

# **JANOME DESKTOP ROBOT**

## **JR2000N Series**

# **Operation Manual**

## **Height Sensor**

Thank you for purchasing a Janome Robot.

- Read this manual thoroughly in order to ensure proper use of this robot. Be sure to read “For Your Safety” before you use the robot. The information will help you protect yourself and others from possible dangers during operation.
- After reading this manual, keep it in a handy place so that you or the operator can refer to it whenever necessary.
- This manual is written according to IEC620790.

# **JANOME**

## FOR YOUR SAFETY



- Before using the height sensor, be sure to read this manual, instructions for each pneumatic device (e.g. air cylinder) included in the operation manual CD-ROM, and operation manuals for the JANOME desktop robot JR2000N series.
- Refer to the instructions included in the operation manual CD-ROM for details of the air cylinder, solenoid valve, speed controller, and filter regulator.
- Be sure to turn off the robot before installation and replacement.
- Use the height sensor according to the specifications (e.g. air pressure, contact life) and working environments described in this manual and instructions for each pneumatic device. Failure to do so may cause unit breakdown.
- Prepare a fail-safe device in advance to prevent serious accidents due to unit breakdown or communication error.
- Do not attempt to disassemble, repair, or modify the height sensor.
- Do not use the height sensor in icy or humid environments, where flammable or corrosive gas is present, or near water, oil, or chemicals. Failure to do so may cause unit damage or malfunction.
- Tighten the mounting screws according to the rated tightening torque. Loose screws may not hold the unit together sufficiently, and may cause unit damage. Overly tightening the screws may damage the mounting parts.
- Do not twist or pull the cables connecting the height sensor, solenoid valve, and connectors with more than 30N (30kgf) force. The minimum bending radius should be more than 7mm.

## SENSOR FUNCTION

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### **Workpiece Height Adjustment**

The height sensor compensates for deviation of the workpiece height and contributes to stability of operation and improvement of quality.

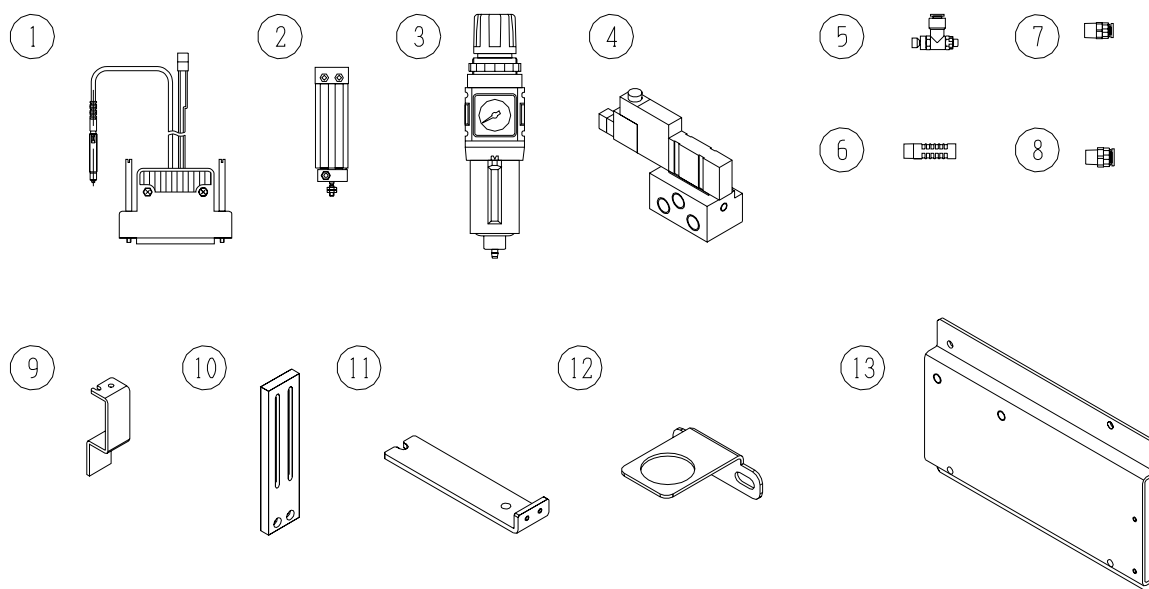
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## Height Sensor

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## ACCESSORY LIST



No.	Part Name	Q'ty	Part No.	Note
1	● Height sensor (Contact switch) with connector	1	963413105	PNP spec.
			963413002	NPN spec.
2	● Air cylinder	1	963407003	Part No. 963405001
3	Filter regulator	1	963408004	
4	Solenoid valve*	1	963406002	PNP specifications
			963406105	NPN specifications
5	● Speed controller	2	963409005	
6	Muffler	2	963410009	
7	Joint (straight) Φ4	2	963411000	
8	Joint (straight) Φ6	4	963412001	
9	● Height sensor fixing plate 1	1	963064004	
10	● Height sensor fixing plate 2	1	963065005	
11	● Height sensor fixing plate 3	1	963066006	
12	L-bracket	1	963405001	
13	Filter and solenoid valve fixing plate	1	963067007	

**\*: The polarity of the solenoid valve should be the same as that of the robot. Check the polarity label on the back of the robot. (See Procedure 5 on Page 7)**

	Part Name	Q'ty	Part No.	Note
	Air tube (Φ4)	2	963074007	1500mm long
	Air tube (Φ6)	1	963075008	3000mm long
	Air tube (Φ6)	1	963075101	100mm long
	Hexagonal socket bolt M5x8	2	000203706	
●	Hexagonal socket bolt M3x6	3	000084503	
●	Hexagonal socket bolt M3x15	2	000203108	
●	M3 nut	2	000060846	
●	M5 nut	2	000161319	
	Hexagonal socket bolt M6x6	2	000203706	
	Hexagonal socket bolt M3x25	2	000202107	
	Slotted/Phillips bind head screw M4x12	4	000170507	
	Operation manual	1	963964002	CD-ROM
	Height Sensor Kit Installation Manual	1	963862000	Japanese
			963862103	English

When setting [Tool Data], be sure to include the total weight of the parts (approximately 300g) indicated with the [●] symbol in [Tool Weight].

#### **Model No. List**

Part Name		Model No.	Manufacturer
Height sensor (Contact switch)		CSJ055A	METROL LTD.
Air cylinder		Q1CU2-6-30	Kuroda Pneumatics Ltd.
Filter regulator		JB08-T1-Z07-028	
Solenoid valve	PNP specifications	A05GS25-1M-01-Z07-077	
	NPN specifications	A05GS25-1P-01-Z07-077	
Speed controller		M4R-M5-0	
Muffler		SL-1	
Joint (straight) Φ4		F4-01M	
Joint (straight) Φ6		F6-01M	

# ASSEMBLY AND CONNECTION

Assemble the height sensor and connect the unit to the robot according to the following procedures:



## Caution

Be sure to turn off the robot before assembling and connecting the height sensor unit.

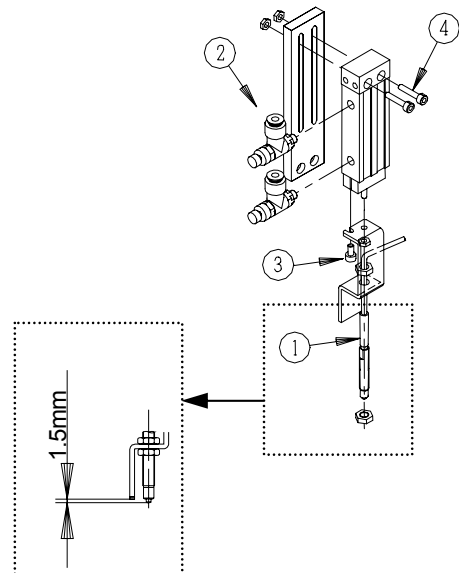
- Tighten the joints with a torque of 7.0 – 9.0 [N·m].  
If you wish to reattach a removed joint, wrap sealing tape around the thread of the joint. Do not cover the tip of the thread (approximately 1.5 – 2mm) with the tape.

### 1. How to Assemble the Height Sensor

1. Secure the height sensor ① to the height sensor fixing plate 1 using the two M5 nuts.

Position the height sensor tip lower than the lower end of the height sensor fixing plate 1. Note that the distance between the height sensor tip and the lower end of the height sensor fixing plate 1 should be 1.5mm. (The bottom of the height sensor fixing plate 1 functions as a stopper.)

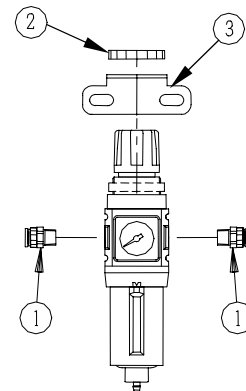
2. Screw the speed controllers ② into the side surface of the air cylinder.
3. Attach the air cylinder to the height sensor fixing plate 1 using the M3 nut (attached to the air cylinder shaft) and the one hexagonal socket bolt M3x6 ③.
4. Attach the air cylinder to the height sensor fixing plate 2 using the two hexagonal socket bolts M3x15 ④ and the M3 nuts.



- If you wish to adjust the height sensor position (maximum 60mm), adjust the air cylinder position when attaching the air cylinder to the height sensor fixing plate 2.
- Tighten the speed controller lightly by hand until it stops, and then tighten it a further 30 – 60 degrees.

## 2. How to Assemble the Filter Regulator

1. Screw the two  $\Phi 6$  joints ① into both sides of the filter regulator.
2. Remove the locking nut ② from the filter regulator and attach the L-bracket ③ to the top of the filter regulator in the direction shown in the illustration to the right.
3. Tighten the locking nut onto the L-bracket to secure the bracket to the filter regulator.

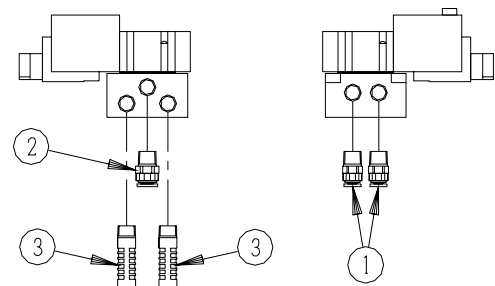


- Tighten the joints with a torque of 7.0 – 9.0 [N·m].

## 3. How to Assemble the Solenoid Valve

1. Screw the two  $\Phi 4$  ① joints into the solenoid valve.
2. Screw the  $\Phi 6$  ② joint into the solenoid valve.
3. Screw the two mufflers ③ into the solenoid valve.

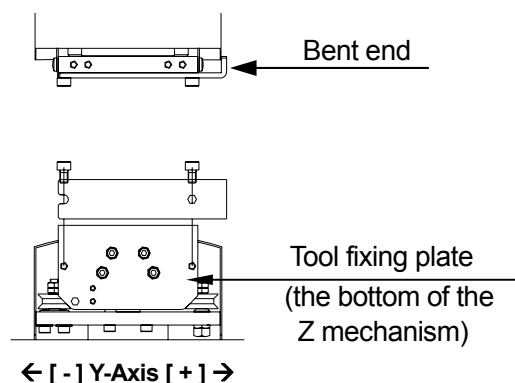
- Tighten the joints with a torque of 7.0 – 9.0 [N·m].
- As it is made of resin, it is best to tighten the muffler by hand. Note that too much lateral load may damage the muffler.



## 4. How to Install the Fixing Plate (Bottom)

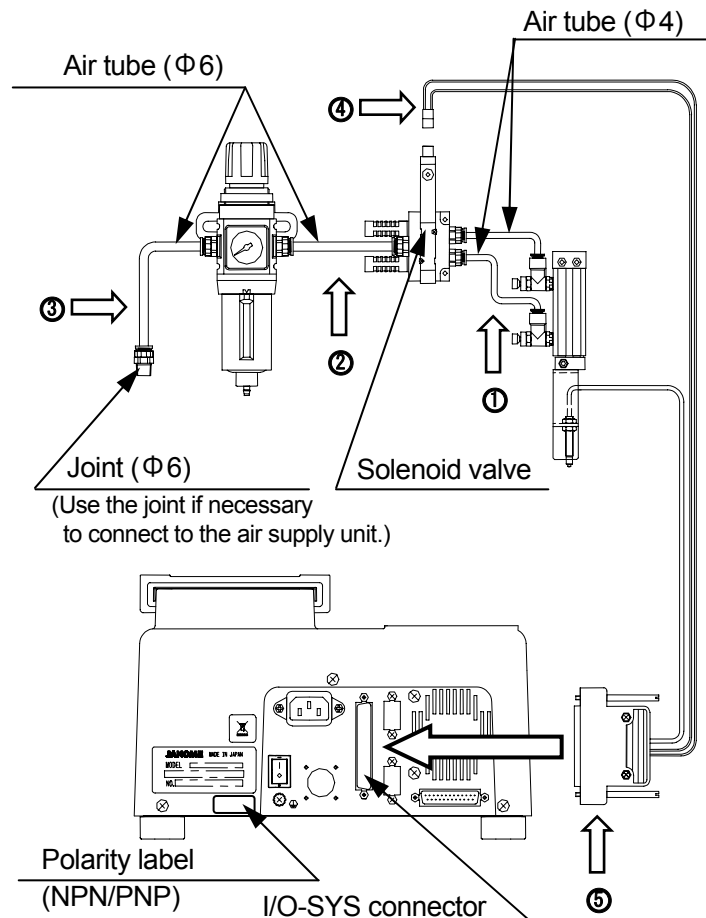
Attach the height sensor fixing plate 3 to the tool fixing plate on the robot (the bottom of the Z mechanism) using the two hexagonal socket bolts M5x8.

Position the height sensor fixing plate 3 with the bent end in the + direction of the Y-Axis as illustrated.



## 5. How to Connect the Air Tube and the Connector

1. Connect the speed controllers on the air cylinder and the  $\Phi 6$  joints on the solenoid valve using the two air tubes ( $\Phi 4$ ) as illustrated. Do not connect them upside down.
2. Connect the  $\Phi 6$  joint on the solenoid valve and the filter regulator using the air tube ( $\Phi 6$ ) as illustrated.
3. Connect the filter regulator and the air supply unit using the air tube ( $\Phi 6$ ) as illustrated. Use the  $\Phi 6$  joint together if necessary.
4. Connect the connector cable, which is not connected to the height sensor, to the solenoid valve.
5. Connect the connector to the I/O-SYS connector on the robot.

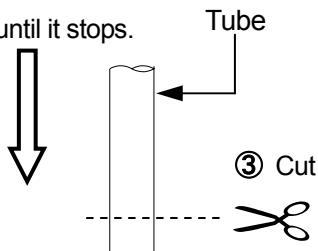


- The polarity of the solenoid valve should be the same as that of the robot. Check the polarity label on the back of the robot.
- Bind the air tubes and the connecting cables using the binder to prevent interfering operation. Be careful not to pinch the air tubes.

### Instructions for Attaching the Air Tube

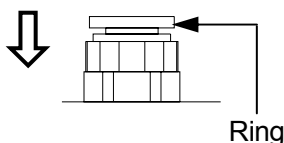
①

Insert until it stops.



②

Push to release.



③ Cut

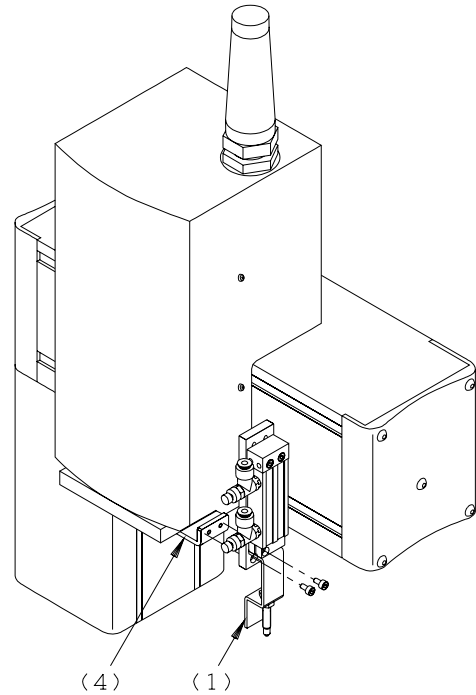


1. When attaching the air tube to the joint, insert the air tube into the joint until it stops and pull the tube to check that it is firmly secured.
2. Before removing the air tube from the joint, push the joint ring down firmly to release the lock.
3. **If you wish to use the removed tube again,** cut off the part secured by the joint.



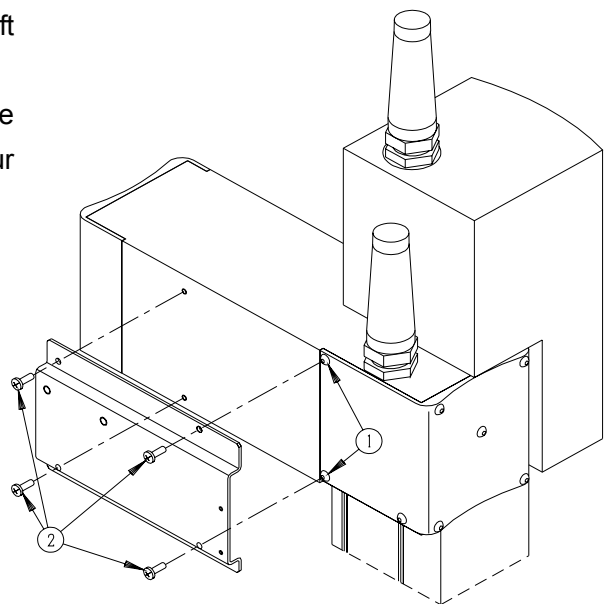
## 6. How to Install the Height Sensor

Install the height sensor and the air cylinder (assembled in Procedure 1) onto the height sensor fixing plate 3 (installed onto the robot in Procedure 4) using the two hexagonal socket bolts M3x6.



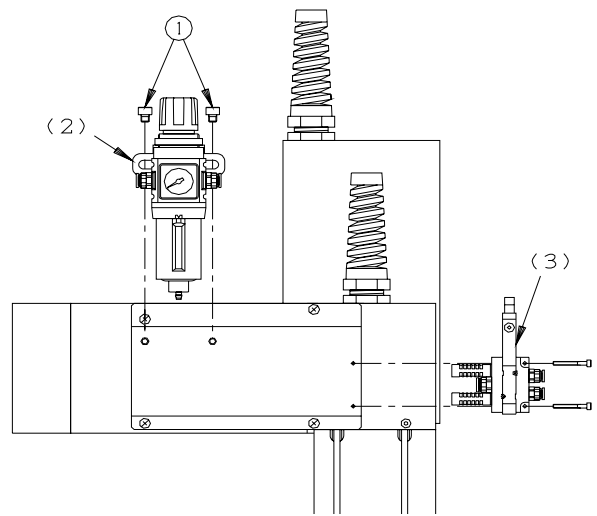
## 7. How to Install the Filter and Solenoid Valve Fixing Plate (Rear)

1. Remove the two hexagonal socket button head bolts M4x14 ① securing the Y left cover to the robot.
2. Install the filter and solenoid valve fixing plate onto the back of the robot using the four slotted/Phillips bind head screws M4x12 ②.



## 8. How to Install the Filter Regulator and the Solenoid Valve

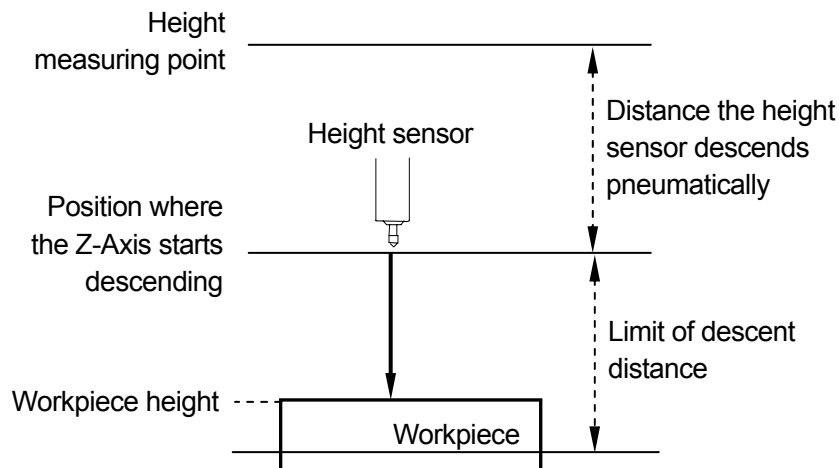
1. Install the filter regulator (assembled in Procedure 2) onto the filter and solenoid valve fixing plate (installed in Procedure 7) using the L-bracket with the two hexagonal socket bolts M6x6 ① as illustrated.
2. Install the solenoid valve (assembled in Procedure 3) onto the filter and solenoid valve fixing plate using the hexagonal socket bolts M3x25.



## WORKPIECE HEIGHT COMPENSATION USING THE HEIGHT SENSOR

Use the height sensor to compensate for deviation of the workpiece height in the Z-Axis direction.

Lower the height sensor pneumatically, and then lower the Z-Axis to read out the position where the height sensor has been turned on.



The robot will adjust the height of the point where the additional function data [Workpiece Adjustment] is set according to the read position (workpiece height).

An error ([Take Z Adjustment Data Error]) will be returned if the height sensor does not turn on even after the Z-Axis moves over the designated [Distance Limit] (limit descent distance).

- If you wish to adjust the height sensor position (maximum 60mm), adjust the air cylinder position when attaching the air cylinder to the height sensor fixing plate 2.

Check that the robot and the height sensor are properly connected and the workpiece is properly set on the work table. Follow the steps below to perform the compensation for the workpiece height deviation using the height sensor.

1. Opening a New Program
2. Setting Tool Data
3. Registering the Work Home Position
4. Registering Points
5. Moving to the Height Measuring Point
6. Creating and Setting Point Job Commands including Measuring Height
  - 6.1. Opening New Point Job Data
  - 6.2. [Take Z Adjustment Data]
  - 6.3. [Take Z Adjustment Data Error]
  - 6.4. Setting Point Job Data to the Height Measuring Point
7. Creating and Setting Additional Function Data [Workpiece Adjustment]
  - 7.1. Opening [Workpiece Adjustment]
  - 7.2. Communication Settings
  - 7.3. [Get Standard Data]
  - 7.4. Setting [Workpiece Adjustment] to the Point

## **1. Opening a New Program**

Open a new program.

## **2. Setting Tool Data**

Select [Tool Data] from the [Program Data Settings] menu.

**TP** →  [Program Data Settings]  
[Tool Data]

**PC** → [Program] → [Program Data] → [Tool Data]

- **Tool Weight**

Set the total weight of the tool and the following height sensor kit as [Tool Weight]:

### **Height Sensor Kit Attached to the Z Mechanism (Approximately 300g)**

- Height sensor
- Speed controllers
- Air cylinder
- Height sensor fixing plates 1, 2, 3
- Hexagonal socket bolts M3x6, M3x8
- Nuts M3, M5

## **3. Registering the Work Home Position**

Select [Work Home] from the [Program Data Settings] menu and enter the coordinates of the work home position.

**TP** →  [Program Data Settings]  
[Work Home]

**PC** → [Program] → [Program Data] → [Work Home]

## 4. Registering Points

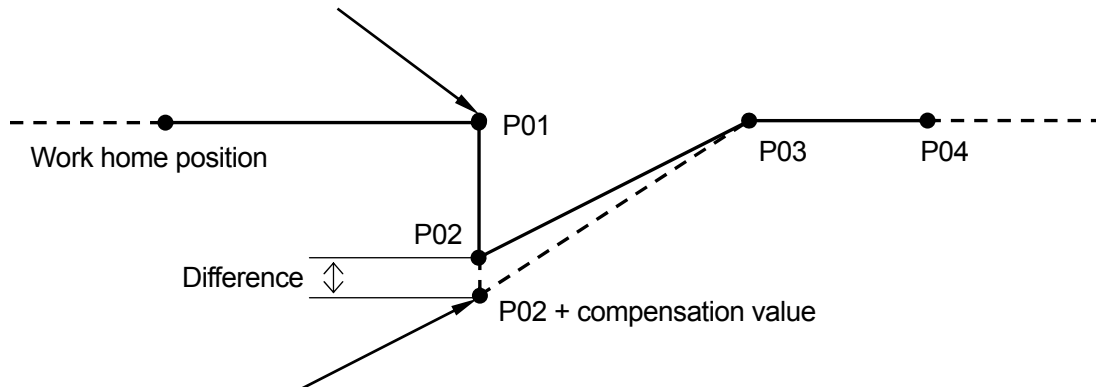
Register the height measuring point and the job point.

The height measuring point can be any point where point job data can be set, as long as it is before the job point for the workpiece (where [Workpiece Adjustment] is set). The height measuring point can also be a previously registered job point.

### Height Measuring Point

The point where point job data, including the height measuring command, is set.

Measure the workpiece height at this point using the height sensor and calculate the difference between the base level and the workpiece height. Set the height measuring point to a point before the job point for the workpiece (to measure the workpiece height).



### Job Point for the Workpiece

The point at which a job such as screw tightening and dispensing is performed on the workpiece.

Set the additional function data [Workpiece Adjustment] to this point. After the [Workpiece Adjustment] is set, the robot will adjust the registered coordinates (P02 in the illustration above) according to the difference calculated at the height measuring point, and then start operation.

## 5. Moving to the Height Measuring Point


Move the robot Axes to P01 (height measuring point).

The robot Axes will move to the displayed coordinates when the **GO** key and the enable switch are pressed at the same time.

## 6. Creating and Setting Point Job Commands including Measuring Height

6.1. Open new point job data.

**TP**  **MENU** [Point Job Settings]

**PC**  [Data] → [Point Job] → [Add]

6.2. [Take Z Adjustment Data]

Select [takeZWadj] from the command list on the Select Category screen and enter an unregistered [Workpiece Adjustment] number.

When this command is performed, the robot will measure the workpiece height using the height sensor and calculate the compensation value corresponding to the designated [Workpiece Adjustment].

- To lower the height sensor pneumatically: Turn the sysOut15 signal on
- To raise the height sensor pneumatically: Turn the sysOut15 signal off.
- If the I/O-SYS pin No. 31 is not set to [Free], rewire the height sensor connector (illustration No. 1 on Page 3) and connect the black cable to a different [Free] pin (Nos. 25 – 30, and 32). The height sensor will descend or ascend when the pin is turned on or off. (For details of the I/O-SYS pin Nos. and the wiring, see “I/O-SYS FUNCTION ASSIGNMENT” on Page 22 and “CIRCUIT DIAGRAM” on Page 24)

The following is an example of point job data set to the height measuring point:

<pre>set #sysOut15 delay 500 takeZWadj 8 reset #sysOut15 delay 500</pre>	<p>Lower the height sensor 30mm pneumatically.          Wait for complete lowering (for 0.5 seconds in this example).          Perform the command and reflect the result to Workpiece Adjustment No. 8.          Raise the height sensor 30mm pneumatically.          Wait for complete elevation (for 0.5 seconds in this example).</p>
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Category	Command	Required parameter	Description
Camera, Z Adjustment	takeZWadj	Workpiece Adjustment Number	<p>Lowers the Z-Axis and calculates the compensation value in the Z direction according to the data obtained when the height sensor touches the workpiece.</p> <p>Set the Z-Axis descending speed in the [Workpiece Adjustment] menu. (Descending distance and speed, and speed limit of the Z-Axis can be set in the [Workpiece Adjustment] menu.)</p>

When getting base height data for the [Workpiece Adjustment] (See “7.3. Get Standard Data” on Page 17), it is necessary to adjust the height sensor position to the height measuring point. You can lower or raise the height sensor while teaching if you create point job data only for lowering or raising the height sensor as described on the next page.

- The following is an example of point job data to lower the height sensor pneumatically:

Lower the height sensor.

- The following is an example of point job data to raise the height sensor pneumatically:

Raise the height sensor.


**TP**

[Manual Job Number Setting]

Set the created point job number.

After this procedure, press the  (FUNC) key on the position entry screen and change the functions assigned to the  –  keys. If the keys are pressed, the robot will perform the point job set to each key. (For more details, see “Manual Job Number Setting” on Page 30 of the operation manual *Teaching Pendant Operation*)

**PC**

Open the JOG dialog box (Select [Robot] → [JOG] or press the  icon on the tool bar) and then specify the point job number in the [Point Job] section and press the  button.

### 6.3. [Take Z Adjustment Data Error]

If a [Take Z Adjustment Data Error] occurs, an incorrect compensation value will be set to the job point coordinates. Set a command to the point job data to specify the robot's movement when a [Take Z Adjustment Data Error] occurs.

You can specify the robot's movement when a [Take Z Adjustment Data Error] occurs by referring to the system flag.

System flag	Error No.	Error
No. 32	No. 41	Take Z Adjustment Data Error

The following is an example of point job data including a command to specify the robot's movement when a [Take Z Adjustment Data Error] occurs:

```
set #sysOut15
delay 500
takeZWadj 8
if
  Id #sysFlag(32)
then
  reset #sysOut15
  goRPoint PTP0,2
endif
reset #sysOut15
delay 500
```

[Take Z Adjustment Data] command

Refer to system flag No. 32.  
If #sysFlag(32) = 1 (true) (error),  
raise the height sensor pneumatically and  
jump to the two points ahead.


6.4. If you do not wish to add any more commands, set the created point job data to the height measuring point.


- If you register a point after creating [Workpiece Adjustment], be sure to set the height measuring point to the same coordinates as those of the position where [Get Standard Data] was performed.



## 7. Creating and Setting Additional Function Data [Workpiece Adjustment]

7.1. Open [Workpiece Adjustment].

**TP**  **MENU** [Additional Function Data Settings]  
[Workpiece Adjustment Settings]

**PC**  [Data] → [Additional] → [Work Adjustment] → [Add]

Open the additional function data [Workpiece Adjustment] created in Section “6.2. [Take Z Adjustment Data]” on Page 13.

Select [Numeric Adjustment] as the [Work Adjustment Type]. (Select either [Workpiece Adjustment] or [Camera A210/A110 Adjustment] as a type of [Workpiece Adjustment].)

After selecting [Numeric Adjustment], the following menu will be displayed:

### **Numeric Adjustment Menu List**

- X Adjustment: Compensation value in the X-direction
- Y Adjustment: Compensation value in the Y-direction
- Z Adjustment: Compensation value in the Z-direction
- R Adjustment: Compensation value of the R-Axis rotation
- Rotate Adjustment: Angle of rotation around the origin point (0,0,0)
- Z-Adjustment: Settings for the height sensor: Select either [Z-Adjustment with COM] or [Going Down Z-Adjustment].

Check that [X Adjustment], [Y Adjustment], and [Z Adjustment] are set to [0mm] as well as confirming that [R Adjustment] and [Rotate Adjustment] are set to [0deg]. Then select [Z-Adjustment].

Select [Going Down Z-Adjustment] as the [Z-Adjustment] type. (Select either [Going Down Z-Adjustment] or [Z-Adjustment with COM] as a type of [Z-Adjustment]. When using the height sensor, select [Going Down Z-Adjustment].)

After [Going Down Z-Adjustment] is selected, the following menu will be displayed:

### **Going Down Z-Adjustment Menu List**

- Input Channel: I/O signal from the robot connected to the height sensor
- Down Speed: Speed at which the Z-Axis descends
- Distance Limit: A [Take Z Adjustment Data Error] is returned if the height sensor does not turn on even after the Z-Axis descends the preset [Distance Limit].
- Get Standard Data: Select this item to measure the base workpiece height.
- Z Standard Data: The value measured by [Get Standard Data] is displayed on the [Z Standard Data] line. Deviation from this value will be compensated.

## 7.2. Communication Settings

Select [Input Channel] from the Going Down Z-Adjustment menu. To specify the I/O signal #sysIn16 from the robot connected to the height sensor, select [I/O-SYS] and then enter [16].

- If you wish to use a signal which already has a pre-assigned function, it is necessary to change the function to [Free] in the [I/O-SYS Function Assignment] in the [IO settings] menu ([Run Mode Parameter]).

## 7.3. [Get Standard Data]

Enter the desired values for [Down Speed] and [Distance Limit].

Then select [Get Standard Data]. Lower the Z-Axis until the height sensor turns on to measure the workpiece height.

**Be sure to perform [Get Standard Data] after lowering the height sensor pneumatically and adjusting the height sensor position to the height measuring point.**

When [Get Standard Data] is completed successfully, the measured value is displayed on the [Z Standard Data] line. This value will be the base workpiece height during operation.

This is the last step in creating additional function data [Workpiece Adjustment].

## 7.4. Setting [Workpiece Adjustment] to a Point

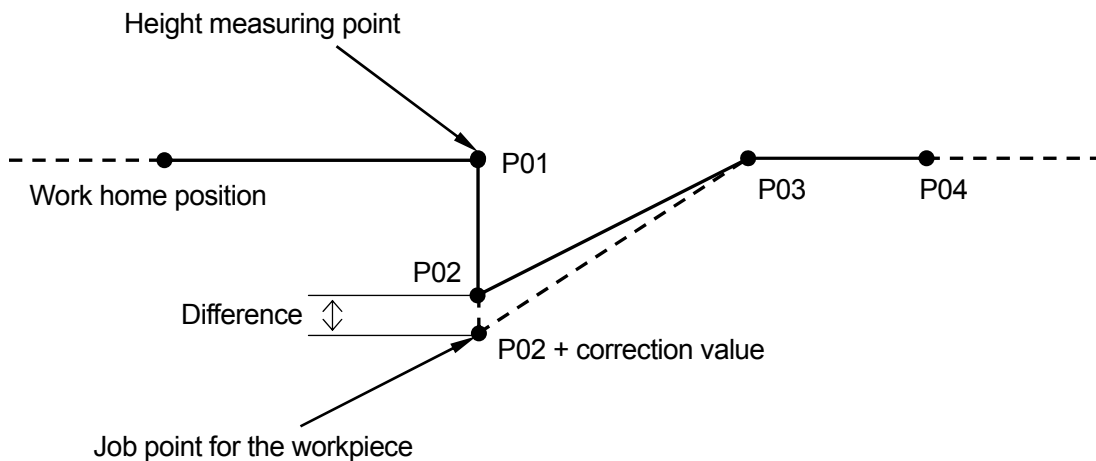
Set the created [Workpiece Adjustment] number to the job point (for the workpiece).

These are all the steps necessary to perform the workpiece adjustment (Z-direction adjustment) using the height sensor.

The screen to the right shows an example of point job data set to the height measuring point.

```

Point Job 1
001 set #sysOut15
002 delay 500
003 takeZWadj 8
004 if
005   Id #sysFlag(32)
006 then
007   reset #sysOut15
008   goRPoint PTP0,2
009 endif
010 reset #sysOut15
011 delay 500
012
  
```



The screen to the right shows an example of additional function data [Workpiece Adjustment] set to the job point for the workpiece.

Z-Adjustment	
Going Down Z-Adjustment	
Input Channel	#sysIn15
Down Speed	20mm/s
Distance Limit	40mm
Get Standard Data	
Z Standard Data	0mm

## ■ Reference

You can assign names to signals #sysIn16 (this signal is turned on while the height sensor is pressed) and #sysOut15 (this signal causes the height sensor to pneumatically ascend or descend).

For example, if you assign the name [SensorON] to #sysIn16 and a name [SensorDOWN] to #sysOut15, the point job data will be intelligible.

The following is an example of point job data to lower the height sensor pneumatically:

→  Lower the height sensor (30mm).

The following is an example of point job data to raise the height sensor pneumatically:

→  Raise the height sensor (30mm).

(To set [SensorDOWN] as the output destination, select [IO-Alias] on the Output Destination selection screen when entering the command.)

Select the following items while logged into the Customizing mode:



[Alias Definition]

[IO Alias Definition]

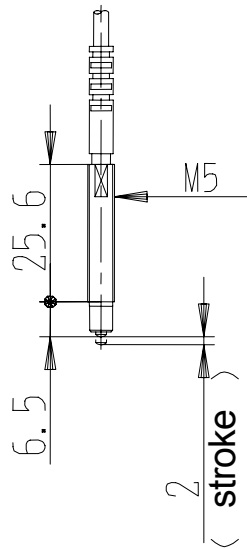
Press the  (NEW) key.



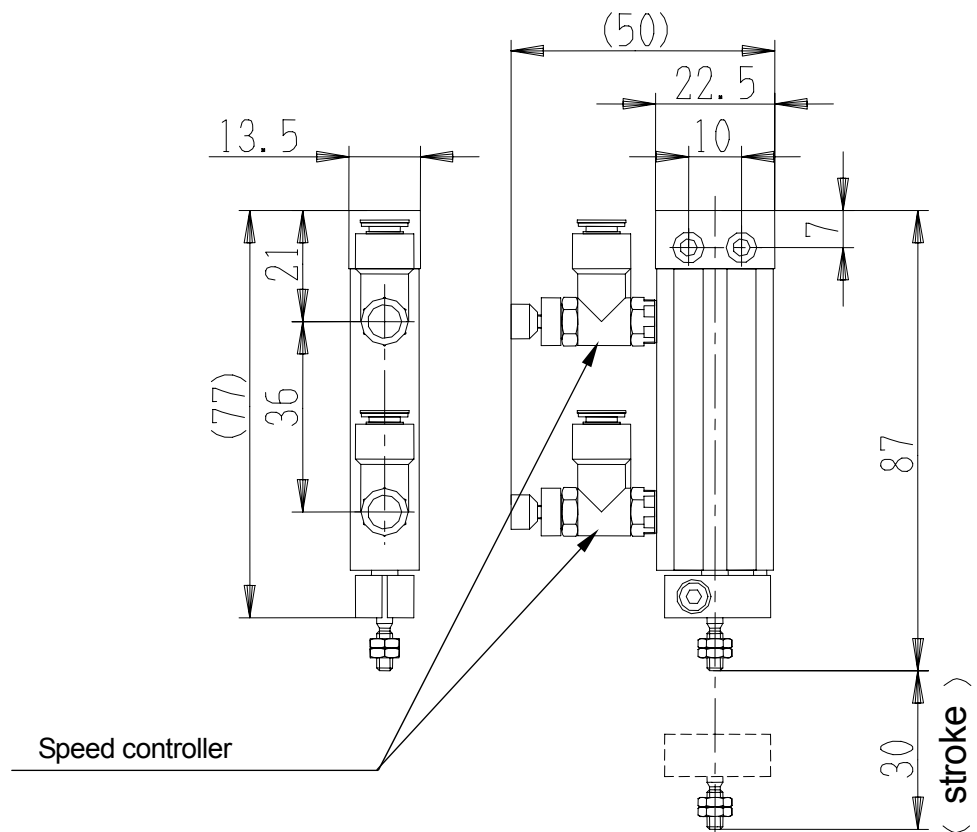
[Customize] → [Alias] → [Add IO Alias Type]

# EXTERNAL DIMENSIONS

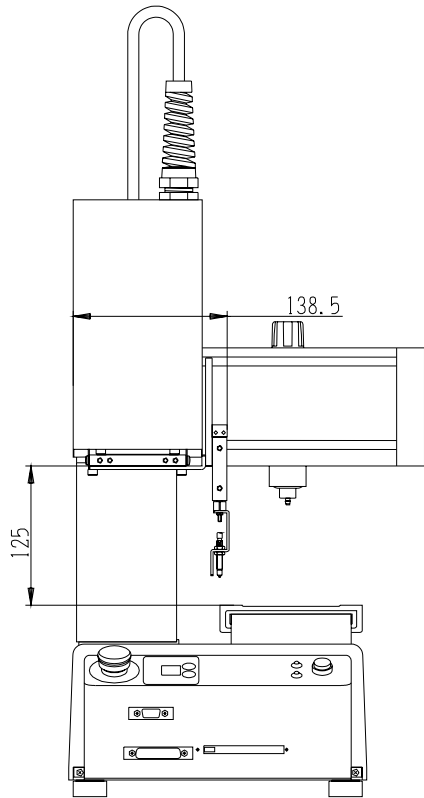
## Height Sensor



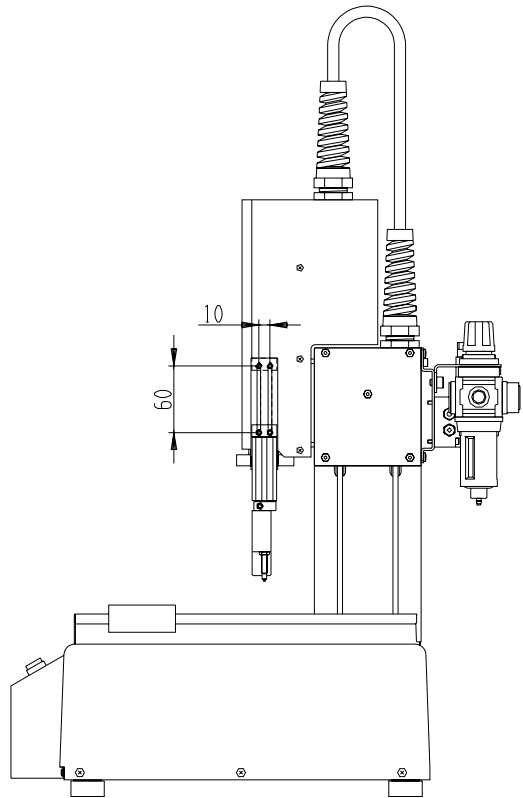
## Air Cylinder



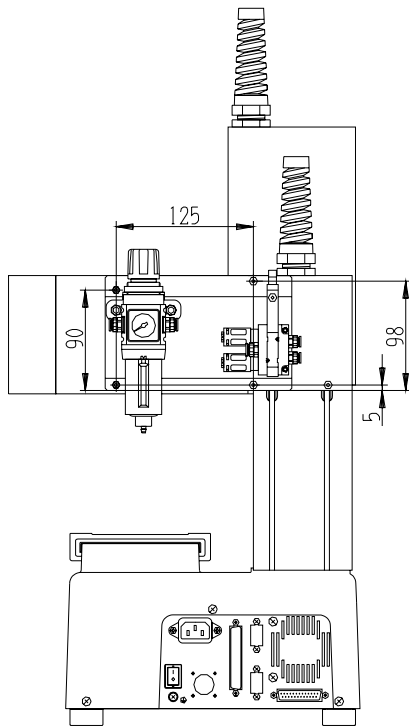
**After Installing the Height Sensor**



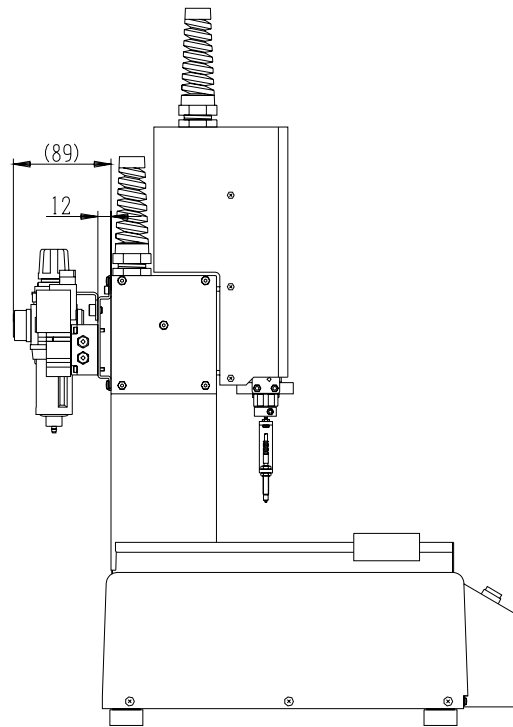
**(Front view of the robot)**



**(Left side view of the robot)**



**(Back view of the robot)**



**(Right side view of the robot)**

## I/O-SYS FUNCTION ASSIGNMENT

Functions previously assigned to the I/O-SYS vary depending on the model specifications. (The table below shows the function assignment for the standard specifications I/O-A.)

If the I/O-SYS Pin No. 15 or 31 is not set to [Free], rewire the height sensor connector (illustration No. 1 on Page 3) and connect the brown or black cable to a different [Free] pin (Nos. 2, 13, and 14 or Nos. 25 – 30, and 32) referring to “CIRCUIT DIAGRAM” on Page 24.

	Name	Function	Pin No.	Insulator color	Spiral mark
Input	Ex #sysIn1	Start	1	Black	
	#sysIn2	Free/Start Inhibition/Stop-Start Inhibition/ Soft Lock/Emergency Stop	2	White	
	#sysIn3	Program Number LOAD	3	Red	
	#sysIn4	Program Number bit0 $2^0=1$	4	Green	
	#sysIn5	Program Number bit1 $2^1=2$	5	Yellow	
	#sysIn6	Program Number bit2 $2^2=4$	6	Brown	
	#sysIn7	Program Number bit3 $2^3=8$	7	Blue	
	#sysIn8	Program Number bit4 $2^4=16$	8	Gray	
	#sysIn9	Program Number bit5 $2^5=32$	9	Orange	
	#sysIn10	Program Number bit6 $2^6=64$	10	Pink	
	#sysIn11	Last Work/ Program Number bit7 $2^7=64$	11	Light blue	
	#sysIn12	Temporary Stop	12	Purple	
	#sysIn13	Free	13	White	Black
	#sysIn14	Free/Start Inhibition/Stop-Start Inhibition/ Soft Lock/Emergency Stop	14	White	Red
	#sysIn15	Free	15	White	Green
	#sysIn16	Free (Height sensor ON)	16	White	Blue
Output	Ex #sysOut1	Ready for Start	17	Black	White
	#sysOut2	Robot Stopping	18	Black	Red
	#sysOut3	Program Number ACK	19	Black	Green
	#sysOut4	Program Number Error	20	Black	Blue
	#sysOut5	Running	21	Red	White
	#sysOut6	Error	22	Red	Black
	#sysOut7	Emergency Stop	23	Red	Green
	#sysOut8	Position Error	24	Red	Blue
	#sysOut9	Free	25	Green	White
	#sysOut10	Free	26	Green	Black
	#sysOut11	Free	27	Green	Red
	#sysOut12	Free	28	Green	Blue
	#sysOut13	Free	29	Yellow	White
	#sysOut14	Free	30	Yellow	Black
	#sysOut15	Free (Height sensor Up/Down)	31	Yellow	Red
	#sysOut16	Free	32	Yellow	Green
Others	–	No connection	33	Yellow	Blue
	COM+	DC24V	34	Brown	White
	COM-	GND	35	Brown	Black
	COM-	GND	36	Brown	Red
	COM-	GND	37	Brown	Green

Ex: Activated only in the External Run Mode

## Signals

Height sensor ON: This signal is turned on while the height sensor (contact switch) is pressed (the tip of the height sensor touches the workpiece).  
(sysIn16)

Height sensor Up/Down: Turn this signal on to raise or lower the height sensor 30mm pneumatically.  
(sysOut15)

## Cables

### NPN Specifications

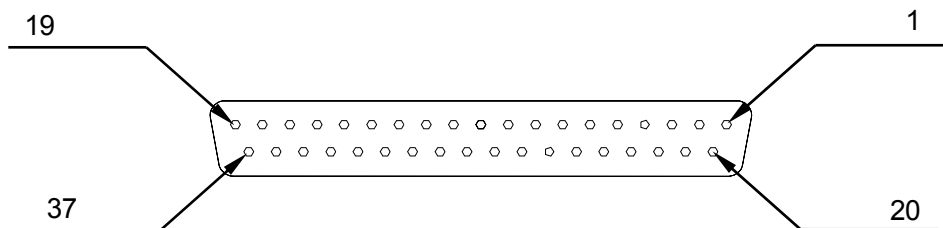
(I/O-SYS) Pin No.	Name	Function	Attached cable
			Insulator color
16	sysIn16	Height sensor ON	Brown
31	sysOut15	Height sensor Up/Down	Black
34	COM+	DC24V	Red
37	COM-	GND	Blue

### PNP Specifications

(I/O-SYS) Pin No.	Name	Function	Attached cable
			Insulator color
16	sysIn16	Height sensor ON	Brown
31	sysOut15	Height sensor Up/Down	Black
34	COM+	DC24V	Blue
37	COM-	GND	Yellow

- If [#sysIn16] (Pin No. 16) or [#sysOut15] (Pin No. 31) is not set to [Free], rewire the height sensor connector (illustration No. 1 on Page 3) and connect the brown cable (#sysIn16) or the black cable (#sysOut15) to another [Free] pin. (Nos. 13 and 15: #sysIn16, Nos. 25 – 30, and 32: #sysOut15)

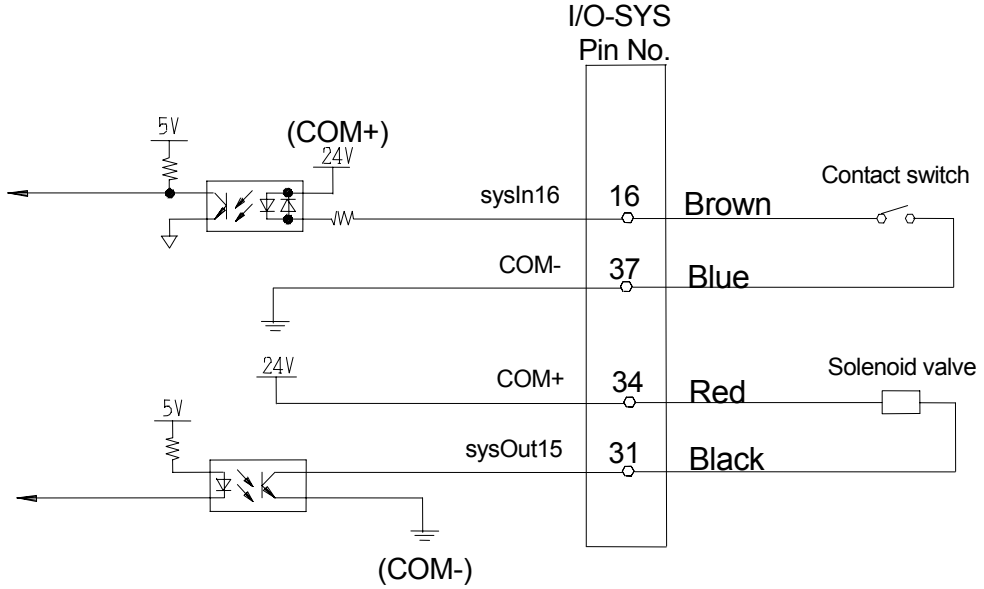
### I/O-SYS Pin Nos. on the Robot



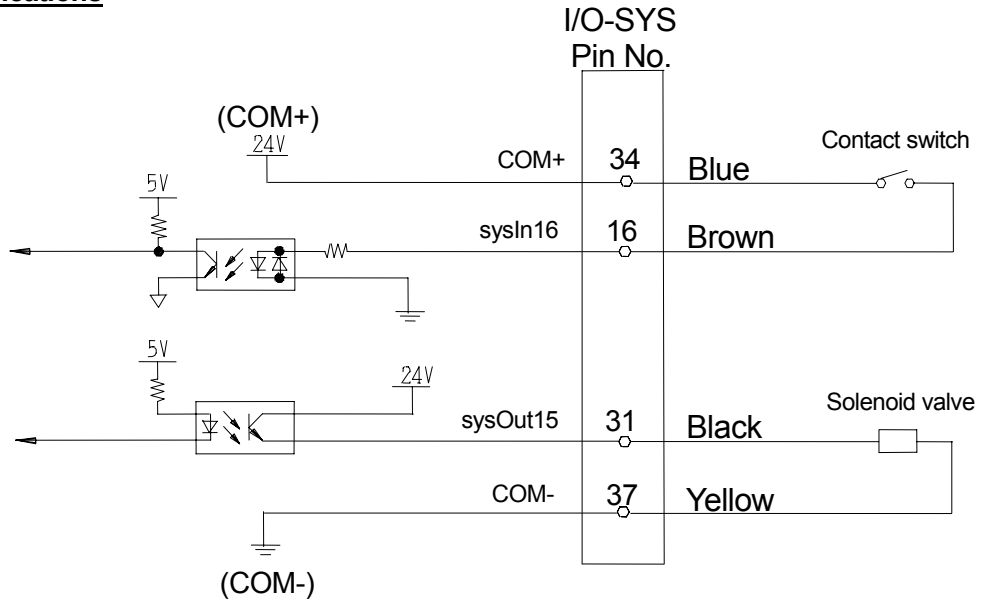


# CIRCUIT DIAGRAM

## NPN Specifications



## PNP Specifications



## SPECIFICATIONS

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Height sensor	
Installable models	JR2203N, JR2303N, JR2403N, JR2503N
Sensing range	70 – 130mm above the bottom of the tool fixing part on the robot (Adjustable height sensor position: maximum 60mm)
Cylinder stroke	30mm
Sensor stroke	2mm (until the height sensor turns on after touching the workpiece: 0.3mm)
Sensing speed range	1 – 50mm/sec (Guaranteed sensing accuracy: 1 – 3mm/sec)
Sensing accuracy	±0.02mm under a sensing speed at 3mm/sec, after idling (Guaranteed sensing accuracy: 1 – 3mm/sec)
Instruction manual	CD-ROM (included in the package)
Cylinder air pressure	0.2 – 0.7MPa
Rated voltage (Solenoid valve)	DC24V ± 10%
Power consumption (Solenoid valve)	0.6W
Interface	Connect to I/O on the robot.
Total packaging weight	1.3kg

**MEMO**

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The specifications of the product or the contents of this manual may be modified without prior notice to improve quality.

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