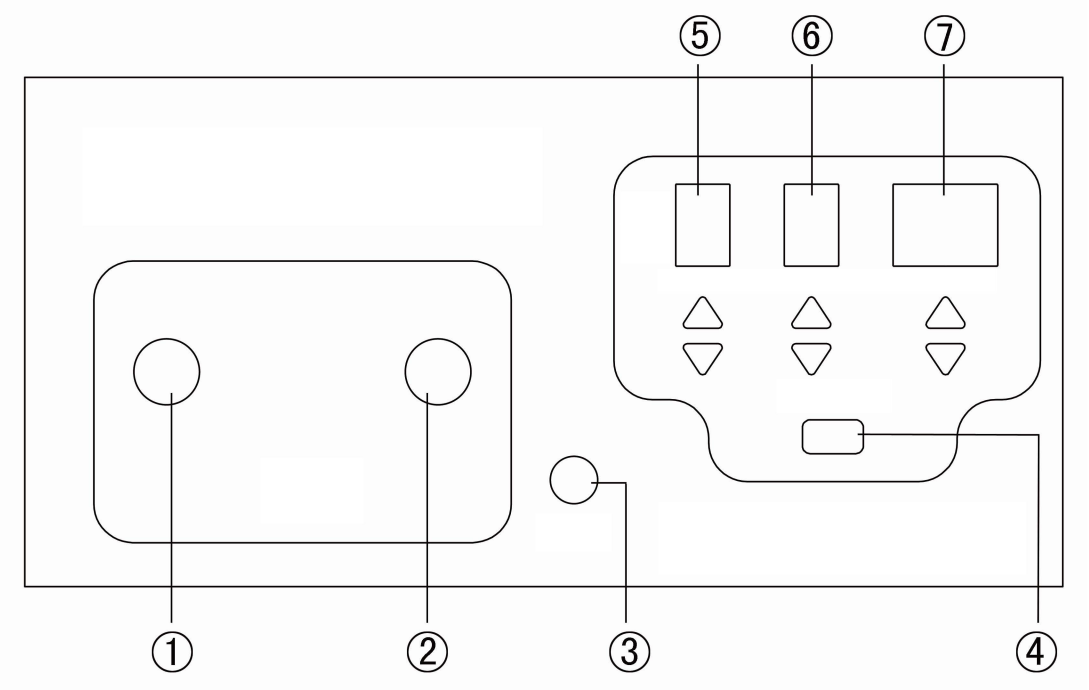
MANUAL
Mold Welder VN-51

Technical Considerations

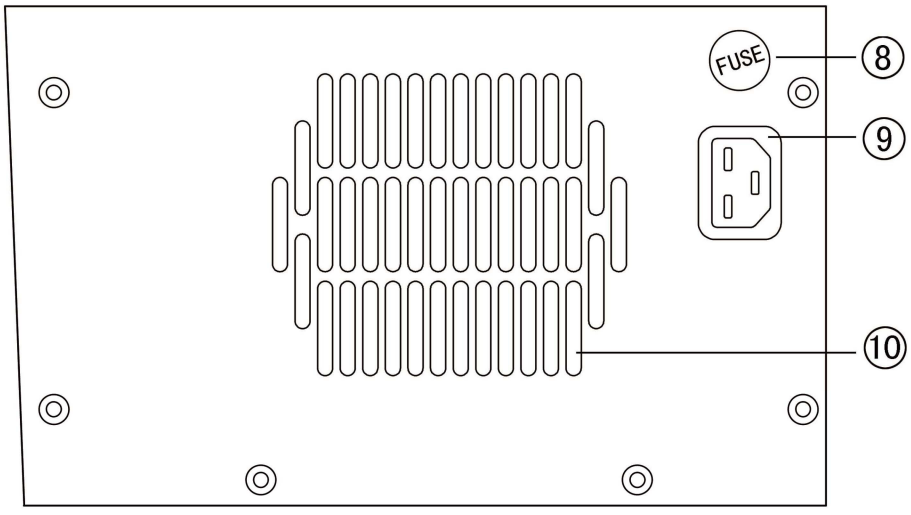
Applicable Materials:	Ferrous metal
Applicable Projects:	wear and tear of moulds, dies and tools
	Excessive cutting. Casting defects. Insufficient arch/TIG welding. Erosion marks
Electric current:	Single-phase 220V±20% 50Hz
Power:	5W – 600W
Instantaneous power:	Max >20KW
Mode:	3 modes, Precise/Normal/Spot
Machine size:	270×220×140mm^3, 6Kg

Panel Illustration



Front (Illustration 1)

① Welding Torch Connect
② Magnet Cable Connect
③ Foot switch
④ Work/Stop
⑤ Mode Select: 1-Precise; 2-Nomral; 3-Spot Weld
⑥ Electrode Diameter Select: 1-5 available
⑦ Filler Thickness Select: 1-12 available



Back (Illustration 2)

8. Fuse. Pls use 5A fuses.
9. Electric Power Plug
10. Vantilation area. Pls keep clean.

Operation procedures

1. Choose "ON" of the main power switch at the back. The machine is now in preparation state. The indicators on the front panel will display two small red dots.

2. Wait for 30 seconds, and then press the Work/Stop button on the front panel. The machine is now ready to work. The indicators will display four numbers "2508".

If you press the power button before a full 30 seconds, the indicators will flash "2508" then the "Mode" indicator will display "¬ ". In this case, please wait for a longer period of time.

Make sure you wait for 30 seconds after you turning on the main power switch, and then press the power button.

3. Select the electrode diameter and the filler thickness.

The electrode diameter ranges from 1mm to 5mm. The number 1 stands for Φ1mm.

The filler thickness ranges from 1mm to 12mm. The number 1 stands for thickness of 0.10mm.

4. Select the welding mode.

Mode 1 - Precise Mode. Suggested for corners and delicate surface.

Mode 2 – Normal Mode. The most frequently used mode.

Mode 3 – Spot Weld. Produce one weld, when stepping foot switch.

5. Connect the workpiece using two magnetic connectors.

To ensure good connection, please put both magnetic connectors on clean and smooth area near the working area. If the workpiece is consisted of several separated parts, put the magnetic connectors on the same part of the working area.

6. Clean the filler sheet, the working area and the electrode. Remove any oil, rust or dust.

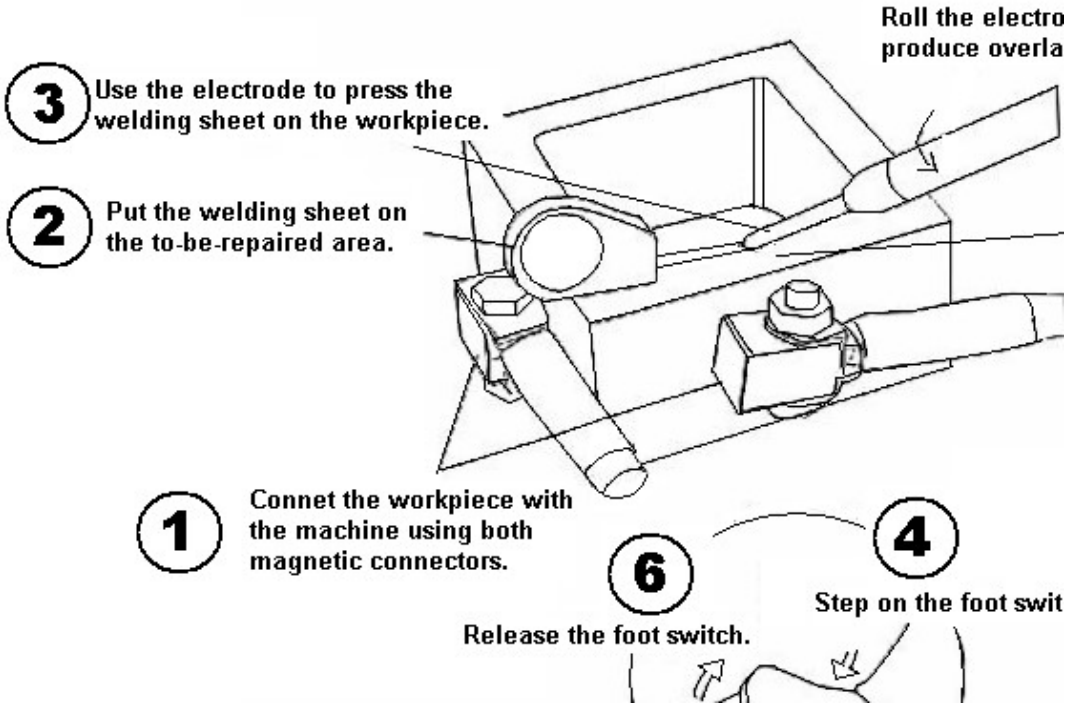
7. Press the welding sheet firmly on top of the defect by the electrode, and then step on the foot switch. The electrode is now welding. Roll the electrode slowly to produce continuous welded lines and these overlapping lines form a repaired area. Please see Illustration Four next page.

If one layer of welding sheet is not thick enough, weld more layers on top of previous ones. Make sure each layer is welded firmly.

You are suggested to wear a pair of protection glasses to prevent you from

accidentally splashing metal. We have prepared one piece for you. It is in the tool box.

Illustration 4



Repair Techniques

a) Choose suitable welding material

Our company provides several common steels for repair work - alloy steel (H08Mn2SiA), stainless steel (1Cr18Ni9Ti) and spring steel (70# high carbon steel), T10 and low carbon steel.

alloy steel (H08Mn2SiA):	Good combination with most mould steel. Hardness after welding: ≈ 30 HRC. Easy for afterward trimming work. Similar color. Small repair marks
stainless steel (1Cr18Ni9Ti)	Erosion proof. Good combination with most steels. Good ductility, hardness after welding: ≈ 20 HRC Unsuitable for workpieces that need chemical treatment.
spring steel 70# high carbon steel T10	High hardness. hardness after welding: > 50 HRC Suitable for quenched or to be quenched workpieces. Welded area is more brittle than the rest four kinds.
Low carbon steel	Low hardness after welding, ≈ 15 HRC Especially good for casting repair.

You can DIY your own favorite welding material using materials that have similar properties as the workpieces.

b) Choose suitable welding sheet thickness

Suitable welding sheet thickness varies according to varied workpiece smoothness and repair amount.

If you are repairing high smoothness moulds, the thickness should be below 120 μm.

If the workpiece steel is easy to quench but should not be quenched, the thickness should be below 80 μm.

c) Essential preparation

1. Clean work: clean the working area, magnetic connectors, the electrode or the filler sheet before welding.

   Clean Oil: use ethanol or acetone.

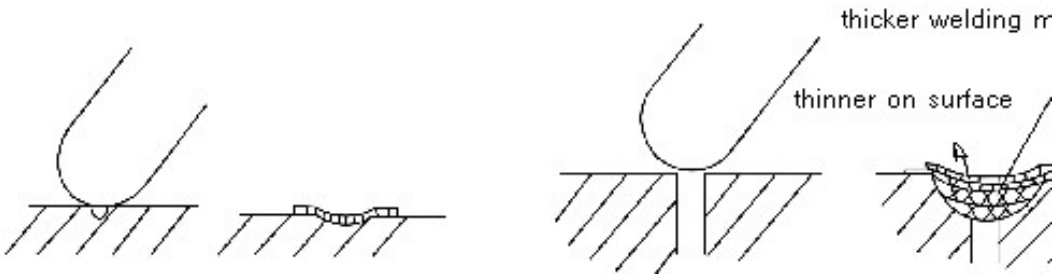
   Oxidation: use abrasive paper or whetstone.

2. Expand small deep holes: Small deep holes (such as pin holes) and steep holes need to be expanded first.

   Select thickness of 06-09, and use ball end electrode (usually Φ3-Φ5). The electrode diameter depends on the diameter of the hole.

   Press the electrode on the hole (without welding sheet), step on the foot switch, and then melt the top corners of the hole until it becomes a spherical depression.

Illustration 5



3. Grind the working area:

   If the working area has dense small holes, please grind the surface by 0.1mm.

4. Remove nitrides: Nitrides often worsen welding quality; therefore they need to be removed before work.

   You can remove the nitride cover by grinding or welding the nitride cover once before repairing, to release part of the nitrogen.

d) Choose suitable welding electrode

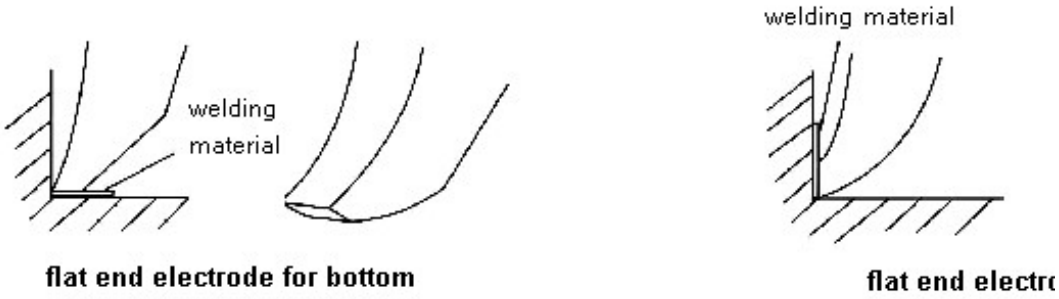
The machine has two types of electrode shape, ball end and flat end.

Ball end electrode can roll continuously during welding, and the touching area is stable. Ball end electrode is used frequently, because it guarantees stable welding quality.

Flat end electrode is especially designed for bottom corner repair. The touching area of flat end electrode should be 1-2mm^2. Area that is smaller than 1mm^2 may cause electrical arc and burn the workpiece. Area that is larger 2mm^2 may cause fake welding because of insufficient power.

Both electrodes need daily maintenance to keep the touching area smooth. A smooth electrode helps greatly with welding quality. Please avoid very sharp electrode.

Illustration 6



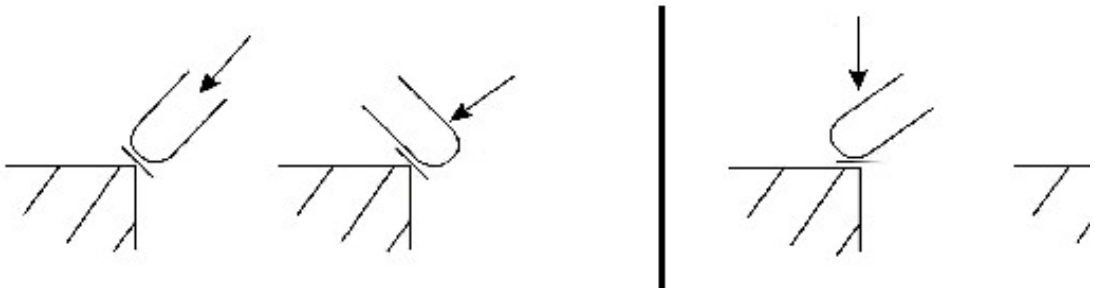
e) Deal with welding quality problems

1. <u>Can NOT repair edges:</u>

   Green -hand operators may find edge repair very difficult, because they have to weld several layers of 0.1mm sheet just to repair a 0.1mm defect. This problem may occur when output power mismatches touching area. Edges have a relatively smaller touching area, therefore normal welding power is too big for edge repair. Excessive power melts and throws up welding material.

   To avoid such problem, please decrease output power and change touching areas and press directions. See illustration 7.

Illustration 7



2. <u>lots of tiny holes after polishing the workpiece:</u>

   This problem may happen because:

   Mismatching output power and touching area;

   Air, oxides, or brass is melt in the welded area.

   To avoid this problem, you are advised to use thinner welding sheet, and select suitable output power.

   Before re-welding such areas, please grind the surface by 0.1mm.

3. <u>tiny cracks or holes circling the repaired area after polishing workpiece:</u>

   This problem may have two possible causes:

   If the working area is a flat depression before repair, this circling defect is caused by insufficient welding power. Please increase welding power or decrease touching area.

If the working area is a steep depression/hole before repair, this circling defect is caused by impurities, such as oxides, nitrides, etc. Please grind the nitride or oxide cover before re-weld.

4. the welded spot is slightly lower than the datum surface after polishing the workpiece:

   This problem mainly happens when welding material is softer than workpiece material, especially when the workpiece is quenched or has a nitride cover. Please use harder material as welding sheet, to match the hardness of the workpiece.

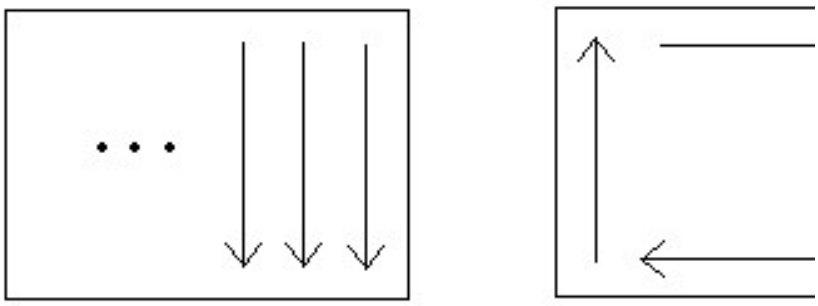
5. the welded spot is slightly higher than the datum surface after polishing the workpiece

   This problem mainly happens because the welding power quenches the workpiece, especially obvious when the material is easy to quench. Please use thinner welding sheet (0.05mm) for the bottom layer. Thinner sheet requires smaller welding power and reduces the quench degree.

6. bubble-like peeling off after thermal treatment:

   This may happen when you melt air into the metal during welding. The melt air inflates during thermal treatment and peels off the surface. You can avoid this problem by orderly welding sequence.

Illustration 8



Correct	Wrong
Weld line by line from one border of the sheet to another	Weld the four borders first and then weld the middle area.
Try to weld every spot firmly the first time	Miss many spots during the first welding. Weld again and again to patch.

Maintenance of the Electrodes

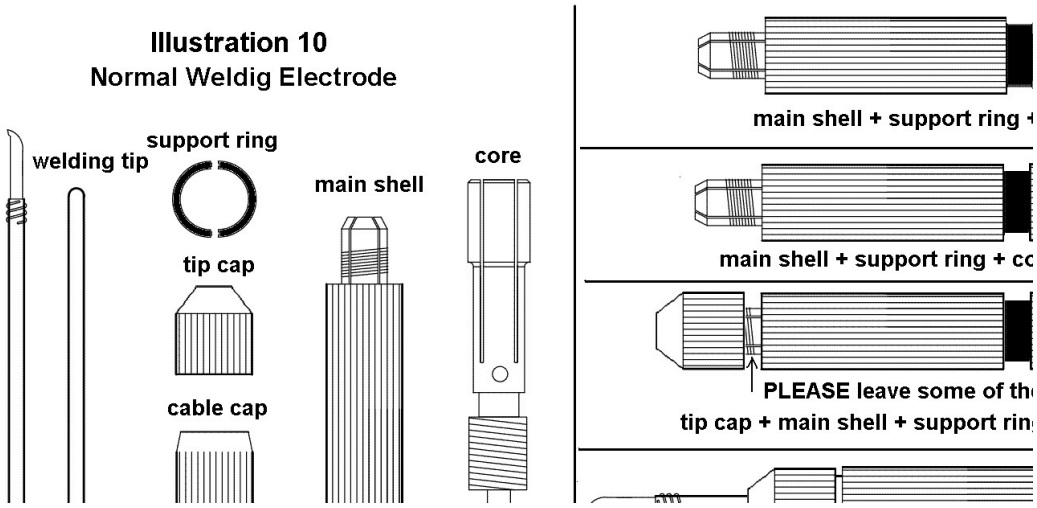
The Normal Welding Electrode can be dissembled into six parts – one copper welding tip, one plastic support ring, one tip cap, one cable cap, one shell, and one core, as illustrated in the next page.

The copper welding tip is the part that directly presses on the welding sheet. It will gradually wear during work.

The plastic support ring is used to help the rotation of the electrode.

The tip cap is used to fix the welding tip.

The cable cap the used to fix the cable that connects the positive pole.



It is very important that the welding tip, the main shell and the core are having good contact. If there is much oxide between the main shell and the core, or the main shell and the welding tip, the actual welding power will weaken significantly, hence welding quality will decrease.

Therefore, please clean these contact areas regularly. Normally, you can use abrasive paper to remove the oxide cover. `

Common System Failures and Solutions

Failure Condition	Cause	Solutions
The indicators have no display after switching on the main power	The power cable is in bad connection. The fuse broke.	Check and connect the power cable properly. Replace the broken fuse.
Low or no welding power	The magnet connectors are dirty The magnetized area is dirty The electrode is dirty The electrode is not firmly fastened to the positive pole	Clean the connectors, the magnetized surface, the electrode inside and the welding tip surface. Fasten the electrode.
The machine sounds an alarm when stepping on the foot switch	The to-be-repaired area is dirty. The electrode is dirty.	Remove rust, dust and oil from the to-be-welded area, from the electrode inside, and from the welding tip surface.
	Wrong operation procedures. The operator steps on the foot switch before the electrode is pressed on the workpiece.	Practice more. Make sure the welding tip is pressed on the workpiece before stepping on the foot switch, and release the foot switch before the electrode leaves the working surface.
	The workpiece is not tightly magnetized by the magnet connectors.	Magnetize the connector to areas that is clean and smooth. Remove rust, dust, scrap iron, and oil before magnetizing.
The machine stop working after several dozen minutes, with the "Mode" indicator displaying "╕ " and others off.	The machine automatically shut off to avoid overheat damage, which is usually caused by bad ventilation.	Check the cooling fan Make sure the machine has enough space for ventilation.

<u>NOTICE:</u> the electrical source has a good earthing no larger than 4Ω.

<u>WARNING:</u> We do NOT recommend dismantling the main machine. If you have to, cut off the main power before opening the shell of the machine. Be extra careful when examining the inner circuits.

Package List

Main machine	1 pcs
Normal welding electrode (with cable)	2 pcs
Magnet connectors (with cable)	2 pcs
protection glasses	1 pair
foot switch	1 pcs
Power cable	1 pcs
Fuse (5A)	4 pcs
Scissor	1 pcs
Welding tip	5 pcs
H08 welding sheet （0.05;0.07;0.10;0.15;0.2）	1 coil each specification
Stainless welding sheet（0.05;0.07;0.10;0.15;0.2）	1 coil each specification
Spring welding sheet（0.05;0.07;0.10;0.15;0.2）	1 coil each specification

Please contact us if any fittings are needed. We sell these fittings as well.
We provide free repair of the main machine for one year since the purchase date, and charge repair cost for fittings and main machine that is older than one year since the purchase date.