

JANOME DESKTOP ROBOT

JR3000 Series

Operation Manual

Basic Instructions

Thank you for purchasing this Janome Robot.

- Before using your robot, please 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.
- This manual is written according to IEC 62079.

Original Instructions

JANOME

PREFACE

The Janome Desktop Robot JR3000 Series are new, low-cost, high-performance robots. With these robots we succeeded in reducing the price while maintaining functionality. The combined use of stepping motors and specialized micro step driving circuits saves both energy and installation space. This manual covers the JR3200, JR3300, JR3400, JR3500* and JR3600* series (*under development). There are several manuals pertaining to these robots.

JR3000 Series

For Your Safety	This is important safety information. Make sure you read this before using the robot.
Setup	Explains how to set up the robot. ■ Make sure you read this manual ■ 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 ■ 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.
Quick Start	Explains the actual operation of the robot by creating and running simple programs.
Teaching Pendant Operation	Explains how to operate the robot via the teaching pendant.
Functions I	Explains point teaching.
Functions II	Explains commands, variables, and functions.
Functions III	Explains functions such as All Program Common Settings and PLC programs.
Functions IV	Explains Customizing Functions.
External Control (I/O / Fieldbus)	Explains I/O and Fieldbus. Please refer to this manual if you are using Fieldbus.
Communication Control (COM/LAN)	Explains COM 1 – 3 and LAN communication control.
Camera & Sensor Functions	Explains the functions of the attachable camera and Z position sensor.
Specifications	Outlines general specifications such as the robot's operating range, mass, etc.
Auxiliary Axis Functions	Explains the auxiliary axis functions.
PC Operation	Explains how to use the PC software JR C-Points II.
Application Specifications	Explains the specialized functions of the various application specifications.

Note: The content of this manual may differ from the robot in your possession due to updates to the product specifications.

The descriptions within this manual are based on standard specifications. The menu item names etc. may vary depending on the model type.

Attention

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 listed on the previous page.

Attention

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.

Attention

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.



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 shocks, fires, malfunction, and unit breakdown.



Warning

Make sure that the machine power supply is OFF before connecting the power cord.

Failure to do so could cause electric shock and/or injury.



Warning

Do not handle or operate the robot in ways not covered in the manuals listed on the previous page. Contact Janome (listed on the back page of this manual) for repairs.

Failure to do so can cause electric shock and/or injury.

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



Operation via the teaching pendant



Operation via PC (JR C-Points II)

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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. Please refer to the list below for an explanation of these 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 robot 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 list the nature of the danger and any necessary safety methods to be taken.

	Indicates caution must be taken
	Take Caution (General Precaution)
	Indicates a forbidden action
	Never do this (General Precaution)
	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 formation of a robot 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

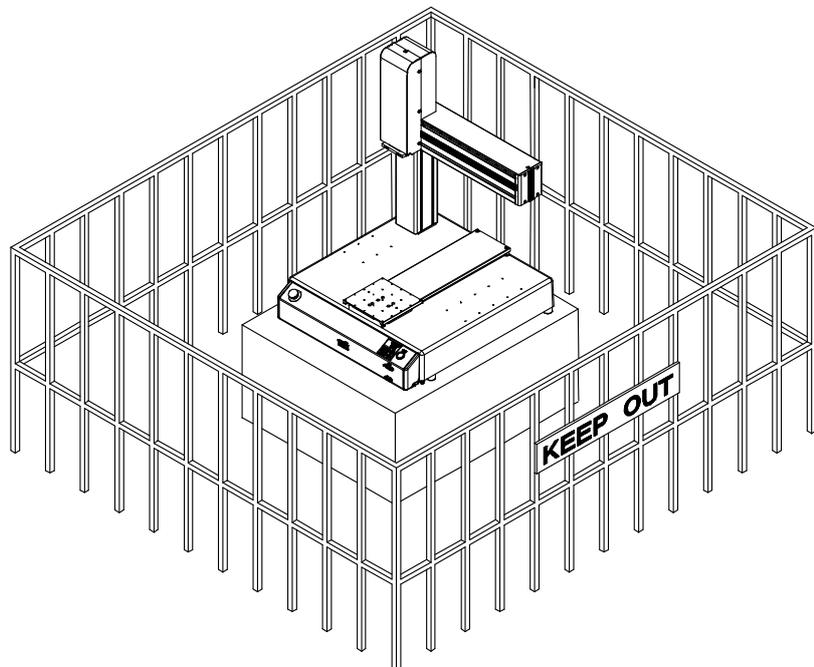


Always set up a safety enclosure or cover the robot with a guard so the moveable parts cannot be touched.

Anyone within the maximum reach of the robot and the auxiliary axes it is controlling may be injured. Using the I/O-S connector accessory, set up an **emergency stop interlock system that cuts off the motor power to the auxiliary axes and is triggered when the entrance to the safety enclosure is opened**. Make sure there is no other way of entering the restricted area.

Furthermore, put up a **“No Entry”** or **“Do Not Operate”** warning sign in a clearly visible place.

Example:



FOR YOUR SAFETY

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

Danger



When power to the robot is ON, never enter the safety enclosure or put your face, hands, or any part of your body inside.

Failure to do can result in injury.



When entering the safety enclosure 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, operators in Japan who engage in teaching, inspections, adjustments and/or repairs **must take lectures as part of the “special education” for industrial robots as stipulated by Article 59 of the Japan Industrial Safety and Health Act and the related regulations.**

Likewise, when using the robot outside of Japan, make sure to do so according to 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 enclosure.
- **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(s) 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 a safety enclosure that is strong enough to protect the operator against such dangers as the tool or workpiece splintering, etc.

When working within the safety enclosure, 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, weight, 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 enclosure, 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 enclosure 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 and 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 and switchbox on a workbench 60cm or higher above floor level, and install the robot in the center of the workbench. In addition, **for units with a cooling fan on the back, allow for 30cm or more clearance between the back of the unit and the wall.**

If installation is inadequate, the unit can drop or fall over causing injury and unit breakdown. Also, inadequate installation causes overheating and fire.



Make sure to power the unit within its rated current range.
Failure to do so causes electric shocks, fires, and unit malfunction.



Plug the power cord into the wall 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 fires and unit malfunction.



When replacing fuses, or inspecting or lubricating the unit, unplug the power cord from the wall 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 cord. Failure to follow these steps causes electric shocks and 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 shocks, fires, malfunction, and unit breakdown.



Wipe the power plug with a clean, dry cloth periodically to eliminate dust.
Dust accumulation deteriorates the electrical insulation and causes fires.



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 fires.



Be sure to turn OFF the unit before inserting or removing cords and cables such as the teaching pendant cable.
Failure to do so causes electric shock, fire, data loss, and unit malfunction.



Do not attempt to disassemble or modify the unit.
Disassembly or modification causes electric shocks and unit malfunction.



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 malfunction.
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 the dealer from whom you purchased the robot or the office listed on the last page of this manual.
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 causes injuries or damages 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 – 90%, and without condensation.

Use outside of these conditions can cause unit 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 an enclosure.

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(s). 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.

FOR YOUR SAFETY

Caution



When attaching tools etc., 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. 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.



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.

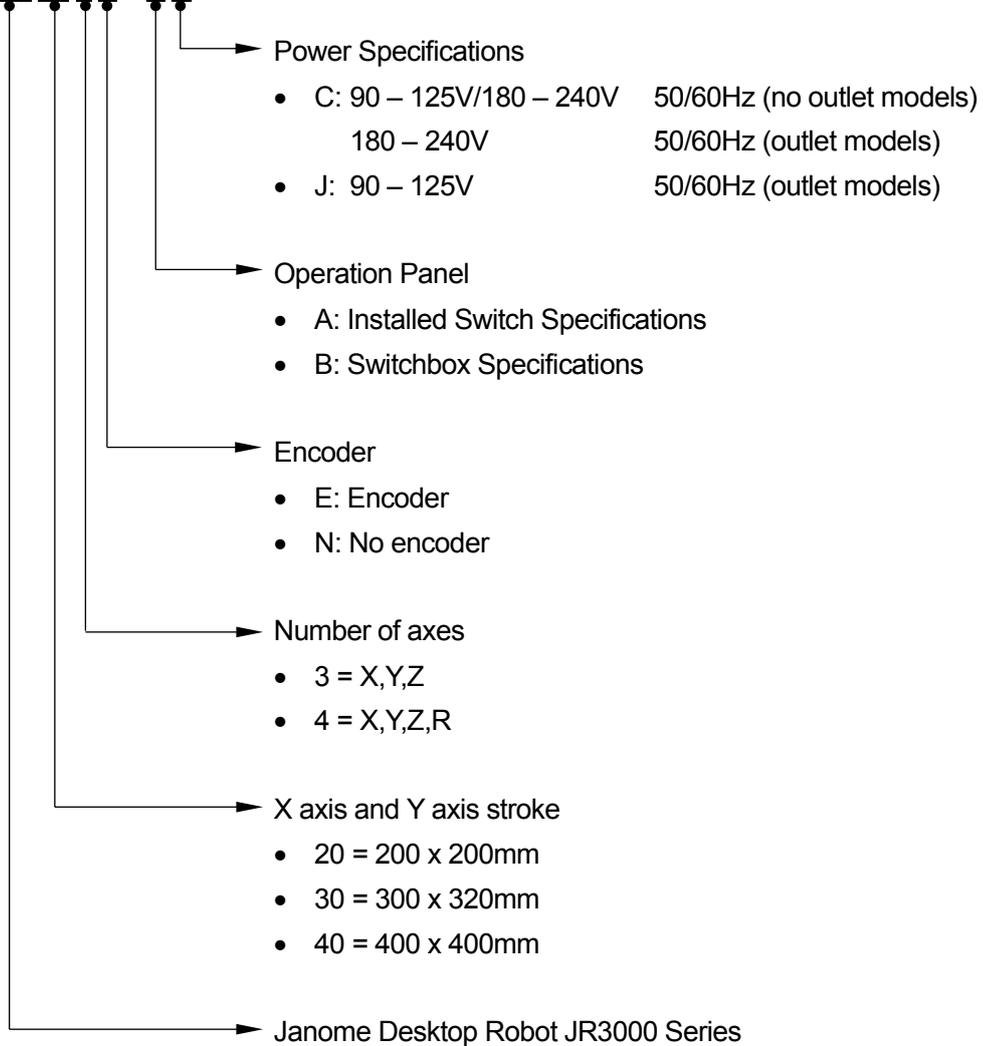
Direct sunlight causes unit malfunction or breakdown.



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. NOMENCLATURE

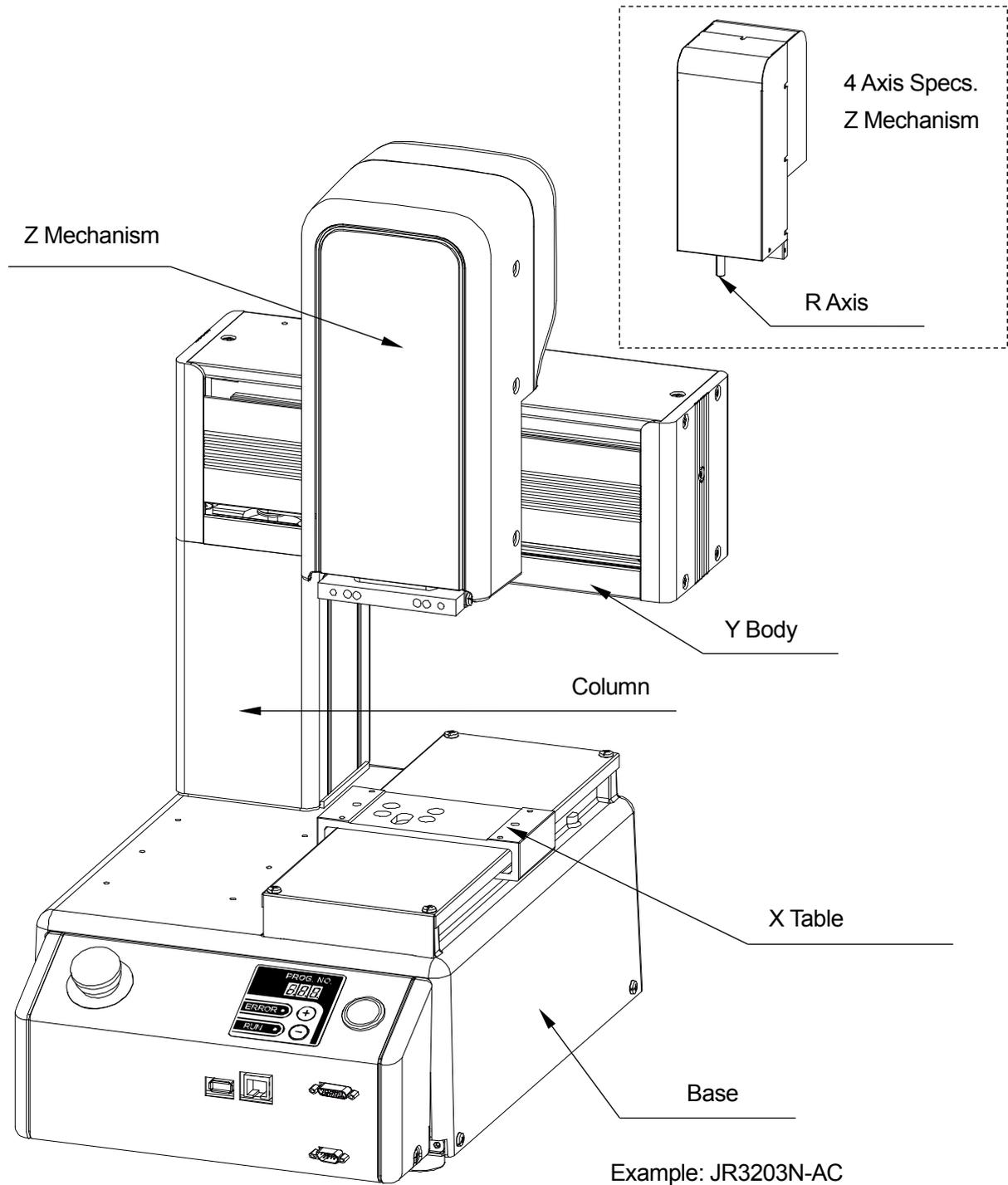
Example: JR3 20 4 E - A C



2. PART NAMES

2.1 JR3200 Series

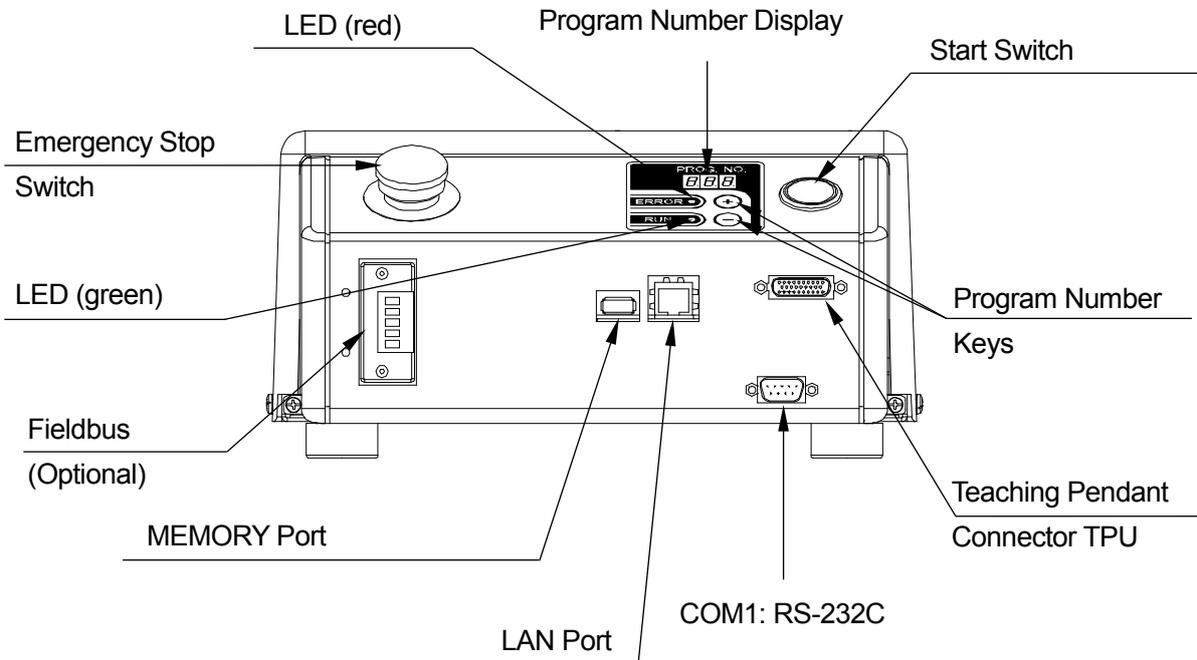
2.1.1 Main Unit



2.1.2 Operation Panel

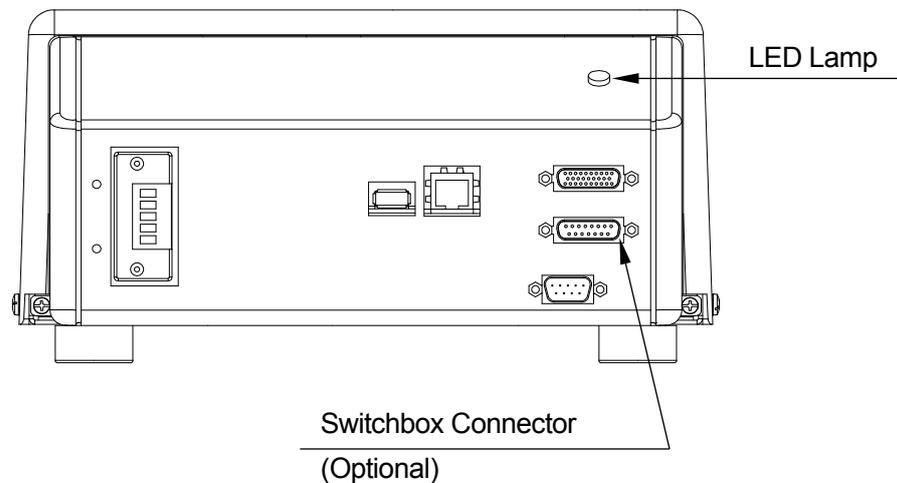
■ Installed Switch Specifications

Example: JR3203N-AC



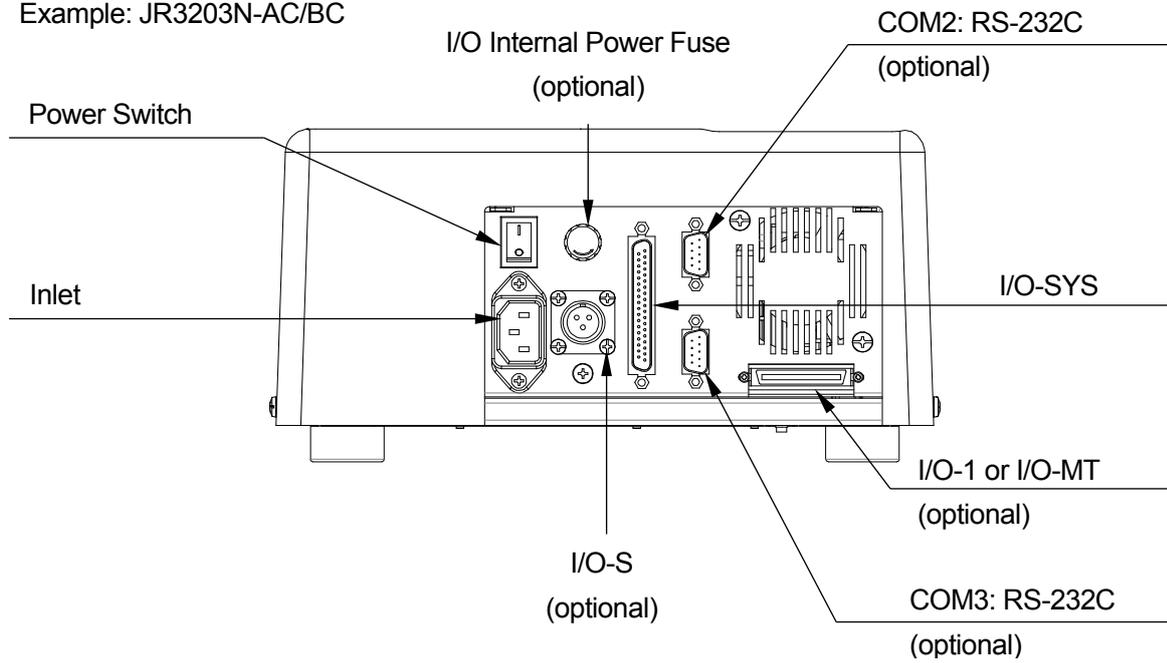
■ Switchbox Specifications

Example: JR3203N-BC



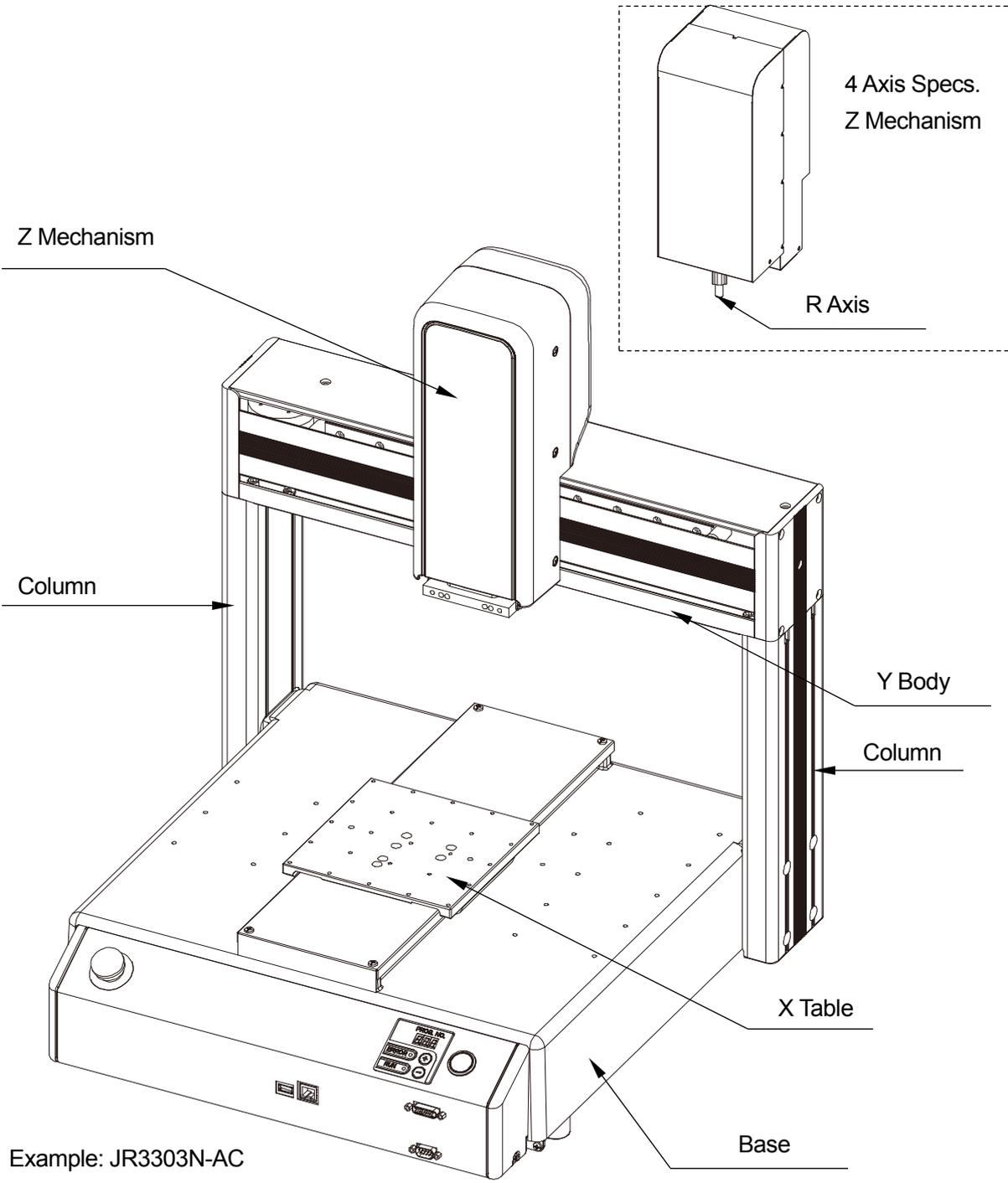
2.1.3 Operation Panel Rear

Example: JR3203N-AC/BC



2.2 JR3300 Series

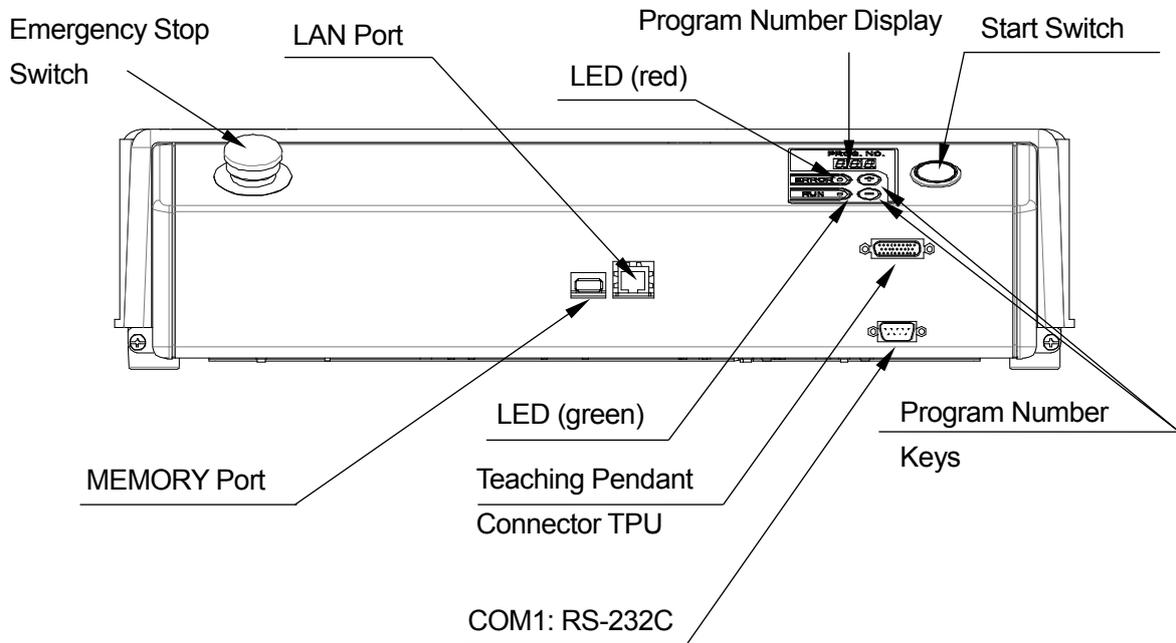
2.2.1 Main Unit



2.2.2 Operation Panel

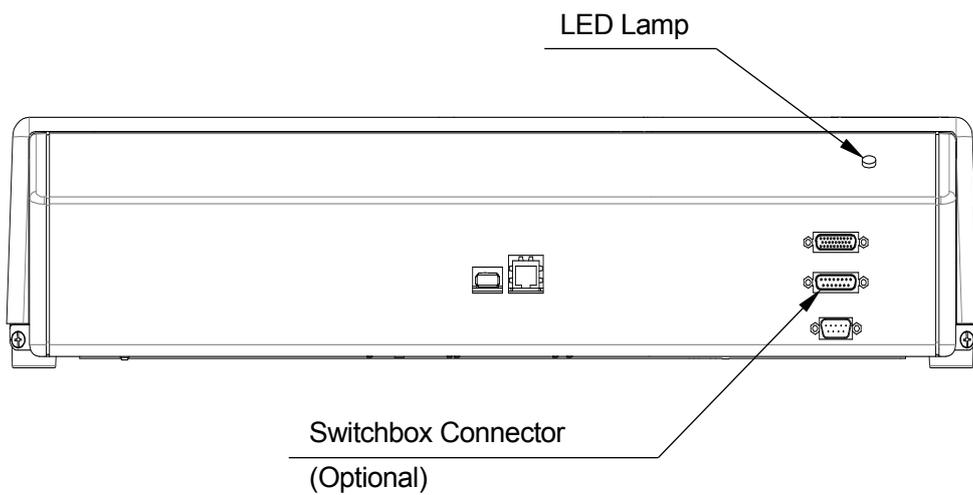
■ Installed Switch Specifications

Example: JR3303N-AC



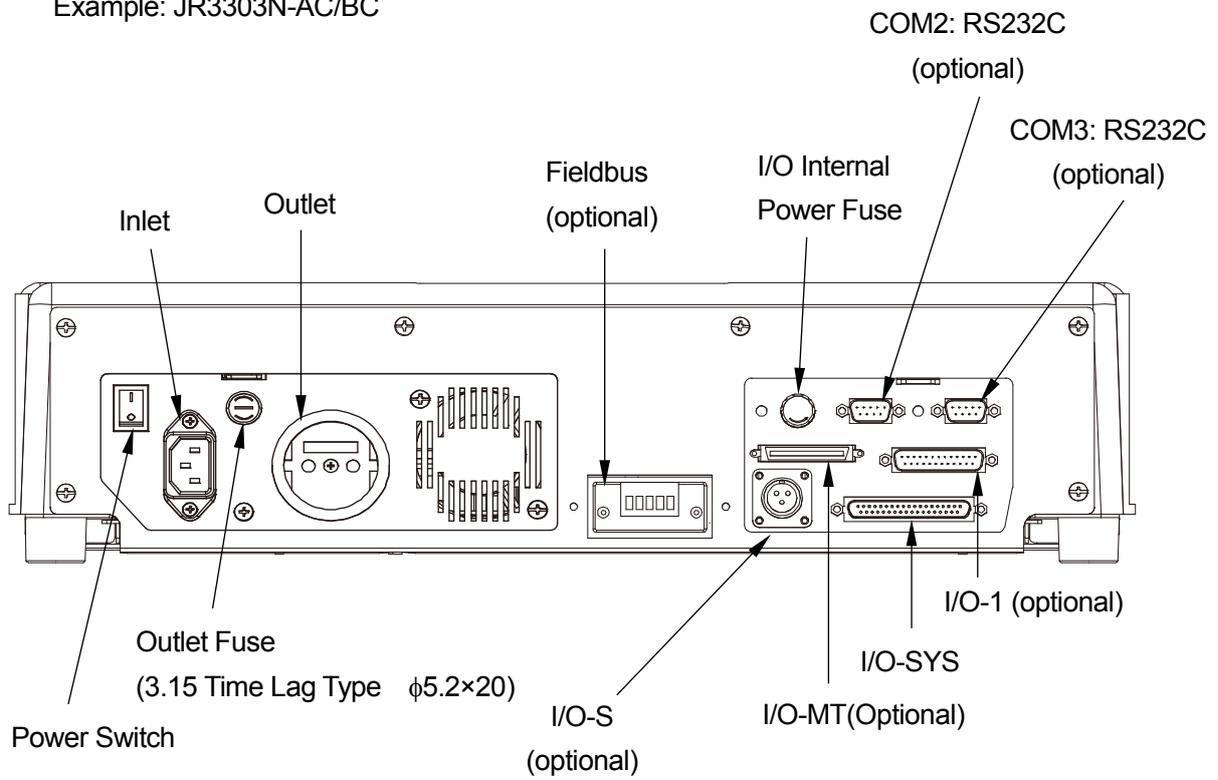
■ Switchbox Specifications

Example: JR3303N-BC



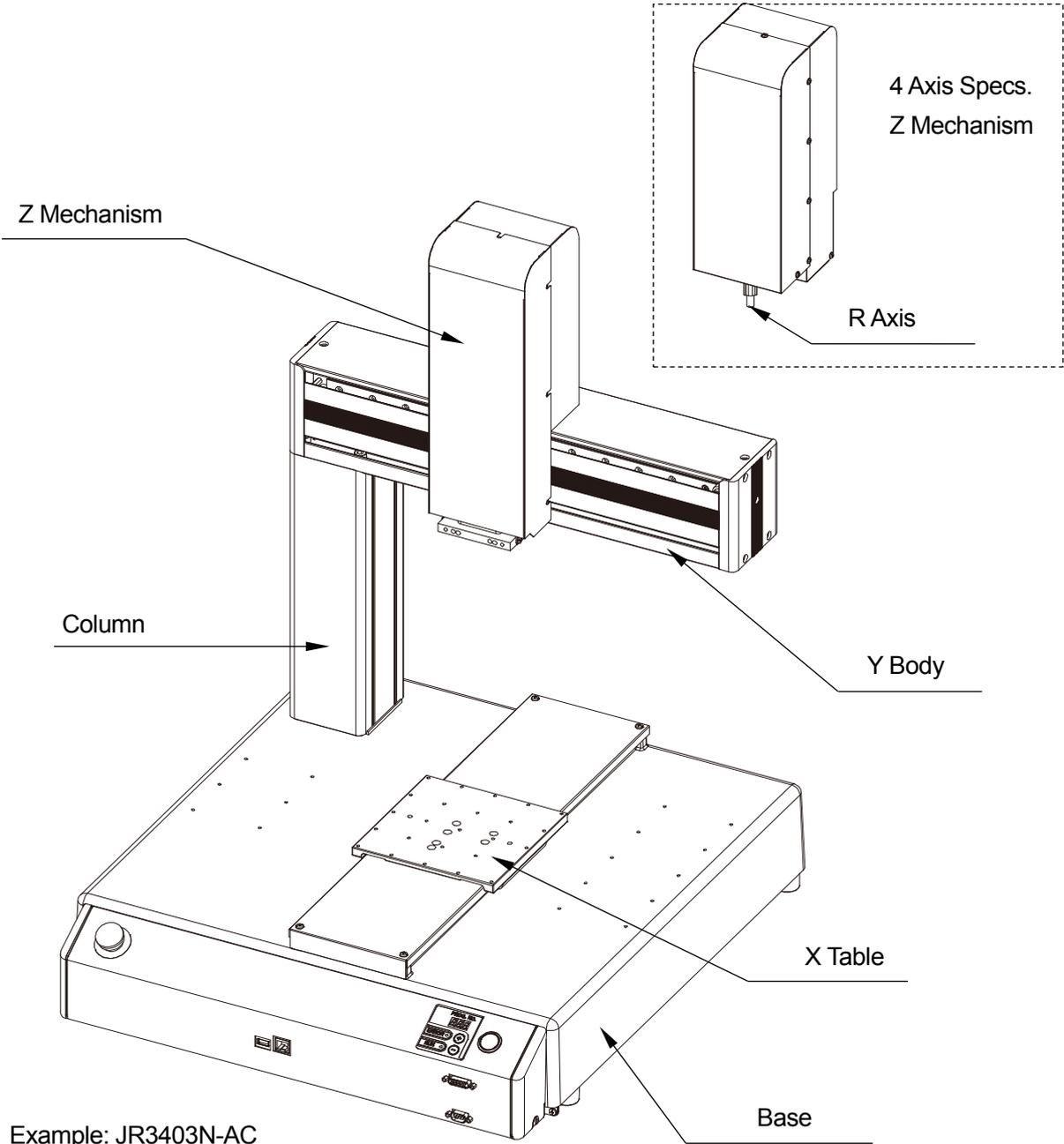
2.2.3 Operation Panel Rear

Example: JR3303N-AC/BC



2.3 JR3400 Series

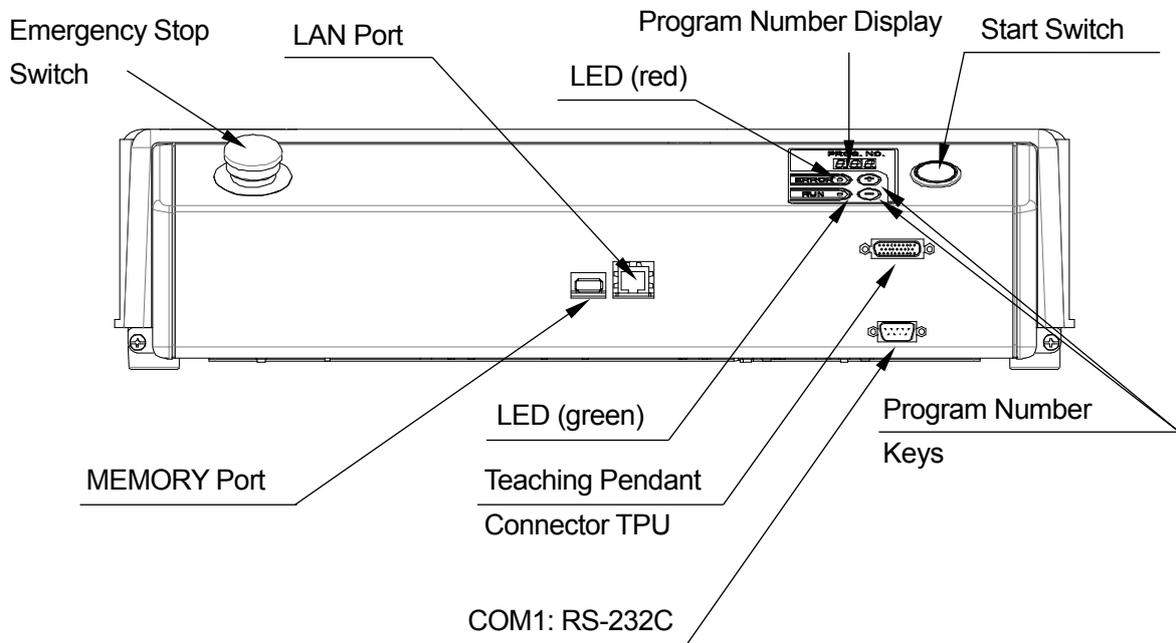
2.3.1 Main Unit



2.3.2 Operation Panel

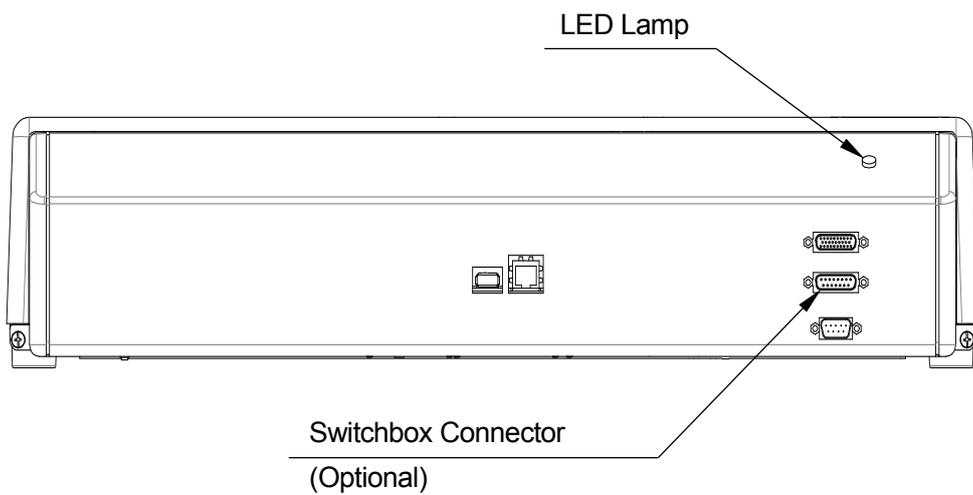
- Installed Switch Specifications

Example: JR3403N-AC



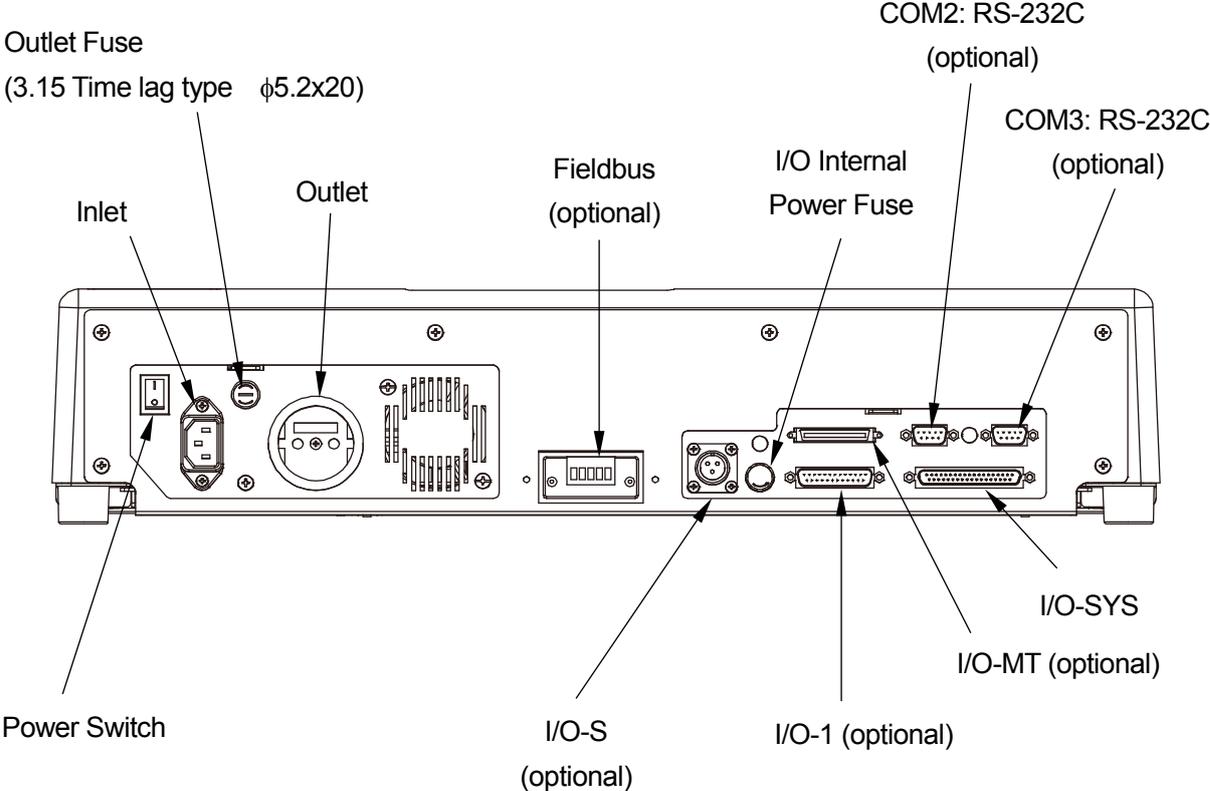
- Switchbox Specifications

Example: JR3403N-BC



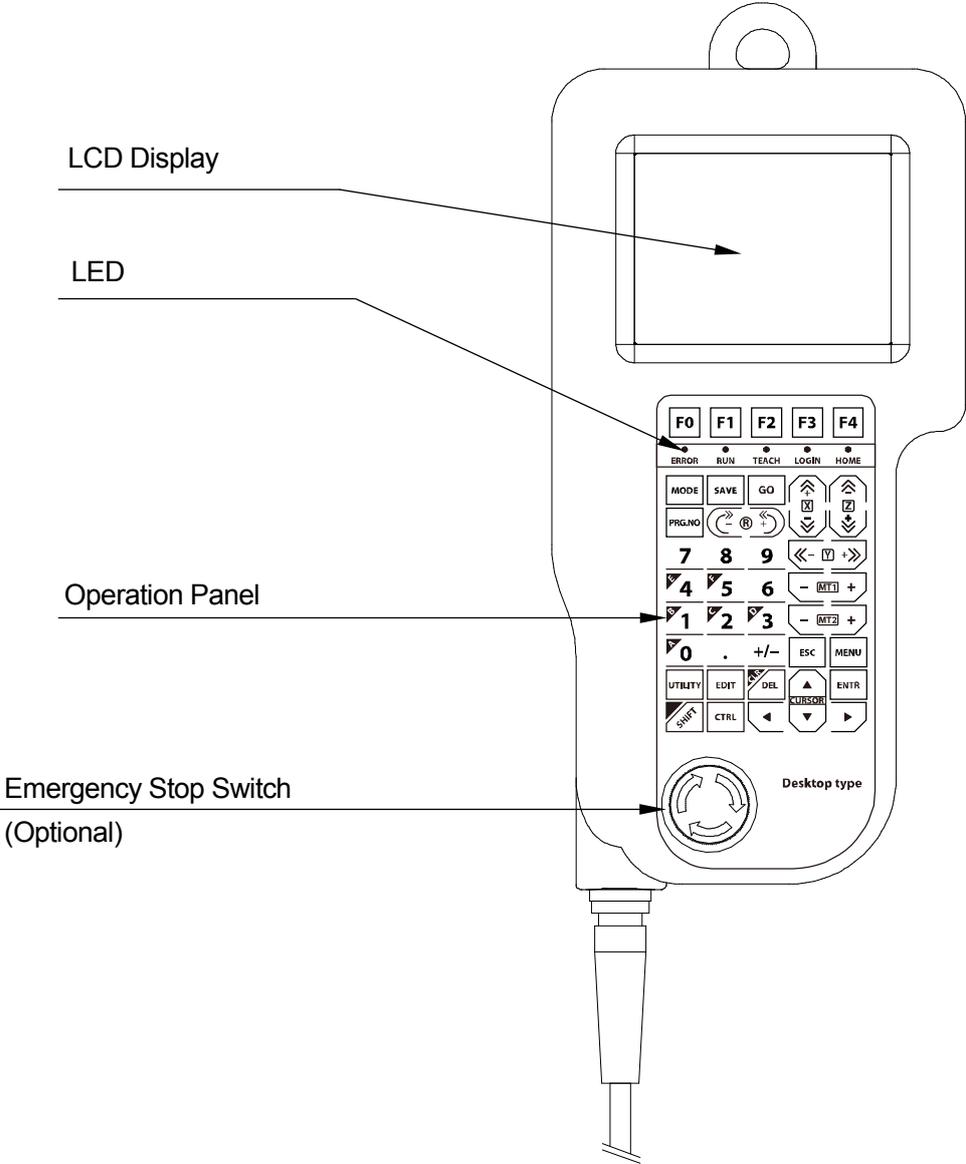
2.3.3 Operation Panel Rear

Example: JR3403N-AC/BC



2.4 Teaching Pendant

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



NOTE

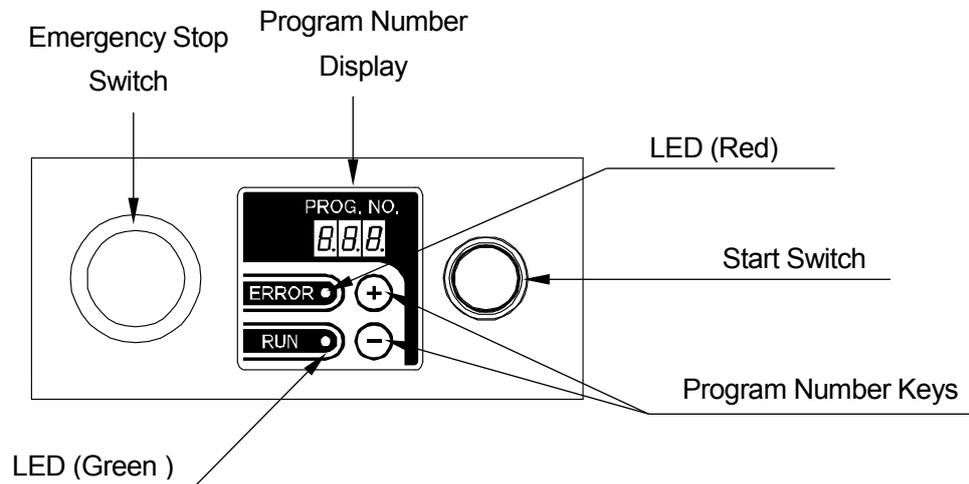
The teaching pendant is optional. From here onwards, the description "optional" is omitted.

Attention

Do not plug or unplug the teaching pendant when the power is still ON. Doing so can cause malfunction or breakdown. Additionally, only use teaching pendants that have options/no options with compatible robots. Incompatible use can cause breakdown.

2.5 Switchbox

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



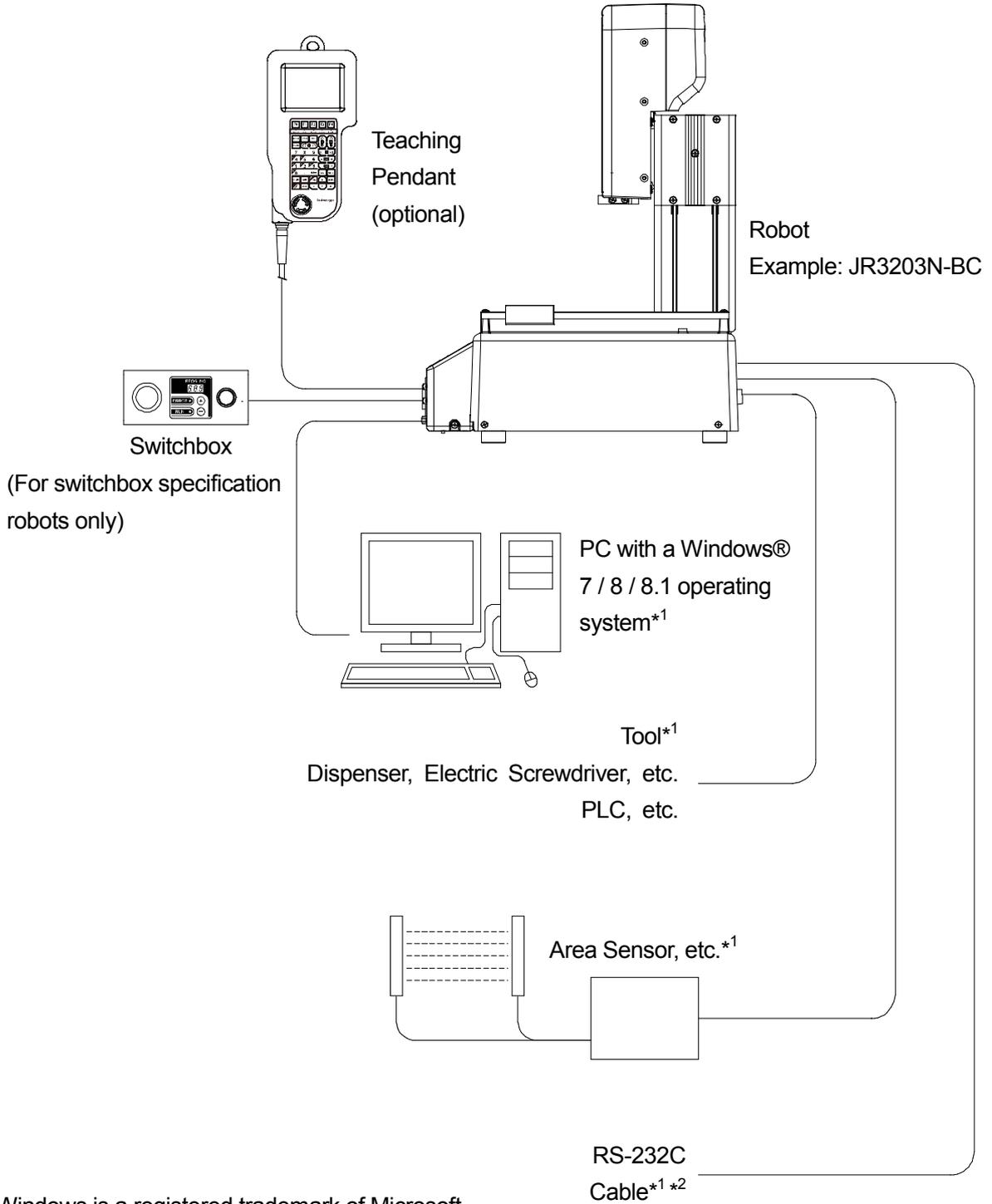
2.6 Teaching Pendant Operation Panel Keys

Key	Name	Function	
Function Keys	F0	Function 0 Key	
	F1	Function 1 Key	
	F2	Function 2 Key	
	F3	Function 3 Key	
	F4	Function 4 Key	
MODE	MODE Key	Changes the robot mode.	
SAVE	SAVE Key	Saves C&T data.	
GO	GO Key	Moves each axis to the coordinates displayed on the LCD.	
PRG.NO	Program Number Key	Displays the program number input screen.	
UTILITY	Utility Key	Displays the utility menu.	
EDIT	EDIT Key	Displays the point edit menu.	
Numerical Input Keys	0 / A	0 / A Key	Enters the number 0. Press together with SHIFT to enter the hexadecimal A.
	1 / B	1 / B Key	Enters the number 1. Press together with SHIFT to enter the hexadecimal B.
	2 / C	2 / C Key	Enters the number 2. Press together with SHIFT to enter the hexadecimal C.

	Key	Name	Function
Numerical Input Keys	3 / D	3 / D Key	Enters the number 3. Press together with SHIFT to enter the hexadecimal D.
	4 / E	4 / E Key	Enters the number 4. Press together with SHIFT to enter the hexadecimal E.
	5 / F	5 / F Key	Enters the number 5. Press together with SHIFT to enter the hexadecimal F.
	6	6 Key	Enters the number 6.
	7	7 Key	Enters the number 7.
	8	8 Key	Enters the number 8.
	9	9 Key	Enters the number 9.
	+ / -	+ / - Key	Enters the + / - symbols.
	.	Decimal Point Key	Enters a decimal point.
JOG Keys	X+	X+ Directional Key	Moves the X axis in the + direction.
	X-	X- Directional Key	Moves the X axis in the - direction.
	Y+	Y+ Directional Key	Moves the Y axis in the + direction.
	Y-	Y- Directional Key	Moves the Y axis in the - direction.
	Z-	Z- Directional Key	Moves the Z axis in the - direction.
	Z+	Z+ Directional Key	Moves the Z axis in the + direction.
	R+	R+ Directional Key	Moves the R axis in the + direction.
	R-	R- Directional Key	Moves the R axis in the - direction.
	MT1+	MT1+ Directional Key	Moves the support MT1 axis in the + direction.
	MT1-	MT1- Directional Key	Moves the support MT1 axis in the - direction.
	MT2+	MT2+ Directional Key	Moves the support MT2 axis in the + direction.
	MT2-	MT2- Directional Key	Moves the support MT2 axis in the - direction.
CURSOR ◀	Cursor Left Key	Moves the cursor to the left.	
CURSOR ▶	Cursor Right Key	Moves the cursor to the right.	
CURSOR ▲	Cursor Up Key	Moves the cursor up.	
CURSOR ▼	Cursor Down Key	Moves the cursor down.	
MENU	Menu Key	Displays the menu	
ESC	Escape Key	Returns to the previous screen.	
DEL / CLR	DELETE / CLEAR Key	Deletes 1 character from the values entered. Press together with SHIFT to delete all the values entered.	
ENTR	ENTER Key	Press to fix the values entered or the item selected.	
SHIFT	Shift Key	Press this together with another key to change functions.	
CTRL	Control Key	Press this together with another key to change functions.	

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

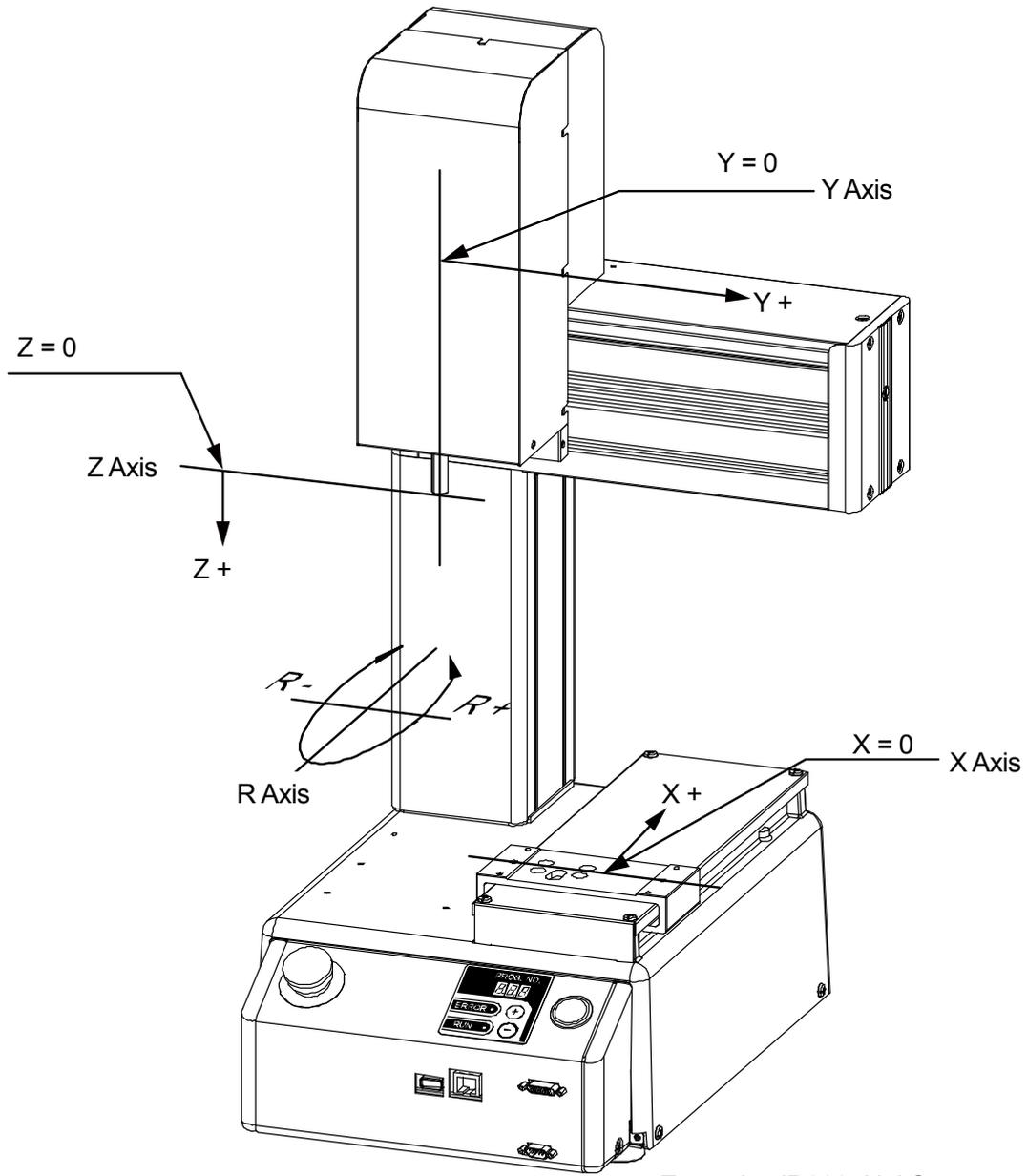


Windows is a registered trademark of Microsoft

*1 Not included

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

4. COORDINATE SYSTEM

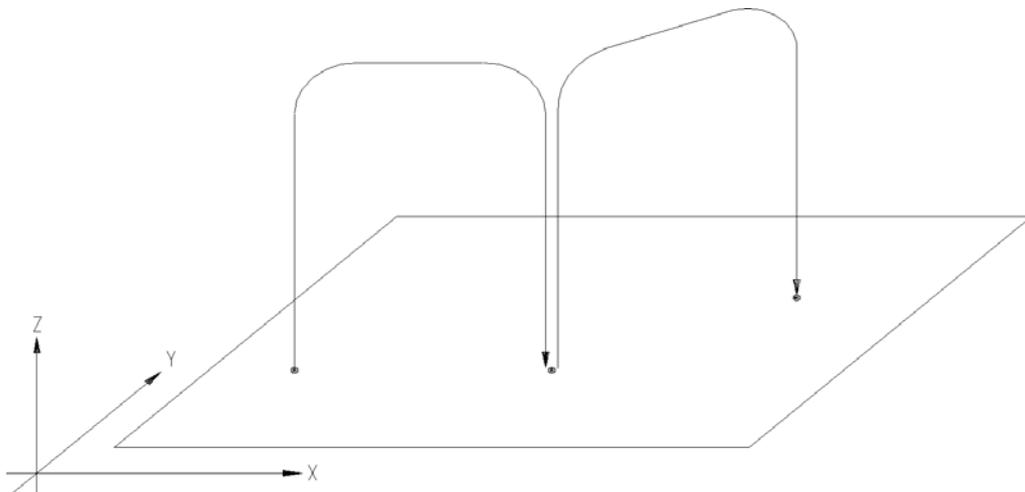


5. MOVEMENT TYPES

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.

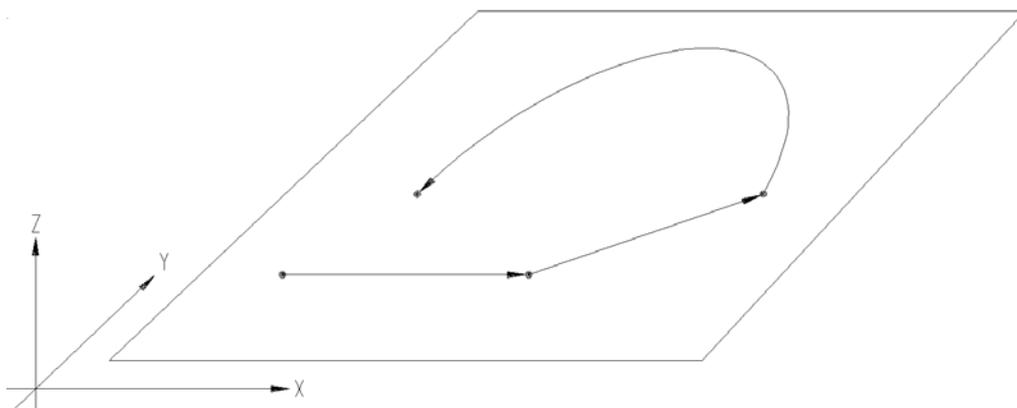
5.1 PTP Movement

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.



5.2 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.



6. 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 switch.)
- Teaching Mode:.....Creates programs
- Customizing Mode:Creates data that goes into programs
- Administration Mode:.....For administration and maintenance

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 Keys: The modes change in the following order:
 Teaching → Switch Run → External Run → Teaching
 → Switch Run

PC  [Robot] → [Changing Mode]

Note: The manuals use these marks as follows:

- TP**  Operation via the teaching pendant
- PC**  Operation via PC (JR C-Points II)

When the teaching pendant is connected, the teaching pendant LEDs indicate the current mode.

- ERRORRed LED
- RUNRed LED
- TEACHGreen LED
- LOGINGreen LED
- HOMEGreen LED

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

When making point runs and/or test runs in Teaching Mode, both the TEACH and RUN LEDs light up.

8. WHAT YOU CAN DO IN EXTERNAL RUN MODE

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 Setting /PLC Programs)*.

The RUN light on the teaching pendant is lit up when in External Run Mode. Also, the HOME light 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.

8.1 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. To execute mechanical initialization in External Run Mode, send a mechanical initialization instruction from the start channel (I/O-SYS, Fieldbus, COM1 or Ethernet).

■ Mechanical Initialization from I/O-SYS

Turn “#sysIn01 (Start)” ON from an external device connected to the I/O-SYS. With I/O-SYS, run start and mechanical initialization are both assigned to #sysIn1.

■ Mechanical Initialization from Fieldbus

Turn “#fbIn1000 (Start)” ON from an external device connected to the Fieldbus. With the Fieldbus, run start and mechanical initialize are both assigned to “fbIn1000”.

■ Mechanical Initialization from COM1

Send the communication command “Initialize (R0)” to the robot from an external device (e.g. PC) connected to COM1.

■ Mechanical Initialization from Ethernet

Send the communication command “Initialize R0” to the robot from an external device (e.g. 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.

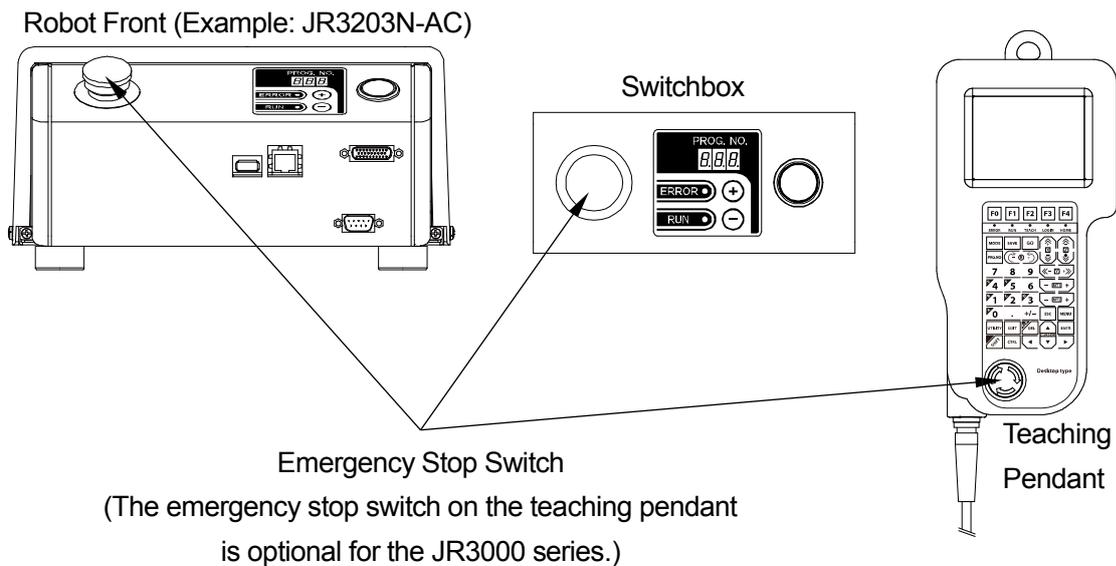
TP **MODE** [Administration]
[Administration Settings Mode]
[Start Channel]

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

8.2 Emergency Stop

Push 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 or on the switch box.
- Press the emergency stop switch (optional) on the teaching pendant.



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

8.3 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 **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 pushing the **F3** (LIST) key on the input screen.

2. Selection from the program selection keys on the front operation panel of the robot or on the switchbox.

Call the desired run program number using the program number display on the front of the robot. (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, set the program you want to run to the “program number” bit (#sysIn4 – #sysIn10) (when using the default settings*).

If [Program Number Switching Method] is set to [LOAD/ACK Handshake], when program number Load Number (#sysIn3) comes ON, the “program number” bit is loaded.

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 **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 (#fbln101) (when using the default settings*).

If [Program Number Switching Method] is set to [LOAD/ACK Handshake], when program number Load Number (#fbln1002) 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

TP  [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 restrict the devices which are able to select program numbers by selecting [Administration Settings Mode] → [Changing Program Number] in Administration Mode. The devices that are restricted cannot select programs.

8.4 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] → [General Setting]

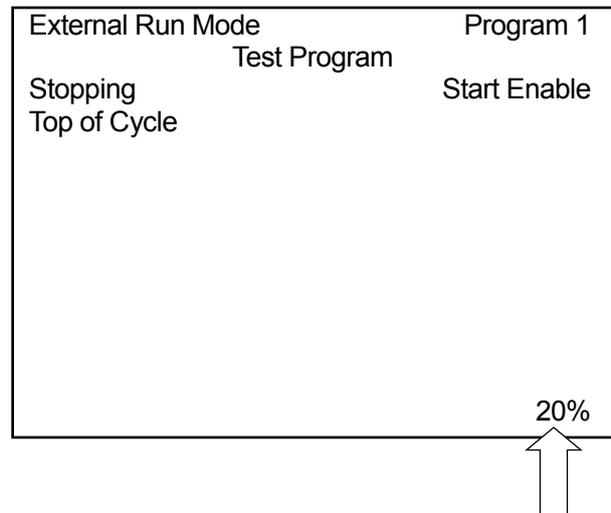
8.5 PTP Speed Override

You can set the running PTP speed to a fraction (of the regular speed). (This setting does not affect the CP speed (linear speed)). Please use this when you wish 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.

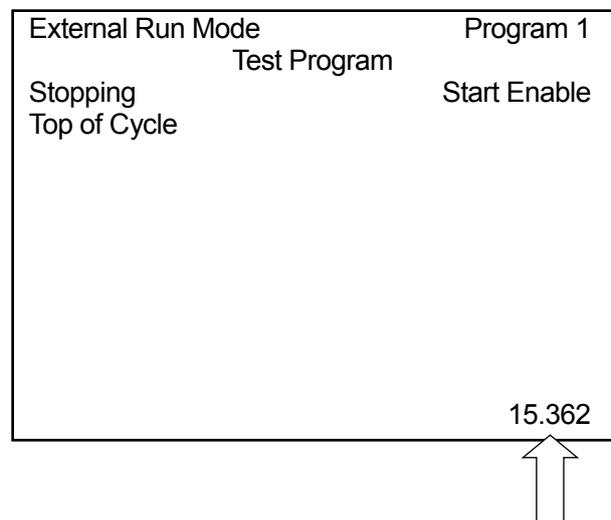


8.6 Cycle Time

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.



8.7 Changing the Teaching Pendant Display

You can change the teaching pendant LCD display settings by pushing the **UTILITY** key and selecting [Teaching Environment Settings] → [Screen Contrast].

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

8.8 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)*.

8.9 Error History

■ Error History Log

You can refer to error history from Teaching Mode and Run Modes.

The error history can retain up to the most recent 1000 errors. After reaching 1000 errors, older errors are deleted to make room for newer errors.

Timestamps are recorded to each of the errors. The time for the timestamps is based on the clock function of the robot. You can change the time on the clock through the following menu:

[Administration] → [Administration Settings Mode] → [Clock Settings]

■ Viewing Error History

You can view error history in Teaching Mode or Run Modes by connecting a teaching pendant.

If you have a teaching pendant connected, 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]

Run Mode Menu	
PTP Speed Override	100%
Error History	

Error History			
2014	10/15	12:20 45	Error No.001
2014	10/15	15:20 32	Error No.082
2014	10/16	09:20 20	Error No.082

Error Description	
2014 10/15 12:20 45	Error No.001
Error No.001	
Enter the number of a registered program	

NOTE

The displayed error history content is the same error history displayed in Teaching Mode.

8.10 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 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 deleted automatically 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 (optional) or JR C-Points II Limited Edition (included in the Operation Manual CD) and save it as a file.

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.

9. WHAT YOU CAN DO IN SWITCH RUN MODE

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

Performing mechanical initialization is necessary after you turn the robot ON. Push the start switch to perform mechanical initialization. Push the start 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.

9.1 Mechanical Initialization

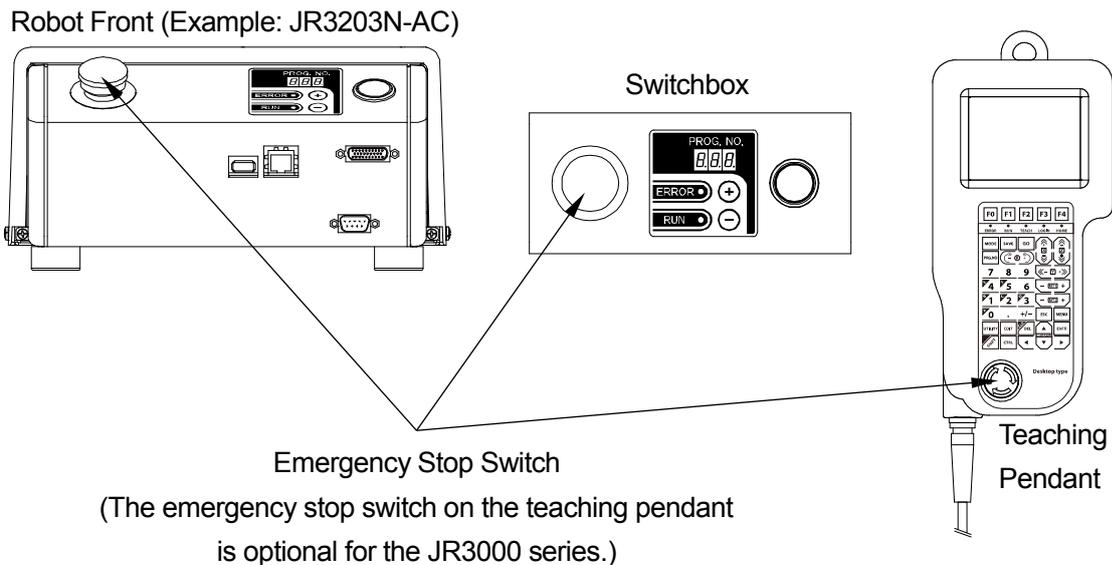
Mechanical initialization is an operation to make the robot recognize its current coordinates. This is necessary after turning the power ON and after releasing the emergency stop.

If you start up the robot in Switch Run Mode and “Press Start Switch” is displayed on the screen, press the start switch and the robot begins mechanical initialization. When “Press Start Switch” is not displayed on the screen, push the start switch and the robot starts running.

9.2 Emergency Stop

Push 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 or on the switch box.
- Press the emergency stop switch (optional) on the teaching pendant.



■ 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, push the start switch. After initializing, the robot is waiting to start running.

NOTE

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

9.3 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 **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 pushing the **F3** (LIST) key on the input screen.

2. Selection from the program selection keys on the front operation panel of the robot or on the switchbox.

Call the desired run program number using the program number display on the front of the robot. (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, set the program you want to run to the “program number” bit (#sysIn4 – #sysIn10) (when using the default settings*).

If [Program Number Switching Method] is set to [LOAD/ACK Handshake], when program number Load Number (#sysIn3) comes ON, the “program number” bit is loaded.

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 **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 (#fbln101) (when using the default settings*).

If [Program Number Switching Method] is set to [LOAD/ACK Handshake], when program number Load Number (#fbln1002) 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

TP  [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

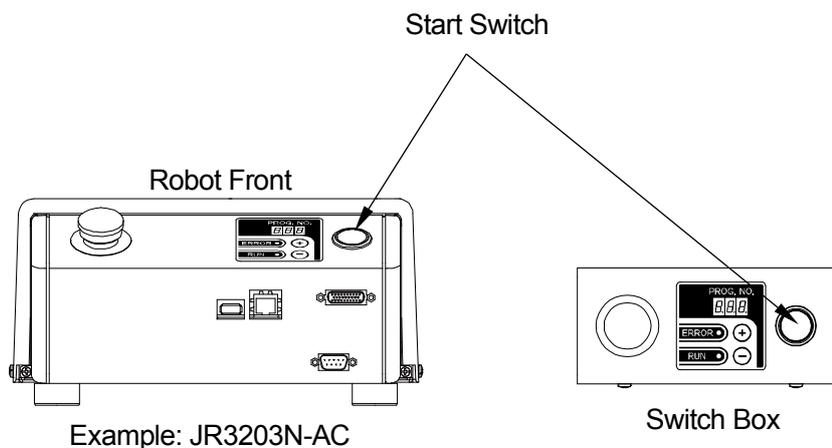
You can restrict the devices which are able to select program numbers by selecting [Administration Settings Mode] → [Changing Program Number] in Administration Mode. The devices that are restricted cannot select programs.

9.4 Run Start

When in Switch Run Mode, push the start switch to start running a program.

Also, push the start switch again if you want to temporarily stop the robot in the middle of a program.

Push it again to restart the run (it is possible to disable the start switch temporary stop).



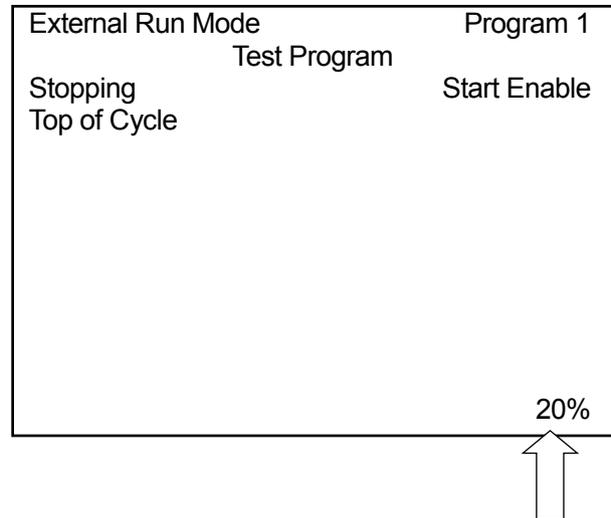
9.5 PTP Speed Override

You can set the running PTP speed to a fraction (of the regular speed). (This setting does not affect the CP speed (linear speed)). Please 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.

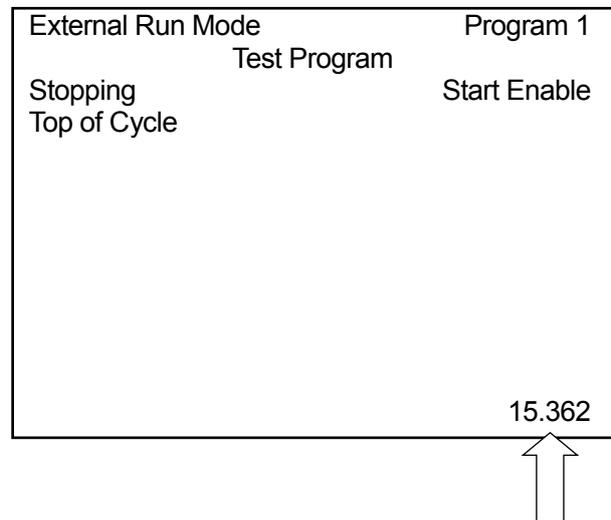


9.6 Cycle Time

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.



9.7 Changing the Teaching Pendant Display

It is possible to change the teaching pendant LCD display settings. Push the **UTILITY** key and select [Teaching Environment Settings] → [Screen Contrast].

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

9.8 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)*.

9.9 Error History

■ Error History Log

You can refer to error history from Teaching Mode and Run Modes.

The error history can retain up to the most recent 1000 errors. After reaching 1000 errors, older errors are deleted to make room for newer errors.

Timestamps are recorded to each of the errors. The time for the timestamps is based on the clock function of the robot. You can change the time on the clock through the following menu:

[Administration] → [Administration Settings Mode] → [Clock Settings]

■ Viewing Error History

You can view error history in Teaching Mode or Run Modes by connecting a teaching pendant.

If you have a teaching pendant connected, 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]

Run Mode Menu	
PTP Speed Override	100%
Error History	

Error History			
2014	10/15	12:20 45	Error No.001
2014	10/15	15:20 32	Error No.082
2014	10/16	09:20 20	Error No.082

Error Description	
2014 10/15 12:20 45	Error No.001
Error No.001	
Enter the number of a registered program	

NOTE

The displayed error history content is the same error history displayed in Teaching Mode.

9.10 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 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 deleted automatically 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 (optional) or JR C-Points II Limited Edition (included in the Operation Manual CD) and save it as a file.

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.

10. WHAT YOU CAN DO IN TEACHING MODE

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 light on the teaching pendant is lit up after mechanical initialization is performed.

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.

10.1 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. 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, push 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.

10.2 Emergency Stop

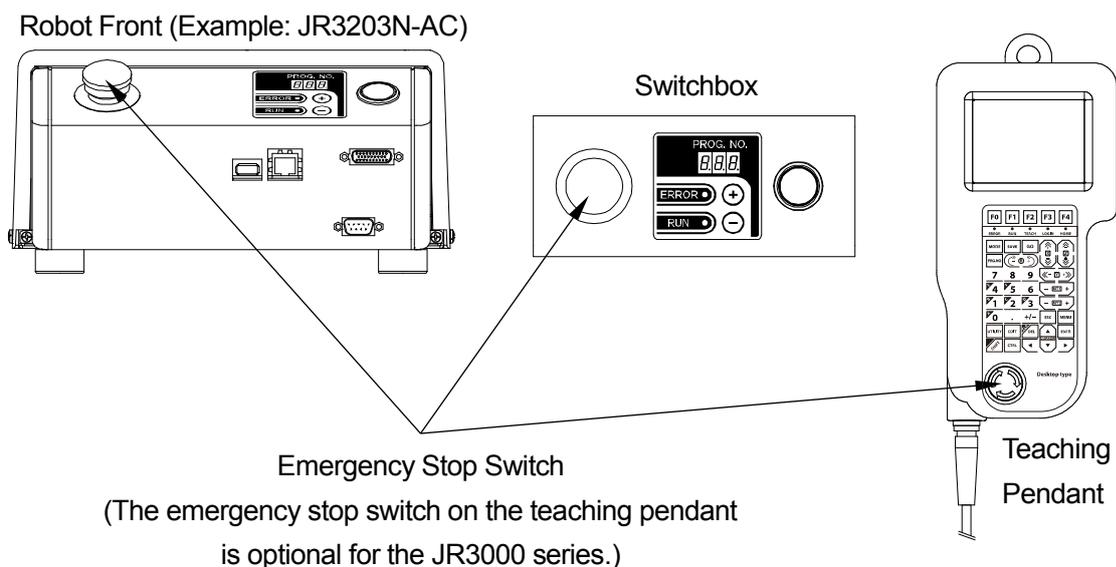
Push the emergency stop switch to stop the robot if anything unexpected occurs during operation. Power to the motor is cut OFF (the power supply for the motor) and the robot stops running.

- Press the emergency stop switch on the robot or on the switch box.
- Press the emergency stop switch (optional) on the teaching pendant.

■ 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, push the **F4** key on the teaching pendant or using the PC software (JR C-Points II (optional)), 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 pushed during movement, the robot may stop later than when the emergency stop was actually pushed due to inertia. The stopping position may therefore exceed the range of movement.

10.3 How to Select a Program

Select a program using the following method:

- From the Teaching Pendant

Press the  key on the teaching pendant and enter the program number you want to run.

10.4 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 the “Execute Condition” 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 250mm/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.

10.5 Test Run

Before an actual run, perform [Test Run] when you want to check the movements of a newly registered program, or of an edited program.

For safety purposes, the test run speed is limited to 250mm/s. Otherwise, the point job and/or additional functions are executed exactly the same as Run Mode. This is useful when you want to check the “Execute Condition” etc., and in some circumstances, points which are executed from a different program.

Always check the data of newly registered programs and edited programs, and then make a test run before actually running the program.

Teaching Mode

  [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 point run or test run operational methods, refer to the operational manual *Teaching Pendant Operation*.

10.6 Teaching Environment Settings

In the Teaching Mode, push the **UTILITY** key and select [Teaching Environment Settings] to display the teaching environment settings menu. In 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 saved on the robot even when it is turned OFF.

- Screen ContrastAdjusts the brightness of the teaching pendant LCD.
- Unit of MeasurementSwitch between millimeters [mm] [mm/s] or inches [in] [in/s].
- Display LanguageSwitch among 10 languages: English / Japanese / German / Italian / Spanish / French / Korean / Chinese (simplified) / Czech / Vietnamese
- GO Key FunctionThe movement conditions (PTP movement) for each axis when the **GO** key is pushed while entering positions using JOG mode in Teaching Mode.
- JOG FunctionThe movement conditions (JOG movement) for each axis during JOG operation when entering positions using JOG mode in Teaching Mode.
- Teaching ToolTool settings when entering position coordinates using a different tool than the tool registered in Teaching Mode.
- Manual Job Number SettingSet a point job data number here so you can execute this registered point job data when entering position coordinates in Teaching Mode.

- Key ClickSelect where click sounds occur when keys on the operation panels are pushed.
 - 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 TeachingSelect [OFF] to turn off the backlight of the LCD display when in Teaching Mode.

- Save on Changing ModeIf 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 DisplaySettings for the coordinates display (normal display/ detailed display) in the point settings value screen.

Changing the display language can be done in any mode by pushing the CTRL + UTILITY keys.

10.7 Error History

■ Error History Log

You can refer to error history from Teaching Mode and Run Modes.

The error history can retain up to the most recent 1000 errors. After reaching 1000 errors, older errors are deleted to make room for newer errors.

Timestamps are recorded to each of the errors. The time for the timestamps is based on the clock function of the robot. You can change the time on the clock through the following menu:

[Administration] → [Administration Settings Mode] → [Clock Settings]

■ Viewing Error History

You can view error history in Teaching Mode or Run Modes by connecting a teaching pendant.

■ When in Teaching Mode

If you have a teaching pendant connected, 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]

Error History				Error Description	
2014	10/15	12:20	45	Error No.001	
2014	10/15	15:20	32	Error No.082	2014 10/15 12:20 45 Error No.001
2014	10/16	09:20	20	Error No.082	
				Error No.001	
				Enter the number of a registered program	

10.8 Saving Data

Teaching data is saved in combination with customizing data (C&T data).

If the teaching pendant is connected, press the **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 deleted automatically when the power to the robot is turned OFF. Always save if you have edited teaching or customizing data.

To back up data as a precaution against contingencies, send C&T data from the robot to your PC using the PC software JR C-Points II (optional) or JR C-Points II Limited Edition (included in the Operation Manual CD-ROM), and save it as a file.

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.

10.9 Types of Teaching Data

Up to 999 individual programs can be made. Each program includes individual program settings and point data. The Teaching Mode menu contains the following items in the table below.

TP Teaching Mode → MENU

Item	Details
Individual Program Settings	Settings which are only activated during the program run of the program to that 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.
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.

10.9.1 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].

Individual program settings can be set 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 – 20 characters) with the teaching pendant.	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 [Common Job on Start of Cycle] an item in all program common settings 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” command to end the program.
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*		Position data values used to indicate the distance from the program start coordinates.
	Moving Amount*		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	
Tool Data	With 3 axis specifications, this is the tool mass and the difference between the registered tool position and the current tool position. With 4 axis specifications, this is the tool mass and the distance from the R axis center to the tool tip.	Common/Individual	
Move Area Limit	The moveable range limit for 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. It is possible to make settings for each axis. The settable range for each axis is 0 – the maximum moveable range. (R axis is -360 to 360).	Common/Individual	

Workpiece Mass (not available with JR3200)	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. Please refer to <i>Auxiliary Axis Functions</i> .	Common/Individual

* 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.

- 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], please refer to the operation manual *Functions IV (Customizing)*.

- Point Data

Selected program number → Program 1

Point number → P1

Point coordinates → X+23 Y+112 Z+25 R+12

Point type → PTP Point

Job after Moving → 6

If a point job or additional function data is set, this is displayed below the point type.

S.MARK E.MARK J.EXEC P.EXEC → F0 – F4 key functions are displayed here.

Base screen example: Point settings screen

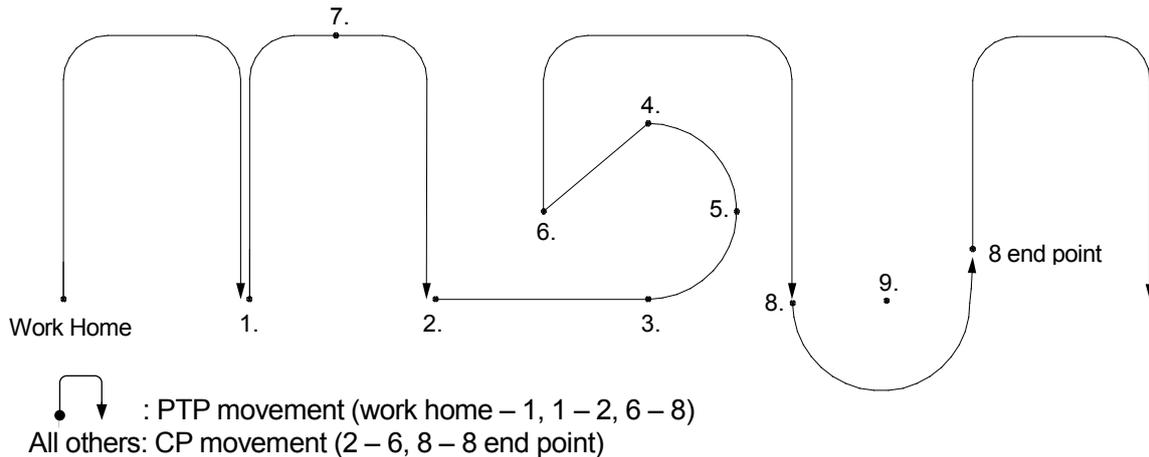
Point data has the following entries:

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



1) PTP Point

The robot moves to the set point by PTP movement.

2) CP Start Point

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

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.

8) Circle Start Point

Specify a Circle Center Point and Circle, and then use this point to make an arc movement (CP movement). The following point, the Circle Center Point, is the center of the arc. The circle angle is set in the following point; the Circle Center 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) User Definition Type

Point types can be created in Customizing Mode. These created point types are called “user-defined” point types. (In contrast, point type items 1 – 9 are called “base” point types.) 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 type. (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. Additional functions can also be assigned to point job operations. For further information, please refer to “10.9.6 Additional Function Data”.

7. Tag Code

The values assigned to points.

10.9.2 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: <ul style="list-style-type: none"> • 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 	Common only
Job and PLC on Run Mode	The following items can be set: <ul style="list-style-type: none"> • Job on Power ON • Job after Initialize • 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

Settable Items	Details	Common/Individual
Point Reset Settings	Settings related to a point reset.	Common only
Other Parameters	The following items can be set: <ul style="list-style-type: none"> • Initialize • Initialization at Start • Position Error Check • Order of Init. • Stop by Start 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
Tool Data	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)	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

10.9.3 Common Data

Depending on the settings in Customization Mode, “Common Data” is not displayed in the menu. Common data are 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.

10.9.4 Condition Data

Depending on the settings in Customization Mode, the name “Condition Data” is not displayed in the menu.

Condition data are defined in the 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.

10.9.5 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 01 – 500 in Teaching Mode. Point job data numbers 501 – 1000 can be created in Customizing Mode.

10.9.6 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. Depending on the point type, some settings may be unavailable. 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, please refer to *Functions I (Point Teaching)*.

1. PTP Condition

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

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.

6. Execute Condition

Use 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.

(✓: Can be set, blank: Cannot be set)

Point Job Data/ Additional Function Data	Job before Moving	Job while Moving	Job while CP Moving	Job after Moving	Condition Data	PTP Condition	CP Condition	Tool Data	Pallet Routine	Execute Condition	Workpiece Adjustment	Tag Code
Point Type												
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				✓		✓						✓
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.

10.9.7 PLC Programs

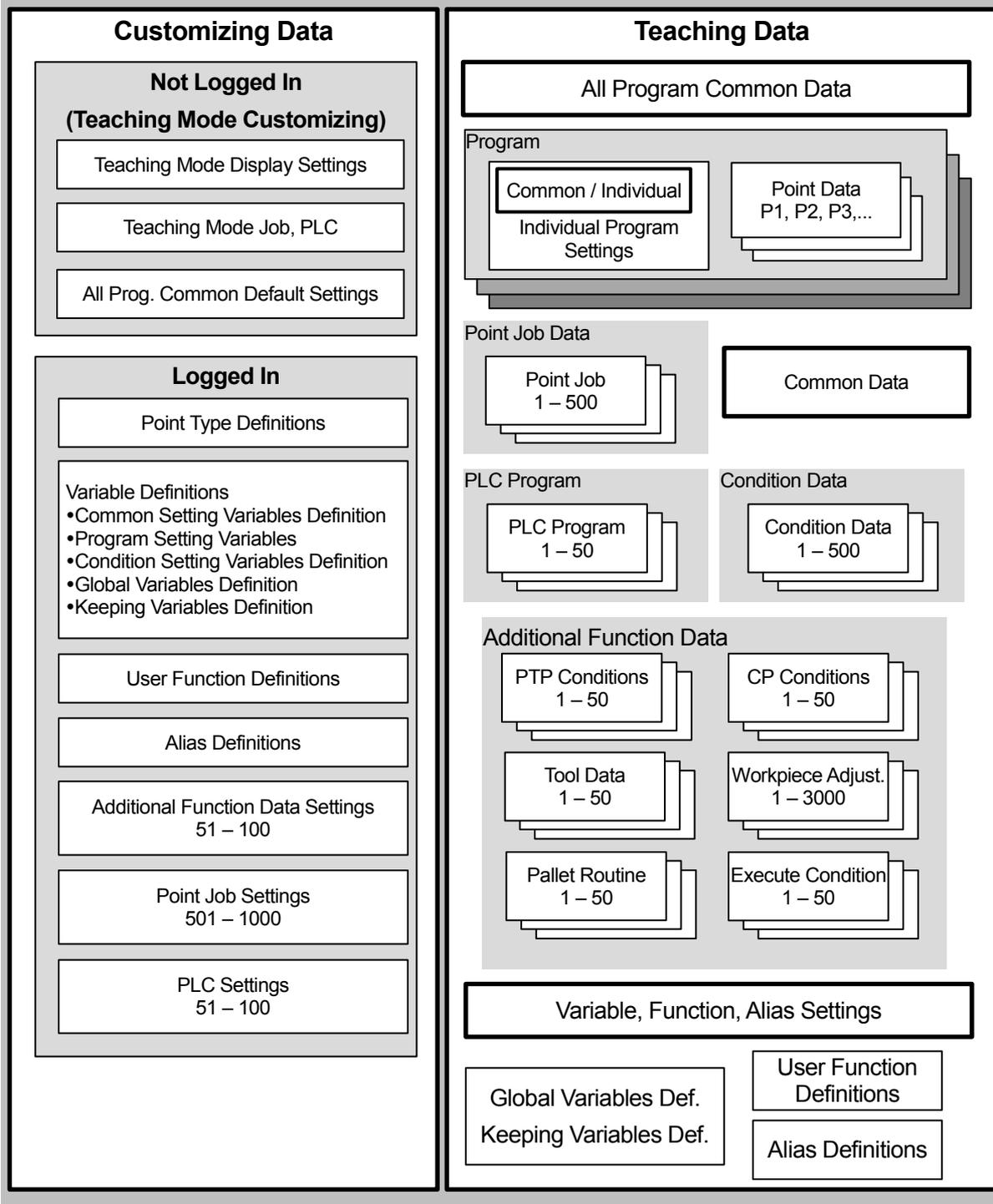
A PLC program is a set of logical operation commands for controlling I/O signals, etc. They are activated while in Run Mode.

You can create PLC program numbers 01 – 50 in Teaching Mode. PLC program numbers 51 – 100 can be created in Customizing Mode.

10.9.8 Data Composition

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

C&T Data



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 specifications, [Auxiliary Axis Configuration] is also displayed.

For further details, refer to *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

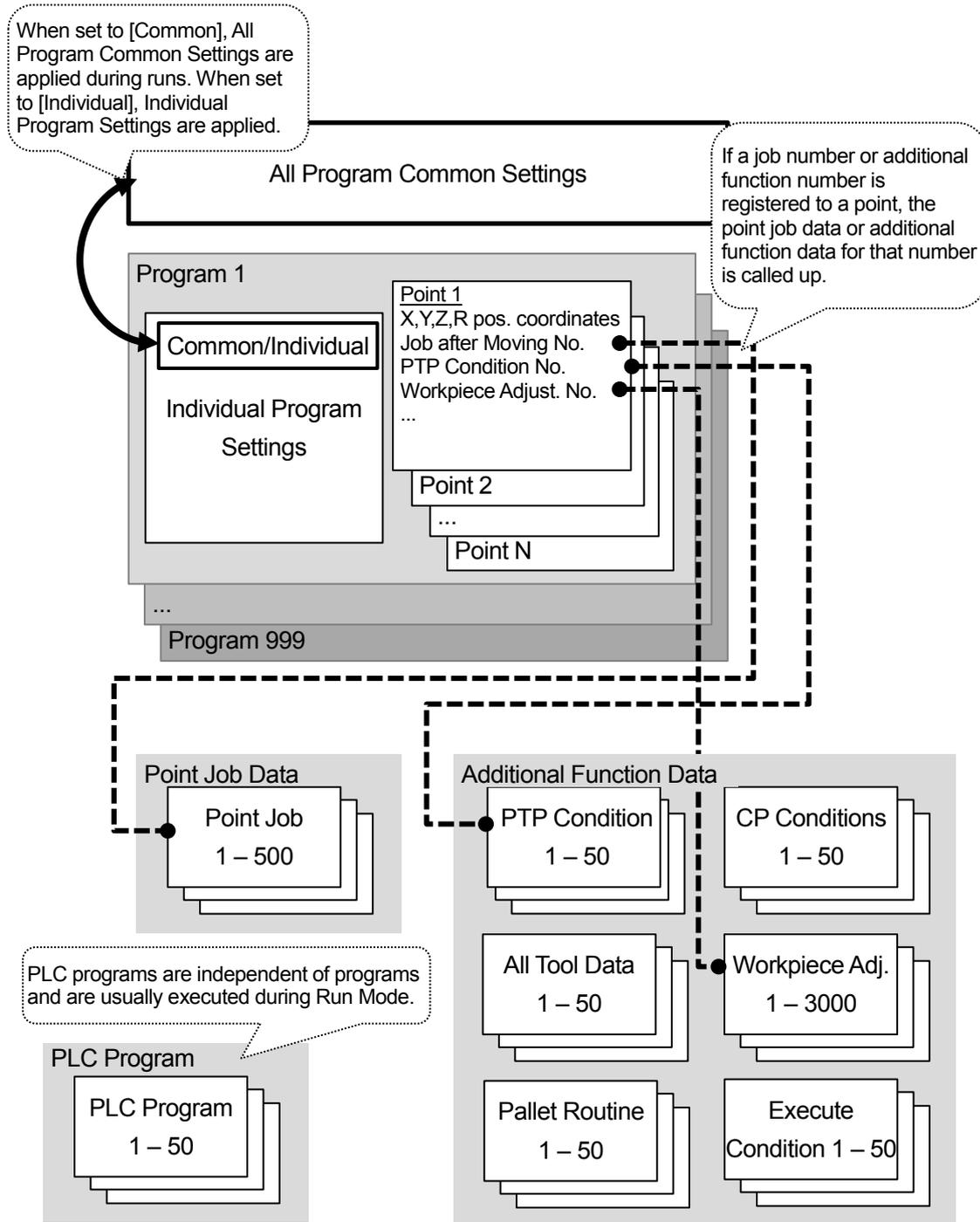
■ Battery Backup Data

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.

10.10 Teaching Data Correlation



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

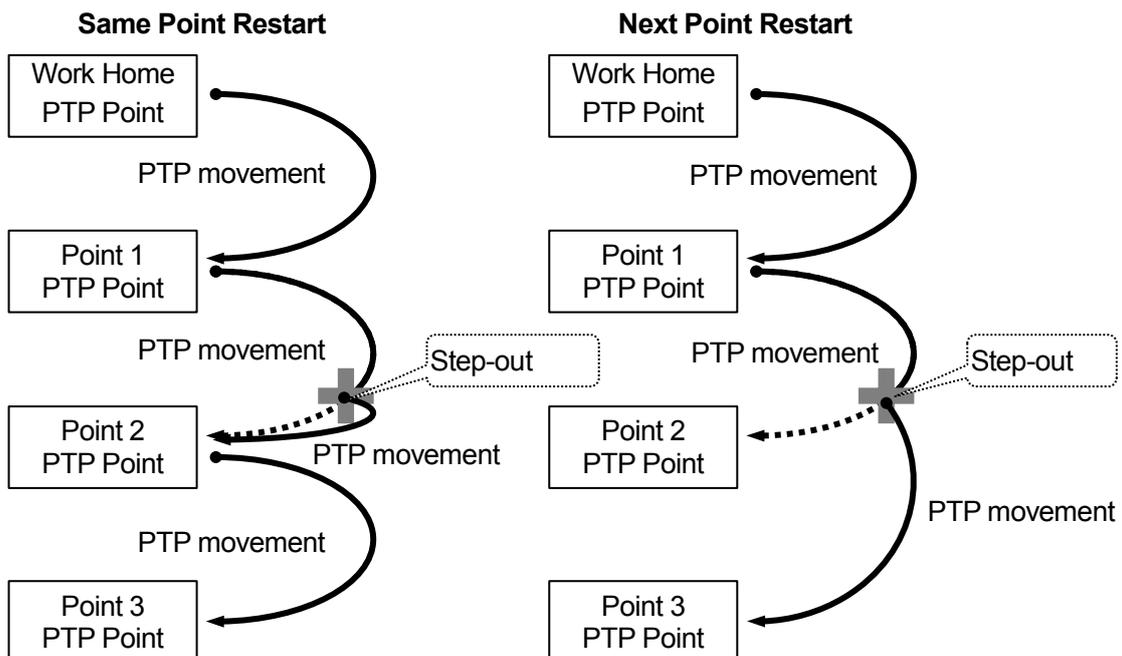
10.11 Restart Method After Position Offset (JR3000E Series Only)

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:

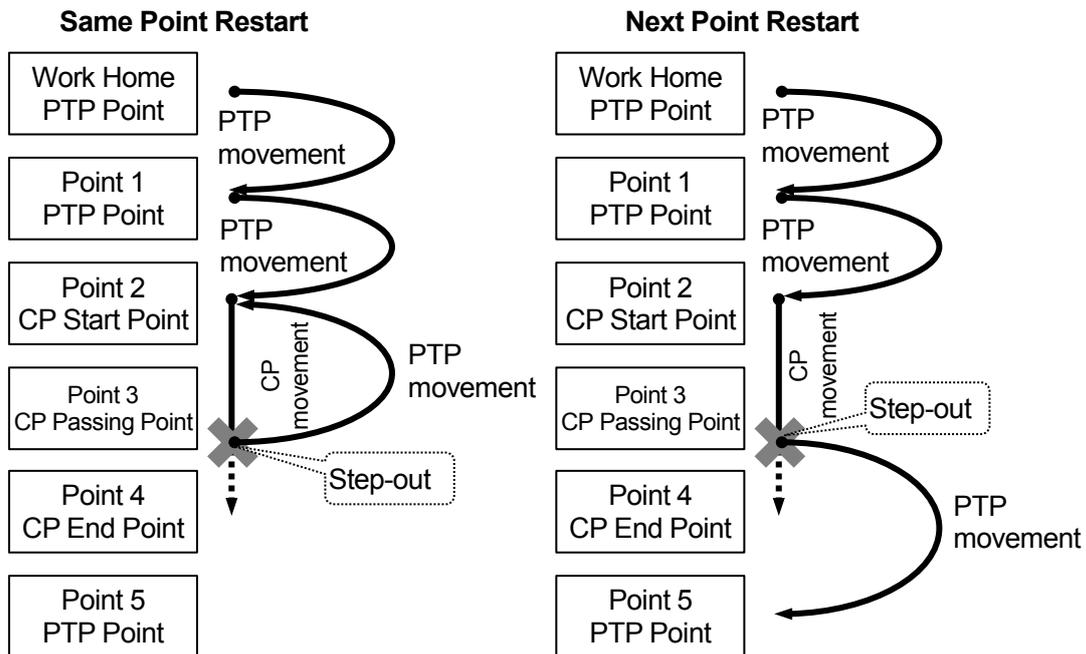
Selectable Items	Description	
None	The program finishes at the position where the robot stops.	
Same Point	PTP movement	From the position where the robot stops, the robot makes a PTP movement to the destination of the PTP movement which was stopped short.
	CP movement	From the position where the robot 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 movement.
Switch Run Mode	Press the start switch or a teaching pendant key to reset the error, and have the robot standby for a run. After this, press the start 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.

11. WHAT YOU CAN DO IN CUSTOMIZING MODE

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 *Functions IV (Customizing)*.

11.1 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.

11.2 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.

To back up data, send C&T data from the robot to your PC using the PC software JR C-Points II (optional) or JR C-Points II Limited Edition (included on the Operation Manual CD), and save it as a file.

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 ADMINISTRATION MODE

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

12.1 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.

12.2 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.
- 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 and subnet mask.
- Fieldbus: Sets the communication settings for DeviceNet, Profibus, and CC-Link.
- MEMORY Port: Sets up the MEMORY port function.
- Back Light 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). 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. 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.

For further details please refer to “1. Administration Settings” in *Functions III*.

12.3 Diagnostic Mode



Caution

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

* A maintenance operator is someone who has attended maintenance courses at Janome or at one of our dealers. For further details, please refer to *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 of the 45 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.
X Axis Motor	Confirms: <ul style="list-style-type: none"> • Motor drive I/O status confirmation • Pulse number and pulse rate designation for motor drive • Encoder pulse count
Y Axis Motor	
Z Axis Motor	
R Axis Motor	
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 and the motor power status.
COM1 Communication	Checks the communication status with the host via given baud rates
COM2 Communication	
COM3 Communication	
MEMORY Port	Conducts a test of USB add-remove memory status and memory access.
Ethernet	Generates PING for given IP address.
Fieldbus	Monitors the Anybus situation awareness display of the lead input/output 1 word bit set according to the connected module display.

NOTE: I/O-1, COM2, COM3, and Fieldbus are optional.

12.4 Mechanical Adjustment Mode



Caution

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

* A maintenance operator is someone who has attended maintenance courses at Janome or at one of our dealers. For further details, please refer to *Maintenance (For Maintenance Operators)*.

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.

12.5 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.

 /  /  key to display the next page.

 /  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.

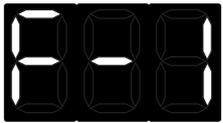
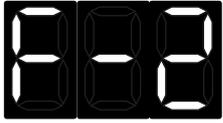
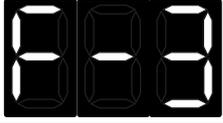
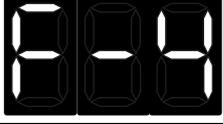
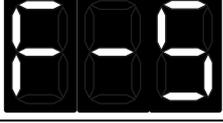
*2 – 4 are normally not used as they are internal administration information.

13. STARTUP MENU

If you hold down the (+) and (-) program selection keys simultaneously on the front operation panel 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
	Send C&T Data	Send C&T data from the robot to USB memory.*
	Receive C&T data	Receive C&T data from the USB memory to the robot.*
	Reserved	Reserved
	Forced Teaching Mode Startup	Startup in Teaching Mode regardless of the mode used when the robot was turned OFF.
	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 started up. 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.

Please 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.

14. MEMORY PORT

■ What you can do with the MEMORY port:

Insert a commercial USB memory (ver. 2.0) into the Memory Port to record robot data.

NOTE

- The USB memory device needs to be in FAT format.
- The robot may not recognize some USB memory devices depending on the manufacturer. However, the robot may recognize the USB memory device if you format it.

Also, please note that there are limits to the number of times you can write files to the USB memory. For details regarding confirmed working devices, refer to “14. MEMORY Port” in *Specifications*.

You can use the following functions with the Memory Port:

- Teaching data backup
- System software updates
- PS data (model setting data) updates

14.1 Teaching Data Backup

With this you can record teaching data from the robot.

You can also retrieve teaching data backups from a USB memory and use them on the robot. This teaching data cannot be sent/received or edited using the PC software JR C-Points II.

NOTE

Error history is not recorded

Press the UTILITY key on the base screen of Teaching Mode.

From the Utility menu, move the cursor to MEMORY Port and press the ENTR key to display the menu on the MEMORY Port:

- Write to USB Memory
- Read from USB Memory

NOTE

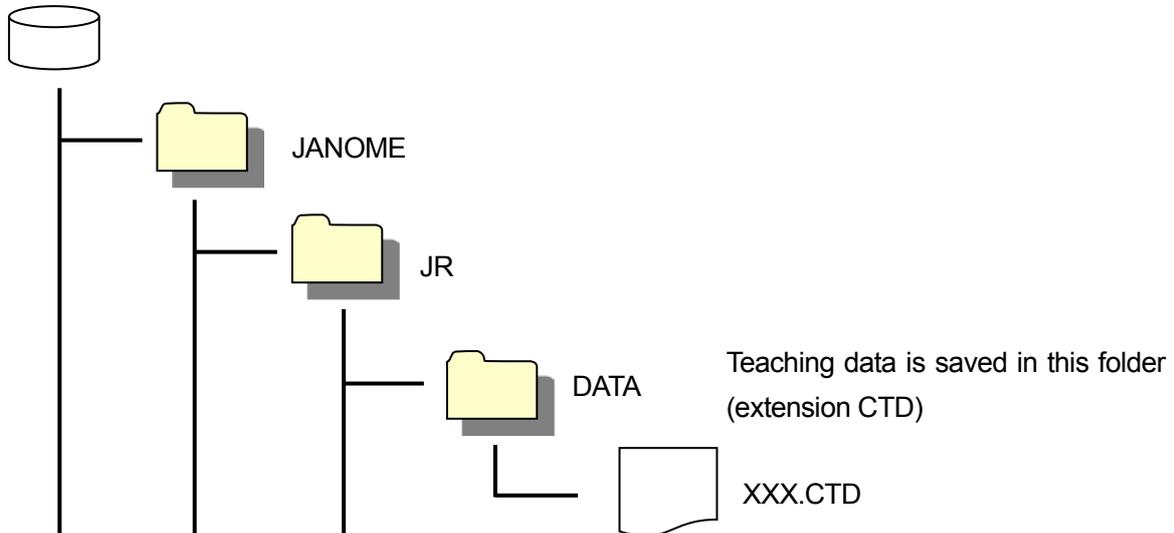
Always make sure to insert/remove the USB memory using the MEMORY Port screen.

Do not insert/remove the USB memory while the message is displayed and the robot is reading/writing.

■ Write to USB Memory

If you write data to the USB memory, teaching data is saved in the following folder.

The folder configuration on the following page is created.

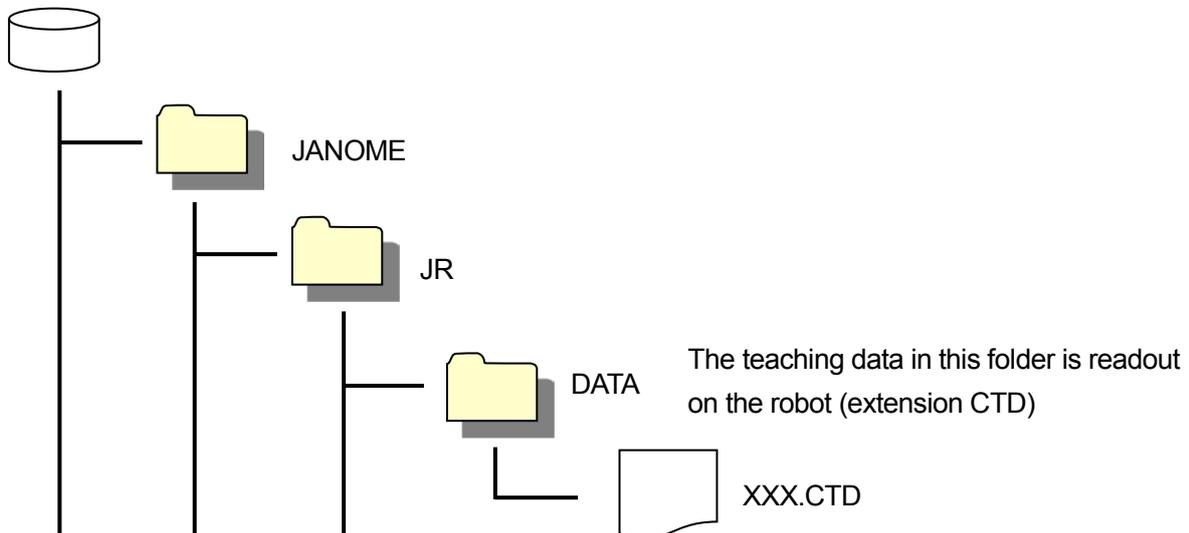


You can only record one teaching data file in the DATA folder. If you write teaching data to the USB memory when you already have teaching data recorded, the folder is overwritten.

■ Read from USB Memory

With this you can read teaching data from the USB memory.

The teaching data backup file is read from the data file in the following folder configuration:



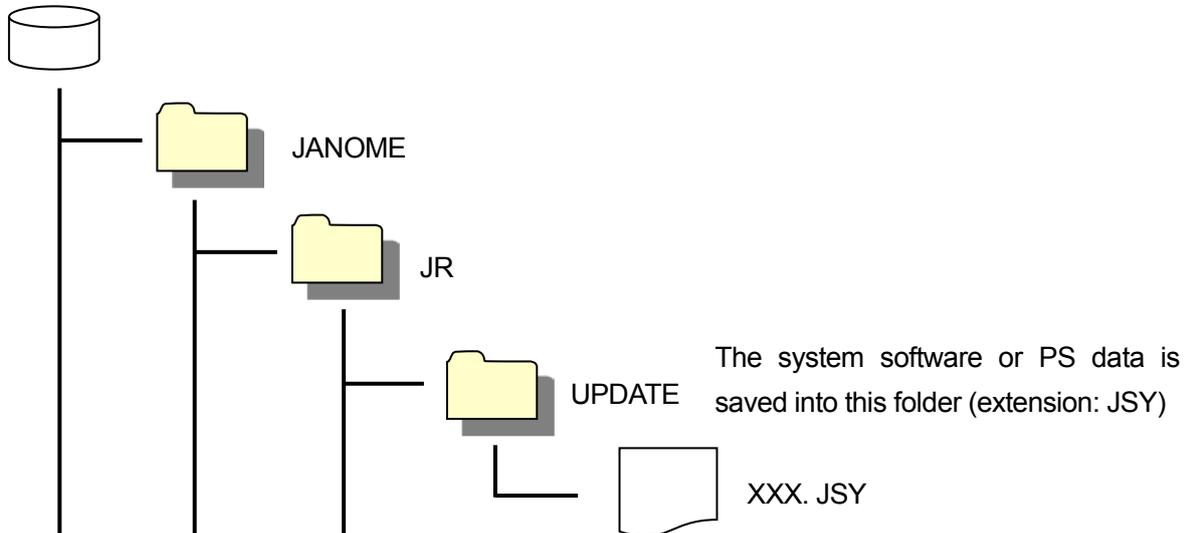
If there is no data in the folder, an error occurs.

NOTE

- Please do not save two or more teaching data backup files.
- If you change the folder name, the data cannot be read.

14.2 System Software and PS Data (Model Setting Data) Updates

Create the predefined folder in the USB memory beforehand. The system software is saved into the UPDATE folder. The following folder configuration is created:



You cannot update both the system software and PS data (model setting files) at the same time. For PS data, you can update the data for all the settings as a group.

Insert the USB memory with the system software saved on it into the robot, turn the power ON and the system software is automatically updated.

NOTE

- Please be aware that the updates happen directly after turning the power back ON and with no user confirmation.
- You can disable this function in Administration Settings Mode.

14.3 Setting up the MEMORY Port (Administration Settings Mode)

Memory Port has the following settings:

- Memory Port Valid/Invalid Setting
- Auto Update Valid/Invalid Setting

■ Memory Port Valid/Invalid Setting

If you set the memory port to invalid, the menus relating to the memory port and the auto update are no longer displayed.

■ Auto Update Valid/Invalid Setting

You can disable the automatic updates when the power turns ON.

This can be helpful to prevent malfunctions when turning ON the power.

NOTE

Memory port and automatic updates are set to valid as factory default settings.

Janome Sewing Machine Co., Ltd.

Industrial Equipment Sales Division

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