Ultrasonic Soldering System

SUNBONDER USM-5

Type USM-540

INSTRUCTION MANUAL

KURODA TECHNO Co.,Ltd.

For safety, Read and understand this manual thoroughly before operation or maintenance of this System.
Keep this manual in fixed place for easy reference all the time.

Introduction

Thank you for purchasing **Ultrasonic Soldering Device SUNBONDER USM-5(Tyep USM-540)** (hereafter "the product").

This instruction manual (hereafter "this manual") describes what should be observed for prolonged efficient use of the product.

The contents described in this manual are based on the standard specifications, therefore may slightly differ from the specification of the product in your site.

For any question or anything unclear about information such as the specifications, please do not hesitate to contact through the following address.

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About This Manual

Before Use

To use the product for the first time, make sure that nothing listed below is missing.

* In case any accessory is missing, contact us or one of our sales agents.

- ・Ultrasonic Oscillator DEVICE(USM-540) 1
- ・Soldering iron (tip diameter 10mm: standard) 1
- ・Foot switch 1
- ・Power cable 1

(The ground plug adapter is to be prepared by the dealer depending on the country and area of use.)

- ・Wrenches for tip replacement 2
- ・Soldering iron holder 1
- ・Fuse (Utility 100~120V:250V/3A: Normal fusing type) 1

(Utility 200~240V:250V/1.5A: Normal fusing type)

CAUTION

Please use the box and packing materials for the product when transporting the product. To discard them, be sure to comply with the laws and regulations of the corresponding country or the municipality.

In Case of Abnormality

- ・Products have broken
- ・Abnormally heated
- ・Abnormally noisy
- ・Smoking or flaming
- ・Water or foreign substances have gone inside

In case any abnormality as described above occurs, follow the procedure below:

(1) Power off

(2) Plug off the power cable or connection cable

(3) If flaming, use water or fire extinguisher to extinguish fire

(4) Contact us or one of our sales agents.

Contents

For Your Safety (Important)

Read this "For Your Safety" thoroughly before use for your correct usage of the product.

The product is designed not to cause any accident if used correctly. However, any wrong use may lead to injury or an accident, which is dangerous.

To avoid an accident, read this manual thoroughly before use to fully understand safety precautions and operation methods.

The following classifications of contents describe the degrees of harm or damage caused when used wrongly without following the contents included.

⚠ DANGER	**If used wrongly, "It is assumed that danger which causes death or severe injury".**
⚠ WARNING	**If used wrongly, "Possibility of death or severe injury can be assumed".**
⚠ CAUTION	**If used wrongly, "Possibility of injury is assumed".**
CAUTION	**If used wrongly, "Occurrence of material damage is assumed".**

The icons below describe the contents to follow:

	Prohibited matters.
	Prohibition of disassembly.
	Prohibition of contact of a wet hand.
	Prohibition of use at a wet place or contact of water.
	Compulsion of an action compliant with the instruction (make sure of execution).

In addition, this manual adopts the following icons:

Make sure to read the following contents for your correct use of the product:

	This icon refers to information helpful for use of the product.
	This icon refers to a chapter or an item for reference.

⚠ DANGER	
	**Do not touch power cable with wet hand.** This may cause electric shock.
	**Do not disassemble or remodel.** This may cause fire, electric shock or injury.
	**Do not get water or foreign substances inside (e.g. connector, vent).** This may cause fire or electric shock. In case water or foreign substances go inside, unplug the power plug and consult with us or one of our sales agents.
	**Do not touch the tip or the heater when the product is carrying current.** The tip and the heater reach extremely high temperatures when the product is in operation. It may cause burning. Be sure to wear heat-resistant gloves and so forth when using the product and never touch them with bare hands.
	**Turn OFF(O) the MAIN switch when leaving the product unattended.** When the MAIN switch is turned ON (I), the heater becomes hot except when the "HEAT Setting" is at "OFF." Be sure to turn OFF(O) the MAIN switch when leaving the product unattended.

⚠ WARNING	
	**Failure to follow precautions below may cause death or severe injury by fire or electric shock.** • Do not damage the power cable. • Do not place the device between wall and shelves. • Do not process or damage the power cable. • Do not place close to a thermal appliance. Do not heat up. • Do not place a heavy object or pull the device. • Unplug the power plug when moving the controller. • When unplug the power plug, make sure to hold the plug straightly. (Do not unplug it diagnally or pull the cable.) * In case the power cable is damaged, purchase a new power cable.
	**Caution on noise** The product generates noise by ultrasonic oscillation device when it is used. Use appropriate noise protection equipment such as ear plugs and covers (ear muffs) when operating the product.
	**Do not place where it is humid or dusty, where condensation occurs, or where the product contacts with oily smoke or steam.** Placement at such places as above may cause fire or electric shock.
	**Unplug the power plug for cleaning.** Cleaning the system with plug in socket, it may cause electric shock.
	**Stop use immediately if any abnormality is found.** Stop use immediately if any abnormality such as abnormal noise or heat from the device or peripheral equipments is found, and unplug the power plug from the socket. Then consult with us or one of our sales agents. Continuation of use may cause fire or electric shock.

⚠ WARNING	
	**Do not use the power cable not dedicated to the product.** This may cause fire or electric shock.
	**Do not touch the device or the power plug when thunder is rumbling.** This may cause electric shock.
	**Do not operate the product for a long time.** The successive operation time for ultrasonic oscillation output shall be limited to 15 minutes.
	**Solder type** The solder used with this system shall be "CERASOLZER ECO®." * Please use a flux-free solder, although normal solder can also be used.
	**How to dispose the product** For disposal of the product, contact us (KURODA TECHNO Co.,Ltd.). The product cannot be disposed as a general waste.

⚠ CAUTION	
	**Unplug the power plug when the product is not used.** If the product is moved leaving the power plugged in damages the power cable, causing fire or electric shock. If not used for a long time, power off with the MAIN switch at the back panel and unplug from the socket to ensure safety. Leaving it plugged in may cause fire.
	**Do not place on an unstable place.** If placed on an unstable rack or sloping place, the product falls, which may cause injury or breakdown. Fully confirm intensity of the placement or installation place.
	**Arrange the device and cables correctly.** If cables are caught by foot, the device falls or turns over, which may cause injury or breakdown. Therefore, pay full attention to cable arrangement.
	**Do not get on the device or place heavy object.** This leads the person or object to turning over, falling or breaking, which may cause injury or breakdown.
	**Do not pile the device with other devices for installation.** This leads the object to turning over or falling, which may cause injury or breakdown.
	**Do not leave the device or peripheral devices on the floor.** You may get tripped over or step on them, which may cause injury or breakdown.

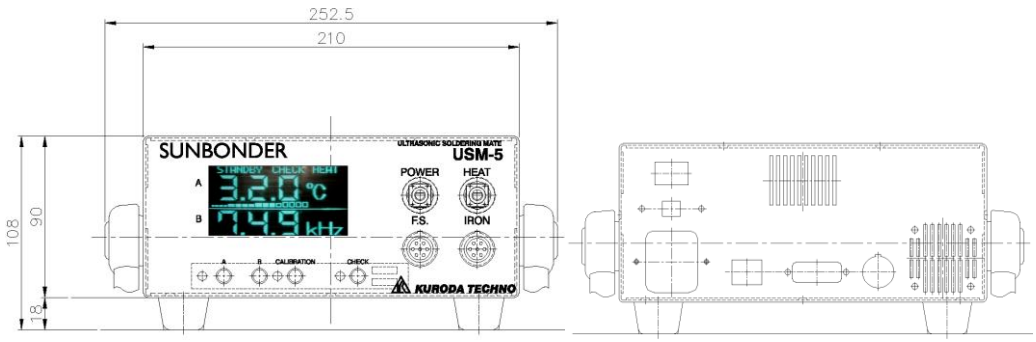
CAUTION	
	**Do not place at an abnormally hot place.** Leaving the product in a car with windows completely closed (particulary in summer), the device case may be transformed or the product may have a breakdown.
	**Do not install or keep the product in direct sunlight or close to a thermal appliance.** This leads internal overheating, which may cause fire or breakdown.
	**Do not apply strong shock.** Do not throw or fall the device or peripheral devices, or hit any object at them. Further, do not apply shock when carrying.

1 Product Outline

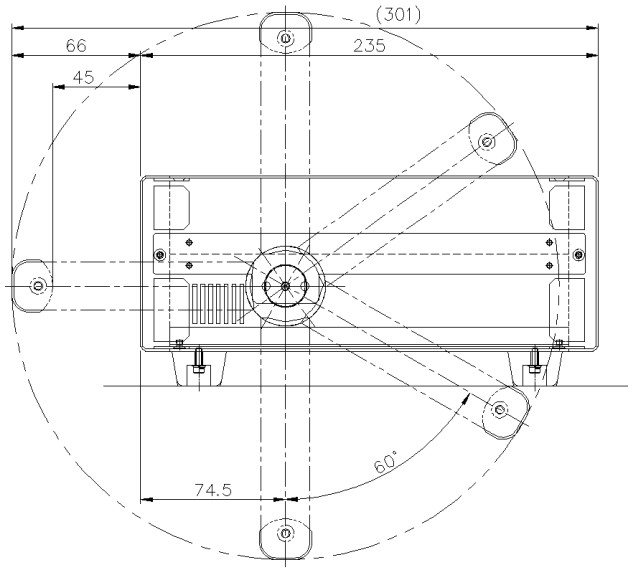
1-1 Function outline

The product comprises of the Oscillator device, Soldering Iron and Foot Switch. The soldering tip generates ultrasonic vibration by high-frequency voltage supplied by the Oscillator device, while the coiled heater heats the solder to the fusing temperature at the same time.

Using "CERASOLZER ECO®" on this tip and bringing it lightly to the soldering material, you can solder easily and directly to glass, ceramic and so forth which had been considered impossible to solder conventionally with "cavitation effect" by ultrasonic vibration. It is also possible to solder materials that are low solderability metals such as aluminum and stainless steel or to solderability metals which can be fused with normal solder such as silver and cupper without using flux.



Front view rear view



Side view

1-2 Features

(1)Direct soldering to glass, ceramics, low solderability metals

(2)Stable ultrasonic frequency with constant amplitude control and new feedback system for automatic adjustment of resonance frequency.

(3)Adjustable ultrasonic-power output.(1~12W)

(4)Heater temperature is possible to adjust 200-600 degree at intervals of 10 degree and OFF setting.

(5)Soldering condition is possible to reproduce by display ultrasonic-frequency, ultrasonic-power and heater temperature.

(6)Compact handy type, portable hand and space-saving.

(7)Easy to operate.

(8)Variable power supply with AC100~120V/220~240V by switch.

1-3 Specifications

Oscillator device

Item	Description
Ultrasonic frequency	Auto control 40kHz ± 5kHz
Ultrasonic power	Rating 15 W (max) Effective 10 W (max)
Power setting	Variable(multi-choice)
Temperature range	200~600degree and OFF
Temperature setting	Variable(intervals of 10degree)
Power requirements	AC 100~120V/220~240V 50/60Hz 200W
Dimension	210mm (W) x 90mm (H) x 235mm (D) (excluding the handle and the rubber foots)
Environmental requirements	Operating temperatures: 0 to 40degree Operating humidity: 90% RH or lower (no condensation)
Control unit weight	Approx. 5Kg

Soldering Iron

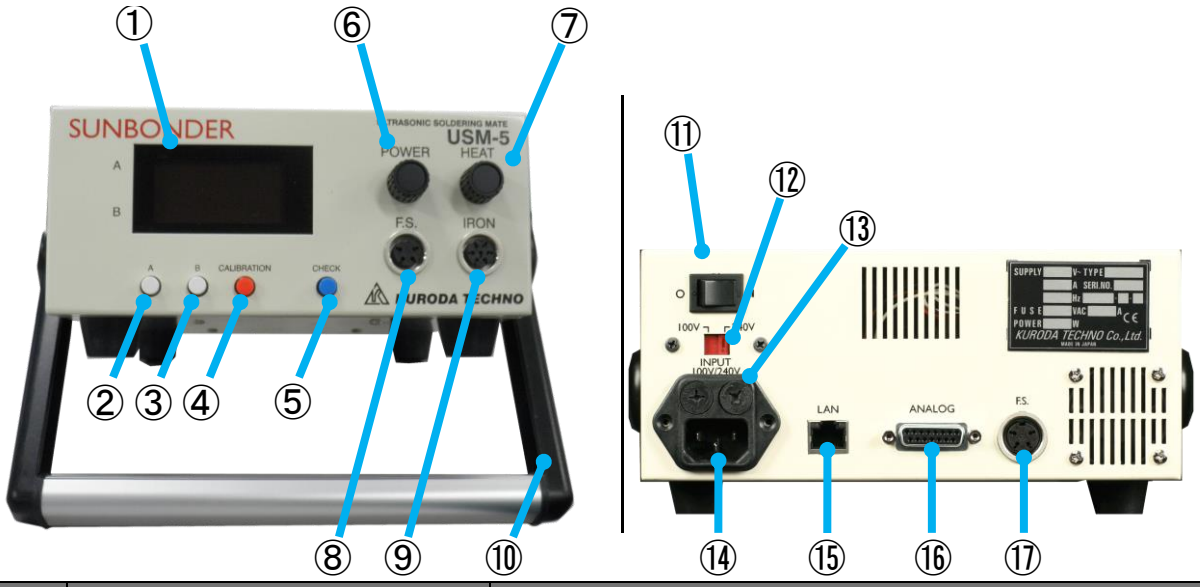
Item	Description
Transducer	Langevin type (P.Z.T.) 40kHz
Tip material	Stainless steel
Heater	High performance sheath heater 250W
Sensor	Sheath thermocouple(type K)
Tip diameter	10mm (Standard)
Transducer cooling method	Natural air cooling
Size	Ø 34 (max) x 295 mm (cable excluded)
Weight	Approx. 520 g

Recommended Solders

Product name	Type(melting point)	Diameter	Weight
CERASOLZER ECO® (Special solder)	#217	Φ1.0	1Kg
	#182	Φ1.0	150g
	#155	Φ1.0	150g

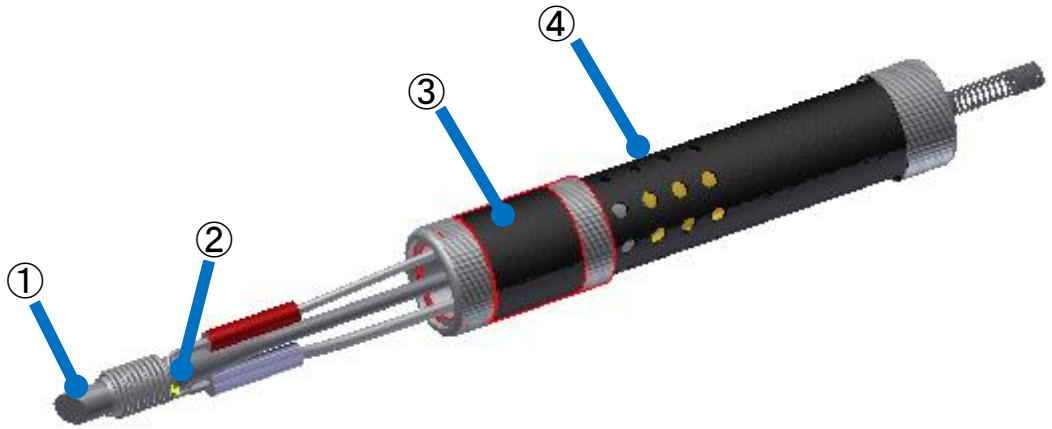
2 Names and Functions

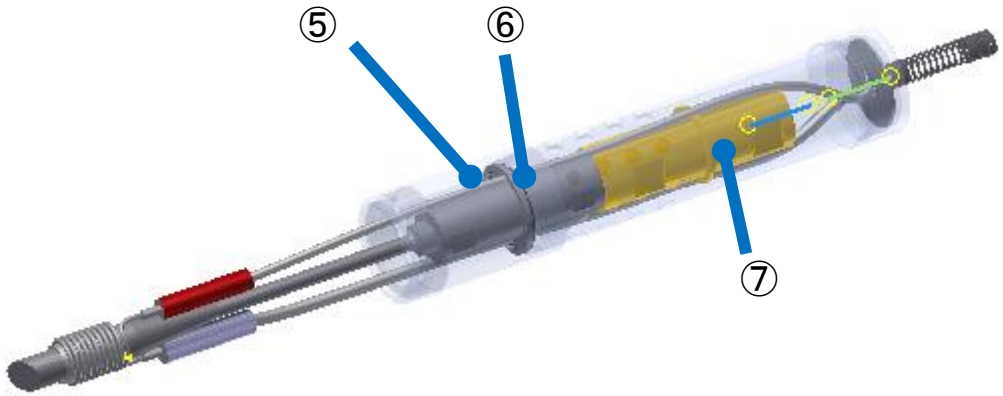
2-1 Ultrasonic Oscillator Device

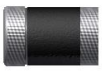
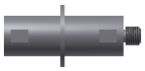


No.	Name	Function
①	Monitor	Show the frequency, the power, the temperature or the amplitude.
②	Monitor A switch	Change the Monitor A (upper side) showing.
③	Monitor B switch	Change the Monitor B (lower side) showing.
④	Calibration switch	For calibration
⑤	Check switch	Start the ultrasonic oscillation.
⑥	Power knob	Adjust the power setting.
⑦	Heater knob	Adjust the heater temperature setting.
⑧	Foot switch connector	Connect the foot switch cable.
⑨	Soldering iron connector	Connect the soldering iron.
⑩	Handle	Adjust the device angle.
⑪	MAIN switch	Turn ON power
⑫	AC100/240V switch	Setting to utility voltage. 100~120V/220~240V
⑬	Fuse holder x2pc	Attach the Fuse: 100~120V :250V/3A 220~240V :250V/1.5A
⑭	AC inlet	Connect the power source cable.
⑮	LAN input *option	Connect to LAN
⑯	Monitoring connector	External operation and the power/the temperature monitoring.
⑰	Foot switch connector	Same as No.8

2-2 Soldering Iron





番号	名称	説明
①	Tip	Φ10.0 slanting cut 
②	Heater/Sensor	Heater and Temperature sensor 
③	Cap	Fix horn 
④	Case	4 pc parts 
⑤	Horn	Amplify vibration 
⑥	O-ring	Fix horn
⑦	Oscillator	For 40kHz 

*Tip size is Φ10.0mm for standard.

3 Operation Procedure

Prepare a "CERASOLZER ECO®" solder before operating the product.

3-1 Power ON

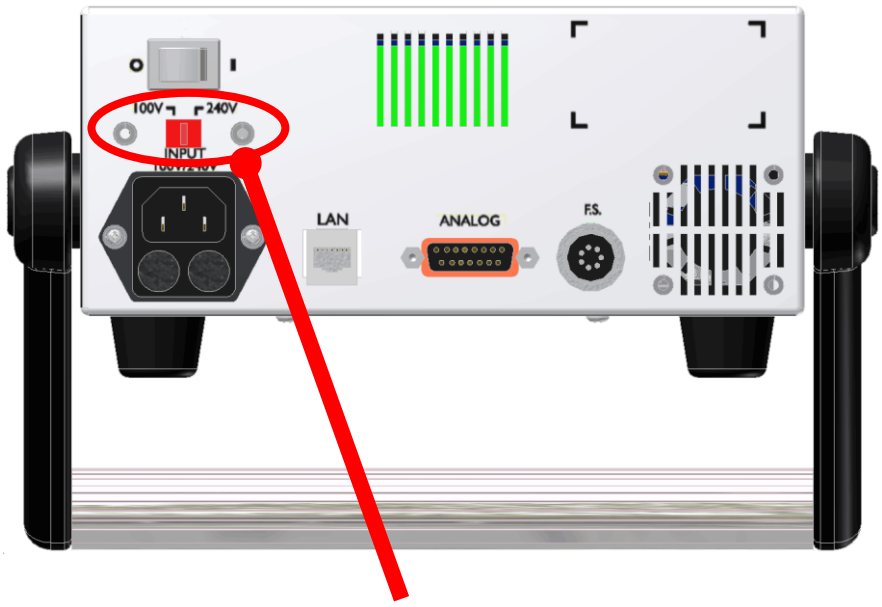
Turn ON (I) the power according to the following procedures;

⚠ DANGER
Do not touch power cable with wet hand. This may cause electric shock.

1. Push the handle stepper of the handle with both hands to set the oscillator in the desired angle that is easy to operate. Then release the hands.

2. Confirm the AC100/240V change switch to be utility voltage.

3. Confirm MAIN switch to be OFF(O) position.



Check the position

to be utility voltage

4. Connect the foot switch connector to the device (① in figure below).

*Same as rear conector

5. Connect the soldering iron connector to the device (② in figure below).

6. Connect the power cable to the AC inlet on the device and insert the power source plug into a power outlet.

Be sure to ground the GND terminal to the attached adapter or a power outlet with grounding.

7. Turn ON (I) the power switch.

8. With reference to the table below and considering the thermal capacity of the solder and soldering material to be used and so forth, set the “HEAT” knob to the desired position.

The set temperature will be reached in about 5 minutes.
Even if the temperature setting reaches the target, the tip could not be enough temperature at same time.

3-2 Operation

Operate the product according to the following procedures;

⚠ WARNING
Caution is required that CERASOLZER ECO may become powdered and spattered if the ultrasonic power is too high. Be sure to wear heat-resistant gloves and long-sleeved clothing if necessary.

1. Supply an appropriate quantity of CERASOLZER ECO® at the tip.

2. Solder while stepping on the foot swtich to apply ultrasonic vibration.

3. If the ultrasonic power is too low, turn the "POWER" knob to the right and increase the power with the foot switch OFF.
   - When the Ultrasonic vibration is operated over 30 minutes, it is changed to STANBY mode and the Ultrasonic vibration is stopped aoutomatically.

3-3 Operation Panel

Explane switches, knob operations and displays.

1. POWER knob
   The power becomes high by clockwise operation of the knob. It becomes low by counterclockwise operation of the knob.When start, the setting is same as the last time. The setting value is shown to the monitor B when operation. And it is changed current value after 2 seconds.
   - Default setting is 5W when delively from factory.

2. HEAT knob
   The temperature becomes high by clockwise operation of the knob. It becomes low by counterclockwise operation of the knob.When start, the setting is same as the last time. The setting value is shown to the monitor B when operation. And it is changed current value after 2 seconds.
   - Default setting is HEAT OFF when delively from factory.

3. Monitor switch A

Monitor A (Upper display) is changed by the switch pushed.

Every switch operation, the current value is shown as follows:

POWER(W) → FREQUENCY(kHz) → AMPLITUDE(μm) → TEMPERATURE(℃)
→CONDITION(%)→

4. Monitor switch B

Monitor B (Lower display) is changed by the switch pushed.

Every switch operation, the current value is shown as follows:

POWER(W) → FREQUENCY(kHz) → AMPLITUDE(μm) → TEMPERATURE(℃)
→CONDITION (%)→

5. CALIBRATION Switch

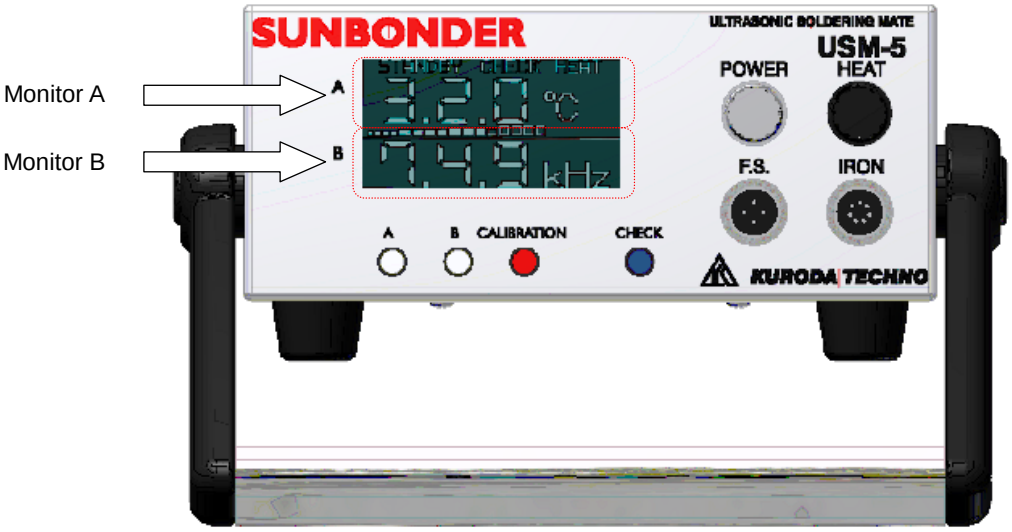
Start calibration of the oscillation.(about 10 seconds)

*Normaly no need operation because it is auto adjustment to the suitable oscillation. However, when changing not less than "3W / 50℃" of preset values, it recommends performing a calibration.

*The calibration action is not working 5 minutes after the temperature is reached the setting value.

6. CHECK switch

The oscillation is started by switch operation. The operation is same as foot switch operation.



3-4 Screen

Screen shows as follows:

1. Opening
Product name and software version is shown.

2. After opening
Either of Power(W), Frequency(kHz), Amplitude(μ m), Temperature(°C), Condition(%) is shown on screen. The screen is changed by the Monitor switch A and the Monitor switch B.
*At the start the temperature setting is OFF then "HEAT" display is turned off.

3. Non-connection
"~~HEAT~~" display is blinking, and Tenperature(°C) is displayd with "---°C".

4. Heating
"HEAT" display is blinking.

5. Stable temperature
"HEAT" display is turned on, and "CALIBRATION" switch lights up.
*The display value is reference. The tip temperature is different by the tip shape or materials. ([Heater temperature]−[50~150]°C)

6. Tip temperature over 50 degrees.
"＊" mark is turned on gradual. When this display is shown, do not tough the tip absolutely.

7. Power setting / Temperature setting
Monitor B (lower display) is shown the setting value when setting change operation. it is changed current value after 2 seconds.

8. Oscillation check
"CHECK" is blinking.

9. CALIBRATION
"CALIBRATION" literature is shown to the Monitor A (upper display). Then progress situation is shown the Monitor B (lower display).

10. Condition
The condition of oscillation operation is displayed. The temperature and load of Iron also influence.
Use at not less than 50% is recommended.

11. Standby / Suspend
Refer to "3-5 STANDBY / SUSPEND".

12. Interlock
Refer to "3-6 Interlock".

Display example

3-5 STANDBY / SUSPEND

For saving power and safty, the following functions is prepared.

1. STANDBY function

Standby mode is started if no operation (foot switch or change setting) is countinued 30minutes.

About Standby mode

"STANDBY" is blinging, "HEAT" is shown and " * "mark is turned on gradual.

*The heater temperature is kept by the setting value.

The screen return to standard when some operations.

2. SUSPEND function

Suspend mode is started if Standby mode is continued 1hour (The SUSPEND function can be OFF by setting time).

About Suspend mode

The heater temperature setting becomes OFF.

"STANBY" and " * "mark is blinking until the current heater become under 50 degree.

After the temperature become under 50 degree, it become turn off.

The screen and the heater temperature setting return to standard when some operations. Then heating is started.

Please wait to ultrasonic vibration until finish heating.

3. SUSPEND time

*The SUSPEND time to become suspend mode can be changed by operate as follows:

MAIN switch is turned ON(I) with both Monitor A switch and Monitor B switch is pushed.

The screen becomes setting mode.

*****TOP MENU*****
＞Settings
EXIT

****SETTINGS****
＞Suspend time : 1H
PZT Interlock : ON
Push B to Exit

Suspension shift time can be changed into “0H/1H” by uniting a cursor in order of “Settings”>”Suspend time” on a setting screen, and pushing A button.

After operating a POWER knob, uniting a cursor with “Exit” and pushing A button, it shifts to normal mode.

*Unless choosing “EXIT”, a changed setup is not reflected.

*Default setting is 1 hour.

3-6 Interlock

1. Interlock function

The rise in heat and degradation of PZT vibrator which are used inside Iron are controlled.

When continuation oscillation or intermittent oscillation operation with a short quiescent period is performed for a long time, oscillation operation is stopped by compulsion.

The continuation oscillation time to interlock starting changes with an oscillation output & heater temperature. (In the continuation oscillation of "5W/350 °C", it's about 15 minutes.)

During interlock, it is displayed on Monitor A as "PZT Interlock", and oscillation operation cannot be performed.

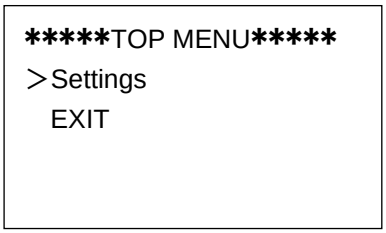
An interlock is removed in about 5 minutes, but continuous oscillation possible time just after a cancel release is 1/3 of initial state.

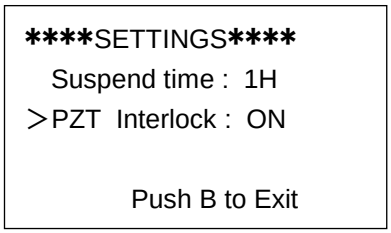
A continuous oscillation possible time recovers by stopping and increases with absolute maximum (initial state) in about 15 minutes.

2. ON/OFF setup

To change ON/OFF of interlock function, power supply ON does both monitor switch A and B in spite of being a push and enters setting mode.

It chooses in order of "Settings">"PZT Interlock" in setting mode, and changes "ON/OFF" of interlock.





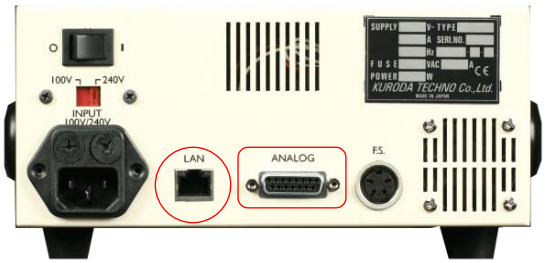
After change, B button is pushed and it returns to "TOP MENU". Then, "EXIT" is chosen and it shifts to normal mode.

*Unless choosing "EXIT", a changed setup is not reflected.

*Default setting is "ON".

3-7 External connection

External connection ports is located to rear panel.

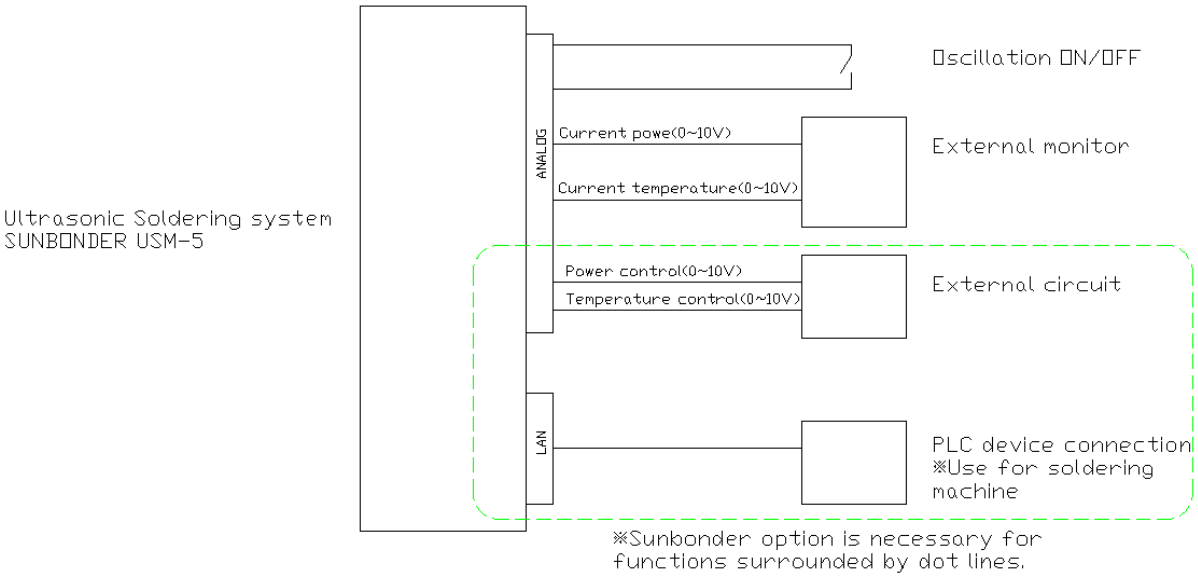


1. Function by external connection

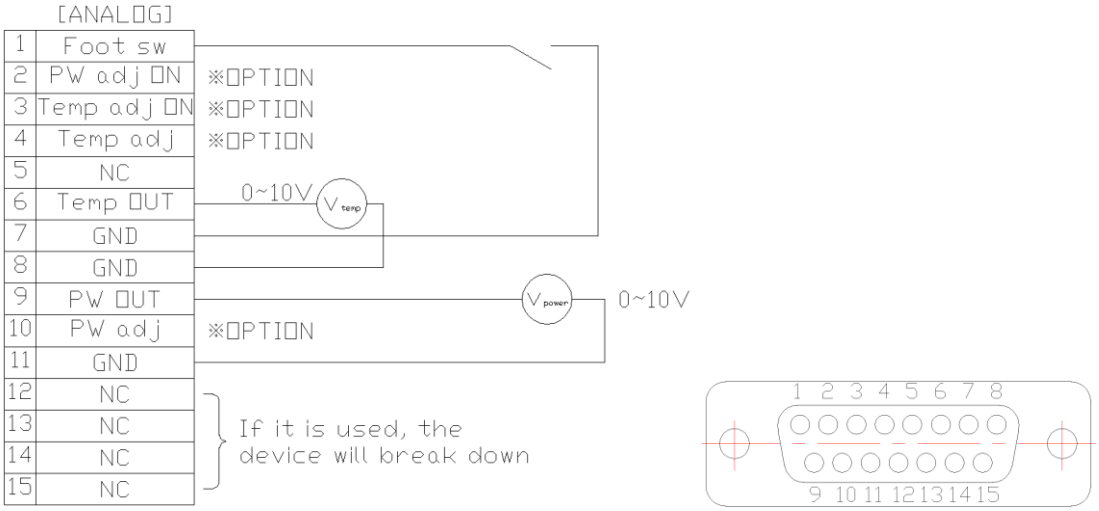
- Remote operation of oscillation start. (Same as foot switch)
- Heater temperature monitoring
- Oscillation power monitoring
- Following functions is option.
- Oscillation power External setting
- Heater temperature External setting
- Connect with PLC devices

➢ Please turn a ferrite core at LAN cable. (Recommendation : ZCAT3035-1330 TDK)

2. External connection example

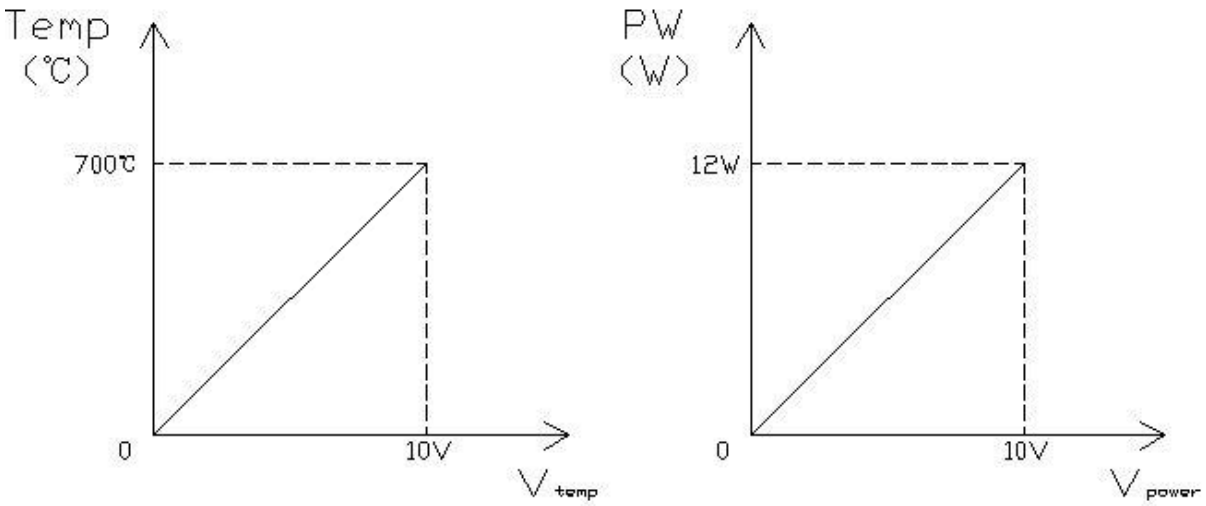


3. ANALOG connector pin assign



●It is necessary to use a Shielded Cable and a ferrite core for this connection.

4. Reletionship of output voltage and each parameters



5. Option functions

Please contact us when option functions is necessary.

●If LAN port is used, it is necessary to turn LAN cable to a ferrite core as follows.(Only for CE)

(Recommendation : ZCAT3035-1330 TDK)

4 Maintenance Procedure

This section provides the basic maintenance procedures for this product.

4-1 Heater Replacement

1. Make sure to switch the power OFF(O) and pull out the connector soldering Iron.

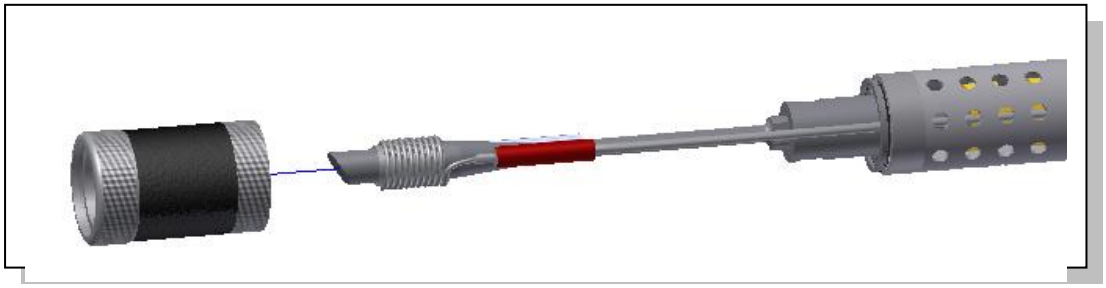
Front

Rear

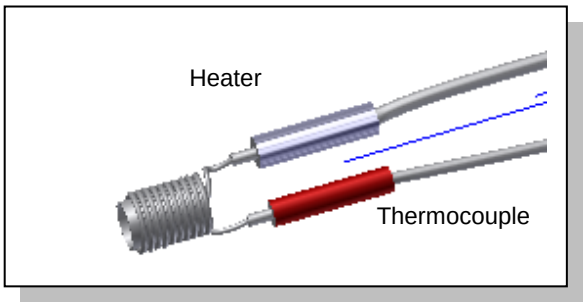
⚠ DANGER

Do not touch the tip or the heater.
The tip and the heater may still be hot immediately after turning OFF(O) the MAIN switch. Never touch them with bare hands.

2. After confirming that the iron tip has cooled down, remove the cap.



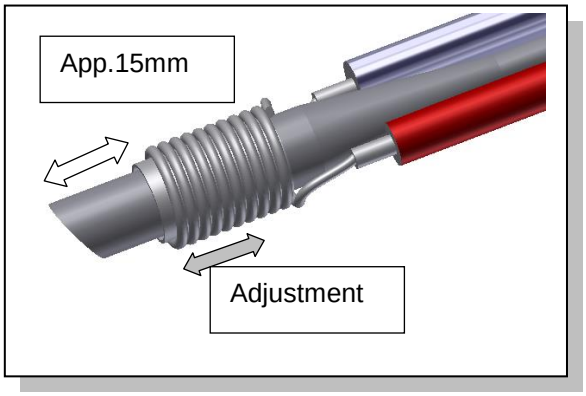
3. Pull the sleeve until the heater connection points became visible, and remove the heater with caution not to bend it.



4. Insert a new heater onto the tip and attach the connection points.

Be careful of the polarity of the temperature sensor (red/white line).

5. Check the contact between the tip and the heater. If the heater position is too much forward or if the heater is pressing too much on the tip, adjust so they are not in contact with each other. The guideline for adjustment is to have the end of the heater coiling and the begining of the straight section of the tip matching.



6. Now reassemble the Soldering Iron by reversing the procedures of the above.

4-2 Tip Replacement

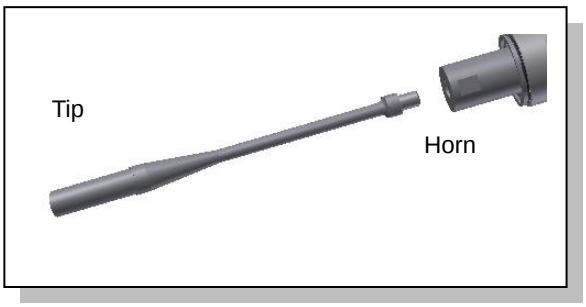
1. Implement Heater replacement procedures ***1.*** to ***3.***

2. Remove the tipn using the two spanners.

3. Mount a new tip in the same manner using the spanners.

(Tightening torque : 50kg･cm)

4. Implement Heater replacement procedure ***5.*** to ***6.***



5 Troubleshooting

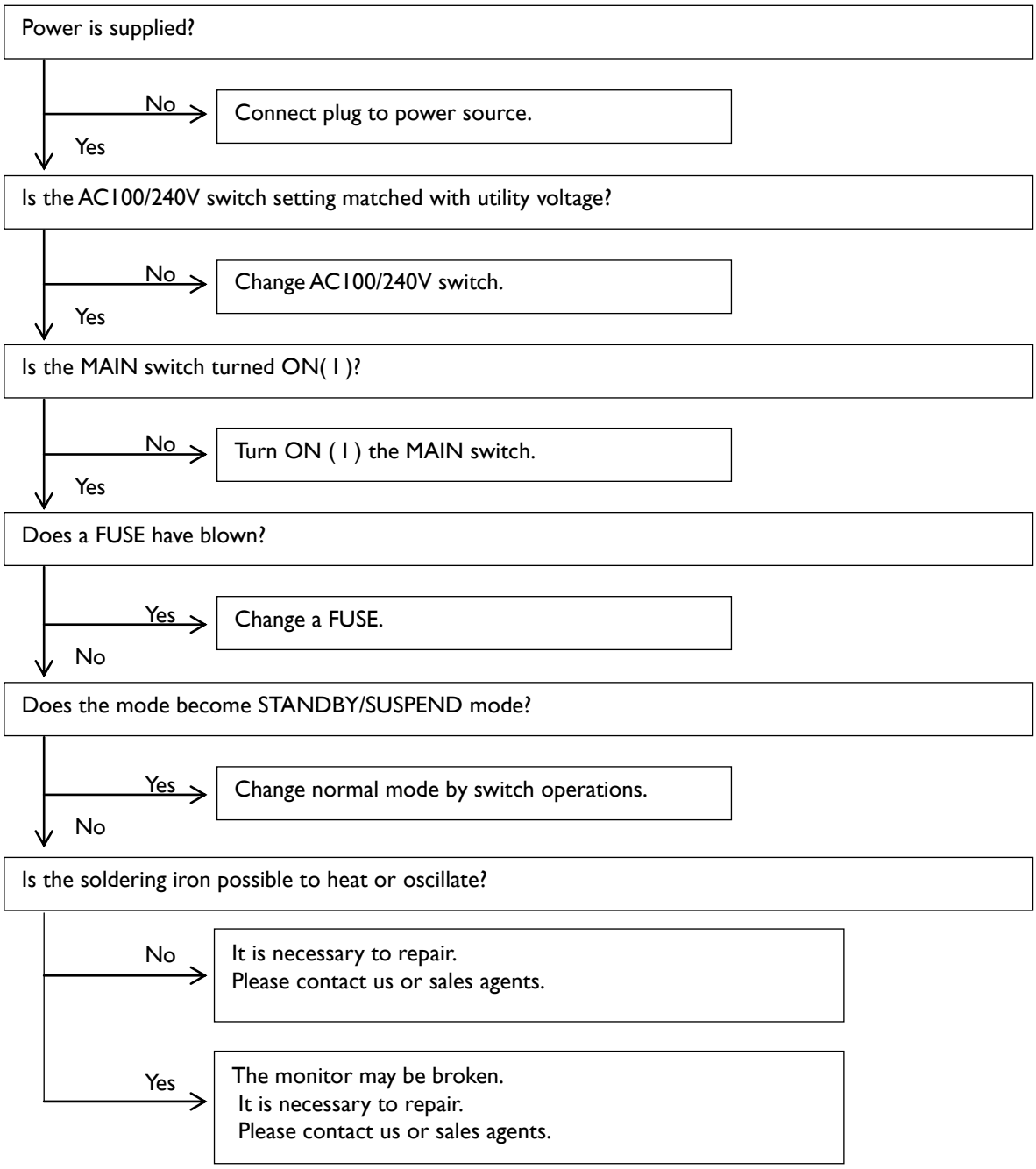
5-1 For Troubleshooting

⚠ DANGER

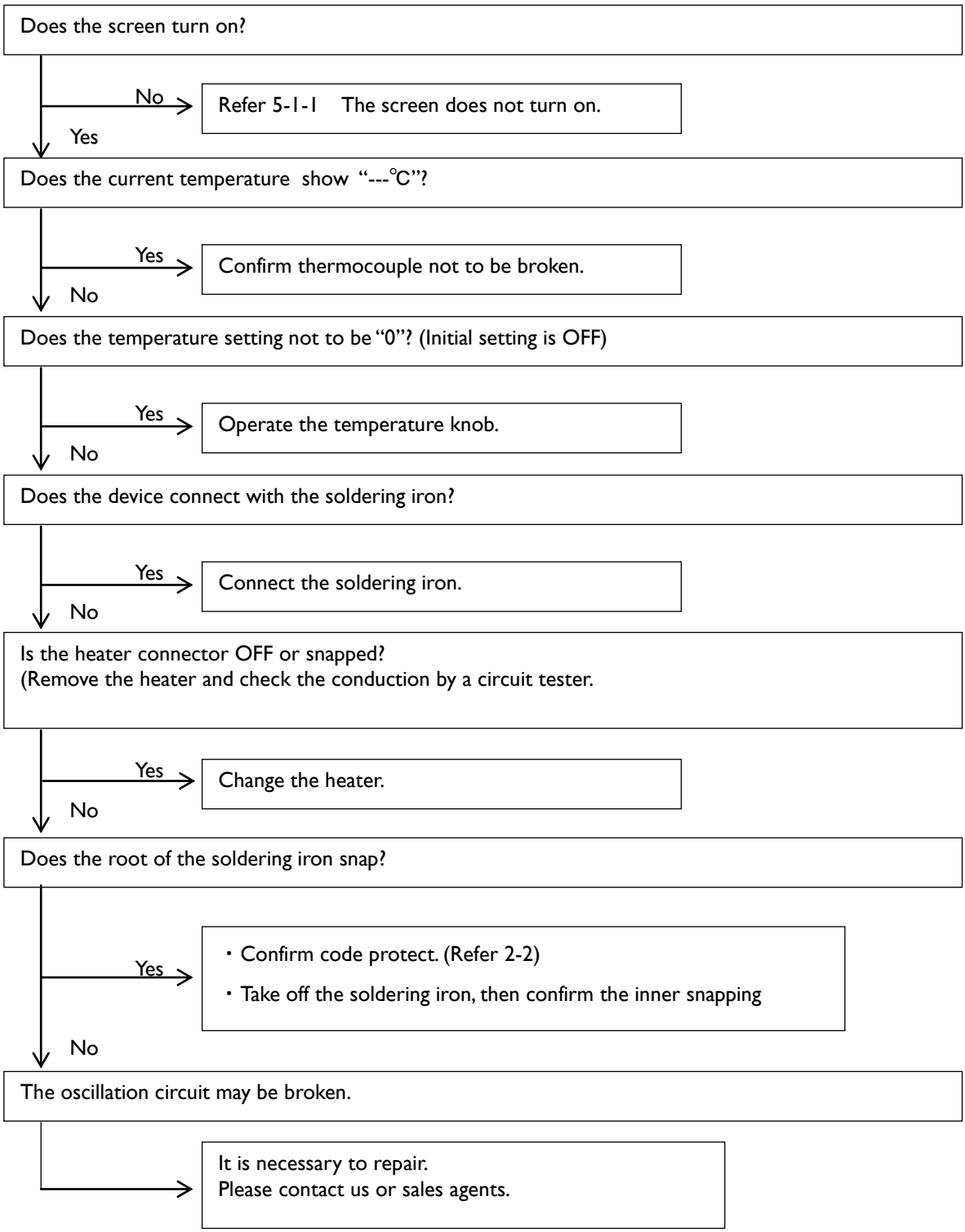
Electrical shock may occur. Set the MAIN switch to OFF (O) then disconnect the power plug before starting any test that does not require the power to be on.

Symptom	Content to confirm	Countermeasure
The screen does not turn on.	Refer to "5-1-1 The screen does not turn on".	
The heater does not heat.	Refer to "5-1-2 The heater does not heat".	
There is no oscillation.	Refer to "5-1-3 Does not oscillate".	
Error codes are displayed. (【E01】~【E09】)	Refer to "5-2 Error codes 【E01】~【E09】"	
The condition display will always be less than 50% at the time of oscillation operation.	Please check bolting of a chip and a horn. (*Refer to "4-2 Tip Replacement") When still becoming less than 50% always, please contact us or one of our sales agents.	
Ultrasonic output is weak.	● Is the Power supply plug into a power outlet? ● Is the Power switch ON (I)? ● Are the tip and the horn connected properly?	Increase the output by turning the "POWER" knob to the right with the Foot Switch OFF (O). If the output still remains weak, please contact us or one of our sales agents.

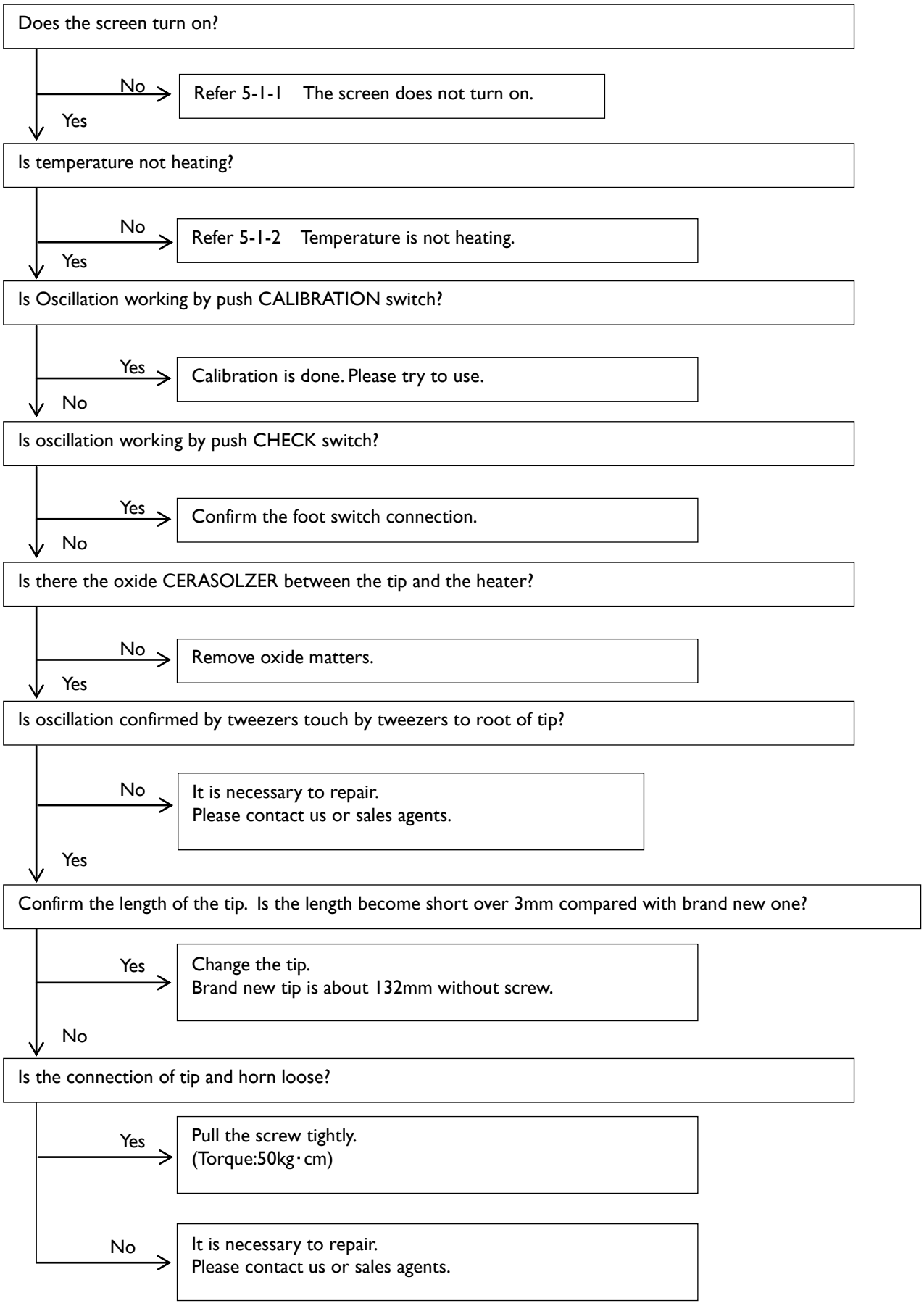
5-1-1 The screen does not turn on.



5-1-2 Temperature is not heating.



5-1-3 Oscillation is not working or unstable.



5-2 Error Codes【E01】～【E09】

When Error Codes are displayed on Monitor A, please perform the following correspondence.

Codes	Countermeasure
【E01】 【E02】	Please reswitch on the power supply. When Error Codes are still displayed, the oscillation circuit may be broken. Please contact us or one of our sales agents.
【E03】	It is displayed when unusual heating of a heater occurs. Heater or oscillation circuit trouble can be considered. Please contact us or one of our sales agents.
【E04】	It is displayed when heater preset temperature is except "OFF", and preset temperature is not reached 40 minutes or more. Since heater failure can be considered, please exchange. When after exchange occurs, please contact us or one of our sales agents.
【E05】	It is displayed when oscillation operation is unstable. Please reswitch on a power supply and use it. During heating, since oscillation operation becomes unstable easily, please wait till the completion of heating. When the condition at the time of oscillation operation is always less than 50%, please check bolting of a chip and a horn. (*Refer to "4-2 Tip Replacement")
【E06】	It is displayed when heater preset temperature is except "OFF", and heater temperature is less than 50 ℃ of 2 minutes or more. When the chip or the heater is exchanged, please reconfirm the polarity of a temperature sensor. When the temperature sensor is normal, please exchange since heater failure can be considered. When after exchange occurs, please contact us or one of our sales agents.
【E07】	It is displayed when FAN-rpm in equipment is less than half of a normal value. FAN exchange is required when an error display is carried out, even if it reswitches on the power supply. Please contact us or one of our sales agents.
【E09】	It is displayed when the circuit temperature in equipment is 80 ℃ or more. Please turn off the power supply, and use it after stopping about 10 minutes. When generating frequently, circuit failure can be considered. Please contact us or one of our sales agents.

6 Warranty and after-sales service

■ Warranty

We will repair the product free of charge if there is a failure within 6 months after delivery and under normal using conditions according to the instruction manual. However, Soldering Iron and the heater are exempted from warranty except for incipient failures.

The warranty shall not apply even within warranty period if any of the followings implies.

-> Accident or failure caused by modification or re-installation after the delivery, or caused by operation for modified purpose.
-> Failure that occurs after delivery and is caused by natural disaster or accident during transfer or related.
-> Compensation for secondary damage caused by failure of this System
(Including compensations for; personal accident, damage related to the production, damage to the properties other than the items delivered by THE COMPANY, and damage due to social impact).
-> Accident that occurs to anything whose term of warranty expired.
-> Delivery delay after large delay in supply of the customer supplied item by the reason of the customer.
-> Delivery delay when large specification change was requested by the customer.
-> Accident, failure or damage due to faulty operation control.
-> Accident that arose due to maintenance or servicing done by the customer after delivery.
-> Wearing of the parts with less than one year of lifetime, including the consumable parts and the replacement parts.
-> Accident affected by machinery other than the items THE COMPANY delivered.
-> The failure cause is unidentifiable because of reasons like loss of the damaged parts.
-> Trouble due to inadequate customer-supplied reference, data or information.
-> Damage or rust due to inadequate handling and/or storage by the customer after delivery.
-> Accident caused by customer supplied item.
-> Cause is corrosion of material.
-> Handling, storage, and/or use was done under harsh environment that deviates the design specification conditions.

■ After-Sales Service

If any abnormality is found, refer to the contents of this Instruction Manual (particulaly of Troubleshooting).

If such abnormality still continues, contact KURODA TECHNO Co.,Ltd or one of our sales agents found in the warranty.

We will repair the product based on the contents described in this warranty.

For repairing after the duration of guarantee, we will respond upon consultation.

Soul in Technology

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