

L-CAT NEO Series Operation Manual



Thank you for purchasing the L-CAT NEO Series.
Read these instructions thoroughly for proper use of this machine.

Make sure to read "Safety Notes" before you use machine.

This information protects you from possible dangers during use.

Apollo Seiko Ltd.

Safety Notes

- This manual includes the important information to use this machine safely. This also includes useful information to prevent injury or damage to property. Please read this manual carefully prior to connecting or operating the L-CAT NEO Series.
- Keep this manual near the machine at all times.

Supply only specified voltage

- Do not connect to a power supply greater than the specified voltage. If voltage is exceeded, electrical shock and /or damage to the unit may occur.
- Make sure that the electrical outlet is properly grounded. If the outlet is not properly grounded, electrical shock and/or damage to the unit may occur.

Working ambient temperature and relative humidity

- This machine has been designed for use between 0~40 degrees C, 10%~90%. Do not use this machine exceeding these conditions.

Handle with care

- This machine is designed to use a solder feeder and hot iron for soldering. Touching a heated soldering iron will cause severe burns. Make sure the iron has cooled down before you are touching it for replacing the iron cartridge.
- Please handle this machine with care. If the machine is dropped or sustains great impact / vibration, it may cause malfunction.

If you do not use the machine for a long time

- Please turn off the power, remove the power cable and keep it in a dry and cool place.

If you note malfunction on machine

- If the machine malfunctions, turn off the power immediately and contact the dealer you purchased the machine from.

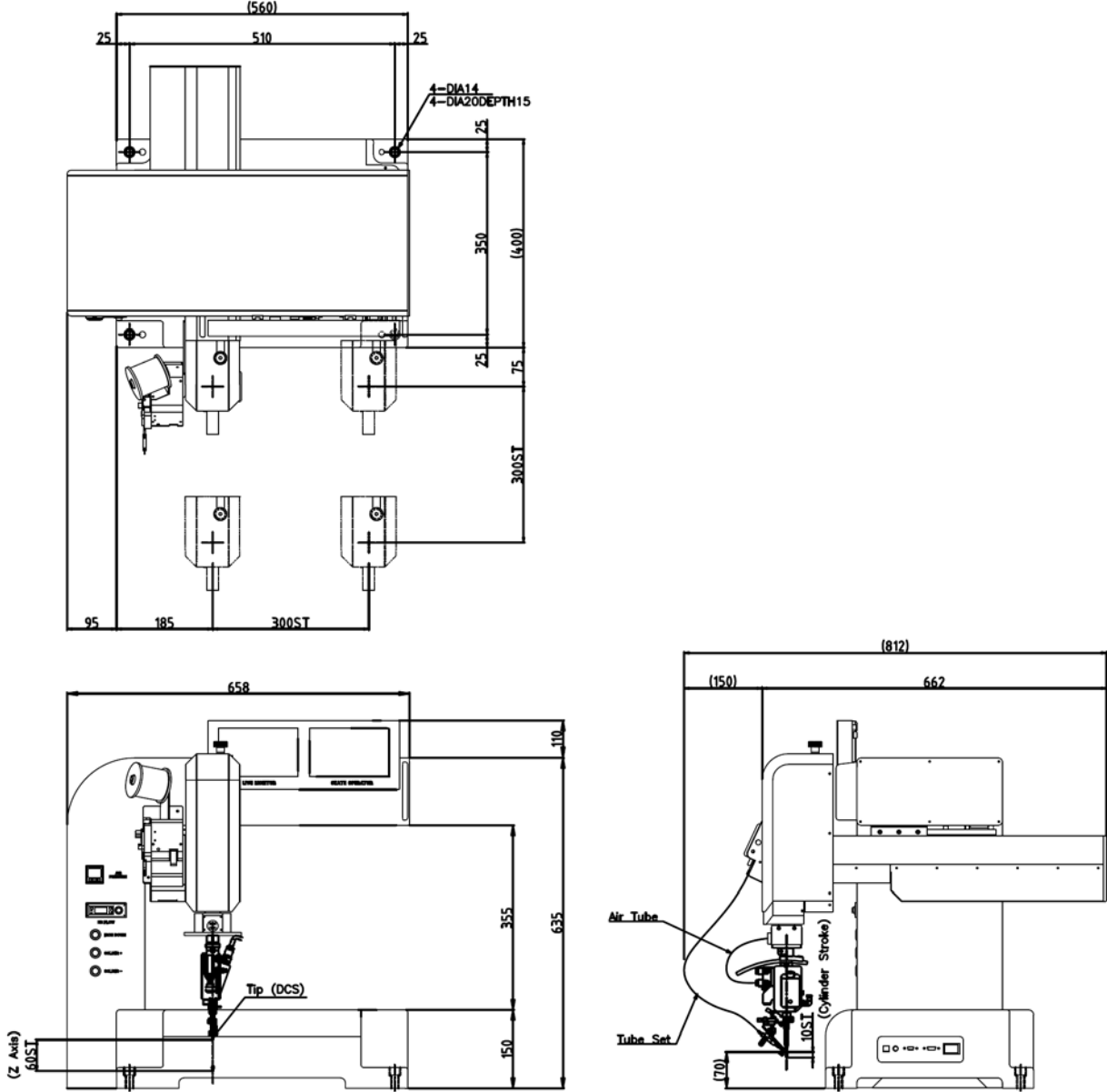
Immunity from responsibility

- We **do not** take responsibility for damage caused by misuse, mistakes, accidents, use in abnormal conditions or natural disasters, such as in an earthquake, a fire etc.
- We **do not** take responsibility on contingency loss, (Business loss, Business stop) caused by machine stop.
- We **do not** take responsibility for losses or damages caused by operating with other means not mentioned in this manual.
- We **do not** take responsibility for losses or damages caused by a wrong connection with other equipment.
- If for any reason the internal circuitry is tampered with altered or repaired without written consent of Apollo Seiko, the warranty is null and void. The customer is allowed to make necessary tooling adjustments, replace solder iron tips and make any necessary adjustments to the temperature controller.

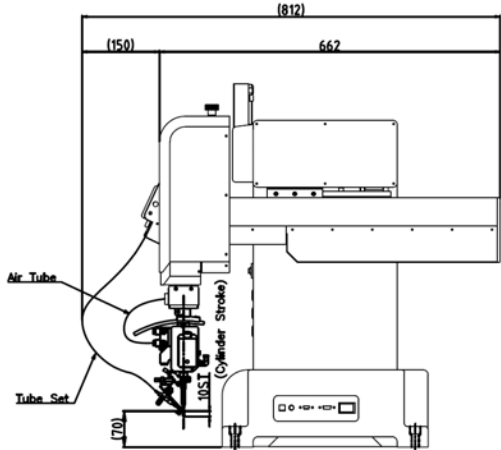
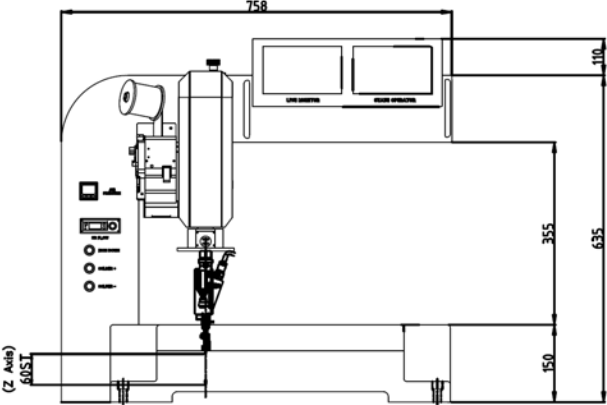
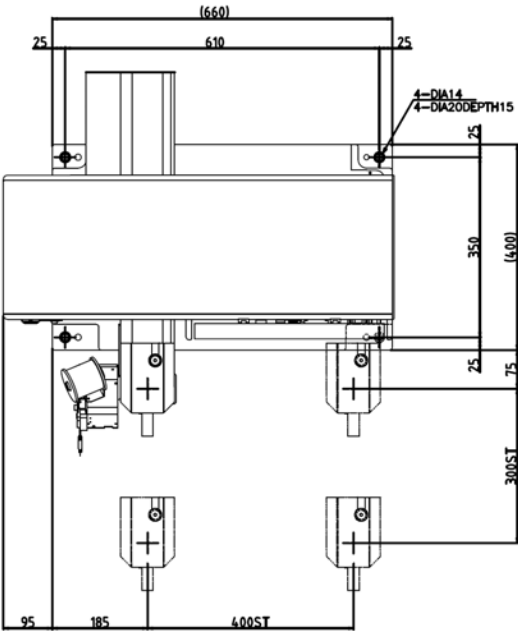
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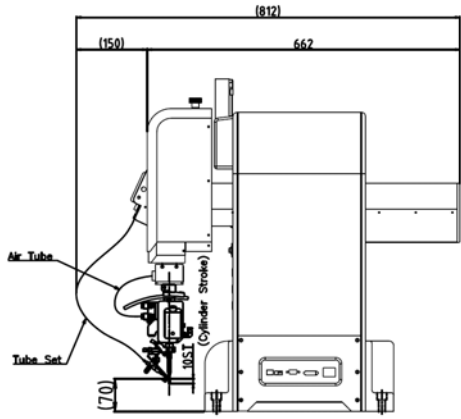
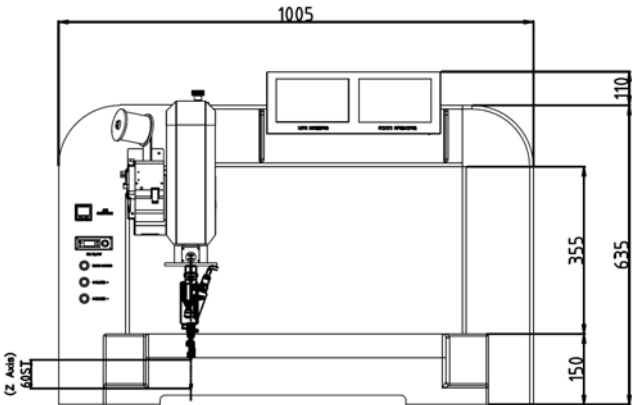
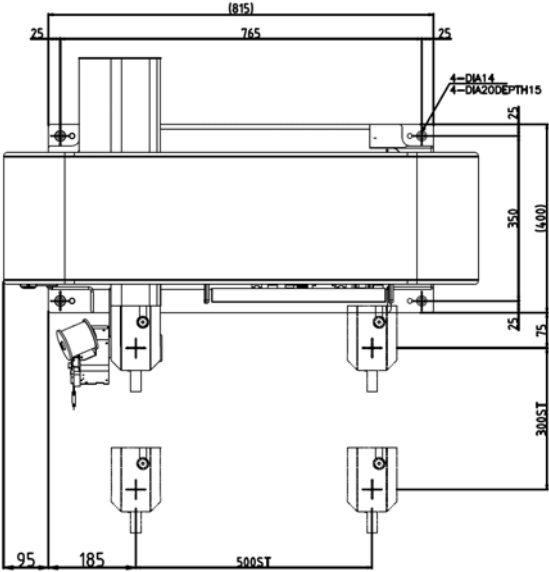
1. Dimensions



L-CAT NEO 4330

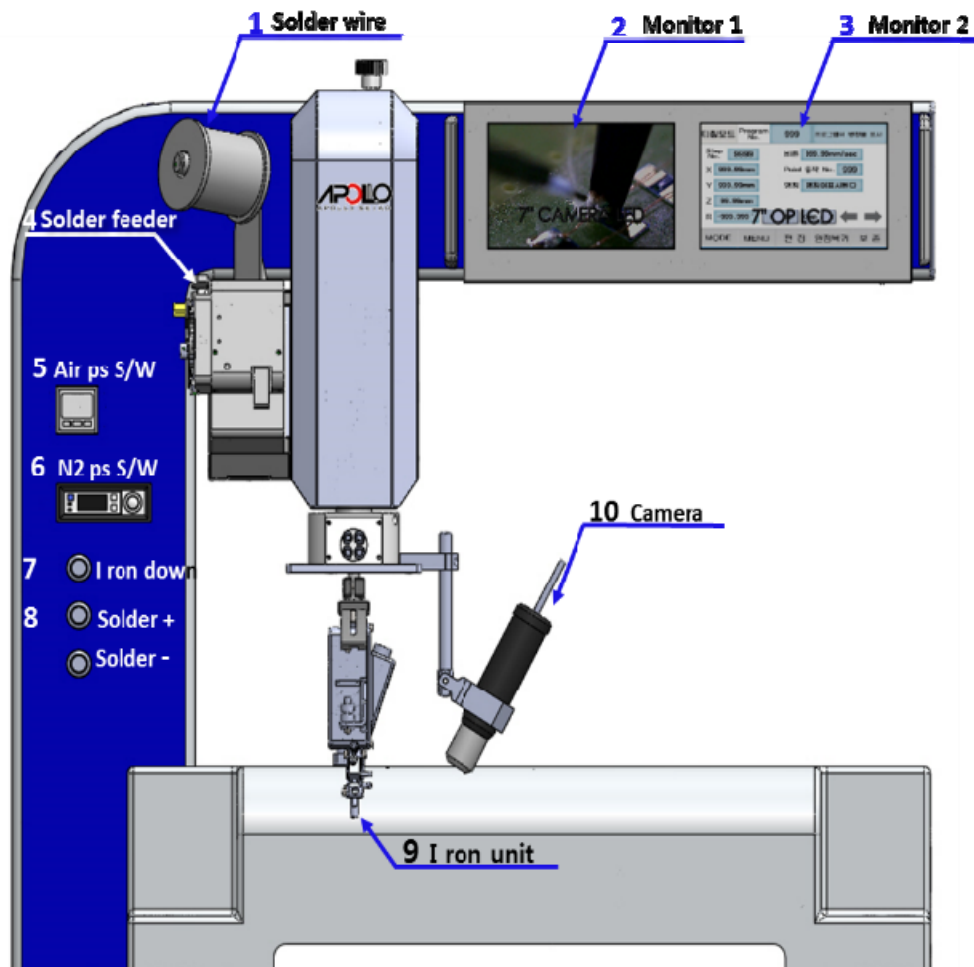


L-CAT NEO 4430



L-CAT NEO 4530

2. Robot Description



1. Solder Wire

Refer to “Preparation” page.

2. Monitor 1

Monitor the soldering operation.

3. Monitor 2

Displays the soldering parameters.

4. Solder Feeder

Feeds the solder wire by set amount.

5. Air ps S/W

Displays the current value of the air pressure.

The upper and lower limits can be set.

6. N2 sp S/W

Displays the current nitrogen flow value and allows adjustment of the value.

7. Iron Down

By pressing once this button, the iron goes down and up.

By holding the button, the iron stays in the lower position.

While teaching the soldering position, the position can be checked with this button.

8. Solder +/-

(+) Button: Feeds solder wire forward (-) Button: Feeds solder wire in reverse

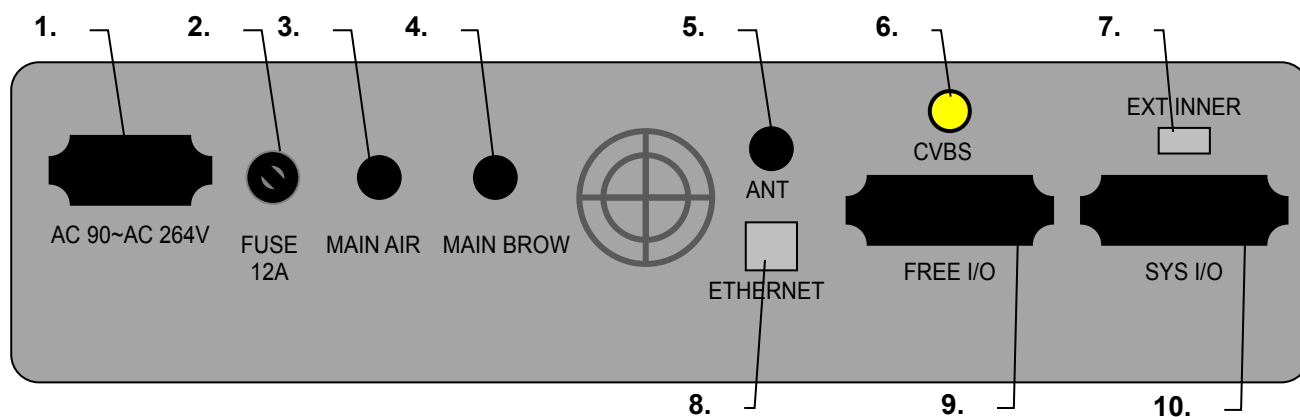
9. Iron Unit

Refer to “How to change iron tip” for replacing iron cartridge.

10. Camera

For monitoring and recording the soldering operation.

<Robot Rear>



1. Power Inlet: Connect the power cable.

2. FUSE 12A

3. MAIN AIR: Connect to the air tube. (Use dry and clean air.)

4. MAIN BROW: Used for the air tube of cleaner cup of “CRU-A” or “CRB-A2”.

5. ANT: Used for Wi-Fi

6. CVBS: Used for the other monitoring screen

7. EXT INNER: Switch between External power and Internal power.

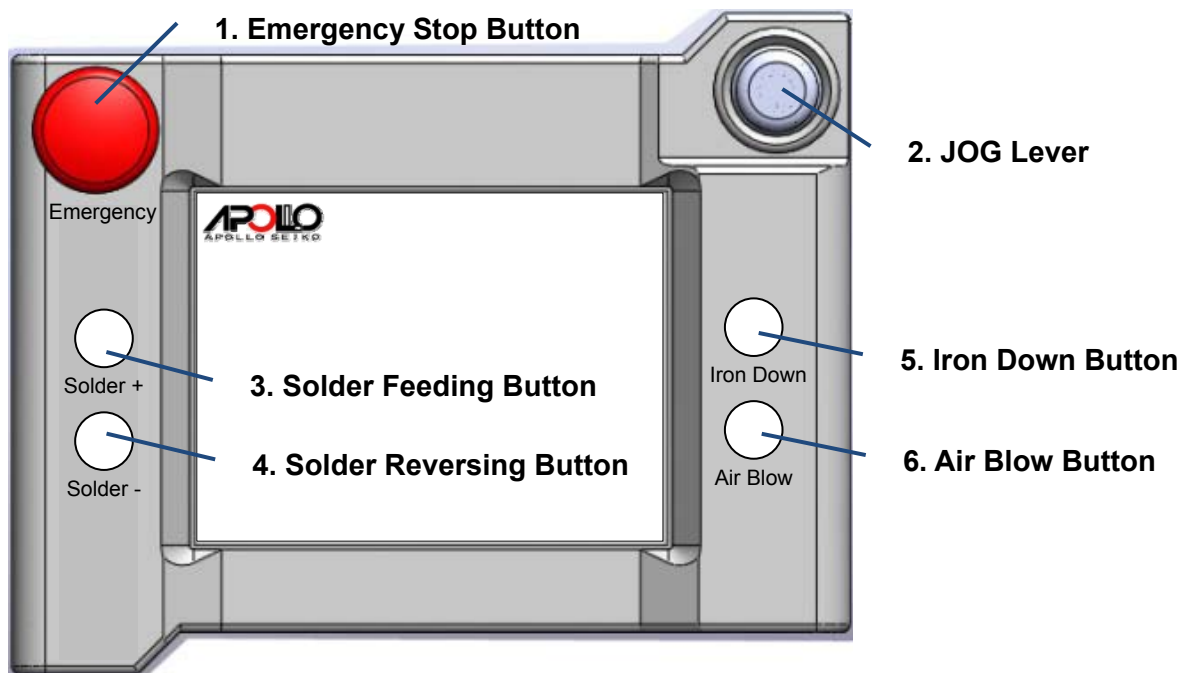
*The factory setting is the Internal power. (Right side “INNER”)

8. ETHERNET: Used for PC connection.

9. FREE I/O

10. SYS I/O

3. Teaching Pendant Description



1. **Emergency Stop Button**

Press the emergency stop button to immediately stop the robot if any accident has occurred during operation.

To release the emergency stop, turn the depressed button clockwise.

2. **JOG lever**

Use this lever to move 4-axis for teaching.

Press the center of JOG lever to switch movement from X/Y axes to Z/R.

3. **Solder Feeding Button**

Solder wire is fed by pressing this button based upon the programmed speed.

4. **Solder Reversing Button**

Solder wire is fed in reverse by pressing this button based upon the programmed speed.

5. **Iron Down Button**

This button lowers and raises the iron unit via the air cylinder.

If pressing and holding this button for 2 seconds, the iron stays at lower position.

Pressing the button again will bring the iron to the up position.

While teaching the soldering position, the position can be checked with this button.

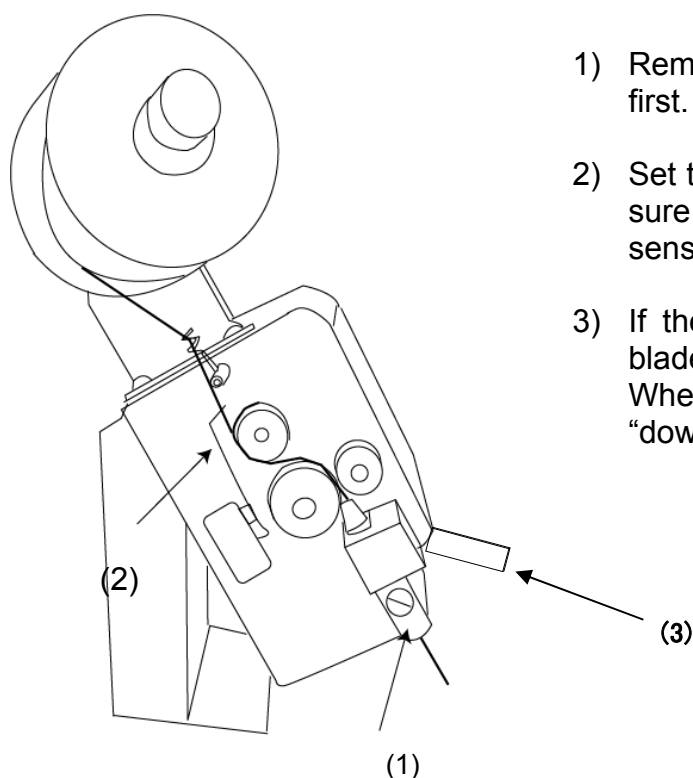
This button does not operate during program execution.

5. **Air Blow Button**

By pressing and holding, air is blowing.

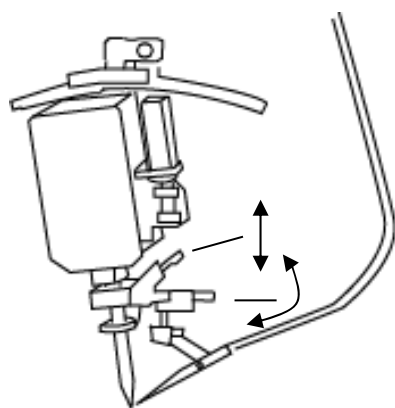
4. Preparation

4.1. Set Solder Wire



- 1) Remove the feed tube and pull solder wire through first. Then attach the solder tube.
- 2) Set the solder wire as per the diagram, and make sure to set solder wire on top of the solder shortage sensor arm.
- 3) If the release lever is upper position, the cutting blade/pinch roller will not feed the solder wire. When ready to feed the wire, put the lever in the "down" position.

4.2 How to Adjust RSP Iron Unit

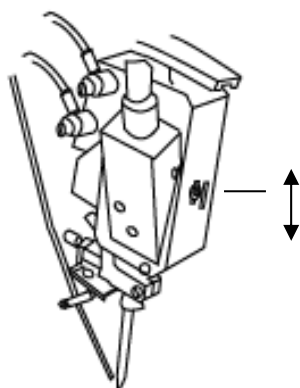


- 4) Solder wire feeding position can be adjusted.

Upper adjusting screw : Up/down direction
Lower adjusting screw : Left/right direction

- 5) Iron up down speed can be adjusted by turning screws after loosening the locking nut.

Upper black screw : Iron Up Speed
Lower white screw : Iron Down Speed



- 6) Second solder feeding position can be altered by moving this screw. Using this adjustment screw, solder can be prefed under the tip then fed into the joint with the iron down.

Lowering the screw position:

- Decreases the distance the Iron moves for second feed.

Raising the screw position:

- Increases the distance the iron moves for second feed.

5. Returning to Home Position

After turning on the power switch of L-CAT NEO, proceed to home the machine (initializing). The display language can also be selected only at this screen.

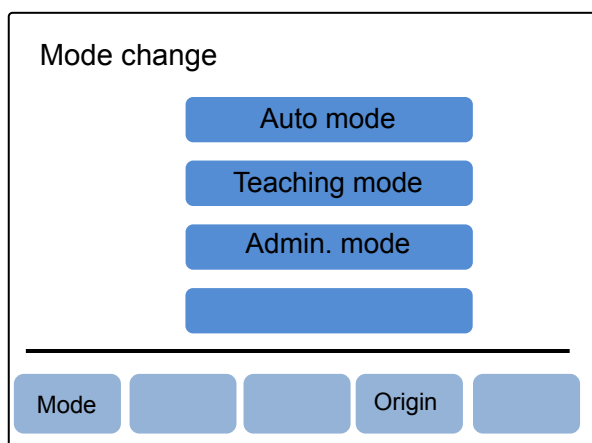


Press “Origin” to return machine to the home position.

After pressing “Origin”, the robot arms moves to the home position. During initializing, the display shows the following screen on the teaching pendant.

6. Mode Switching

After returning to the home position, Auto Mode screen is shown. In order to switch the operating mode, touch “MODE” key. The following screen is shown.



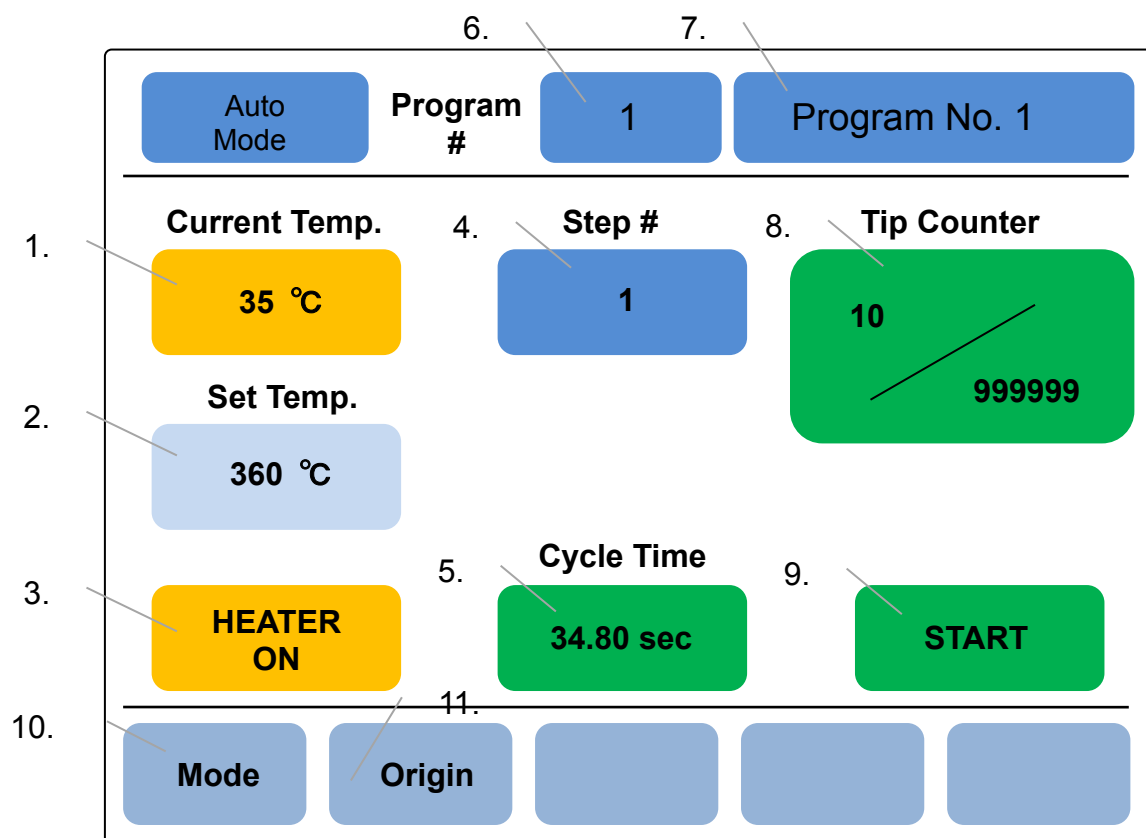
Auto mode: To run the created programs automatically.
*Refer to “7. Auto Mode”.

Teaching mode: To create programs.
The password is necessary to switch to the Teaching Mode.
(The initial password is 9999)
*Refer to “8. Teaching Mode”.

Admin. Mode: To set the parameter, temperature control, etc.
*Refer to “9. Admin. Mode”.

7. Auto Mode

After returning to the home position, the display changes to the “Auto Mode”. In Auto Mode, the following display is shown on the teaching pendant,

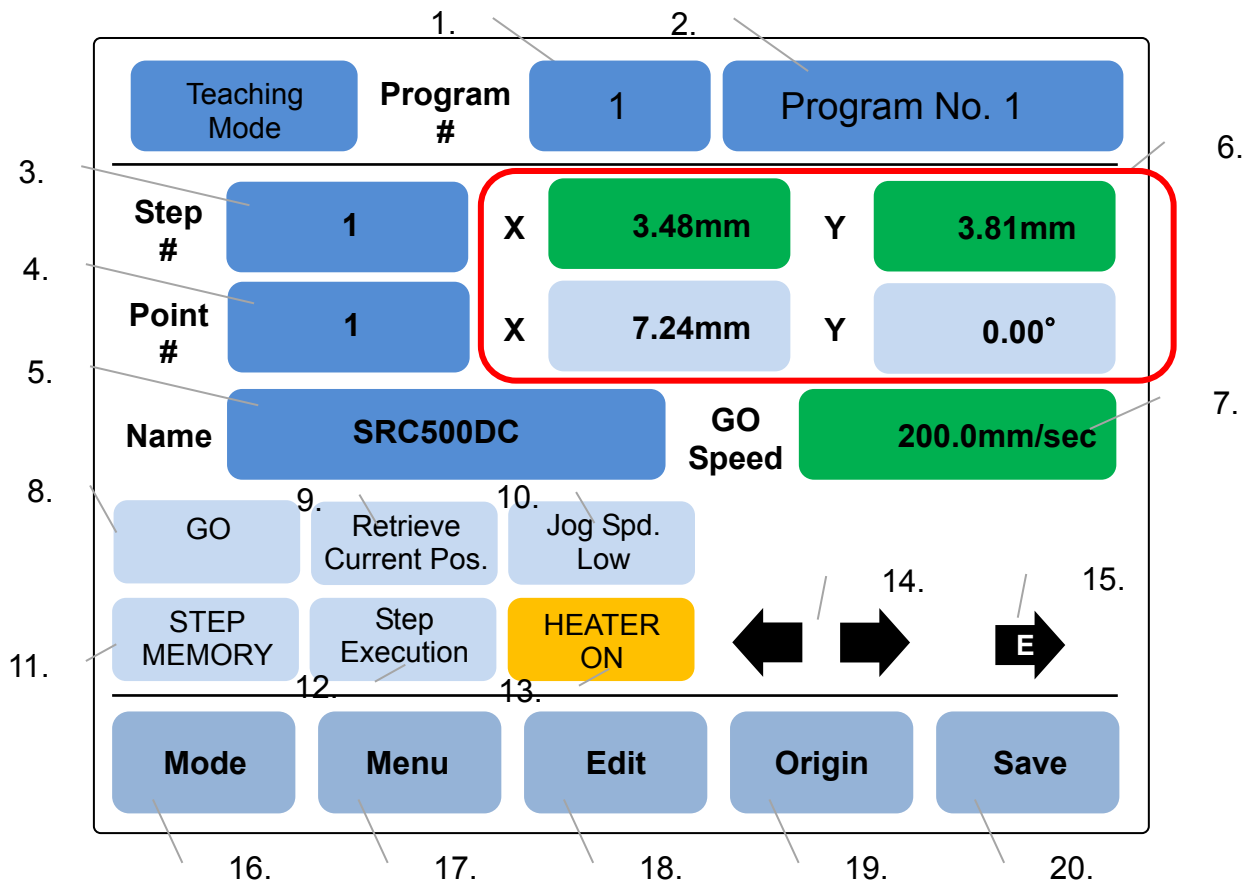


1. **Current Temperature Value:** Displays the current temperature of the iron tip.
2. **Setting Temperature Value:** Displays the temperature set in the program setting.
3. **Heater ON / OFF:** Switch between the heater ON and OFF. During operation, this key cannot be used.
4. **Step Number:** Displays the current running step number.
5. **Cycle Time:** Displays time from the pushing start button to the end of operation.
6. **Program Number:** Displays the operating program number.
7. **Program Name:** Displays the program name set in the program setting.
8. **Tip Counter:** Displays the iron shot counter.
9. **Program Start:** When READY signal outputs, the program can be started. During operation, the button displays “STOP” to stop the cycle.
10. **Mode:** Switch between “Auto Mode”, “Teaching Mode” or “Admin. Mode”
*Refer to “6. Mode Switching”.
11. **Origin:** The 4-axes move to the home position.

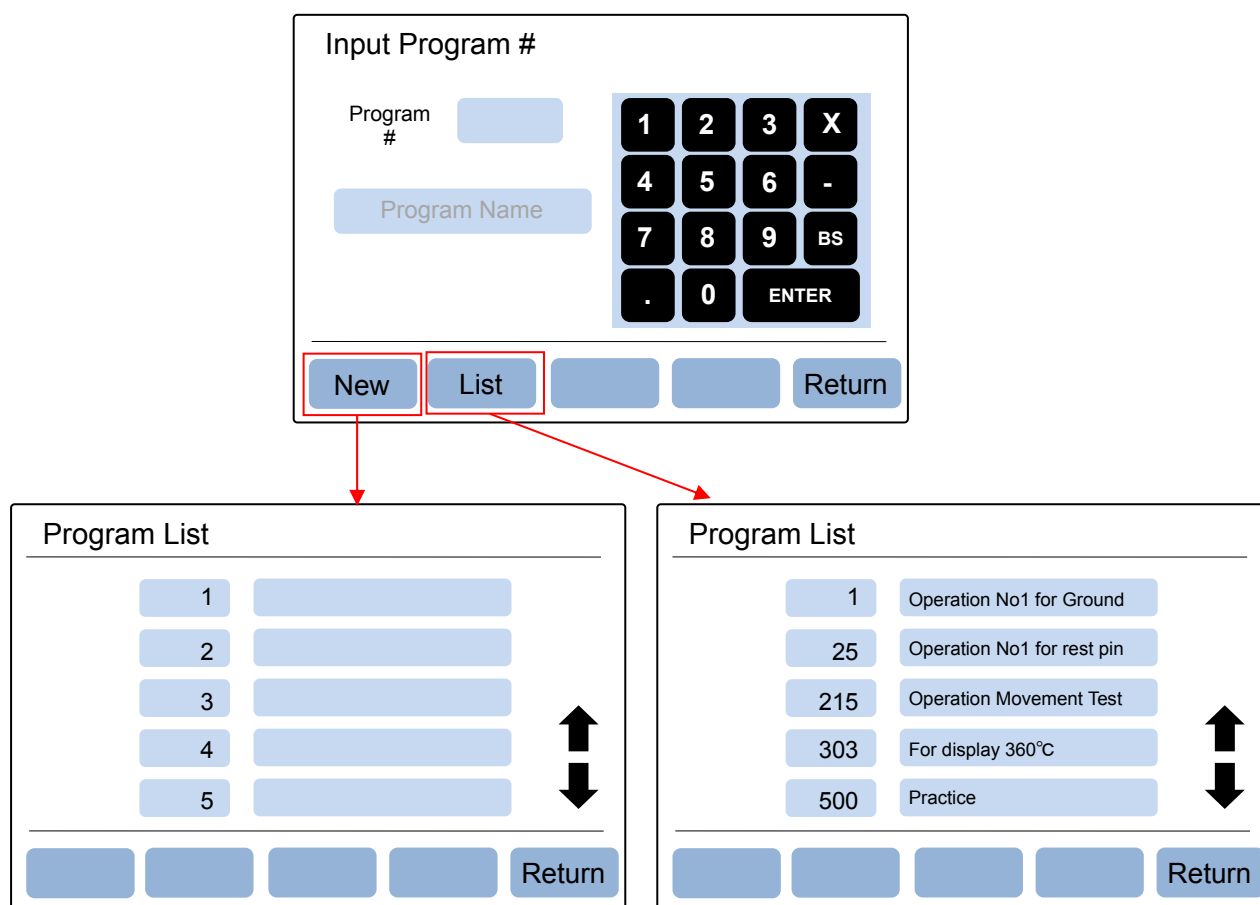
8. Teaching Mode

When switching to the Teaching Mode, the password screen is firstly shown.
 (The initial password is "9999".)

After entering the password, the following display is shown on the teaching pendant.



- 1. Program Number:** Displays and choose the programming number.
When touching this key, the following screen is shown.
Enter the program number by numeric key.
(Program number range: 1~512)
*Refer to “10. Program Setting”.



Touch “New” for creating new program.
The lists of unset program are shown.
Select the creating program number.
You can also input the program name.

Touch “List” to see the registered program.

- 2. Program Name:** Displays the program name set in the programming.
- 3. Step Number:** Displays the step number being taught.
- 4. Point Number:** Displays the current point condition number. *Refer to “11. Point Setting”.
- 5. Point Operation Name:** Displays the name to be registered in the point operation setting.
- 6. Coordinate Value of 4-axis:** Displays the current coordinate value or the coordinate value set in the step. The green axes keys are available to move.
- 7. GO Speed:** Displays the moving speed of the X/Y axes. *Refer to “15. Parameter Setting <Axis Control 1/2>”.
- 8. GO:** The axes move to the coordinates displayed at the current Step #.

- 9. Retrieve Current Position:** When this key is pressed the current coordinate value is displayed.
- 10. Jog Spd. Low / High:** Toggles the JOG speed between low/high. The speed can be changed in Parameter settings. *Refer to “15. Parameter Setting <Axis Control 2/2>”.
- 11. STEP MEMORY:** Press this key to save changes to a step after editing. Make sure to touch this key every time each step is decided or edited.
- 12. Step Execution:** The axes move to the coordinate value of the displayed Step # and operates the displayed Point # condition.
- 13. HEATER ON:** Switch between the heater ON and OFF. During operation, this key cannot be used.
- 14. Step Number change:** Used to switch the step # to previous / next step #.
- 15. End:** Used to jump the screen to the end of the step #.
- 16. Mode:** Used to switch the screen to “Auto Mode”, “Teaching Mode” or “Admin. Mode”
*Refer to “6. Mode Switching”.
- 17. Menu:** Used to move to the programming screen or point operating screen.
- 18. Edit:** Used to edit the program, point operation and step.
*Refer to “13. Edit of Program / Point Operation / Step
- 19. Origin:** Used to move the axes to the home position.
- 20. Save:** Used to save the data.
“Auto Mode” cannot be operated, if the data is not saved.

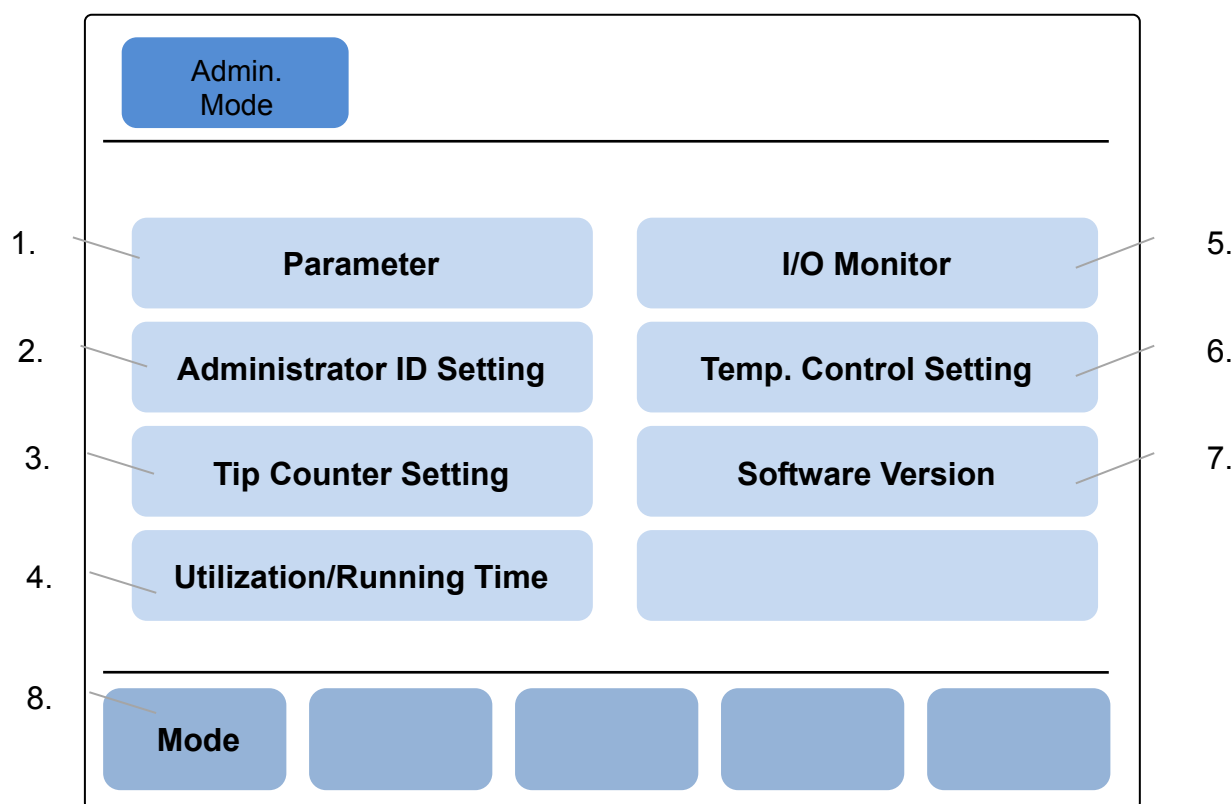


Please be careful.

If you turn off the power before saving, the data will be deleted.

9. Admin. Mode

In Admin. Mode, the following display is shown on the teaching pendant.

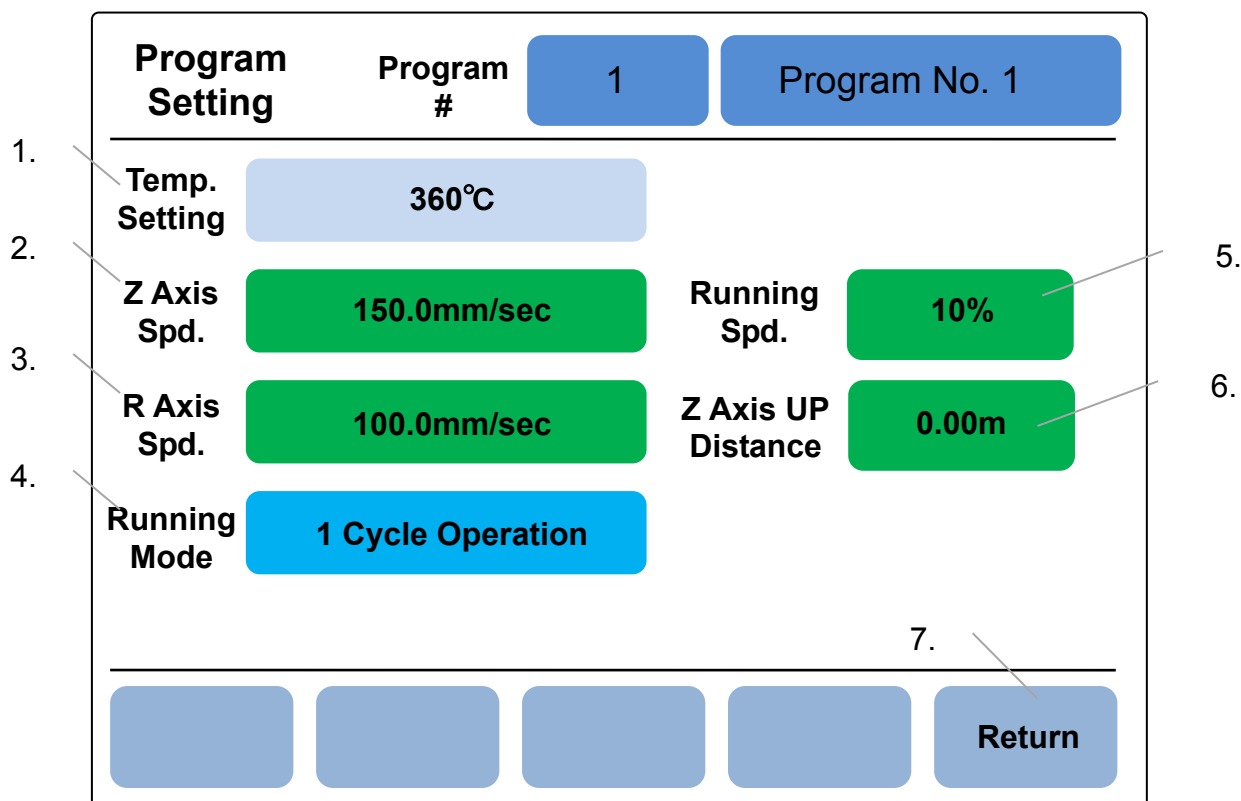


1. **Parameter:** Pressing this button firstly displays the password screen. Entering the password will display the parameter setting screen. (The initial password is 9999.)
*Refer to “15. Parameter Setting”.
2. **Administrator ID:** Used to set the ID and password. (The initial password is 9999.) **
3. **Tip Counter Setting:** Used to set / reset the shot counter amount. **
4. **Utilization / Running Time:** Utilization Time is the operation time from power on. Running Time is the total operating time from the first time used. **
5. **I/O Monitor:** Used to check the inputs and outputs. **
6. **Temp. Control Setting:** Used to set PID by auto-tuning. **
7. **Software Version:** Displays the system version. **
8. **Mode:** Used to switch between “Auto Mode”, “Teaching Mode” or “Admin. Mode”
*Refer to “6. Mode Switching”.

** Refer to “16. Admin. Mode Setting”.

10. Creating a Program

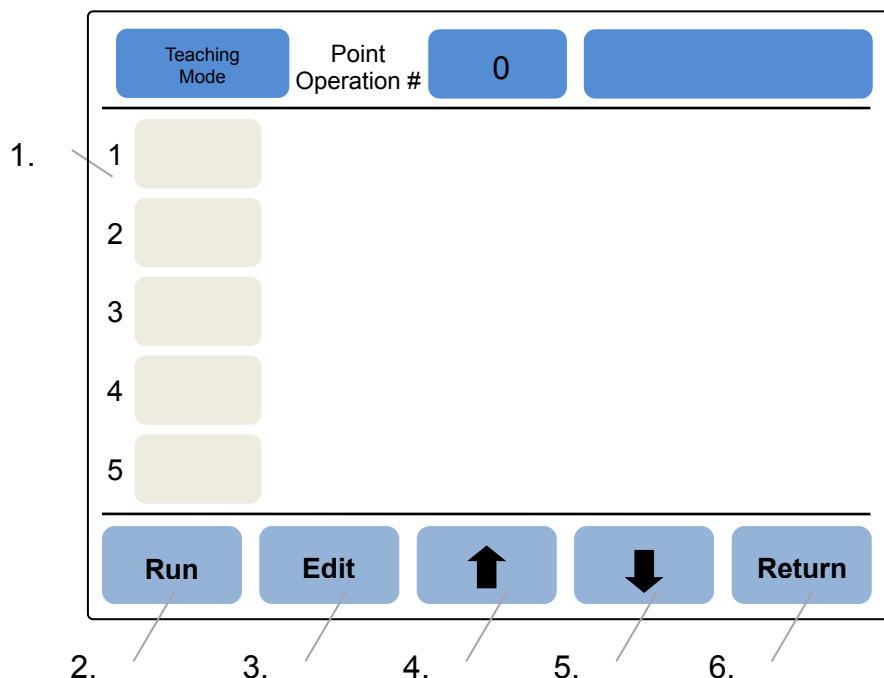
In Teaching Mode touch “Menu” then select “Program Setting”.
Set the program number. The following display is shown on the teaching pendant.



1. **Temp. Setting:** Displays the iron tip temperature when the program operates.
2. **Z Axis Spd:** Displays the moving speed of Z-axis. This speed is reflected to all the steps
3. **R Axis Spd:** Displays the moving speed of R-axis. This speed is reflected to all the steps
4. **Running Mode:** Used to select between one cycle operation and continuous operation.
5. **Running Spd:** Used to set the rate of the running speed.
6. **Z Axis UP Distance:** Used to set the Z axis rising distance between the steps.
7. **Return:** Back to previous screen.

11. Creating a Point Operation

In Teaching Mode, touch “Menu” then select “Point Operation Setting”.
Set the point operation number and commands. *Refer to “12. Command List”.
The following display is shown on the teaching pendant.



1. Step Number: The number range is 1 ~ 999

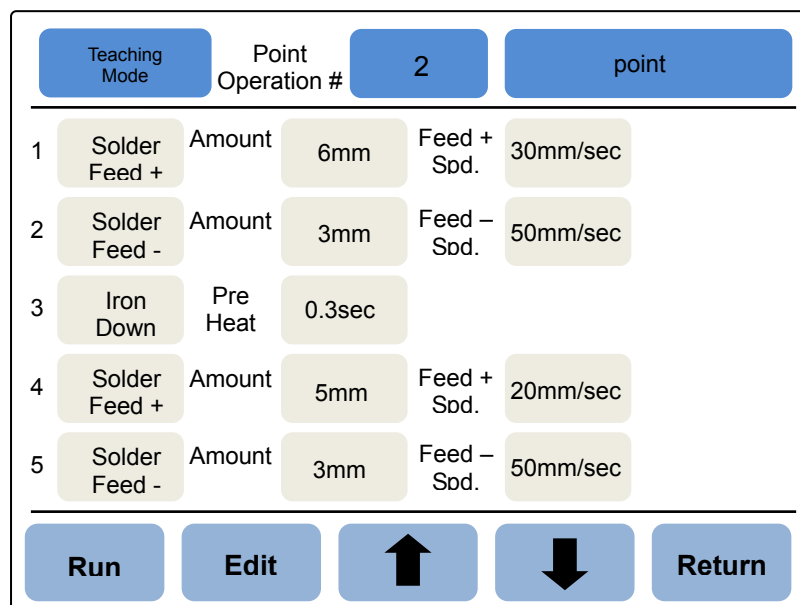
2. Run: Used to run the point operation (The axes do not move).

3. Edit: When this key is touched, the “Edit” key lights up in blue, giving functionality to add or delete steps and edit commands.

4. 5. Scroll key: Used for switching between the previous and next page.

6. Return: Back to previous screen.

Entry example:



12. Command List

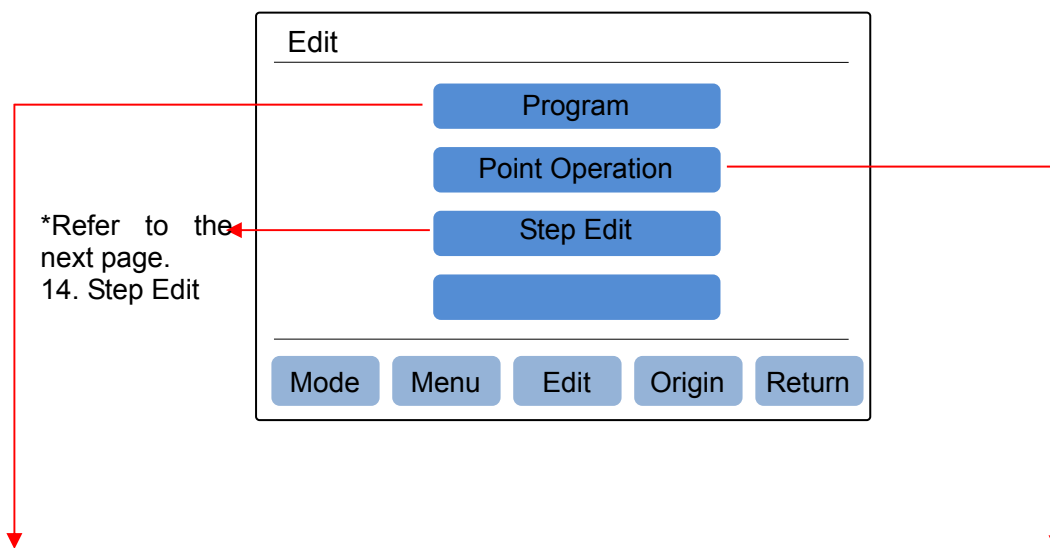
Command	Description
Soldering	
Solder Feed +	Solder feed amount & speed
Solder Feed –	Solder reverse amount & speed
Iron Down	Iron unit goes down & pre-heat time
Iron Up	Iron unit goes up & waiting time
Heating Time	Heating time
Line Solder Feed	Line (Slide) solder feed amount & speed The feed mode can be selected.
Start of Line Soldering	Start point of line soldering
Passing Point	Passing point of line soldering
Passing Arc Point	Arc passing point of line soldering
End of Line Soldering	End point of line soldering
Temp. Setting	Temperature setting
Sync. Operation	Simultaneous operation
Command End	End of command
Tip Cleaning	
Air Cleaning	Time for air blowing
Brush Cleaning	Time to rotate brushes
Start of Brush	Start point of rotating brushes
End of Brush	End point of rotating brushes
CW Rotate	Clockwise rotation of sponges
CCW Rotate	Counterclockwise rotation of sponges
Start of CW Rotate	Start point of rotating sponges
End of CW Rotate	End point of rotating sponges
Cleaning Passing Point	Passing point of cleaning
Cleaning Arc Passing Point	Arc passing point of cleaning

Command	Description
Axis Control	
Evasion Point	Point of evading
CP Start Point	Start point of CP
CP Passing Point	Passing point of CP
CP Arc Passing Point	Arc passing point of CP
CP End Point	End point of CP
Center Point	Center point
CP Move X, Y Axis	Coaxial interpolation
CP Move Z, R Axis	Coaxial interpolation
PTP Move X, Y Axis	4-axis coaxial interpolation
PTP Move Z,R Axis	4-axis coaxial interpolation
End of Evasion	End of Evasion
Position Adj.	
Get Offset Data	Acquisition of correction data
Delete Offset Data	Delete of correction data
Setting Display	Call of setting number
Window Display	Call of window display
2Point Offset Trigger 1	2 points correction trigger 1
2Point Offset Trigger 2	2 points correction trigger 2
V-Calibration Run	Run of image position correction
V-Calibration Stop	Stop of image position correction
Tip Pos. Adj.	
Set X Axis Data Point	Acquisition of X axis reference position
Set Y Axis Data Point	Acquisition of Y axis reference position
Set Z Axis Data Point	Acquisition of Z axis reference position
Set X Axis Offset Data	Acquisition of X axis correction position
Set Y Axis Offset Data	Acquisition of Y axis correction position
Set Z Axis Offset Data	Acquisition of Z axis correction position
T-Calibration Run	Run of tip position correction
T-Calibration Stop	Stop of tip position correction

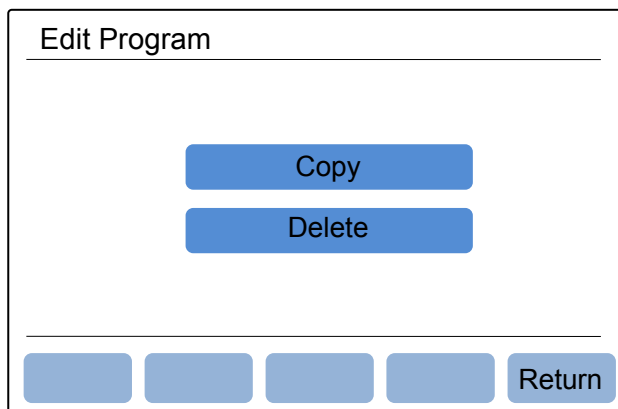
Command Control 1/3	
Set	Command hold
Reset	Command reset
Pulse	Pulse output
Buzzer	Buzzer ON / OFF
If	Conditional branch
Then	Condition (True)
Else	Condition (False)
Endif	Condition branch end
Wait Time	Waiting time
Time Up	Run after reaching the waiting time
End Wait	End of waiting
Wait Cond.	Waiting for enter of condition
Command Control 2/3	
Ld	ON input
Ldi	OFF input
And	Series ON input
Andi	Series OFF input
Or	Parallel ON input
Ori	Parallel OFF input
Call Program	Call a specified program as a subprogram
Jump	Jump to a specified step
Rjump	Jump to a relative specified step
End Program	Program end
Wait Start	Waiting for start signal
Delay	Time of delay
Command Control 3/3	
For	The command from "For" to "Next" repeats until the specified variable reaches to the end value from the initial value.
Next	
Exit For	Exit from "For" command.
Do	Repeat the command from "For" to "Loop".
Loop	
Exit Loop	Exit from "For" command.

13. Program Editing / Point Operation / Step

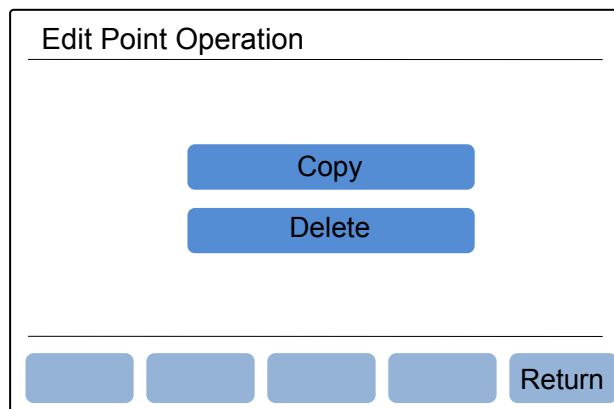
Touch “Edit” in Teaching Mode, the following screen is shown.



<Program Edit Screen>



<Point Operation Edit Screen>



Program and Point Operation can “Copy” and “Delete”.

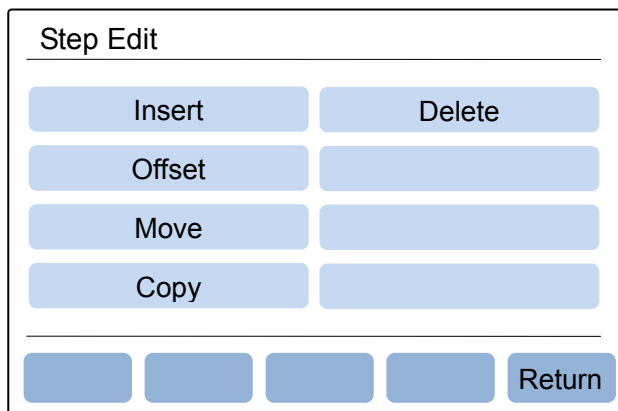
14. Step Edit (Insert / Delete / Offset / Move / Copy)

For editing the step, touch “Edit” in the Teaching Mode”.

*Refer to 13. Edit of Program / Point Operation / Step.

Select “Step Edit”, the following screen is shown.

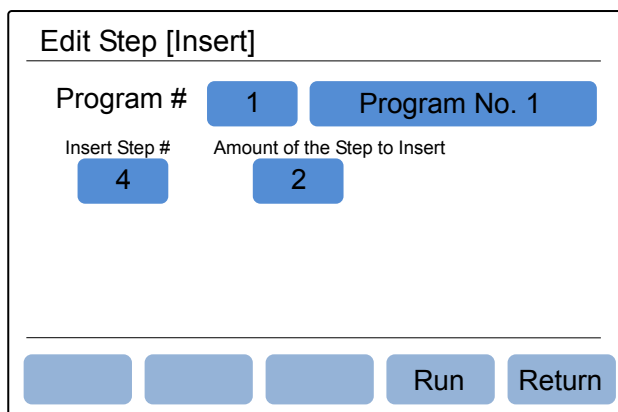
<Program Edit Screen>



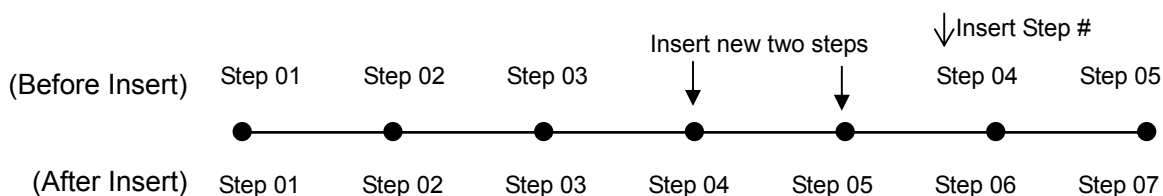
14.1 Insert

New step can be created starting at “Inset Step#”.

E.g.) Insert the two new steps to Step# 4.



1. Enter the Step# 4.
2. Enter the number of inserting steps “2”.
3. Touch “Run”.



14.2 Delete

The specified range of steps can be deleted.

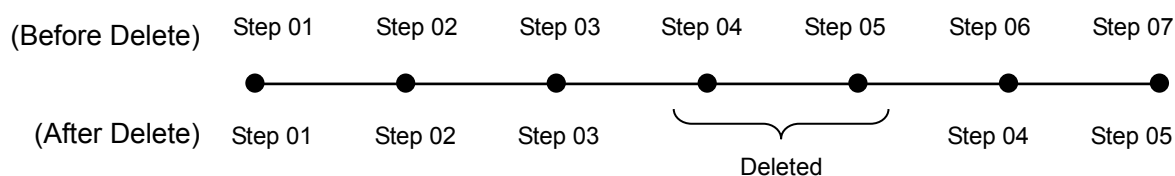
E.g.) Delete Step# 4 – Step# 5.

Edit Step [Delete]

Program # Program No. 1

Start Step # End Step #

1. Enter the Start Step# 4 and End Step# 5.
2. Touch "Run".
3. The message "Do you want to delete the data?" is shown. Choose "Yes".



14.3 Offset

The coordinates of a range of steps can be offset in any or all of the 4 axes.

E.g.) Offset Step# 3 in Y 2.54mm direction.

Edit Step [Offset]

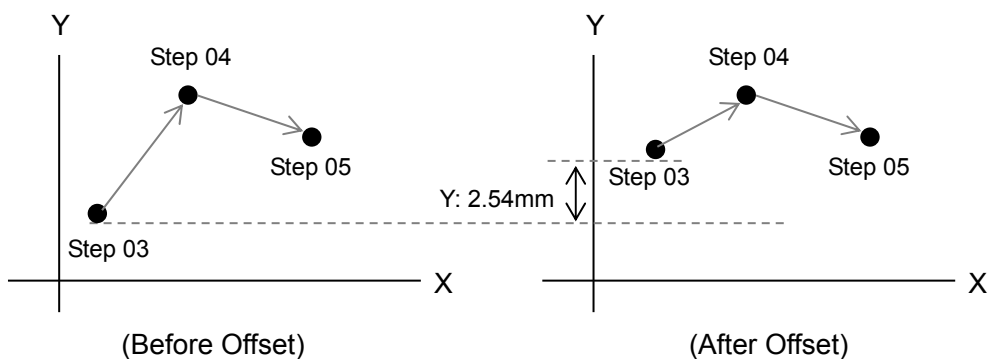
Program # Program No. 1

Start Step # End Step #

X Y

Z R

1. Enter the Start Step# 3 and End Step# 3.
2. Enter the offset value Y: 2.54mm.
3. Touch "Run".



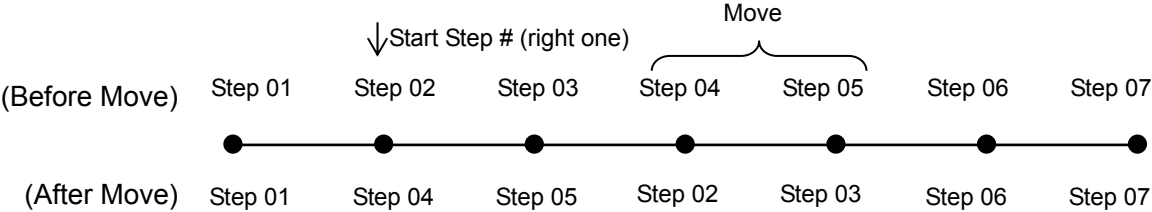
14.4 Move

The specified step can be moved to another specified step..

E.g.) Move Step# 4 – Step# 5 to Step# 2

Edit Step [Move]					
Program #	1	Program No. 1			
Start Step #	4	End Step #	5	Start Step #	2
Run Return					

1. Enter the Start Step# 4 (left one) and End Step# 5.
2. Enter the Start Step# 2 (right one).
*This step is not overwritten.
3. Touch "Run".



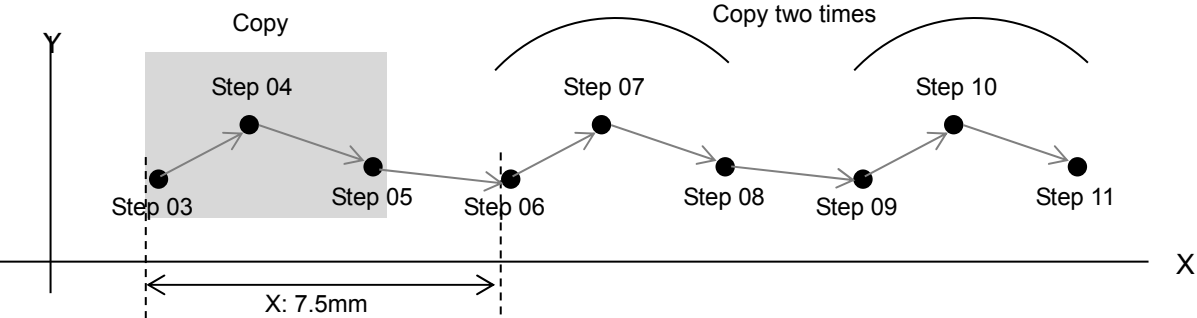
14.5 Copy

The specified step range can be copied and the coordinates of the copied steps can be offset. The number of times to copy can be entered.

E.g.) Copy Step# 3 – Step# 5 to Step# 6 in X 7.5mm direction.

Edit Step [Copy]					
Program #	1	Program No. 1			
Start Step #	3	End Step #	5	Destination Step #	6
X	7.50m	Y	0.00mm	Copy Times	
Z	0.00mm	R	0.00mm	2	
Run Return					

1. Enter the Start Step# 3 and End Step# 5.
2. Enter the Step# 6.
3. Enter the X distance "7.50".
4. Touch "Run".



15. Parameter Setting

Select "Parameter" at the Admin. Mode" top screen.

This Parameter consists of 3 pages "Soldering", "Axis Control" and "Others".

<Soldering>

Parameter Setting Soldering

Temp. Calibration	Solder Feed Calibration	Temperature On/Off
Temp. Error Upper Limit	Solder Feed + Spd.	Feeder On/Off
Temp. Error Lower Limit	Solder Feed – Spd.	Iron Unit On/Off
Temp. Error Delay Time	Feeder Encoder Error Setting Value	Tip Counter On/Off
	Air Pressure Alarm On/Off	N2 Alarm On/Off

Axis Control(1/2)	Axis Control(2/2)	Others		Return
--------------------------	--------------------------	---------------	--	---------------

Soldering	Description	Initial Value	Setting Range
Temp. Calibration	Calibration between present temperature and displayed temperature of iron tip.	-30°C	-100 ~ 100
Temp. Error Upper Limit	Set the upper temperature limit before error.	30°C	0 ~ 100
Temp. Error Lower Limit	Set the lower temperature limit before error	30°C	0 ~ 100
Temp. Error Delay Time	Delay time for error output when upper/lower limit is reached	3 sec	0 ~ 30
Solder Feed Calibration	Calibration of solder feed amount	0%	50 ~ 150
Solder Feed + Spd.	Set the manual solder feed speed	30mm/sec	5 ~ 50
Solder Feed - Spd.	Set the manual solder reverse speed	30mm/sec	5 ~ 50
Feeder Encoder Error Setting Value	Set the output range of encoder error	-	0 ~ 100
Air Pressure Alarm On/Off	Set "Enable" / "Disable" for the air pressure alarm	Disable	Enable/Disable
Temperature On / Off	Set "Enable" / "Disable" for the temperature controller	Enable	Enable/Disable
Feeder On / Off	Set "Enable" / "Disable" for the feeder	Enable	Enable/Disable
Iron unit On / Off	Set "Enable" / "Disable" for the iron unit	Enable	Enable/Disable
Tip Counter On / Off	Set "Enable" / "Disable" for the iron shot counter	Disable	Enable/Disable
N2 Alarm On/Off	Set "Enable" / "Disable" for the air pressure alarm	Disable	Enable/Disable

<Axis Control 1/2>

Parameter Setting Axis Control (1/2)

X Axis Stroke	X Axis Max Spd.	X Axis Accel. Time	X Axis Decel. Time
Y Axis Stroke	Y Axis Max Spd.	Y Axis Accel. Time	Y Axis Decel. Time
Z Axis Stroke	Z Axis Max Spd.	Z Axis Accel. Time	Z Axis Decel. Time
R Axis Stroke	R Axis Max Spd.	R Axis Accel. Time	R Axis Decel. Time

Soldering Setting	Axis Control(2/2)	Others		Return
--------------------------	--------------------------	---------------	--	---------------

Axis Control 1/2	Description	Initial Value	Setting Range
X Axis Stroke	Set the stroke of X axis	300mm	100 ~ 500
Y Axis Stroke	Set the stroke of Y axis	300mm	100 ~ 300
Z Axis Stroke	Set the stroke of Z axis (MAX 60mm)	60mm	10 ~ 60
R Axis Stroke	Set the stroke of R axis (+/- 160°)	+/- 180°	+/- 10 ~ +/- 360
X Axis Max Spd.	Set the maximum speed of X axis	800mm/sec	100 ~ 1000
Y Axis Max Spd.	Set the maximum speed of Y axis	800mm/sec	100 ~ 1000
Z Axis Max Spd.	Set the maximum speed of Z axis	320mm/sec	10 ~ 320
R Axis Max Spd.	Set the maximum speed of R axis	800°/sec	10 ~ 800
X Axis Accel. Time	Set the acceleration time of X axis	400mm/sec	200 ~ 1200
Y Axis Accel. Time	Set the acceleration time of Y axis	400mm/sec	200 ~ 1200
Z Axis Accel. Time	Set the acceleration time of Z axis	200mm/sec	100 ~ 1200
R Axis Accel. Time	Set the acceleration time of R axis	300mm/sec	200 ~ 1200
X Axis Decel. Time	Set the deceleration time of X axis	240mm/sec	200 ~ 1200
Y Axis Decel. Time	Set the deceleration time of Y axis	240mm/sec	200 ~ 1200
Z Axis Decel. Time	Set the deceleration time of Z axis	200mm/sec	100 ~ 1200
R Axis Decel. Time	Set the deceleration time of R axis	300mm/sec	200 ~ 1200

<Axis Control 2/2>

Parameter Setting Axis Control (2/2)

X Axis Homing Spd.	X Axis Jog High	X Axis Jog Low	R Axis On/Off
Y Axis Homing Spd.	Y Axis Jog High	Y Axis Jog Low	
Z Axis Homing Spd.	Z Axis Jog High	Z Axis Jog Low	
R Axis Homing Spd.	R Axis Jog High	R Axis Jog Low	

Soldering Setting
Axis Control(1/2)
Others

Return

Axis Control 2/2	Description	Initial Value	Setting Range
X Axis Homing Spd.	Set the X axis speed of home position returning	35mm/sec	10 ~ 50
Y Axis Homing Spd.	Set the Y axis speed of home position returning	35mm/sec	10 ~ 50
Z Axis Homing Spd.	Set the Z axis speed of home position returning	20mm/sec	10 ~ 30
R Axis Homing Spd.	Set the R axis speed of home position returning	50°/sec	10 ~ 150
X Axis Jog High	Set the JOG high moving speed of X axis	20mm/sec	20 ~ 100
Y Axis Jog High	Set the JOG high moving speed of Y axis	20mm/sec	20 ~ 100
Z Axis Jog High	Set the JOG high moving speed of Z axis	15mm/sec	15 ~ 30
R Axis Jog High	Set the JOG high moving speed of R axis	60°/sec	60 ~ 150
X Axis Jog Low	Set the JOG low moving speed of X axis	10mm/sec	5 ~ 15
Y Axis Jog Low	Set the JOG low moving speed of Y axis	10mm/sec	5 ~ 15
Z Axis Jog Low	Set the JOG low moving speed of Z axis	5mm/sec	3 ~ 10
R Axis Jog Low	Set the JOG low moving speed of R axis	50°/sec	5 ~ 50
R Axis On / Off	Set "Enable" / "Disable" of R axis	Enable	Enable/Disable

<Others>

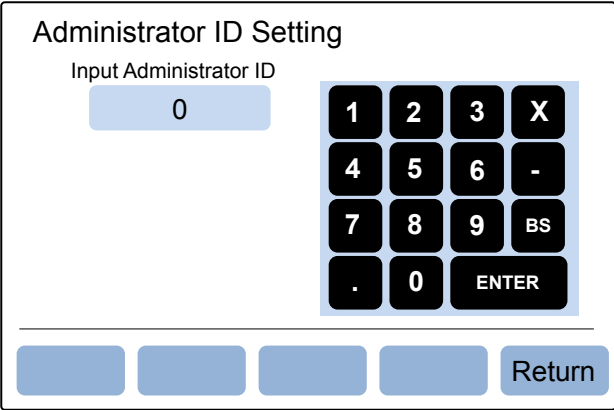
Parameter Setting Axis Over Time & Others			
Temp. Control Comm.	OP Comm.	Tool Offset Value	Tool Center
Origin	Solder Feeder Comm.	Camera Offset Value	Camera Center
Iron Sensor	Vision Sensor Comm.	V-Calibration Save	V-Error Action Set
TP Comm.	External Input		
<hr/>			
Soldering Setting	Axis Control(1/2)	Others	Return

Others	Description	Initial Value	Setting Range
Temp. Control Comm.	Set the delay time for the temperature controller communication error output.	10sec	5 ~ 30
Origin	Set the delay time for error output when returning to the home position.	30sec	20 ~ 60
Iron Sensor	Set the delay time for the iron upper/lower sensor error output.	3.0sec	1 ~ 10
TP Comm.	Set the delay time for the communication error of the teaching pendant	10sec	5 ~ 30
OP Comm.	Set the delay time for the communication error of the operation box.	10sec	5 ~ 30
Solder Feeder Comm.	Set the delay time for the communication error of the feeder.	30sec	30 ~ 60
Vision Sensor Comm.	Set the delay time for the communication error of the position correction camera.	10sec	5 ~ 30
External Input	Set the delay time for the timeout of external inputs.	0sec	0 ~ 300
Tool Offset Value	Shows the tool calibration offset value	-	-
Camera Offset Value	Shows the camera offset value	-	-
V-Calibration Value	Select save the calibration value on / off.	Off	On/Off
Tool Center	Register the tool center	0.00mm	0 ~ 200
Camera Center	Register the camera center	0.00mm	0 ~ 200

16. Admin. Mode Setting

The following functions can be set at “Admin. Mode”.

<Administrator ID Setting>



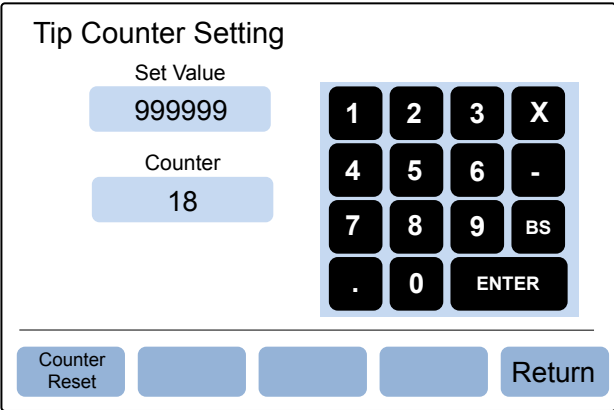
The screen displays the title "Administrator ID Setting". Below it, the label "Input Administrator ID" is followed by a text box containing the number "0". To the right is a numeric keypad with buttons for digits 1-9, 0, a decimal point, a hyphen, and an "ENTER" button. The keypad also includes "X" and "BS" buttons. At the bottom of the screen, there are four empty text boxes and a "Return" button.

Select “Administrator ID Setting”.
Administrator password can be registered.

(The initial password is 9999.)

<Tip Counter Setting>

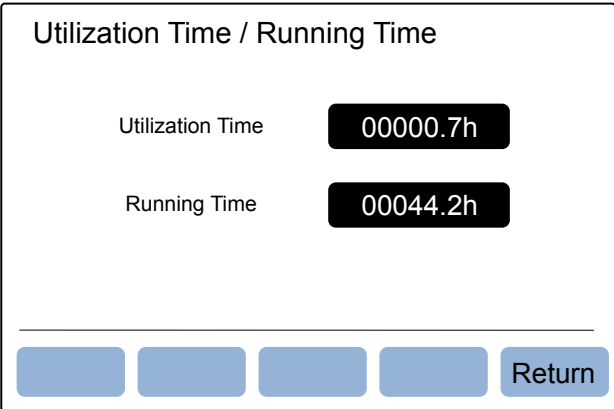
This is the useful function to exchange iron tip.
When the counter value reaches the set value, the message of iron cartridge exchange is shown.



The screen displays the title "Tip Counter Setting". It shows two input fields: "Set Value" with "999999" and "Counter" with "18". To the right is a numeric keypad with buttons for digits 1-9, 0, a decimal point, a hyphen, and an "ENTER" button. The keypad also includes "X" and "BS" buttons. At the bottom, there is a "Counter Reset" button, four empty text boxes, and a "Return" button.

Select “Tip Counter Setting”.
The maximum set value is 999999.
To reset the counter, press “Counter Reset”.

<Utilization Time / Running Time>



The screen displays the title "Utilization Time / Running Time". It shows two rows of data: "Utilization Time" with a value of "00000.7h" and "Running Time" with a value of "00044.2h". At the bottom, there are four empty text boxes and a "Return" button.

Select “Utilization Time / Running Time”.
The utilization & running time are displayed.
Utilization Time is the operation time from power on.
Running Time is the total operating time from the first time used.

“I/O Monitor” has three pages of “SYS-I/O, Free-I/O, System Monitor.

<SYS-I/O Monitor>

SYS-I/O Monitor ※Caution: Robot can move when out is turn on

Input Pin # 1 2 3 4 5 6 7 8 9 10 11 12
13 14 15 16 17 18 19 20 21 22 23

Output Pin # 24 25 26 27 28 29 30 31 32 33 34 35
36 37 38 39 40 41 42 43 44 45 46

Free-I/O System [] [] Return

<Free-I/O Monitor>

Free-I/O Monitor ※Caution: Robot can move when out is turn on

Input Pin # 1 2 3 4 5 6 7 8 9 10 11 12
13 14 15 16 17 18 19 20 21 22 23

Output Pin # 24 25 26 27 28 29 30 31 32 33 34 35
36 37 38 39 40 41 42 43 44 45 46

SYS-I/O I/O System [] [] Return

Input Pin # : Input pin lights in green.

<System Sensor Monitor>

System Sensor Monitor

- Iron Upper Sensor
- Iron Lower Sensor
- X Axis Origin Sensor
- Y Axis Origin Sensor
- Z Axis Origin Sensor
- R Axis Origin Sensor
- DC24V Power Supply
- DC48V Power Supply

Iron Down Time [] sec

Iron Up Time [] sec

SYS-I/O I/O System [] [] Return

The System Sensor Monitor controls the origin sensor of 4-axes, iron unit upper/ lower sensor, and DC power supply.

Iron Up / Down calculates the time of the iron rising and lowering for adjusting the air supply amount.

<Temp. Control Setting>

Temp. Control Setting		
Temp.	360°C	HEATER ON
Proportional Band	7.3%	AT Start
Integration Time	4sec	
Derivative Time	1sec	
Proportional Period	0.1sec	

Return

PID setting can be changed, when the iron cartridge is replaced or the new type of iron cartridge is attached.

It is possible to auto-tuning or input PID directly.
Proportional Period is the direct input only.

<Software Version>

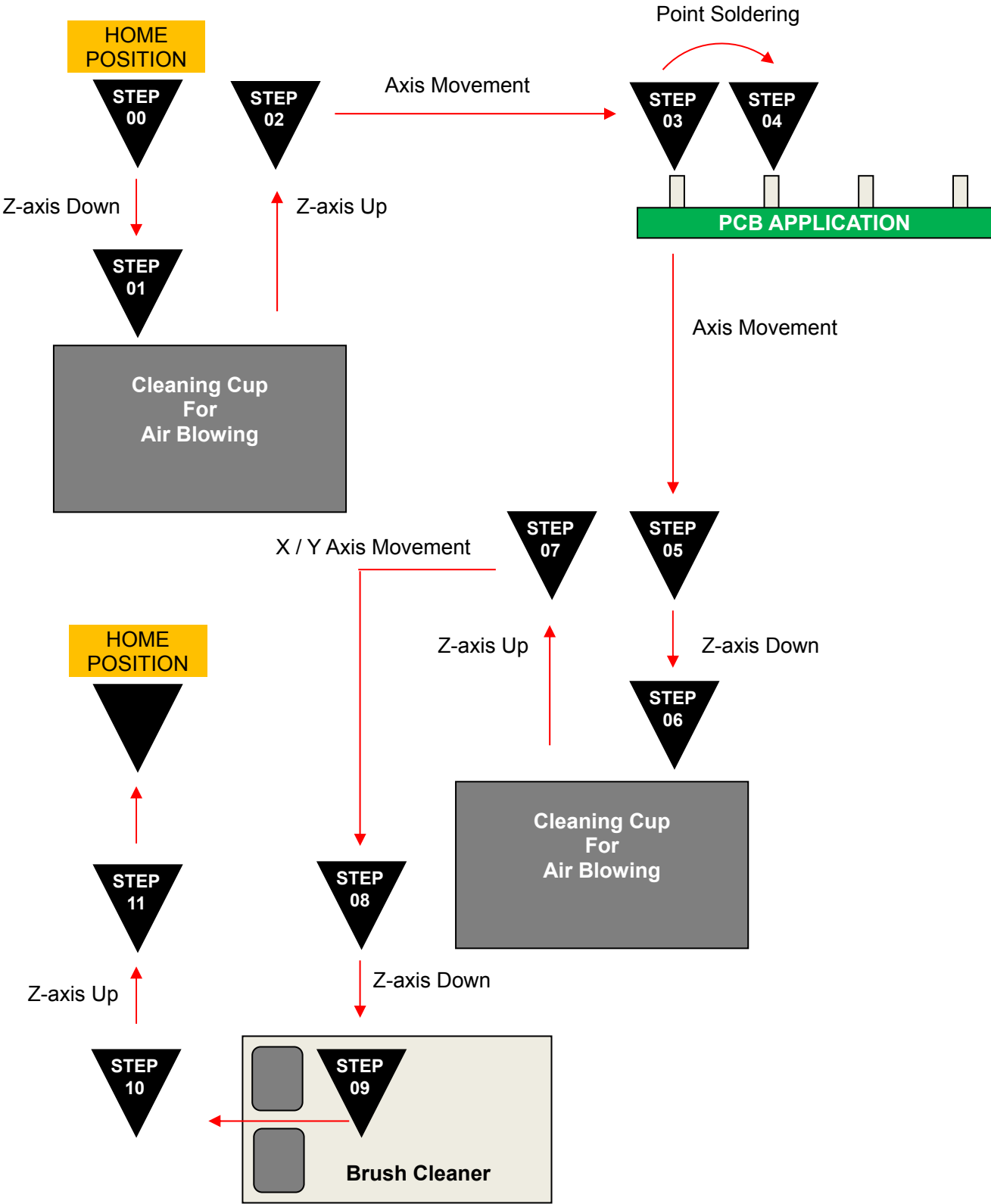
CPU Version	0.70
TP Version	0.59
OP Version	0.49
Feeder Version	0.03

Return


“Software Version” confirms the type of software being used.

17. Program Setting Example – Point Soldering

The following is the example for the program setting of the point soldering.



1. Switch the mode to Teaching Mode.
2. Set the program number.
3. Set the GO Speed.
4. Choose the JOG Speed, High or Low.

5. **HOME POSITION**


Home position

Set the home position using JOG lever.
 (The initial coordinate : 0mm for each X/Y/Z axis.)
 The home position is the waiting point at program start and finish.
Set the Point # "0", because the command is not used at the home position.

6. 

Iron Tip Cleaning

Move the iron cartridge to the cleaning point with JOG lever.
 Set the Point number. (e.g. Point # 100)
 Enter the point name. (e.g. Air Blowing)
 Set the command in the point setting screen.
 Touch "Return" for back to the previous screen (The coordinate screen).
 Touch "STEP MEMORY" on the coordinate screen to save the setting.
***Make sure to save the setting every time the point setting is done for every step.**
If it is not saved and goes to next step, the setting data is deleted.

<Point Setting Screen (Air Blowing Example)>

The purpose of "Solder Feed-" is to prevent the solder wire from melting by the heat of iron tip.
 Also the next solder amount can accurately feed by retracting the solder wire.

Make sure to set "Command End" for ending the point operation.

Teaching Mode		Point Operation #	100	Air Blowing	
1	Solder Feed +	Amount	10mm	Feed + Spd.	20mm/sec
2	Solder Feed -	Amount	5mm	Feed - Spd.	50mm/sec
3	Air Cleaning	Blow Time	0.5sec		
4	Command End				
5					
Run		Edit	↑	↓	Return

7. 

Evasion Point

Move the iron cartridge to the evasion point with JOG lever.
 Set the Point # "0", because the operation command does not execute at the evasion point.
 Touch "STEP MEMORY" on the coordinate screen to save the setting.
***Evasion point is used for evading such as obstacles between the coordinates.**
 Make sure to set the evasion point every time there is obstacles.

8.



Point Soldering

Move the iron cartridge to the “Point soldering” point with JOG lever.
Check the iron position by pressing “Iron Up/Down Button”.

Set the point number. (e.g. Point # 101)

Enter the point name. (e.g. Point Soldering 1)

Set the command in the point setting screen.

Touch “Return” for back to the previous screen (The coordinate screen).

Touch “STEP MEMORY” on the coordinate screen to save the setting.

***Make sure to save the setting every time the point setting is done for every step.**

<Point Setting Screen (Point Soldering Example) Page 1/2>

By feeding a few solder wire to the iron tip, the heat can quickly transfer to the joint area.

The purpose of “Solder Feed-“ is to prevent the solder wire from melting by the heat of iron tip.
Also the next solder amount can accurately feed by retracting the solder wire.

This is the main solder feeding.
Although the solder amount depends on the joint, the previous Solder Feed - amount needs to be considered at this command.

Teaching Mode	Point Operation #	101	Point Soldering 1	
1 Solder Feed +	Amount	10mm	Feed + Sod. 20mm/sec	
2 Solder Feed -	Amount	5mm	Feed - Sod. 50mm/sec	
3 Iron Down	Pre Heat	0.3sec		
4 Solder Feed +	Amount	8mm	Feed + Sod. 20mm/sec	
5 Solder Feed -	Amount	5mm	Feed - Sod. 50mm/sec	
Run	Edit	↑	↓	Return

<Point Setting Screen (Point Soldering Example) Page 2/2>

This heating time allows solder for proper wetting flow.

At this waiting time, the iron tip is up position.

Make sure to set “Command End” for ending the point operation.

Teaching Mode	Point Operation #	101	Point Soldering 1	
6 Heating Time	Heat Time	0.5sec		
7 Iron Up	Wait Time	0sec		
8 Command End				
9				
10				
Run	Edit	↑	↓	Return

9.



Point Soldering

Move the iron cartridge to the “Point soldering” point with JOG lever.
Check the iron position by pressing “Iron Up/Down Button”.

Set the point number. (e.g. Point # 102)

Enter the point name. (e.g. Point Soldering 2)

Set the command in the point setting screen.

Touch “Return” for back to the previous screen (The coordinate screen).

Touch “STEP MEMORY” on the coordinate screen to save the setting.





***Make sure to save the setting every time the point setting is done for every step.**

<Point Setting Screen Example Page 1/2>

Teaching Mode		Point Operation #	102	Point Soldering 2	
1	Solder Feed +	Amount	10mm	Feed + Spd.	20mm/sec
2	Solder Feed -	Amount	3mm	Feed - Spd.	50mm/sec
3	Iron Down	Pre Heat	0.3sec		
4	Solder Feed +	Amount	6mm	Feed + Spd.	20mm/sec
5	Solder Feed -	Amount	5mm	Feed - Spd.	50mm/sec
Run		Edit	↑	↓	Return

<Point Setting Screen Example Page 2/2>

Teaching Mode		Point Operation #	102	Point Soldering 2	
6	Heating Time	Heat Time	0.5sec		
7	Iron Up	Wait Time	0sec		
8	Command End				
9					
10					
Run		Edit	↑	↓	Return

10.  Evasion Point (Waiting Point)
Set the evasion point before air blowing point.
Move the iron cartridge to the evasion point with JOG lever.
Set the Point # "0", because the operation command does not execute at the evasion point.
Touch "STEP MEMORY" on the coordinate screen to save the setting.
11.  Iron Tip Cleaning
This is the same setting as STEP02.
Move the iron cartridge to the cleaning point with JOG lever.
Set the same Point number as STEP02. (e.g. Point # 100)
Touch "STEP MEMORY" on the coordinate screen to save the setting.
***Make sure to save the setting every time the point setting is done for every step.**
If it is not saved and goes to next step, the setting data is deleted.
12.  Evasion Point
Move the iron cartridge to the evasion point with JOG lever.
Set the Point # "0", because the operation command does not execute at the evasion point.
Touch "STEP MEMORY" on the coordinate screen to save the setting.
13.  Evasion Point
Move the iron cartridge to the evasion point with JOG lever.
Set the Point # "0", because the operation command does not execute at the evasion point.
Touch "STEP MEMORY" on the coordinate screen to save the setting.

14.



Brush Cleaning Start Point

Move the iron cartridge to the brush cleaning start point with JOG lever/.
Set the Point number. (e.g. Point # 110)
Enter the point name. (e.g. Brush Cleaning Start)
Set the command in the point setting screen.
Touch "Return" for back to the previous screen (The coordinate screen).
Touch "STEP MEMORY" on the coordinate screen to save the setting.

<Point Setting Screen (Brush Cleaning Start Example)>

Teaching Mode	Point Operation #	110	Brush Cleaning Start
1	Solder Feed -	Amount 2mm	Feed + Spd. 50mm/sec
2	Brush Clean	Rotation Time 1 sec	
3	Sync. Operation		
4	Start of Brush		
5	Command End		
<div style="display: flex; justify-content: space-between; align-items: center;"> Run Edit ↑ ↓ Return </div>			

15.




Brush Cleaning End Point

Move the iron cartridge to the brush cleaning end point with JOG lever.
This end point needs to be set as the iron cartridge slides between the brushes from the brush start point.
Set the Point number. (e.g. Point # 111)
Enter the point name. (e.g. Brush Cleaning End)
Set the command in the point setting screen.
Touch "Return" for back to the previous screen (The coordinate screen).
Touch "STEP MEMORY" on the coordinate screen to save the setting.

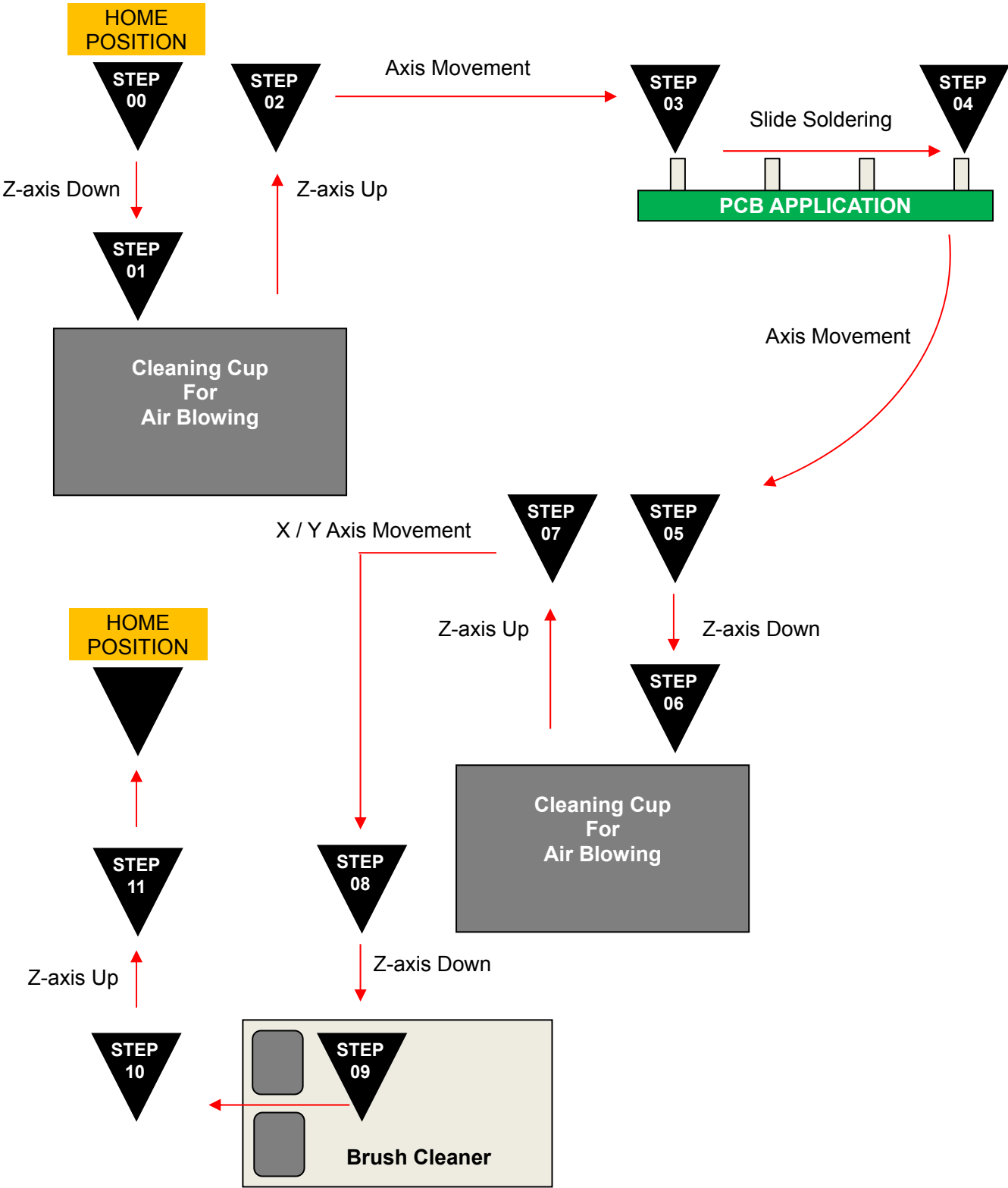
<Point Setting Screen (Brush Cleaning End Example)>

Teaching Mode	Point Operation #	111	Brush Cleaning End
1	Solder Feed +	Amount 2.5mm	Feed + Spd. 50mm/sec
2	End of Brush	Rotation Time 1 sec	
3	Command End		
4			
5			
<div style="display: flex; justify-content: space-between; align-items: center;"> Run Edit ↑ ↓ Return </div>			

16.  Evasion Point
Move the iron cartridge to the evasion point with JOG lever.
Set the Point # "0", because the operation command does not execute at the evasion point.
Touch "STEP MEMORY" on the coordinate screen to save the setting.
17. Save
Touch the "SAVE" on the coordinate screen in order to save the teaching program.
This save is different from the point setting data saving by "STEP MEMORY".
- *If the teaching program is not saved, the program does not run in the Auto Mode.
*If turning off the power before saving, the teaching data including point setting data is deleted.
18. Program running
Switch the mode to "Auto Mode".
Check the operating temperature. (If the temperature is unset, set in the "Admin. Mode".)
Touch "HEATER ON".
After the present temperature reaches to the setting temperature,
touch "START" for running.

18. Program Setting Example – Slide Soldering

The following is the example for the program setting of the slide soldering.



1. Until STEP 02, the setting is same as the Point Setting Example of Point Soldering.



Slide Soldering Start

Move the iron cartridge to the “Slide soldering start” point with JOG lever. Check the iron position by pressing “Iron Up/Down Button”.

Set the point number. (e.g. Point # 103)

Enter the point name. (e.g. Slide Soldering Start)

Set the command in the point setting screen.

Touch “Return” for back to the previous screen (The coordinate screen).

Touch “STEP MEMORY” on the coordinate screen to save the setting.

***Make sure to save the setting every time the point setting is done for every step.**

<Point Setting Screen (Slide Soldering Start Example) Page 1/2>

Teaching Mode	Point Operation #	103	Slide Soldering Start
1	Solder Feed +	Amount 12mm	Feed + Spd. 20mm/sec
2	Solder Feed -	Amount 3mm	Feed - Spd. 50mm/sec
3	Iron Down	Pre Heat 1sec	
4	Start of Line	Delay Control 0sec	
5	Sync. Operation		
<div style="display: flex; justify-content: space-around;"> Run Edit ↑ ↓ Return </div>			

<Sync. Operation>

The commands before and after the Sync. Operation Command operates at the same time.

In this case, 4. Start of Line and 6. Line Solder Feed operates simultaneously.

<Delay Control >

Minus Time value:

It is solder pooling time.

Firstly the solder of the 6. Line Solder Feed is fed.

Then the axes starts moving after the “Minus time”.

.....>

Line Solder Feed	
- Time	Start of Line (Axis move)

Plus Time value:

Firstly the axes starts moving.

After the “Plus time”, the solder of 6. Line Solder Feed starts being fed.

.....>

+ Time	Line Solder Feed
Start of Line (Axis move)	

<Point Setting Screen (Slide Soldering Example) Page 2/2>

Teaching Mode	Point Operation #	103	Slide Soldering Start
6	Line Solder Feed	Amount 65mm	Feed + Spd. 7mm/sec
7	Solder Feed -	Amount 3mm	Feed - Spd. 50mm/sec
8	Heating Time	Heat 0.5sec	
9	Iron Up	Wait Time 0sec	
10	Command End		
<div style="display: flex; justify-content: space-around;"> Run Edit ↑ ↓ Return </div>			

*Next page for more details.

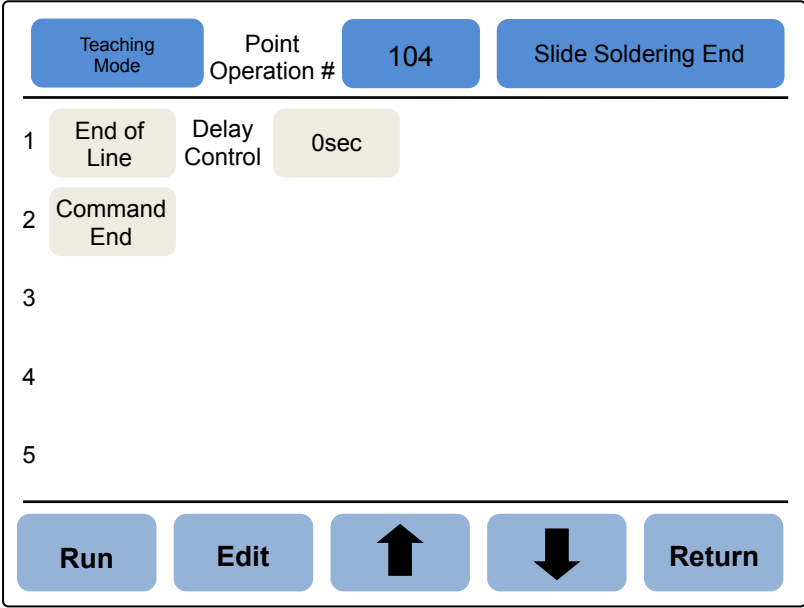
3.



Slide Soldering End

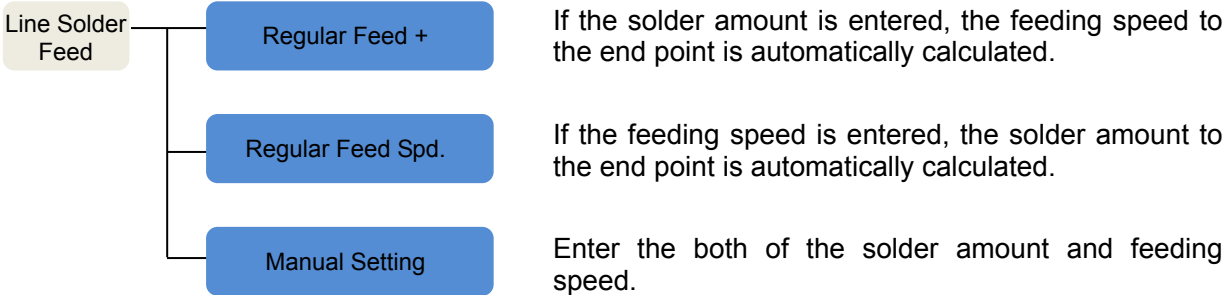
Move the iron cartridge to the “Slide soldering end” point with JOG lever.
 Check the iron position by pressing “Iron Up/Down Button”.
 Set the point number. (e.g. Point # 104)
 Enter the point name. (e.g. Slide Soldering End)
 Set the command in the point setting screen.
 Touch “Return” for back to the previous screen (The coordinate screen).
 Touch “STEP MEMORY” on the coordinate screen to save the setting.

<Point Setting Screen (Slide Soldering End Example) >



4. From STEP 05, the program setting is same as the point soldering programing.

*Line Solder Feed has three types of mode.



19. Input / Output

19.1 I/O List

SYS-I/O List			
	Pin#	Signal Name	Function
INPUT	1	Prog Call	Calls the selected program number (Pin No.2 ~ 10).
	2	Prog Sel 1	Program number selection (0-511)
	3	Prog Sel 2	
	4	Prog Sel 4	
	5	Prog Sel 8	
	6	Prog Sel 16	
	7	Prog Sel 32	
	8	Prog Sel 64	
	9	Prog Sel 128	
	10	Prog Sel 256	
	11	HOME		Moves to the home position with turning on the heater.
	12	START	Starts automatic operation. Restarts the operation during partial stop.
	13	P-Stop	Pauses automatic operation. Although the axis movement stops immediately, the point operation stops after completion.
	14	Err Reset	All the error can be removed. (Except for Iron Shot Counter Reset)
	15	Tip Count Reset	Resets the Iron Shot Counter value.
	16	SysIn1	Used for point operation. Signal name: SYSIN1
	17	SysIn2	Used for point operation. Signal name: SYSIN2
	18	SysIn3	Used for point operation. Signal name: SYSIN3
	19	SysIn4	Used for point operation. Signal name: SYSIN4
	20	SysIn5	Used for point operation. Signal name: SYSIN5
	21	SysIn6	Used for point operation. Signal name: SYSIN6
	22	SysIn7	Used for point operation. Signal name: SYSIN7
	23	SysIn8	Used for point operation. Signal name: SYSIN8
OUTPUT	26	Prog Call End	Outputs when the Program Call is completed after the Program Call signal is inputted.
	27	Ready	Turns on, when automatic operation is ready to operate.
	28	Running	Turns on during automatic operation.
	29	End	Turns on in 200mm/sec after automatic operation.
	30	X_Pos Err	X axis position detection error. Turns on, when X axis moves out of the tolerance.
	31	Y_Pos Err	Y axis position detection error. Turns on, when Y axis moves out of the tolerance.
	32	Z_Pos Err	Z axis position detection error. Turns on, when Z axis moves out of the tolerance.
	33	R_Pos Err	R axis position detection error. Turns on, when R axis moves out of the tolerance.
	34	Prog Data Err	Turns on, when the unprogrammed number is selected and started. Turns on, when the coordinates in the program exceeds the soft limit.
	35	Input Over Time	Turns on, when its input signal is not entered after the program of input signal waiting is executed.
	36	EMR Stopping	Turns on, during emergency stop.
	37	Com. Err	Turns on, when the communication error of the temperature controller/ the feeder board/ OP/ TP/ the option COM port occurs.
	38	Solder Shortage	Turns on, when the solder wire is shortage.
	39	Solder Clogged	Turns on, when the solder clogged switch turns on three times during soldering execution.
	40	Heater Err	Turns on, when the iron temperature exceeds the tolerance range.
	41	Iron Unit Upper Sensor Err	Turns on, when the upper/ lower sensor does not turn on at the time it is supposed to turn on. (Set the ON waiting time in the system parameter)
	42	Iron Unit Lower Sensor Err	
	43	Tip Count Alm	Outputs, when the iron shot counter reaches the set count.
	44	N2 Flow Alm	Turns on, nitrogen flow exceeds the tolerance.
	45	Air Press Alm	Turns on, air pressure exceeds the tolerance.
	46	SRC CW	Rotates clockwise the sponges of SRC.
	47	SRC CCW	Rotates counterclockwise the sponges of SRC.
	48	BRC Rot.	Used to turn on/ off BRC. SSR contact for high current (MAX 2A)
	Others	24	COM+	+24V power supply (Internal and external power can be switched by the switch on the back of the robot.)
49		COM	0VCOM (Internal and external power can be switched by the switch on the back of the robot.)
25		EMERGENCY	No voltage B (break) contact
50			

FREE-I/O List			
	Pin#	Signal Name	Function
INPUT	1	FreeIn1	Used for point operation. Signal name: FREEIN1 (When using position calibration, input X/Y Sensor.)
	2	FreeIn2	Used for point operation. Signal name: FREEIN2 (When using position calibration, input Z Sensor.)
	3	FreeIn3	Used for point operation. Signal name: FREEIN3
	4	FreeIn4	Used for point operation. Signal name: FREEIN4
	5	FreeIn5	Used for point operation. Signal name: FREEIN5
	6	FreeIn6	Used for point operation. Signal name: FREEIN6
	7	FreeIn7	Used for point operation. Signal name: FREEIN7
	8	FreeIn8	Used for point operation. Signal name: FREEIN8
	9	FreeIn9	Used for point operation. Signal name: FREEIN9
	10	FreeIn10	Used for point operation. Signal name: FREEIN10
	11	FreeIn11	Used for point operation. Signal name: FREEIN11
	12	FreeIn12	Used for point operation. Signal name: FREEIN12
	13	FreeIn13	Used for point operation. Signal name: FREEIN13
	14	FreeIn14	Used for point operation. Signal name: FREEIN14
	15	FreeIn15	Used for point operation. Signal name: FREEIN15
	16	FreeIn16	Used for point operation. Signal name: FREEIN16
OUTPUT	17	Error	Turns on for all the errors output.
	18		
	20	FreeOut1	Used for point operation. Signal name: FREEOUT1
	21	FreeOut2	Used for point operation. Signal name: FREEOUT2
	22	FreeOut3	Used for point operation. Signal name: FREEOUT3
	23	FreeOut4	Used for point operation. Signal name: FREEOUT4
	24	FreeOut5	Used for point operation. Signal name: FREEOUT5
	25	FreeOut6	Used for point operation. Signal name: FREEOUT6
	26	FreeOut7	Used for point operation. Signal name: FREEOUT7
	27	FreeOut8	Used for point operation. Signal name: FREEOUT8
	28	FreeOut9	Used for point operation. Signal name: FREEOUT9
	29	FreeOut10	Used for point operation. Signal name: FREEOUT10
	30	FreeOut11	Used for point operation. Signal name: FREEOUT11
	31	FreeOut12	Used for point operation. Signal name: FREEOUT12
32	FreeOut13	Used for point operation. Signal name: FREEOUT13	
33	FreeOut14	Used for point operation. Signal name: FREEOUT14 SSR contact for high current (The total current is Max 2A using pin#33~35 at the same time.)	
34	FreeOut15	Used for point operation. Signal name: FREEOUT15 SSR contact for high current (The total current is Max 2A using pin#33~35 at the same time.)	
35	FreeOut16	Used for point operation. Signal name: FREEOUT16 SSR contact for high current (The total current is Max 2A using pin#33~35 at the same time.)	
Others	19	COM+	+24V power supply (Internal and external power can be switched by the switch on the back of the robot.)
	37	COM-	0VCOM (Internal and external power can be switched by the switch on the back of the robot.)

*Internal / External power

By the slide switch on the back of the robot, it can be switched between Internal and External power.



Warning

Factory setting: Internal power

Make sure to switch the Internal/External power properly.

The machine will be broken, if connecting the External power with the slide switch is set in the Internal power.

19.2 Pin Assignment

SYS-I/O (Robot Side Connector)

17	16	15	14	.....	4	3	2	1
33	32	31	30	.....	21	20	19	18
50	49	48	47	.....	37	36	35	34

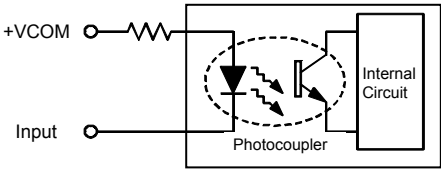
FREE-I/O (Robot Side Connector)

19	18	17	16	.....	4	3	2	1
37	36	35	34	.....	23	22	21	20

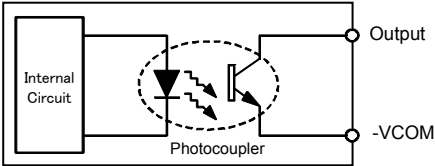
19.3 Internal Circuit Diagram (Schematic Diagram)

SINK (NPN) Type

Input



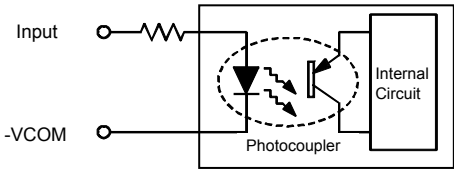
Output



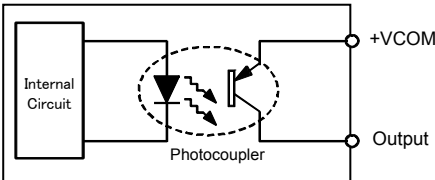
Use the machine in Voltage DC24V and Current 100mA or less.

SOURCE (PNP) Type

Input



Output

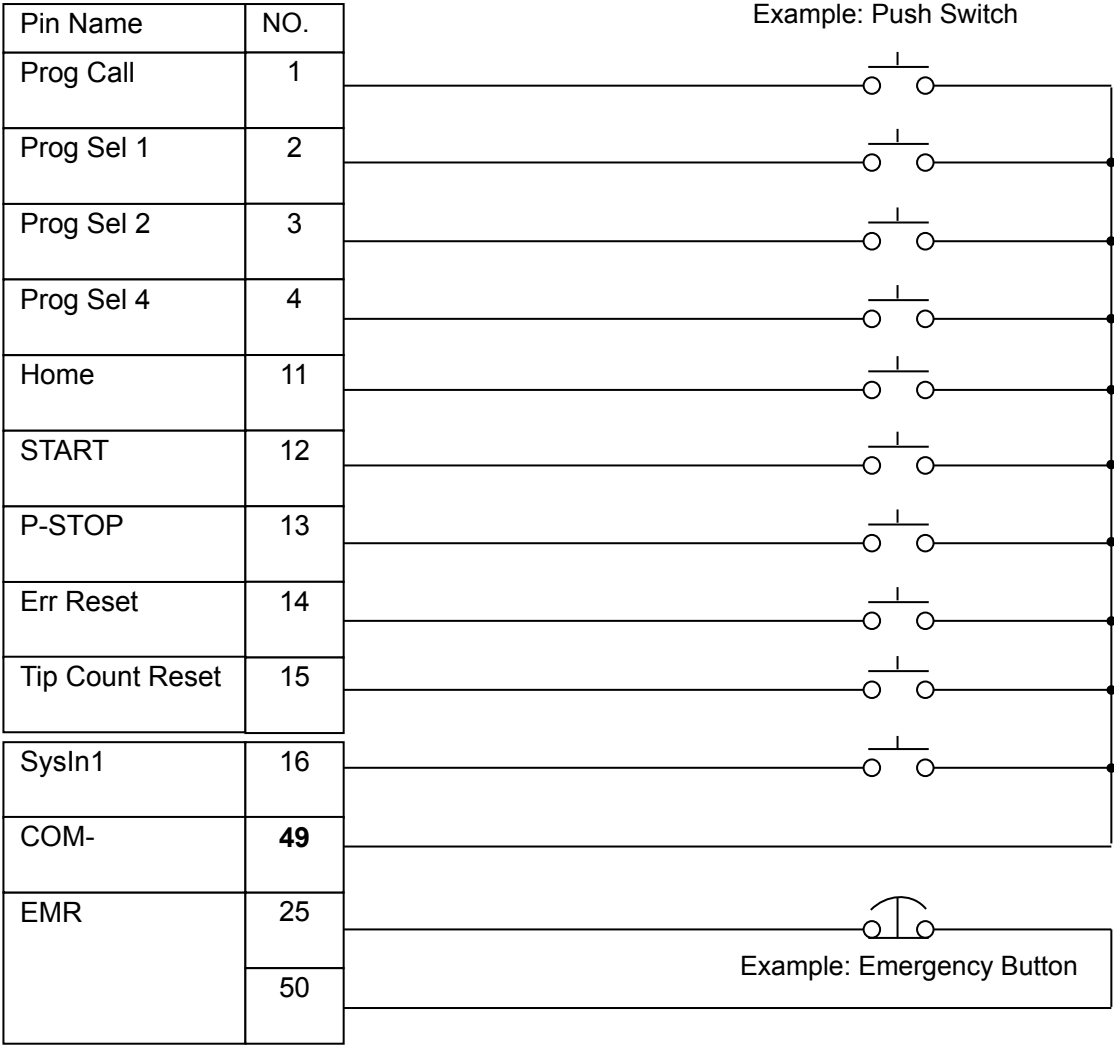


Use the machine in Voltage DC24V and Current 100mA or less.

19.3 I/O Wiring Examples

System Input Wiring (Sink NPN Type)

The example of connecting a push switch using the Internal power

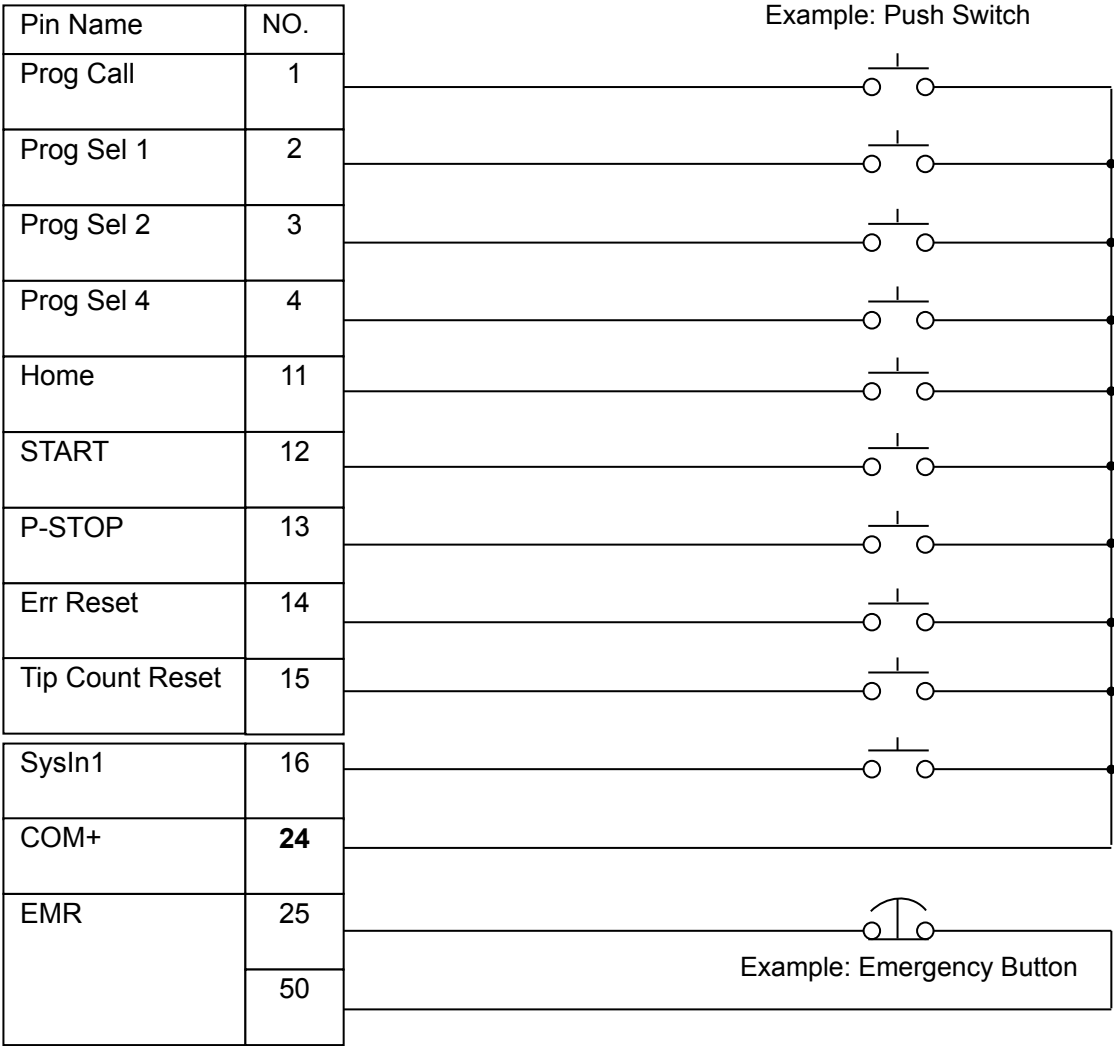


Note:

1. For using the internal power, set the slide switch on the back to the right side (INNER).
2. External input should be no voltage "A" contact or an open collector.
3. EMERGENCY has to be no voltage contact.
4. When no emergency stop function is required, short-circuit the 25 and 50 pins.

System Input Wiring (Source PNP Type)

The example of connecting a push switch using the Internal power

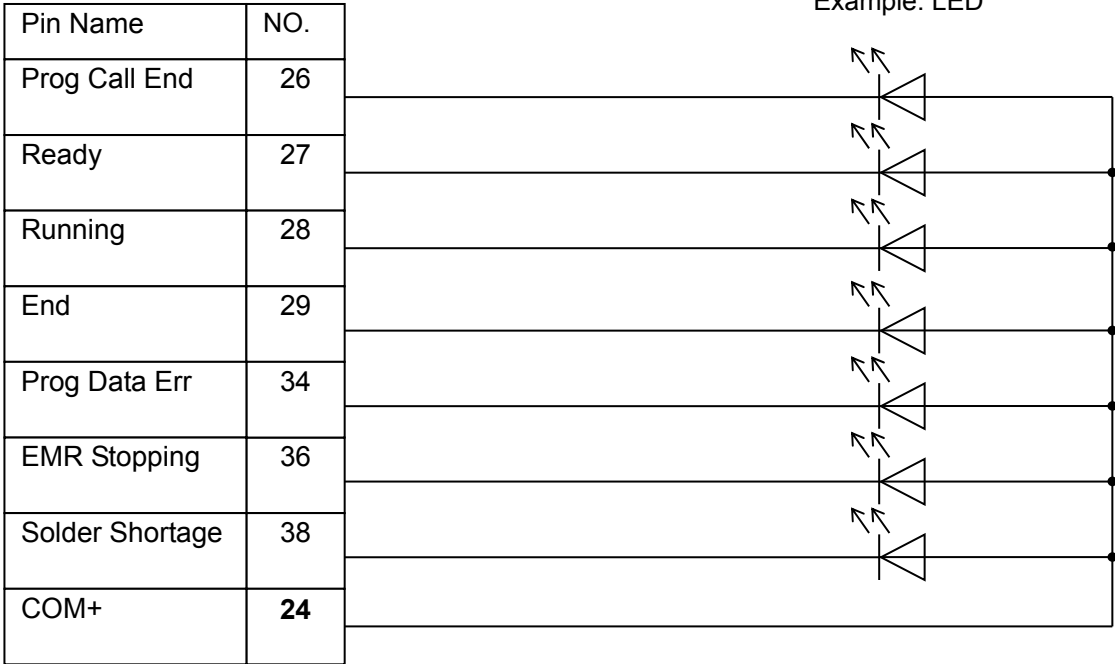


Note:

1. For using the internal power, set the slide switch on the back to the right side (INNER).
2. External input should be no voltage "A" contact or an open collector.
3. EMERGENCY has to be no voltage contact.
4. When no emergency stop function is required, short-circuit the 25 and 50 pins.

System Output Wiring (Sink NPN Type)

The example of connecting LED using the Internal power

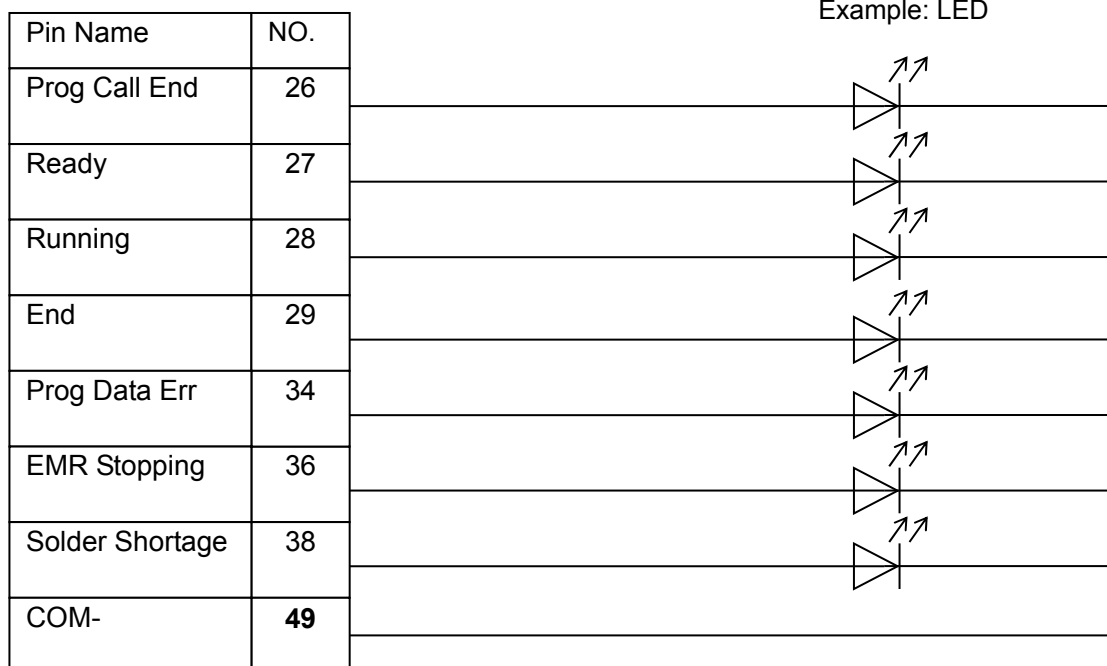


Note:

- 1. For using the internal power, set the slide switch on the back to the right side (INNER).
- 2. In order to avoid the output photo-coupler damage, please use a surge killer built-in parts or add a diode as per the above diagram when the induction load such as relay coil etc. were connected to the output.
- 3. Note that the output maximum is 0.1A each.

System Output Wiring (Source PNP Type)

The example of connecting LED using the Internal power

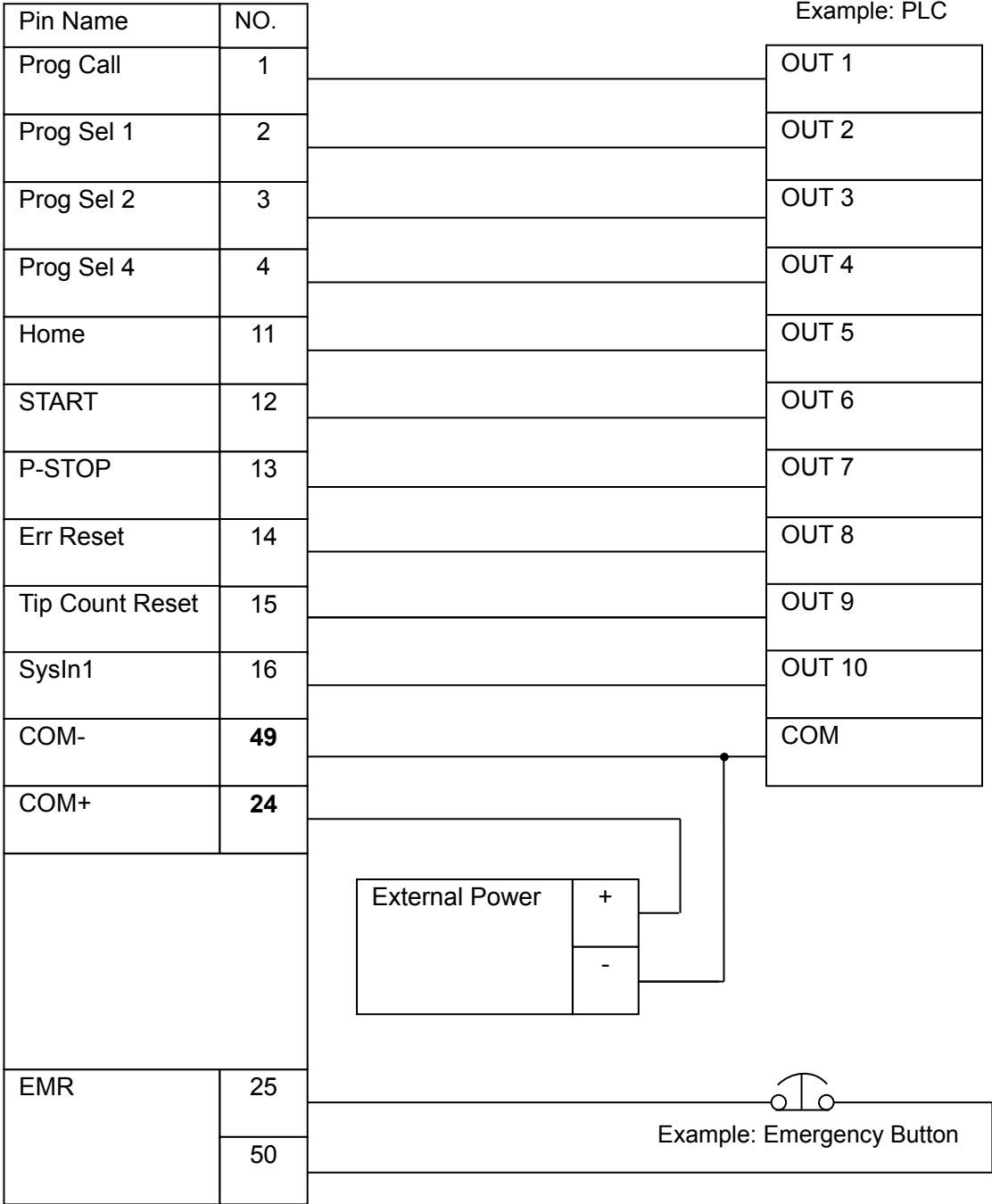


Note:

1. For using the internal power, set the slide switch on the back to the right side (INNER).
2. In order to avoid the output photo-coupler damage, please use a surge killer built-in parts or add a diode as per the above diagram when the induction load such as relay coil etc. were connected to the output.
3. Note that the output maximum is 0.1A each.

System Input Wiring (Sink NPN Type)

The example of connecting PLC using the External power



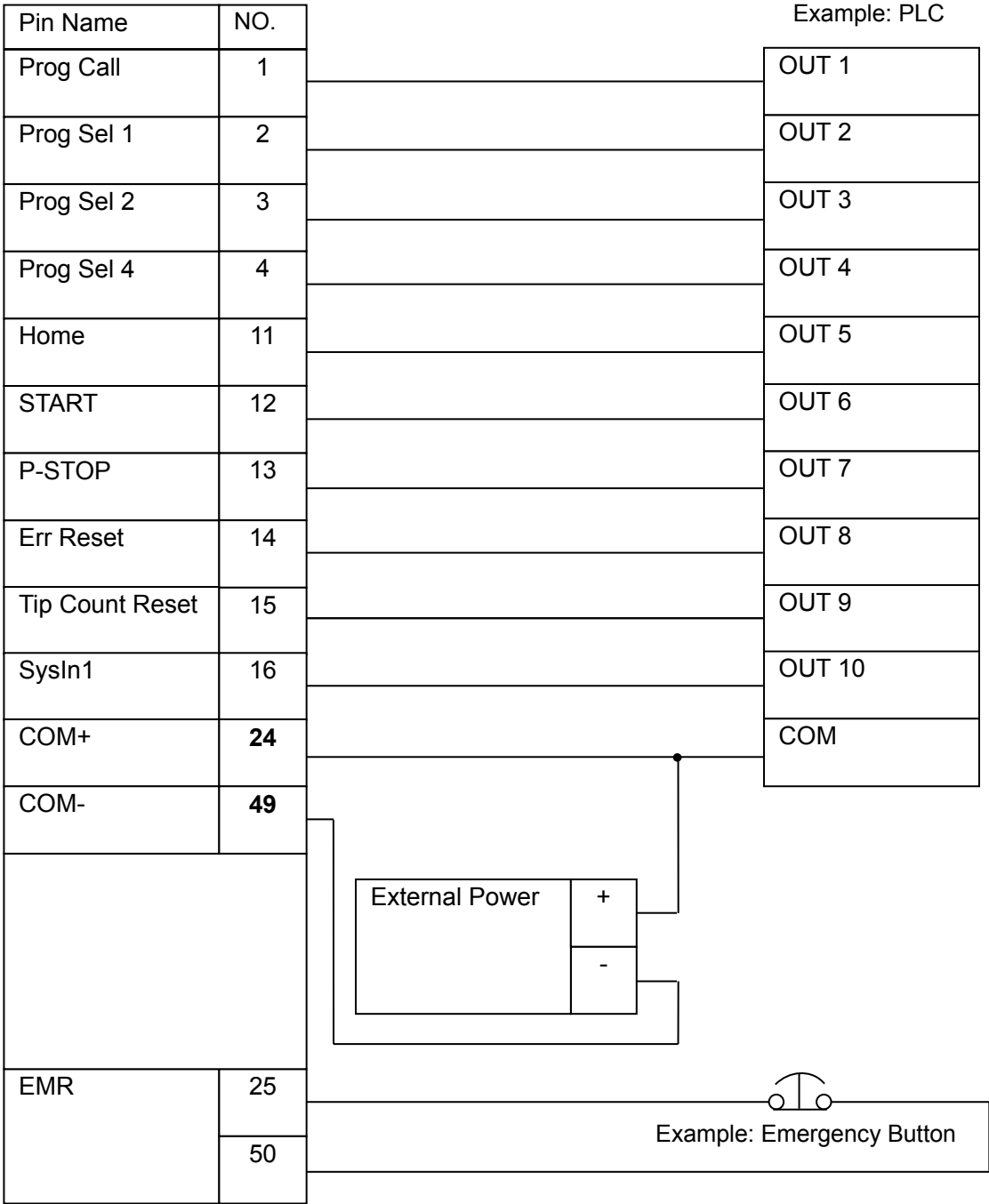
Note:

1. For using the external power, set the slide switch on the back to the left side (EXT).
2. External input should be no voltage “A” contact or an open collector.
3. EMERGENCY has to be no voltage contact.
4. When no emergency stop function is required, short-circuit the 25 and 50 pins.

 **Caution:** Make sure the slide switch is turned to the left side (EXT).

System Input Wiring (Source PNP Type)

The example of connecting PLC using the External power



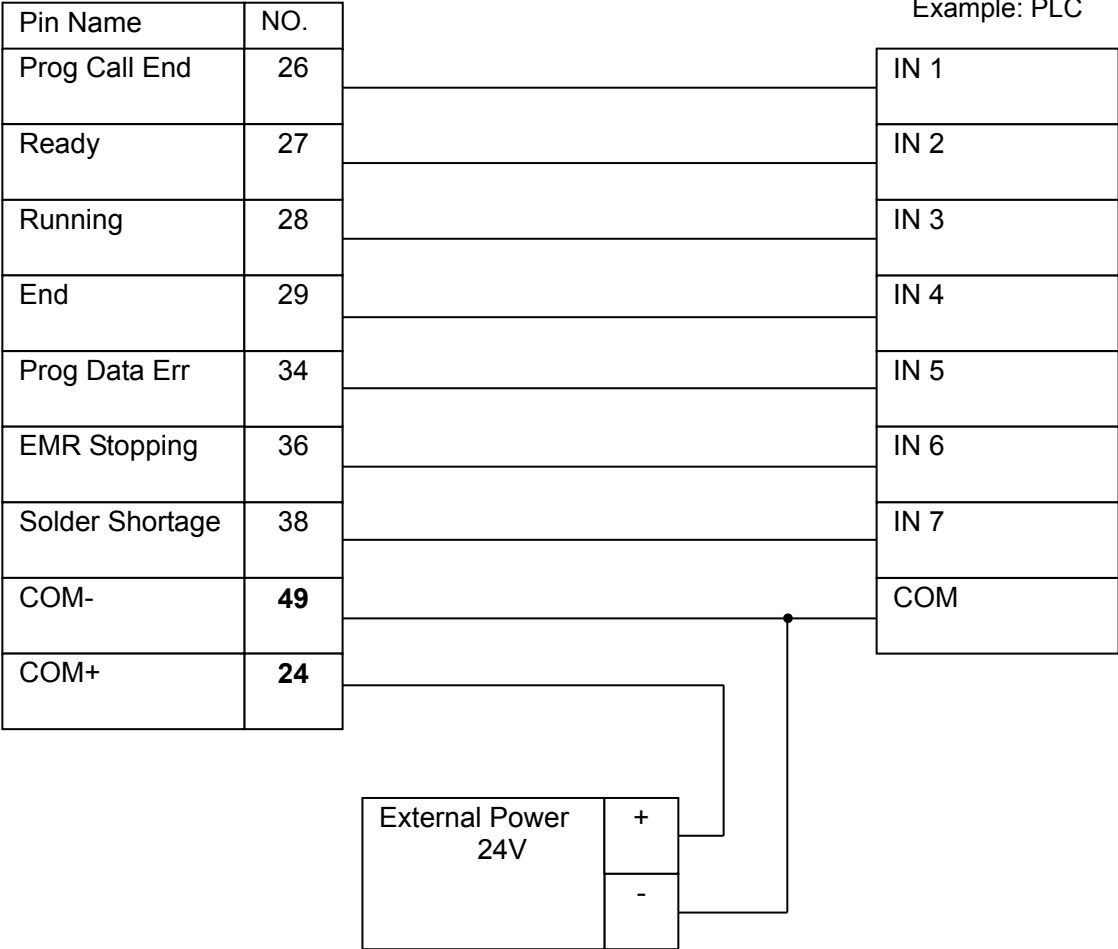
Note:

1. For using the external power, set the slide switch on the back to the left side (EXT).
2. External input should be no voltage “A” contact or an open collector.
3. EMERGENCY has to be no voltage contact.
4. When no emergency stop function is required, short-circuit the 25 and 50 pins.

 **Caution:** Make sure the slide switch is turned to the left side (EXT).

System Output Wiring (Sink NPN Type)

The example of connecting PLC using the External power



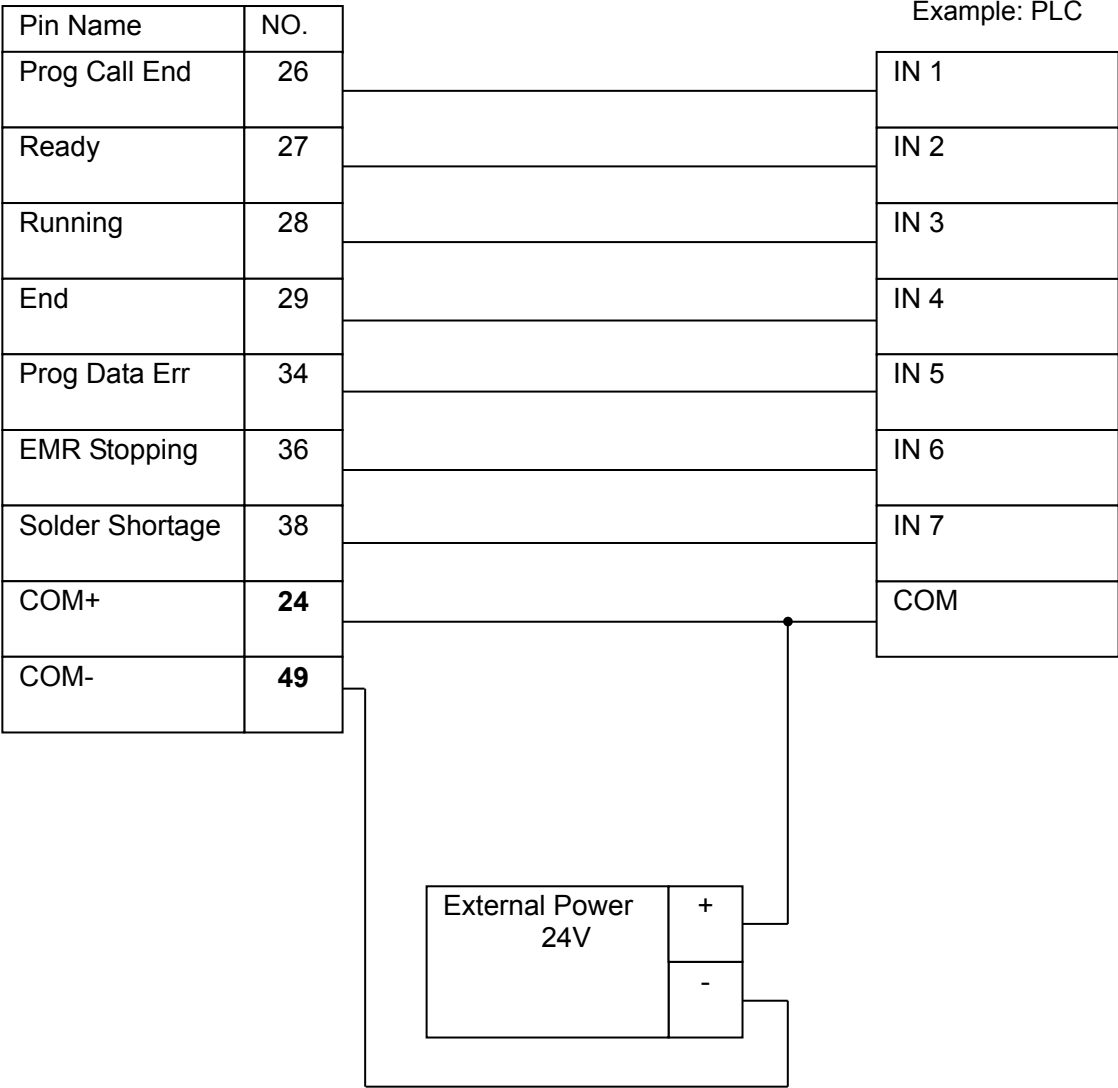
Note:

- 1. For using the external power, set the slide switch on the back to the left side (EXT).
- 2. Note that the output maximum is 0.1A each.

 **Caution:** Make sure the slide switch is turned to left side (EXT).

System Output Wiring (Source PNP Type)

The example of connecting PLC using the External power

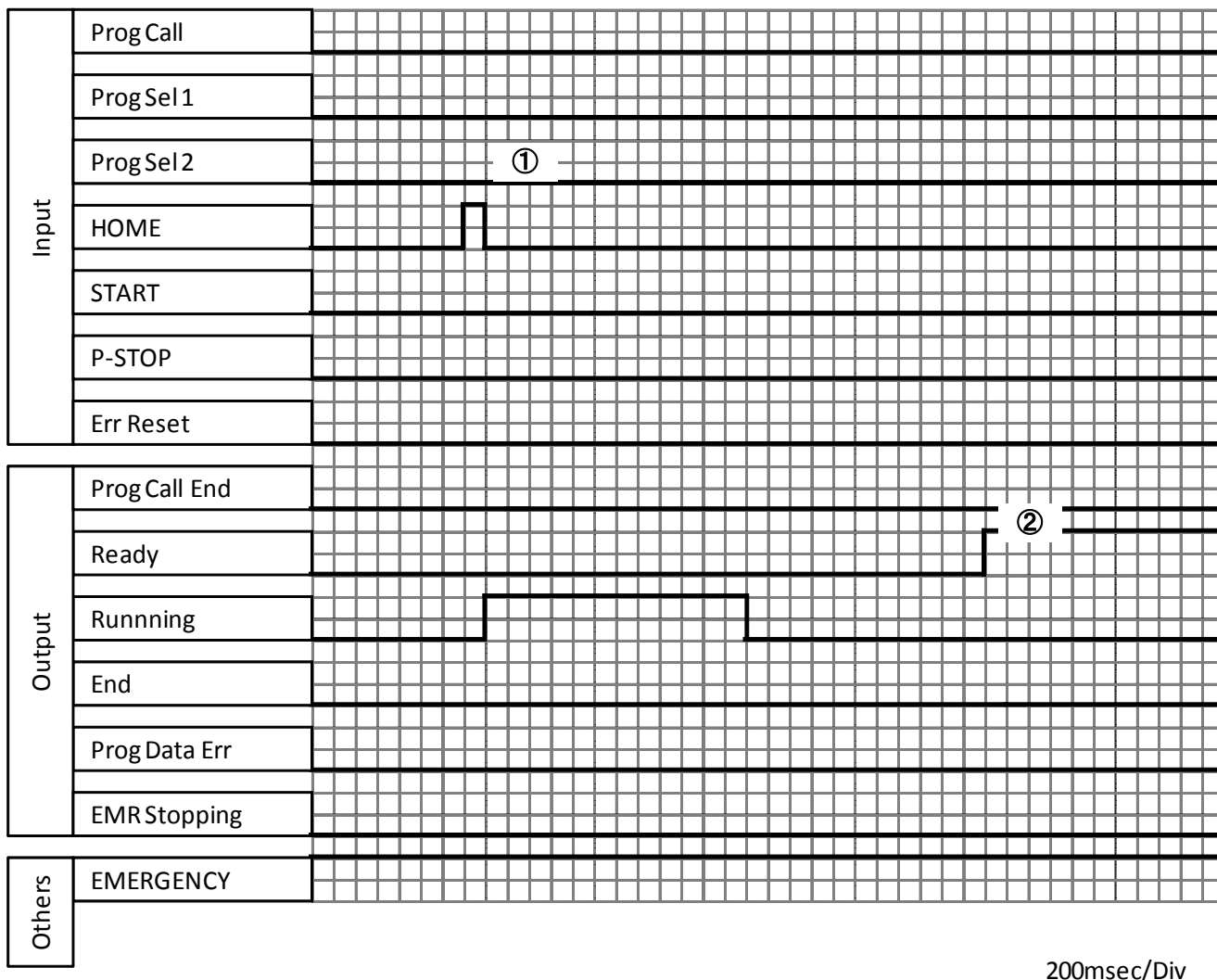


- Note:
1. For using the external power, set the slide switch on the back to the left side (EXT).
 2. Note that the output maximum is 0.1A each.

Caution: Make sure the slide switch is turned to left side (EXT).

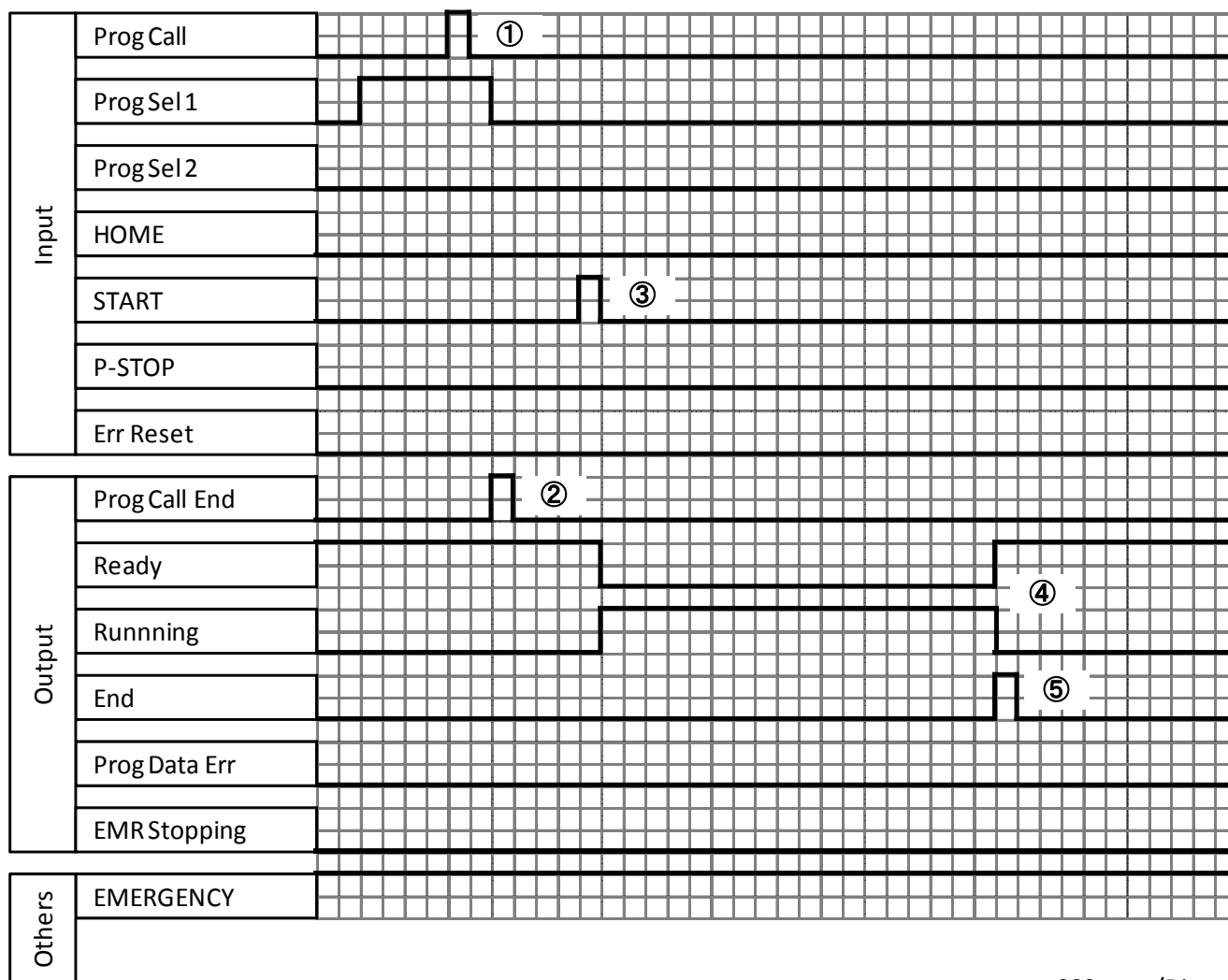
19.4 Timing Chart

Initializing (Returning to the Home Position)



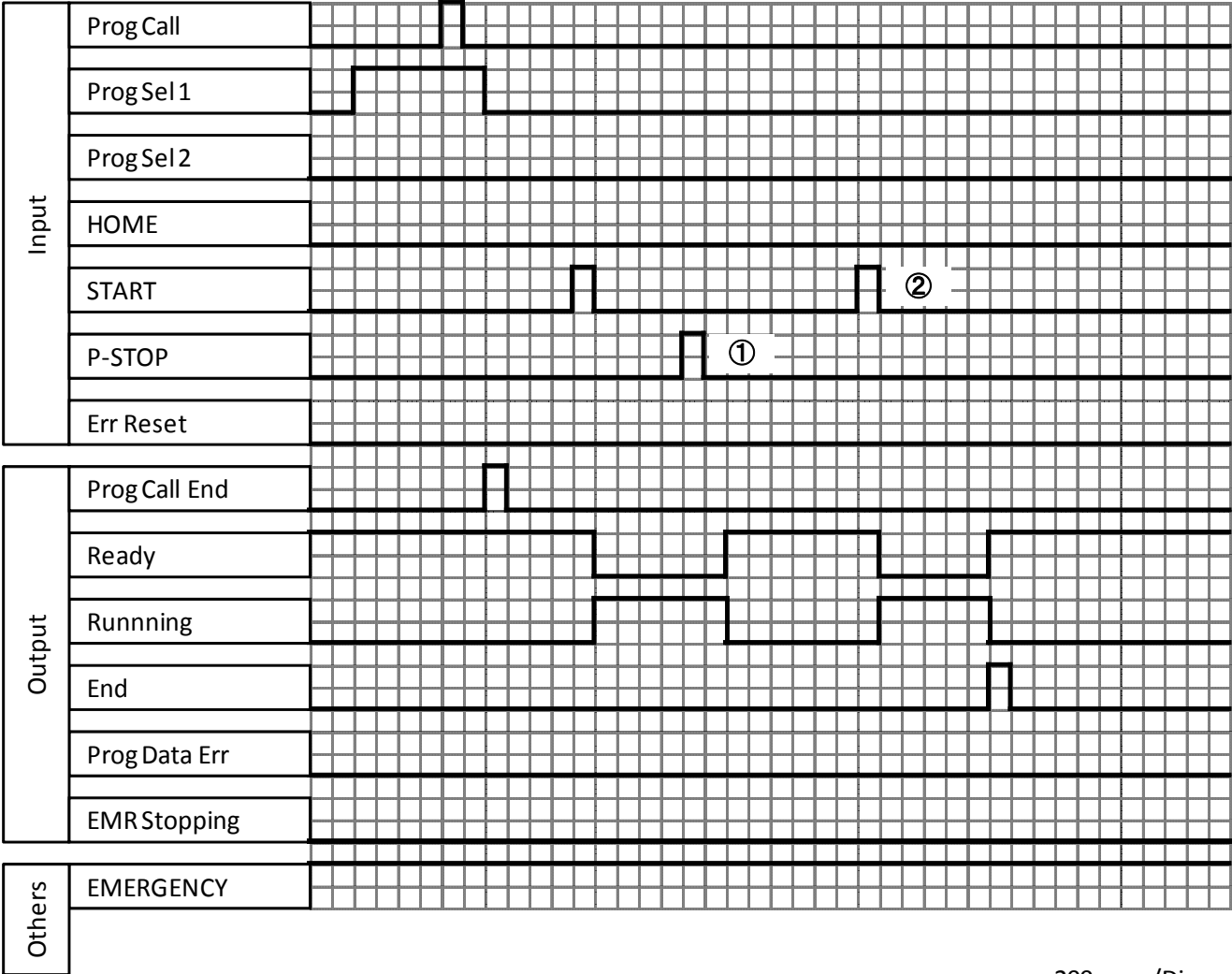
1. All the signals are OFF immediately after the robot power is turned ON. When inputting the HOME signal (200ms), the robot starts returning to Home position. During returning to Home position, Running signal turns ON. Firstly, Z axis starts returning to Home position. After the Z axis reaches to the Home position, X, Y and θ axes starts returning to Home position.
2. The temperature of the heater rises with home position returning. Ready signal turns ON, after each axis returns to the Home position and the temperature of the iron tip reaches to the setting range.

Program Call and Normal Operation



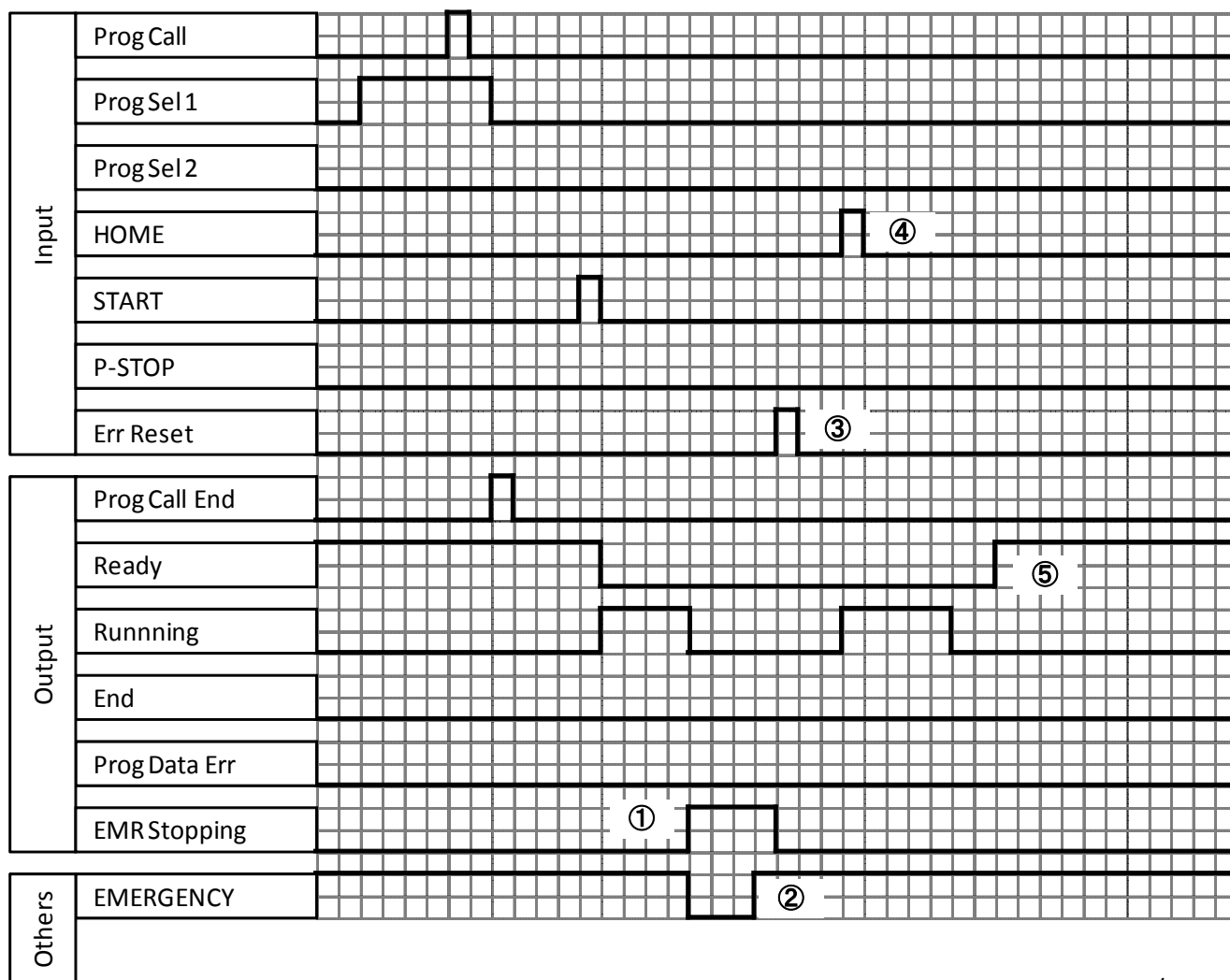
1. Select the program number to be desired to operate by inputting Prog Sel signal (Binary number). Then input Prog Call signal (200ms).
2. If there is no error, Prog Call End signal turns ON (200ms). Turn ON Prog Sel signal and Prog Call signal before START signal input. Turn OFF Prog Sel signal and Prog Call signal at the timing Prog Call End signal turns ON.
3. When inputting START signal (200ms), Ready signal turns OFF, Running signal turns ON, and the automatic operation starts by the program number set in the Prog Sel.
4. When the automatic operation normally ends, Ready signal turns ON and Running signal turns OFF.
5. END signal turns ON (200ms) at the same time that the automatic operation ends.

P-STOP



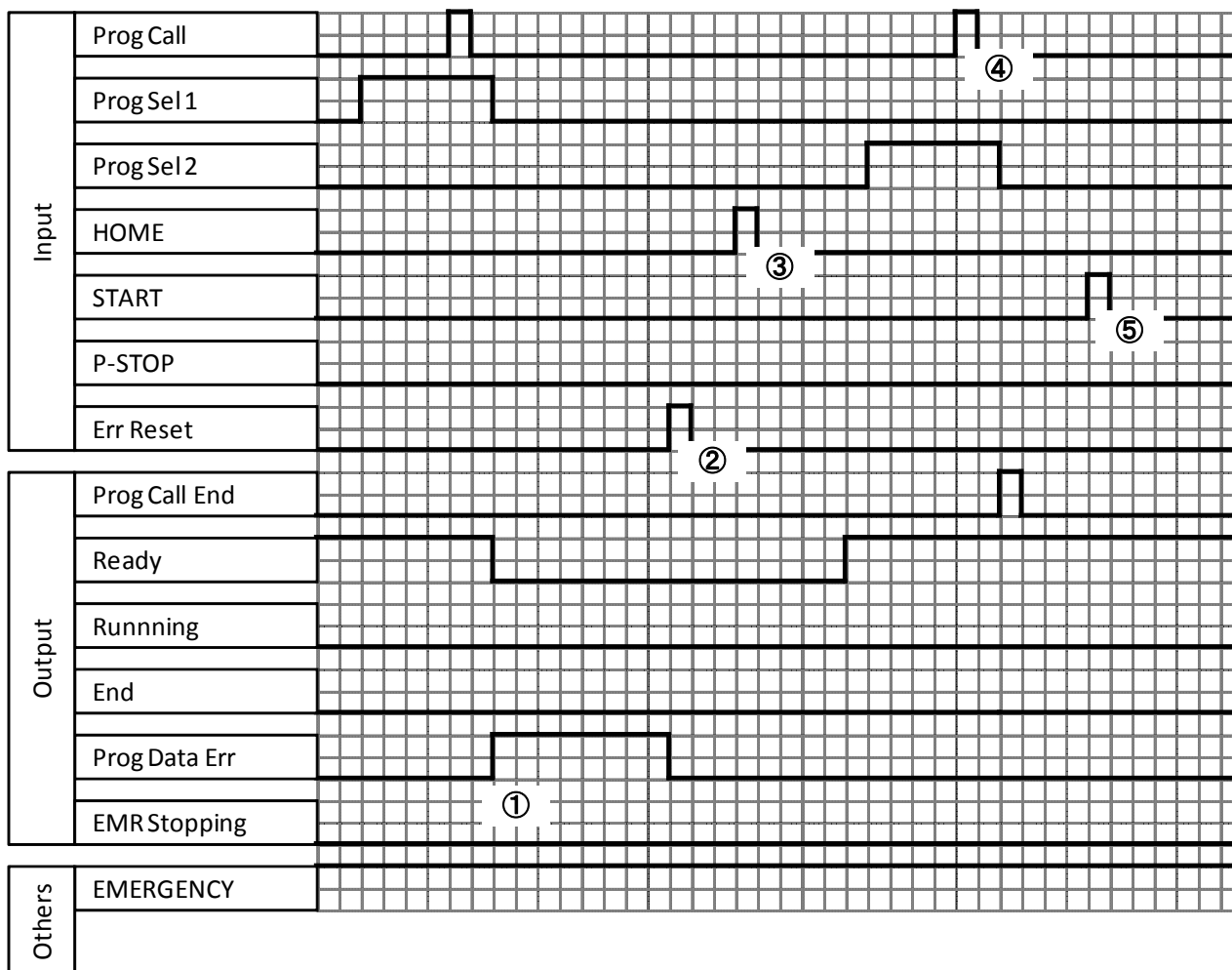
1. When inputting P-STOP signal (200ms or more) during the automatic operation, axis operation stops at the point. If it is during soldering, the operation stops after the soldering operation. (It is not stopped in the middle of soldering.)
2. When inputting START signal, the robot starts operating from the stop point.

Emergency Stop



1. Running signal turns OFF and EMR Stopping Signal turns ON at the same time that EMERGENCY signal turns OFF by the emergency stop switch during the automatic operation.
2. Turn ON EMERGENCY signal in order to recover the emergency status.
3. Input Error Reset signal (200ms or more). Turn OFF EMR Stopping signal.
4. Input HOME signal (200ms) and make the robot return to Home position.
5. After returning to Home position, if there is no error, Ready signal turns ON.
6. If Ready signal is ON, the automatic operation can be started by inputting START signal.

Prog Data Err

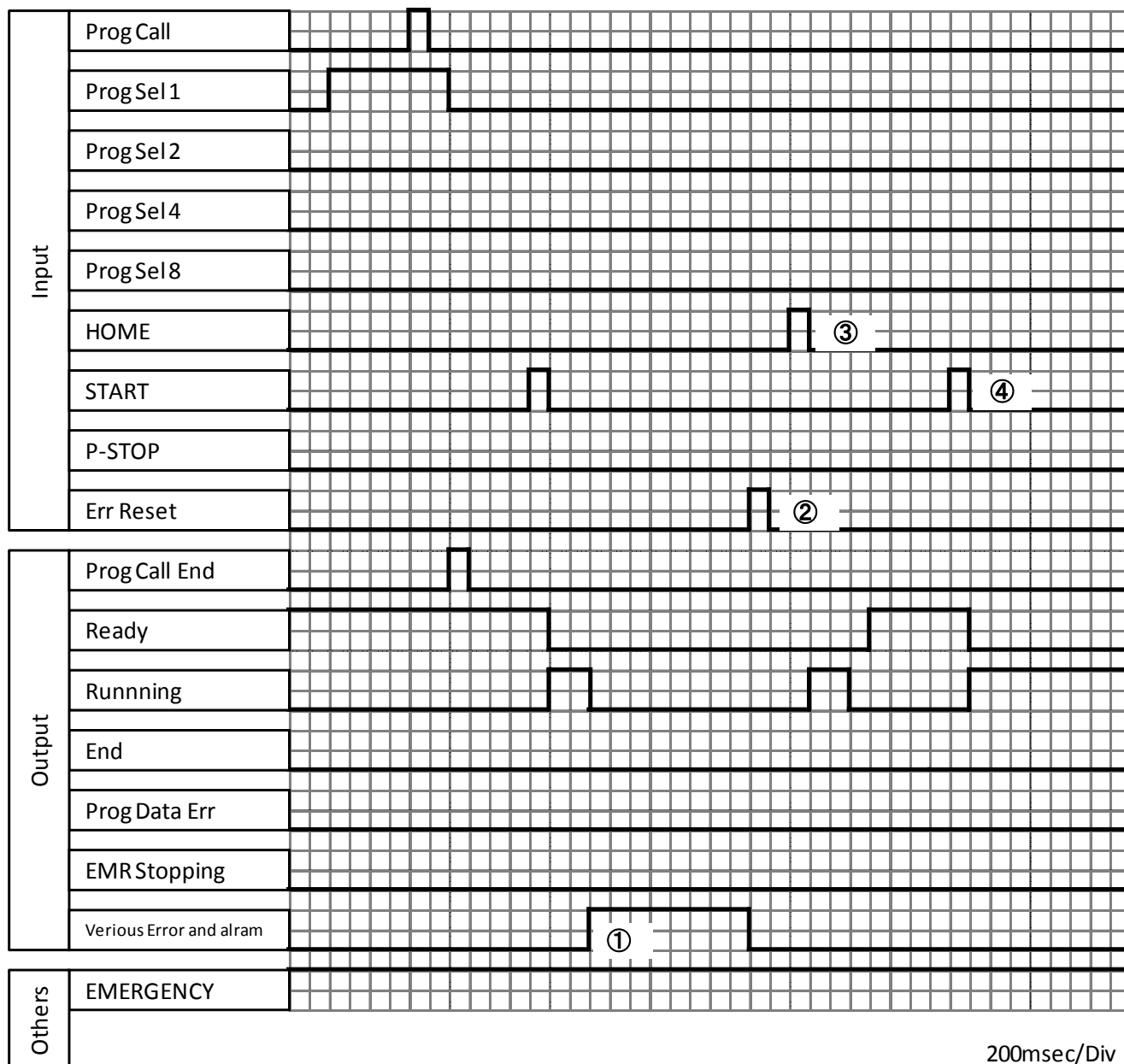


200msec/Div

1. If Prog Call signal is input when the unprogrammed number or the program number that is not set properly is selected, Prog Data Err signal turns ON. In this case, the robot does not operate, even if START signal is input.
2. Input Err Reset signal for recovering.
3. Input HOME signal to make the robot return to Home position.
4. Reselect the program number and input Prog Call signal.
5. If there is no error for the reselected program number, Prog Call End signal turns ON. Input START signal to operate the robot.

Various Errors and Alarm Operation

This operation is applied to all the error signals and the alarm signal of SYS-IO.



1. If there is an error during the automatic operation, the signal in accordance with the error turns ON. The axis operation stops at the point.
2. Input Err Reset signal for recovering.
3. Input HOME signal to make the robot return to Home position.
4. The robot starts operation from the first step by inputting START signal.

20. Maintenance

- Daily inspection requirement items are as follows:

Note: When inspecting, turn off the power and let the the iron tip cool down.

1. Existence of solder wire:
If the solder wire is not sufficient, please change to new one.
2. Wear of iron tip:
If soldering results become inconsistant, please change it to a new iron tip. The life of the iron tip depends on the heating time, the solder feeding point and speed.
3. Heater Malfunction:
If the temperature error lamp is on check the following. :
 - 1) The breaking of heater. Change the iron cartridge
 - 2) The breaking of the relay cord. Change the iron cord.
 - 3) The iron tip is worn. Change the iron cartridge

If these items check out to be OK there may be a malfunction with the heater.

4. Air pressure:
Check for sufficient air pressure. (0.5MPa)
 5. Feed tube clog:
If the solder clogs near the feeder, remove the tube and clean it with alcohol.
 6. Up/down movement:
If the iron unit sticks while moving up or down, clean the area with flux remover and ensure all flux residue is removed.
 7. Cutting blade and pinch roller for solder wire feeding:
Make sure flux or solder does not stick to the above parts. If so, clean it with a soft (brass) wire brush and alcohol.
- After every 5,000 points soldering:
Check the solder tip temperature with a thermometer.
Refer to the temperature calibration page.
 - Every month
Make sure a solder wire runs through the solder wire tube. If not, clean the inside of tube or replace.

21. Error Sign

1. Emergency Stop

When L-CAT NEO detects the error, the following display is shown on the Monitor 2. The error button lights up in red. Check and resolve the error.

*Refer to the next page for the error details.



2. Initializing

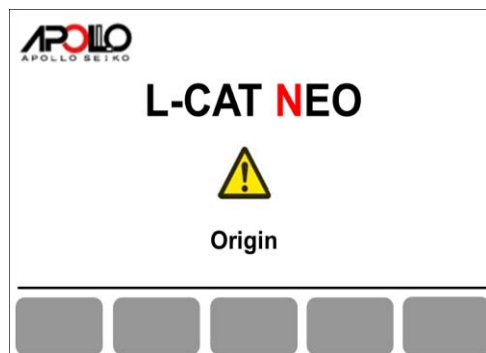


Touch “Error Reset” on the teaching pendant.

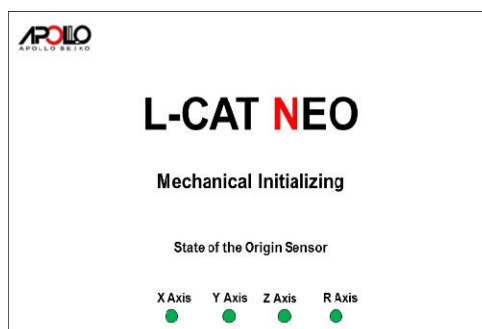
Then touch “Origin” to return the home position.

3. Returning to Home position

During returning to home position, the screens below are shown on the teaching pendant and the Monitor 2.



Teaching Pendant



Monitor 2

Error List

Error	Description	Failure Reason	Recommend Solution
Solder Shortage	Detection of the solder shortage sensor	End of solder wire feeding	Replace with a new solder wire/.
		Solder wire is broken or cut.	Remove the solder in solder feeding tube, and reset solder wire.
		Misdetection of solder shortage sensor	Check the solder wire is set properly.
		Solder shortage sensor is damaged.	Contact Apollo Seiko or our agency.
Solder Clogged Error	Detection of the solder clogged sensor	Solder wire is clogged in the solder feeding tube.	Replace a new solder feeding tube.
		Solder wire does not melt properly.	Slow down the solder feeding speed.
			Adjust the solder feeding position.
Feeding Amount Error	Not used.	Not used.	Not used.
Temp. Error	Error detection of temperature controller	The iron cartridge is not attached properly.	Check the iron cartridge is inserted to the iron unit properly.
		Iron tip heater is broken. Iron tip thermocouple is damaged.	Replace a new iron cartridge.
		The range between temperature alarm value and lower value is small.	Enter proper value in the system parameter.
N2 Flow Alarm	Error detection of nitrogen generator	The flow amount is out of the set range.	Adjust the nitrogen flow amount.
Air Pressure Low Alarm Error	Error detection of air pressure.	The air pressure is out of the set range.	Check the air source.
X-Axis Step Out	Error detection of step out of X- Axis.	X position detection error.	Reset the error and return to the home position.
Y-Axis Step Out	Error detection of step out of Y- Axis.	Y position detection error.	
Z-Axis Step Out	Error detection of step out of Z- Axis.	Z position detection error.	
R-Axis Step Out	Error detection of step out of R- Axis.	R position detection error.	
Iron Sensor Error	Error detection of the lower / upper cylinder sensor of iron unit.	Air is not supplied.	Check the air pressure.
		Air leakage or tube is not jointed.	Make sure if there is the air leakage on the air hoses or a part of the connection.
		Regulation of the cylinder speed controller is not proper.	Regulate the speed controller properly.
		Upper / Lower sensor of air cylinder is damaged.	Contact to Apollo Seiko or our agency for repair.

Program Data Error	Error detection of program data error	Operation of the program that is not set.	Set the proper program for operation.
External input Time Over	Error detection of external input time	The delay time for timeout is not proper.	Set the delay time in the parameter properly.
Vision Compare Error	Error detection of calibration camera data setting.	The search area is too large to detect the application. Or the Slot # (Image number) is not proper.	Check and set the search are / Slot # properly.
Temp. Controller Comm. Error	Error detection of the temperature communication	Mismatch of data.	Set the proper value.
Vision Communication Error	Error detection of vision communication	Mismatch of data.	Click "Trigger Preview" on the calibration camera PC soft, when image is sent to L-CAT NEO.
Temp. Controller Comm. Time Over	Error detection of Temperature delay time.	The delay time of temperature controller communication is not proper.	Check the parameter and set the proper value of the delay time.
Feeder Controller Comm. Time Over	Error detection of feeder delay time.	The delay time of feeder communication is not proper.	Check the parameter and set the proper value of the delay time.
Check DC24V PCB	Error of control power supply (Except board)		Contact to Apollo Seiko or our agency for repair.
Check DC48V PCB	Error of the heater power		Contact to Apollo Seiko or our agency for repair.

Troubleshooting

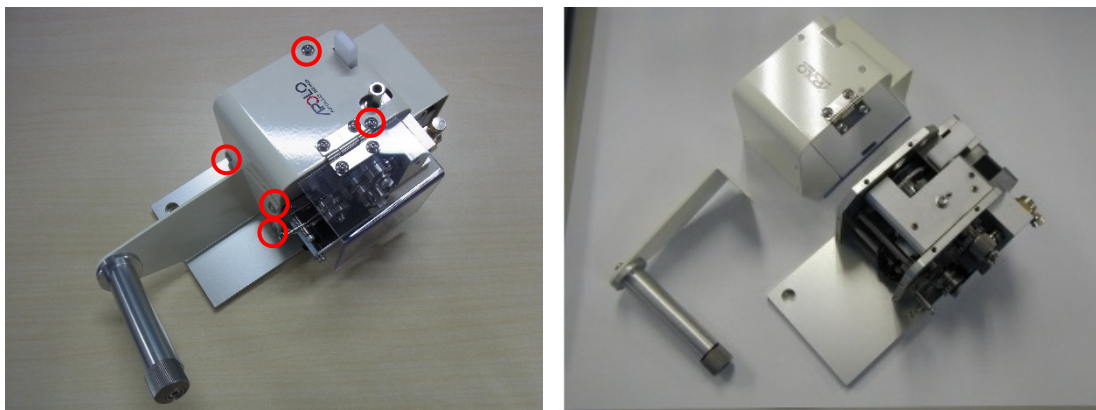
Problem	Failure reason	Recommended solution
The robot is not receiving power	The power cord is disconnected	Check the power cord connection
	Fuse is blown	Replace with a 3 Amp fuse
	Control PCB is damaged.	Contact Apollo Seiko or our agency for repair
The iron tip does not heat properly	Heater is broken.	Replace with a new heater
	Heater connector is disconnected.	Check the heater connection.
	Heater cable is broken.	Replace with a new heater cable.
	The tip is at end of life.	Replace with a new iron tip.
	Parameter setting is not proper.	Check the system parameter and input proper value/.
	Control PCB is damaged.	Contact to Apollo Seiko or our agency for repair.
Solder is not properly fed.	The release lever is upper position.	Lower the release lever.
	The feeding cutting blade is idling	Adjust the position of cutting blade.
	Speed setting is '0'.	Check the system parameter.
	The motor is damaged.	Contact Apollo Seiko or our agency for repair.
	Control PCB is damaged.	Contact Apollo Seiko or our agency for repair.
The temperature controller cannot be adjusted.	Heater is broken.	Replace with a new heater.
	Heater cable is broken.	Replace with a new cable.
	Heater cable is disconnected.	Check the cable connection.
Temperature abnormality does not disappear.	Upper/ lower temperature alarm value is not proper.	Check the system parameter and enter proper value.
Iron unit does not move up/down.	Air is not supplied to the unit.	Check air supply.
	Control PCB is damaged.	Contact Apollo Seiko or our agency for repair.

22. ZSB feeder adjustment and alignment (Option)

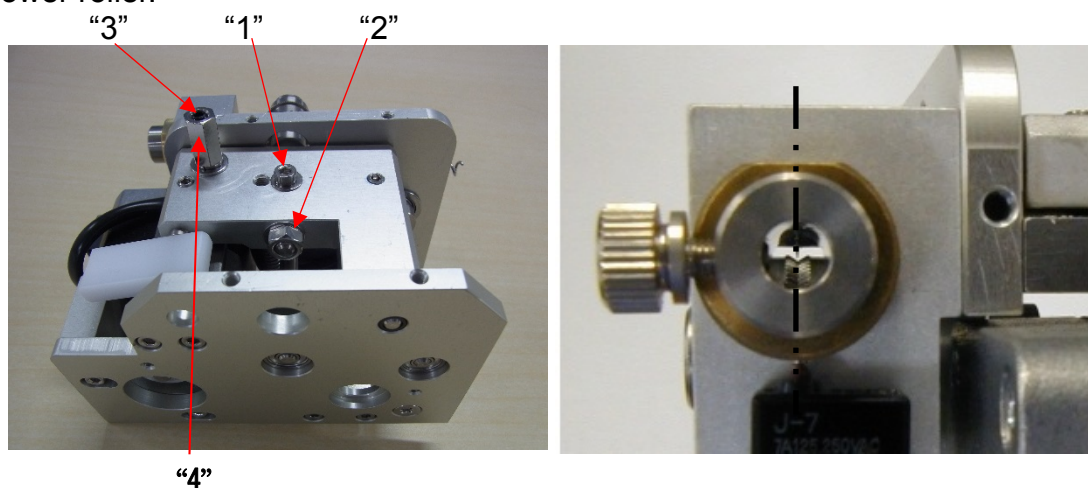
Adjust the ZSB feeder as follows:

The cutting depth of ZSB blade must be adjusted properly to optimal operation. Clean the ZSB cutting wheel and rollers daily.

(1) Remove the cover after loosening the five setting screws.

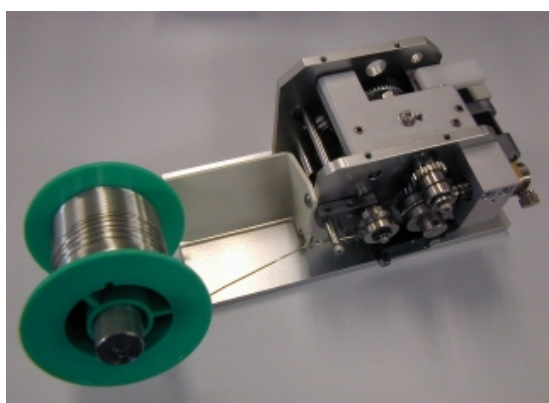


(2) To align the cutting blade shaft, loosen the set screw "1". To adjust the shaft position, set the nut to "2". Move the blade shaft position to match the center of the cutting blade and V groove of the lower roller.

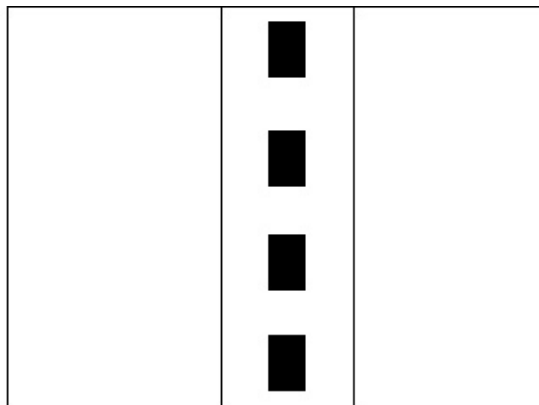
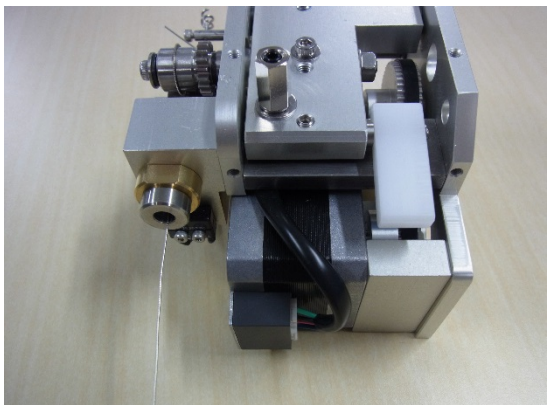


(3) Tighten the set screw "1".

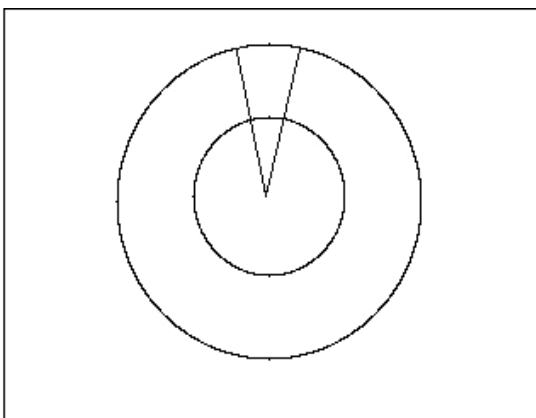
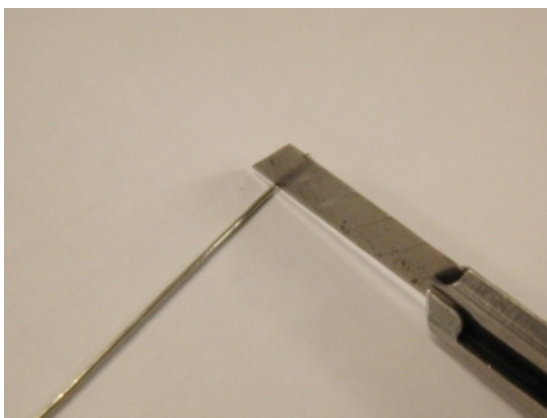
(4) With the cover removed, attach the reel pin and set the solder wire.



(5) Push down solder clamp lever and feed the solder wire. Make sure the cutting blade makes holes on the center of the solder wire. If the holes were not on the center, adjust the cutting blade shaft position, then re-feed the solder wire and re-check it.



(6) Cut the solder wire with holes perpendicularly and check the cross section. Make sure the cutting blade penetrates into flux core. If the cutting depth was not enough or too deep, loosen the nut "4" then adjust the adjusting screw "3" for the cutting depth to penetrate into flux core. Repeat until desired depth is acquired.



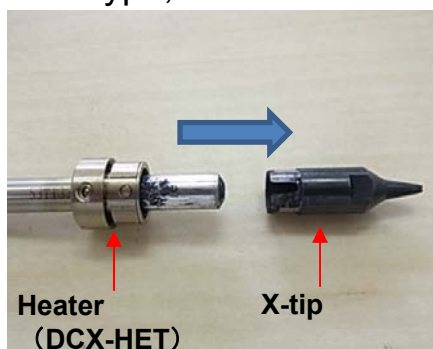
(7) Complete adjustment and the alignment of the cutting blade and increase the temperature of iron tip. Melt the solder wire with holes, and make sure the flux is coming out the holes.



(8) Put the cover back and tighten five set screws.

23. How to change iron tip

DC-X type, X-***



- 1) Make sure to “power off” the unit and let the iron cartridge (DCX-HET and X-tip) cool down.
Pull down on the DCX-HET and the X-tip..

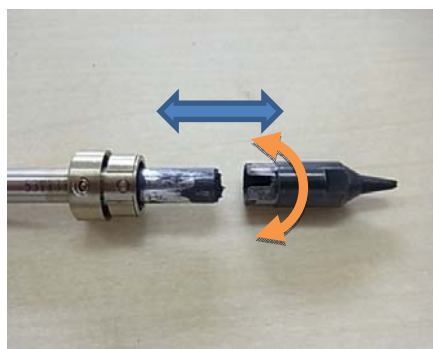
- 2) Pull out X-tip from DCX-HET.



- 3) Wipe off the burning inhibitor substance stuck on the top of DCX-HET.
It can be easily wiped off with a dry cloth.



- 4) Insert a new X-tip to DCX-HET.
Make sure that burning inhibitor substance has been applied and insert a new X-tip.



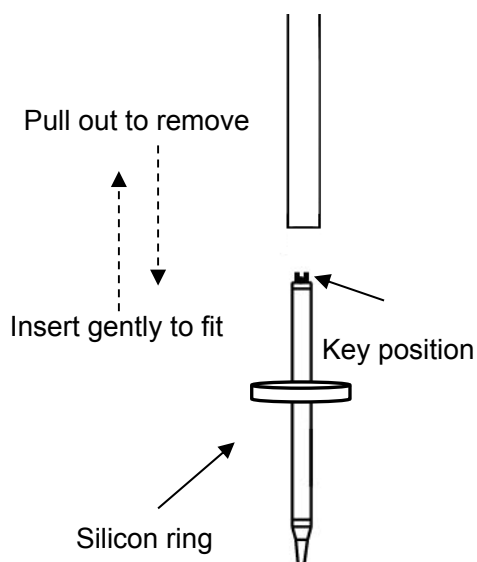
- 5) As shown on the left, the top of DCX-HET has not been covered with burning inhibitor substance.
In order to apply burning inhibitor substance on DCX-HET, re-insert the X-tip, pull it down, rotate it to the left and right several times.



- 6) Make sure that burning inhibitor substance has been applied to the whole top of DCX-HET as shown on the left.
Then insert the X-tip firmly while adjusting the key groove to the correct position.



Make sure to turn off the power of the unit and let the DCX-HET and X-tip cool down before replacing.



1) Make sure to turn the power off and let the iron cartridge cool down. Pull down on the iron cartridge to remove. If it does not come out, use a silicone tube to pull it down using “some force”.

2) To insert the new iron cartridge, insert gently until it reaches the end of the cartridge tube. Turn it until you feel the key drop or click into position. When you feel it click, insert it firmly.

*Do NOT insert the iron while the key is in the incorrect position or the key is damaged.

2) Slip the silicon ring over the iron cartridge.

⚠ Caution

Make sure to turn the power off and let the iron cartridge cool down.

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