Robot Controller RC700 / RC90 Option
Teach Pendant

TP2

Rev.11
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.

WARRANTY

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

Product malfunctions resulting from normal handling or operation will be repaired free of charge during the normal warranty period. (Please contact the supplier of your region for warranty period information.)

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

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

Warnings, Cautions, Usage:

1. If the robot system associated equipment is used outside of the usage conditions and product specifications described in the manuals, this warranty is void.
2. If you do not follow the WARNINGS and CAUTIONS in this manual, we cannot be responsible for any malfunction or accident, even if the result is injury or death.
3. We cannot foresee all possible dangers and consequences. Therefore, this manual cannot warn the user of all possible hazards.
TRADEMARKS
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TRADEMARK NOTATION IN THIS MANUAL
Microsoft® Windows® 7 Operating system
Microsoft® Windows® 8 Operating system
Microsoft® Windows® 10 Operating system
Throughout this manual, Windows 7, Windows 8, and Windows 10 refer to above respective operating systems. In some cases, Windows refers generically to Windows 7, Windows 8, and Windows 10.

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
Contact information is described in “SUPPLIERS” in the first pages of the following manual:

Robot System  Safety and Installation  Read this manual first
Before Reading This Manual

Following descriptions are indicated throughout the manual by these symbols.

<table>
<thead>
<tr>
<th>NOTE</th>
<th>The “NOTE” sections describe important information to be followed for operating the Robot system.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIP</td>
<td>The “TIP” sections describe hints for easier or alternative operations.</td>
</tr>
</tbody>
</table>

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**

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

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:

<table>
<thead>
<tr>
<th>Controller</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>RC700</td>
<td>EPSON RC+ 7.0</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Label</th>
<th>Controller</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RC90</td>
<td>EPSON RC+ 7.0</td>
</tr>
</tbody>
</table>

RC90 Controller firmware

| 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.

TYPE C:

<table>
<thead>
<tr>
<th>Manipulator</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>T series</td>
<td>EPSON RC+ 7.0 Ver.7.3.1 or later</td>
</tr>
</tbody>
</table>

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

For details of Safety, refer to Safety Chapter in the User's Guide. Please read and understand the chapter before using the robot system.

- Only trained personnel should design and install the robot system. Trained personnel are defined as those who have taken robot system training and maintenance training classes held by the manufacturer, dealer, or local representative company, or those who understand the manuals thoroughly and have the same knowledge and skill level as those who have completed the training courses.

- Only authorized personnel who have taken the safety training should be allowed to execute teaching or calibration of the robot system. The safety training is the program for industrial robot operator that follows the laws and regulations of each nation. The personnel who have taken the safety training acquire knowledge of industrial robots (operations, teaching, etc.). The personnel who have completed the robot system-training class held by the manufacturer, dealer, or locally-incorporated company are allowed to maintain the robot system.
1. Safety

**WARNING**

- Only authorized personnel who have taken the safety training should be allowed to maintain the robot system. The safety training is the program for industrial robot operator that follows the laws and regulations of each nation. The personnel who have taken the safety training acquire knowledge of industrial robots (operations, teaching, etc.), knowledge of inspections, and knowledge of related rules/regulations. The personnel who have completed the robot system-training and maintenance-training classes held by the manufacturer, dealer, or locally incorporated company are allowed to maintain the robot system.

- 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.

**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.)

- **EN ISO 10218-1**: Robots and robotic devices -- Safety requirements for industrial robots -- Part 1: Robots
- **EN 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
- **EN ISO 12100**: Safety of machinery -- General principles for design -- Risk assessment and risk reduction
- **EN ISO 13849-1**: Safety of machinery -- Safety-related parts of control systems -- Part 1: General principles for design
- **EN ISO 13850**: Safety of machinery -- Emergency stop function -- Principles for design
- **EN ISO 13855**: Safety of machinery -- Positioning of safeguards with respect to the approach speeds of parts of the human body.
- **EN ISO 13857**: Safety of machinery -- Safety distances to prevent hazard zones being reached by upper and lower limbs.
- **EN ISO 14120**: Safety of machinery -- Guards -- General requirements for the design and construction of fixed and movable guards
- **IEC 60204-1**
  - **EN 60204-1**: Safety of machinery -- Electrical equipment of machines -- Part 1: General requirements
- **CISPR11**
  - **EN 55011**: Industrial, scientific and medical (ISM) radio-frequency equipment -- Electromagnetic disturbance characteristics -- Limits and methods of measurement
- **IEC 61000-6-2**
  - **EN 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.

Personnel that 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”.

**NOTE**
The Controller software latches that the operation mode is set to “TEACH”.

(2) Enter the safeguarded area and perform the teaching operations.
(3) Leave the safeguarded area and close the safeguard.
(4) Return the mode selector key switch to “Auto”.

**NOTE**
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.
To cancel the Emergency Stop state, first turn the EMERGENCY STOP switch to the right to release the mechanical latch. Switch the mode selector key switch to “Teach”. Press the <Reset> key to reset the electrically held Emergency Stop state. The E-STOP lamp goes OFF.
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.
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

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General specifications</strong></td>
<td></td>
</tr>
<tr>
<td>Rated voltage</td>
<td>DC24 V</td>
</tr>
<tr>
<td>Electric power consumption</td>
<td>2.8 W or less</td>
</tr>
<tr>
<td>Weight</td>
<td>Approx. 400 g or less (excluding cables)</td>
</tr>
<tr>
<td><strong>Display specifications</strong></td>
<td></td>
</tr>
<tr>
<td>Display element</td>
<td>STN type Reflective black and white LCD</td>
</tr>
<tr>
<td>Contrast</td>
<td>0 to 60</td>
</tr>
<tr>
<td>Back light</td>
<td>0 to 255</td>
</tr>
<tr>
<td><strong>Serial interface specifications</strong></td>
<td></td>
</tr>
<tr>
<td>Electrical characteristics</td>
<td>Compliant with RS-422A standard</td>
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</tbody>
</table>
2.3 Outer Dimensions
3. Installation

3.1 Contents

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<thead>
<tr>
<th>Item</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP2 (with 5 m cables)</td>
<td>1 unit</td>
</tr>
<tr>
<td>Mode selector key</td>
<td>2 units</td>
</tr>
</tbody>
</table>

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.

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

3.3 Operating Precautions

- 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.

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>■ 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.</td>
</tr>
<tr>
<td>■ 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.</td>
</tr>
<tr>
<td>■ 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.</td>
</tr>
<tr>
<td>■ 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.</td>
</tr>
</tbody>
</table>

3.4.1 Typical cable connection

The Teach Pendant is connected to TP port of Controller.

**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**

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**

**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 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**

<table>
<thead>
<tr>
<th>01 000 LWM T00A00</th>
<th>■</th>
</tr>
</thead>
<tbody>
<tr>
<td>X : 0150.000</td>
<td></td>
</tr>
<tr>
<td>Y : 0150.000</td>
<td></td>
</tr>
<tr>
<td>Z : 0050.000</td>
<td></td>
</tr>
</tbody>
</table>

**AUTO mode**

Auto  Ready
4. Operation Mode (TEACH, AUTO)

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+ 7.0 Option Force Guide 7.0.

**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.
Functions & Installation  4. Operation Mode (TEACH, AUTO)

**TEACH mode**

Jog & Teach

- **F1** Point Editor
- **F2** I/O command
- **F3** Motion command
- **F4** Free Joints
- **F5** Brake
- **F6** Execute alignment
- **F7** Robot
- **F8** RST jog
- **F9** ESP
- **F10** Point No.

Shift + ▲ Impedance Tester

Direct Teach + Touch Jog

- **F1** Point Editor
- **F2** I/O command
- **F3** Motion command
- **F4** Sensor reset
- **F5** Start/End Direct Teach + Touch Jog
- **F6** Execute alignment
- **F7** Robot
- **F8** Force setting
- **F9** Touch Jog setting
- **F10** Change the Point No.

**Dialog name**

- Jog & Teach

**Function key**

* 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+ 7.0 option Force Guide 7.0. When not using the Force Guide 7.0, the impedance tester is not available.

* Direct Teach + Touch Jog function is supported as default for EPSON RC+ 7.0 Ver.7.4.4 or later. However, Direct Teach + Touch Jog function is available only when using EPSON RC+ 7.0 Option Force Guide 7.0. When not using the Force Guide 7.0, 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 Controller software latches that the operation mode is set to “TEACH”.

To switch the mode from TEACH to AUTO, the latch release input is required.

For the latch release, refer to *Robot Controller manual: Latch Release Switch.*
5. Operation Panel (Key Description)

5.1 Key Description

The operation panel includes a variety of keys for different functions:

- **E-Stop lamp**: Stops the robot immediately.
- **Safety lamp**: Indicates any safety concerns.
- **Cancel key**: Cancels the current operation.
- **OK key**: Confirms selections.
- **Arrow keys**: Move the cursor or navigate menus.
- **Jog keys**: Jog the robot in different directions.
- **Number Input keys**: Enter numerical values.
- **Function keys**: Access various functions.
- **Teaching keys**: Use for teaching modes.
- **User Dist key**: Access user-defined distances.
- **CLR key**: Clears input or resets values.
- **Guide key**: Provides instructional guidance.
- **Page Up/Down key**: Navigate through options.

### Number Input Keys

<table>
<thead>
<tr>
<th>Mode</th>
<th>Key</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number input mode</td>
<td>From 0 to 9</td>
<td>Number input</td>
</tr>
<tr>
<td></td>
<td>−/ + (period)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CLR</td>
<td>Clears a number.</td>
</tr>
</tbody>
</table>

### Teaching Keys

Teaching key is available only in TEACH mode.

<table>
<thead>
<tr>
<th>Key</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teach</td>
<td>Saves the current position data</td>
</tr>
<tr>
<td>Save</td>
<td>Saves the point data to a file</td>
</tr>
<tr>
<td>Load</td>
<td>Loads the point data from a file</td>
</tr>
<tr>
<td>Speed</td>
<td>Specifies the Jog speed</td>
</tr>
<tr>
<td>Mode</td>
<td>Specifies the Jog mode</td>
</tr>
<tr>
<td>Dist</td>
<td>Specifies the Jog distance</td>
</tr>
<tr>
<td>Reset</td>
<td>Sets the initial setup status</td>
</tr>
<tr>
<td>Motor</td>
<td>Switches the motor power ON/OFF</td>
</tr>
<tr>
<td>Home</td>
<td>Moves the robot to home position</td>
</tr>
</tbody>
</table>
### Arrow Keys

<table>
<thead>
<tr>
<th>Key</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>▲</td>
<td>Moves the cursor up</td>
</tr>
<tr>
<td>▼</td>
<td>Moves the cursor down</td>
</tr>
<tr>
<td>◄</td>
<td>Move the cursor to the left</td>
</tr>
<tr>
<td>►</td>
<td>Move the cursor to the right</td>
</tr>
</tbody>
</table>

### Function Keys

The function keys (F1 to F10) are assigned to each screen. To check the key assignment, press the <Guide> key.

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**

```
01 000 LWM T00A00  ■
 X: 0150.000
 Y: 0150.000
 Z: -0050.000
```

**Guide**

- F3: Motion Command
- F4: FreeJoint
- F6: Edit ECP number

Example: Press the <F3> key to execute motion commands.

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.

<table>
<thead>
<tr>
<th>Key</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>−</td>
<td>Moves the target joint (X to W, J1 to J6) to − direction</td>
</tr>
<tr>
<td>+</td>
<td>Moves the target joint (X to W, J1 to J6) to + direction</td>
</tr>
</tbody>
</table>

### Other keys

<table>
<thead>
<tr>
<th>Key</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancel</td>
<td>Cancels the setting and goes back to the previous screen</td>
</tr>
<tr>
<td>OK</td>
<td>Saves the setting and changes to the next screen</td>
</tr>
<tr>
<td>Page Up</td>
<td>Changes to the previous page</td>
</tr>
<tr>
<td>Page Down</td>
<td>Changes to the next page</td>
</tr>
</tbody>
</table>
6. Enable Switch

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

When the Enable Switch is required to execute an operation, you must hold down the switch to the center (enable) position. To do this, pull the switch until it just stops at the center detent. If you pull harder, or let go, then the switch will be disengaged and the operation will be canceled.

### 7. Warning Sound (Beep)

The Teach Pendant beeps when the robot passes the singularity.
7. Warning Sound (Beep)
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.

```
01 000 LWM T00A00  ■
X : 0150.000
Y : 0150.000
Z : -0050.000
```

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

**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+7.0 Option Force Guide 7.0 to move the robot arm directly in the [Direct Teach + Touch Jog] screen.

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

   01 000 LWM T00A00

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

3. Move the robot to the teaching position.

   You can set a desired distance as “U” (User) jog distance. For details, refer to Operation 2.1.11 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.

   01 000 LWC T00A00

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.

<table>
<thead>
<tr>
<th>01 Free Joint</th>
<th>■</th>
</tr>
</thead>
<tbody>
<tr>
<td>J1:LOCK</td>
<td>J2:LOCK</td>
</tr>
<tr>
<td>J3:LOCK</td>
<td>J4:LOCK</td>
</tr>
</tbody>
</table>

Select “LOCK” (servo lock) or “FREE” (servo free) for the 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+7.0 Option Force Guide 7.0 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.

Go to the screen for
Direct Teach and
Touch Jog.
Continue?

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

<table>
<thead>
<tr>
<th>01 000 FDT T00</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>X : 0150.000</td>
<td></td>
</tr>
<tr>
<td>Y : 0150.000</td>
<td></td>
</tr>
<tr>
<td>Z : -0050.000</td>
<td></td>
</tr>
</tbody>
</table>
1. Teaching Procedure

(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.

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

(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.

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

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

```
01 [Executing..]
X: 0010.000
Y: 0415.000
Z: 0570.000
```

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.

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 standard for EPSON RC+ 7.0 Ver. 7.2.0 or later. However, the impedance tester is available only when using the EPSON RC+ 7.0 option Force Guide 7.0.

When not using the Force Guide 7.0, the impedance tester is not available.

* Direct Teach + Touch Jog function is supported as default for EPSON RC+ 7.0 Ver.7.4.4 or later. However, Direct Teach + Touch Jog function is available only when using EPSON RC+ 7.0 Option Force Guide 7.0.

When not using the Force Guide 7.0, 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.

![Screen Capture](image)

**Header**

<table>
<thead>
<tr>
<th>01</th>
<th>000</th>
<th>L</th>
<th>W</th>
<th>M</th>
<th>T00</th>
<th>A00</th>
<th>*</th>
<th>■</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robot Number</td>
<td>Point Number</td>
<td>Speed</td>
<td>Jog Mode</td>
<td>Jog Distance</td>
<td>Tool Number</td>
<td>Arm Number</td>
<td>RST</td>
<td>Jog Motor</td>
</tr>
<tr>
<td>Low</td>
<td>High</td>
<td>World</td>
<td>Tool</td>
<td>Local</td>
<td>Joint</td>
<td>ECP</td>
<td>User</td>
<td>Cont</td>
</tr>
</tbody>
</table>

**Key operation**

<table>
<thead>
<tr>
<th>Key operation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jog keys</td>
<td>Executes jog motion.</td>
</tr>
<tr>
<td>Reset</td>
<td>Sets the initial setup status.</td>
</tr>
<tr>
<td>Motor</td>
<td>Turns ON / OFF the motor.</td>
</tr>
<tr>
<td>Teach</td>
<td>Executes a Teach operation. Refer to <em>Operation 2.1.13 Teaching Operation</em>.</td>
</tr>
<tr>
<td>Speed</td>
<td>Switches the Speed (Low / High).</td>
</tr>
<tr>
<td>Mode</td>
<td>Switches the Jog Mode (World / Tool / Local / Joint / ECP).</td>
</tr>
<tr>
<td>Dist</td>
<td>Switches the Jog Distance (Long / Medium / Short / User / Cont).</td>
</tr>
<tr>
<td>Home</td>
<td>Execute a Home operation.</td>
</tr>
<tr>
<td>Save</td>
<td>Saves a point file. Refer to <em>Operation 2.1.15 Saving Point Data to File</em>.</td>
</tr>
<tr>
<td>Load</td>
<td>Loads a point file. Refer to <em>Operation 2.1.16 Loading Point Data from File</em>.</td>
</tr>
<tr>
<td>▲ / ▼</td>
<td>Adds / subtracts point number by one.</td>
</tr>
<tr>
<td>◀ / ▶</td>
<td>Subtracts / adds point number by ten.</td>
</tr>
<tr>
<td>Local</td>
<td>Switches to Local number input mode.</td>
</tr>
<tr>
<td>Tool</td>
<td>Switches to Tool number input mode.</td>
</tr>
<tr>
<td>Arm</td>
<td>Switches to Arm number input mode.</td>
</tr>
<tr>
<td>User Dist</td>
<td>Switches to User Dist number input mode.</td>
</tr>
<tr>
<td>Guide</td>
<td>Displays the key operation guide.</td>
</tr>
<tr>
<td>Page Up / Down</td>
<td>Changes to the previous or next page.</td>
</tr>
</tbody>
</table>
### Operation 2. TEACH Mode

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

<table>
<thead>
<tr>
<th>6-axis Robot</th>
<th>SCARA, Cartesian Robot</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Page 1</strong></td>
<td></td>
</tr>
<tr>
<td>01 000 LWM T00 *■</td>
<td>01 000 LWM T00A00 *■</td>
</tr>
<tr>
<td>X : 0150.000</td>
<td>X : 0150.000</td>
</tr>
<tr>
<td>Y : 0150.000</td>
<td>Y : 0150.000</td>
</tr>
<tr>
<td>Z :-0050.000</td>
<td>Z :-0050.000</td>
</tr>
<tr>
<td><strong>Page 2</strong></td>
<td></td>
</tr>
<tr>
<td>01 000 LWM T00 *■</td>
<td>01 000 LWM T00A00 *■</td>
</tr>
<tr>
<td>U : 0000.000</td>
<td>U : 0000.000</td>
</tr>
<tr>
<td>V : 0000.000</td>
<td>S : 0000.000</td>
</tr>
<tr>
<td>W : 0000.000</td>
<td>T : 0000.000</td>
</tr>
<tr>
<td><strong>Page 3</strong></td>
<td></td>
</tr>
<tr>
<td>01 000 LWM T00 *■</td>
<td>01 000 LWM T00A00 *■</td>
</tr>
<tr>
<td>S : 0000.000</td>
<td>Hand : Righty</td>
</tr>
<tr>
<td>T : 0000.000</td>
<td></td>
</tr>
<tr>
<td><strong>Page 4</strong></td>
<td></td>
</tr>
<tr>
<td>01 000 LWM T00 *■</td>
<td></td>
</tr>
<tr>
<td>Hand : Righty</td>
<td></td>
</tr>
<tr>
<td>Elbow: Above</td>
<td></td>
</tr>
<tr>
<td>Wrist: NoFlip</td>
<td></td>
</tr>
<tr>
<td><strong>Page 5</strong></td>
<td></td>
</tr>
<tr>
<td>01 000 LWM T00 *■</td>
<td></td>
</tr>
<tr>
<td>J1lag: 0</td>
<td></td>
</tr>
<tr>
<td>J4lag: 0</td>
<td></td>
</tr>
<tr>
<td>J6Flag: 000</td>
<td></td>
</tr>
</tbody>
</table>
## 2. TEACH Mode

<table>
<thead>
<tr>
<th>Page 1</th>
<th>Joint-type Robot</th>
<th>RS series Robot</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>01 000 LWM T00A00  * ■</td>
<td>01 000 LWM T00A00  * ■</td>
</tr>
<tr>
<td></td>
<td>X : 0150.000</td>
<td>X : 0000.000</td>
</tr>
<tr>
<td></td>
<td>Y : 0150.000</td>
<td>Y : 0000.000</td>
</tr>
<tr>
<td></td>
<td>Z : -0050.000</td>
<td>Z : 0000.000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Page 2</th>
<th>Joint-type Robot</th>
<th>RS series Robot</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>01 000 LWM T00A00  * ■</td>
<td>01 000 LWM T00A00  * ■</td>
</tr>
<tr>
<td></td>
<td>U : 0000.000</td>
<td>U : 0000.000</td>
</tr>
<tr>
<td></td>
<td>V : 0000.000</td>
<td>S : 0000.000</td>
</tr>
<tr>
<td></td>
<td>W : 0000.000</td>
<td>T : 0000.000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Page 3</th>
<th>Joint-type Robot</th>
<th>RS series Robot</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>01 000 LWM T00A00  * ■</td>
<td>01 000 LWM T00A00  * ■</td>
</tr>
<tr>
<td></td>
<td>R : 0000.000</td>
<td>Hand : Righty</td>
</tr>
<tr>
<td></td>
<td>S : 0000.000</td>
<td>J1Flag: 0</td>
</tr>
<tr>
<td></td>
<td>T : 0000.000</td>
<td>J2Flag: 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Page 4</th>
<th>Joint-type Robot</th>
<th>RS series Robot</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>01 000 LWM T00A00  * ■</td>
<td>01 000 LWM T00A00  * ■</td>
</tr>
<tr>
<td></td>
<td>J1Angle : 0000.000</td>
<td></td>
</tr>
</tbody>
</table>
## N series Robot

### Page 1

```plaintext
01 000 LWM T00  * ■
X : 0150.000
Y : 0150.000
Z : -0050.000
```

### Page 2

```plaintext
01 000 LWM T00  * ■
U : 0000.000
V : 0000.000
W : 0000.000
```

### Page 3

```plaintext
01 000 LWM T00  * ■
S : 0000.000
T : 0000.000
```

### Page 4

```plaintext
01 000 LWM T00  * ■
Hand : Righty
Elbow : Below
Wrist : NoFlip
```

### Page 5

```plaintext
01 000 LWM T00  * ■
J4Flag : 0
J6Flag : 000
```
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 in the confirmation screen.

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 *
```

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 robot fingers 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.

<table>
<thead>
<tr>
<th>Key operation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;Numeric keys&gt;</td>
<td>(Available in the number input mode. Inputs a number.)</td>
</tr>
<tr>
<td>CLR</td>
<td>(Available in the number input mode. Clears the number to 0.)</td>
</tr>
<tr>
<td>Motor</td>
<td>Turns ON / OFF the motor.</td>
</tr>
<tr>
<td>Speed</td>
<td>Switches the Speed (Low / High).</td>
</tr>
<tr>
<td>OK</td>
<td>Switches to the [Alignment Execution] screen.</td>
</tr>
<tr>
<td>Cancel</td>
<td>Returns to the [Jog &amp; Teach] screen.</td>
</tr>
<tr>
<td>F3</td>
<td>Switches to the local coordinate system input mode.</td>
</tr>
<tr>
<td>F5</td>
<td>Returns to the [Jog &amp; Teach] screen.</td>
</tr>
</tbody>
</table>

(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.

<table>
<thead>
<tr>
<th>Robot: 01</th>
</tr>
</thead>
<tbody>
<tr>
<td>C4-A601S</td>
</tr>
<tr>
<td>Robot1.PTS</td>
</tr>
<tr>
<td>L00 T00</td>
</tr>
</tbody>
</table>

(3) Press the <F4> key.

The following screen will be displayed.

<table>
<thead>
<tr>
<th>01 MCal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hold Enable switch.</td>
</tr>
<tr>
<td>Press the OK Key.</td>
</tr>
</tbody>
</table>

(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 2.1.10 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 2.1.11 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>.
   
   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>.
   
   01 000 LJM T00A00 ※


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”.

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

Press the <Dist> key and select the Jog Distance.

<table>
<thead>
<tr>
<th>Jog type</th>
<th>Jog Distance</th>
<th>Display</th>
<th>Default</th>
<th>Editable from</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous</td>
<td>Continuous</td>
<td>C</td>
<td></td>
<td>–</td>
</tr>
<tr>
<td>Step</td>
<td>Long</td>
<td>L</td>
<td>10.0</td>
<td>EPSON RC+, TP1</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>M</td>
<td>1.0</td>
<td>EPSON RC+, TP1</td>
</tr>
<tr>
<td></td>
<td>Short</td>
<td>S</td>
<td>0.1</td>
<td>EPSON RC+, TP1</td>
</tr>
<tr>
<td></td>
<td>User</td>
<td>U</td>
<td>0.0</td>
<td>TP2</td>
</tr>
</tbody>
</table>

The default setting is “Medium”.

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 time 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.

   UserDist: 000.000
(2) Using the numeric keys and arrow keys, input a desired distance.

(3) Press the <OK> key.

The User jog distance 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.

To execute the jog with the User jog distance, select “U (User)” at the Jog Distance.

“U” Jog Distance is available only during the current TEACH mode. Once you switch to the AUTO mode, the Jog Distance will restore to “Short”.

### 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 increases or decreases the point number by 1.

<◄> and <►> keys increases or decreases 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 is some change 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. 

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+ 7.0 Option  Force Guide 7.0
Software  1.2 Checking the Connection

Set Mass Property:
Reference: EPSON RC+ 7.0 Option  Force Guide 7.0
Software 1.3 Checking the Accuracy of the Force Sensor

Perform Tool setting:
Reference: EPSON RC+ 7.0 User’s Guide
5.11.1 [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.

   Go to screen for
   Direct Teach and
   Touch Jog
   Continue?

(2) Perform either of the following steps.

   Press the <OK> key
   Switch to the [Direct Teach + Touch Jog] screen.

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

   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 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.
Operation 2. TEACH Mode

[Direct Teach +Touch Jog] screen

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

Header

<table>
<thead>
<tr>
<th>01</th>
<th>000</th>
<th>F</th>
<th>DT</th>
<th>T00</th>
<th>R</th>
<th>L</th>
<th>■</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robot number</td>
<td>Point number</td>
<td>Motion direction</td>
<td>Operation mode</td>
<td>Tool number</td>
<td>Operation start status</td>
<td>Jog distance for Touch Jog</td>
<td>Motor status</td>
</tr>
<tr>
<td>Free</td>
<td>Direct Teach + Touch Jog</td>
<td>Long</td>
<td>On</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line</td>
<td>Direct Teach</td>
<td>Medium</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plane</td>
<td>Touch Jog</td>
<td>Short</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotation</td>
<td>Custom</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 2.1.13 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 2.1.15 Saving Point Data to File.
- Load: Loads a point file.
  Refer to Operation 2.1.16 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.
<table>
<thead>
<tr>
<th>Key operation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>Changes to the point editing screen.</td>
</tr>
<tr>
<td>F2</td>
<td>Changes to the I/O command screen.</td>
</tr>
<tr>
<td>F3</td>
<td>Changes to the motion command screen.</td>
</tr>
<tr>
<td>F4</td>
<td>Changes to the reset screen of the force sensor.</td>
</tr>
<tr>
<td></td>
<td>Refer to <em>Operation 2.2.10 Reset Force Sensor</em></td>
</tr>
<tr>
<td>F5</td>
<td>Sets the Direct Teach or Touch Jog operations to run.</td>
</tr>
<tr>
<td></td>
<td>Refer to <em>Operation 2.2.15 Execute Direct Teach or Touch Jog</em></td>
</tr>
<tr>
<td>F6</td>
<td>Changes to the Alignment execution screen.</td>
</tr>
<tr>
<td></td>
<td>Refer to <em>Operation 2.2.16 Execute Alignment</em></td>
</tr>
<tr>
<td>F7</td>
<td>Changes to the robot screen.</td>
</tr>
<tr>
<td></td>
<td>Refer to <em>Operation 2.2.17 Changing the Robot</em></td>
</tr>
<tr>
<td>F8</td>
<td>Changes to the force setting screen.</td>
</tr>
<tr>
<td></td>
<td>Refer to <em>Operation 2.2.8 Set Direct Teach (Force Setting)</em></td>
</tr>
<tr>
<td>F9</td>
<td>Changes to the Touch Jog setting screen.</td>
</tr>
<tr>
<td></td>
<td>Refer to <em>Operation 2.2.9 Set Touch Jog</em></td>
</tr>
<tr>
<td>F10</td>
<td>Changes to the point number input mode.</td>
</tr>
</tbody>
</table>
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 the all pages.

6-axis Robot

Page 1

```
01 000 FDT T00 R      L■
X : 0150.000
Y : 0150.000
Z : -0050.000
```

Page 2

```
01 000 FDT T00 R      L■
U : 0000.000
V : 0000.000
W : 0000.000
```

Page 3

```
01 000 FDT T00 R      L■
Hand : Righty
Elbow: Above
Wrist: NoFlip
```

Page 4

```
01 000 FDT T00 R      L■
J1Flag : 0
J4Flag : 0
J6Flag : 000
```
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 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
```

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.
   ```plaintext
   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”.
   ```plaintext
   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.
   ```plaintext
   01 000 FDT TO0 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

The default setting is “DT(Direct Teach + Touch Jog)”. 

<table>
<thead>
<tr>
<th>Mode</th>
<th>Display</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Teach + Touch Jog</td>
<td>DT</td>
<td>Use the 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</td>
</tr>
<tr>
<td>Direct Teach</td>
<td>D_</td>
<td>Use Direct Teach function only.</td>
</tr>
<tr>
<td>Touch Jog</td>
<td>_T</td>
<td>Use Touch Jog function only.</td>
</tr>
</tbody>
</table>
2.2.8 Set 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 the all pages.

6-axis robot

Page 1

01 Force Setting ■
MP Object #: 00
Coordinate: Local
Hardness: Soft

Page 2

01 Force Setting ■
Direction: Free
Detail: Move & Rotate

Key operation Description

▲ / ▼ Select an item to be modified.
However, temporary fix or cancel the item to be modified only when Custom is selected.

◄ / ► Display the choices rotationally and use ▼ / ▲ key to select and temporary fix the items.
However, move the item sideways only when Custom is selected.

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 #: [ ]

2. Use ◄ / ► key to change the mass property number.

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 update Direct Teach setting:
   - Press the <Cancel> key.
   - Return to the [Direct Teach + Touch Jog] screen without updating 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 update Direct Teach setting:
   - Press the <Cancel> key.
   - Return to the [Direct Teach + Touch Jog] screen without updating the Direct Teach settings.

   Set other parameters of Direct Teach settings:
   - Use ▲ / ▼ key to move the cursor to the other parameter.
Operation  2. TEACH Mode

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 update Direct Teach setting:
Press the <Cancel> key.
Return to the [Direct Teach + Touch Jog] screen without updating 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 → Custom.

(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.

<table>
<thead>
<tr>
<th>Direction</th>
<th>Detail</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free</td>
<td>Move &amp; Rotate Move Rotate</td>
<td>Move the robot fingers freely according to the selected coordinate system mode.</td>
</tr>
<tr>
<td>Line</td>
<td>X, Y, Z</td>
<td>Move the robot fingers on the selected straight line according to the selected coordinate system mode.</td>
</tr>
<tr>
<td>Plane</td>
<td>XY, YZ, XZ</td>
<td>Move the robot fingers on the selected plane in the selected coordinate system mode.</td>
</tr>
<tr>
<td>Rotation</td>
<td>RX, RY, RZ</td>
<td>Rotate the robot fingers around the selected axis according to the selected coordinate system mode.</td>
</tr>
<tr>
<td>Custom</td>
<td>X, Y, Z, RX, RY, RZ</td>
<td>Move the robot fingers in the direction of your choice according to the selected coordinate system mode.</td>
</tr>
</tbody>
</table>

When setting Custom:

The following screen appears:

```
01 Force Setting ■
Direction: Custom
Detail: Custom
  X Y Z RX RY RZ
```

Press ▼ key to move the cursor to the line displaying X, Y, Z, RX, RY, RZ.

Use ◀ / ▶ key and select the motion direction to be set.

Use ▲ / ▼ key to set enable/disable of the selected motion direction.

If "*" is displayed on the left of “Direction”, the motion direction is enabled.

(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 update 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 Set 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 the all pages.

6-axis robot

Page 1

01 Touch Jog Setting ■
Distance: Long
XYZ:   0.10 mm
UVW:   0.10 deg

Page 2

01 Touch Jog Setting ■
Force: Normal
Torque: Normal
Touch sound: On

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:”.

Distance: Long

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

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

The following values are set by default.

<table>
<thead>
<tr>
<th></th>
<th>XYZ directions [mm]</th>
<th>UVW directions [deg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long</td>
<td>5.00</td>
<td>5.00</td>
</tr>
<tr>
<td>Medium</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Short</td>
<td>0.10</td>
<td>0.10</td>
</tr>
</tbody>
</table>

Change the jogging amount to desired value:

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

XYZ: 10 mm

UVW: 0.10 deg

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 update Direct Teach setting:

Press the <Cancel> key.

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

<table>
<thead>
<tr>
<th>Force: Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Torque: Normal</td>
</tr>
</tbody>
</table>

(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”.

| Touch sound: On |

(2) Use ◀ / ► key to change the sensitivity 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 update 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 Reset 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.

(1) Press the <F4> key.
Switch to the sensor reset screen.

```
01 Sensor Reset  FS2 ■
Make sure, sensor
is no pressing.
Continue?
```

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 Teach 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.

```
01 SavePoints
Robot1.PTS
```

(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.

```
01 LoadPoints
Robot1.PTS
```

(2) Move the cursor to select a file.
2.2.15 Execute Direct Teach or Touch Jog

Use Direct Teach or Touch Jog to move the robot fingers 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 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. When it is available, “R” is displayed on the header.

| 01 000 FDT T00 R |
| 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 2.1.13 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 2.1.15 Saving Point Data to File.
Load | Loads a point file. Refer to Operation 2.1.16 Loading Point Data from File.
### Key operation Description

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

(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.

```
01 [Executing..]
X: - 0010.000
Y:  0415.000
Z:  0570.000
```

To perform point teaching or change parameters, release the hand from the enable switch.
(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 robot fingers 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 robot fingers 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 robot fingers do 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.
Motion near the singular point

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

(1) The following screen appears when the robot fingers get 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 FT T00 R | L■ |

**TIP** When Touch Jog is disabled, the robot fingers cannot be moved. For operations to enable Touch Jog function, refer to *Operation 2.2.7 Switch the function.*

(2) When the robot moves from the singular point, the following screen is displayed, and the robot operation is paused.
TP2 alerts a warning sound at the same time.

The PTP motion to avoid the singularity point has completed.

(4) 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 robot fingers to parallel with the set working plane.

(3) 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.

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

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

<table>
<thead>
<tr>
<th>Key operation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 Alignment</td>
<td>L ■</td>
</tr>
<tr>
<td>Go Align (Here, 01)</td>
<td></td>
</tr>
<tr>
<td>Hold Enable switch.</td>
<td></td>
</tr>
<tr>
<td>Press the OK Key.</td>
<td></td>
</tr>
</tbody>
</table>

(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.
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.

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

### Key operation

<table>
<thead>
<tr>
<th>Key operation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;Numeric keys&gt;</td>
<td>Inputs a number. (Available in the number input mode.)</td>
</tr>
<tr>
<td>CLR</td>
<td>Clears the number to 0. (Available in the number input mode.)</td>
</tr>
<tr>
<td>▲ / ▼</td>
<td>Moves the cursor. Temporary fix a number. (Available in the number input mode.)</td>
</tr>
<tr>
<td>◄ / ►</td>
<td>Switches the pose flag.</td>
</tr>
<tr>
<td>Page Up / Down</td>
<td>Changes to the previous or next page.</td>
</tr>
<tr>
<td>OK</td>
<td>Fixes the change and stores in the memory. Return to the [Jog &amp; Teach] screen or the [Direct Teach + Touch Jog] screen.</td>
</tr>
<tr>
<td>Cancel</td>
<td>Cancels the change. Return to the [Jog &amp; Teach] screen or the [Direct Teach + Touch Jog] screen.</td>
</tr>
<tr>
<td>Teach</td>
<td>Executes the teaching operation. Refer to Operation 2.1.13 Teaching Operation.</td>
</tr>
<tr>
<td>Save</td>
<td>Saves the point file. Refer to Operation 2.1.15 Saving Point Data to File.</td>
</tr>
<tr>
<td>Load</td>
<td>Loads the point file. Refer to Operation 2.1.16 Loading Point Data from File.</td>
</tr>
<tr>
<td>Local</td>
<td>Switches to Local number input mode.</td>
</tr>
<tr>
<td>Guide</td>
<td>Displays the key operation guide.</td>
</tr>
<tr>
<td>F1</td>
<td>Switches to the point number input mode.</td>
</tr>
<tr>
<td>F2</td>
<td>Switches to the Local number input mode.</td>
</tr>
<tr>
<td>F3</td>
<td>Switches to the number input mode for the current position. Refer to Operation 2.2.2 Editing Points - Changing Coordinate Value.</td>
</tr>
<tr>
<td>F4</td>
<td>Deletes the point data from the memory.</td>
</tr>
<tr>
<td>F5</td>
<td>Returns to the [Jog &amp; Teach] screen.</td>
</tr>
</tbody>
</table>
## 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.

<table>
<thead>
<tr>
<th>6-axis Robot</th>
<th>SCARA, Cartesian Robot</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Page 1</strong></td>
<td></td>
</tr>
<tr>
<td>000 Pick</td>
<td>000 Pick</td>
</tr>
<tr>
<td>X : 0150.000</td>
<td>X : 0150.000</td>
</tr>
<tr>
<td>Y : 0150.000</td>
<td>Y : 0150.000</td>
</tr>
<tr>
<td>Z : -0050.000</td>
<td>Z : -0050.000</td>
</tr>
<tr>
<td><strong>Page 2</strong></td>
<td></td>
</tr>
<tr>
<td>000 Pick</td>
<td>000 Pick</td>
</tr>
<tr>
<td>U : 0000.000</td>
<td>U : 0000.000</td>
</tr>
<tr>
<td>V : 0000.000</td>
<td>S : 0000.000</td>
</tr>
<tr>
<td>W : 0000.000</td>
<td>T : 0000.000</td>
</tr>
<tr>
<td><strong>Page 3</strong></td>
<td></td>
</tr>
<tr>
<td>000 Pick</td>
<td>000 Local: 00</td>
</tr>
<tr>
<td>S : 0000.000</td>
<td>Hand : Righty</td>
</tr>
<tr>
<td>T : 0000.000</td>
<td></td>
</tr>
<tr>
<td><strong>Page 4</strong></td>
<td></td>
</tr>
<tr>
<td>000 Local: 00</td>
<td>Hand : Righty</td>
</tr>
<tr>
<td>Hand : Righty</td>
<td>Elbow: Above</td>
</tr>
<tr>
<td>Wrist: NoFlip</td>
<td></td>
</tr>
<tr>
<td><strong>Page 5</strong></td>
<td></td>
</tr>
<tr>
<td>000 Local: 00</td>
<td></td>
</tr>
<tr>
<td>J1lag: 0</td>
<td></td>
</tr>
<tr>
<td>J4lag: 0</td>
<td></td>
</tr>
<tr>
<td>J6Flag: 000</td>
<td></td>
</tr>
</tbody>
</table>
## 2. TEACH Mode

**RS series Robot**

<table>
<thead>
<tr>
<th>Page 1</th>
<th>Joint-type Robot</th>
</tr>
</thead>
<tbody>
<tr>
<td>000 Pick</td>
<td>000 Pick</td>
</tr>
<tr>
<td>X : 0150.000</td>
<td>X : 0150.000</td>
</tr>
<tr>
<td>Y : 0150.000</td>
<td>Y : 0150.000</td>
</tr>
<tr>
<td>Z : -0050.000</td>
<td>Z : -0050.000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Page 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>000 Pick</td>
<td>000 Pick</td>
</tr>
<tr>
<td>U : 0000.000</td>
<td>U : 0000.000</td>
</tr>
<tr>
<td>S : 0000.000</td>
<td>V : 0000.000</td>
</tr>
<tr>
<td>T : 0000.000</td>
<td>W : 0000.000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Page 3</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>000 Local: 00</td>
<td>000 Pick</td>
</tr>
<tr>
<td>Hand : Righty</td>
<td>R : 0000.000</td>
</tr>
<tr>
<td>J1Flag: 0</td>
<td>S : 0000.000</td>
</tr>
<tr>
<td>J2Flag: 0</td>
<td>T : 0000.000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Page 4</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>000 Local: 00</td>
<td></td>
</tr>
<tr>
<td>J1Angle : 0000.000</td>
<td></td>
</tr>
</tbody>
</table>
### 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.

<table>
<thead>
<tr>
<th>Pick</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>0150.000</td>
<td>0150.000</td>
<td>-0050.000</td>
</tr>
</tbody>
</table>

(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”.

```
000 Local:00
Hand : Righty
```

(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.

<table>
<thead>
<tr>
<th>Input</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Off Start</td>
<td></td>
</tr>
<tr>
<td>1 Off SpelProg1</td>
<td></td>
</tr>
<tr>
<td>2 Off SpelProg2</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
<td>Input bit or output bit is ON status.</td>
</tr>
<tr>
<td>Off</td>
<td>Input bit or output bit is OFF status.</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Output</th>
<th>F1:On F2:Off</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 On</td>
<td>Ready</td>
</tr>
<tr>
<td>1 Off</td>
<td>Running</td>
</tr>
<tr>
<td>2 Off</td>
<td>Paused</td>
</tr>
</tbody>
</table>

(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

<table>
<thead>
<tr>
<th>01 Motion</th>
<th>1:Go</th>
<th>4:GoHereTLZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:Move</td>
<td>5:MoveHereTLZ</td>
<td></td>
</tr>
<tr>
<td>3:Arc3</td>
<td>6:GoAlignHere</td>
<td></td>
</tr>
</tbody>
</table>

#### Except 6-axis Robot

<table>
<thead>
<tr>
<th>01 Motion</th>
<th>1:Jump:Z(0)</th>
<th>4:Move</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:Jump</td>
<td>5:Arc</td>
<td></td>
</tr>
<tr>
<td>3:Go</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Key Operation

<table>
<thead>
<tr>
<th>Key Operation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numeric keys</td>
<td>Moves the cursor and select the motion command.</td>
</tr>
<tr>
<td>▲ ▼ ◀▶</td>
<td></td>
</tr>
<tr>
<td>OK</td>
<td>Executes the motion command.</td>
</tr>
<tr>
<td>Cancel</td>
<td>Returns to the previous screen.</td>
</tr>
<tr>
<td>Motor</td>
<td>Turns ON / OFF the motor.</td>
</tr>
<tr>
<td>Reset</td>
<td>Sets the initial setup status.</td>
</tr>
<tr>
<td>Guide</td>
<td>Displays the key operation guide.</td>
</tr>
<tr>
<td>F4</td>
<td>Executes MCal.</td>
</tr>
<tr>
<td>F5</td>
<td>Returns to the previous screen.</td>
</tr>
</tbody>
</table>
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 [ ] and press the <OK> key.

   - 01 Motion
   - 1: Go  
   - 4: GoHereTLZ
   - 2: Move 5: MoveHereTLZ
   - 3: Arc3 6: GoAlignHere

2. The Go command setting screen appears.

   - 01 Go        L
   - Robot1.PTS
   - Point:000

Specifying Motion Command Parameter

1. Specify the point number. Press the <F1> key to turn to the point number input mode.

   - 01 Go        L
   - Robot1.PTS
   - Point:001

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.

   - 01 Go        L
   - Go P1
   - Hold Enable switch.
   - Press the OK Key.
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.

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.

<table>
<thead>
<tr>
<th>01 Go</th>
<th>L ■</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robot1.PTS</td>
<td></td>
</tr>
<tr>
<td>Point:000</td>
<td></td>
</tr>
</tbody>
</table>

#### Key operation

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

This section indicates settings in the command advanced setting screen.

<table>
<thead>
<tr>
<th>01 Move</th>
<th>L ■</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robot1.PTS</td>
<td></td>
</tr>
<tr>
<td>Point:000</td>
<td></td>
</tr>
<tr>
<td>ROT:No</td>
<td>ECP:No</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>01 Arc3</th>
<th>L ■</th>
</tr>
</thead>
<tbody>
<tr>
<td>MiddleP:000</td>
<td></td>
</tr>
<tr>
<td>EndP :000</td>
<td></td>
</tr>
<tr>
<td>ROT:No</td>
<td>ECP:No</td>
</tr>
</tbody>
</table>

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.

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

2.5.6 MoveHereTLZ

This section indicates settings in the command advanced setting screen.

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

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

2.5.8 Jump Z(0)

This section indicates settings in the command advanced setting screen.

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

This section indicates settings in the command advanced setting screen.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>01 Jump</td>
<td>L</td>
<td></td>
</tr>
<tr>
<td>Point:000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>+Z : 000.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LimZ: 000.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

2.5.10 Arc

This section indicates settings in the command advanced setting screen.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>01 Arc</td>
<td>L</td>
<td></td>
</tr>
<tr>
<td>MiddleP:000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EndP :000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROT:No</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free</td>
<td>Servo Free for the joint</td>
</tr>
<tr>
<td>Lock</td>
<td>Servo Lock for the joint</td>
</tr>
<tr>
<td>(Blank)</td>
<td>Motor OFF or invalid joint</td>
</tr>
</tbody>
</table>

**Key operation**

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Servo Free for the joint.</td>
</tr>
<tr>
<td>Servo Lock for the joint.</td>
</tr>
<tr>
<td>Changes to the previous or next page.</td>
</tr>
<tr>
<td>Return to the [Jog &amp; Teach] screen.</td>
</tr>
<tr>
<td>Return to the [Jog &amp; Teach] screen.</td>
</tr>
<tr>
<td>Sets the initial setup status.</td>
</tr>
<tr>
<td>Turns ON / OFF the motor.</td>
</tr>
<tr>
<td>Displays the key operation guide.</td>
</tr>
<tr>
<td>Changes all joints to FREE (servo free) status.</td>
</tr>
<tr>
<td>Changes all joints to LOCK (servo lock) status.</td>
</tr>
<tr>
<td>Switches between J4, J5, and J6 jog keys and J7, J8, and J9 jog keys.</td>
</tr>
<tr>
<td>Return to the [Jog &amp; Teach] screen.</td>
</tr>
</tbody>
</table>
### 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.

<table>
<thead>
<tr>
<th>6-axis Robot</th>
<th>SCARA, RS series, Cartesian Robot</th>
<th>Joint-type Robot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Page 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>01 Free Joint</td>
<td>01 Free Joint</td>
<td>01 Free Joint</td>
</tr>
<tr>
<td>J1:LOCK</td>
<td>J1:LOCK</td>
<td>J1:LOCK</td>
</tr>
<tr>
<td>J2:LOCK</td>
<td>J2:LOCK</td>
<td>J2:LOCK</td>
</tr>
<tr>
<td>J3:LOCK</td>
<td>J3:LOCK</td>
<td>J3:LOCK</td>
</tr>
<tr>
<td>J4:LOCK</td>
<td>J4:LOCK</td>
<td>J4:LOCK</td>
</tr>
<tr>
<td>J5:LOCK</td>
<td>J5:LOCK</td>
<td>J5:LOCK</td>
</tr>
<tr>
<td>J6:LOCK</td>
<td>J6:LOCK</td>
<td>J6:LOCK</td>
</tr>
</tbody>
</table>

| Page 2             |                                   |                  |
| 01 Free Joint      | 01 Free Joint                     |                  |
| J8:LOCK            | J8:LOCK                           |                  |
| J9:LOCK            | J9:LOCK                           |                  |

### 2.6.2 Servo Free for Each Joint

1. Turn ON the motor.
2. 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.
3. 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>.

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>.

<table>
<thead>
<tr>
<th>01 Free Joint</th>
</tr>
</thead>
<tbody>
<tr>
<td>*</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>01 Free Joint</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

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) Turn ON the motor.

(2) Press the <F1> key.

The status of all joints switches from “Lock” to “Free”.

Now, you can move all the joints by hand.

(3) 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.

```
01 Brake
  J1:On   J2:On
  J3:On   J4:On
  J5:On   J6:On
```

<table>
<thead>
<tr>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
<td>Brake ON for the joint.</td>
</tr>
<tr>
<td>Off</td>
<td>Brake OFF for the joint.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Key operation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;→&gt; Jog key</td>
<td>Brake OFF for each joint</td>
</tr>
<tr>
<td>&lt;+&gt; Jog key</td>
<td>Brake ON for each joint</td>
</tr>
<tr>
<td>Reset</td>
<td>Sets the initial setup status.</td>
</tr>
<tr>
<td>OK</td>
<td>Return to the [Jog &amp; Teach] screen.</td>
</tr>
<tr>
<td>Cancel</td>
<td>Return to the [Jog &amp; Teach] screen.</td>
</tr>
<tr>
<td>Motor</td>
<td>Turns ON / OFF the motor.</td>
</tr>
<tr>
<td>Guide</td>
<td>Displays the key operation guide.</td>
</tr>
<tr>
<td>F5</td>
<td>Returns to the [Jog &amp; Teach] screen.</td>
</tr>
</tbody>
</table>

### 2.7.1 Turn the brake ON

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

### 2.7.2 Turn 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.

   **Warning:**
   BRAKE OFF can be cause the joint to Fall. Continue?

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.

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

2.8.1 Changing the Robot

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

Robot: 01

(2) Enter the desired robot number.

(3) Press the <OK> key and change the robot.
2.9 Impedance Tester

- 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+ 7.0 option Force Guide 7.0

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.

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.
### Screen Description Example (for the above screen)

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

### Key operation

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
</tr>
<tr>
<td>Cancel</td>
</tr>
<tr>
<td>Reset</td>
</tr>
<tr>
<td>Motor</td>
</tr>
<tr>
<td>Teach</td>
</tr>
<tr>
<td>Save</td>
</tr>
<tr>
<td>Load</td>
</tr>
<tr>
<td>▲ / ▼</td>
</tr>
<tr>
<td>◀ / ▶</td>
</tr>
<tr>
<td>Local</td>
</tr>
<tr>
<td>Tool</td>
</tr>
<tr>
<td>Arm</td>
</tr>
<tr>
<td>Guide</td>
</tr>
</tbody>
</table>

Refer to *Operation 2.1.15 Saving Point Data to File.*

Refer to *Operation 2.1.16 Loading Point Data from File.*
## 2. TEACH Mode

<table>
<thead>
<tr>
<th>Key operation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>Moves to the [Sensor Reset] screen.</td>
</tr>
<tr>
<td>F2</td>
<td>Switches to the force control object number input mode.</td>
</tr>
<tr>
<td>F3</td>
<td>Switches to the mass property object number input mode.</td>
</tr>
<tr>
<td>F4</td>
<td>Moves to the [Motion Command] screen. Refer to Operation 2.5 Motion Command. (Pressing the &lt;F5&gt; key returns to the [Impedance Tester] screen.)</td>
</tr>
<tr>
<td>F5</td>
<td>Returns to the [Jog &amp; Teach] screen.</td>
</tr>
<tr>
<td>F6</td>
<td>Moves to the [I/O Command] screen. Refer to Operation 2.4 I/O Command. (Pressing the &lt;F5&gt; key returns to the [Impedance Tester] screen.)</td>
</tr>
<tr>
<td>F10</td>
<td>Switches to the point input mode.</td>
</tr>
</tbody>
</table>

### 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 in the confirmation screen.

![Message](01 Motor

- Ready to turn robot motors ON.
- Continue?]

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

![Display](Impedance Tester ■)

**Turning OFF the motor:**

Press the <Motor> key.

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

![Display](Impedance Tester)
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+ 7.0 option Force Guide 7.0*

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

```
FC0001 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.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass of Fx,Fy,Fz</td>
<td>[mN/(mm/sec²)]</td>
<td>0.2</td>
</tr>
<tr>
<td>Damper of Fx,Fy,Fz</td>
<td>[N/(mm/sec)]</td>
<td>0.2</td>
</tr>
<tr>
<td>Spring of Fx,Fy,Fz</td>
<td>[N/mm]</td>
<td>0</td>
</tr>
<tr>
<td>Mass of Tx,Ty,Tz</td>
<td>[mN·mm/(deg/sec²)]</td>
<td>1700</td>
</tr>
<tr>
<td>Damper of Tx,Ty,Tz</td>
<td>[N·mm/(deg/sec)]</td>
<td>100</td>
</tr>
<tr>
<td>Spring of Tx,Ty,Tz</td>
<td>[N·mm/deg]</td>
<td>0</td>
</tr>
</tbody>
</table>

**<F8> key**: Selects a standard force control object.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass of Fx,Fy,Fz</td>
<td>[mN/(mm/sec²)]</td>
<td>0.5</td>
</tr>
<tr>
<td>Damper of Fx,Fy,Fz</td>
<td>[N/(mm/sec)]</td>
<td>0.5</td>
</tr>
<tr>
<td>Spring of Fx,Fy,Fz</td>
<td>[N/mm]</td>
<td>0</td>
</tr>
<tr>
<td>Mass of Tx,Ty,Tz</td>
<td>[mN·mm/(deg/sec²)]</td>
<td>4000</td>
</tr>
<tr>
<td>Damper of Tx,Ty,Tz</td>
<td>[N·mm/(deg/sec)]</td>
<td>500</td>
</tr>
<tr>
<td>Spring of Tx,Ty,Tz</td>
<td>[N·mm/deg]</td>
<td>0</td>
</tr>
</tbody>
</table>

**<F3> key**: Selects a hard force control object.
Operation 2. TEACH Mode

**<F2> key:** Selects a standard force control object.

**C4 series, N2 series, N6 series, G series, RS series**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass of Fx,Fy,Fz</td>
<td>[mN/(mm/sec²)]</td>
<td>0.5</td>
</tr>
<tr>
<td>Damper of Fx,Fy,Fz</td>
<td>[N/(mm/sec)]</td>
<td>0.5</td>
</tr>
<tr>
<td>Spring of Fx,Fy,Fz</td>
<td>[N/mm]</td>
<td>0</td>
</tr>
<tr>
<td>Mass of Tx,Ty,Tz</td>
<td>[mN·mm/(deg/sec²)]</td>
<td>4000</td>
</tr>
<tr>
<td>Damper of Tx,Ty,Tz</td>
<td>[N·mm/(deg/sec)]</td>
<td>500</td>
</tr>
<tr>
<td>Spring of Tx,Ty,Tz</td>
<td>[N·mm/deg]</td>
<td>0</td>
</tr>
</tbody>
</table>

**C8 series**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass of Fx,Fy,Fz</td>
<td>[mN/(mm/sec²)]</td>
<td>0.75</td>
</tr>
<tr>
<td>Damper of Fx,Fy,Fz</td>
<td>[N/(mm/sec)]</td>
<td>0.75</td>
</tr>
<tr>
<td>Spring of Fx,Fy,Fz</td>
<td>[N/mm]</td>
<td>0</td>
</tr>
<tr>
<td>Mass of Tx,Ty,Tz</td>
<td>[mN·mm/(deg/sec²)]</td>
<td>4000</td>
</tr>
<tr>
<td>Damper of Tx,Ty,Tz</td>
<td>[N·mm/(deg/sec)]</td>
<td>500</td>
</tr>
<tr>
<td>Spring of Tx,Ty,Tz</td>
<td>[N·mm/deg]</td>
<td>0</td>
</tr>
</tbody>
</table>

**<F3> key:** Selects a hard force control object.

**C4 series, C8 series, N2 series, N6 series, G series, RS series**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass of Fx,Fy,Fz</td>
<td>[mN/(mm/sec²)]</td>
<td>1</td>
</tr>
<tr>
<td>Damper of Fx,Fy,Fz</td>
<td>[N/(mm/sec)]</td>
<td>1</td>
</tr>
<tr>
<td>Spring of Fx,Fy,Fz</td>
<td>[N/mm]</td>
<td>0</td>
</tr>
<tr>
<td>Mass of Tx,Ty,Tz</td>
<td>[mN·mm/(deg/sec²)]</td>
<td>8000</td>
</tr>
<tr>
<td>Damper of Tx,Ty,Tz</td>
<td>[N·mm/(deg/sec)]</td>
<td>1000</td>
</tr>
<tr>
<td>Spring of Tx,Ty,Tz</td>
<td>[N·mm/deg]</td>
<td>0</td>
</tr>
</tbody>
</table>

(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+ 7.0 option Force Guide 7.0*

---

**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 <F3> key. It turns to the FC number input mode.

```
FC001 MP01 P000
```

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

```
FC001
Fx:ON  Fy:ON  Fz:ON
Tx:ON  Ty:ON  Tz:ON
FCS:01
```

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

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

(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 <F2> 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 MP01 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+ 7.0 option Force Guide 7.0*

---

**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.

<table>
<thead>
<tr>
<th>Screen</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FC001 MP01 P000</td>
<td></td>
</tr>
</tbody>
</table>

(2) Press the <F1> key.

   It turns to the mass property object number advanced setting information.

<table>
<thead>
<tr>
<th>Screen</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP01</td>
<td>Wt:005.000</td>
</tr>
<tr>
<td>x: 0150.000</td>
<td></td>
</tr>
<tr>
<td>y: 0100.000</td>
<td></td>
</tr>
<tr>
<td>z:-0050.000</td>
<td></td>
</tr>
</tbody>
</table>

   FC001 MP01 P000

   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.

(4) Press the <F10> key.

   It turns to the point number input mode.

   FC001 MP01 P000

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

(6) 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.

(3) 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?
```

(4) 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.

<table>
<thead>
<tr>
<th>Start Force Control?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caution: Sensor drift</td>
</tr>
<tr>
<td>makes unintentional</td>
</tr>
<tr>
<td>motion.</td>
</tr>
</tbody>
</table>

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 FCxxxx] 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.

<table>
<thead>
<tr>
<th>Impedance Tester</th>
</tr>
</thead>
<tbody>
<tr>
<td>RB01 FS1 T00 L00 A00</td>
</tr>
<tr>
<td>FC001 MP01 P000</td>
</tr>
<tr>
<td>[Executing FC001]</td>
</tr>
</tbody>
</table>

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.

Error : 4031
Motor is OFF.
Turn the motor ON.
Press OK.

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.

Impedance Tester ■
RB01 FS1 T00 L00 A00
FC001 MP01 P000
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.

```
Auto           Ready
```

<table>
<thead>
<tr>
<th>Key operation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guide</td>
<td>Displays the key operation guide.</td>
</tr>
<tr>
<td>F1</td>
<td>Displays the [System History] screen.</td>
</tr>
</tbody>
</table>
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

Page 1
Er:4014 R:02 J:1
2012/01/01 00:00:00
Code1:0
Code2:3

Warning details screen

Page 1
Wa: 0504 R:00 J0
2012/01/01 00:00:00
Code1:0
Code2:0

Page 2
MCAL was not completed.

An Error occurred on a Background Task.

Key operation

<table>
<thead>
<tr>
<th>Key operation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Page Up / Down</td>
<td>Changes to the previous or next page.</td>
</tr>
<tr>
<td>OK</td>
<td>Return to the [Auto] screen.</td>
</tr>
<tr>
<td>Cancel</td>
<td>Return to the [Auto] screen.</td>
</tr>
<tr>
<td>Guide</td>
<td>Displays the key operation guide.</td>
</tr>
<tr>
<td>F5</td>
<td>Returns to the [Auto] screen.</td>
</tr>
</tbody>
</table>
3.3 Errors / Warnings

The error number is displayed when an error occurs.

Error: 4031

The warning number is displayed when a warning occurs.

Warning: 501

<table>
<thead>
<tr>
<th>Key operation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td>Changes to the screen before the error occurred.</td>
</tr>
<tr>
<td>Cancel</td>
<td>Changes to the screen before the error occurred.</td>
</tr>
</tbody>
</table>

NOTE

For the errors and warnings, refer to the manual *SPEL+ Language Reference: SPEL+ Error Messages*. 
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 *SPEL+ Language Reference: SPEL+ Error Messages*.

**Robot does not move by pressing the Jog key**
- Execute the Motor On command to energize the Robot motor. (Refer to *SPEL+ Language Reference: Motor On*)
- Energize the Robot motor. (Refer to *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: 2.1.11 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 will 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

Be sure to specify the proper codes when ordering maintenance parts.

<table>
<thead>
<tr>
<th>Part Name</th>
<th>Code1</th>
<th>Code2</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP2 (with cables)</td>
<td>R12B120112</td>
<td>R12NZ9005P</td>
<td>Cable: D-sub connector (5 m)</td>
</tr>
<tr>
<td>Key</td>
<td>R13B120113</td>
<td>2111826</td>
<td>Mode selector key switch</td>
</tr>
</tbody>
</table>