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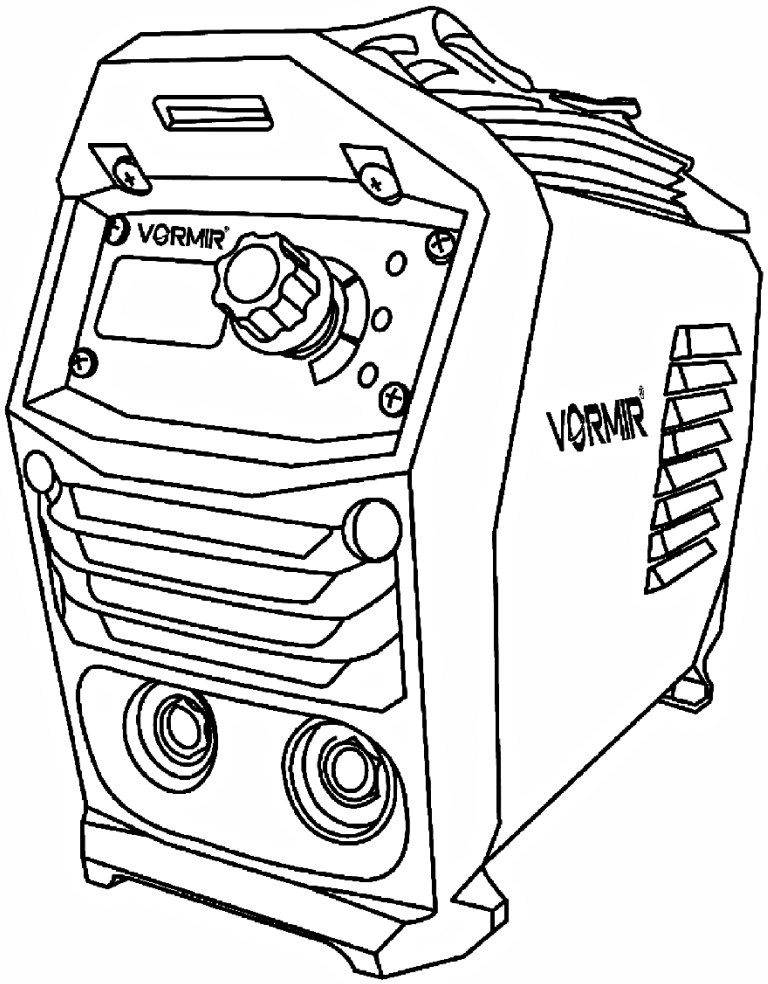
OPERATOR'S MANUAL



WELDING MACHINE

VR M200-90

<Read manual carefully before using>

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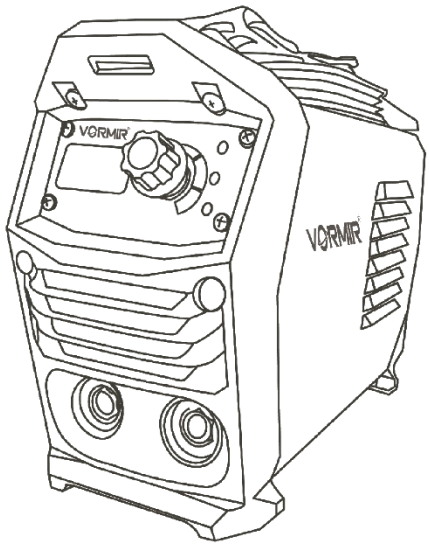


SAFETY PRECAUTIONS: ARC WELDING

⚠ **WARNING!** Read all safety warnings, instructions, illustrations and specifications provided with this machine. Failure to follow all instructions listed below may result in electric shock, fire and/or serious injury. Save all warnings and instructions for future reference. **Only qualified persons should install, operate, maintain, and repair this unit.**

ELECTRIC SHOCK

Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine circuits are also live when power is on. Incorrectly installed or improperly grounded equipment is a hazard.

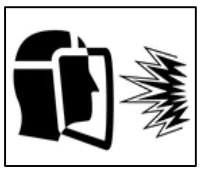
- **Do not touch live electrical parts**. Wear dry, hole-free insulating gloves and body protection.
- **Insulate yourself from work** and ground using dry insulating mats or covers, big enough to prevent any physical contact with the work or ground.
- **Do not use AC output in damp areas, if movement is confined**, or if there is a danger of falling. Use AC output ONLY if required for the welding process.
- **Do not connect more than one electrode or work cable to any single weld output terminal.**
- Disconnect input power or stop the machine before installing or servicing this equipment.
- **Always verify the supply ground** – check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet.
- **Frequently inspect input power cord for damage or bare wiring** – replace cord immediately if damaged – bare wiring can kill.
- **Do not touch electrode if you are in contact with the work, ground, or another electrode from a different machine.**

FUMES AND GASES

Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health. **Keep your head out of the fumes. Do not breathe the fumes.**

- If inside, ventilate the area and/or use exhaust at the arc to remove welding fumes and gases. If ventilation is poor, use an approved air-supplied respirator.
- **Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator**. Always have a trained watch-person nearby. Welding fumes and gases can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- **Do not weld in locations near cleaning, or spraying operations**. The heat and rays of the arc can react with vapours to form highly toxic and irritating gases.
- **Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel**, unless the coating is removed from the weld area, the area is well ventilated, and if necessary, while wearing an air-supplied respirator.

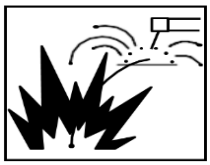
ARC RAYS



Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Sparks fly off from the weld.

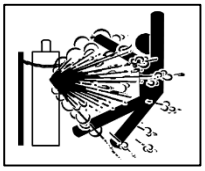
- **Wear a welding helmet fitted with a proper shade of filter to protect your face and eyes when welding or watching.**
- Wear approved safety glasses with side shields under your helmet.
- Use protective screens or barriers to protect others from flash and glare; **warn others not to watch the arc.**
- Wear protective clothing made from durable, flame-resistant material (leather and wool) and foot protection.

EXPLOSION



Welding on closed containers, such as tanks, drums, or pipes, can cause them to blow up. Sparks can fly off from the welding arc. The flying sparks, hot work-piece, and hot equipment can cause fires and burns. **Accidental contact of electrode to metal objects can cause sparks, explosion, overheating, or fire.** Check and be sure the area is safe before doing any welding.

- Protect yourself and others from flying sparks and hot metal. Do not weld where flying sparks can strike flammable material.
- Remove all flammables within 35 feet (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
- Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
- **Watch for fire, and keep a fire extinguisher nearby.**
- Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side. **Do not weld on closed containers such as tanks, drums, or pipes, unless they are properly prepared by required safety Standards.**
- Connect work cable to the work as close to the welding area as practical to prevent welding current from traveling long, possibly unknown paths and causing electric shock and fire hazards.

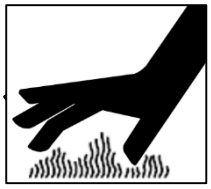


Cylinders can explode if damaged; Shielding gas cylinders contain gas under high pressure and damaged cylinder can explode, so be sure to treat them carefully.

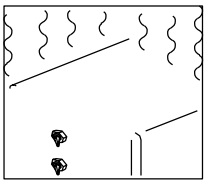
- **Keep cylinders away from any welding** or other electrical circuits. Never hang a welding torch over a gas cylinder.
- Never allow a welding electrode to touch any cylinder. Never weld on a pressurized cylinder – explosion will result.

Do not install or place unit on, over, or near combustible surfaces or flammables. Do not overload building wiring – be sure power supply system is properly sized, rated, and protected to handle this unit.

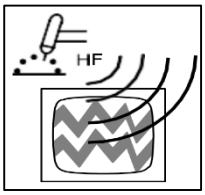
FURTHER CASES



Hot parts can cause severe burns. Do not touch hot parts bare handed. Allow cooling period before working on gun or torch.

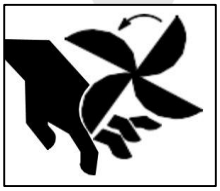


Overuse can cause overheating; Allow cooling period and follow rated duty cycle. Reduce the current before starting to weld again. Do not block or filter airflow to unit.



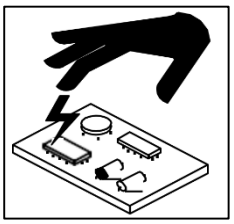
High-frequency due to welding can cause interference, it can interfere with radio navigation, safety services, sensors computers, and communications equipment.

Be sure all the equipment in the welding area is electromagnetically compatible. To reduce possible interference, keep weld cables as short as possible, close together, and down low, such as on the floor. Locate welding operation 100 meters from any sensitive electronic equipment.



Moving parts can cause injury. Keep away from moving parts such as fans. Keep all doors, panels, covers, and guards closed and securely in place.

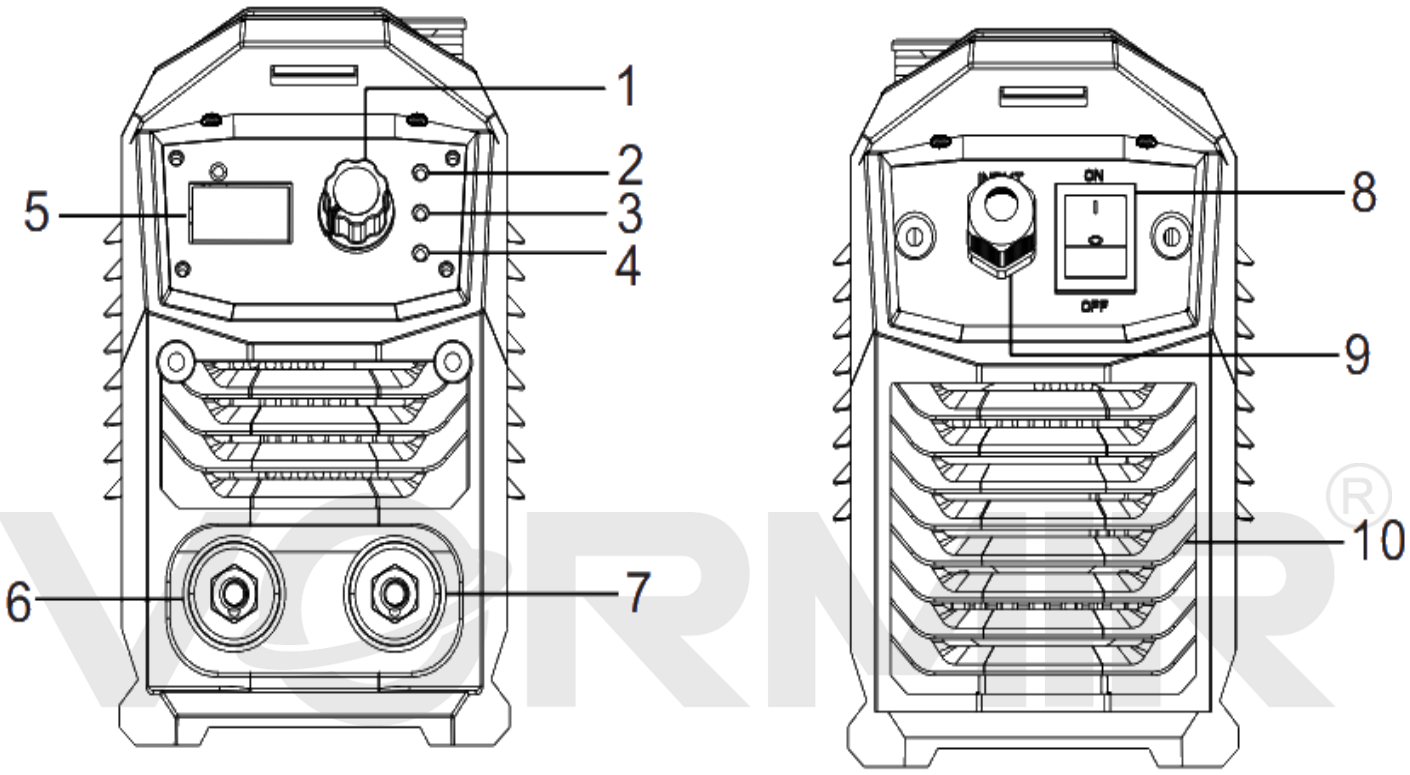
Welding wire can cause injury; Do not press gun trigger until instructed to do so. Do not point gun toward any part of the body, other people, or any metal when threading welding wire.



Electo-static discharge can damage printed circuit boards. Put on grounded wrist strap before handling boards or parts. Use proper static-proof bags and boxes to store, move, or ship PC boards.

PRODUCT OVERVIEW

VR M200-90



1. Current adjusting knob
2. Power indicator
3. Heat Indicator
4. QC indicator
5. Digital Display

6. Quick connector socket: welding machine output (+)
7. Quick connector socket: welding machine output (-)
8. On-off Switch
9. Power cord anchorage
10. Smart Fan

PRODUCT SPECIFICATIONS

Model Number	VR M200-90
Input Power (V)	220V±15%
Supply Frequency (Hz)	50/60Hz
Input Capacity (KVA)	6.1
Input Current (A)	28
No Load Voltage (V)	48
Current Range@ 100%	20-140
Max Current(A)	200
Efficiency (%)	85%
Usable electrodes(mm)	1 to 4
Hot Start	Built-in
Anti-Stick	Built-in
ARC Force	Built-in
Advanced IGBT Technology	Yes
Voltage Compensation	Yes
VRD	Built-in
Thermal Protection	Yes
Insulation class	F
Protection Class	IP21S
Cooling	Smart Fan**
Power Socket Amp Required	32A
Continuous welding @100%	140
Continuous welding electrode gauge	10
Maximum electrode cable length (100% Efficiency)	20M***
Generator (KW) Required	5

**** Smart Fan work only when cooling is required.**

***** Current proportionally reduce when electrode cable length increases.**

SETUP

UNPACKING AND ENSURING

- The equipment is packed in durable packages. Nevertheless, always before using the equipment, make sure it is not damaged during transportation/delivery.
- Place the unit on horizontal, solid and clean surface. Shield it from heavy rain and scorching sun. Make sure that cooling air circulates freely.

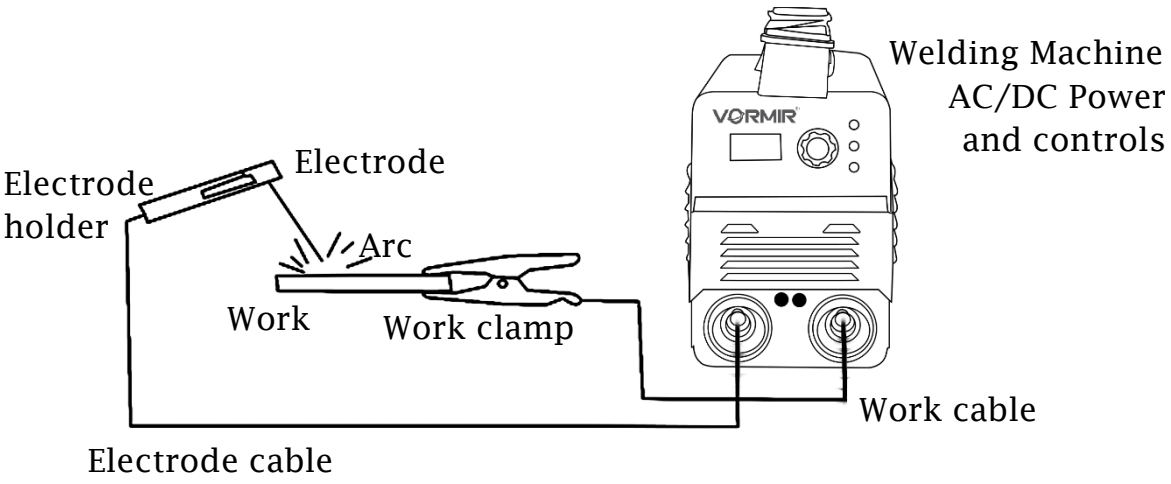
⚠ **WARNING!** The product must be fully assembled before operation! Do not use a product that is only partly assembled or assembled with damaged parts! Do not connect the product to power supply before it is completely assembled!

INTENDED USE

Welding machines are among the most essential tools for a welding professional. Welding machines generate heat that melts metal parts, so that these parts can be joined.
In **Manual Metal Arc Welding** (MMA), consumable, flux-covered electrode and a ground clamp, a short-circuit is initially made on the weld piece. An electric arc forms between electrode and work-piece, which heats up enough to melt both. As the electrode melts, the flux coating on the electrode develops gas and slag, which help protect the weld pool. The gas keeps air and other pollutants away, while slag forms on top of the weld pool to protect the weld seam. The slag cools down and solidifies rapidly, protecting the weld area after the gas has disappeared.
The machine uses a high performance IGBT Technology, which is very useful as they give power that can be used for different welding processes.

INSTALLATION

- Make sure that the air vent of the machine is not covered and clogged up to avoid failure of cooling system**. All our welding machines are equipped with VRD (Voltage Reduction Device) Technology.**
- Connect the welding tongs (grounding clamp and electrode holder) correctly according to the following figure. Firstly, make sure that cable, welding tongs and quick plugs are connected reliably.
- Insert the quick plug that connects the electrode holder in the quick socket with the polarity of "+", and then tighten it by force clockwise.
- Insert the quick plug that connects the grounding clamp into quick socket with the polarity of "-" on the panel of welding machine, tighten it by force clockwise, the grounding clamp connects to the work-piece.
- Pay attention to the polarity of connection, if connected improperly, unstable electric arc, large splash and sticky welding rod may occur.
- Connect the power plug to the corresponding voltage class of distribution box according to the input voltage class of welding machine, don't connect the voltage by mistake. Make sure that tolerance of supply voltage is within the allowable range.



PARAMETERS

Current setting: The correct current, or amperage setting primarily depends on the diameter and type of electrode selected. The side of the electrode box usually indicates operating ranges. Select an amperage based on the material thickness, welding position (about 15 percent less heat for overhead work compared to a flat weld) and observation of the finished weld.

Length of arc: The correct arc length varies with each electrode and application. As a good starting point, arc length should not exceed the diameter of the metal portion of the electrode. Excessively long arcs (too much voltage) produce spatter, low deposition rates, undercuts and sometimes porosity.

Angle of travel: Hold the rod perpendicular to the joint and tilt the top of the electrode in the direction of travel approximately 5 to 15°. For welding vertical up, use a forehand technique and tilt the top of the rod 15° away from the direction of travel.

Speed of travel: The proper travel speed produces a weld bead with the desired contour (or crown), width and appearance. Adjust travel speed so that the arc stays within the leading one-third of the weld pool. Slow travel speeds produce a wide, convex bead with shallow penetration. Excessively high travel speeds also decrease penetration, create a narrow and/or highly crowned bead, and possibly undercuts.

Manipulation: Each welder manipulates or weaves the electrode in a unique style. Develop your own style by observing others, practicing and creating a method that produces good results for you. Note that on material 1/4 inch and thinner, weaving the rod typically creates a bead that is wider than necessary. In many instances, plain, straight-ahead travel works fine. To create a wider bead on thicker material, manipulate the electrode from side to side creating a continuous series of partially overlapping circles, or in a

Z-shaped, semi-circle or stutter-step pattern. Limit side-to-side motion to two and a half times the diameter of the electrode core. To cover a wider area, make multiple passes or stringer beads. When welding vertical up, focus on welding the sides of the joint and the middle will take care of itself.

Diameter of welding rod and Welding current

Diameter of welding rod (mm)	φ1.6	φ2.0	φ2.5	φ3.2	φ4.0	φ5.0	φ5.8
Welding current (A)	40	55	80	115	160	190-260	250-300

Thickness of steel plate and Diameter of welding rod

Thickness of steel plate (mm)	1-2	2-5	5-10	Over 10
Diameter of welding rod (mm)	1-2.5	2.5-4	3.2-5.8	4-8

NOTE: It is recommended that you try welding and rate of welding current first on something else than the actual work piece. You can start welding after having made the necessary selections. Arc is lit by scratching the welding piece with electrode. Length of arc is regulated by holding electrode tip at a suitable distance from welding piece. Suitable arc length is usually about half the diameter of the electrode wire.

CONTROLS AND OPERATIONAL FEATURES

Current adjusting knob:
Potentiometer is used to set the output current during welding.

Anti-sticking (INBUILT):
This electronic device minimizes the short circuit current in the event of the electrode sticking to the work piece for a prolonged period. It also serves as a safety device in protecting the operator.

Power ON/OFF LED:
This LED lights up when the machine is ON.

Heat LED:
This indicator will turn on when the machine is overheated and the output has been disabled. This normally occurs when the duty cycle of the machine has been exceeded.

QC LED:
This turns on when the machine is overheated/overloaded.

Digital Display:
The meter displays the present welding current before welding and the actual welding current during welding.

Quick connector socket: welding machine output (+):
Connect the electrode holder to this socket.

Quick connector socket: welding machine output (-):
Connect earth cable to this socket.

Smart Fan:
This machine has a Smart Fan circuitry inside, which work only when cooling is required. The fan will continue to run whenever the machine is welding.

VRD (INBUILT):
VRD (Voltage Reduction Device) provides an additional measure of safety, especially when working in an environment with a higher risk of electrical shock conditions.

GENERAL OPERATION

In Manual metal arc(MMA) welding, the welding filler material is melted from the electrode to the weld pool. Rate of welding current is selected on the basis of electrode size used and welding position. Arc forms between electrode tip and welding piece. The melting electrode coating forms gas and slag, which protects the weld pool.

⚠ **WARNING!** Make sure that welding cable and earth cable connections are tight. If a connection is slack, it will result in voltage drop that will cause the connection to heat. During welding, it is forbidden to pull off any plug or cable in use, or it will lead to life-threatening danger and severe damage to the machine.

- Always fix earth cable clamp directly on the welding piece. Clean connection surface of earth clamp from paint and rust. Connect the clamp carefully so that contact surface is as large as possible.
- Turn the power switch to “ON” position. Cooling fan inside the machine should begin to work once welding starts. This welding machine is equipped with automatic cooling technology; Smart fan will work only when welding starts and helps to cool the internal circuit and components.
- Clamp the welding rod on the electrode holder, the machine is in the manual welding mode and in the standby state.
- In accordance with the thickness of welding work-piece, diameter of welding rod, working position and technology needs, make sure suitable welding current. If current is too high, intensified splashing may lead to inferior formation of weld and if low, the melted welding stick becomes fluid and drop transfer would not proceed smoothly.

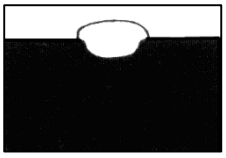
For beginners, the first difficulty is priming the arc. For best results proceed as follows:

- Test the current intensity and the electrode on a piece of scrap material. Hold the electrode approximately 2 cm above the start of the joint and hold the face shield in front of your face. Touch the work-piece with the electrode and stroke it repeatedly on and off the work-piece to start the arc. Remove the electrode with a firm lateral jerk.
- **Watch the arc only through the face shield** and keep the arc length approximately 1–1.5 times the diameter of the electrode. The arc length is very important as it has an influence on the welding current and welding voltage.
- Incorrect current intensity produces a poor quality, weak joint. Hold the electrode at an angle approximately 70° – 80° to the work-piece in the direction of advancement. If the angle is too large, the slag can penetrate the joint; if the angle is too small, the arc flutters and sprays molten metal. In both cases, a weak, porous joint is produced.
- Wait until the joint has cooled completely before removing the slag. If you wish to continue welding a joint after taking a break, the slag at the end of the joint must be removed first. Prime the arc in the joint and melt the electrode at the point where the two joints meet.

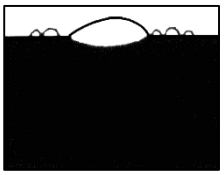
NOTE: Always use tongs or pliers to remove spent electrodes and to move parts that you have just welded. Please note that the electrode holder must always be put down so that it is insulated after you have completed the welding work. Do not remove the slag until the weld has cooled. If you want to continue a weld after an interruption, the slag from your initial attempt must first be removed**. Do not bang the electrode on the work-piece as this could damage the electrode covering, making it more difficult to prime the arc.**

WELDING PITFALLS

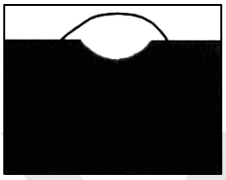
The arc welding technique is an acquired skill and requires considerable practice before perfect results are obtained. The diagrams below will help to explain the pitfalls (problems) in your technique and how to overcome them.



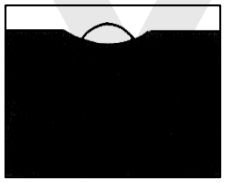
Arc too short
This causes irregular masses of weld to be deposited, with slag contamination on an uneven surface.



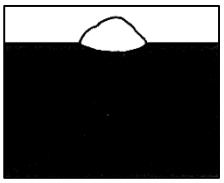
Arc too long
This causes poor penetration resulting in a weak weld with excessive spatter and porosity.



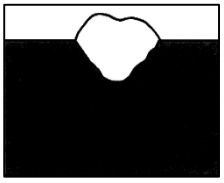
Electrode moved too slowly
This causes a very wide and heavy deposit which overlaps at the sides. It is wasteful both in terms of time and electrode use.



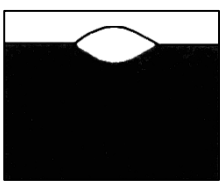
Electrode moved too quickly
This causes poor penetration with a 'stringy' and incomplete weld deposit. Slag is very hard to remove.



Current too low
This causes poor penetration and causes the electrode to stick to the work-piece too readily. Also results in a very irregular and high weld deposit.



Current too high
This causes excessive penetration with spatter and deep pointed crater. It may also cause holes to be burned in the work-piece.



The perfect weld
With the correct combination of arc length, current regulation, inclination and speed of the electrode, you will (with practice) produce the perfect weld.

STORAGE

Store the equipment and accessories out of children's reach in a dark and dry place at above freezing temperature. The ideal storage temperature is between 5°C and 30°C. Store the electric tool in its original packaging.

MAINTENANCE

All the maintenance work must be conducted under the condition of complete power failure; please make sure that power plug is pulled out.

- Regularly remove the dust on the welding machine with dry compressed air. When use it in heavy fume and polluted air, do this job at least once a month. Compressed air should drop down to the required pressure to prevent damaging the small parts and units in machine.
- Avoid water or moist getting into welding machine, or else, blow the welding machine to dry immediately, then measure the insulation with insulation resistance meter, it can only be used when the measuring result is accepted.
- In the event that the welding machine is not used for long-term, it should be placed into the original package and stored in dry place.
- Any improper or incorrect operation may cause the welder's failure and damage. Routine maintenance on power control switch, grounding device, welding electrode holder, coupling device and set screws should be performed on a regular basis.
- Measure the welder's insulation resistance with insulation resistance meter.

NOTE: Repairing welding equipment should be carried out by a qualified person using original spare parts. This ensures the safety of the device as well as yourself.

TROUBLESHOOTING

The following operations must be performed by qualified electricians with valid certifications. Before maintenance, please contact with us for professional suggestion.

Problem	Solution
1. Meter doesn't display, fan doesn't work, no welding output.	1.1 Make sure power switch is OFF. 1.2 Make sure the power source connecting to input cable is working alright. 1.3 Make sure the input voltage is 3 phase.
2. Meter is normal, fan is working, no welding output.	2.1 Check if connector of output terminal is broken or damaged. 2.2 Check if the control board is damaged (contact with the dealer or manufacturer).
3. QC indicator is ON, fan is working, meter is normal.	3.1 IGBT is damaged. 3.2 Rectifier of quick recovery is damaged. 3.3 Control board is broken. 3.4 The feedback circuit is in fault.
4. Too much spatter	4.1 Output terminal polarity connection is wrong. So please change the polarity
5. Erratic welding output current or out of control of potentiometer.	5.1 The potentiometer is damaged. 5.2 Check that all kinds of connectors are in poor contact, especially plugs.
6. Power switch doesn't work	6.1 Power switch is broken. 6.2 Three phase rectifier bridge is broken, replace it. 6.3 Check if there is any short circuit of inner-machine.

Waste electrical products should not be disposed of with household waste. Please recycle where facilities exist. Check with your Local Authority or local store for recycling advice.

Do not dispose this product by normal household waste, but take it to a collection point and recycling of electrical and electronic equipment. This is indicated by the symbol on the product, user manual or packaging. Re-use, material utilization or other forms of old appliances, you make an important contribution in protecting our environment.

CONTACT US

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