

Dear Customer

This instruction manual will help you get to know your new machine. Read the manual carefully and you will soon be familiar with all the many great features of your new product. Meanwhile, please remember well safety rules and operate as instruction.

If you treat your product carefully, this definitely helps to prolong its enduring quality and reliability – things which are both essential prerequisites for getting outstanding results.

Production specification may change without advance notice.

The model you purchase is for:

AMIG350LST-R

Please find corresponding models from the "Contents".

Important:

Please take special note of safety rules and operate as instruction in case of damage and serious injury.

Safety Rules



“**Danger**” indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



“**Warning!**” indicates a possible hazardous situation which, if not avoided, could result in death or serious injury. The possible hazards are explained in the text.



“**Caution**” indicates a possible hazardous situation which, if not avoided, may result in slight or moderate injury.



“**Note!**” indicates a situation which implies a risk of impaired welding result and damage to the equipment.

“**Important!**” indicates practical tips and other useful special-message. It is no signal word for a harmful or dangerous situation.



Utilisation for intended purpose only. The machine may only be used for jobs as defined by the “Intended purpose”.

Utilisation for any other purpose, or in any other manner, shall be deemed to be “not in accordance with the intended purpose”. The manufacturer shall not be liable for any damage resulting from such improper use.



Safety signs. All the safety instructions and danger warnings on the machine must be kept in legible condition, not removed, not be covered, pasted or painted cover.



Safety inspection. The owner/operator is obliged to perform safety inspection at regular intervals.

The manufacturer also recommends every 3-6 months for regular maintenance of power sources.



Electric shock can kill. 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 internal circuits are also live when power is on. In MIG/MAG welding, the wire, drive rollers, wire feed housing and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.

Do not touch live electrical parts of the welding circuit, electrodes and wires with your bare skin or wet clothing. The operator must wear dry hole-free insulating welding gloves and body protection while performs the welding.

Insulate yourself from work and ground using dry insulating protection which is large enough to prevent you full area of physical contact with the work or ground.

Connect the primary input cable according to rules. Disconnect input power or stop machine before installing or maintenance.

If welding must be performed under electrically hazardous conditions as follow: in damp locations or wearing wet clothing; on metal structures such as floors, gratings, or scaffolds; when in cramped positions such as sitting, kneeling, or lying; or in occasion when there is a high risk of unavoidable or accidental contact with the work piece or ground. Must use additional safety precautions: semiautomatic DC constant voltage (wire) welder, DC manual (Stick) welder and AC welder with reduced open-load voltage.

Maintain the electrode holder, ground clamp, welding cable and welding machine in good, safe operating condition. Replace damaged part immediately.



Electric and magnetic fields (EMF) may be dangerous. If electromagnetic interference is found to be occurring, the operator is obliged to examine any possible electromagnetic problems that may occur on equipment as follow:

- minas, signal and data-transmission leads
- IT and telecoms equipment
- measurement and calibration devices
- Wearers of pacemakers

Measures for minimizing or preventing EMC problems:

- Mains supply

If electromagnetic interference still occurs, despite the fact that the mains connection in accordance with the regulations, take additional measures

- Welding cables

Keep these as short as possible.

Connect the work cable to the work piece as close as possible to the area being welded.

Lay them well away from other cables.

Do not place your body between your electrode and work cables.

- Equipotential bonding
- Workpiece grounding (earthing)
- Shielding

Shield the entire welding equipment and other equipment nearby.



ARC rays can burn. Visible and invisible rays can burn eyes and skin.

Wear an approved welding helmet or suitable clothing made from durable flame-resistant material (leather, heavy cotton, or wool) to protect your eyes and skin from arc rays and sparks when welding or watching.

Use protective screens or barriers to protect other nearby personnel with suitable, non-flammable screening and/or warn them not to watch the arc nor expose themselves to the arc rays or to hot spatter or material.



Fumes and gases can be dangerous. Welding may produce fumes and gases, breathing these fumes and gases can be hazardous to your health.

When welding, keep your head out of the fume. If inside, ventilate the area at the arc to keep fumes and gases away from the breathing zone. If ventilation is not good, wear an approved air-supplied respirator.

Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator.

Welding fumes and gases can displace air and lower the oxygen level causing injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.



Welding and cutting sparks can cause fire or explosion. When not welding, make sure the electrode circuit is not touching the work or ground. Accidental contact can cause sparks, explosion, overheating, or fire. Make sure the area is safe before doing any welding.

Welding and cutting on closed containers, such as tanks, drums, or containers, can cause them to blow up. Make sure proper steps have been taken.

When pressure gas is used at the work site, special precautions are required to prevent hazardous situations.

Connect work cable to the work as close to the welding zone as practical to prevent welding current from passing too long and creating fire hazards or overheat.

Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap. Wear ear plugs when welding out of position or in confined places. Always wear safety glasses with side shields when in a welding area.

Be attention that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas and start a fire. Remove fire hazardous from the welding area, if not possible, cover them thoroughly. Do not weld where flying sparks can strike flammable material and where the atmosphere may contain flammable dust, gas, or liquid vapors (such as gasoline).

Protect yourself and others from flying sparks and hot metal. Remove any combustibles from operator before perform any welding.

Keep a fire extinguisher readily available.

Empty containers, tanks, drums, or pipes which have combustibles before perform welding.

Remove stick electrode from electrode holder or cut off welding wire at contact tip when not in use.

Apply correct fuses or circuit breakers. Do not oversize or bypass them.



Cylinder can explode if damaged. Pressure gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding process, be sure to treat them carefully.

Cylinders should be located away from areas where they may be struck or subjected to physical damage. Use proper equipment, procedures, and sufficient number of persons to lift and move cylinders.

Always install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling over or tipping.

Keep a safe distance from arc welding or cutting operations and any other source of heat, sparks, or flame.

No touching cylinder by welding electrode, electrode holder or any other electrically "hot" parts. Do not drape welding cables or welding torches over a gas cylinder.

Use only correct compressed gas cylinders, regulators, hoses, and fittings designed for the process used; maintain them and associated parts in good condition.

Use only compressed gas cylinders containing the correct shielding gas for the properly operating regulators designed for the gas and pressure used. All hoses, fittings, etc. should be suitable for the application and maintained in good condition.

Open the cylinder valve slowly and keep your head and face away from the cylinder valve outlet.

Valve protection caps should be kept in place over valve except when the cylinder is in use or connected for use.



Hot parts can burn. Do not touch hot parts with bare hand or skin.

Ensure equipment is cooled down before perform any work.

If touching hot parts is needed, use proper tools and/or wear heavy, insulated welding gloves and clothing to prevent burns.



Flying metal or dirt can injure eyes. When welding, chipping, wire brushing, and grinding can cause sparks and flying metal. It can hurt your eyes.

Remember wear appropriate safety glasses with side shields when in welding zone, even under your welding helmet.



Noise can damage hearing. Noise from some processes or equipment can damage hearing.

Remember wear approved ear protection to protect ears if noise level is high.



Moving parts can injure. Stay away from moving parts such as fans.

Stay away from pinch points such as drive rolls.

Keep all doors, panels, covers, and guards closed and securely in place.

Have only qualified persons remove doors, panels, covers, or guards for servicing and maintenance.

Reinstall doors, panels, covers, or guards when servicing and maintenance is finished and before reconnecting input power.



Overuse can cause overheating. Use machine follow duty cycle. Reduce current or reduce duty cycle before starting to weld again.

Allow cooling period.

Do not block or filter airflow to unit.



Safety markings. Equipment with CE-markings fulfils the basic requirements of the Low-Voltage and Electromagnetic Compatibility Guideline (e.g. relevant product standards according to EN 60 974).



Equipment with CCC markings meets the requirements of implementations rules for China compulsory certification.

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1 - GENERAL REMARKS

1-1 Power source features

This series of power sources apply IGBT soft switch inverter technology. Its internal control system applies DSP which ensures quick response to any change during the welding process so as to achieve precise control of welding process and ensure optimal welding results. The strong ability of arc self-adjustment ensures a highly stable welding current against grid fluctuation and arc length change to get optimal results.

This series has 3 core system, almost can communicate with all robots on market by digital /analogue interface. Perform welding work easily.

Features and benefits:

- High speed DSP+FPGA multi-core system, can shorten control period to control arc effectively;
- Periodic molten drop control technology, molten pool is more stable, with beautiful welding seam formation;
- Welding spatter for carbon steel decreases 80%, reduce spatter clean work; heat input reduces 10%~20%, small deformation;
- Work with robot like KUKA, ABB, FANUC, YASKAWA, COMAU, IGM, etc;
- Integrated analog communication, international Devicenet digital communication and Ethernet communication interface, realize seamless integration with robot;
- Open type communication mode, robot can control all parameters of welding machine;
- Built-in start point test function, can achieve welding seam start point test without adding robot hardware;
- With precise pulse waveform control technology, and lower heat input to avoid burn through and deformation, also reduce 80% spatter, realize very thin plate low spatter welding. This technology is widely used in bicycle, fitness equipment, automobile component, and furniture industries.

1-2 Functional principle

This series of power sources adopt IGBT soft switch inverter technology. 3-phase input voltage are rectified by rectifier, inverted into HF AC, reduced by HF transformer, rectified and filtered by HF rectifier, chopped and then output DC power suitable for welding. After this process, the welding machine dynamical responsive speed has been greatly increased, so the size and weight are reduced noticeably result in energy saving. The control circuit's closed-loop control makes the power source enjoy strong ability against power grid fluctuation and perfect welding performance. The schematic diagram is as shown in Fig. 1-2-1:

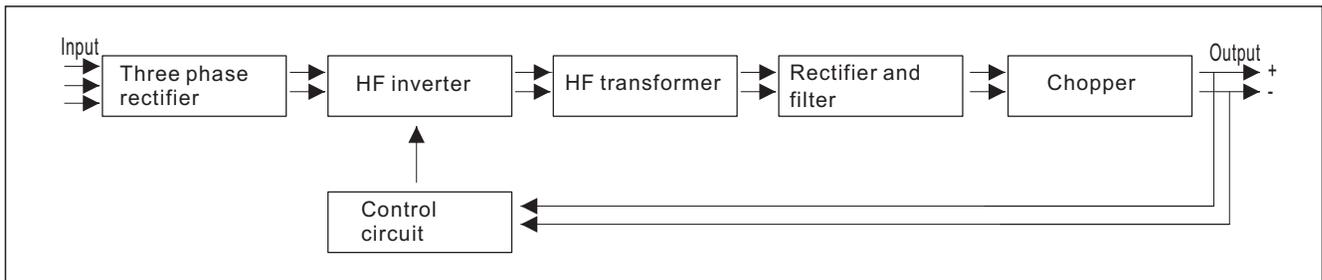


Fig. 1-2-1: Schematic diagram

1-3 Output characteristics

Output characteristics as Fig. 1-3-1:

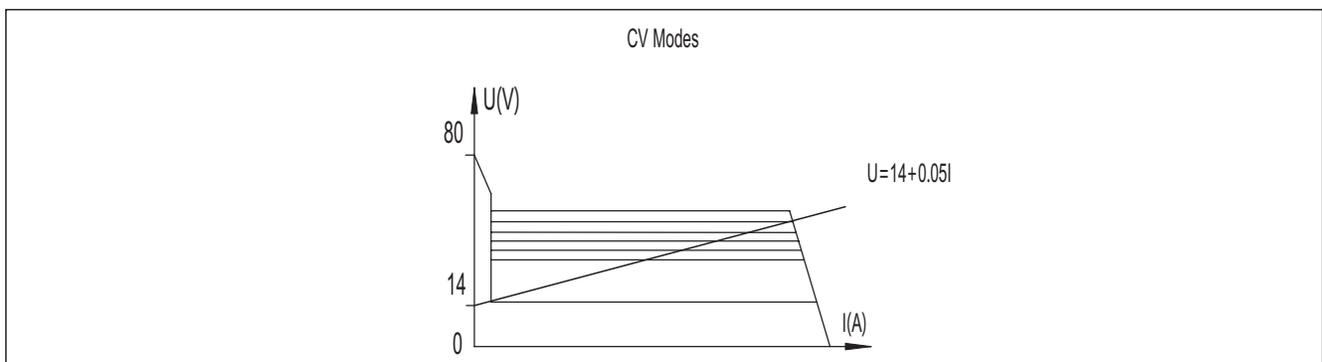


Fig. 1-3-1: Output characteristics

1-4 Duty cycle

Duty cycle is percentage of 10 minutes that a machine can weld at rated load without overheating. If overheats, thermostat(s) will open, output stops. Wait for fifteen minutes for the machine to cool down. Reduce amperage or duty cycle before welding.

NOTE! Exceeding duty cycle can damage unit and void warranty.

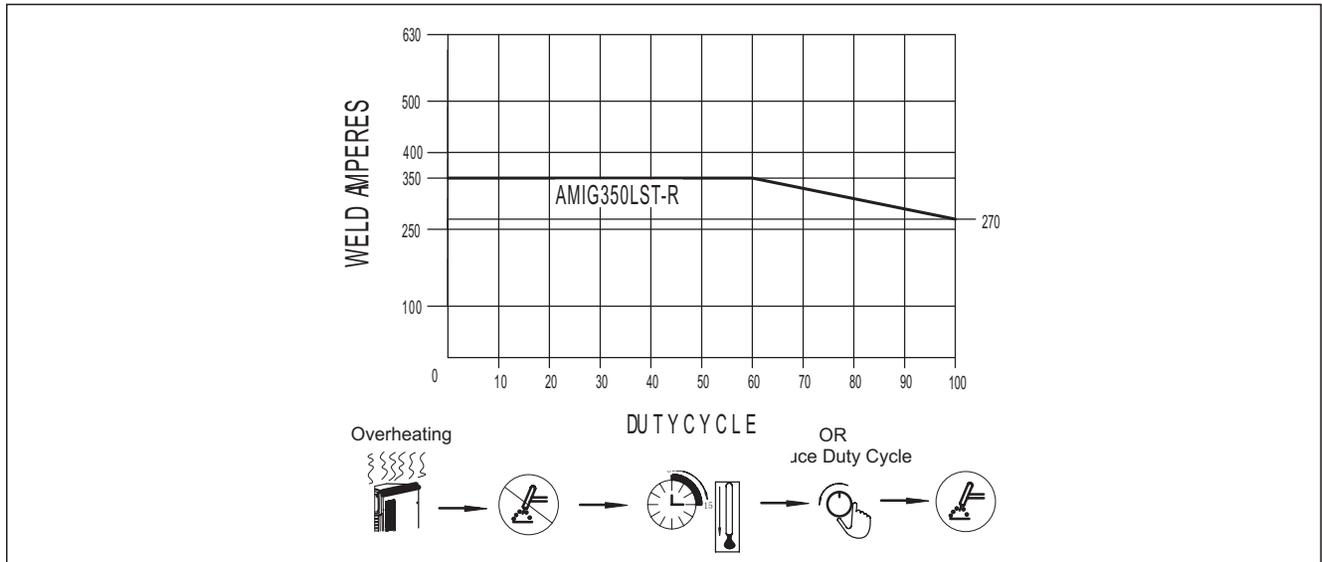


Fig. 1-4-1: Duty cycle

1-5 Applications

AMIG-LST-R series can realize thin plate (less than 3mm thickness) welding of stainless steel, galvanized sheet, carbon steel.

The power source is designed for the following applications:

- Automated application
- Robot application
- Automobile and components supply industry
- Chemical plant construction
- Boiler and pressure vessel
- Shipyards
- Power plant construction
- Vehicle manufacturing
- Machinery industry
- Others

1-6 Warning label

The warning label is affixed on the top of machine.

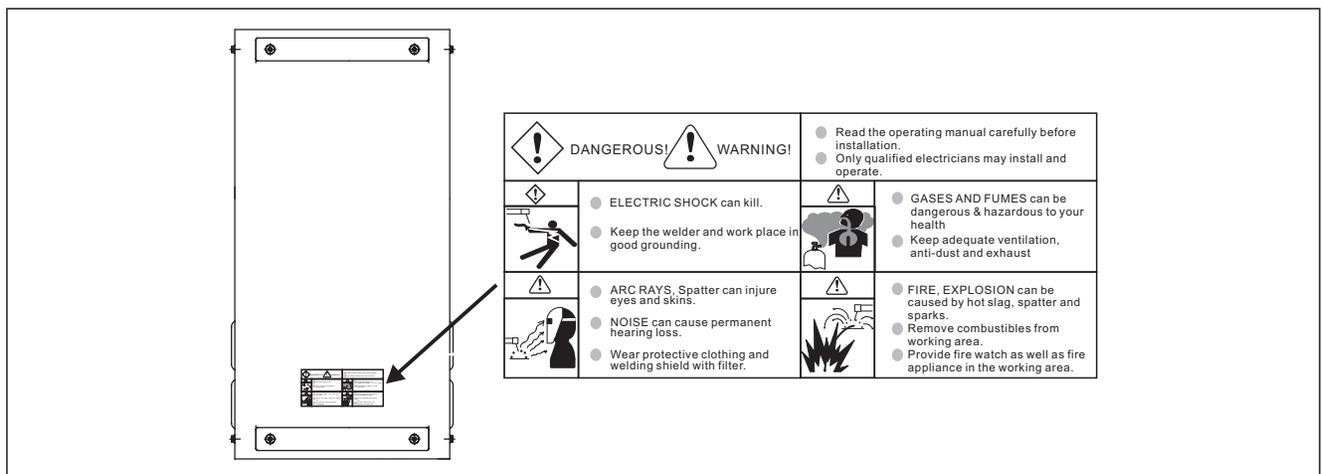


Fig. 1-6-1: Warning label

2 - VERSIONS BRIEFS

Professional welding of special materials requires special welding parameters. Different models of the power sources are matched to different welding.

AMIG350LST-R

This series inverter welding machine is specially designed for working with robot, equip with robot matching wire feeder, which communicate with robot through digital/analogue interface, and combine robot welding system. It has MIG, LST (low spatter technology) welding processes.

3 - BEFORE COMMISSIONING



Warning! Operating the equipment incorrectly can cause serious injury and damage. Do not use the functions described here until you have read and completely understood "safety rules".

3-1 Utilization for intended purpose only

AMIG-LST-R series may only be used for MIG, LST. Utilization for other purposes, or in any other manner, shall be deemed to be "not in accordance with the intended purpose". The manufacturer shall not be liable for any damage resulting from such improper use. Operate, inspect and maintain should follow all the instructions given in this manual.

3-2 Machine installation rules

According to test, protection degree of this power source is IP21S (optional IP23S). However, the internal key components must be protected from direct soaking.



Warning! A machine that topples over or falls from its stand can cause injury. Place equipment on an even, firm floor in such a way that it stands firmly.

The venting duct is very important for safety protections. When choosing the machine location, make sure it is possible for the cooling air to freely enter and exit through the louvers on the front and back of machine. Any electro conductive metallic dust like drillings must not be allowed to get sucked into the machine.

3-3 Power source connection

- The power source is designed to run on the voltage given on the nameplate.
- The mains cables and plugs must be mounted in accordance with the relevant technical standards.
- The power supply sockets that come with power source are designed to use strictly according to the marked voltages.

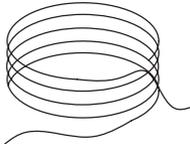
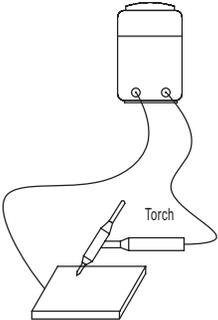


Note! Inadequately dimensioned electrical installations can lead to serious damage. The mains lead, and its fuse protection, must be dimensioned in accordance with the local power supply. The technical data shown on the nameplate shall apply.

3-4 Welding cables instruction

When welding, please pay attention to the followings:

- a. The welding cables should be kept as short as possible;
- b. If extended cable is used, please do as shown in Fig. 3-4-1.

<p style="text-align: center;">Wrong</p> <p>Coil the excess ground cable and welding cable in same direction respectively.</p>	
<p style="text-align: center;">Correct</p> <p>Straighten the ground cable and welding cable and make them close to each other.</p> <p>Bundle the ground cable and welding cable together, running the wires close to the ground.</p>	

Correct

When the excess cables are only be used by rolling up, coil the cables to two windings in reverse direction and overlap them.

The number of turns for A is same as the number for B.

Handle the welding cable and ground cable according to above-mentioned method.

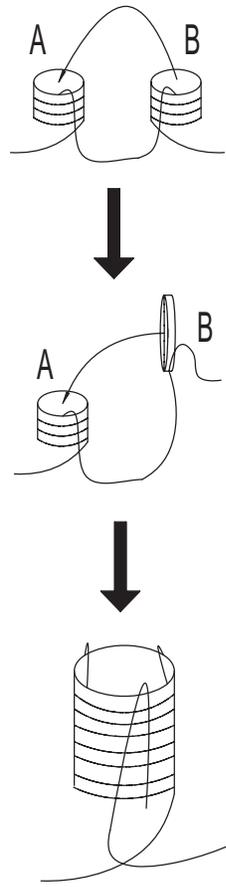


Fig. 3-4-1: Welding cables instruction

4 - AMIG350LST-R

4-1 System components

This series inverter welding machine is specially designed for working with robot, it needs follow parts to combine robot welding system.

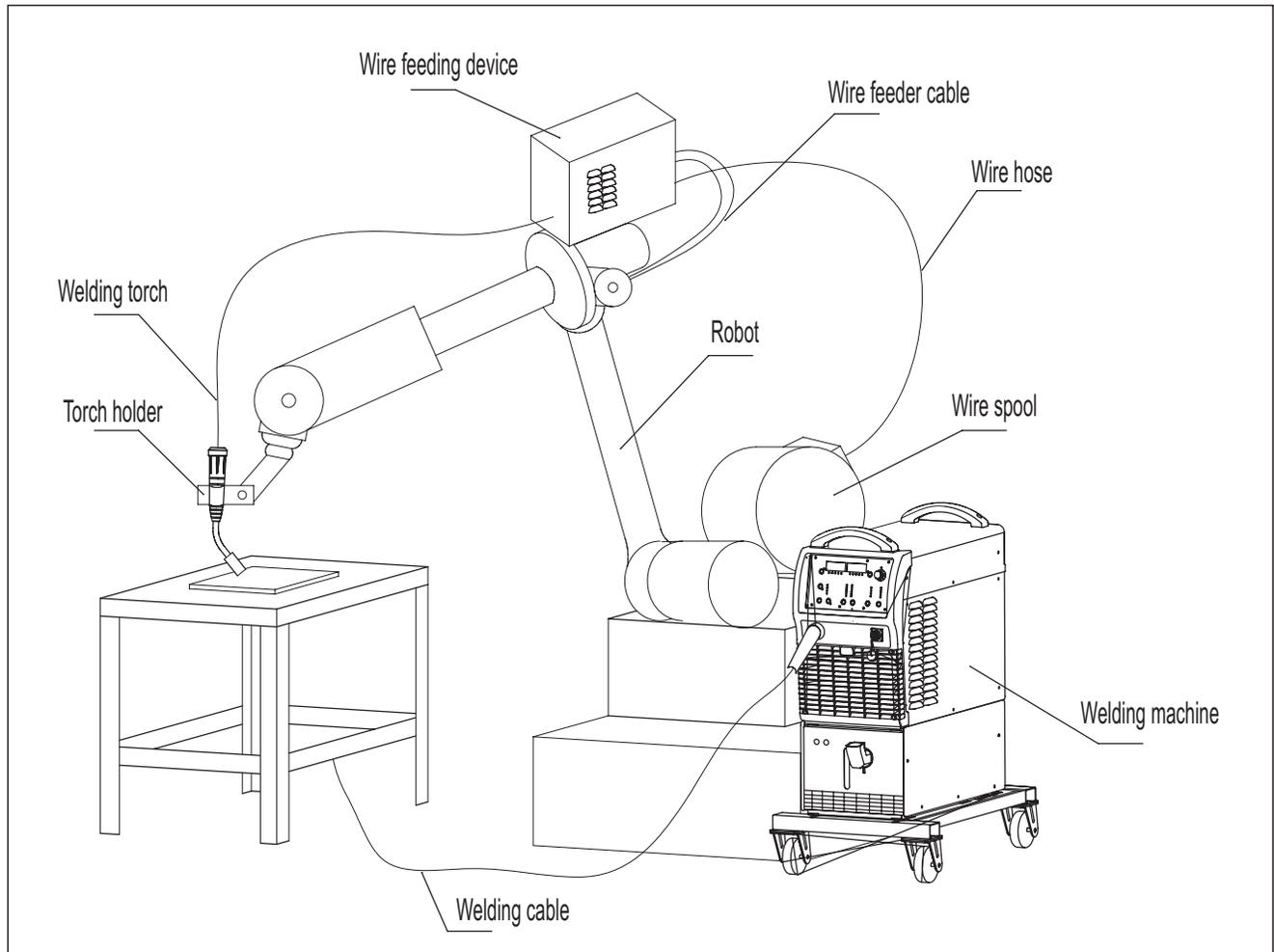


Fig. 4-1-1: System components

4-2 Basic equipments for welding

Only be equipped with the necessary accessories, can the robot system operates well. The following is the needed accessories list.

- Welding machine (AMIG350LST-R)
- Robot
- Welding torch matching for robot
- Wire feeder matching for robot
- Wire spool

4-3 Control panel

The functions on the control panel are all arranged in a very logical way. The various modes and parameters needed for welding are easy to select by pressing the appropriate button; parameters are easy to adjust by rotating encoder.



Note! Some described parameters in this manual may be slightly different from the power source, some identification may be slightly different from panel identification, but the manner of working is the same.



Warning! Operating the equipment incorrectly can cause serious injury and damage. Do not use the functions described here until you have read and completely understood all content of this manual.

Note! Control panel of welding machine is for function selection and some parameters setting. Welding parameters can be adjusted by panel control (control by welding machine control panel, sub-menu parameter P09 is ON) and remote control (control by robot, sub-menu parameter P09 is OFF).

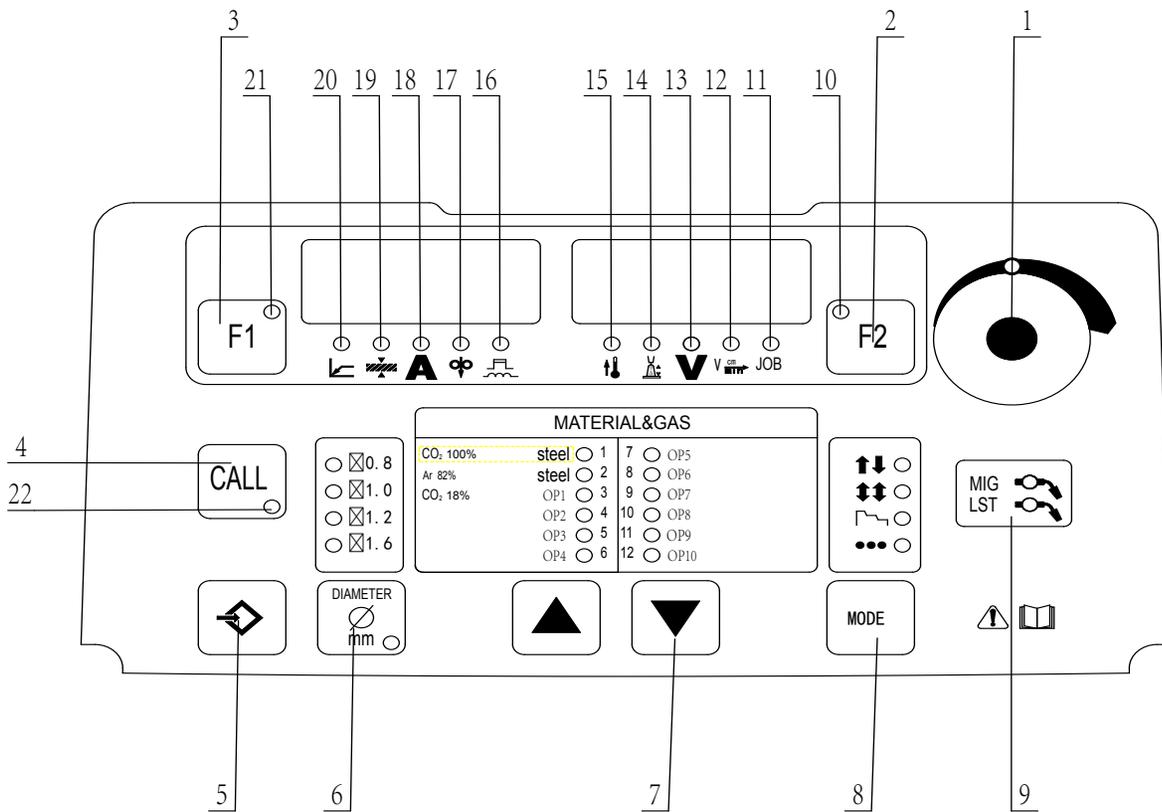


Fig. 4-3-1: Control panel

1. Adjustment knob

Adjust the parameters. When the light is on, this knob can be used to adjust parameters of selected item.

Important! Values increase in clockwise direction while decrease in anti-clockwise rotation. To turn left or right while pressing this button will achieve quick adjustment.

2. Parameters selection button F2

Press this button, one parameter indicator light is on, and the corresponding parameter is chosen; keep pressing this button can switch among the following parameters:

- Arc length correction
- Welding voltage
- Job (Channel) No.

If both parameter indicator light and the adjusting knob (1) indicator light are on, then the indicated/ selected parameter can be adjusted with the adjusting knob (1).

3. Parameters selection button F1

Press this button, one parameter indicator light is on, and the corresponding parameter is chosen; keep pressing this button can switch among the following parameters:

- Wire feeding speed
- Welding current
- Arc force/ Arc stiffness

4. CALL button

Load stored set of parameters.

5. STORE button

- For accessing the sub-menu parameter set-up menu or (in job mode) for storing parameter settings.
- During creating or correcting a job, store parameter settings.

6. Wire diameter selection button

For selecting wire diameter.

7. Wire material selection button(s)
For selecting the filler metal and shielding gas type.

8. Torch operation selection button
For selecting the operating mode of torch.

- 2-step mode (standard operating mode)
- 4-step mode (the trigger lock mode)
- Special 4-step mode (arc-starting and crater-filler parameters are adjustable)
- Spot welding mode

Operating mode of welding torch
Graphic symbol

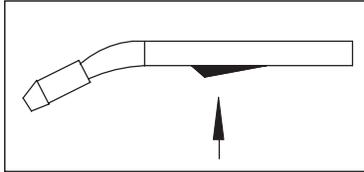


Fig. 4-3-2 Press torch trigger

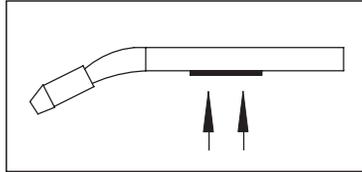


Fig. 4-3-3 Hold torch trigger

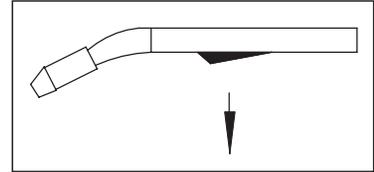


Fig. 4-3-4 Release torch trigger

- P01.....Burn back time
- P03.....Gas pre-flow time
- P04.....Gas post-flow time
- P05.....Initial period: the base metal can be heated up rapidly, despite the fast thermal dissipation at the start of welding
- P06.....Crater filler parameter: Prevent burn-through caused by too much heat at the welding ends.
- P07.....Transitional period: the time from welding current to crater-filler current.
- P08.....Spot welding time
- I.....Welding current: Uniform thermal input for the preheated base metals.

- 2-step mode

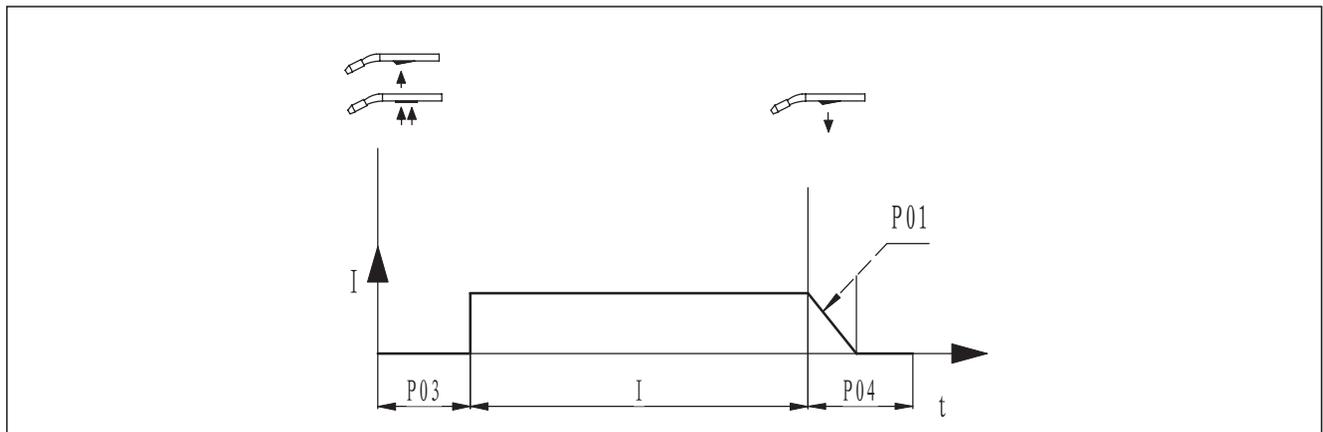


Fig. 4-3-5: 2-step mode

- 4-step mode

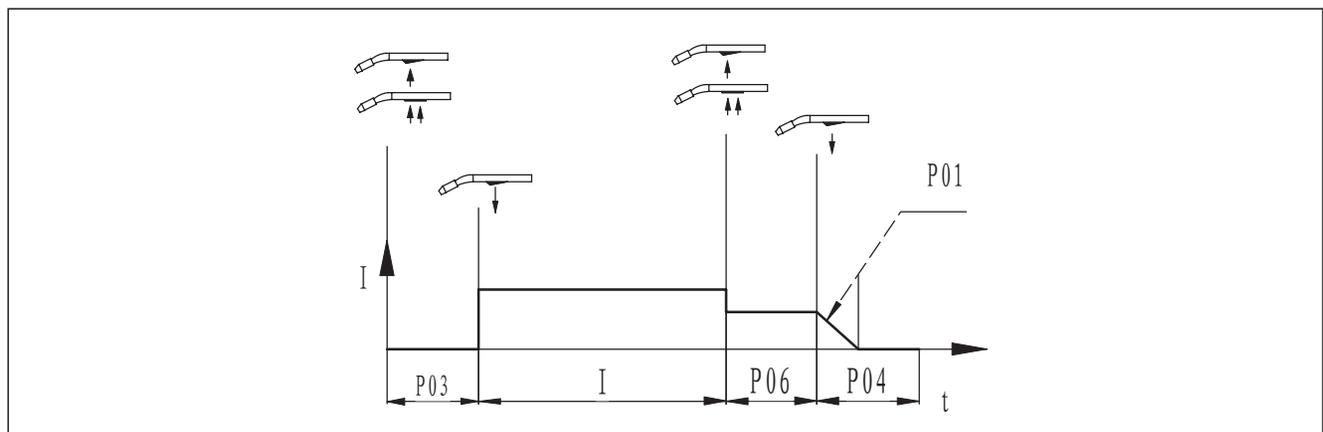


Fig. 4-3-6: 4-step mode

- Special 4-step mode (arc-starting and crater-filler parameters are adjustable)

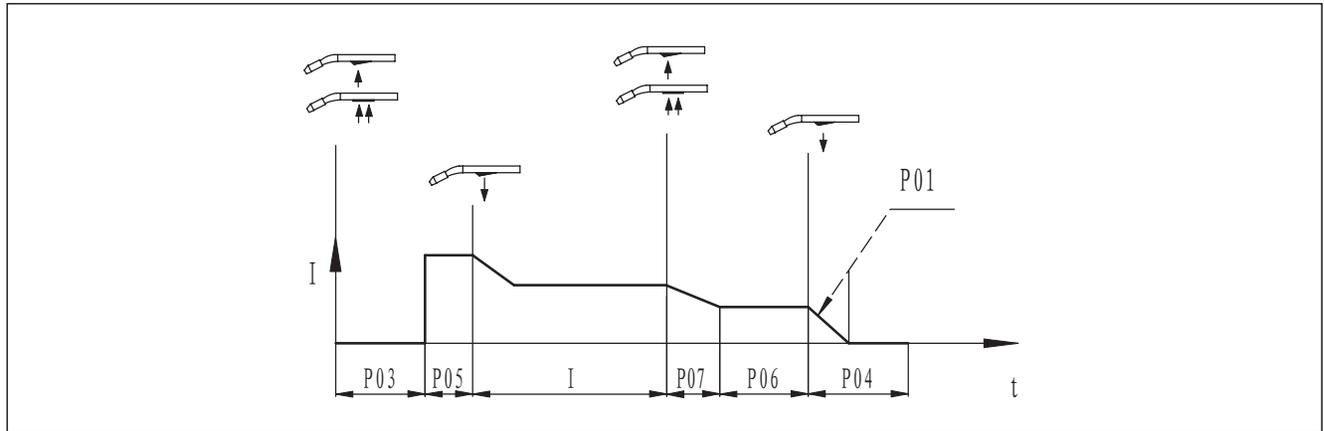


Fig. 4-3-7: Special 4-step mode

- Spot welding mode

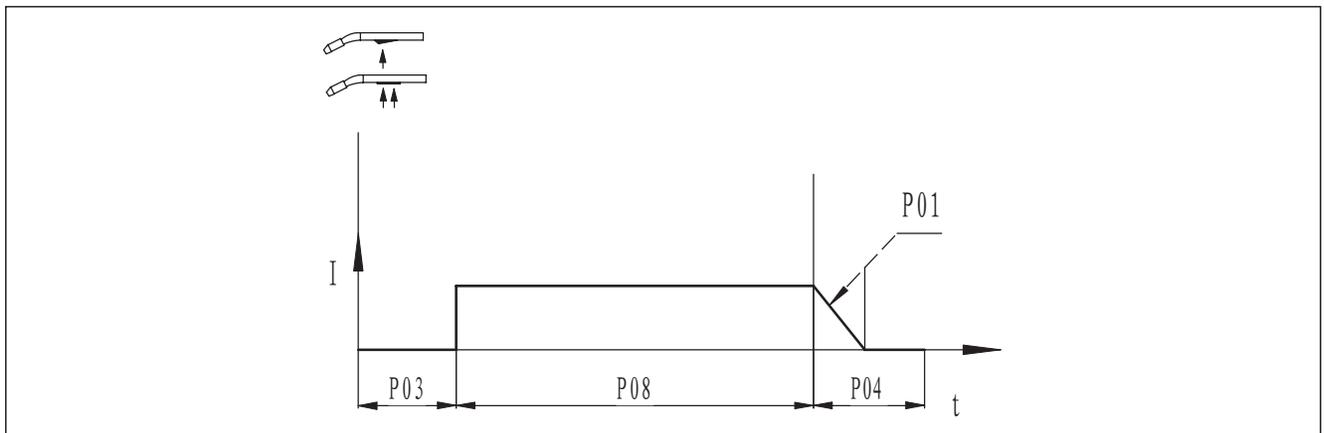


Fig. 4-3-8: Spot welding mode

9. Process button

For select welding process.

- MIG
- LST

10. F2 selection key indicator

When the indicator light is lit up, F2 works.

11. Job No. indicator

For receiving parameter records/job numbers that were previously saved with "Store" button.

12. Welding speed indicator

When the light is on, right-hand displayer shows preset welding speed (cm/min). The wire feeding speed and welding current & voltage are calculated as a function of the "a"-dimension parameter (20).

13. Welding voltage indicator

When the indicator is on, right-hand displayer shows preset or actual welding voltage.

14. Arc-length correction indicator

For correcting the arc length (-5.0-+5.0) by adjustment knob (1), right-hand displayer shows the arc length value when the indicator is on.

- shorter arc length
- 0 neutral arc length
- + longer arc length

Important! The range (-5.0-+5.0) means that, when preset welding current, the arc length value is -50%~+50% of the corresponding welding voltage.

15. Temperature indicator

This is reserved function, and cannot operate now.

16. Arc force/ Arc stiffness

In synergic MIG/MAG DC welding, change the arc stiffness value when short circuiting transfer (-5.0-+5.0).

- harder, stable arc

0 neutral arc

+ soft, low spatter arc

17. Wire feeding speed indicator

When the indicator is on, left-hand displayer shows the wire feeding speed (M/min).

18. Welding current indicator

When the indicator is on, left-hand displayer shows the preset or actual welding current.

19. Sheet thickness indicator

When the indicator is on, left-hand displayer shows the preset sheet thickness (mm).

20. "a" dimension indicator

When the indicator is on, left-hand displayer shows "a" dimension (mm).

21. F1 selection key indicator

When the indicator is on, F1 button works.

22. CALL program mode indicator

When the indicator is on, power source is in call program mode.

23. Sub-menu parameters indicator

This indicator is on when in sub-menu parameters adjustment.

Sub-menu parameter

In order to achieve an optimum welding result, it is necessary in some cases to make corrections of the arc-length, arc force as well as parameters like gas pre-flow time, gas post-flow time and slow wire feeding. For details of how to set the Sub-menu parameters, please refer to "Sub-menu parameter set". Specific sub-menu parameters as Table 4-3-1:

Item	Parameters	Setting Range	Factory Setting
P01	Burn back time	0.01~2.00s	0.01s
P02	Slow wire feeding	1.0~21.0 m/min	1.5m/min
P03	Gas pre-flow time	0.1~10.0s	0.20s
P04	Gas post-flow time	0.1~10.0s	1.0s
P05	Initial period	1~200%	135%
P06	Crater filler period	1~200%	50%
P07	Transitional period	0.1~10.0s	2.0s
P08	Spot welding time	0.5~5.0s	3.0s
P09	Panel control selection	OFF/ON	OFF
P10	Water cooling selection	OFF/ON	ON
P16	Fan-on demand cooling time	5~15min	15min
P17	Arc start time	0~10s	OFF
P18	Arc stop time	0~10s	OFF
P19	Separate adjustment mode	OFF/ON	OFF
P22	Pulse current when start arc	-50%~50%	0
P23	Pulse time when start arc	-50%~50%	0

Item	Parameters	Setting Range	Factory Setting
P24	Short circuit rise rate	-50%~50%	0
P25	Short circuit rise knee point	-50%~50%	0
P26	Arcing peak value	-50%~50%	0
P27	Arcing peak time	-50%~50%	0
P30	Inch wire feeding speed	1.0~21.0m/min	3m/min
P31	Molten drop transition time 1	-50%~50%	0
P32	Molten drop transition time 2	-50%~50%	0
P33	Spatter adjust	-50%~50%	0
P34	Ball removing voltage	-50%~50%	0
P35	Ball removing voltage time	-50%~50%	0

Table 4-3-1: Sub-menu parameter

Note! P11-P14 is available on double pulse function; P20-P21 is available on twin wire welding mode.

- P01 Burn back time

If too long time, the wire will burn back too much with too large melting ball at the end of wire; if too short time, the wire will stick with the work piece

- P02 Slow wire feeding

With too quick feeding speed, the wire will be easily exploding with failed arc-starting; if the feeding speed is slower than the melting speed, the long arc will cause conductive tip burned.

- P03 Gas pre-flow time

Longer time will cause waste of gas and low efficiency; shorter time will cause air hole during arc-starting

- P04 Gas post-flow time

Longer time will cause waste of gas; shorter time will cause air hole during crater filler period

- P05 Initial period

Special 4-step mode and set the percentage between initial period and pre-set parameters. When adjust the initial period, press F2 and then adjust dial (1), make correction of the arc length of the initial period. Press F2 again to exit.

- P06 Crater filler period

4-sept or special 4-step mode, set the percentage between crater filler period and pre-set parameters. When adjust the crater filler, press F2 and then adjust dial (1), make correction of arc length of the crater filler. Press F2 again to exit.

- P07 Transitional period

During the special 4-step mode, the time cost from starting current to normal welding current and then to post current

- P08 Spot welding time

Choose spot welding process and set the welding time

- P09 Panel control selection

In OFF mode, welding process and parameters are controlled by wire feeder or digital remote-control box; In ON mode, welding process is controlled by adjust dial in the panel

- P10 Water cooling selection

In OFF mode, without water cooler or the water cooler do not work, no water cooling protection; In ON mode, the water cooler works, and has water cooling protection if in wrong situation

- P16 Fan-on demand cooling time

Set the time that fan continues to work after power source stops welding.

- P17 Arc start time

On special 2-step mode, time for start period. When choose at number, it is time for start period, when reach to this time, will turn to welding standard; when choose at OFF, the function closes.

- P18 Arc stop time

On special 2-step mode, time for crater filler time. When choose at number, it is time for crater filler, when reach to this time, will turn to stop welding standard; when choose at OFF, the function closes.

- P19 Separate adjustment mode

In OFF mode, current and voltage is synergic adjusted; in ON mode, current and voltage is separately adjusted.

- P22 Pulse current when start arc

Too small will cause wire touches with work piece, and arc start fails. Too large will cause large energy when start arc, and arc has defect.

- P23 Pulse time when start arc

Too short will cause difficult to start arc; too long will cause large energy when start arc, and arc has defect.

- P24 Short circuit rise rate

The higher the short circuit current rise rate is, the harder the arc is, and the large spatter is; otherwise, arc will be softer, spatter will be lesser. Too small will cause unstable welding.

- P25 Short circuit rise knee point

The higher the short circuit rise knee point is, the harder the arc is; otherwise, the softer the arc is. Recommend to use factory setting parameter value.

- P26 Arcing peak value

The higher the arcing peak value is, the longer the arc length is, the stronger the directivity is; otherwise the shorter the arc is, the weaker the arc directivity is. Too low value of this parameter will cause unstable welding.

- P27 Arcing peak time

The longer the arcing peak time is, then the larger arc energy is, the larger welding heat affected zone is; otherwise, the smaller arc energy is, the smaller welding heat affected zone is. Too low value of this parameter will cause deformed weld.

- P30 Inch wire feeding speed

Set manual wire feeding speed.

- P31 Molten drop transition time 1

This parameter is used together with P32, the longer the time is, the larger arc energy is, the longer droplet transfer time is, the softer arc is; otherwise, the smaller arc energy is, the shorter droplet transfer time is, the harder arc is. Recommend to use factory setting parameter value.

- P32 Molten drop transition time 2

This parameter is used together with P31, the longer the time is, the larger arc energy is, the longer droplet transfer time is, the softer arc is; otherwise, the smaller arc energy is, the shorter droplet transfer time is, the harder arc is. Recommend to use factory setting parameter value.

- P33 Spatter adjust

The longer the parameter is, the larger welding spatter is; otherwise, the smaller welding spatter is. Too small will cause unstable welding, recommend to use factory setting parameter value.

- P34 Ball removing voltage

When remove welding ball, set welding ball removing voltage.

- P35 Ball removing voltage time

When remove welding ball, set welding ball removing time.

Sub-menu parameter adjustment

Enter and exit from the sub-menu and parameters adjustment as Fig. 4-3-9:

1. Press and hold the store button (5) in standby mode;
2. Press wire diameter selection button (6) simultaneously;
3. Release store button (5) and wire diameter selection button (6), the indicator (23) is on means enter into the sub-menu; **Important!** The last parameter to be selected is displayed! The first-time enter shows "P01".
4. Press wire diameter selection button (6) to select parameters; Note! Also can use "wire material selection button(s) (7)



" to select.

5. Press adjustment knob (1) to adjust parameters;

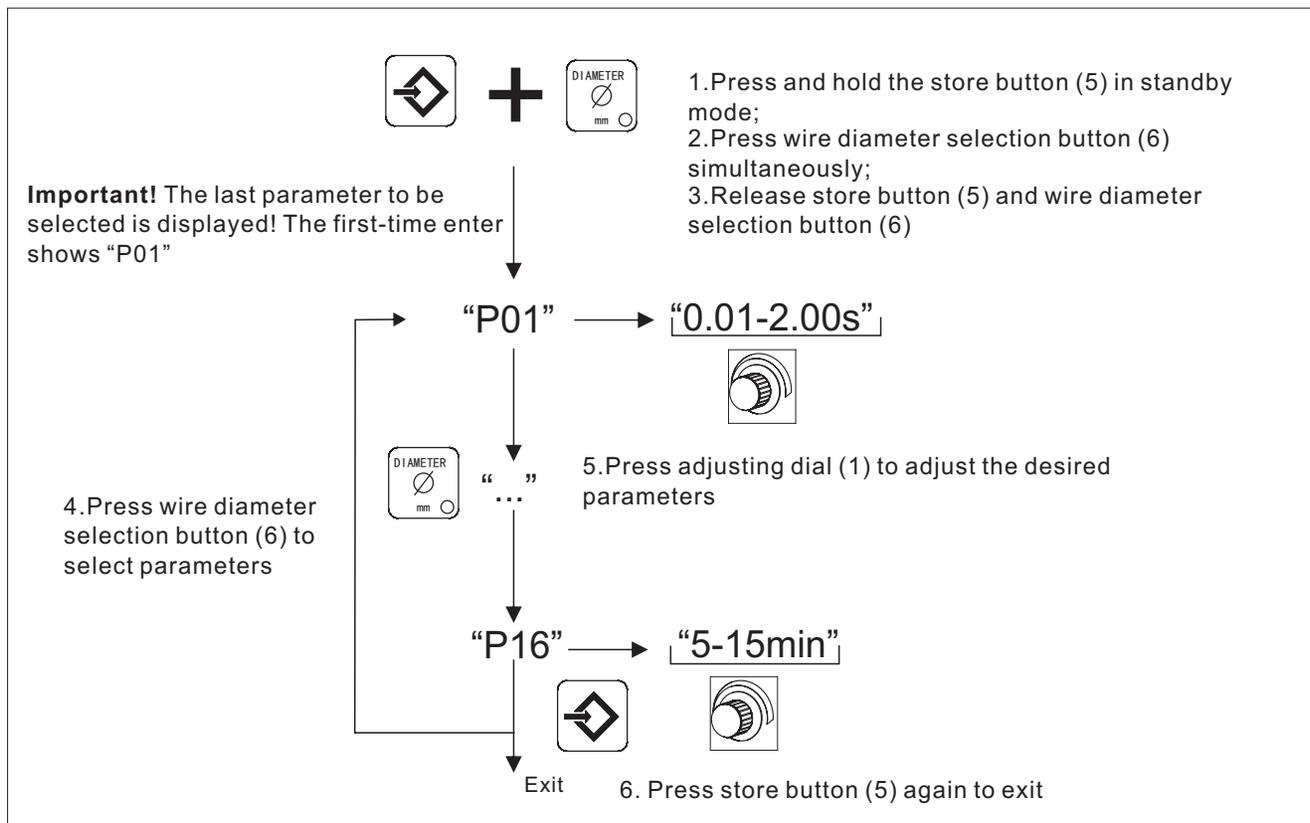


Fig. 4-3-9: Sub-menu parameters set

Important! Adjust the parameters of current percent and arc-length correction firstly before select the parameters of initial standard (P05) and arc stopping standard (P06). Press F2 to choose the desired one and then changes the parameters by adjusting knob (1).

6. Press store button (5) again and then exit from the sub-menu mode. The indicator (23) is off meaning the exiting from the sub-menu.

Note! When this series welding machines are working with robot, some parameters will be adjusted from the robot itself, and the welding power front panel is not allowed an adjustment, please refer to Table 4-3-2. While if the operator wants to adjust the parameter from control panel, please refer to the sub-menu parameter part, Table 4-3-1, and set the welding machine in panel control mode. Set sub-menu parameter P09 as ON.

Parameter	When in remote control, can the parameter adjust from control panel?	
	Analogue Interface	Digital Interface
Arc length correction		
Job No.	✓	
Wire feeding speed	✓	
Welding current		
ARC force/Arc stiffness	✓	
Wire diameter selection	✓	✓
Wire material selection	✓	✓
Torch operating mode	✓	
Welding mode selection	✓	
P01	Burn back time	✓

Parameter		When in remote control, can the parameter adjust from control panel?	
		Analogue Interface	Digital Interface
P02	Slow wire feeding speed	√	√
P03	Gas pre-flow time	√	√
P04	Gas post-flow time	√	√
P05	Initial period	√	√
P06	Crater filler period	√	√
P07	Transitional period	√	√
P08	Spot welding time	√	√
P09	Panel control selection	√	√
P10	Water cooling selection	√	√
P16	Fan-on demand cooling time	√	√
P17	Arc start time	√	√
P18	Arc stop time	√	√
P19	Separate adjustment mode	√	√
P22	Pulse current when start arc	√	√
P23	Pulse time when start arc	√	√
P24	Short circuit rise rate	√	√
P25	Short circuit rise knee point	√	√
P26	Arcing peak value	√	√
P27	Arcing peak time	√	√
P30	Inch wire feeding speed	√	√
P31	Molten drop transition time 1	√	√
P32	Molten drop transition time 2	√	√
P33	Spatter adjust	√	√
P34	Ball removing voltage	√	√
P35	Ball removing voltage time	√	√

Table 4-3-2: Parameter adjustment on analogue/digital interface

Sub-menu parameter for arc start/ crater filler/ short circuit control characteristic

Sub-menu parameter for arc start characteristic

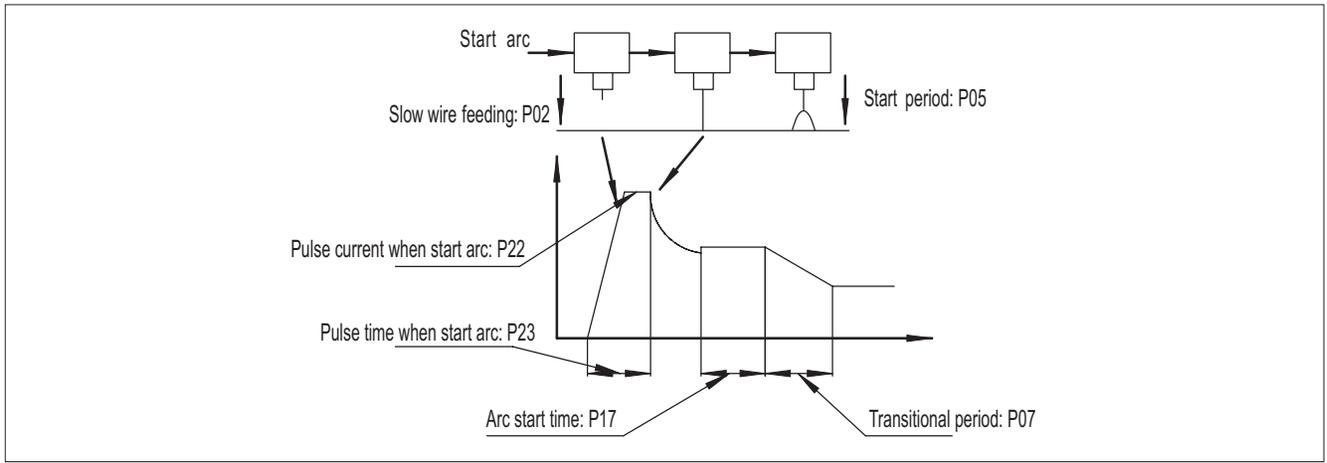


Fig. 4-3-10: Operating mode sequence diagram of start arc

When welding voltage and current settings are correct, but not easy to start arc, please adjust sub-menu parameter as follow table.

Item	Function	Adjust method
P02	Wire feeding speed when wire touches with work piece	Wire touches with work piece, wire explodes seriously – adjust smaller No arc start or slow arc start – adjust larger
P05	Initial period, default state is OFF	Arc start section in weld seam is narrow or work piece does not melt – adjust larger
P17	Initial period function time (arc start time)	Arc start section in weld seam is wide or work piece bores a hole – adjust smaller No problem of arc start section in weld seam - OFF
P07	Transitional time from initial period to welding period	Formation changes a lot for arc start section in weld seam – adjust larger No problem of arc start section in weld seam - OFF
P22	Pulse current when start arc	Longer arc when start arc, work piece burns seriously, large spatter – adjust larger
P23	Pulse time when start arc	Difficult to start arc, wire explodes, work piece and wire does not fuse - OFF

Table 4-3-3: Sub-menu parameter

Sub-menu parameter for crater filler control characteristic

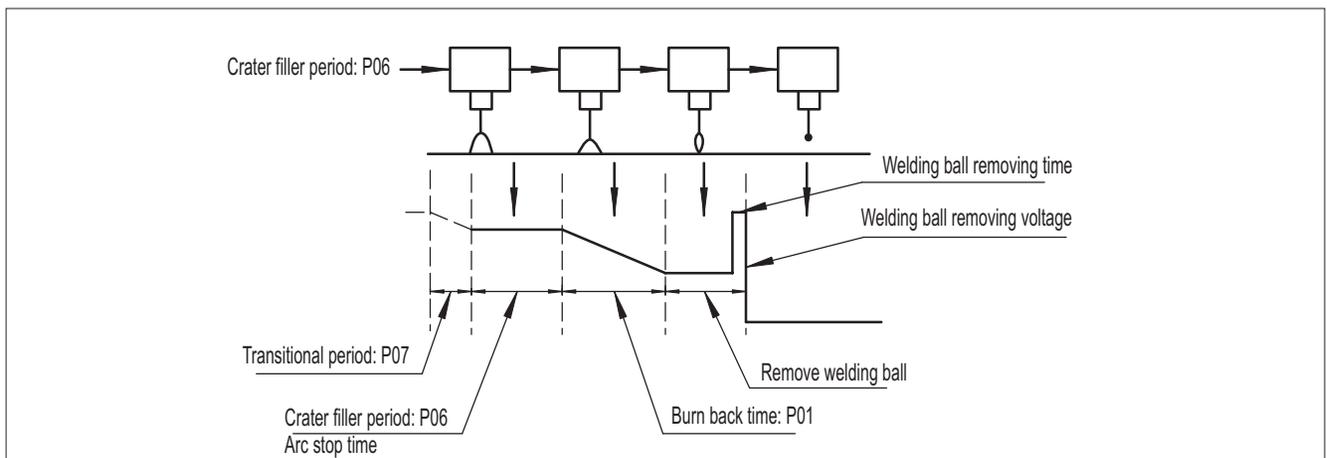


Fig. 4-3-11: Operating mode sequence diagram of crater filler

Item	Function	Adjust method
P07	Transitional time from welding period to crater filler period	Weld seam formation is narrow – adjust larger Weld seam formation is wide – adjust smaller No problem of weld seam formation - OFF
P18	Crater filler time, default is OFF	
P06	Crater filler period	
P01	Burn back time	Wire sticks with work piece, work piece burns seriously - adjust larger Wire sticks with contact tip - adjust smaller
P34	Ball removing voltage	No arc start when re-start arc – adjust larger Arc is long when re-start arc, work piece burns – adjust smaller
P35	Ball removing voltage time	

Table 4-3-4: Sub-menu parameter

Sub-menu parameter for short circuit control characteristic

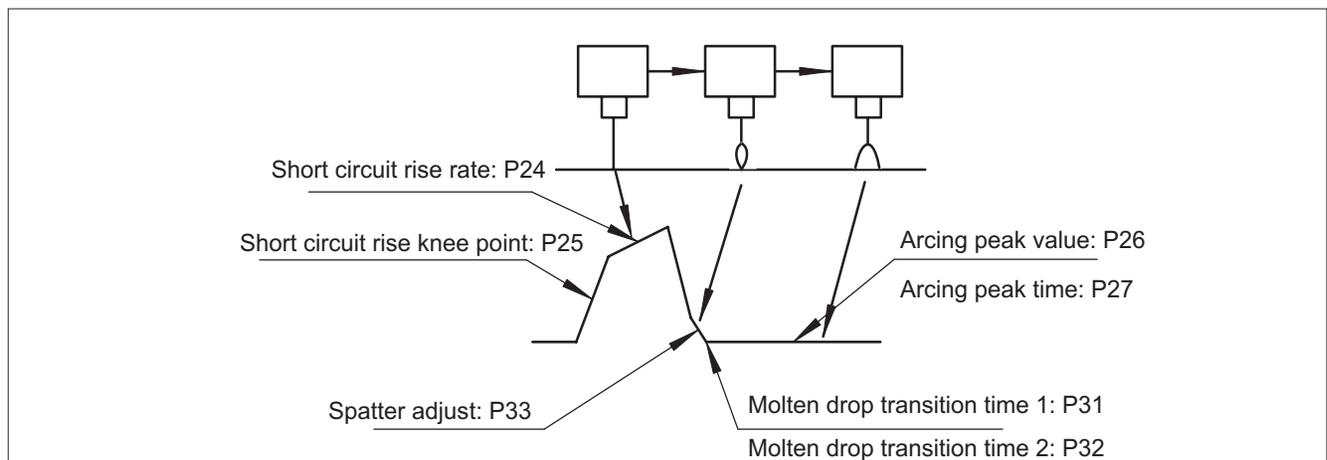


Fig. 4-3-12: Operating mode sequence diagram of short circuit control

When welding voltage, welding current are correct, but cannot perform stable welding, please adjust short circuit control parameter, to improve welding stability and weld seam formation.

On condition of stable welding, fine adjust P33 to adjust welding spatter.

Item	Function	Adjust method
P33	Spatter adjust	Unstable welding – adjust larger Large spatter during welding – adjust smaller
P24	Short circuit rise rate	Large spatter, wire explodes – adjust larger Unstable welding arc – adjust smaller
P25	Short circuit rise knee point	
P26	Max. length of welding arc	Small welding arc energy, short welding arc, need flat weld seam – adjust larger No short circuit of molten drop, arc length is longer- adjust smaller
P27	Max. energy of welding arc	

Table 4-3-5: Sub-menu parameter

Job mode

“Job Mode” enhances the quality of welding, both in semi-automatic and fully automated operation. Traditionally, technical parameters of some repeated operations need to be written down for record. In Job Mode, it is now possible to store and retrieve up to 100 different jobs.

The following symbols are used in Job Mode, on the left-hand displayer:

---.....No job in this program location (only when you try to retrieve a job from this location, otherwise nPG)

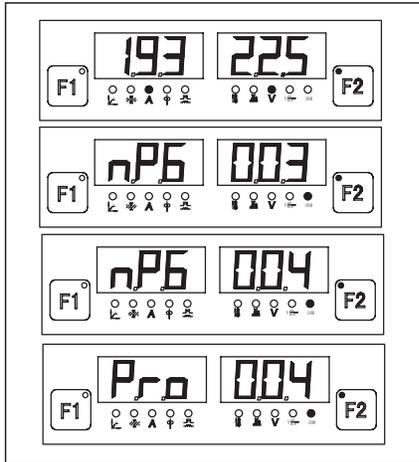
nPG.....No job in this program location

Pro.....Job is being created /copied in this program location

PrG.....There is a job in this program location

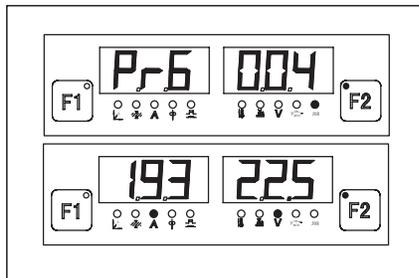
Creating a job

The machine comes with no jobs pre-programmed. A job has to be created before it can be retrieved. To create a job, proceed as follows:



- (1) Set the welding parameters that you want to store as a “Job”.
- (2) Briefly press the Store button (5) to enter into the job menu. The first vacant program location for the job is now indicated.
- (3) Select the program location with the adjustment knob (1), or else leave the suggested program location unchanged.
- (4) Press and hold the Store button (5). The left-hand displayer reads “Pro” –the job is stored in the program location you have just selected.

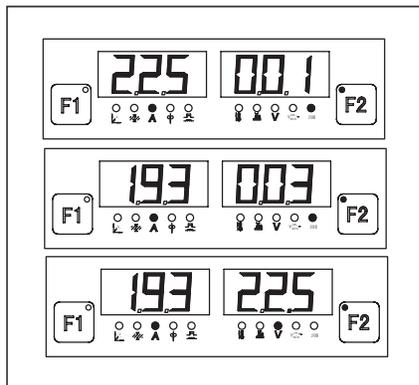
Important! If the selected program location already has a job stored in it, then this existing job will be replaced by the new job.



- (5) “PrG” appears on the left-hand displayer to indicate that the job is now stored. Release the Store button (5)
- (6) Briefly press the Store button (5) to exit from the job menu

Retrieving a job

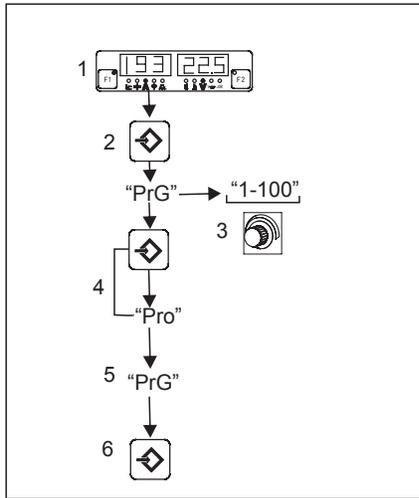
You can copy a job that has already been stored in one program location to any other program location. To copy a job, proceed as described below:



- (1) With the “CALL” button (4), indicator (22) is on -the last job used is displayed. To view settings programmed in this job, use the “Parameter selection” buttons (2) and (3). The process and operating mode of the stored job are also displayed.
- (2) With the adjustment knob (1), select the desired job.
- (3) Press the “CALL” button (4), indicator (22) is off. Exit from the retrieving mode.

Job correction

If correct job, please follow the steps: Fig. 4-3-13:



- (1) Set the welding parameters that you want to store as a "Job"
- (2) Briefly press the Store button (5) to change to the job menu. The first vacant program location for the job is now indicated
- (3) Select the program location with the adjustment dial (1), or else leave the suggested program location unchanged.
- (4) Press and hold the Store button (5). The left-hand displayer reads "Pro" –the job is stored in the program location you have just selected
- (5) "PrG" appears on the left-hand displayer to indicate that the job is now stored. Release the Store button (5). If the selected program location already has a job stored in it, then this existing job will be replaced by the new job
- (6) Briefly press the Store button (5) to exit from the job menu

Fig. 4-3-13: Job correction

Restore the factory setting

Press adjustment knob (1) for about 5 seconds, it comes back to factory set (see Fig. 4-3-14).

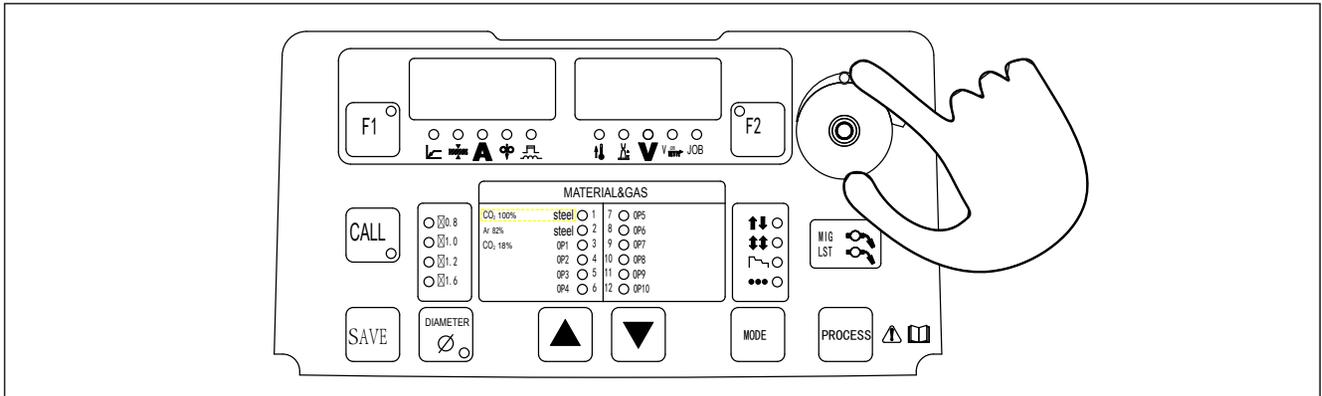


Fig. 4-3-14: Restore the factory setting

4-4 Connections

Front panel

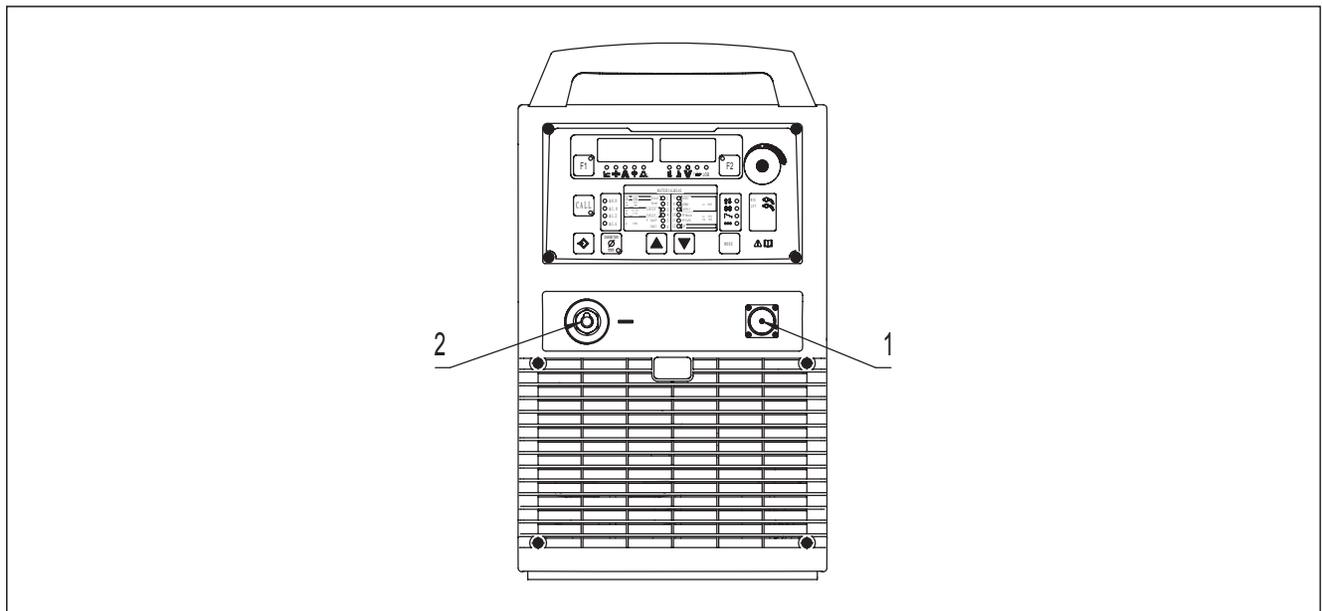


Fig. 4-4-1: Front panel

1. Arc voltage feedback socket
Connect with arc voltage feedback components.

2. Output socket (-)
For connecting with the work piece by ground cable.

Rear panel

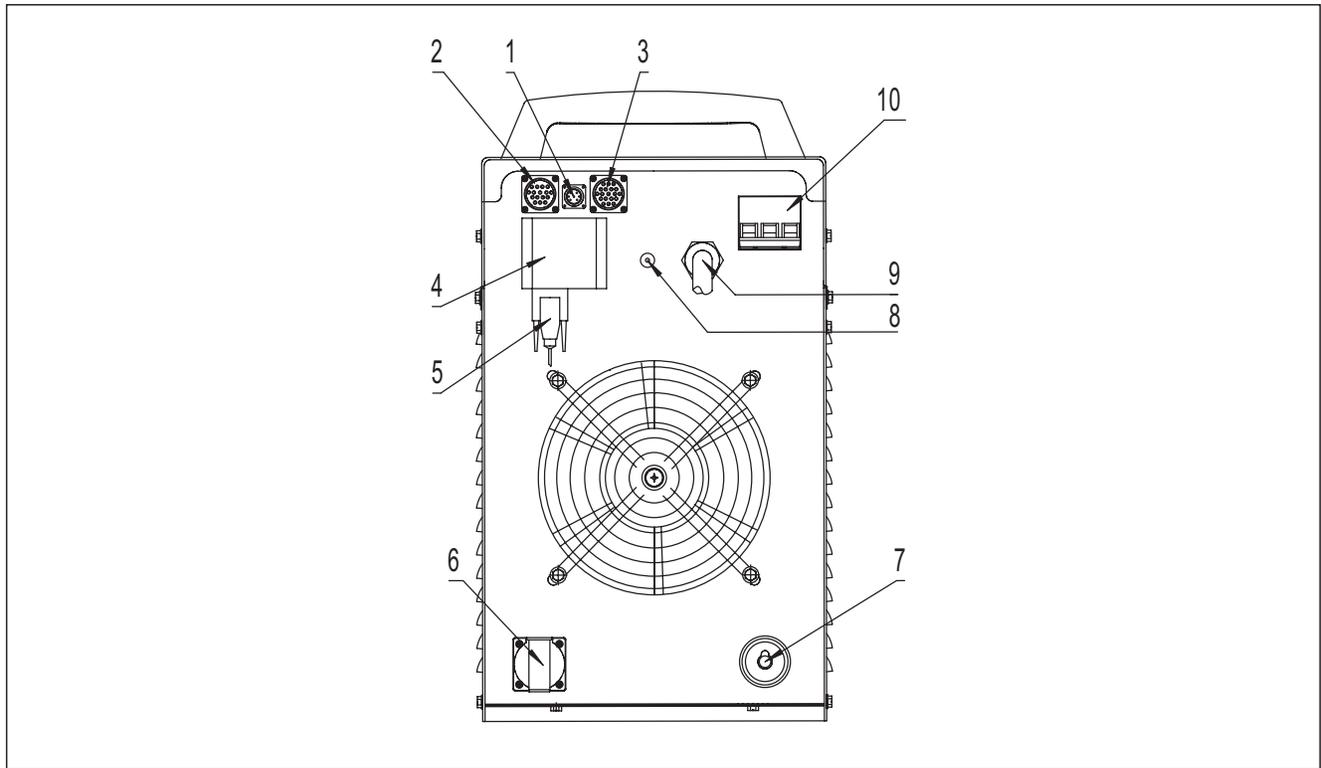


Fig. 4-4-2: Rear panel

1. Digital connector X6
Digital connector control function is powerful, with strong universality, can match with most robots in market. But this robot needs to have digital communication module, and need to purchase digital interface box from specified manufacturer.

	Pin	Description
	1,2	AC38V power
	3	Connect welding machine + sending line (Y\T+)
	4	Connect welding machine - sending line (Z\T-)
	5	Connect welding machine + receiving line (A\R+)
	6	Connect welding machine - receiving line (B\R-)

Table 4-4-1: Digital connector X6

2. Analogue connector X5
Analogue connector can use analogue control cable to connect, low cost, high reliability, can perform basic welding process by robot, but cannot use expert database.

Pin	Description
4	External power supply DC24V
5	Voltage given signal (0~10V correspond to -50%~50%)
6	Current given signal (0~10V correspond to 0~500A)
7	Manual wire feeding switch
8	Gas test switch
9	Start/Stop switch
10	Manual wire withdraw switch
11	Analogue given signal GND
12, 13	Current on/off (arc strike success) contact signal (has current)
14, 15	Wire stick feedback signal
16, 17	Anti-crash contact signal
18, 19	Arc breaking contact signal
Note! Except 5, 6 which are analog level signal, others are switching signal, 12~17 signals are welding machine output signal, others are input signal.	

Table 4-4-2: Analogue connector X5

3. Wire feeder control socket X7

For connecting with the wire feeder of robot, please refer to "Table 4-4-3" in detail:

Pin	Description
2	Solenoid valve -
3	Wire feeder +
4	Wire feeder -
5	Voltage feedback +
6, 7	Anti-crash reserved signal
8, 9, 10	Rotation speed feedback signal, 8 is +5V, 9 is GND, 10 is signal
11	Gas test signal
12	Wire test signal
13	Torch trigger signal
14	GND of signal 11, 12, 13
15, 16	Null

Table 4-4-3: Wire feeder control socket X7

4. Communication control device
Digital communication with robot.

5. Robot connecting digital connector
Digital connector used to connect with robot.

6. Power supply socket for gas heater (AC36V)
For connecting the heater coil of the CO2 gas regulator.

 **Note!** Please choose the gas regulator with the same voltage degree of output socket.

7. Output socket (+)
Connect with wire feeder by wire feeder cable.

8. Wire feeder over load protector
This protector will turnoff (jump up) automatically when wire feeder is in fault, such as over load. Press this protector after trouble shooting.

9. Power input cable
Yellow-green cable needs to be grounded firmly; other 3 cables connect with three phase power.

10. Circuit breaker
The function of circuit breaker is to protect welding machine and operator by automatic trip to turn-off power supply when overload or short circuit happens to the power source. Normally, the switch flipped to upward means power-on. To start or stop the welding machine is done by the mains switch in the distribution box. Please do not take this circuit breaker as the power switch.

Output socket

The output socket of this power source is fast plug-in type.

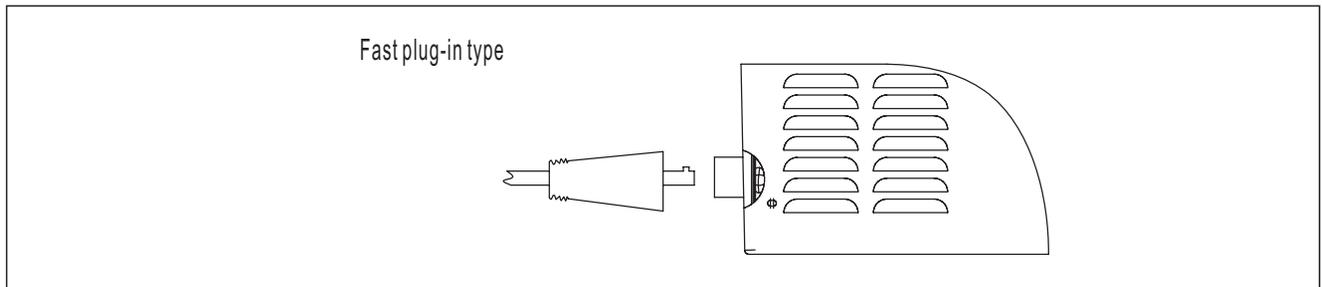


Fig. 4-4-3: Output socket

4-5 Robot wire feeder

Robot matched wire feeder as follow picture. It connects with X7 socket on welding machine rear panel by control cable. Wire feeder control part is in the inside of welding machine, it reduces wire feeder weight, also reduces robot load-bearing.

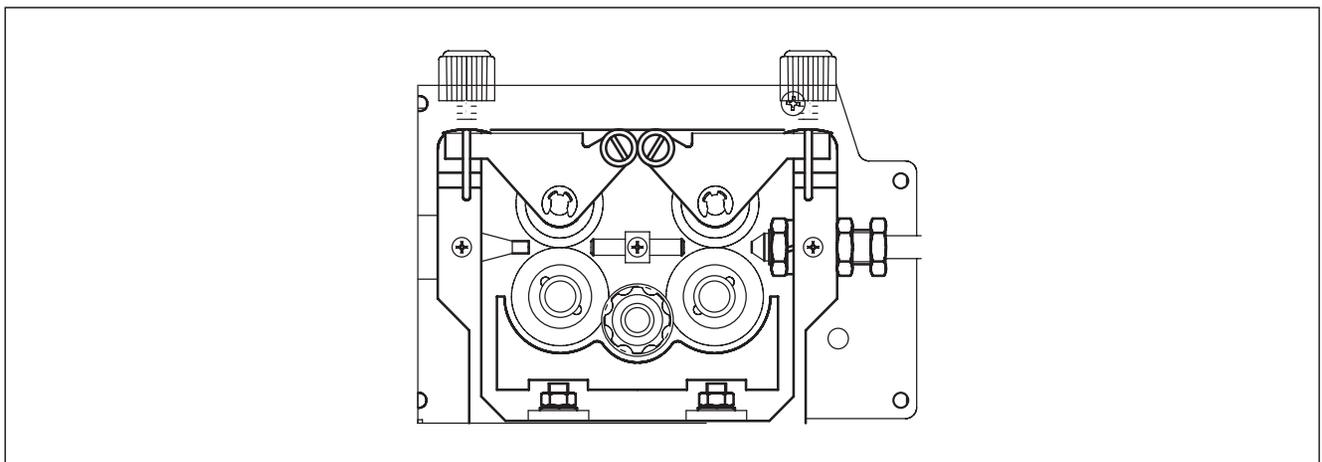


Fig. 4-5-1: Wire feeding device

Characteristics

1. Grating feedback wire feeder motor, high precision, strong power of wire feeding, strong anti-interference capacity, ensure welding stability.
2. 4 wire feed rollers, strong power and stability of wire feeding.
3. Easy to replace wire feed rollers, without using tools.
4. Small size and light weight, suit to install on robot, help robot move easily.

Wire feeding device interface

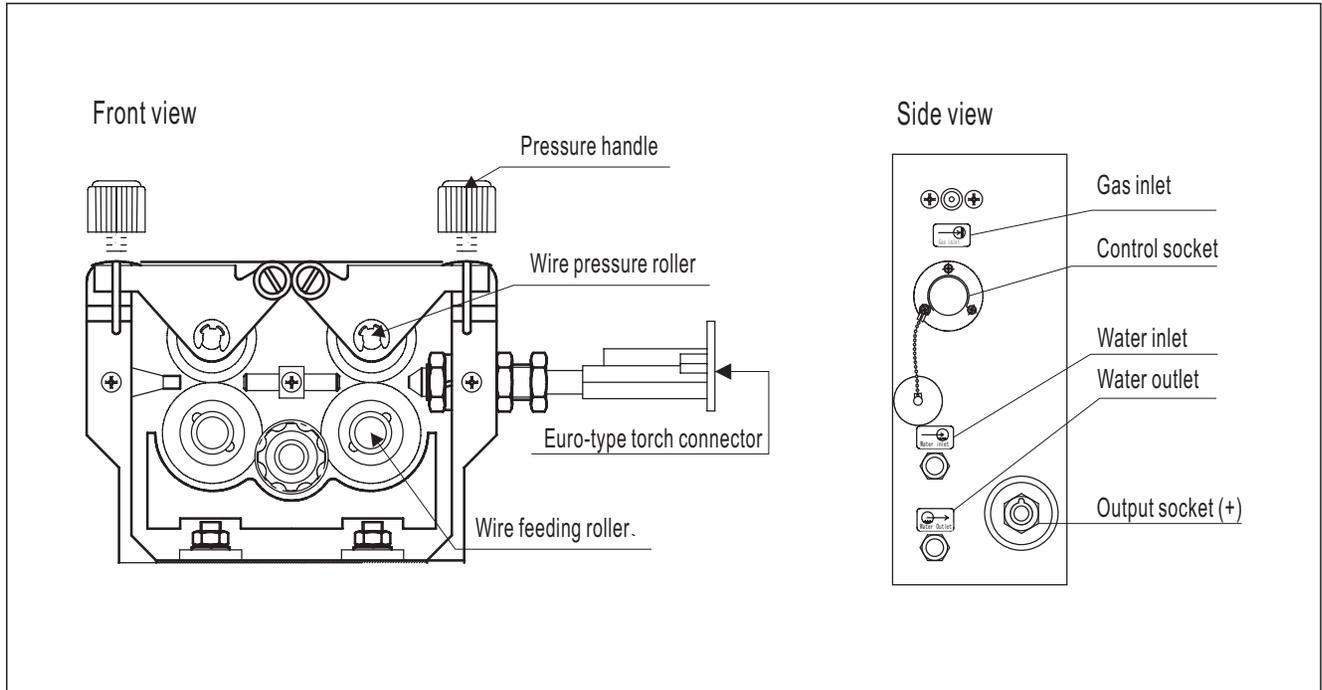


Fig. 4-5-2: Wire feeding device interface

Technical parameter

Item	Technical parameter
Motor rated voltage	DC24V
Motor rated current	5A
Wire feeding speed range (m/min)	1~22
Weight (kg)	5.5
Dimension (mm3)	253×134×204

Table 4-5-1: Technical parameter

Operation

Press wire test button to start wire feeder motor, first 1 second is slow wire feeding, later is quick wire feeding, wire feeding speed is preset value of sub-menu parameter P30. Release wire test button, wire stops feeding. Press gas test button to open gas valve, wire feeder and welding machine does not work. Gas will feed for 30 seconds, re-press gas test button during this time to stop feeding gas.

4-6 Robot welding torch

Normally choose Euro type connector (Fig. 4-6-1), consider duty cycle, cooling way and suitable welding material when select. Generally robot is on long working time, to ensure good welding result and torch safe use, choose water cooled type. While for carbon steel welding, because CO2 has cooling characteristic, can choose air cooled type at low current welding.

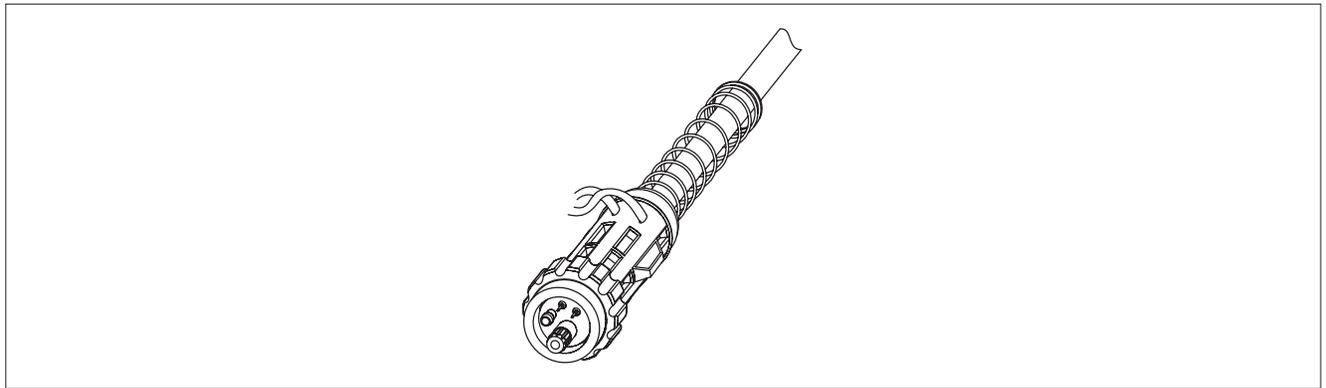


Fig. 4-6-1: Euro type connector

Note! When use water cooled welding torch, need to fill in purified water, pay attention to freeze protection.

There are different buckling angle for robot torch neck, like 22°, 35° and 45° common angle. (Fig. 4-6-2) Buckling angle has big influence for robot posture, so must consider angle to make robot works at the safest and most comfortable way.

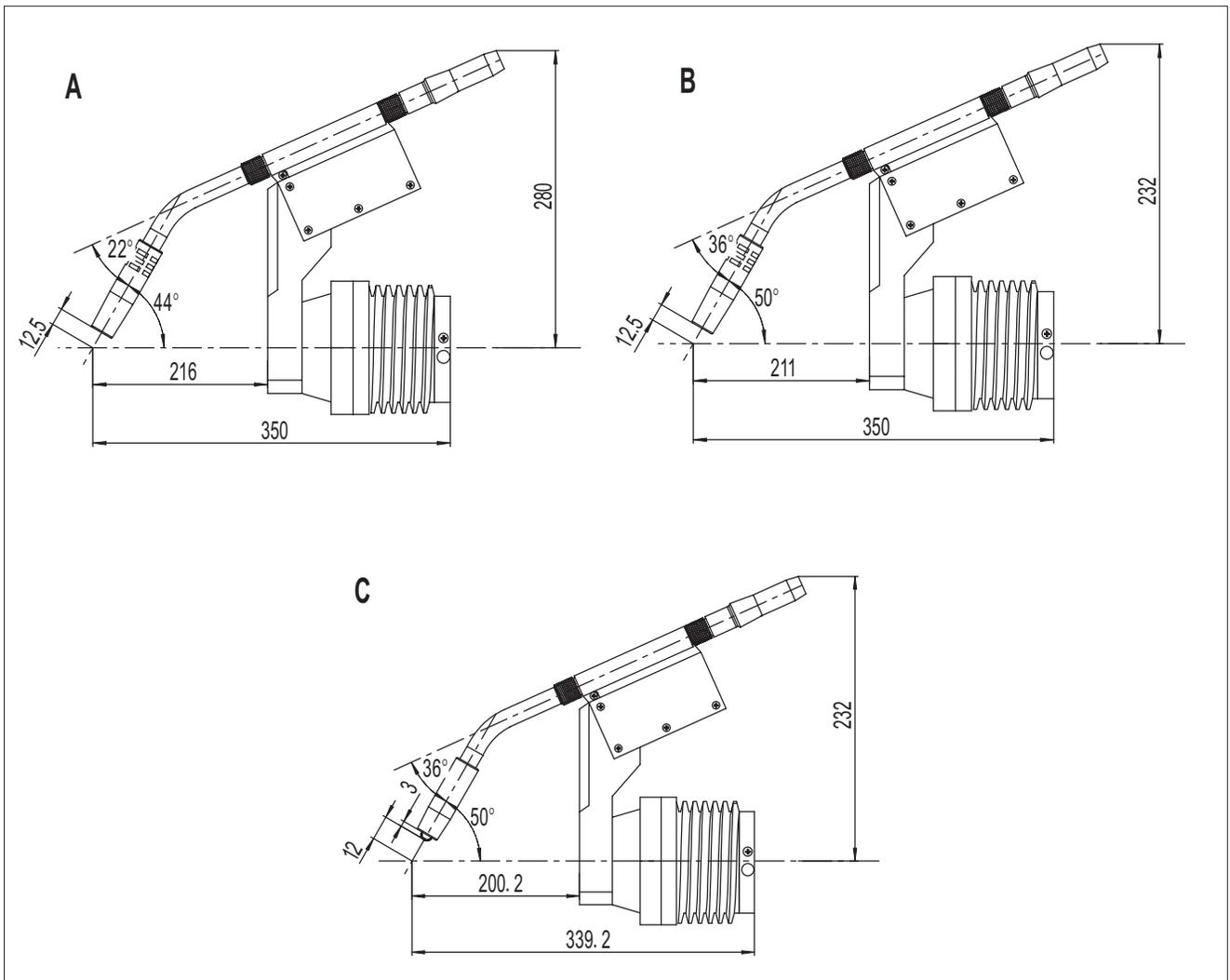


Fig. 4-6-2: Different buckling angle for robot torch neck

Torch has specialized torch holder, ensure torch and robot sixth axis firmly connected when installation, and ensure torch TCP coherence when changing torch.

4-7 Interface

As communication link between welding machine and robot, must ensure interface safety, reliability and strong applicability. Analogue and digital connectors can choose for robotic series welding machine.

4-7-1 Analogue interface

Analogue interface chooses analogue control cable, low cost and high reliability, can realize basic welding process through robot, but does not have expert database call function.

4-7-2 Digital interface

Digital interface includes EtherNetIP, DeviceNet, CAN, CANOPEN, 485 five kinds of communication methods, adopts standard communication protocol. It can call welding standards stored inside of welding machine. Welding machine can store and call 100 welding standards. Have high applicability, can match with most brands robot. Digital interface requires that robot has digital communication module, and purchase Aotai interface box. Connect interface box with X6 socket on welding machine rear panel.

4-7-3 EtherNetIP interface box

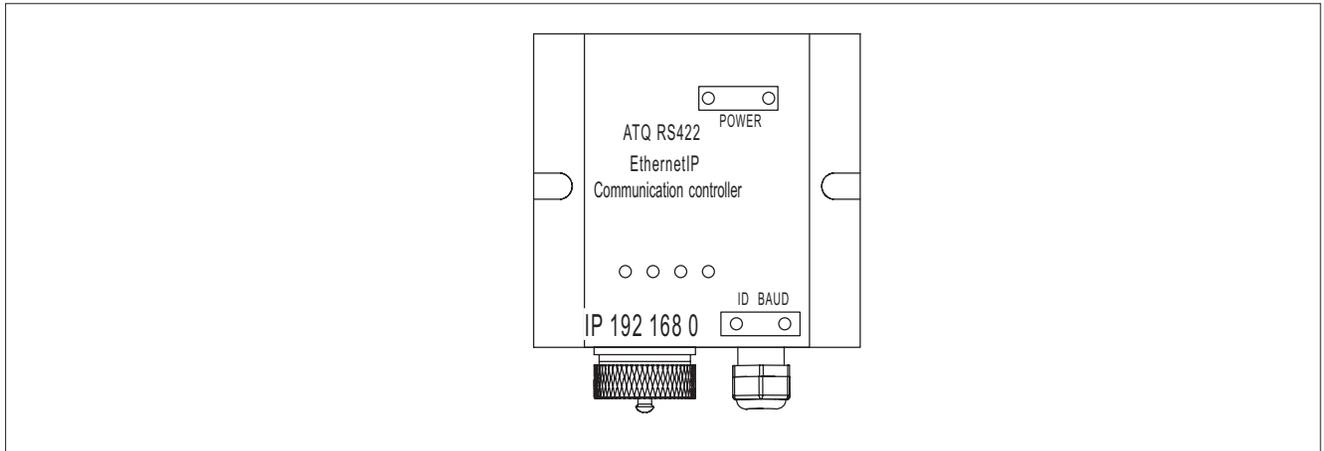


Fig. 4-7-3-1: ATQ-RS422/EtherNetIP interface box

ATQ-RS422/EtherNetIP interface box is specially designed for robot matched welding machine, interface box can realize conversion between robot EtherNetIP protocol and welding machine protocol. EtherNet/IP adopts standard Ethernet technique, includes IEEE 802.3 standard and TCP/IP protocol. It adopts common industrial protocol (CIP) as its application layer protocol.

Ethernet physical interface

ATQ-RS422/EtherNetIP interface box Ethernet connector adopts water-proof RJ45 standard interface.

Internet parameter setting

IP address: 192.168.0.2 ~ 192.168.0.99

Subnet mask: 255.255.255.0

Default gateway: 192.168.0.1

Last bit of IP address can be adjusted by knob on interface box, other parameters cannot adjust.

4-7-4 CANOPEN interface box

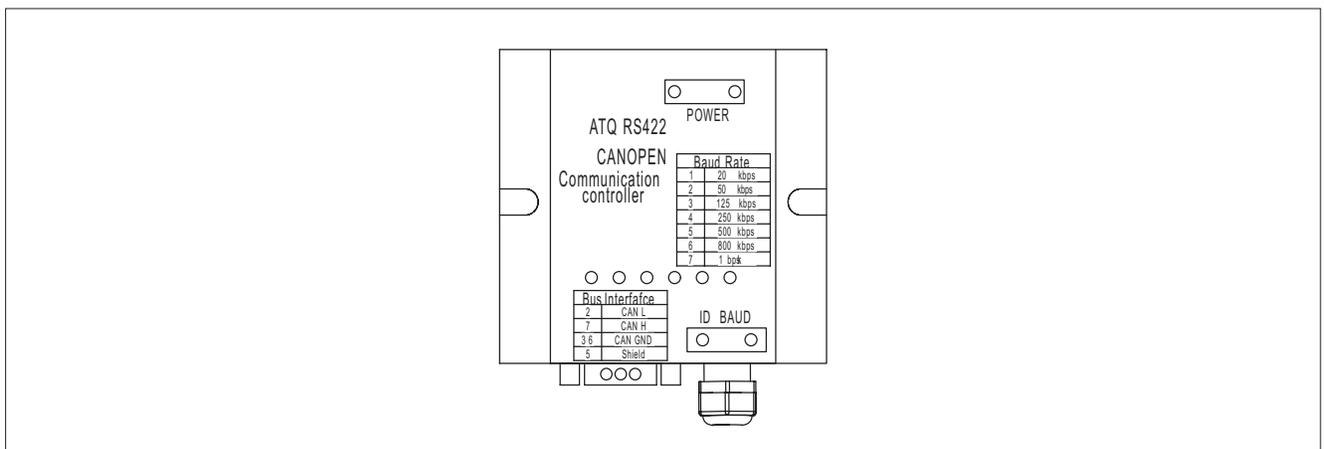


Fig. 4-7-4-1: ATQ-RS422/CANOPEN interface box

ATQ-RS422/CANOPEN is used to realize conversion between CANOPEN and welding machine communication protocol. It adopts standard CANOPEN interface, conforms to CIA301, CIA401, CIA402 standard.

Can bus physical interface

ATQ-RS422/CANOPEN interface box CAN bus physical interface adopts DB9 pin type socket which conforms to CAN bus standard, pin 2 is CAN-L, pin 7 is CAN-H, pin 3, 6 are CAN-GND, pin 5 is shielding layer.

Address, bus baud rate selection

Bus address and baud rate of ATQ-RS422/CANOPEN interface box can be set by knob on panel, bus address is 1-9, baud rate is 20Kbps, 50Kbps, 125Kbps, 250Kbps, 500Kbps, 800Kbps, 1Mbps.

4-7-5 CAN interface box

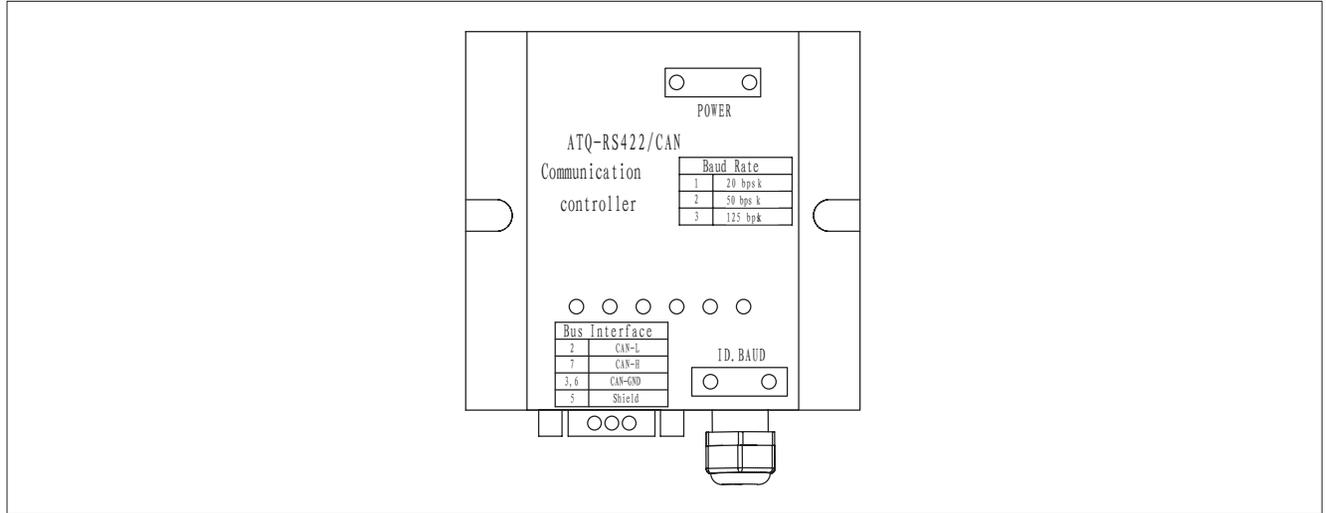


Fig. 4-7-5-1: ATQ-RS422/CAN interface box

ATQ-RS422/CAN interface box is used to realize conversion between CAN bus and welding machine communication protocol. Product meets needs of CAN2.0 protocol standard.

Can bus physical interface

ATQ-RS422/CANO interface box CAN bus physical interface adopts DB9 pin type socket which conforms to CAN bus standard, pin 2 is CAN-L, pin 7 is CAN-H, pin 3, 6 are CAN-GND, pin 5 is shielding layer.

Address, bus baud rate selection

Bus address and baud rate of ATQ-RS422/CANO interface box can be set by knob on panel, bus address is 1-9, baud rate is 50Kbps, 125Kbps, 250Kbps.

4-7-6 DeviceNet interface box

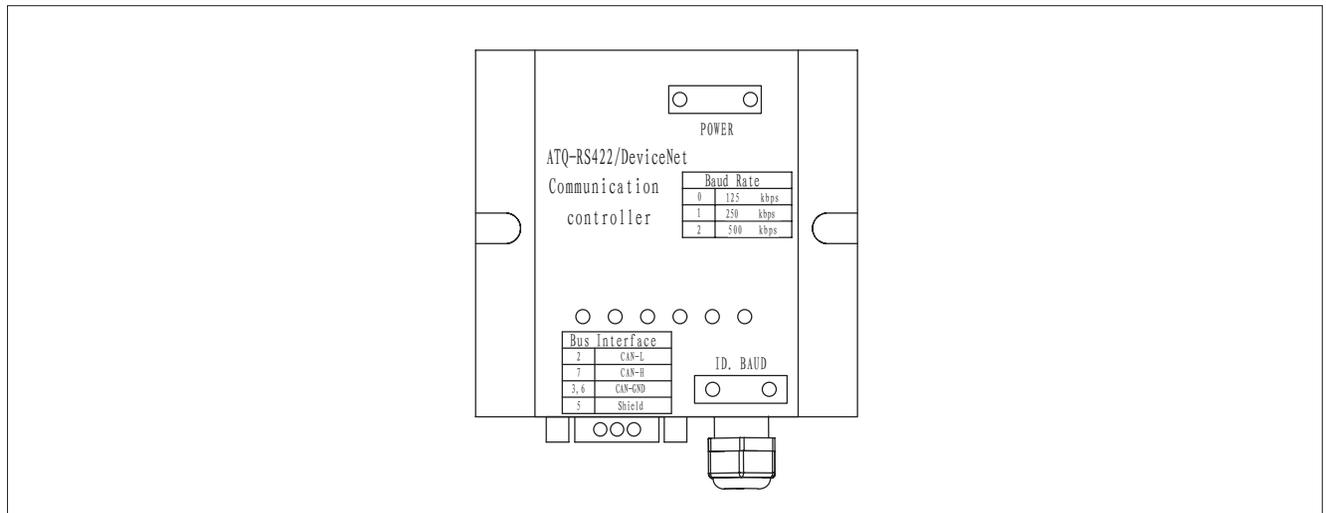


Fig. 4-7-6-1: ATQ-RS422/DeviceNet interface box

ATQ-RS422/DeviceNet interface box is used to realize conversion between DeviceNet bus and welding machine communication protocol. Product meets needs of CAN2.0 protocol standard.

Can bus physical interface

ATQ-RS422/CANO interface box CAN bus physical interface adopts DB9 pin type socket which conforms to CAN bus standard, pin 2 is CAN-L, pin 7 is CAN-H, pin 3, 6 are CAN-GND, pin 5 is shielding layer.

Address, bus baud rate selection

Bus address and baud rate of ATQ-RS422/CANO interface box can be set by knob on panel, bus address is 1-9, baud rate is 125Kbps, 250Kbps, 500Kbps.

4-7-7 RS485 interface box

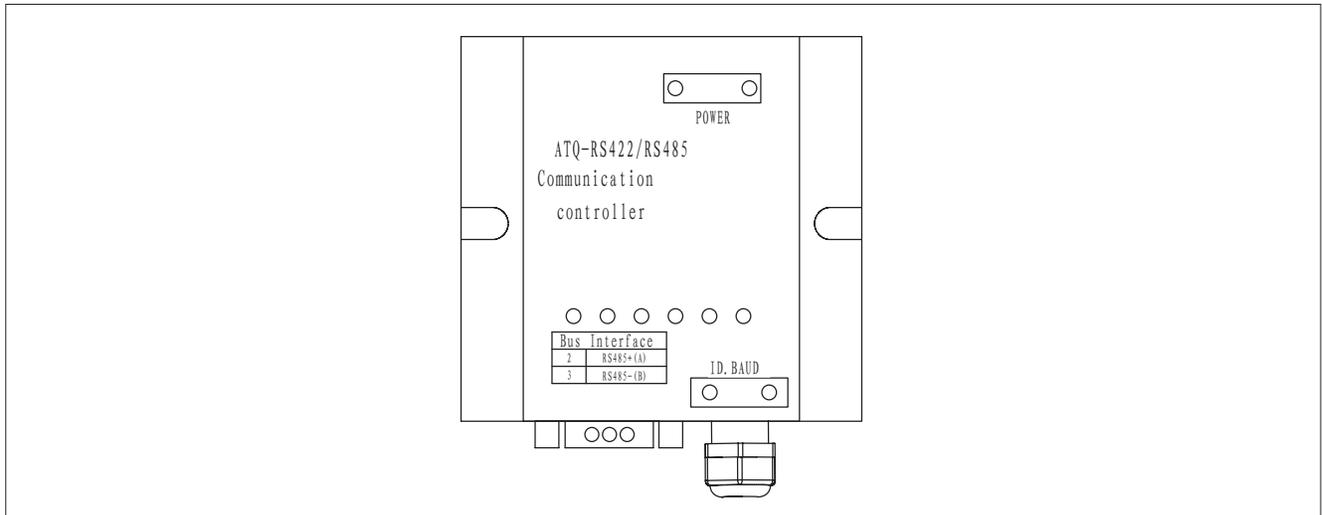


Fig. 4-7-7-1: ATQ-RS422/RS485 interface box

ATQ-RS422/RS485 interface box adopts standard ModBus RTU method to output data.

Can bus physical interface

ATQ-RS422/RS485 interface box adopts DB9 pin type socket, pin 2 is RS485+ (A), pin 3 is RS485- (B).

4-8 Water cooling system SLJ-8

As welding torch cooled device, water cooler plays an important role on robot long time welding. Water cooling system connections please refer to Fig. 4-8-1.

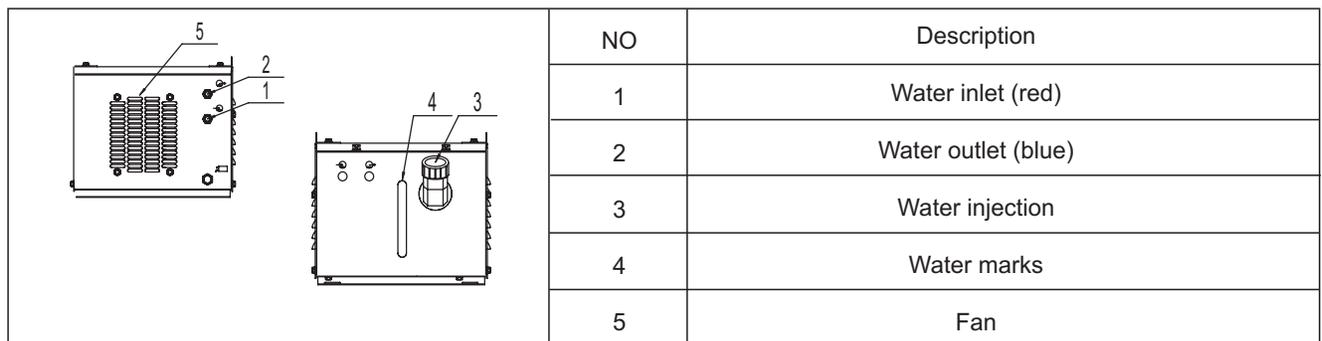


Fig. 4-8-1: Water cooling system connections SLJ-8

Note! When use water cooling system, need to fill in purified water, pay attention to freeze protection.

Note! Please check the volume and purity of the coolant before using. Please take freeze-proofing measures when the temperature is too low.

Factory setting is water cooled mode (sub-menu parameter P10 is ON), welding machine will display E0A when short of water, and welding machine stops working; when welding machine is gas cooled configuration, please set P10 as OFF.

4-9 Installation and operation



Warning! An electric shock can be fatal. If the machine is plugged into the mains electricity supply during installation, there is high risk of very serious injury and damage. Do not use the functions described here until you have read and completely understood “safety rules” in the beginning. Only carry out work on the machine when

- the mains switch is on turn-off position,
- the machine is unplugged from the mains.

Welding machine input power supply cable installation

Please note the size of fuse and circuit breaker in the table below are for reference only.

Single voltage

Model		AMIG350LST-R
Input power supply		3 phase, AC380/400/415/440/460/480/525V ±10%, 50/60Hz
Electricity grid min. power (KVA)	Generator	30
	Power grid	22
Input protect (A)	Fuse	30
	Circuit breaker	63
Cable size (mm ²)	Input cable	≥2.3
	Output cable	35
	Protective GND wire	≥2.5

Table 4-9-1: Input power supply cable requirement- Single voltage

Multi voltage

Model		AMIG350LST-R
Input power supply		3 phase, AC220V /380V /440V± 10%, 50/60Hz
Electricity grid min. power (KVA)	Generator	34
	Power grid	26
Input protect (A)	Fuse	50
	Circuit breaker	63
Cable size (mm ²)	Input cable	≥6
	Output cable	35
	Protective GND wire	≥6

Table 4-9-2: Input power supply cable requirement- Multi voltage

Note! Welding machine must be taken special design if it is powered by generator, please contact with manufacturer if you have such needs.

Please refer to Fig. 4-9-1 for connections of welding machine input cable and distribution box:

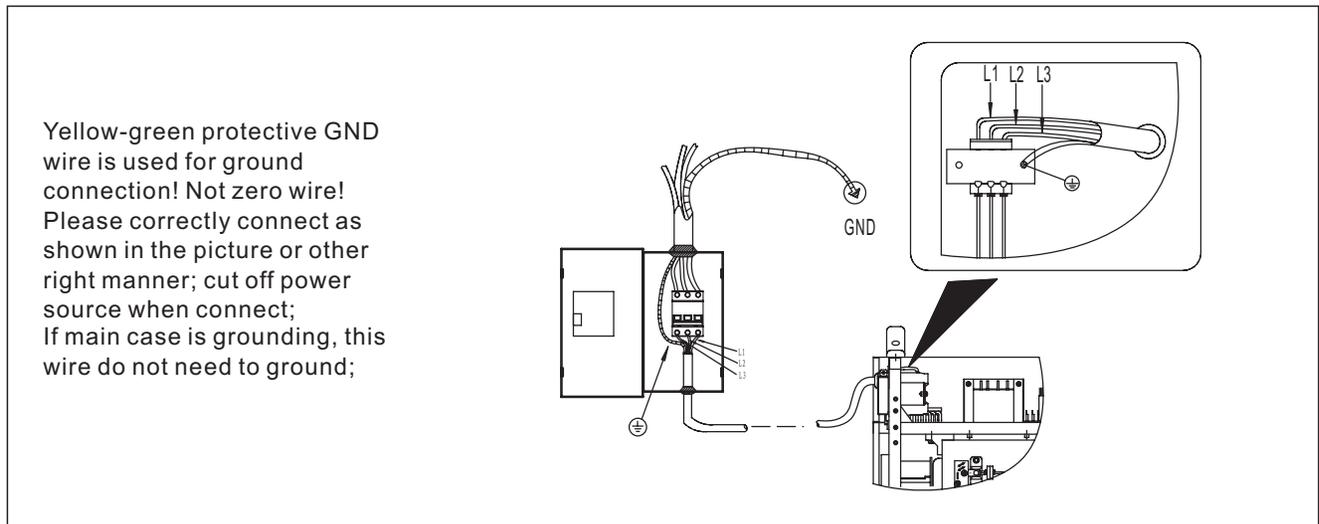


Fig. 4-9-1: Connections for input cable and distribution box

Gas cylinder installation

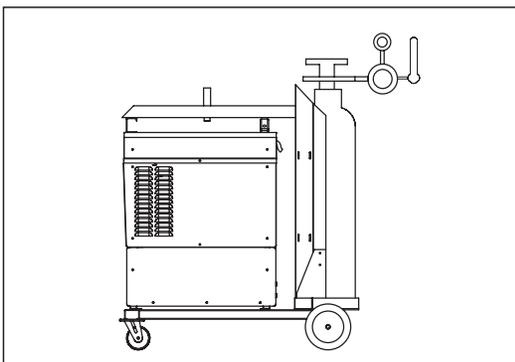


Fig. 4-9-2: Gas cylinder installation

1. Stand the gas cylinder on the trolley and secure it by fixing the cylinder strap around a point in the top third of the cylinder-but never around the neck of the cylinder.
2. Take the protective cap off the gas cylinder.
3. Gently turn the gas-cylinder value anticlockwise, and blow off any dust and dirt.
4. Screw the pressure regulator onto the gas cylinder and tighten it.
5. Connect the shielding-gas connector to the pressure regulator.

Making an earth connection

- (1) Connect output socket (-) of welding machine and work piece by ground cable;
- (2) Connect arc voltage feedback socket with work piece with voltage feedback cable.

Wire feeder connection

- (1) Connect output socket (+) of welding machine and wire feeder by wire feeder cable;
- (2) Connect wire feeder control socket X7 and wire feeder by wire feeder control cable.

Torch and wire feeder connection

Connect water inlet of welding torch to blue water inlet on water cooler rear panel, connect water outlet of welding torch with red water outlet on water cooler rear panel.

Installation for wire feeding device

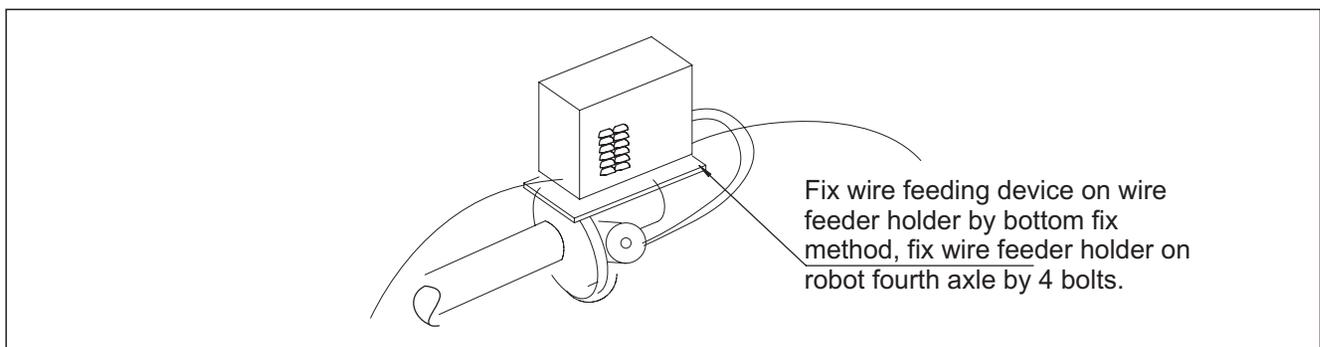


Fig. 4-9-3: Installation for wire feeding device

Note! Use insulating mat or insulating sleeve to insulate wire feeding device and wire feeder holder, ensure there is no contact between set bolt and wire feeder metal.

Wire feed roller standard and installation

The proper wire feeding rollers must be chosen according to the size and material of the wire. Types of wire feeding rollers as Fig. 4-9-4:

Type 1: for hard wire, such as carbon steel wire, stainless steel wire

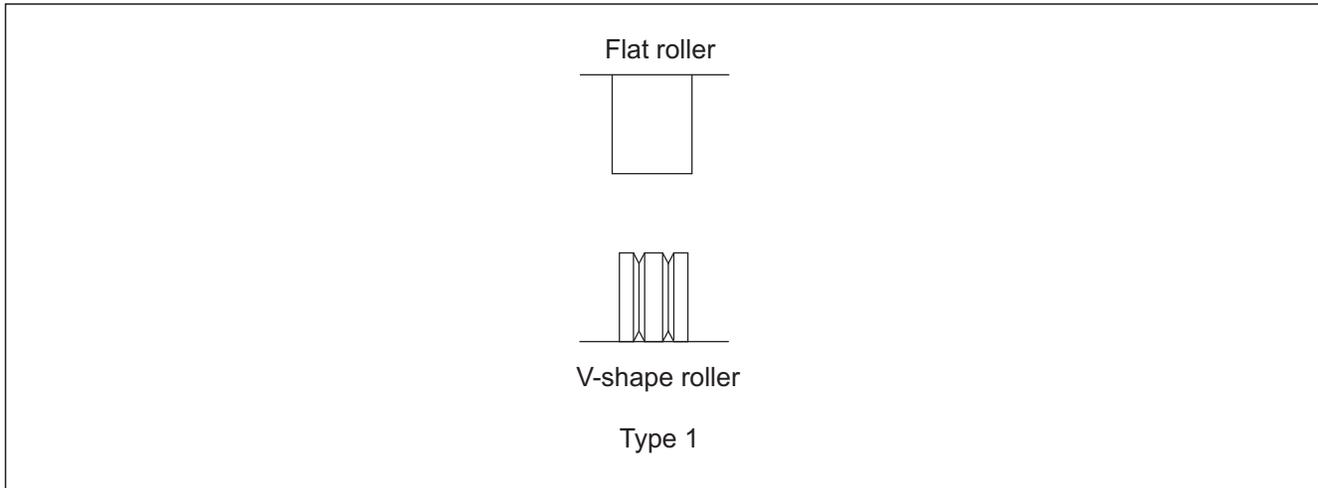


Fig. 4-9-4: Wire feeding rollers

Important! When use pressure device to adjust wire feed roll pressure, too much pressure will cause wire crushed, and the wire coating be damaged, and it will cause the wearing out of feeding rollers and increase the wire feeding resistance. Suitable pressures for wires of different materials and diameters are as shown in Table 4-9-3.

Type	Pressure value	Wire diameter			
		φ0.8	φ1.0	φ1.2	φ1.6
1		1.5~2.5			

Table 4-9-3: Wire feeding rollers installation parameter

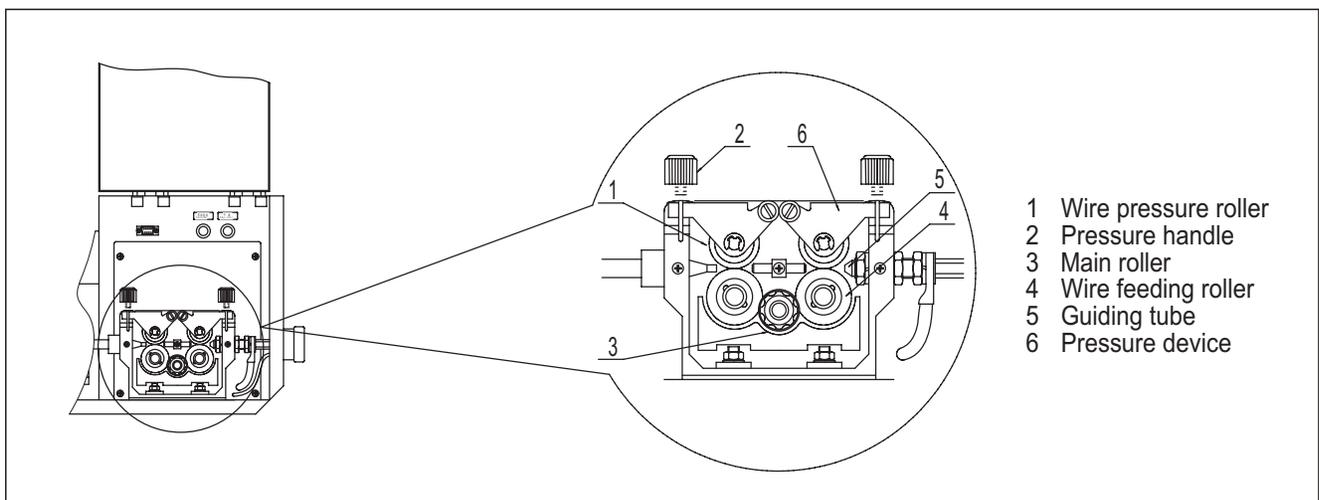


Fig. 4-9-5: Wire feeder structure

1. Switch off the power source;
2. Open the side plate;
3. Press the pressure device downward;
4. Pull up the pressure device;
5. Remove the fixed wire pressure roller or wire feeding roller by the screw driver;
6. Replaced by the proper wire pressure roller or wire feeding roller;

7. Fix the wire pressure roller or wire feeding roller by the screw driver;

Installation for wire spool



Warning! The spooling wire may cause danger. During the installation, hold on the wire end to prevent wire damage after bounce.

Should install wire spool near robot but do not interfere robot movement. Normal there are two methods: fix wire spool on first axle of robot, it moves together with robot; install wire spool on rear side of robot, and length of wire hose (wire hose from wire spool to wire feeding device) should be longer than distance between wire spool and the farthest position wire feeding device will be when robot moves.

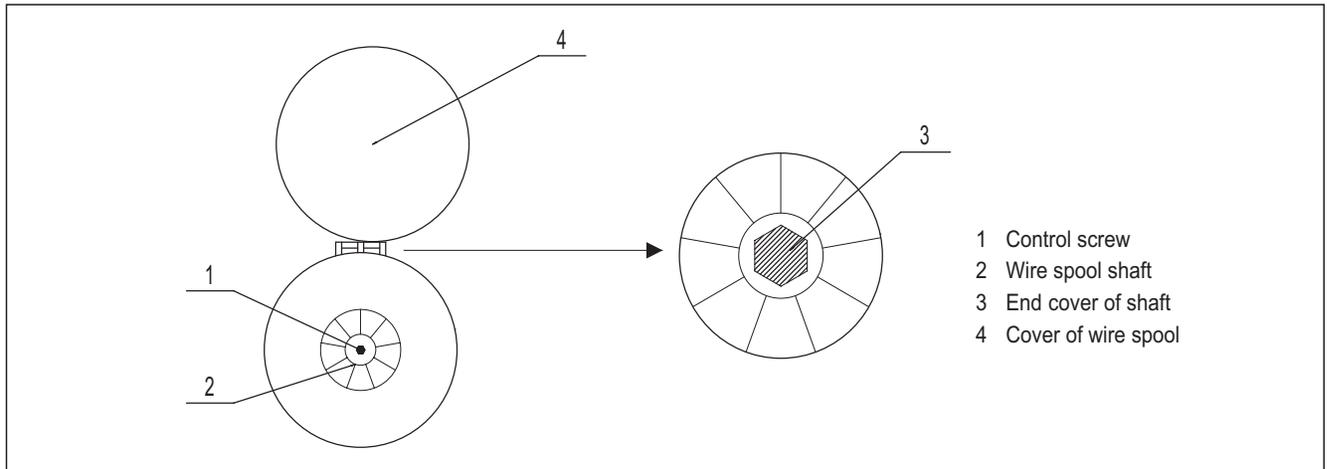


Fig. 4-9-6: Wire spool

1. Switch off the power source;
2. Open the cover of wire spool;
3. Screw the end cap;
4. Fix the wire spool into the shaft and make sure of the correct direction;
5. Twist the end cap.



Note! Use screw wrench to turn the Brake Force Control Screw (1) to adjust braking force. The brake force must be appropriate, ensure the wire round the wire spool will not become too loose and prevent the wire scattering. If the brake force is too strong, it will increase the wire-feeding load.

6. Close the cover of wire spool

Installation for digital interface

Install robot interface box on upper left of welding machine rear panel, fix well by two screws, refer to Fig. 4-9-7.

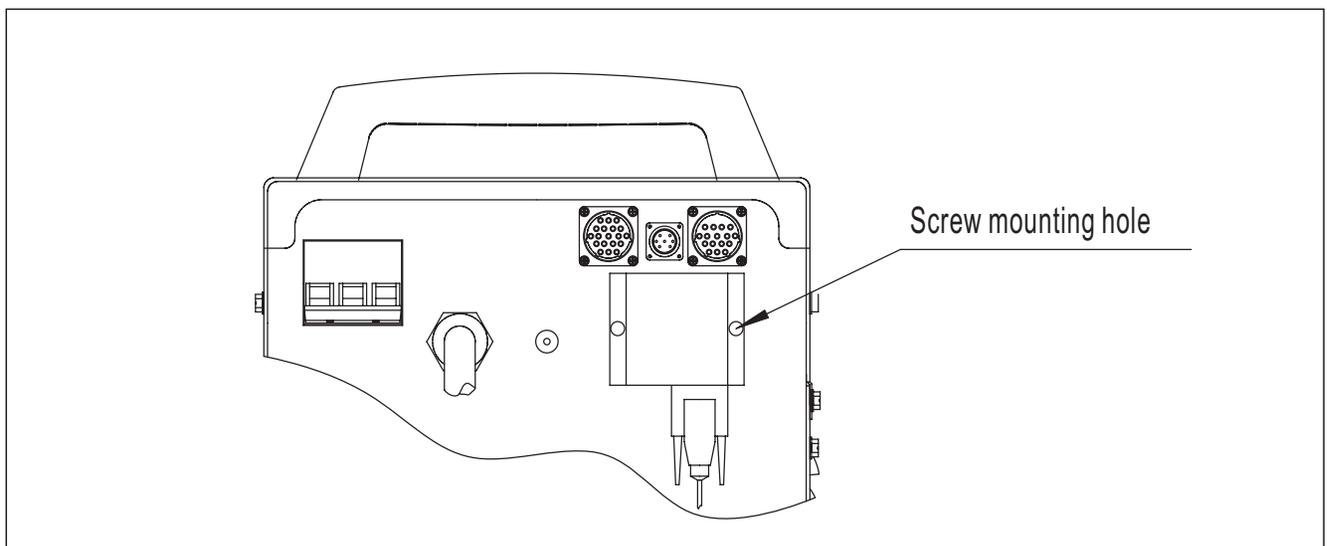


Fig. 4-9-7: Robot interface box installation

Installation for torch holder and torch

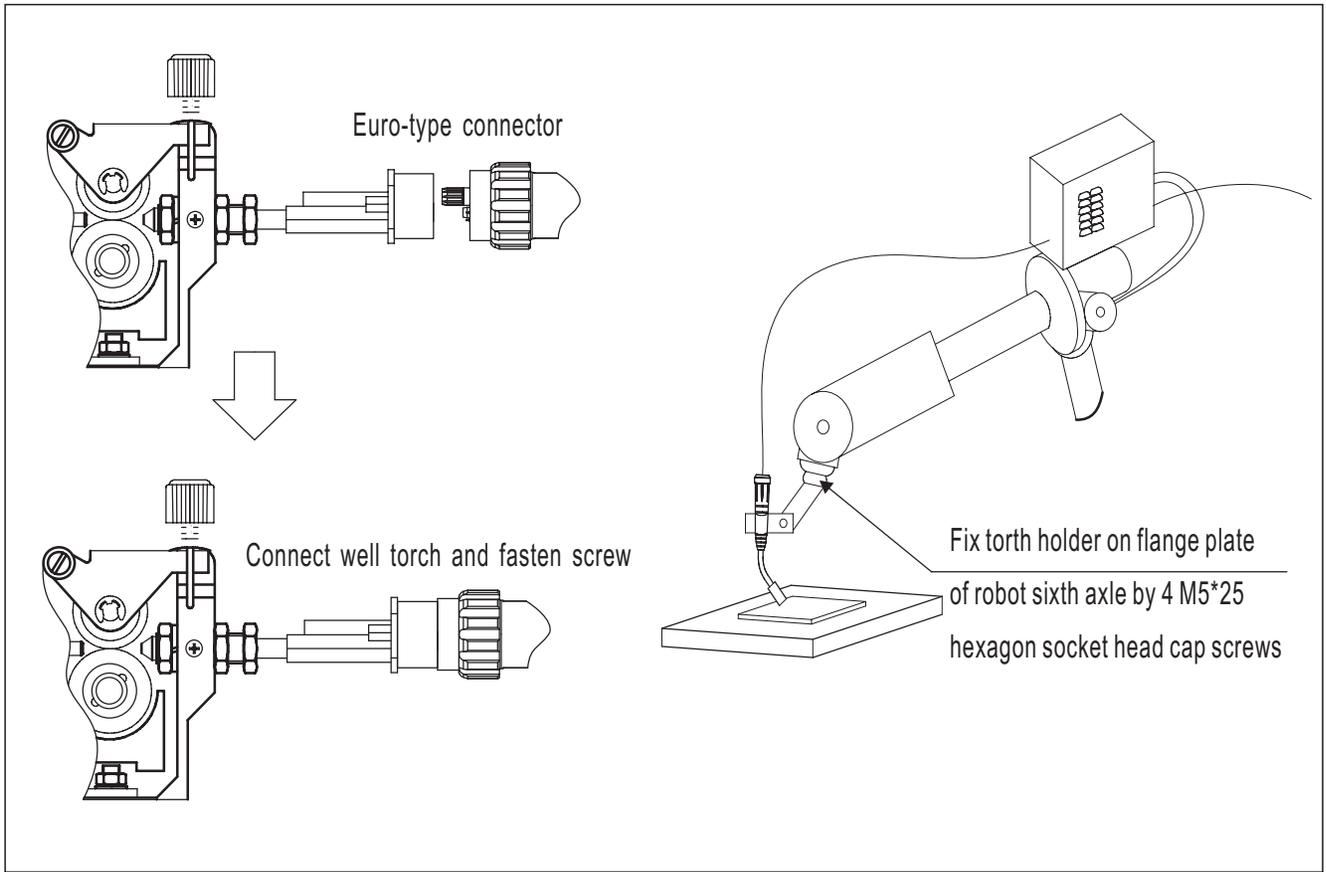


Fig. 4-9-8: Installation

Must make sure wire feeding hose, contact tip is agree with torch model, wire feeding hose is agree with used wire diameter, type, so as to ensure success of welding process. Too tight or too loose of wire feeding hose may increase wire feeding resistance to cause wire feeding unstable. Tighten quick plug on torch to ensure there is no voltage drop on contact area. Loose connect will cause voltage drop and wire feeder, welding torch overheat. Steel wire hose is for hard wire, such as carbon steel wire, install steel guide tube inside of Euro-type connector, refer to Fig. 4-9-9.

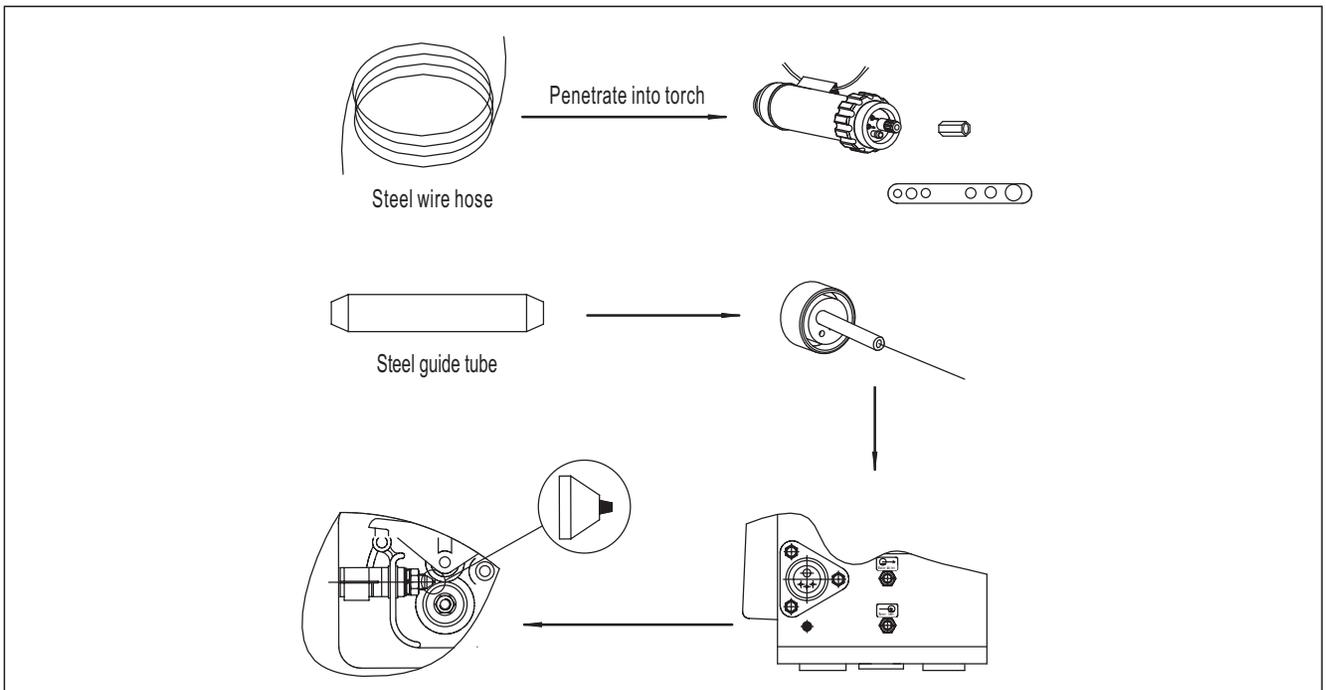


Fig. 4-9-9: Installation of steel wire hose

4-10 Technical data



Note! Please use the machine under the allowed power supply voltage range marked in the nameplate. The technical data with the basic input voltage are listed as the Table 4-10-1 and Table 4-10-2.

Single voltage

Model	AMIG350LST-R
Voltage/frequency	3 phase, AC380/400/415/440/460/480/525V ±10%, 50/60Hz
Rated input power (KVA)	14
Rated input current (A)	21
Rated output voltage (V)	31.5
Rated duty cycle (%)	60%
Output open circuit voltage (V)	79
Output current/voltage (A/V)	60A/17V~420A/35V
Wire diameter (mm)	0.8, 1.0, 1.2
Wire feeding type	Wire push type
Gas flow rate (L/min)	15~20
Torch cooling method	Gas cooled
Protection class	IP23
Insulation class	H
Dimension (cm ³)	66×32×56
Weight (Kg)	55

Table 4-10-1: AMIG350LST-R technical data - single voltage

4-11 Disassembly and reassembly

4-11-1 Wire feeding device

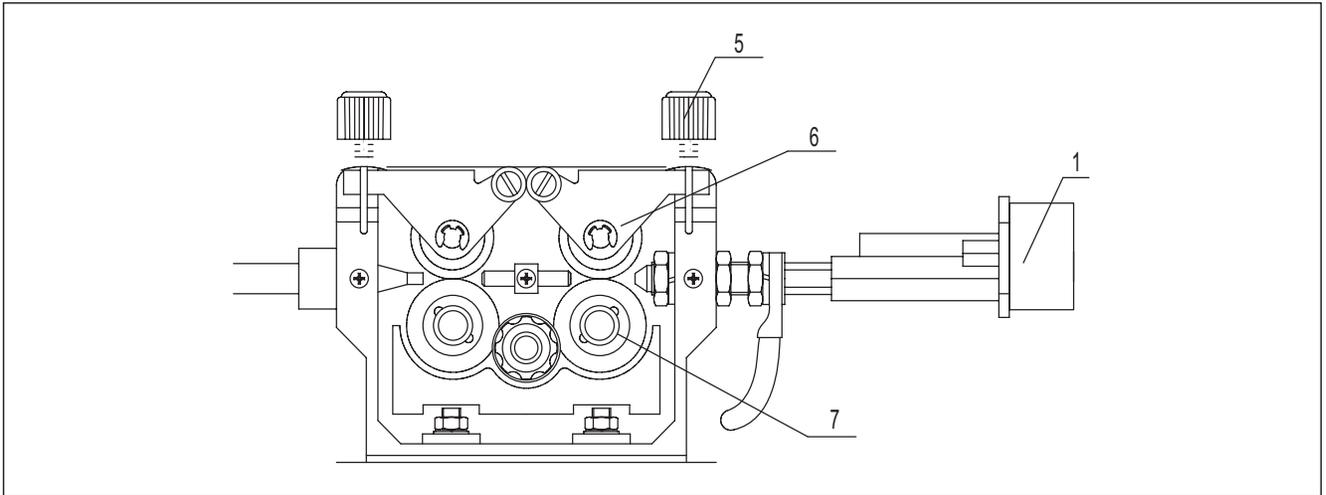


Fig. 4-11-1-1: Left view

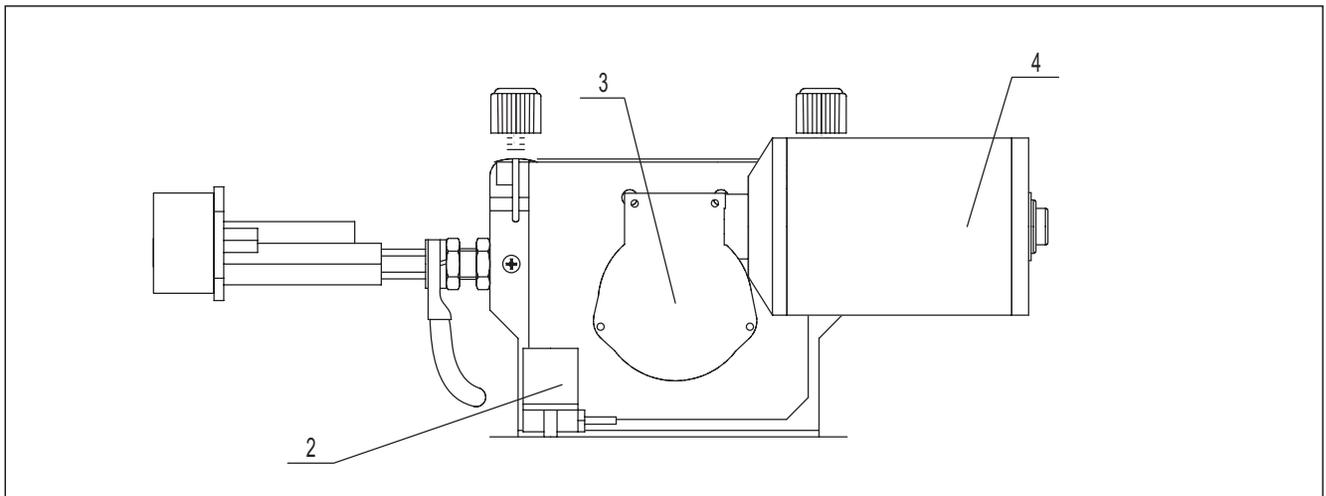


Fig. 4-11-1-2: Right view

No.	Item	Stock no.	Quantity	Remark
1	Euro type	322017-00002	1	/
2	Solenoid valve	752001-00020	1	/
3	Motor	321011-00020	1	/
4	Raster	328005-00065	1	/
5	Pressure device	327047-00009	2	/
6	Wire pressure roller	327023-00002	2	/
7	Wire feeding roller	327011-00003	2	Φ0.8-Φ1.0 V
		327011-00022	2	Φ1.0-Φ1.2 V
		327011-00012	2	Φ1.2-Φ1.6 V

Table 4-11-1-1: Main components list

4-11-2 Welding machine

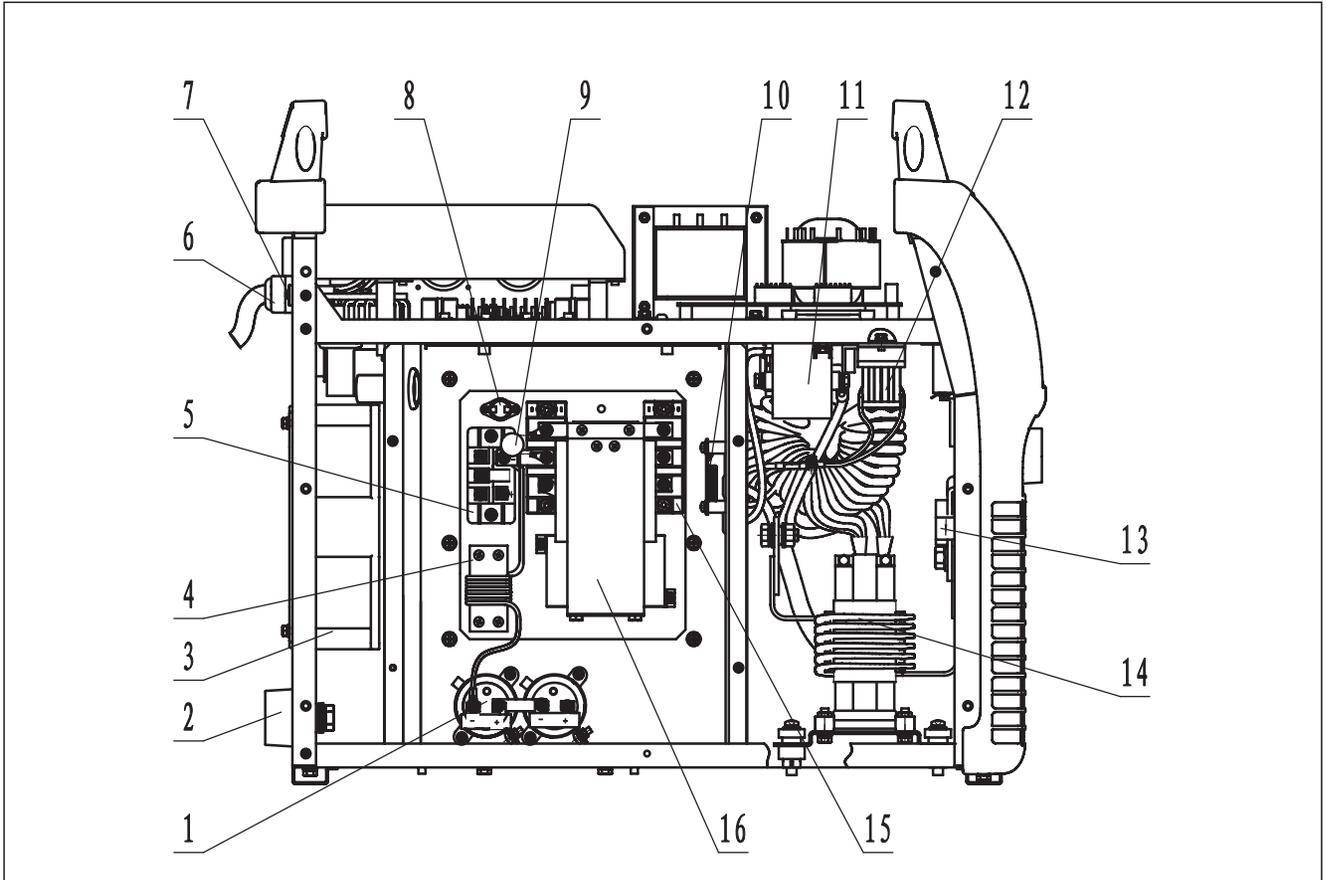


Fig. 4-11-2-1: Left view

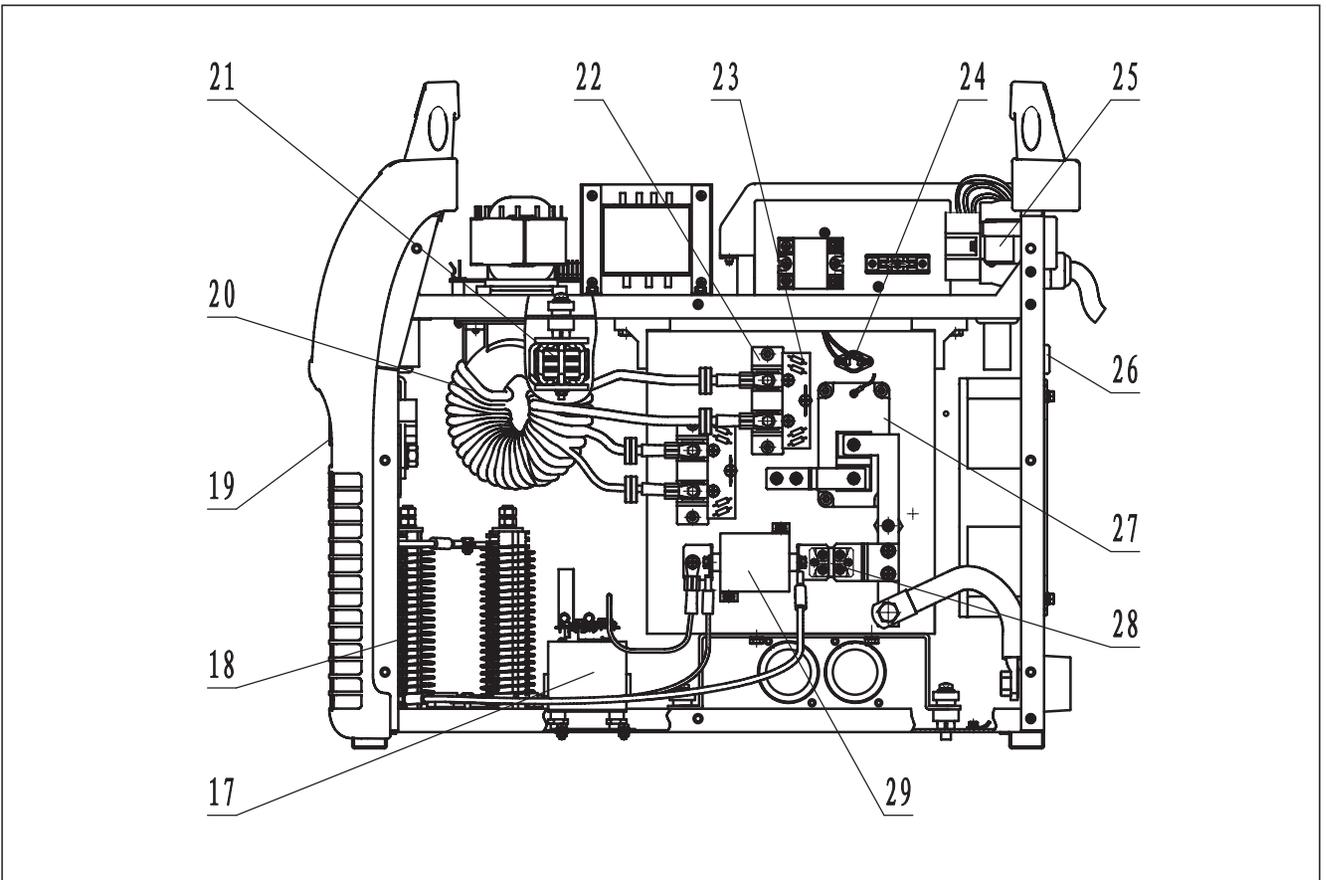


Fig. 4-11-2-2: Right view

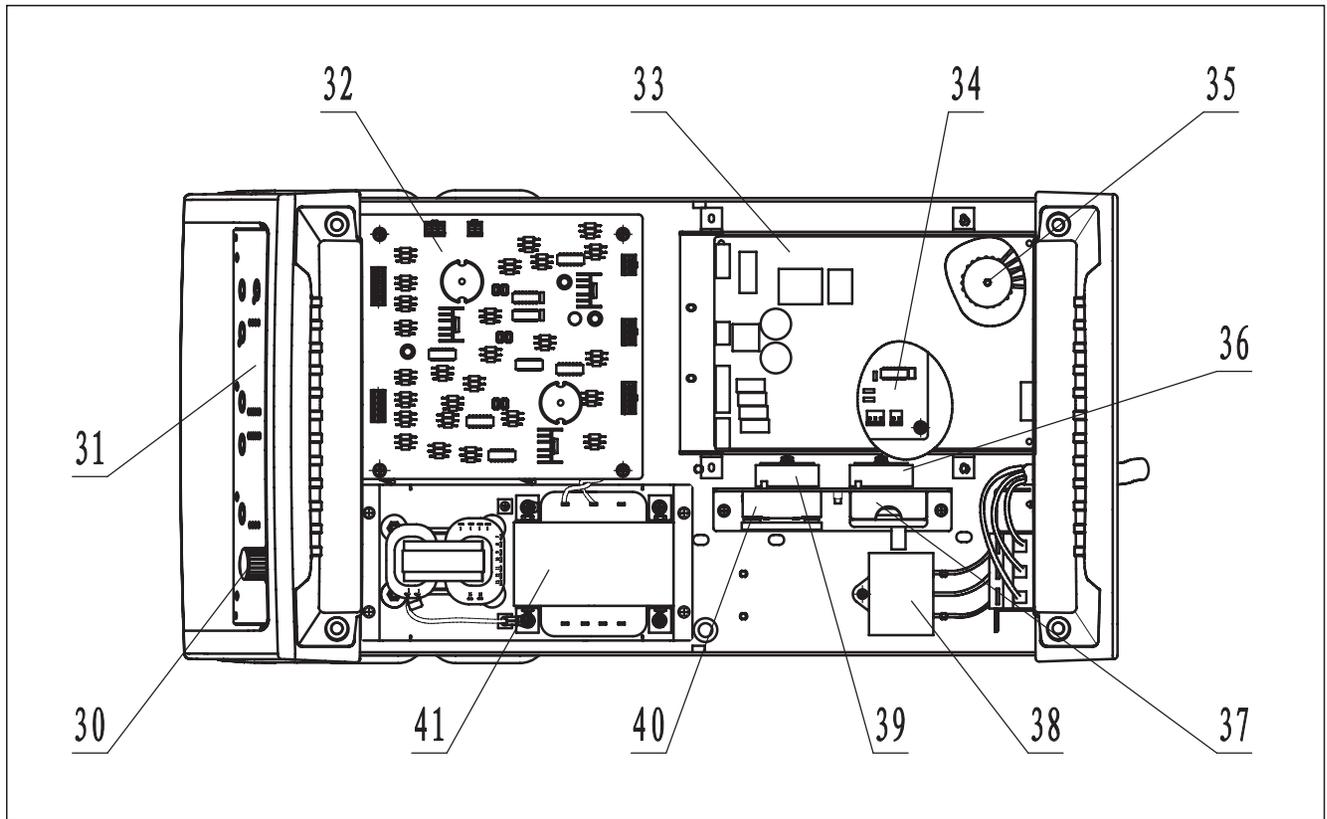


Fig. 4-11-2-3: Top view

No.	Item	Stock no.
1	Aluminum electrolytic capacitor	722004-00101, 380V, 50Hz
2	Quick socket	740002-00027, 380V, 50Hz
3	Fan	746001-00087, 380V, 50Hz
4	Input filter inductor	220479-00002, 380V, 50Hz
5	Three phase rectifier module	735005-00002, 380V, 50Hz
6	Waterproof cable clamp connector	773002-00011, 380V, 50Hz
7	Over current protector	745013-00044, 380V, 50Hz
8	Temperature relay	745008-00007, 380V, 50Hz
9	Varistor	720021-00017, 380V, 50Hz
10	Current transformer	220149-00137, 380V, 50Hz
11	Polypropylene capacitor	722001-00073, 380V, 50Hz
12	Current exchange inductor	220281-00037, 380V, 50Hz
13	Current sensor	753001-00020, 380V, 50Hz
14	Output reactor	763004-00177, 380V, 50Hz
15	IGBT module	735007-00048, 380V, 50Hz

No.	Item	Stock no.
16	IGBT protection board	220005-00131, 380V, 50Hz
17	Arc ignition control component	220900-00302, 380V, 50Hz
18	Large power resistance	720006-00072, 380V, 50Hz
19	Aviation socket	740001-00045, 380V, 50Hz
20	Main transformer	220629-00284, 380V, 50Hz
21	Resonant inductor	2205221-00072, 380V, 50Hz
22	Fast recovery diode module	735006-00029, 380V, 50Hz
23	Diode protection board	220455-00002, 380V, 50Hz
24	Temperature relay	745008-00008, 380V, 50Hz
25	Circuit breaker	745011-00022, 380V, 50Hz
26	Brazil socket	740004-00271, 380V, 50Hz
27	IGBT module	735007-00069, 380V, 50Hz
28	Fast recovery diode module	735006-00020, 380V, 50Hz
29	Polypropylene capacitor	722001-00070, 380V, 50Hz
30	Potentiometer knob	720031-00140, 380V, 50Hz
31	Display board	220503-00189, 380V, 50Hz
32	Main control board	210580-00821, 380V, 50Hz
33	Wire feeder control box	220900-00252, 380V, 50Hz
34	Drive board	210310-00118, 380V, 50Hz
35	Input anti-common-mode inductor	220467-00063, 380V, 50Hz
36	Drive board input inductor	220401-00031, 380V, 50Hz
37	Fuse	740007-00007, 380V, 50Hz
38	Polypropylene capacitor	722001-00191, 380V, 50Hz
39	Voltage feedback inductor	220900-00301, 380V, 50Hz
40	Solid state relay	715004-00003, 380V, 50Hz
41	Power transformer	220179-00783, 380V, 50Hz

Table 4-11-2-1: Main components list

Note: This table is for reference only, and the detail of actual product shall prevail. If no special remarks, the input voltage mentioned in above table is three phase.

5- TROUBLE SHOOTING

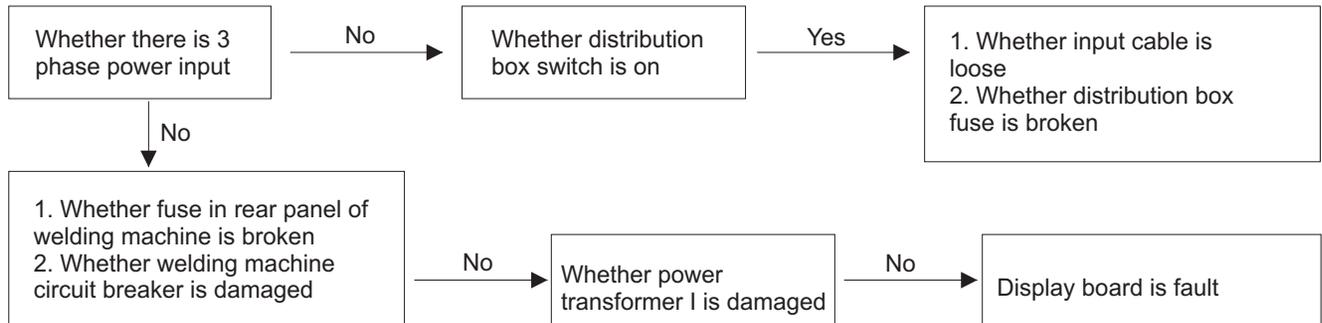


Warning! An electric shock can be fatal. Before doing any work on the machine:

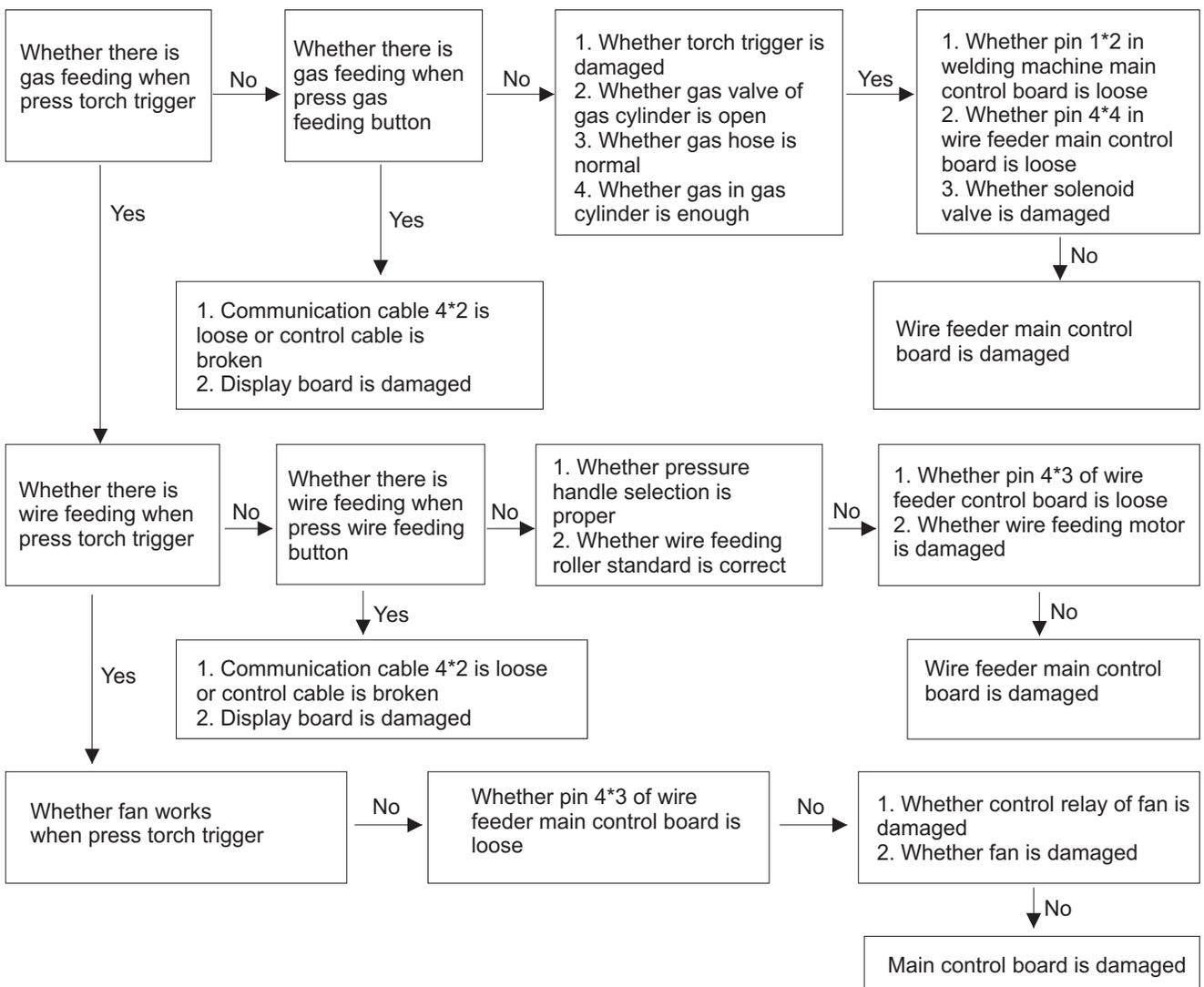
- Switch it off and unplug it from the mains
- Put up a clearly legible and easy-to-understand warning sign to stop anybody inadvertently switching it on again
- Check to make sure the electrically charged components (e.g. capacitors) have been discharged
- Bolts in machine case also work for ground connection. Never use other bolt that can not work for ground connection

5-1 General check flow

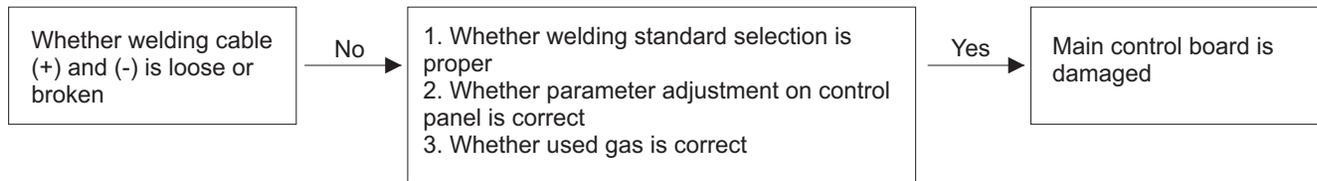
Welding machine control panel has no display



Gas feed, wire feed, fan fault



Cannot start normal welding



5-2 Error code display

This series of machines have automatic protection and error code display function. Relevant Cause & Remedy can be found according to below Error codes, as shown in Table 8-1.

Error code	Trouble	Cause	Remedy
E0A	Water shortage protection	1) Not enough or no circulating water in water-cooling system 2) Water flow switch or signal line are faulty	1) No or not enough cooling water 2) Water hose is blocked or no connection 3) Water circulation of torch is blocked 4) Water-cooling motor is faulty 5) Check water flow switch or signal line 6) Replace control board 7) Adjust sub-menu parameter P10 to OFF
E10	Torch trigger abnormal	Press the torch trigger for long time without welding operation	1) Release torch trigger: 2) The error code disappears and torch is normal 3) Always display the error code and the torch is damaged, replace the torch
E15	Abnormal when the mains switch is ON	1) The torch trigger is on closed state when machine is ON 2) Open circuit voltage 3) Current outputs 4) Wire feeding 5) Gas flow	1) Check torch trigger 2) Replace control board 3) Replace drive board
E17	Too large output current	1) Over-current 2) Current sensor fault 3) Signal line is broken 4) Main control board is damaged	1) Check and repair output cable 2) Trouble-shoot the signal line failure 3) Replace current sensor 4) Replace main control board
E18	Abnormal output voltage	1) Voltage feedback wire is broken 2) Main control board is damaged	1) Check voltage feedback wire 2) Replace main control board
E19	Over-heat protection	1) The welding machine is overheat (Duty cycle of power source has been exceeded; The ventilation openings are hindered) 2) Temperature relay fault 3) Signal line is broken 4) Main control board is damaged	1) Check fan and wait for the machine cool down 2) Check the connection of temperature relay 3) Replace temperature relay 4) Replace main control board
E30	Wire feeder overload	1) The welding wire is at the end 2) The wire feed motor is over-current, stuck or damaged	1) Replace wire spool 2) Straighten the torch cable and check if the wire feed hose is twisted or blocked by dust
E40	Communication between the display board and main control board is abnormal	1) Communication cables are loosen or broken 2) Main control board is damaged 3) Display board is damaged	1) Check communication cables 2) Replace main control board 3) Replace display board

Error code	Trouble	Cause	Remedy
E42	Communication between welding machine and wire feeder is abnormal	1) Control cable of wire feeder is not plugged in or broken 2) Communication cables are loosen or broken 3) Wire feeder main control board is damaged 4) Control circuit of welding machine is faulty	1) Check control cable 2) Check communication cables 3) Replace main control board for wire feeder 4) Replace circuit board for welding machine
E80	Communication between welding machine and dEV interface is failed	1) Communication cable between dEV interface is broken 2) dEV interface is faulty	1) Check communication cables or interface 2) Replace interface
E81	Communication between dEV controller and dEV transceiver module is failed	1) dEV controller can't receive the data from dEV transceiver 2) The received data is always at fault	Power-on reset, check module's power supply or replace module
E82	dEV transceiver module initialization failed	dEV transceiver module can't initialize normally	Power-on reset or replace module
E83	dEV transceiver module fault	dEV transceiver module can't operate normally	Check the indicator state of switching board module, take proper measures or replace module
E84	dEV bus fault	dEV bus can't establish connection successfully	Check the indicator state of switching board module, check if the bus connection, bus power supply, terminal resistance, bus baud rate is correct depending on indicator state
E85	No robot ready signal	Don't apply power to robot or has not finished initialization, that is robot do not give ready signal	Check the robot or replace welding machine main control board
E86	Exceed given range	External equipments (robot, automation welding system) given parameters exceed welding procedure's allowed range	Adjust to suitable range for external equipments (robot, automation welding system)
E87	No corresponding welding procedure	The given procedure channel for robot has no corresponding database, or no stored parameter in store channel which is called	Modify given parameter for robot, switch to the channel which has expert database and stored welding parameters

Table 5-2-1: Error code display

Important! If any error message that is not described here appears on the displays, then the fault is one that can only be put right by a service technical. Make a note of the error message shown in the display, and the serial number and configuration of the power source, and get in touch with our after-sale service, giving them a detailed description of the error.

5-3 Power source trouble shooting



Note! The flowing troubles and causes are uncertain. However, during the process of MIG Pulse and the normal using conditions, that might happen.

Trouble			No arc start	No gas output	No wire feeding	Bad arc start	Unstable arc	Poor welding seam	Wire sticks with work piece	Wire sticks with contact tip	Gas hole
Remedy											
Welding machine	Distribution box (input protection device)	1. Switch is off or trips 2. Fuse is broken 3. Connection part is loose 4. Phase missing	○	○	○						
	Input power supply cable	1. Cable is broken 2. Connection part (input part) is loose	○	○	○						
	Welding machine operation	1. Circuit breaker is off or trips 2. 2A fuse in rear panel of welding machine is broken	○	○	○						
Gas	Gas cylinder and gas regulator	1. Gas valve is closed 2. Gas inside of gas cylinder is not enough 3. Pressure or gas flow rate is not proper 4. Connection part is loose		○			○				○
	Gas feeding hose	1. Connection part is loose 2. Gas hose is broken		○							○
Wire feeding	1. Wire feeding roller, wire feeding hose: improper wire standard 2. Not enough pressure set by pressure handle 3. Wire powder is in wire feeding hose inlet 4. Improper slow wire feeding speed				○	○	○	○		○	

Remedy \ Trouble		No arc start	No gas output	No wire feeding	Bad arc start	Unstable arc	Poor welding seam	Wire sticks with work piece	Wire sticks with contact tip	Gas hole
Welding torch	1. Contact tip, nozzle, torch tube is loose 2. Loose connection with wire feeder						○			○
	1. Contact tip, long wire feeding hose: wrong wire standard, worn, unclean or deformation				○	○	○		○	
Welding torch cable	1. Cable broken: welding cable, torch trigger cable 2. Loose connection with wire feeder or it is damaged	○	○	○		○		○		
	1. Cable: overlay or serious curve				○	○	○		○	
Work piece cable	1. Cable standard: not enough sectional area 2. Connection part is loose 3. Work piece is bad electric conduction				○	○	○			
Work piece surface	Surface has oil, paint coating				○	○	○	○		○
Welding condition	1. Wrong welding current, voltage, torch angle, welding speed or wire stick-out length 2. Wrong welding program				○	○	○	○	○	

Table 5-3-1: Trouble shooting

6 - CARE AND MAINTENANCE

Before open the machine



Warning! An electric shock can be fatal. Before doing any work on the machine:

- Switch it off and unplug it from the mains
- Put up a clearly legible and easy-to-understand warning sign to stop anybody inadvertently switching it back on again
- Check to make sure the electrically charged components (e.g. capacitors) have been discharged.
- Bolts in machine case also work for ground connection. Never use other bolt that cannot work for ground connection

Maintenance of welding power source

Please follow the instructions as below to ensure normal use of power source

- Conduct safety check at regular intervals (see "Safety rules")
- Dismantle machine side panels and clean machine inside with clean and low-pressure compressed air by professional technician, not less than twice per year. Clean the components at a certain distance only
- If a lot of dust has accumulated, clean the cooling-air ducts

Maintenance of welding torch

- Torch nozzle may stain with some grain because of welding splash, long time use will influence protective gas flow and welding, so clean in time.
- Welding contact tip is consumable, in order to ensure good welding result, replace every day before welding.
- Inwall of torch wire feeding hose may stain impurity after long time using, if not clean, will influence wire feeding smoothness and welding quality. Generally, after finishing using a reel of wire, use high pressure gas to clean wire feeding system. If wire feeding resistance is still high, change wire feeding hose.

For water cooled welding torch:

- Check the connections of water cooling system
- Check the coolant level, cleanliness of coolant etc. (clean coolant only)
- Frequently check coolant's back flow state

Maintenance of wire feeder

- Avoid water and other strong corrosion liquid, wipe in time if contacts, keep clean of wire feeder.
- As gearing equipment, wire feeder should keep lubrication and clean of rotate part, add lubricant usually.
- Replace worn wire feeding rollers because of long time use which will influence wire feeding stability.
- Clean wire feeding system frequently to avoid wire feeding resistance increasing, and influencing wire feeding stability and welding quality.

Daily maintenance

			Disconnect main power before maintenance				
	3 months	Change illegible labe		Repair or replace broken cable		Clean and tighten welding terminal	
	6 months	Blow or suck inner part, and clean every month when working in harsh environmental condition					

Fig. 6-1: Daily maintenance

7 - BASIC WELDING TECHNIQUE



Note! This section being general welding technique guide is for reference only. Specific functions of your machine please refer to previous chapters.

7-1 MIG (GMAW/FCAW) welding technique

Two different welding processes are covered in this section (GMAW and FCAW), with the intention of providing the very basic concepts in using the Mig mode of welding, where a welding gun is hand held, and the electrode (welding wire) is fed into a weld puddle, and the arc is shielded by an inert welding grade shielding gas or inert welding grade shielding gas mixture.

GAS METAL ARC WELDING (GMAW): This process, also known as MIG welding, CO₂ welding, Micro WireWelding, short arc welding, dip transfer welding, wire welding etc., is an electric arc welding process which fuses together the parts to be welded by heating them with an arc between a solid continuous, consumable electrode and the work. Shielding is obtained from an externally supplied welding grade shielding gas or welding grade shielding gas mixture. The process is normally applied semi automatically; however the process may be operated automatically and can be machine operated. The process can be used to weld thin and fairly thick steels, and some non-ferrous metals in all positions.

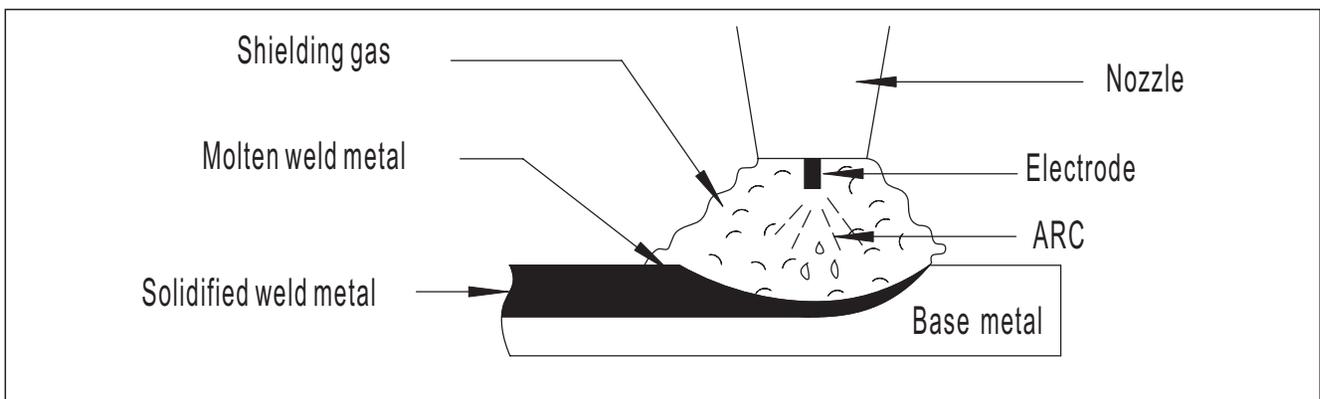


Fig. 7-1-1: GMAW process

FLUX CORED ARC WELDING (FCAW): This is an electric arc welding process which fuses together the parts to be welded by heating them with an arc between a continuous flux filled electrode wire and the work. Shielding is obtained through decomposition of the flux within the tubular wire. Additional shielding may or may not be obtained from an externally supplied gas or gas mixture. The process is normally applied semi automatically; however the process may be applied automatically or by machine. It is commonly used to weld large diameter electrodes in the flat and horizontal position and small electrode diameters in all positions. The process is used to a lesser degree for welding stainless steel and for overlay work.

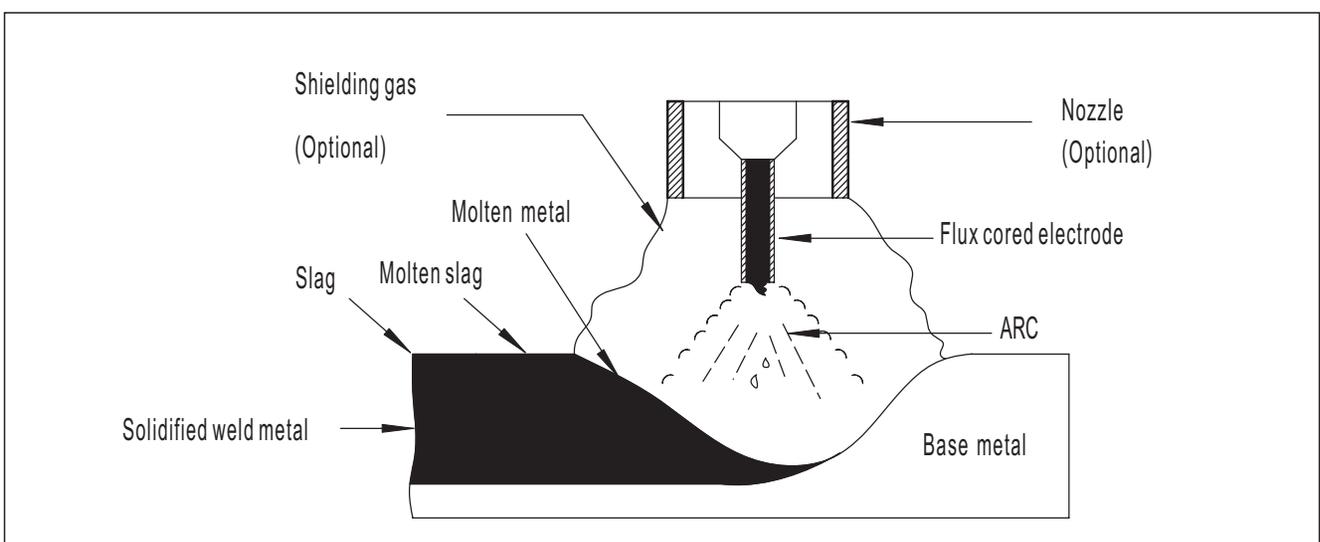


Fig. 7-1-2: FCAW process

Position of MIG torch

The angle of MIG torch to the weld has an effect on the width of the weld.

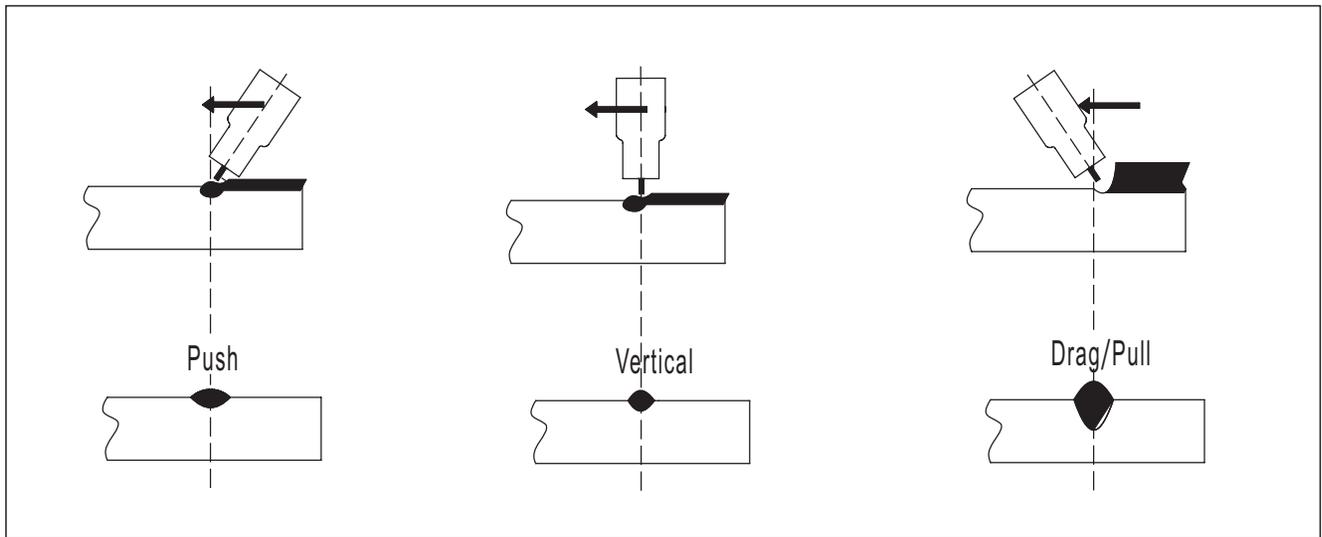


Fig. 7-1-3: Position of TIG torch

The welding gun should be held at an angle to the weld joint. (see Secondary Adjustment Variables below) Hold the gun so that the welding seam is viewed at all times. Always wear the welding helmet with proper filter lenses and use the proper safety equipment.

Note! Do not pull the welding gun back when the arc is established. This will create excessive wire extension (stick-out) and make a very poor weld.

The electrode wire is not energized until the gun trigger switch is depressed. The wire may therefore be placed on the seam or joint prior to lowering the helmet.

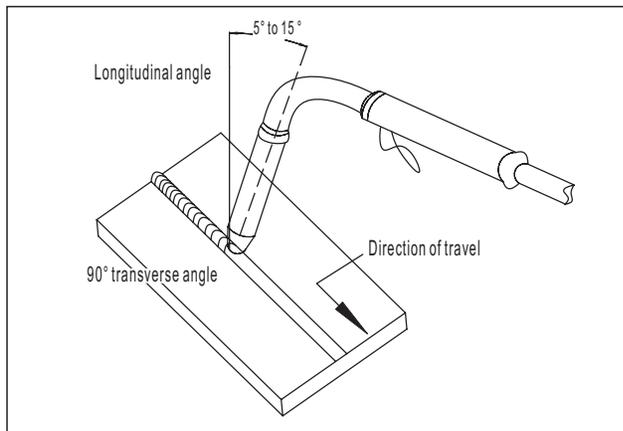


Fig. 7-1-4: Butt & horizontal welds

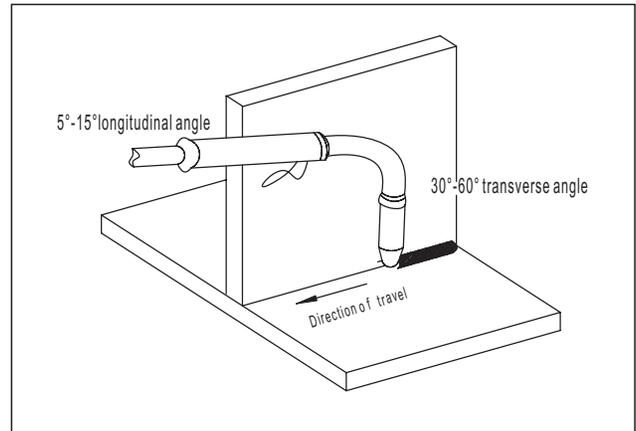


Fig. 7-1-5: Horizontal fillet weld

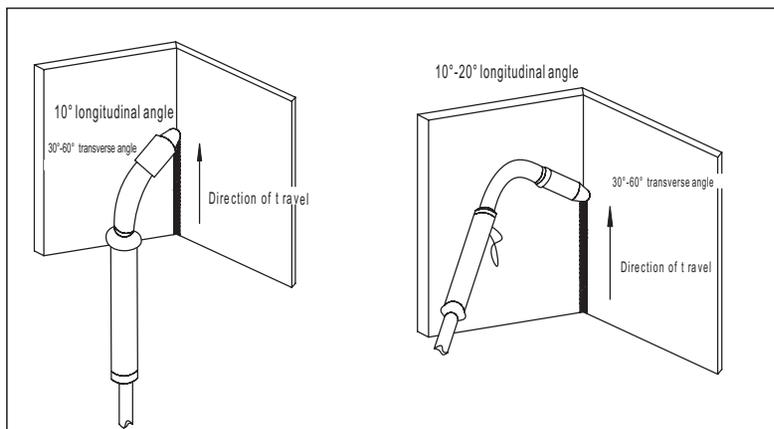


Fig. 7-1-6: Vertical fillet welds

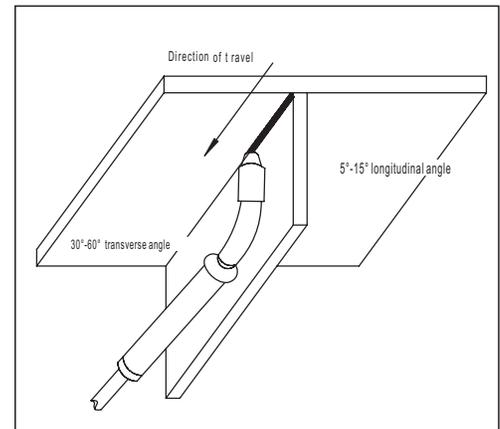


Fig. 7-1-7: Overhead weld

Distance from the MIG torch nozzle to the work piece

The electrode wire stick out from the MIG Torch nozzle should be between 10.0mm to 20.0mm. This distance may vary depending on the type of joint that is being welded.

Travel speed

The speed at which the molten pool travels influences the width of the weld and penetration of the welding run.

MIG welding (GMAW) variables

Most of the welding done by all processes is on carbon steel. The items below describe the welding variables in short-arc welding of 24gauge (0.024", 0.6mm) to 1/4" (6.4mm) mild sheet or plate. The applied techniques and end results in the GMAW process are controlled by these variables.

Preselected variables

Preselected variables depend upon the type of material being welded, the thickness of the material, the welding position, the deposition rate and the mechanical properties. These variables are:

- Type of electrode wire
- Size of electrode wire
- Type of gas (not applicable to self shielding wires FCAW)
- Gas flow rate (not applicable to self shielding wires FCAW)

Primary adjustable variables

These control the process after preselected variables have been found. They control the penetration, bead width, bead height, arc stability, deposition rate and weld soundness. They are:

- Arc Voltage
- Welding current (wire feed speed)
- Travel speed

Secondary adjustable variables

These variables cause changes in primary adjustable variables which in turn cause the desired change in the bead formation. They are:

1. Stick-out (distance between the end of the contact tube (tip) and the end of the electrode wire). Maintain at about 10mm stick-out
2. Wire Feed Speed. Increase in wire feed speed increases weld current. Decrease in wire feed speed decreases weld current.

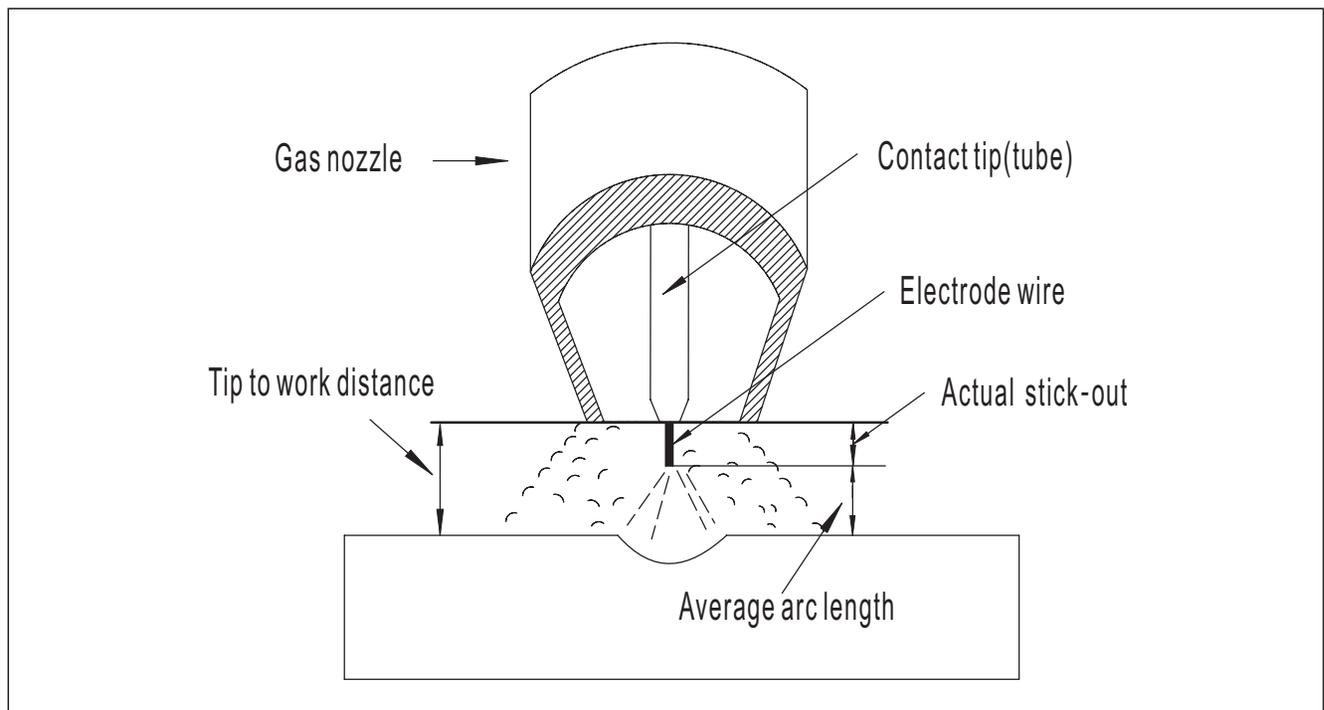


Fig. 7-1-8: Electrode stick-out

3.Nozzle Angle. This refers to the position of the welding gun in relation to the joint. The transverse angle is usually one half the included angle between plates forming the joint. The longitudinal angle is the angle between the center line of the welding gun and a line perpendicular to the axis of the weld. The longitudinal angle is generally called the Nozzle Angle and can be either trailing (pulling) or leading (pushing). Whether the operator is left handed or right handed has to be considered to realize the effects of each angle in relation to the direction of travel.

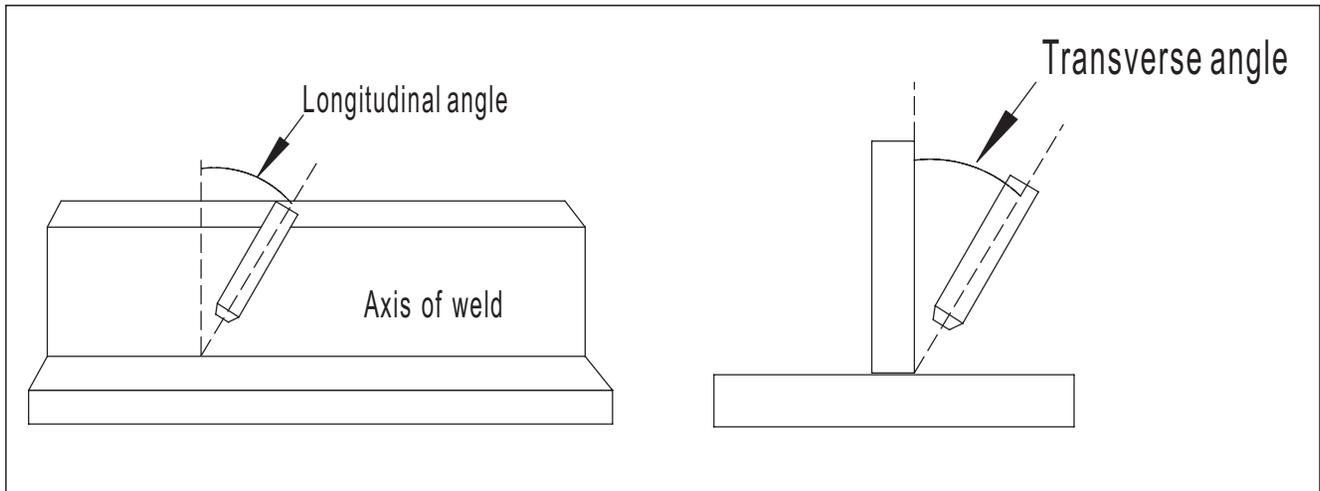


Fig. 7-1-9: Transverse and Longitudinal

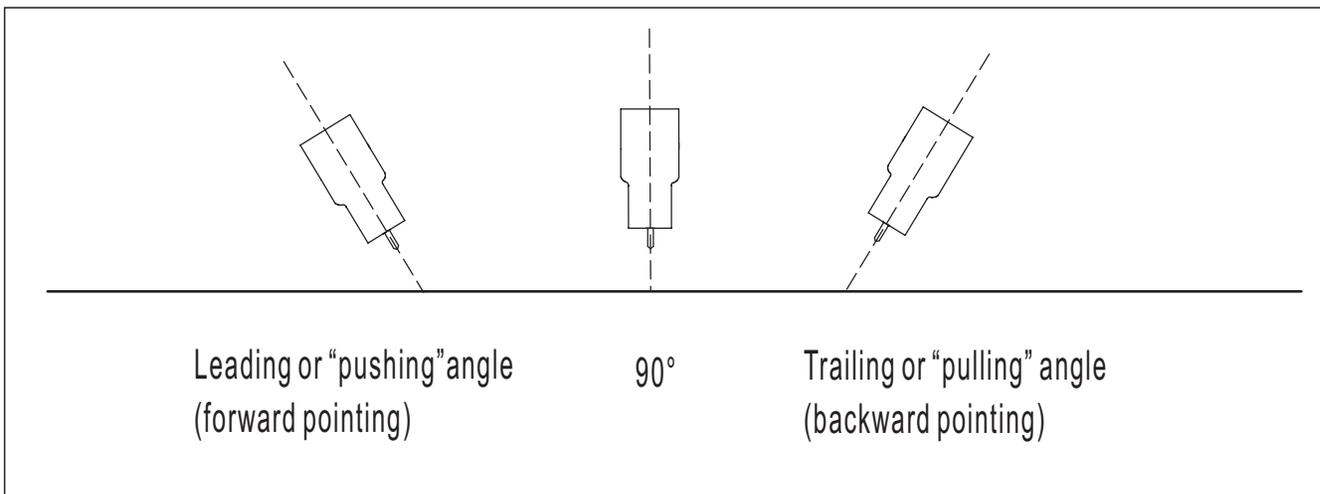


Fig. 7-1-10: Nozzle Angle Right Handed Operator

Establishing the Arc and Making Weld Beads

Before attempting to weld on a finished piece of work, it is recommended that practice welds be made on a sample metal of the same material as that of the finished piece.

The easiest welding procedure for the beginner to experiment with MIG welding is the flat position. The equipment is capable of flat, vertical and overhead positions.

For practicing MIG welding, secure some pieces of 16 or 18 gauge (0.06” 1.5mm or 0.08” 2.0mm) mild steel plate 6” x 6” (150 x 150mm). Use 0.030” (0.8mm) flux cored gasless wire or a solid wire with shielding gas.

Setting of the power source

Power source and Wirefeeder setting requires some practice by the operator, as the welding plant has two control settings that have to balance. These are the Wirespeed control and the welding Voltage Control. The welding current is determined by the Wirespeed control, the current will increase with increased Wirespeed, resulting in a shorter arc. Less wire speed will reduce the current and lengthen the arc. Increasing the welding voltage hardly alters the current level, but lengthens the arc. By decreasing the voltage, a shorter arc is obtained with a little change in current level.

When changing to a different electrode wire diameter, different control settings are required. A thinner electrode wire needs more Wirespeed to achieve the same current level.

A satisfactory weld cannot be obtained if the Wirespeed and Voltage settings are not adjusted to suit the electrode wire diameter and the dimensions of the work piece.

If the Wirespeed is too high for the welding voltage, "sticking" will occur as the wire dips into the molten pool and does not melt. Welding in these conditions normally produces a poor weld due to lack of fusion. If, however, the welding voltage is too high, large drops will form on the end of the wire, causing spatter. The correct setting of voltage and Wirespeed can be seen in the shape of the weld deposit and heard by a smooth regular arc sound.

Electrode wire size selection

The choice of Electrode wire size and shielding gas used depends on the following

- Thickness of the metal to be welded
- Type of joint
- Capacity of the wire feed unit and Power Source
- The amount of penetration required
- The deposition rate required
- The bead profile desired
- The position of welding
- Cost of the wire