

7. Operation (continued)

The screenshot shows the 'Cleaning settings' interface. At the top, there are five buttons labeled 1 through 5. Below these, the screen is divided into two main sections: 'AIR' and 'BRUSH'. Each section has fields for 'Current point', 'Start point', and 'End point' with sub-fields for X, Y, Z, and θ axes. There are also fields for 'DWELL' time and 'SPEED'. At the bottom, there are checkboxes for 'Disable axisY' and buttons for 'Use current pos.', 'Check Operation', and 'OK'. Red boxes and numbers 1 through 6 highlight specific elements: (1) points to the setting selection buttons; (2) points to the 'Current point' input fields; (3) points to the 'Use current pos.' buttons; (4) points to the 'Start point' input fields; (5) points to the 'DWELL' time input fields; and (6) points to the 'SPEED' input field.

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

The screenshot shows the 'Cleaning settings' interface with two main sections: AIR and BRUSH. Callouts are as follows:

- (7) Points to the 'Use current pos.' button under the BRUSH End point section.
- (8) Points to the 'End point' header for the BRUSH section.
- (9) Points to the 'Dwell' time input field, which is set to 1.0 sec.
- (10) Points to the 'Z lifting' input field, which is set to 20.000 mm.
- (11) Points to the 'Check Operation' button.
- (12) Points to the 'OK' button.

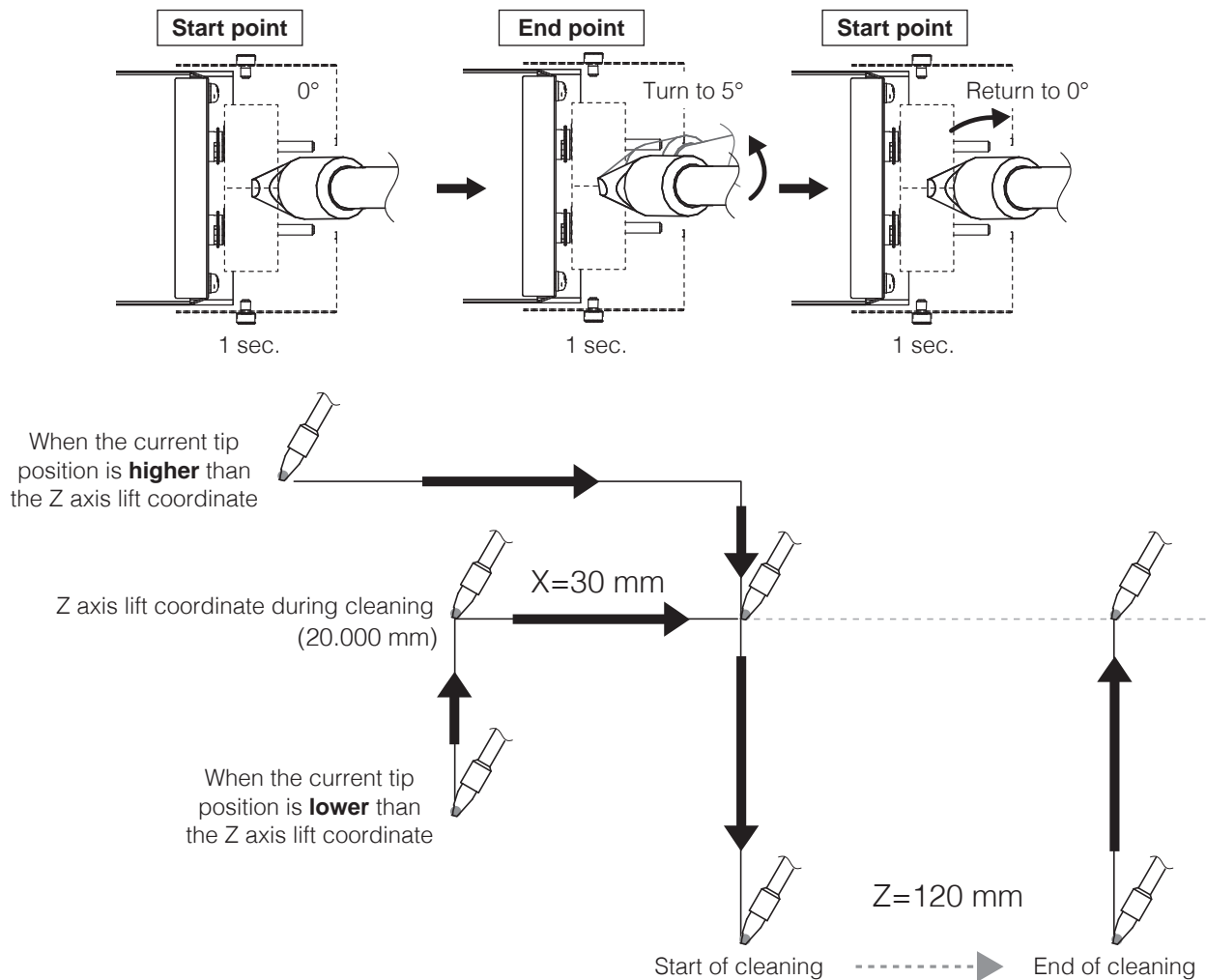
The BRUSH section shows the following values:

Start point	End point
X: 30.000 mm	X: 30.000 mm
Y: 250.000 mm	Y: 250.000 mm
Z: 120.000 mm	Z: 120.000 mm
θ : 0.000 deg	θ : 5.000 deg
SPEED: 100.0 mm/s	SPEED: 100.0 mm/s
DWELL: 1.0 sec	DWELL: 1.0 sec

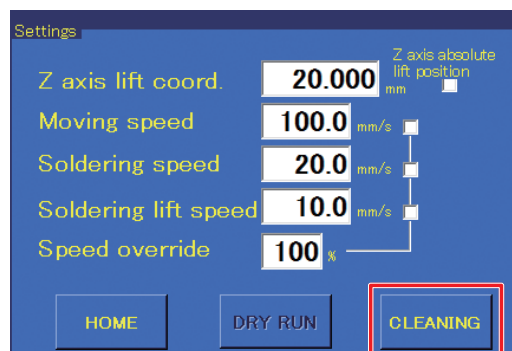
9. Tap **[Use current pos.]** on the **BRUSH** end point side (7). The coordinates of the current position will be reflected in the **[End point]** space (8).
10. Set the time to stay at the end point position as the **DWELL** time (9). In the example, cleaning will be performed for 1 second at the end 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)

7. Operation (continued)

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.



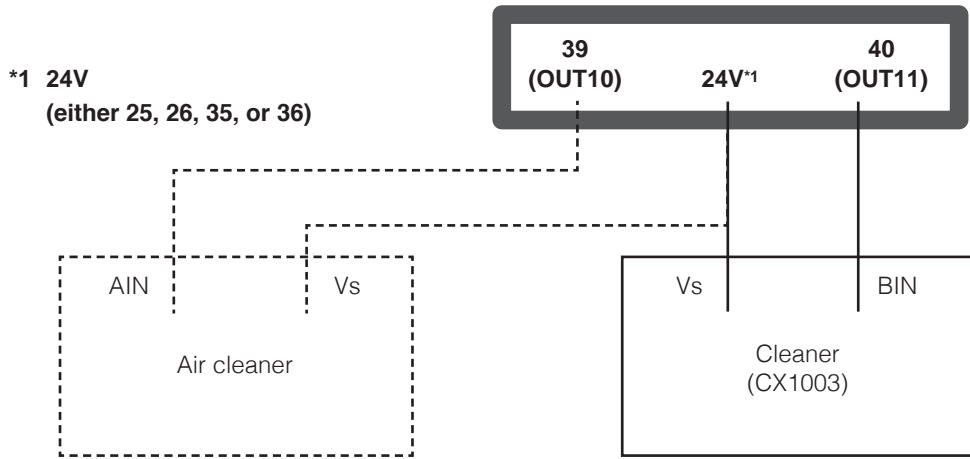
To perform cleaning manually, tap **[CLEANING]** in the top screen.

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. 73).

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.

Cleaning settings

1 2 3 4 5

Z lifting 20.000 mm

Current point

	AIR	BRUSH
X	000.000 mm	30.000 mm
Y	000.000 mm	250.000 mm
Z	000.024 mm	120.000 mm
θ	000.000 deg	0.000 deg
SPEED	10.0 mm/s	100.0 mm/s
DWELL	0.0 sec	1.0 sec
Use current pos.	Use current pos.	Use current pos.
Disable axisY	<input type="checkbox"/>	<input type="checkbox"/>

Check Operation

OK

7. Operation (continued)

7-4 Solder Installation and Solder Feed Settings

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

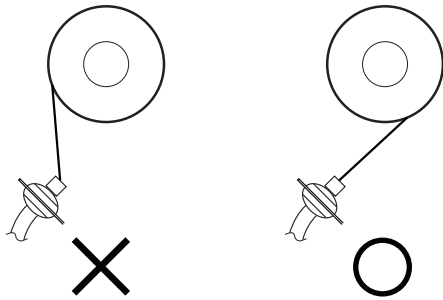
Check that the feeder unit and soldering unit mount are firmly assembled. For details on assembling and attaching them, refer to “5-2-1 Attaching the Feeder Unit (CX5005)” (p. 20) and “5-2-2 Attaching the Soldering Iron Unit” (p. 21).

7-4-1-1 Solder Installation

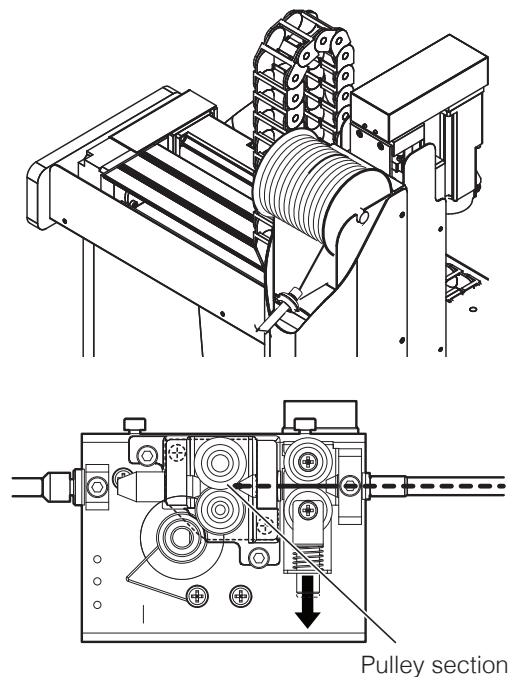
— Note —

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

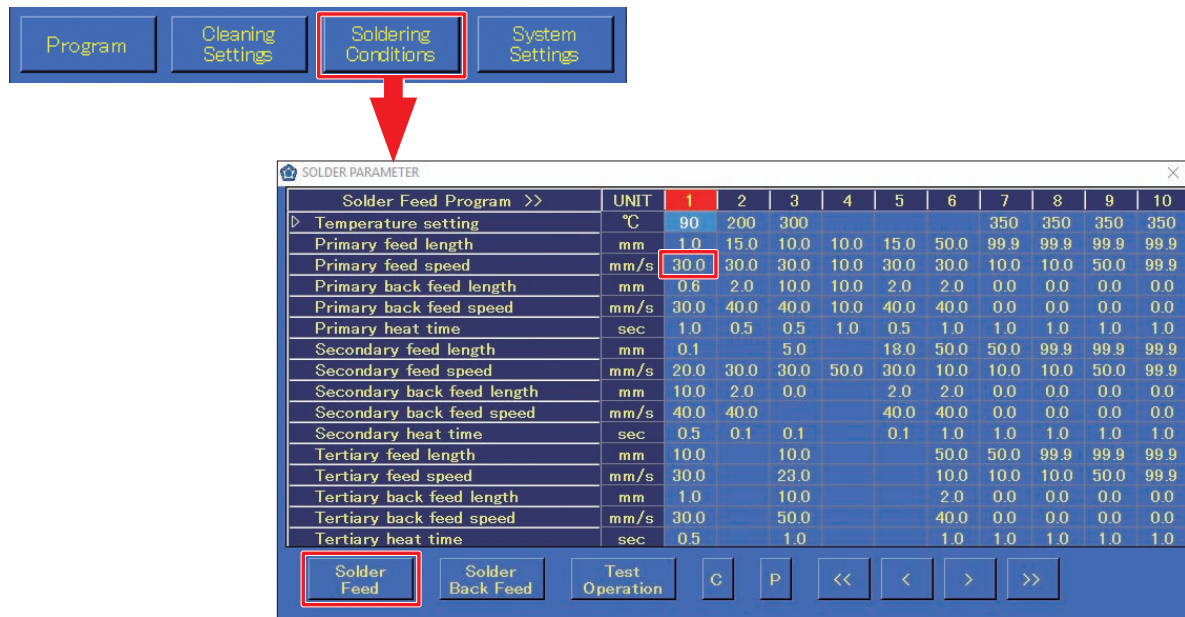
1. Set the solder in the solder reel holder.
Set the solder orientation so that the solder will be fed from the rear side.



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.



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



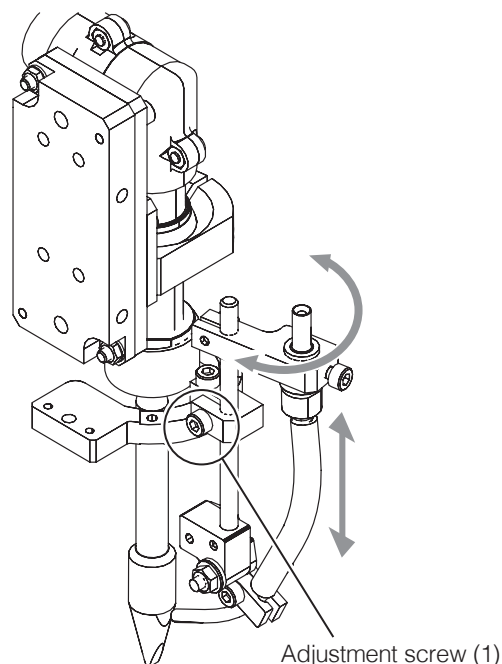
- When **[Solder Feed]** in the Solder Feed Parameter Setting Screen is tapped, solder will be fed. Tapping it again will cause solder feed to stop.
Feed solder until solder comes out of the end of the Teflon tube.

— Note —

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

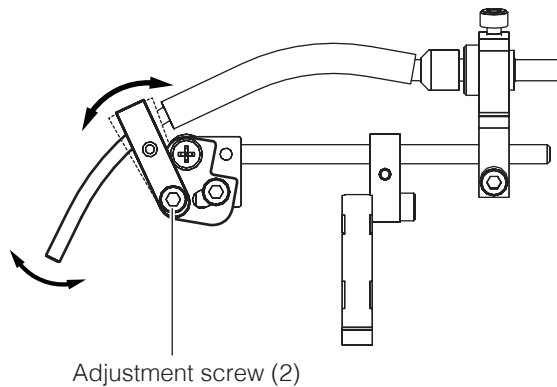
7-4-1-2 Solder Feed Position Adjustment

- 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.

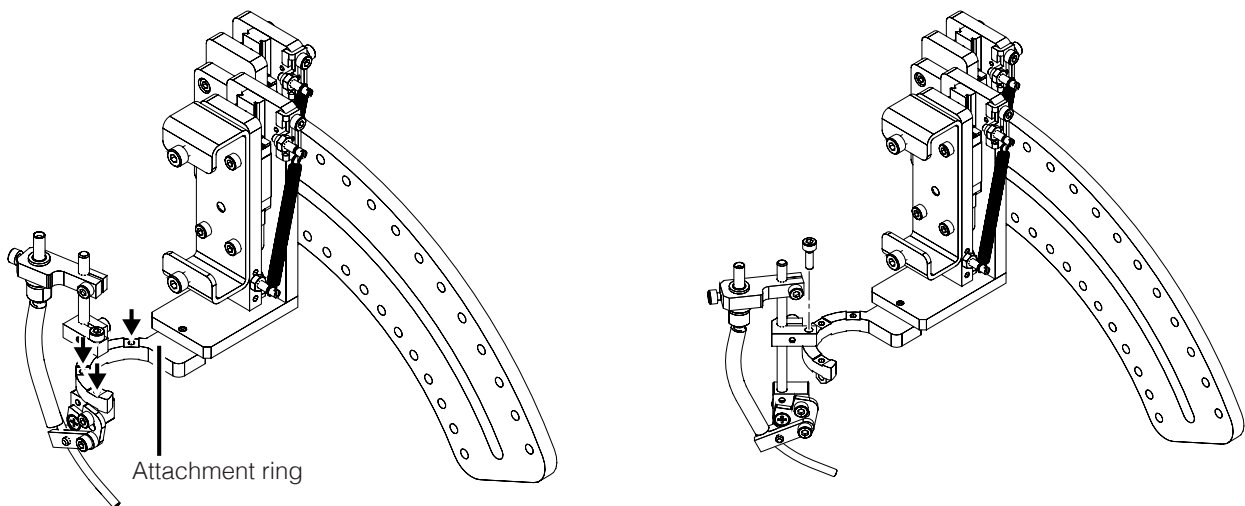


7. Operation (continued)

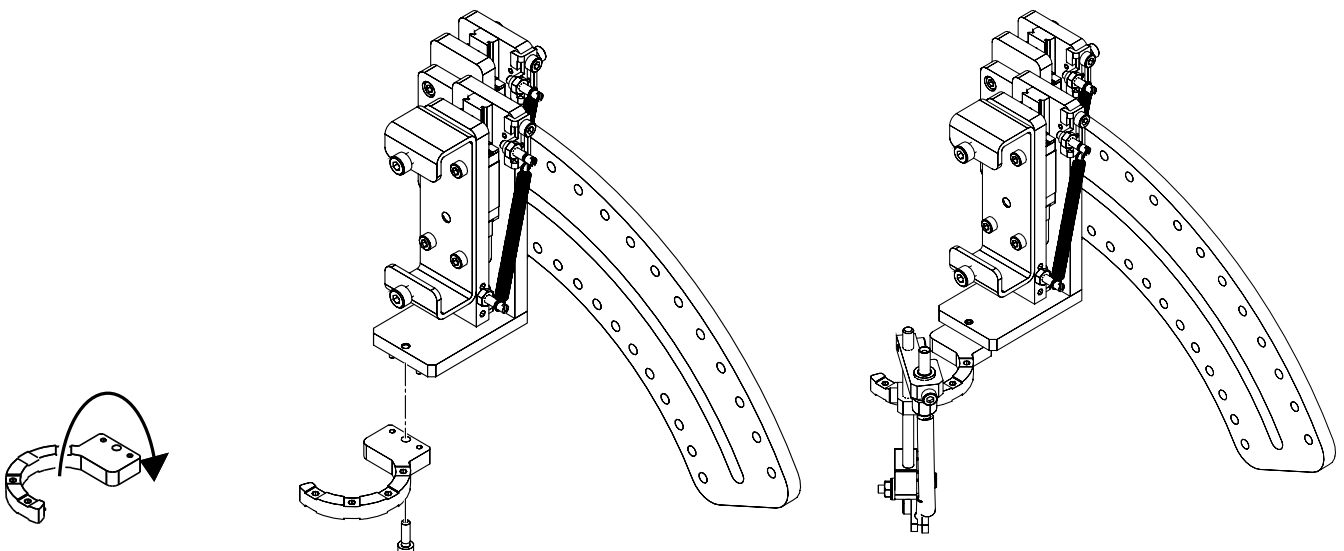
2. When adjustment screw (2) is loosened, the guide pipe can be moved as shown in the diagram below. Adjust it to a position where the solder will come in contact with the soldering iron tip.



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



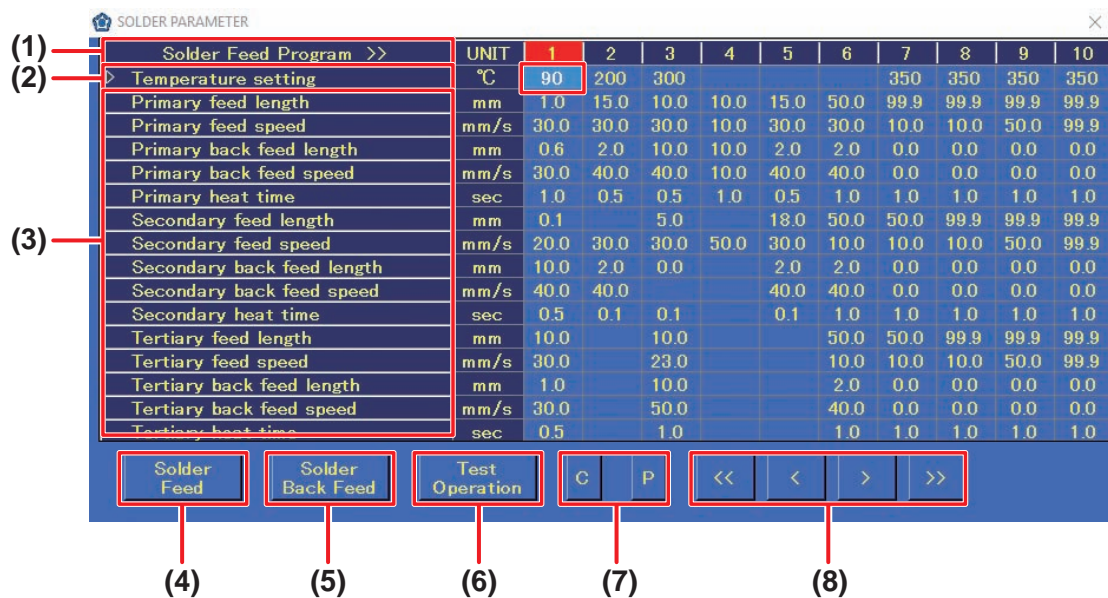
4. Changing the attachment orientation of the attachment ring will make it possible to attach the feed guide set at the opposite angle.



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 HAKKO FU-601 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.

7. Operation (continued)

— Note —

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

SOLDER PARAMETER													X
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	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	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	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	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	1.0	
Secondary feed length	mm	0.1		5.0		18.0	50.0	50.0	99.9	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	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	0.0	
Secondary back feed speed	mm/s	40.0	40.0			40.0	40.0	0.0	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	1.0	
Tertiary feed length	mm	10.0		10.0			50.0	50.0	99.9	99.9	99.9	99.9	
Tertiary feed speed	mm/s	30.0		23.0									
Tertiary back feed length	mm	1.0		10.0									
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	
Export Solder Conditions Table													
Import Solder Conditions Table													
Solder Feed	Solder Back Feed	Test Operation	C	P	<<	<	>	>>					

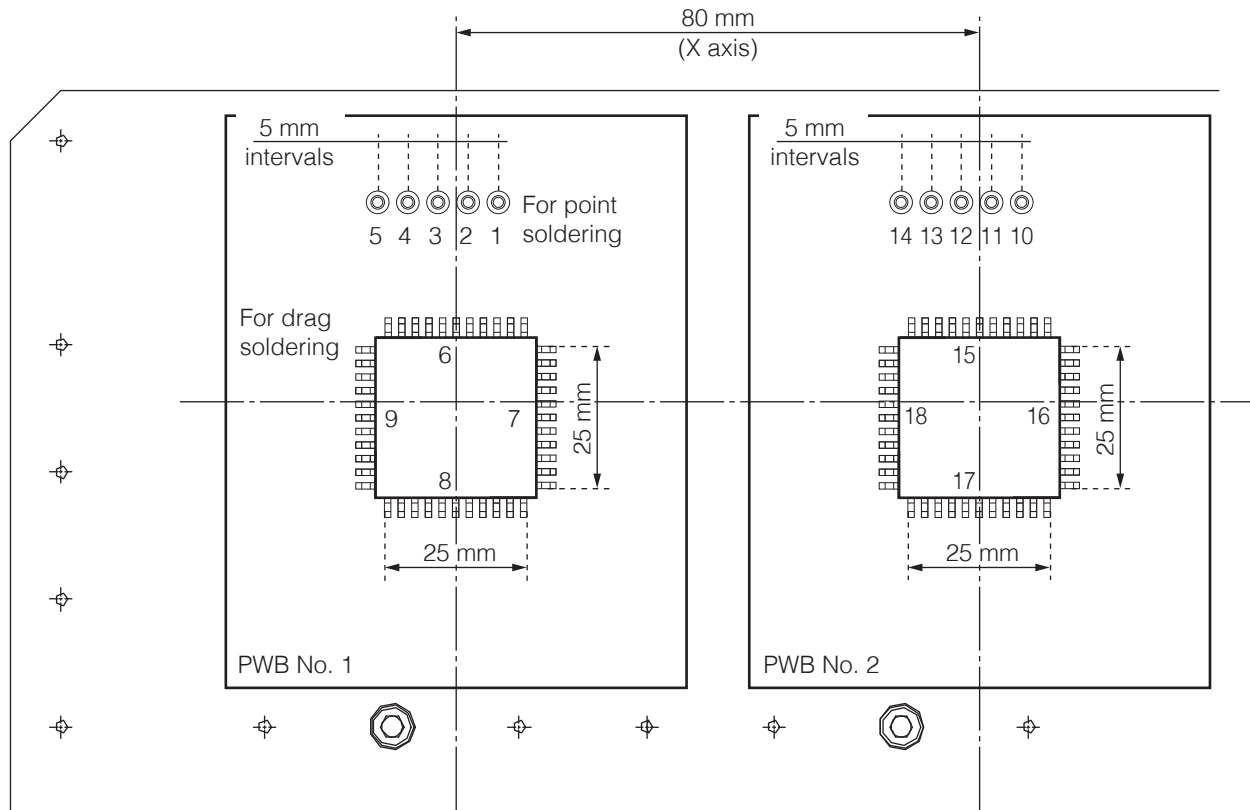
2. As shown in the diagram above, the Export Solder Conditions Table/Import Solder Conditions Table selection screen will appear.
To write solder conditions to a file, select Export Solder Conditions Table; to read solder conditions from a file, select Import Solder Conditions Table. This function reads 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	—

7. Operation (continued)

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).

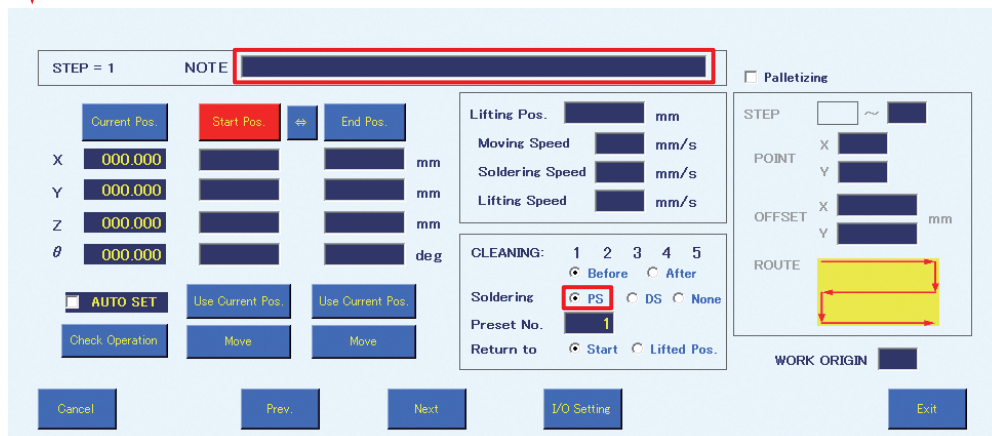
Switch on the tablet power and start the software (HAKKO SOLDERING SYSTEM2).

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)

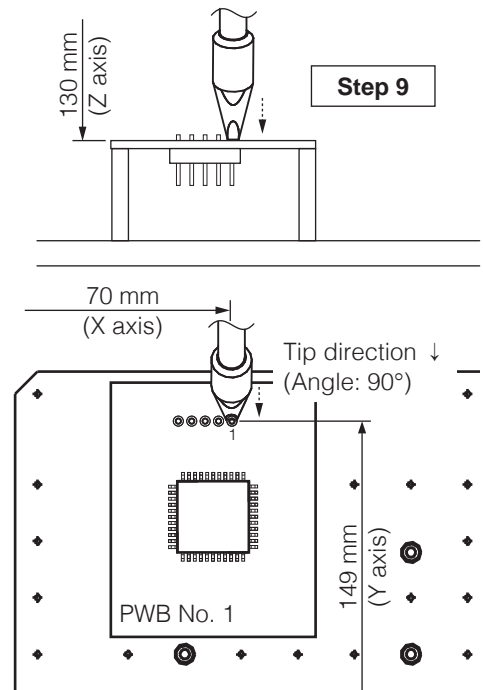


1. Tap **[Program]** in the top screen. The program list will open.
2. Tap the beginning of a row to select the entire row.
3. Tap the **Program name**, select a cell, and then tap it again to enter the condition for inputting characters. (The cursor will blink.)
4. If the OSK does not appear, tap **[OSK]** 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.

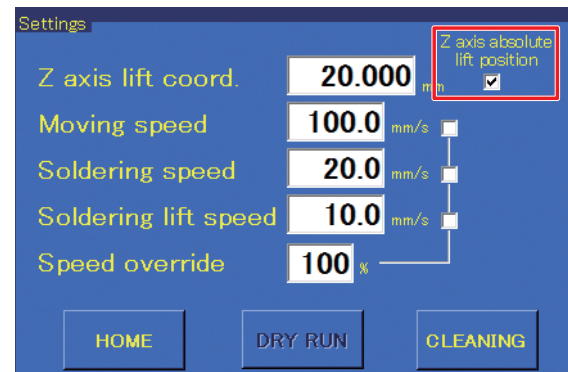


8. Select **PS** as the soldering mode.

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. 60).



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.



7. Operation (continued)

Tap **[Use Current Pos.]** on the end point side.

The coordinates can also be input by pressing the robot's **[Easy Input Switch]** button.



STEP = 1 NOTE

Current Pos. Start Pos. End Pos.

X 000.000 mm

Y 000.000 mm

Z 000.000 mm

θ 000.000 deg

AUTO SET Use Current Pos. Use Current Pos.

Check Operation Move Move

Cancel Prev. Next I/O Setting Exit

Lifting Pos. mm

Moving Speed mm/s

Soldering Speed mm/s

Lifting Speed mm/s

CLEANING: 1 2 3 4 5

Soldering: PS DS None

Preset No. 1

Return to: Start Lifted Pos.

Palletizing

STEP ~

POINT X Y

OFFSET X Y mm

ROUTE

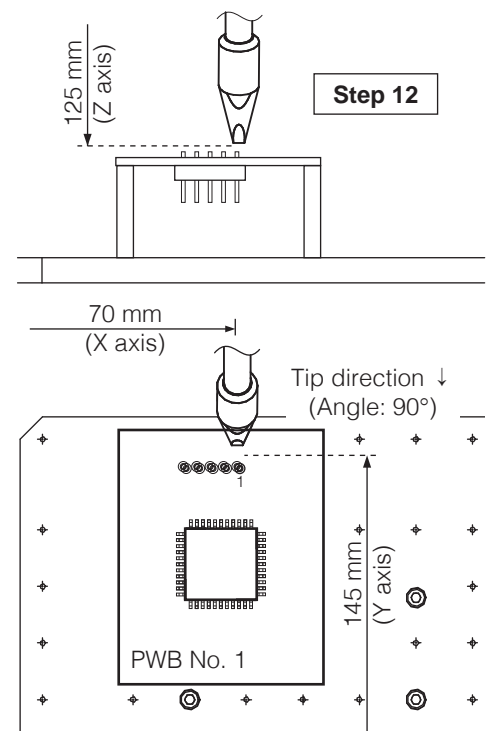
WORK ORIGIN

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.

STEP = 1 NOTE

	Current Pos.	Start Pos.	End Pos.	
X	070.000	70.000	070.000	mm
Y	145.000	145.000	149.000	mm
Z	125.000	125.000	131.000	mm
θ	090.000	90.000	090.000	deg

☒ AUTO SET **Use Current Pos.** Use Current Pos.

Check Operation Move Move

Lifting Pos. mm
Moving Speed mm/s
Soldering Speed mm/s
Lifting Speed mm/s

CLEANING: 1 2 3 4 5
☒ Before ☐ After
Soldering ☒ PS ☐ DS ☐ None
Preset No. 1
Return to ☒ Start ☐ Lifted Pos.

Palletizing
STEP ~
POINT X Y
OFFSET X Y mm
ROUTE
WORK ORIGIN

Cancel Prev. Next I/O Setting Exit

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

STEP = 1 NOTE

	Current Pos.	OFFSET	End Pos.	
X	070.000		70.000	mm
Y	149.000		149.000	mm
Z	131.000		131.000	mm
θ	090.000		90.000	deg

☐ AUTO SET Use Current Pos. Use Current Pos.

Check Operation Move Move

Lifting Pos. mm
Moving Speed mm/s
Soldering Speed mm/s
Lifting Speed mm/s

CLEANING: 1 2 3 4 5
☒ Before ☐ After
Soldering ☒ PS ☐ DS ☐ None
Preset No. 1
Return to ☒ Start ☐ Lifted Pos.

Palletizing
STEP ~
POINT X Y
OFFSET X Y mm
ROUTE
WORK ORIGIN

Cancel Prev. Next I/O Setting Exit

7. Operation (continued)

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. 74) 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.

STEP = 1 NOTE

Current Pos. **OFFSET** **End Pos.**

X 070.000 5.000 70.000 mm

Y 149.000 149.000 mm

Z 131.000 131.000 mm

θ 090.000 90.000 deg

☐ AUTO SET Use Current Pos. Use Current Pos.

Check Operation Move Move

Lifting Pos. mm

Moving Speed mm/s

Soldering Speed mm/s

Lifting Speed mm/s

CLEANING: 1 2 3 4 5

Before After

Soldering PS DS None

Preset No. 1

Return to Start Lifted Pos.

☐ Palletizing

STEP ~

POINT X Y

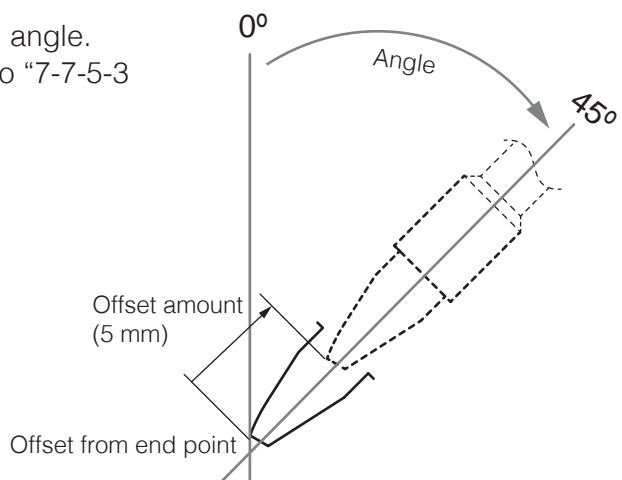
OFFSET X Y mm

ROUTE

WORK ORIGIN

Cancel Prev. Next I/O Setting Exit

The offset amount can be set according to the tip angle.
For information on how to set the tip angle, refer to "7-7-5-3 SOLDER HEAD ANGLE Function" (p. 113).



— 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.



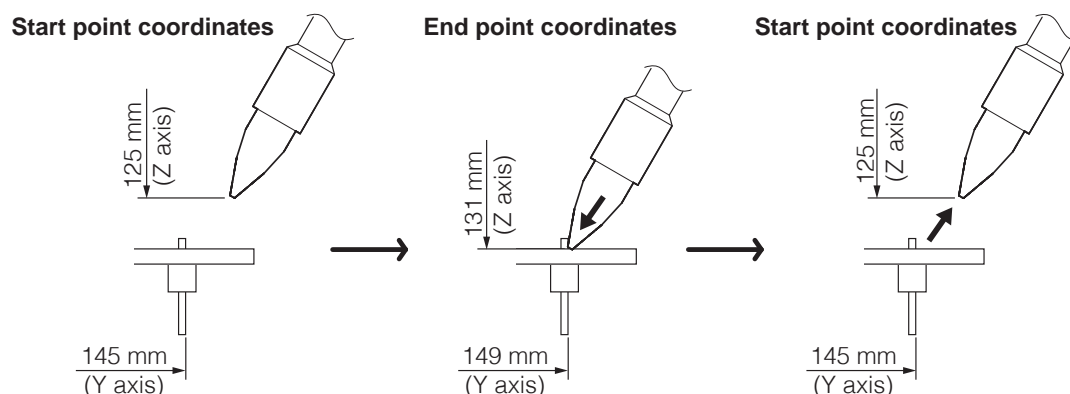
16. Select the soldering conditions (solder feed program number). (Input range: 1 – 250)

In this example, soldering condition 1 is selected. For details on soldering conditions settings, refer to “7-1-3 Soldering Conditions” (p. 48).

17. Set the destination after completion of soldering. Select settings for Return to.

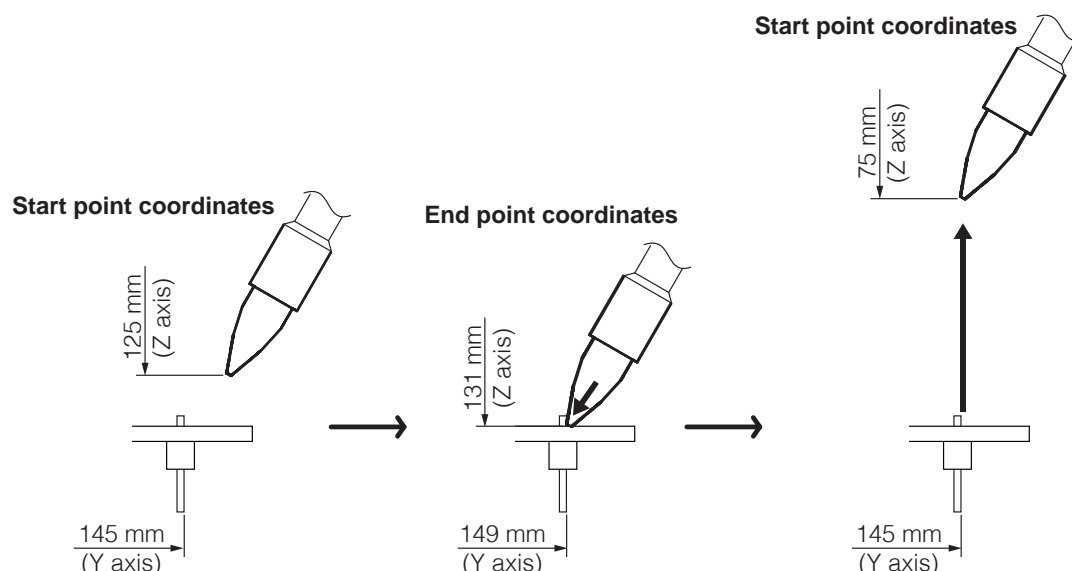
Ex.) When the start point was selected

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.



7. Operation (continued)

Ex.) When individual settings are performed

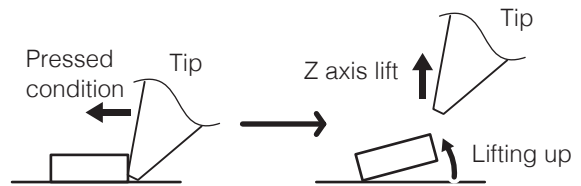
When a value is input for the Z lift position in the Point Edit Screen, Z axis lift will be performed to the coordinates input for that point in the Point Edit Screen.

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. 51).

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.

Lifting Pos.	<input type="text"/>	mm
Moving Speed	<input type="text"/>	mm/s
Soldering Speed	<input type="text"/>	mm/s
Lifting Speed	<input type="text"/>	mm/s

CLEANING:	1	2	3	4	5
	<input checked="" type="radio"/> Before	<input type="radio"/> After			
Soldering	<input checked="" type="radio"/> PS	<input type="radio"/> DS	<input type="radio"/> None		
Preset No.	<input type="text" value="1"/>				
Return to	<input checked="" type="radio"/> Start	<input type="radio"/> Lifted Pos.			

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. 88).

<input type="text"/>	mm
<input type="text"/>	mm/s
<input type="text"/>	mm/s
<input type="text"/>	mm/s

1	2	3	4	5
<input checked="" type="radio"/> Before	<input type="radio"/> After			
<input checked="" type="radio"/> PS	<input type="radio"/> DS	<input type="radio"/> None		
<input type="text" value="1"/>				
<input checked="" type="radio"/> Start	<input type="radio"/> Lifted Pos.			

STEP	<input type="text"/>	~	<input type="text"/>
POINT	X	<input type="text"/>	
	Y	<input type="text"/>	
OFFSET	X	<input type="text"/>	mm
	Y	<input type="text"/>	
ROUTE			
WORK ORIGIN	<input type="text" value="1"/>		

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

STEP = 1 NOTE

Current Pos. Start Pos. End Pos.

X 070.000 70.000 70.000 mm

Y 145.000 145.000 149.000 mm

Z 125.000 125.000 131.000 mm

θ 090.000 90.000 90.000 deg

☐ AUTO SET Use Current Pos. Use Current Pos.

Check Operation Move Move

Lifting Pos. mm

Moving Speed mm/s

Soldering Speed mm/s

Lifting Speed mm/s

CLEANING: 1 2 3 4 5
☒ Before ☐ After

Soldering ☒ PS ☐ DS ☐ None

Preset No. 1

Return to ☒ Start ☐ Lifted Pos.

☐ Palletizing

STEP ~

POINT X Y

OFFSET X Y mm

ROUTE

WORK ORIGIN 1

Cancel Prev. Next I/O Setting Exit

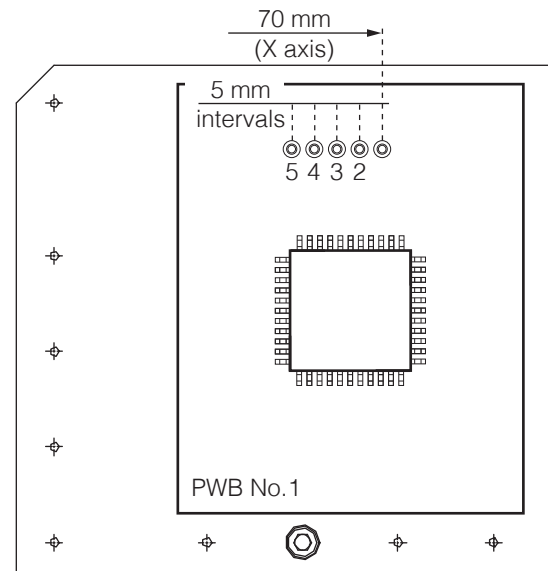
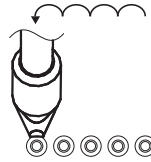
21. When the Point Edit Screen has been closed once, select STEP 1 in the Program Edit Screen and tap **[+]** to add a row. Then double-tap on the added row to edit STEP 2.
Create the soldering program for the 2nd to 5th points in the same way as for the 1st point.

Program List (TEST)														X	
	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	<input type="checkbox"/>	<input type="checkbox"/>	1	<input type="checkbox"/>	**C***	
	2									<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>		

Update Run COPY PASTE + - Gerber

7. Operation (continued)

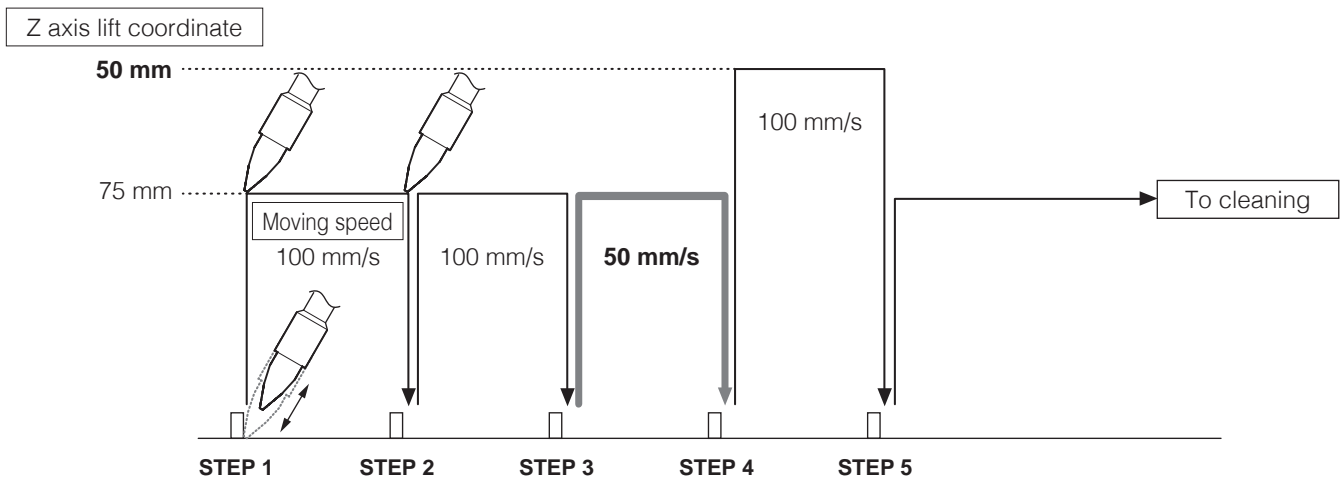
In this example, the movement speed for the 3rd point is set to 50 mm/sec., the Z axis lift coordinate for the 4th point is set to 50.000 mm, and brush cleaning is set to be performed after soldering of the 5th point. (The cleaning number is 1.)



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

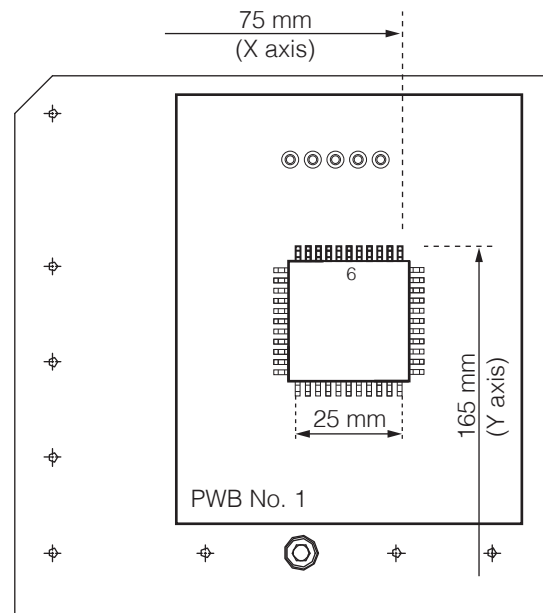
*1 If a value was not input in the Point Edit Screen, the top screen value will be shown.

*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.

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													
7													

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.

STEP = 6

NOTE

Current Pos.

Start Pos.

End Pos.

X

Y

Z

θ

070.000

149.000

131.000

090.000

mm

mm

mm

deg

AUTO SET

Use Current Pos.

Use Current Pos.

Check Operation

Move

Move

Lifting Pos.

Moving Speed

Soldering Speed

Lifting Speed

mm

mm/s

mm/s

mm/s

CLEANING:

1

2

3

4

5

Before

After

Soldering

PS

DS

None

Preset No.

1

Return to

Start

Lifted Pos.

Palletizing

STEP

POINT

OFFSET

ROUTE

WORK ORIGIN

Cancel

Prev.

Next

I/O Setting

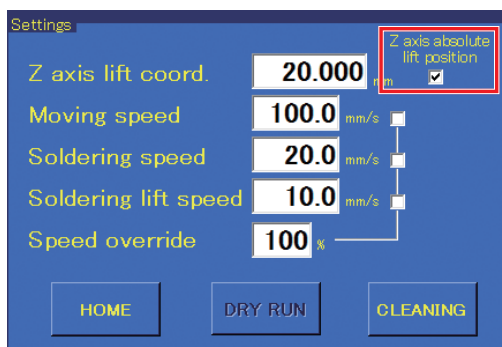
Exit

7. Operation (continued)

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. 60).

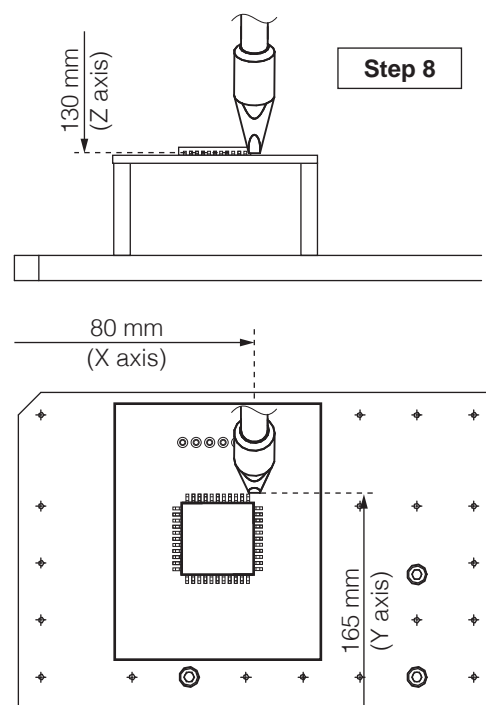
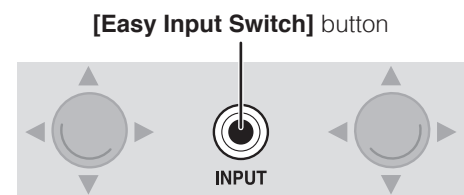
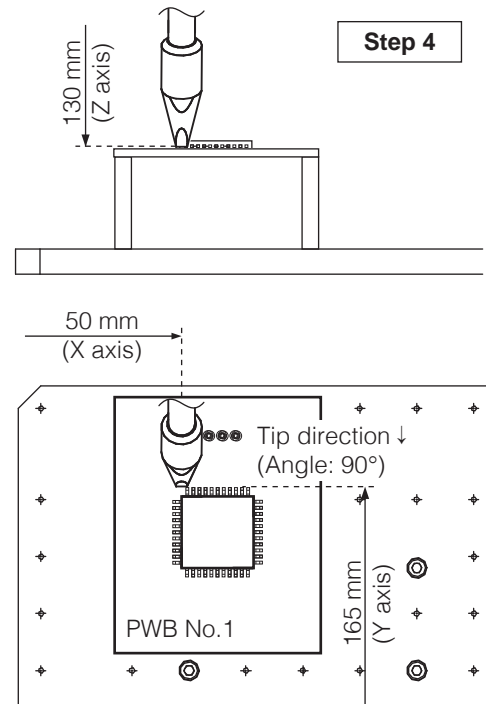


5. Perform fine adjustment using the top screen's **INCHING PITCH** function, etc. to align the soldering iron tip with the point to be soldered.
6. Tap **[Use Current Pos.]** on the start point side (refer to the screenshot on the next page). When performing operations from the robot, press the **[Easy 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.

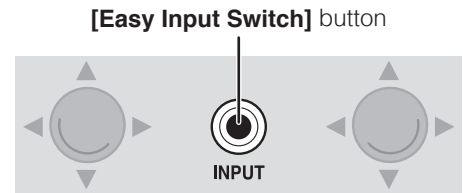
Use JOG operation to align the soldering iron tip with the soldering end position.

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 **Z axis lift coord.** corresponds to the start point. Since soldering of the PWB is performed at the time of primary feeding, the settings for secondary and later can be left blank. 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. 51)).

7. Operation (continued)

STEP = 6

NOTE

	Current Pos.	Start Pos.	⇌	End Pos.	
X	075.000	50.000		75.000	mm
Y	165.000	165.000		165.000	mm
Z	130.000	130.000		130.000	mm
θ	090.000	90.000		90.000	deg

☐ AUTO SET

Lifting Pos. mm
 Moving Speed mm/s
 Soldering Speed mm/s
 Lifting Speed mm/s

CLEANING: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
 ☒ Before ☐ After
 Soldering ☐ PS ☒ DS ☐ None
 Preset No.
 Return to ☐ Start ☒ Lifted Pos.

☐ Palletizing

STEP ~
 POINT X
 Y
 OFFSET X
 Y mm
 ROUTE 
 WORK ORIGIN

Lifting Pos.

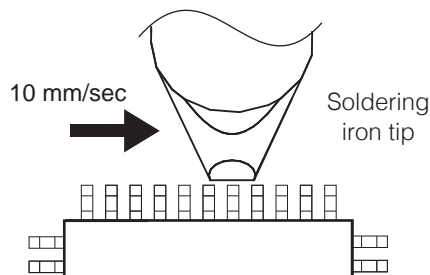
This coordinate is set to avoid contact with protruding objects on the workpiece when moving horizontally.

Moving Speed

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

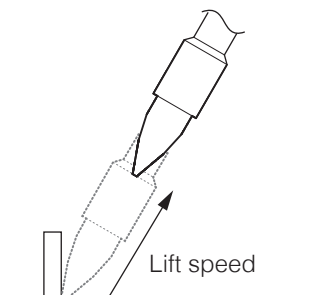
Soldering Speed

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.

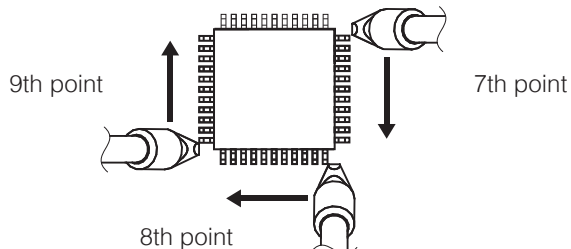


15. Set the **WORK ORIGIN**. In this example, 1 is input in the same way as for “PS (point soldering) settings”. For details on **WORK ORIGIN**, refer to “Using the WORK ORIGIN” (p. 88).

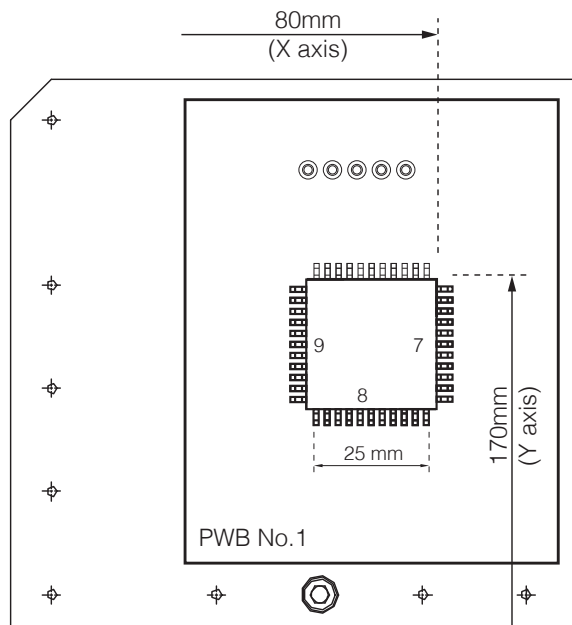
16. Tap **[Exit]** to finish 1 of the settings of the DS (drag soldering) settings for the 6th point. To cancel settings, tap **[Cancel]**.

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.



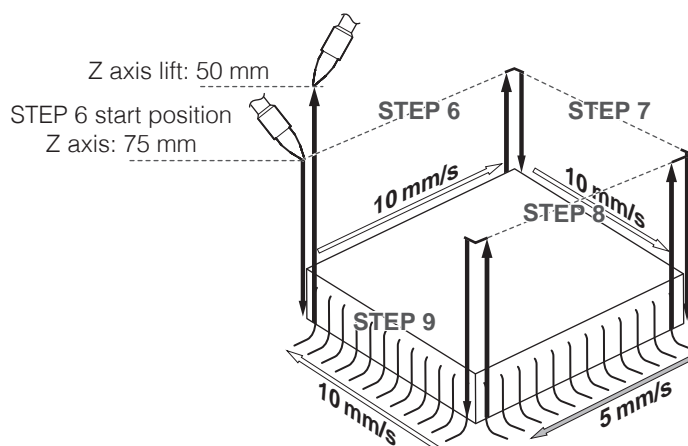
In this example, the soldering speed for the 8th point is set to 5 mm/sec., the Z axis lift coordinate for the 9th point is set to 50.000 mm, and brush cleaning is set to be performed after soldering of the 9th point. (The cleaning number is set to 1.)



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. Operation (continued)

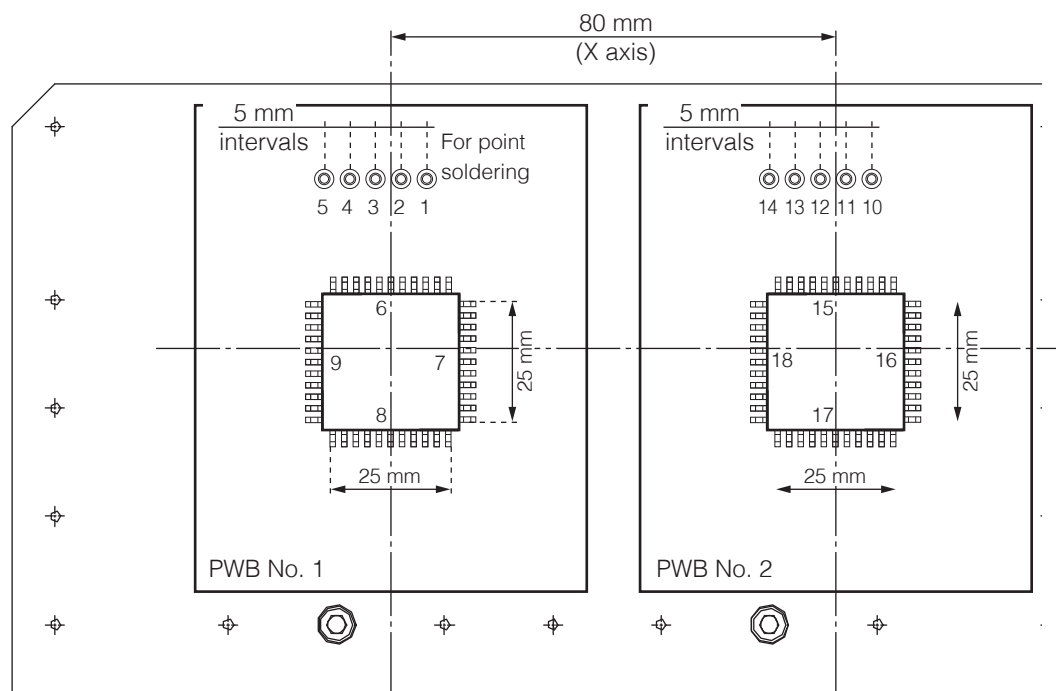
7-5-3 Copying Soldering Programs

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.

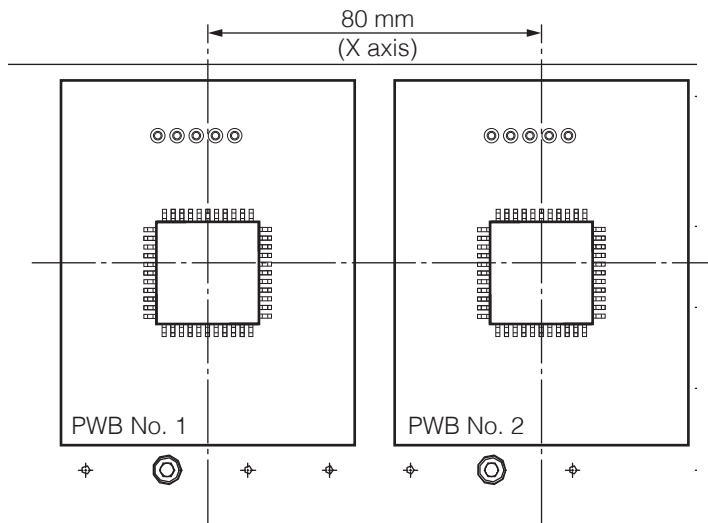
When 2 of the same PWBs are lined up as shown in the diagram below, the soldering program for PWB No. 1 will be applied for PWB No. 2.



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].

1. With this area tapped

2. Drag.

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											0		
11													
12													
13													
14													
15													
16													
17													
18													
19											1		

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7. Operation (continued)

5. Tap row 10.

6. Tap **[PASTE]**.

Program List (TEST02) X

	STEP	X0	Y0	Z0	$\theta 0$	X1	Y1	Z1	$\theta 1$	O	Z	P	D	I/O
	1	70.000	145.000	125.000	90.000	70.000	149.000	131.000	90.000	<input type="checkbox"/>	<input type="checkbox"/>	1	<input type="checkbox"/>	**C***
	2	65.000	145.000	125.000	90.000	65.000	149.000	131.000	90.000	<input type="checkbox"/>	<input type="checkbox"/>	1	<input type="checkbox"/>	
	3	60.000	145.000	125.000	90.000	60.000	149.000	131.000	90.000	<input type="checkbox"/>	<input type="checkbox"/>	1	<input type="checkbox"/>	****S*
	4	55.000	145.000	125.000	90.000	55.000	149.000	131.000	90.000	<input type="checkbox"/>	<input type="checkbox"/>	1	<input type="checkbox"/>	***Z**
	5	50.000	145.000	125.000	90.000	50.000	149.000	131.000	90.000	<input type="checkbox"/>	<input type="checkbox"/>	1	<input type="checkbox"/>	**C***
	6	50.000	165.000	130.000	90.000	75.000	165.000	130.000	90.000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>	**C*S*
	7	80.000	170.000	130.000	0.000	80.000	195.000	130.000	0.000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>	****S*
	8	75.000	200.000	130.000	-90.000	50.000	200.000	130.000	-90.000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>	****S*
	9	45.000	195.000	130.000	-180.000	45.000	170.000	130.000	-180.000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>	**CZS*
▷	10	70.000	145.000	125.000	90.000	70.000	149.000	131.000	90.000	<input type="checkbox"/>	<input type="checkbox"/>	1	<input type="checkbox"/>	**C***
	11	65.000	145.000	125.000	90.000	65.000	149.000	131.000	90.000	<input type="checkbox"/>	<input type="checkbox"/>	1	<input type="checkbox"/>	
	12	60.000	145.000	125.000	90.000	60.000	149.000	131.000	90.000	<input type="checkbox"/>	<input type="checkbox"/>	1	<input type="checkbox"/>	****S*
	13	55.000	145.000	125.000	90.000	55.000	149.000	131.000	90.000	<input type="checkbox"/>	<input type="checkbox"/>	1	<input type="checkbox"/>	***Z**
	14	50.000	145.000	125.000	90.000	50.000	149.000	131.000	90.000	<input type="checkbox"/>	<input type="checkbox"/>	1	<input type="checkbox"/>	**C***
	15	50.000	165.000	130.000	90.000	75.000	165.000	130.000	90.000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>	**C*S*
	16	80.000	170.000	130.000	0.000	80.000	195.000	130.000	0.000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>	****S*
	17	75.000	200.000	130.000	-90.000	50.000	200.000	130.000	-90.000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>	****S*
	18	45.000	195.000	130.000	-180.000	45.000	170.000	130.000	-180.000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>	**CZS*
○	19									<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	

Update Run COPY **PASTE** + - Gerber

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.

Work Origin		
No.	X	Y
1	0.000	0.000
2	80.000	0.000
3	80.000	100.000
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

Tap here in advance.

Set the work origin

Same as source

Work origin 2

Cancel

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.

STEP = 19 NOTE

	Current Pos.	Start Pos.	End Pos.	
X	000.000	0.000		mm
Y	000.000	0.000		mm
Z	000.000	0.000		mm
θ	000.000	0.000		deg

☐ AUTO SET **Use Current Pos.** Use Current Pos.

Check Operation Move Move

Lifting Pos. mm
Moving Speed mm/s
Soldering Speed mm/s
Lifting Speed mm/s

CLEANING: 1 2 3 4 5
☒ Before ☐ After
Soldering ☐ PS ☐ DS ☒ None
Preset No.
Return to ☒ Start ☐ Lifted Pos.

☐ Palletizing

STEP POINT OFFSET ROUTE WORK ORIGIN

Cancel Prev. Next I/O Setting Exit

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.

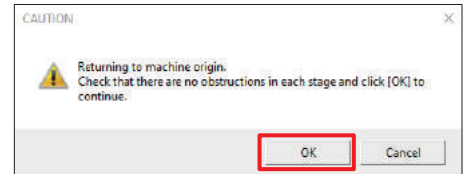
7. Operation (continued)

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.

Running program												
STEP	X0	Y0	Z0	$\theta 0$	X1	Y1	Z1	$\theta 1$	O	Z	P	I/O
1	70.000	145.000	125.000	90.000	70.000	149.000	131.000	90.000	<input type="checkbox"/>	<input type="checkbox"/>	1	**C***
2	65.000	145.000	125.000	90.000	65.000	149.000	131.000	90.000	<input type="checkbox"/>	<input type="checkbox"/>	1	
3	60.000	145.000	125.000	90.000	60.000	149.000	131.000	90.000	<input type="checkbox"/>	<input type="checkbox"/>	1	****S*
4	55.000	145.000	125.000	90.000	55.000	149.000	131.000	90.000	<input type="checkbox"/>	<input type="checkbox"/>	1	***Z**
5	50.000	145.000	125.000	90.000	50.000	149.000	131.000	90.000	<input type="checkbox"/>	<input type="checkbox"/>	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, $\theta 0$: Shows the start point coordinates of the point

X1, Y1, Z1, $\theta 1$: 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, “**IO CZSP**” 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:

Running program												
STEP	X0	Y0	Z0	$\theta 0$	X1	Y1	Z1	$\theta 1$	O	Z	P	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***

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 HAKKO FU-601 Ready signal.
Moving to drag soldering position	Moving from drag soldering start point to end point

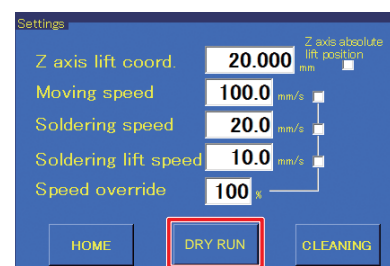
4. Tap [DRY RUN] in the top screen to check positions.

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].

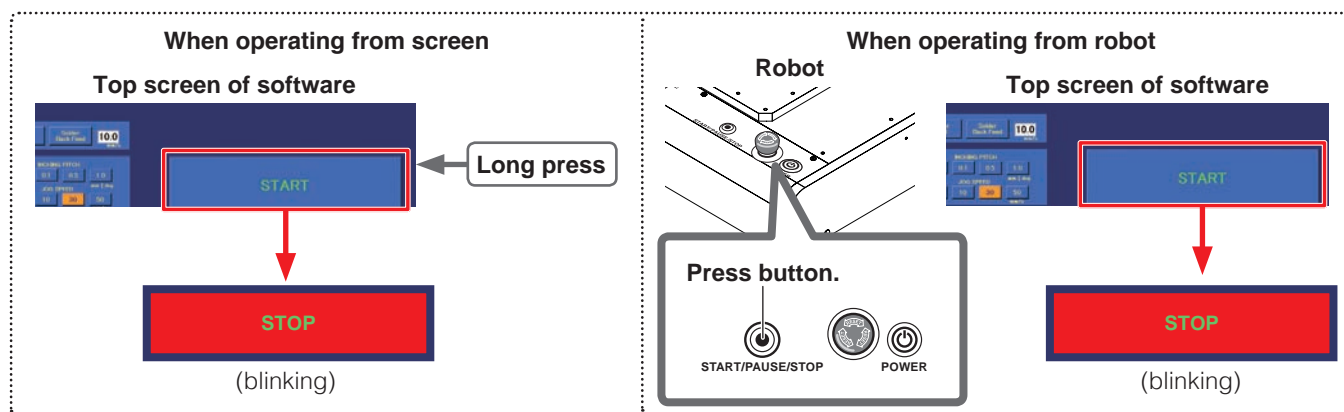
To exclude [DRY RUN] from the count, check PAUSE.

For details on COUNT DOWN, refer to “7-1-5 Work Information” (p. 50).



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. 54) or “7-1-11-2 Flowchart (Robot Button Operation)” (p. 55).



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.

Running program				
STEP	X0	Y0	Z0	
1	70.000	145.000	125.000	
2	65.000	145.000	125.000	
3	60.000	145.000	125.000	

7. Operation (continued)

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.

The screenshot shows the 'Point Edit' screen for STEP = 1. The 'AUTO SET' checkbox is checked and highlighted with a red box. The 'Current Pos.' column shows coordinates: X: 000.000, Y: 000.000, Z: 000.000, θ: 000.000. The 'Start Pos.' and 'End Pos.' columns are empty. The 'End Pos.' header is highlighted with a red box. The 'Use Current Pos.' button is also highlighted with a red box. The 'Check Operation' button is visible. The right side of the screen shows various settings: Lifting Pos. (mm), Moving Speed (mm/s), Soldering Speed (mm/s), Lifting Speed (mm/s), CLEANING (Before/After), Soldering (PS/DS/None), Preset No. (1), Return to (Start/Lifted Pos.), and a Palletizing section with STEP, POINT, OFFSET, and ROUTE settings. The 'Exit' button is at the bottom right.

1. Check the **AUTO SET** checkbox.
2. Use the JOY STICKS to align the tip with the end point position.

The screenshot shows the 'Point Edit' screen for STEP = 1, similar to the previous one, but with updated coordinates in the 'Current Pos.' column: X: 070.000, Y: 149.000, Z: 131.000, θ: 090.000. The 'End Pos.' header and the 'Use Current Pos.' button are still highlighted with red boxes. The 'Check Operation' button is visible. The right side of the screen shows the same settings as the previous screenshot. The 'Exit' button is at the bottom right.

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.

The screenshot displays the robot's control interface for Step 1. The interface is organized into several sections:

- STEP = 1**: Indicates the current step in the sequence.
- NOTE**: A text area for additional information.
- Position Input Table**:

	Current Pos.	Start Pos.	End Pos.	Unit
X	070.000	70.000	070.000	mm
Y	145.000	145.000	149.000	mm
Z	125.000	125.000	131.000	mm
θ	090.000	90.000	090.000	deg
- Buttons**:
 - AUTO SET**: A checkbox that is currently checked.
 - Check Operation**: A button to verify the current settings.
 - Move**: Two buttons, one for 'Use Current Pos.' and another for 'Move'.
- Settings Section**:
 - Lifting Pos.**: A field for lifting position in mm.
 - Moving Speed**: A field for moving speed in mm/s.
 - Soldering Speed**: A field for soldering speed in mm/s.
 - Lifting Speed**: A field for lifting speed in mm/s.
 - CLEANING**: A section with radio buttons for 'Before' and 'After'.
 - Soldering**: A section with radio buttons for 'PS', 'DS', and 'None'.
 - Preset No.**: A field set to '1'.
 - Return to**: A section with radio buttons for 'Start' and 'Lifted Pos.'.
- Palletizing Section**:
 - STEP**: A field for step number.
 - POINT**: Fields for X and Y coordinates.
 - OFFSET**: Fields for X and Y offsets in mm.
 - ROUTE**: A diagram showing a yellow rectangular path with red arrows indicating the direction of travel.
 - WORK ORIGIN**: A field for work origin.
- Navigation Buttons**:
 - Cancel**: A button to cancel the current operation.
 - Prev.**: A button to go to the previous step.
 - Next**: A button to go to the next step.
 - I/O Setting**: A button for input/output settings.
 - Exit**: A button to exit the current screen.

7. Operation (continued)

Inputting the Start Point Offset Value Using AUTO SET

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

STEP = 1 NOTE

	Current Pos.	OFFSET	End Pos.	
X	070.000	20.000	070.000	mm
Y	149.000		149.000	mm
Z	131.000		131.000	mm
θ	090.000		090.000	deg

☒ **AUTO SET** Use Current Pos. Use Current Pos.

Check Operation Move Move

Lifting Pos. mm
Moving Speed mm/s
Soldering Speed mm/s
Lifting Speed mm/s

CLEANING: 1 2 3 4 5
Before After
Soldering PS DS None
Preset No. 1
Return to Start Lifted Pos.

STEP POINT OFFSET ROUTE

WORK ORIGIN

Cancel Prev. Next I/O Setting Exit

1. Check **AUTO SET**.
2. Use the JOY STICKS to align the tip with the end point position.

SYSTEM SETTING

ANGLE

Y X Z

OFFSET

SOLDER HEAD ADJUST

X 0.000 mm
Y 0.000 mm
Z 0.000 mm

CLEAR

SOLDER HEAD ANGLE

45.000 deg

OTHER

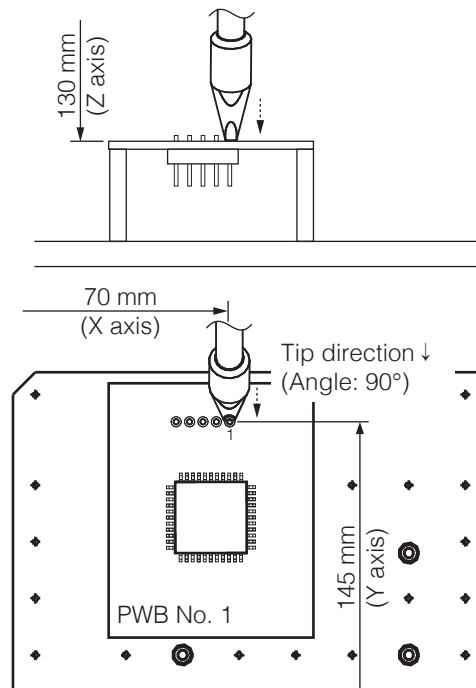
OFFSET 10.000 mm
Z-ESC 20.000 mm
COUNT 1000

SOLDER UNIT

CONNECT

Set Temperature Tolerance °C
Lower 5 Upper 5

Lang ENGLISH



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.

Program List (TEST)													
	STEP	X0	Y0	Z0	θ 0	X1	Y1	Z1	θ 1	O	Z	P	I/O
▷	1	70.000	145.000	125.000	90.000	70.000	149.000	131.000	90.000	<input type="checkbox"/>	<input type="checkbox"/>	1	**C**
○	2									<input type="checkbox"/>	<input type="checkbox"/>		

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

The 'Import Gerber' dialog box is shown. It has a light blue background. Fields include: 'D-Code' (empty red box), 'Back Side' (unchecked checkbox), 'Z Solder Position' (dark blue box), 'OFFSET' (dark blue box), 'Board Origin' (two red boxes followed by 'mm'), 'Board (0,0)' (diagram with two dots and a line), 'CANCEL' (blue button), and 'IMPORT' (blue button).

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

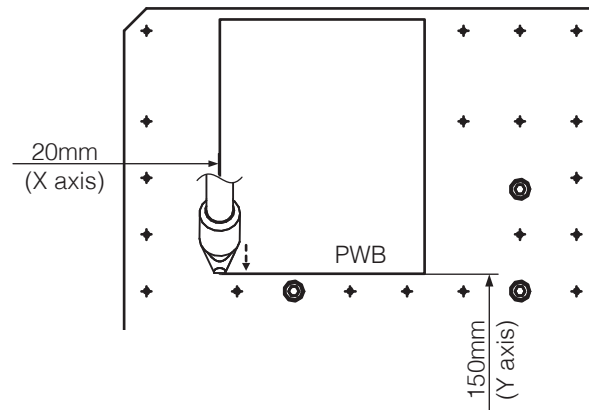
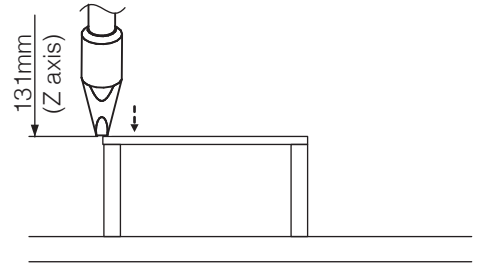
The 'Import Gerber' dialog box is shown. The 'D-Code' field now contains the number '32'. All other fields and buttons remain the same as in the previous step.

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.

The 'Import Gerber' dialog box is shown. The 'Back Side' checkbox is now checked. All other fields and buttons remain the same as in the previous steps.

7. Operation (continued)

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.

The screenshot shows the 'Import Gerber' dialog box. The 'Z Solder Position' field is set to '131.000'. Other fields include 'D-Code' (32), 'Back Side' (unchecked), 'OFFSET' (empty), and 'Board Origin' (two red boxes). The 'Board (0,0)' button is highlighted.

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

The screenshot shows the 'Import Gerber' dialog box. The 'OFFSET' field is set to '10.000'. Other fields include 'D-Code' (32), 'Back Side' (unchecked), 'Z Solder Position' (131.000), and 'Board Origin' (two red boxes). The 'Board (0,0)' button is highlighted.

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).

The screenshot shows the 'Import Gerber' dialog box. The 'Board Origin' field is set to '20.000' and '150.000' mm. Other fields include 'D-Code' (32), 'Back Side' (unchecked), 'Z Solder Position' (131.000), and 'OFFSET' (10.000). The 'Board (0,0)' button is highlighted.

-
- 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.
- 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. Operation (continued)

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.

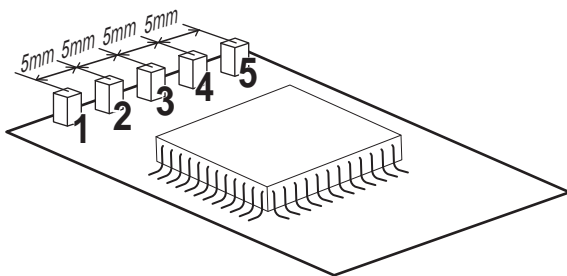
Not only can a single point be repeated, but a continuous series of points can also be duplicated.

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.

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		***1
2													

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

STEP = 1 NOTE

Current Pos.	Start Pos.	⇄	End Pos.
X 070.000	50.000		50.000 mm
Y 149.000	145.000		149.000 mm
Z 131.000	125.000		131.000 mm
θ 090.000	90.000		90.000 deg

☐ AUTO SET Use Current Pos. Use Current Pos.

Check Operation Move Move

Lifting Pos. mm

Moving Speed mm/s

Soldering Speed mm/s

Lifting Speed mm/s

CLEANING: 1 2 3 4 5

☒ Before ☐ After

Soldering ☒ PS ☐ DS ☐ None

Preset No. 1

Return to ☒ Start ☐ Lifted Pos.

☒ Palletizing

STEP 1 ~ 1

POINT X 1 Y 1

OFFSET X 0.000 mm Y 0.000

ROUTE

WORK ORIGIN

Cancel Prev. Next I/O Setting Exit

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.

STEP = 1 NOTE

	Current Pos.	Start Pos.	⇌	End Pos.	
X	070.000	50.000		50.000	mm
Y	149.000	145.000		149.000	mm
Z	131.000	125.000		131.000	mm
θ	090.000	90.000		90.000	deg

☐ AUTO SET Use Current Pos. Use Current Pos.

Check Operation Move Move

Lifting Pos. mm
Moving Speed mm/s
Soldering Speed mm/s
Lifting Speed mm/s

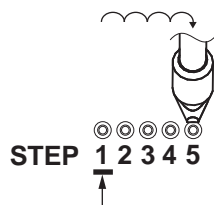
CLEANING: 1 2 3 4 5
☒ Before ☐ After
 Soldering ☒ PS ☐ DS ☐ None
 Preset No. 1
 Return to ☒ Start ☐ Lifted Pos.

☒ Palletizing

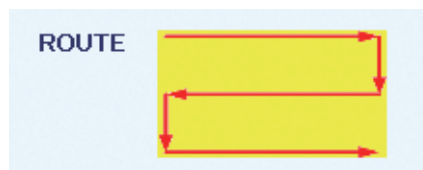
STEP 1 ~ 1
 POINT X 5
 POINT Y 1
 OFFSET X 5.000 mm
 OFFSET Y 0.000 mm
 ROUTE
 WORK ORIGIN

Cancel Prev. Next I/O Setting Exit

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. Operation (continued)

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

- In addition to the program created in “7-7-2-1 Repeating a Single Point” (p. 100) 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. 83).
These values will be input into the rows for STEP 2 to STEP 5.

STEP	X0	Y0	Z0	$\theta 0$	X1	Y1	Z1	$\theta 1$	O	Z	P	D	I/c
1	50.000	145.000	125.000	90.000	50.000	149.000	131.000	90.000	<input type="checkbox"/>	<input type="checkbox"/>	1	<input type="checkbox"/>	***
2	50.000	165.000	130.000	90.000	75.000	165.000	130.000	90.000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>	**C*
3	80.000	170.000	130.000	0.000	80.000	195.000	130.000	0.000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>	***
4	75.000	200.000	130.000	-90.000	50.000	200.000	130.000	-90.000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>	***
5	45.000	195.000	130.000	-180.000	45.000	170.000	130.000	-180.000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>	**C*
6									<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	
7									<input type="checkbox"/>	<input type="checkbox"/>	1	<input type="checkbox"/>	

- 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.
- Select rows 1 – 5 by tapping and dragging, and then tap **[COPY]**.
- Tap row 6, and then tap **[PASTE]**.

No.	X	Y
1	0.000	0.000
2	80.000	0.000
3	80.000	100.000
4	0.000	100.000
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

Tap the values

Select up to row 5 and then tap **[COPY]**.

Select row 6 and then tap **[PASTE]**.

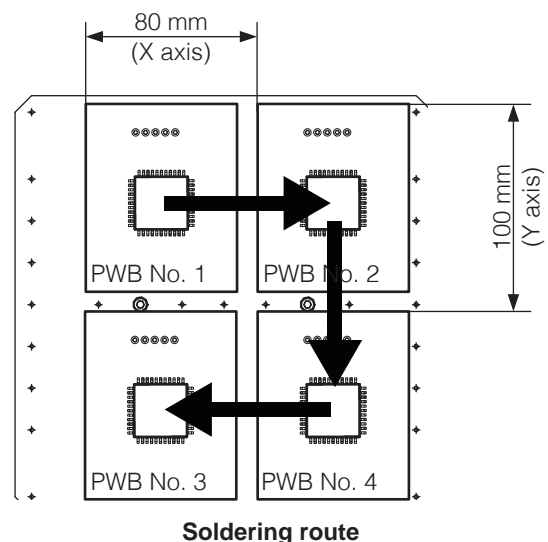
Set the work origin

Same as source
Work origin 2
Cancel

The tapped number will be shown.

- Tap the values in the work origin screen and then tap **[Work origin 2]** to complete the copying process.
- Repeat the same procedure to paste the programs for work origins 3 and 4.

This completes duplication of the programs using the palletizing function.

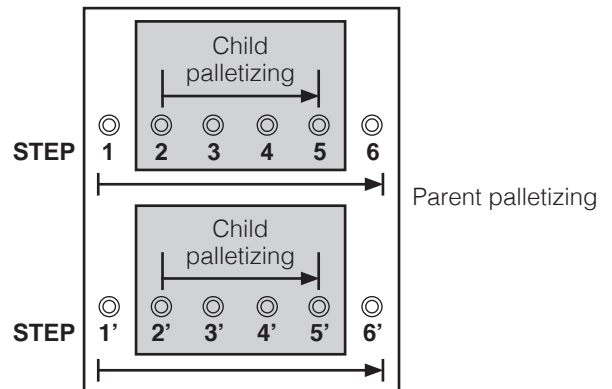


7-7-2-3 Duplicating a Series of Multiple Points as a Group

→ 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	θ0	X1	Y1	Z1	θ1	0	Z	P	D	I/O
1	50.000	145.000	125.000	90.000	50.000	149.000	131.000	90.000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	<input type="checkbox"/>	**C**P
2	55.000	145.000	125.000	90.000	55.000	149.000	131.000	90.000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	<input type="checkbox"/>	*****P
3	50.000	165.000	130.000	90.000	75.000	165.000	130.000	90.000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>	**C*S*
4	80.000	170.000	130.000	0.000	80.000	195.000	130.000	0.000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>	****S*
5	75.000	200.000	130.000	-90.000	50.000	200.000	130.000	-90.000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>	****S*
6	45.000	195.000	130.000	-180.000	45.000	170.000	130.000	-180.000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>	**C*S*
7									<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	
8									<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	

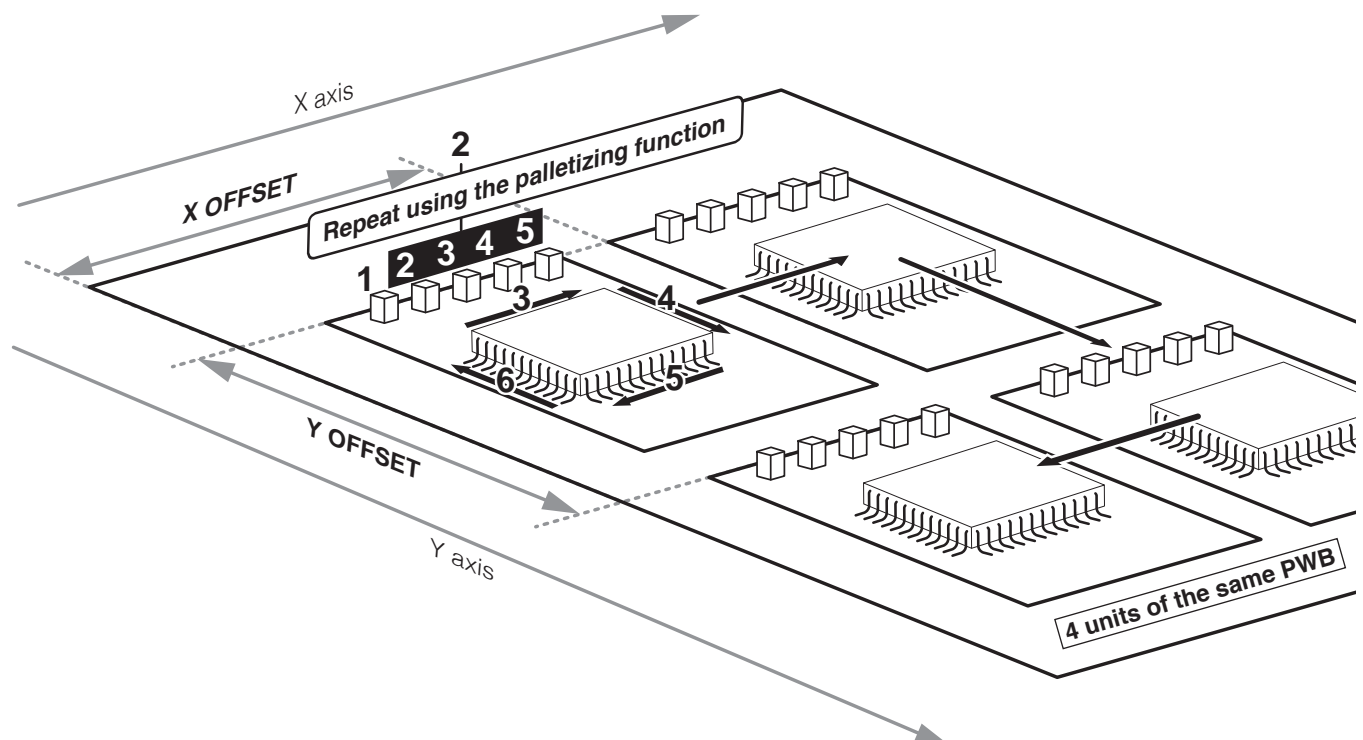
Row 1: Soldering of the 1st – 9th points will be repeated (4 times).

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.



7. Operation (continued)

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 x 3 times in the Y direction, for a total of 9 points.

STEP = 1

NOTE

Current Pos.

Start Pos.

⇄

End Pos.

X

070.000

50.000

50.000

mm

Y

149.000

145.000

149.000

mm

Z

131.000

125.000

131.000

mm

θ

090.000

90.000

90.000

deg

☐ AUTO SET

Use Current Pos.

Use Current Pos.

Check Operation

Move

Move

Lifting Pos.

mm

Moving Speed

mm/s

Soldering Speed

mm/s

Lifting Speed

mm/s

CLEANING:

1 2 3 4 5

☒ Before
 ☐ After

Soldering

☒ PS
 ☐ DS
 ☐ None

Preset No.

1

Return to

☒ Start
 ☐ Lifted Pos.

STEP

1 ~ 1

POINT

X

1

Y

1

OFFSET

X

0.000

mm

Y

0.000

ROUTE

WORK ORIGIN

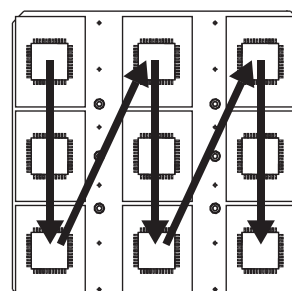
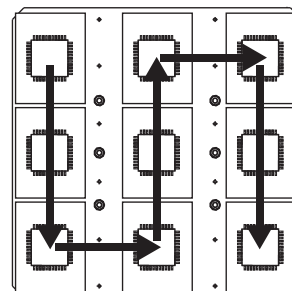
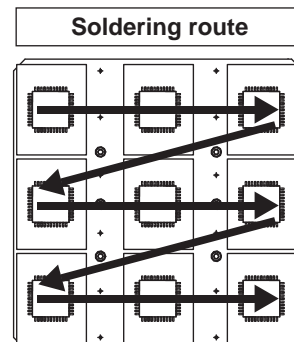
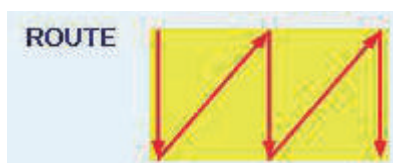
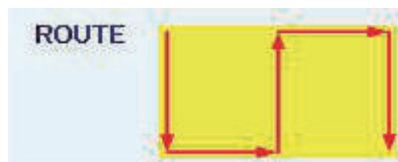
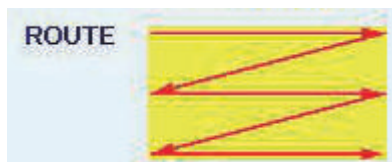
Cancel

Prev.

Next

I/O Setting

Exit



7-7-3 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.

7-7-3-1 Registering a Bar Code

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

The screenshot shows the 'Program List' screen with a table containing columns: BarCode, Program name, Modification date, and Creation date. The first row has 'TEST' in the Program name column. Below the table are buttons: OSK, Edit, Run, and BAR CODE. A red box highlights the 'BAR CODE' button, and a red arrow points from it to a dialog box. The dialog box has fields for: PROGRAM NAME (TEST), PROGRAM CODE, CUSTOMER CODE, CUSTOMER NAME, PROGRAM NO. (a numeric keypad from 01 to 15), and a COMMENT text area. At the bottom are CANCEL and OK buttons.

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.

This screenshot shows the same dialog box as before, but the 'PROGRAM CODE' field is now highlighted with a red box, indicating it is the active field for bar code input.

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

The screenshot shows the 'Program List' screen again. The 'BarCode' column header is highlighted with a red box, and a barcode is visible in the first row of the table.

7. Operation (continued)

7-7-3-2 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. 92).

7-7-3-3 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 “7-7-3-1 Registering a Bar Code” (p. 105).

1. Select the name of the program to be linked in the Program List Screen and tap **[BAR CODE]**.
2. The number for selecting a program can be set in **PROGRAM NO.** Tap on the desired number to select it.

PROGRAM NAME **TEST**

PROGRAM CODE

CUSTOMER CODE

CUSTOMER NAME

PROGRAM NO.

01 02 03 04 05 06 07 08 09 10 11 12 13 14 15

COMMENT

CANCEL **OK**

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]**.

Program List			
BarCode	Program name	Modification date	Creation date
01	TEST		
OSK Edit Run BAR CODE			

7-7-3-4 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 “7-7-3-3 Registering an I/O Setting” (p. 106). For details, refer to “7-7-3-3 Registering an I/O Setting” (p. 106).

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

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.

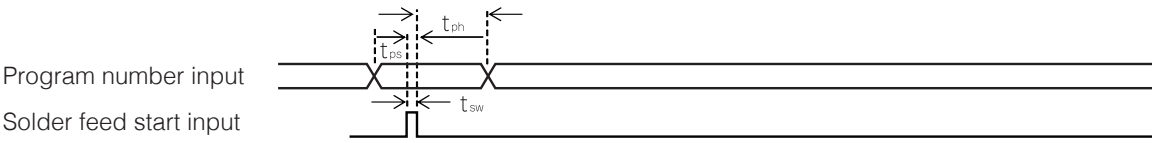
Ex.) Assignment table when INP0 is selected for program number input

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.

7. Operation (continued)

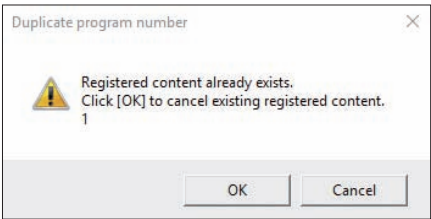
The timing chart when starting a program using **PROGRAM No.** input is shown below.



Program specification setup time: $t_{PS}>5$ msec
Start signal pulse width: $t_{SW}>15$ msec
Program specification hold time: $t_{PH}>150$ msec

PROGRAM NAME: Shows the program name.

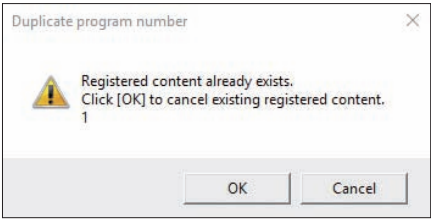
PROGRAM CODE: Input the code for calling up the program. When a bar code is read while this is selected, the code read from the bar code will be input. If the code is a duplicate, an error will be shown. Tapping **[OK]** will cause the duplicated destination setting to be erased, and the code to be assigned 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.

7-7-4 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

Program List (TEST)

STEP	X0	Y0	Z0	θ0	X1	Y1	Z1	θ1	O	Z	P	D	I/O
1													
2	+216.936	+000.000	50.000	+000.000	+216.936	+064.819	+074.799	180.000					
3		50.000						90.000					
4					100.000	40.000		0.000					

STEP = 1 NOTE

Current Pos. Start Pos. ⇄ End Pos.

X 000.000 mm
Y 000.000 mm
Z 000.000 mm
θ 000.000 deg

☐ AUTO SET Use Current Pos. Use Current Pos.

Check Operation Move Move

Lifting Pos. mm
Moving Speed mm/s
Soldering Speed mm/s
Lifting Speed mm/s

CLEANING: 1 2 3 4 5
☒ Before ☐ After
 Soldering ☒ PS ☐ DS ☐ None
 Preset No. 1
 Return to ☒ Start ☐ Lifted Pos.

☐ Palletizing

STEP POINT X Y
OFFSET X Y mm
ROUTE
WORK ORIGIN

Cancel Prev. Next **I/O Setting** Exit

Input settings section

Output settings section

SHOT: 100 ms

CANCEL OK

Input settings section: After 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. Inputs used in "7-7-5 System Settings" (p. 110) cannot be used.

7. Operation (continued)

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 "7-7-5 System Settings" (p. 110) 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.

* **Minimum time for IN:** 10 msec

ON detection current for IN: Around 5 mA

Rated current for OUT: 150 mA

(Since it is the element rating, the actual value is around 100 mA)

7-7-5 System Settings

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

The screenshot shows the 'SYSTEM SETTING' screen. At the top, there is a navigation bar with buttons: 'Program', 'Cleaning Settings', 'Soldering Conditions', and 'System Settings' (highlighted with a red box and a red arrow pointing to the main screen). The main screen is divided into several sections:

- Work information:** Includes 'Program name' and 'Position' fields.
- Diagram:** A diagram showing a solder head at an angle with 'ANGLE' and 'OFFSET' labels.
- SOLDER HEAD ADJUST:** Fields for X (0.000 mm), Y (0.000 mm), and Z (0.000 mm), with a 'CLEAR' button.
- SOLDER HEAD ANGLE:** A field for '45.000 deg'.
- OTHER:** Fields for 'OFFSET' (10.000 mm), 'Z-ESC' (20.000 mm), and 'COUNT' (1000).
- SOLDER UNIT:** A checkbox for 'CONNECT' and 'Set Temperature Tolerance °C' with 'Lower' (5) and 'Upper' (5) fields.
- I/O MAPPING:** Two sections: 'Output assignment' (1. OPERATING, 2. YELLOW LMP, 3. RED LMP, 4. GREEN LMP) and 'Input assignment' (1. EMERGENCY SW, 2. START SW, 3. PROGRAM No., 4. AREA SENSOR, 5. AREA SENSOR (PAUSE), 6. AREA SENSOR 2).
- Lang:** A dropdown menu set to 'ENGLISH'.
- CAMERA:** A dropdown menu.
- Ver ***:** A version indicator.
- Operation Mode:** A button labeled 'Admin'.
- OK:** A large button at the bottom right.

7-7-5-1 OTHER (OFFSET, Z-ESC, COUNT) Functions

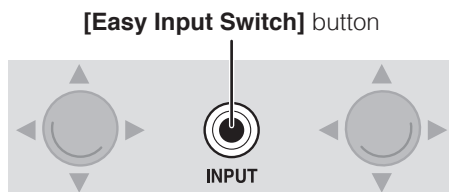
■ OFFSET (Settable range: 0 – 100 mm)

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)

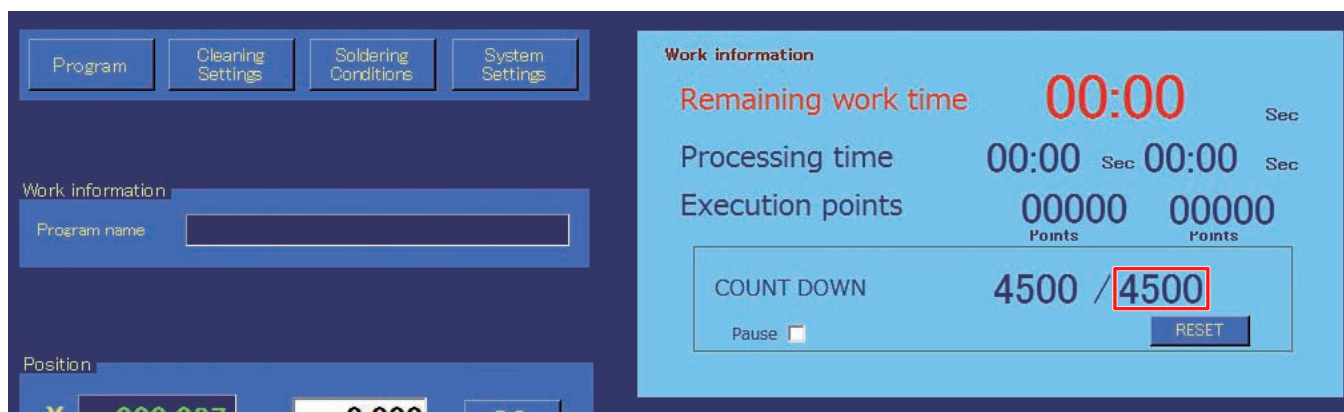
If an FU-601 error or feeder error occurs during program operation, the robot will pause and then lift the Z axis by the set distance. (This setting is not a coordinate.)

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. Operation (continued)

7-7-5-2 SOLDER HEAD ADJUST Function

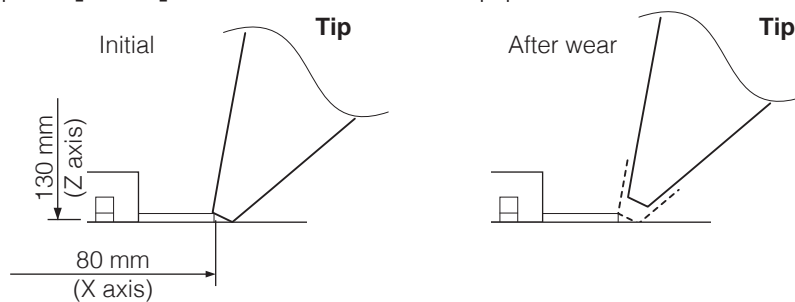
(Settable range: X: 0.000 mm – 10.000 mm; Y: 0.000 mm – 10.000 mm;
Z: 0.000 mm – 10.000 mm)

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	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	<input type="checkbox"/>	<input type="checkbox"/>	1	<input type="checkbox"/>	***C***	
	2	65.000	145.000	125.000	90.000	65.000	149.000	131.000	90.000	<input type="checkbox"/>	<input type="checkbox"/>	1	<input type="checkbox"/>		
	3	60.000	145.000	125.000	90.000	60.000	149.000	131.000	90.000	<input type="checkbox"/>	<input type="checkbox"/>	1	<input type="checkbox"/>	****S*	
	4	55.000	145.000	125.000	90.000	55.000	149.000	131.000	90.000	<input type="checkbox"/>	<input type="checkbox"/>	1	<input type="checkbox"/>	***Z**	
	5	50.000	145.000	125.000	90.000	50.000	149.000	131.000	90.000	<input type="checkbox"/>	<input type="checkbox"/>	1	<input type="checkbox"/>	***C***	
	6	50.000	165.000	130.000	90.000	75.000	165.000	130.000	90.000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>	***C*S*	
	7	80.000	170.000	130.000	0.000	80.000	195.000	130.000	0.000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>	****S*	
	8	75.000	200.000	130.000	-90.000	50.000	200.000	130.000	-90.000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>	****S*	
	9	45.000	195.000	130.000	-180.000	45.000	170.000	130.000	-180.000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>	**CZS*	
○	10									<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>		
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
Y axis	80.000 mm	79.000 mm	-1 mm
X 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.

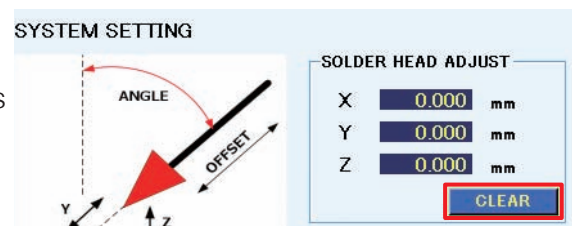
During point soldering, the correction will be applied to both the start point and end point. It is also applied during cleaning.

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**.

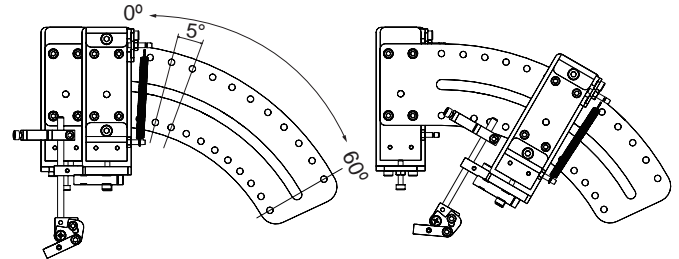


7-7-5-3 SOLDER HEAD ANGLE Function (Settable range: 0 – 90°)

The angle of the soldering iron unit attached in “5-2-1 Attaching the Feeder Unit (CX5005)” (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.



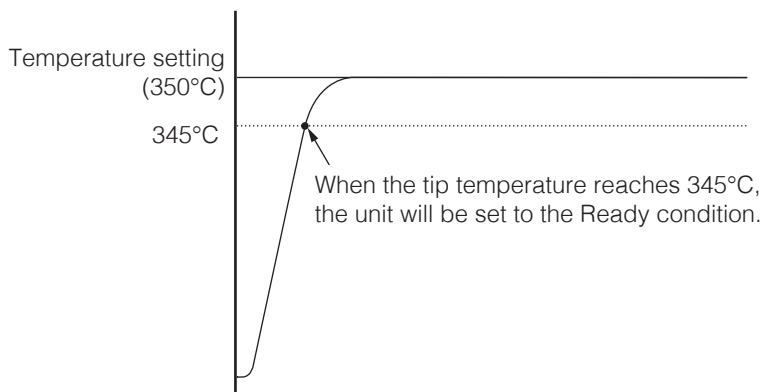
7-7-5-4 SOLDER UNIT

Performs connection with the HAKKO FU-601 and setting of the temperature tolerance standard.

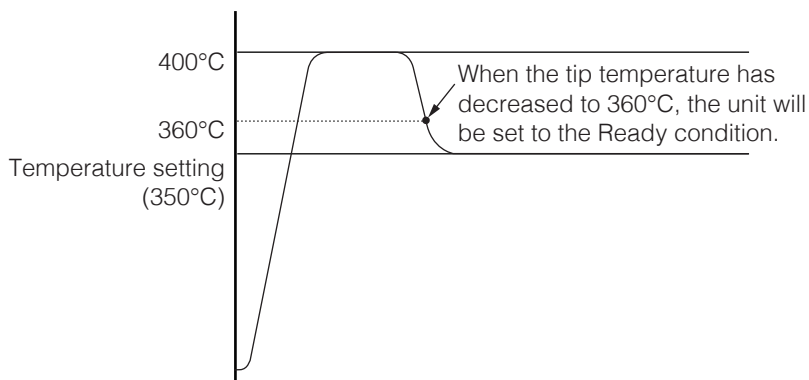
- When **CONNECT** is checked, connection with the HAKKO FU-601 will be performed.
- When **CONNECT** is unchecked, the HAKKO FU-601 will not be connected.

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



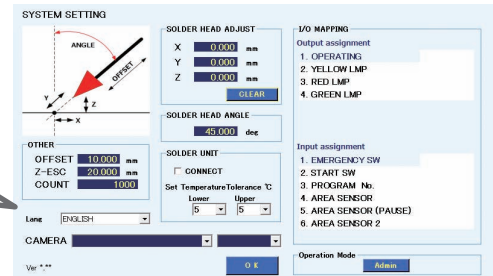
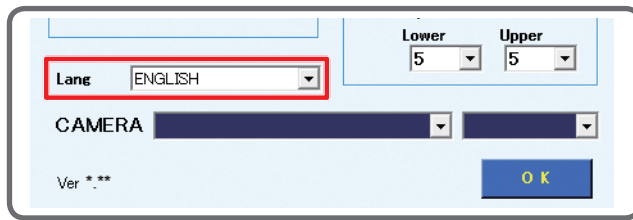
Ex. 2) Temperature setting: 350°C; Upper limit temperature tolerance: 10°C; Decreasing from 400°C



7. Operation (continued)

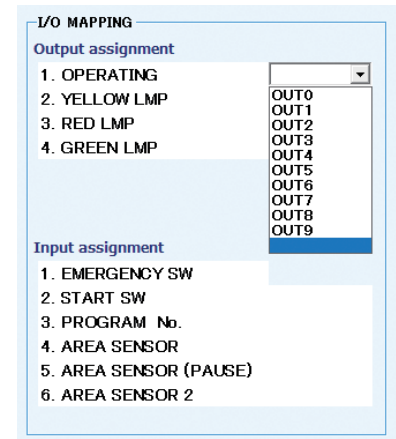
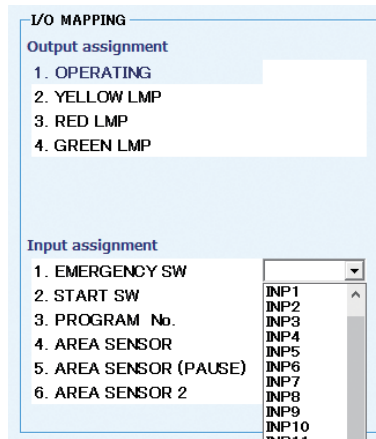
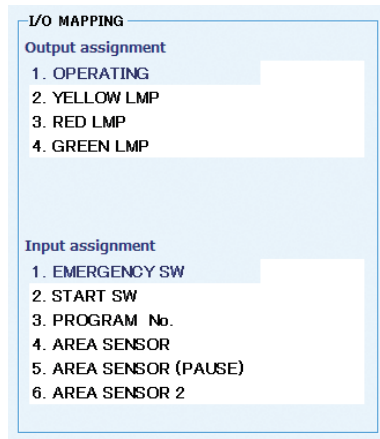
7-7-5-6 Lang (Change of the language)

The indication of the screen becomes the selected language.



7-7-5-5 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 Signal Assignment

1.	Working:	Lit while the program is running
2.	Green light:	Lit when the program is not running.
3.	Red light:	Lit until the program is resumed or stopped after being paused due to a solder feed or FU-601 error while the program is running.
4.	Yellow light:	Blinking while the program is running.

■ Input Signal Assignment

1.	Emergency stop input:	Performs emergency stop.
2.	Start input:	Starts the soldering program.
3.	Program number input:	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 (emergency 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 (emergency stop2)*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.

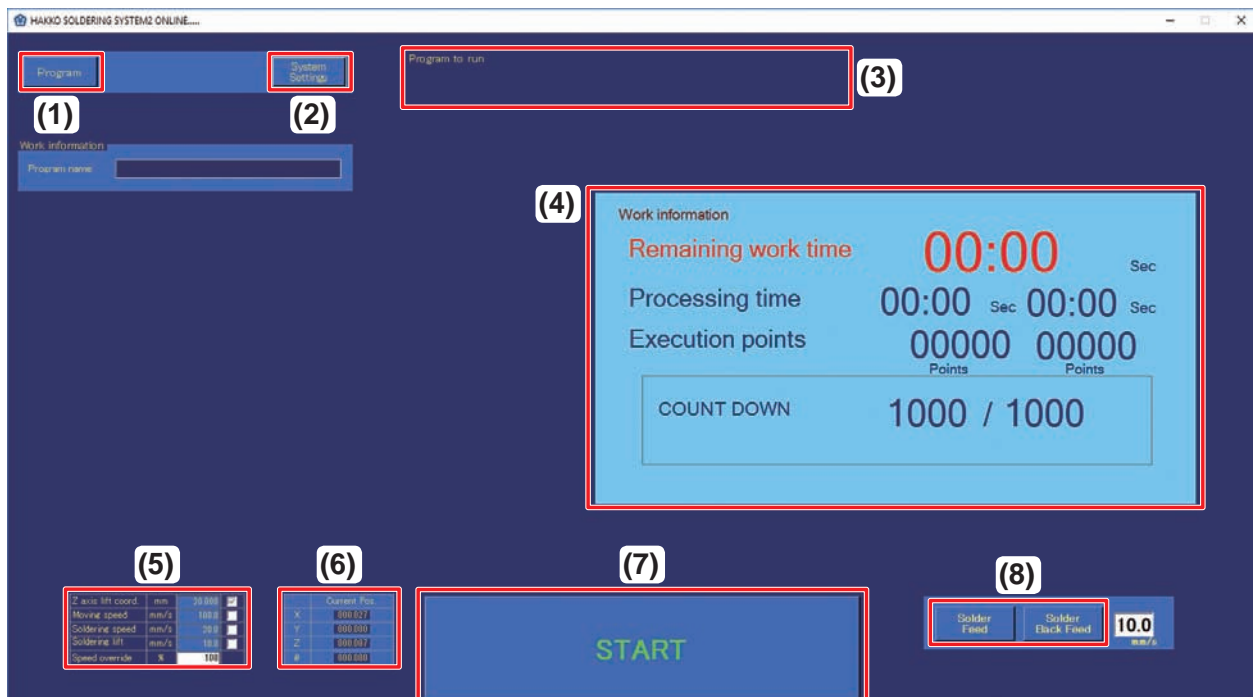
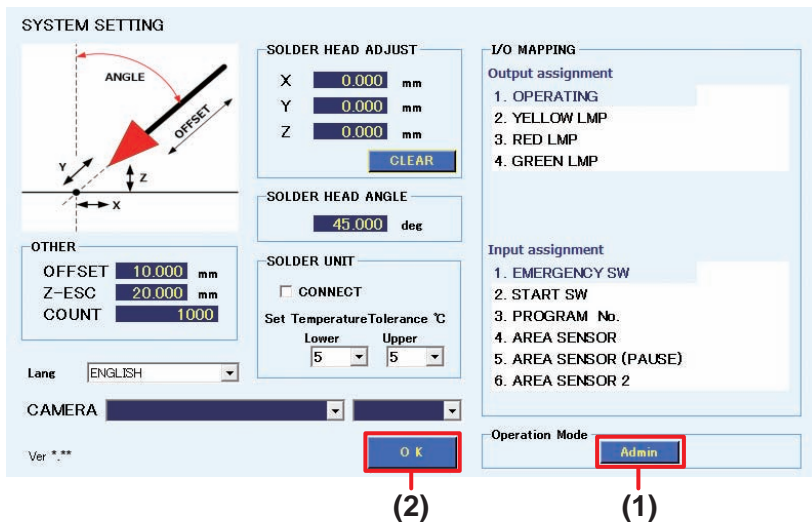
7-7-5-7 Operation Mode

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.) | (5) Settings (Only speed override can be set. For details, refer to (5a) "Speed override" (p. 52)) |
| (2) System Settings
(Operation Mode settings can be performed.) | (6) Position (Display only) |
| (3) Program to run
(Display the program which was called up.) | (7) Start button
(Execution of program which was called up) |
| (4) Work information
(COUNT DOWN reset/pause function cannot be used.) | (8) Solder Feed/Solder Back Feed
(Use of solder feeding/retraction and speed setting can be performed.) |

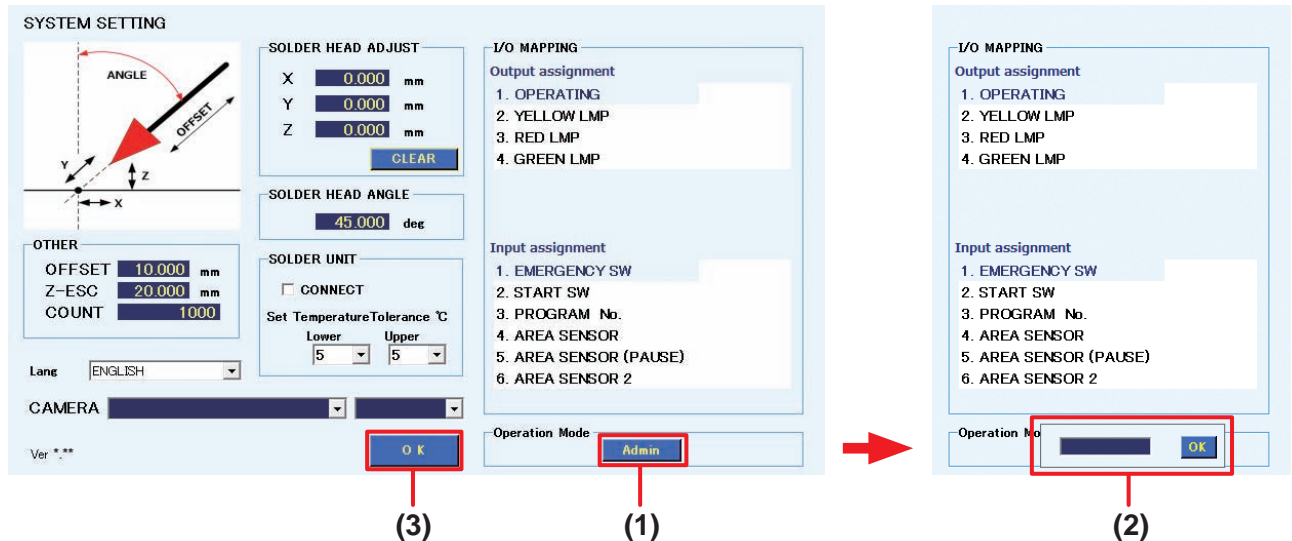
7. Operation (continued)

■ Admin mode

In Admin mode, all functions can be used.

For details, refer to “7-1 Explanation of Software Screen” (p. 40).

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.

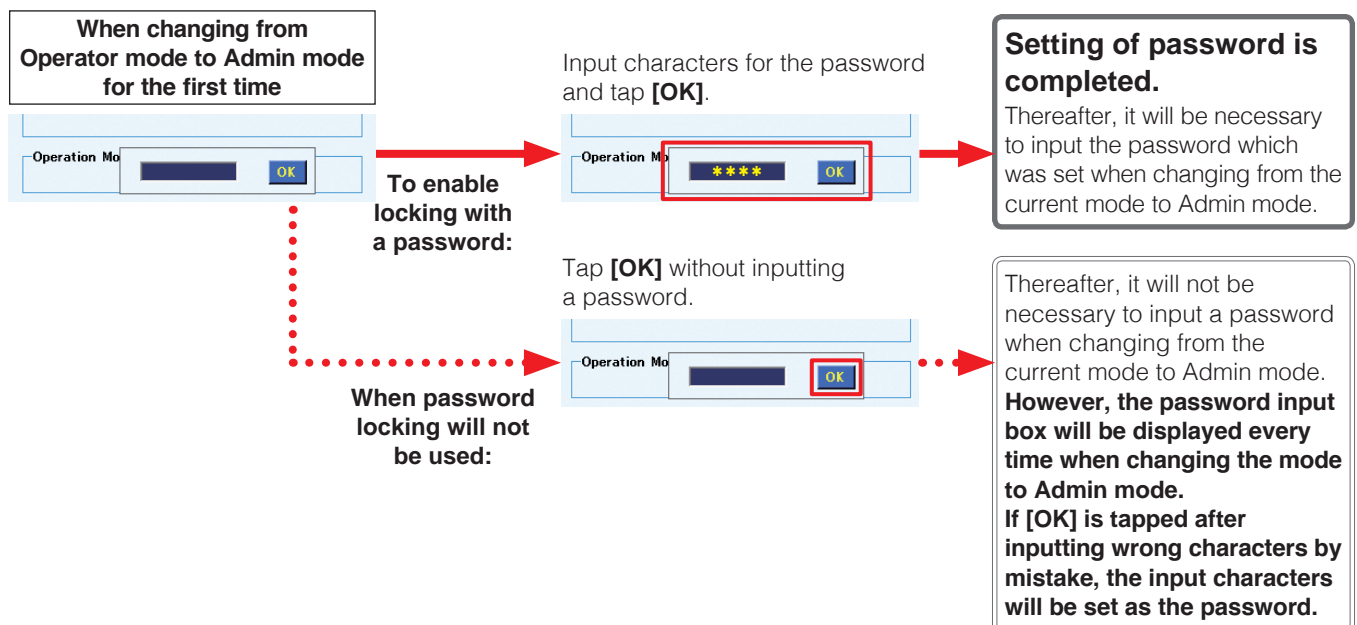


■ Setting password

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

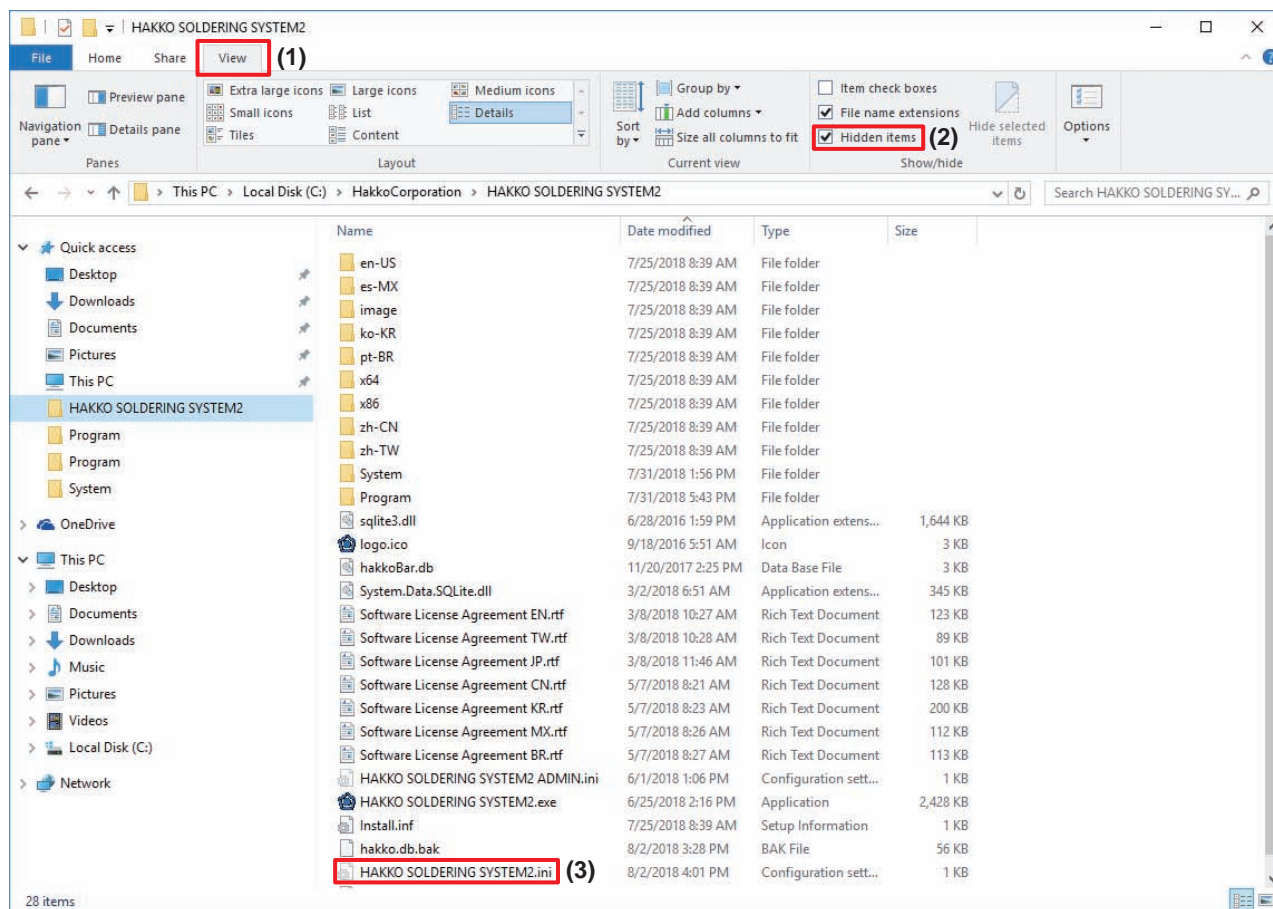
Please manage the password strictly and be careful that it is not given to other people.

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.

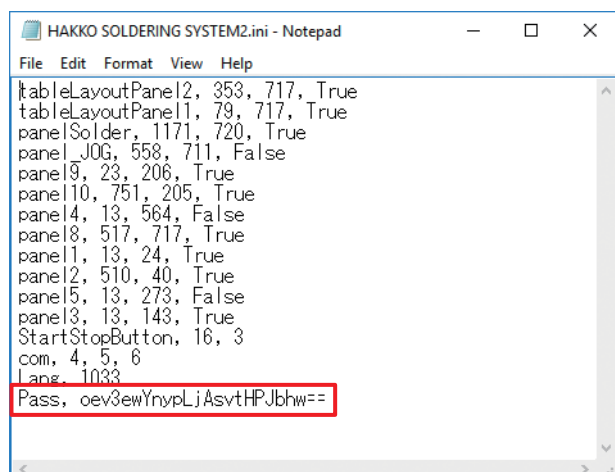
■ Password reset

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).

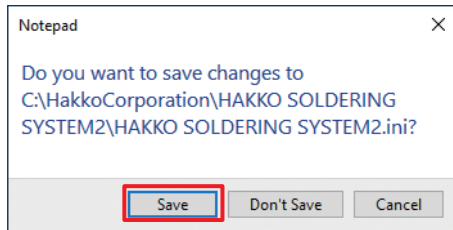


4. Select Notepad as the application to open the file.
5. Delete the final line starting with “Pass,”.



7. Operation (continued)

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.

7-7-6 Changing Solder Diameter

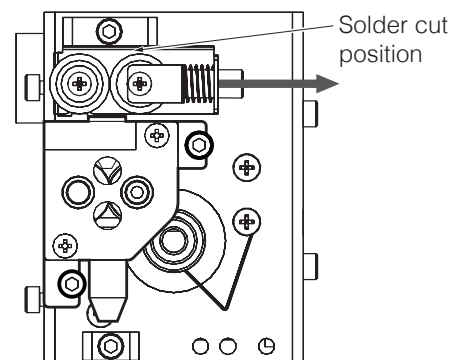
The solder wire diameter can be changed by replacing the tube unit, Teflon tube, solder feed guide set, and solder feed pulley unit.

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

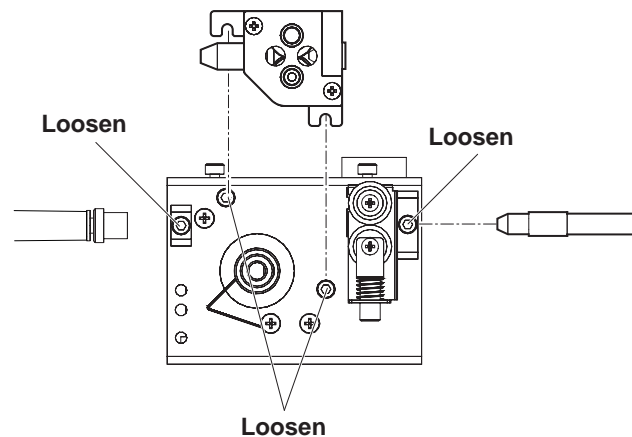
⚠ CAUTION

- **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 $\Phi 0.3$ mm solder (BX1000) is different. Refer to “Solder setting method” included with the BX1000.**
- **First, switch off the power of the HAKKO FU-601 and let the tip cool down to room temperature before performing work. Performing work while the tip is hot risks causing burns.**

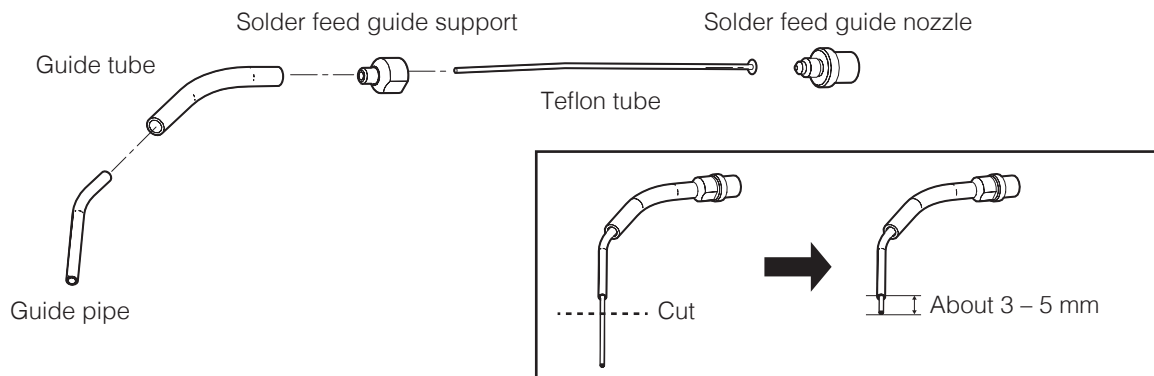
1. First, open the feeder unit cover and cut the solder on the solder reel side of the solder feed pulley unit. At this time, pulling slightly on the roller equipped with a spring will enable cutting to be performed more easily.



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, 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 Teflon 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. 134).



7-7-7 Installing the Teflon Tube



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

⚠ CAUTION

Make sure that the Teflon 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.

8. Maintenance

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.

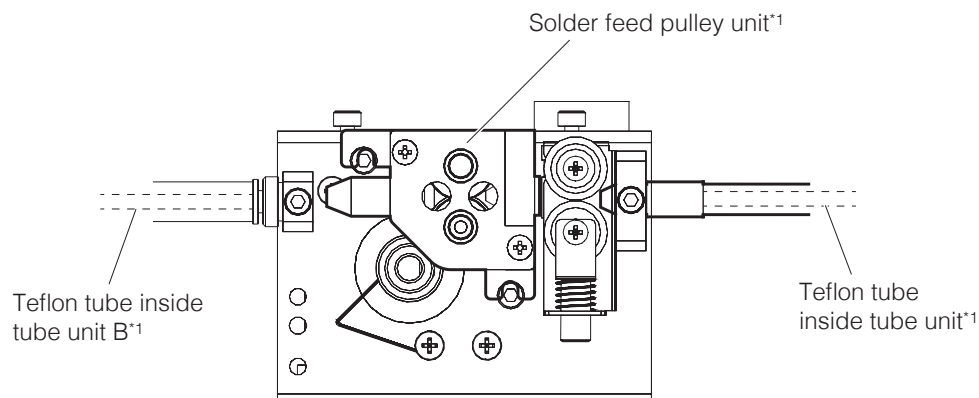
8-1-2 Soldering Iron Unit (HAKKO FU-601)

For the soldering iron unit, maintenance of the tip and soldering iron unit should be performed. Refer to “8. Maintenance” in the instruction manual of the HAKKO FU-601.

8-1-3 Feeder Unit (CX5005)

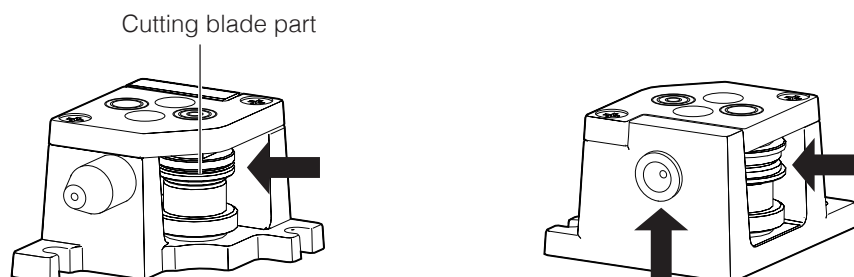
As a general rule, the following inspection and cleaning items should be performed when the solder is replaced.

- If there is solder or flux stuck on the Teflon tube or inside the solder feed pulley unit, use a brush or alcohol to remove it.
- If the Teflon 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 Teflon 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 Teflon tubes inside the tube unit or tube unit B.

Locations where dirt is likely to stick



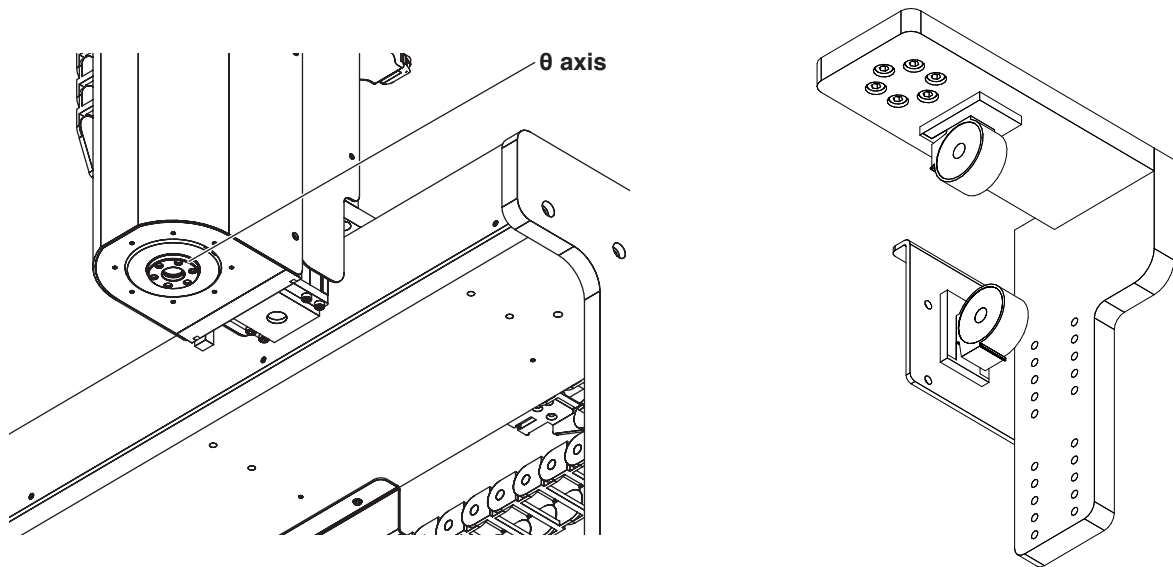
⚠ CAUTION

Be careful not to touch the cutting blade part.

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

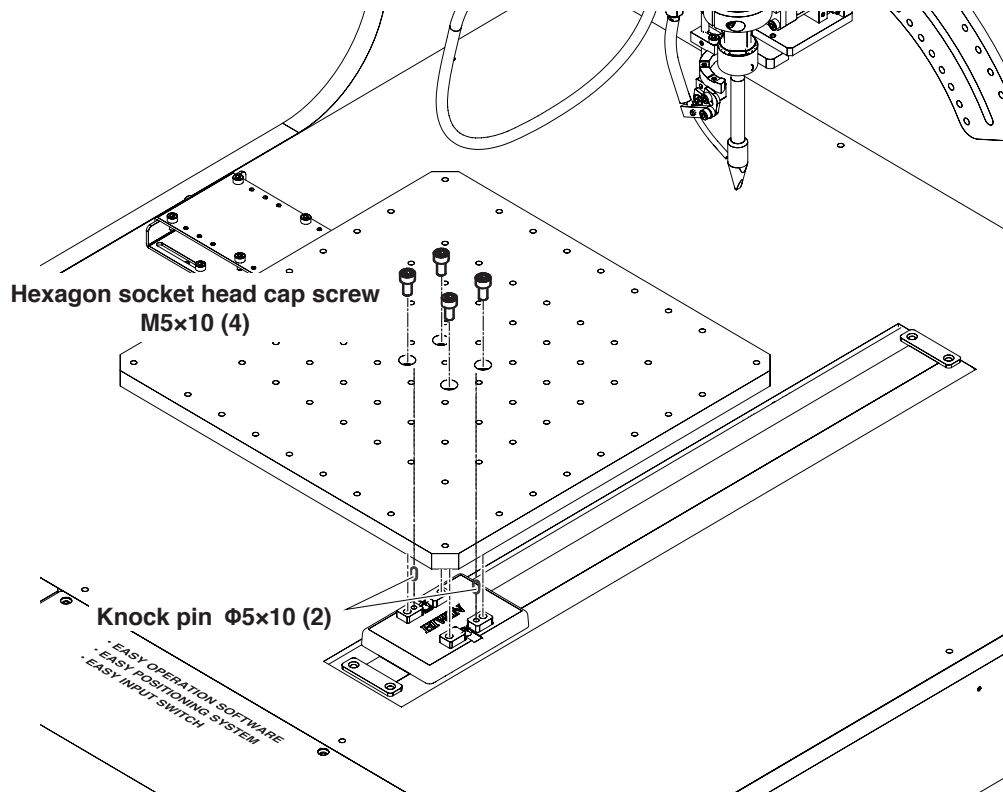
If solder or flux is stuck on the soldering unit fixture base (CX5002) or θ axis, use a brush or alcohol to remove it.

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

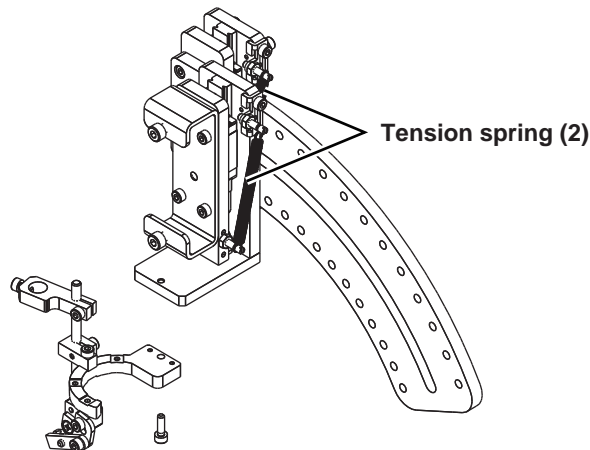
The jig table may become warped or scratched due to falling parts or contact with parts. If the warping or scratching is extreme, remove the damaged parts and replace them with new ones.



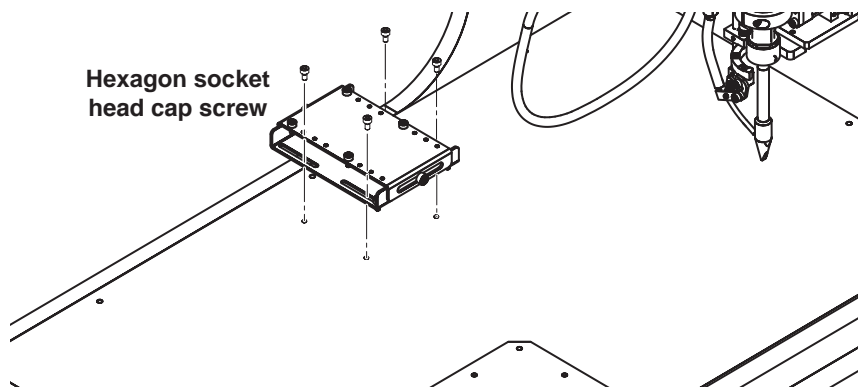
8. Maintenance (continued)

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. Maintenance (continued)

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.

X, Z axes: HIWIN G05 general-purpose grease

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

Y axis: HIWIN G03 cleanroom high-speed grease

Color	Yellow
Base oil	Synthetic hydrocarbon oil
Thickener	Special calcium soap based
Operating temperature range	-45 – 125°C
Consistency (0.1 mm)	265 – 295
Viscosity (40°C)	30 cSt
(100°C)	5.9 cSt
Boiling point	>210°C

— Note —

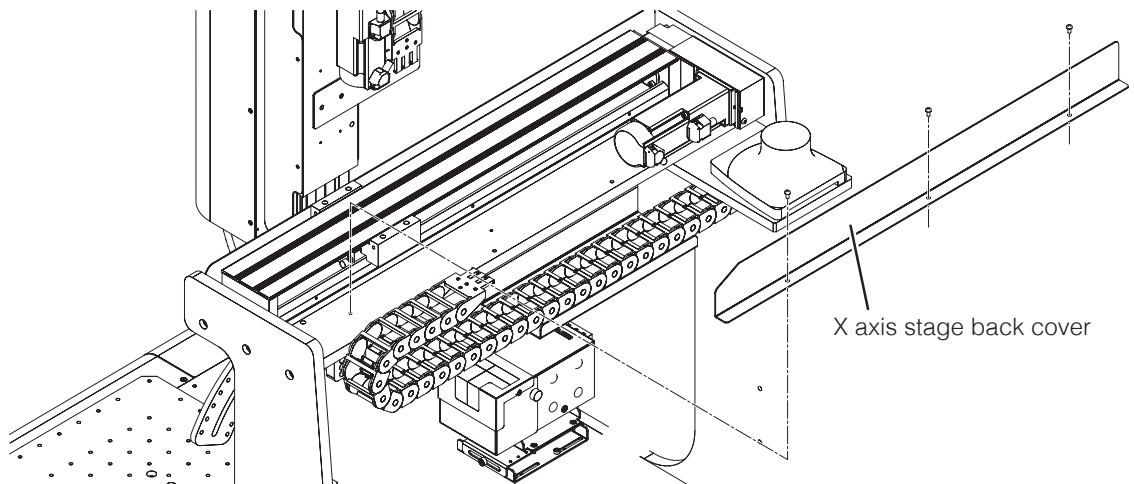
Use only grease of the specified type or specifications. Be careful that it is not mixed with other types of grease.

⚠ CAUTION

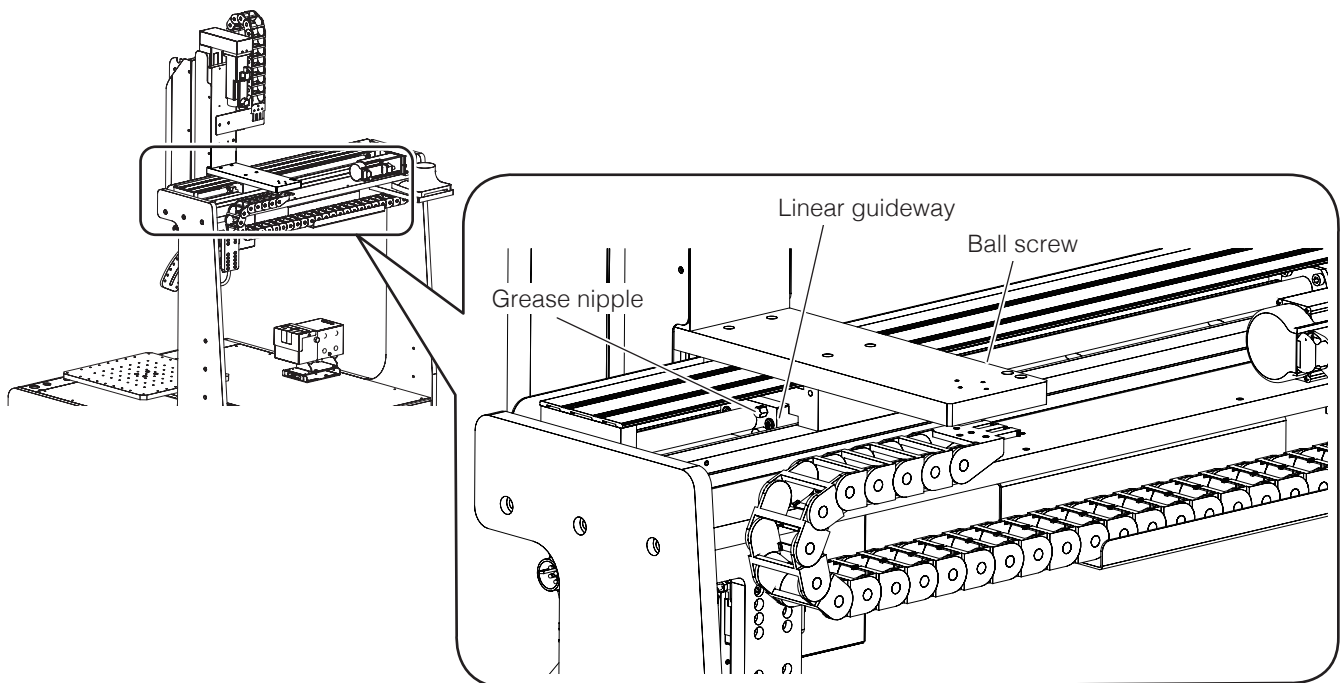
**After replenishing grease, wash hands well with soap and water.
If grease somehow gets in eyes, immediately consult a medical specialist and receive appropriate treatment.**

8-2-5-1 X Axis

- 1.** Remove the X axis stage back cover.



- 2.** Replenish grease on the ball screw and linear guideway.

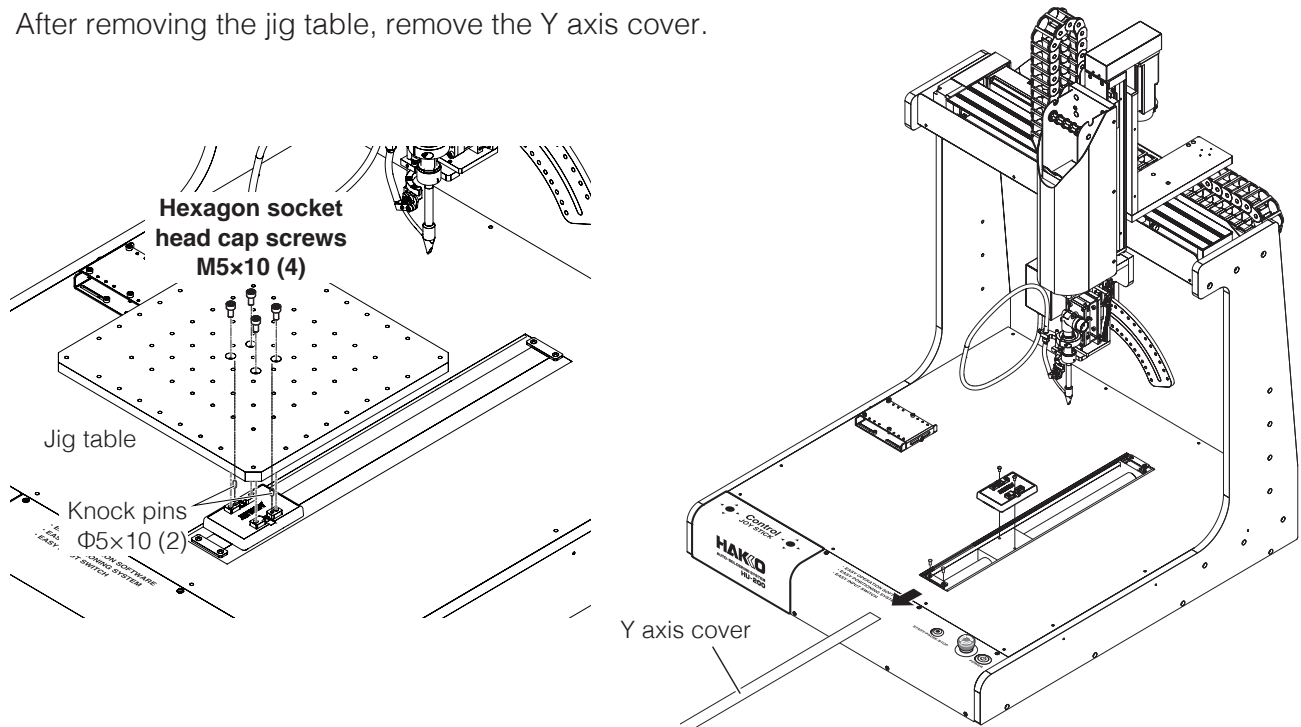


- 3.** Slide the slider back and forth several times by hand so that the grease reaches the entire axis.

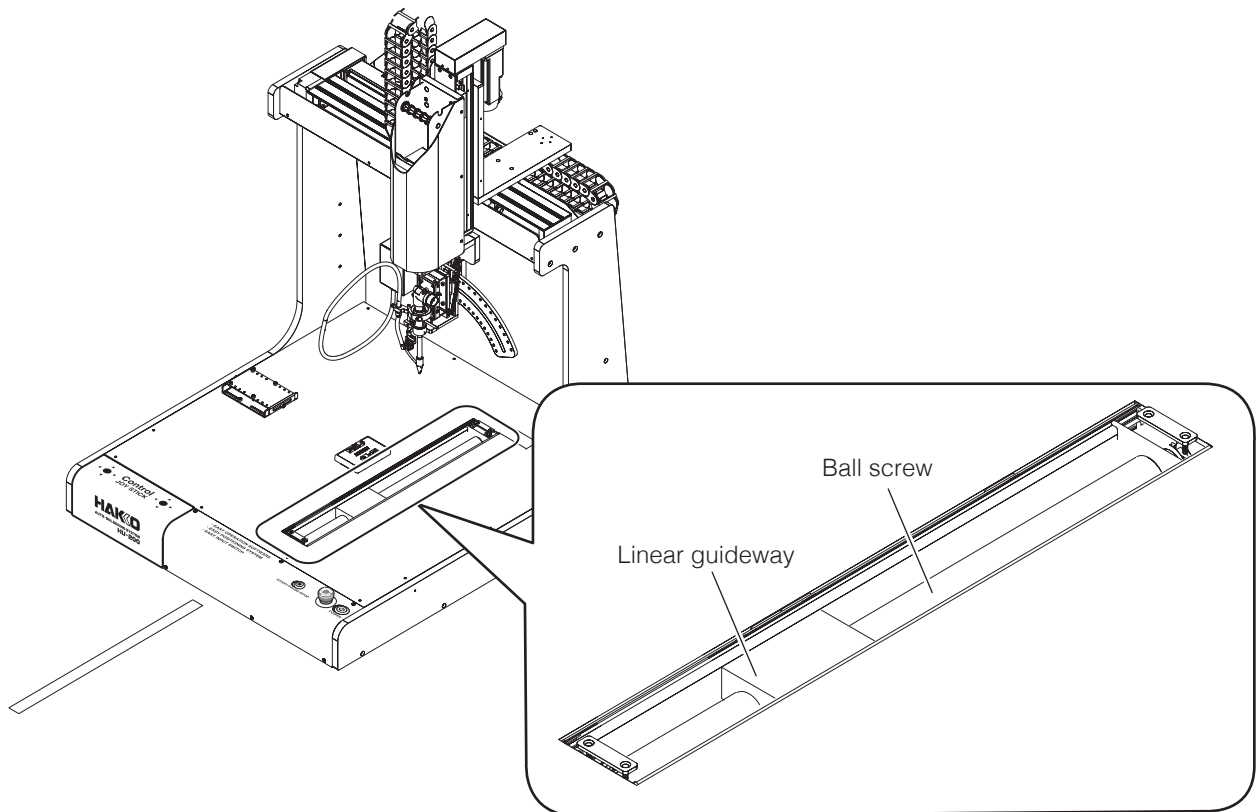
8. Maintenance (continued)

8-2-5-2 Y Axis

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



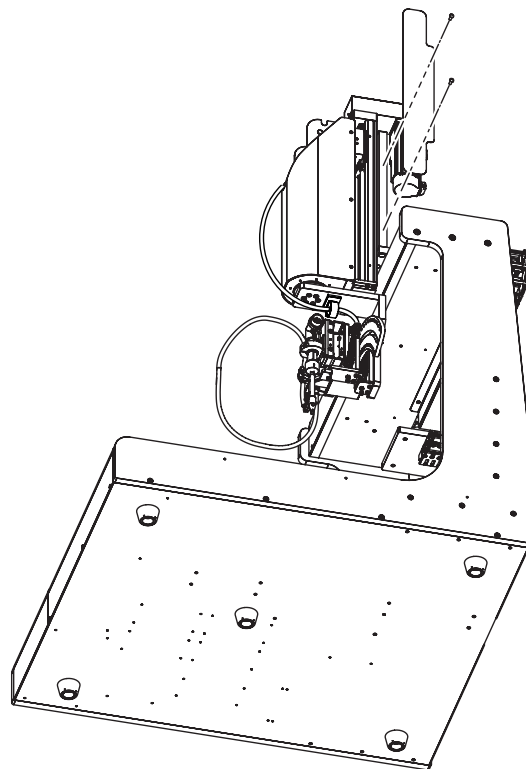
2. Replenish grease on the ball screw and linear guideway.



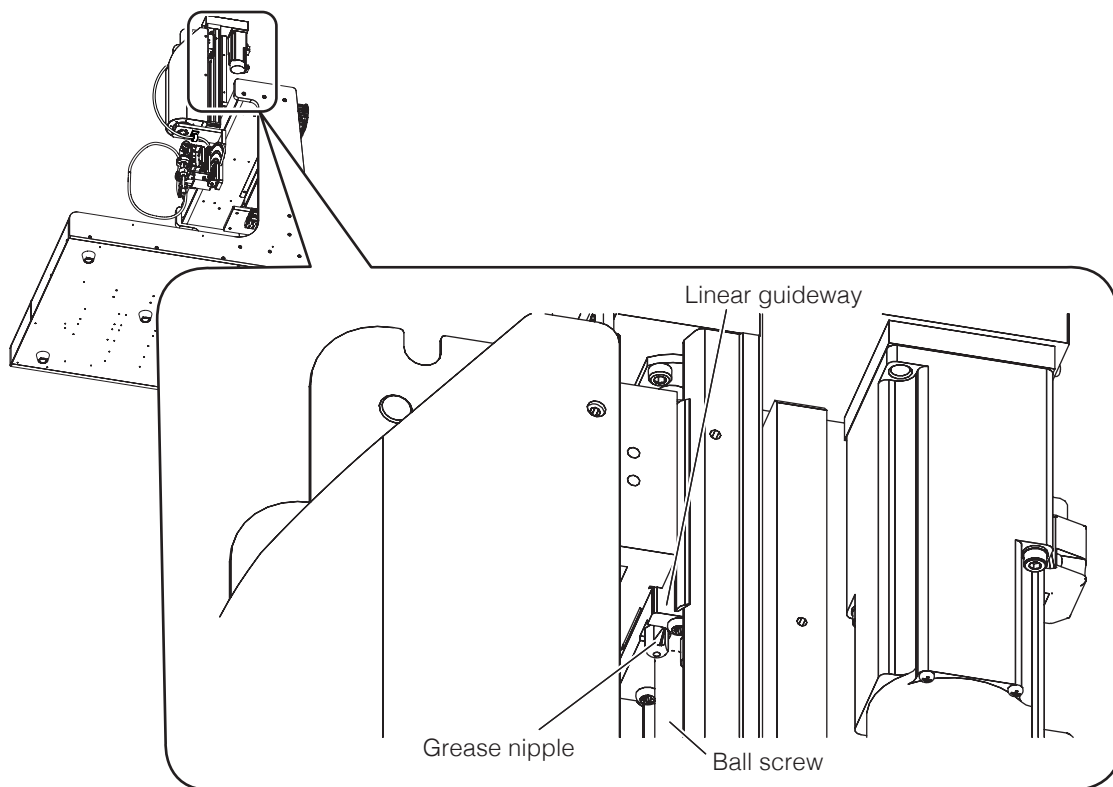
3. Slide the slider back and forth several times by hand so that the grease reaches the entire axis.

8-2-5-3 Z Axis

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



2. Replenish grease on the ball screw and linear guideway.



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

8. Maintenance (continued)

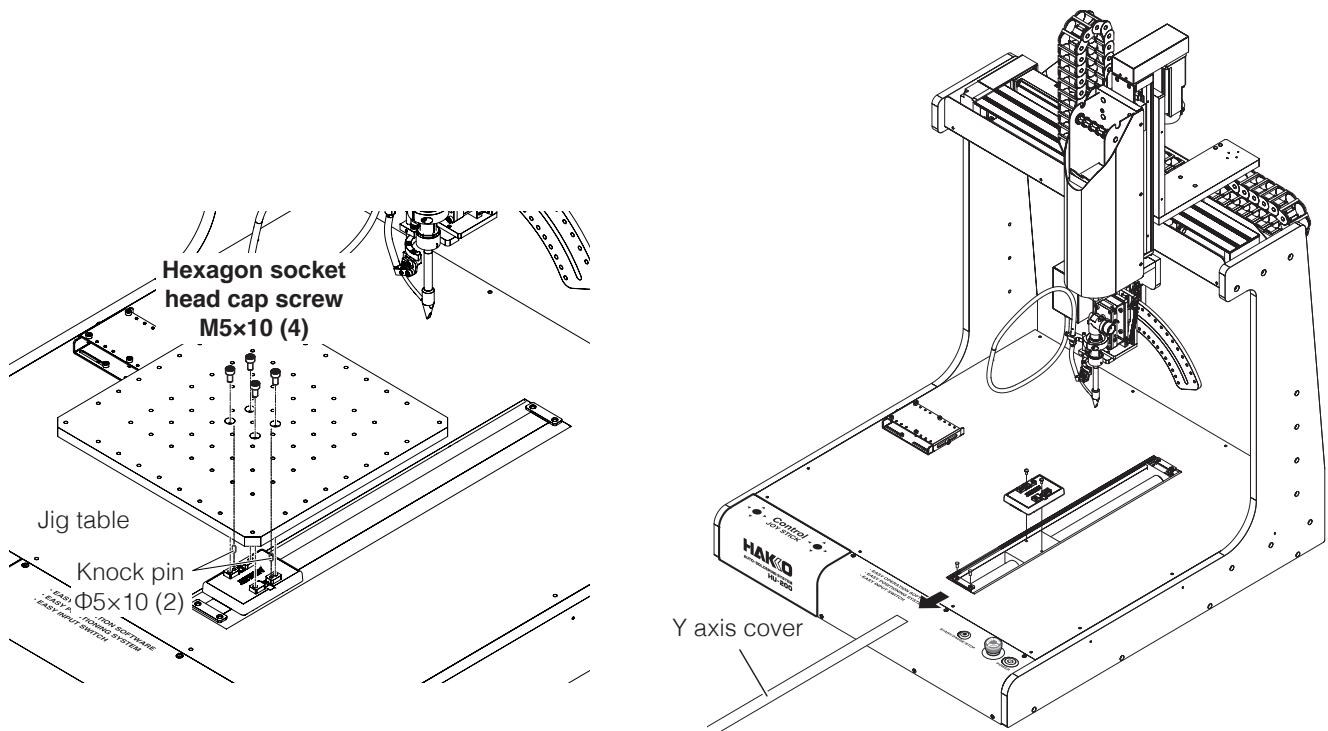
8-3 Mechanical Adjustments (when Replacing Timing Belt or Y-axis Cover)

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.

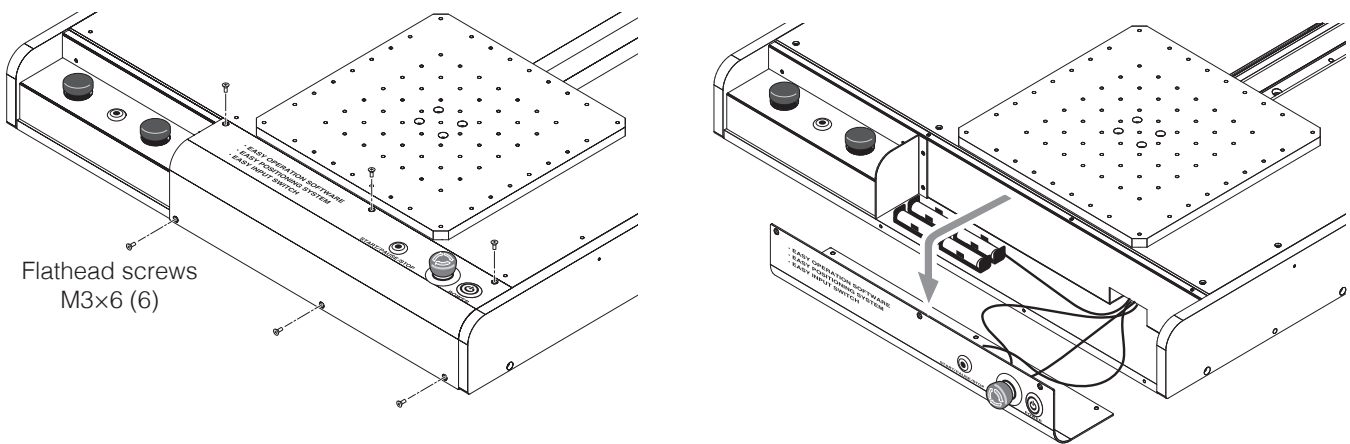
8-4 How to replace batteries

CAUTION

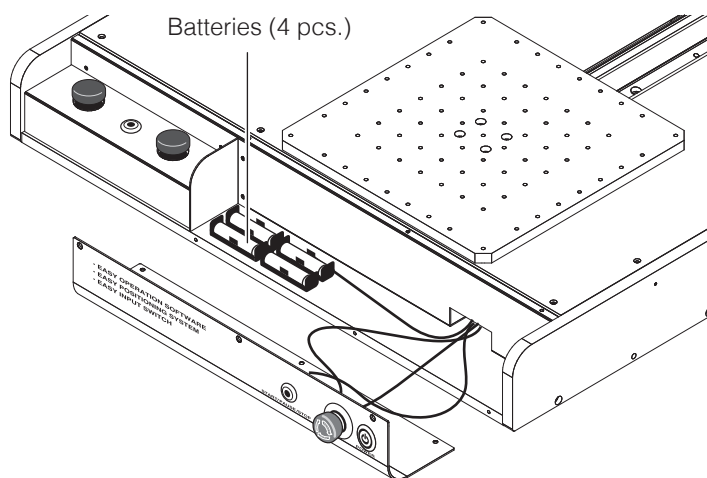
- When replacing batteries, be sure to replace them while keeping the power switched on.
- If replacement is performed with the power switched off, the axis position information will be lost.
- If replacement was performed with the power switched off, please contact the sales office or distributor.
-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

Perform battery replacement with the power left on.

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



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



3. Reattach the front panel.

Battery replacement is completed.

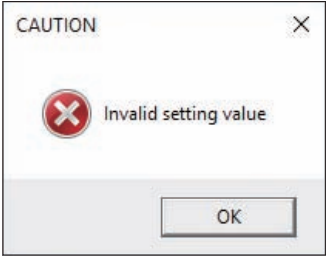

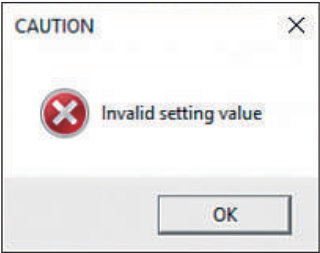
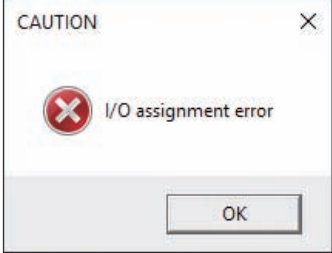
9. Error Messages

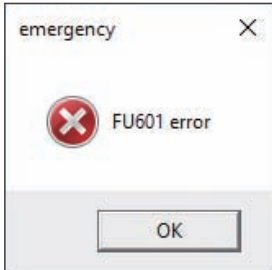
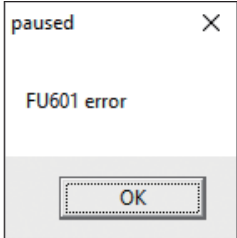
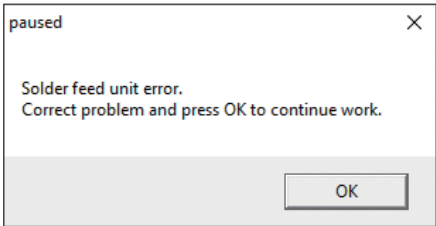
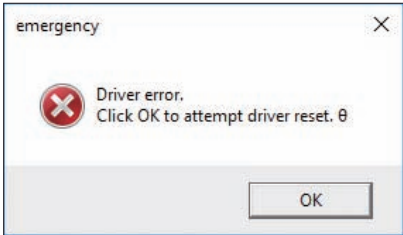
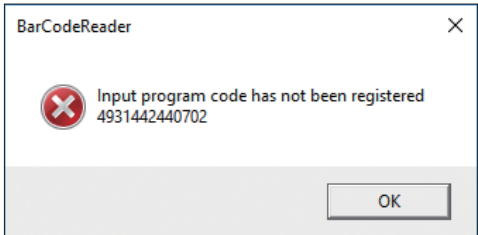
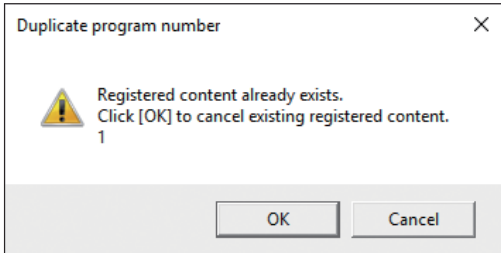
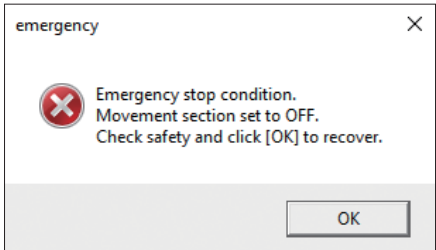
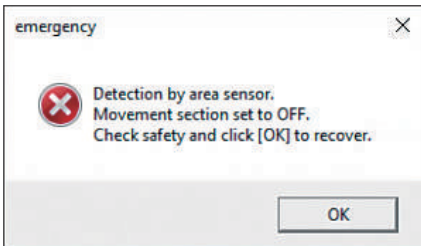
9-1 Attached Accessories

The soldering iron unit will show error information in the settings display screen.
For error information, refer to “10. Error displays” in the instruction manual of the HAKKO FU-601.

9-2 Robot

Software error

<p>Input error</p> <p>Shown when the setting value is invalid.</p>  <p>The screenshot shows a dialog box with the title 'CAUTION' and a close button (X). Inside, there is a red circle with a white 'X' icon followed by the text 'Invalid setting value'. At the bottom, there is an 'OK' button.</p>	<p>Setting error</p> <p>Shown when [Finish] is tapped in the Point Edit Screen while some items are still not set.</p>  <p>The screenshot shows a dialog box with the title 'ERROR' and a close button (X). Inside, there is a red circle with a white 'X' icon followed by the text 'Some items have not been set.'. At the bottom, there is an 'OK' button.</p>
<p>Coordinates value error</p> <p>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.</p>  <p>The screenshot shows a dialog box with the title 'CAUTION' and a close button (X). Inside, there is a red circle with a white 'X' icon followed by the text 'Invalid setting value'. At the bottom, there is an 'OK' button.</p>	<p>I/O assignment error</p> <p>Shown when duplicate assignments for I/O setting were set in the System Settings Screen and closing the System Settings Screen was attempted.</p>  <p>The screenshot shows a dialog box with the title 'CAUTION' and a close button (X). Inside, there is a red circle with a white 'X' icon followed by the text 'I/O assignment error'. At the bottom, there is an 'OK' button.</p>

<p>FU-601 error (Stop)</p> <p>Shown when communication with the FU-601 was blocked and operation was stopped.</p> 	<p>FU-601 error (Pause)</p> <p>Shown when the READY signal from the FU-601 has stopped while the program is running, causing the program to pause.</p> 
<p>Solder feed unit error</p> <p>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.</p> 	<p>Driver abnormality</p> <p>Shown when the motor driver has detected abnormal heat, causing operation to stop immediately.</p> 
<p>Bar code reading error</p> <p>Shown when an unregistered bar code was read.</p> 	<p>Bar code registration error</p> <p>Shown when the bar code to be registered is a duplicate.</p> 
<p>Emergency stop</p> <p>Shown when the emergency stop button (including emergency stopping via I/O) has been pressed, causing operation to stop.</p> 	<p>Area sensor</p> <p>Shown when area sensors have been set as I/O connections and a sensor has detected something, causing operation to stop.</p> 

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 Teflon 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 Teflon 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. 134)

HAKKO U-601

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.
	The fuse has blown.	After determining the cause of the blown fuse, replace the fuse.
The tip doesn't get hot. S-E is shown.	The tip isn't firmly inserted.	Insert the tip fully to the end.
	The soldering iron cable is disconnected.	Refer to "9. Inspection" in the instruction manual for the HAKKO FU-601.
	The heater or sensor is disconnected.	
Solder doesn't stay on the tip.	The temperature setting of the tip is too high.	Set the appropriate temperature.
	Oxidized materials are stuck on the tip.	Remove the oxidized materials.
The tip temperature is too high.	Soldering iron cable is disconnected.	Refer to "9. Inspection" in the instruction manual for the HAKKO FU-601.
	The input offset value is incorrect.	Input the correct value.
The tip temperature is too low.	Oxidized materials are stuck on the tip.	Remove the oxidized materials.
	The input offset value is incorrect.	Input the correct value.
An error is being displayed.	—	Refer to "10. Error displays" in the instruction manual for the HAKKO FU-601, and correct each error.

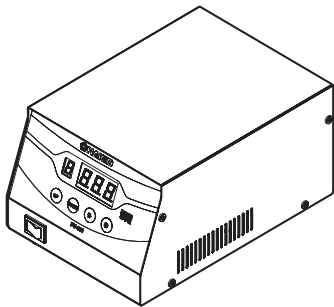
— Note —

For maintenance and inspection, refer to "8. Maintenance" and "9. Inspection" in the instruction manual for the HAKKO FU-601.

11. Parts List

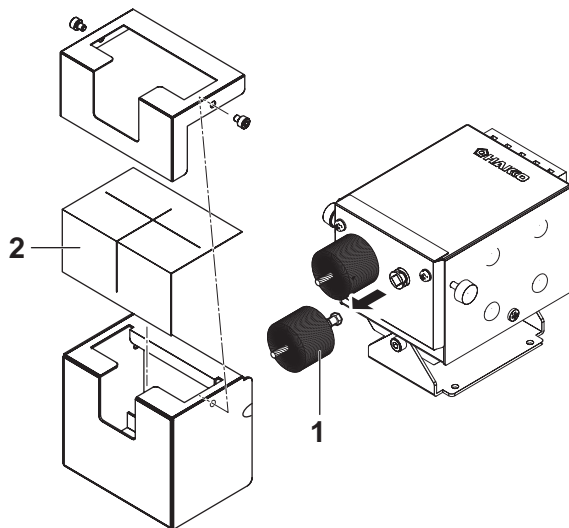
● Accessories

	Product Number	Specifications
FU-601	HAKKO FU-601	—

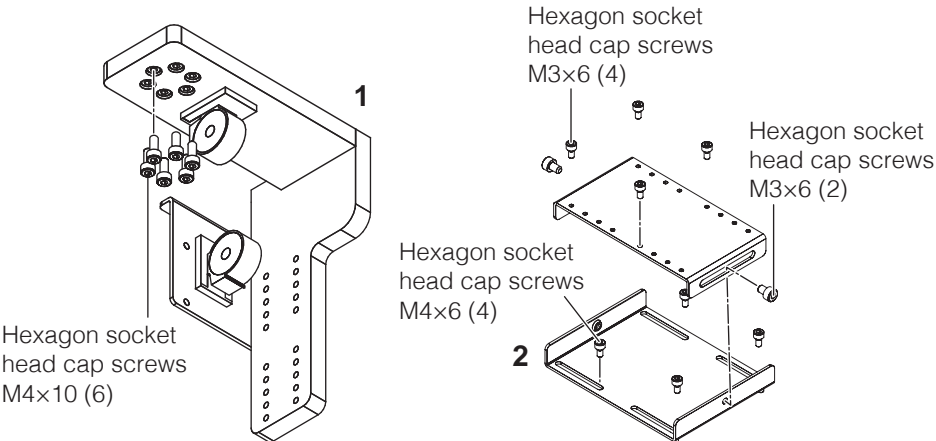


Cleaner	Product Number	Specifications
	CX1003	—

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

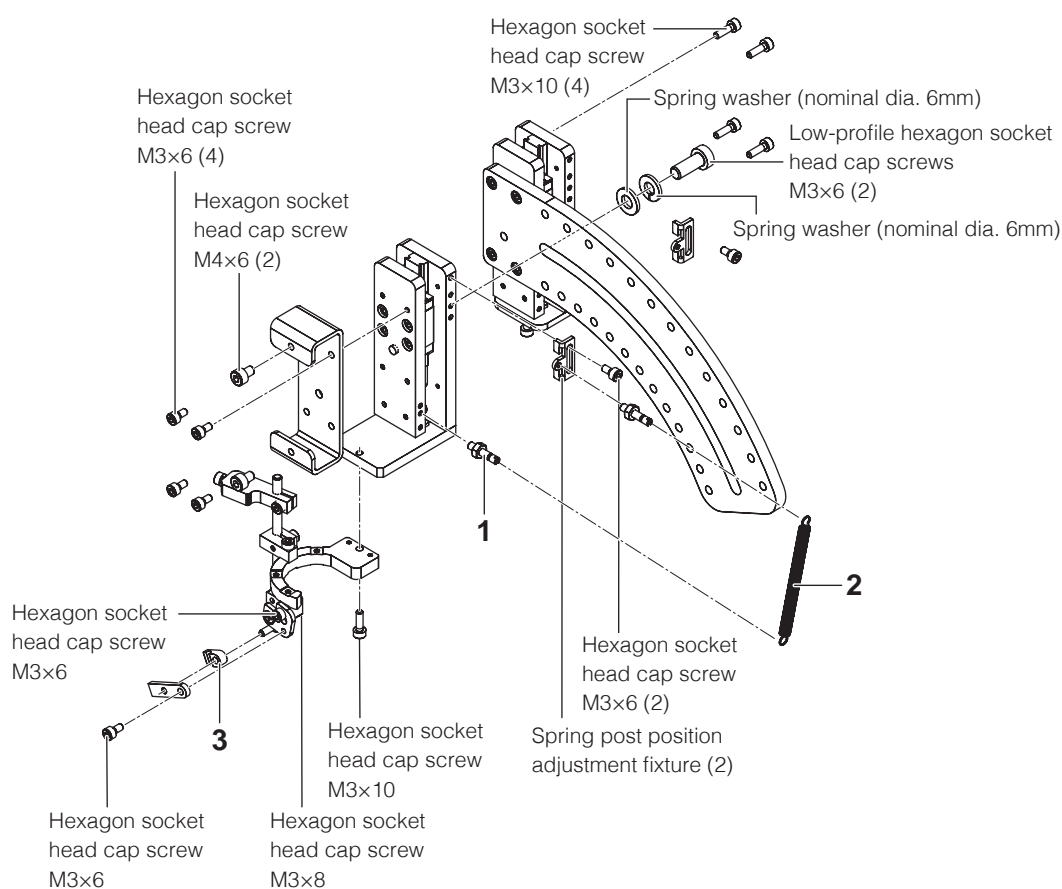


Number in Diagram	Product Number	Product Name	Comments
1	CX5002	Soldering unit fixture base/for HU-200	—
2	CX5003	Cleaner base/for HU-200	



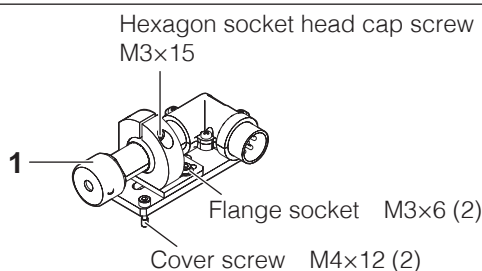
Soldering Unit Mount/ for HU-200		Product Number	Specifications
		CX5004	—

Number in Diagram	Product Number	Product Name	Comments
1	BX1043	Spring post	—
2	BX1044	Tension spring	
3	BX1063	Guide pipe fixing plate/for 0.3 – 1.6 mm	



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

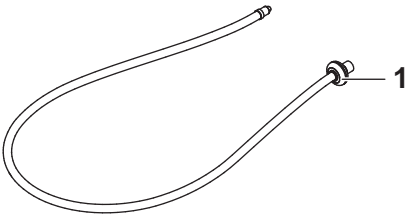
Number in Diagram	Product Number	Product Name	Comments
1	BX1027	Flux protector	—



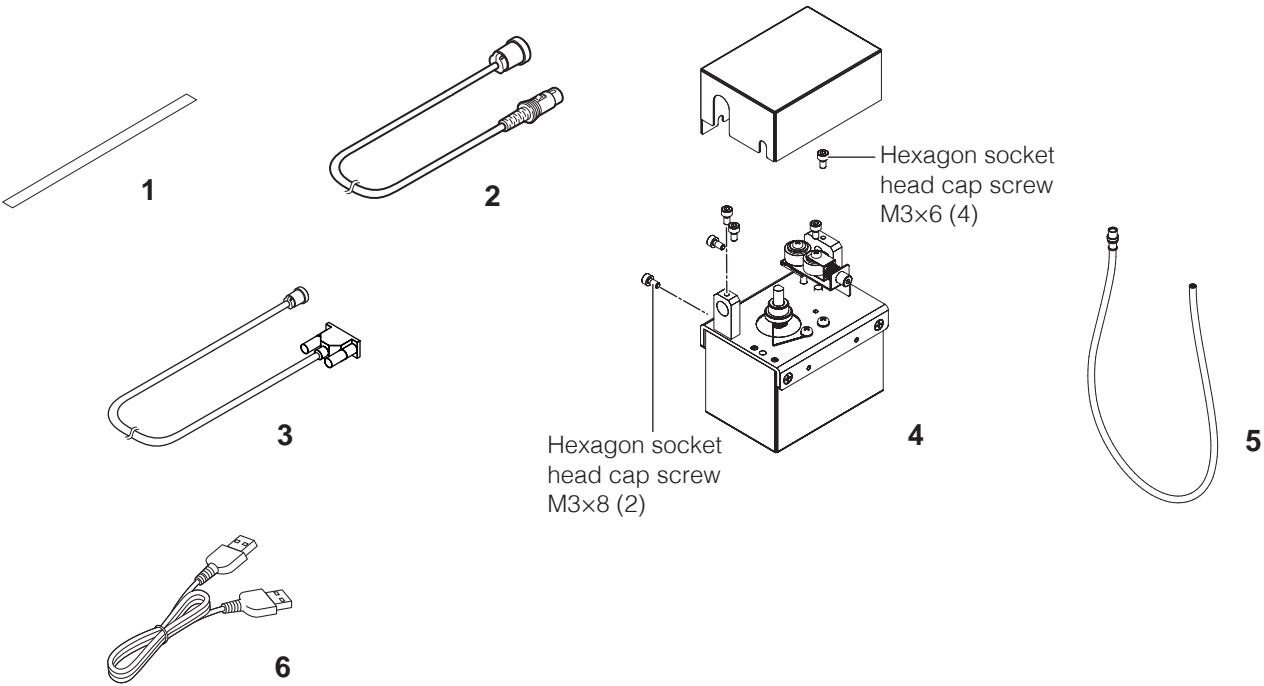
11. Parts List (continued)

● Parts

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
1	BX1022	Grommet	—



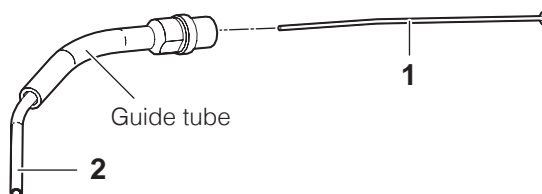
Number in Diagram	Product Number	Product Name	Comments
1	AX1001	Y axis cover	—
2	BX1033	Soldering iron cable/5m	
3	BX1045	Feeder cable/4 m; for HU-200	
4	CX5005	Feeder unit/0.3 – 1.6 mm; for HU-200	
5	BX1054	Tube unit B/for 0.3 mm	
	BX1052	Tube unit B/for 0.5 – 1.0 mm	
	BX1053	Tube unit B/for 1.2 – 1.6 mm	
6	BX1062	USB cable	



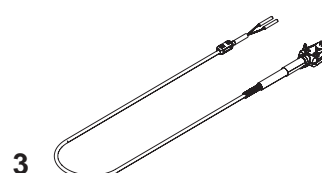
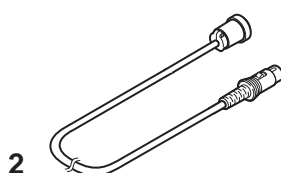
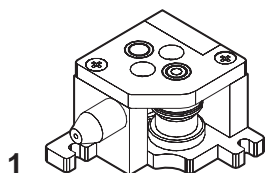
• Optional Accessories

Solder feed guide set	Product Number	Specifications
	BX1046	0.3 mm
	BX1047	0.5 – 1.0 mm
	BX1048	1.2 – 1.6 mm

Number in Diagram	Product Number	Product Name	Comments
1	BX1010	Teflon tube/0.3 mm Package of 10	—
	BX1011	Teflon tube/0.5 – 0.6 mm Package of 10	
	BX1012	Teflon tube/0.8 mm Package of 10	
	BX1013	Teflon tube/1.0 mm Package of 10	
	BX1014	Teflon tube/1.2 mm Package of 10	
	BX1015	Teflon tube/1.6 mm Package of 10	
2	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	

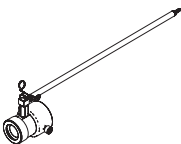
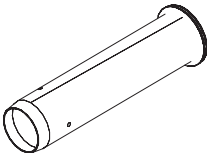
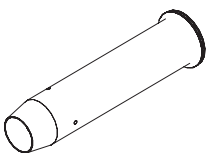


Number in Diagram	Product Number	Product Name	Comments
1	BX1000	Solder feed pulley unit/0.3 mm	—
	BX1001	Solder feed pulley unit/0.5 mm	
	BX1002	Solder feed pulley unit/0.6 mm	
	BX1003	Solder feed pulley unit/0.8 mm	
	BX1004	Solder feed pulley unit/1.0 mm	
	BX1005	Solder feed pulley unit/1.2 mm	
	BX1006	Solder feed pulley unit/1.6 mm	
2	BX1034	Soldering iron cable/8 m	—
3	CX1002	Temperature probe/for auto-soldering systems	

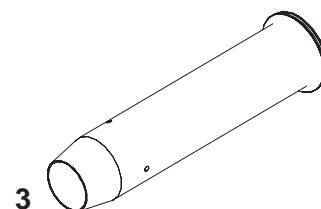
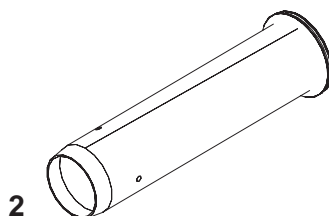
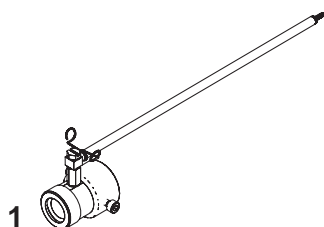


11. Parts List (continued)

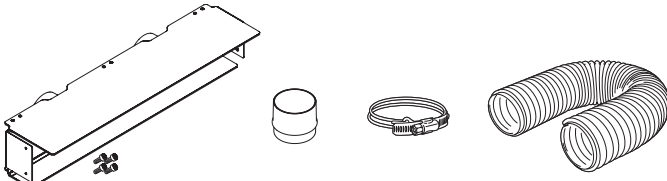
• Optional Accessory (N₂ adapter, nozzles)

N ₂ adapter/ nozzle set	Set Contents		Specifications
	BX1029 	BX1030 or BX1031  	—

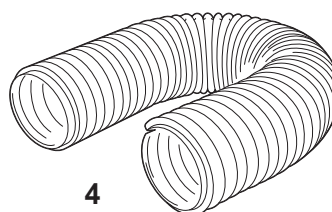
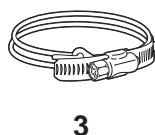
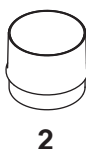
Number in Diagram	Product Number	Product Name	Comments
1	BX1029	Adapter assembly A	FU-601
2	BX1030	Nozzle assembly D	XD4, XD6, XDR4, XDR6, XBCR4, XBCR6, XRX
3	BX1031	Nozzle assembly E	XD3, XDR3, XBCR3



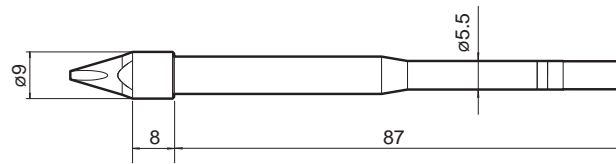
• Optional Accessory (smoke absorber nozzles)

Smoke absorber nozzle set	Set Contents		Specifications
	BX1059 		<p>With hexagon socket head cap screws M4 × 12 (4)</p> <p>The net is already attached to the smoke absorber nozzle duct opening</p> <p>The duct band is already installed on the duct</p>

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
4		Duct	

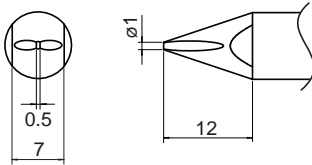


Tip Types

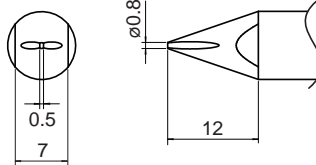


Units: mm

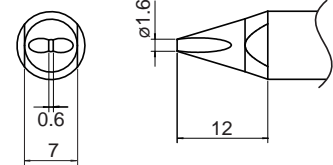
TX1-XD Shape-XD



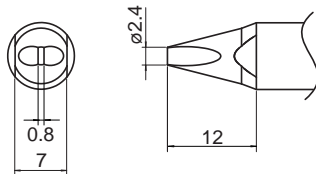
TX1-XD08 Shape-0.8XD



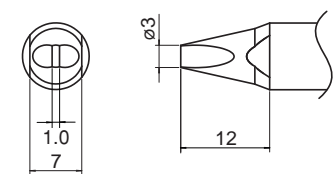
TX1-XD16 Shape-1.6XD



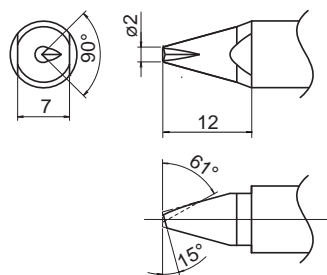
TX1-XD24 Shape-2.4XD



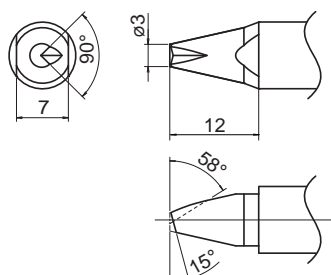
TX1-XD3 Shape-3XD



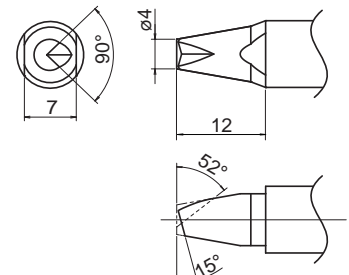
TX1-XBCR2 Shape-2XBCR



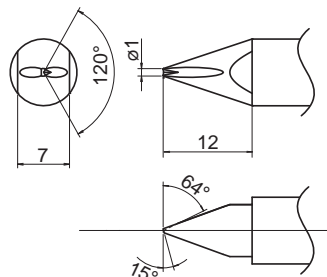
TX1-XBCR3 Shape-3XBCR



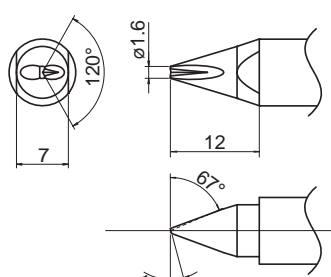
TX1-XBCR4 Shape-4XBCR



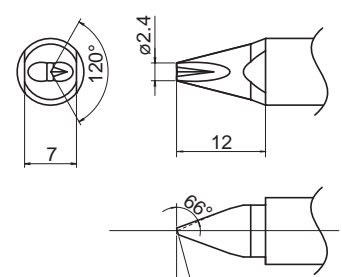
TX1-XDR Shape-XDR



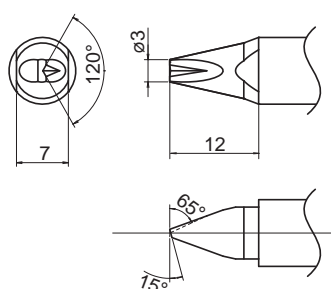
TX1-XDR16 Shape-1.6XDR



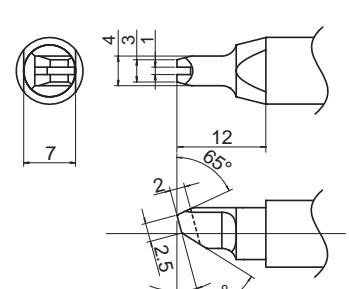
TX1-XDR24 Shape-2.4XDR



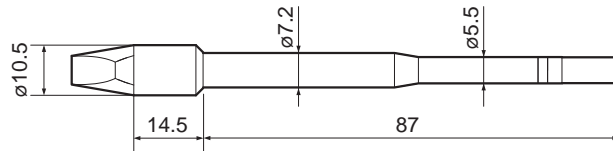
TX1-XDR3 Shape-3XDR



TX1-XRK Shape-XRK

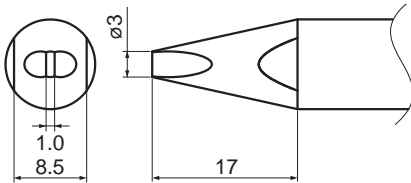


11. Parts List (continued)

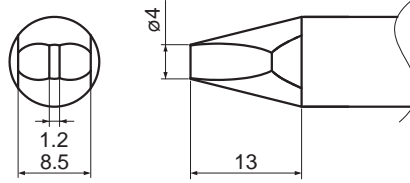


Units: mm

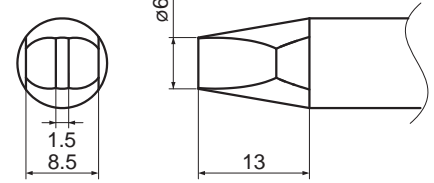
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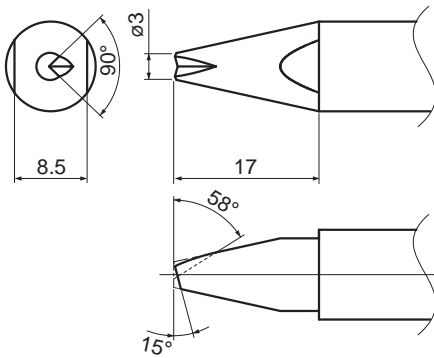
TX2-XD4 Shape-4XD



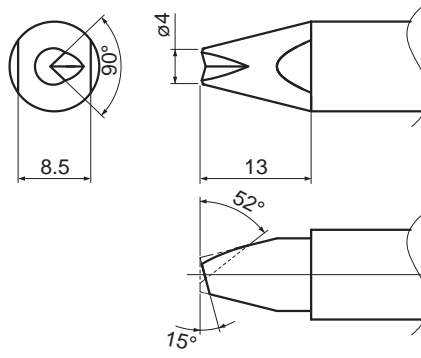
TX2-XD6 Shape-6XD



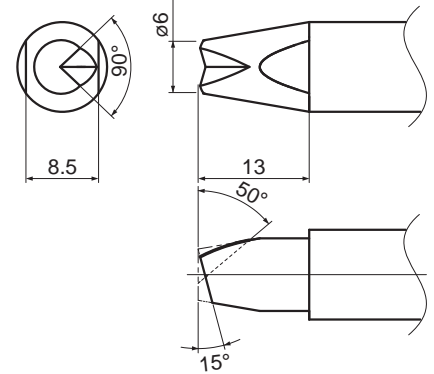
TX2-XBCR3 Shape-3XBCR



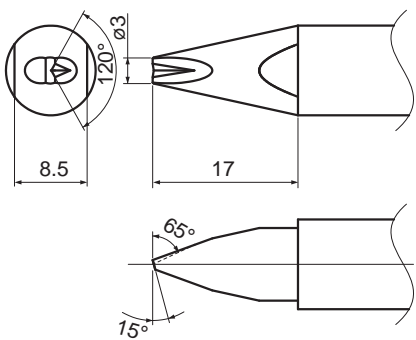
TX2-XBCR4 Shape-4XBCR



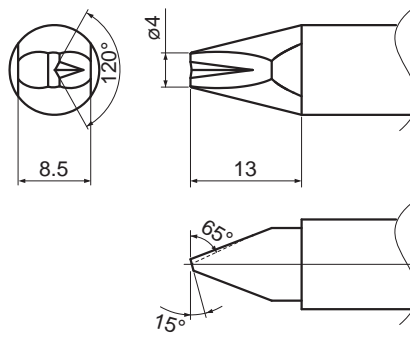
TX2-XBCR6 Shape-6XBCR



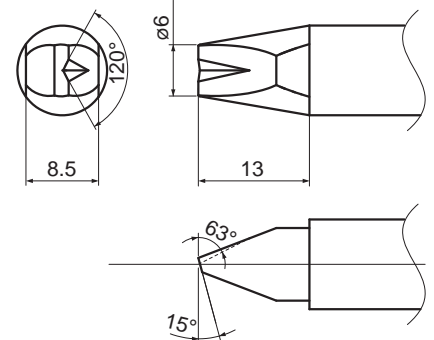
TX2-XDR3 Shape-3XDR



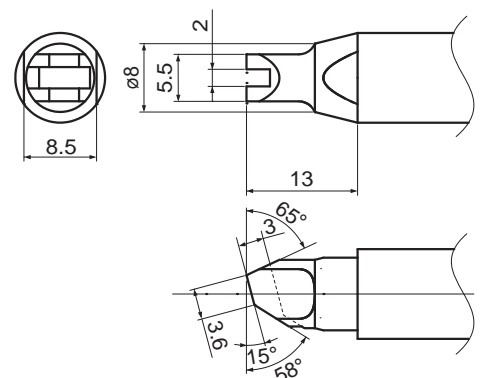
TX2-XDR4 Shape-4XDR



TX2-XDR6 Shape-6XDR



TX2-XRK Shape-XRK





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