OPERATION MANUAL

TML Spot Welder
W-50R

Tokyo Sokki Kenkyujo Co., Ltd.

INTRODUCTION

Thank you for having purchased our spot welder model W-50R. Please read this operation manual thoroughly to familiarize yourself with the functions and operating procedures of the W-50R. This will enable you to make maximum use of all its functions and ensure efficient and accurate measurement.

Each user is requested to note the following.

1. Follow the instruction in this manual to ensure stable performance and a long service life.
2. We have made every effort to provide accurate information in this manual. However, if you should have any questions or comments, please feel free to contact us.
3. The contents of this instruction manual are subject to change without notice for the purpose of product improvement.
4. Tokyo Sokki Kenkyujo Co., Ltd. shall not take any responsibility, despite item 2 above, for claims of loss and/or damage arising from the operation of this product.
5. Reproduction or reprinting of this instruction manual, either partially or totally, without permission from Tokyo Sokki Kenkyujo Co., Ltd. is strictly prohibited.
6. Please keep this manual always ready to use.

Guaranty

This products has been carefully examined by our in-house inspection division before delivery. If it malfunctions due to a manufacturing fault or an accident during shipment, please report on the condition to your nearest dealer or directly to Tokyo Sokki Kenkyujo Co., Ltd.

The guarantee period of this product is twelve months from the date of delivery. If the product goes out of order or is broken during the period, we will repair it free of charge. However, this free guarantee repair service will not apply in the case of trouble or damage caused by improper handling of the product, remodeling or modification by the user, or an act of God.

The company and product names referred to in this manual represent trade names or registered trademarks.

⚠ PRECAUTIONS

Observe the following instructions to ensure stable and reliable operation of this instrument	
◎ **Operating temperature and environment**	Operate the instrument at a temperature between 0 and +50°C. If the operating site is exposed to direct sunlight or an extremely low temperature, arrange for shade or a thermal insulating material.
◎ **Humidity**	Operate the instrument at a relative humidity less than 85%. Do not expose it to rain or extreme humidity. (Serious problems may result if water is allowed to enter the unit.)
◎ **Flammable environment**	Do not operate the instrument in a place where there is flammable gas or flammable steam. This may cause a fire.
◎ **Other environmental conditions**	Sudden changes in outside temperature may cause dew condensation. Leave the instrument in the desired operation site for a certain length of time before turning on the power supply. Do not leave it for long in direct sunlight or freezing temperatures.
◎ **Powder, dust, etc.**	Powder or dust inside the instrument may cause poor contact or a lowered insulation effect in the connector. Pay special attention, during use and storage, not to allow dust to enter the instrument.
◎ **Vibration or impact**	Do not subject the instrument to excessive vibration while in operation. Do not subject it to strong impacts, such as by dropping, during transportation. Strong impacts or vibrations may cause malfunctioning of the instrument.
◎ **Protective measures for transportation**	When transporting the instrument, use the packaging materials that were used in delivery to protect it from vibration and impacts.
◎ **Strong electromagnetic field**	The instrument may malfunction if either the unit or its wiring is placed near such machines as a large motor, crane, transformer, or welding machine. When extending the sensor to a place subject to a strong electric field, such as near a power substation or radio transmission station, use a special cable such as a shielded cable.
◎ **Thunderbolts**	The instrument is vulnerable to the dielectric effect of thunderbolts. Take preventive measures against thunderbolts where applicable. Contact your dealer or Tokyo Sokki Kenkyujo for details.
◎ **Power supply**	Before supplying power to the instrument, make sure that the power source voltage is within the specified range. Too high a voltage may cause a malfunction or fire. If the instrument is used where there is a chance of lowered or fluctuating voltage or power failure, use a constant voltage unit or a commercial synchronous type UPS (uninterrupted power supply).
◎ **Power ON/OFF**	Switching the power ON/OFF places a heavy load onto the instrument. Allow a time interval of 5 seconds or more between switching operations.
◎ **Breaker**	Reset the breaker after power off and the power cable is pulled off. Do not power on with pressing the reset button of the breaker because of a breakdown and an accident.
◎ **Connection cables**	Do not forcibly pull off any connection cable. Otherwise, the cable will be disconnected or the connector will be pulled out. Be careful not to subject the connector elements to strong impacts. The connector elements must be free of soil, mud, water, and oil.

◎ **Disassembly**	It is not recommended for the user to disassemble or remodel the instrument. Such a do-it-yourself action may cause an electric shock or a malfunction.
◎ **Vent**	The cover of main body has vents to prevent rising temperature inside it. Do not block vents and insert a metal piece. The temperature is susceptible to rise if the main body is fitted a rack or placed next other instruments. Keep an opening between each instrument for ventilation.
◎ **Electrode**	Put the supplied protect cap on the electrode to prevent an electric shock and a breakdown in cause of a short-circuit in the electrodes by a driver or a metal piece.
◎ **Welding tip**	Take care of your hands when filing or exchanging the tip.
◎ **Setting of welding energy**	Make sure that welding energy to keep the minimum and find best condition for welding by trial welding. When you decrease a welding energy, a free welding to unnecessary material is needed to discharge the high energy in the condenser.
◎ **Prevention for accident**	[Eyes prevention] • Protect eyes by wearing protection glasses or sunglasses in working. [Skin prevention] • Protect skin by wearing a shirt with long sleeves and leather gloves. [Fire and explosion prevention] • Do not place combustible such as acetone, thinner, benzine, machine oil, paint and papers around a job site. • Working is a well-ventilated room. [Prevention for long time use] • Do not use for a long time to prevent wrists inflammation of a tendon sheath.
◎ **Do not place heavy object.**	Do not place the object on the W-50R.
◎ **Cleaning**	When the housing of the instrument needs cleaning, wipe it with a soft cloth soaked in a dilute solution of neutral detergent, then dry it well with a cloth. Never use strong solvents such as thinner, which may melt or change the color of the surface coating.

CONTENTS

W-50R Spot Welder

1. General

The W-50R is a capacitive discharge spot welder that is compact and lightweight. Output power is possible be set to 2 ranges, 5 to 50 watt sec. and 1 to 10 watt sec. Time of welding is as short as about 5 msec. so heat damage is a little to a welded base metal. The welding energy is not affected by the fluctuation of voltage due to the stabilizing circuit, and the cable and etc. can be stored in the welder for easy carry.

2. Features

1. Little change of material except at welding points
2. Smallest change of shape at welding points
3. No annealing in slow cooling
4. No color change at welding points by oxidation
5. A little damage at electrode
6. Compact and easy carrying to job sites
7. Indicating a value of welding force for easy setting
8. Indicating a time of welding for little welding leak

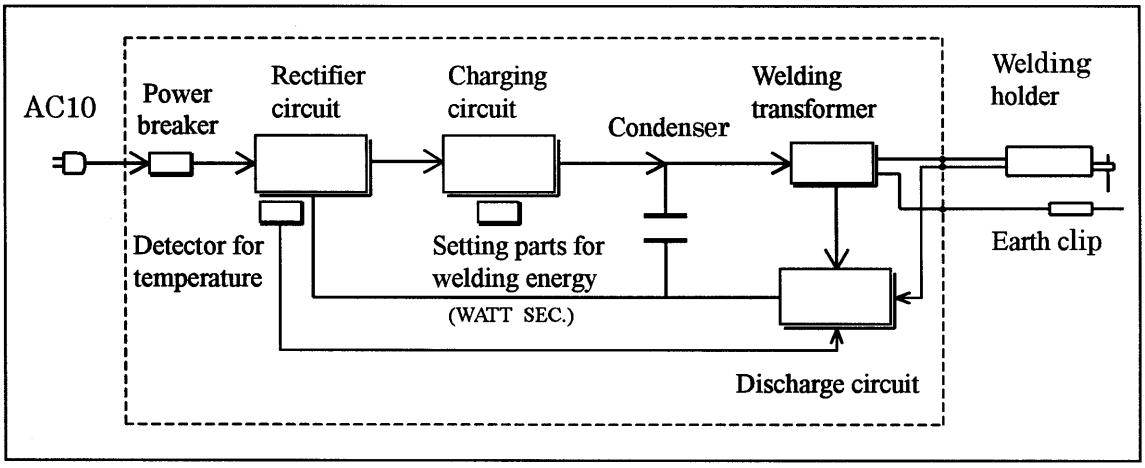
3. Specifications

Welding energy	5 to 50 watt sec. and 1 to 10 watt sec. (Variable)
	60 watt sec. max. (AC 110 V 50Hz)
Max welding voltage	32 VMAX
Output pulse width	5 msec MAX
Welding intervals	2 times/sec. (at 50 watt sec.)
Rating	20 min./1.5 times/sec. (at 50 watt sec.)
Welding holder	Holder type Ⅲ
Welding force	0.5 to 2 Kg
Cable length	2 m
Welding tip	Diameter ϕ 3, tip ϕ 1
Overload protection	Automatically stop at 95℃
Power requirement	AC to V, 50/60 Hz
AC Power consumption	550 VA peak (160 msec.)
	210 VA/2 times/sec.
Environment	0 to 50℃ 85 %RH or less (no condensation)
Dimension, Weight	300 (W)×195 (H)×195 (D) mm, 13 Kg

Standard accessory	Operation manual	1
	Power cable	1
	Shoulder belt	1
	Welding tip	3
	Sandpaper (#400)	5
	Hexagonal wrench M2.5	1
	Electrode protection cap	2

4. Operation principle

Block chart



By charging circuit, a condenser is charged with DC voltage of electric charge that is equal to necessary welding energy of watt sec.

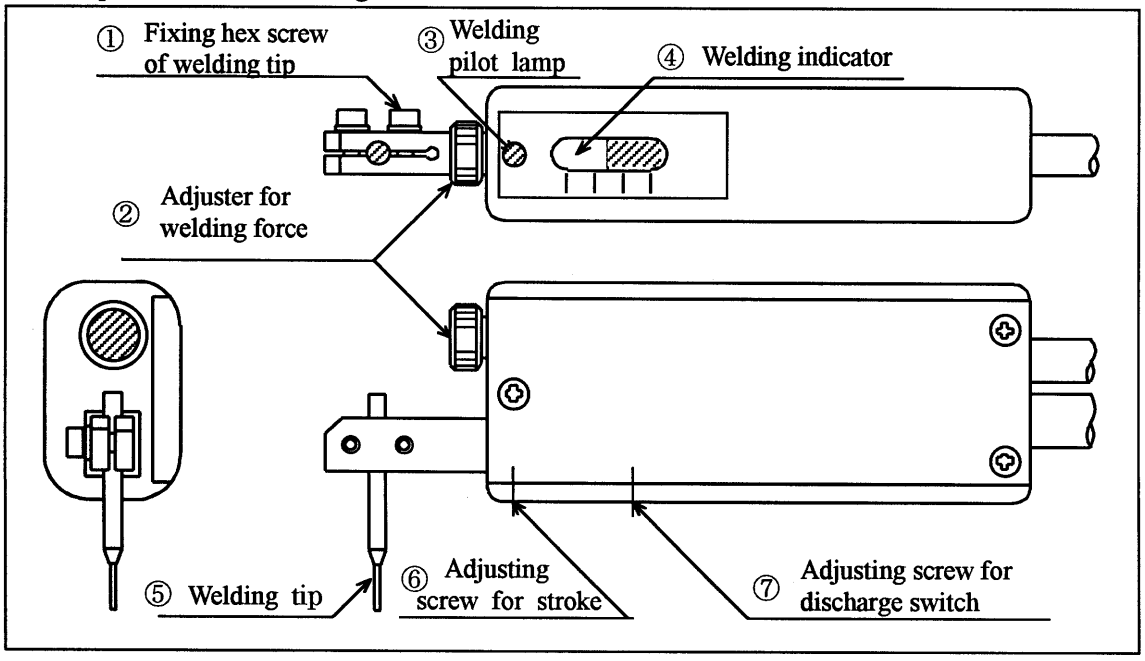
Welding holder has a switch for discharge, and it is turned on when welding force is reached a set value at a welding electrode.

Then the electric charge of the condenser is discharged to the weld transformer and a large current flows to the secondary side in a short period of time to locally heat a material between the electrodes due to Joule heat and weld.

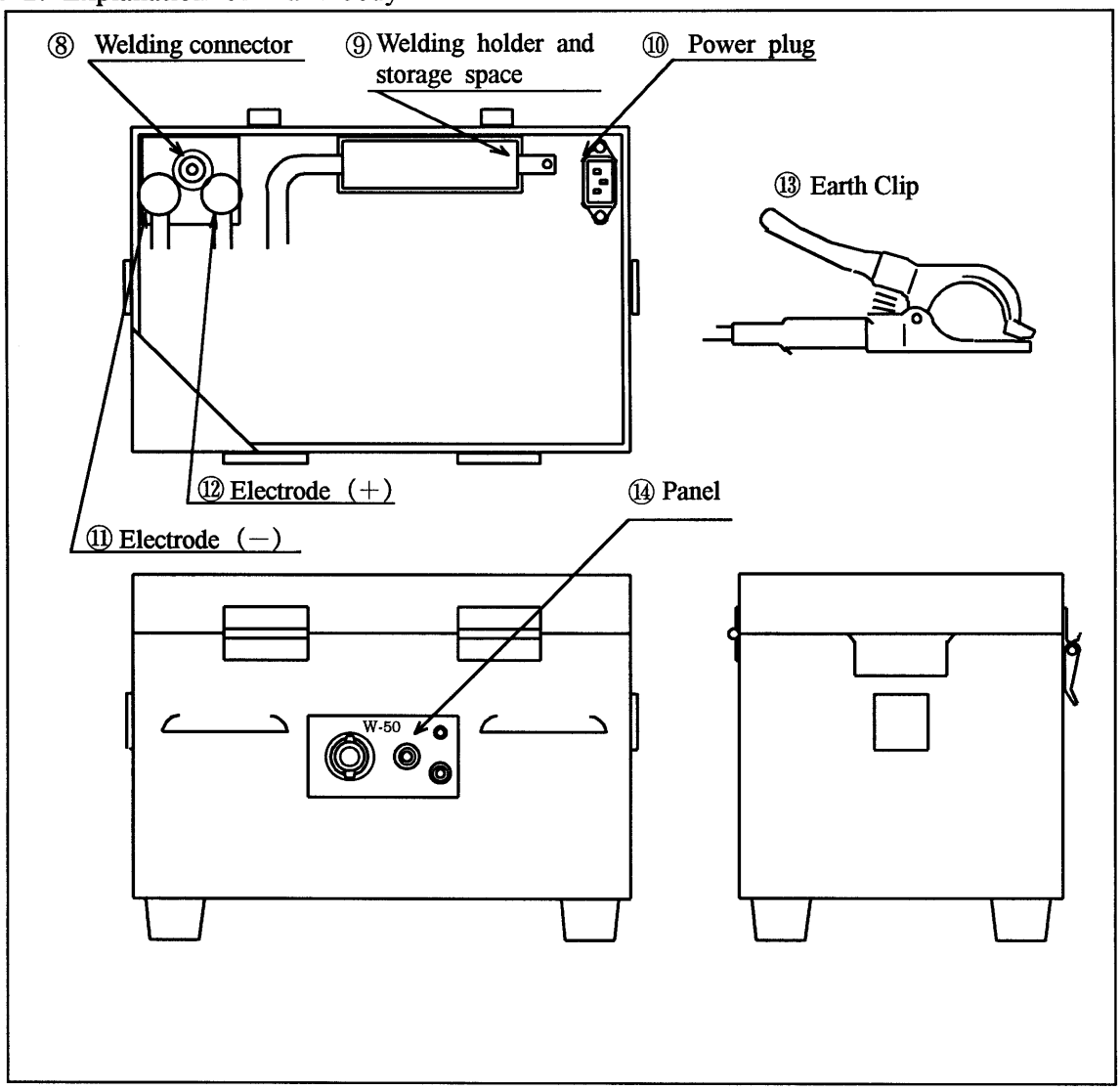
The rectifier circuit has a detector for temperature and if temperature is over 95℃ with an overload, the discharge circuit is stopped to protect the welder from burnout.

5. Handling method

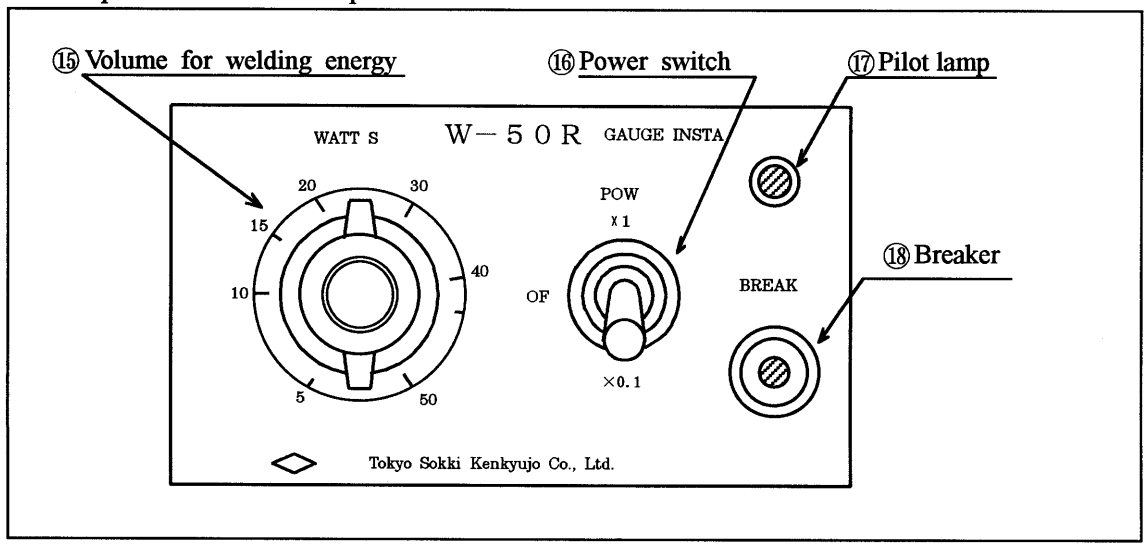
5-1. Explanation of welding holder



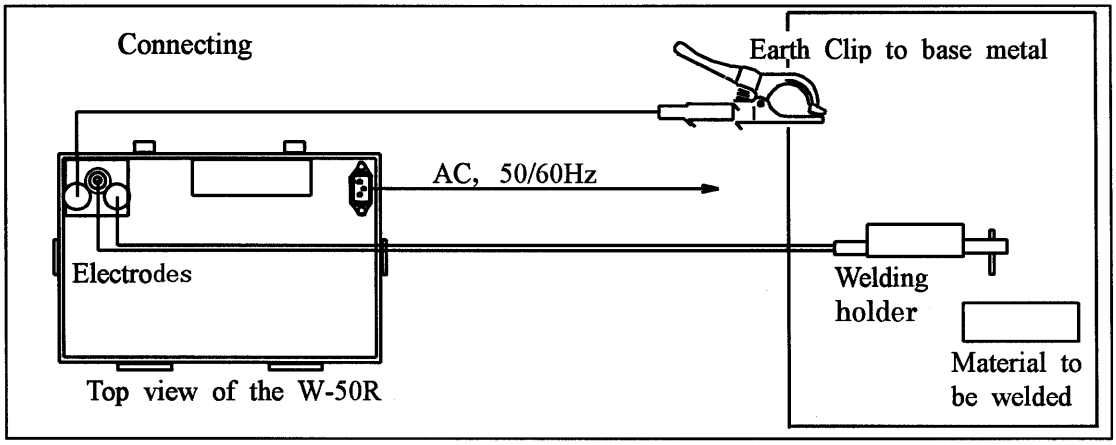
5-2. Explanation of main body



5-3. Explanation of front panel



5-4. Test Welding



If it is first welding or welding materials and base metals are changed, you need to find best conditions though test welding.

1) Setting of the earth clip

Take care of connecting of the earth clip. Imperfect clipping is a cause of incomplete welding because the current is sent from ⑤ welding tip to welding materials to base metal to ⑬ earth clip.

* Make sure that a connect point if the earth clip is oil or rust free. → Cleaning
* Make sure that the material to be clipped is oil or rust free.
  → File rust on a base metal and then clean it by acetone.
* In case of a big base metal that ⑬ earth clip cannot clip, fasten it by other holder.

⚠ Warning

Follow the following for disaster prevention.

[Eyes prevention]

· Protect eyes by wearing protection glasses or sunglasses in working.

[Skin prevention]

· Protect skin by wearing a shirt with long sleeves and leather gloves.

[Fire and explosion prevention]

· Do not place combustible such as acetone, thinner, benzine, machine oil, paint and papers around a job site.

· Working is a well-ventilated room.

[Prevention for long time use]

· Do not use for a long time to prevent wrists inflammation of a tendon sheath.

⚠ Warning

Put the protect cap on the electrodes for protection from an electric shock and troubles. Shorting of the electrodes by a driver or a metal piece is a causes of an electric shock or a damage.

2) Cleaning at welding points and materials

* There are no oil, rust nor dust on welding points of a base metal and a welding material. → Cleaning
* If the surface of a base metal is not flat, file off it.

3) Setting of welding force

* For a thin sheet, a thin rod and a soft steel rod, set 0.8 to 1 kg of ④ welding force by ② knob of welding force adjustment.
* For a thick sheet, a thin rod and a hard steel rod, set 1.5 to 2 kg.

4) Setting of welding energy

In the beginning, welding energy is set smallest for good welding.

* For a thin sheet, a thin rod and a soft steel rod, set 5 watt sec. of the setting knob for welding energy and then turn on ⑯ power switch down (x0.2).
  (In case of x0.2, actual value of energy is one fifth of indicated value.)
* For a thick sheet, a thin rod and a hard steel rod, set 5 watt sec., turn on ⑯ power switch up (x1).

⚠ Caution

Find out a best point of welding condition while inspecting welded points by ⑯ power switch x 0.2.

5) Welding

Grip the welding holder and then push the welding tip down at right angle to a welding material. The welding pilot lamp lights and weld. If not weld, increase welding energy gradually to find out a best point while inspecting welding points as follows.

* If the weld is weak even with the maximum welding energy, decrease welding energy gradually.
* If sparking or unstable, decrease energy gradually.

Refer to (5-4.3) Setting of welding pressure and (5-4.4) Setting of welding energy.

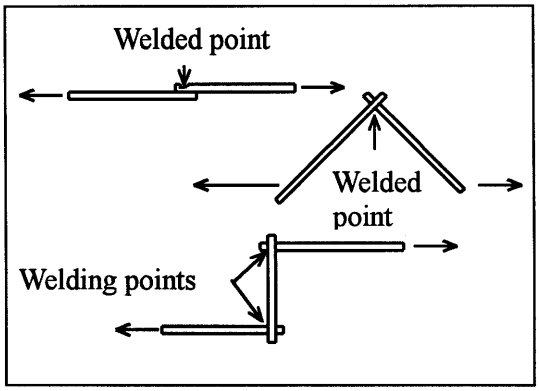
5-5. Inspection of welded points

Welding strength is determined by measuring a force for peeling the welds, but most users do not have much facilities. Therefore, make a test pieces for tension test and obtain data on peeling force and the state of peeling by yourself. In practice a force acting on the weld point is not simple tension but includes shear and bending. So it is recommended to do test welds.

1) Observing test for welding of closed wires

* Test pieces for tension

Make test pieces as in the right drawings and pull it in the direction of arrows until it is broken. Judge good or not of weld from a destructive force and condition of material.

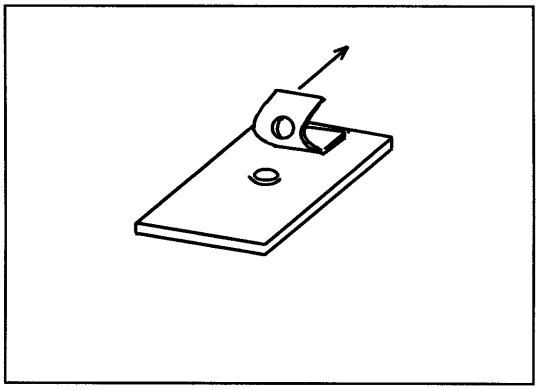


* Weld condition

Little shape change is better at the time of welding but best welding has about 10 % of shape change and deposition between a wire and a base metal. By welding with the W-50R, little discoloration is observed because of a short period of welding. If oxidation is observed too much, it is a cause of abnormal overload (welding force is small, welding energy is large), a material changes in quality and welding strength is not maximum.

2) Peeling test

Peel a welded sheet off a base metal using pliers as in the right drawing. Good weld is that welded point of a sheet leaves on a base metal and the maximum strength is confirmed by a hole on a sheet whose diameter is twice the thickness of a sheet. In case of rods, good weld is that the surface of the rod becomes dented and its point leaves on another rod.



5-6. Welding in practice

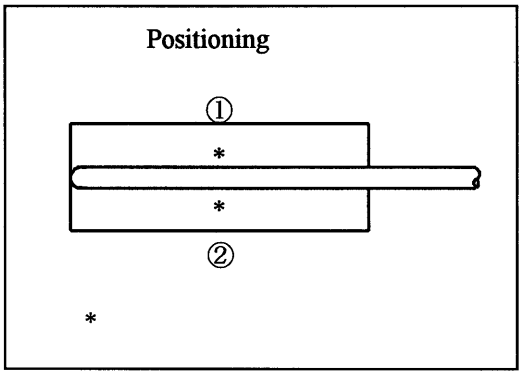
1) Maintenance of the welding tip

Clean ⑤ welding tip for uniform welding at all times. If welding condition is changed with dirt, sputter, coating by a vaporization or a shape change, they are in causes of bad welding.

* If the shape of the welding tip deforms, make it flat use a mild file.
* Put ⑤ welding tip at right angle on a sandpaper #400 and file to finish it up by moving with the sand paper. If the tip is coated by a vaporization of other metal, clean it by the above method.
* If the tip is cannot be normally shaped, exchange it with new one.

2) Welding procedure for a thin sheet such as a weldable strain gauge

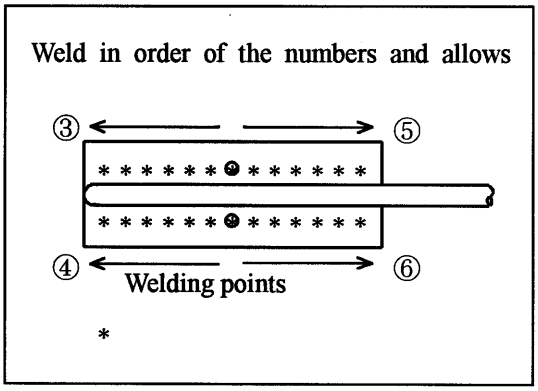
* Weld to position a gauge at point ① and ② as in the right drawing. Correct the position if necessary at this time. (It is recommended to previously determine the welding condition by under the same condition as practice on a test piece.



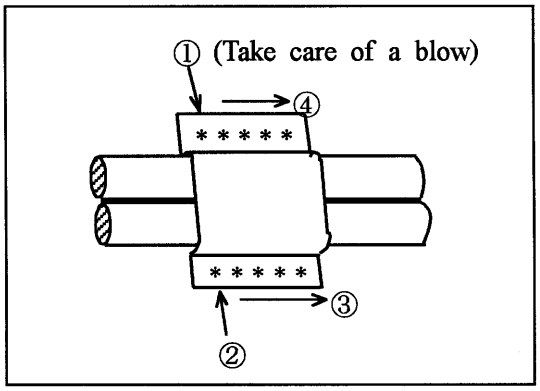
⚠ Caution

⑤ Welding tips are sharp. Take care of your hands when forming by filing and exchanging it.

* Weld in order of the numbers and allows show to the right drawing. It is recommended to increase welding energy little by little every welding because welding energy is distributed to welding points. Take care of bad welding in case of successive welding under insufficient charge.



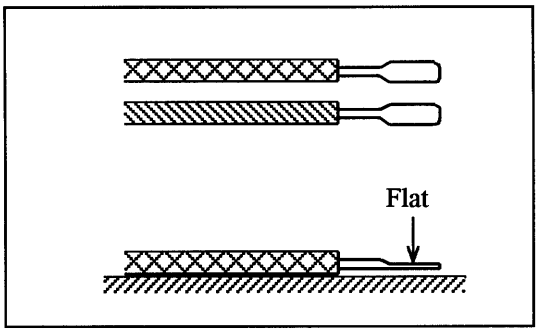
3) Welding of a thick sheet such as a metal fitting



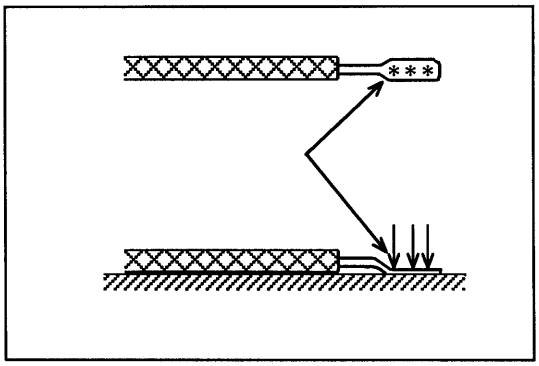
* The procedure of positioning and welding are the same as 2) but distribution of welding energy is much than thin sheets.
Take care of bad welding.
In case of welding at many points, accidents are apt to happen such that the first welding make a hole in the material by sparking. It is recommended to increase the welding force at the first point.

4) Welding thick lead wires such as a thermocouple

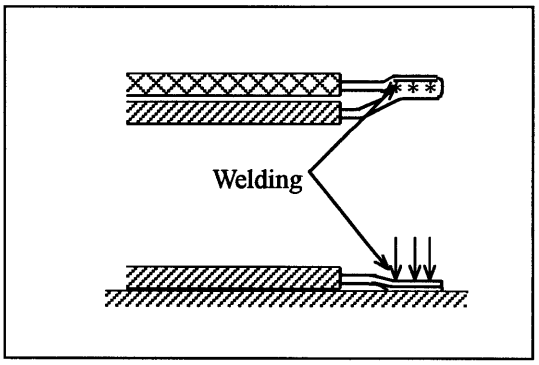
* Make the end of leadwires flat with a roller or a hammer because welding energy is short for thick lead wires.



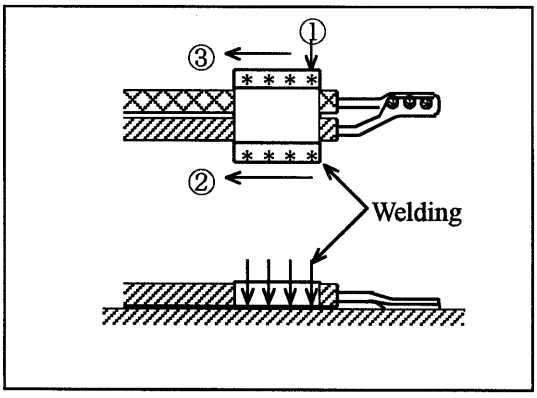
* In the first weld one leadwire. A higher welding force is recommended for a thermocouple because the thermocouple has high inherent resistance and the treated end is still rough.



* Weld another wire over the welded thermocouple.



* Fixing the lead wires
  Fix the lead wires by a stainless steel sheet as in the right drawing.



6. Trouble shooting

6-1. In case of the breaker serving

If a large current flows due to overload, ⑱ breaker serves to cut off the power and ⑰ pilot lamp goes out. In this case, first, cut the power switch off and then press the reset button of the breaker and then switch the power on again.

> ⚠ Caution
>
> Reset the breaker after 10 seconds from the power off and pull the power cable off. Do not switch the power on during pressing the reset button of the breaker not to cause a breakdown an accident.

6-2. In case of the lamp lighting without operation

If welding continues with a large electric power, the safety circuit functions to stop welding because of overload of the power transformer. Ventilate the heated transformer to cool. After cooled, welding will get possible.

6-3. In case of switch failure

If ⑰ pilot lamp is turned on but discharge is not done, confirm that the internal switch inside the welding holder operates with low clicking sound.

In case of no clicking sound, contact our representative or TML.

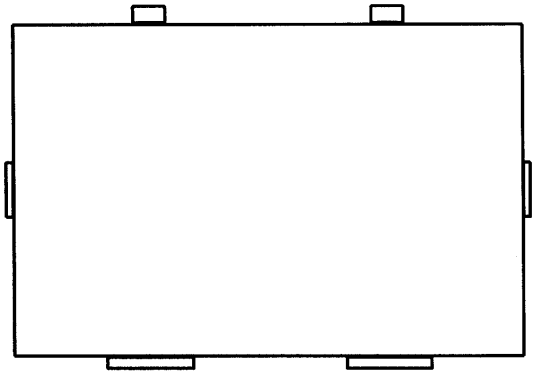
6-4. In case of frequently sparking

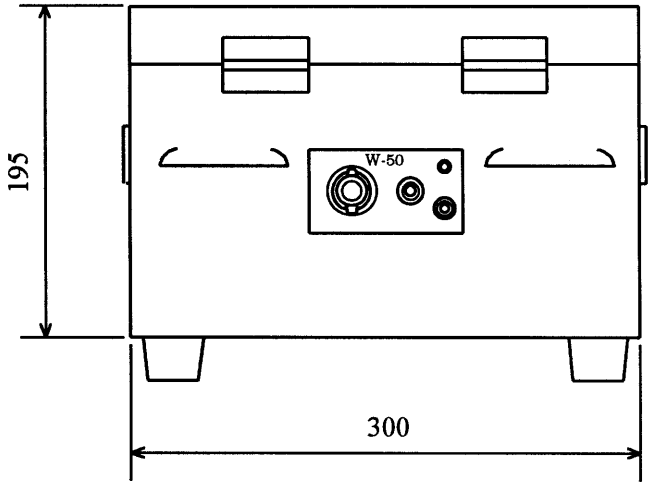
Causes of frequently sparking are as follows.

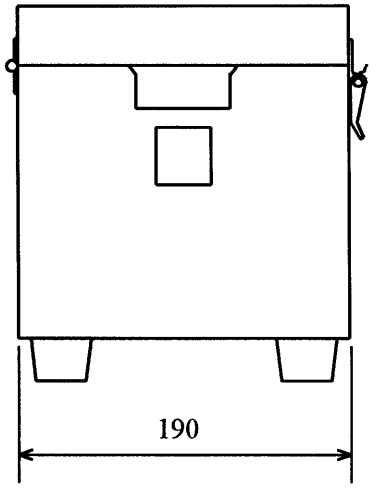
1) Watt sec. of welding energy is too much.
2) Dust, oil, adhesive or rust adheres to welding points.
3) Welding force is too high.
4) The material of a welding tip is not adapted and equate for welding.

7. Dimensions

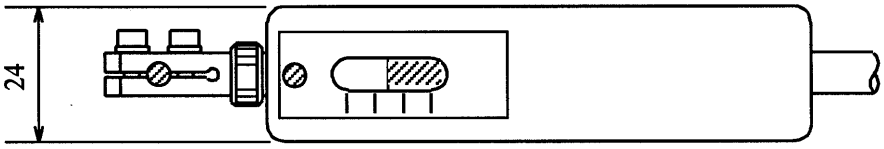
7-1. Dimensions of the main body

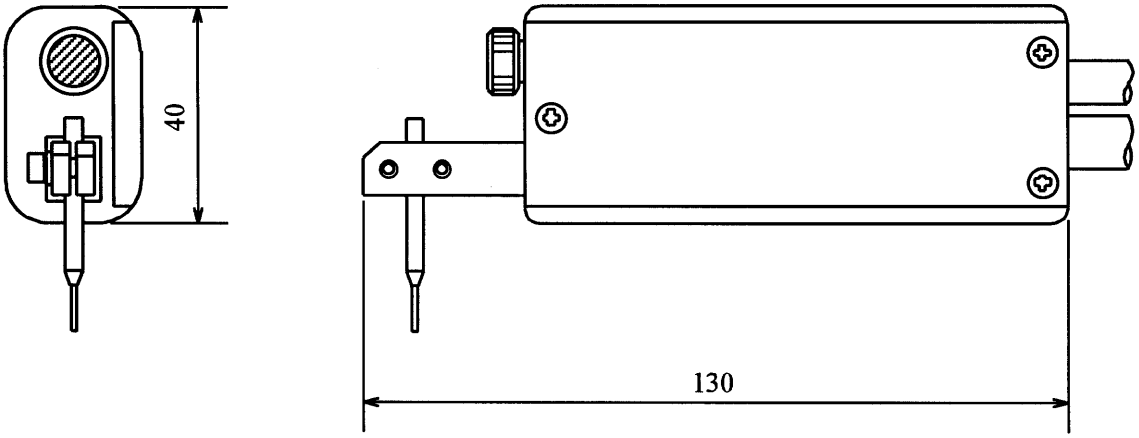


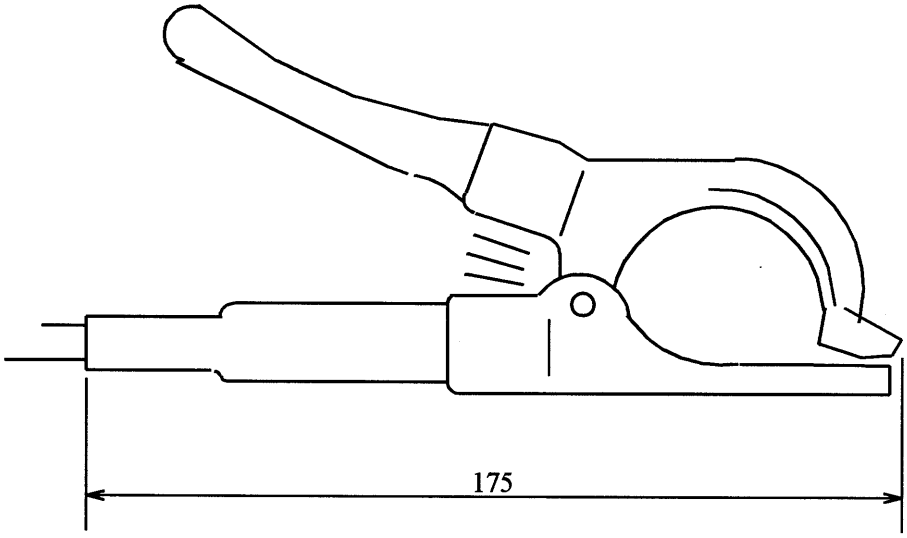




7-2. Dimensions of the welding holder and the earth clip







Before requesting for maintenance and service (repair)

If there should be any failure or malfunction of the W-50R, please contact TML head office or your local representatives.

When you send us the device for repair and maintenance service:

- ○ For quick and precise repair and delivery services, please let us know the conditions of trouble or likely cause of such troubles.
- ○ When packing the device to return it to us, use the packing material employed upon delivery of the device from us or the equivalent.
- ○ If the device must be adjusted with accessory parts or element attached, make sure to deliver them to us at the same time.

Tokyo Sokki Kenkyujo Co., Ltd.
8-2, Minami-ohi 6-chome, Shinagawa-ku, Tokyo 140-8560, Japan
Tel: (03)3763-5611 Fax: (03)3763-5713