

KeyGree

**TIG-315/TIG-400  
TIG USER'S MANUAL**

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*Do it easy, comfortable, trustable.*

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## PREFACE

Dear users, thank you for using our inverter welder ("welder" or "product"). For your correct operation of our product, please read this manual carefully before use and keep it properly for future reference.

### **SPECIAL NOTICE:**

1. When the welder is placed on an inclined plane, care should be taken to prevent it from tipping over;
2. As the protection level of this welder series is IP21S, it is not suitable for use in the rain;
3. This product conforms to GB/T 15579.1-2013 standard.
4. This product complies with the electromagnetic compatibility requirements for type A equipment.

This Manual is subject to change without prior notice.

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## SAFETY PRECAUTIONS

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### **⚠ DANGER** ELECTRIC SHOCK !!!

- Install the earthing device according to the application standard.
- Do not touch live parts with your exposed skin or wet gloves or wet clothes on.
- Make sure you are insulated from the ground and the workpiece.
- Never remove the cover plate before power-up, or it may cause electric shock.
- Make sure your workstation is in a safe state.



### **⚠ DANGER** FIRE !!!

- To avoid the risk of fire, please install the welder on a non-combustible object.
- Keep the welder away from combustible materials in case of fire.



### **⚠ DANGER** EXPLOSION HAZARD !!!

- Do not install the welder in an environment containing explosive gas, or it may pose an explosion risk.

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### **⚠ DANGER**

- Replacing parts and components may cause danger
- Only professionals are allowed to replace the parts.
- Thread ends, screws, gaskets, metal bars, etc. must be prevented from dropping into the welder when the parts are being replaced.
- After replacement of the circuit board, the internal wire of the welder must be correctly connected to ensure safe operation.

## PRECAUTIONS FOR USE



### **⚠ DANGER** ELECTRIC SHOCK !!!

- Install the earthing device according to the application standard.
- Do not touch live parts with your exposed skin or wet gloves or wet clothes on.
- Make sure you are insulated from the ground and the workpiece.
- Never remove the cover plate before power-up, or it may cause electric shock.
- Make sure your workstation is in a safe state.



### **FUME/DUST — IT MAY BE HARMFUL TO HEALTH**

- Weld fume and dust are harmful to human bodies. Avoid inhalation into the respiratory tract.
- Keep your head away from the weld fume. Use ventilation or exhaust facilities in the breathing area and keep the air flowing in the working environment.



### **ARC RADIATION — IT MAY HURT YOUR EYES AND BURN YOUR SKIN**

- Wear a suitable welding mask and protective clothing to protect your eyes and body.
- Let the bystanders wear a suitable facial mask or use a suitable curtain to protect themselves.



### **MAGNETIC FIELD WILL AFFECT PACEMAKERS**

- The electric current from any conductor will produce electromagnetic fields. Welding operators with cardiac pacemakers should consult a doctor before welding.
- Keep away from power sources as far as possible to minimize the impact of electromagnetic fields.



### **IMPROPER USE AND OPERATION MAY CAUSE FIRE OR EXPLOSION**

- Welding sparks may lead to fire. Please check whether there is any flammable near the welding station and pay attention to fire safety.
- Ensure that a fire extinguisher is installed nearby and there is a person who has been trained on how to use the fire extinguisher.
- Do not weld sealed containers.
- Do not use the welder for thawing pipelines.



### **HOT WORKPIECES MAY RESULT IN SEVERE BURNS**

- Do not touch hot workpieces with bare hands.
- Cool down the welding torch for a while after continuous operation.



### **NOISE — EXCESSIVE NOISE IS HARMFUL TO HEARING**

- Wear an ear defender or put on other hearing protector to protect your ears.
- Warn bystanders of the potential damage of the noise to their hearing.



### **MOVING PARTS MAY CAUSE PERSONAL INJURY**

- Keep away from moving parts (i.e., fans).
- Tightly close and correctly install protective devices such as doors, panels, covers and baffles.



### **FAULT — SEEK PROFESSIONAL HELP WHEN IN TROUBLE**

- If you encounter difficulties during installation and operation, please read this Manual for troubleshooting.
- If you do not fully understand it or if you cannot solve the problem with this Manual, you are recommended to contact your supplier immediately and seek professional help.

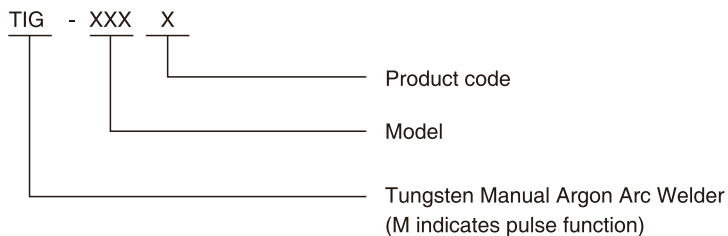
## **PRECAUTIONS FOR SCRAPPING**

### **When scrapping the welder, please note:**

- The electrolytic capacitor of the main circuit and on the printed board may explode when burned.
- Plastic parts such as front panel will release toxic gas when burned.
- Please treat it as industrial waste.

# CHAPTER I PRODUCT OVERVIEW

## 1.1 Model explanation



## 1.2 General technical parameters

Figure 1-1 Model Explanation

Item		TIG-315	TIG-400
Input	Input Power	AC380V10% 50Hz Three-phase AC380V10% 50Hz	
	Rated input capacity (KVA argon arc/manual)	7.1/10.7	8.5/12
	Power factor	0.8	
Output	No-load voltage (V)	66	
	Rated maximum output (A/V)	250/20	290/21.6
	Welding current range (A)	20-250	20-290
	Manual welding function	W/	W/
	Arcing way	Non-contact high frequency arc starting	
	Output characteristics	Constant current characteristics	
Structure	IP rating	IP21S	
	Cooling type	Forced air cooling	
Rated duty cycle (%)		60	
Efficiency (%)		80	
Insulation class (%)		F	

Table 1-1 Technical Parameters

### 1.3 Dimension and weight

Model	TIG-315	TIG-400
External dimensions (L×W×H)MM	405×215×390	470×235×435
Weight/KG	13.5	17.5

Table 1-2 Technical Parameters

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### 1.4 System composition and support

Factory configuration list: (There may be differences in the auxiliaries of each model)

- Welder\*1
- User's manual\*1
- Certificate of approval\*1
- Warranty card\*1
- Quick connector\*1
- Allen wrench\*1

### 1.5 Functions and features

WS(M) series is a mature and stable inverter welder produced with advanced inverter technology.

- Pulse series is a highly reliably soft-switching all-digital design with highly integrated circuit;
- Cutting-edge IGBT inverter technology, frequency up to 20-30 KHz, characterized by smaller volume, lighter weight, higher efficiency, higher energy conservation, and lower noise;
- Manual welding, DC TIG welding, and DC pulse TIG welding (WSM) functions;
- Accurate control of ramp-up and ramp-down currents and speeds;
- Good arc stiffness and high success rate of high frequency arc starting.

### 1.6 System characteristics

#### 1. Duty cycle

Duty cycle refers to the percentage of the ratio of the welder's normal working time in the rated maximum output current state to 10 minutes. The welder's duty cycle is 60%, and when exceeded, it will overheat the welder. Frequent use under excess load will accelerate aging or even damage the welder.

#### 2. Output characteristics

The static external characteristics of this welder series are constant current characteristics.

# CHAPTER II INSTALLATION AND WIRING

## 2.1 Installation requirements

**Environmental requirements: The following should be noted for choosing installation environ-**

Avoid installation in dusty, metallic powder-containing locations;

- It is strictly forbidden to install the product in the area with corrosive and explosive gases;
- Ambient temperature range: working: -10 to +40C; transport and storage: -25 to +55C;
- Do not place the welder on a table top with an inclination greater than 15 to carry out welding;
- Place it in a dry and ventilated area with humidity lower than 90% and protected from direct sunlight or rain;
- Keep the welding site from wind, and use a wind shield, etc. when necessary in case of affecting the welding procedure.

**Installation space requirements:**

- The welder is at least 20 cm away from the wall. If two welders are installed alongside, the spacing should be no shorter than 30 cm.

## 2.2 Electrical connection

**ATTENTION:**

- 1) Please have the connection performed by a qualified electrical operator.
- 2) Electrical connection must be performed with the switch of the distribution box disconnected to ensure safety.
- 3) Do not touch the live parts with wet objects.
- 4) Do not place heavy objects on the cable.

### 2.2.1 Connection of the welder output end:

- 1) Install the main cable connector of the torch on the negative quick socket under the front panel of the welder and tighten it clockwise;
- 2) Install the electrogas connector of the torch on the gas-electric connector under the front panel of the welder and tighten it with a wrench;
- 3) Installing the torch control line plug in the control socket under the front panel of the welder and tighten it;
- 4) Install the earth wire on the positive quick socket under the front panel of the welder, tighten it clockwise, and fix the other end on the workpiece;
- 5) To avoid interference with other equipment and to obtain the optimal running process, lead the cables directly to the workpiece while avoiding too long cable runs from coiling up.

Table 2-1 Recommended Torch Current

Welding current	Recommended Welding Torch
120A	QQ150 air cooled
200A	WP26 air cooled
200A< 350A	WP18 water cooled

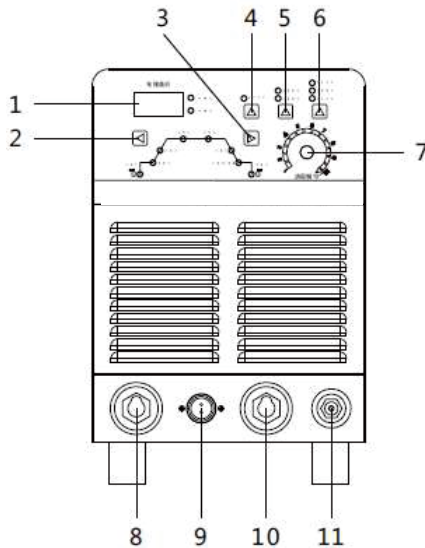
Table 2-2 Input Cable Cross-Sectional Area

Item	Input Cable Cross-Sectional Area	Air-break switch	Earthing cable
TIG-200D	2.5 mm <sup>2</sup>	40	16 mm <sup>2</sup>
TIG-250D	2.5 mm <sup>2</sup>	40	25 mm <sup>2</sup>
TIG-250	4 mm <sup>2</sup>	40	25 mm <sup>2</sup>
TIG-315	2.5 mm <sup>2</sup>	40	25 mm <sup>2</sup>
TIG-400/TIG-315	4 mm <sup>2</sup>	63	35 mm <sup>2</sup>
TIG-400	6 mm <sup>2</sup>	63	50 mm <sup>2</sup>
TIG-500/630	6 mm <sup>2</sup>	63	50 mm <sup>2</sup>

## CHAPTER III OPERATING INSTRUCTIONS

### 3.1 Panel function

1) TIG front panel (taking TIG-315 for example), as shown in Figure 3-1





S/N	Part Name	Part Function
1	Digital meter	Displaying preset current value
2	Function selection button, left	Selecting the function button in a circular and leftward manner
3	Function selection button, right	Selecting the function button in a circular and rightward manner
4	Gas purge button	Checking whether the gas line is normal
5	Manual welding/argon arc welding	Switching the manual/argon arc welding state in turn
6	Spot welding/non-self-locking/self-locking	Selecting spot welding/non-self-locking(2T)/self-locking (4T) in turn
7	Parameter control	Adjusting various function parameters
8	Positive output terminal	Connecting the workpiece for argon arc welding and the electrode holder for manual welding
9	Control switch line socket	Connecting the torch's control switch plug
10	Negative output terminal	Connecting the main cable of the torch (or the workpiece during manual welding)
11	Electrogas connector	Connecting the torch inlet connector

Figure 3-1

2) TIG rear panel (taking TIG-315 for example), as shown in Figure 3-2

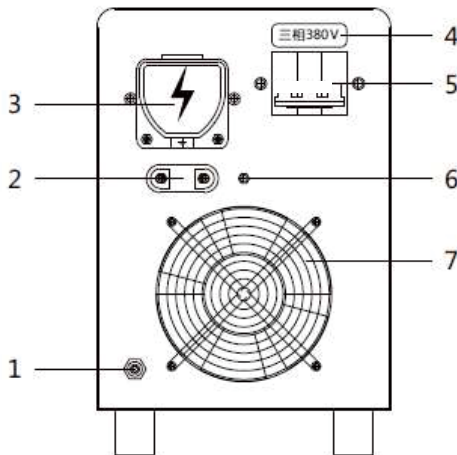


Figure 3-2

S/N	Part Name	Part Function
1	Gas inlet	Connecting the gas cylinder outlet
2	Crimp terminal	Tightly pressing the input cable
3	Power input box	Connecting the input cable
4	Input bar adhesive sticker	Marking the input voltage range
5	Power switch	Controlling input cable ON/OFF
6	Earth stud	Connecting power cord earth wire
7	Radiator fan	Forced air cooling

Figure 3-2

3) TIG front panel (taking TIG-400 as an example), as shown in Figure 3-3

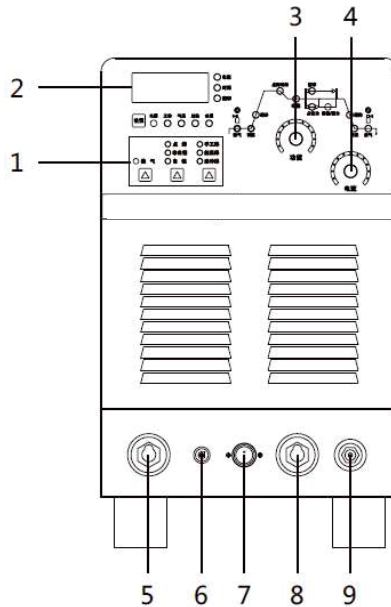


Figure 3-3

S/N	Part Name	Part Function
1	Function button area	Various indicator lamps and function buttons
2	Digital meter	Displaying various parameters
3	Encoder	Adjusting corresponding setting status and selection items
4	Current adjustment knob	Adjusting output current magnitude
5	Positive output terminal	Connecting the workpiece for argon arc welding and the electrode holder for manual welding
6	Water outlet connector	Connecting the water-cooled torch inlet pipe
7	Control switch line socket	Connecting the torch's control switch plug
8	Negative output terminal	Connecting the main cable of the torch (or the workpiece during manual welding)
9	Electrogas connector	Connecting the torch inlet connector

Figure 3-3

4) TIG rear panel (taking TIG-400 as an example), as shown in Figure 3-4

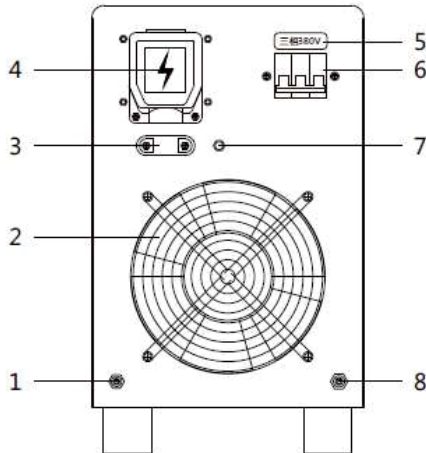


Figure 3-4

S/N	Part Name	Part Function
1	Gas inlet	Connecting the gas cylinder outlet
2	Radiator fan	Forced air cooling
3	Crimp terminal	Tightly pressing the input cable
4	Power input box	Connecting the input cable
5	Input bar adhesive sticker	Marking the input voltage range
6	Power switch	Controlling input cable ON/OFF
7	Earth stud	Connecting power cord earth wire
8	Water inlet	Connecting water tank outlet connector

Figure 3-4

5) For the panel parameter setting of other model, please refer to TIG-400.



Function	Unit of Adjustment	Range of Adjustment	Default
Gas pre-flow time	0.01	0.01-5 0.01s to 5s	0.5、0.5 s
Arc initiation current	1	20A-40A	20A
Ramp up time	0.01	0.01-10 0.01 to 10s	0.5、0.5 s
Welding current	1	20-400A 0.1-1000HZ	100A
Pulse frequency	0.1Hz	1-90%	1Hz
Duty ratio	1	20A-400A	30%
Basic value time	1	0.01-10	20A
Ramp down time	0.01	0.01 to 10s	0.5、0.5 s
Crater filler current	1	20-100A	40A
Gas post-flow time	0.01	0.01-60 0.01 to 60s	2、2 s

Figure 3-5

Parameter Item	Part Function
Area A	A1: Gas purge button, in an ON/OFF mode, pressed to enter the manual gas purge state, then released to stop.
	A2: Welding mode selection button, pressed to select spot welding, non-self-locking or self-locking mode in turn, effective for argon arc welding.
	A3: Welding type selection button, pressed to select "manual welding", "constant current argon arc welding", or "pulse argon arc welding" in turn.
Area B	B1: Setting button, designed specially for panel setting. Press for 5 s or above to enter the set state; after setting, press the setting button again to save the setting data. Behind it is a function button indicator lamp that indicates the current working state when turned on.
	B2: Digital meter, displaying parameters in a digitized way, i.e., current, time, and frequency; behind it is a display unit indicator lamp, corresponding to the unit displays for the parameters of various settings or in working as shown on the digital meter. Unit means that the indicator lamp is turned on.
Area C	C1: Gas pre-flow indicator lamp, applied to set the pre-flow time
	C2: Arc striking indicator lamp, applied to set the magnitude of arc initiation current
	C3: Ramp-up indicator lamp, used to set the rise time from the arc initiation current to the welding current
	C4: Spot welding time indicator lamp, used to set the spot welding duration
	C5: Current indicator lamp, used to set the preset current and actual current and indicate the peak current during pulse welding
	C6: Duty cycle indicator lamp, applied to set peak current duty cycle
	C7: Frequency indicator lamp, applied to set pulse current frequency
	C8: Basic value/thrust current indicator lamp, applied to set the magnitude of basic value current for pulse welding and the magnitude of thrust current for manual welding
	C9: Arc initiation indicator lamp, applied to set the magnitude of arc initiation current
	C10: Ramp down indicator lamp
	C11: Gas post-flow indicator lamp, applied to set the post-flow time
Area D	D1: Function encoder, applied to regulate function selection items at the set state
	D1: Current encoder, applied to regulate function item parameters at the set state and preset state

Figure 3-6

<b>Fault Code</b>	<b>Fault Cause</b>
E01	Lack of air protection, insufficient air pressure or air pressure switch not closed
E02	Lack of water protection, insufficient water pressure or water pressure switch not closed
E03	Overheat protection, temperature too hot or the temperature switch disconnected

Figure 3-7

### 3.2 Welding preparations

#### 3.4.1 Safety appliances:

- To prevent gas poisoning and asphyxiation, dust poisoning and other hazard, please use exhaust equipment or respiratory protective gears as required.
- When welding or supervising welding, please wear safety goggles or protective gears with sufficient light shade.
- To protect your eyes from spatter and welding slag, please wear protective spectacles.
- Please wear protective gears such as leather gloves, long-sleeved clothes, foot protectors, and aprons.
- Set up a protective barrier around the welding place to prevent the arc light from injuring others.
- When the noise is loud, please use sound insulation apparatuses.
- Please use ventilators to change the air and take wind protection measures to prevent wind from directly blowing the electric arc to affect the welding effect.

For the use and selection of filter lens, please refer to Table 3-8.

<b>Light Filter No.</b>	<b>Electric Arc Welding &amp; Cutting Operations</b>
1.2, 1.4, 1.7	Anti-side light and anti-stray light
3, 4	Ancillary work
5, 6	Electric arc operation below 30A
7, 8	Electric arc operation at 30-75A
9, 10, 11	Electric arc operation at 5-200A
12, 13	Electric arc operation at 200-400A
14	Electric arc operation above 400A

Figure 3-8

### 3.4.2 Check cable connection:

- When fixing the welder place the welder on a dry, flat and ventilated workstation.
- Check whether the earth cable, input power cable, welding cable, and workpiece side cable are properly connected.

### 3.3 Do's and don'ts

The welder has been installed with protective circuits for overvoltage, overcurrent and overheating. When the grid voltage, output current and in-welder temperature exceed the given standard, the welder will stop automatically. Nevertheless, excessive use (such as excessive voltage) may cause damages to the welder, so the following things need to be noted:

#### Ensure good ventilation

When the welder is running, there is a large working current passing through, and natural ventilation cannot meet the cooling requirements of the welder. Hence, a fan is installed inside the welder to cool the welder and ensure smooth and stable operation. Users need to check whether the ventilated place is covered or blocked and make sure that the distance between the welder and surrounding objects is less than 30 cm.

#### Prohibit excessive voltage

In general, the automatic voltage compensation circuit inside the welder will ensure that the welding current is kept within the allowable range. If the supply voltage exceeds the allowable value, it will damage the welder. Users should be fully aware of it and take appropriate precautionary measures.

#### Prohibit overload

The allowable duty cycle should be noted when using the welder and the welding current should not exceed the maximum allowable load current. Current overload will shorten the life of the welder to a great degree or even burn it out.

If the standard duty cycle is exceeded, the welder may suddenly enter the protection state and stop working. In other words, overheating triggers the thermo switch to stop the welder and the indicator lamp on the front panel turns on at the same time. In this case, keep the air-break switch on and let the fan cool down the welder. Resume welding after the indicator lamp goes out and the temperature drops to the standard range.

### 3.4 Operations after welding

#### Turn off power supply

- To allow the welder to cool internally, please disconnect the power supply at least 3-5 minutes later after welding.
- First close the air-break switch of the welder, then turn off the power of the distribution box.

## CHAPTER IV MAINTENANCE

### 4.1 Routine maintenance

#### ATTENTION

**Routine inspection must be carried out after switching off the power supply of the distribution box and the welder (except for visual inspection that does not require contact with the conductor) to avoid personal injury like electric shock and burn.**

**Notice for Use:**

- 1) Routine inspection is vital for the high use performance and safe operation of the welder.
- 2) Carry out routine inspection according to items listed in the table below, and cleaning or replacement when necessary.
- 3) When changing parts, please use the parts recommended by our company in order to maintain a high performance.

Item	Inspection Requirements	Remarks
Front panel	Check whether the parts are damaged or loosened; Check whether the quick output socket is tight; Observe whether the indicator lamp is on.	The quick socket terminal on the front panel is the item of regular inspection. In case of nonconformity, the interior of the welder shall be checked, the fastener replenished, or the part and component replaced.
Rear panel	Check whether the input power cord and the buckle are intact and whether the air inlet is smooth and free of foreign matters.	
Upper cover	Check whether the bolt is loose.	In case of nonconformity, the fastener shall be replenished or the part and component replaced.
Base plate	Check whether the screw on the base plate is loose.	
Routine inspection	Check whether there is color fading or overheating; Check whether the sound of the fan is normal when the welder is working; Check whether there is odor, abnormal vibration and noise when the welding is working.	If abnormality occurs, check the inside of the welder.

Table 4-1 Routine Inspection Contents of the Welder

Item	Inspection Requirements	Remarks
Earth cable	Check whether the earth cable falls off, including the working earth wire and the welder earth wire.	In case of nonconformity, the fastener or part shall be replenished or changed.
(Welding) torch cable	Check whether the insulation layer of the torch cable is worn or damaged or whether the live parts are exposed; Check whether the cable is stretched by abnormal external force; Check whether the workpiece cable is firmly connected with the workpiece.	To ensure safe and normal welding, proper methods should be adopted for comparative inspection according to the worksite conditions.

Table 4-2 Routine Inspection Contents of Cables



## 4.2 Regular inspection

### ATTENTION

To ensure safety, only professionals are allowed to perform regular inspections. The power supply of the distribution box and the welder must be turned off before regular inspection to avoid electric shock, burns and other personal injury. As the capacitor discharges electricity, it is necessary to cut off the power supply of the welder and wait for 5 minutes before inspection.



#### CAUTION

- All servicing work must be done with the power completely disconnected. Make sure the power plug is removed before opening the housing.
- When the welder is energized, keep your hands, hairs and tools away from the live parts (e.g., fan) inside the welder to avoid personal injury or welder breakdown.



#### REGULAR INSPECTION

- Regularly check whether the circuit connection inside the welder is correct and the connector is firm (especially the insert connector or component). If rust or looseness is found, use sand paper to grind off the rust layer or oxidation film before reconnection and tightening. Regularly check all cable insulated leathers for breakage; if broken, bind up or replace the cable.



#### BEWARE OF STATIC ELECTRICITY

- To protect semiconductor components and circuit boards from electrostatic damage, wear anti-static devices and remove the static electricity in advance by touching the
- metal parts of the housing before touching the wiring conductor and circuit board inside the welder.



#### KEEP DRY

- Avoid water or vapor entering the welder, and dry it if damped. Later, measure the insulation of the welder with an ohmmeter (between the connection nodes and between the connection point and the housing). Be aware that continuous welding is performed only when no abnormality is found.
- If the welder is idle for a long time, put it in the original packaging case and store in a dry environment.



#### PAY ATTENTION TO MAINTENANCE

- To extend its life, the welder must be checked at fixed periods. Regularly inspection should be meticulous and include the inspection and cleaning of the welder inside.
- Regular inspection is usually carried out once every 6 months, but if the welding site is full of dust or oily fume, it is shortened to once every 3 months.



#### BEWARE OF CORROSION

- Please use neutral detergent when cleaning plastic parts.

## CHAPTER V TROUBLESHOOTING

### 5.1 Welder failure and problems in welding procedure

Fault	Troubleshooting
The fan and panel refuse to work when the powered on.	a. Check whether the power switch is closed. b. Check whether the input cable is electrified. c. Check whether there is phase loss in power supply. d. Check whether the air-break switch is damaged.
The fan does not work and the digital meter does not display parameters.	a. Check whether the power cord of the fan is disconnected. b. Check whether there is phase loss in power supply. c. Check whether the fan is damaged.
The digital meter does not work.	a. Check whether the internal power terminal is firmly connected. b. Check whether there is phase loss in power supply. c. Check whether the internal control power input is normal. d. Check whether the welder is idling. If the voltage is normal at no load, change the digital meter and check again.
The fan, power indicator lamp and digital meter are working, but there is no welding output.	a. Open circuit or poor contact at the output end connection. b. Open circuit or poor contact at the output end connection. c. The overheating protection light is on or shows E03 overheating code. It means that the welder has entered the protection state due to overheating. In this case, it is needless to cut off the welder power supply to make the fan cool the welder; when the indicator lamp goes out, it can work again. Check whether the thermo switch is damaged. If not, it should be in a normally closed state. Check whether the main control board is damaged. d. Check whether the bridge rectifier module, IGBT module, secondary rectifier diode, etc. are damaged.
Difficulty in arc starting	a. The workpiece surface is not clean. b. The tungsten electrode quality is low or the tungsten electrode is too blunt.
No argon	a. The gas valve is damaged. b. The main control board is damaged. c. The welding torch is damaged.

Table 5-1 WSM Series Failure and Problems in Welding Procedure

**If you encounter a fault that cannot be eliminated, please notify our local agent of the specific phenomenon during use for maintenance treatment.**

### 5.2 After-sales service

**Warranty card:** Please read the warranty card carefully, fill it out, and keep it properly.

**Maintenance:** Please refer to Table 5-1 for welder failure and problems in welding technology, or contact your local dealer.

We guarantee the welder for a year. The warranty period is subject to the purchase time recorded on the warranty card or purchase invoice. If the damage is caused by improper use, it is beyond the warranty scope but can be handled in the same way as maintenance.