

ULTRAMIG 200 Inverter

MIG Welder

INSTRUCTION MANUAL



AMH

Thank you for choosing AMH Canada's ULTRAMIG 200 INVERTER. Our welders are of high safety, reliability, durability and convenient maintenance, as well as excellent welding efficiency. This user's manual contains important information about safe installation, operation and maintenance of this product. For welder's technical parameters, please refer to technical parameter in this manual. Please read this manual carefully before operate. In order to ensure the operator's safety and a reliable working environment, please pay attention the safety tips and operate according to the instructions. For more AMH Canada products, please contact AMH Canada headquarters, authorized dealers, or visit our website: <http://www.amh.ca>.

Declaration

AMH Canada Ltd: We hereby solemnly declare that all products are manufactured according to relative GB or ISO standard, and conform to IEC60974-1 international safety standard.

All products purchased from our company are covered for one-year defect liability period, starting from the purchasing day on the contract.

Please read this manual carefully before operation:

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5. This manual was released in April, 2021.

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Notes:

To avoid any loss and personal injury, please pay special attention to all "NOTE!".

Please read this manual carefully before operation.

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1. Safety

Welding may cause damage to you and others. Please take good protection during welding. Please refer to the operator safety guidelines in conformity with the accident prevention requirements of the manufacturer for more details.



Only qualified personnel can operate this machine!

- Please use welding protection appliances approved by national safety supervision department.
- All operators must be licensed and valid special operating personnel for metal welding & cutting jobs.
- Please cut off power supply while maintaining.



Electric shock-may result in serious injury or even death!

- Install grounding device according to application standard.
- Do not touch live parts with naked skin, wet gloves or wet clothes.
- Be sure you are insulated from ground and work piece.
- Make sure all your working conditions are safe



Fume and gases can be dangerous!

- Keep your head away from fumes and gases while in welding.
- Please use enough ventilation or exhaust to keep fumes and gases away from the breathing zone.



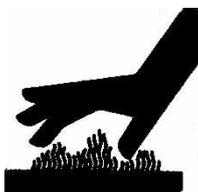
Arc rays can burn!

- Use suitable shield and clothing to protect your eyes and body.
- Protect other nearby personnel with suitable, non-flammable screening from being injured.



Improper operation may cause fire or explosion.

- Welding spark may cause fire. Please make ensure there are no inflammables in welding area, and always be alert to fire safety.
- Make sure there is fire extinguisher readily available and welders are well trained to operate the fire extinguisher.
- Do not weld air-tight container.
- **Do not use this machine for pipe unfreezing**



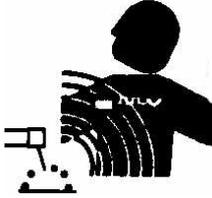
Weld materials can burn.

- Do not touch hot work piece with bare hands.
 - Cool the welding torch after continuously working.
-



Excessive noise can be harmful to hearing.

- Wear ear covers or other hearing protectors when welding.
- Give warning to nearby personnel that noise may be potentially hazardous to hearing.



Magnetic field can be harmful to pacemakers.

- Electric current flowing through any conductor creates electric and magnetic fields. Welders having pacemakers should consult their doctor before operating this equipment.



Moving parts may injure your body.

- Please keep away from moving parts (such as fan).
- All door, panel, cover, baffle plate, and other protective device should be closed and well located.



Asking for professional support while trouble strikes.

- When trouble strikes in installation and operation, please resort to this manual for according contents.
 - If you are still in lost, or you still cannot solve the problem, please contact the AMH Canada dealer or the service center for professional support.
-

2. Symbol Description

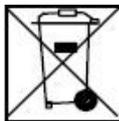
WARNING



Cautions in operation



Items need special instruction



It's forbidden to dispose electric waste with other ordinary waste. Please take care of our environment.

3. Function Description

- **Multi-function Design**
 - ◆ MMA/MIG are available
 - ◆ Integrated trolley
 - ◆ Spool gun
 - ◆ FCAW

4. Performance Features

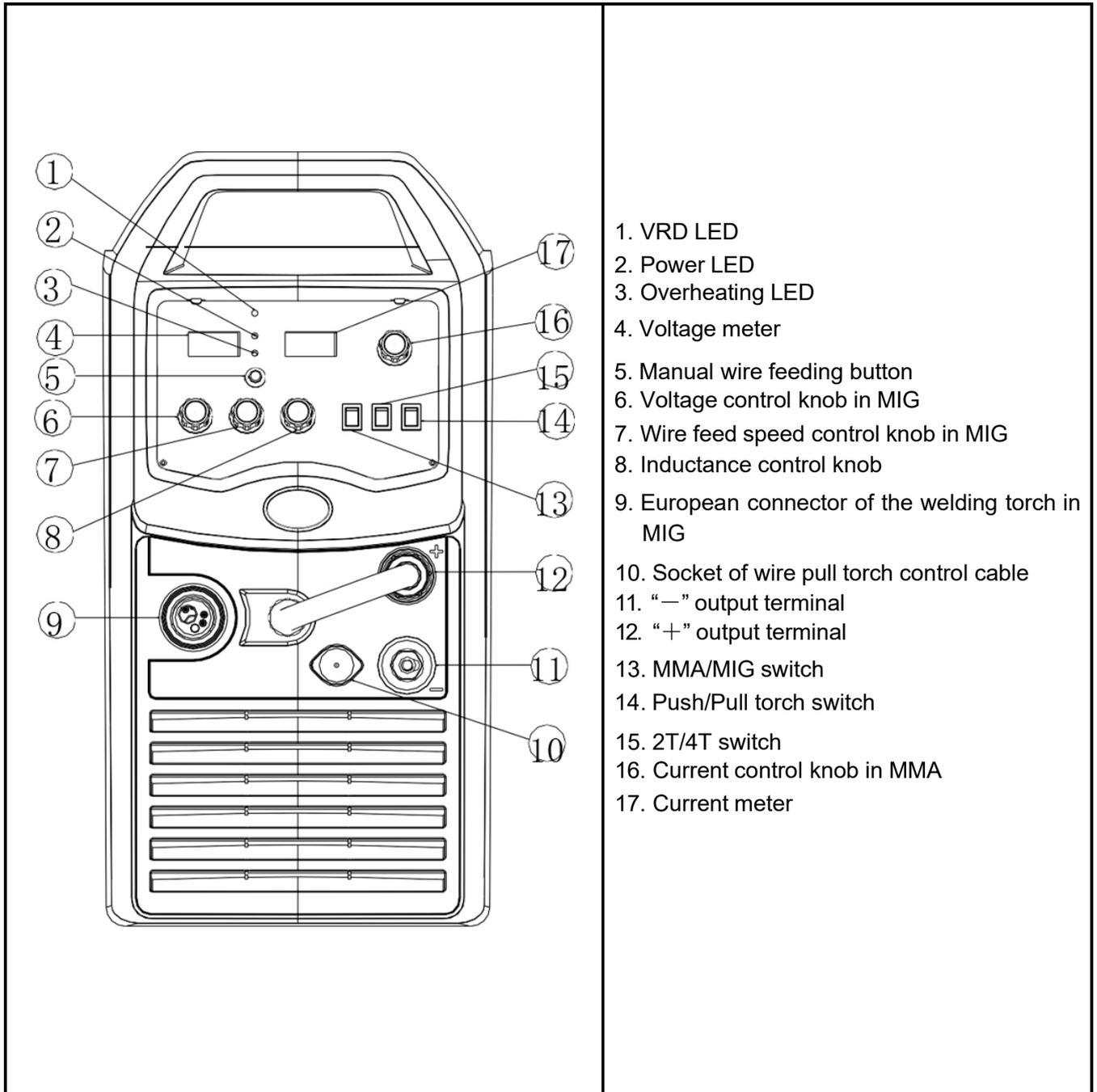
- **Advanced IGBT inverter technology**
 - ◆ 20-33KHz inverting frequency greatly reduces welder's size and weight
 - ◆ Great reduction in copper and iron loss greatly enhances the welding efficiency and saves energy.
 - ◆ Switching frequency is beyond audio frequency, which almost eliminates noise pollution.
- **Leading control mode**
 - ◆ It can be welded with various electrodes with a diameter of 0.6mm~1.2mm, and it can be widely used in acid and basic electrode welding.
 - ◆ Easy arc starting, less spatter, stable current and good shaping.
- **Nice shape and structure design**
 - ◆ Metal enclosure can withstand strong shock and drop and guarantee high work efficiency even in harsh working environment.
 - ◆ Excellent insulating property.
 - ◆ Waterproof, antistatic and anticorrosion.

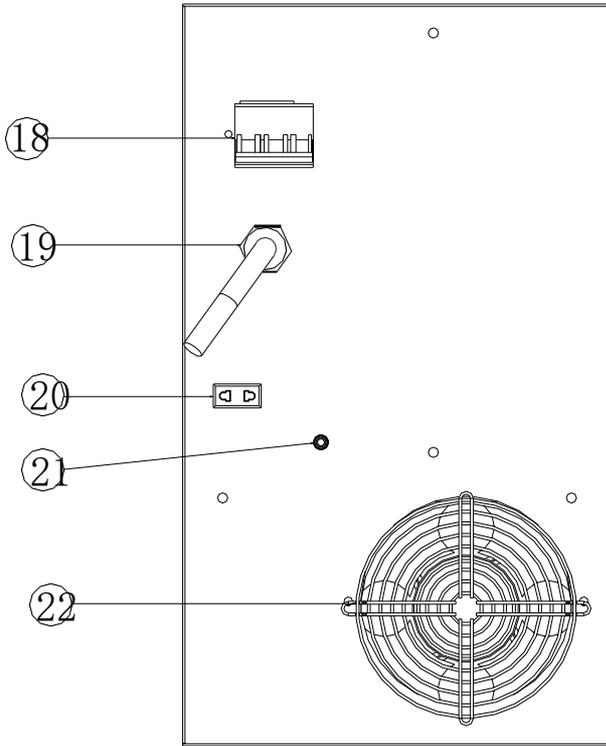
5. Main Technical Parameters

MODEL	ULTRAMIG 200 INVERTER
Input power supply	Single-phase AC220V-240V, 50/60Hz
Rated input capacity (KVA)	8.8
Rated output current (A)	200
Rated output voltage (V)	24
Rated duty cycle (%)	35
No-load voltage (V)	52
Output current range in MMA (A)	10~200
Output current range in MIG (A)	30~200
Output voltage range in MIG (V)	11~27
Electrode diameter applicable (mm)	0.6/0.8/0.9/1.0
Wire spool applicable (kg)	15
Wire feed speed range (m/min)	1.5~16
Insulation class	F
Cooling mode	Air-cooling
Protection class	IP21S
Power factor	0.7
Efficiency (%)	85
Size (mm)	900X450X755
Weight (Kg)	46

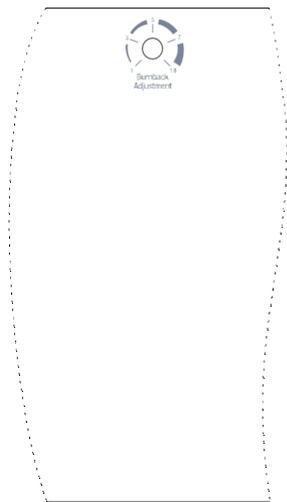
6. ※Note!: ① Tested under 40°C working environment.

6. Operation Description

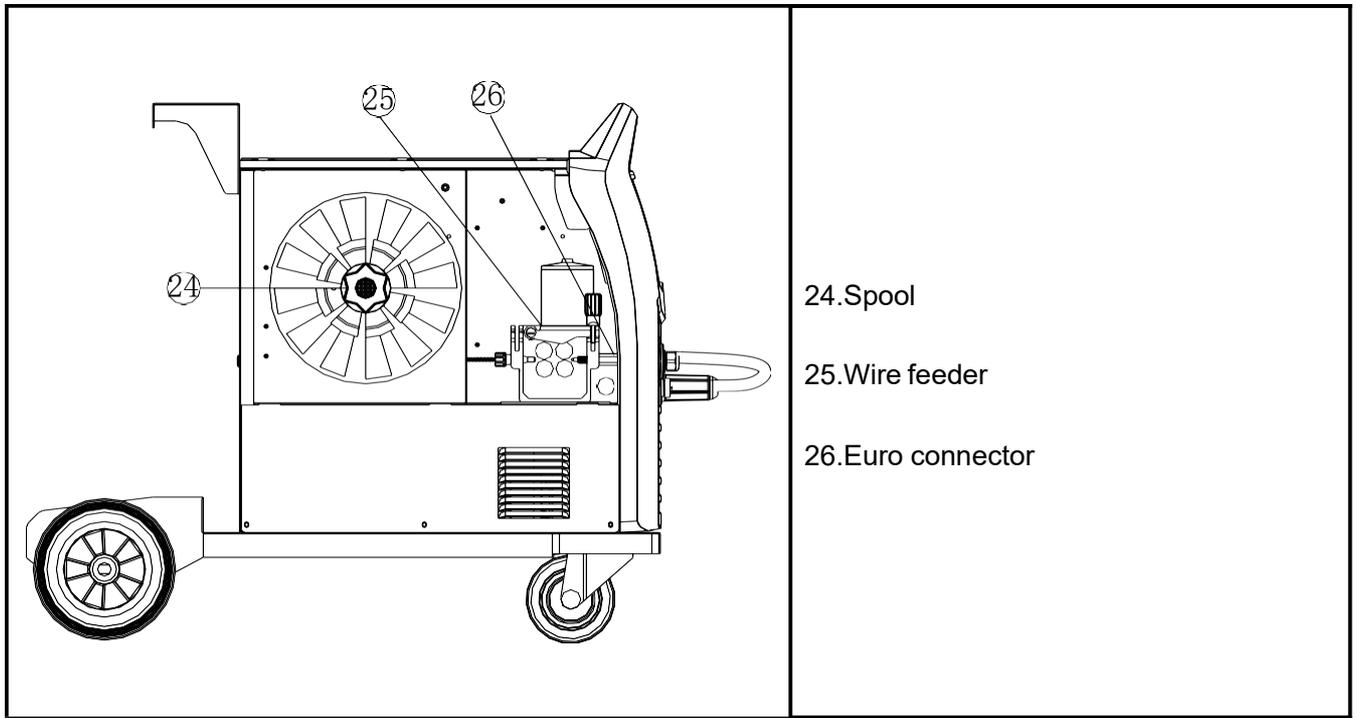




- 18. Power switch
- 19. Input power cord
- 20. Socket of gas regulator heater
- 21. Fan
- 22. Gas inlet



- 23. Burn back time



7. Installation, Debugging & Operation

Notice: Please install the machine strictly according to the following steps.

Turn off the power supply before any electric connection operation.

IP21S enclosure protection grade, please do not operate it in rain.

7.1 MMA Installation

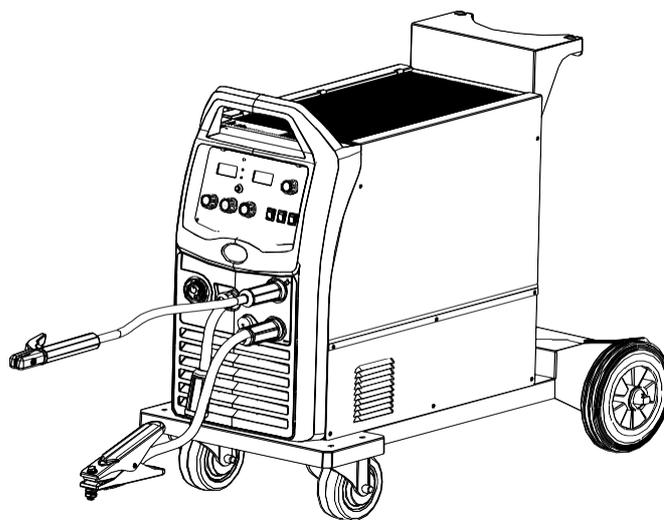


Fig 6 MMA Sketch Map

1. Please connect the primary power line to the according voltage class. Please make sure the power

line is connected to the right voltage class.

2. Please make sure the primary source is in fine contact with the according power line terminal or socket and prevent oxidation.
3. Please measure the voltage with multi-meter and check if it's in the fluctuation range.
4. Please insert the earth clamp cable plug into the front panel's below position "+" socket, and screw tightly clockwise.
5. Please insert the electrode holder cable plug into the front panel's upper position "-" socket and screw tightly clockwise.
6. Please make sure the supply is in good earthing condition.

7.1.1 Operation

- 1) After the correct installation per above methods, please turn on the power switch("ON"). While the power supply is "ON", welder starts to work normally with indicator lighting up and fan working.
- 2) Please pay attention to the polarity while connecting. There are normally two ways of wiring: DCEP and DCNP. DCNP: welding holder connected to "-" and work piece to "+"; DCEP: workpiece to "-" and welding holder to "+". Please choose the proper connection method according to different workpiece and processing methods. Unstable arc, spatter, and electrode sticking could happen if improper polarity is selected. Please change the quick connect plug to change the polarity in case of above abnormal situation.
- 3) When switching the welding mode to MMA, welding can be carried out with output current in rated range.
- 4) Select guide line with larger cross-section to reduce the voltage drop if the welder and workpiece distance is too far and secondary cables (welding cable and earth cable) are long.
- 5) Preset the welding current according to electrode type and size; clamp the electrode and then welding can be carried out by short circuit arc ignition.

For welding parameters, please refer to the below table.

7.1.2 Welding parameters table (for reference only)

Electrode Diameter (mm)	Recommended Welding Current (A)	Recommended Welding Voltage (V)
1.0	20~60	20.8~22.4
1.6	44~84	21.76~23.36
2.0	60~100	22.4~24.0
2.5	80~120	23.2~24.8
3.2	108~148	23.32~24.92
4.0	140~180	24.6~27.2
5.0	180~220	27.2~28.8
6.0	220~260	28.8~30.4

Note: This table is suitable for mild steel welding. For other materials, please consult related materials and welding processing manual.

7.2 Gas Shielded Welding Installation and Operation

7.2.1 Installation :

- 1) Insert the welding torch into the front panel's "Euro connector for torch" output socket and tighten it. After install the wire spool, pull through the welding wire into the torch body.
- 2) Connect the cylinder equipped with the gas regulator to the gas inlet on the back panel of the machine with a gas hose.
- 3) Insert the cable plug with earth clamp into the front panel's "-" output terminal and tighten it clockwise.
- 4) Insert the front panel's quick plug into "+" output terminal and tighten it clockwise.
- 5) Install the wire spool on the spindle adapter, ensuring that the groove size in the feeding position on the drive roll matches the contact tip size of the welding torch and the wire size being used. Release the pressure arm of the wire feeder to thread the wire through the guide tube, and into the drive roll groove. Adjust the pressure arm, ensuring no sliding of the wire. Too high pressure will lead to wire distortion, which will affect wire feeding. Press the inching wire feeding button to thread the wire out of the torch contact tip.

Installation Sketch Map:

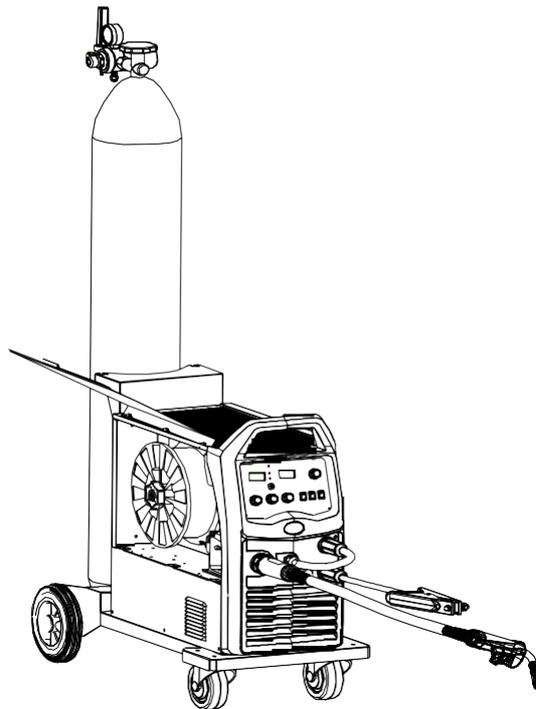


Fig7 Gas Shielded Welding Sketch Map

7.2.2 Operation:

- 1) After the correct installation per above methods, please turn on the power switch. While the power supply is "ON", welder starts to work normally with the indicator lighting up and fan working. Open the cylinder valve,

and adjust the flow regulator to get the proper gas flow.

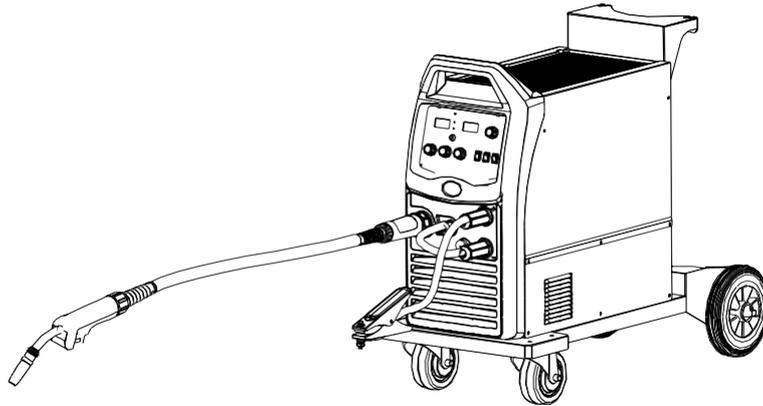
- 2) Preset the wiring feeding speed and welding voltage according to workspace's thickness and electrode diameter.

7.3 Installation and operation of gasless self-shielded metal arc welding

7.3.1 Installation

- 1) Insert the welding torch into the front panel's "Euro connector for torch" output socket and tighten it. After install the wire spool, pull through the welding wire into the torch body.
- 2) Insert the cable plug with earth clamp into the front panel's "+" output terminal and tighten it clockwise.
- 3) Insert the quick plug of the wire feeder into the front panel's "-" output terminal and tighten it clockwise.
- 4) Install the wire spool on the spindle adapter, ensuring that the groove size in the feeding position on the drive roll matches the contact tip size of the welding torch and the wire size being used. Release the pressure arm of the wire feeder to thread the wire through the guide tube, and into the drive roll groove. Adjust the pressure arm, ensuring no sliding of the wire. Too high pressure will lead to wire distortion, which will affect wire feeding. Press the inching wire feeding button to thread the wire out of the torch contact tip.

Installation Sketch Map:



Installation Sketch Map

7.3.2 Operation :

The operation method is the same to gas shielded welding operation except for polarity connection.

8. CAUTION

8.1 Working Environment

- 1) Welding should be carried out in dry environment with humidity of 90% or less.
- 2) The working environment temperature should be between -10°C and 40°C.
- 3) Avoid welding in the open air unless sheltered from sunlight and rain. Keep welder dry.
- 4) Avoid welding in dusty area or environment with corrosive chemical gas.
- 5) Gas shielded arc welding should be operated in environment without strong airflow.

8.2 Safety Tips

Overheating protection circuit is installed in this machine. When machine's inner temperature exceeds the setting standard, it will stop working automatically. However, **excessive operation** will lead to welder damage. Therefore, please note:

- 1) Ventilation

There will be large current during operation and will require strict cooling devices instead of natural ventilation. Therefore, the built-in two fans are very important to ensure effective cooling and stable working performance. The operator should make sure that the louvers be uncovered and unblocked. The minimum distance between the machine and nearby objects should be 30cm. Good ventilation is of critical importance to the normal performance and lifespan of the machine.

- 2) Over-load is forbidden

The welder is operated according to allowable duty circle (refer to the corresponding duty cycle). Make sure that the welding current should not exceed the max load current. Overload could obviously shorten the machine's lifespan, or even damage the machine.

- 3) Over-voltage is forbidden.,

Please refer to "Technical Parameters" for the power supply voltage range. This machine is of automatic voltage compensation to ensure the welding current is within the given range. In case that the input voltage exceeds the stipulated value, it would possibly damage the components of the machine. The operator should take according measures to this case.

- 4) A sudden halt may occur with the front panel's yellow indicator lighting up while the machine is of over-load status. Under this circumstance, it is unnecessary to restart the machine for its resulted from overheating and the triggered the temperature control switch. Keep the built-in fans working to lower the machine's temperature. Welding can be resumed when temperature falls into the standard range and the yellow indicator is off.

9. BASIC KNOWLEDGE OF WELDING

9.1 Basic knowledge of MMA

Manual metal arc welding (MMA) is an arc welding by manually operating electrode. MMA requires simple equipment and is a convenient, flexible and adaptive welding processing type. MMA is applied to various metal materials with thickness more than 2mm. It's suitable for various material structures, particularly to workpiece with complex structure and shape, short weld joint or bending shape, as well as weld joints in various spatial locations.

9.1.1 Welding Process of MMA

Connect the two output terminals of the welder to the workpiece and electrode holder respectively, and then clamp the electrode by the electrode holder. When welding, arc is ignited between the electrode and the workpiece, and the end of the electrode and part of the workpiece is fused to form a weld crater under the high-temperature arc. The weld crater is quickly cooled and condensed to form weld joint which can firmly integrally connect two separate pieces of workpiece. The coating of the electrode is fused to produce slag to cover the weld crater. The cooled slag can form slag crust to protect the weld joint. The slag crust is removed at last, and the joint welding is finished.

9.1.2 Tools for MMA

Common tools for MMA include electrode holder, welding mask, slag hammer, wire brush (see Fig. 8), welding cable and labor protection supplies.

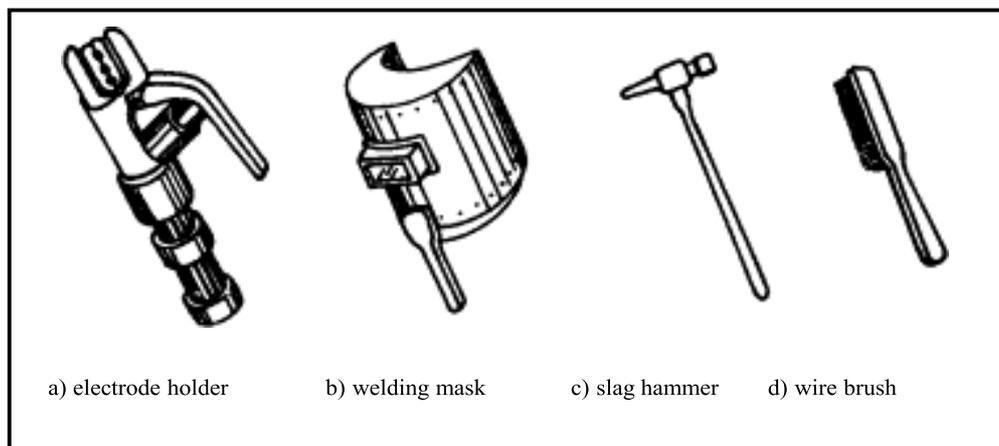


Fig. 8 Tools for MMA

a) Electrode holder: a tool for clamping electrode and conducting current, mainly including 300A type and 500A type.

b) Welding mask: a shielding tool for protecting eyes and face from injuring due to arc and spatter, including handholding type and helmet type. Colored chemical glass is installed on the viewing window of the mask to filter ultraviolet ray and infrared ray. Arc burning condition and weld crater condition can be observed from the viewing window during welding. Thus, welding can be carried out by operators conveniently.

- c) **Slag hammer (peen hammer)**: for the use of removing slag crust on the surface of weld joint.
- d) **Wire brush**: for the use of removing dirt and rust at the joints of the workpiece before welding, as well as cleaning the surface of weld joint and the spatter after welding.
- e) **Welding cable**: generally, cables formed from many fine copper wires. Both YHH type arc welding rubber sleeve cable and THHR type arc welding rubber sleeve extra-flexible cable can be used. Electrode holder and welding machine are connected via a cable, and this cable is named as welding cable (live wire). Welding machine and workpiece are connected via another cable (earth wire). The electrode holder is covered with insulating material performing insulation and heat insulating.

9.1.3 Basic Operation of MMA

1) Welding joint cleaning

Rust and greasy dirt at the joint should be removed completely before welding in order to implement arc igniting and arc stabilizing conveniently as well as ensure the quality of weld joint. Wire brush can be used for condition with low requirement on dust removal; grinding wheel can be used for condition with high requirement on dust removal.

2) Posture in operating

Take flat welding of butt joint and T-shaped joint from left to right as an example. (See Fig. 9) The operator should stand at the right side of the working direction of weld joint with mask in the left hand and electrode holder in the right hand. The left elbow of the operator should be put on his left knee to prevent his upper body from following downwards, and his arm should be separated from the costal part so as to stretch out freely.

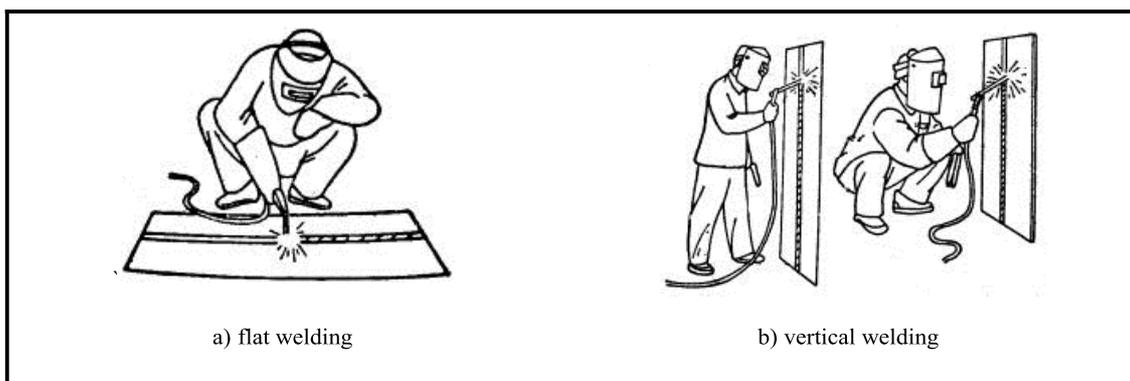


Fig. 9 Posture in welding

3) Arc igniting

Arc igniting is the process for producing stable arc between electrode and workpiece in order to heat them to implement welding. Common arc ignition mode includes scraping mode and striking mode. (See Fig.10) During welding, touch the surface of the workpiece with the end of the electrode by scraping or light striking to form short circuit, and then quickly lift the electrode 2~4mm away to ignite arc. If arc ignition fails, it is probably because there is coating at the end of the electrode, which affects the electric conduction. In this case, the operator can strongly knock the electrode to remove the insulation material until the metal surface of the core wire can be seen.

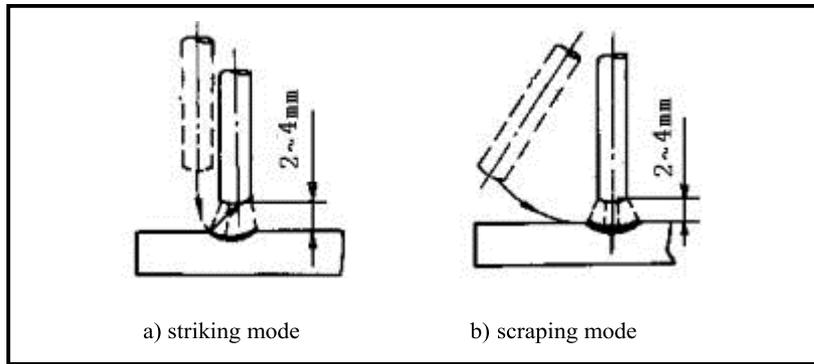


Fig. 10 Arc ignition modes

4) Tack weld

For fixing the relative positions of the two pieces of weldment and welding conveniently, 30~40mm short weld joints are welded every certain distance in order to fix the relative positions of the workpiece during welding assembly. This process is named as tack weld.

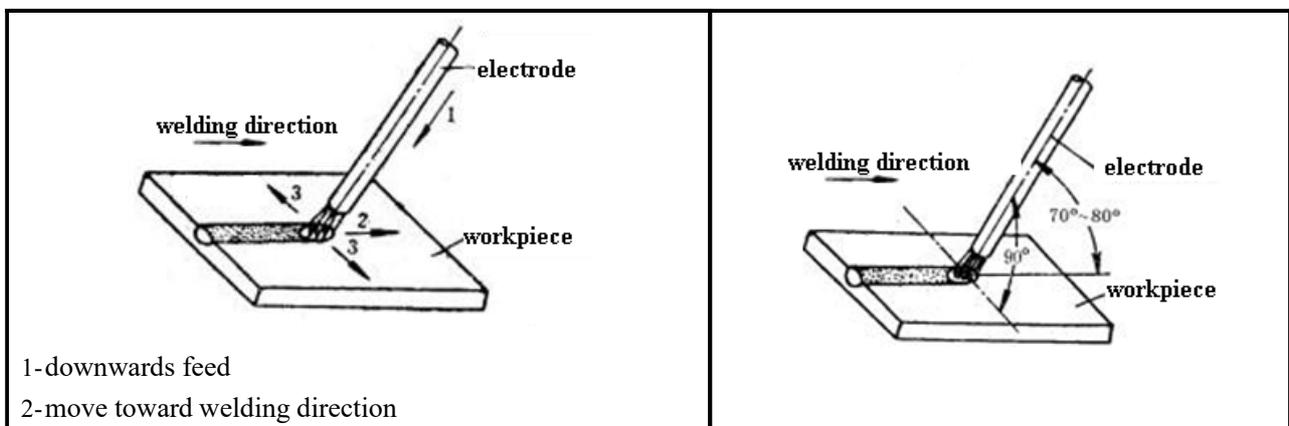
5) Electrode manipulation

The electrode manipulation actually is a resultant movement in which the electrode simultaneously moves in three basic directions: the electrode gradually moves along the welding direction; the electrode gradually moves toward the weld crater; and the electrode transversely swings. (See Fig.11) Electrode should be correctly manipulated in three movement directions after arc is ignited. In butt welding and flat welding, the most important is to control the following three aspects: welding angle, arc length and welding speed.

(1) Welding angle: the electrode should be inclined in $70^{\circ}\sim 80^{\circ}$ forwards. (See Fig.12)

(2) Arc length: the proper arc length is equal to the diameter of electrode in general.

(3) Welding speed: proper welding speed should make the crater width of the weld bead about twice the diameter of the electrode, and the surface of the weld bead should be flat with fine ripples. If the welding speed is too high, and the weld bead is narrow and high, the ripples are rough, and the fusion is not well implemented. If the welding speed is too low, the crater width is excessive, and the workpiece is easy to be burned through. Besides, current should be proper, electrode should be aligned, arc should be low, and welding speed should not be too high and should be kept uniform during the whole welding process.



<p>3-transversely swing</p> <p>Fig.11 Three basic movement directions of electrode</p>	<p>Fig.12 Angles of electrode in flat welding</p>
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6) Arc extinguishing

Arc extinguishing is unavoidable during welding. Poor arc extinguishing may bring shallow weld crater and poor density and strength of weld metal by which cracks, air holes, slag inclusion and shortage the like are easy to be produced. Gradually pull the end of the electrode to the groove and raise the arc when extinguishing arc, in order to narrow the weld crater and reduce the metal and heat. Thus, defects such as cracks and air holes can be avoided. Pile up the weld metal of the crater to make the weld crater sufficiently transferred. Then, remove the excessive part after welding. The operation modes of arc extinguishing are shown in the figure below.

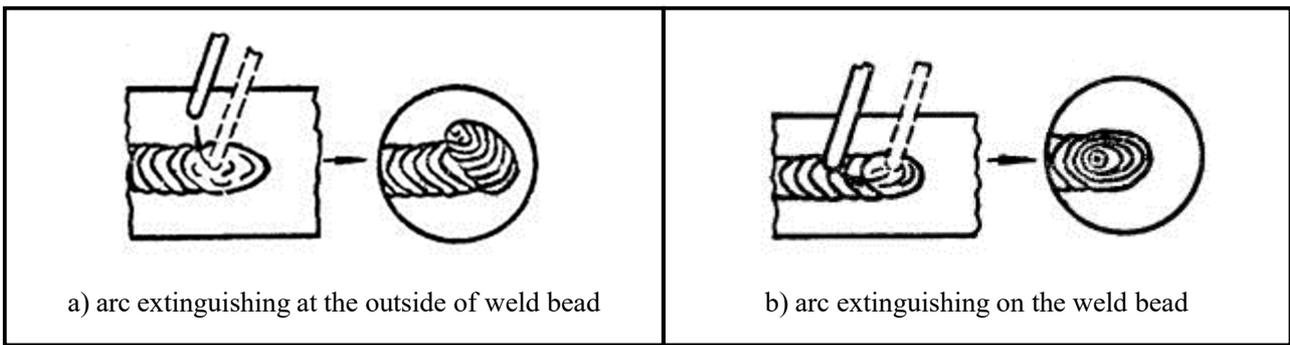


Fig.13 Arc extinguishing modes

7) Weldment cleaning

Clean welding slag and spatter with wire brush and tools the like after welding.

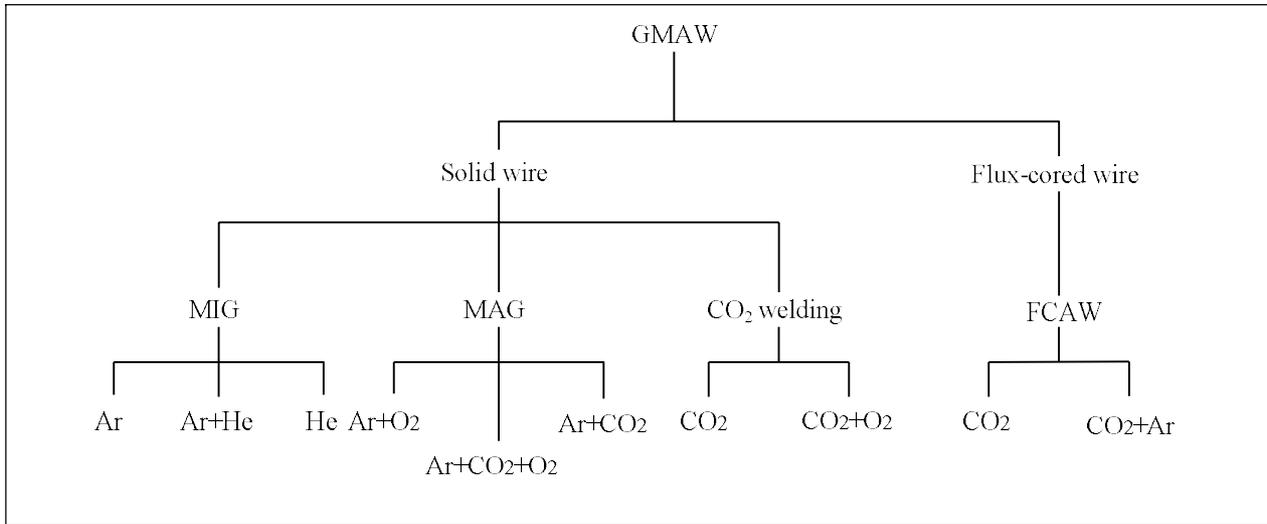
9.2 Basic knowledge of GMAW

Gas shielded arc welding is a kind of arc welding mode which adopts gas as arc media and for protecting arc and welding zone. Gas shielded welding is a kind of open arc welding, and it does not adopt flux-cored wire generally. It can be applied widely with high productivity.

Metal inert gas arc welding, MIG for short, is a kind of welding mode which adopts the continuous fed welding wire as the melting electrode and inert gas as the shield gas. It is one of the most commonly used welding modes in the automotive sheet metal welding repair job, and it is mainly applied in the welding of metal which is relatively active, such as stainless steel, heat-resistant alloy, copper alloy and aluminum-magnesium alloy, etc.

9.2.1 Classification and application of GMAW

According to the type of shield gas, the form of welding wire and the mode of operation, GMAW can be divided into several categories as below:

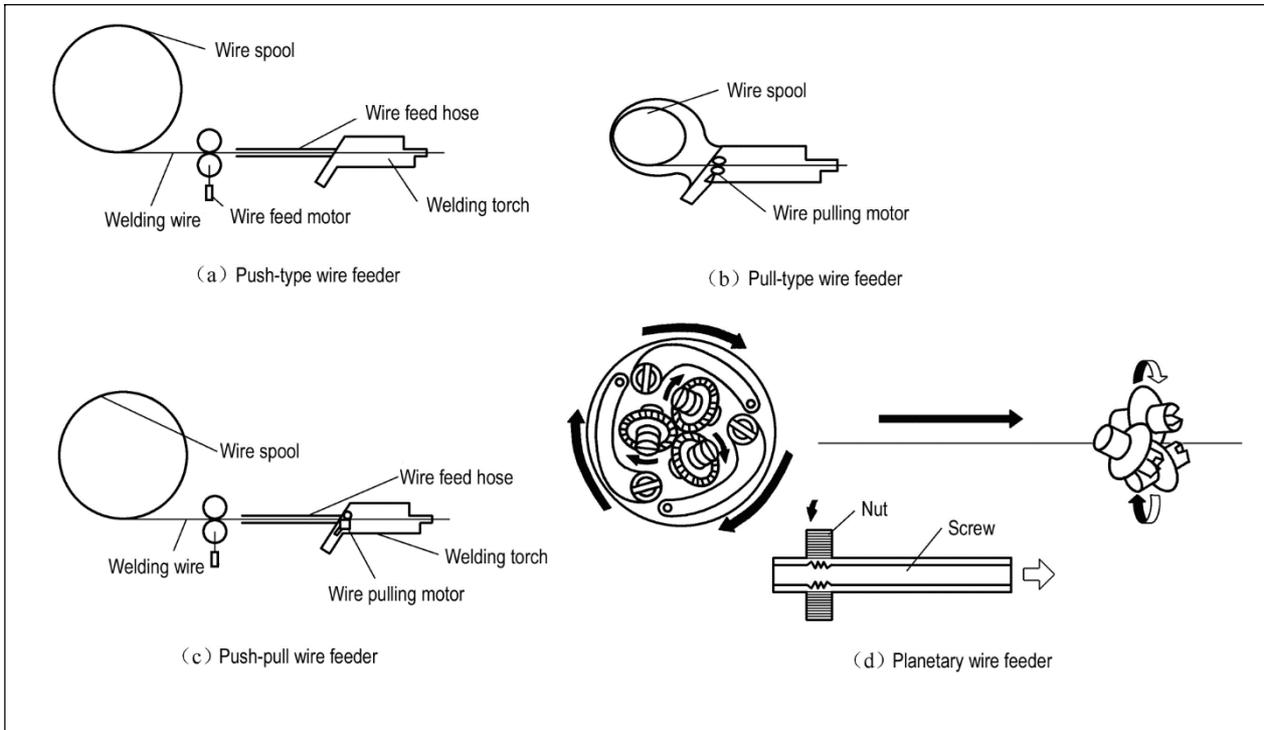


- GMAW can be applied to the welding of most metals and alloys, and it is ideal for welding carbon steel, low alloy steel, stainless steel, aluminum, aluminum alloy, copper, copper alloy and magnesium alloys.
- For metal with high melting point such as high strength steel and high strength aluminum alloy, some corresponding treatment should be done before welding.
- GMAW is not suitable for welding metal with low melting point.
- Welding thickness should be not less than 1mm.
- It has a high adaptability to various welding positions.

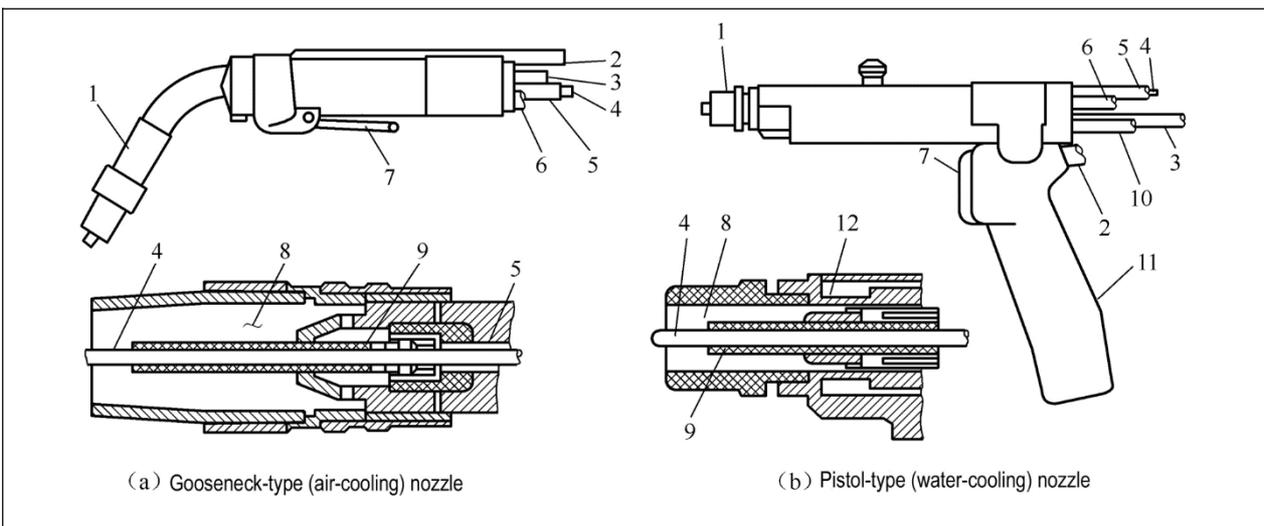
9.2.2 Welding tools.

a) Welding source: GMAW adopts DC welding source generally, and the power of welding source depends on the desired current range in different applications.

b) Wire feed system: Generally, the wire feed system consists of wire feeder (including motor, reducer, aligning wheels and wire feed wheel), wire feed hose, wire spool and other components.



c) Welding torch: The welding torch for GMAW can be classified into semi-automatic torch and automatic torch, and the former can be classified into air-cooled torch and water-cooled torch according to different cooling methods.



9.2.3 Basic Operation of GMAW

a) Preweld cleaning, equipment checks and labor protection

① Preweld cleaning

Chemical cleaning: Chemical cleaning methods vary with the materials.

Mechanical cleaning: Mechanical cleaning includes sanding, scraping and sand blasting, and it is used to clean oxidation film on the metal surface.

② Equipment check

Firstly, check if there are obvious damage marks on the exterior of the welding machine, and if there is any lack or damage of any components of the welding machine. Get known of the maintenance history and lifespan of the welding machine, the welding environment and welding process. Then, Check the welding machine by check the category, connection, grounding and capacity of the welding machine, and if the welding process used is correct. After making sure there is no problem with the welding machine, check other equipment.

③ Labor protection

Operators should wear proper labor protection appliances such as masks, protective gloves, protective footwear, and canvas overalls before welding, and should wear protective goggles or welding helmet during operation. Wear rubber overshoes when welding in wet places or in rainy day. Meanwhile, pay attention to avoiding the damage from dust, electric shock, scalding, fire and radiation.

b) Welding parameter selecting

The parameters for MIG mainly include welding current, welding voltage, welding speed, stick-out, angle of welding wire, wire diameter, welding position, polarity, type and flow of the shield gas and so on.

① Welding current and welding voltage

Generally, operators choose proper wire diameter according to the thickness of the workpiece, and then decide the welding current, mode of metal transfer and welding voltage.

② Welding speed

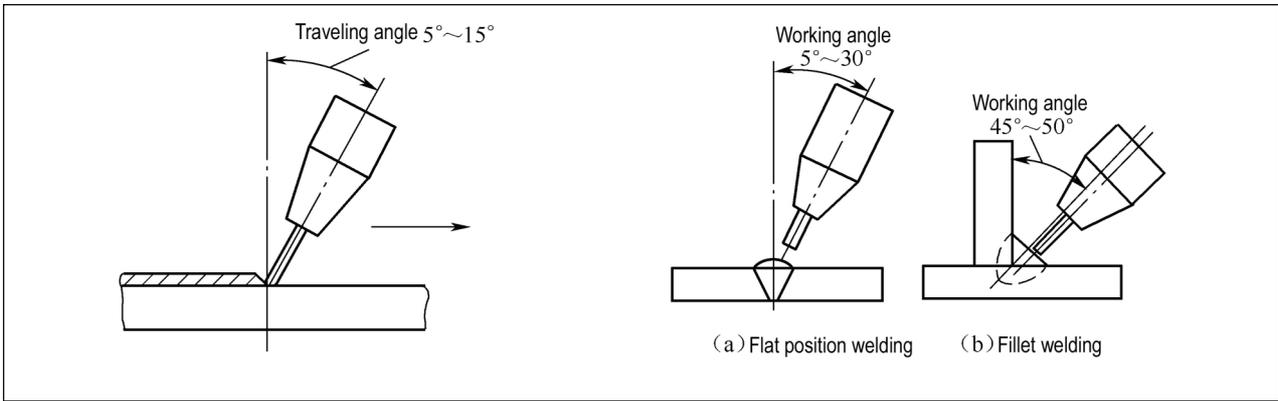
The welding speed of single-pass welding refers to the relative moving speed of the torch moving along the center line of the weld joint. When other conditions are fixed, the penetration will increase when reducing the welding speed, and the depth and width of the molten pool will reduce when increasing the welding speed.

③ Stick-out

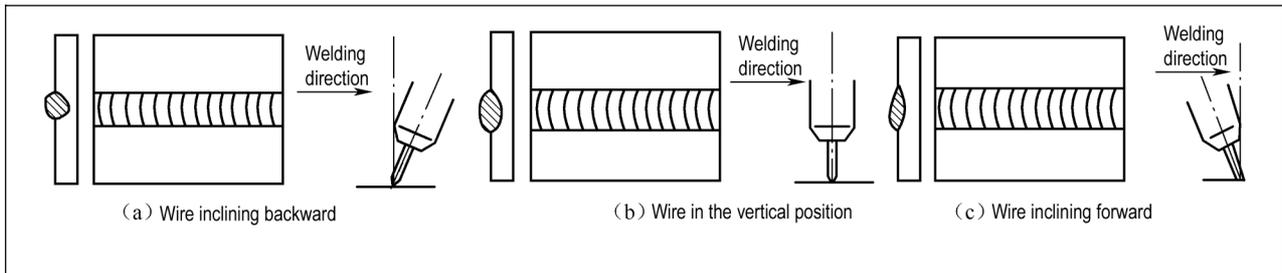
The longer the stick-out is, the greater the resistance heat will be, and accordingly the lower the melting speed of the wire will be. If the stick-out is too long, the filling metal will be too much. If the stick-out is too short, the contact tip of the torch will be burned easily. Therefore, the proper stick-out should be about 10 times as long as the wire diameter.

④ Position of welding wire

The angle and position of the axis of welding wire relative to the center line of weld bead will affect the shape of weld bead and the penetration. In the plane of the axis of welding wire and the center line of weld bead, the angle formed by the axis of welding wire and the vertical line of the center line of weld bead is called traveling angle.



The effect on the weld bead shaping caused by the angle of welding wire is shown in the above figure. When welding wire changes to backward position from vertical position with other conditions fixed, the penetration will increase, the weld bead will narrow, the weld reinforcement will increase, and arc will be stable with little spatter. Usually, maximum penetration can be obtained by forehand welding with a travel angle of 25°. In order to control the molten pool better, the traveling angle should be 5°~15° generally. When welding fillet welds in the horizontal position, the working angle should be 45° generally.



⑤ Welding position

GMAW is applicable to flat position welding, vertical position welding, overhead position welding, upward welding in the inclined position and downward welding in the inclined position.

⑥ Gas flow

There are two situations for shield gas flowing out of the nozzle: the thicker laminar flow and the thinner laminar flow close to the turbulent flow. Generally, the diameter of the nozzle should be 20mm, and the gas flow should be 3~20L/min.

c) Arc igniting

Gas shielded arc welding generally adopts contact-short arc ignition. Adjust the stick-out to the proper length before arc ignition. When igniting arc, pay attention that the welding wire should not be too close to the workpiece, and keep the end of welding wire 2~3mm away from the workpiece. If thick spherical head appears at the end of welding wire, cut it off.

d) Welding

For the welding process (including positioning, weld bead initiating, electrode manipulation method, weld bead connection and weld bead ending) of MIG welding, please refer to the relevant contents in 12.1.

e) Arc extinguishing

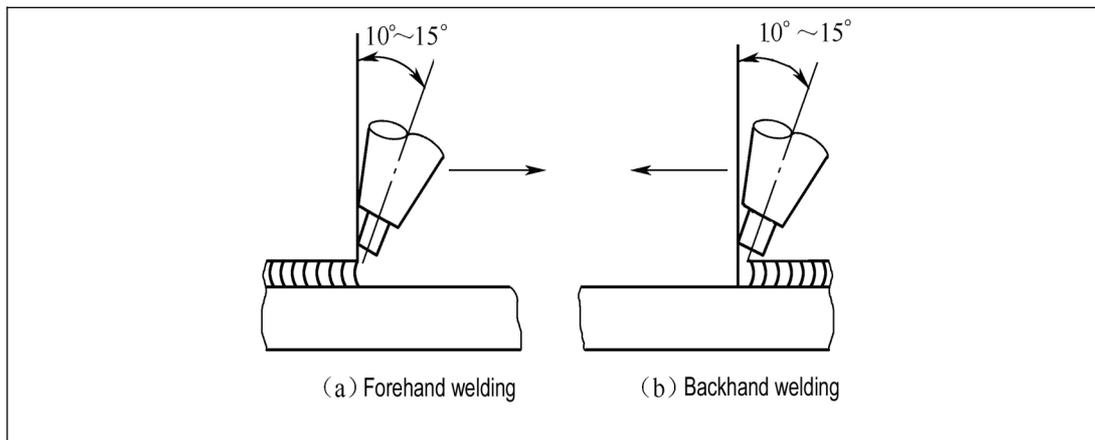
Do not extinguish arc immediately when ending welding. Otherwise, crater will be left and defects such as cracks and air holes are easy to be produced. Keep the torch staying a little while at the crater when extinguishing arc, and raise the torch slowly after the crater is filled, so that the molten pool can be well protected before it is solidified.

f) Weld bead connection

Generally, back step welding is adopted for weld bead connection, and its operation is the same as that of MMA welding.

g) Forehand welding and backhand welding

GMAW adopts forehand welding generally.



h) Electrode manipulation

There are two modes of electrode manipulation, namely straight moving mode and transverse swing mode. The weld bead obtained through straight moving mode is narrow, and this mode mainly used in sheet metal welding and backing welding. Transverse swing mode means that electrode makes cross-swing transversely based on the center line of the weld bead during welding, mainly in the form of zigzag, crescent shape, regular triangle, and oblique circle shape, and the electrode manipulation method is similar to that of MMA welding.

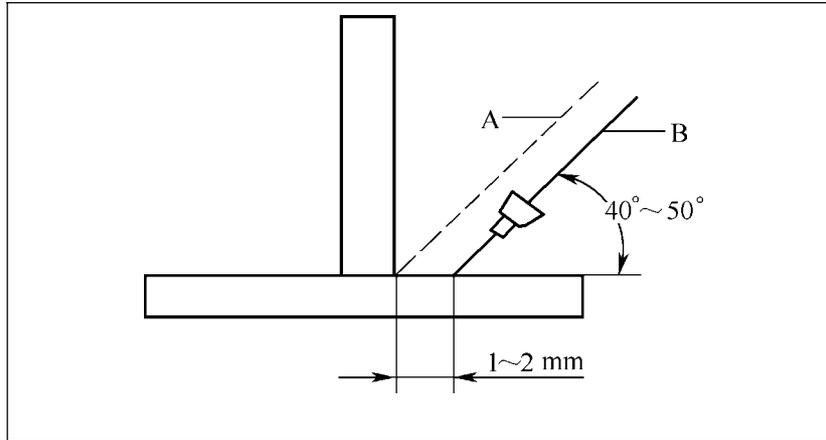
9.3 Welding operation mode in different position

a) Flat position welding

Flat position welding usually adopts forehand welding with a traveling angle of 10°~15°. For sheet metal welding and backing welding, use straight moving electrode manipulation mode; for groove filling layer welding, transverse swing electrode manipulation mode can be used.

b) Welding of T-shaped joints and lap joints

Defects such as undercut, incomplete penetration and weld bead sagging are easy to produce when welding T-shaped joints, so operators should control the angle of torch according to the plate thickness and the fillet weld size during welding operation. For horizontal fillet welding of T-shaped joints formed by plates of different thickness, incline the arc toward to the thicker plate, in order that the two plates can be heated equally.



c) Vertical position welding

There are two modes for the vertical position welding of GMAW, namely upward welding in the vertical position and downward welding in the vertical position. Due to the gravitation effect, the melting metal may drop down easily in upward welding in the vertical position. Adding the disadvantages such as deep penetration and narrow weld bead due to the arc effect, this welding mode is seldom used.

d) Horizontal position welding

The parameters in horizontal position welding are mainly the same as that in vertical position welding, except that the welding current can be a little higher.

This product is under continuous improvements; therefore, there might be differences in some respects except for functions and operation. Your understanding is much appreciated.

10. MAINTENANCE

WARNING



The following operation requires professional knowledge on electric application and comprehensive safety knowledge. Operators should be licensed with related qualification certificates (still in validation) which can prove their skills and knowledge. Make sure the power supply is cut off before uncovering the welding machine.

- 1) Check periodically whether inner circuit connection is in good condition (esp. plugs). Tighten the loose connection. If there is oxidization, remove it with sandpaper and then reconnect.
- 2) Keep hands, hair and tools away from the moving parts such as the fan to avoid personal injury or machine damage.
- 3) Clean the dust periodically with dry and clean compressed air. If welding environment with heavy smoke and pollution, the machine should be cleaned daily. The pressure of compressed air should be at a proper level in order to avoid the small parts inside the machine being damaged.
- 4) Avoid rain, water and vapor infiltrating the machine. If there is, dry it and check the insulation of the

equipment (including that between the connections and that between the connection and the enclosure). Only when there are no abnormal phenomena anymore, can the machine be used.

- 5) Check periodically whether the insulation cover of all cables is in good condition. If there is any dilapidation, rewrap it or replace it.
- 6) Put the machine into the original packing in dry location if it is not to be used for a long time.

11. TROUBLESHOOTING

WARNING



The following operation requires professional knowledge on electric application and comprehensive safety knowledge. Operators should be licensed with related qualification certificates (still in validation) which can prove their skills and knowledge. Make sure the power supply is cut off before uncovering the welding machine.

11.1 Common Malfunction Analysis and Solution

Malfunction phenomena	Cause analysis	Solutions
There is no current after turning on the machine.	The power cord is not well connected.	Reconnect the power cord.
	The welding machine fails.	Ask professionals to check.
The fan does not work during welding.	The power cord for the fan is not well connected.	Reconnect the power cord for the fan.
	Auxiliary power fails.	Ask professionals to check.
The overheating indicator is on.	The overheating protection circuit works.	It can be recovered after the machine cools down.

11.2 Troubleshooting in MIG/MAG

Malfunction phenomena	Cause analysis	Solutions
There is no response when pushing the torch trigger and the alarm indicator does not illuminate.	The welding torch is not well connected with the wire feeder.	Reconnect it.
	The torch trigger fails.	Repair or replace the welding torch.
When the torch trigger is pushed, there is gas output, but there is no output current, and the alarm indicator does not illuminate.	The earth cable is not well connected with the workpiece.	Reconnect it.
	The wire feeder or welding torch fails.	Repair the wire feeder or welding torch.

There is output current when pushing the torch trigger to feed gas, but the wire feeder does not work.	The wire feeder is clogged.	Unclog it.
The welding current is unstable.	The wire feeder fails.	Repair it.
	The control PCB or wire feeding power PCB inside the machine fails.	Replace it.
	The pressure arm on the wire feeder is not properly adjusted.	Adjust it to get proper pressure.
	The drive roll does not match the wire size being used.	Make sure they match with each other.
	The contact tip of the welding torch is badly worn.	Replace it.
	The wire-feeding tube of the welding torch is badly worn.	Replace it.
	The electrode is of poor quality.	Use electrode of good quality.

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APPENDIX A: PACKING, TRANSPORTATION AND STORAGE

A1. Packing

No.	Name	Unit	Quantity
1	User's manual for MIG series (English)	Volume	1
2	Product certificate	Sheet	1
3	Warranty card	Sheet	1
4	Desiccant	Pack	1
5	Accessories	Pack	1

A2. Transportation

Equipment should be handled with care in transportation to avoid severe impact. Equipment should be prevented from being affected with damp and caught in the rain in transportation.

A3. Storage

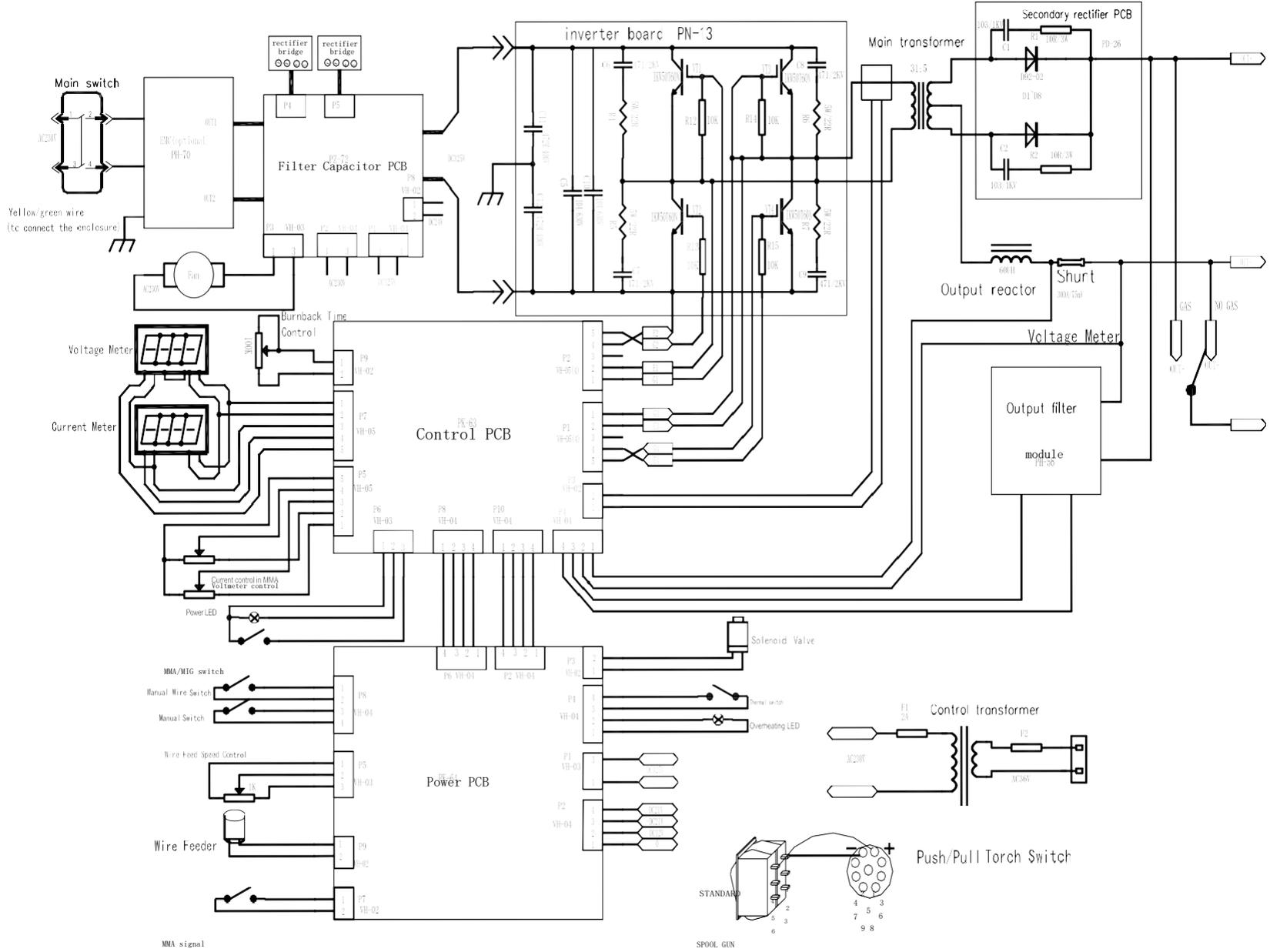
Temperature for storage: $-25^{\circ}\text{C}\sim+50^{\circ}\text{C}$

Humidity for storage: relative humidity $\leq 90\%$

Storage life: 12 months

Place for storage: ventilated indoor place without corrosive gas

APPENDIX B: WIRING DIAGRAM OF COMPLETE MACHINE



ULTRAMIG 200 INVERTER wiring diagram

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