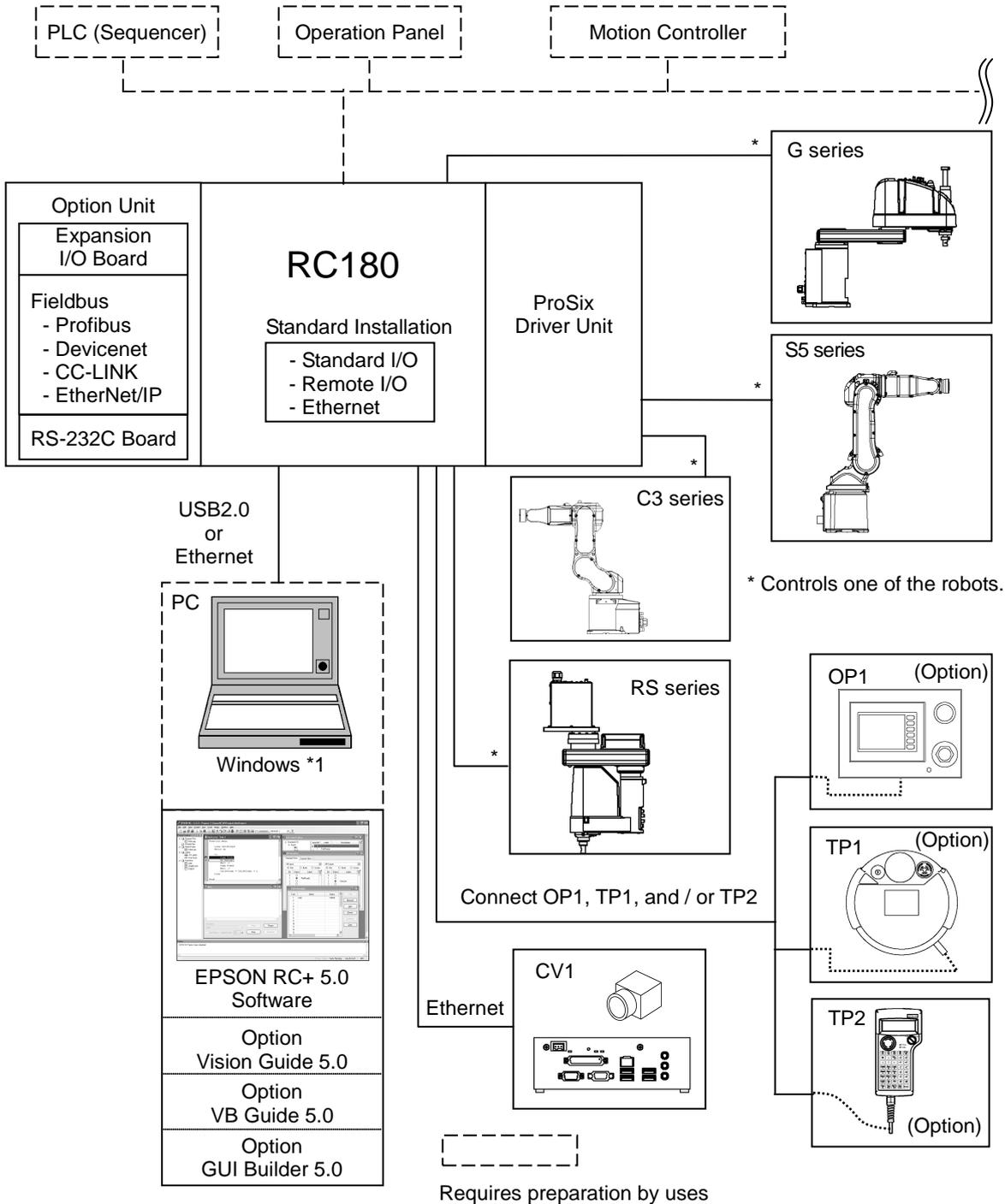
| | |
|--|--|
|  <p>WARNING</p> | <ul style="list-style-type: none">■ Do not open the cover(s) of the Controller except while maintaining it. Opening the cover(s) of the Controller is extremely hazardous and may result in electric shock even when its main power is OFF because of the high voltage charge inside the Controller. |
|--|--|

Setup & Operation

This section contains information for setup and operation of the Robot Controller.

1. Specifications

1.1 System Example



*1 EPSON RC+ 5.0 supports the following OS.
 Windows XP Professional Service Pack 3 (EPSON RC+ 5.0 Ver.5.2.0 SP3 or after is required.)
 Windows Vista Business Service Pack 2 (EPSON RC+ 5.0 Ver.5.3.1 or after is required.)
 Windows 7 Professional (EPSON RC+ 5.0 Ver.5.3.4 or after is required.)
 Windows 8.1 Pro (EPSON RC+ 5.0 Ver.5.4.6 or after is required.)

1.2 Standard Specifications

| Item | Specification | | |
|--|---|---|--|
| Model | Robot Controller RC180 (UL specification: RC180-UL) | | |
| CPU | 32 bits Ultra Low Voltage Processor | | |
| Controllable axes | Up to six (6) connectable AC servo motors | | |
| Robot manipulator control | Programming language and Robot control software | EPSON RC+ 5.0 (a multi-tasking robot language) | |
| | Joint Control | Up to six (6) joints Simultaneous control Software AC servo control | |
| | Speed Control | PTP motion : Programmable in the range of 1 to 100% CP motion : Programmable (Actual value to be manually entered.) | |
| | Acceleration/ deceleration control | PTP motion : Programmable in the range of 1 to 100%; Automatic CP motion : Programmable (Actual value to be manually entered.) | |
| Positioning control | PTP (Point-To-Point control) CP (Continuous Path control) | | |
| Memory capacity | Maximum Object Size : 4 MB Point data area : 1000 points (per file) Backup variable area : Max. 100 kB (Includes the memory area for the management table.) Approx. 1000 variables (Depends on the size of array variables.) | | |
| Teaching method | Remote Direct MDI (Manual Data Input) | | |
| External input/output signals (standard) | Standard I/O | Input : 24 Output : 16 | Including 8 inputs, 8 outputs with remote function assigned Assignment change allowed |
| Communication interface (standard) | Ethernet | 1 channel | |
| Options (Max. 4 slots) | I/O | Input : 32 per board Output : 32 per board | Addition of 4 boards allowed |
| | Communication interface | RS-232C : 4ch per board | Addition of 2 boards allowed |
| | | Fieldbus I/O : 1ch per board PROFINET PROFIBUS-DP DeviceNet CC-Link EtherNet/IP | Addition of 1 board allowed |

| Item | Specification | | |
|---------------------------|---|---------|--------------------------------------|
| Safety features | <ul style="list-style-type: none"> - Emergency stop switch - Safety door input - Low power mode - Dynamic brake - Encoder cable disconnection error detection - Motor overload detection - Irregular motor torque (out-of-control Manipulator) detection - Motor speed error detection - Positioning overflow - servo error - detection - Speed overflow - servo error - detection - CPU irregularity detection - Memory check-sum error detection - Overheat detection at the Motor Driver Module - Relay welding detection - Over-voltage detection - AC power supply voltage reduction detection - Temperature error detection - Fan error detection | | |
| Power Source | 200 VAC to 240 VAC Single phase 50/60 Hz | | |
| Maximum Power Consumption | 2.5 kVA (Depending on the Manipulator model) | | |
| Insulation Resistance | 100 MΩ or more | | |
| Rated Ambient Temperature | 5 to 40 deg.C | | |
| Rated Relative Humidity | 20% to 80% (with no condensation) | | |
| Weight *1 | For SCARA robot *2 | 9.0 kg | Base unit without option |
| | For Six-axis robot *3 | 10.5 kg | Base unit + ProSix Driver Unit |
| | Option unit | 1.0 kg | Incase of installing 2 option boards |

*1 Weight of the unit is indicated on the Controller itself.

Make sure to check the weight before units transfer or relocation and prevent throwing out your back at holding the unit.

Also, make sure to keep your hands, fingers, and feet safe from being caught or serious injury.

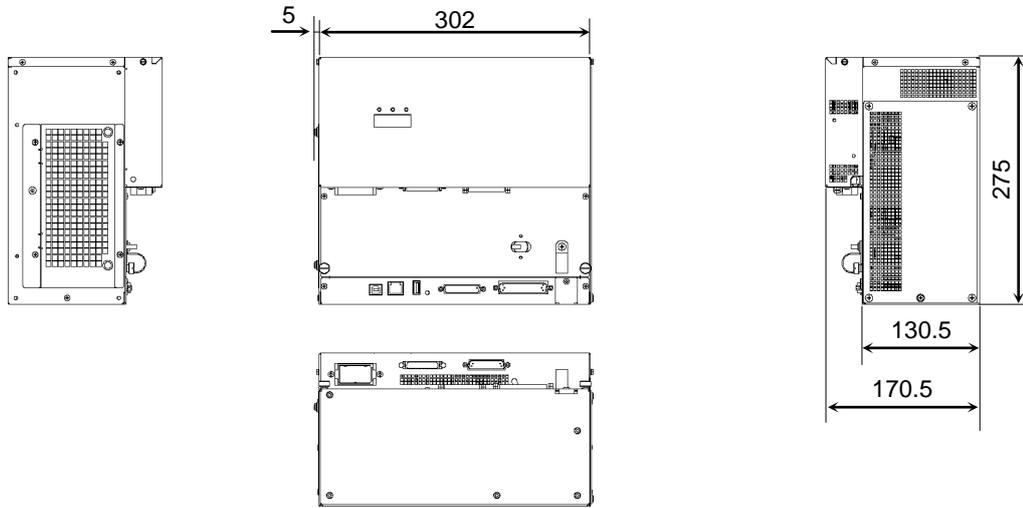
*2 Including RS series.

*3 Including C3 series, S5 series.

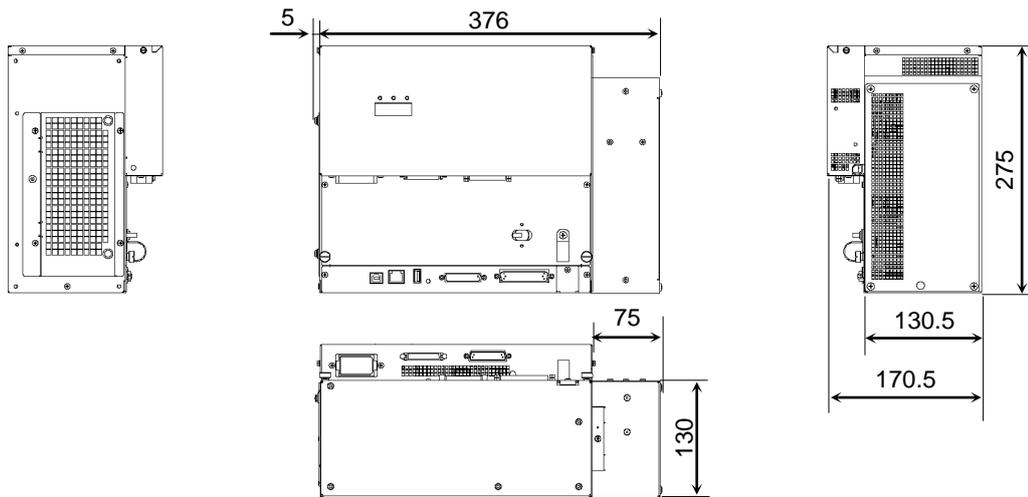
1.3 Outer Dimensions

Dimension of RC180-UL is the same as RC180.

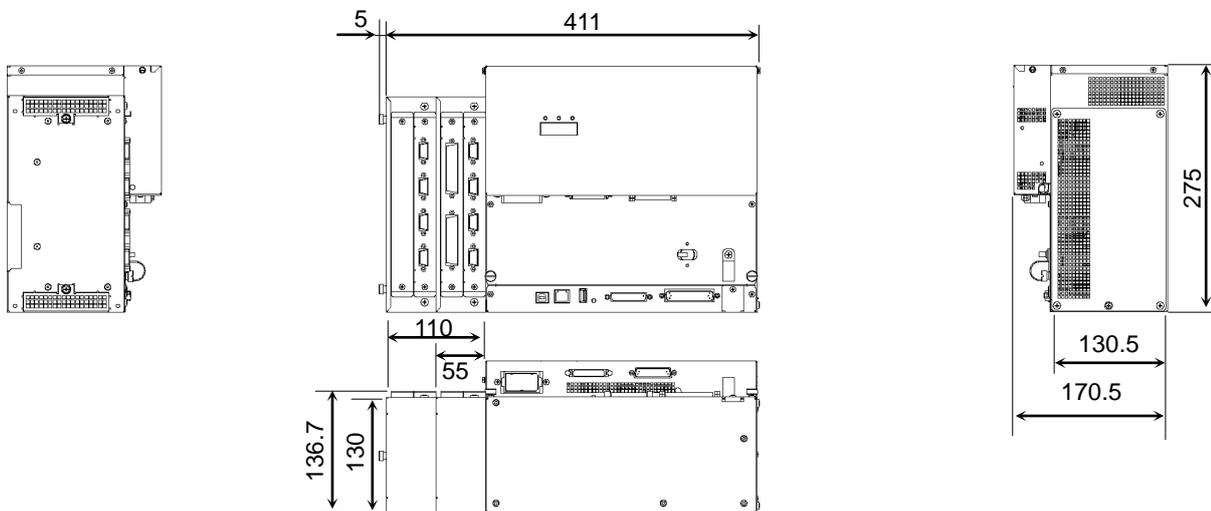
Base Unit (Four-axis robot construction)



Base Unit + ProSix Driver Unit (Six-axis robot construction)



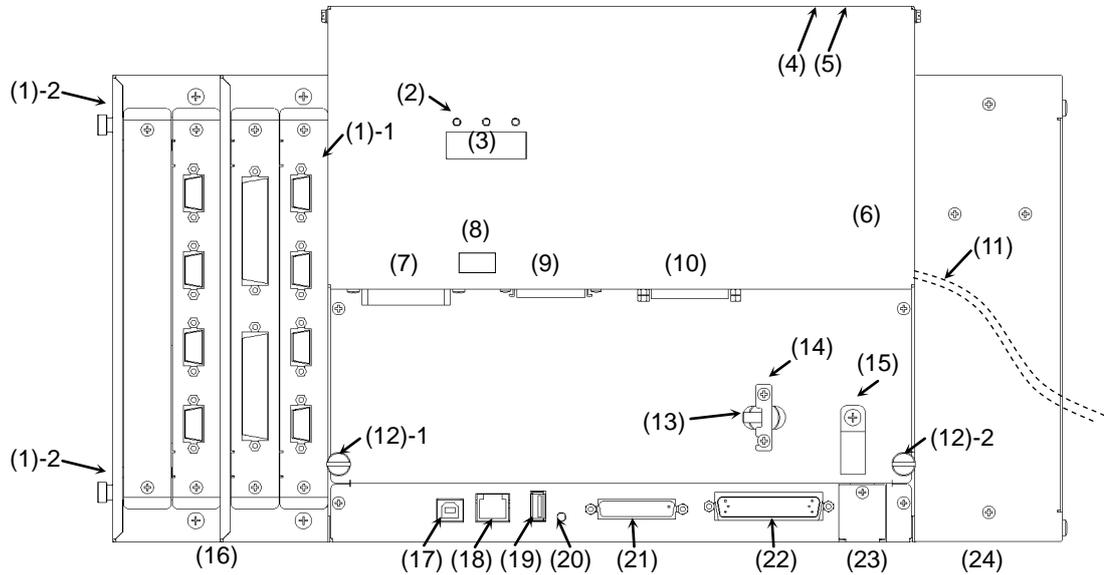
RC180: Base Unit + Option Unit



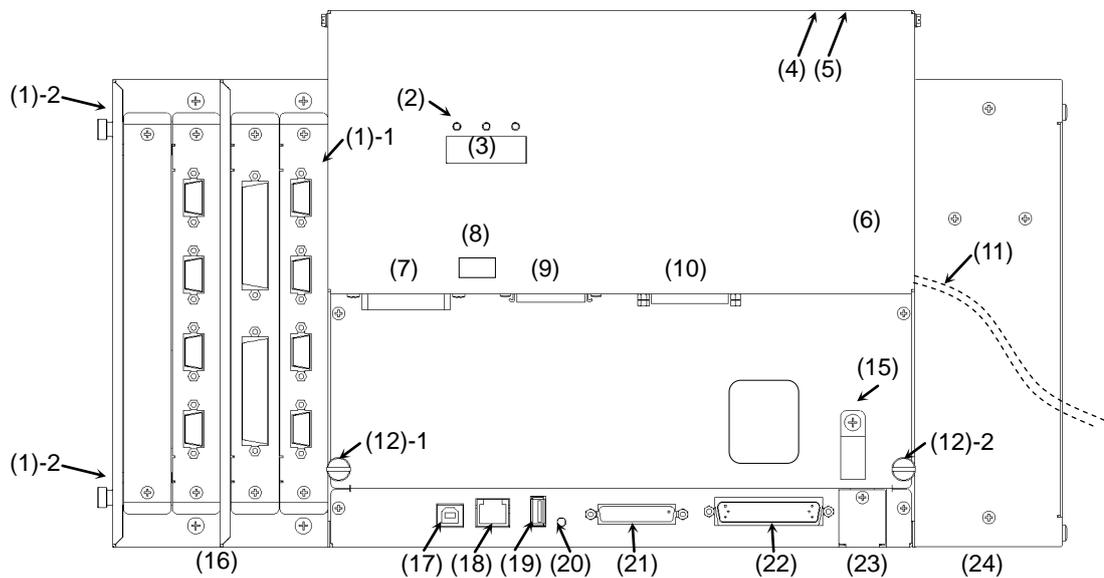
2. Part Names and Functions

2.1 Part Names

RC180



RC180-UL



2.2 Functions

- (1) -1 Fan Filter (Without Option Unit)

A protective filter is installed in front of the fan to filter out dust.
Check the condition of the filter regularly and clean it when necessary. A dirty filter may result in malfunction of the robot system due to temperature rise of the Controller.
For inspection, cleaning, and replacement, refer to the *Maintenance 6.1 Fan and Fan Filter*.
- (1) -2 Fan Filter (With Option Unit)

A protective filter is installed in front of the fan to filter out dust.
Check the condition of the filter regularly and clean it when necessary. A dirty filter may result in malfunction of the robot system due to temperature rise of the Controller.
For inspection, cleaning, and replacement, refer to the *Maintenance 6.1 Fan and Fan Filter*.
- (2) LED

The LED indicates current operation mode (TEACH, AUTO, or PROGRAM mode).
For details, refer to *Setup & Operation 2.3 LED and Seven-segment LED*.
- (3) Seven-segment LED

Four-digit seven-segment LED displays the line number and the status of the controller (error number, warning number, status of Emergency Stop and Safety Door).
For details, refer to *Setup & Operation 2.3 LED and Seven-segment LED*.
- (4) Signature label (top panel)

The serial number of the Controller and other information are shown.
- (5) MT label (top panel)

The label indicates the specification number for the customized Manipulator and is attached only to the customized Manipulator. If your Manipulator indicates this label, it may require a specific maintenance procedure. In this case, make sure to contact your dealer before performing any maintenance procedures.
- (6) Controller Number label

The serial number of the Controller is indicated.
- (7) M/C POWER connector

A connector for the Manipulator power source.
Connect the dedicated power cable attached to the Manipulator.
- (8) Connection Check label

The details of the Manipulator to be connected are recorded on the label as shown in the right. The label indicates the Manipulator model and Manipulator serial number.

| | |
|-------------|-------|
| MANIPULATOR | |
| G6-551S | 00002 |

(9) M/C SIGNAL connector

This connector is used for signals such as the Manipulator's motor encoders, the origin sensor signals, etc. Connect the Manipulator's dedicated signal cable.

(10) EMERGENCY connector

This connector is used for input/output from/to Emergency Stop and Safety Door switches. For details, refer to the *Setup & Operation 9. EMERGENCY*.

(11) AC IN

The cable for AC 200V power input.

For details, refer to *Setup & Operation 3.3.2 AC Power Cable*.

(12) Thumb Head screw

This is two of the four screws used to attach the front cover of the Controller. Use these screws to pull out the Motor Driver module and CPU board unit.

NOTE



- A spacer is attached to the thumb head screw on Controllers S/N01001 or later.

Do not remove the spacer.

Installing the front cover using a thumb head screw without a spacer may result in a cable being stuck and/or malfunction of the Controller.

- Installing the front cover using other screws may result in cable being stuck and/or malfunction of the Controller.

(13) POWER switch

Turns ON or OFF the Controller.

* This is not available for RC180-UL. For details, refer to the *Setup & Operation 3.3.2 AC Power Cable, For RC180-UL*.

(14) Power Switch metal hasp

To lock the power switch in the OFF position, set the power switch to the OFF position and mount the metal hasp. Lock the power off for maintenance or repair of the robot system.

* This is not available for RC180-UL. For details, refer to the *Setup & Operation 3.3.2 AC Power Cable, For RC180-UL*.

(15) Cable Clamp

This can be used to secure the M/C Signal Cable and the EMERGENCY cable if necessary.

(16) Option Unit

Option boards such as expansion I/O board, Fieldbus I/O board, RS-232C board can be installed. Two slots per unit are available. Up to two units (four slots) are supported.

For details, refer to *Setup & Operation 12.Option Unit*.

(17) Development PC connection port

This port connects the Controller and the Development PC using a USB cable.

Do not connect other devices except the Development PC.

For details, refer to *Setup & Operation 5. Development PC Connection Port*.

(18) LAN (Ethernet communication) port

This port connects the Controller and the Development PC using an Ethernet cable. 100BASE-TX / 10BASE-T communication are available.

For details, refer to *Setup & Operation 7. LAN (Ethernet communication) Port*.

(19) Memory port

This port connects the common USB memory for Controller status storage function. Do not connect other USB devices except the USB memory.

For details, refer to *Setup & Operation 6. Memory Port*.

(20) Trigger Switch

This switch is for Controller status storage function using the USB memory.

For details, refer to *Setup & Operation 6. Memory Port*.

(21) TP/OP port

Connects Teach Pendant TP1 (Option) TP2 (Option), Operator Panel OP1 (Option), and TP/OP bypass plug.

For details, refer to *Setup & Operation 8. TP/OP Port*.

NOTE



Do not connect the following to the TP/OP port of RC180. Connecting to the followings may result in malfunction of the device since the pin assignments are different.

OPTIONAL DEVICE dummy plug

Operation Pendant OP500

Operator Pendant OP500RC

Jog Pad JP500

Teaching Pendant TP-3**

(22) I/O connector

This connector is used for input/output device. There are 24 inputs and 16 outputs.

For details, refer to *Setup & Operation 10. I/O Connector*.

(23) Battery

This is a lithium battery for data backup.

For replacement, refer to *Maintenance 6.2 Battery*.

(24) ProSix Driver Unit

This unit is used for C3 series and S5 series manipulators.

Motor driver for two axes is installed.

2.3 LED and Seven-segment LED

2.3.1 LED and Seven-segment Display

Three LEDs and a four-digit seven-segment LED display are located on the front panel of the Controller.

LED : LED (TEACH, AUTO, PROGRAM) turns ON according to the current operation mode (TEACH, Auto, Program).

Seven-segment : Indicates the line number and Controller status (error number, warning number, Emergency Stop or Safeguard status).

From turning ON the Controller to completing startup

LED : All three LEDs blink.

Seven-segment : All four LED digits turn OFF the lights.

After Controller Startup

LED : LED (TEACH, AUTO, PROGRAM) turns ON according to the current operation mode (TEACH, Auto, Program).

Seven-segment : Display changes according to the Controller status.

When several Controller statuses occurred at one time, the status indicated earlier on the following table is displayed. For an example, when both Emergency Stop and Safeguard statuses occurred at one time,  is displayed.

| Controller status | Display of seven-segment | |
|--|---|----------|
| Execute Controller status storage function to the USB memory | Displays  and  repeatedly. | |
| Complete Controller status storage to USB memory | Displays  (for 2s) | |
| Failure of Controller status storage to USB memory | Displays  (for 2s) | |
| Error | Displays four-digit error number (1.6s) and  (0.4s) repeatedly. *1 | |
| Warning | Displays four-digit warning number (1.6s) and  (0.4s) repeatedly. *1 | |
| Emergency Stop |  | Blink |
| Safety Door |  | Blink |
| READY |  | Blink |
| START |  line number | Blink *2 |
| PAUSE |  line number | Blink *2 |

*1 For error numbers and warning numbers, refer to *Maintenance 8.1 Error Code Table*.

*2 In initial status, execution line of task number 1 is displayed in three-digit.

Use Ton statement to change the displayed task number.

For details, refer to *EPSON RC+ 5.0 SPEL+ Language Reference, or Online Help*.

2.3.2 Particular Status Display

When particular status occurs, seven-segment displays the followings.

| Seven-segment | Controller status |
|---|--|
|  | Controller startup failure *1 |
|  | Controller startup failure |
|  | Controller in Recovery mode Refer to <i>Maintenance 4. Backup and Restore.</i> |
|  | AC power supply drop is detected and software shut down. |
|  | Software shut down is specified from the EPSON RC+ 5.0 (software) or the Teach Pendant (option). |

*1 When the Initialize Error occurs, reboot the Controller. If the Initialize Error is displayed again after the Controller is rebooted, please contact the supplier of your region.

2.4 Safety Features

The robot control system supports safety features described below. However, the user is recommended to strictly follow the proper usage of the robot system by thoroughly reading the attached manuals before using the system. Failure to read and understand the proper usage of the safety functions is highly dangerous.

Among the following safety features, the Emergency Stop Switch and Safety Door Input are particularly important. Make sure that these and other features function properly before operating the robot system.

For details, refer to the *Setup & Operation 9. EMERGENCY.*

Emergency Stop Switch

The EMERGENCY connector on the Controller has expansion Emergency Stop input terminals used for connecting the Emergency Stop switches.

Pressing any Emergency Stop switch can shut off the motor power immediately and the robot system will enter the Emergency Stop condition.

Safety Door Input

In order to activate this feature, make sure that the Safety Door Input switch is connected to the EMERGENCY connector at the Controller.

When the safety door is opened, normally the Manipulator immediately stops the current operation, and the status of Manipulator power is operation-prohibited until the safety door is closed and the latched condition is released. In order to execute the Manipulator operation while the safety door is open, you must change the mode selector key switch on the Teach Pendant to the “Teach” mode. Manipulator operation is available only when the enable switch is on. In this case, the Manipulator is operated in low power status.

Low Power Mode

The motor power is reduced in this mode.

Executing a power status change instruction will change to the restricted (low power) status regardless of conditions of the safety door or operation mode. The restricted (low power) status ensures the safety of the operator and reduces the possibility of peripheral equipment destruction or damage caused by careless operation.

Dynamic Brake

The dynamic brake circuit includes relays that short the motor armatures. The dynamic brake circuit is activated when there is an Emergency Stop input or when any of the following errors is detected: encoder cable disconnection, motor overload, irregular motor torque, motor speed error, servo error (positioning or speed overflow), irregular CPU, memory check-sum error and overheat condition inside the Motor Driver Module.

Encoder Cable Disconnection Error Detection

The dynamic brake circuit is activated when the Motor Encoder Signal cable is disconnected.

Motor Overload Detection

The dynamic brake circuit is activated when the system detects that the load on the motor has exceeded its capacity.

Irregular Motor Torque (out-of-control manipulator) Detection

The dynamic brake circuit is activated when irregularity with motor torque (motor output) is detected (in which case the Manipulator is out of control).

Motor Speed Error Detection

The dynamic brake circuit is activated when the system detects that the motor is running at incorrect speed.

Positioning Overflow –Servo Error- Detection

The dynamic brake circuit is activated when the system detects that the difference between the Manipulator's actual position and commanded position exceeds the margin of error allowed.

Speed Overflow –Servo Error- Detection

The dynamic brake circuit is activated when the Manipulator's actual speed is detected to mark an overflow (the actual speed is outside the nominal range) error.

CPU Irregularity Detection

Irregularity of CPU that controls the motor is detected by the watchdog timer. The system CPU and the motor controlling CPU inside the Controller are also designed to constantly check each other for any discrepancies. If a discrepancy is detected, the dynamic brake circuit is activated.

Memory Check-sum Error Detection

The dynamic brake circuit is activated when a memory check-sum error is detected.

Overheat Detection at the Motor Driver Module

The dynamic brake circuit is activated when the temperature of the power device inside the Motor Driver module is above the nominal limit.

Relay Deposition Detection

The dynamic brake circuit is activated when relay deposition or junction error is detected.

Over-Voltage Detection

The dynamic brake circuit is activated when the voltage of the Controller is above the normal limit.

AC Power Supply Voltage Drop Detection

The dynamic brake circuit is activated when the drop of the power supply voltage is detected.

Temperature Anomaly Detection

The temperature anomaly is detected.

Fan Malfunction Detection

Malfunction of the fan rotation speed is detected.

3. Installation

3.1 Unpacking

| | |
|--------------------------------|--------|
| TP/OP bypass plug | 1 unit |
| Controller mounting metal hasp | 1 set |
| EMERGENCY port connector | 1 set |

3.2 Environmental Requirements



- The Manipulator and the Controller must be used within the environmental conditions described in their manuals. This product has been designed and manufactured strictly for use in a normal indoor environment. Using the product in the environment that exceeds the conditions may not only shorten the life cycle of the product but also cause serious safety problems.

3.2.1 Environment

In order to optimize the robot system's performance for safety, the Controller must be placed in an environment that satisfies the following conditions:



- The Controller is not designed for clean-room specification. If it must be installed in a clean room, be sure to install it in a proper enclosure with adequate ventilation and cooling.
- Install Controller in a location that allows easy connection / disconnection of cables.

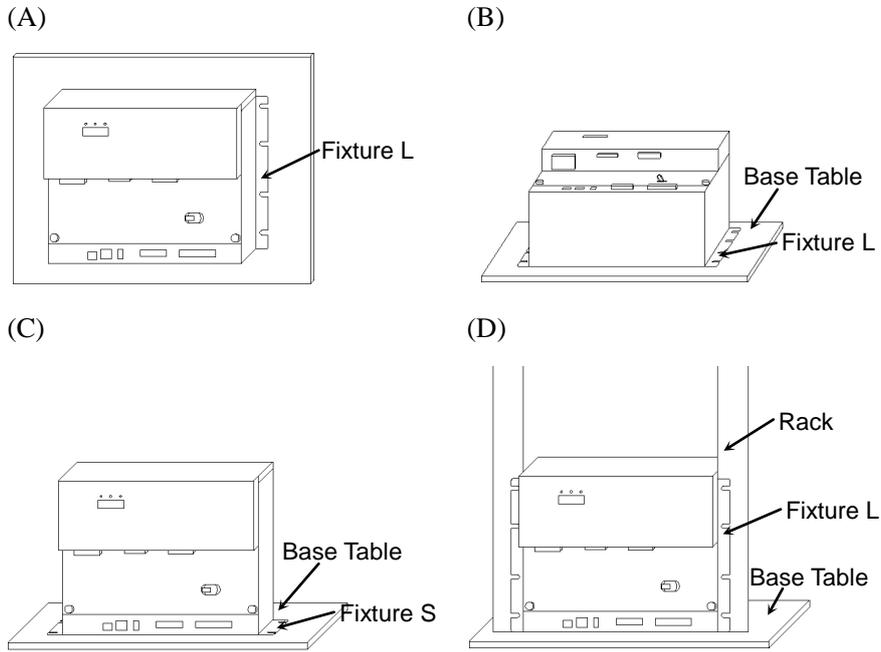
| Item | Condition |
|-----------------------------|---|
| Ambient temperature | 5 to 40 deg.C (with minimal variation) |
| Ambient relative humidity | 20% to 80% (with no condensation) |
| First transient burst noise | 2 kV or less (Power supply wire) 1 kV or less (Signal wire) |
| Electrostatic noise | 4 kV or less |
| Base table | Use a base table that is at least 100 mm off the floor. Placing the Controller directly on the floor could allow dust penetration leading to malfunction. |

If the Controller must be used in an environment that does not fulfill the conditions mentioned above, take adequate countermeasures. For example, the Controller may be enclosed in a cabinet with adequate ventilation and cooling.

- Install indoors only.
- Place in a well-ventilated area.
- Keep away from direct sunlight and radiation heat.
- Keep away from dust, oily mist, oil, salinity, metal powder or other contaminants.
- Keep away from water.
- Keep away from shocks or vibrations.
- Keep away from sources of electronic noise
- Prevent the occurrence of strong electric or magnetic field.

3.2.2 Installation

- Mount the Controller mounting screws with 80 to 110 Ncm torque.
- Install the controller on a flat surface such as wall, floor, and controller box in the direction shown from (A) to (D).



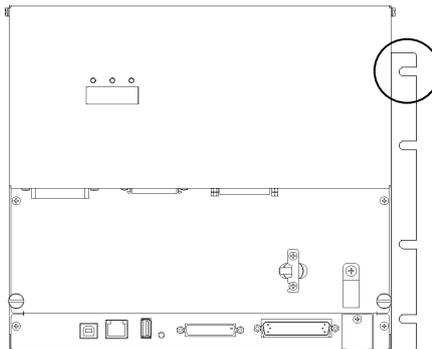
There are two types of fixtures. Mount the fixture to the Controller with the four attached screws.

Fixture L: Used in (A), (B), and (D)

Fixture S: Used in I

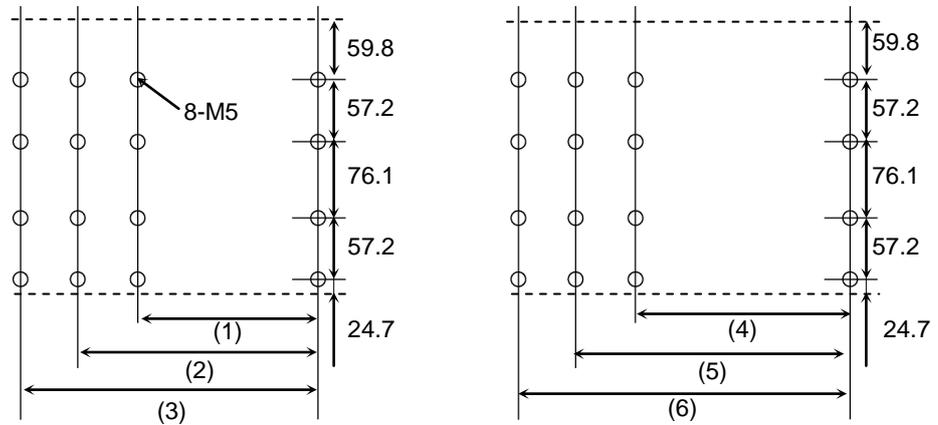


The length from the edge of fixture L differs by the side. Refer to the following figure and mount the side with shorter distance from the edge to the screw hole on the Upper side.

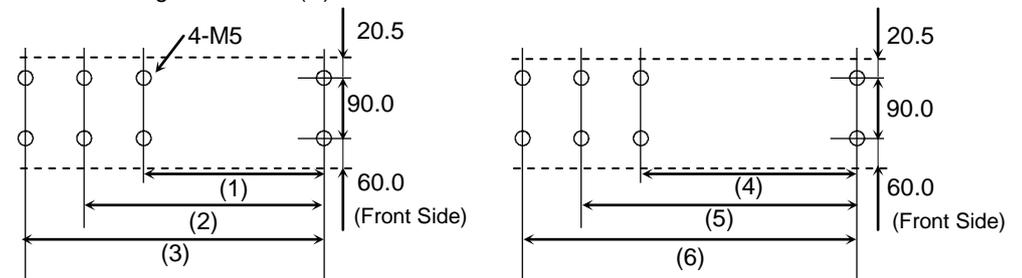


For Controller installation to the Controller box or the base table, process screw hole drilling as follows.

When mounting direction is (A) or (B)



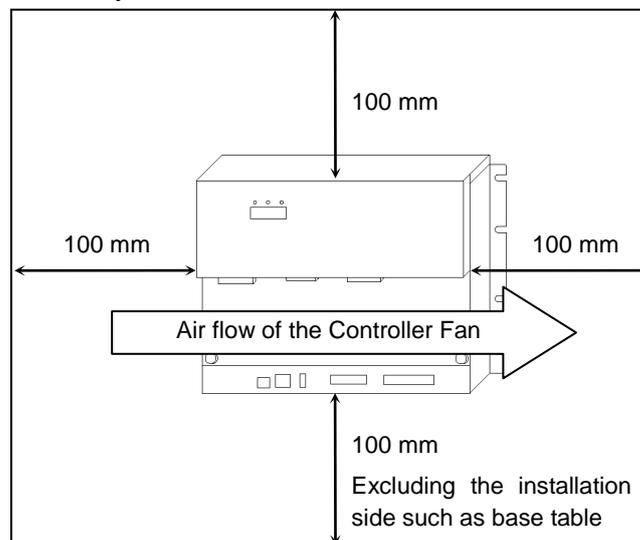
When mounting direction is (C) : Fixture S



No screw hole processing is required for mounting direction (D).
Secure it to the rack with screws and nuts.

| | Controller Only | Controller + ProSix Driver Unit |
|-----------------|-----------------|---------------------------------|
| No Option Unit | (1) 323 mm | (4) 398 mm |
| Option Unit × 1 | (2) 378 mm | (5) 453 mm |
| Option Unit × 2 | (3) 433 mm | (6) 508 mm |

- Ensure the draft around the in/out and also install the Controller by keeping the distance as follows to prevent the nose influence from other equipments such as large contactor and relay.

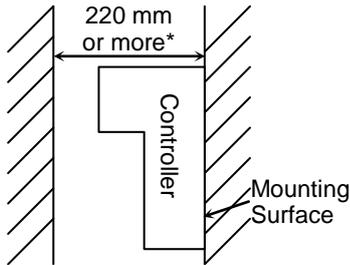


- Hot air with higher temperature than the ambient temperature (about 10 deg.C) comes out from the Controller.
Make sure that heat sensitive devices are not placed near the outlet.

3.2.3 Install inside a Cabinet

When installing the Controller inside a Cabinet, make sure to satisfy the condition indicated in 3.2.1 *Environment*, 3.2.2 *Installation* and also the following conditions.

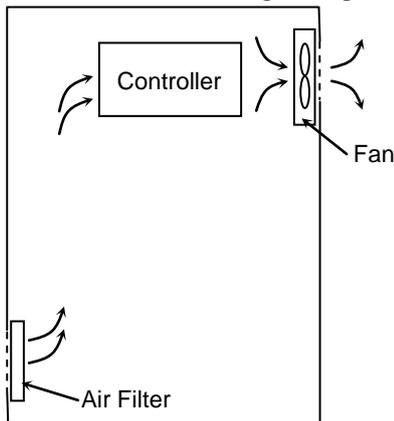
- The distance from the mounting surface and the inside of the door must be 220 mm or more (190 mm when using the option I/O connector).



I/O Connector (Option)
Product No: R12B040710

* When using the I/O connector (option), 190 mm or more

- Set the temperature inside the Controller box to 40 deg.C or less by referring the cooling method in the following example.



3.3 Power Supply

3.3.1 Specifications

Ensure that the available power meets following specifications.

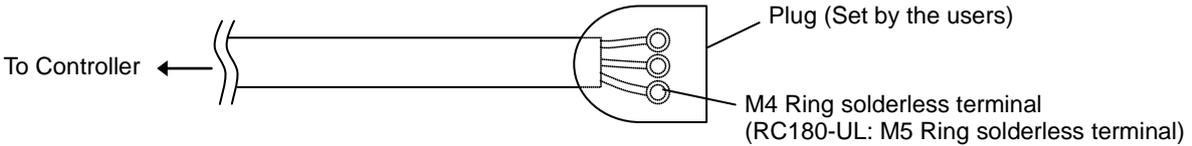
| Item | Specification |
|---------------------------|--|
| Voltage | 200 VAC to 240 VAC |
| Phase | Single phase |
| Frequency | 50/60 Hz |
| Momentary Power Interrupt | 10 ms Or less |
| Power Consumption | <p>Max. 2.5 kVA Actual consumption depends on the model, motion, and load of the Manipulator. For approximate power consumption of each model, refer to the followings.</p> <ul style="list-style-type: none"> C3 : 1.2 kVA S5 : 1.2 kVA G1 : 0.5 kVA G3 : 1.1 kVA G6 : 1.5 kVA G10 : 2.4 kVA G20 : 2.4 kVA RS3 : 1.2 kVA RS4 : 1.4 kVA <p>Refer to Manipulator manual for Manipulator rated consumption.</p> |
| Peak Current | <p>When power is turned ON : approximately 150 A (2 ms.) When motor is ON :approximately 60 A (5 ms.)</p> |
| Leakage Current | Max. 10 mA |
| Ground Resistance | 100 Ω or less |

Install an earth leakage circuit breaker or a circuit breaker in the AC power cable line at 15 A or less rated electric current. Both should be a two-pole disconnect type. If you install an earth leakage circuit breaker, make sure to use an inverter type that does not operate by induction of a 10 kHz or more leakage current. If you install a circuit breaker, please select one that will handle the above mentioned “peak current”.

The power receptacle shall be installed near the equipment and shall be easily accessible.

3.3.2 AC Power Cable

| | |
|--|---|
|  WARNING | <ul style="list-style-type: none"> Make sure that cable manufacturing and connection are done by a qualified personal. When proceeding, be sure to connect the earth wire of the AC power cable colored green/yellow on the Controller to the earth terminal of the factory power supply. The equipment must be grounded properly at all times to avoid the risk of electric shock. Always use a power plug and receptacle for power connecting cable. Never connect the Controller directly to the factory power supply. (Field wiring) |
|--|---|



The AC plug in not attached to the AC power cable delivered at shipment. Refer to the wire connection specification and attach a proper plug to the cable that is suitable for the factory power supply. (A plug is prepared as option.)

Cable Wire Connection Specification

| Purpose | Color |
|--------------------------|----------------|
| AC power wire (2 cables) | Black |
| Ground wire | Green / Yellow |

Cable length: 3 mm (Standard)

For RC180-UL

| | |
|--|--|
|  WARNING | <ul style="list-style-type: none"> Branch Circuit protection (Rated current: 15 A or less) shall be installed in the external AC power supplying side in accordance with the National Electrical Code. A disconnecting means shall be installed in accordance with the National Electrical Code and provide the ability for lockout and tagout. |
|--|--|

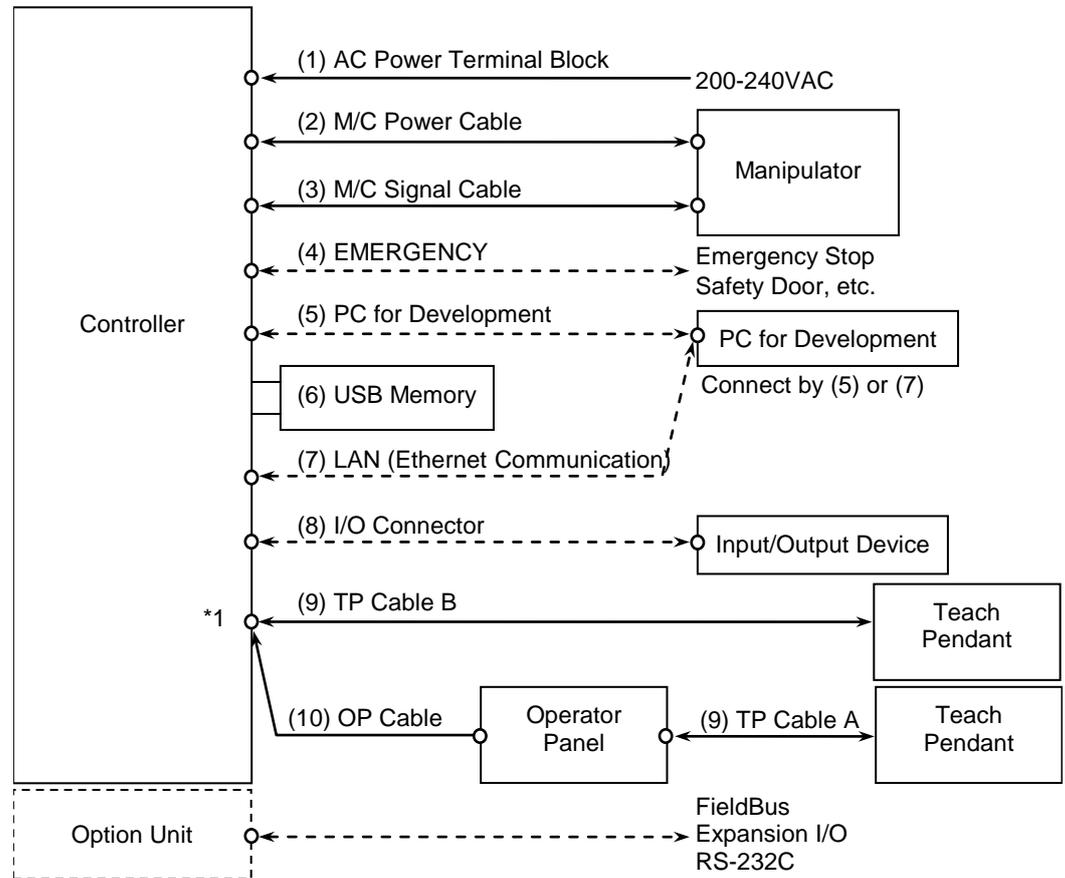
3.4 Cable Connection

| | |
|--|---|
|  WARNING | <ul style="list-style-type: none"> ■ Make sure that the power to the Controller is turned OFF and the power plug is disconnected before connecting or disconnecting any cables. Connecting or disconnecting any cables with the power ON is extremely hazardous and may result in electric shock and malfunction of the Controller. ■ Be sure to connect the cables properly. Do not allow unnecessary strain on the cables. (Do not put heavy objects on the cables. Do not bend or pull the cables forcibly.) The unnecessary strain on the cables may result in damage to the cables, disconnection, and/or contact failure. Damaged cables, disconnection, or contact failure is extremely hazardous and may result in electric shock and/or improper function of the system. |
|--|---|

| | |
|--|---|
|  CAUTION | <ul style="list-style-type: none"> ■ The serial number of the Manipulator that should be connected is indicated on the Connection Check Label on the Controller. Connect the Controller and the Manipulator correctly. Improper connection between the Controller and the Manipulator may cause not only improper function of the robot system but also safety problems. ■ Before connecting the connector, make sure that the pins are not bent. Connecting with the pins bent may damage the connector and result in malfunction of the robot system. |
|--|---|

3.4.1 Typical Cable Connection

- Disconnectable connector
- Cable attached at delivery
- - - - Cable prepared by users



*1 For this connection, only one of the connectors (9) TP cable B or (10) OP cable is connectable to the TP/OP port.

For details of connection of Operator Panel or Teach Pendant to the TP/OP port, refer to *Setup & Operation 8.1 What is TP/OP Port?*

- (1) AC Power terminal block
Terminal block for 200VAC power input to the Controller.
- (2) M/C Power cable
The cable with 50-pin connector on the Controller side.
Connect the POWER connector on the Manipulator and the M/C POWER connector on the Controller. Insert the connectors until you hear a “click”.
- (3) M/C Signal cable
The cable with 50-pin connector on the Controller side.
Connect the signal cable to the SIGNAL connector on the Manipulator and the M/C SIGNAL connector on the Controller.
- (4) EMERGENCY
The EMERGENCY connector has inputs to connect the Emergency Stop switch and the Safety Door switch. For safety reasons, connect proper switches for these input devices.
For details, refer to the *Setup & Operation 9. EMERGENCY*.
- (5) PC for development
Connect the PC for development.
For details, refer to the *Setup & Operation 5. Development PC Port*.
- (6) USB memory
Connect the USB memory.
For details, refer to the *Setup & Operation 6. Memory Port*.
- (7) LAN (EtherNet Communication)
Connect the EtherNet cable.
For details, refer to the *Setup & Operation 7. LAN (Ethernet Communication) Port*.
- (8) I/O connector
This connector is used for input/output devices of the user.
When there are input/output devices, use this connector.
There are I/O cable (option) and terminal block (option) for the I/O connector.
For details, refer to the *Setup & Operation 10. I/O Connector*.

(9) TP cable

Connect the option Teach Pendant.

There are two types of connector shapes for the Teach Pendant.

TP cable A : Circular connector

TP cable B : D-sub 25pin

For details, refer to the *Setup & Operation 8.TP/OP Port*.

(10) OP cable

Connect the option Operator Panel.

For details, refer to the *Setup & Operation 8.TP/OP Port*.

3.4.2 Connecting Manipulator to Controller

Connect the Manipulator to the Controller by using the Power cable and the Signal cable.

| | |
|--|--|
|  WARNING | <ul style="list-style-type: none"> ■ Make sure that the power to the Controller is turned OFF before connecting or disconnecting any cables. Connecting or disconnecting any cables with the power ON is extremely hazardous and may result in electric shock and malfunction of the Controller. ■ Be sure to connect the cables properly. Do not allow unnecessary strain on the cables. (Do not put heavy objects on the cables. Do not bend or pull the cables forcibly.) The unnecessary strain on the cables may result in damage to the cables, disconnection, and/or contact failure. Damaged cables, disconnection, or contact failure is extremely hazardous and may result in electric shock and/or improper function of the system. |
|--|--|

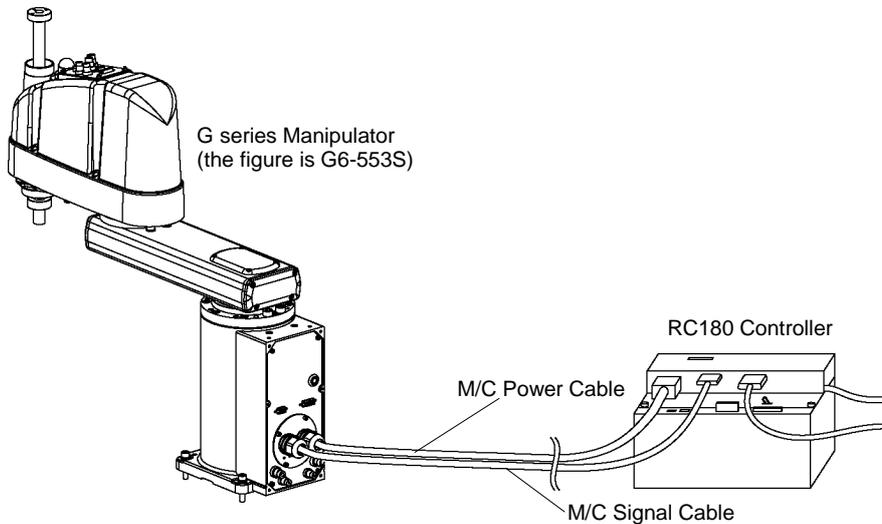
| | |
|--|---|
|  CAUTION | <ul style="list-style-type: none"> ■ The serial number of the Manipulator that should be connected is indicated on the Connection Check Label on the Controller. Connect the Controller and the Manipulator correctly. Improper connection between the Controller and the Manipulator may cause not only improper function of the robot system but also safety problems. ■ When connecting the Manipulator to the Controller, make sure that the serial numbers on each equipment match. Improper connection between the Manipulator and Controller may not only cause improper function of the robot system but also serious safety problems. The connection method varies with the Controller used. For details on the connection, refer to the Controller manual. If the SCARA Manipulator is connected to the Controller for the 6-axis Manipulator, it may result in malfunction of the Manipulator. |
|--|---|

The configuration data for the Manipulator and Manipulator model are stored in the Controller. Therefore the Controller should be connected to the Manipulator whose serial number is specified in the Connection Check label attached on the front of the Controller.

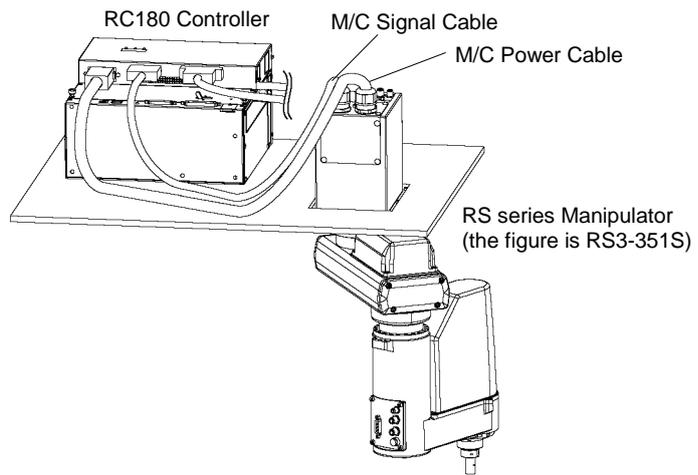
NOTE


The Manipulator's serial number is indicated on the signature label on the back of the Manipulator.

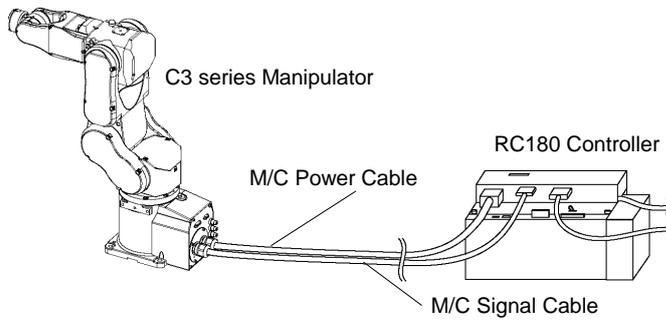
G series



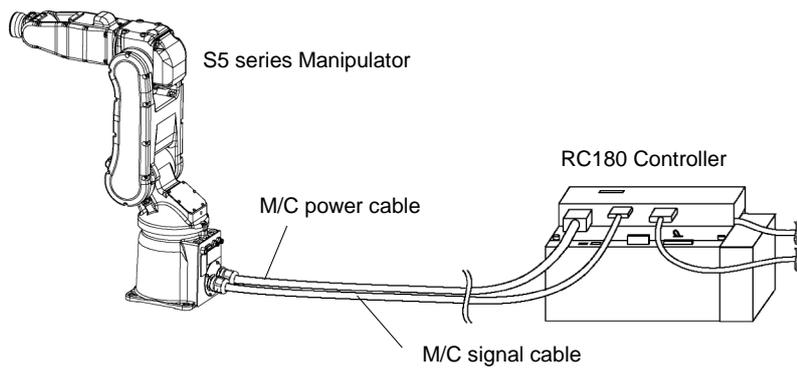
RS series



C3 series and



S5 series

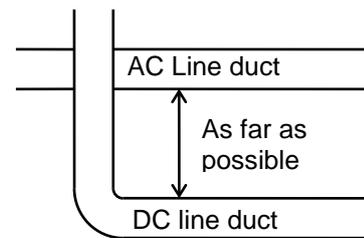


3.5 Noise Countermeasures

To minimize electrical noise conditions, the following items must be observed in the system's cable wiring:

To minimize electrical noise condition, be sure of followings for wiring.

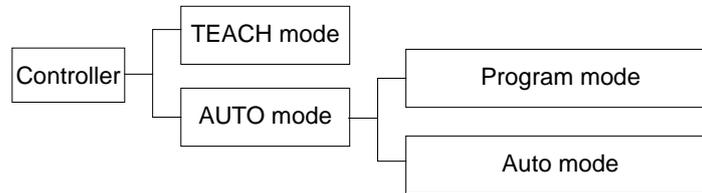
- The earth wire of the power supply should be grounded. (Ground resistance: 100 Ω or less) It is important to ground the frame of Controller not only for prevention from electric shock, but also for reducing the influence of electric noise around the Controller. Therefore, be sure to connect the earth wire (yellow/green) of the Controller's power cable to the ground terminal of the factory power supply. For details about the plug and AC power cable, refer to the *Setup & Operation 3.3 Power Supply*.
- Do not tap power from a power line that connects to any equipment which may cause noise.
- When you tap power for the Controller and the single-phase AC motor from the same power line, change the phase of one or the other. Ensure that they will not be the same phase.
- Use a twisted pair motor power line.
- Do not run AC power lines and DC power lines in the same wiring duct, and separate them as far as possible. For example, separate the AC motor power line and the Controller power line as far as possible from the sensor or valve I/O lines; and do not bundle both sets of wiring with the same cable tie. If more than one duct/cable must cross each other, they should cross perpendicularly. The preferable example is shown in the right figure.
- Wire as short as possible to the I/O connector and EMERGENCY connector. Use a shielded cable and clamp the shield to the attached connector interior. Make sure to keep away from the peripheral noise source as far as possible.
- Make sure that the induction elements used to connect to the Controller's I/O (such as relays and solenoid valves) have surge suppressors. If an induction element without a surge suppressor is used, make sure to connect a rectifying diode located at the induction element in parallel with it. In selecting a rectifying diode, make sure that it can handle the voltage and current incurred by the induction load.
- To start and change revolutions of the conveyer's (or the like's) AC motor (ex: an induction motor or three-phase induction motor) regularly or abruptly, make sure to install a spark suppressor between the wires. The spark suppressor is more effective when placed closer to the motor.
- As they are easily influenced by static electricity or the noise from power source, keep cable such as USB, Ethernet, RS-232C, or fieldbus away from peripheral noise sources.



4. Operation Mode (TEACH/AUTO)

4.1 Overview

The Robot system has two operation modes TEACH mode and AUTO mode.



TEACH mode This mode enables point data teaching and checking close to the Robot using the Teach Pendant.

In this mode the Robot operates in Low power status.

AUTO mode This mode enables automatic operation (program execution) of the Robot system for the manufacturing operation, and also programming, debug, adjustment, and maintenance of the Robot system.

This mode cannot operate the Robots or run programs with the Safety Door open.

4.2 Switch Operation Mode

Change the operation mode using the mode selector key switch on the Teach Pendant.

TEACH mode Turn the mode selector key switch to “Teach” for TEACH mode. Switching to TEACH mode pauses the program if it was running. The operating Robot stops by Quick Pause.

AUTO mode Turn the mode selector key switch to “Auto” and turn on the latch release input signal for AUTO mode.

4.3 Program Mode (AUTO)

4.3.1 What is Program Mode (AUTO)?

Program mode is for programming, debug, adjustment, and maintenance of the Robot system.

Procedures for switching to the Program mode are the followings.

A : Set the start mode of the EPSON RC+ 5.0 to “Program” and start the Controller connection. (Refer to 4.3.2 Setup from EPSON RC+ 5.0.)

B : Select the “Program mode” from the Teach Pendant main menu. (Refer to 4.3.3 Setup from Teach Pendant.)

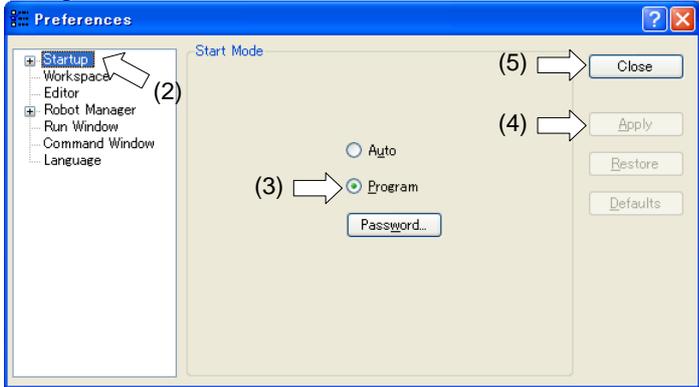


When EPSON RC+ 5.0 is used for switching to Program mode, the Teach Pendant cannot switch modes. Also, when the Teach Pendant is used for switching to Program mode, EPSON RC+ 5.0 cannot switch modes.

4.3.2 Setup from EPSON RC+ 5.0

Switch the mode to Program mode from the EPSON RC+ 5.0.

(1) Select EPSON RC+ 5.0 menu-[Setup]-[Configuration] to display the [Preference] dialog.



- (2) Select [Startup].
- (3) Select [Start mode]-<Program> button.
- (4) Click the <Apply> button.
- (5) Click the <Close> button.

4.3.3 Setup from Teach Pendant

Switch the mode to Program mode from the Teach Pendant.

(Only TP1. TP2 does not support this function.)

- (1) Press the <F4> key on the Print window to display the Main menu window.
- (2) Select the “Program mode ...” by the <↑↓> key.
- (3) Press the <OK> key.

4.4 Auto Mode (AUTO)

4.4.1 What is Auto mode (AUTO)?

Auto mode (AUTO) is for automatic operation of the Robot system.

Procedures for switching to the Auto mode (AUTO) are the followings.

A : Set the start mode of the EPSON RC+ 5.0 to “Auto” and start the EPSON RC+ 5.0.

(Refer to 4.4.2 Setup from EPSON RC+ 5.0.)

B : Offline the EPSON RC+ 5.0.

NOTE

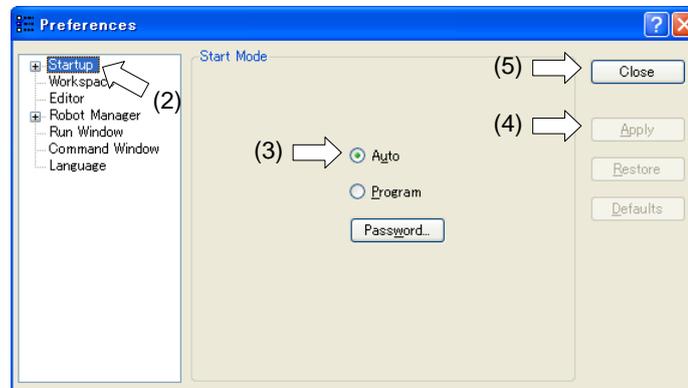


Execute and stop the program from the control device specified by the EPSON RC+ 5.0.
(Refer to Setup & Operation 4.4.3 Setup Control Device.)

4.4.2 Setup from EPSON RC+ 5.0

Switch the mode to Auto mode (AUTO) from the EPSON RC+ 5.0.

(1) Select EPSON RC+ 5.0 menu-[Setup]-[Preference] to display the [Preference] dialog.

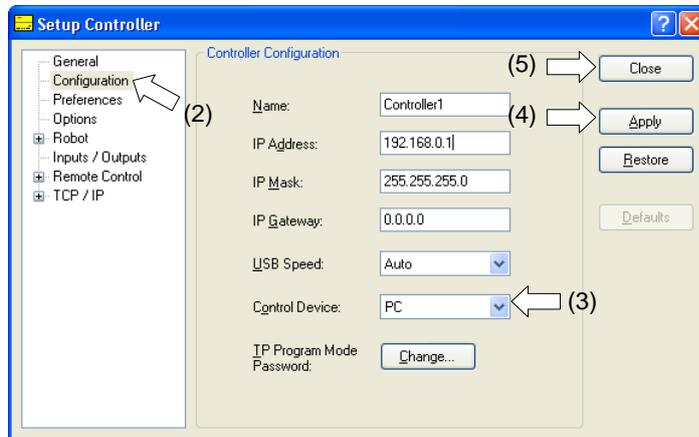


- (2) Select [Startup].
- (3) Select [Start Mode]-<Auto> button.
- (4) Click the <Apply> button.
- (5) Click the <Close> button.

4.4.3 Setup from Control Device

Set the control device from EPSON RC+ 5.0.

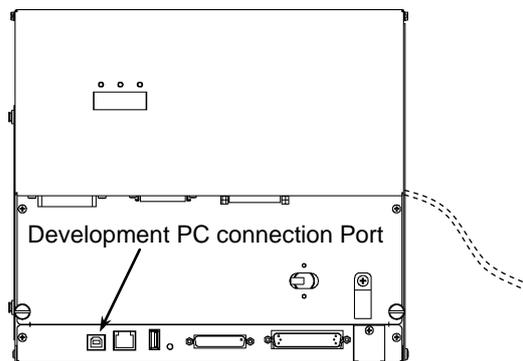
- (1) Select EPSON RC+ 5.0 menu-[Setup]-[Controller] to display the [Setup Controller] dialog.



- (2) Select [Configuration].
- (3) Select [Setup Controller]-[Control Device] to select the control device from the following three types.
 - PC
 - Remote (I/O)
 - OP (Option: Operator Panel)
- (4) Click the <Apply> button.
- (5) Click the <Close> button.

5. Development PC Connection Port

Development PC connection USB port (USB B series connector)



NOTE



For other details of development PC and Controller connection, refer to *EPSON RC+ 5.0 User's Guide 5.12.1 PC to Controller Communications Command*.

NOTE



For RC180, be sure to install the EPSON RC+ 5.0 to the development PC first, then connect the development PC and RC180 with the USB cable.

If RC180 and the development PC are connected without installing the EPSON RC+ 5.0 to the development PC, [Add New Hardware Wizard] appears. If this wizard appears, click the <Cancel> button.

5.1 About Development PC Connection Port

The development PC connection port supports the following USB types.

- USB2.0 HighSpeed/FullSpeed (Speed auto selection, or FullSpeed mode)
- USB1.1 FullSpeed

Interface Standard : USB specification Ver.2.0 compliant
(USB Ver.1.1 upward compatible)

Connect the Controller and development PC by a USB cable to develop the robot system or set the Controller configuration with the EPSON RC+ 5.0 software installed in the development PC.

Development PC connection port supports hot plug feature. Cables insert and remove from the development PC and the Controller is available when the power is ON.

However, stop occurs when USB cable is removed from the Controller or the development PC during connection.

5.2 Precaution

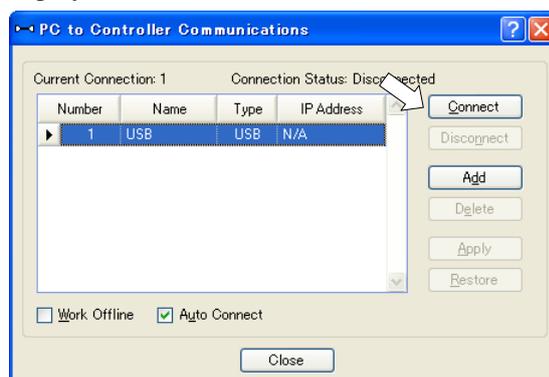
When connecting the development PC and the Controller, make sure of the following:

- Connect the development PC and the Controller with a 5 m or less USB cable.
Do not use the USB hub or extension cable.
- Make sure that no other devices except the development PC are used for development PC connection port.
- Use a PC and USB cable that supports USB2.0 HighSpeed mode to operate in USB2.0 HighSpeed mode.
- Do not pull or bend the cable strongly.
- Do not allow unnecessary strain on the cable.
- When the development PC and the Controller are connected, do not insert or remove other USB devices from the development PC. Connection with the Controller may be lost.

5.3 Software Setup and Connection Check

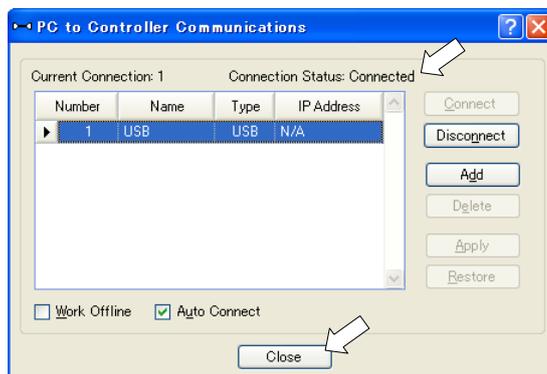
Connection of the development PC and the Controller is indicated.

- (1) Make sure that software EPSON RC+ 5.0 (Ver.5.2 or later) is installed to the Controller connected to the development PC. (Install the software when it is not installed.)
- (2) Connect the development PC and the Controller using a USB cable.
- (3) Turn ON the Controller.
- (4) Start EPSON RC+ 5.0.
- (5) Select the EPSON RC+ 5.0 menu-[Setup]-[PC to Controller Communications] to display the [PC to Controller Communications] dialog.



- (6) Select "No.1 USB" and click the <Connect> button.

- (7) After the development PC and the Controller connection has completed, “Connected” is displayed at [Connection status]. Make sure that “Connected” is displayed and click the <Close> button to close the [PC to Controller Communications] dialog.



The connection between the development PC and the Controller is completed. Now the robot system can be used from EPSON RC+ 5.0.

5.4 Disconnection of Development PC and Controller

Disconnection of the development PC and the Controller communication.

- (1) Select the EPSON RC+ 5.0 menu-[Setup]-[PC to Controller Communications] to display the [PC to Controller Communications] dialog.
- (2) Click the <Disconnect> button.
Communication between the Controller and the development PC is disconnected and the USB cable can be removed.



If the USB cable is removed when the Controller and the development PC are connected, the Robot will stop. Be sure to click the <Disconnect> button in the [PC to Controller Communications] dialog before USB cable is removed.

6. Memory Port

Connect a commercial USB memory to the Controller memory port for following functions. (Only TP1. TP2 does not support this function.)

- Function for Controller status storage to the USB memory.
- Transfer Programs and various data.
Option TP1 Teach Pendant is required. For programs and various data transfer using TP1, refer to manual *RC180 Option Teach Pendant TP1*.

6.1 What is Controller Status Storage Function?

This function saves various kinds of Controller data with one push to the USB memory. Data saved in USB memory is loaded to EPSON RC+ 5.0 to get the status of the Controller and the program simply and accurately.
The saved data can also be used for restoring the Controller. For details, refer to *Maintenance 4.4 Restore*.

6.2 Before Using Controller Status Storage Function

6.2.1 Precautions

| | |
|--|--|
|  CAUTION | <p>■ Controller status storage function is available at any time and in any Controller status after starting the Controller. However, operations from the console including stop and pause are not available while executing this function. Also, this function influences the robot cycle time and the communication with EPSON RC+ 5.0. Other than only when it is necessary, do not execute this function when operating the robot.</p> |
|--|--|

- Make sure that the USB port is used only for USB memory even though the port on the Controller is a universal USB port.
- Insert the USB memory directly into the Controller memory port. Connection with cables or hubs between the Controller and the USB memory is not assured.
- Make sure that the USB memory is inserted or removed slowly.
- Do not edit the saved files with an editor. Operation of the robot system after data restoration to the Controller is not assured.

6.2.2 Adoptable USB Memory

Use USB memory that meets following conditions.

- USB2.0 supported
- Without security function
USB memory with password input function cannot be used.
- No installation of a driver or software is necessary for Windows XP, Windows Vista, Windows 7 or Windows 8.
(For supported operating systems for the EPSON RC+ 5.0, refer to *Setup & Operation 1.1 System Example*.)

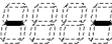
6.3 Controller Status Storage Function

6.3.1 Controller Status Storage with Trigger Button

| | |
|---|--|
|  CAUTION | <p>■ Controller status storage function is available at any time and in any Controller status after starting the Controller.</p> <p>However, operations from the console including stop and pause are not available while executing this function.</p> <p>Also, this function influences the robot cycle time and the communication with EPSON RC+ 5.0. Other than only when it is necessary, do not execute this function when operating the robot.</p> |
|---|--|

Use this procedure to save the status of the Controller to USB memory.

- (1) Insert the USB memory into the memory port.
- (2) Wait approximately 10 seconds for USB memory recognition.
- (3) Press the trigger button on the Controller.

The seven-segment displays  and  repeatedly during the data transfer. Wait until the display returns back to the former display. (Transfer time differs depending on the amount of data, such as the project size.)

- (4) When the storage has been completed,  is displayed on the seven-segment for two seconds.

When the storage has failed,  is displayed on the seven-segment for two seconds.

- (5) Remove the USB memory from the Controller.

NOTE



USB memory with LED is recommended to check the status changes in procedure (2).

NOTE

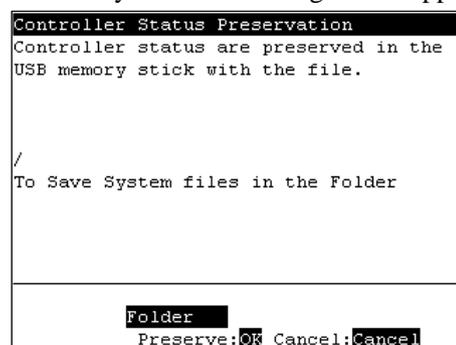


When storage is executed during Motor ON status, it may fail to store the status. Use another USB memory or execute the storage during Motor OFF status.

6.3.2 Controller Status Storage with Teach Pendant (Option)

Use this procedure to save the status of the Controller to the USB memory.

- (1) Insert the USB memory into the Controller.
- (2) In the [Main Menu] screen, move the cursor to [Controller States...], and press the <OK> key. The following screen appears.

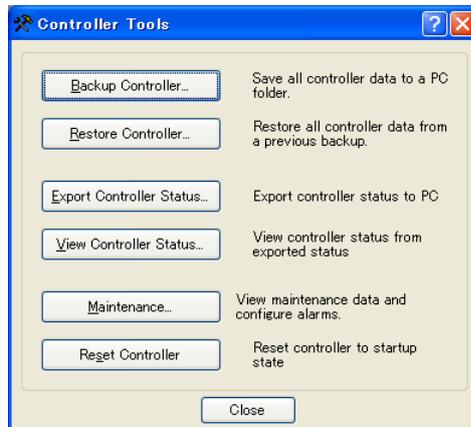


- (3) Select a folder to save the data.
The root directory is selected by default.
- (4) Press the <OK> key to save the status.

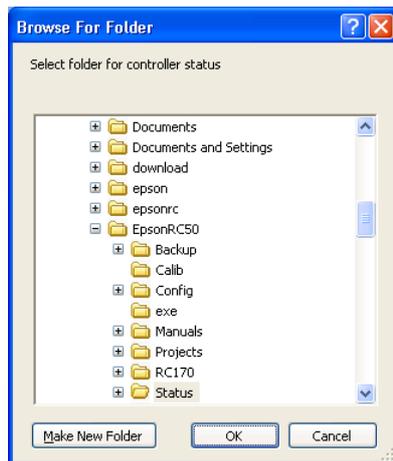
6.3.3 Load Data with EPSON RC+ 5.0

The following shows the procedure to read the data stored in the USB memory by EPSON RC+ 5.0 and display the Controller status.

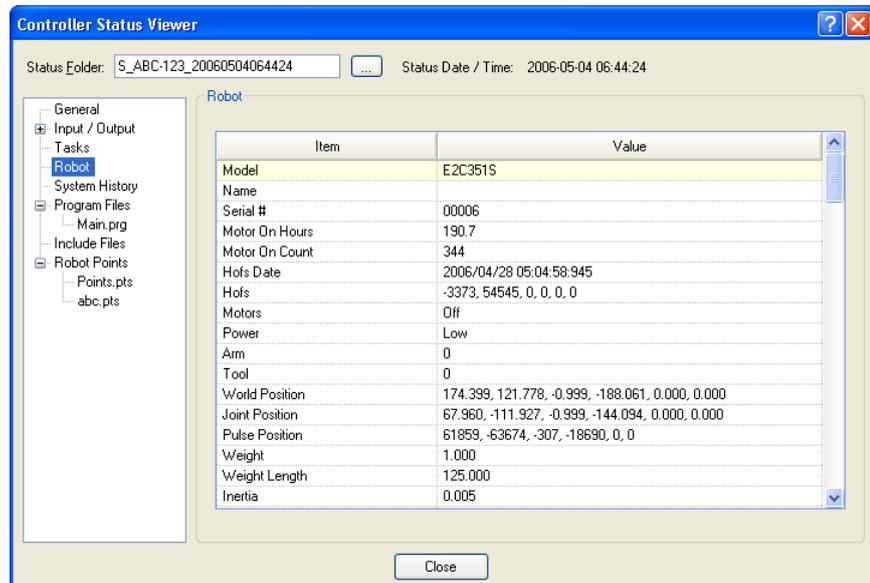
- (1) Insert the USB memory into the PC with EPSON RC+ 5.0.
- (2) Make sure that the following folder is indicated in the USB memory.
S_ serial number_data status was saved
→ Exmaple: S_12345_200608074410
- (3) Copy the folder confirmed in procedure (2) to the “\EpsonRC50\Status” folder.
- (4) Select the EPSON RC+ 5.0 menu-[Tools]-[Controller] to display the [Controller Tools] dialog.



- (5) Click the <Export Controller Status...> button.
- (6) [Browse For Folder] dialog appears. Select the folder copied in procedure (3) and click the <OK> button.



- (7) [Controller Status Viewer] dialog appears to confirm the Controller status.
For details, refer to *View Controller Status* in *EPSON RC+ 5.0 User's Guide 5.11.7 Controller Command (Tools Menu)*.



6.3.4 Transfer with E-mail

Follow this procedure to transfer the data by e-mail that was saved to the USB memory.

- (1) Insert the USB memory to a PC that supports sending of e-mail.
- (2) Make sure that the USB memory has following folders.
S_serial number_data status was saved
→ Example: S_12345_200608074410
- (3) Send all the folders by e-mail.



Delete files that do not relate to the project before transfer.

This function is used to send the data to the system director and EPSON from the end users for problem analysis.

6.4 Details of Data

The following data files are created by the Controller status storage function.

| File Name | Outline | |
|--|--------------------------------------|--|
| Backup.txt | Information file for restore | File with information for Controller restore. |
| CurrentMnp01.PRM | Robot parameter | Saves information such as ToolSet. |
| CurrentStatus.txt | Save status | Saves program and I/O status. |
| ErrorHistory.csv | Error history | |
| InitFileSrc.txt | Initial setting | Saves various settings of the Controller. |
| MCSys01.MCD | Robot setting | Saves information of connected robot. |
| SrcmcStat.txt | Hardware information | Saves installation information of hardware. |
| ProjectName.obj | OBJ file | Result of project build. Prg file is not included. |
| GlobalPreserves.dat *1 | Global Preserve variables | Saves values of Global Preserve variables. |
| MCSRAM.bin MCSYSTEMIO.bin MCTABLE.bin MDATA.bin SERVOSRAM.bin VXDWORK.bin | Inner information of Robot operation | |
| All files related to project except ProjectName.obj *2 | Project | When [Include project files when status exported] check box is checked in EPSON RC+ 5.0 menu-[Setup]-[Setup Controller]-[Preference], the project file is stored. Includes program files. |

1 When the Controller firmware version is Ver.1.0..*, GlobalPreserves.dat is not stored.

*2 Storage of "All files related to project except ProjectName.obj" can be specified by a setting.

7. LAN (Ethernet Communication) Port

- NOTE  - Refer to *EPSON RC+ 5.0 User's Guide 5.12.1 PC to Controller Communications Command (Setup Menu)* for other details for the development PC and Controller connection.
- For Ethernet (TCP/IP) communication with robot application software, refer to *EPSON RC+ 5.0 Online Help* or *User's Guide 12. TCP/IP Communications*.
 - Refer to *Vision Guide 5.0* manual for other details of connection of the Controller and CV1.
 - This port is not used for EtherNet/IP. Use the port for fieldbusI/O board. For other details, refer to *Setup & Operation 12.3.7 EtherNet/IP*.

7.1 About the LAN (Ethernet Communication) Port

Ethernet communication port supports 100BASE-TX / 10 BASE-T.

This port is used for three different purposes.

Connection with development PC

LAN (Ethernet communication) port is used for connection of the Controller and the development PC.

Equivalent operation is available to connect between the Controller and the development PC with the development PC connection port.

(Refer to *Setup & Operation 5. Development PC Connection Port*)

Connection with other Controller or PC

The LAN (Ethernet communication) port can be used as an Ethernet (TCP/IP) communication port to communicate between multiple controllers from robot application software.

Connection with CV1

The LAN (Ethernet communication) port is used for connection of the Controller and CV1.

7.2 IP Address

Set the proper IP address or subnet mask depending on the Controller and development PC configuration to use the LAN port.

Do not input a random value for the IP address of the network configured TCP/IP. This is the only address that specifies the computer using an Internet connection.

The IP address is assigned from the company or organization that has control of IP address.

Use an address from the following Internet private environment such as P2P or line. Make sure that the address is not redundantly assigned inside the closed network.

Private Address List

| | | |
|-------------|----|-----------------|
| 10.0.0.1 | to | 10.255.255.254 |
| 172.16.0.1 | to | 172.31.255.254 |
| 192.168.0.1 | to | 192.168.255.254 |

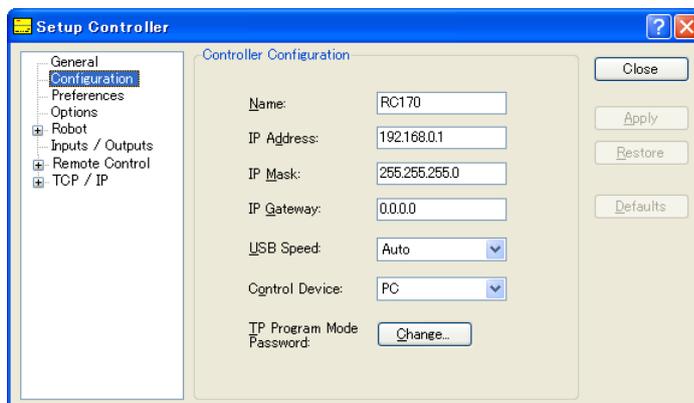
The following is the configuration of the controller at delivery.

IP Address : 192.168.0.1
 IP Mask : 255.255.255.0
 IP Gateway : 0.0.0.0

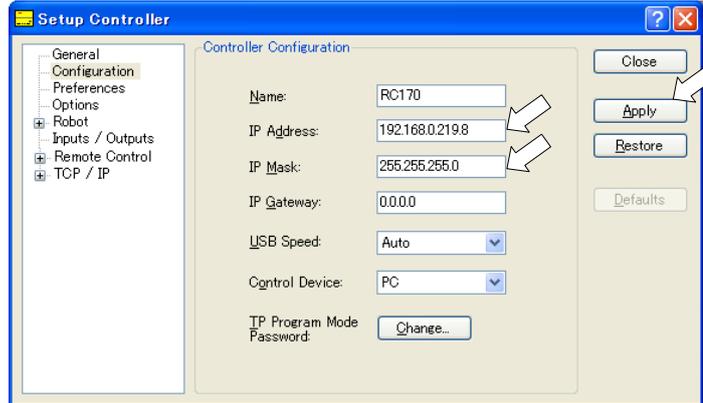
7.3 Changing Controller IP Address

In this section, the procedure to change the Controller IP address when connecting Controller development PC connection port and the development PC by the USB cable is indicated.

- (1) For connection between the development PC and the Controller, refer to *Setup & Operation 5.3 Connection of Development PC and Controller*.
- (2) Select the EPSON RC+ 5.0 menu-[Setup]-[Controller] to display the [Setup Controller] dialog.



- (3) Enter the proper IP address and subnet mask and click the <Apply> button.



- (4) Click the <Close> button. The Controller reboots automatically.



IP address configuration is completed and the Controller reboot dialog disappears.

- (5) Connect the Ethernet cable to the Controller LAN port.

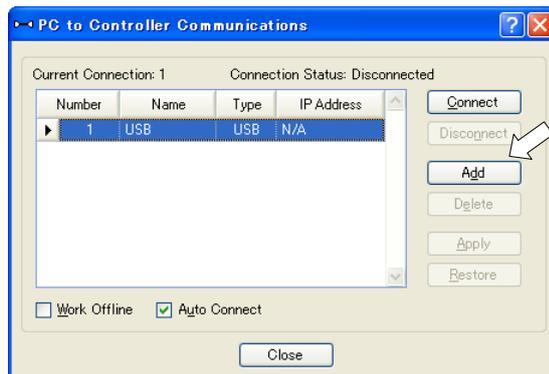


When the Controller and the development PC are connected via the Ethernet, the Controller IP address can also be changed. However, Controller and the development PC do not connect automatically after rebooting the Controller at Ethernet connection.

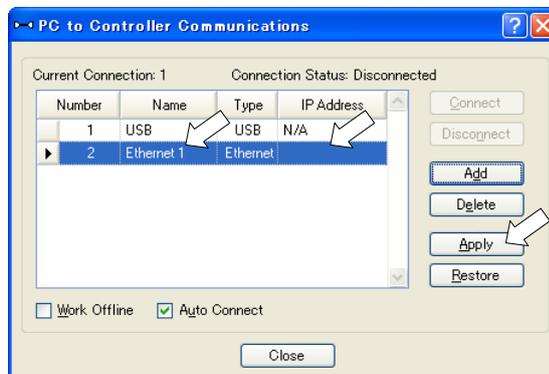
7.4 Connection of Development PC and Controller with Ethernet

Connection between the development PC and the Controller is shown below.

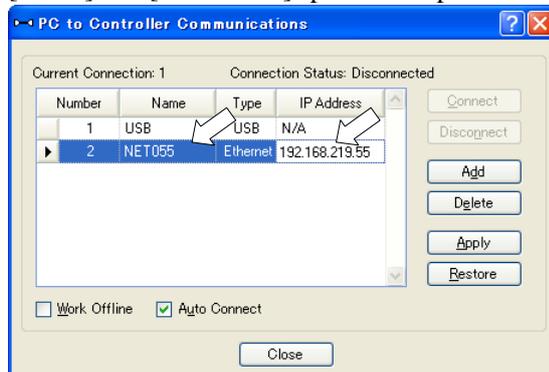
- (1) Connect the development PC and the Controller. (Set the IP address in the same subnet before hand.)
- (2) Turn on the Controller.
- (3) Start EPSON RC+ 5.0.
- (4) Display the [PC-Controller Connection] dialog from [Setup] in EPSON RC+ 5.0 menu.
- (5) Click the <Add> button.



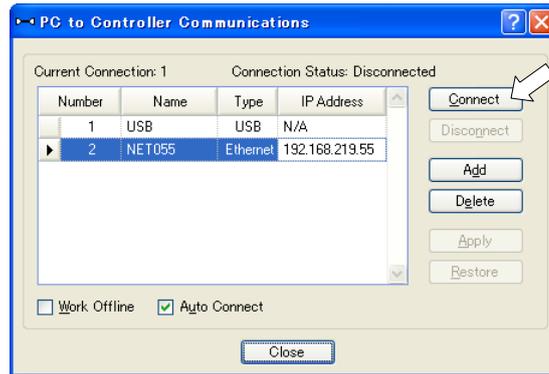
- (6) Connection “No.2” is added. Set the following and click the <Apply> button.
 Name : Valid value to identify the controller to connect
 IP Address : IP address for Controller to connect



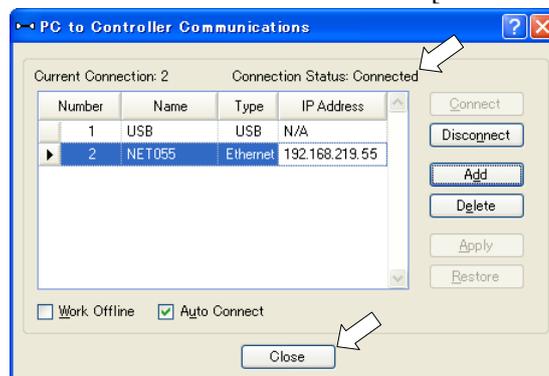
- (7) [Name] and [IP Address] specified in procedure (6) is displayed.



- (8) Make sure that “No.2” is selected, and click the <Connect> button.



- (9) After the development PC and Controller connection is completed, “Connected” is displayed in the [Connection status:]. Make sure that “Connected” is displayed and click the <Close> button to close the [PC to Controller Communications] dialog.



Connection between the development PC and the Controller is complete. Now the robot system can be used via an Ethernet connection from EPSON RC+ 5.0.

7.5 Disconnection of Development PC and Controller with Ethernet

Disconnection of the development PC and the Controller is shown below.

- (1) Display [PC-Controller Connection] dialog from [Setup] in EPSON RC+ 5.0 menu.
- (2) Click the <Disconnect> button.

Communication between the Controller and the development PC is disconnected and the Ethernet cable can be removed.



If the Ethernet cable is removed when the Controller and the development PC is connected, Emergency Stop occurs and the Robot stops. Be sure to click the <Disconnect> button in the [PC to Controller Communications] dialog before the Ethernet cable is removed.

8. TP/OP Port

8.1 What is the TP/OP Port?

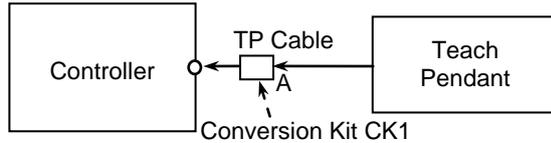
The TP/OP port connects the Teach Pendant and / or the Operator Panel to the Controller.



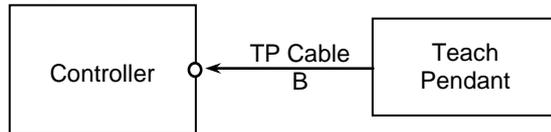
When nothing is connected to the TP/OP port, Emergency Stop status occurs in the Controller. When the Teach Pendant or the Operator Panel is not connected, connect the TP/OP bypass plug.

Typical cable connection (TP1 is only B.)

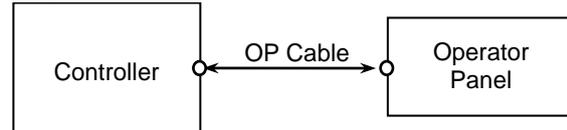
A: Only using Teach Pendant (TP Cable A)



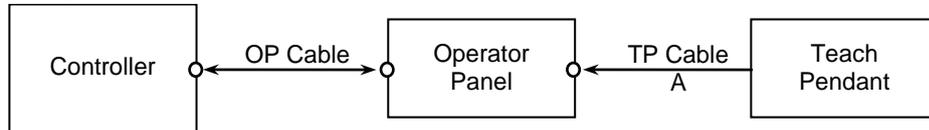
B: Only using Teach Pendant (TP Cable B)



C: Only using Operator Panel



D: Using Teach Pendant and Operator Panel



The cable connectors used in connection A, D and connection B are different.
 TP Cable A: Circular connector used to connect to the Operator Panel.
 (Direct connection is available with conversion kit CK1.)

TP Cable B: D-sub connector to connect directly to the Controller.



When the Teach Pendant with Operator Panel cable is inserted to the TP port of the Operator Panel, both Operator Panel and Teach Pendant are available.
 (Connection D)



Do not connect the following devices to the TP/OP port of RC180. Connecting these devices may result in malfunction of the device since the pin assignments are different.

- OPTIONAL DEVICE dummy plug
- Operation Pendant OP500
- Operator Pendant OP500RC
- Jog Pad JP500
- Teaching Pendant TP-3**

8.2 Teach Pendant Connection

A cable for connection to the RC180 Controller is attached to the Teach Pendant. Connect this cable connector to the TP/OP port.

Communication is set automatically. Enable the Teach Pendant by one of the following procedures.

- Insert the Teach Pendant connector to the Controller and turn ON the Controller.
- Insert the Teach Pendant connector while the Controller is turned ON.

NOTE



Teach Pendant connection and disconnection from the Controller are allowed when the Controller power is ON.

NOTE



When the Teach Pendant connector is removed from the Controller with the mode selector key switch of the Teach Pendant in the “Teach” position, the operation mode will remain in the TEACH mode. The operation mode cannot be switched to AUTO mode. Be sure to remove the Teach Pendant after switching the operation mode to “Auto” mode.

For details, refer to manual

RC180 Option Teach Pendant TP1.

RC90/RC180 Option Teach Pendant TP2.

8.3 Operator Panel Connection

A cable for connection to the RC180 Controller is attached to the Operator Panel OP1. Connect this cable connector to the TP/OP port.

Communication is set automatically. Enable the Operator Panel as follows.

- Insert the Operator Panel cable connector to the Controller and turn ON the Controller.

NOTE



Make sure that the Controller is turned OFF when inserting or removing the Operator Panel.

For details, refer to manual *RC180 Option Operator Panel OP1.*

9. EMERGENCY

NOTE



The details of safety requirements for this section are described in *EPSON RC+ 5.0 User's Guide 2. Safety*. Please refer to them to keep the robot system safe.

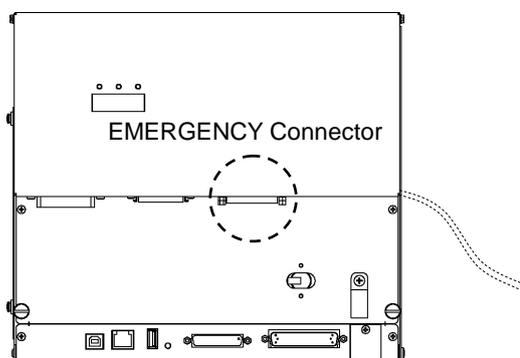
Connect a safeguard switch or Emergency Stop switch to the Controller EMERGENCY connector for safety.

When nothing is connected to the EMERGENCY connector, the Controller does not operate normally.



WARNING

- Before connecting the connector, make sure that the pins are not bent. Connecting with the pins bent may damage the connector and result in malfunction of the robot system.



9.1 Safety Door Switch and Latch Release Switch

The EMERGENCY connector has input terminals for the Safety Door switch and the Emergency Stop switch. Be sure to use these input terminals to keep the system safe.

| Connector | Standard |
|--|---|
| EMERGENCY connector (Controller side) | D-sub 25 male pin Mounting style #4 - 40 |

* The E-STOP BOX, connector cable, terminal block, and connector kit are offered as options.

9.1.1 Safety Door Switch

| | |
|---|---|
|  WARNING | <ul style="list-style-type: none"> ■ The interlock of the Safety Door must be functioning when the robot system is operated. Do not operate the system under the condition that the switch cannot be turned ON/OFF (e.g. The tape is put around the switch.). Operating the robot system when the switch is not functioning properly is extremely hazardous and may cause serious safety problems as the Safety Door input cannot fulfill its intended function. |
|---|---|

In order to maintain a safe working zone, a safeguard must be erected around the Manipulator. The safeguard must have an interlock switch at the entrance to the working zone. The Safety Door that is described in this manual is one of the safeguards and an interlock of the Safety Door is called a Safety Door switch. Connect the Safety Door switch to the Safety Door input terminal on the EMERGENCY connector.

The Safety Door switch has safety features such as temporary hold-up of the program or the operation-prohibited status that are activated whenever the Safety Door is opened.

Observe the followings in designing the Safety Door switch and the Safety Door.

- For the Safety Door switch, select a switch that opens as the Safety Door opens, and not by the spring of the switch itself.
- The signal from the Safety Door (Safety Door input) is designed to input to two redundant signals. If the signals at the two inputs differ by two seconds or more, the system recognizes it to be a critical error. Therefore, make sure that the Safety Door switch has two separate redundant circuits and that each connects to the specified pins at the EMERGENCY connector on the Controller.
- The Safety Door must be designed and installed so that it does not close accidentally.

9.1.2 Latch Release Switch

The controller software latches these conditions:

- The safety door is open.
- The operation mode is set to “TEACH”.

The EMERGENCY connector has an input terminal for a latch release switch that cancels the latched conditions.

Open : The latch release switch latches conditions that the safety door is open or the operation mode is “TEACH”.

Closed : The latch release switch releases the latched conditions.



When the latched TEACH mode is released while the safety door is open, the status of Manipulator power is operation-prohibited because the safety door is open at that time. To execute a Manipulator operation, close the safety door again, and then close the latch release input.

9.1.3 Checking Latch Release Switch Operation

After connecting the safety door switch and latch release switch to the EMERGENCY connector, be sure to check the switch operation for safety by following the procedures described below before operating the Manipulator.

- (1) Turn ON the Controller while the safety door is open in order to boot the controller software.
- (2) Make sure that “Safety” is displayed on the main window status bar.
- (3) Close the safety door, and turn ON the switch connecting to the latch release input. Make sure that the “Safety” is dimmed on the status bar.

The information that the safety door is open can be latched by software based on the latch release input condition.

Open : The latch release switch latches the condition that the safety door is open. To cancel the condition, close the safety door, and then close the safety door latch release input.

Closed : The latch release switch does not latch the condition that the safety door is open.



The latch release input also functions to acknowledge the change of to TEACH mode. In order to change the latched condition of TEACH mode, turn the mode selector key switch on the Teach Pendant to “Auto”. Then, close the latch release input.

9.2 Emergency Stop Switch Connection

9.2.1 Emergency Stop Switch

If it is desired to add an external Emergency Stop switch(es) in addition to the Emergency Stop on the Teach Pendant and Operator Panel, be sure to connect such Emergency Stop switch(es) to the Emergency Stop input terminal on the EMERGENCY connector.

The Emergency Stop switch connected must comply with the following:

- It must be a push button switch that is “normally closed”.
- A button that does not automatically return or resume.
- The button must be mushroom-shaped and red.
- The button must have a double contact that is “normally closed”.

NOTE



The signal from the Emergency Stop switch is designed to use two redundant circuits. If the signals at the two circuits differ by two seconds or more, the system recognizes it as a critical error. Therefore, make sure that the Emergency Stop switch has double contacts and that each circuit connects to the specified pins on the EMERGENCY connector at the Controller. Refer to the *Setup & Operation 5.5 Circuit Diagrams*.

9.2.2 Checking Emergency Stop Switch Operation

Once the Emergency Stop switch is connected to the EMERGENCY connector, continue the following procedure to make sure that the switch functions properly. For the safety of the operator, the Manipulator must not be powered ON until the following test is completed.

- (1) Turn ON the Controller to boot the controller software while pressing the Emergency Stop switch.
- (2) Make sure that the seven-segment LED on the Controller displays .
- (3) Make sure that “E.Stop” is displayed on the status bar on the main window.
- (4) Release the Emergency Stop Switch.
- (5) Execute the RESET command.
- (6) Make sure that  LED is turned OFF and that “E-Stop” is dimmed on the main window status bar.

9.2.3 Recovery from Emergency Stop

To recover from the emergency stop condition, follow the procedure of safety check as required by the system.

After safety check, the operations below are required to recover from the emergency stop condition.

- Release the Emergency Stop Switch
- Execute the RESET command

9.3 Pin Assignments

The EMERGENCY connector pin assignments are as follows:

| Pin No. | Signal | Function | Pin No. | Signal | Function |
|---------|---------|---|---------|----------|---|
| 1 | ESW11 | Emergency Stop switch contact (1) ^{*3} | 14 | ESW21 | Emergency Stop switch contact (2) ^{*3} |
| 2 | ESW12 | Emergency Stop switch contact (1) ^{*3} | 15 | ESW22 | Emergency Stop switch contact (2) ^{*3} |
| 3 | ESTOP1+ | Emergency Stop circuit 1 (+) | 16 | ESTOP2+ | Emergency Stop circuit 2 (+) |
| 4 | ESTOP1- | Emergency Stop circuit 1 (-) | 17 | ESTOP2- | Emergency Stop circuit 2 (-) |
| 5 | NC | ^{*1} | 18 | SDLATCH1 | Safety Door Latch Release |
| 6 | NC | ^{*1} | 19 | SDLATCH2 | Safety Door Latch Release |
| 7 | SD11 | Safety Door input (1) ^{*2} | 20 | SD21 | Safety Door input (2) ^{*2} |
| 8 | SD12 | Safety Door input (1) ^{*2} | 21 | SD22 | Safety Door input (2) ^{*2} |
| 9 | 24V | +24V output | 22 | 24V | +24V output |
| 10 | 24V | +24V output | 23 | 24V | +24V output |
| 11 | 24VGND | +24V GND output | 24 | 24VGND | +24V GND output |
| 12 | 24VGND | +24V GND output | 25 | 24VGND | +24V GND output |
| 13 | NC | | | | |

*1 Do not connect anything to these pins.

*2 A critical error occurs if the input values from the Safety Door 1 and Safety Door 2 are different for two or more seconds. They must be connected to the same switch with two sets of contacts.

*3 A critical error occurs if the input values from the Emergency Stop switch contact 1 and Emergency Stop switch contact 2 are different for two or more seconds. They must be connected the same switch with two sets of contacts.

| | | |
|--|---|----------------|
| Emergency Stop switch output rated load | +30 V 0.3 A or under | 1-2, 14-15 pin |
| Emergency Stop rated input voltage range Emergency Stop rated input current | +24 V \pm 10% 47.5 mA /+24 V input | 3-4, 16-17 pin |
| Safety Door rated input voltage range Safety Door rated input current | +24 V \pm 10% 10 mA/+24 V input | 7-8, 20-21 pin |
| Latch Release rated input voltage range Latch Release rated input current | +24 V \pm 10% 10 mA/+24 V input | 18-19 pin |

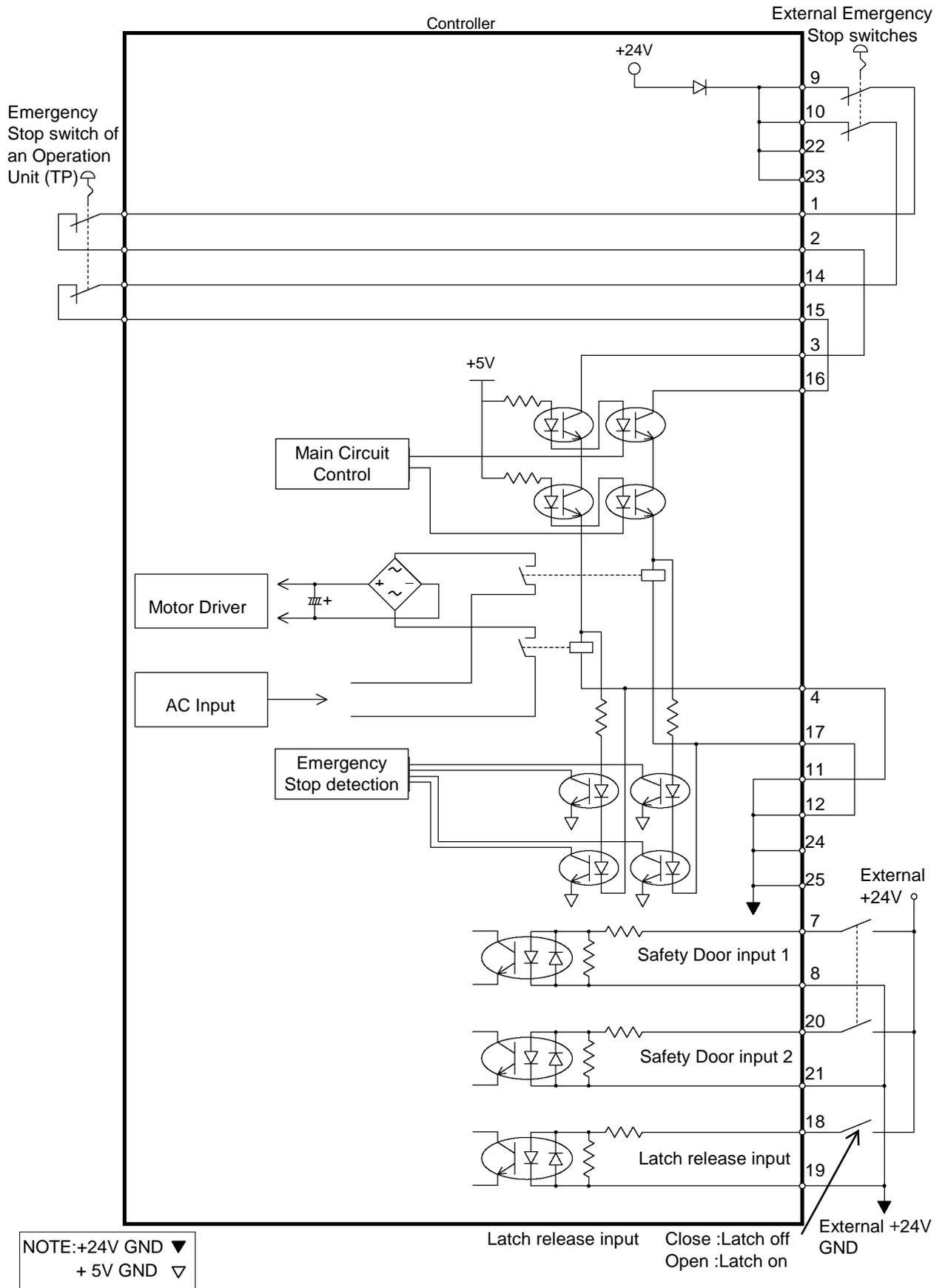
NOTE



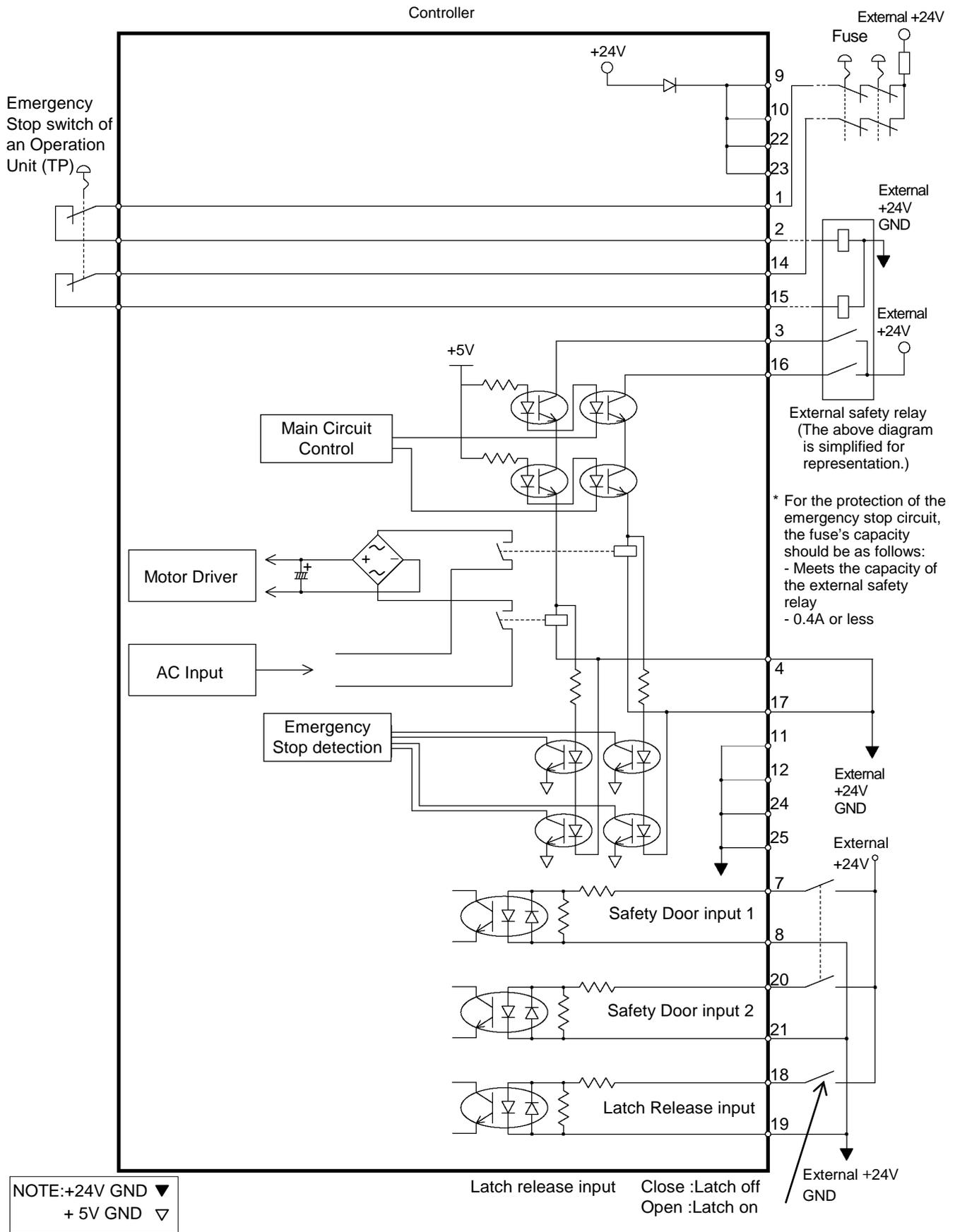
The total electrical resistance of the Emergency Stop switches and their circuit should be 1 Ω or less.

9.4 Circuit Diagrams

9.4.1 Example 1: External emergency stop switch typical application



9.4.2 Example 2: External safety relay typical application



10. I/O Connector

The I/O connector is for connecting your input/output equipment to the system.

| | Pins | Bit number |
|--------|------|------------|
| Input | 24 | 0 to 23 |
| Output | 16 | 0 to 15 |

Refer to Setup & Operation 12.2. Expansion I/O board.

For cable wiring, refer to the *Setup & Operation 3.5 Noise Countermeasures* in order to prevent noise.

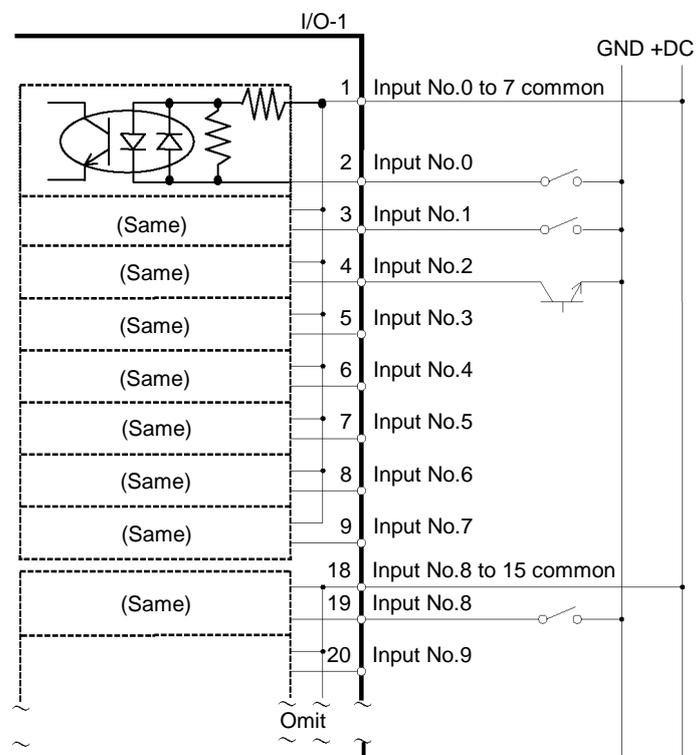
Remote function is initially assigned to both input and output from 0 to 7. For further details, refer to *11. I/O Remote Settings*.

10.1 Input Circuit

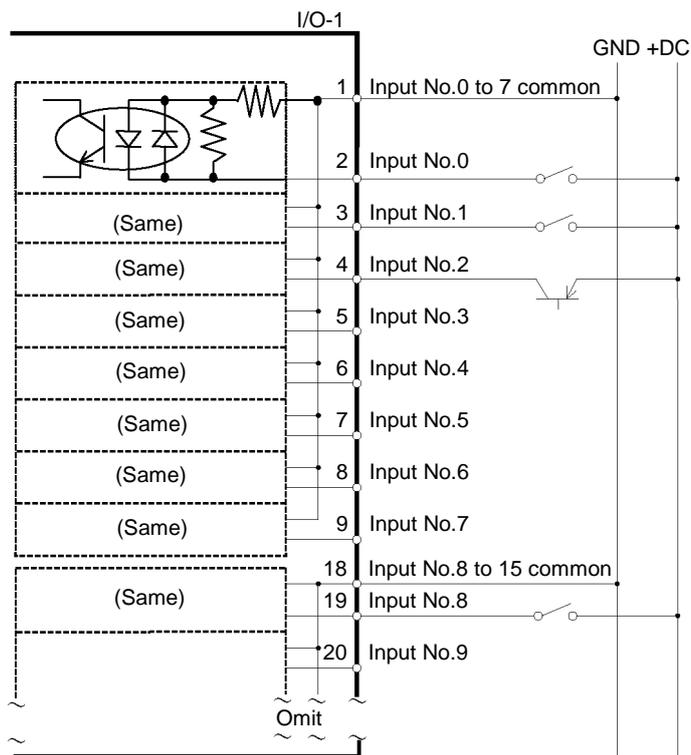
| | |
|---------------------|------------------------------|
| Input Voltage Range | : +12 to 24 V \pm 10% |
| ON Voltage | : +10.8 V (min.) |
| OFF Voltage | : +5 V (max.) |
| Input Current | : 10 mA (TYP) at +24 V input |

Two types of wiring are available for use with the two-way photo coupler in the input circuit.

Typical Input Circuit Application 1



Typical Input Circuit Application 2

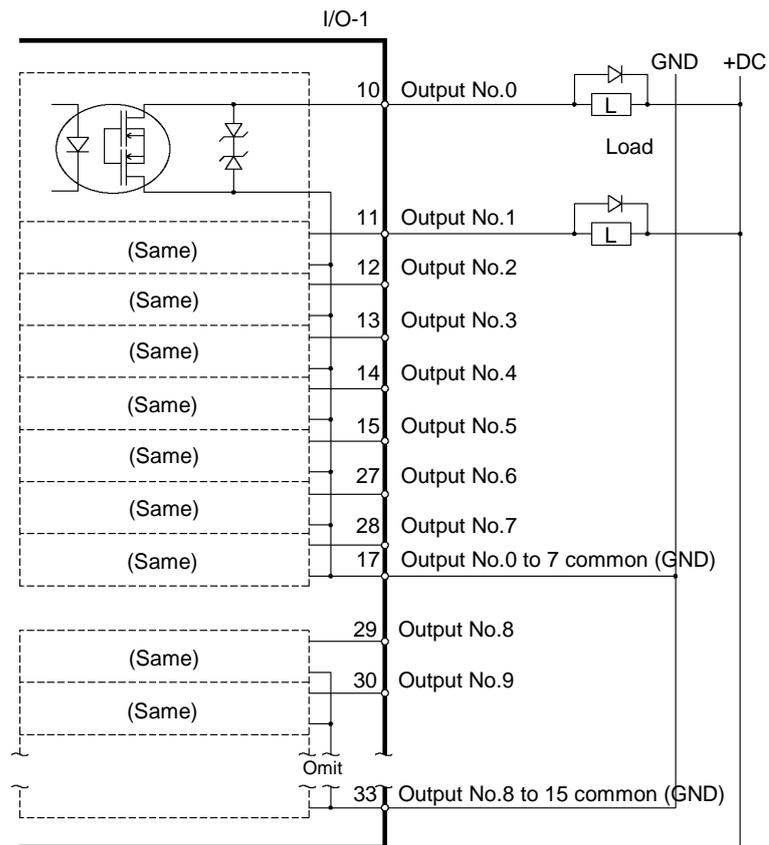


10.2 Output Circuit

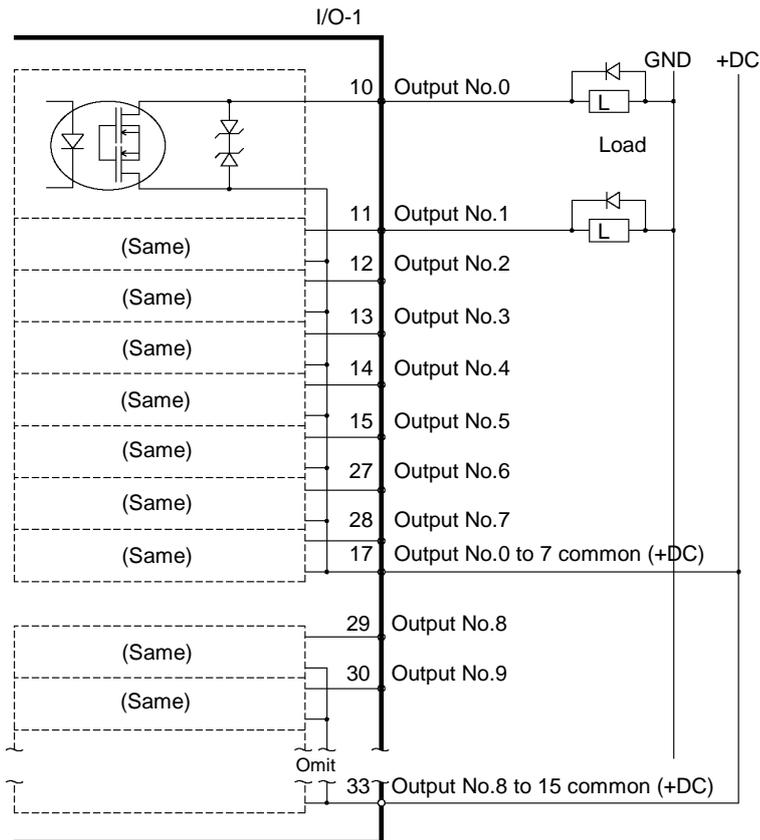
Rated Output Voltage : +12 V to 24 V \pm 10%
 Maximum Output Current : TYP 100 mA/1 output
 Output Driver : PhotoMOS Relay
 On-State Resistance (average) : 23.5 Ω or less

Two types of wiring are available for use with the nonpolar photoMOS relay in the output circuit.

Typical Output Circuit Application 1



Typical Output Circuit Application 2



10.3 Pin Assignments

| Pin No. | Signal Name | Pin No. | Signal Name | Pin No. | Signal Name |
|---------|----------------------------|---------|---------------------------|---------|---------------------------|
| 1 | Input common No. 0 to 7 | 18 | Input common No. 8 to 15 | 34 | Input common No. 16 to 23 |
| 2 | Input No. 0 (Start) | 19 | Input No. 8 | 35 | Input No. 16 |
| 3 | Input No. 1 (SelProg1) | 20 | Input No. 9 | 36 | Input No. 17 |
| 4 | Input No. 2 (SelProg2) | 21 | Input No. 10 | 37 | Input No. 18 |
| 5 | Input No. 3 (SelProg4) | 22 | Input No. 11 | 38 | Input No. 19 |
| 6 | Input No. 4 (Stop) | 23 | Input No. 12 | 39 | Input No. 20 |
| 7 | Input No. 5 (Pause) | 24 | Input No. 13 | 40 | Input No. 21 |
| 8 | Input No. 6 (Continue) | 25 | Input No. 14 | 41 | Input No. 22 |
| 9 | Input No. 7 (Reset) | 26 | Input No. 15 | 42 | Input No. 23 |
| 10 | Output No. 0 (Ready) | 27 | Output No. 6 (SError) | 43 | Output No.11 |
| 11 | Output No. 1 (Running) | 28 | Output No. 7 (Warning) | 44 | Output No.12 |
| 12 | Output No. 2 (Paused) | 29 | Output No. 8 | 45 | Output No.13 |
| 13 | Output No. 3 (Error) | 30 | Output No. 9 | 46 | Output No.14 |
| 14 | Output No. 4 (EstopOn) | 31 | Output No.10 | 47 | Output No.15 |
| 15 | Output No. 5 (SafeguardOn) | 32 | Not Used | 48 | Not Used |
| 16 | Not Used | 33 | Output common No. 8 to 15 | 49 | Not Used |
| 17 | Output common No. 0 to 7 | | | 50 | Not Used |

Remote function inside () in the table above is initially assigned to both input and output from 0 to 7. For further details, refer to *11. I/O Remote Settings*.

| Connector | Standard |
|---------------------------------|---|
| I/O Connector (Controller side) | D-sub 50 male pin Mounting style #4 - 40 |

* The I/O connector, I/O connector cable, terminal block, and I/O connector kit are offered as options.

11. I/O Remote Settings

This section describes the functions and timings of input and output signals.

The remote functions may be assigned to your standard I/O board(s), expansion I/O board(s), or fieldbus I/O board(s) to enhance robot system control - either from an operational unit of your choice or a sequencer.

Remote function is initially assigned to both input and output from 0 to 7.

To accept external remote inputs, assign the remote function and the control device is remote. For further details, refer to the section, *Remote Control Software Configuration* in *EPSON RC+ 5.0 User's Guide 10. Remote Control*.

The user defines the I/O number that a remote function is assigned to using software configuration. For further details, refer to the section, *Remote Control Software Configuration* in *EPSON RC+ 5.0 User's Guide 10. Remote Control*.

For details about I/O cable connection, refer to sections on *Setup & Operation 10. I/O Connector* and *12.2. Expansion I/O Board (Option)* and *12.3 Fieldbus I/O Board (Option)*.

For details about communication with external equipment, refer to *EPSON RC+ 5.0 User's Guide 10. Remote Control*.

| | |
|--|--|
|  CAUTION | <ul style="list-style-type: none"> ■ When using remote I/O, always make sure of the following. Using the robot system under unsatisfactory conditions may cause malfunction of the system and/or safety problems. <ul style="list-style-type: none"> - Assign remote functions to inputs/outputs correctly and wire correctly when setting up remote I/O signals. - Make sure that the functions correspond to the correct input/output signals before turning ON the system. - When verifying the robot system operation, prepare for failures with initial settings or wiring. If the Manipulator functions unusually by the failures with initial settings or wiring, press the Emergency Stop switch immediately to stop the Manipulator. |
|--|--|

NOTE



Remote function is available when virtual I/O is enabled.

NOTE



When you set up a remote I/O signal, please either keep a written record of the settings or store the data in a file for later reference.

NOTE



When you set up a fieldbus I/O signal to the remote function, response depends on the baud rate of the fieldbus. For details of fieldbus response, refer to *Setup & Operation 12.3.2 Response Speed of Fieldbus I/O*.

11.1 I/O Signal Description

Remote function is initially assigned to both input and output from 0 to 7.

To change the function assignment from the initial setting, use EPSON RC+ 5.0.

To use all signals, you will need to add Expansion I/O or Fieldbus I/O board(s).

11.1.1 Remote Input Signals

Remote inputs are used to control the Manipulators and start programs. Certain conditions must be met before inputs are enabled, as shown in the table below.

To accept external remote inputs, assign the remote function and set remote to the control device. When external remote input is available, "AutoMode output" turns ON.

Except "SelProg", the signals execute each function when the signal starts in input acceptance condition. The function executes automatically. Therefore, no special programming is needed.

NOTE



When an error occurs, you must execute a "Reset" to clear the error condition before any other remote input commands can be executed. Use the "Error output" and "Reset input" to monitor the error status and clear error conditions from the remote device.

| Name | Initial | Description | Input Acceptance Condition (*1) |
|----------------------------------|-------------|--|--|
| Start | 0 | Execute function selected at SelProg. (*2) | Ready output ON Error output OFF EStopOn output OFF SafeguardOn output OFF Pause input OFF Stop input OFF |
| SelProg1 SelProg2 SelProg4 | 1 2 3 | Specify the executing Main function number. (*2) | |
| Stop | 4 | All tasks and commands are stopped. | |
| Pause | 5 | All tasks are paused. (*3) | Running output ON |
| Continue | 6 | Continue the paused task. | Paused output ON Pause input OFF Stop input OFF |
| Reset | 7 | Reset emergency stop and error. (*4) | Ready output ON |
| SetMotorOn | Not Set | Turn ON robot motors. (*5) | Ready output ON EStopOn output OFF SafeguardOn output OFF SetMotorOff input OFF |
| SetMotorOff | Not Set | Turn OFF robot motors. | Ready output ON |
| Home | Not Set | Move the Robot Arm to the home position defined by the user. | Ready output ON Error output OFF EStopOn output OFF SafeguardOn output OFF MotorsOn output ON Pause input OFF Stop input OFF |

| Name | Initial | Description | Input Acceptance Condition (*1) |
|--------------------|---------|--|---|
| ForcePowerLow (*6) | Not Set | Operates as the forced low power function. The robot is operated in the low power mode. Power High control from the command is not accepted. Executes the following according to the controller preferences. Stops or temporarily stops all the tasks and commands. (*7) | Any time This input is acceptable even AutoMode output is OFF. |
| ALIVE | Not Set | Input signal for alive monitoring of the controller. Same signal as the input will be output to ALIVE output. The master equipment can perform alive monitoring of the controller by switching the input periodically and checking the output signal. | |

(*1) “AutoMode output” ON is omitted from the table. This is an input acceptance condition for all functions.

(*2) “Start input” executes Function specified by the “SelProg1, 2, 4, and 3” bits.

| Function | SelProg1 | SelProg2 | SelProg4 |
|----------|----------|----------|----------|
| Main | 0 | 0 | 0 |
| Main1 | 1 | 0 | 0 |
| Main2 | 0 | 1 | 0 |
| Main3 | 1 | 1 | 0 |
| Main4 | 0 | 0 | 1 |
| Main5 | 1 | 0 | 1 |
| Main6 | 0 | 1 | 1 |
| Main7 | 1 | 1 | 1 |

0=OFF, 1=ON

(*3) “NoPause task” and “NoEmgAbort task” do not pause.

For details, refer to EPSON RC+ 5.0 *Online Help* or *Pause* in *SPEL+ Language Reference*.

(*4) Turns OFF the I/O output and initializes the robot parameter.

For details, refer to EPSON RC+ 5.0 *Online Help* or *Reset* in *SPEL+ Language Reference*.

(*5) Initializes the robot parameter.

For details, refer to EPSON RC+ 5.0 *Online Help* or *Motor* in *SPEL+ Language Reference*.

(*6) This is for the experienced. Make sure that you fully understand the input specification before using.

When the input changes from ON to OFF, all tasks and commands will stop.

It is supported by EPSON RC+ 5.0 Ver.5.4 and Firmware Ver. 1.10.*.*.

(*7) Operation of all tasks and commands, power mode of the robot, and PowerHigh command by the setting of the controller preferences.

Preferences (1): “Motor power low when ForcePowerLow signal OFF”

Preferences (2): “ForcePowerLow signal change pauses all tasks”

For details of the controller preferences, refer to *EPSON RC+ 7.0 User's Guide* [Setup]-[System Configuration]-[Controller]-[Preferences] in 5.12.2 [System Configuration] Command (Setup Menu).

| Preferences (1) | Preferences (2) | ForcePowerLow | All tasks and commands | Power mode | PowerHigh |
|-----------------|-----------------|---------------|------------------------|------------|------------|
| 0 | 0 | 1→0 | Stop | Low only | Accept |
| 0 | 0 | 0→1 | Stop | Low only | Not accept |
| 0 | 1 | 1→0 | Continue | High/Low | Accept |
| 0 | 1 | 0→1 | Temp. stop | Low only | Not accept |
| 1 | 0 | 1→0 | Stop | Low only | Not accept |
| 1 | 0 | 0→1 | Stop | Low only | Accept |
| 1 | 1 | 1→0 | Temp. stop | Low only | Not accept |
| 1 | 1 | 0→1 | Continue | High/Low | Accept |

11.1.2 Remote Output Signals

Remote outputs provide status for the Manipulator and Controller.

Remote outputs provide the assigned function using with any control device. The outputs execute automatically. Therefore, no special programming is needed.

| Name | Initial | Description |
|--|---------|---|
| Ready | 0 | Turns ON when the controller startup completes and no task is running. |
| Running | 1 | Turns ON when task is running. However, turns OFF when "Paused output" is OFF. |
| Paused | 2 | Turns ON when pause task exists. |
| Error | 3 | Turns ON when an error occurs. Use "Reset input" to recover from the error. |
| EStopOn | 4 | Turns ON at Emergency Stop. |
| SafeguardOn | 5 | Turns ON when the safeguard is open. |
| SError | 6 | Turns ON when critical error occurs. When a critical error occurs, "Reset input" does not function. Reboot the controller to recover. |
| Warnig | 7 | Turns ON when warning occurs. The task runs as normal with the warning. However, be sure to eliminate the cause of the warning as soon as possible. |
| MotorsOn | Not Set | Turns ON when the motor is ON. |
| AtHome | Not Set | Turns ON when the robot is in the home position. |
| CurrProg1 CurrProg2 CurrProg4 | Not Set | Indicates the running or the last main function number (*1) |
| AutoMode | Not Set | Turns ON in remote input acceptable status. (*2) |
| TeachMode | Not Set | Turns ON in TEACH mode. |
| ErrorCode1 . . . ErrorCode8192 | Not Set | Indicates the error number. |
| InsideBox1(*3) . . . InsideBox15 | Not Set | Turns ON when the robot is in the approach check area. For details, refer to EPSON RC+ 5.0 <i>Online Help</i> or <i>Box</i> in <i>SPEL+ Language Reference</i> . |
| InsidePlane1 (*3) . . . InsidePlane15 | Not Set | Turns ON when the robot is in the approach check plane. For details, refer to EPSON RC+ 5.0 <i>Online Help</i> or <i>Plane</i> in <i>SPEL+ Language Reference</i> . |
| Alarm | Not Set | Turns ON when any of the alarms is occurring. (*5) |
| Power High (*4) | Not Set | Turns ON when the power status is High. |
| ALIVE | Not Set | Output signal for alive monitoring of the controller. The signal input by ALIVE input will be output. The master equipment can perform alive monitoring of the controller by switching the input periodically and checking the output signal. |

(*1) Outputs the current or the last function number of CurrProg1, CurrProg2, or CurrProg4.

| Function | CurrProg1 | CurrProg2 | CurrProg4 |
|----------|-----------|-----------|-----------|
| Main | 0 | 0 | 0 |
| Main1 | 1 | 0 | 0 |
| Main2 | 0 | 1 | 0 |
| Main3 | 1 | 1 | 0 |
| Main4 | 0 | 0 | 1 |
| Main5 | 1 | 0 | 1 |
| Main6 | 0 | 1 | 1 |
| Main7 | 1 | 1 | 1 |

0=OFF, 1=ON

(*2) Remote function is available in the followings conditions.

- The setting is Auto mode and the control device is remote.
- The setting is Program mode and Remote I/O is enabled.

(*3) When the Controller firmware version is Ver.1.4.*.* or before, the remote outputs do not provide InsideBox1 to 15 and InsidePlane1 to 15.

(*4) It is supported by EPSON RC+ 5.0 Ver.5.4 and Firmware Ver. 1.10.*.*.

(*5) The signal turns on when the alarm occurs either in the controller alarm information or the robot alarm information.

11.2 Timing Specifications

11.2.1 Design Notes for Remote Input Signals

The following charts indicate the timing sequences for the primary operations of the Controller.

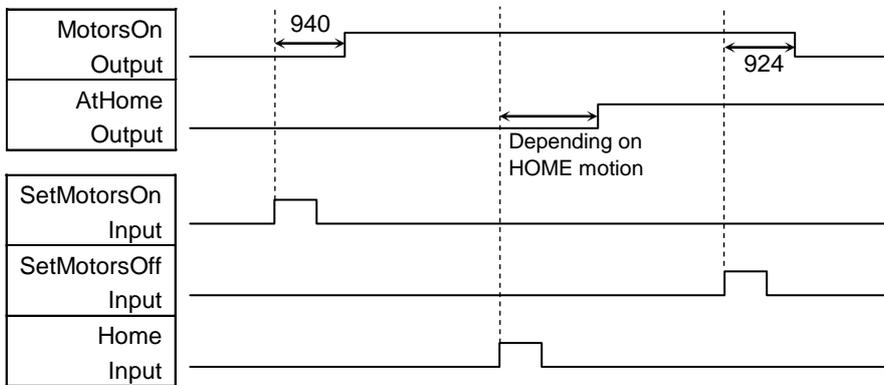
The indicated time lapses (time durations) should be referred to only as reference values since the actual timing values vary depending on the number of tasks running, as well as CPU speed of the Controller. Check carefully and refer to the following charts for the timing interrelation when you enter an input signal.

During system design, make sure that you actuate only one remote input operation at a time, otherwise an error will occur.

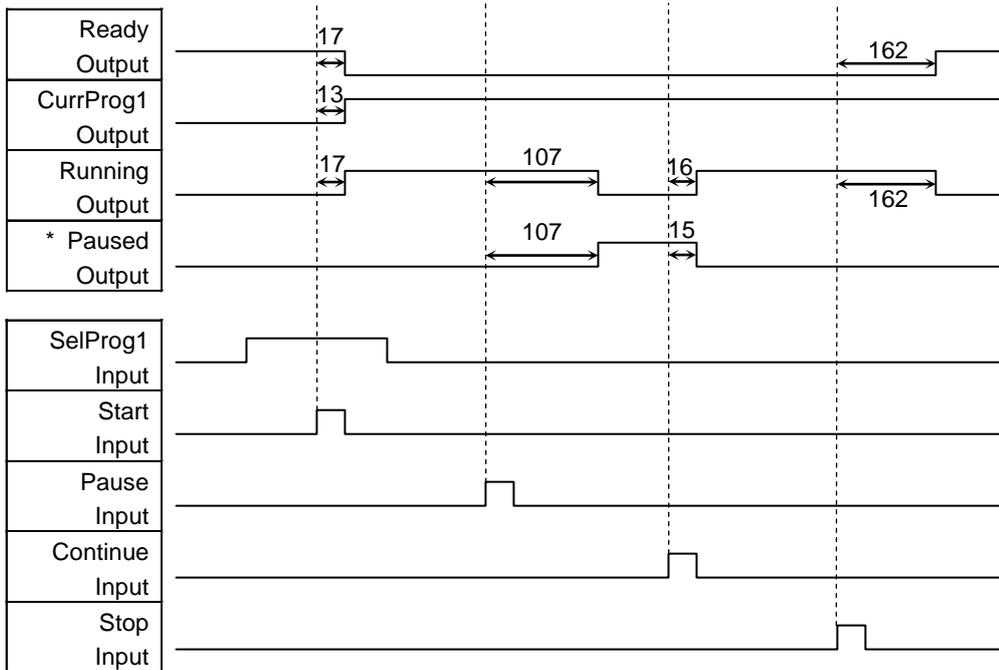
The pulse width of an input signal must be 25 or more milliseconds to be detected.

[Unit: msec]

11.2.2 Timing Diagram for Operation Execution Sequence

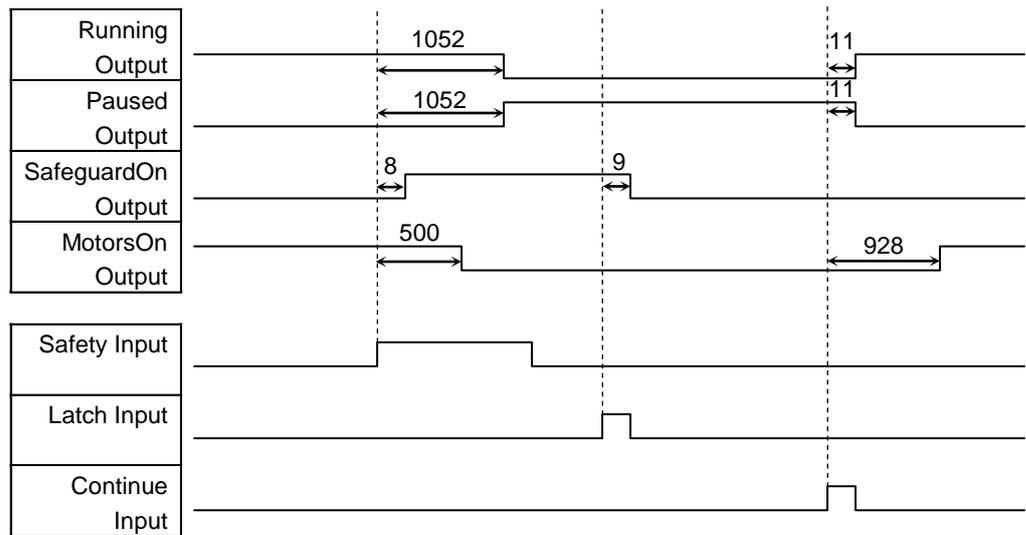


11.2.3 Timing Diagram for Program Execution Sequence

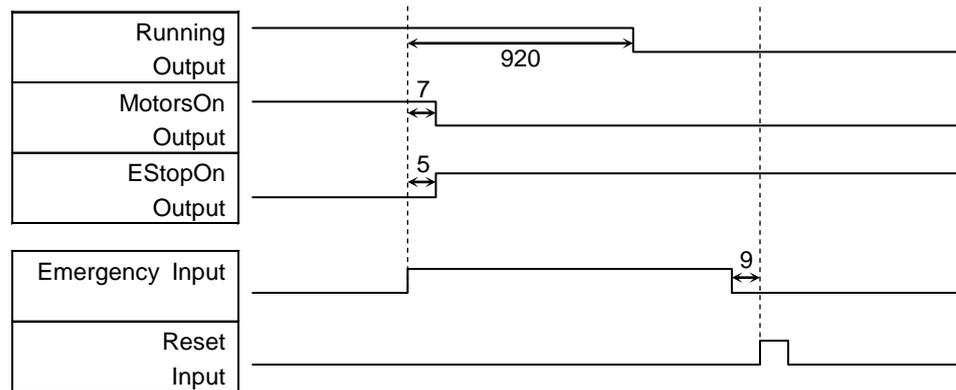


* The duration varies depending on the Quick Pause (QP) setting and the program's operating status at the time of Pause input

11.2.4 Timing Diagram for Safety Door Input Sequence



11.2.5 Timing Diagram for Emergency Stop Sequence



12. Option Units

12.1 What are Option Units?

The option units contain option boards for RC180.

Up to two units can be installed on one Controller. Up to four option boards can be installed.

The types of the option boards are as follows.

- 12.2 Expansion I/O Board
- 12.3 Fieldbus I/O Board
- 12.4 RS-232C Board

12.2 Expansion I/O Board

12.2.1 About Expansion I/O Board

Install an option unit in the Controller when extra inputs or outputs are desired.

Each additional expansion I/O board provides 32 inputs and 32 outputs.

CN1: 16 inputs / 16 outputs

CN2: 16 inputs / 16 outputs

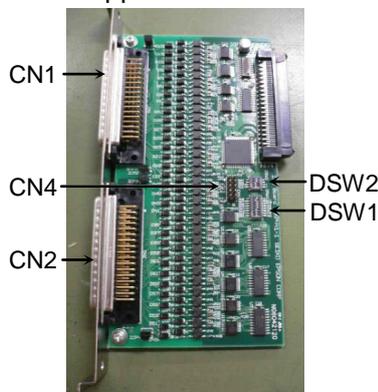
The number of I/Os that can be expanded is maximum 4 boards and 128 inputs and outputs.

The input and output bit numbers are assigned as follows. (Bit number is assigned from CN1.)

| Input Bit # | Output Bit # | Applicable Hardware |
|-------------|--------------|---|
| 0 to 23 | 0 to 15 | STANDARD I/O |
| 64 to 95 | 64 to 95 | The 1 st Expansion I/O board |
| 96 to 127 | 96 to 127 | The 2 nd Expansion I/O board |
| 128 to 159 | 128 to 159 | The 3 rd Expansion I/O board |
| 160 to 191 | 160 to 191 | The 4 th Expansion I/O board |

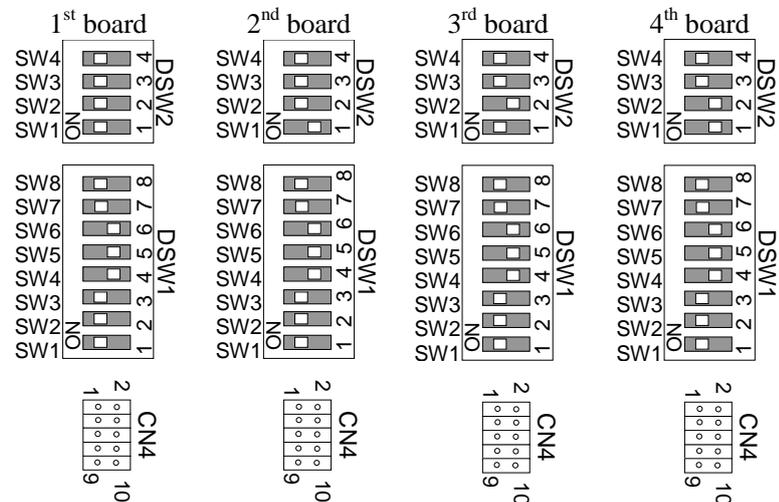
12.2.2 Board Configuration (Expansion I/O)

Board Appearance



Switch and Jumper Configuration

Setup the DSW1 and DSW2. CN4 is all open.

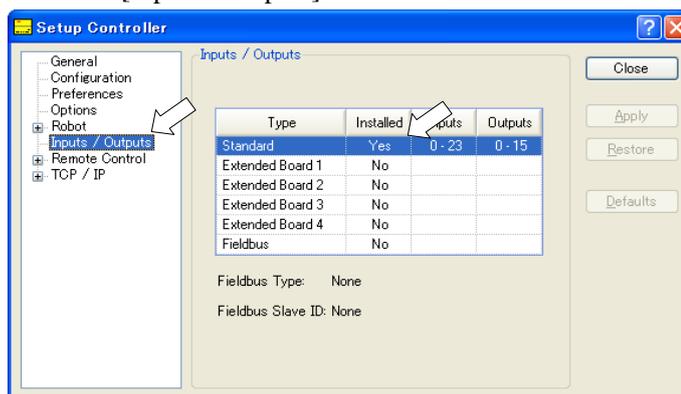


12.2.3 Confirmation of Operation Using EPSON RC+ 5.0

When an expansion I/O board is mounted to the option unit, the Controller software automatically identifies the expansion I/O board. Therefore, no software configuration is needed.

Correct identification can be confirmed from EPSON RC+ 5.0.

- (1) Select the EPSON RC+ 5.0 menu-[Setup]-[Controller] to display the [Setup Controller] dialog.
- (2) Select the [Inputs / Outputs].



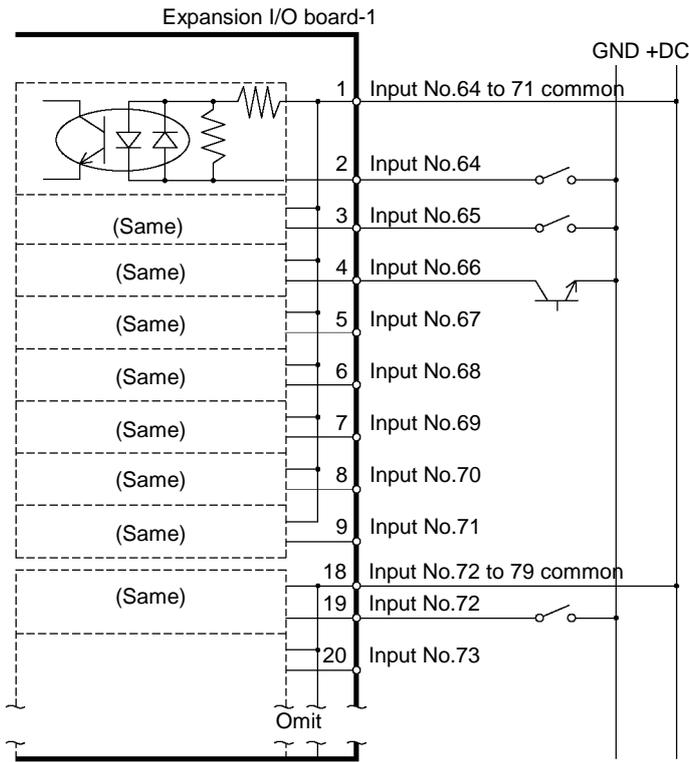
- (3) Make sure that “Yes” is displayed in the Installed column.
The expansion I/O board is identified by the Controller software. Corresponding Input and Output is available.

12.2.4 Input Circuit

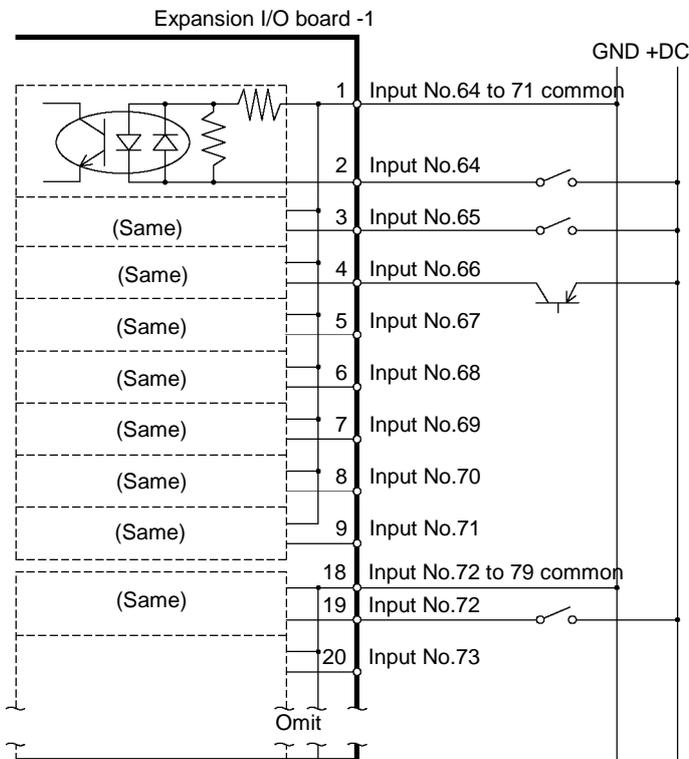
| | |
|---------------------|-------------------------------|
| Input Voltage Range | : + 12 V to 24 V \pm 10% |
| ON Voltage | : + 10.8 V (Min.) |
| OFF Voltage | : + 5 V (Max.) |
| Input Current | : 10 mA (TYP) at + 24 V input |

Two types of wiring are available for use with the two-way photo coupler in the input circuit.

Protected Expansion I/O Board
 Typical Input Circuit Application 1



Protected Expansion I/O Board
 Typical Input Circuit Application 2

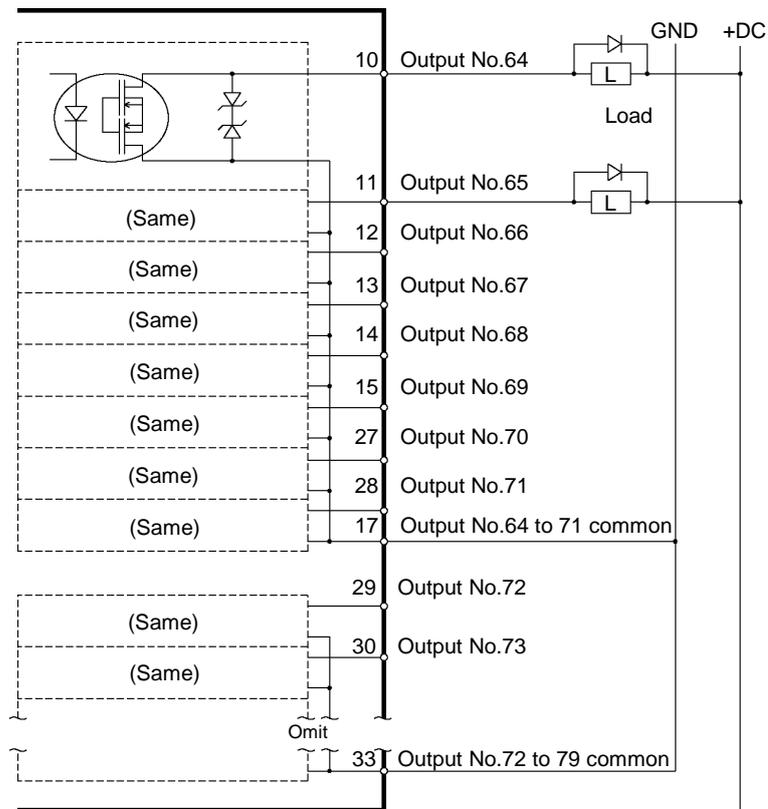


12.2.5 Output Circuit

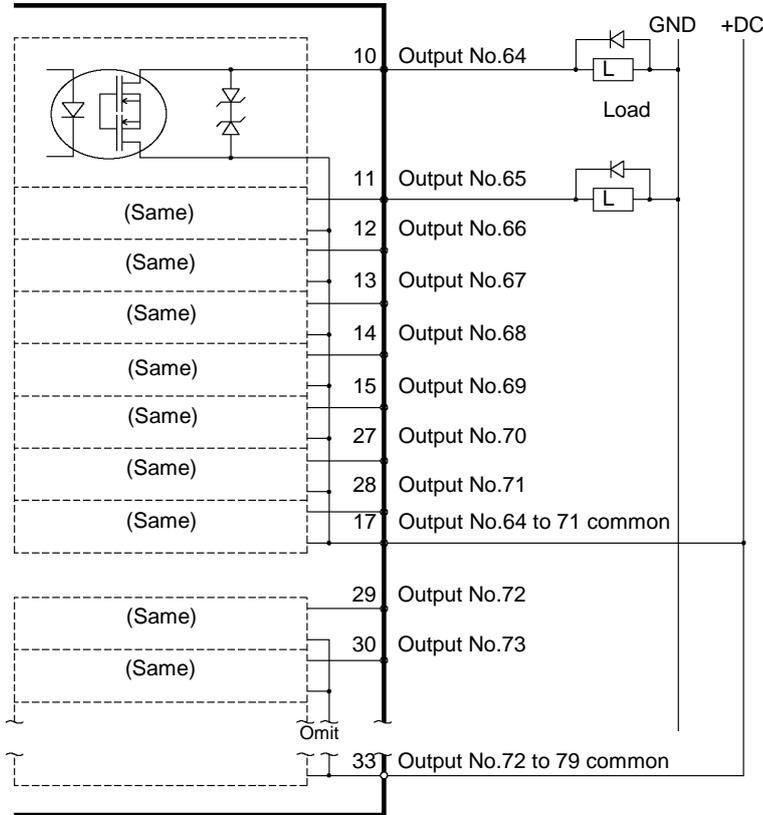
- Rated Output Voltage : +12 V to 24 V \pm 10%
- Maximum Output Current : TYP 100 mA/1 output
- Output Driver : PhotoMOS Relay
- On-State Resistance (average) : 23.5 Ω or less

Two types of wiring are available for use with the nonpolar photoMOS relay in the output circuit.

Protected Expansion I/O Board
 Typical Output Circuit Application 1
 Expansion I/O-1



Protected Expansion I/O Board
 Typical Output Circuit Application 2
 Expansion I/O-1



12.2.6 Pin Assignments

Pin Assignment table of the 1st Expansion I/O board.

Connector 1 Pin Assignments

| Pin No. | Signal Name | Pin No. | Signal Name | Pin No. | Signal Name |
|---------|---------------------------|---------|---------------------------|---------|--------------|
| 1 | Input common No.64 to 71 | 18 | Input common No.72 to 79 | 34 | Not Used |
| 2 | Input No.64 | 19 | Input No.72 | 35 | Not Used |
| 3 | Input No.65 | 20 | Input No.73 | 36 | Not Used |
| 4 | Input No.66 | 21 | Input No.74 | 37 | Not Used |
| 5 | Input No.67 | 22 | Input No.75 | 38 | Not Used |
| 6 | Input No.68 | 23 | Input No.76 | 39 | Not Used |
| 7 | Input No.69 | 24 | Input No.77 | 40 | Not Used |
| 8 | Input No.70 | 25 | Input No.78 | 41 | Not Used |
| 9 | Input No.71 | 26 | Input No.79 | 42 | Not Used |
| 10 | Output No.64 | 27 | Output No.70 | 43 | Output No.75 |
| 11 | Output No.65 | 28 | Output No.71 | 44 | Output No.76 |
| 12 | Output No.66 | 29 | Output No.72 | 45 | Output No.77 |
| 13 | Output No.67 | 30 | Output No.73 | 46 | Output No.78 |
| 14 | Output No.68 | 31 | Output No.74 | 47 | Output No.79 |
| 15 | Output No.69 | 32 | Not Used | 48 | Not Used |
| 16 | Not Used | 33 | Output common No.72 to 79 | 49 | Not Used |
| 17 | Output common No.64 to 71 | | | 50 | Not Used |

| Connector | Standard |
|---------------------------------|---|
| I/O Connector (Controller side) | D-sub 50 male pin Mounting style #4 - 40 |

* The I/O connector, I/O connector cable, terminal block, and I/O connector kit are offered as options.

Connector 2 Pin Assignments

| Pin No. | Signal Name | Pin No. | Signal Name | Pin No. | Signal Name |
|---------|---------------------------|---------|---------------------------|---------|--------------|
| 1 | Input common No.80 to 87 | 18 | Input common No.88 to 95 | 34 | Not Used |
| 2 | Input No.80 | 19 | Input No.88 | 35 | Not Used |
| 3 | Input No.81 | 20 | Input No.89 | 36 | Not Used |
| 4 | Input No.82 | 21 | Input No.90 | 37 | Not Used |
| 5 | Input No.83 | 22 | Input No.91 | 38 | Not Used |
| 6 | Input No.84 | 23 | Input No.92 | 39 | Not Used |
| 7 | Input No.85 | 24 | Input No.93 | 40 | Not Used |
| 8 | Input No.86 | 25 | Input No.94 | 41 | Not Used |
| 9 | Input No.87 | 26 | Input No.95 | 42 | Not Used |
| 10 | Output No.80 | 27 | Output No.86 | 43 | Output No.91 |
| 11 | Output No.81 | 28 | Output No.87 | 44 | Output No.92 |
| 12 | Output No.82 | 29 | Output No.88 | 45 | Output No.93 |
| 13 | Output No.83 | 30 | Output No.89 | 46 | Output No.94 |
| 14 | Output No.84 | 31 | Output No.90 | 47 | Output No.95 |
| 15 | Output No.85 | 32 | Not Used | 48 | Not Used |
| 16 | Not Used | 33 | Output common No.88 to 95 | 49 | Not Used |
| 17 | Output common No.80 to 87 | | | 50 | Not Used |

| Connector | Standard |
|---------------------------------|---|
| I/O Connector (Controller side) | D-sub 50 male pin Mounting style #4 - 40 |

* The I/O connector, I/O connector cable, terminal block, and I/O connector kit are offered as options.

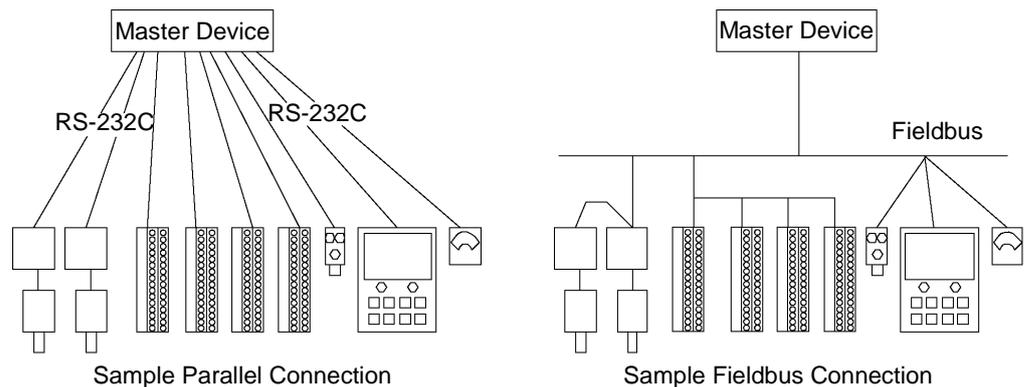
12.3 Fieldbus I/O Board

12.3.1 Overview of Fieldbus I/O

The Fieldbus I/O option is an option to add fieldbus slave function (DeviceNet, PROFIBUS-DP, PROFINET, CC-Link, EtherNet/IP) to the robot Controller.

A fieldbus is a standard of signal communications between field devices operating in a factory (sensor, actuator, robot controller, etc.) and controller (PLC or robot controller) using serial communications. Compared to signal communications using analog signals, a fieldbus has the following features:

- Access to signals from multiple devices and multiple data from each device using one cable.
- Precise signal transmission since there is no need for A/D conversion and D/A conversion.
- Less wiring costs, including signal relay board costs and installation area due to several dozen (or a hundred) devices connected on one fieldbus.
- More flexible modification and expansion of a system because multiple devices are simply added to one fieldbus without additional wiring.
- Slave devices can transmit self-diagnostics information.



Fieldbus slave function can be added to the RC180 Controller. For each fieldbus on the controller, there is one board installed. You cannot use more than one fieldbus type on the same controller.

For master device transmission, up to 256 inputs and 256 outputs are available with Fieldbus I/O.



Response times for Fieldbus I/O can vary and depend on several factors, including baud rate, scan rate, number and types of devices, number of SPEL+ tasks, etc.

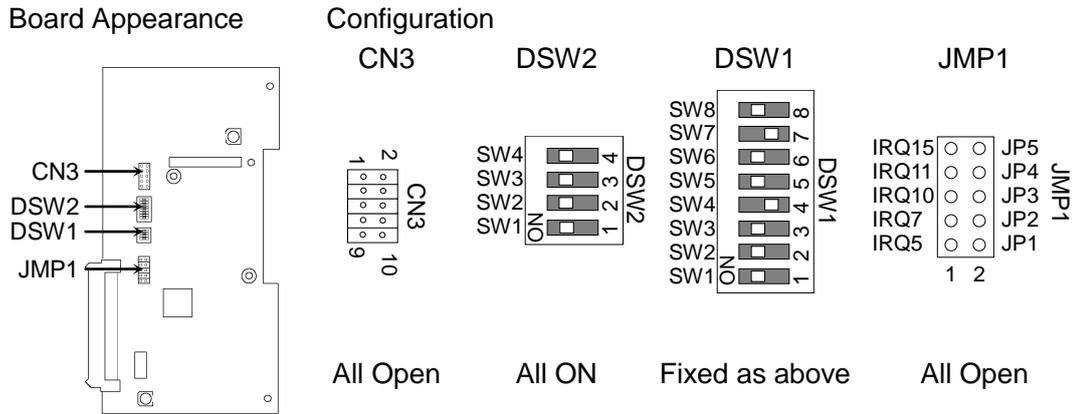
12.3.2 Response Speed of Fieldbus I/O

Fieldbus I/O communicates the I/O status using serial communication. I/O status exchange lag occurs according to the serial communication speed. This exchange lag is also influenced by scan cycle, amount and type of the device, and existence of communication error.

In the RC180 Controller, status of the Fieldbus I/O is updated approximately every 30 mS. Although the fieldbus communication speed is fast, response is not available for pulses less than or equal to 30 mS.

12.3.3 Fieldbus I/O Board Configuration

The Fieldbus I/O board is configured as follows at shipment.



12.3.4 DeviceNet

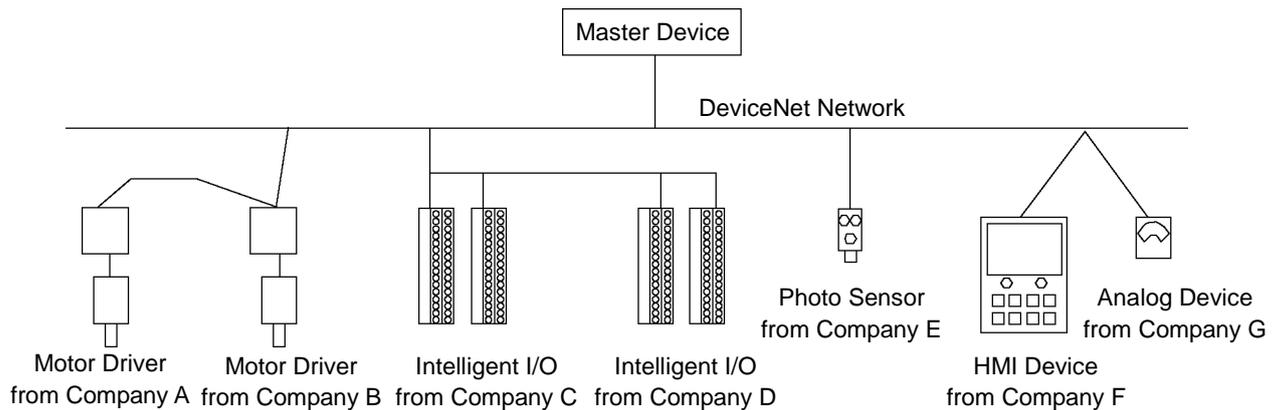
| | |
|--|---|
|  WARNING | <ul style="list-style-type: none"> ■ Make sure that the power is turned OFF before installing/removing any boards or connecting/disconnecting any cables. Installing/removing any boards or connecting/disconnecting any cables with the power ON is extremely hazardous and may result in electric shock and/or malfunction of equipment. |
|--|---|

| | |
|--|---|
|  CAUTION | <ul style="list-style-type: none"> ■ Pay attention to the followings in order to prevent the DeviceNet connector from coming off. <ol style="list-style-type: none"> 1. Use the connectors attached to the board. 2. Insert the connectors all the way seated. 3. Fix the cables at proper positions in order not to put a load on the connectors. |
|--|---|

Overview of DeviceNet

DeviceNet is a fieldbus network that provides easy interconnection between control devices (PLC, PC, sensor, actuator, etc.).

DeviceNet was developed by Allen-Bradley as an open communication standard to connect various field devices (sensor, actuator, robot controller, etc.). Because of the open communication standard, DeviceNet users can easily construct a multi-vendor system with various devices developed around the world.

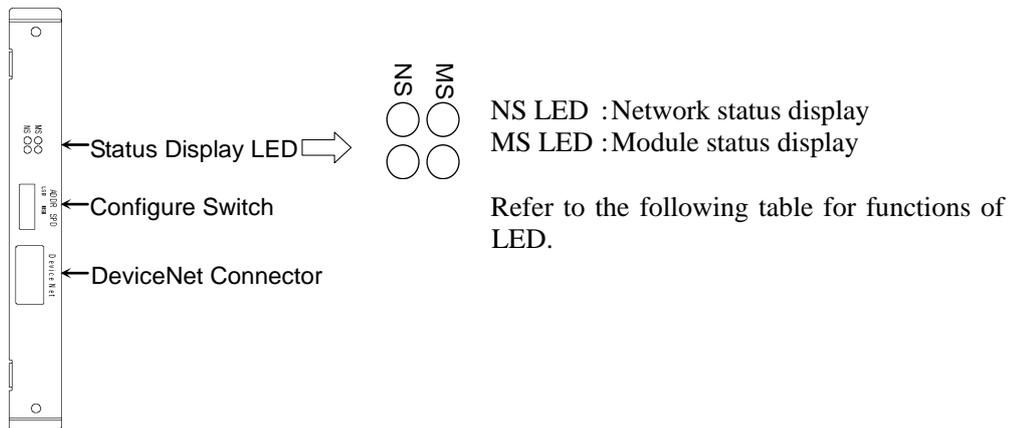


DeviceNet Communication Specifications

| Item | Specification | | | |
|--|--|---------------------|--------------|------------------------|
| Name | DeviceNet board | | | |
| Code | R12B040706 | | | |
| Supported Connection | I/O messaging connection (Polling), Explicit message connection DeviceNet communication protocol | | | |
| Baud Rates | 125k / 250k / 500k (bps) | | | |
| Transfer Distance | Baud Rates | Max. Network Length | Drop Length | Total Drop Line Length |
| | 500k (bps) | 100 m | 6 m or under | 39 m or under |
| | 250k (bps) | 250 m * | 6 m or under | 78 m or under |
| | 125k (bps) | 500 m * | 6 m or under | 156 m or under |
| Cable | 5-wire cable dedicated to DeviceNet (2 wires for signal, 2 wires for power supply, 1 shield wire) | | | |
| Communications Power Supply Voltage | 24 V DC (supplied from a connector) | | | |
| Communication Power Supply Current Consumption | Maximum 30 mA | | | |
| Mode | Slave | | | |
| Interface | 1 DeviceNet port | | | |
| Connection type | Polling | | | |
| Explicit message connection | Supported | | | |
| Input data size | 256 bits (32 bytes) | | | |
| Output data size | 256 bits (32 bytes) | | | |

* When thin cable is used for trunk line, the maximum network length is 100 m.

DeviceNet Appearance



LED Description of DeviceNet

LED status represents the status of the fieldbus board.

| LED status | | NS | MS |
|------------|----------|--|-------------------------|
| OFF | | Communication power supply OFF Disconnected | Device power supply OFF |
| GRN | ON | Link OK Online connected | Device operating |
| | Blinking | Online disconnected | Data size error |
| RED | ON | Link error | Critical error |
| | Blinking | Communication time out | Error |

Board Installation of DeviceNet

Set the baud rates between the MAC address of the device and the master by setting the DeviceNet board configure switch.

- (1) Set the MAC address for DeviceNet board by setting the configure switch. Make sure that the MAC address is different from the other devices in the network. Refer to the following table for the configuration.

| MAC address | Switch | | | | | |
|---------------------|--------------|-----|-----|-----|-----|--------------|
| | sw3 (MSB) | sw4 | sw5 | sw6 | sw7 | sw8 (LSB) |
| 0 | OFF | OFF | OFF | OFF | OFF | OFF |
| 1 | OFF | OFF | OFF | OFF | OFF | ON |
| 2 | OFF | OFF | OFF | OFF | ON | OFF |
| 3 | OFF | OFF | OFF | OFF | ON | ON |
| ⋮ | OFF | OFF | OFF | OFF | OFF | OFF |
| 62 | ON | ON | ON | ON | ON | OFF |
| 63 (at shipment) | ON | ON | ON | ON | ON | ON |

- (2) Set the DeviceNet baud rate. Check the master configuration and set the same baud rate. Refer to the following table for configuration settings.

| Baud Rate | Switch | |
|--------------------------|--------|-----|
| | sw1 | sw2 |
| 125 K | OFF | OFF |
| 250 K | OFF | ON |
| 500 K | ON | OFF |
| Configuration prohibited | ON | ON |

Wiring (DeviceNet)

The DeviceNet connector is a 5 pin open connector. Use the connector attached to the board for wiring.

Terminal name for each pin

| Terminal No | Terminal Name |
|-------------|---------------|
| 1 | V- |
| 2 | CAN_L |
| 3 | SHELD |
| 4 | CAN_H |
| 5 | V+ |

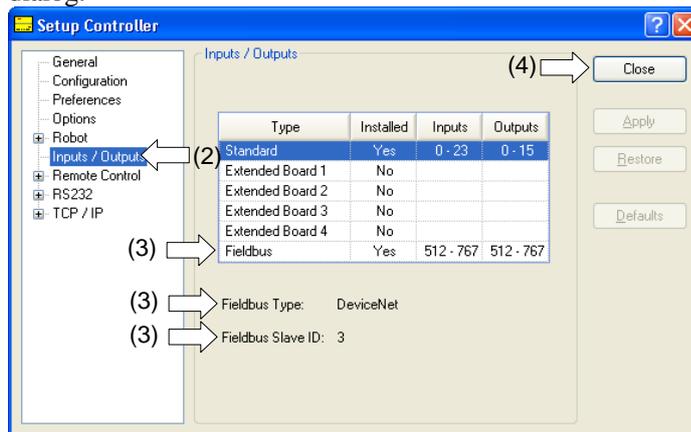


Prepare the cable for DeviceNet sold in the market as a communication cable. Install terminating resistors at both ends of the network.

DeviceNet Confirmation with EPSON RC+ 5.0

When the DeviceNet board is installed to the Controller, it is recognized automatically. Confirm whether EPSON RC+ 5.0 has recognized the DeviceNet board using the following procedure.

- (1) Select EPSON RC+ 5.0 menu-[Setup]-[Controller] to display the [Setup Controller] dialog.



- (2) Select [Inputs / Outputs].
- (3) Make sure that the following are displayed.
 Fieldbus-Installed : Yes
 Fieldbus Type : DeviceNet
 Fieldbus Slave ID : (MAC address depending on the setting)
- (4) Click the <Close> button.

Operation

For details, refer to 12.3.9 Operation.

Electronic Information File (EDS file)

An EDS file is supplied for DeviceNet network configuration. The file is located in the following folder in the Manual Update CD that is attached to the Robot Controller.

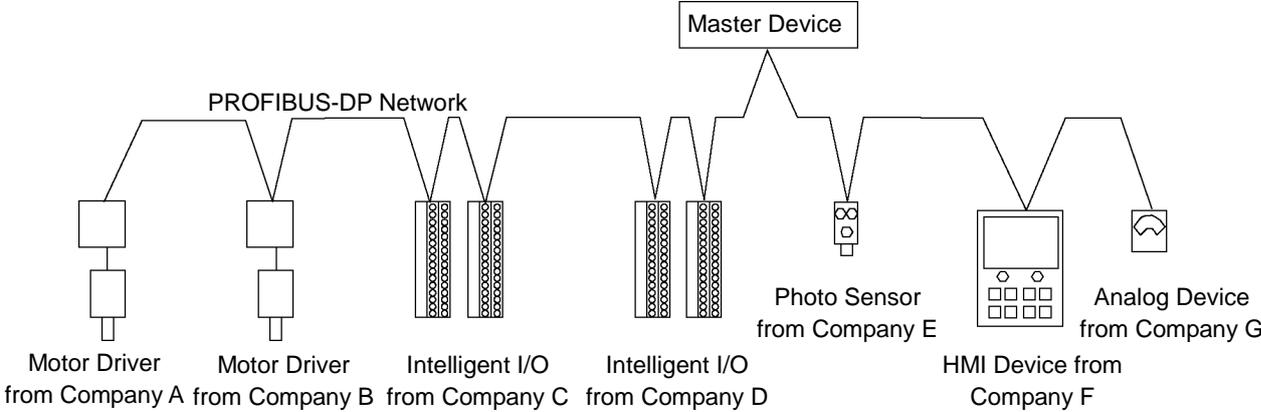
\EpsonRC50\Fieldbus\DeviceNet

12.3.5 PROFIBUS-DP

| | |
|---|---|
|  | <ul style="list-style-type: none">■ Make sure that the power is turned OFF before installing/removing any boards or connecting/disconnecting any cables. Installing/removing any boards or connecting/disconnecting any cables with the power ON is extremely hazardous and may result in electric shock and/or malfunction of equipment. |
|---|---|

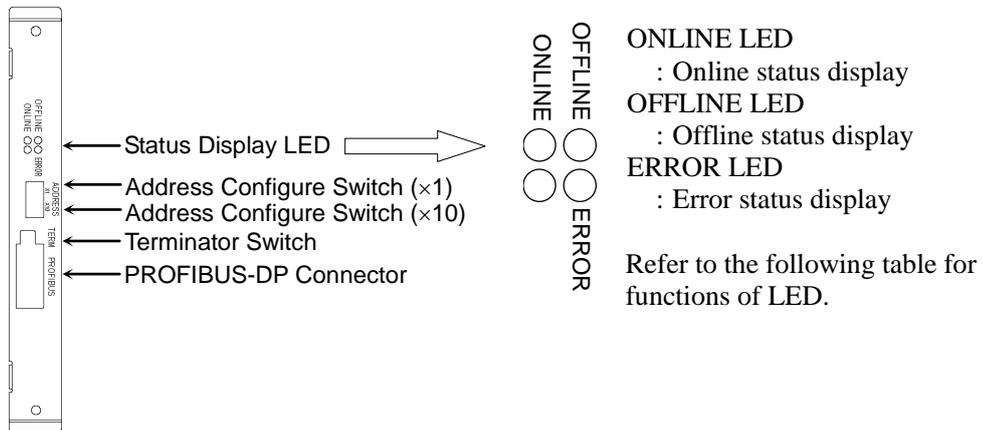
Overview of PROFIBUS-DP

PROFIBUS DP is one of the fieldbus networks that provide easy interconnection between control devices (PLC, PC, sensor, actuator, etc.). PROFIBUS DP was developed as an open communication standard to connect various field devices (sensor, actuator, robot controller, etc.). Because of the open communication standard, PROFIBUS DP can easily construct multi-vendor system with various devices developed around the world.



| PROFIBUS DP Specifications | | |
|----------------------------|---|--------------|
| Item | Specification | |
| Name | PROFIBUS-DP board | |
| Code | R12B040707 | |
| Connection Method | Hybrid (token passing procedure and master-slave communication) | |
| Baud Rates (bps) | 9.6k, 19.2k, 45.45k, 93.75k, 187.5k, 500k, 1.5 M, 3 M, 6 M, 12 M | |
| Transfer Distance | Baud Rates | Cable Length |
| | 12M (bps) | 100 m |
| | 6M (bps) | 100 m |
| | 3M (bps) | 100 m |
| | 1.5M (bps) | 200 m |
| | 500k (bps) | 400 m |
| | 187.5k (bps) | 1000 m |
| | 93.75k (bps) | 1200 m |
| | 45.45k (bps) | 1200 m |
| 19.2k (bps) | 1200 m | |
| 9.6k (bps) | 1200 m | |
| Maximum Stations | 126 (including master unit and repeater) | |
| Data Length / Frame | 244 bytes | |
| Cable | 2-wire cable dedicated to PROFIBUS (2 wires for signal) | |
| Modes | Slave | |
| Interface | 1 PROFIBUS-DP port (EN 50170) | |
| Output Current Capacity | Maximum 150 mA | |
| Input Data Size | 256 bits (32 bytes) | |
| Output Data Size | 256 bits (32 bytes) | |

Appearance of PROFIBUS-DP



LED Description of PROFIBUS-DP

LED status represents the status of the fieldbus board.

| LED status | ONLINE GRN | OFFLINE RED | ERROR RED |
|---------------|-----------------------------|--------------------------------|---|
| OFF | Offline | Online | Normal operation |
| ON | Online Data exchangeable | Offline Data unexchangeable | – |
| 1 Hz blinking | – | – | Initialization error (Mismatch with network configuration) |
| 2 Hz blinking | – | – | Initialization error (Mismatch with user parameter) |
| 4 Hz blinking | – | – | Initialization error (Module initialization error) |

Board Installation of PROFIBUS-DP

Set the node address of the device using the address configuration switch of the PROFIBUS-DP board. Set network termination ON or OFF with the terminator switch.

- Set the node address of the PROFIBUS-DP board using the address configuration switch. Make sure that the node address is different from the other devices in the network. Switch on the “×10” side for tens digit address configuration. Switch on the “×1” side for units digit address configuration.



Generally, a node address from 0 to 125 is available for the PROFIBUS-DP device, however, this Controller supports node addresses from 0 to 99.

Generally, node addresses are recommended to be configured as shown in the table.

| Node address | Device Name |
|--------------|-----------------------------|
| 0 | Service unit such as PG/PC |
| 1 | Operation panel such as HMI |
| 2 | Master station |
| 3-99 (-125) | DP slave station |

- Turn network termination ON or OFF using the terminator switch.

Wiring (PROFIBUS-DP)

PROFIBUS-DP connector is standard D-sub 9 pins connector.

Terminal name for each pin

| Terminal No | Terminal Name |
|-------------|---------------|
| Case | Shield |
| 1 | Not used |
| 2 | Not used |
| 3 | B line |
| 4 | RTS |
| 5 | GND BUS |
| 6 | +5V BUS |
| 7 | Not used |
| 8 | A line |
| 9 | Not used |



Prepare the cable for PROFIBUS-DP sold in the market as a communication cable.

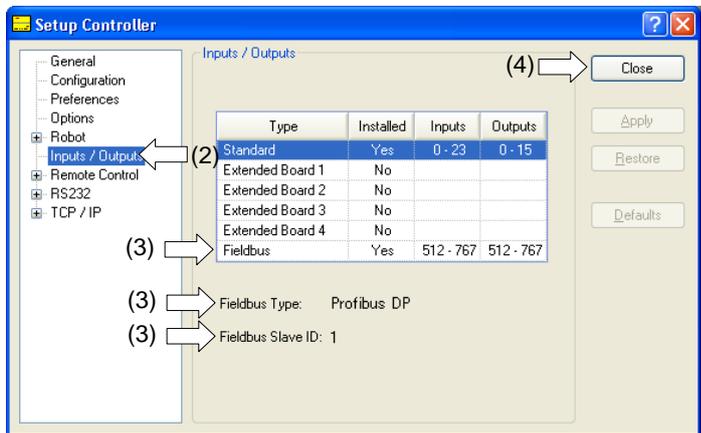
Install terminating resistors at both ends of the network.

A terminating resistor is installed in the PROFIBUS-DP board. Turn the terminating resistor ON or OFF using the terminator switch on the front panel.

PROFIBUS-DP Confirmation with EPSON RC+ 5.0

When a PROFIBUS-DP board is installed to the Controller, it is recognized automatically. Confirm whether EPSON RC+ 5.0 has recognized the PROFIBUS-DP board using the following procedure.

- (1) Select EPSON RC+ 5.0 menu-[Setup]-[Controller] to display the [Setup Controller] dialog.



- (2) Select [Inputs / Outputs].
- (3) Make sure that the following are displayed.
 - Fieldbus-Installed : Yes
 - Fieldbus Type : PROFIBUS DP
 - Fieldbus Slave ID : (depends on the address configure switch)
- (4) Click the <Close> button.

Operation

For details, refer to 12.3.9 Operation.

Electronic Information File (GSD file)

A GSD file (EPSN0A4C.gsd) is supplied for PROFIBUS-DP network configuration. The file is located in the following folder in the Manual Update CD that is attached to the Robot Controller.

\\EpsonRC50\Fieldbus\PROFIBUS

12.3.6 CC-Link

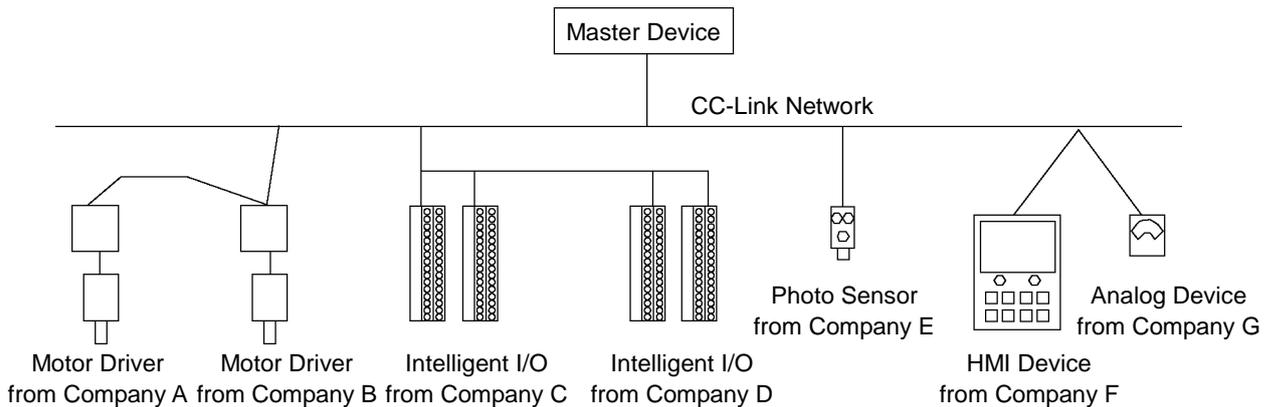
| | |
|--|---|
|  WARNING | <ul style="list-style-type: none"> ■ Make sure that the power is turned OFF before installing/removing any boards or connecting/disconnecting any cables. Installing/removing any boards or connecting/disconnecting any cables with the power ON is extremely hazardous and may result in electric shock and/or malfunction of equipment. |
|--|---|

| | |
|--|---|
|  CAUTION | <ul style="list-style-type: none"> ■ Pay attention to the followings in order to prevent the CC-Link connector from coming off. <ol style="list-style-type: none"> 1. Use the connectors attached to the board. 2. Insert the connectors all the way seated. 3. Fix the cables at proper positions in order not to put a load on the connectors. |
|--|---|

Overview of CC-Link

CC-Link is one of fieldbus networks that provide easy interconnection between control devices (PLC, PC, sensor, actuator, etc.).

CC-Link was developed as an open communication standard to connect various field devices (sensor, actuator, robot controller, etc.). Because of the open communication standard, CC-Link can easily construct multi-vendor system with various devices developed around the world.



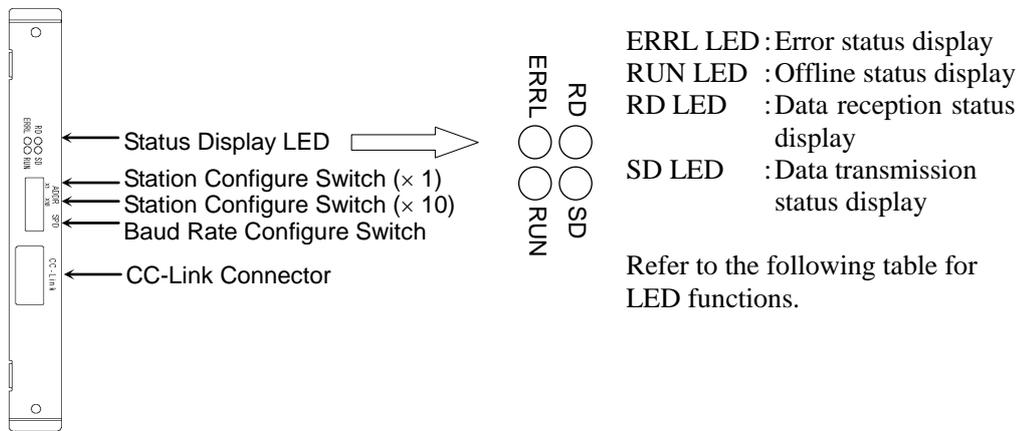
CC-Link Specifications

| Item | Specification | |
|-----------------------|---|--------------|
| Name | CC-Link board | |
| Code | R12B040708 | |
| Connection Method | Broadcast polling | |
| Baud Rates (bps) | 156k, 625k, 2.5M, 5M, 10M | |
| Transfer Distance | Baud Rates | Cable Length |
| | 10M (bps) | 100 m |
| | 5M (bps) | 160 m |
| | 2.5M (bps) | 400 m |
| | 625k (bps) | 900 m |
| 156k (bps) | 1200 m | |
| Maximum Device Volume | 64 units | |
| Cable | Dedicated cable supporting CC-Link Ver.1.10 | |
| Modes | Slave | |
| Interface | 1 CC-Link V1 port | |
| Occupied stations | 3 station fixed | |
| Input Data Size | 256 bits (96 bits + 10 words)* | |
| Output Data Size | 256 bits (96 bits + 10 words)* | |

* 16 bits of each system inputs and outputs are reserved. Open data size for user is as follows.

Inputs/Outputs: 80 bits + 10 words

Appearance of CC-Link



LED Description of CC-Link

LED status represents the status of the fieldbus I/O board.

| LED status | ERRL RED | RUN GRN | RD GRN | SD GRN |
|------------|---|---------------------------------------|---|--|
| OFF | Normal operation Device power supply OFF | Offline Device power supply OFF | No data reception Device power supply OFF | No data transmission Device power supply OFF |
| ON | CRC error: station Address error Baud rate configuration error | Normal operation | Data reception | Data transmission |
| Blinking | — | — | — | — |

Board Configuration (CC-Link)

Configuration of the device station is available with the station configure switch on the CC-Link board.

Baud rate configuration is available with baud rate configure switch on the CC-Link board.

- (1) Set the station of the CC-Link board with the station configuration switch.
 Make sure that the station does not duplicate with the other devices inside the network at configuration.
 Switches on the ×10 side are for tens place address value configuration. Switches on the ×1 side are for units digit address value configuration. Stations from 1 to 62 are available. CC-Link board occupies three stations. Assign the configured stations +3 stations to the next node.
- (2) Set the CC-Link baud rate. Check the master configuration and set the same baud rate. Refer to the following table for configuration.

| Baud Rate | Switch |
|--------------------------|--------|
| 156k | 0 |
| 625k | 1 |
| 2.5M | 2 |
| 5M | 3 |
| 10M | 4 |
| Configuration prohibited | 5-9 |

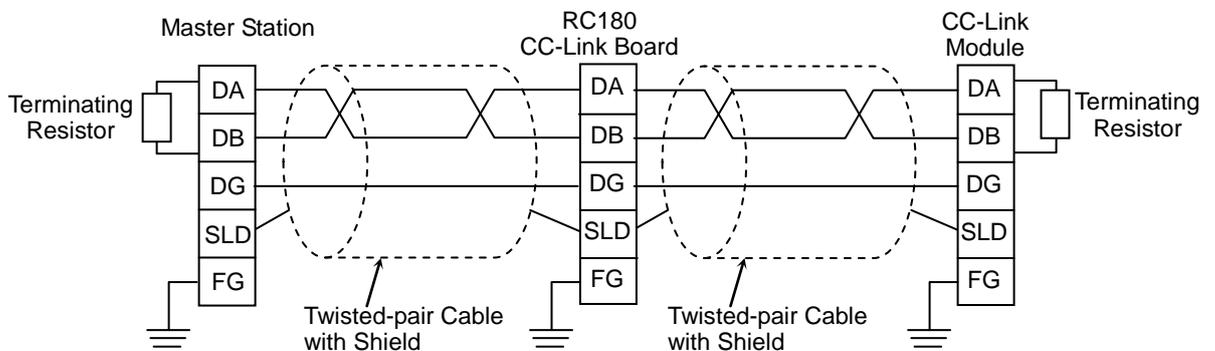
Wiring (CC-Link)

The CC-Link connector is a 5 pin open connector. Use the connector attached to the board for wiring.

Terminal name for each pin

| Terminal No | Terminal Name |
|-------------|---------------|
| 1 | DA |
| 2 | DB |
| 3 | DG |
| 4 | SLD |
| 5 | FG |

Connect the CC-Link master module and the CC-Link board as follows.



Prepare the cable for CC-Link Ver.1.10 sold in the market as a communication cable.

NOTE  Install terminating resistors at both end of the network.
Use the terminating resistor attached to the CC-Link master station.

Make sure to disconnect the connectors only after turning OFF the power supply of the specific station.

Connect the shield wire for CC-Link to the “SLD” of each unit and ground the both end via the “FG.”

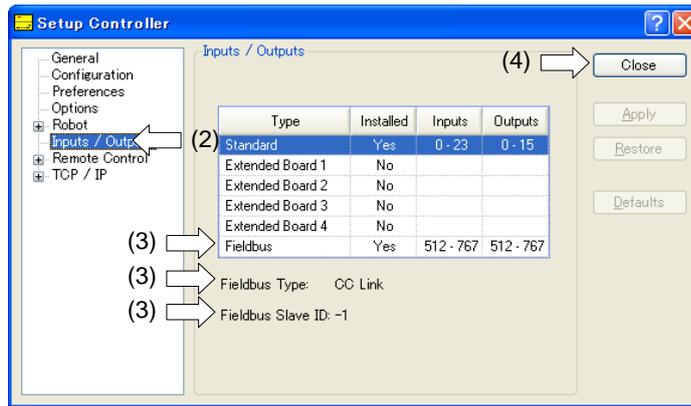
CC-Link Confirmation with EPSON RC+ 5.0

NOTE  Confirmation with EPSON RC+5.0 should be done while connecting to the PLC.
Following error occurs when the PLC is not running or not connected.

Error: 7101 Communication error occur during transform

When CC-Link board is installed to the Controller, it is recognized automatically. Confirm whether EPSON RC+ 5.0 has recognized the CC-Link board using the following procedure.

- (1) Select EPSON RC+ 5.0 menu-[Setup]-[Controller] to display the [Setup Controller] dialog.



- (2) Select [Inputs / Outputs].
- (3) Make sure that the following are displayed.
Fieldbus-Installed : Yes
Fieldbus Type : CC Link
- (4) Click the <Close> button.

NOTE  For CC-Link, station address cannot be confirmed. “-1” is displayed.

Operation (CC-Link)

When CC-Link is installed, some operation differs from the other Fieldbus I/O options. This section indicates how to operate.

Remote Input

Remote input (RX) and remote output (RY) indicates ON/OFF information. Remote data is bit data and the FROM/TO command is executed per 16 bits (1 word).

“n” in the following tables is address configured as a master station with the station configure. This is calculated by the following expression.

$$n = (\text{Station} - 1) \times 2$$

Result of the calculation is in decimal number. Substitute the result to “n” after converting to hexadecimal number.

(Example)

When CC-Link board station is 1

Remote Input RXn0 to RX(n+5)F → RX00 to RX5F

Remote Output RYn0 to RY(n+5)F → RY00 to RY5F

When CC-Link board station is 4

Remote Input RXn0 to RX(n+5)F → RX60 to RXAF

Remote Output RYn0 to RY(n+5)F → RY60 to RYAF

Remote Input List (3 stations occupied, Default configuration *1)

Signal direction: Remote device station (CC-Link board) → Master station (PLC)

Bits indicated as “NA” are left for user. Use these free for SPEL+ program.

| Address | Signal Name | | Controller Bit No |
|----------|--|----|-------------------|
| RXn0 | Ready | *1 | 512 |
| RXn1 | Start | *1 | 513 |
| RXn2 | Pause | *1 | 514 |
| RXn3 | Error | *1 | 515 |
| RXn4 | EStopOn | *1 | 516 |
| RXn5 | SafeguardOn | *1 | 517 |
| RXn6 | SError | *1 | 518 |
| RXn7 | Waning | *1 | 519 |
| RXn8 | MotorOn | *1 | 520 |
| RXn9 | Home | *1 | 521 |
| RXnA | CurrProg1 | *1 | 522 |
| RXnB | CurrProg2 | *1 | 523 |
| RXnC | CurrProg4 | *1 | 524 |
| RXnD | AutoMode | *1 | 525 |
| RXnE | TeachMode | *1 | 526 |
| RXnF | ErrorCode1 | *1 | 527 |
| RX(n+1)0 | ErrorCode2 | *1 | 528 |
| RX(n+1)1 | ErrorCode4 | *1 | 529 |
| RX(n+1)2 | ErrorCode8 | *1 | 530 |
| RX(n+1)3 | ErrorCode16 | *1 | 531 |
| RX(n+1)4 | ErrorCode32 | *1 | 532 |
| RX(n+1)5 | ErrorCode64 | *1 | 533 |
| RX(n+1)6 | ErrorCode128 | *1 | 534 |
| RX(n+1)7 | ErrorCode256 | *1 | 535 |
| RX(n+1)8 | ErrorCode512 | *1 | 536 |
| RX(n+1)9 | ErrorCode1024 | *1 | 537 |
| RX(n+1)A | ErrorCode2048 | *1 | 538 |
| RX(n+1)B | ErrorCode4096 | *1 | 539 |
| RX(n+1)C | ErrorCode8192 | *1 | 540 |
| RX(n+1)D | NA | | 541 |
| RX(n+1)E | NA | | 542 |
| RX(n+1)F | NA | | 543 |
| RX(n+2)0 | NA | | 544 |
| : | : | | |
| RX(n+4)F | NA | | 591 |
| RX(n+5)0 | System reservation | | 592 |
| RX(n+5)1 | System reservation | | 593 |
| RX(n+5)2 | System reservation | | 594 |
| RX(n+5)3 | System reservation | | 595 |
| RX(n+5)4 | System reservation | | 596 |
| RX(n+5)5 | System reservation | | 597 |
| RX(n+5)6 | System reservation | | 598 |
| RX(n+5)7 | System reservation | | 599 |
| RX(n+5)8 | Initial data processing request flag | *2 | 600 |
| RX(n+5)9 | Initial data configuration complete flag | *2 | 601 |
| RX(n+5)A | Error status flag | *2 | 602 |
| RX(n+5)B | Remote Ready | *2 | 603 |
| RX(n+5)C | System reservation | | 604 |
| RX(n+5)D | System reservation | | 605 |
| RX(n+5)E | System reservation | | 606 |
| RX(n+5)F | System reservation | | 607 |

*1 I/O assignment can be changed or invalid (NA). For details, refer to *EPSON RC+ 5.0 User's Guide 10. Remote Control*.

*2 For details, refer to the *CC-Link flag operation* section.

Remote Output List (3 stations occupied, Default configuration *1)

Signal direction : Master station (PLC) → Remote device station (CC-Link board)

Bits indicated as “NA” are left for user. Use these free for SPEL+ program.

| Address | Signal Name | Controller Bit No |
|----------|--|-------------------|
| RYn0 | Start *1 | 512 |
| RYn1 | SelProg1 *1 | 513 |
| RYn2 | SelProg2 *1 | 514 |
| RYn3 | SelProg4 *1 | 515 |
| RYn4 | Stop *1 | 516 |
| RYn5 | Pause *1 | 517 |
| RYn6 | Continue *1 | 518 |
| RYn7 | Reset *1 | 519 |
| RYn8 | SetMotorOn *1 | 520 |
| RYn9 | SetMotorOff *1 | 521 |
| RYnA | Home *1 | 522 |
| RYnB | NA | 523 |
| RYnC | NA | 524 |
| RYnD | NA | 525 |
| RYnE | NA | 526 |
| RYnF | NA | 527 |
| RY(n+1)0 | NA | 528 |
| : | : | |
| RY(n+4)F | NA | 591 |
| RY(n+5)0 | System reservation | 592 |
| RY(n+5)1 | System reservation | 593 |
| RY(n+5)2 | System reservation | 594 |
| RY(n+5)3 | System reservation | 595 |
| RY(n+5)4 | System reservation | 596 |
| RY(n+5)5 | System reservation | 597 |
| RY(n+5)6 | System reservation | 598 |
| RY(n+5)7 | System reservation | 599 |
| RY(n+5)8 | Initial data processing complete flag *2 | 600 |
| RY(n+5)9 | Initial data configuration request flag *2 | 601 |
| RY(n+5)A | Error reset request flag *2 | 602 |
| RY(n+5)B | System reservation | 603 |
| RY(n+5)C | System reservation | 604 |
| RY(n+5)D | System reservation | 605 |
| RY(n+5)E | System reservation | 606 |
| RY(n+5)F | System reservation | 607 |

*1 I/O assignment can be changed or invalid (NA). For details, refer to *EPSON RC+ 5.0 User's Guide 10. Remote Control*.

*2 For details, refer to the *CC-Link flag operation* section.

Remote Register

Remote register (RW_r, RW_w) is numeric value

“m” indicated in the following tables are master station address configured with station configure. This is calculated by the following expression.

$$m = (\text{Station} - 1) \times 4$$

Result of the calculation is in decimal number. Substitute the result to “m” after converting to hexadecimal number.

(Example)

When the CC-Link board is 1

Remote Register RW_{rm} to RW_{rm}+B → RW_r0 to RW_rB

Remote Register RW_{wm} to RW_{wm}+B → RW_w0 to RW_wB

When the CC-Link board is 4

Remote Register RW_{rm} to RW_{rm}+B → RW_rC to RW_r17

Remote Register RW_{wm} to RW_{wm}+B → RW_wC to RW_w17

Remote Register List (3 stations occupied, Default configuration *1)

Signal direction: Remote device station (CC-Link board) → Master station (PLC)

Bits indicated as “NA” are left for user. Use these free for SPEL+ program.

| Address | Signal Name | Controller Word No | Controller Bit No |
|---------------------|--------------------|--------------------|-------------------|
| RW _{rm} | NA | 38 | 608 to 623 |
| : | : | | |
| RW _{rm} +9 | NA | 47 | 752 to 767 |
| RW _{rm} +A | System reservation | - | - |
| RW _{rm} +B | System reservation | - | - |

Signal direction: Master station (PLC) → Remote device station (CC-Link board)

Bits indicated as “NA” are left for user. Use these free for SPEL+ program.

| Address | Signal Name | Controller Word No | Controller Bit No |
|---------------------|--------------------|--------------------|-------------------|
| RW _{wm} | NA | 38 | 608 to 623 |
| : | : | | |
| RW _{wm} +9 | NA | 47 | 752 to 767 |
| RW _{wm} +A | System reservation | - | - |
| RW _{wm} +B | System reservation | - | - |

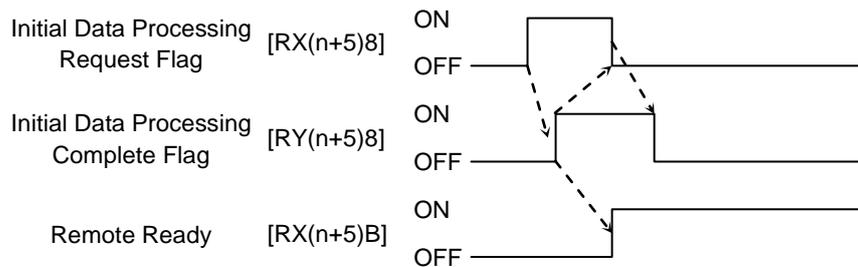
CC-Link Flag Operation

Flag operation of the remote output is describes in this section.

Initial Request Process after Power Supply

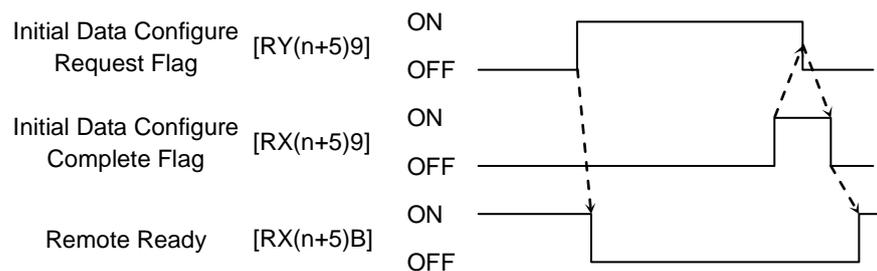
Initial request process is executed from the remote device station (CC-Link board).

After turning ON the Controller, the initial data processing request flag [RX(n+5)8] will be ON by completing the CC-Link board initialization. Set the initial data processing complete flag [RY(n+5)8] ON.



Initial Processing Request from the Master (PLC)

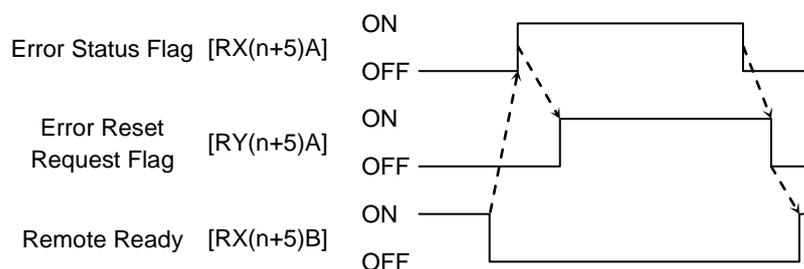
This is an initial configure request for the CC-Link board. No processing is required for no initial data.



Error Flag, Error Reset Process

Error status flag [RX(n+5)A] turns ON at master error or configure error.

When error reset request flag [RY(n+5)A] turns ON at error occurrence, [RX(n+5)A] turns OFF at status that enables error status clear.



When CC-Link error occurs (when error status flag is ON), the Controller status changes to the error status. Reset the error status of the Controller after the error reset process indicated above is completed.

When an error occurred at the Robot or the program, the error flag indicated above does not turn ON.

Electronic Information File (CSP file)

A CSP file is supplied for CC-Link network configuration. The file is located in the following folder in the Manual Update CD that is attached to the Robot Controller.

`\EpsonRC50\Fieldbus\CCLink`

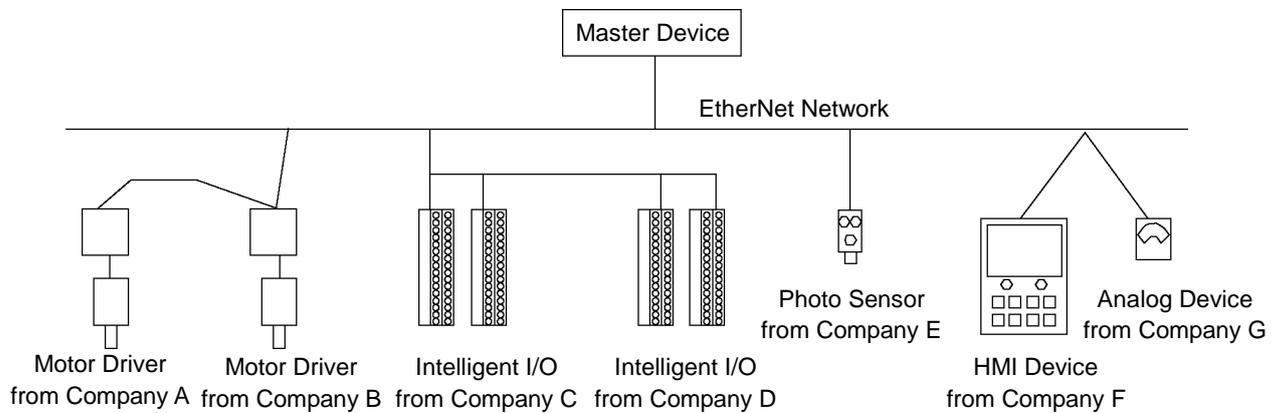
12.3.7 EtherNet/IP

| | |
|--|--|
|  <p>WARNING</p> | <p>■ Make sure that the power is turned OFF before installing/removing any boards or connecting/disconnecting any cables. Installing/removing any boards or connecting/disconnecting any cables with the power ON is extremely hazardous and may result in electric shock and/or malfunction of equipment.</p> |
|--|--|

Overview of EtherNet/IP

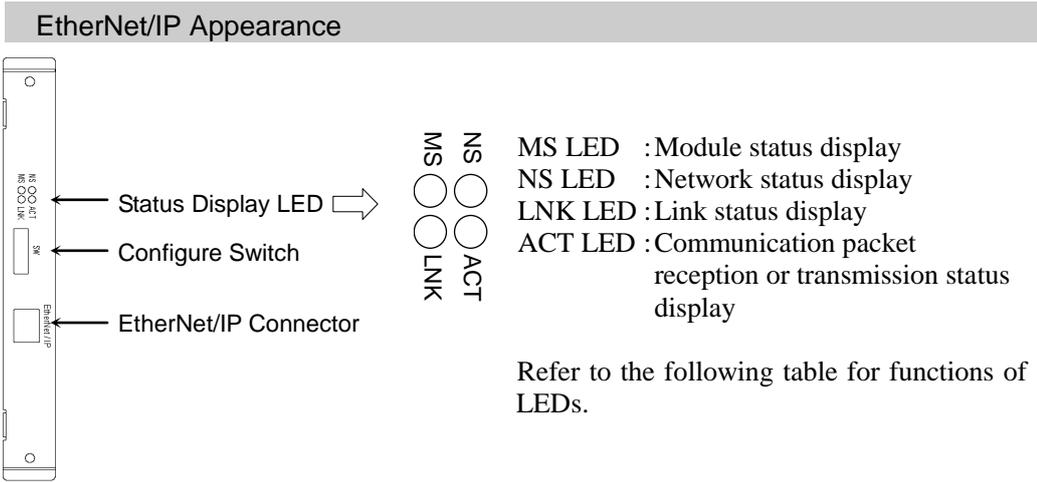
EtherNet/IP is a fieldbus network that provides easy interconnection between control devices (PLC, PC, sensor, actuator, etc.).

EtherNet/IP was developed by Allen-Bradley as an open communication standard to connect various field devices (sensor, actuator, robot controller, etc.). Because of the open communication standard, EtherNet/IP users can easily construct a multi-vendor system with various devices developed around the world.



EtherNet/IP Communication Specifications

| Item | Specification |
|-----------------------------|--|
| Name | EtherNet/IP board |
| Code | R12B040719 |
| Supported Connection | I/O messaging connection (Cyclic), Explicit message connection EtherNet/IP communication protocol |
| Baud Rates | 10M, 100M (bps) |
| Transfer Distance | Standard Ethernet protocol |
| Cable | Standard Ethernet protocol |
| Mode | Slave |
| Interface | 1 EtherNet/IP port |
| Connection type | Cyclic |
| Explicit message connection | Supported |
| Input data size | 256 bits (32 bytes) |
| Output data size | 256 bits (32 bytes) |



LED Description of EtherNet/IP

| LED status | | MS | NS |
|-------------------|----------|------------------------------|---|
| OFF | | Power supply OFF | Power supply OFF or IP address not configured |
| GRN | ON | Master connected (executing) | Online operating |
| | Blinking | Master connected (idling) | Waiting master connection |
| RED | ON | Non-recoverable error | Wrong IP address (duplication) |
| | Blinking | Non-recoverable error | Connection time out |
| GRN/RED alternate | | Self-diagnosing | Self-diagnosing |

| LED status | | LNK | ACT |
|------------|--|---------|---|
| OFF | | No link | No communication packet reception or transmission |
| ON | | Linking | Communication packet reception or transmission |

Board Installation of EtherNet/IP

Set all EtherNet/IP board configure switches OFF. If all EtherNet/IP board configure switches are not OFF, reset error occurs.

All the EtherNet/IP communication configurations are set by the development software (EPSON RC+ 5.0).

Wiring (EtherNet/IP)

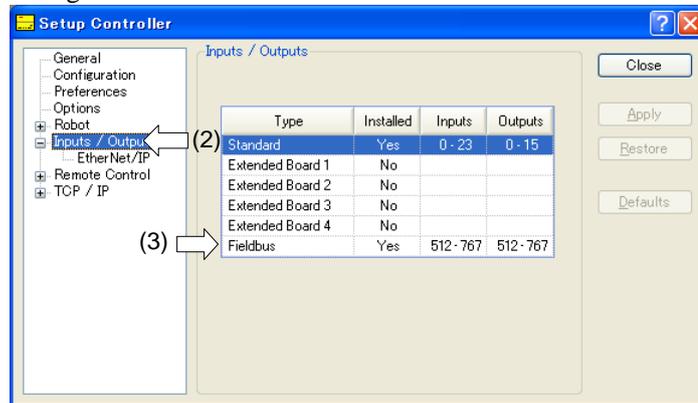
Use a standard Ethernet connector for wiring to the board.

| | |
|-------------|---|
| CAUTION | <p>■ You can use the general Ethernet hub or Ethernet switch for the EtherNet/IP. However, be sure to use a product complying with the industrial standards or noise resistant Ethernet cable (STP cable). If you use an office use product or UTP cable, it may cause communication errors and may not offer the proper performance.</p> |
|-------------|---|

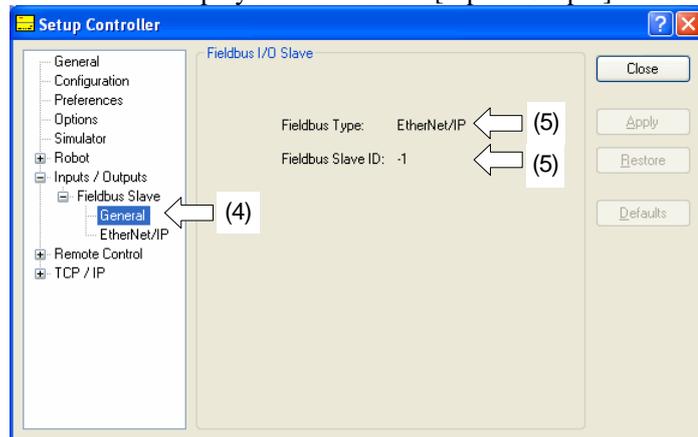
EtherNet/IP Confirmation and Configuration with EPSON RC+ 5.0

When EtherNet/IP board is installed to the Controller, it is recognized automatically. Confirm whether the EPSON RC+ 5.0 has recognized the EtherNet/IP board by the following procedure.

- (1) Select EPSON RC+ 5.0 menu-[Setup]-[Controller] to display the [Setup Controller] dialog.

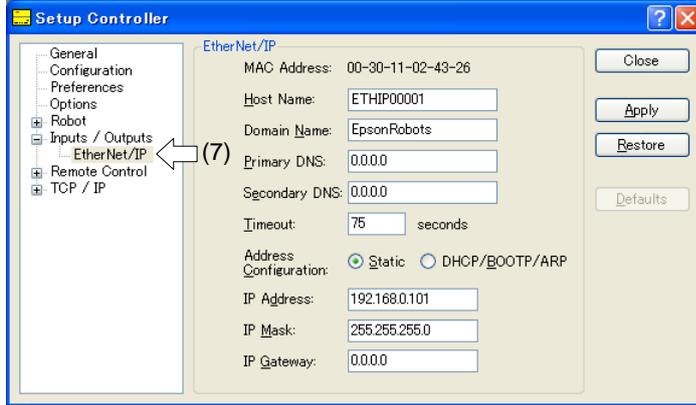


- (2) Select the [Inputs / Outputs].
- (3) Make sure that following is displayed.
Fieldbus-Installed : Yes
- (4) Click the "+" displayed on the left of [Input / Output] and select the [General].



- (5) Make sure that following are displayed.
Fieldbus type : EtherNet/IP
Fieldbus station ID : -1 (Fixed)

- (6) Click the “+” displayed on the left of [Input / Output] and select the [EtherNet/IP].



- (7) Set each item to the specific value to connect the Ethernet network. For information about the setting values, contact your network administrator. Address Configuration is set to “DHCP/BOOTP/ARP” at shipment.
- (8) When the configuration is completed, click the <Apply> button to apply the setting.
- (9) Click the <Close> button.



When Address Configuration is set to “DHCP/BOOTP/ARP”, the Controller waits for DHCP/BOOTP/ARP sever response for 30 seconds at Controller startup. When DHCP/BOOTP/ARP does not response within a time, the Controller stops the request to the DHCP/BOOTP/ARP server and waits ARP.

Operation

For details, refer to 12.3.9 Operation.

Electronic Information File (EDS file)

An EDS file is supplied for EtherNet/IP network configuration. The file is located in the following folder in the Manual Update CD that is attached to the Robot Controller.

\EpsonRC50\Fieldbus\EtherNet/IP

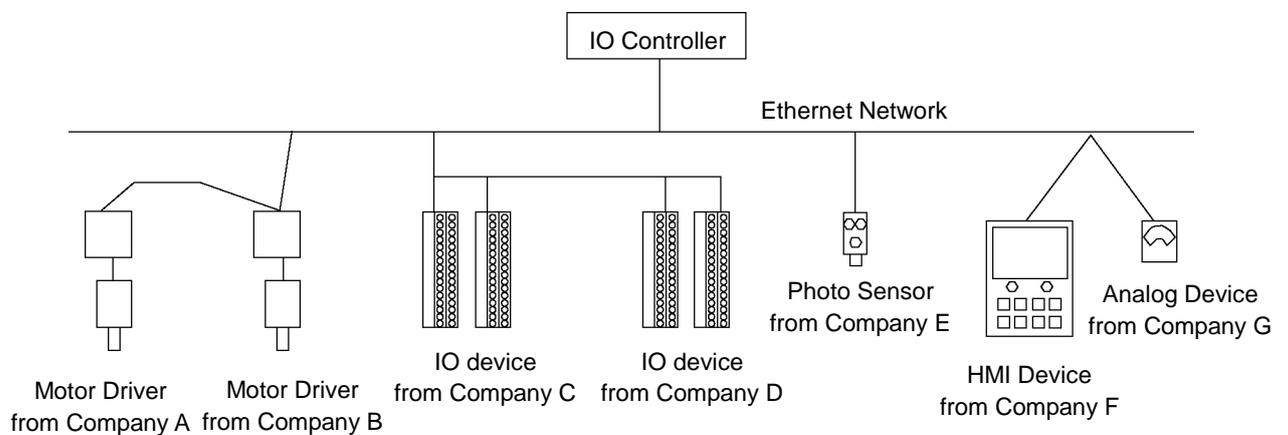
12.3.8 PROFINET

| | |
|---|--|
|  | <p>■ Make sure that the power is turned OFF before installing/removing any boards or connecting/disconnecting any cables. Installing/removing any boards or connecting/disconnecting any cables with the power ON is extremely hazardous and may result in electric shock and/or malfunction of equipment.</p> |
|---|--|

Overview of PROFINET

PROFINET is a fieldbus network using industrial Ethernet.

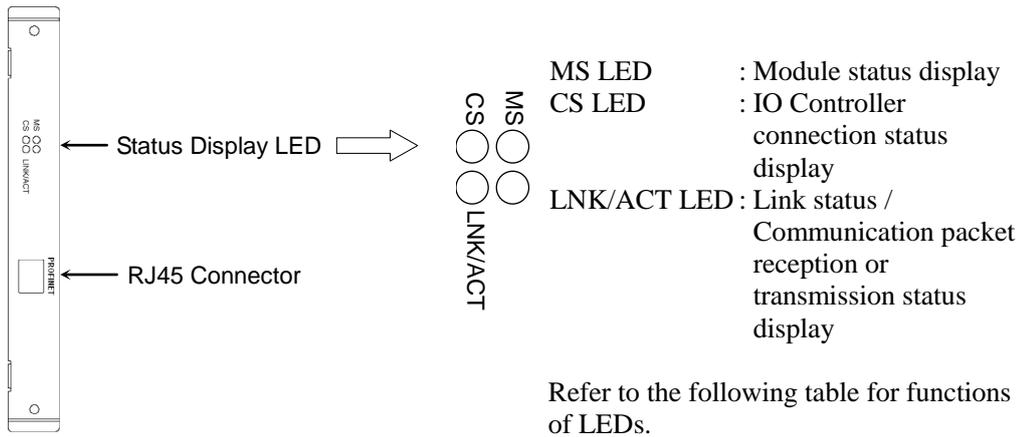
PROFINET was developed as an open communication standard to connect various field devices (sensor, actuator, robot controller, etc.). Because of the open communication standard, PROFIBUS DP can easily construct multi-vendor system with various devices developed around the world.



PROFINET Specifications

| Item | Specification |
|------------------------|---------------------------------------|
| Name | PROFINET board |
| Code | R12B040707 |
| Connection Method | RT (Real-Time) |
| Protocol | PROFINET IO |
| Device type | IO device |
| Baud Rates (bps) | 100M bps, full duplex |
| Maximum segment length | 100 m |
| Cable | RJ45 with connector 100BASE-TX (Cat5) |
| Cycle time | 2 ms |
| Interface | RJ45 port × 1 |
| Input Data Size | 256 bits (32 bytes) |
| Output Data Size | 256 bits (32 bytes) |

PROFINET Appearance



LED Description of PROFINET

LED status represents the status of the fieldbus board.

| LED status | | MS | CS | LNK/ACT |
|------------|---------------|--|---|---|
| OFF | | Power OFF or Device is being initialized | Offline | No link or Power OFF |
| GRN | ON | Normal operation | Offline IO controller is in RUN | Linking |
| | Blinking | - | - | Receiving/transmitting communication packet |
| | Blinking once | Evaluating | Offline / IO controller is in STOP | - |
| RED | Blinking | Blinking once | - | - |
| | | Blinking 3 times | No station name has been set or No IP address has been set | - |
| | | Blinking 4 times | Internal error | - |

Board Configuration (PROFINET)

PROFINET settings such as the communication setting are all configured by the development software (EPSON RC+ 5.0). You don't need to configure anything about PROFINET board.

Wiring (PROFINET)

PROFINET connector is RJ45 connector.

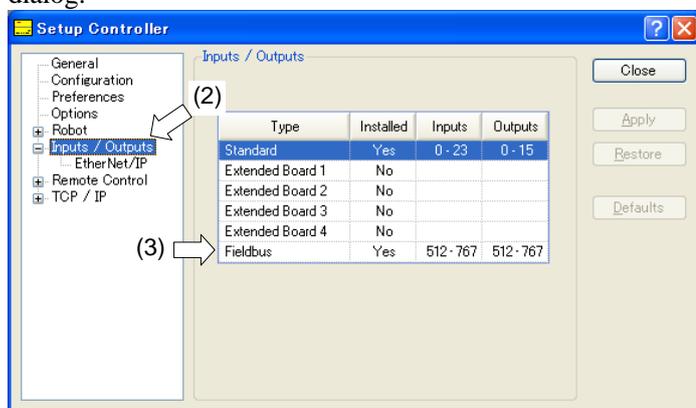
Use cable 100 BASE-TX (STP type).

| | |
|---|--|
|  CAUTION | <ul style="list-style-type: none"> Be sure to use cables and connectors complying with the industrial standards or noise resistant Ethernet cable (STP cable). If you use an office use product or UTP cable, it may cause communication errors and may not offer the proper performance. |
|---|--|

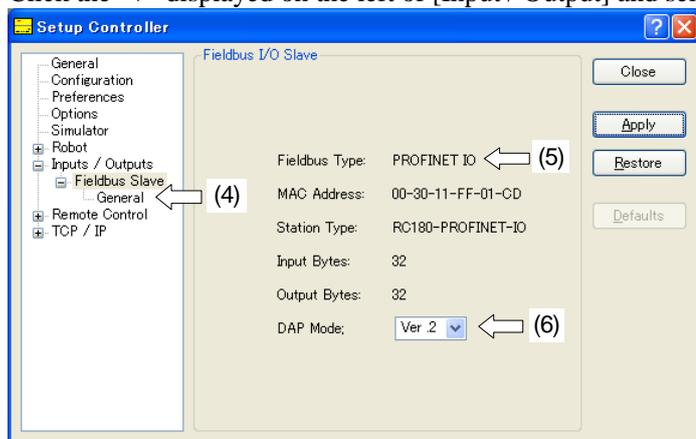
PROFINET Confirmation with EPSON RC+ 5.0

When PROFINET board is installed in the controller, it is recognized automatically. Confirm that EPSON RC+ 5.0 has recognized the board in the following procedure.

- (1) Select EPSON RC+ 5.0 menu-[Setup]-[Controller] to display the [Setup Controller] dialog.



- (2) Select the [Inputs / Outputs].
- (3) Make sure that following is displayed.
Fieldbus : Yes
- (4) Click the “+” displayed on the left of [Input / Output] and select the [General].



- (5) Make sure that following is displayed.
Fieldbus Type : PROFINET IO

- (6) Set the [MAC Address] according to the PROFINET IO controller that uses the DAP mode.
Usually, select DAP Ver.2. DAP Ver.1 is available for the obsolete PROFINET IO controller.

NOTE  The PROFINET option does not have the alert function that is an optional function in DAP Ver.2.

- (7) When the configuration is completed, click the <Apply> button and apply the settings.
- (8) Click the <Close> button.

Operation

For details, refer to *12.3.9 Operation*.

Electronic Information File (GSDML file)

A GSDML file is supplied for PROFINET network configuration. The file is located in the following folder in the Manual Update CD that is attached to the Robot Controller.

`\EpsonRC50\Fieldbus\PROFINET`

12.3.9 Operation (DeviceNet, PROFIBUS-DP, EtherNet/IP, PROFINET)

This section indicates how to use the Fieldbus I/O option after it has been installed. For details of CC-Link, also refer to *12.3.5 CC-Link – Operation (CC-Link)*.

SPEL+ Fieldbus I/O Commands

All the commands for the Fieldbus I/O are the same as the standard I/O. Bit numbers differ from standard I/O. There is no restriction for command use. Typical I/O commands are listed in the following table. For command details, refer to EPSON RC+ 5.0 *Online Help* or *SPEL+ Language Reference*.

| Command | Function |
|---------|---|
| In | Returns the status of the specified 8 bits input port. |
| InW | Returns the status of the specified 16 bits input port. |
| Off | Turns Off the specified output. |
| On | Turns On the specified output. |
| Out | Simultaneously sets 8 output bits. |
| OutW | Simultaneously sets 16 output bits. |
| Sw | Returns the specified input port status. |
| Wait | Waits until the specified input condition. |

NOTE  Response times for Fieldbus I/O can vary and depend on several factors, including baud rate, scan rate, number and types of devices, communication error, etc.

Outputs Off by Emergency Stop and Reset Instruction

You can configure the controller system so that all outputs including the fieldbus outputs will be turned off when the emergency stop occurs and when a Reset instruction is executed.

For details of the configuration, refer to *[Setup]-[Controller]-[Preference]* in *EPSON RC+ 5.0 User's Guide 5.12.2 Controller command (Setup Menu)*.

NOTE  A command that was issued just before an emergency stop can be executed after the emergency stop condition is cleared. If the outputs from the fieldbus involve risk, check the [Outputs off during Emergency Stop] box to remove all power to output devices when an emergency stop occurs.

Remote I/O Configuration

You can configure the controller system so that all I/O including the fieldbus will be set to remote function.

I/O setup for Fieldbus I/O is the default configuration.

NOTE  Setup for the Remote I/O can be changed by signal. Configuration with bits of standard I/O, expansion I/O and Fieldbus I/O is available.

| Input Signal | Bit No. | Input Signal | Bit No. |
|--------------|---------|---------------|---------|
| Start | 512 | ForcePowerLow | Not Set |
| SelProg1 | 513 | Reserved | Not Set |
| SelProg2 | 514 | ExtCmdSet | Not Set |
| SelProg4 | 515 | ExtRespGet | Not Set |
| Stop | 516 | ExtCmdReset | Not Set |
| Pause | 517 | Alive | Not Set |
| Continue | 518 | | |
| Reset | 519 | | |
| SetMotorsOn | 520 | | |
| SetMotorsOff | 521 | | |
| Home | 522 | | |

| Output Signal | Bit No. | Input Signal | Bit No. |
|---------------|---------|---------------|---------|
| Ready | 512 | InsideBox1 | Not Set |
| Running | 513 | InsideBox2 | Not Set |
| Paused | 514 | InsideBox3 | Not Set |
| Error | 515 | InsideBox4 | Not Set |
| EStopOn | 516 | InsideBox5 | Not Set |
| SafeguardOn | 517 | InsideBox6 | Not Set |
| SError | 518 | InsideBox7 | Not Set |
| Warning | 519 | InsideBox8 | Not Set |
| MotorsOn | 520 | InsideBox9 | Not Set |
| AtHome | 521 | InsideBox10 | Not Set |
| CurrProg1 | 522 | InsideBox11 | Not Set |
| CurrProg2 | 523 | InsideBox12 | Not Set |
| CurrProg4 | 524 | InsideBox13 | Not Set |
| AutoMode | 525 | InsideBox14 | Not Set |
| TeachMode | 526 | InsideBox15 | Not Set |
| PowerHigh | Not Set | InsidePlane1 | Not Set |
| ErrorCode1 | 527 | InsidePlane2 | Not Set |
| ErrorCode2 | 528 | InsidePlane3 | Not Set |
| ErrorCode4 | 529 | InsidePlane4 | Not Set |
| ErrorCode8 | 530 | InsidePlane5 | Not Set |
| ErrorCode16 | 531 | InsidePlane6 | Not Set |
| ErrorCode32 | 532 | InsidePlane7 | Not Set |
| ErrorCode64 | 533 | InsidePlane8 | Not Set |
| ErrorCode128 | 534 | InsidePlane9 | Not Set |
| ErrorCode256 | 535 | InsidePlane10 | Not Set |
| ErrorCode512 | 536 | InsidePlane11 | Not Set |
| ErrorCode1024 | 537 | InsidePlane12 | Not Set |
| ErrorCode2048 | 538 | InsidePlane13 | Not Set |
| ErrorCode4096 | 539 | InsidePlane14 | Not Set |
| ErrorCode8192 | 540 | InsidePlane15 | Not Set |
| | | Reserved | Not Set |
| | | Alive | Not Set |
| | | ExtCmdGet | Not Set |
| | | ExtRespSet | Not Set |
| | | ExtCmdResult | Not Set |
| | | ExtError | Not Set |

Explicit Message Connection (for DeviceNet, EtherNet/IP)

Issuing an Explicit message from DeviceNet / EtherNet/IP master unit to the RC180 controller acquires and configures the DeviceNet / EtherNet/IP I/O area.

Supported function and Class ID configurations are as follows:

When using Assembly Object Class (Class ID = 4)

| Function | Class ID | Instance | Service Code |
|----------------------|----------|-----------|--------------|
| Input acquisition | 4 (04h) | 100 (64h) | 14 (0Eh) |
| Output configuration | 4 (04h) | 150 (96h) | 16 (10h) |
| Output acquisition | 4 (04h) | 150 (96h) | 14 (0Eh) |

When using I/O Data Mapping Object Class (Class ID = 160, 161)

| Function | Class ID | Instance | Service Code |
|----------------------|-----------|----------|--------------|
| Input acquisition | 160 (A0h) | 01 (01h) | 14 (0Eh) |
| Output configuration | 161 (A1h) | 01 (01h) | 16 (10h) |
| Output acquisition | 161 (A1h) | 01 (01h) | 14 (0Eh) |

Command response

It can acquire 32 bytes input/output data.

12.4 RS-232C Board

12.4.1 About the RS-232C Board

A standard RS-232C port is not available with the Controller. An RS-232C option board must be added.

Mount the RS-232C board in the option unit to communicate with external equipment with RS-232C.

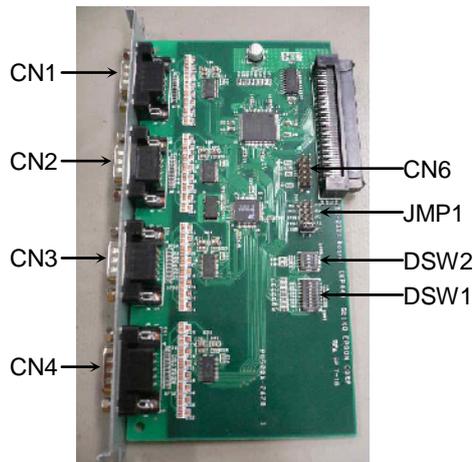
The RS-232C option accepts four ports expansion per board. A maximum of two boards, eight ports expansion is available for RS-232C board.

Port numbers are assigned as follows.

| Port No. | Supported hardware |
|----------|----------------------|
| #1 to #4 | First RS-232C board |
| #5 to #8 | Second RS-232C board |

12.4.2 Board Setup (RS-232C)

Board Appearance



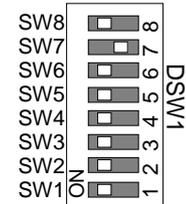
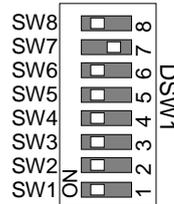
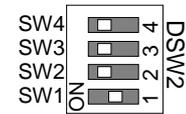
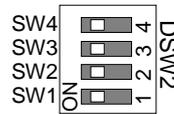
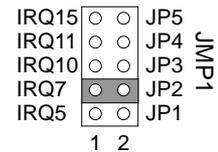
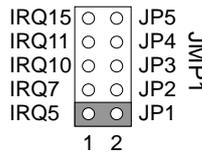
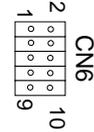
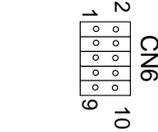
Switch and Jumper Configuration

Set DSW1, DSW2 and JMP1.

CN6 is all open.

1st board

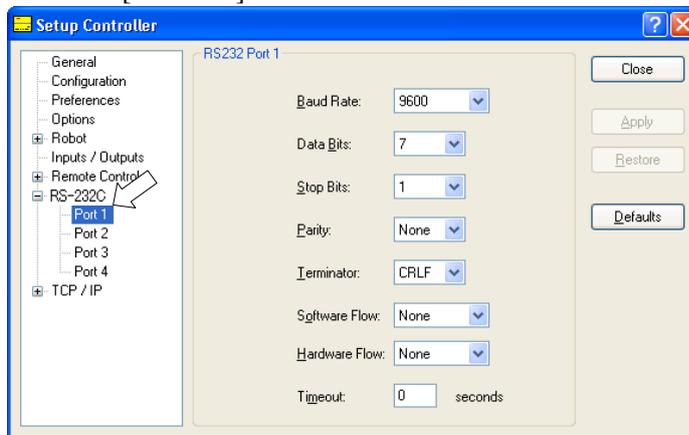
2nd board



12.4.3 Verify with EPSON RC+ 5.0 (RS-232C)

When an RS-232C board is mounted in as option unit, the Controller software automatically identifies the RS-232C board. Therefore, no software configuration is needed. Correct identification can be confirmed from EPSON RC+ 5.0.

- (1) Select the EPSON RC+ 5.0 menu-[Setup]-[Controller] to display the [Setup Controller] dialog.
- (2) Select the [RS-232C].



If no RS-232C board is identified, RS-232C will not be displayed.

If RS-232C is displayed, then the Controller software identified the RS-232C board. Communication with external equipment is available.

12.4.4 RS-232C Software Communication Setup (RS-232C)

Available communication settings are as follows.

| Item | Specification |
|-----------------|---|
| Baud Rates | 110, 300, 600, 1200, 2400, 4800, 9600, 14400, 19200, 38400, 57600, 115200 |
| Data bit length | 7, 8 |
| Stop bit length | 1, 2 |
| Parity | Odd, even, NA |
| Terminator | CR, LF, CRLF |

Refer to *EPSON RC+ 5.0 Online Help* or *11. RS-232C Communications* for RS-232C communication from the Robot application.

12.4.5 Communication Cable (RS-232C)

Prepare a communication cable as described in this section.

| Connector | Standard |
|--|--|
| RS-232C Connector (Controller side) | D-sub 9 male pin Mounting style #4 - 40 |



Use twisted pair cable for shielded wire.

Clamp the shield to the hood for noise prevention.

Pin assign of the RS-232C connector is as follows.

| Pin No | Signal | Function | Signal Direction |
|--------|--------|---------------------|------------------|
| 1 | DCD | Data carrier detect | Input |
| 2 | RXD | Receive data | Input |
| 3 | TXD | Send data | Output |
| 4 | DTR | Terminal ready | Output |
| 5 | GND | Signal ground | - |
| 6 | DSR | Data set ready | Input |
| 7 | RTS | Request to send | Output |
| 8 | CTS | Clear to send | Input |
| 9 | RI | Ring indicator | Input |

Maintenance

This section contains maintenance procedures for the Robot Controller.

1. Safety Precautions on Maintenance

1.1 Safety Precautions



WARNING

- Only authorized personnel who have taken the safety training should be allowed to execute teaching or calibration of the robot system.

The safety training is the program for industrial robot operator that follows the laws and regulations of each nation. The personnel who have taken the safety training acquire knowledge of industrial robots (operations, teaching, etc.).

The personnel who have completed the robot system-training class held by the manufacturer, dealer, or locally-incorporated company are allowed to maintain the robot system.

- Only authorized personnel who have taken the safety training should be allowed to maintain the robot system.

The safety training is the program for industrial robot operator that follows the laws and regulations of each nation.

The personnel who have taken the safety training acquire knowledge of industrial robots (operations, teaching, etc.), knowledge of inspections, and knowledge of related rules/regulations.

The personnel who have completed the robot system-training and maintenance-training classes held by the manufacturer, dealer, or locally-incorporated company are allowed to maintain the robot system.

Make sure to use only dedicated/specified maintenance parts especially for the optional boards or any other parts in the Controller to be replaced. Using non-specified parts may cause serious damage to the robot system and/or serious safety problems.

- Do not remove any parts that are not covered in this manual. Follow the maintenance procedure strictly as described in this manual. Do not proceed using any methods other than described in this manual when you do replace a part or maintain the equipment. Improper removal of parts or improper maintenance may cause not only improper function of the robot system but also serious safety problems.



WARNING

- Before performing any maintenance procedure, always make sure that the main power of the Controller is turned OFF, unplug the power supply, and that the high voltage charged area is completely discharged. Performing any maintenance procedure while the main power is ON or the high voltage charged area isn't discharged completely is extremely hazardous and may result in electric shock and/or cause serious safety problems.

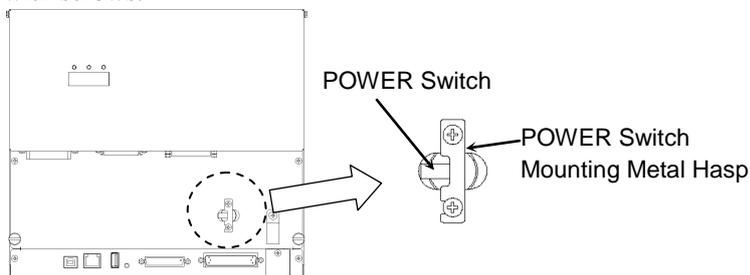
| | |
|--|--|
|  CAUTION | <ul style="list-style-type: none"> ■ Do not touch the Motor Driver modules, Switching Power Supply, and Regeneration Module directly in the Controller. The metal resistance of these can become very hot and may result in a burn. If you maintain them, examine the surface temperatures and wear protective gloves if necessary. ■ Do not shock, shake, or drop any parts during maintenance. When the parts related with data are shocked physically, they may be damaged and may also cause data loss during data loading/saving. ■ Do not lose the screws removed at maintenance. When the screw is dropped into the Controller, be sure to take it out. Leaving the screw in the Controller may cause short circuit and may result in equipment damage to the parts and/or robot system. ■ Make sure that the power rating (wattage) of a new Motor Driver module is correct. Using a Motor Driver module with improper power rating (wattage) in the Controller may cause improper function of the robot system and errors. ■ The serial number of the Manipulator that should be connected is indicated on the Connection Check Label on the Controller. Connect the Controller and the Manipulator correctly. Improper connection between the Controller and the Manipulator may cause not only improper function of the robot system but also serious safety problems. |
|--|--|

NOTE  Before performing maintenance on the Controller, all the data must be copied as a backup. The details of data backup/restore are described in the *Maintenance 4. Backup and Restore*.

1.2 Lockout / Tagout

Lockout / tagout is a method to prevent any one from turning ON the robot system by mistake while someone else is within the safeguarded area for maintenance or repair. When performing maintenance and repair, lockout and tagout using the following procedure.

- (1) Turn OFF the POWER switch.
- (2) Secure the POWER switch mounting metal hasp in the POWER switch OFF position with screws.



- (3) Unplug the power supply plug of the Controller from the power supply socket.
- (4) Attach a note to the POWER switch or the power supply plug to prevent any one from turning ON the robot system by mistake.

RC180-UL:

For maintenance and repair, make sure to lockout and tagout the external disconnecting means.

2. Regular Maintenance Inspection

Performing regular maintenance inspection properly is essential for preventing trouble and maintaining safety. This chapter describes the schedules for maintenance inspection and procedures.

Be sure to perform the maintenance inspections in accordance with the schedules.

2.1 Schedule for Maintenance Inspection

Inspection points are divided into five stages: daily, monthly, quarterly, biannual, and annual. Inspection points are added at every stage.

If the robot system is operated for 250 hours or more per month, inspection points must be added every 250 hours, 750 hours, 1500 hours, and 3000 hours operation.

| | Inspection Point | | | | |
|--------------------|-------------------|--------------------|----------------------|---------------------|-------------------|
| | Daily inspection | Monthly inspection | Quarterly inspection | Biannual inspection | Annual inspection |
| 1 month (250 h) | Inspect every day | ✓ | | | |
| 2 months (500 h) | | ✓ | | | |
| 3 months (750 h) | | ✓ | ✓ | | |
| 4 months (1000 h) | | ✓ | | | |
| 5 months (1250 h) | | ✓ | | | |
| 6 months (1500 h) | | ✓ | ✓ | ✓ | |
| 7 months (1750 h) | | ✓ | | | |
| 8 months (2000 h) | | ✓ | | | |
| 9 months (2250 h) | | ✓ | ✓ | | |
| 10 months (2500 h) | | ✓ | | | |
| 11 months (2750 h) | | ✓ | | | |
| 12 months (3000 h) | | ✓ | ✓ | ✓ | ✓ |
| 13 months (3250 h) | | ✓ | | | |
| ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

2.2 Inspection Point

2.2.1 Inspection While the Controller is Turned OFF

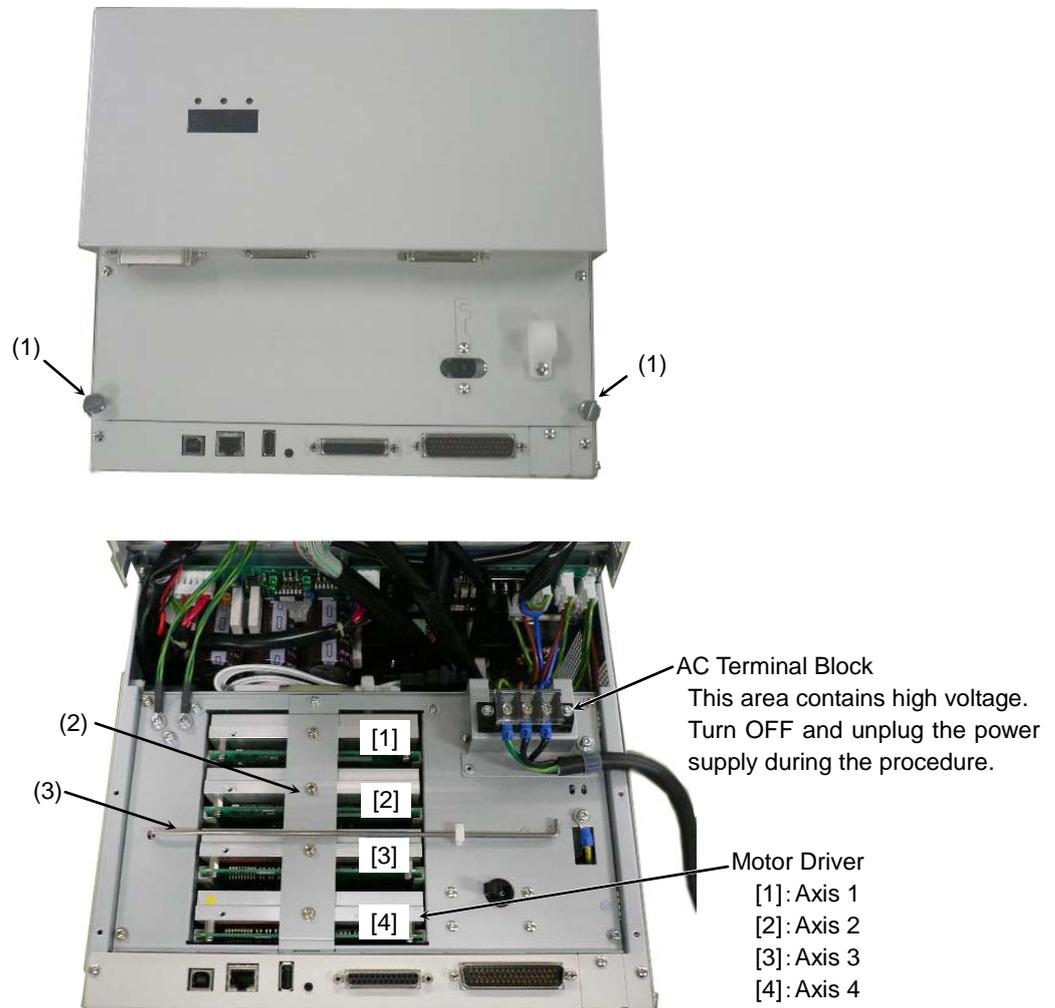
| Inspection Point | Inspection Location | Daily | Monthly | Quarterly | Biannual | Annual |
|--|--|--------------|---------|-----------|----------|--------|
| Visually check for external defects. Clean up if necessary. | External appearance of Controller | ✓ | ✓ | ✓ | ✓ | ✓ |
| Clean the fan filter | Fan filter on the side of the Controller | | ✓ | ✓ | ✓ | ✓ |
| Battery | Front side | Ever 5 years | | | | |

2.2.2 Inspection While the Controller is Turned ON

| Inspection Point | Inspection Location | Daily | Monthly | Quarterly | Biannual | Annual |
|--|-------------------------|---------------------------|---------|-----------|----------|--------|
| Check whether unusual sound or vibration is occurring. | Entire Controller | ✓ | ✓ | ✓ | ✓ | ✓ |
| Make a backup of data. | Project and system data | Whenever data is changed. | | | | |

3. Controller Structure

3.1 Location of Parts



(1) Thumb Head screws

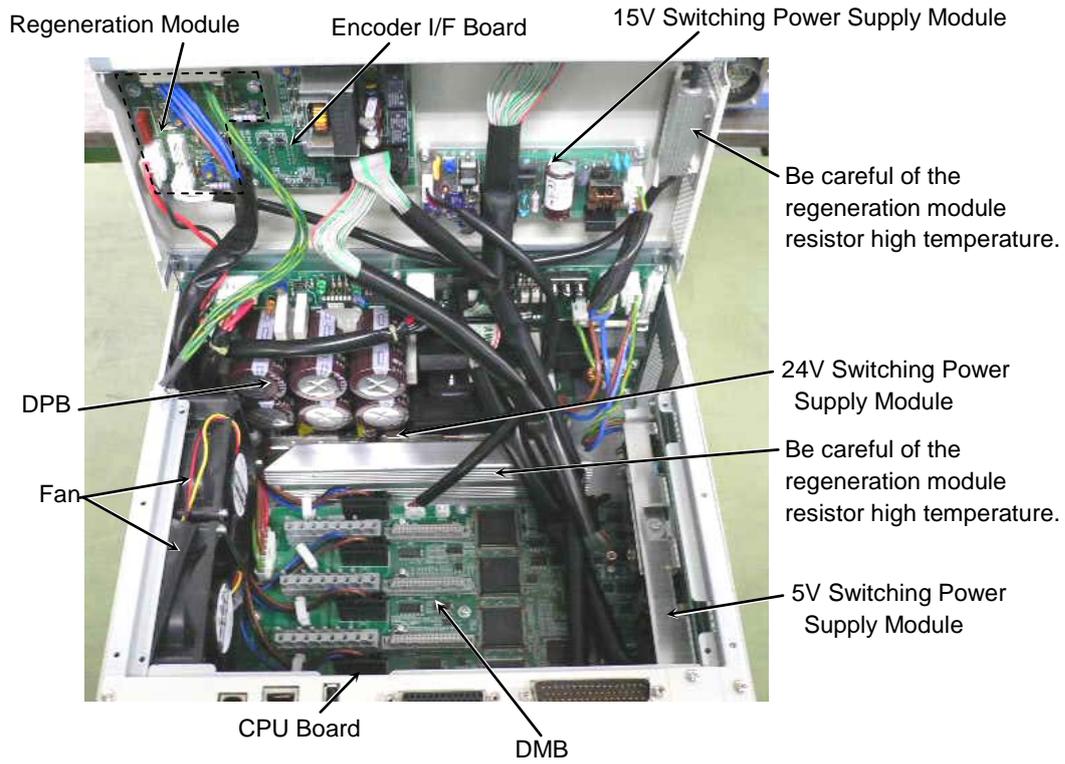
These are two of the four screws used to mount the front cover of the Controller. These screws are also used to pull out the Motor Driver module and CPU board unit.

(2) Motor Driver Mounting Bracket

This is a bracket is used to secure the four motor drives. Make sure that each Motor Driver is connected properly and then mount the bracket. Improper connection may cause not only improper function of the robot system but also safety problems.

(3) Front Side Supporting Bar

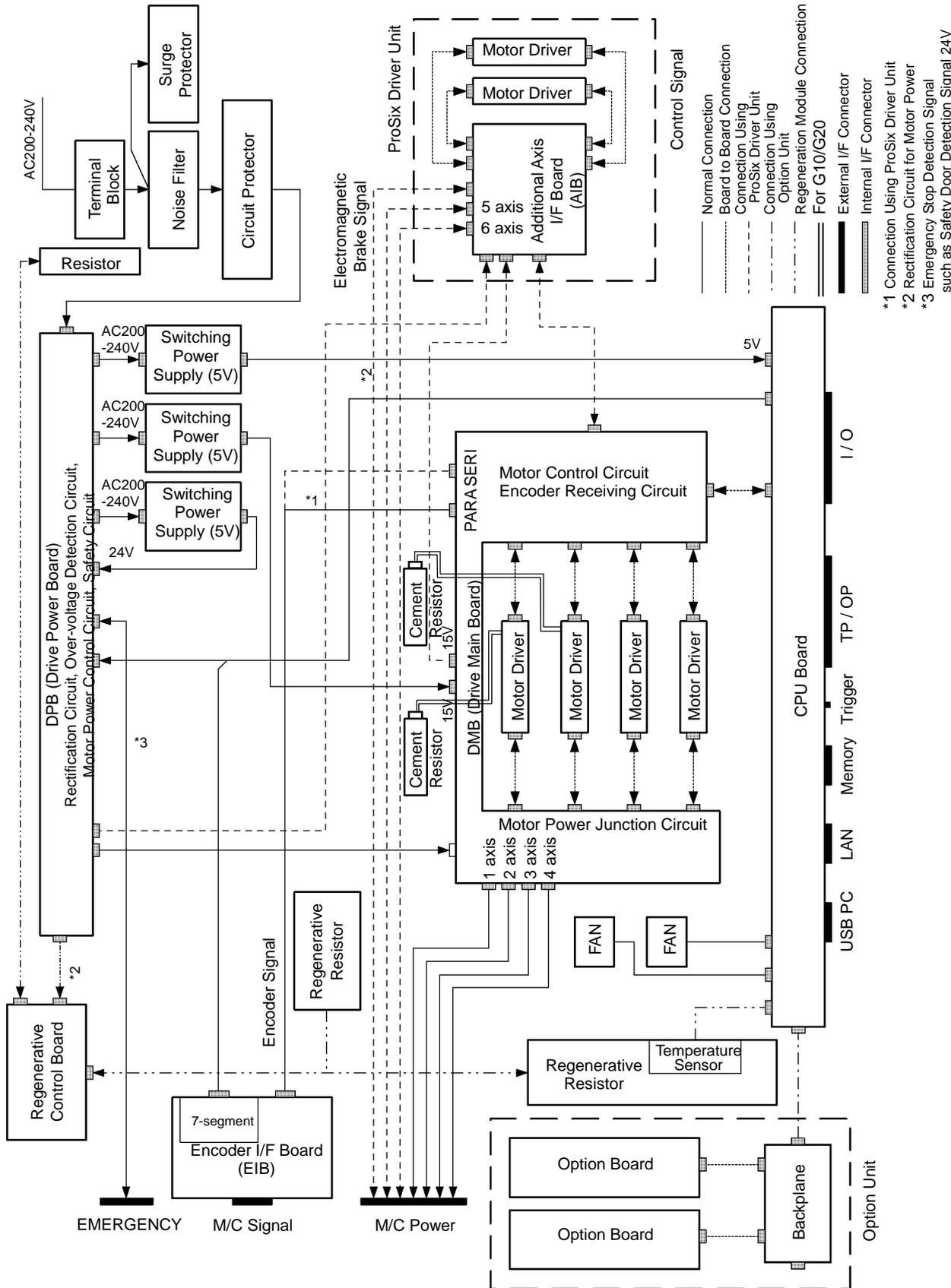
This supporting bar is used to hold the front cover open. Make sure that the supporting bar is in the proper position.



3.2 Diagram of Cable Connections

For the electrical connections of the Controller, refer to the following diagram.

RC180

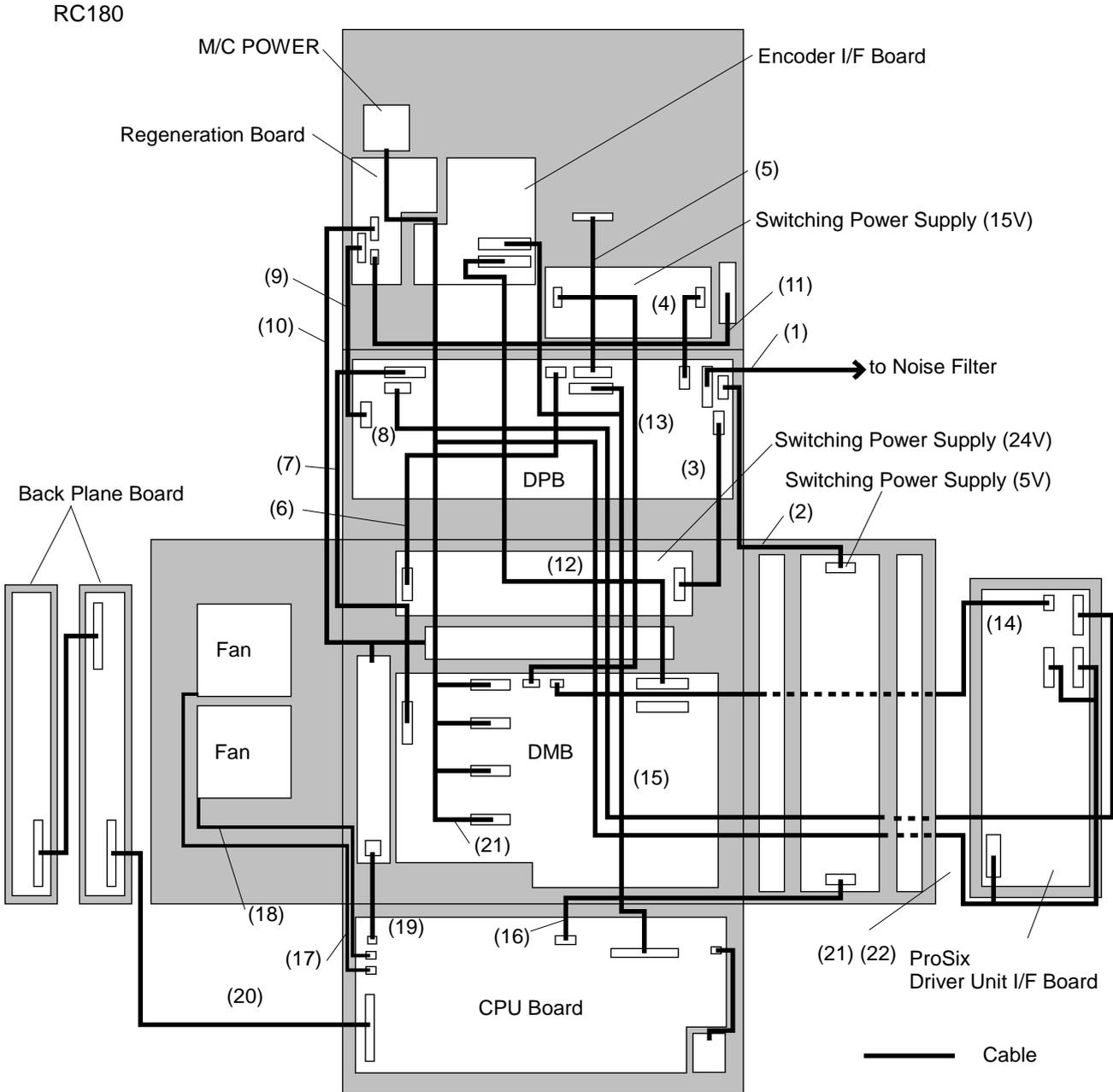


Cable Layout Drawing

For cable connections inside the Controller, refer to the following figure.

This diagram is a simplified development view inside the Controller.

The numbers indicated such as (1), (2), (3) correspond to the following cable list.



RC180 Cable List

| Cable No. | Connection | Connector Pin Quantity | Wire Quantity | Connector Pin Quantity | Connection | Note |
|-----------|--------------------|--|----------------|--|-------------------------------------|------|
| (1) | DPB | 8  | 6 | – | Noise Filter | |
| (2) | DPB | 5  | 3 | 5  | Switching Power Supply (5V) | |
| (3) | DPB | 5  | 3 | 5  | Switching Power Supply (24V) | |
| (4) | DPB | 5  | 3 | 5  | Switching Power Supply (15V) | |
| (5) | DPB | 26 | 26<F> | 25(D-SUB) | EMERGENCY | |
| (6) | DPB | 4  | 4 | 8  | Switching Power Supply (24V) | |
| (7) | DPB | 8  | 6 | 8  | DMB | |
| (8) | DPB | 5  | 3 | 5  | ProSix Driver Unit I/F Board | *1 |
| (9) | DPB | 5  | 2 | 5  | Regeneration Board | |
| (10) | Regeneration Board | 4  | 2 | – | Regeneration Resistance | |
| (11) | Regeneration Board | 3  | 2 | – | Resistance | |
| (12) | DMB | 34 | 34<F> | 34 | Encoder I/F Board | |
| (13) | DMB | 4  | 4 | 4  | Switching Power Supply (15V) | |
| (14) | DMB | 2  | 2 | 2  | ProSix Driver Unit I/F Board | *1 |
| (15) | CPU Board | 50 | 34<F> 16<F> | 34 16 | DPB Encoder I/F Board | |
| (16) | CPU Board | 4  | 4 | 4  | Switching Power Supply (5V) | |
| (17) | CPU Board | 3 | 3 | – | Fan | |
| (18) | CPU Board | 3 | 3 | – | Fan | |
| (19) | CPU Board | 2 | 2 | – | Temperature Sensor | |
| (20) | CPU Board | 80 | 80<F> | 80 | Back Plane Board | *3 |
| (21) | M/C POWER | 50 | 16 | 4,4,4,4 | DMB | |
| (22) | M/C POWER | 50 | 16 14 | 4,4,4,4 4,4,8 | DMB ProSix Driver Unit I/F Board | *1 |

<F> Flat cable

*1 When connected to ProSix Driver unit

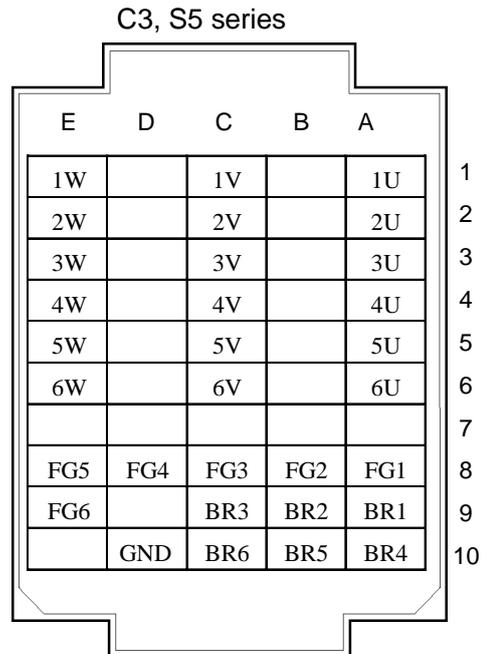
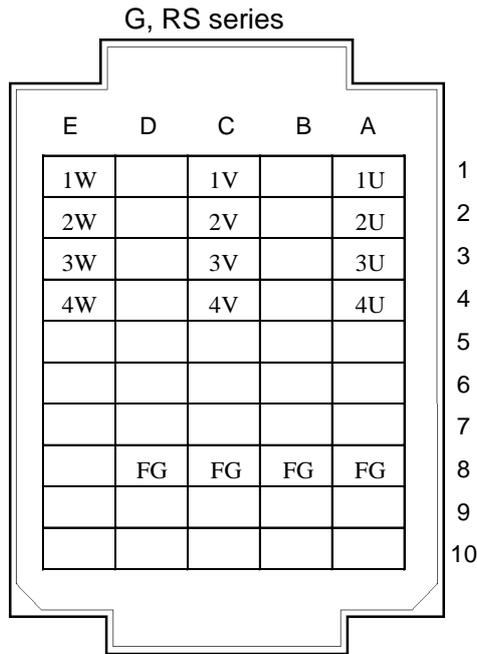
*3 When connected to Option unit

3.3 Connector Pin Assignment

Pin assignments differ depending on the manipulator type.

The following tables show the pin assignments for the M/C power connector and M/C signal connector. For EMERGENCY and TP/OP connectors, refer to *Setup & Operation*.

3.3.1 M/C Power Connector



3.3.2 M/C Signal Connector

| | G, RS | C3, S5 | | G, RS | C3, S5 |
|----|---------|---------|----|---------|---------|
| 1 | - | - | 26 | ENC_GND | ENC_GND |
| 2 | 1S+ | 1S+ | 27 | 1S- | 1S- |
| 3 | 2S+ | 2S+ | 28 | 2S- | 2S- |
| 4 | 3S+ | 3S+ | 29 | 3S- | 3S- |
| 5 | ENC_5V | ENC_5V | 30 | - | EMC_PWR |
| 6 | ENC_GND | ENC_GND | 31 | - | ENC_GND |
| 7 | 4S+ | 4S+ | 32 | 4S- | 4S- |
| 8 | - | 5S+ | 33 | - | 5S- |
| 9 | - | 6S+ | 34 | - | 6S- |
| 10 | ENC_5V | ENC_5V | 35 | - | ENC_5V |
| 11 | ENC_GND | ENC_GND | 36 | - | ENC_GND |
| 12 | - | - | 37 | - | - |
| 13 | - | - | 38 | - | - |
| 14 | - | - | 39 | - | - |
| 15 | ENC_5V | ENC_5V | 40 | - | - |
| 16 | ENC_GND | ENC_GND | 41 | - | - |
| 17 | - | - | 42 | - | - |
| 18 | - | - | 43 | - | - |
| 19 | - | - | 44 | - | - |
| 20 | ENC_5V | ENC_5V | 45 | - | - |
| 21 | - | - | 46 | - | - |
| 22 | MPOWER | MPOWER | 47 | - | - |
| 23 | EMB_J3 | - | 48 | - | - |
| 24 | - | - | 49 | 24V | 24V |
| 25 | - | 24VGND | 50 | 24VGND | 24VGND |

4. Backup and Restore

4.1 What is the Backup Controller Function?

The controller configuration set by EPSON RC+ 5.0 can be stored with the “Backup Controller” function.

The Controller settings can be restored easily using the data previously stored with “Backup Controller” after a configuration mistake or Controller problem.

Be sure to execute “Backup Controller” before changing the Controller setup, before maintenance, or after teaching.

For some problems, backup may not be available before maintenance has to be performed. Be sure to backup the data after making changes, before problems occur.



“Controller Status Storage” is one of the RC180 functions. It saves the Controller setup data the same as with “Backup Controller,” and additional data such as the Controller status.

There data can be used as the backup data at restoring.

The methods for “Controller Status Storage” are as follows:

- A : “Controller status storage to USB memory”
For details, refer to *Setup & Operation 6. Memory Port*.
- B : “Export Controller Status function” in EPSON RC+ 5.0.
For details, refer to *EPSON RC+ 5.0 User’s Guide 5.9.9 Import Command (Project Menu)*.

4.2 Backup Data Types

The table below shows the files created with “Backup Controller”.

| File Name | Overview | |
|------------------------------------|------------------------------|---|
| Backup.txt | Information file for restore | File including information for restoring the Controller. |
| CurrentMnp01.PRM | Robot parameters | Stores information such as TlSet. |
| InitFileSrc.txt | Initial configuration | Stores various Controller parameters. |
| MCSys01.MCD | Robot configuration | Stores connected Robot information. |
| All the files related to Project * | Project related | All the project files transferred to the Controller. Includes program files when EPSON RC+ 5.0 is configured to transfer source code to the Controller. |
| GlobalPreserves.dat * | Global Preserve variables | Saves values of Global Preserve variables. |

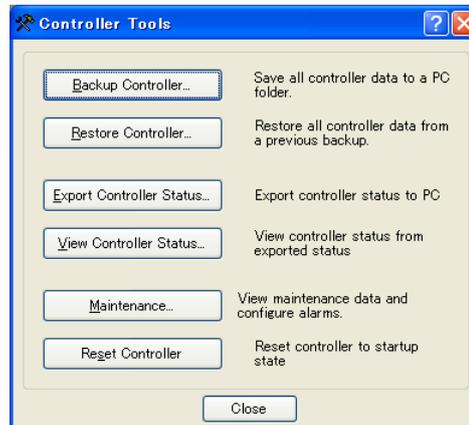
* If the version of the Controller firmware is Ver.1.0.*.*, project related data and GlobalPreserves.dat are not stored.

4.3 Backup

Backup the Controller status from the Teach Pendant (Option) or EPSON RC+ 5.0.

4.3.1 Backup from EPSON RC+ 5.0

- (1) Select EPSON RC+ 5.0 menu-[Tools]-[Controller] to display the [Controller Tools] dialog.



- (2) Click the <Backup Controller...> button to display the [Browse For Folder] dialog.



- (3) Specify the folder to save the backup data. Create a new folder if desired.
- (4) Click the <OK> button. A folder is created in the specified folder containing the backup data with a name in the following format.
B_ serial number_date status was saved
→ Example: B_12345_200608074410
- (5) The following message appears when backup is completed.



- (6) Click the <OK> button to complete the backup.



CAUTION

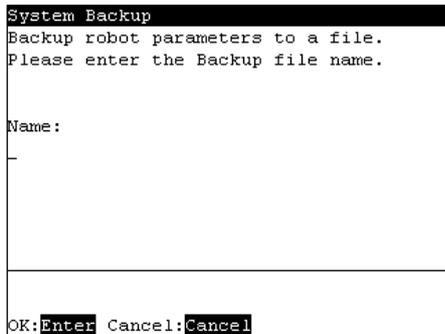
- Do not edit the backup files. Otherwise, operation of the robot system after data restoration to the Controller is not assured.

4.3.2 Backup from the Teach Pendant TP1 (Option)

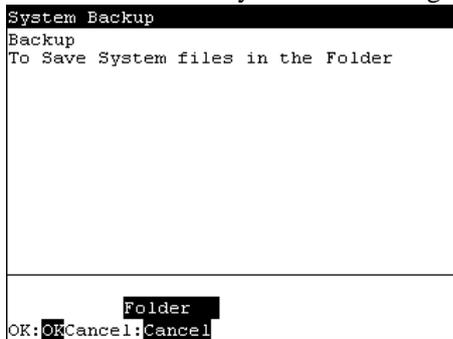
Backs up system files in the Controller to USB memory. (Only TP1. TP2 does not support this function.)

- (1) Insert the USB memory into the Controller.
- (2) In the [Programming] screen, move the cursor to [System Backup...], and press the <OK> key. The following screen appears.

Enter the file name.



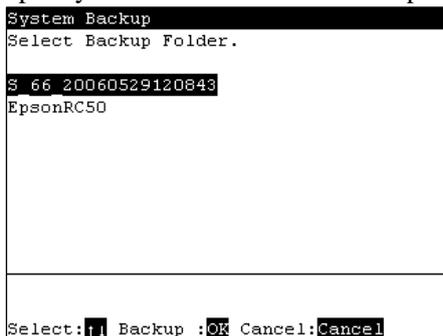
- (3) Press the <Enter> key. The following screen appears.



<OK> When the <OK> key is pressed without specifying a folder, the backup files are stored in a subfolder of the USB memory root folder.

- (4) Press the <F2> key. The following screen appears.

Specify the folder to save the backup data.



- (5) Press the <OK> key. The following screen appears.

```

System Backup
Backup
To Save System files in the Folder

Folder
OK:OKCancel:Cancel

```

- (6) Press the <OK> key to execute the system backup.

When a file of the same name already exists, the following screen appears.

```

System Backup
SYS
file already exist.
Overwrite?

Yes No
Cancel:Cancel

```

<F1> Overwrites the file.

<F2> Moves to the [Programming] screen.

- (7) After execution has completed, the following screen appears.

```

System Backup

Backup completed successfully.

OK:OK

```



CAUTION

- Do not edit the backup files. Otherwise, operation of the robot system after data restoration to the Controller is not assured.

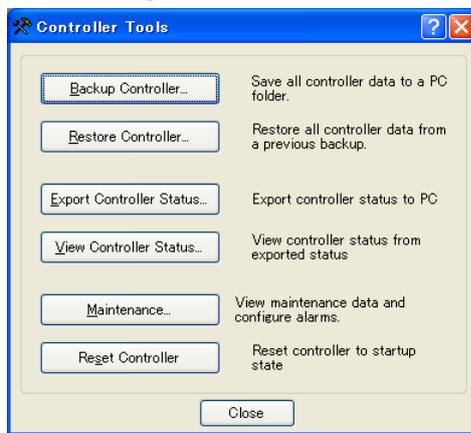
4.4 Restore

Restore the Controller status from the Teach Pendant (Option) or EPSON RC+ 5.0.

4.4.1 Restore from EPSON RC+ 5.0

| | |
|---|---|
|  CAUTION | <ul style="list-style-type: none"> ■ Make sure that the data used for restore was saved previously for same Controller. ■ Do not edit the backup files. Otherwise, operation of the robot system after data restoration to the Controller is not assured. |
|---|---|

- (1) Select the EPSON RC+ 5.0 menu-[Tools]-[Controller] to display the [Controller Tools] dialog.



- (2) Click the <Restore Controller...> button to display the [Browse For Folder] dialog.



- (3) Specify the folder that contains the backup data. Backup data folders are named using the following format:

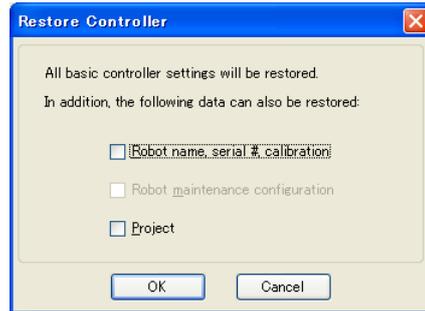
B_serial number_date status was saved
 → Example: B_12345_200608074410



Data saved with the Controller status storage function can also be specified for restore.

Specify the following folder.
 S_serial number_date status was saved
 → Example: S_12345_200608074410

- (4) Click the <OK> button to display the dialog to select the restore data.



Robot name, serial #, calibration

This checkbox allows you to restore the robot name, robot serial number, Hofs data, and CalPIs data. Make sure that the correct Hofs data is restored. If the wrong Hofs data is restored, the robot may move to wrong positions.

The default setting is unchecked.

Robot maintenance configuration

This checkbox allows you to restore the parts consumption data.

For details, refer to *Appendix. Alarm*.

The parts consumption management is available for the following Manipulator types:

G series (G1, G3, G6, G10, G20)

RS series (RS3, RS4)

The default setting is unchecked.

Project

This checkbox allows you to restore the files related to projects.

The default is unchecked.

When a project is restored, the values of Global Preserve variables are loaded.

For details about Global Preserve variable backup, refer to *EPSON RC+ 5.0 User's Guide 5.10.10 Display Variables Command (Run Menu)*.



If the version of the Controller firmware is Ver.1.0.*.*, or the version of EPSON RC+ 5.0 Ver.5.0.*, this dialog does not appear. Robot name, serial number, and calibration data is always restored.

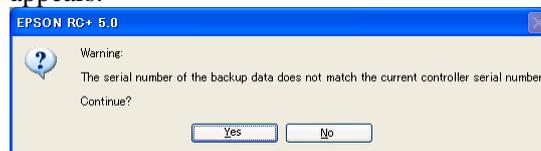
The project is not restored.

- (5) Click the <OK> button to restore the system information.



Restore the system configuration saved using Backup Controller only for the same system.

When different system information is restored, the following warning message appears.



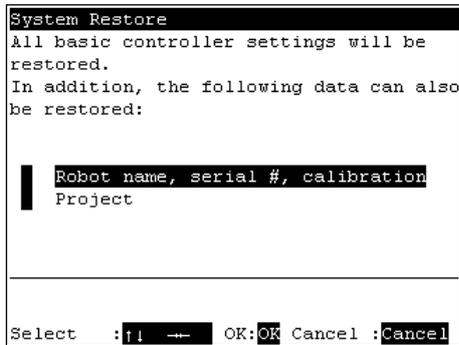
Click the <No> button (do not restore data) except for special situations such as controller replacement.

4.4.2 Restore from Teach Pendant TP1 (Option)

| | |
|---|---|
|  CAUTION | <ul style="list-style-type: none"> ■ Make sure that the data used for restore was saved previously for same Controller. ■ Do not edit the backup files. Otherwise, operation of the robot system after data restoration to the Controller is not assured. |
|---|---|

Restores system files backed up in USB memory to the Controller. (Only TP1. TP2 does not support this function.)

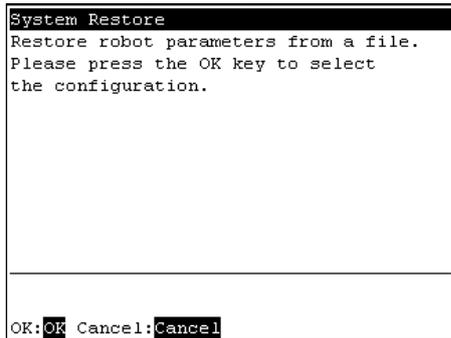
- (1) Insert the USB memory into the Controller.
- (2) In the [Program Mode] screen, move the cursor to [7 System Restore...], and press the <OK> key.
- (3) The following screen appears.



When you restore the robot name, serial number, and the calibration data with the basic Controller settings, move the cursor to [Robot name, serial #, calibration] and press the <-> key.

When you restore the project with the basic Controller settings, move the cursor to [Project] and press the <-> key.

- (4) Press the <OK> key
- (5) The following screen appears. Press the <OK> key.



- (6) The following screen appears. Move the cursor to the desired folder.

Press the <Enter> key.

```
System Restore
Select Backup files.

RC170
B_00000_20060711125450
B_00000_20060530144013
B_00000_20060711125512
B_00000_20060912094421

Select: ↑↓ Restore: OK Down: ENTER
```

- (7) The following screen appears. Press the <F1> key to start the restore.

```
System Restore

/B_00000_20060912094421

Ready to restore system files.
Continue?

Yes No
Cancel: Cancel
```

When the Controller serial number does not match the serial number of the selected Controller setting data, the following screen appears. To continue, press the <F1> key.

```
System Restore
Warning:
The serial number of the backup data
does not match the current controller
serial number.
Continue?

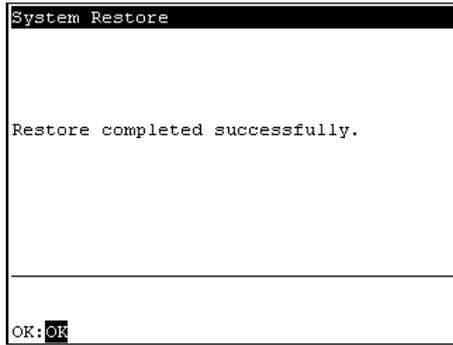
Yes No
Cancel: Cancel
```

When the Controller system software version does not match the version of the selected Controller setting data, the following screen appears. To continue, press the <F1> key.

```
System Restore
Warning:
The version number of the backup data
does not match the current controller
version.
Continue?

Yes No
Cancel: Cancel
```

- (8) After execution is completed, the following screen appears.
Press the <OK> key and the Controller reboots.



5. Firmware Update

This chapter describes the firmware upgrade procedure and data file initialization when firmware or Robot configuration errors cause Controller startup or operation failure.

5.1 Updating Firmware

Firmware (software stored in non-volatile memory) and data files necessary to control the Controller and the Robot are preinstalled in the Controller. Controller configuration set from EPSON RC+ 5.0 is always saved in the Controller.

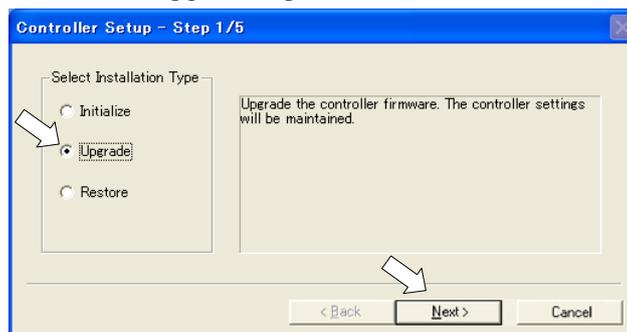
Controller firmware is supplied by CD-ROM as needed. Please contact us for information.

You must use a PC running EPSON RC+ 5.0 connected to a Controller with USB to update the Controller firmware. Firmware cannot be updated with an Ethernet connection.

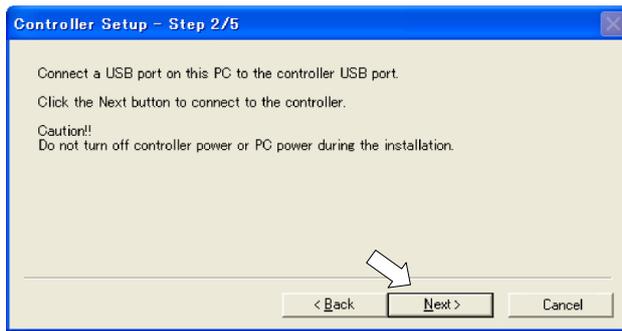
5.2 Firmware Upgrade Procedure

The firmware upgrade procedure is described as follows:

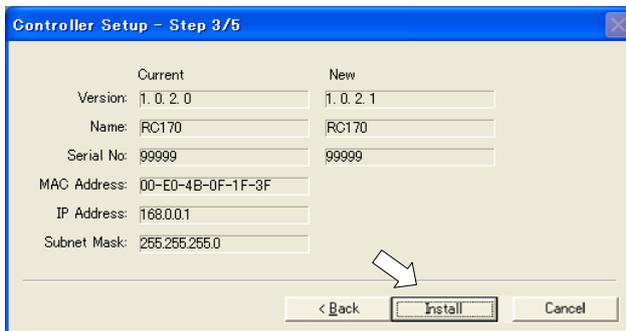
- (1) Connect the development PC and the Controller with a USB cable (the firmware cannot be changed with an Ethernet connection).
- (2) Turn ON the Controller. (Do not start the development software EPSON RC+ 5.0 until the firmware upgrade is completed.)
- (3) Insert the “firmware CD-ROM” in the development PC CD-ROM drive.
- (4) Execute “Ctrlsetup.exe”. The following dialog appears.
- (5) Select the <Upgrade> option button and click the <Next> button.



- (6) Make sure that the development PC is connected to the Controller with a USB cable and Click the <Next> button.

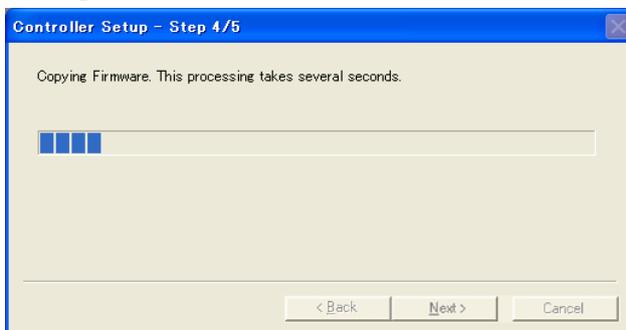


- (7) Check the current firmware version and the new firmware version and click the <Install> button.

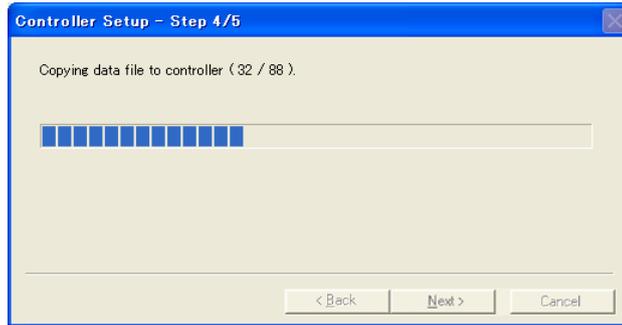


NOTE

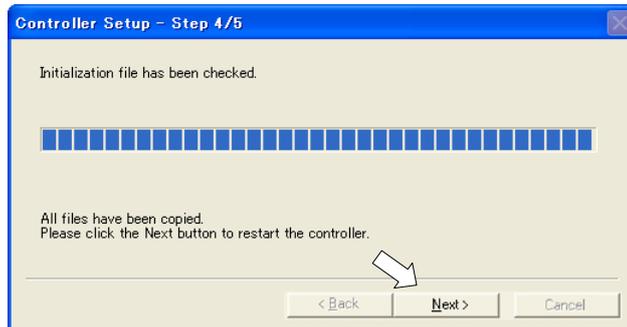

- (8) The firmware upgrade starts. It takes several minutes to complete. Do not unplug the USB cable during transfer or turn OFF the Controller or the development PC.



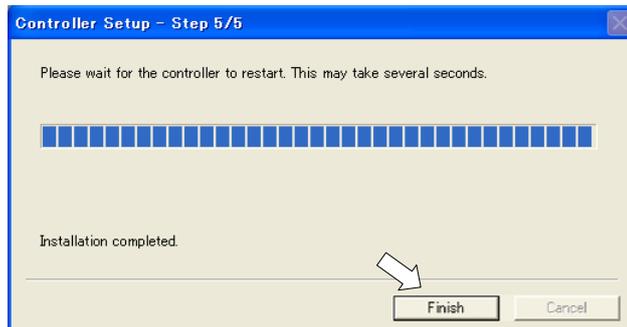
(9) Continuous data file transfer starts.



(10) The following dialog appears when transfer has completed. Click the <Next> button to reboot the Controller.



(11) The following dialog appears after the Controller reboot. Click the <Finish> button.



The firmware upgrade is complete.

5.3 Controller Recovery

If the Controller becomes inoperable, use the procedures described in this section to recover.



Controller Backup is recommended for easy recovery of the Controller operation. For details of Controller Backup, refer to *Maintenance 4. Backup and Restore*.

The following two conditions describe the Controller error status after turning on the Controller.

Condition A The Controller automatically changes to Recovery mode and the seven-segment LED blinks **9999**. You are able to communicate with the development PC though the Controller does not operate properly.

Condition B The Controller seven-segment LED does not blink.
Cannot communicate with the Controller using the development PC.

Countermeasure for the error status is as follows.

Condition A Follow the Firmware Initialization Procedure in section 5.4 to initialize the firmware.

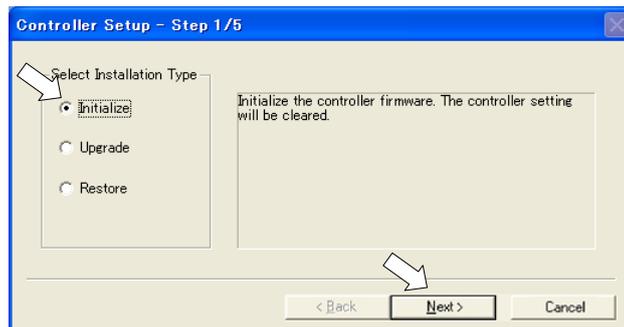
Condition B Execute the following steps:

- (1) Turn OFF the Controller.
- (2) Push the trigger button located on the front side of the Controller and while holding the button in, turn ON the Controller. Continue to hold in the trigger button for 30 seconds. This will cause the Controller to start in Recovery mode.
- (3) Make sure that the seven-segment LED blinks **9999**.
- (4) Follow the procedure in *5.4 Firmware Initialization Procedure* from step (3) to initialize the firmware.

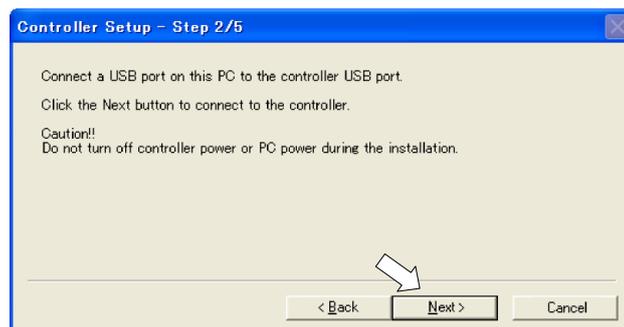
5.4 Firmware Initialization Procedure

The firmware initialization procedure described in this section.

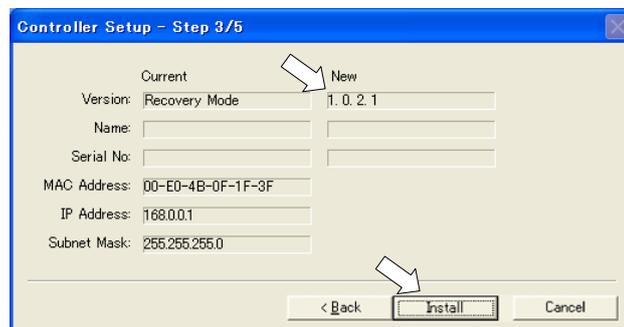
- (1) Connect the development PC to the Controller with a USB cable (the firmware cannot be changed with an Ethernet connection).
- (2) Turn ON the Controller. Do not start the development software EPSON RC+ 5.0 until firmware initialization is complete.
- (3) Insert the “firmware CD-ROM” in the development PC CD-ROM drive.
- (4) Execute “Ctrlsetup.exe”.
- (5) Select the <Initialize> option button and click the <Next> button.



- (6) Make sure that the development PC is connected to the Controller with a USB cable and Click the <Next> button.



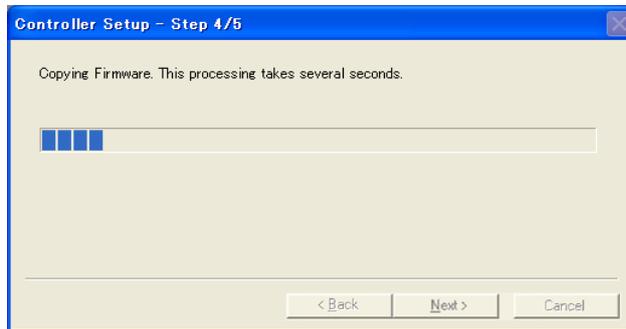
- (7) Check the version information and click the <Install> button.



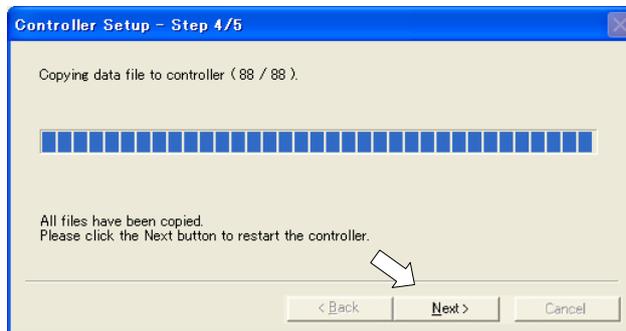
- (8) Firmware and data file transfer starts. It takes several minutes to complete.

NOTE

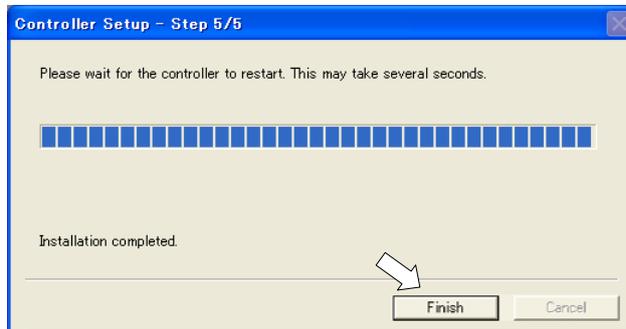

Do not unplug the USB cable during transfer or turn OFF the Controller or the development PC.



- (9) The following dialog appears when transfer is completed. Click the <Next> button to reboot the Controller.



- (10) The following dialog appears after the Controller reboot. Click the <Finish> button.



The firmware upgrade is completed.

Start EPSON RC+ 5.0 and restore the Controller settings.

For details of restoring the operating system, refer to *Maintenance 4. Backup and Restore*.

6. Maintenance Parts Replacement Procedures

| | |
|---|---|
|  WARNING | <ul style="list-style-type: none"> ■ Before performing any maintenance procedure, always make sure that the main power of the Controller is turned OFF and that the high voltage charged area is completely discharged. Performing any maintenance procedure while the main power is ON or the high voltage charged area is not discharged completely is extremely hazardous and may result in electric shock and/or cause serious safety problems. ■ When opening or closing the front side, make sure that the 200 V power supply for the Controller is OFF. Performing procedure to the power supply terminal block inside the Controller while the power supply is ON is extremely hazardous and may result in electric shock and/or cause serious safety problems. |
|---|---|

NOTE



- Be careful not to damage cables. Be sure not to drop any screws into the Controller.
- A spacer is used with each thumb head screw on controllers with serial number 01001 or later. Do not remove the spacer.
Installing the front cover using a thumb head screw without a spacer may result in a cable being damaged and/or malfunction of the Controller.
- Installing the front cover using the wrong screws may result in a cable being damaged and/or malfunction of the Controller.

6.1 Fan and Fan Filter

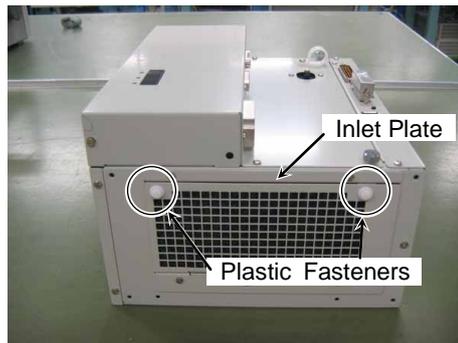
Inspect the fan filter periodically and clean it when needed. The temperature inside the Controller may get too high and the Controller may not operate properly if the filter is not kept clean.

For the inspection schedule of the fan filter, refer to *Maintenance 2. Regular Maintenance Inspection*.

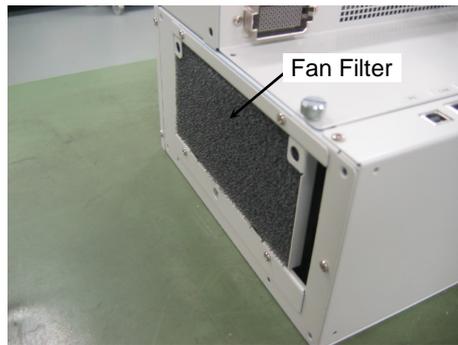
6.1.1 Cleaning and Replacing the Fan Filter

Fan Filter Remove

- (1) Turn OFF the Controller.
- (2) Pull out the two plastic fasteners indicated in the photo.

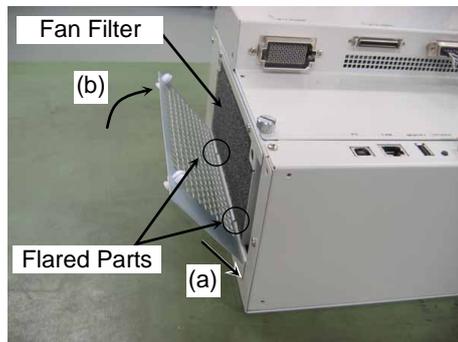


- (3) Remove the fan filter.
Vacuum off the dust when cleaning the filter.



Fan Filter Mount

- (1) Mount the fan filter.
- (2) Insert the two flared parts of the inlet plate into the opening of the Controller in the direction shown by arrow (a).
- (3) Push the two plastic fasteners in the direction shown by arrow (b) until they make a clicking sound to secure the inlet plate.
Make sure that the plate is mounted properly.



- (4) Plug in the power connector. Turn ON the Controller and make sure that the Controller starts properly without any vibration or abnormal noise.

6.1.2 Replacing the Fan Unit

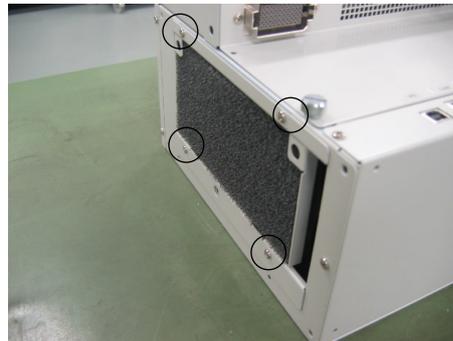
Fan Unit
Remove

- (1) Turn OFF the Controller.

Remove the Option Units if they are mounted.

Refer : *Procedure (1) to (4) in Maintenance 6.7.1 Remove Option Unit 1*
Maintenance 6.7.5 Remove Option Unit 1, 2

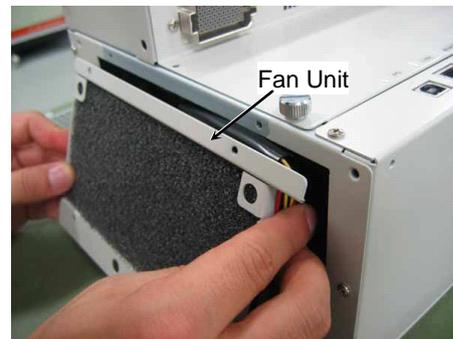
- (2) Pull out the two plastic fasteners and remove the inlet plate.
- (3) Remove the four screws on the fan unit.



- (4) Remove the fan unit.



The fan cable is connected to the fan unit. Be sure to remove it slowly.



- (5) Pull out the two fan cable connectors from the CPU board to the direction shown by the arrow.



- (6) Remove the fan filter from the fan unit.



When the Option Unit is mounted, the fan filter is not used.

Fan Unit
Mount

- (1) Mount a new fan filter in the fan unit.

NOTE


When an Option Unit is mounted, no fan filter is necessary.

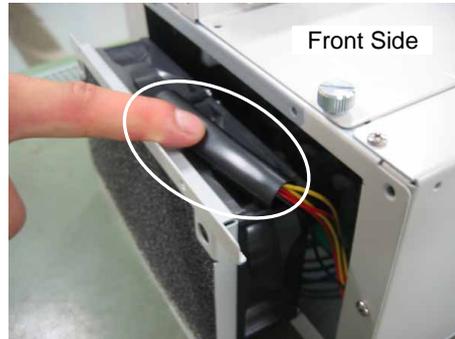
- (2) Connect the two fan cable connectors to the CPU board.

Refer : *Maintenance 3.2 Diagram of Cable Connections*
- Cable Layout Drawing

- (3) Hold down the fan cable protection tube as shown in the photo and install the fan unit to the Controller.

NOTE


Be sure to keep the Controller cable from being trapped between the DPB and the fan.



- (4) Secure the fan unit to the main chassis with four screws.

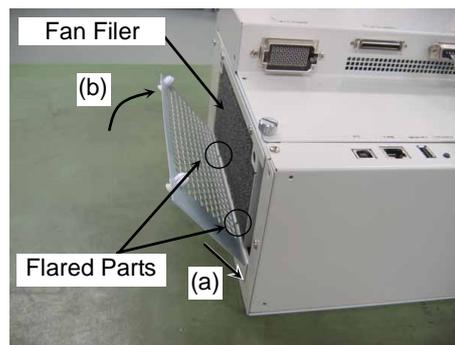
- (5) Mount the Option units if they were mounted before.

Refer : *Maintenance 6.7.2 Mount Option Unit 1.*

- (6) Insert the two flared parts of the inlet plate into the opening of the Controller in the direction shown by arrow (a).

- (7) Push in the two plastic fasteners in the direction shown by arrow (b) until they make a clicking sound to mount the inlet plate.

Make sure that the plate is mounted properly.



- (8) Plug in the power connector. Turn ON the Controller and make sure that the Controller starts properly without any vibration or abnormal noise.

6.1.3 Cleaning and Replacing the Option Unit Fan Filter

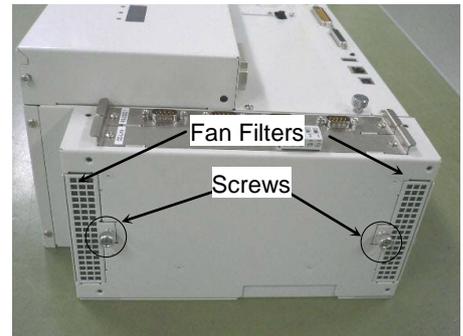
Option Unit
Fan Filter
Remove

- (1) Turn OFF the Controller.
- (2) Remove the mounting screw for each fan filter located on the top and the bottom of the Option Unit.



NOTE Two fan filters are mounted on the Option Unit. Be sure to replace both at the same time.

Clean the fan filter when it is necessary.



Option Unit
Fan Filter
Mount

- (1) Insert the fan filters into the Option Unit and secure each of them with a screw.
- (2) Plug in the power connector. Turn ON the Controller and make sure that the Controller starts properly without any vibration or abnormal noise.

6.2 Battery

| | |
|--|---|
|  CAUTION | <ul style="list-style-type: none"> ■ Use meticulous care when handling the lithium battery. Improper handling of the lithium battery as mentioned below is extremely hazardous, may result in heat generation, leakage, explosion, or inflammation, and may cause serious safety problems. <ul style="list-style-type: none"> • Battery Charge • Disassembly • Incorrect Installation • Exposing to Fire • Forced Discharge • Deformation by Pressure • Short-circuit (Polarity; Positive/Negative) • Heating (85°C or more) • Soldering the terminal of the lithium battery directly ■ Be sure to use the battery supplied as maintenance part from EPSON (Refer to 9. Maintenance Parts List). ■ When disposing of the battery, consult with the professional disposal services or comply with the local regulation. Spent battery or not, make sure the battery terminal is insulated. If the terminal contacts with the other metals, it may short and result in heat generation, leakage, explosion, or inflammation. |
|--|---|

NOTE  Before starting battery replacement, turn on the controller for approximately one minute. Perform the replacement within 10 minutes to prevent data loss.

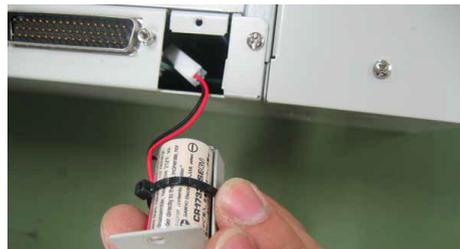
Battery Removal

- (1) Backup the Controller data.
Refer to *Maintenance 4. Backup and Restore*.
- (2) Turn OFF the Controller.
- (3) Remove the screw for the battery mounting plate.

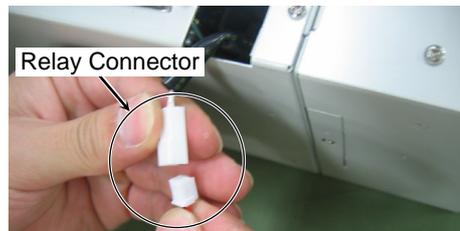


- (4) Pull out the battery assembly.

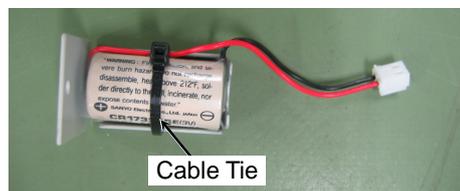
NOTE  The lithium battery cable is connected to the main chassis. Be sure to remove it slowly.



- (5) Disconnect the relay connector.



- (6) Cut the cable tie to remove the lithium battery.

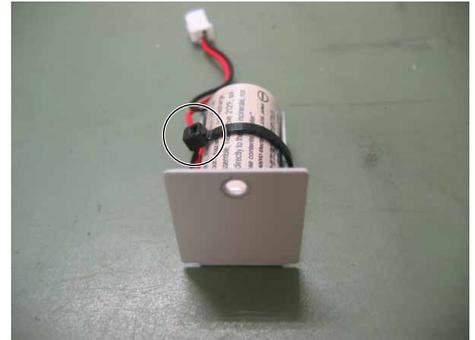


Battery
Installation

- (1) Place a new lithium battery in position and secure it with the attached cable tie.

Position the cable tie as show in the photo.

If it is difficult to insert the lithium battery to the Controller, adjust the cable tie position.



- (2) Connect the relay connector.
- (3) Insert the lithium battery assembly into the Controller.

NOTE



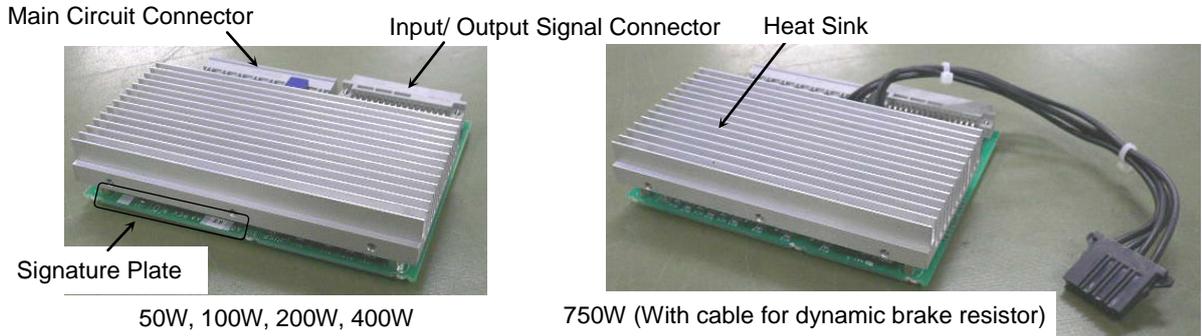
Be sure to prevent the cable and the connector from being trapped.

Push the relay connector to the left when inserting the lithium battery. If the connector is behind the lithium battery, the lithium battery may not be inserted.

- (4) Mount the plate to the Controller with a screw.
- (5) Plug in the power connector. Turn ON the Controller and make sure that the Controller starts properly without any vibration or abnormal noise.

6.3 Motor Driver

6.3.1 Part Names



The wattage of the motor driver can be determined by the type code indicated on the signature plate. The wattage of the installed motor driver corresponds with the wattage of the driving motor.

| Type | Wattage |
|--------------|---------|
| JUSP-SU021A* | 50 W |
| JUSP-SU028A* | 100 W |
| JUSP-SU065A* | 200 W |
| JUSP-SU085A* | 400 W |
| JUSP-SU169A* | 750 W |

* The asterisk indicates one alphanumeric character.

6.3.2 Replacing the Motor Driver (Axis 1 to 4)



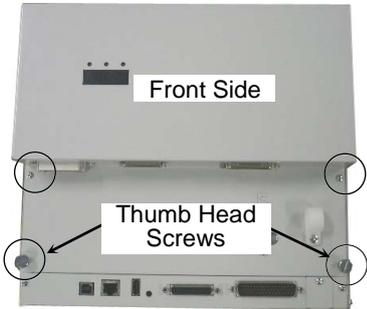
WARNING

- Be sure to record the type and the power rating (wattage) setting of the current Motor Driver to set the correct power rating (wattage) when replacing the Motor Driver.

Using a Motor Driver with improper power rating (wattage) in the Controller will cause improper function of the robot system.

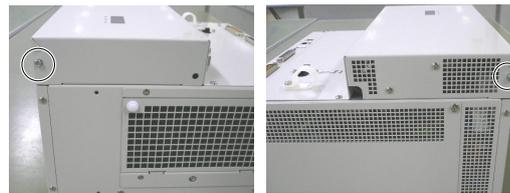
Motor Driver
(Axis 1 to 4)
Remove

- (1) Turn OFF the Controller and unplug the power connector.
- (2) Disconnect the following cables from the front side of the Controller.
 - M/C Power Cable
 - M/C Signal Cable
 - EMERGENCY Cable
- (3) Remove the four screws shown in the photo.



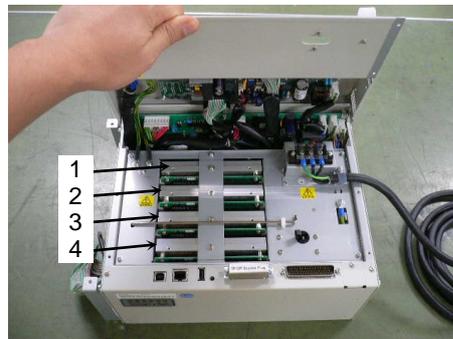
NOTE The thumb head screws are used to pull out the Motor Driver.

(4) Loosen the two screws on the side of the front side.



(5) Open the front cover and hold it open.

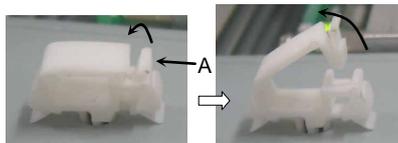
Motor Driver
 1: Axis 1
 2: Axis 2
 3: Axis 3
 4: Axis 4



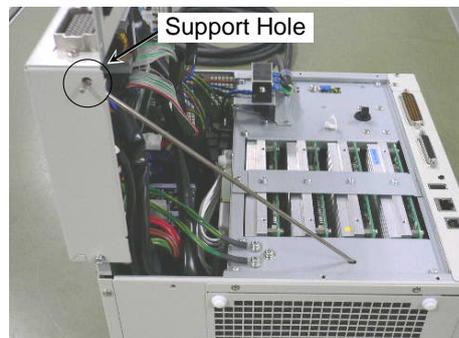
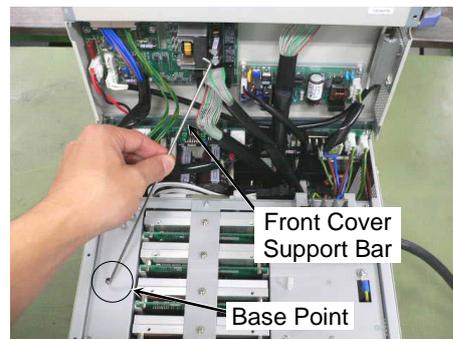
(6) Open the clamp for the front cover support bar.

NOTE


Push the latch A shown in the photo first and then open the clamp.



(7) Insert the top of the support bar into the support hole as shown without moving the base point.



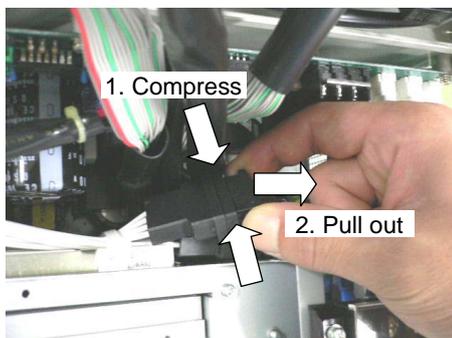
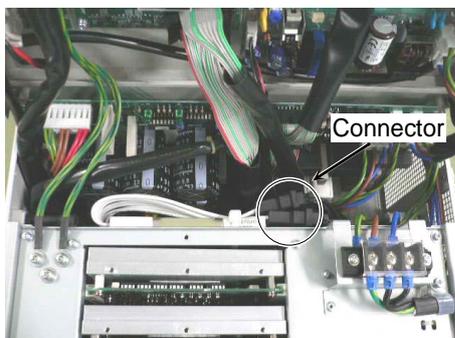
- (8) Remove the five screws from the Motor Driver mounting bracket.



Connected to the G10 or G20 series manipulator
 Refer to Remove step (9) and remove the connector.

Connected to the G1, G3, G6, RS, C3 or S5 series manipulator
 Go on to Remove step (10).

- (9) When replacing the first or the second motor driver, compress both ends of the connector connected to the driver to pull out the connector.
 (Remove the connector connected to the replacing motor driver.)



- (10) Secure the two thumb head screws removed in step (3) to the Motor Driver heat sink.

Pull out the Motor Driver by pulling the two thumb head screws together evenly.



NOTE

When using the G10 or G20 series manipulator, a cable and a connector are connected to the first and the second motor driver.
 When removing the motor driver, make sure to keep the connector from being stuck.

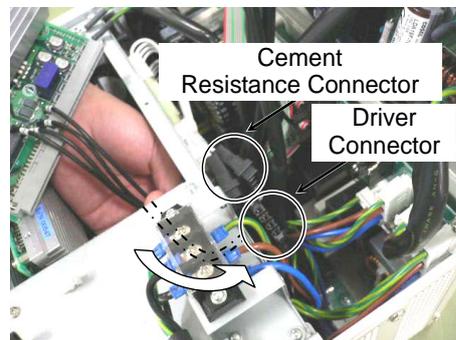
| | |
|--|---|
| | <ul style="list-style-type: none"> ■ Be careful not to cut your fingers. The Motor Driver connector may be connected tightly. The connector may be disconnected suddenly by a strong pull and may cause your fingers to be cut by the Motor Driver heat sink. |
|--|---|

Motor Driver
(Axis 1 to 4)
Mount

Connected to the G10 or G20 series manipulator
Start from Mount step (1).

Connected to the G1, G3, G6, RS, C3 or S5 series manipulator
Start from Mount step (3).

- (1) When replacing the first or the second motor driver, insert the connector connected to the motor driver carefully along the guide rail through the rear side of the intermediate plate

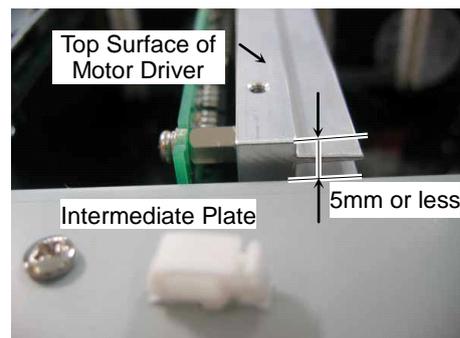


- (2) Connect the connector connected to the replacing first or second motor driver to the cement resistance connector.



There are two cement resistance connectors. The connector for the motor driver can be connected to either one of them. Connect to the resistance connector in the easier position.

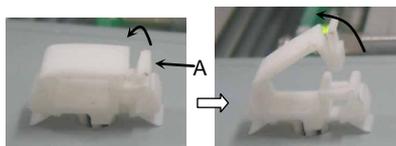
- (3) Insert the Motor Driver along the guide rails until the surface height differences of the Motor Driver comes to 5 mm or less.
- (4) Push the Motor Driver securely into the two Motor Driver connectors.



- (5) Secure the Motor Driver mounting bracket with five screws.
- (6) Hold the front cover and put the front cover support bar back to the normal position.
- (7) Secure the front cover support bar with the clamp.



Push latch A as shown in the photo first and open up the clamp.



- (8) Secure the two screws on the side of the front cover.
- (9) Close the front cover and secure it with four screws.



Make sure to keep cables from becoming trapped or damaged.

- (10) Connect the following cables if they were previously connected to the front of the Controller.
 - M/C Power Cable
 - M/C Signal Cable
 - EMERGENCY Cable

- (11) Plug in the power connector. Turn ON the Controller and make sure that the Controller starts properly without any vibration or abnormal noise.

6.3.3 Replacing the Motor Driver (Axis 5 and 6)

Motor Driver
(Axis 5 and 6)
Remove

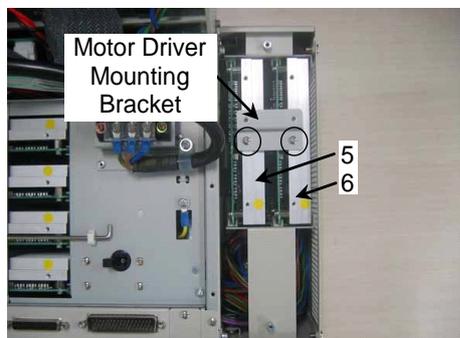
- (1) Turn OFF the Controller and unplug the power connector.
- (2) Open the front cover.
Refer : *Maintenance 6.3.2 Replacing Motor Driver (Axis 1 to 4)*
Removing procedure from (2) to (7)

- (3) Remove the four screws shown to remove the top cover of the ProSix Driver Unit.



- (4) Remove two screws to remove the Motor Driver mounting bracket.

Motor Driver
5: Axis 5
6: Axis 6



- (5) Secure the two thumb head screws removed in step (2) to the Motor Driver heat sink as shown.

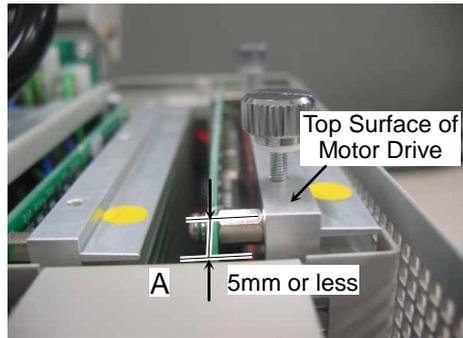
- (6) Pull out the Motor Driver by pulling the two thumb head screws together evenly.



| | |
|---|---|
|  CAUTION | <ul style="list-style-type: none"> ■ Be careful not to cut your fingers. The Motor Driver connector may be connected tightly. The connector may be disconnected suddenly by a strong pull and may cause your finger to be cut by the Motor Driver heat sink. |
|---|---|

Motor Driver
(Axis 5 and 6)
Mount

- (1) Insert the Motor Driver along the guide rails until the surface height differences of the Motor Driver comes to 5 mm or less.
- (2) Push the Motor Driver securely into the two Motor Driver connectors.



- (3) Secure the Motor Driver mounting bracket with two screws.
- (4) Secure the top cover of the ProSix Driver Unit with four screws.
- (5) Close the front side.
Refer : *Maintenance 6.3.2 Replacing Motor Driver (Axis 1 to 4)*
Mounting procedure from (5) to (9)
- (6) Plug in the power connector. Turn ON the Controller and make sure that the Controller starts properly without any vibration or abnormal noise.

6.4 CPU Board Unit



The controller differs by the using manipulator. Different procedures are instructed for each controller as follows. Follow the corresponding procedure.

Connected to the C3 or S5 series manipulator

Connected to the G or RS series manipulator

Remove the Option Units if they are mounted.

Refer : *Maintenance 6.7.1 Remove Option Unit 1*

Maintenance 6.7.5 Remove Option Unit 1, 2

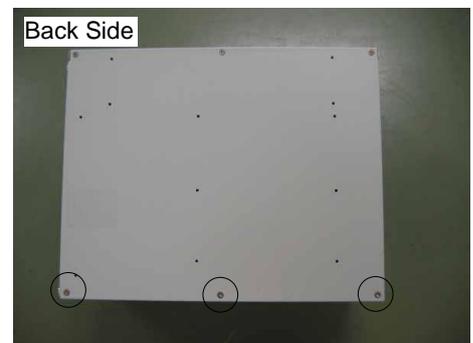
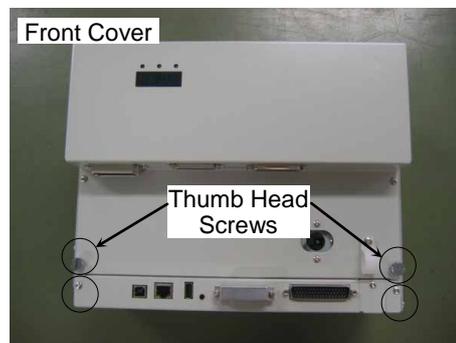
CPU Board Unit
Remove

(1) Turn OFF the Controller and unplug the power connector.

(2) Disconnect the cables connected to the CPU board.

USB PC LAN USB memory TP/OP I/O

(3) Remove four screws on the front cover and three screws on the backside shown in the photo.



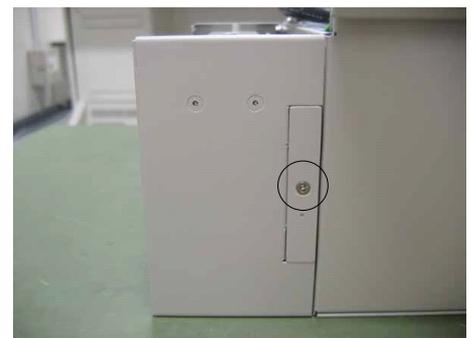
Connected to the C3 or S5 series manipulator

Perform steps (4) to (6) to remove the ProSix Driver Unit.

Connected to the G or RS series manipulator

Go on to step (7).

(4) Remove the screw on the top and bottom to remove the two covers.



(5) Remove two screws on each cover.

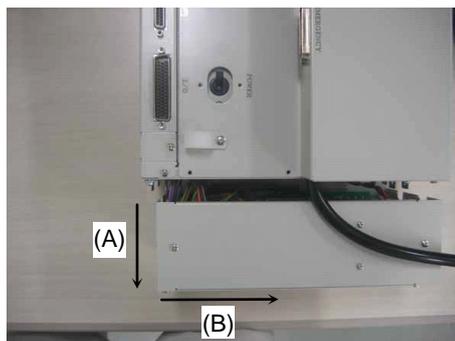


(6) Slide the ProSix Driver Unit approximately 20 mm in direction (A) and then slowly slide it approximately 10 mm in direction (B).



The ProSix Driver Unit cable is connected to the main chassis. Be sure to remove it slowly.

The DMB of the ProSix Driver Unit is connected to the board connector. Be sure to slide the ProSix Driver Unit straight out in direction (A) as shown.



(7) Remove the screws on both sides of the CPU board unit.



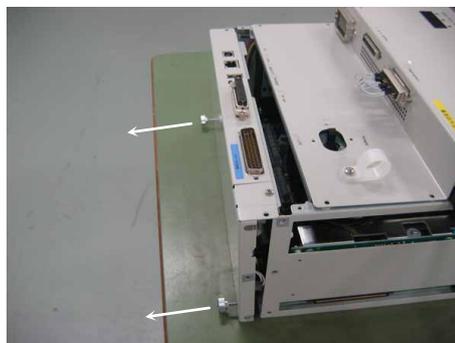
(8) Install the two thumb head screws removed in step (3) in the CPU board unit.



(9) Hold the thumb head screws and pull the CPU board unit straight out.



The CPU board unit cable is connected to the main chassis. Be sure to remove slowly.



(10) Disconnect the four connectors connected to the CPU board.

Refer : *Maintenance 3.2 Diagram of Cable Connections*
 - *Cable Layout Drawing*

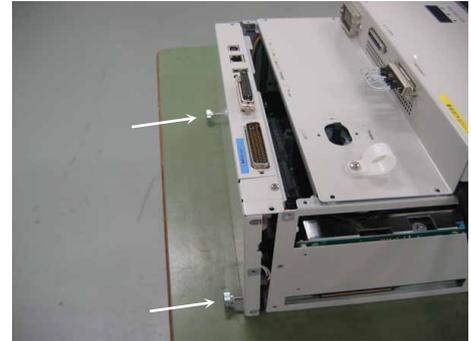
CPU Board Unit Mount (1) Connect the four CPU board connectors.
 Refer : *Maintenance 3.2 Diagram of Cable Connections*
 - *Cable Layout Drawing*

(2) Carefully insert the CPU board unit by pushing it straight in.



NOTE Make sure that connector CN2 of the CPU Board and the DMB connector (CPU IF) are connected when inserting the Unit.

Be sure to keep the cable from being trapped or damaged.



(3) Mount the screw on each side of the CPU board.

Connected to the C3 or S5 series manipulator
 Perform steps (4) to (6) to secure the ProSix Driver Unit.

Connected to the G or RS series manipulator
 Move on to step (7).

(4) Insert the ProSix Driver Unit into the position.



NOTE Refer to the photo and be sure to position the mounting bracket properly as shown.



(5) Secure the ProSix Driver Unit with two screws on the top and bottom.

(6) Secure the two covers with a screw of the top and bottom.

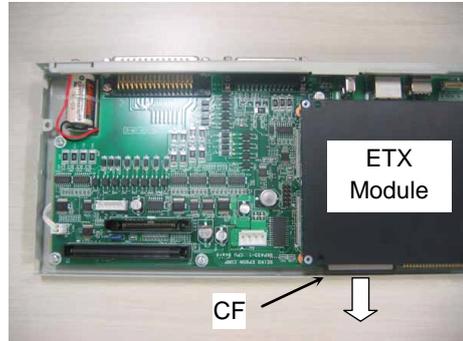
(7) Secure each cover with the screws.
 (Front cover : 4 screws, Backside : 3 screws)

(8) Connect the following cables to the CPU board.
 USB PC LAN USB memory TP/OP I/O

(9) Plug in the power connector. Turn ON the Controller and make sure that the Controller starts properly without any vibration or abnormal noise.

6.5 CF (Compact Flash)

- CF Remove
- (1) Turn OFF the Controller and unplug the power connector.
 - (2) Remove the CPU board unit.
Refer : *Maintenance 6.4 CPU Board Unit*
 - (3) Pull out the CF in the direction shown by the arrow.



- CF Mount
- (1) Insert the new CF along the guide rail.
NOTE
 Insert the CF until the CF is approximately 3 mm out from the ETX module.
 - (2) Mount the CPU board unit.
Refer : *Maintenance 6.4 CPU Board Unit*
 - (3) Plug in the power connector. Turn ON the Controller and make sure that the Controller starts properly without any vibration or abnormal noise.

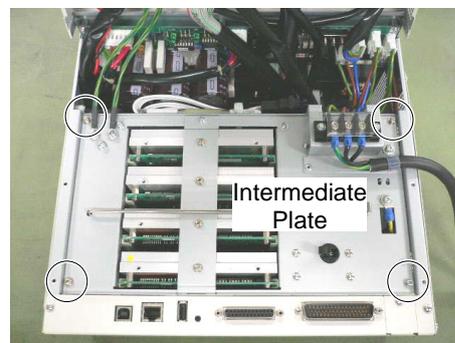
6.6 Fuse



The fuse is not used for RC180-UL.

Fuse Remove

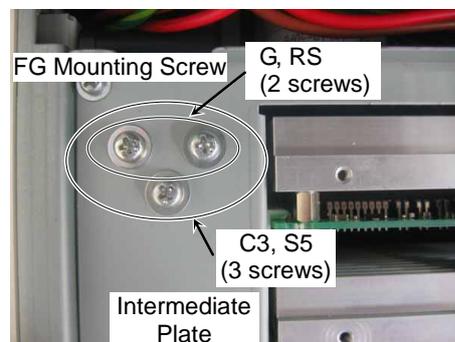
- (1) Turn OFF the Controller and unplug the power connector.
- (2) Remove the Option Unit when it is mounted.
Refer : *Maintenance 6.7.2 Remove Option Unit 1*
Maintenance 6.7.5 Remove Option Unit 1, 2
- (3) Remove the fan unit
Refer : *Maintenance 6.1.2 Replacing Fan Unit*
- (4) Remove the Motor Drive Module.
Refer : *Maintenance 6.3.2 Replacing Motor Driver (Axis 1 to4)*
- (5) Remove four screws on the intermediate plate as shown.



- (6) Remove the FG mounting screws (G, RS: 2 screws/ C3, S5: 3 screws) and remove the plate.



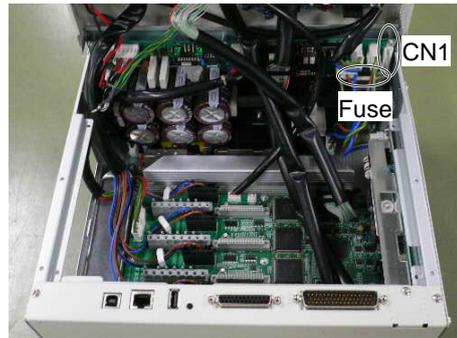
Be sure to remove the intermediate plate slowly.
The cables are connected to the main chassis.



WARNING

- Before disconnecting the DPB cable connector, always make sure that the power supply of the Controller is unplugged. Performing this procedure while the power supply is connected is extremely hazardous and may result in electric shock and/or cause serious safety problems.

- (7) Pull out the DPB cable connector (CN1) and remove the intermediate plate.



NOTE


- (8) Pull out the fuse in direction of the arrow. Pull the wires to the side to allow clearance for pulling out the fuse.



Fuse Mount

- (1) Hold the intermediate plate to connect the DPB cable connector (CN1).
- (2) Mount the intermediate plate to the Controller and secure the four mounting screws and the FG mounting screws (G / RS: 2 screws, C3 / S5: 3 screws) removed in steps (5) and (6).

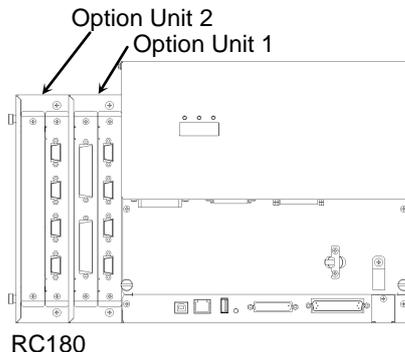
NOTE


Be sure to keep the cable from being trapped or damaged.

- (3) Mount the Motor Driver Module.
 Refer : *Maintenance 6.3.2 Replacing Motor*
- (4) Mount the fan unit.
 Refer : *Maintenance 6.1.2 Replacing Fan Unit*
- (5) Mount the Option Unit when it was installed.
 Refer : *Maintenance 6.7.2 Mount Option Unit 1*
Maintenance 6.7.6 Mount Option Unit 1, 2
- (6) Plug in the power connector. Turn ON the Controller and make sure that the Controller starts properly without any vibration or abnormal noise.

6.7 Option Unit

This section contains instructions for removing and installing the two Option Units. Option Unit 1 and Option Unit 2 are shown in the following figure.



6.7.1 Remove Option Unit 1

- (1) Turn OFF the Controller and unplug the power connector.
- (2) Disconnect the cables connected to the Option Unit board.
- (3) Remove two screws on the backside and remove the cover.



- (4) Pull out the flat cable connector connected on the backside.

NOTE


Compress both ends of the connector to pull out the connector.

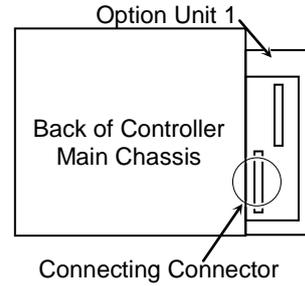


- (5) Remove the screws (two screws each on front side and backside) and remove Option Unit 1 in the direction shown by the arrow.



6.7.2 Mount Option Unit 1

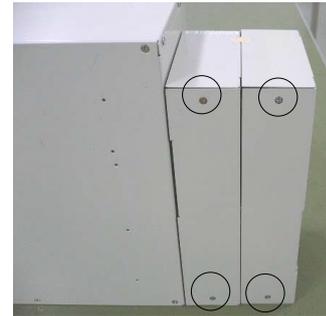
- (1) Secure Option Unit 1 with two screws each on front side and backside.
- (2) Connect the flat cable connector to the backside of Option Unit 1.



- (3) Secure the backside cover to Option Unit 1 with two screws. Orient the cover so that there is no gap when mounted.
- (4) Plug in the power connector. Turn ON the Controller and make sure that the Controller starts properly without any vibration or abnormal noise.

6.7.3 Remove Option Unit 2

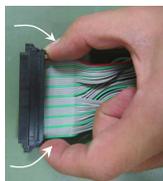
- (1) Turn OFF the Controller and unplug the power connector.
- (2) Disconnect the cables connected to the Option Unit board.
- (3) Remove two screws on each unit from the backside of Option Units 1 and 2 to remove the covers.



- (4) Pull out the flat cable connector connected on the backside of Option Units 1 and 2.

NOTE


Compress both ends of the connector to pull out the connector.



- (5) Secure a backside cover to Option Unit 1 with two screws.

Orient the cover so that there is no gap when mounted.



Be sure to keep the cable from being trapped or damaged.



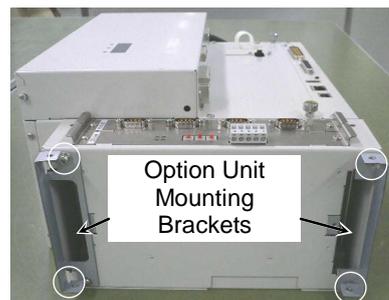
- (6) Remove two screws each on the front side and backside and remove Option Unit 2 in the direction shown by the arrow.



When replacing Option Unit 2.
The removal procedure is complete.

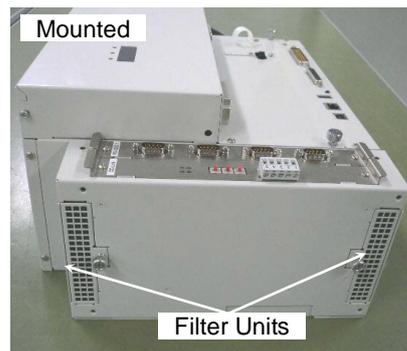
When Option Unit 2 is not used.
Perform steps (7) to (9).

- (7) Remove four screws and remove the Option Unit mounting bracket from the Option Unit 1.



- (8) Remove the Option Unit 2 filter units (two places).
Refer : *Maintenance 6.1.3 Cleaning and Replacing Fan Filter*

- (9) Mount the fan filters (two places) to Option Unit 1.



6.7.4 Mount Option Unit 2

When adding Option Unit 2: Perform steps (1) to (8).

When replacing Option Unit 2: Perform steps (3) to (7).

- (1) Remove the fan filters (two places) of Option Unit 1 and mount Option Unit 2.
Refer : *Maintenance 6.1.3 Cleaning and Replacing Fan Filter*

- (2) Secure the Option Unit mounting brackets to Option Unit 1 with four screws.



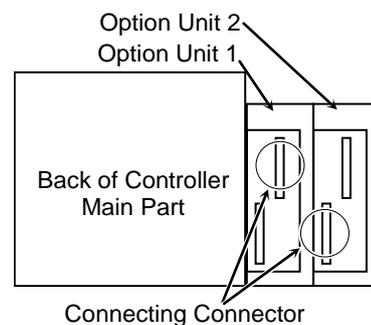
The shape of the mounting bracket for the top (DPB) and bottom (CPU board) side are different. Be sure to mount them properly.



- (3) Secure Option Unit 2 with two screws each on front and backside.

- (4) Remove two screws to remove the backside cover of the Option Unit 1.

- (5) Connect the flat cable connectors (two places) to the backside of Option Units 1 and 2.



- (6) Secure the covers to the backside of Option Units 1 and 2 with two screws for each. Orient the cover so that there is no gap when mounted.



- (7) Plug in the power connector. Turn ON the Controller and make sure that the Controller starts properly without any vibration or abnormal noise.

6.7.5 Remove Option Units 1 & 2

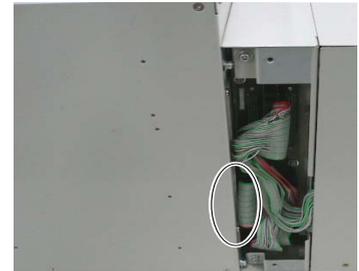
- (1) Turn OFF the Controller and unplug the power connector.
- (2) Disconnect the cables connected to the Option Unit boards.
- (3) Remove two screws from the backside of Option Unit 1 to remove the cover.



- (4) Pull out the flat cable connector connected on the backside.

NOTE


Compress both ends of the connector to pull out the connector.

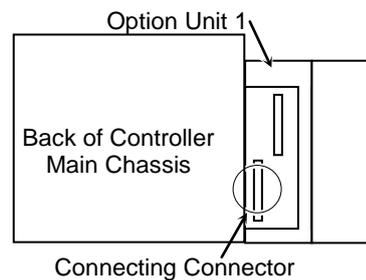


- (5) Remove the screws (two screws each on front side and backside) and remove Option Units 1 and 2 in direction shown by the arrow.



6.7.6 Mount Option Units 1 & 2

- (1) Secure Option Units 1 and 2 with two screws each on front and backside.
- (2) Connect the flat cable connector to the backside of Option Unit 1.



- (3) Secure the backside covers of Option Unit 1 with two screws for each.
- (4) Plug in the power connector. Turn ON the Controller and make sure that the Controller starts properly without any vibration or abnormal noise.

6.7.7 Replacing or Adding an Option Board

Remove

- (1) Turn OFF the Controller and unplug the power connector.
- (2) Disconnect the cables connected to the Option Unit board.
- (3) Remove two screws and pull out the Option board.



Mount

- (1) Configure the Option board switches.
Refer : *Maintenance 12. Option Unit*
- (2) Insert an Option board into the Option Unit along the guide rail and secure with two screws.
- (3) Connect the cables to the Option board.
- (4) Plug in the power connector. Turn ON the Controller and make sure that the Controller starts properly without any vibration or abnormal noise.

Add

- (1) Turn OFF the Controller and unplug the power connector.
- (2) Remove two screws to remove the cover.



- (3) Insert an Option board into the Option Unit along the guide rail and secure with two screws.
- (4) Plug in the power connector. Turn ON the Controller and make sure that the Controller starts properly.

7. Verifying Robot System Operation

When maintenance has been performed for either the Manipulator or the Controller, including replacing any parts in those units, items must be checked according to the procedures in this section to ensure proper operation.

- (1) Connect all the necessary cables for the system.

| | |
|--|--|
|  WARNING | <ul style="list-style-type: none"> ■ When verifying the robot system operation, prepare for failures with initial settings or wiring. If the Manipulator operates abnormally because of incorrect initial settings or wiring, press the Emergency Stop switch immediately to stop the Manipulator. <p>Verify the robot system operation in the restricted mode (low speeds and low power) status. Verifying the robot system operation at high speeds may damage the robot system and/or cause serious safety problems as the Manipulator cannot stop operating immediately in case of abnormal operation of the Manipulator.</p> |
|--|--|

| | |
|--|---|
|  CAUTION | <ul style="list-style-type: none"> ■ The serial number of the Manipulator that should be connected is indicated on the Connection Check Label on the Controller. Connect the Controller and the Manipulator correctly. Improper connection between the Controller and the Manipulator may cause not only improper function of the robot system but also serious safety problems. |
|--|---|

- (2) Turn ON the Controller. The Controller will boot up. During this process, watch and monitor the LED status as described in the following list:

| | From power-on to boot | While running | |
|-----------|-----------------------|--|----------------|
| LED | All blink | LED for current operation mode (TEACH, AUTO, PROGRAM) turns ON. | |
| 7 segment | All lights out |  | READY (Normal) |
| | |  | Emergency Stop |
| | |  | Safeguard |
| | | Four digits | Error |

For details of the display, refer to *Maintenance 2.3 LED and Seven-segment LED*.
 For error number, refer to *Maintenance 8.1 Error Code Table*.

- (3) Execute MOTOR ON and check the following:
 - No error is displayed.
 - There is servo excitation and the Manipulator operates normally.
- (4) Execute various motion commands (such as JUMP, etc.). The Manipulator must operate accordingly and normally without vibration or unusual sounds.

8. Troubleshooting

8.1 Error Code Table

There are 18 types of errors as follows.

| | | |
|-----------------|--------------------|-------------|
| Events | Simulator | Points |
| Warnings | Interpreter | Fieldbus |
| Controller Main | Parser | Vision |
| Operator Panel | Motor control | GUI Builder |
| Teach Pendant | Servo | Hardware |
| PC | Vision Calibration | EPSON RC+ |

Events

| No. | Message | Remedy | Note 1 | Note 2 |
|-----|---|--|--|------------------------|
| 1 | Controller control program started. | | | |
| 2 | Termination due to low voltage of the power supply. | | | |
| 3 | Controller control program has completed. | Stores this log when the controller is rebooted from EPSON RC+ or TP1. | | |
| 4 | Preserve variables save area has been cleaned. | | | |
| 5 | Function Main started. | | | |
| 6 | Function Main started. Later same logs are skipped. | Skip the log "Function Main started." to prevent system history space run out. | | |
| 7 | Serial number has been saved. | | | |
| 8 | System backup has been executed. | | | |
| 9 | System restore has been executed. | | | |
| 10 | Robot parameters have been initialized. | | | |
| 11 | Offset pulse value between the encoder origin and the home sensor (HOFS) is changed. Additional data is J1 value. | | J1 value after change | J1 value before change |
| 12 | Offset pulse value between the encoder origin and the home sensor (HOFS) is changed. Additional data is J2 value. | | J2 value after change | J2 value before change |
| 13 | Offset pulse value between the encoder origin and the home sensor (HOFS) is changed. Additional data is J3 value. | | J3 value after change | J3 value before change |
| 14 | Offset pulse value between the encoder origin and the home sensor (HOFS) is changed. Additional data is J4 value. | | J4 value after change | J4 value before change |
| 15 | Offset pulse value between the encoder origin and the home sensor (HOFS) is changed. Additional data is J5 value. | | J5 value after change | J5 value before change |
| 16 | Offset pulse value between the encoder origin and the home sensor (HOFS) is changed. Additional data is J6 value. | | J6 value after change | J6 value before change |
| 17 | Move to the message saving mode. | | | |
| 18 | Conversion of Robot Parameter file has been executed. | | | |
| 20 | Enable setting in Teach mode has been saved. | | | |
| 21 | Enable setting in Teach mode has been changed. | | | |
| 100 | Device connected to Controller. | | | |
| 101 | Console device has changed. | | 21:PC 22:Remote 23:OP1 26: Remote Ethernet | |

Maintenance 8. Trouble Shooting

| No. | Message | Remedy | Note 1 | Note 2 |
|-----|--|---|---|------------------------------|
| 102 | Display device has changed. | | | |
| 103 | Working mode has changed. | | | |
| 110 | Controller firmware has been installed. | | 1:Setup 2:Initialize 3:Upgrade 4:Recover | |
| 111 | IP address has been restored. | May store this log when the controller firmware is installed. | | |
| 120 | PC connected to the Controller. | | 1:Ethernet 2:USB | |
| 121 | TP connected to the Controller. | | | |
| 122 | OP connected to the Controller. | | | |
| 123 | PC disconnected from the Controller. | | | |
| 124 | TP disconnected from the Controller. | | | |
| 125 | OP disconnected from the Controller. | | | |
| 126 | Working mode changed to AUTO. | | | |
| 127 | Working mode changed to Program. | | | |
| 128 | Working mode changed to Teach. | | | |
| 129 | Remote Ethernet connected to the Controller. | | | |
| 130 | Remote Ethernet disconnected from the Controller. | | | |
| 131 | Remote RS232 connected to the Controller. | | | |
| 132 | Remote RS232 disconnected from the Controller. | | LogoutStatus 0:Nomal 1:Abnormal (Timeout) | |
| 410 | The battery alarm for the controller occurred. Replace the battery and reset the alarm. | Replace the battery. After replacing the battery, reset the alarm in EPSON RC+ 5.0-[Tools]-[Controller]-[Maintenance]. | 1000 times of consumption rate | 1000 times of boundary value |
| 411 | The battery alarm for the robot occurred. Replace the battery and reset the alarm. | Replace the battery. After replacing the battery, reset the alarm in EPSON RC+ 5.0-[Tools]-[Controller]-[Maintenance]. | 1000 times of consumption rate | 1000 times of boundary value |
| 412 | The belt alarm for the robot occurred. Replace the belt and reset the alarm. | Replace the timing belt. After replacing the timing belts, reset the alarm in EPSON RC+ 5.0-[Tools]-[Controller]-[Maintenance]. | 1000 times of consumption rate | 1000 times of boundary value |
| 413 | The grease alarm for the robot occurred. Grease the reduction gear units and reset the alarm. | Grease up the reduction gear units. After greasing up, reset the alarm in EPSON RC+ 5.0-[Tools]-[Controller]-[Maintenance]. | 1000 times of consumption rate | 1000 times of boundary value |
| 414 | The motor alarm for the robot occurred. Replace the motor and reset the alarm. | Replace the motor. After replacing the motor, reset the alarm in EPSON RC+ 5.0-[Tools]-[Controller]-[Maintenance]. | 1000 times of consumption rate | 1000 times of boundary value |
| 415 | The gear alarm for the robot occurred. Replace the gear units and reset the alarm. | Replace the gear units. After replacing the gear units, reset the alarm in EPSON RC+ 5.0-[Tools]-[Controller]-[Maintenance]. | 1000 times of consumption rate | 1000 times of boundary value |
| 416 | The ball screw spline alarm for the robot occurred. Replace the ball screw spline and reset the alarm. | Replace the ball screw spline. After replacing the ball screw spline, reset the alarm in EPSON RC+ 5.0-[Tools]-[Controller]-[Maintenance]. | 1000 times of consumption rate | 1000 times of boundary value |
| 420 | The battery alarm for the controller occurred. Replace the battery and reset the alarm. | Replace the battery. After replacing the battery, reset the alarm in EPSON RC+ 5.0-[Tools]-[Controller]-[Maintenance]. | 1000 times of consumption rate | 1000 times of boundary value |

| No. | Message | Remedy | Note 1 | Note 2 |
|-----|--|---|--------------------------------|------------------------------|
| 421 | The battery alarm for the robot occurred. Grease the reduction gear units and reset the alarm. | Replace the battery. After replacing the ball screw spline, reset the alarm in EPSON RC+ 5.0-[Tools]-[Controller]-[Maintenance]. | 1000 times of consumption rate | 1000 times of boundary value |
| 422 | The belt alarm for the robot occurred. Replace the belt and reset the alarm. | Replace the timing belt. After replacing the timing belts, reset the alarm in EPSON RC+ 5.0-[Tools]-[Controller]-[Maintenance]. | 1000 times of consumption rate | 1000 times of boundary value |
| 423 | The grease alarm for the robot occurred. Grease the reduction gear units and reset the alarm. | Grease up the reduction gear units. After greasing up, reset the alarm in EPSON RC+ 5.0-[Tools]-[Controller]-[Maintenance]. | 1000 times of consumption rate | 1000 times of boundary value |
| 424 | The motor alarm for the robot occurred. Replace the motor and reset the alarm. | Replace the motor. After replacing the motor, reset the alarm in EPSON RC+ 5.0-[Tools]-[Controller]-[Maintenance]. | 1000 times of consumption rate | 1000 times of boundary value |
| 425 | The gear alarm for the robot occurred. Replace the gear units and reset the alarm. | Replace the gear units. After replacing the gear units, reset the alarm in EPSON RC+ 5.0-[Tools]-[Controller]-[Maintenance]. | 1000 times of consumption rate | 1000 times of boundary value |
| 426 | The ball screw spline alarm for the robot occurred. Replace the ball screw spline and reset the alarm. | Replace the ball screw spline. After replacing the ball screw spline, reset the alarm in EPSON RC+ 5.0-[Tools]-[Controller]-[Maintenance]. | 1000 times of consumption rate | 1000 times of boundary value |

Warnings

| No. | Message | Remedy | Note 1 | Note 2 |
|-----|--|---|---------------|----------------|
| 501 | Trace history is active. | Effects system performance if trace history is active. | | |
| 502 | Memory has been initialized. | When this error occurs, the value of the Global Preserve variable will be initialized. Replace the CPU board battery. Replace the CPU board. | | |
| 505 | Reboot the controller. | | | |
| 511 | Battery voltage of the CPU board backup is lower than the allowed voltage. Replace the CPU board battery. | Replace the CPU board battery immediately. Keep the power to the controller ON as far as possible until you replace the battery. | Current value | Boundary value |
| 512 | 5V input voltage for the CPU board is lower than the allowed voltage. | If normal voltage is not generated by a 5V power supply alone, replace the power supply. | Current value | Boundary value |
| 513 | 24 V input voltage for the motor brake, encoder and fan is lower than the specified voltage. | If normal voltage is not generated by a 24V power supply alone, replace the power supply. | Current value | Boundary value |
| 514 | Internal temperature of the Controller is higher than the allowed temperature. | Stop the controller as soon as possible and check whether the ambient temperature of the controller is not high. Check whether the filter is not clogged up. | Current value | Boundary value |
| 515 | Rotating speed of the controller fan is below the allowed speed. (FAN1) | Check whether the filter is not clogged up. If the warning is not cleared after the controller is rebooted, replace the fan. | Current value | Boundary value |
| 516 | Rotating speed of the controller fan is below the allowed speed. (FAN2) | Check whether the filter is not clogged up. If the warning is not cleared after the controller is rebooted, replace the fan. | Current value | Boundary value |
| 517 | Internal temperature of the Controller is higher than the allowed temperature. | | | |
| 597 | The PTP motion to avoid the singularity point has completed. | PTP motion for the singularity avoidance was completed. Clicking the same jog button will operate the robot in the normal jog motion. | | |
| 598 | Robot stopped due to a collision detection. Move in a different direction to avoid the collision. | | | |
| 599 | Jogging attempted near singularity point. | | | |
| 700 | Motor driver type does not match the current robot model. Check the robot model. Replace the motor driver. | Check the robot model. | | |
| 736 | Encoder has been reset. Reboot the controller. | Reboot the controller. | | |
| 737 | Low voltage from the encoder battery. Replace the battery with the controller ON. | Replace the battery for the robot with the controller ON. | | |
| 752 | Servo alarm D. | | | |

Controller Main

| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|---|--------|--------|
| 1001 | Operation Failure. Command parameter is invalid. | | | |
| 1002 | Requested data cannot be accessed. The data is not set up or the range is invalid. | Check whether the target I/O, variables, and tasks exist. | | |
| 1003 | The password is invalid | Enter the correct password. | | |
| 1004 | Cannot execute with unsupported version. | Use the correct version file. | | |
| 1005 | Cannot execute with invalid serial number. | Use the backup data for the same controller to restore the controller configuration. | | |
| 1006 | Cannot execute with invalid Robot model. | Use the backup data for the same controller to restore the controller configuration. | | |
| 1007 | Cannot execute with invalid Controller. | Controller connected with PC is not supported. Connect with a regular controller. | | |
| 1008 | Initialization failure. Failed to initialize TP. | | | |
| 1009 | OP is not supported by the connected controller. | | | |
| 1020 | Cannot execute in recovery mode. | Boot the controller as normal. | | |
| 1021 | Cannot execute due to controller initialization failure. | Restore the controller configuration. | | |
| 1022 | Cannot execute without the project being open. | Open a project. | | |
| 1023 | Cannot execute while the project is open. | Rebuild the project. | | |
| 1024 | Cannot activate from remote. | Enable the remote input. | | |
| 1025 | Execution in Teach mode is prohibited. | Change to the AUTO mode. | | |
| 1026 | Cannot execute in Teach mode except from TP. | Change to the AUTO mode. | | |
| 1027 | Cannot execute in Auto mode. | Change to the Program mode. | | |
| 1028 | Cannot execute in Auto mode except from the main console. | Change to the Program mode. | | |
| 1029 | Cannot execute from OP. | Enable the OP input. | | |
| 1030 | Does not allow Operation mode to be changed. | Change to the Auto mode with a console in the Program mode. | | |
| 1031 | Cannot execute while tasks are executing. | Stop the task and then execute. | | |
| 1032 | Cannot execute while the maximum number of tasks are executing. | Stop the task and then execute. | | |
| 1033 | Cannot execute during asynchronous motion command. | Execute after the motion ends. | | |
| 1034 | Asynchronous command stopped during operation. | The asynchronous command already stopped when the controller received a stop command. | | |
| 1035 | Cannot execute in Remote enable except from the Remote. | The command cannot be executed by the console except the remote I/O when AutoMode output of the remote I/O is ON. | | |
| 1036 | Cannot execute in OP enable except from the OP. | | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|---|--------|--------|
| 1037 | Cannot execute in Remote Ethernet enable except from the Remote Ethernet. | The command cannot be executed by the console except the remote Ethernet when Auto flag of the remote Ethernet is ON. | | |
| 1040 | Cannot execute in Remote RS232C enable except from the Remote RS232C. | | | |
| 1041 | Cannot execute during Emergency Stop status. | Cancel the Emergency Stop status. | | |
| 1042 | Cannot execute while the safeguard is open. | Close the safeguard. | | |
| 1043 | Cannot execute during error condition. | Cancel the error condition. | | |
| 1044 | Cannot execute when the remote pause input is ON. | Change the remote pause input to OFF. | | |
| 1045 | Input waiting condition is the only available condition to input. | The controller received an input while it was not in the Input waiting condition. | | |
| 1046 | Cannot execute during file transfer. | Execute after the file transmission. | | |
| 1047 | Cannot cancel the command executed from other devices. | Cancel the motion command from the device the command was issued from. | | |
| 1048 | Cannot execute after after low voltage was detected. | Reboot the controller. | | |
| 1049 | Other devices are in program mode. | | | |
| 1050 | Password is too long. | Enter the password that is less than 16 characters. | | |
| 1051 | Export Controller Status failed. | <ol style="list-style-type: none"> 1. Retry using the same USB memory. 2. Retry using another USB memory. 3. Retry after rebooting the controller. | | |
| 1052 | Export Controller Status busy. | Execute the command after completing the controller status backup. | | |
| 1100 | File failure. Cannot access the file. | <ol style="list-style-type: none"> 1. Reboot the controller. 2. Reinstall the firmware. 3. Replace the CF. | | |
| 1102 | File failure. Read and write failure of the registry | <ol style="list-style-type: none"> 1. Reboot the controller.. 2. Replace the CF. | | |
| 1103 | File is not found. | Check whether the file exists. | | |
| 1104 | Project file was not found. | Rebuild the project. | | |
| 1105 | Object file was not found. | Rebuild the project. | | |
| 1106 | Point files were not found. | Rebuild the project. | | |
| 1107 | The program is using a feature that is not supported by the current controller firmware version. | | | |
| 1108 | One or more source files are updated. Please build the project. | Rebuild the project. | | |
| 1109 | Not enough storage capacity. | Increase free space of the USB memory. | | |
| 1110 | File is not found. | | | |
| 1120 | File failure. Setting file is corrupt. | Restore the controller configuration. | | |
| 1121 | File failure. Project file is corrupt. | Rebuild the project. | | |
| 1122 | File failure. Point file is corrupt. | Rebuild the project. | | |
| 1123 | File failure. I/O label file is corrupt. | Rebuild the project. | | |
| 1124 | File failure. User error file is corrupt. | Rebuild the project. | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|---|--------|--------|
| 1126 | File failure. Software option information is corrupt. | 1. Reboot the controller. 2. Reinstall the firmware. 3. Reconfigure the option. | | |
| 1127 | File failure. Vision file is corrupt. | Rebuild the project. | | |
| 1128 | File failure. Backup information file is corrupt. | The specified backup information cannot be restored. Acquire the backup information again, and then restore the file. | | |
| 1130 | Error message failure. No item is found in the error history. | No error history exists. Reboot the controller. | | |
| 1131 | Cannot access the USB memory. | Insert the USB memory properly. When this error still occurs after the USB memory is inserted properly, the memory may be unrecognizable to controller. Insert another memory to check the operation. | | |
| 1132 | File failure. Failed to copy the file. | | | |
| 1133 | File failure. Failed to delete the file. | | | |
| 1135 | File failure. The name of Playback is invalid. | | | |
| 1140 | File failure. Failed to open the object file. | Rebuild the project. | | |
| 1141 | File failure. Failed to open the project file. | Rebuild the project. | | |
| 1142 | File failure. Failed to read the project file. | Rebuild the project. | | |
| 1143 | File failure. Failed to open the condition save file. | 1. Retry using the same USB memory. 2. Retry using another USB memory. 3. Retry after rebooting the controller. | | |
| 1144 | File failure. Failed to write the condition save file. | 1. Retry using the same USB memory. 2. Retry using another USB memory. 3. Retry after rebooting the controller. | | |
| 1150 | File failure. Error history is invalid. | 1. Reboot the controller. 2. Replace the CF. | | |
| 1151 | File failure. Failed to map the error history. | 1. Reboot the controller. 2. Replace the CF. | | |
| 1152 | File failure. Failed to open the error history file. | 1. Reboot the controller. 2. Replace the CF. | | |
| 1153 | File failure. Failed to write the error history file. | 1. Reboot the controller. 2. Replace the CF. | | |
| 1155 | File failure. Failed to open the settings file. | Restore the controller configuration. | | |
| 1156 | File failure. Failed to save the settings file. | Restore the controller configuration. | | |
| 1157 | File failure. Failed to read the settings file. | Restore the controller configuration. | | |
| 1158 | File failure. Failed to write the settings file. | Restore the controller configuration. | | |

Maintenance 8. Trouble Shooting

| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|--|--------|--------|
| 1160 | MCD failure. Failed to open the MCD file. | Restore the controller configuration. | | |
| 1161 | MCD failure. Failed to read the MCD file. | Restore the controller configuration. | | |
| 1163 | MCD failure. Failed to save the MCD file. | Restore the controller configuration. | | |
| 1165 | MPD failure. Failed to open the MPD file. | | | |
| 1166 | MPD failure. Failed to read the MPD file. | | | |
| 1168 | MPD failure. Failed to save the MPD file. | | | |
| 1170 | MPL failure. Failed to open the MPL file. | 1. Reboot the controller. 2. Reinstall the firmware. | | |
| 1181 | PRM failure. Failed to replace the PRM file. | 1. Reboot the controller. 2. Reconfigure the robot. | | |
| 1185 | File failure. Failed to open the backup information file. | | | |
| 1186 | File failure. Failed to read the backup information file. | | | |
| 1187 | File failure. Failed to write the backup information file. | | | |
| 1188 | File failure. Failed to save the backup information file. | | | |
| 1189 | The backup data was created by an old version. | Cannot restore the controller configuration in the specified procedure for using old backup data. Check the backup data. | | |
| 1190 | The backup data was created by a newer version. | | | |
| 1191 | There is no project in the backup data. | | | |
| 1195 | File failure. Failed to map the health history. | Reboot the controller. | - | - |
| 1196 | File failure. Failed to open the health history file. | Reboot the controller. | - | - |
| 1197 | File failure. Failed to write the health history file. | Reboot the controller. | - | - |
| 1200 | Compile failure. Check the compile message. | This error occurs during compilation from TP. Correct where the error occurred. | | |
| 1201 | Link failure. Check the link message. | This error occurs during compilation from TP. Correct where the error occurred. | | |
| 1500 | Communication error. | | | |
| 1501 | Command did not complete in time. | Execute the command again after a while. Check the connection between the PC and controller. | | |
| 1502 | Communication disconnection between PC and Controller. Re-establish communication. | Check the connection between the PC and controller. | | |
| 1503 | Disconnection while executing a task. | Check the connection between the console device and controller. | | |
| 1510 | Out of IP Address range. | Check the IP address setting of the controller. | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|---|--------|--------|
| 1521 | Vision communication. Failed to initialize Ethernet. | Reboot the controller. | | |
| 1522 | Vision communication. Failed to terminate Ethernet. | | | |
| 1523 | Vision communication. Failed to create the socket handle. | Reboot the controller. | | |
| 1524 | Vision communication. Failed to connect. | Check the connection between the camera and controller. | | |
| 1526 | Vision communication. Failed to send to the server. | Check the connection between the camera and controller. | | |
| 1527 | Vision communication. Failed to read from the server. | Check the connection between the camera and controller. | | |
| 1528 | Vision communication. Failed to set option. | | | |
| 1529 | Vision communication. Ethernet has not been initialized yet. | Reboot the controller. | | |
| 1530 | Vision communication. Connection is not completed. | Check the connection of the camera and controller. | | |
| 1531 | Vision communication. All sockets are used. | | | |
| 1532 | Vision communication. Send timeout. | Check the connection between the camera and controller. | | |
| 1533 | Vision communication. Read timeout. | Check the connection between the camera and controller. | | |
| 1534 | Vision communication. Communication error. | Check the connection between the camera and controller. | | |
| 1550 | Communication failure. Ethernet initialization error. | Reboot the controller. Check the connection of the Ethernet cable. | | |
| 1551 | Communication failure. USB initialization error. | Reboot the controller. Check the connection of the USB cable. | | |
| 1552 | Communication failure. Controller internal communication error. | Reboot the controller. | | |
| 1553 | Communication failure. Invalid data is detected. | | | |
| 1555 | Ethernet transmission error. | Check the connection between the PC and controller. | | |
| 1556 | Ethernet reception error. | Check the connection between the PC and controller. If the router is used between the PC and controller, confirm that the DHCP function is disabled. | | |
| 1557 | USB transmission error. | Check the connection between the PC and controller. | | |
| 1558 | USB reception error. | Check the connection between the PC and controller. | | |
| 1559 | Communication failure. Failed to allocate memory. | | | |
| 1580 | Parser communication error. | 1. Reboot the controller. 2. Upgrade the firmware. | | |
| 1581 | Parser communication failure. Timeout error occurred during communication with parser. | 1. Reboot the controller. 2. Reinstall the firmware. | | |
| 1582 | Parser communication failure. Parser transmission error. | Reboot the controller. Rebuild the project. | | |

Maintenance 8. Trouble Shooting

| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|--|--------|--------|
| 1583 | Parser communication failure. Parser initialization error. | Reboot the controller. | | |
| 1584 | Parser communication failure. Connection error. | Reboot the controller. | | |
| 1585 | Parser communication failure. Parameter is invalid. | Reboot the controller. Rebuild the project. | | |
| 1586 | Parser communication failure. Busy. | | | |
| 1587 | Parser communication failure. Invalid data is detected. | Upgrade the firmware. | | |
| 1901 | Unsupported. Unsupported command was attempted. | Update the firmware. | | |
| 1902 | Unsupported. Unsupported parameter was specified. | | | |
| 1903 | System error. | | | |

Operator Panel

| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|--|--------|--------|
| 1600 | Initialization failure. Failed to initialize OP. | | | |
| 1603 | Timeout error occurred during communication with OP. | Check whether the cable is firmly connected. Replace the cable. | | |
| 1604 | Parity error occurred during communication with OP. | Check whether the cable is firmly connected. Replace the cable. | | |
| 1605 | Framing error occurred during communication with OP. | Check whether the cable is firmly connected. Replace the cable. | | |
| 1606 | Overrun error occurred during communication with OP. | Check whether the cable is firmly connected. Replace the cable. | | |
| 1607 | Checksum error occurred during communication with OP. | Check whether the cable is firmly connected. Replace the cable. | | |
| 1608 | Retry error occurred during communication with OP. | Check whether the cable is firmly connected. Replace the cable. | | |
| 1609 | OP cannot be connected. | Upgrade the controller software. Upgrade the OP firmware. | | |

Teach Pendant

| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|--------|--------|--------|
| 1700 | Initialization failure. Failed to initialize TP. | | | |
| 1701 | Initialization failure. Failed to initialize TP. | | | |
| 1702 | Initialization failure. Failed to initialize TP. | | | |
| 1703 | File failure. Failed to read the screen data file. | | | |
| 1704 | Failed to read the setting file. | | | |
| 1706 | Failed to open the TP port. | | | |
| 1708 | Failed to read the key table for TP. | | | |
| 1709 | Failed to change the language. | | | |
| 1710 | Failed to make the screen. | | | |

PC

| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|---|--------|--------|
| 1800 | The controller is already connected to a PC. | Only one PC can be connected to the controller. | | |
| 1802 | The command was attempted without being connected to a controller. | | | |
| 1803 | Failed to read or write the file on the PC. | | | |
| 1804 | Initialization failure. Failed to allocate memory on the PC. | | | |
| 1805 | Connection failure. Check the controller startup and connection of the communication cable. | | | |
| 1806 | Timeout during connection via Ethernet. | | | |
| 1807 | Timeout during connection via USB. | | | |
| 1808 | USB driver is not installed. | Failed to install EPSON RC+ 5.0. Install EPSON RC+ 5.0 again. | | |
| 1851 | Unsupported. Unsupported command was attempted. | | | |
| 1852 | System error. Uncommon error. | 1. Reboot the EPSON RC+5.0. 2. Reboot the PC. 3. Reinstall the EPSON RC+ 5.0. | | |

Simulator

| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|--|--------|--------|
| 1861 | Initialization failure. Failed to initialize SimulatorMNG. | 1. Reboot the EPSON RC+ 5.0. 2. Reboot the PC. 3. Reinstall the EPSON RC+ 5.0. | | |
| 1862 | Initialization failure. Failed to initialize WBProxy. | 1. Reboot the EPSON RC+ 5.0. 2. Reboot the PC. 3. Reinstall the EPSON RC+ 5.0. | | |
| 1863 | The parameter is invalid. | | | |
| 1864 | Initialization failure. Virtual controller does not exist. | Installation of EPSON RC+ 5.0 failed. Reinstall EPSON RC+ 5.0. | | |
| 1865 | Initialization failure. Failed to start virtual controller. | 1. Retry after a while. 2. Reboot the PC. | | |
| 1867 | Cannot execute because it is not dry run mode. | Dry run mode is invalid. Enable the dry run. | | |
| 1868 | Initialization failure. Directory cannot be found. | Installation of the EPSON RC+ 5.0 failed. Reinstall the software. | | |
| 1870 | Pallet failure. Number of point is beyond the maximum value. | | | |
| 1871 | Connection failure. Virtual controller version is old. | | | |
| 1872 | Connection failure. Files for simulator that used real controller cannot be found. | | | |
| 1873 | Connection failure. Files for simulator that used virtual controller cannot be found. | Register the virtual controller again in the connection setting. | | |
| 1874 | Virtual Controller cannot be added. | Installation of EPSON RC+ 5.0 failed. Reinstall the software. | | |
| 1875 | Simulator Object failure. Cannot register data of the simulator object. | | | |
| 1876 | Simulator Object failure. Cannot register data of the simulator object. | | | |
| 1877 | Simulator Object failure. Cannot remove data of the simulator object. | | | |
| 1878 | Simulator Object failure. Cannot update data of the simulator object. | | | |
| 1879 | Other virtual controllers are starting. | Start another EPSON RC+5.0 and check if it connects with the virtual controller. | | |
| 1880 | Cannot execute during controller reset. | | | |

Maintenance 8. Trouble Shooting

| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|--|--------|--------|
| 7750 | Initialization failure. | Reboot RC+. | | |
| 7751 | Failed to save the objects. | Reboot RC+. | | |
| 7752 | Failed to load the objects. | Reboot RC+. | | |
| 7753 | Failed to mapping of memory. | Reboot RC+. | | |
| 7754 | The virtual controller already exists. | Name of the virtual controller may be duplicated. Check the virtual controller name. | | |
| 7755 | Failed to create the virtual controller connection information. | Reboot RC+. | | |
| 7756 | The copy source of the virtual controller does not exist. | Check the virtual controller name. | | |
| 7757 | The copy destination of the virtual controller already exists. | Name of the virtual controller may be duplicated. Check the virtual controller name. | | |
| 7758 | Failed to copy the virtual controller connection information. | Reboot RC+. | | |
| 7759 | Failed to delete the virtual controller connection information. | Reboot RC+. | | |
| 7760 | Failed to delete the controller connection information. | Reboot RC+. | | |
| 7761 | Failed to rename the controller connection information. | Check the virtual controller name. | | |
| 7762 | The rename source of the virtual controller does not exist. | Check the virtual controller name. | | |
| 7763 | The rename destination of the virtual controller already exists. | Check the virtual controller name. | | |
| 7764 | Invalid Robot number. | Reboot RC+. | | |
| 7765 | Failed to read the Robot definition file. | Check whether the definition file exists. | | |
| 7766 | Failed to copy the layout objects. | Reboot RC+ | | |
| 7767 | Failed to cut the layout objects. | Reboot RC+ | | |
| 7768 | Failed to paste the layout objects. | Reboot RC+ | | |
| 7769 | Failed to remove the Robot. | Reboot RC+ | | |
| 7770 | Cannot execute with unsupported version. | Update RC+ to the latest version | | |

Interpreter

| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|--|--------|--------|
| 2000 | Unsupported. Unsupported command was attempted. | Rebuild the project. | | |
| 2001 | Unsupported. Unsupported motion command was attempted. | Rebuild the project. | | |
| 2002 | Unsupported. Unsupported conveyer command was attempted. | Rebuild the project. | | |
| 2003 | Unsupported. Unsupported Function argument was specified. | Rebuild the project. | | |
| 2004 | Unsupported. Unsupported Function return value was specified. | Rebuild the project. | | |
| 2005 | Unsupported. Unsupported condition was specified. | Rebuild the project. | | |
| 2006 | Unsupported. Unsupported I/O command was specified. | Rebuild the project. | | |
| 2007 | Unsupported condition was specified. | Cannot jog in the CP motion (default). | | |
| 2008 | Unsupported. Unknown error number. | Clicking the same jog button will operate the robot in the PTP motion. | | |
| 2009 | Unsupported. Invalid Task number. | Cannot jog in the CP motion (default). | | |
| 2010 | Object file error. Build the project. Out of internal code range. | Rebuild the project. | | |
| 2011 | Object file error. Build the project. Function argument error. | Rebuild the project. | | |
| 2012 | Object file error. Build the project. Command argument error. | Rebuild the project. | | |
| 2013 | Object file error. Build the project. Cannot process the code. | Rebuild the project. | | |
| 2014 | Object file error. Build the project. Cannot process the variable type code. | Rebuild the project. | | |
| 2015 | Object file error. Build the project. Cannot process the string type code. | Rebuild the project. | | |
| 2016 | Object file error. Build the project. Cannot process the variable category code. | Rebuild the project. | | |
| 2017 | Object file error. Build the project. Cannot process because of improper code. | Rebuild the project. | | |
| 2018 | Object file error. Build the project. Failed to calculate the variable size. | Rebuild the project. | | |
| 2019 | Object file error. Cannot process the variable wait. Build the project. | Rebuild the project. | | |
| 2020 | Stack table number exceeded. Function call or local variable is out of range. | Check whether no function is called infinitely. Reduce the Call function depth. | | |
| 2021 | Stack area size exceeded. Stack error. Function call or local variable is out of range. | If using many local variables, especially String type, replace them to global variables. | | |

Maintenance 8. Trouble Shooting

| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|---|--------|--------|
| 2022 | Stack failure. Required data not found on the stack. | Rebuild the project. | | |
| 2023 | Stack failure. Unexpected tag found on the stack. | Rebuild the project. | | |
| 2030 | System failure. Drive unit quantity is beyond the maximum count. | Restore the controller configuration. | | |
| 2031 | System failure. Robot number is beyond the maximum count. | Restore the controller configuration. | | |
| 2032 | System failure. Task number compliance error. | Rebuild the project. | | |
| 2033 | System failure. Too many errors. | Remedy the errors occurring frequently. | | |
| 2040 | Thread failure. Failed to create the thread. | Reboot the controller. | | |
| 2041 | Thread failure. Thread creation timeout. | Reboot the controller. | | |
| 2042 | Thread failure. Thread termination timeout. | Reboot the controller. | | |
| 2043 | Thread failure. Thread termination timeout. | Reboot the controller. | | |
| 2044 | Thread failure. Daemon process timeout. | Reboot the controller. | | |
| 2045 | Thread failure. Task continuance wait timeout. | Reboot the controller. | | |
| 2046 | Thread failure. Task stop wait timeout. | Reboot the controller. | | |
| 2047 | Thread failure. Task startup wait timeout. | Reboot the controller. | | |
| 2050 | Object file operation failure. Object file size is beyond the allowable size. | Rebuild the project. | | |
| 2051 | Object file operation failure. Cannot delete the object file during execution. | Reboot the controller. | | |
| 2052 | Object file operation failure. Cannot allocate the memory for the object file. | Reboot the controller. | | |
| 2053 | Object file update. Updating the object file. | Perform the same processing after a while. Rebuild the project. | | |
| 2054 | Object file operation failure. Synchronize the project. Function ID failure. | Synchronize the files of the project. Rebuild the project. | | |
| 2055 | Object file operation failure. Synchronize the project. Local variable ID failure. | Synchronize the files of the project. Rebuild the project. | | |
| 2056 | Object file operation failure. Synchronize the project. variable ID failure. | Synchronize the files of the project. Rebuild the project. | | |
| 2057 | Object file operation failure. Synchronize the project. Global Preserve variable ID failure. | Synchronize the files of the project. Rebuild the project. | | |
| 2058 | Object file operation failure. Failed to calculate the variable size. | Synchronize the files of the project. Rebuild the project. | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|--|--------------|-------------------------------|
| 2059 | Exceed the global variable area. Cannot assign the Global variable area. | Reduce the number of Global variables to be used. | | |
| 2070 | SRAM failure. SRAM is not mapped. | Replace the CPU board. | | |
| 2071 | SRAM failure. Cannot delete when Global Preserve variable is in use. | Perform the same processing after a while. Rebuild the project. | | |
| 2072 | Exceed the backup variable area. Cannot assign the Global Preserve variable area. | Reduce the number of Global Preserve variables to be used. | Maximum size | The size you attempted to use |
| 2073 | SRAM failure. Failed to clear the Global Preserve variable area. | Rebuild the project. | | |
| 2074 | SRAM failure. to clean up the Global Preserve variable save area. | Reboot the controller. | | |
| 2100 | Initialization failure. Failed to open the initialization file. | Restore the controller configuration. | | |
| 2101 | Initialization failure. Duplicated initialization. | Reboot the controller. | | |
| 2102 | Initialization failure. Failed to initialize MNG. | Reboot the controller. | | |
| 2103 | Initialization failure. Failed to create an event. | Reboot the controller. | | |
| 2104 | Initialization failure. Failed to setup a priority. | Reboot the controller. | | |
| 2105 | Initialization failure. Failed to setup the stack size. | Reboot the controller. | | |
| 2106 | Initialization failure. Failed to setup an interrupt process. | Reboot the controller. | | |
| 2107 | Initialization failure. Failed to start an interrupt process. | Reboot the controller. | | |
| 2108 | Initialization failure. Failed to stop an interrupt process. | Reboot the controller. | | |
| 2109 | Initialization failure. Failed to terminate MNG. | Reboot the controller. | | |
| 2110 | Initialization failure. Failed to allocate memory. | Reboot the controller. | | |
| 2111 | Initialization failure. Failed to initialize motion. | Restore the controller configuration. | | |
| 2112 | Initialization failure. Failed to terminate motion. | Reboot the controller. | | |
| 2113 | Initialization failure. Failed to map SRAM. | Replace the CPU board. | | |
| 2114 | Initialization failure. Failed to register SRAM. | Replace the CPU board. | | |
| 2115 | Initialization failure. Fieldbus board is beyond the maximum count. | Check the number of fieldbus boards. | | |
| 2116 | Initialization failure. Failed to initialize fieldbus. | Reboot the controller. Check the fieldbus board. Replace the fieldbus board. | | |
| 2117 | Initialization failure. Failed to terminate fieldbus. | Reboot the controller. | | |

Maintenance 8. Trouble Shooting

| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|---|--------|--------|
| 2118 | Initialization failure. Failed to open motion. | Restore the controller configuration. | | |
| 2119 | Initialization failure. Failed to initialize conveyor tracking. | Make sure the settings of conveyor and encoder are correct. | | |
| 2120 | Initialization failure. Failed to allocate the system area. | Reboot the controller. | | |
| 2121 | Initialization failure. Failed to allocate the object file area. | Reboot the controller. | | |
| 2122 | Initialization failure. Failed to allocate the robot area. | Reboot the controller. | | |
| 2123 | Initialization failure. Failed to create event. | Reboot the controller. | | |
| 2124 | Initialization failure. Failed to create the simulator data file. | | | |
| 2130 | MCD failure. Failed to open the MCD file. | Restore the controller configuration. | | |
| 2131 | MCD failure. Failed to map the MCD file. | Restore the controller configuration. | | |
| 2132 | PRM failure. PRM file cannot be found. | Restore the controller configuration. | | |
| 2133 | PRM failure. Failed to map the PRM file. | Restore the controller configuration. | | |
| 2134 | PRM failure. PRM file contents error. | Restore the controller configuration. | | |
| 2135 | PRM failure. Failed to convert the PRM file. | Reboot the controller. | | |
| 2136 | PRM failure. Failed to convert the PRM file. | Reboot the controller. | | |
| 2137 | PRM failure. Failed to convert the PRM file. | Reboot the controller. | | |
| 2150 | Operation failure. Task number cannot be found. | Reboot the Controller. | | |
| 2151 | Operation failure. Executing the task. | Reboot the Controller. | | |
| 2152 | Operation failure. Object code size failure. | Reboot the Controller. | | |
| 2153 | Operation failure. Jog parameter failure. | Reboot the Controller. | | |
| 2154 | Operation failure. Executing jog. | Reboot the Controller. | | |
| 2155 | Operation failure. Cannot execute the jog function. | Reboot the Controller. | | |
| 2156 | Operation failure. Jog data is not configured. | Reboot the Controller. | | |
| 2157 | Operation failure. Failed to change the jog parameter. | Reboot the Controller. | | |
| 2158 | Operation failure. Failed to allocate the area for the break point. | Reboot the Controller. | | |
| 2159 | Operation failure. Break point number is beyond the allowable setup count. | Reduce the break points. | | |
| 2160 | Operation failure. Failed to allocate the function ID. | Reboot the Controller. | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|--|--------|--------|
| 2161 | Operation failure. Failed to allocate the local variable address. | Reboot the Controller. | | |
| 2162 | Operation failure. Not enough buffer to store the local variable. | Review the size of the Local variable. | | |
| 2163 | Operation failure. Value change is available only when the task is halted. | Halt the task by the break point. | | |
| 2164 | Operation failure. Failed to allocate the global variable address. | Review the size of the global variable. | | |
| 2165 | Operation failure. Not enough buffer to store the global variable. | Review the size of the global variable. | | |
| 2166 | Operation failure. Failed to obtain the Global Preserve variable address. | Review the size of the global preserve variable. | | |
| 2167 | Operation failure. Not enough buffer to store the Global Preserve variable. | Review the size of the global preserve variable. | | |
| 2168 | Operation failure. SRAM is not mapped. | Reboot the Controller. | | |
| 2169 | Operation failure. Cannot clear the Global Preserve variable when loading the object file. | Reboot the Controller. | | |
| 2170 | Operation failure. Not enough buffer to store the string. | Check the size of the string variable. | | |
| 2171 | Operation failure. Cannot start the task after low voltage was detected. | Check the controller power. Reboot the Controller. | | |
| 2172 | Operation failure. Duplicated remote I/O configuration. | Reboot the Controller. | | |
| 2173 | Remote setup error. Cannot assign non-existing input number to remote function. | Check the I/O input number. | | |
| 2174 | Remote setup error. Cannot assign non-existing output number to remote function. | Check the I/O output number. | | |
| 2175 | Operation failure. Remote function is not configured. | Reboot the Controller. | | |
| 2176 | Operation failure. Event wait error. | Reboot the Controller. | | |
| 2177 | Operation failure. System backup failed. | Reboot the Controller. Install the Controller firmware. | | |
| 2178 | Operation failure. System restore failed. | Reboot the Controller. Install the Controller firmware. | | |
| 2179 | Remote setup error. Cannot assign same input number to some remote functions. | Check the remote setting. | | |
| 2180 | Remote setup error. Cannot assign same output number to some remote functions. | Check the remote setting. | | |
| 2190 | Cannot calculate because it was queue data. | Review the program. | | |

Maintenance 8. Trouble Shooting

| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|--|--|--------|
| 2192 | Cannot execute AbortMotion because robot task is already finished. | Task is completed. Review the program. | | |
| 2193 | Cannot execute Recover without motion because AbortMotion was not executed. | Execute AbortMotion in advance to execute Recover WithoutMove. | | |
| 2194 | Conveyor setting error. | Make sure the settings of conveyor and encoder are correct. | | |
| 2195 | Conveyor setting error. | Make sure the settings of conveyor and encoder are correct. | | |
| 2196 | Conveyor number is out of range. | Make sure the settings of conveyor and encoder are correct. | | |
| 2200 | Robot in use. Cannot execute the motion command when other tasks are using the robot. | The motion command for the robot cannot be simultaneously executed from more than one task. Review the program. | | |
| 2201 | Robot does not exist. | Check whether the robot setting is performed properly. Restore the controller configuration. | | |
| 2202 | Motion control module status failure. Unknown error was returned. | Rebuild the project. | | |
| 2203 | Cannot clear local number '0'. | The Local number 0 cannot be cleared. Review the program. | | |
| 2204 | Cannot clear an arm while in use. | The Arm cannot be cleared while it is in use. Check whether the Arm is not used. | The Arm number you attempted to clear | |
| 2205 | Cannot clear arm number '0'. | The Arm number 0 cannot be cleared. Review the program. | | |
| 2206 | Cannot clear a tool while in use. | The Tool cannot be cleared while it is in use. Check whether the Tool is not used. | The Tool number you attempted to clear | |
| 2207 | Cannot clear tool number '0'. | The Tool number 0 cannot be cleared. Review the program. | | |
| 2208 | Cannot clear ECP '0'. | The ECP number 0 cannot be cleared. Review the program. | | |
| 2209 | Cannot clear an ECP while in use. | The ECP cannot be cleared while it is in use. Check whether the ECP is not used. | The ECP number you attempted to clear | |
| 2210 | Cannot specify '0' as the local number. | The command processing the Local cannot specify the Local number 0. Review the program. | | |
| 2216 | Box number is out of range. | Available Box numbers are from 1 to 15. Review the program. | | |
| 2217 | Box number is not defined. | Specified Box is not defined. Review the Box number. | | |
| 2218 | Plane number is out of range. | Available Box numbers are from 1 to 15. Review the program. | | |
| 2219 | Plane number is not defined. | Specified Plane is not defined. Review the Plane number. | | |
| 2220 | PRM failure. No PRM file data is found. | Reboot the controller. Restore the controller configuration. | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|---|---|-------------------------|
| 2221 | PRM failure. Failed to flash the PRM file. | Reboot the controller. Restore the controller configuration. | | |
| 2222 | Local number is not defined. | Check the Local setting. Review the program. | The specified Local number | |
| 2223 | Local number is out of range. | Available Local number is from 1 to 15. Review the program. | The specified Local number | |
| 2224 | Unsupported. MCOFS is not defined | | | |
| 2225 | CalPIs is not defined. | Check the CalPIs setting. | | |
| 2226 | Arm number is out of range. | Available Arm number is from 0 to 3. Depending on commands, the Arm number 0 is not available. Review the program. | The specified Arm number | |
| 2227 | Arm number is not defined. | Check the Arm setting. Review the program. | The specified Arm number | |
| 2228 | Pulse for the home position is not defined. | Check the HomeSet setting. | | |
| 2229 | Tool number is out of range. | Available Tool number is from 0 to 3. Depending on commands, the Tool number 0 is not available. Review the program. | The specified Tool number | |
| 2230 | Tool number is not defined. | Check the Tool setting. Review the program. | The specified Tool number | |
| 2231 | ECP number is out of range. | Available Tool number is from 0 to 15. Depending on commands, the Tool number 0 is not available. Review the program. | The specified ECP number | |
| 2232 | ECP number is not defined. | Check the ECP setting. Review the program. | The specified ECP number | |
| 2233 | Axis to reset the encoder was not specified. | Be sure to specify the axis for encoder reset. | | |
| 2234 | Cannot reset the encoder with motor in the on state. | Turn the motor power OFF before reset. | | |
| 2235 | XYLIM is not defined. | Check the XYLim setting. Review the program. | | |
| 2236 | PRM failure. Failed to set up the PRM file contents to the motion control status module. | Reboot the controller. Restore the controller configuration. | | |
| 2240 | Array subscript is out of user defined range. Cannot access or update beyond array bounds. | Check the array subscript. Review the program. | The dimensions exceeding the definition | The specified subscript |
| 2241 | Dimensions of array do not match the declaration. | Check the array's dimensions. Review the program. | | |
| 2242 | Zero '0' was used as a divisor. | Review the program. | | |
| 2243 | Variable overflow. Specified variable was beyond the maximum allowed value. | Check the variable type and calculation result. Review the program. | | |
| 2244 | Variable underflow. Specified variable was below the minimum allowed value. | Check the variable type and calculation result. Review the program. | | |
| 2245 | Cannot execute this command with a floating point number. | This command cannot be executed for Real or Double type. Review the program. | | |

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| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|---|--------------------------------|--|
| 2246 | Cannot calculate the specified value using the Tan function. | Check the specified value. Review the program. | The specified value | |
| 2247 | Specified array subscript is less than '0'. | Check the specified value. Review the program. | The specified value | |
| 2248 | Array failure. Redim can only be executed for an array variable. | You attempted to redimension the variable that is not array. Rebuild the project. | | |
| 2249 | Array failure. Cannot specify Preserve for other than a single dimension array. | Other than a single dimension array was specified as Preserve for Redim. Rebuild the project. | | |
| 2250 | Array failure. Failed to calculate the size of the variable area. | Rebuild the project. | | |
| 2251 | Cannot allocate enough memory for Redim statement. | Reduce the number of subscripts to be specified for Redim. Perform Redim modestly. | | |
| 2252 | Cannot allocate enough memory for ByRef. | Reduce the number of array's subscripts to be seen by ByRef. | | |
| 2253 | Cannot compare characters with values. | Check whether the string type and the numeric data type are not compared. Review the program. | | |
| 2254 | Specified data is beyond the array bounds. Cannot refer or update beyond the array bounds. | Check the number of array's subscripts and data. Review the program. | The number of array subscripts | The number of data to be referred or updated |
| 2255 | Variable overflow or underflow. Specified variable is out of value range. | The value that exceeds the range of Double type is specified. Review the program. | | |
| 2256 | Specified array subscript is beyond the maximum allowed range. | Reduce the number of subscripts to be specified. For available subscripts, see the online help. | | |
| 2260 | Task number is out of the available range. | For available task number, see the online help. Review the program. | The specified task number | |
| 2261 | Specified task number does not exist. | Review the program. | The specified task number | |
| 2262 | Robot number is out of the available range. | The available Robot number is 1. Review the program. | The specified robot number | |
| 2263 | Output number is out of the available range. The Port No. or the Device No. is out of the available range. | For available output number, see the online help. Review the program. | The specified output number | |
| 2264 | Command argument is out of the available range. Check the validation. Added data 1: Passed value. Added data 2: argument order. | For available range of argument, see the online help. Review the program. | The specified value | What number argument? |
| 2265 | Joint number is out of the available range. | Available Joint number is from 1 to 6. Review the program. | The specified joint number | |
| 2266 | Wait time is out of available range. | Available wait time is from 0 to 2147483. Review the program. | The specified wait time | |
| 2267 | Timer number is out of available range. | Available timer number is from 0 to 15. Review the program. | The specified timer number | |
| 2268 | Trap number is out of available range. | Available trap number is from 1 to 4. Review the program. | The specified trap number | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|---|---------------------------------|--|
| 2269 | Language ID is out of available range. | For available language ID, see the online help. Review the program. | The specified language ID | |
| 2270 | Specified D parameter value at the parallel process is out of available range. | Available D parameter value is from 0 to 100. Review the program. | The specified D parameter value | |
| 2271 | Arch number is out of available range. | Available arch number is from 0 to 7. Review the program. | The specified arch number | |
| 2272 | Device No. is out of available range. | The specified number representing a control device or display device is out of available range. For available device number, see the online help. Review the program. | The specified device number | |
| 2273 | Output data is out of available range. | Available output data value is from 0 to 255. Review the program. | Output data | What number byte data is out of range? |
| 2274 | Asin argument is out of available range. Range is from -1 to 1. | Review the program. | | |
| 2275 | Acos argument is out of available range. Range is from -1 to 1. | Review the program. | | |
| 2276 | Sqr argument is out of available range. | Review the program. | | |
| 2277 | Randomize argument is out of available range. | Review the program. | | |
| 2278 | Sin, Cos, Tan argument is out of available range. | Review the program. | | |
| 2280 | Timeout period set by the TMOUt statement expired before the wait condition was completed in the WAIT statement. | Investigate the cause of timeout. Check whether the set timeout period is proper. | Timeout period | |
| 2281 | Timeout period set by TMOUt statement in WaitSig statement or SyncLock statement expired. | Investigate the cause of timeout. Check whether the set timeout period is proper. | Signal number | Timeout period |
| 2282 | Timeout period set by TMOUt statement in WaitNet statement expired. | Investigate the cause of timeout. Check whether the set timeout period is proper. | Port number | Timeout period |
| 2283 | Timeout. Timeout at display device setting. | Reboot the controller. | | |
| 2290 | Cannot execute a motion command. | Cannot execute the motion command after using the user function in the motion command. Review the program. | | |
| 2291 | Cannot execute the OnErr command. | Cannot execute OnErr in the motion command when using user function in the motion command. Review the program. | | |
| 2292 | Cannot execute an I/O command while the safeguard is open. Need Forced. | I/O command cannot be executed while the safeguard is open. Review the program. | | |
| 2293 | Cannot execute an I/O command during emergency stop condition. Need Forced. | I/O command cannot be executed during emergency stop condition. Review the program. | | |
| 2294 | Cannot execute an I/O command when an error has been detected. Need Forced. | I/O command cannot be executed while an error occurs. Review the program. | | |
| 2295 | Cannot execute this command from a NoEmgAbort Task. | For details on inexecutable commands, refer to the online help. Review the program. | | |

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| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|---|-------------------------------------|--------|
| 2296 | One or more source files are updated. Please build the project. | Rebuild the project. | | |
| 2297 | Cannot execute an I/O command in TEACH mode without the Forced parameter. | I/O command cannot be executed in TEACH mode. Review the program. | | |
| 2298 | Cannot continue execution in Trap SGClose process. | You cannot execute Cont and Recover statements with processing task of Trap SGClose. | | |
| 2299 | Cannot execute this command. Need the setting. | Enable the [enable the advance taskcontrol commands] from RC+ to execute the command. | | |
| 2300 | Robot in use. Cannot execute the motion command when other task is using the robot. | The motion command for the robot cannot be simultaneously executed from more than one task. Review the program. | Task number that is using the robot | |
| 2301 | Cannot execute the motion command when the Enable Switch is OFF. | Execute the motion command with the enable switch gripped. | | |
| 2302 | Cannot execute a Call statement in a Trap Call process. | Another function cannot be called from the function called by Trap Call. Review the program. | | |
| 2303 | Cannot execute a Call statement in a parallel process. | Review the program. | | |
| 2304 | Cannot execute an Xqt statement in a parallel process. | Review the program. | | |
| 2305 | Cannot execute a Call statement from the command window. | Execute Call from the program. | | |
| 2306 | Cannot execute an Xqt statement from the task started by Trap Xqt. | Review the program. | | |
| 2307 | Cannot execute this command while tasks are executing. | Check whether all tasks are completed. | | |
| 2308 | Cannot turn on the motor because of a critical error. | Find the previously occurring error in the error history and resolve its cause. Then, reboot the controller. | | |
| 2309 | Cannot execute a motion command while the safeguard is open. | Check the safeguard status. | | |
| 2310 | Cannot execute a motion command while waiting for continue. | Execute the Continue or Stop and then execute the motion command. | | |
| 2311 | Cannot execute a motion command during the continue process. | Wait until the Continue is complete and then execute the motion command. | | |
| 2312 | Cannot execute a task during emergency stop condition. | Check the emergency stop status. | | |
| 2313 | Cannot continue execution immediately after opening the safeguard. | Wait 1.5 seconds after the safeguard is open, and then execute the Continue. | | |
| 2314 | Cannot continue execution while the safeguard is open. | Check the safeguard status. | | |
| 2315 | Duplicate execution continue. | Wait until the Continue is completed. | | |
| 2316 | Cannot continue execution after an error has been detected. | Check the error status. | | |
| 2317 | Cannot execute the task when an error has been detected. | Reset the error by Reset and then execute the task. | | |
| 2318 | Cannot execute a motion command when an error has been detected. | Execute the motion command after resetting the error by Reset. | | |
| 2319 | Cannot execute a I/O command during emergency stop condition. | Check the emergency stop status. | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|--|---------------------|--------------------------|
| 2320 | Function failure. Argument type does not match. | Rebuild the project. | | |
| 2321 | Function failure. Return value does not match to the function. | Rebuild the project. | | |
| 2322 | Function failure. ByRef type does not match. | Rebuild the project. | | |
| 2323 | Function failure. Failed to process the ByRef parameter. | Rebuild the project. | | |
| 2324 | Function failure. Dimension of the ByRef parameter does not match. | Rebuild the project. | | |
| 2325 | Function failure. Cannot use ByRef in an Xqt statement. | Rebuild the project. | | |
| 2326 | Cannot execute a Dll Call statement from the command window. | Execute Dll Call from the program. | | |
| 2327 | Failed to execute a Dll Call. | Check the DLL. Review the program. | | |
| 2328 | Cannot execute the task before connect with RC+. | You need to connect with RC+ before executing the task. | | |
| 2329 | Cannot execute a Eval statement in a Trap Call process. | Check the program. | | |
| 2330 | Trap failure. Cannot use the argument in Trap Call or Xqt statement. | Check the program. | | |
| 2331 | Trap failure. Failed to process Trap Goto statement. | Rebuild the project. | | |
| 2332 | Trap failure. Failed to process Trap Goto statement. | Rebuild the project. | | |
| 2333 | Trap failure. Trap is already in process. | Rebuild the project. | | |
| 2334 | Cannot execute a Eval statement in a Trap Finish and Trap Abort process. | Check the program. | | |
| 2335 | Cannot continue execution and Reset Error in TEACH mode. | Check the program. | | |
| 2336 | Cannot use Here statement with a parallel process. | Go Here :Z(0) ! D10; MemOn(1) ! is not executable. Change the program to: P999 = Here Go P999 Here :Z(0) ! D10; MemOn(1) ! | | |
| 2337 | Cannot execute except from the event handler function of GUI Builder | Review the program. | | |
| 2340 | Value allocated in InBCD function is an invalid BCD value. | Review the program. | Tens digit | Units digit |
| 2341 | Specified value in the OpBCD statement is an invalid BCD value. | Review the program. | The specified value | |
| 2342 | Cannot change the status for output bit configured as remote output. | Check the remote I/O setting. | I/O number | 1: bit, 2: byte, 3: word |
| 2343 | Output time for asynchronous output commanded by On or Off statement is out of the available range. | Review the program. | The specified time | |
| 2344 | I/O input/output bit number. is out of available range or the board is not installed. | Review the program. Check whether the expansion I/O board and Fieldbus I/O board are correctly detected. | Bit number | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|---|------------------------|--------|
| 2345 | I/O input/output byte number is out of available range or the board is not installed. | Review the program. Check whether the expansion I/O board and Fieldbus I/O board are correctly detected. | Byte number | |
| 2346 | I/O input/output word No. is out of available range or the board is not installed. | Review the program. Check whether the expansion I/O board and Fieldbus I/O board are correctly detected. | Word number | |
| 2347 | Memory I/O bit number is out of available range. | Review the program. | Bit number | |
| 2348 | Memory I/O byte number is out of available range. | Review the program. | Byte number | |
| 2349 | Memory I/O word number is out of available range. | Review the program. | Word number | |
| 2350 | Command allowed only when virtual I/O mode is active. | The command can be executed only for virtual I/O mode. | | |
| 2351 | Cannot change the status for CC-Link system area. | | | |
| 2352 | Remote setup error. Cannot assign CC-Link system area to remote function. | | | |
| 2360 | File failure. Failed to open the configuration file. | Restore the controller configuration. | | |
| 2361 | File failure. Failed to close the configuration file. | Restore the controller configuration. | | |
| 2362 | File failure. Failed to open the key of the configuration file. | Restore the controller configuration. | | |
| 2363 | File failure. Failed to obtain the string from the configuration file. | Restore the controller configuration. | | |
| 2364 | File failure. Failed to write in the configuration file. | Restore the controller configuration. | | |
| 2365 | File failure. Failed to update the configuration file. | Restore the controller configuration. | | |
| 2370 | The string combination exceeds the maximum string length. | The maximum string length is 255. Review the program. | Combined string length | |
| 2371 | String length is out of range. | The maximum string length is 255. Review the program. | The specified length | |
| 2372 | Invalid character is specified after the ampersand in the Val function. | Review the program. | | |
| 2373 | Illegal string specified for the Val function. | Review the program. | | |
| 2374 | String Failure. Invalid character code in the string. | Review the program. | | |
| 2380 | Cannot use ' 0 ' for Step value in For...Next. | Check the Step value. | | |
| 2381 | Relation between For...Next and GoSub is invalid. Going in or out of a For...Next using a Goto statement. | Review the program. | | |
| 2382 | Cannot execute Return while executing OnErr. | Review the program. | | |
| 2383 | Return was used without GoSub. Review the program. | Review the program. | | |
| 2384 | Case or Send was used without Select. Review the program. | Review the program. | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|---|-------------|-----------|
| 2385 | Cannot execute EResume while executing GoSub. | Review the program. | | |
| 2386 | EResume was used without OnErr. Review the program. | Review the program. | | |
| 2400 | Curve failure. Failed to open the Curve file. | Reboot the controller. Create a Curve file again. | | |
| 2401 | Curve failure. Failed to allocate the header data of the curve file. | Reboot the controller. Create a Curve file again. | | |
| 2402 | Curve failure. Failed to write the curve file. | Reboot the controller. Create a Curve file again. | | |
| 2403 | Curve failure. Failed to open the curve file. | Reboot the controller. Create a Curve file again. | | |
| 2404 | Curve failure. Failed to update the curve file. | Reboot the controller. Create a Curve file again. | | |
| 2405 | Curve failure. Failed to read the curve file. | Reboot the controller. Create a Curve file again. | | |
| 2406 | Curve failure. Curve file is corrupt. | Reboot the controller. Create a Curve file again. | | |
| 2407 | Curve failure. Specified a file other than the curve file. | Reboot the controller. Create a Curve file again. | | |
| 2408 | Curve failure. Version of the curve file is invalid. | Reboot the controller. Create a Curve file again. | | |
| 2409 | Curve failure. Robot number in the curve file is invalid. | Reboot the controller. Create a Curve file again. | | |
| 2410 | Curve failure. Cannot allocate enough memory for the CVMove statement. | Reboot the controller. | | |
| 2411 | Specified point data in the Curve statement is beyond the maximum count. | The maximum number of points specified in the Curve statement is 200. Review the program. | | |
| 2412 | Specified number of output commands in the Curve statement is beyond the maximum count. | The maximum number of output commands specified in the Curve statement is 16. Review the program. | | |
| 2413 | Curve failure. Specified internal code is beyond the allowable size in Curve statement. | Reboot the controller. | | |
| 2414 | Specified continue point data P(:) is beyond the maximum count. | The maximum number of points specified continuously is 200. Review the program. | Start point | End point |
| 2415 | Curve failure. Cannot create the curve file. | Reboot the controller. Create a Curve file again. | | |
| 2416 | Curve file does not exist. | Check whether the specified Curve file name is correct. | | |
| 2417 | Curve failure. Output command is specified before the point data. | Check whether no output command is specified before the point data. | | |
| 2418 | Curve file name is too long. | Check whether the specified Curve file name is correct. The maximum string length of the file name is 32. | | |
| 2419 | Curve failure. Curve file path is too long. | Check whether the specified Curve file name is correct. | | |
| 2420 | Curve file name is invalid. | | | |
| 2430 | Error message failure. Error message file does not exist. | Reboot the controller. | | |

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| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|---|--------|--------|
| 2431 | Error message failure. Failed to open the error message file. | Reboot the controller. | | |
| 2432 | Error message failure. Failed to obtain the header data of the error message file. | Reboot the controller. | | |
| 2433 | Error message failure. Error message file is corrupted. | Reboot the controller. | | |
| 2434 | Error message failure. Specified a file other than the error message file. | Reboot the controller. | | |
| 2435 | Error message failure. Version of the error message file is invalid. | Reboot the controller. | | |
| 2440 | File Error. File number is used. | Check the file number. | | |
| 2441 | File Error. Failed to open the file. | Make sure the file exists and you specified the file correctly. | | |
| 2442 | File Error. The file is not open. | Open the file in advance. | | |
| 2443 | File Error. The file number is being used by another task. | Check the program. | | |
| 2444 | File Error. Failed to close the file. | Check the file. | | |
| 2445 | File Error. File seek failed. | Review the program. Check the pointer setting. | | |
| 2446 | File Error. All file numbers are being used. | Close unnecessary files. | | |
| 2447 | File Error. No read permission. | Use ROpen or UOpen that has read access to the file. | | |
| 2448 | File Error. No write permission. | Use WOpen or UOpen that has write access to the file. | | |
| 2449 | File Error. No binary permission. | Use BOpen that has binary access to the file. | | |
| 2450 | File Error. Failed to access the file. | Check the file. | | |
| 2451 | File Error. Failed to write the file. | Check the file. | | |
| 2452 | File Error. Failed to read the file. | Check the file. | | |
| 2453 | File Error. Cannot execute the commnad for current disk. | The specified command is not available in the current disk (ChDisk). | | |
| 2454 | File Error. Invalid disk. | Review the program. | | |
| 2455 | File Error. Invalid drive. | Review the program. | | |
| 2456 | File Error. Invalid folder. | Review the program. | | |
| 2460 | Database Error. The database number is already being used. | Review the program. Specify the number of other database. Close the database. | | |
| 2461 | Database Error. The database is not open. | Review the program. Open the database. | | |
| 2462 | Database Error. The database number is being used by another task. | Review the program. | | |
| 2470 | Windows Communication Error. Invalid status. | Reboot the Controller. Rebuild the project. | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|---|---------------------------|--------|
| 2471 | Windows Communication Error. Invalid answer. | Reboot the Controller. Rebuild the project. | | |
| 2472 | Windows Communication Error. Already initialized. | Reboot the Controller. | | |
| 2473 | Windows Communication Error. Busy. | Reboot the Controller. Rebuild the project. | | |
| 2474 | Windows Communication Error. No request. | Reboot the Controller. Rebuild the project. | | |
| 2475 | Windows Communication Error. Data buffer overflow. | Reduce the data volume. Review the program. | | |
| 2476 | Windows Communication Error. Failed to wait for event. | Reboot the Controller. | | |
| 2477 | Windows Communication Error. Invalid folder. | Make sure the specified folder is correct. | | |
| 2478 | Windows Communication Error. Invalid error code. | Rebuild the project. | | |
| 2500 | Specified event condition for Wait is beyond the maximum count. | The maximum number of event conditions is 8. Review the program. | | |
| 2501 | Specified bit number in the Ctr function was not setup with a CTRreset statement. | Review the program. | The specified bit number | |
| 2502 | Task number is beyond the maximum count to execute. | The available number of the tasks that can be executed simultaneously is 16. Review the program. | | |
| 2503 | Cannot execute Xqt when the specified task number is already executing. | Review the program. | The specified task number | |
| 2504 | Task failure. Specified manipulator is already executing a parallel process. | Rebuild the project. | | |
| 2505 | Not enough data for Input statement variable assignment. | Check the content of communication data. Review the program. | | |
| 2506 | Specified variable for the Input statement is beyond the maximum count. | For OP, only one variable can be specified. For other devices, up to 32 variables can be specified. | | |
| 2507 | All counters are in use and cannot setup a new counter with CTRreset. | The available number of the counters that can be set simultaneously is 16. Review the program. | | |
| 2508 | OnErr failure. Failed to process the OnErr statement. | Rebuild the project. | | |
| 2509 | OnErr failure. Failed to process the OnErr statement. | Rebuild the project. | | |
| 2510 | Specified I/O label is not defined. | The specified I/O label is not registered. Check the I/O label file. | | |
| 2511 | SyncUnlock statement is used without executing a previous SyncLock statement. Review the program. | Review the program. | Signal number | |
| 2512 | SyncLock statement was already executed. | The SyncLock statement cannot be executed for the second time in a row. Review the program. | Signal number | |
| 2513 | Specified point label is not defined. | The specified point label is not registered. Check the point file. | | |
| 2514 | Failed to obtain the motor on time of the robot. | Reboot the controller. | | |
| 2515 | Failed to configure the date or the time. | Check whether a date and time is set correctly. | | |

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| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|---|-------------|-----------|
| 2516 | Failed to obtain the debug data or to initialize. | Reboot the controller. | | |
| 2517 | Failed to convert into date or time. | Check the time set on the controller. Reboot the controller. | | |
| 2518 | Larger number was specified for the start point data than the end point data . | Specify a larger number for the end point data than that for the start point data. | Start point | End point |
| 2519 | Specified the format for FmtStr\$ can not understand. | Check the format. | | |
| 2520 | Point file name is too long. | Check whether the specified point file name is correct. The maximum string length of the file name is 32. | | |
| 2521 | Point failure. Point file path is too long. | Check whether the specified point file name is correct. | | |
| 2522 | Point file name is invalid. | Make sure you don't use improper characters for file name. | | |
| 2523 | The continue process was already executed. | Review the program. | | |
| 2524 | Cannot execute Xqt when the specified trap number is already executing. | Review the program. | | |
| 2525 | Password is invalid. | Check whether a password is set correctly. | | |
| 2526 | No wait terms. | Rebuild the project. | | |
| 2527 | Too many variables used for global variable wait. | Review the program. | | |
| 2528 | The variables cannot use global variable wait. | Review the program. | | |
| 2529 | Cannot use Byref if the variables used for global variable wait. | Review the program. | | |
| 2530 | Too many point files. | Check the point file. | | |
| 2531 | The point file is used by another robot. | Review the program. | | |
| 2532 | Cannot calculate the point position because there is undefined data. | Check the point data. | | |
| 2533 | Error on INP or OUTP. | Review the program. | | |
| 2534 | No main function to start on Restart statement. | Without executing main function, Restart is called. | | |
| 2535 | Does not allow Enable setting in Teach mode to be changed. | Setup the authority. | | |
| 2536 | Failed to change Enable setting in Teach mode. | Reboot the Controller. | | |
| 2539 | Password is invalid. | Check whether a password is set correctly. | | |
| 2546 | Cannot turn on the motor immediately after opening the safeguard. | Wait 1.5 seconds after the safeguard is open, and then execute the motor on. | | |
| 2550 | Specified command is not supported for joint type robot. | Specified robot is not supported. Check the robot configuration. | | |
| 2551 | Failed to Get the health information. | Reboot the controller. | | |
| 2900 | Failed to open as server to the Ethernet port. | Check whether the Ethernet port is set properly. Check whether the Ethernet cable is connected properly. | | |
| 2901 | Failed to open as client to the Ethernet port. | Check whether the Ethernet port is set properly. Check whether the Ethernet cable is connected properly. | | |
| 2902 | Failed to read from the Ethernet port. | Check whether the port of communication recipient is not close. | | |
| 2904 | Invalid IP Address was specified. | Review the IP address. | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|--|--|--------|
| 2905 | Ethernet failure. No specification of Server/Client. | Review the program. | | |
| 2906 | Ethernet port was not configured. | Check whether the Ethernet port is set properly. | Port number | |
| 2907 | Ethernet port was already in use by another task. | A single port cannot be used by more than one task. | Port number | |
| 2908 | Cannot change the port parameters while the Ethernet port is open. | The port parameters cannot be changed while the port is open. | Port number | |
| 2909 | Ethernet port is not open. | To use the Ethernet port, execute the OpenNet statement. | Port number | |
| 2910 | Timeout reading from an Ethernet port. | Check the communication. | Timeout value | |
| 2911 | Failed to read from an Ethernet port. | Check the communication. | | |
| 2912 | Ethernet port was already open by another task. | A single port cannot be used by more than one task. | Port number | |
| 2913 | Failed to write to the Ethernet port. | Check whether the Ethernet port is set properly. Check whether the Ethernet cable is connected properly. | Port number | |
| 2914 | Ethernet port connection was not completed. | Check whether the port of communication recipient is open. | Port number | |
| 2915 | Data received from the Ethernet port is beyond the limit of one line. | The maximum length of a line is 255 bytes. | The number of bytes in a received line | |
| 2920 | RS-232C failure. RS-232C port process error. | Check whether the RS-232C board is correctly detected. | | |
| 2921 | RS-232C failure. Uncommon error. RS-232C port read process error. | Check the parameter and communication. | | |
| 2926 | The RS-232C port hardware is not installed. | Check whether the RS-232C board is correctly detected. | Port number | |
| 2927 | RS-232C port is already open by another task. | A single port cannot be used by more than one task. | Port number | |
| 2928 | Cannot change the port parameters while the RS-232C port is open. | The port parameters cannot be changed while the port is open. | Port number | |
| 2929 | RS-232C port is not open. | To use the RS-232C port, execute the OpenCom statement. | Port number | |
| 2930 | Timeout reading from the RS-232C port. | Check the communication. | Timeout value | |
| 2931 | Failed to read from the RS-232C port. | Check the communication. | | |
| 2932 | RS-232C port is already open by another task. | A single port cannot be used by more than one task. | Port number | |
| 2933 | Failed to write to the RS-232C port. | Check the communication. | Port number | |
| 2934 | RS-232C port connection not completed. | Check the RS-232C port. | | |
| 2935 | Data received from the RS-232C port is beyond the limit of one line. | The maximum length of a line is 255 bytes. | The number of bytes in a received line | |
| 2937 | Cannot execute while Remote RS-232C are using. | Specified port is currently used. Specify another port. | | |
| 2950 | Daemon failure. Failed to create the daemon thread. | Reboot the Controller. | | |
| 2951 | Daemon failure. Timeout while creating the daemon thread. | Reboot the Controller. | | |
| 2952 | TEACH/AUTO switching key input signal failure was detected. | Set the TP key switch to TEACH or AUTO properly. Check whether the TP is connected properly. | | |

Maintenance 8. Trouble Shooting

| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|---|--------|--------|
| 2953 | ENABLE key input signal failure was detected. | Check whether the TP is connected properly. | | |
| 2954 | Relay weld was detected. | Overcurrent probably occurred due to short-circuit failure. Investigate the cause of the problem and take necessary measures and then replace the DPB. | | |
| 2955 | Temperature of regeneration resistor was higher than the specified temperature. | Check whether the filter is not clogged up and the fan does not stop. If there is no problem on the filter and fan, replace the regenerative module. | | |
| 2970 | MNG failure. Area allocate error. | Reboot the Controller. | | |
| 2971 | MNG failure. Real time check error. | Reboot the Controller. | | |
| 2972 | MNG failure. Standard priority error. | Reboot the Controller. | | |
| 2973 | MNG failure. Boost priority error. | Reboot the Controller. | | |
| 2974 | MNG failure. Down priority error. | Reboot the Controller. | | |
| 2975 | MNG failure. Event wait error. | Reboot the Controller. | | |
| 2976 | MNG failure. Map close error. | Reboot the Controller. | | |
| 2977 | MNG failure. Area free error. | Reboot the Controller. | | |
| 2978 | MNG failure. AddIOMem error. | Reboot the Controller. | | |
| 2979 | MNG failure. AddInPort error. | Reboot the Controller. | | |
| 2980 | MNG failure. AddOutPort error. | Reboot the Controller. | | |
| 2981 | MNG failure. AddInMemPort error. | Reboot the Controller. | | |
| 2982 | MNG failure. AddOutMemPort error. | Reboot the Controller. | | |
| 2983 | MNG failure. IntervalOutBit error. | Reboot the Controller. | | |
| 2984 | MNG failure. CtrReset error. | Reboot the Controller. | | |
| 2997 | Collision was detected. | If you use the simulator, check if the object is placed in the direction of the robot motion. | | |
| 2998 | AbortMotion attempted when robot was not moving | See Help for AbortMotion. | | |
| 2999 | AbortMotion attempted when robot was moving | See Help for AbortMotion. | | |

Parser

| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|---|--------|--------|
| 3000 | OBJ file size is large. TP1 may not be able to build this project. | When it is necessary to build the project from TP1, consider to reduce the program. | | |
| 3050 | Main function is not defined. | Declare a Main function. | | |
| 3051 | Function does not exist. | Declare an unresolved function. | | |
| 3052 | Variable does not exist. | Declare an unresolved variable. | | |
| 3100 | Syntax error. | Correct the syntax error. | | |
| 3101 | Parameter count error. | The number of parameters is excess or deficiency. Correct the parameters. | | |
| 3102 | File name length is beyond the maximum allowed. | Shorten the file name. | | |
| 3103 | Duplicate function definition. | Change the function name. | | |
| 3104 | Duplicate variable definition ' ** '. | Change the variable name. | | |
| 3105 | Global and Global Preserve variables cannot be defined inside a function block. | Declare the Global and Global Preserve variables outside the function block. | | |
| 3106 | An undefined function was specified. | Specify a valid function name. | | |
| 3107 | Both While and Until for Do...Loop was specified. | The While/Until statement is specified for both Do statement and Loop statement. Delete either While/Until statement. | | |
| 3108 | Specified line number or label ' ** ' does not exist. | Set the line label. | | |
| 3109 | Overflow error. | The direct numerical specification overflows. Reduce the numeric value. | | |
| 3110 | An undefined variable was specified ' ** '. | There is an undefined variable. Declare the variable. | | |
| 3111 | Specified variable is not an array variable. | Specify the array variable. | | |
| 3112 | Cannot change the dimensions of the array variable. | Dimension of the array cannot be changed in Redim statement during the run time. Correct the program. | | |
| 3114 | Specified Next variable does not match the specified For variable. | Correct the variable name. | | |
| 3115 | Cannot use a point expression in the first argument. | Specify a single point for the point flag setting. Do not specify a point expression. | | |
| 3116 | Array number of dimensions does not match the declaration. | Check the number of array dimensions. | | |
| 3117 | File cannot be found. | The file that configures the project cannot be found. Check the project folder if the file exists. | | |
| 3118 | Corresponding EndIf cannot be found. | The number of EndIf statements that correspond to If and ElseIf statements is not enough. Add the EndIf statements. | | |
| 3119 | Corresponding Loop cannot be found. | The number of Loop statements that correspond to Do statements is not enough. Add the Loop statements. | | |
| 3120 | Corresponding Next cannot be found. | The number of Next statements that correspond to For statements is not enough. Add the Next statements. | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|--|--------|--------|
| 3121 | Corresponding Send cannot be found. | The number of Send statements that correspond to Select statements is not enough. Add the Send statements. | | |
| 3123 | On/Off statements are beyond the maximum count. | An upper limit (max. 16) is set on the number of On/Off statements in Curve statement. Check the upper limit and correct the program. | | |
| 3124 | Point number is beyond the maximum count. | An upper limit ("200" for open curves, "50" for closed curves) is set on the available number of points in Curve statement. Check the upper limit and correct the program. | | |
| 3125 | Corresponding If cannot be found. | The number of EndIf statements that correspond to If statements is too many. Delete the unnecessary EndIf. | | |
| 3126 | Corresponding Do cannot be found. | The number of Loop statements that correspond to Do statements is too many. Delete the unnecessary Loop. | | |
| 3127 | Corresponding Select cannot be found. | The number of Send statements that correspond to Select statements is too many. Delete the unnecessary Send. | | |
| 3128 | Corresponding For cannot be found. | The number of Next statements that correspond to For statements is too many. Delete the unnecessary Next. | | |
| 3129 | '_' cannot be used as the first character of an identifier. | Change the first character of the identifier to an alphabetic character. | | |
| 3130 | Cannot specify ROT parameter. | ROT parameter cannot be specified in BGo, Go, TGo, Jump, and Jump3 statements. Correct the program. | | |
| 3131 | Cannot specify ECP parameter. | ECP parameter cannot be specified in BGo, Go, TGo, Jump, Jump3, and Arc statements. Correct the program. | | |
| 3132 | Cannot specify Arch parameter. | Arch parameter cannot be specified in BGo, Go, TGo, Arc, Arc3, BMove, Move, and TMove statements. Correct the program | | |
| 3133 | Cannot specify LimZ parameter. | LimZ parameter cannot be specified in BGo, Go, TGo, Jump3, Arc, Arc3, BMove, Move, and TMove statements. Correct the program. | | |
| 3134 | Cannot specify Sense parameter. | Sense parameter cannot be specified in BGo, Go, TGo, Arc, Arc3, BMove, Move, and TMove statements. Correct the program. | | |
| 3135 | Invalid parameter is specified. | Invalid parameter is specified in Xqt, and Call statements. Correct the program. | | |
| 3136 | Cannot use #include. | | | |
| 3137 | Cannot specify the array variable subscript. | The array variable subscript cannot be specified. Correct the program. | | |
| 3138 | ByRef was not specified on Function declaration. | Specify ByRef in the parameter list of function declaration that is called by Call statement. | | |
| 3139 | Cannot execute the Xqt statement for a function that needs a ByRef parameter. | The Xqt statement cannot be executed for a function needing a ByRef parameter. Delete the ByRef parameter. | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|--|--------|--------|
| 3140 | Cannot execute the Redim statement for a ByRef variable. | The Redim statement cannot be executed for a variable specifying ByRef parameter. Delete the ByRef parameter. | | |
| 3141 | OBJ file is corrupt. | | | |
| 3142 | OBJ file size is beyond the available size after compiling. | The compilation result exceeds the limit value (max. 1 MB per file). Divide the program. | | |
| 3143 | Ident length is beyond the available size. | The available length of the identifier is max. 32 characters for labels and variable names, and 64 characters for function names. Reduce the number of characters so as not to exceed the available length. For details of the available length, refer to <i>EPSON RC+ User's Guide "6.4 Function and Variable Names (Naming restriction)"</i> . | | |
| 3144 | '**' already used for a function name. | Correct the identifier '**' or the function name. | | |
| 3145 | '**' already used for a Global Preserve variable. | Correct the identifier '**' or the Global Preserve variable name. | | |
| 3146 | '**' already used for a Global variable. | Correct the identifier '**' or the Global variable name. | | |
| 3147 | '**' already used for a Module variable. | Correct the identifier '**' or the Module variable name. | | |
| 3148 | '**' already used for a Local variable. | Correct the identifier '**' or the Local variable name. | | |
| 3149 | '**' already used for a I/O label. | Correct the identifier '**' or the I/O label name. | | |
| 3150 | '**' already used for a User Error label. | Correct the identifier '**' or the User Error label name. | | |
| 3151 | Cannot use a function parameter. | Argument cannot be specified for the function that is executed by the Trap statement. Correct the program. | | |
| 3152 | Over elements value. | Limit value of the array elements depends on the type of variables. Refer to <i>EPSON RC+5.0 User's Guide "6.7.6 Array"</i> and correct the number of array elements so as not to exceed the limit value. | | |
| 3153 | Parameter type mismatch. | Parameter type does not match in Call, Force_GetForces, and Xqt statements. Correct the parameter type. | | |
| 3154 | '**' is not Input Bit label. | Specify a valid input bit label. | | |
| 3155 | '**' is not Input Byte label. | Specify a valid input byte label. | | |
| 3156 | '**' is not Input Word label. | Specify a valid input word label. | | |
| 3157 | '**' is not Output Bit label. | Specify a valid output bit label. | | |
| 3158 | '**' is not Output Byte label. | Specify a valid output byte label. | | |
| 3159 | '**' is not Output Word label. | Specify a valid output word label. | | |
| 3160 | '**' is not Memory Bit label. | Specify a valid memory I/O bit label. | | |
| 3161 | '**' is not Memory Byte label. | Specify a valid memory I/O byte label. | | |
| 3162 | '**' is not Memory Word label. | Specify a valid memory I/O word label. | | |
| 3163 | Too many function arguments. | The maximum number of the function parameter is 100. Reduce the number of parameters. | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|--|--------|--------|
| 3164 | Cannot compare Boolean value. | The size of Boolean values cannot be compared. Correct the program. | | |
| 3165 | Cannot use Boolean value in the expression. | Boolean value cannot be used in the expression. Correct the program. | | |
| 3166 | Cannot compare between Boolean and expression. | The size of Boolean value and the expression cannot be compared. Correct the program. | | |
| 3167 | Cannot store Boolean value to the numeric variable. | Boolean value cannot be used in the numeric variable. Correct the program. | | |
| 3168 | Cannot store numeric value to the Boolean variable. | The numeric value cannot be used in Boolean variable. Correct the program. | | |
| 3169 | Undefined I/O label was specified. | Define a new I/O label or specify the defined I/O label. | | |
| 3170 | Invalid condition expression was specified. | String expression is specified for the right side of the condition expression in Do or Loop statement. Correct the condition expression so that the right side of the expression is Boolean value. | | |
| 3171 | Cannot compare between numeric value and string. | The numeric value and string cannot be compared. Correct the program. | | |
| 3172 | Cannot use keyword for the variable name. | Some SPEL+ keywords cannot be used as the variable names. Correct the variable name not to overlap with the keywords. | | |
| 3173 | '**' already used for a line label. | Correct the identifier '**' or the line label name. | | |
| 3174 | Duplicate line number or label (**). | The line labels with the same name cannot be specified in the same function. Delete the line label '**', or define a new line label and correct the program. | | |
| 3175 | Undefined Point label was specified. | Define a new point label or specify the defined point label. | | |
| 3176 | An undefined variable was specified. | Define a new variable or specify the defined variable. | | |
| 3177 | '**' already used for a Point label. | Correct the identifier '**' or the point label name. | | |
| 3178 | Cannot use the result number. | The result number cannot be specified when a vision object that does not return multiple results is used in VSet and VGet statements. Correct the program. | | |
| 3179 | String literal is beyond the available length. | The limit value of the string length is max. 255 characters. Reduce the string length so as not to exceed the limit value. | | |
| 3180 | Cannot change a calibration property value with the VSet command. | Calibration property cannot be changed in VSet statement. Correct the program. | | |
| 3181 | Array variable should be used with ByRef. | ByVal cannot be specified for the array variable. Specify the ByRef parameter. | | |
| 3182 | Subscription was not specified. | Specify a subscription. | | |
| 3187 | Invalid Point flag value was specified. | Correct the program so that the point flag value is within the range from 0 to 127. | | |
| 3188 | Call command cannot be used in parallel processing. | Call command cannot be used parallel processing. Correct the program. | | |
| 3189 | Local variables cannot be used with the Wait command. | Change of local variable cannot be waited by Wait statement. Correct the program. | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|---|--------|--------|
| 3190 | Array variables cannot be used with the Wait command. | Change of array variable cannot be waited by Wait statement. Correct the program. | | |
| 3191 | Real variables cannot be used with the Wait command. | Change of real variable cannot be waited by Wait statement. Correct the program. | | |
| 3192 | String variables cannot be used with the Wait command. | Change of string variable cannot be waited by Wait statement. Correct the program. | | |
| 3194 | Cannot use Boolean value for the timeout value. | Boolean value cannot be used for the timeout value of Wait statement. Correct the program. | | |
| 3196 | Fend is not there. | The number of Fend statements that correspond to Function statements is not enough. Add the Fend statements. | | |
| 3197 | Numeric variable name cannot use '\$'. | Numeric variable name cannot use '\$'. Correct the variable name. | | |
| 3198 | String variable should has '\$'. | String variables must have a '\$' suffix. Add a '\$' suffix to the variable name. | | |
| 3199 | Invalid object is specified. | Invalid vision object is specified in Vision Guide commands such as VSet and VGet. Specify the valid vision object. | | |
| 3200 | Value is missing. | Add a value. | | |
| 3201 | Expected ', '. | Add ', '. | | |
| 3202 | Expected ' ('. | Add ' ('. | | |
| 3203 | Expected ') '. | Add ') '. | | |
| 3204 | Identifier is missing. | Specify an identifier. | | |
| 3205 | Point is not specified. | Specify a point. | | |
| 3206 | Event condition expression is missing. | Add an event condition expression. | | |
| 3207 | Formula is missing. | Add a formula. | | |
| 3208 | String formula is missing. | Add a string formula. | | |
| 3209 | Point formula is missing. | Add a point formula. | | |
| 3210 | Line label was not specified. | Check if the specified line label exists in the program. Add a valid line label. | | |
| 3211 | Variable was not specified. | Specify a variable. | | |
| 3212 | Corresponding Fend cannot be found. | The number of Fend statements that correspond to Function statements is not enough. Add the Fend statements. | | |
| 3213 | Expected ' : '. | Add ' : '. | | |
| 3214 | True/False was not specified. | True/False was not specified in the property of Vision Guide/GUI Builder or substitution of logical expression which requires Boolean value setting. Specify True or False. | | |
| 3215 | On/Off was not specified. | On or Off must be specified for the remote output logic setting of Motor, Brake, AutoLJM, SetSw, and Box statements. Specify On or Off. | | |
| 3216 | High/Low was not specified. | High or Low must be specified for the power mode setting of Power statement. Specify High or Low. | | |
| 3217 | Input bit label was not specified. | Input bit label is not specified in SetSW, CTRreset statement, Sw, and Ctr function. Specify a valid input bit label. | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|--|--------|--------|
| 3218 | Input byte label was not specified. | Input byte label is not specified in SetIn statement, In, and InBCD function. Specify a valid input byte label. | | |
| 3219 | Input word label was not specified. | Input word label is not specified in SetInW statement, InReal, and InW function. Specify a valid input word label. | | |
| 3220 | Output bit label was not specified. | Output bit label is not specified in On, Off statement, and Oport function. Specify a valid output bit label. | | |
| 3221 | Output byte label was not specified. | Output byte label is not specified in Out, OpBCD statement, and Out function. Specify a valid output byte label. | | |
| 3222 | Output word label was not specified. | Output word label is not specified in OutW, OutReal statement, OutW, and OutReal function. Specify a valid output word label. | | |
| 3223 | Memory bit label was not specified. | Memory bit label is not specified in MemOn, MemOff statement, and MemSw function. Specify a valid memory bit label. | | |
| 3224 | Memory byte label was not specified. | Memory byte label is not specified in MemOut statement and MemIn function. Specify a valid memory byte label. | | |
| 3225 | Memory word label was not specified. | Memory word label is not specified in MemOutW statement and MemInW function. Specify a valid memory word label. | | |
| 3226 | User error label was not specified. | User error label is not specified in Error statement. Specify a valid user error label. | | |
| 3227 | Function name was not specified. | Function name is not specified in the statement that requires function name designation, such as Call and Xqt. Specify a valid function name. | | |
| 3228 | Variable type was not specified. | Variable type is not specified for the parameter definition of Function statement and Preserve parameter specification of Global statement. Specify a correct variable type. | | |
| 3229 | Invalid Trap statement parameter. Use Goto, Call, or Xqt. | Specify either GoTo, Call, or Xqt as a parameter of Trap statement. | | |
| 3230 | Expected For/Do/Function. | Specify either For, Do, or Function as a parameter of Exit statement. | | |
| 3231 | Above/Below was not specified. | Setting value for the elbow orientation is not specified in Elbow statement. Specify either Above or Below. | | |
| 3232 | Righty/lefty was not specified. | Setting value for the hand orientation is not specified in Hand statement. Specify either Righty or Lefty. | | |
| 3233 | NoFlip/Flip was specified. | Setting value for the wrist orientation is not specified in Wrist statement. Specify either NoFilip or Flip. | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|--|--------|--------|
| 3234 | Port number was not specified. | Port number that indicates the file or communication port is not specified in Read, ReadBin, Write, and WriteBin statements. Refer to <i>SPEL+ Language Reference</i> "Read Statement" and specify a proper file number or port number. | | |
| 3235 | String type variable was not specified. | String type variable is not specified in the command that requires specification of string type variable as a parameter. Specify a valid string type variable. | | |
| 3236 | RS-232C port number was not specified. | RS-232C port number is not specified in OpenCom, CloseCom, and SetCom statements. Refer to <i>SPEL+ Language Reference</i> "OpenCom Statement" and specify a proper port number. | | |
| 3237 | Network communication port number was not specified. | Network communication port number is not specified in OpenNet, CloseNet, SetNet, and WaitNet statement. Specify an integer from 201 to 216. | | |
| 3238 | Communication speed was not specified. | Communication speed (baud rate) is not specified in SetCom statement. Refer to <i>SPEL+ Language Reference</i> "SetCom Statement" and specify a proper baud rate. | | |
| 3239 | Data bit number was not specified. | Data bit length is not specified in SetCom statement. Refer to <i>SPEL+ Language Reference</i> "SetCom Statement" and specify a proper data bit length. | | |
| 3240 | Stop bit number was not specified. | Stop bit length is not specified in SetCom statement. Refer to <i>SPEL+ Language Reference</i> "SetCom Statement" and specify a proper stop bit length. | | |
| 3241 | Parity was not specified. | Parity is not specified in SetCom statement. Refer to <i>SPEL+ Language Reference</i> "SetCom Statement" and specify a proper parity. | | |
| 3242 | Terminator was not specified. | Terminator (end of send/receive line) is not specified in SetCom and SetNet statements. Refer to <i>SPEL+ Language Reference</i> "SetCom Statement" and specify a proper terminator. | | |
| 3243 | Hardware flow was not specified. | Hardware flow is not specified in SetCom statement. Refer to <i>SPEL+ Language Reference</i> "SetCom Statement" and specify a proper flow control. | | |
| 3244 | Software flow was not specified. | Software flow is not specified in SetCom statement. Refer to <i>SPEL+ Language Reference</i> "SetCom Statement" and specify a proper flow control. | | |
| 3245 | None was not specified. | "NONE" is not specified for software flow control setting in SetNet statement. Specify "NONE". | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|--|--------|--------|
| 3246 | Parameter ' O ' or ' C ' was not specified. | Open or close parameter for the end of a curve is not specified in Curve statement. Refer to <i>SPEL+ Language Reference "Curve Statement"</i> and specify a proper open/close parameter. | | |
| 3247 | NumAxes parameter was not specified. | The number of coordinate axes controlled during a curve motion is not specified in Curve statement. Refer to <i>SPEL+ Language Reference "Curve Statement"</i> and specify a proper number of the coordinate axes. | | |
| 3248 | J4Flag value (0-1) was not specified. | Specify 0 or 1, or an expression for J4Flag value. | | |
| 3249 | J6Flag value (0-127) was not specified. | Specify an integer from 0 to 127, or an expression for J6Flag value. | | |
| 3250 | Array variable was not specified. | Array variable is not specified in the statement that requires specification of array variable. Specify a valid array variable. | | |
| 3251 | String Array variable was not specified. | Array which stores a token must be a string array variable in ParseStr statement and ParseStr function. Specify a string array variable. | | |
| 3252 | Device ID was not specified. | Device ID is not specified in DispDev statement or Cls command. Refer to <i>SPEL+ Language Reference "DispDev Statement"</i> and specify a proper device ID. | | |
| 3253 | I/O type was not specified. | I/O type is not specified in IOLabel\$ function. Refer to <i>SPEL+ Language Reference "IOLabel\$ Function"</i> and specify a proper I/O type. | | |
| 3254 | I/O bit width was not specified. | I/O bit size (I/O port width) is not specified in IODef, IOLabel function. Refer to <i>SPEL+ Language Reference "IODef Function"</i> and specify a proper I/O bit size. | | |
| 3255 | ByRef was not specified. | Although the ByRef is specified in the function declaration, no ByRef is specified for calling. Specify the ByRef parameter. | | |
| 3256 | Variable type was not specified. | Variable type is not specified in Global statement. Specify a proper variable type. | | |
| 3257 | Condition expression does not return Boolean value. | Condition expression in If, ElseIf, Do, and Loop statement must return a Boolean value. Correct the condition expression to return a Boolean value. | | |
| 3258 | RS232C port number was not specified. | RS-232C port number is not specified in ChkCom function. Refer to <i>SPEL+ Language Reference "ChkCom Function"</i> and specify a proper port number. | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|--|--------|--------|
| 3259 | Network communication port number was not specified. | Network communication port number is not specified in ChkNet function. Refer to <i>SPEL+ Language Reference "ChkNet Function"</i> and specify a proper port number. | | |
| 3260 | Language ID was not specified. | Language ID is not specified in ErrMsg\$ function. Refer to <i>SPEL+ Language Reference "ErrMsg\$ Function"</i> and specify a proper language ID. | | |
| 3261 | Expected '. | Add '. | | |
| 3262 | Vision Sequence Name was not specified. | Vision sequence name is not specified in Vision Guide commands such as VSet, VGet, and VRun. Add a sequence name. | | |
| 3263 | Vision Sequence Name or Calibration Name was not specified. | Vision sequence name or calibration name is not specified in VSet and VGet statements. Add a sequence name or calibration name. | | |
| 3264 | Vision Property Name or Result Name was not specified. | Vision property name or result name is not specified in VSet and VGet statements. Add a property name or result name. | | |
| 3265 | Vision Property Name, Result Name or Object Name was not specified. | Either of Vision property name, result name, or object name is not specified in VSet and VGet statements. Add either of a property name, result name, or object name. | | |
| 3266 | Vision Calibration Property Name was not specified. | Vision calibration property name is not specified in VSet and VGet statements. Add a property name. | | |
| 3267 | Task type was not specified. | Task type is not specified in Xqt statement. Refer to <i>SPEL+ Language Reference "Xqt Statement"</i> and specify a proper task type. | | |
| 3268 | Form name was not specified. | Form name is not specified in GSet, GGet, GShow, GShowDialog, and GClose statements. Specify a form name. | | |
| 3269 | Property Name or Control Name was not specified. | Property name or control name is not specified in GSet and GGet statements. Specify a property name or control name. | | |
| 3270 | Property Name was not specified. | Property name is not specified in GSet and GGet statements. Specify a property name. | | |
| 3271 | BackColorMode was not specified. | BackColorMode property setting value is not specified in GSet statement. Refer to <i>GUI Builder 5.0 manual "BackColorMode Property"</i> and specify a proper setting value. | | |
| 3272 | BorderStyle was not specified. | BorderStyle property setting value is not specified in GSet statement. Refer to <i>GUI Builder 5.0 manual "BorderStyle Property"</i> and specify a proper setting value. | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|------------------------------------|--|--------|--------|
| 3273 | DropDownStyle was not specified. | DropDownStyle property setting value is not specified in GSet statement. Refer to <i>GUI Builder 5.0</i> manual “ <i>DropDownStyle Property</i> ” and specify a proper setting value. | | |
| 3274 | EventTaskType was not specified. | EventTaskType property setting value is not specified in GSet statement. Refer to <i>GUI Builder 5.0</i> manual “ <i>EventTaskType Property</i> ” and specify a proper setting value. | | |
| 3275 | ImageAlign was not specified. | ImageAlign property setting value is not specified in GSet statement. Refer to <i>GUI Builder 5.0</i> manual “ <i>ImageAlign Property</i> ” and specify a proper setting value. | | |
| 3276 | IObjectType was not specified. | IObjectType property setting value is not specified in GSet statement. Refer to <i>GUI Builder 5.0</i> manual “ <i>IObjectType Property</i> ” and specify a proper setting value. | | |
| 3277 | FormBorderStyle was not specified. | FormBorderStyle property setting value is not specified in GSet statement. Refer to <i>GUI Builder 5.0</i> manual “ <i>FormBorderStyle Property</i> ” and specify a proper setting value. | | |
| 3278 | ScrollBars was not specified. | ScrollBars property setting value is not specified in GSet statement. Refer to <i>GUI Builder 5.0</i> manual “ <i>ScrollBars Property</i> ” and specify a proper setting value. | | |
| 3279 | SizeMode was not specified. | SizeMode property setting value is not specified in GSet statement. Refer to <i>GUI Builder 5.0</i> manual “ <i>SizeMode Property</i> ” and specify a proper setting value. | | |
| 3280 | StartPosition was not specified. | StartPosition property setting value is not specified in GSet statement. Refer to <i>GUI Builder 5.0</i> manual “ <i>StartPosition Property</i> ” and specify a proper setting value. | | |
| 3281 | TextAlign was not specified. | TextAlign property setting value is not specified in GSet statement. This error occurs when the control type cannot be identified because the control is specified by a string variable. Refer to <i>GUI Builder 5.0</i> manual “ <i>TextAlign Property</i> ” and specify a proper setting value. | | |
| 3282 | TextAlign was not specified. | TextAlign property setting value is not specified in GSet statement. This error occurs when the control is a text box. Refer to <i>GUI Builder 5.0</i> manual “ <i>TextAlign Property</i> ” and specify a proper setting value. | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|---|--------|--------|
| 3283 | TextAlign was not specified. | TextAlign property setting value is not specified in GSet statement. This error occurs when the control is other than a text box. Refer to <i>GUI Builder 5.0</i> manual “ <i>TextAlign Property</i> ” and specify a proper setting value. | | |
| 3284 | WindowState was not specified. | WindowState property setting value is not specified in GSet statement. Refer to <i>GUI Builder 5.0</i> manual “ <i>WindowState Property</i> ” and specify a proper setting value. | | |
| 3285 | J1FLAG was not specified. | Specify 0 or 1, or an expression for J1Flag value. | | |
| 3286 | J2FLAG was not specified. | Specify 0 or 1, or an expression for J2Flag value. | | |
| 3289 | areaID was not specified. | Area number is not specified in InsideBox and InsidePlane function. Specify an approach check area number which returns status by an integer from 1 to 15. | | |
| 3300 | External definition symbol was included. (Not in use) | | | |
| 3301 | Version of linked OBJ file does not match. | Not all project files are compiled in the same version. Perform the rebuild. Rebuild the project. | | |
| 3302 | Linked OBJ file does not match the compiled I/O label. | The project configuration has been changed. Rebuild the project. | | |
| 3303 | Linked OBJ file does not match the compiled user error label. | The project configuration has been changed. Rebuild the project. | | |
| 3304 | Linked OBJ file does not match the compiled compile option. | The project configuration has been changed. Rebuild the project. | | |
| 3305 | Linked OBJ file does not match the compiled link option. | The project configuration has been changed. Rebuild the project. | | |
| 3306 | Linked OBJ file does not match the compiled SPEL option. | The project configuration has been changed. Rebuild the project. | | |
| 3307 | Duplicate function. | The same function name is used for more than one file. Correct the program (function name). | | |
| 3308 | Duplicate global preserve variable. | The same global preserve variable name is used for more than one file. Correct the program (variable name). | | |
| 3309 | Duplicate global variable. | The same global variable name is used for more than one file. Correct the program (variable name). | | |
| 3310 | Duplicate module variable. | The same module variable name is used for more than one file. Correct the program (variable name). | | |
| 3311 | File cannot be found. | | | |
| 3312 | OBJ file is corrupt. | | | |
| 3313 | The specified file name includes character(s) that cannot be used. | | | |
| 3314 | Cannot open the file. | The file is used for other application. Quit the other application. | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|---|--------|--------|
| 3315 | '**' is already used for the function name. | Correct the identifier '**' or the function name. Rebuild the project. | | |
| 3316 | '**' is already used for the global preserve variable. | Correct the identifier '**' or the global preserve variable name. Rebuild the project. | | |
| 3317 | '**' is already used for the global variable. | Correct the identifier '**' or the global variable name. Rebuild the project. | | |
| 3318 | '**' is already used for the module variable. | Correct the identifier '**' or the module variable name. Rebuild the project. | | |
| 3319 | Dimension of the array variable does not match the declaration. | Correct the dimension of the array and rebuild the project. | | |
| 3320 | Return value type of the function does not match the declaration. | Correct the return value type of the function and rebuild the project. | | |
| 3321 | '**' is already used with function name. | Correct the identifier '**' or the function name. Rebuild the project. | | |
| 3322 | '**' is already used with Global Preserve name. | Correct the identifier '**' or the global preserve variable name. Rebuild the project. | | |
| 3323 | '**' is already used with Global name. | Correct the identifier '**' or the global variable name. Rebuild the project. | | |
| 3324 | '**' is already used with Module name. | Correct the identifier '**' or the module variable name. Rebuild the project. | | |
| 3325 | '**' is already used with Local name. | Correct the identifier '**' or the local variable name. Rebuild the project. | | |
| 3326 | The number of parameters does not match the declaration. | Check the number of parameters in the function, correct the program, and then rebuild the project. | | |
| 3327 | ByRef was not specified on Function declaration on parameter **. | | | |
| 3328 | ByRef was not specified on parameter **. | | | |
| 3329 | Parameter ** type mismatch. | | | |
| 3330 | Linked OBJ file does not match the compiled Vision Project. | Rebuild the project. | | |
| 3331 | OBJ file size is beyond the available size after linking. | The OBJ file size exceeds the limit value (8MB). Reduce the program. | | |
| 3332 | Variable '**' is redefined. | Variable '**' is overloaded. Delete unnecessary variable definition and rebuild the project. | | |
| 3333 | Linked OBJ file does not match the compiled GUI Builder Project. | Rebuild the project. | | |
| 3334 | The number of variable which is using Wait command are beyond the maximum allowed. | The number of variables which is using Wait command is exceeding the maximum allowed (64). Delete the variables and rebuild the project. | | |
| 3335 | Call cannot use in the parallel processing. | Call cannot be used in parallel processing. Correct the program and rebuild the project. | | |
| 3336 | Variable was redefined. | Correct the data type of the variable and rebuild the project. | | |
| 3405 | DialogResult was not specified. | DialogResult property setting value is not specified in GSet statement. Refer to <i>GUI Builder 5.0 "DialogResult Property"</i> and specify a proper setting value. | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|---|--------|--------|
| 3406 | MsgBox_Type was not specified. | Display type is not specified in MsgBox statement. Refer to <i>SPEL+ Language Reference</i> “MsgBox Statement” and specify a proper setting value. | | |
| 3408 | Single array variable was not specified. | The number of dimensions is not proper in the command where single array variable is only available. Correct the number of dimensions. | | |
| 3409 | Point list was not specified. | Pixel coordinate or robot coordinate is not specified as a continuous point data in VxCalib statement. Specify a continuous point data in the following format: P (start : end) | | |
| 3411 | EdgeType was not specified. | EdgeType property setting value is not specified in VSet statement. Refer to <i>Vision Guide 5.0 Properties & Results Reference</i> “EdgeType Property” and specify a proper setting value. | | |
| 3414 | Point was not specified. | PointType property setting value is not specified in VSet statement. Refer to <i>Vision Guide 5.0 Properties & Results Reference</i> “PointType Property” and specify a proper setting value. | | |
| 3415 | Reference was not specified. | ReferenceType property setting value is not specified in VSet statement. Refer to <i>Vision Guide 5.0 Properties & Results Reference</i> “ReferenceType Property” and specify a proper setting value. | | |
| 3437 | Part kind of controller was not specified. | Specify the controller part type. | | |
| 3438 | Part kind of robot was not specified. | Specify the robot part type. | | |
| 3500 | Duplicate macro in #define statement. | Another macro with the same name has been defined. Change the macro name. | | |
| 3501 | Macro name was not specified. | Macro name is not specified in #define, #ifdef, #ifndef, and #undef statements. Add a macro name. | | |
| 3502 | Include file name cannot be found. | Include file name is not specified in #include statement. Add a valid include file name. | | |
| 3503 | Specified include file is not in the project. | The include file that is not registered in the project configuration is specified. Add the include file to the project configuration. | | |
| 3504 | Parameter of the macro function does not match to the declared. | Check the number of parameters and correct the macro function. | | |
| 3505 | Macro has a circular reference. | The macro has a circular reference. Correct the circular reference. | | |
| 3506 | #define, #ifdef, #ifndef, #else, #endif, #undef and variable declaration statements are only valid in an include file. | Check and correct the content of include file. | | |
| 3507 | Over #ifdef or #ifndef nesting level. | Reduce the nesting level to under the limited value. | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|--|--------|--------|
| 3508 | Cannot find corresponding #ifdef or #ifndef. | The number of #endif statements that correspond to #ifdef and #ifndef statements is too many. Delete #endif statements or add the #ifdef and #ifndef statements. | | |
| 3509 | No #endif found for #ifdef or #ifndef. | The number of #endif statements that correspond to #ifdef and #ifndef statements is not enough. Add the #endif statements. | | |
| 3510 | Cannot obtain the macro buffer. | | | |
| 3550 | Parameter for the macro function was not specified. | The macro declared as a macro function is called without argument. Correct the program. | | |
| 3601 | Parameter type is mismatch for the external function '%s'. Confirm all place which are using this function, in this file. | LJM parameter cannot be specified in BGo, TGo, Arc, Arc3, BMove, Move, and TMove statements. Delete the LJM parameter. | | |
| 3602 | The specified motion command cannot use LJM parameter. | InReal function cannot be used with Wait statement. Correct the program. | | |
| 3603 | InReal function cannot use with Wait statement. | PerformMode parameter cannot be specified in Jump3, Jump3CP, Arc, Arc3, BMove, Move, and TMove statements. Delete the PerformMode parameter. | | |
| 3800 | Compile process aborted. | | | |
| 3801 | Link process aborted. | | | |
| 3802 | Compile process aborted. Compile errors reached the maximum count. | Correct the error in the program and rebuild the project. | | |
| 3803 | Link process aborted. Link errors reached the maximum count. | Correct the error in the program and rebuild the project. | | |
| 3804 | Specified command cannot be executed from the Command window. | Declaration of variables and functions, program control statement, preprocessor commands, and some commands cannot be executed from the command window. For details, refer to <i>SPEL+ Language Reference</i> "Appendix A : SPEL+ Command Use Condition List". | | |
| 3805 | Specified command can only be executed from the Command window. | Brake, SysConfig, Where, Cnv_QueueList, and WorlQue_List statements can only be executed from the command window. Delete these statements from the program. | | |
| 3806 | Specified function cannot be executed from the Command window. | LogIn function cannot be executed from the command window even when used with Print statement. Use the function in the program. | | |
| 3808 | Specified parameter cannot be used with the current version. | LJM and PerformMode parameters of motion commands may not be specified depending on the compiler version. LJM parameter: 6.0.x.x or later PerformMode parameter: 7.0.4.x or later Check the compiler version from the project property. | | |
| 3809 | Module variable cannot be used from the Command window. | Module variable cannot be accessed from the command window. Check the input command. | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|--|--------|--------|
| 3810 | The number of point file is beyond the limit. | There are too many point files. Reduce some point files that are registered to project. | | |
| 3811 | The number of points is beyond the limit. | There are too many points defined by registered point files. Reduce some points. | | |
| 3850 | File not found. | | | |
| 3900 | Uncommon error. Cannot obtain the internal communication buffer. | | | |
| 3901 | Buffer size is not enough. | | | |
| 3910 | Undefined command was specified. | | | |
| 3911 | Cannot enter the file name in the file name buffer. | | | |
| 3912 | Cannot obtain the internal buffer. | | | |
| 3913 | Cannot set priority. | Reboot the controller. | | |
| 3914 | Invalid ICode. | Rebuild the project. | | |
| 3915 | Invalid ICode. | Rebuild the project. | | |
| 3916 | Invalid ICode. | Rebuild the project. | | |
| 3917 | Invalid ICode. | Rebuild the project. | | |
| 3918 | Invalid ICode. | Rebuild the project. | | |
| 3919 | Invalid ICode. | Rebuild the project. | | |
| 3920 | Invalid ICode. | Rebuild the project. | | |
| 3921 | Invalid ICode. | Rebuild the project. | | |

Motor Control

| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|--|--------|---------------------------------|
| 4001 | Arm reached the limit of motion range. | Check the point to move, current point, and Range setting. | | |
| 4002 | Specified value is out of allowable range. | Review the setting parameters. | | The parameter causing the error |
| 4003 | Motion device driver failure. Communication error within the motion control module. | Reboot the controller. Initialize the controller firmware. Replace the controller. | | |
| 4004 | Motion device driver failure. Event waiting error within the motion control module. | Reboot the controller. Initialize the controller firmware. Replace the controller. | | |
| 4005 | Current point position is above the specified LimZ value. | Lower the Z axis. Increase the specified LimZ value. | | |
| 4006 | Target point position is above the specified LimZ value. | Lower the Z coordinate position of the target point. Increase the specified LimZ value. | | |
| 4007 | Coordinates conversion error. The end/mid point is out of the motion area. Jogging to the out of the motion area. | Check whether the coordinate out of the motion range is not specified. | | |
| 4008 | Current point position or specified LimZ value is out of motion range. | Change the specified LimZ value. | | |
| 4009 | Motion device driver failure. Timeout error within motion control module. | Reboot the controller. Initialize the controller firmware. Replace the controller. | | |
| 4010 | Specified Local coordinate was not defined. | Define the Local coordinate system. | | Local number |
| 4011 | Arm reached the limit of XY motion range specified by XYLim statement. | Check the area limited by the XYLim statement. | | |
| 4013 | Motion control module internal calculation error. | Calculation of the timing of Arch motion failed. Perform either of the following: - Check and modify Arch parameter - Disable Arch | | |
| 4016 | SFree statement was attempted for prohibited joint(s). | Due to robot mechanistic limitation, setting some joint(s) to servo free status is prohibited. Check the robot specifications. | | |
| 4018 | Communication error within the motion control module. Check sum error. | Reboot the controller. Initialize the controller firmware. Replace the controller. | | |
| 4021 | Point positions used to define the Local are too close. | Set the distance between points more than 1 μ m. | | |
| 4022 | Point coordinate data used to define the Local is invalid. | Match the coordinate data for the points to be specified. | | |
| 4023 | Cannot execute when the motor is in the off state. | Turn the motor power ON and then execute. | | |
| 4024 | Cannot complete the arm positioning using the current Fine specification. | Check whether the robot does not generate vibration or all parts and screws are secured firmly. Increase the Fine setting value. | | |
| 4025 | Cannot execute a motion command during emergency stop condition. | Clear the emergency stop condition and execute the motion command. | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|---|--------|--------|
| 4026 | Communication error within the motion control module. Servo I/F failure. | Reboot the controller. Initialize the controller firmware. Replace the controller. | | |
| 4028 | Communication error within the motion control module. Device driver status failure. | Reboot the controller. Initialize the controller firmware. Replace the controller. | | |
| 4030 | Buffer for the average torque calculation has overflowed. Shorten the time interval from Atclr to Atrq. | Shorten the time interval from Atclr to Atrq less than about two minutes. | | |
| 4031 | Cannot execute a motion command when the motor is in the off state. | Turn the motor power ON and then execute the motion command. | | |
| 4032 | Cannot execute a motion command when one or more joints are in SFree state. | Set all joints to the SLock state and execute the motion command. | | |
| 4034 | Specified command is not supported for this manipulator model. | Use the Jump3 and Jump3CP statements. | | |
| 4035 | Only the tool orientation was attempted to be changed by the CP statement. | Set a move distance between points. Use the ROT modifier, SpeedR statement, and AccelR statement. | | |
| 4036 | Rotation speed of tool orientation by the CP statement is too fast. | Decrease the setting values for the SpeedS and AccelS statements. Use the ROT modifier, SpeedR statement, and AccelR statement. | | |
| 4037 | The point attribute of the current and target point positions differ for executing a CP control command. | Match the point attribute. | | |
| 4038 | Two point positions are too close to execute the Arc statement. | Set the distance between points more than 1 μ m. | | |
| 4039 | Three point positions specified by the Arc statement are on a straight line. | Use the Move statement. | | |
| 4041 | Motion command was attempted to the prohibited area at the backside of the robot. | Check the robot motion range. | | |
| 4042 | Motion device driver failure. Cannot detect the circular format interruption. | Reboot the controller. Initialize the controller firmware. Replace the controller. | | |
| 4043 | Specified command is not supported for this manipulator model or this joint type. | Remove the unsupported command from the program. | | |
| 4044 | Curve failure. Specified curve form is not supported. | Create a Curve file again with the Curve statement. | | |
| 4045 | Curve failure. Specified mode is not supported. | Specify the Curve mode properly. Create a Curve file again with the Curve statement. | | |
| 4046 | Curve failure. Specified coordinate number is out of the allowable range. | The number of the available coordinate axes is 2, 3, 4, and 6. Create a Curve file again with the Curve statement. | | |
| 4047 | Curve failure. Point data was not specified. | Create a Curve file again with the Curve statement. | | |
| 4048 | Curve failure. Parallel process was specified before the point designation. | Create a Curve file again with the Curve statement. | | |
| 4049 | Curve failure. Number of parallel processes is out of the allowable range. | Create a Curve file again with the Curve statement. | | |

Maintenance 8. Trouble Shooting

| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|---|--------|--------|
| 4050 | Curve failure. Number of points is out of the allowable range. | The number of available point numbers differs according to the curve form. Check the number of points again. | | |
| 4051 | Curve failure. Local attribute and the point attribute of all specified points do not match. | Match the local and point flag for all the specified points. | | |
| 4052 | Curve failure. Not enough memory to format the curve file. | Reboot the controller. | | |
| 4053 | Curve failure. Failed to format the curve file. | Review the point data. Check whether adjacent two points do not overlap on the specified point line. | | |
| 4054 | Curve failure. Curve file error | The Curve file is broken. Create a Curve file again with the Curve statement. | | |
| 4055 | Curve failure. No distance for curve file movement. | Review the point data. | | |
| 4056 | Curve failure. Point positions for the Curve statement are too close. | Set the distance between two points adjacent to the specified point more than 0.001 mm. | | |
| 4059 | Executed encoder reset command while the motor is in the on state. | Turn the motor power OFF. | | |
| 4060 | Executed an invalid command while the motor is in the on state. | Turn the motor power OFF. | | |
| 4061 | Specified parameter is in use. | You attempted to clear the currently specified Arm and Tool. Select other Arm and Tool and execute. | | |
| 4062 | Orientation variation is over 360 degrees. | You attempted to rotate the joint #J6 more than 360 degrees with a CP motion command. | | |
| 4063 | Orientation variation of adjacent point is over 90 degrees. | On the specified point line by the Curve statement, set the orientation variation of U, V, and W coordinate values between two adjacent points to under 90 degrees. | | |
| 4064 | Cannot execute the orientation correction automatically. | On the specified point line, a curve cannot be created by automatic orientation correction. Change the specified point line so that the joint #J6 orientation variation decreases. | | |
| 4065 | Attempt to revolve J6 one rotation with the same orientation in CP statement. | You attempted to rotate the joint #J6 more than 360 degrees with a CP motion command. You attempted to revolve the joint 6 one rotation with the same as motion start orientation. Change the target point so that the joint #J6 revolves less than one rotation. | | |
| 4066 | Motion command was attempted in the prohibited area depended on joint combination. | You attempted to move the joints to the robot's interference limited area. | | |
| 4068 | ROT modifier parameter was specified for the CP motion command without orientation rotation. | Delete the ROT from the CP motion command. | | |
| 4069 | Specified ECP without selecting ECP in CP statement. | Specify a valid ECP. | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|--|--------|--------|
| 4070 | Specified ECP number does not match the ECP number used in curve file creation. | Specify a valid ECP. | | |
| 4071 | Attempted motion command during electronic brake lock condition. | Release the electromagnetic brake | | |
| 4072 | Initialization failure. Hardware monitor was not initialized. | Reboot the controller. Initialize the controller firmware. Replace the controller. | | |
| 4074 | Motor type does not match the current robot setting. | Check whether the specified robot model is connected. | | |
| 4075 | ECP Option is not active. | Enable the ECP option. | | |
| 4076 | Point positions used to define the Plane are too close. | Set the distance between points more than 1 μ m. | | |
| 4077 | Point coordinate data used to define the Plane is invalid. | Match the coordinate data for the points to be specified. | | |
| 4080 | Cannot execute when the Enable Switch is OFF. | Turn the Enable Switch ON and then execute. | | |
| 4085 | Failed to change to specified location. | Reboot the controller. Initialize the controller firmware. Replace the controller. | | |
| 4086 | Cannot execute because it is not dry run mode. | Change to the dry run mode and execute. | | |
| 4089 | The time interval from HealthRBStart to HealthRBStop is too long or too short. | Set the time interval from HealthRBStart to HealthRBStop to be within 1 to 3600 seconds. | - | - |
| 4090 | HealthRBStop is executed without HealthRBStart. | Execute HealthRBStop after executing HealthRBStart. This error also occurs when HealthRBStop is executed again without executing HealthRBStart after HealthRBStop. | - | - |
| 4099 | Servo error was detected during operation. | Check if a 5000 number error is occurring in the system history. If the error is occurring, take measures for a 5000 number error. | | |
| 4100 | Communication error in motion control module. Cannot calculate the current point or pulse. | Reboot the controller. Initialize the controller firmware. Replace the controller. | | |
| 4101 | Communication error in the motion control module. Cannot calculate the current point or pulse. | Reboot the controller. Initialize the controller firmware. Replace the controller. | | |
| 4103 | Initialization failure. Motion control module initialization error. | Reboot the controller. Initialize the controller firmware. Replace the controller. | | |
| 4105 | EMERGENCY connector connection failure. | | | |
| 4106 | Drive unit failure. | | | |
| 4150 | Redundant input signal failure of the emergency stop. | The input status of the redundant emergency stop input continuously differs for more than two seconds. Check whether no disconnection, earth fault, or short-circuit of the emergency stop input signal exists. Then reboot the controller. | | |

Maintenance 8. Trouble Shooting

| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|--|--------|--------|
| 4151 | Redundant input signal failure of the safeguard. | The input status of the redundant emergency stop input continuously differs for more than two seconds. Check whether no disconnection, earth fault, or short-circuit of the emergency stop input signal exists. Then reboot the controller. | | |
| 4152 | Relay welding error of the main circuit. | A relay welding error was detected due to power system over current. Replace the controller. Replace the robot. | | |
| 4153 | Redundant input signal failure of the enable switch. | The input status of the redundant enable signal differs continuously for more than two seconds. Check the TP connector connection. Replace the TP. Replace the controller. | | |
| 4154 | Temperature of regeneration resistor was higher than the specified temperature. | Robot's Duty is too high. Lengthen the waiting time or reduce the Accel value. If the error occurs although Duty was lowered, replace the DPB. | | |
| 4180 | Manipulator initialization failure. Specified manipulator was is not found. | Configure the manipulator. | | |
| 4181 | Manipulator initialization failure. Specified manipulator was in use by another task. | Specified manipulator cannot be configured since it is already configured. | | |
| 4182 | Manipulator initialization failure. Manipulator name is too long. | Shorten the manipulator name. | | |
| 4183 | Manipulator initialization failure. Manipulator data version error. | Reconfigure the manipulator. | | |
| 4187 | Manipulator initialization failure. Communication error with the module : VSRCMNPk. | Reboot the controller. Initialize the controller firmware. Replace the controller. | | |
| 4188 | Manipulator initialization failure. Joint angle interference matrix is invalid. | Reboot the controller. Initialize the controller firmware. Replace the controller. | | |
| 4189 | Manipulator initialization failure. Communication error with the module : VSRCMC. | Reboot the controller. Initialize the controller firmware. Replace the controller. | | |
| 4191 | Manipulator initialization failure. Physical-logical pulse transformation matrix is invalid. | Reboot the controller. Initialize the controller firmware. Replace the controller. | | |
| 4192 | Manipulator initialization failure. Communication error with the servo module. | Reboot the controller. Initialize the controller firmware. Replace the controller. | | |
| 4210 | RAS circuit detected the servo system malfunction. Reboot the controller. Measure the noise. Replace the controller. | Reboot the controller, take the measure against noise, or replace the DMB. | | |
| 4211 | Servo CPU internal RAM failure. Reboot the controller. Measure the noise. Replace the DMB. | Reboot the controller, take the measure against noise, or replace the DMB. | | |
| 4212 | RAM for the main and servo CPU communication failure. Reboot the controller. Measure the noise. Replace the DMB. | Reboot the controller, take the measure against noise, or replace the DMB. | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|---|--------|--------|
| 4213 | Servo CPU internal RAM failure. Reboot the controller. Measure the noise. Replace the DMB. | Reboot the controller, take the measure against noise, or replace the DMB. | | |
| 4214 | Initialization communication of main CPU and servo CPU failure. Reboot the Controller. Measure the noise. Replace DMB. | Reboot the controller, take the measure against noise, or replace the DMB. | | |
| 4215 | Initialization communication of the main and servo CPU failure. Reboot the controller. Noise measure. Replace the DMB. | Reboot the controller, take the measure against noise, or replace the DMB. | | |
| 4216 | Communication of the main and servo CPU failure. Reboot the controller. Measure the noise. Replace the DMB. | Reboot the controller, take the measure against noise, or replace the DMB. | | |
| 4217 | Communication of the main and servo CPU failure. Reboot the controller. Measure the noise. Replace the DMB. | Reboot the controller, take the measure against noise, or replace the DMB. | | |
| 4218 | Servo long time command overrun. | Reboot the controller, take the measure against noise, or replace the DMB. | | |
| 4219 | Servo long time command check sum error. | Reboot the controller, take the measure against noise, or replace the DMB. | | |
| 4220 | System watchdog timer detected the failure. Reboot the controller. Measure the noise. Replace the DMB. | Reboot the controller, take the measure against noise, or replace the DMB. | | |
| 4221 | Drive unit check failure. | Reboot the controller, take the measure against noise, or replace the DMB. | | |
| 4222 | RAM failure of the servo CPU. Reboot the controller. Measure the noise. Replace the DMB. | Reboot the controller, take the measure against noise, or replace the DMB. | | |
| 4223 | Failure of duplicate circuit of the emergency stop or the safeguard. Check the wiring. | Check the wiring of the emergency stop or the safeguard. | | |
| 4224 | Low voltage of the main circuit power supply is detected. Check the power supply voltage. Reboot the controller. | Check the power supply voltage, or reboot the controller. | | |
| 4225 | Control relay contact of the main circuit power supply is welded. Replace the DPB. | Replace the DPB. | | |
| 4230 | Servo real time status failure. Check sum error. | A data checksum error was detected in the controller. Check the short-circuit and improper connection of the peripheral equipment wiring. (Emergency, D-I/O, and Expansion I/O connectors) Replace the controller. | | |
| 4232 | Servo real time status failure. Free running counter error with the servo. | A free running counter error was detected in the controller. Check the short-circuit and improper connection of the peripheral equipment wiring. (Emergency, D-I/O, and Expansion I/O connectors) Replace the controller. | | |

Maintenance 8. Trouble Shooting

| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|---|--------|--------|
| 4233 | Servo real time status failure. Communication error with the servo CPU. | A communication error was detected in the controller. Check the short-circuit and improper connection of the peripheral equipment wiring. (Emergency, D-I/O, and Expansion I/O connectors) Replace the controller. | | |
| 4240 | Irregular motion control interruption was detected. Interruption duplicate. | A interruption error was detected in the controller. Check the short-circuit and improper connection of the peripheral equipment wiring. (Emergency, D-I/O, and Expansion I/O connectors) Replace the controller. | | |
| 4241 | Over speed during low power mode was detected. | The robot over speed was detected during low power mode. Check the robot mechanism. (Smoothness, backlash, non-smooth motion, loose belt tension, brake) Check whether the robot does not interfere with peripheral equipment. (Collision, contact) Replace the motor driver. Replace the motor. (Motor and encoder failure) Check the short-circuit and improper connection of the peripheral equipment wiring. (Emergency, D-I/O, and Expansion I/O connectors) | | |
| 4242 | Improper acceleration reference was generated. | You attempted to operate the robot with the acceleration reference exceeding the specified value. For a CP motion, decrease the AccelS value. | | |
| 4243 | Improper speed reference is generated in the high power mode. | The robot over speed was detected during high power mode. Check the robot mechanism. (Smoothness, backlash, non-smooth motion, loose belt tension, brake) Check whether the robot does not interfere with peripheral equipment. (Collision, contact) Replace the motor driver. Replace the motor. (Motor and encoder failure) Check the short-circuit and improper connection of the peripheral equipment wiring. (Emergency, D-I/O, and Expansion I/O connectors) | | |
| 4250 | Arm reached the limit of motion range during the operation. | Check whether a CP motion trajectory is within the motion range. | | |
| 4251 | Arm reached the limit of XY motion range specified by XYLim during the operation. | Check the XYLim setting. | | |
| 4252 | Coordinate conversion error occurred during the operation. | Check whether a CP motion trajectory is within the motion range. | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|--|--------|--------|
| 4267 | Attempt to exceed the J4Flag attribute without indication. | You attempted to exceed the J4Flag attribute during motion without the J4Flag indication. Change the J4Flag for the target point. | | |
| 4268 | Attempt to exceed the J6Flag attribute without indication. | You attempted to exceed the J6Flag attribute during motion without the J6Flag indication. Change the J6Flag for the target point. | | |
| 4269 | Attempt to exceed the particular wrist orientation attribute without indication. | You attempted to exceed the particular wrist orientation attribute during motion without the Wrist indication. Change the Wrist attribute for the target point. Change the target point to avoid a particular wrist orientation. | | |
| 4270 | Attempt to exceed the particular arm orientation attribute without indication. | You attempted to exceed the particular hand orientation attribute during motion without the Hand indication. Change the Hand attribute for the target point. Change the target point to avoid a particular hand orientation. | | |
| 4271 | Attempt to exceed the particular elbow orientation attribute without indication. | You attempted to exceed the particular elbow orientation attribute during motion without the Elbow indication. Change the Elbow attribute for the target point. Change the target point to avoid a particular elbow orientation. | | |
| 4272 | Specified point flag is invalid. | For a CP motion command, the arm form at the target point is different from the point flag specified with the target point. Change the point flag for the target point. | | |
| 4273 | J6Flag switched during the lift motion in conveyer tracking | Adjust the Tool orientation so that J6Flag will not switch | | |
| 4274 | Manipulator motion did not match to J6Flag of the target point | For a CP motion command, the manipulator reached to the target point with J6Flag which differs from the one specified for the target point. Change J6Flag for the target point. | | |
| 4275 | Manipulator motion did not match to J4Flag of the target point | For a CP motion command, the manipulator reached to the target point with J4Flag which differs from the one specified for the target point. Change J4Flag for the target point. | | |
| 4276 | Manipulator motion did not match to ArmFlag of the target point | For a CP motion command, the manipulator reached to the target point with ArmFlag which differs from the one specified for the target point. Change ArmFlag for the target point. | | |
| 4277 | Manipulator motion did not match to ElbowFlag of the target point | For a CP motion command, the manipulator reached to the target point with ElbowFlag which differs from the one specified for the target point. Change ElbowFlag for the target point. | | |

Maintenance 8. Trouble Shooting

| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|--|--------|--------|
| 4278 | Manipulator motion did not match to WristFlag of the target point | For a CP motion command, the manipulator reached to the target point with WristFlag which differs from the one specified for the target point. Change WristFlag for the target point. | | |

Servo

| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|--|--------|--------|
| 5000 | Servo control gate array failure. Check the DMB. | Check the short-circuit and improper connection of the peripheral equipment wiring. (Emergency and I/O connectors) Replace the DMB. Replace the additional axis unit. | | |
| 5001 | Disconnection of the parallel encoder signal. Check the signal cable connection or the robot internal wiring. | Check the M/C cable signal. Check the robot signal wiring. (Missing pin, disconnection, short-circuit) Replace the motor. Replace the DMB. Check the connector connection in the controller. (Loosening, connecting to the serial encoder terminal on the DMB) Check the model setting. Check the peripheral equipment wiring. (Emergency and I/O) | | |
| 5002 | Motor driver is not installed. Install the motor driver. Check the DMB or the motor driver. | Check whether the motor driver is mounted. Check the model setting and hardware setting. Replace the motor driver. Replace the DMB. | | |
| 5003 | Initialization communication failure of incremental encoder. Check the signal cable connection and the robot setting. | Check the model setting. Replace the motor. Replace the DMB. | | |
| 5004 | Initialization failure of absolute encoder. Check the signal cable connection or the robot setting. | Check the model setting. Replace the motor. Replace the DMB. | | |
| 5005 | Encoder division setting failure. Check the robot setting. | Check the model setting. | | |
| 5006 | Data failure during absolute encoder initialization. Check the signal cable connection, the controller, or the motor. | Replace the motor. Replace the DMB. Check the noise countermeasures. | | |
| 5007 | Absolute encoder multi-turn is beyond the maximum range. Reset the encoder. | Reset the encoder. Replace the motor. | | |
| 5008 | Position is out of the range. Reset the encoder. | Reset the encoder. Replace the DMB. Replace the motor. | | |
| 5009 | No response from the serial encoder. Check the signal cable connection, the motor, the DMB, or the encoder IF board. | Check the model setting. (Improperly setting of the parallel encoder model) Check the signal cable connection. Replace the DMB and encoder I/F board. | | |
| 5010 | Serial encoder initialization failure. Reboot the controller. Check the motor, the DMB, or the encoder IF board. | Check the robot configuration. Check the signal cable connection. Replace the DMB and encoder I/F board. | | |

Maintenance 8. Trouble Shooting

| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|--|--------|--------|
| 5011 | Serial encoder communication failure. Reboot the controller. Check the motor, the DMB, or the encoder I/F board. | Check the robot configuration. Check the signal cable connection. Replace the DMB and encoder I/F board. | | |
| 5012 | Servo CPU watchdog timer failure. Reboot the controller. Check the motor or the DMB. | Replace the DMB. Check the noise countermeasures. | | |
| 5013 | Current control circuit WDT failure. Reboot the controller. Check the controller. | Check the power cable connection. Check the 15V power supply and cable connection. Replace the DMB. Check the noise countermeasures. | | |
| 5015 | Encoder is reset. Reboot the controller. | Reboot the controller. | | |
| 5016 | Power supply failure of the absolute encoder. Replace the battery. Check the robot internal wiring. | Reset the encoder. Check the signal cable connection. | | |
| 5017 | Backup data failure of the absolute encoder. Reset the encoder. | Reset the encoder. Check the signal cable connection. | | |
| 5018 | Absolute encoder battery alarm. | Replace the battery. Check the signal cable connection. | | |
| 5019 | Position failure of the absolute encoder. Reset the encoder. Replace the motor. | Reset the encoder. Replace the motor. | | |
| 5020 | Speed is too high at controller power ON. Stop the robot and reboot the controller. | Reboot the controller. | | |
| 5021 | Absolute encoder overheat. | Lower the motion duty. Wait until the temperature of the encoder decreases. | | |
| 5022 | R/D transducer failure. Check the resolver board. | Check the noise countermeasure. Replace the resolver board. | | |
| 5023 | G sensor communication failure. Check the control board. | Check the M/C signal cable. Check the robot signal wiring (for pin falling, disconnection, short). Check the noise countermeasure. Replace the control board. Replace the DMB. | | |
| 5024 | G sensor data failure. Check the control board. | Replace the control board. | | |
| 5025 | Resolver mixing failure. Reset the encoder. | Reset the resolver. Check the noise countermeasure. Replace the resolver board. | | |
| 5026 | Resolver signal disconnection. Check the motor and resolver board. | Check the robot signal wiring. Replace the resolver board. | | |
| 5027 | S-DSP communication failure. Check-sum error, Free-run counter error | Reboot the controller. Replace the DMB. Check the noise countermeasure. | | |
| 5028 | Current data failure. Data update stopped. Parity error. | Reboot the controller. Replace the DMB. Check the noise countermeasure. | | |
| 5029 | D-DSP communication failure. Check-sum error, Free-run counter error | Reboot the controller. Replace the DMB. Check the noise countermeasure. | | |
| 5032 | Servo alarm A. | Reboot the controller. | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|--|--------|--------|
| 5040 | Motor torque output failure in high power state. Check the power cable connection, the robot, the driver or the motor. | Specify the Weight/Inertia setting. Check the load. Check the robot. (Smoothness, backlash, non-smooth motion, loose belt tension, brake) Check the interference with the peripheral equipment. (Collision, contact) Check the model setting. Check the power cable connection. Check the robot power wiring. (Missing pin, disconnection, short-circuit) Check the power supply voltage. (Low power supply voltage) Replace the motor driver. Replace the DMB. Replace the motor. | | |
| 5041 | Motor torque output failure in low power state. Check the power cable connection, robot, brake, driver, or motor. | Check the robot. (Smoothness, backlash, non-smooth motion, loose belt tension, brake) Check the interference with the peripheral equipment. (Collision, contact) Check the model setting. Check the power cable connection. Check the robot power wiring. (Missing pin, disconnection, short-circuit) Check the power supply voltage. (Low power supply voltage) Replace the motor driver. Replace the DMB. Replace the motor. | | |
| 5042 | Position error overflow in high power state. Check the power cable connection, the robot, the driver and the motor. | Specify the Weight/Inertia setting. Check the load. Check the robot. (Smoothness, backlash, non-smooth motion, loose belt tension, brake) Check the interference with the peripheral equipment. (Collision, contact) Check the model setting. Check the power cable connection. Check the robot power wiring. (Missing pin, disconnection, short-circuit) Check the power supply voltage. (Low power supply voltage) Replace the motor driver. Replace the DMB. Replace the motor. | | |

Maintenance 8. Trouble Shooting

| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|---|--------|--------|
| 5043 | Position error overflow in low power state. Check the power cable connection, robot, brake, driver, or motor. | <p>Check the robot. (Smoothness, backlash, non-smooth motion, loose belt tension, brake)</p> <p>Check the interference with the peripheral equipment. (Collision, contact)</p> <p>Check the model setting.</p> <p>Check the power cable connection.</p> <p>Check the robot power wiring. (Missing pin, disconnection, short-circuit)</p> <p>Check the power supply voltage. (Low power supply voltage)</p> <p>Replace the motor driver.</p> <p>Replace the DMB.</p> <p>Replace the motor.</p> | | |
| 5044 | Speed error overflow in high power state. Check the power cable connection, robot, brake, driver, or motor. | <p>Specify the Weight/Inertia setting.</p> <p>Check the load.</p> <p>Check the robot. (Smoothness, backlash, non-smooth motion, loose belt tension, brake)</p> <p>Check the interference with the peripheral equipment. (Collision, contact)</p> <p>Check the model setting.</p> <p>Check the power cable connection.</p> <p>Check the robot power wiring. (Missing pin, disconnection, short-circuit)</p> <p>Check the power supply voltage. (Low power supply voltage)</p> <p>Replace the motor driver.</p> <p>Replace the DMB.</p> <p>Replace the motor.</p> | | |
| 5045 | Speed error overflow in low power state. Check the power cable connection, robot, brake, drive, or motor. | <p>Check the robot. (Smoothness, backlash, non-smooth motion, loose belt tension, brake)</p> <p>Check the interference with the peripheral equipment. (Collision, contact)</p> <p>Check the model setting.</p> <p>Check the power cable connection.</p> <p>Check the robot power wiring. (Missing pin, disconnection, short-circuit)</p> <p>Check the power supply voltage. (Low power supply voltage)</p> <p>Replace the motor driver.</p> <p>Replace the DMB.</p> <p>Replace the motor.</p> | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|--|--------|--------|
| 5046 | Over speed in high power state. Reduce SpeedS. Check the signal cable connection, robot, brake, driver or motor. | <p>Reduce SpeedS of the CP motion. Change the orientation of the CP motion. Specify the Weight/Inertia setting. Check the load.</p> <p>Check the robot. (Smoothness, backlash, non-smooth motion, loose belt tension, brake)</p> <p>Check the interference with the peripheral equipment. (Collision, contact)</p> <p>Check the model setting.</p> <p>Check the power cable connection.</p> <p>Check the robot power wiring. (Missing pin, disconnection, short-circuit)</p> <p>Check the power supply voltage. (Low power supply voltage)</p> <p>Replace the motor driver.</p> <p>Replace the DMB.</p> <p>Replace the motor.</p> | | |
| 5047 | Over speed in low power state. Check the signal cable connection, robot, brake, driver, or motor. | <p>Check the motion in high power state.</p> <p>Check the robot. (Smoothness, backlash, non-smooth motion, loose belt tension, brake)</p> <p>Check the interference with the peripheral equipment. (Collision, contact)</p> <p>Check the model setting.</p> <p>Check the power cable connection.</p> <p>Check the robot power wiring. (Missing pin, disconnection, short-circuit)</p> <p>Check the power supply voltage. (Low power supply voltage)</p> <p>Replace the motor driver.</p> <p>Replace the DMB.</p> <p>Replace the motor.</p> | | |
| 5048 | Over voltage of the main power circuit. Check the main power voltage or the regeneration module. | <p>Specify the Weight/Inertia setting. Check the load.</p> <p>Check the robot. (Smoothness, backlash, non-smooth motion, loose belt tension, brake)</p> <p>Check the interference with the peripheral equipment. (Collision, contact)</p> <p>Check the model setting.</p> <p>Check the power cable connection.</p> <p>Check the robot power wiring. (Missing pin, disconnection, short-circuit)</p> <p>Check the power supply voltage. (Low power supply voltage)</p> <p>Replace the motor driver.</p> <p>Replace the DMB.</p> <p>Replace the motor.</p> | | |
| 5049 | Over current of the motor driver. Check the power cable connection or the robot internal wiring. | <p>Check the short-circuit and earth fault of the power line.</p> <p>Replace the motor driver.</p> <p>Replace the DMB.</p> | | |

Maintenance 8. Trouble Shooting

| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|---|--------|--------|
| 5050 | Over speed during torque control. Check the work motion speed range. | Check the motion speed during torque control. | | |
| 5051 | 15V PWM drive power supply failure. Reboot the controller. Replace the 15V power supply. | Check the 15V power supply and cable connection. Replace the motor driver. Replace the DMB. | | |
| 5054 | Overload of the motor. Decrease the motion duty and the Accel. | Lower the motion duty. Check the Weight/Inertia setting. Check the robot. (Backlash, large load, loose belt tension, brake) | | |
| 5055 | Overload of the motor. Decrease the operation duty and the Accel. | Lower the motion duty. Check the Weight/Inertia setting. Check the robot. (Backlash, large load, loose belt tension, brake) | | |
| 5056 | G sensor output failure. Check the control board. | Check the noise countermeasures. Replace the control board. | | |
| 5072 | Servo alarm B. | Reboot the controller. | | |
| 5080 | Motor is overloaded. Decrease the duty and the Accel. | Lower the motion duty. Check the Weight/Inertia setting. Check the robot. (Backlash, large load, loose belt tension, brake) | | |
| 5098 | High temperature of the encoder. Decrease the duty. Check the reduction gear unit of the robot. | Wait until the temperature of the encoder decreases. Lower the motion duty. Check the Weight/Inertia setting. Check the robot. (Backlash, large load, loose belt tension, brake) | | |
| 5099 | High temperature of the motor driver . Clean the controller fan filter. Check the ambient temperature. Decrease the duty. | Clean the cooling fan filter. Lower the motion duty. Check the Weight/Inertia setting. Lower the ambient temperature. | | |
| 5112 | Servo alarm C. | Reboot the controller. | | |

Vision Calibration

| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|---|--------|--------|
| 6001 | Calibration number is out of range. | Correct the calibration number. | | |
| 6002 | Calibration data is not defined. | Perform calibration. | | |
| 6003 | Camera mounting direction is out of range. | Correct the CameraOrientation value. | | |
| 6004 | 2-point measurement flag is out of range. | Correct the TwoRefPoint value. | | |
| 6005 | There is an invalid data in the pose data. | Re-teach the points. | | |
| 6006 | Calibration failure: Invalid data prevents calculation. | Perform point teaching and calibration again. | | |
| 6007 | Coordinate conversion: Invalid data prevent calculation. | Reteach the points. | | |
| 6009 | Calibration file name is not correct. | Correct the calibration file name. | | |
| 6010 | Calibration file does not exist. | Correct the calibration file name. | | |
| 6012 | Failed to load the calibration file. | Correct the calibration file name. | | |
| 6013 | Failed to write into the calibration file. | Check access permission for the project folder. | | |
| 6014 | Specify continuous 9 data for the Pixel coordinate. | Make sure that at least 9 results are obtained in the vision sequence. | | |
| 6015 | Specify continuous 18 data for the Pixel coordinate. | Make sure that at least 18 results are obtained in the vision sequence. | | |
| 6016 | Specify continuous 9 data for the Robot coordinate. | Reteach the points. | | |
| 6017 | Specify continuous 18 data for the Robot coordinate. | Reteach the points. | | |
| 6018 | Specify continuous 9 data and 1 reference point for the Robot coordinate. | Perform point teaching and calibration again. | | |
| 6019 | Specify continuous 9 data and 2 reference points for the Robot coordinate. | Perform point teaching and calibration again. | | |

Points

| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|---|--------|--------|
| 7003 | The specified robot cannot be found. | Reboot the controller. Initialize the control firmware. | | |
| 7004 | Duplicate allocation of the point data area. | Reboot the controller. Initialize the control firmware. | | |
| 7006 | Specified point number cannot be found. Specify a valid point number. | Check the specified point number. | | |
| 7007 | Specified point number was not defined. Specify a teach point number. | Check whether point data is registered in the specified point. Perform the teaching. | | |
| 7010 | Cannot allocate the memory area for the pallet definition. | Reboot the controller. Initialize the controller firmware. Replace the controller. | | |
| 7011 | Cannot free the memory area for the pallet definition. | Reboot the controller. Initialize the controller firmware. | | |
| 7012 | Specified pallet number cannot be found. Specify a valid pallet number. | Check the pallet number. | | |
| 7013 | Specified pallet is not defined. Specify a defined pallet or define the pallet. | Check whether the specified pallet is defined by the Pallet statement. Declare the pallet. | | |
| 7014 | Specified division number is beyond the pallet division number definition. Specify a valid division. | Check the specified division number. | | |
| 7015 | Specified coordinate axis number does not exist. | Check the specified coordinate axis number. | | |
| 7016 | Specified arm orientation number does not exist. | Check the specified arm orientation number. | | |
| 7017 | Cannot allocate the required memory. | Reboot the controller. Initialize the controller firmware. Replace the controller. | | |
| 7018 | Specified point label cannot be found. Specify a valid point label. | Check the specified point label. | | |
| 7019 | Parameter setup in the initialization file is invalid. | Reboot the controller. Initialize the controller firmware. | | |
| 7021 | Duplicate point label. Specified label name is already registered. Change the label name. | Change the point label. | | |
| 7022 | Specified local coordinate system is not defined. Specify a valid local coordinate system number. | Check the specified local number. Define the Local coordinate system. | | |
| 7023 | Specified string is not in the correct format. | | | |
| 7024 | Point data memory area for the specified robot is not allocated. | Rebuild the project. | | |
| 7026 | Cannot open the point file. Specify a valid point file name. | Check the point file name. Check whether the point file specified for the project exists. | | |
| 7027 | Cannot read the point data from the point file. | Create the point file again. | | |
| 7028 | Point area is allocated beyond the available point number. | There are too many points. Review the number of points. | | |
| 7029 | Specified point file name is not correct. Specify a valid point file name. | Check the file extension. | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|--|--------|--------|
| 7030 | Specified point label is beyond the maximum length. Specify a valid point label. | Change the point label. | | |
| 7031 | Description for the specified point is beyond the maximum length. Specify a valid description. | Change the comment. | | |
| 7032 | Point file is corrupted. Check sum error. | Create the point file again. | | |
| 7033 | Specified point file cannot be found. Specify a valid point file name. | Check the name of the specified point file. | | |
| 7034 | Cannot save the point file. | Failed to save the point file (create a temporary file). Reboot the controller. Initialize the controller firmware. Replace the controller. | | |
| 7035 | Cannot save the point file. | Failed to save the point file (file open). Reboot the controller. Initialize the controller firmware. Replace the controller. | | |
| 7036 | Cannot save the point file. | Failed to save the point file (renew the file header). Reboot the controller. Initialize the controller firmware. Replace the controller. | | |
| 7037 | Cannot save the point file. | Failed to save the point file (create the file name). Reboot the controller. Initialize the controller firmware. Replace the controller. | | |
| 7038 | Cannot save the point file. | Failed to save the point file (copy the file). Reboot the controller. Initialize the controller firmware. Replace the controller. | | |
| 7039 | Cannot save the point file. | Failed to save the point file (change the file name). Reboot the controller. Initialize the controller firmware. Replace the controller. | | |
| 7040 | The point label is not correct. Specify a valid point point label. | The initial character of the point label name is improper. Correct the label name. | | |
| 7041 | The point label is not correct. Specify a valid point point label. | Inadequate character is used. Correct the label name. | | |

Fieldbus

| No. | Message | Remedy | Note 1 | Note 2 |
|---|---|---|--------|--------|
| 7101 | Communication error occur during transform. | The module is broken or the controller software is damaged. Restore the controller firmware. | 1 | |
| | | | 2 | |
| | | | 3 | |
| | | | 4 | |
| | | | 10 | |
| | | A communication data error was detected during communication. The communication cable has a problem. Check the communication cable and its related units. | 11 | |
| | | | 12 | |
| | | The module is broken or the controller software is damaged. Restore the controller firmware. | 13 | |
| | | | 14 | |
| | | | 15 | |
| The PLC is not running or not connected. Check the PLC, the communication cable, and peripherals. (If Code 1 is 22 when the CC-Link board is used.) | 22 | | | |
| 7103 | Timeout error occurs during transform. | The module is broken or the controller software is damaged. Restore the controller firmware. (If Code 1 is 1, 2, or 3) | 1 | |
| | | | 2 | |
| | | | 3 | |
| | | A communication data error was detected during communication. The communication cable has a problem. Check the communication cable and its related units. | 4 | |

Vision

| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|---|--------|--------|
| 7300 | Vision Communication. Server mode not supported. | | | |
| 7302 | Vision Communication. Failed to read from the camera. | Check the connection with the camera. | | |
| 7303 | Vision Communication. Read data overflow. | Data exceeding the receive buffer was received. | | |
| 7304 | Vision Communication. Failed to open the Ethernet port. | Check the connection with the camera. | | |
| 7305 | Vision Communication. Invalid IP address of camera. | Rebuild the project. Check the camera configuration. | | |
| 7306 | Vision Communication. No specification of Server/Client. | | | |
| 7307 | Vision Communication. Failed to send to the camera. | Check the connection with the camera. | | |
| 7308 | Vision Communication. Camera version is old. | The version of the connected camera is old. Update the camera. | | |
| 7321 | Vision Communication. Camera setting has not been set. | Rebuild the project. Check the camera configuration. | | |
| 7322 | Vision Communication. Read timeout. | Check the connection with the camera. | | |
| 7323 | Vision Communication. Read invalid data. | Check the connection with the camera. | | |
| 7324 | Vision Communication. Failed to send to the camera. | Check the connection with the camera. | | |
| 7325 | Vision Communication. Connection is not completed. | Check the connection with the camera. | | |
| 7326 | Vision Communication. Read data is too long. | | | |
| 7327 | Vision Communication. Undefined vision sequence. | Check the sequence name. | | |
| 7328 | Vision Communication. Camera setting has not been set. | Rebuild the project. Check the camera configuration. | | |
| 7329 | Vision Communication. Vis file is not found. | Rebuild the project. Check the camera configuration. | | |
| 7330 | Vision Communication. Failed to allocate memory. | Reduce the number of sequences, objects, and calibration. | | |
| 7341 | Vision Communication. Out of max camera number. | Review the camera registration. | | |
| 7342 | Vision Communication. Invalid camera number. | Review the camera registration. | | |
| 7343 | Vision Communication. VSet parameter is too long. | Review the names and string variables of sequences, objects, and calibration. | | |
| 7344 | Vision Communication: Too many parameters for VGet. | The number of specified variables is exceeding 32. Reduce the number of parameters. | | |
| 7345 | Vision Communication. Not enough data for VGet statement variable assignment. | Reboot the camera. Check the version of the camera. | | |
| 7346 | Vision Communication. Cannot execute a Vision statement from the command window. | Execute the command from the program. | | |
| 7500 | Smart camera. Out of memory. | Initialize the camera. Reduce the project size. | | |
| 7501 | Smart camera. Project does not exist. | Rebuild the project. | | |

Maintenance 8. Trouble Shooting

| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|--|--------|--------|
| 7502 | Smart camera. Project has not been set. | Rebuild the project. | | |
| 7503 | Smart camera. Vision property or result not supported. | Update the camera firmware. | | |
| 7504 | Smart camera. Cannot open project file. | Rebuild the project. | | |
| 7505 | Undefined vision sequence. | Check the sequence name. Rebuild the project. | | |
| 7506 | Undefined vision object. | Check the object name. Rebuild the project. | | |
| 7507 | Smart camera. Critical error. | Initialize the camera. Rebuild the project. | | |
| 7508 | Smart camera. Invalid command. | Update the camera firmware. | | |
| 7509 | Invalid vision property value. | Check the property value. Update the camera firmware. | | |
| 7510 | Invalid vision property. | Check the property name. Update the camera firmware. | | |
| 7511 | Vision model not trained. | Teach the model. | | |
| 7512 | Undefined vision calibration. | Check the calibration name. Rebuild the project. | | |
| 7513 | Vision model object not Self. | Check the property value. | | |
| 7514 | Invalid vision result. | Check the result name. Update the camera firmware. | | |
| 7515 | Vision object not found. | Check the Found result before obtaining the result. | | |
| 7516 | No vision calibration. | Check the calibration name. | | |
| 7517 | Incomplete vision calibration. | Perform calibration. | | |
| 7518 | Smart camera. Cannot connect with camera. | Check the camera connection. | | |
| 7519 | Smart camera. Communication error. | Check the camera connection. | | |

GUI Builder

| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|--|--------|--------|
| 7600 | Cannot execute a GUI Builder statement from the command window. | GUI Builder commands are only available in the program. | | |
| 7602 | GSet parameter is too long. | Correct the parameter to the proper length. | | |
| 7603 | Too many parameters for GGet. | Check the number of parameters. | | |
| 7604 | Not enough data for GGet statement variable assignment. | Specify the variable. | | |
| 7610 | The event task cannot be executed. System in pause state and EventTaskType is Normal. | The system can be operated by changing EventTaskType to "NoPause" | | |
| 7611 | The event task cannot be executed. Safeguard is open and EventTaskType is Normal. | The system can be operated by changing EventTaskType to "NoEmgAbort" | | |
| 7612 | The event task cannot be executed. Estop is active and EventTaskType is not NoEmgAbort. | The system can be operated by changing EventTaskType to "NoEmgAbort" | | |
| 7613 | The event task cannot be executed. System in error state and EventTaskType is not NoEmgAbort. | The system can be operated by changing EventTaskType to "NoEmgAbort" | | |
| 7650 | Invalid property. | Specify the valid property. | | |
| 7651 | Invalid form. | Specify the valid form. | | |
| 7652 | Invalid control. | Specify the valid control. | | |
| 7653 | The specified form is already open. | Modify the program to avoid double launch. | | |
| 7654 | Event function does not exist. | Check the function name set for the event. | | |
| 7655 | The item does not exist. | Specify the valid item. | | |
| 7656 | Invalid property value. | Check the property value and specify the valid value. | | |
| 7847 | MDL failure. Failed to open the MDL file. | Reboot the controller. Reinstall the firmware. | - | - |
| 7848 | MDL failure. Failed to read the MDL file. | Reboot the controller. Reinstall the latest firmware version. | - | - |

Hardware

| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|---|---------------|----------------|
| 9001 | Emergency stop circuit failure was detected. Disconnection or other failure was found in one of the redundant inputs. | Check whether no disconnection, earth fault, or short-circuit of the emergency stop input signal exists. Then reboot the controller. | | |
| 9002 | Safeguard circuit failure was detected. Disconnection or other failure was found in one of the redundant inputs. | Check whether no disconnection, earth fault, or short-circuit of the safeguard input signal exists. Then reboot the controller. | | |
| 9011 | Battery voltage of the CPU board backup is lower than the specified voltage. Replace the CPU board battery. | Replace the battery for the CPU board immediately. Keep the controller ON as long as possible until the battery is replaced. | | |
| 9012 | 5V input voltage for CPU board is lower than the specified voltage. | If normal voltage is not generated by 5V power supply alone, replace the power supply. | | |
| 9013 | 24 V input voltage for the motor brake, encoder and fan is lower than the specified voltage. | If normal voltage is not generated by 24V power supply alone, replace the power supply. | | |
| 9014 | Internal temperature of the Controller is higher than the specified temperature. | Stop the controller as soon as possible and check whether the ambient temperature of the controller is not high. Check whether the filter is not clogged up. | Current value | Boundary value |
| 9015 | Rotating speed of the controller fan is below the allowed speed. (FAN1) | Check whether the filter is not clogged up. If the warning is not cleared after the controller is rebooted, replace the fan. | Current value | Boundary value |
| 9016 | Rotating speed of the controller fan is below the allowed speed. (FAN2) | Check whether the filter is not clogged up. If the warning is not cleared after the controller is rebooted, replace the fan. | Current value | Boundary value |
| 9017 | Internal temperature of the Controller is higher than the specified temperature. | Stop the controller as soon as possible and check whether the ambient temperature of the controller is not high. Check whether the filter is not clogged up. | | |
| 9100 | Initialization failure. Failed to allocate memory. | Reboot the controller. | | |
| 9101 | Message queue has become full. | | | |
| 9233 | The Fieldbus I/O driver is in an abnormal state. | The module is broken or the controller software is damaged. Restore the controller firmware. | | |
| 9234 | Fieldbus I/O driver initialization failure. | The module is broken or the controller software is damaged. Restore the controller firmware. | | |
| 9610 | RAS circuit detected a servo system malfunction. Reboot the controller. Check for noise. Replace the controller. | Check the noise countermeasures. Replace the DMB. | | |
| 9611 | Servo CPU internal RAM failure. Reboot the controller. Check for noise. Replace the DMB. | Check the noise countermeasures. Replace the DMB. | | |
| 9612 | RAM for the main and servo CPU communication failure. Reboot the controller. Check for noise. Replace the DMB. | Check the noise countermeasures. Replace the DMB. | | |
| 9613 | Servo CPU internal RAM failure. Reboot the controller. Check for noise. Replace the DMB. | Check the noise countermeasures. Replace the DMB. | | |
| 9614 | Initialization communication of main CPU and servo CPU failure. Reboot the Controller. Check for noise. Replace DMB. | Check the noise countermeasures. Replace the DMB. | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|---|--------|--------|
| 9615 | Initialization communication of the main and servo CPU failure. Reboot the controller. Check for noise. Replace the DMB. | Check the noise countermeasures. Replace the DMB. | | |
| 9616 | Communication of the main and servo CPU failure. Reboot the controller. Check for noise. Replace the DMB. | Check the noise countermeasures. Replace the DMB. | | |
| 9617 | Communication of the main and servo CPU failure. Reboot the controller. Check for noise. Replace the DMB. | Check the noise countermeasures. Replace the DMB. | | |
| 9618 | Servo long time command overrun. | Check the noise countermeasures. Replace the DMB. | | |
| 9619 | Servo long time command check sum error. | Check the noise countermeasures. Replace the DMB. | | |
| 9620 | System watchdog timer detected a failure. Reboot the controller. Check for noise. Replace the DMB. | Check the noise countermeasures. Replace the DMB. | | |
| 9621 | Drive unit check failure. | Check the noise countermeasures. Replace the DMB. | | |
| 9622 | RAM failure of the servo CPU. Reboot the controller. Check for noise. Replace the DMB. | Check the noise countermeasures. Replace the DMB. | | |
| 9623 | Failure of the redundant circuitry for the emergency stop or the safeguard. Check the wiring. | Check the noise countermeasures. Replace the DMB. | | |
| 9624 | Low voltage of the main circuit power supply was detected. Check the power supply voltage. Reboot the controller. | Check the noise countermeasures. Replace the DMB. | | |
| 9625 | Control relay contact of the main circuit power supply is welded closed. Replace the DPB. | Replace the DMB. | | |
| 9630 | Servo real time status failure. Check sum error. | Reboot the controller. Replace the DMB. Check the noise countermeasures. | | |
| 9632 | Servo real time status failure. Servo free running counter error | Reboot the controller. Replace the DMB. Check the noise countermeasures. | | |
| 9633 | Servo real time status failure. Servo CPU communication error. | Reboot the controller. Replace the DMB. Check the noise countermeasures. | | |
| 9640 | Irregular motion control interruption was detected. Interruption duplicate. | Reboot the controller. Replace the DMB. Check the noise countermeasures. | | |
| 9700 | Servo control gate array failure. Check the DMB. | Check the short-circuit and improper connection of the peripheral equipment wiring. (Emergency and I/O connectors) Replace the DMB. Replace the additional axis unit. | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|---|---|--------|--------|
| 9701 | Disconnection of the parallel encoder signal. Check the signal cable connection or the robot internal wiring. | Check the M/C cable signal. Check the robot signal wiring. (Missing pin, disconnection, short-circuit) Replace the motor. (Encoder failure) Replace the DMB. (Detection circuit failure) Check the connector connection in the controller. (Loosening, connecting to the serial encoder terminal on the DMB) Check the model setting. (Improperly setting of the parallel encoder) Check the peripheral equipment wiring. (Emergency and I/O) | | |
| 9702 | Motor driver is not installed. Install the motor driver. Check the DMB or the motor driver. | Check whether the motor driver is mounted. Check the model setting and hardware setting. Replace the motor driver. Replace the DMB. | | |
| 9703 | Initialization communication failure of incremental encoder. Check the signal cable connection and the robot setting. | Check the model setting. Replace the motor. (Encoder failure) Replace the DMB. | | |
| 9704 | Initialization failure of absolute encoder. Check the signal cable connection or the robot setting. | Check the model setting. Replace the motor. (Encoder failure) Replace the DMB. | | |
| 9705 | Encoder division setting failure. Check the robot setting. | Check the model setting. | | |
| 9706 | Data failure at the absolute encoder initialization. Check the signal cable connection, the controller, or the motor. | Replace the motor. (Encoder failure) Replace the DMB. Check the noise countermeasures. | | |
| 9707 | Absolute encoder multi-turn is beyond the maximum range. Reset the encoder. | Reset the encoder. Replace the motor. (Encoder failure) | | |
| 9708 | Position is out of the range. Reset the encoder. | Reset the encoder. Replace the DMB. Replace the motor. (Encoder failure) | | |
| 9709 | No response from the serial encoder. Check the signal cable connection, the motor, the DMB, or the encoder IF board. | Check the model setting. (Improperly setting of the parallel encoder model) Check the signal cable connection. Replace the DMB and encoder I/F board. | | |
| 9710 | Serial encoder initialization failure. Reboot the controller. Check the motor, the DMB, or the encoder IF board. | Check the robot configuration. Check the signal cable. Replace the DMB and encoder I/F board. | | |
| 9711 | Serial encoder communication failure. Reboot the controller. Check the motor, the DMB, or the encoder IF board. | Check the robot configuration. Check the signal cable. Replace the DMB and encoder I/F board. | | |
| 9712 | Servo CPU watchdog timer failure. Reboot the controller. Check the motor or the DMB. | Replace the DMB. Check the noise countermeasures. | | |
| 9713 | Current control circuit WDT failure. Reboot the controller. Check the controller. | Check the power cable connection. Check the 15V power supply and cable connection. Replace the DMB. Check the noise countermeasures. | | |
| 9715 | Encoder is reset. Reboot the controller. | Reboot the controller. | | |
| 9716 | Power supply failure of the absolute encoder. Replace the battery to a new one. Check the robot internal wiring. | Reset the encoder. Check the signal cable connection. | | |
| 9717 | Backup data failure of the absolute encoder. Reset the encoder. | Reset the encoder. Check the signal cable connection. | | |

| No. | Message | Remedy | Note 1 | Note 2 |
|------|--|--|--------|--------|
| 9718 | Absolute encoder battery alarm. | Replace the battery. Check the signal cable connection. | | |
| 9719 | Position failure of the absolute encoder. Reset the encoder. Replace the motor. | Reset the encoder. Replace the motor. (Encoder failure) | | |
| 9720 | Speed is too high at controller power ON. Stop the robot and reboot the controller. | Reboot the controller. | | |
| 9721 | Absolute encoder over heat. | Lower the motion duty. Wait until the temperature of the encoder decreases. | | |
| 9722 | R/D transducer failure. Check the resolver board. | Check the noise countermeasure. Replace the resolver board. | | |
| 9723 | G sensor communication failure. Check the control board. | Check the M/C signal cable. Check the robot signal wiring (for pin falling, disconnection, short). Check the noise countermeasure. Replace the control board. Replace the DMB. | | |
| 9724 | G sensor data failure. Check the control board. | Replace the control board. | | |
| 9725 | Resolver mixing failure. Reset the encoder. | Reset the resolver. Replace the resolver board. | | |
| 9726 | Resolver signal disconnection. Check the motor and resolver board. | Check the robot signal wiring. Replace the resolver board. | | |
| 9727 | S-DSP communication failure. Check-sum error, Free-run counter error | Reboot the controller. Replace the DMB. Check the noise countermeasure. | | |
| 9728 | Current data failure. Data update stopped. Parity error. | Reboot the controller. Replace the DMB. Check the noise countermeasure. | | |
| 9729 | D-DSP communication failure. Check-sum error, Free-run counter error | Reboot the controller. Replace the DMB. Check the noise countermeasure. | | |
| 9732 | Servo alarm A. | | | |

EPSON RC+

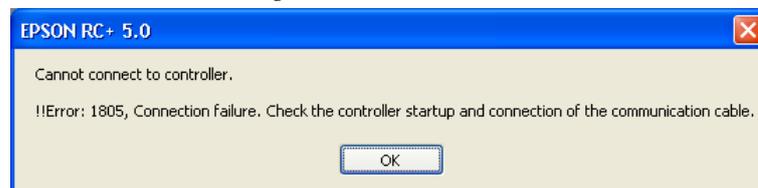
| No. | Message | Remedy | Note 1 | Note 2 |
|-------|--|--|--------|--------|
| 7713 | Option not enabled. | | | |
| 7714 | File not found. | | | |
| 10000 | Command aborted by user | | | |
| 10001 | Command timeout. | | | |
| 10002 | Bad point file line syntax | | | |
| 10003 | Project could not be built. | | | |
| 10004 | Cannot initialize Spel class instance. | | | |
| 10005 | Cannot initialize parser. | | | |
| 10006 | Cannot initialize wbproxy. | | | |
| 10007 | Project does not exist. | Check whether the project name and the path are correct. | | |
| 10008 | No project specified. | Specify the project. | | |
| 10009 | Cannot open file. | Check whether the project name and the path are correct. | | |
| 10010 | Cannot create file. | | | |
| 10011 | File not found | Check whether the project name and the path are correct. | | |
| 10012 | Option not enabled | | | |
| 10013 | Cannot execute LoadPoints with Robot Manager open. | Close the robot manager and execute. | | |
| 10014 | Project cannot be locked. It is being used by another session. | Terminate other applications. | | |
| 10015 | Project could not be synchronized. | | | |
| 10016 | Drive not ready | Check whether the drive designation is correct. | | |
| 10017 | Invalid IP address | Check the IP address. | | |
| 10018 | Invalid IP mask | Check the IP mask. | | |
| 10019 | Invalid IP gateway | Check the IP gateway. | | |
| 10020 | IP address or gateway cannot be the subnet address | Check the IP address. | | |
| 10021 | IP address or gateway cannot be the broadcast address | Check the IP address. | | |
| 10022 | Invalid DNS address | Check the DNS. | | |
| 10023 | Commands cannot be executed because the project build is not complete. | Execute after the project build is completed. | | |
| 10024 | Invalid task name. | Check the task name. | | |
| 10025 | Trial runtime expired. | | | |
| 10100 | Command already in cycle. | | | |
| 10101 | Command aborted by user. | | | |

8.2 Cannot Connect the Development PC and the Controller using the USB cable



- Do not connect the USB cable to a PC or a Controller without installing Program Development Software EPSON RC+ 5.0 to the PC.
You must install EPSON RC+ 5.0 to control the Controller.
If the USB cable is connected to a PC or a Controller without installing Program Development Software EPSON RC+ 5.0, the [Add New Hardware] wizard appears. Click the <Cancel> button to close the [Add New Hardware] wizard.

If the following error message appears when connecting the development PC and Controller with the USB cable and connecting the Controller to EPSON RC+ 5.0, Windows may not recognize the Controller properly. Refer to *8.2.1 Confirmation Using Windows Device Manager* to check the connection of the Controller.



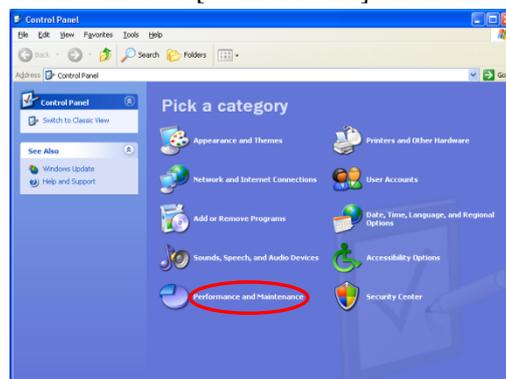
8.2.1 Confirmation Using Windows Device Manager

- Make sure that the development PC and the Controller is connected to the USB cable.

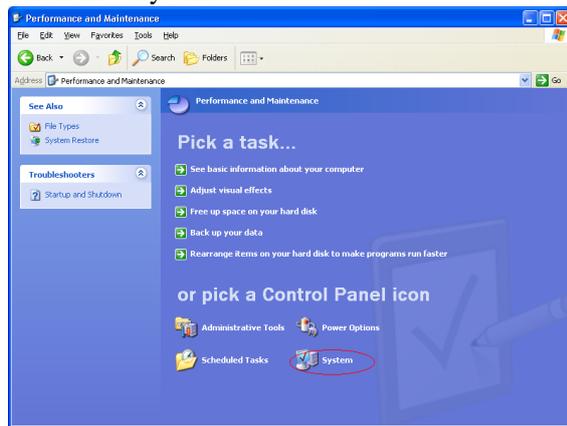


When checking the Controller connection using the Windows device manager, the development PC and the Controller must be connected with the USB cable.

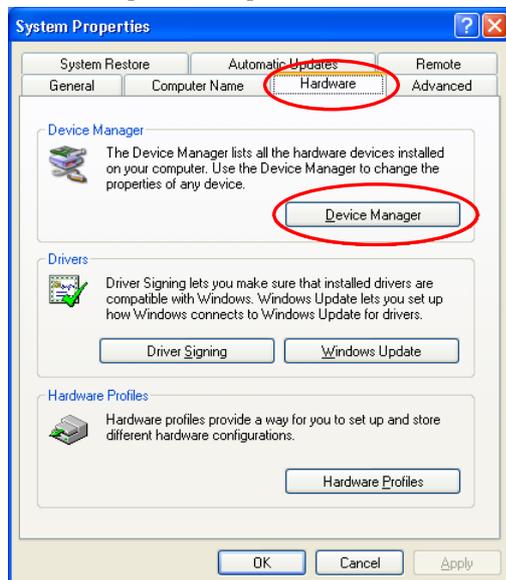
- Click Windows-[Control Panel]-<Performance and Maintenance>.



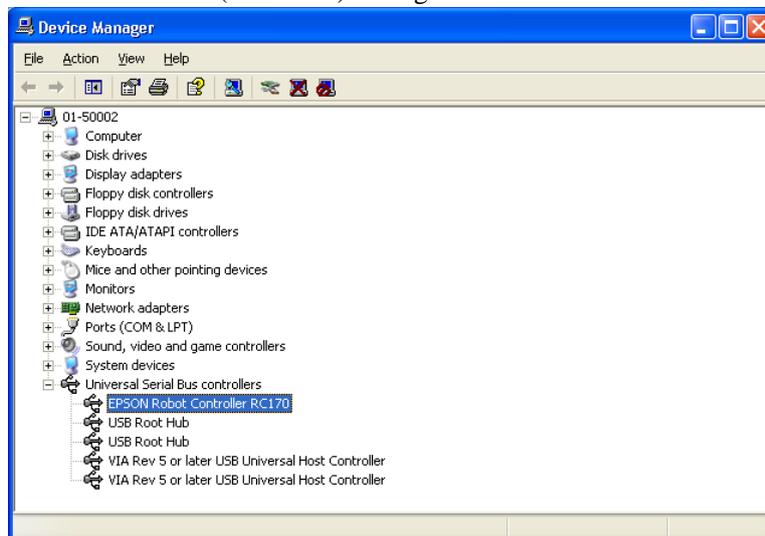
- (3) The [Performance and Maintenance] dialog appears.
Click the <System> icon.



- (4) The [System Properties] dialog appears.
Select the [Hardware] tab and click the <Device Manager> button.



- (5) The [Device Manager] dialog appears.
Click <Universal Serial Bus controllers> and make sure that “EPSON Robot Controller RC170 (or RC180)” is registered.



NOTE  When “EPSON Robot Controller RC170 (or RC180)” is registered and located under “Universal Serial Bus controllers” in step (5), the development PC and the Controller connect properly.

If the following error message appears, please contact EPSON.

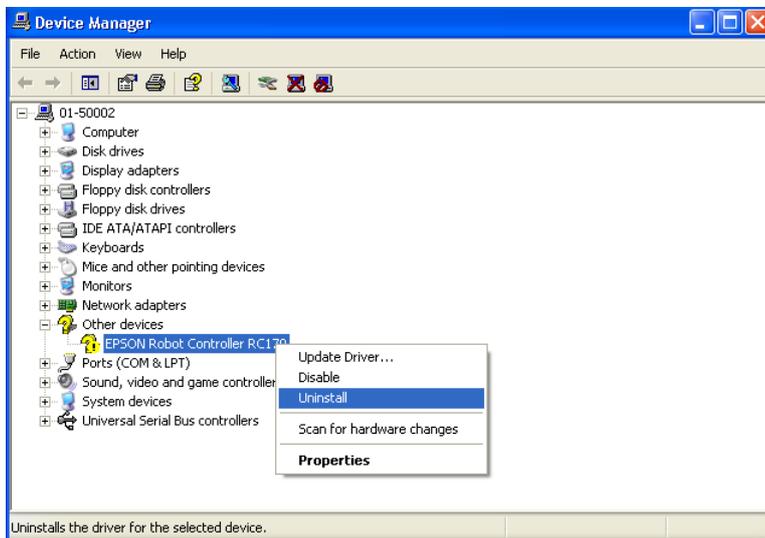
“Cannot connect to controller.

!! Error: 1805, Connection failure, check the controller startup and connection of the communication cable.”

If “EPSON Robot Controller RC170 (or RC180)” is not located under “Universal Serial Bus controllers” but located under “Other devices” in step (5), refer to 8.2.2 *When recognized under “Other devices” in Windows Device Manager.*

8.2.2 When recognized under “Other devices” in Windows Device Manager

If “EPSON Robot Controller RC170 (or RC180)” is recognized under “Other devices” in the Windows device manager as shown in the following dialog, delete “EPSON Robot Controller RC170 (or RC180)” from the device manager and connect the USB cable again to correct the problem.



- (1) Select and right click “EPSON Robot Controller RC170 (or RC180)” in the [Device Manager] dialog.
- (2) Select [Uninstall].
- (3) The [Confirm Device Removal] dialog appears.
Click the <OK> button.



- (4) Remove the USB cable and connect the USB cable again. The following message appears at the right bottom of the Windows screen.



- (5) When the Controller is installed automatically and the following message appears, the communication is available.



NOTE



If the problem is not corrected, please contact EPSON.

9. Maintenance Parts List

| Part Name | | Code | Note |
|-----------------------------------|---------------------|------------|------------------------------------|
| Fan Unit | | R13B060501 | |
| Fan Filter | For Base Unit | R13B060502 | |
| | For Option Unit | R13B060503 | 2 unit per set |
| Battery | | R13B060003 | Banding band CR17335SE (FDK) |
| Motor Driver | 50 W | R13B070101 | |
| | 100 W | R13B070102 | |
| | 200 W | R13B070103 | |
| | 400 W | R13B070104 | |
| | 750 W | R13B070105 | |
| Fuse | | R13B060401 | For DPB |
| CPU Unit | S/N: 10000 or below | R13B040004 | |
| | S/N: 10001 or later | R13B040009 | |
| CF (Compact Flash) | S/N: 10000 or below | R13B110601 | |
| | S/N: 10001 or later | R13B110608 | |
| TP/OP Bypass Plug | | R13B060705 | |
| Controller Mounting Metal Hasp | S | R13B071302 | |
| | L | R13B071303 | |
| Expansion I/O Board | | R12B040301 | Option |
| RS-232C Board | | R12B040705 | Option |
| DeviceNet Board | | R12B040706 | Option |
| PROFIBUS-DP Board | | R12B040707 | Option |
| CC-Link Board | | R12B040708 | Option |
| EtherNet/IP Board | | R12B040719 | Option |
| PROFINET board | | R12B040728 | Option |

Appendix. Alarm

When the batteries (lithium batteries) for the controller and the manipulator drain, an alarm warning voltage reduction occurs. However, the alarm does not guarantee the battery lives until replacement, and it is necessary to replace the batteries immediately. If you run out the batteries, the robot parameters will be lost and recalibration of the robot will be required.

In addition, the parts for the manipulator joints may cause accuracy decline or malfunction due to deterioration of the parts resulting from long term use. If the robot breaks down due to deterioration of the parts, it will take significant time and cost for repair.

The following sections describe the alarm function which announces the following maintenance timings in order to perform maintenance well ahead of time before the warning error.

| Controller firmware Ver. | Maintenance items |
|--|---|
| Ver.1.16.4.x or later Ver.1.24.4.x or later | <ul style="list-style-type: none"> - Controller battery replacement - Robot battery replacement - Grease up - Replacement of the timing belt - Replacement of the motor - Replacement of the reduction gear unit - Replacement of the ball screw spline unit |

1. Parts Consumption Management

The recommended replacement time can be configured for the controller batteries, robot batteries/grease, timing belts, motors, reduction gear units, and ball screw spline units.

The parts consumption management is available for the following Manipulator types:
 G series (G1, G3, G6, G10, G20)
 RS series (RS3, RS4)

| | |
|--|--|
|  CAUTION | <ul style="list-style-type: none"> ■ Make sure that the date and time on the controller are set correctly. The parts consumption management cannot function properly with improper date and time setting. ■ If the CPU board or CF is replaced, the maintenance information may be lost. When you replaced these parts, confirm the date and time of the controller and the maintenance information. |
|--|--|

NOTE  When installed to the firmware version 1.16.4.x, and 1.24.4.x or later, the parts consumption management will be disabled (default).

For details for enabling or disabling the parts consumption management, refer to the *EPSON RC+ 5.0 User's Guide 5.12.2 [Controller] Command (Setup Menu) - [Setup]-[Controller]-[Preferences] Page.*

1.1 Robot Maintenance Information

If enabled, the maintenance information for the battery, timing belts, motors, reduction gear units, ball screw spline unit, and grease up will be configured automatically when the robot is configured or changed.

The following parts are subject to grease up:

SCARA (including RS series): Ball screw spline unit on the Joint # 3

For details on the robot configuration, refer to the *EPSON RC+ 5.0 User's Guide 9.1 Setting the Robot Model*.

| | |
|---|--|
|  CAUTION | <ul style="list-style-type: none"> ■ Changing of the robot should be done carefully. The alarm setting will be reset when the robot is changed. |
|---|--|



If you are using the controller with the firmware version before 1.16.2.x or 1.24.2.x, the maintenance information is not configured. In such case, edit the information.

For details on the maintenance information editing, refer to *Appendix. 3. How to Edit the Maintenance Information*.



The robot maintenance information depends on the controller where the robot is configured to. If the robot is replaced with the other robot with a different serial number, the maintenance information will not function properly. When you replace the robot, edit the maintenance information.

For details on the maintenance information editing, refer to *Appendix. 3. How to Edit the Maintenance Information*.

1.2 Controller Maintenance Information

If the parts consumption management is enabled, the controller battery is automatically configured at the first connection with the EPSON RC+7.0 after upgrading to the firmware version 1.16.4.x or Ver.1.24.4.x and later.

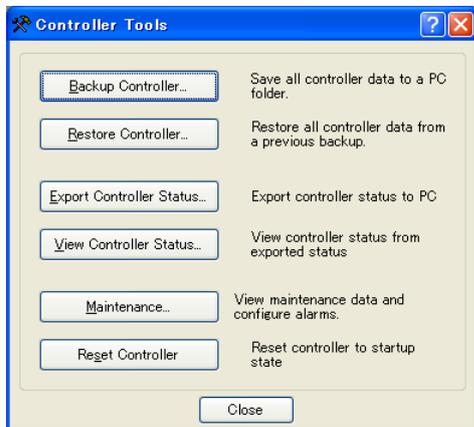


If you are using the controller before the version upgrade, there may be a difference in the maintenance information. In such case, edit the information. For details on the maintenance information editing, refer to *Appendix. 3. How to Edit the Maintenance Information*.

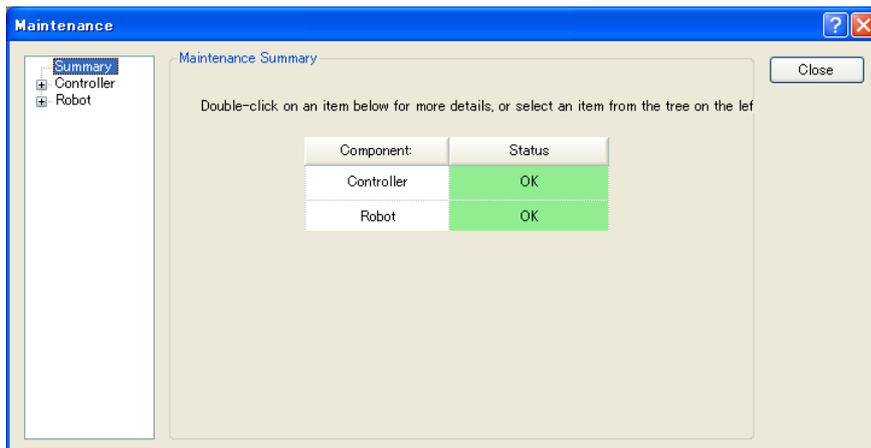
2. How to View the Maintenance Information

The configured maintenance information can be checked in the EPSON RC+ 5.0 Ver.5.4.7 or later.

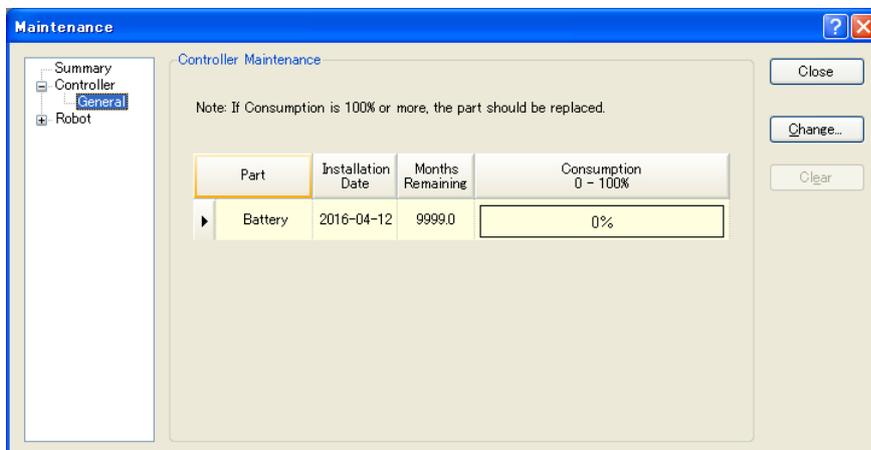
- (1) Select the EPSON RC+ 5.0 menu-[Tools]-[Maintenance] to display the [Controller Tools] dialog box.



- (2) To check the controller maintenance information, click the <Maintenance> button and display the [Maintenance] dialog box.



- (3) Select “General” or specify the axis from the tree to display information of the target parts.





The recommended replacement time for the battery is calculated based on the battery capacity. The battery may run out if it passes the recommended replacement time.

The recommended replacement time for the grease is calculated based on the running distance of the robot. The replacement time may be shorter or longer depending on usage condition, such the load applied on the robot.

The recommended replacement time for the parts (timing belts, motors, reduction gear units, and ball screw spline unit) is when it reaches the L10 life (time until 10% failure probability). In the dialog window, the L10 life is displayed as 100%.

3. How to Edit the Maintenance Information

The configured maintenance information can be edited in the EPSON RC+ 5.0 Ver.5.4.7 or later.

- (1) Select the EPSON RC+ 7.0 menu-[Tools]-[Maintenance] to display the [Controller Tools] dialog box.
- (2) To edit the maintenance information, display the [Maintenance] dialog box.
- (3) Select “General” or specify the axis from the tree to display information of the target parts.
- (4) Select the alarm to be changed and click the <Change> button.
- (5) Display the [Change Alarm] dialog box and enter any of the followings.



Purchase or replacement date of the battery

Date of grease up

Purchase or replacement date of the timing belt

Purchase or replacement date of the motor

Purchase or replacement date of the reduction gear unit

Purchase or replacement date of the ball screw spline unit

- (6) Click the <OK> button and change the specified alarm information.



The offset can be set for the consumption rate of already installed parts.
Follow the steps below to calculate a rough offset setting value.

1. Measure the usable months for the past operation by HealthRBAAnalysis.
2. Confirm the past Motor ON time in the controller status viewer.
3. Calculate a rough offset value with the following formula.

$$\text{Offset} = 100 \times \frac{\text{Motor On time}}{24 \times 30.4375 \times \text{Usable months}}$$

For details, refer to the following manual.

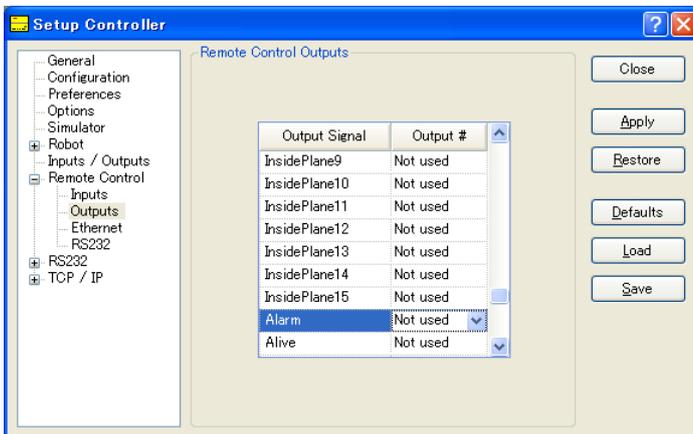
EPSON RC+ 7.0 SPEL+ Language Reference

4. Alarm Notifying Method

The alarm notifying method can be configured by the output bit of the Remote I/O.

The Remote I/O can be configured in the EPSON RC+ 5.0- [Setup] - [Controller] - [Remote Control].

For details, refer to *EPSON RC+ 5.0 User's Guide 11.8 Remote Outputs*.



The controller enters the warning state if an alarm occurs.

5. How to Cancel the Alarm

An alarm occurs when the consumption rate of the parts reaches 100%.



The alarm cannot be canceled by executing the Reset command or restarting the controller.
The alarm can be canceled from the EPSON RC+ 5.0 [Maintenance] dialog box.

Refer to *Appendix. 3 How to Edit the Maintenance Information* to change the alarm information in the same steps.