

# **OPERATORS' MANUAL**

## **Top Gun 206 MS**

### **INVERTER Based Welding Machines**

**IMPORTANT: Read this Owner's Manual Completely** before attempting to use this equipment. Save this manual and keep it handy for quick reference. Pay particular attention to the safety instructions we have provided for your protection. Contact your distributor if you do not fully understand this manual.

**CONTENT**

**§1 Safety..... 1**

    §1.1 Symbols Explanation ..... 1

    §1.2 Machine Operating warnings!..... 1

    §1.3 EMC device classification ..... 8

    §1.4 EMC measure..... 9

    §1.5 Warning label..... 10

**§2 Overview..... 11**

    §2.1 Brief Introduction .....11

    §2.2 Working Principle..... 12

    §2.3 Volt-Ampere Characteristic..... 12

    §2.4 Principles of welding ..... 13

**§3 Installation and Adjustment ..... 14**

    §3.1 Parameters ..... 14

    §3.2 Duty cycle and Over-heat..... 14

    §3.3 Equipment Connection..... 15

        §3.3.1 MIG Welding- Gas shielded wire ..... 15

        §3.3.2 MIG Welding- Gasless wire ..... 16

        §3.3.3 MMA Welding ..... 16

    §3.4 Maintenance of MIG Gun mechanism ..... 17

        §3.4.1 Dissection graphics for the MIG GUN ..... 17

        §3.4.2 Parts list for the MIG GUN ..... 17

        §3.4.3 the operation for the MIG GUN..... 18

**§4 Operation..... 20**

    §4.1 Machine Layout Description ..... 20

    §4.2 Welding operation..... 22

        §4.2.1 MIG mode operation..... 22

        §4.2.2 MMA mode operation ..... 22

    §4.3 Welding parameters..... 22

    §4.4 Operation environment ..... 24

    §4.5 Operation Notices ..... 24

<b>§5 Maintenance &amp; Troubleshooting .....</b>	<b>25</b>
§5.1 Maintenance.....	25
§5.2 Troubleshooting .....	26
§5.3 List of error code .....	28
§5.4 Electrical schematic drawing.....	29

# §1 Safety

Welding and cutting equipment can be dangerous to both the operator and people in or near the surrounding working area, if the equipment is not correctly operated. Equipment must only be used under the strict and comprehensive observance of all relevant safety regulations. Read and understand this instruction manual carefully before the installation and operation of this equipment.

## §1.1 Symbols Explanation



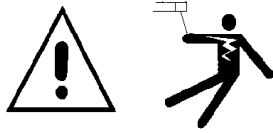
- The above symbols mean warning!

**Notice!** Running parts, getting an electric shock or making contacts with thermal parts will cause damage to your body and others. The underline message is as follows:

**Welding is quite a safe operation after taking several necessary protection measures!**

## §1.2 Machine Operating warnings!

- The following symbols and words explanations are for some damages to your body or others, which could happen during the welding operation. While seeing these symbols, please remind yourself and others to be careful.
- Only people who are trained professionally can install, debug, operate, maintain and repair the welding equipment covered with this Operator's Manual!
- During the welding operation, non-concerned people should NOT be around, especially children!
- After shutting off the machine power, please maintain and examine the equipment according to §7 because of the DC voltage existing in the electrolytic capacitors at the output of the power supply!



## **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 internal machine 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 dangerous.

- Never touch live electrical parts.
- Wear dry, hole-free gloves and clothes to insulate your body.
- Be sure to install the equipment correctly and ground the work or metal to be welded to a good electrical (earth) ground according to the operation manual.
- The electrode and work (or ground) circuits are electrically “hot” when the machine is ON. Do not touch these “hot” parts with your bare skin or wet clothing. Wear dry, hole-free gloves to insulate hands.
- In semiautomatic or automatic wire welding, the electrode, electrode reel, welding head, nozzle or semiautomatic welding gun are also electrically “hot”.
- Insulate yourself from work and ground using dry insulation. Make certain the insulation is large enough to cover your full area of physical contact with work and ground.
- Be Careful when using the equipment in small places, falling-off and wet circumstance.
- Always be sure the work cable makes a good electrical connection with the metal being welded. The connection should be as close as possible to the area being welded.
- Maintain the electrode holder, work clamp, welding cable and welding machine in good, safe operating condition. Replace damaged insulation.
- Never dip the electrode in water for cooling.
- Never simultaneously touch electrically “hot” parts of electrode holders connected

to two welders because voltage between the two can be the total of the open circuit voltage of both welders.

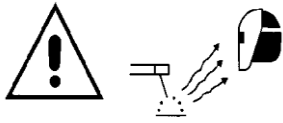
- When working above the floor level, use a safety belt to protect yourself from a fall should you get an electric shock!



### **FUMES AND GASES CAN BE DANGEROUS.**

Smoke and gas generated whilst welding or cutting can be harmful to people's health. Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

- Do not breathe the smoke and gas generated whilst welding or cutting, keep your head out of the fumes. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone. When welding with electrodes which require special ventilation such as stainless or hard facing or on lead or cadmium plated steel and other metals or coatings which produce highly toxic fumes, keep exposure as low as possible and below the Threshold Limit Values using local exhaust or mechanical ventilation. In confined spaces or in some circumstances, outdoors, a respirator may be required. Additional precautions are also required when welding on galvanized steel.
- Do not weld in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products.
- Shielded gases used for arc welding can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.
- Read and understand the manufacturer's instructions for this equipment and the consumables to be used, including the material safety data sheet and follow your employer's safety practices.



### **ARC RAYS: Harmful to people's eyes and skin.**

Arc rays from the welding process produce intense visible and invisible ultraviolet and infrared rays that can burn eyes and skin.

- Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing open arc welding.
- Use suitable clothing made from durable flame-resistant material to protect your skin and that of your coworkers from the arc rays.
- 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 metal.



### **SELF-PROTECTION**

- Keep all equipment safety guards, covers and devices in position and in good repair. Keep hands, hair, clothing and tools away from V-belts, gears, fans and all other moving parts when starting, operating or repairing equipment.
- Do not put your hands near the engine fan. Do not attempt to override the governor or idler by pushing on the throttle control rods while the engine is running.



**DO NOT** add any fuel near an open-flame welding arc or when the engine is running. Stop the engine and allow it to cool before refueling to prevent spilled fuel from vaporizing on contact with hot engine parts and igniting. Do not spill fuel when filling tank. If fuel is spilled, wipe it up and do not start engine until fumes have been eliminated.

**WELDING SPARKS can cause fire or explosion.**

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

- Remove fire hazards material from the welding area. If this is not possible, cover them to prevent the welding sparks from starting a fire. Remember that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas. Avoid welding near hydraulic lines. Have a fire extinguisher readily available.
- Where compressed gases are to be used at the job site, special precautions should be used to prevent hazardous situation.
- When not welding, make certain no part of the electrode circuit is touching the work or ground. Accidental contact can cause overheating and create a fire hazard.
- Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been “cleaned”.
- Vent hollow castings or containers before heating, cutting or welding. They may explode.
- Sparks and spatter are thrown from the welding arc. Wear oil free protective garments such as leather gloves, heavy shirt, cuff less trousers, high shoes and a cap over your hair. Wear earplugs when welding out of position or in confined places. Always wear safety glasses with side shields when in a welding area.
- Connect the work cable to the work as close to the welding area as practical. Work cables connected to the building framework or other locations away from the welding area increase the possibility of the welding current passing through lifting

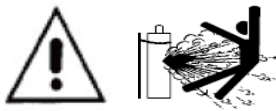


chains, crane cables or other alternate circuits. This can create fire hazards or overheat lifting chains or cables until they fail.



### **Rotating parts may be dangerous.**

- Use only compressed gas cylinders containing the correct shielding gas for the process used and 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.
- Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.
- Cylinders should be located:
  - Away from areas where they may be struck or subjected to physical damage.
  - At a safe distance from arc welding or cutting operations and any other source of heat, sparks, or flame.
- Never allow the electrode, electrode holder or any other electrically “hot” parts to touch a gas cylinder.
- Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.
- Valve protection caps should always be in place and hand tight except when the cylinder is in use or connected for use.



### **Gas Cylinders.**

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

- Protect gas cylinders from excessive heat, mechanical shocks, physical damage, slag, open flames sparks, and arcs.

- Insure cylinders are held secure and upright to prevent tipping or falling over.
- Never allow the welding electrode or earth clamp to touch the gas cylinder, do not drape welding cables over the cylinder.
- Never weld on a pressurised gas cylinder, it will explode and kill you.
- Open the cylinder valve slowly and turn your face away from the cylinder outlet valve and gas regulator.



The build up of gas can causes a toxic environment, deplete the oxygen content in the air resulting in death or injury. Many gases use in welding are invisible and odourless.

- Shut off shielding gas supply when not in use.
- Always ventilate confine spaces or use approved air-supplied respirator.



Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). The discussion on the effect of EMF is ongoing in the entire world. Up to now, no material evidences show that EMF may have effects on health. However, the research on the effect of EMF is still ongoing. Before any conclusion, we should minimize exposure to EMF as few as possible.

In order to minimize EMF, we should use the following procedures:

- Route the electrode and work cables together – Secure them with tape when possible.
- All cables should be put away and far from the operator.
- Never coil the power cable around your body.
- Make sure welding machine and power cable to be far away from the operator as far as possible according to the actual circumstance.

- Connect the work cable to the workpiece as close as possible to the area being welded.
- The people with heart-pacemaker should be away from the welding area.



### **Noise can damage hearing.**

Noise from some processes or equipment can damage hearing. You must protect your ears from loud noise to prevent permanent loss of hearing.

- To protect your hearing from loud noise, wear protective ear plugs and/or earmuffs. Protect others in the workplace.
- Noise levels should be measured to be sure the decibels (sound) do not exceed safe levels.



### **Hot parts.**

Items being welded generate and hold high heat and can cause severe burns. Do not touch hot parts with bare hands. Allow a cooling period before working on the welding gun. Use insulated welding gloves and clothing to handle hot parts and prevent burns.

## **§1.3 EMC device classification**



### **Radiation Class A Device.**

- Only can be used in the industrial area
- If it is used in other area, it may cause connection and radiation problems of circuit.

### **Radiation Class B device.**

- It can meet the radiation requirements of residential area and industrial area. It also can be used in residential area which power is supplied by public low voltage circuit.

EMC device can be classified by power nameplate or technical data.

hanker welding machines belong to Class A.

## §1.4 EMC measure



In the special situation, The specified area may be affected, the standard of radiation limit value has been complied with (eg: The device, which is easy effected by electromagnetism, is used at the installation location, or there is radio or TV near the installation location). In this condition, the operator should adopt some appropriate measures to remove interference.

Accoring to the domestic and international standards, the ambient devices' electromagnetism situation and anti-interference ability must be checked:

- Safety device
- Power line, Signal transmission line and Date transmission line
- Date processing equipment and telecommunication equipment
- Inspection and calibration device

The effective measures avoid the problem of EMC:

a) Power source

Even though the power source connection meet rules, we still need to take additional measure to remove the electromagnetic interference. (eg: Use the right power filter. )

b) The welding line

- Try to shorten the length of cable
- Put the cable together
- Be Far away from other cable

c) Equipotential connection

d) Ground connection of work-piece

- When necessary, use appropriate capacitance to connect the ground.

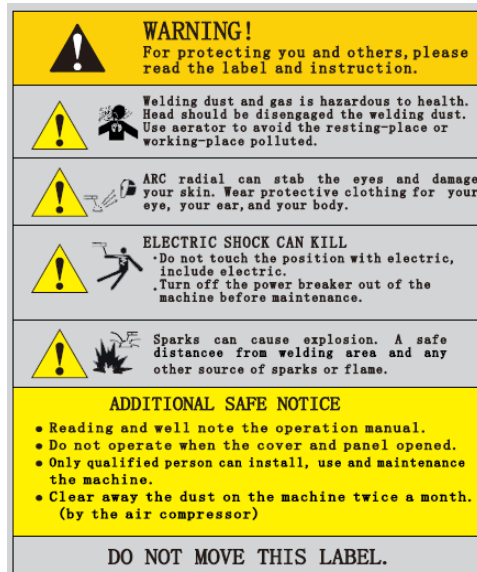
e) Shielding, when necessary

- Shield the ambient devices

- Shield the whole welding machine

## §1.5 Warning label

The device with a warning label. **Do not remove, destroy or cover this label.** These warnings are intended to avoid incorrect device operations that could result in serious personal injury or property damage.



## §2 Overview

### §2.1 Brief Introduction

MIG SERIES arc welding machine adopts the latest pulse width modulation (PWM) technology and insulated gate bipolar transistor (IGBT) power module, which can change work frequency to medium frequency so as to replace the traditional hulking work frequency transformer with the cabinet medium frequency transformer. Thus, it is characterized with portable, small size, light weight, low consumption and etc.

MIG SERIES arc welding machine uses Mix gas as shielded gas to realize gas shielded welding, active gas (Ar+O<sub>2</sub>, Ar+CO<sub>2</sub>) as shielded gas to realize MAG welding and inactive gas (Ar) as shielded gas to realize MIG welding.

MIG SERIES arc welding machine has automatic protection functions with intelligent to over-voltage, over-current and over-heat. If any one of the above problems happens, the alarm lamp on the front panel will be lighted and output current will be shut off automatically to protect itself and prolong the equipment using life.

MIG SERIES Features:

1. Digital control system, real-time display the welding parameters;
2. High performance multifunction power source (MMA/MIG/MAG);
3. Waveform control, stable welding arc;
4. IGBT technology, low power dissipation;
5. Rated duty circle is 40%(40°C).

MULTIMIG 160/200 has another feature: Synergic control of the welding current and voltage.

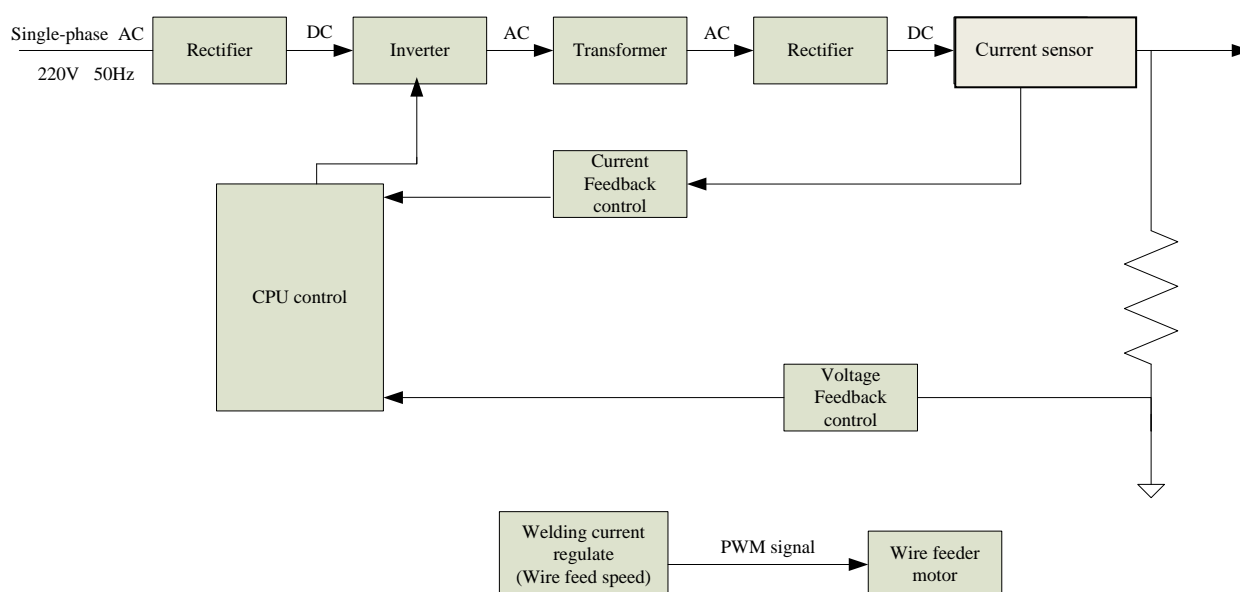
MIG SERIES arc welding machine is suitable for all positions welding for various plates made of stainless steel, carbon steel, alloyed steel, copper, titanium, etc, which is also applied to pipe installment, mould mend, petrochemical, architecture decoration, car repair, bicycle, handicraft and common manufacture.

MAG--Metal Active Gas Welding

MIG--Metal Inert Gas Welding

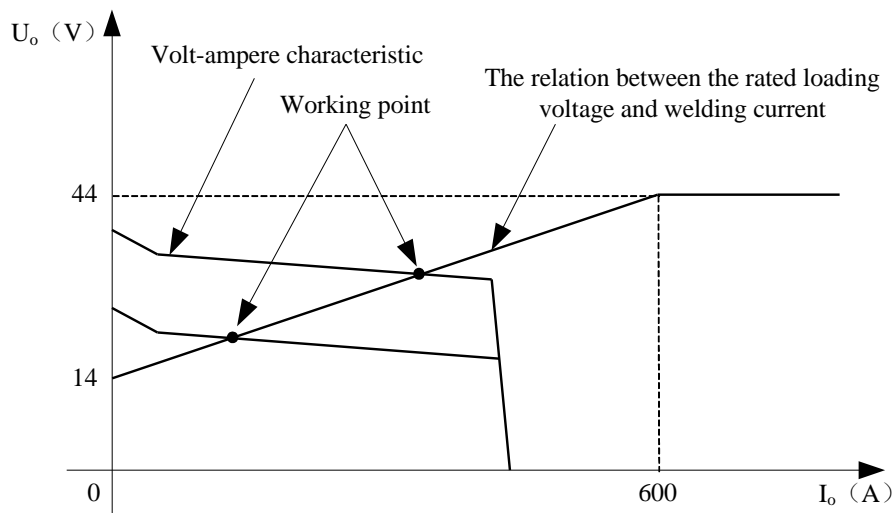
## §2.2 Working Principle

The working principle of MIG SERIES arc welding machine is shown as the following figure. Single-phase 220V work frequency AC is rectified into DC (350V), then is converted to medium frequency AC (about 40KHz) by inverter device (IGBT), after reducing voltage by medium transformer (the main transformer) and rectifying by medium frequency rectifier (fast recovery diodes), and is outputted by inductance filtering. The circuit adopts current feedback control technology to insure current output stably when MMA or TIG. And adopts voltage feedback control technology to insure voltage output stably when MIG. Meanwhile, the welding current parameter can be adjusted continuously and infinitely to meet with the requirements of welding craft.

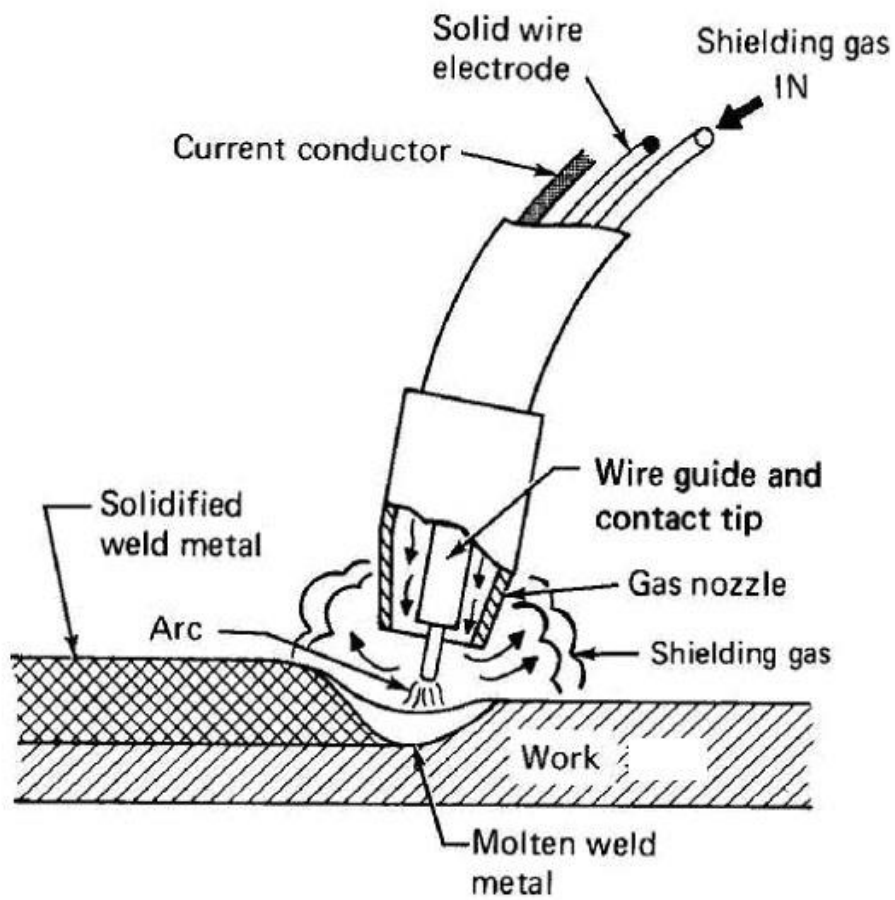


## §2.3 Volt-Ampere Characteristic

MIG series welding machine has an excellent volt-ampere characteristic, whose graph is shown as the following figure. The relation between the rated loading voltage  $U_2$  and welding current  $I_2$  is as follows:  $U_2=14+0.05I_2(V)$



## §2.4 Principles of welding





## §3 Installation and Adjustment

### §3.1 Parameters

Model	MIG 206 MS	
Parameters		
Input Voltage (V)	1~240 ± 10%	
Input Current (A)	38 MIG	46 MMA
Input Power (KW)	5.1 MIG	4.7 MMA
Welding Current (A)	40-200 MIG	10-200MMA
No-load Voltage (V)	69	
Duty cycle (40°C)	25% 200A 60% 155A 100%120A	10% 200A 60% 130A 100%100A
Welding Current Range (A)	40-200 MIG	10-200 MMA
Welding Voltage Range (V)	16-24	20.4-28
Diameter (mm)	0.6、0.8、0.9、1.0 (Fe /Ss/Flux-Cored)	
Protection class	IP23	
Insulation class	H	
Power factor	0.65	
Efficiency (%)	85%	
Dimensions (mm)	450*215*400	
Weight (Kg)	12	

**Note: The above parameters are subject to change with future machine improvement!**

### §3.2 Duty cycle and Over-heat

The letter “X” stands for Duty Cycle, which is defined as the portion of the time a welding machine can weld continuously with it’s rated output current within a certain time cycle (10 minutes).

The relation between the duty cycle “X” and the output welding current “I” is shown as the right

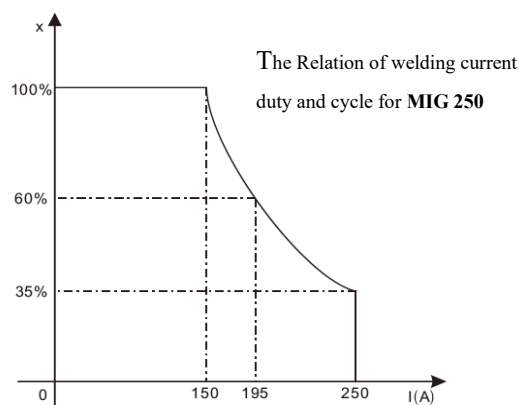
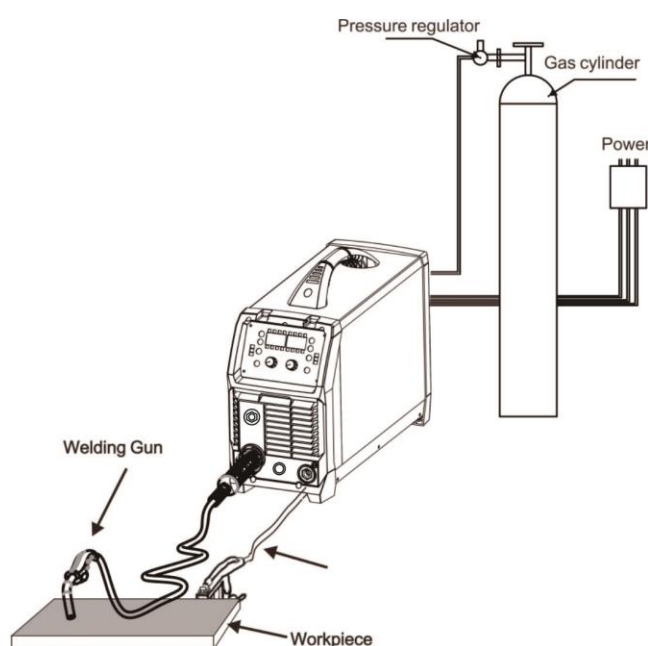


figure.

If the welding machine is overheating, the IGBT over-heat protection sensing will send a signal to the welding machine control unit to cut the output welding current OFF and light the over-heat pilot lamp on the front panel. In that case, the machine should not be welding for 10-15 minutes to cool down with the fanrunning. When operating the machine again, the welding output current or the duty cycle should be reduced.

## §3.3 Equipment Connection

### §3.3.1 MIG Welding- Gas shielded wire



- (1) Insert the earth cable plug into the negative socket on the front of the machine and tighten it.
- (2) Plug the welding torch into the MIG torch connection socket on the front panel and tighten it.

**IMPORTANT :** When connecting the torch be sure to tighten the connection. A loose connection can result in the connector arcing and damaging the machine and gun connector.

- (3) Connect the MIG power connection lead to the positive welding power output socket.

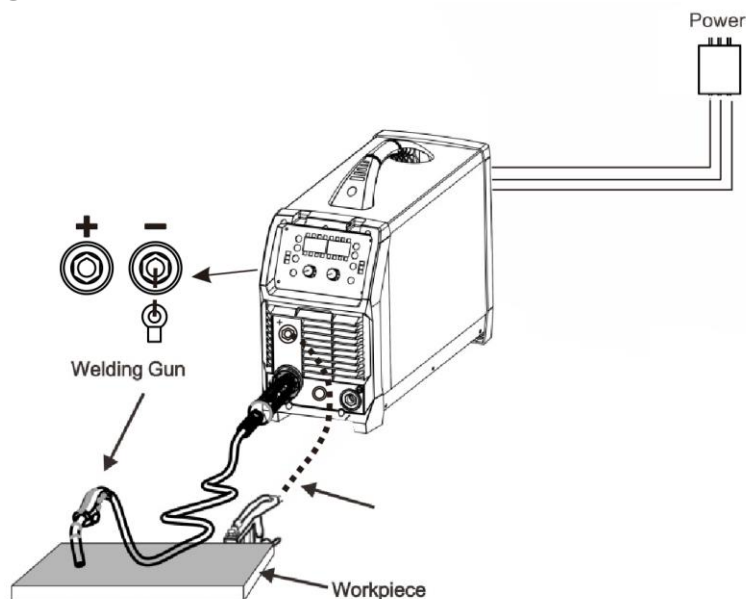
Note if this connection is not made, there will be no electrical connection to the welding torch!

- (4) Connect the gas regulator to the Gas Cylinder and connect the gas line to the Gas Regulator.

#### **Check for Leaks!**

- (5) Connect the gas line to gas connector on the rear panel. **Check for Leaks!**
- (6) Connect the power cable of welding machine with the output switch in electric box on site.

### §3.3.2 MIG Welding- Gasless wire



### §3.3.3 MMA Welding

**Connection of Output Cables** Two sockets are available on this welding machine. For MMA welding the electrode holder is shown be connected to the positive socket, while the earth lead (work piece) is connected to the negative socket, this is known as DCEP. However various electrodes require a different polarity for optimum results and careful attention should be paid to the polarity, refer to the electrode manufacturers information for the correct polarity.

DCEP: Electrode connected to “+” output socket.

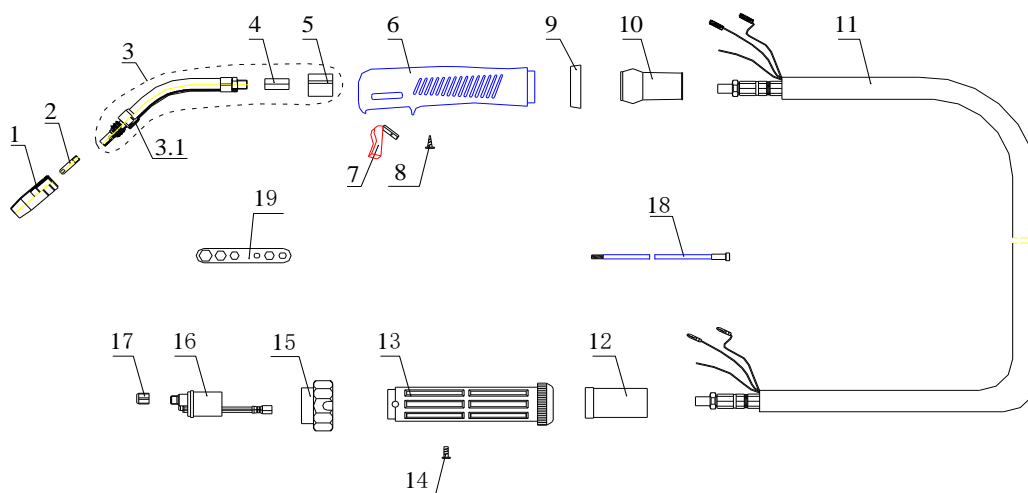
DCEN: Electrode connected to “-” output socket.

Switch the ON/OFF Switch (located on the rear panel) to OFF.

- (1) Connect the earth lead to “-” , tighten clockwise;
- (2) Connect the earth clamp to the work piece. Contact with the work piece must be firm contact with clean, bare metal, with no corrosion, paint or scale at the contact point.
- (3) Connect the electrode lead to “+” , tighten clockwise;
- (4) Each machine is equipped with a power cable should be based on the input voltage welding power cable connected to the appropriate position, not to pick the wrong voltage;
- (5) With the corresponding input power supply terminal or socket good contact and prevent oxidation;
- (6) With a multi meter measure the input voltage is within the fluctuation range;
- (7) The power ground is well grounded.

### §3.4 Maintenance of MIG Gun mechanism

#### §3.4.1 Dissection graphics for the MIG GUN



#### §3.4.2 Parts list for the MIG GUN

NO.	Description	QTY.	Remark
1	Tip D.12 14-15AK	1	
2	Electric nozzle 0.8/M6*25	1	
3	15AK Goose gun neck (Hexangular adapter and Plastic adapter)	1	
3.1	15AK Goose gun	1	
4	Hexangular adapter	1	
5	Plastic adapter	1	
6	MIG blue handle	1	
7	Torch Switch 21.8mm	1	
8	Screw D.3*10	3	
9	Handle locking ring	1	
10	Cable fixing joint 15AK	1	
11	Coaxial cable team /16mmq/3m	1	
12	Cable thimble 12-16-25 MMQ	1	
13	CO <sub>2</sub> Euro-rear thimble	1	
14	Screw M4*6 UNI 6107	1	
15	Torch locknut /plastic screw thread	1	
16	Euro-main socket/flexibility pin	1	
17	Feeding pipe locknut	1	
18	Insulating feed pipe 0.6-0.8 3m, Blue	1	
19	Spanner for the electric nozzle	1	

### §3.4.3 the operation for the MIG GUN

1. Service the wire feed mechanism at least every time the reel is changed.

- Check the wear of the feed roll groove and change the feed roll when necessary.
- Clean the welding gun wire guide with compressed air.

2. Cleaning the wire guide

Pressure of the feed rolls remove metal dust from the filler wire's surface which then finds its way to the wire guide. If the wire guide is not cleaned, it gradually clogs up and causes wire feed malfunctions. Clean the wire guide in the following manner:

Remove the welding gun's gas nozzle, contact tip and contact tip's adapter.

With a pneumatic pistol, blow compressed air through the wire guide.

Blow the wire feed mechanism and reel housing clean with compressed air.

Reattach the welding gun's parts. Tighten the contact tip and contact tip's adapter to spanner tightness.

3. Changing the wire guide

If the wire guide is too worn or totally clogged, change it to a new one according to the following instructions.

Open the mounting nut of the wire guide which exposes the end of the wire guide.

Straighten the welding gun's cable and withdraw the wire guide from the gun.

Push a new wire guide in to the gun. Make sure that the wire guide enters all the way into the contact tip's adapter and that there is an O-ring at the machine-end of the guide.

Tighten the wire guide in place with the mounting nut.

Cut the wire guide 2mm from the mounting nut and file the sharp edges of the cut round.

Reattach the gun in place and tighten the parts to spanner tightness.

Threading the filler wire

Threading the filler wire as the follow steps:

Open the reel housing by pressing on the opening button and install the wire reel in such a way that it rotates counter clockwise. You can use either a diameter 200mm or 100mm wire reel in the machine.

Attach the reel with a reel lock.

Unfasten the wire end from the reel, but hold on it all the time.

Straighten the wire end for approximately 20 cm and cut the wire in the straightened location.

Open the pressure control level which then opens the feed gear.

Thread the wire through the wire's rear guide to the gun's wire guide.

Close the feed gear and fasten it with the pressure control lever. Make sure that the wire runs in the feed roll groove.

Adjust the compression pressure with the pressure control lever no higher than to the middle of the scale. If the pressure is too high, it removes metal fragments from the wire surface and may damage the wire. On the other hand, if the pressure is too low, the feed gear slips and the wire does not run smoothly.

Press the welding gun trigger and wait for the wire to come out.

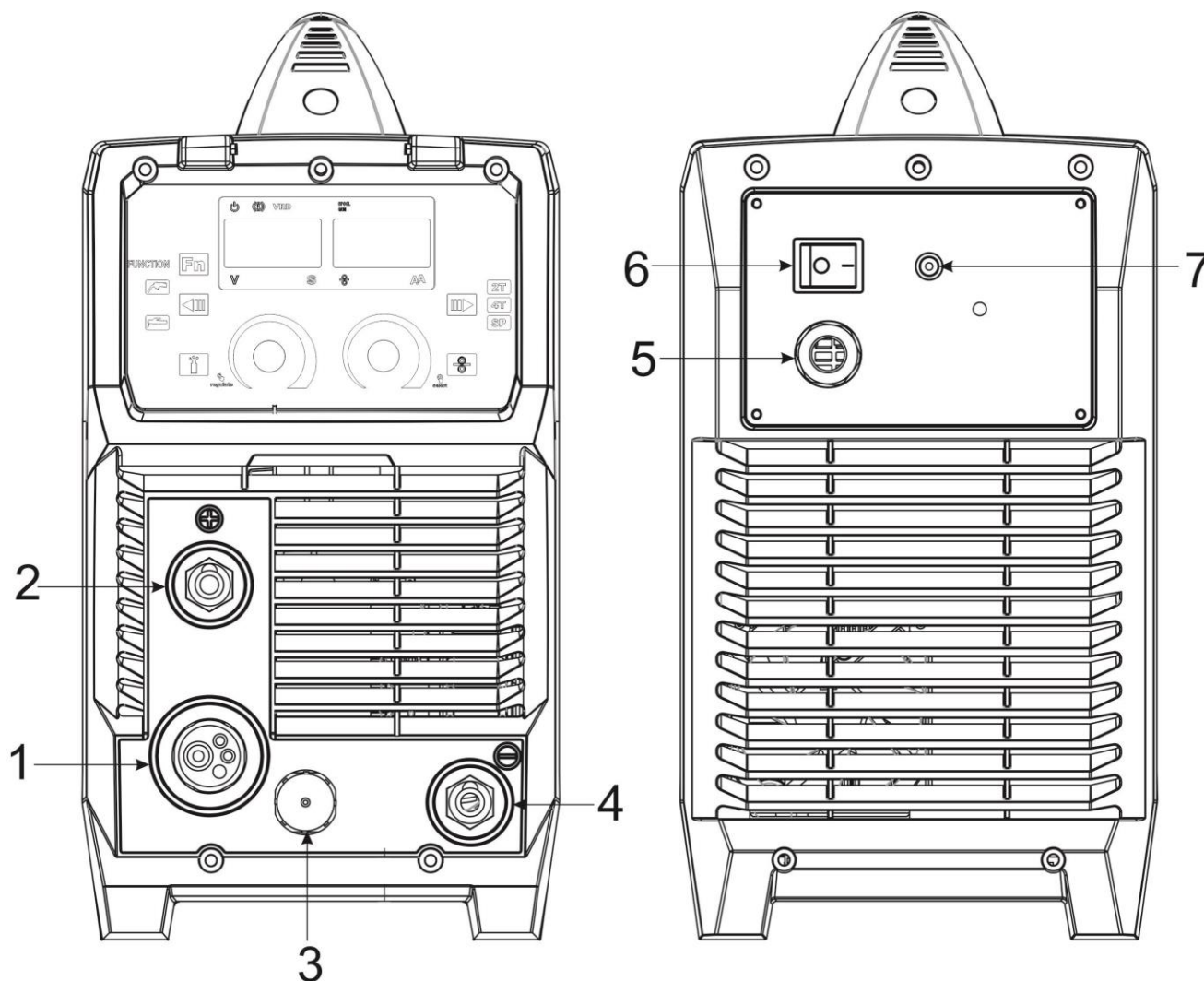
Close the reel housing cover.

**Note: When driving the wire into the gun, do not point the gun at yourself or others.**

## §4 Operation

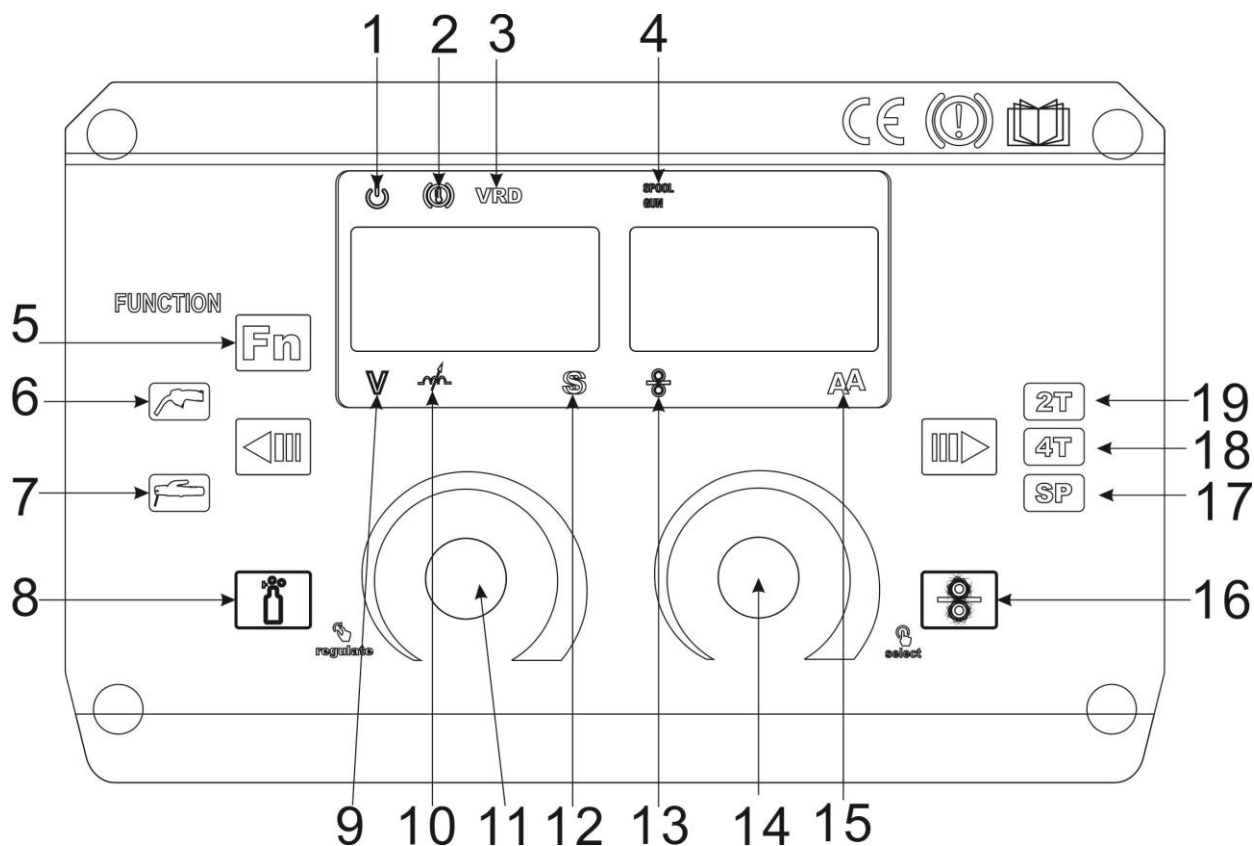
### §4.1 Machine Layout Description

#### Front and rear panel layout of welding machine



- 1, MIG torch euro connector.
- 2, Positive (+) welding power output connection socket.
- 3, Spool gun connector.
- 4, Negative (-) welding power output connection socket.
- 5, Input power cable.
- 6, Power switch.
- 7, Gas inlet connector.

## Control Panel of welding machine



1. Power indicator
2. Alarm indicator
3. VRD indicator
4. Spool Gun indicator
5. Function select
6. MIG model
7. MMA model
8. Gas check
9. Voltage indicator
10. Wave control indicator
11. Voltage adjust knob.
12. Parameter derivation.
13. Wire feeder indicator.
14. Welding current knob
15. Current indicator
16. Fast wire feeder
17. Spot welding model
18. 4T model
19. 2T model



## §4.2 Welding operation

### §4.2.1 MIG mode operation

#### 1. Shielding Gas choice

- 1) When the wire material is Fe, the shielding gas is 80%Ar + 20%CO<sub>2</sub> ;
- 2) When the wire material is Ss, the shielding gas is 98%Ar + 2%O<sub>2</sub> ;
- 3) When the wire material is Al, the shielding gas is 100%Ar.

#### 2. Welding state choice

- 1) Select 'MIG' using the welding method key.
- 2) Spool Gun Switch turn off (down) ;
- 3) Manual wire switch & air check switch;
- 4) Burn back adjust, Slow feed adjust, Post flow adjust, Pre-flow knob adjust;
- 5) Set the welding parameters as required using the knob on the front panel. You are now ready to weld!

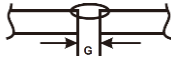
### §4.2.2 MMA mode operation

- 1) According to the above method to install is correct, turn the power switch to the "ON" position, the power L.E.D. light should illuminate, the fan comes on, the device work properly.
- 2) Select 'MMA' using the welding method key.
- 3) Set the welding parameters as required using the knob on the front panel. You are now ready to weld!

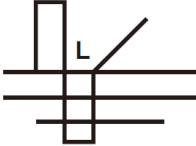
**Note:** The current display is preset current before welding and is welding current when welding. The voltage display is real voltage.

## §4.3 Welding parameters

**Process reference for CO<sub>2</sub> butt welding of low carbon steel solid welding wire**

Butt-joint 	Material thickness (MM)	Root gap G (MM)	Wire diameter (MM)	Welding current (A)	Welding voltage (V)	Welding speed (CM/MIN)	Gas-flow rate (L/MIN)
	0.8	0	0.8	60-70	16-16.5	50-60	10
	1.0	0	0.8	75-85	17-17.5	50-60	10-15
	1.2	0	0.8	80-90	17-18	50-60	10-15
	2.0	0-0.5	1.0/1.2	110-120	19-19.5	45-50	10-15
	3.2	0-1.5	1.2	130-150	20-23	30-40	10-20
	4.5	0-1.5	1.2	150-180	21-23	30-35	10-20
	6	0	1.2	270-300	27-30	60-70	10-20
	6	1.2-1.5	1.2	230-260	24-26	40-50	15-20
	8	0-1.2	1.2	300-350	30-35	30-40	15-20
	8	0-0.8	1.6	380-420	37-38	40-50	15-20
	12	0-1.2	1.6	420-480	38-41	50-60	15-20

**Process reference for CO2 corner welding of low carbon steel solid welding wire**

Corner joint 	Material thickness (MM)	Wire diameter (MM)	Welding current (A)	Welding voltage (V)	Welding speed (CM/MIN)	Gas-flow rate (L/MIN)
	1.0	0.8	70-80	17-18	50-60	10-15
	1.2	1.0	85-90	18-19	50-60	10-15
	1.6	1.0/1.2	100-110	18-19.5	50-60	10-15
	1.6	1.2	120-130	19-20	40-50	10-20
	2.0	1.0/1.2	115-125	19.5-20	50-60	10-15
	3.2	1.0/1.2	150-170	21-22	45-50	15-20
	3.2	1.2	200-250	24-26	45-60	10-20
	4.5	1.0/1.2	180-200	23-24	40-45	15-20
	4.5	1.2	200-250	24-26	40-50	15-20
	6	1.2	220-250	25-27	35-45	15-20
	6	1.2	270-300	28-31	60-70	15-20
	8	1.2	270-300	28-31	60-70	15-20
	8	1.2	260-300	26-32	25-35	15-20
	8	1.6	300-330	25-26	30-35	15-20
	12	1.2	260-300	26-32	25-35	15-20
	12	1.6	300-330	25-26	30-35	15-20
16	1.6	340-350	27-28	35-40	15-20	
19	1.6	360-370	27-28	30-35	15-20	

## §4.4 Operation environment

- ▲ Height above sea level  $\leq 1000$  M
- ▲ Operation temperature range  $-10 \sim +40^{\circ}\text{C}$
- ▲ Air relative humidity is below 90 % (  $20^{\circ}\text{C}$  )
- ▲ Preferable site the machine some angles above the floor level, the maximum angle does not exceed  $15^{\circ}$ .
- ▲ Protect the machine against heavy rain AND against direct sunshine.
- ▲ The content of dust, acid, corrosive gas in the surrounding air or substance cannot exceed normal standard.
- ▲ Take care that there is sufficient ventilation during welding. There must be at least 30cm free distance between the machine and wall.

## §4.5 Operation Notices

- ▲ Read Section §1 carefully before starting to use this equipment.
- ▲ Connect the ground wire with the machine directly.
- ▲ Ensure that the input is single-phase: 50/60Hz, 110V/220V  $\pm 10\%$ .
- ▲ Before operation, none concerned people should not be around the working area and especially children. Do not watch the arc in unprotected eyes.
- ▲ Ensure good ventilation of the machine to improve Duty Cycle.
- ▲ Turn off the engine when the operation finished for energy consumption efficiency.
- ▲ When power switch shuts off protectively because of failure. Don't restart it until problem is resolved. Otherwise, the range of problem will be extended.
- ▲ In case of problems, contact your local dealer if no authorized maintenance staff is available!

## §5 Maintenance & Troubleshooting

### §5.1 Maintenance

In order to guarantee safe and proper operation of welding machines, they must be maintained regularly. Let customers understand the maintenance procedure of welding machines. Enable customers to carry on simple examination and inspections. Do your best to reduce the fault rate and repair times of welding machines to lengthen service life of arc welding machine. Maintenance items in detail are in the following table.

- **Warning: For safety while maintaining the machine, please shut off the main input power and wait for 5 minutes, until capacitors voltage already drop to safe voltage 36V!**

Date	Maintenance items
Daily examination	<p>Observe that the knobs and switches in the front and at the back of arc welding machine are flexible and put correctly in place. If any knob has not been put correctly in place, please correct. If you can't correct or fix the knob, please replace immediately;</p> <p>If any switch is not flexible or it can't be put correctly in place, please replace immediately! Please get in touch with maintenance service department if there are no accessories.</p> <p>After turn-on power, watch/listen if the arc-welding machine has shaking, whistle calling or peculiar smell. If there is one of the above problems, find out the reason and clear it. If you can't find out the reason, please contact your local service repair station or distributor/Agent.</p> <p>Observe that the display value of LED is intact. If the display number is not intact, please replace the damaged LED. If it still doesn't work, please maintain or replace the display PCB.</p> <p>Observe that the min./max. Values on LED agree with the set value. If there is any difference and it has affected the normal welding results, please adjust it.</p> <p>Check whether the fan is damaged and whether it is normal to rotate or control. If the fan is damaged, please change immediately. If the fan does not rotate after the machine is overheated, observe if there is something blocking the blade. If it is blocked, please clear the problem. If the fan does not rotate after getting rid of the above problems, you can poke the blade by the rotation direction of fan. If the fan rotates normally, the start capacity should be replaced. If not, change the fan.</p> <p>Observe whether the fast connector is loose or overheated. If the arc-welding machine has the above problems, it should be fastened or changed.</p> <p>Observe whether the current output cable is damaged. If it is damaged, it should be insulated or changed.</p>

Monthly examination	<p>Using the dry compressed air to clear the inside of arc welding machine. Especially for clearing up the dusts on radiator, main voltage transformer, inductors, IGBT modules, fast recover diodes, PCB's, etc.</p> <p>Check the screws and bolts in the machine. If any is loose, please screw it tight. If it is shaved, please replace. If it is rusty, please erase rust on all bolts to ensure it works well.</p>
Quarter-yearly examination	<p>Check whether the actual current accords with the displaying value. If they did not accord, they should be regulated. The actual welding current value can be measured by and adjusted by plier-type ampere meter.</p>
Yearly examination	<p>Measure the insulating impedance among the main circuit, PCB and case, if it below <math>1M\Omega</math>, insulation is thought to be damaged and need to change, and need to change or strengthen insulation.</p>

## §5.2 Troubleshooting

- Before the welding machines are dispatched from the factory, they have already been tested and calibrated accurately. **It is forbidden for anyone who is not authorized by our company to do any change to the equipment!**
- Maintenance course must be operated carefully. If any wire becomes flexible or is misplaced, it maybe potential danger to user!
- Only professional maintenance staff that is authorized by our company could overhaul the machine!
- **Be sure to shut off the Main Input Power before doing any repair work on the welding machine!**
- If there is any problem and there is no authorized professional maintenance personal on site, please contact local agent or the distributor!

If there are some simple troubles with the welding machine, you can consult the following Chart:

NO.	Troubles		Reasons	Solution
1	Close the breaker, but the power light isn't on		Breaker damaged	Change it
			Fuse damaged	Change it
			Input power damaged	Change it
2	After welding machine is over-heat, the fan doesn't work		Fan damaged	Change it
			The cable is loose	Screw the cable tight
3	Press the gun switch, no output shielded gas	No output gas when test gas	No gas in the gas cylinder	Change it
			Gas hose leaks gas	Change it
			Electromagnetic valve damaged	Change it
	Output gas when test gas	Control switch damaged	Repair the switch	
		Control circuit damaged	Check the PCB	
4	Wire-feed er doesn't work	Wire reel doesn't work	Motor damaged	Check and change it
			Control circuit damaged	Check the PCB
	Wire reel works	The press wheel is loosen or weld wire skids	Press it tightly again	
		The wheel doesn't fit with the diameter of weld wire	Change the wheel	
		Wire reel damaged	Change it	
		Wire feed pipe is jammed	Repair or change it	
		Tip is jammed because of splash	Repair or change it	
5	No striking arc and no output voltage		Output cable is connected incorrectly or loosen	Screw it down or change it
			Control circuit damaged	Check the circuit
6	Welding stops, and alarm light is on		Machine has self-protection	Check over-voltage, over-current, over-temperature, lower-voltage and over-temperature, and solve it
7	Welding current is run away and can be not controlled		The potentiometer damaged	Check or change it
			The control circuit damaged	Check the circuit
8	The crater current can be not adjusted		The PCB damaged	Check it
9	No post-gas		The PCB damaged	Check it

### §5.3 List of error code

<b>Error Type</b>	<b>Error code</b>	<b>Description</b>	<b>Lamp status</b>
Thermal relay	E01	Over-heating(1st thermal relay)	Yellow lamp(thermal protection) always on
	E02	Over-heating(2nd thermal relay)	Yellow lamp(thermal protection) always on
	E03	Over-heating(3rd thermal relay)	Yellow lamp(thermal protection) always on
	E04	Over-heating(4th thermal relay)	Yellow lamp(thermal protection) always on
	E09	Over-heating(Program in default)	Yellow lamp(thermal protection) always on
Welding machine	E10	Phase loss	Yellow lamp(thermal protection) always on
	E11	No water	Yellow lamp(lack water) always on
	E12	No gas	Red lamp always on
	E13	Under voltage	Yellow lamp(thermal protection) always on
	E14	Over voltage	Yellow lamp(thermal protection) always on
	E15	Over current	Yellow lamp(thermal protection) always on
	E16	Wire feeder over load	
Switch	E20	Button fault on operating panel when switch on the machine	Yellow lamp(thermal protection) always on
	E21	Other faults on operating panel when switch on the machine	Yellow lamp(thermal protection) always on
	E22	Torch fault when switch on the machine	Yellow lamp(thermal protection) always on
	E23	Torch fault during normal working process	Yellow lamp(thermal protection) always on
Accessory	E30	Cutting torch disconnection	Red lamp blink
	E31	Water cooler disconnection	Yellow lamp(lack water) always on
Communication	E40	Connection problem between wire feeder and power source	
	E41	Communication error	

## §5.4 Electrical schematic drawing

