HAKKO

AUTO-SOLDERING SYSTEM

HU-200

Instruction Manual

Thank you very much for purchasing the HAKKO HU-200.

The HAKKO HU-200 is a soldering robot system.
Be sure to read this manual before operating the HAKKO HU-200.

Keep this manual readily accessible for reference.

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1. Set Components

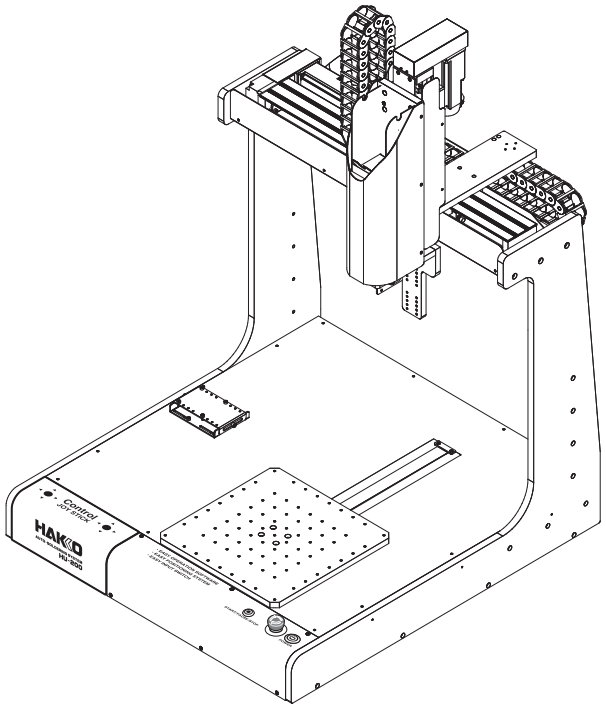
1-1 Packing List

Product Name	Product Number	Configuration Information	Comments
Main unit HU-200	—	p. 2	
Power cord	—	p. 2	
USB cable	BX1067	p. 2	For South Korea and Europe
	BX1062	p. 2	For regions other than the above
Cleaner	CX1003	p. 3	Sold separately for the South Korean specification only.
Cleaner base	CX5003*1	p. 3	
Cleaner positioning board	BX1066	p. 3	
Soldering iron unit HF-600	—	p. 3	Sold separately for the South Korean specification only.
Soldering unit mount	CX5004	p. 4	
Soldering unit fixture base	CX5002*1	p. 4	
Feeder unit	CX5040	p. 4	Sold separately for the South Korean specification only.
Solder reel support shaft	—	p. 2	
Feeder cable: 4 m	BX1045*1	p. 2	
Tube unit Φ 0.3 – 1.0	BX1055	p. 2	
Tube unit Φ 1.2 – 1.6	BX1042	p. 2	
Tube unit B Φ 0.3	BX1054	p. 2	
Tube unit B Φ 0.5 – 1.0	BX1052	p. 2	
Tube unit B Φ 1.2 – 1.6	BX1053	p. 2	
PC	CX5036	p. 4	For South Korea (For South Korea specification, PC are sold separately.)
	—	p. 4	For regions other than the above
Pen	—	p. 4	
USB hub	—	p. 4	
Attachment holder (for tablet PC)	—	p. 2	
Display arm (for tablet PC)	—*1	p. 2	
Instruction manual (CD-ROM)	—	p. 2	
Quick manual (Installation and Connection)	—	p. 2	
Quick user guide (PC software)	—	p. 2	
I/O cable (for cleaner)	—	p. 2	
Relay cord (1.5 m)	—	p. 2	

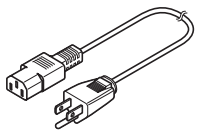
See the web page for the product information such as replacement parts/options.
https://www.hakko.com/doc_hu200-e

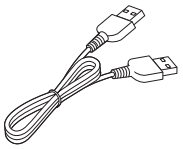
1-2 Robot HU-200

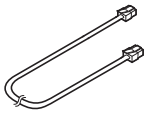
Main unit HU-200 1
Power cord 1
USB cable (BX1062 / BX1067) 1
Solder reel support shaft 1
Feeder cable 4 m (BX1045)*1 1
Tube unit Φ 0.3 – 1.0 mm (BX1055) 1
Tube unit Φ 1.2 – 1.6 mm (BX1042) 1
Tube unit B Φ 0.3 mm (BX1054) 1
Tube unit B Φ 0.5 – 1.0 mm (BX1052) 1
Tube unit B Φ 1.2 – 1.6 mm (BX1053) 1
Instruction manual (CD-ROM) 1
Quick manual (Installation and Connection) 1
Quick user guide (PC software) 1
I/O cable (for cleaner) 1
Short-circuit cable 2
Attachment holder 1
Display arm*1 1
Relay cord 1.5m 1



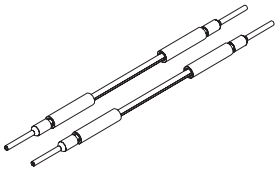
Main unit HU-200

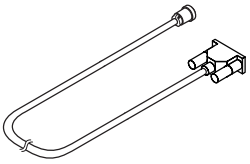

Power cord


USB cable
(BX1062 / BX1067)

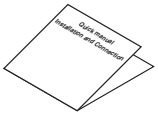

Relay cord 1.5m


I/O cable
(for cleaner)


Short-circuit cable


Feeder cable 4 m
(BX1045)

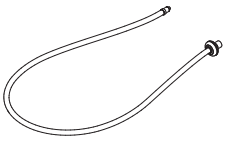

Solder reel
support shaft

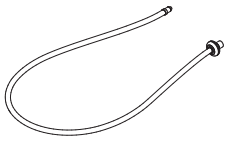


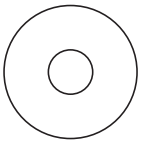
Quick manual
Installation and Connection

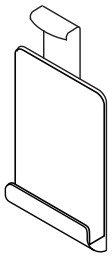


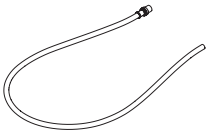
Quick user guide
PC software

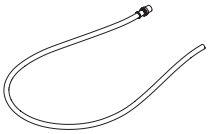

Tube unit
Φ 0.3 – 1.0 mm
(BX1055)

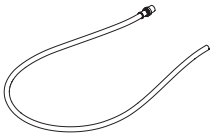

Tube unit
Φ 1.2 – 1.6 mm
(BX1042)

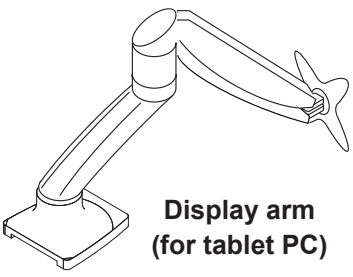

Instruction manual
(CD-ROM)


Attachment holder
(for tablet PC)


Tube unit B
Φ 0.3 mm
(BX1054)

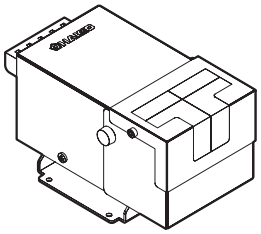

Tube unit B
Φ 0.5 – 1.0 mm
(BX1052)


Tube unit B
Φ 1.2 – 1.6 mm
(BX1053)

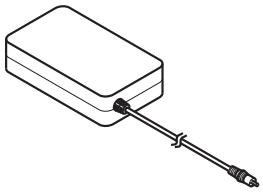

Display arm
(for tablet PC)

1-3 Cleaner (CX1003)[*4]

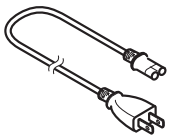
Cleaner (CX1003) 1
AC adapter 1
Power cord (for cleaner) 1
Instruction manual (for cleaner) 1



Cleaner (CX1003)



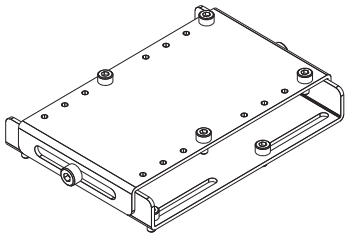
AC adapter



Power cord (for cleaner)

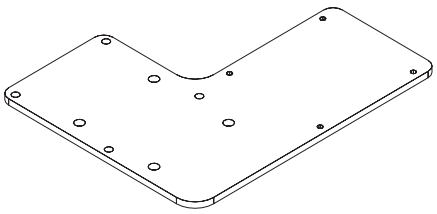
1-4 Cleaner Base (CX5003)

Cleaner base (CX5003)[*1] 1



1-5 Cleaner positioning board (BX1066)

Cleaner positioning board (BX1066) 1
Instruction manual 1





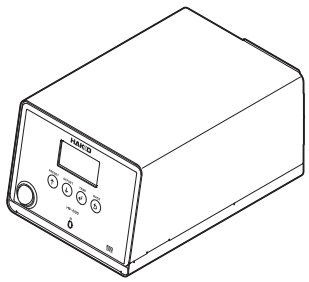
Hexagon socket head cap screws M4×10 (4)



Hexagon socket head cap screws M3×6 (4)

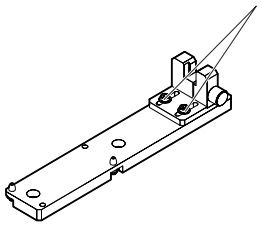
1-6 Soldering Iron Unit HF-600[*4]

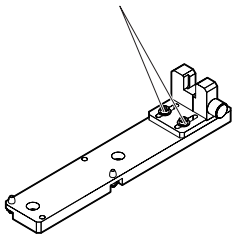
Station HF-600[*2] 1
Handpiece FU-6002 (FU6002-01X) 1
Flux protector (BX1027) 1
Soldering unit fixture base (CX5019) 1
Tip adjustment jig unit
For TX1 series tips (CX5017) 1
For TX2/TX3 series tips (CX5018) 1
Feeder unit attachment screw 1
Soldering iron cable 5 m (BX1033)[*1] 1
Relay cord (BX1056) 1
Power cord 1
Heat-resistant pad 1
Filter 1
Instruction manual 1



Station HF-600

Flange socket M3×10 (2)

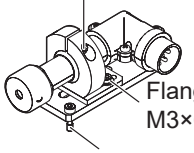




For TX1 series tips (CX5017) **For TX2/TX3 series tips (CX5018)**

Tip adjustment jig unit

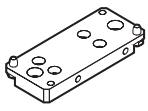
Hexagon socket head cap screw M3×15



Flange socket M3×6 (2)

Cover screw M4×12 (2)

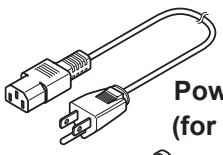
Handpiece FU-6002 (FU6002-01X)



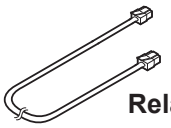
Soldering unit fixture base (CX5019)



Flux protector (BX1027)



Power cord (for HF-600)



Relay cord (BX1056)

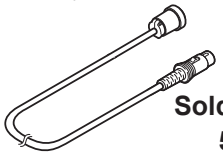


Filter

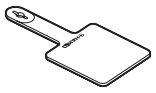


Hexagon socket head cap screw M3 × 30 (2)

Feeder unit attachment screw



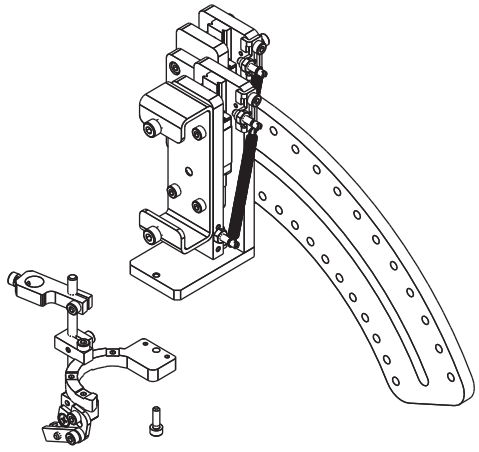
Soldering iron cable 5 m (BX1033)



Heat-resistant pad

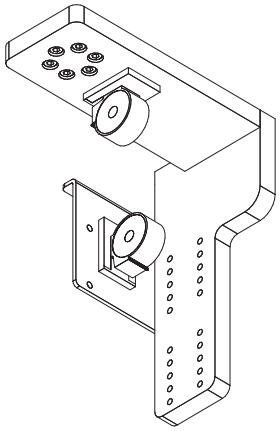
1-7 Soldering Unit Mount (CX5004)

Soldering unit mount (CX5004) 1



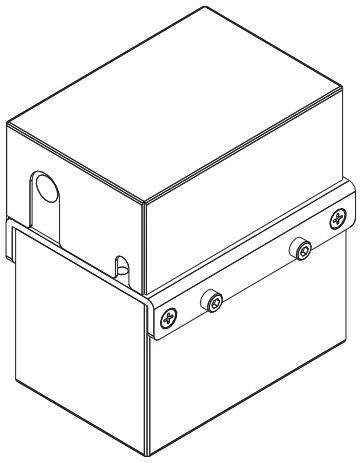
1-8 Soldering Unit Fixture Base (CX5002)

Soldering unit fixture base (CX5002)*1 1



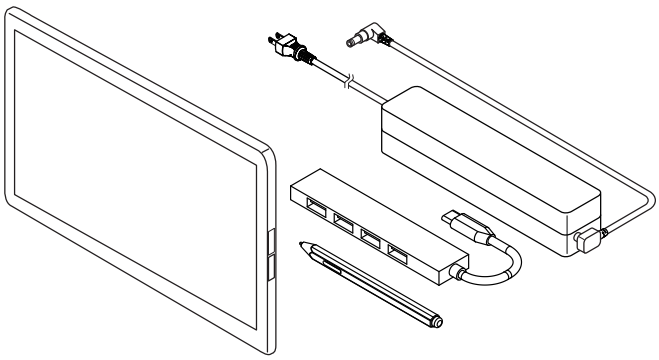
1-9 Feeder Unit (CX5040)*4

Feeder unit (CX5040)*3 1



1-10 PC*4

Tablet PC 1
Pen 1
USB hub 1
Power cord 1



*1 This system is shipped with it attached to the robot main body.
*2 Tips are sold separately. Refer to “11. Parts List” (p. 170).
*3 Solder feed pulley units, solder feed guide sets and Fluoroplastic tubes are sold separately. For further details, refer to “11. Parts List” (p. 170).
*4 For the South Korea specification, PC, cleaner, soldering iron unit HF-600, and feeder unit are sold separately.

2. Specifications

2-1 Specifications for Each Model

2-1-1 Robot

Power supply	AC100 – 240V 50/60Hz	
Power consumption	300W	
Movable range (stroke)	X	400 mm
	Y	300 mm
	Z	200 mm
	θ	±200°
Drive system (motor type)	X	Servo motor
	Y	
	Z	
	θ	
	Solder feed	Stepping motor
Position detection method	Absolute encoder	
Payload capacity	Y (workpiece)	20kg
Speed	X	1 – 800 mm/s
	Y	
	Z	
	θ	1 – 800°/s
Repeatable position accuracy	X	±0.01 mm
	Y	
	Z	
	θ	±0.01°
Allowable voltage range	AC100 – 240V 50/60Hz ±5%	
Noise level	56dB	
Operating environment	Ambient temperature range	0 – 40 °C (No condensation or freezing)
	Ambient humidity range	85% RH or less (No condensation or freezing)
	Use atmosphere	No corrosive or combustible gas
		No excessive dust
Outside dimensions	600 (W) ×910 (H) ×650 (D) mm	
Weight	50 kg	
External I/O	Input: 20	
	Output: 12 (NPN type) (including 2 for cleaner)	
External interface	USB × 4 (including one port for PC)	
Z axis solenoid brake release button	Provided on left side of Z axis	

2-1-2 Soldering Iron Unit HF-600

Station	
Power consumption	460W
Settable temperature range	50 – 500 °C
Temperature Stability	Unloaded condition ± 5 °C at idle
Output	AC 30 V
Outside dimensions	140(W)×111(H)×212(D)mm
Weight	4 kg
Handpiece (FU-6002)	
Power consumption	390 W(29 V)
Tip to ground resistance	< 2 Ω
Tip to ground potential	< 2 mV
Cord length	5 m
Overall length[*1, *2]	171 mm
Weight[*1]	135 g (174 g including soldering unit fixture base)

*1 With TX3-XD4 tip
*2 The dimension can be adjusted in range of ±5 mm

● The total length and weight excludes the cord.
● This product is applied with electrostatic countermeasures.

⚠ CAUTION

■ **Handling precautions for ESD Safe products**
This product contains electrostatic countermeasures, so please use the following precautions:
1. Not all plastic parts are insulators, they may be conductive. Be careful not to expose live electrical parts or damage insulating materials when performing repairs or replacing parts.
2. Be sure the product is grounded before use.

Settable ranges for solder feed[*2–*4]

Number of solder feed programs	Maximum of 250 programs
Solder feed length	0.1 – 99.9 mm
Solder feed speed	0.1 – 99.9 mm/s[*1]
Solder back feed length	0 – 20.0 mm
Solder back feed speed	0 – 99.9 mm
Heat time	0.1 – 9.9 sec

*1 Depending on the type of solder, it may not be possible to feed solder normally at high speed. In such cases, contact the dealer where you purchased the product.
*2 The values in the table above are for primary soldering.
*3 For secondary and tertiary soldering, all values can be set starting from 0. If no feed speed is set for secondary soldering, that operation will be canceled. For other values, setting any of the values to 0 or blank will skip all subsequent operations.
*4 For DS (drag soldering), if a condition in which the secondary feed length is set is selected, the secondary feed length setting will be ignored.

2-1-3 Feeder Unit (CX5040)

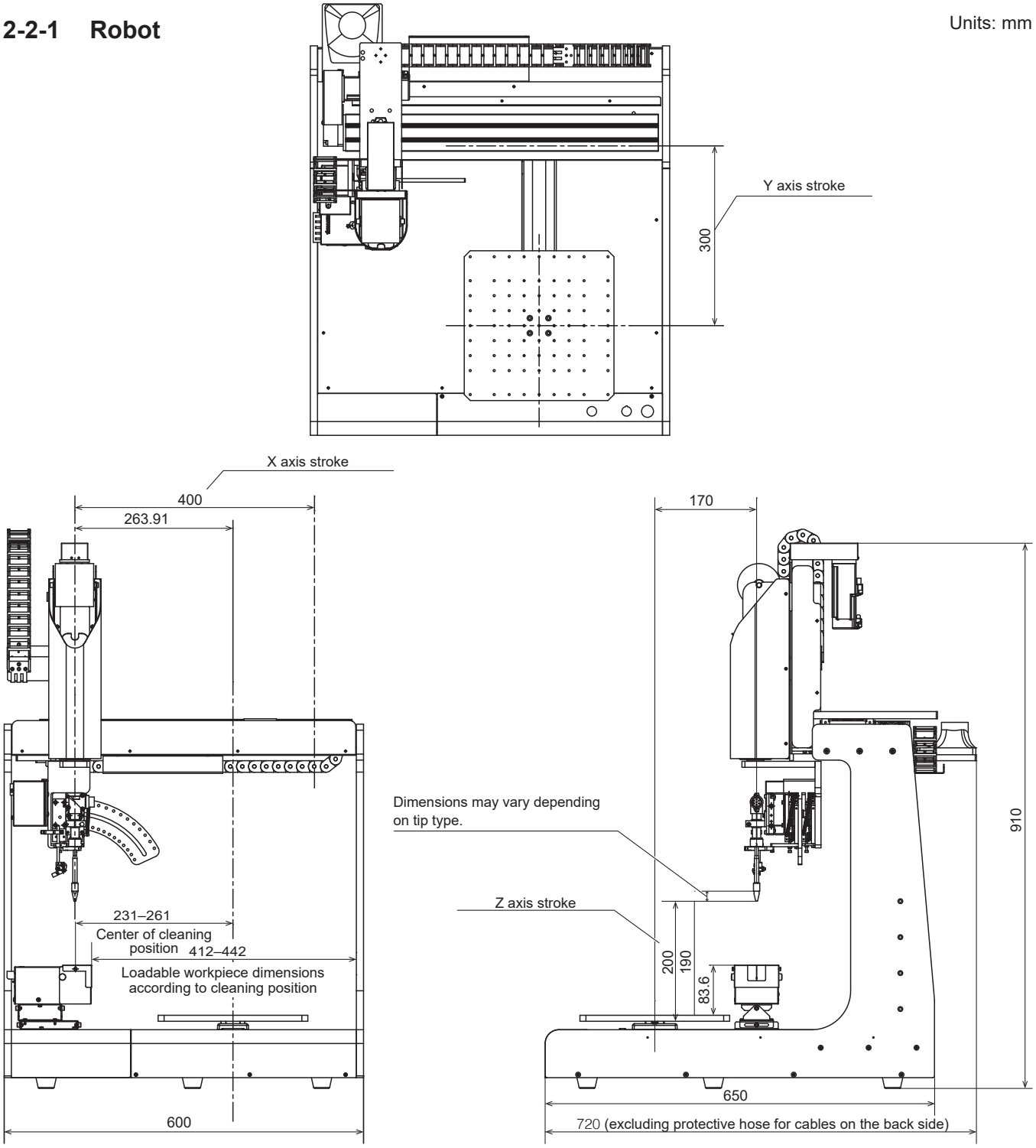
Usable solder wire diameter	0.3, 0.5, 0.6 (0.65), 0.8, 1.0, 1.2, 1.6 mm

- A spool of up to 1 kg of solder can be installed.
- A solder feed pulley unit, solder feed guide set, and Fluoroplastic tube are necessary for use. These are sold separately and should be purchased according to the diameter of the solder which will be used.

2-2 Part Dimensions

2-2-1 Robot

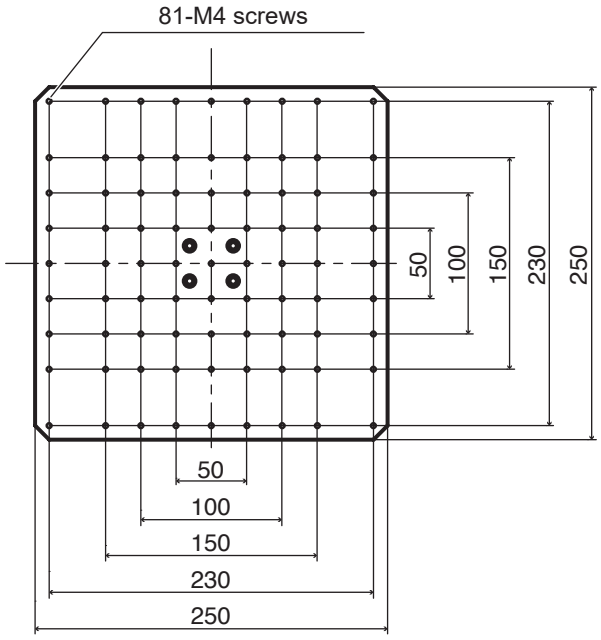
Units: mm



NOTE Specifications and design are subject to change without notice.

2-2-2 Jig Table

Units: mm



3. Warnings, Cautions and Notes

Warnings, cautions, and notes are placed at critical points in this manual to direct your attention to significant items. They are defined as follows:

⚠WARNING: Failure to comply with a WARNING may result in serious injury or death.

⚠CAUTION: Failure to comply with a CAUTION may result in injury to the operator, or damage to the items involved.

NOTE : This indicates procedures or information that are important in a process described in this document.

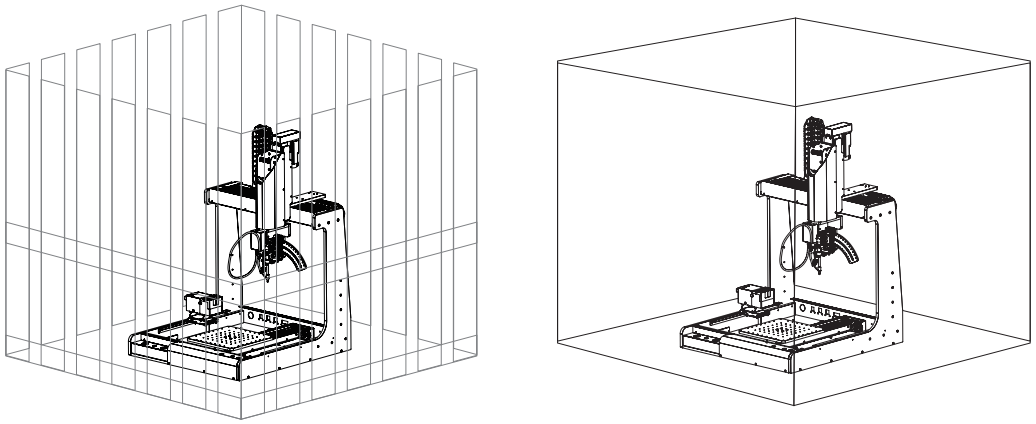
Be sure to observe the following precautions to ensure safety.

⚠ WARNING

. Establish guidelines related to each of the following items and perform work following these guidelines.
(1) Robot operation and procedures (7. Operation)
(2) Speed of robot in operation (7-1 Explanation of Software Screen, 7-2 JOG Operation)
(3) Operation when 2 or more operators are performing operations (5-1 Cautions on Installation)
(4) Measures if abnormalities are discovered (9. Error Messages, 10. Troubleshooting)
(5) Measures to restart the device if abnormalities are discovered and robot operation is stopped. (10. Troubleshooting)
(6) Other required measures to prevent dangers due to unexpected robot operations and malfunctions (3. Warnings, Cautions and Notes: During work)
2. Operators performing operations and personnel in charge of observing operators are to perform measures to stop robot operations when abnormalities are discovered. (3. Warnings, Cautions and Notes: During work)
3. While work is being performed, perform required measures to prevent personnel other than designated operators from operating switches, etc. such as by displaying messages to the robot operating switches, etc. that work is being performed. (3. Warnings, Cautions and Notes: During work)

During operation

There is a risk of death or injury if a person comes in contact with the robot while it is operating. Take safety measures (such as installation of a safety cover) to prevent workers from entering the robot's range of movement during operation.
If there is no safety cover, indicate the robot's range of movement and take necessary safety measures.



⚠ WARNING

Installation/transportation

- When transporting the robot, it should be carried by at least 2 people, or a cart, hand truck, etc. should be used.
- When performing work involving 2 or more people, be sure that the relationship between the leader and subordinates is clear, and perform work while giving voice instructions to each other to ensure safety and prevent dangerous contact or falls.
- Install the robot on a flat surface and secure it in place to prevent the robot from tipping over or falling.
- Do not climb on top of the robot or use it as a step.
- When moving the robot, be sure to secure its movable parts before moving.
- Be sure that the main power supply is switched off when installing the robot and performing wiring, and check that wiring has been performed properly.
- When using externally connected devices such as emergency stop equipment, etc., check that they operate correctly before use.

During automatic operation

- Check the safety of the surrounding area before starting operation.
- Provide indications that the robot is in operation and be careful that no one enters the safety cover during operation.
- When workers have entered the safety cover, take measures to enable emergency stopping.

During work

- When performing work inside the safety cover, notify nearby workers that work is being performed and display a “Working” sign, etc. in an easily visible location.
- When work will be performed inside the safety cover, before starting work check whether or not external wires are equipped with insulation or shielding, whether or not there are abnormalities in the operation of moving sections, and that there are no abnormalities in the operation of emergency stop equipment, etc.
- When training work, inspection, etc. is being performed, be sure that workers perform the work thoroughly.
- To enable operation to be immediately stopped in the event of a dangerous condition, perform work within reach of an emergency stop button, or install emergency stop devices close at hand.
- If a dangerous situation occurs, press the emergency stop button (button of emergency stop device) immediately.
- When work is being performed by multiple workers, perform work while giving voice instructions to each other and while checking safety to prevent other workers from performing careless operations during the work.
- When inspecting or replacing parts that do not require operation, switch off the main power supply before performing such work.

Other

- Do not use near flammable, inflammable, explosive, or corrosive gases or materials.
- If the product will not be used for a long period of time, unplug the power plug.
- Do not touch metal parts near the tip while the tip is at high temperatures.
- Since there is a danger of fingers getting pinched, keep your fingers away from moving sections (X, Y, Z, and θ axes).
- When performing repairs or replacing parts, be sure to unplug the power plug and wait for the soldering iron to cool down before performing such work.
- Do not allow disassembly or repair to be performed by workers other than qualified repair technicians. Also, do not modify the product.

Failure to observe the following precautions to ensure safety might result in electric shock, malfunction or other trouble.

⚠ CAUTION

- Since the door (cover) of the JOY STICKS may become detached, be careful not to hold onto the door (cover).
- When transporting the product, be careful not to hold it by the X axis section. Doing so may result in damage to the product.
- Attach only HAKKO-specified accessories to the robot, and do not use this product for applications other than soldering.
- Ensure safety by wearing a helmet, protective gloves, safety glasses, and safety shoes when necessary.
- Do not subject the product to strong impact.
- Product should be installed so that sufficient working space to safely perform preventive maintenance, etc. can be secured.
- Be sure to ground the product during use.
- Be sure to provide sufficient illumination to perform work safely. (JIS Z9110 specifies 300 to 750 lux.)
- Be sure to use the product only in the specified use environment. Use in high-temperature high-humidity regions or in cold high-altitude regions may not provide sufficient performance.
- Do not touch the product with wet hands or use the product when the main body or cords are wet.
- If the product becomes abnormally hot or emits smoke, abnormal odors, or abnormal noise, stop use immediately and set the power switch to off.
- When use is interrupted or completed, set power switch to off.
- Always hold the power plug when plugging it in or unplugging it.
- Do not place the cord close to heat, oil, or objects with protruding corners.
- Do not forcibly bend, pull on, or twist the cord.
- Do not use the cord if the plug is damaged or if it is loose in the electrical outlet.
- The cutting blade has a sharp edge. Be careful not to cut your hands, etc. on it.
- If cut flux-containing solder is not used for a long time, the flux characteristics may deteriorate.
- Since the flux characteristics of cut solder inside the guide pipe may deteriorate due to the heat of the soldering iron, it should be used quickly.
- Do not bend the guide pipe or forcibly turn it. Doing so may cause it to break.
- Do not fold the tube or bend it at a sharp angle. Doing so may cause it to become clogged with solder.
- If solder or flux sticks to the cutting blade or pulley, use a brush, etc. to remove it.
- Periodically remove the guide pipe and Fluoroplastic tube and clean off any flux that is stuck on.
- Systems related to safety do not lead to loss of safety functions even if defects of single parts occur. Defects of single parts are detected before safety functions of the next cycle are executed and safety functions remain enabled even if defects occur on single parts.
- This product is a precision equipment. Data may get lost due to sudden malfunctions, etc. As a precaution, periodically take backup of important data stored in this product. We shall not be held responsible for any damage or loss of the data stored in this product or in the connected products. Also, we are not capable of recovering, restoring, or duplicating recorded data. We shall not be held responsible if data could not be saved to this product for unspecified reasons.

About Batteries (for backup AX1004)

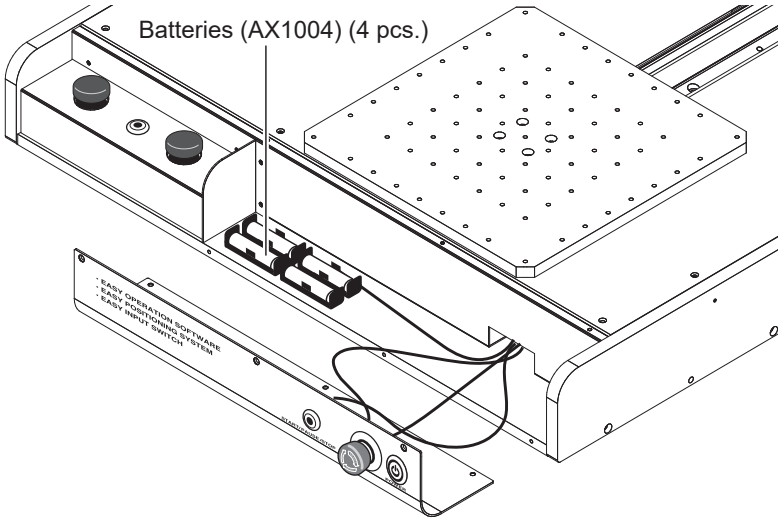
Please be sure to replace batteries (AX1004) before end of service life.

The battery (AX1004) will be depleted when all power supply is turned off or the main supply on the back side is turned on and the power supply button on the front panel is turned off.

Battery (AX1004) life **Approx. 6500 hours (approx. 9 months)**

Use the above information as a reference for the service life of the battery (AX1004).

However, the duration of the charge varies depending on the use environment and ambient temperature.



⚠ CAUTION

If the battery (AX1004) runs out, the position information for each axis will be lost and the product will not operate normally.
Always be sure to have a new battery (AX1004) on hand and replace the battery (AX1004) before it runs out.

If battery (AX1004) has run out:
If the battery (AX1004) has run out, please consult the sales office or distributor since it will be necessary to set the position information again from the start.

Refer to “8-4 How to replace batteries (for backup AX1004)” (p. 164) for the procedure for replacing batteries (AX1004).

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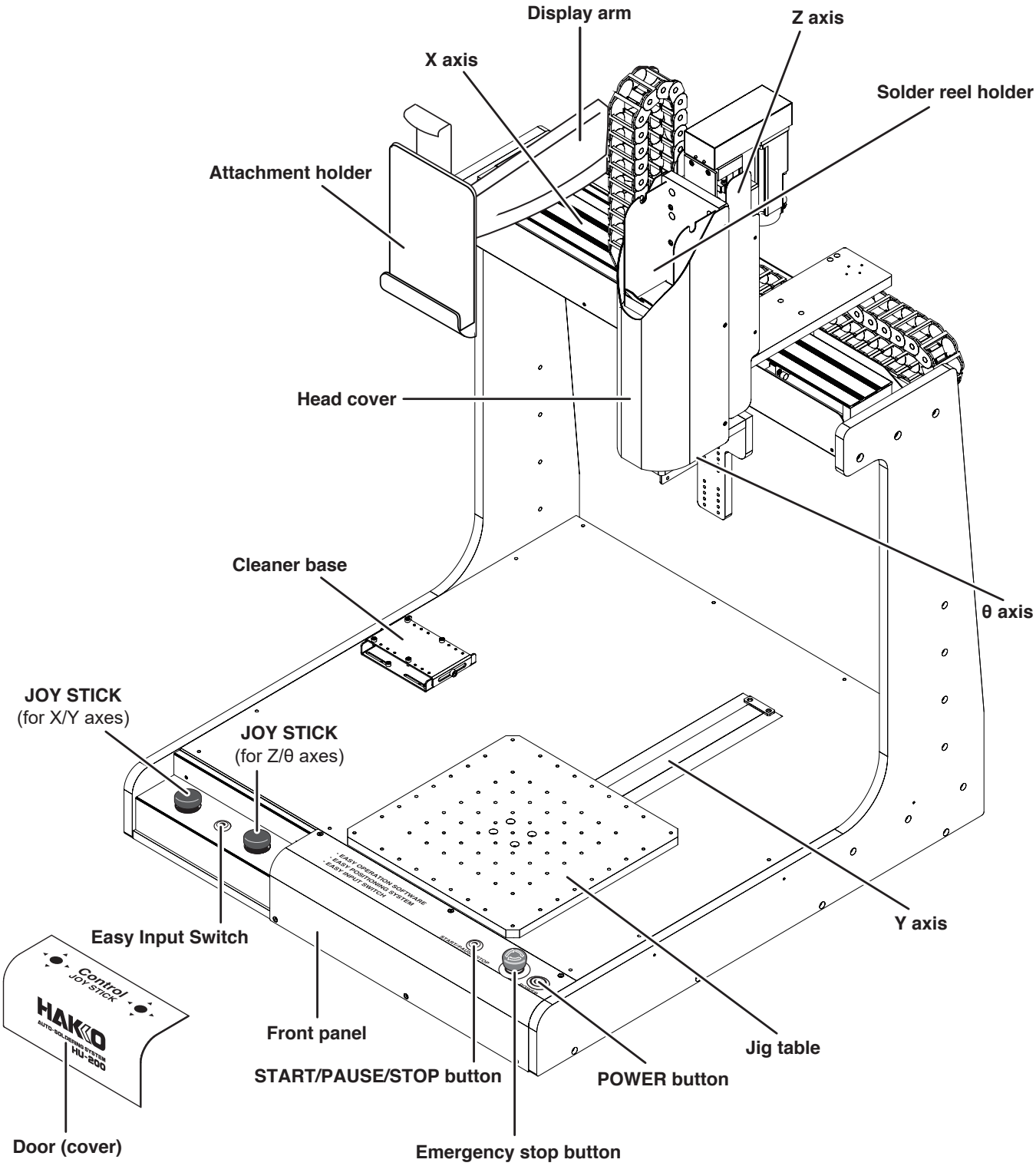
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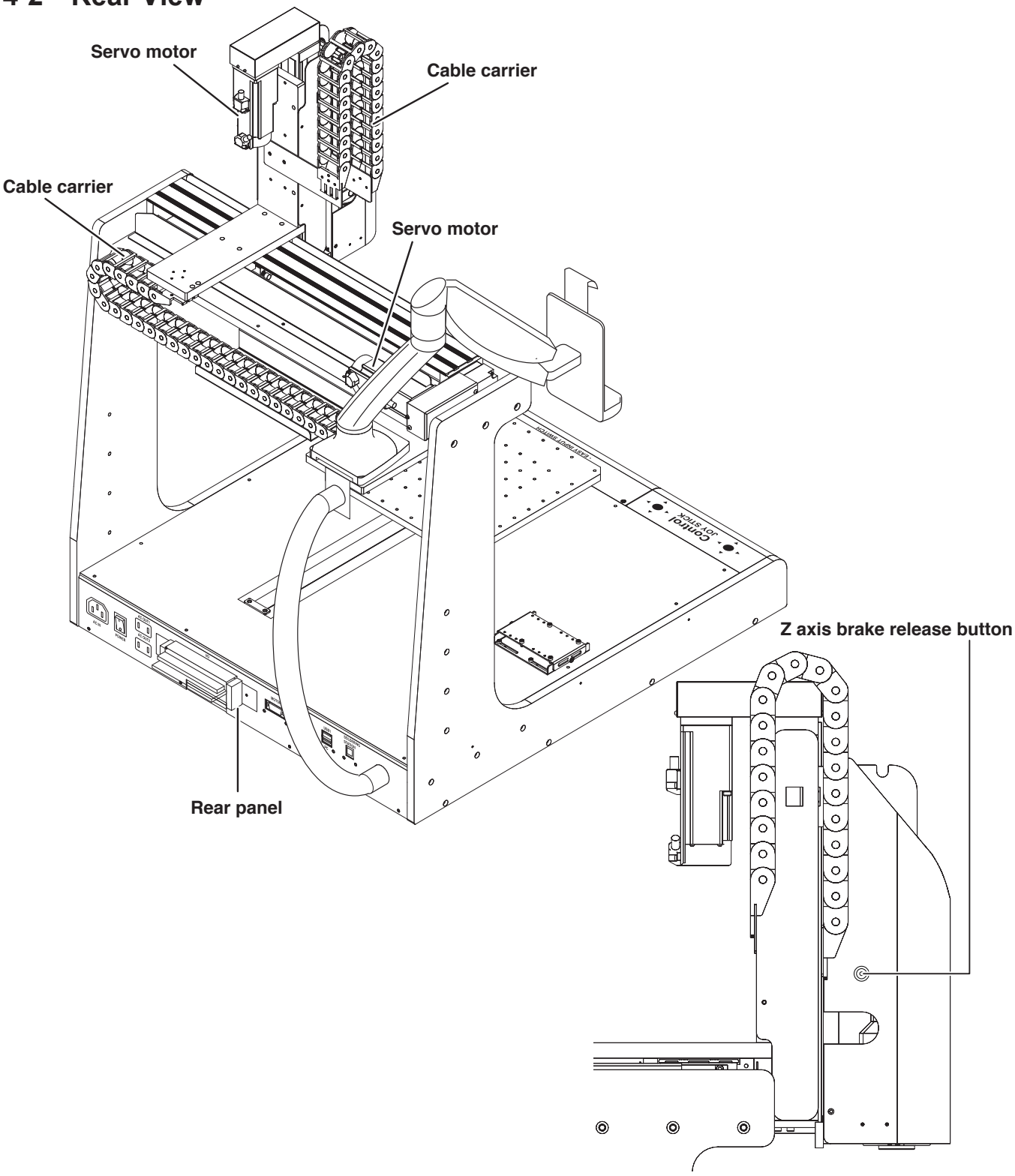
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4-1 Front View



4-2 Rear View

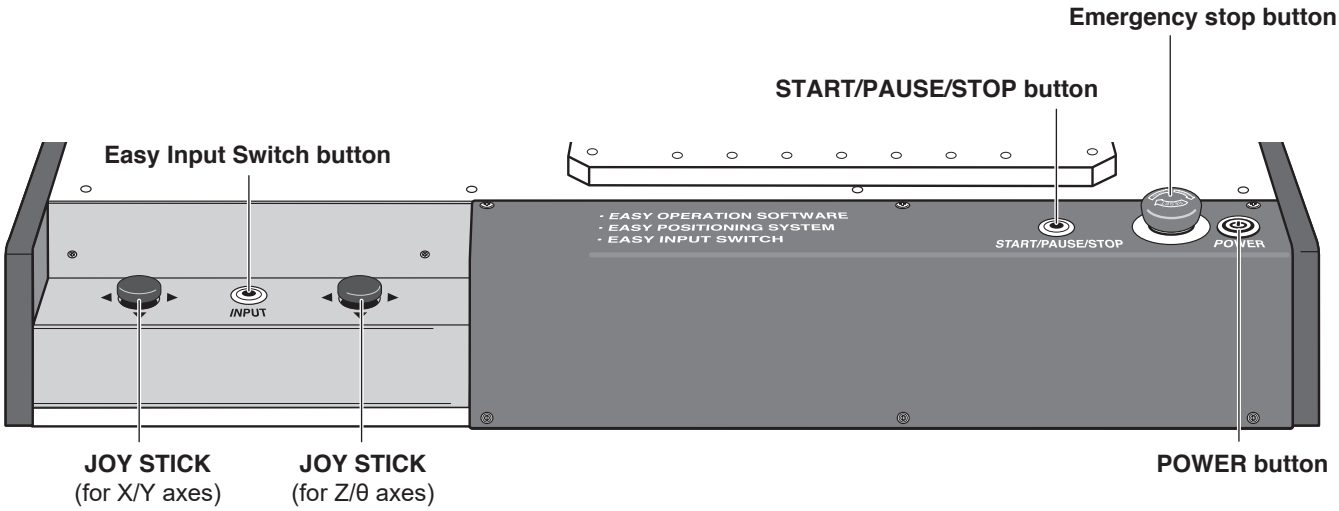


Z axis brake release button

If the **Z axis brake release button** is pressed while the equipment is in emergency stop condition while the software is running, the solenoid brake will be set to off.

⚠ CAUTION
There is a danger of the Z axis dropping when the solenoid brake is set to off. Be sure to support the Z axis before setting the solenoid brake to OFF.

4-3 Front Panel



JOY STICK (for X/Y axes)
Moves the X axis and Y axis manually. For movement direction, refer to the diagram.
For operation details, see “7-2 JOG Operation” (p. 73).

JOY STICK (for Z/θ axes)
Moves the Z axis and θ axis manually. For movement direction, refer to the diagram. For operation details, see “7-2 JOG Operation” (p. 73).

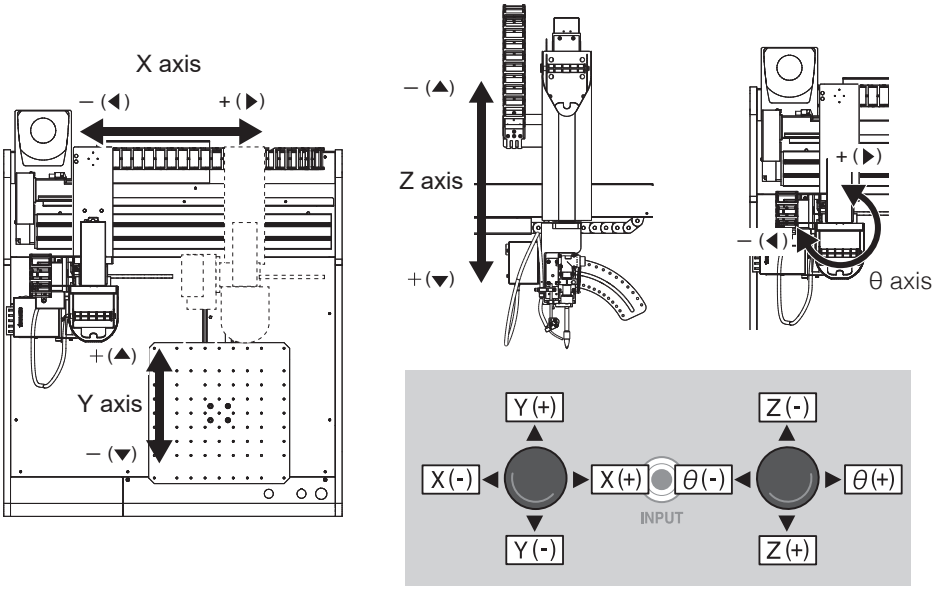
Easy Input Switch button
Pressing the Easy Input Switch will set the current coordinates as the soldering start point or end point. For operation details, see “7-4 Solder Installation and Solder Feed Settings” (p. 85).

START/PAUSE/STOP button
Runs, pauses, and stops the program.
For operation details, see “7-6 Running a Program” (p. 109).

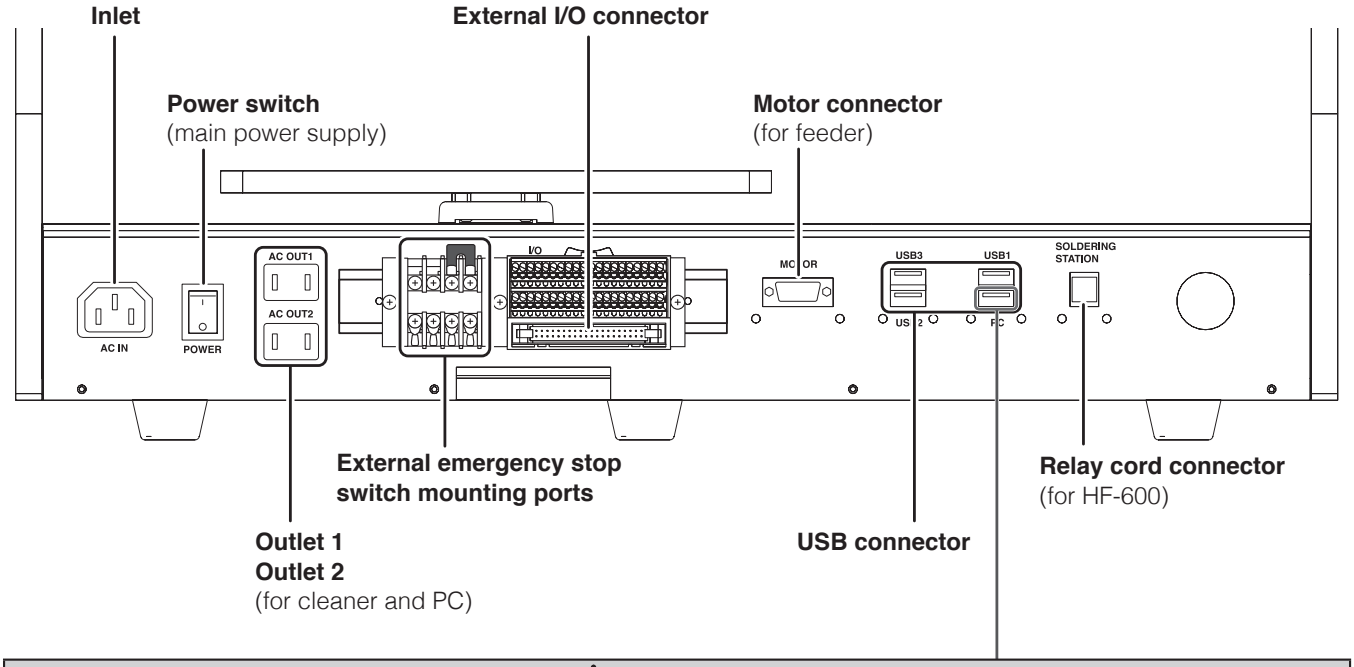
Emergency stop button
Sets the equipment to emergency stop condition. Turn clockwise to cancel this condition.

POWER button
Button to switch the secondary-side power on and off.

JOY STICK operation and axis movement directions



4-4 Rear Panel



⚠ CAUTION

Even if the cable is plugged into a USB connector other than the USB connector for PC (lower right), connection between the PC and robot will not be achieved.

5. Installation

5-1 Cautions on Installation

Install the robot on a level surface.

⚠ WARNING

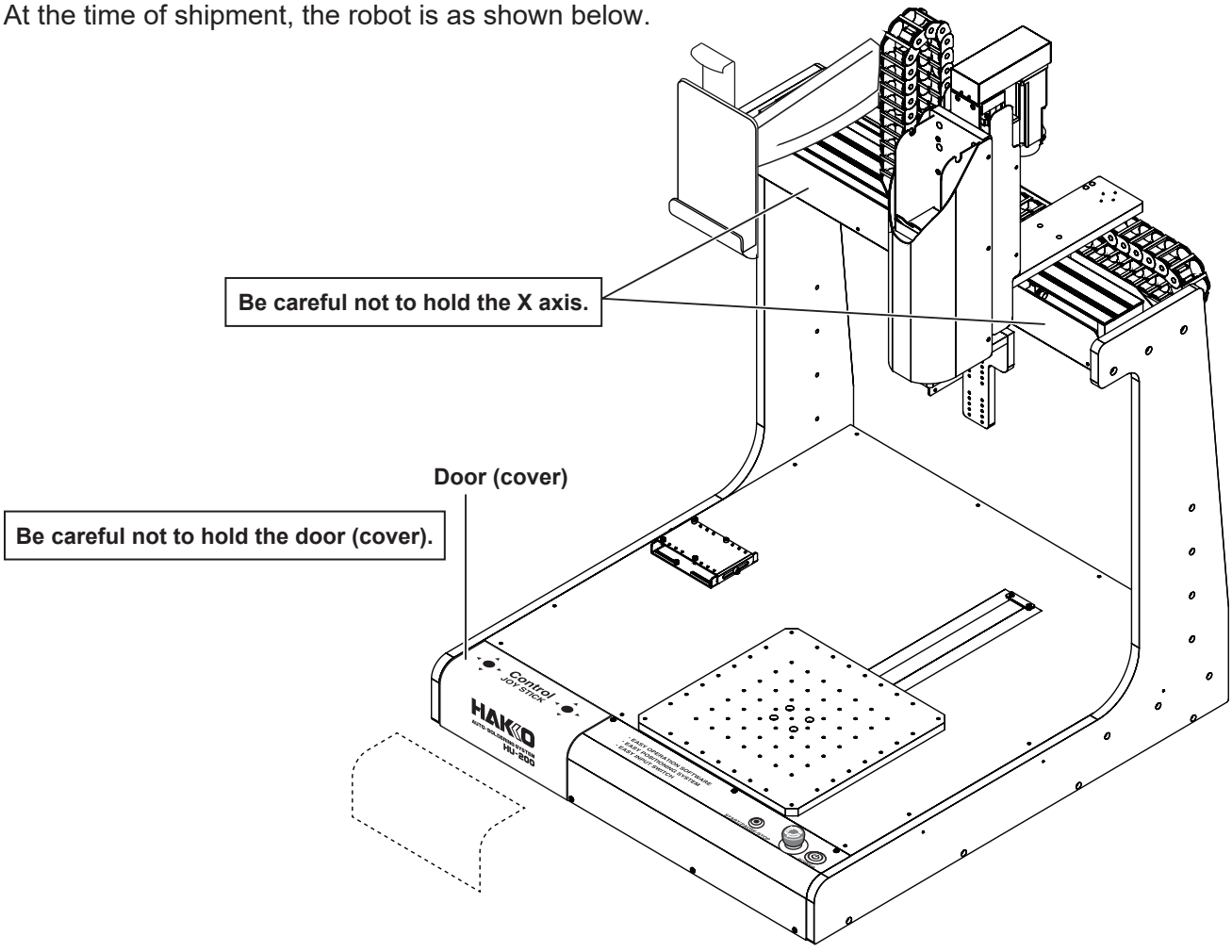
- When transporting the robot, it should be carried by at least 2 people, or a cart, hand truck, etc. should be used.
- When performing work involving 2 or more people, be sure that the relationship between the leader and subordinates is clear, and perform work while giving voice instructions to each other to ensure safety and prevent dangerous contact or falls.
- Secure the robot in place to prevent the robot from tipping over or falling.

⚠ CAUTION

- Since the door (cover) of the JOY STICKS may become detached, be careful not to hold onto the door (cover).
- When transporting the product, be careful not to hold it by the X axis section. Doing so may result in damage to the product.

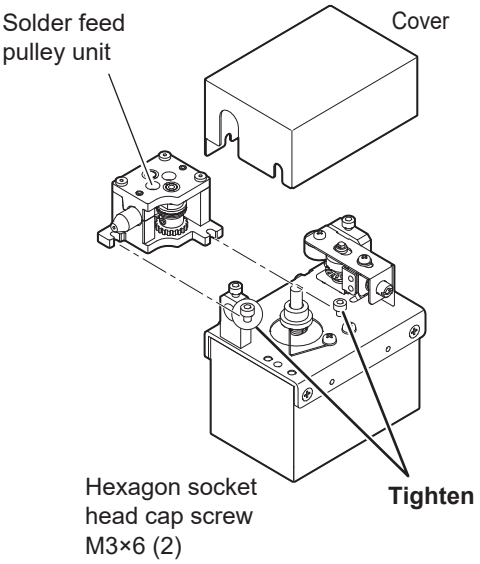
5-2 Attaching Accessories to the Robot

At the time of shipment, the robot is as shown below.



5-2-1 Attaching the Feeder Unit (CX5040)

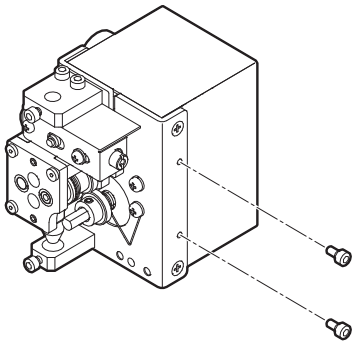
1. Open the cover of the feeder unit (CX5040), attach the solder feed pulley unit to the feeder unit (CX5040), and tighten the screws indicated in the diagram.



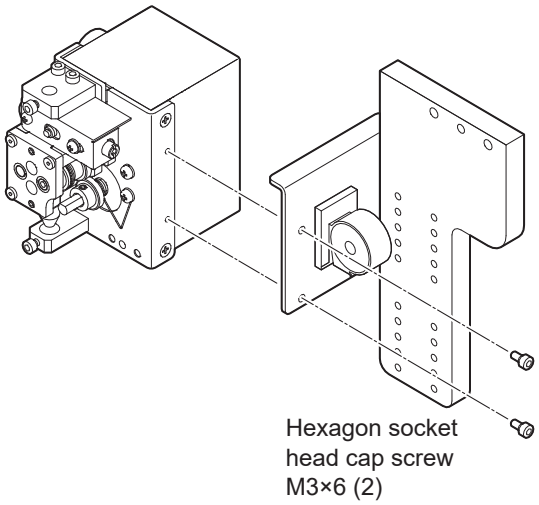
⚠ CAUTION

Do not touch any hexagon socket head cap screw other than those indicated in this manual. Also, be careful not to overtighten the screws.
The attachment method of the solder feed pulley unit for Φ0.3 mm solder (BX1076) is different. Refer to the instruction manual for BX1076.

2. Remove the hexagon socket head cap screws of the feeder unit (CX5040).

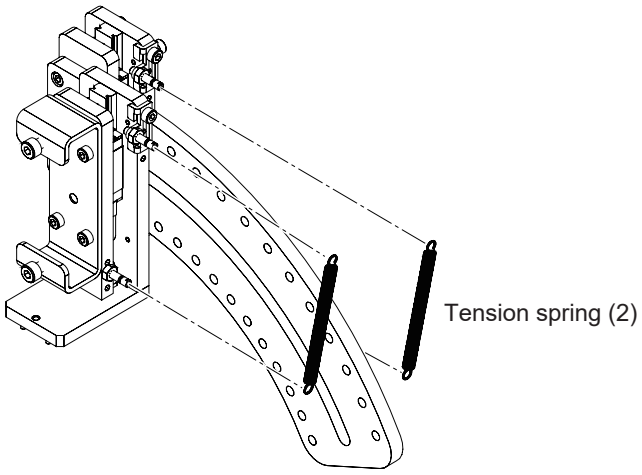


3. Use the removed hexagon socket head cap screws to attach the feeder unit (CX5040) to the soldering unit fixture base.

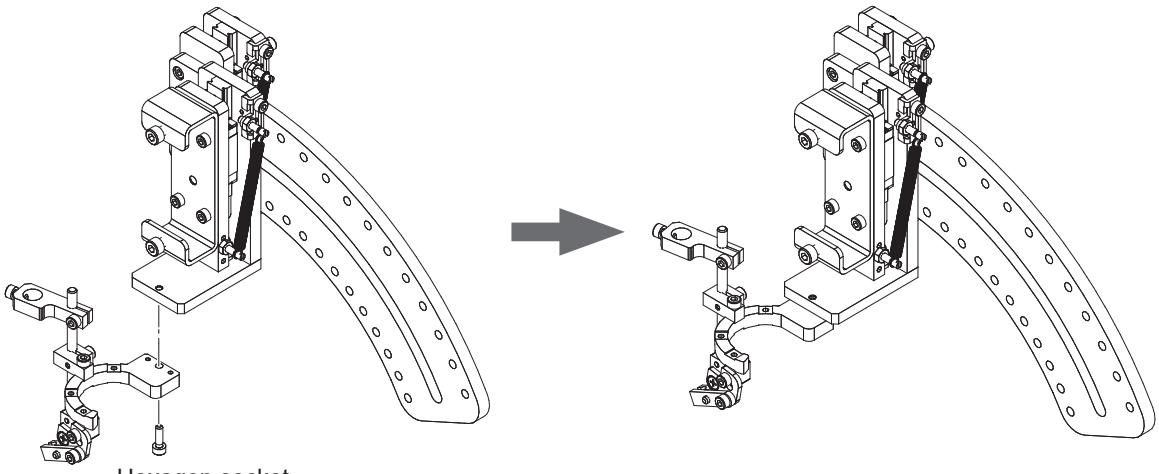


5-2-2 Attaching the Soldering Iron Unit

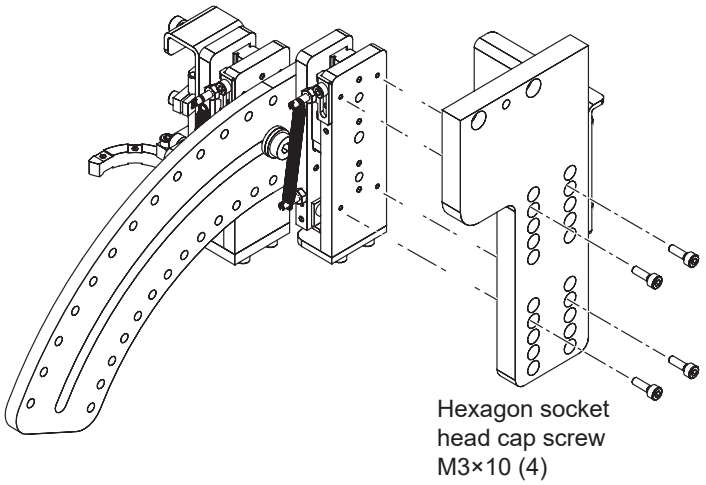
1. Attach the tension springs included with the soldering unit mount (CX5004) to the soldering unit mount.



2. Assemble the soldering unit mount (CX5004) using 1 of the hexagon socket head cap screws included with the soldering unit mount.

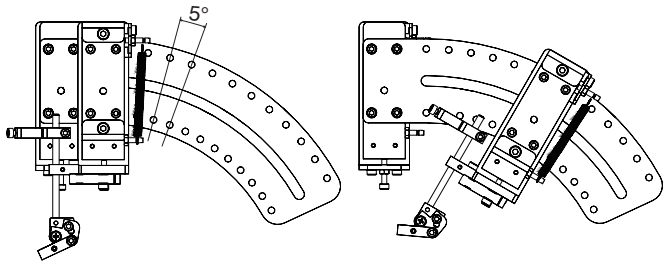


3. Attach the soldering unit mount (CX5004) to the soldering unit fixture base (CX5002) using 4 of the hexagon socket head cap screws included with the soldering unit mount.
The mounting angle can be set with the soldering unit mount.
For details, refer to “About the Soldering Unit Mount (CX5004)” (p. 22).

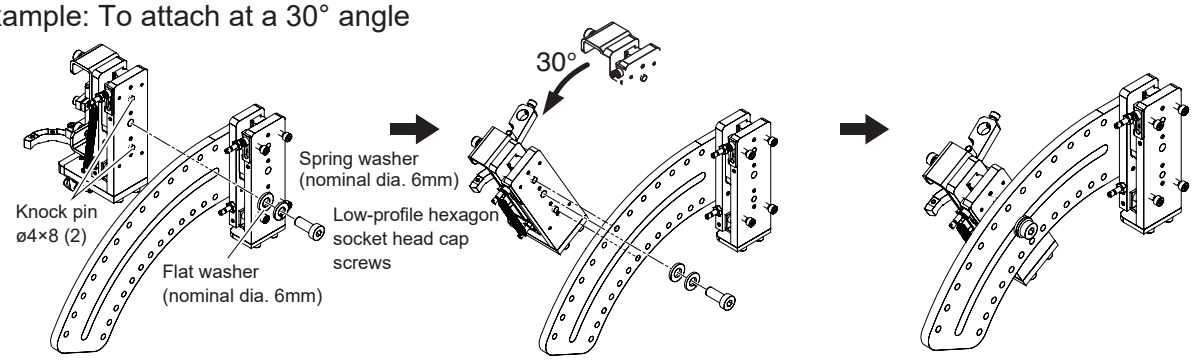


About the Soldering Unit Mount (CX5004)

The angle of the soldering unit mount (CX5004) for attaching the handpiece FU-6002 and feeder unit (CX5040) can be changed in 5° intervals.



Example: To attach at a 30° angle

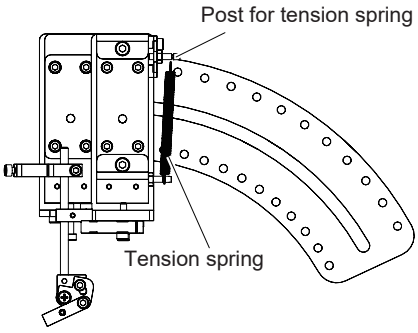


⚠ CAUTION

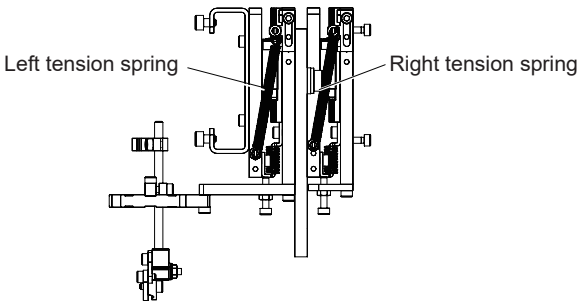
When changing the angle, be sure that the 2 knock pins are securely in the mounting holes.

Setting the tension spring positions

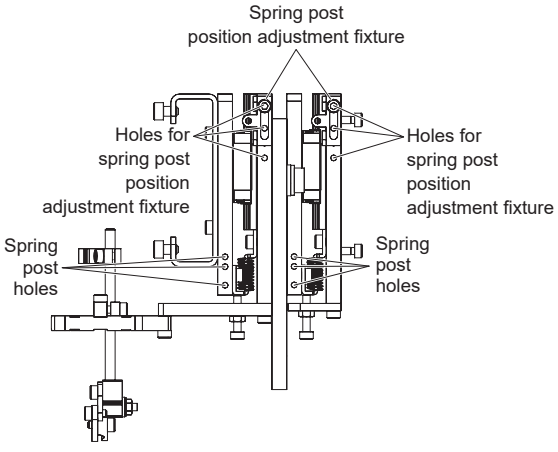
Tension springs are included with the soldering unit mount (CX5004).
When the angle is changed when attaching the handpiece FU-6002 and feeder unit (CX5040), change the tension spring attachment positions and adjust the pressure of the tip when it touches the workpiece.



Right-side view of soldering unit mount

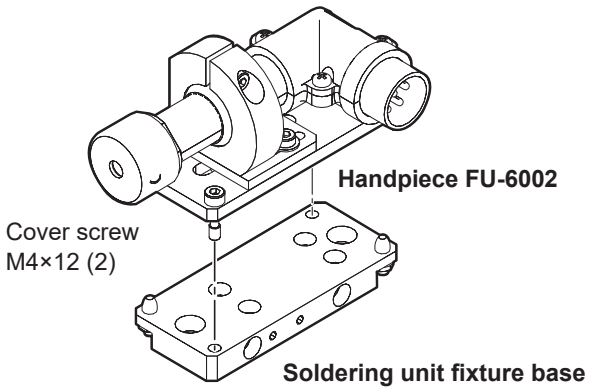


In the right-side view of the soldering unit mount, the right tension spring supports the soldering unit mount (CX5004), feeder unit (CX5040), and handpiece FU-6002, and the left tension spring supports the feeder unit (CX5040) and handpiece FU-6002. Insert the spring posts into the spring post holes and attach the tension springs to the spring posts.

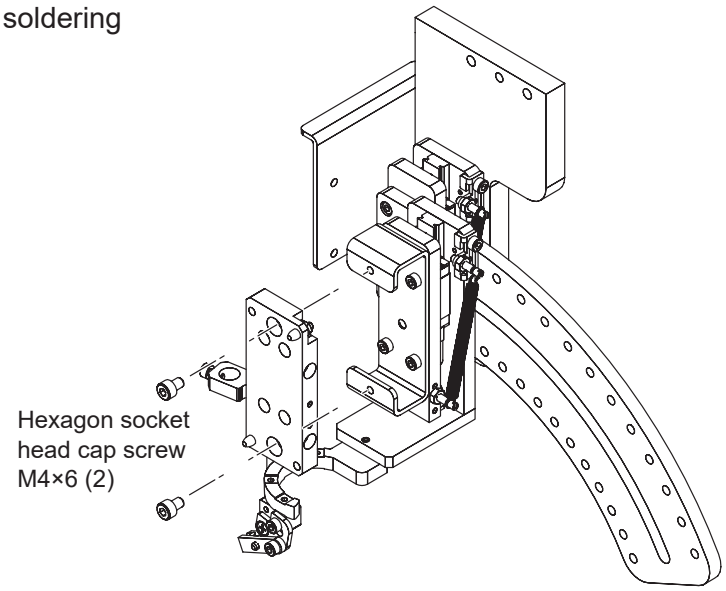


NOTE The spring post position adjustment fixture can be attached for finely adjusting the pressure of the tip when it touches the workpiece.

4. Remove the soldering unit fixture base included with the soldering iron unit HF-600 from the handpiece FU-6002.

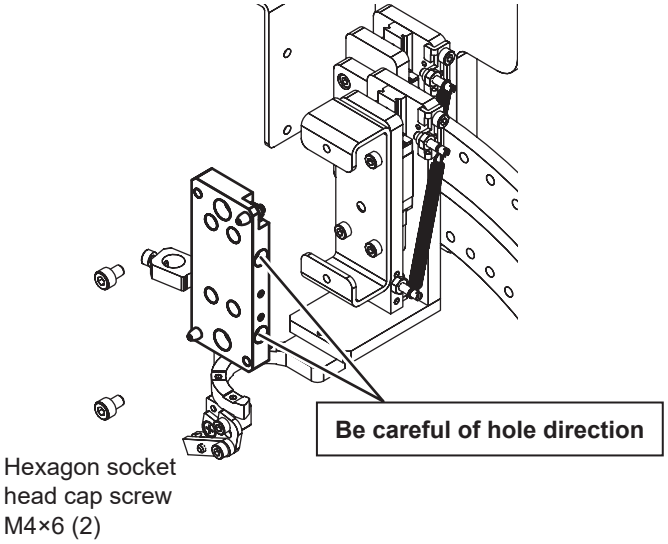


5. Attach the soldering unit fixture base to the soldering unit mount (CX5004).



⚠ CAUTION

Be sure to attach the soldering unit fixture base in the proper orientation.
Attach in the orientation shown in the following diagram while paying attention to the hexagon socket head cap screw mounting holes, etc.



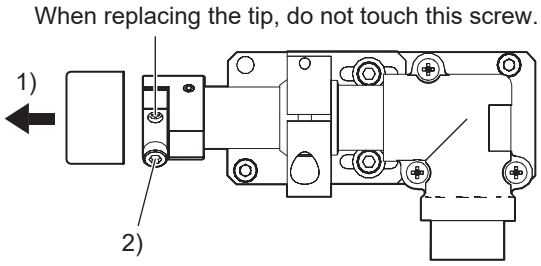
5. Installation (continued)

6. Attach the tip (sold separately) to the Handpiece FU-6002 included with the soldering iron unit HF-600.

⚠ CAUTION

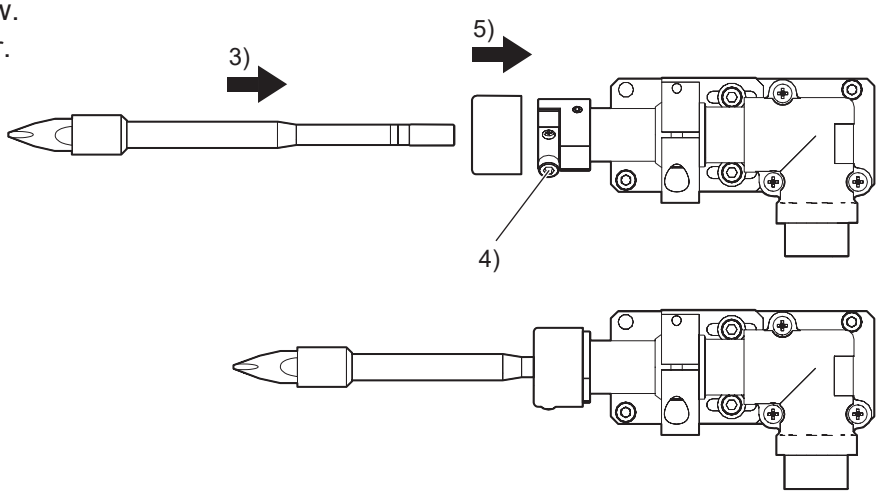
Allow the tip to cool before replacing it.
When replacing the tip while it is still hot, be sure to use the heat-resistant pad.

1) Slide the flux protector forward.
2) Loosen the tip holding screw (M3 × 10).



handpiece FU-6002

3) Insert the tip.
4) Tighten the tip holding screw.
5) Cover with the flux protector.

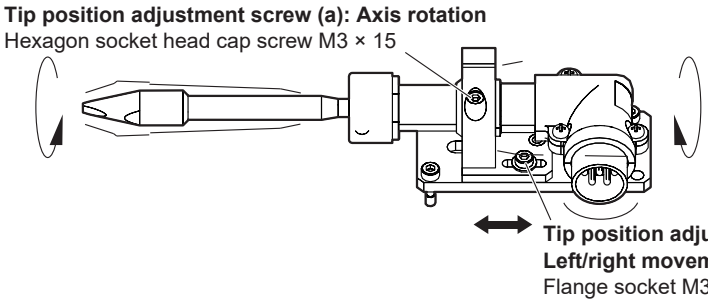


⚠ CAUTION

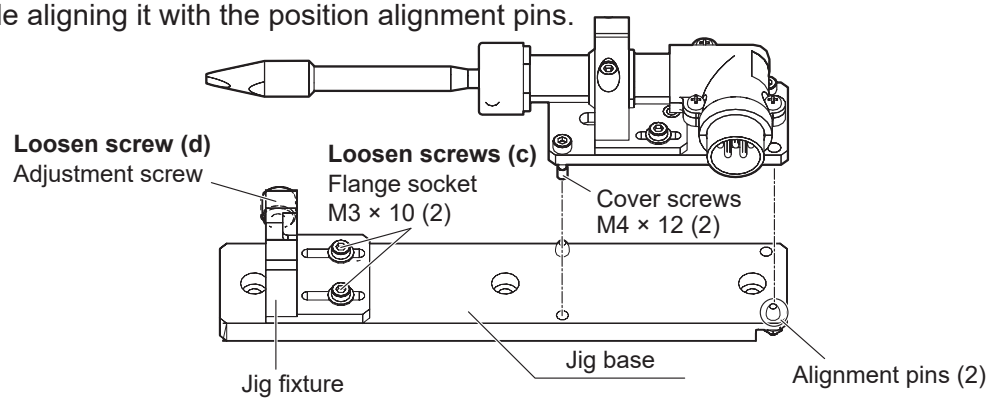
- Check that there are no gaps between the tip and the flux protector.
- When attaching a new tip, it is necessary to perform tip position adjustment. (See p. 25.)

How to Adjust the Tip Position

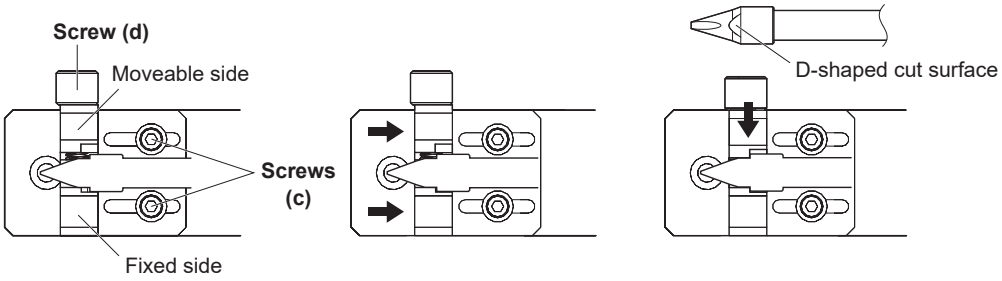
1. When the tip position adjustment screws are loosened, axis rotation **(a)** and left/right movement **(b)** can be performed. Move the tip relative to the target workpiece, and after determining the tip position, tighten the screws.



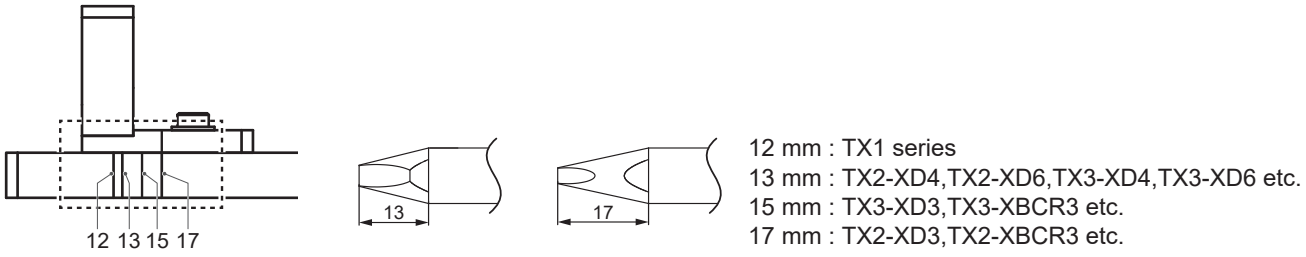
2. Loosen screws **(c)** and **(d)**, and place the handpiece FU-6002 on the tip adjustment jig unit while aligning it with the position alignment pins.



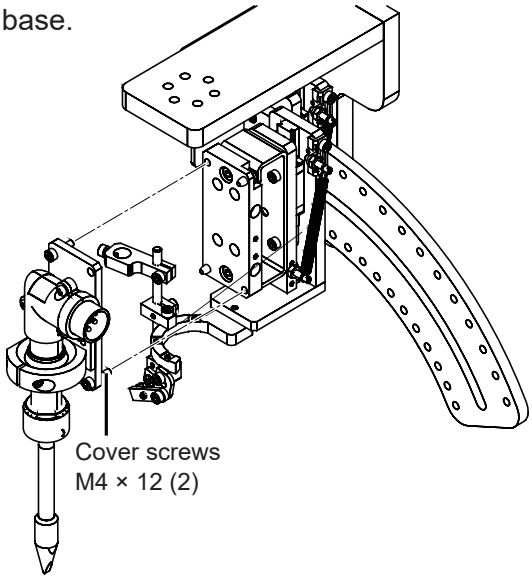
3. Align the D-shaped cut surface of the tip with the indentation in the jig fixture and move the jig fixture so that the tip fits into the fixture exactly. This position will be the standard point, so retighten the 2 screws **(c)**.
Then, to make sure that the tip does not lift up, hold it down while tightening screw **(d)**.
Unless the workpiece changes, do not move the jig fixture other than the moveable side.
After setting the standard point, remove the tip from the tip adjustment jig unit.



NOTE There are markings on the side of the tip adjustment jig unit.
They are for tip end dimensions of 12 mm, 13 mm, 15mm, and 17 mm. Use these markings as guides when adjusting the position of the jig fixture.

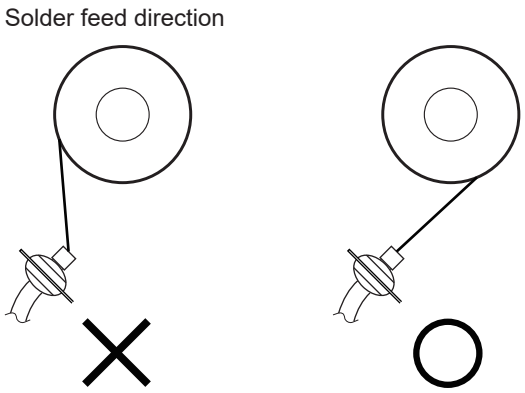


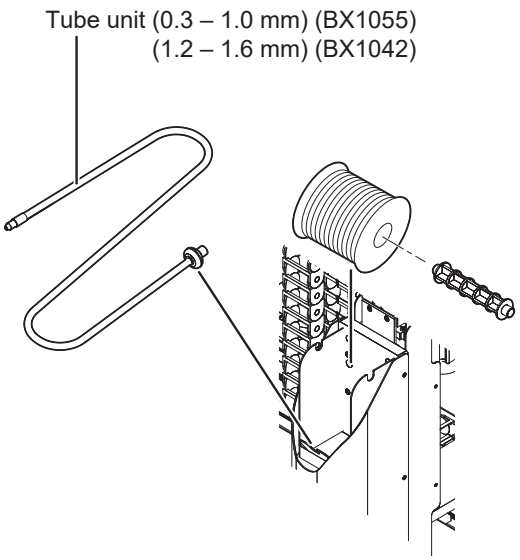
7. Attach the handpiece FU-6002 to the soldering unit fixture base.



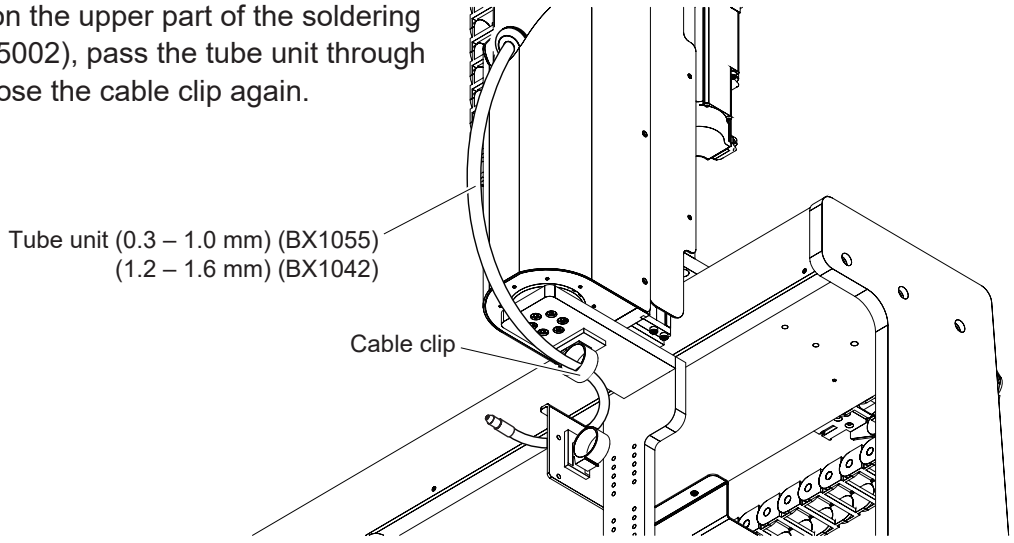
5-2-3 Attaching Tube Units

1. Install the tube unit and solder bobbin on the HU-200 (robot). Install the solder bobbin while paying attention to the solder feed direction.

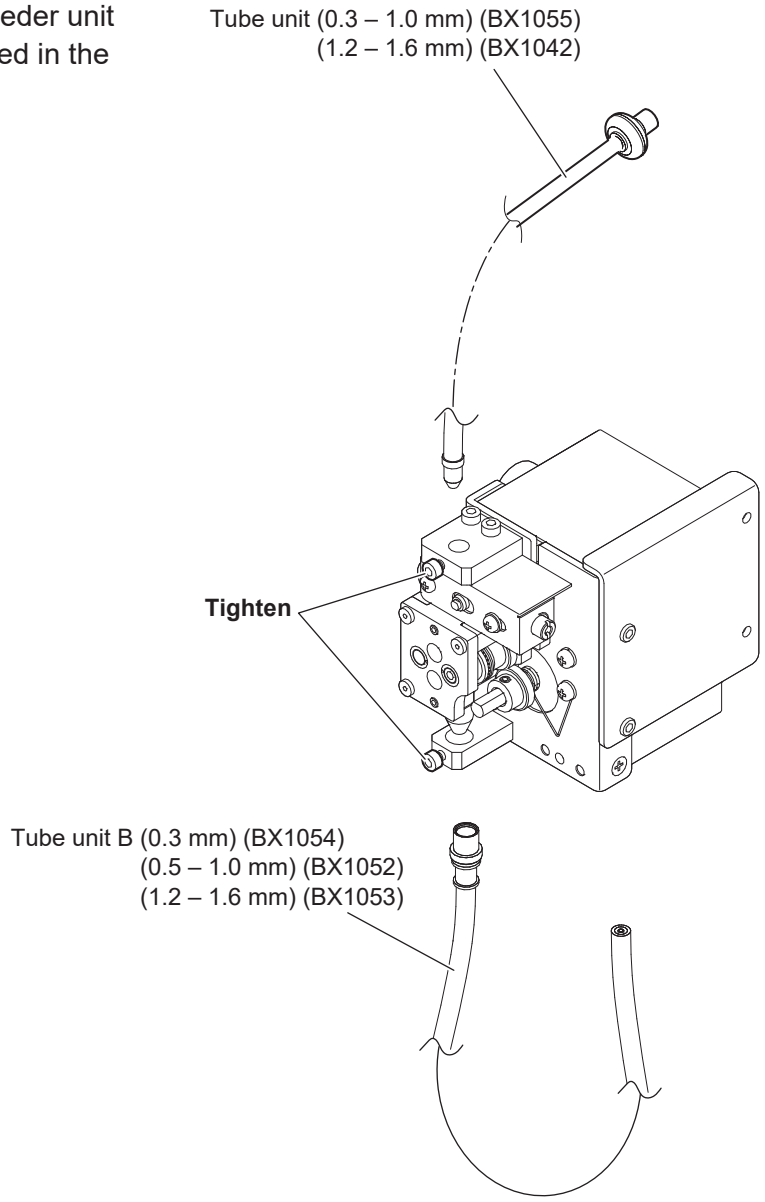




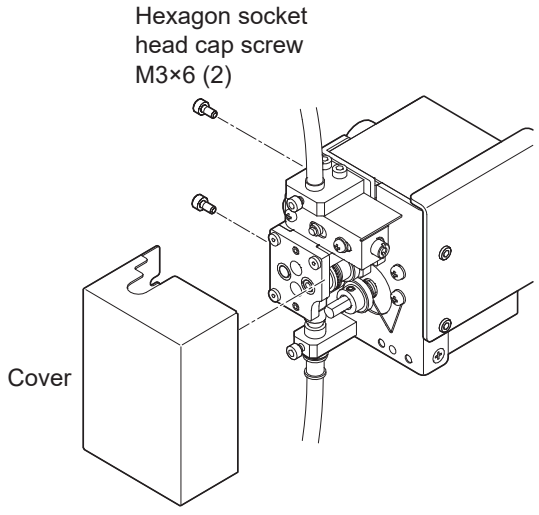
2. Open the cable clip on the upper part of the soldering unit fixture base (CX5002), pass the tube unit through the cable clip, and close the cable clip again.



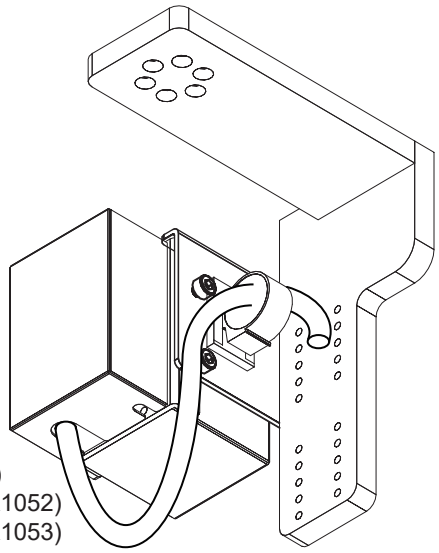
3. Attach tube unit and tube unit B to the feeder unit (CX5040) and tighten the screws indicated in the diagram.



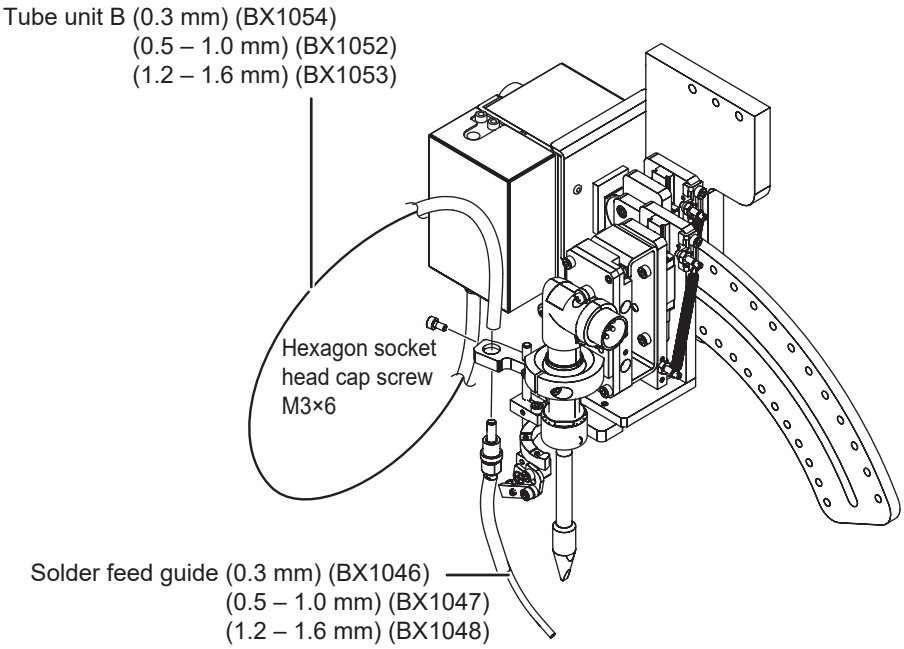
4. Close the feeder unit cover.



5. Open the cable clip on the upper part of the soldering unit fixture base (CX5002), pass the tube unit through the cable clip, and close the cable clip again.



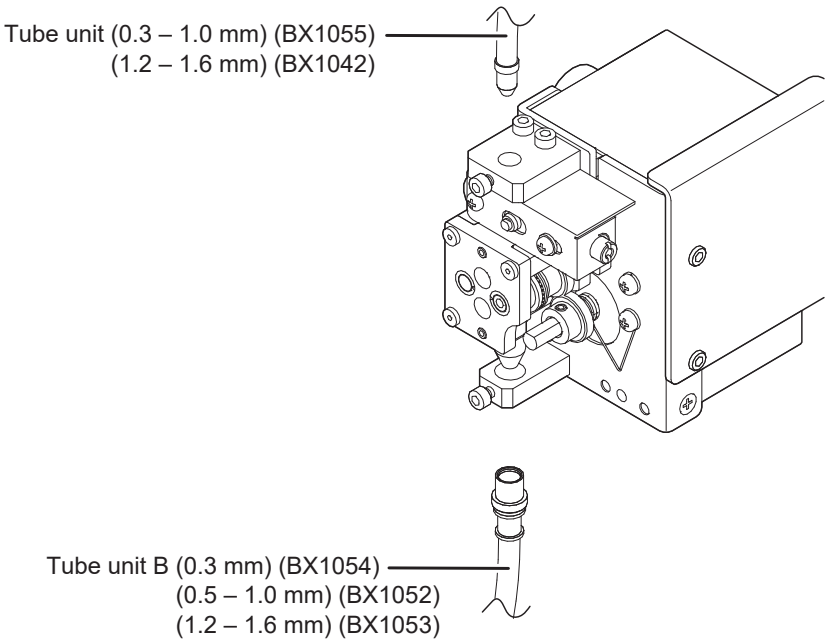
6. Attach tube unit B and the solder feed guide to the soldering unit mount.



NOTE

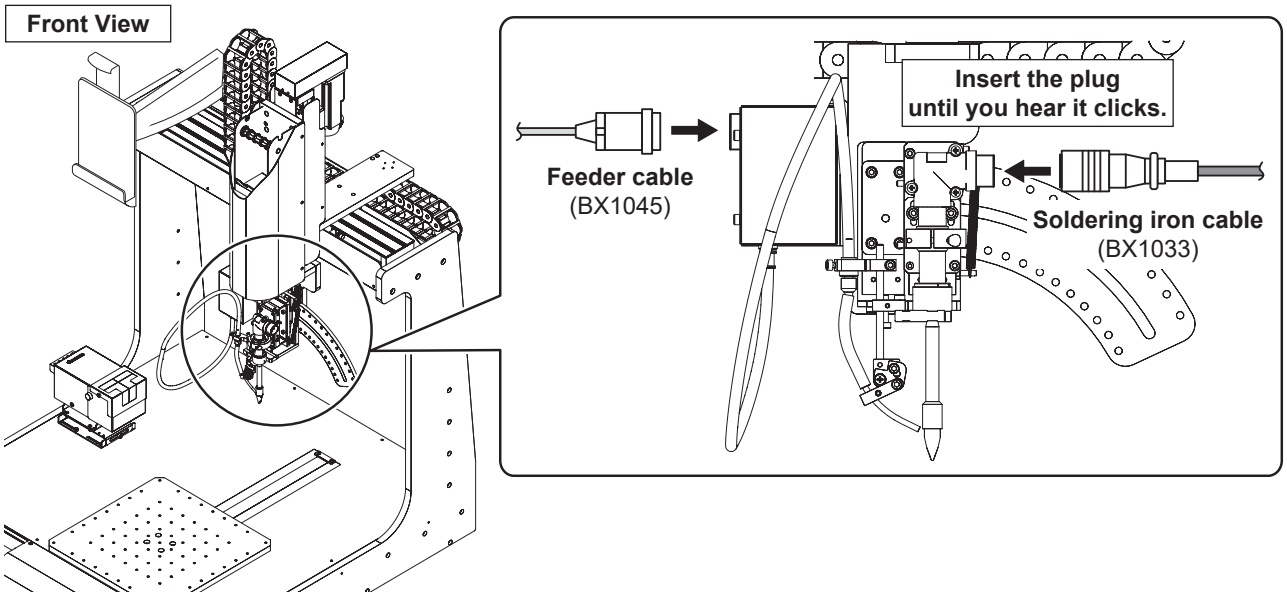
It is necessary to adjust the solder feed position of the solder feed guide and the Fluoroplastic tube attachment method.
For adjustment method details, refer to “7-4-1 Solder Installation and Solder Feed Position Adjustment” (p. 85).

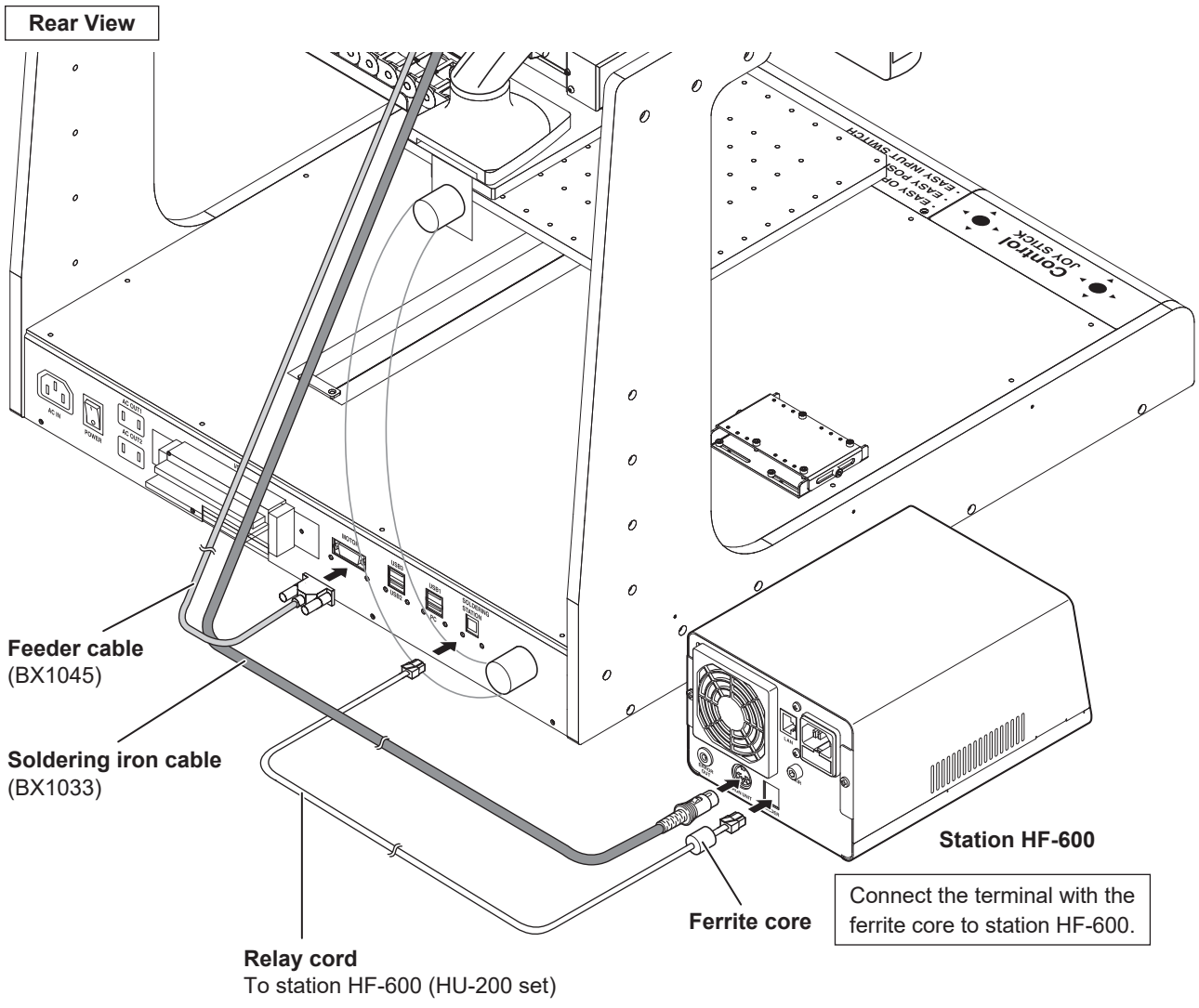
NOTE There are 2 kinds of tube units: The tube unit attached between the HU-200 (robot) and the feeder unit, and tube unit B attached between the feeder unit and the solder feed guide. There are different models of each kind according to the solder diameter.



5-2-4 Connecting Cables and Cords

1. Connect the feeder cable (BX1045) between the robot and feeder unit (CX1010), and connect the relay cord (HU-200 set) between the station FU-601 and robot.
2. Connect the soldering iron cable (BX1033) between the station HF-600 and handpiece FU-6002.

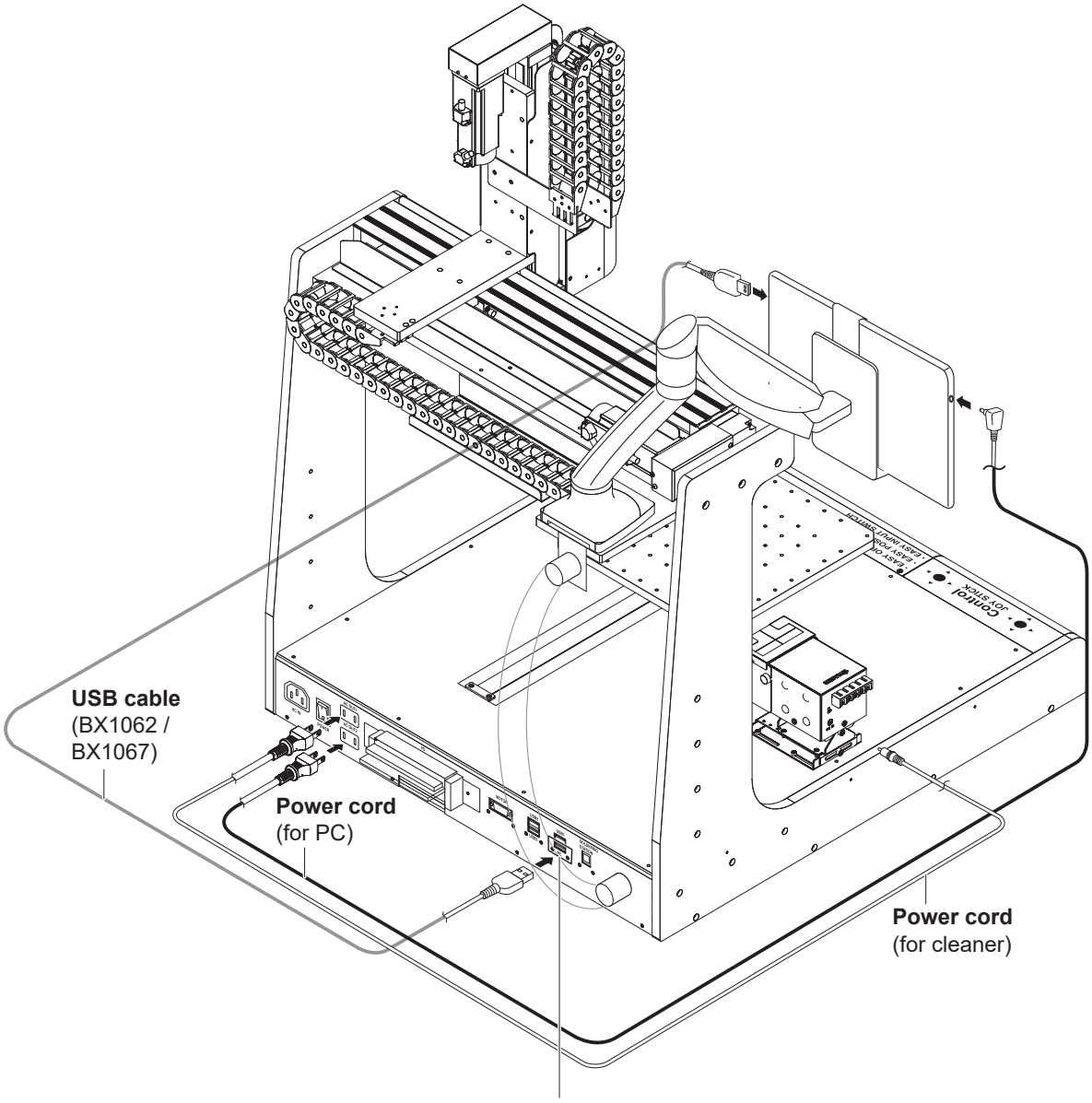




5-2-5 Mounting and Connecting the PC

1. Lift up the top part of the tablet holder, slide the PC in, and secure it in the tablet holder.

2. Connect the PC and robot with the USB cable (BX1062 / BX1067) and power cord.

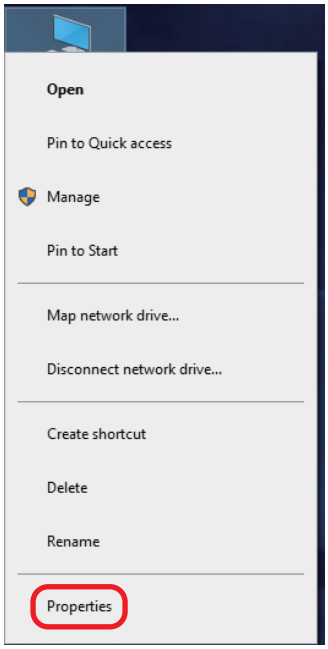


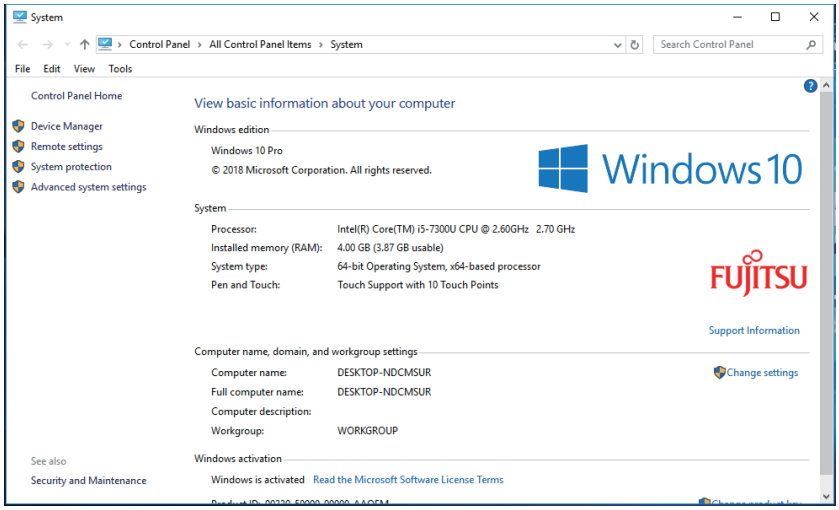
⚠ CAUTION

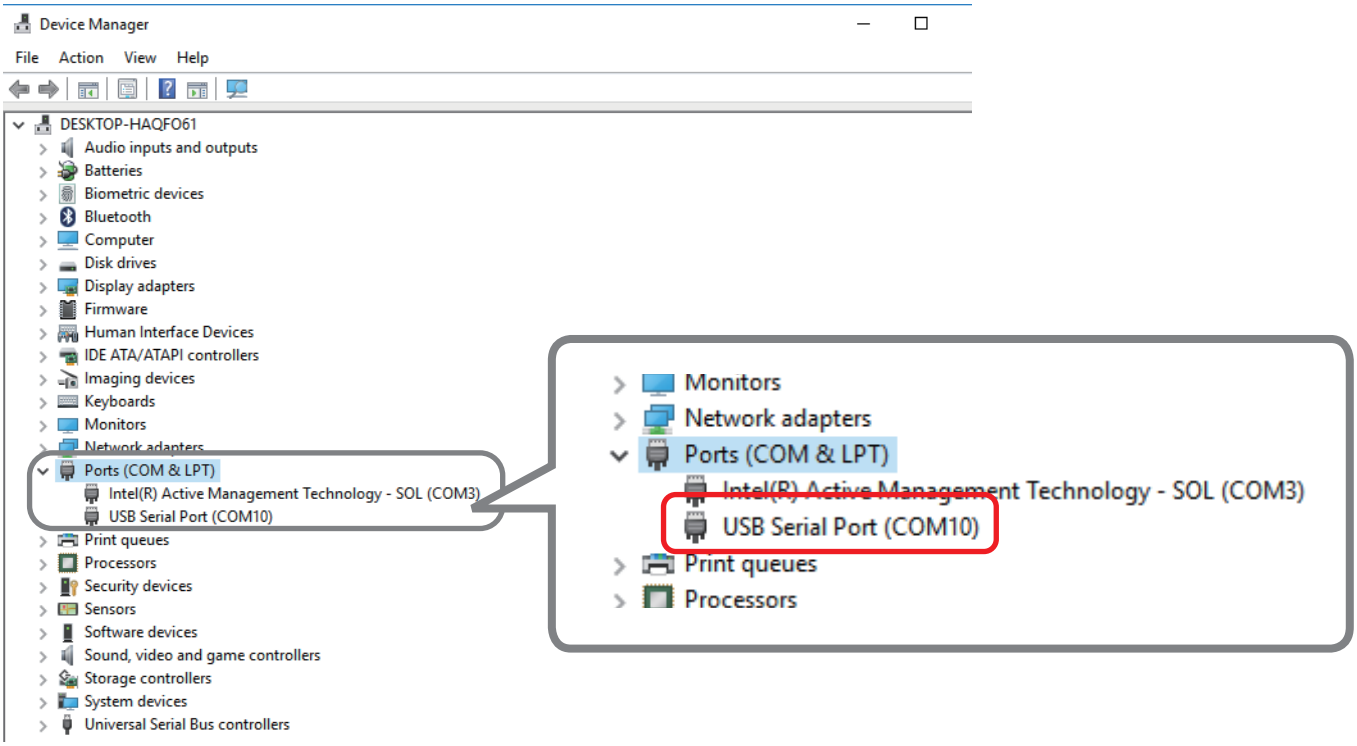
Even if the cable is plugged into a USB connector other than the USB connector for PC (lower right), connection between the PC and robot will not be achieved.

If the PC and robot cannot be connected, perform settings with the following procedures.

3. Launch “Device Manager”.

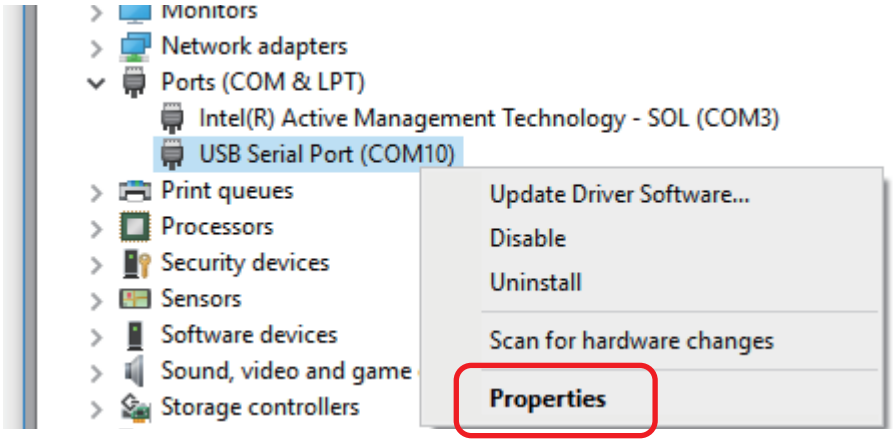


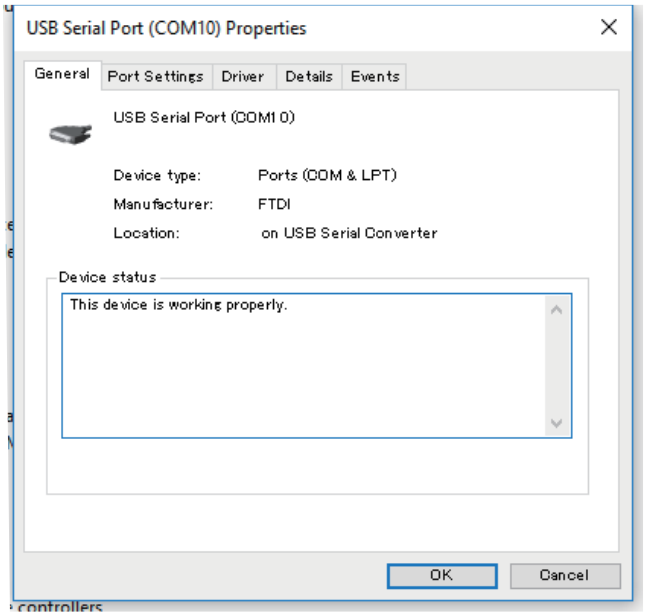




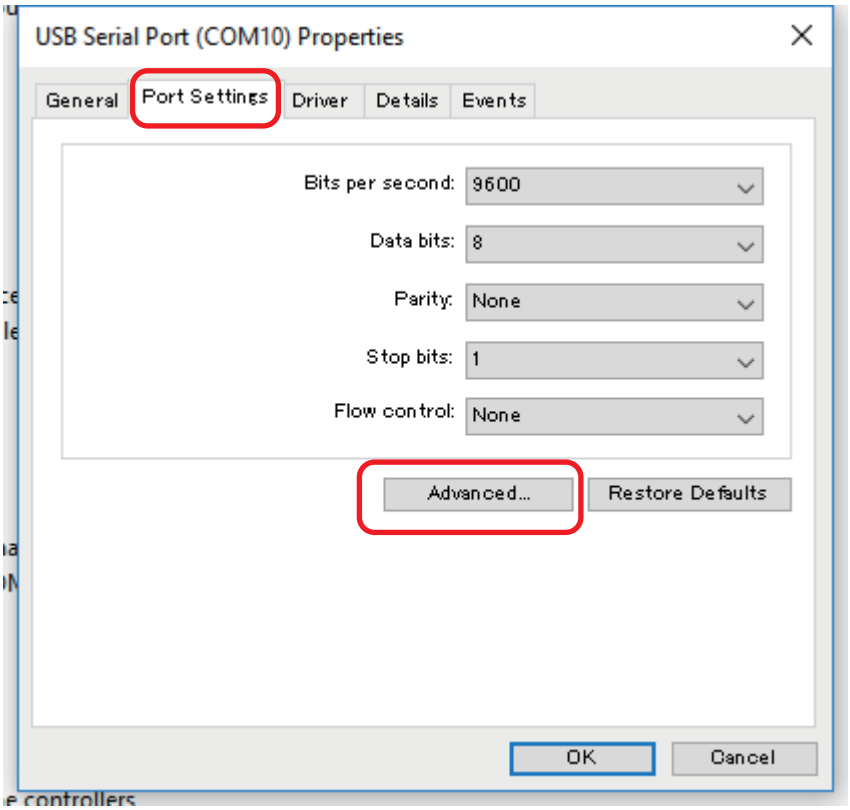
4. Changing the COM number

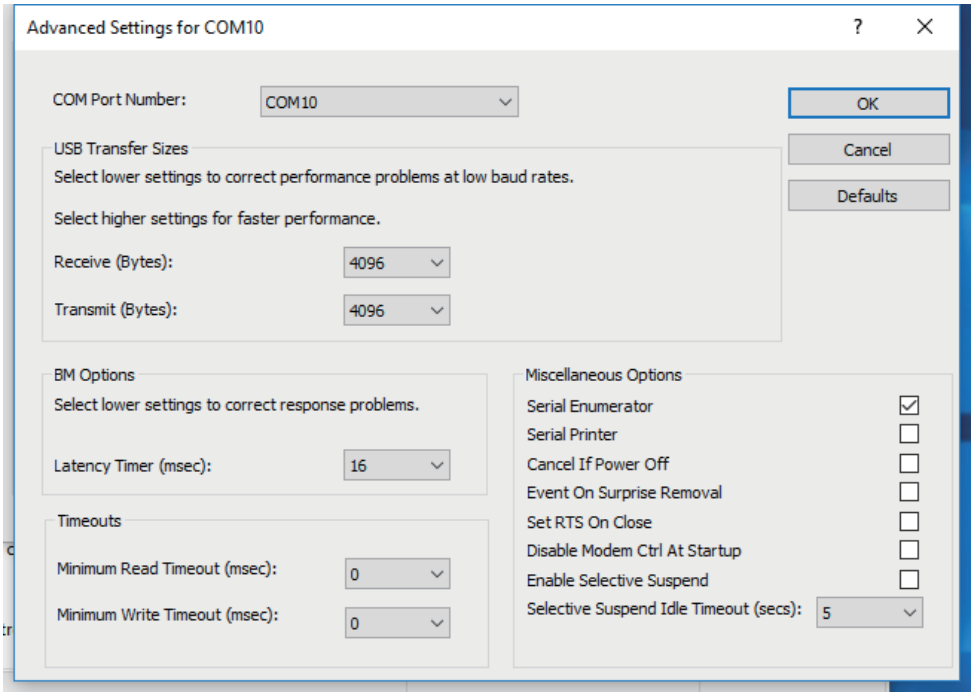
1) Press and hold the USB Serial Port or other device name to display the menu and select “Properties”.



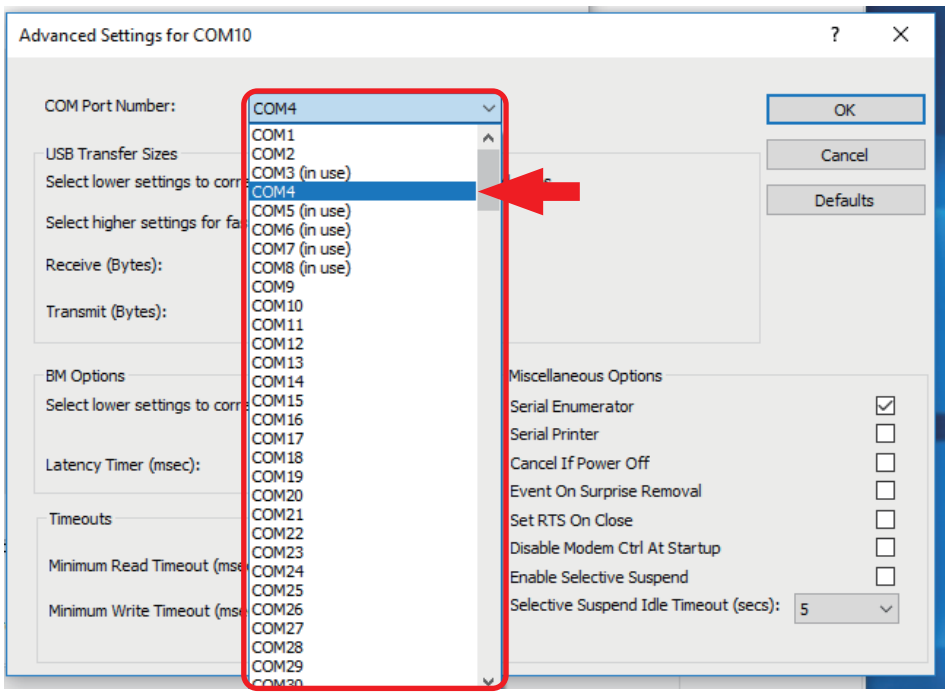


2) Select the Port Settings tab and open the Advanced Settings



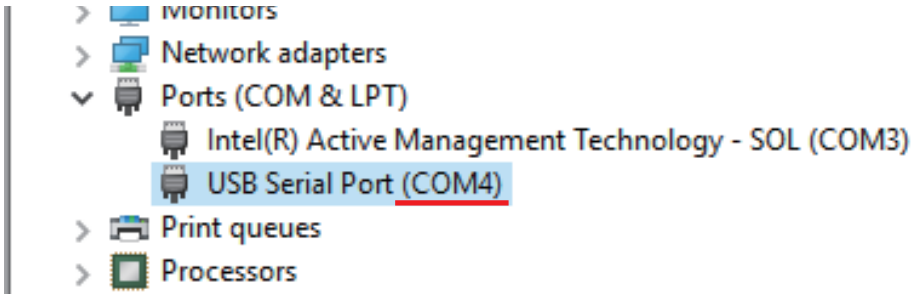


3) Select COM4 for the COM Port Number.



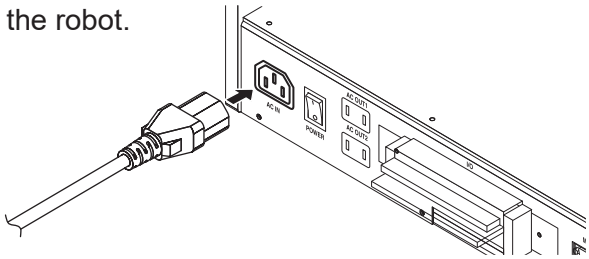
4) Press **[OK]** to confirm the changes and then press **[OK]** to close the Properties window.

If “USB Serial Port (COM10)” changes to “USB Serial Port (COM4)”, then the procedure is complete.



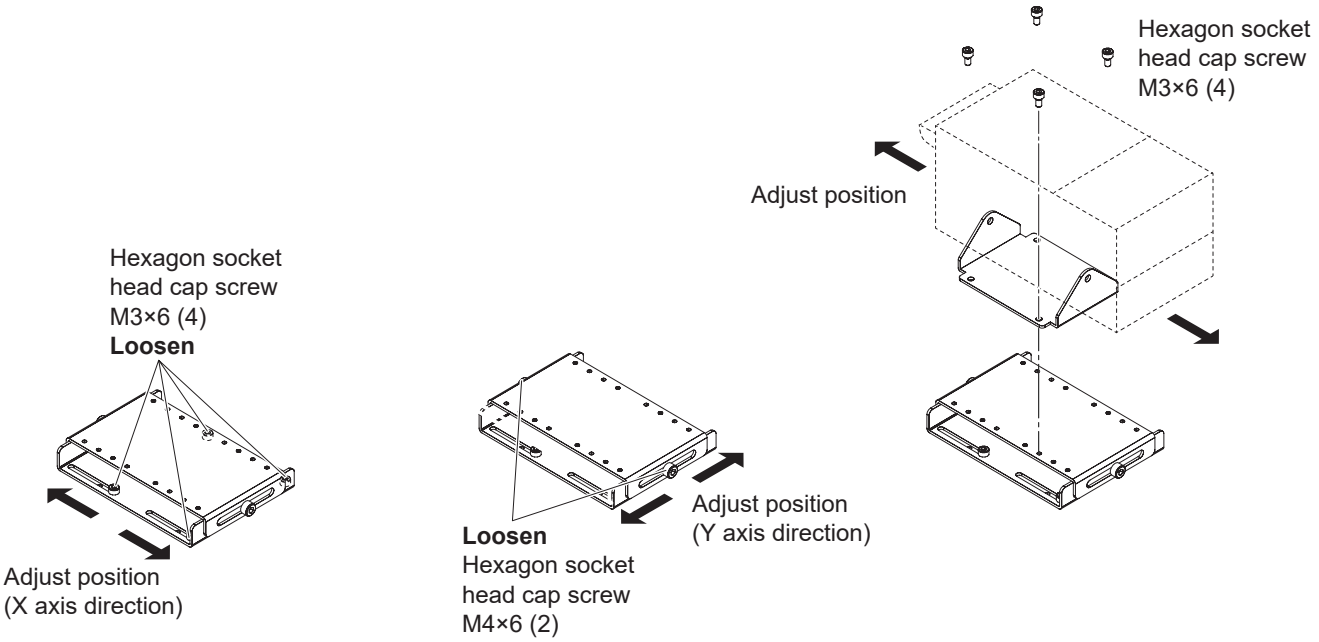
5-2-6 Connecting the Power Cord (for robot)

Insert the power cord (for robot) into “AC IN” at the back of the robot.



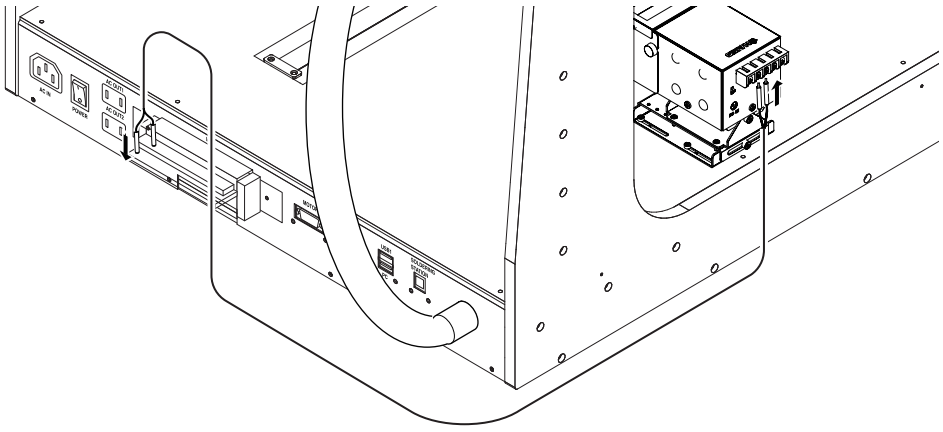
5-2-7 Attaching the Cleaner (CX1003)

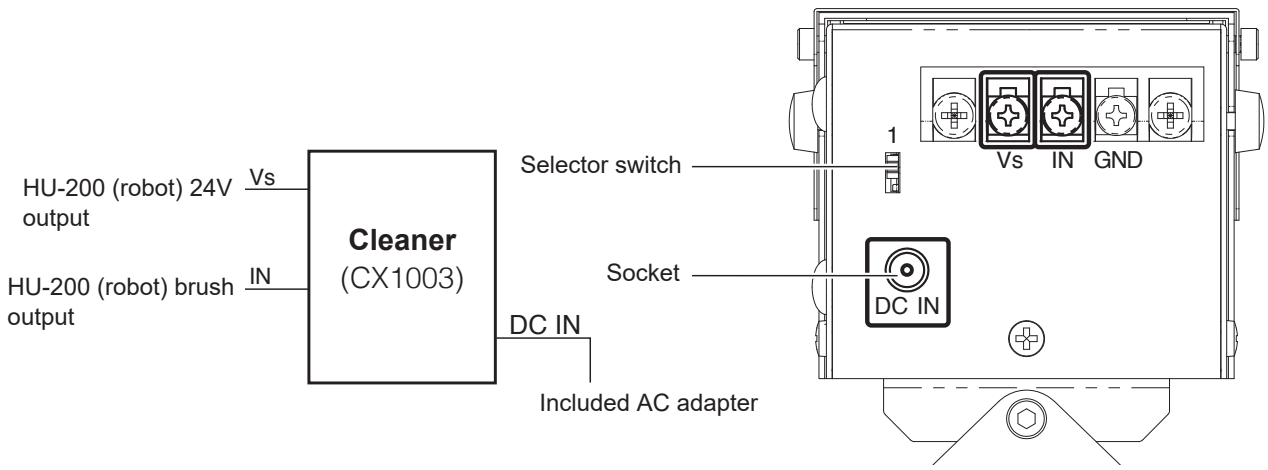
1. Attach the cleaner (CX1003) to the cleaner base (CX5003).



* When changing the orientation of the cleaner, use the cleaner positioning board (BX1066).
For instructions on how to use it, refer to the instruction manual for the cleaner positioning board (BX1066).

NOTE When the cleaner is connected to the robot, set the selector switch to “1” and connect as shown in the diagram below.
For information on how to use the cleaner (CX1003), refer to the cleaner instruction manual.

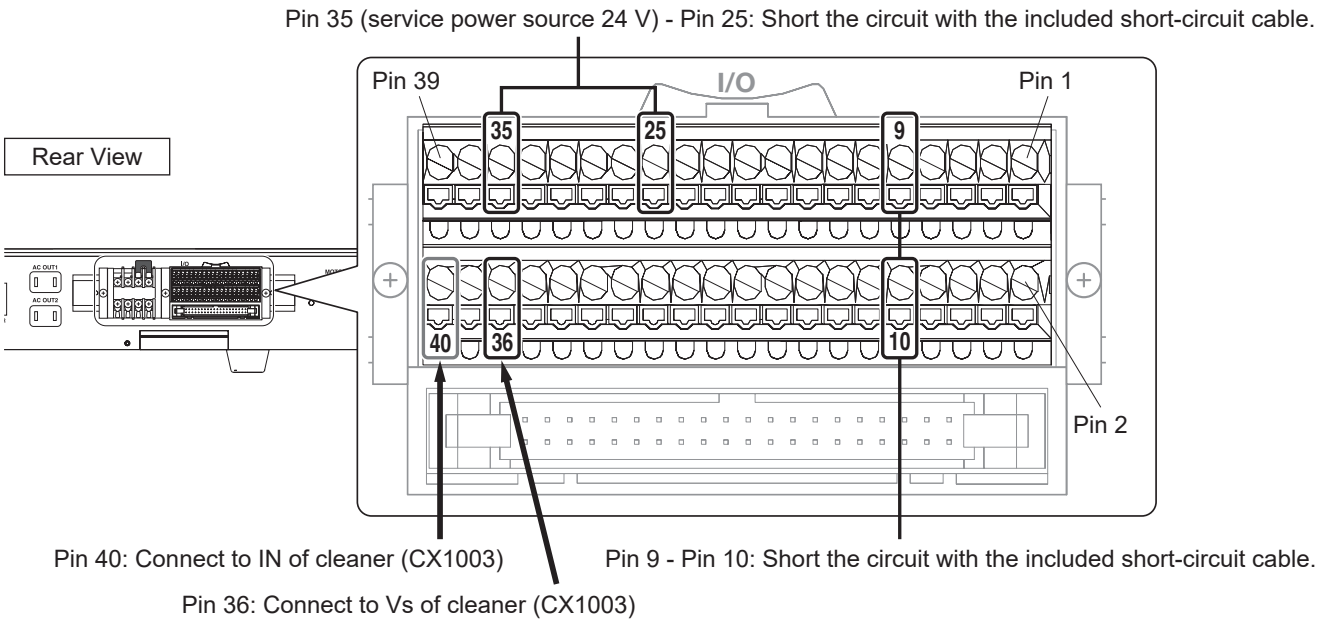




5-2-8 Wiring of the Cleaner

The cleaner is wired as in the diagram below.

●When using the internal power source



— Connecting of the lead (previous type) **—**

Loosen the screw — Insert the lead — Tighten the screw

Pull the lead, and confirm that it is not pulled out.

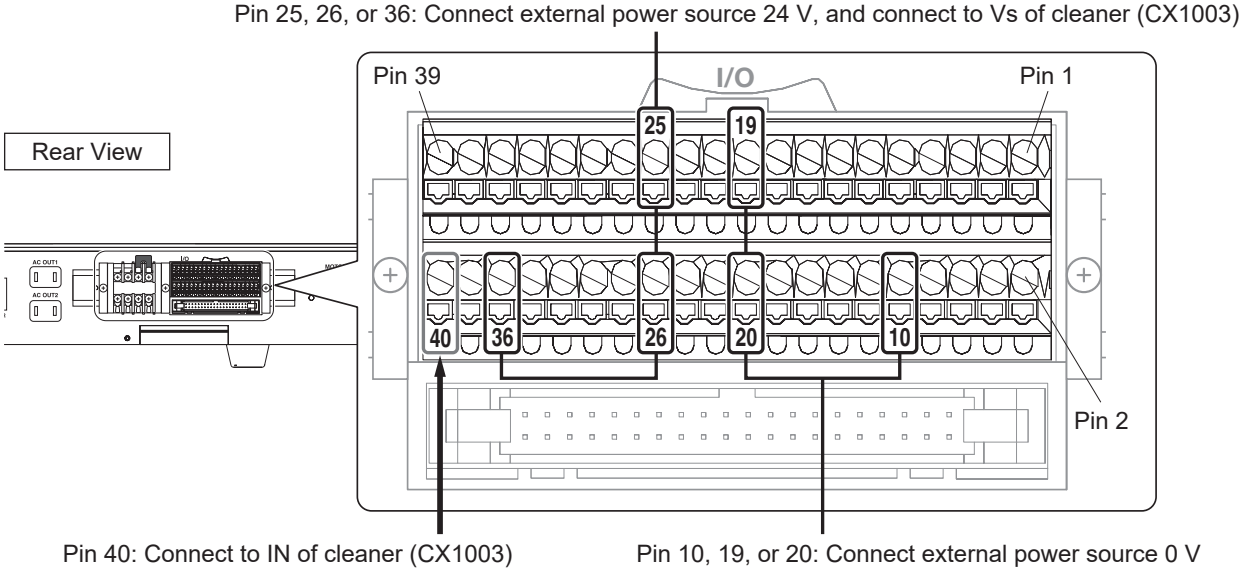
— Connecting of the lead —

Press the button — Insert the lead — Release the button

Pull the lead, and confirm that it is not pulled out.

●When using an external power source to isolate the internal board from the cleaner

With the following connection method, the internal board and the cleaner can be used insulated.



⚠ CAUTION

Be sure to turn OFF the power source of the HU-200 when wiring the cleaner.

5-2-9 Configuring the Bar Code Reader

1. Checking the bar code reader specifications

- Required bar code reader specifications
  - Capabilities of the Virtual Com Port connection over USB
  - Capabilities of the CR(0x0d) setting as a suffix
  - The following COM communication settings are available
    COM Port Number: 6
    Baud rate: 9600 bps
    Data bits: 8
    Stop bit: 1
    Parity: None
    Flow control: None

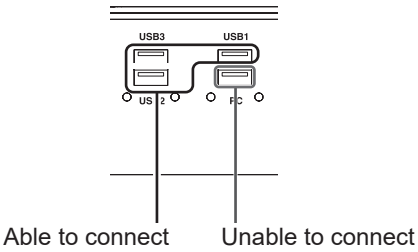
- An example of scanning actual data

  Reading in a bar code with the data 123456789
  Transmitted data : 123456789[CR]
  Hexadecimal number display for the data above : 0x31 0x32 0x33 0x34 0x35 0x36 0x37 0x38 0x39 0x0d

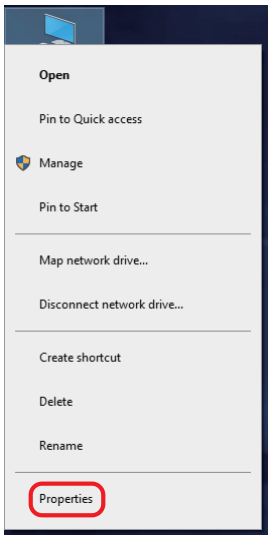
  In this case, "123456789" is set as the PROGRAM CODE.

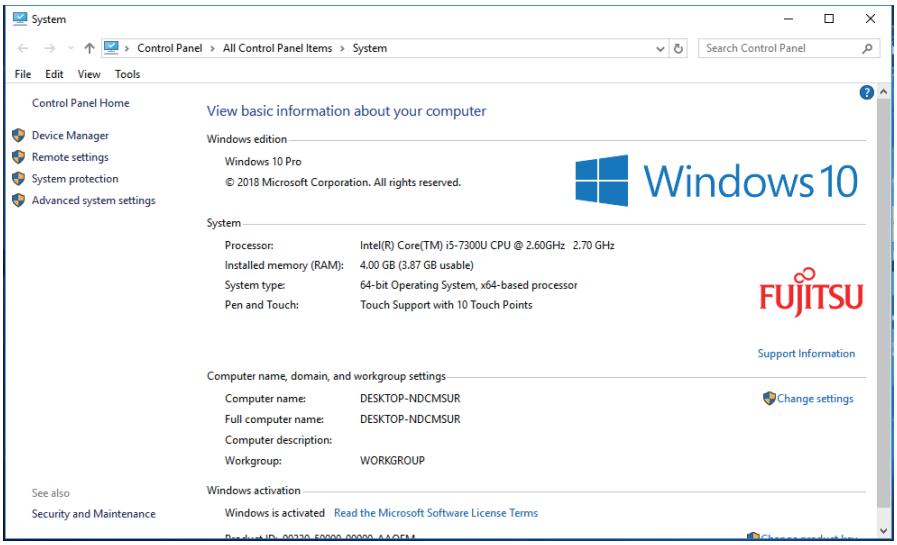
2. Connecting the bar code reader

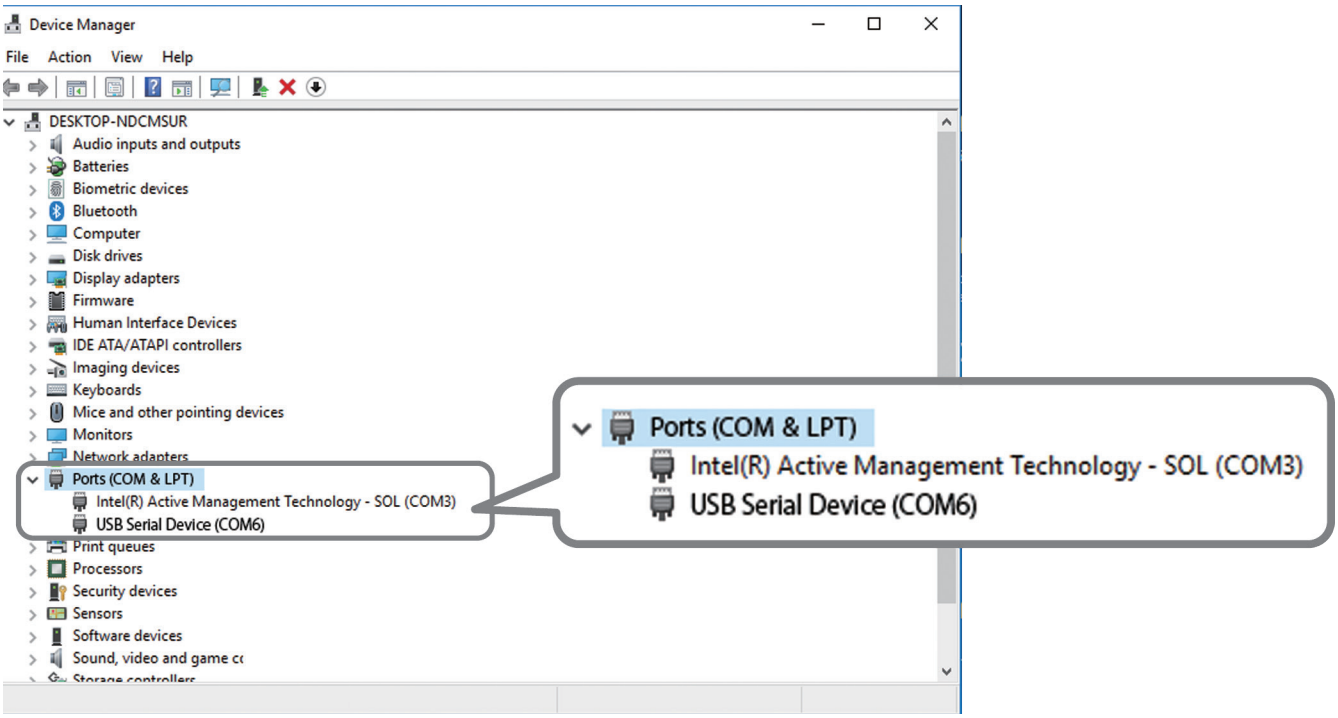
Connect the bar code reader to a USB connector (USB 1 through 3) on the rear panel of the HU-200.



Launch the “Device Manager” and check that the bar code reader has been added. (This screen shows USB Serial Device (COM6))
If the Virtual COM Port connection (with COM number) is not configured, follow the steps in the bar code reader Instruction Manual to set up the VirtualCOM connection.



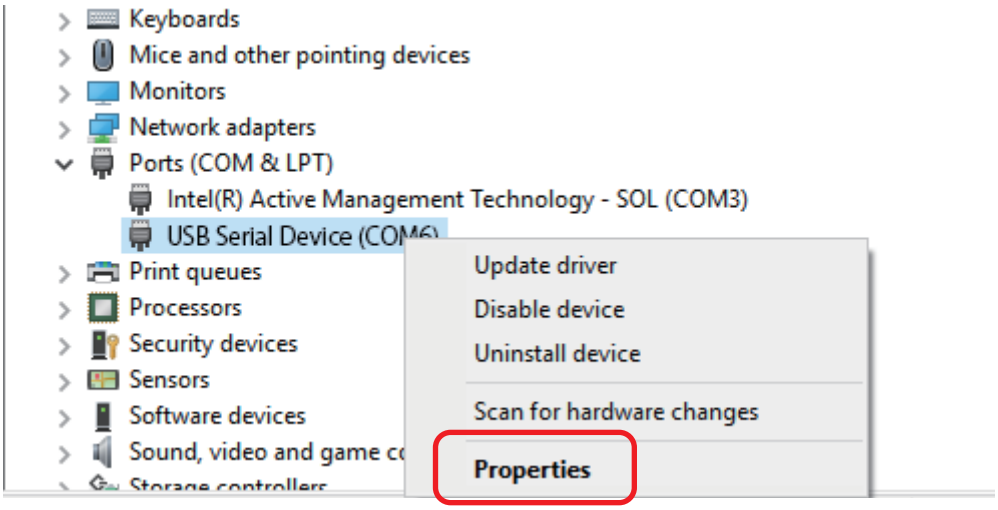


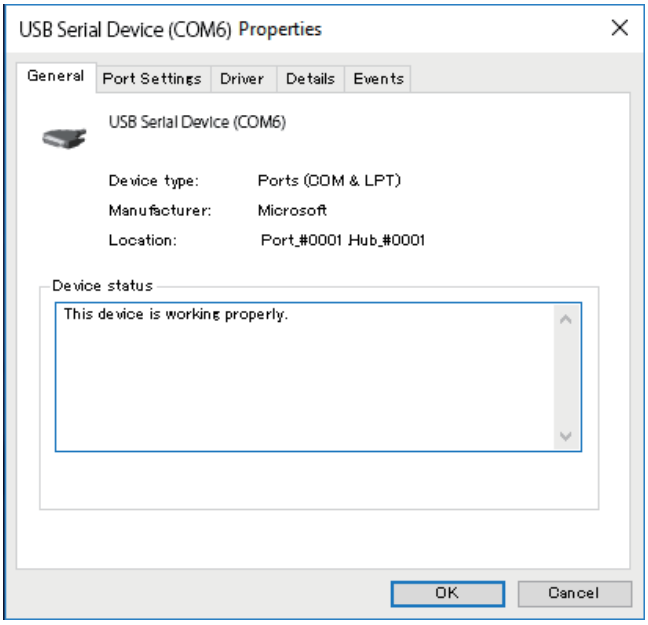


If the USB Serial Device (bar code reader) is set here to COM6, the bar code reader configuration is complete, so you do not need to perform Step 3. Proceed to Step 4.
If the bar code reader COM Port is not set to 6, set the COM number with the following procedure.

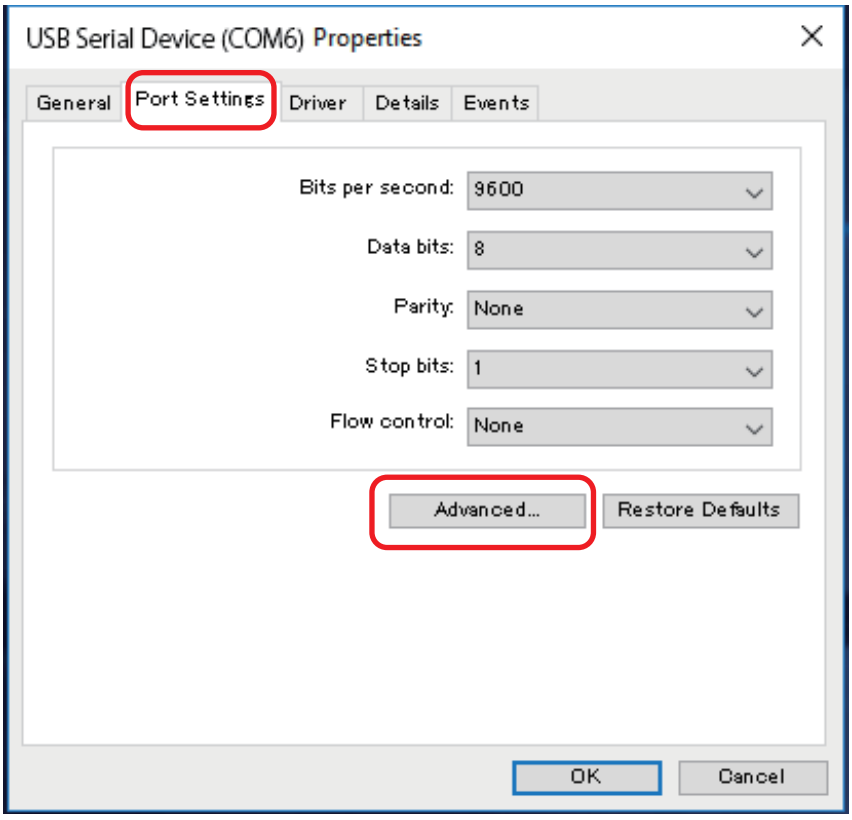
3. Changing the COM number

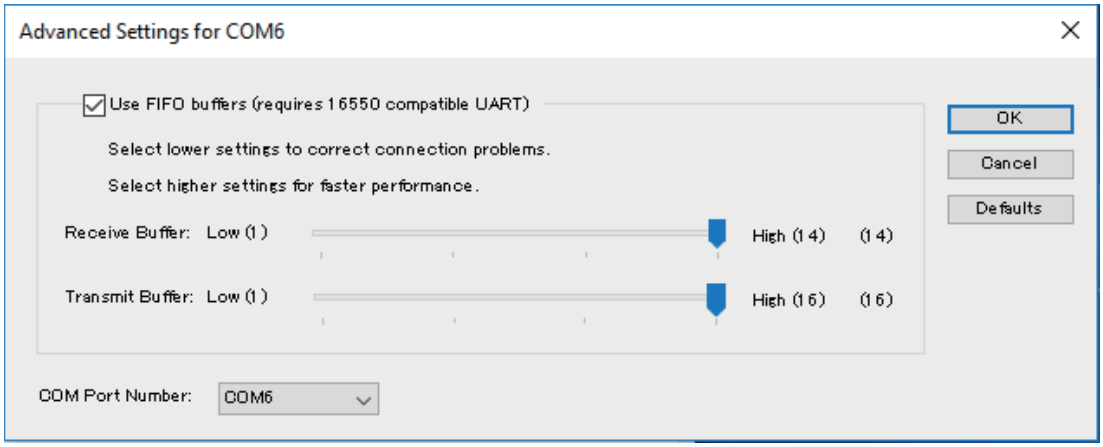
1) Press and hold the USB Serial Device or other device name to display the menu and select "Properties".



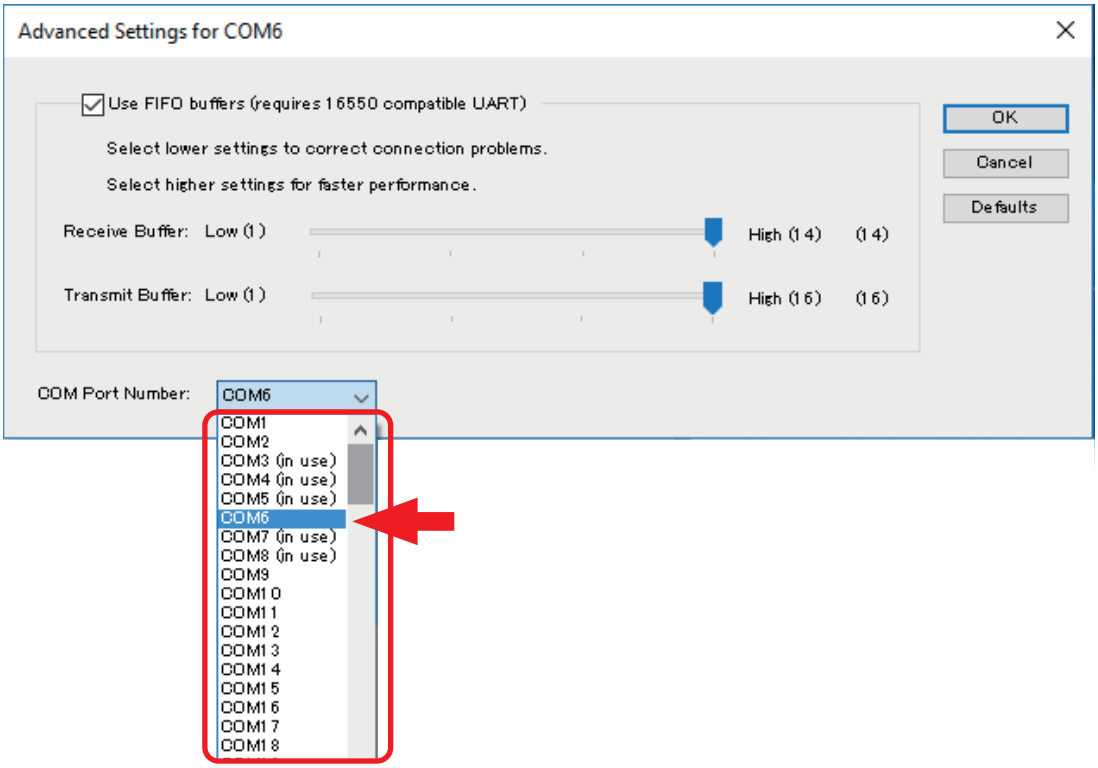


2) Select the Port Settings tab and open the Advanced Settings.



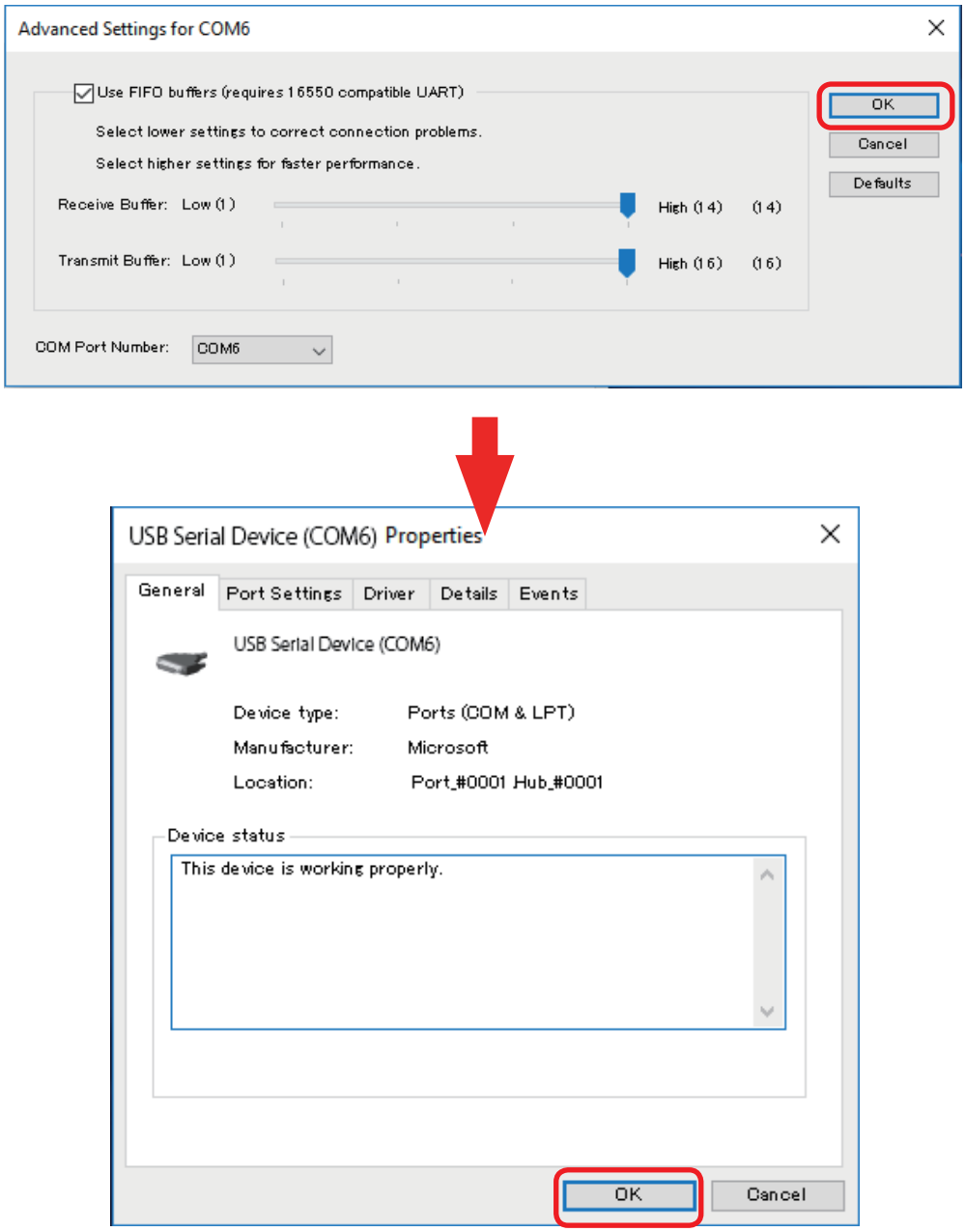


3) Select COM6 for the COM Port Number.

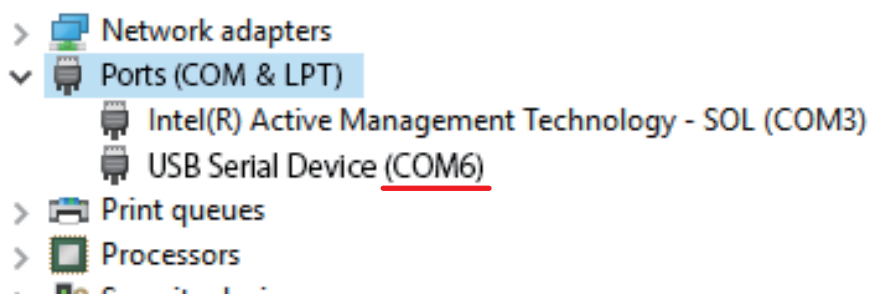


If another device is connected and using COM6, reconfigure that device to connect to a different COM port.

4) Press **[OK]** to confirm the changes and then press **[OK]** to close the Properties window.



If "USB Serial Device (COM1)" changes to "USB Serial Device (COM6)", then the procedure is complete.



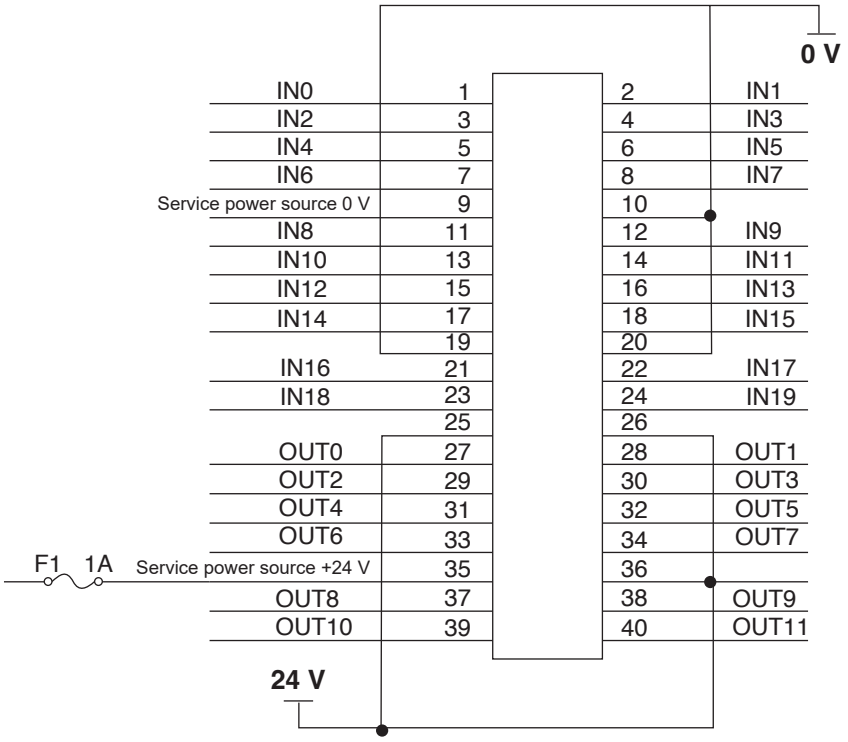
4. Restart the tablet PC.

5. Start the HAKKO SOLDERING SYSTEM2, assign the PROGRAM CODE, and check the settings.
1) Launch the **[HAKKO SOLDERING SYSTEM2]**
2) **[Program]** => select the program that you wish to configure and tap **[BARCODE]**.
3) Scan the bar code that you wish to configure with the bar code reader to configure the settings
4) Press **[OK]** to complete the configuration
5) If you scan the bar code with the bar code reader from the software top screen, the program which was just configured is loaded.

5-3 External Input and Output

5-3-1 I/O Pin Assignment

This is the I/O pin layout for input/output with external devices. It is used when assigning input signals and output signals for use when running soldering programs or for external emergency stop circuits. Connection is performed using the connector on the back of the robot. (The pins for OUT10 and OUT11 are exclusively for connection to the cleaner.) Wiring should be performed using stranded wire with a diameter of 0.5mm^2 (equivalent to AWG20).



Item	Specifications
Service power source	DC24 V
Maximum rated load	1 A
Input power source (24 V, 0 V)	DC24 V ± 10%

⚠ CAUTION
To prevent electrical shock, be sure to ground the product during use.

5-3-2 I/O Pin Specifications

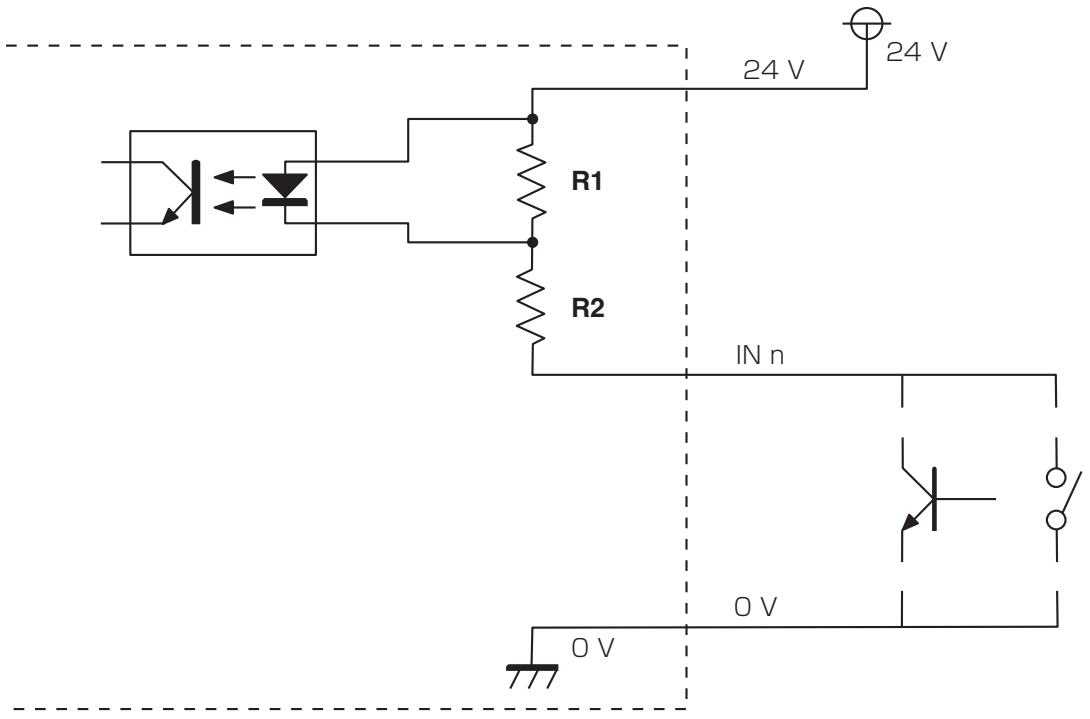
⚠ CAUTION

- The [24 V] and [0 V] terminals are not connected to the service power source. A power supply is required for use.
  (Not connected to service power source)
- If a separate power source is not provided, connect pin 9 to any one of pin 10, 19, or 20 for 0 V, and pin 35 to any one of pin 25, 26, or 36 for 24 V.
- If the load is short circuited or a current which exceeds the maximum load current flows through the circuit, it may cause the internal circuit to fail. Please exercise sufficient caution when connecting to the I/O Pins.
- The voltage of the load power supply should not exceed the voltage of the 24 V terminal.

5-3-2-1 Input Circuit

Item	Specifications
Presence of insulation	Insulated by photocoupler
Rated input current	5 mA
Response time	15 msec

Internal circuit diagram



R1=680Ω, R2=4.7kΩ

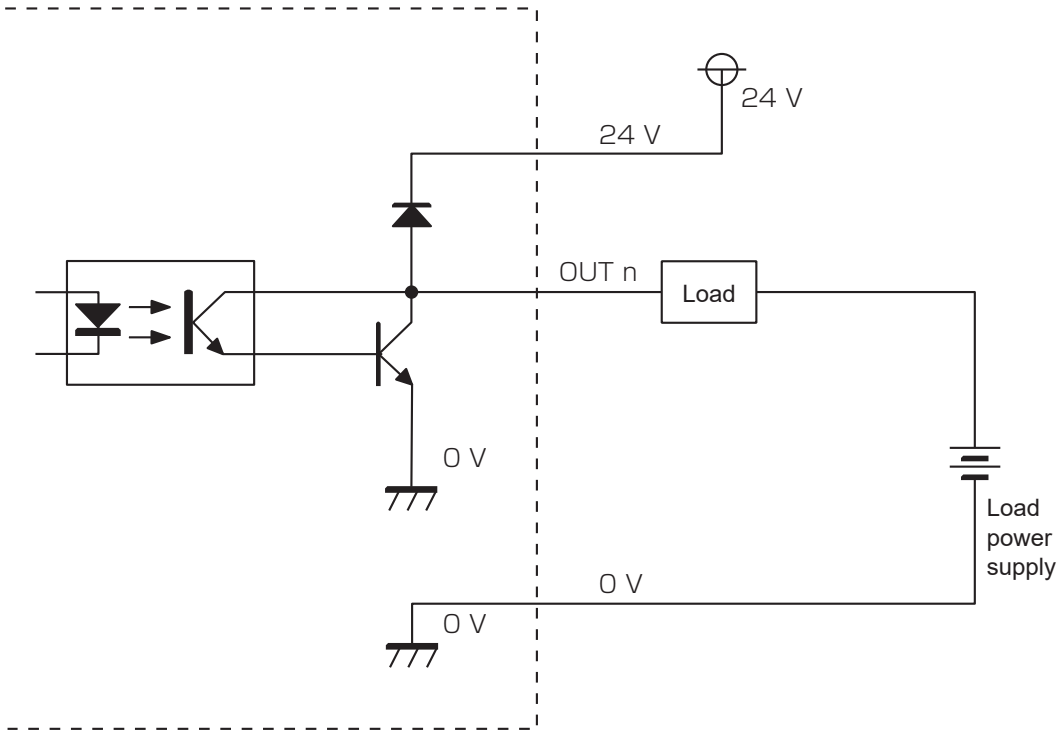
⚠ CAUTION

- Use contact input or NPN open collector input.
- If set to start input, please note that an input of 0.5 seconds or more is interpreted as a long press, which results in a different operation.

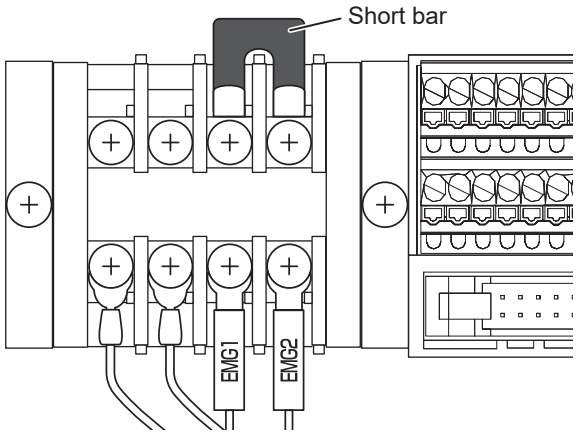
5-3-2-2 Output Circuit

Item	Specifications
Presence of insulation	Insulated by photocoupler
Output format	NPN open collector
Rated load voltage	5 VDC to 24 VDC
Maximum load current	100 mA
Maximum voltage drop when ON	1.2 V or less

Internal circuit diagram

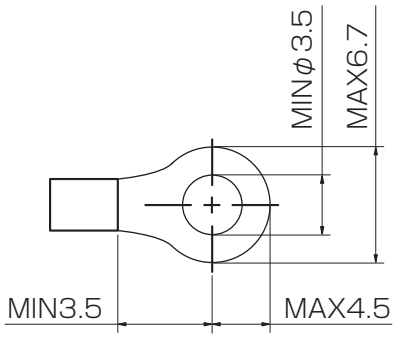


5-3-3 External emergency stop switch mounting ports

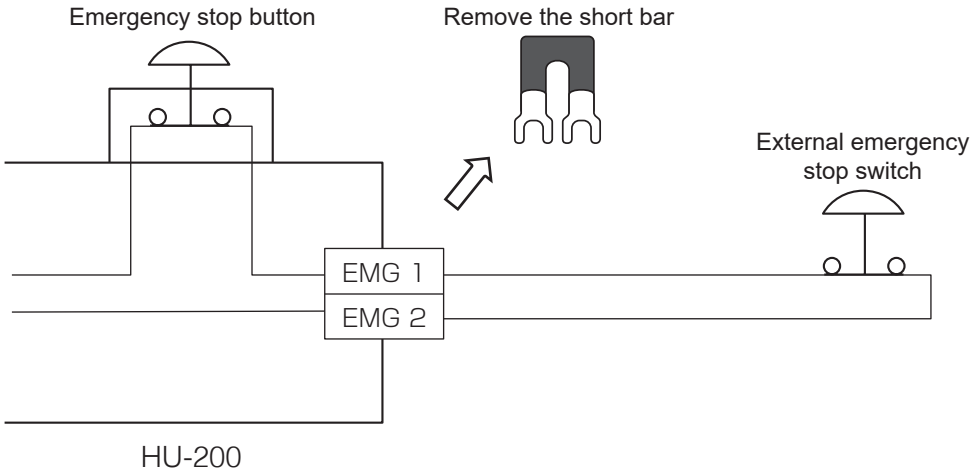


Emergency stop switches can be mounted to the machine exterior using the EMG 1 and EMG 2 ports. Refer to the circuit configuration example when mounting an emergency stop switch.
* Use dry contacts for the switches.
* Turn off HU-200 and unplug the power cord before mounting.

●Compatible port size



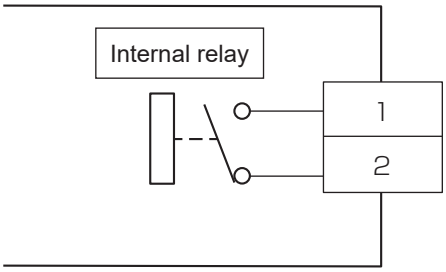
●Circuit configuration example



5-3-4 General-purpose output ports

The internal relay contact allows for power to be output. The circuit is closed when HU-200 is in operation.
The circuit is open in the following cases.

- When HU-200 is not turned on
- During an emergency stop (This includes stops from driver abnormalities, area sensors, and communication errors.)



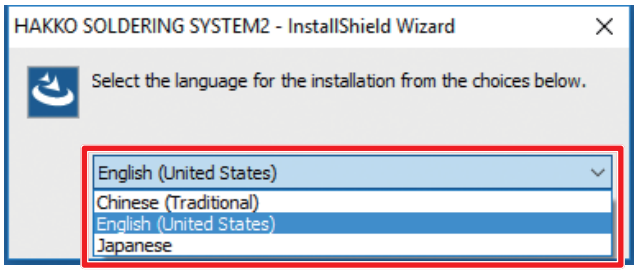
Item	Specifications
Presence of insulation	Insulated
Output format	Relay output
Rated load voltage	30 VDC
Maximum load current	1 A

You must be logged into the computer with Administrator user rights in order to install the software.

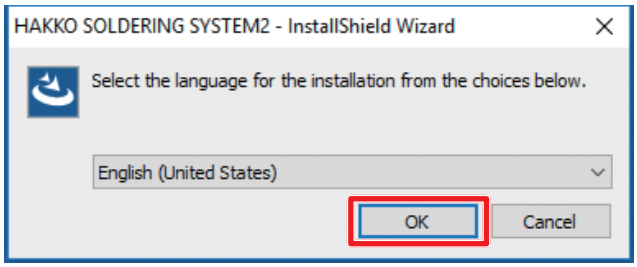
6-1 Performing a New Installation of the Software

1. Double-tap on HAKKO SOLDERING SYSTEM2 Ver.*.** Setup.exe.

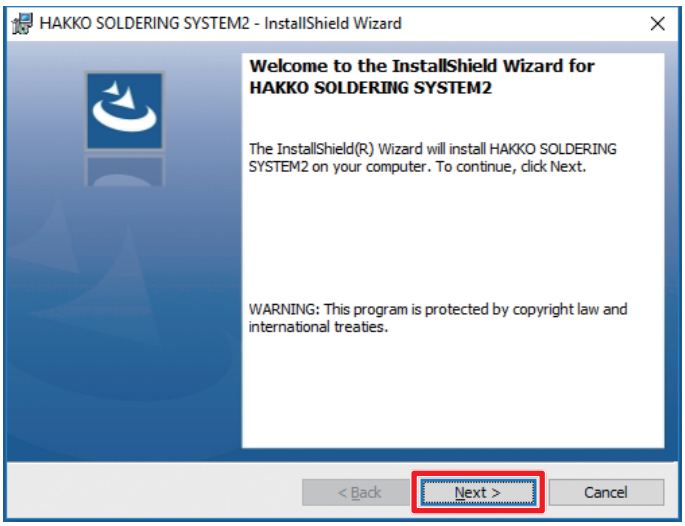
2. Select the language to be used for the installation.



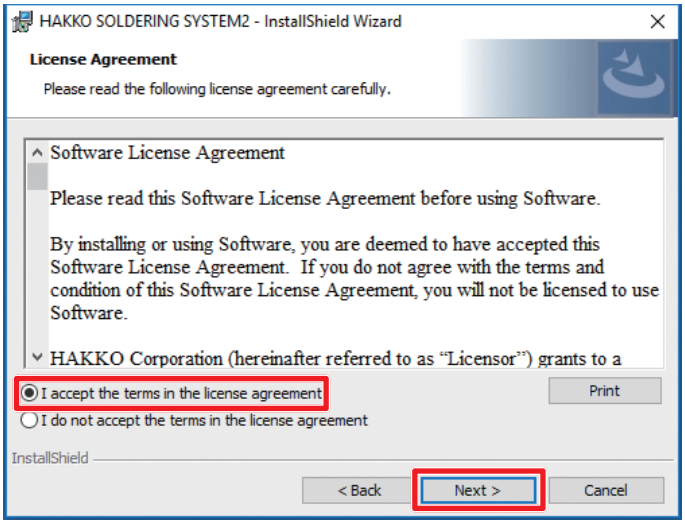
3. After selecting the language, tap **[OK]** to proceed to the installation screen.



4. When the installation screen is displayed, tap **[Next]**.



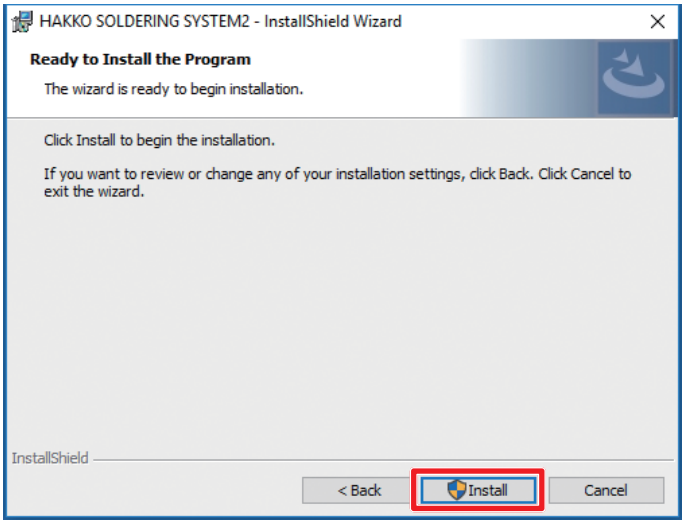
5. The End User's License Agreement will appear. Read the terms of the license agreement carefully and if you agree to the terms, select **"I accept the terms in the license agreement"** and tap **[Next]**.



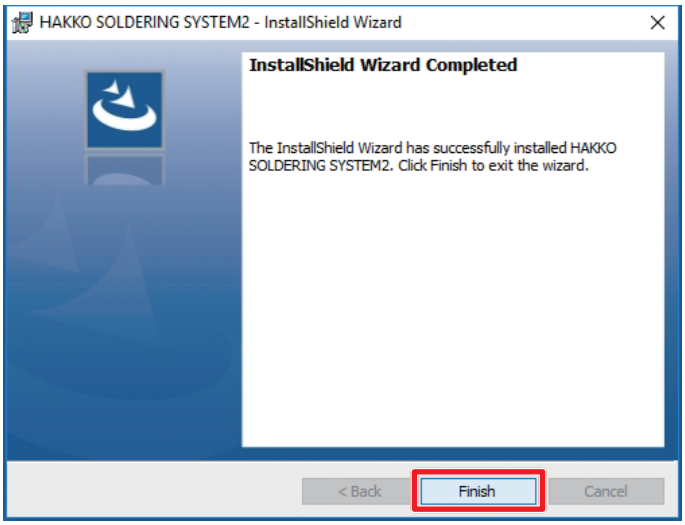
⚠ CAUTION

Installation and use of this software can be performed only by agreeing to this "Software License Agreement".
If agreement to the End User's License Agreement is not given, this software cannot be used.

6. Tap **[Install]**.



7. After installation has been completed, tap **[Finish]**.



6-2 Performing a Software Update

6-2-1 Backing up Data

Back up the data before Updating the software.
The backup procedure is as follows:

1. Tap the “This PC” icon on the desktop and open the C: drive.
   Next, open the HakkoCorporation folder and then open the HAKKO SOLDERING SYSTEM2 folder.

2. Create new folders on the desktop and copy the following two folders as backup data.
   • **“Program” folder** (containing soldering program data)
   • **“System” folder** (containing cleaning setting data)

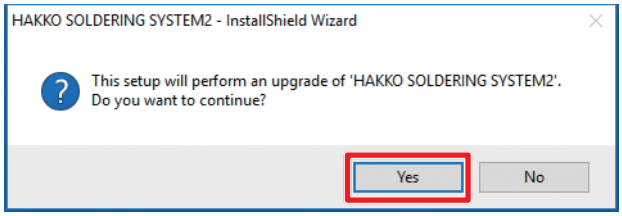
For information on backing up soldering conditions, refer to “7-4-2-2 Reading/Writing Soldering Conditions” (p. 89).

System setting and main screen setting information cannot be backed up. Be sure to keep a record of any changed setting values, etc.

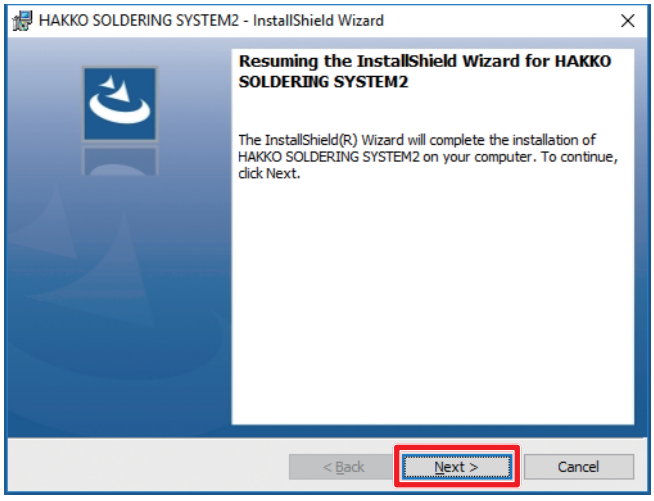
6-2-2 Updating Software

1. Double-tap on HAKKO SOLDERING SYSTEM2 Ver.*.** Setup.exe.

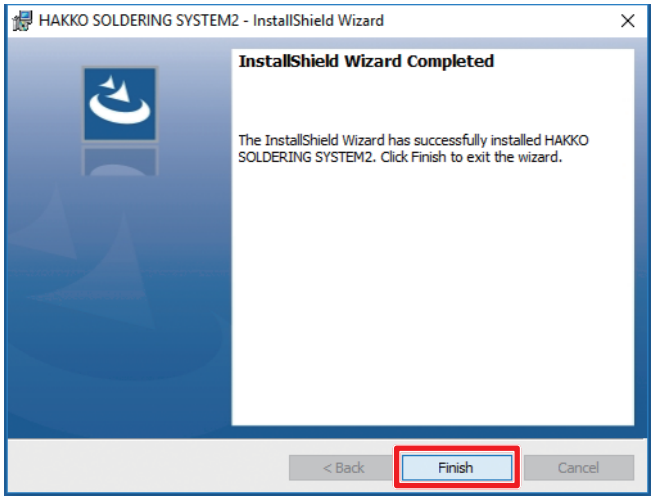
2. When the update screen is displayed, tap **[Yes]**.



3. When the installation screen is displayed, tap **[Next]**.



4. After installation has been completed, tap **[Finish]**.



6-2-3 After Installation Has Been Completed

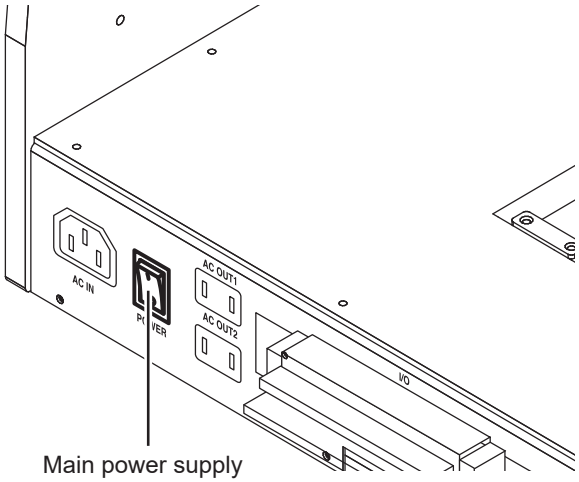
- **"Program" folder**
  After updating, check that there is a "Program" folder under the C:\Hakko Corporation\HAKKO SOLDERING SYSTEM2 folder.
  If the "Program" folder has been deleted, copy the backup "Program" folder to that location.
- **"System" folder**
  Copy the backup "System" folder to under C:\Hakko Corporation\HAKKO SOLDERING SYSTEM2 and overwrite the existing "System" folder.
  If the existing folder is not overwritten with the backup copy, cleaning settings will be the initial settings.

For soldering conditions, refer to "7-4-2-2 Reading/Writing Soldering Conditions" (p. 89) and read the files.

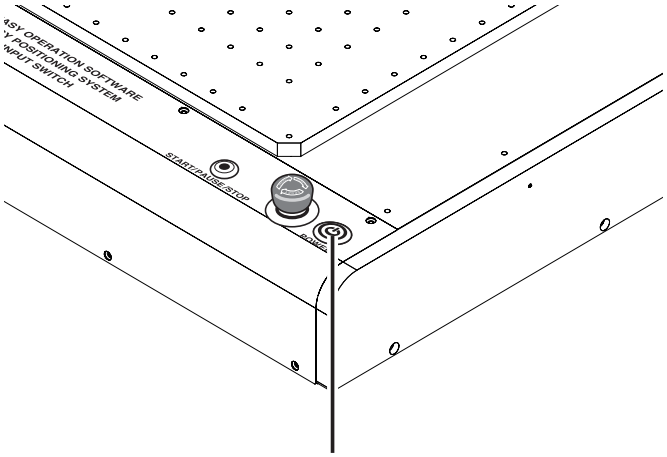
For system setting and main screen setting information, modify the changed values, etc. to the values recorded before updating the software.

7. Operation

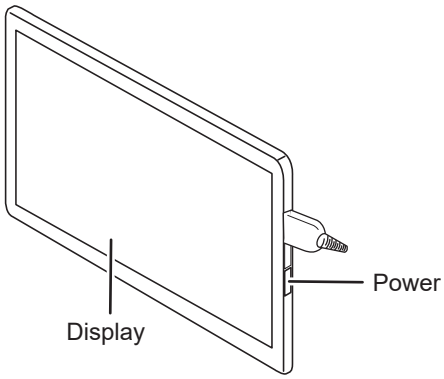
First, check that all connections in **“5. Installation”** have been performed, and then switch on the main power supply and POWER button of the HU-200 (robot) and switch on the power of the PC.



Main power supply



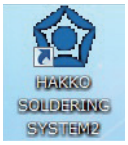
POWER button



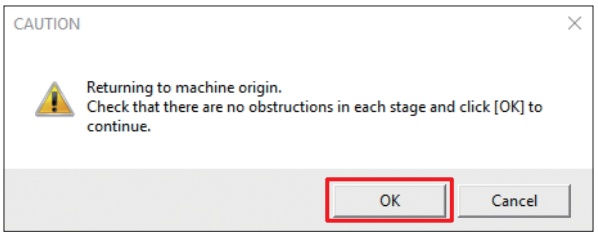
Power

Display

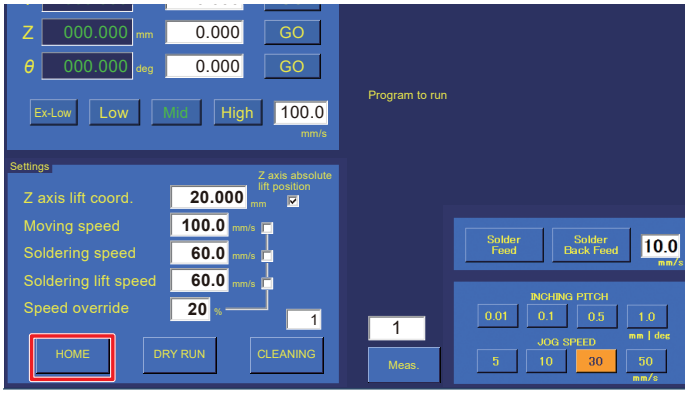
When the PC is switched on, the sign in screen will appear. When first shipped from the factory, it is possible to proceed without inputting anything.
Next, double-tap on the HAKKO SOLDERING SYSTEM2 icon to start HAKKO SOLDERING SYSTEM2.
* Cannot be started while the emergency stop button is pressed.



When the software is started, a window asking whether to return to origin will appear (refer to the diagram below).
Tap **[OK]** to execute return to origin.

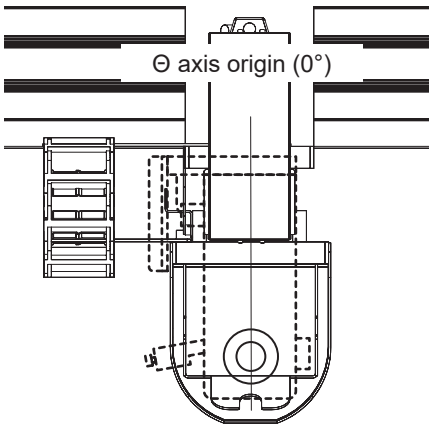


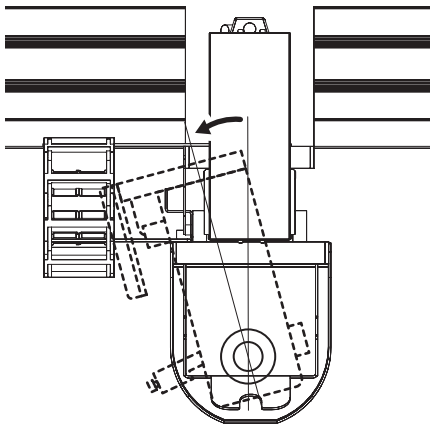
When **[Cancel]** is selected, be sure to execute return to origin from **[HOME]** of the software's top screen.



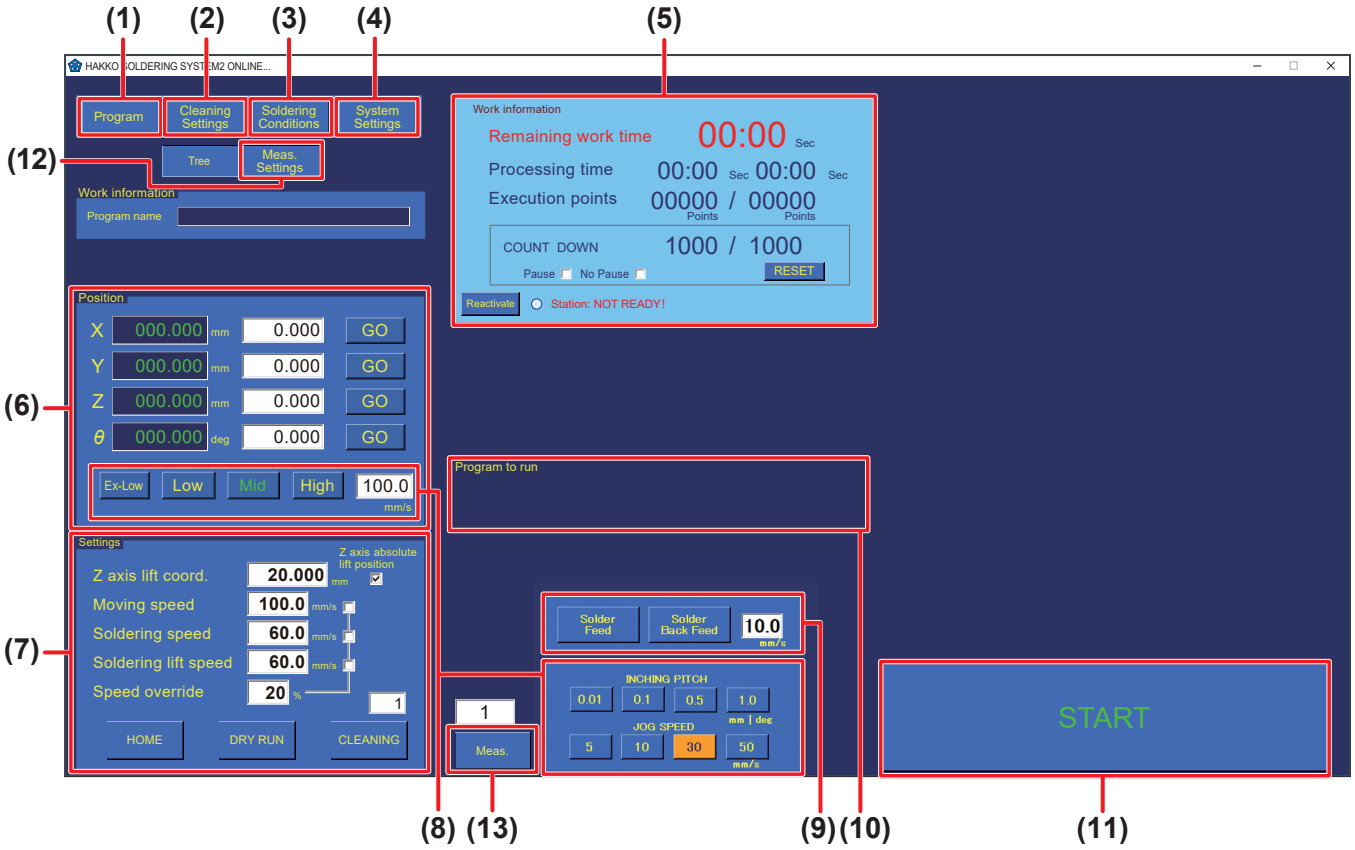
⚠ CAUTION

- First, check that all equipment have been connected properly and that there is no danger in the surrounding area.
  When HAKKO SOLDERING SYSTEM2 starts, each axis will move as the robot returns to the origin. Be careful to stay out of the way of the robot as it moves.
- When the θ axis rotates while returning to the origin, there is a danger of cables wrapping around the robot.
  If it seems like there is a danger of cables wrapping around, press the emergency stop button immediately, turn the θ axis slightly counterclockwise from the origin (0°) when viewed from above the soldering unit fixture base, and then tap **[HOME]** again.





7-1 Explanation of Software Screen



Software Top Screen (Admin mode)

When the software starts up, the top screen including the following information will be shown.

(1) Program

(2) Cleaning Settings

(3) Soldering Conditions

(4) System Settings

(5) Work information

(6) Position

(7) Settings

(8) JOG operation settings

(9) Solder Feed/Solder Back Feed

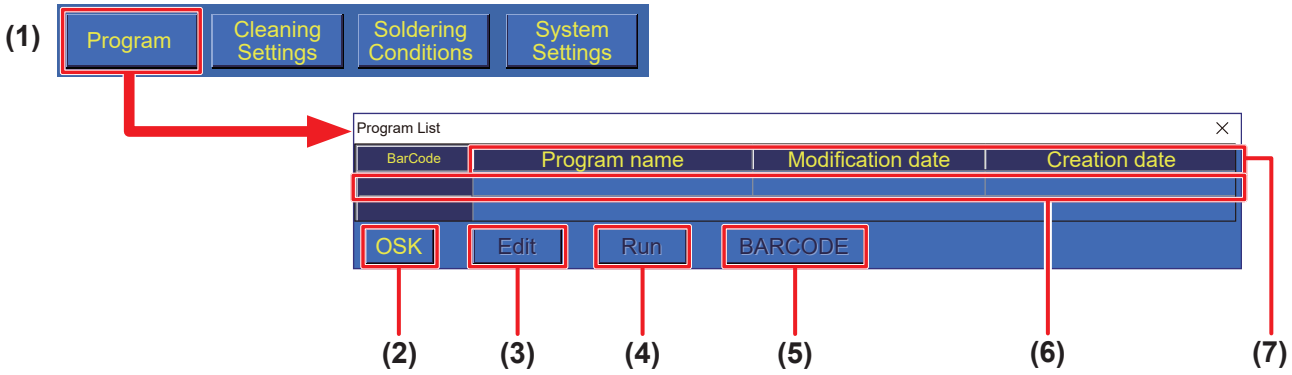
(10) Program to run

(11) Start button

(12) Meas. Settings

(13) Meas.

7-1-1 Program



Program List Screen

(1) Program (top screen)
Used for selecting, editing, or newly creating a work program.

(2) OSK
Calls up the on-screen keyboard for inputting the program name.

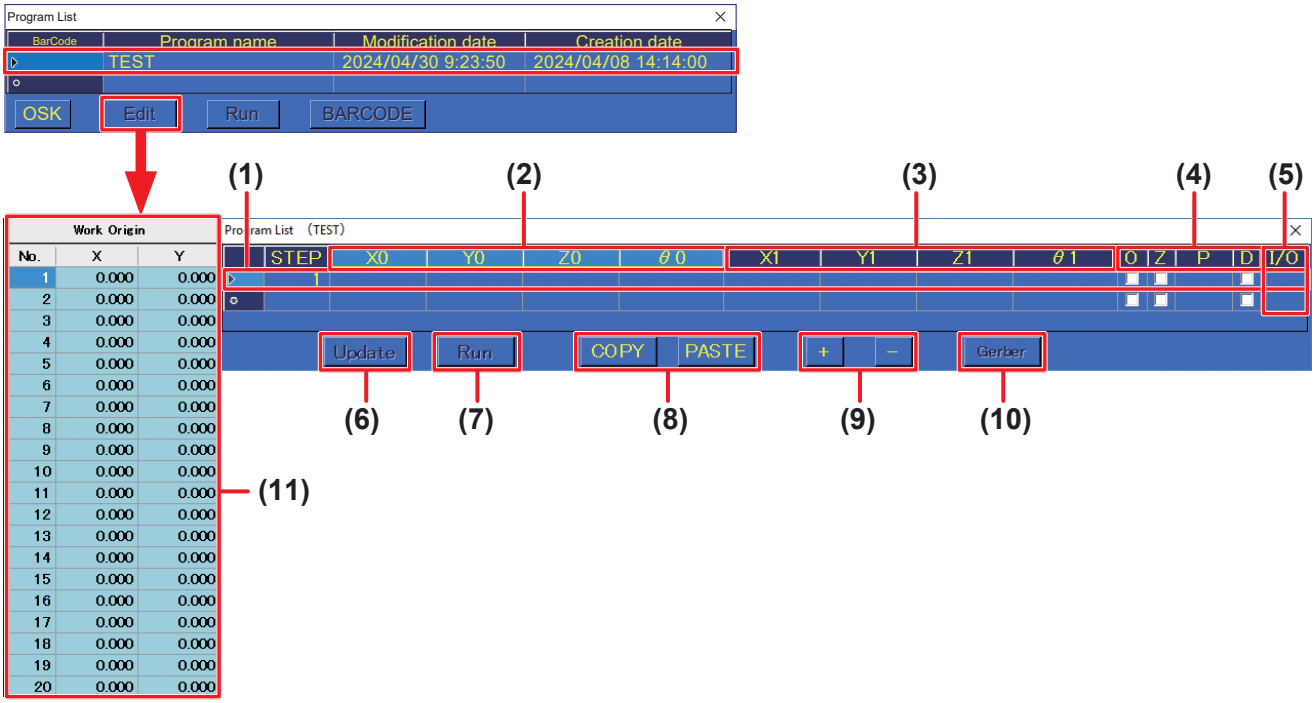
(3) Edit
Calls up the Program Edit Screen (refer to next page) for the selected program.
For details on the Program Edit Screen, refer to “7-5 Creating a Soldering Program” (p. 90).

(4) Run
Selects the program to run. The selected program will be shown in the running programs area of the top screen.

(5) BARCODE
Calls up the Bar Code Setting Screen. The PWB to be worked on and the created program can be linked.
For details on the Bar Code Setting Screen, refer to “7-7-4 Calling up a Program Using a Bar Code or I/O” (p. 128).
→ A commercially available USB type bar code reader is necessary to use bar codes.

(6) The BarCode, program name, modification date, and creation date of the created program will be shown.
(If a bar code for calling up the program has been linked, a simplified bar code will be shown.)

(7) Program name, Modification date, Creation date
Tapping each of the items will cause the list to be ordered by that item.



Program Edit Screen

The start point and end point cells and checkboxes can be set directly in the Program Edit Screen. More detailed settings can be performed in the Point Edit Screen which can be called up by double-tapping in the first column or in the STEP column.

(1) Each horizontal row shows information for a single point.

(2) **X0, Y0, Z0, θ0**
Shows the information for the soldering start point.

(3) **X1, Y1, Z1, θ1**
Shows the information for the soldering end point.

(4) **O:** If checked, indicates that the start point is an offset.
Z: Checked when “Return to” is set to Z lift position.
P: Shows the solder feed soldering condition number.
D: If checked, indicates that the soldering mode is DS (drag soldering).

(5) Shows indications for when I/O settings or individual point settings have been set. If all settings have been set, **[IOCZSP]** will be shown. If no setting has been made for the corresponding section, the character for that section will be replaced by **[*]**.
I: Input setting
O: Output setting
C: Cleaning setting
Z: Individual point Z axis lift setting
S: Individual point speed setting
P: Palletizing setting

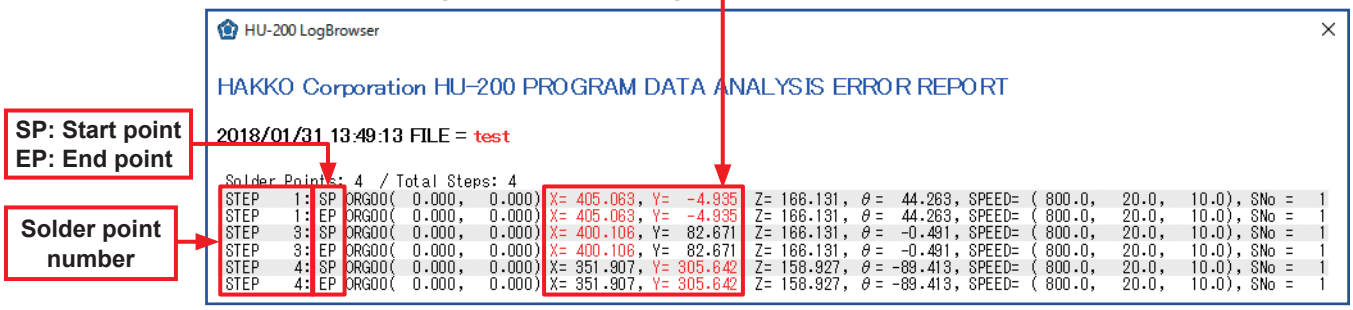
(6) **Update**
Applies the changes to the program and saves it.

(7) Run

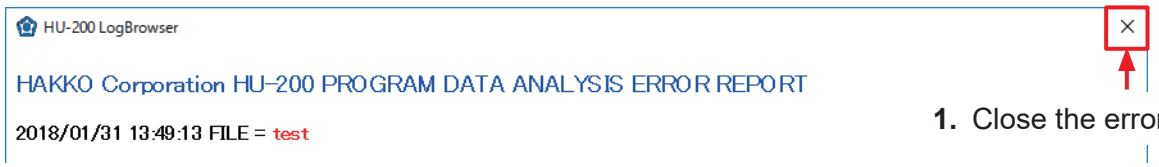
Selecting the desired program and tapping **[Run]** will cause the selected program to be shown in the running programs area of the top screen.
Error checking will be performed at the same time. If an error such as input of a value outside the range, etc. is found, an error screen will be shown. When the problem has been solved, the program can be run.

Outside range • STEP 1: X, Y axis start point and end point
• STEP 3: X axis start point and end point
• STEP 4: Y axis start point and end point
→Settable ranges: X axis: 0 – 400 mm, Y axis: 0 – 300 mm

Error screen showing values outside range

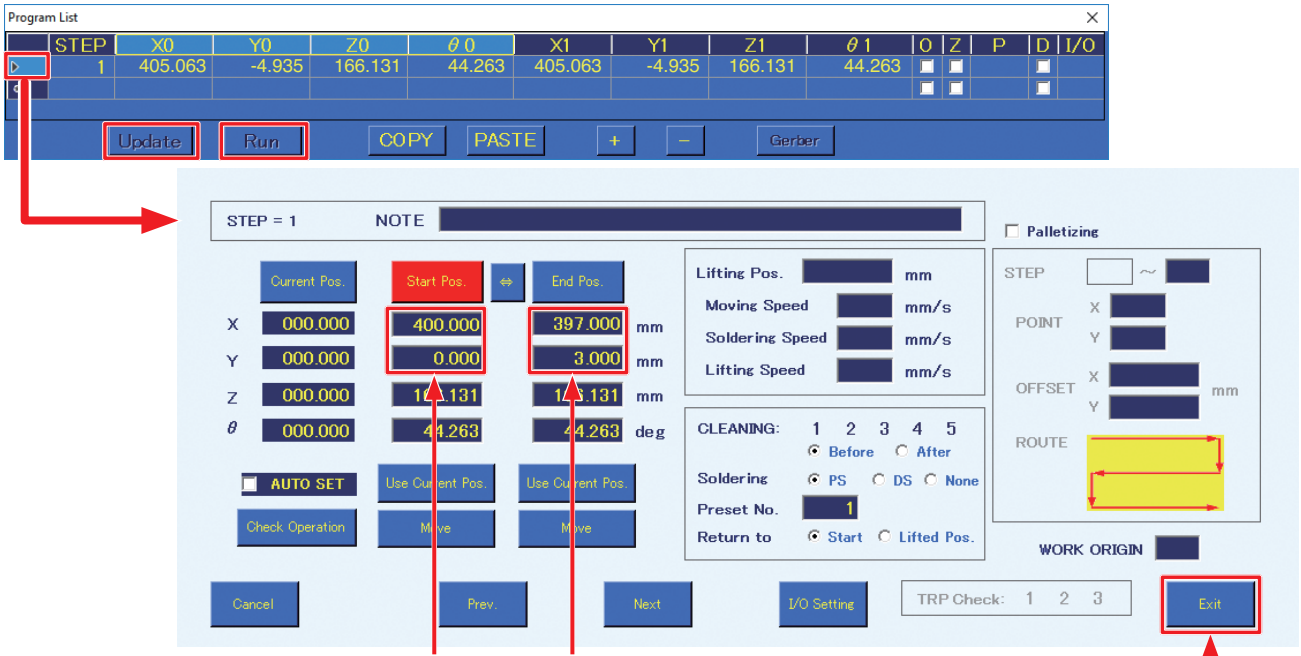


Procedure for Correcting Errors



1. Close the error screen.

2. Open the Point Edit Screen for the step to be corrected in the program list.



3. Input proper values in the start point and end point boxes.

4. When correction has been finished, tap **[Exit]**.

5. Correct STEP 3 and STEP 4 in the same way.

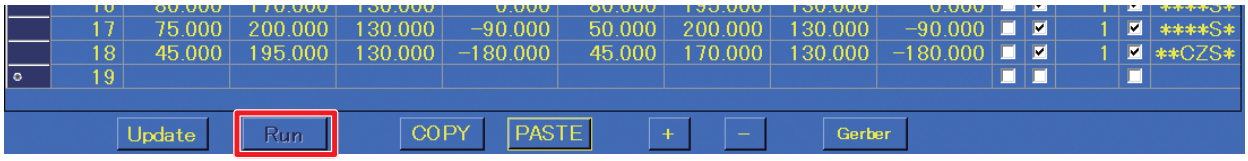
6. After all problems have been corrected, tap **[Update]** in the Program Edit Screen.
After that, tap **[Run]**.

For details on the Point Edit Screen, refer to Point Edit Screen on the next page.

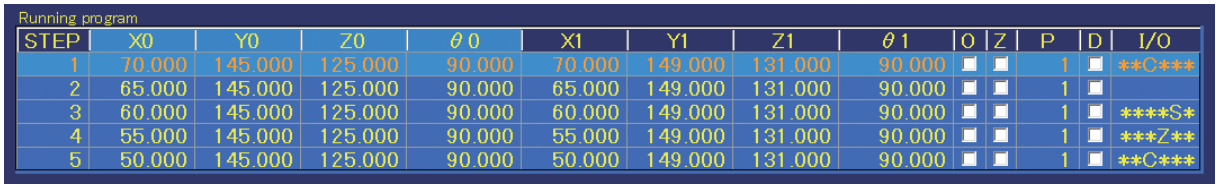
Attention at the time of error-checking

When reading a soldering program to be run, error-checking is performed.
At this time, if the emergency stop button is pressed during error-checking, error-checking will be ended.

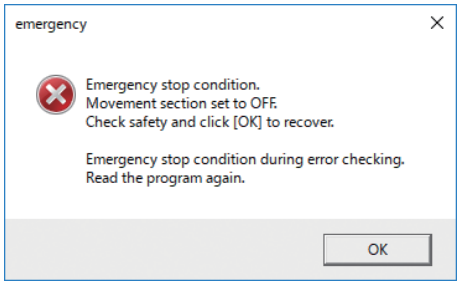
1. Follow the procedure in “7-6-1 Calling up and Running a Program” (p. 109) in the detailed instruction manual. In **Step 3**, select **[Run]**.



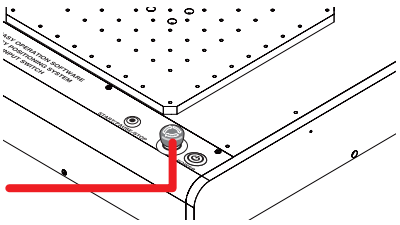
2. **The execution program will be displayed**. Error-checking will be performed at the same time as displaying the program.



3. If the **[emergency stop button]** is pressed before error-checking has been completed, the warning message shown below will be shown and error-checking will be stopped. If the warning message has been displayed, just resetting the **[emergency stop button]** will not continue operation.



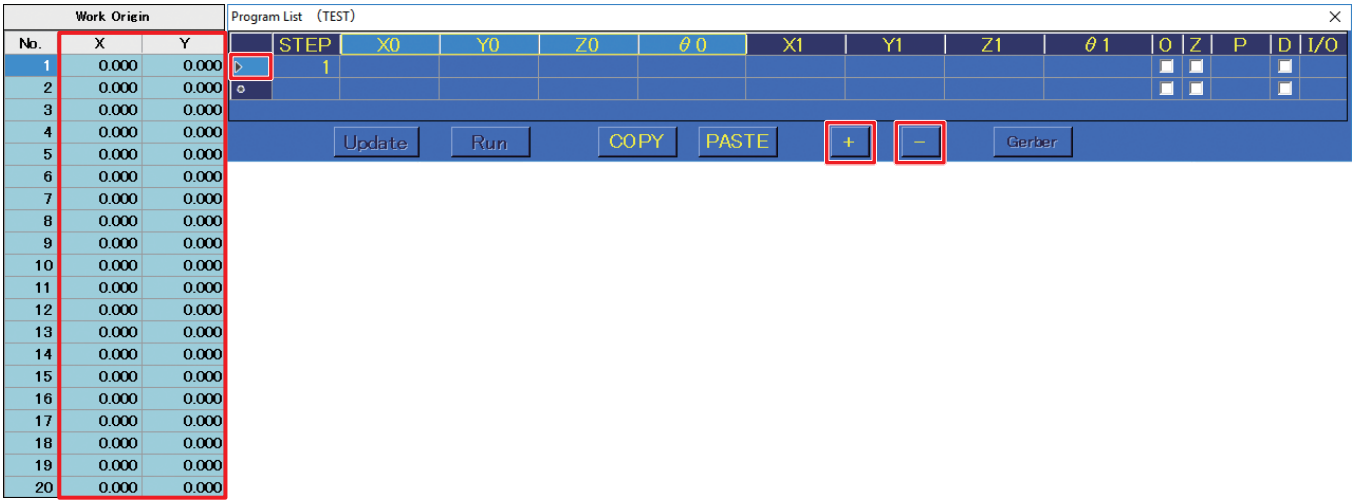
Emergency stop button



4. If the above error message has been displayed, after resetting the **[emergency stop button]**, the program can be run by calling up the program list screen again, selecting **[Run]**, and performing error-checking again.

(8) COPY: Copies point data. Select the beginning of the row to be copied and tap **[COPY]**. The data for a single point row will be copied. To select multiple rows, tap and drag on the beginning of the rows.

PASTE: Pastes the copied data. Select the beginning of the row to paste data into and tap **[PASTE]**. When **[PASTE]** is tapped, existing data in the selected row will be overwritten. To add data, add a new row before performing paste.
When pasting, it is necessary to input the work origin. Set the post-copy workpiece origin in advance, and select the X axis and Y axis values for the set work origin.



(9) As shown in the above figure, tapping the beginning of a row will cause the entire row to be selected. In this condition, tapping [+] or [−] will cause a row to be added or deleted respectively.

[+]: Adds a row below the selected row.

[−]: Deletes the selected row.

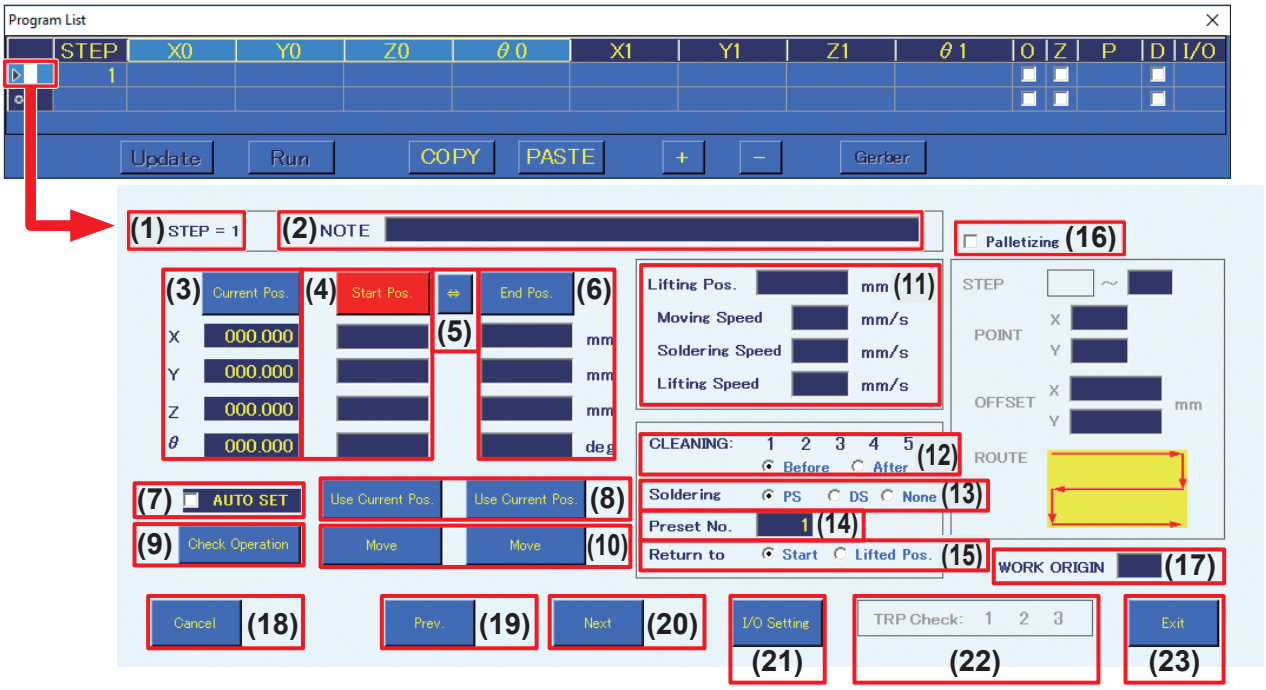
(10) Gerber

Calls up a screen for inputting coordinates for the aperture specification of Gerber data used in circuit design creation.

(11) Work Origin

When the Program Edit Screen is opened, the Work Origin screen will be shown on the left side of that screen.

Work origins can be set in this screen (up to 20 points).



Point Edit Screen

Detailed point settings are performed in the Point Edit Screen.

(1) STEP = 1 (number)
1 (number) indicates the solder point number.

(2) NOTE
Comments, memos, etc. for each point can be input.

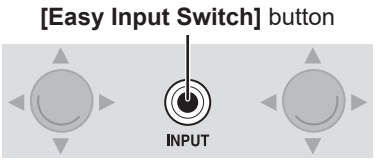
(3) Current Pos.
Shows the current tip position.

(4) Start Pos./OFFSET
Sets the coordinates or offset amount of the start point.
When **[Start Pos.]** is shown, tapping **[Start Pos.]** will switch to **[OFFSET]**, and when **[OFFSET]** is shown, tapping **[OFFSET]** will switch to **[Start Pos.]**.

(5) ⇔
Switches between setting the coordinates read using the robot's **[Easy Input Switch]** button or **[Use Current Pos.]** as the start point/offset or end point.

(6) End Pos.
Sets the coordinates of the end point.

(7) AUTO SET
Reads coordinates using the robot's **[Easy Input Switch]** button.
When checked, the setting destination will be automatically switched each time the robot's **[Easy Input Switch]** button is pressed.
Soldering mode*1 For PS mode: End point → Start point → Next point
For DS mode: Start point → End point → Next point
For None: Start point → Next point
For PS mode (Offset): End point (Automatic offset input*2) → Next point



*1 For details about soldering mode, refer to "(13) Soldering" on the next page.
*2 The automatically input offset amount is set in the System Settings Screen.
For details about system settings, refer to "7-1-4 System Settings" (p. 65).

(8) Use Current Pos.
Sets the current coordinates as the start point or end point.
When the start point is an offset, sets the offset value of the System Settings Screen.

(9) Check Operation
The operation of the steps set in this screen will be simulated.

(10) Move

Moves to the set Start Pos./OFFSET or end point coordinates. If the value is blank, no movement will be performed.

If the end point is blank when the start point is an offset, no movement will be performed even if **[Move]** on the start point side is tapped because calculation cannot be performed.

(11) Individual point settings

Sets the Lifting Pos., Moving Speed, Soldering Speed, and Lifting Speed for individual points.

If a value is blank, the values in the top screen will be applied. When numerical values are input for the Lifting Pos., those values will be used even if Z axis absolute lift position is not checked in the top screen.

(12) CLEANING settings

Select from the cleaning numbers **[1]** – **[5]** set in the Cleaning Settings Screen. The cleaning timing can be set as before or after soldering of that point. For details on cleaning settings, refer to “7-1-2 Cleaning Settings” (p. 63).

(13) Soldering

Select from PS (point soldering), DS (drag soldering), or None (movement only)

(14) Preset No.

Sets the soldering conditions number. Settable range: 1 – 250

(15) Return to

Sets the movement destination for after solder completion. For start point, movement will be to the start point or offset destination; for Z lift position, movement will be vertically to the Z axis lift position.

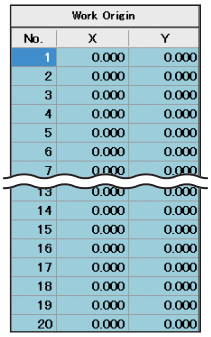
(16) Palletizing

When checked, palletizing settings can be performed. Palletizing is used when the settings for a created point will be repeated multiple times.

(17) WORK ORIGIN

Sets the WORK ORIGIN number in the **Work Origin** screen.

When blank, X=0.000, Y=0.000 will be used as the Work Origin.



(18) Cancel

Discards the points currently being edited and closes the screen.

(19) Prev.

Moves to the previous point.

(20) Next

Moves to the next point.

NOTE

If the necessary settings for start point coordinates, end point coordinates, and soldering conditions have not been set, a setting error will be shown and movement to the next Point Edit Screen will not be performed. If the next point is a new point, it will inherit the start point/offset display and soldering conditions.

(21) I/O Settings

Opens the point I/O Settings Screen. For details on the I/O Settings Screen, refer to “7-7-5 I/O Settings” (p. 132).

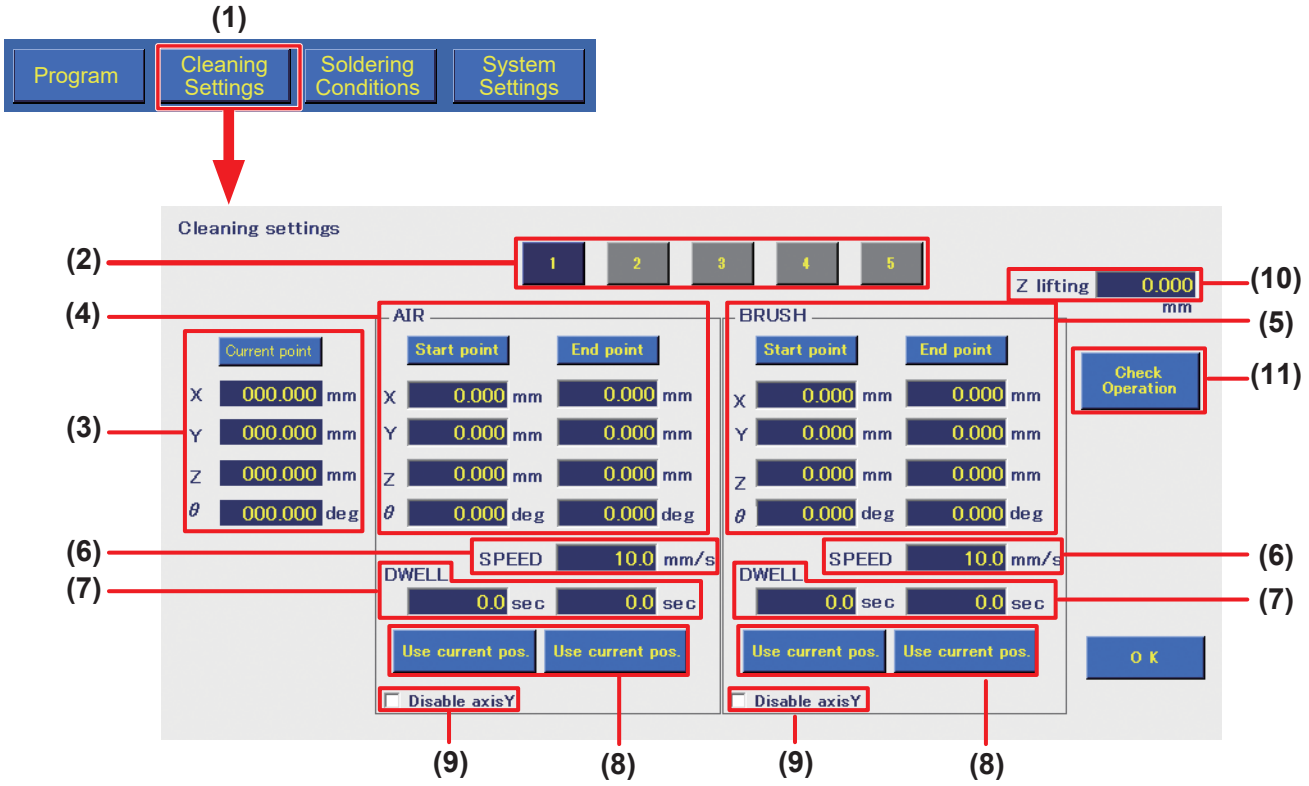
(22) TRP Check (Temperature/Resistance/Potential)

The **“TRP Check”** is used for **“Automatic temperature measurement and adjustment system”**. For more information, refer to the CX5041 instruction manual.

(23) Exit

Finishes the settings and closes the current Point Edit Screen. If the necessary settings for start point coordinates, end point coordinates, and soldering conditions have not been set, a setting error will be shown and the screen cannot be closed. However, if movement to a new row has been performed using **AUTO SET** or **[Next]** and all coordinate values are blank, the point currently being edited will be discarded and the screen will close.

7-1-2 Cleaning Settings



Cleaning Settings Screen

(1) Cleaning Settings (top screen)
Button for setting cleaning settings. Up to 5 settings can be set.

(2) Cleaning number
Cleaning program number. Up to 5 cleaning programs can be set.

(3) Current point
Shows the current tip position.

(4) AIR
Sets air cleaning settings.

(5) BRUSH
Sets brush cleaning settings.

(6) SPEED
Sets the movement speed when moving the tip from Start point → End point → Start point.

(7) DWELL
Sets the respective cleaning times while waiting at the start point and end point during cleaning. (Settable range: 0.0 – 60.0 sec.)

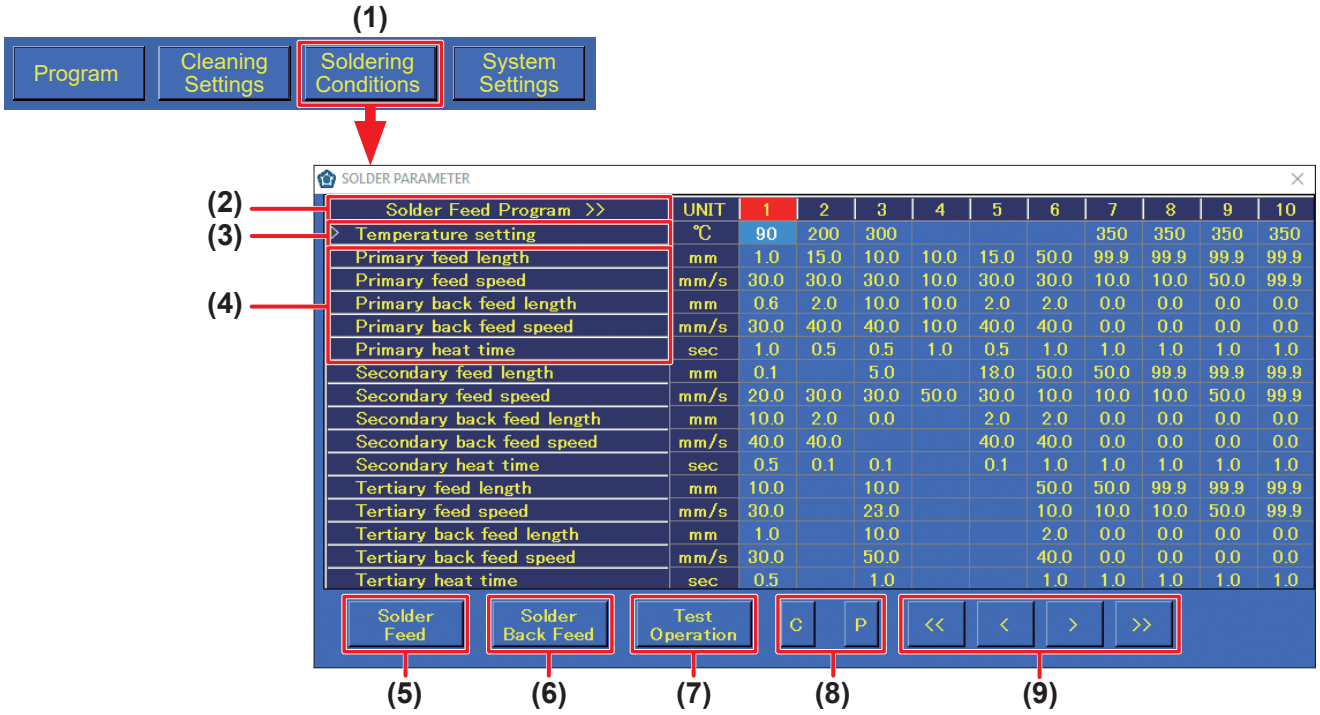
(8) Use current pos.
Sets the current coordinates as the start point or end point.

(9) Disable axis Y
When checked, forces the Y axis to not move during cleaning regardless of the input coordinate values.

(10) Z lifting
The Z axis lift coordinates to be used during cleaning. These values will be given priority during cleaning regardless of the **Z axis lift coord.** set in the top screen.
For details on Z axis lift behavior, refer to “7-2-2 Z Axis Lift” (p. 77).

(11) Check operation
Checks the operation of the set cleaning behavior.

7-1-3 Soldering Conditions



Solder Feed Parameter Setting Screen

(1) Soldering Conditions (top screen)
Solder feed programs are created in the Solder Feed Parameter Setting Screen.
A maximum of 250 solder feed programs can be set.

(2) Soldering Feed Program
Solder feed program numbers. A single vertical column is a single program.

(3) Temperature setting
Input the temperature setting. (Settable range: 50 – 500°C)

(4) Feed length, feed speed, back feed length, back feed speed, heat time
These are the solder feed settings. The settable range for each item are as shown in the table below.
For primary soldering, the settings are for the start point position. For both secondary and tertiary soldering, the settings are for the end point position.

Setting item	Range*1
Solder feed length	0.1 – 99.9 mm
Solder feed speed	0.1 – 99.9 mm/s
Solder back feed length	0 – 20.0 mm
Solder back feed speed	0 – 99.9 mm
Heat time	0.1 – 9.9 sec

*1 For secondary and tertiary soldering, all values can be set starting from 0.

(5) Solder Feed
Button for manually feeding solder. When tapped, it will be set to on and solder will be fed. Tapping it again will set it to off. (Solder feeding, solder retraction, and solder feed speed settings can also be performed from the top screen.)

(6) Solder Back Feed
Button for manually retracting solder. When tapped, it will be set to on and solder will be retracted. Tapping it again will set it to off. (Solder feeding, solder retraction, and solder feed speed settings can also be performed from the top screen.)

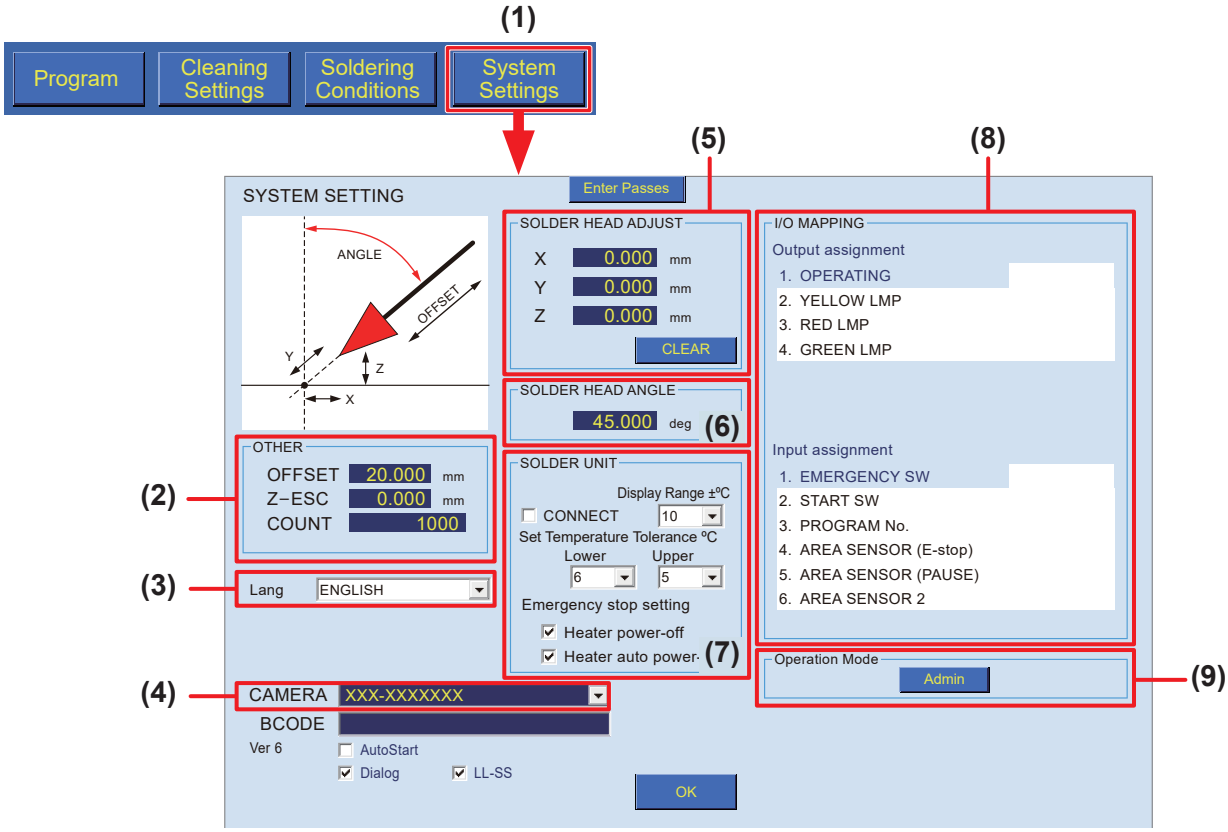
(7) Test Operation
The program for the soldering conditions number for the selected column will be run.

(8) C:
Copies the soldering conditions in the selected column.
P:
Pastes the copied soldering conditions into the selected column.

(9) [<<] / [>>]:
Moves to the previous or next soldering conditions page (1 page = 10 columns)
To switch between pages (columns 1 – 10 ⇆ columns 11 – 20), tap [<<] or [>>].

[<] / [>]:
Selects the previous or next column of conditions.

7-1-4 System Settings



System Settings Screen (Admin mode)

(1) System Settings (top screen)
Used for setting more detailed settings. For details, refer to “7-7 Performing Detailed Settings” (p. 111).

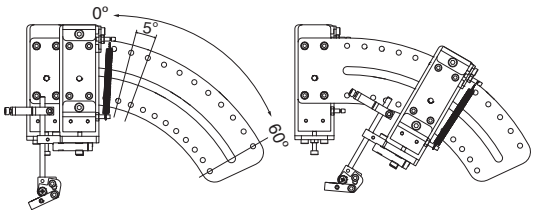
(2) OTHER
OFFSET: Sets the offset when using AUTO SET.
Z-ESC: Sets the Z axis lift amount when an error occurs in the station solder feed.
COUNT: Sets the numerical value for COUNT DOWN shown in work information in the top screen.

(3) Lang
Select the language.

(4) CAMERA
Selects the camera to be used by the system.

(5) SOLDER HEAD ADJUST
Corrects the tip position for tips whose dimension has changed due to wear.

(6) SOLDER HEAD ANGLE
Set the angle matching the mounting angle of the soldering iron unit.
The tip angle can be changed between 0° and 60° and mounted. (Refer to diagram at right.)

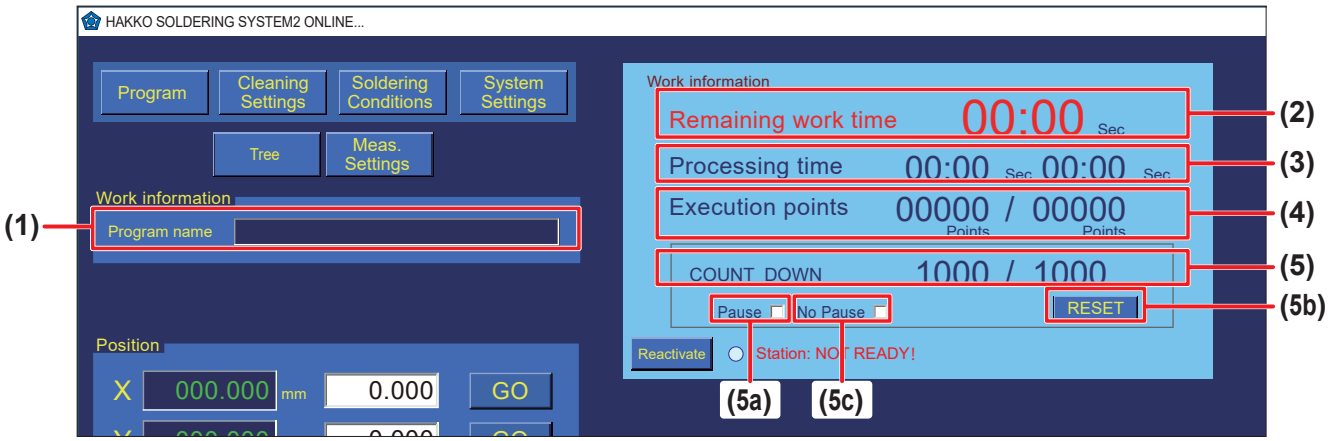


(7) SOLDER UNIT
Set the connection to the station, upper limit temperature and lower limit temperature for the temperature tolerance standard, and when HF-600 is connected, the emergency stop setting.

(8) I/O MAPPING
Sets the I/O connections for external peripheral equipment such as an emergency stop device, etc.

(9) Operation Mode
Switches the mode to either Admin mode or Operator mode. In Admin mode, all operations can be performed.In Operator mode, program editing or settings such as cleaning settings, soldering conditions, etc. cannot be performed. For details on switching modes, refer to “7-7-6-10 Operation Mode” (p. 148).

7-1-5 Work Information



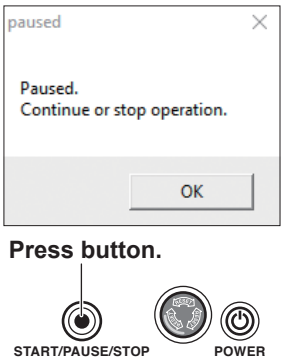
(1) Program name
Displays the name of the selected program. When a program name is displayed, the Program Edit Screen for the program corresponding to the name can be opened by double-tapping on the program name.

(2) Remaining work time
For a program which has been run to the end at least once already, the remaining work time will be shown when the program is run a second or later time. Even if the program has been changed, the remaining time for the program before the change will be shown.

(3) Processing time
Left value: Shows the elapsed time for the program currently being run.
Right value: Shows the time for a single program.
The program times are shown only for programs which have been run to the end at least once. In addition, even if the program has been changed, the work time for the program before the change will be shown.

(4) Execution points
Left value: Shows the number of points for which work has been completed.
Right value: Shows the total number of points for the program being run.

(5) COUNT DOWN
Left value:
Shows the value equal to the set value minus the number of executed points. When the count reaches 0, the program will pause even if the program is in the middle of running. At that time, a pause dialog will be shown. It can be used for tip life management, maintenance timing management, etc. When the program is paused, **[START]** will change to **[PAUSE]**. When **[PAUSE]** is tapped, operation will restart from the point at which it was paused.
(Refer to “7-1-11-1 Flowchart (Screen Button Operation)” (p. 71)).
When performing operation using the robot buttons, press the **[START/PAUSE/STOP]** button. (Refer to “7-1-11-2 Flowchart (Robot Button Operation)” (p. 72)).



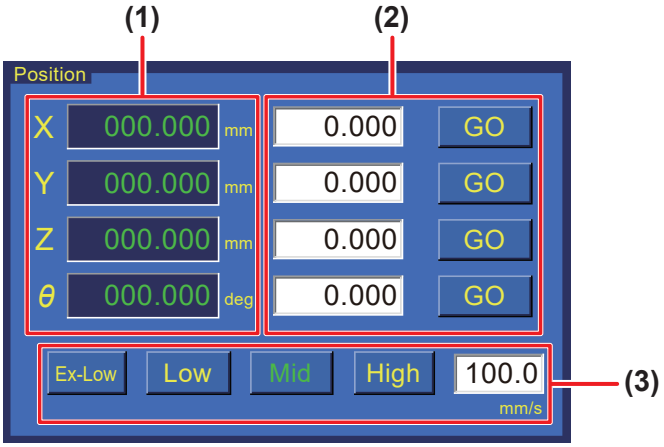
Right value:
Shows any desired value set in the COUNT box for OTHER in systems settings.

(5a) Pause Check it to temporarily pause the COUNT DOWN function.
While checked, the count (left value) is stopped even if soldering is performed.

(5b) RESET Resets the COUNT DOWN value.
If it is reset, the count (left value) will return to the same as the original value at right.
When this button is tapped after setting a value in the COUNT box for OTHER in systems settings, the value will be updated in this screen.

(5c) No Pause If the **[No Pause]** is checked, the program does not pause even when the **[COUNT DOWN]** number reaches **[0]** and keeps on running to complete the program.
The **[COUNT DOWN]** number will remain at **[0]** unless the **[RESET]** button is pressed.
The program can be started even if the number is **[0]**. If **[No Pause]** is unchecked, the program pauses (Pause state) when the **[COUNT DOWN]** number reaches **[0]** (after the end of STEP).

7-1-6 Position

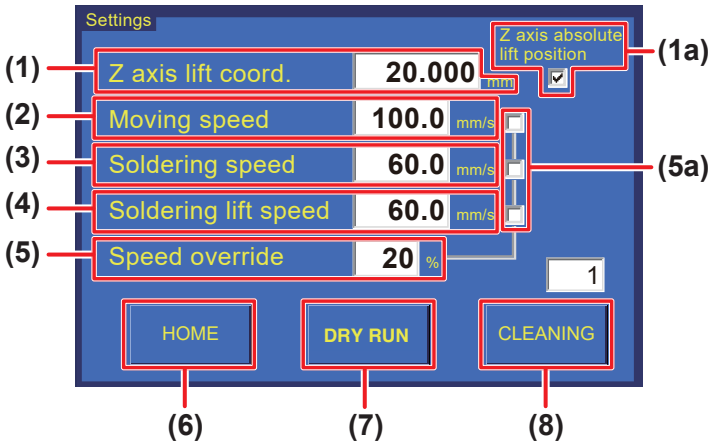


Used for checking the current coordinates of the robot or for performing coordinate movement of the robot.

(1) Shows the current coordinate of the robot for each axis.
(2) When the coordinates to move to are known, input the coordinates.
When **[GO]** is tapped, the corresponding axes will move to the specified coordinates.
(Settable range: X: 0 – 400 mm; Y: 0 – 300 mm; Z: 0 – 200 mm; θ: ± 200°)
(3) Selects the speed for movement to the coordinates specified in **(2)**.
Ex-Low: 5 mm/sec.; **Low:** 30 mm/sec.
Mid: 100 mm/sec.; **High:** 200 mm/sec.
Free setting range: 1 – 800 mm/sec. can be input.

NOTE When the movement distance is long, select Mid or High while being careful to avoid contact.When the movement distance is short, use Ex-Low or set a low value for the free setting.

7-1-7 Settings



Sets movement speed, etc. When individual settings are not performed, these values are used when running the program.

(1) Z axis lift coord.
Sets the value for the Z axis lift when the robot is moving to coordinates. This coordinate is set to avoid contact with protruding objects on the workpiece. (Settable range: 0.000 – 200.000 mm)
For details on Z axis lift, refer to “7-2-2 Z Axis Lift” (p. 77)

(1a) Z axis absolute lift position (checkbox)
Sets the Z axis lift coordinate on and off. Normally, this checkbox is checked.

(2) Moving speed
Sets the movement speed of each axis for movement between points while the program is being run.
(Settable range: 1 – 800 mm/sec.)

(3) Soldering speed
Sets the soldering moving speed between primary soldering and secondary soldering (from start point to end point).
(Settable range: 1 – 800 mm/sec.)

(4) Soldering lift speed
Sets the speed for movement after the end point to the movement destination (start point or Z lift position).
(Settable range: 1 – 800 mm/sec.)

(5) Speed override
The speeds for moving speed, soldering speed, and soldering lift speed can be adjusted as percentages. This can be used for adjusting the speed of completed programs.
(Settable range: 1 – 100%)

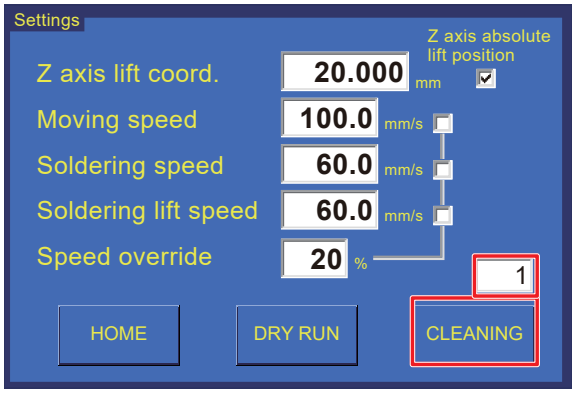
(5a) Speed override (checkbox)
Sets the items for adjustment using speed override on and off.

(6) HOME
Returns the robot to the origin point. The Z axis will be moved first, and then the X, Y, and θ axes will be moved in that order.

(7) DRY RUN
Performs the robot motion of the selected program without adjusting the soldering iron temperature or performing solder feed. This operation is used to check the position information of the program.

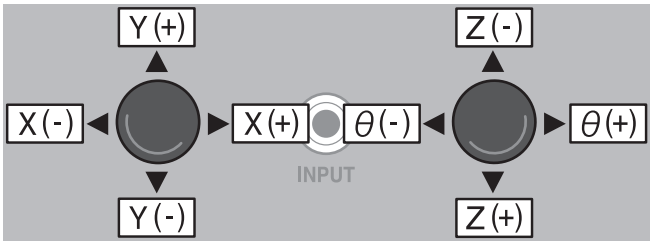
NOTE COUNT DOWN is also performed when using DRY RUN.For details on COUNT DOWN, refer to “7-1-5 Work Information” (p. 66).

(8) CLEANING
Performs cleaning. Used to perform cleaning at any desired time.
Cannot be used while a program is running.
By entering a number in the figure, any number of cleanings can be performed.
This number is saved in the soldering program. For details, refer to “7-1-2 Cleaning Settings” (p. 63).
* When the soldering program is updated or the program is ended, the entered number will be saved.



7-1-8 INCHING PITCH/JOG SPEED





Used for axis movement of the robot. There are 2 ways of moving. Fine adjustments can be performed by using either of the 2 methods according to the application.

(1) INCHING PITCH

When a numerical value is selected, operating the robot's JOY STICK will move the robot only by the selected amount.

Since movement will not continue even if the JOY STICK continues to be tilted, this is suitable for movements by small degrees.

(2) JOG SPEED

When a speed is selected, movement will be performed at the selected speed for as long as the robot's JOY STICK is kept tilted.

7-1-9 Solder feeding / Solder retraction

Buttons for feeding and retracting solder when in manual. The solder feed speed can also be set. For details, refer to "7-1-3 Soldering Conditions" (p. 64), and for operations refer to "7-4 Solder Installation and Solder Feed Settings" (p. 85).

7-1-10 Running Program

Running program

STEP	X0	Y0	Z0	θ 0	X1	Y1	Z1	θ 1	O	Z	P	D	I/O
1	70.000	145.000	125.000	90.000	70.000	149.000	131.000	90.000	☐	☐	1	☐	**C***
2	65.000	145.000	125.000	90.000	65.000	149.000	131.000	90.000	☐	☐	1	☐	
3	60.000	145.000	125.000	90.000	60.000	149.000	131.000	90.000	☐	☐	1	☐	****S*
4	55.000	145.000	125.000	90.000	55.000	149.000	131.000	90.000	☐	☐	1	☐	***Z**
5	50.000	145.000	125.000	90.000	50.000	149.000	131.000	90.000	☐	☐	1	☐	**C***

While a program is running, the STEP (row) currently being performed will be highlighted, and the rows will scroll.

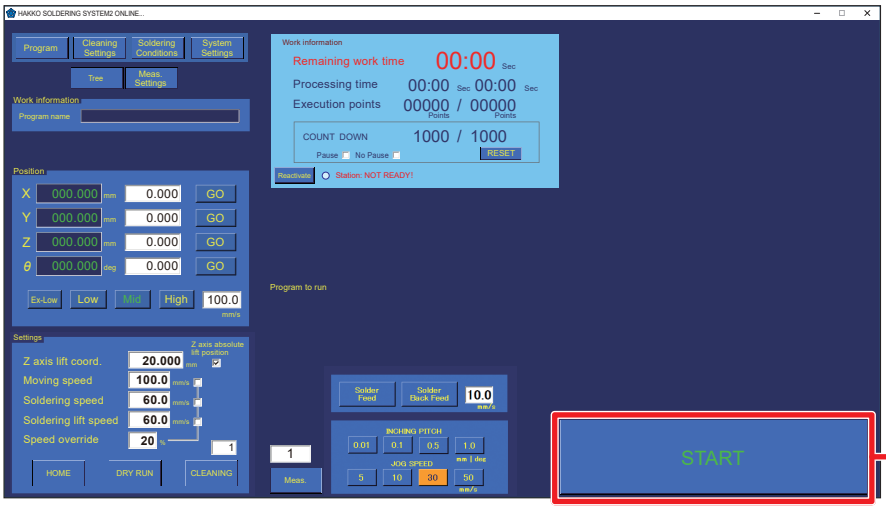
A maximum of 5 rows of the program which was called up will be shown. While the program is running, the screen will automatically scroll with the STEP currently being executed. This section is for display only, and setting changes, etc. cannot be performed here.

For details on programs, refer to "7-5 Creating a Soldering Program" (p. 90).

7-1-11 Start Button

Program start, pause, stop, and restart operations can be performed using the **[START/PAUSE/STOP]** button on the robot's front panel or the **[START]** button on the software's top screen.

For details, refer to "7-1-11-1 Flowchart (Screen Button Operation)" (p. 71) or "7-1-11-2 Flowchart (Robot Button Operation)" (p. 72).



Top screen of software

List of button displays

All displays are blinking displays.





Screen button operation

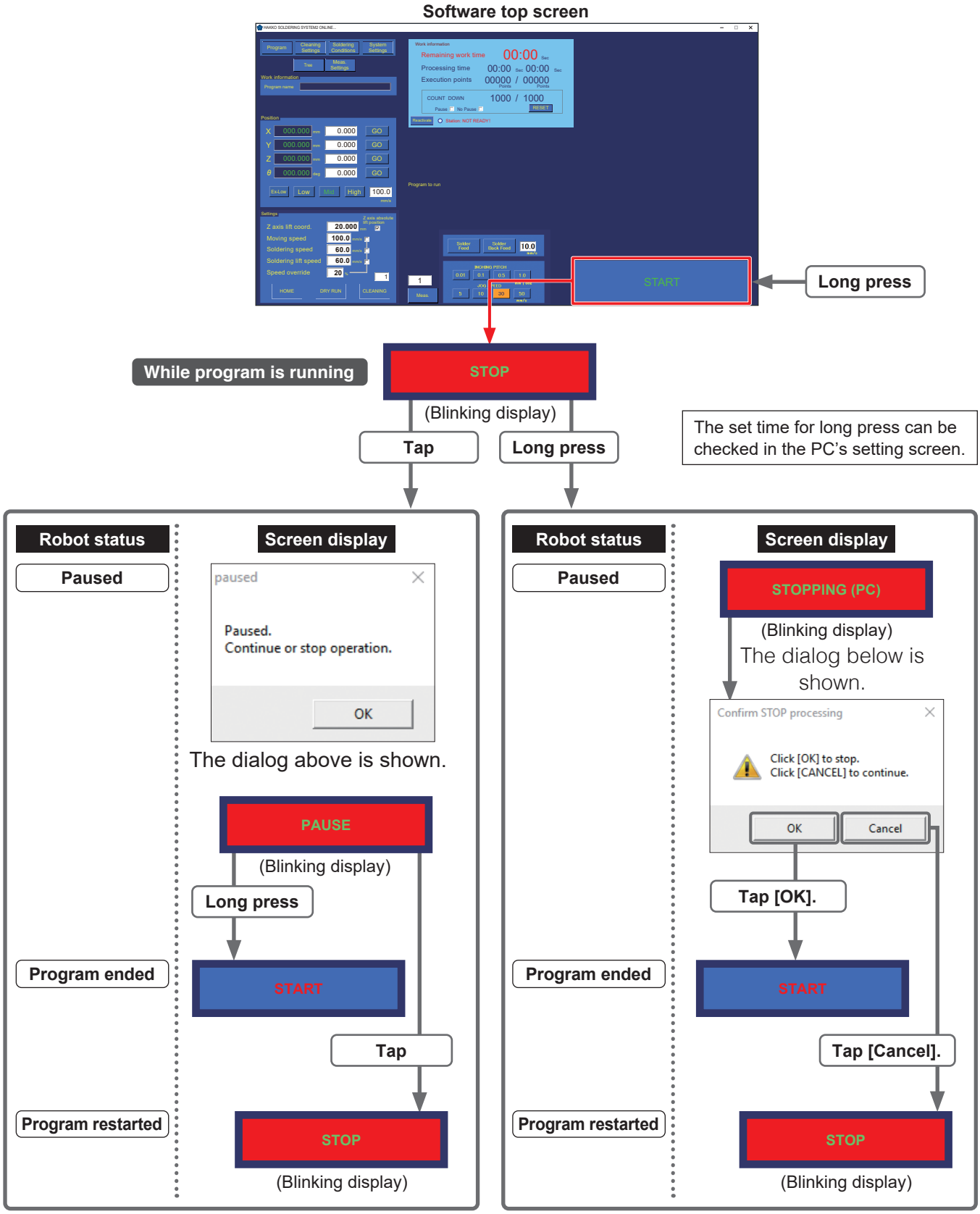


Robot button operation



7-1-11-1 Flowchart (Screen Button Operation)

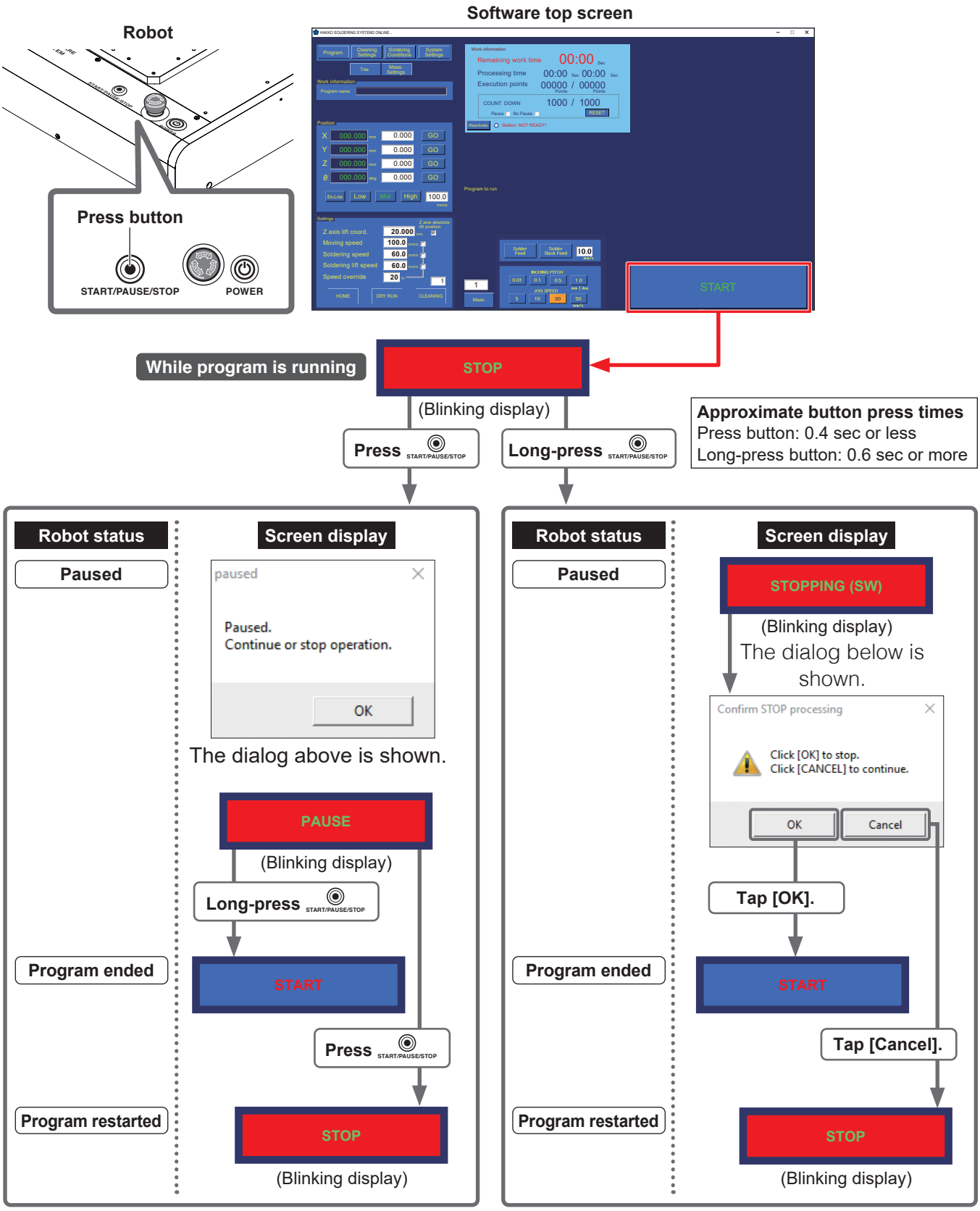
The diagram below shows the flow of program pause, stop, and restart operations using the screen buttons after a program has been started.



If **[PAUSE]** is long-pressed (end program) or tapped (restart program) the display will automatically disappear.

7-1-11-2 Flowchart (Robot Button Operation)

The diagram below shows the flow of program pause, stop, and restart operations using the robot button after a program has been started.



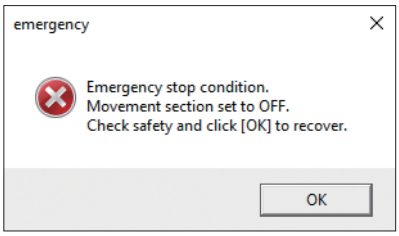
If **[PAUSE]** is long-pressed (end program) or tapped (restart program) the display will automatically disappear.

7-2 JOG Operation

⚠ CAUTION

When the robot will be operated, notify nearby workers that work is being performed and perform work while checking safety.
To enable operation to be immediately stopped in the event of a dangerous condition, perform work within reach of an emergency stop button.

When an emergency stop condition has been entered by pressing the emergency stop button, the display below will be shown on the screen.
After removing the cause of the emergency stop, turn the robot's emergency stop button clockwise to return it to its normal position.
Then, tap **[OK]** in the message window.

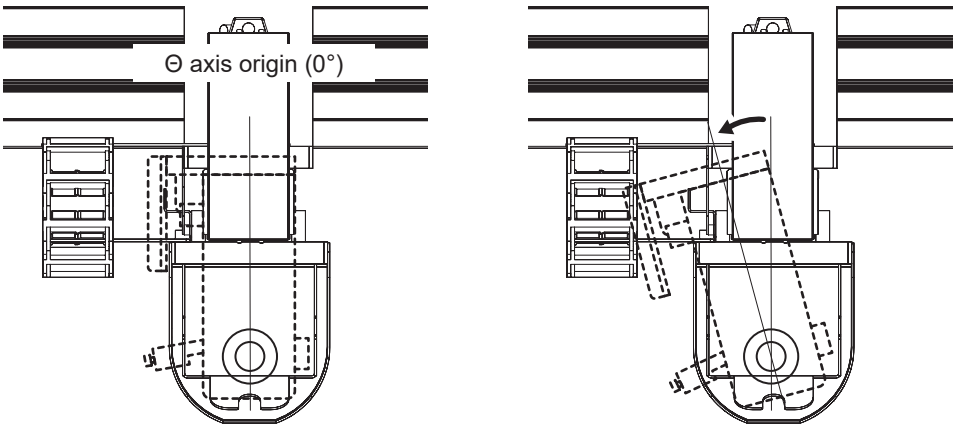


⚠ CAUTION

When the θ axis rotates while returning to the origin, there is a danger of cables wrapping around the robot. If it seems like there is a danger of cables wrapping around, press the emergency stop button immediately, turn the θ axis slightly counterclockwise from the origin (0°) when viewed from above the soldering unit fixture base, and then tap **[HOME]** again.

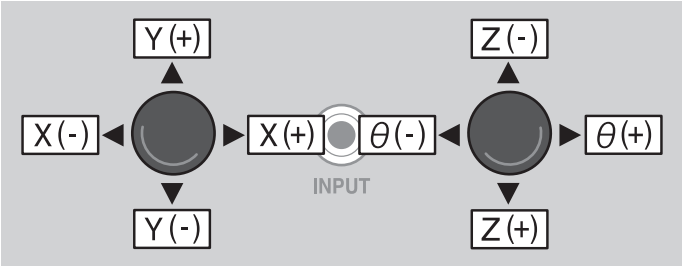
NOTE Even if [OK] is tapped before the emergency stop button has been returned to its normal position, the same display will appear again. Perform the emergency stop button operation first.

NOTE After recovering from an emergency stop condition, be sure to tap [HOME] in the top screen to return the robot to the origin point. The Z axis will be moved first, and then the X, Y, and θ axes will be moved in that order.



7-2-1 Basic Operations for JOG Operation

7-2-1-1 Movement Direction Using JOY STICKS



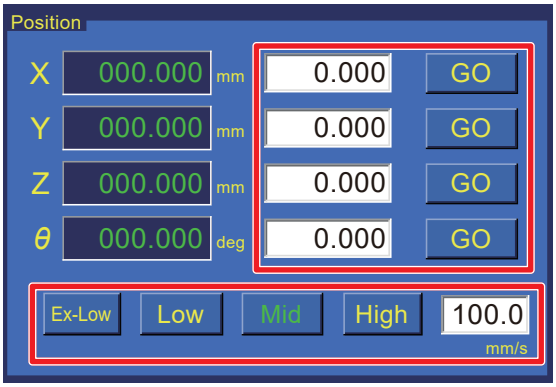
7-2-1-2 Axis Movement by Direct Coordinate Input

If the rough coordinates are known, input the coordinate directly in the top screen and move the robot.

1. Select Ex-Low, Low, etc. speed.

Ex-Low: 5 mm/sec.; **Low:** 30 mm/sec.
Mid: 100 mm/sec.; **High:** 200 mm/sec.

Free speed setting (1 – 800 mm/sec.) can also be set by inputting.



NOTE Select Ex-Low, Low, etc. speed first and be careful of contact.

2. Input the X, Y, Z, and θ coordinates to move to into the respective spaces.
(Settable range: X: 0 – 400 mm; Y: 0 – 300 mm; Z: 0 – 200 mm; θ: ± 200°)

3. Tapping **[GO]** next to each axis will cause the corresponding axis to move to the input coordinate. **[GO]** for the moving axis will be shown in red, and if **[GO]** for the moving axis is tapped again or if **[GO]** for a different axis is tapped, movement will be interrupted.
Input values within the movement range for each axis.
(If the input value is outside the range or if the value is blank, the input space will be shown in red.)

Inputting Values

Tapping each input space will cause a numerical keypad window to be shown. (Refer to the diagram below.) After inputting the value using the numerical keypad, tapping **[ENTER]** will cause the input value to be reflected in the input space. To cancel the numerical keypad window, tap on **[CAN]** at the upper right. To input negative values, after inputting the number tap +/−.

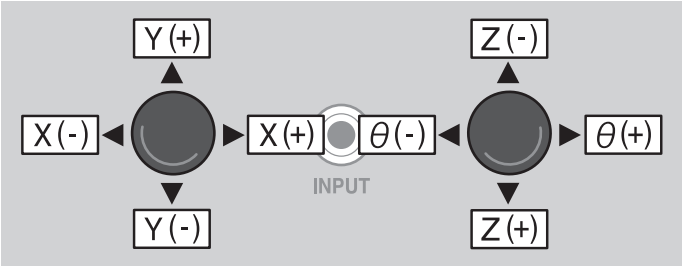


7-2-1-3 Axis Movement at Selected Speed (JOY STICK operation)

If the coordinates are unknown or if you want to move the robot freely, movement of axes can be performed using the JOY STICKS inside the door (cover) of the robot.



1. Select the desired **JOG SPEED** (5 mm/sec, 10 mm/sec, 30 mm/sec, or 50 mm/sec) in the top screen.
2. Tilt the JOY STICK inside the robot door (cover) in the desired direction.
   Refer to the diagram below for JOY STICK movement directions. Movement will be performed at the selected speed while the JOY STICK is tilted.



3. Move the axis close to the desired position while watching the robot movement.
   Letting go of the JOY STICK will stop movement.

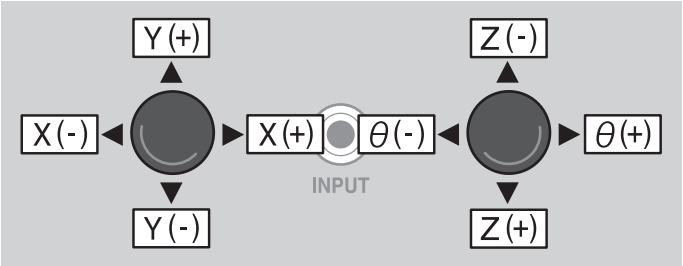
7-2-1-4 Axis Movement by Inching (JOY STICK operation)

To move the axis in fine increments or to perform fine adjustments when adjusting tip position, etc., the axis can be moved using the inching function. (Refer to diagram below.)



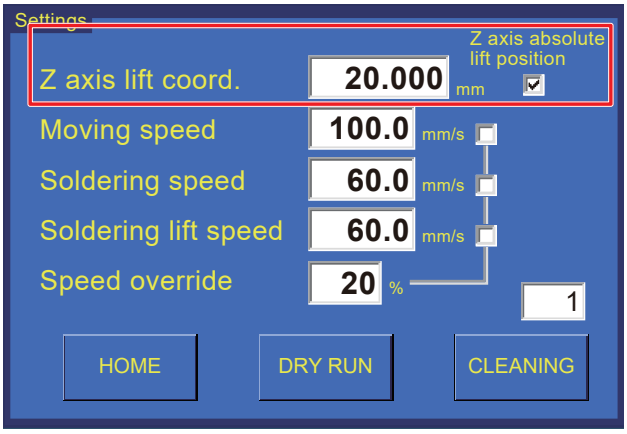
1. Select the desired **INCHING PITCH** (0.01 mm/deg, 0.1 mm/deg, 0.5 mm/deg, or 1.0 mm/deg) in the top screen.

2. Tilt the JOY STICK inside the robot's door (cover) in the desired direction. The robot will move only one unit of the selected pitch in the direction of the JOY STICK tilt.



3. Repeat **Step 2** as necessary to move the axis to the desired position.

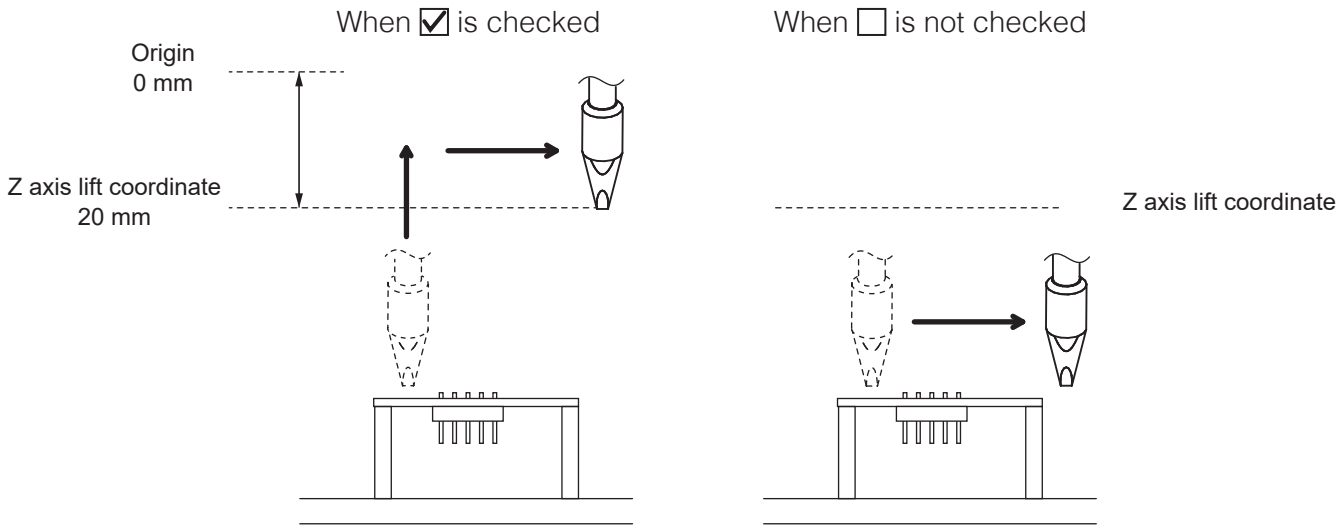
7-2-2 Z Axis Lift



Z axis lift is a function for avoiding danger and unexpected damage to the PWB and areas around where soldering is performed.
The Z axis lift coordinate is a coordinate setting for avoiding contact with protruding objects on the workpiece during horizontal movement.
This operates both while a program is running and also during manual JOG operation.

When **Z axis absolute lift position** is checked in the top screen **Settings** and movement of an axis is performed, the Z axis will move to the lift coordinate before movement of the other axes is performed.
The lift coordinate is set by inputting the **Z axis lift coord.**. (Refer to diagram above.)

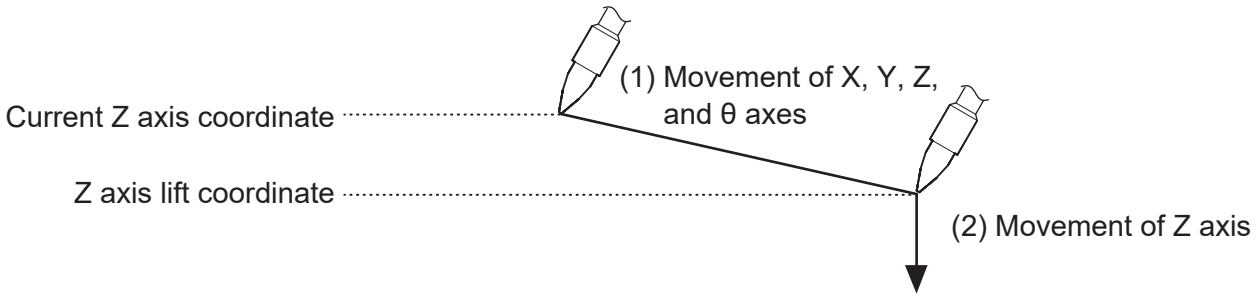
Ex.) When moving to the right by JOG operation



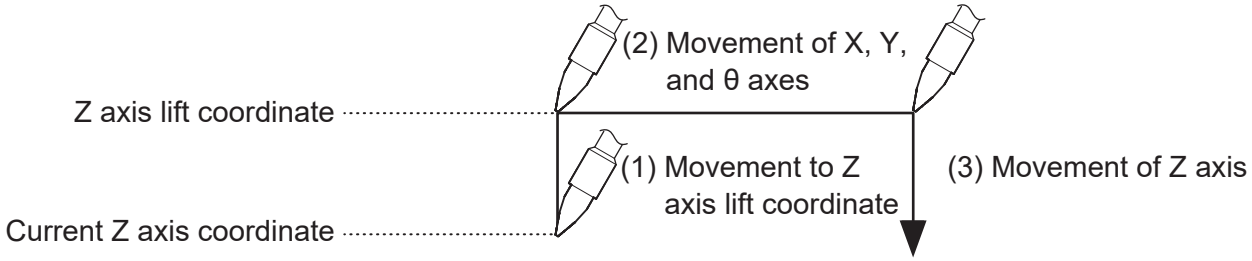
⚠ CAUTION

However, when fine adjustments such as setting tip position are necessary, if Z axis lift is performed each time the axis is moved, work becomes difficult. In such cases, uncheck the checkbox and use extra care to avoid contact with surrounding parts while moving.
After work has been completed, be sure to check the checkbox again.

• **When current Z axis coordinate is higher than the Z axis lift coordinate**
Movement of the Z axis to the Z axis lift coordinate is performed after movement of the X, Y, Z, and θ axes.



• **When current Z axis coordinate is lower than Z axis lift coordinate**
Movement to the Z axis lift coordinate is performed, followed by movement of the X, Y, and θ axes, and finally the Z axis.

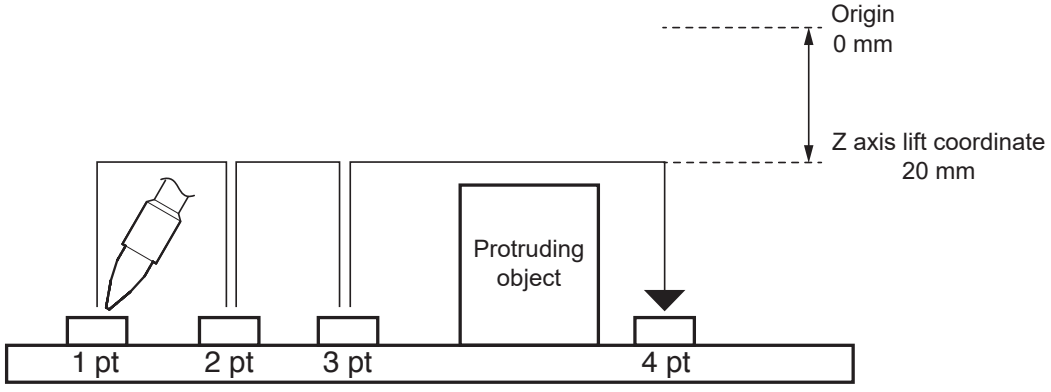


NOTE

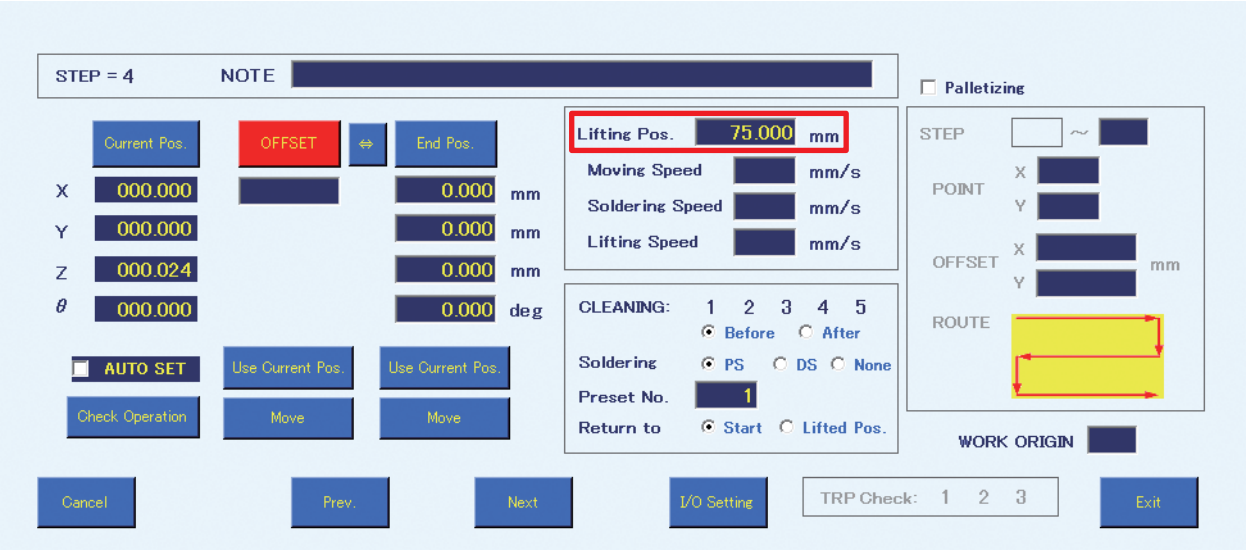
If the Z axis before movement is at the same height as the Z axis lift coordinate, movement of the X, Y, and θ axes will be performed without moving the Z axis.
If movement of only the Z axis is performed without changing the X, Y, and θ axes, Z axis lift will not be performed.

When performing axis movement of the X, Y, and θ axes using the JOY STICKS, Z axis lift will be performed at the point when the JOY STICK is tilted, and movement cannot be interrupted until the Z axis lift coordinate has been reached.
During JOG operation, the Z axis lift operating speed will be the speed set for position in the top screen (refer to “7-1-6 Position” (p. 67)). The **JOG SPEED** is not applied.
When axis movement of the X/Y and θ/Z axes is performed simultaneously using the JOY STICKS, X, Y, and θ axis movement will be stopped at the point where the Z axis is moved from a position higher than the Z axis lift coordinate to a position lower than the Z axis lift coordinate.

While a program is running, if the **Z axis absolute lift position** in the top screen **Settings** is checked, Z axis lift will be performed for each point.



In addition, the height can be changed and a Z axis lift coordinate can be set only for specific points.

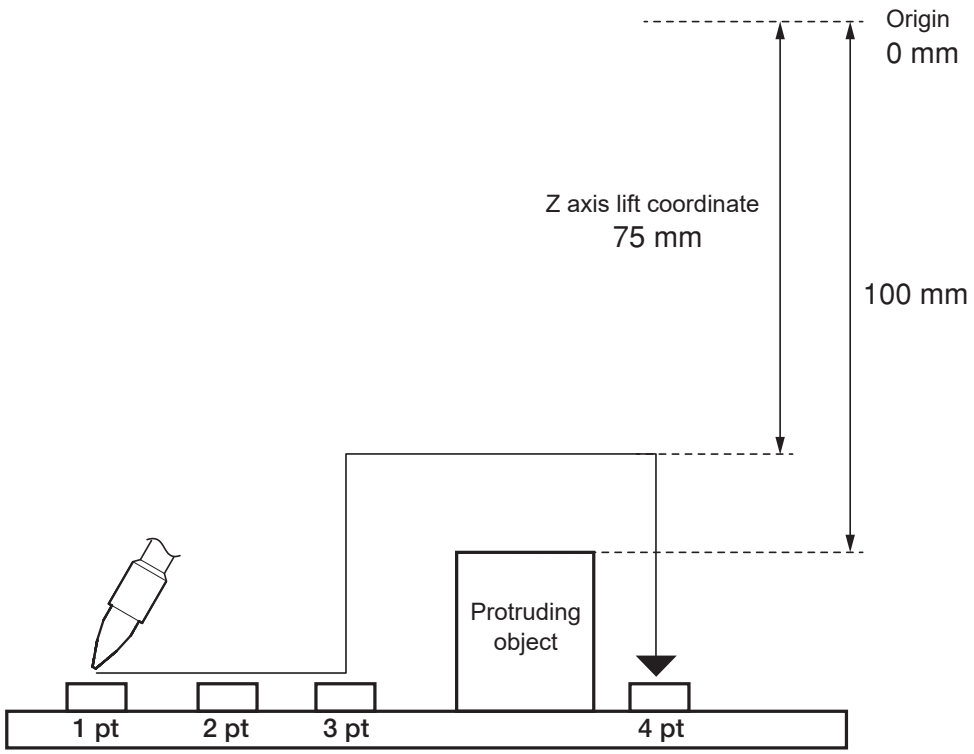


Ex.) When there is a protruding object between the 3rd point and the 4th point
- No Z axis lift is set up to the 3rd point.
- In order to avoid the protruding object when moving from the 3rd point to the 4th point, the **Lifting Pos.** is set to 75 mm in the Point Edit Screen of the 4th point.

→Z axis lift is performed from the 3rd point to the 4th point.

NOTE If Z axis lift values are set in both the top screen and the Point Edit Screen, the Z axis lift coordinate set in the Point Edit Screen will be given priority and be applied.

NOTE To avoid a protruding object between the 3rd point and the 4th point, input a value for the Z axis lift coordinate of the 4th point.

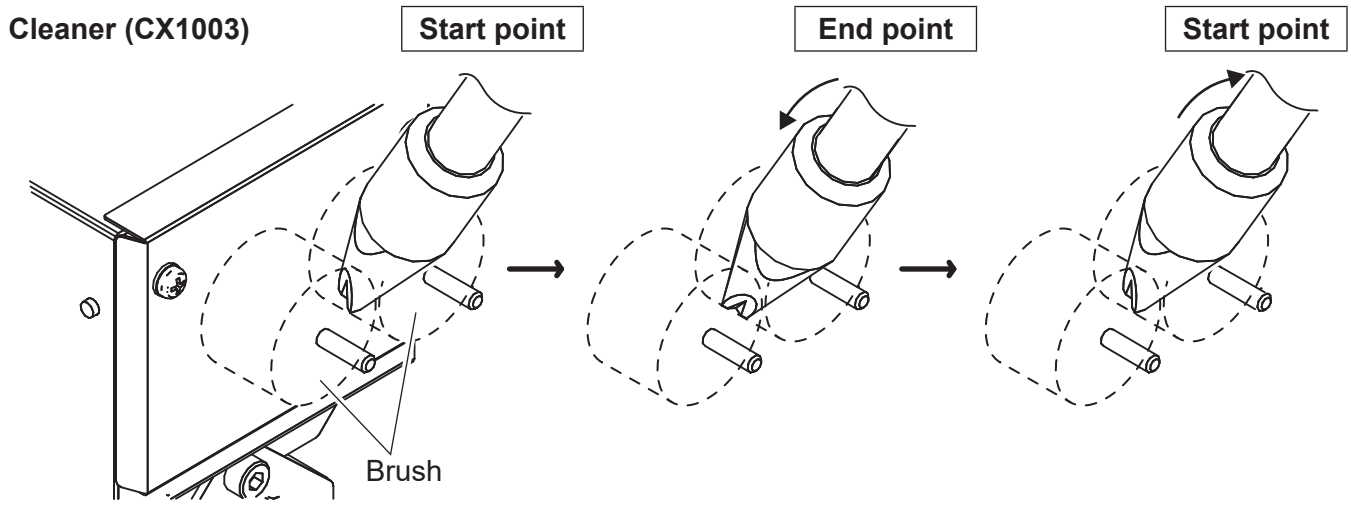


7-3 Cleaner (CX1003) Settings

⚠ CAUTION
After performing JOG operation learning, be sure to set the cleaning position settings first.

7-3-1 Brush Cleaning Coordinate Settings

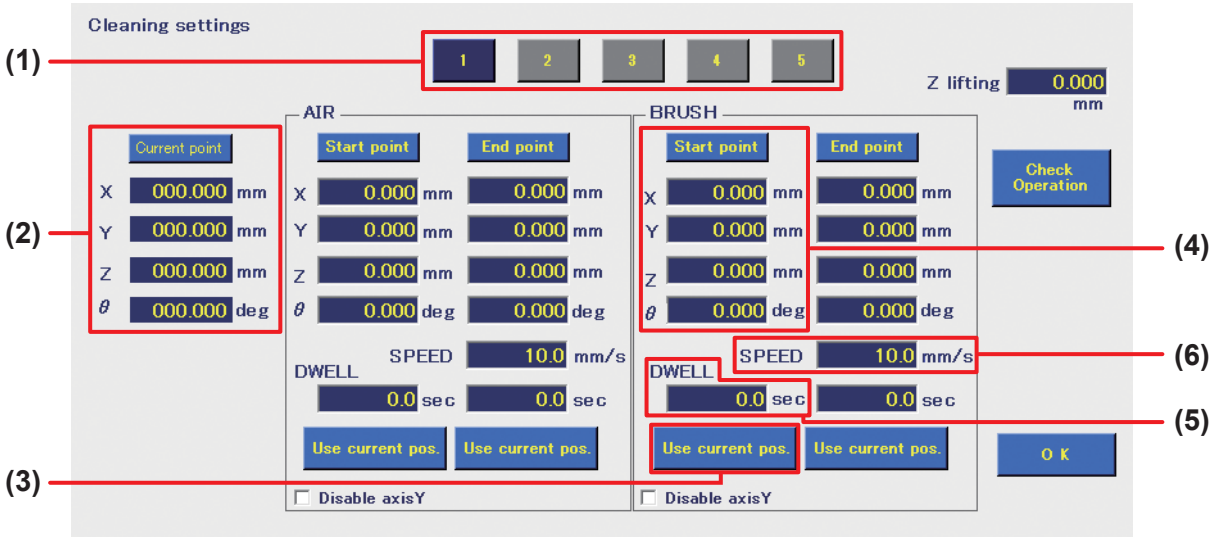
Determining the cleaning position of the installed cleaner (CX1003) will be performed.
To make it possible for the cleaner (CX1003) to perform cleaning and make the tip solder clean, the start point → end point → start point, movement to the cleaning process, and the angle can be set.



Tap **[Cleaning Settings]** in the top screen and input the settings.

1. Move the tip to a position where cleaning can be performed using the brushes of the cleaner (CX1003) by using the robot's JOY STICKS or specifying coordinates in the top screen. Adjust the cleaning position while selecting the appropriate **JOG SPEED** or **INCHING PITCH**.

NOTE Since the Y axis coordinate is for jig table movement, it is not directly related to cleaning operation. If movement of the jig table is not desired, check the **Disable axis Y** checkbox.



2. Open the Cleaning Settings Screen (diagram above) from the top screen.

3. Up to 5 cleaning settings can be set. Select the number to be set by tapping the corresponding button **(1)**.

4. Settings are started by setting the start point first. (Refer to table below.) The coordinates for the position adjusted to in **Step 1** are shown as the **[Current point] (2)**.

X axis	30.000 mm
Y axis	250.000 mm
Z axis	120.000 mm
θ axis	0°
Movement speed	100 mm/sec
Cleaning time	1.0 sec

5. Check that the position is one where the tip is in contact with the brushes and cleaning can be performed, and tap **[Use current pos.]** on the **BRUSH** start point side **(3)**. The coordinates of the current position will be reflected in the **[Start point]** space **(4)**. Note that direct input of values can also be performed.

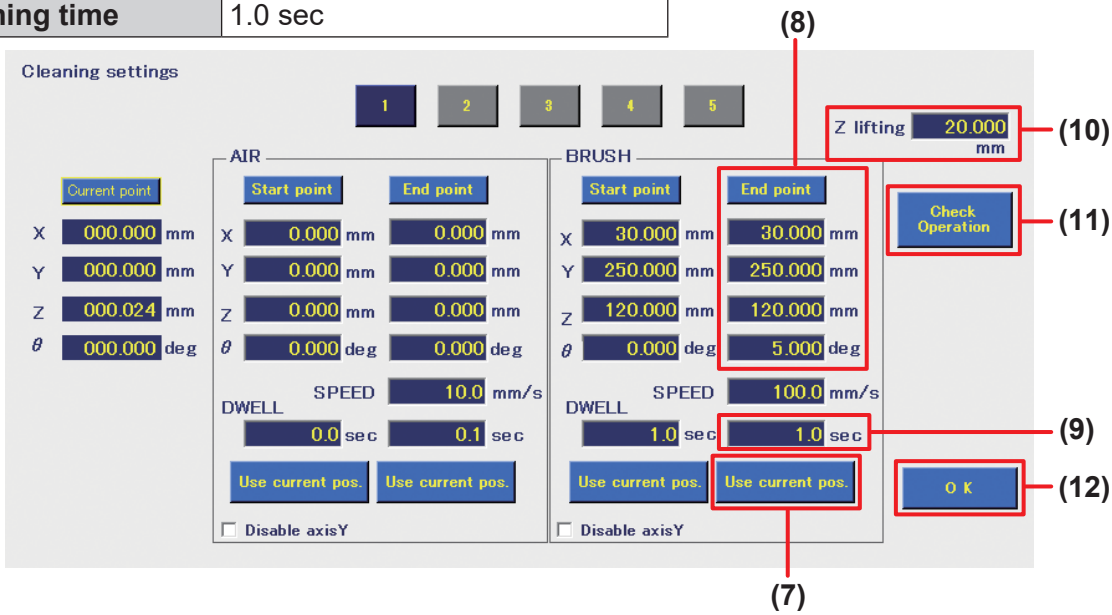
NOTE Input values within the movable range for each axis.
For the movable range for each axis, refer to “2-1-1 Robot” in “2. Specifications” (p. 5).
(If the input value is outside the range or if the value is left blank, the input space will be red.)

6. Set the time to stay at the start point position as the **DWELL** time **(5)**. In the example, cleaning will be performed for 1 second at the start point coordinates. If this space is set to “0” or is left blank, this process will be skipped.

7. Set the movement speed during cleaning as the **SPEED (6)**.
In the example, it is set to 100 mm/sec. (Settable range: 1 – 800 mm/sec.)

8. Next, set the end point (refer to table below). The end point coordinates for cleaning are coordinates that are set to enable cleaning of areas that cannot be cleaned at the start point coordinates.
Adjust the cleaning position using the robot's JOY STICKS or by specifying coordinates in the top screen.
In the example the Y coordinate and Z coordinate are the same as those of the start point, and only the θ has been changed.

X axis	30.000 mm
Y axis	250.000 mm
Z axis	120.000 mm
θ axis	5°
Movement speed	100 mm/sec
Cleaning time	1.0 sec

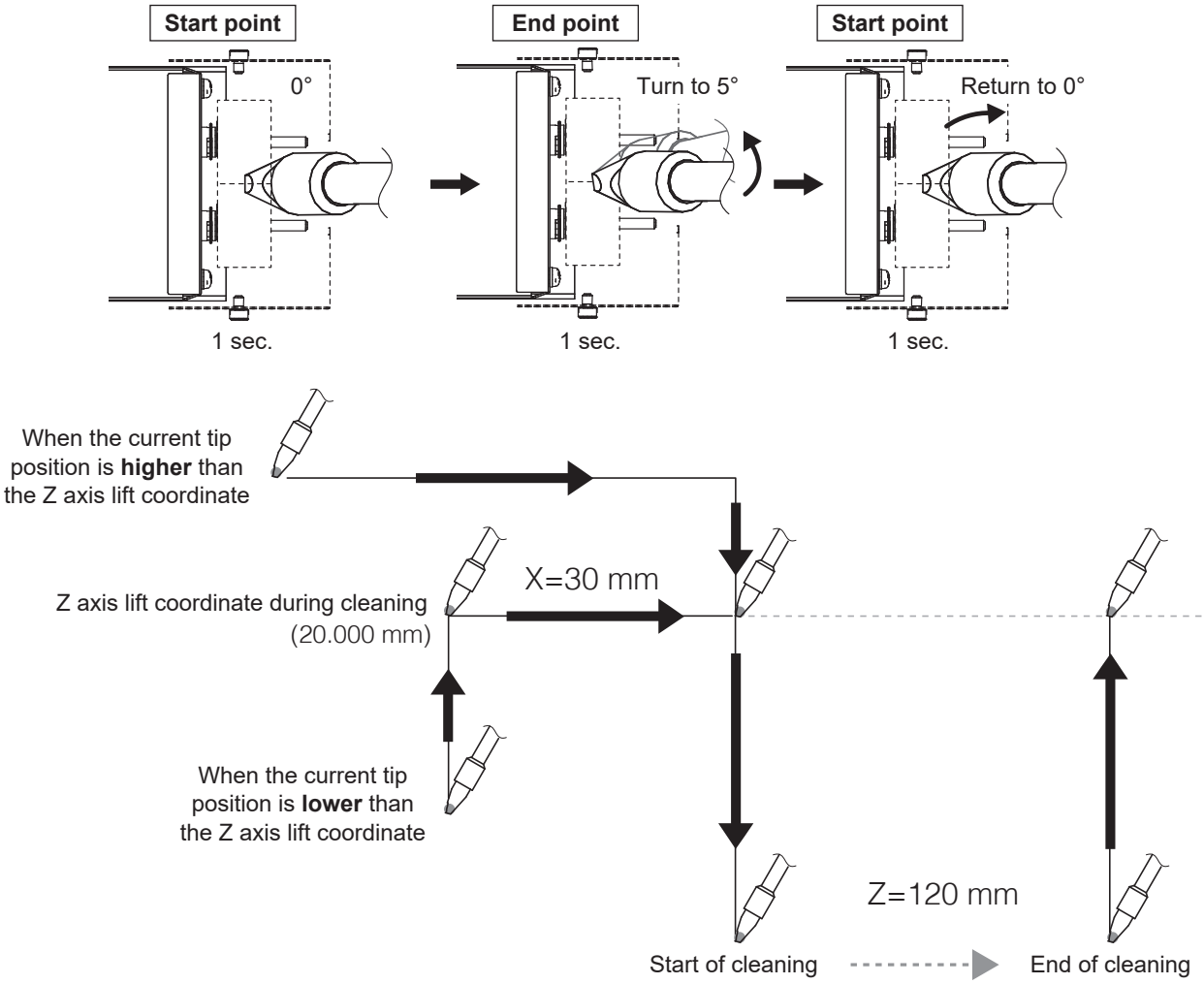


9. Tap **[Use current pos.]** on the **BRUSH** end point side **(7)**. The coordinates of the current position will be reflected in the **[End point]** space **(8)**.

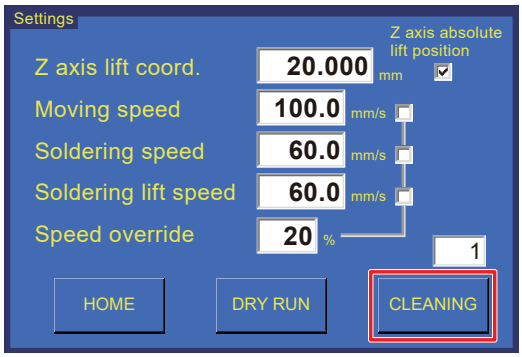
10. Set the time to stay at the end point position as the **DWELL** time **(9)**. In the example, cleaning will be performed for 1 second at the end point coordinates. (Settable range: 0.0 – 60.0 sec.) If this space is set to "0" or is left blank, this process will be skipped.

11. Finally, set the Z axis lift coordinate before cleaning or after cleaning as the **Z lifting (10)**.
These values will be given priority when performing cleaning regardless of the **Z axis lift coord.** set in the top screen.
For the movement during cleaning, refer to the next page.
In the example, it is set to 20.000 mm. (Settable range: 0.000 – 200.000 mm)

The cleaning movement which has been set can be checked by tapping **[Check operation] (11)**. When cleaning is performed according to the settings set in **Steps 4** to **11**, brush cleaning will be performed as shown in the diagram below.



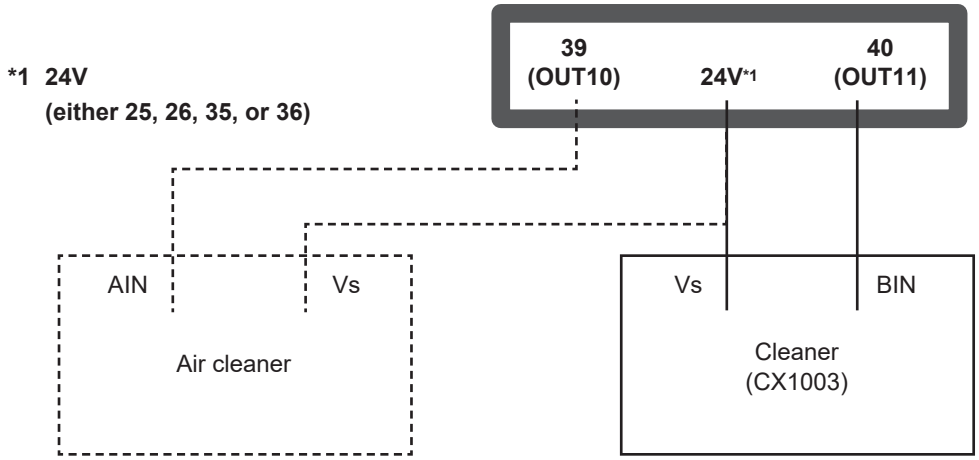
12. Tap **[OK] (12)** to save the settings.



To perform cleaning manually, tap **[CLEANING]** in the top screen.
In this case, cleaning will be performed according to setting 1. This button cannot be used while the robot has accepted another operation. To specify the cleaning timing in a soldering program, refer to “7-5 Creating a Soldering Program” (p. 90).
The order of cleaning is air cleaning → brush cleaning

7-3-2 Connecting an Air Cleaner

Cleaner (CX1003) included in the set is a brush cleaner. In addition to this, an air cleaner can also be set. The method for setting cleaning settings is the same as when using a **BRUSH** cleaner.
Wiring of an air cleaner can be performed as shown in the diagram below.



If the connections to AIN and BIN are reversed, brush cleaning will be performed using the air cleaning settings, and air cleaning will be performed using the brush cleaning settings.

7-3-3 Selecting Cleaner Type

To use both air cleaning and brush cleaning

When values have been input for both **AIR** and **BRUSH**, cleaning is performed in the order air cleaning → brush cleaning.

To use either air cleaning or brush cleaning

NOTE If the DWELL time for both start point and end point are set to 0, that cleaning will be canceled.

Ex.) To use air cleaning

If the **AIR DWELL** time is set to 0 sec. for the start point and 0.1 sec. for the end point, air cleaning will be performed for 0.1 sec. at the end point coordinates.



7-4 Solder Installation and Solder Feed Settings

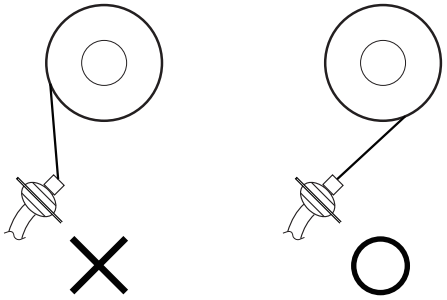
7-4-1 Solder Installation and Solder Feed Position Adjustment

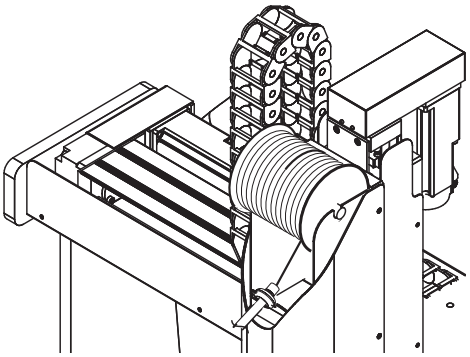
Check that the feeder unit and soldering unit mount are firmly assembled. For details on assembling and attaching them, refer to “5-2-1 Attaching the Feeder Unit (CX5040)” (p. 20) and “5-2-2 Attaching the Soldering Iron Unit” (p. 21).

7-4-1-1 Solder Installation

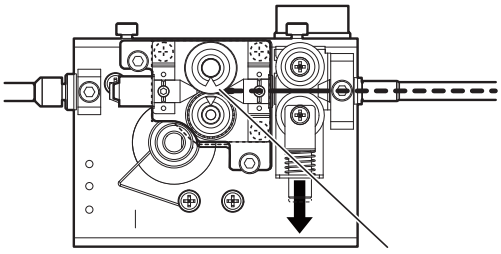
NOTE A 2.5mm hexagonal wrench is used for adjusting the feeder unit and soldering unit mount.

1. Set the solder in the solder reel holder.
Set the solder orientation so that the solder will be fed from the rear side.

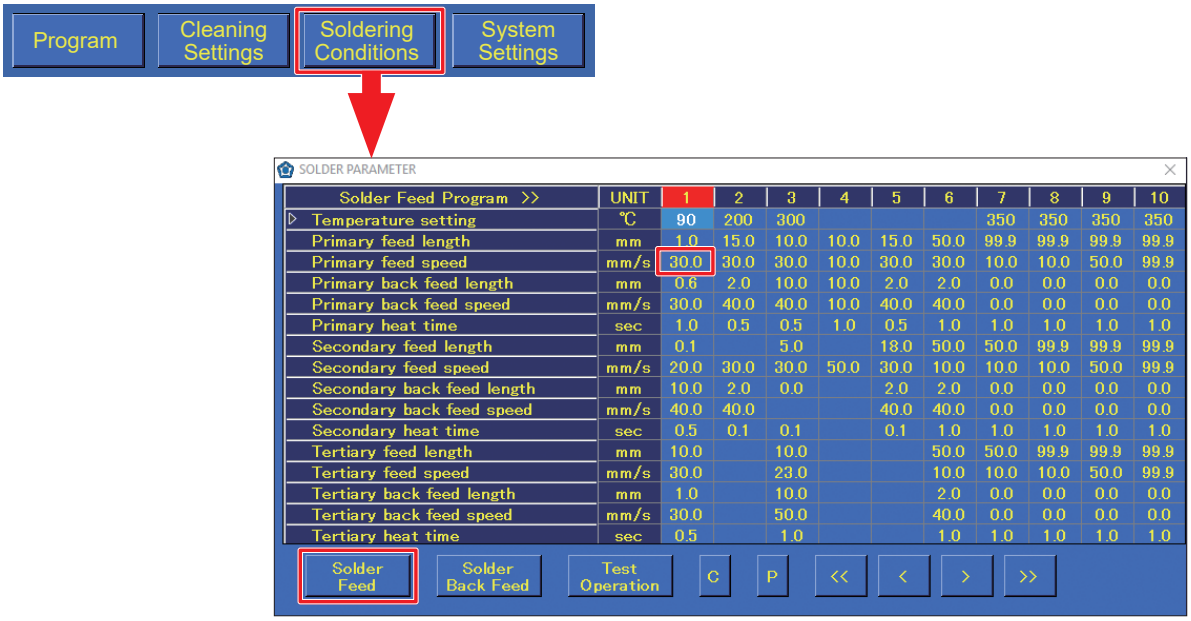




2. While turning the solder bobbin, pass the solder through the tube unit so that it pushes against the pulley section of the solder feed pulley unit.
To prevent solder feed problems, the bending radius of the tube unit should be kept to 10 cm or more.



3. Tap **[Soldering Conditions]** in the top screen to open the Solder Feed Parameter Setting Screen.



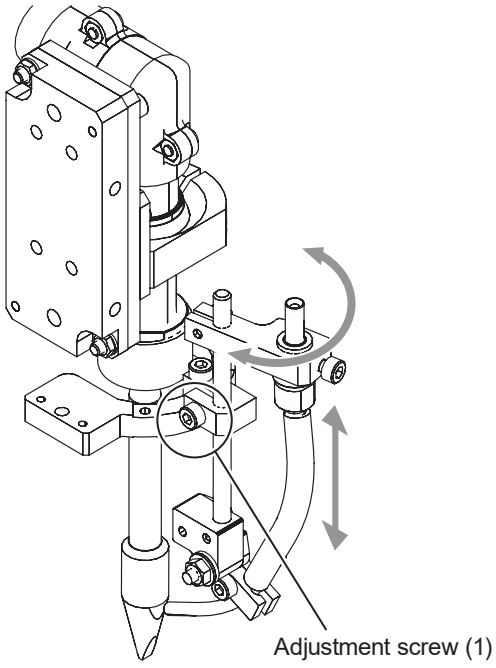
Solder Feed Program >>	UNIT	1	2	3	4	5	6	7	8	9	10
Temperature setting	℃	90	200	300				350	350	350	350
Primary feed length	mm	1.0	15.0	10.0	10.0	15.0	50.0	99.9	99.9	99.9	99.9
Primary feed speed	mm/s	30.0	30.0	30.0	10.0	30.0	30.0	10.0	10.0	50.0	99.9
Primary back feed length	mm	0.6	2.0	10.0	10.0	2.0	2.0	0.0	0.0	0.0	0.0
Primary back feed speed	mm/s	30.0	40.0	40.0	10.0	40.0	40.0	0.0	0.0	0.0	0.0
Primary heat time	sec	1.0	0.5	0.5	1.0	0.5	1.0	1.0	1.0	1.0	1.0
Secondary feed length	mm	0.1		5.0		18.0	50.0	50.0	99.9	99.9	99.9
Secondary feed speed	mm/s	20.0	30.0	30.0	50.0	30.0	10.0	10.0	10.0	50.0	99.9
Secondary back feed length	mm	10.0	2.0	0.0		2.0	2.0	0.0	0.0	0.0	0.0
Secondary back feed speed	mm/s	40.0	40.0			40.0	40.0	0.0	0.0	0.0	0.0
Secondary heat time	sec	0.5	0.1	0.1		0.1	1.0	1.0	1.0	1.0	1.0
Tertiary feed length	mm	10.0		10.0			50.0	50.0	99.9	99.9	99.9
Tertiary feed speed	mm/s	30.0		23.0			10.0	10.0	10.0	50.0	99.9
Tertiary back feed length	mm	1.0		10.0			2.0	0.0	0.0	0.0	0.0
Tertiary back feed speed	mm/s	30.0		50.0			40.0	0.0	0.0	0.0	0.0
Tertiary heat time	sec	0.5		1.0			1.0	1.0	1.0	1.0	1.0

4. When **[Solder Feed]** in the Solder Feed Parameter Setting Screen is tapped, solder will be fed. Tapping it again will cause solder feed to stop.
Feed solder until solder comes out of the end of the fluoroplastic tube.

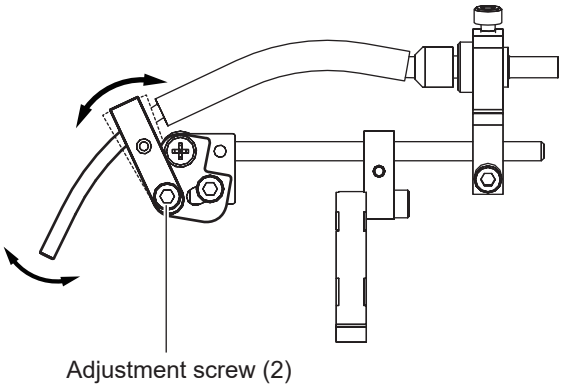
NOTE The solder feed speed will be the primary feed speed for the column of the selected soldering conditions number.

7-4-1-2 Solder Feed Position Adjustment

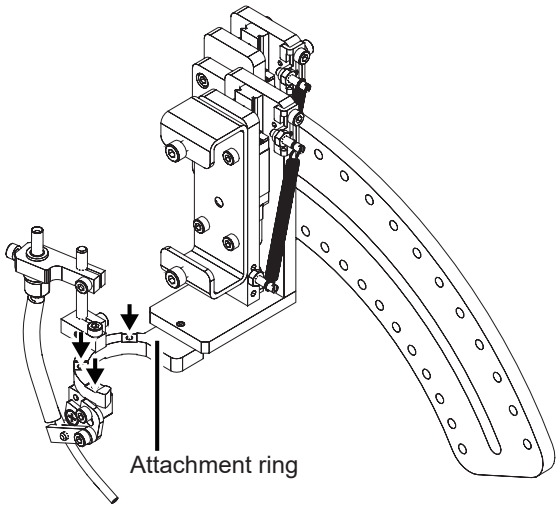
1. When adjustment screw (1) of the soldering unit mount is loosened, the entire feed guide set can be moved as shown in the diagram below.
Adjust the rod length and direction (rotation direction) and move the tip of the feed guide set to the soldering iron tip position.

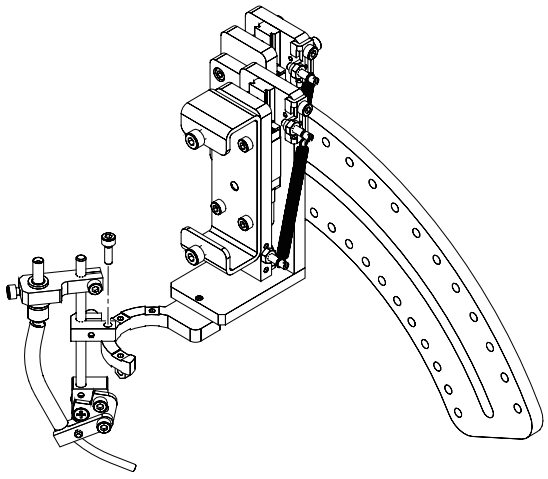


2. When adjustment screw (2) is loosened, the guide pipe can be moved as shown in the diagram below. Adjust it to a position where the solder will come in contact with the soldering iron tip.

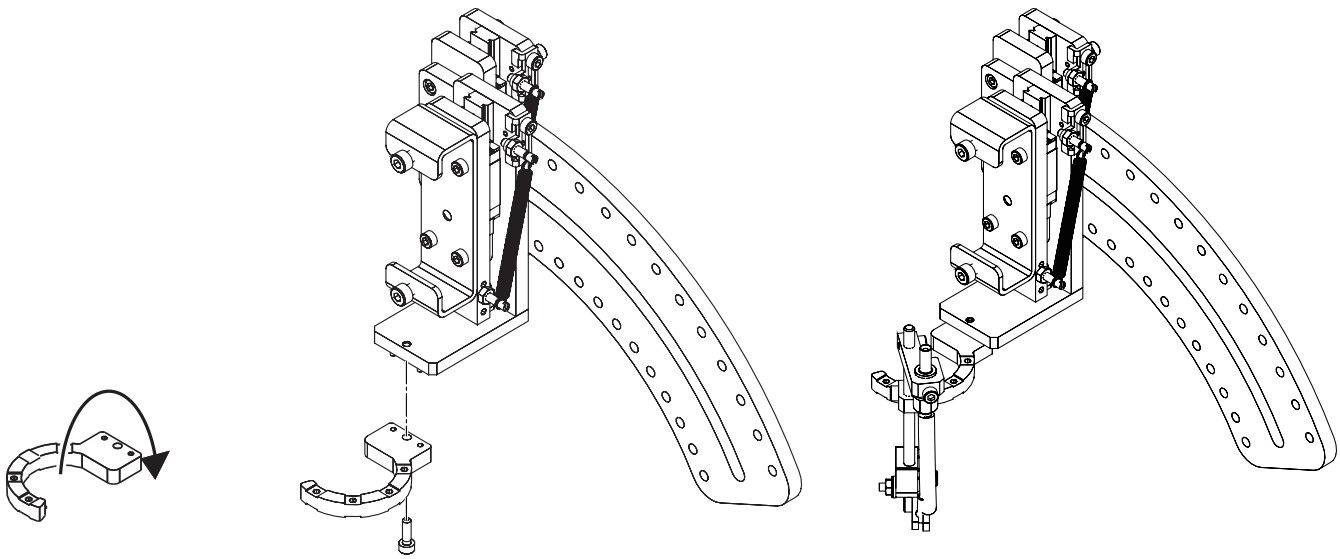


3. The attachment ring has holes in 4 locations. The feed guide set angle can be adjusted by changing the attachment ring hole position.





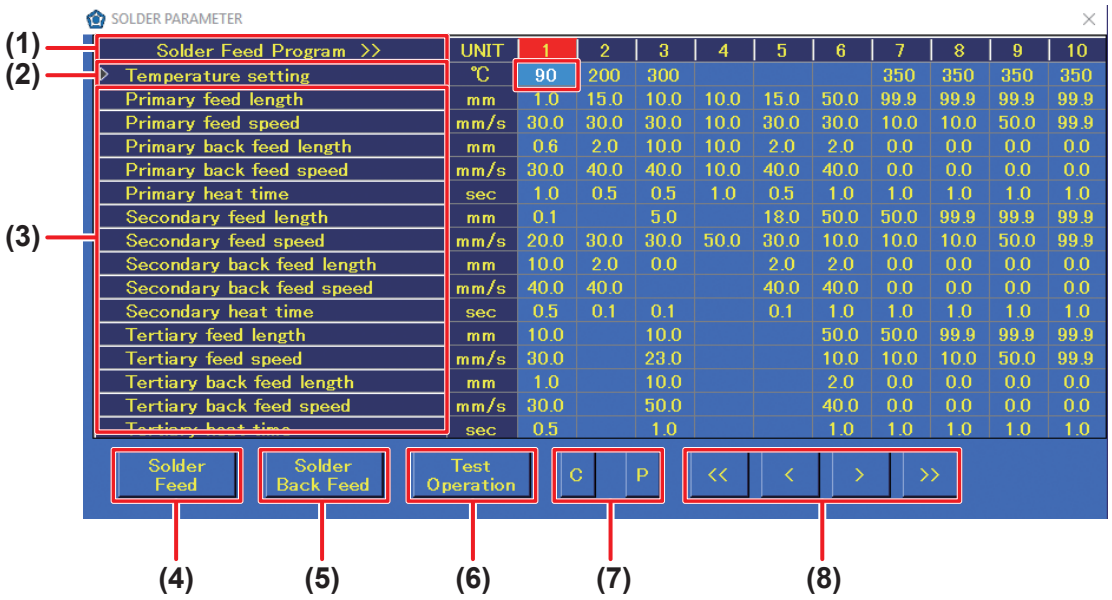
4. Changing the attachment orientation of the attachment ring will make it possible to attach the feed guide set at the opposite angle.



7-4-2 Solder Feed Settings

7-4-2-1 Creating a Solder Feed Program (Solder Feed Parameter Setting Screen)

Tap **[Soldering Conditions]** in the top screen to open the Solder Feed Parameter Setting Screen. Set the solder feed settings in this settings screen.



(1) Soldering Feed Program

This is the solder feed program number. Up to 250 programs can be set. A single vertical column is a single program.

(2) Temperature setting

Input the temperature setting if it is desired to change the temperature setting to match the soldering conditions from the robot.

If the space is blank, the soldering iron unit HF-600 temperature setting will be applied.

(3) Feed length, feed speed, back feed length, back feed speed, heat time

These are the solder feed parameter settings. The settable range for each item are as shown in the table below. For primary soldering, the settings are for the start point. For both secondary and tertiary soldering, the settings are for the end point.

Setting item	Range*1 – *4
Solder feed length	0.1 – 99.9 mm
Solder feed speed	0.1 – 99.9 mm/s
Solder back feed length	0 – 20.0 mm
Solder back feed speed	0 – 99.9 mm
Heat time	0.1 – 9.9 sec

*1 Depending on the type of solder, it may not be possible to feed solder normally at high speed. In such cases, contact the dealer where you purchased the product.

*2 The values in the table above are for primary soldering.

*3 For secondary and tertiary soldering, all values can be set starting from 0. If no feed speed is set for secondary soldering, that operation will be canceled. For other values, setting any of the values to 0 or blank will skip all subsequent operations.

*4 If the back feed length or back feed speed is set to 0, the corresponding back feed operation will be skipped.

NOTE The conditions for both PS (point soldering) and DS (drag soldering) can be set in the Solder Feed Parameter Setting Screen.

NOTE When setting conditions for DS (drag soldering), set the secondary feed speed.
For DS (drag soldering), if a condition in which the secondary feed length is set is selected, the secondary feed length setting will be ignored.

(4) Solder feed
Used to feed solder at any desired timing. Tapping it once will start solder feed.
Tapping it again will stop solder feed. The solder feed speed will be the primary feed speed in the column for the selected soldering conditions number. (Solder feeding, solder retraction, and solder feed speed settings can also be performed from the top screen.)

(5) Solder back feed
Used to retract solder at any desired timing. Tapping it once will start solder back feed. Tapping it again will stop solder back feed. The solder feed speed will be the primary feed speed in the column for the selected soldering conditions number. (Solder feeding, solder retraction, and solder feed speed settings can also be performed from the top screen.)

(6) Operation test
The program operations for the selected soldering conditions number will be performed. To select the soldering conditions number, select the top of the corresponding column.

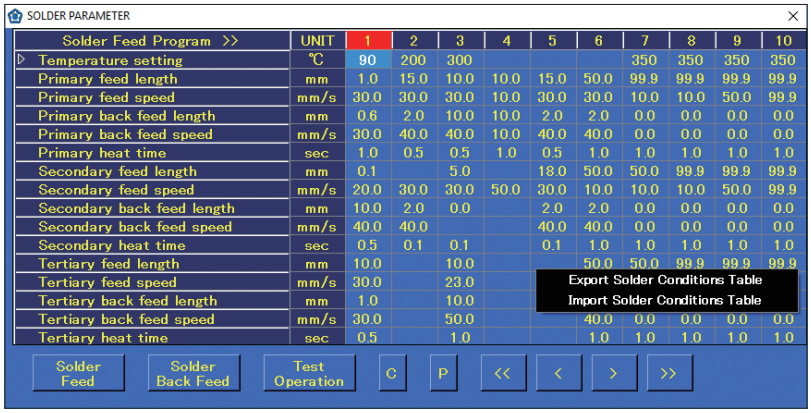
(7) **C:** Copies the soldering conditions in the selected column.
P: Pastes the copied soldering conditions into the selected column.

(8) [<<] / [>>]: Moves to the previous or next soldering conditions page (1 page = 10 columns)
[<] / [>]: Selects the previous or next column of conditions.

7-4-2-2 Reading/Writing Soldering Conditions

Soldering conditions can be read and written in CSV format.

1. Long-press anywhere in the Solder Feed Parameter Setting Screen.

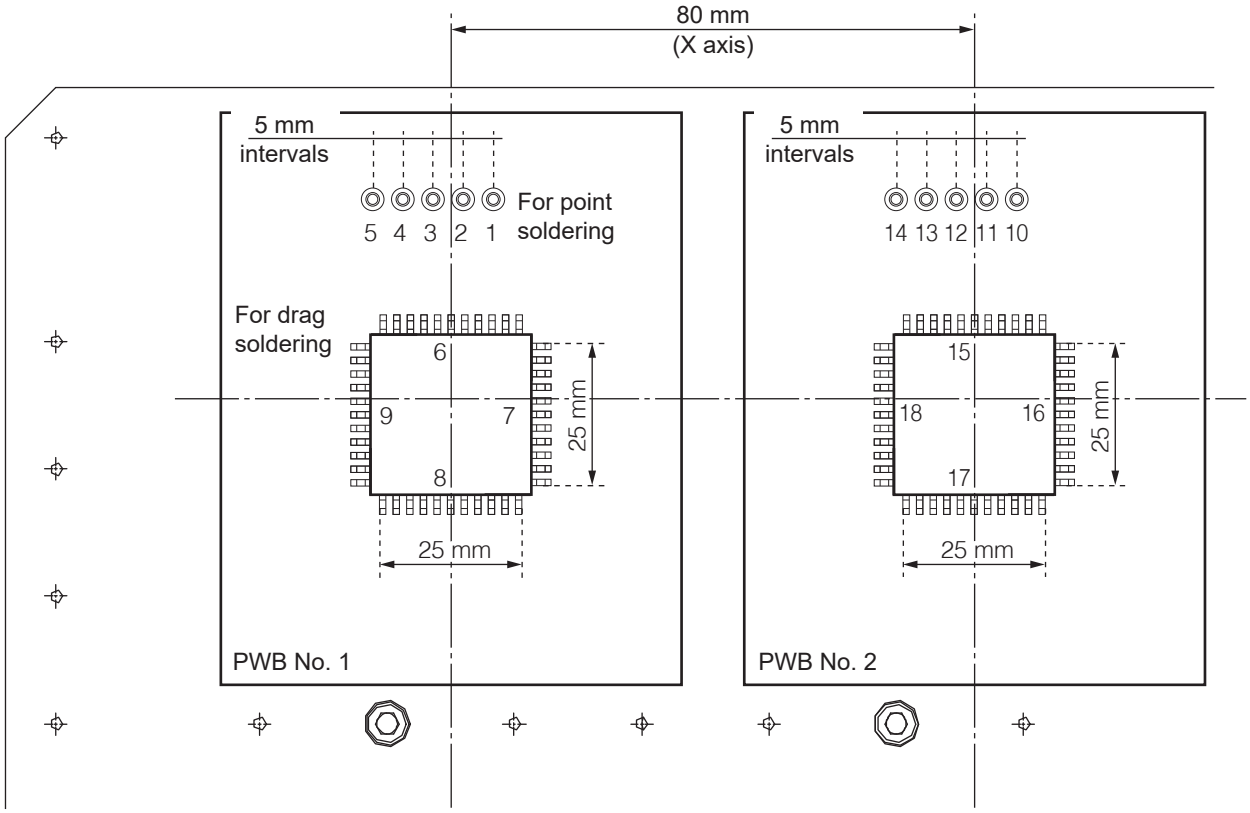


2. As shown in the diagram above, the Export Solder Conditions Table/Import Solder Conditions Table selection screen will appear.
To write solder conditions to a file, select Export Solder Conditions Table; to read solder conditions from a file, select Import Solder Conditions Table. This function reads and writes all soldering conditions.
Reading or writing of individual soldering conditions cannot be performed.

NOTE Since importing will overwrite the current conditions, the current conditions will be lost. To retain the current conditions, export them and save them to a file first.

3. Perform reading or writing of a file according to the Windows OS screen.

7-5 Creating a Soldering Program



Performing order	Type of soldering	PWB No.
1	PS (point soldering)	1
2	PS (point soldering)	1
3	PS (point soldering)	1
4	PS (point soldering)	1
5	PS (point soldering)	1
6	DS (drag soldering)	1
7	DS (drag soldering)	1
8	DS (drag soldering)	1
9	DS (drag soldering)	1
10	PS (point soldering)	2
11	PS (point soldering)	2
12	PS (point soldering)	2
13	PS (point soldering)	2
14	PS (point soldering)	2
15	DS (drag soldering)	2
16	DS (drag soldering)	2
17	DS (drag soldering)	2
18	DS (drag soldering)	2
19	Removal	—

A soldering program will be created in the order shown in the table on the previous page using the PWB shown in the diagram on the previous page.

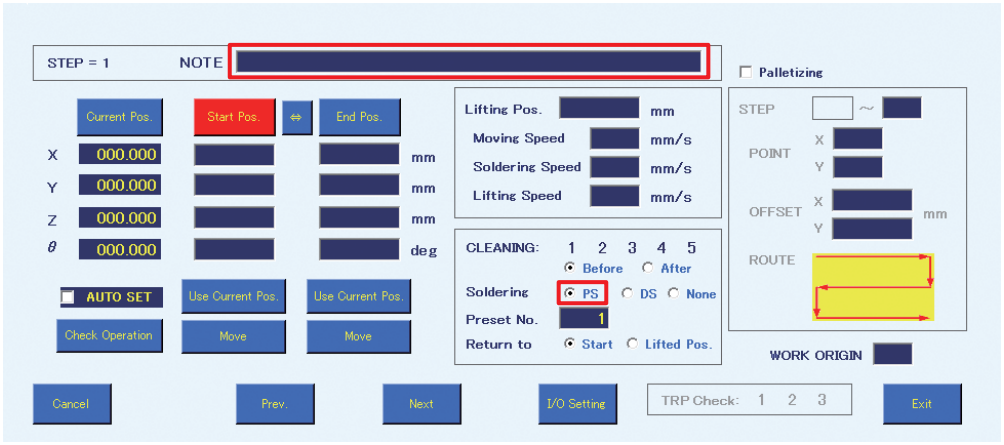
7-5-1 PS (Point Soldering) Settings

First, check that all equipment is connected properly, and that the power is switched on. For connection details, refer to “5. Installation” (p. 19).
Switch on the tablet power and start the software (HAKKO SOLDERING SYSTEM2).
Since a window asking whether to return to origin will appear, perform return to origin.

Setting the End Point and Start Point of the 1st Point (PS)

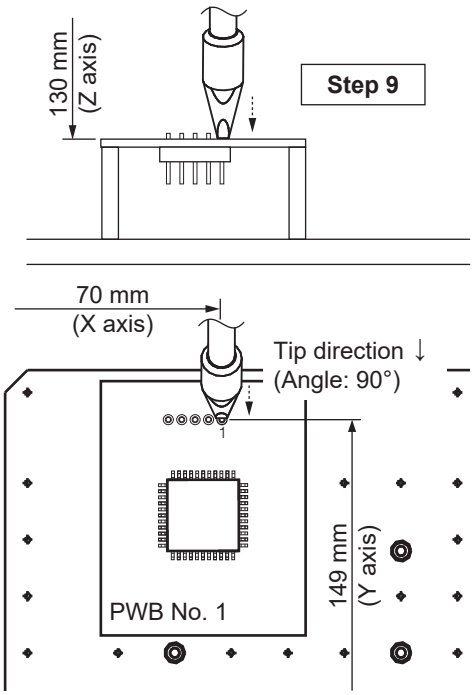


1. Tap **[Program]** in the top screen. The program list will open.
2. Tap the beginning of a row to select the entire row.
3. Tap the **Program name**, select a cell, and then tap it again to enter the condition for inputting characters. (The cursor will blink.)
4. If the OSK does not appear, tap **[OSK]** to open the on-screen keyboard and input the program name.
5. Tap **[Edit]** to open the Program Edit Screen.
6. Double-tap **STEP 1** and open the Point Edit Screen as shown in the diagram below.
7. Input the name of the product to be soldered in the **NOTE** space.

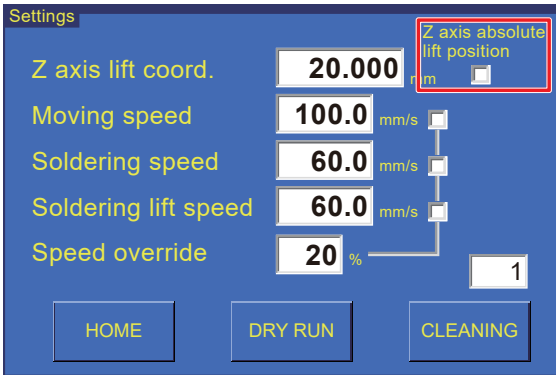


8. Select **PS** as the soldering mode.

9. Determining the position of the end point coordinates for the 1st point will be performed.
(The end point coordinates for PS mode will be the position of the point to be soldered.)
Move the tip to the position on the workpiece (refer to the figure at right) where point soldering will be performed.



1) Use the JOY STICKS or directly input the coordinates in the top screen to move the tip close to the point to be soldered.
2) To perform fine adjustment such as determining the tip position, etc., uncheck **Z axis absolute lift position** in the top screen.
For details on Z axis lift behavior, refer to “7-2-2 Z Axis Lift” (p. 77).

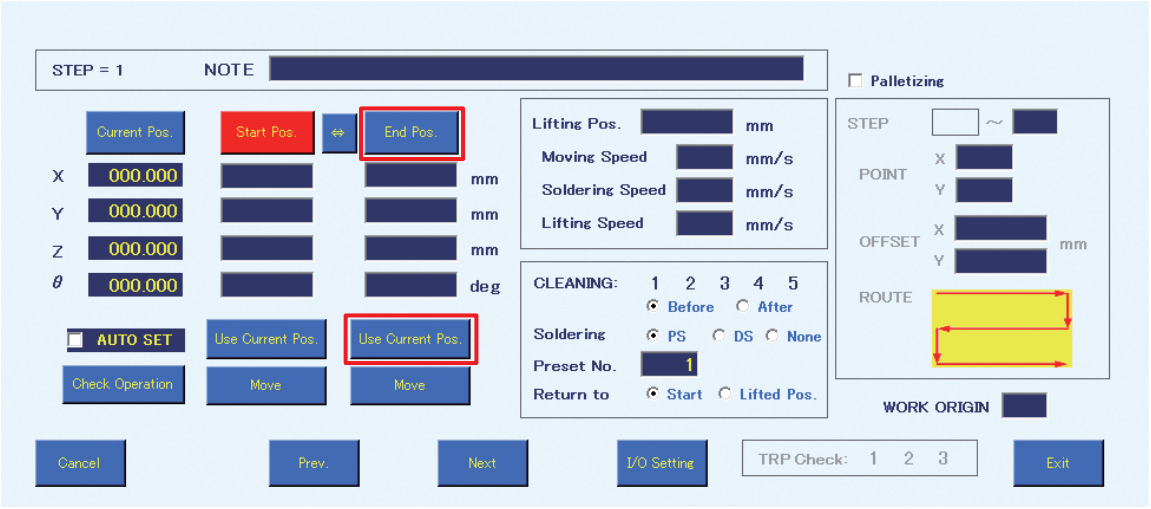


10. Perform fine adjustment and align the tip with the point to be soldered.
Selecting any of the **INCHING PITCH** buttons in the top screen will cause the robot to move only that amount when the JOY STICK is tilted once.
Use this to perform fine adjustment. The movement speed will be the speed set in the top screen’s **Position** area.



Tap **[Use Current Pos.]** on the end point side.
The coordinates can also be input by pressing the robot's **[Easy Input Switch]** button.

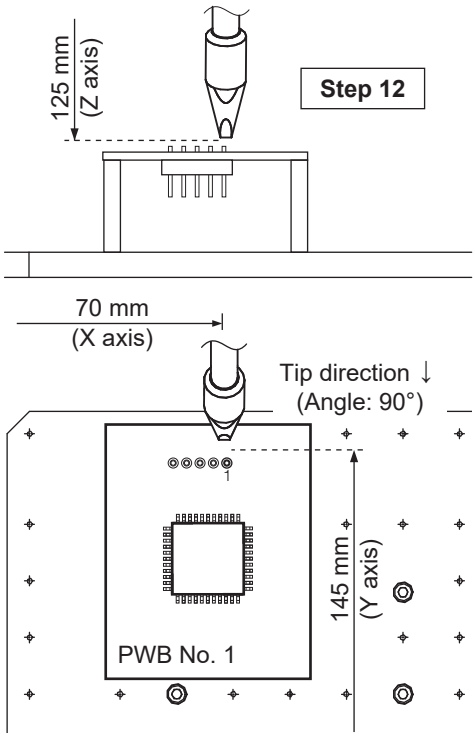
INPUT



11. This completes the input of the coordinates determined by the positioning operation in **Step 10** as the end point coordinates.

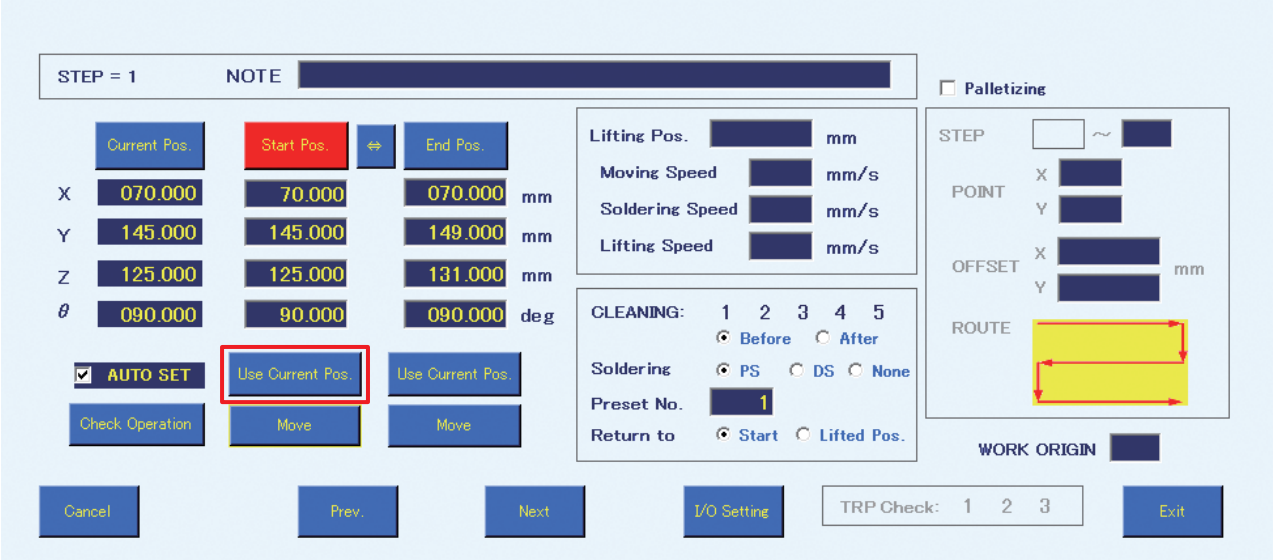
12. Determining the position of the start point coordinates for the 1st point will be performed.
(The start point coordinates for PS mode is the pre-soldering position).
To avoid deterioration of the flux or solder, pre-soldering should be set to a position as close as possible to the point to be soldered.

1) With the **Z axis absolute lift position** checkbox in the top screen still unchecked from when the end point coordinates were set, continue with fine adjustment.
2) Align the tip with the pre-soldering position.

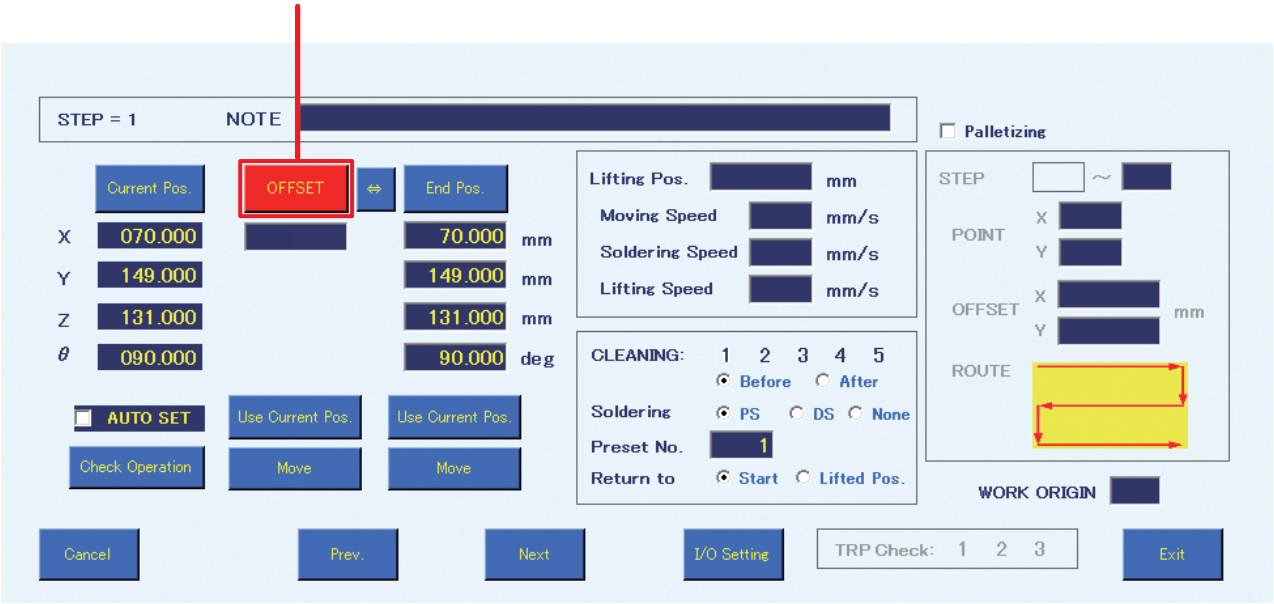


13. Tap **[Use Current Pos.]** on the start point side. In the same way as for setting the end point, input can also be performed using the robot's **[Easy Input Switch]** button.

14. This completes input of the coordinates determined by the positioning operation in **Step 12** as the start point coordinates.



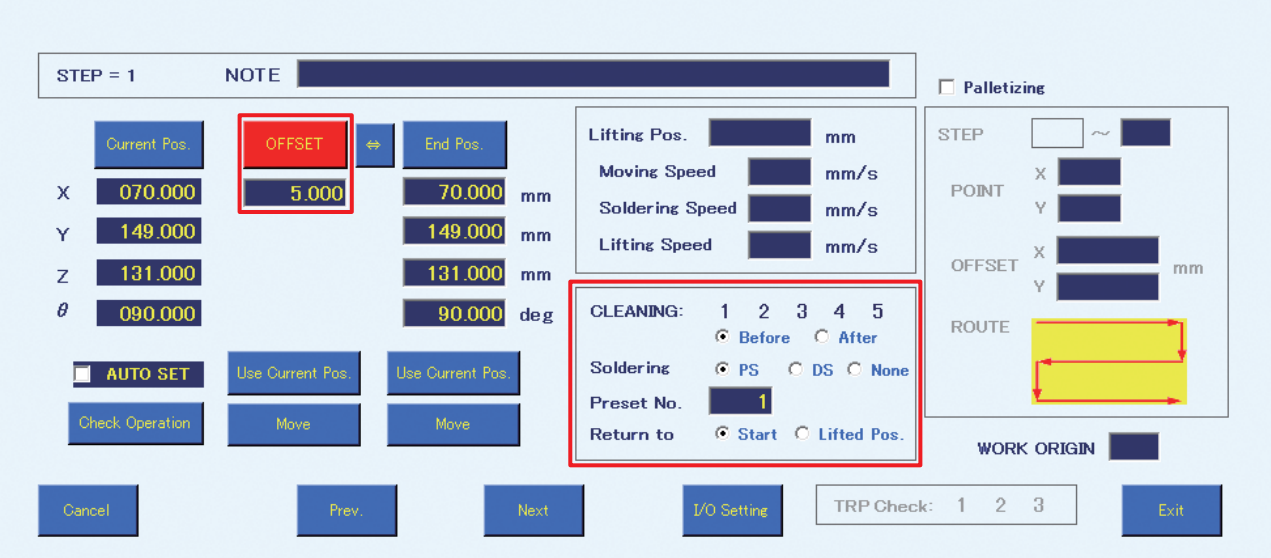
If the offset screen is shown, tap **[OFFSET]** to switch to **[Start Pos.]**.



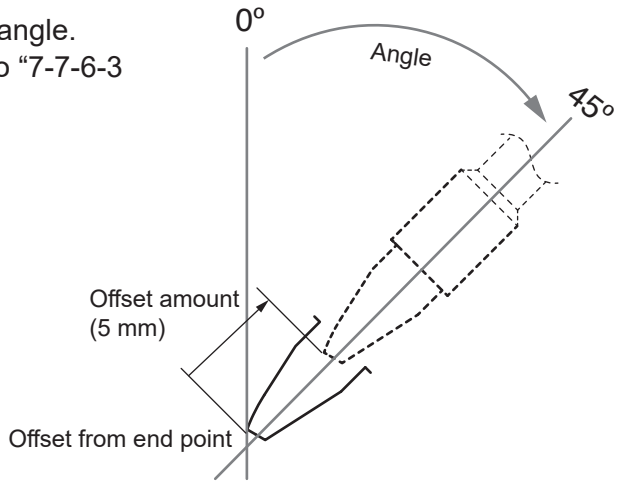
Another Way of Setting the Start Point: Offset

The offset amount is a function that enables setting the start point by inputting the value of the distance from the end point.

1. Tap **[Start Pos.]** so that the button display changes to **[OFFSET]**.
2. Determining the position of the end point coordinates will be performed.
   The coordinates set in “Setting the End Point and Start Point of the 1st Point (PS)” (p. 91) will be used as an example.
3. Input the value for the offset from the end point in **[OFFSET]**.
   Ex.) 5mm is input as the offset amount. The position shown in the diagram will be the start point.



The offset amount can be set according to the tip angle.
For information on how to set the tip angle, refer to “7-7-6-3 SOLDER HEAD ANGLE Function” (p. 139).

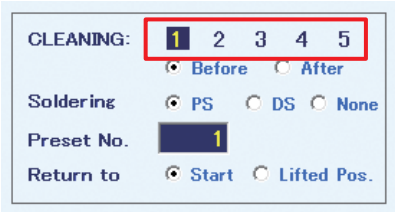


NOTE In the Point Edit Screen, the offset amount is the movement distance from the end point. If there are many nearby components and the tip might hit them, switch to coordinate input. In coordinate input mode, fine positioning can be set by inputting the X, Y, Z, and θ values.

⚠ CAUTION

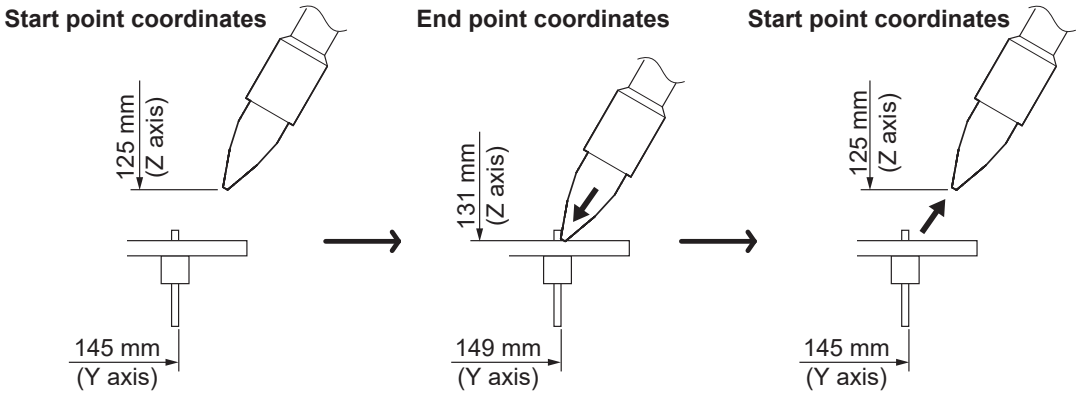
Offset can only be set for PS (point soldering) mode.

15. Select the CLEANING number and timing for performing cleaning.
A cleaning condition from **[1]** – **[5]** can be selected. The conditions can be set in the Cleaning Settings Screen.
The selected number will be highlighted. Tapping it again will cancel the selection. For the cleaning timing, before or after the point being edited can be selected.
If cleaning will not be performed, skip this process.

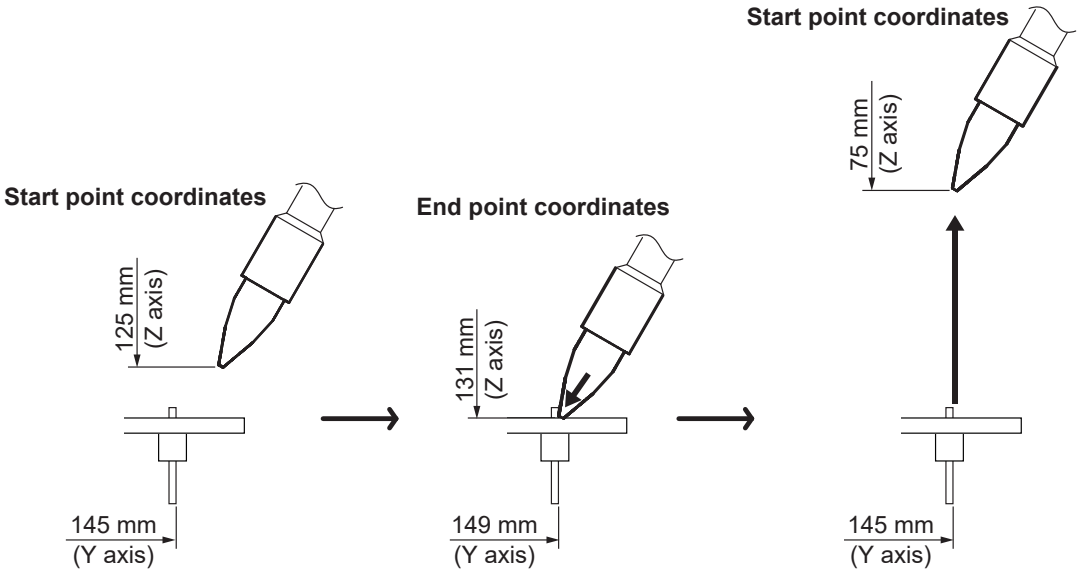


16. Select the soldering conditions (solder feed program number). (Input range: 1 – 250)
In this example, soldering condition 1 is selected. For details on soldering conditions settings, refer to “7-1-3 Soldering Conditions” (p. 64).

17. Set the destination after completion of soldering. Select settings for Return to.
Ex.) When the start point was selected
When the start point is selected, the tip will move to the start point coordinates after soldering has been completed.



Ex.) When the Z lift position was selected
When the Z lift position is selected, the tip will move to the Z axis lift coordinate in the top screen.



Ex.) When individual settings are performed

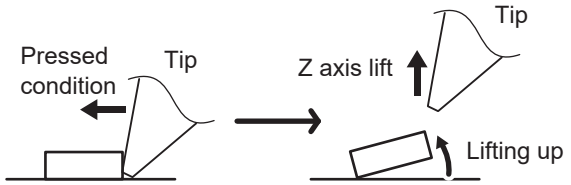
When a value is input for the Z lift position in the Point Edit Screen, Z axis lift will be performed to the coordinates input for that point in the Point Edit Screen.

When a value has been input for Z axis lift coordinate in the Point Edit Screen, that value will be given priority and Z axis lift will be performed to the input point.

In this example, the start point will be set.

⚠ CAUTION

- When the Z axis lift position checkbox in the top screen is unchecked, it may be dangerous because Z axis lift will not be performed. When a soldering program will be run, be sure that the Z axis lift position checkbox is checked.
- Since the tip presses against the point to be soldered, damage may be caused depending on the shape of the part. Select suitable Z axis lift and start point coordinates for the end point movement destination.



18. Set the **Lifting Pos.**, **Moving Speed**, **Soldering Speed**, and **Lifting Speed**. If values are not input, the values in the top screen will be applied. The values input here will have priority over the values in the top screen.

When values have been input for **Lifting Pos.**, **Moving Speed**, **Soldering Speed**, or **Lifting Speed** in the Point Edit Screen, the Point Edit Screen settings will have priority over the top screen settings. For details on the top screen settings, refer to “7-1-7 Settings” (p. 67).

Lift Pos.

This coordinate is set to avoid contact with the workpiece or jigs when moving horizontally.

Moving Speed

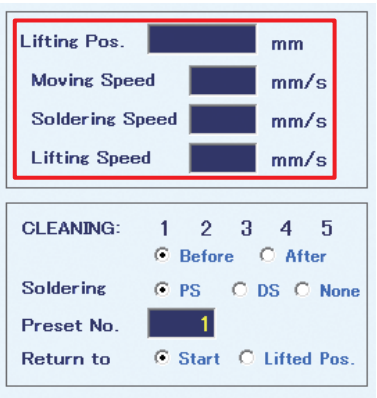
Sets the movement speed of each axis for movement between points while running a program.

Soldering Speed

Sets the solder movement speed between primary soldering and secondary soldering.

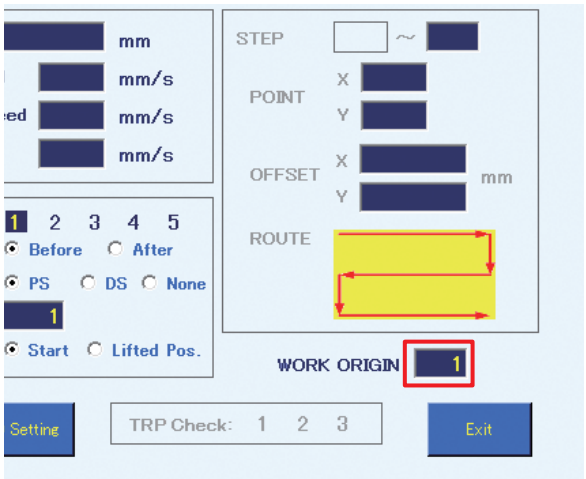
Lifting Speed

Sets the movement speed after soldering has been completed.



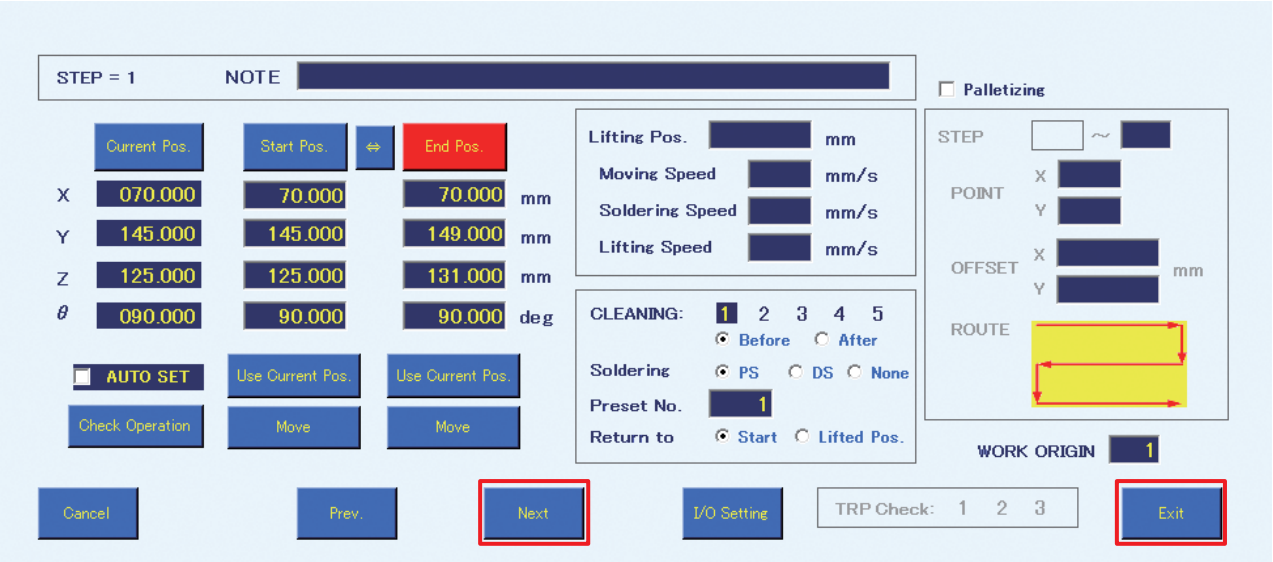
19. Set the **WORK ORIGIN**. In this example, 1 is input. If it is left blank, X=0.000, Y=0.000 will be used as the **WORK ORIGIN**.

For details on WORK ORIGIN, refer to “Using the WORK ORIGIN” (p. 105).



20. Tap **[Exit]** to finish the settings for the 1st point. To cancel settings, tap **[Cancel]**.
To continue with setting the next point, tap **[Next]**.

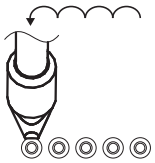
Settings for the 2nd to 5th points

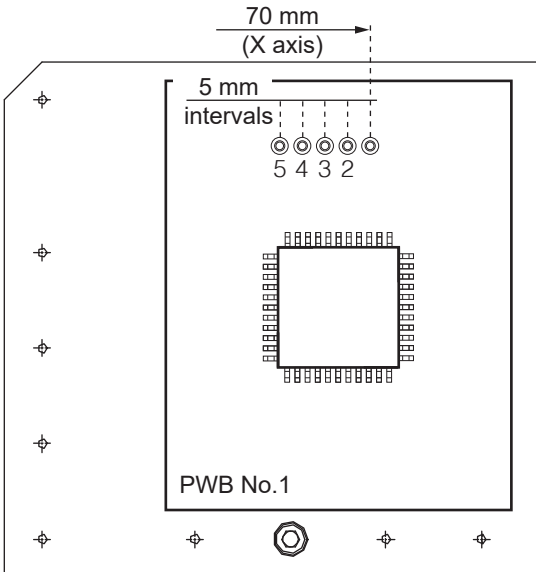


21. When the Point Edit Screen has been closed once, select STEP 1 in the Program Edit Screen and tap ⊞ to add a row. Then double-tap on the added row to edit STEP 2.
Create the soldering program for the 2nd to 5th points in the same way as for the 1st point.



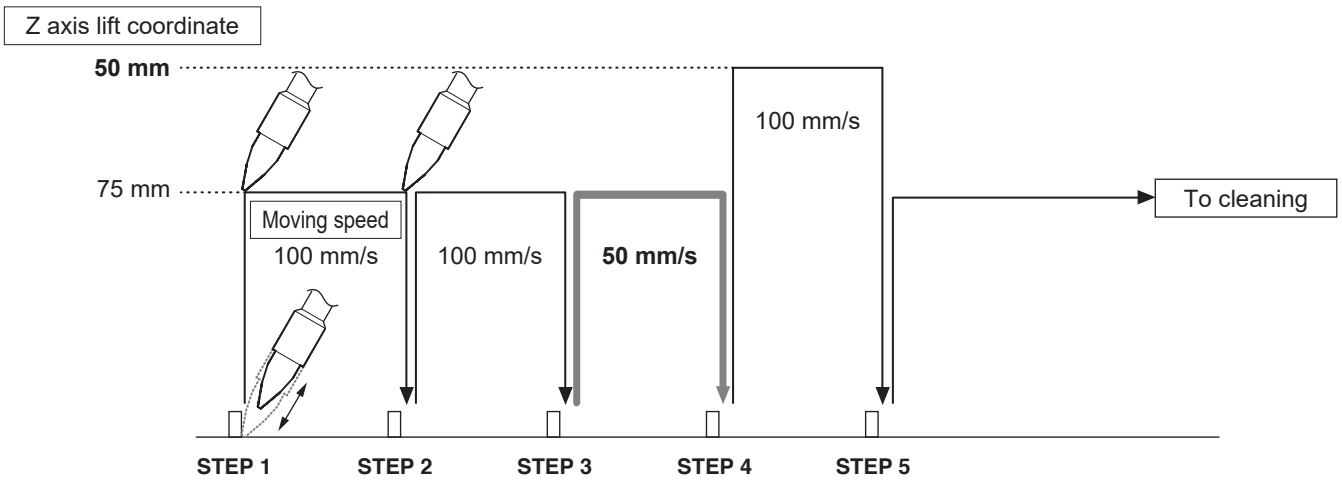
In this example, the movement speed for the 3rd point is set to 50 mm/sec., the Z axis lift coordinate for the 4th point is set to 50.000 mm, and brush cleaning is set to be performed after soldering of the 5th point. (The cleaning number is 1.)





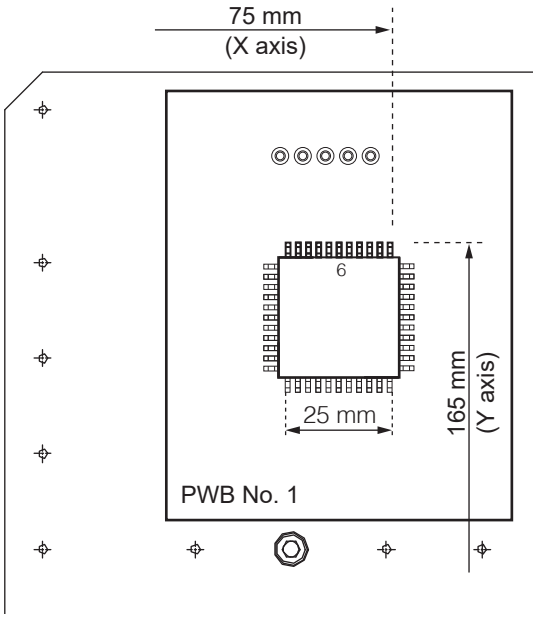
STEP	1	2	3	4	5
X0 Start point (mm)	70	65	60	55	50
Y0 Start point (mm)	145	145	145	145	145
Z0 Start point (mm)	125	125	125	125	125
θ0 Start point (°)	90	90	90	90	90
X1 End point (mm)	70	65	60	55	50
Y1 End point (mm)	149	149	149	149	149
Z1 End point (mm)	131	131	131	131	131
θ1 End point (°)	90	90	90	90	90
Moving speed (mm/s)*1	100	100	**50***2	100	100
Soldering speed (mm/s)*1	30	30	30	30	30
Soldering conditions	1	1	1	1	1
PS/DS	PS	PS	PS	PS	PS
WORK ORIGIN	1	1	1	1	1
Z lift position (mm)*1	75.000	75.000	75.000	**50.000***2	75.000
Cleaning number	**1**	—	—	—	**1**
Cleaning	**Previous**	—	—	—	**Next**

*1 If a value was not input in the Point Edit Screen, the top screen value will be shown.
*2 If a value was input in the Point Edit Screen, the Point Edit Screen value will be shown.



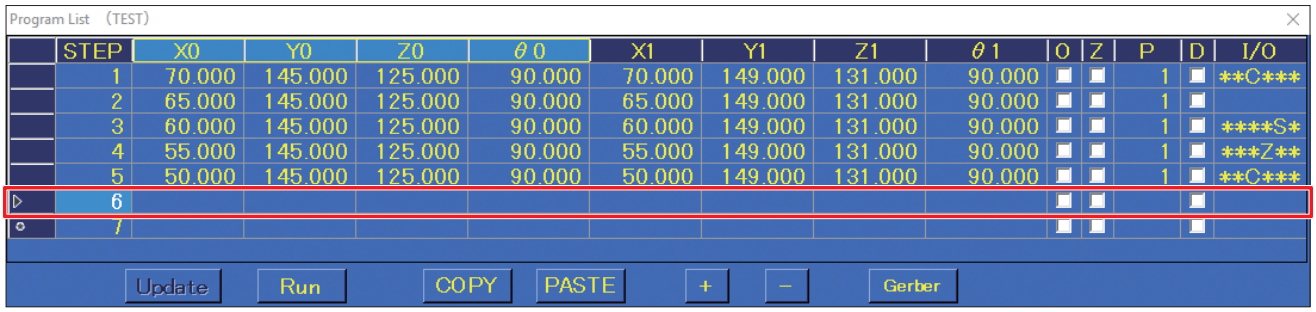
7-5-2 DS (Drag Soldering) Settings

Programs up to Program No. 5 have been completed by point soldering settings. Next, set the soldering program for Program No. 6 (for the 6th point, which is the 1st point for drag soldering).



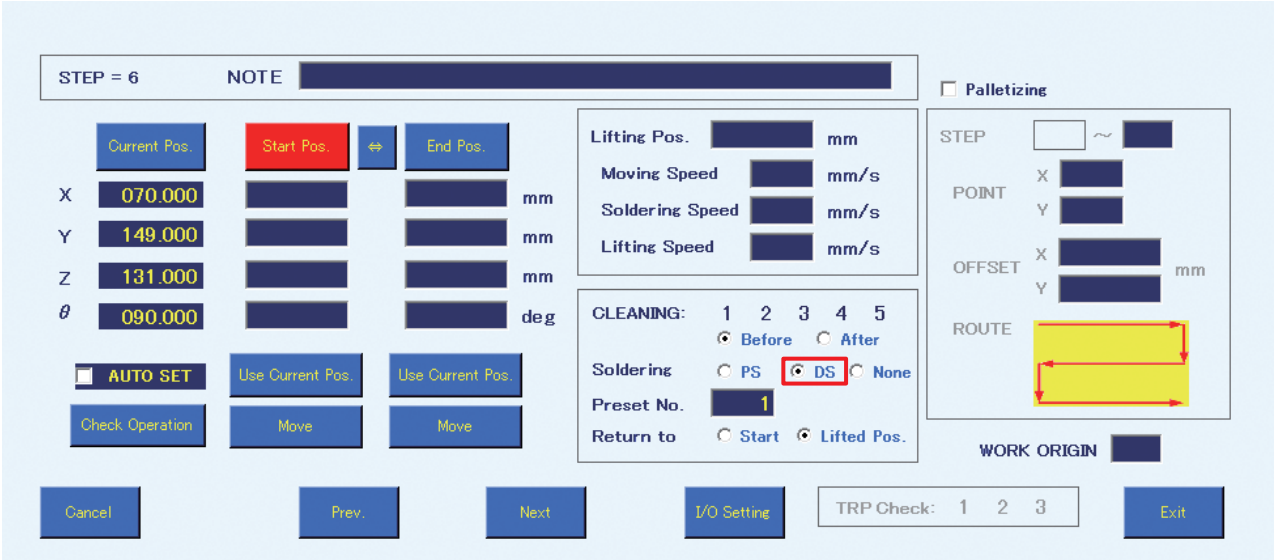
When continuing setting after PS settings, continue by performing settings from the Program Edit Screen.

1. Double-tap on **STEP 6**. The Point Edit Screen as shown in the diagram below will appear.



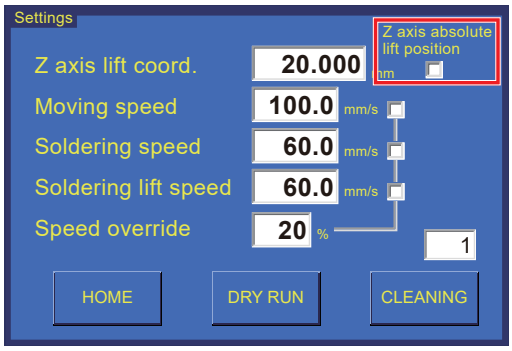
2. Input the name of the part to be soldered in the **NOTE** space.

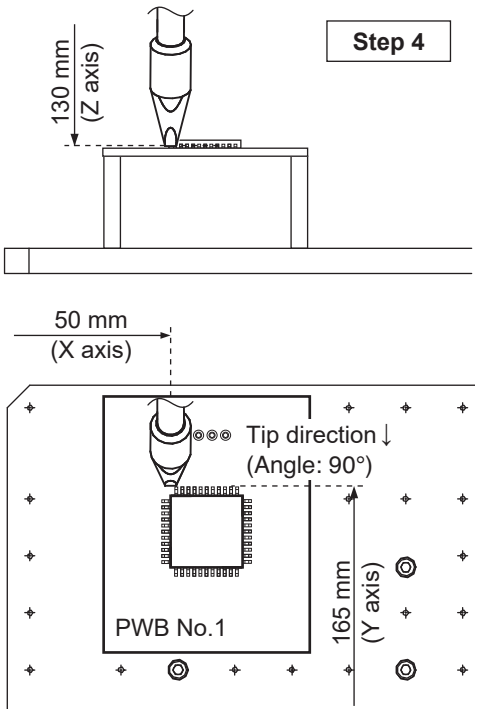
3. Select **DS** for the soldering mode. In DS mode, **[Start Pos.]** cannot be set using **[OFFSET]** mode.



4. Determining the start point coordinates of the 6th point will be performed.
(In DS mode, the start point coordinates will be the starting position of the drag soldering point.) Use JOG operation to move the tip to the drag soldering starting position on the workpiece (diagram at right), and align the soldering iron tip.

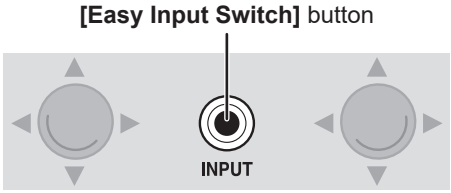
1) Move to the drag soldering starting position using the JOY STICKS or direct input of coordinates.
2) To perform fine adjustment such as determining the tip position, etc., uncheck **Z axis absolute lift position** in the top screen.
For details on Z axis lift behavior, refer to “7-2-2 Z Axis Lift” (p. 77).





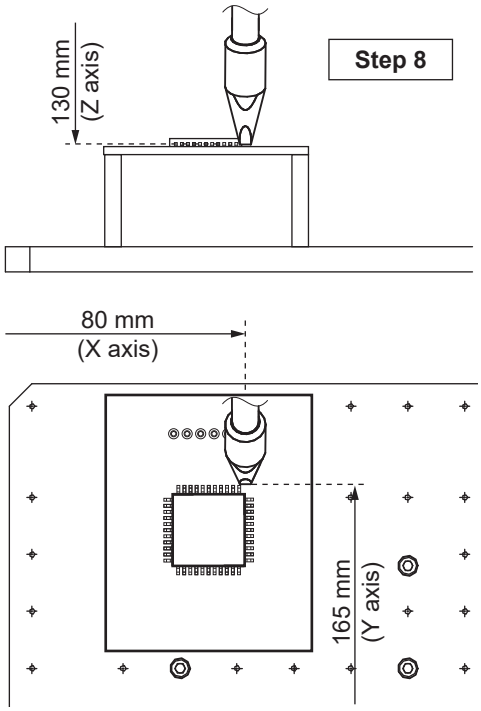
5. Perform fine adjustment using the top screen’s **INCHING PITCH** function, etc. to align the soldering iron tip with the point to be soldered.

6. Tap **[Use Current Pos.]** on the start point side (refer to the screenshot on the next page). When performing operations from the robot, press the **[Easy Input Switch]** button.



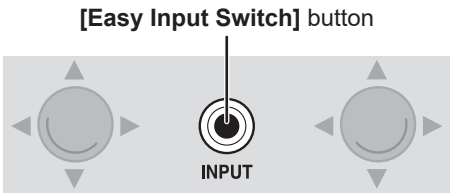
7. This completes input of the coordinates determined by the positioning operation in **Step 4** as the start point coordinates.

8. Determining the end point coordinates of the 6th point will be performed. In DS mode, the end point coordinates are the final position of the drag soldering point. Use JOG operation to align the soldering iron tip with the drag soldering end position on the workpiece.

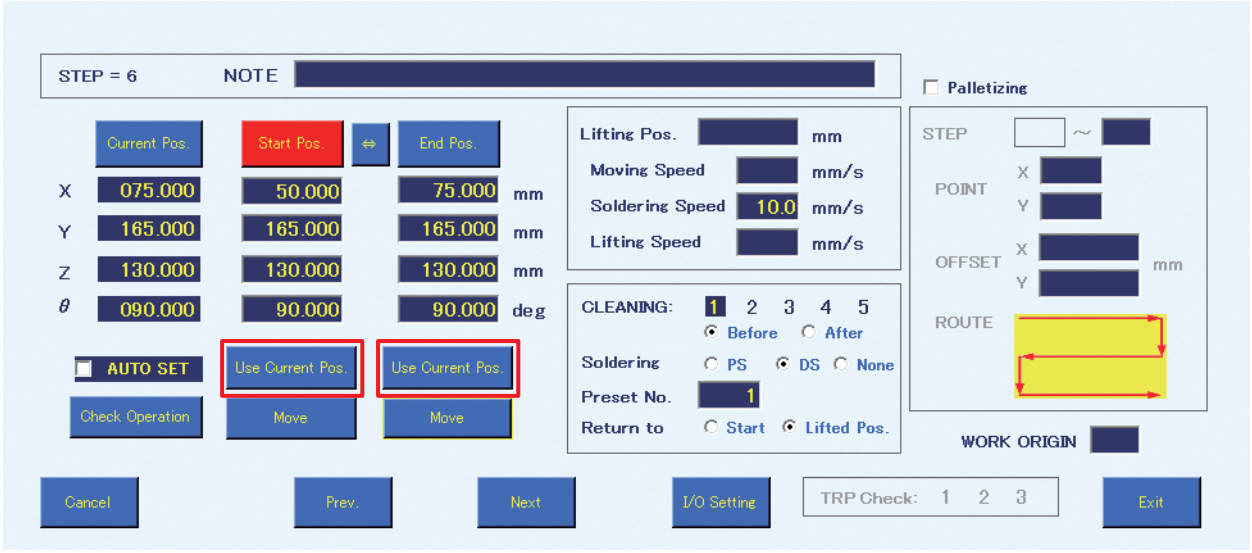


Use JOG operation to align the soldering iron tip with the soldering end position.
With the **Z axis absolute lift position** checkbox in the top screen still unchecked from when the end point coordinates were set, continue with fine adjustment.
Use JOG operation to align the soldering iron tip with the drag soldering end position.

9. Tap **[Use Current Pos.]** on the end point side (refer to the screenshot below). When performing operations from the robot, press the **[Easy Input Switch]** button.



10. This completes input of the coordinates determined by the positioning operation in **Step 6** as the end point coordinates.

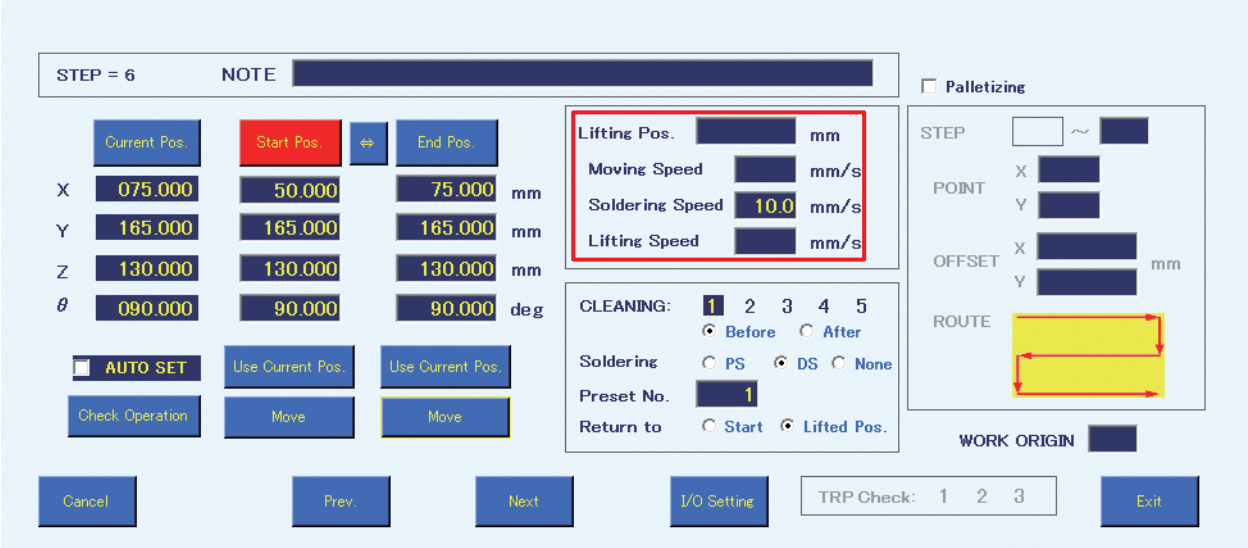


11. The CLEANING number and timing for performing cleaning will be selected in the same way as for “PS (point soldering) settings”. For DS (drag soldering) as well, cleaning will be set to be performed before soldering of the 6th point (refer to screenshot above).

12. Select the soldering conditions (solder feed program number). (Input range: 1 – 250)
In this example, soldering condition 1 is selected.
Unlike for point soldering, in drag soldering the Start Pos. corresponds to the start point.
The primary solder is performed at a point (the sky of the start point) where only the Z-axis coordinate of the origin became the Lifting Pos., and a solder is sent at forwarding speed set to a second solder.
If a condition in which the secondary feed length is set is selected for DS (drag soldering), that setting will be ignored.

13. When **DS** is selected for the **Soldering**, only **Lifting Pos.** will be selected for **Return to**, regardless of whether or not Z axis lift is checked. If **Lifting Pos.** in the Point Edit Screen is blank, movement will be to the top screen **Z axis lift coord.**.
For drag soldering, the value input for the **Z axis lift coord.** will be the primary solder feed position.

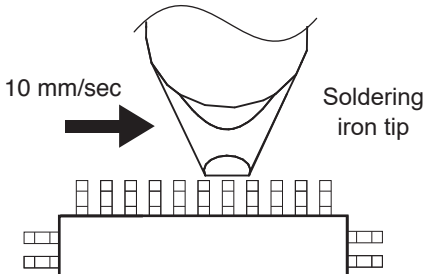
14. Set the **Lifting Pos.**, **Moving Speed**, **Soldering Speed**, and **Lifting Speed**. If values are not input, the values in the top screen will be applied. When values have been input for **Lifting Pos.**, **Moving Speed**, **Soldering Speed**, or **Lifting Speed** in the Point Edit Screen, the Point Edit Screen settings will have priority over the top screen settings (“7-1-7 Settings” (p. 67)).



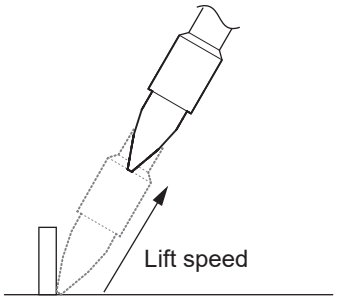
Lifting Pos.
This coordinate is set to avoid contact with protruding objects on the workpiece when moving horizontally.

Moving Speed
Sets the movement speed of each axis for movement between points.

Soldering Speed
Sets the solder movement speed between primary soldering and secondary soldering. The standard **Soldering speed** for drag soldering can be set as the soldering speed in the top screen. To change the drag soldering speed for each point, input values for **Soldering Speed** in the Point Edit Screen.
In this example, it is set to 10 mm/sec.



Lifting Speed
Sets the movement speed
after soldering has been completed.

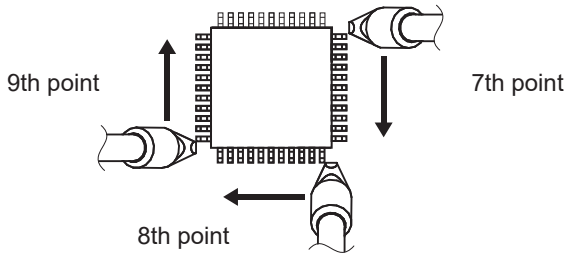


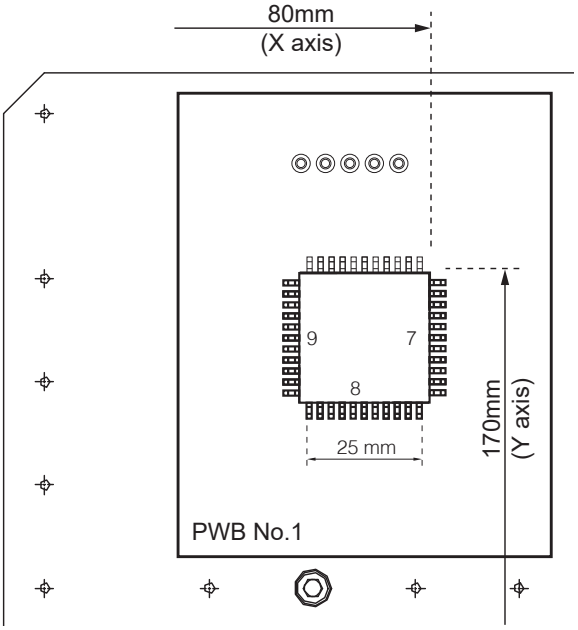
15. Set the **WORK ORIGIN**. In this example, 1 is input in the same way as for “PS (point soldering) settings”. For details on **WORK ORIGIN**, refer to “Using the WORK ORIGIN” (p. 105).

16. Tap **[Exit]** to finish 1 of the settings of the DS (drag soldering) settings for the 6th point.
To cancel settings, tap **[Cancel]**.

Settings (DS) for the 7th to 9th points

Create the soldering programs for the 7th to 9th points in the same way as for the 6th point.

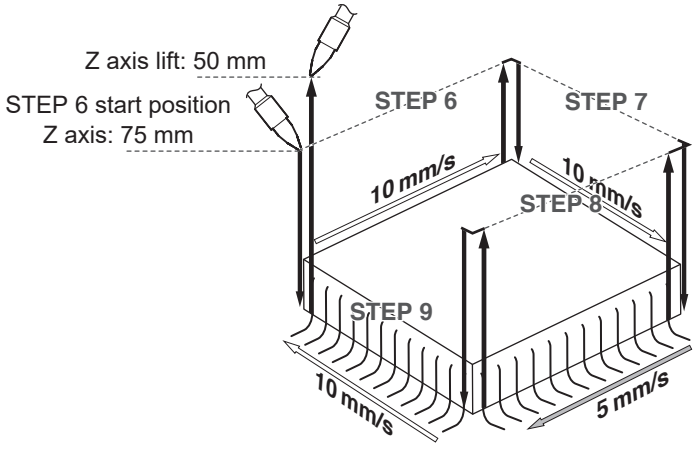




In this example, the soldering speed for the 8th point is set to 5 mm/sec., the Z axis lift coordinate for the 9th point is set to 50.000 mm, and brush cleaning is set to be performed after soldering of the 9th point. (The cleaning number is set to 1.)

STEP	6	7	8	9
X0 Start point (mm)	50	80	75	45
Y0 Start point (mm)	165	170	200	195
Z0 Start point (mm)	130	130	130	130
θ0 Start point (°)	90	0	–90	–180
X1 End point (mm)	75	80	50	45
Y1 End point (mm)	165	195	200	170
Z1 End point (mm)	130	130	130	130
θ1 End point (°)	90	0	–90	–180
Moving speed (mm/s)*1	100	100	100	100
Soldering speed (mm/s)*1	**10***2	**10***2	**5***2	**10***2
Soldering conditions	1	1	1	1
PS/DS	DS	DS	DS	DS
WORK ORIGIN	1	1	1	1
Z lift position (mm)*1	75.000	75.000	75.000	**50.000***2
Cleaning number	**1**	—	—	**1**
Cleaning	**Previous**	—	—	**Next**

*1 If a value was not input in the Point Edit Screen, the top screen value will be used.
*2 If a value was input in the Point Edit Screen, the Point Edit Screen value will be used.



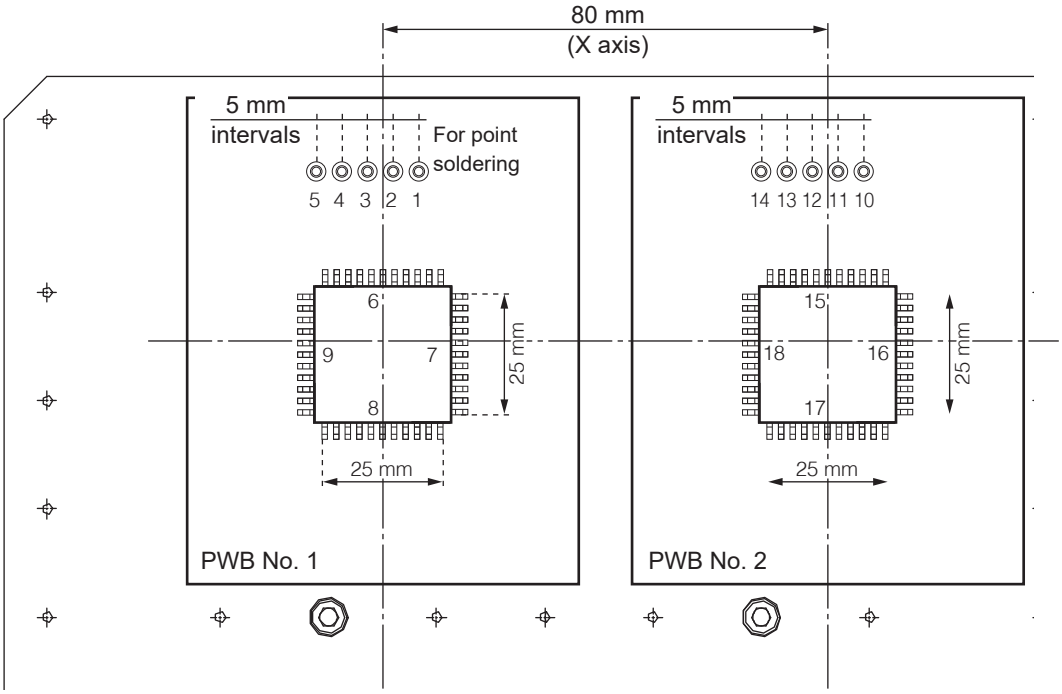
7-5-3 Copying Soldering Programs

When the same soldering program will be applied to multiple PWB's.

Using the WORK ORIGIN

The same soldering program can be run for multiple PWBs using the robot's work origin as the standard point.

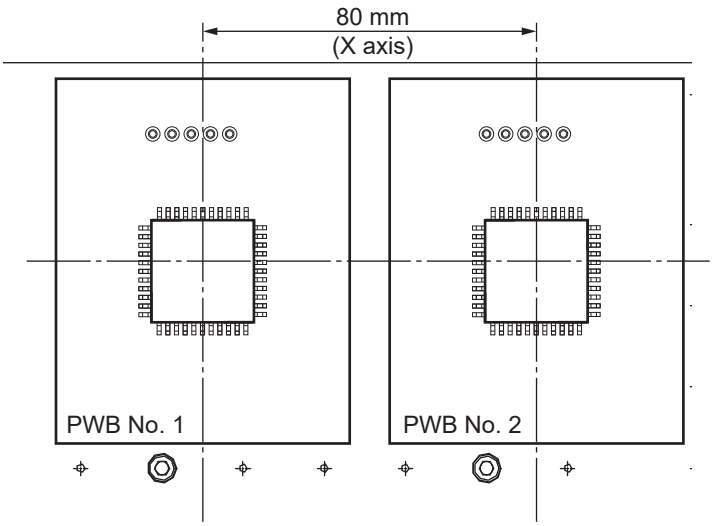
When 2 of the same PWBs are lined up as shown in the diagram below, the soldering program for PWB No. 1 will be applied for PWB No. 2.



1. Set the work origins. For PWB No. 1, the work origin is 1 (X coordinate: 0, Y coordinate: 0).

Work Origin		
No.	X	Y
1	0.000	0.000
2	0.000	0.000
3	0.000	0.000
4	0.000	0.000
5	0.000	0.000
6	0.000	0.000
7	0.000	0.000
8	0.000	0.000
9	0.000	0.000
10	0.000	0.000
11	0.000	0.000
12	0.000	0.000
13	0.000	0.000
14	0.000	0.000
15	0.000	0.000
16	0.000	0.000
17	0.000	0.000
18	0.000	0.000
19	0.000	0.000
20	0.000	0.000

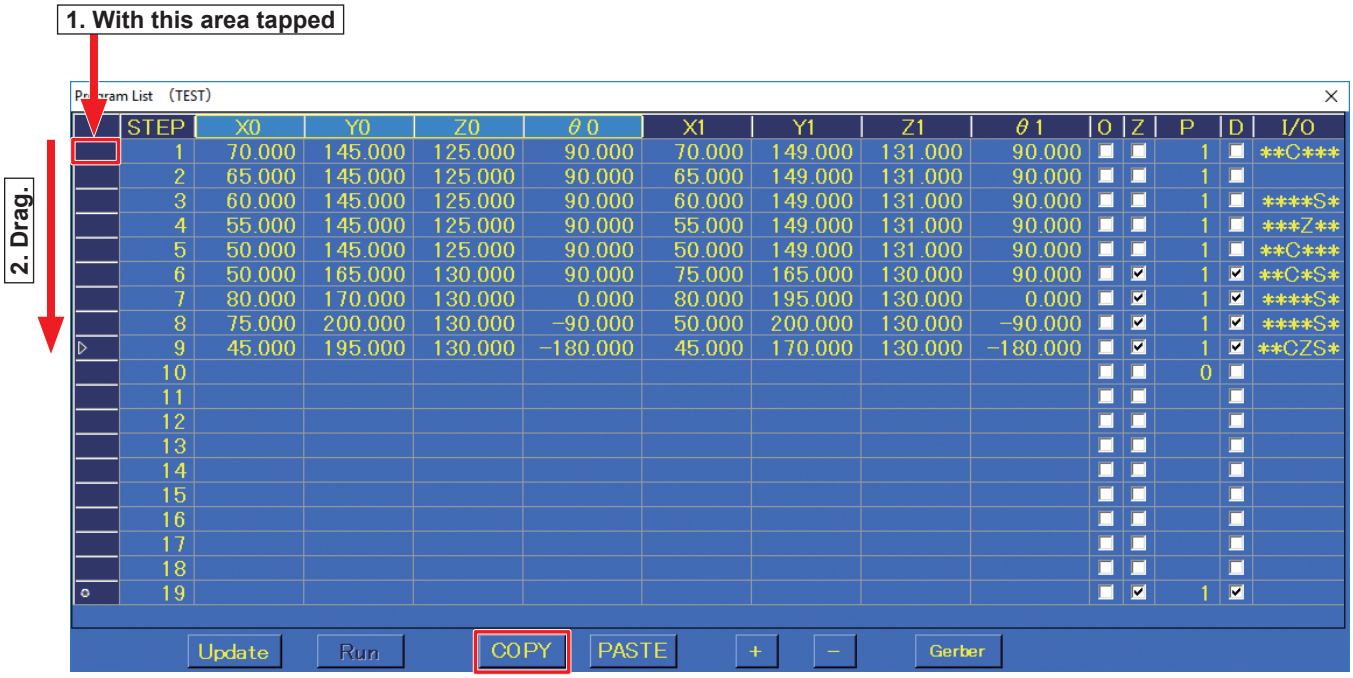
2. The distance between PWB No. 1 and PWB No. 2 is 80 mm in the X axis direction and 0mm in the Y axis direction. These values will be input as work origin 2.



Work Origin		
No.	X	Y
1	0.000	0.000
2	80.000	0.000
3	0.000	0.000
4	0.000	0.000
5	0.000	0.000
6	0.000	0.000
7	0.000	0.000
8	0.000	0.000
9	0.000	0.000
10	0.000	0.000
11	0.000	0.000
12	0.000	0.000
13	0.000	0.000
14	0.000	0.000
15	0.000	0.000
16	0.000	0.000
17	0.000	0.000
18	0.000	0.000
19	0.000	0.000
20	0.000	0.000

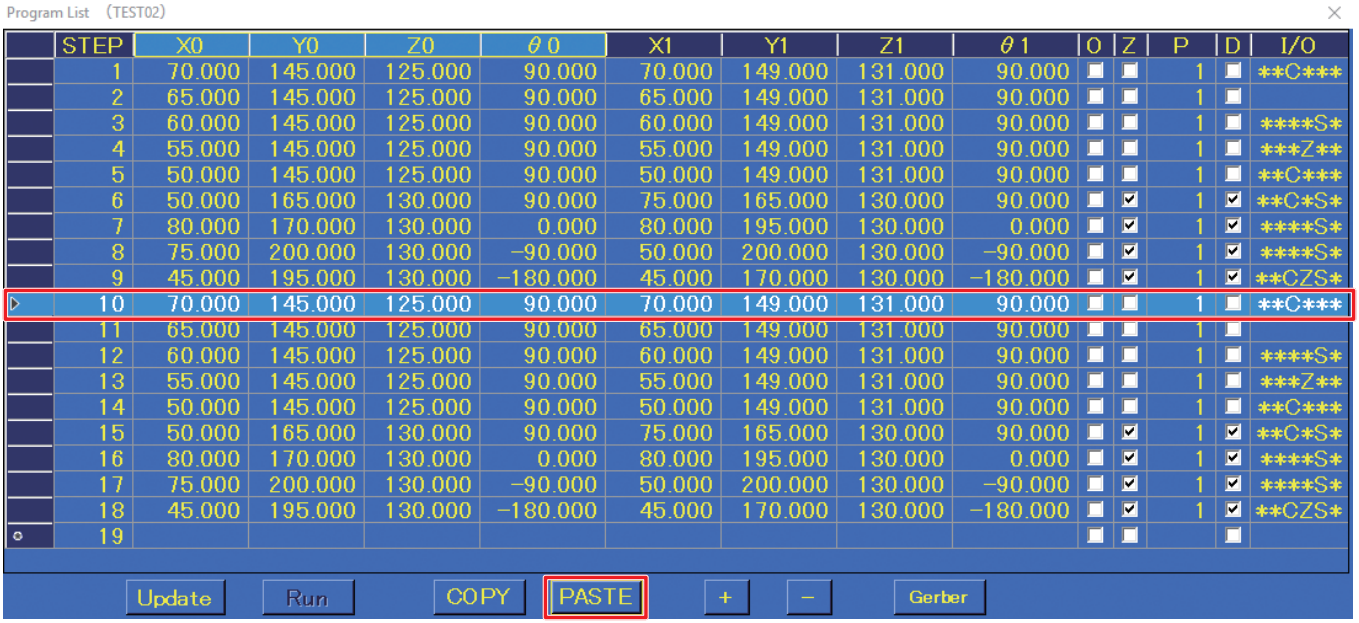
3. Select rows 1 to 9. (Tap and drag to select down to row 9.)

4. Tap **[COPY]**.

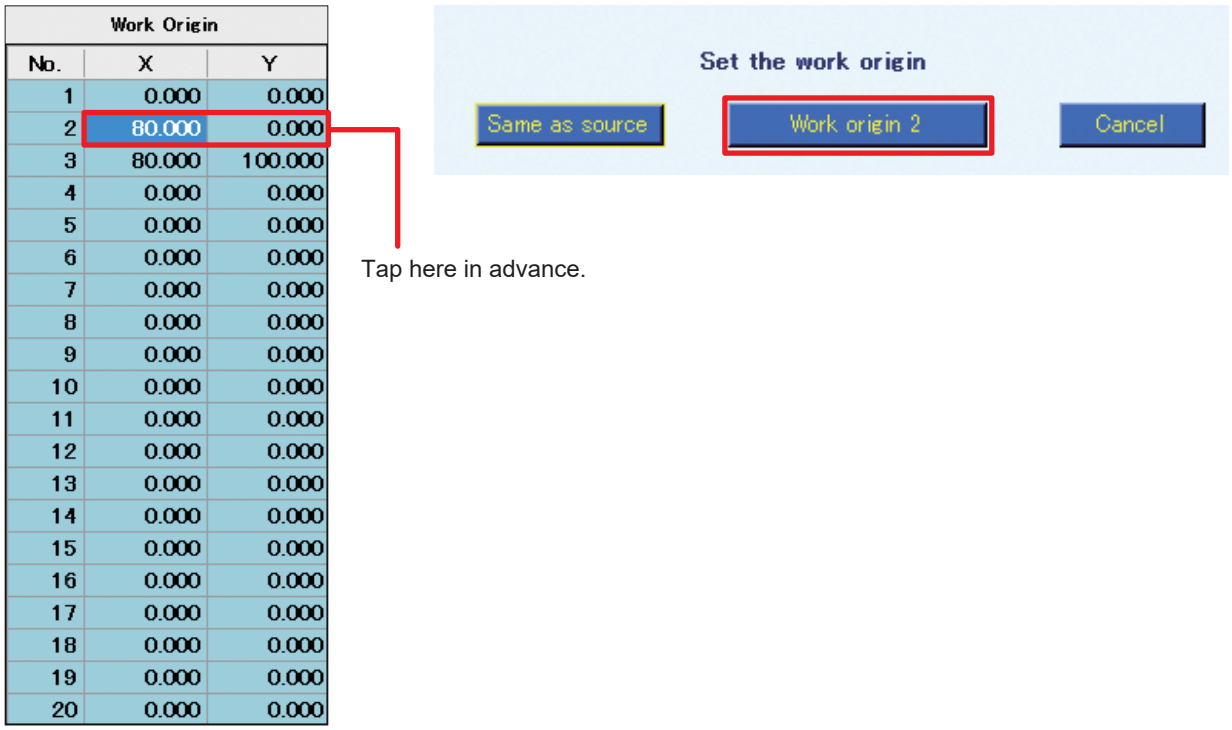


5. Tap row 10.

6. Tap **[PASTE]**.



7. Tapping on the values in the work origin screen and tapping **[Work origin 2]** which will be used this time will complete the copying process.
The copied data will use the selected origin point.



8. This completes the soldering program settings for sample PWBs No. 1 and No. 2.

7-5-4 None (PWB Removal Position) Settings

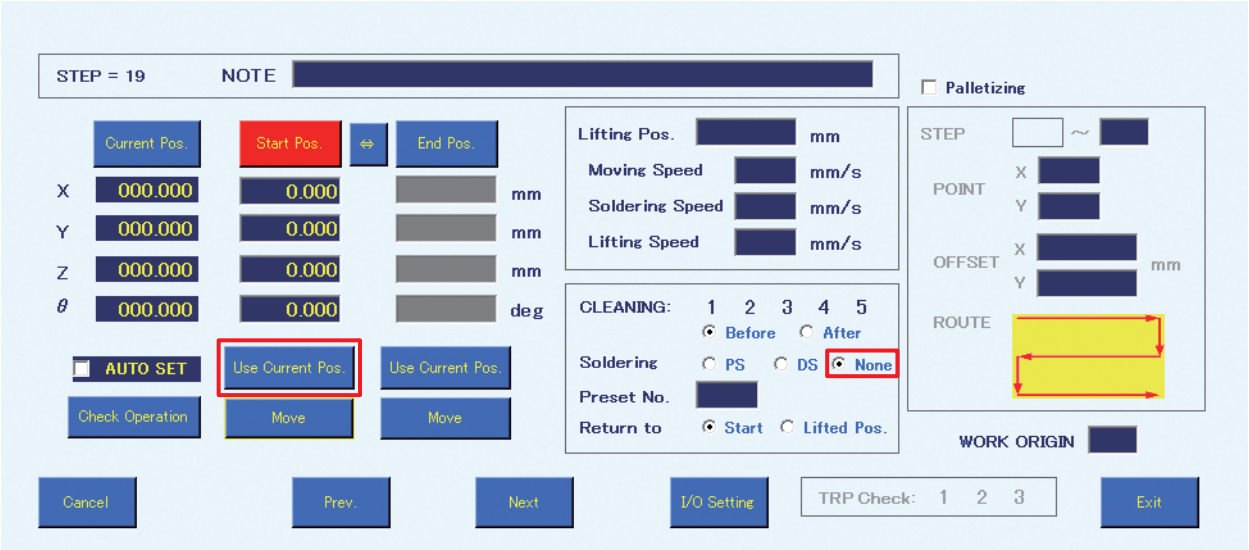
Settings to move the jig table out in front for removing the PWB will be performed.
For safe removal, the settings in this example will return all axes to their origin points.

1. Select row 19 and tap [+].

2. The Point Edit Screen for row 19 will open.

3. Set the soldering mode to **None**.

4. Determining the coordinates for removing the PWB will be performed.
   Use the JOY STICKS to move the PWB to the removal position. (The coordinates can also be input directly without moving the PWB.) In this example, the **[Start Pos.]** X, Y, Z and θ values will be set as shown in the diagram below.



5. Tap **[Use Current Pos.]**.

6. This completes input of the PWB removal position. (When the soldering mode is set to **None**, input of soldering conditions is not necessary.)

7. Tap **[Exit]** to complete the settings for **None** (PWB removal position). To cancel settings, tap **[Cancel]**.

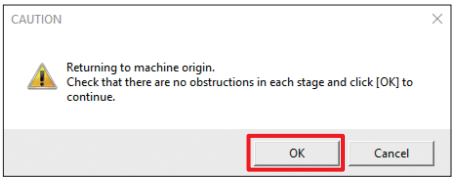
This completes creation of the soldering program for sample PWBs No.1 and No.2 from point soldering to drag soldering and PWB removal.

7-6 Running a Program

7-6-1 Calling up and Running a Program

First, check that all equipment is connected properly, and that the power is switched on. For connection details, refer to “5. Installation” (p. 19). Start HAKKO SOLDERING SYSTEM2.

1. Tap **[HOME]** in the top screen to return the robot to the origin.
   A confirmation dialog will appear. Tap **[OK]**.

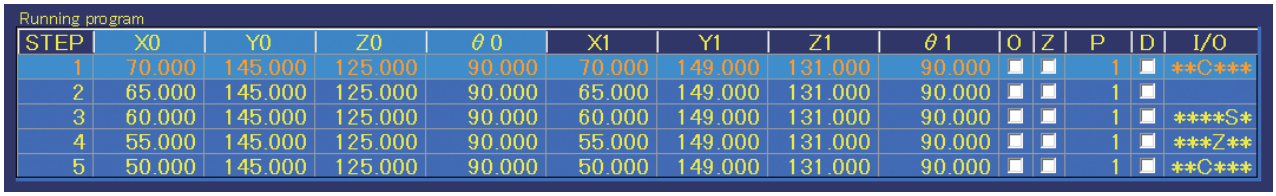


⚠ CAUTION

When the θ axis rotates while returning to the origin, there is a danger of cables wrapping around the robot. If it seems like there is a danger of cables wrapping around, press the emergency stop button immediately, turn the θ axis slightly counterclockwise from the origin (0°) when viewed from above the soldering unit fixture base, and then tap **[HOME]** again.

2. Tap **[Program]** in the top screen. The Program List Screen will open.
3. Select the program to be run, open the Program Edit Screen, and tap **[Run]**.

NOTE When a program is read, a check of whether or not the speed and coordinate settings of the selected program are within the settable range will be performed. If a value is outside the settable range, the program will not be read. Judgement of whether or not values are within range include the values for offset, palletizing, and tip correction.



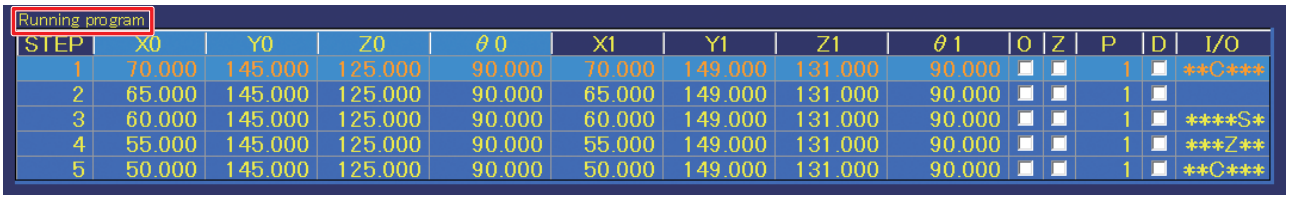
STEP	X0	Y0	Z0	θ0	X1	Y1	Z1	θ1	O	Z	P	D	I/O
1	70.000	145.000	125.000	90.000	70.000	149.000	131.000	90.000	☐	☐	1	☐	**C***
2	65.000	145.000	125.000	90.000	65.000	149.000	131.000	90.000	☐	☐	1	☐	
3	60.000	145.000	125.000	90.000	60.000	149.000	131.000	90.000	☐	☐	1	☐	****S*
4	55.000	145.000	125.000	90.000	55.000	149.000	131.000	90.000	☐	☐	1	☐	***Z**
5	50.000	145.000	125.000	90.000	50.000	149.000	131.000	90.000	☐	☐	1	☐	**C***

A maximum of 5 rows of the program which was called up will be shown.
While the program is running, the screen will automatically scroll with the point currently being executed.
STEP: Shows the consecutive number of the point
X0, Y0, Z0, θ0: Shows the start point coordinates of the point
X1, Y1, Z1, θ1: Shows the end point coordinates of the point

O: Checked when the start point is offset.
Z: Checked when **Return to** is set to Z lift position.
When not checked, **Return to** will be the start point.
P: Shows the solder feed program number.
D: Checked when the soldering mode is DS mode.
I/O: Shows indications for when I/O settings or individual point settings have been set. If all settings have been set, “**IOCZSP**” will be shown. If no setting has been made for the corresponding section, the character for that section will be replaced by “*”.
I: Input setting
O: Output setting
C: Cleaning setting
Z: Individual point Z axis lift setting
S: Individual point speed setting
P: Palletizing setting

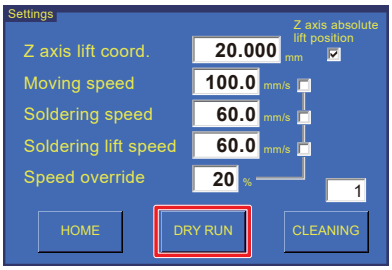
Display of the top screen running program section

While a soldering program is being run, the section for displaying **Running program** during waiting is shown as follows:

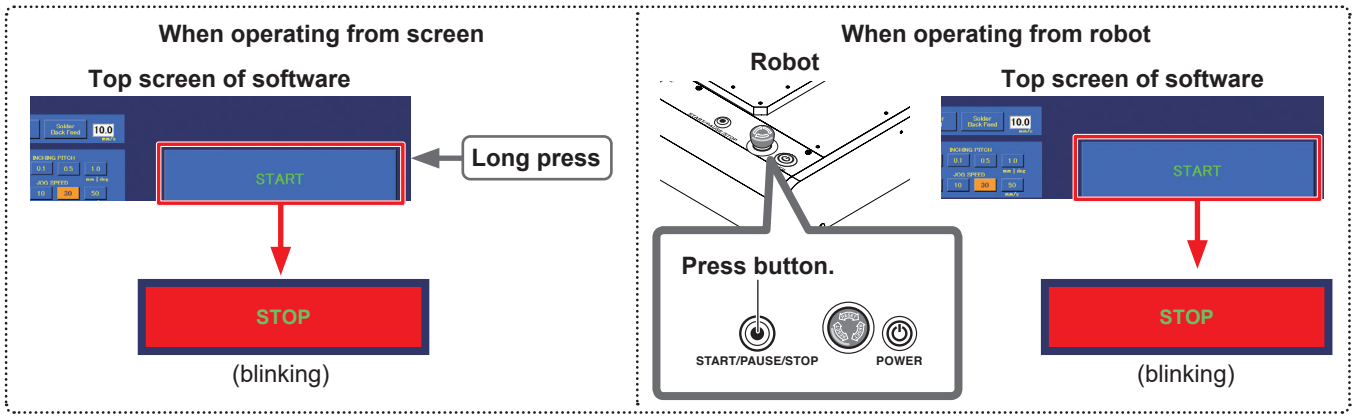


Displayed information	Displayed status
Cleaning tip	Moving to end point after moving to cleaning coordinates.
Moving to start point	Moving from previous point to start point.
Waiting for command to lower tip	When there is an input setting.
Moving to soldering point	Moving from start point to end point
Waiting for soldering completion	Waiting for completion of solder feed (after primary heating)
Soldering completed. Returning to start point	After completion of soldering, moving from end point to start point.
Waiting for soldering READY	Waiting for station Ready signal.
Moving to drag soldering position	Moving from drag soldering start point to end point

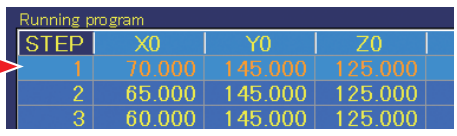
4. Tap **[DRY RUN]** in the top screen to check positions.
By performing only the robot motion of the selected program without adjusting the soldering iron temperature or performing solder feed, the soldering positions of the program can be checked.
COUNT DOWN in the top screen (refer to diagram at right) is also performed when using **[DRY RUN]**.
To exclude **[DRY RUN]** from the count, check PAUSE.
For details on COUNT DOWN, refer to “7-1-5 Work Information” (p. 66).



5. Long-pressing **[START]** will run the program. The button will become red, and the display will change to a blinking **[STOP]**. The program can also be run using the robot’s **[START/PAUSE/STOP]** button or start input from I/O.
For details on screen operation or robot operation while a program is running, refer to “7-1-11-1 Flowchart (Screen Button Operation)” (p. 71) or “7-1-11-2 Flowchart (Robot Button Operation)” (p. 72).



6. Screen highlighting of the running program rows will move together with the progress of the running program.
When the entire program has been completed, the screen highlight will return to the first row.



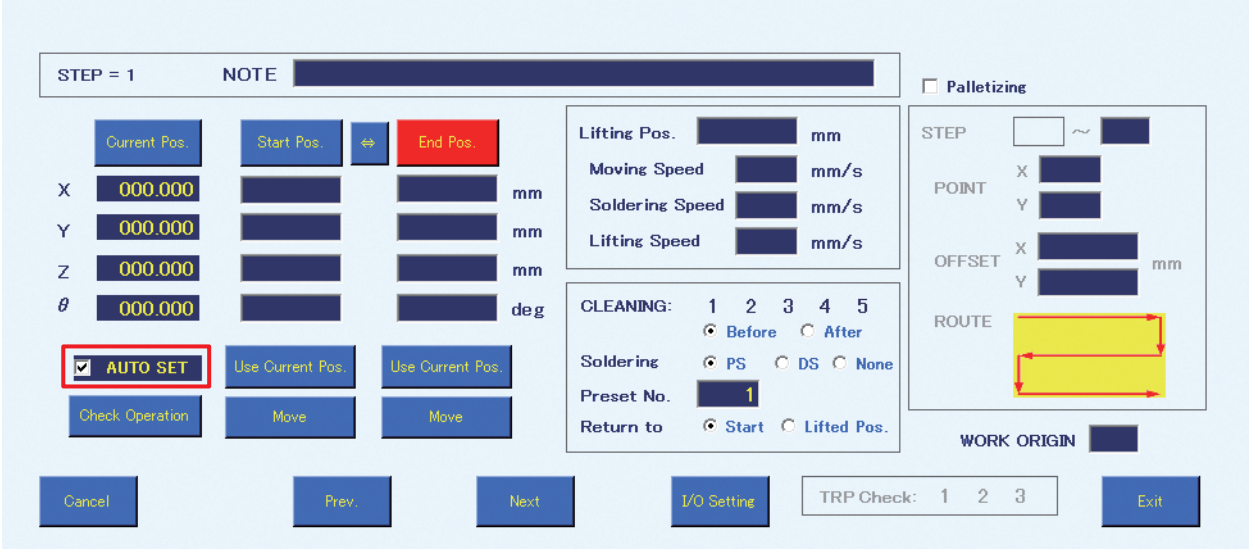
7-7 Performing Detailed Settings

There are several functions for performing detailed settings.
By using these functions, more detailed soldering program settings can be performed.

7-7-1 Other Inputting Methods of Coordinates

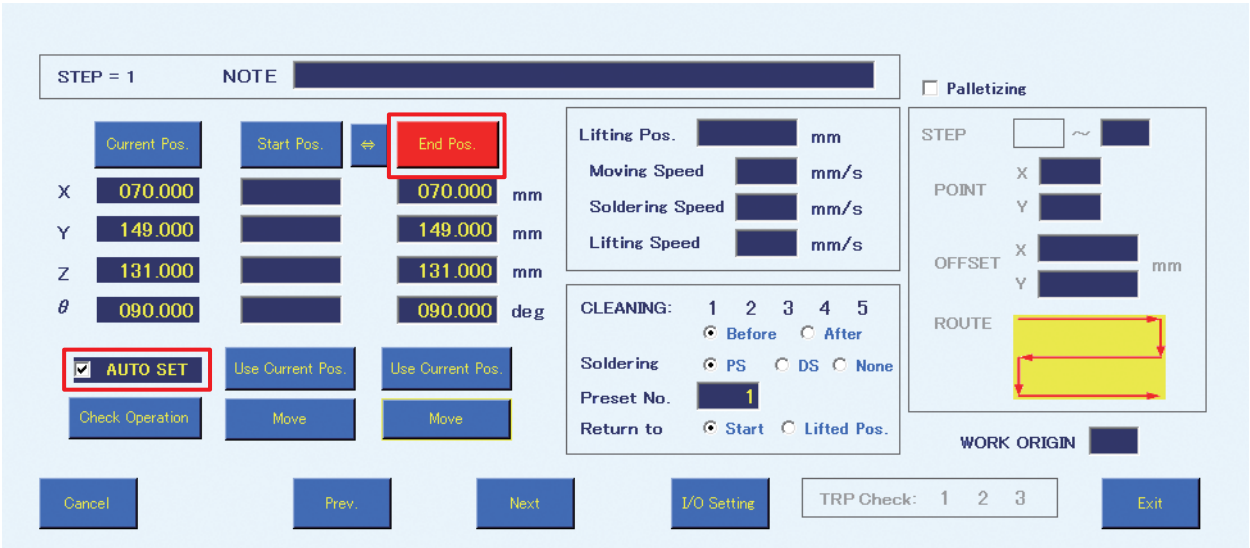
7-7-1-1 Using “AUTO SET”

When **AUTO SET** in the Point Edit Screen is checked, input can be performed easily using the robot’s **[Easy Input Switch]** button without using **[Use Current Pos.]**.
Each time the **[Easy Input Switch]** button is pressed, the input position switches automatically from End point → Start point → End point of next point.
In **DS** mode, the input position switches from Start point → End point → Start point of next point.
For **None**, the input position switches from Start point → Start point of next point.



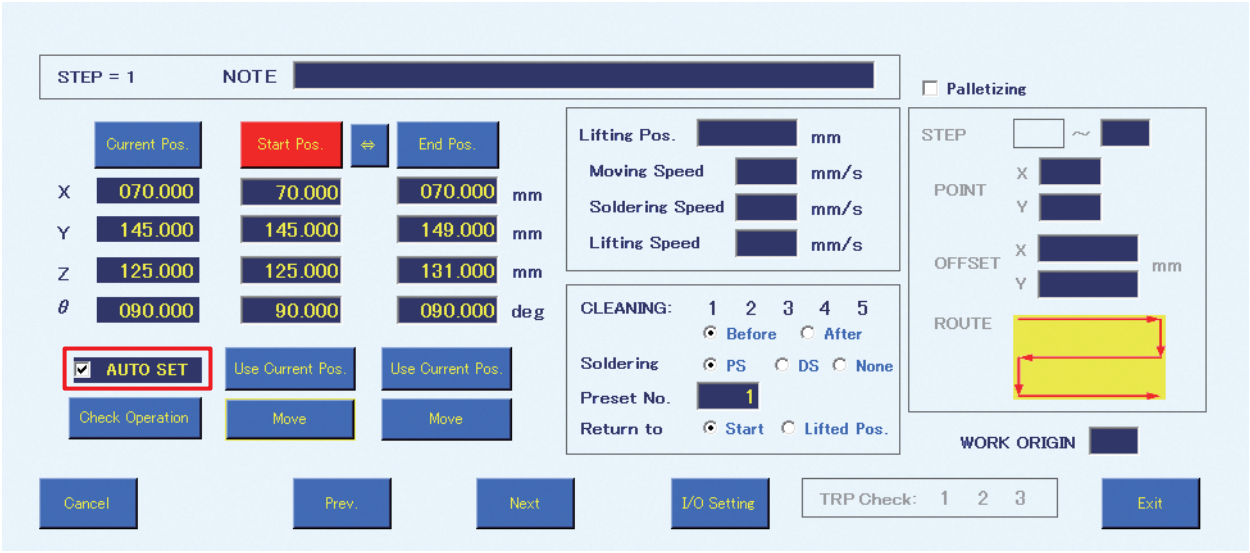
1. Check the **AUTO SET** checkbox.

2. Use the JOY STICKS to align the tip with the end point position.



3. When the robot's **[Easy Input Switch]** button is pressed, input of the coordinates determined by the operation in **Step 2** as the end point coordinates will be completed.
The input position will automatically change to the start point side. Use the JOY STICKS to align the tip with the start point position.

4. When the robot's **[Easy Input Switch]** button is pressed, input of the coordinates determined by the operation in **Step 3** as the start point coordinates will be completed. The input position will automatically switch to the end point of the next point.



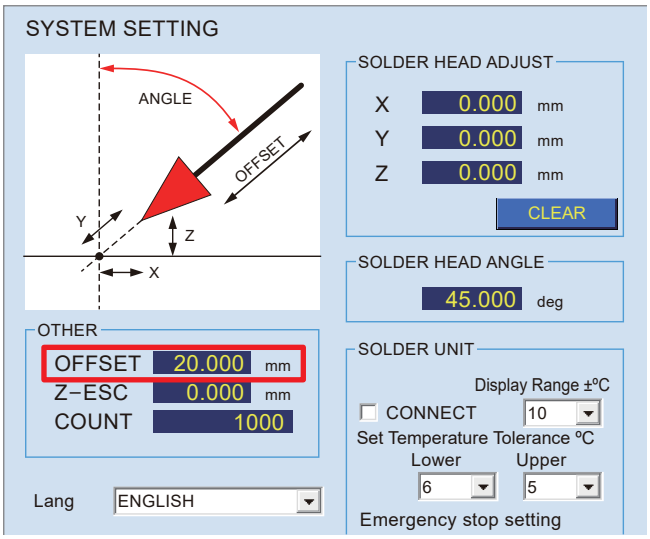
Inputting the Start Point Offset Value Using AUTO SET

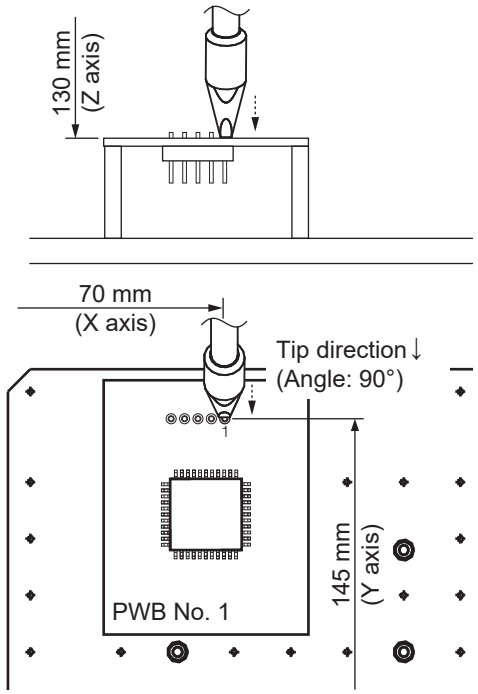
In the screen for setting the start point offset amount, check AUTO SET.



1. Check **AUTO SET**.

2. Use the JOY STICKS to align the tip with the end point position.





3. When the robot's **[Easy Input Switch]** button is pressed, input of the coordinates determined by the operation in step 2 as the end point coordinates and input of the offset amount will be completed. The input position will automatically change to the next point.

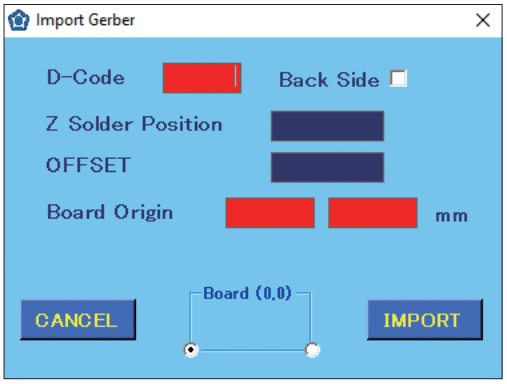
NOTE The offset amount will automatically be input as the value set for **OFFSET** in the **OTHER** section of the System Settings Screen. (Refer to the screenshot above.) To set the offset amount individually for each point, input the value in the offset space before pressing the **[Easy Input Switch]** button.

7-7-1-2 Using Gerber Data

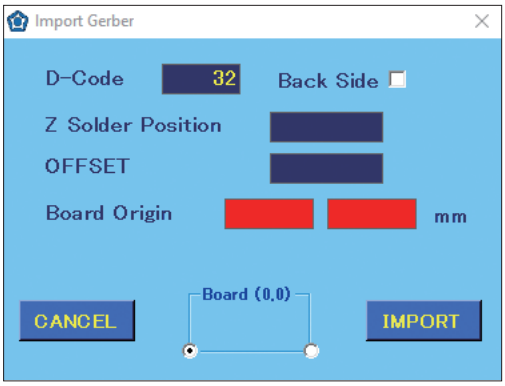
If the Gerber data for the PWB is available, input of coordinates can be performed using the Gerber data. Gerber data can be used only for PS (point soldering) mode.



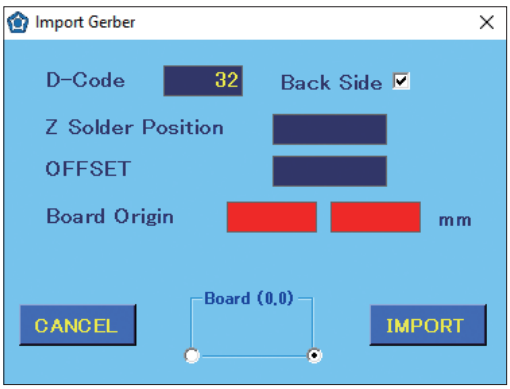
1. Select the row to import data into in the Program Edit Screen, and tap **[Gerber]** to open the Import Gerber Data Screen.



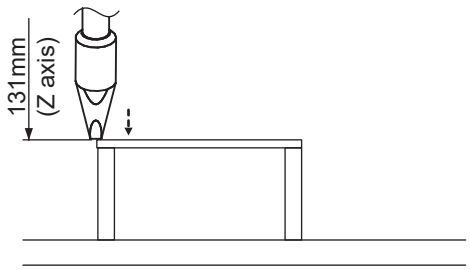
2. Specify the D-code No. of the aperture on the PWB for the layer to be soldered.

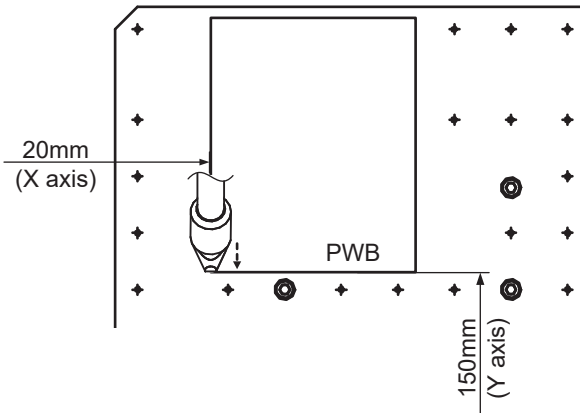


3. When BackSide is not checked, the front side of the PWB is specified; when **Back Side** is checked, the back side of the PWB is specified. For soldering to the PWB backside such as for throughholes, etc., check **Back Side**. The PWB standard point (0.0) is different when the PWB front side is set than when the PWB back side is set.

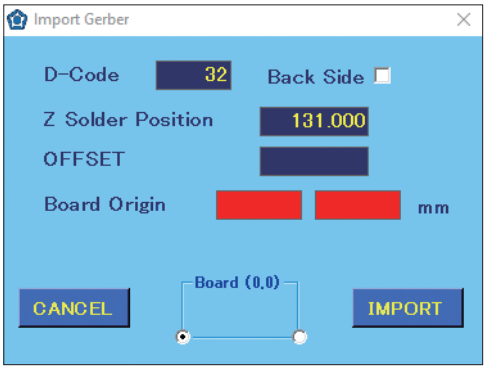


4. Use the JOY STICKS to align the tip with the PWB's standard point (0.0) and then with the height of the soldering position. For the front surface, align with the front surface's standard point; for the back surface, align with the back surface's standard point.

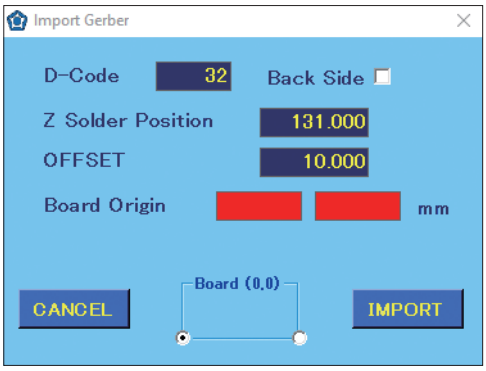




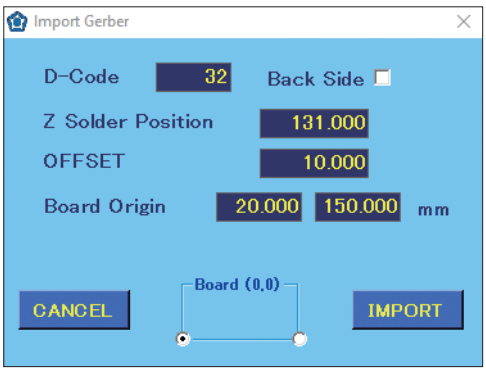
5. Input the Z axis coordinate from **Step 4** as the **Z Solder Position**.
This value will be set as the Z axis coordinate for soldering.



6. Set the soldering offset amount in **OFFSET**.
This value will be set as the start point during soldering.



7. Input the X axis and Y axis coordinates from **Step 4** as the **Board Origin**.
This will be the PWB's standard point (0.0).



8. Tap **[IMPORT]** to open the read file selection screen, and select the file to be read.
All items with the same selected aperture will be converted into the respective point coordinates and imported.

NOTE If moving to the next item is attempted without inputting the D-Code or Board Origin, the input spaces will become red. In this condition, the file selection screen will not open.

NOTE θ axis settings are not included when reading Gerber data. Manually check and set the tip direction during soldering.
If it is not input, the last value set for θ axis in the Program Edit Screen will be used. If no value has been set for θ axis in all rows, the direction will be set to 0°

9. After reading, the **Board Origin** will be input into the **NOTE** for the first row.

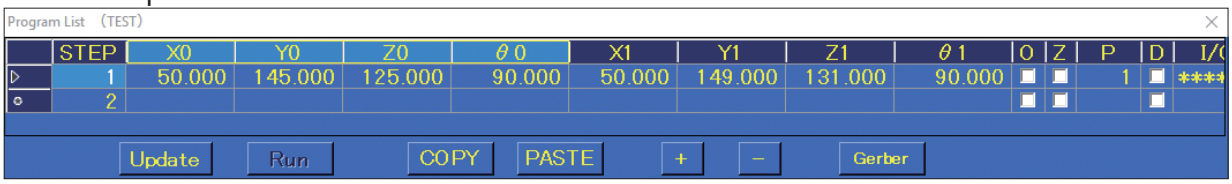
10. θ axis settings are not included when reading Gerber data. For detailed settings of the tip's θ axis angle, position, etc., manually check them and change the program information.

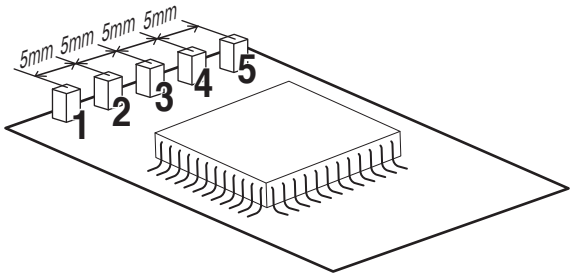
7-7-2 Using the Palletizing Function

Palletizing can be used to combine repeated programs into a single one.
When pins are lined up at a fixed interval (such as for D-sub connectors), the soldering program for the 1st point can be duplicated and repeated for the remaining points.
Not only can a single point be repeated, but a continuous series of points can also be duplicated.

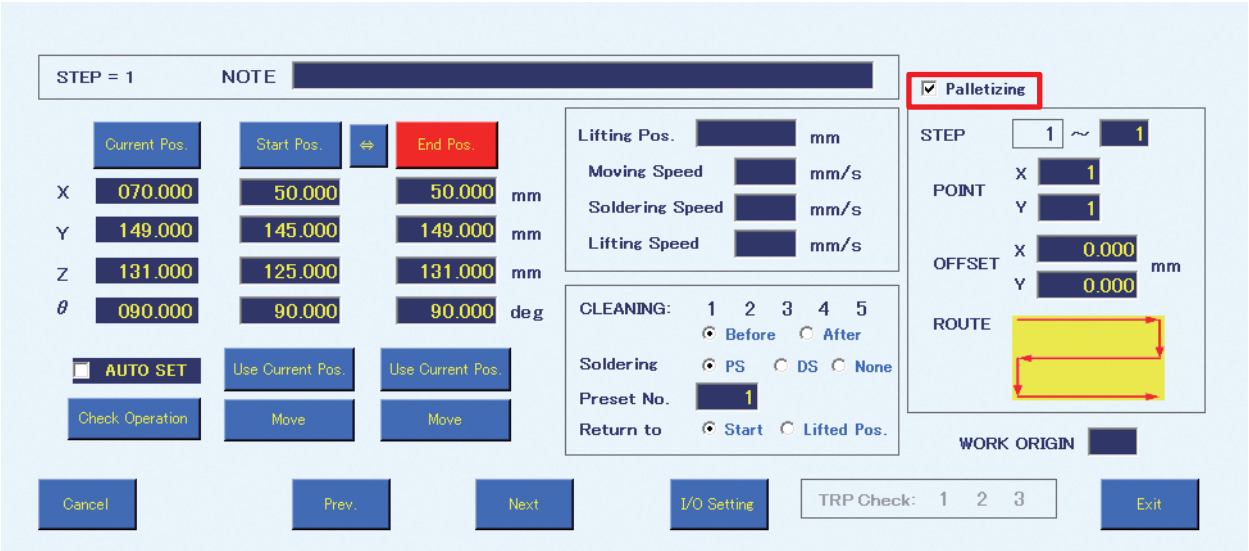
7-7-2-1 Repeating a Single Point

1. In this example, the soldering work for the 1st point will be repeated, so open the Point Edit Screen for the 1st point.





2. Check **Palletizing** in the Point Edit Screen.



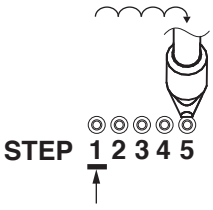
3. Input rows from the current STEP to the STEPS that will be repeated (1 – 9999).
The first value is fixed as the number of the opened STEP. In this example, the soldering for the 1st point will be repeated. The second value will be left as 1.

4. Input the number of times to repeat work respectively in the X direction and Y direction. (1 – 9999)
In this example, the settings for repeating work 5 times in the X direction × 1 time in the Y direction were set.

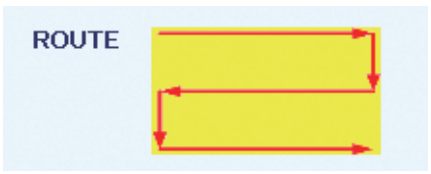
5. Set the amount of offset when repeating the work.
For this example, 5 mm was input for the X axis and 0 mm was input for the Y axis.



6. Set the **ROUTE** order in which soldering should be performed. There are 4 kinds of ROUTES, and each time the **ROUTE** diagram is tapped it will switch to the next **ROUTE**. This time, the **ROUTE** selected by default was selected.



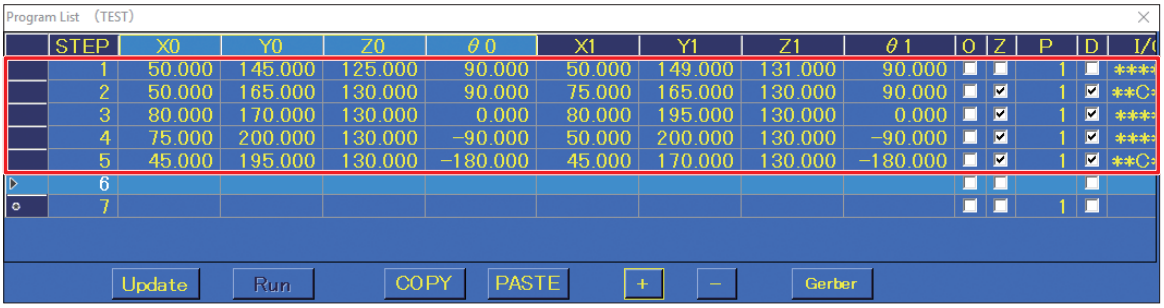
This will be duplicated as the standard.



7. Tap **[Exit]** to complete the **Palletizing** settings.
With these settings, the 1st point will be repeated 5 times in the X direction × 1 time in the Y direction.

7-7-2-2 Duplicating a Program that Uses the Palletizing Function and Work Origin

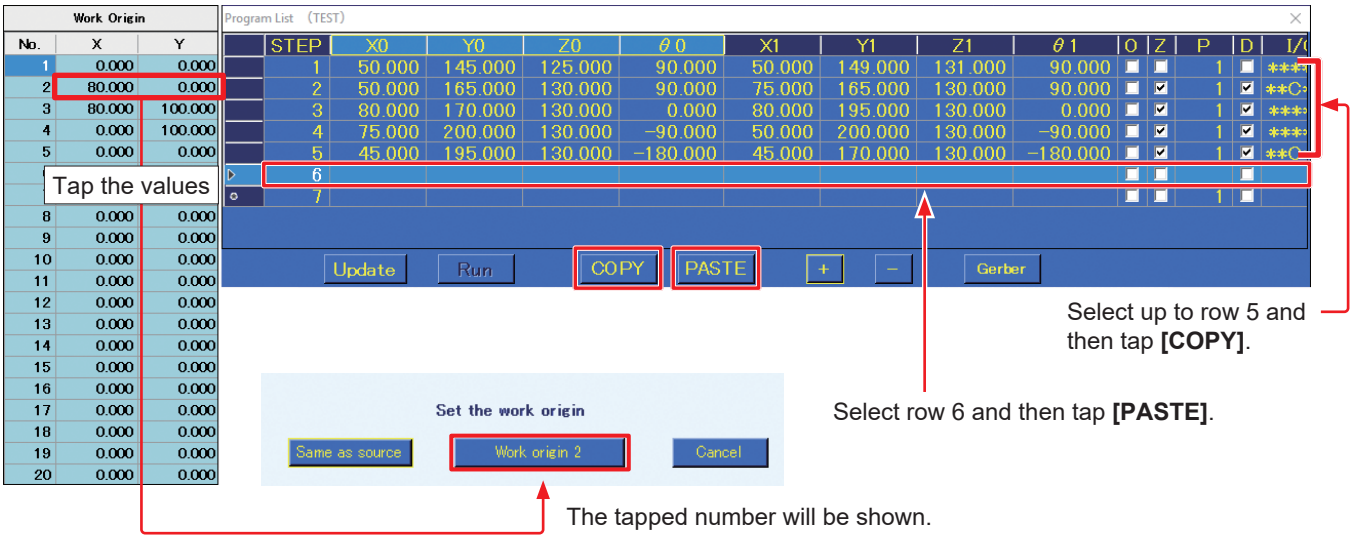
1. In addition to the program created in “7-7-2-1 Repeating a Single Point” (p. 117) for up to the 5th point, settings for the 6th to 9th point will be performed.
For the values in the screenshot below, refer to “7-5-2 DS (Drag Soldering) Settings” (p. 100).
These values will be input into the rows for STEP 2 to STEP 5.



2. The values of the work origins for the copy source will be input in advance.
In this example, X: 80.000, Y: 0.000 will be input as work origin 2, X: 80.000, Y: 100.000 will be input as work origin 3, and X: 0.000, Y: 100.000 will be input as work origin 4.

3. Select rows 1 – 5 by tapping and dragging, and then tap **[COPY]**.

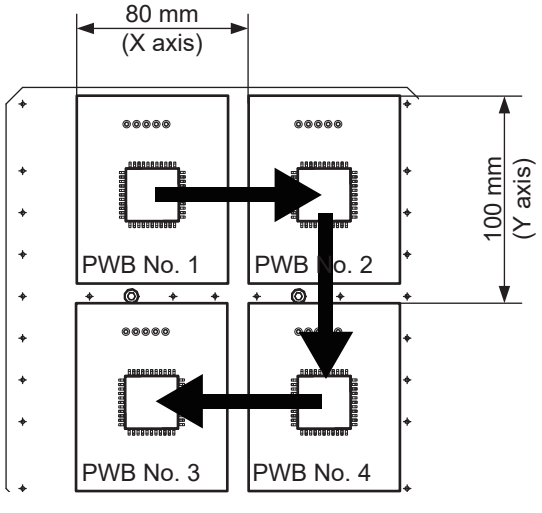
4. Tap row 6, and then tap **[PASTE]**.



5. Tap the values in the work origin screen and then tap **[Work origin 2]** to complete the copying process.

6. Repeat the same procedure to paste the programs for work origins 3 and 4.

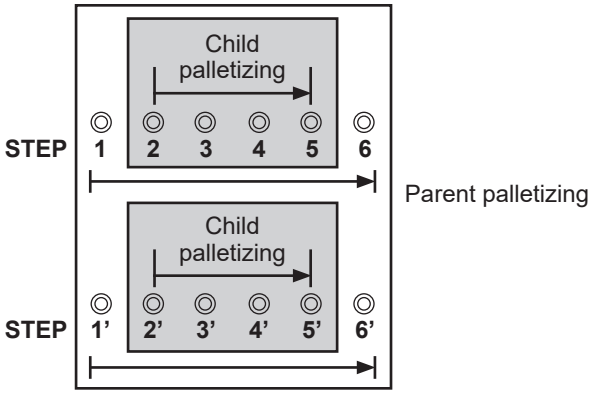
This completes duplication of the programs using the palletizing function.



Soldering route

7-7-2-3 Duplicating a Series of Multiple Points as a Group

➡ The first STEP of the parent must be before the first STEP of the child.
➡ The last STEP of the parent must be after the last STEP of the child.
Ex.) The 2nd – 5th points are repeated using the palletizing function, and soldering including those points for the 1st – 9th points will be repeated using the palletizing function.



Program List (TEST)

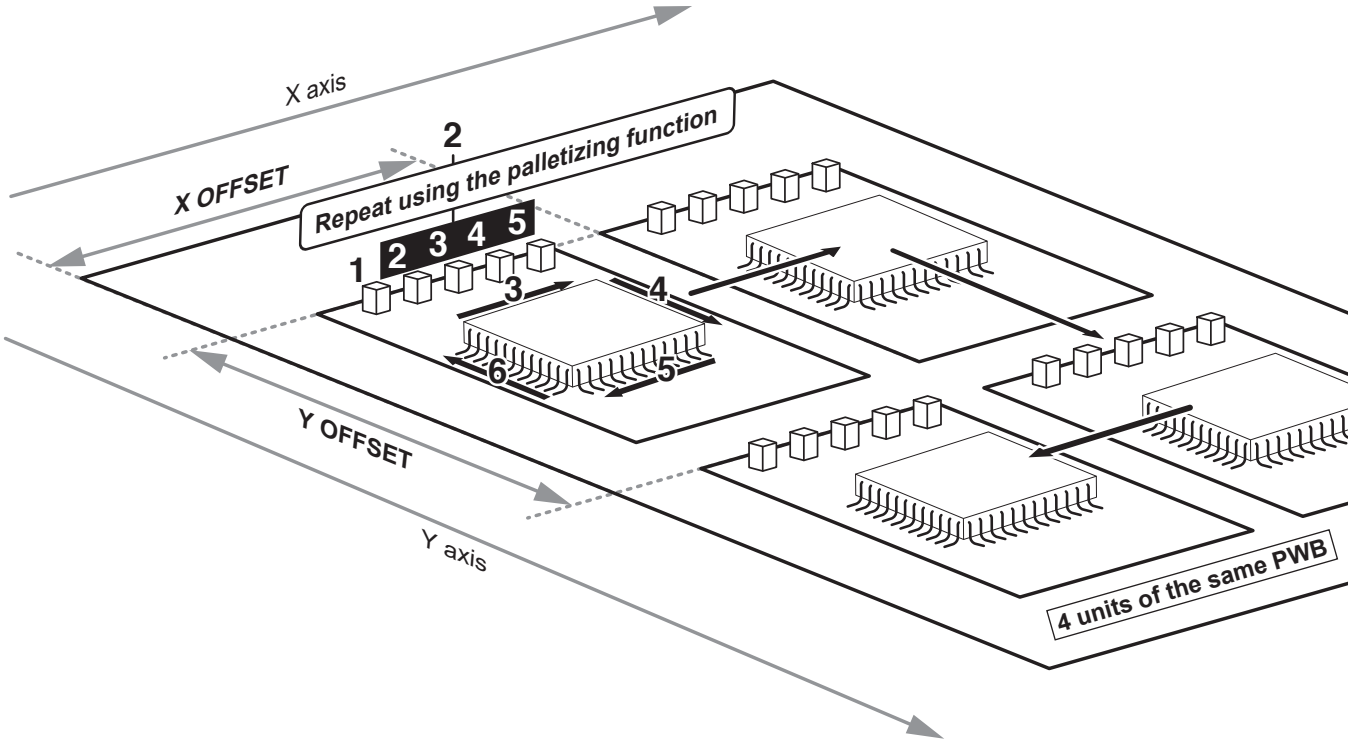
	STEP	X0	Y0	Z0	θ 0	X1	Y1	Z1	θ 1	O	Z	P	D	I/O
▷	1	50.000	145.000	125.000	90.000	50.000	149.000	131.000	90.000	☐	☐	1	☐	**C**P
	2	55.000	145.000	125.000	90.000	55.000	149.000	131.000	90.000	☐	☐	1	☐	*****P
	3	50.000	165.000	130.000	90.000	75.000	165.000	130.000	90.000	☐	☑	1	☑	**C*S*
	4	80.000	170.000	130.000	0.000	80.000	195.000	130.000	0.000	☐	☑	1	☑	****S*
	5	75.000	200.000	130.000	−90.000	50.000	200.000	130.000	−90.000	☐	☑	1	☑	****S*
	6	45.000	195.000	130.000	−180.000	45.000	170.000	130.000	−180.000	☐	☑	1	☑	**C*S*
	7									☐	☐		☐	
⚙	8									☐	☐		☐	

Update | Run | COPY | PASTE | + | − | Gerber

Row 1: Soldering of the 1st – 9th points will be repeated (4 times).
Row 2: Soldering of the 2nd point will be repeated (4 times).
In this way, 36 rows (9 points × 4) of soldering programs are collected into 6 rows.

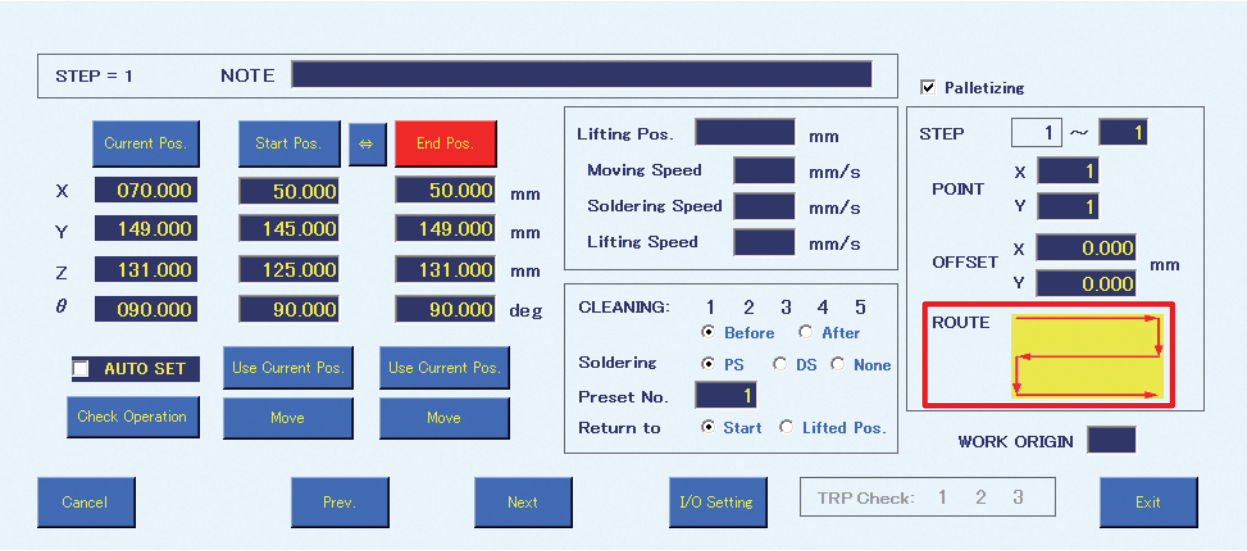
⚠ CAUTION

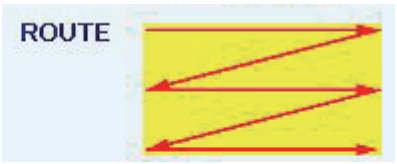
Table movement in the Y axis direction is opposite to the displayed direction. Be careful since proper soldering cannot be performed if the opposite direction is set.



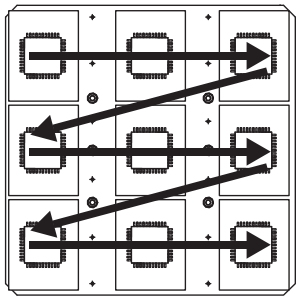
About ROUTE Selection

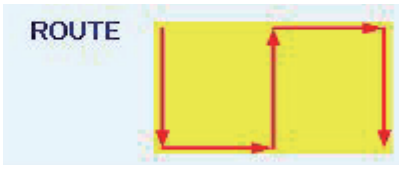
There are 4 kinds of **ROUTES** for setting the soldering sequence when using the palletizing function.
The sequence for each ROUTE is shown below using the example of when the same STEP is repeated 3 times in the X direction × 3 times in the Y direction, for a total of 9 points.

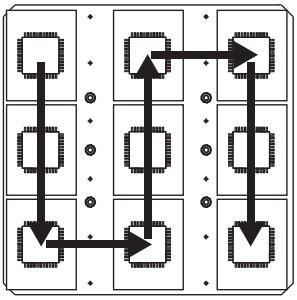


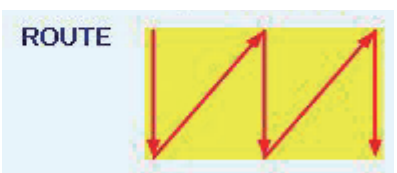


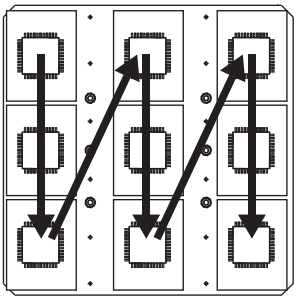
Soldering route







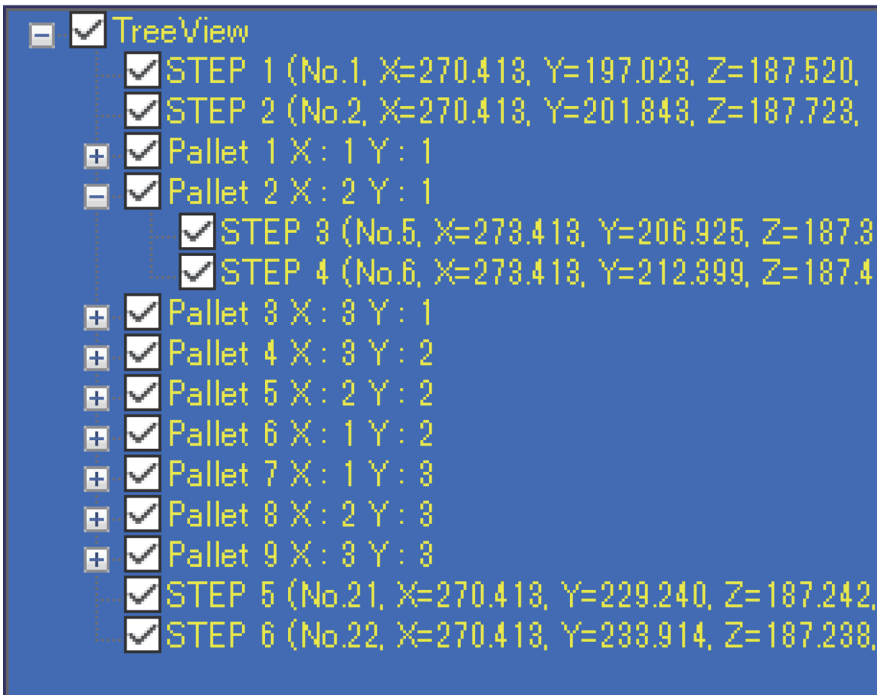




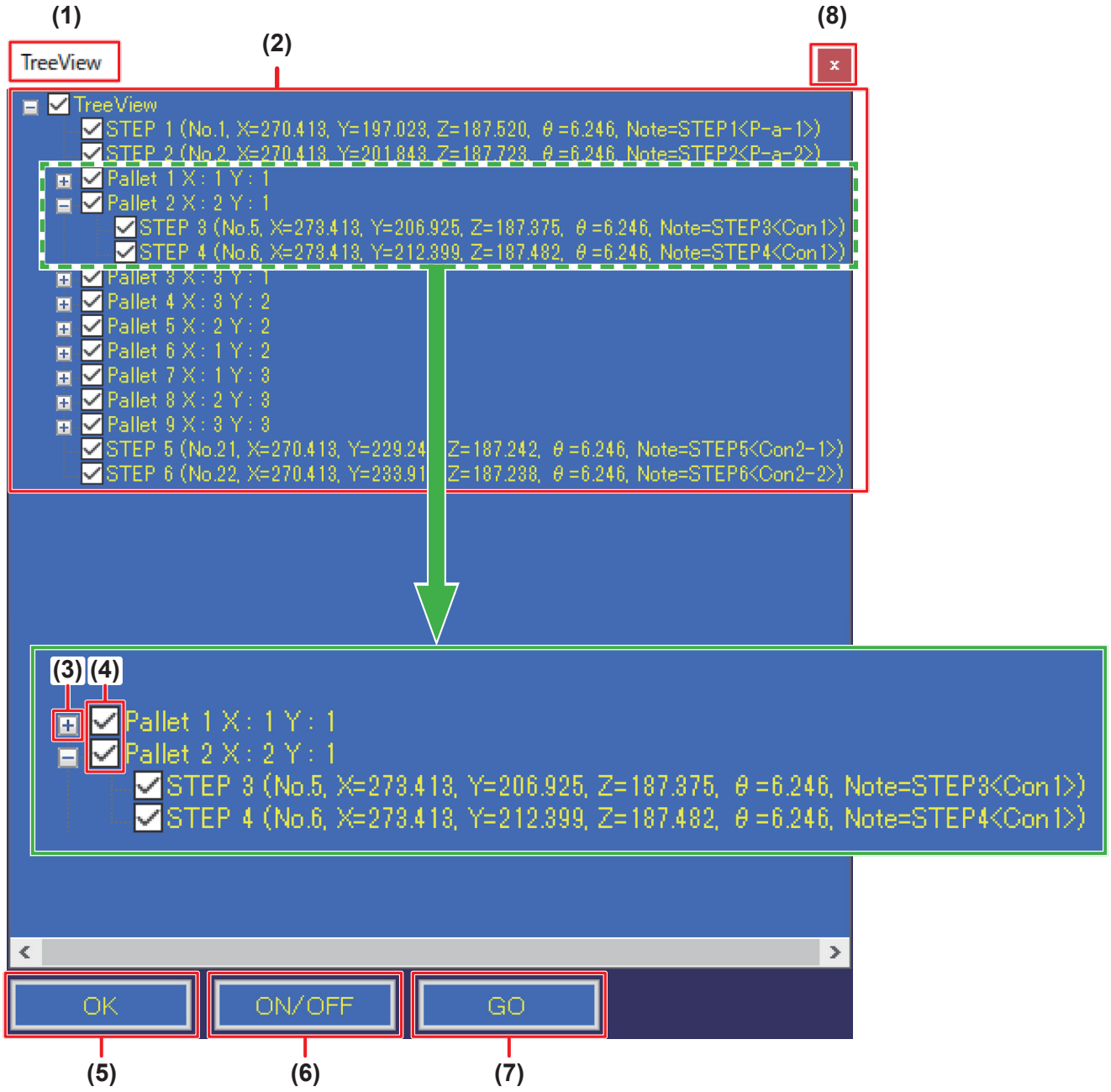
7-7-3 TreeView

Overview

The program can be viewed in a tree view as shown in the figure.
Also, by checking each STEP, it is possible to solder only at the desired position.



Part Names


(1)
(2)
(8)
TreeView
TreeView
STEP 1 (No.1, X=270.413, Y=197.023, Z=187.520, θ=6.246, Note=STEP1<P-a-1>)
STEP 2 (No.2, X=270.413, Y=201.843, Z=187.723, θ=6.246, Note=STEP2<P-a-2>)
Pallet 1 X : 1 Y : 1
Pallet 2 X : 2 Y : 1
STEP 3 (No.5, X=273.413, Y=206.925, Z=187.375, θ=6.246, Note=STEP3<Con1>)
STEP 4 (No.6, X=273.413, Y=212.399, Z=187.482, θ=6.246, Note=STEP4<Con1>)
Pallet 3 X : 3 Y : 1
Pallet 4 X : 3 Y : 2
Pallet 5 X : 2 Y : 2
Pallet 6 X : 1 Y : 2
Pallet 7 X : 1 Y : 3
Pallet 8 X : 2 Y : 3
Pallet 9 X : 3 Y : 3
STEP 5 (No.21, X=270.413, Y=229.24 Z=187.242, θ=6.246, Note=STEP5<Con2-1>)
STEP 6 (No.22, X=270.413, Y=233.91 Z=187.238, θ=6.246, Note=STEP6<Con2-2>)
(3)
(4)
Pallet 1 X : 1 Y : 1
Pallet 2 X : 2 Y : 1
STEP 3 (No.5, X=273.413, Y=206.925, Z=187.375, θ=6.246, Note=STEP3<Con1>)
STEP 4 (No.6, X=273.413, Y=212.399, Z=187.482, θ=6.246, Note=STEP4<Con1>)
OK
ON/OFF
GO
(5)
(6)
(7)

(1) Program name currently displayed in the tree

(2) Tree view
One tree is displayed for each STEP.

STEP 5 (**No.8**, **X=**.***, Y=**.***, Z=**.***, θ=**.***, **Note= ~~~~~**)
a b c d

a : Indicates the STEP No.
b : Indicates the number of soldering steps in the soldering program.
In case of palletizing, etc., repetitions are also in the calculated order.
c : Coordinate of the end point (or the start point if no soldering mode)
Coordinates calculated including palletizing and the working origin, if set.
* The tip position compensation is not included.
d : Note on the STEP detailed settings screen will be displayed. Describe the points and other information.

If there is a palletizing setup, its STEP is included in one Pallet.

Pallet 3 **X : 2** **Y : 1**
a b c

a : Indicates the number of palletizing.
b : The number of times in the X direction in palletizing.
c : The number of times in the Y direction in palletizing.

(3) Tree expansion button

(4) Check box

(5) OK button

(6) ON/OFF button

(7) Move button

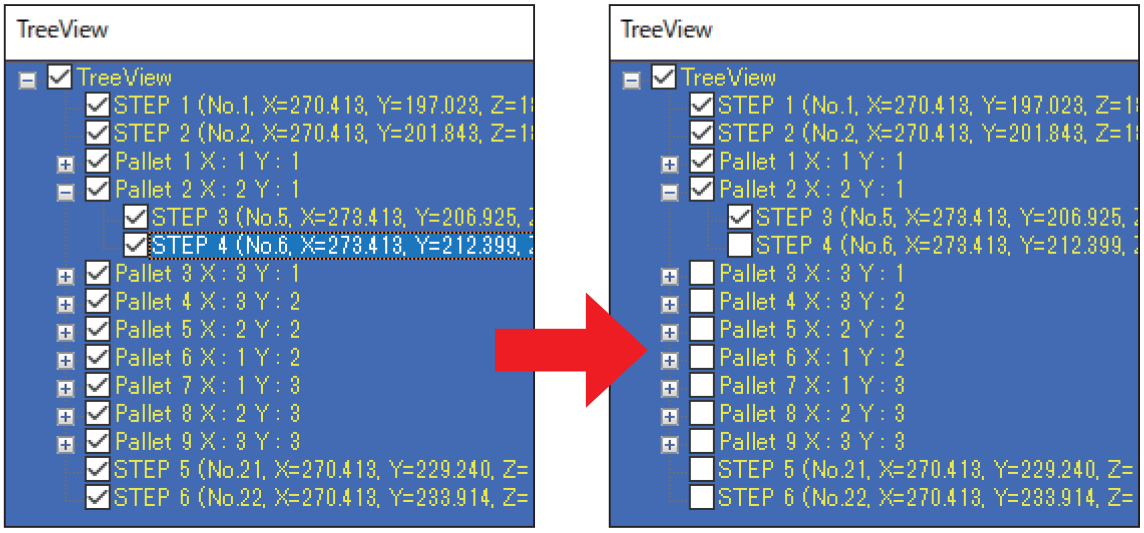
(8) × button

How to use

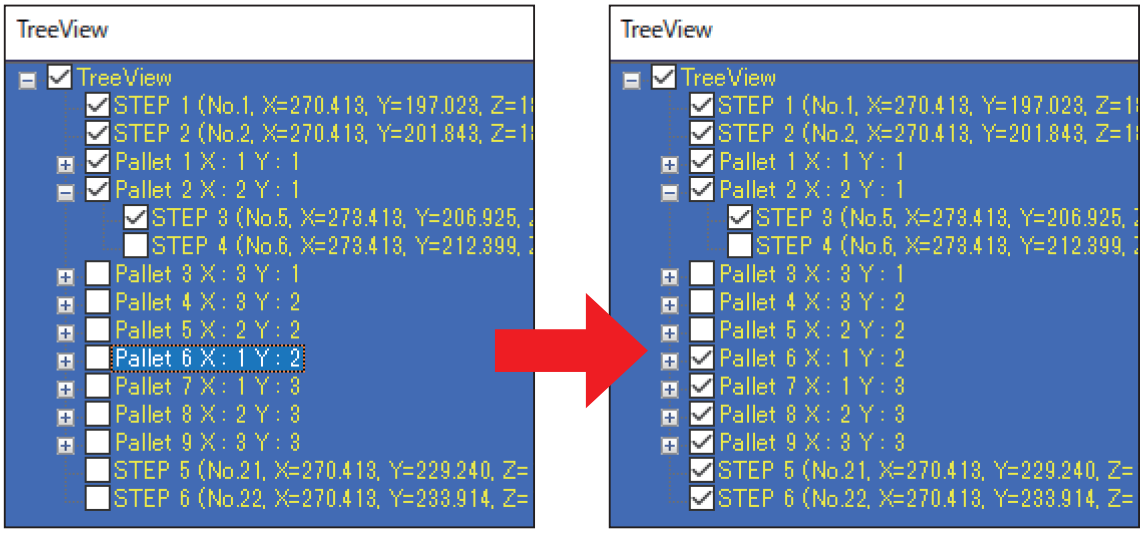
Tree view window

- **Check box**
  - Sets soldering availability for each STEP and Pallet.
    Clicking toggles the check status.
  - Clicking on the checkbox in the Palette line to toggle it ON and OFF will also toggle all the checkboxes in the child trees ON and OFF.
  - The checkbox on the Pallet line is checked if there is at least one check for STEP or Pallet in the Pallet.
- **Tree expansion button**
  - Clicking on it will expand the child trees contained in that Pallet. Trees below the child trees will not be expanded.
- **OK button**
  - Save the current check status and close the window.
- **ON/OFF button**
  - Turn ON or OFF the check box following the selected STEP or Pallet.

To turn OFF



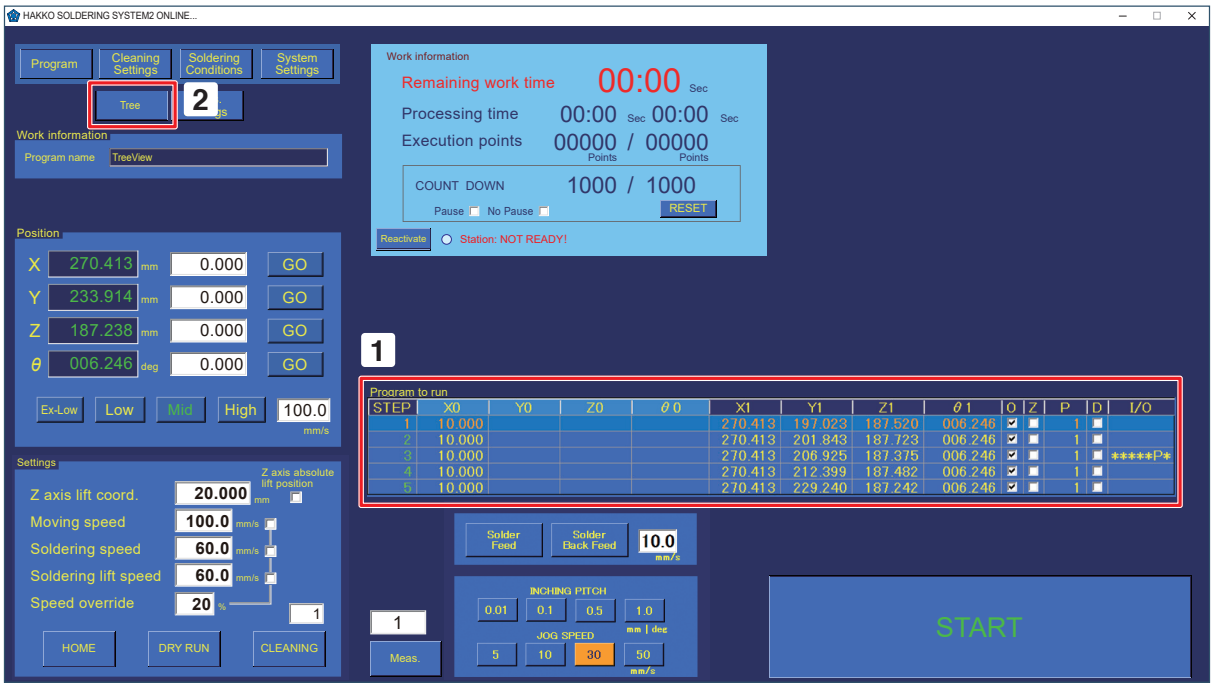
To turn ON

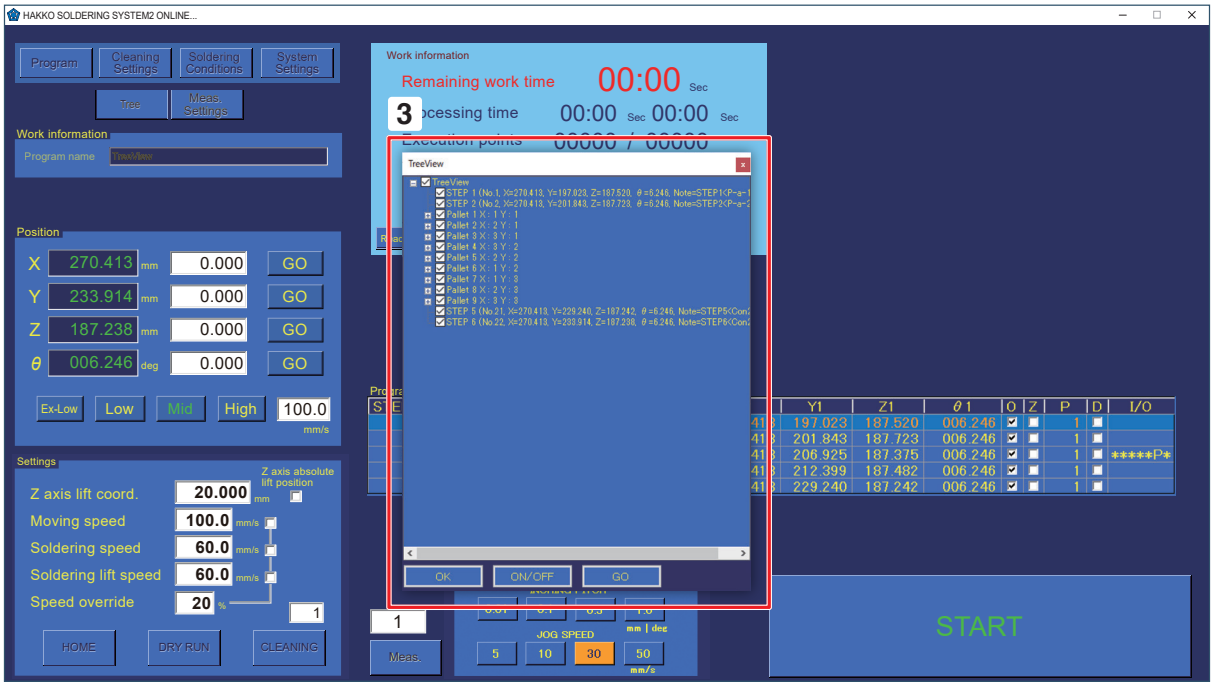


- **Move button**
  - Move to the selected STEP. (The starting point or the position where only the Z-axis of the starting point is set to the Z-axis evacuation coordinates.)
    If there is palletizing, moves to the coordinates after palletizing.
- **× button**
  - Discard the current edits and close the window.

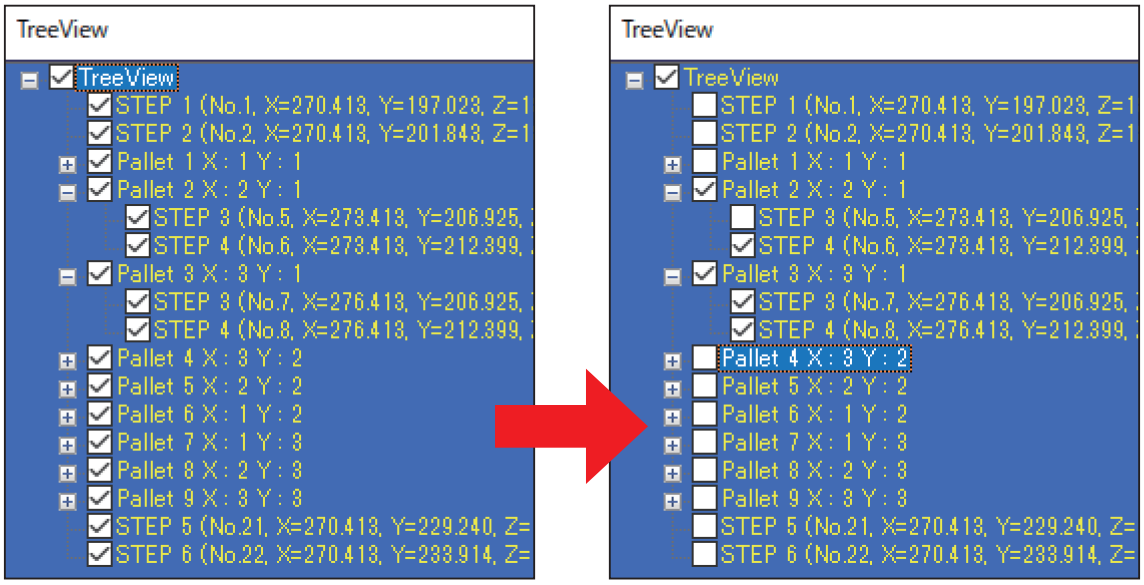
HAKKO SOLDERING SYSTEM2

1. Load the soldering program for soldering.
2. Click the **[Tree]** button.
3. The TreeView window will open.





4. Turn ON only the checkboxes of the programs to be soldered in the tree view.



5. Click the **[OK]** button at the bottom of TreeView to close the window.

6. START the program as usual.

• By editing the tree, soldering is performed only at the locations where the tree is checked.
• For unchecked locations, it works as follows.

PS : After moving to the starting point, it moves directly to the next soldering.

PS (When the endpoint move destination is a Z-axis evacuation)

: After moving up the Z-axis evacuation distance of the start point, it moves up the Z-axis evacuation distance of the end point.
After that, it moves to the next soldering.

DS : After moving from the Z-axis evacuation position on the start point to the Z-axis evacuation position on the end point, it moves to the next soldering.
The operating speed shown above is the "Moving speed".

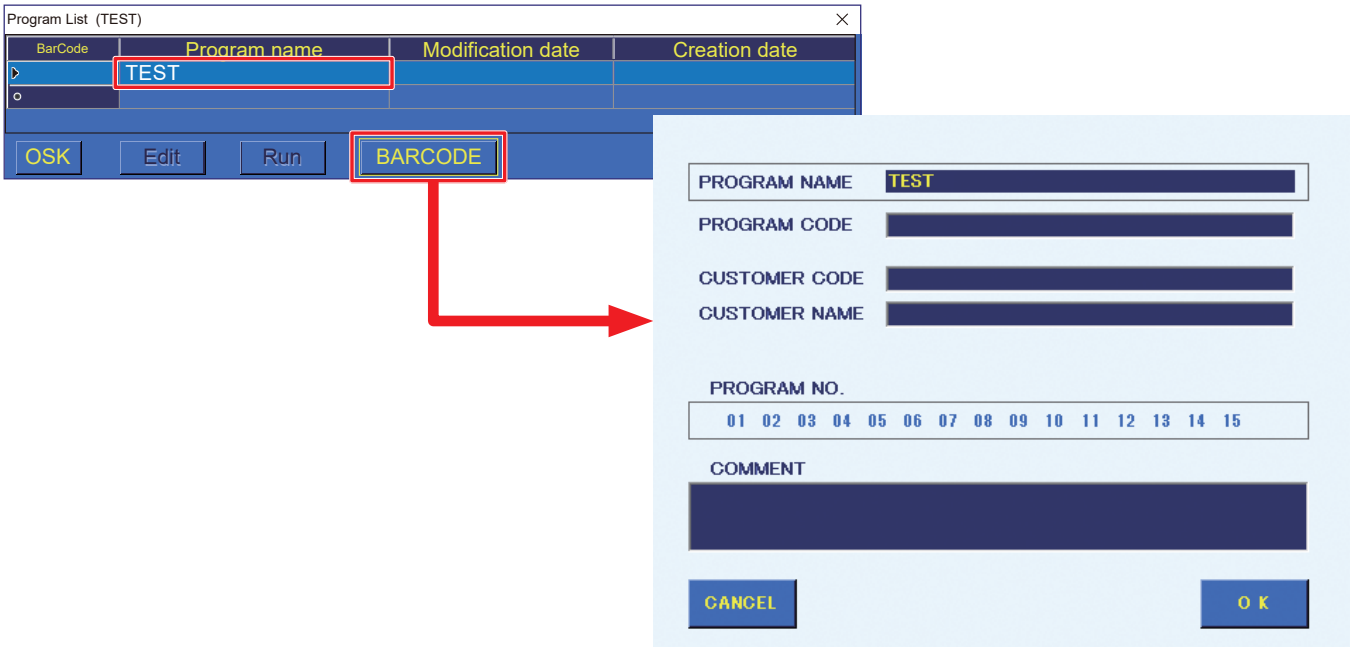
* Since the check state is retained, after temporarily setting the checks for reworking the board, be sure to turn all checks ON before starting the soldering process for normal products.
* I/O settings are executed as they are. It is not possible to omit inputs or disable outputs.
* Cleaning is not performed.

7-7-4 Calling up a Program Using a Bar Code or I/O

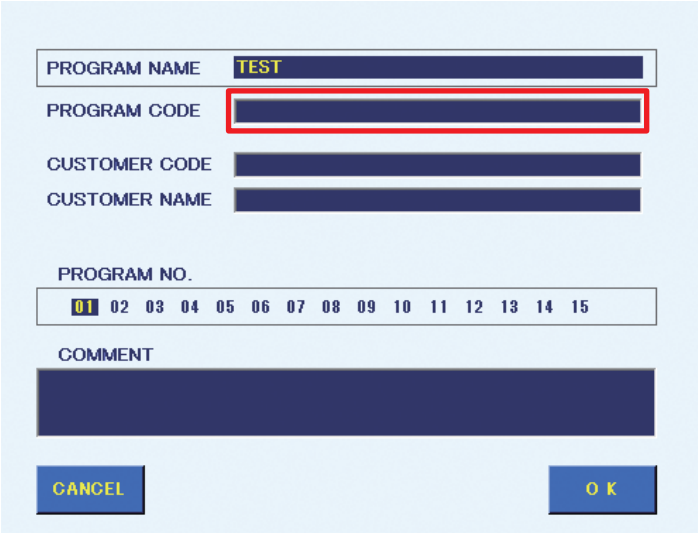
If the PWB to perform work on and the created program are linked in advance in the Bar Code Setting Screen, the program can be called up using a bar code or by I/O.

7-7-4-1 Registering a Bar Code

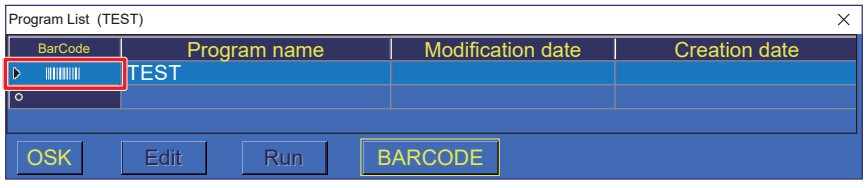
1. Select the name of the program to be linked in the Program List Screen and tap **[BARCODE]**.



2. Reading the bar code while the **PROGRAM CODE** space is selected will cause the code to be input.
A commercially available USB type bar code reader is necessary to read bar codes.



3. Tap **[OK]** to complete the setting. To finish without saving the setting, tap **[CANCEL]**.



7-7-4-2 Calling up a Program with a Bar Code

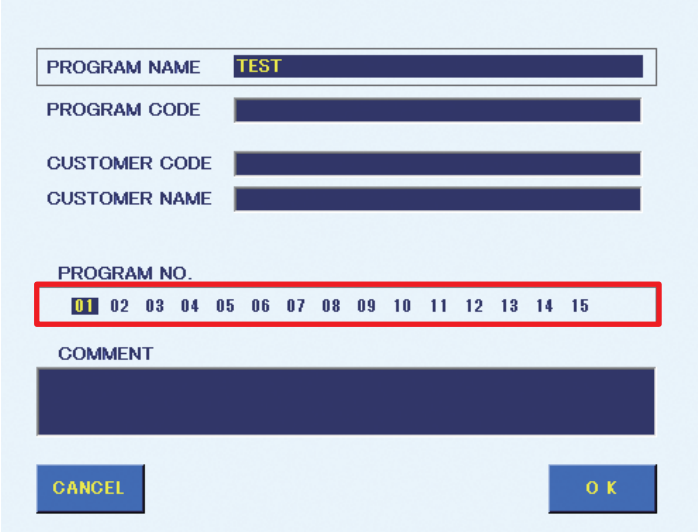
If a bar code is read with a bar code reader while HAKKO SOLDERING SYSTEM 2 is running, the program which was linked to the bar code in advance will be called up.
A read confirmation dialog will appear. Tap **[OK]** to read in the program.
If there is no registered program, a warning message will appear.
The program which was read in can be run by following the same procedure as in “7-6 Running a Program” (p. 109).

7-7-4-3 Registering an I/O Setting

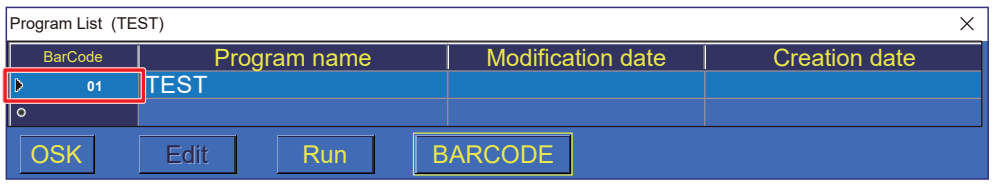
I/O setting registration can be performed in the same screen as bar code registration. For details how to get to this screen, refer to “7-7-4-1 Registering a Bar Code” (p. 128).

1. Select the name of the program to be linked in the Program List Screen and tap **[BARCODE]**.

2. The number for selecting a program can be set in **PROGRAM NO.** Tap on the desired number to select it.



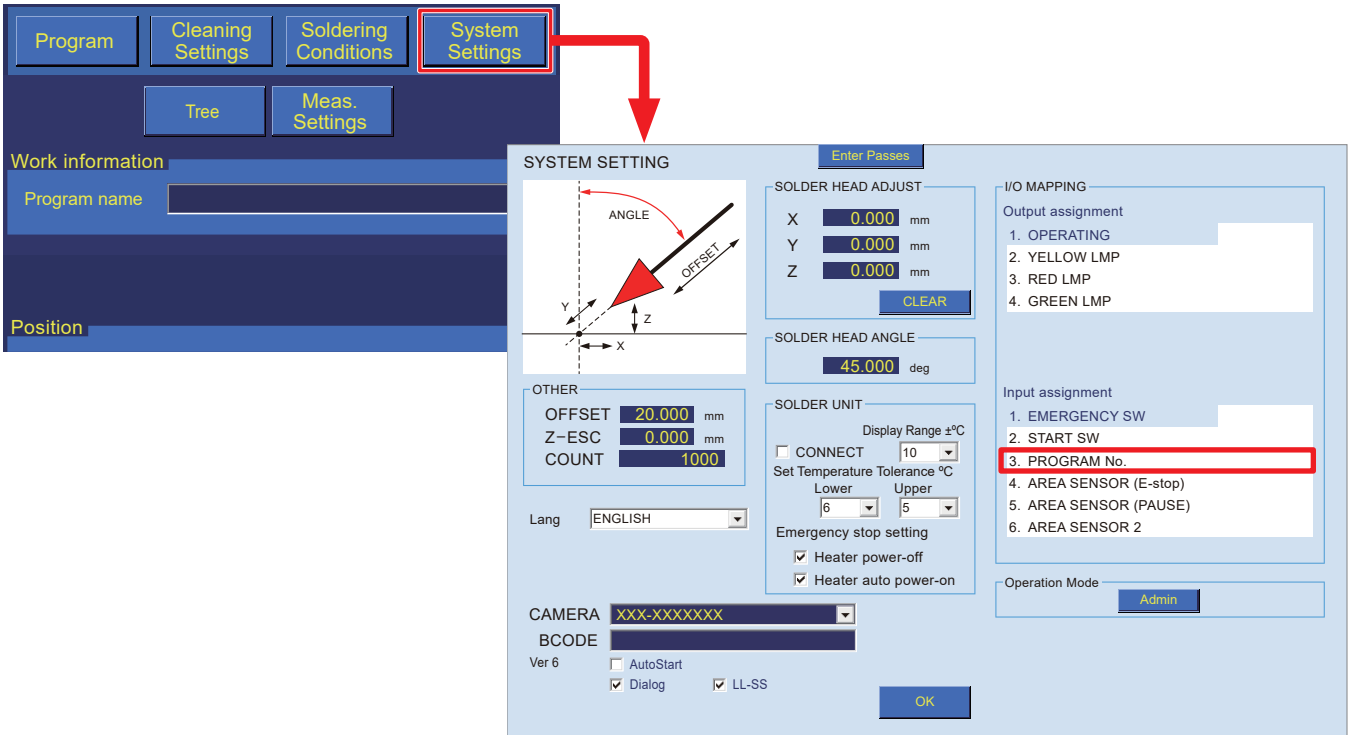
3. Tap **[OK]** to complete the setting. The selected number (**“01”** in this example) will be shown in the BarCode column as in the screenshot below.
To finish without saving the setting, tap **[CANCEL]**.



7-7-4-4 Calling up a Program via I/O

Programs can be called up by external equipment using the number set for the program in **PROGRAM NO.** in “7-7-4-3 Registering an I/O Setting” (p. 129). For details, refer to “7-7-4-3 Registering an I/O Setting” (p. 129).

1. Tap **[System Settings]** on the top screen.
2. Assign the input signal for program number input in the Input assignment frame of **I/O MAPPING** in



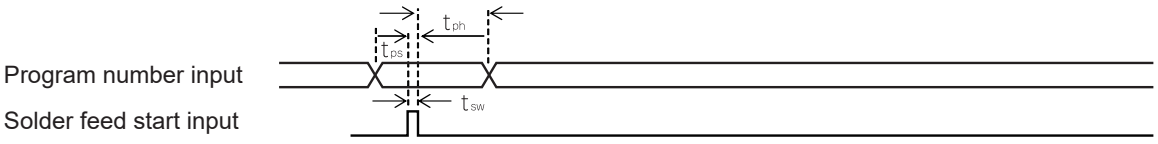
3. When the number set in **PROGRAM No.** is specified by an external device using binary numbers and START is input, the program will be called up and automatically started. Program number input uses 4 signals starting with the signal assigned to program number input in I/O MAPPING. For example, when INP0 is selected, the 4 signals from INP0 to INP3 will be used.

Ex.) Assignment table when INP0 is selected for program number input

No.	INP0	INP1	INP2	INP3
01	ON			
02		ON		
03	ON	ON		
04			ON	
05	ON		ON	
06		ON	ON	
07	ON	ON	ON	
08				ON
09	ON			ON
10		ON		ON
11	ON	ON		ON
12			ON	ON
13	ON		ON	ON
14		ON	ON	ON
15	ON	ON	ON	ON

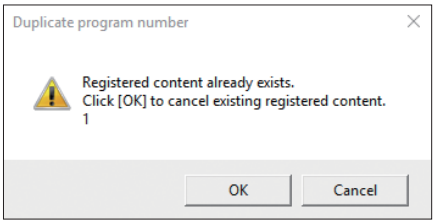
The program set for PROGRAM NO. 01 on the previous page would be run by setting the INP0 signal to on.

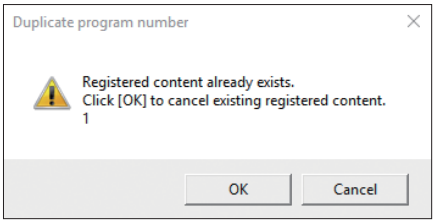
The timing chart when starting a program using **PROGRAM No.** input is shown below.



Program specification setup time: t_{ps}>5 msec
Start signal pulse width: 400msec > t_{sw} > 15msec
Program specification hold time: t_{ph}>150 msec

PROGRAM NAME:	Shows the program name.
PROGRAM CODE:	Input the code for calling up the program. When a bar code is read while this is selected, the code read from the bar code will be input. If the code is a duplicate, an error will be shown. Tapping **[OK]** will cause the duplicated destination setting to be erased, and the code to be assigned to the current program.
CUSTOMER CODE:	The customer (or PWB) identification code, etc. can be input.
CUSTOMER NAME:	The customer name, etc. can be input.
PROGRAM NO.:	The number for selecting the program using external I/O can be set. Tap the desired number to select it. If the code is a duplicate, an error will be shown. Tapping **[OK]** will cause the duplicated destination setting to be erased, and the number to be assigned to the current program.
COMMENT:	A comment for the program can be input.

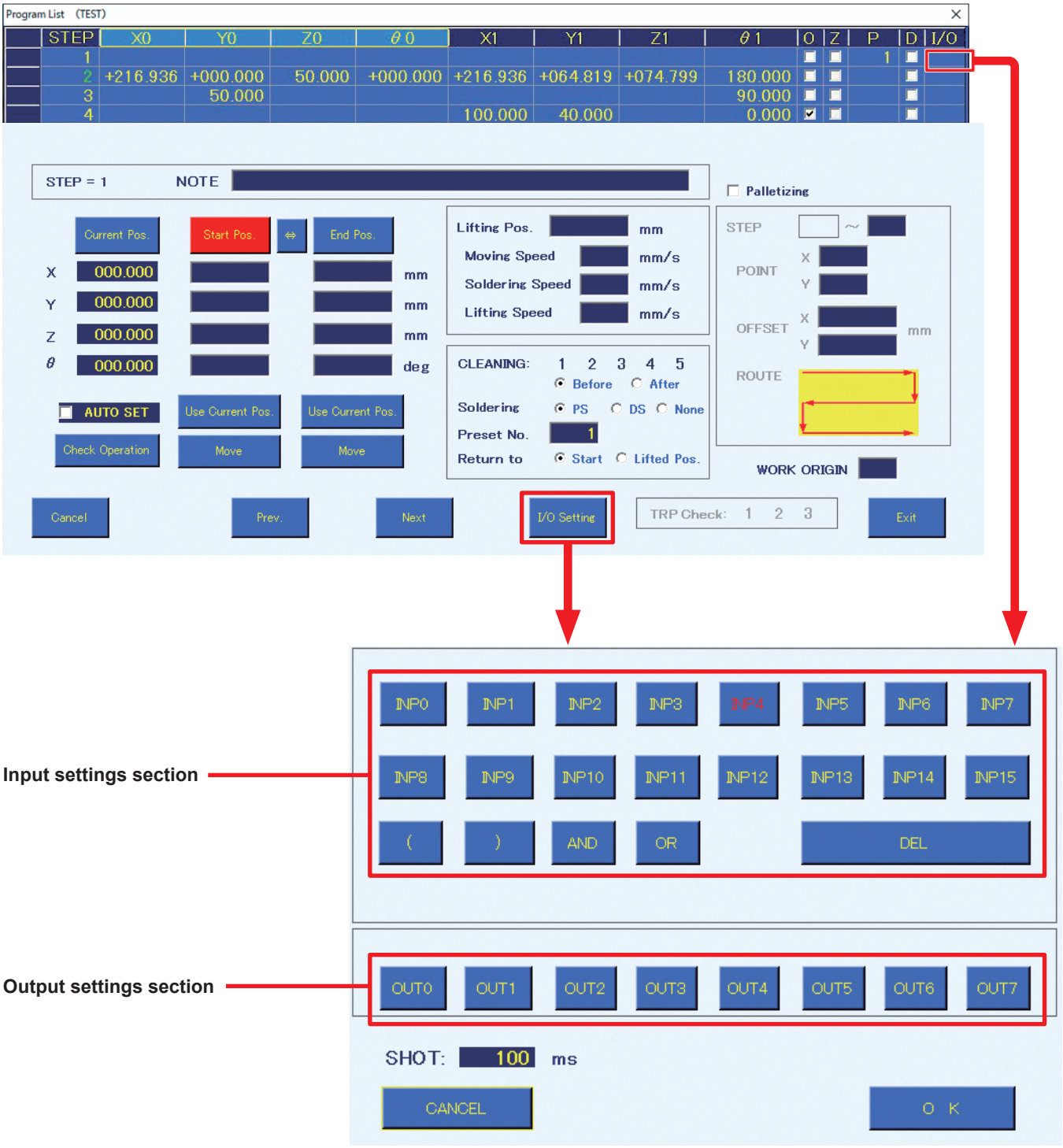




7-7-5 I/O Settings

The I/O settings for each point can be set by tapping **I/O** in the Program Edit Screen or selecting **[I/O Setting]** in the Point Edit Screen.

I/O Settings Screen



Input settings section: Before movement to the start point for each point, if an input which has been set in external I/O occurs, the subsequent operations will be performed.

*1 If pre-cleaning is set, cleaning is performed.

*2 If the Z axis lift is set, it will move to Z lift position after ending the previous step, then wait for input.

Inputs used in “7-7-6 System Settings” (p. 135) cannot be used.

Tapping **[INP *]** will cause it to switch between ON and OFF.
ON: Sets input to ON.
OFF: Sets input to OFF.
[( ], [ )], [AND], and [OR] can be used to create logical AND and OR statements.

Ex.) (INP4 OR INP5) AND INP6
The operation will be performed when either INP4 or INP5 is on and INP6 is also on.

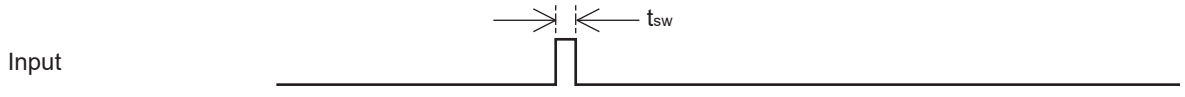
Tapping **[DEL]** will move back one step in the equation.
Output settings section:
After each point's soldering has been completed and the robot has moved to the start point, the output set in external I/O will be performed.
Outputs used in "7-7-6 System Settings" (p. 135) cannot be used.
Tapping **[OUT *]** will cause it to switch in the following order: ON, OFF, SHOT, SHOT B.
ON: Sets output to ON.
OFF: Sets output to OFF.
SHOT: The output will be set to ON only for the SHOT period. Even if soldering of the next point has been completed, the program will not proceed to the next point until the signal becomes OFF.
SHOT B: The output will be set to ON only for the SHOT period. If soldering of the next point has been completed, the program will proceed to the next point without waiting for the signal to become OFF.
SHOT [ ] ms: Input the SHOT output time in msec.

With regard to inputs, the following timing is required for I/O inputs in the soldering program.
If the input or output is too short, the input may not be detected making it unable to proceed to the next step.
As shown in the timing charts below, a minimum of 50 msec of input is always required.

The following are timing charts in the program that also include the output.

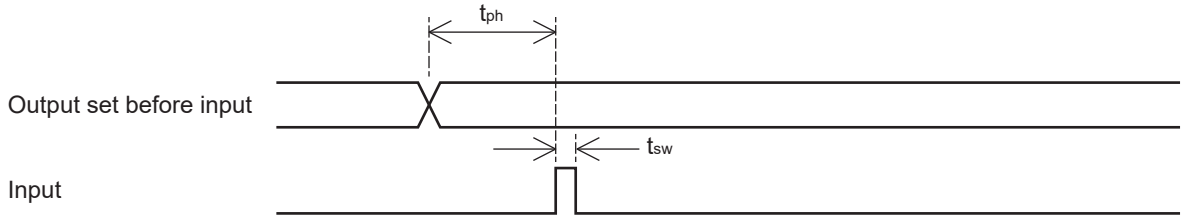
■ Input timing when there is no output in the previous step

* Must be in standby status for waiting to start solder processing



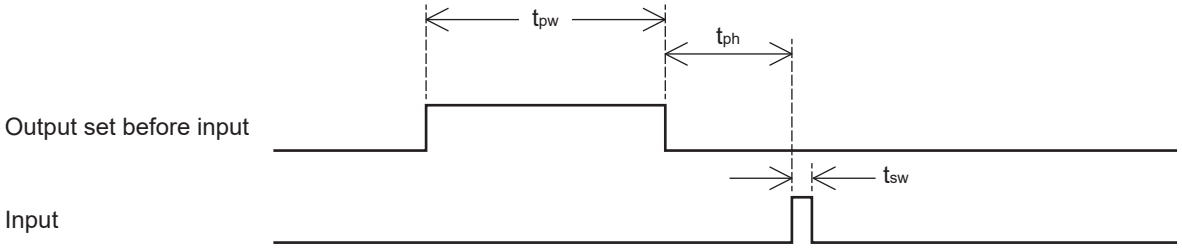
Input signal pulse width : t_{sw} > 50 msec

■ Input timing after ON/OFF output



Input signal pulse width : t_{sw} > 50 msec
Waiting time after output : t_{ph} > 200 msec

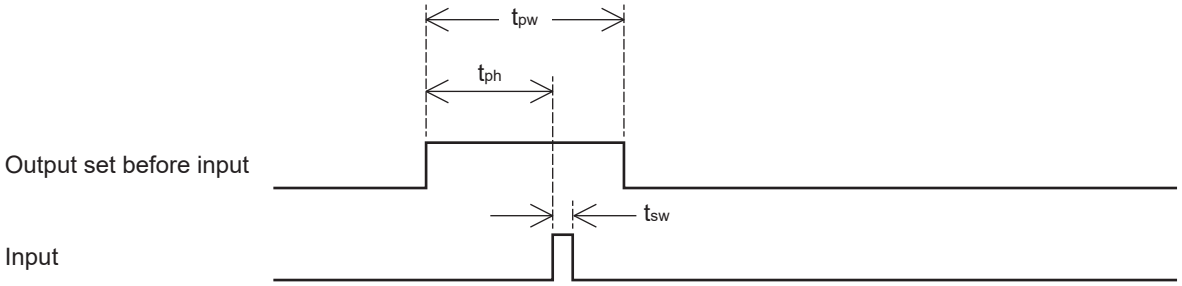
■ Input timing after SHOT output



Output signal pulse width : t_{pw} > 100 msec
Input signal pulse width : t_{sw} > 50 msec
Waiting time after output : t_{ph} > 200 msec

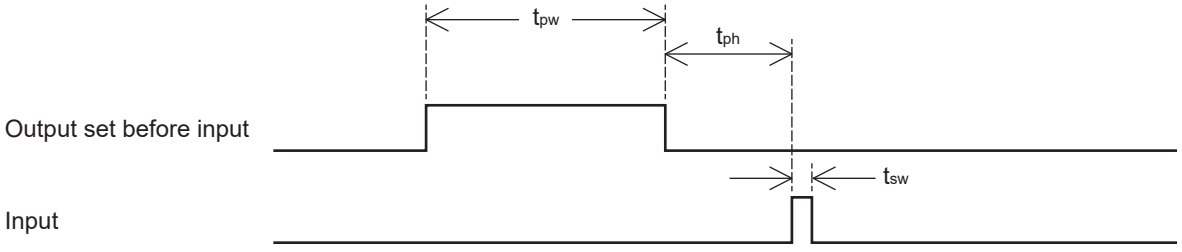
■ Input timing after SHOTB output

1. When input is set during output



Output signal pulse width : t_{pw} >t_{ph} +t_{sw} + +50 msec
Input signal pulse width : t_{sw} > 50 msec
Waiting time after output : t_{ph} > 200 msec

2. When input is set after output ends

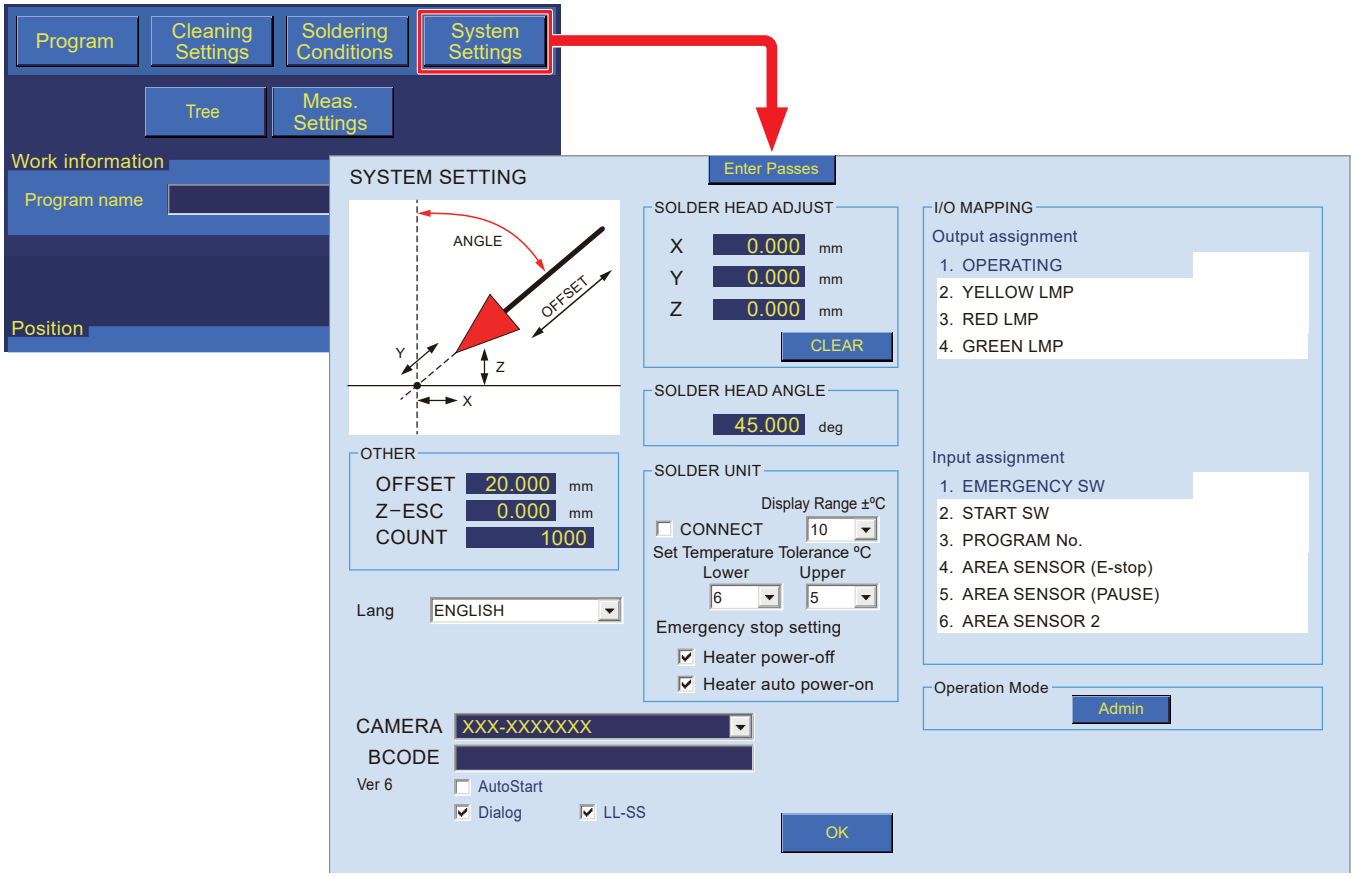


Output signal pulse width : t_{pw} > 100 msec
Input signal pulse width : t_{sw} > 50 msec
Waiting time after output : t_{ph} > 200 msec

* **ON detection current for IN:** Around 5 mA
Rated current for OUT: 100 mA

7-7-6 System Settings

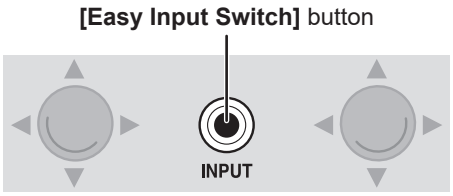
The System Settings Screen can be opened from the top screen.

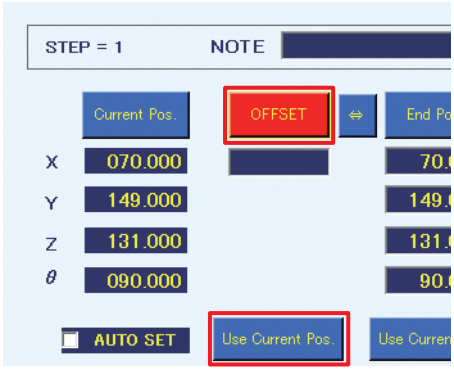


7-7-6-1 OTHER (OFFSET, Z-ESC, COUNT) Functions

■ **OFFSET (Settable range: 0 – 100 mm)**

Sets the offset amount to be used when using **AUTO SET**.
In addition, if no offset value is set in **[OFFSET]** mode settings, operation will be performed using this setting.
When a value has been input for individual offset in the Point Edit Screen, that value will be given priority.
After setting, tapping **[Use Current Pos.]** or pressing the robot's **[Easy Input Switch]** button will cause this offset value to be used.



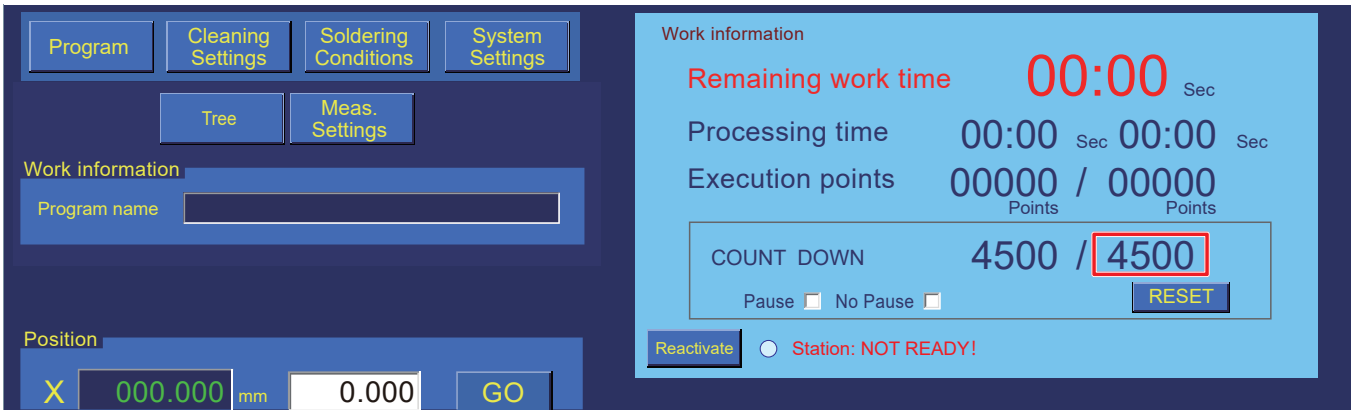


■ **Z-ESC (Settable range: 0 – 200 mm)**

If a station error or feeder error occurs during program operation, the robot will pause and then lift the Z axis by the set distance. (This setting is not a coordinate.)
If the lift position would become negative because of the Z axis position when an error occurs, the Z axis will be set to the 0.000 coordinate.

■ **COUNT (Settable range: 1 – 9999999)**

Sets the **COUNT DOWN** value shown in the **Work information** area of the top screen.
By setting the value so that the count becomes 0 before the soldering capacity of the tip becomes poor due to wear, countermeasures can be taken before problems occur.



Ex.) If it is assumed that the timing when soldering would become poor is at 5000 points, set the count to 4500.

1) When soldering of 4500 points has been performed, the count becomes 0 and operation stops.
2) Replace worn parts such as the tip, etc.
3) After replacing parts, perform tip position adjustment, etc.
4) Use DRY RUN to check positions of soldering points.

NOTE If **Pause** in the top screen's **Work information** area is checked at this time, countdown will not be performed. Check **Pause** when counting is not necessary, such as when performing position checking, etc.

When work is restarted after having stopped, this value will be reset.
It can also be reset by tapping **[RESET]** in the work information area.

7-7-6-2 SOLDER HEAD ADJUST Function (Settable range: X: -10.000 mm – 10.000 mm; Y: -10.000 mm – 10.000 mm; Z: -10.000 mm – 10.000 mm)

When the tip dimensions have changed due to tip wear, this function can be used to correct the tip position so that soldering can be performed without changing the program.

1. Open the Point Edit Screen for row 7.

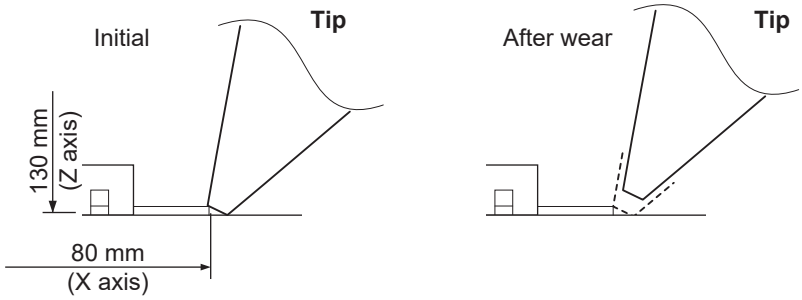
Program List (TEST)

	STEP	X0	Y0	Z0	θ0	X1	Y1	Z1	θ1	O	Z	P	D	I/O
	1	70.000	145.000	125.000	90.000	70.000	149.000	131.000	90.000	☐	☐	1	☐	**C***
	2	65.000	145.000	125.000	90.000	65.000	149.000	131.000	90.000	☐	☐	1	☐	
	3	60.000	145.000	125.000	90.000	60.000	149.000	131.000	90.000	☐	☐	1	☐	****S*
	4	55.000	145.000	125.000	90.000	55.000	149.000	131.000	90.000	☐	☐	1	☐	***Z**
	5	50.000	145.000	125.000	90.000	50.000	149.000	131.000	90.000	☐	☐	1	☐	**C***
	6	50.000	165.000	130.000	90.000	75.000	165.000	130.000	90.000	☐	☑	1	☑	**C*S*
▷	7	80.000	170.000	130.000	0.000	80.000	195.000	130.000	0.000	☐	☑	1	☑	****S*
	8	75.000	200.000	130.000	−90.000	50.000	200.000	130.000	−90.000	☐	☑	1	☑	****S*
	9	45.000	195.000	130.000	−180.000	45.000	170.000	130.000	−180.000	☐	☑	1	☑	**CZS*
○	10									☐	☐		☐	

Update | Run | COPY | PASTE | + | − | Gerber

2. The initial coordinates have been input for the end point in the Point Edit Screen.

3. Tap the end point **[Move]** button and check the tip position after wear.



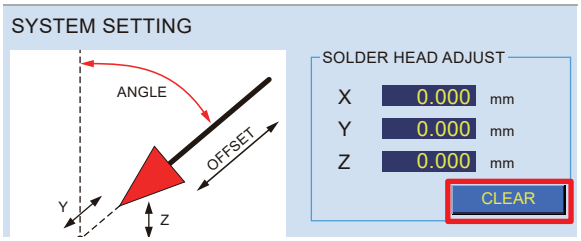
4. Use JOG operation to move the worn tip to the position where it can perform soldering, and perform settings again.

5. Determine the differences from the initial soldering position.

	Initial setting	Position after setting again	Difference
X axis	80.000 mm	79.000 mm	-1 mm
Y axis	195.000 mm	195.000 mm	0 mm
Z axis	130.000 mm	131.000 mm	1 mm

6. Input the differences in **SOLDER HEAD ADJUST** and finish writing the data.
During point soldering, the correction will be applied to both the start point and end point. It is also applied during cleaning.
For drag soldering, perform the correction while taking into account the movement from the start point to the end point.
In addition, even if values have been input in **SOLDER HEAD ADJUST**, the coordinates displayed while moving using the JOG operation, etc. will not include the corrections.

Tapping **[CLEAR]** will set all values to 0.000 (no correction). When the tip is replaced with a new one, be sure to set the correction values to 0. Then perform correction again. If it is used without doing this, there is a danger of damage to the workpiece.
After replacing the tip, perform **Steps 1** – **6** and input the differences between the initial soldering position and the soldering position for the replaced tip into **SOLDER HEAD ADJUST**.



* The above setting value is when $\theta = 0°$.

Determine the reference position and input the deviation at $\theta = 0°$, or use the following formulas to calculate the values.
The following formulas can be used to calculate the values.

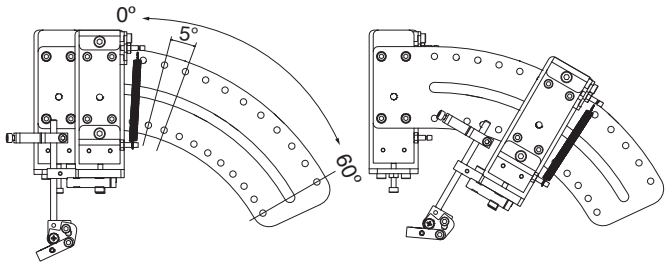
$$\text{X correction value } Xh_0 = \frac{(\cos\theta\Delta x - \sin\theta\Delta y)}{\{(\cos\theta)^2 + (\sin\theta)^2\}}$$

$$\text{Y correction value } Yh_0 = \frac{(\cos\theta\Delta y + \sin\theta\Delta x)}{\{(\cos\theta)^2 + (\sin\theta)^2\}}$$

Xh_0 : X-axis correction value of the system settings
Yh_0 : Y-axis correction value of the system settings
θ : θ position of the measured deviation
Δx : (X position after deviation - original X position)
Δy : (Y position after deviation - original Y position)

7-7-6-3 SOLDER HEAD ANGLE Function (Settable range: 0 – 90°)

The angle of the soldering iron unit attached in “5-2-1 Attaching the Feeder Unit (CX5040)” (p. 20) can be set.
When using offset, use this angle setting and determine the offset direction.
Be careful since the angle setting may cause the start point of the point for which offset was set to change.

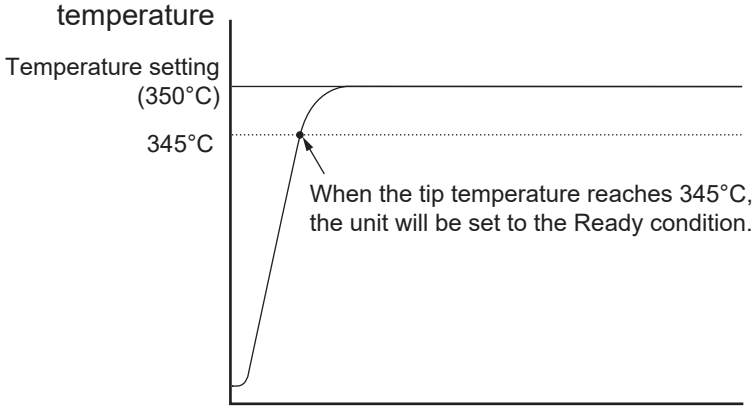


7-7-6-4 SOLDER UNIT

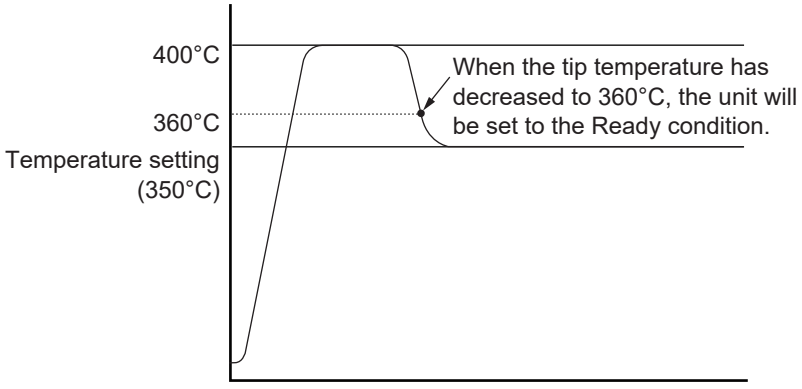
Performs connection with the station and setting of the temperature tolerance standard.
• When **[CONNECT]** is checked, the station will be connected.
• When **[CONNECT]** is unchecked, the station will not be connected.

When the tip temperature is judged to have reached the temperature differential between the set temperature and the upper limit tolerance or lower limit tolerance, the unit will be set to the Ready condition. If the upper limit tolerance of the **Temperature Tolerance standard** is such that the set temperature is lower than the current tip temperature, the lower limit will become the judgement standard when the temperature setting increases.

Ex. 1) Temperature setting: 350°C; Lower limit temperature tolerance: 5°C; Starting from room temperature



Ex. 2) Temperature setting: 350°C; Upper limit temperature tolerance: 10°C; Decreasing from 400°C

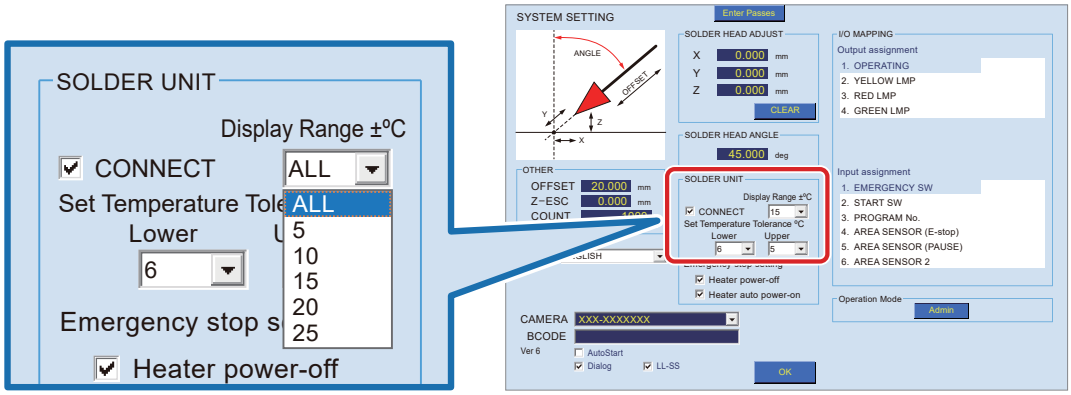


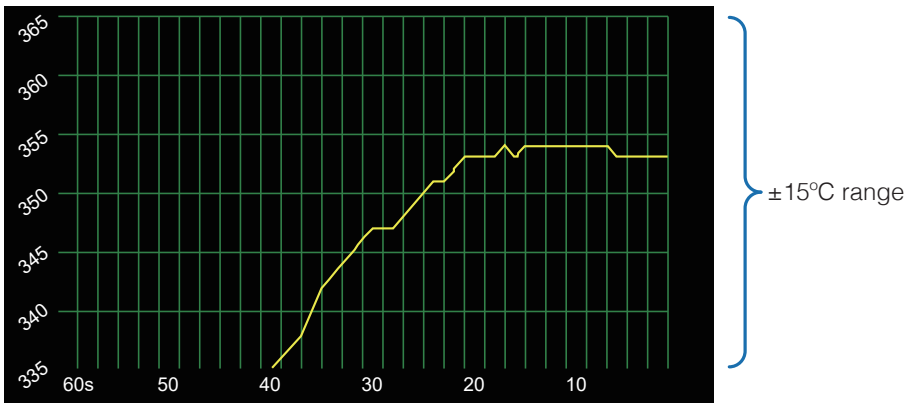
7-7-6-5 Temperature display range setting

⚠ CAUTION

If the optional part CX5039, “Camera Unit & Trace App”, is not installed, the graph will not be displayed.

If **[CONNECT]** in **[SOLDER UNIT]** is checked, the temperature display range of the graph that can be displayed is determined.
If the unit with a set temperature of 350ºC is connected and the display range of **[CONNECT]** is set to **[15]**, the graph will show a range of 335 to 365ºC.
Select **[ALL]** to display the 0 to 500ºC range on the graph.

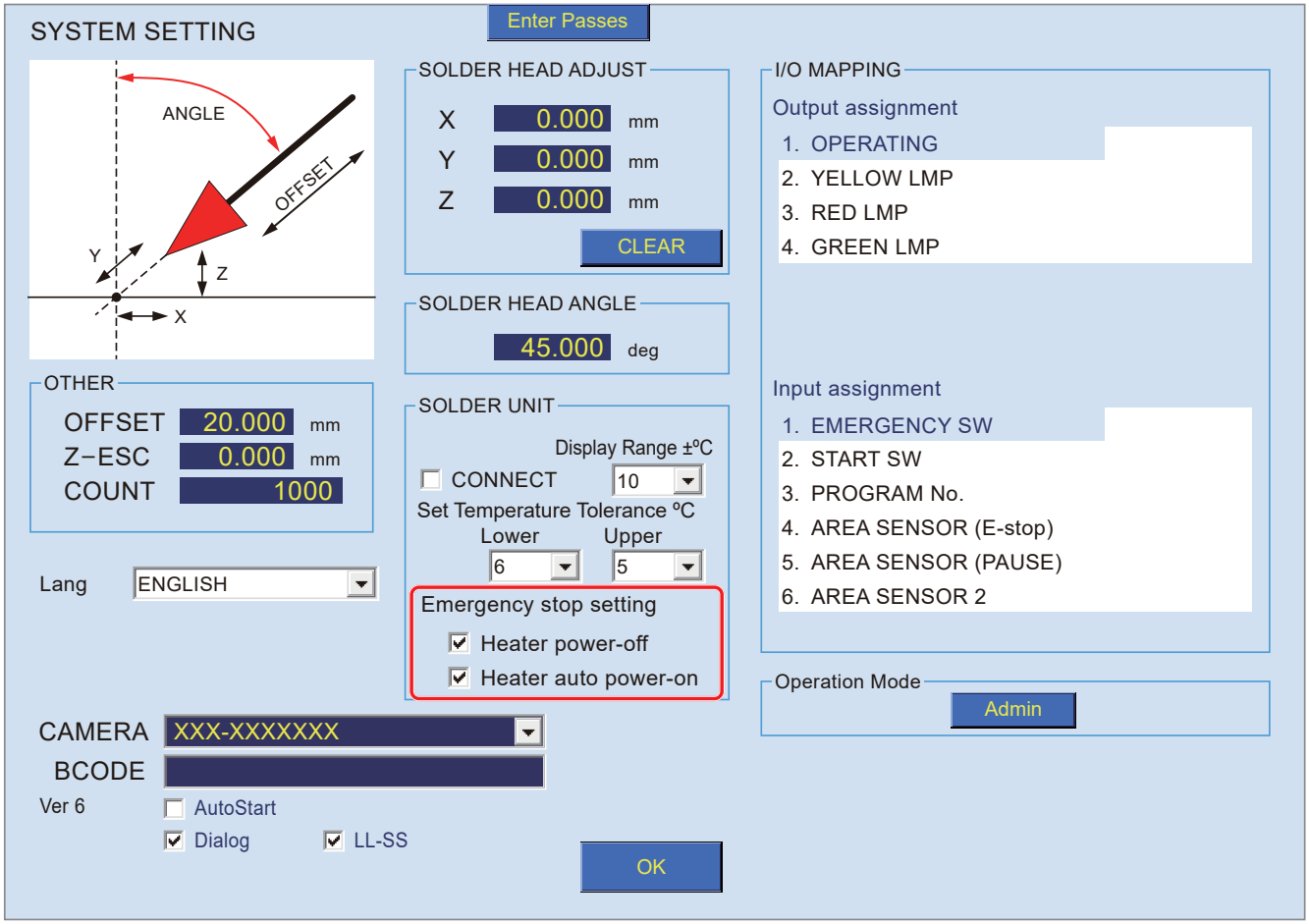




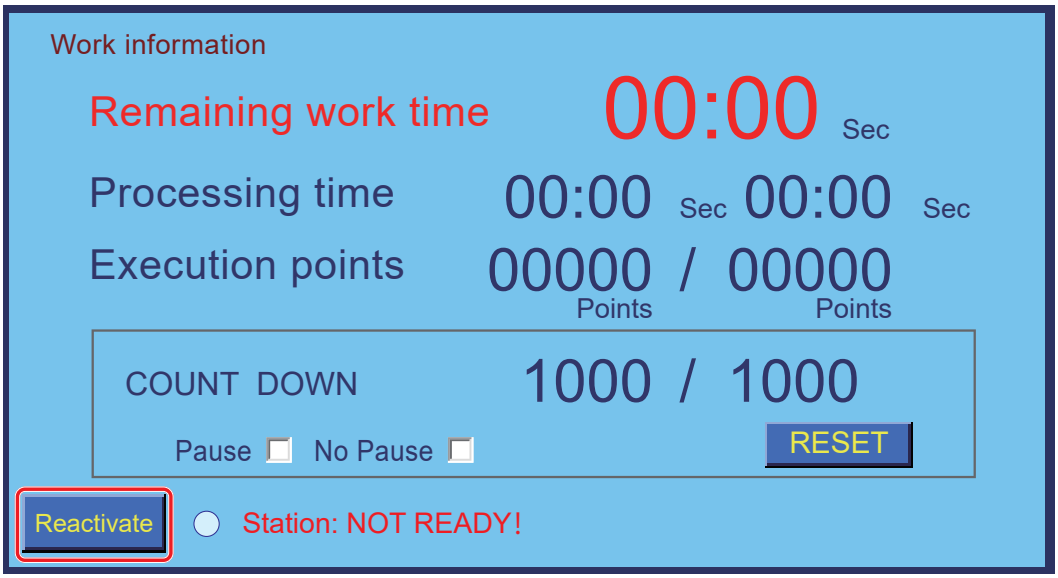
7-7-6-6 Emergency stop setting

Set the power on/off to the heater of the station during emergency stop.

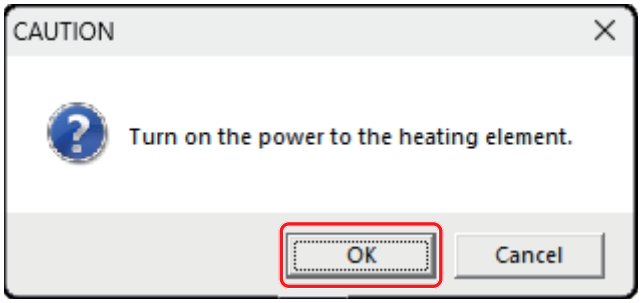
- If **[Heater power-off]** checkbox is checked, the station will be in emergency stop status and the power to the heater will be turned off when at emergency stop.
- If **[Heater power-off]** checkbox is unchecked, the station will keep its status when in emergency stop.
- If [Heater auto power-on] checkbox is checked, the station will automatically reactivate from the emergency stop status when emergency stop is released.
- If [Heater auto power-on] checkbox is unchecked, the station will require manual operation in order to reactivate from the emergency stop status when emergency stop is released.



1. Release the emergency stop button.
2. Press the **[Reactivate]** button.



3. A confirmation dialog will appear, press **[OK]**.
   * Press **[Cancel]** to keep the station in an emergency stop status.



About the message next to the reactivate button

•Station: NOT READY!

Displayed when not in the ready state, such as by changing the set temperature.
*It will not be in this state when the offset is changed.
*It will not be in this state if the temperature is changed by solder conditions.

•Station: OFFLINE!!

Displayed when there is no communication with the station, or when power is first turned on, until the ready state is reached.

Station: TEMP = *** °C

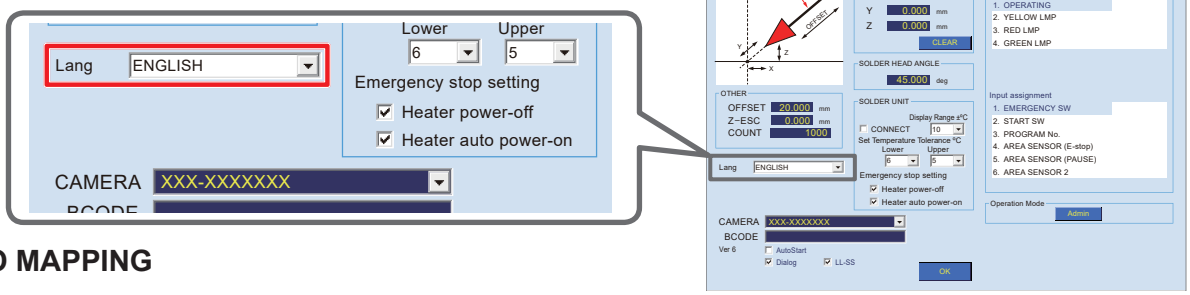
Displayed when the station is connected. Displays the sensor temperature of the current tip.

•Station: TEMP = *** (***)°C

Displayed when the temperature is changed by solder conditions. The front number is the sensor temperature of the tip. The rear number is the set temperature changed by the solder condition.

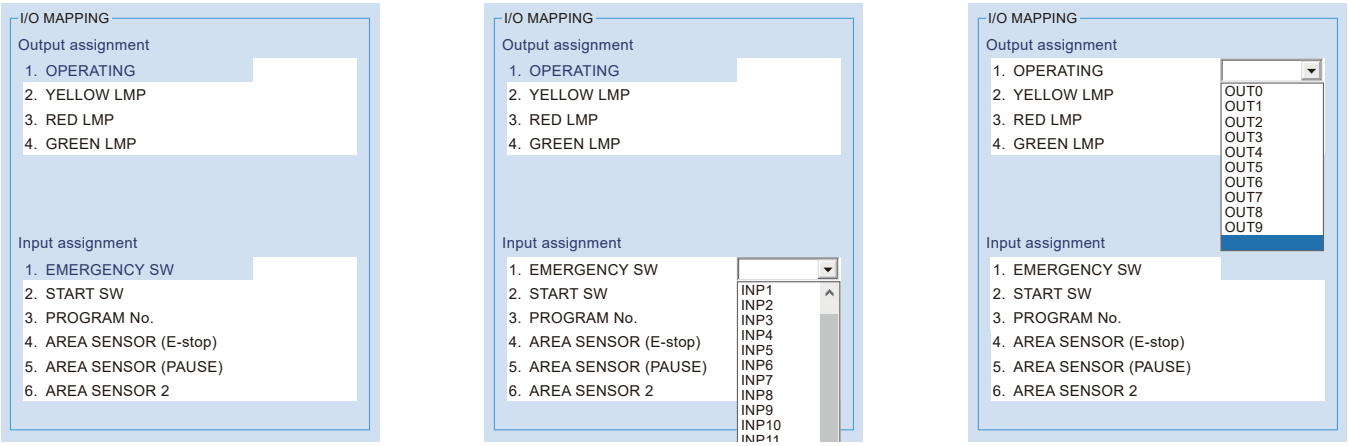
7-7-6-7 Lang (Change of the language)

The indication of the screen becomes the selected language.



7-7-6-8 I/O MAPPING

Performs I/O connection settings for peripheral devices such as external emergency stop devices, etc.



The I/O list is shown in a pull-down list, so output signals can be assigned to the following peripheral devices by selecting the I/O number to be set.
If duplicate numbers are selected, a warning message will be shown. In such case, select a different number.

■ **Output assignment**

1.	OPERATING:	Lit while the program is running (Lit when the program is paused.)
2.	YELLOW LMP:	Lit when the program is not running. (Lit when the program is paused.)
3.	RED LMP:	Blinking until the program is resumed or stopped after being paused due to a solder feed, soldering iron or measurement timeout errors while the program is running. Lit when the program is stopped. (emergency stop)
4.	GREEN LMP:	Blinking while the program is running. (Blinking while the program is paused.)

■ **List of output states**

		When the program is not running	While the program is running	While the program is paused	When the program is paused due to solder feeding, soldering iron, or measurement timeout errors during execution.	When the program is emergency stopped
1.	OPERATING:	●	○	○	○	●
2.	YELLOW LMP:	○	●	○	○	○
3.	RED LMP:	●	●	●	◎	○
4.	GREEN LMP:	●	◎	◎	◎	●

○ : Lit ◎ : Blink ● : Off

* While the program is running, DRY RUN is included.
* The stop includes the START/PAUSE/STOP button on the PC, start input while driving, an area sensor (stop).
* The emergency stop includes emergency stop inputs, area sensor (emergency stop) and area sensor 2.

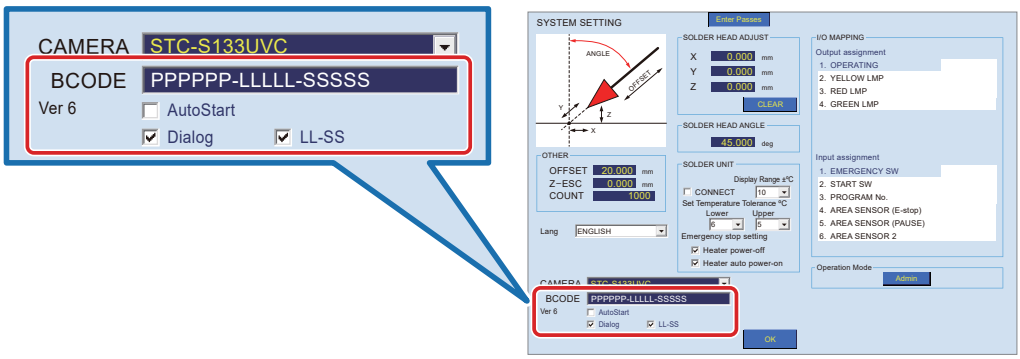
■ **Input assignment**

1.	EMERGENCY SW:	Performs emergency stop.
2.	START SW:	Starts the soldering program.
3.	PROGRAM No.:	When the program number is selected, the program corresponding to the input number PROGRAM NO. (set in the Bar Code Settings Screen) will be called up.
4.	AREA SENSOR (E-stop):	Performs emergency stop when something is detected by an area sensor.
5.	AREA SENSOR (PAUSE):	Performs pause when something is detected by an area sensor.
6.	Area sensor 2*1:	Performs emergency stop when something is detected by an area sensor while a program is running.

*1 Area sensor (emergency stop) performs an emergency stop when something is detected by the sensor regardless of the robot status, but area sensor 2 performs an emergency stop only while a program is running.

NOTE When values are changed in the System Settings Screen, if there is a program that was already read in, the program will be rescanned when the screen is closed.

7-7-6-9 Barcode setting



BCODE setting box

In calling the soldering program by barcode, data in the barcode data can be selected.

1. Part number setting (P): When **"P (single-byte capital letter P)"** is entered in the BARCODE setting box in the system setup, that part is recognized as the part number. This is used for program search.
2. Lot setting (L): When **"L (single-byte capital letter L)"** is entered in the BARCODE setting box in the system setup, the part is recognized as the lot number.
3. Serial setting (S): When **"S (single-byte capital letter S)"** is entered in the BARCODE setting box in the system setup, that part is recognized as a serial number.

* If there is no **"P"**, **"L"**, or **"S"**, the program is searched with all the data read.
* Lowercase letters **"P"**, **"L"**, and **"S"** are not recognized.
* Double-byte characters **"P"**, **"L"**, and **"S"** are not recognized.
* If any characters other than **"P"**, **"L"**, or **"S"** are entered, the part of the data is not recognized.

The part number, lot, and serial settings don not have to be in any particular order, but they must be consecutive.

Make the combination with those letters and set the same digits of characters as the data to read.

	1 - 5						8 - 11					13 - 19						
Example 1) Barcode setting:	P	P	P	P	P	#	#	L	L	L	L	#	S	S	S	S	S	S	S
Data :	F	X	9	7	1	0	1	2	1	0	4	S	1	2	3	4	5	6	7

In **example 1**, the data from the 1st to 5th digits is recognized as the part number, the data from 6 to 7th position is ignored, and the data from 13th to 19th position is recognized as the serial number.

Therefore, the application searches the program for **"FX971"**, and recognized the lot number of **"2104"** and the serial number of **"1234567"**.

	1 - 3				5 - 6								
Example 2) Barcode setting:	S	S	S	#	P	P	#	#	#	#	#	#	#
Data :	0	2	5	@	9	6	a	b	c	d	e	f	g	h

In **example 2**, the data from 1st to 3rd digits is recognized as the serial number, the data for 4th digits is ignored, the data from 5th to 6th digits is recognized as the part number, and the data beyond 7th digits is ignored. There is no data for lot number.

❖ 1 If the read data is shorter than the barcode setting

1. If the data for serial number is shorter than the serial number setting part

Example 3) Barcode setting : L L L L L L P P P P P P P * * S S S S S
(19 - 21)
Data : 2 1 0 3 0 9 F X 9 7 1 - 0 1 K L 0 3

In **example 3**, the data from the 19th to 21st digits, that is supposed to be a part of the serial number, is missing.

In this case, the application searches for the program registered under **"FX971-01"**, and since only the lot number setting part has the same number of digits as the data, it recognizes only the lot number **"210309"**.

2. If the data for lot number is shorter than the lot number setting part

Example 4) Barcode setting : * S S S S S P P P P P P P * L L L L L L
(19 – 21)
Data : L 0 3 0 0 5 F X 9 7 1 - 0 1 K 2 1 0

In **example 4**, the data from the 19th to 21st digits, that is supposed to be a part of the lot number, is missing.

In this case, the application searches for the program registered under **"FX971-01"**, and since only the serial number setting part has the same number of digits as the data, it recognizes only the serial number **"03005"**.

3. If the data for part number is shorter than the part number setting part

Example 5) Barcode setting : L L L L L L P P P P P P P P * * S S S S S
(12 - 14) (17 - 21)
Data : 2 1 0 3 0 9 F X 9 7 1

In **example 5**, the data from the 12th to 14th digits, that is supposed to be a part of the part number, is missing.

In this case, the application searches for the program registered under **"210309FX971"**.

❖ 2 If the read data is longer than the barcode setting

Example 6) Barcode setting : * S S S S S P P P P P P P P * L L L L L L
(1 - 21)
Data : L 0 3 1 5 6 F X 9 7 1 - 0 1 K 2 1 0 3 1 5 a b c d e f g h

In **example 6**, the data from the 22nd digits and beyond is ignored. In this case, the application recognizes the part number, lot number and serial number in the data from the 1st to 21st digits.

In this case, the application searches for the program registered under **"FX971-01"**, and it recognizes the lot number **"210315"** and serial number **"03156"**.

Other setting

• AutoStart setting

If there is a program that matches the barcode read, the program is read and starts automatically.

* If an error is found during the error check, the program does not start.
* If **[Dialog]** was checked, the read confirmation dialog box will be displayed.
  When press the **[OK]** button, it will start reading and start if there are no problems.
* Even if **[Dialog]** is checked, it will not be displayed if the same program as the part number setting is read.
  In this case, if the **[AutoStart]** is checked, the program will start automatically.

• Dialog setting

If there is a program that matches the barcode read, the dialog appears to confirm loading the program.

* The dialog does not appear if the same program as the part number setting is read.
* The **[Dialog]** will be automatically unchecked when **[AutoStart]** is checked.
* The **[Dialog]** can be checked after the **[AutoStart]** is checked.

• LL-SS setting

If the lot and serial numbers are entered in the BCODE setting box, the lot and serial numbers are added to the folder name when Trace data is saved.

* If the LL-SS setting is checked, the folder name will be created in the order of **“Program name-Datetime (YYYYMMhhmmss)_L (Lot)_S (Serial)”**.
* The folder name will be created in the order of **“Program name-Datetime (YYYYMMhhmmss)”** by default.

Example) Program name : FX971 soldering

Barcode setting: P P P P P # # L L L L # S S S S S S S

Data : F X 9 7 1 0 1 2 1 0 4 S 1 2 3 4 5 6 7

Folder name for saving the Trace data

: FX971 soldering-202104019000_2104_1234567

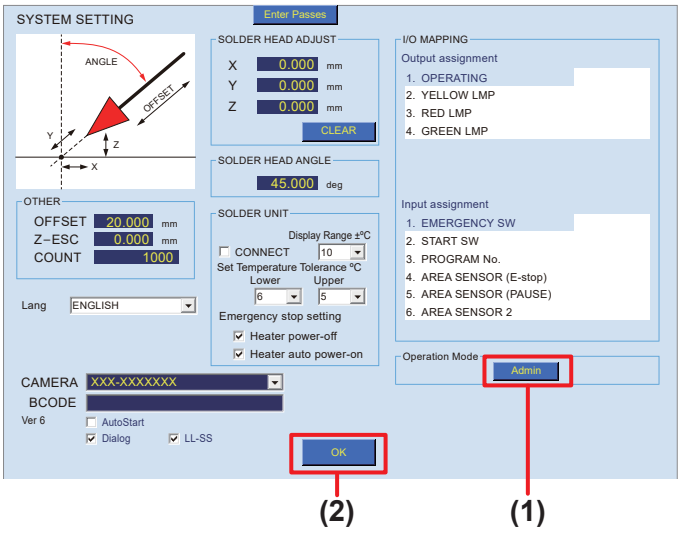
7-7-6-10 Operation Mode

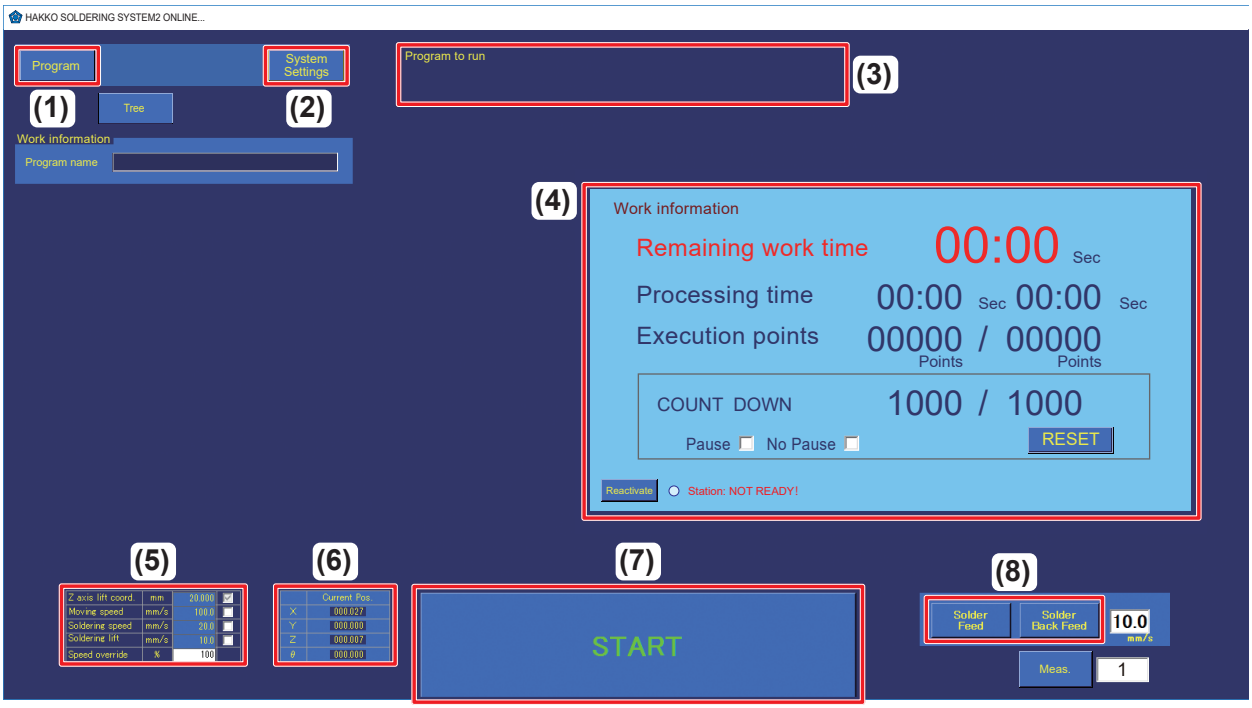
Admin mode or Operator mode can be selected for Operation Mode.

■ **Operator mode**

The functions which can be used in Operator mode are limited.

1. In the System Settings screen, tap **[Admin] (1)**. It will change to **[Operator]**.
2. Tap **[OK] (2)** to switch the mode and close the screen.





Software top screen (Operator mode)

In Operator mode, the following functions can be used.

(1) Program (Call up the selected program.)

(2) System Settings
(Operation Mode settings can be performed.)

(3) Program to run
(Display the program which was called up.)

(4) Work information
(COUNT DOWN reset/pause function cannot be used.)

(5) Settings (Only speed override can be set. For details, refer to (5a) “Speed override” (p. 68))

(6) Position (Display only)

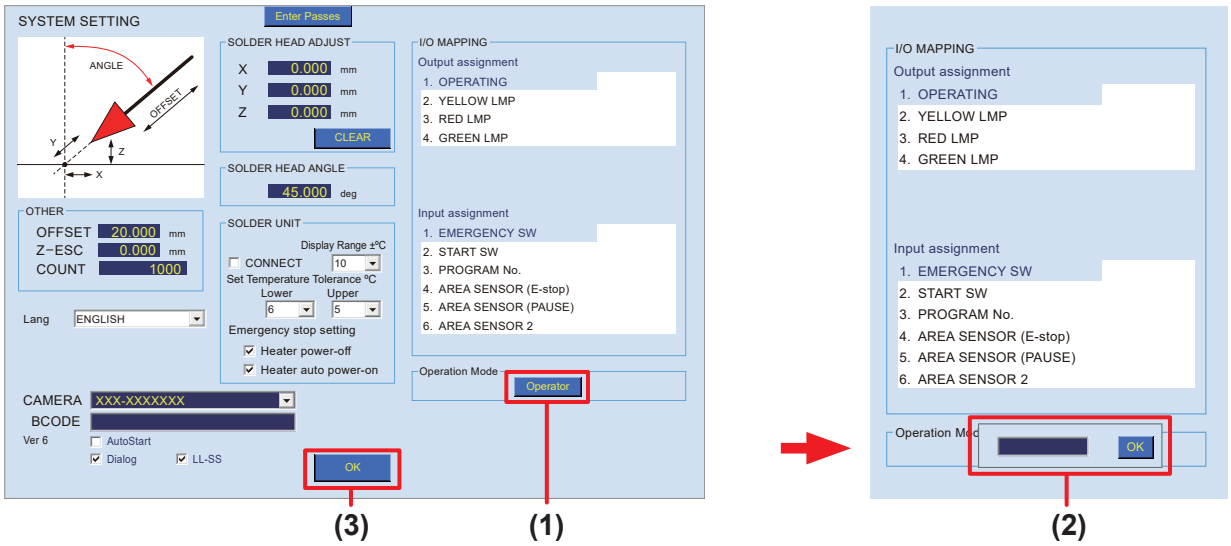
(7) Start button
(Execution of program which was called up)

(8) Solder Feed/Solder Back Feed
(Use of solder feeding/retraction and speed setting can be performed.)

■ Admin mode

In Admin mode, all functions can be used.
For details, refer to “7-1 Explanation of Software Screen” (p. 55).

1. In the System Settings screen, tap **[Operator] (1)**. The password input box will appear.
2. Input the password and tap **[OK] (2)**. **[Operator]** will change to **[Admin]**.
3. Tap **[OK] (3)** to switch the mode and close the screen.

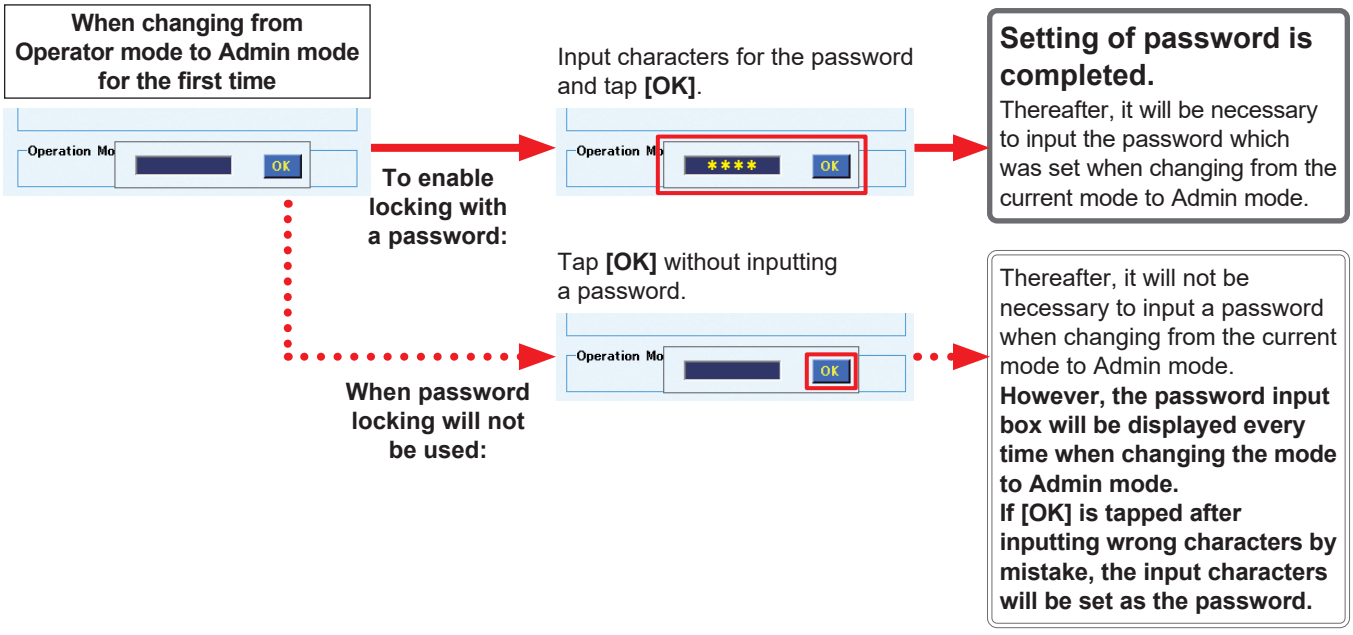


■ Setting password

When changing from Operator mode to Admin mode, the password input box will be displayed.

When setting a password:

- Inputtable characters: Single-byte alphanumeric characters and symbols
- Maximum number of inputtable characters: No limit



⚠ CAUTION

Please manage the password strictly and be careful that it is not given to other people.

When the software is restarted after shutting down, it will start up in the mode which was selected when the software was shut down the previous time.

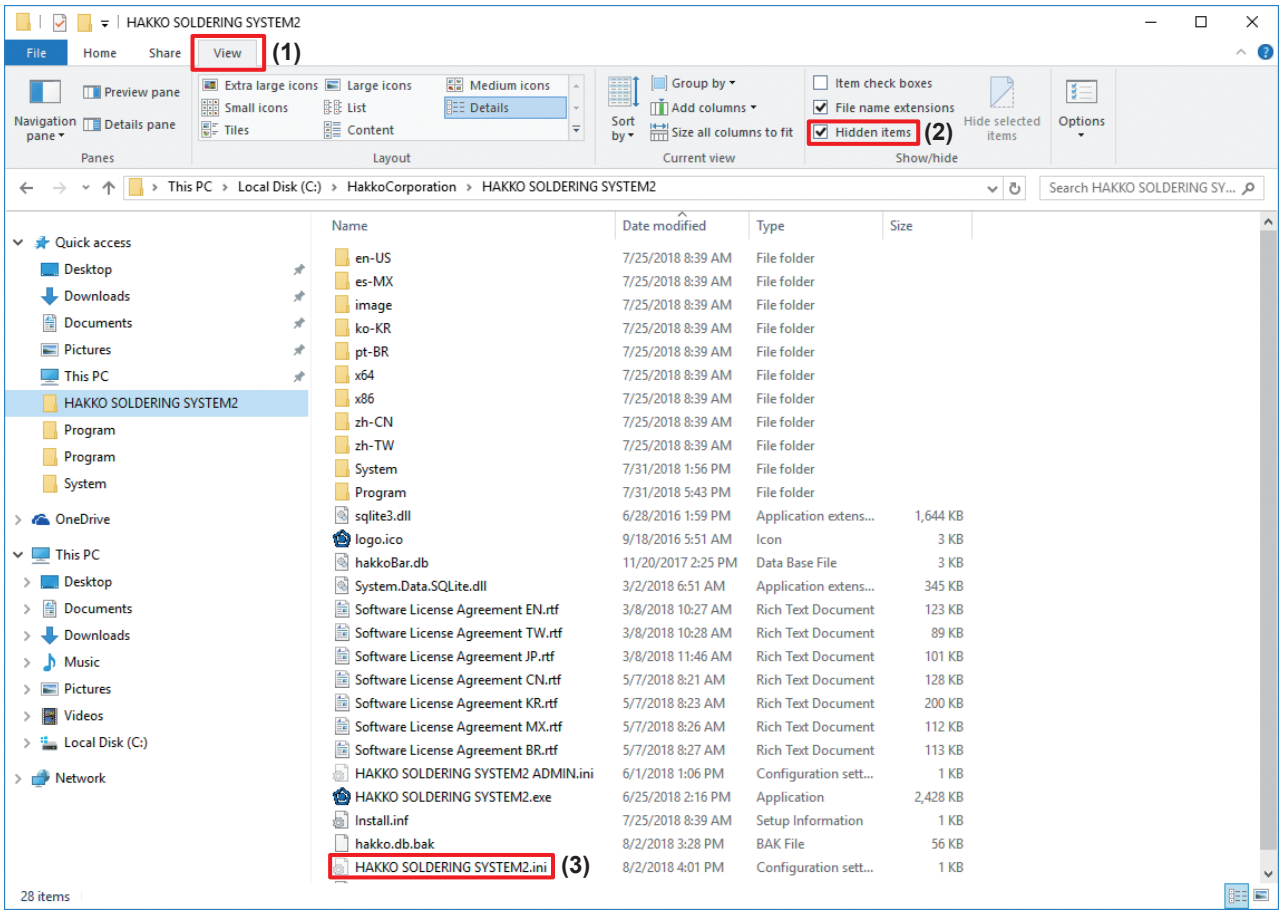
■ Password reset

To change the password or if the set password is forgotten, the password can be reset by the following steps.

1. Tap the “This PC” icon on the desktop and open the C: drive.
   Next, open the HakkoCorporation folder and then open the HAKKO SOLDERING SYSTEM2 folder.

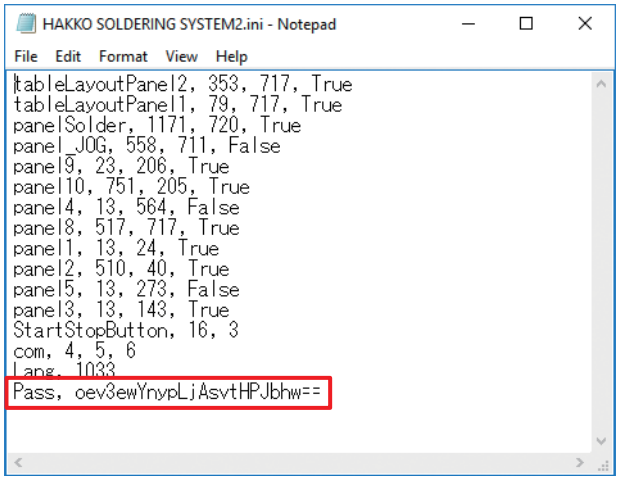
2. Select **View (1)** and check **Hidden items (2)** to show hidden files.

3. Double-tap **“HAKKO SOLDERING SYSTEM2.ini” (3)**.

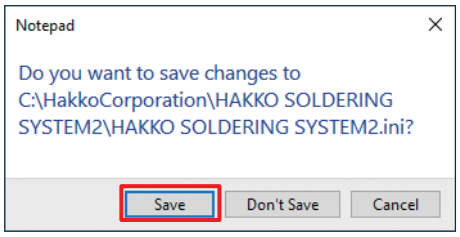


4. Select **Notepad** as the software to open the file.

5. Delete the final line starting with “Pass,”.



6. When closing Notepad, tap **[Save]**.



The password will be reset by the above steps.

⚠ CAUTION

Do not touch other lines in the file because deleting or changing other lines will prevent the program from operating normally.

7-7-7 Changing Solder Diameter

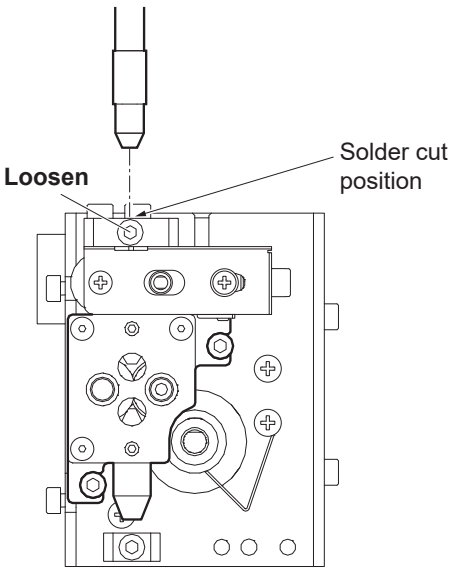
The solder wire diameter can be changed by replacing the tube unit, Fluoroplastic tube, solder feed guide set, and solder feed pulley unit.

* The solder feed guide set, Fluoroplastic tube, and solder feed pulley unit are sold separately. Use the parts corresponding to the solder wire diameter which will be used.

⚠ CAUTION

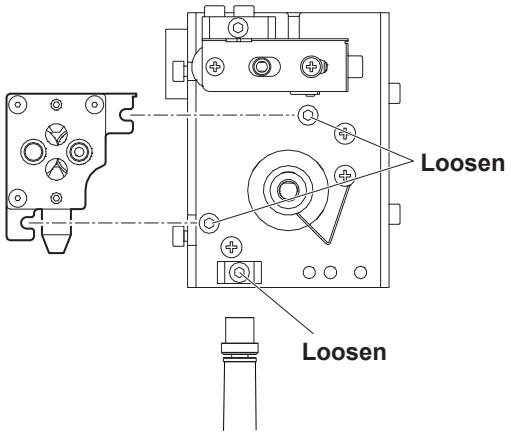
- Do not use solder other than the compatible wire diameter. Doing so will cause a malfunction. The attachment method of the solder feed pulley unit for Φ0.3 mm solder (BX1076) is different. Refer to the instruction manual for BX1076.
- First, switch off the power of the soldering iron unit HF-600 and let the tip cool down to room temperature before performing work. Performing work while the tip is hot risks causing burns.

1. Open the feeder unit cover and loosen the screw. Remove the tube unit and cut the solder.

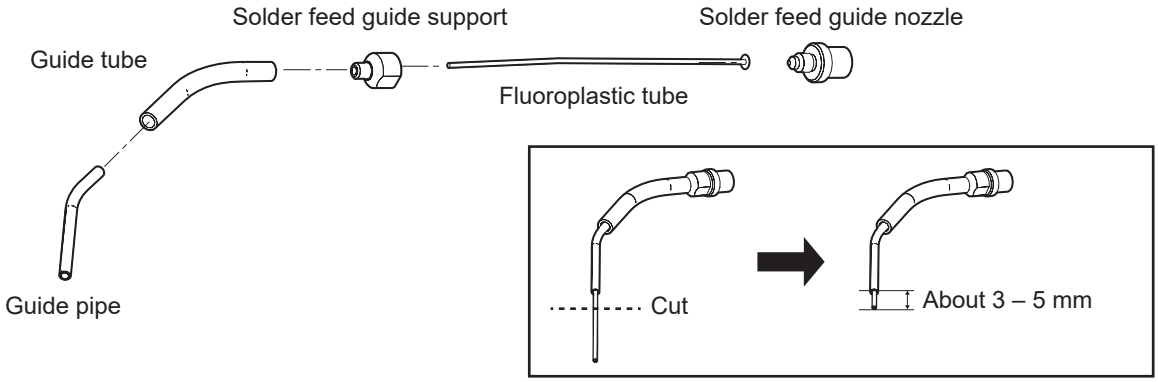


2. Open the Solder Feed Parameter Setting Screen from **[Soldering Conditions]**, tap **[Solder Feed]**, and feed the cut solder out. Since the solder will stop after it feeds out a little, tap **[Solder Feed]** again and when the tip of the solder sticks out a little, pull it out.
For solder remaining in the solder wire spool, turn the spool and wind the solder back onto the spool.

3. Loosen the screws indicated in the diagram below, and remove the tube unit B, and solder feed pulley unit. Further, remove the Tube unit B and solder feed guide set from the soldering unit mount. Attach the units for the solder diameter which will be used. (For the solder feed guide set, install the Fluoroplastic tube for the solder diameter which will be used before attaching the solder feed guide set.)
For details on the parts compatible with solder wire diameters, refer to “11. Parts List” (p. 170).



7-7-8 Installing the Fluoroplastic Tube



Turn the solder feed guide nozzle counterclockwise and remove the solder feed guide support so that the Fluoroplastic tube can be installed. Insert the guide pipe last.
The Fluoroplastic tube is made somewhat long. Cut the excess length of the Fluoroplastic tube protruding from the guide pipe to an appropriate length (about 3 – 5 mm).

⚠ CAUTION

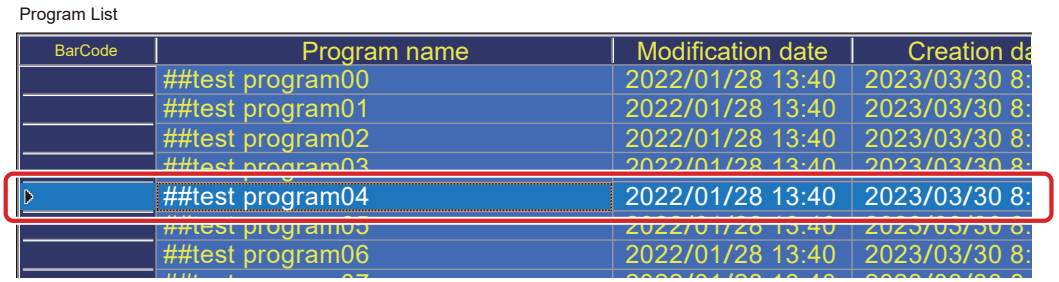
Make sure that the Fluoroplastic tube protrudes from the guide pipe before use. If it does not, it could cause solder clogging.
When cutting, use a cutter knife or similar tool instead of scissors so that the cross-section is not crushed.

7-8 Delete/copy program

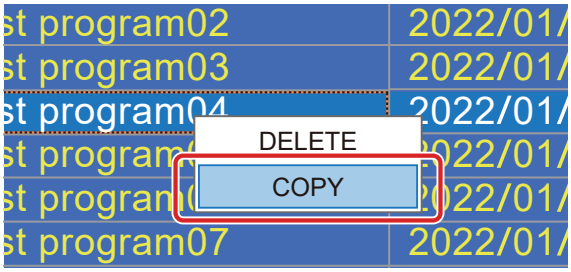
It is possible to copy and delete soldering programs from **“Program List”**.

Program copy

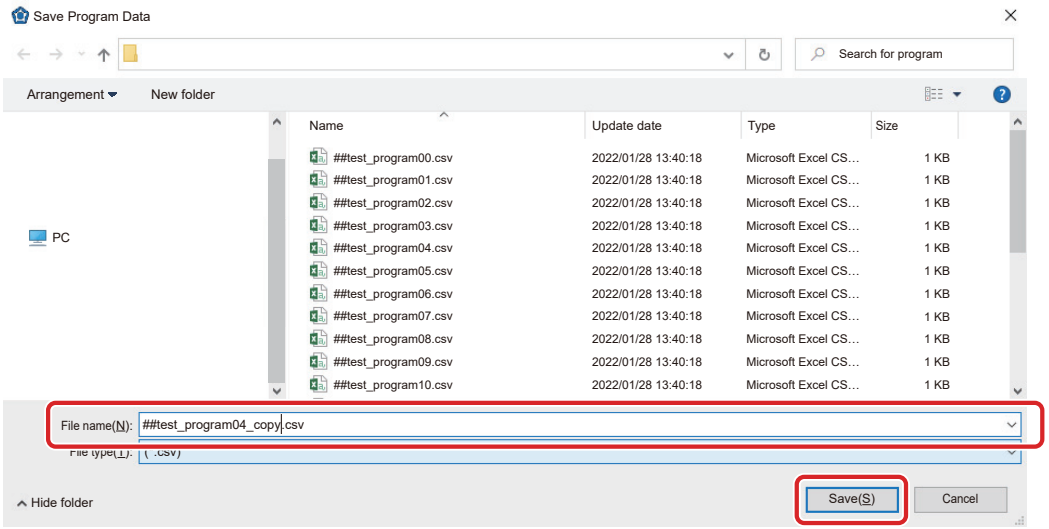
1. Select the program to be copied from **“Program List”**.
   The entire line will change color, and operate on in that state.



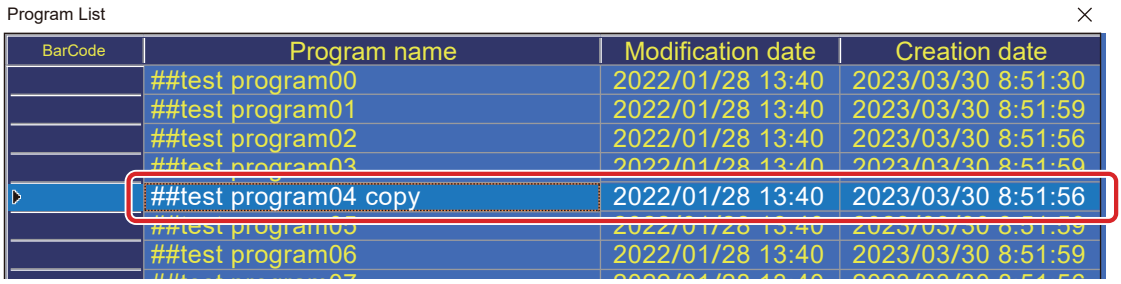
2. Press and hold the screen until a square frame appears over the selected line.
   * In mouse operation, right-click.
3. When releasing the finger, the **“DELETE / COPY”** menu appears.
4. Touch **[COPY]**.



5. The file save window appears.
6. Enter the new name.
7. Press **[Save]** to close the window.



8. The copied program appears in **“Program List”** and copying is complete.



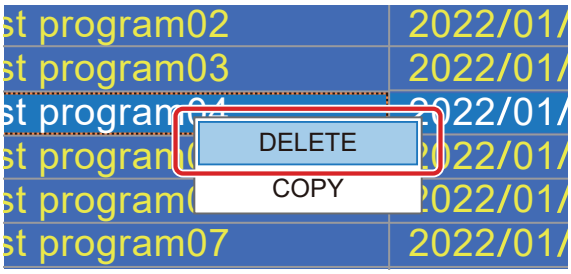
Program deletion

1. Select the program to delete from **“Program List”**.
The entire line will change color, and operate on in that state.

2. Press and hold the screen until a square frame appears over the selected line.
*In mouse operation, right-click.

3. When releasing the finger, the **“DELETE / COPY”** menu appears.

4. Touch **[DELETE]**.



5. The dialog to confirm the deletion will appear. If there is no problem, press **[OK]**.

6. The program is deleted from **“Program List”**.

7-9 Automatic temperature measurement and adjustment function (CX5041)

Connecting CX5041 (automatic temperature measurement and adjustment system) to HU-200 allows automatic measurement of tip temperature, tip to ground resistance, and tip to ground potential, as well as automatic correction of tip temperature. The measurement results can be recorded with the supplied software.
For more information, refer to the CX5041 instruction manual.

8-1 Attached Accessories

The maintenance items for the various equipment are described below.

8-1-1 Cleaner (CX1003)

For details on maintenance of the cleaner, refer to “5. Maintenance” in the instruction manual of the CX1003.

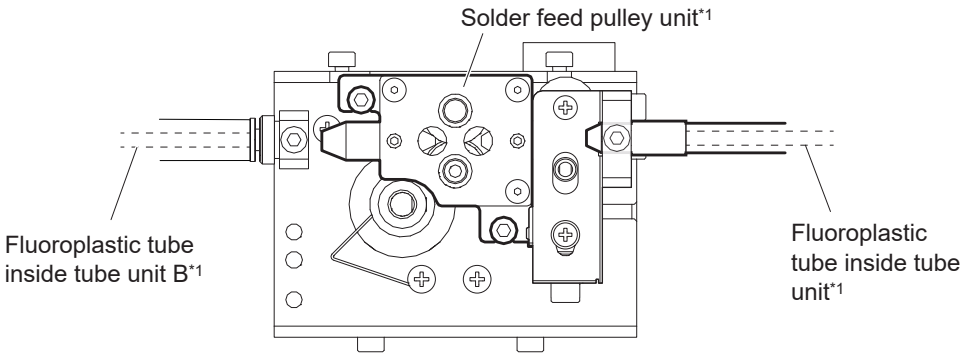
8-1-2 Soldering Iron Unit (HF-600)

For the soldering iron unit, maintenance of the tip and soldering iron unit should be performed.
Refer to “Maintenance” in the instruction manual of the soldering iron unit HF-600

8-1-3 Feeder Unit (CX5040)

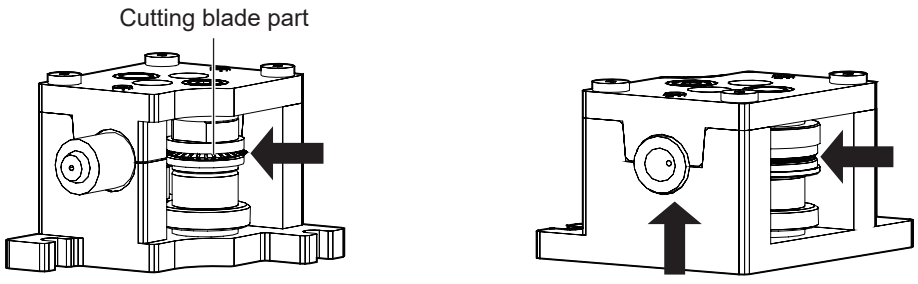
As a general rule, the following inspection and cleaning items should be performed when the solder is replaced.

- If there is solder or flux stuck on the Fluoroplastic tube or inside the solder feed pulley unit, use a brush or alcohol to remove it.
- If the Fluoroplastic tube is broken or extremely dirty, replace it.
- Regardless of when maintenance is performed, if the cutting amount is insufficient or if spattering of solder balls, etc. is occurring, it is possible that the cutting blade has reached its service life. Replace the solder feed pulley unit.
- If the tube unit is broken or if the inside of the Fluoroplastic tube is worn or broken, replace the tube unit.



*1 It is not possible to replace only the cutting blade inside the solder feed pulley unit or the Fluoroplastic tubes inside the tube unit or tube unit B.

Locations where dirt is likely to stick



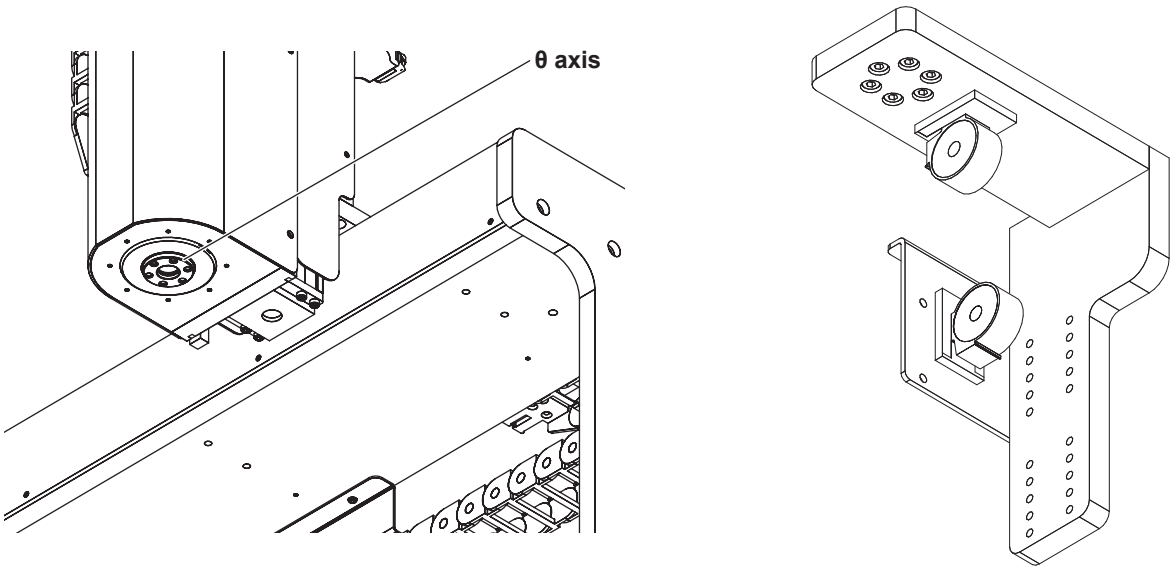
⚠ CAUTION

Be careful not to touch the cutting blade part.

* If the “Solder feed unit error” (p. 165) is not resolved even after performing the above maintenance, the sensor roller assembly may have deteriorated. Replace the sensor roller assembly (BX1075).

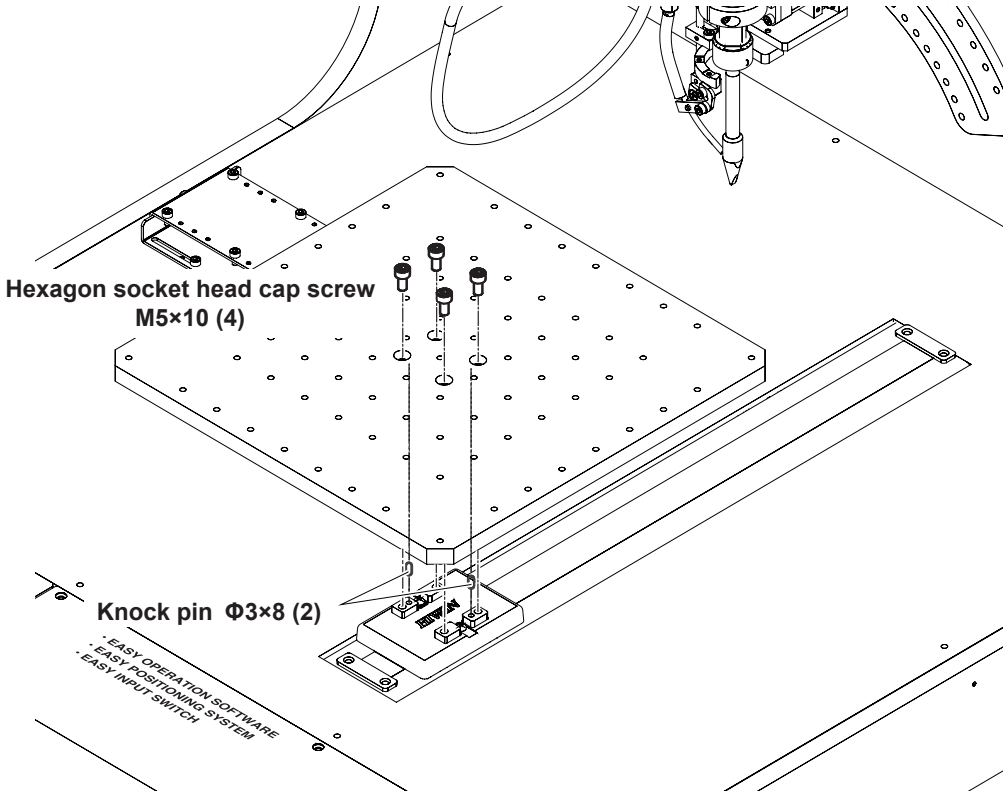
8-1-4 Soldering Unit Fixture Base (CX5002)

If solder or flux is stuck on the soldering unit fixture base (CX5002) or θ axis, use a brush or alcohol to remove it.
Falling parts or contact with parts may cause warping or scratching. If the warping or scratching is extreme, remove the damaged parts and replace them with new ones.



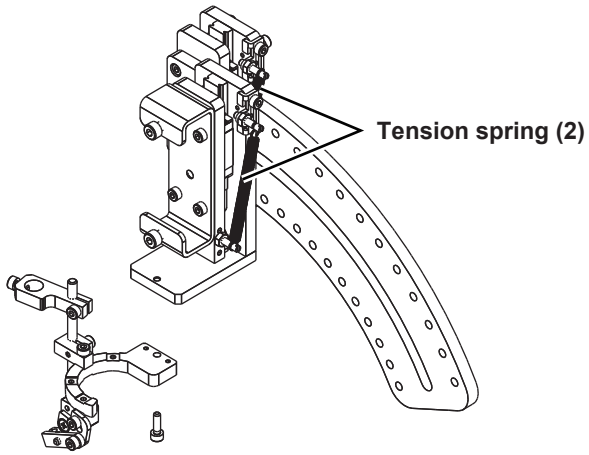
8-1-5 Jig Table

The jig table may become warped or scratched due to falling parts or contact with parts. If the warping or scratching is extreme, remove the damaged parts and replace them with new ones.

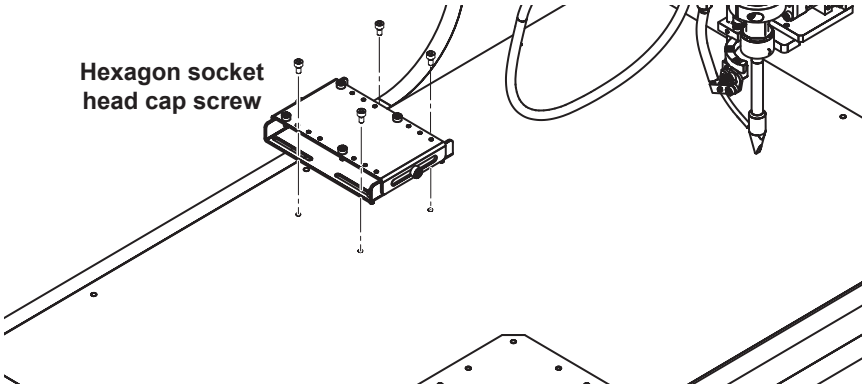


8-1-6 Soldering Unit Mount (CX5004)

If solder or flux is stuck on the soldering unit mount (CX5004) or θ axis, use a brush or alcohol to remove it. If solder or flux is stuck on other areas, use a brush or alcohol to remove it in the same way. If the tension springs of the soldering unit mount (CX5004) deteriorate or wires break, replace the soldering unit mount (CX5004) with a new one.



8-1-7 Cleaner Base (CX5003)



⚠ CAUTION

The various parts use hexagon socket head cap screws with different dimensions.
Be careful to manage the parts separately when replacing parts so that they do not get mixed up.

8-2 Inspection Items and Inspection Frequency

Periodic maintenance should be performed in order to use the products for a long time in good condition.

⚠ WARNING

Unless otherwise specified, all of the work described below should be performed with the main power switched off. When performing internal inspection or replacing parts, also unplug the power cord.

Perform maintenance inspection as follows:

External visual inspection	Every time at the start of work
Internal inspection	Every 6 months after starting operation
Grease replenishment	Every 3 months

NOTE When short-distance movements are performed repeatedly in use, there is a risk of the film of lubrication becoming broken. Periodically perform multiple full-stroke movements.

8-2-1 Items to be Checked during External Visual Inspection

When performing external visual inspection, check the following items:
- That none of the product's screws, nuts, etc. are loose.
- That none of the cables are damaged and that they are all firmly plugged in.
- That there are no abnormal noises or vibrations

⚠ CAUTION

- Since dust getting into gaps may cause malfunctions, do not blow strongly with pressurized air during cleaning.
- Do not use petroleum-based solvents. They can damage painted surfaces.

8-2-2 Cleaning during External Visual Inspection

- Outer surfaces should be cleaned whenever they are dirty.
- Wipe off dirt using a soft cloth, etc.
- If dirt is remarkable, use alcohol, etc. to wipe it off.

8-2-3 Internal Inspection

When performing internal visual inspection, check the following items:
- That none of the product's screws, nuts, etc. are loose.
- The lubrication condition of guide parts and that they are not dirty or contaminated with foreign materials such as dust, etc.
- The lubrication condition of the ball screw section and that it is not dirty or contaminated with foreign materials such as dust, etc.

If the grease is dirty due to dust or is not shiny, or the grease has become worn out due to long-term use, clean all of the parts and then replenish the grease.

8-2-4 Cleaning during Internal Inspection

Wipe off dirt using a soft cloth, etc.

⚠ CAUTION
● Since dust getting into gaps may cause malfunctions, do not blow strongly with pressurized air during cleaning. ● Do not use petroleum-based solvents, neutral detergent, or alcohol.

8-2-5 Replenishing Grease

Use the following grease.

AX1002 (for general-purpose)

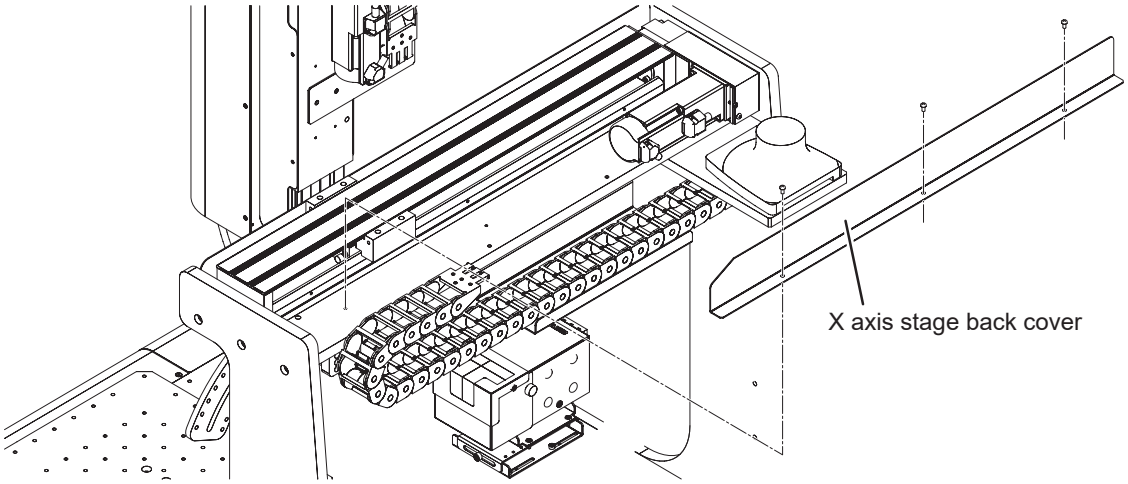
Color	Brown
Base oil	Mineral oil
Thickener	Lithium soap based
Operating temperature range	-15 – 120°C
Consistency (0.1 mm)	265 – 295
Viscosity (40°C)	200 cSt
Boiling point	190°C

NOTE Use only grease of the specified type or specifications.

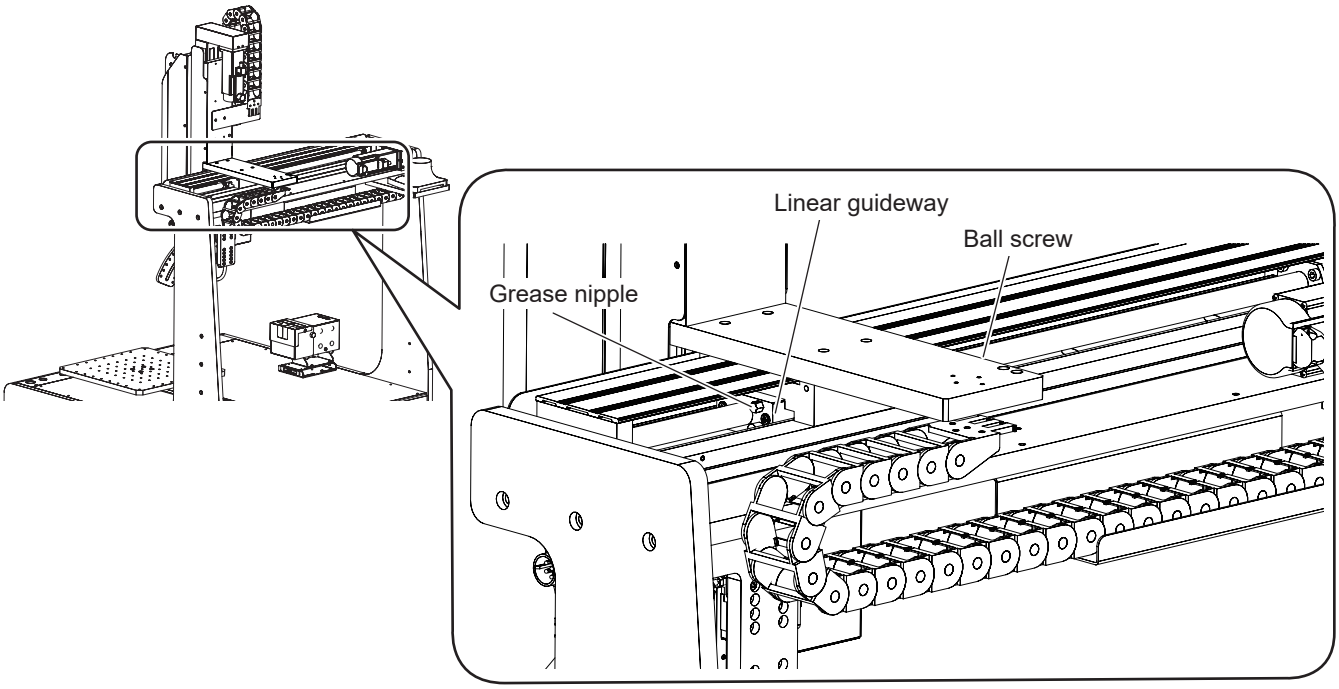
⚠ CAUTION
After replenishing grease, wash hands well with soap and water. If grease somehow gets in eyes, immediately consult a medical specialist and receive appropriate treatment.

8-2-5-1 X Axis

1. Remove the X axis stage back cover.



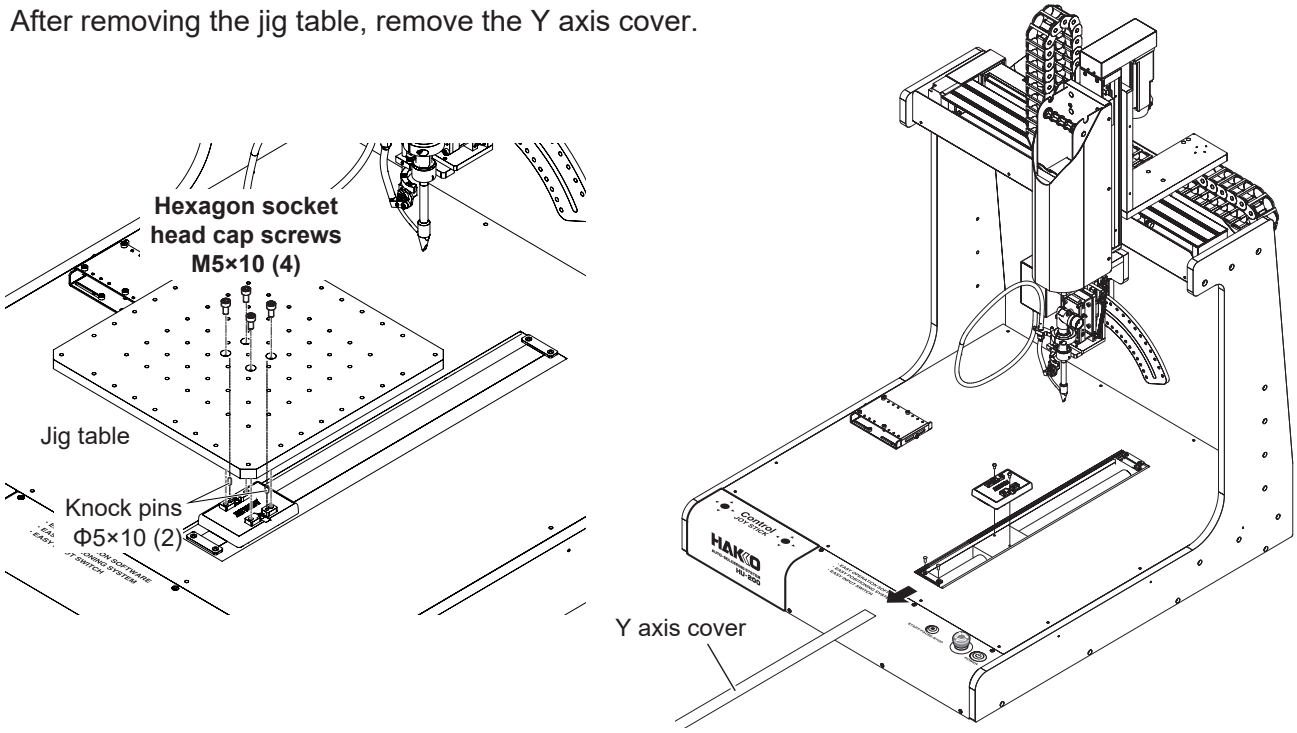
2. Replenish grease (AX1002) on the ball screw and linear guideway.



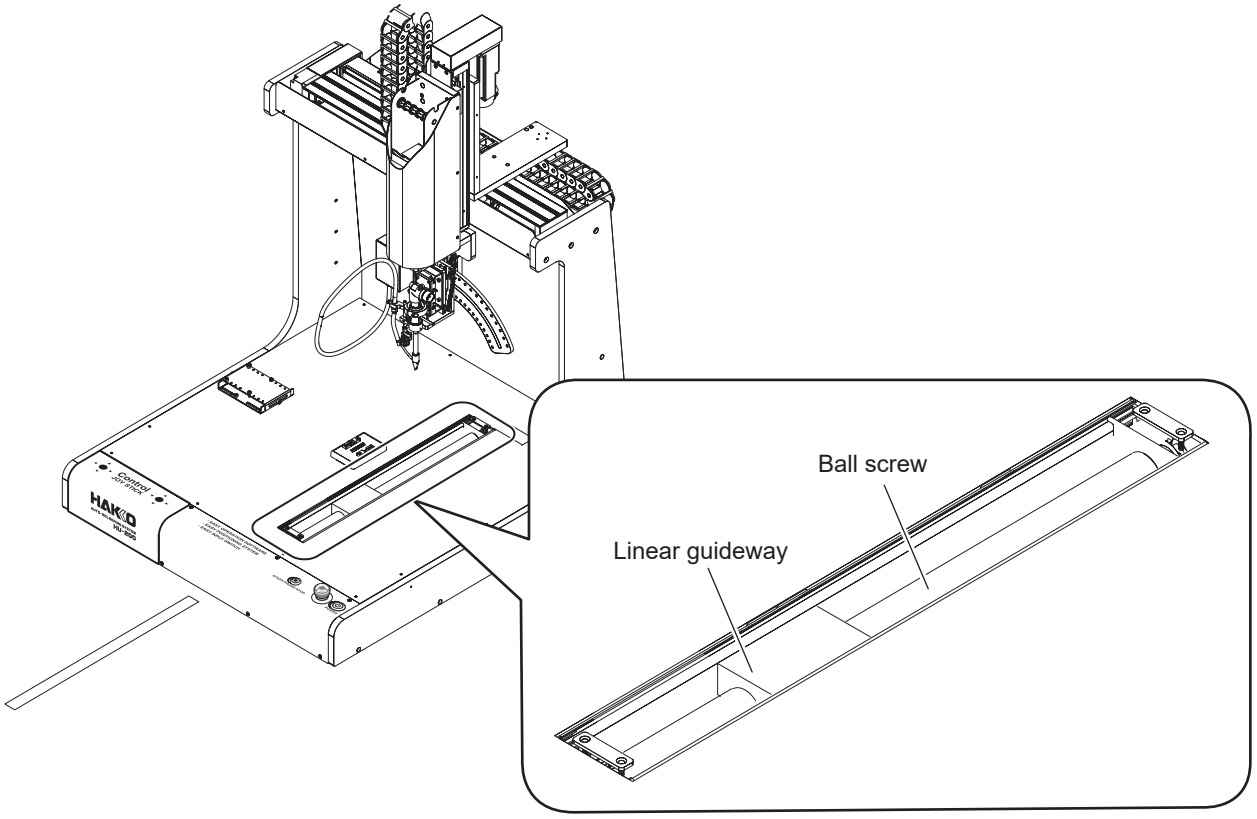
3. Slide the slider back and forth several times by hand so that the grease (AX1002) reaches the entire axis.

8-2-5-2 Y Axis

1. After removing the jig table, remove the Y axis cover.



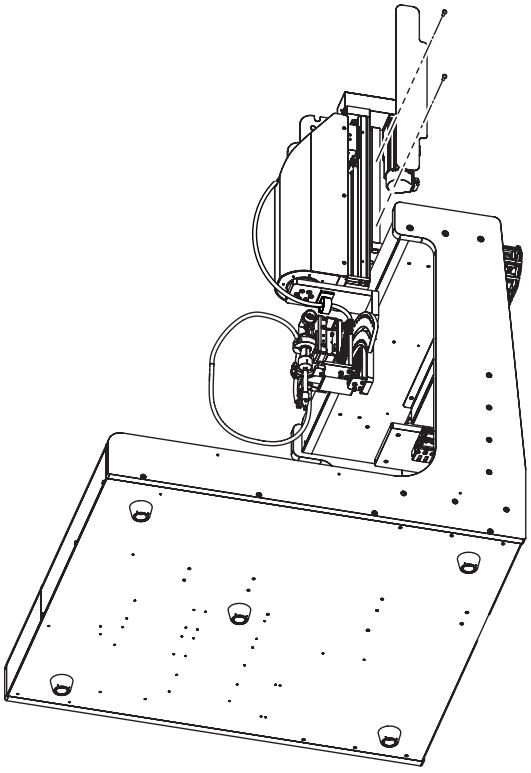
2. Replenish grease (AX1002) on the ball screw and linear guideway.



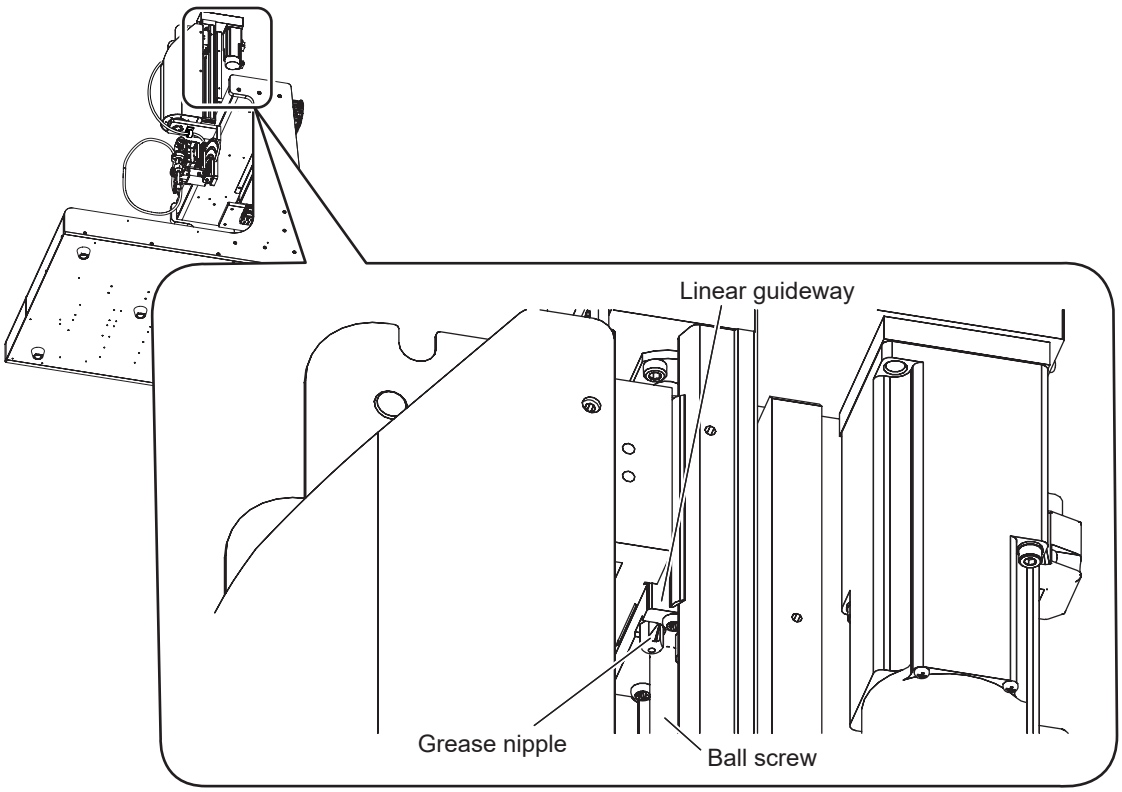
3. Slide the slider back and forth several times by hand so that the grease (AX1002) reaches the entire axis.

8-2-5-3 Z Axis

1. Remove the Z axis cover (left side surface).



2. Replenish grease (AX1002) on the ball screw and linear guideway.

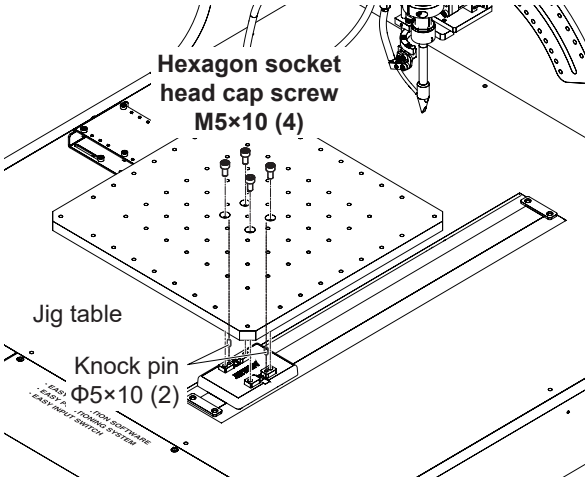


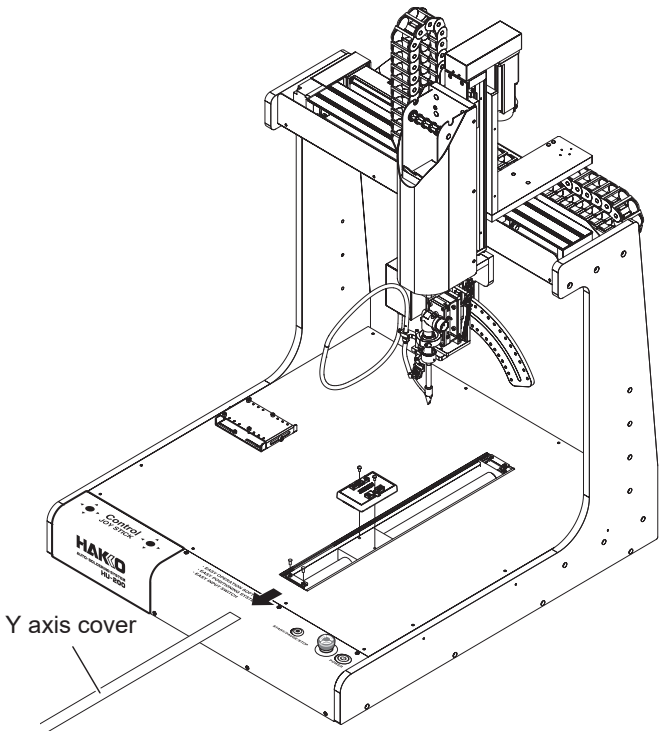
3. Slide the slider back and forth several times by hand so that the grease (AX1002) reaches the entire axis.

8-3 Mechanical Adjustments (when Replacing Timing Belt or Y-axis Cover)

Timing belt service life (X, Y, Z axes): Replace after more than 10,000 km as a general rule

Y axis cover: When there is visibly noticeable breakage or chipping
When the Y axis cover has deformed or the cover no longer fits tightly in to form a sealed condition





When a timing belt needs replacement, please contact the sales office or distributor.

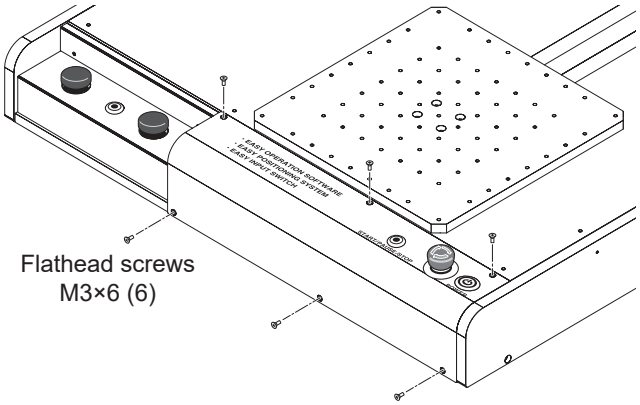
8-4 How to replace batteries (for backup AX1004)

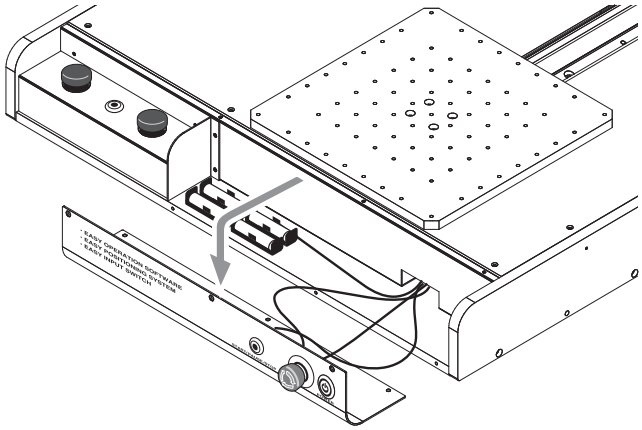
⚠ CAUTION

- When replacing batteries (AX1004), be sure to replace them while keeping the power switched on.
- If replacement is performed with the power switched off, the axis position information will be lost.
- If replacement was performed with the power switched off, please contact the sales office or distributor.
- Always replace all 4 batteries (AX1004).

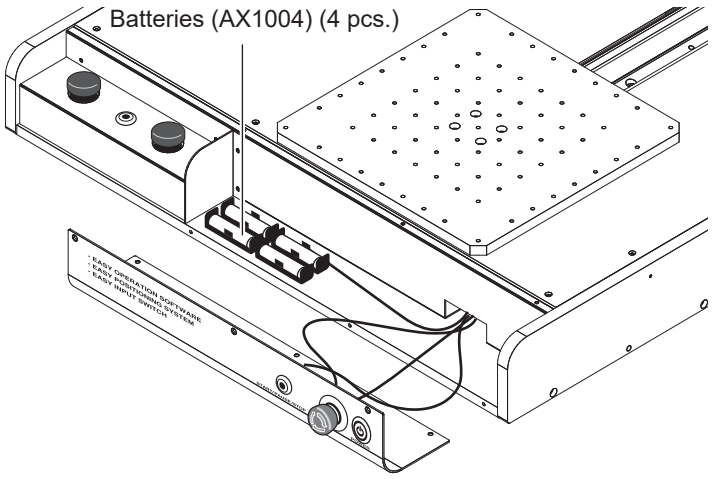
Perform battery (AX1004) replacement with the power left on.

1. Remove the flathead screws (M3 × 6) and remove the front panel.





2. Remove the used batteries (AX1004) and replace them with new ones.



3. Reattach the front panel.

Battery (AX1004) replacement is completed.

9. Error Messages

9-1 Attached Accessories

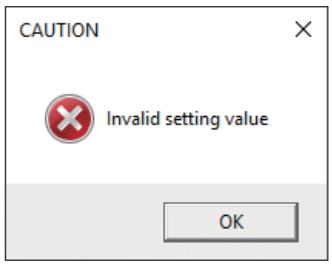
The soldering iron unit will show error information in the settings display screen.
For error information, refer to the instruction manual of the soldering iron unit HF-600.

9-2 Robot

Software error

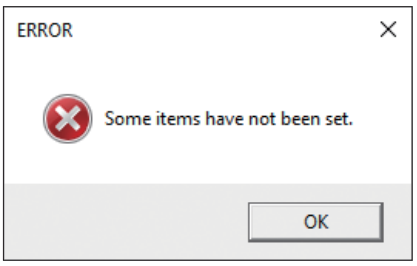
Input error

Shown when the setting value is invalid.



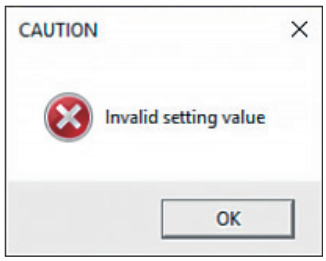
Setting error

Shown when **[Finish]** is tapped in the Point Edit Screen while some items are still not set.



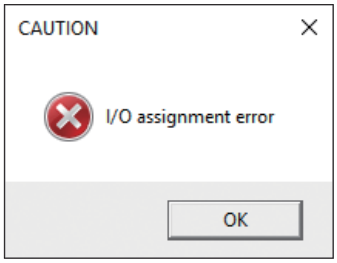
Coordinates value error

Shown when Gerber data is being read and the coordinates converted from the Gerber data would be outside the robot's coordinate range, causing reading in to be stopped.



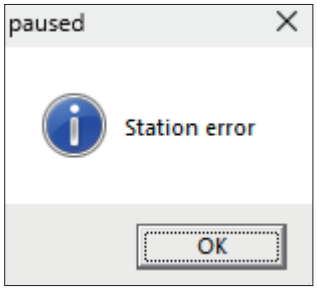
I/O assignment error

Shown when duplicate assignments for I/O setting were set in the System Settings Screen and closing the System Settings Screen was attempted.



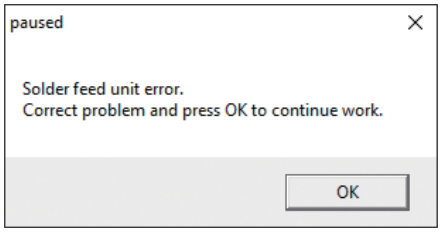
Station error (Pause)

Shown when the READY signal from the station has stopped while the program is running, causing the program to pause.



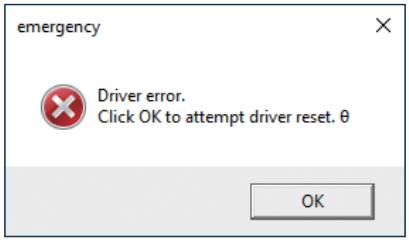
Solder feed unit error

Shown when the solder feed detection sensor has detected that solder has run out or solder clogging has occurred, causing the feed operation to be stopped immediately.



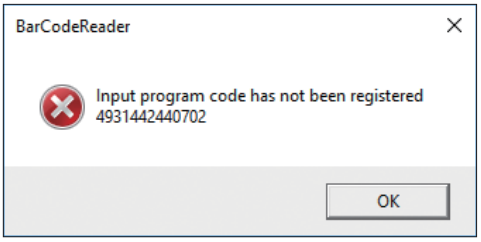
Driver abnormality

Shown when an abnormality is detected on the motor driver causing immediate stop of the robot operation.



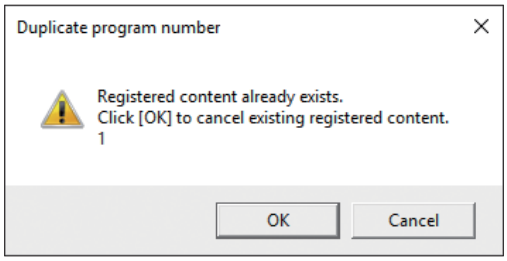
Bar code reading error

Shown when an unregistered bar code was read.



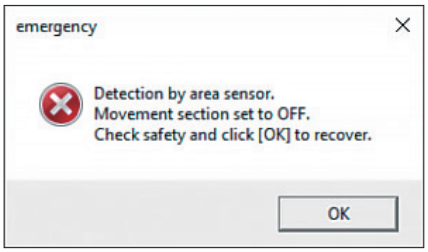
Bar code registration error

Shown when the bar code to be registered is a duplicate.



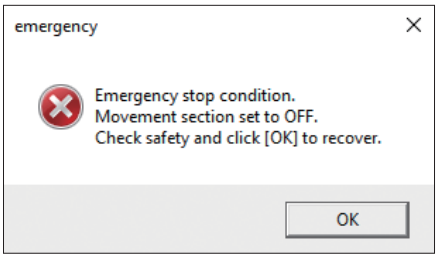
Area sensor

Shown when area sensors have been set as I/O connections and a sensor has detected something, causing operation to stop.



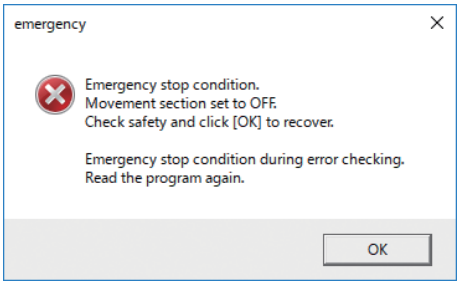
Emergency stop

Shown when the emergency stop button (including emergency stopping via I/O) has been pressed, causing operation to stop.



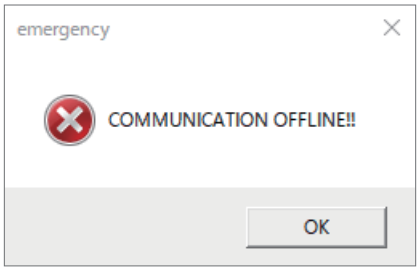
Emergency stop (when error-checking)

Shown when the emergency stop button has been pressed during error-checking, causing operation to stop.



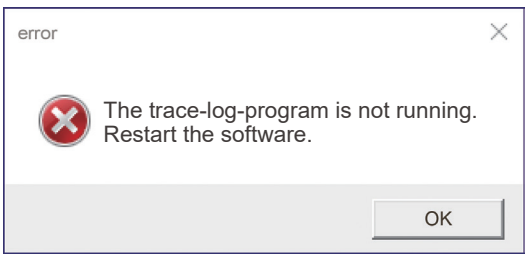
Communication error

Shown when communication between the PC and the robot is lost, causing operation to stop.



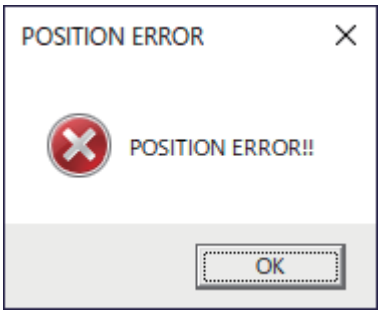
Trace log error

The trace-log-program is not running.
Restart the software.



Position error

Displayed if any coordinate of the 4 axes exceeded proper range.
Please contact your nearest agent.



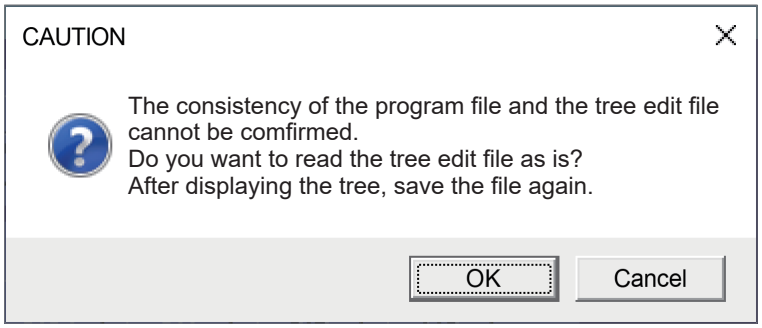
Read error

Displayed if the internal data of this product could not be loaded properly when the software was launched.
Press **[OK]** and load again.
If this continues, stop using the product, and contact the store at which you made your purchase.



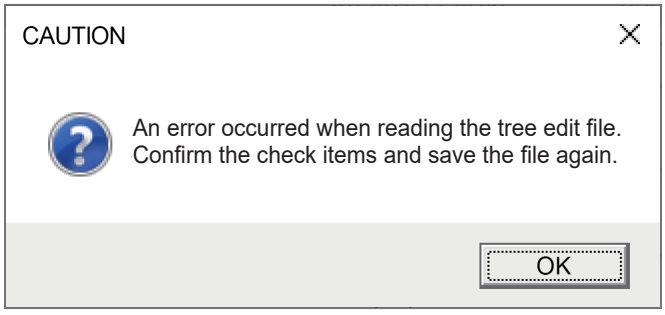
TreeView error

If the contents of the program file and the tree file are different (*1) when the tree window is started, the following dialog box is displayed.



[OK] : The check information is read as it is.
[Cancel] : All checks are displayed as ON.
(*1 The coordinates, etc. inside STEP do not match.)

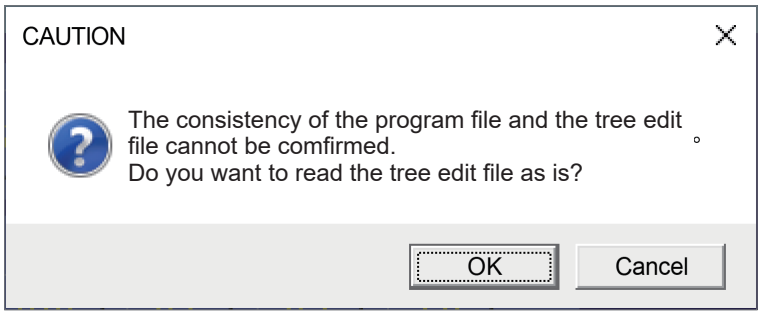
If the checks stored in the tree edit file do not match the expanded tree (*2) when the tree window is started, the following dialog box is displayed.



[OK] : The tree will be reflected with the check contents obtained as they are.
The check ON/OFF position may be shifted because the tree is reflected with the check contents that do not match.
(*2 When the number of solderings in the program and the number of solderings saved in the tree edit file do not match, or when the check ON/OFF contents are different.)

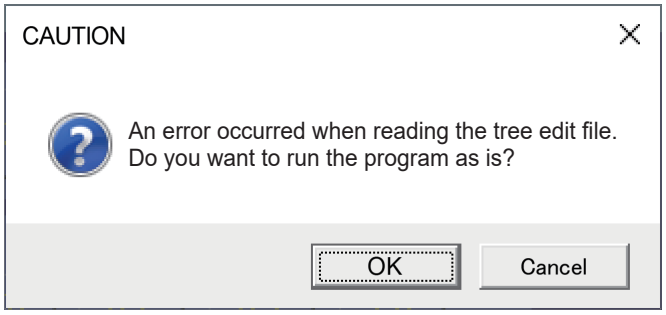
TreeView error

If the contents of the program file and the tree file are different (*1) when the program is started, the following dialog box is displayed.



[OK] : The check information is read as it is.
[Cancel] : Cancels the start of the program.
(*1 When there is a change in coordinates, etc. inside STEP.)

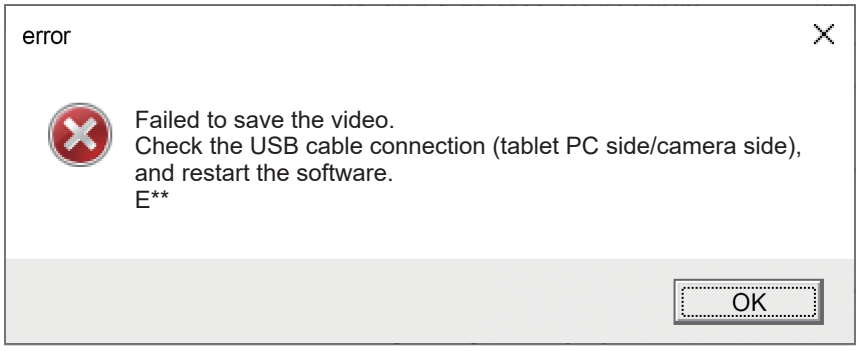
If the contents of the program file and the tree file are different (*2) when the program is started, the following dialog box is displayed.



[OK] : The tree will be reflected with the check contents obtained as they are, and the program will be started.
The check ON/OFF position may be shifted because the program starts with the check contents that do not match.
[Cancel] : Cancels the start of the program.
(*2 When the number of solderings in the program and the number of solderings saved in the tree edit file do not match, or when the check ON/OFF contents are different.)

TraceView error

If saving the video of the Trace function fails, the following dialog box is displayed. The video recorded data may not have been saved. For details, refer to “Troubleshooting” in the instruction manual of CX5039 (Camera unit & trace app).



10.Troubleshooting

Malfunction diagnosis (How to check robot operation, how to check the buttons and screen lists for each function, how to check external I/O-related problems)

- Software does not start.
- Connection with the robot cannot be achieved.
- The soldering program doesn’t run.
- Operation stopped while a soldering program was being run.
- Solder isn’t being fed.

Robot

Symptom	Cause	Solution
It doesn’t operate even though the power switch is set to ON.	The power cord isn’t properly connected.	Connect the power cord properly.
Connection with the robot cannot be achieved.	The robot power supply is switched off.	Switch on the power supply.
	The cable isn’t properly connected.	Connect the cable properly.
	The emergency stop button is pressed.	Release the emergency stop button.
The soldering program doesn’t run.	Return to origin hasn't been performed.	Tap the **[HOME]** button.
	The emergency stop button is pressed.	Release the emergency stop button.
	The I/O connector is disconnected.	Connect the I/O connector.
	The motor connector is disconnected.	Connect the motor connector.
	An error message is being shown.	Cancel the error message display.
Y axis movement is poor.	The stainless-steel belt is broken or deteriorated.	Replace the stainless-steel belt.
Solder isn’t being fed well./ A solder feed error is shown.	Solder clogging has occurred.	Remove the solder clogging.
	Solder has run out.	Replenish with new solder.
	Solder or flux is stuck on the cutting blade or pulleys.	Use a brush or alcohol to remove it.
	The tube unit or Fluoroplastic tube is extremely dirty, worn, or damaged.	If it is extremely dirty, worn, or damaged, replace the parts with new ones.
	The tube unit is forcibly bent.	Make the bending radius more gentle.
	Flux is clogging the tip of the Fluoroplastic tube or inside of the guide pipe.	Use a brush or alcohol to remove it.
	Parts such as the solder feed pulley unit, etc. are not compatible with the solder wire diameter being used.	Replace with compatible products. Refer to “11. Parts List” (p. 170)

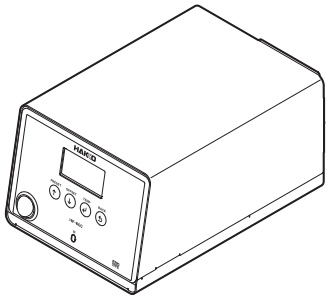
NOTE For maintenance of the soldering iron unit, , refer to the instruction manual for the HF-600.

11.Parts List

The list is as of September 2025 and is subject to change.
See the web page for the latest product information such as replacement parts/options.
https://www.hakko.com/doc_hu-200-e

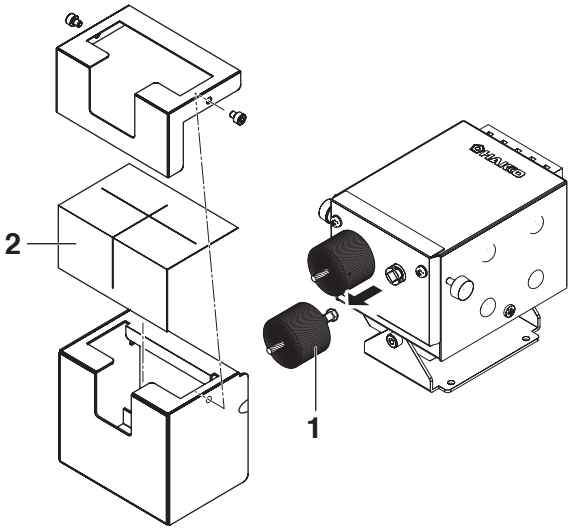
● Accessories

	Product Number	Specifications
HF-600	Soldering iron unit HF-600	—

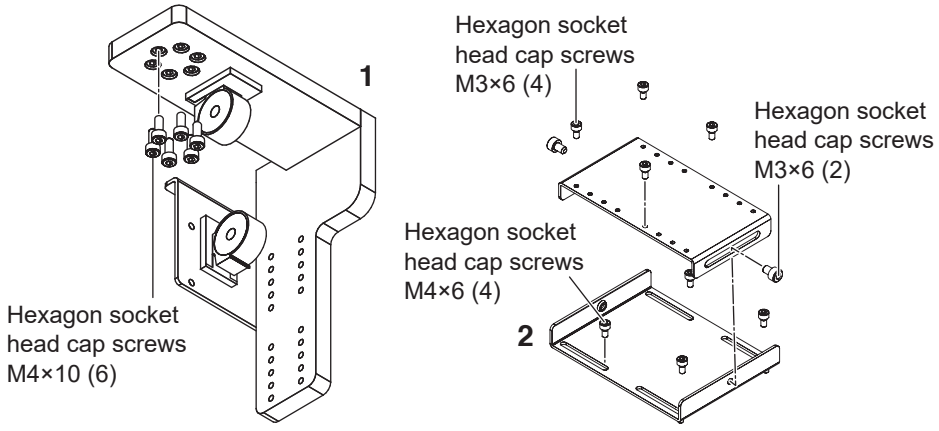


Cleaner	Product Number	Specifications
	CX1003	—

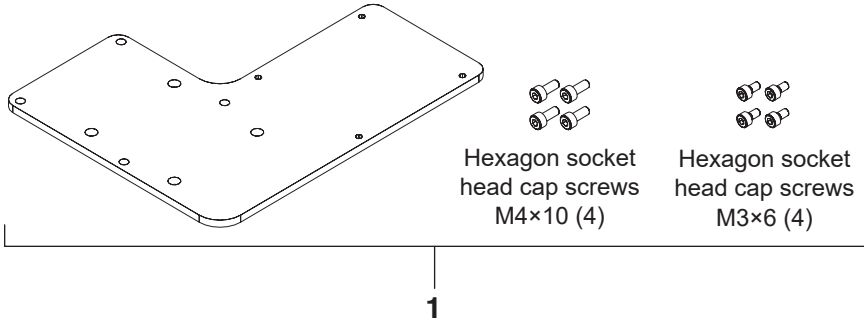
Number in Diagram	Product Number	Product Name	Comments
1	A1567	Cleaning brush B	Metal brushes (package of 2)
2	BX1028	Spatter prevention sheet	—



Number in Diagram	Product Number	Product Name	Comments
1	CX5002	Soldering unit fixture base/for HU-200	—
2	CX5003	Cleaner base/for HU-200	

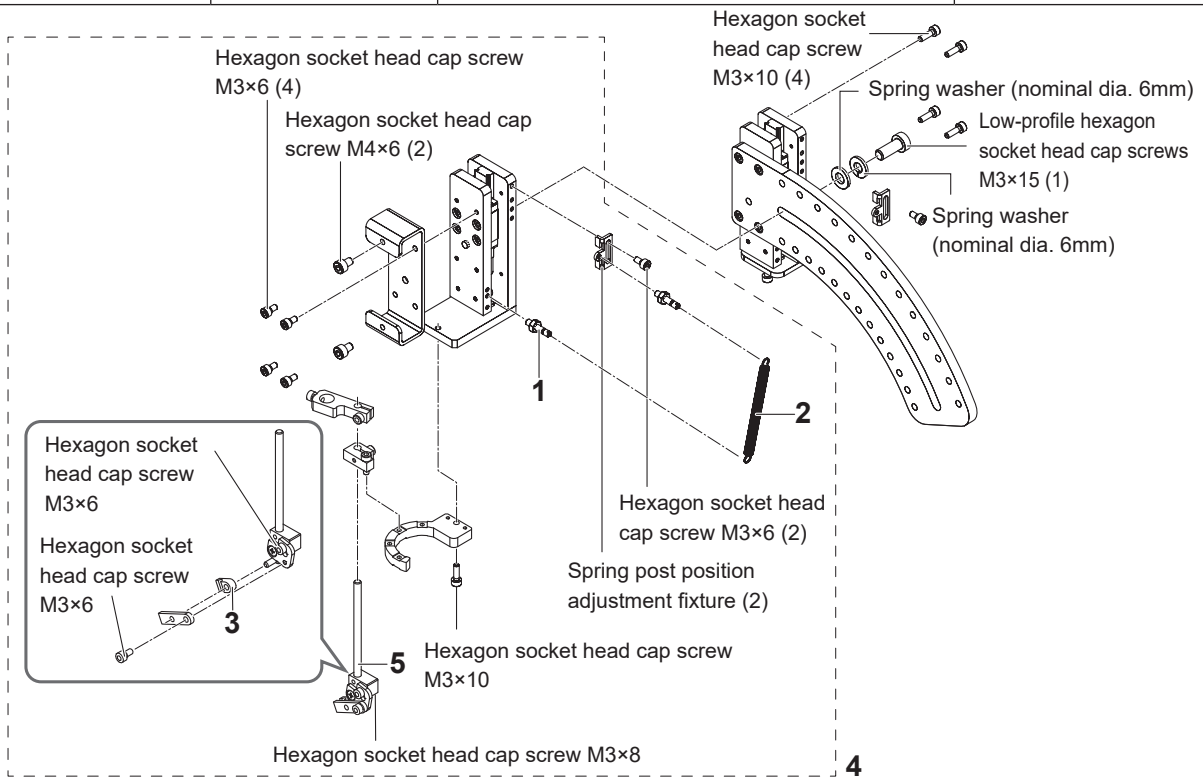


Number in Diagram	Product Number	Product Name	Comments
1	BX1066	Cleaner positioning board	—



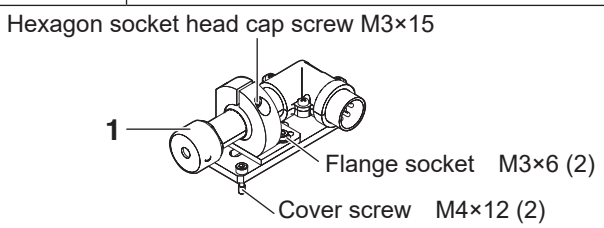
Soldering Unit Mount/ for HU-200	Product Number	Specifications
	CX5004	—

Number in Diagram	Product Number	Product Name	Comments
1	BX1043	Post for tension spring	—
2	BX1044	Tension spring	
3	BX1063	Guide pipe fixing plate/for 0.3 – 1.6 mm	
4	CX5033	Iron unit base assembly	
5	BX1073	Fixing pipe assembly/for 0.3 – 1.6 mm	



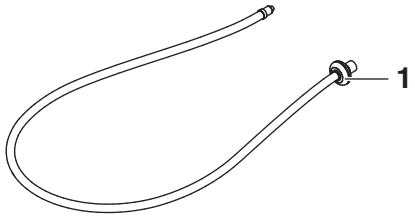
Handpiece FU-6002	Product Number	Specifications
	FU6002-01X	—

Number in Diagram	Product Number	Product Name	Comments
1	BX1027	Flux protector	—



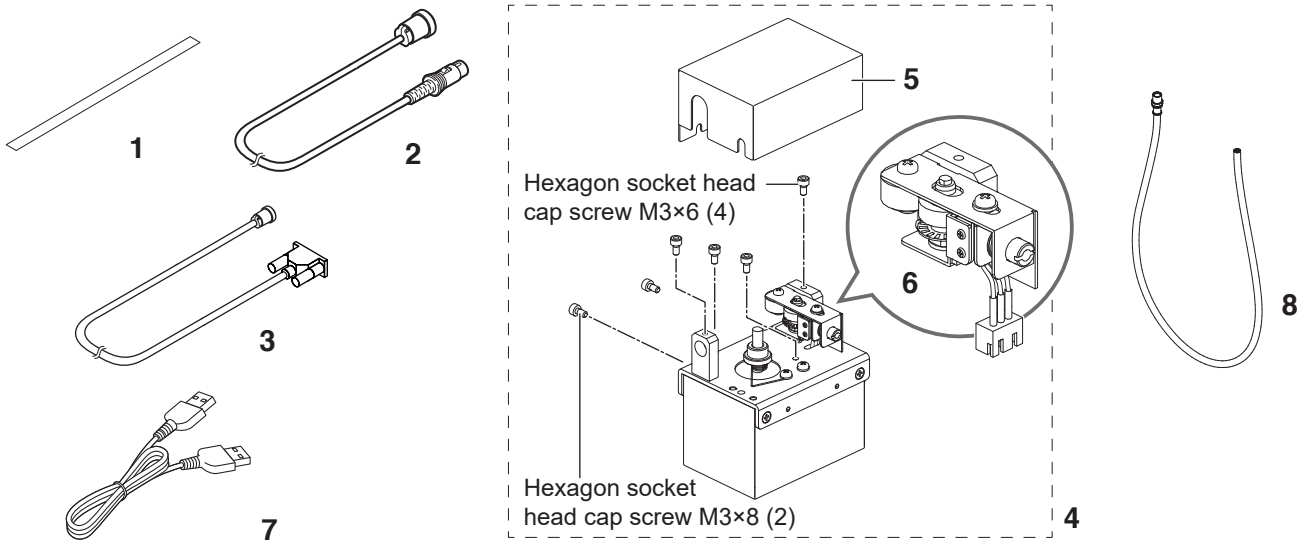
Tube unit	Product Number	Specifications
	BX1055	For 0.3 – 1.0 mm
	BX1042	For 1.2 – 1.6 mm

Number in Diagram	Product Number	Product Name	Comments
—	BX1060	Fluoroplastic tube/0.3–1.0 mm	—
	BX1061	Fluoroplastic tube/1.2–1.6 mm	—
1	BX1022	Grommet	—



Number in Diagram	Product Number	Product Name	Comments
1	AX1001	Y axis cover	—
2	BX1033	Soldering iron cable/5m	
3	BX1045	Feeder cable/4 m; for HU-200	
4	CX5040	Feeder unit/0.3 – 1.6 mm; for HU-200	
5	BX1071	Feeder unit cover	
6	BX1075	Sensor roller assembly	
7	BX1067	USB cable	For South Korea and Europe
	BX1062		For regions other than the above

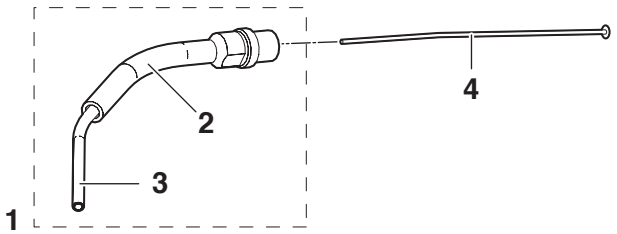
Number in Diagram	Product Number	Product Name	Specifications
8	BX1054	Tube unit B	For 0.3 mm
	BX1052	Tube unit B	For 0.5 – 1.0 mm
	BX1053	Tube unit B	For 1.2 – 1.6 mm
—	BX1105	Fluoroplastic tube/0.3–1.0 mm/480 mm	—
	BX1106	Fluoroplastic tube/1.2–1.6 mm/480 mm	



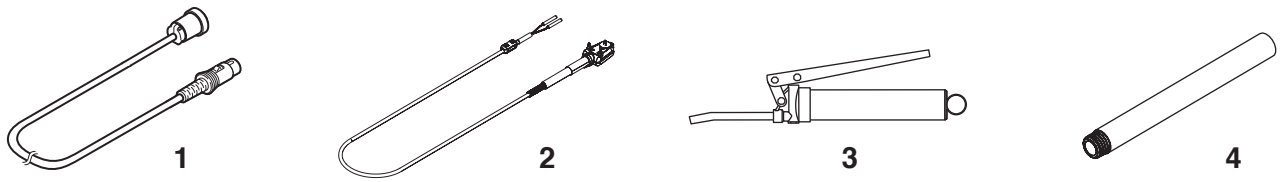
Product Number	Product Name	Comments
AX1004	Battery/LS14500 Lithium-thionyl chloride battery	4 qty

• Optional Accessories

Number in Diagram	Product Number	Product Name	Comments
1	BX1046	Solder feed guide set/0.3 mm	—
	BX1047	Solder feed guide set/0.5 – 1.0 mm	
	BX1048	Solder feed guide set/1.2 – 1.6 mm	
2	BX1018	Guide tube	—
3	BX1049	Guide pipe/0.3 mm For HU-200	—
	BX1050	Guide pipe/0.5 – 1.0 mm For HU-200	
	BX1051	Guide pipe/1.2 – 1.6 mm For HU-200	
4	BX1010	Fluoroplastic tube/0.3 mm Package of 10	—
	BX1011	Fluoroplastic tube/0.5 – 0.6 mm Package of 10	
	BX1012	Fluoroplastic tube/0.8 mm Package of 10	
	BX1013	Fluoroplastic tube/1.0 mm Package of 10	
	BX1014	Fluoroplastic tube/1.2 mm Package of 10	
	BX1015	Fluoroplastic tube/1.6 mm Package of 10	

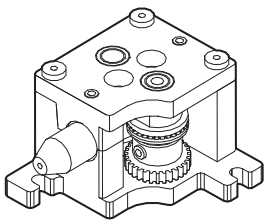


Number in Diagram	Product Number	Product Name	Comments
1	BX1034	Soldering iron cable/8 m	—
2	CX1002	Temperature probe/for auto-soldering systems	
3	CX5034	Grease gun/for HU-200	
4	CX5035	Extension nozzle/Y axis for grease gun	
—	AX1002	Grease/70G	



● Optional Accessory (Solder feed pulley unit)

Number in Diagram	Product Number	Product Name	Specifications
1	BX1076	Solder feed pulley unit/0.3 mm	Disassembly type
	BX1077	Solder feed pulley unit/0.5 mm	
	BX1078	Solder feed pulley unit/0.6 mm	
	BX1079	Solder feed pulley unit/0.8 mm	
	BX1080	Solder feed pulley unit/1.0 mm	
	BX1081	Solder feed pulley unit/1.2 mm	
	BX1082	Solder feed pulley unit/1.6 mm	
—	BX1083	Pulley unit base/cover	For disassembly type/ for 0.3 – 1.6 mm
	BX1084	Driving shaft/0.3 mm	For disassembly type
	BX1085	Driving shaft/0.5 mm	
	BX1086	Driving shaft/0.6 mm	
	BX1087	Driving shaft/0.8 mm	
	BX1088	Driving shaft/1.0 mm	
	BX1089	Driving shaft/1.2 mm	
	BX1090	Driving shaft/1.6 mm	
	BX1091	Following shaft/0.3 mm	
	BX1092	Following shaft/0.5 mm	
	BX1093	Following shaft/0.6 mm	
	BX1094	Following shaft/0.8 mm	
	BX1095	Following shaft/1.0 mm	
	BX1096	Following shaft/1.2 mm	
	BX1097	Following shaft/1.6 mm	
	BX1098	Pulley unit supply nozzle/0.3 mm	
	BX1099	Pulley unit supply nozzle/0.5 – 1.0 mm	
	BX1100	Pulley unit supply nozzle/1.2 – 1.6 mm	
	BX1101	Pulley unit guide nozzle/0.3 mm	
	BX1102	Pulley unit guide nozzle/0.5 – 0.6 mm	
	BX1103	Pulley unit guide nozzle/0.8 – 1.0 mm	
	BX1104	Pulley unit guide nozzle/1.2 – 1.6 mm	



1

● Optional Accessory (N_2 adapter, nozzles)

For TX1 series

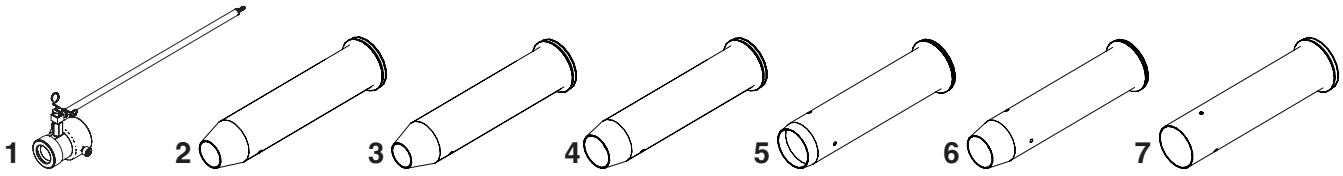
Number in Diagram	Product Number	Product Name	Comments
1	BX1023	Adapter assembly	For TX1 series
2	BX1024	Nozzle assembly A	XD24, XD3, XDR24, XDR3, XBCR2, XBCR3
3	BX1025	Nozzle assembly B	XD, XD08, XD16, XDR, XDR16
4	BX1026	Nozzle assembly C	XRK, XBCR4

For TX2 series

Number in Diagram	Product Number	Product Name	Comments
1	BX1029	Adapter assembly A	For TX2 series
5	BX1030	Nozzle assembly D	XBCR4, XBCR6, XD4, XD6, XDF4, XDF6, XDR4, XDR6, XDRF4, XDRF6,XRK, XRK1040, XRK1545, XRK2055, XRK3065
6	BX1031	Nozzle assembly E	XBCR16, XBCR24, XBCR3, XBCR32, XD08, XD16, XD24, XD3, XD32, XDR3, XDR1632, XDF08, XDF16, XDF24, XDF32, XDRF12, XDRF16, XDRF24, XDRF32, XNC16, XNC24, XNC32
7	BX1065	Nozzle assembly F	XNC40, XNC60, XNC100

For TX3 series

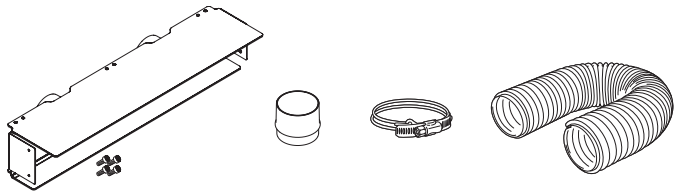
Number in Diagram	Product Number	Product Name	Comments
1	BX1029	Adapter assembly A	For TX3 series
5	BX1030	Nozzle assembly D	XBCR16, XBCR24, XBCR32, XBCR4, XBCR6, XBCR7, XD08, XD16, XD24, XD3, XD32, XD4, XD6, XDF08, XDF16, XDF24, XDF32, XDF4, XDF6, XDR1026, XDR102615, XDR1632, XDR163215, XDR3, XDR4, XDR6, XDRF12, XDRF16, XDRF24, XDRF32, XDRF4, DRF6, XNC16, XNC24, XNC32, XRK, XRK1030, XRK1040, XRK1545, XRK2055, XRK3065
7	BX1065	Nozzle assembly F	XD100, XDF100, XDR100, XDRF100, XNC40, XNC60, XNC100, XRK4080



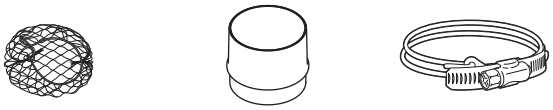
Common for the TX1/TX2/TX3 series

Number in Diagram	Product Number	Product Name	Comments
—	BX1064	Urethane tube/3 m	For N_2
—	BX1068	Urethane tube/5 m	For N_2
—	BX1069	Urethane tube/8 m	For N_2

● Optional Accessory (smoke absorber nozzles)

	Set Contents	Specifications
Smoke absorber nozzle set	BX1059 	With hexagon socket head cap screws M4 × 12 (4)
		The net is already attached to the smoke absorber nozzle duct opening
		The duct band is already installed on the duct

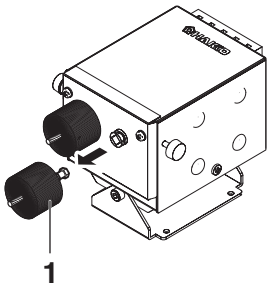
Number in Diagram	Product Number	Product Name	Comments
1	B3625	Net	Already attached to the smoke absorber nozzle duct opening
2	B3621	Adapter	For 3-inch duct
3	B2416	Duct band	Already attached to duct



1 2 3

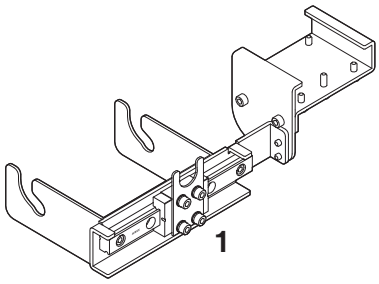
● Optional Accessory (Cleaner)

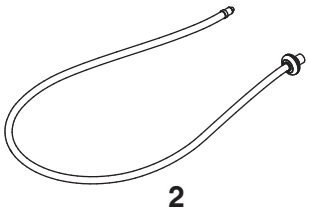
Number in Diagram	Product Number	Product Name	Comments
1	AX1005	Cleaning brush	Silicone brush (package of 2)

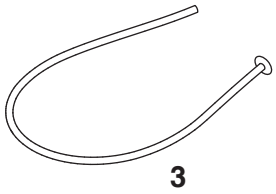


● Optional Accessory (Solder reel stand)

Number in Diagram	Product Number	Product Name	Comments
1	BX1074	Adjustable reel stand	—
2	BX1110	Tube unit/0.3 – 1.0 mm/430 mm	For BX1074 adjustable reel stand
	BX1111	Tube unit/1.2 – 1.6 mm/430 mm	For BX1074 adjustable reel stand
3	BX1112	Fluroplastic tube/0.3 – 1.0 mm/430 mm	For BX1074 adjustable reel stand
	BX1113	Fluroplastic tube/1.2 – 1.6 mm/430 mm	For BX1074 adjustable reel stand







●Optional Accessory (Camera unit & trace app)

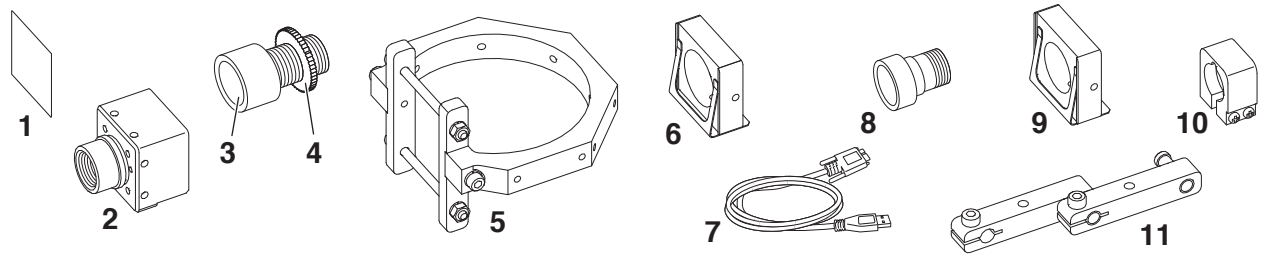
Number in Diagram	Product Number	Product Name	Comments
—	CX5039	Camera unit & trace app	—

Replacement parts

Number in Diagram	Product Number	Product Name	Comments
1	AX1006	Glass coverslip set/qty 5	—
2	BX1114	Camera	—
3	BX1115	Lens/25 mm	—
4	BX1116	Lens lock nut	—
5	BX1117	Camera ring assembly	—
6	BX1118	Glass coverslip holder for 25 mm	—
7	BX1119	USB cable	—

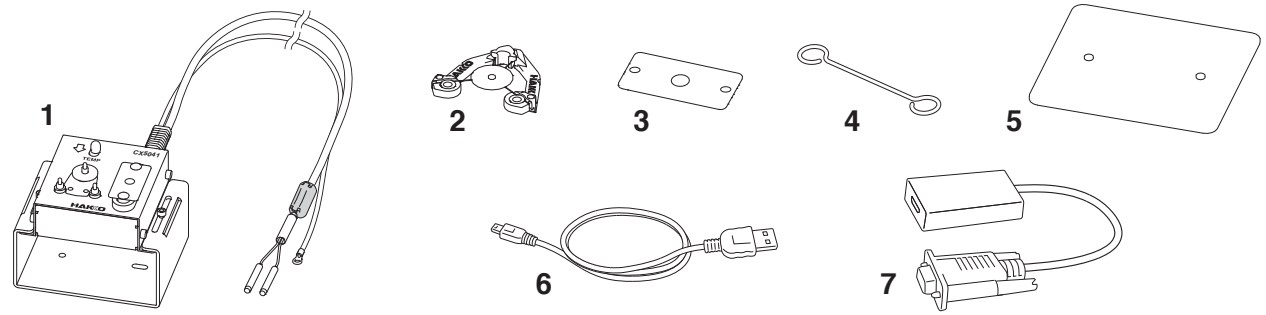
Optional parts

Number in Diagram	Product Number	Product Name	Comments
8	BX1120	Lens/12 mm	—
9	BX1121	Glass coverslip holder for 12 mm	—
10	BX1122	Lens holder assembly for 12 mm lens	—
11	BX1123	Camera fixing support extension kit	—

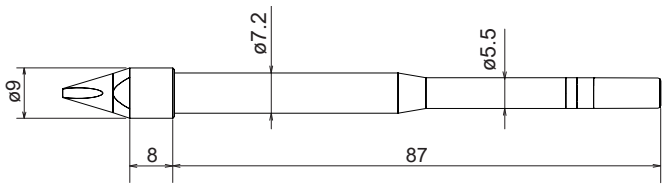


●Optional Accessory (Automatic temperature measurement and adjustment system)

Number in Diagram	Product Number	Product Name	Comments
1	CX5041	Automatic temperature measurement and adjustment system	—
2	AS5000	Sensor	Lead-free with certificate of conformance
3	B1752	Conduction plate	—
4	B1950	Conduction wire	—
5	BX1124	Probe fixing plate	—
6	B5129	USB cable	—
7	BX1125	USB converter	—

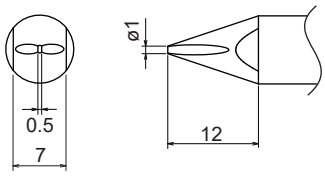


Tip Types

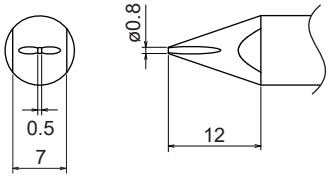


Units: mm

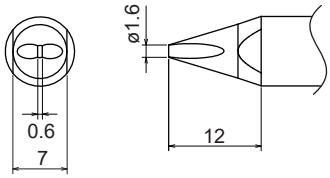
TX1-XD Shape-XD



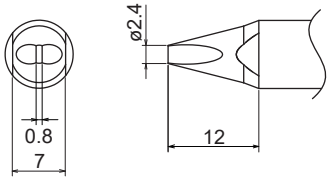
TX1-XD08 Shape-0.8XD



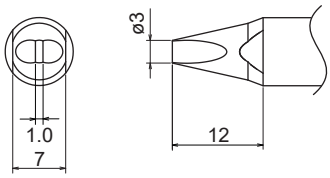
TX1-XD16 Shape-1.6XD



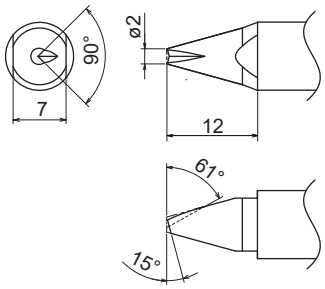
TX1-XD24 Shape-2.4XD



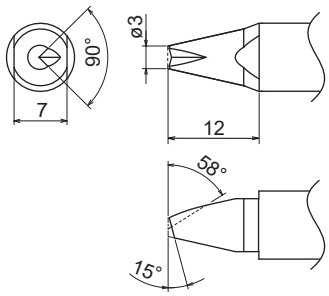
TX1-XD3 Shape-3XD



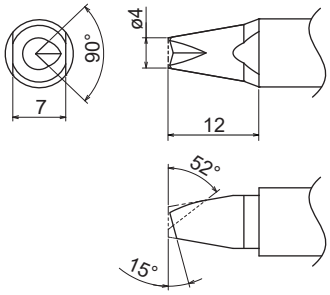
TX1-XBCR2 Shape-2XBCR with V-groove



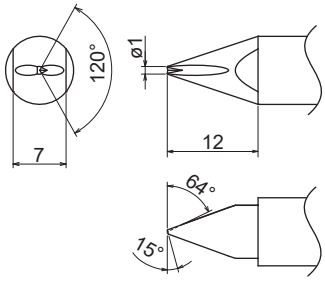
TX1-XBCR3 Shape-3XBCR with V-groove



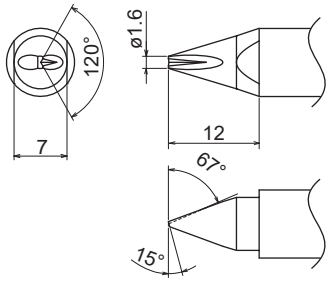
TX1-XBCR4 Shape-4XBCR with V-groove



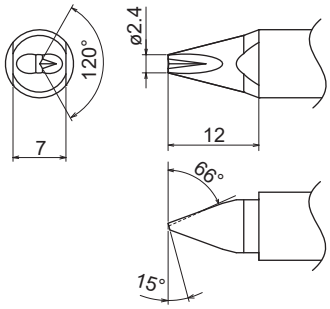
TX1-XDR Shape-XDR with V-groove



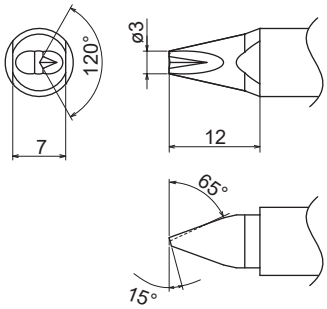
TX1-XDR16 Shape-1.6XDR with V-groove



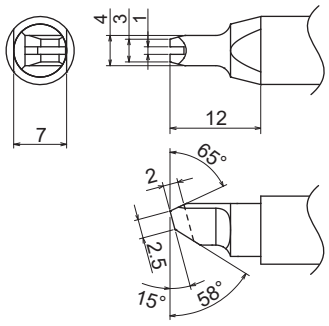
TX1-XDR24 Shape-2.4XDR with V-groove



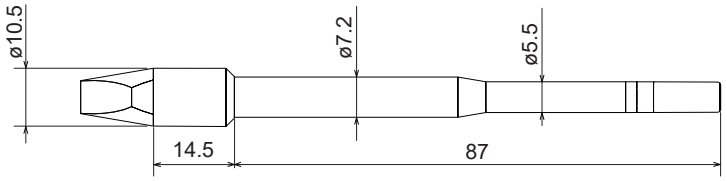
TX1-XDR3 Shape-3XDR with V-groove



TX1-XRK Shape-XK with concave in 1.0 / out 4.0 / depth 2.0 mm

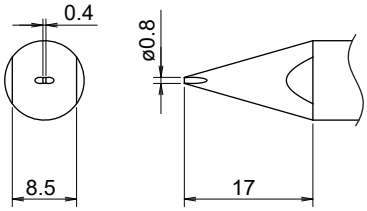


Tip Types (continued)

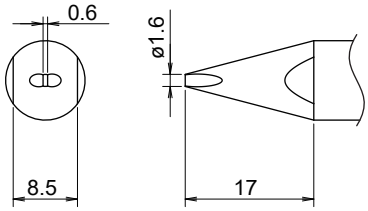


Units: mm

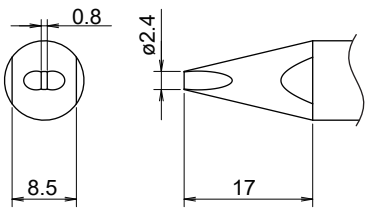
TX2-XD08 Shape-0.8XD
TX2-XDF08*



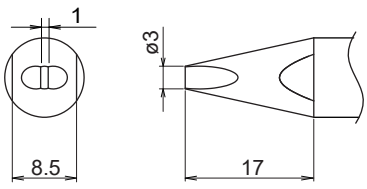
TX2-XD16 Shape-1.6XD
TX2-XDF16*



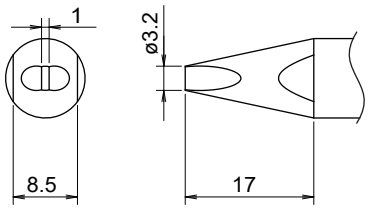
TX2-XD24 Shape-2.4XD
TX2-XDF24*



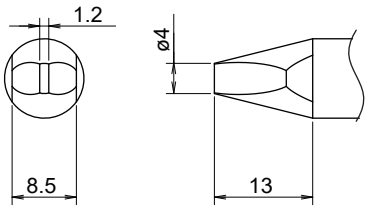
TX2-XD3 Shape-3XD



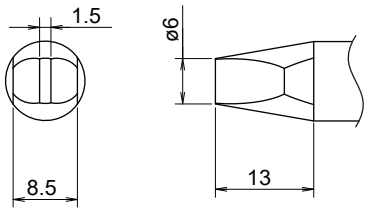
TX2-XD32 Shape-3.2XD
TX2-XDF32*



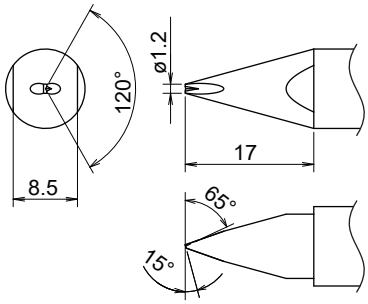
TX2-XD4 Shape-4XD
TX2-XDF4*



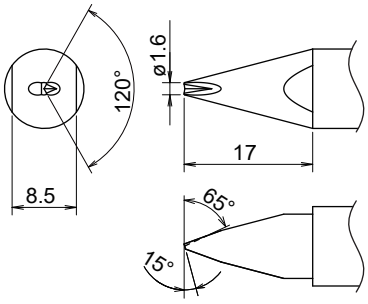
TX2-XD6 Shape-6XD
TX2-XDF6*



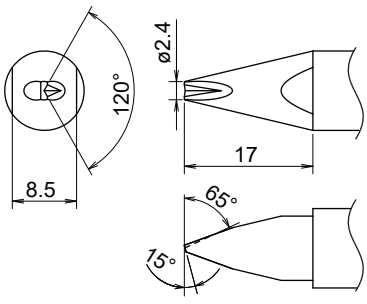
TX2-XDRF12* Shape-1.2XD
with V-groove



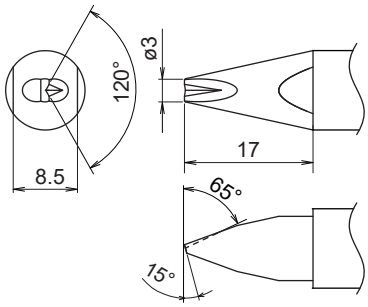
TX2-XDRF16* Shape-1.6XD
with V-groove



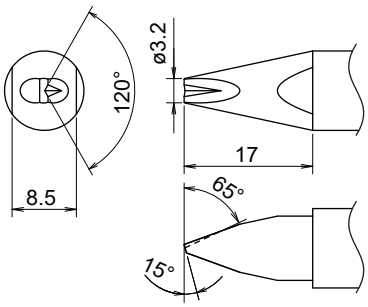
TX2-XDRF24* Shape-2.4XD
with V-groove



TX2-XDR3 Shape-3XD
with V-groove

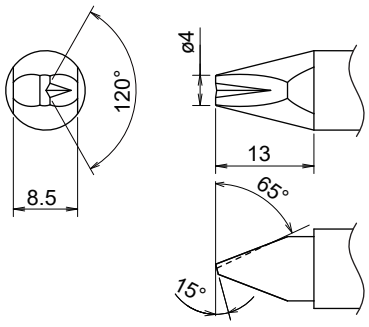


TX2-XDRF32* Shape-3.2XD
with V-groove

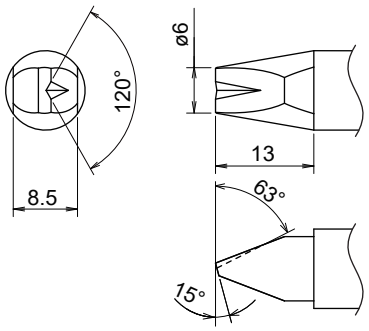


* Pretining on one side only

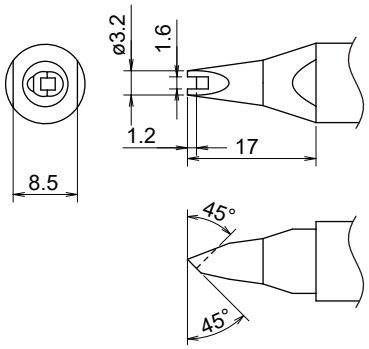
TX2-XDR4 Shape-4XD
TX2-XDRF4*
with V-groove



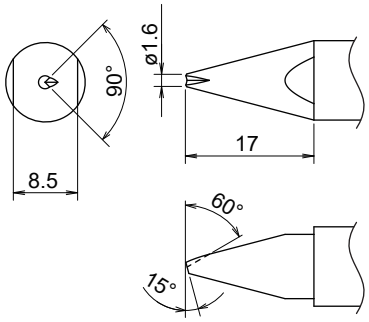
TX2-XDR6 Shape-6XD
TX2-XDRF6*
with V-groove



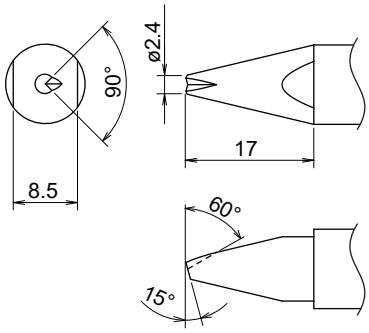
TX2-XDR1632 Shape-XD
with concave
in 1.6 / out 3.2 mm



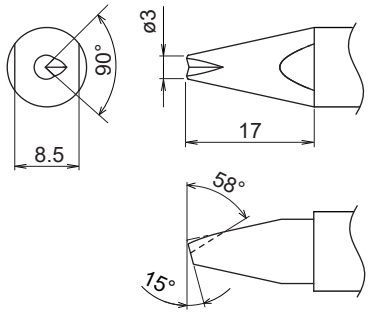
TX2-XBCR16 Shape-1.6XBC
with V-groove



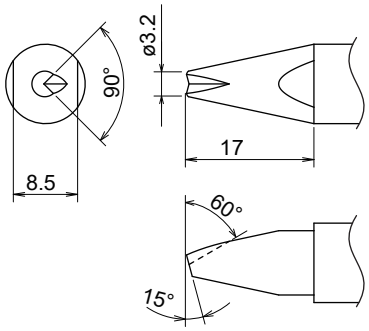
TX2-XBCR24 Shape-2.4XBC
with V-groove



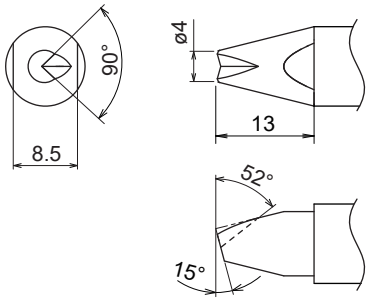
TX2-XBCR3 Shape-3XBC
with V-groove



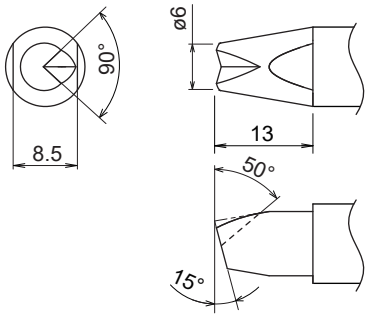
TX2-XBCR32 Shape-3.2XBC
with V-groove



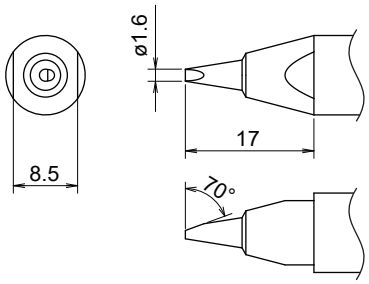
TX2-XBCR4 Shape-4XBC
with V-groove



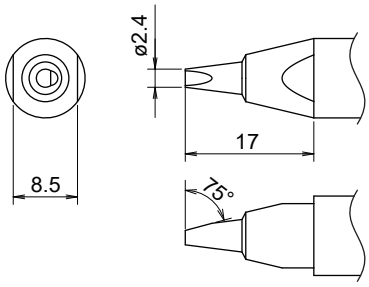
TX2-XBCR6 Shape-6XBC
with V-groove



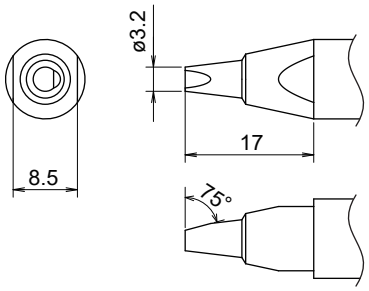
TX2-XNC16 Shape-1.6XNC



TX2-XNC24 Shape-2.4XNC



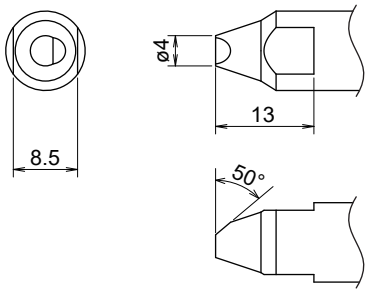
TX2-XNC32 Shape-3.2XNC



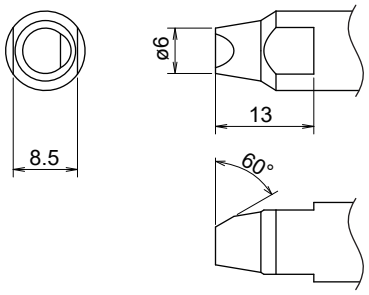
* Pretining on one side only

Tip Types (continued)

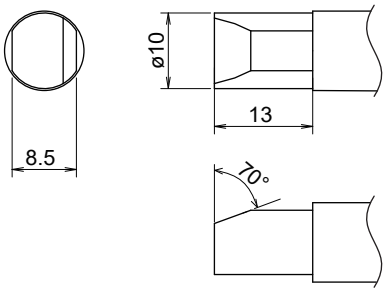
TX2-XNC40 Shape-4XNC



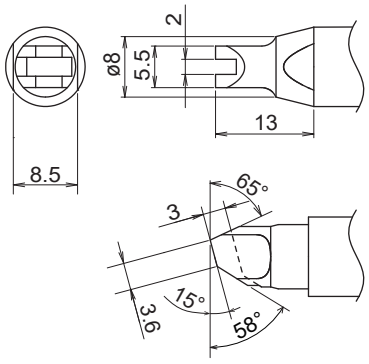
TX2-XNC60 Shape-6XNC



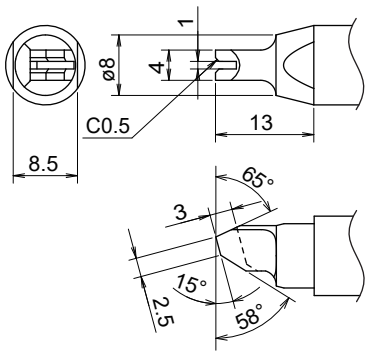
TX2-XNC100 Shape-10XNC



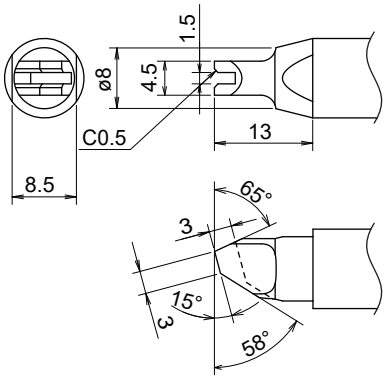
TX2-XRK Shape-XK
with concave
in 2.0 / out 5.5 / depth 3.0 mm



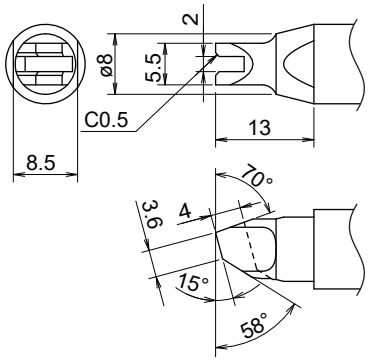
TX2-XRK1040 Shape-XK
with concave
in 1.0 / out 4.0 / depth 3.0 mm



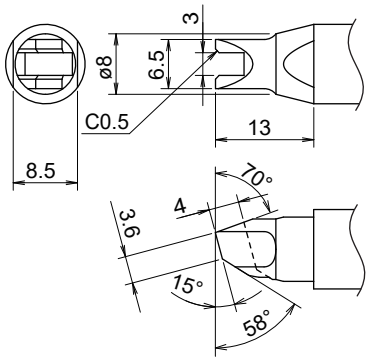
TX2-XRK1545 Shape-XK
with concave
in 1.5 / out 4.5 / depth 3.0 mm

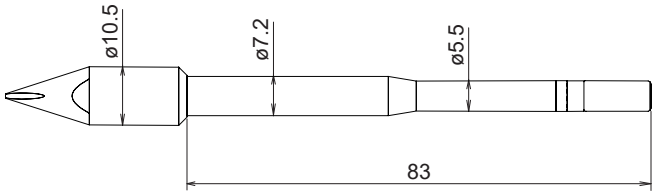


TX2-XRK2055 Shape-XK
with concave
in 2.0 / out 5.5 / depth 4.0 mm



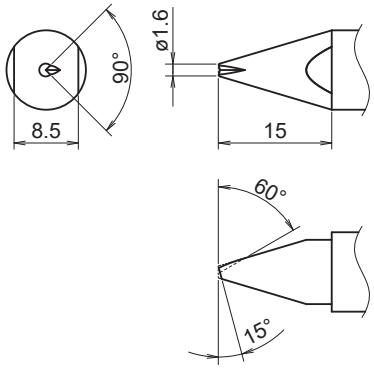
TX2-XRK3065 Shape-XK
with concave
in 3.0 / out 6.5 / depth 4.0 mm



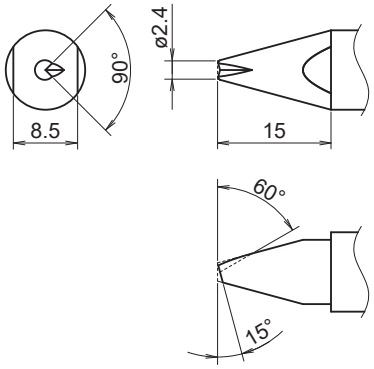


Units: mm

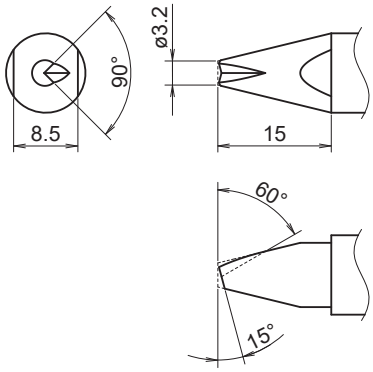
TX3-XBCR16 Shape-1.6XBC with V-groove



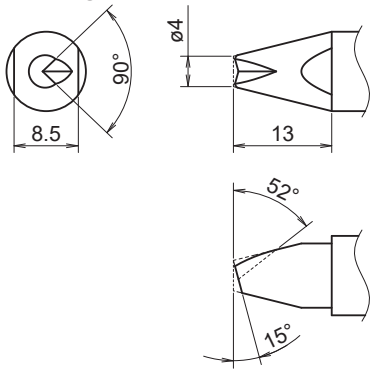
TX3-XBCR24 Shape-2.4XBC with V-groove



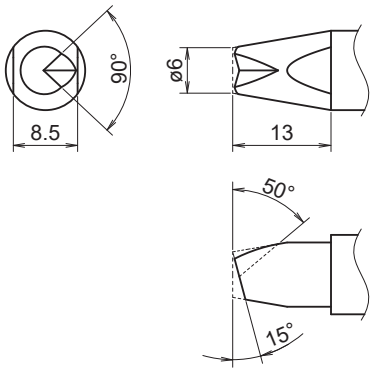
TX3-XBCR32 Shape-3.2XBC with V-groove



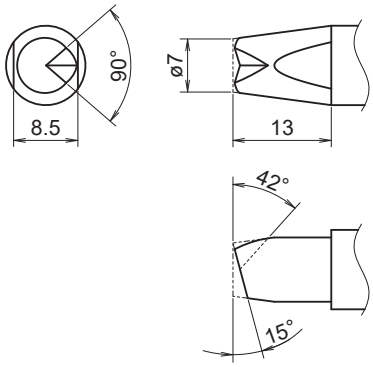
TX3-XBCR4 Shape-4XBC with V-groove



TX3-XBCR6 Shape-6XBC with V-groove

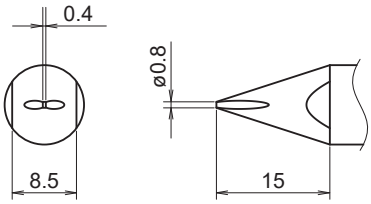


TX3-XBCR7 Shape-7XBC with V-groove

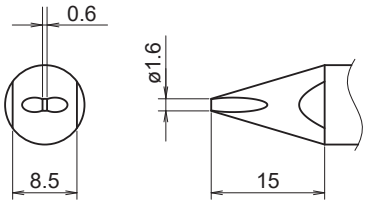


Tip Types (continued)

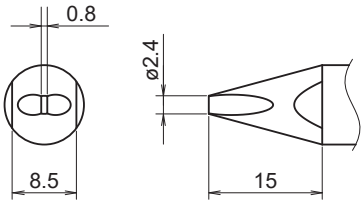
TX3-XD08 Shape-0.8XD
TX3-XDF08*



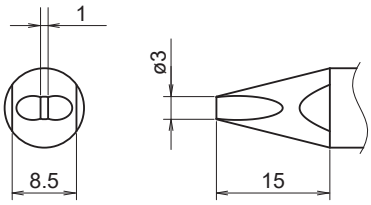
TX3-XD16 Shape-1.6XD
TX3-XDF16*



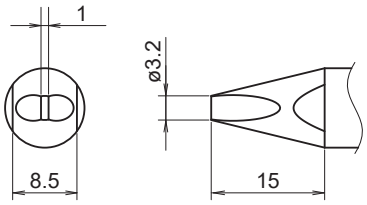
TX3-XD24 Shape-2.4XD
TX3-XDF24*



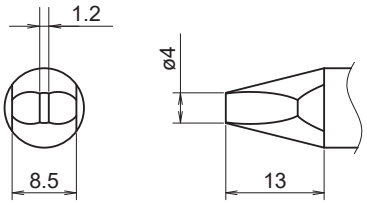
TX3-XD3 Shape-3XD



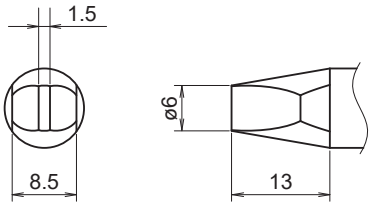
TX3-XD32 Shape-3.2XD
TX3-XDF32*



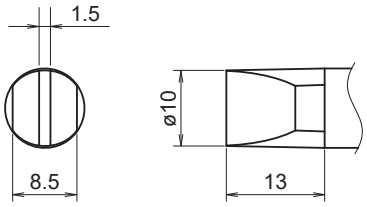
TX3-XD4 Shape-4XD
TX3-XDF4*



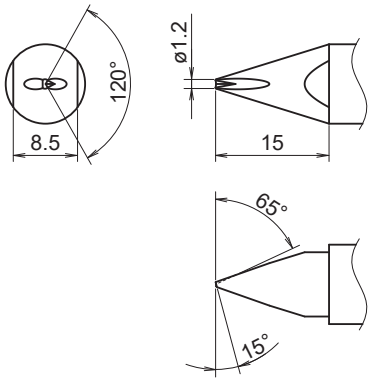
TX3-XD6 Shape-6XD
TX3-XDF6*



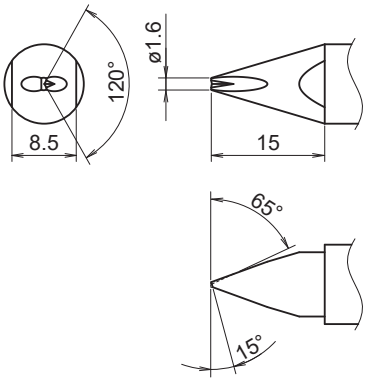
TX3-XD100 Shape-10XD
TX3-XDF100*



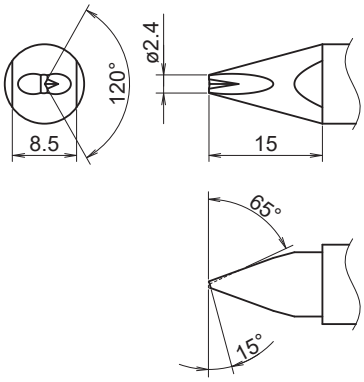
TX3-XDRF12* Shape-1.2XD
with V-groove



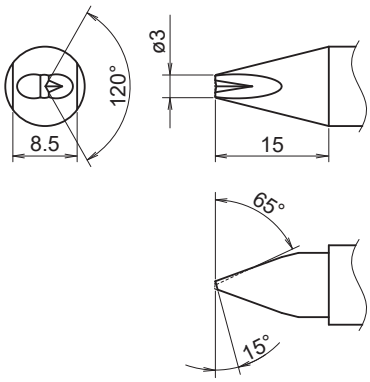
TX3-XDRF16* Shape-1.6XD
with V-groove



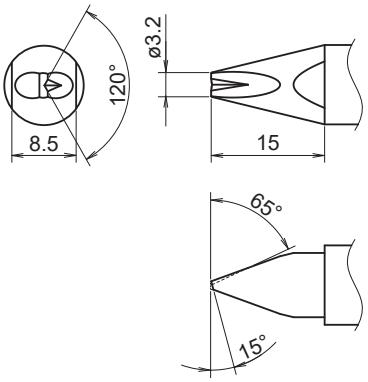
TX3-XDRF24* Shape-2.4XD
with V-groove



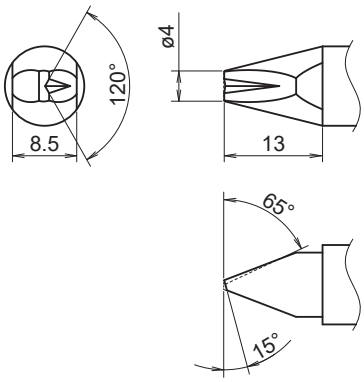
TX3-XDR3 Shape-3XD
with V-groove



TX3-XDRF32* Shape-3.2XD
with V-groove

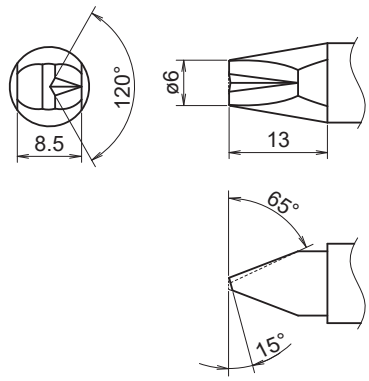


TX3-XDR4 Shape-4XD
TX3-XDRF4*
with V-groove

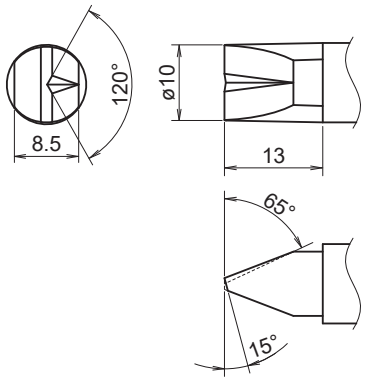


* Pretining on one side only

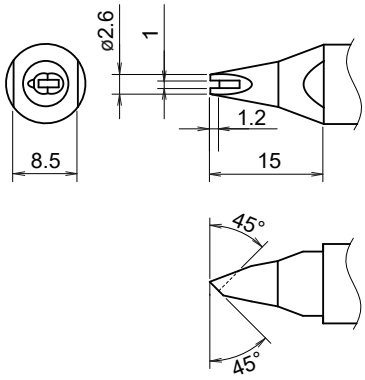
TX3-XDR6 Shape-6XD
TX3-XDRF6*
with V-groove



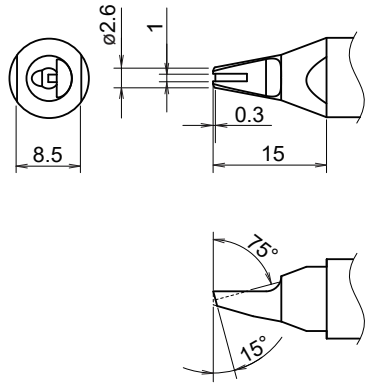
TX3-XDR100 Shape-10XD
TX3-XDRF100*
with V-groove



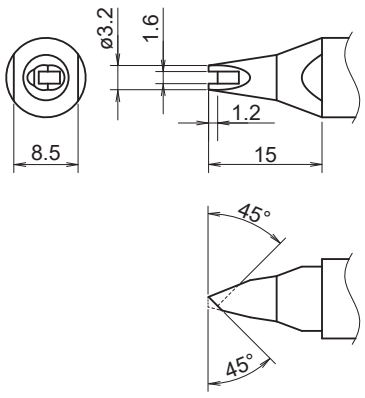
TX3-XDR1026 Shape-XD
with concave
in 1.0 / out 2.6mm



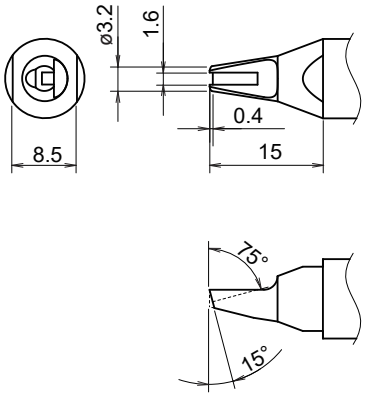
TX3-XDR102615 Shape-XD
with concave
in 1.0 / out 2.6 mm / 15°



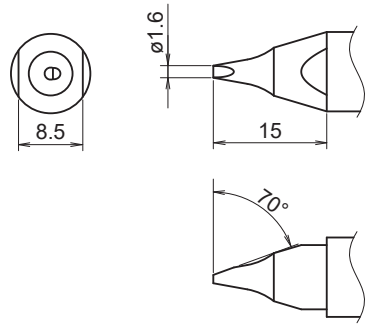
TX3-XDR1632 Shape-XD
with concave
in 1.6 / out 3.2 mm



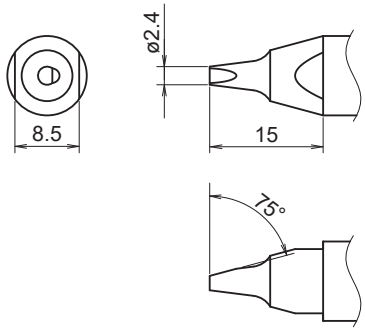
TX3-XDR163215 Shape-XD
with concave
in 1.6 / out 3.2 mm / 15°



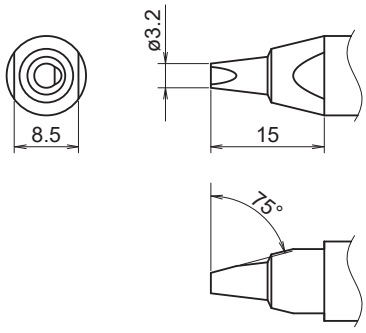
TX3-XNC16 Shape-1.6XNC



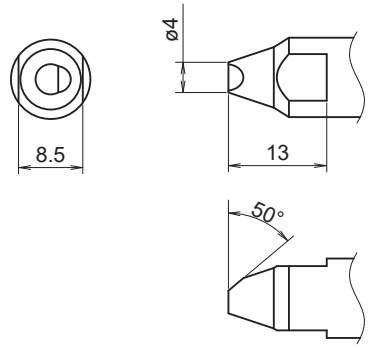
TX3-XNC24 Shape-2.4XNC



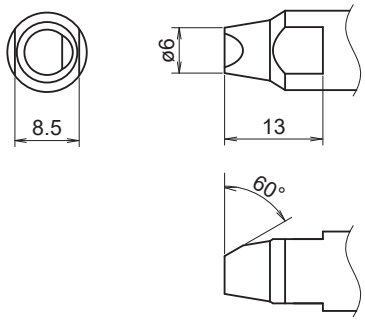
TX3-XNC32 Shape-3.2XNC



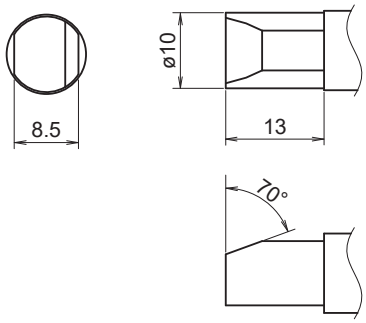
TX3-XNC40 Shape-4XNC



TX3-XNC60 Shape-6XNC



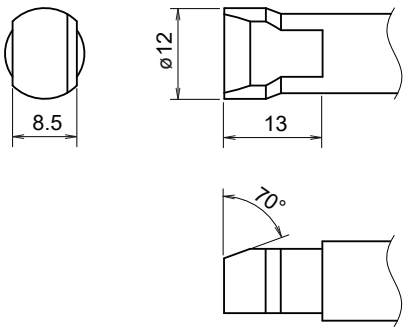
TX3-XNC100 Shape-10XNC



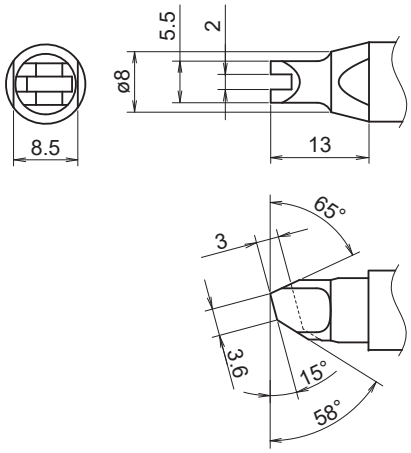
* Pretining on one side only

Tip Types (continued)

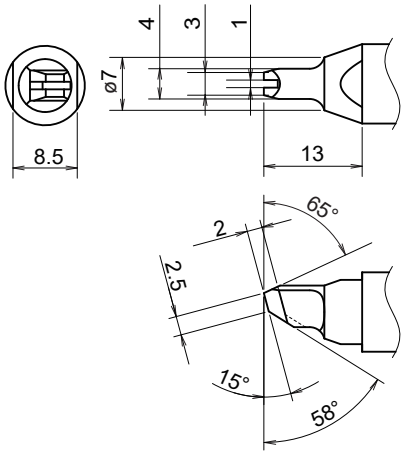
TX3-XNC120 Shape-12XNC



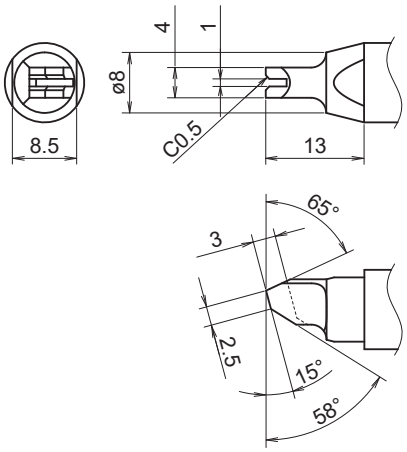
TX3-XRK Shape-XK
with concave
in 2.0 / out 5.5 / depth 3.0 mm



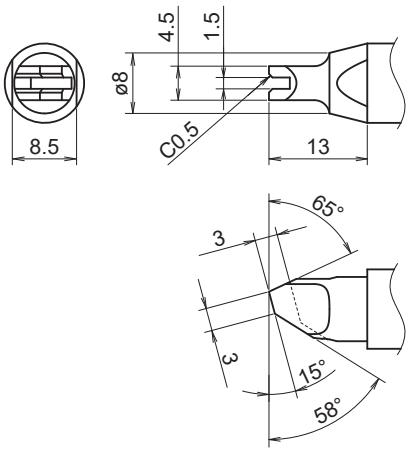
TX3-XRK1030 Shape-XK
with concave
in 1.0 / out 3.0 / depth 2.0 mm



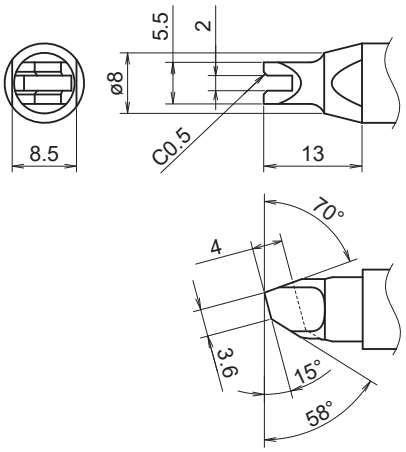
TX3-XRK1040 Shape-XK
with concave
in 1.0 / out 4.0 / depth 3.0 mm



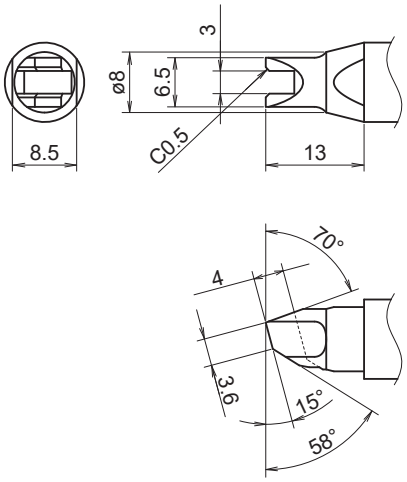
TX3-XRK1545 Shape-XK
with concave
in 1.5 / out 4.5 / depth 3.0 mm



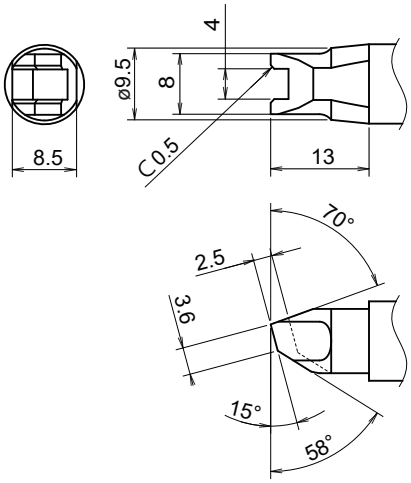
TX3-XRK2055 Shape-XK
with concave
in 2.0 / out 5.5 / depth 4.0 mm



TX3-XRK3065 Shape-XK
with concave
in 3.0 / out 6.5 / depth 4.0 mm



TX3-XRK4080 Shape-XK
with concave
in 4.0 / out 8.0 / depth 2.5 mm



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