Thank you for purchasing a Janome Robot.

- Read this manual thoroughly in order to ensure proper use of this robot. Be sure to read “For Your Safety” before you use the robot. The information will help you protect yourself and others from possible dangers during operation.

- After having read this manual, keep it in a handy place so that you or the operator can refer to it whenever necessary.

JANOME
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PART NAMES

Main Unit

X Base

R-Axis

Z Mechanism (4-Axis Model)

Y Frame

Column

Base
**Operation Panel (Front) (Side)**

- Program Select Key
- Emergency Stop Switch
- Program Number Display
- Switch Box Connector (CE model only)
- COM1 (RS-232C)
- Start Switch
- Green LED
- Red LED
- Teaching Pendant Connector (TPU) (RS422)

**(Side of the robot)**

**(With the panel cover removed)**

- Special Mode Switch
- I/O-1 Internal/External Power Selector Switch
- I/O-SYS Internal/External Power Selector Switch
- Spare Switch
- Panel Cover
Operation Panel (Rear) (JR2200N Series)

- Inlet
- Power Switch
- I/O-S (CE model only)
- COM2 (RS-232C) (Optional)
- I/O-SYS
- I/O-1 (Optional)
- COM3 (RS-232C) (Optional)
Operation Panel (Rear) (Common to JR2300N Series and JR2400N Series)

- Power Switch
- Inlet
- Grounding Screw (M4)
- Fuse (3.15 Time-Lag Fuse, $\phi$ 5.2x20)
- COM2 (RS-232C) (Optional)
- Outlet (Size and availability vary depending on the model specifications.)
- I/O-S (CE model only)
- I/O-SYS
- I/O-1 (Optional)
- COM3 (RS-232C) (Optional)
Teaching Pendant

- LCD
- Enable Switch (Optional)
- Operation Panel
- Emergency Stop Switch (Optional)

Be sure to turn off the robot before removing or inserting the teaching pendant cable.
If your teaching pendant has options, be sure to change the model settings accordingly.
Failure to do so may cause unit malfunction.

Switch Box (CE Model Only)

- Emergency Stop Switch
- Start Switch
Teaching Pendant Operation Panel Keys

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<thead>
<tr>
<th>Key</th>
<th>Function</th>
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<tr>
<td>F.0</td>
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<tr>
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<td>Function 1 Key</td>
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<tr>
<td>F.2</td>
<td>Function 2 Key</td>
</tr>
<tr>
<td>F.3</td>
<td>Function 3 Key</td>
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<tr>
<td>F.4</td>
<td>Function 4 Key</td>
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<td>Go Key</td>
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<td>Program No. Key</td>
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<td>J. Enter Key</td>
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<td>T.ENV</td>
<td>T. ENV key *</td>
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<td>EDIT</td>
<td>Edit Key</td>
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<td>0 - 9</td>
<td>Numeric Key</td>
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<tr>
<td>±</td>
<td>Plus Minus Key</td>
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<tr>
<td>.</td>
<td>Decimal Point Key</td>
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<table>
<thead>
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<th>Function</th>
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</thead>
<tbody>
<tr>
<td>↑X</td>
<td>X Plus Key</td>
</tr>
<tr>
<td>↓X</td>
<td>X Minus Key</td>
</tr>
<tr>
<td>←Y</td>
<td>Y Minus Key</td>
</tr>
<tr>
<td>→Y</td>
<td>Y Plus Key</td>
</tr>
<tr>
<td>Z↑</td>
<td>Z Up Key</td>
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<tr>
<td>Z↓</td>
<td>Z Down Key</td>
</tr>
<tr>
<td>R</td>
<td>R Plus Key</td>
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<tr>
<td>ᵃR</td>
<td>R Minus Key</td>
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<td>CURSOR</td>
<td>Cursor Right Key</td>
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<td>CURSOR</td>
<td>Cursor Up Key</td>
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<tr>
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<td>Cursor Down Key</td>
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<td>Monitor Key</td>
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<td>Menu Key</td>
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<td>Escape Key</td>
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<td>DEL</td>
<td>Delete Key</td>
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<td>CLEAR</td>
<td>Clear Key</td>
</tr>
<tr>
<td>ENTR</td>
<td>Enter Key</td>
</tr>
</tbody>
</table>

*: Teaching Environment
CONFIGURATION OF EQUIPMENT

Robot System Configurations

- Teaching Pendant
- Robot
- RS-232C Extension Cable (Optional)
- Switch Box (CE Model Only)
- Personal Computer (PC) with Windows® 2000/XP operating system *
- Tool (e.g. Dispenser, impulse welder)
- Control Device (e.g. Sequencer)
- Area Sensor
- RS-232C Extension Cable (Optional)

*: Windows 2000/XP is a registered trademark of Microsoft.
COORDINATE SYSTEM

[Diagram showing coordinate system with labels for X, Y, and Z axes.]
PTP DRIVE/CP DRIVE

During operation, each robot Axis shifts either in the PTP drive or the CP drive.

**PTP Drive**

“PTP” stands for “Point to Point”. The robot Axes ascend vertically, shift in the X or Y direction, and descend vertically to the next point.

**CP Drive**

“CP” stands for “Continuous Path”. The robot Axes shift in a straight line or in an arc to the designated point at a constant speed. When using the CP drive, the Axes will shift between the CP start point and the CP end point without stopping at the CP passing point or the CP arc point.
This robot has the following operation modes:

- **External Run Mode** — To run programs
  (Start running programs using a signal from the I/O-SYS or COM1.)
- **Switch Run Mode** — To run programs
  (Start running programs by pressing the start switch.)
- **Teaching Mode** — To create programs
- **Customizing Mode** — To create data to compose programs
- **Administration Mode** — For administration and adjustment

If the teaching pendant is connected, the teaching pendant LED lights indicate the current mode.

- **E.RUN:** External Run Mode
- **RUN:** Switch Run Mode
- **TEACH:** Teaching Mode
- **CUSTOM:** Customizing Mode
- **ADMIN:** Administration Mode

Follow the procedures below to change modes:

**Using the Teaching Pendant**

- Press the **MODE** key. The mode selection (Changing Mode) screen will be displayed.
- Each time the **SHIFT** and **MODE** keys are pressed, the modes will change in the following order:
  - External Run Mode → Switch Run Mode → Teaching Mode

**Using a PC**

- Select [Robot] → [Changing Mode].

- If you cannot start the robot due to the commands set in the [Job on Power ON] ([Run Mode Parameter] menu), turn the spare switch (inside the panel cover on the side of the robot) ON and then turn the power on again. The robot will start in the Teaching mode automatically. Change the [Job on Power ON] in the Teaching mode. Be sure to turn the spare switch to OFF after changing the job.
EXTERNAL RUN MODE

In the External Run Mode, the robot starts running programs upon receiving a start signal from the I/O-SYS or COM1. The E.RUN light on the teaching pendant will turn on when running in this mode.

Performing the mechanical initialization is necessary if you have turned the robot on in the External Run Mode. Start the operation and perform the mechanical initialization. The External Run Mode will start. Start the operation in the External Run Mode, the robot will start running the currently selected program. (See the procedures below on how to start the operation.)

Caution

Do not touch any of the robot’s moving parts. Doing so may cause injury or unit malfunction.

How to Start the Operation

Select either of the following methods in the external run mode to start running a program:

From I/O-SYS

Turn [#sysIn01] ON from an external device connected to the I/O-SYS.

From COM1

Send the communication command [Start] to the robot from an external device (e.g. PC) connected to COM1.

Program start instructions will be possible only from either the I/O-SYS or COM1. Be sure to check which one is set as the [Start Channel] (in the [Administration Setting Mode] menu).

TP ➔ MENU [Administration Setting Mode] ➔ [Start Channel] (Administration Mode)

PC ➔ [Robot] ➔ [External Start]

Basic Instructions 11 Desktop Robot JR2000N Series
Emergency Stop
Use the emergency stop switch to stop the robot if any accident has occurred during operation. The motor's power (power to the motor) will be turned off and the robot will stop running if you press any of the switches indicated below:

- The emergency stop switch on the robot.
- The emergency stop switch on the switch box. (CE model)
- The emergency stop switch on the teaching pendant. (Optional: See the picture below)

To release the emergency stop, turn the depressed emergency stop switch clockwise. Then send a start instruction signal from either the I/O-SYS or COM1. After the mechanical initialization, the robot will stand by for a start command.

How to Select a Program
Select a program by the following methods:

From the Robot
Set the desired program number on the program number display using the + and - keys on the side of the display.

From the PC
Connect a PC to COM1 of the robot and send the R1: Program Number Change command and the desired program number to the robot. (See Pages 12 – 13 “OPERATION CONTROL” of the COM Communication (External Control II) operation manual)

From the Teaching Pendant
Press the PRG.NO key on the teaching pendant and enter the desired program number.
SWITCH RUN MODE

In the Switch Run Mode, the robot starts running programs when the start switch is pressed. The RUN light on the teaching pendant will turn on while running in this mode.

Performing the mechanical initialization is necessary if you have turned the robot on in the Switch Run Mode. Start the operation and perform the mechanical initialization. The Switch Run Mode will start. Start the operation in the Switch Run Mode, the robot will start running the currently selected program. (See the procedures below on how to start the operation.)

Caution
Do not touch any of the robot’s moving parts. Doing so may cause injury or unit malfunction.

How to Start the Operation
To start running a program, press the start switch while in the Switch Run Mode.
If you press the start switch again while running a program, the robot will stop. Press the switch again to restart. (This temporary stop function can be disabled.)

Start Switch
Front of the Robot
Switch Box (CE Model)
**Emergency Stop**
Use the emergency stop switch to stop the robot immediately if any accident has occurred during operation. The power to the motor will be turned off and the robot will stop running if you press any of the switches indicated below:

- The emergency stop switch on the robot.
- The emergency stop switch on the switch box. (CE model)
- The emergency stop switch on the teaching pendant. (Optional: See the illustration below)

To release the emergency stop, turn the depressed emergency stop switch clockwise. Then press the start switch. After the mechanical initialization, the robot will stand by for a start command.

**How to Select a Program**
Select a program using the following methods:

**From the Robot**
Set the desired program number on the program number display using the + and - keys on the side of the display.

**From the PC**
Connect a PC to COM1 of the robot and send the R1: Program Number Change command and the desired program number to the robot. (See Pages 12 – 13 “OPERATION CONTROL” of the COM Communication (External Control II) operation manual)

**From the Teaching Pendant**
Press the PRG.NO key on the teaching pendant and enter the desired program number.
TEACHING MODE

Create programs in the Teaching Mode.
Teaching data is the information registered in the robot by teaching.

**Types of Teaching Data**
Teaching data consists of the following seven items:

- Program
- Common Setting Data
- Condition Setting Data
- Point Job Data (1 – 100)*
- Additional Function Data (1 – 50)*
- Sequencer Program Data (1 – 50)*
- Run Mode Parameter

*: The point job data (101 – 200), additional function data (51 – 100), and sequencer program data (51 – 100) are included in the customizing data. (See Page 26)

**Program**
You can operate the robot in various ways by running different programs.
Up to 255 programs (Numbers 1 – 255) can be registered in the robot.
A program consists of two items: the program data that controls the program and the point data that includes position coordinates at which the robot performs the operation. (Multiple point data is also referred to as *point data array.*)

<table>
<thead>
<tr>
<th>Program Data</th>
<th>Point Data [01]</th>
<th>Point Data [02]</th>
<th>...</th>
<th>Point Data [28]</th>
</tr>
</thead>
</table>

Program data consists of the following nine items:

1. Program Name: You can use up to 40 – 120 characters, depending on the character types, in combination to name the program.
2. Work Home: This is the point (coordinates) where the robot Axes return to and waits for the next start instructions after running the last point of the program in the [1 Cycle Playback] operation.

3. Job on Start of Cycle: The robot will perform the point job data designated by the set number. If [Continuous Playback] is selected, the robot will perform the point job data only when it receives start instructions after completing the [Job on Start of Cycle] set in the [Job and Sequencer on Run Mode] menu.

![Warning] Note that the Move commands (e.g. Call Program) included the set point job data will be ignored.

4. Cycle Mode: This is the operation mode that includes [1 Cycle Playback] and [Continuous Playback].

5. PTP Condition: This includes the settings (e.g. speed) for shifting from a point to another in the PTP drive. (Invalid in the CP drive)

6. CP Condition: The settings (e.g. speed) for shifting from one point to another in the CP drive. (Invalid for the PTP drive)

7. Tool Data: Consists of the tool weight and the distance from the standard tool position (R-Axis center) to the tool center point.

8. Move Area Limit: The maximum coordinates and angles which can be set for each robot Axis.

9. Position Data Type: Consists of the following three coordinates:
   - Absolute: The position data value is equal to the robot's absolute coordinates.
   - Relative: The position data is equal to the distance from the program start coordinates to the current position coordinates.
   - Moving Amount: The position data value is equal to the distance to the next point.
Point data consists of the following six items:

1. Coordinates X, Y, Z, R: The point coordinates (X, Y, Z, R) data

2. Point Type: Eight different types of points depending on the shifting and adjustment methods employed

![Diagram of point types](image)

1. **PTP Point**
   - The point from which the robot Axes start shifting to the next point in the PTP drive

2. **CP Start Point**
   - The point from which the robot Axes switch from the PTP drive to the CP drive

3. **CP Passing Point**
   - The point at which the robot Axes change its shifting direction during the CP drive: The Axes shift to the next point at the same speed as they shifted from the previous point.

4. **CP Stop Point**
   - The point at which the robot performs a point job or the robot Axes change its shifting direction during the CP drive: At this point the shifting speed slows to 0 mm/s.

5. **CP Arc Point**
   - This point specifies the arc motion of the robot Axes in the CP drive.

6. **CP End Point**
   - The point at which the robot Axes complete the CP drive and start shifting to the next point in the PTP drive

7. **PTP Evasion Point**
   - The point at which the robot Axes evade obstacles in the PTP drive
8. **User Definition Type**

Point types created in the Customizing Mode are called user-defined point types.
(The above point type items 1 – 7 are called the pre-defined point types.)
If you create a user-defined point type, it has the same basic contents (e.g. way of moving to the next point) as the point type used as its base.

3. **Line Speed:** The shifting speed to the next point in the CP drive: If the robot Axes are not set to shift to continue shifting in the CP drive, this setting is not necessary.

4. **Point Job Number:** Number assigned to the point job data: The robot will perform point jobs designated by the point job number. You can select from the following four point jobs according to your preference. Depending on the point type set to the point, selection of these point jobs may not be possible. (See the table on Page 20)

   - **Job before Moving:** The robot performs the point job before its Axes start shifting from the previous point to the designated point.
   - **Job while Moving:** The robot performs the point job while its Axes are shifting from the previous point to the designated point in the PTP drive.
   - **Job while CP Moving:** The robot repeats the point job while its Axes are shifting from the designated point to the next point in the CP drive.
   - **Point Job:** The robot performs the point job after its Axes have reached the designated point.

5. **Additional Function Number:** Number assigned to the additional function data: Additional functions can be assigned to a job point if necessary.

6. **Tag Code:** Value (tag code) assigned to a point
Common Data Settings
For the standard applications, the common data settings are not available; however, you can create the common data settings in the Customizing Mode and set its parameters (e.g. value and item) in the Teaching Mode. The name created in the Customizing Mode is displayed on the Teaching Mode menu screen. If you have not set the name, [Common Data Settings] (default name) is displayed on the Teaching Mode menu screen. For other applications, the common data settings names are preset (e.g. [Devices Signals] for the screw tightening applications); however, you can change the names in the Customizing Mode. The common data settings are common to all programs.

Condition Data Settings
For the standard applications and the dispensing applications, the condition data settings are not available; however, you can create the condition data settings in the Customizing Mode and set its parameters (e.g. value and item) in the Teaching Mode. The name created in the Customizing Mode is displayed on the Teaching Mode menu screen. If you have not set the name, [Condition Data Settings] (default name) is displayed on the Teaching Mode menu screen. For the screw tightening applications and soldering applications, the condition data settings name is preset ([Screw Tightening Condition] and [Soldering Condition]) and cannot be changed. The condition data can be selected on the point settings screen.

Point Job Data Settings
The point job data is a set of commands and logic operations that is performed at job points. The robot will perform point jobs selected from the point job number list on the point settings screen. (See “POINT JOB DATA” on Page 59 of the Teaching Pendant Operation manual for details) Depending on the point type set to the point, selection may not be possible. (See the table on Page 20)
You can create point job data Nos. 01 – 100 in the Teaching Mode. Point job data Nos. 101 – 200 can be created in the Customizing Mode.

Additional Function Data Settings
Select the additional function data you wish to set from the additional function data number list on the point settings screen. (See “ADDITIONAL FUNCTION DATA” on Page 69 of the Teaching Pendant Operation manual for details) The designated additional function is set to job points. Depending on the point type set to the point, selection may not be possible. (See the table on Page 20)
You can create additional function data (Nos. 01 – 50) in the Teaching Mode. Further, additional function data Nos. 51 – 100 can be created in the Customizing Mode.
Additional function data consists of the following six items:

1.  PTP Condition: The contents are the same as those set in the program data.
    Use this item to change the settings between designated points only.

2.  CP Condition: The contents are the same as those set in the program data.
    Use this item to change the settings only between designated points.

3.  Tool Data: The contents are the same as those set in the program data.
    Use this item when you wish to use different tool data, set in the program data, between designated points.
4. Pallet Routine: The pallet is the offset of the coordinates from the standard point. It has a counter function. For details, see “Pallet Routine” on Page 32 of the Functions I operation manual.

5. Execute Condition: Use this item to determine whether or not to run the designated point. If the point is not run, the robot Axes will skip the point and shift to the next point.

6. Workpiece Adjustment: You can adjust the designated position (coordinates) according to the values entered in the [Workpiece Adjustment] menu.

![Table]

<table>
<thead>
<tr>
<th>Point Job Data/ Additional Function Data</th>
<th>Job before Moving</th>
<th>Job while Moving</th>
<th>Point Job</th>
<th>PTP Condition</th>
<th>CP Condition</th>
<th>Tool Data</th>
<th>Pallet Routine</th>
<th>Execute Condition</th>
<th>Workpiece Adjustment</th>
<th>Tag Code</th>
</tr>
</thead>
<tbody>
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<td>CP Start Point</td>
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<td>○ ○ ○</td>
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<tr>
<td>CP Passing Point</td>
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<td>×</td>
<td>×</td>
<td>×</td>
<td>○ ○ ○</td>
</tr>
<tr>
<td>CP End Point</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>○</td>
<td>×</td>
<td>○</td>
<td>× ○ ○</td>
</tr>
<tr>
<td>PTP Evasion Point</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>○ ○ ○</td>
</tr>
<tr>
<td>Work Home (PTP Point)</td>
<td>○</td>
<td>○</td>
<td>×</td>
<td>○</td>
<td>×</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○ ○ ○</td>
</tr>
<tr>
<td>Work Home (CP Start Point)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>×</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○ ○ ○</td>
</tr>
</tbody>
</table>

- [Point Job] set at the work home position is performed at the work home position coordinates only when the tool center point is placed above the work home position after a cycle of operation.
- [Job while CP Moving] is performed repeatedly while shifting from the work home position to the next (first) point.
- [Job before Moving] and [Job while Moving] are performed while the robot Axes are returning from the last point of the program to the work home position after a cycle of operation.

**Sequencer Program Data**
The sequencer program data is a set of logical operation commands for controlling I/O signals, etc. It is activated while running a program.
You can create sequencer program data (Nos. 01 – 50) in the Teaching Mode. Sequencer program data (Nos. 51 – 100) can be created in the Customizing Mode.

**Run Mode Parameter**
The operation mode environment and functions such as the I/O-SYS function settings ([I/O Settings]) and the jobs in the Run Mode ([Job on Run Mode]) can be set here.
Data Save
Save teaching data in combination with customizing data. The unit of data is called C & T data.
If the teaching pendant is connected, press the [SAVE] key. If a PC is connected, send data to the
robot using the PC software JR C-Points. The data sent from the PC will be saved automatically.
C & T data created using the teaching pendant is stored in the robot temporarily; it will be deleted
automatically when the power to the robot is turned off. Be sure to save if you have modified the
teaching data or customizing data.
To back up the data, send C & T data from the robot to your PC using the PC software JR C-Points or
JR C-Points Limited Edition.
The following C & T data is saved on both the robot and the PC as well as transmitted between them. The administration mode data and teaching environment setting data will not be deleted even if the power to the robot is turned off.

**C & T Data**

**Customizing Data**
- Teaching Mode Customizing
  - Title of Condition Data Settings
  - Point Job Settings Valid/Invalid
  - Add. Function Settings Valid/Invalid
  - Sequencer Settings Valid/Invalid
  - Run Mode Parameter Valid/Invalid
  - Job at Starting Teaching Mode
  - Default Program Data
  - Default Run Mode Parameter

**Teaching Data**
- Program
  - Point Data
    - Program Data
  - Common Data Settings
  - Condition Data Settings
  - Point Job Data (1 – 100)
  - Additional Function Data (1 – 50)
  - Sequencer Program Data (1 – 50)
  - Run Mode Parameter
    - IO Settings
      - Job on Run Mode
      - Sequencer on Run Mode
      - Point Reset Settings

**Administration Data**
- Start Channel
- Program Number Change Invalid
- COM Communication Setting

**Teaching Environment Setting Data**
- Brightness Adjustment
- Unit of Measure
- Display Language
- GO Function
- JOG Function
- Tool for Teaching
- Manual Job Number
- Key Click
- Setting Tool for Teaching
- Save on Changing Mode
Correlation between the Teaching Data Items

The robot can perform various operations by running programs.

**Program**

<table>
<thead>
<tr>
<th>No. 1</th>
<th>No. 2</th>
<th>No. 3</th>
<th>Point n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Point 1</td>
<td>Point 2</td>
<td>Point 3</td>
<td>Point n</td>
</tr>
<tr>
<td>Job No. 03</td>
<td>Job No. 17</td>
<td>Job No. 03</td>
<td>Job No. 31</td>
</tr>
<tr>
<td>Additional Function: Execute</td>
<td>Additional Function: Nil</td>
<td>Additional Function: Pallet Routine 06</td>
<td></td>
</tr>
<tr>
<td>Condition 01</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Plural Point Data**

Point job data numbers are set in the point data. The same point job data number can be selected at several points in the same program.

**Point Job Data**

A set of commands that is performed at points

<table>
<thead>
<tr>
<th>No. 1</th>
<th>No. 2</th>
<th>No. 3</th>
<th>~</th>
<th>No. 100</th>
</tr>
</thead>
</table>

**Additional Function Data**

Designated functions can be set to a point.

<table>
<thead>
<tr>
<th>No. 1</th>
<th>No. 2</th>
<th>No. 3</th>
<th>~</th>
<th>No. 50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Execute Condition</td>
<td>Workpiece Adjustment</td>
<td>Pallet Routine</td>
<td>Tool Data</td>
<td>CP Condition</td>
</tr>
</tbody>
</table>

**Sequencer Program Data**

Controls I/O signals while running programs.

<table>
<thead>
<tr>
<th>No. 1</th>
<th>No. 2</th>
<th>No. 3</th>
<th>~</th>
<th>No. 50</th>
</tr>
</thead>
</table>

- Point job data Nos. 101 – 200 and additional function data Nos. 51 – 100, included in customizing data, do not appear in this chart; however, they can be selected from the point data.
You can select from four items, in the Administration Menu: [Administration Settings Mode], [Diagnostic Mode], [Mechanical Adjustment Mode], and [Version Information].

**Administration Settings Mode**
The following six items can be set in this mode:

- **Start Channel:** Selects either the [I/O-SYS] or [COM1] depending on the origin of the start command in the External Run Mode.
- **Program Number Change:** Selects the device to be used for changing program numbers.
- **COM Setting:** Selects the communication settings for COMs 1 – 3 and TPIF.
- **Back Light Auto OFF:** Switches the teaching pendant LCD backlight on and off in the Teaching Mode.
- **IO Type:** Selects the IO type from either [I/O-A] or [I/O-B] according to the [I/O-SYS Function Assignments]. (Some models do not have this function.)
- **Clear All Data:** Clears all the C & T data (customizing data and teaching data).

These settings cannot be transmitted between the robot and the PC; however, you can refer to or change the settings from the PC. The settings will not be deleted if power to the robot is turned off.
**Diagnosis Mode**
If there is any trouble with the robot, teaching pendant or switch box, perform a diagnosis and check the function.

<table>
<thead>
<tr>
<th>No.</th>
<th>Menu Item</th>
<th>No.</th>
<th>Menu Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Key of Teaching Pendant</td>
<td>8</td>
<td>ZR Axis Motor</td>
</tr>
<tr>
<td>2</td>
<td>Teaching Pendant</td>
<td>9</td>
<td>Position of Sensor</td>
</tr>
<tr>
<td>3</td>
<td>Switch</td>
<td>10</td>
<td>External I/O</td>
</tr>
<tr>
<td>4</td>
<td>LED Buzzer</td>
<td>11</td>
<td>Emergency</td>
</tr>
<tr>
<td>5</td>
<td>State of Sensor</td>
<td>12</td>
<td>COM1 Communication</td>
</tr>
<tr>
<td>6</td>
<td>Z-Phase of Motor Driver</td>
<td>13</td>
<td>COM2 Communication</td>
</tr>
<tr>
<td>7</td>
<td>XY Axis Motor</td>
<td>14</td>
<td>COM3 Communication</td>
</tr>
</tbody>
</table>

- COM2 and COM3 are optional.

**Mechanical Adjustment Mode**
You can adjust the sensor by selecting [Sensor Adjustment] in this mode.
Be sure to perform this [Sensor Adjustment] after replacing the motor or the timing belt.

**Version Information**
Management information of the robot that includes the model name and the robot system software version is displayed on the teaching pendant LCD.
In the Customizing Mode, you can set the Teaching Mode menu and define the point type. Set up an account and then log in. You can limit access to the data or definitions set in this mode (excluding the teaching mode customizing data) by other accounts and the Teaching Mode.

**Types of the Customizing Data**
Customizing data consists of the following eight items:

- Teaching Mode Customizing Data
- Point Type Definition
- Variable Definition
- User Function Definition
- Alias Definition
- Point Job Data (101 – 200)
- Additional Function Data (51 – 100)
- Sequencer Program Data (51 – 100)

- Point job data (1 – 100), additional function data (1 – 50), and sequencer program data (1 – 50) are included in the teaching data. (See Page 15)
- Set up an account and log in to define or create customizing data. This step is not necessary when creating teaching mode customizing data.

**Teaching Mode Customizing Data**
This enables you to set the menu items and operation in the Teaching Mode. For example, you can hide [Point Job Settings] from the Teaching Mode menu. The data set here can be accessed from any accounts.
Account
Set up an account and log in when you define or create the customizing data (except when creating teaching mode customizing data).
If you define or create data after setting up an account and logging in, access to the data will be limited. You can create up to 50 accounts.
Four levels of access limitation are available in [Protect Mode]. Set the level for each data set according to the table below:

### Access Limitation from Other Accounts

<table>
<thead>
<tr>
<th>Protect Mode</th>
<th>No Limit</th>
<th>Public</th>
<th>Protected</th>
<th>Private</th>
</tr>
</thead>
<tbody>
<tr>
<td>To use data</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>x</td>
</tr>
<tr>
<td>To browse data</td>
<td>○</td>
<td>○</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>To change data</td>
<td>○</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

- Any access (use, browse, or change) from the Teaching mode will be denied regardless of the Protect Mode settings.

Point Type Definition
A point type created by setting command lines (that have the same function as the point job data) to a pre-defined point type (e.g. PTP Point) is called a user-defined point type. You can set up to 100 user-defined point types.
The following ten items are contained in the point type:

1. **Identifier:** Set the name to be used to identify the point type (since the point types have no numbers).
2. **Protect Mode:** Select the level of access limitation for other accounts.
3. **Base Type:** Select from the pre-defined point types and registered user-defined point types.
4. **Point Type Caption:** Set the point type name displayed on the point type selection screen in the Teaching Mode.
5. **Job before Moving:** Set the command lines that have the same function as the point job data [Job before Moving] by entering the commands directly instead of setting point job numbers.
6. **Job while Moving:** Set the command lines that have the same function as the point job data [Job while Moving] by entering the commands directly instead of setting point job numbers.

7. **Point Job:** Set the command lines that have the same function as the point job data [Point Job] by entering the commands directly instead of setting point job numbers.

8. **Job while CP Moving:** Set the command lines that have the same function as the point job data [Job while CP Moving] by entering the commands directly instead of setting point job numbers.

9. **Additional Function Number:** Set the number to be assigned to additional function data.

10. **Point Setting Variables Definition:** Define the variable to be assigned to the point data, up to 5 variables. Set necessary parameters such as [Input Unit] and [Variable Caption] at the same time.
Variable Definition
The following four variable types can be defined in the Customizing Mode. All variables are used in command lines such as the point job data.

1. Common Setting Variables Definition: Variables common to all programs and points that can be defined up to 100. After setting a definition, that variable caption will appear in the Teaching Mode menu. Select the caption and enter the necessary values and items.

2. Condition Setting Variables Definition: Up to 100 multiple variables can be set at one time. After setting a definition, the variable caption will appear in the Teaching Mode menu. Select the caption and enter the necessary values and items. You can enter up to 500 condition numbers per set. The numbers can be selected from the condition number list on the point settings screen. (See the screw tightening or soldering applications manual for this robot on how to select the condition number.)

3. Global Variables Definition: Up to 500 variables common to all programs can be defined.

4. Keeping Variables Definition: Up to 500 variables common to all programs can be defined. Values will not be deleted if the power to the robot is turned off.

User Function Definition
Functions that can be used in command lines such as the point job data are called user-defined functions. Functions already built into the robot are called pre-defined functions. Both functions can be used in formulas.

Sequencer Settings
The sequencer program data is a set of logical operation commands for controlling I/O signals, etc. It is activated while running a program. The contents of the sequencer program data created in the Customizing Mode are the same as those created in the Teaching Mode; however, access to the data can be limited according to the Protect Mode settings.
You can create sequencer program data Nos. 51 – 100 in the Customizing Mode.
**Alias Definition**
Settings for the I/O-SYS and I/O-1 input/output include data width.
Set the COM port using identifiers.

**Point Job Data Settings**
Point job data is a set of commands and logic operations that is performed at a point. The robot will perform point jobs selected from the point job number list on the point settings screen. (See “POINT JOB DATA” on Page 59 of the *Teaching Pendant Operation* manual for details)
The contents of point job data created in the Customizing Mode are the same as those created in the Teaching Mode; however, access to the data can be limited according to the Protect Mode settings. (See Page 26)
You can create point job data Nos. 101 – 200 in the Customizing Mode.

**Additional Function Data Settings**
Select the additional function data you wish to set from the additional function data number list on the point settings screen. (See “ADDITIONAL FUNCTION DATA” on Page 69 of the *Teaching Pendant Operation* manual for details) The designated additional function data is set to job points.
The contents of additional function data created in the Customizing Mode are the same as those created in the Teaching Mode; however, access to the data can be limited according to the Protect Mode settings. (See Page 26)
You can create additional function data Nos. 51 – 100 in the Customizing Mode.
TEACHING ENVIRONMENT SETTING

Press the T.ENV key in the Teaching Mode to display the Teaching Environment Setting menu. In this menu, you can set the teaching mode environment when entering positions as well as the teaching pendant LCD display options.

These settings cannot be transmitted between the robot and the PC; however, you can check or change the settings from the PC. The settings will not be deleted if the power to the robot is turned off.

- **Brightness Adjustment**: Adjust the teaching pendant LCD brightness.
- **Unit of Measure**: Switch between millimeter (mm) and inch (inch).
- **Display Language**: Switch between English, Japanese, German, Italian, Spanish, French, and Korean.
- **GO Function**: Set the shifting conditions of the robot Axes (in the PTP drive) when the GO key is pressed while entering positions using the JOG keys in the Teaching Mode.
- **JOG Function**: Set the shifting conditions of the robot Axes (in the PTP drive) when entering positions using the JOG keys in the Teaching Mode.
- **Tool for Teaching**: Set the tool settings valid in the Teaching Mode when entering a position using a tool different from the one used during operation.
- **Manual Job Number**: Set point job numbers to be performed when entering positions using JOG keys in the Teaching Mode.
- **Key Click**: Select the location from which a sound will be emitted when any key on the operation panel is pressed.
  - Inside: ON, Panel: ON…From both the robot and the teaching pendant
  - Inside: OFF, Panel: ON…Only from the teaching pendant
  - Inside: ON, Panel: OFF…Only from the robot
  - Inside: OFF, Panel: OFF…No sound
- **Back Light on Teaching**: Select [OFF] to disable the teaching pendant LCD backlight in the Teaching Mode.
- **Save on Changing Mode**: Select [Valid] (default) to display the Data Save confirmation screen when changing from the Teaching Mode to the Run Mode.
- **Coordinates Display**: Select the coordinates display settings on the point settings screen from [Normal] and [Detail].

You can select [Display Language] by pressing the SHIFT + T.ENV keys from any mode.
In the Teaching Mode, any point in a program can be run. (If the CP drive is selected, the robot will run from [CP Start Point] through [CP End Point].)

The robot will perform operations such as the point job data and additional function data in exactly the same way as in the Run Mode. This function is useful when you wish to check which points designated by [Execute Condition] the robot will run.

- If you set the point job data or sequencer program data to wait for a start signal from I/O or COM1, the robot will wait for a start signal when running points in the Teaching Mode.

**Caution**
Always pay special attention to the robot's movement in the Teaching Mode.

Press the **F.4** key on the point settings screen. The robot will run the currently displayed point and the screen will change to the settings screen for the next point.

- **Be sure not to perform a test run when the point settings screen displays a CP point other than the CP start and end points (e.g. CP passing point).**

If the currently selected point is a CP start point, the robot will run a program from the CP start point through the CP end point, without stopping at the CP passing point or the CP arc point.

See the examples of the robot's running process by pressing the **F.4** key one time on the settings screen for P1.

![Diagram](image)

In Example 1, the robot runs P1 (shifts its Axes to the point and performs the point job data and additional function data) and then stops at P1. The screen will change to the settings screen for P2.
In Example 2, the robot runs P1 → P2 → P3 in order (shifts its Axes to the point and performs the point job data and additional function data) and then stops at P3. The screen will change to the settings screen for P4.

After running the last point of the program, press the \texttt{F.4} key again. The robot will run the work home position or the first point depending on [Cycle Mode] settings in the [Default Program Data] menu. ([1 Cycle Playback]: work home position, [Continuous Playback]: first point)

Press the \texttt{F.4} key on the point settings screen. The robot will run the currently displayed point and the screen will change to the settings screen for the next point.

An & mark will appear in the first line of the screen. Press the \texttt{F.4} key to run the next point.
If an & is not displayed, the currently displayed point will be run again by pressing the \texttt{F.4} key.

When an & is displayed on the point settings screen, the same additional function data will be repeated at the points following the current point.
If the additional function data [Pallet Routine] is set to P2, after running P2, an & will appear on the settings screen for P2. Each time the \texttt{F.4} key is pressed, the robot Axes will shift to the next point in the pallet.

- The & mark will disappear if either the \texttt{MENU}, \texttt{EDIT}, \texttt{CURSOR}, or \texttt{CURSOR} key is pressed or when the settings screen for the next point is displayed.
  Note that the pallet counter will be reset if the & mark disappears while running the [Pallet Routine].

<table>
<thead>
<tr>
<th>Program 1</th>
<th>&amp; P1</th>
</tr>
</thead>
<tbody>
<tr>
<td>X + 23.2</td>
<td>Y + 312.5</td>
</tr>
<tr>
<td>Z + 25</td>
<td>R + 12</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>PTP Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Point Job Number</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>S.MARK</th>
<th>E.MARK</th>
<th>J.EXEC</th>
<th>P.EXEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>F.0</td>
<td>F.1</td>
<td>F.2</td>
<td>F.3</td>
</tr>
</tbody>
</table>