JANOME DESKTOP ROBOT

JR2000N/JR-V2000 Series

Operation Manual

Basic Instructions

Thank you for purchasing a Janome Robot.

- **Read this manual thoroughly in order to ensure proper use of this robot. Be sure to read "For Your Safety" before you use the robot. The information will help you protect yourself and others from possible dangers during operation.**
- **After reading this manual, keep it in a handy place so that you or the operator can refer to it whenever necessary.**
- **This manual is written according to IEC 62079.**

JANOME

PREFACE

The Janome Desktop Robot JR2000N Series is a new low-cost, high-performance robot. We have succeeded in reducing the price while maintaining functionality. Energy- and space-saving qualities have been made possible through the combined use of stepping motors and special micro step driving circuits.

This manual describes standard applications of the JR2000N Series. Refer also to the following individual manuals during actual operation of this robot.

JR2000N Series

Setup	Explains how to set up the robot. **Be sure to read this manual before you operate the robot.**
Maintenance	Explains maintenance procedures for the robot. **Be sure to read this manual before you operate the robot.**
Basic Instructions	Provides part names, data structures, and the basic knowledge necessary to operate the robot.
Quick Start	Explains the actual operation of the robot with simple running samples.
Teaching Pendant Operation	Explains how to operate the robot via the teaching pendant.
Features I	Explains point teaching.
Features II	Explains commands, variables, and functions.
Features III	Explains features such as run mode parameters, sequencer programs, etc.
Features IV	Explains features in the Customizing mode.
External Control I (I/O-SYS)	Explains the I/O-SYS control.
External Control II (COM Communication)	Explains the COM communication control system (COM1 – COM3).
Monitoring Camera & Sensors	Explains the optional CCD Camera used for monitoring operations and the Z-Axis Sensor.
Specifications	Provides comprehensive specifications, including mechanical and electrical requirements.
Applications	Explains the function specifications for each specialized application.

Note: The product specifications in these manuals may differ from those of the machine you have received due to product updates.

These manuals are based on the standard applications. Menu items may vary depending on the model.

JR-V2000 Series

JR-V2000 Setup & Maintenance	Explains setup and maintenance procedures for the robot. **Be sure to read this manual before you operate the robot.**
Basic Instructions	Provides part names, data structures, and the basic knowledge necessary to operate the robot.
Quick Start	Explains the actual operation of the robot with simple running samples.
Teaching Pendant Operation	Explains how to operate the robot via the teaching pendant.
Features I	Explains point teaching.
Features II	Explains commands, variables, and functions.
Features III	Explains features such as run mode parameters, sequencer programs, etc.
Features IV	Explains features in the Customizing mode.
External Control II (COM Communication)	Explains COM communication control. （The External Control I manual is not applicable to the JR-V2000 Series）
JR-V2000	Explains features found only in the JR-V2000 Series.

Note: The product specifications in these manuals may differ from those of the machine you have received due to product updates.

Note

Do not operate or handle this machine in a way that is not indicated in these manuals. Be sure to follow the instructions in these manuals. Proper use of the machine will ensure continued functionality and high performance.

Note

Be careful whenever shutting down the robot after making changes to the settings or data. If the robot is shut down without saving the changes, such changes will be lost and the robot will return to its former settings. Be sure to save all changes before shutting down.

Warning

Make sure the ground is connected. Do not use the robot with the ground disconnected. Please set the grounding resistance for the robot's power source to **100Ω or less.**
Failure to properly ground the robot can cause electric shock, fire, malfunction, or damage to the robot.

Warning

Make sure that the power to the robot is OFF before plugging in the power cord.
Failure to do so could cause electric shock or injury.

Note: In this manual, the operation procedures are indicated as follows:

TP Teaching Pendant operation method

PC PC-based operation method（using JR C-Points software）

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FOR YOUR SAFETY

The precautions in this manual are provided for the customer to make the best use of this product safely, and to provide preventive measures against injury to the customer or damage to property.

・・・・・Be sure to follow the instructions・・・・・

Various symbols are used in this manual. Please read the following explanations of each symbol.

● Symbols Indicating the Degree of Damage or Danger

The following symbols indicate the degree of damage or danger which may be incurred if the safety notes are ignored.

Danger	The Danger symbol indicates the imminent risk of death or serious injury.
Warning	The Warning symbol indicates the possibility of death or serious injury.
Caution	The Caution symbol indicates the possibility of accidental injury or damage to property.

● Symbols Indicating Details of Danger and Preventive Measures

The following symbols indicate the type of safety measure that should be taken:

	Indicates the safety measures that should be taken.
	Be careful. (General caution)
	Indicates a forbidden action.
	Never do this. (General prohibition)
	Do not disassemble, modify, or attempt to repair.
	Do not touch. (Contact prohibition)
	Indicates a necessary action.
	Be sure to follow instructions.
	Be sure to unplug power cord from wall outlet.
	Be sure to check that the machine is grounded.

FOR YOUR SAFETY

⚠ Danger

Do not use the unit where flammable or corrosive gas is present.
Leaked gas accumulated around the unit can cause fire or an explosion.

⚠ Warning

Install the unit in a place appropriate for its weight and conditions while running.
Placing the unit on a surface that is unstable, or not strong enough to support its weight may cause the unit to fall, overturn, or break down. This could result in operator injury. Be sure to leave a space of at least 30cm between the back of the robot (equipped with a cooling fan) and the wall. Insufficient space can lead to overheating or fire.

Power the unit only with the rated voltage.
Failure to do so may cause electric shock, fire, or unit malfunction.

Plug the power cord into the wall outlet firmly.
Failure to do so may cause the plug to heat up and may result in fire.

Be sure to use the unit within the voltage range indicated.
Failure to do so may cause fire or unit malfunction.

Turn off all sources of electricity.
Before performing inspections or oiling the unit, please be sure to unplug the plug from the electrical outlet, remove the power cord from the main unit. Also, after cutting off the electrical power, please do not touch the prongs of the electrical inlet for at least 5 seconds. Contact with the prongs could result in electrical shock or injury.

FOR YOUR SAFETY

⚠ Warning

Be sure to check grounding before you use the unit.
Improper grounding can cause electric shock or fire.

Wipe the power plug with a clean, dry cloth periodically to eliminate dust.
Dust accumulation can deteriorate the electrical insulation and cause fire.

Be sure to unplug the power cord from the power outlet when the unit is not in use for long periods of time.
Dust accumulation can cause fire.

Be sure to turn off the unit before inserting or removing cables such as the teaching pendant cable.
Failure to do so may result in electric shock, fire, data loss, or unit

Do not attempt to disassemble or modify the unit.
Disassembly or modification may cause electric shocks or unit malfunction.

Do not allow water or oil to come in contact with the unit or the power cable.
Contact with water or oil can cause electric shock, fire, or unit malfunction.
IP Protection Rating: IP30 (IP40 for CE specification model)

If anything unusual occurs (e.g. a burning smell or unusual sound), stop operation and unplug the cable immediately. Contact the dealer from whom you purchased the robot or the office listed on the last page of this manual.
Continuous use without repair can cause electric shock, fire, or unit

FOR YOUR SAFETY

⚠ Caution

Be sure to secure the movable parts of the unit before transportation.
Failure to do so may result in injury or breakdown.

Before operating the unit, be sure to check that there is no danger in or around the operating range.
Failure to do so may result in injury.

Use the unit in an environment between 0 and 40 degrees centigrade with a humidity level of 20 to 90 percent and without condensation.
Use outside these conditions may result in unit malfunction.
IP Protection Rating: IP30 (IP40 for CE specification models)

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

If the unit is equipped with the I/O-S, install an area sensor or a safety barrier of adequate strength.
Otherwise, a person entering anywhere within the robot's operating range may be injured.

Please make sure the emergency stop button is always placed within the operator's reach whenever you operate the unit.
Failure to do so may be dangerous since it may not be possible to stop the robot immediately and safely.

Regularly check that the emergency stop switch works properly.
For models with I/O-S circuits, also check that they work properly.
Failure to do so may be dangerous since it may not be possible to stop the robot immediately and safely.

FOR YOUR SAFETY

⚠ Caution

Be sure to confirm that tools such as the electric screwdriver unit are properly connected.
Failure to do so may result in injury or breakdown.

Check the mounting screws regularly so that they are always firmly tightened.
Loose screws may cause injury or breakdown.

Be sure to check the wiring to the main unit.
Improper wiring may result in unit malfunction or breakdown.

Be sure to secure the movable parts of the unit before transportation.
Failure to do so may result in injury or breakdown.

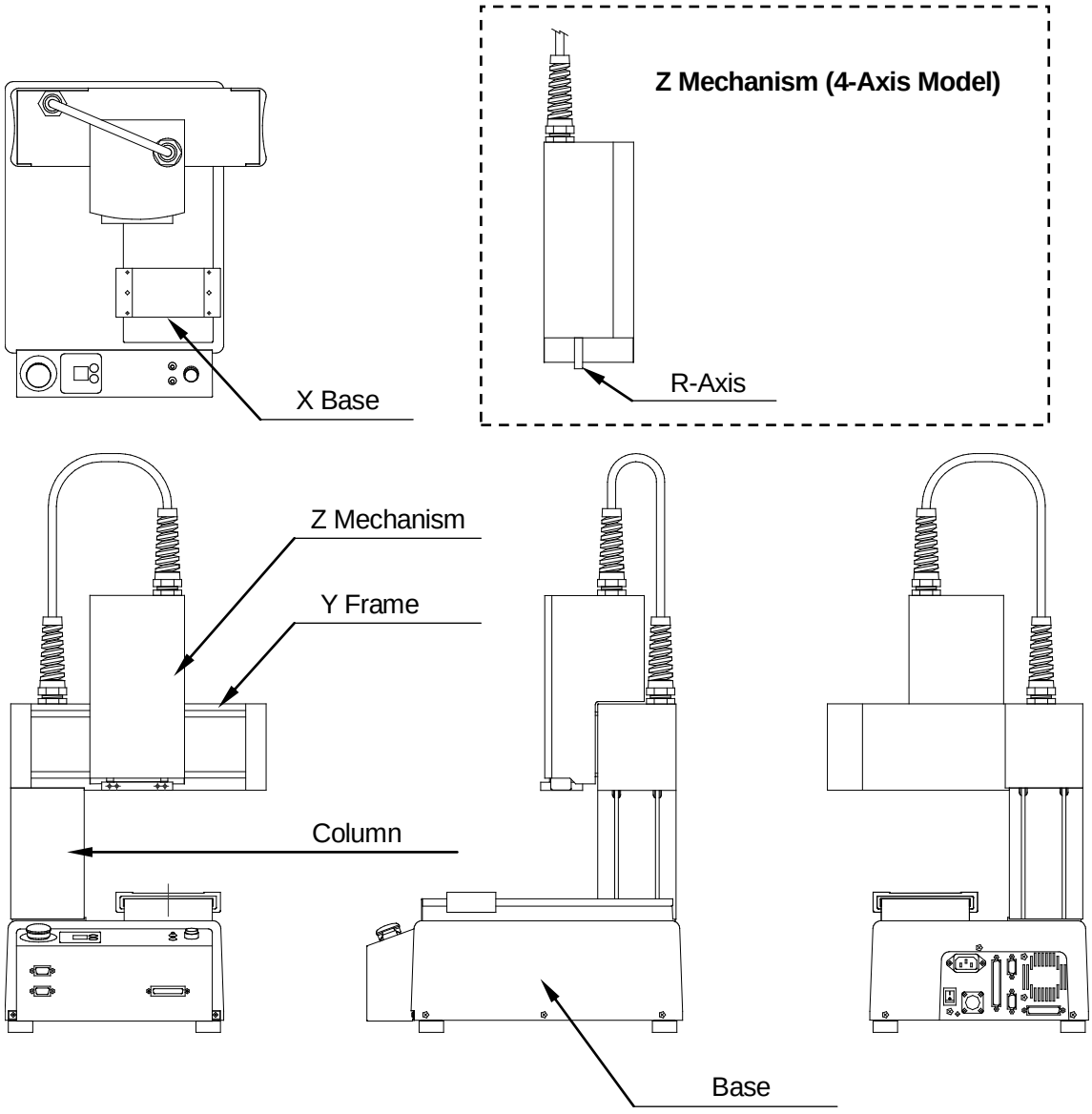
Use the unit in an environment that is not exposed to direct sunlight.
Direct sunlight may cause unit malfunction or breakdown.

MEMO

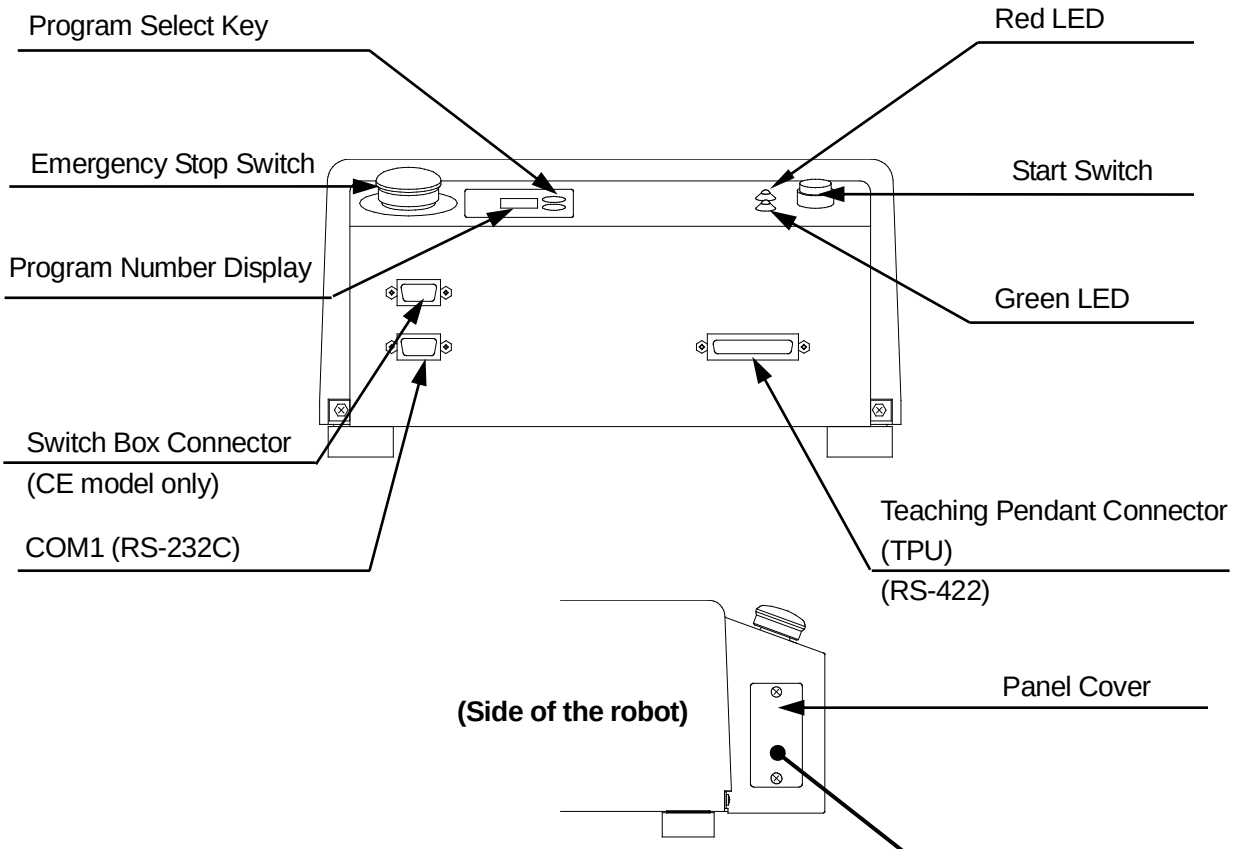
PART NAMES

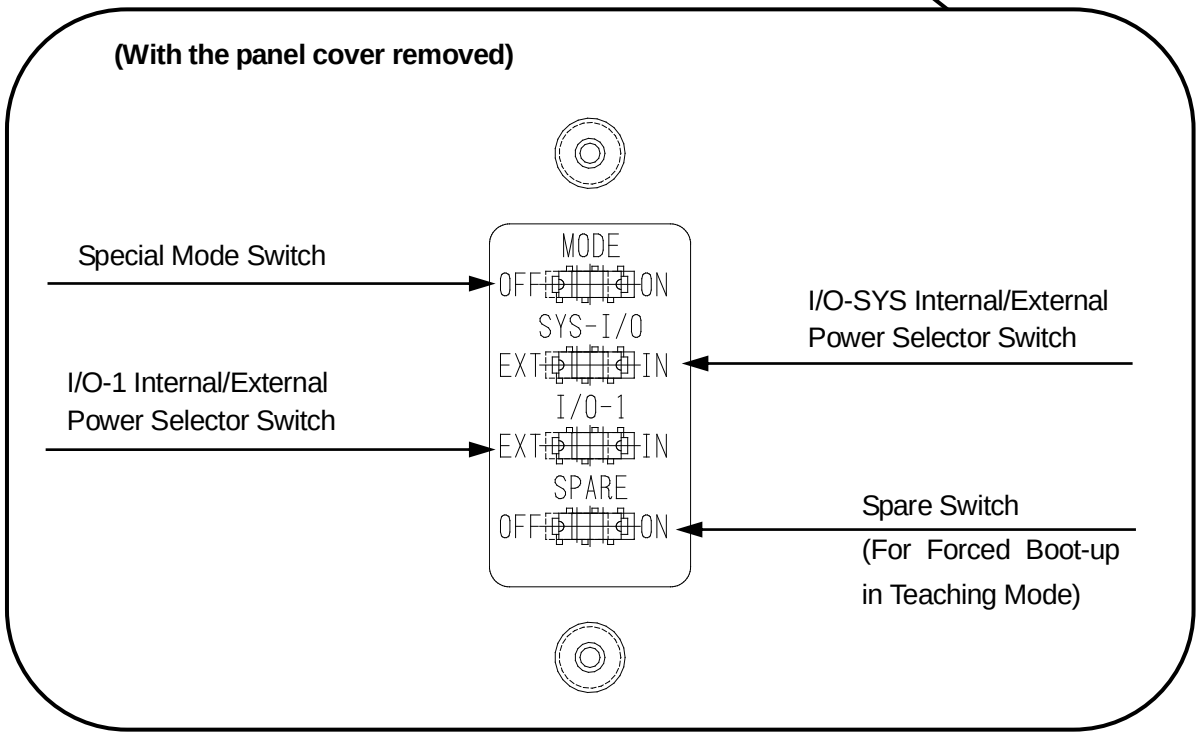
- When using a JR-V2000 Series robot, please refer to the JR-V2000 manual.

Main Unit

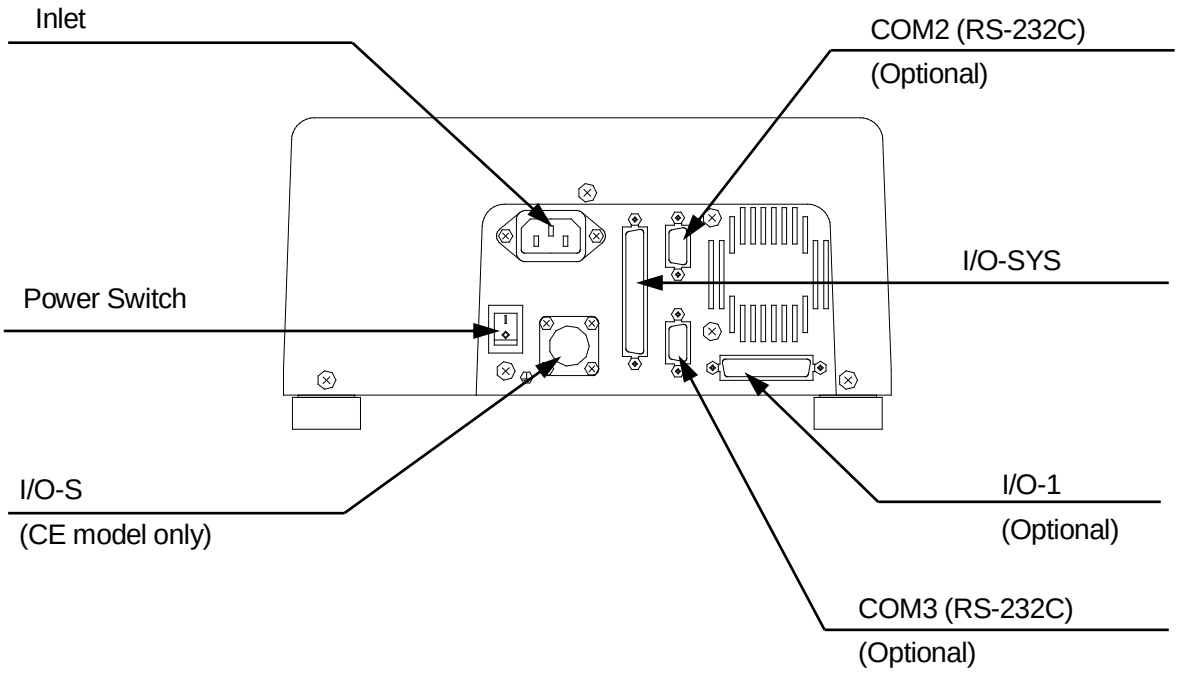


Operation Panel (Front) (Side)

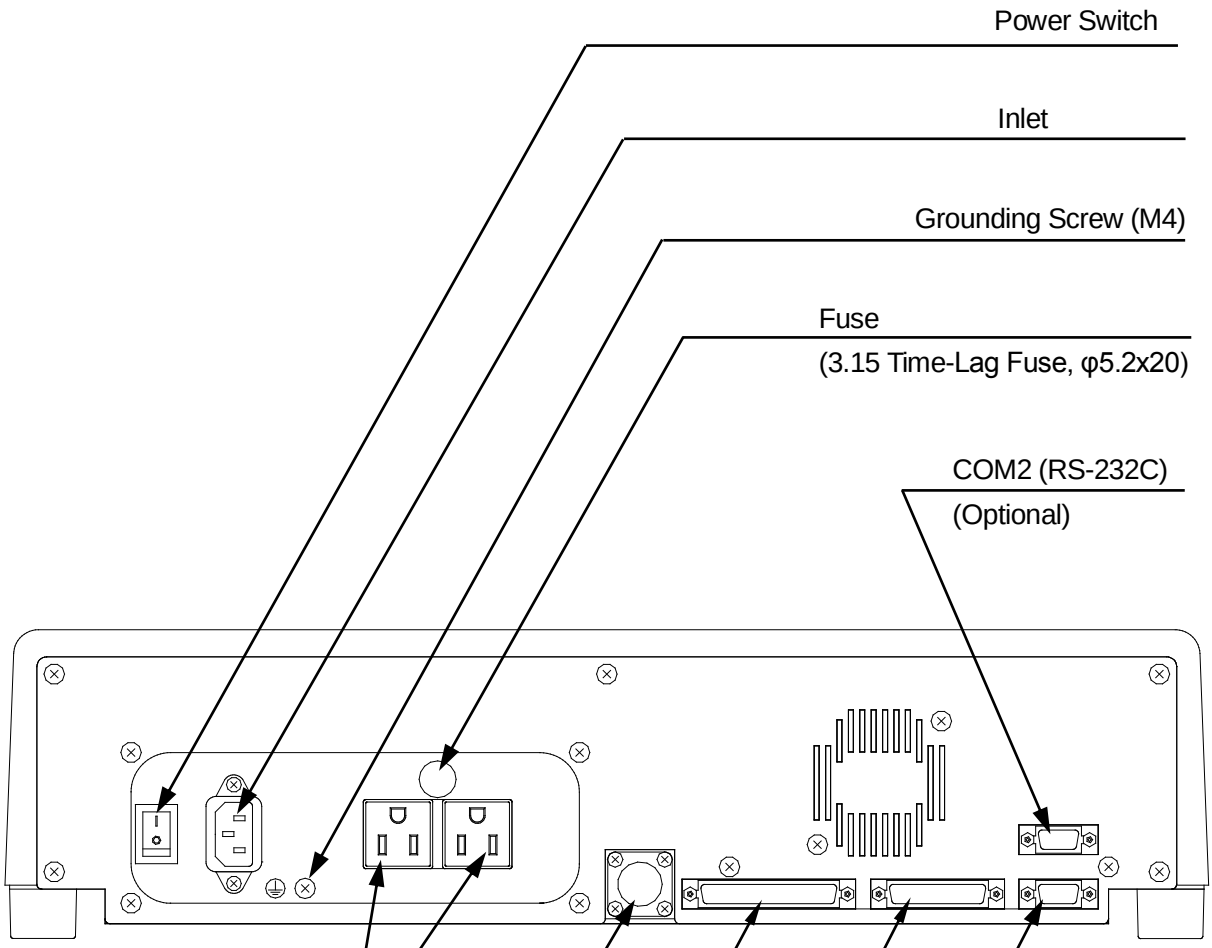




Operation Panel (Rear) (JR2200N(E) Series)



Operation Panel (Rear) (Common to JR2300N(E) Series and JR2400N Series)



Outlet
(Size and availability vary depending on the model specifications.)

I/O-S
(CE model only)

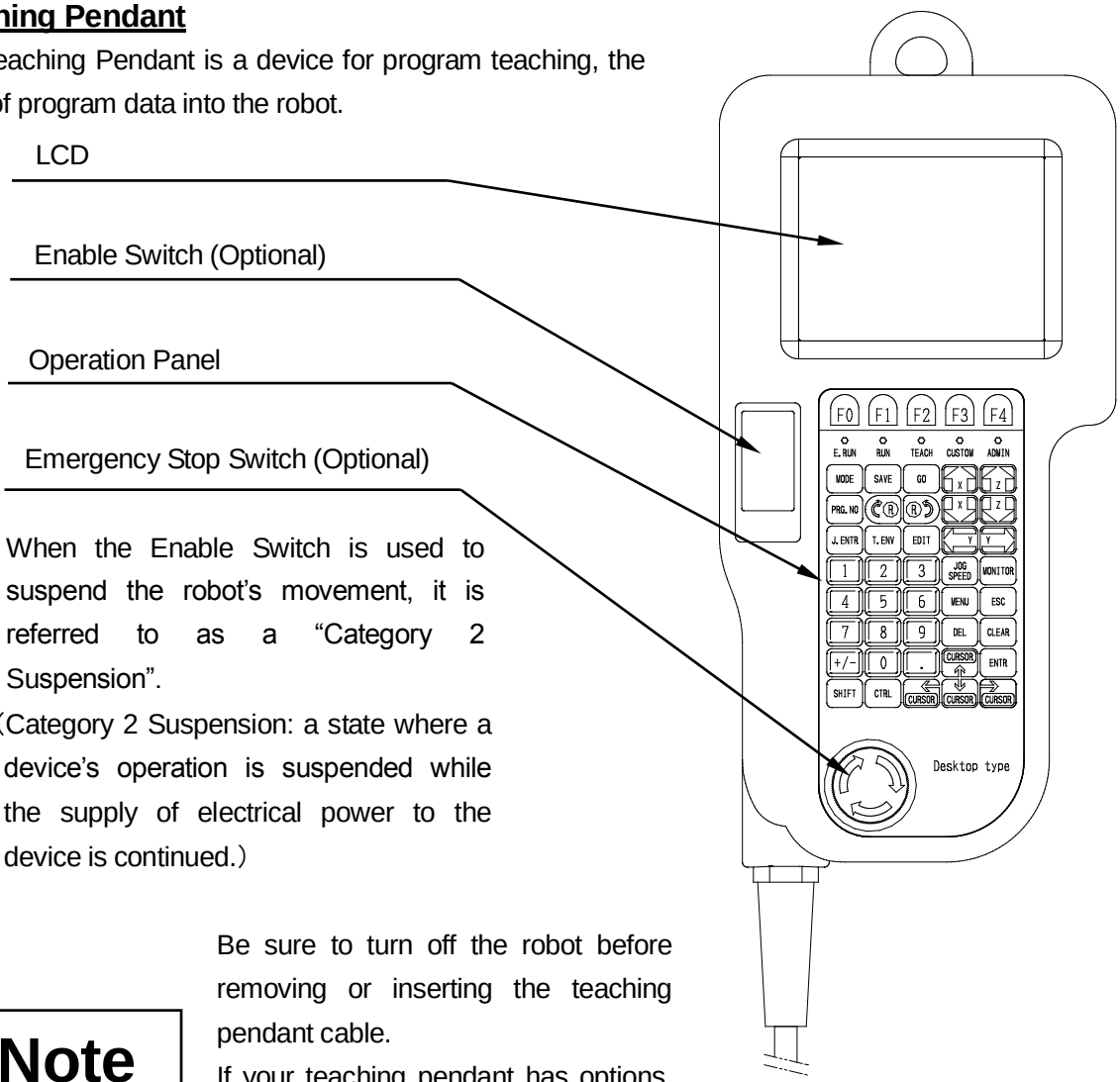
I/O-SYS

I/O-1 (Optional)

COM3 (RS-232C)
(Optional)

Teaching Pendant

The Teaching Pendant is a device for program teaching, the input of program data into the robot.



- When the Enable Switch is used to suspend the robot's movement, it is referred to as a "Category 2 Suspension".

  (Category 2 Suspension: a state where a device's operation is suspended while the supply of electrical power to the device is continued.)

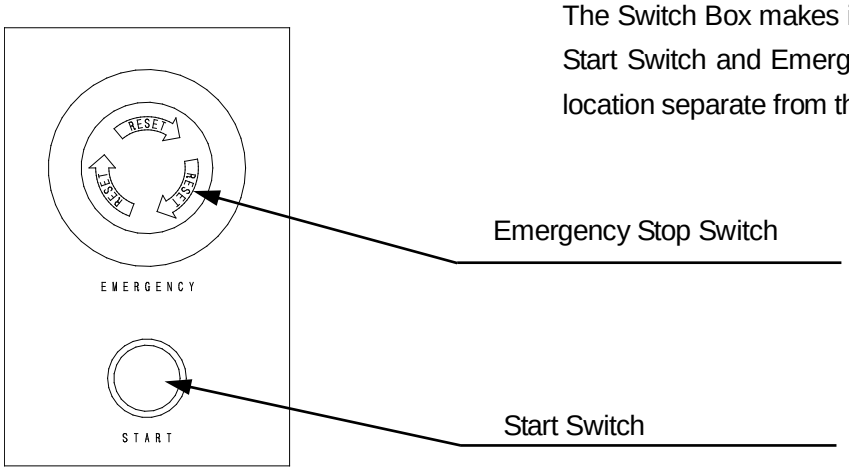
Note

Be sure to turn off the robot before removing or inserting the teaching pendant cable.

If your teaching pendant has options, be sure to change the model settings accordingly.

Switch Box (CE Model Only)

The Switch Box makes it possible to press the Start Switch and Emergency Stop Switch at a location separate from the robot



Teaching Pendant Operation Panel Keys

F0 ____ Function 0 Key

F1 ____ Function 1 Key

F2 ____ Function 2 Key

F3 ____ Function 3 Key

F4 ____ Function 4 Key

MODE ____ Mode Key

SAVE ____ Save Key

GO ____ Go Key

PROG.NO __..Program No. Key

J.ENTR ___ .J. Enter Key

T.ENV ____ T. ENV key *

EDIT ____ Edit Key

0 – 9 ____ Numeric Key

± ___ Plus Minus Key

. ____ .Decimal Point Key

Numerical Key

↑X ____ X Plus Key

X↑ ____ X Minus Key

←Y ____ Y Minus Key

Y→ ____ Y Plus Key

Z↑ ____ Z Up Key

Z↓ ____ Z Down Key

R ____ R Plus Key

R ____ R Minus Key

JOG Key

CURSOR ← __. Cursor Left Key

CURSOR → __. Cursor Right Key

CURSOR ↑ __. Cursor Up Key

CURSOR ↓ __. Cursor Down Key

JOG SPEED __. JOG Speed Key

MONITOR __. Monitor Key

MENU _____ Menu Key

ESC _____ . Escape Key

DEL _____ .. Delete Key

CLEAR _____ Clear Key

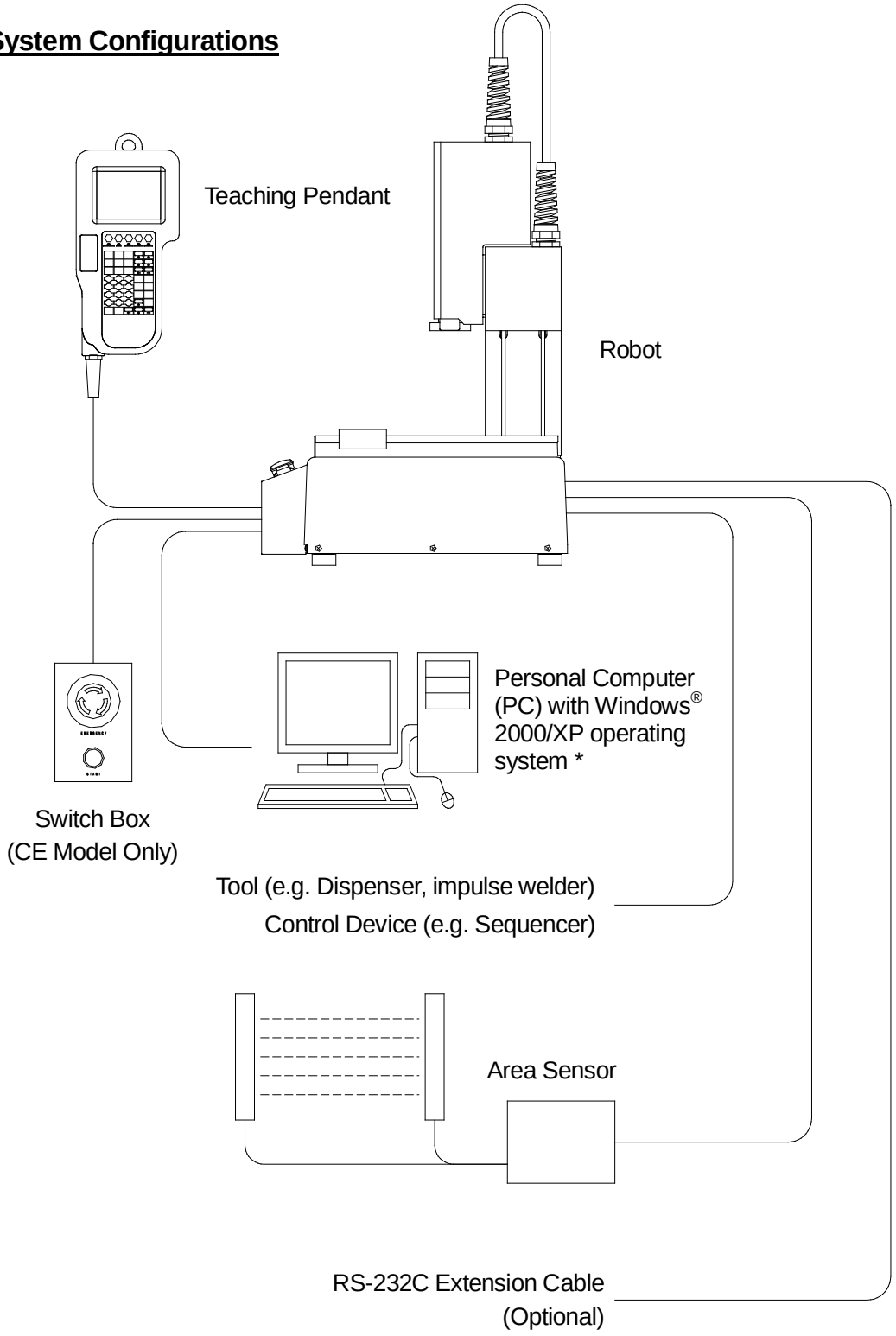
ENTR _____ Enter Key

*: Teaching Environment

CONFIGURATION OF EQUIPMENT

- When using a JR-V2000 Series robot, please refer to the JR-V2000 manual.

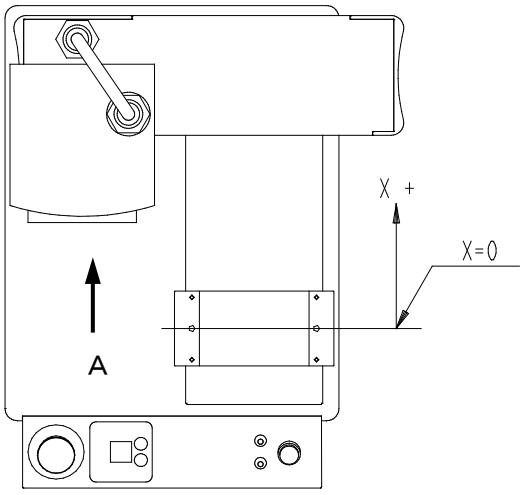
Robot System Configurations

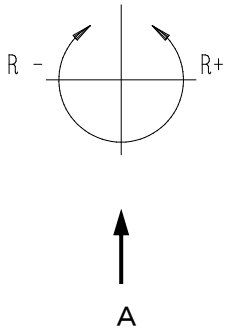


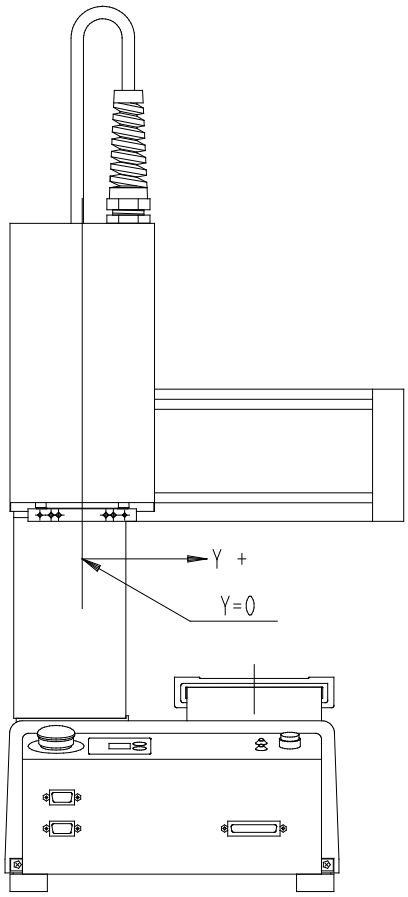
*: Windows 2000/XP is a registered trademark of Microsoft.

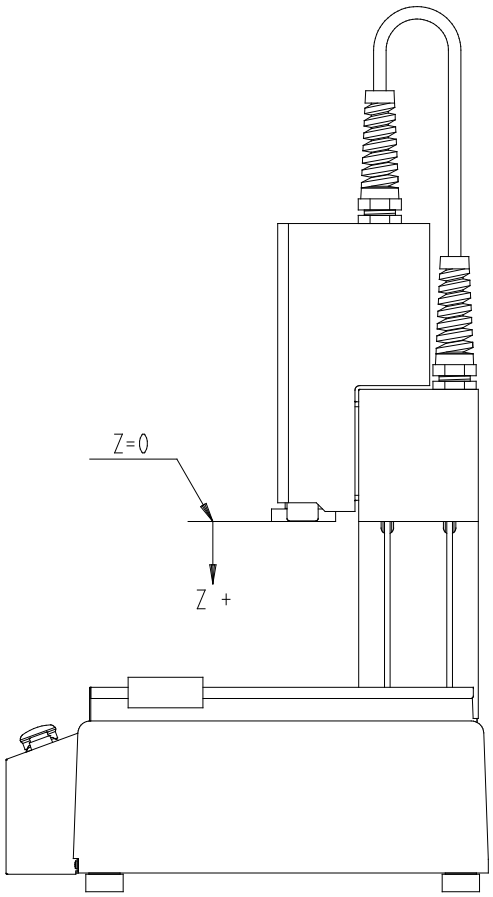
COORDINATE SYSTEM

- When using a JR-V2000 Series robot, please refer to the JR-V2000 manual.







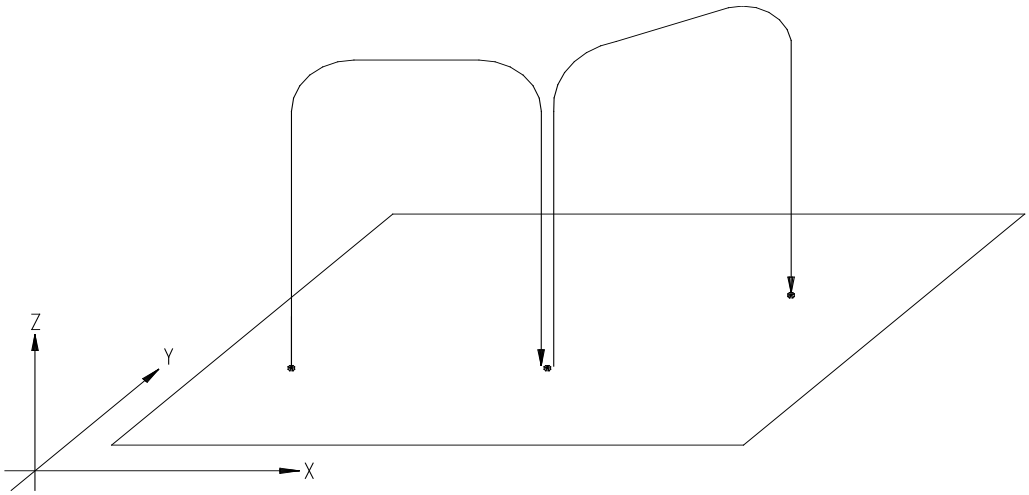


PTP DRIVE/CP DRIVE

This robot is designed on the assumption that a tool attached to the tip of the Z-Axis is carried by the robot arm from point to point, and that it performs operations at such points. Movement from point to point is either PTP (Point to Point) or CP (Continuous Path) depending upon the settings for each point.

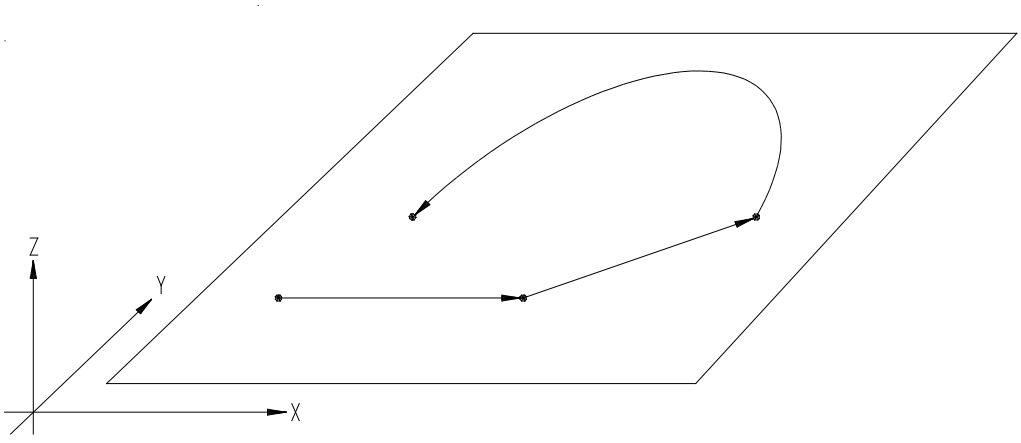
PTP Drive

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



CP Drive

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



CHANGING MODES

This robot has the following operation modes:

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

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

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

Follow the procedures below to change modes:

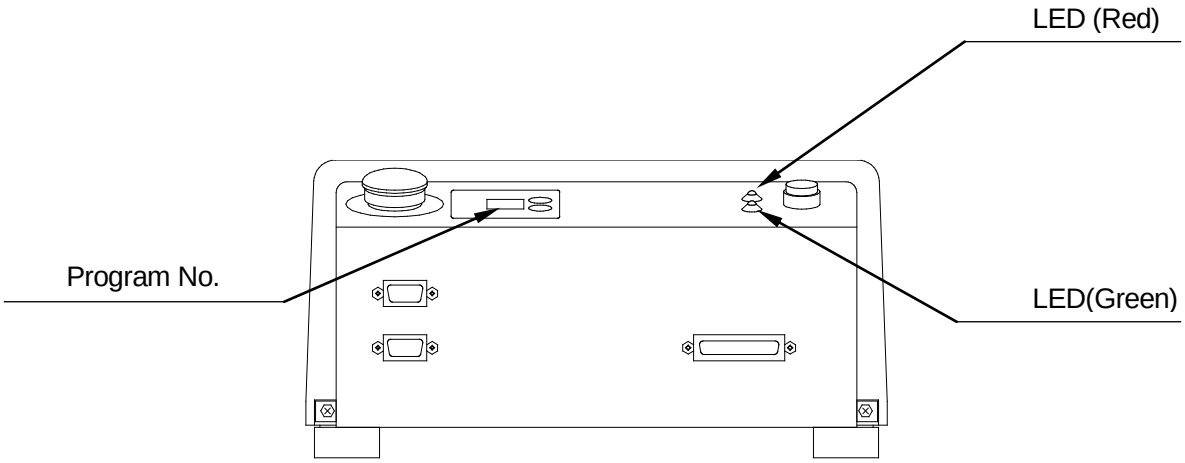
TP MODE Key : the Mode Selection screen appears on the display.
SHIFT + MODE Key: Each time these are pushed, the mode changes from External Run Mode to Switch Run Mode to Teaching Mode and then back External Run Mode.

PC Select [Robot] → [Changing Mode].

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

Note: In this manual, the operation procedures are indicated as follows:
TP Teaching Pendant operation method
PC PC-based operation method（using JR C-Points software）

LED INDICATOR MEANINGS



（The model in this example is a JR2200N）

(LED)

- Red Blinking Start prohibted
- Green Blinking Start on standby
- Green Blinking (rapid) External start signal（#sysIn1 ON, or start command from COM input）standby
- Green Lit Robot is running
- Red/Green Alternating blinks Emergency stop

※ The following will cause the robot to prohibit starting:

The prohibit start signal is ON (#sysIn2,#sysIn14)

The robot's movement is suspended (#sysOut2ON) and the temporary stop（#sysIn12）or temporary stop・prohibit start signal (#sysIn2,#sysIn14) is OFF.

With the I/O-S set for "Interlock" and the robot's movement is suspended or in standby with the I/O-S ON (only for CE specification models).

（With the JR-V2000 Series, when the robot's movement is suspended #sysOut8 turns ON. Temporary stop and prohibit start signals are #sysIn6 and #sysIn8 respectively.)

(Program Number Indicator)

The program number indicators range from「01」to「00」. The number on the display represents the number for the currently selected program. 「00」 stands for program no. 100.

EXTERNAL RUN MODE

The robot operates in five major mode categories, one of which is the External Run Mode. When the robot is active in this mode, the 「E.RUN」 LED on the Teaching Pendant is lit. In this mode the robot begins running its program when a start signal is input to it through I/O-SYS or COM1. When the robot is in another mode, it will not respond to start signals input through I/O-SYS or COM1.

With this robot, after switching the power ON, first it is necessary to perform mechanical initialization. After mechanical initialization, start the robot and it will begin running the selected program.

Also, once the robot starts running a program, no other operations can be performed except for the emergency stop function.

Caution

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

Mechanical Initialization

Mechanical Initialization is the process whereby the robot recognizes its current coordinate position. It is absolutely necessary to perform initialization after turning on the power or releasing the emergency stop switch.

To perform Mechanical Initialization with the robot in External Run Mode, perform either of the following operations.

From I/O-SYS

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

From COM1

With COM1 connected to an external device (such as a PC, etc.), send a Mechanical Initialization command to the robot.

The commands for mechanical initialization or to start operation can be sent only through either ［I/O-SYS］ or [COM1]. Before starting the robot, set the connector which is connected to the device from which the start signal is sent as the “Starting Source”.

TP MODE [Administration Setting Mode] → [Administration Mode] → [Start Channel]

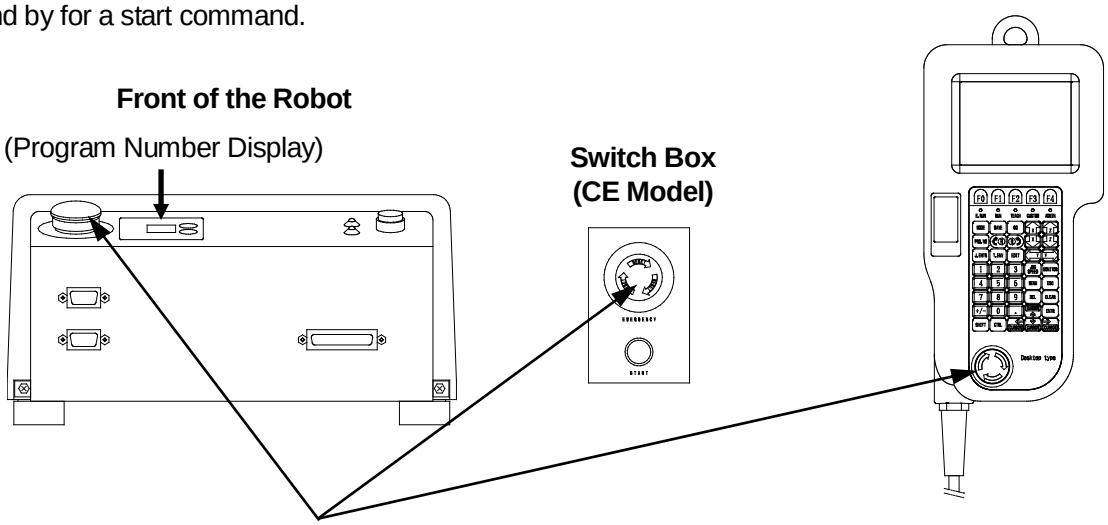
PC [Robot] → [Administration Setting] → [Start Channel]

Emergency Stop

Use the emergency stop switch to stop the robot if any accident occurs during operation. Power to the motor will be turned off and the robot will stop running if you press any of the switches indicated below:

- The emergency stop switch on the robot
- The emergency stop switch on the switch box (for the CE models)
- The emergency stop switch on the teaching pendant (option: See the picture below)

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



How to release the switch: After confirming it is safe to do so, turn the pushed in Emergency Stop Switch clockwise to release it.

However, when the Emergency Stop Switch on a Grip Switch is pushed in, releasing the switch is not enough to stop the alarm buzzer. After releasing the Emergency Stop Switch, turn off the robot and then turn it on again, or briefly press and then release the Emergency Stop Switch on the main unit or switch box (as with CE specification robots) and the buzzer will stop.

Next, send a mechanical initialization command to the robot from either the device connected to the I/O-SYS port, or from a PC. After initialization is complete, the robot will be on standby, ready to start operation.

- The emergency stop switch on the teaching pendant and the switch box are not included with the JR-V2000 Series.

- When the Emergency Stop Switch is pushed while the robot is running, the robot will not come to a stop exactly at the point in time and at the position where the switch was pushed due to a lag caused by inertia. Accordingly, the robot may come to a stop at a position outside of its soft limit, or possible operating range.

How to Select a Program

Select a program using the following methods:

From the Robot

Set the desired program number on the program number display using the [+] and [-] keys on the side of the display.

From the PC

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

From the Teaching Pendant

Press the [PRG.NO] key on the teaching pendant and enter the desired program number.

Press the [F2](LIST) key on the Program Number Selection screen and a list of programs for which teaching is done appears. The user can then select the program they want.

The external devices which can be used to select program numbers can be restricted by using the “change program number” function in the Administration Mode. Program numbers cannot be selected using restricted devices.

How to Start the Operation

Select either of the following methods in the External Run mode to start running a program:

From I/O-SYS

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

From COM1

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

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

  TP [MODE] [Administration Setting Mode] → [Administration Mode] → [Start Channel]

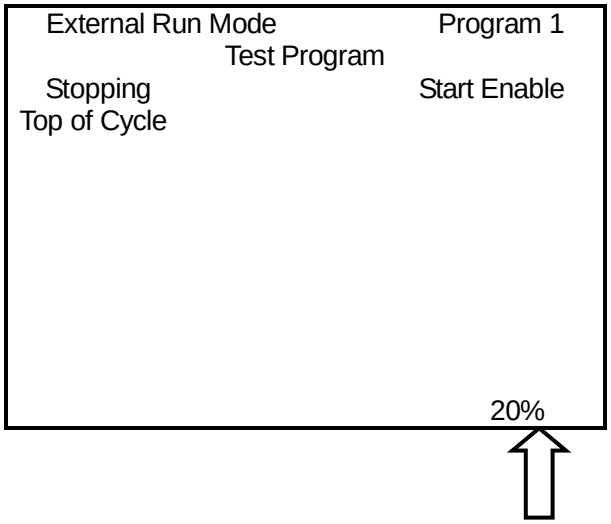
  PC [Robot] → [Administration Setting] → [Start Channel]

PTP Speed Override

It is possible to reduce the PTP speed while the robot is running by the preset speed rate, for example, when you wish to start a new program at a low speed. (This setting does not affect the CP speed.)

Press the MENU key while the Ext. Run mode is selected, and then select [PTP Speed Override] from the menu.
Enter the desired PTP speed rate.

If the set speed rate is not 100%, the speed rate will be displayed on the screen as shown to the right.

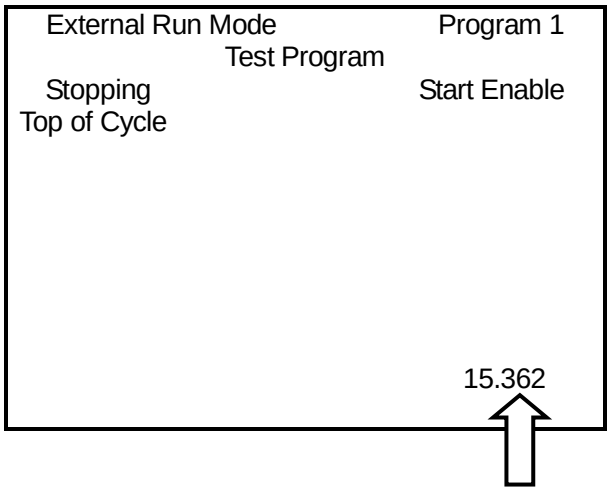


Cycle Time

The operation cycle time (sec) will be displayed on the screen after running a cycle of the program.

If [Cycle Mode] (MENU → [Program Data Settings]) is set to [Continuous Playback], the robot will repeat the same program.
In this case, the total cycle time will be displayed when the robot is stopped by the sysIn11 Last Work signal.

- The cycle time will not be displayed if a program is terminated due to an error.



Teaching Pendant Display Adjustment

The teaching pendant LCD settings are adjustable by pressing the [T.ENV] key.

Item	Function
Contrast	User can change the contrast on the teaching pendant LCD screen. [CURSOR↑] key: Darker [CURSOR↓] key: Brighter
Changing Length Measurement Unit Display	User can choose either millimeters or inches.
Changing Display Language	User can choose from the list of languages.

Run Mode Operations, Sequencer

By setting point job data numbers for Run Mode operations, the robot will carry out those point jobs at the designated timing. For example, with a “job during an emergency stop”, this job is carried out when the robot is in an emergency stop.

In the case of a sequencer, job data numbers set to the sequencer are executed at regular intervals. For details, refer to the Functions III manual.

SWITCH RUN MODE

The robot operates in five major mode categories, one of which is the Switch Run Mode. In the Switch Run mode, the robot starts running programs when the start switch is pressed. The **RUN** light on the teaching pendant will turn on while running in this mode.

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

Also, except for an emergency stop and pause, the user cannot make the robot do anything else in the middle of running a program.

Caution

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

Mechanical Initialization

Mechanical Initialization is the process whereby the robot recognizes its current coordinate position. It is absolutely necessary to perform initialization after turning on the power or releasing the emergency stop switch.

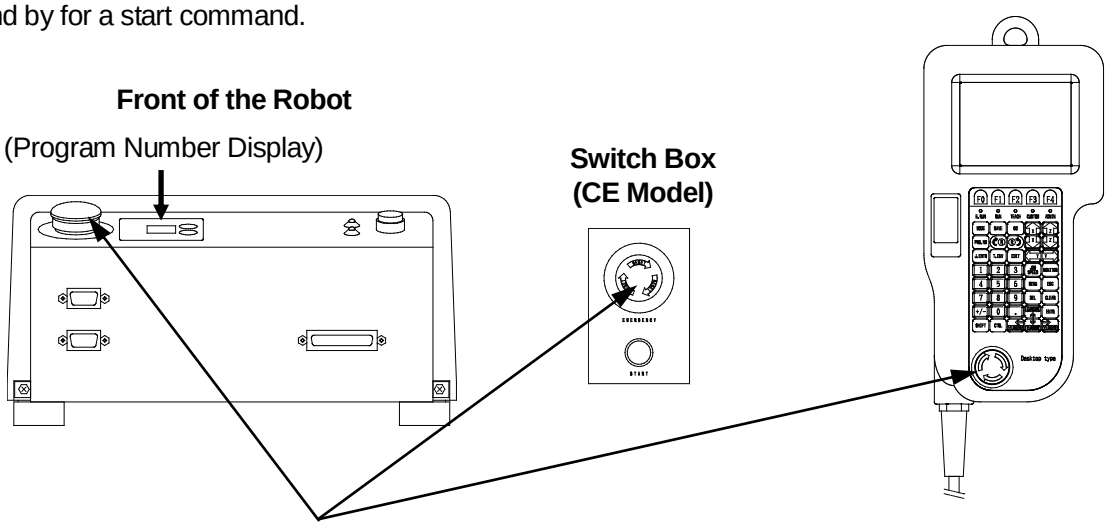
With the robot on and in Switch Run Mode, if the words, “Press the Start Switch” appear on the display, press the Start Switch and initialization begins. If “Press the Start Switch” does not appear on the display, press the Start Switch and the robot will start running.

Emergency Stop

Use the emergency stop switch to stop the robot immediately if any accident occurs during operation. The power to the motor will be turned off and the robot will stop running if you press any of the switches indicated below:

- The emergency stop switch on the robot
- The emergency stop switch on the switch box (for the CE models)
- The emergency stop switch on the teaching pendant (option: See the illustration below)

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



How to release the switch: After confirming it is safe to do so, turn the pushed in Emergency Stop Switch clockwise to release it.

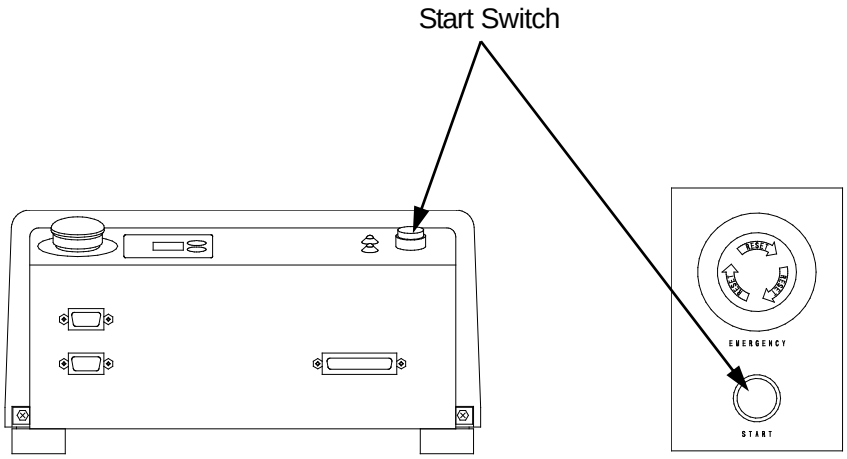
However, when the Emergency Stop Switch on a Grip Switch is pushed in, releasing the switch is not enough to stop the alarm buzzer. After releasing the Emergency Stop Switch, turn off the robot and then turn it on again, or briefly press and then release the Emergency Stop Switch on the main unit or switch box (as with CE specification robots) and the buzzer will stop.

Next, send a mechanical initialization command to the robot from either the device connected to the I/O-SYS port, or from a PC. After initialization is complete, the robot will be on standby, ready to start operation.

- The emergency stop switch on the teaching pendant and the switch box are not included with the JR-V2000 Series.
- When the Emergency Stop Switch is pushed while the robot is running, the robot will not come to a stop exactly at the point in time and at the position where the switch was pushed due to a lag caused by inertia. Accordingly, the robot may come to a stop at a position outside of its soft limit, or possible operating range.

How to Start Operation

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



Front of the Robot

Switch Box (CE Model)

How to Select a Program

Select a program using the following methods:

From the Robot

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

From the PC

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

From the Teaching Pendant

Press the PRG.NO key on the teaching pendant and enter the desired program number.
Press the F2 (LIST) key on the Program Number Selection screen and a list of programs for which teaching is done appears. The user can then select the program they want.

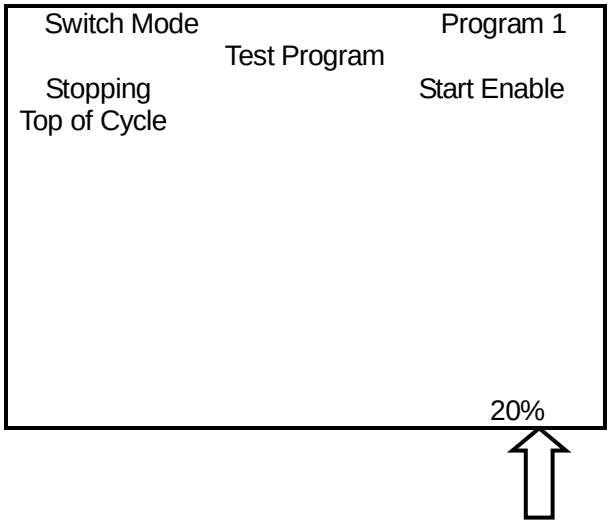
The external devices which can be used to select program numbers can be restricted by using the “change program number” function in the Administration Mode. Program numbers cannot be selected using restricted devices.

PTP Speed Override

It is possible to reduce the PTP speed while the robot is runing by the preset speed rate, for example, when you wish to start a new program at a low speed. (This setting does not affect the CP speed.)

Press the MENU key while the Switch Run mode is selected, and then select [PTP Speed Override] from the menu.
Enter the desired PTP speed rate.

If the set speed rate is not 100%, the speed rate will be displayed on the screen as shown to the right.

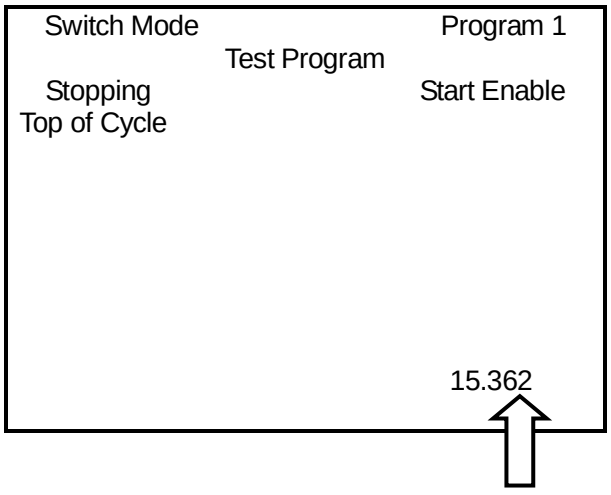


Cycle Time

The operation cycle time (sec) will be displayed on the screen after running a cycle of the program.

If [Cycle Mode] (MENU → [Program Data Settings]) is set to [Continuous Playback], the robot will repeat the same program.
In that case, the total cycle time will be displayed when the robot is stopped by the sysIn11 Last Work signal.

- The cycle time will not be displayed if a program is terminated due to an error.



Teaching Pendant Display Adjustment

The teaching pendant LCD settings are adjustable by pressing the [T.ENV] key.

Item	Function
Contrast	User can change the contrast on the teaching pendant LCD screen. [CURSOR↑] key: Darker [CURSOR↓] key: Brighter
Changing Length Measurement Unit Display	User can choose either millimeters or inches.
Changing Display Language	User can choose from the list of languages.

Run Mode Operations, Sequencer

By setting point job data numbers for Run Mode operations, the robot will carry out those point jobs at the designated timing. For example, with a “job during an emergency stop”, this job is carried out when the robot is in an emergency stop.

In the case of a sequencer, job data numbers set to the sequencer are executed at regular intervals. For details, refer to the Functions III manual.

TEACHING MODE

The robot operates in five major mode categories, one of which is the Teaching Mode. When the robot is active in this mode, the 「TEACH」 LED on the Teaching Pendant is lit.
Teaching Mode is for creating programs, etc. The creation of programs and entering settings is referred to as “Teaching” and the information entered into the robot while in Teaching Mode is “Teaching Data”.

For details about Teaching Mode, refer to the Functions I (Point Teaching) manual.

Caution

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

Mechanical Initialization

Mechanical Initialization is the process whereby the robot recognizes its current coordinate position. It is absolutely necessary to perform initialization after turning on the power or releasing the emergency stop switch. To carry out initialization, press the F.4 key when the key indicator in the lower part of the LCD screen shows 「INIT」.

If the indicator above the F.4 key does not show「INIT」,
Change to the appropriate position entry screen. The indicator above the F.4 key will now show 「INIT」.

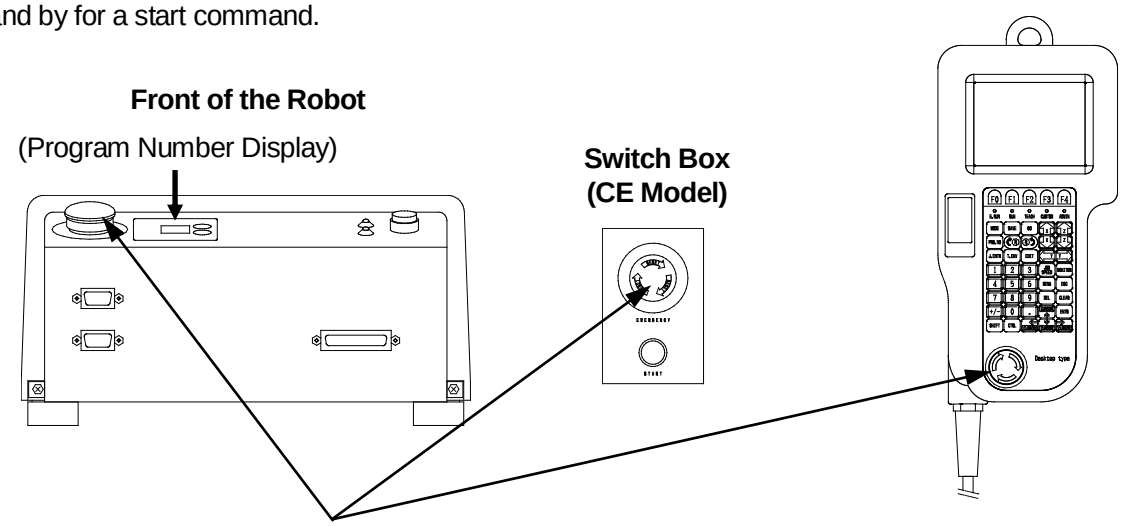
- When using a teaching pendant equipped with the optional enable switch, it is necessary to press and hold down the enable switch when using the operation keys. Please also continuously press the enable switch when operating the robot. If the enable switch is released or pushed in, as a safety measure the robot will stop moving.

Emergency Stop

Use the emergency stop switch to stop the robot immediately if any accident occurs during operation. The power to the motor will be turned off and the robot will stop running if you press any of the switches indicated below:

- The emergency stop switch on the robot
- The emergency stop switch on the switch box (for the CE models)
- The emergency stop switch on the teaching pendant (option: See the illustration below)

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



How to release the switch: After confirming it is safe to do so, turn the pushed in Emergency Stop Switch clockwise to release it.

However, when the Emergency Stop Switch on a Grip Switch is pushed in, releasing the switch is not enough to stop the alarm buzzer. After releasing the Emergency Stop Switch, turn off the robot and then turn it on again, or briefly press and then release the Emergency Stop Switch on the main unit or switch box (as with CE specification robots) and the buzzer will stop.

Next, send a mechanical initialization command to the robot from either the device connected to the I/O-SYS port, or from a PC. After initialization is complete, the robot will be on standby, ready to start operation.

- The emergency stop switch on the teaching pendant and the switch box are not included with the JR-V2000 Series.
- When the Emergency Stop Switch is pushed while the robot is running, the robot will not come to a stop exactly at the point in time and at the position where the switch was pushed due to a lag caused by inertia. Accordingly, the robot may come to a stop at a position outside of its soft limit, or possible operating range.

How to Select a Program

Press the PRG.NO key on the teaching pendant and enter the desired program number.

Point Run

Caution

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

In the Teaching mode, any point in a program can be run. (If the CP drive is selected, the robot will run from [CP Start Point] through [CP End Point].)
The robot will perform operations such as the point job data and additional function data in exactly the same way as in the Ext. Run and the Switch Run modes. This function is useful when you wish to check which points designated by [Execute Condition] the robot will run.

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

Test Run

Use the “Test Run” function to test a newly taught program or an edited program before actually running the robot.

The speed of test runs is limited to 250 mm/s for your safety; however, the robot will perform one cycle of a test run including the point job data and additional function data exactly as done in the External Run and Run modes.
Be sure to execute [Checking Data] and then [Test Run] before actual operation if you register a new program or modify a registered program.

- During a test run, the「TEACH」 and 「RUN」LED on the Teaching Pendant will light up.
  If during a point job or a sequencer command the robot waits for an incoming command from I/O-SYS or I/O-1, then it will perform this same waiting for command during a test run as well.

- For information about point movement and test run operations, please refer to the Teaching Pendant Operation manual.

Teaching Environment Setting

Press the T.ENV key in the Teaching mode to display the Teaching Environment Setting menu. In this menu, you can set the teaching mode environment when entering positions as well as the teaching pendant LCD display options.
These settings cannot be transmitted between the robot and the PC; however, you can check or change the settings from the PC. The settings will not be deleted if the power to the robot is turned off.

- Brightness Adjustment: Adjust the teaching pendant LCD brightness.
- Unit of Measure: Switch between millimeter (mm) and inch (inch).
- Display Language: Switch between English, Japanese, German, Italian, Spanish, French, Korean, Chinese, and Vietnamese.
- GO Function: Set the shifting conditions of the robot Axes (in the PTP drive) when the GO key is pressed while entering positions using the JOG keys in the Teaching mode.
- JOG Function: Set the shifting conditions of the robot Axes (in the PTP drive) When entering positions using the JOG keys in the Teaching mode.
- Tool for Teaching: Set the tool settings valid in the Teaching mode when entering a position using a tool different from the one used during operation.
- Manual Job Number: Set point job numbers to be performed when entering positions using JOG keys in the Teaching mode.
- Key Click: Select the location from which a sound will be emitted when any key on the operation panel is pressed.

  ・Inside: ON, Panel: ON…From both the robot and the teaching pendant
  ・Inside: OFF, Panel: ON…Only from the teaching pendant
  ・Inside: ON, Panel: OFF…Only from the robot
  ・Inside: OFF, Panel: OFF…No sound

- Back Light on Teaching: Select [OFF] to disable the teaching pendant LCD backlight in the Teaching mode.

- Save on Changing Mode: Select [Valid] (default) to display the Data Save confirmation screen when changing from the Teaching mode to the Ext. Run or the Switch Run mode.

- Coordinates Display: Select the coordinates display settings on the point settings screen from [Normal] and [Detail].

- You can select [Display Language] by pressing the CTRL + T.ENV keys from any mode.

- In the JR2000N Series, system software Ver9.57 and older cannot display Vietnamese.

Save Data

Save teaching data in combination with customizing data. The unit of data is referred to as *C & T data*.
If the teaching pendant is connected, press the SAVE key. If you wish to save data edited on a PC in the robot, send data to the robot using the PC software JR C-Points (option). The data sent from the PC will be saved in the robot automatically.
C & T data created using the teaching pendant is stored in the robot temporarily; **it will be deleted automatically when the power to the robot is turned off.** Be sure to save if you have modified the teaching data or customizing data.
To back up the data, send C & T data from the robot to your PC using the PC software JR C-Points (option) or JR C-Points Limited Edition (included in the operation manual CD-ROM) and save it as a file.

Types of Teaching Data

Teaching data consists of the following seven items:

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

*: The point job data (101 – 200), additional function data (51 – 100), and sequencer program data (51 – 100) are included in the customizing data. (See Page 31)

Program

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

Up to 255 programs (Numbers 1 – 255) can be registered in the robot.

A program consists of two items: the program data that controls the program and the point data that includes position coordinates at which the robot performs the operation. (Multiple point data is also referred to as point data array.)

Program				
Program Data	**Point Data [01]**	**Point Data [02]**	**…**	**Point Data [28]**

Program data consists of the following nine items:

1. Program Name: You can use up to 40 – 120 characters, depending on the character types, in combination to name the program.

2. Work Home: This is the point (coordinates) where the robot Axes return to and wait for the next start instructions after running the last point of the program in the [1 Cycle Playback] operation.

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

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

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

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

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

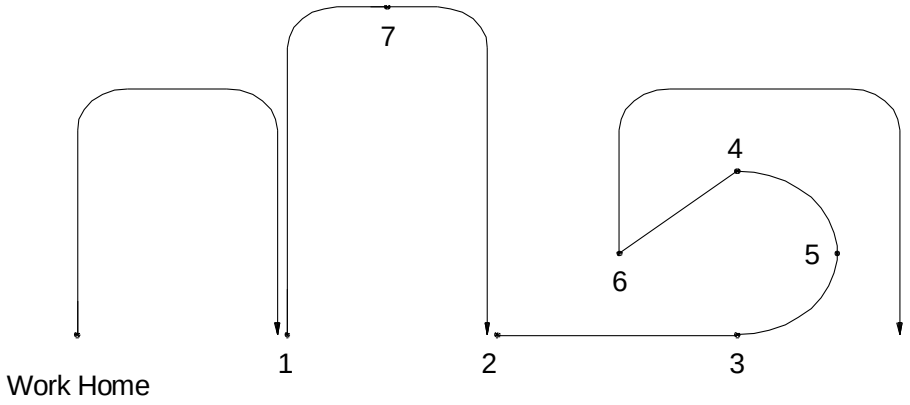
8. Move Area Limit: This is the moving range limit for each axis. When the robot is running and it moves beyond the coordinates defined by these limits, a position error occurs and the robot suspends movement. In addition, when in the JOG mode, the robot axes are not movable beyond these limits. Limits may be set for each axis, with a range from 0 to the maximum operating limit.

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

The point data categories are as follows:

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

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



1. PTP Point

The point from which the robot Axes start shifting to the next point in the PTP drive

2. CP Start Point

The point from which the robot Axes switch from the PTP drive to the CP drive

3. CP Passing Point

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

4. CP Stop Point

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

5. CP Arc Point

This point specifies the arc motion of the robot Axes in the CP drive.

6. CP End Point

The point at which the robot Axes complete the CP drive and start shifting to the next point in the PTP drive

7. PTP Evasion Point

The point at which the robot Axes evade obstacles in the PTP drive

8. User Definition Type

Point types created in the Customizing mode are called user-defined point types.

(The above point type items 1 – 7 are called the pre-defined point types.)

If you create a user-defined point type, it has the same basic contents (e.g. way of moving to the next point) as the point type used as its base.

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

4. Condition Number: Number assigned to the point job data: Using the condition number, you can set the condition data set in the Teaching mode to job points. (Condition data is defined in the Customizing mode and its parameters are set in the Teaching mode.)

5. Point Job Number: Number assigned to the point job data: The robot will perform point jobs designated by the point job number. You can select from the following four point jobs according to your preference. Depending on the point type set to the point, selection of these point jobs may not be possible. (See the table on Page 32)

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

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

7. Tag Code: Value (tag code) assigned to a point

Common Data Settings

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

Condition Data Settings

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

Point Job Data Settings

Point job data is a set of commands and logic operations that is performed at job points. The robot will perform point jobs selected from the point job number list on the point settings screen. (See “POINT JOB DATA” on Page 59 of the *Teaching Pendant Operation* manual for details) Depending on the point type set to the point, selection may not be possible. (See the table on Page 22)

You can create point job data Nos. 01 – 100 in the Teaching mode. Point job data Nos. 101 – 200 can be created in the Customizing mode.

Additional Function Data Settings

Select the additional function data you wish to set from the additional function data number list on the point settings screen. (See “ADDITIONAL FUNCTION DATA” on Page 69 of the *Teaching Pendant Operation* manual for details) The designated additional function is set to job points. Depending on the point type set to the point, selection may not be possible. (See the table on Page 22)

You can create additional function data (Nos. 01 – 50) in the Teaching mode. Further, additional function data Nos. 51 – 100 can be created in the Customizing mode.

Additional function data consists of the following six items:

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

3. Tool Data: The contents are the same as those set in the program data.
Use this item when you wish to use different tool data, set in the program data, between designated points.

4. Pallet Routine: The pallet is the offset of the coordinates from the standard point. It has a counter function. For details, see “Pallet Routine” on Page 32 of the *Functions I* operation manual.

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

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

(○: Can be set, ×: Cannot be set)

Point Job Data/ Additional Function Data / Point Type	Job before Moving	Job while Moving	Job while CP Moving	Point Job	Condition Data	PTP Condition	CP Condition	Tool Data	Pallet Routine	Execute Condition	Workpiece Adjustment	Tag Code
PTP Point	○	○	×	○	×	○	×	○	○	○	○	○
CP Start Point	○	○	○	○	○	×	○	○	○	○	○	○
CP Passing Point	×	×	×	○	×	×	×	×	×	○	○	○
CP Stop Point	×	×	○	○	○	×	○	×	×	○	○	○
CP Arc Point	×	×	×	○	×	×	×	×	×	○	○	○
CP End Point	×	×	×	○	×	○	×	×	×	○	○	○
PTP Evasion Point	×	×	×	×	×	○	×	×	○	○	×	×
Work Home (PTP Point)	○	○	×	○	×	○	×	○	○	○	○	○
Work Home (CP Start Point)	○	○	○	○	○	×	○	○	○	○	○	○

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

- You can create condition data in the Customizing mode and set parameters (e.g. value and item) in the Teaching mode. The name created in the Customizing mode is displayed on the Teaching Mode menu screen. If you have not set the name, [Condition Data Settings] (the default name) is displayed on the Teaching Mode menu screen.

Sequencer Program Data

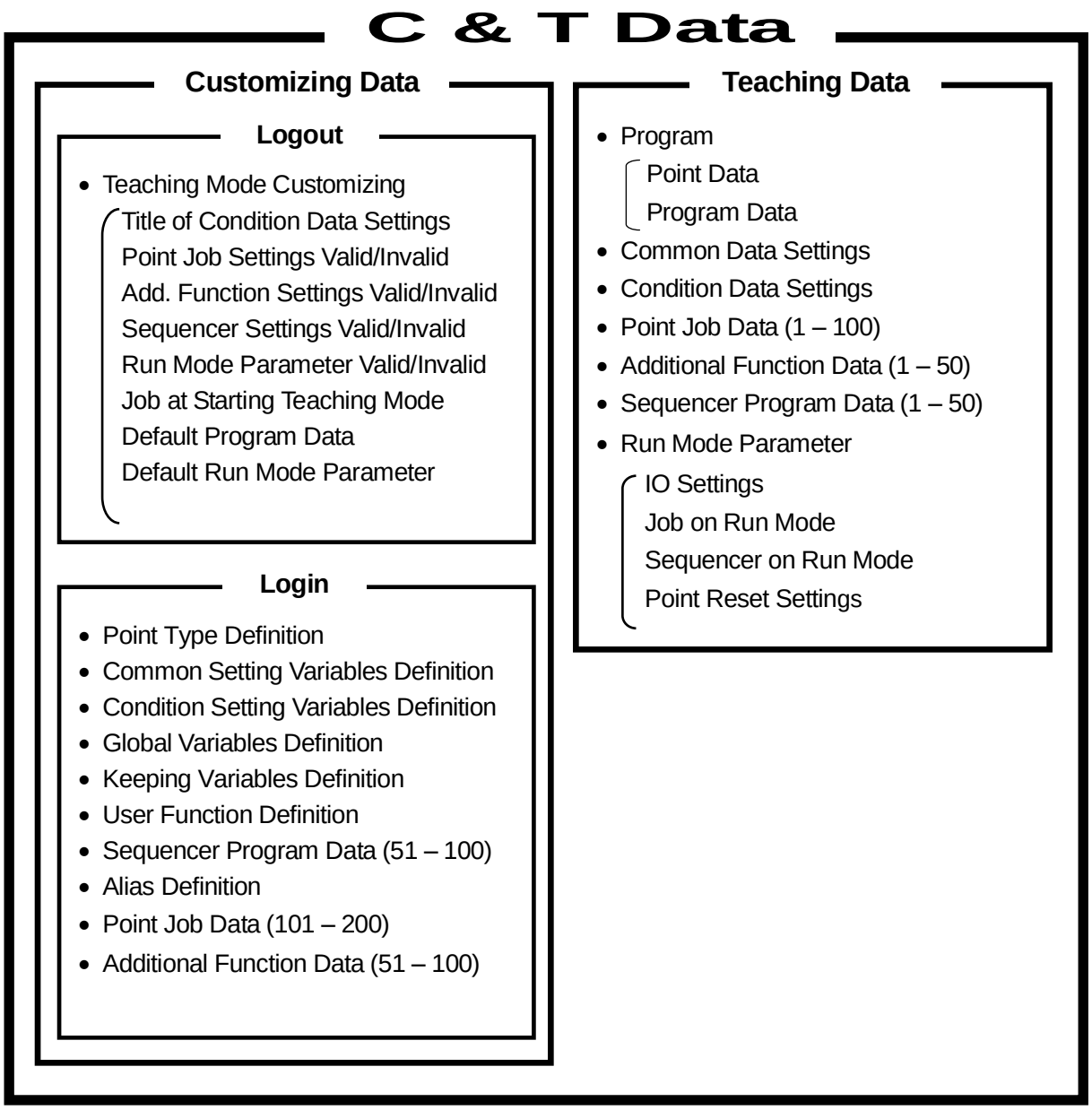
The sequencer program data is a set of logical operation commands for controlling I/O signals, etc. It is activated while running a program, such as normal operations while in Run mode.

You can create sequencer program data (Nos. 01 – 50) in the Teaching mode. Sequencer program data (Nos. 51 – 100) can be created in the Customizing mode.

Run Mode Parameter

The operation environments and functions in the Ext. Run and the Switch Run modes, [IO Settings] and [Job on Run Mode] for example, can be set here.

The following C & T data is saved on both the robot and the PC as well as transmitted between them. The administration mode data and teaching environment setting data will not be deleted even if the power to the robot is turned off.



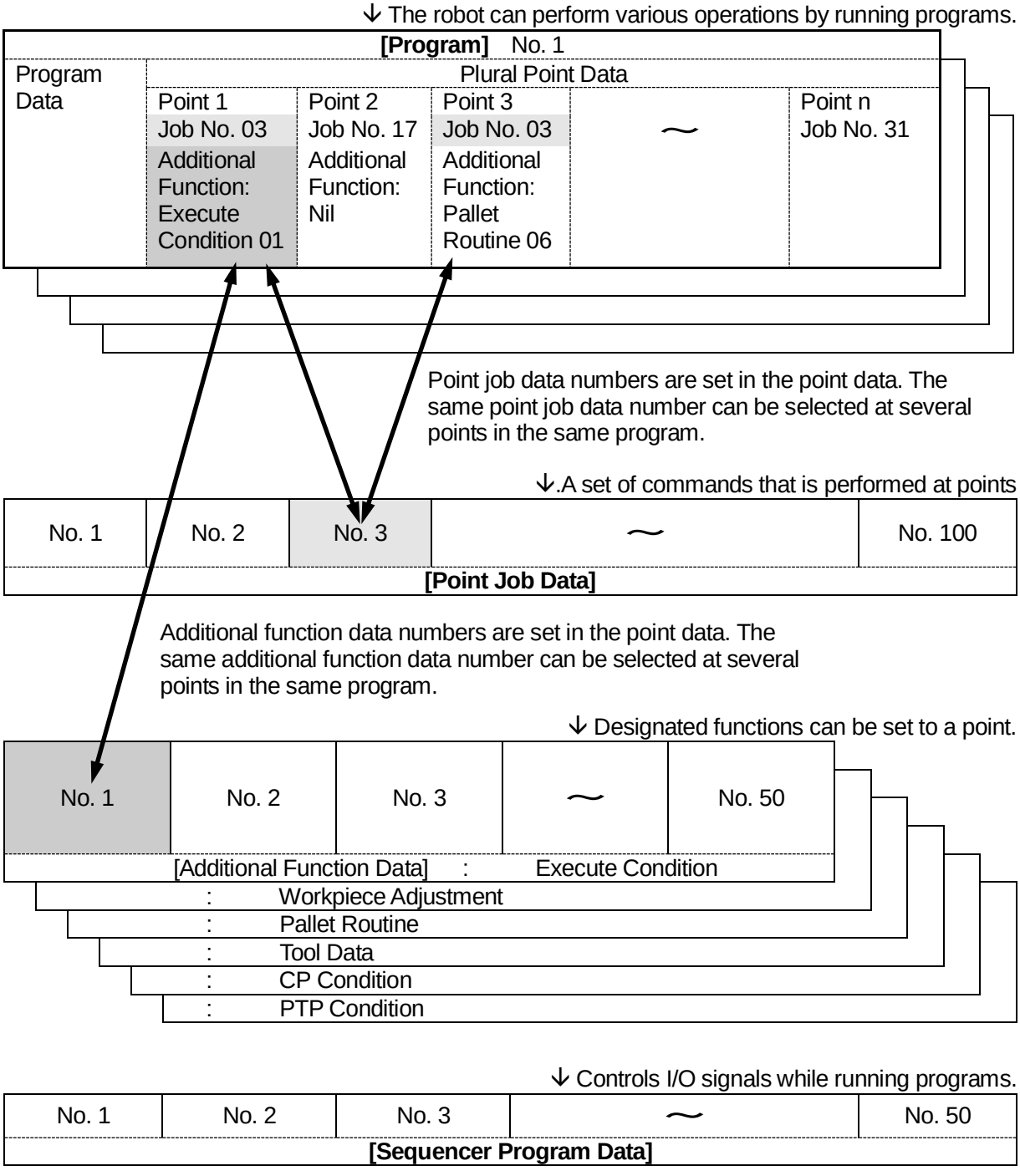
Administration Data

- Start Channel
- Program Number Change Invalid
- COM Communication Setting

Teaching Environment Setting Data

- Brightness Adjustment
- Unit of Measure
- Display Language
- GO Function
- JOG Function
- Tool for Teaching
- Manual Job Number
- Key Click
- Back Light on Teaching
- Save on Changing Mode

Correlation between Teaching Data Items



- Point job data Nos. 101 – 200 and additional function data Nos. 51 – 100, included in customizing data, do not appear in this chart; however, they can be selected from the point data.

ADMINISTRATION

The robot operates in five major mode categories, one of which is the Administration Mode. When the robot is active in this mode, the 「ADMIN」 LED on the Teaching Pendant is lit. Within the Administration Mode, there are four other modes, namely Administration Settings Mode, Diagnostic Mode, Mechanical Adjustment Mode, and Version Information Display Mode.

Emergency Stop

The Emergency Stop functions the same way in the Administration Mode as it does in the Teaching Mode. When the Emergency Stop Switch is released, the robot reverts to Teaching Mode.

Administration Settings Mode

The following six items can be set in this mode:

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

  With individual application specifications (such as dispensing or screw-tightening, etc.), this action will delete all of the customized data for those applications, and the robot will no longer be able to perform those functions. If this occurs, refer to the Applications manual and send C & T data which includes customized function data to the robot from a PC.

Diagnostic Mode

Caution Please have only maintenance technicians do these tasks.

If there is any trouble with the robot, teaching pendant or switch box, perform a diagnosis and check the function.

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

- COM2 and COM3 are optional.

Mechanical Adjustment Mode

Caution Please have only maintenance technicians do these tasks.

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

Version Information Display

Management information of the robot including the model name and the robot system software version is displayed on the teaching pendant LCD.

CUSTOMIZING MODE

The robot operates in five major mode categories, one of which is the Customizing Mode. When the robot is active in this mode, the 「CUSTOM」 LED on the Teaching Pendant is lit. The Customizing Mode allows the user to set up their own Teaching menu and create data for inclusion in operating programs.

In addition, by setting up and logging into their own accounts users can restrict access to customized data and definitions (except for customized Teaching Mode data) from Teaching Mode or other accounts.

For details about Customizing Mode, refer to Functions IV (Customizing).

Emergency Stop

The Emergency Stop functions the same way in the Customizing Mode as it does in the Teaching Mode. When the Emergency Stop Switch is released, the robot reverts to Teaching Mode.

Data Save

Save teaching data in combination with customizing data. The unit of data is referred to as *C & T data*.
If the teaching pendant is connected, press the SAVE key. If you wish to save data edited on a PC in the robot, send data to the robot using the PC software JR C-Points (option). The data sent from the PC will be saved in the robot automatically.
C & T data created using the teaching pendant is stored in the robot temporarily; **it will be deleted automatically when the power to the robot is turned off.** Be sure to save if you have modified the teaching data or customizing data.
To back up the data, send C & T data from the robot to your PC using the PC software JR C-Points (option) or JR C-Points Limited Edition (included in the operation manual CD-ROM) and save it as a file.

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The specifications of the robot or the contents of this manual may be modified without prior notice in order to improve its quality.

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