JANOME DESKTOP ROBOT

JR3000 Series

JANOME CARTESIAN ROBOT

JC-3 Series

Operation Manual

Basic Instructions

Thank you for purchasing this Janome Robot.

- **Before using this robot, read this manual thoroughly and always make sure you use the robot correctly. In particular, be sure to thoroughly read "For Your Safety" as it contains important safety information.**

- **After reading this manual, store in a safe place that can be easily accessed at any time by the operator.**

Original Instructions

JANOME

PREFACE

This manual covers the JR3200, JR3300, JR3400, JR3500, JR3600, and the JC-3 Series.

There are several manuals pertaining to these robots.

Manual	Details	JR3000	JC-3	JS3
Read This First	• For Your Safety Be sure to thoroughly read "For Your Safety" as it contains important safety information. • Package Contents (JS3 Series only) Check the items included with your robot. • CD-ROM Contents Explains the CD-ROM contents.	✓	✓	✓
Setup (JR3000 / JC-3) Installation (JS3)	Explains how to set up the robot. ■ Make sure you read this manual when installing the robot ■ NOTE: This manual is designed for people who have received safety and installation training regarding the robot.	✓	✓	✓
Maintenance	Explains maintenance procedures for the robot. ■ Make sure you read this manual when performing maintenance ■ NOTE: This manual is designed for people who have received safety and maintenance training regarding the robot.	✓	✓	✓
Basic Instructions	Provides part names, data configurations, and the basic knowledge necessary to operate the robot.	✓	(Common)	✓
Quick Start	Explains the actual operation of the robot by creating and running simple programs.	✓	(Common)	✓
Teaching Pendant Operation	Explains how to operate the robot via the teaching pendant.	✓	(Common)	✓
Functions I	Explains point teaching.	✓ (Common)		
Functions II	Explains commands, variables, and functions.	✓ (Common)		
Functions III	Explains functions such as All Program Common Settings and PLC programs.	✓ (Common)		
Functions IV	Explains Customizing Functions.	✓ (Common)		
External Control (I/O / Fieldbus)	Explains I/O and Fieldbus. Refer to this manual if you are using Fieldbus.	✓	✓	✓
Communication Control (COM/LAN)	Explains COM 1 – 3 and LAN communication control.	✓ (Common)		
Camera & Sensor Functions	Explains the functions of the attachable camera and Z position sensor.	✓ (Common)		

Manual	Details	JR3000	JC-3	JS3
Specifications	Outlines general specifications such as the robot's operating range, mass, etc.	✓	✓	—
Auxiliary Axis Functions	Explains the auxiliary axis functions.	✓ (Common)		
Application Specifications	Explains the specialized functions of the various application specifications.	Standard model: - Application model: ✓		

⚠ **Warning**

🚫 Do not handle or operate the robot in ways not covered in the manuals listed here.
Contact Janome (listed on the back of this manual) for repairs.
Failure to do so can cause electric shock or injury.

⚠ **Caution**

❗ To make full use of the machine's functions and capabilities, make sure that you use the robot according to the correct handling/operation procedures that are written in the manuals pertaining to this robot.

❗ If you turn OFF the power after making changes to robot's settings or data without saving, these changes are lost and the robot will revert to its original settings. Make sure that you save any changes to data and/or settings.

❗ Before using this robot for the first time, make sure you back up robot data and save the individual configuration information. Individual configuration information is needed when replacing internal circuit boards.
For details on how to back up robot data, refer to "3. Backing up and Restoring Robot Data" in the operation manual *Setup* for the JR3000 Series, "6.1 Backing up and Restoring Robot Data" in the operation manual *Setup* for the JC-3 Series.

- The descriptions within this manual are based on standard specifications. The menu item names etc. may vary depending on the model type.
- Menu items related to the Z axis may appear with 2 axis specifications; however any settings made for these items are not applied.
- For information regarding optional additions for this robot, refer to "24. Specifications" in the operation manual *Specifications* for the JR3000 Series, "14. Specifications" in the operation manual *Specifications* for the JC-3 Series. The notation "optional" is not used in the main text of this manual except for diagrams.
- Machine specifications may be modified without prior notice to improve quality.

- The proper name of Windows® is Microsoft®Windows® Operating System.
- Microsoft and Windows are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

Remarks:
- The operation methods described in this manual are indicated as follows:

  T P ▶ Operation via the teaching pendant

  P C ▶ Operation via the PC (JR C-Points II)

- Click text that appears blue and is underlined to jump to that section.

  Example: Refer to "1. READING THE MODEL NAME."

CONTENTS

FOR YOUR SAFETY

The safety notes outlined below are provided in order to ensure safe and correct usage of the product in addition to preventing injury to the operator, other people and damage to property as well.

‧ ‧ ‧ ‧ ‧ Be sure to follow the safety guidelines detailed here ‧ ‧ ‧ ‧ ‧

Symbols are also listed alongside the safety note explanations. Refer to the information below for understanding these terms and symbols.

■ Symbols that indicate the level of danger and/or damage.
   The level of danger or damage that could occur as a result of ignoring these safety guidelines and misusing the press are classified by the following symbols.

⚠ **Danger**	This symbol indicates an imminent risk of serious injury or death.
⚠ **Warning**	This symbol indicates a risk of serious injury or death.
⚠ **Caution**	This symbol indicates the possibility of serious injury or damage to property.

■ The following symbols indicate the nature of the danger and any necessary safety precautions to be taken.

△	Indicates caution must be taken
⚠	Take Caution (General Precaution)
⃠	Indicates a forbidden action
⃠	Never do this (General Prohibition)
🚫	Do not disassemble, modify or repair.
🖐	Do not touch (Contact Prohibition)
●	Indicates a required action
❗	Be sure to follow instructions (General Requirement)
🔌	Be sure to unplug the power supply cord
⏚	Make sure the machine is grounded

FOR YOUR SAFETY

If using auxiliary axis functions to operate a motor, such as a servo motor, that produces feedback and/or a motor with high output etc., or when using auxiliary axes in the robot setup etc., we ask that you perform a risk assessment on your side and take any necessary safety measures.

If Using Auxiliary Axis Functions in a Way that Require Safety Measures

⚠ Danger

Always set up safety guards around the robot or the auxiliary axes so the moveable parts cannot be touched.

Anyone within the maximum reach of the robot and the auxiliary axes being controlled by the robot may be injured. Set up an **emergency stop interlock device that cuts off the motor power to the auxiliary axes when the entrance to the safety guard is opened** and make sure this entrance is the only way to access the machine.

NOTE: A stop made via a device connected to the I/O-S connector is a category 2 stop. Make sure to perform a separate risk assessment of the interlock device.

Furthermore, put up a **"Keep Out"** or **"Do Not Operate"** warning sign in a clearly visible place.

Example:

FOR YOUR SAFETY

■■■■■■■■■■■■■■■ JR3000 Series ■■■■■■■■■■■■■■■■■

If Using Auxiliary Axis Functions in a Way that Require Safety Measures

⚠ Danger

🚫 | **When power to the robot is ON, never enter the safety guard or put your head, hands, or any part of your body inside.**
Entering the safety guard could result in injury.

❗ | **When entering the safety guard** due to something wrong with the robot or a peripheral device, or to inspect or lubricate the machine etc., **with both the power supply breaker and the robot switched OFF, make sure to lockout and tagout and confirm there is no electricity flowing to the robot.**
Failure to do so can cause electric shock or injury.

⚠ Warning

❗ | When creating a robot system using auxiliary axis functions, if the system can be categorized as an industrial robot, make sure to use the robot in accordance with the laws and guidelines of the country where it is used.

❗ | **Before performing a run or operation, always check the following:**

- **Obstacles** : Make sure there are no obstacles or people within the safety guard.
- **Installation** : Make sure the robot is installed properly, that there are no abnormalities with the robot and the surrounding devices, and that the teaching pendant and tools are in the appropriate places.
- **Emergency Stop Switch** : Make sure the I/O-S circuit (interlock) and emergency stop switch(es) are functioning properly.

It is potentially dangerous to operate the robot without making these checks first.

FOR YOUR SAFETY

If Using Auxiliary Axis Functions in a Way that Require Safety Measures

	⚠ **Warning**
!	**Construct safety guards that are strong enough to protect the operator against such dangers as the tool or workpiece splintering, etc.** When working within the safety guard, use protective gear such as a helmet, protective gloves, protective goggles, and safety shoes. Failure to follow these safety measures can result in injury.
!	If objects that the robot grasps have a risk of falling or being projected, **take into account the size, mass, and chemical composition of the objects for the required safety precautions.** Failure to do so can result in injury or unit breakdown.
!	**When working within the safety guard, make sure not to come within the maximum range of the robot.** Failure to do so can cause injury.
!	When starting a run, first confirm there are **no people inside of the safety guard and there are no obstacles that could interfere with the run.** Failure to do so can cause injury or unit breakdown.

FOR YOUR SAFETY

	⚠ **Danger**
🚫	**Do not use where flammable or corrosive gas is present.** Leaked gas accumulating around the unit causes explosions or fire.

	⚠ **Warning**
❗	**Make sure that you securely install the unit in a place that can fully withstand both the unit's weight and its usage.** Install the robot on a workbench 60 cm or higher above floor level, in the center of the workbench. In addition, **for units with a cooling fan on the back, allow for 30 cm or more clearance between the back of the unit and the wall.** Install the switchbox 60 cm or more above floor level in an easily accessible place. If installation is inadequate, the unit can drop or fall over causing injury and unit breakdown. Also, inadequate installation causes overheating or fire.
❗	**Make sure to power the unit within its rated current range.** Failure to do so causes electric shock, fire, or unit breakdown.
❗	**Plug the power cord into the power outlet firmly.** Failure to do so causes the plug to heat up resulting in fire.
❗	**Be sure to use the unit within its indicated voltage range.** Failure to do so causes unit breakdown, fire, or electric shock.
	When replacing fuses, or inspecting or lubricating the unit, unplug the power cord from the power outlet, then remove the cord from the main unit and make sure there is no electrical current. Also, do not touch any of the power inlet pins within 5 seconds of removing the power cords. Failure to follow these steps causes electric shock or injury.

FOR YOUR SAFETY

⚠ **Warning**

⏚	Always **make sure the machine is grounded through the power cord.** **Do not use the machine when it is not grounded.** Improper grounding causes electric shock, fire, malfunction, or unit breakdown.
❗	**Wipe the power plug with a clean, dry cloth periodically to eliminate dust.** Dust accumulation deteriorates the electrical insulation or causes fire.
🔌	**Be sure to unplug the power cord from the power outlet when the unit is not in use for long periods of time.** Dust accumulation causes fire.
❗	**Be sure to turn OFF the unit before inserting or removing cords and cables such as the teaching pendant cable or LAN cable.** Failure to do so causes electric shock, data loss, unit breakdown, or malfunction.
🚫	**If disassembling this machine, follow the instructions in the operation manual *Maintenance*, and do not disassemble in any other way other than those specified.** Do not modify the machine in any way. Inappropriate disassembly or modification causes electric shock or unit breakdown.
🚫	**Do not allow water or oil to come in contact with the unit, control box or the power cord.** Contact with water or oil causes electric shock, fire, or unit breakdown. IP Protection Rating: IP20.
🔌	**If anything unusual occurs, such as a burning smell or unusual sound, stop operation and unplug the power cord immediately. Contact Janome (details on the back of this manual) or a Janome dealer.** Continuing to use the robot without addressing the problem causes electric shock, fire, or unit breakdown.

FOR YOUR SAFETY

⚠ Caution

🚫	**Do not drop or jar the unit during transport and/or installation.** This can cause injury or damage the unit.
❗	**Before performing any operation, ensure there is no imminent danger to any of the operators.** Failure to do so causes injury.
❗	**Use the unit in an environment between 0 and 40 °C, with a humidity level of 20 to 90 %, and without condensation.** Use outside of these conditions can cause unit breakdown or malfunction.
❗	**Use the unit in an environment where no electrical noise is present.** Failure to do so causes unit malfunction or breakdown.
❗	**For models with I/O-S circuits*, when installing the unit, take safety measures such as setting up area sensors and safety guards.** If there are no safety measures in place and someone enters the area of operation when the robot is running, they may be injured.
❗	**Keep the emergency stop switch within reach of the operator when running or operating the robot.** If the robot is operated when the emergency switch is not within reach, it may not be possible to stop the robot immediately and safely. This is potentially dangerous.
❗	**Make sure that you regularly perform a function check of the emergency stop switch(es). Also, for models with I/O-S circuits*, regularly perform an I/O-S circuit function check.** If the robot is operated without making these checks, it may not be possible to stop the robot immediately and safely in an emergency. This is potentially dangerous.

* A stop made via a device connected to the I/O-S connector is a category 2 stop. Make sure to perform a separate risk assessment of the interlock device.

FOR YOUR SAFETY

	⚠ **Caution**
🛈	**When attaching tools, a USB camera, or any other device, make sure they are securely fitted before running the robot.** Failure to do so causes injury or breakdown.
🛈	**When using the machine for extended periods of time, check and make sure none of the main unit's mounting screws are loose, and perform a routine inspection every 3 months or after every 750 hours of operation.** Failure to do so causes injury or breakdown.
🛈	**Be sure to check the connections of the cords and cables to the main unit.** Improper wiring causes unit malfunction or breakdown.
🛈	**When lifting or transporting the robot, do so in accordance with the following:** • **Secure the movable parts of the unit (the Z/ZR mechanism) before transportation.** • **Lift and transport the JR3200 Series with 2 or more people.** • **Lift and transport the JR3300 – JR3600 Series with 2 or more people or use a lifter.** • **Hold the bottom of the base and keep the robot horizontal.** • **Do not hold the robot by the column or Y body.** Failure to adhere to this can cause injury or damage the robot.
🛈	**Use the unit in an environment that is not exposed to direct sunlight.** Direct sunlight causes unit malfunction or breakdown.
🚫	Individual Configuration Information varies for each individual unit even if they are the same model. **Do not use backup data with a different robot. The robot cannot function normally with backup data from a different robot.**

FOR YOUR SAFETY

■■■■■■■■■■■■■■■■■ JC-3 Series ■■■■■■■■■■■■■■■■■

Industrial Robot Safety Standards

Make sure to use the robot in accordance with the laws and guidelines of the country where it is used.

FOR YOUR SAFETY

⚠ Danger

🚫	**Do not use where flammable or corrosive gas is present.**
	Leaked gas accumulating around the unit causes explosions or fire.

❗	**Always set up safety guards.**
	Anyone within the maximum reach of the robot may be injured.
	Using the included EMG OUT connector, set up an emergency stop interlock system that is triggered when the entrance to the safety guard is opened and make sure this entrance is the only way to access the machine.
	Furthermore, put up a **"Keep Out"** or **"Do Not Operate"** warning sign in a clearly visible place.
	Example:

FOR YOUR SAFETY

⚠ Danger

(!)	Construct a safety circuit before operating the robot. **Use the EMG OUT connector to maintain safety by installing a relay such as an external stop device on the power supply line which cuts the DC 48 V power input. Construct the safety circuit so it operates as a category 0 stop when the emergency stop switch is pressed.** Without the construction of a safety circuit, motor power 48 V will not be cut OFF even if the emergency stop switch is pressed, leading to unexpected accidents and injury. An error will occur if you construct the safety circuit without it operating as a category 0 stop when the emergency stop switch is pressed.
(Ø)	**When power to the robot is ON, never enter the safety guard or put your head, hands, or any part of your body inside.** Entering the safety guard could result in injury.
(plug)	**Before entering the safety guard or inspecting or performing maintenance on the robot, make sure there is no electrical current.** • **Unplug the controller power cord from the power outlet. Do not touch any of the power inlet pins within 5 seconds of removing the power cords.** • **If using a controller with a terminal block (DC 48 V), turn the power OFF and remove the wiring from the terminal block.** Failure to follow these steps can cause unexpected operation, electric shock, or injury.
(!)	**Before performing a run or operation, always check the following:** • **Obstacles** : Make sure there are no obstacles or people within the safety guard. • **Installation** : Make sure the robot is installed properly, that there are no abnormalities with the robot and surrounding devices, and that the teaching pendant and tools are in the appropriate places. • **Emergency Stop Switch** : Make sure the EMG OUT circuit (interlock) and emergency stop switch(s) are functioning properly. It is potentially dangerous to operate the robot without making these checks first.

FOR YOUR SAFETY

⚠ Danger

Keep the emergency stop switch within reach of the operator when running or operating the robot.
If the robot is operated when the emergency switch is not within reach, it may not be possible to stop the robot immediately and safely. This is potentially dangerous.

Make sure that you regularly perform a function check of the emergency stop switch(s). Also regularly perform an EMG OUT circuit function check.
If the robot is operated without making these checks, it may not be possible to stop the robot immediately and safely in an emergency. This is potentially dangerous.

⚠ Warning

Make sure to power the unit within its rated current range.
Failure to do so causes electric shock, fire, or unit breakdown.

Plug the power cord into the power outlet firmly.
Failure to do so causes the plug to heat up resulting in fire.

Make sure to connect and use crimp terminals with the power cord connecting to the terminal block (DC 48 V input) and to securely tighten the terminal block screws. Failure to do so causes electric shock, fire, or unit breakdown.

Make sure to perform work from outside of the safety guards when the power is ON. Failure to do so can cause injury.

Be sure to use the unit within its indicated voltage range.
Failure to do so causes unit breakdown, fire, or electric shock.

Install the controller within an industrial control panel, and make sure when the industrial control panel door is opened, the controller power is automatically cut off. In addition, for controllers with a cooling fan, allow for a clearance of 30 cm or more from the top of the controller, as well as 10 cm or more from the air vent on the side. Inadequate installation can cause overheating, fire, electric shock, or injury.

FOR YOUR SAFETY

⚠ **Warning**

🛈	**With the 3 axis specifications, if releasing the brake, do so after either removing the attached tool or taking measures to prevent the tool from dropping.** If you release the brake when turning the power ON in Teaching Mode, Switch Run Mode, or External Run Mode, the axis may drop down depending on the mass attached to the Z axis. If the Z axis drops down, it can cause injury or unit breakdown.
🔌	When inspecting or performing maintenance on the controller, **make sure there is no electrical current and perform the following**: • **Unplug the controller power cord from the power outlet. Do not touch any of the power inlet pins within 5 seconds of removing the power cords.** • **If using a controller with a terminal block (DC 48 V), turn the power OFF and remove the wiring from the terminal block.** Failure to follow these steps can cause electric shock, injury, data loss, unit breakdown, or malfunction.
⏚	Always **make sure the machine is grounded through the power cord.** **Do not use the machine when it is not grounded.** Improper grounding causes electric shock, fire, malfunction, or unit breakdown.
🛈	**Wipe the power plug with a clean, dry cloth periodically to eliminate dust.** Dust accumulation deteriorates the electrical insulation or causes fire.
🔌	**Be sure to unplug the power cord from the power outlet when the unit is not in use for long periods of time.** Dust accumulation causes fire.
🚫	**If disassembling this machine, follow the instructions in the operation manual *Maintenance*, and do not disassemble in any other way other than those specified. Do not modify the machine in any way.** Inappropriate disassembly or modification causes electric shock or unit breakdown.
🚫	**Do not allow water or oil to come in contact with the unit, controller or the power cord.** Contact with water or oil causes electric shock, fire, or unit breakdown. IP Protection Rating: IP20.

FOR YOUR SAFETY

■■■■■■■■■■■■■■■■■■ JC-3 Series ■■■■■■■■■■■■■■■■■■

⚠ Warning

If anything unusual occurs, such as a burning smell or unusual sound, stop the run, unplug the controller power cord from the power outlet, and make sure there is no electrical current. Contact Janome (details on the back of this manual) or a Janome dealer.

- **Unplug the controller power cord from the power outlet. Do not touch any of the power inlet pins within 5 seconds of removing the power cords.**
- **If using a controller with a terminal block (DC 48 V), turn the power OFF and remove the wiring from the terminal block.**

Continuing to use the robot without addressing the problem causes electric shock, fire, or unit breakdown.

Make sure to use the robot in accordance with the laws and guidelines of the country where it is used.

⚠ Caution

Do not drop or jar the unit during transport and/or installation.
This can cause injury or damage the unit.

Before performing any operation, ensure there is no imminent danger to any of the operators.
Failure to do so causes injury.

Use the unit in an environment between 0 and 40 °C, with a humidity level of 20 to 90 %, and without condensation.
Use outside of these conditions can cause unit breakdown or malfunction.

Use the unit in an environment where no electrical noise is present.
Failure to do so causes unit malfunction or breakdown.

When attaching tools, a USB camera, or any other device, make sure they are securely fitted before running the robot.
Failure to do so causes injury or breakdown.

FOR YOUR SAFETY

⚠ Caution

❗	**When using the machine for extended periods of time, check and make sure none of the main unit's mounting screws are loose, and perform a routine inspection every 3 months or after every 750 hours of operation.** Failure to do so causes injury or breakdown.
❗	**Be sure to check the connections of the cords and cables to the main unit and controller.** Improper wiring causes unit malfunction or breakdown.
❗	**Secure the movable parts of the unit before transportation.** Failure to do so causes injury or breakdown.
❗	**When lifting and transporting the robot, do so with 2 or more people.** Failure to do so causes injury or breakdown.
❗	**Use the unit in an environment that is not exposed to direct sunlight.** Direct sunlight causes unit malfunction or breakdown.
🚫	Individual Configuration Information varies for each individual unit even if they are the same model. **Do not use backup data with a different robot. The robot cannot function normally with backup data from a different robot.**

1. READING THE MODEL NAME

1.1 Main Unit

■ JR3000 Series

Example: **JR3 20 4 E – A C**

→ Power Specifications
- C: 100 – 120 V/200 – 240 V~*   50/60 Hz (no outlet models)
  - 200 – 240 V~*   50/60 Hz (outlet models)
- J: 100 – 120 V~*   50/60 Hz (outlet models)
  - * ± 10% tolerance

→ Operation Panel
- A: Installed Switch Specifications
- B: Switchbox Specifications
- C: Basic Switchbox Specifications

- E: Encoder
- N: No encoder
- F: High Payload Model

→ Number of axes
- 3 = X, Y, Z
- 4 = X, Y, Z, R

→ X axis and Y axis stroke
- 20 = 200 x 200 mm
- 30 = 300 x 320 mm
- 40 = 400 x 400 mm
- 50 = 510 x 510 mm
- 60 = 510 x 620 mm

→ Janome Desktop Robot JR3000 Series

■ JC-3 Series

Example: **JC-3 A 0 0 - 0 T 3**

→ Number of Axes
- 2: 2-Axis Specifications
- 3: 3-Axis Specifications
- 4: 4-Axis Specifications

→ Supporting Frame
- T: Single Sided
- H: Double Sided

→ Specifications
- 0: Standard Specifications

→ Z/ZR Axis
- N: None
- 0: Z Slider: Oriental Motor
- 1: ZR Mechanism: Janome Sewing Machine

→ XY Slider
- 0: Oriental Motor

→ Motor

	X	Y	Z	R
A	AR	AR	AR	
B	AR	AR	Sanyo	Sanyo
C	AR	AR		
D	AZ	AZ	AZ	

AR: Incremental encoder motor, Oriental Motor

AZ: Absolute encoder motor, Oriental Motor

Sanyo: ZR motor, Sanyo Electric

→ Janome Cartesian Robot JC-3 Series

1.2 Controller (JC-3 Series Only)

Example: **JC-3 C – 3**

→ Number of Axes

- 2: 2-Axis Model

- 3: 3-Axis Model

- 4: 4-Axis Model

- 3A: 3-Axis Absolute Encoder Model

→ Classification

- C: Controller

→ Janome Cartesian Robot JC-3 Series

2. PART NAMES

2.1 JR3200 Series

2.1.1 Main Unit

4 Axis Specs
Z Mechanism

R Axis

Z Mechanism

Y Body

Column

X Table

Base

Example: JR3203N-AC

2.1.2 Operation Panel

■ Installed Switch Specifications
  Example: JR3203N-AC

LED (red)
Program Number Display
Start/Stop Switch
Emergency Stop Switch
Program Number Keys
LED (green)
Fieldbus (Optional)
Teaching Pendant Connector
MEMORY Port
COM1:RS-232C
LAN Port

■ Installed Switch Specifications with Optional Switch
  Example: JR3203N-AC

Optional Switch
LED (red)
Program Number Display
Start/Stop Switch
Emergency Stop Switch
Program Number Keys
LED (green)
Fieldbus (Optional)
Teaching Pendant Connector
MEMORY Port
COM1:RS-232C
LAN Port

■ Switchbox Specifications
   Example: JR3203N-BJ

Fieldbus (Optional)

LED Lamp

Teaching Pendant Connector

MEMORY Port

LAN Port

Switchbox Connector

COM1:RS-232C

■ Basic Switchbox Specifications
   Example: JR3203N-CC

LED (red)

Program Number Display

PROG. NO.

ERROR

RUN

Program Number Keys

LED (green)

Teaching Pendant Connector

Fieldbus (Optional)

MEMORY Port

LAN Port

Switchbox Connector

COM1:RS-232C

2.1.3 Operation Panel Rear

Example: JR3203N-AC/BC/CC

Power Switch

I/O Internal Power Fuse
(optional)

COM2:RS-232C
(optional)

Inlet

I/O-SYS

I/O-S (optional)

I/O-1 (optional) or I/O-MT (optional)
In this diagram, the I/O-MT connector is shown.

Grounding Screw

COM3:RS-232C
(optional)

2.2 JR3300 Series

2.2.1 Main Unit

4 Axis Specs
Z Mechanism

R Axis

Z Mechanism

Column

Y Body

Column

X Table

Base

Example: JR3303N-AJ

2.2.2 Operation Panel
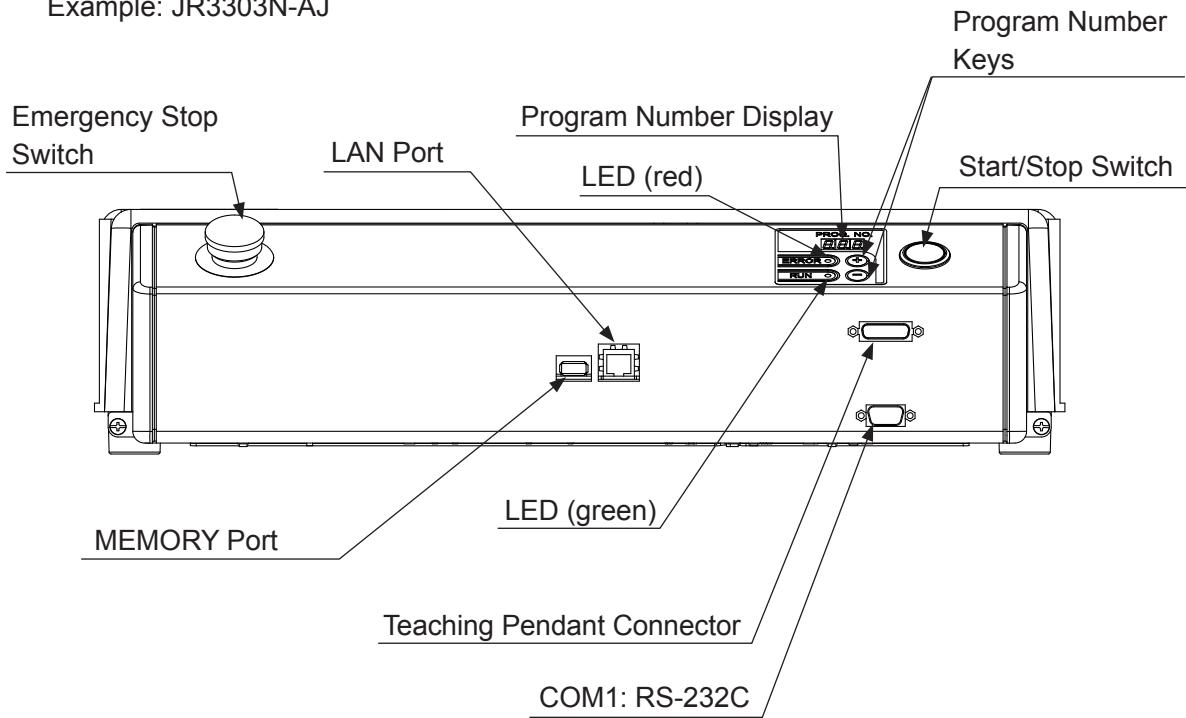
■ Installed Switch Specifications
  Example: JR3303N-AJ

Program Number Keys

Emergency Stop Switch

LAN Port

Program Number Display

LED (red)

Start/Stop Switch

MEMORY Port

LED (green)

Teaching Pendant Connector

COM1: RS-232C

■ Installed Switch Specifications with Optional Switch
  Example: JR3303N-AJ

Program Number Keys

Optional Switch

Emergency Stop Switch

LAN Port

Program Number Display

LED (red)

Start/Stop Switch

MEMORY Port

LED (green)

Teaching Pendant Connector

COM1: RS-232C

■ Switchbox Specifications
　Example: JR3303N-BJ

LAN Port

LED

MEMORY Port

Teaching Pendant Connector

Switchbox Connector

COM1:RS-232C

■ Basic Switchbox Specifications
　Example: JR3303N-CJ

Program Number Display

LED (red)

LED (green)

Program Number Keys

PROG. NO.

MEMORY Port

Teaching Pendant Connector

COM1:RS-232C

LAN Port

Switchbox Connector
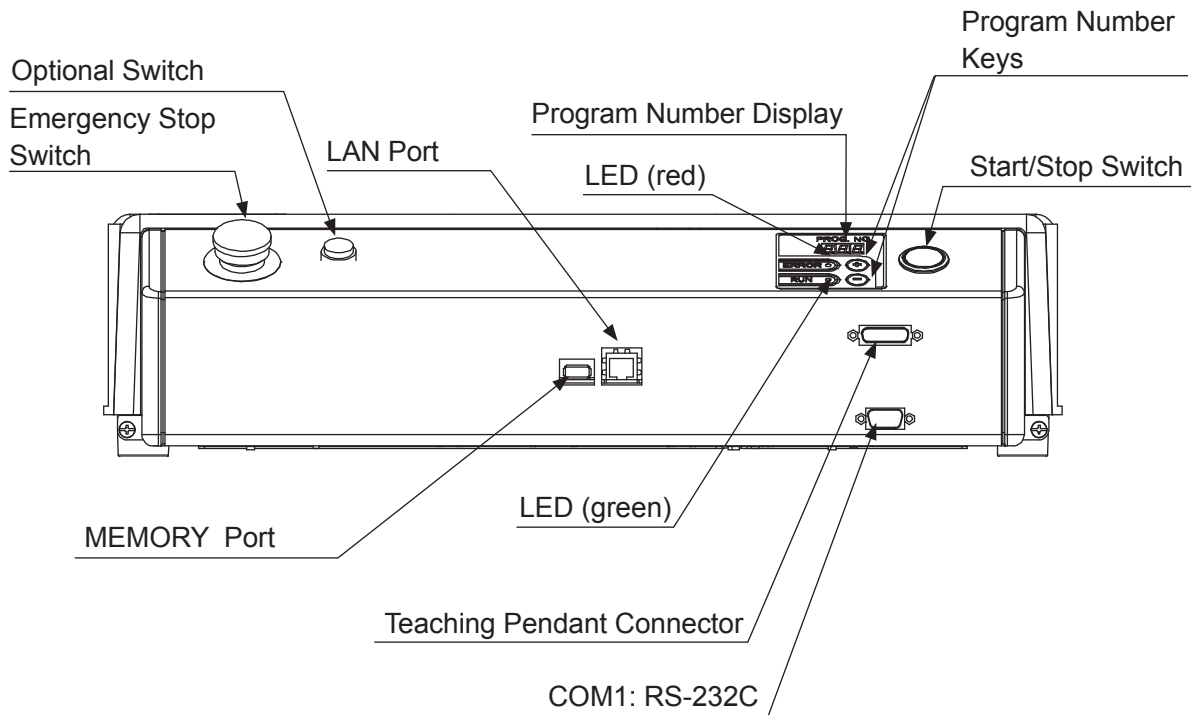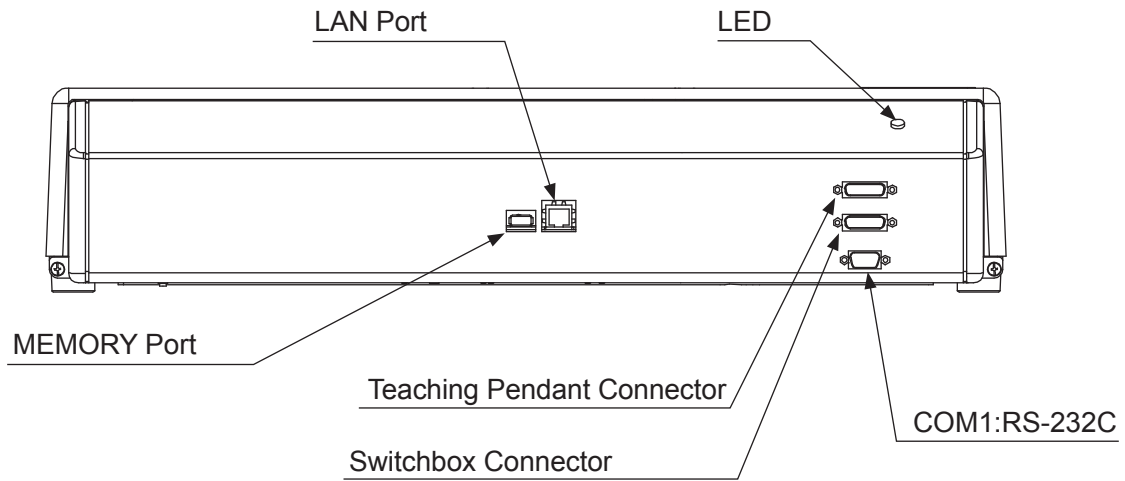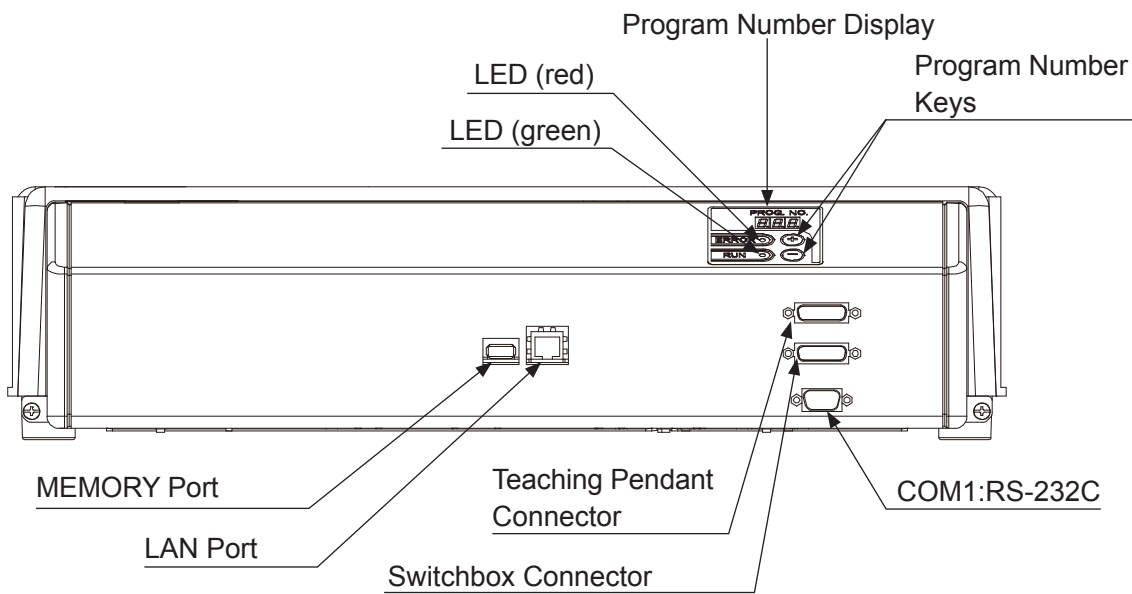
2.2.3 Operation Panel Rear

■ Outlet 100 V Specifications
Example: JR3303N-AJ/BJ/CJ

I/O Internal Power Fuse (optional)

COM2:RS-232C (optional)

COM3:RS-232C (optional)

Outlet

Fieldbus (optional)

Inlet

Power Switch

I/O-S (optional)

Grounding Screw

I/O-MT (optional)

I/O-1 (optional)

I/O-SYS

Outlet Fuse
(3.15 Time Lag Type ⌀ 5.2 × 20)
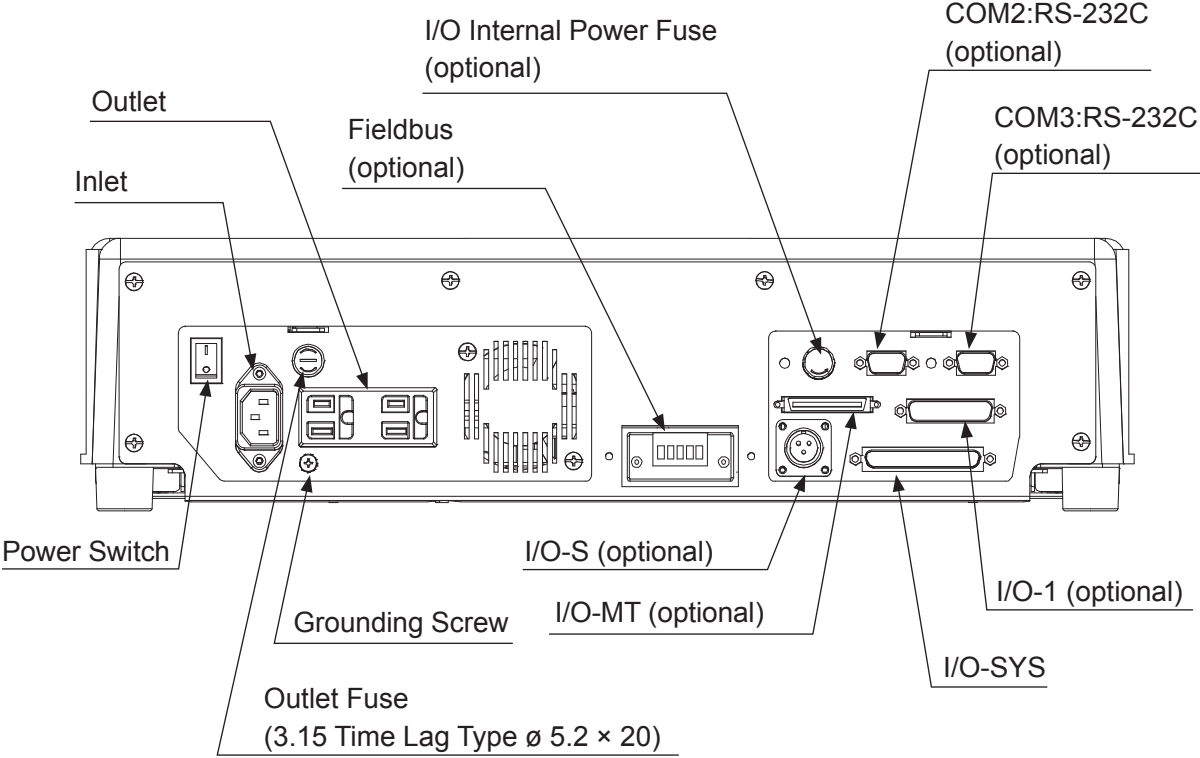
2.3 JR3400 – JR3600 Series

2.3.1 Main Unit

4 Axis Specs.
Z Mechanism

R Axis

Z Mechanism

Column

Y Body

X Table

Base
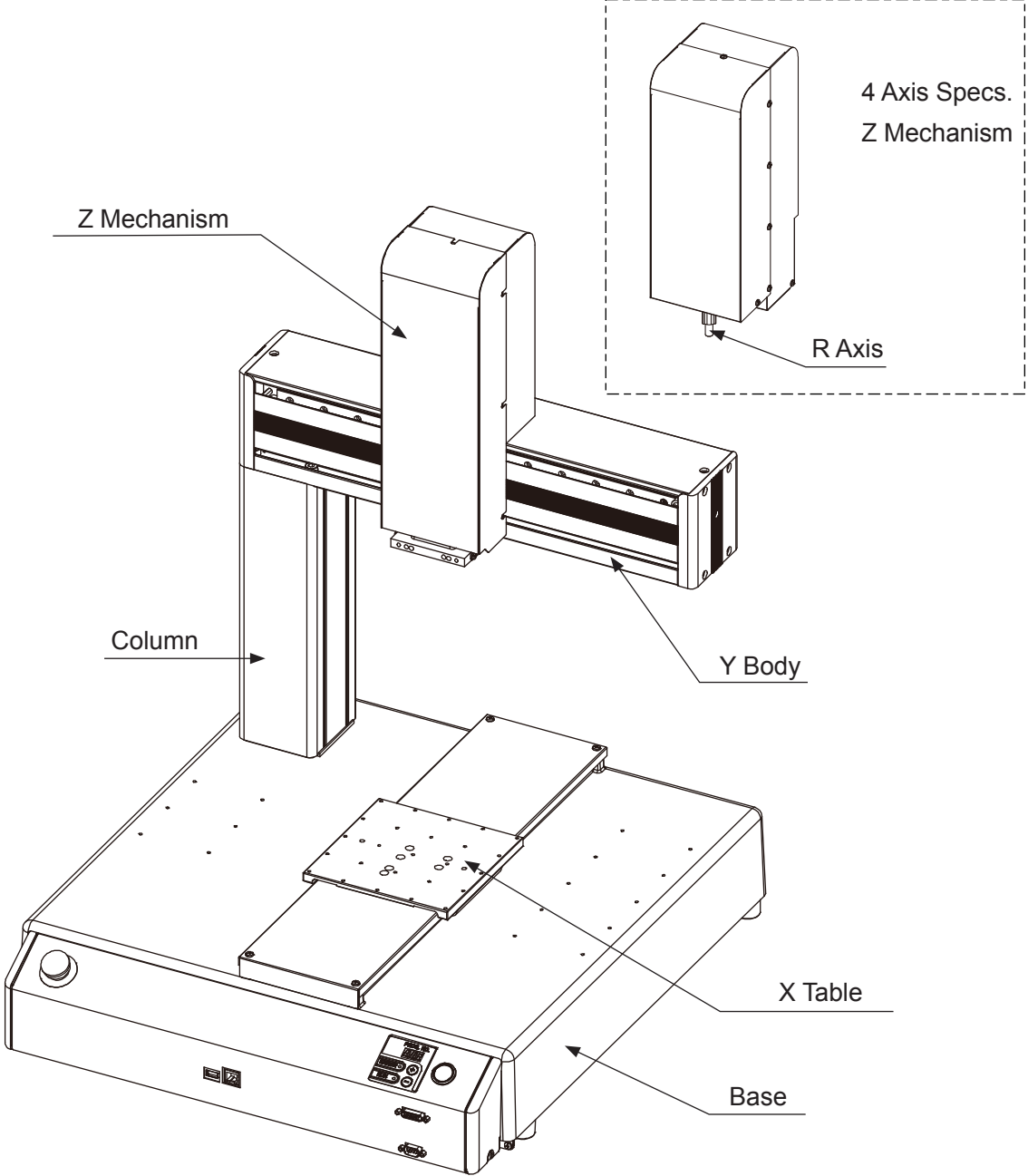
Example: JR3403N-AJ

2.3.2 Operation Panel
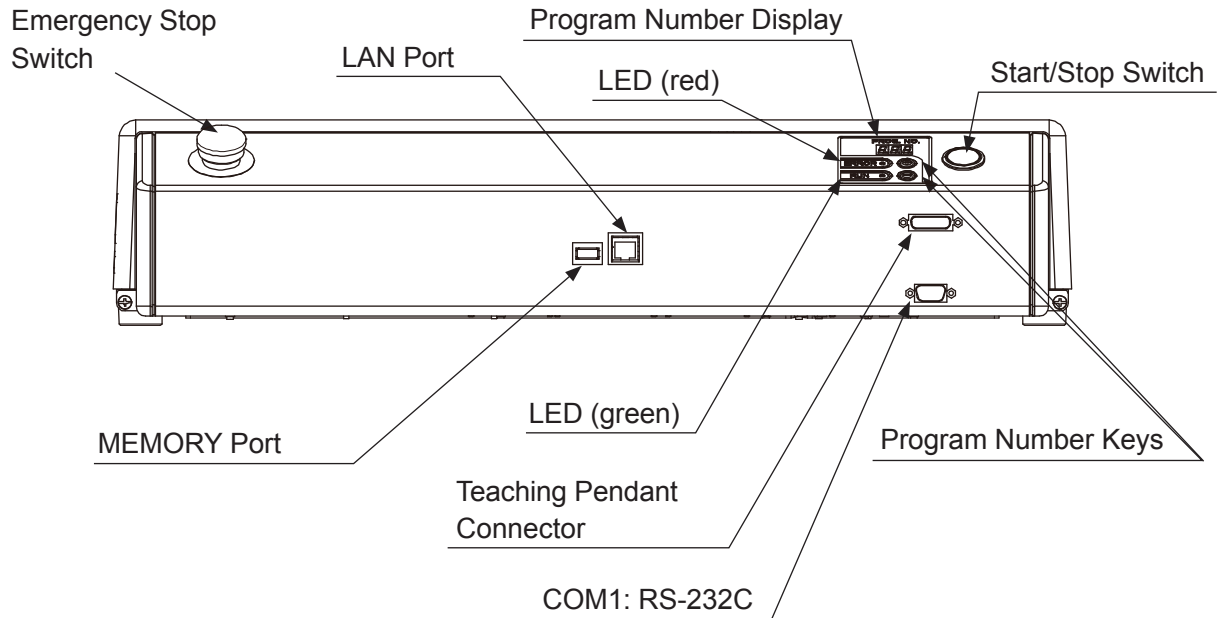
■ Installed Switch Specifications
      Example: JR3403N-AJ

Emergency Stop Switch
LAN Port
Program Number Display
LED (red)
Start/Stop Switch
MEMORY Port
LED (green)
Program Number Keys
Teaching Pendant Connector
COM1: RS-232C

■ Installed Switch Specifications with Optional Switch
      Example: JR3403N-AJ

Optional Switch
Emergency Stop Switch
LAN Port
Program Number Display
LED (red)
Start/Stop Switch
MEMORY Port
LED (green)
Program Number Keys
Teaching Pendant Connector
COM1: RS-232C

■ Switchbox Specifications
　Example: JR3403N-BJ

LAN Port

LED

MEMORY Port

Teaching Pendant Connector

COM1:RS-232C

Switchbox Connector

■ Basic Switchbox Specifications
　Example: JR3403N-CJ

Program Number Display

LED (red)

LED (green)

Program Number Keys

MEMORY Port

Teaching Pendant
Connector

COM1:RS-232C

LAN Port

Switchbox Connector
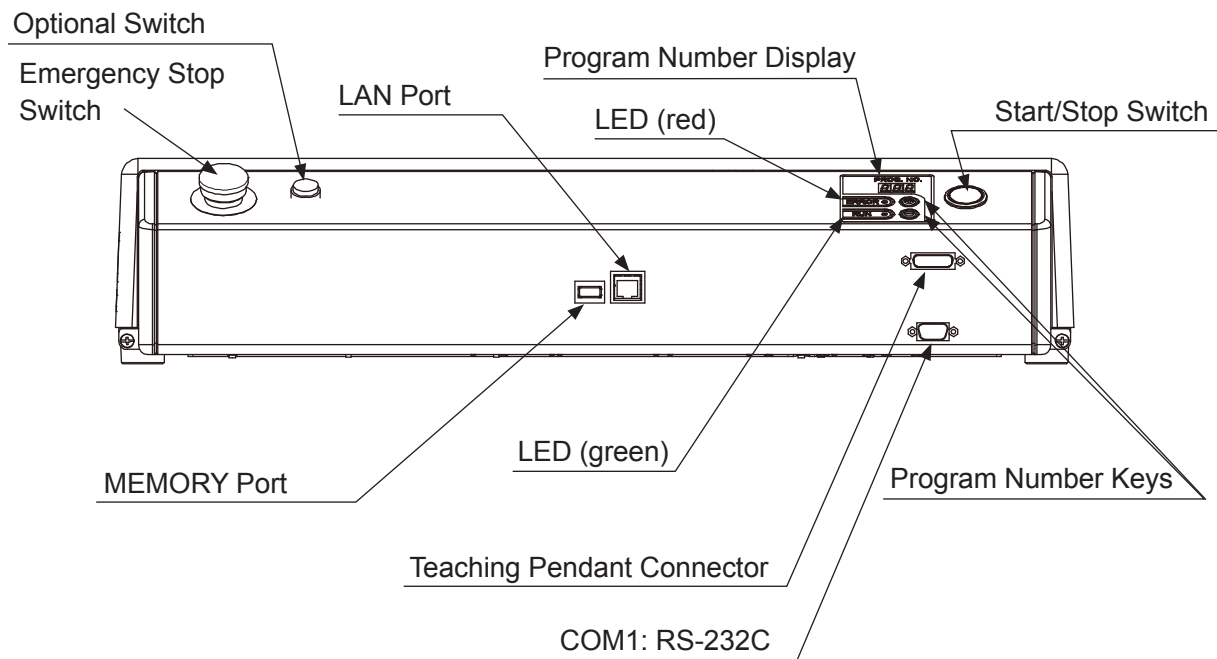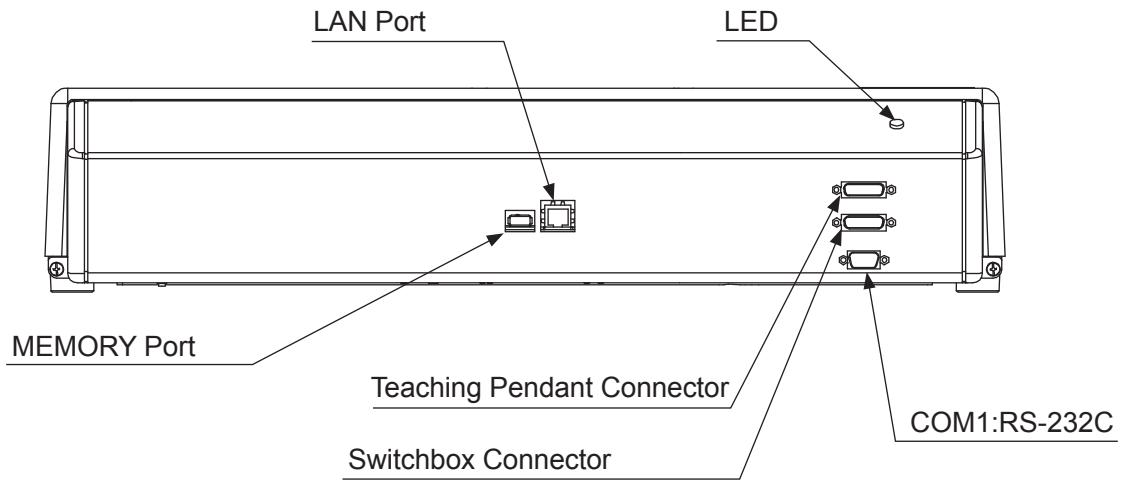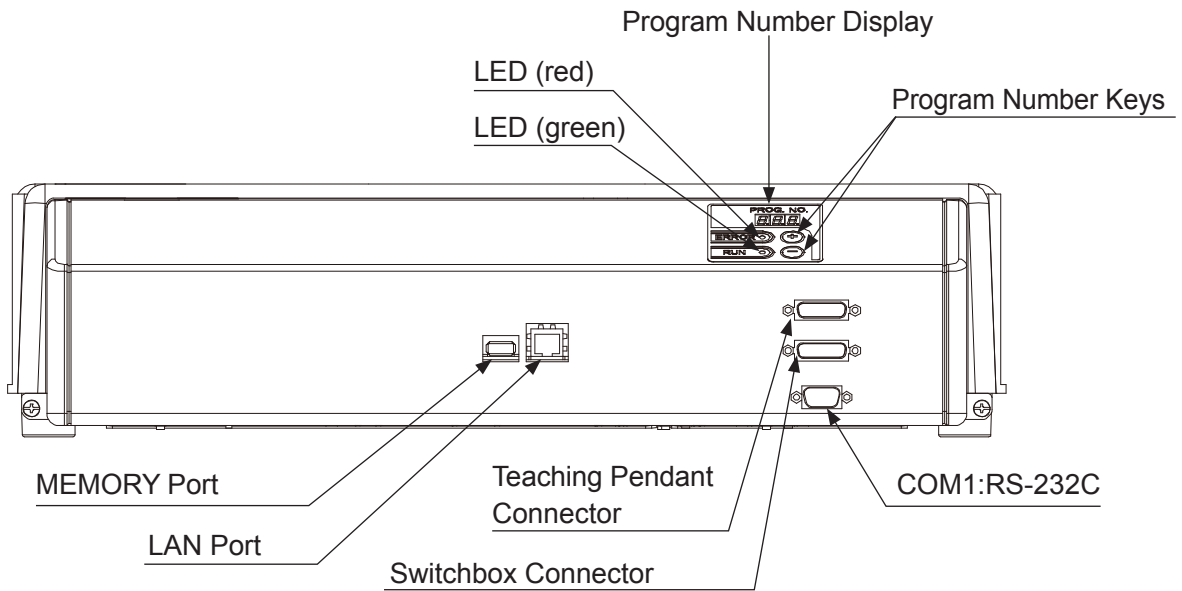
2.3.3 Operation Panel Rear

■ Outlet 100 V Specifications
　　Example: JR3403N-AJ/BJ/CJ

Outlet Fuse
(3.15 Time lag type ø 5.2 × 20)

Outlet

Inlet

Fieldbus
(optional)

COM2:RS-232C
(optional)

COM3:RS-232C
(optional)

I/O-S (optional)

Grounding Screw

Power Switch

I/O Internal Power Fuse (Optional)

I/O-SYS

I/O-MT (optional)
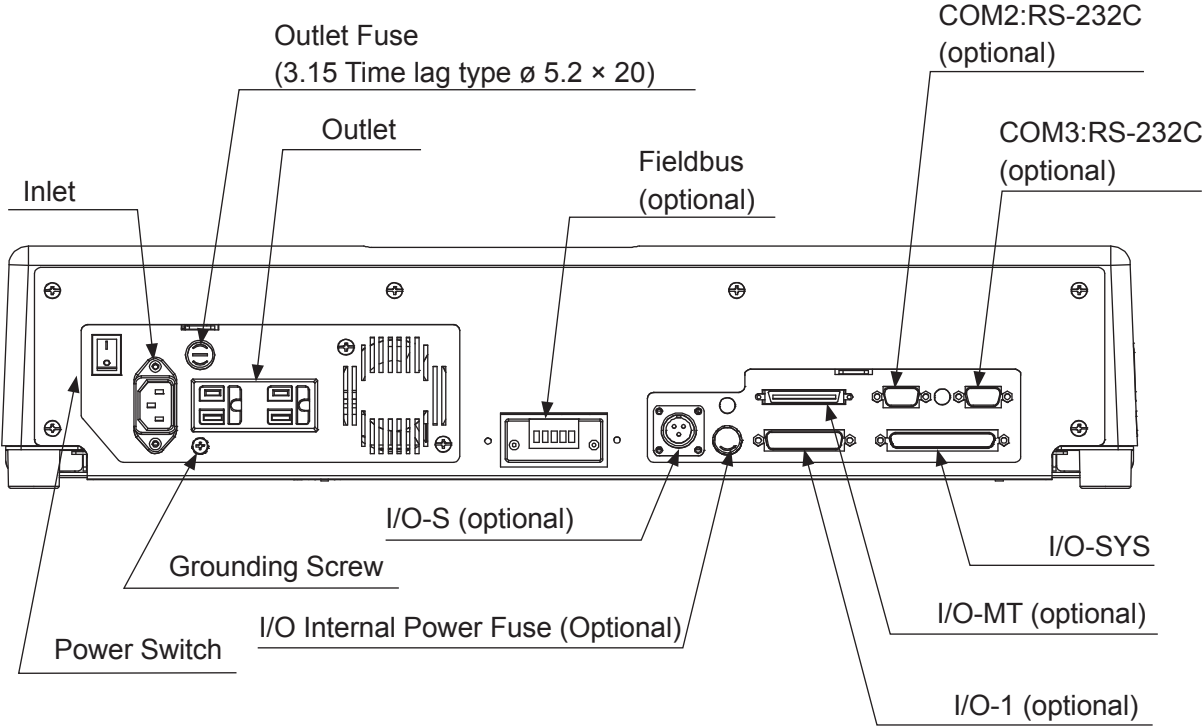
I/O-1 (optional)

2.4 JC-3 Series

2.4.1 Main Unit

■ JC-3C0N-0T2 (2 Axis Specifications)

Bracket

Y Connector Mounting Plate

Y Slider

Table

Cableveyor (Optional)

X Slider
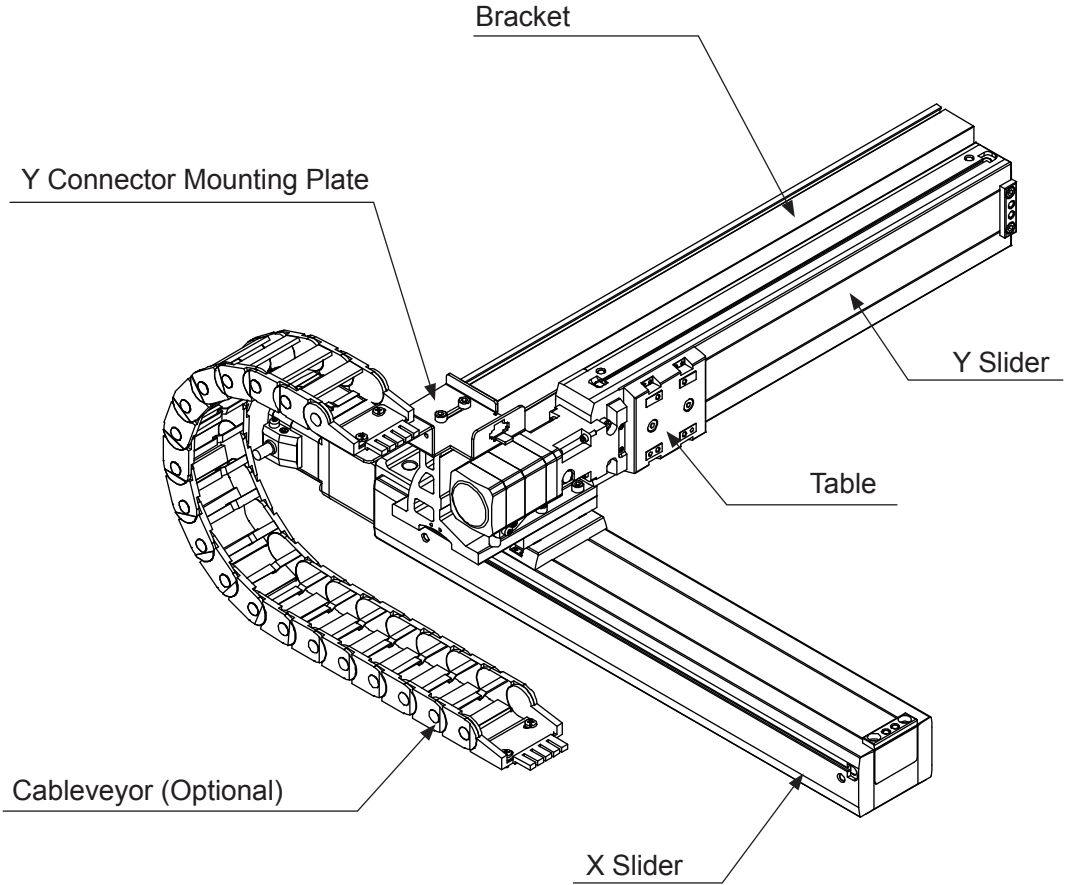
■ JC-3C0N-0H2 (2 Axis Specifications)

Bracket

Y Connector
Mounting Plate

Support Guide

Y Slider

Table

Cableveyor
(Optional)

X Slider
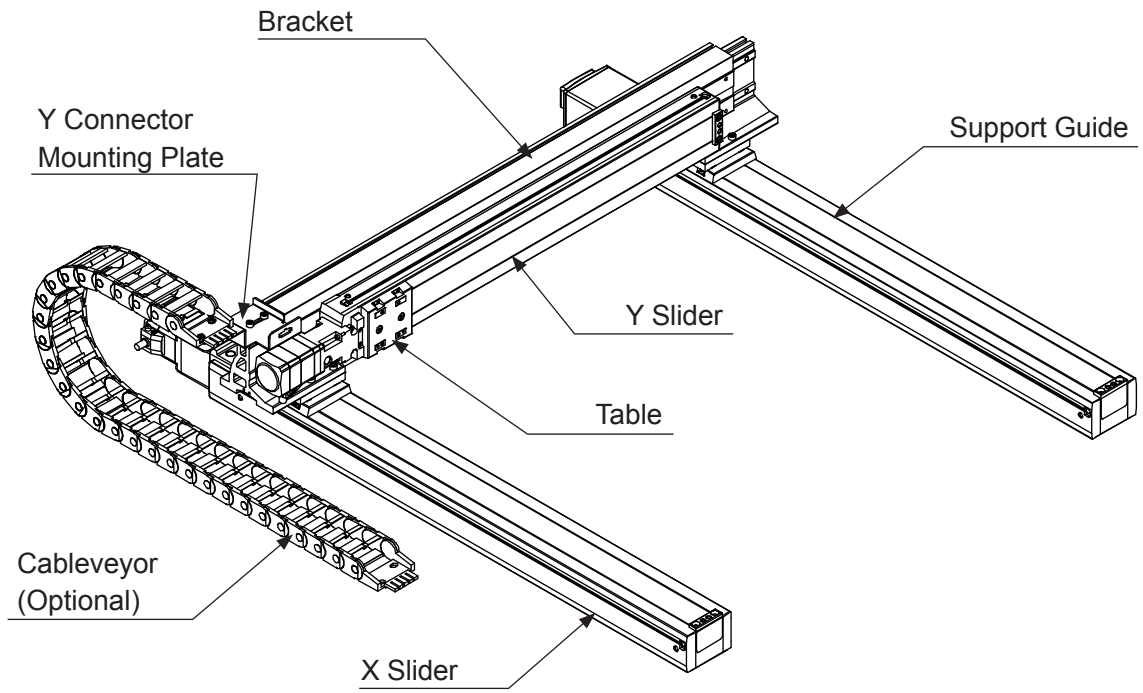
■ JC-3A00-0T3 (3 Axis Specifications)
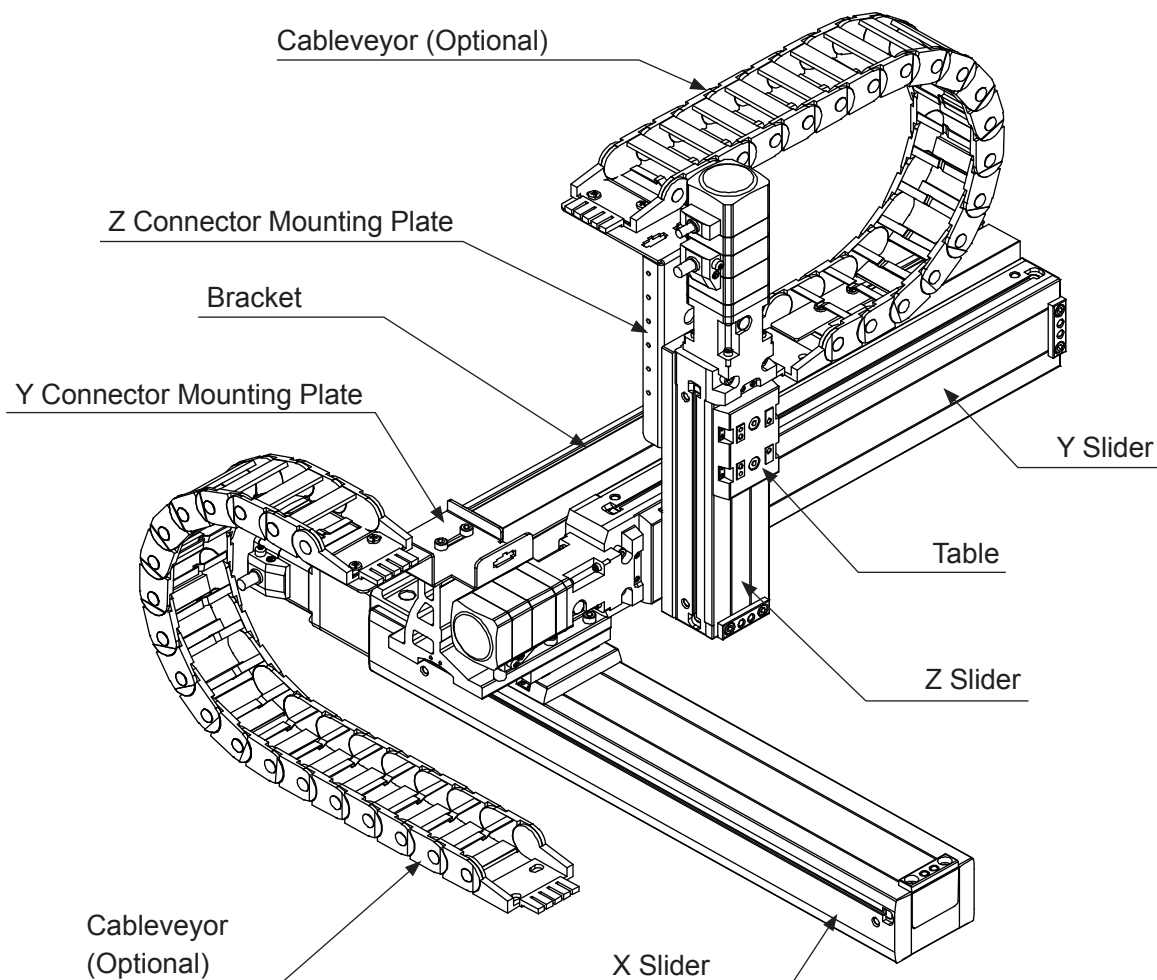
Cableveyor (Optional)

Z Connector Mounting Plate

Bracket

Y Connector Mounting Plate

Y Slider

Table

Z Slider

Cableveyor
(Optional)

X Slider

NOTE:

- The optional covers for the Y and Z connector mounting plates are omitted from this diagram.
- Absolute encoder models are equipped with Y and Z connector mounting plate covers by standard.

■ JC-3A00-0H3 (3 Axis Specifications)
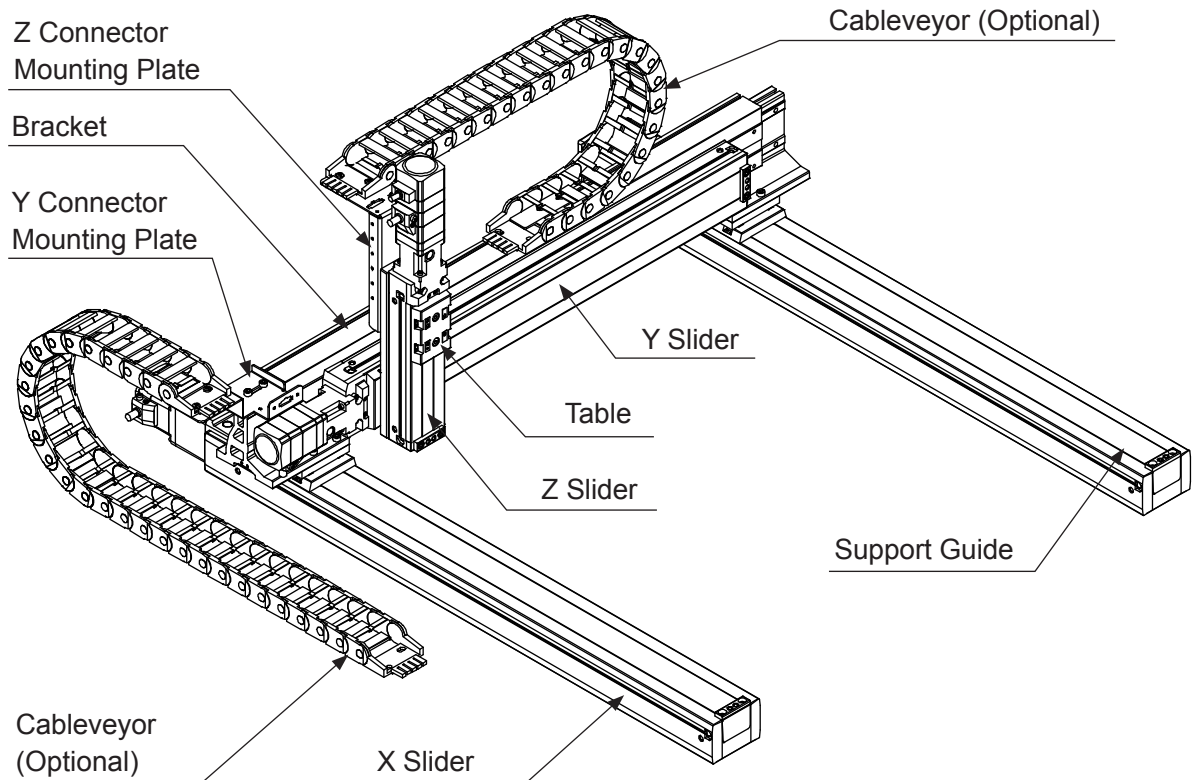
Z Connector Mounting Plate

Bracket

Y Connector Mounting Plate

Cableveyor (Optional)

Y Slider

Table

Z Slider

Support Guide

Cableveyor (Optional)

X Slider

NOTE:

- The optional covers for the Y and Z connector mounting plates are omitted from this diagram.
- Absolute encoder models are equipped with Y and Z connector mounting plate covers by standard.

■ JC-3B01-0H4 (4 Axis Specifications)

Cableveyor (Optional)

ZR Cableveyor
Retainer Plate

Y Connector
Mounting Plate

Y – Z Veyor Guide (Optional)

Bracket

Y Slider

ZR Mechanism

R Axis

Support Guide

Cableveyor
(Optional)

X Slider
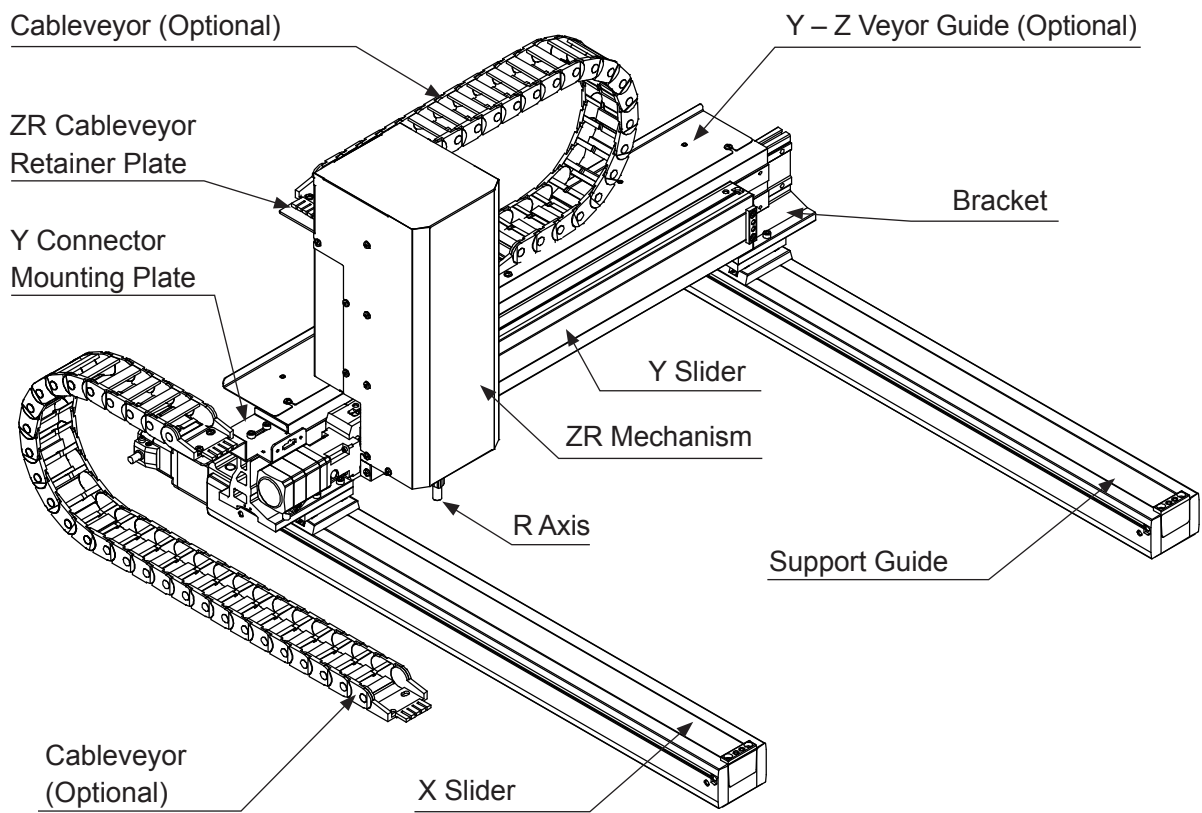
NOTE: The optional cover for the Y connector mounting plate is omitted from this diagram.

2.4.2 Controller

■ JC-3 C-2 (2 Axis Specifications) / JC-3C-3 (3 Axis Specifications)

Power Lamp

COM1

COM2

COM3

I/O-SYS

Motor
Connectors
- Z Bre*
- MX
- MY
- MZ*

MP
External Power
Supply DC 48 V

Inlet

TPU

SW-BOX

I/O-1

LAN

MEMORY

I/O-MT (Optional)

Fieldbus (Optional)

Power Switch

Fuse

EMG-OUT

JANOME JC-3

POWER TPU

COM1 SWBOX

COM2 I/O-1

COM3 I/O-MT

I/O-SYS

Z Bre MX MY MZ

MP
48V ---

INLET
90-240V~

EMG OUT

FUSE
2.5A ST

LAN

MEMORY
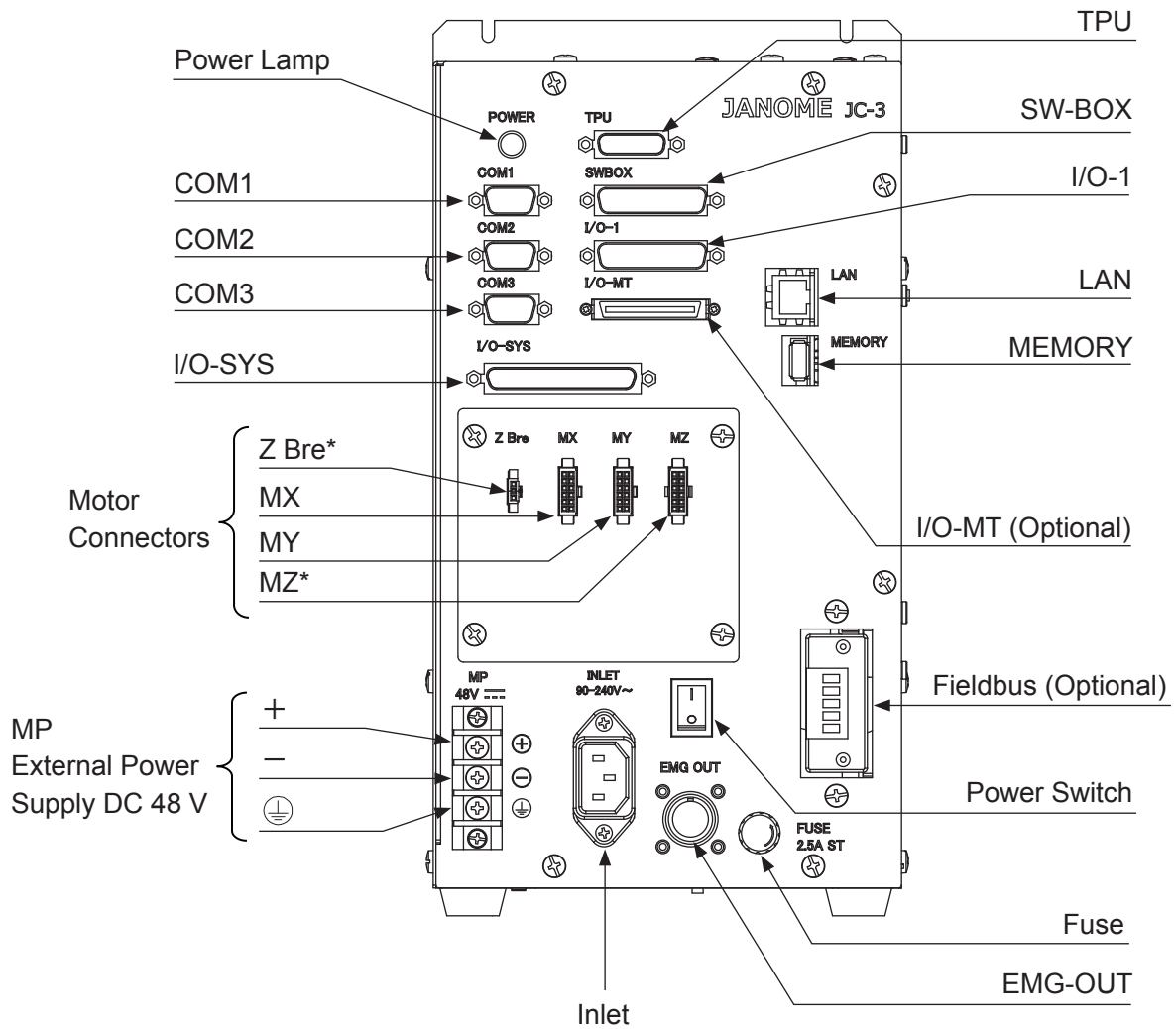
* 2 axis specifications are not equipped with these items.

■ JC-3 C-4 (4 Axis Specifications)

Power Lamp

TPU

SW-BOX

I/O-1

COM1

COM2

COM3

I/O-SYS

LAN

MEMORY

Motor
Connectors

SEN
MX
MY
MZR

I/O-MT (Optional)

MP
External Power
Supply DC 48 V

Fieldbus (Optional)

Power Switch

Fuse

EMG-OUT

Inlet
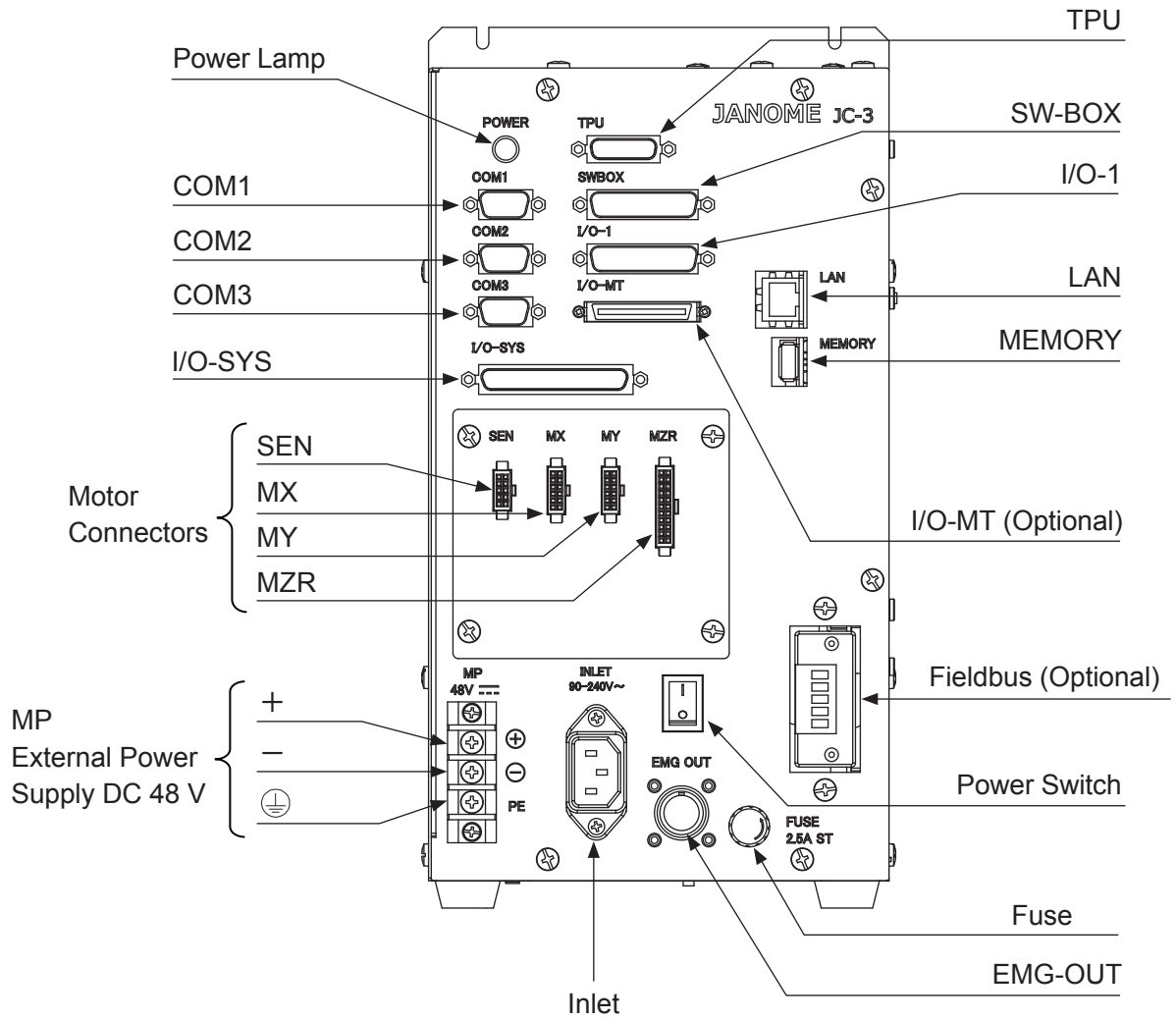
■ Absolute Encoder Model JC-3 C-3 (3 Axis Specifications)

Power Lamp

TPU

SW-BOX

I/O-1

LAN

MEMORY

COM1

COM2

COM3

I/O-SYS

I/O-MT (Optional)

Motor Connectors
- MX
- MY
- MZ
- Z Bre

Fieldbus (Optional)

MP External Power Supply DC 48 V
- +
- −
- ⏚

Power Switch

Fuse

EMG-OUT

Inlet
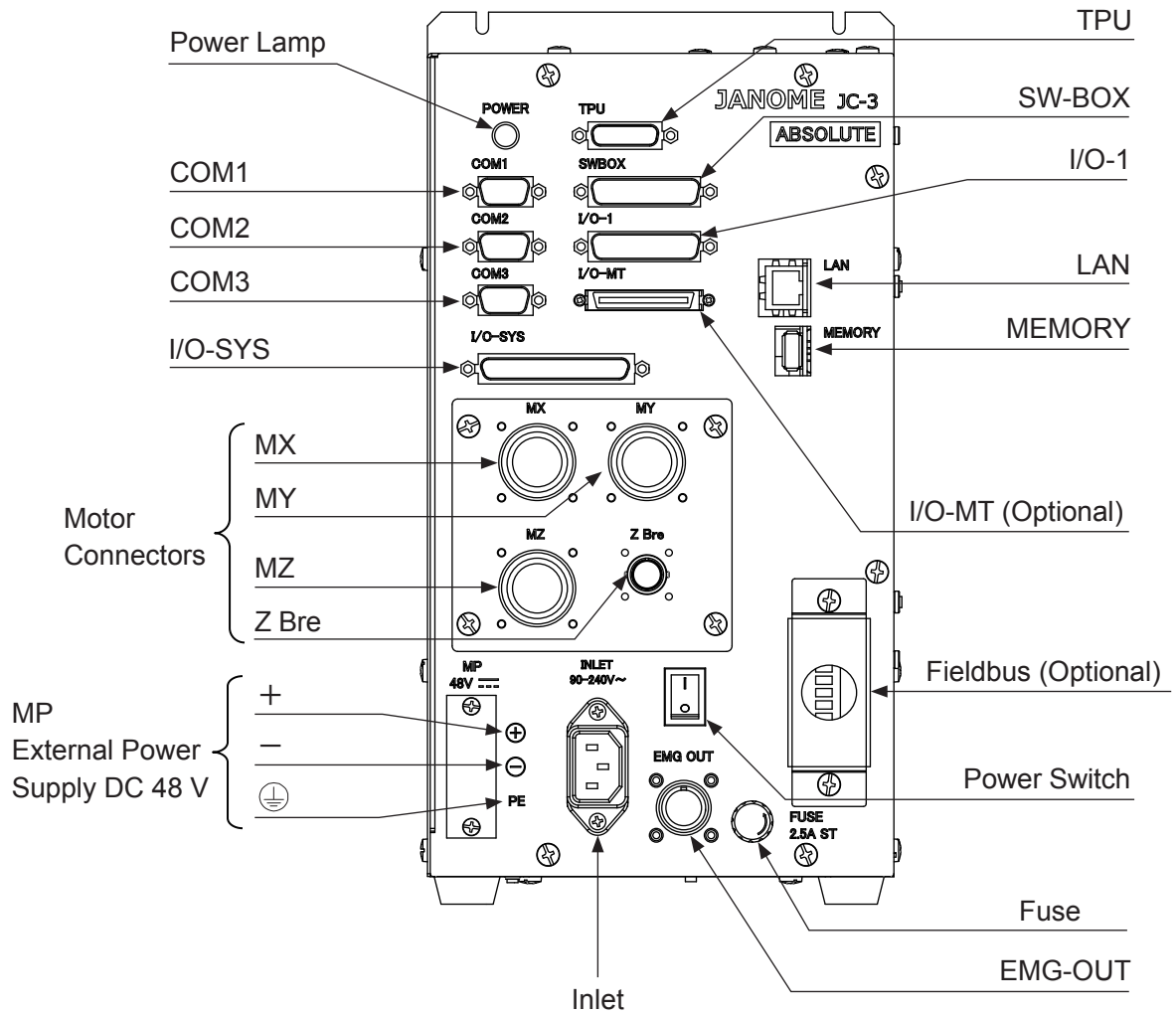
2.5 Teaching Pendant

The teaching pendant is a device used to teach and enter programs etc., into the robot. There are two types of teaching pendants.

Teaching Pendant II (New Model)
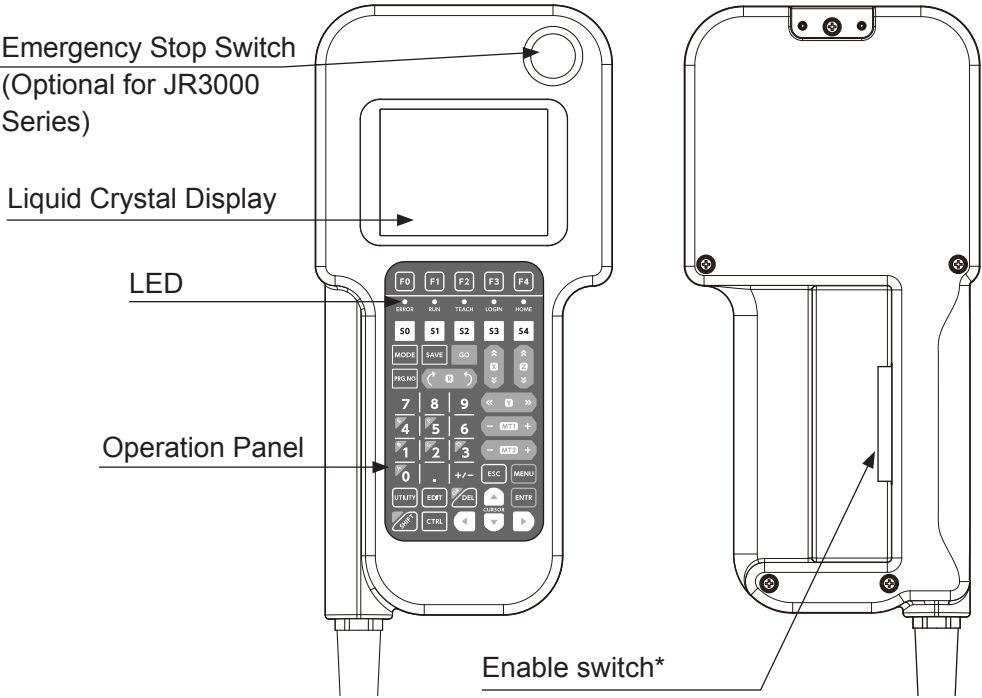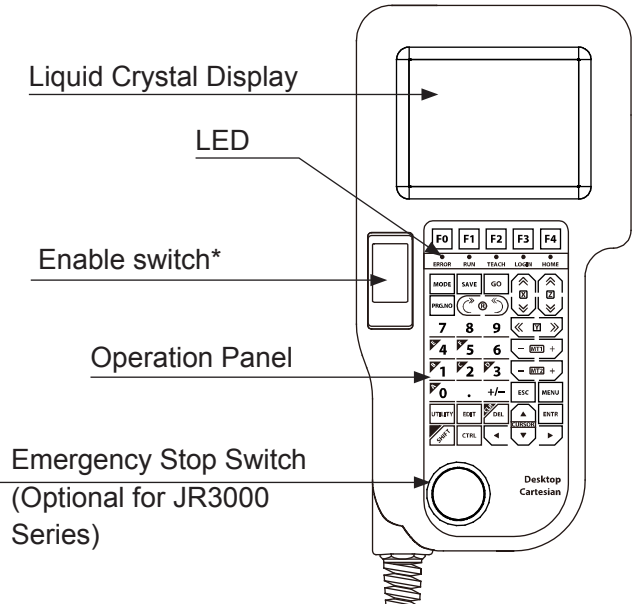
Emergency Stop Switch (Optional for JR3000 Series)

Liquid Crystal Display

LED

Operation Panel

Enable switch*

Teaching Pendant (Conventional Model)

Liquid Crystal Display

LED

Enable switch*

Operation Panel

Emergency Stop Switch (Optional for JR3000 Series)

* A stop made via the enable switch is a category 2 stop. The motor is stopped with power left available to the actuators.

NOTE: The teaching pendant is optional.

2.6 Switchbox

The switchbox is a device to be used from a separate location equipped with a start/stop switch and emergency stop switch.

2.6.1 JR3000 Series

■ Standard Specifications (included with switchbox specifications robots)
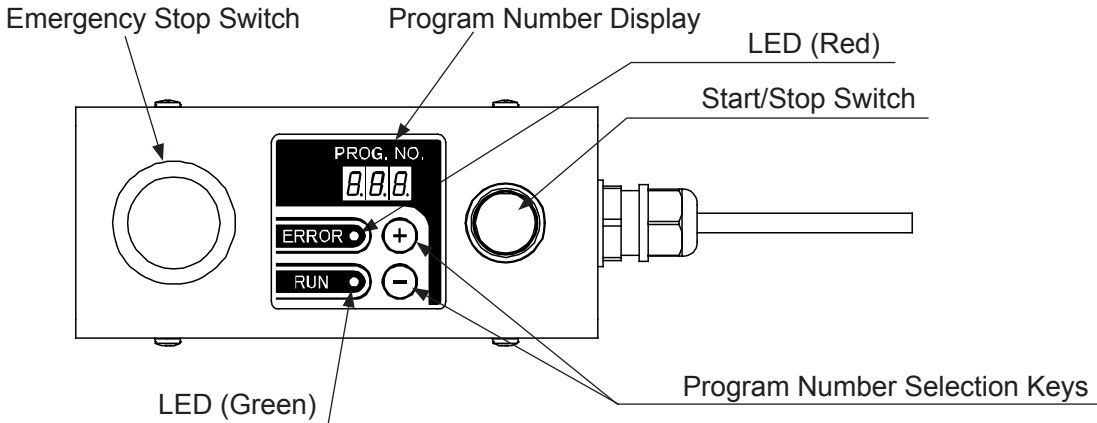
■ Standard Specifications with Select Switch (included with switchbox specifications robots)

■ Standard Specifications with Optional Switch (included with switchbox specifications robots)

Emergency Stop Switch   Program Number Display   LED (Red)

Start/Stop Switch

PROG. NO.

ERROR

RUN

Optional Switch

LED (Green)

Program Number Selection Keys

■ Basic Specifications (included with basic switchbox specification robots)

Emergency Stop Switch

Start/Stop Switch

■ Basic Specifications with Select Switch (included with basic switchbox specification robots)

Emergency Stop Switch

Start/Stop Switch

Cap

Select Switch

■ Basic Specifications with Optional Switch (included with basic switchbox specification robots)

Emergency Stop Switch

Start/Stop Switch
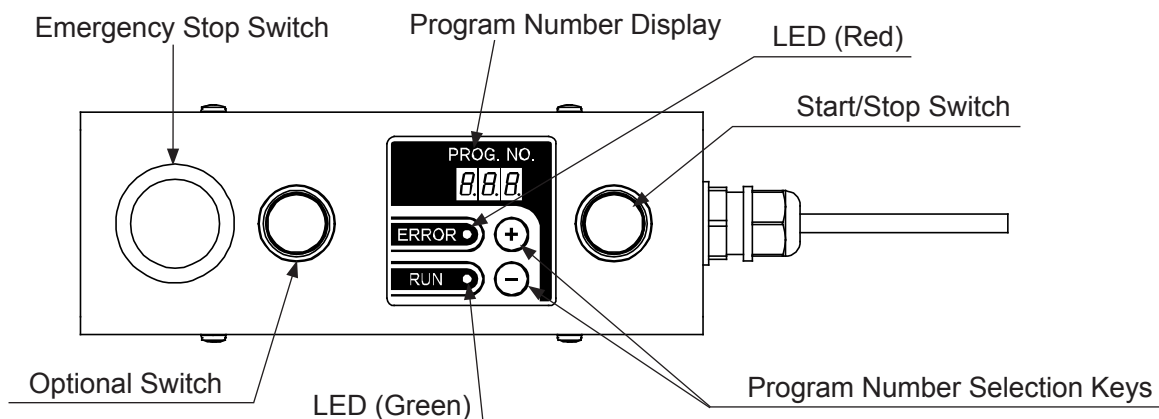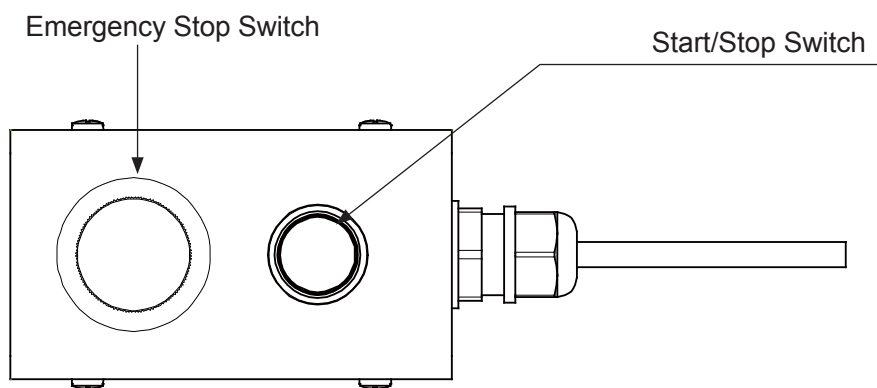
Optional Switch*

Optional Switch* or Cap
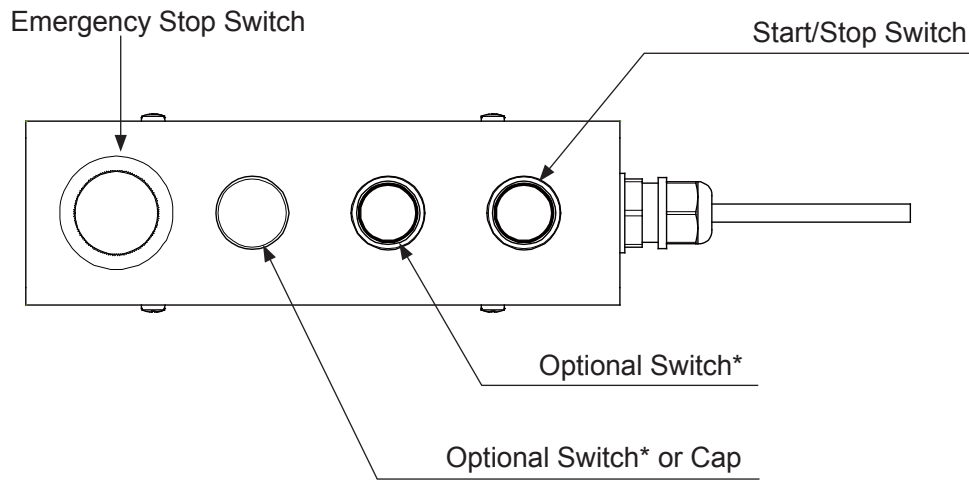
NOTE: If there is one Optional Switch, the left side is the cap. If there are two, they are numbered optional switches 1 and 2 from the left.

■ Basic Specifications with Select Switch and Optional Switch
(included with basic switchbox specification robots)

Emergency Stop Switch

Start/Stop Switch

Optional Switch

Select Switch
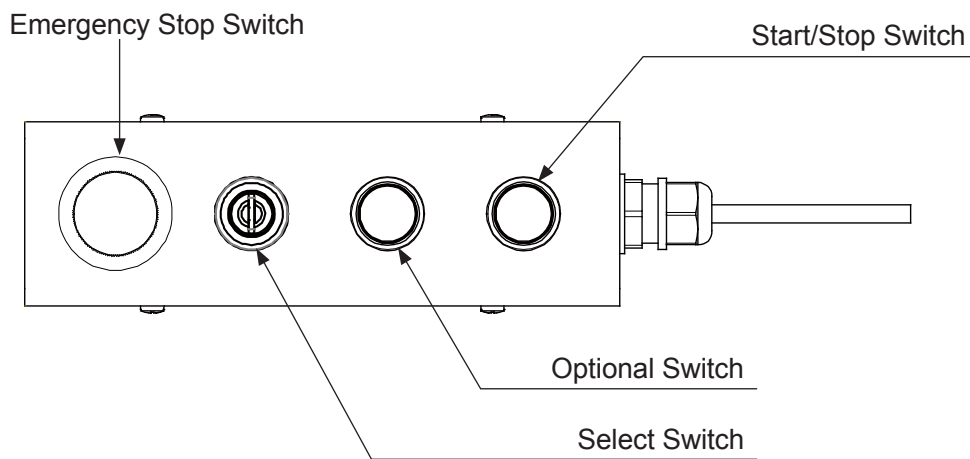
2.6.2 JC-3 Series

The switchbox is optional for the JC-3 Series.

■ Standard Specifications with Initialize Switch*
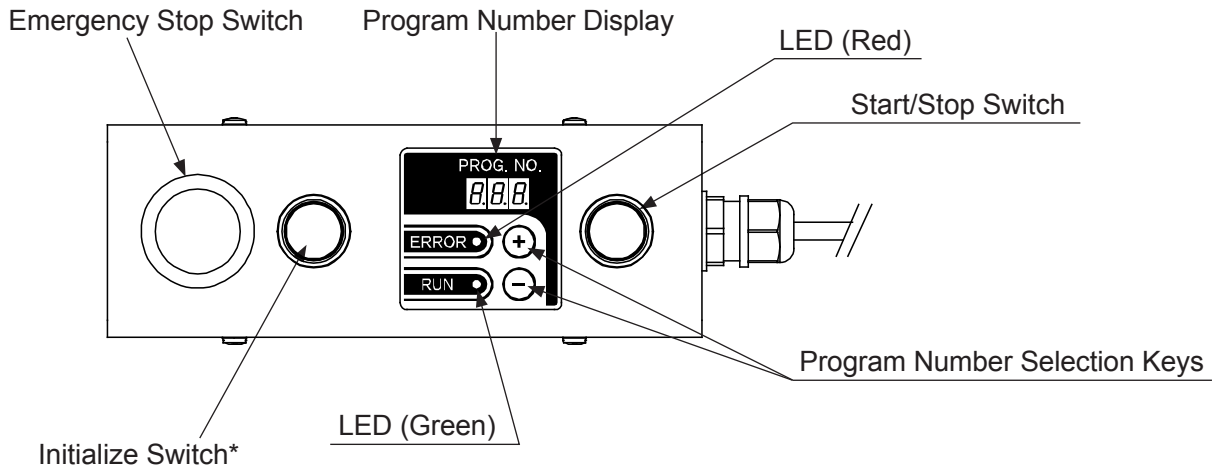
Emergency Stop Switch   Program Number Display   LED (Red)

Start/Stop Switch

PROG. NO.

ERROR

RUN

Program Number Selection Keys

Initialize Switch*

LED (Green)

* With the JC-3 absolute encoder models, [Initialize Switch] is the [Work Home Switch] function.

■ Standard Specifications with Initialize Switch* and Select Switch
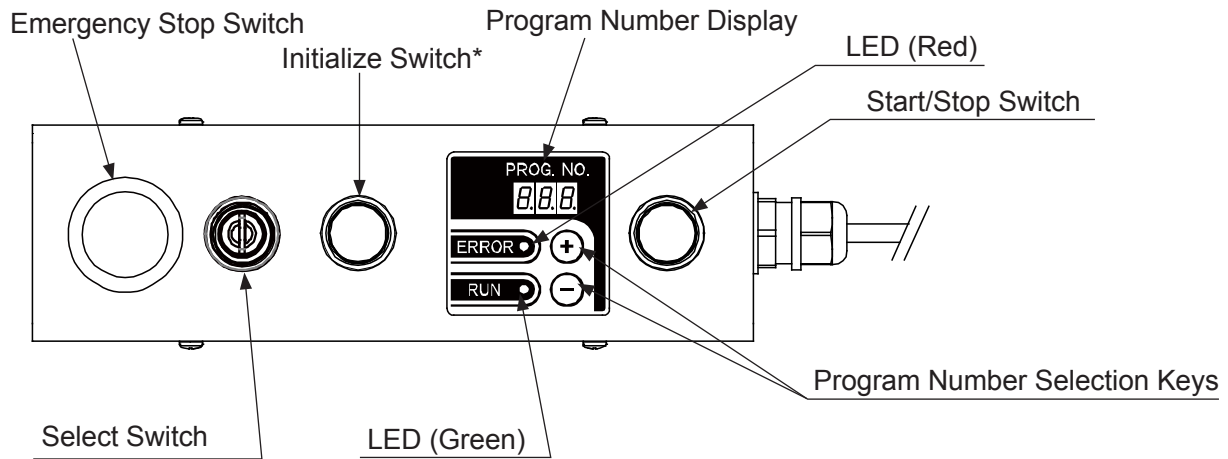
Emergency Stop Switch   Program Number Display   LED (Red)

Initialize Switch*   Start/Stop Switch

PROG. NO.

ERROR

RUN

Program Number Selection Keys

Select Switch   LED (Green)

* With the JC-3 absolute encoder models, [Initialize Switch] is the [Work Home Switch] function.

■ Standard Specifications with Initialize Switch* and Purge Switch
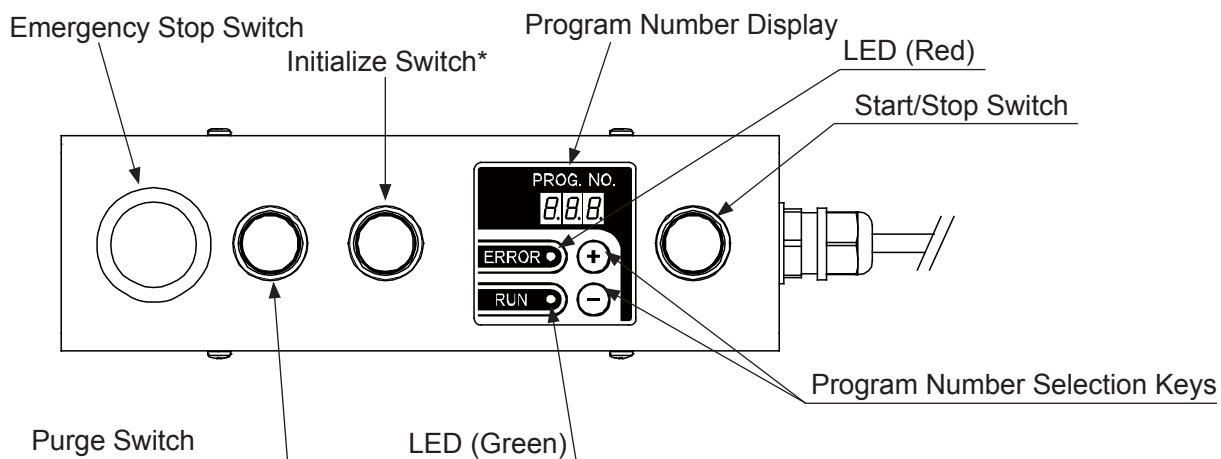
Emergency Stop Switch

Initialize Switch*

Program Number Display

LED (Red)

Start/Stop Switch

PROG. NO.

ERROR

RUN

Program Number Selection Keys

Purge Switch

LED (Green)

* With the JC-3 absolute encoder models, [Initialize Switch] is the [Work Home Switch] function.

■ Standard Specifications with Initialize Switch*, Select Switch and Purge Switch

Emergency Stop Switch

Initialize Switch*

Program Number Display

LED (Red)

Start/Stop Switch

PROG. NO.

ERROR

RUN

Program Number Selection Keys

Purge Switch

LED (Green)

Select Switch
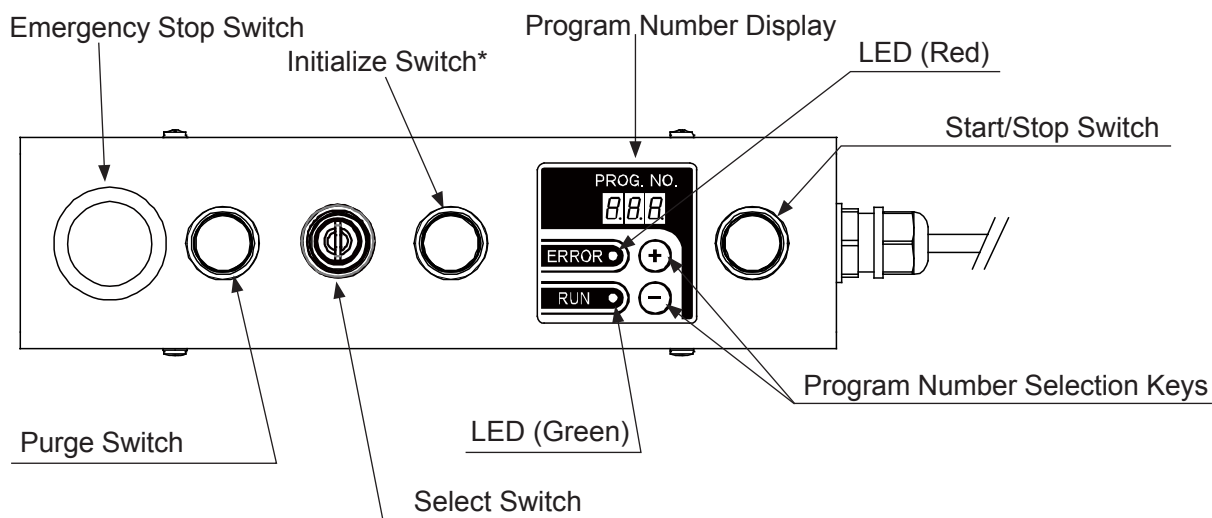
* With the JC-3 absolute encoder models, [Initialize Switch] is the [Work Home Switch] function.

2.7 Teaching Pendant Operation Panel Keys

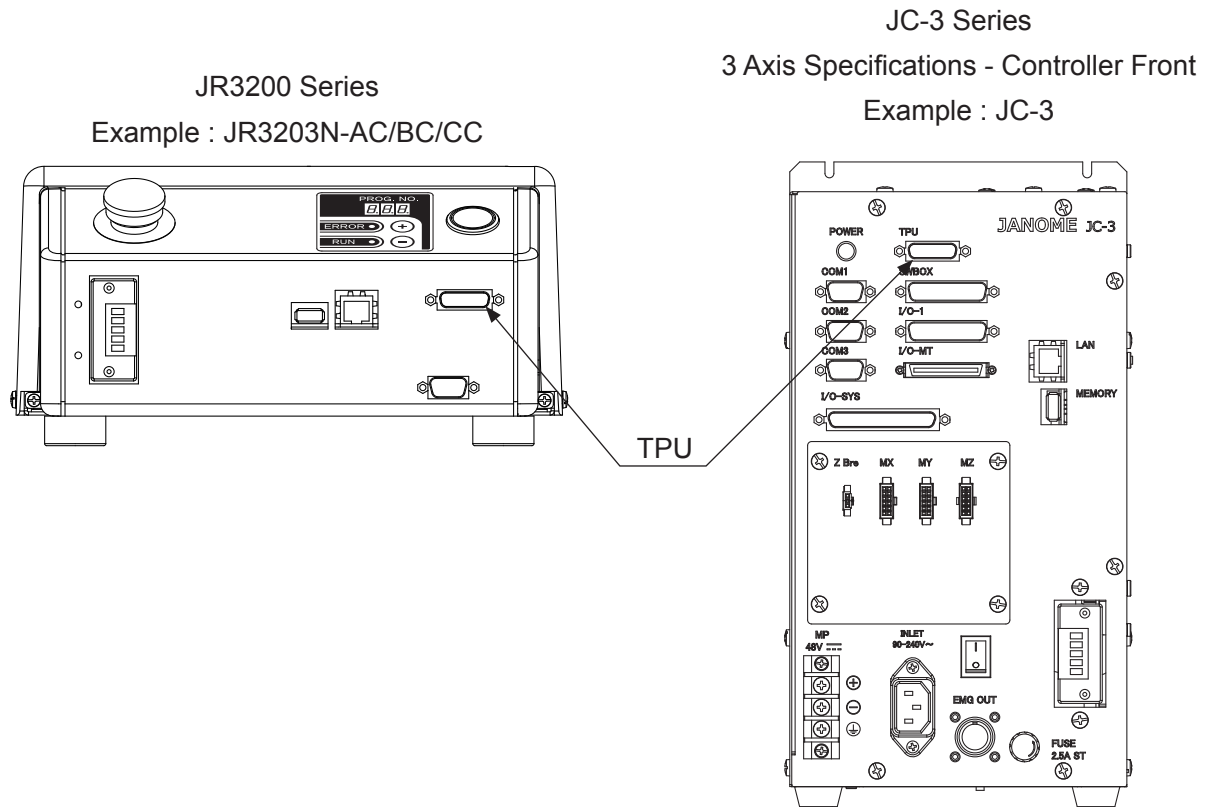| Key		Function
F0		Executes the functions displayed in the lowest line of the LCD. The functions displayed in the lowest line of the LCD change according to the screen.
F1		
F2		
F3		
F4		
MODE		Changes the robot mode.
SAVE		Saves C&T data.
GO		Moves each axis to the coordinates displayed on the LCD.
PRG.NO		Displays the program number input screen.
Utility		Displays the utility menu.
EDIT		Displays the point edit menu.
Numerical Input Keys	0 / A	Enters the number 0. Press together with SHIFT to enter the hexadecimal A.
	1 / B	Enters the number 1. Press together with SHIFT to enter the hexadecimal B.
	2 / C	Enters the number 2. Press together with SHIFT to enter the hexadecimal C.
	3 / D	Enters the number 3. Press together with SHIFT to enter the hexadecimal D.
	4 / E	Enters the number 4. Press together with SHIFT to enter the hexadecimal E.
	5 / F	Enters the number 5. Press together with SHIFT to enter the hexadecimal F.
	6	Enters the number 6.
	7	Enters the number 7.
	8	Enters the number 8.
	9	Enters the number 9.
	+ / -	Enters the + / - symbols.
	Decimal Point	Enters a decimal point.
Shortcut Keys	S0	You can assign useful functions to each key such as setting the point type etc, when teaching which you can execute just by pressing the assigned key.
	S1	
	S2	
	S3	
	S4	

Key		Function
JOG Keys	X ⩘	Moves the X axis in the + direction. (JR3000 Series)
		Moves the X axis in the - direction. (JC-3 Series)
	X ⩗	Moves the X axis in the - direction. (JR3000 Series)
		Moves the X axis in the + direction (JC-3 Series)
	Y ≫	Moves the Y axis in the + direction.
	Y ≪	Moves the Y axis in the - direction.
	Z ⩘	Moves the Z axis in the - direction.
	Z ⩗	Moves the Z axis in the + direction.
	R ≪)	Rotates the R axis in the + direction*.
	(≫ R	Rotates the R axis in the − direction*.
	MT1+	Moves the support MT1 axis in the + direction.
	MT1-	Moves the support MT1 axis in the - direction.
	MT2+	Moves the support MT2 axis in the + direction.
	MT2-	Moves the support MT2 axis in the - direction.
CURSOR ◁		Moves the cursor to the left.
CURSOR ▷		Moves the cursor to the right.
CURSOR △		Moves the cursor up.
CURSOR ▽		Moves the cursor down.
MENU		Displays the menu.
ESC		Returns to the previous screen.
DEL / CLR		Deletes 1 character from the values entered.
		Press together with SHIFT to delete all the values entered.
ENTR		Press to fix the values entered or the item selected.
SHIFT		Press this together with another key to change functions.
CTRL		Press this together with another key to change functions.

* You can change the type of operation the robot makes when the R keys are used. For further details, refer to "4.1.5 JOG Function" in the operation manual *Teaching Pendant Operation*.

The function of each key varies depending on the mode or status of the robot. For further details refer to the explanations later in this manual.

3. SYSTEM CONFIGURATION

3.1 JR3000 Series

Teaching Pendant
(optional)

Robot
Example: JR3203N-BC

Switchbox or
Basic Switchbox

PC with a Windows®
7 / 8.1 / 10 operating
system*1

Tool*1
Dispenser, Electric Screwdriver, etc.

PLC, etc.

Area Sensor, etc.*1
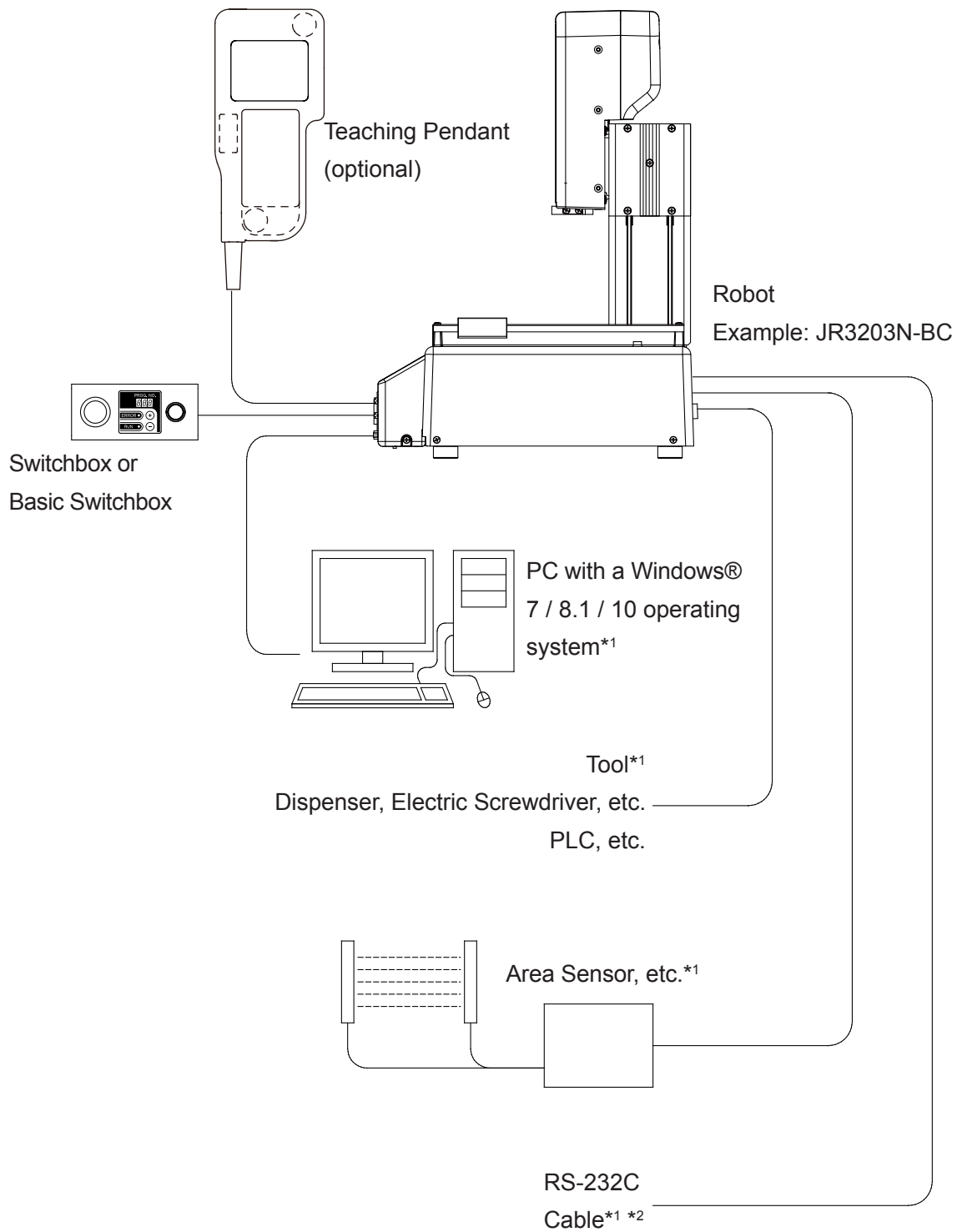
RS-232C
Cable*1 *2

*1: Not included

*2: An RS-232C port on the back of the robot is optional

3.2 JC-3 Series

PC with a Windows®
7 / 8.1 / 10 operating system*

Teaching Pendant
(Optional)

COM — TPU*

I/O-1 — SW-BOX*

I/O-SYS

EMG OUT

MOTOR-X,Y,Z

Controller
Example: JC-3C-3

Robot
Example: JC-3A00-0H3

Area Sensor etc.*

External Device
(such as a PLC, etc.)

External Device
(such as a PLC, etc.)

External Device
(such as a PLC, etc.)

Switchbox (Optional)
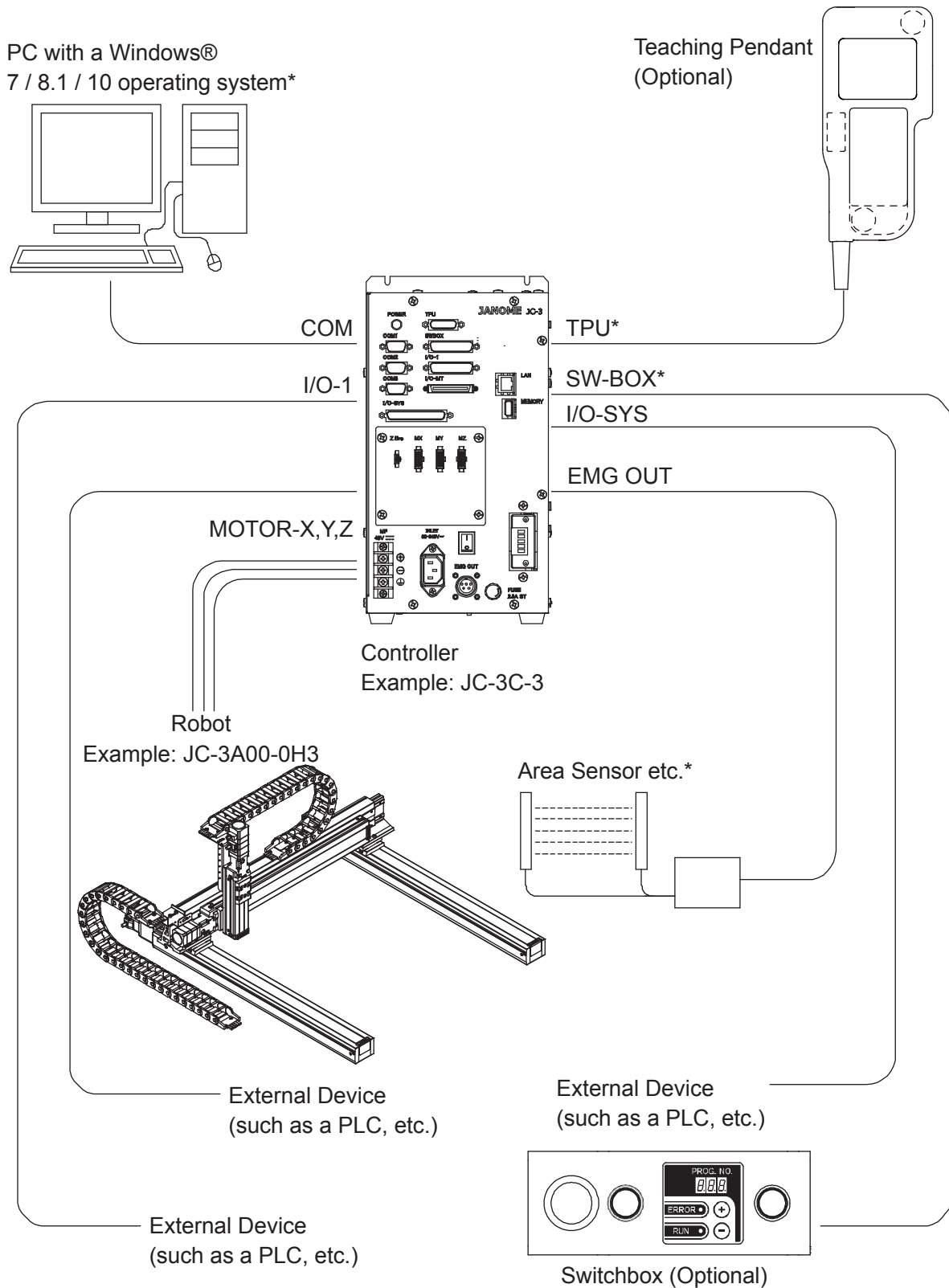
* Please prepare on your side.

4. COORDINATE SYSTEM

4.1 JR3000 Series

Example: JR3204N-AC

4.2 JC-3 Series

R Axis

R+

Z=0

R-

Z+

4 Axis Specs

Z Axis

Y+

Y Axis

Z=0

Z+

3 Axis Specs

(2 axis specs has no Z axis)

Z Axis

X+

X Axis

X=0, Y=0

Example:
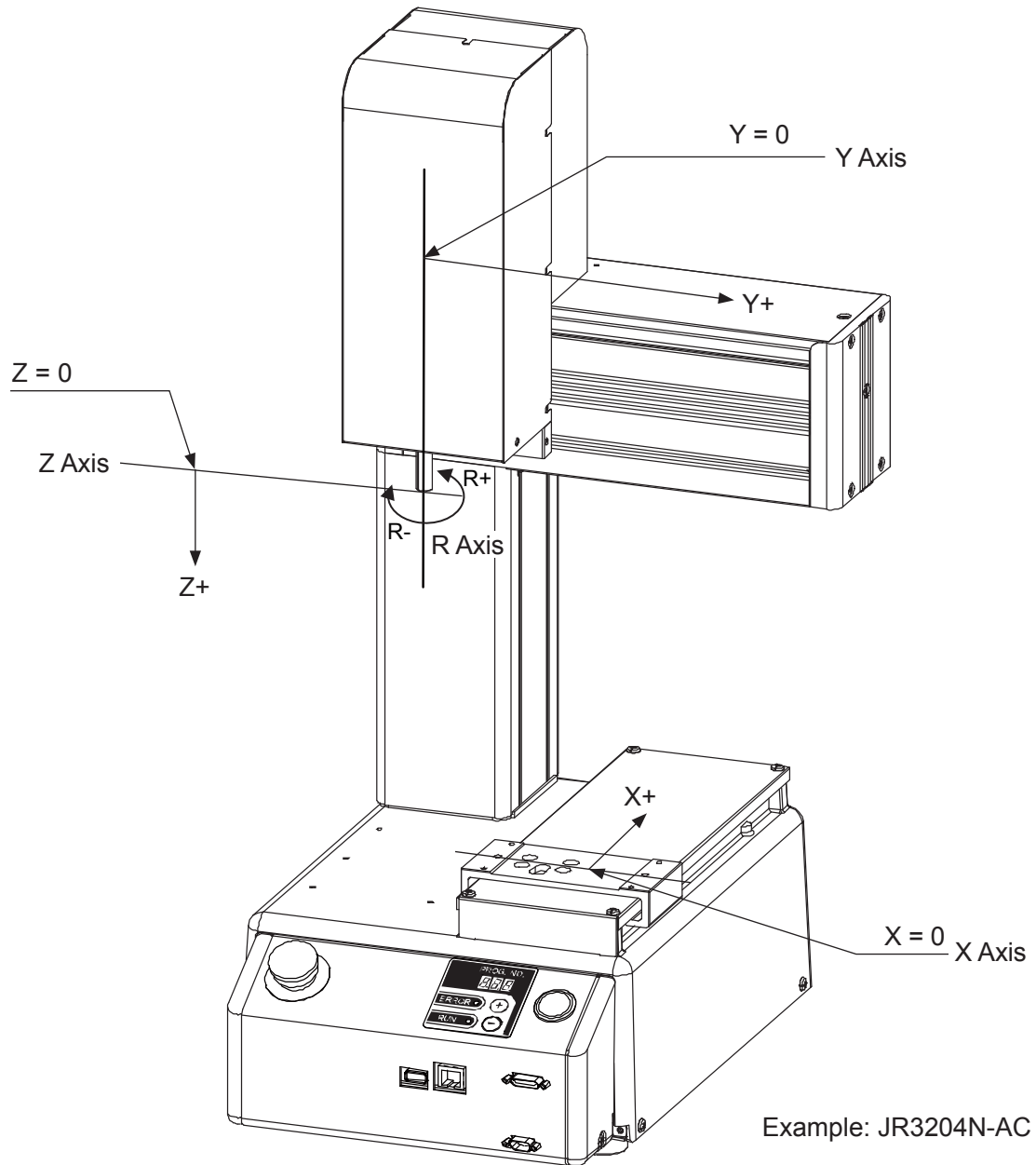
Single Sided Specifications
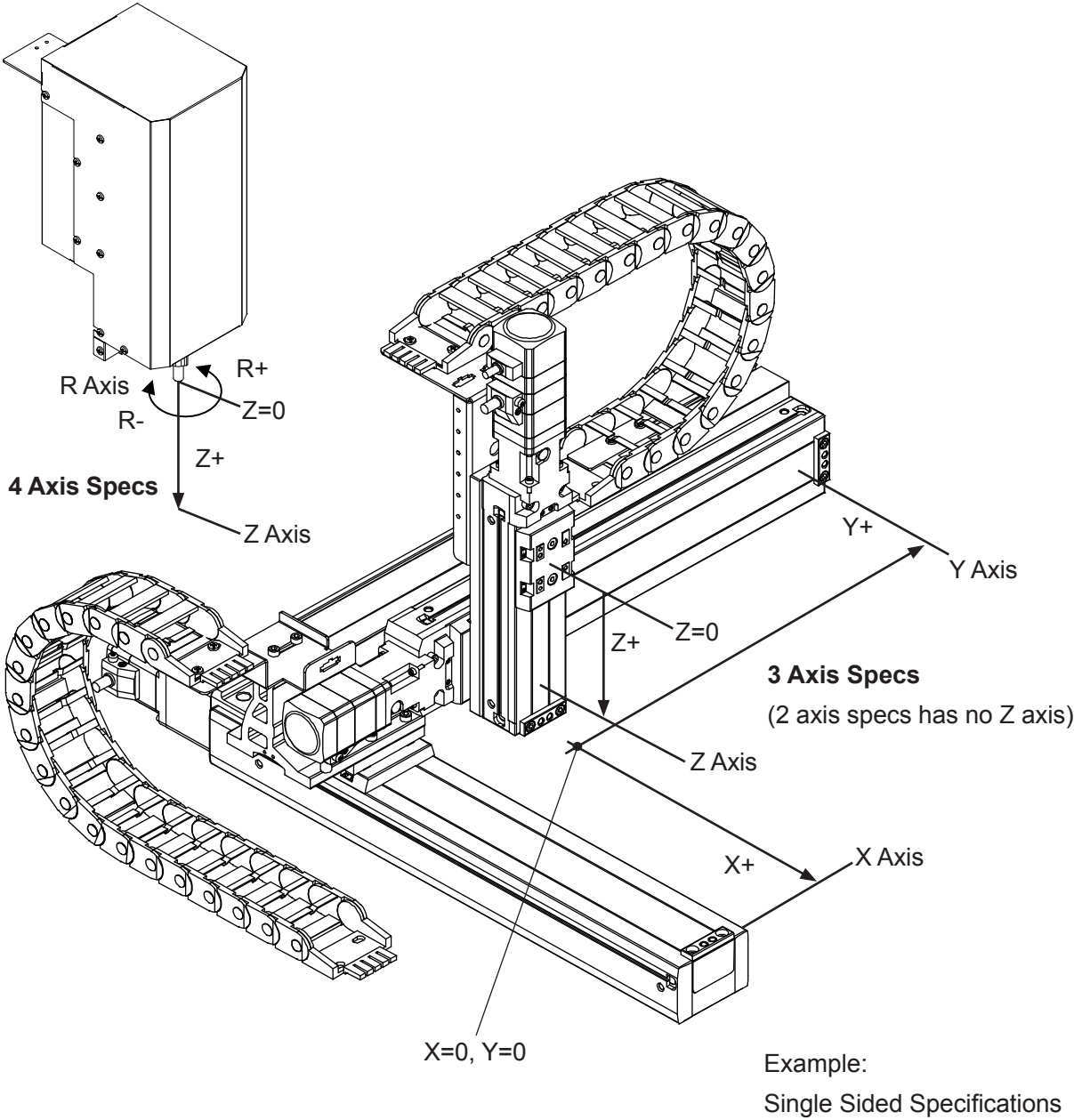
5. BRAKE

JR3000F models and the JC-3 Series are equipped with a brake. The brake is engaged when the power is switched OFF or an emergency stop is activated. Before resuming operation after an emergency stop, etc., when the tool is in contact with the workpiece, make sure to perform a mechanical initialization. For further details, refer to "12.1 Mechanical Initialization."
A mechanical initialization first raises the Z axis and then moves the X and Y axes to their mechanical home positions.
You can move the X and Y axes manually when the power is switch OFF; however, you need to use JOG Mode if you want to move the Z axis to a given position.

6. MOVEMENT TYPES

The robot moves from one point to another with a tool attached to the tip of its Z axis, where it performs jobs registered to each point. Movements from one point to another are performed as a PTP movement or a CP movement depending on the settings of the each point.

NOTE: Although the robot may produce varying levels and types of noise depending on the model, tool, speed, position or distance of operations, the robot is functioning normally. It may be possible to change the level or type of noise by modifying the operation speed.

6.1 PTP Movement

PTP stands for Point to Point. The robot axes ascend vertically, move in the X or Y direction, and descend vertically to the next point.
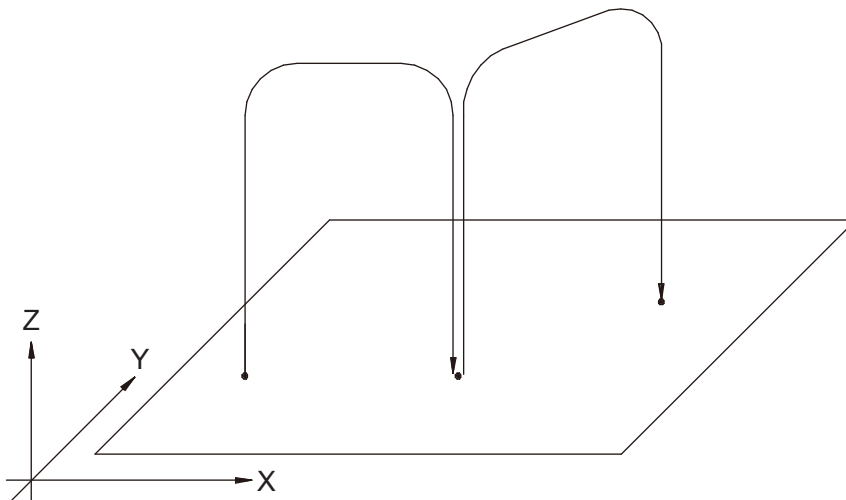
6.2 CP Movement

CP stands for Continuous Path. The robot axes move in a straight line or in an arc to the designated point. The axes move to the next point at a uniform speed.
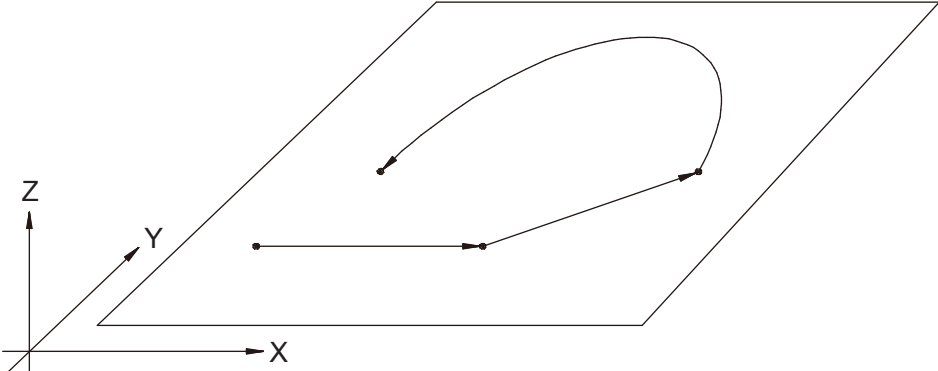
7. CHANGING MODES

■ Broadly speaking, this robot has the following 5 operation modes:

- External Run Mode: Runs programs
  (Start running programs from I/O-SYS, Fieldbus, COM1, or Ethernet)
- Switch Run Mode: Runs programs
  (Start running programs by pressing the start/stop switch.)
- Teaching Mode: Creates programs
- Customizing Mode: Creates data that goes into programs
- Administration Mode: For administration and maintenance

If you are using a switchbox with a mode switch, you can change the mode by turning the key.

- External Run Mode (EXT.RUN)
- Switch Run Mode (RUN)
- Teaching Mode (TEACH)

Also, when in Teaching Mode, you can select the following modes by pressing the | MODE | key.

- Customizing Mode
- Administration Mode

■ To change modes, do one of the following at the base screen of any mode:

TP ▶ | MODE | Key: Displays the mode selection screen.

| SHIFT | + | MODE | Key: The modes change in the following order:

Teaching → Switch Run → External Run → Teaching → Switch Run

(The modes will not change with these keys if using a switchbox with a mode switch.)

TP ▶ [Robot] → [Change Mode]

When the teaching pendant is connected, the teaching pendant LEDs indicate the current mode. When making point runs and/or test runs in Teaching Mode, both the TEACH and RUN LEDs light up.

LED	Color	Lamp Conditions
ERROR	Red	ON when an error has occurred.
RUN	Green or Red*	ON during External Run Mode or Switch Run Mode.
TEACH	Green	ON during Teaching Mode.
LOGIN	Green	ON when logged into an account or in Customizing Mode.
HOME	Green	ON when the return to home or mechanical initialization operations are complete.

* Teaching pendant II : Green LED lights up.

Teaching pendant (conventional model) : Red LED lights up.

8. WHAT THE LEDS MEAN

Program Number Display
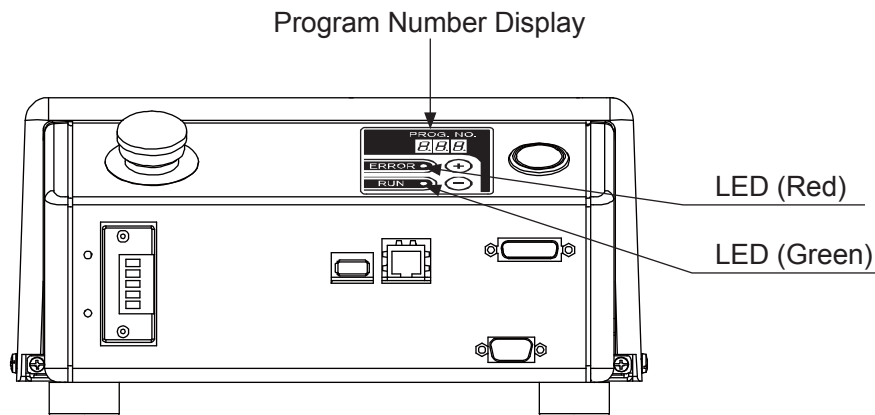
Example: JR3203N-AC

LED (Red)

LED (Green)

■ LED

- Red   Blinking :   Start inhibit
- Green   Blinking :   Waiting to start
- Green   Blinking (fast) :   Waiting to start - external start signal
                                            (Start instruction from the start channel)
- Green   Lit :   Running
- Red/Green Alternate Blinking : Emergency stop in progress

NOTE: Start inhibition applies in the following instances:
- The start inhibition signal (#sysIn2, #sysIn14) is ON.
- The robot is in a stopped state (#sysOut2 ON), and Temporary Stop (#sysIn12) / Stop –
  Start Inhibition signal (#sysIn2, #sysIn14) is OFF.
- I/O-S is set to [Interlock], the robot is stopped or waiting and the I/O-S is OPEN
  (if using a JR3000 Series robot with I/O-S specifications).
- EMG OUT is set to [Interlock], the robot is stopped or waiting and the EMG OUT is OPEN
  (JC-3 Series).

Teaching Mode (when using the JR3000 Series)

T P ▶ MENU [All Program Common Settings]
                    [I/O Settings]
                        [I/O-S Function Settings] (JR3000 Series)

■ Program Number Display
On the program number display, the values from "1" to "999" are displayed. The value being displayed is the number of the currently selected program. When the robot is standing by for mechanical initialization, this is displayed as "0." The maximum number of programs is 999.

9. TEACHING PENDANT FUNCTIONS

The teaching pendant is a device used to teach and enter programs etc., into the robot.

Teaching Pendant II (New Model)

Emergency Stop Switch*2

Liquid Crystal Display

LED

Operation Panel

Enable switch *1

Teaching Pendant (Conventional Model)

Liquid Crystal Display

LED

Enable switch *1

Operation Panel
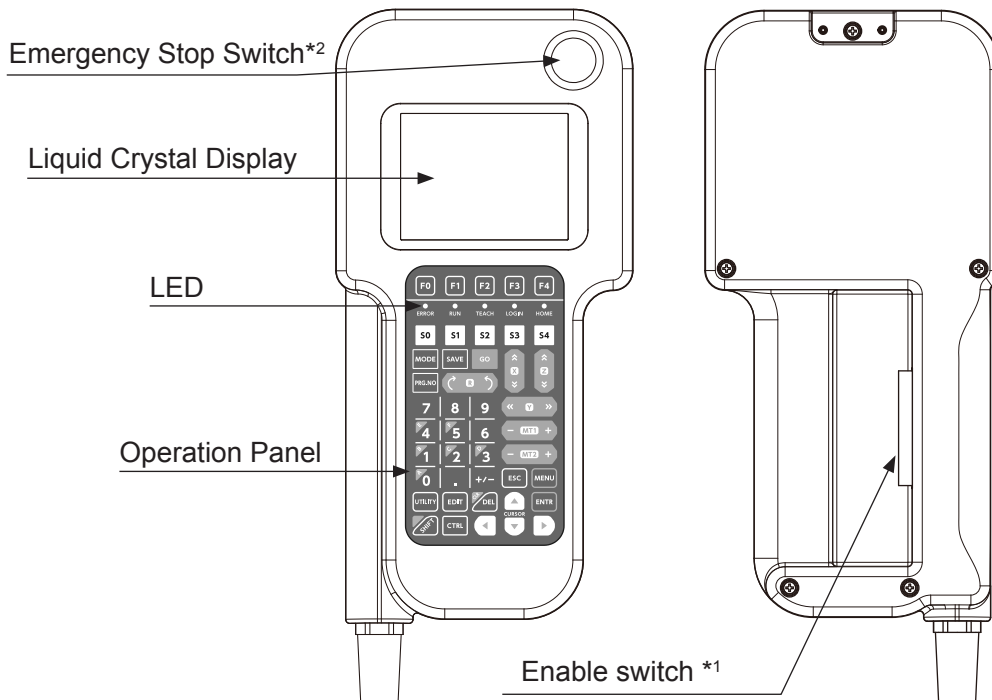
Emergency Stop Switch*2
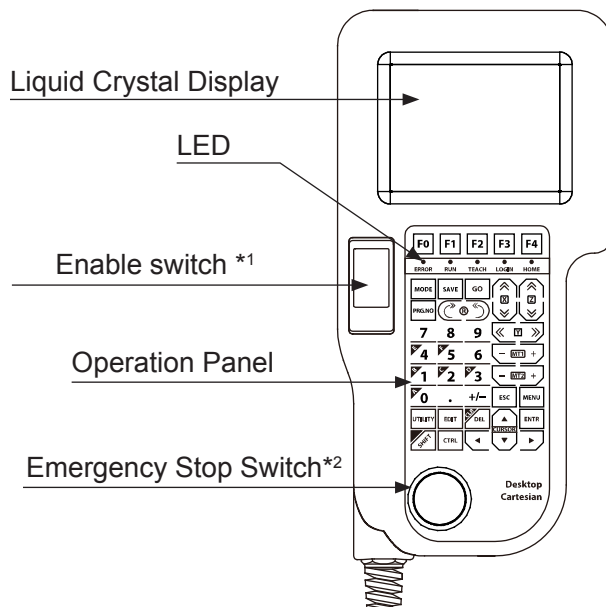
*1: The enable switch is optional. A stop made via the enable-switch is a category 2 stop. The motor is stopped with power left available to the actuators.

*2: The emergency stop switch is optional for the JR3000 Series and standard for the JC-3 Series.

9.1 LED Display

The LEDs on the teaching pendant light up according to the robot status.
However, when running or test running points in Teaching Mode, both the TEACH and RUN LEDs light up.

The teaching pendant is optional.

From here onwards, the description "optional" is omitted.

LED Names	Color	LED Condition
ERROR	Red	Lights up when an error has occurred.
RUN	Green or Red*	Lights up when in External Run Mode or Switch Run Mode.
TEACH	Green	Lights up when in Teaching Mode.
LOGIN	Green	Lights up when in Customizing Mode or logged in.
HOME	Green	Lights up when the homing operation and/or mechanical initialization is complete.

* Teaching pendant II : Green LED lights up.

Teaching pendant (conventional model) : Red LED lights up.

⚠ Caution

🚫 Do not plug or remove the teaching pendant while the power is ON.
Additionally, only connect teaching pendants with options/without options to the compatible robot. Connecting an incompatible teaching pendant can cause robot breakdown.

If the screen below is displayed when the power is turned ON, make sure the connected teaching pendant and its specifications (whether or not it has an emergency switch and/or enable switch) are compatible with your robot. If you are using the appropriate teaching pendant and this screen is still displayed, the teaching pendant is likely to be faulty.
Contact Janome (details on the back of this manual) or a Janome dealer.

```
   Wrong Teaching Pendant Type
 Turn off and Connect the Right
       Pendant as follows

       Emergency Switch N
         Enable Switch N
```

Teaching Pendant Specification Screen Example

NOTE: Even if "Hit Any Key" is displayed, do not press any of the keys.

9.2 Operation Panel Keys

Key		Function
F0		Executes the functions displayed in the lowest line of the LCD. The functions displayed in the lowest line of the LCD change according to the screen.
F1		
F2		
F3		
F4		
Shortcut Keys	S0	You can assign useful functions to each key such as setting the point type etc, when teaching which you can execute just by pressing the assigned key.
	S1	
	S2	
	S3	
	S4	
MODE		Changes the robot mode.
SAVE		Saves C&T data.
GO		Moves each axis to the coordinates displayed on the LCD.
PRG.NO		Displays the program number input screen.
UTILITY		Displays the utility menu.
EDIT		Displays the point edit menu.
Numerical Input Keys	0 / A	Enters the number 0. Press together with SHIFT to enter the hexadecimal A.
	1 / B	Enters the number 1. Press together with SHIFT to enter the hexadecimal B.
	2 / C	Enters the number 2. Press together with SHIFT to enter the hexadecimal C.
	3 / D	Enters the number 3. Press together with SHIFT to enter the hexadecimal D.
	4 / E	Enters the number 4. Press together with SHIFT to enter the hexadecimal E.
	5 / F	Enters the number 5. Press together with SHIFT to enter the hexadecimal F.
	6	Enters the number 6.
	7	Enters the number 7.
	8	Enters the number 8.
	9	Enters the number 9.
	+ / -	Enters the + / - symbols.
	.	Enters a decimal point.

Key		Function
JOG Keys	X ⩘	Moves the X axis in the + direction. (JR3000 Series)
		Moves the X axis in the - direction. (JC-3 Series)
	X ⩗	Moves the X axis in the - direction. (JR3000 Series)
		Moves the X axis in the + direction (JC-3 Series)
	Y ⩘	Moves the Y axis in the + direction.
	Y ⩗	Moves the Y axis in the - direction.
	Z ⩘	Moves the Z axis in the - direction.
	Z ⩗	Moves the Z axis in the + direction.
	R ⩘)	Rotates the R axis in the + direction*.
	(⩘ R	Rotates the R axis in the − direction*.
	MT1+	Moves the support MT1 axis in the + direction.
	MT1-	Moves the support MT1 axis in the - direction.
	MT2+	Moves the support MT2 axis in the + direction.
	MT2-	Moves the support MT2 axis in the - direction.
CURSOR ◁		Moves the cursor to the left.
CURSOR ▷		Moves the cursor to the right.
CURSOR △		Moves the cursor up.
CURSOR ▽		Moves the cursor down.
MENU		Displays the menu
ESC		Returns to the previous screen.
DEL / CLR		Deletes 1 character from the values entered.
		Press together with SHIFT to delete all the values entered.
ENTR		Press to fix the values entered or the item selected.
SHIFT		Press this together with another key to change functions.
CTRL		Press this together with another key to change functions.

* You can change the type of operation the robot makes when the R keys are used. For further details, refer to "4.1.5 JOG Function" in the operation manual *Teaching Pendant Operation*.

The function of each key varies depending on the mode or status of the robot. For further details refer to the explanations later in this manual.

9.3 Teaching Pendant (TPU) Connector

JR3200 Series
Example : JR3203N-AC/BC/CC

JC-3 Series
3 Axis Specifications - Controller Front
Example : JC-3

TPU

⚠ Caution

Connect the teaching pendant II if the "caution" sticker around the connector says "Please use TPU II for this product." Do not use or connect the conventional teaching pendant. Connecting the incompatible teaching pendant can cause unit breakdown.

Make sure to plug the connector into the corresponding receptacle the correct side up. Forcefully connecting a plug into the teaching pendant connector (TPU) on the controller the wrong side up can break it.

The connectors are a rounded trapezoid shape.

Refer to the diagram to the right and make sure the corresponding plug is facing the correct direction.

You can also use the "TPU" marking above the connector on the controller to identify the larger side of the receptacle.

Larger Side

Smaller Side
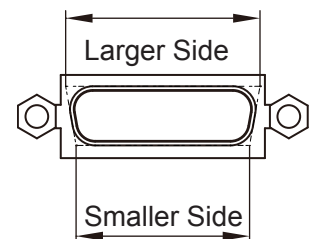
Teaching Pendant Connector

10. WHAT YOU CAN DO IN EXTERNAL RUN MODE

⚠ Warning

Make sure to perform work from outside of the safety guards when the power is ON.
Failure to do so can cause injury.

External Run Mode is a mode to start running programs by a signal from the start channel (I/O-SYS, Fieldbus, COM1, user definitions or Ethernet). For further information regarding the start channel (user definition), refer to the operation manual *Functions III* (All Program Common Settings /PLC Programs). The RUN LED on the teaching pendant is lit up when in External Run Mode. Also, the HOME LED on the teaching pendant is lit up after mechanical initialization is performed.

After turning the power ON, it is necessary to perform mechanical initialization. After mechanical initialization is complete, do a start run operation and the selected program will start running.

⚠ Caution

Do not touch any moving parts while the robot is operating.
Moving parts can cause injury or unit breakdown.

10.1 Mechanical Initialization

Mechanical initialization is an operation to make the robot recognize the home position; this is necessary after turning the power ON or after releasing the emergency stop (JC-3 absolute encoder models do not have this function). To execute mechanical initialization in External Run Mode, send a mechanical initialization instruction from the start channel (I/O-SYS, Fieldbus, COM1 or Ethernet).

NOTE:
- A mechanical initialization is performed in the following order: Z axis → (R axis) → X, Y axes. For details regarding how to set the order of the mechanical initialization for the X and Y axes, refer to "2.4.4 Order of Initialization" in the operation manual *Functions III*.
- JC-3 absolute encoder models do not have a mechanical initialization function. However, after setting up the robot, you need to perform a mechanical reset. Refer to "7.1 Mechanical Reset (Absolute Encoder Models)" in the operation manual *Setup* for further details.

■ Mechanical Initialization from I/O-SYS

Turn "#sysIn01 (Start)" ON from an external device connected to the I/O-SYS. When using the JR3000 Series, run start and mechanical initialization are both assigned to #sysIn1 with I/O-SYS. When using the JC-3 Series, mechanical initialization is assigned to #sysIn2.

■ Mechanical Initialization from Fieldbus

Turn "#fbIn1000 (Start)" ON from an external device connected to the Fieldbus. When using the JR3000 Series, run start and mechanical initialize are both assigned to "fbIn1000" with Fieldbus. When using the JC-3 Series, mechanical initialization is assigned to #fbIn1001.

■ Mechanical Initialization from COM1

If using COM 1, enable command communication from Administration Mode → [Administration Settings Mode] → [COM1 Command Communication Function].
Send the communication command "Initialize (R0)" to the robot from an external device (e.g. a PC) connected to COM1.

Set only when COM1:

TP ▶ MODE [Administration]

　　　　　　　　[Administration Settings Mode]

　　　　　　　　　　[COM1 Command Communication Function]
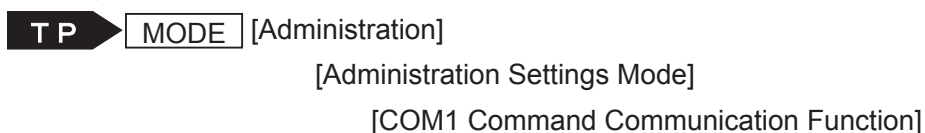
■ Mechanical Initialization from Ethernet

Send the communication command "Initialize R0" to the robot from an external device (e.g. a PC) connected via Ethernet.

NOTE: Mechanical initialization commands are valid through only one connector: [I/O-SYS], [Fieldbus], [COM1], or [Ethernet]. Set the [Start Channel] you will use in advance.
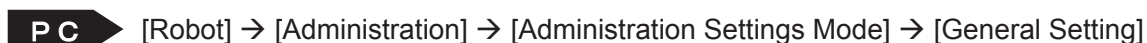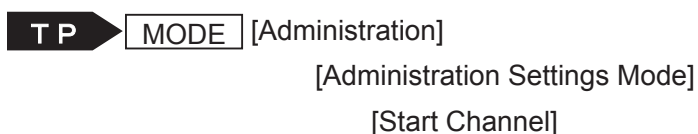
TP ▶ MODE [Administration]

　　　　　　　　[Administration Settings Mode]

　　　　　　　　　[Start Channel]

PC ▶ [Robot] → [Administration] → [Administration Settings Mode] → [General Setting]

10.2 Emergency Stop

Press the emergency stop switch to stop the robot if anything unexpected occurs during operation. Power to the motor is cut OFF (the power supply for the motor) and the robot stops running.

- Press the emergency stop switch on the robot (JR3000 Series) or on the switchbox.

- Press the emergency stop switch on the teaching pendant.

Robot Unit
Example: JR3203N-AC

Switchbox
Example: JR3000 Series
Switchbox specifications

Example: JC-3 Series (optional)

Emergency Stop Switch*

Teaching Pendant II
(New Model)

Teaching Pendant
(Conventional Model)
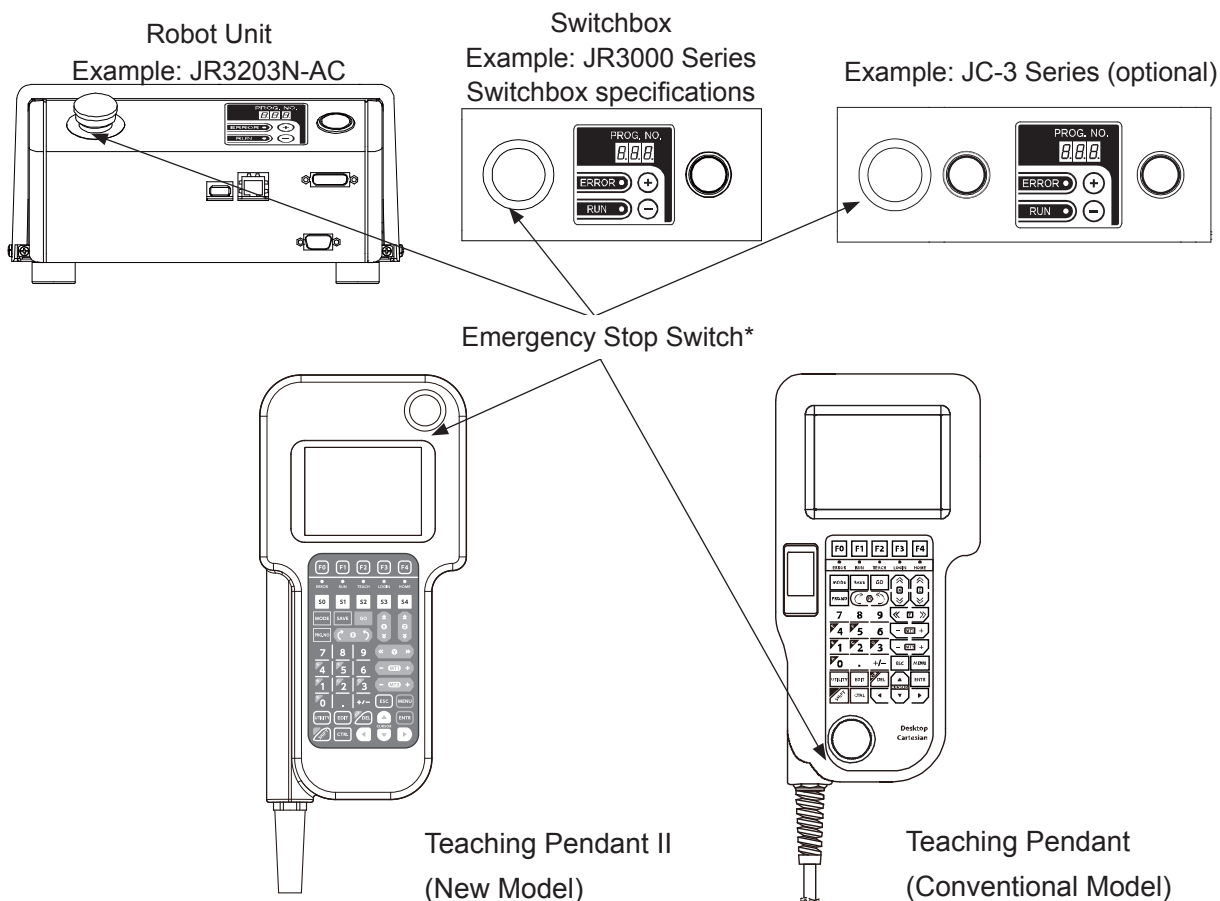
* The emergency stop switch on the teaching pendant is optional for the JR3000 Series.

■ How to release the switch

Confirm it is safe to release the switch, and while the switch is pressed down, turn it clockwise to release. Instruct the robot to execute mechanical initialization from the start channel (I/O-SYS, Fieldbus, COM1, or Ethernet). After initializing, the robot is in standby to start a run.

NOTE:

- If the emergency stop switch is pressed during movement, the robot may stop at a time and position later than when the emergency stop switch was actually pressed due to inertia. Take caution as the robot may exceed its range of movement when stopping.

- With the JC-3 Series, an emergency stop is also activated when the DC 48 V power supply is cut off. If this happens, turn the DC 48 V power supply ON and execute a mechanical initialization. Note however that if the robot is in Run Mode and the axes are out of the move area limit, a move area limit error occurs.
- With a JC-3 absolute encoder model, the robot performs a drive unit initialization after the emergency stop is deactivated.

10.3 How to Select a Program

Select a program using the following methods:
1. Teaching Pendant
2. Operation Switches (program selection keys)
3. I/O-SYS
4. Fieldbus
5. COM1
6. Ethernet

1. Selection from the teaching pendant
   Press the $\boxed{\text{PRG.NO}}$ key on the teaching pendant and enter the program number you want to run. You can also select from a list of registered programs by pressing the $\boxed{\text{F3}}$ (LIST) key on the input screen.

2. Selection from the program selection keys on the front operation panel of the robot (JR3000 Series) or on the switchbox. Call the desired run program number using the program number display on the front of the robot (JR3000 Series) or on the switchbox. (Use the "+" and "-" keys on the bottom of the number display to change numbers).

3. Selection from I/O-SYS
   If you have an external device connected to I/O-SYS, with the JR3000 Series set the program you want to run to the "program number" bit (#sysIn4 – #sysIn10) and with the JC-3 Series set it to "program number" bit ("#sysIn6 – #sysIn12) (when using the default settings*).
   If [Program Number Switching Method] is set to [LOAD/ACK Handshake], when the Program Number LOAD (#sysIn3) signal with the JR3000 Series, or the Program Number LOAD (#sysIn5) with the JC-3 Series comes ON, the "program number" bit is read. If [Program Number Switching Method] is set to [Load at Start (I/O-SYS)], the "program number" bit is loaded when the program starts.

Teaching Mode

▰ TP ▶ $\boxed{\text{MENU}}$ [All Program Common Settings]
　　　　　　[I/O Settings]

4. Selection From Fieldbus

    If you have an external device connected to the Fieldbus, set the program you want to run to the [Program Number (word)] register (#fbIn101) (when using the default settings*).
    If [Program Number Switching Method] is set to [LOAD/ACK Handshake], when program number Load Number (#fbIn1002) comes ON, the [Program Number (word)] register is loaded.
    If [Program Number Switching Method] is set to [Load at Start (Fieldbus)], when the program starts, the [Program Number (word)] register is loaded.

Teaching Mode

T P ▶ ⎯MENU⎯ [All Program Common Settings]
                                    [I/O Settings]

*   If [Program Number Switching Method] is set to [Binary Code], set the program number in binary format, and if set to [BCD (Binary Coded Decimal)], set the program number in BCD format.

5. Selection from COM1

    When an external device (PLC, etc.) is connected to COM1, send a "Change Program Number (R1)" command to the robot.

6. Selection from Ethernet

    When an external device (PLC, etc.) is connected via Ethernet, send a "Change Program Number (R1)" command to the robot.

NOTE: You can set restrictions as to which devices can be used to select program numbers by selecting [Administration Settings Mode] → [Changing Program Number] in Administration Mode. The devices that are restricted cannot select programs.

10.4 Run Start

To start running a program when in External Run Mode, select one of the operations below. However, you must select a registered program.

■ From I/O-SYS

From an external device connected to I/O-SYS, turn "Start signal (#sysIn1)" ON.

■ From Fieldbus

From an external device (PLC, etc.) connected to the Fieldbus, turn "Start Signal (#fbIn1000)" ON.

■ From COM1

From an external device (PLC, etc.) connected to COM1, send the "Start (R3)" command to the robot.

■ From Ethernet

From an external device (PLC, etc.) connected via Ethernet, send the "Start (R3)" command to the robot.

Valid run start instructions can come from among only one of these types; [I/O-SYS], [Fieldbus], [COM1] or [Ethernet]. Set up the Start Channel in advance.

TP ▶ MODE [Administration]
                [Administration Settings Mode]
                    [Start Channel]

PC ▶ [Robot] → [Administration] → [Administration Settings Mode] → [General Setting]

10.5 PTP Speed Override

You can reduce the running PTP speed by the percentage you set. (This setting does not affect the CP speed (line speed)). Use this when you want to run a new program at a low speed, etc.

Press the ⌈ MENU ⌉ key when in Ext. Run Mode, and then select [PTP Speed Override] from the menu.
Enter the desired percentage of the PTP speed.

If the set speed rate is anything other than 100%, the speed rate appears on the screen as shown to the right.

```
External Run Mode           Program 1
              Test Program
Stopping               Start Enable
Top of Cycle




                              20 %
                               ⇧
```
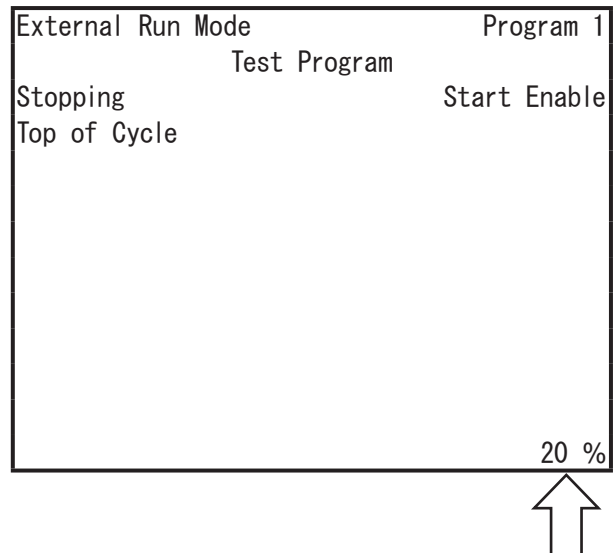
10.6 Cycle Time

The cycle time (sec) appears on the screen after running one cycle of the program.

If Cycle Mode is set to [Continuous Playback], the robot will not report the time for every cycle, but the total cycle time will appear when the robot is stopped by the Last Work signal.

However, the cycle time does not appear when a program is terminated due to an error.

Refer to "12.9.1 Programs" for Individual Program Settings for Cycle Mode.

```
External Run Mode           Program 1
              Test Program
Stopping               Start Enable
Top of Cycle




                            15.362
                               ⇧
```
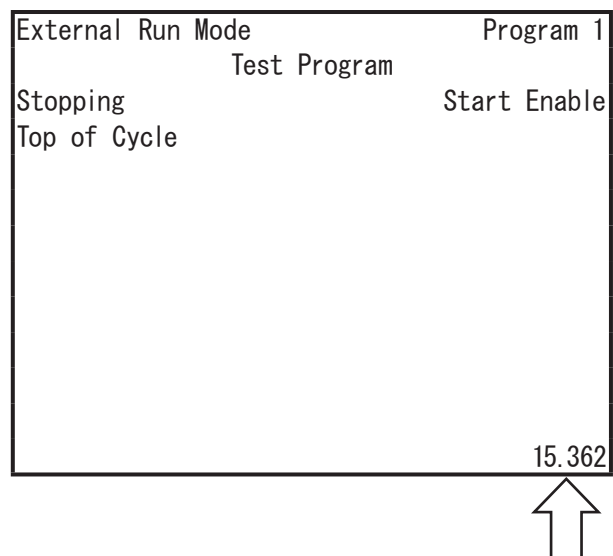
10.7 Changing the Teaching Pendant Display

You can change the teaching pendant LCD display settings by pressing the ⌗UTILITY⌗ key and selecting [Teaching Environment Settings].

However, you cannot perform this operation while running a program.

Item	Function
Screen Contrast	Change the teaching pendant LCD contrast ⌗CURSOR △⌗ key: darker ⌗CURSOR ▽⌗ key: lighter
Unit of Measurement	Select the unit of measurement. Either millimeters [mm] [mm/s] or inches [in] [in/s]
Display Language	Select the display language

10.8 Run Mode Operation, PLC Program

If you set point job data numbers to a Run Mode operation, the robot executes the point jobs according to their respective timing. For example, the robot executes "Job on Emergency Stop" when there is an emergency stop in Run Mode.

Teaching Mode

TP ▶ ⌗MENU⌗ [All Program Common Settings]
                      [Job and PLC on Run Mode]

A PLC runs registered PLC program numbers during normal Run Mode operation.

For further details, refer to the operation manual *Functions III (All Program Common Settings / PLC Programs)*.

10.9 Error History

You can view error history by pressing the ⌗MENU⌗ key at the base screen and selecting [Error History] from the menu.

TP ▶ ⌗MENU⌗ [Error History]

For further details regarding error notification and error history, refer to the operation manual *Maintenance*.

10.10 Saving Data

Customizing data and teaching data are saved collectively (C&T data).
If the teaching pendant is connected to the robot, press the ⌊ SAVE ⌋ key. If you want to save data edited on a PC to the robot, use the PC software JR C-Points II to transfer the data to the robot. The data sent from the PC is stored in the robot automatically.
All C&T data created using the teaching pendant is stored in the robot temporarily; however, it is <u>deleted automatically</u> when the robot is turned OFF. Always make sure to save after you modify teaching data or customizing data.

Also, if you want to create backup data as a contingency for data loss, transfer C&T data from the robot to the PC using the PC software JR C-Points II or JR C-Points II Limited Edition. You can also save C&T data to a USB memory device. Refer to the operation manual *Maintenance* for further details regarding saving data to USB memory.

To prevent data loss, C&T data is duplicated and logged. When the robot recognizes there is an error with either copy of the duplicated data, "CA28" is displayed the next time the robot is turned ON. This shows the robot is automatically restoring the data. Never turn OFF the robot during this process.

11. WHAT YOU CAN DO IN SWITCH RUN MODE

⚠ Warning

Make sure to perform work from outside of the safety guards when the power is ON.
Failure to do so can cause injury.

Switch Run Mode is a mode that starts running programs when the start/stop switch is pressed. The RUN LED on the teaching pendant is lit up when in Switch Run Mode. Also, the HOME LED on the teaching pendant is lit up after mechanical initialization is performed.

Performing mechanical initialization is necessary after you turn the robot ON. Press the start/stop switch to perform mechanical initialization. Press the start/stop switch again to start running the currently selected program. While the robot is running, it cannot perform other operations, except for making emergency stops or temporary stops.

⚠ Caution

Do not touch any moving parts while the robot is operating.
Moving parts can cause injury or mechanical breakdown.

11.1 Mechanical Initialization

Mechanical initialization is an operation to make the robot recognize its current coordinates. This is necessary after turning the power ON and after releasing the emergency stop (JC-3 absolute encoder models do not have this function). If you start up the robot in Switch Run Mode and "Press Start/ Stop Switch" is displayed on the screen, press the start/stop switch and the robot begins mechanical initialization. When "Press Start/Stop Switch" is not displayed on the screen, press the start/stop switch and the robot starts running. Additionally, with the JC-3 series, if you press the mechanical initialization switch on the switchbox as shown below, the robot performs mechanical initialization.
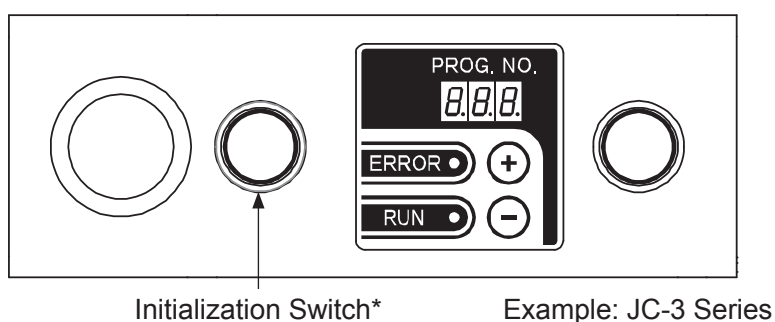
Initialization Switch*   Example: JC-3 Series

* A mechanical initialization is performed in the following order: Z axis → (R axis) → X, Y axes.
  For details regarding how to set the order of the mechanical initialization for the X and Y axes, refer to "2.4.4 Order of Initialization" in the operation manual *Functions III*.
  JC-3 absolute encoder models have a work home switch instead of an initialization switch. The axes move to the work home when this switch is pressed.

NOTE: JC-3 absolute encoder models do not have a mechanical initialization function. However, after setting up the robot, you need to perform a mechanical reset. Refer to "7.1 Mechanical Reset (Absolute Encoder Models)" in the operation manual *Setup* for further details.

11.2 Emergency Stop

Press the emergency stop switch to stop the robot if anything unexpected occurs during operation. Power to the motor is cut off (the power supply for the motor) and the robot stops running.

- Press the emergency stop switch on the robot (JR3000 Series) or on the switchbox.
- Press the emergency stop switch on the teaching pendant.

Robot Unit
Example: JJR3203N-AC〉

Switchbox
Example: JR3000 Series
Switchbox specifications

Example: JC-3 Series (optional)

Emergency Stop Switch*

Teaching Pendant II
(New Model)

Teaching Pendant
(Conventional Model)
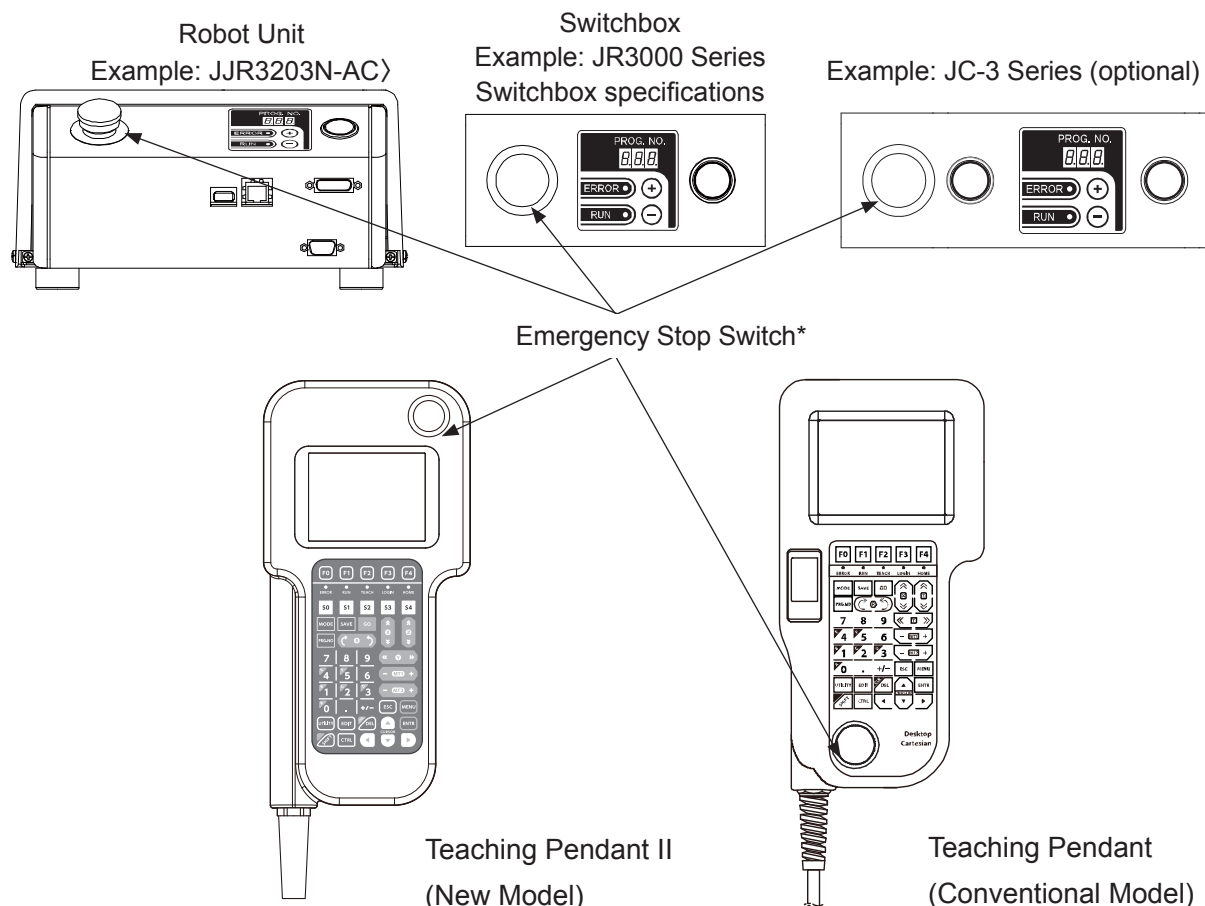
* The emergency stop switch on the teaching pendant is optional for the JR3000 Series.

■ How to release the switch
Confirm it is safe to release the switch, and while the switch is pressed down, turn it clockwise to release. Next, press the start/stop switch. After initializing, the robot is waiting to start running.

NOTE:
- If the emergency stop is pressed while the robot is moving, the robot may stop later than when the emergency stop was actually pressed due to inertia. The stopping position may therefore exceed the range of movement.

- With the JC-3 Series, an emergency stop is also activated when the DC 48 V power supply is cut off. If this happens, turn the DC 48 V power supply ON and execute a mechanical initialization. Note however that if the robot is in Run Mode and the axes are out of the move area limit, a move area limit error occurs.
- With a JC-3 absolute encoder model, the robot performs a drive unit initialization after the emergency stop is deactivated.

11.3 How to Select a Program

Select a program using the following methods:
1. Teaching Pendant
2. Operation Switches (program selection keys)
3. I/O-SYS
4. Fieldbus
5. COM1
6. Ethernet

1. Selection from the teaching pendant
   Press the $\boxed{\text{PRG.NO}}$ key on the teaching pendant and enter the program number you want to run. You can also select from a list of registered programs by pressing the $\boxed{\text{F3}}$ (LIST) key on the input screen.

2. Selection from the program selection keys on the front operation panel of the robot (JR3000 Series) or on the switchbox
   Call the program number you want to run using the program number display on the front of the robot (JR3000 Series) or on the switchbox. (Use the "+" and "-" keys on the bottom of the number display to change numbers).

3. Selection from I/O-SYS
   If you have an external device connected to I/O-SYS, with the JR3000 Series set the program you want to run to the "program number" bit (#sysIn4 – #sysIn10) and with the JC-3 Series set it to "program number" bit ("#sysIn6 – #sysIn12) (when using the default settings*).
   If [Program Number Switching Method] is set to [LOAD/ACK Handshake], when the Program Number LOAD (#sysIn3) signal with the JR3000 Series, or the Program Number LOAD (#sysIn5) with the JC-3 Series comes ON, the "program number" bit is read. If [Program Number Switching Method] is set to [Load at Start (I/O-SYS)], the "program number" bit is loaded when the program starts.

Teaching Mode

▐ TP ▶ $\boxed{\text{MENU}}$ [All Program Common Settings]
                    [I/O Settings]

4. Selection From Fieldbus

    If you have an external device connected to the Fieldbus, set the program you want to run to the [Program Number (word)] register (#fbIn101) (when using the default settings*).
    If [Program Number Switching Method] is set to [LOAD/ACK Handshake], when program number Load Number (#fbIn1002) comes ON, the [Program Number (word)] register is loaded.
    If [Program Number Switching Method] is set to [Load at Start (Fieldbus)], when the program starts, the [Program Number (word)] register is loaded.

Teaching Mode

T P ▶ MENU [All Program Common Settings]
                     [I/O Settings]

* If [Program Number Switching Method] is set to [Binary Code], set the program number in binary format, and if set to [BCD (Binary Coded Decimal)], set the program number in BCD format.

5. Selection from COM1

    When an external device (PLC, etc.) is connected to COM1, send a "Change Program Number (R1)" command to the robot.

6. Selection from Ethernet

    When an external device (PLC, etc.) is connected via Ethernet, send a "Change Program Number (R1)" command to the robot.

NOTE: You can set restrictions as to which devices can be used to select program numbers by selecting [Administration Settings Mode] → [Changing Program Number] in Administration Mode. The devices that are restricted cannot select programs.

11.4 Run Start

When in Switch Run Mode, press the start/stop switch to start running a program.
Also, press the start/stop switch again if you want to temporarily stop the robot in the middle of a program. Press it again to restart the run (it is possible to disable the start/stop switch temporary stop).

Start/Stop Switch

|Robot|Switch Box|
|Example:JR3203N-AC|Example: JR3000 Series|
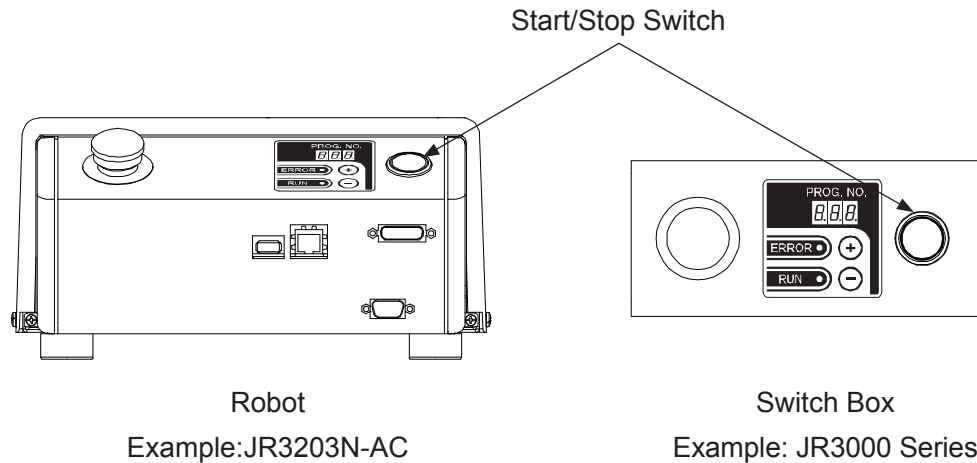
11.5 PTP Speed Override

You can reduce the running PTP speed by the percentage you set. (This setting does not affect the CP speed (line speed)). Use this when you wish to run a new program at a low speed, etc.

Press the MENU key when in Run Mode, and then select [PTP Speed Override] from the menu.
Enter the desired percentage for the PTP speed.

If the set speed rate is anything other than 100%, the speed rate appears on the screen as shown to the right.

```
External Run Mode               Program 1
              Test Program
Stopping                      Start Enable
Top of Cycle



                                  20 %
```
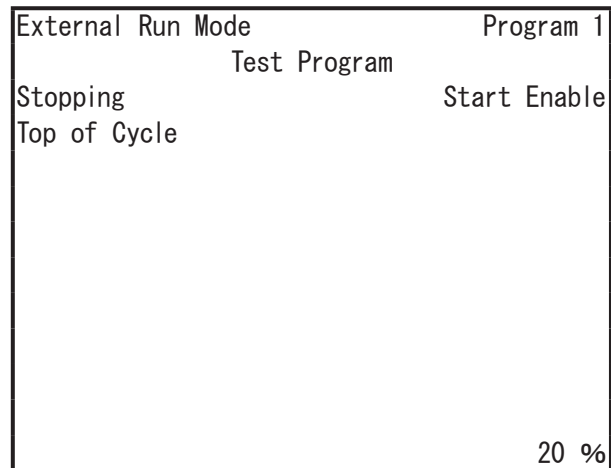
11.6 Cycle Time

The cycle time (sec) appears on the screen after running one cycle of the program.

If Cycle Mode is set to [Continuous Playback], the robot will not report the time for every cycle, but the total cycle time is displayed when the robot is stopped by the Last Work signal.

However, the cycle time does not appear when a program is terminated due to an error.

Refer to "12.9.1 Programs" for Individual Program Settings for Cycle Mode.

```
External Run Mode              Program 1
                 Test Program
Stopping                     Start Enable
Top of Cycle




                                  15.362
```
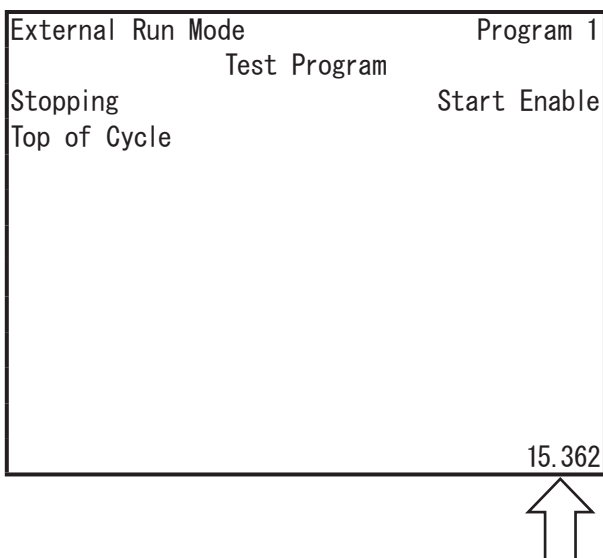
11.7 Changing the Teaching Pendant Display

It is possible to change the teaching pendant LCD display settings. Press the | UTILITY | key and select [Teaching Environment Settings].
However, this operation cannot be performed during a program run.

Item	Function
Screen Contrast	Change the teaching pendant LCD contrast CURSOR △ key: darker CURSOR ▽ key: lighter
Unit of Measurement	Select the unit of measurement, either millimeters [mm] [mm/s] or inches [in] [in/s]
Display Language	Select the display language

11.8 Run Mode Operation, PLC Program

If you set point job data numbers to a Run Mode job, during Run Mode the robot executes the point job data of the registered numbers according to their respective timing. For example, the robot executes "Job on Emergency Stop" when there is an emergency stop in Run Mode.

Teaching Mode

TP ▶ MENU [All Program Common Settings]
[Job and PLC on Run Mode]

A PLC runs the numbers of registered PLC programs during normal Run Mode operation.
For further details, refer to the operation manual *Functions III (All Program Common Settings / PLC Programs)*.

11.9 Error History

You can view error history by pressing the MENU key at the base screen and selecting [Error History] from the menu.

TP ▶ MENU [Error History]

For further details regarding error notification and error history, refer to the operation manual *Maintenance*.

11.10 Saving Data

Customizing data and teaching data are saved collectively (C&T data).
If the teaching pendant is connected to the robot, press the $\boxed{\text{SAVE}}$ key. If you want to save data edited on a PC to the robot, use the PC software JR C-Points II to send the data to the robot. The data sent from the PC is stored in the robot automatically.
All C&T data created using the teaching pendant is stored in the robot temporarily; however, it is <u>deleted automatically</u> when the robot is turned OFF. Always make sure to save whenever teaching data or customizing data is modified.

Also, if you want to create backup data in case of contingencies, send C&T data from the robot to the PC using the PC software JR C-Points II or JR C-Points II Limited Edition. You can also save C&T data to a USB memory device. Refer to the operation manual *Maintenance* for further details regarding saving data to USB memory.

To prevent data loss, C&T data is duplicated and logged. If there is an error with either copy of the duplicated data, when the robot recognizes the error, "CA28" is displayed the next time the robot is turned ON. This shows the robot is automatically restoring the data. Never turn OFF the robot during this process.

12. WHAT YOU CAN DO IN TEACHING MODE

⚠ Warning

> **Make sure to perform work from outside of the safety guards when the power is ON.**
> Failure to do so can cause injury.

Teaching Mode is a mode used to create programs, etc. Creating programs and entering settings is called "teaching." Through teaching, the information is entered into the robot and is called "teaching data."
The "TEACH" LED on the teaching pendant is lit up when in Teaching Mode. Also, the HOME LED on the teaching pendant is lit up after mechanical initialization is performed.

If you want to move the axes using one of the corresponding keys on the teaching pendant when using a teaching pendant with an enable switch, do so by pressing the key which moves the axis you want while holding down the enable switch. The enable switch has three states: pressed, pressed-in, and released. To move the axes using the JOG keys, do so while pressing the enable switch. Additionally, you need to keep pressing the enable switch while moving the axes. If you release or press in the enable switch, the robot stops as a safety measure*.
* The motor is stopped with power left available to the actuators (category 2 stop).

For further details regarding Teaching Mode, refer to the operation manual *Functions I (Point Teaching)*.

⚠ Caution

> Do not touch any moving parts while the robot is operating.
> Moving parts can cause injury and unit breakdown.

12.1 Mechanical Initialization

Mechanical initialization is an operation to make the robot recognize its current coordinates. This is always necessary after turning the power ON and after releasing the emergency stop (JC-3 absolute encoder models do not have this function). To perform mechanical initialization, when the space at the bottom of the LCD display on the teaching pendant above the ⌞F4⌟ key is shown as INIT, press the ⌞F4⌟ (INIT) key. When the area above the ⌞F4⌟ key does not show INIT, switchover to the position entry screen. The area above the ⌞F4⌟ key now shows up as INIT.

You can mechanically initialize the robot with the ⌞SHIFT⌟ + ⌞GO⌟ keys on the base screen.

NOTE:

- A mechanical initialization is performed in the following order: Z axis → (R axis) → X, Y axes. For details regarding how to set the order of the mechanical initialization for the X and Y axes, refer to "2.4.4 Order of Initialization" in the operation manual *Functions III*.
- JC-3 absolute encoder models do not have a mechanical initialization function. However, after setting up the robot, you need to perform a mechanical reset. Refer to "7.1 Mechanical Reset (Absolute Encoder Models)" in the operation manual *Setup* for further details.

12.2 Emergency Stop

Press the emergency stop switch to stop the robot if anything unexpected occurs during operation. Power to the motor is cut OFF (the power supply for the motor) and the robot stops running.

- Press the emergency stop switch on the robot (JR3000 Series) or on the switchbox.
- Press the emergency stop switch on the teaching pendant.

Robot Unit
Example: JR3203N-AC〉

Switchbox
Example: JR3000 Series
Switchbox specifications

Example: JC-3 Series (optional)

Emergency Stop Switch*

Teaching Pendant II
(New Model)

Teaching Pendant
(Conventional Model)
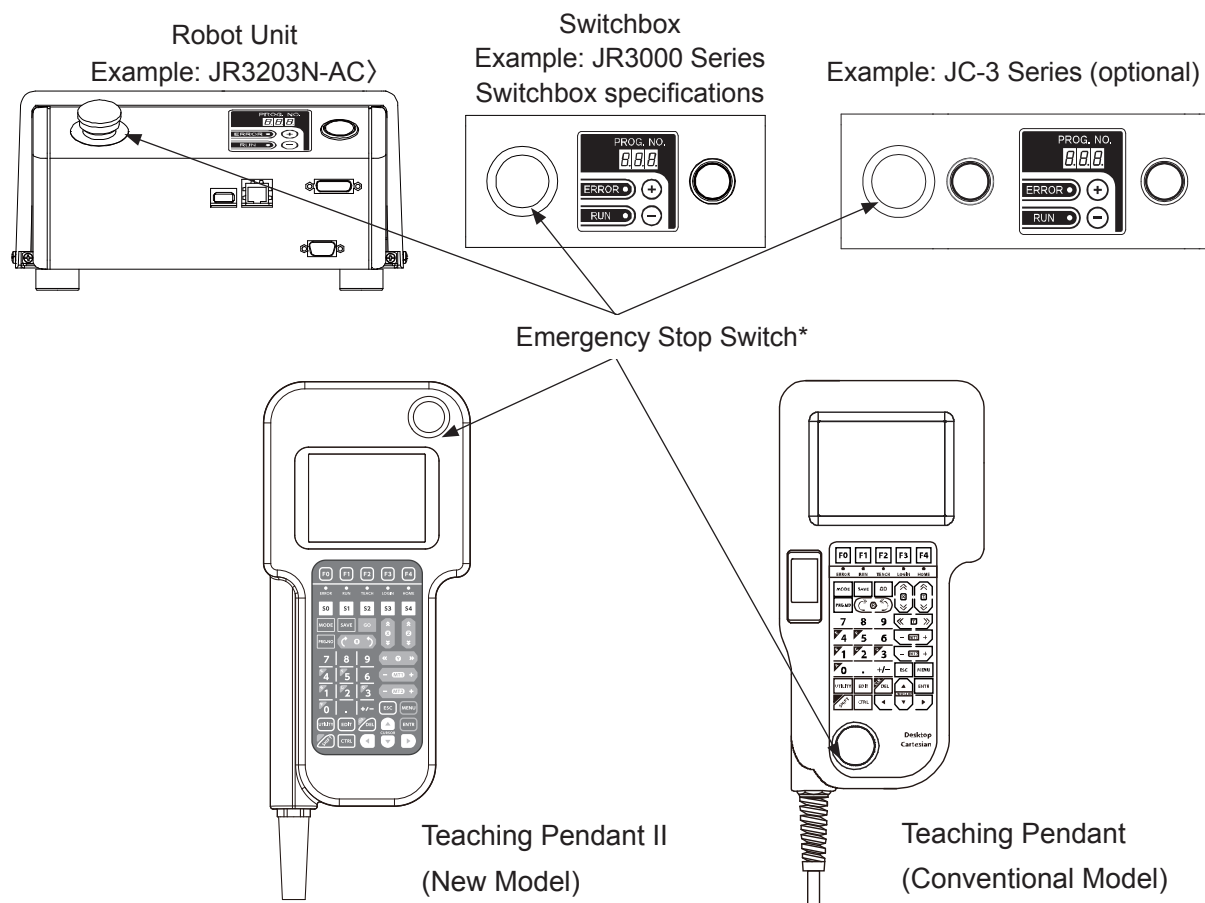
* The emergency stop switch on the teaching pendant is optional for the JR3000 Series.

■ How to release the switch

Confirm it is safe to release the switch, and while the switch is pressed down, turn it clockwise to release.Next, press the ⌊ F4 ⌋ key on the teaching pendant or using the PC software JR C-Points II, and select [Mechanical Initialization] from the [Robot] pull-down menu. After initializing, you will be at the screen for point setting values (base screen).

NOTE:

- If the emergency stop is pressed during movement, the robot may stop later than when the emergency stop was actually pressed due to inertia. The stopping position may therefore exceed the range of movement.
- With the JC-3 Series, an emergency stop is also activated when the DC 48 V power supply is cut off. If this happens, turn the DC 48 V power supply ON and execute a mechanical initialization. Note however that if the robot is in Run Mode and the axes are out of the move area limit, a move area limit error occurs.

- With a JC-3 absolute encoder model, the robot performs a drive unit initialization after the emergency stop is deactivated.

12.3 How to Select a Program

Select a program using the following method:

■ From the Teaching Pendant
Press the $\boxed{\text{PRG.NO}}$ key on the teaching pendant and enter the program number you want to run.

12.4 Point Run

⚠ Caution

When the robot is in Teaching Mode, the operator should pay special attention to its movements.

In Teaching Mode, any single point in a program can be run. (However, with CP movement, the robot runs [Start Point] – [End Point] as one unit). You can run points at your discretion, so a point in the middle of a program can be run by itself.
A point job and/or additional function run in Teaching Mode is executed exactly the same as in the External Run and Switch Run Modes. This function is useful when you wish to check "Execute Conditions" etc., and in some circumstances, also points which are executed from a different program. However, the same as with a test run, the point run speed is limited to 250 mm/s.

If you set the point job data or PLC program data to wait for a start signal from I/O-1, etc., the robot will also wait for a start signal when running single points.

A [PTP Evasion Point] performed in a point run executes the next point in the program as well, the same as done for a [CP Passing Point]. When a [PTP Evasion Point] is executed using a point run, the robot moves to next point in the program via the [PTP Evasion Point] and performs the point job for that point. The screen then shows the next point in the program.

12.5 Test Run

Before an actual run, perform [Test Run] when you want to check the movements of a newly registered program, or of a modified program. For safety purposes, the test run speed is limited to 250 mm/s. Otherwise, the point job and/or additional functions are executed exactly the same as Run Mode. You can use this function to check "Execute Conditions" etc., and in some circumstances, also points which are executed from a different program.
Always check the data of newly registered programs and modified programs, and then make a test run before actually running the program.

Teaching Mode

TP ▶ | UTILITY | [Test Menu]
[Test Run]

NOTE:

- During the test run, the "TEACH" and "RUN" LEDs on the teaching pendant are lit up. If there are commands in the point job data and/or PLC program data to wait for a signal from I/O-SYS or I/O-1, the test run will also execute these commands and wait for the signal.
- For details regarding how to perform a point run or a test run, refer to the operational manual *Teaching Pendant Operation*.

12.6 Teaching Environment Settings

In the Teaching Mode, press the UTILITY key and select [Teaching Environment Settings].
The teaching environment settings menu appears. From the teaching environment settings menu,
you can change the environment settings for when inputting positions in Teaching Mode as well as
change the display settings of the teaching pendant LCD. The data for these settings is not transferred
between the robot and PC. However, it is possible to view and edit a part of these settings from a PC.
Additionally, the data for these settings is stored on the robot even when it is turned OFF.

- Screen Contrast
  Adjusts the brightness of the teaching pendant LCD.

- Unit of Measurement
  Switch between millimeters [mm] [mm/s] or inches [in] [in/s].

- Display Language
  Switch among 11 languages: English / Japanese / German / Italian / Spanish / French / Korean /
  Simplified Chinese / Czech / Vietnamese / Traditional Chinese.
  NOTE:
    - Traditional Chinese can only be displayed on compatible teaching pendants. With the
      teaching pendant imcompatible with Traditional Chinese, "Unsupported" displays on the
      right side of the language selection screen. If you select Tranditional Chinese, the display
      language changes to English.
    - Changing the display language can be done in any mode by pressing the CTRL + UTILITY
      keys.

- GO Key Function
  The movement conditions (PTP movement) for each axis when the GO key is pressed while
  entering positions using JOG mode in Teaching Mode.

- JOG Function
  The movement conditions (JOG movement) for each axis during JOG operation when entering
  positions using JOG mode in Teaching Mode.

- Teaching Tool
  Tool settings when entering position coordinates using a different tool than the tool registered
  in Teaching Mode.

- Manual Job Number Setting
  Set a point job data number here so you can execute this registered point job data when
  entering position coordinates in Teaching Mode.

- Key Click

    Select where click sounds occur when keys on the operation panels are pressed.

    - Robot ON, TP Panel ON: Both the robot and teaching pendant beep
    - Robot OFF, TP Panel ON: Only the teaching pendant beeps
    - Robot ON, TP Panel OFF: Only the robot beeps
    - Robot OFF, TP Panel OFF: No sound

- Back Light on Teaching

    Select [OFF] to turn off the backlight of the LCD display when in Teaching Mode.

- Save on Changing Mode

    If this is set to [Valid] (default setting), when changing from Teaching Mode to Run Mode or Administration Mode, a confirmation screen to save teaching data appears only when you have modified settings or data.

- Coordinates Display

    Settings for the coordinates display (normal display/detailed display) in the point settings value screen.

12.7 Error History

You can view error history by pressing the UTILITY key at the Teaching Mode base screen and selecting [Error History] from the menu.

TP ▶ UTILITY [Error History]

For further details regarding error notification and error history, refer to the operation manual *Maintenance*.

12.8 Saving Data

Teaching data is saved in combination with customizing data (C&T data).
If the teaching pendant is connected, press the $\boxed{\text{SAVE}}$ key. If you want to save data edited on a PC to the robot, send data to the robot using JR C-Points II (PC software). The data sent from the PC is saved to the robot automatically. C&T data created using the teaching pendant is stored in the robot temporarily; it is <u>deleted automatically</u> when the power to the robot is turned OFF. Always save if you have edited teaching or customizing data.

Also, if you want to create backup data in case of contingencies, send C&T data from the robot to the PC using the PC software JR C-Points II or JR C-Points II Limited Edition. You can also save C&T data to a USB memory device. Refer to the operation manual *Maintenance* for further details regarding saving data to USB memory.

To prevent data loss, C&T data is duplicated and logged. If there is an error with either copy of the duplicated data, when the robot recognizes the error, "CA28" is displayed the next time the robot is turned ON. This shows the robot is automatically restoring the data. Never turn OFF the robot during this process.

12.9 Types of Teaching Data

You can create up to 999 individual programs. Each program includes individual program settings and point data. The Teaching Mode menu contains the items listed in the table below.

TP ▶ Teaching Mode → | MENU |

Item	Details
Individual Program Settings	Settings which are only activated during a program run of the program to which they are set.
Common Data	Common data is settable in Teaching Mode only if it has been defined. Common data definitions can be made in Customizing Mode.
Condition Data	Condition data is settable in Teaching Mode only if it has been defined. Condition data definitions can be made in Customizing Mode.
Additional Function Data Settings	You can create numbers 1 – 50 in Teaching Mode. You can create numbers 51 – 100 in Customizing Mode. There are 1 – 3000 workpiece adjustment numbers. These cannot be created in Customizing Mode.
Point Job Settings	You can create numbers 1 – 500 in Teaching Mode. You can create numbers 501 – 1000 in Customizing Mode.
Variable, Function, Alias Settings	You can define global variables, keeping variables, individual user functions and aliases to set names to the I/O types.
User Defined Message	You can create numbers 1 – 50 in Teaching Mode. You can create numbers 51 – 100 in Customizing Mode.
PLC Program Settings	You can create numbers 1 – 50 in Teaching Mode. You can create numbers 51 – 100 in Customizing Mode.
All Program Common Settings	Settings which are made in common and activated for all programs during program runs.
Main-Tool Configuration	The main tool refers to the primary tool used in job content and for jobs.
System-Camera Configuration	The system camera refers to a camera used for adjusting the positions of main tool point jobs in program runs.

12.9.1 Programs

You can operate the robot in various ways by running different programs.

A program is made up of [Program Individual Settings] and [Point Data].

You can set individual program settings to each program individually.

Point data includes data such as position coordinates to operate the robot. Multiple lots of point data are referred to as a "point data array."

■ Individual Program Settings

There are settable items which can be set for both individual program settings and all program common settings. By specifying [Common/Individual] with these settable items, you can switch between the two and select which one to apply when running a program.

Settable Item	Details		Common/ Individual Conversion
Program Name	The program name. You can enter 40 – 120 characters depending on the character type entered by the PC. You can enter 40 characters per line, up to 3 lines (1 – 120 characters) with the teaching pendant.		Individual only
PTP Condition Number for Home	This item is settable only with the JC-3 Series. This a setting for the return operation to the work home, such as the movement speed, etc., for when the I/O input signal "Go Home" comes ON. Select a number from the additional function settings [PTP Condition Settings] → [PTP Condition Number].		Individual only
Individual Job on Start of Cycle	The point job of the registered number is executed when a run starts. If the cycle mode is set to [Continuous Playback], this is executed only when there is a run start signal. This is executed after the program common setting [Common Job on Start of Cycle] is performed.		Individual only
Cycle Mode	The type of run method. There are 2 types as listed below.		Individual only
	1 Cycle Playback	Executes the program once.	
	Continuous Playback	Executes the program continuously. Enter the "Last Work" [*1] command to end the program.	

Settable Item	Details		Common/ Individual Conversion
Position Data Type	The coordinate type held by the point data. There are 3 types as listed below.		Individual only
	Absolute Coordinates	Position data values used to indicate the robot's fixed coordinates.	
	Relative Coordinates*2	Position data values used to indicate the distance from the program start coordinates.	
	Moving Amount*2	Position data values used to indicate the distance to the next point.	
Work Home	After executing the last point of a program during a 1 cycle playback, this is the point where the robot waits until it receives the next start signal.		Common/Individual
PTP Conditions	Point to point movement settings such as speed, etc. (Only PTP movements abide by these settings. CP movements do not abide by these settings.)		Common/Individual
CP Conditions	Point to point movement settings such as speed, etc. (Only CP movements abide by these settings. PTP movements do not abide by these settings.)		Common/Individual
Move Area Limit	Limits for the movable range of each axis. If the robot exceeds the coordinates set for this item during a run, a positioning error occurs and the robot stops. Also, you cannot make movements which exceed this range in JOG Mode. You can set a limit for each axis individually. The settable range for each axis is 0 – the maximum movable range. (R axis is -360 to 360°).		Common/Individual
Workpiece Mass*3	Settings for the mass carried by the X table. The X axis moves at the optimum speed and acceleration according to the set mass. If the workpiece mass is heavier than the setting, a positioning error may occur.		Common/Individual
Restart Method After Pos. Offset	This item is settable only with the JR3000E Series. The JR3000E Series detects motor step-outs and stops during movement. You can set how to restart the operation from the position where the robot stopped.		Common/Individual
Valid/Invalid Settings of Move Axis	This item is only settable with robots equipped with auxiliary axis functions. Refer to the operation manual *Auxiliary Axis Functions*.		Common/Individual

*1: The last work command is executed by one of the following methods:
  - Turn the Last Work command (sysIn13) OFF → ON with I/O-SYS.
  - Turn the Fieldbus "fbIn100C Last Work command" input signal ON.
  - Send the "Last Work (R5)" communications control command.

  Refer to the operation manual *External Control* regarding I/O-SYS and Fieldbus.

  Refer to the operation manual *Communication Control* regarding communication control commands.

*2: A setting which registers the position data type as a relative coordinate or a moving amount is normally used when calling up that data from another program as a subprogram. If this type of data is performed individually, the robot may move out of its work range.

*3: Workpiece Mass is not available for the JC-3 Series.

  Workpiece Mass is fixed at 7kg for the JR3200 Series.

- Default Values (Initial Values)

  When you create a new program, the program individual settings are created with the same values set in [Default All Program Individual Settings].

  If you set values appropriate to the environment and conditions in which the robot is used in advance to [Default All Program Individual Settings], you can save yourself time by not having to enter the program individual settings each time you create a new program.

  For more information regarding [Default All Program Common Settings], refer to the operation manual *Functions IV (Customizing)*.

■ Point Data

Selected program ─────→ Program 1   P1 ←── Point number
number
                          X+23   Y+112   Z+25   R+12
Point coordinates   Type   PTP Point
                          Job after Moving   6
Point type

If a point job or
additional function data   F0 – F4 key
is set, this is displayed   functions are
below the point type.   displayed here.
                          S.MARK E.MARK   J.EXEC P.EXEC ←──
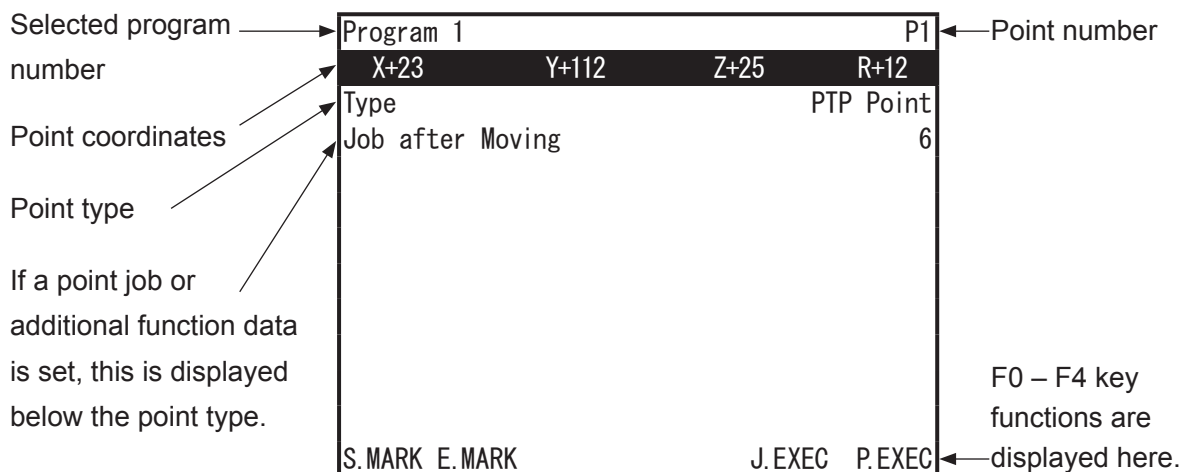
Base screen example: Point settings screen

Point data consists of the following items:

1. Coordinates X, Y, Z, R
   Point coordinate (X, Y, Z, R) data

2. Point Type
   Point types defined by the different methods for moving to the next point

   Point types can be broadly divided between the "Basic Point Type" and "Point type created
   by customization".
   The basic point type is a movement only, built-in function.
   You can create a point type in Customizing mode. The point type created by the manufacturer
   (Janome) is called the "Manufacturer Defined Point Type" and the point type created by the
   user is called the "User Defined Point Type".

Basic Point Type			PTP movement / CP Start Point / CP Passing Point / CP Stop Point / CP Arc Point / CP End Point / PTP Evasion Point / Circle Start Point / Circle Center Point
Point type created by customization	Manufacturer Defined Point Type	Standard Specifications	Single Camera Shoot Point / Multi Camera Shoot Point / Double Camera Shoot Point 1 / Double Camera Shoot Point 2 / Wait Start Point
		Application Specifications	Refer to the various application specifications
	User Defined Point Type		User Defined Point Type

7

4

6   5

Work Home   1   2   3   8   9   8 end point

: PTP movement (work home – 1, 1 – 2, 6 – 8)

All others: CP movement (2 – 6, 8 – 8 end point)
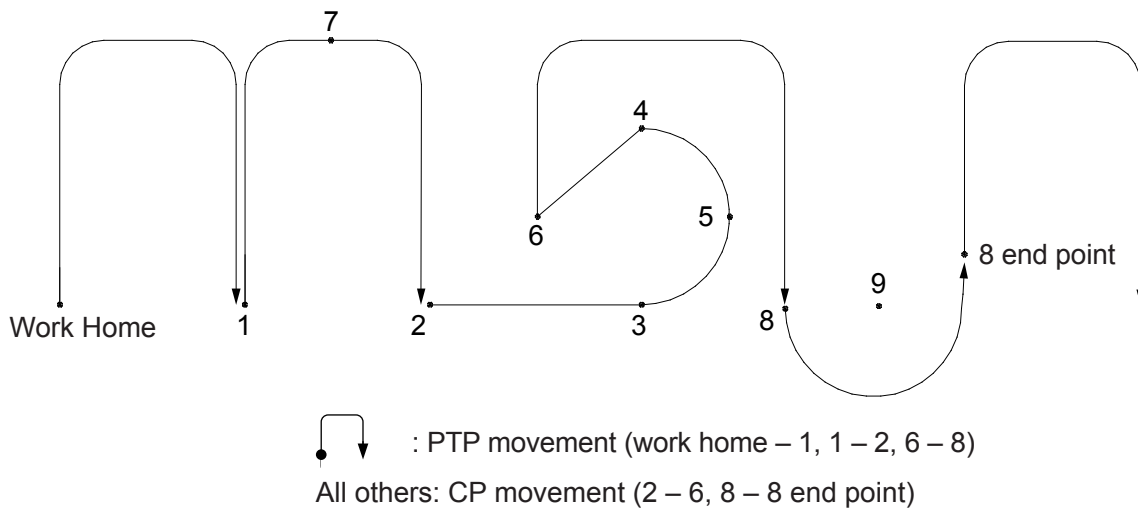
(1) PTP Point

The robot makes a PTP movement to the set point.

The main tool TCP tool data is applied for this point.

(2) CP Start Point

The point where the robot changes from PTP movement and starts CP movement.

The main tool TCP tool data is applied for this point.

(3) CP Passing Point

The point where the robot changes direction in a CP movement. The robot moves to the next point at the same speed as from the previous point.

(4) CP Stop Point

The point where the robot performs a point job or changes direction in a CP movement. The speed is temporarily slowed to 0 mm/s at this point.

(5) CP Arc Point

This point is needed to specify the arc for a CP arc movement.

(6) CP End Point

The point where the robot completes a CP movement and then moves to the next point by PTP movement.

(7) PTP Evasion Point

The point where the robot evades obstacles in a PTP movement.

The main tool TCP tool data is applied for this point.

(8) Circle Start Point

Specify a Circle Center Point and Circle, and then use this point to make an arc movement (CP movement). The subsequent point, the Circle Center Point, is the center of the arc. The circle angle is set in the subsequent point; the Circle Center Point. If you set a workpiece adjustment, the Circle Center Point is offset together with the Circle Start Point. The main tool TCP tool data is applied for this point.
NOTE: This does not have settings for an arc end point.

(9) Circle Center Point

This point is used to indicate the center and angle of the arc movement (CP movement) started by the Circle Start Point.

(10) Single Camera Shoot Point

The robot makes a PTP movement and photographs marks on the workpiece. The adjustment values from the workpiece adjustment data set in [Ref. Work Adj. No.] are applied. You can use these workpiece adjustments by setting them to PTP Points, etc. By applying [No Tool] tool data to this point, the robot does not deviate from the taught position. The robot position will not change even if the tool data for the main tool TCP is modified.

(11) Multi Camera Shoot Point

Use this point type when you want to split and take photographs and make adjustments separately when photographing multiple workpieces. Use this to collectively photograph the multiple workpieces. After doing so, you can collectively make adjustments so that these adjustments are applied to PTP Points, etc., according to the mark photograph results. Register the workpiece adjustment type as [CCD Camera Adjst. with Counter/ Z-Adjst.] for workpiece adjustment data set to [Ref. Work Adj. No.]. By applying [No Tool] tool data to this point, the robot does not deviate from the taught position. The robot position will not change even if the tool data for the main tool TCP is modified.

(12) Double Camera Shoot Point 1

(13) Double Camera Shoot Point 2

An image acquired with the Double Camera Shoot Points is done by splitting the photographing into two separate shots, allowing you to make adjustments using a wider area than you can with one imaging point. This makes for even more precise adjustments. To execute the Double Camera Shoot Points, you need to consecutively teach Double Camera Shoot Point 1 and Double Camera Shoot Point 2. Create two work adjustment numbers in sequence for the work adjustment used at the two photographing locations. Set the smaller workpiece adjustment number to [Ref. Work Adj. No.] for Double Camera Shoot Point 1. The other workpiece adjustment number, which was created in sequence, is automatically applied to Double Camera Shoot Point 2. The robot makes a PTP movement to the photographing locations and photographs the marks on the workpiece. The photograph results are applied as adjustment values to the workpiece adjustment data set in [Ref. Work Adj. No.]. You can use the adjustment data by setting this workpiece adjustment data to PTP Points, etc. By applying [No Tool] tool data to this point, the robot does not deviate from the taught position. The robot position will not change even if the tool data for the main tool TCP is modified.

(14) Wait Start Point

The robot waits at this position until the start button is pressed or until a start signal comes ON. The robot makes a PTP movement to the next point. The main tool TCP tool data is applied for this point.

(15) User Defined Point Type

You can create point types in Customizing Mode.

A user-defined point type has the same basic content, such as the method of moving to the next point, etc., as the base point from which it was created. (User-defined point types are not included in the diagram on the previous page).

3. Line Speed

The speed of movement to the next point in CP movement. Set this item if the movement to the next point is a CP movement.

4. Condition Number

The numbers assigned to condition data. You can set condition data entered in the Teaching Mode menu [Condition Data Settings] to points.

(Condition data is defined in Customizing Mode and their parameters are entered in Teaching Mode.)

5. Point Job Number

   The numbers assigned to point job data. The robot executes point job data as specified by these numbers. You can select from the following four types according to the execution timing, etc. Depending on the point type, there are some jobs which cannot be set.

   • Job before Moving

     The robot performs a point job before moving from the previous point to the designated point.

   • Job while Moving

     The robot repeatedly performs a point job while moving from the previous point to the designated point in a PTP movement.

   • Job after Moving

     The robot performs a point job after reaching the designated point.

   • Job while CP Moving

     The robot repeatedly performs a point job while moving from the designated point to the next point in CP movement.

6. Additional Function Number

   The numbers assigned to additional function data. Other than point jobs, additional functions can also be assigned to a point. For further information, refer to "12.9.6 Additional Function Data."

7. Tag Code

   The values assigned to points.

12.9.2 All Program Common Settings

All program common settings are settings that work the same for all programs.

You can make settings for the Run Mode environment and functions such as I/O-SYS function settings and/or Run Mode jobs, etc. There are settable items which can be set for both all program common settings and individual program settings. By specifying [Common/Individual] with these settable items, you can switch between the two and select which one to apply when running a program.

You can switch between Common/Individual with [Individual Program Settings] in the Teaching Mode menu.

Settable Items	Details	Common/Individual
I/O Settings	The following items can be set: • Program Number Switching Method • Program Number Reading Format • I/O-SYS Function Assignment • Fieldbus Function Assignment • Fieldbus Expansion I/O Function • I/O-SYS Function Settings (JR3000 Series only) • EMG OUT Function Settings (JC-3 Series only)	Common only
Job and PLC on Run Mode	The following items can be set: • Job on Power ON • Job after Initialize[1] • Job on Emergency Stop • Job on Playback Error • Job on System Error • Job on Start of Run Mode • Common Job on Start of Cycle • Job on End of Cycle • Job on Stopping • Job on Starting • Job while Stopping (Cycle Top) • Job while Stopping (In Cycle) • PLC Program on Run Mode	Common only
Point Reset Settings	Settings related to a point reset.	Common only

Settable Items	Details	Common/Individual
Other Parameters	The following items can be set:[*2] • Initialize • Initialization at Start • Position Error Check • Order of Init. • Stop by Start/Stop Switch • Initialization Speed (X – R axes) • PTP Auto Restart (JR3000E Series only)	Common only
Work Adjustment (XY) on CP	You can set the workpiece adjustment range for workpiece adjustments during CP movements.	Common only
Work Home	The same settable items as individual program settings.	Common/Individual
PTP Conditions	The same settable items as individual program settings.	Common/Individual
CP Conditions	The same settable items as individual program settings.	Common/Individual
Move Area Limit	The same settable items as individual program settings.	Common/Individual
Workpiece Mass (not available with JR3200 and JC-3 Series)	The same settable items as individual program settings.	Common/Individual
Restart Method After Pos. Offset (JR3000E Series only)	The same settable items as individual program settings.	Common/Individual
Valid/Invalid Settings of Move Axis (only for robots with auxiliary axis functions)	The same settable items as individual program settings.	Common/Individual

*1: With JC-3 absolute encoder models, this is [Job after Drive Unit Initialize].

*2: With JC-3 absolute encoder models, only [Stop by Start/Stop Switch] is available.

12.9.3 Common Data

Depending on settings made in Customization Mode, "Common Data" is not displayed in the Teaching Mode menu. Common data is defined in Customizing Mode, and the values and items are set in Teaching Mode. The names set in Customizing Mode are displayed in the menus. Common data settings are common to all programs.

12.9.4 Condition Data

Depending on settings made in Customization Mode, the name "Condition Data" is not displayed in the Teaching Mode menu.
Condition data is defined in Customizing Mode, and the values and items are set in Teaching Mode. The names set in Customizing Mode are displayed in the Teaching Mode menu. Condition data settings are called and used from points.

12.9.5 Point Job Data

Point job data is a series of collected commands and logic operations performed at job points. By setting numbers to point job data, you can call up and use them by number. Some settings might be unavailable depending on the point type.
You can create point job data numbers 1 – 500 in Teaching Mode. Point job data numbers 501 – 1000 are created in Customizing Mode.

12.9.6 Additional Function Data

Additional function data is used and called up from the point data by number. Once the additional function is called, it is set to the job point. Some settings might be unavailable depending on the point type. Additional function data consists of the six types below. Not including workpiece adjustments, you can create data numbers 1 – 50 for each additional function in Teaching Mode, and data numbers 51 – 100 in Customizing Mode. There are 1 – 3000 workpiece adjustment data numbers and they can only be created in Teaching Mode (workpiece adjustments cannot be set in Customizing Mode). For further details, refer to the operation manual *Functions I (Point Teaching)*.

1. PTP Condition
    The content and items are the same as those set in program data. Use this when you only want to change PTP settings between specified points.

2. CP Condition

   The content and items are the same as those set in program data. Use this when you only want to change CP settings between specified points.

3. Tool Data

   The content and items are the same as those set in program data. Use this when you only want to use tool data different from that set in the program data between designated points. Tool data number 60 is specialized data for the system camera, 61 is for the main tool, 63 is for the No Tool, and 64 is for the teaching camera*.

4. Pallet Routine

   Pallet Routine is the offset of the coordinates from a standard point. It has a counter function.

5. Workpiece Adjustment

   You can adjust the designated point position (coordinates) you want exactly according to the values entered in the [Workpiece Adjustment] menu. Workpiece adjustment numbers 3000 and 2999 are reserved for the system camera and teaching camera*.

6. Execute Condition

   The robot uses this item to determine whether or not to run the set point. If the determination is to not run the point, the robot skips the point and moves to the next point.

* For details regarding the system camera, refer to "12.9.8 Camera Configuration" and the operation manual *Camera and Sensor Functions*. For details regarding the main tool, refer to "12.9.7 Main Tool Configuration." The teaching camera is used for teaching with the PC software. JR C-Points II. Refer to the operation manual *PC Operation* for further details. The [No Tool] is a virtual tool that holds the TCP values "0, 0, 0." This is used to prevent position changes that can occur during operation if using other tool data settings.

(✓: Can be set, blank: Cannot be set)

Point Type \ Point Job Data/ Additional Function Data	Job Before Moving	Job while Moving	Job while CP Moving	Job After Moving	Condition Data	PTP Condition Number	CP Condition Number	Tool Number	Pallet Routine Number	Execute Condition Number	Work Adjustment Number	Tag Code	Ref. Work Adj. No.
PTP Point	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	
CP Start Point	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	
CP Passing Point				✓						✓	✓	✓	
CP Stop Point			✓	✓			✓			✓	✓	✓	
CP Arc Point				✓						✓	✓	✓	
CP End Point				✓		✓				✓	✓	✓	
PTP Evasion Point						✓			✓	✓			
Circle Start Point	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	
Circle Center Point				✓		✓						✓	
Wait Start Point	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	
Single Camera Shoot Point	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓
Multi Camera Shoot Point	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓
Double Camera Shoot Point 1	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓
Double Camera Shoot Point 2	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	
Standby Point on Camera Error	✓	✓		✓		✓		✓	✓	✓	✓	✓	
Work Home (PTP Point)	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	
Work Home (CP Start Point)	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	

NOTE:

- [Job after Moving], set at the work home position, is performed at the work home position coordinates only when the tool center point is the same as the work home position after the end of a cycle. [Job while CP Moving] is performed repeatedly while moving from the work home position to the next (first) point. [Job before Moving] and [Job while Moving] are performed while the robot is returning from the last point of the program to the work home position at the end of a cycle.

- Condition Data is data created in Customizing Mode. When condition data is created it comes up as an item in the Teaching Mode menu. The display item name can also be set in Customizing Mode.

12.9.7 Main Tool Configuration

The main tool refers to the primary tool used in job content and for jobs.
Tool data for the main tool needs to be set according to the job content and application.

For example, the syringe needle nozzle is considered the "main tool" with dispensing applications, and the screwdriver is considered the "main tool" with screw tightening applications. Furthermore, tools such as a camera or height sensor used for adjusting positions of point jobs that use the main tool are not considered the "main tool."

Set the tool data for the main tool (TCP, etc.,) in [Main Tool Configuration].

T P ▶ MENU [Main-Tool Configuration] → [Main TCP Setting]

P C ▶ Refer to the operation manual *PC Operation*.

The tool data set in [Main Tool Configuration] can be applied to points used in program runs.
The tool data set in [Main-Tool Configuration] is automatically set to point types. These point types are as follows:
• PTP Point
• CP Start Point*
• PTP Evasion Point
• Circle Start Point*
• Wait Start Point

* The tool data is applied from the start point through to the end position of the CP movement.

For details regarding point teaching for application models which are not standard application models, refer to the operation manual pertaining to that application.

12.9.8 Camera Configuration

The camera refers to a camera used for adjusting the positions of main tool point jobs in program runs. Configure the camera when you want to make position adjustments using a camera during program runs.

Set tool data and other such settings for the camera in [Camera Configuration].
For details regarding [Camera Configuration], refer to "1.3.6 Workpiece Adjustment Settings 2: Calibration (Match up the Robot and Camera Positioning)" in the operation manual *Camera & Sensor Functions* or "9.2 Camera Configuration" in the operation manual *PC Operation*.

12.9.9 User Defined Messages

User defined messages are data used to register message character strings.
You can register a character string for each language the robot supports per one message number. You can acquire and display the registered character strings on the teaching pendant using point jobs and the built-in function *getUserMessage()*.
Message character strings acquired with *getUserMessage()* are displayed according to the language settings made in [Teaching Environment Settings].
If you register translated messages for each individual language, a translated message will appear for the language that is set as the display language.
A maximum of 100 user defined messages can be created; message numbers 1 to 50 are created in Teaching Mode and message numbers 51 to 100 are created in Customizing Mode. You can restrict access to message numbers 51 to 100 using Protect Mode settings.

NOTE: There is no need to translate messages for languages that you do not use. We recommend registering English messages, etc., for the language data you do not use.

12.9.10 PLC Programs

A PLC program is a set of logical operation commands for controlling I/O signals, etc. They are activated while in Run Mode. You can create PLC program numbers 01 – 50 in Teaching Mode. PLC program numbers 51 – 100 can be created in Customizing Mode.

12.9.11 Data Composition

The data retained in the robot is structured as shown in the diagram on the next page.
For further details, refer to the operation manual *Functions III (All Program Common Settings / PLC Programs)*.

C&T Data

Customizing Data

Not Logged In
(Teaching Mode Customizing)

Teaching Mode Display Settings

Teaching Mode Job, PLC

All Prog. Common Default Settings

Logged In

Point Type Definitions

Variable Definitions
· Common Setting Variables Definition
· Program Setting Variables
· Condition Setting Variables Definition
· Global Variables Definition
· Keeping Variables Definition

User Function Definitions

Alias Definitions

Additional Function Data Settings
51 – 100

Point Job Settings
501 – 1000

PLC Settings
51 – 100

User Defined Message
51 – 100

Teaching Data

All Program Common Data

Program

Common / Individual

Individual Program Settings

Point Data
P1, P2, P3,...

Point Job Data

Point Job
1 – 500

PLC Program

PLC Program
1 – 50

Common Data

Condition Data

Condition Data
1 – 500

User Defined Message

User Defined Message
1 – 50

Additional Function Data

PTP Conditions
1 – 50

CP Conditions
1 – 50

Tool Data
1 – 50

Workpiece Adjust.
1 – 3000

Pallet Routine
1 – 50

Execute Condition
1 – 50

Variable, Function, Alias Settings

Global Variables Def.
Keeping Variables Def.

User Function Definitions

Alias Definitions

Administration Mode Data

Teaching Environment Setting Data

Battery Backup Data

■ C&T Data

C&T data contains "teaching data" and "customizing data." Teaching data combined with customizing data is referred to as "C&T data."

Saving using the ⎡SAVE⎤ key or data transfers between the robot and the PC are done in units of "C&T data." If you turn the power to the robot OFF without saving C&T data, the modified data is deleted.

■ Administration Mode Data

Administration Mode data is not included in C&T data. Administration Mode data is not deleted even if the power to the robot is turned OFF. Administration Mode data contains the following settable contents:

Start Channel	Fieldbus Settings
Change Program Number	MEMORY Port Settings
COM Settings	Back Light Auto OFF
Ethernet Settings	Clock Settings

NOTE: If you are using I/O-MT functions, [Auxiliary Axis Configuration] is also displayed.
For further details, refer to the operation manual *Auxiliary Axis Functions*.

■ Teaching Environment Setting Data

Teaching environment setting data is not included in C&T data. Teaching environment setting data is not deleted even if the power to the robot is turned OFF. Teaching environment setting data contains the following settable contents:

Brightness Adjustment	Manual Job Number Setting
Unit of Measurement	Key Click
Display Language	Back Light on Teaching
GO Function	Save on Changing Mode
JOG Function	Coordinates Display
Tool for Teaching	PTP Speed Override

■ Battery Backup Data

Battery backup data is saved with the built-in battery for the robot. The battery can hold data approximately 8 years. If the power is turned OFF during the period, the data is not deleted. The following information and data is saved to the battery backup data:

Time
Playback time
ON time
Error history
Built-in keeping variable values (#mkv, #nkv, #skv)
Global keeping variable values

If battery backup data is erased, the next time the robot is turned ON, "CA50" is displayed in the program number 7 segment LED display.

12.10 Teaching Data Correlation

When set to [Common], All Program Common Settings are applied during runs. When set to [Individual], Individual Program Settings are applied.

If a job number or additional function number is registered to a point, the point job data or additional function data for that number is called up.

All Program Common Settings

Program 1

Common/Individual

Individual Program Settings

Point 1
X,Y,Z,R pos. coordinates
Job after Moving No.
PTP Condition No.
Workpiece Adjust. No.
...

Point 2
...
Point N

. . .

Program 999

Acquire message by specified number using a job command.

User Defined Message

User Defined Message
1 – 50

Point Job Data

Point Job
1 – 500

Additional Function Data

PTP Condition
1 – 50

CP Conditions
1 – 50

All Tool Data
1 – 50

Workpiece Adj.
1 – 3000

Pallet Routine
1 – 50

Execute Condition
1 – 50

PLC programs are independent of programs and are usually executed during Run Mode.

PLC Program

PLC Program
1 ～ 50

- Point job data and additional function data are called up by their specified numbers. You can call up the same data number from various different points.
- Point job data 501 – 1000 and additional function data 51 – 100 are part of customizing data. These data numbers can also be called up from points in the same way.

12.11 Restart Method After Position Offset (JR3000E Series Only)

This function is only applicable with the JR3000E Series. The JR3000N Series does not have this. If a large burden or external force is placed upon one of the axes during movement, the motor may step-out. If you continue movement while the robot is out of step, the robot will be out of position compared to the destination position. With the JR3000E Series, when one of the axes steps out during a movement, the robot detects this and stops. You can then restart the movement once the position offset is restored. With [Restart Method After Pos. Offset], you can set the restart method used from the position where the robot stops after the step-out is detected. The selectable items for this are as shown in the table below:

Selectable Items		Description
None		The program finishes at the position where the robot stops.
Same Point	PTP movement	From the position where the robot stops, the robot makes a PTP movement to the destination of the PTP movement which was stopped short.
	CP movement	From the position where the robot stops, the robot makes a PTP movement to the start of the CP movement which was stopped short. After this, the same CP movement is made once more.
Next Point	PTP movement	From the position where the robot stops, the robot makes a PTP movement to the succeeding point of the point which was stopped short.
	CP movement	From the position where the robot stops, the robot makes a PTP movement to the next point after the end point of the CP movement which stopped short.

Below is an operation example of the same point and next point restarts.

■ Same point and next point restarts for a PTP movement
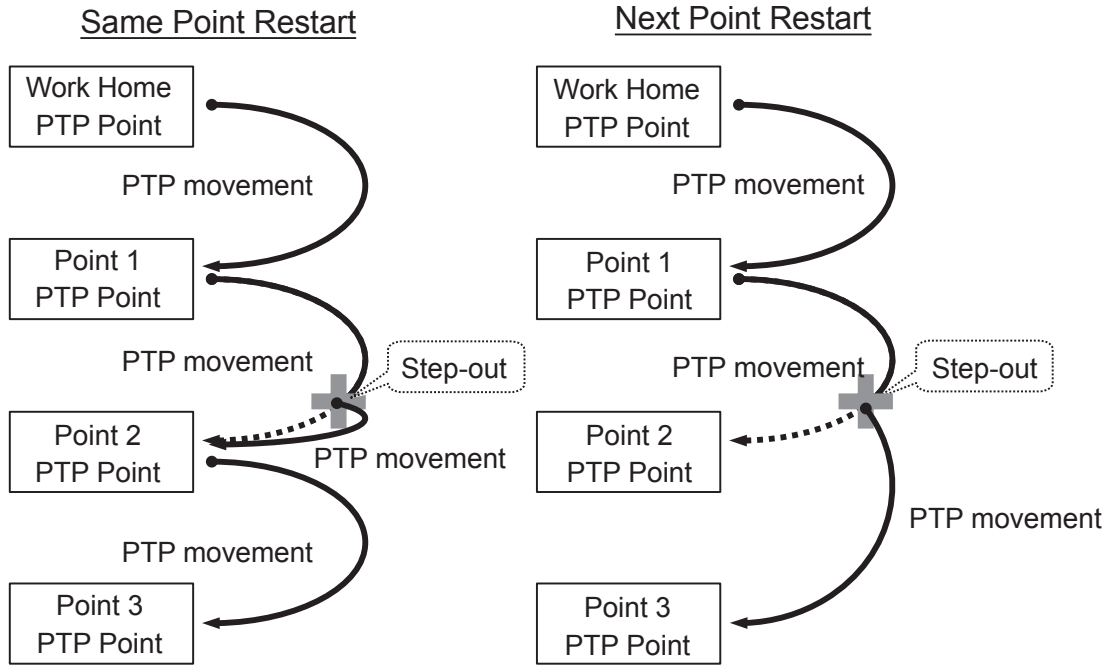
■ Same point and next point restarts for a CP movement
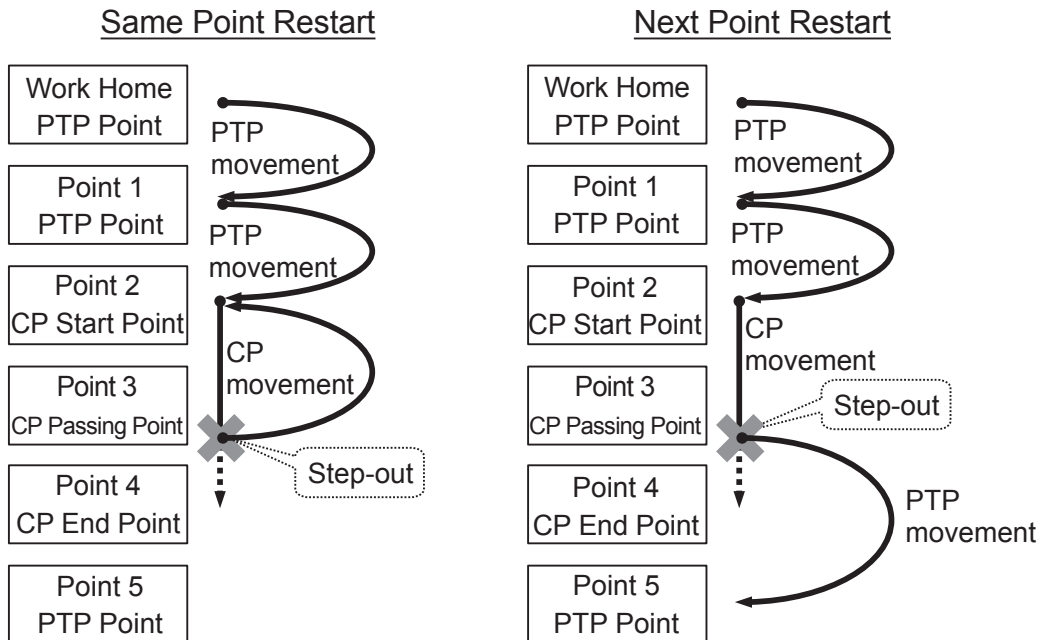
■　Instructing Operation Restarts

If a step-out is detected during a movement, error No. 83 "Stop due to Overload" occurs. When this error occurs, a prescribed operation is performed and the error is cleared, and once a run start instruction is sent to the robot, the robot restarts the movement according to the [Restart Method After Pos. Offset] settings.

Mode	Movement Restart Method
Teaching Mode (Test Run)	Press a teaching pendant key to reset the error. After this, press the 　F4　 (START) key to restart the operation. However, with Teaching Mode (Test Run), the operation is restarted from the work home regardless of the settings.
Switch Run Mode	Press the start/stop switch or a teaching pendant key to reset the error, and have the robot standby for a run. After this, press the start/stop switch to restart the movement.
External Run Mode	Turn ON the sysIn11 [Error Reset] signal to reset the error and have the robot standby for a run. After this, turn ON the #sysIn1 [Start] signal to restart the movement.

13. WHAT YOU CAN DO IN CUSTOMIZING MODE

⚠ Warning

🛈 **Make sure to perform work from outside of the safety guards when the power is ON.**
Failure to do so can cause injury.

Customizing Mode is a mode used to organize the Teaching Mode menu and create data that makes up programs.

Additionally, you can set up an account and then log in to restrict access to data created or definitions set in this mode (excluding the Teaching Mode customizing data) from other accounts and Teaching Mode. "LOGIN" is lit up on the teaching pendant when logged into Customizing Mode.

For further information regarding Customizing Mode, refer to the operation manual *Functions IV (Customizing)*.

13.1 Emergency Stop

The emergency stop in Customizing Mode is the same in Teaching Mode. After the emergency stop is released, the robot returns to Teaching Mode. You are not logged out.

13.2 Saving Data

Customized data is saved in combination with teaching data (C&T data).

If the teaching pendant is connected, press the ⎡SAVE⎤ key. If you wish to save data edited on a PC to the robot, send data to the robot using the PC software JR C-Points II. The data sent from the PC is saved in the robot automatically. C&T data created using the teaching pendant is stored in the robot temporarily; it is deleted automatically when the power to the robot is turned OFF. Always save if you have edited any of your teaching data or customizing data.

Also, if you want to create backup data in case of contingencies, send C&T data from the robot to the PC using the PC software JR C-Points II or JR C-Points II Limited Edition. You can also save C&T data to a USB memory device. Refer to the operation manual *Maintenance* for further details regarding saving data to USB memory.

To prevent data loss, C&T data is duplicated and logged. If there is an error with either copy of the duplicated data, when the robot recognizes the error, "CA28" is displayed the next time the robot is turned ON. This shows the robot is automatically restoring the data. Never turn OFF the robot during this process.

14. WHAT YOU CAN DO IN ADMINISTRATION MODE

⚠ Warning

Make sure to perform work from outside of the safety guards when the power is ON.
Failure to do so can cause injury.

Administration Mode is broken up into 5 modes: Administration Settings Mode, Diagnostic Mode, Mechanical Adjustment Mode, Version Information, and Error History.

14.1 Emergency Stop

The emergency stop in Administration Mode is the same in Teaching Mode. After the emergency stop is released, the robot returns to Teaching Mode.

14.2 Administration Settings Mode

In this mode, the items below can be set. The data for these settings is not transferred between the robot and PC (however, it is possible to browse and modify these settings from a PC). The data for these settings is saved in the robot even when it is turned OFF.

- Start Channel
  Determines whether to receive the run start command from [I/O-SYS] / [Fieldbus] / [COM1] / [User Definitions] / [Ethernet] in External Run Mode.

- COM1 Command Communication Function
  Enables and disables command communication for COM1.

- Change Program Number:
  Determines the device used for changing program numbers.

- COM Settings
  Sets the communication settings for COM 1 – 3.

- Ethernet
  Sets the Ethernet IP address, subnet mask, and client port.

- Fieldbus

  Sets the communication settings for DeviceNet, PROFIBUS, CC-Link, CANopen, PROFINET, EtherNet/IP.

- MEMORY Port

  Sets up the MEMORY port function.

- Backlight Auto OFF

  Sets the teaching pendant LCD backlight ON/OFF in Run Mode.

- Clock Settings

  Sets the current time and date.

- Clear Error History

  Deletes the error history.

- Clear All C&T Data

  Clears all the C&T data (customizing data and teaching data). <u>Selecting this for an application specification robot (dispensing, screw tightening etc.) deletes all of the customizing data for that application specification. The robot will no longer be able to operate under those application specifications.</u> In this situation, refer to *the Dispensing Specifications* or *Screw Tightening Specifications* operation manuals, and transfer the C&T data, which includes the application specification customizing data, from the PC to the robot.

- Reset Teaching Environment Settings

  Resets the teaching environment settings and PTP speed override in the Run Mode menu to their initial (default) values.

- Reset Administration Settings

  Resets the settable items in Administration Settings Mode and other administration data (Standard of Needle Adjustment) to their initial (default) values.

- Backup

  Reads and saves the robot system software, C&T data, individual configuration information and model setting files as a file. If you do not specify an extension name, the file is saved with the extension "JRB."

- Restore

  "Restore" refers to restoring the robot using previously saved backup data. Executing robot data restoration deletes all of the data in the robot (robot system software, C&T data, individual configuration information and model setting files) and overwrites it with the backup file.

For further details refer to "1. Administration Settings" in the operation manual *Functions III*.

14.3 Diagnostic Mode

⚠ Warning

⓵ Make sure that only trained maintenance operators* do this work due to the risk of injury and unit breakdown.

* Maintenance personnel are individuals who have received maintenance training from Janome or from a Janome dealer. For further details, refer to the operation manual *Maintenance (For Maintenance Operators)*.

If there is any trouble with the robot, teaching pendant or switch box, perform a diagnostic.
Perform this when you suspect there is a failure or damage to the robot unit.

Menu Name	Details
Teaching Pendant Keys	Checks the operation for each of the teaching pendant keys.
Teaching Pendant	Checks the switches, buzzer, LEDs, and LCD on the teaching pendant.
Switches	Checks the switches on the main unit.
Buzzer and LEDs	Checks the operation panel (SB board) LED, the 7 seg LEDs and the buzzer.
State of Sensor	Checks the initialization sensors for the XYZR axes (JR3000 Series) Checks the initialization sensors for the ZR axes (JC-3 Series)
X Axis Motor	Confirms:
Y Axis Motor	• Motor drive I/O status confirmation
Z Axis Motor	• Pulse number and pulse rate designation for motor drive
R Axis Motor	• Encoder pulse count
Position of Sensor	Returns to home and outputs the phase contrast of the initialization sensors and Z phase.
External I/O	Monitors the input and output of the I/O-SYS and I/O-1.
Emergency Stop Related	Checks the emergency stop button, I/O-S (JR3000 Series), EMG OUT (JC-3 Series), and the motor power status.
COM1 Communication	Checks the communication status with the host via given baud rates.
COM2 Communication	
COM3 Communication	
MEMORY Port	Displays the mount status of the USB and tests the memory access.
Ethernet	Performs a ping test for the given IP address.
Fieldbus	You can monitor the Fieldbus connection status and the top input/output word bit set according to the details displayed for the connected module.

14.4 Mechanical Adjustment Mode

⚠ Warning

Make sure that only trained maintenance operators* do this work due to the risk of injury and unit breakdown.

* Maintenance operators are individuals who have received maintenance training from Janome or from a Janome dealer. For further details, refer to the operation manual *Maintenance (For Maintenance Operators Only)*.

14.4.1 Check Phase Difference (JC-3 Series Only)

The phase difference is the distance from the mechanical stop position to the motor home position, measured in pulse units.

14.4.2 Sensor Adjustment

This is a mode to perform [Sensor Adjustment].
Be sure to perform a sensor adjustment in Mechanical Adjustment Mode after replacing the motor or the timing belt.

14.4.3 Mechanical Reset (JC-3 Absolute Encoder Models Only)

Performing this executes a mechanic initialization in order from the Z axis to the X and Y axes. This adjusts the home position at the motor end of the mechanical stroke to 6 mm for the X axis and 3 mm for the Y and Z axes. For further details refer to "8. Mechanical Reset" in the operation manual *Maintenance*.

14.5 Version Information

Administrative information pertaining to the robot including the model name and the robot system software version is displayed on the teaching pendant LCD.

The version information screen on the teaching pendant has multiple pages.
| CURSOR ▽ | / | CURSOR ▷ | / | ENTR | key to display the next page.
| CURSOR △ | / | CURSOR ◁ | key to display the previous page.

1. Version information
2. System program*: Information regarding the system program
3. Boot program*: Information regarding the boot program
4. Teaching data*: Information regarding teaching data.

* 2 – 4 are normally not used as they are internal administration information.

14.6 Error History

You can view error history by pressing the [MODE] key, selecting [Administration], and then selecting [Error History] from the displayed menu.

TP ► [MODE] [Administration]

[Error History]

For further details regarding error notification and error history, refer to the operation manual *Maintenance*.

15. STARTUP MENU

If you hold down the (+) and (-) program selection keys simultaneously on the front operation panel (JR3000 series) or the switch box when turning the power ON, you enter a startup menu before Teaching Mode or Run Mode is started. You can enter the startup menu even if the teaching pendant is not connected. At the startup menu, the menu numbers are displayed in the 7seg LEDs of the program number display. Also note that menu selection and finalization is made by using the program selection keys (+) and (-).

• By pressing the (+) or (-) key for a short time you can select the F-1 – F-5 menus.
• By holding the (+) key down (2 seconds) the currently selected function is executed.
  The menu numbers blink while the function is executed.
• By holding the (-) key down (2 seconds) the startup menu is terminated.
  Once the menu is terminated, END is displayed in the menu number area. After END is displayed, press a program selection key to go to the initialization standby screen.

The following functions can be performed at the startup menu.

Menu Number	Function	Description
F-1	Write to USB Memory	Write C&T data to USB memory.* This is saved using the fixed file name "JR3_CandT_data.CTD". If a file with the same name already exists in the folder, the file is overwritten. The file is saved to the following folder: \JANOME\JR\DATA
F-2	Read from USB Memory	Read C&T data from USB memory.* The robot can only read the data when it is saved using the fixed file name "JR3_CandT_data.CTD" The file is read from the following folder: \JANOME\JR\DATA
F-3	Save Error Log	Save the robot error history to USB memory. This function is available for system software versions 6.0 or higher. The error log is saved under the following file name: ErrorLog_YYYYMMDD.CSV The file is saved to the following folder: \JANOME\JR\ERRLOG "YYYY" refers to the year, "MM" refers to the month, and "DD" refers to the day the file is created. The date and time is acquired from the robot's internal clock.

Menu Number	Function	Description
F-4	Forced Teaching Mode Startup	Startup in Teaching Mode regardless of the mode used when the robot was turned OFF.
F-5	IP Address Check	Confirms the IP address and subnet mask set to the robot.

* If the Memory Port settings in Administration Mode are set to "Invalid", the Forced Teaching Mode (F-4) is activated. This menu cannot be selected.

The robot continues into Teaching Mode or Run Mode if the startup menu functions complete or the startup menu is closed by holding down the [-] key.

Use the Forced Teaching Mode Startup (F-4) when a Job on Power ON (All Program Common Settings) is set with a command with which the robot cannot startup, etc.

16. WHAT YOU CAN DO WITH THE MEMORY PORT

For details regarding precautions when using the memory port, refer to "14.1 USB Memory Usage Precautions" in the operation manual *Specifications* for JR3000 robots or "8.1 USB Memory Usage Precautions" in the operation manual *Specifications* for JC-3 robots.

By inserting a commercial USB memory (Ver. 2.0) into the Memory Port you can use the following functions:

■ Back up teaching data (C&T Data)
Refer to "1.1 Backing Up Teaching Data (C&T Data)" in the operation manual *Maintenance*.

■ Save error log to USB memory
Refer to "4.3.4 Save Error Log to USB Memory" in the operation manual *Teaching Pendant Operation*.

■ Format the USB memory device
Refer to "4.3.5 Format USB Memory" in the operation manual *Teaching Pendant Operation*.

■ Upgrade the system software
Refer to "1.3 Upgrading System Software" in the operation manual *Maintenance*.

■ Backup/restore robot data
Refer to "1.2 Backing Up and Restoring Robot Data" in the operation manual *Maintenance*.

17. GLOSSARY

[0-9]

1 Cycle Playback

A type of run method used for running programs.

After the robot completes one run cycle, the robot returns to the work home and waits.

[A]

Absolute

A type of encoder built into a servomotor.

This detects the "absolute position" in relation to the origin.

The encoder continues to record the current position while the power is OFF, but requires a battery to do so.

For the JC-3 Series, there is also a battery-less type in which a mechanical encoder is built into the stepping motor.

Absolute Coordinates

A position data type.

Position data values used to indicate the robot's fixed coordinates.

Refer to "13. Absolute, Relative & Moving Amount (Position Data Types)" in *Functions I*.

Account

The access rights for users to log into certain areas.

For this robot, access rights can be set for Customizing Mode.

You can restrict access to data set and created using an account. You can modify the restrictions using Data > [Protect Mode] settings.

Refer to "4. Accessibility" in *Functions IV*.

Additional Function

Information and conditions set to individual points.

These consist of PTP/CP Conditions and execute conditions, etc. These conditions take priority over conditions specified in [Individual Program Settings].

Depending on the point type, the additional functions you can set vary.

Additional Function Data Settings

A menu located in Teaching Mode and Customizing Mode.

Additional functions are set from this menu.
The additional function settings are divided into items, each of which is then saved and distinguished by its own set of numbers.

Additional Function Numbers 1 to 50 are registered in Teaching Mode and numbers 51 to 100 are registered in Customizing Mode.

Additional Function Number

A number to distinguish registered additional function data. Although the numbers are separated for each setting item, they are collectively referred to as "additional function numbers."

1 to 100 additional function data numbers are available for each setting item. Call up an additional function by specifying the additional function data number to a point.

Administration Mode

A mode for administration settings and maintenance work (fault diagnostics, mechanical adjustments).

Press the MODE key on the Teaching Pendant on the Base screen for each mode, and select [Administration Mode] to switch to this mode.

Refer to "14. WHAT YOU CAN DO IN ADMINISTRATION MODE" in *Basic Instructions.*

Administration Settings Mode

A function located in Administration Mode.

A menu mode from which you can modify settings related to the all robot operations.

You can also delete all C&T data from this menu.

Information set here is retained even when the controller is switched OFF.

Refer to "1. Administration Settings" in *Functions III*.

Alias Definitions

A function located in Teaching Mode and Customizing Mode. Used to assign the I/O signals with different names.

Defines the I/O including the I/O width for I/O-SYS and I/O-1, etc. Also specifies identifiers for the COM ports.

Refer to "9. Alias Definitions" in *Functions II*.

All Program Common Default Settings

A menu item located in Customizing Mode > [Teaching Mode Customizing].

Values set here are used as default values for all program common settings in Teaching Mode. These are used when creating a new program.

Refer to "8.3 Default Values" in *Functions IV*.

All Program Common Settings

A menu item located in the Teaching Mode Menu.

Sets Run Mode preferences and functions. You can make I/O-SYS function assignments and set Run Mode Jobs, etc.

Refer to "2. All Program Common Settings" in *Functions III*.

Application Software

Robot system software, designed for a specific application.

The application specification can be changed by re-writing the software.

The Normal specification is the base, and there are basically no changes in operation, but there are more application-specific commands and settable parameters.

There is software for jobs such as screw tightening, painting, soldering, etc.

Application Specifications

This robot model is customized for a specific purpose of use. The robot employs a specialized application software system.

There are specifications for screw tightening, painting, soldering, etc.

Area Sensor

A device that sends a signal to the robot when an obstacle enters the detection area.

A component used to create a safety guard for this robot. The area sensor prohibits robot movements when an obstacle is inside the detection area.

Use by connecting to the I/O-S Connector is used for the JR3000 Series, and to the EMG OUT Connector for the JC-3 Series.

[B]

Backlight

A light that illuminates the teaching pendant LCD from behind.

The backlight ON/OFF settings for Run Mode are made from [Administration Settings Mode] > [Backlight Auto OFF].

Refer to "12. LCD Backlight ON/OFF" in *Teaching Pendant Operation*.

Ball Screw

A mechanical part that converts shaft's rotary motion into linear motion.

A nut is fitted to the thread on the shaft, and as the shaft rotates, the nut linearly moves along the shaft.

On this robot, it is used in the Z axis drive.

Base Screen

The first screen displayed (except when there are no registered programs) after accessing a mode.

You need to be on this screen when you want to access the screen for changing modes.

Refer to "3.1 Base Screen" in *Teaching Pendant Operation*.

Base Type

The base point type selected when creating user defined point types in Customizing Mode.

Refer to "5.2 Base Type" in *Functions IV*.

Basic Point Type

The 9 point types with which standard robot models are programmed by default.

Conversely, point types created by the user using the customization function are called "user-defined" point types.

Baud Rate

A value that indicates the modulation rate per second. Baud rate. The larger the value, the more information you can transfer within the same amount of time.

You can modify the baud rate from Administration Mode > [COM Settings] menu.

BCD

Binary-coded decimal.

In computing, this is one method of expressing numerical values (MDI) where each decimal digit (0 to 9) is represented as a 4-digit binary number.

Big Endian

This is a method to arrange data in order from the higher byte to the lower byte when handling large quantities of byte data. This method is used for Ethernet communication.

Binary

A binary number or a binary file format.

Bit

The smallest unit of electronic data. Can be indicated by a single binary digit, either as a 0 or a 1.

The I/O memory relay has a single bit domain.

8 bits = 1 byte 16 bits = 1 word

→ Byte

→ Word

Block

Specifies a group of points in a program from a certain point number to a certain point number. This group of points within the specified range is called a "block."

Point blocks are used to collectively delete/move/copy a group of points or collectively modify point settings.

Block Editing

This is a function located in Teaching Mode > Editing Points Menu.

Edits (delete, move, copy, mirror copy, offset, position data rotation) a block of points in a program.

Refer to "7.1.3 Block Editing" in *Teaching Pendant Operation*.

Boolean Variable

A variable that stores one of only 2 values: true or false.

Built-In Functions

The built-in mathematical functions (functions programmed to the robot in advance).

Refer to "8.1 Built-In Functions" in *Functions II*.

Built-In Variables

The built-in variables (variables programmed to the robot in advance).

Refer to "7.1 Built-In Variables" in *Functions II*.

Buzzer

A device that alerts the user to an error, etc., by emitting a high-pitched electrical sound.

Equipped in two places: the controller and inside the teaching pendant.

Byte

An electronic data unit. An 8 digit binary number. Using decimal numbers, this can indicate a value from 0 to 255 without using a code.

1 byte = 8 bits. 2 bytes = 1 word.

The I/O memory register has a domain for 2 bytes (equaling 1 word).

→ Bit

→ Word

[C]

C&T Data

A unit that collectively contains customizing data and teaching data. A unit of data.

The robot transfers data to the PC in this unit when making a backup.

Refer to "3. C&T Data" in *PC Operation*.

CE Specification

A specialized specification for structures which satisfy the safety standard indicated by European EC/EU directives.

A CE marking appears on the rated identification plate.

CE marking

Declaration that the product complies with the European health, safety and environmental protection legislation in practice by the EC/EU directives.

This marking is required for import to and sale within the EEA (European Economic Area),

On this robot, it is located on the CE specification type rated identification plate.

Refer to "2. Rated Identification Plate" in *Specifications*

Change Mode

Switch from the current mode to a different mode.

Press the Mode key on the Teaching Pendant on the Base screen for each mode,

Press a MODE key to move to the selected screen (Mode menu).

Or, press the SHIFT + MODE keys to switch sequentially through External Run → Switch Run → Teaching → External Run.

Character Length

Settings for the character size (the number of data bits per character).

You can modify the character length from Administration Mode > [COM Settings] menu.

Character String Variable

Variables that can store character strings.

With this robot, a character string variable can hold up to 255 bytes.

Check Data

This is a function located in Teaching Mode > [Test Menu].

Use this to check whether there are errors in the current program.

Refer to "4.2.1 Check Data" in *Teaching Pendant Operation*.

Check SUM

One method of detecting errors when transferring data.

Before the transfer, the data is divided into blocks, represented as a value and then totaled. The data is then transferred with an 8 bit or 16 bit "error detection code."

After receiving the data, calculate the total in the same way and check whether or not it matches the received error detection code.

If the data is altered during the transfer, the current data does not match the error detection code and the robot determines there is an error.

Refer to "3.1 COM Communication" in *Communication Control*.

COM Alias

A function to set different names to COM ports.

Set from Customizing Mode > [Alias Definition].

Refer to in "9.2 COM Alias" in *Functions II*.

COM Port

An interface for communicating with external devices (PC, PLC, etc). This robot has a COM communication connector as standard equipment.

COM is an abbreviation of "communication." Compliant with RS-232C standards.

→ RS-232C

COM Settings

A menu located in Administration Mode > Administration Settings Mode. Sets the COM1 to 3 communication settings.

Namely, the baud rate, character length, stop bit, and parity.

→ Baud Rate

→ Character Length

→ Stop Bit

→ Parity

Command

Commands for instructing robot operations, signal I/O, etc.

Combine these with variables and functions to create point jobs and movement conditions.

Refer to *Functions II*.

Command Category

Categories of commands sorted according to the command type and content.

When creating a command string using the teaching pendant, first select the category from the command category list and then select the command you want to use from that category.

Common Block Settings

This is a function located in Teaching Mode > Editing Points Menu.

An editing function that collectively sets a block of points in a program with a line speed and additional function data number.

Refer to "7.1.4 Common Block Settings" in *Teaching Pendant Operation*.

Common Data Settings

Settings made in Teaching Mode based on common setting variables defined in Customizing Mode. Enter the numerical value and the item in Common Setting Variable. Common data settings appear when a common setting variable is defined.

If a name is set in Customizing Mode, that common data setting appears with that name.

Refer to "10.5 Common Data Setting" in *PC Operation*.

Common Line Speed Settings

A function located in Editing Points Menu > [Common Block Settings].

This function collectively sets the line speed set to points that are within a specified block of point numbers.

Common Setting Variable

A type of setting variable.

These use common values for all programs.

Refer to "6.1 Common Setting Variables" in *Function IV*, or "16.5.1 Common Setting Variables" in *PC Operation*.

Condition Command

A command used to calculate a condition (true/false). Used after conditional commands and conditional standby commands (if, waitCond, waitCondTime).

These consist of Id (ON input) and Idi (OFF input) and are used together with parameters such as variables and input/output signals.

Refer to "12. Conditions" in *Functions II*.

Condition Data

1. Data defined in Customizing Mode using condition setting variables.

2. The items displayed in Teaching Mode menu when the data described in 1 above exists. You can assign condition data to points by specifying the condition data with a condition number. However, if the condition data is assigned a name in Customizing Mode, that name appears in the Teaching Mode menu.

Condition Number

The numbers assigned to condition data.

The numbers 1 to 500 can be used.

Condition Setting Variable

A type of setting variable.

Collectively registers multiple condition setting variables and the sequence of values used in variables as condition data by number (condition number). You can create 1 to 500 condition numbers.

Refer to "6.3 Condition Setting Variables" in *Functions IV*.

Continuous Playback

A type of run method used for running programs.

The robot repeats the programs until it receives a run stop signal.

Set in [Individual Program Settings] > [Cycle Mode].

Refer to "7. Cycle Mode" in *Functions I*.

Connector

Parts for connecting the robot unit and the cables. Also known as a "plug" or "receptacle."

Controller

A component used to control the JC-3 Series. Operate by using the controller cables to connect it to the robot unit.

Use devices such as the teaching pendant and switchbox by connecting them to the controller.

Coordinates

A combination of numbers that represent point positions.

Indicates the distance (angle) from the reference point.

This robot has coordinates for the X, Y, Z, and R axes, which indicate the position of each one.

You can select from among 3 types of coordinate display methods, each with a different method of reference point control: [Absolute], [Relative], and [Moving Amount]. Modify the settings from [Individual Program Settings] > [Position Data Type].

→ Absolute Coordinates
→ Relative Coordinates
→ Moving Amount

Refer to "13. Absolute, Relative & Moving Amount (Position Data Types)" in *Functions I*.

Coordinates Display

A function located in [Teaching Environment Settings].

Select the coordinates display type from [Normal Display] and [Detailed Display] on the Point Settings screen.

CP Acceleration

The acceleration used during a CP movement.

Specify this as a percentage (1 to 150 %) of the maximum acceleration.

Set this in the CP Conditions menu.

CP Arc Point

A point type.

Use this point type to move the robot in an arc by specifying this point type in CP movement between a CP Start Point/CP Passing Point and a CP End Point/ CP Stop Point.

Refer to "4. Robot Operation(CP Movements)" in *Quick Start*.

CP Conditions

Sets the various conditions used in a CP movement.

You can set the following 3 conditions: [CP Acceleration], [R-Axis Rotate Speed], and [R-Axis Acceleration].

These are set in [Individual Program Settings] or [Additional Function Data Settings].

→ CP Acceleration
→ R-Axis Rotate Speed
→ R-Axis Acceleration

Refer to "9. CP Condition (Program Data)," "20. CP Condition (Additional Function Data)" in *Functions I*.

CP Condition Number

1. The number assigned to the CP conditions set in [Additional Function Data Settings]. Numbers 1 to 50 are set in Teaching Mode and numbers 51 to 100 are set in Customizing Mode.

2. A function located in Editing Points Menu > [Common Block Settings]. This function collectively modifies the CP conditions set to points that are within a specified block of point numbers.

CP End Point

A point type.
The CP movement ends at this point.

CP Movement

CP is an abbreviation for "Continuous Path."

You can use this movement type to specify a point to pass through when moving to the next point. You can also draw and move in an arc with this movement type by specifying an Arc Point.

The axes move to the next point at a uniform speed. The speed for this movement (line speed) is set directly to points.

CP Passing Point

A point type.

A point where the robot performs a point job or changes direction in a CP movement.

The robot passes through this point without reducing its speed to 0 mm/s.

Refer to "4. Robot Operation (CP Movements)" in *Quick Start*.

CP Speed Over

An error that occurs when robot movement finishes before the CP movement can reach the set line speed.

This occurs when the distance for the line speed is short or the CP acceleration is low.

If this error occurs, lower the line speed settings or increase the CP acceleration to correct it.

CP Start Point

A point type.

A CP movement starts from this point.

CP Stop Point

A point type.

A point where the robot performs a point job or changes direction in a CP movement.

The robot briefly reduces its speed to 0 mm/s when passing through this point.

Refer to "4. Robot Operation (CP Movements)" in *Quick Start*.

Customizing Mode

A mode for user convenience that can modify settings, assign names, etc., to the fundamental elements used in teaching.

This mode is located within Administration Mode.

You can customize point type definitions, variable definitions, user function definitions, and alias definitions.

Refer to "13. WHAT YOU CAN DO IN CUSTOMIZING MODE" in *Basic Instructions*.

Cycle

When a program is executed, this is the robot movement from the work home until the program ends and the robot stops.

Cycle Time

The elapsed time from the start until the end of the run when executing a program in Manual/External Run Mode. However, this does not include runs that were terminated due to errors or emergency stops.

With 1 Cycle Playback, the cycle time is measured for that one program run. With Continuous Playback, the cycle time is measured from the time the robot starts running the program until the time the robot stops via the Last Work command.

Cycle Mode

The type of run method. There are 2 types: [1 Cycle Playback] and [Continuous Playback]. Select the Cycle Mode from [Individual Program Settings].

Refer to "7. Cycle Mode" in *Functions I*.

[D]

Default Value

Data that is automatically entered when creating a program or modifying settings or conditions, etc.

You can modify these default values from Customizing Mode > [Teaching Mode Customizing].

Delete All Data

A function located in Administration Mode > Administration Settings Mode.

This erases all C&T data.

Delete All Teaching Data

A function located in Teaching Mode Menu > [Teaching Data Copy, Delete, Conversion].

Deletes all teaching data such as the programs, additional functions, and point job data.

Point job data (101 to 200), additional function data (51 to 100), and PLC programs (51 to 100) are included in Customizing Data and are therefore not deleted by this function.

Diagnostic Mode

A function located in the Administration Mode menu.

A mode for performing diagnostics and checking for problems with the various parts of the robot unit, controller, teaching pendant, and /or switchbox.

Refer to "7.3 Fault Diagnostic" in *the JR3000 Maintenance* manual, and to "9.3 Fault Diagnostic" in *the JC-3 Maintenance* manual.

Direct TCP-XY Setting

Set this in [Tool Data] from [Main TCP Setting] in [Main-Tool Configuration] or [Additional Function Data Settings].

A function for entering the TCP-X/Y.

Calculate [TCP-X] and [TCP-Y] by jogging the tool tip to the same point twice from different R axis angles.

Refer to "10. Tool Data" in *Functions I*.

Drive (Movement)

The process of using power to make something move.

Driving Time

The program run time.

[E]

Editing Commands Menu

The menu displayed by pressing the Edit key on the Point Job Data Setting screen.

From here you can edit/insert/delete commands and edit the point job name.

Editing Points Menu

The menu displayed by pressing the EDIT key on the Point Settings screen.

A menu with functions to edit individual points such as inserting/deleting points, Block Editing, and Common Block Settings, etc.

EMG OUT

The signals and connector used to attach an external safety device to a JC-3 Series machine.

The JC-3 Series cannot operate when there is nothing connected to this connector.

Emergency Stop Switch

A switch for stopping robot movements in the event of an emergency.

Pressing this stops the motor movements, sounds the buzzer, and activates the emergency stop error status.

Disengage an activated emergency stop switch by turning it clockwise.

For the standard JR3000 Series specification, it is on the controller (front), and for the JR3000 Series switchbox specification and JC-3 Series, it is on the switchbox.

An emergency stop switch may also be located on the Teaching Pendant, as an optional specification.

Enable Switch

A switch on the teaching pendant. A type of safety device.

In Teaching Mode, the enable switch has three states: pressed, pushed-in, and released. You can only drive the robot arm while the enable switch is in its "pressed" state.

While operating the robot by pressing the enable switch, push it in or release it to stop robot movements and cut the motor power OFF.

Releasing or pushing in the enable switch while in Teaching Mode turns the motor power OFF.

Encoder

A device incorporated into the motor for detecting the current position.

Error

A status where the robot determines the run cannot be continued for some reason.

When an error occurs, robot movement is stopped and the buzzer sounds. The LCD display on the Teaching Pendant displays the error number and error content (other than for error No.114). If the robot is connected to a PC, you can check the error number using the Error Log function in JR C-Points II.

On the JR3000 Series, the Program number display on the front of the controller alternates between "Er" and the error number, and the red LED (ERROR) blinks.

Errors occur for reasons such as the following: the run cannot execute correctly due to an invalid parameter in a program, an internal component is faulty, an emergency stop is activated.

Refer to "7.2 Error Display (Self-Diagnostic)" in *the JR3000 Maintenance* manual, and "9.2 Error Display (Self-Diagnostic)" in *the JC-3 Maintenance* manual.

Error No.

The number which appears on the Teaching Pendant LCD when an error occurs. If the robot is connected to a PC, this also appears in the Error Log of JR C-Points II.

On the JR3000 Series, the Program number display on the front of the controller alternates with "Er".

Refer to "10. Error Message List " in *the JR3000 Maintenance* manual, and "11. Error Message List" in *the JC-3 Maintenance* manual.

Excitation

Running electrical current through motor coils to generate torque.

Execute Conditions

An additional point function.

The robot executes a point set with Execute Condition only when it meets the specified conditions.

Create the conditions from the Additional Function Data Settings menu.

Refer to "24. Execute Condition Settings" in *Functions I*.

Execute Condition Number

1. The number assigned to the Execute Condition set in [Additional Function Data Settings]. Numbers 1 to 50 are set in Teaching Mode and numbers 51 to 100 are set in Customizing Mode.

2. A function located in Editing Points Menu > [Common Block Settings]. This function collectively modifies the Execute Conditions set to points that are within a specified block of point numbers.

External Run Mode

A mode for running the robot and executing programs. Runs are started by external signals (I/O-SYS, COM1)

Refer to "10. WHAT YOU CAN DO IN EXTERNAL RUN MODE" in *Basic Instructions*.

[F]

Fieldbus

1. A digital communication method used primarily with industrial machinery for data communication. Through a PLC, the superior device (master) controls the inferior device (slave) by integrating the inferior device's data. There are various standards for the various types. This robot is compatible with the following 6 types: DeviceNet, PROFIBUS, CC-LINK, CANopen, PROFINET, and EtherNet/IP.

2. The menu for settings related to the communication described above. This contains settings for the Fieldbus type and the stations, etc. Each robot has its own settings. These are applied to all programs for that robot.

Refer to "7. Fieldbus" in *JR3000 External Control*, and to "6. Fieldbus" in *JC-3 External Control*.

Fixture

A device or tool used to secure workpieces and position robot operations. Also known as a jig.

Free Variables

A variable that is not assigned with a function by default and can be used freely.

The available identifiers are #mv, #mkv (boolean variables) #nv, #nkv (numeric variables) #sv, and #skv (character string variables), all of which can be used from 1 to 99 respectively.

Refer to "7.1.1 Free Variables" in *Functions II*.

Function Keys

The F0 – F4 keys on the Teaching Pendant operation panel.

These functions vary according to the teaching pendant screen. The functions for a given screen are often displayed at the bottom of the screen.

Fuse

This part is on the back of the controller for the JR3300 - JR3600 Series.

Its purpose is to protect against higher than rated electrical current flowing in the outlet.

When an electrical current in excess of the rating has flowed for a certain amount of time, part of its internal wire is melted by the heat, cutting the electrical current.

Once a fuse has melted, power output from the outlet is disabled until the fuse is replaced with a new one.

[G]

Gate Switch

A device attached to an entrance that detects the opening and closing of the gate and sends signals according to the gate status.

A component used to create a safety guard for the robot. The gate switch prohibits robot movements when the entrance is open.

Use by connecting to the I/O-S Connector for the JR3000 Series, and to the EMG OUT Connector for the JC-3 Series.

Global Variable Definitions

Variable definition common to all programs and points.

These can be set from the [Variable Definition] menu in Customizing Mode. Up to 500 can be defined.

GO Key Function

A function located in [Teaching Environment Settings].

This sets the speed, etc., at which the axes move when the GO key is pressed in Position Entry Mode during teaching. Refer to "4.1.4 GO Function" in *Teaching Pendant Operation*.

Graph Display

A diagram that visually represents the teaching data.

You can view the graph display after selecting a program number using the teaching pendant.

Ground

The method of connecting to the standard electrode potential in order to prevent electric shock and static electricity. Also known as "earthing." Ground.

Grounding

The method of connecting to the standard electrode potential in order to prevent electric shock and static electricity.

Also known as "earthing." Ground.

Guide roller

These rollers are attached along moving belts and shafts etc. to prevent uneven distribution of position or load.

On the JR3000 Series, it is used in the Z mechanism.

[H]

Handshake

Communication where the sender and receiver constantly acknowledge (ACK, etc.) transfers to facilitate highly reliable communication.

Hand Tool

A type of tool attached to the robot. You can use I/O signals to open and close the hand tool and perform pick and place operations.

Highlight Display

Refers to when the contrast of a given item on the teaching pendant LCD is inverted (the background is black and the letters are white).

You can highlight a different item by using the CURSOR keys. Press the ENTR key when an item is highlighted to "select" that item.

Hold (Excitation)

A state in which only a certain phase of a stepping motor continues to be excited

The shaft of the motor does not turn, and it stops at a fixed angle.

Home Position

A point serving as a reference for the robot coordinates. Coordinate positions are measured by how far the arm has moved from this position.

Each axis moves to this point when the robot is mechanically initialized.

[I]

Identifier

A character string created in Customizing Mode for distinguishing variables, functions, and point types, etc.

You can input up to 40 alphanumeric characters (including underbars).

You cannot register conflicting (duplicate) identifiers. All C&T data is checked for conflicts.

For example, if data is created with the identifier "A" for a Point Type Definition, you cannot create a User Function Definition using the identifier "A."

Import Merge

A function located in the editing commands menu.

Specify the point job number. The contents of the entered point job data are placed behind the last command line of the currently selected point job data.

incPallet

Increment pallet. A command used when controlling a pallet with a command string during a point job.

The pallet count increases by 1.

→ Pallet Routine

Refer to "14.1 Pallet Command" in *Functions II*.

Individual Job on Start of Cycle

Settings to execute the specified point job data at the start of a run.

Set in [Individual Program Settings]. Executed after [Common Job on Start of Cycle] (All Program Common Settings) is performed.

Unlike the Run Mode job [Common Job on Start of Cycle], you can set different point job data to each program.

Refer to "6. Individual Job on Start of Cycle" in *Functions I*.

Individual Program Settings

A menu item located in the Teaching Mode Menu.

Modify movement conditions and settings for the selected program.

Modifying program settings changes settings for the entire program; whereas, you can also set additional functions to points to modify settings only for that point.

Refer to "1. Program" in *Functions I*.

Initialization Sensor

The sensors attached at the initialization positions of the X, Y, Z, and R axes.

They turn ON when the drive for each axis goes beyond the initialization position in the negative direction. They are used for mechanical initialization.

You can perform a sensor position check with the [Sensor Adjustment] function.

Inlet

The plug for plugging in the power cord.

It is on the back of the robot for the JR3000 Series, and on the front of the controller for the JC-3 Series.

Interface

A component on the robot or controller used to exchange information with external devices.

This refers to the connectors and the wiring connected to those connectors.

Interlock Device

A device that prevents operation unless certain conditions are met.

Prevents machine malfunction and accidents caused by operator error.

→ Safety Device

Internal Relay

A type of free variable. (#mv1 - #mv99)

Does not retain the value after the power is switched OFF.

I/O

An abbreviation of "Input/Output."

The process of receiving signals (input) from, and sending signals (output) to, an external device.

Also refers to the functions, interfaces, and data used with I/O.

I/O-1

1. An input/output system (Input/Output 1). An interface for communicating data with external devices by turning digital signals ON/OFF. Also refers to the signals themselves.

2. The menu for making settings related to the above interface.

Refer to "8. I/O-1" in *JR3000 External Control*, and to "7. I/O-1" in *JC-3 External Control*.

I/O-Alias

A function to give an I/O signal a different name.

Defines the I/O width and name of the I/O signals available from the I/O-SYS and I/O-1 connectors, etc.

Set in Customizing Mode Menu > [Alias Definition].

Refer to "9.1 I/O Alias" in *Functions II*.

I/O-S

The signals and connector used to attach an external safety device to a JR3000 Series machine.

The JR3000 Series cannot operate when there is nothing connected to this connector.

Refer to "9. I/O-S" in *JR3000 External Control*.

I/O-SYS

1. An Input/Output system. An interface for communicating data with external devices by turning digital signals ON/OFF. Also refers to the signals themselves.

2. The menu for making settings related to the above interface.

Refer to "2. I/O-SYS" in *JR3000 External Control*, and to "1. I/O-SYS" in *JC-3 External Control*.

I/O-SYS Function Assignment

A menu item used to change the functions preassigned to the I/O-SYS signals when you want to use the I/O-SYS signals for a different application.

Set in Teaching Mode Menu > [All Program Common Settings] > [I/O Settings].

[J]

Job after Moving

A function to perform a job specified by job number after the movement to the set point is complete.

This function is set using "job data numbers" on the point setting screen.

Job before Moving

A function to perform a job specified by job number at a point before moving to the specified point.

Set from the job data number on the Point Settings screen.

Job Data Number

The numbers assigned to point job data.

You can create numbers 1 to 100 in Teaching Mode and numbers 101 to 200 in Customizing Mode.

Job during CP Movement

A function to repeat a job specified by job data number while the robot is making a CP movement.

The job is repeatedly performed from the point at which it was set until the robot reaches the next point.

Set from the [Job Data Number] item on the Point Settings screen.

Refer to "18.4 Job While CP Moving" in *Functions I*.

Job on Start of Cycle

Settings to execute the specified point job data at the start of a run.

Set in [All Program Common Settings] > [Run Mode Job and PLC Program]. [Individual Job on Start of Cycle] set in [Individual Program Settings] is executed after [Common Job on Start of Cycle] is performed.

Refer to "2. All Program Common Settings" in *Functions III*.

Job while Moving

A function to repeat a job specified by job data number while the robot is making a PTP movement.

Set this job to a point. The job is repeatedly performed from the point prior to the specified point until the robot reaches the specified point.

Set from the job data number on the Point Settings screen.

JOG Function

A function located in [Teaching Environment Settings].

You can use this function to set the movement speed for when moving the robot in JOG Mode.

Refer to "4.1.5 JOG Function" in *Teaching Pendant Operation*.

JOG Keys

The keys on the teaching pendant that are marked with an axis and a movement direction.

Used together with the enable switch to move the axes in JOG Mode. Refer to "2.7 Teaching Pendant Operation Panel Keys" in *Basic Instructions.*

JOG Mode

A mode for entering positions.

A position entry mode in which you can move the robot arm to a given position using the JOG keys on the teaching pendant.

Press the F2 (JOG) key on the Position Entry screen to switch to this mode.

Refer to "3.5.3 JOG Mode" in *Teaching Pendant Operation*.

JR C-Points II

A PC software application (Windows® compatible) used to operate the robot.

You can save C&T data (back up the data to PC), edit, and upgrade the robot system software.

[K]

Keep Relay

A type of free variable.

Retains the value even after the power is switched OFF. (#mkv1 – #mkv99)

Keeping Variable

Variables common to all programs and points. The robot can retain these even after the power is switched OFF.

These can be set from the [Variable Definition] menu in Customizing Mode. The maximum number of definitions is 500.

[L]

Labyrinth Structure

This structure combines clearances for irregularities between fixed and moving parts, and prevents the entry of foreign material from outside.

On the JR3000 Series, it is used on the X Table.

Last Work

A function assigned to an I/O input signal.

When Cycle Mode is set to [Continuous Playback], the robot stops the run when it receives the I/O signal assigned with this function.

Assigned to #sysIn11 for the JR3000 Series and to #sysIn13 for the JC-3 Series, by default.

LCD

An abbreviation of "liquid crystal display" .

Used in the display unit on the teaching pendant.

LED

An abbreviation of "light emitting diode" .

Used on the controller, the teaching pendant, the front of the operation box, etc.

Line Speed

The movement speed of a CP movement.

Max. Speed varies depending on the series.

You can set this to point types that make CP movements to the subsequent point.

Set individually to each point. However, you can collectively modify the line speed of points within a specified range from Editing Points Menu > [Common Block Settings] > [Common Line Speed Settings] or [Multiple Line Speed].

Refer to "7.1.4 Common Block Settings" in *Teaching Pendant Operation*.

Linear Motion Guide

A mechanical part for moving a block linearly along a rail.

On the JR3000 Series, it is used in the guide parts of the X and Y axes and the shaft.

On the JC-3 Series, it is used inside each slider.

Local Variable

Variables created using a variable declare command in a function or command string.

This command is only valid in the function or command string within which it is nested. It cannot be called up from a separate function or command string.

Set the variable type and an identifier when declaring the variable. There are 2 types of variables: Numeric and String.

loopPallet

A looped pallet routine. A command used when controlling a pallet with a command string during a point job.

The pallet count increases by 1 and the robot moves to the specified point until the counter is full.

→ Pallet Routine

Refer to "14.1 Pallet Command" in *Functions II*.

Lubricant

A semi-solid (jelly) or solid lubricant.

Applied for lubrication and rust prevention to the shaft (ball screw) and reduction drive.

Lubrication

Maintenance work to remove old grease and apply new grease. Also referred to as "greasing." Prevents function degradation and machine failure.

Performed during a periodic inspection (every 6 months or every 1,500 hours of operation) when lubrication is required or when a lubrication notification appears on the teaching pendant LCD or JR C-Points II.

Refer to "6. Lubrication" in *the JR3000 Maintenance* manual, and "5. Lubricating" in *the JC-3 Maintenance* manual.

[M]

Management Information

A function located in Administration Mode.

Administration information, such as the robot model type, the robot system software version, is displayed on the teaching pendant.

Refer to "9. Checking Version Information" in *the JR3000 Maintenance* manual, and "10. Checking Version Information" in *the JC-3 Maintenance* manual.

Manual Data Input Mode

A mode for entering positions. Enter position coordinates using the number keys.

Press the $\boxed{\text{F3}}$ (MDI) key on the Position Entry screen to switch to this mode.

Manual Job Number Setting

A function located in [Teaching Environment Settings].

Sets up to 3 point job data numbers for each of the function keys (12 total).

On the position entry screen in Teaching Mode, this function allows you to use the function keys to execute point job data set by number.

Refer to "4.1.7 Manual Job Number Setting" in *Teaching Pendant Operation*.

MDI

An abbreviation of "Manual Data Input" Used to indicate Manual Data Input Mode in English.

Mechanical Adjustment Mode

A function located in Administration Mode.

You can perform [Sensor Adjustment].

→ Sensor adjustment

Mechanical Initialization

Refers to returning each of the robot's axes to its home position. Return to Home Pos.

Mechanical Initialization Sequence

A function located in Teaching Mode Menu > Run Parameters.

Set the order in which to initialize the X axis and Y axis when initializing the robot.

The default setting is to initialize the X and Y axes simultaneously.

Changing the setting causes one of the axes to be initialized first, followed by the other.

Micro Step operation

The control method for the stepping motor.

Control is divided into single steps by controlling the electrical current flowing in the coils of the motor.

Mode Menu

This displays the screen for selecting the mode.

Pressing the $\boxed{\text{MODE}}$ key on the Teaching Pendant on the Base screen for each mode also switches to this screen.

Refer to "7. CHANGING MODES" in *Basic Instructions*.

Modes

The menus selected when operating the robot.

The menus displayed and functions that can be executed vary depending on the mode. Select the mode according to the work you want to perform.

There are 5 modes: Manual/ Auto Run Mode, Teaching Mode, Customizing Mode, and Administration Mode.

Model Setting File

A file for writing robot internal parameters (number of axes, stroke, etc.).

Re-writing is not normally possible, but writing is necessary in situations such as after a robot printed circuit board has been replaced.

Motor Cable

Cords for connecting the JC-3 Series robot unit and the controller.

There are cables for the X slider, Y slider, Z slider, and ZR mechanism (4-axis specification), and connecting them makes it possible to start and control the robot. (Sensor cables are required for the 4-axis specification)

Refer to "4.3 Connecting the Main Unit to the Controller " in *the JC-3 Setup* manual.

Motor Driver Z Phase

An item located in Diagnostic Mode.

It moves the motor by just 1 step from its initialized state, to check whether the Z phase signal turns off.

It performs motor diagnosis for each axis, X to R.

Move Area Limit

A function that stipulates the movement coordinates and angle range for the robot in the program.

This can be run from [Program] and set to each axis, X to R.

Refer to "12. Move Area Limit" in the operation manual *Functions I*.

Movement Control

Refers to moving the robot axes.

Or, the command category for moving the robot axes.

Refer to "17. Move" in *Functions II* and "7. Movement Control" in *Communication Control*.

Moving Amount

A position data type.

This treats the current position as the origin for the position data and so the numerical value is treated as the distance from the current position to the next position.

Refer to "13. Absolute, Relative & Moving Amount (Position Data Types)" in *Functions I*.

Multiple Line Speed

A function located in Editing Points Menu > [Common Block Settings].

This function sets a line speed ratio to points that are within a specified block of point numbers.

[N]

Nested Level

Indicates the number of nested functions.

An error occurs if the nested level exceeds 10 with subroutines such as "call_Job" or "callprog," or with "if... end if" or "for... next" commands.

Nesting

In programming, nesting is when a function is contained within another function. Also known as a "nested structure."

This occurs with commands such as "call_Job" and "callprog" (subroutine call), "if... endif" (conditional), and "for... next" (loop).

Noise

Electrically unnecessary signals that get mixed with signals during data transmission.

Noise may distort the information contained in the data transfer.

Numeric Variables

A variable that stores numeric values.

An 8 byte real type (double type) variable.

[O]

Offset

1. A value that expresses the necessary data value as the difference from a reference point.

2. When relocating a point, this is the method used to specify the distance for the point destination. There are two types of offsets: [XYZR Offset] where you a enter value for the moving distance of each coordinate, and [JOG Offset] where you specify two points to relocate a point the difference between those two points. Both of these offset types are executed from Editing Points Menu > [Block Editing].

Refer to "7.1.3 Block Editing" in *Teaching Pendant Operation*.

ON Time

The ON time of the robot.

Open Height

The distance from the top of the X table to the bottom of the Y unit on the robot body.

Option

An additional or modified specification/accessory included when requested; not supplied for standard models.

There are additional I/O ports, and an emergency stop switch on the Teaching Pendant.

Outlet

A connector located on the back of the JR3300 Series - 3600 Series. It is used when supplying power from the robot to external devices. Power supply output connector.

Output Bit Number

Specifies the output width (the number of I/O bits) used to output the I/O signal.

Required when you want to output values using the point job command dateout.

Refer to "10.6 Output Values from I/O" in *Functions II*.

[P]

Pallet Routine

1. A function located in [Additional Function Data Settings]. This creates and registers a pallet.

2. Set the number of lines (columns and rows), reference point coordinates, and the coordinates for determining the offsets to register a pallet routine. A pallet routine includes a counter that determines the offset amount when the counter increases. The robot uses this to perform the pallet routine at equal intervals for the set number of lines (columns, rows). Used when working at equally spaced points or when systematically drawing patterns.

Refer to "22. Pallet Routine Data Settings" in *Functions I*.

Pallet Routine Number

1. The number assigned to the Pallet Routine created from the [Additional Function Data Settings] menu. Numbers 1 to 50 are set in Teaching Mode and numbers 51 to 100 are set in Customizing Mode.

2. A function located in Editing Points Menu > [Common Block Settings]. This function collectively modifies the Pallet Routine set to points that are within a specified block of point numbers.

Parameter

This is a value for determining operating conditions. This term can be used to indicate the kind of value to be set, or the set value itself.

Parity

A function located in Administration Mode > COM Settings.

You can select the parity bit from among [None], [Even Parity], and [Odd Parity].

Parity Bit

An "error detection code" added during a data transfer to detect whether or not binary data is altered during the communication.

First, set the parity bit as either odd or even. From there, the robot counts how many 1s are included in the data and if this is the same as the odd/even parity bit, the robot adds "0" to the data transfer. If the number of 1s is different from the odd/even parity bit, the robot add "1" to the data transfer.

After transferring the data, the robot counts the number of 1s again and compares this value with the parity bit attached to the data transfer. If the data is altered to an odd number of bit errors, the current parity bit will not match the attached parity bit and the robot determines there is an error.

However, if the data is altered to an even number of bit errors, the robot cannot detect the error.

PCB

→ Printed Circuit Board

Photocoupler

An electrical component for transmitting electrical signals. Composed of an emitter and a photosensor in an outer casing that blocks external light.

Transmits a signal by converting the input electric signal into light.

Because the input end and output end are electrically insulated, they are often used to transmit signals between circuits that have different voltage references.

With this robot, this is used as a component on printed circuit boards.

PLC

An abbreviation of "Programmable Logic Controller."

A PC or dedicated input device used as a device to sequentially control preprogrammed control content.

PLC Program

A set of logical operation commands for controlling I/O signals, etc.

Created in Teaching Mode or Customizing Mode.

You can control I/O signals during program runs by specifying the PLC program number in [All Program Common Settings] > [Job and PLC in Run Mode].

Refer to "3. PLC Programs" in *Functions III*.

PLC Program Number

The numbers assigned to a created PLC program.

Numbers 1 to 50 are set in Teaching Mode and numbers 51 to 100 are set in Customizing Mode.

Point

Points that make up the operating program of the robot.

Points are programmed with the arm position (coordinates) and can also hold information such as the job (point job), the type of action (point type), and the settings related to the operation (additional function).

A program is created by creating and setting multiple points.

Point Job

A function to perform a job specified by job number after arriving at the set point.

Set from job number on the point setting screen.

Point Job Data

A command string for executing a job at a point.

Created from [Point Job Settings] in Teaching Mode or Customizing Mode.

Numbers 1 to 500 are registered in Teaching Mode and numbers 501 to 1000 are registered in Customizing Mode.

Refer to "8.5 Point Job Data" in *Teaching Pendant Operation*.

Point Job Data Setting Screen

A screen that shows point job data content when it is being edited. Also known as a "base screen."

You can check, edit, and enter new commands for the current command string.

Pressing the EDIT key on this screen opens the Editing Commands Menu.

Refer to "8.5 Point Job Data" in *Teaching Pendant Operation*.

Point Job Number

A number to distinguish registered point job data.

1 to 1,000 point job numbers are available. Call up a point job by specifying the point job number to a point.

Point Job Settings

A function located in Teaching Mode and Customizing Mode.

Creates and edits point job data.

Point Number

The numbers assigned to points within a program.

Starting with the work home position as point number 1, points are set individually in succession from point 2 to 3 and onwards.

When a program is executed, the robot works sequentially from point number 1.

Point Run

A function to run individual points while creating a program.

Press the ⌷F4⌷ (P.EXEC) key on the Point Settings screen to run the currently displayed point. The settings screen for the next point then appears.

However, if the current point is a CP movement Start Point, the robot does not stop and continues to run through to the CP movement End Point.

Refer to "6. Point Run" in *Teaching Pendant Operation*.

Point Settings Screen

A screen that shows registered points when editing a program in Teaching Mode. Also known as a "base screen."

You can check and modify the coordinates, the point types, and the set conditions, etc.

You can switch between [Normal Display] and [Detailed Display] from [Teaching Environment Settings] > [Coordinates Display].

Pressing the ⌷EDIT⌷ key on this screen opens the command editing menu.

Refer to "4.1.11 Coordinates Display" in *Teaching Pendant Operation*.

Point Setting Variable

Variables that can hold a value for individual points.

Created from Customizing Mode > [Point Type Definition] > [Point Setting Variables Definition].

Point Setting Variables Definition

A function located in Customizing Mode > [Point Type Definition] menu.

Creates point setting variables.

Refer to "5.5 Point Setting Variables Definition" in *Functions IV*.

Point String Variable

A variable which can set the lineup of points during teaching input.

A specific type of setting variable.

Point Teaching

Refers to registering point coordinates, additional functions, and jobs, etc. Refer to *Functions I*.

Point Tool Data Settings

A function located in [Additional Function Data Settings]. Sets the tool mass and the TCP (tool center point).

This is the same content set in [Main TCP Setting] using [Main-Tool Configuration] in Teaching Mode. Use this when you want to use tool data between specified points that is different from that set in the individual program data.

Refer to "21. Point Tool Data Settings (Additional Function Data)" in *Functions I*.

Point Type

A parameter set to points.

Information for how the robot operates at that point.

There are PTP movement points and CP movement Start Points, etc.

Refer to "12.9.1 Programs" in *Basic Instructions.*

Point Type Caption

A function located in Customizing Mode > [Point Type Definition] menu.

Names set with this function appear on the point type selection screen in Teaching Mode.

Refer to "5.3 Point Type Captions" in *Functions IV*.

Point Type Definitions

A function in Customizing Mode.

Creates a point type based on a base point type that is set with a point job such as a job before moving or job after moving.

Point types created with this function appear on the point type selection screen in Teaching Mode.

Refer to "5. Point Type Definitions" in *Functions IV*.

Port

An interface for input/output communication of data and signals with an external device.

With this robot, this refers to all of the connectors.

Position Coordinate

→ Position Data

Position Data

Parameters that represent point positions. Also known as position coordinates.

They are expressed as values for the X, Y, Z, and R axes.

Note that the home position used as a reference for these values varies depending on the position data type settings.

Position Data Type

This is a function located in Teaching Mode > Teaching Mode Menu.

This defines how the point positions are expressed (basis of the position data values). There are 3 types: [Absolute], [Relative], and [Moving Amount].

→ Absolute Coordinates

→ Relative Coordinates

→ Moving Amount

Refer to "13. Absolute, Relative & Moving Amount (Position Data Types)" in *Functions I*.

Position Entry Mode

The methods for entering point coordinates on the position entry screen.

You can switch between JOG Mode and Manual Data Input Mode by pressing the corresponding function keys on the Position Entry screen.

Refer to "3.5 Position Entry" in *Teaching Pendant Operation*.

Position Entry Screen

The screen used to enter point position data when creating a program.

This screen appears after you select [Coordinate Display] when creating new point data or when you are on the point setting screen.

You can also switch to Position Entry Mode from this screen.

Refer to "3.5 Position Entry" in *Teaching Pendant Operation*.

Position Out of Sync Detection Specification

One of the specialized specifications.

If a stepping motor steps out of sync, this specification has a function to detect the position error, trigger an error, and stop the robot.

Power Lamp

A component located on the front of the JC-3 Series controller. For the JR3000 Series, it is on controller if the robot is of the switchbox specification.

This is ON while the robot is powered ON.

Printed Circuit Board

An electrical component used to assemble electrical wiring. Printed circuit board. May also be abbreviated to "PCB".

A plate-shaped component fixed with multiple electronic components such as integrated circuits, resistors, and capacitors that are wired together to construct an electronic circuit.

Program

Instructs the robot with a processing (jobs and conditions) procedure.

Create a program in Teaching Mode and then execute it in Run Mode to move the robot.

Each program is identified by number and can be set from 1 to 999.

You can create a program using the teaching pendant or JR C-Points II.

Program Name

The name set to a program. Enter the program name in [Individual Program Settings].

You can enter up to 120 half-width alphanumeric characters and symbols when entering a program name using the teaching pendant.

However, only 36 characters are displayed in the program list and only 40 characters are displayed on the Run Mode base screen.

Program Number

A number to distinguish registered programs.

Numbers 1 to 999 are available. Call up a program by specifying the program number in Run Mode.

Program Number Selection Key

Keys used to switch to the program number you want to execute in Run Mode.

It is attached to the switchbox.

Program Number Switching Method

A function located in Teaching Mode Menu > [All Program Common Settings] > [I/O Settings].

Changes the signal used to command a program number change.

Select from among [LOAD/ACK Handshake], [Load at Start (I/O-SYS)], and [Load at Start (Fieldbus)].

Refer to "2.1.1 Program Number Switching Method" in *Functions III*.

Program Number Reading Format

A function located in Teaching Mode Menu > [All Program Common Settings] > [I/O Settings].

Select whether the signals that match the I/O Program Number 1 – 512 signals are read as [Binary] or [BCD].

Program Setting Variable Definition

A type of setting variable.

A variable that sets values to programs individually.

Refer to "6.2 Program Setting Variables" in *Functions IV*.

Protect Mode

Information set to data created in Customizing Mode.

Sets the access permissions for accounts that did not create the data.

There are 4 levels of permission: [No Limit], [Public], [Protected], and [Private].

Refer to "4.1 Types of Accessibility" in *Functions IV*.

PTP Conditions

Sets the various conditions used in a PTP movement.

You can set the speed limit, acceleration limit, and the height of the arc or gate trajectory, etc.

These are set in [Individual Program Settings] or [Additional Function Data Settings].

Refer to "8. PTP Condition (Program Data)," and "19. PTP Condition (Additional Function Data)" in *Functions I*.

PTP Condition Number

1. The number assigned to the PTP conditions created in [Additional Function Data Settings]. Numbers 1 to 50 are set in Teaching Mode and numbers 51 to 100 are set in Customizing Mode.

2. A function located in Editing Points Menu > [Common Block Settings]. This function collectively modifies the PTP Condition Numbers set to points that are within a specified block of point numbers.

PTP Evasion Point

A point type.

A point used to modify the robot path in a PTP movement.

Used when there is an obstacle obstructing the path to the next point.

Refer to "16.2 PTP Evasion Point" in *Functions I*.

PTP Movement

An abbreviation of "Point to Point movement."

When moving to a subsequent point, the robot axes ascend vertically from the previous point, move in the XY direction, and descend vertically to the next point.

The speed and amount the Z axis raises during this movement is set in [Individual Program Settings] > [PTP Conditions].

Refer to "16. PTP Movement" in *Functions I*.

PTP Speed

The speed limit for a PTP movement. Specify this as a percentage (1 to 100 %) of the maximum speed.

Maximum speed varies depending on the series.

Make settings under PTP Conditions.

Refer to "24. Specifications" on *the JR3000 Specifications*, or to "14. Specifications" in *the JC-3 Specifications*.

PTP Speed Override

Press the ⌁MENU⌁ key while the robot is in Manual/ External Run Mode to execute this function.

This function limits the PTP movement speed during a program run.

You can use this to specify the actual run speed as a percentage (1 to 100 %) of the maximum PTP movement speed.

Pulse

A signal/electrical current that continues to output for a very short time.

[R]

R-Axis

1. Part of the ZR mechanism, which moves in the Z-axis and R-axis directions. There is a screw hole in the tip, and it is used to attach tools.

2. An axis that represents rotational direction changes. It is only present on robots with the 4-axis specification. The coordinate is the angle of rotation of the R axis.

R-Axis Acceleration

The acceleration of R axis rotations.

Specify this as a percentage (1 to 150 %) of the maximum acceleration.

Set this from [CP Conditions] for CP movements and [PTP Conditions] for PTP movements.

R-Axis Rotate Speed

The speed at which the R axis rotates.

Specify this as a percentage (1 to 150 %) of the maximum speed. (Maximum speed with no tool attached is 800 deg/sec for the JR3000 Series, and 900 deg/sec for the JC-3 Series).

Set this from [CP conditions] for CP movements and [PTP Conditions] for PTP movements.

Also for CP movement, when the robot is moving at the set R-Axis Rotate Speed, if the R axis cannot complete the rotation by the next point, the robot reduces the CP speed so that the R axis can complete the rotation.

Rated Identification Plate

This is a label stating information about the robot. It is affixed to the side of the base of the JR3000 Series and to the side of the controller of the JC-3 Series.

It is printed with information such as the model name, power supply specification, model number, etc.

The content differs between normal use and the CE specification.

Refer to "2. Rated Identification Plate" in *Specifications.*

Receive Buffer

A domain for temporarily storing externally received data.

Used to temporarily store received data until it can be properly processed, such as when the transfer speed exceeds the processing speed.

This robot is equipped with a receive buffer for each external input/output port.

Refer to "19. COM/Ethernet Input/Output" in *Functions II*.

Register

A method used to specify the I/O memory domain. Done by specifying a 2 byte unit domain through a 3 digit hexadecimal address. Used for data communication with numerical values, etc.

Relative Coordinates

A position data type.

Position data values used to indicate the distance from the program start coordinates.

If the start coordinate is (0, 0), positioning is handled the same as for absolute coordinates.

Refer to "13. Absolute, Relative & Moving Amount (Position Data Types)" in *Functions I*.

Relay

1. A device that opens/closes electrical circuits. Relays the ON/OFF status of signals through the reception of electrical signals or electrical current fluctuations, etc.

2. A method used to specify the I/O memory domain. Done by specifying a 1 bit unit domain through a 4 digit hexadecimal address. The relay can hold a 0 or 1 value, used to express the ON/OFF status of signals when signals with such functions are assigned.

resPallet

Reset pallet. A command used when controlling a pallet routine with a point job command string.

Resets the pallet count to 0.

→ Pallet Routine

Refer to "14.1 Pallet Command" in *Functions II*.

Return to Home Pos.

→ Mechanical initialization

Rigidness

The criterion of an object's ability to withstand deformation when force is applied to it.

The higher rigidness, the higher the object's ability to withstand deformation (the less the object deforms) even when force is applied to it.

Robot System Function

Functions related to robot operations and teaching pendant statuses, etc.

Robot System Software

The built-in system software used to operate the robot.

You can upgrade the version and change the application model of the robot by writing new system software to the robot.

You need to connect the robot to a PC and use JR C-Points II for writing.

RS-232C

A standard for Input/Output device interfaces. A standard set by the EIA (Electronic Industries Alliance) in the United States.

With this robot, the COM1 - COM3 connectors use this standard.

Refer to "2.2 COM Connection" in *Communication Control*.

RS-422

A standard for input / output device interfaces. A standard set by the EIA (Electronic Industries Alliance) in the United States.

With this robot, the teaching pendant connector (TPU) uses this standard.

Run Mode

A mode for running the robot and executing programs.

There are two types: External Run Mode and Switch Run Mode.

→ External Run Mode

→ Switch Run Mode

Run Mode Job

A function located in Teaching Mode Menu > [Run Mode Parameters].

These are jobs that are executed at certain timing, such as when the power is turned ON or an emergency stop is activated.

Refer to "2.2 Run Mode Jobs and PLC Programs" in *Functions III*.

[S]

Safety Device

A device for preventing accidents and ensuring the safety of workers when accidents occur.

Examples of these are the emergency stop switch, the enable switch, and the safety guards.

Safety Guard

Consists of a protective wall or fence and a gate switch or area sensor, etc., (an I/O-S Connector is used for the JR3000 Series, and an EMG OUT Connector for the JC-3 Series)

This is a device for completely separating human operators from the operating range of the robot. The robot operates only when the entrance is closed or when there is no one inside the detection area; i.e., there are no people inside the robot's moving range.

Opening the entrance during a run activates an emergency stop.

Scan Time

The time it takes to run a PLC program.

The scan time increases as the number of PLC program steps (rows) increase.

Select

This refers to highlighting an item on the teaching pendant and then pressing the $\boxed{\text{ENTR}}$ key.

The item is selected and the subsequent screen appears.

Select Language

A function to change the language displayed on the teaching pendant.

Switch from among English / Japanese / German / Italian / Spanish / French / Korean / Simplified Chinese / Czech / Vietnamese / Traditional Chinese.

Access this function from [Teaching Environment Settings] > [Select Language] or press the $\boxed{\text{CTRL}}$ + $\boxed{\text{T.ENV}}$ keys on any screen.

Sensor Adjustment

A diagnostic menu for the initialization sensors that are attached to each axis.

Run it from Administration Mode > Mechanical Adjustment Menu.

Sensor position adjustment must be performed if any error occurs after components such as the sensor, motor, or timing belt, are replaced.

Setting Variable

Variables that set values in Teaching Mode and are defined in Customizing Mode.

There are 3 types: common setting variables, program setting variables, and condition setting variables.

Each of these can be set from [Variable Definition] in Customizing Mode.

Refer to "6. Setting Variables Definition" in *Functions IV*.

S-Form Acceleration

The robot accelerates with a smooth transition, like an S curve, rather than at a constant rate.

Refer to "4.1.4 GO Function" in *Teaching Pendant Operation*.

Slave

A term used to refer to a lower device of the Fieldbus network that receives control commands from the master. The slave is controlled by the master.

Specifications

1. The type of robot unit/controller. The robot can have an I/O polarity type of either NPN specification or PNP specification. You can check the robot I/O polarity on the I/O identification plate sticker, which is affixed to the base of the JR3000 Series and to the side of the controller of the JC-3 Series.

2. The type of application software with which the robot is programmed. There are "standard models" and "application models" for each application.

3. A data sheet or list summarizing the functions, performances, and other such product specifications.

Standard Model

1. The standard robot unit and/or controller model that does not have any optional additions.

2. A type of robot system software. The base system software not customized for individual applications.

Station

The numbers used to identify devices that are connected to the Fieldbus network.

Start Channel

A function located in Administration Mode > Administration Settings Mode.

Determines whether to receive the run start command from [I/O-SYS] / [Fieldbus] / [COM1] / [User Definitions] / [Ethernet] in Run Mode.

Refer to "1.1 Start Channel" in *Functions III*.

Start/Stop Switch

A switch to run a program.

For the standard JR3000 Series specification, it is on the controller (front), and for the JR3000 Series CE specification and JC-3 Series, it is on the switchbox.

Step

The distance an axis moves when a JOG key is pressed once when in JOG Mode.

You can respectively set the step for the low speed, medium speed, and high speed in [Teaching Environment Settings] > [JOG Function]

Refer to "4.1.5 JOG Function" in *Teaching Pendant Operation*.

Step Out

When the control pulses and rotation are not in the correct relationship during stepping motor operation.

It occurs when speed variation or overload are applied suddenly, and the rotation of the motor cannot fully react to the control pulses.

When it occurs, the motor can no longer turn normally, and the robot cannot reach the specified position.

Stepping Motor

A motor which rotates through a fixed angle for every drive pulse. Pulse motor

A motor which turns because it is magnetized (excited) when electrical current passes through its electromagnets, pulling the magnets on the shaft closer.

It can provide high-precision positioning, even without the use of a position detector (encoder).

On this robot, it is used to drive the axes.

Stop Bit

The bit attached to the end of a data set when using serial communication. Indicates the end of the data string and is always the value "1".

You can set the length (1 bit, 1.5 bits, 2 bits) from [COM Settings] in Administration Mode.

Stop Categories

The 3 categories (0, 1, and 2) and methods of stopping the machine as defined by international safety standards. Of these categories, 0 and 1 are used for emergency stops.

A stop made by this robot via I/O-S (JR3000) or EMG OUT (JC-3) is a category 1 stop. (Category 1 stop: a controlled stop with power available to the machine actuators to achieve the stop and then removal of power when the stop is achieved. After the stop is made, the motor power is cut off).

Stops made via the emergency stop switches of the JR3000 Series and JC-3 Series are category 0 stops. (Stop Category 0: Uncontrolled stop).

If the teaching pendant used has an enable switch, the stops made with the enable switches are category 2 stops. (Category 2 stop: A stop with power available to the machine even after it stops).

Stroke

The operating range of the Z axis coordinates.

Each model is set with its own maximum value, from which you can further limit operating range with a software limit.

Subprogram

A program called up as a subroutine.

Subroutine Call

Call and execute another program / point job while executing a point job.

System Flag

Boolean type built-in variables. A category of variables that represent the specialized command results and hardware statuses.

Refer to "6. System Flag List" in *Functions II*.

Switchbox

This is a box equipped with an emergency stop switch, and start/stop switches.

Switch Run Mode

A mode for running the robot and executing programs.

Press the start switch on the switchbox or the robot body to start the run.

Refer to "11. WHAT YOU CAN DO IN SWITCH RUN MODE" in *Basic Instructions*.

[T]

Tag Code

A function to set a numerical value (0 to 255) to a point.

Set the numerical value to the respective point directly from the point setting screen.

You can output the set value from I/O with the dataOut command.

You can also refer to the input numerical value with the #point_TagCode variable name.

Refer to "25. Tag Code" in *Functions I*.

TCP

TCP is an abbreviation of "tool center point."
This value indicates the position of the tip of the tool attached to the R axis.

Set this in [Tool Data] from [Main TCP Setting] in [Main-Tool Configuration] or [Additional Function Data Settings].

This value has different meanings for the X / Y axis and the Z / R axis, as shown below.

- TCP-X/Y: The X/Y direction distance from the R axis center to the tool center point.
- TCP-deltaZ/deltaR: The Z direction distance / R angular discrepancy from the tool tip during teaching to the current tool center point.

TCP/IP Protocol

A protocol (communication standard) typically used to connect to the Internet. This communication standard is also used for Ethernet communication with this robot.

TCP: Transmission Control Protocol

IP: Internet Protocol

Refer to "2.1.3 LAN Communication Settings (IP Address Settings)" in *Communication Control*.

Teaching

Refers to the creation of a robot operation program.

This also refers to registering the program to the robot.

Teaching Environment Settings

A function that sets user preferences for when using the teaching pendant.

To open the menu, press the UTILITY key on the Base screen for any Mode screen.

You can set the display language, the measurement units, speed of JOG movements, key click sounds, etc.

Refer to "4.1 Teaching Environment Settings" in *Teaching Pendant Operation*.

Teaching Mode

A mode used to create programs.

Refer to "12. WHAT YOU CAN DO IN TEACHING MODE" in *Basic Instructions.*

Teaching Mode Customizing

A menu located in Customizing Mode.

Organizes and sets menu operations to the menus in Teaching Mode.

You can modify the names and display order of the menus displayed in Teaching Mode and configure [Individual Program Settings] and [All Program Common Default Settings], etc.

Refer to "8. Customizing Teaching Mode" in *Functions IV*.

Teaching Mode Menu

The menu displayed by pressing the MENU key on the Point Settings screen.

Sets [Individual Program Settings], [Additional Function Data Settings], and [Point Job Settings].

Refer to "8. Teaching Mode Menu (MENU)" in *Teaching Pendant Operation*.

Teaching Pendant

On the JR3000 Series, it is connected to the robot, and on the JC-3 Series, it is connected to the controller. It is used for operations such as teaching and mode switching.

Refer to "1. Teaching Pendant" in *Teaching Pendant Operation*.

Test Menu

The menu displayed by pressing the UTILITY key on the Point Settings screen and selecting [Test Menu].

You can perform functions such as data checks and test runs to check for programming errors and/or if the program runs as intended.

Refer to "4.2 Test Menu" in *Teaching Pendant Operation*.

Test Run

This is a function located in Teaching Mode > [Test Menu].

You can run the registered program from the work home through to the end point.

This is performed almost the same as an actual run. Meaning that point jobs, etc., are also executed.

However, the maximum speed is limited to 250 mm/s for safety.

Test Run (Check I/O)

This is a function located in Teaching Mode > [Test Menu].

The robot executes a Test Run while showing the I/O signal statuses.

Refer to "4.2.4 Test Run (Check I/O)" in *Teaching Pendant Operation*.

Timing Chart

A diagram showing how the digital signals change with time.

Timing Belt

A toothed belt made of rubber that interlocks the motors for each axis with the drive (base, shaft).

Tool

The tool attached to the robot that is used for jobs.

It is attached to the Z mechanism and ZR mechanism.

Tool Data

A function located in [Point Tool Data Settings] within [Main TCP Setting] in [Main-Tool Configuration] or [Additional Function Data Settings].

Sets information regarding the tool attached to the robot.

Refer to "10. Tool Data" in *Functions I*.

Tool Mass

The mass of the tool attached to the robot. Set in [Tool Data] from [Main TCP Setting] in [Main-Tool Configuration] or [Additional Function Data Settings].

There is no need to make any settings on the JC-3 Series.

Tool Number

1. The number assigned to the tool data that is set in [Additional Function Data Settings]. Numbers 1 to 50 are set in Teaching Mode and numbers 51 to 100 are set in Customizing Mode.

2. An item located in Editing Points Menu > [Common Block Settings]. This function collectively modifies the tool number set to points that are within a specified block of point numbers.

Trap Error

An error that occurs when the software detects an exceptional condition.

Main CPU errors, address errors, interrupt errors, etc.

[U]

Unit of Measurement

A function to change the measurement unit used for point coordinates on the teaching pendant.

Switch between millimeters (mm) (mm/s) or inches (in) (in/s).

Access this function from [Teaching Environment Setting].

User Defined Function

Functions created in Customizing Mode > [User Function Definition].

Refer to "8.2 User Defined Functions" in *Functions II*.

User Defined Point Type

Point types created in Customizing Mode > [Point Type Definition].

Refer to "2.2 Point Type Definition" in *Functions IV*.

User Function Definitions

A function located in Customizing Mode.

Defines and saves a command string as a function.

You can use these saved functions when creating point jobs, etc., in Teaching Mode.

[V]

Variable

Data handled within a program that is given a unique name in the data storage domain so that it is saved for a certain period of time and can be accessed when necessary.

The unique name used to distinguish the data is called an "identifier," and the data stored in the variable is referred to as the "value" for that variable.

Variables used by the robot are classified into "boolean," "numerical," "character string," and "point string" types according to the value type that the variable holds.

Refer to "7. Variables" in *Functions II*.

Variable Definitions

A function located in Customizing Mode.

A user defined variable that is created separate from the built-in variables. You can set the variable type and name, etc.

Among the variables created here, the variables whose values can be modified in Teaching Mode are "common setting variables," "program setting variables," and "condition setting variables."

Variables other than these are "global variables" and "keeping variables."

Refer to "6. Setting Variables Definition" in *Functions IV* and "7.2 User Defined Variables" in *Functions II*.

[W]

Word

An electronic data unit. A 16 digit binary number. Using decimal numbers, this can indicate a value from 0 to 65536 without using a code.

1 word = 16 bits = 2 bytes

The I/O memory register has a domain for 1 word.

→ Byte

→ Bit

Work Home

The point where the robot waits after finishing a run until the next run is started. Also known as a work standby point.

You can set a work home in both [Individual Program Settings] and [All Program Common Settings].

Refer to "5. Work Home" in *Functions I*.

Workpiece

The object on which the robot works using the attached tool. The work produced. Product.

Workpiece Adjustments

An additional point function.

You can shift a particular point position (coordinates) by an exact amount according to entered values.

Create the conditions from the Additional Function Data Settings menu or Customizing Mode.

Refer to "23. Workpiece Adjustment Settings (Numeric Adjustment)" in *Functions I*.

Workpiece Adjustment Number

1. The number assigned to the workpiece adjustment created from the [Additional Function Data Settings] menu. Numbers 1 to 50 are set in Teaching Mode and numbers 51 to 100 are set in Customizing Mode.

2. An item located in Editing Points Menu > [Common Block Settings]. This function collectively modifies the workpiece adjustment set to points that are within a specified block of point numbers.

Workpiece Table

→ X Table

Work Standby Point

→ Work Home

[X]

X Axis

The axis in the depth direction of the robot body.

The coordinate is the distance the X table has moved from the home position.

X Table

Units which move along the X-axis. Workpiece table. It has screw holes for mounting the workpiece.

Refer to "2. PART NAMES" in *Basic Instructions*.

[Y]

Y Axis

The axis in the horizontal direction of the robot.

The coordinate is the distance the Z mechanism / ZR mechanism has moved from the home position.

[Z]

Z Axis

The axis in the vertical direction of the robot.

The coordinate is the distance the tool plate / R axis of the Z mechanism / ZR mechanism has lowered from the home position.

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