JANOME DESKTOP ROBOT
JR3000 Series

Operation Manual
Dispensing Specifications

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 having read 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.**

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. There are several manuals pertaining to these robots.

This manual describes dispensing specifications for the JR3000 Series. Other than this *Dispensing Specifications* operation manual, there are also operation manuals with common sections relevant to all robots in this series. Refer also to these manuals when operating this robot.

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 Run Mode parameters and PLC programs.
Functions IV	Explains Customizing Functions.
External Control I (IO/Fieldbus)	Explains IO 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.
Dispensing Specifications	This operation manual

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

| **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. Do not handle or operate the robot in ways not covered in these manuals. |

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

| ⚠ **Warning** | Make sure that the **machine is grounded and do not use the machine if it is not grounded**. Using the machine without sufficient grounding can cause electric shock, fire, accidental operation and machine 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. |

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

TP ▶ Operation via the teaching pendant

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

CONTENTS

FOR YOUR SAFETY

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

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

Symbols are also listed alongside the safety note explanations. 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

⚠ 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.**
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 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 unit is grounded. Do not use when the unit is not grounded.** Improper grounding causes electric shocks and fires.
	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 IO-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 for the emergency stop switch. Also, for models with IO-S circuits, regularly perform an IO-S circuit function check.** If you perform work without making a circuit check, you or the operator will not be able to immediately and safely stop the robot in an emergency. This is potentially dangerous.

FOR YOUR SAFETY

	⚠ **Caution**
❗	**When the dispenser (syringes etc.) is equipped, make sure it is 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.
❗	**Be sure to secure the movable parts of the unit before transportation.** Failure to do so causes injury or breakdown.
❗	**When transporting and lifting 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. INSTALLATION

1.1 How to Mount the Dispenser (Example: 3-Axis Model)

1. Mount the syringe on the Z-axis of the robot.
2. Connect the air tube to the syringe.
3. Connect the air tube to the dispenser controller.
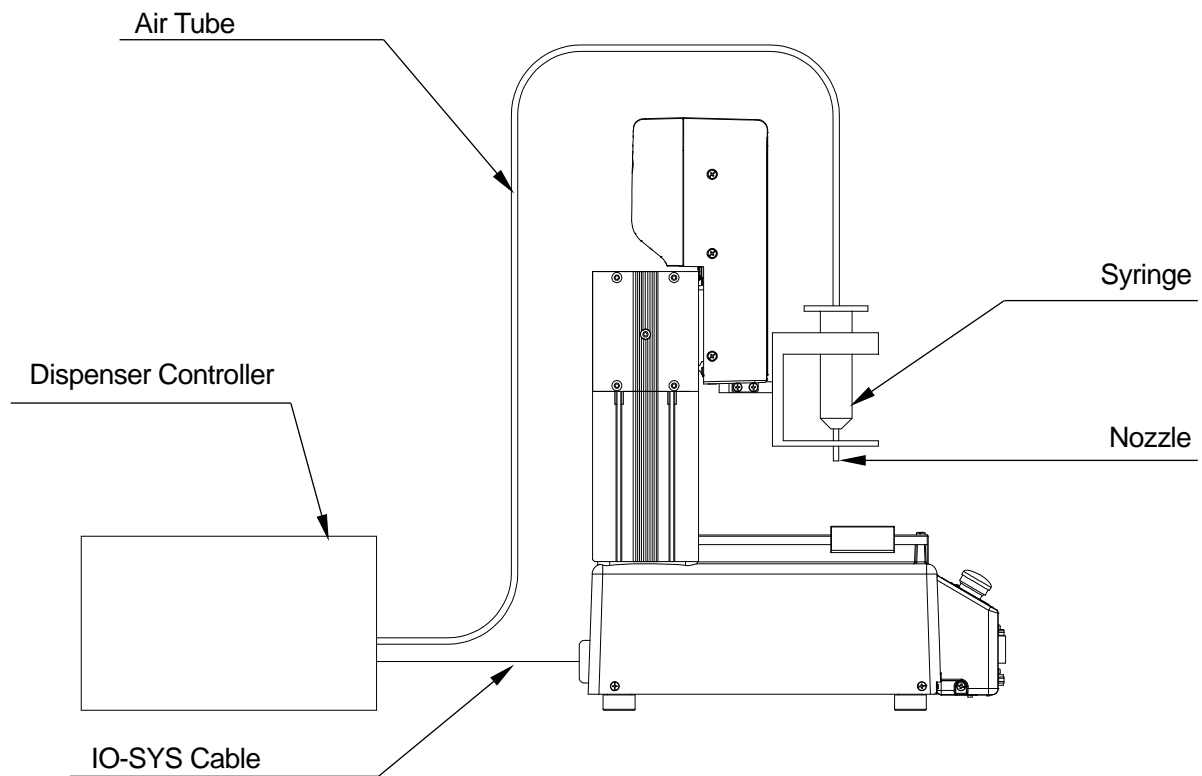
4. Connect the IO SYS cable to the dispenser controller and to the robot.
    For further details, refer to "2.5.5 Attaching Tools" in *Setup*.
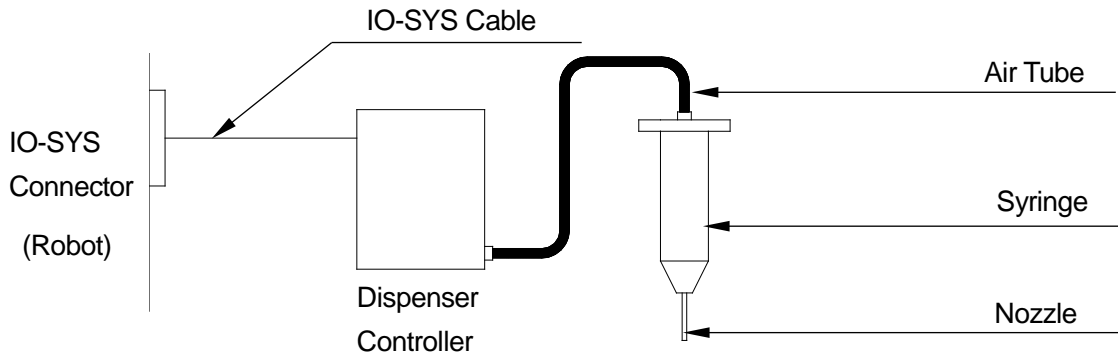
2. TEACHING DATA

2.1 Point Types

Point types are defined according to the type of job or movement, such as Point Dispense or Start of Line Dispense.

For dispensing specifications there are the 6 standard point types and as well as the following 20 point types:
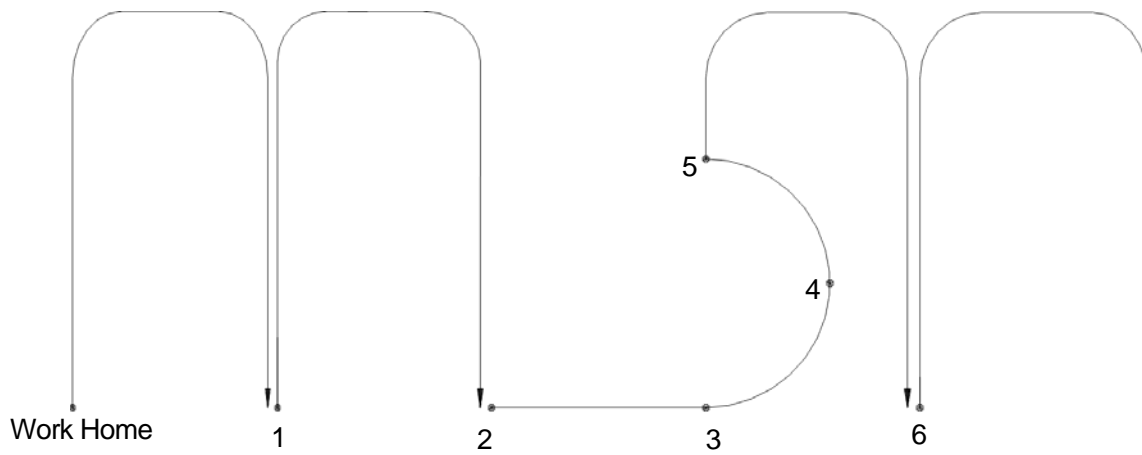
1. Point Dispense
   This does point dispensing. A point dispensing time can be set for this. When point dispensing is finished, the "dispensing return movement" as set in Dispense Conditions is performed. The robot makes a PTP movement to the next point.

2. Start of Line Dispense
   Line dispensing starts from this point. The robot switches from PTP to a CP movement for this. You can set the dispenser ON/OFF and the line speed to this point.
   After the dispenser is turned ON, the robot holds for the [Wait Time at Start] set in Dispense Conditions. The robot then moves by CP movement until it finishes the End of Line Dispense point.

3. Line Passing
   This point is used to change the direction or speed of the CP movement between the Start of Line Dispense and the End of Line Dispense points. You can set the dispenser ON/OFF and the line speed for this point.

4. CP Arc Point

This point is necessary for specifying an arc in a CP movement drawn between the Start of Line Dispense and End of Line Dispense points. You can set the line speed for this point.

5. End of Line Dispense

This point executes the "dispensing return movement" set in Dispense Conditions once Line Dispensing (CP movement) finishes. The robot makes a PTP movement to the next point.

6. Wait Start Point

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

7. Start of Circle Dispense
8. Center of Circle Dispense

By moving in succession from a Start of Circle Dispense point → Center of Circle Dispense point the robot draws a circle or arc (CP movement). The [Dispenser ON] signal comes ON automatically at the Start of a Circle Dispense point and goes OFF at the end position of the circle or arc.

You can set the line speed to the Start of Circle Dispense, and a circle angle to the Center of Circle Dispense points.

You can set up to ±9999.999 deg. for the circle angle in increments of 0.001 deg. If the value of the circle angle is positive, the robot makes an arc counterclockwise (when looking from above the front of the robot) as illustrated below. After the dispenser is turned ON at the Start of Circle Dispense point, the robot stands by for the prescribed [Wait Time at Start] set in "Dispense Conditions", and then moves to the circle or arc end position by CP movement. At the circle or arc end position, the robot executes the "dispensing return movement" set in Dispense Condition.

Circumference Angle: -90°   ⤏ Moves to the next point by PTP movement

Moves from the previous point by
PTP Movement   Moves to the next point by PTP movement
(7) Start of Circle ●   ●
Dispense   (8) Center of Circle
+X   Dispense
                                         Circumference Angle: 180°

+Y
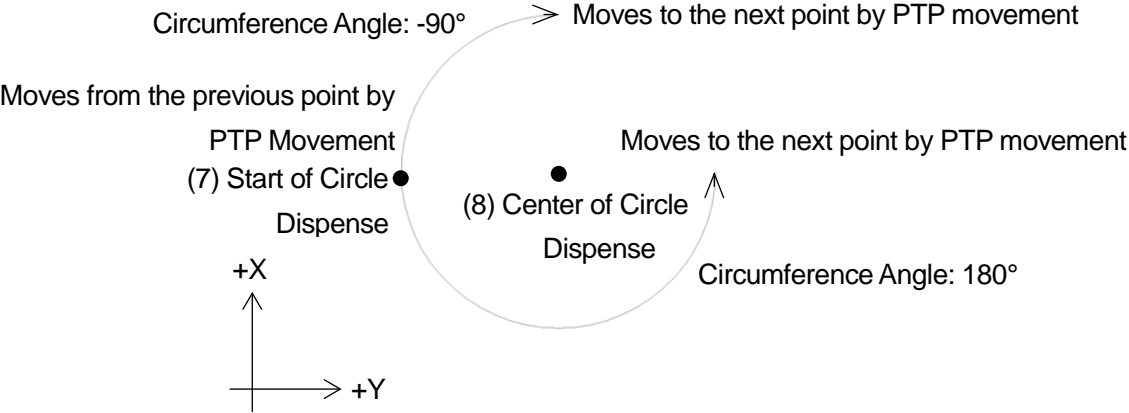
NOTE

- If a circle or arc is drawn from the Start of Circle Dispense → Center of Circle points, the robot makes a PTP movement to the next point. If you want to move from a circle or arc by CP movement, please use a CP Arc Point.

- Always teach the Start of Circle Dispense and Center of Circle Dispense points in succession. If any point other than the Center of Circle Dispense Point immediately comes after the Start of Circle Dispense point, an error will occur. In addition, because the robot makes a PTP movement from the arc to the next point, if the point following the Center of Circle Dispense point is a Line Passing point, End of Line Dispense point, or CP Arc Point, this becomes an error.

9. Zigzag Start Point

The robot zigzags and fills in the area of a rectangle specified by the [Zigzag Start Point] and [Rectangle End Point].

:Fill Area

9. Zigzag Start Point
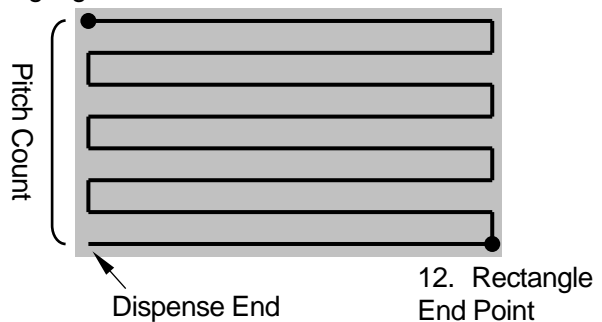
Pitch Count

Dispense End

12. Rectangle End Point

10. Rectangular Spiral Start Point

The robot spirals from the Rectangular Spiral Start Point toward the center, and does so by executing line dispensing at the specified [Line Speed] on a horizontal plane at the Rectangular Spiral Start Point.

Dispense End

10. Rectangular Spiral Start Point

12. Rectangle End Point
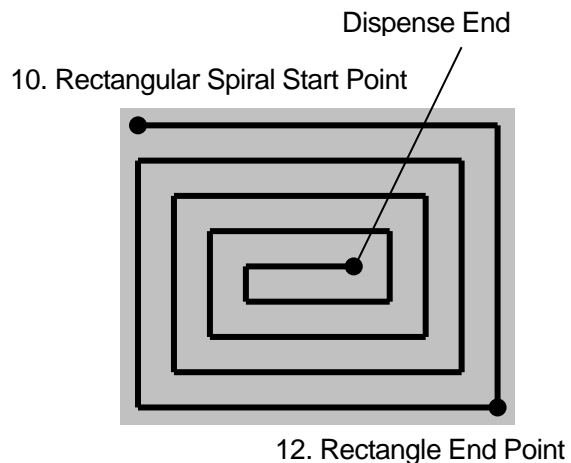
11. Hollow Rectangle Start Point

The robot spirals from the Hollow Rectangle Start Point toward the center, and does so by executing line dispensing at the specified [Line Speed] on a horizontal plane at the Hollow Rectangle Start Point.

However, with a Hollow Rectangle Start Point – Rectangle End Point operation, the line dispensing finishes directly before the corner that exceeds the specified [Filling Width] of the spiral trajectory. The center of the rectangle is not filled in.

12. Rectangle End Point

The robot fills in the area of a rectangular shape specified by one of the following points: [Zigzag Start Point], [Rectangular Spiral Start Point] or [Hollow Rectangle Start Point], and the [Rectangle End Point]. After dispensing is finished, the robot makes a PTP movement to the next point.

13. Spiral Start Point

The robot fills in a circular area specified by the three points: [Spiral Start Point], [Circumference of Spiral Area 1] and [Circumference of Spiral Area 2].

The robot spirals from the Spiral Start Point toward the center at the specified [Line Speed], and does so by executing line dispensing on a horizontal plane from the Spiral Start Point Z coordinates.

14. Hollow Spiral Start Point

The robot spirals toward the center at the specified [Line Speed], and does so by executing line dispensing on a horizontal plane from the Hollow Spiral Start Point Z coordinates.

However, line dispensing ends at the position where the robot exceeds the specified [Filling Width]. The center of the spiral is not filled in.

15. Circumference of Spiral Area 1

The robot fills in the area of a circle specified by the three points: [Spiral Start Point] or [Hollow Spiral Start Point], [Circumference of Spiral Area1] and [Circumference of Spiral Area 2].

16. Circumference of Spiral Area 2

The robot fills in the area of a circle specified by the three points: [Spiral Start Point] or [Hollow Spiral Start Point], [Circumference of Spiral Area1] and [Circumference of Spiral Area 2]. After dispensing is finished, the robot makes a PTP movement to the next point.

17. Circle Start Point
18. Circle Center Point

These two point types perform the same operations as the Start of Circle Dispense → Center of Circle Dispense points, except that the [Dispenser ON] signal does not change ON/OFF.

19. X Needle Measure Point

This is a point for measuring the needle in the X direction when using a needle adjuster. When replacing the nozzle, adjust by comparing the nozzle tip position.

20. Y Needle Measure Point

This is a point for measuring the needle in the Y direction when using a needle adjuster. When replacing the nozzle, adjust by comparing the nozzle tip position.

NOTE

For information regarding standard point types, please refer to the to the operation manual *Basic Instructions*.

Depending on the point types set to the points, some items cannot be set to them.

The chart below indicates what items can be set to each point type.

(✓: Can be set, Blank: Cannot be set)

Job/Additional Function Data / Point Type	Line Speed	*1 Condition Number	*2 Job Before Moving	*2 Job while Moving	*2 Job after Moving	*2 Job While CP Moving	PTP Condition	CP Condition	Tool Data	Pallet Routine	Work piece Adjustment	Execute Conditions	Tag Code	Dispense Time	Dispenser ON	Circle Angle	Direction	The Number of Pitches	Filling Width	Line Dispensing
Point Dispense		✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓						
Start of Line Dispense	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓			✓				
Line Passing	✓				✓						✓	✓	✓			✓				
CP Arc Point	✓				✓						✓	✓	✓							
End of Line Dispense					✓		✓				✓	✓	✓							
Wait Start Point		✓	✓	✓	✓		✓		✓	✓	✓	✓	✓							
Start of Circle Dispense	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓			✓				
Center of Circle Dispense					✓		✓				Δ		✓			✓				
Zigzag Start Point	✓	✓	✓	✓	✓				✓	✓	✓		✓					✓	✓	
Rectangular Spiral Start Point	✓	✓	✓	✓	✓				✓	✓	✓		✓					✓		
Hollow Rectangle Start Point	✓	✓	✓	✓	✓				✓	✓	✓		✓					✓	✓	
Rectangle End Point					✓		✓						✓							
Spiral Start Point	✓	✓	✓	✓	✓				✓	✓	✓		✓					✓		✓
Hollow Spiral Start Point	✓	✓	✓	✓	✓				✓	✓	✓		✓					✓	✓	✓
Circumference of Spiral Area 1																				
Circumference of Spiral Area 2					✓		✓						✓							
PTP Point		✓	✓	✓	✓		✓		✓	✓	✓	✓	✓							
CP Start Point	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓							
CP Passing Point	✓				✓						✓	✓	✓							
CP Stop Point	✓				✓	✓			✓		✓	✓	✓							
CP End Point					✓		✓				✓	✓	✓							
PTP Evasion Point							✓			✓		✓								
Circle Start Point	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓							
Circle Center Point					✓		✓				Δ		✓			✓				
X Needle Measure Point		✓	✓	✓	✓		✓		✓	✓	✓	✓	✓							
Y Needle Measure Point		✓	✓	✓	✓		✓		✓	✓	✓	✓	✓							

Δ: When drawing an arc using Start of Circle Dispense – Center of Circle Dispense points or Circle Start Point – Circle Center Points, the [Workpiece Adjustment] set to a Start of Circle Dispense point or Circle Start Point is applied. Even if you set a [Workpiece Adjustment] to a Center of Circle Dispense or Circle Center Point it is not applied to the arc. Also, you cannot set [Workpiece Adjustment] to a Center of Circle Dispense or Circle Center Point from a PC (JR C-Points II).

*[1] [Condition Data] selected from [Condition Number] is different from [Condition Data] set from individual program settings. For further details, please refer to "2.2 Dispense Conditions."

*[2] When a [Point Job], etc., is set to the point types [Point Dispense] – [Line Passing], [End of Line Dispense], [Wait Start Point], [Start of Circle Dispense] – [Circumference of Area 2], the job/operation attached to that point type is not executed. For example, [Wait Start Point] is a point where the robot waits until the start switch is pressed or until a start command is received; however, if an optional [Point Job] is set, the robot will not wait anymore.

If you want to set [Point Job] etc., to these points and also want the robot to do the jobs included in the point types, please use the *CallBase* command.

*[3] Do not set the items shown as settable for the point types [X Needle Measure Point] and [Y Needle Measure Point]. For further details refer to "15. Using Needle Adjuster 2 (Optional) (3 Axis Specifications Only)."

2.2 Dispense Conditions
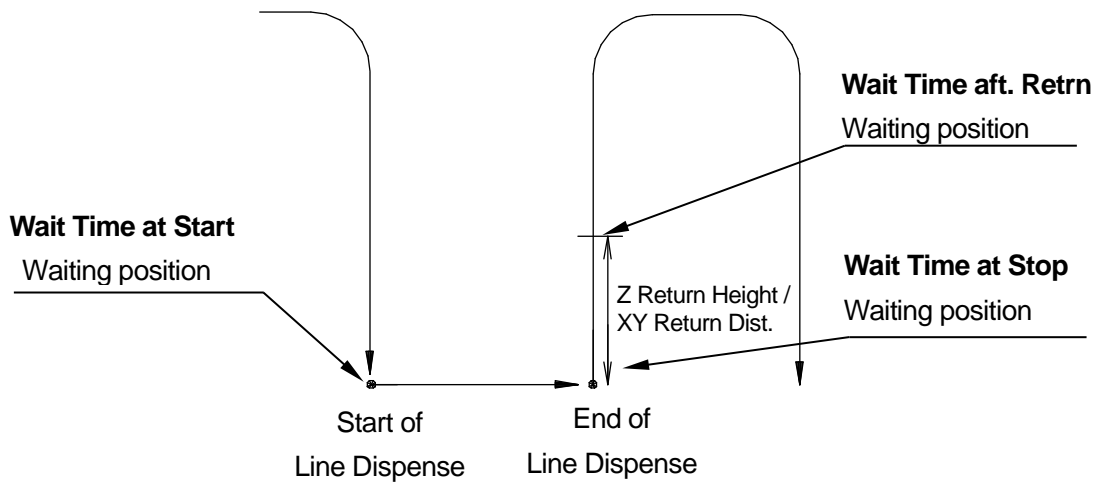
1. Wait Time at Start

   This is the time the robot holds until it starts dispensing after the dispenser signal is turned ON.

   (Holding point: Start of Line Dispense point/Start of Circle Dispense point)

2. Wait Time at Stop

   This is the time the robot holds until the Z axis starts going up after the dispenser signal is turned OFF.

   (Holding position: Point Dispense/End of Line Dispense point/dispensing end position*)

3. Return Type

After dispensing ends, the Z axis is raised at the [Return Line Speed] to prevent dripping. You can select from the following 4 types. The return movements are executed with [Point Dispense], [End of Line Dispense] or at the dispensing end position*.

- Nil

  After the end of dispensing, once the robot stands by for the prescribed [Wait Time at Stop], it moves to the next point.

- Z Up Only

  After the end of dispensing, once the robot stands by for the prescribed [Wait Time at Stop]; only the Z axis ascends at the specified [Return Line Speed] to exactly the specified [Z Return Height].

- XY Moving After Z Up

  After the end of dispensing, once the robot stands by for the prescribed [Wait Time at Stop]; only the Z axis ascends at the specified [Return Line Speed] to exactly the specified [Z Return Height]. Thereafter, X and Y move by the exact [XY Return Dist.] in the return direction (opposite to line dispensing).

- XYZ Simultaneous

  After the end of dispensing, once the robot stands by for the prescribed [Wait Time at Stop], X and Y move by the exact [XY Return Dist.] in the return direction while the Z axis ascends at the specified [Return Line Speed] to exactly the specified [Z Return Height]. (XYZ move and rise simultaneously)

4. Z Return Height
5. XY Return Dist.

   In order to prevent dripping on non-dispensing areas once dispensing has finished, the X and Y axes move by the distance specified here while the Z axis ascends after the robot stands by for the prescribed [Wait Time at Stop]. With a [Point Dispense] operation, only the Z axis ascends and even if [XY Return Dist.] is set, the robot does not move in the X and Y directions.

6. Return Line Speed

   After the robot holds for the specified [Wait Time at Stop], the robot moves/raises each axis by the exact amount set in [Z Return Height]/[XY Return Dist.] at the speed specified here.

7. Wait Time aft. Retrn

   The robot stands by for the time specified here before the Z axis ascends at normal speed, after the return movement is complete (the robot moves/raises each axis by the exact amount set in [Z Return Height]/[XY Return Dist.] at the speed specified in [Return Line Speed]),
   (Hold position: (Point Dispense/End of Line Dispense point/dispensing end position*) + [Z Return Height]/[XY Return Dist.])

*Dispensing End Position: This is the end position of an arc or dispense filling that is drawn with Start of Circle Dispense – Center of Circle Dispense

2.2.1 Individual Program Settings

Within individual program settings there is the settable item [Dispense Condition]. These can be set for each program, and the values set are valid only when that program is executed.

Press the MENU key and select [Individual Program Settings] → [Dispense Condition]. The dispense condition settings screen (as shown to the right) is displayed.

```
Program 1
Wait Time at Start               0.5sec
Wait Time at Stop                  0sec
Return type         XY moving after Z up
Z return Height                    10mm
ZY return dist.                    30mm
Return line speed                30mm/s
Wait time aft. Retrn               0sec
```

2.2.2 Condition Number

When [Condition Number] is set with a "dispense condition," use this method rather than [Individual Program Settings].

Press the MENU key and select [Dispense Condition] and enter the condition number. The dispense condition settings screen (as shown to the right) is displayed.

```
Dispense Condition 1
Wait Time at Start               0.5sec
Wait Time at Stop                  0sec
Return type         XY moving after Z up
Z return Height                    10mm
ZY return dist.                    30mm
Return line speed                30mm/s
Wait time aft. Retrn               0sec
```

2.3 Dispenser

There are [Dispenser] settings which are universal settings (common data) for all programs.

You can set or change the dispenser connection point, type and valid/invalid status for dispenser response signals, and the dispenser mode.

TP ▶ MENU [Dispenser]

Press the MENU key and select [Dispenser] to display the dispenser setting screen (as shown to the right.

```
                    Dispenser
 IO Function Assignment
 Dispenser Type          No Response Signal
 Dispenser Mode                     Steady
 Purge Switch                 Constant valid
 Purge by ext. signal         Constant valid
 Automatic Purge                    Invalid
 Cycle of automatic purge            10sec
 Time of automatic purge            0.5sec


```

Dispenser Item Selection Screen

1. IO Function Assignment

    The assignment of dispenser related signals can be changed. By default, these are assigned as follows:

    - Dispenser ON: #sysOut10
    - Dispenser Response: #sysIn13
    - Purge by Ext. Signal: #sysIn14
    - X Needle Sensor: #sysIn15
    - Y Needle Sensor: #sysIn16

2. Dispenser Type

    You can select and set the dispenser return signal types from among the following 3 choices:

    - No Response Signal

      The robot ignores signals from the dispenser.

    - Busy Signal Operation

      The robot verifies signals output from the dispenser while dispensing from the start to the end of dispensing.

    - Finish Signal Operation

      The robot verifies signals from the dispenser when dispensing ends.

3. Dispenser Mode

The Dispenser mode can be selected from the following 2 choices:

- Steady

  Dispensing time is controlled at the robot side.

- Timer

  Dispensing time is set by the timer on the dispenser.

However, during line dispensing or when the dispensing type is set to [No Response Signal], the robot runs in Steady Mode even if [Dispenser Mode] is set to [Timer].

4. Purge Switch

This enables/disables the purge switch on the front of the robot or on the switchbox (optional).

- Constant Valid

  The purge operation is executed regardless of the robot's status.

  (Do not push the purge switch during a dispensing operation in a run. The robot will be unable to dispense correctly.)

- Invalid During Run

  The purge operation is not executed when the robot is running even if the switch is pressed.

- Constant Invalid

  The purge operation is not executed even if the switch is pressed regardless of the robot's status.

JR3000 Unit

Purge Switch

JR3203 Example
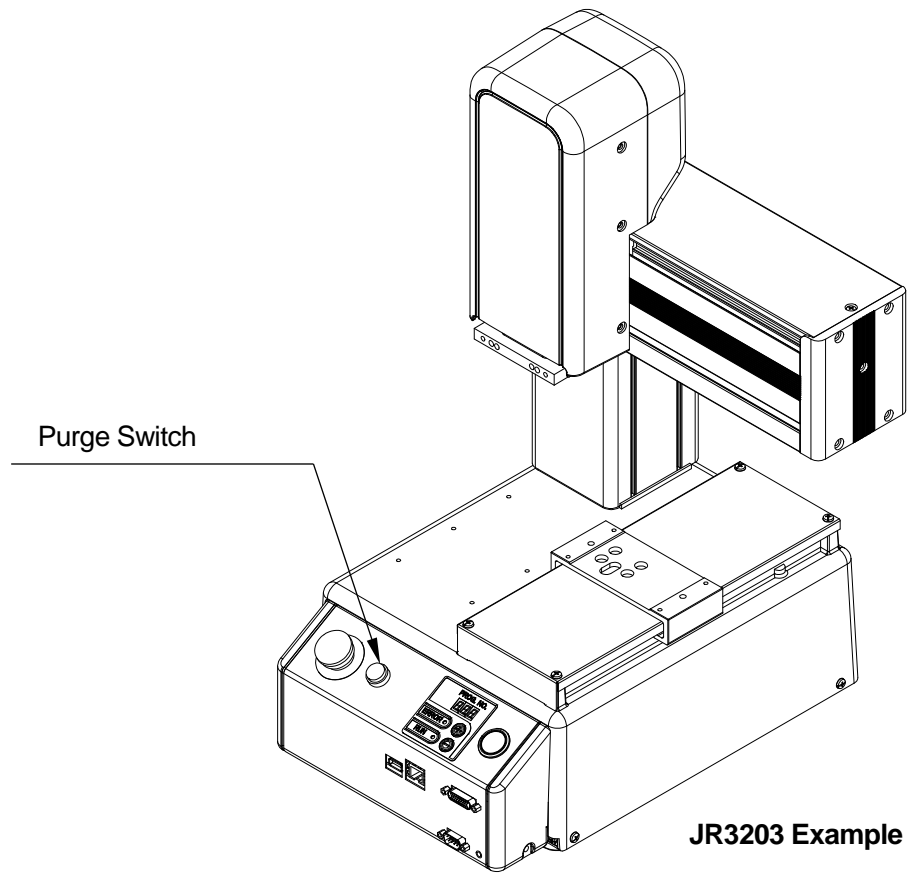
Switchbox (Optional)
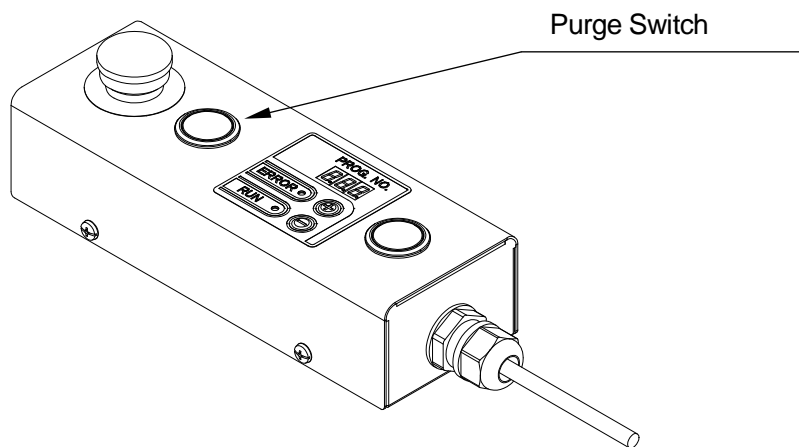
Purge Switch

5. Purge by External Signal

If you are using this setting, it is assumed that there is an arbitrary remote purge switch connected to Option Switch 1. Here, the remote purge switch can be enabled or disabled.

- Constant Valid

  The purge operation is executed regardless of the robot's status.

  (Do not push the purge switch during a dispensing operation in a run. The robot will be unable to dispense correctly.)

- Invalid During Run

  The remote purge switch is disabled when the robot is running.

- Constant Invalid

  The remove purge switch is disabled regardless of the robot's status.

6. Automatic Purge

- Valid

  When the current operation ends and after the robot returns to the work home position, the robot automatically executes the purge operation.

- Invalid

  The purge operation is only executed when the purge switch is pressed.

7. Cycle of Automatic Purge

When [Automatic Purge] is executed, if [Cycle of automatic purge] is set to execute once during the registered time period and [Time of automatic purge] for the dispenser is turned ON (purge execution), the auto purge operation is repeated until a run is started or until an emergency stop is executed.

8. Time of automatic purge

When [Automatic Purge] is executed, if [Cycle of automatic purge] is set to execute once during the registered time period and [Time of automatic purge] for the dispenser is turned ON (purge execution), the auto purge operation is repeated until a run is started or until an emergency stop is executed.

When [Dispenser Mode] is set to [Timer], this setting is invalid. The time that is set for [Timer] on the dispenser becomes the ON time (purge execution) for the dispenser.

3. TOOL DATA

Before registering a program, etc., match up the following settings to the methods and environment with which you will use the robot.

3.1 3 Axes

When you change tools, the tool center point will be out of alignment due to the angle of attachment and other such factors. If you run the robot without realigning the tool, the point coordinates will also be out of alignment by exactly this same amount.

The offset value from the offset of the tool tip to the corresponding axes is referred to as the tool center point (TCP).

NOTE

If the tool mass is heavier than the settings, it is possible a position displacement error will occur.

When you change tools, modify the tool data by following the procedure below.
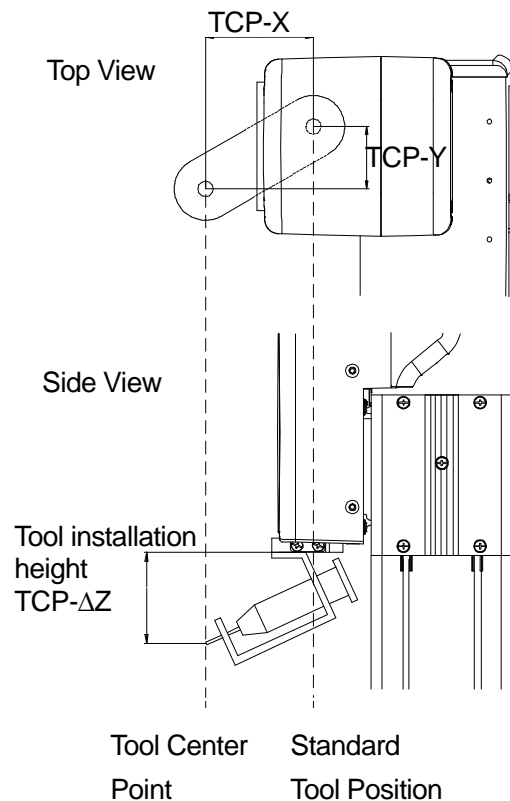
Top View

TCP-X

TCP-Y

Side View

Tool installation height
TCP-ΔZ

Tool Center Point   Standard Tool Position

TP ▶ | MENU | [Individual Program Settings]
                     [Tool Data]

NOTE: Press the | CURSOR ▼ | key when the bottommost item is highlighted to continue to display the settable items for that point.

PC ▶ [Program] → [Individual Program Settings] → [Tool/Workpiece] → [Tool Data]

The following settings are in [Tool Data]:

- Tool Weight (the weight affecting the Y-axis)
- TCP-X: the X-direction distance from the standard tool position to the current tool center point.
- TCP-Y: the Y-direction distance from the standard tool position to the current tool center point.
- TCP-ΔZ: the Z-direction distance from the tool attachment height to the current tool center point.

3.2 4-Axes

Refer to the following table to set [Tool Mass].

	Tool Mass		
	1	2	3
JR3200	1 kg	3.5 kg	
JR3300, JR3400	1 kg	4 kg	7 kg

The offset value from the offset of the tool tip to the corresponding axes is referred to as the tool center point (TCP).

NOTE: If the tool mass is heavier than the registered settings, a position error may occur.

For 4 axis specification models, always set the tool data (TCP-X, Y) before doing program teaching. If you do program teaching without first setting the tool data, all of the registered coordinates will need to be revised when exchanging tools.

If the tool tip exceeds the allowed moment of inertia, a position error may occur.

	Tool Tip Moment of Inertia
JR3200	65kg/cm2
JR3300, JR3400	90kg/cm2

Once you have changed tools, modify the tool data by following the procedure below.

TCP-X
Top View

TCP-Y

Side View

Tool installation height
TCP-ΔZ

Tool Center Point   Standard Tool Position

TP ▶ | MENU |

    [Individual Program Settings]

        [Tool Data]

NOTE: Press the | CURSOR ▼ | key when the bottommost item is highlighted to continue to display the settable items for that point.

PC ▶ [Program] → [Individual Program Settings] → [Tool/Workpiece] → [Tool Data]

The following settings are in [Tool Data]:

- Tool Mass (the mass affecting the Y axis)
- TCP-X: the X direction distance from the standard tool position to the current tool center point.
- TCP-Y: the Y direction distance from the standard tool position to the current tool center point.
- TCP-ΔZ: the Z direction distance from the tool attachment height to the current tool center point.
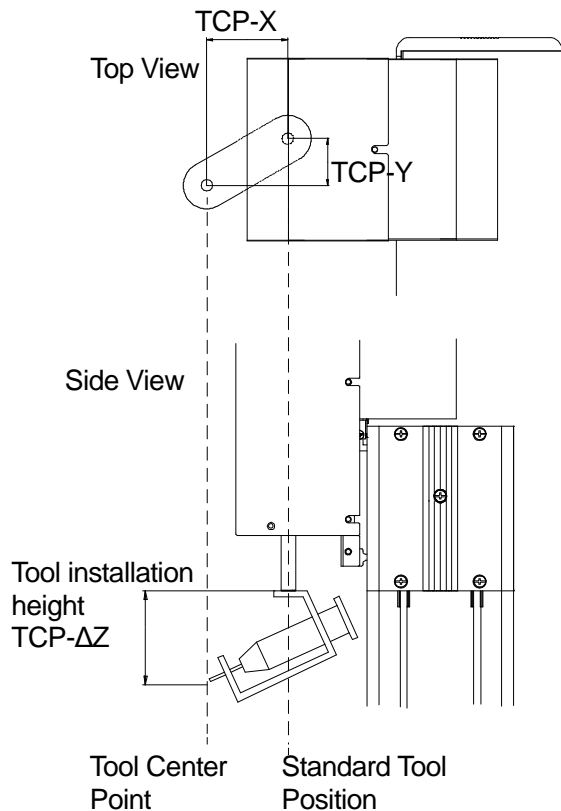
3.2.1 TCP Automatic Adjustment Functions (4 Axis Specifications Only)

The TCP automatic adjustment function is a function that can automatically set the tool data [Direct TCP-XY Settings]. To use this function, you need a special sensor (please prepare this on your side).

■ Sensor (please prepare this on your side)

To use the TCP automatic adjustment function, you need a configuration such as the one below.

Photoelectric sensor (2ch) ・・・X direction and Y direction
Example: Keyence: FS-N Series (digital fiber sensor: uses a transmission type sensor)

NOTE
Please select and use a fiber sensor which matches the size of the tool tip you are using.

Photoelectric sensor - sensor mounting jig (design and assemble on your side)

Install so that the light rays of the photoelectric sensor can pass through.
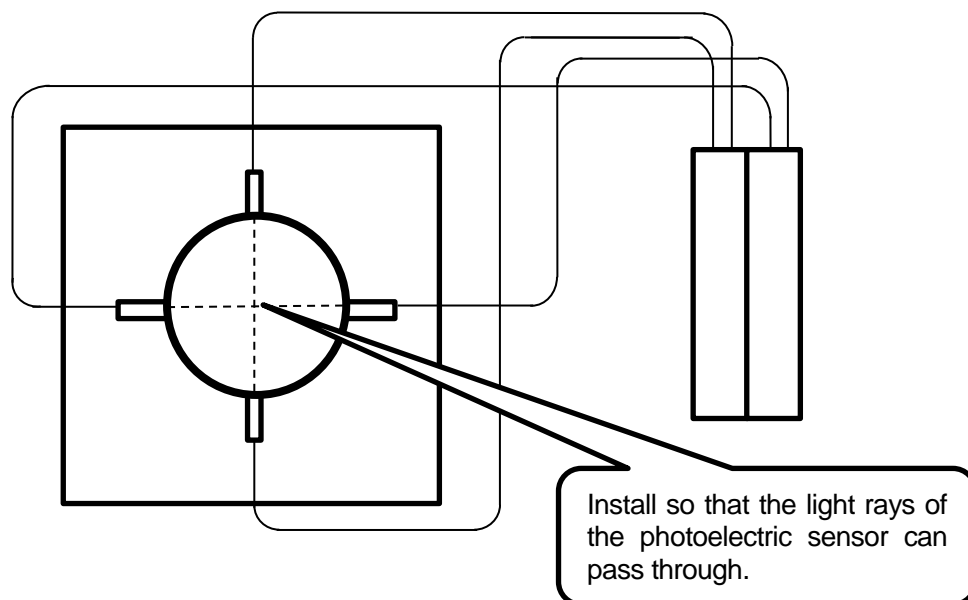
NOTE
Completely secure the sensor (please prepare on your side) to the X table.

■ External IO Connections

To use the TCP automatic adjustment function, the robot uses an arbitrary 2 bit IO-SYS input.

By default, this is assigned to #sysIn15 and #sysIn16 in the IO function assignments.

This section explains the connection procedure on the assumption you are using the default settings.

Refer to *External Control (IO/Fieldbus)* for information regarding making connections to IO-SYS external devices.

■ Checking Sensor Operations

Once the sensor is connected to the robot, check sensor operations to confirm connectivity.

TP ▶ UTILITY [Test Menu]
                [IO Test]

Check to see that the connected sensor is responding correctly using the IO connection test.
Display: 1=ON, _=OFF

This completes sensor preparation.

```
                    IO Test
                         6543210987654321
IO-SYS IN                11_____
IO-1 IN                    _____

                         6543210987654321
IO-SYS OUT               ___█_____
IO-1 OUT                   _____


        Push [ENTR] Key to Change Output
```
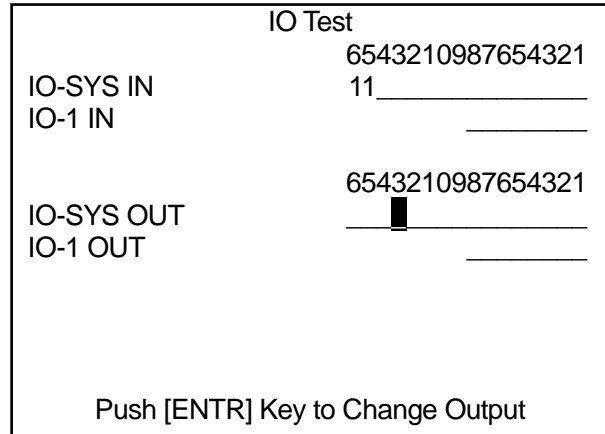
3.2.2 TCP Automatic Adjustment Settings

To perform a TCP automatic adjustment the following settings are required:

TP ▶ UTILITY [TCP Auto Measurement]

PC ▶ [Robot] → [Teaching Environment Setting] → [TCP Automatic Adjustment Settings]

- Measurement Position
- IO Function Assignment
- TCP Detection Angle
- Z-Height Apply to TCP/Z-Height Not Apply to TCP

- Measurement Position

This sets the sensor (please prepare on your side) installation position on the robot.

You can only set one point as the measurement position for each robot.

Measurement position summary

Set the measurement position within 5mm of the intersecting point of the light rays.

R=5mm

- IO Function Assignment

You can set the bit number for the IO-SYS arbitrary IO.

#sysIn15 (X), #sysIn16 (Y) are assigned by default.

- TCP Detection Angle

You can set the angle for TCP detection.

45°, 90°, 180°, -45°, -90°, -180°

The symbols indicate the rotation direction

Positive: right rotation (counter clockwise), Negative: left rotation (clockwise)

- Z-Height Apply to TCP/Z-Height Not Apply to TCP

You can select whether or not to apply the TCP automatically detected tool tip Z direction position variation against the standard values.

Standard values can be set in [Customizing Mode] → [Teaching Mode Customizing] → [Default All Program Common Settings] → [Tool Data].

For further details please refer to "3.2.4 TCP Automatic Adjustment Standard Value Settings."

3.2.3 TCP Automatic Adjustment Execution

Once the above settings are complete, you can perform the TCP automatic adjustment using the following settings:

Teaching Mode

TP ▶ | MENU | [Individual Program Settings]

             [Tool Data]

                [Individual]

                    [Start TCP Auto Measurement]

TP ▶ | MENU | [Additional Function Data Settings]

             [Point Tool Data Settings]

                [Tool Number]

                    [Numeric TCP]

                        [Start TCP Auto Measurement]

TP ▶ | UTILITY | [Teaching Environment Settings]

             [Tool for Teaching]

                [Setting Tool For Teaching #1 – 5]

                    [Start TCP Auto Measurement]

Customizing Mode

▰TP▰ [Teaching Mode Customizing]

     [Default All Program Common Settings]

       [Tool Data]

         [Start TCP Auto Measurement]

▰TP▰ [Additional Function Data]

     [Point Tool Data Settings]

      [Tool Number]

        [Numeric TCP]

          [Start TCP Auto Measurement]

▰PC▰ [Program] → [Individual Program Settings] → [Tool/Workpiece] → [Tool Data]
    → [Automatic TCP Adjustment]

▰PC▰ [Data] → [All Program Common Settings] → [Tool/Workpiece] → [Tool Data]
    → [Automatic TCP Adjustment]

▰PC▰ [Data] → [Additional] → [Tool Data] → [Add/Edit] → [Automatic TCP Adjustment]

▰PC▰ [Set T.M.C] → [Default All Program Common Settings] → [Tool/Workpiece] → [Tool Data]
    → [Automatic TCP Adjustment]

⚠ **Caution** The robot axes move with this operation. Perform this only after taking the necessary safety precautions.

When you perform a TCP automatic adjustment, the robot axes move to [Measurement Position] set in the TCP automatic adjustment settings from where the robot performs the sensor position detection operation.

The robot performs this operation as outlined below.

1. The robot searches for the sensor position.
2. Aligns the senor with the light ray path.
3. The R axis makes a partial rotation by the [TCP Detection Angle] with the sensor intersecting point in the center.

When you perform this operation, the screens on the next page are displayed. Follow the instructions on the screens.

```
┌─────────────────────────────────────────┐
│                                          │
│        Axis will work if you select YES  │
│      Please check the safety around the robot │
│      Do you want to continue this operation? │
│                                          │
│                                          │
│              YES      NO                 │
│                                          │
│                                          │
│                                          │
│                                          │
└─────────────────────────────────────────┘
```
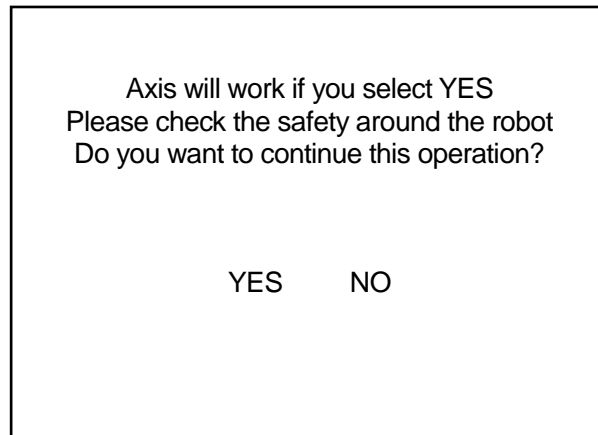
The LCD screen (warning) before measurement

```
┌─────────────────────────────────────────┐
│                                          │
│                                          │
│                                          │
│                Measurement               │
│                Please wait               │
│                                          │
│                                          │
│                                          │
│                                          │
└─────────────────────────────────────────┘
```
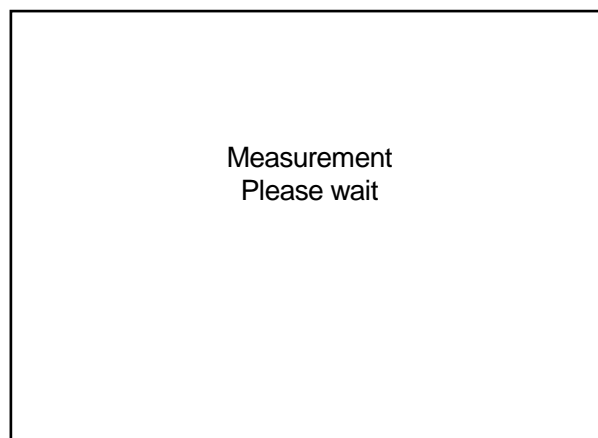
The LCD screen during measurement

```
┌─────────────────────────────────────────┐
│                                          │
│                                          │
│            Measurement Result            │
│                Succeeded                 │
│                                          │
│                                          │
│                                          │
│              Press any Key               │
└─────────────────────────────────────────┘
```
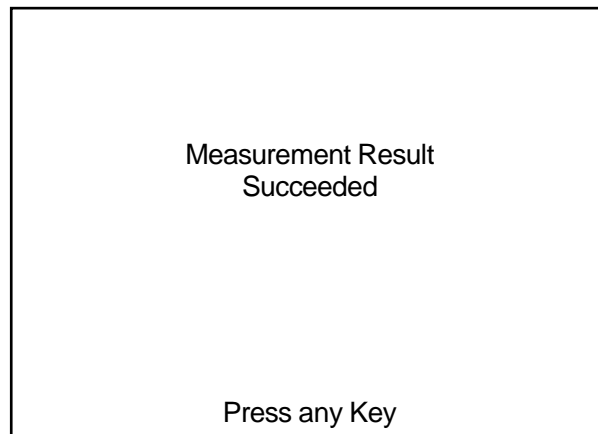
The LCD screen after measurement is complete

Once measurement is complete, the TCP automatic adjustment results (TCP values) are displayed.

3.2.4 TCP Automatic Adjustment Standard Value Settings

The TCP automatic adjustment automatically calculates the XY directional offset amounts from the R axis center to the tool tip.

By setting all program common standard values for the TCP automatic adjustment, you can add an adjustment to the Z axis.

Customizing Mode

> **TP** ▶ [Teaching Mode Customizing]
> > [Default All Program Common Settings]
> > > [Tool Data]
> > > > [Set Standard TCP]

> **PC** ▶ [Set T.M.C] → [Default All Program Common Settings] → [Tool/Workpiece] → [Tool Data]
> → [Reg. Z axis coordinates as ref. value]

From the default all program common settings screen, if you perform TCP automatic adjustment, the Z direction absolute position of the sensor center is displayed.

If you register these values in advance, you can offset any differences in the tool's position using this position as a reference.

When you are setting tool data from Teaching Mode, set the TCP automatic adjustment [Z-Height Apply/Not Apply to TCP] to [Z-Height Apply to TCP].

Standard position

TCP auto adjustment result position

The difference from the standard position is offset
NOTE: When set to [Z-Height Apply to TCP]
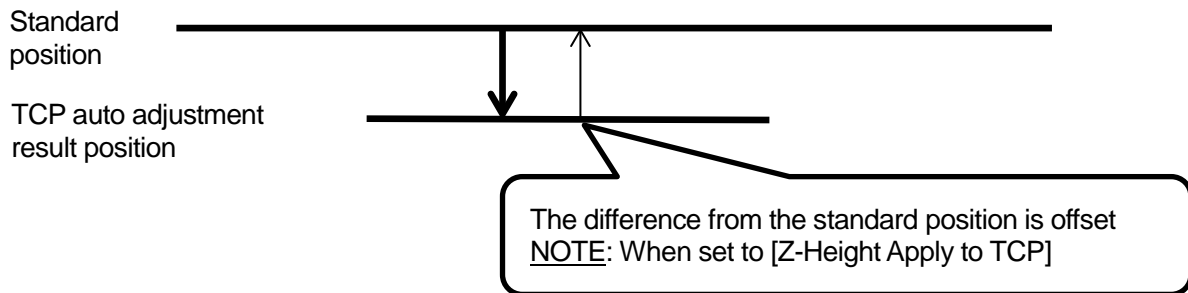
3.2.5 Tool Data

In [Tool Data], the settable item [Direct TCP-XY Setting] is included for 4 axis specifications only.

The content of this setting is the same as [Tool Data] in individual program settings.

3.2.6 Camera/Z Sensor Commands

By specifying the point job command *autoTCP*, the adjustment is performed at the given point.

    Required parameters: N/A

    Command content: This allows you to perform TCP automatic adjustments with 4 axis specification desktop robots.

    <u>NOTE</u>

- A separate sensor is required
- For information regarding the camera/Z sensor commands, refer to *Camera & Sensor Functions*.

3.2.7 Reset Administration Settings

When you perform [Reset Administration Settings], in addition to the settable items in Administration Settings Mode, the TCP Auto Measurement settings are also reset to their default values.

4. IO FUNCTIONS

4.1 IO-SYS Function Assignments

		Name	Function	Pin No.
Input	Ext	sysIn1	Start/Free	1
		sysIn2	Free/Start Inhibition/Stop-Start Inhibition/ Software Interlock/Urgent Stop	2
		sysIn3	Program Number LOAD/Free	3
		sysIn4	Program Number 1/Free	4
		sysIn5	Program Number 2/Free	5
		sysIn6	Program Number 4/Free	6
		sysIn7	Program Number 8/Free	7
		sysIn8	Program Number 16/Free	8
		sysIn9	Program Number 32/Free	9
		sysIn10	Program Number 64/Free	10
		sysIn11	Last Work/Program Number 128/Error Reset/Free	11
		sysIn12	Temporary Stop/Program Number 256/Free	12
	Var	sysIn13	Dispenser Response/Program Number 512/Free	13
	Var	sysIn14	Purge By External Signal/Free/Start Inhibition/ Stop-Start Inhibition/Software Interlock/Urgent Stop	14
	Var	sysIn15	X Needle Sensor/Last Work/Error Reset	15
	Var	sysIn16	Y Needle Sensor/Temporary Stop	16
Output	Ext	sysOut1	Ready for Start/Free	17
		sysOut2	Robot Stopped/Free	18
		sysOut3	Program Number ACK/Free	19
		sysOut4	Program Number Error/Free	20
		sysOut5	Running/Free	21
		sysOut6	Error/Free	22
		sysOut7	Emergency Stop/Free	23
		sysOut8	Position Error/Free	24
		sysOut9	Free	25
	Var	sysOut10	Dispenser ON/Free	26
		sysOut11	Free	27
		sysOut12	Free/Finish Initialize	28
		sysOut13	Free	29
		sysOut14	Free	30
		sysOut15	Free	31
		sysOut16	Free	32
		–	Not in use	33
Others		COM+	DC24V	34
		COM–	GND	35
		COM–	GND	36
		COM–	GND	37

Ext: Activated only in External Run Mode.

Var: The arbitrary IO function assignments can be changed. Change by selecting Teaching Mode →
 MENU key → [Dispenser] → [IO Function Assignment].

4.1.1 Input

- Start (#sysIn1)

  Turn ON this signal to start or restart a program in External Run Mode. In addition, this signal is used for mechanical initialization when the power is turned ON, and for moving to the work home position coordinates. This signal is enabled when Ready to Start (#sysOut1) is ON.

The Start (#sysIn1) signal performs mechanical initialization, starts, or restarts running programs with the robot under any of the following conditions when the IO-S input is ON and when Start is not inhibited by the Start Inhibition (#sysIn2) signal in External Run Mode:

1. Mechanical initialization standby when the power is turned ON.
2. Mechanical initialization standby after an emergency stop and emergency stop cancellation.
3. Waiting for program start at the work home position.
4. Waiting for restart after a temporary stop.
5. Waiting for restart after stopping at the wait start stop point.
6. Waiting for start according to a point job *waitStart* command.

A Start (#sysIn1) signal with a pulse of 20msec or less is invalid due to noise elimination.

A pulse width of 30msec or wider is useable, however, rather than using time to establish the signal, we recommend using the action of the Ready for Start (#sysIn1) signal turning OFF as an acknowledgment signal (ACK signal). When waiting to start as described above, the Ready for Start Signal (#sysOut1) goes ON.

The Ready for Start (#sysOut1) turns OFF when the Start (#sysIn1) turns ON.

#sysIn1 Start

#sysOut1 Ready For Start
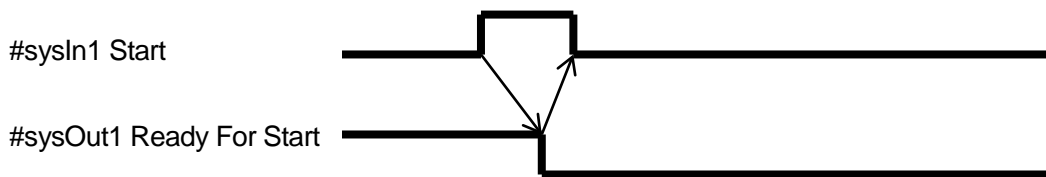
- Free (#sysIn2)

  The default for the #sysIn2 signal is [Free].

  This signal is useable as a free signal unless its function is changed in [IO Function Assignment].

- Start Inhibition (#sysIn2)

  Start is inhibited if Start Inhibition (#sysIn2) is set in [IO Function Assignment]. This signal works when it is OFF (negative logic).

  If this signal is OFF and the Robot Stop (#sysOut2) signal is ON (when the robot is stopped), start is inhibited. Even if you try to start the robot, it will not move.

  When the Robot Stopped (#sysOut2) signal is OFF (the robot is moving), this signal is invalid.

- Stop – Start Inhibition (#sysIn2)

  This signal becomes a function to temporarily stop operation or inhibit start when Stop – Start Inhibition (#sysIn12) is set in [IO Function Assignment]. This signal works when it is OFF (negative logic).

  If this signal is OFF and the Robot Stop (#sysOut2) signal is ON (the robot is stopped), start is inhibited. Even if you try to start the robot, it will not move.

  If you turn this signal OFF when the Robot Stop (#sysOut2) signal is OFF (when the robot is moving), the robot completes its current PTP movement and then holds. To restart, insert a start signal after turning ON this signal.

- Software Interlock (#sysIn2)

  If Software Interlock (#sysIn2) is set in [IO Function Assignment], this becomes a function to inhibit start and make urgent stops during operation. This signal works when it is OFF (negative logic).

  If this signal is turned OFF when the Robot Stop (#sysOut2) signal is ON (the robot is stopped), then start is inhibited. Even if you try to start the robot, it will not move.

  If this signal is turned OFF when the Robot Stop (#sysOut2) signal is OFF (the robot is moving), the robot makes an urgent stop.

- Urgent Stop (#sysIn2)

  When Urgent Stop (#sysIn2) is set in [IO Function Assignment], this becomes a function for making urgent stops. This signal works when it is OFF (negative logic).

  If you turn OFF this signal in Run Mode, the robot makes an urgent stop.

- Program Number LOAD (#sysIn3)

  This signal directs the loading of program numbers. When this signal goes ON, Program Number (#sysIn 4 – 10) is loaded. This function is enabled when [Administration Settings Mode] → [Program Number Change] → [IO-SYS] is set to [Valid] and [Program Number Switching Method] is set to [LOAD/ACK Handshake].

- Program Number 1 – 64 (#sysIn4 – #sysIn10)

  You can specify program numbers by turning ON this signal.

  Example: If you want to specify program number [67]:

  67 = 64 (#sysIn10) +2 (#sysIn5) + 1 (#sysIn4) = Turn ON signals #sysIn10, #sysIn5 and #sysIn4.

  This function is enabled when [Administration Settings Mode] → [Program Number Change] → [IO-SYS] is set to [Valid]. If [Program Number Switching Method] is set to [Load at Start (IO-SYS)], start the program after specifying the program number with this signal.

- Last Work (#sysIn11)

  When [Cycle Mode] is set to [Continuous Playback], after finishing the last point, the robot moves to point 01 and repeats the operation. To end this function, end the program using a point job or turn this signal ON. This function is only valid at the point when the last point is finished (before moving). You cannot use this signal to terminate a program mid operation.

- Error Reset (#sysIn11)

  If an error occurs when the robot is running programs, turn this signal ON to do an error reset. The program (run) is then terminated on the spot. In addition, the Error (#sysOut6) signal turns OFF when this signal is turned ON, so you can use Error (#sysOut6) as an ACK signal for this signal.

  Another way to use this signal is when the robot is holding or the Ready for Start (#sysOut1) signal is output and the robot is waiting to start, you can turn ON this signal to reset the program's execution and terminate the program on the spot.

  Program termination via this signal is enabled in the following situations:

  1. The robot has stopped moving due to a hold and is awaiting a restart.
  2. The robot is holding at a Wait Start Point and is awaiting a restart.
  3. The robot is awaiting restart from a point job *waitStart* command.

- Program Number 128 (#sysIn11)

  When ON, this signal enables you to specify program numbers 128 and above.

- Temporary Stop (#sysIn12)

  You can temporarily stop running programs by turning ON this signal. However, you cannot stop a CP movement while it is running. You can only hold at PTP points.

  Also, when this signal is ON, start is inhibited.

- Program Number 256 (#sysIn12)

  When ON, this signal enables you to specify program numbers 256 and above.

- Dispenser Response (#sysIn13)

  This signal is invalid when [Dispenser Type] is set to [No Response Signal]. When set to [Busy Signal Operation], the robot determines it is dispensing when this signal is ON. When set to [Finish Signal Operation], the robot determines dispensing is finished when this signal is ON.

- Program Number 512 (#sysIn12)

  When ON, this signal enables you to specify program numbers 512 and above.

- Purge by Ext. Signal (#sysIn14)

  The default status for the sysIn14 signal is [Purge by Ext. Signal]. You can use it as the purge by external signal provided the function is not changed in [IO Function Assignment].

  With this signal, you can select from Purge by External Signal/Free/Start Inhibition/Stop – Start Inhibition/Software Interlock and Urgent Stop for the signal function.

4.1.2 Output

- Ready for Start (#sysOut1)

  When the Start (#sysIn1) signal is enabled, this signal goes ON in the following situations:
  - The robot is waiting to start mechanical initialization when the power is turned ON.
  - The robot is waiting to start moving to the work home position.
  - The robot is waiting to start running.
  - The robot is waiting to restart after a temporary stop.

When in External Run Mode and the start channel is IO-SYS, if IO-S input is ON and the start is not inhibited by Start Inhibition (#sysIn2), Ready for Start (#sysOut1) comes ON in the following conditions:

1. Mechanical initialization standby when the power is turned ON.
2. Mechanical initialization standby after an emergency stop and emergency stop cancellation.
3. Waiting for program start at the work home position.
4. Waiting for restart after a temporary stop.
5. Waiting for restart after stopping at a wait start stop point.
6. Waiting to start due to a point job *waitStart* command.

If the Running (#sysOut5) signal is OFF, the robot is in any of the conditions 1, 2 or 3. In other cases (4, 5 and 6), the robot's condition cannot be distinguished from signal alone.

When the Ready for Start (#sysOut1) signal is ON, the Robot Stopped (#sysOut2) signal is also ON. However, this is not so for the reverse. If the robot is stopped because it is waiting for a signal, then the Robot Stopped (#sysOut2) signal will be ON, but the Ready for Start (#sysOut1) signal will not go ON.

- Robot Stopped (#sysOut2)

  When the robot is stopped this signal is ON, when the robot is moving, it is OFF. If you turn the Software Interlock (#sysIn2) signal OFF when this signal is ON (the robot is stopped), start is inhibited. Even if you try to start the robot, it will not move.

  If you turn the Software Interlock (#sysIn2) signal OFF when this signal is OFF (the robot is moving), it will make an urgent stop.

- Program Number ACK(#sysOut3)

  This is a response signal for Program Number LOAD (#sysIn3). When you turn Program Number LOAD (#sysIn3) ON, this signal comes ON after Program Number (#sysIn4 – #sysIn10) is loaded. If Program Number LOAD (#sysIn3) goes OFF, this signal also goes OFF.

- Program Number Error(#sysOut4)

  This signal goes ON when you specify an unregistered program number in Run/External Run Mode.

- Running (#sysOut5)

  When you start to run a program this signal goes ON. When the program finishes it goes OFF.

- Error (#sysOut6)

  This signal comes ON when an error occurs.

- Emergency Stop(#sysOut7)

  This signal comes ON when an "Emergency Stop Error" occurs (due to the emergency stop switch being pushed, etc.) When this signal is ON, the Error (#sysOut6) signal comes ON at the same time.

- Position Error (#sysOut8)

  If [Position Error Check] is set to [Valid], the position sensor checks the position error just before the robot completes a run (before returning to the work home position). This signal turns ON if a position error is detected.

- Dispenser ON(#sysOut10)

  This is a signal to turn the dispenser ON (execute dispensing).

4.2 IO-1 Function Assignment

	Name	Function	Pin No.
Input	genIn1	Free	1
	genIn2	Free	2
	genIn3	Free	3
	genIn4	Free	4
	genIn5	Free	5
	genIn6	Free	6
	genIn7	Free	7
	genIn8	Free	8
Output	genOut1	Free	9
			10
	genOut2	Free	11
			12
	genOut3	Free	13
			14
	genOut4	Free	15
			16
	genOut5	Free	17
	genOut6	Free	18
	genOut7	Free	19
	genOut8	Free	20
Others	COM+	DC24V	21
	COM+	DC24V	22
	COM–	GND	23
	COM–	GND	24

4.3 IO Polarity

There are two types of IO polarity: PNP specifications and NPN specifications. After confirming your robot's polarity specifications, always connect tools (etc.) which are compatible with these specifications.

The robot's IO polarity can be confirmed on the IO polarity nameplate.

For further details, refer to *External Control (IO/Fieldbus)*.

- COM+ (DC24V)

    If IO-SYS is using external power supply specifications, connect the COM+ pin to the plus pole of the external power supply (DC24V).

    If IO-SYS is using internal power supply specifications, DC24V (+) is output.

- COM- (GND)

    If IO-SYS is using external power supply specifications, connect the COM- pin to the external power supply ground.

    If IO-SYS is using internal supply specifications, use the pin as a common ground.

Attention	When IO-SYS is set to [Internal], do not connect the robot to an external power supply. Doing so causes unit breakdown.

4.4 Other

For details regarding Fieldbus (optional), please refer to *External Control (IO/Fieldbus)*.

5. TIMING CHARTS

5.1 No Response Operations (Steady Mode, Line Dispensing, Point Dispensing)

Start (sysIn1)

To the X, Y work positions

To the next work position

X. Y movement

Line dispensing

To the work position

Moves to the Z height

(return speed)

Z movement

Line dispensing

Return

Wait Time at Start

Wait Time at Stop

Wait Time aft. Retrn

Dispenser ON (sysOut10) ON

Line dispensing

OFF

To the X, Y work positions

Next work position

To the standby position

X, Y movement

To the work position

Moves to the Z height

To the standby position

Return

Z movement

(return speed)

Wait Time at Stop

Wait Time Aftr. Retrn

Dispenser ON (sysOut10) ON

Point dispensing

OFF

[Dispense Time]

5.2 Busy Signal Operations (Timer Mode, Point Dispense)

The robot turns ON the Dispenser ON signal (sysOut10) and waits until the Dispenser Busy Signal Operation (sysIn13) comes ON.

If the robot waits for 0.5 seconds and the Dispenser Busy Signal Operation (sysIn13) has not come ON, the robot determines that the dispenser is damaged or not connected causing an error and stopping the robot. If this happens, the Dispenser Error signal comes ON.

When the Dispenser Busy Signal Operation (sysIn13) comes ON, the robot determines that dispensing has started and turns OFF the Dispenser ON signal (sysOut10).

Afterward, the robot waits until the Dispenser Busy Signal Operation (sysIn13) goes OFF, and when it does so, the robot determines that dispensing is complete and moves to the next operation.

5.3 Finish Signal Operations (Timer Mode, Point Dispense)
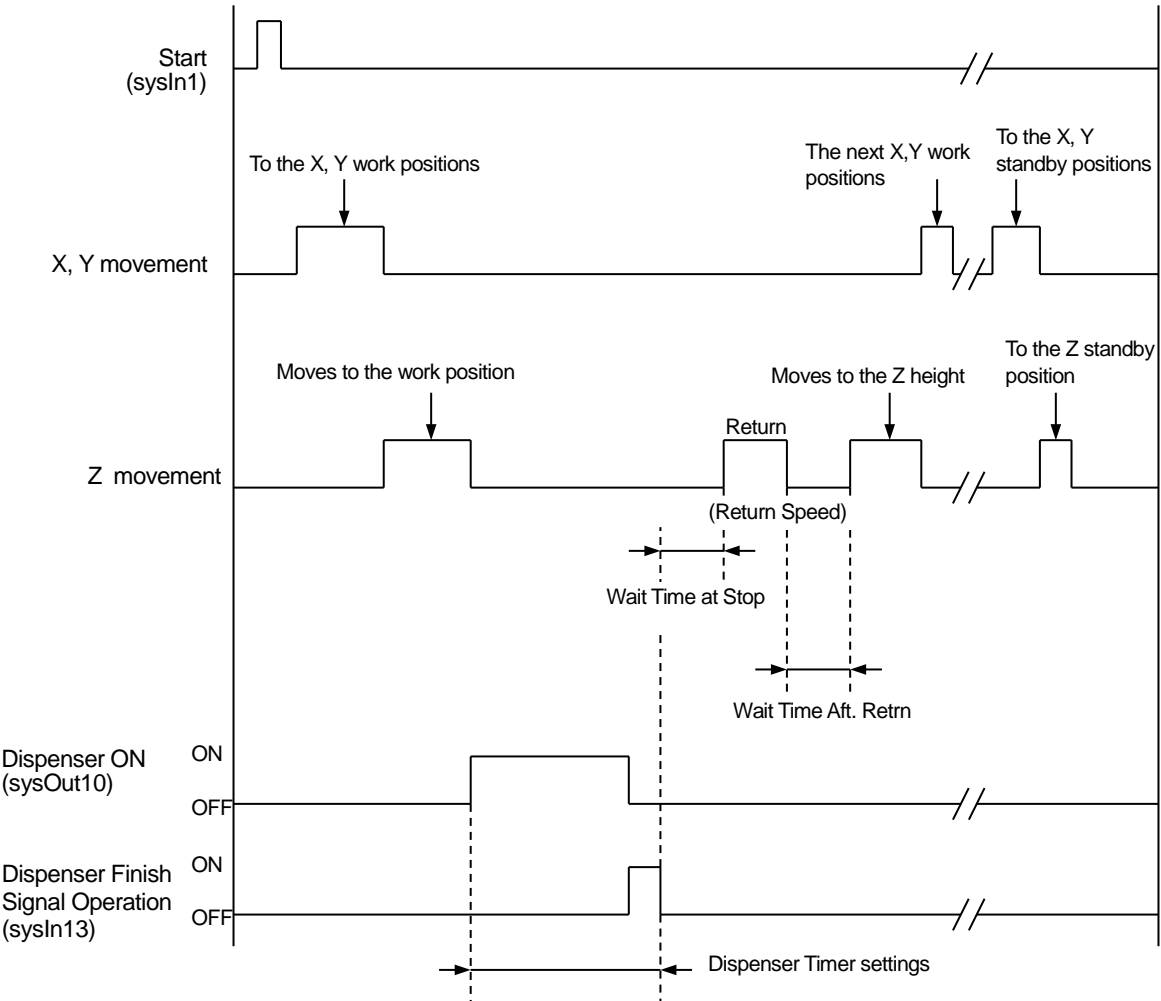
The robot turns ON the Dispenser ON signal (sysOut10) and waits for the Dispenser Response pulse (sysIn13) to come.

When the Dispenser Response signal (sysIn13) turns ON, the Dispenser ON signal (sysOut10) turns OFF.

After that, if the Dispenser Response signal (sysIn13) turns OFF, the robot determines that dispensing is finished and moves to the next operation.

6. POINT DISPENSING

With point dispensing, the robot stops for the preset point dispensing time at the point position and turns ON the dispenser. To point dispense, register a point with the point type [Point Dispense].

Enter the point position where you want to perform Point Dispense. If you are registering a new point, the point type selection screen shown to the right appears after coordinate entry. Select [Point Dispense].

If you wish to change the point type of an existing point to Point Dispense, display the point settings screen for the point you want to change and select the point type submenu. The point type selection screen is displayed. Select [Point Dispense].

When you select [Point Dispense], the entry screen for the dispensing time appears. Enter the point dispensing time you want.

```
Select Point Type          1/3
Point Dispense
Start of Line Dispense
Line Passing
CP Arc Point
End of Line Dispense
Wait Start Point
Start of Circle Dispense
Center of Circle Dispense
Zigzag Start Point
Rectangular Spiral Start Point
Hollow Rectangle Start Point
Rectangle End Point
```

Point Type Selection Screen

If you are teaching using a PC (JR C-Points II), click the icon to add the [Point Dispense] point to the end of the program.

NOTE
- If you set MENU → [Dispenser] → [Dispenser Mode] to [Timer], you can control the dispensing time using the timer on the dispenser.
  When [Dispenser Mode] is set to [Timer], the dispensing time set to the point is ignored and dispensing is done according to the dispense time set to the dispenser.
- After dispensing, the robot moves according to the [Wait Time at Stop], [Return Type], [Z Return Height], [XY Return Dist.], [Return Line Speed], and [Wait Time aft. Retrn] settings in [Individual Program Settings]/[Dispensing Condition], however, even if [XY Return Dist.] is set to a Point Dispense point, the XY axes do not make a return movement.

7. LINE DISPENSING

To perform line dispensing, you need to register points with the point types [Start of Line Dispense] and [End of Line Dispense] respectively. If you register a [Line Passing] point between the [Start of Line Dispense] and the [End of Line Dispense] points, you can change direction during line dispensing. Also, if you insert a [CP Arc Point] point between the [Start of Line Dispense] and the [End of Line Dispense] points, you can draw an arc.

7.1 How to Draw a Line in Line Dispensing

Register the point position where you wish to perform line dispensing.

If you are registering a new point, the point type selection screen shown to the right appears after coordinate entry. Select [Start of Line Dispense].

When you select [Start of Line Dispense], the entry screen for the line speed appears. Enter the line speed you want.

```
┌─────────────────────────────────────┐
│     Select Point Type          1/3   │
│ Point Dispense                       │
│ ▌Start of Line Dispense            ▌ │
│ Line Passing                         │
│ CP Arc Point                         │
│ End of Line Dispense                 │
│ Wait Start Point                     │
│ Start of Circle Dispense             │
│ Center of Circle Dispense            │
│ Zigzag Start Point                   │
│ Rectangular Spiral Start Point       │
│ Hollow Rectangle Start Point         │
│ Rectangle End Point                  │
└─────────────────────────────────────┘
```

Point Type Selection Screen

Register [End of Line Dispense] to the position where you want to finish line dispensing. The dispenser is turned OFF automatically at this point.

For the [Start of Line Dispense] and the [Line Passing] points, you can select whether to turn the dispenser ON or OFF. By setting the dispenser ON or OFF for [Line Passing] points, you can set the sections where dispensing is done and the sections where it is not done.

```
Dispenser ON      OFF      ON       ON       OFF      ON      OFF
Point        1------------2----------3-----------4-----------5-----------6---------7      : Dispensing sections
     Start of Line   Passing   Passing   Passing   Passing   Passing   End
        Dispense      Point      Point      Point      Point     Point   Point
```
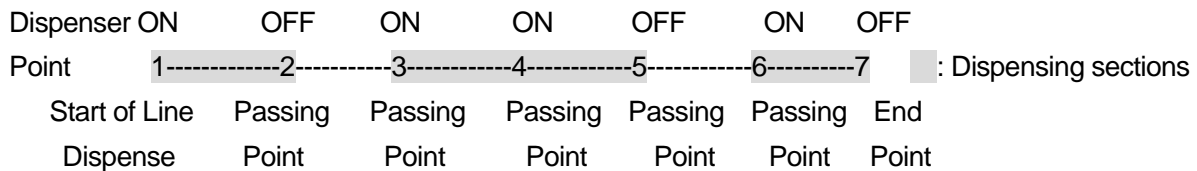
- At the Start of Line Dispense point, the robot holds according to the [Wait Time at Start] settings in in [Individual Program Settings]/[Dispensing Condition]. [Wait Time at Start] is only valid for the Start of Line Dispense and the Start of Circle Dispense points.
- For an End of Line Dispense point, the robot operates according to the [Wait Time at Stop], [Z Return Height], [XY Return Dist.], [Return Line Speed], and [Wait Time aft. Retrn] settings in [Individual Program Settings]/[Dispensing conditions].
- Even if [Dispenser Mode] is set to [Timer], dispensing cannot be controlled by the dispenser's timer for line dispensing. Line dispensing is run in [Steady] Mode regardless of the settings.

7.2 How to Draw an Arc in Line Dispensing

With line dispensing it is possible to draw an arc.

Register these three points in this order: [Start of Line Dispense] → [CP Arc Point] → [End of Line Dispense]. The robot draws an arc by passing through these three points.

By registering [Line Passing] instead of [End of Line Dispense], you can continue to draw arcs.
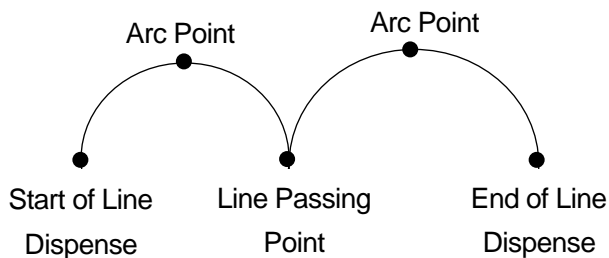
You can also draw an arc in line dispensing if you register the points [Start of Circle Dispense] → [Center of Circle Dispense] consecutively. However, the robot will make a PTP movement to the next point. If you want to continue line dispensing after drawing an arc, or move the robot by CP movement, please use a CP Arc Point.

Set a line speed to the Start of Circle Dispense point and set a circle angle to the Center of Circle Dispense point.

You can set up to ±9999.999 deg. for the circle angle in increments of 0.001 deg. If the value of the circle angle is positive, the robot will draw a circle counterclockwise from the Start of Circle Dispense point (when looking from above the front of the robot).

The [Dispenser ON] signal comes ON automatically at the Start of a Circle Dispense point and goes OFF at the circle, or arc end position.

Circumference Angle: -90°   ➢ Makes a PTP movement to the next point

                                              Makes a PTP movement to the next point
Start of Circle Dispense ●
                              Center of Circle
                              Dispense   ↖
        +X   Circumference Angle: 180°

         ↑

         ┼──➤ +Y
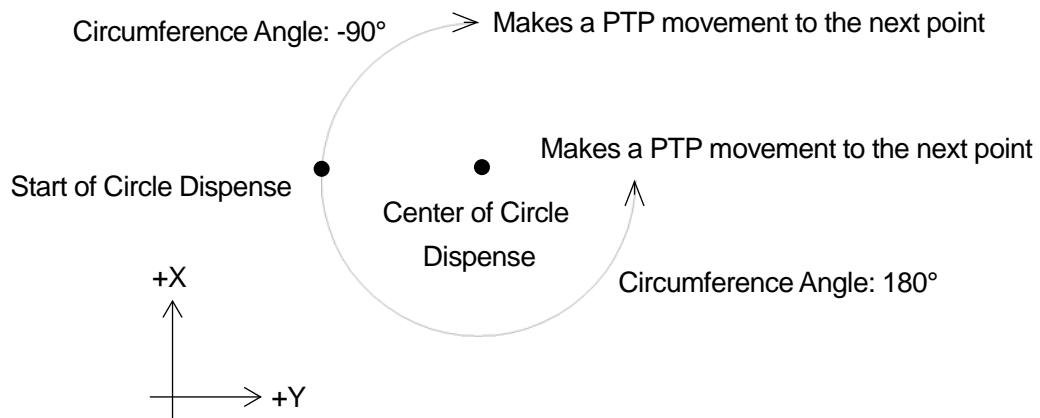
If you are using a PC (JR C-Points II) to register points, click the icons below to add the corresponding point to the program.

- 🖊 : Start of Line Dispense
- 🖊 : Line Passing
- 🖊 : End of Line Dispense
- ⌒ : CP Arc Point

In order to set point types other than the ones shown above, change the point type of the point you have added. Click the point type cell to display the "▼" mark on the right of the cell. Click this mark to display the point types in a pull-down menu. Select and set the point type that you want to set.

8. DISPENSE FILLING

8.1 Rectangle Filling

Specify the rectangle area with 2 consecutive points: [Zigzag Start Point] and [Rectangle End Point], or [Rectangular Spiral Start Point] and [Rectangle End Point], and by line dispensing in either a zigzag shape or a rectangular spiral shape, the robot fills in the specified area.
If you specify the rectangular area with the two points: [Hollow Rectangle Start Point] and [Rectangle End Point], you can dispense a donut shape with an empty center.
Once dispensing is complete, the robot makes a PTP movement to the next point.

- With line dispensing operations, if the distance from one turning point to the next is short, the line speed may slow down. Specifically, when filling in towards the center of a spiral shape pattern, the dispensing speed near the corners of the zigzag dispensing may slow down.

Specify the area that you want to fill in by registering the two points: [Zigzag Start Point] and [Rectangle End Point], or [Rectangular Spiral Start Point] and [Rectangle End Point]. If you want to use a donut shape pattern with an empty center, specify the area you want to fill in with the two points: [Hollow Rectangle Start Point] and [Rectangle End Point].
With the diagrams below, the grey areas are the areas that are filled in.

Point Type Selection	1/3
Point Dispense	
Start of Line Dispense	
Line Passing	
CP Arc Point	
End of Line Dispense	
Wait Start Point	
Start of Circle Dispense	
Center of Circle Dispense	
Zigzag Start Point	
Rectangular Spiral Start Point	
Hollow Rectangle Start Point	
Rectangle End Point	

Specify [Direction], [Line Speed] and [The Number of Pitches] at [Start Point]. If using a donut shape pattern with an empty center, specify [Filling Width] as well.

: Filling Area

Zigzag Start Point /
Rectangular Spiral Start Point

Hollow Rectangle Start Point

Rectangle End Point

Rectangle End Point
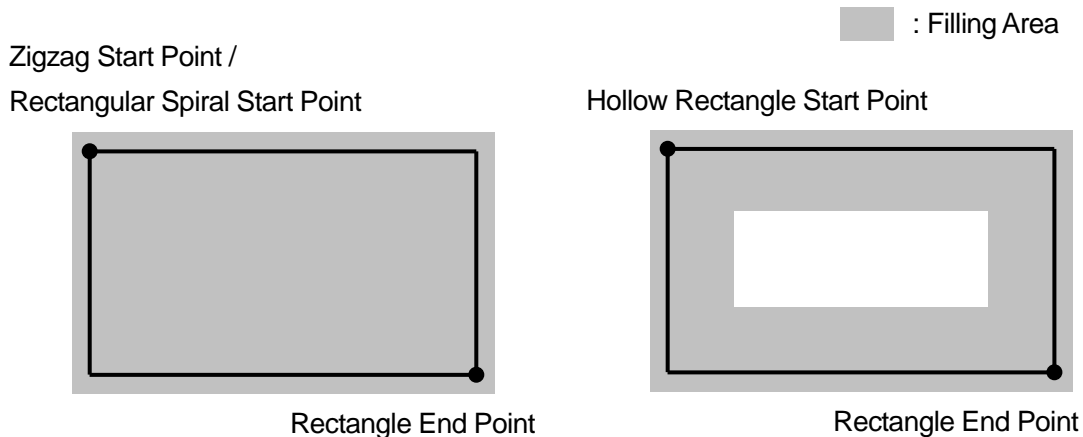
■ Zigzag Start Point – Rectangle End Point

• Direction: Y Direction

The robot executes line dispensing back and forth in a zigzag motion at the specified [Line Speed] filling in the rectangular area specified by the Zigzag Start Point and Rectangle End Point.

If the Z coordinates for the Zigzag Start Point and the Rectangle End Point differ, the robot changes the height of the Z axis so it dispenses on a slope while it performs line dispensing.

The robot moves back and forth by splitting up the X direction distance from the Zigzag Start Point to the Rectangle End Point according to [The Number of Pitches]. The pitch count shown in the diagram to the top right is 7. The pitch count can be set 2 – 100.
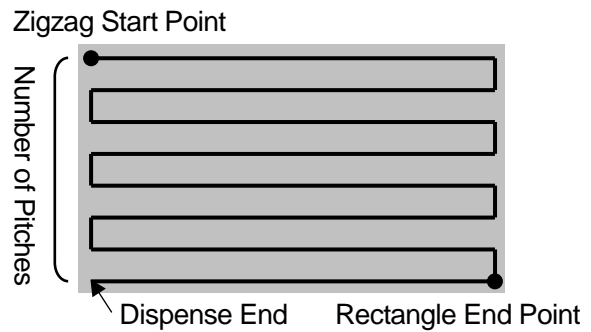
• Direction: X Direction

The robot line dispenses back and forth in a zigzag pattern at the specified [Line Speed], filling in the rectangular area specified by the Zigzag Start Point and Rectangle End Point.

If the Z coordinates for the Zigzag Start Point and the Rectangle End Point differ, the robot changes the height of the Z axis so it dispenses on a slope while it performs line dispensing.

The robot moves back and forth by splitting up the Y direction distance from the Zigzag Start Point to the Rectangle End Point according to the [The Number of Pitches].

The pitch count shown in the diagram on the right is 12. If the number of pitches is an even number, the Rectangle End Point becomes a Dispense End point.
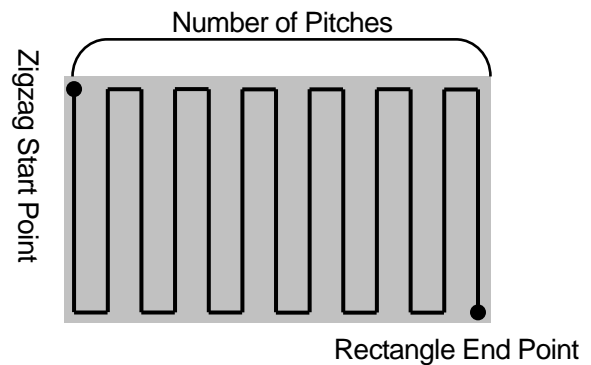
When filling in a rectangle from the Zigzag Start Point to the Rectangle End Point, if the Z coordinates for the Zigzag Start Point and the Rectangle End Point differ, the robot changes the height of the Z axis so it dispenses on a slope while it executes dispensing.

With other dispensing operations, the robot dispenses from the start point Z coordinates in a horizontal plane.
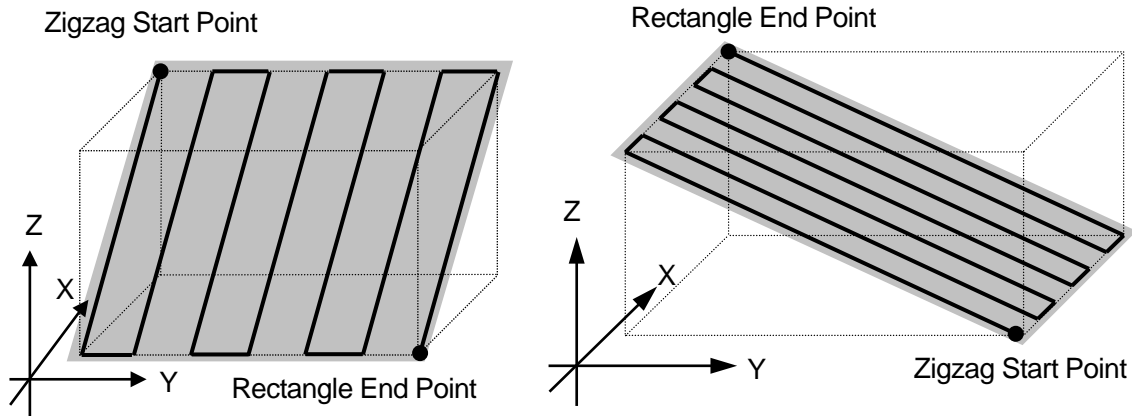
■ Rectangular Spiral Start Point – Rectangle End Point

The robot spirals from the Rectangular Spiral Start Point toward the center, and does so by executing line dispensing at the specified [Line Speed] on a horizontal plane at the Rectangular Spiral Start Point.

The robot draws the spiral by splitting up the shorter X or Y direction distance (L in the diagram to the right) according to the number of pitches (N) from the Rectangular Spiral Start Point to the Rectangle End Point.

$(L) \div (N) = (d)$

Also, the robot dispenses along the longer X or Y direction. With the diagram above and to the right, the horizontal direction is longer than the vertical direction (L), and therefore spirals in a clockwise direction. With the diagram to the right, this is the opposite.
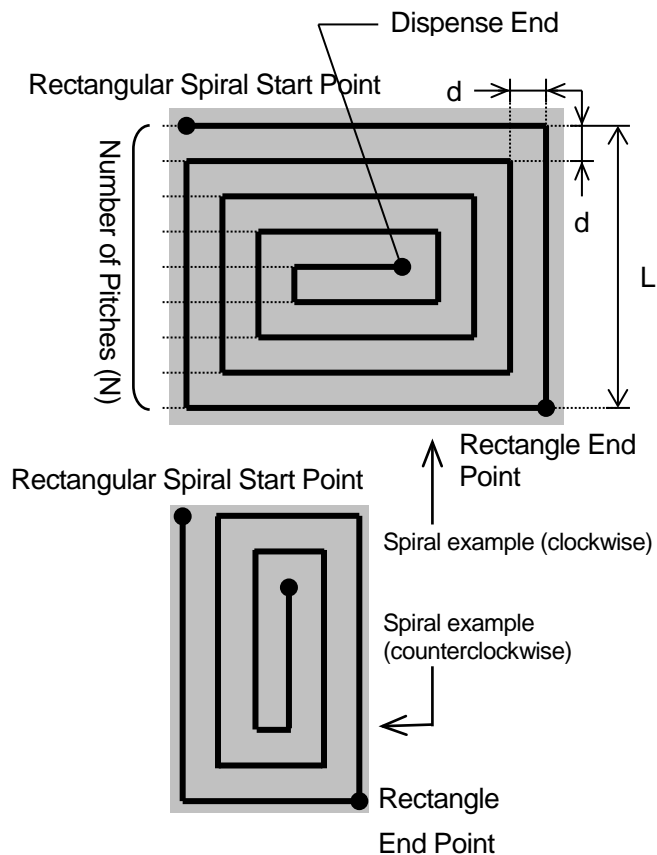
■ Hollow Rectangle Start Point – Rectangle End Point

The robot spirals from the Hollow Rectangle Start Point toward the center, and does so by executing line dispensing at the specified [Line Speed] on a horizontal plane at the Hollow Rectangle Start Point.

Just the same as for a spiral from a Rectangular Spiral Start Point to a Rectangle End Point, the robot draws the spiral by splitting up the shorter X or Y direction distance according to the number of pitches (N) from the Hollow Rectangular Spiral Start Point to the Rectangle End Point. If the Start Point and End Point have
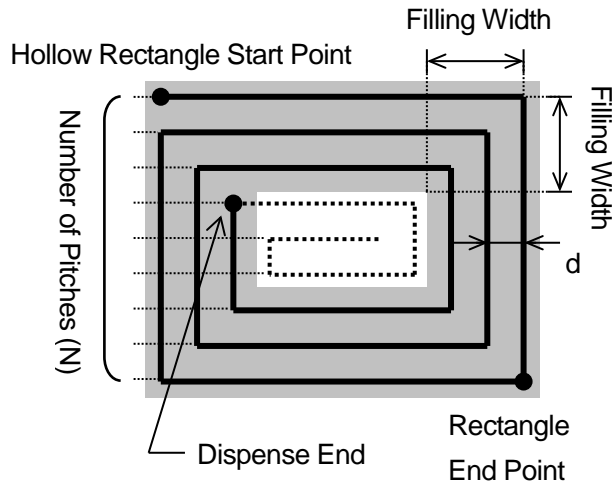
the same coordinates, the interval "d" will have the same width as it does with a Rectangular Start Point – Rectangular End Point operation regardless of [Filling Width].

However, with a Hollow Rectangle Start Point – Rectangle End Point operation, the line dispensing finishes directly before the corner that exceeds the specified [Filling Width] of the spiral trajectory.

Also, the robot dispenses along the longer X or Y direction. With the diagram above, the horizontal direction is longer than the vertical direction, and therefore the robot spirals in a clockwise direction.

8.2 Circle Filling

Specify the circular area with the 3 point types: [Spiral Start Point], [Circumference of Spiral Area 1] and [Circumference of Spiral Area 2], and by line dispensing in a spiral shape, the robot fills in the specified area.

If you specify a circular area with the 3 point types: [Hollow Spiral Start Point], [Circumference of Spiral Area 1] and [Circumference of Spiral Area 2], you can make a donut shape with an empty center.

After dispensing is finished, the robot makes a PTP movement to the next point.

NOTE

When line dispensing, if the arc is small, the line speed may slow down. Specifically, when filling in a spiral shape, the dispensing operation toward the center of the circle may slow down.

Specify the circular area that you want to fill in by registering the 3 points: [Spiral Start Point], [Circumference of Spiral Area 1] and [Circumference of Spiral Area 2]. To make a donut shape pattern with an empty center, specify the area using the points: [Hollow Spiral Start Point], [Circumference of Spiral Area 1] and [Circumference of Spiral Area 2].

Specify the [Direction], the [Line Speed] and [The Number of Pitches] at the [Start Point]. To

Point Type Selection	2/3
Spiral Start Point	
Hollow Spiral Start Point	
Circumference of Spiral Area 1	
Circumference of Spiral Area 2	
PTP Point	
CP Start Point	
CP Passing Point	
CP Stop Point	
CP End Point	
PTP Evasion Point	
Circle Start Point	
Circle Center Point	

perform a donut shape pattern with an empty center, specify the [Filling Width] as well.

The grey areas in the diagrams below are the areas that are filled in.

□ : Fill Area
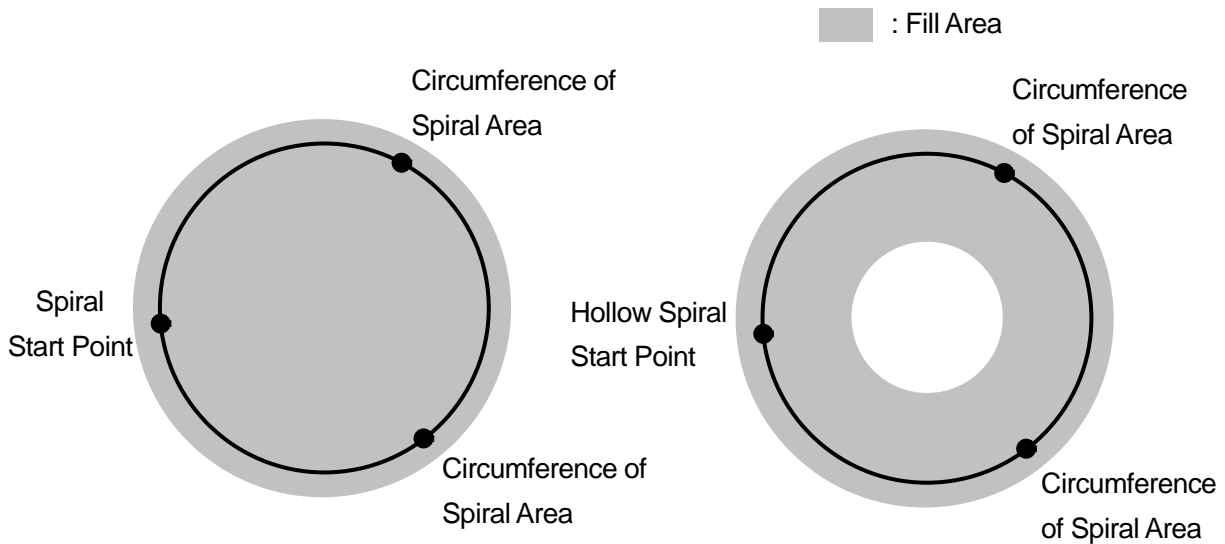
■ Spiral Start Point – Circumference of Spiral Area 1 – Circumference of Spiral Area 2

The robot spirals from the Spiral Point toward the center at the specified [Line Speed], and does so by executing line dispensing on a horizontal plane at the Spiral Start Point. The robot draws a spiral in the order of Spiral Start Point, Circumference of Spiral Area 1, and Circumference of Spiral Area 2. The spiral is drawn clockwise in the example to the right. If Circumference of Area 1 and Circumference of Area 2 are round the other way, the robot draws the spiral counterclockwise.
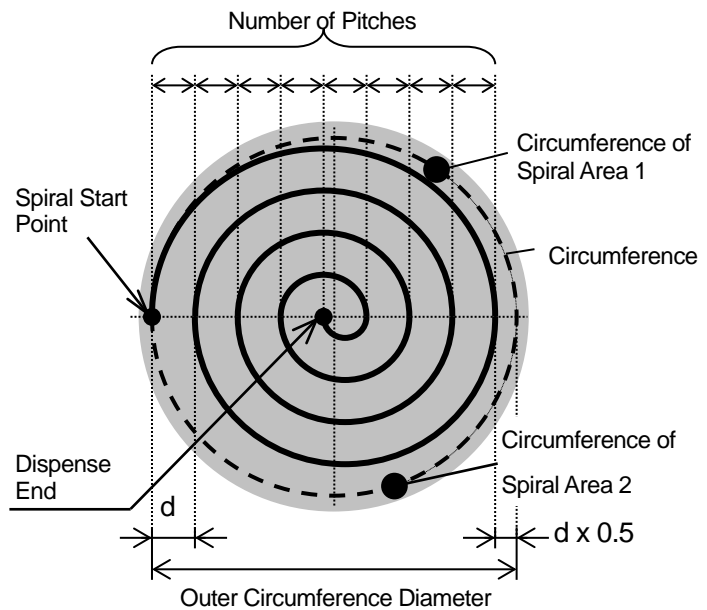
The robot defines how many times it spirals around by splitting up the outer circumference diameter by [The Number of Pitches].

Outer Circumference Diameter ÷ (Pitch Count + 0.5) = d

If [Line Dispensing] is set to [Circumference] or [Without], the robot dispenses along the circumference before drawing the spiral.

■ Hollow Spiral Start Point – Circumference of Spiral Area 1 – Circumference of Spiral Area 2

The robot spirals from the Hollow Spiral Start Point toward the center at the specified [Line Speed], and does so by executing line dispensing on a horizontal plane at the Hollow Spiral Start Point.

The robot draws a spiral in the order of Hollow Spiral Start Point, Circumference of Spiral Area 1, and Circumference of Spiral Area 2. The spiral is drawn counterclockwise in the example to the right.
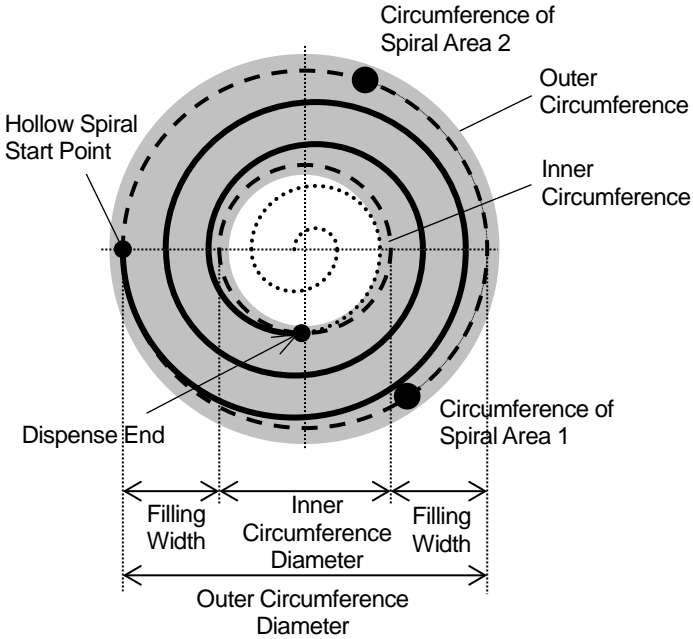
The robot defines how many times it spirals around by splitting up the outer circumference diameter by [The Number of Pitches].

However, line dispensing ends at the position where the robot exceeds the specified [Filling Width].

The following settings are for [Line Dispensing]:

- Without···No border operation is executed.
- Circumference ································Draws a spiral after line dispensing along the circumference of the circle.
- Inner Circumference ·························Line dispenses along the inner circumference of the circle at the end.
- Circumference, Inner Circumference·······Draws a spiral after line dispensing along the circumference of the circle, and line dispenses along the inner circumference of the circle at the end.

9. HOW TO CONNECT THE DISPENSER

The [Dispenser Response] and [Dispenser ON] output signals are assigned by default to sysIn13 and sysOut10 respectively. These are intended for connecting the dispenser to IO-SYS.
If you want to connect a dispenser to IO-1 or to output the [Dispenser ON] signal to multiple dispensers, you can change this IO assignment.

TP ▶ | MENU | [Dispenser]
[IO Function Assignment]

Press the | MENU | key and select
[Dispenser] from the menu. The selection screen shown to the right appears.

```
                    Dispenser
 IO Function Assignment
 Dispenser Type         No Response Signal
 Dispenser Mode                     Steady
 Purge Switch               Constant valid
 Purge by ext. Signal       Constant valid
 Automatic purge                   Invalid
 Cycle of automatic purge           10sec
 Time of automatic purge             1sec



```

Dispenser Selection Screen

Select [IO Function Assignment].
The [IO Function Assignment] selection screen for dispensing shown to the right appears.
Select the signal you wish to set or change.

```
            IO Function Assignment
 Dispenser ON                   #sysOut10
 Dispenser Response               #sysIn13
 Purge by ext. Signal             #sysIn14
 X Needle Sensor                  #sysIn15
 Y Needle Sensor                  #sysIn16




```

IO Function Assignment Selection Screen

The "Dispenser Responses" are input signals, therefore they are normally assigned to [IO-SYS (sysIn)] or [IO-1 (genIn)].

However, as a setting they can typically be assigned not only as input but also as output signals (sysOut, genOut) and internal or keep relays.

Select [IO-SYS (sysIn)] or [IO-1 (genIn)] and a number entry screen is displayed. Enter the IO number and the display returns to the IO Function Assignment selection screen.

Dispenser Response
IO-SYS (sysIn)
IO-1 (genIn)
IO-FB (fbIn)
IO-SYS (sysOut)
IO-1 (genOut)
IO-FB (fbOut)
Internal Relay (mv)
Keep Relay (mkv)

Dispenser Response Type Selection Screen

If you select the [Dispenser ON] output signal (normally sysOut or genOut), after entering the IO number, the output width entry screen appears as shown to the right.
The default width is [1].

If you select [genOut] on the type selection screen, enter [3] on the number entry screen, and then enter [2] on the width entry screen, the Dispenser ON signal is output from genOut3 and genOut4 at the same time.
If the output width is set to [3], the Dispenser ON signal is output from genOut3, genOut4 and genOut5.

Enter a number.
Width   **1**

NOTE
- The "Width" cannot be set to extend over different types of IO, such as sysOut10 and genOut1. It is limited to IO with consecutive numbers.
- If you wish to assign a dispenser-related signal to IO-SYS, assign that signal to [Free] in [IO-SYS Function Assignment] of all program common data settings.

PC ▶ [Data] → [Dispenser] → [IO Signal Setting]
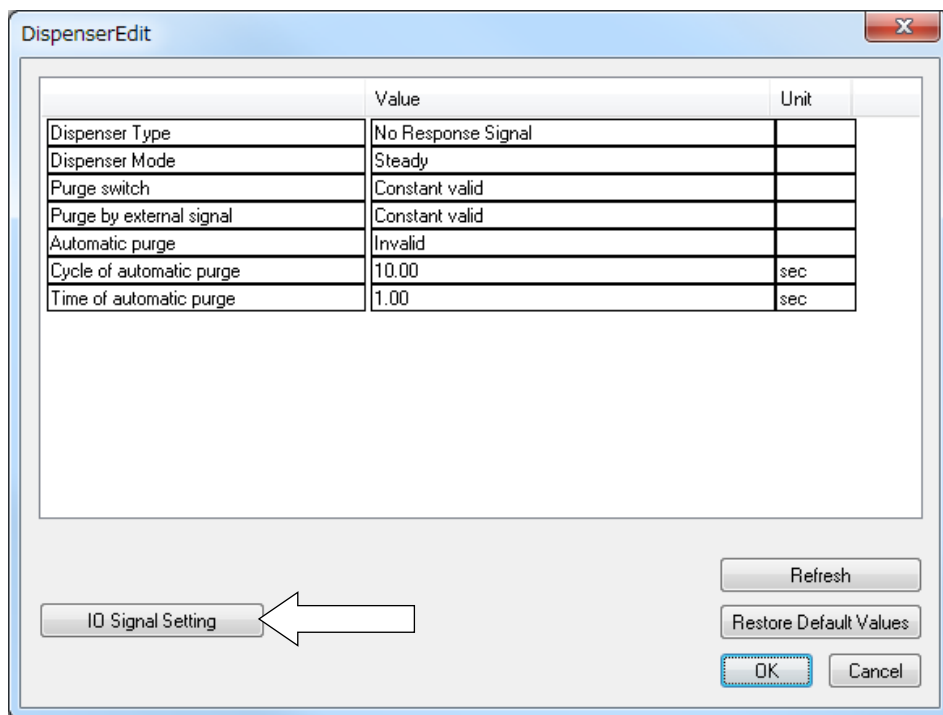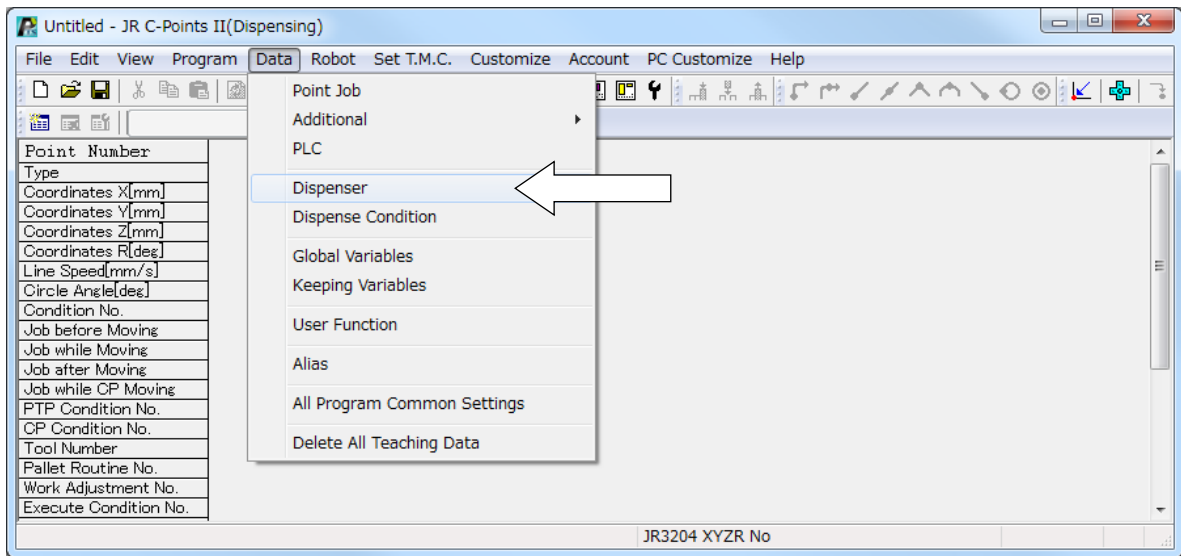
Select [Dispenser]. The Dispenser Edit screen appears. Click the [IO Signal Setting] button. The screen on the next page is displayed.

To connect the dispenser, set the connector (from the cells indicated by the white arrows), pin number (the [Number] cell), and the number of pins (the [Width] cell). Click each setting cell to select or numerically enter the item you want.
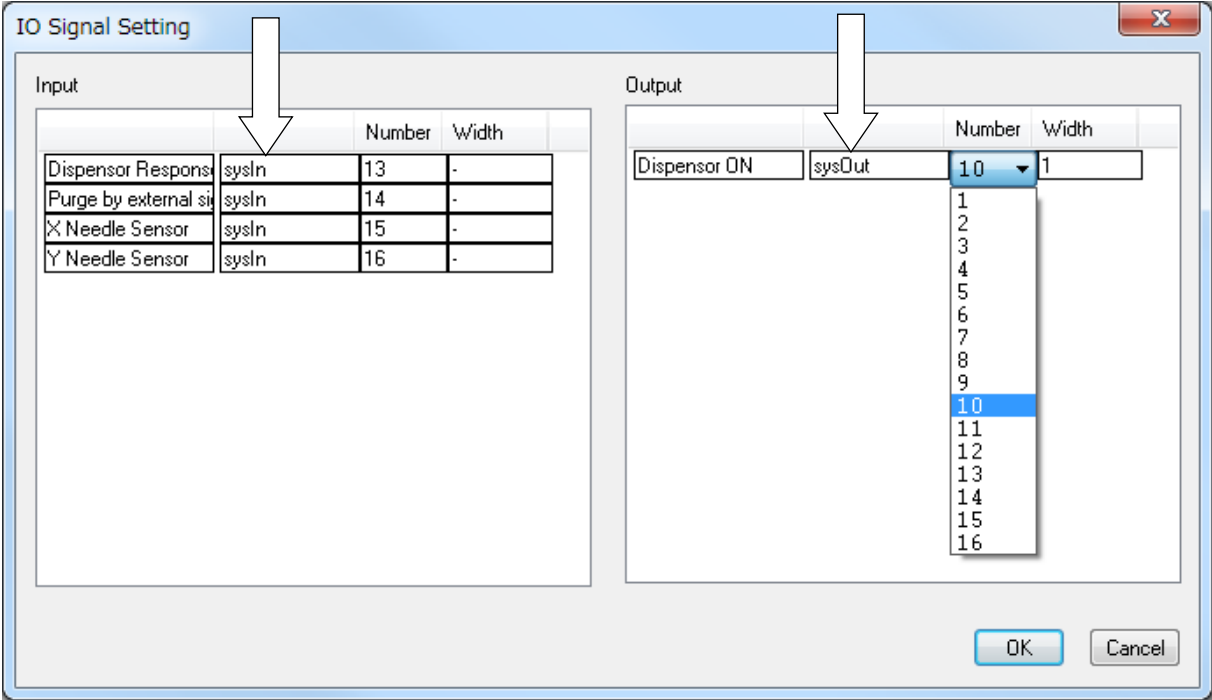
10. DISPENSER TYPE

When using this robot, set/modify [Dispenser Type], under ⎢MENU⎢ [Dispenser], according to the dispenser connected to the robot. There are three types as follows:

- No Response Signal
  The robot ignores the signals returned from the dispenser.
- Busy Signal Operation
  The robot checks the signals returned from the dispenser during dispensing, from start to finish.
- Finish Signal Operation
  The robot checks the signal returned from the dispenser when dispensing is complete.

TP ▶ ⎢MENU⎢ [Dispenser]

[Dispenser Type]

Press the ⎢MENU⎢ key and select [Dispenser] from the menu. Select [Dispenser Type].
The Dispenser Type selection screen shown to the right appears.

```
┌─────────────────────────────────────┐
│            Dispenser Type            │
│ No Response Signal                   │
│ Busy Signal Operation                │
│ Finish Signal Operation              │
│                                      │
│                                      │
│                                      │
│                                      │
│                                      │
│                                      │
└─────────────────────────────────────┘
```
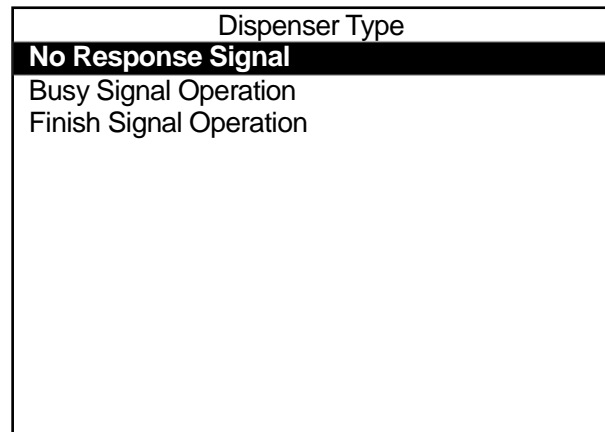
Dispenser Type Selection Screen

[Data] → [Dispenser] → [Dispenser Type]
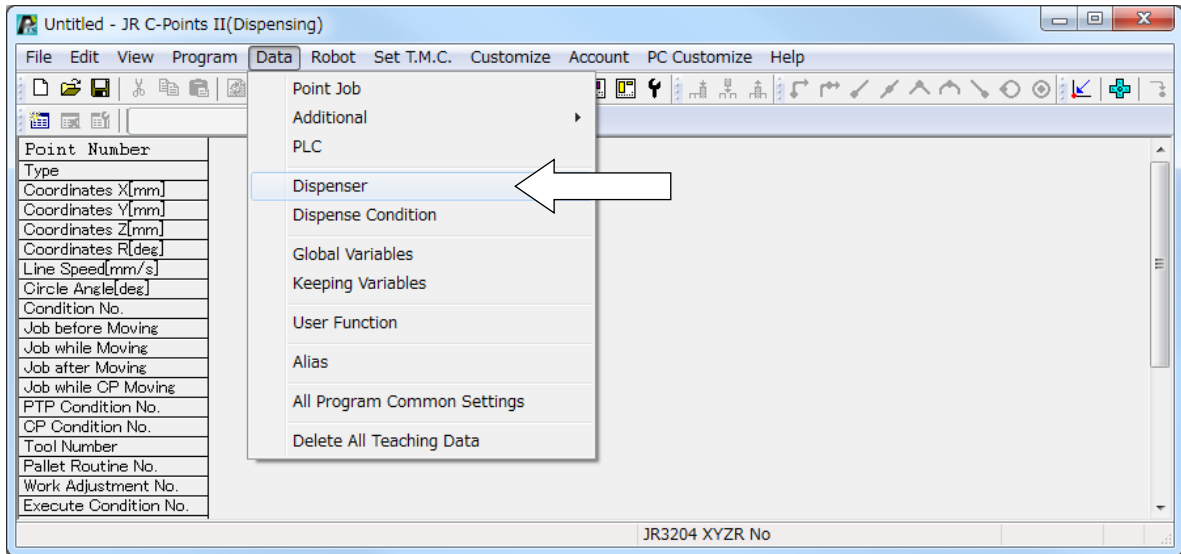
Select [Dispenser] from the menu and then select [Dispenser Type].
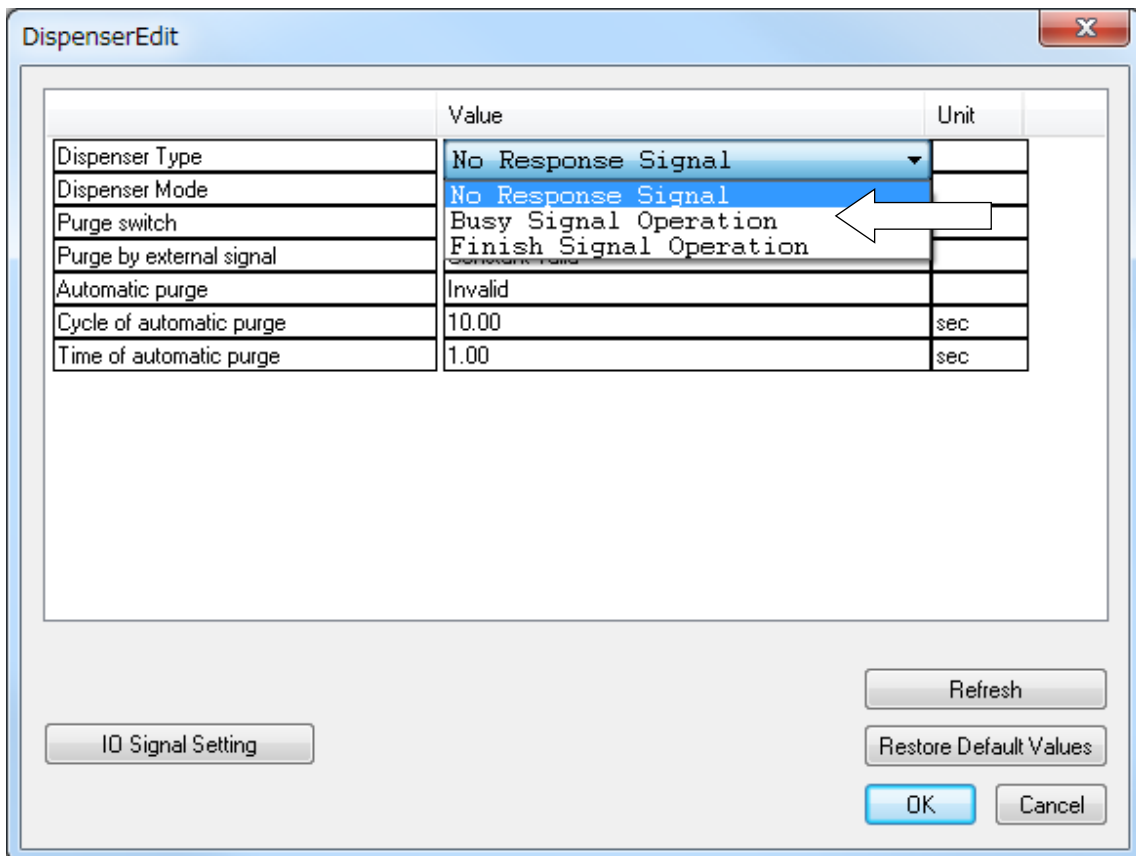
11. DISPENSER MODE

This changes the [Dispenser Mode], under $\boxed{\text{MENU}}$ [Dispenser]. There are two types to select from:

- Steady

  The dispensing time is controlled by the robot.
- Timer

  The dispensing time is controlled by the timer on the dispenser.

  (However, during line dispensing or when [Dispenser Type] has been set to [No Response Signal], this setting is invalid. The robot runs in [Steady] mode even if [Dispenser Mode] is set to [Timer].)

$\blacktriangleright$ **TP** $\blacktriangleright$ $\boxed{\text{MENU}}$ [Dispenser]
                    [Dispenser Mode]

Press the $\boxed{\text{MENU}}$ key and select [Dispenser] from the menu. Select [Dispenser Mode].

The Dispenser Mode selection screen shown to the right appears.

If you want to determine the dispensing time using the timer on the dispenser, select [Timer].

```
┌─────────────────────────────────┐
│          Dispenser Mode         │
│ Steady                          │
│ Timer                           │
│                                 │
│                                 │
│                                 │
│                                 │
│                                 │
│                                 │
│                                 │
└─────────────────────────────────┘
```
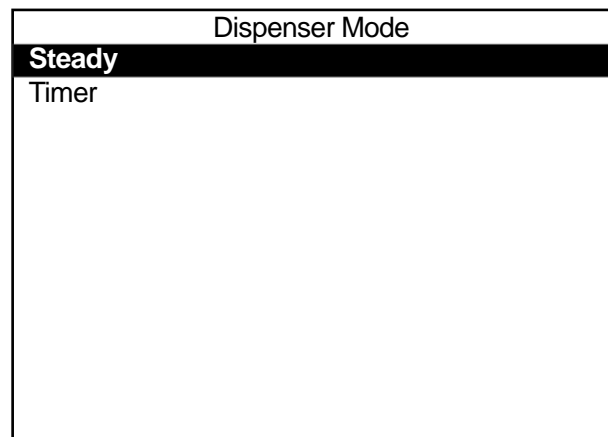
Dispenser Mode Selection Screen

NOTE

If [Dispenser Mode] is set to [Timer], the settings entered for [Point Dispense Time] when teaching Point Dispense points are ignored. The same also applies for the [Point Dispense Time] for Point Dispense points already registered.

PC ▶ [Data] → [Dispenser] → [Dispenser Mode]
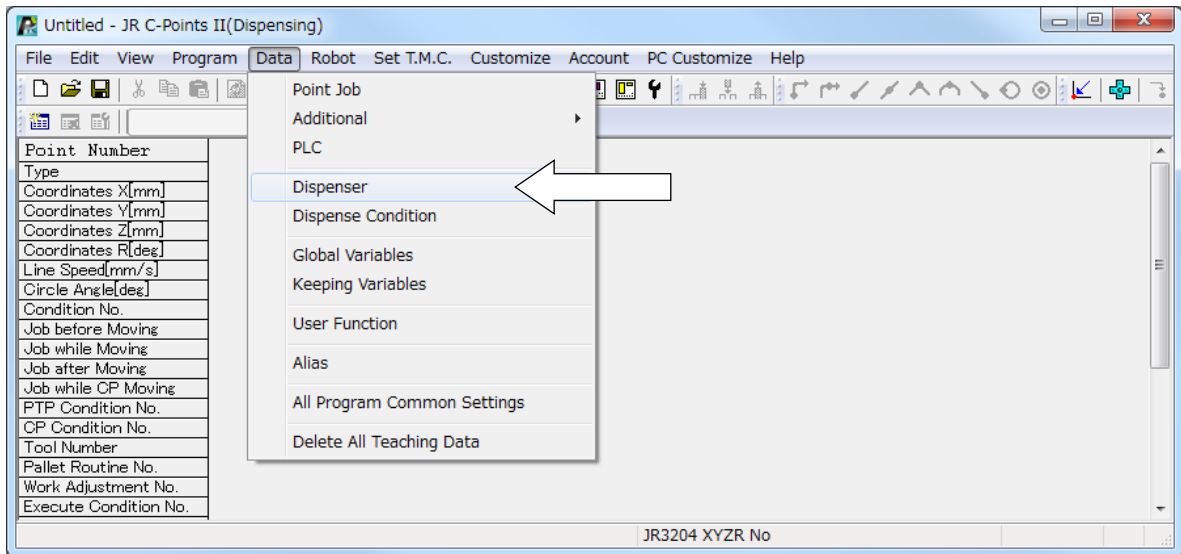
Select [Dispenser] from the menu and then select the Dispenser Mode.
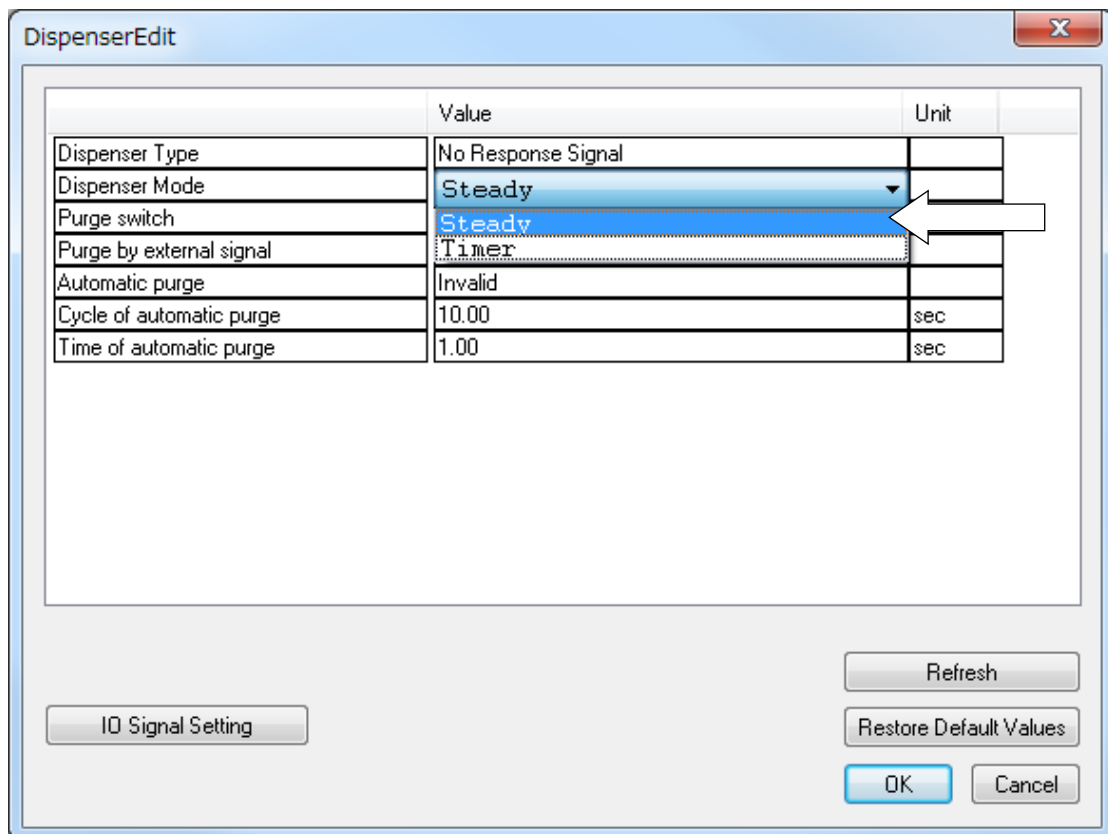
12. FUNCTIONS AT THE START/END OF LINE DISPENSING

12.1 Prevent Fragmented Dispensing at the Start of Line Dispensing (Wait Time at Start)

At a line dispensing start point*, if the X and/or Y axes (etc.) move before the actual dispensing operation starts and the dispensing agent fragments at the start section, or if you want the dispensing agent thicker at the start section, modify/register [Wait Time at Start] in [Dispense Condition].

Once [Wait Time at Start] is set, after the dispenser signal comes ON at [Start of Line Dispense]/[Start of Circle Dispense], the robot waits exactly for the set time before moving.

Dispense Movement
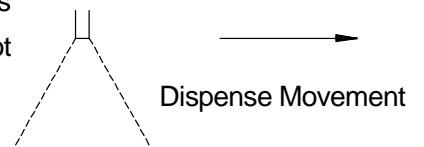
If you want to set this function to the majority of start points for line dispensing operations in your program, set these points with [Dispense Condition] in the individual program settings. If you want to set these to a minority of such points, register these points with the condition data [Dispense Condition].
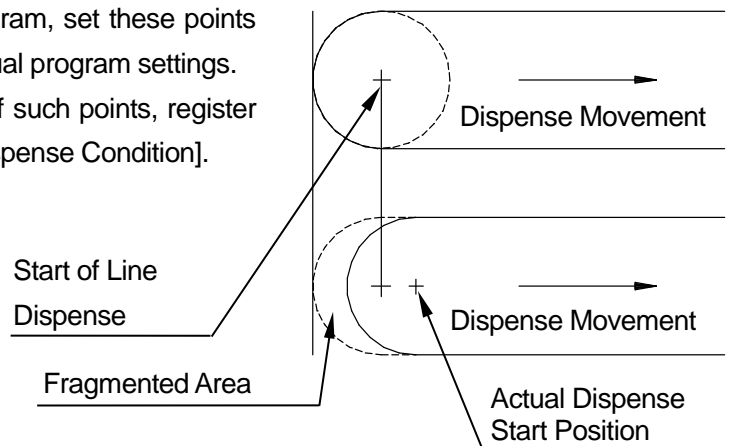
Dispense Movement

* Start of Line Dispense, Start of Circle Dispense, Zigzag Start Point, Rectangular Spiral Start Point, Hollow Rectangle Start Point, Spiral Start Point, and Hollow Spiral Start Point

Start of Line Dispense

Fragmented Area

Dispense Movement

Actual Dispense Start Position

Dispense Conditions in Individual Program Settings

TP ▶ MENU [Individual Program Settings]
             [Dispense Condition]
                [Wait Time at Start]

Dispense Conditions in Condition Data

TP ▶ MENU [Dispense Condition]
             Number Entry
                [Wait Time at Start]

[Dispense Condition] in individual program settings is applied to all line dispensing start points in the same program. Condition data [Dispense Condition] apply only to points that are set with dispensing condition numbers.

■ Individual Program Settings
  [Dispense Condition]
Press the MENU key, select [Individual Program Settings], and then select [Dispense Condition]. Select [Wait Time at Start].
The Wait Time at Start entry screen shown on the right is displayed.
Enter the value you want to register.
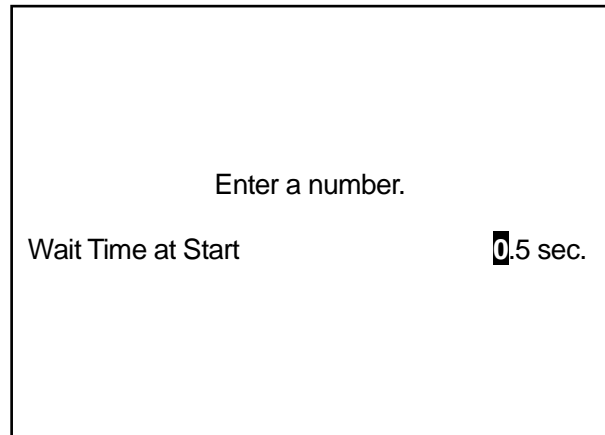
```
┌─────────────────────────────────────┐
│                                      │
│                                      │
│           Enter a number.            │
│                                      │
│   Wait Time at Start        0.5 sec. │
│                                      │
│                                      │
│                                      │
└─────────────────────────────────────┘
```

■ Condition Data [Dispense Condition]
1. Press the MENU key on the value setting screen for the point you want to prevent fragmented dispensing on at the start of the line dispensing, such as a Start of Line Dispense point, etc., and select [Dispense Condition] and enter the condition number.
    Select [Wait Time at Start]. The screen for entering the wait time (as shown above) is displayed. Enter the value you want to set.
2. Call up value setting screen for the point for which you want to set the dispensing condition and select [Condition Number]. (Move the cursor (highlight bar) to a blank line on the point setting screen to display the settable point jobs and condition data.)
3. The condition number entry screen (as shown below) for the dispensing condition is displayed. Enter the dispensing condition number entered in 1. Press the F3 (LIST) key to display a list of registered dispensing condition numbers. You can also select the number you want to set from this list.

NOTE
With the following procedure you can register dispensing conditions and also set them to points. Select [Condition Number] from the point setting screen, and press the F4 (VIEW) key on the dispensing condition selection screen (as shown to the right) while the dispensing condition number you want to set is displayed to show the dispensing condition information for that number.
You can select the item you want to enter and also enter the values you want here.

Current Number Entered

```
┌─────────────────────────────────────┐
│                                      │
│                                      │
│                                      │
│           Enter a number.            │
│                                      │
│   Condition Number               1   │
│                                      │
│                                      │
│   DEL    COPY   NEW    LIST   VIEW   │
└─────────────────────────────────────┘
    F0      F1     F2     F3     F4
```
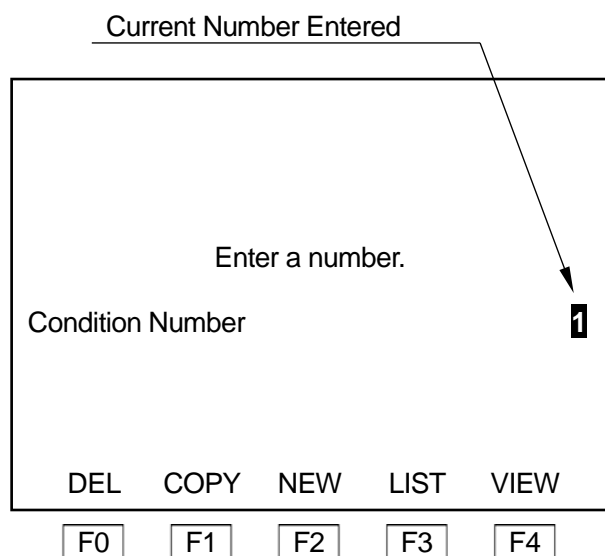
[Wait Time at Start] is executed only at points that start line dispensing.

Dispense Conditions in Individual Program Settings

`PC` [Program] → [Individual Program Settings] → [Individual Data] → [Dispense Condition]
→ [Wait Time at Start]

Dispense Conditions in Condition Data

`PC` [Data] → [Dispense Condition] → [Add/Edit] → [Wait Time at Start]

To set dispense conditions in individual program settings, select [Dispense Condition] from the [Individual Program Settings] – [Individual Data] dialog box. The dialog below is displayed.

To register condition data dispense conditions, select [Dispense Condition] from the [Data] pull-down menu. The dialog below is displayed.

Enter the values you want to change in the dispense condition [Wait Time at Start].
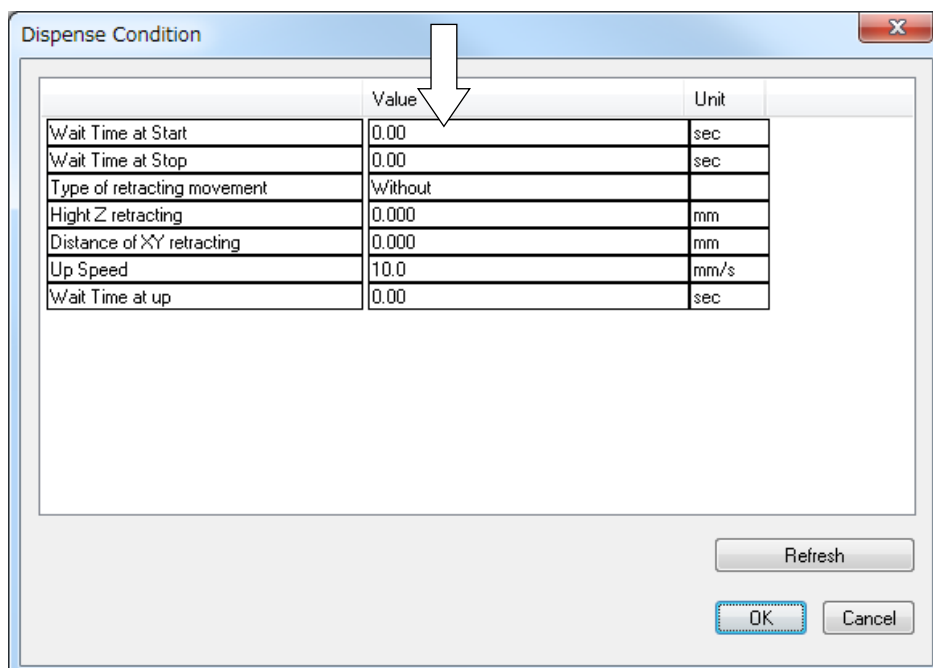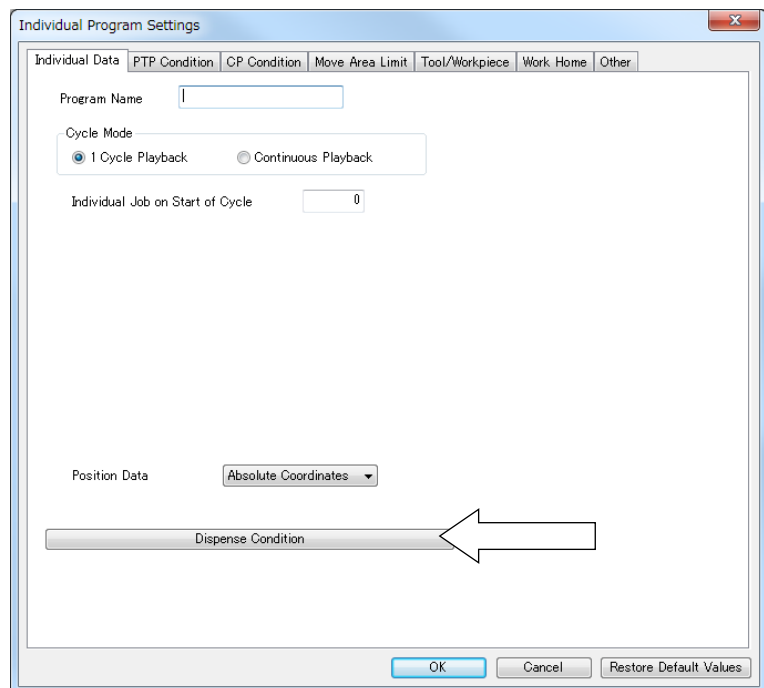
12.2 Prevent Fragmented Dispensing at the End of Line Dispensing (Wait Time at Stop)

At a Point Dispense/End of Line Dispense/dispensing end position*, if the Z axis ascends before the actual dispensing finishes and/or the X and/or Y axes (etc.) start moving causing the dispensing agent to drip, register/modify the dispensing condition [Wait Time at Stop].

Once [Wait Time at Stop] is set, after the dispenser signal goes OFF at the Point Dispense/End of Line Dispense/dispensing end position*, the robot waits for exactly the time set here before ascending/moving.

*Dispensing end position: The end position of a circle or arc drawn with [Start of Circle Dispense] – [Center of Circle Dispense].
The dispensing end position of a rectangle or circle dispense filling area.

Dispense Conditions in Individual Program Settings

TP ▶ MENU [Individual Program Settings]
[Dispense Condition]
[Wait Time at Stop]

Dispense Conditions in Condition Data

TP ▶ MENU [Dispense Condition]
Number Entry
[Wait Time at Stop]

[Dispense Condition] in individual program settings is applied to all line dispensing start points in the same program. [Dispense Condition] set by [Condition Number] is only applied to points that are set with dispensing condition numbers.

■ Dispense Conditions in Individual Program Settings

Press the MENU key, select [Individual Program Settings], and then select [Dispense Condition]. (Shown on the right).

Select [Wait Time at Stop].
The Wait Time at Stop entry screen is displayed.
Enter the value you want to set.

Program 1	
Wait Time at Start	0.5 sec
Wait Time at Stop	**0 sec**
Retracting Movement	XY Move after Z Up
Z Return Height	10 mm
XY Return Dist.	-30 mm
Return Line Speed	30 mm/s
Waiting Time After Retraction	0 sec

■ Condition Data Dispense Conditions

1. Press the ‎MENU‎ key on the value setting screen for the start point of the dispensing operation for which you want to prevent the dispensing agent dripping at the end of line dispensing, such as a Start of Line Dispense point etc. Select [Dispense Condition] and enter the condition number.

The dispensing operation for which you want to prevent dripping at the end of line dispensing

Area of dripping

Start of Line Dispense
(Point to Set Dispense
Condition)

Dispense End

Select [Wait Time at Stop]. The screen for entering the wait time is displayed. Enter the value you want to set.

2. Call up the value setting screen for the point to where you want to set the dispensing condition and select the condition number. (Move the cursor (highlight bar) to a blank line on the point setting screen to display the settable point jobs and condition data.)

3. The condition number entry screen for the dispensing condition is displayed. Set the dispensing condition number entered in 1. If you press the ‎F3‎ (LIST) key to display a list of registered dispensing condition numbers, you can also select the number you want to set from this list.

NOTE

With the following procedure you can register dispensing conditions and also set them to points. Select the condition number from the point setting screen, and press the ‎F4‎ (VIEW) key when the dispensing condition number you want to set is displayed on the screen (as shown to the right) to show the information for that number.

You can select the item you want to edit and also modify the information here.

Current Number Entered

Enter a number.

Condition Number   1

DEL	COPY	NEW	LIST	VIEW
F0	F1	F2	F3	F4
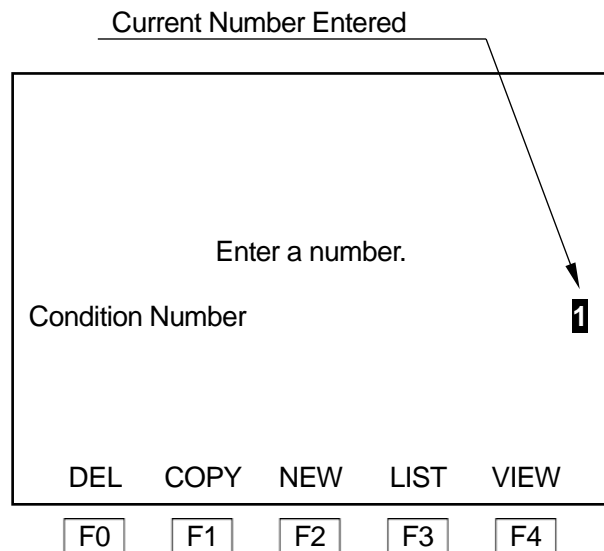
The [Wait Time at Stop] is only executed at [Point Dispense], [End of Line Dispense], and/or dispensing end positions.

Dispense Conditions in Individual Program Settings

PC ▶ [Program] → [Individual Program Settings] → [Individual Data] → [Dispense Condition] → [Wait Time at Stop]

Dispense Conditions in Condition Data

PC ▶ [Data] → [Dispense Condition] → [Add/Edit] → [Wait Time at Stop]

Select [Dispense Condition] from the [Individual Program Settings] – [Individual Data] dialog. The dialog below is displayed.
Enter the values you want to modify in [Wait Time at Stop].

To register condition data dispense conditions, select [Dispense Condition] from the [Data] pull-down menu. The dialog box below appears.
Enter the values you want to modify in [Wait Time at Stop].

	Value	Unit
Wait Time at Start	0.00	sec
Wait Time at Stop	0.00	sec
Type of retracting movement	Without	
Hight Z retracting	0.000	mm
Distance of XY retracting	0.000	mm
Up Speed	10.0	mm/s
Wait Time at up	0.00	sec
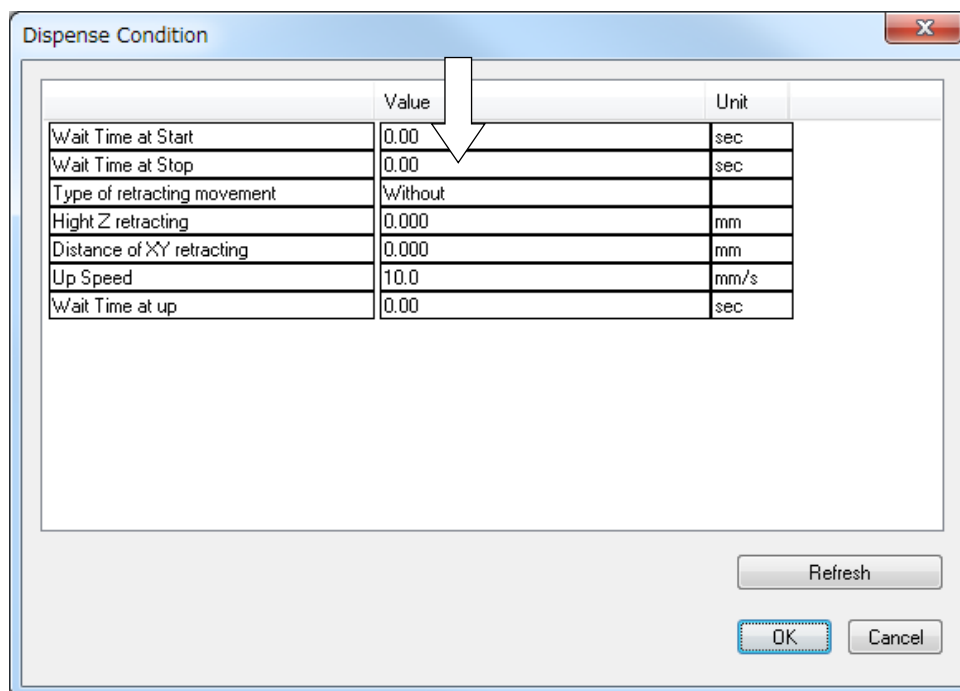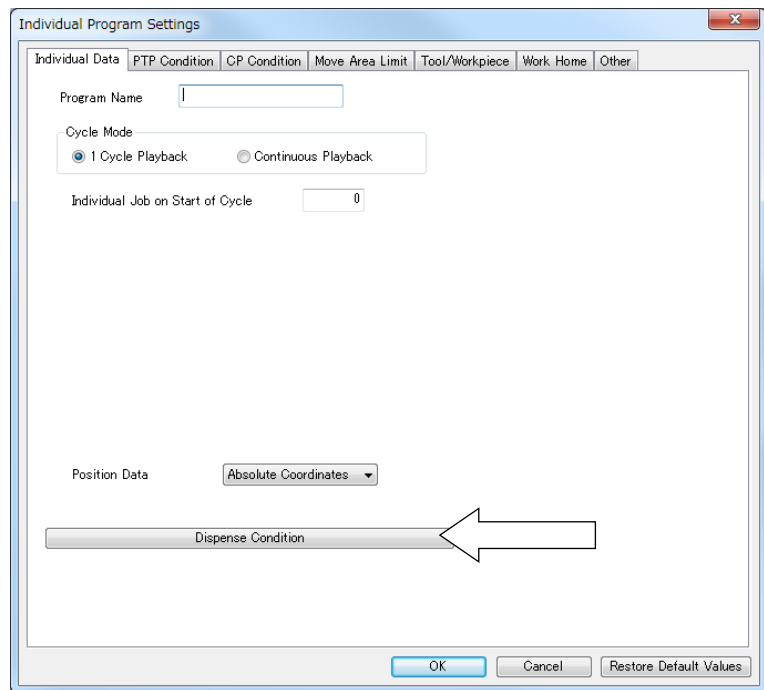
12.3 Prevent Liquid Stringing at the End of Dispensing

If liquid strings at a [Point Dispense], [End of Line Dispense], or dispense end position, you can set a stop time, or raise the Z axis at a slow speed to help reduce stringing.

Set the [Return Type], the [Z Return Height], the [XY Return Dist.], the [Return Line Speed] and the [Wait Time Aft. Retrn] in [Dispense Condition]. If you set [Dispense Condition] in individual program settings, the content set is applied to all dispensing points in the program. If you set [Dispense Condition] in condition data, the condition data [Dispense Condition] is applied only to the point to which it is set.

Return type	Return type at the line dispensing end position*
Nil	After the robot stands by for [Wait Time at Stop], it moves to the next point.
Z up only	After the robot stands by for [Wait Time at Stop], the Z axis ascends exactly to [Z Return Height] at the specified [Return Line Speed], and then waits the exact [Wait Time Aft. Retrn] to move to the next point.
XY moving after Z up	After the robot stands by for [Wait Time at Stop], the Z axis ascends exactly to [Z Return Height] at the specified [Return Line Speed], and then the X and Y axes move the exact [XY Return Dist.] at the specified [Return Line Speed]. After this, the robot waits the exact [Wait Time Aft. Retrn] to move to the next point.
XYZ simultaneous	After the robot stands by for [Wait Time at Stop], the X,Y, and Z axes move diagonally (synchronized) to [Z Return Height] and [XY Return Dist.] at the specified [Return Line Speed]. After this, the robot waits the exact [Wait Time Aft. Retrn] to move to the next point.

*With [Point Dispense], dispense filling end position, or a circle ([Start of Circle Dispense] – [Center of Circle Dispense]), a [Z up only] movement is made even if [XY moving after Z up] or [XYZ simultaneous] is set. If [Nil] is set, no return movement is performed.

Return Type: Z Up Only
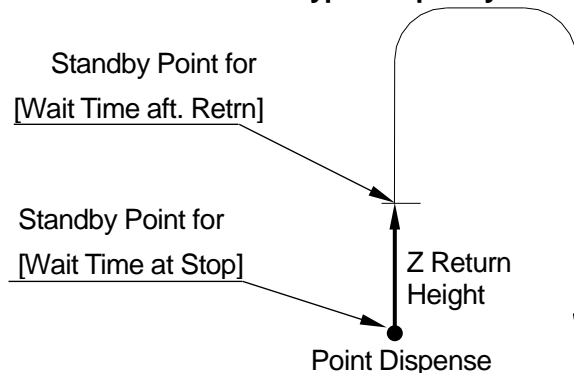
Return Type: XY Moving After Z Up
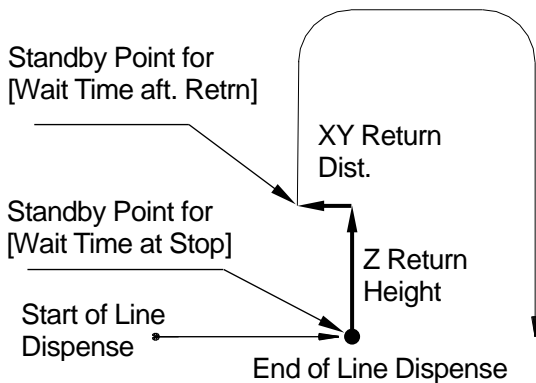
Return Type: XYZ Simultaneous
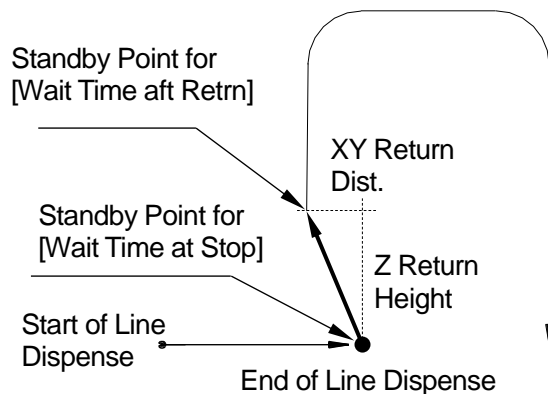
Set a positive (+) or negative (-) value for the [XY Return Dist.].

- If a positive value ([XY Return Dist.] > 0) is set, the XY axes return in the direction opposite from the direction used to reach the dispensing end position.

XY Return Dist.: Positive

- If a negative value ([XY Return Dist.] < 0) is set, the XY axes continue in the same direction as the direction used to reach the dispensing end position.

XY Return Dist.: Negative

- The return movement with circle dispensing is done in a straight line from the dispensing end position to the arc point. If the [XY Return Dist.] is a negative value, the robot returns in the opposite direction.

Arc Point
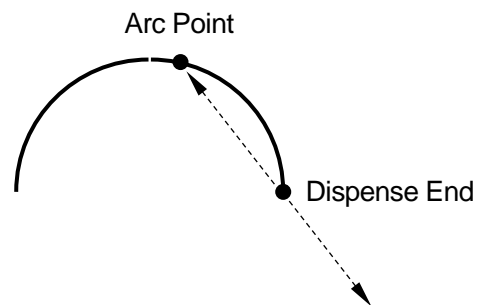
Dispense End

Dispensing Conditions in Individual Program Settings

TP ➤ | MENU | [Individual Program Settings]
　　　　　　　　　[Dispense Condition]
　　　　　　　　　　　[Return Type]
　　　　　　　　　　　[Z Return Height]
　　　　　　　　　　　[XY Return Dist.]
　　　　　　　　　　　[Return Line Speed]
　　　　　　　　　　　[Wait Time Aft. Retrn]

NOTE

Even if values are set to [Z Return Height] – [Wait Time Aft. Retrn], no return movement is performed if [Return Type] is set to [Nil].

Press the | MENU | key, select [Individual Program Settings], and then select [Dispense Condition].
The Dispense Condition settings screen is displayed as shown to the right.
Select the [Return Type] and then select and set the movement you want. The display returns to the Dispense Condition settings screen.
After selecting [Z Return Height], [XY Return

Program 1	
Wait Time at Start	**0.5 sec**
Wait Time at Stop	0 sec
Return Type	XY Move after Z Up
Z Return Height	10 mm
XY Return Dist.	30 mm
Return Line Speed	30 mm/s
Wait Time Aft. Retrn	0 sec

Dist.], [Return Line Speed], or [Wait Time Aft. Retrn], each entry screen appears accordingly. Enter and set the values you want to modify. The display returns to the Dispense Condition settings screen.

Condition Data Dispensing Conditions

▶ **TP** ▶ MENU [Dispense Condition]

Number Entry

[Return Type]

[Z Return Height]

[XY Return Dist.]

[Return Line Speed]

[Wait Time Aft. Retrn]

The dispensing operation for which you want to prevent liquid stringing at the End of Line Dispensing

↓   Stringing point

●━━━━━━━━━━━━━━━━●⌒

Start of Line Dispense   End of Line
(Point Set with   Dispense
Dispense Condition)
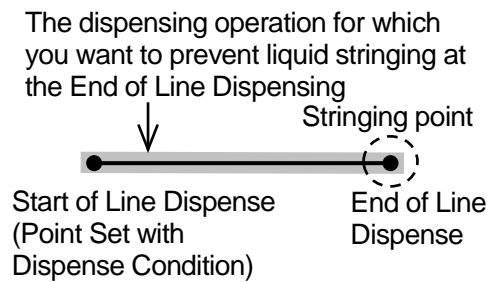
1. Press the MENU key on the settings screen of a given point, select [Dispense Condition] and enter the condition number.

    Enter and set the "dispensing return movement" you want. The display returns to the dispensing condition setting screen.

2. After selecting [Z Return Height], [XY Return Dist.], [Return Line Speed] or [Wait Time Aft. Retrn], each entry screen appears accordingly. Enter and set the values you want to modify. The display returns to the Dispense Condition settings screen.

3. On the settings screen for the point for which you want to set the dispensing condition (the point you want to prevent stringing at for the end of the line dispensing, such as a Start of Line Dispense Point) select [Condition Number] (move the cursor (highlight bar) to a blank line on the point setting screen to display the settable point jobs and condition data).

4. The dispensing condition number entry screen is displayed.

    Enter the dispensing condition number entered in 1. If you press the F3 (LIST) key to display a list of registered dispensing condition numbers, you can also select the number you want to set from this list.

    NOTE

    With the following procedure you can register dispensing conditions and also set them to points. Select [Condition Number] from the point setting screen, and when the dispensing condition number you want to set has been entered, press the F4 (VIEW) key to show the information for that number.

    You can select the item you want to edit and also modify the information here.

Return movements are executed at [End of Line Dispense] points, and/or dispensing end positions.

Dispense Conditions in Individual Program Settings

▶ **PC** ▶ [Program] → [Individual Program Settings] → [Individual Data] → [Dispense Condition]

→ [Hight Z Retracting]

[Distance of XY Retracting]

[Up Speed]

[Wait Time at Up]

Dispense Condition in Condition Data

| PC | [Data] → [Dispense Condition] → [Add/Edit] → [Hight Z Retracting] |

→ [Distance of XY Retracting]

→ [Up Speed]

→ [Wait Time at Up]

Select [Dispense Condition] from the [Individual Program Settings] – [Individual Data] dialog. The dialog below is displayed. Enter the values you want to modify in [Hight Z Retracting], [Distance of XY Retracting], [Up Speed] and [Wait Time at Up].

To register condition data dispense conditions, select [Dispense Condition] from the [Data] pull-down menu. The dialog below appears.
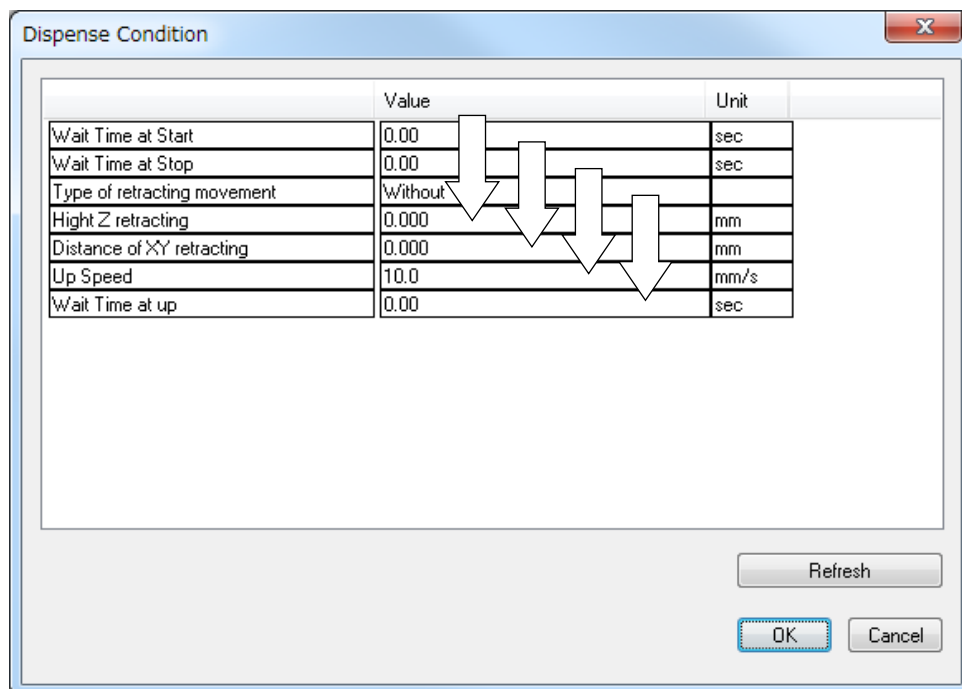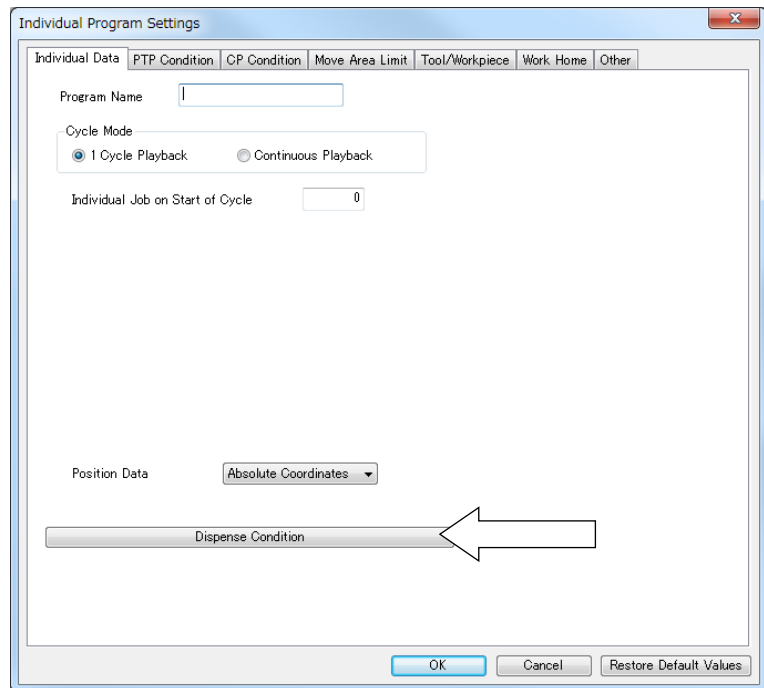
13. WORK ADJUSTMENTS FOR DISPENSING SPECIFICATIONS

With work adjustments, the Start of Line Dispense Point – End of Line Dispense point (as well as the CP Start Point – CP End Point) is considered one block of points. Therefore, if a work adjustment is set at the Start of Line Dispense point, it applies to all points through the End of Line Dispense point. However, if [Work Adjustment] is set to the points shown below in gray, you can only apply a height (Z direction) adjustment. The work adjustment set to the Start of Line Dispense point applies for the X, Y, R directions for those points.

To make a work adjustment to the height (Z direction) of the points shaded gray in the table below, create a work adjustment and set that number to the point type you want.

Settable Points for Workpiece Adjustment

Point Type	Point Dispense	Start of Line Dispense	Passing Point	CP Arc Point	End of Line Dispense	Waiting to Start	Start of Circle Dispense	Center of Circle Dispense	Zigzag Start Point	Rectangular Spiral Start Point	Hollow Rectangle Start Point	Rectangle End Point	Spiral Start Point	Hollow Spiral Start Point	Circumference of Spiral Area	PTP Point	CP Point	CP Continuous Passing Point	CP Stop Point	CP End Point	PTP Evasion Point	Circle Start Point	Circle Center Point
Settable: ✓ N/A: Blank	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓		✓	✓	✓	✓	✓		✓	

(Example)

Point	P1	P2	P3	P4	P5	P6
Point Type	Start of Line Dispense	Line Passing	Line Passing	End of Line Dispense	Start of Circle Dispense	Center of Circle Dispense
Work Adjustment number set to the point	7	8	0 (No number is set)	9	7	8
Work Adjustment number applicable to X, Y, and R directions	7	7	7	7	7	7
Work Adjustment number applicable to the Z direction	7	8	7	9	7	7

Point	P1	P2	P3	P4	P5	P6
Point Type	Start of Line Dispense	Line Passing	Line Passing	End of Line Dispense	Start of Circle Dispense	Center of Circle Dispense
Work Adjustment Number Set to the point	0 (No number is set.)	8	0 (No number is set.)	9	0 (No number is set.)	8
Work Adjustment Number Applicable to X, Y, and R directions	N/A	N/A	N/A	N/A	N/A	N/A
Work Adjustment Number Applicable to the Z direction	N/A	8	N/A	9	N/A	N/A

When drawing an arc from Start of Circle Dispense – Center of Circle Dispense points, or Circle Start Point – Circle Center Point, only the work adjustment data set to the Start of Circle Dispense or Circle Start Point applies. Even if you set work adjustment data to a Center of Circle Dispense or Circle Center Point it is not applicable.

Also note that you cannot set a work adjustment to the Center of Circle Dispense or Circle Center Points using a PC (JR C-Points II).

TP ▶ ⌐MENU⌐ [Additional Data Function Settings]
[Workpiece Adjustment Settings]

If you move the cursor to a blank line on a point setting screen, the settable point jobs and condition data for that point are displayed. Select [Workpiece Adjustment] here, and set the workpiece adjustment number you created.

PC ▶ [Data] → [Additional] → [Work Adjustment] → [Add/Edit]

14. PURGING THE DISPENSING AGENT

You can purge the dispensing agent at your own discretion.

If in Switch Run/External Run Mode, make sure the robot is in run standby.

■ Switch Run Mode

Press the purge switch. While the purge switch is pressed the dispenser is ON. Release the purge switch to turn the dispenser OFF.

■ External Run Mode

Turn ON the purge by external signal (#sysIn14). The dispenser is ON when the purge by external signal (#sysIn1) is ON. Turn OFF the purge by external signal and the dispenser also turns OFF.

■ Teaching Mode

TP Press the purge switch. While the purge switch is pressed, the dispenser is ON. Release the purge switch to turn the dispenser OFF.

PC If you are operating the robot from a PC, create and use point job data that turns the dispenser ON and set the JOG operation dialog to [Point Job].

Point Job Example (the dispenser comes ON for 1 second when executed)

```
Set #sysOut10
Delay 1000
Reset #sysOut10
```

14.1 Purge Switch

Press the purge switch (Option Switch 1) located on the front of the robot or on the switchbox (optional). Press the purge switch to turn the dispenser ON, release it to turn the dispenser OFF.

However, if [Dispenser Mode] is set to [Timer] and [Dispenser Type] is set to [Busy Signal Operation] or to [Finish Signal Operation], pressing the purge switch will initiate the following operation:

The dispenser turns ON according to the time set for it. This is repeated while the purge switch is pressed. Dispensing continues until the time set on the timer runs out even if the purge switch is released before the time runs out.

```
              End/Start              End
    |─────────────────►|─────────────────►|- - - -     Repeats
    |                  |                  |            until purge
    Time set to timer   Time set to timer             switch is
    (Dispenser)         (Dispenser)                    released.
```
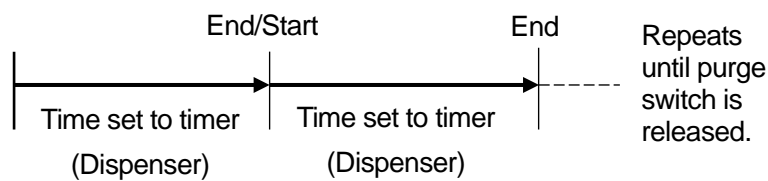
TP ▶ MENU [Dispenser]
                [Purge Switch]

Press the MENU key and select [Dispenser]. The selection screen for the dispenser's settable items appears as shown on the right. Select [Purge Switch] and then select the item you want to set.

```
                    Dispenser
IO Function Assignment
Dispenser Type           No Response Signal
Dispenser Mode                      Steady
Purge Switch                 Constant Valid
Purge by ext. signal       Constant Invalid
Automatic purge                      Valid
Cycle of automatic purge           1.0 sec
Time of automatic purge            0.5 sec




```

Dispenser Selection Screen

- Constant Valid

  The purge operation is executed regardless of the robot's status when the purge switch is pressed. (Do not push the purge switch during a dispensing operation in a run. The dispensing operation will not be able to be performed properly.)

- Invalid During Run

  The purge operation is not executed when the robot is running even if the purge switch is pressed.

- Constant Invalid

  The purge operation is not executed even if the switch is pressed regardless of the robot's status.

14.2 Purge by Ext. Signal (#sysIn14)

To use this signal, connect the remote purge switch to IO-SYS #sysIn14, and then press the remote purge switch. When the remote purge switch is pressed the dispenser turns ON, when it is released the dispenser turns OFF. However, if [Dispenser Mode] is set to [Timer] and [Dispenser Type] is set to [Busy Signal Operation] or to [Finish Signal Operation], pressing the purge switch will initiate the following operation:

The dispenser turns ON according to the time set for the dispenser. This is repeated while the purge switch is pressed. Dispensing continues until the time set on the timer runs out even if the purge switch is released before the time runs out.

```
                    End/Start              End
                        |                   |        Repeats
          |─────────────────────►|─────────────────────►|- - - -   until purge
          |                       |                   |            switch is
          Time set to timer       Time set to timer                released.
          (Dispenser)             (Dispenser)
```
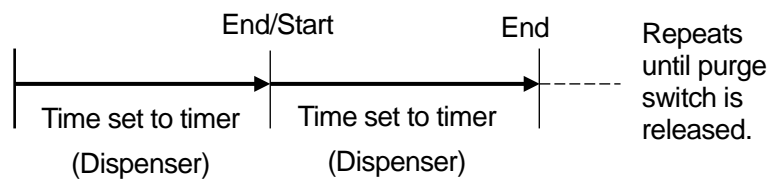
| TP ► | MENU | [Dispenser]
[Purge by ext. signal]

Press the │ MENU │ key and select [Dispenser]. The selection screen for the dispenser's settable items appears as shown on the right. Select [Remote Purge Signal] and then select the item you want to set.

```
                  Dispenser
 IO Function Assignment
 Dispenser Type          No Response Signal
 Dispenser Mode                     Steady
 Purge Switch               Constant valid
 Purge by ext. signal       Constant valid
 Automatic Purge                   Invalid
 Cycle of automatic purge         1.0 sec.
 Time of automatic purge          0.5 sec.


```

Dispenser Selection Screen

- Constant Valid

  The purge operation is executed regardless of the robot's status when the remote purge switch is pressed. (Do not push the remote purge switch during a dispensing operation in a run. The dispensing operation will not be able to be performed properly.)

- Invalid During Run

  The purge operation is not executed when the robot is running even if the remote purge switch is pressed.

- Constant Invalid

  The purge operation is not executed even if the remote purge switch is pressed regardless of the robot's status.

NOTE

If the #sysIn14 function assignment is not set to [Remote Purge Signal], the setting for the [Remote Purge Signal] is disabled.

14.3 Automatic Purge

You can purge the dispensing agent automatically after one run cycle ends. This is called [Automatic Purge]. For the [Automatic Purge] function, the dispenser turns ON for the time set in [Time of automatic purge] for one [Cycle of automatic purge]. [Cycle of automatic purge] repeats until a run is started. The [Time of automatic purge] is disabled when [Dispenser Mode] is set to [Timer]. The time set in [Timer] for the dispenser becomes the [Time of automatic purge].

When one run cycle ends, [Automatic Purge] is executed once the robot returns to the work home position. If the robot is set to [Continuous Playback] (individual program settings), [Automatic Purge] is not executed as the dispenser does not return to the work home position.

TP ▶ MENU [Dispenser]
        [Automatic Purge]
        [Cycle of automatic purge]
        [Time of automatic purge]

Press the MENU key and select [Dispenser]. The selection screen for the dispenser's settable items appears as shown on the right. Select [Automatic Purge] and then select [Valid].

Dispenser	
IO Function Assignment	
Dispenser Type	No Response Signal
Dispenser Mode	Steady
Purge Switch	Constant Valid
Purge by ext. signal	Constant Disabled
Automatic Purge	Valid
Cycle of automatic purge	1.0 sec.
Time of automatic purge	0.5 sec.

Dispenser Selection Screen

Arrives at Work Home — Auto Purge Time — Auto Purge Cycle — Repeats — Ends with a run start
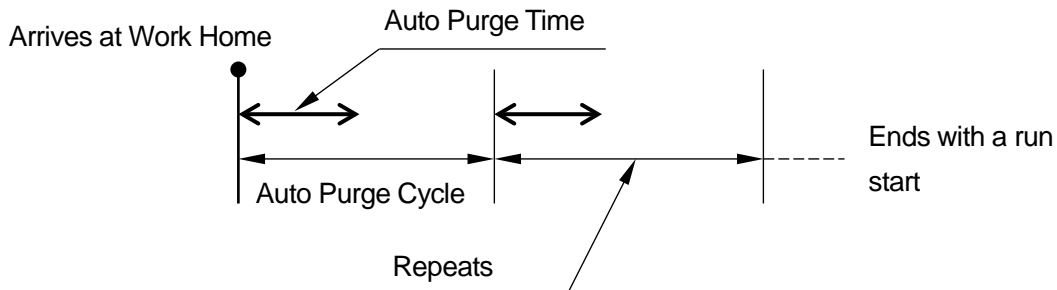
When [Dispenser Mode] is set to [Timer], if a run is started during the purge operation (the robot is dispensing), the run starts after the time set to the dispenser ends.

If the time set in [Cycle of automatic purge] is shorter than the time set to the dispenser, the timing for the next purge cycle will overlap with the purge operation being executed. If this happens, the current purge operation being executed will continue, however the overlapping purge operation will not be executed.

NOTE

To end the purging operation without starting a run, push the emergency stop switch. However, if [Dispenser Mode] is set to [Timer], the purge operation being executed will continue, but following purge operations will not be executed.

15. USING NEEDLE ADJUSTER 2 (OPTIONAL) (3 AXIS SPECIFICATIONS ONLY)

NOTE

For 4 axis specifications, refer to "3.2.1 TCP Automatic Adjustment Functions (4 Axis Specifications Only)."

The Janome Needle Adjuster 2 features a slim and compact structure with high resolution sensors.

Needle Adjuster 2 has a simple structure using two infrared sensors and can support a wide range of nozzles; there is the standard specification type (PR-1) supporting needle dimensions of ϕ0.35 to 2.5mm and the EXF specification type (PR-2) that supports needle dimensions of ϕ0.20 to 1.0mm.

In addition, for the sensor areas which can easily get dirty, Needle Adjuster 2 is equipped with detachable sensors for simple and economical replacement.

Needle Adjuster 2 is available with either NPN or PNP specifications.

NOTE

To use Needle Adjuster 2 (optional), the robot requires a needle adjuster connector (optional). For robots with no needle adjuster connector, you cannot use Needle Adjuster 2.

■ Precautions

- Needle nozzles which are severely bent might be undetectable by Needle Adjuster 2 (this can particularly occur when using fine needles).
- Transparent taper nozzles (plastic translucent nozzles etc.) might be undetectable by Needle Adjuster 2. Also, errors may still occur even if the needle is detected.
- Before you use the needle adjuster functions, check to make sure that there is no dispensing agent dripping from the nozzle. If the sensor area gets dirty, it cannot detect nozzles.
- Needle Adjuster 2 is a dedicated 3 axis desktop robot device.
- As this device uses an infrared LED, the device may react to infrared light emitted from a heater and malfunction. Avoid using this device in combination with a heater.
- Avoid using this device near sunlight, tungsten lamps, electric heaters, or near machines and lighting equipment that emit a lot of infrared rays (or rays of light that feel warm to the skin). Doing so can cause malfunction.
- Multiple nozzles of various dimensions cannot be detected during the same job. If the nozzle dimensions change, reteach the points or adjust the positions using [XYZR Offset]*.
- If you want to use needle adjuster functions with an existing program, perform standard registration of the needle adjuster functions after adjusting the point positions using [XYZR Offset]*.

*For further details regarding [XYZR Offset], refer to "7.1.3 Block Editing" in the operation manual *Teaching Pendant Operation*.

15.1 Needle Adjuster 2 Overview

Use Needle Adjuster 2 by attaching it to the X table.

If you teach a program such as the one shown below which only contains 2 points and then load the nozzle position as standard data, when you replace nozzles you can automatically adjust the nozzle position by simply running the program.

(You need to run this program every time you replace the nozzle.)

—— : Light (Infrared)
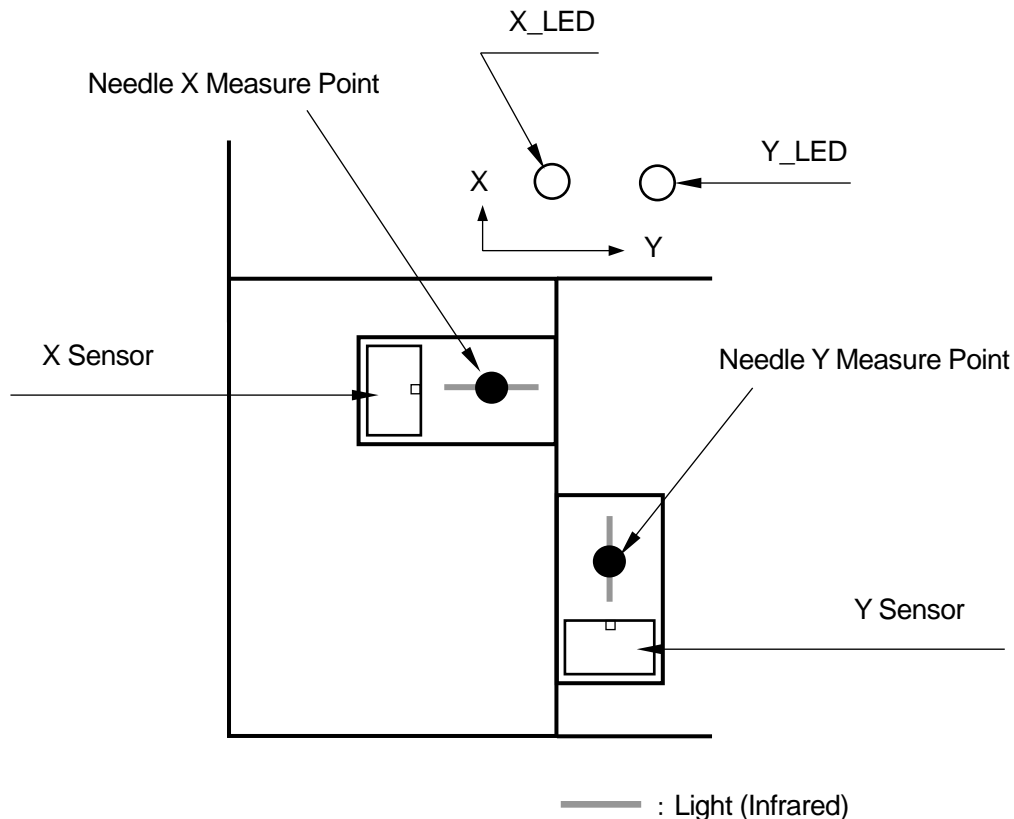
Register [Needle X Measure Point] and [Needle Y Measure Point] to a given program number.

Needle measuring in the X direction is determined by [Needle X Measure Point] and needle measuring in the Y direction is determined by [Needle Y Measure Point].

Register the nozzle tip length at the measuring point and the standard positions for the X/Y directions in the Teaching Mode menu. At this time, the TCP (tool data) is used as (0, 0, 0).

When replacing the nozzle, and you run this program, Needle Adjuster 2 makes adjustment (overwrites the tool data) for the position of the new nozzle tip position by comparing it to the registered standard position data.

15.2 Teaching and Making Standard Registration of Measuring Points

Make sure the robot and Needle Adjuster 2 are properly connected and set the nozzle the same as it is during a run.

15.2.1 New Program

Open a new program.

Create a dedicated measuring program separate from programs that are used to actually perform jobs.

15.2.2 Point Teaching

Register the measuring points as the first and second points in the program.

Register a total of two points: the nozzle measuring position for the X direction to [Needle X Measure Point] and the nozzle measuring position for the Y direction to [Needle Y Measure Point]. These points can be registered in any order.

Also, register the measuring points so that the nozzle is at a height where it blocks the light.

If the light is blocked, the corresponding LED turns OFF.

(When the light is blocked at the X measuring point, the X_LED turns OFF and the Y_LED turns OFF when the light is blocked at the Y measuring point).

——————: Light (Infrared)
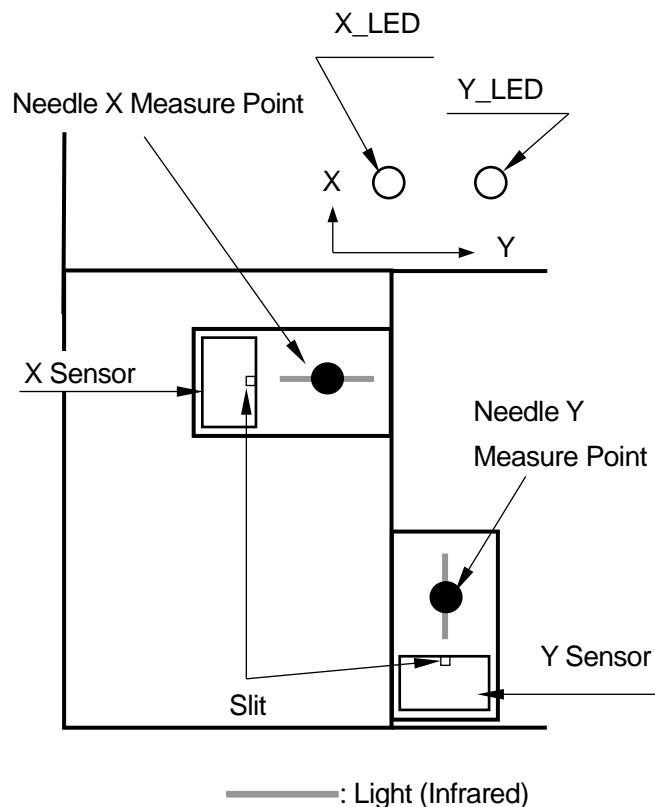
Standard Nozzle Height

2.3mm
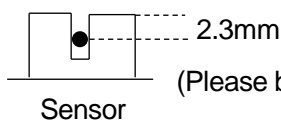
(Please be aware that there can be a broad height variance)

Sensor

When you enter point coordinates, the point type selection screen is displayed.

Use the CURSOR ▼ to move down the screen or the . key to display the screen to the right.

Select [Needle X Measure Point] and [Needle Y Measure Point].

```
          Select Point Type        3/3
Needle X Measurement
Needle Y Measurement




```
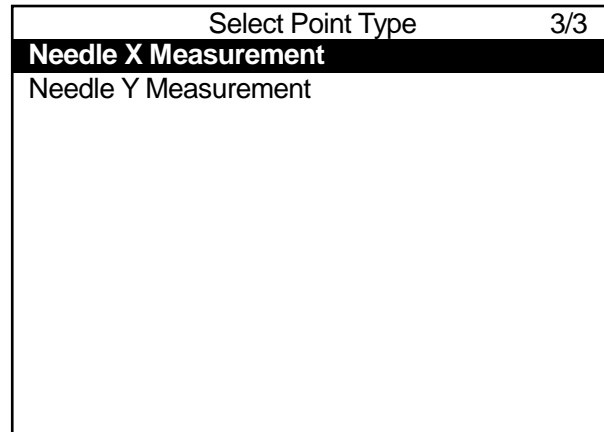
15.2.3 Standard Registration

After you enter the X/Y measuring points, register the needle standard position.

When you use the needle adjuster functions, Needle Adjuster 2 calculates the adjustment by comparing the position of the needle with the values registered here.

Press the MENU key to open the Teaching Mode menu, and select [Standard of Needle Adjustment].

This item is displayed in the Teaching Mode menu only when programs that include needle measuring points are selected.

```
          Teaching Mode Menu
Individual Program Settings
Dispenser Condition
Dispenser
Additional Function Data Settings
Point Job Settings
Variable, Function, Alias Settings
Sequencer Settings
Run Mode Parameter
Teaching Data Copy, Delete, Conversion
Standard of Needle Adjustment

```
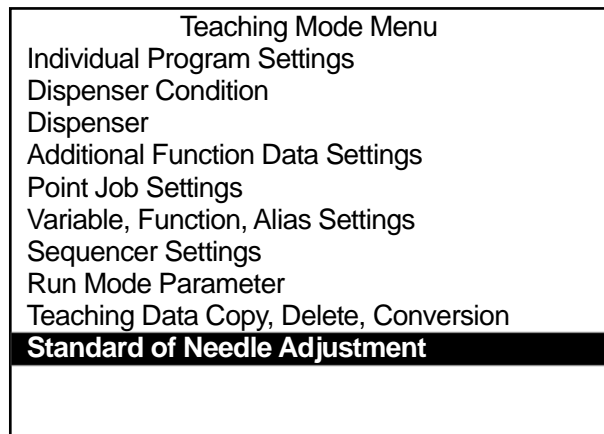
Once you select [Standard of Needle Adjustment], the screen shown to the right appears and the axes move to the registered measuring points.

```
     Standard of Needle Adjustment


    Measurement of Needle Adjustment



           Exit with [ESC]


```
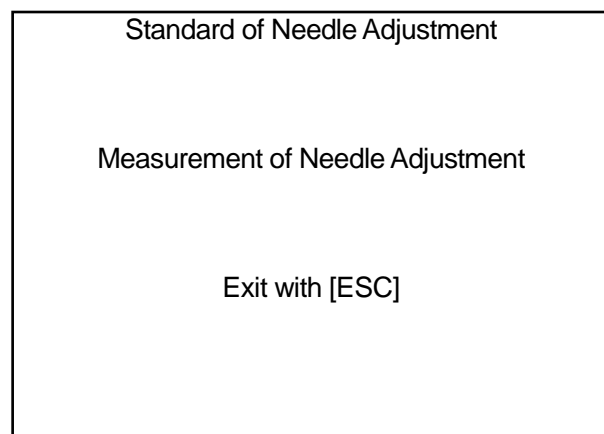
Once the operation is complete, return to the base screen.

NOTE

Standard needle adjustment registration cannot be performed from a PC.

15.2.4 Execution

Once you have replaced the nozzle, switch to Run Mode and execute the program that has [Needle X Measure Point] and [Needle Y Measure Point] registered.

By running this program, the difference between the obtained nozzle position and the nozzle position measured/registered with [Standard of Needle Adjustment] is registered to the tool data in all programs as [TCP-X], [TCP-Y] and [TCP-deltaZ]. (However, this does not include the program in which the measuring points themselves are registered)

NOTE

- If measurement cannot be made correctly with [Needle X Measure Point] and [Needle Y Measure Point], error No.056 "Needle Measurement Error" occurs. If this happens, please reregister the measurement points.

  If the error still persists, it is possible that the sensor printed circuit board has malfunctioned. Please replace the sensor printed circuit board.

- The Needle Adjuster 2 functions do not affect the [Tool Data] values in Additional Function Data.

- If there is a point near the end of the operating range (the X/Y coordinates are close to either 0 or the maximum value), the point position may go out of range (error No.007 "Position is Out of Range") while adjusting using Needle Adjuster 2. Do not register points near the ends of the operating range when using Needle Adjuster 2.

Power ON

External/Switch Run Mode | Teaching Mode

F・1 LANG — English, Japanese, German, Italian, Spanish, French, Korean, Simplified Chinese, Czech, Vietnamese

External/Switch Run Mode — F・1 LANG — Start (Initialize)
Teaching Mode — F・4 (Initialize) — F・1 LANG

MODE

External/Switch Run Mode
- Run
  - Existing
- PRG.NO — Program Number ► Error
  - New
- MENU — PTP Speed Override, Error History
- UTILITY ► (A)-1

Teaching Mode
- UTILITY
  - Teaching Environment Setting ► (A)
  - Test Menu — Check Data, Test Run, IO Test, Test Run (Check IO), IO Test (Fieldbus), Test Run (Fieldbus Check IO), Check IO (Fieldbus)
  - MEMORY Port — Write USB Memory, Read USB Memory
  - Error History
  - TCP Auto Measurement
- SAVE ► Save Data
- PRG.NO — Program Number
  - F・0 (DEL) — Delete Program
  - F・1 (COPY) — Copy Source Program No. — Copy Dest. Program No.
  - F・2 (NEW) — Display Unregistered Program Number List
  - F・3 (LIST) — Display Registered Program Number List
  - F・4 (GLIST) — Display Program Graphic
  - Existing
  - New (D)
- CURSOR ► Displays next point
  - Input Position — ENTER — Select Point Type ► (D)
    - F・2 (JOG)
    - F・3 MDI — GO — Move to Input Position
    - (J)
- CURSOR ◄ Displays previous point
  - Existing
  - Coordinates
  - Select Point Type ► (J)
  - CURSOR ▼ — Additional Function Data
  - F・0 (S.MARK) — Set to Block Start Number
  - F・1 (E.MARK) — Set to Block End Number
  - F・3 (J.EXEC) — Execute Displayed Point Job
  - F・4 (P.EXEC) — After Executing Displayed Point Job, Go to Next Point Screen
  - GO — Move to Displayed Point Position
- EDIT
  - Insert a Point
  - Delete a Point
  - Block Editing — Block Start Number — Block End Number
    - Delete Block Points
    - Move Block Points
    - Copy Block Points
    - XYZR Offset
    - Mirror Copy (Right - Left)
    - Mirror Copy (Front - Back)
    - Block Rotation
    - Copy Block Rotation
    - JOG Offset
  - Common Block Settings — Block Start Number — Block End Number
    - Common Line Speed Settings
    - Multiple Line Speed
    - PTP Condition Number
    - CP Condition Number
    - Tool Number
    - Pallet Routine Number
    - Execute Condition Number
    - Work Adjustment Number
  - Convert to Relative Coordinates
- MENU ► (B)

(J) Select Point Type
- Point Dispense — Dispense Time
- Start of Line Dispense — Line Speed
- Line Passing — Dispense ON/OFF
- CP Arc Point — Line Speed
- End of Line Dispense
- Wait Start Point
- Start of Circle Dispense — Line Speed, Dispense ON/OFF
- Center of Circle Dispense — Circle Angle
- Zigzag Start Point — Direction, Painting Speed, The number of pitches
- Rectangular Spiral Start Point — Painting Speed, The number of pitches
- Hollow Rectangle Start Point — Painting Speed
- Rectangle End Point — The number of pitches, Filling width
- Spiral Start Point — Painting Speed, The number of pitches, Line dispense
- Hollow Spiral Start Point — Painting Speed, The number of pitches, Line dispense, Filling width
- Circumference of Spiral Area 1
- Circumference of Spiral Area 2
- PTP Point
- CP Start Point — Line speed
- CP Passing Point
- CP Stop Point
- CP End Point
- PTP Evasion Point
- Circle Start Point
- Circle Center Point — Circle Angle
- X Needle Measure Point
- Y Needle Measure Point

Administration
- UTILITY ► (A)-1
- Administration Settings Mode
  - Start Channel — IO-SYS, Fieldbus, COM1, User Definition
  - Change Program Number — Teaching Pendant (Valid/Invalid), Operation Switch (Valid/Invalid), IO-SYS (Valid/Invalid), Fieldbus (Valid/Invalid), COM1 (Valid/Invalid)
  - COM Settings — COM 1 - 3 Communication Settings — Baud Rate (2400, 4800, 9600, 19200, 38400, 57600, 76800, 115200), Character Length (8 Bit, 7 Bit), Stop Bit (1 Bit, 2 Bit), Parity (None, Even Parity, Odd Parity)
  - Ethernet Settings
  - Fieldbus Settings
  - MEMORY Port Settings
  - Back Light Auto OFF — Auto OFF Invalid, ON with Key or at Start, ON with Key, ON at Start, Always OFF — Wait Time
  - Clock Settings
  - Clear Error History
  - Clear All C&T Data
  - Reset Teaching Environment Settings
  - Reset Administration Settings
- Diagnostic Mode
- Mechanical Adjustment Mode — Sensor Adjustment
- Version Information
- Error History

Customizing Mode
(C)

Teaching Pendant Keys, Teaching Pendant, Switches, Buzzer and LEDs, State of Sensor, X Axis Motor, Y Axis Motor, Z Axis Motor, R Axis Motor, Position of Sensor, External IO, Emergency Stop Related, COM 1-3 Communication, MEMORY PORT, Ethernet, Fieldbus

(A)
- Screen Contrast
- Unit of Measurement — Millimeters, Inches
- Display Language — English, Japanese, German, Italian, Spanish, French, Korean, Simplified Chinese, Czech, Vietnamese (A)-1
- GO Function — PTP Speed
- JOG Function — Low Speed, Medium Speed, High Speed, Low Step, Middle Step, High Step, R-Axis Low Step, R-Axis Middle Step, R-Axis High Step
  - R-Axis Rotate Speed, R-Axis Acceleration, Relative Mode/Absolute Mode, Z Move Height/Horizontal Move Pos'n, Z Up Distance/Start Horizontal, Z Down Distance/Start Down Pos'n
- Tool for Teaching — Tool for Teaching — Invalid, Tool 1-5 Valid
  - Setting Tool for Teaching 1-5 — Tool Mass, TCP-X, TCP-Y, TCP-deltaZ, Direct TCP-XY Setting, Start TCP Auto Measurement
- Manual Job Number Settings — F1-F12 Key Job Numbers
- Key Click — Robot: OFF TP Panel: OFF, Robot: ON TP Panel: OFF, Robot: OFF TP Panel: ON, Robot: ON TP Panel: ON
- Back Light on Teaching — ON, OFF
- Save on Changing Mode — Valid, Invalid
- Coordinates Display — Normal Display, Detailed Display

(B) Individual Program Settings

- Program Name
- Dispense condition
  - Wait Time at Start
  - Wait Time at Stop
  - Return type
  - Z return Height
  - XY return dist.
  - Up Speed
  - Wait Time at up
- Individual Job on Start of Cycle
- Cycle Mode
  - 1 Cycle Playback
  - Continuous Playback
- Position Data Type
  - Absolute
  - Relative
  - Moving Amount
- Work Home
- PTP Condition
  - Individual
  - Common
    - PTP Speed
    - R-Axis Rotate Speed
    - R-Axis Acceleration
- CP Condition
  - Individual
  - Common
    - CP Acceleration
    - R-Axis Rotate Speed
    - R-Axis Acceleration
    - Relative Mode/Absolute Mode
    - Z Move Height/Horizontal Move Pos'n
    - Z Up Distance/Start Horizontal
    - Z Down Distance/Z Start Down Pos'n
- Tool Data
  - Individual
  - Common
    - Tool Mass
    - TCP-X
    - TCP-Y
    - TCP-deltaZ
    - Direct TCP-XY Setting
    - Start TCP Auto Measurement
- Move Area Limit
  - Individual
  - Common
    - X Upper Limit
    - Y Upper Limit
    - Z Upper Limit
    - R Upper Limit
    - R Lower Limit
- Workpiece Mass (JR3200 does not have this function) — Common/Individual
- Restart Method After Pos. Offset (JR3000E Series only) — Common/Individual
- Valid/Invalid Settings of Move Axis (only for robots with auxiliary axis functions)

- Dispense condition
  - Wait Time at Start
  - Wait Time at Stop
  - Return type
  - Z return Height
  - XY return dist.
  - Up Speed
  - Wait Time at up
- Dispenser
  - IO Function Assignment
    - Dispenser ON
      - IO-SYS (sysIn)
      - IO-1 (genIn)
      - IO-FB (fbIn)
      - IO-SYS (sysOut)
      - IO-1 (genOut)
      - IO-FB (fbOut)
      - Internal Relay (mv)
      - Keep Relay (mkv)
        - IO-SYS (sysOut)
        - IO-1 (genOut)
        - IO-FB (fbOut)
        - Internal Relay (mv)
        - Keep Relay (mkv)
  - Dispenser Type
    - No Response Signal
    - Busy Signal Operation
    - Finish Signal Operation
    - Dispensor Response
      - Purge by external signal
      - X Needle Sensor
      - Y Needle Sensor
        - Constant Valid
        - Valid During Run
        - Constant Invalid
  - Dispenser Mode
    - Steady
    - Timer
  - Purge switch
  - Purge by ext. signal — Valid/Invalid
  - Automatic purge
  - Auto Purge Cycle
  - Auto Purge Time
- Additional Function Data Settings → (F)
- Point Job Settings — Point Job Number — Select Command Category — Select Command
- Variable, Function, Alias Settings
  - Global Variables Definition
  - Keeping Variables Definition
  - User Function Definition
  - Alias Definition
- PLC Settings — PLC Number — Select Command Category — Select Command
- All Program Common Settings
  - IO Settings
    - Program Number Switching Method
    - Program Number Reading Format
      - Binary Code
      - BCD (Binary Coded Decimal)
        - LOAD/ACK Handshake
        - Load at Start (IO-SYS)
        - Load at Start (FieldBus)
    - IO-SYS Function Assignment
    - Fieldbus Function Assignment
    - Fieldbus Expansion IO Function — Invalid/Valid
    - IO-S Function Settings
      - Emergency
      - Interlock
  - Job and PLC on Run Mode
    - 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
  - Point Reset Settings
    - Reset at Power ON — Valid/Invalid
    - Reset at Emergency — Valid/Invalid
    - Reset at Going Home — Valid/Invalid
  - Other Parameters
    - Initialize
      - Work Home on Start
      - Work Home after First Cycle
      - Work Home after Initialize
    - Initialize at Start — Valid/Invalid
    - Position Error Check — Valid/Invalid
    - Order of Init.
      - Simultaneously
      - X before Y
      - Y before X
    - Stop by Start Switch — Valid/Invalid
    - Initialization Speed(X-Axis)
    - Initialization Speed(Y-Axis)
    - Initialization Speed(Z-Axis)
    - Initialization Speed(R-Axis)
    - PTP Auto Restart (JR3000E Series Only) — Valid/Invalid
  - Work Adjustment (XY) on CP
    - Apply CP Start Function To All Points
    - Apply Separately To Each Point
  - Work Home
  - PTP Condition
    - PTP Speed
    - R-Axis Rotate Speed
    - R-Axis Acceleration
  - CP Condition
    - CP Acceleration
    - R-Axis Rotate Speed
    - R-Axis Acceleration
    - Relative Mode/Absolute Mode
    - Z Move Height/Horizontal Move Pos'n
    - Z Up Distance/Start Horizontal
    - Z Down Distance/Start Down Pos'n
  - Tool Data
    - Tool Mass
    - TCP-X
    - TCP-Y
    - TCP-deltaZ
    - Direct TCP-XY Setting
    - Start TCP Auto Measurement
  - Move Area Limit
    - X Upper Limit
    - Y Upper Limit
    - Z Upper Limit
    - R Upper Limit
    - R Lower Limit
  - Workpiece Mass (JR3200 does not have this function)
  - Restart Method After Pos. Offset (JR3000E Series only)
    - nothing
    - same point
    - next point
  - Valid/Invalid Settings of Move Axis (only for robots with auxiliary axis functions)
- Teaching Data Copy, Delete, Conversion → (H)

(F)

- PTP Condition Settings — PTP Condition Number
  - PTP Speed
  - R-Axis Rotate Speed
  - R-Axis Acceleration
  - Relative Mode/Absolute Mode
  - Z Move Height/Horizontal Move Pos'n
  - Z Up Distance/Start Horizontal
  - Z Down Distance/Start Down Pos'n
- CP Condition Settings — CP Condition Number
  - CP Acceleration
  - R-Axis Rotate Speed
  - R-Axis Acceleration
- Point Tool Data Settings — Tool Number
  - Numeric TCP
  - Set TCP by Camera
    - Tool Mass
    - Point Tool TCP — Preference / Adding
    - TCP-X
    - TCP-Y
    - TCP-deltaZ
    - Direct TCP-XY Setting
    - Start TCP Auto Measurement
      - Tool Mass
      - Point Tool TCP — Preference / Adding
      - TCP-X
      - TCP-Y
      - TCP-deltaZ
      - Direct TCP-XY Setting
      - Start TCP Auto Measurement
- Pallet Routine Data Settings — Pallet Routine Number
  - Plane Pallet
  - Cubic Pallet
  - Row
  - 1 Point Repeat
  - Circle Pallet
  - Repeat By Camera
- Workpiece Adjustment Settings — Work Adjustment Number
  - Numeric Adjustment
    - X Adjustment
    - Y Adjustment
    - Z Adjustment
    - R Adjustment
    - Rotate Adjustment
    - Z-Adjustment
      - Z-Adjustment with COM
        - Z-Adjustment COM Port
          - COM1
          - COM2
          - COM3
        - Get Standard Data
        - Z Standard Data
      - Going Down Z-Adjustment
        - Input Channel
        - Down Speed
        - Distance Limit
        - Get Standard Data
        - Z Standard Data
  - Camera Comm Settings
    - Camera COM Port
      - COM1
      - COM2
      - COM3
    - Camera Preset
      - A210/110
      - PV310
      - PV510
      - CV3000
  - Calibration
    - Calibration Mark Number
    - Get Calibration Mark
    - Robot Coordinate Position
    - Camera Facing Up/Down
    - Calculate and Register
    - Unit Coefficient
    - Rotate Angle
    - X Shifting Amount
    - Y Shifting Amount
    - Calibration Position
  - Standard Data Setting
    - Standard Mark Number
    - Get Standard Data
  - Apply Rotation to R-Axis/Do Not Apply Rotation to R-Axis
  - R Rotation
- CCD Camera Adjustment
  - Camera Comm Settings
    - Camera COM Port
      - COM1
      - COM2
      - COM3
    - Camera Preset
      - A210/110
      - PV310
      - PV510
      - CV3000
- CCD Camera Adj With Counter
  - Auto Increment
  - Increment by Point Job
  - Calibration
    - Standard Settings
      - Calibration Mark Number
      - Get Calibration Mark
      - Robot Coordinate Position
      - Camera Facing Up/Down
      - Calculate and Register
      - Unit Coefficient
      - Rotate Angle
      - X Shifting Amount
      - Y Shifting Amount
      - Calibration Position
        - Camera Data Acquisition No Movement
        - Camera Data Acquisition Movement (Y)
        - Camera Data Acquisition Movement (R)
    - Simple Settings
      - Camera Facing Up/Down
      - Start Auto Calibration
      - Reference Coefficient
      - Calibration Position
  - Standard Data Setting
    - Standard Mark Number
    - Get Standard Data
  - Execute Parameter Setting
    - Apply Rotation/ Do Not Apply Rotation to R-Axis
    - Reset/Do not Reset Z Adjustment
    - Reset/Do Not Reset at Program Start
  - Display Adjustment
    - X Adjustment
    - Y Adjustment
    - Z Adjustment
    - R Adjustment
    - Rotate Adjustment
  - Z-Adjustment
    - Z-Adjustment with COM
      - Z-Adjustment COM Port
        - COM1
        - COM2
        - COM3
      - Get Standard Data
      - Z Standard Data
    - Going Down Z-Adjustment
      - Input Channel — IO-SYS(sysIn) / IO-1(genIn)
      - Down Speed
      - Distance Limit
      - Get Standard Data
      - Z Standard Data
- Execute Condition Settings — Execute Condition Number — Condition

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(C)

UTILITY → **(A)-1**

Teaching Mode Customizing
- Teaching Mode Display Settings
  - Application Caption → **(G)**
  - Condition Data Caption
  - Common Data Caption
  - Program Data Caption
  - Additional Function Data Settings — Valid/Invalid
  - Point Job Settings — Valid/Invalid
  - Variable, Function, Alias Settings — Valid/Invalid
  - PLC Settings — Valid/Invalid
  - All Program Common Settings — Valid/Invalid
  - Order of Point Type
  - Order of Condition Data
  - Order of Common Data
  - Order of Program Data
- Teaching Mode Job, PLC
  - [0] - [9] Key Job Number
  - Job On Start of Teaching Mode
  - Job On Emergency in Teaching Mode
  - Job on End of Cycle in P.EXEC — Invalid/Valid
  - [0] - [9] Job on Key Release

All Program Common Default Settings
- IO Settings
  - Program Number Switching Method
    - LOAD/ACK Handshake
    - Load at Start (IO-SYS)
    - Load at Start (Fieldbus)
  - Program Number Reading Format
    - Binary Code
    - BCD (Binary Coded Decimal)
  - IO-SYS Function Assignment
  - Fieldbus Function Assignment
  - Fieldbus Expansion IO Function — Invalid/Valid
  - IO-S Function Settings
    - Emergency
    - Interlock
- Job and PLC on Run Mode
  - 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
- Point Reset Settings
  - Reset at Power ON — Valid/Invalid
  - Reset at Emergency — Valid/Invalid
  - Reset at Going Home — Valid/Invalid
- Other Parameters
  - Initialize
    - Work Home on Start
    - Work Home after First Cycle
    - Work Home After Initialize
  - Initialize at Start — Valid/Invalid
  - Position Error Check — Invalid/Valid
  - Order of Init.
    - Simultaneously
    - X before Y
    - Y before X
  - Stop by Start Switch — Valid/Invalid
  - Initialization Speed (X-Axis)
  - Initialization Speed (Y-Axis)
  - Initialization Speed (Z-Axis)
  - Initialization Speed (R-Axis)
  - PTP Auto Restart (JR3000E Series Only) — Valid/Invalid
- Work Adjustment (XY) on CP
  - Apply CP Start Function To All Points
  - Apply Separately To Each Point
- Individual/Common Settings
- Individual Job on Start of Cycle
- Cycle Mode
  - 1 Cycle Playback
  - Continuous Playback
- Position Data Type
  - Absolute
  - Relative
  - Moving Amount
- Work Home
- PTP Condition
  - PTP Speed
  - R-Axis Rotate Speed
  - R-Axis Acceleration
  - Relative Mode/Absolute Mode
  - Z Move Height/Horizontal Move Pos'n
  - Z Up Distance/Start Horizontal
  - Z Down Distance/Start Down Pos'n
- CP Condition
  - CP Acceleration
  - R-Axis Rotate Speed
  - R-Axis Acceleration
- Tool Data
  - Tool Mass
  - TCP-X
  - TCP-Y
  - TCP-deltaZ
  - Direct TCP-XY Setting
  - Start TCP Auto Measurement
  - Set Standard TCP
  - Standard Data Setting for Z
- Move Area Limit
  - X Upper Limit
  - Y Upper Limit
  - Z Upper Limit
  - R Upper Limit
  - R Lower Limit
- Workpiece Mass (JR3200 does not have this function)
- Restart Method After Pos. Offset (JR3000E Series only)
  - nothing
  - same point
  - next point
- Valid/Invalid Settings of Move Axis (only for robots with auxiliary axis functions)

Account
- Login
- Make New Account — Enter a Login Name
- Delete Account — Enter the security code
- Account — Logout

Point Type Definition
- Protect Mode
  - No Limit
  - Public
  - Protected
  - Private
- Base Type → **(I)**
- Point Type Caption → **(G)**
- Job before Moving — Select command category — Select command
- Job while Moving
- Job after Moving
- Job while CP Moving
- Additional Function Number
  - PTP Condition Number
  - CP Condition Number
  - Tool Number
  - Pallet Routine Number
  - Execute Condition Number
  - Work Adjustment Number
- Point Setting Variables Definition
  - Variable Type
    - Enumeration Type
      - Variable Caption → **(G)**
      - TP Input Method — Default / Input
      - Number of Selections
      - Selection Item Caption → **(G)**
    - Numeric Type
      - Variable Caption → **(G)**
      - TP Input Method — Default / Input
      - Input Unit
        - No Unit
        - Time
        - Length
        - Deg
        - Speed
        - Percentage
        - Anglar velocity
        - Acceleration
        - Number of rotations
        - Temperature
        - Weight
        - Milli Time
        - Minute Time
        - Angle acceleration
      - Smallest Unit
      - Default Value
      - Maximum Value
      - Minimum Value
- Condition Number Input
  - No
  - Yes

Variable Definition → **(E)**

User Function Definition
- Protect Mode
  - No Limit
  - Public
  - Protected
  - Private
- Function Type
  - Numeric
  - String
- Edit Arguments — Select an argument
  - Passing Type
    - Call by Value
    - Call by Reference
  - Argument Type
    - Numeric
    - String
  - Dimension
    - Element
    - 1 Dimension
    - 2 Dimension
    - 3 Dimension
- Edit Operations

Alias Definition
- IO Alias Definition
  - Protect Mode
    - No Limit
    - Public
    - Protected
    - Private
  - Caption → **(G)**
  - Default
  - Default Data Width
  - Direction — Input / Output
  - Data Width Setting — Invalid / Valid
    - IO-SYS(sysIn)
    - IO-1(genIn)
    - IO-SYS(sysOut)
    - IO-FB(fbIn)
    - IO-1(genOut)
    - IO-FB(fbOut)
    - Internal Relay (mv)
    - Keep Relay (mkv)
- COM Alias Definition
  - Protect Mode
    - No Limit
    - Public
    - Protected
    - Private
  - Caption → **(G)**
  - Default
    - COM1
    - COM2
    - COM3
    - TPU

Additional Function Data Settings
- PTP Condition Settings
- CP Condition Settings
- Point Tool Data Settings
- Pallet Routine Data Settings
- Execute Condition Settings

Point Job Settings — Select a point job — Select command category — Select command
PLC Settings — Select a PLC number — Select command category — Select command
Data Copy, Delete
- Point Type Definition
- Common Setting Variables Definition
- Program Setting Variables Definition
- Condition Setting Variables Definition
- Global Variables Definition
- Keeping Variables Definition
- User Function Definition
- IO Alias Definition
- COM Alias Definition
- PTP Condition
- CP Condition
- Tool Data
- Pallet Routine
- Execute Condition
- Point Job
- PLC
  - Copy
  - Delete

(G)
- English Caption
- Japanese Caption
- German Caption
- Italian Caption
- Spanish Caption
- French Caption
- Korean Caption
- Simplified Chinese Caption
- Czech Caption
- Vietnamese Caption

(E)

Common Setting Variables Definition
- Variable Type
  - Enumeration Type
    - Protect Mode
      - Hide Control — Valid/Invalid
        - No Limit
        - Public
        - Protected
        - Private
    - Variable Caption → **(G)**
    - Number of Selections
    - Selection Item Caption → **(G)**
  - Numeric Type
    - Protect Mode
      - Hide Control — Valid/Invalid
        - No Limit
        - Public
        - Protected
        - Private
    - Variable Caption → **(G)**
    - Input Unit
      - No Unit
      - Time
      - Length
      - Deg
      - Speed
      - Percentage
      - Angular velocity
      - Acceleration
      - Number of rotations
      - Temperature
      - Weight
      - Milli Time
      - Minute Time
      - Angle acceleration
    - Smallest Unit
    - Default Value
    - Maximum Value
    - Minimum Value
  - Array of Points Type
    - Protect Mode
      - Hide Control — Valid/Invalid
        - No Limit
        - Public
        - Protected
        - Private
    - Variable Caption → **(G)**
    - Default Number of Points
    - Default Points
  - PTP Condition Type
    - Protect Mode
      - Hide Control — Valid/ Invalid
        - No Limit
        - Public
        - Protected
        - Private
    - Variable Caption → **(G)**
    - PTP Condition Number

Program Setting Variables Definition
Condition Setting Variables Definition
- Variable Type
  - Enumeration Type
    - Protect Mode
      - Hide Control — Valid/Invalid
        - No Limit
        - Public
        - Protected
        - Private
    - Variable Caption → **(G)**
    - Number of Selections
    - Selection Item Caption
  - Numeric Type
    - Protect Mode
      - Hide Control — Valid/Invalid
        - No Limit
        - Public
        - Protected
        - Private
    - Variable Caption → **(G)**
    - Input Unit
      - No Unit
      - Time
      - Length
      - Deg
      - Speed
      - Percentage
      - Angular velocity
      - Acceleration
      - Number of rotations
      - Temperature
      - Weight
      - Milli Time
      - Minute Time
      - Angle acceleration
    - Smallest Unit
    - Default Value
    - Maximum Value
    - Minimum Value
  - Array of Points Type
    - Protect Mode
      - Hide Control — Valid/Invalid
        - No Limit
        - Public
        - Protected
        - Private
    - Variable Caption → **(G)**
    - Default Number of Points
    - Default Points

Global Variables Definition
Keeping Variables Definition
- Protect Mode
  - No Limit
  - Public
  - Protected
  - Private
- Variable Type
  - Numeric
  - String
- Dimension
  - Element
  - 1 Dimension
  - 2 Dimension
  - 3 Dimension

(H)

- Program
  - Program List
  - Copy Program
  - Delete Program
  - Change Program Number
  - Delete All Programs
  - Copy Program Data
- Dispense condition
  - Copy Condition Data
  - Delete Condition Data
  - Delete All Condition Data
- PTP Condition
  - Copy PTP Condition Data
  - Delete PTP Condition Data
  - Delete All PTP Condition Data
  - Copy PTP Condition Data (many)
  - Delete PTP Condition Data (many)
- CP Condition
  - Copy CP Condition Data
  - Delete CP Condition Data
  - Delete All CP Condition Data
  - Copy CP Condition Data (many)
  - Delete CP Condition Data (many)
- Tool Data
  - Copy Tool Data
  - Delete Tool Data
  - Delete All Tool Data
  - Copy Tool Data (many)
  - Delete Tool Data (many)
- Pallet Routine
  - Copy Pallet Routine Data
  - Delete Pallet Routine Data
  - Delete All Pallet Routine Data
  - Copy Pallet Routine Data (many)
  - Delete Pallet Routine Data (many)
- Workpiece Adjustment
  - Copy Workpiece Adjustment Data
  - Delete Workpiece Adjustment Data
  - Delete All Workpiece Adjustment Data
  - Copy Workpiece Adjustment Data (many)
  - Delete Workpiece Adjustment Data (many)
- Execute Condition
  - Copy Execute Condition Data
  - Delete Execute Condition Data
  - Delete All Execute Condition
  - Copy Execute Condition Data (many)
  - Delete Execute Condition Data (many)
- Point Job
  - Copy Point Job Data
  - Delete Point Job Data
  - Delete All Point Job Data
  - Copy Point Job Data (many)
  - Delete Point Job Data (many)
- PLC
  - Copy PLC Data
  - Delete PLC Data
  - Delete All PLC Data
  - Copy PLC Data (many)
  - Delete PLC Data (many)
- Delete All Teaching Data
- Reset Individual Program Settings
- Reset All Program Common Settings
- 2-Point Position Conversion
  - Position Setting
  - Calculate Conversion Coefficient
  - Convert Data
    - Convert All Position Data
    - Specify Program Number
    - Specify Point Number
      - X Shifting Amount
      - Y Shifting Amount
      - Z Shifting Amount
      - R Shifting Amount
      - Rotate Angle
  - Display Conversion Coefficient
    - X Shifting Amount
    - Y Shifting Amount
    - Z Shifting Amount
    - R Shifting Amount
    - Rotate Angle

(I)

- 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
- Point Dispense
- Start of Line Dispense
- Line Passing
- End of Line Dispense
- Wait Start Point
- Start of Circle Dispense
- Center of Circle Dispense
- Zigzag Start Point
- Rectangular Spiral Start Point
- Hollow Rectangle Start Point
- Rectangle End Point
- Spiral Start Point
- Hollow Spiral Start Point
- Circumference of Spiral Area 1
- Circumference of Spiral Area 2
- X Needle Measure Point
- Y Needle Measure Point

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