EPSON

Robot Controller Option
Teach Pendant
TP2

Rev.20 ENM247P6595F

Original instructions

Robot Controller Option
Teach Pendant

TP2

Rev.20

FOREWORD

Thank you for purchasing our robot products.
This manual contains the information necessary for the correct use of the Teach Pendant.
Please carefully read this manual and other related manuals before installing the robot system.
Keep this manual handy for easy access at all times.

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. Please note that the basic performance of the product will not be exhibited if our robot system is used outside of the usage conditions and product specifications described in the manuals.

This manual describes possible dangers and consequences that we can foresee. Be sure to comply with safety precautions on this manual to use our robot system safety and correctly.

TRADEMARKS

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TRADEMARK NOTATION IN THIS MANUAL

Microsoft® Windows® 10 operating system
Microsoft® Windows® 11 operating system
Throughout this manual, Windows 10 and Windows 11 refer to above respective operating systems. In some cases, Windows refers generically to Windows 10 and Windows 11.

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

CONTACT INFORMATION

For detailed contact information, see "SUPPLIER" of the manual below.

"Safety Manual"

Before Reading This Manual

Following descriptions are indicated throughout the manual by these symbols.

NOTE ☞	The “NOTE” sections describe important information to be followed for operating the Robot system.
TIP ☞	The “TIP” sections describe hints for easier or alternative operations.

NOTE ☞ Do not connect the TP2 to following Robot Controllers. Connecting to following Robot Controllers may result in malfunction of the device since the pin assignments are different.

RC420 / RC520 / SRC5** / SRC-3** / SRC-2**

NOTE ☞ Operation of RC700 / RC90 (EPSON RC+7.0) option TP2 deviates from the descriptions in this manual when it is connected to the Robot Controller RC90 (EPSON RC+5.0) or RC180. In this case, refer to the following manual.

RC90 / RC180 option Teach Pendant TP2 Manual

NOTE ☞ A coordinate point including the arm pose is defined as “position (point),” and the data is called “point data.”

Control System Configuration

This option is used with the following combinations of Controllers and software.

TYPE A:

Controller	Software
RC700 series	EPSON RC+ 7.0 Epson RC+ 8.0
RC90-B	EPSON RC+ 7.0 Epson RC+ 8.0
RC800-A	Epson RC+ 8.0

TYPE B: Robot Controller RC90 with the following label attached.

Label	Controller	Software
	RC90	EPSON RC+ 7.0 Epson RC+ 8.0

EPSON RC+ 7.0:

		RC90 Controller firmware
		Ver.7.0.2.0 or later
EPSON RC+ 7.0	Before Ver.7.0.1	!!!
	Ver.7.0.2 or later	OK

OK: Compatible All functions of the EPSON RC+ 7.0 and the Controller are available.

!!!: Compatible Connection is OK. We recommend using EPSON RC+7.0 Ver. 7.0.2 or later.

Epson RC+ 8.0:

	RC90-B Controller firmware	
	Before Ver.7.5.3.x	Ver.7.5.4.x or later
Epson RC+ 8.0	N/A	OK

N/A: Not Available An error will be shown

OK: Compatible All functions of the Epson RC+ and the Controller are available.

TYPE C:

Manipulator	Software
T series	EPSON RC+ 7.0 Ver.7.3.1 or later Epson RC+ 8.0 Ver.8.0.0 or later
T-B series	EPSON RC+ 7.0 Ver.7.5.1A or later Epson RC+ 8.0 Ver.8.0.0 or later
VT series	EPSON RC+ 7.0 Ver.7.4.3 or later Epson RC+ 8.0 Ver.8.0.0 or later

NOTE

When using the Robot Controller RC90 without the label (EPSON RC+ 5.0) or RC180, refer to the *RC90 / RC180 option Teach Pendant TP2* manual. Functions are different from the descriptions in this manual.

NOTE

Manual PDF for TYPE B is available from EPSON RC+ 7.0 Ver. 7.0.2

For T series, VT series Manipulator user only

T series and VT series Manipulators are Controller integrated Manipulators.

Read “Controller” and “Robot Controller” described in this manual as “T series Manipulator” “VT series Manipulator”.

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Functions & Installation

This section contains information about functions and installation of the Teach Pendant to be known before operation and maintenance.

1. Safety

1.1 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.

1.2 Safety Precautions

This product is a device dedicated to Epson robots used in industrial environments.

For details of Safety, refer to *Safety Manual*. Please read and understand the chapter before using the robot system.


WARNING

- The robot system should be designed and installed by personnel who has taken robot system training held by us and suppliers.

- Only qualified 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 personnel who has taken maintenance training held by us and suppliers should be allowed to perform the maintenance of robot system.

WARNING

- Immediately press the EMERGENCY STOP switch whenever you suspect any danger.
  The Teach Pendant is equipped with an EMERGENCY STOP switch. Before operating the Teach Pendant, make sure that the EMERGENCY STOP switch on the Teach Pendant functions properly. Operating the Teach Pendant when the switch does not function properly is extremely hazardous and may result in serious bodily injury and/or serious damage to the equipment, as the switch cannot fulfill its intended function in an emergency.
  When nothing appears on its display window, the Teach Pendant is not connected with the Controller. In this case, the EMERGENCY STOP switch on the Teach Pendant will not function.

- If the Teach Pendant is not connected to the controller, DO NOT place it within easy reach during operation. You might press the EMERGENCY STOP switch on the unconnected Teach Pendant by mistake to stop the robot system in an emergency. Pressing the EMERGENCY STOP switch on the disconnected Teach Pendant in an emergency is extremely hazardous and may cause serious safety problems.

- When entering the safeguarded area for teaching, change the mode of the Teach Pendant to TEACH and take out the key for the mode selector key switch and then enter the safeguarded area with the key. Leaving the key in the mode selector key switch is extremely hazardous and may cause serious safety problems as someone else may inadvertently change the mode to the automatic operation.

- The mode selector key switch of the Teach Pendant does not comply with functional safety.

WARNING

- Be sure to connect the cables between the Controller and the Teach Pendant 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. Do not use the cables near heat or fire.

CAUTION	■ Do not shock the Teach Pendant physically or place any object on Teach Pendant. A liquid crystal display is used for the Teach Pendant display. If the display is damaged, liquid crystal may leak out. Liquid crystal is harmful. If it sticks on your skin or clothes, immediately wash your skin and clothes thoroughly with clean water and soap immediately. ■ The Teach Pendant must be used within the environmental conditions described in this manual. This product has been designed and manufactured strictly for use in a normal indoor environment. Using this product in the environment that exceeds the conditions may not only shorten the life cycle of the product but also cause serious safety problems. ■ Do not disassemble, repair, or modify the Teach Pendant by yourself. Improper disassembly, repair, or modification of the Teach Pendant may cause not only improper function of the robot system but also serious safety problems.

Safety-related Requirements

Specific tolerances and operating conditions for safety are contained in the manuals for the robot, Controller and other devices. Be sure to read those manuals as well.
Robot systems safety standard and other examples are given in this chapter. Therefore, to ensure that safety measures are complete, please refer to the other standards listed as well.
(Note: The following is only a partial list of the necessary safety standards.)

ISO 10218-1	Robots and robotic devices -- Safety requirements for industrial robots -- Part 1: Robots
ISO 10218-2	Robots and robotic devices -- Safety requirements for industrial robots -- Part 2: Robot systems and integration
ANSI/RIA R15.06	American National Standard for Industrial Robots and Robot Systems -- Safety Requirements
ISO 12100	Safety of machinery -- General principles for design -- Risk assessment and risk reduction
ISO 13849-1	Safety of machinery -- Safety-related parts of control systems -- Part 1: General principles for design
ISO 13850	Safety of machinery -- Emergency stop function -- Principles for design
ISO 13855	Safety of machinery -- Positioning of safeguards with respect to the approach speeds of parts of the human body.
ISO 13857	Safety of machinery -- Safety distances to prevent hazard zones being reached by upper and lower limbs.
ISO 14120	Safety of machinery -- Guards -- General requirements for the design and construction of fixed and movable guards
IEC 60204-1	Safety of machinery -- Electrical equipment of machines -- Part 1: General requirements
CISPR11	Industrial, scientific and medical (ISM) radio-frequency equipment -- Electromagnetic disturbance characteristics -- Limits and methods of measurement
IEC 61000-6-2	Electromagnetic compatibility (EMC) -- Part 6-2: Generic standards -- Immunity for industrial environments

1.3 EMERGENCY STOP

⚠ WARNING	■ Immediately press the Emergency Stop switch whenever you suspect any danger. The Teach Pendant is equipped with an Emergency Stop switch. Before operating the Teach Pendant, make sure that the Emergency Stop switch on the Teach Pendant functions properly. Operating the Teach Pendant when the switch does not function properly is extremely hazardous and may result in serious bodily injury and/or serious damage to the equipment, as the switch cannot fulfill its intended function in an emergency. When nothing appears on its display window, the Teach Pendant is not connected with the Controller. In this case, the Emergency Stop switch on the Teach Pendant will not function.

When the Emergency Stop switch is pushed, stops the programs execution and halts the robot excitation. Programs and point data will not be damaged.
When pushed, the Emergency Stop switch mechanically holds that state and electrically holds the emergency stop state.

Reset EMERGENCY STOP

Follow these steps to reset Emergency Stop condition.

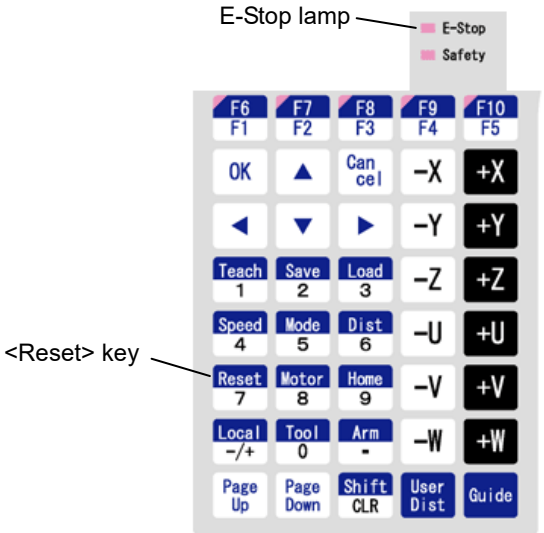
(1) Remove the cause of the Emergency Stop and verify that it is safe to operate the robot again.

(2) Release the Emergency Stop switch. To release the mechanical latch, turn the Emergency Stop switch to the right.

(3) Turn the Teach Pendant mode selector key switch to “Teach”.

(4) Press the [Reset] key on the operation panel to reset the Emergency Stop.

(5) Make sure that the E-Stop lamp on the operation panel is OFF.



1.4 Mode Selector Key Switch

The mode selector key switch is used to select TEACH or AUTO operation mode. For safety, if the mode is changed during program execution, all tasks will be stopped.

Mode switching during task execution

AUTO → TEACH

(1) Press the [Stop] button of Epson RC+ to stop all tasks normally.
(2) Turn the mode selector key switch to “Teach”.

TEACH → AUTO

Turn the mode selector key switch to “Auto” and close the latch release input.

NOTE

The Controller software latches that the operation mode is set to “TEACH”.
To switch the mode from TEACH to AUTO, release the latched condition using the latch release input.

1.5 Using Teach Pendant in Safeguarded Area

When the mode selector switch of the Teach Pendant is switched to “Teach” mode, the operator can jog and move the robot to predefined points in slow speed when the Enable Switch is held down and the safeguard is open.
Person who will be using the Teach Pendant should be thoroughly trained on how to use it.
Follow these guidelines when using the Teach Pendant in the safeguarded area:

(1) Before entering the safeguarded area to use the Teach Pendant, turn the mode selector key switch to “Teach”.
(2) Take out the key for the mode selector key switch and then enter the safeguarded area with the key.

WARNING	■ Leaving the key in the mode selector key switch is extremely hazardous and may cause serious safety problems as someone else may inadvertently change the mode to the automatic operation.

(3) Enter the safeguarded area and perform the teaching operations.
(4) Leave the safeguarded area and close the safeguard.
(5) Insert the key and return the mode selector key switch to “Auto”.
(6) Close the latch release input.
For details on the latch release input, refer to
RC90 Series MANUAL
RC700 Series MANUAL
RC700-D MANUNAL
RC700-E MANUNAL
RC800-A MANUAL
T Series MANUAL
T-B Series MANUAL
VT Series Manual

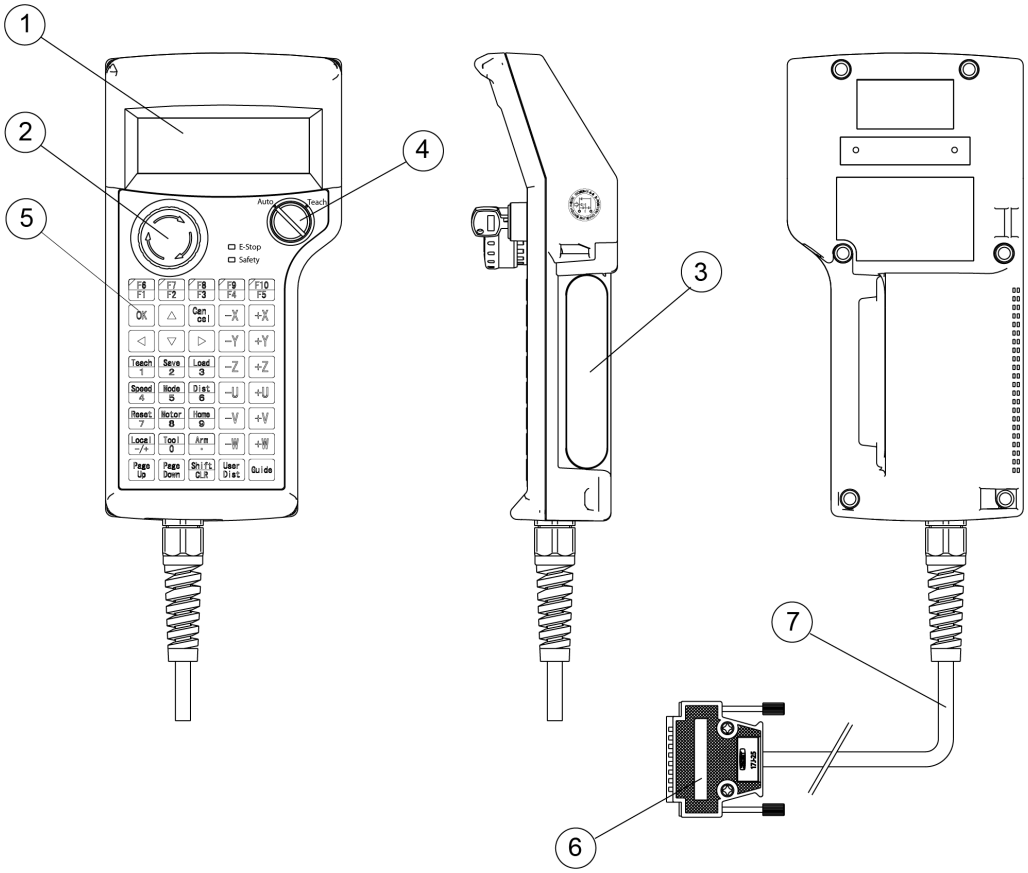
NOTE

The Controller software latches that the operation mode is set to “TEACH”.
To switch the mode from TEACH to AUTO, release the latched condition using the latch release input.

CAUTION	■ Although the Teach Pendant can be operated inside the safeguarded area as described above, operate the robot system while all operators are outside of the safeguarded area wherever possible.

2. Specifications

2.1 Part Names and Functions



(1) Display

Displays various kinds of information. Displays 4 lines and 20 characters.

(2) EMERGENCY STOP switch

When this switch is pushed, the Emergency Stop state is held both mechanically and electrically. Pushing the switch stops the program, removes power to robot motors and stops the robot motion immediately.

For the procedure to reset the EMERGENCY STOP switch, refer to *Setup & Operation 1.3 EMERGENCY STOP*.

(3) Enable Switch

This is a three-position switch. Motion and I/O output commands are available while the switch is held down when the Teach Pendant is operated in TEACH mode. The switch turns ON when it is at the midpoint, and it turns OFF when it is fully held down or released.

(4) Mode Selector Key Switch

The mode selector key switch is used to change the operation mode between TEACH and AUTO. The mode can be fixed by pulling out the key.

NOTE For the mode selecting, refer to *Function & Installation 1.4 Mode Selector Key Switch*.

(5) Operation Panel

Teaching operation, automatic operation and data input are available.

(6) Host Interface Connector

(7) Host Interface Cable (5 m)

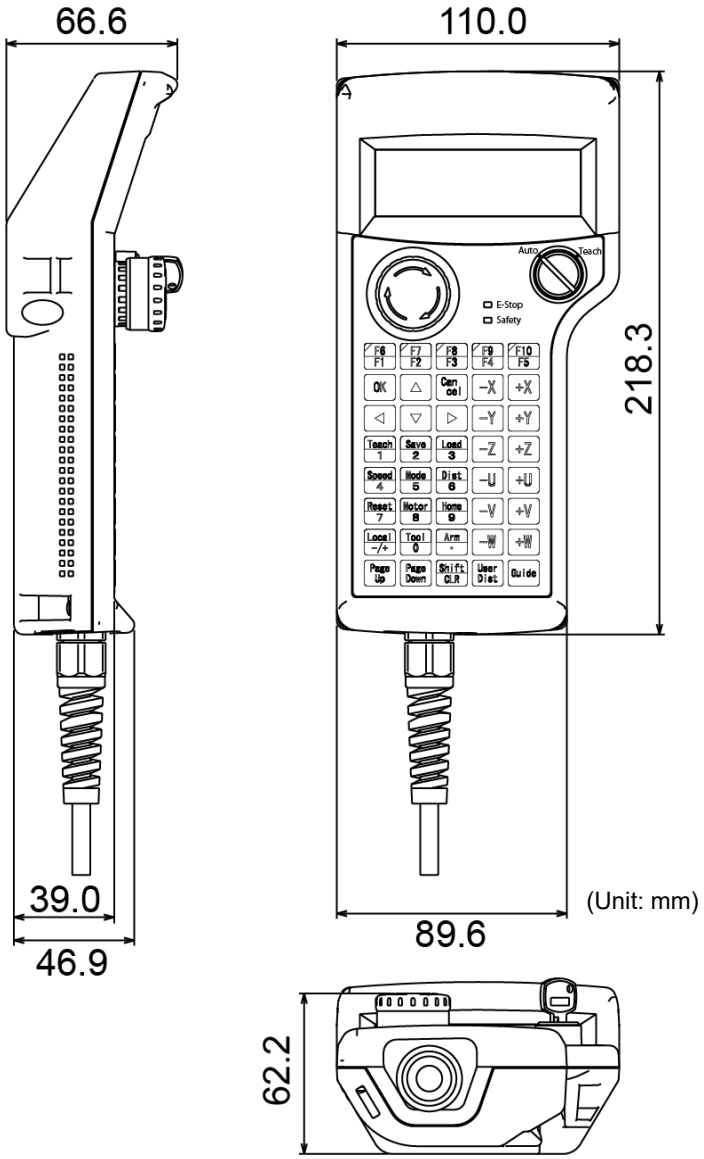
This is a cable to connect the Teach Pendant and the Controller.

The connector is attached at the end of the cable.

2.2 Standard Specifications

Item		Specification
General specifications	Rated voltage	DC24 V
	Electric power consumption	2.8 W or less
	Weight	Approx. 400 g or less (excluding cables)
Display specifications	Display element	STN type Reflective black and white LCD
	Contrast	0 to 60
	Back light	0 to 255
Serial interface specifications	Electrical characteristics	Compliant with RS-422A standard

2.3 Outer Dimensions



3. Installation

3.1 Contents

TP2 (with 5 m cables) : 1 unit
Mode selector key : 2 units

3.2 Environmental Conditions

The Teach Pendant must be used in an environment that conforms to the following requirements to ensure safe and reliable operation.

Item	Condition
Ambient temperature	0 to 40 °C (with minimal variation)
Ambient relative temperature	10 to 90%
Protection structure	IP54 (excluding the cable connector)
Environment	- Keep away from dust, oily smoke, salinity, metal powder and other contaminants. - Keep away from droplets of oil and chemicals. - Keep away from flammable or corrosive solvents and gases.

3.3 Operating Precautions

CAUTION

- Do not drop the Teach Pendant or hit hard against other objects to avoid damage, as the case of the Teach Pendant may be damaged since the main body is made of resin.
- Use the hand strap to prevent dropping the Teach Pendant during operation.
- Do not hit the touch panel of the Teach Pendant against a hard object or put excessive pressure on it. The touch panel is made of glass. Therefore, if excessive pressure is put on it, it may be damaged.
- Do not press or rub the surface of the front panel push buttons with a hard object such as a tool. The surface of the buttons may be damaged as they are easily scratched.
- Wipe the dirt and oils adhering to the surface of the Teach Pendant display with a soft cloth dampened with a neutral detergent or an alcohol solvent.

3.4 Connection

This section indicates the connection of the Controller and the Teach Pendant.

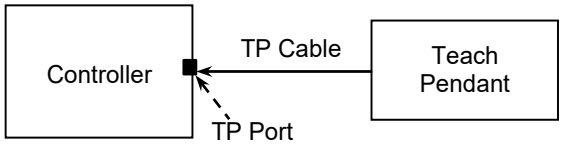
⚠ CAUTION	■ Be sure to connect the cables of Controller and Teach Pendant properly. Do not allow unnecessary strain on the cables. (Do not put heavy objects on the cables. Do not bend or pull the cables forcibly.) The unnecessary strain on the cables may result in damage to the cables, disconnection, and/or contact failure. Damaged cables, disconnection, or contact failure is extremely hazardous and may result in improper function of the system. ■ Make sure that the pins are not bent when connecting the connector. Connecting the connector with the pin bent may cause malfunction and result in improper function of the system. ■ The connector connected to the end of the cable is a general-purpose type connector. When connecting the connector, note that the waterproof efficiency and dustproof efficiency of the connector do not comply with IP65. ■ When connecting the Teach Pendant TP2 to the TP port, be careful of the connector inserting direction (up/down). It may cause malfunction and result in improper function of the system.

3.4.1 Typical cable connection

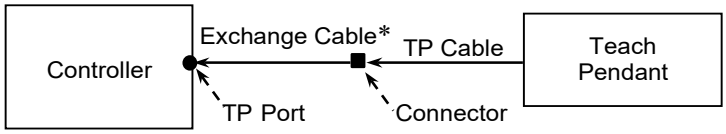
The Teach Pendant is connected to TP port of Controller.

Example

A: RC90-B, RC700



B: RC700-A, RC700-D, RC700-E, RC800-A, T series, VT series



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

NOTE When connecting TP2 to RC700-A, RC700-D, RC700-E, RC800-A, T series, VT series, a conversion cable is necessary.
If you need the conversion cable, please contact the supplier of your region.

* TP Exchange Cable : R12NZ900L6

NOTE Do not connect TP2 to the following Robot Controllers. Connecting to the following Robot Controllers may result in malfunction of the device since the pin assignments are different.

RC420 / RC520 / SRC5** / SRC-3** / SRC-2**

Operation of RC700 / RC90 (EPSON RC+ 7.0) option TP2 deviates from the descriptions in this manual when it is connected to the Robot Controller RC90 (EPSON RC+ 5.0) or RC180.
In this case, refer to the following manuals.

RC90 / RC180 option Teach Pendant TP2 Manual

3.4.2 Connection to the Controller

(1) Make sure that the Controller and the robot is connected properly.

(2) Connect the connector of the Teach Pendant cable to the TP port of Controller.

(3) Turn ON the Controller.

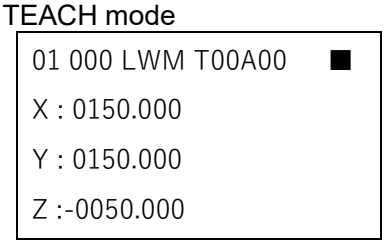
NOTE

- Teach Pendant insert and removal from the Controller are available when the Controller power is ON.
- When Teach Pendant connector is removed from the Controller with the mode selector key switch of Teach Pendant that is in “Teach” position, the operation mode will remain in TEACH mode. The operation mode cannot be switched to AUTO mode. Make sure to remove the Teach Pendant after switching the operation mode to “Auto” mode.

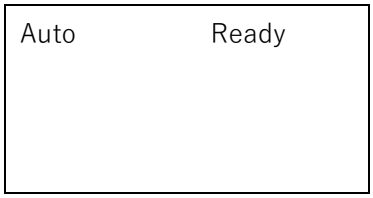
3.5 Power Supply

The power of the Teach Pendant is supplied via the TP connector on the Controller.
After the completing the Controller and the Teach Pendant communication, the following screen will appear on the display of the Teach Pendant.

TEACH mode



AUTO mode



4. Operation Mode (TEACH, AUTO)

NOTE A coordinate point including the arm pose is defined as “position (point),” and the data is called “point data.”

4.1 Outline

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

TEACH mode This mode enables point data teaching and check close from the Robot using the Teach Pendant.

Robot operates in Low power status.

Move the robot to the teaching position and assign it to the specified point number.

Move the robot by the following methods:

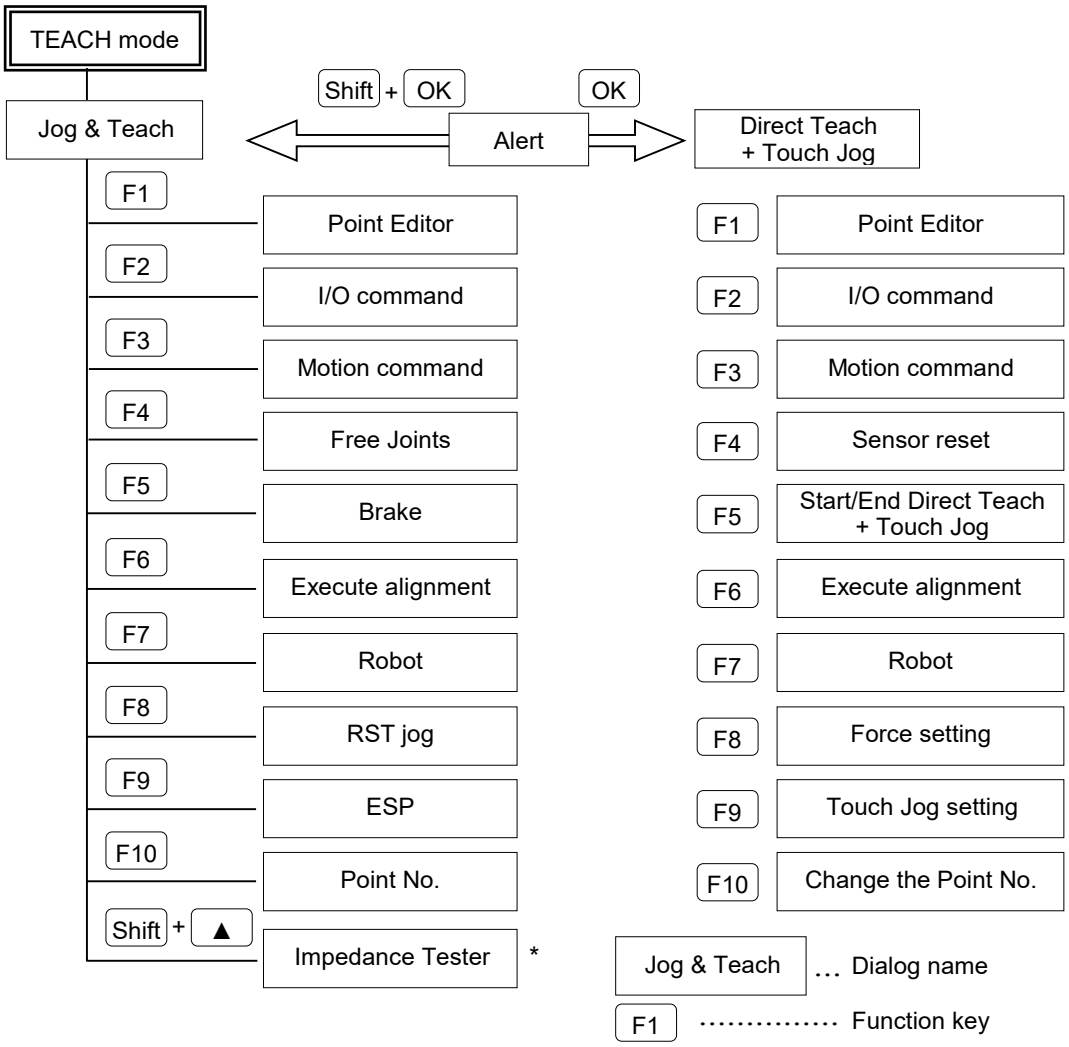
Jog motion:
Push the jog key to move the robot.

Direct Teach + Touch Jog operations:
Move the robot directly.
Use Epson RC+ Option Force Guide.

AUTO mode This mode enables automatic operation (program execution) of the Robot system at the manufacture operation, besides, programming, debug, adjustment, and maintenance of the Robot system.

This mode cannot operate Robot or run program with the Safety Door open.

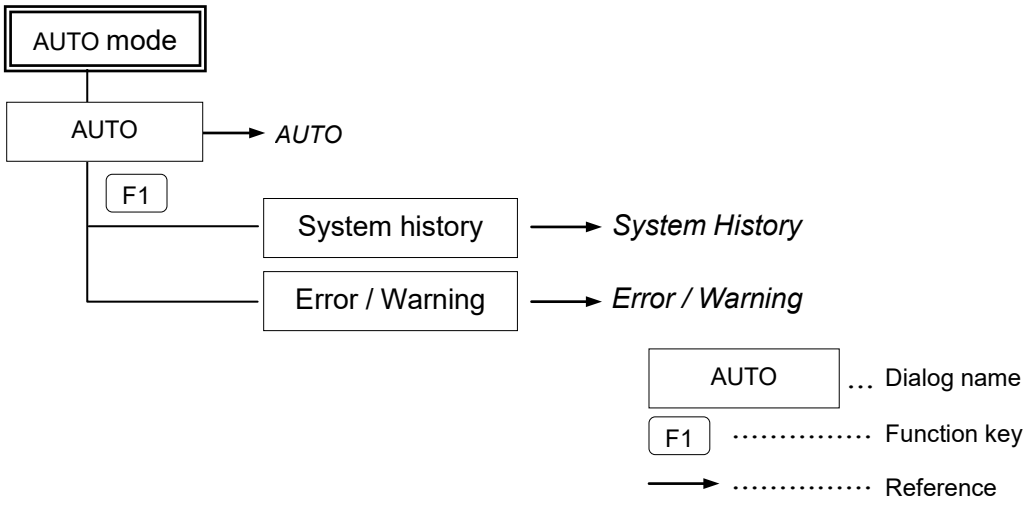
NOTE This product does not support a low speed program verification function (T1: manual deceleration mode) and high-speed program verification function (T2: manual acceleration mode) which is defined in Safety Standards.



* The impedance tester is supported as default for EPSON RC+ 7.0 Ver. 7.2.0 or later. However, the impedance tester is available only when using Epson RC+ Option Force Guide.
When not using the Force Guide, the impedance tester is not available.

NOTE

Direct Teach + Touch Jog function is supported as default for EPSON RC+ 7.0 Ver.7.4.4 or later, and Epson RC+ 8.0. However, Direct Teach + Touch Jog function is available only when using Epson RC+ Option Force Guide.
When not using the Force Guide, Direct Teach + Touch Jog function is not available.



4.2 Switch Operation Mode

Change the TEACH mode and AUTO mode with the mode selector key switch on the Teach Pendant.

TEACH mode	Turn the mode selector key switch to “Teach” for TEACH mode. Pauses the executing program when operation mode is switched to TEACH mode. The operating Robot stops by Quick Pause.
AUTO mode	Turn the mode selector key switch to “Auto” and change the latch release input signal to ON position for AUTO mode.

NOTE

The TEACH mode status is latched by software.
To switch the mode from TEACH to AUTO, release the latched condition using the latch release input.
The message “Make sure that no one is inside the safeguarded area”. Ensure safety when working.
For details on how to release latch, refer to
RC700 Series MANUAL
RC700-D MANUAL
RC700-E MANUAL
RC800-A MANUAL
RC90 Series MANUAL
T Series MANUAL
T-B Series MANUAL
VT Series MANUAL

NOTE

When the mode is switched with the mode switching key switch, the motor is turned OFF.

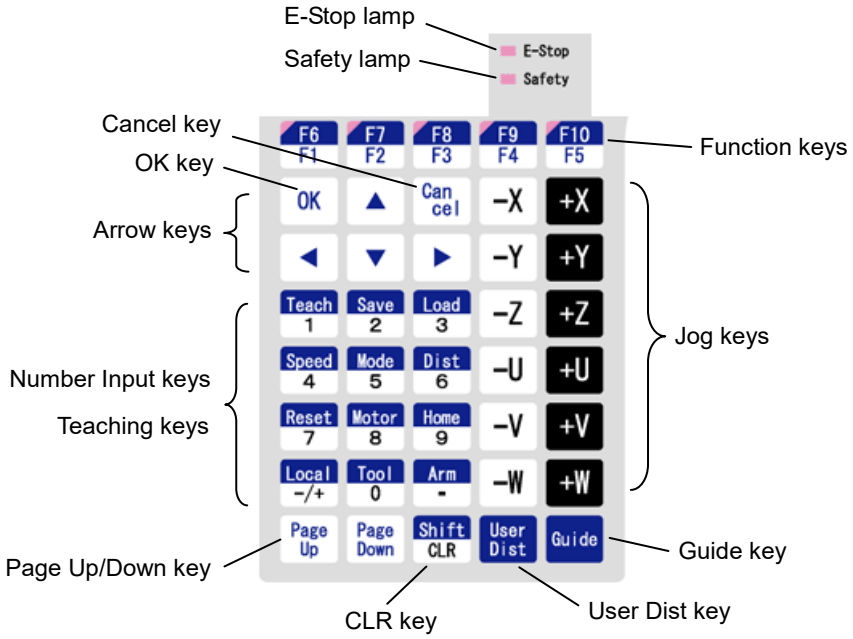
NOTE

Turn OFF enable switch, when you switch the mode with the mode switching key switch.
If the mode is switched with the mode switching key switch while the enable switch is turned ON, and the motor is turned ON, an error will occur. Be sure to turn the enable switch OFF

once and then ON again before turning the motor ON.

5. Operation Panel (Key Description)

5.1 Key Description



Number Input Keys

Mode	Key	Function
Number input mode	From 0 to 9 – / + . (period)	Number input
	CLR	Clears a number.

Teaching Keys

Teaching key is available only in TEACH mode.

Key	Function
Teach	Saves the current position data
Save	Saves the point data to a file
Load	Loads the point data from a file
Speed	Specifies the Jog speed
Mode	Specifies the Jog mode
Dist	Specifies the Jog distance
Reset	Sets the initial setup status
Motor	Switches the motor power ON/OFF
Home	Moves the robot to home position

Arrow Keys

Key	Function
▲	Moves the cursor up
▼	Moves the cursor down
◀	Move the cursor to the left
▶	Move the cursor to the right

Function Keys

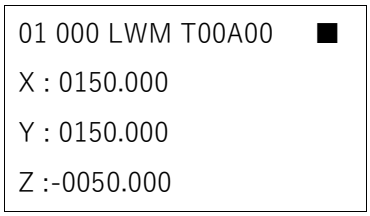
The function keys (F1 to F10) are assigned to each screen.

To check the key assignment, press the [Guide] key.

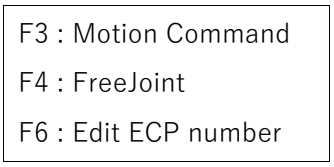
TIP

Press the [Shift] key when F6 to F10 keys are enabled, it switches between the keys F1 to F5 and F6 to F10.

Example : Jog&Teach Screen



Guide



Example : Press the [F3] key to execute motion commands.

NOTE

When no functions are assigned to a function key, the key is not available.
Example : [F5]

Jog Keys

Jog key is available only in TEACH mode.

Key	Function
–	Moves the target joint (X to W, J1 to J6) to – direction
+	Moves the target joint (X to W, J1 to J6) to + direction

Other keys

Key	Function
Cancel	Cancels the setting and goes back to the previous screen
OK	Saves the setting and changes to the next screen
Page Up	Changes to the previous page
Page Down	Changes to the next page

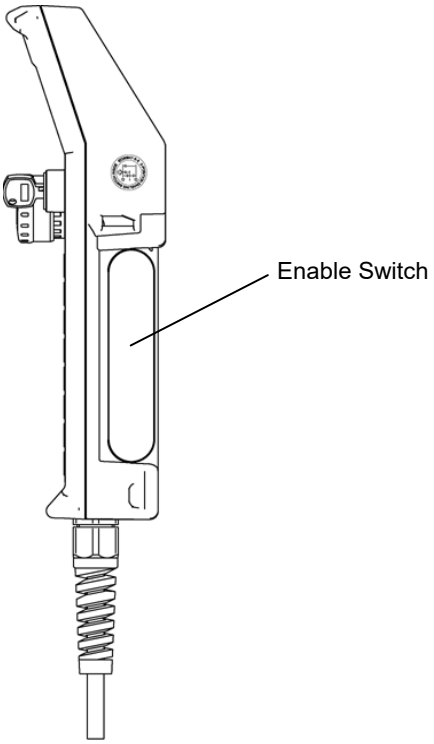
Lamp

Lamp	Function
E-Stop	Turns ON when an EMERGENCY STOP occurs
Safety	Turns ON when the safeguard is open

6. Enable Switch

In TEACH mode, several operations require use of the Enable Switch located on the right side of the pendant.

When operation of the enable switch is required, grip switch to the center position (ON state). If you grip the switch harder, it will be OFF state and the robot will stop.



7. Warning Sound (Beep)

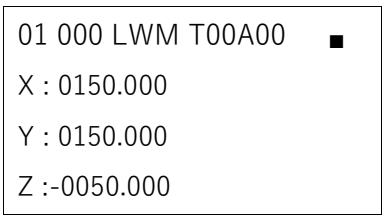
The Teach Pendant beeps when the robot passes the singularity.

Operation

This section contains information about operation of the Teach Pendant and maintenance procedure.

1. Teaching Procedure

The basic jog operation and teaching procedure is indicated.
Switch the mode selector switch to “Teach” to display the [Jog & Teach] screen.



In the [Jog & Teach] screen, jog motion (push the jog keys to move the robot) is available.

NOTE

When you switch the mode to “TEACH”, the speed setting of the robot will be the speed (high, low) on the [Jog & Teach] window. Since the motion command will be executed at this speed after the above operation, set the speed again by the commands such as Motor, Speed, and Accel.

SCARA robots, RS series robot:

Direct Teaching operation is available.
Set the robot’s joint to Servo Free by the [Jog & Teach] screen and move the robot arm directly.

6-Axis robots (C4 series, C8 series, N series):

Direct Teach + Touch Jog operation is available.
Use Epson RC+ Option Force Guide to move the robot arm directly in the [Direct Teach + Touch Jog] screen.

NOTE

Direct Teach + Touch Jog function is supported as default for EPSON RC+ 7.0 Ver.7.4.4 or later, and Epson RC+ 8.0. However, Direct Teach + Touch Jog operation is available only when using Epson RC+ Option Force Guide.
When not using the Force Guide, Direct Teach + Touch Jog operation is not available.

1.1 Jog Operation

Move the Robot to the teaching position by either operation (Step Jog operation, Continuous Jog operation) in the [Jog & Teach] screen.

Robot's speed setting is the speed (high, low) in the [Jog & Teach] screen Speed setting is the speed (high, slow).

Step Jog Operation

In Step Jog, moves the Robot by pressing the Jog key each time.
Jog distance of the Robot is configured beforehand.

(1) Press the [Dist] key to specify the Jog Distance (L/M/S/U) in the [Jog & Teach] screen.

(2) Execute the step jog by holding down the enable switch as pressing the Jog key.

(3) Move the robot to the teaching position.

NOTE

You can set a desired distance as "U" (User) jog distance. For details, refer to *Operation 2.1.12 Jog Distance*.

Continuous Jog Operation

In Continuous Jog, moves the Robot while pressing the Jog key.

(1) Press the [Dist] key to select "C" for the Jog Distance in the [Jog & Teach] screen.

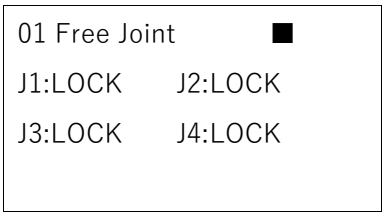
(2) Execute the continuous jog by gripping the enable switch as pressing the Jog key.

(3) Move the robot to the teaching position.

1.2 Direct Teaching Operation (SCARA, RS series robots)

Set the joint which you want to teach to Servo Free status and move the robot directly. This operation is called “Direct Teaching”.
Move the robot to the teaching position.

(1) Press the [F4] key to display the [Free Joint] screen in the [Jog & Teach] screen.



Select “LOCK” (servo lock) or “FREE” (servo free) for each joint.

+ Jog Key	: LOCK for the joint
– Jog Key	: FREE for the joint
[F1] Key	: FREE for all joints
[F2] Key	: LOCK for all joints

“FREE” joint can be moved with hands.

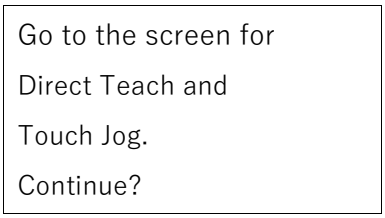
(2) Press the [F5] key to return to the [Jog & Teach] screen.

(3) Move the robot arm to the teaching position manually.

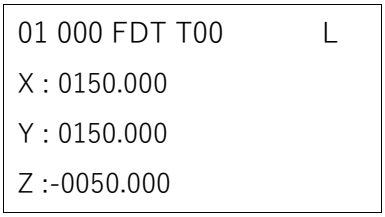
1.3 Direct Teach + Touch Jog Operation (C4, C8, N series robots)

In [Direct Teach + Touch Jog] screen, use Epson RC+ Option Force Guide to move the robot directly by hands.

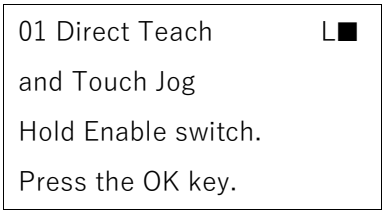
(1) Press the [Shift] key and the [OK] key in the [Jog & Teach] screen.
The following confirmation screen appears.



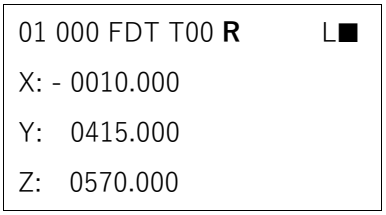
(2) Press the [OK] key to switch to the [Direct Teach + Touch Jog] screen.



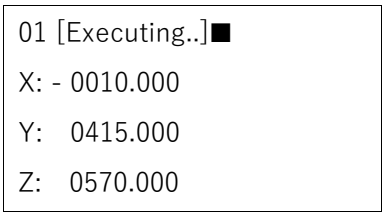
(3) Press the [F5] key in the [Direct Teach + Touch Jog] screen. Set Direct Teach or Touch Jog to ready for operation.
The following confirmation screen appears.



(4) Press the [OK] key to set Direct Teach or Touch Jog to ready for operation.
When the Direct Teach or Touch Jog can be executed, "R" is displayed on the header.



(5) Move the robot arm to the teaching position manually while holding the enable switch.



While the Direct Teach or Touch Jog is operating, "Executing…" is displayed on the header and any key operations of TP2 is disabled.

To perform point teaching or change parameters, release the hand from the enable switch.

1.4 Teaching Operation

Apply the Robot position to the specified point number.

NOTE A coordinate point including the arm pose is defined as “position (point),” and the data is called “point data.”

(1) Specify the point number you want to teach by pressing the [▲] [▼] keys in the [Jog & Teach] screen or the [Direct Teach + Touch Jog] screen.

(2) Press the [Teach] key. The following screen appears.

```
01 Teach      Point:000
Ready to assign
current position.
Continue?
```

When a point data is already registered in the specified point number, the following screen appears.

```
01 Teach      Point:000
Ready to assign
current position.
Overwrite?
```

(3) Press the [OK] key to assign the Robot position in the specified point number.

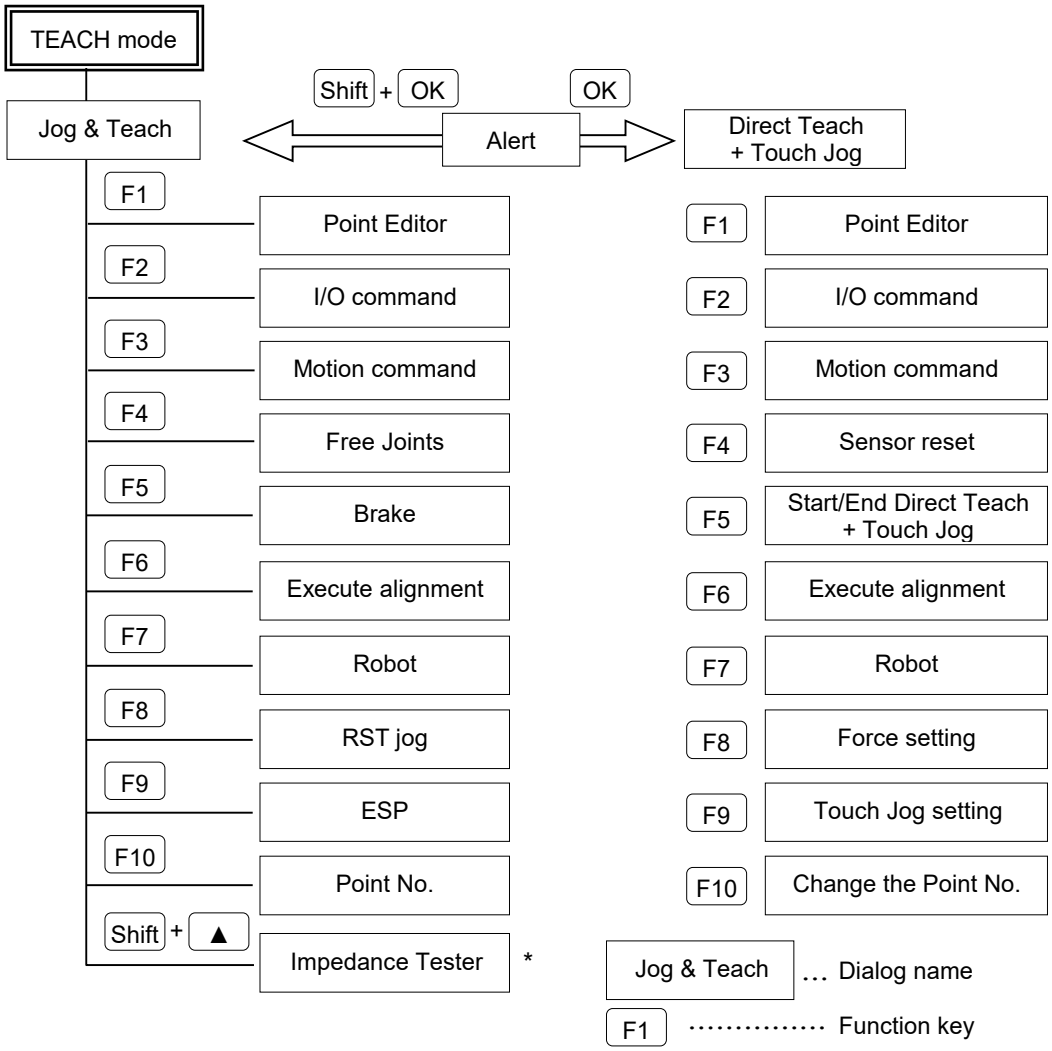
(4) Press the [Save] key to display the [SavePoints] screen.

(5) Press the [OK] key in the [SavePoints] screen to save the taught point data in the point file.

NOTE In the [SavePoints] screen, if you press the [Cancel] key, it does not save the file and returns to the [Jog & Teach] screen or the [Direct Teach + Touch Jog] screen.

2. TEACH Mode

Switch the mode selector key switch to “Teach” to enter the TEACH mode. In this mode, jog, teaching, operation commands, I/O commands, and other operations and commands can be executed using the Teach Pendant.
Note, however, that the program cluster cannot be executed.



NOTE A coordinate point including the arm pose is defined as “position (point),” and the data is called “point data.”

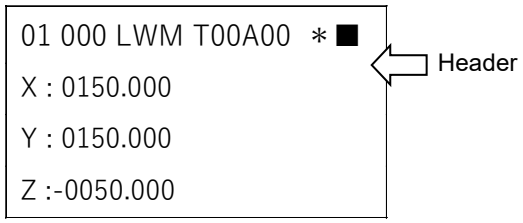
* The impedance tester is supported as default for EPSON RC+ 7.0 Ver. 7.2.0 or later, and Epson RC+ 8.0. the impedance tester is available only when using the Epson RC+ Option Force Guide.
When not using the Force Guide, the impedance tester is not available.

NOTE Direct Teach + Touch Jog function is supported as default for EPSON RC+ 7.0 Ver.7.4.4 or later, and Epson RC+ 8.0. However, Direct Teach + Touch Jog function is available only when using Epson RC+ Option Force Guide.
When not using the Force Guide, Direct Teach + Touch Jog function is not available.

2.1 Jog & Teach

This section indicates settings in the [Jog & Teach] screen.

(1) Switch the mode selector key switch to “Teach” to display the following screen.



Header

01	000	L	W	M	T00	A00	*	■
Robot Number	Point Number	Speed **L**ow **H**igh	Jog Mode **W**orld **T**ool **L**ocal **J**oint **E**CP	Jog Distance **L**ong **M**edium **S**hort **U**ser **C**ont	Tool Number	Arm Number	RST Jog	Motor ■:On

Key operation	Description
Jog keys	Executes jog motion.
Reset	Sets the initial setup status.
Motor	Turns ON / OFF the motor.
Teach	Executes a Teach operation. Refer to *Operation 2.1.14 Teaching Operation*.
Speed	Switches the Speed (Low / High).
Mode	Switches the Jog Mode (World / Tool / Local / Joint / ECP).
Dist	Switches the Jog Distance (Long / Medium / Short / User / Cont).
Home	Execute a Home operation.
Save	Saves a point file. Refer to *Operation 2.1.16 Saving Point Data to File*.
Load	Loads a point file. Refer to *Operation 2.1.17 Loading Point Data from File*.
▲ / ▼	Adds / subtracts point number by one.
◀ / ▶	Subtracts / adds point number by ten.
Local	Switches to Local number input mode.
Tool	Switches to Tool number input mode.
Arm	Switches to Arm number input mode.
User Dist	Switches to User Dist number input mode.
Guide	Displays the key operation guide.
Page Up / Down	Changes to the previous or next page.

Key operation	Description
F1	Changes to the point editing screen.
F2	Changes to the I/O command screen.
F3	Changes to the motion command screen.
F4	Changes to the Free Joint screen.
F5	Changes to the Brake screen. *(6 axis robot only)*
F6	Switches to the alignment execution screen. Refer to *Operation 2.1.5 Execute Alignment*
F7	Changes to the robot screen.
F8	Switches between U, V, and W jog keys and R, S, and T jog keys.
F9	(When the ECP option is enabled.) Switches to ECP number input mode.
F10	Changes to the point number input mode.

2.1.1 Current Position Display

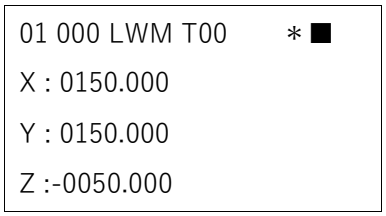
In the [Jog & Teach] screen, you can check the current position while the operation.
The current position display shows the whole information in three pages. Press the [Page Up] [Page Down] keys to see all pages.

	6−axis Robot	SCARA, Cartesian Robot
Page 1	01 000 LWM T00 ＊■ X : 0150.000 Y : 0150.000 Z :-0050.000	01 000 LWM T00A00 ＊■ X : 0150.000 Y : 0150.000 Z :-0050.000
Page 2	01 000 LWM T00 ＊■ U : 0000.000 V : 0000.000 W : 0000.000	01 000 LWM T00A00 ＊■ U : 0000.000 S : 0000.000 T : 0000.000
Page 3	01 000 LWM T00 ＊■ S : 0000.000 T : 0000.000	01 000 LWM T00A00 ＊■ Hand : Righty
Page 4	01 000 LWM T00 ＊■ Hand : Righty Elbow: Above Wrist: NoFlip	
Page 5	01 000 LWM T00 ＊■ J1lag: 0 J4lag: 0 J6Flag: 000	

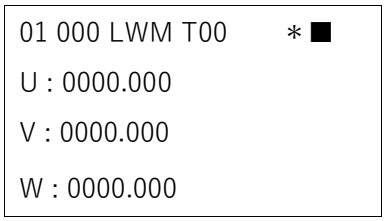
	Joint-type Robot	RS series Robot
Page 1	01 000 LWM T00A00 ＊■ X : 0150.000 Y : 0150.000 Z :-0050.000	01 000 LWM T00A00 ＊■ X : 0000.000 Y : 0000.000 Z : 0000.000
Page 2	01 000 LWM T00A00 ＊■ U : 0000.000 V : 0000.000 W : 0000.000	01 000 LWM T00A00 ＊■ U : 0000.000 S : 0000.000 T : 0000.000
Page 3	01 000 LWM T00A00 ＊■ R : 0000.000 S : 0000.000 T : 0000.000	01 000 LWM T00A00 ＊■ Hand : Righty J1Flag: 0 J2Flag: 0
Page 4		01 000 LWM T00A00 ＊■ J1Angle : 0000.000

N series Robot

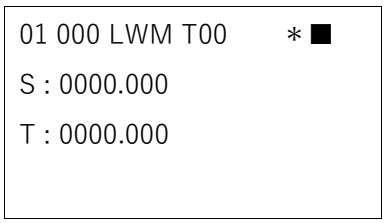
Page 1



Page 2

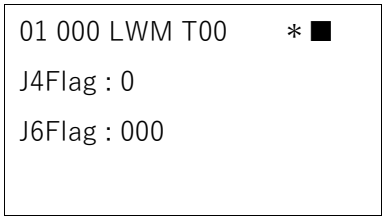


Page 3



Page 4

Page 5



2.1.2 Resetting Error

When an error occurs, press the [Reset] key to clear the error.

The [Reset] key can be executed at any time in TEACH mode.

2.1.3 Motor ON / OFF

This can be executed at any time in TEACH mode when the motor status is displayed in the screen.

Turning ON the motor

(1) Press the [Motor] key.

(2) Press the [OK] key while holding the enable switch in the confirmation screen.

```
01 Motor
Ready to turn robot
motors ON.
Continue?
```

Robot motor is turned ON and the display changes as below.

```
01 000 LWM T00A00  * ■
```

Turning OFF the motor

Press the [Motor] key.

Robot motor is turned OFF and the display changes as below.

```
01 000 LWM T00A00  *
```

NOTE Perform the following operations to turn OFF the motor.
- Turn OFF the enable switch
- Switch the mode with the mode switching key switch

NOTE Turn OFF enable switch, when you switch the mode with the mode switching key switch. If the mode is switched with the mode switching key switch while the enable switch is turned ON, and the motor is turned ON, an error will occur. Be sure to turn the enable switch OFF once and then ON again before turning the motor ON.

2.1.4 Executing Return to Home

(1) Press the [Home] key.
The following screen appears.

```
01 Home                ■


Hold Enable switch.
Press the OK Key.
```

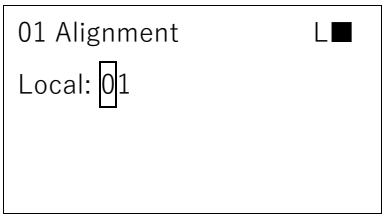
(2) Holding down the Enable Switch, press the [OK] key to execute a Home operation.

(3) When the robot has reached the Home position, it returns to the [Jog & Teach] screen.

2.1.5 Executing Alignment

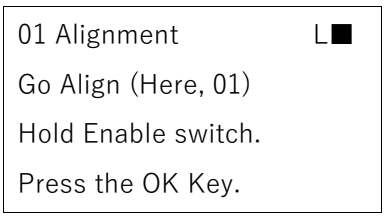
Move the end effector to parallel with the set working plane.

(1) Press the [Shift] key and switch the function key from [F6] to [F10].
Press the [F6] key and switch to the preparation screen for Alignment.
Using [Numeric keys], input the local coordinate system which is a target of Alignment.



Key operation	Description
[Numeric keys]	(Available in the number input mode. Inputs a number.)
CLR	(Available in the number input mode. Clears the number to 0.)
Motor	Turns ON / OFF the motor.
Speed	Switches the Speed (Low / High).
OK	Switches to the [Alignment Execution] screen.
Cancel	Returns to the [Jog & Teach] screen.
F3	Switches to the local coordinate system input mode.
F5	Returns to the [Jog & Teach] screen.

(2) Press the [OK] key and switch to the [Alignment Execution] screen.
Check the local coordinate system which is a target of Alignment.



(3) Press the [OK] key while holding the enable switch.
End Alignment.
When Alignment ends, return to the [Jog & Teach] screen.

2.1.6 Executing MCal

(1) Press the [Shift] key and switch the function key from [F6] to [F10].

(2) Press the [F7] key.
The [Robot] screen is displayed.

```
Robot: 01
C4-A601S
Robot1.PTS
L00 T00
```

(3) Press the [F4] key.
The following screen will be displayed.

```
01 MCal                ■

Hold Enable switch.
Press the OK Key.
```

(4) Holding down the Enable Switch, press the [OK] key and execute MCal.

(5) After the robot moves to its home position, the screen returns to [Robot].

(6) Press the [OK] key.
Return to the [Jog & Teach] screen.

2.1.7 Specifying Jog Speed

Press the [Speed] key and select the speed. (Low / High)

L (Low) : Low jog speed

H (High) : High jog speed

2.1.8 Executing Jog Motion

The jog motion includes “Step Jog” and “Continuous Jog”.
The following describes how to execute the jog with the “Joint” Jog Mode and “Short” Jog Distance.

(1) Press the [Mode] key until the Jog Mode turns to ‘J’.

```
01 000 LJM T00A00    ■
```

For details of the Jog Mode, refer to *Operation 2.1.11 Jog Mode*.

(2) Press the [Dist] key until the Jog Distance turns to ‘S’.

```
01 000 LJS T00A00    ■
```

For details of the Jog Mode, refer to *Operation 2.1.12 Jog Distance*.

(3) Holding down the Enable Switch, press the Jog key.
It executes the Step Jog motion in “Joint” Jog Mode and “Short” Jog Distance.

2.1.9 Moving the Robot by RST

Jogging the additional S and T axes of vertical 6-axis robots

To jog the additional axes of vertical 6-axis robots, switch the V and W jog keys to S and T jog keys.

(1) Press the [Shift] key and switch the function key from [F6] to [F10].

(2) Press [F8].

```
01 000 LJM T00A00   *■
```

V and W jog keys switch to S and T jog keys.

To return the S and T jog keys to V and W jog keys, press [F8] again.

```
01 000 LJM T00A00    ■
```

Jogging the Axis # 7 and the additional S and T axes of Joint-type robots

To jog the Axis # 7 and the additional axes of Joint-type robots, switch the U, V, and W jog keys to R, S, and T jog keys.

(1) Press the [Shift] key and switch the function key from [F6] to [F10].

(2) Press [F8].

```
01 000 LJM T00A00   *■
```

U, V, and W jog keys switch to R, S and T jog keys.

To return the R, S and T jog keys to U, V and W jog keys, press [F8] again.

```
01 000 LJM T00A00    ■
```

NOTE To jog the additional S and T axes of the joint-type robot which has 4 or less axes, use V and W jog keys.

Jogging the additional S and T axes of SCARA, Cartesian, and RS series robots

To jog the additional S and T axes of SCARA, Cartesian, and RS series robots, use the V and W jog keys.

2.1.10 Changing Local / Tool / Arm / ECP

The following describes how to change Local / Tool / Arm / ECP.

Changing Local number

(1) Press the [Local] key.
It turns to the Local number input mode.

```
Local: 00
```

(2) Using the numeric keys and arrow keys, input the Local number you want to change.
In this example, the number is “15”.

```
Local: 15
```

(3) Press the [OK] key.
The Local number has changed and it returns to the [Jog & Teach] screen.

TIP When you press the [Cancel] key, it returns to the [Jog &Teach] screen without saving the change.

Changing Tool number

(1) Press the [Tool] key.
It turns to the Tool number input mode.

```
01 000 LJM T00A00    ■
```

(2) Using the numeric keys and arrow keys, input the Tool number you want to change.

(3) Press the [OK] key.
The Tool number has changed and it returns to the [Jog & Teach] screen.

TIP When you press the [Cancel] key, it returns to the [Jog &Teach] screen without saving the change.

Changing Arm number

(1) Press the [Arm] key.
It turns to the Arm number input mode.

```
01 000 LJM T00A00    ■
```

(2) Using the numeric keys and arrow keys, input the Arm number you want to change.

(3) Press the [OK] key.
The Arm number has changed and it returns to the [Jog & Teach] screen.

TIP When you press the [Cancel] key, it returns to the [Jog &Teach] screen without saving the change.

Changing ECP number

Editing the ECP number is available when the ECP option is enabled.

(1) Press the [Shift] key.

(2) Press the [F6] key.
It turns to the ECP number input mode.

```
ECP: 00
```

(3) Using the numeric keys and arrow keys, input the ECP number you want to change.

(4) Press the [OK] key.
The ECP number has changed and it returns to the [Jog & Teach] screen.

TIP When you press the [Cancel] key, it returns to the [Jog &Teach] screen without saving the change.

2.1.11 Jog Mode

Press the [Mode] key and specify the Jog Mode.

```
01 000 LWM T00A00
```

The default setting is “World”.

Mode	Display	Description
World	W	Jogs the robot along the X, Y, Z axes in the current local, tool, arm, and ECP. Also, you can also jog U (roll).
Tool	T	Jogs the robot in the coordinate system defined by the current tool.
Local	L	Jogs the robot in the coordinate system defined by the current local.
Joint	J	Jogs each joint of the robot. Other jog key will appear when using non-Cartesian robots in the “Joint” mode.
ECP	E	Jogs the robot along the axes of the coordinate system defined by the current external control point.

2.1.12 Jog Distance

Press the [Dist] key and select the Jog Distance.

The default setting is “Medium”.

Jog type	Jog Distance	Display	Default	Editable from
Continuous	Continuous	C	−	
Step	Long	L	10.0	Epson RC+, TP4
	Medium	M	1.0	Epson RC+, TP4
	Short	S	0.1	Epson RC+, TP4
	User	U	0.0	TP2

According to the Jog Distance setting, the Jog type is divided into “Continuous Jog” and “Step Jog”.

Executing Continuous Jog

In Continuous Jog, the robot moves continuously while the Jog key is held down.

(1) Press the [Dist] key and select “C (Continuous)” at the Jog Distance.

(2) Holding down the enable switch, press the Jog key to execute Continuous Jog.

Executing Step Jog

In Step Jog, the robot moves each tune the Jog key is pressed.
The distance of the robot motion is configured beforehand.

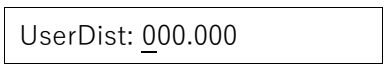
(1) Press the [Dist] key and select the Jog Distance.
- L : Long jog distance
- M : Medium jog distance
- S : Short jog distance
- U : User jog distance

(2) Holding down the enable switch, press the Jog key to execute Step Jog.

Changing User Jog Distance

With TP2, you cannot change the values of Long, Medium, and Short jog distance. When you want to move the robot in other distance, use the User jog distance that you can specify desired distance.

(1) Press the [User Dist] key in the [Jog & Teach] screen.
It turns to the User jog distance input mode.



(2) Using the numeric keys and arrow keys, input a desired distance.
When you press the [Cancel] key, it returns to the [Jog &Teach] screen without saving the change.

(3) Press the [OK] key.

The User jog distance has changed and it returns to the [Jog & Teach] screen.

2.1.13 Servo Lock and Servo Free

You can move the robot directly by setting the teaching joint to Servo Free (FREE).

For the details, refer to *Operation 2.6 Free Joints*.

2.1.14 Teaching Operation

The following describes how to register the current position in P1.

(1) Press the [▲] key and set the point number at "1".

```
01 001 LWM T00A00
```

(2) Press the [Teach] key.

```
01 Teach      Point:001
Ready to teach
current position.
Continue?
```

When the point number is already used, the following screen appears.

```
01 Teach      Point:001
Ready to re-teach
current position.
Overwrite?
```

(3) Press the [OK] key.

The point data is registered in the memory and it returns to the [Jog & Teach] screen.

TIP

This can also be executed in the [Point Editor] screen.

2.1.15 Changing Point Number

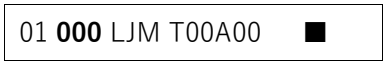
Pushing [▲] and [▼] keys increase or decrease the point number by 1.

[◀] and [▶] keys increase or decrease the point number by 10.

To change the point number directly, execute [F10] point number.

(1) Press the [Shift] key.

(2) Press the [F10] key.
The mode turns to the point number input mode.



(3) Using the numeric keys and arrow keys, input a desired point number.

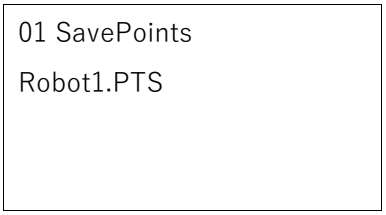
(4) Press the [OK] key.

TIP When you press the [Cancel] key, it returns to the [Jog &Teach] screen without saving the change.

2.1.16 Saving Point Data to File

You can save the point data registered in the memory to the point file.

(1) Press the [Save] key.

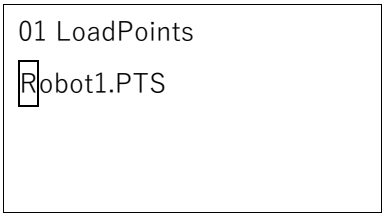


(2) Press the [OK] key to save the point data to the file.

TIP This can also be executed in the [Point Editor] screen.

2.1.17 Loading Point Data from File

(1) Press the [Load] key.



(2) Move the cursor and select a file.

(3) Press the [OK] key to load the point data in the file memory.
When there are some changes in the point file, the following screen appears. [OK]

```
01 LoadPoints
Change were made to
Robot1.PTS
Save?
```

(4) Select if you save the point file.

[OK] : Saves the change and loads the point file.
[Cancel] : Does not save the change and loads the point file.

TIP
This can also be executed in the [Point Editor] screen.

2.1.18 Changing the Robot

You can change the robot to execute Jog & Teach.

For details, refer to *Operation 2.8 Robot*.

2.2 [Direct Teach + Touch Jog]

To use the Direct Teach or Touch Jog function, some settings are required on Epson RC+ after installing the force sensor.
Perform the following settings before using the Direct Teach or Touch Jog function.

To make the Controller recognizes the installed force sensor:
Reference: *Epson RC+ Option Force Guide*
Software 1.2 Checking the Connection

Set Mass Property:
Reference: *Epson RC+ Option Force Guide*
Software 1.3 Checking the Accuracy of the Force Sensor

Perform Tool setting:
Reference: *Epson RC+ User's Guide*
5.12.1 [Robot Manager] Command (Tools Menu)

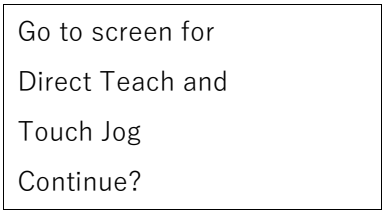
2.2.1 Switch to [Direct Teach + Touch Jog] screen

CAUTION	■ Executing the Direct Teach or Touch Jog function with improper settings of the Force Sensor, coordinate transformation, and gravity compensation may result in unintended motion. Be careful when configuring the settings and check operation before executing the Direct Teach or Touch Jog function.

Switch the [Jog & Teach] screen to the [Direct Teach + Touch Jog] screen.

First, check the preset settings.

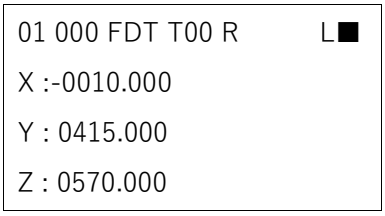
(1) Press the [Shift] key, then press the [OK] key in the [Jog & Teach] screen.
The following screen appears.



(2) Perform either of the following steps.

Press the [OK] key

Switch to the [Direct Teach + Touch Jog] screen.

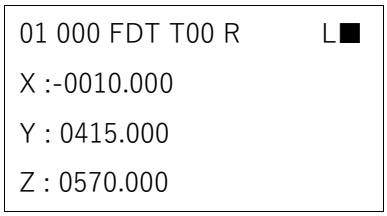


Press the [Cancel] key.

Return to the [Jog & Teach] screen.

CAUTION	■ Be sure to start the Direct Teach or Touch Jog function with no external force applied to it. Direct Teach or Touch Jog function automatically reset the force sensor when starting the operation. If the Direct Teach or Touch Jog function is executed with an external force applied to it and the force sensor is reset, the state in which an external force applied is "0". Therefore, if the force applied is removed, the Force Sensor detects a force even if no force is applied. If the Direct Teach or Touch Jog function is executed in this state, the robot may move unintentionally. Caution is required in this regard.

[Direct Teach +Touch Jog] screen



Header

01	000	F	DT	T00	R	L	■
Robot number	Point number	Motion direction **F**ree **L**ine **P**lane **R**otation	Operation mode **D**irect Teach + **T**ouch Jog **D**irect Teach **T**ouch Jog	Tool number	Operation starts status R: Operable	Jog distance for Touch Jog **L**ong **M**edium **S**hort	Motor status ■: On

Key operation	Description
Jog keys	Not in use.
Reset	Sets the initial setup status.
Motor	Turns ON / OFF the motor.
Teach	Executes a Teach operation. Refer to *Operation 2.1.14 Teaching Operation.*
Speed	Not in use.
Mode	Switches the modes (Direct Teach + Touch Jog, Direct Teach, Touch Jog).
Dist	Switches the Jog Distance for Touch Jog (Long, Medium, Short).
Home	Execute a Home operation.
Save	Saves a point file. Refer to *Operation 2.1.16 Saving Point Data to File.*
Load	Loads a point file. Refer to *Operation 2.1.17 Loading Point Data from File.*
▲ / ▼	Adds / subtracts point number by one.
◀ / ▶	Subtracts / adds point number by ten.
Local	Switches to Local number input mode.
Tool	Switches to Tool number input mode.
Arm	Switches to Arm number input mode.
User Dist	Not in use.
Guide	Displays the key operation guide.
Page Up / Down	Changes to the previous or next page.

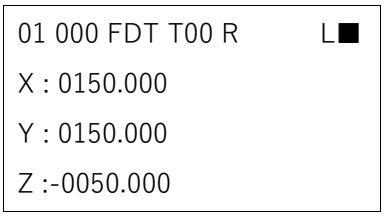
Key operation	Description
F1	Changes to the point editing screen.
F2	Changes to the I/O command screen.
F3	Changes to the motion command screen.
F4	Changes to the reset screen of the force sensor. Refer to *Operation 2.2.10 Reset Force Sensor*
F5	Sets the Direct Teach or Touch Jog operations to run. Refer to *Operation 2.2.15 Execute Direct Teach or Touch Jog*
F6	Changes to the Alignment execution screen. Refer to *Operation 2.2.16 Execute Alignment*
F7	Changes to the robot screen. Refer to *Operation 2.2.17 Changing the Robot*
F8	Changes to the force setting screen. Refer to *Operation 2.2.8 Set Direct Teach (Force Setting)*
F9	Changes to the Touch Jog setting screen. Refer to *Operation 2.2.9 Set Touch Jog*
F10	Changes to the point number input mode.

2.2.2 Switch the Display

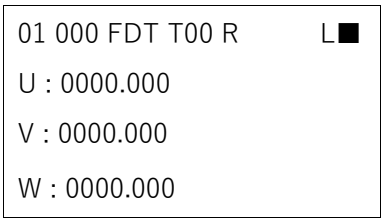
In the [Direct Teach + Touch Jog] screen, you can check the current position while the operation.
You can check various kinds of information by switching the pages.
Press the [Page Up] [Page Down] keys to see all pages.

6-axis Robot

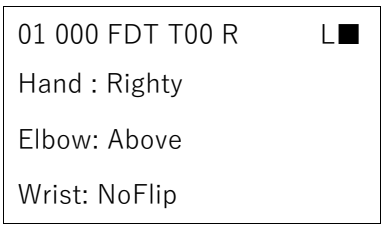
Page 1



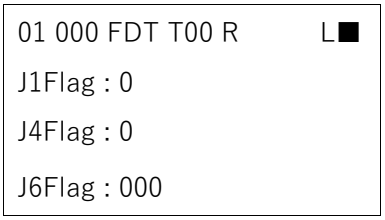
Page 2



Page 3



Page 4



2.2.3 Resetting Error

When an error occurs, press the [Reset] key and clear the error.

The [Reset] key can be executed at any time in TEACH mode.

2.2.4 Motor ON / OFF

This can be executed at any time in TEACH mode when the motor status is displayed in the screen.

Turning ON the motor

(1) Press the [Motor] key.

(2) Press the [OK] key while holding the enable switch in the confirmation screen.

```
01 Motor
Ready to turn robot
motors ON.
Continue?
```

Robot motor is turned ON and the display changes as below.

```
01 000 FDT T00 R        L■
```

Turning OFF the motor

Press the [Motor] key.

Robot motor is turned OFF and the display changes as below.

```
01 000 FDT T00 R        L
```

NOTE Perform the following operations to turn OFF the motor.
- Turn OFF the enable switch
- Switch the mode with the mode switching key switch

NOTE Turn OFF enable switch, when you switch the mode with the mode switching key switch. If the mode is switched with the mode switching key switch while the enable switch is turned ON, and the motor is turned ON, an error will occur. Be sure to turn the enable switch OFF once and then ON again before turning the motor ON.

2.2.5 Executing Return to Home

(1) Press the [Home] key.
The following screen appears.

```
01 Home                 ■


Hold Enable switch.
Press the OK Key.
```

(2) Holding down the Enable Switch, press the [OK] key to execute a Home operation.

(3) When the robot has reached the Home position, it returns to the [Direct Teach + Touch Jog] screen.

2.2.6 Changing Local and Tool

The following describes how to change Local and Tool.

Changing Local number

(1) Press the [Local] key.
It turns to the Local number input mode.

```
Local: 00
```

(2) Using the numeric keys and arrow keys, input the Local number you want to change.
In this example, the number is “15”.

```
Local: 15
```

(3) Press the [OK] key.
The Local number has changed and it returns to the [Direct Teach + Touch Jog] screen.

TIP When you press the [Cancel] key, it returns to the [Direct Teach + Touch Jog] screen without saving the change.

Changing Tool number

(1) Press the [Tool] key.
It turns to the Tool number input mode.

```
01 000 FDT T00 R        L■
```

(2) Using the numeric keys and arrow keys, input the Tool number you want to change.

(3) Press the [OK] key.
The Tool number has changed and it returns to the [Direct Teach + Touch Jog] screen.

TIP When you press the [Cancel] key, it returns to the [Direct Teach + Touch Jog] screen without saving the change.

2.2.7 Switch the function

Press the [Mode] key and switch the mode for teaching.

```
01 000 FDT T00 R        L■
```

The default setting is "DT(**Di**rect Teach + **T**ouch Jog)".

Mode	Display	Description
Direct Teach + Touch Jog	DT	Use both functions: Direct Teach and Touch Jog. For the use of both functions, refer to the following section: *Operation 2.2.15 Execute Direct Teach or Touch Jog*
Direct Teach	D_	Use Direct Teach function only.
Touch Jog	_T	Use Touch Jog function only.

2.2.8 Setting Direct Teach (Force Setting)

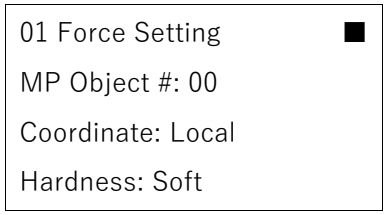
Change the setting of Direct Teach function.

The following screen appears by pressing the [F8] key in the [Direct Teach + Touch Jog] screen.

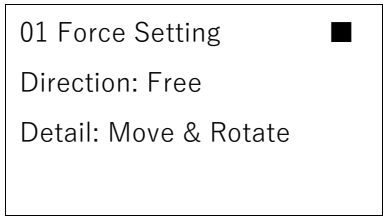
Press the [Page Up] [Page Down] keys to see all pages.

6-axis robot

Page 1



Page 2



Key operation	Description
[Numeric keys]	(Available in the number input mode. Inputs a number.)
CLR	(Available in the number input mode. Clears the number to 0.)
▲ / ▼	Select an item to be modified.
◀ / ▶	Display the choices rotationally and use ▼/▲ key to select and temporary fix the items.
Page Up / Down	Changes to the previous or next page.
OK	Fix the changes and rerun to the [Direct Teach + Touch Jog] screen.
Cancel	Cancel the changes and rerun to the [Direct Teach + Touch Jog] screen.
F5	Return to the [Direct Teach + Touch Jog] screen.

Changing Mass Property Object Number

(1) Use ▲ / ▼ key to move the cursor to “MP Object #:”.

MP Object #: 00

(2) Use ◀ / ▶ key and move the cursor to the position to be changed.

(3) Use [Numeric keys] key to change the mass property number.

(4) Perform either of the following steps.

Update Direct Teach setting:

Press the [OK] key.

Update the Direct Teach settings and return to the [Direct Teach + Touch Jog] screen.

Do not uprate Direct Teach setting:

Press the [Cancel] key.

Return to the [Direct Teach + Touch Jog] screen without updating the the Direct Teach settings.

Set other parameters of Direct Teach settings:

Use ▲ / ▼ key to move the cursor to the other parameter.

Changing the Coordinate system mode

(1) Use ▲ / ▼ key to move the cursor to “Coordinate”.

Coordinate: Local

(2) Use ◀ / ▶ key to change the coordinate system mode.
Display changes in order of Base → Local → Tool.

(3) Perform either of the following steps.

Update Direct Teach setting:

Press the [OK] key.

Update the Direct Teach settings and return to the [Direct Teach + Touch Jog] screen.

Do not uprate Direct Teach setting:

Press the [Cancel] key.

Return to the [Direct Teach + Touch Jog] screen without updating the the Direct Teach settings.

Set other parameters of Direct Teach settings:

Use ▲ / ▼ key to move the cursor to the other parameter.

Changing the hardness of Direct Teach

(1) Use ▲ / ▼ key to move the cursor to “Hardness”.

Hardness: Soft

(2) Use ◀ / ▶ key to change the hardness of Direct Teach.

Display changes in order of Soft → Medium → Hard.

(3) Perform either of the following steps.

Update Direct Teach setting:

Press the [OK] key.

Update the Direct Teach settings and return to the [Direct Teach + Touch Jog] screen.

Do not uprate Direct Teach setting:

Press the [Cancel] key.

Return to the [Direct Teach + Touch Jog] screen without updating the the Direct Teach settings.

Set other parameters of Direct Teach settings:

Use ▲ / ▼ key to move the cursor to the other parameter.

Changing the direction

(1) Use ▲ / ▼ key to move the cursor to “Direction”.

Direction: Free

(2) Use ◀ / ▶ key to change the direction.

Display changes in order of Free → Line → Plane → Rotation.

(3) Use ▲ / ▼ key to move the cursor to “Detail”.

Detail: Move & Rotate

(4) Use ◀ / ▶ key to set the details of the motion direction.

Display changes depending on the motion direction selected in “Direction”.

Use the following table as a reference to set the details of the motion direction.

Direction	Detail	Description
Free	**Move&Rotate** **Move** **Rotate**	Move the end effector freely according to the selected coordinate system mode.
Line	**X** **Y** **Z**	Move the end effector on the selected straight line according to the selected coordinate system mode.
Plane	**XY** **YZ** **XZ**	Move the end effector on the selected plane in the selected coordinate system mode.
Rotation	**RX** **RY** **RZ**	Rotate the end effector around the selected axis according to the selected coordinate system mode.

(5) Perform either of the following steps.

Update Direct Teach setting:

Press the [OK] key.

Update the Direct Teach settings and return to the [Direct Teach + Touch Jog] screen.

Do not uprate Direct Teach setting:

Press the [Cancel] key.

Return to the [Direct Teach + Touch Jog] screen without updating the the Direct Teach settings.

Set other parameters of Direct Teach settings:

Use ▲ / ▼ key to move the cursor to the other parameter.

2.2.9 Setting Touch Jog

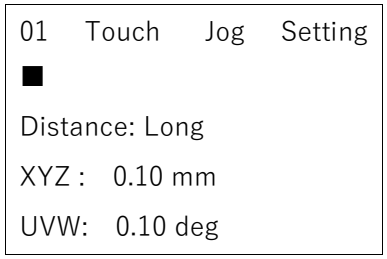
Change the setting of Touch Jog function.

The following screen appears by pressing the [F9] key in the [Direct Teach + Touch Jog] screen.

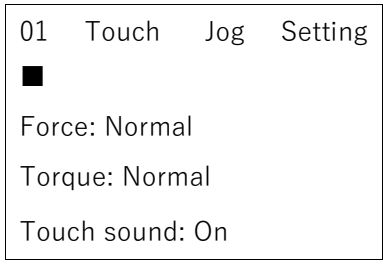
Press the [Page Up] [Page Down] keys to see all pages.

6-axis robot

Page 1



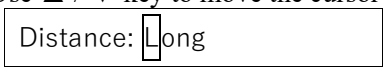
Page 2



Key operation	Description
[Numeric keys]	(Available in the number input mode. Inputs a number.)
CLR	(Available in the number input mode. Clears the number to 0.)
▲ / ▼	Select an item to be modified. However, temporary fix the input value in the number input mode.
◀ / ▶	Display the choices rotationally and use ▼/▲ key to select and temporary fix the items. However, temporary fix the input value in the number input mode.
Page Up / Down	Changes to the previous or next page.
OK	Fix the changes and rerun to the [Direct Teach + Touch Jog] screen.
Cancel	Cancel the changes and rerun to the [Direct Teach + Touch Jog] screen.
F5	Return to the [Direct Teach + Touch Jog] screen.

Changing the jogging amount

(1) Use ▲ / ▼ key to move the cursor to “Distance:”.



(2) Use ◀ / ▶ key to change the jogging amount.

The display changes in order of Long → Medium → Short.

The following values are set by default.

	XYZ directions [mm]	UVW directions [deg]
Long	5.00	5.00
Medium	1.00	1.00
Short	0.10	0.10

Change the jogging amount to desired value:

Use ▲ / ▼ key to move the cursor to the line of “XYZ” or “UVW”.

Use ◀ / ▶ key and move the cursor to the position to be changed.

Use [Numeric keys] to input numbers.

(3) Perform either of the following steps.

Update Direct Teach setting:

Press the [OK] key.

Update the Direct Teach settings and return to the [Direct Teach + Touch Jog] screen.

Do not uprate Direct Teach setting:

Press the [Cancel] key.

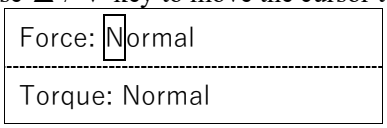
Return to the [Direct Teach + Touch Jog] screen without updating the the Direct Teach settings.

Set other parameters of Direct Teach settings:

Use ▲ / ▼ key to move the cursor to the other parameter.

Setting the sensitivity of Touch Jog

(1) Use ▲ / ▼ key to move the cursor to the line of “Force” or “Moment”.



(2) Use ◀ / ▶ key to change the sensitivity of Touch Jog.

To change the sensitivity related to movement:

Change the “Force” value.

Display switches in order of Sensitive → Normal → Dull.

To change the sensitivity related to movement:

Change the “Torque” value.

Display switches in order of Sensitive → Normal → Dull.

(3) Perform either of the following steps.

Update Direct Teach setting:

Press the [OK] key.

Update the Direct Teach settings and return to the [Direct Teach + Touch Jog] screen.

Do not uprate Direct Teach setting:

Press the [Cancel] key.

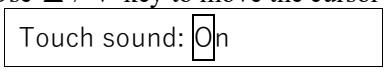
Return to the [Direct Teach + Touch Jog] screen without updating the the Direct Teach settings.

Set other parameters of Direct Teach settings:

Use ▲ / ▼ key to move the cursor to the other parameter.

Set enable / disable the “Touch sound” of Touch Jog

(1) Use ▲ / ▼ key to move the cursor to the line of “Touch sound”.



(2) Use ◀ / ▶ key to enable / disable the “Touch sound” of Touch Jog.
Display switches from On to Off.

(3) Perform either of the following steps.

Update Direct Teach setting:

Press the [OK] key.

Update the Direct Teach settings and return to the [Direct Teach + Touch Jog] screen.

Do not uprate Direct Teach setting:

Press the [Cancel] key.

Return to the [Direct Teach + Touch Jog] screen without updating the the Direct Teach settings.

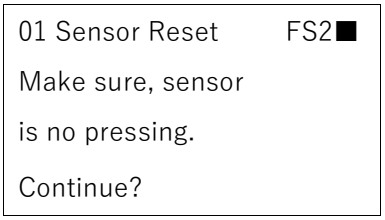
Set other parameters of Direct Teach settings:

Use ▲ / ▼ key to move the cursor to the other parameter.

2.2.10 Resetting Force Sensor

Epson's Force Sensors have a drift characteristic. Therefore, if a time passes, the sensor may move even if the force is not applied to it when executing the Direct Teach or Touch Jog due to the drift errors.
If the sensor drift errors are accumulated, press the [F4] key to reset the sensor.
The Force Sensor can be reset at any time if Direct Teach or Touch Jog has not been executed.
Executing the Direct Teach or Touch Jog without resetting for 10 or more minutes, an error occurs.

(1) Press the [F4] key.
Switch to the sensor reset screen.



The screen confirms with the user that the hand or workpiece at the end of the Force Sensor do not touch other object since it may apply external force to the force sensor.

(2) Perform either of the following steps.

When executing sensor reset:

Press the [OK] key.
Return to the [Direct Teach + Touch Jog] screen after executing sensor reset.

When not executing sensor reset:

Press the [Cancel] key.
Return to the [Direct Teach + Touch Jog] screen.

CAUTION	■ Be sure to reset the Force Sensor with no external force applied to it. If it is reset with an external force applied to it, the state in which an external force applied is "0". Therefore, if the force applied is removed, the Force Sensor detects a force even if no force is applied. If Direct Teach or Touch Jog is performed in this state, the robot may move unintentionally. Caution is required in this regard.

2.2.11 Changing Point Number

To change the point number setting, press the [F10] key to change the setting.

This can be changed at any time if Direct Teach or Touch Jog has not been executed.

(1) Press the [F10] key.
It turns to the point number input mode.

```
01 000 FDT T00 R        L■
```

(2) Enter the point number you want to change.
Use the numeric keys and arrow keys to enter the point number.

(3) Press the [OK] key to change the point number and return to the [Direct Teach + Touch Jog] screen.

2.2.12 Teaching the Current Position

To save the current position, press the [Teach] key to teach positions.
The current position information is saves in the point number set in *2.2.11 Changing Point Number*.

This can be changed at any time if Direct Teach or Touch Jog has not been executed.

(1) Press the [Teach] key.

```
01 Teach      Point:000
Ready to teach
current position.
Continue?
```

If the selected point number has already used, the following screen appears.

```
01 Teach      Point:000
Ready to re-teach
current position.
Overwrite?
```

(2) Perform either of the following steps.

Save position information:

Press the [OK] key.
The point data is registered to the memory and return to the [Touch Jog + Direct Teach] screen.

Do not save position information:

Press the [Cancel] key.
Return to the [Touch Jog + Direct Teach] screen.

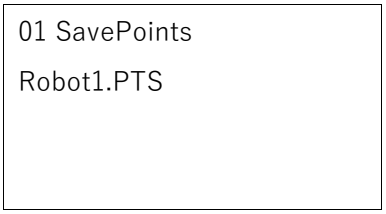
TIP

This can also be executed in the [Point Editor] screen.

2.2.13 Saving Point Data to File

You can save the point data registered in the memory to the point file.

(1) Press the [Save] key.



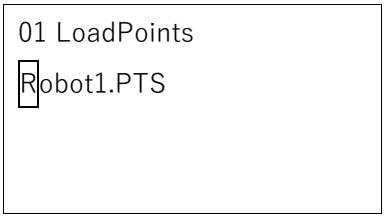
(2) Press the [OK] key to save the point data to the file.

TIP

This can also be executed in the [Point Editor] screen.

2.2.14 Loading Point Data from File

(1) Press the [Load] key.



(2) Move the cursor to select a file.

2.2.15 Executing Direct Teach or Touch Jog

Use Direct Teach or Touch Jog to move the end effector instinctively. Be sure to reset the force sensor before executing Direct Teach or Touch Jog.

For how to reset the force sensor, refer to the following section:

Operations 2.2.10 Reset Force Sensor

Execution procedure

(1) Click the [F5] key to set Direct Teach or Touch Jog to ready for operation.
First, the following screen is displayed.

```
01 Direct Teach          L■
and Touch Jog
Hold Enable switch.
Press the OK key.
```

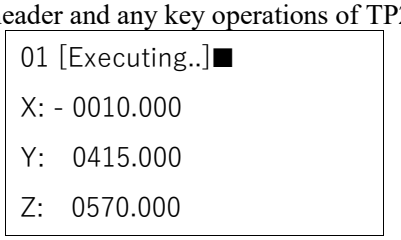
Press the [OK] key to set Direct Teach or Touch Jog to ready for operation. Hold the enable switch to turn the motor on. When it is available, "R" is displayed on the header.

```
01 000 FDT T00 R         L■
X: - 0010.000
Y:   0415.000
Z:   0570.000
```

Key operation	Description
Jog keys	Not in use.
Reset	Sets the initial setup status.
Motor	Turns ON / OFF the motor.
Teach	Executes a Teach operation. Refer to *Operation 2.1.14 Teaching Operation.*
Speed	Not in use.
Mode	Switches the modes (Direct Teach + Touch Jog, Direct Teach, Touch Jog).
Dist	Switches the Jog Distance for Touch Jog (Long, Medium, Short).
Home	Execute a Home operation.
Save	Saves a point file. Refer to *Operation 2.1.16 Saving Point Data to File.*
Load	Loads a point file. Refer to *Operation 2.1.17 Loading Point Data from File.*

Key operation	Description
▲ / ▼	Adds / subtracts point number by one.
◀ / ▶	Subtracts / adds point number by ten.
Local	Switches to Local number input mode.
Tool	Switches to Tool number input mode.
Arm	Switches to Arm number input mode.
User Dist	Not in use.
Guide	Displays the key operation guide.
Page Up / Down	Changes to the previous or next page.
F1	Changes to the point editing screen.
F2	Changes to the I/O command screen.
F3	Changes to the motion command screen.
F4	Changes to the reset screen of the force sensor. Refer to *Operation 2.2.10 Reset Force Sensor*
F5	Start or end the Direct Teach or Touch Jog operations. Refer to *Operation 2.2.15 Execute Direct Teach or Touch Jog*
F6	Changes to the GoAlignHere execution screen. Refer to *Operation 2.2.16 Execute GoAlignHere*
F7	Changes to the robot screen. Refer to *Operation 2.2.17 Changing the Robot*
F8	Changes to the force setting screen. Refer to *Operation 2.2.8 Set Direct Teach (Force Setting)*
F9	Changes to the Touch Jog setting screen. Refer to *Operation 2.2.9 Set Touch Jog*
F10	Changes to the point number input mode.

(2) Execute Direct Teach or Touch Jog while holding the enable switch.
While the Direct Teach or Touch Jog is operating, “Executing…” is displayed on the header and any key operations of TP2 is disabled.



To perform point teaching or change parameters, release the hand from the enable switch. When you want to execute the Direct Teach or Touch Jog again, start from (1).

(3) Use Direct Teach and Touch Jog differently depending on the applied force to the force sensor.

Apply weak force to the force sensor
or apply force for a moment to the force sensor:

Execute Touch Jog and the end effector move by the set jog amount.
(Motion which is same as Step jog operation).

Apply strong force to the force sensor:

Execute Direct Teach and the end effector moves according to the set hardness of Direct Teach. (Motion which is same as Continuous jog operation).

Do not apply force to the force sensor:

The end effector does not move.
If Direct Teach is operating, end the operation.

TIP

You can change the Touch Jog sensitivity and Direct Teach hardness. For more details, refer to the following sections:

Operation 2.2.8 Set Direct Teach (Force Setting)
- Changing the hardness of Direct Teach

Operation 2.2.9 Set Touch Jog
- Setting the sensitivity of Touch Jog

CAUTION

■ Apply the force to the hand or workpiece which is attached near the tip than the Force Sensor.

The Force Sensor cannot detect the force when it is applied to the robot arm or the Force Sensor itself, and it may result in unintended robot motion. Caution is required in this regard.

■ When operating the robot, pay attention not only to the position of the hand or workpiece, but also to the movement of the robot arm.

Especially when the robot is near the singularity, the robot arm may move significantly. Caution is required in this regard.

■ When using Direct Teach, be sure to verify that the setting of jog distance for Touch Jog is as intended before use. If you make an incorrect setting, the robot may move more than expected, possibly results in a collision. Caution is required in this regard.

Motion near the singular point

Direct Teach function is not available near the singular point. Only use Touch Jog function to move the end effector.

(1) The following screen appears when the end effector gets in the singular point, and the robot operation is paused.
TP2 alerts a warning sound at the same time.

```
Direct Teach can't be
executed CP motion.
Execute PTP motion
with Touch Jog
```

(2) Press the [OK] key to disappear the display and rerun to the [Direct Teach + Touch Jog] screen.

(3) Confirm that Touch Jog function is enabled on the the header and execute Touch Jog.
Header display when Touch Jog is enabled:

```
01 000 FDT T00 R        L■
```

Or

```
01 000 F T T00 R        L■
```

TIP

When near the singular point and Touch Jog is disabled, the end effector cannot be moved. For operations to enable Touch Jog function, refer to *Operation 2.2.7 Switch the function*.

(4) When the robot moves from the singular point, the following screen is displayed, and the robot operation is paused.
The warning sound will be stopped at the same time.

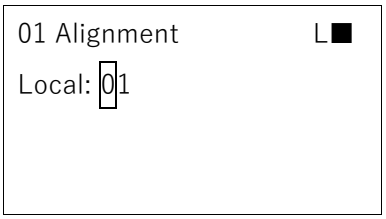
```
The PTP motion to
avoid the.
singularity point
has completed.
```

(5) Press the [OK] key to disappear the display and rerun to the [Direct Teach + Touch Jog] screen. Now, Direct Teach function is available.

2.2.16 Executing Alignment

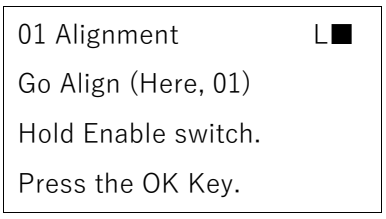
Move the end effector to parallel with the set working plane.

(1) Press the [Shift] key and switch the function key from [F6] to [F10].
Press the [F6] key and switch to the preparation screen for Alignment.
Using [Numeric keys], input the local coordinate system which is a target of Alignment.



Key operation	Description
[Numeric keys]	(Available in the number input mode. Inputs a number.)
CLR	(Available in the number input mode. Clears the number to 0.)
Motor	Turns ON / OFF the motor.
Speed	Switches the Speed (Low / High).
OK	Switches to the [Alignment Execution] screen.
Cancel	Returns to the [Direct Teach + Touch Jog] screen.
F3	Switches to the local coordinate system input mode.
F5	Returns to the [Direct Teach + Touch Jog] screen.

(2) Press the [OK] key and switch to the [Alignment Execution] screen.
Check the local coordinate system which is a target of Alignment.



(4) Press the [OK] key while holding the enable switch.
Execute Alignment.
When Alignment ends, return to the [Direct Teach + Touch Jog] screen.

2.2.17 Changing the Robot

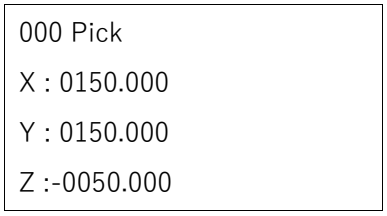
You can change the robot which uses Direct Teach or Touch Jog function.

For more details, refer to *Operation 2.8 Robot*.

2.3 Point Editor

This section indicates settings in the [Point Editor] screen.

Execute either of the following procedures to display the screen.:
Press the [F1] key in the [Jog & Teach] screen.
Press the [F1] key in the [Direct Teach + Touch Jog] screen.



Key operation	Description
[Numeric keys]	Inputs a number. (Available in the number input mode.)
CLR	Clears the number to 0. (Available in the number input mode.)
▲ / ▼	Moves the cursor. Temporary fix a number. (Available in the number input mode.)
◀ / ▶	Switches the pose flag.
Page Up / Down	Changes to the previous or next page.
OK	Fixes the change and stores in the memory. Return to the [Jog & Teach] screen or the [Direct Teach + Touch Jog] screen.
Cancel	Cancels the change. Return to the [Jog & Teach] screen or the [Direct Teach + Touch Jog] screen.
Teach	Executes the teaching operation. Refer to *Operation 2.1.14 Teaching Operation*.
Save	Saves the point file. Refer to *Operation 2.1.16 Saving Point Data to File*.
Load	Loads the point file. Refer to *Operation 2.1.17 Loading Point Data from File*.
Local	Switches to Local number input mode.
Guide	Displays the key operation guide.
F1	Switches to the point number input mode.
F2	Switches to the Local number input mode.
F3	Switches to the number input mode for the current position. Refer to *Operation 2.2.2 Editing Points - Changing Coordinate Value*.
F4	Deletes the point data from the memory.
F5	Returns to the [Jog & Teach] screen.

2.3.1 Switching Point Editor Display

You can edit all items except the point label in the [Point Editor] screen.

Press the [Page Up] [Page Down] keys to see all pages.

	6-axis Robot	SCARA, Cartesian Robot
Page 1	000 Pick X : 0150.000 Y : 0150.000 Z :-0050.000	000 Pick X : 0150.000 Y : 0150.000 Z :-0050.000
Page 2	000 Pick U : 0000.000 V : 0000.000 W : 0000.000	000 Pick U : 0000.000 S : 0000.000 T : 0000.000
Page 3	000 Pick S : 0000.000 T : 0000.000	000 Local:00 Hand : Righty
Page 4	000 Local:00 Hand : Righty Elbow: Above Wrist: NoFlip	
Page 5	000 Local:00 J1lag: 0 J4lag: 0 J6Flag: 000	

	RS series Robot	Joint-type Robot
Page 1	000 Pick X : 0150.000 Y : 0150.000 Z :-0050.000	000 Pick X : 0150.000 Y : 0150.000 Z :-0050.000
Page 2	000 Pick U : 0000.000 S : 0000.000 T : 0000.000	000 Pick U : 0000.000 V : 0000.000 W : 0000.000
Page 3	000 Local:00 Hand : Righty J1Flag: 0 J2Flag: 0	000 Pick R : 0000.000 S : 0000.000 T : 0000.000
Page 4	000 Local:00 J1Angle : 0000.000	

N series Robot

Page 1

```
000 Pick
X : 0150.000
Y : 0150.000
Z :-0050.000
```

Page 2

```
000 Pick
U : 0000.000
V : 0000.000
W : 0000.000
```

Page 3

```
000 Pick
S : 0000.000
T : 0000.000
```

Page 4

```
000 Local:00
Hand : Righty
Elbow : Below
Wrist : NoFlip
```

Page 5

```
000 Local:00
J4Flag : 0
J6Flag : 000
```

Page 6

```
000 Local:00
J1Angle : 0000.000
J4Angle : 0000.000
```

2.3.2 Editing Point Data

The following describes how to edit the point data.

Changing Point Number

(1) Press the [F1] key. It turns to the point input mode.

```
000 Pick
```

(2) Input a number.

(3) Press the [OK] key and fix the change of the point number.

Changing Coordinate Value

(1) Move the cursor to the target coordinate and press the [F3] key. It turns to the coordinate value input mode.

```
000 Pick
X : 0150.000
Y : 0150.000
Z :-0050.000
```

(2) Input a number.
Press the [–] [+] keys to change the sign.

(3) Press the [OK] key to change the coordinate value.

Changing Local Number

(1) Press the [F2] key in the screen that displays the local number. It turns to the local number input mode.

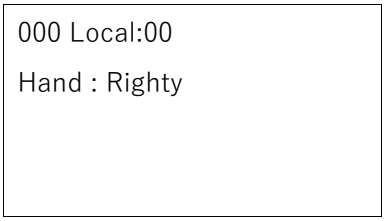
```
000 Local:00
```

(2) Input a number.

(3) Press the [OK] key and fix the change of the local number.

Changing Pose Flag

(1) Move the cursor to “Hand”.



(2) Press the [◀] or [▶] key to change the flag.

(3) Press the [OK] key and fix the change of the Hand flag.

Registering Point Data

Press the [OK] key to apply in the memory.

2.3.3 Deleting Point Data

(1) Display the registered point.

(2) Press the [F4] key.
Then, the point data is deleted from the memory.

NOTE

The point file will not be updated.
If you delete the point data by mistake, load the point file again to restore the point data.

2.4 I/O Command

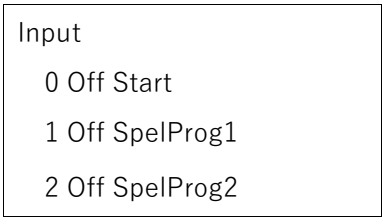
This section indicates settings in the [I/O Command] screen.

Execute either of the following procedures to display the screen.

Press the [F2] key in the [Jog & Teach] screen.

Press the [F6] key in the [Impedance Tester] screen.

Press the [F2] key in the [Direct Teach + Touch Jog] screen.



Status	Description
On	Input bit or output bit is ON status.
Off	Input bit or output bit is OFF status.

Key Operation	Description
▲ / ▼	In the Outputs status display, moves the cursor and selects the output bit.
Page Up / Down	Changes to the previous or next page.
OK	Returns to the previous screen.
Cancel	Returns to the previous screen.
Guide	Displays the key operation guide.
Press F1 while holding Enable Switch	Turns ON the selected output bit.
Press F2 while holding Enable Switch	Turns OFF the selected output bit.
F3	Switches between the Inputs / Outputs status display.
F5	Returns to the previous screen.

2.4.1 Input Status Display

Press the [Page Up] [Page Down] keys to display the input bit status.

2.4.2 Changing Outputs Bit

(1) Press the [F3] key to display the “Output” status.

```
Output   F1:On F2:Off
  0 On   Ready
  1 Off Running
  2 Off Paused
```

(2) Move the cursor to the output bit that you want to change.

(3) Holding down the Enable Switch, press the [F1] or [F2] key to switch the ON / OFF status of the output bit.

A warning appears if you switch the ON / OFF status of the output bit without holding down the Enable Switch.

2.5 Motion Command

This section indicates settings in the [Motion Command] screen.

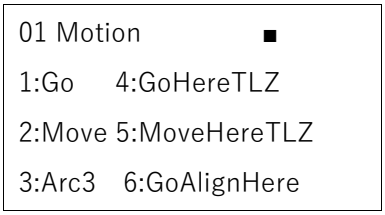
Execute either of the following procedures to display the screen.

Press the [F3] key in the [Jog & Teach] screen.

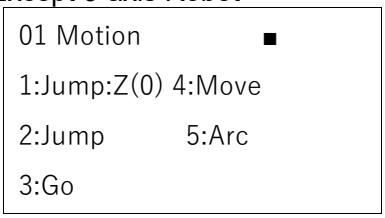
Press the [F4] key in the [Impedance Tester] screen.

Press the [F3] key in the [Direct Teach + Touch Jog] screen.

6-axis Robot



Except 6-axis Robot



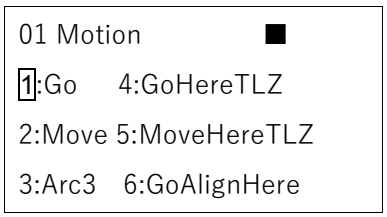
Key Operation	Description
Numeric keys ▲ ▼ ◀ ▶	Moves the cursor and select the motion command.
OK	Executes the motion command.
Cancel	Returns to the previous screen.
Motor	Turns ON / OFF the motor.
Reset	Sets the initial setup status.
Guide	Displays the key operation guide.
F4	Executes MCal.
F5	Returns to the previous screen.

2.5.1 Executing Motion Command

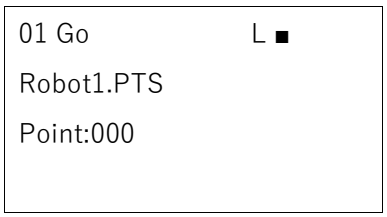
The following indicates the procedure for executing motion commands with an example of motion command [Go P1].

Selecting Motion Command

(1) Move the cursor to 1 and press the [OK] key.

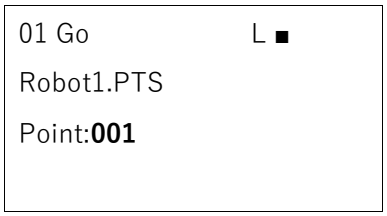


(2) The Go command setting screen appears.



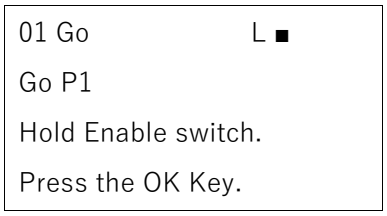
Specifying Motion Command Parameter

(1) Specify the point number. Press the [F1] key to turn to the point number input mode.



(2) Input a point number. Then, press the [OK] key and set the point number.

(3) Press the [OK] key and display the confirmation screen of the motion command execution.



Executing Motion Command

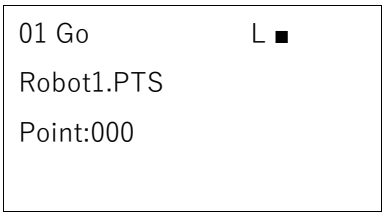
(1) When it is ready to start the motion, hold down the Enable Switch and press the [OK] key.

(2) When the motion is finished, it returns to the motion command selection screen.

NOTE While you are holding down the Enable Switch and pressing the [OK] key, it continues executing the motion command. If you release the Enable Switch or the [OK] key, the motion stops and the screen returns to the confirmation of motion command execution.

2.5.2 Go

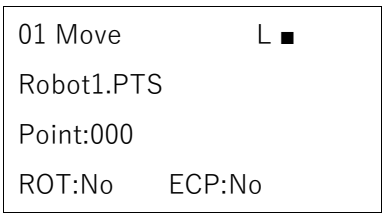
This section indicates settings in the command advanced setting screen.



Key operation	Description
OK	Fixes the parameter setting and displays the execution confirmation screen.
Cancel	Returns to the motion command selection screen.
Motor	Turns ON / OFF the motor.
Speed	Switches the speed (Low / High).
Reset	Sets the initial setup status.
Guide	Displays the key operation guide.
F1	Switches to the point number input mode.

2.5.3 Move

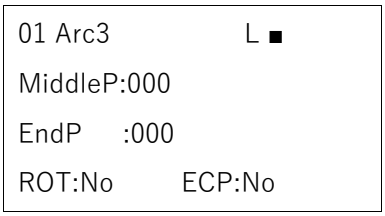
This section indicates settings in the command advanced setting screen.



Key operation	Description
OK	Fixes the parameter setting and displays the execution confirmation screen.
Cancel	Returns to the motion command selection screen.
Motor	Turns ON / OFF the motor.
Speed	Switches the speed (Low / High).
Reset	Sets the initial setup status.
Guide	Displays the key operation guide.
F1	Switches to the point number input mode.
F3	ROT: Switches between Enabled (Yes) and Disenabled (No).
F4	(Available when the ECP option is enabled.) ECP: Switches between Enabled (Yes) / Disenabled (No).

2.5.4 Arc3

This section indicates settings in the command advanced setting screen.

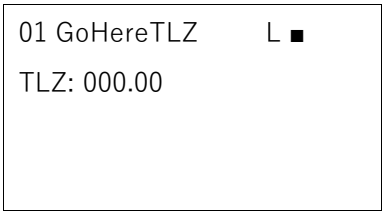


Key operation	Description
OK	Fixes the parameter setting and displays the execution confirmation screen.
Cancel	Returns to the motion command selection screen.
Motor	Turns ON / OFF the motor.
Speed	Switches the speed (Low / High).
Reset	Sets the initial setup status.
Guide	Displays the key operation guide.
F1	MiddleP: Switches to the Middle Point number input mode.
F2	EndP: Switches to the End Point number input mode.
F3	ROT: Switches between Enabled (Yes) and Disenabled (No).

F4	ECP: Switches between Enabled (Yes) and Disenabled (No).

2.5.5 GoHereTLZ

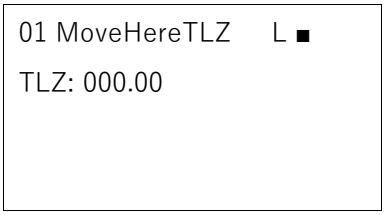
This section indicates settings in the command advanced setting screen.



Key operation	Description
OK	Fixes the parameter setting and displays the execution confirmation screen.
Cancel	Returns to the motion command selection screen.
Motor	Turns ON / OFF the motor.
Speed	Switches the speed (Low / High).
Reset	Sets the initial setup status.
Guide	Displays the key operation guide.
F2	TLZ: Switches to the TLZ input mode.

2.5.6 MoveHereTLZ

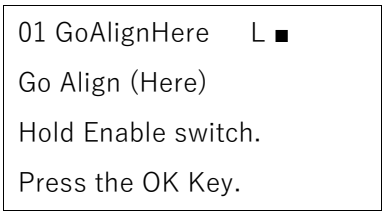
This section indicates settings in the command advanced setting screen.



Key operation	Description
OK	Fixes the parameter setting and displays the execution confirmation screen.
Cancel	Returns to the motion command selection screen.
Motor	Turns ON / OFF the motor.
Speed	Switches the speed (Low / High).
Reset	Sets the initial setup status.
Guide	Displays the key operation guide.
F2	TLZ: Switches to the TLZ input mode

2.5.7 GoAlignHere

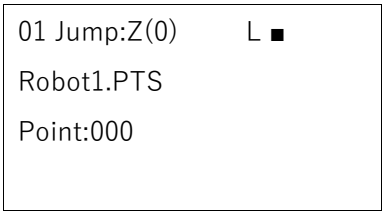
Since GoAlignHere have no execution parameter, the command advanced setting screen cannot be displayed. When the command is selected, the motion command execution confirmation screen will be displayed.



Key operation	Description
OK	Fixes the parameter setting and displays the execution confirmation screen.
Cancel	Returns to the motion command selection screen.
Motor	Turns ON / OFF the motor.
Speed	Switches the speed (Low / High).
Reset	Sets the initial setup status.
Guide	Displays the key operation guide.

2.5.8 Jump Z(0)

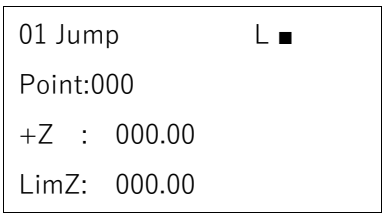
This section indicates settings in the command advanced setting screen.



Key operation	Description
OK	Fixes the parameter setting and displays the execution confirmation screen.
Cancel	Returns to the motion command selection screen.
Motor	Turns ON / OFF the motor.
Speed	Switches the speed (Low / High).
Reset	Sets the initial setup status.
Guide	Displays the key operation guide.
F1	Switches to the point number input mode.

2.5.9 Jump

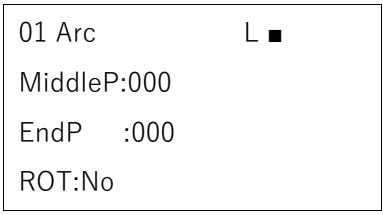
This section indicates settings in the command advanced setting screen.



Key operation	Description
OK	Fixes the parameter setting and displays the execution confirmation screen.
Cancel	Returns to the motion command selection screen.
Motor	Turns ON / OFF the motor.
Speed	Switches the speed (Low / High).
Reset	Sets the initial setup status.
Guide	Displays the key operation guide.
F1	Switches to the point number input mode.
F3	Switches to the +Z input mode.
F4	Switches to the LimZ input mode.

2.5.10 Arc

This section indicates settings in the command advanced setting screen.

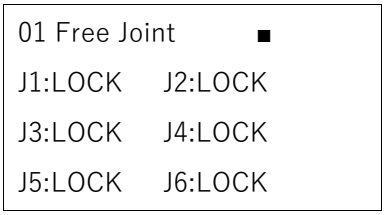


Key operation	Description
OK	Fixes the parameter setting and displays the execution confirmation screen.
Cancel	Returns to the motion command selection screen.
Motor	Turns ON / OFF the motor.
Speed	Switches the speed (Low / High).
Reset	Sets the initial setup status.
Guide	Displays the key operation guide.
F1	MiddleP: Switches to the Middle Point number input mode.
F2	EndP: Switches to the End Point number input mode.
F3	ROT: Switches between Enabled (Yes) and Disenabled (No).

2.6 Free Joint

This section indicates settings in the [Free Joint] screen.

Press the [F4] key in the [Jog & Teach] screen. The following screen appears.



Status	Description
Free	Servo Free for the joint
Lock	Servo Lock for the joint
(Blank)	Invalid joint

Key operation	Description
[−] Jog key	Servo Free for the joint.
[+] Jog key	Servo Lock for the joint.
Page Up / Down	Changes to the previous or next page.
OK	Return to the [Jog & Teach] screen.
Cancel	Return to the [Jog & Teach] screen.
Reset	Sets the initial setup status.
Motor	Turns ON / OFF the motor.
Guide	Displays the key operation guide.
F1	Changes all joints to FREE (servo free) status.
F2	Changes all joints to LOCK (servo lock) status.
F3	Switches between J4, J5, and J6 jog keys and J7, J8, and J9 jog keys.
F5	Return to the [Jog & Teach] screen.

2.6.1 Switching [Free Joint] Display

In the [Free Joint] screen, you can switch motor ON and OFF of all joints.

Use [Page Up] and [Page Down] keys to switch pages.

	6-axis Robot	SCARA, RS series, Cartesian Robot	Joint-type Robot
Page 1	01 Free Joint ■ J1:LOCK J2:LOCK J3:LOCK J4:LOCK J5:LOCK J6:LOCK	01 Free Joint ■ J1:LOCK J2:LOCK J3:LOCK J4:LOCK J8:LOCK J9:LOCK	01 Free Joint ■ J1:LOCK J2:LOCK J3:LOCK J4:LOCK J5:LOCK J6:LOCK
Page 2	01 Free Joint ■ J8:LOCK J9:LOCK		01 Free Joint ■ J7:LOCK J8:LOCK J9:LOCK

2.6.2 Servo Free for Each Joint

(1) Press the [–] Jog Key of the joint that you want to Servo Free.
The status switches from “Lock” to “Free”.
Now, you can move the specified joint by hand.

(2) Press [+] Jog Key of the joint that you want to Servo Lock.
The status switches from “Free” to “Lock”.

2.6.3 Servo Free for J7, J8, and J9

Servo Free the additional J8 and J9 axes of vertical 6-axis robots

To turn OFF (servo free) the additional J8 and J9 axes of vertical 6-axis robots, switch J5 and J6 jog keys to J8 and J9 jog keys.

(1) Press the [Shift] key and switch the function key from [F6] to [F10].

(2) Press [F8].

J5 and J6 jog keys switch to J8 and J9 jog keys.

(3) To return the J8 and J9 jog keys to J5 and J6 jog keys, press [F8] again.

Servo Free the J7 and additional J8 and J9 axes of Joint-type robots

To turn OFF (servo free) the J7 and the additional J8 and J9 axes of Joint-type robots, switch J4, J5 and J6 jog keys to J7, J8 and J9 jog keys.

(1) Press the [Shift] key and switch the function key from [F6] to [F10].

(2) Press [F8].

```
01 Free Joint        *■
```

J4, J5 and J6 jog keys switch to J7, J8 and J9 jog keys.

To return the J7, J8 and J9 jog keys to J4, J5 and J6 jog keys, press [F8] again.

```
01 Free Joint        ■
```

NOTE To turn OFF (servo free) the additional J8 and J9 axes of the joint-type robot which has 4 axes, use J5 and J6 jog keys.

Servo Free the additional J8 and J9 axes of SCARA, Cartesian, and RS series robots

To turn OFF (servo free) the additional J8 and J9 axes of SCARA, Cartesian, and RS series robots, use the J5 and J6 jog keys.

2.6.4 Servo Free for All Joints

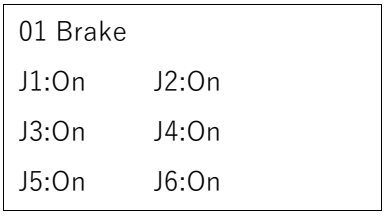
(1) Press the [F1] key.
The status of all joints switches from “Lock” to “Free”.
Now, you can move all the joints by hand.

(2) Press the [F2] key.
The status of all joints switches from “Free” to “Lock”.

2.7 Brake

This section indicates settings in the [Brake] screen.

Press the [F5] key in the [Jog & Teach] screen. The following screen appears.



Status	Description
On	Brake ON for the joint.
Off	Brake OFF for the joint.

Key operation	Description
[–] Jog key	Brake OFF for each joint
[+] Jog key	Brake ON for each joint
Reset	Sets the initial setup status.
OK	Return to the [Jog & Teach] screen.
Cancel	Return to the [Jog & Teach] screen.
Motor	Turns ON / OFF the motor.
Guide	Displays the key operation guide.
F5	Returns to the [Jog & Teach] screen.

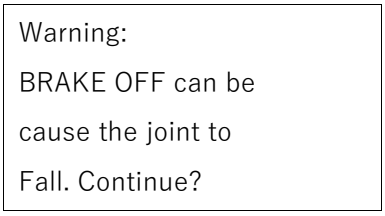
2.7.1 Turning the brake ON

Press the [Jog+] key of the joint whose brake On/Off setting is to be switched.

2.7.2 Turning the brake OFF

(1) Press the [Jog-] key of the joint whose brake On/Off setting is to be switched.

(2) The brake Off confirmation message appears.



(3) Press the [OK] key
The brake is released, and the specified joint moves manually.

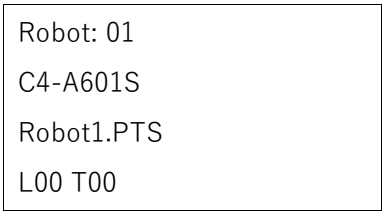
2.8 Robot

Robots to perform Jog can be changed in the [Robot] screen.

Execute either of the following procedures to display the screen.

Press the [F7] key in the [Jog & Teach] screen.

Press the [F3] key in the [Direct Teach + Touch Jog] screen.

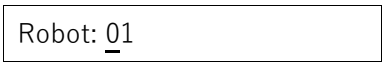


Robot number, model name, current point file name, Local number, Tool number, Arm number, and ECP number of the robot are displayed.

Key operation	Description
▲ ▼ ◀ ▶	Changes the robot.
OK	Sets the robot and returns to the previous screen.
Cancel	Restore the robot to the setting before the change and returns to the previous screen.
Reset	Sets the initial setup status.
Motor	Turns ON / OFF the motor.
Guide	Displays the key operation guide.
F1	Changes to the robot number input mode.
F4	Executes MCal.
F5	Sets the robot and returns to the previous screen.

2.8.1 Changing the Robot

(1) Press the [F1] key. The mode will change to the robot number input mode.



(2) Enter the desired robot number.

(3) Press the [OK] key and change the robot.

2.9 Impedance Tester

CAUTION	■ Executing the impedance test with improper settings of the Force Sensor, coordinate transformation, and gravity compensation may result in unintended motion. Be careful when configuring the settings and check operation before executing the impedance test. For details of the setting and operation check, refer to the following manual. *Epson RC+ Option Force Guide*

The [Jog & Teach] screen is used to change the mode to the impedance test mode.
First, check the preset settings to execute the impedance test.

(1) Press the [Shift] key, then press the [▲] key in the [Jog & Teach] screen.
The following screen appears.

If Force Sensor is not connected or linked to the robot:

Robot and force sensor not linked. System configuration in RC+.

Press the [OK] key to return to the [Jog & Teach] screen.

If Force Sensor is linked to the robot:

Impedance Tester: 1. Make sure end effector has no contact.

The screen confirms with the user that the hand or workpiece at the end of the Force Sensor do not touch other object since it may apply external force to the force sensor.

[Guide] key : Displays the key operation guide for this screen.

(2) Perform either of the following steps.

If no external force is considered to be applied:

Press the [OK] key to move to the following screen.

2. If MP Object not defined, Force Control will be affected by Gravity.

If external force is considered to be applied:

Press the [Cancel] key to return to the [Jog & Teach] screen.

If the mass property object is not configured properly, the force control may make unintended motion due to the gravity effect. This screen confirms with the user that the mass property object is configured properly.

[Guide] key: Displays the key operation guide for this screen.

(3) Perform either of the following steps.

If the mass property object has been configured:

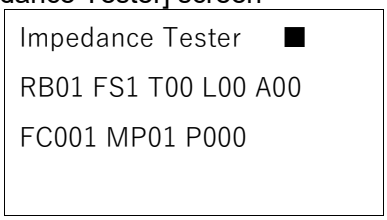
Press the [OK] key to move to the [Impedance Tester] screen.

If the mass property object has not been configured:

Press the [Cancel] key to return to the [Jog & Teach] screen.

 CAUTION	■ Be sure to reset the Force Sensor with no external force applied to it. If it is reset with an external force applied to it, the state in which an external force applied is “0”. Therefore, if the force applied is removed, the Force Sensor detects a force even if no force is applied. If the force control function is performed in this state, the robot may move unintentionally. Caution is required in this regard.

[Impedance Tester] screen



Screen	Description	Example (for the above screen)
Impedance Tester	Screen title	
■	Motor ■: ON No display: OFF	ON
RB01	Robot number	Select robot 1
FS1	Force Sensor number	Select Force Sensor 1
T00	Tool number	Select Tool0
L00	Local number	Select Local0
A00	Arm number	Select Arm0
FC001	Force control object (FC) number	Select force control object 1
MP01	Mass property object (MP) number	Select mass property object 1
P000	Point number	Select Point 0

Key operation	Description
OK	Returns to the [Jog & Teach] screen.
Cancel	Returns to the [Jog & Teach] screen.
Reset	Executes Reset.
Motor	Turns on or off the motors.
Teach	Executes teaching.
Save	Saves the point file. Refer to *Operation 2.1.16 Saving Point Data to File*.
Load	Loads the point file. Refer to *Operation 2.1.17 Loading Point Data from File.*
▲ / ▼	Adds or subtracts one to the point number.
◀ / ▶	Adds or subtracts ten to the point number.
Local	Switches to the local number input mode.
Tool	Switches to the tool number input mode.
Arm	Switches to the arm number input mode.
Guide	Display the key operation guide.

Key operation	Description
F1	Moves to the [Sensor Reset] screen.
F2	Switches to the force control object number input mode.
F3	Switches to the mass property object number input mode.
F4	Moves to the [Motion Command] screen. Refer to *Operation 2.5 Motion Command*. (Pressing the [F5] key returns to the [Impedance Tester] screen.)
F5	Returns to the [Jog & Teach] screen.
F6	Moves to the [I/O Command] screen. Refer to *Operation 2.4 I/O Command*. (Pressing the [F5] key returns to the [Impedance Tester] screen.)
F10	Switches to the point input mode.

2.9.1 Resetting Error

When an error occurs, press the [Reset] key to clear the error.
The error can be cleared at any time if the impedance test has not been executed.

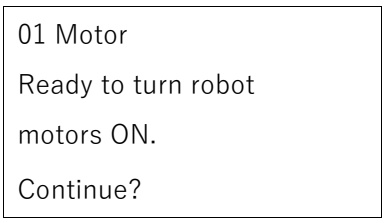
2.9.2 Motor ON / OFF

This can be executed at any time when the motor status is displayed in the impedance tester.

Turning ON the motor:

(1) Press the [Motor] key.

(2) Press the [OK] key while holding the enable switch in the confirmation screen.



(3) Robot motor is turned ON and the display changes as below.

Turning OFF the motor:

Press the [Motor] key.

Robot motor is turned OFF and the display changes as below.

NOTE Perform the following operations to turn OFF the motor.
- Turn OFF the enable switch

- Switch the mode with the mode switching key switch

NOTE

Turn OFF enable switch, when you switch the mode with the mode switching key switch. If the mode is switched with the mode switching key switch while the enable switch is turned ON, and the motor is turned ON, an error will occur. Be sure to turn the enable switch OFF once and then ON again before turning the motor ON.

2.9.3 Changing Local / Tool / Arm

The following describes how to change Local / Tool / Arm.
This can be changed at any time if the impedance test has not been executed.

Changing Local number

(1) Press the [Local] key. It turns to the Local number input mode.

```
RB01 FS1 T00 L00 A00
```

(2) Using the numeric keys and arrow keys, input the Local number you want to change.

(3) Press either of the following keys.
[OK] key: Local number changes and the screen returns to the [Jog & Teach] screen.
[Cancel] key: It returns to the [Jog & Teach] screen without saving the change.

Changing Tool number

(1) Press the [Tool] key.
It turns to the Tool number input mode.

```
RB01 FS1 T00 L00 A00
```

(2) Using the numeric keys and arrow keys, input the Tool number you want to change.

(3) Press either of the following keys.
[OK] key: Tool number changes and the screen returns to the [Jog & Teach] screen.
[Cancel] key: It returns to the [Jog & Teach] screen without saving the change.

Changing Arm number

(1) Press the [Arm] key. It turns to the Arm number input mode.

```
RB01 FS1 T00 L00 A00
```

(2) Using the numeric keys and arrow keys, input the Arm number you want to change.

(3) Press either of the following keys.
[OK] key: Arm number changes and the screen returns to the [Jog & Teach] screen.
[Cancel] key: It returns to the [Jog & Teach] screen without saving the change.

2.9.4 Resetting Force Sensor

Epson's Force Sensors have a drift characteristic. Therefore, if a time passes, the sensor may move even if the force is not applied to it when executing the impedance test due to the drift errors.

If the sensor drift errors are accumulated, press the [F1] key to reset the sensor.

The Force Sensor can be reset at any time if the impedance test has not been executed.

(1) Press the [F1] key to move to the sensor reset screen.

```
Start Sensor Reset?
Caution: Make sure
end effector has no
contact.
```

The screen confirms with the user that the hand or workpiece at the end of the Force Sensor do not touch other object since it may apply external force to the force sensor.

[Guide] key : Displays the key operation guide for this screen.

(2) Perform either of the following steps.

When executing sensor reset:

Press the [OK] key to return to the [Impedance Tester] screen after executing sensor reset.

When not executing sensor reset:

Press the [Cancel key to return to the [Impedance Tester] screen.

 CAUTION	■ Be sure to reset the Force Sensor with no external force applied to it. If it is reset with an external force applied to it, the state in which an external force applied is “0”. Therefore, if the force applied is removed, the Force Sensor detects a force even if no force is applied. If the force control function is performed in this state, the robot may move unintentionally. Caution is required in this regard.

2.9.5 Changing Force Control Object Number

Press the [F2] key to change the settings for the force control object.
This can be changed at any time if the impedance test has not been executed.

Set the force control object in advance by using the force editor.
For details of the force editor, refer to the following manual.
Epson RC+ Option Force Guide

(1) Press the [F2] key. It turns to the force control object number input mode.

```
FC001 MP01 P000
```

(2) Enter the force control object number you want to change.
Using the numeric keys and arrow keys, enter the force control object number configured in the *Epson* RC+ force editor.
You can also use the preset objects assigned to [F1], [F2], and [F3] keys.

The following three preset objects are available.
Soft, Standard, and Hard

The following are parameters of the preset objects.

[F1] key: Selects a soft force control object.

Parameter	Unit	Value
Mass of Fx,Fy,Fz	[mN/(mm/sec^2)]	0.2
Damper of Fx,Fy,Fz	[N/(mm/sec)]	0.2
Spring of Fx,Fy,Fz	[N/mm]	0
Mass of Tx,Ty,Tz	[mN·mm/(deg/sec^2)]	1700
Damper of Tx,Ty,Tz	[N·mm/(deg/sec)]	100
Spring of Tx,Ty,Tz	[N·mm/deg]	0

[F2] key: Selects a standard force control object.

Parameter	Unit	Value
Mass of Fx,Fy,Fz	[mN/(mm/sec^2)]	0.5
Damper of Fx,Fy,Fz	[N/(mm/sec)]	0.5
Spring of Fx,Fy,Fz	[N/mm]	0
Mass of Tx,Ty,Tz	[mN·mm/(deg/sec^2)]	4000
Damper of Tx,Ty,Tz	[N·mm/(deg/sec)]	500
Spring of Tx,Ty,Tz	[N·mm/deg]	0

[F3] key: Selects a hard force control object.

Parameter	Unit	Value
Mass of Fx,Fy,Fz	[mN/(mm/sec^2)]	1
Damper of Fx,Fy,Fz	[N/(mm/sec)]	1
Spring of Fx,Fy,Fz	[N/mm]	0
Mass of Tx,Ty,Tz	[mN·mm/(deg/sec^2)]	8000
Damper of Tx,Ty,Tz	[N·mm/(deg/sec)]	1000
Spring of Tx,Ty,Tz	[N·mm/deg]	0

(3) Press the [OK] key to change the force control object number.

Set the force control object in advance by using the force editor.
For details of the force editor, refer to the following manual.
Epson RC+ Option Force Guide

CAUTION	■ Executing the impedance test with improper settings of the force control object and force coordinate system object may result in unintended motion. Be sure to configure the settings with care before executing the impedance test.

2.9.6 Displaying Details of Force Control Object Number and Force Coordinate System object Number

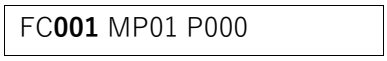
To check force control object settings:

Press the[F4] key in the force control object number input mode and display the force control object number advanced setting information.

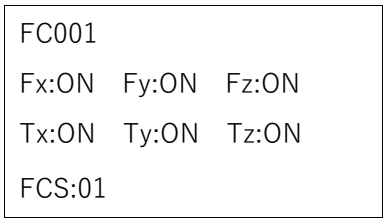
To check Force Coordinate system object settings:

Press the [F1] key in the force control object number advanced setting information and display the force coordinate system object number advanced setting information.

(1) Press the [F2] key. It turns to the FC number input mode.



(2) Press the [F4] key. It displays the force control object number advanced setting information.



Screen	Description
FC001	Displays the currently selected force control object number.
Fx:ON	Displays whether the X-axis for the force in the direction of translation is enabled or disabled. Enable: ON, Disable: OFF
Fy:ON	Displays whether the Y-axis for the force in the direction of translation is enabled or disabled. Enable: ON, Disable: OFF
Fz:ON	Displays whether the Z-axis for the force in the direction of translation is enabled or disabled. Enable: ON, Disable: OFF
Tx:ON	Displays whether the X-axis for the force in the direction of rotation is enabled or disabled. Enable: ON, Disable: OFF
Ty:ON	Displays whether the Y-axis for the force in the direction of rotation is enabled or disabled. Enable: ON, Disable: OFF
Tz:ON	Displays whether the Z-axis for the force in the direction of rotation is enabled or disabled. Enable: ON, Disable: OFF
FCS:01	Displays the currently selected force coordinate system object number

(3) Press the [F1] key. It displays the force coordinate system object number advanced setting information.

If Base is selected for the Force coordinate system object:

```
FCS01 Base
x 0150.000
y 0100.000
z-0050.000
```

If Local is selected for the Force coordinate system object:

```
FCS01 Local No01
x 0150.000
y 0100.000
z-0050.000
```

If Tool is selected for the Force coordinate system object:

```
FCS01 Tool
x 0150.000
y 0100.000
z-0050.000
```

If Custom is selected for the Force coordinate system object:

```
FCS01 Custom
x 0150.000 u 010.000
y 0100.000 v 010.000
z-0050.000 w-005.000
```

Screen	Description
FCS01	Displays the currently selected force coordinate system object number.
Base	Indicates that Base is selected for the Force coordinate system object.
Local	Indicates that Local is selected for the Force coordinate system object.
Tool	Indicates that Tool is selected for the Force coordinate system object.
Custom	Indicates that Custom is selected for the Force coordinate system object.
No01	Displays the Local number when Local is selected.
x 0150.000	Displays the X direction position of the force coordinate system object in the force coordinate system. (Unit: mm)
y 0100.000	Displays the Y direction position of the force coordinate system object in the force coordinate system. (Unit: mm)
z-0050.000	Displays the Z direction position of the force coordinate system object in the force coordinate system. (Unit: mm)
u 010.000	U-axis rotation for relative posture when Custom is selected. (Unit: deg)
v 010.000	V-axis rotation for relative posture when Custom is selected. (Unit: deg)
w-005.000	W-axis rotation for relative posture when Custom is selected. (Unit: deg)

(4) Press the [F5] key.

It returns to the force control object number advanced setting information.

(5) Press the [F5] key.
It returns to the force control object number input mode.

(6) Press either [OK] or [Cancel] key to return to the [Impedance Tester] screen.

2.9.7 Changing Mass Property Object Number

Press the [F3] key to change the settings for the mass property object.

This can be changed at any time if the impedance test has not been executed.

(1) Press the [F3] key.
It turns to the mass property object number input mode.

FC001 MP**01** P000

(2) Using the numeric keys and arrow keys, input the mass property object number you want to change.

(3) Press the [OK] key to change the mass property object number.

Set the mass property object in advance in the Epson RC+ - [Mass/Gravity] panel.
For details of the [Mass/Gravity] panel, refer to the following manual.
Epson RC+ Option Force Guide

CAUTION	■ Executing the impedance test with improper settings of the mass property object may result in unintended motion. Be sure to configure the settings with care before executing the impedance test.

2.9.8 Displaying Details of Mass Property Object Number

To check the settings for the mass property object, press the [F1] key in the mass property object number input mode and display the mass property object number advanced setting information.

(1) Press the [F2] key.
It turns to the mass property object number input mode.

```
FC001 MP01 P000
```

(2) Press the [F1] key.
It turns to the mass property object number advanced setting information.

```
MP01        Wt:005.000
x: 0150.000
y: 0100.000
z:-0050.000
```

Screen	Description
MP01	Displays the currently selected mass property object number
Wt:005.000	Displays the weight of the hand and workpiece (Unit: kg)
x: 0150.000	Displays the X direction of the overall center of gravity of the hand and workpiece. (Unit: mm)
y: 0100.000	Displays the Y direction of the overall center of gravity of the hand and workpiece. (Unit: mm)
z:-0050.000	Displays the Z direction of the overall center of gravity of the hand and workpiece. (Unit: mm)

(3) Press the [F5] key to return to the mass property object number input mode.

(4) Press either [OK] or [Cancel] key to return to the [Impedance Tester] screen.

2.9.9 Changing Point Number

Press the [F10] key to change the point number setting.

This can be changed at any time if the impedance test has not been executed.

(1) Press the [F10] key.
It turns to the point number input mode.

```
FC001 MP01 P000
```

(2) Using the numeric keys and arrow keys, input a desired point number.

(3) Press the [OK] key to change the point number.

2.9.10 Teaching the current position

To save the current position, press the [Teach] key and perform teaching.
The current position will be saved to the point number configured in *2.9.9 Changing Point Number*.

Teaching can be performed anytime unless the impedance test has been performed.

(1) Press the [Teach] key.

```
01 Teach      Point:000
Ready to teach
current position.
Continue?
```

If the selected point number is in use, the following screen appears.

```
01 Teach      Point:000
Ready to re-teach
current position.
Overwrite?
```

(2) Perform either of the following steps.

To save the position data:
Press the [OK] key to return to the [Impedance Tester] screen after registering the point data to the memory.

To not save the position data:
Press the [Cancel] key to return to the [Impedance Tester] screen.

This can also be executed in the [Point Editor] screen.

2.9.11 Executing Impedance Test

To experience the configured parameters for the force control object, press the [OK] key while holding the enable switch. The impedance test will start.

(1) Press the [OK] key while holding the enable switch.

(2) Display the impedance test execution start confirmation screen.

```
Start Force Control?
Caution:Sensor drift
makes unintentional
motion.
```

The screen cautions the user before executing the test that the robot may move with no force being applied when the sensor drift is accumulated.

[Guide] key: Displays the key operation guide for this screen.

(3) Perform either of the following steps.

To start the impedance test:
Press the [OK] key.

When robot motors are ON:
The impedance test starts.
[Executing FCxxx] will be displayed in the fourth line to indicate that the impedance test is in process, and then the screen returns to the [Impedance Tester] screen.

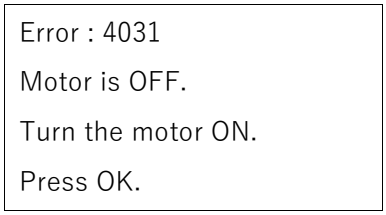
```
Impedance Tester    ■
RB01 FS1 T00 L00 A00
FC001 MP01 P000
 [Executing  FC001]
```

You can directly touch the tip of the Force Sensor to experience the parameters for the force control object.

 CAUTION	■ Apply the force to the hand or workpiece which is attached near the tip than the Force Sensor. The Force Sensor cannot detect the force when it is applied to the robot arm or the Force Sensor itself, and it may result in unintended robot motion. Caution is required in this regard.

When robot motors are OFF:

The [Motor Off notification] screen appears.

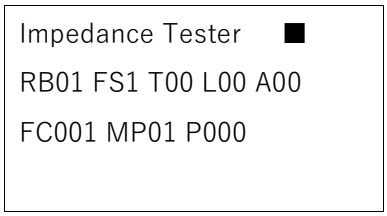


To return to the previous screen, press the [OK] key.

To not start the impedance test:

Press the [Cancel] key to return to the [Impedance Tester] screen.

(4) To finish the impedance test, hold down or release the enable switch.
The message [Executing FCxxx] in the fourth line will disappear.

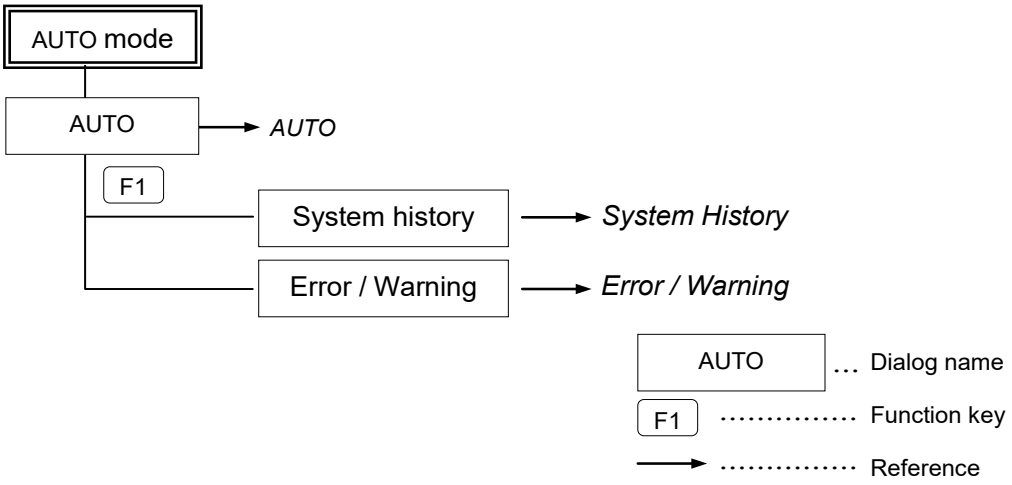


3. AUTO Mode

Switch the mode selector key switch to “Auto” to enter the AUTO mode.

The AUTO mode enables the automated operation (program execution, etc.) of the robot system in the factory and also the status check of the robot system.

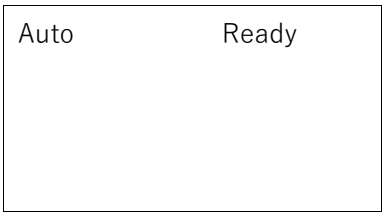
In the AUTO mode, if the safety door is open, the robot motion and program execution are prohibited.



3.1 Auto

This section indicates settings in the [Auto] screen.

When starting the Controller with the mode selector key switch in “Auto”, the following screen appears at the beginning.



Key operation	Description
Guide	Displays the key operation guide.
F1	Displays the [System History] screen.

3.2 System History

This section indicates settings in the [System History] screen.

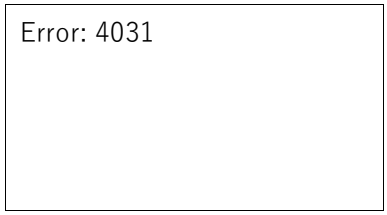
This screen displays a history of events, errors, and warnings that occurred in the past.

	Error details screen	Warning details screen
Page 1	Er:4014 R:02 J:1 2012/01/01 00:00:00 Code1:0 Code2:3	Wa: 0504 R:00 J0 2012/01/01 00:00:00 Code1:0 Code2:0
Page 2	MCAL was not complet ed.	An Error occurred on a Background Task.

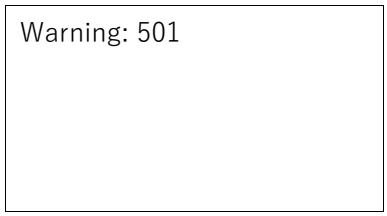
Key operation	Description
Page Up / Down	Changes to the previous or next page.
Guide	Displays the key operation guide.
F5	Returns to the [Auto] screen.

3.3 Errors / Warnings

The error number is displayed when an error occurs.



The warning number is displayed when a warning occurs.



Key operation	Description
OK	Changes to the screen before the error occurred.
Cancel	Changes to the screen before the error occurred.

NOTE For the errors and warnings, refer to *Status Code / Error Code List.*.

4. Troubleshooting

Display panel is blank

−The Controller supplies DC24V.
Check that the Controller is ON.

−Check that the Controller is connected to the TP connector of the Controller properly.

An Error code appears and the Robot does not operate normally

−Please refer to the error code indicated in the following manual.
Status Code / Error Code List

Robot does not move by pressing the Jog key

−Execute the Motor On command to energize the Robot motor.
Epson RC+ SPEL+ Language Reference: Motor

−Energize the Robot motor.
Epson RC+ SPEL+ Language Reference: SLock

−Short jog distance may be selected.
Check the value in the [Jog Distance] screen of the Epson RC+ and change the setting to long distance if needed.
(Refer to *Operation: 2.1.12 Jog Distance*.)

Operation mode does not switch from TEACH mode to AUTO mode

−Send the latch release input signal to release the latch status.

If the condition does not change after performing the countermeasure above, the unit may have suffered a breakdown.
Please contact the distributor.

Robot motion is slow after switching the mode from TEACH to AUTO

Refer to the NOTE in the following section:

Operation: 1. Teaching Procedure

5. Maintenance Parts List

Part Name	Code	Old Code	Note
Key	2111826	R13B120113	Mode selector key switch

6. Option Parts List

Part Name		Code	Note
TP Exchange Cable	0.5 m	R12NZ900L6	For RC700-A controller, RC700-D controller, RC700-E controller, RC800-A controller, T series manipulator, VT series manipulator
Extension Cable	5 m	R12NZ90111	
	10 m	R12NZ900NJ	
	15 m	R12NZ900NK	
Hot Plug Kit		R12N2900NL	

The extension cable cannot connect with the combination of RC90 controller and TP2.