# *USER′S MANUAL*

## MODEL：AC.DC TIG-200/AC.DC TIG-250/AC.DC TIG-315 INVERTER SERIES

**Read first please!**

Thank you !

In order to protect you and others, please read this manual and understand it completely before operate.

## Safety warning

! • Assure that the protection measurements has been done before welding and cutting, because you and others might be hurt. Refer to operator security protection manual according with the accident precautionary demand of manufacturer's for details.

### Electric shock—May cause death!!

- The ground connection device is mounted according to the standards of operation.
- Contacting the live parts and welding electric rod with bare skin, wet gloves or clothes are forbidden.
- The ground, workpieces and you should be in insulation state.
- Make sure that your operating position is in safe.

### Fume—May do harm to health!

- Keep head out of the fume.
- Avoid inhaling fume with devices of ventilation or extraction.

### Arc radiation—May hurt eyes or scorch skin!

- Protect your eyes and body with protective clothing, welding protective mask and glass filter.
- Avoid doing harm to lookers-on by using appropriate mask or curtain.

### Fire hazard

- Make sure there is no tinder near operating position, because the welding sparks may cause fire.

### Hot metal—May scorch skin or burn out clothes.

- Don't touch the weld to avoid heat injury when welding is finished.
- Don't tread or touch the welded spots to avoid burn out shoes and clothes.

### Noise—Excessive noise does harm to ears!

- Protect your ears by using ear shield or the other protective.
- Warn lookers-on that noise does harm to their ears.

### Malfunction—Seek professionals for help when encounter difficulties!

- Refer to the manual when facing problems of installation and operation.
- You should contact your suppliers or service center of our company and seek for the professionals' help if you couldn't solve the problems after reading the manual.

! **Warning!**

Electricity Leakage protection switch must be mounted when using! ! !

## About this machine

A rectifier designed with advanced inverter technology is equipped in this welding machine.

Thanks to the emergence of theory of inverter power source and the parts, inverter arc welding machine appears.

The power source of inverter arc welding machine is produced: first the working current of 50/60HZ is commutated into direct current and inverted into high frequency (e.g. above 100KHZ); then its voltage is reduced and the current is commutated again; last it exports direct current power source of high-power with pulse-width modulation technique (PWM). The weight and volume of main transformer decrease greatly and its efficiency increases above 30%. The inverter welding machine is appraised as a revolution in welding industry by experts.

The AC.DC series welding machine is a new AC-DC welding machine designed by company. Its main characteristic is that it can not only be used for welding stainless steel, alloy steel, carbon steel, carbon and other non-ferrous metal with direct current, but also for welding aluminum product (e.g. scooter and bicycle etc.). The main models of our welding machine includes: AC.DC-200, AC.DC-250, AC.DC-315.

The high-frequency inverting technology which are owned by our company are adopted to the welding machine. Compared with traditional welding machine, this machine has the following advantages: smaller volume, lighter, higher conversion rate and more energy saving. Compared with imported welding machine, it also has the following advantages: lower price, high applicability for power system. The most advantage of this machine is that it adopts double inverting technology and generates a clear square-wave. Its output can lead a stronger arc and centralize heat. And it has better inverted clearing capability, wide clearing range and un-easy broken arc with small current. So such welding machine can operate with a good welding performance.

The AC.DC series welding machine is also equipped with a foot switch which is used for controlling current. You can operate the machine with foot and do other operation with hands. With such characteristic, the current can be increased when feeding wires, or at the beginning of welding operation to heat quickly and decreased for getting a better welding form. The application of footstep can improve welding efficiency and reduce welding difficulty. Also the welding quality can be controlled. Please purchase the foot impulse device manufactured by our company if you want to take an impulse welding operation.

Welcome friends of all circles to use these products and give precious advice. We will try our best to offer the best products and services.

## ! Warning!

This machine is mainly used in industry. The users should do enough preparations for avoiding radio disturbance in indoor environment.

## Main performance parameters table:

| Model / Parameters | AC.DC TIG-200 | AC.DC TIG-250 | AC.DC TIG-315 |
|---|---|---|---|
| Power voltage | Single-phase AC110V/220 ±15% | Three-phase AC380±15% | |
| Power frequency（HZ） | 50/60 | 50/60 | 50/60 |
| Rated input current (A) | 20.7 | 9.6 | 13.9 |
| Output current adjustment (A) | 20-200 | 20-250 | 20-315 |
| No-load voltage (V) | 56 | 45 | 45 |
| Rated operating voltage (V) | 18 | 20 | 23 |
| Pre-flow (S) | 0-2 | 0-2 | 0-2 |
| Duty ratio (%) | 20-80 | 20-80 | 20-80 |
| Down-slope time (S) | 0-5 | 0-5 | 0-5 |
| Post gas (S) | 2-10 | 2-10 | 2-10 |
| Remote control | Non-available | Available | Available |
| Arc initiation | High frequency | High frequency | High frequency |
| Efficiency (%) | 85 | 85 | 85 |
| Duty cycle (%) | 60 | 60 | 60 |
| Power factor | 0.93 | 0.93 | 0.93 |
| Insulation grade | B | B | B |
| Shell protection grade | IP21 | IP21 | IP21 |
| Weight (kg) | 20 | 20 | 20 |
| Outline dimension (mm) | 710x400x660 | 710x400x660 | 710x400x660 |
| Maximum welding thickness | 27 | 27 | 27 |

Parameter table for impulse foot switch:

| | Parameters |
|---|---|
| Frequency (Hz) | 0.5-10 |
| Duty ratio (%) | 20-80 |
| Valley valve (%) | 10-90 |

## Function and description of control panel.

1. Transfer switch:

1) AC/DC transfer switch: The welding machine can be used for AC argon arc welding (for aluminum material) when locate the transfer switch at “AC” position. The “DC” position is used for DC argon arc welding(for stainless steel, iron and copper etc.).

2) Hand/foot transfer switch: The current is adjusted by button on the control panel when locate the transfer switch at “ OFF” position. The current is adjusted by foot step switch when it locates at “ ON” position.

2. Adjusting button:

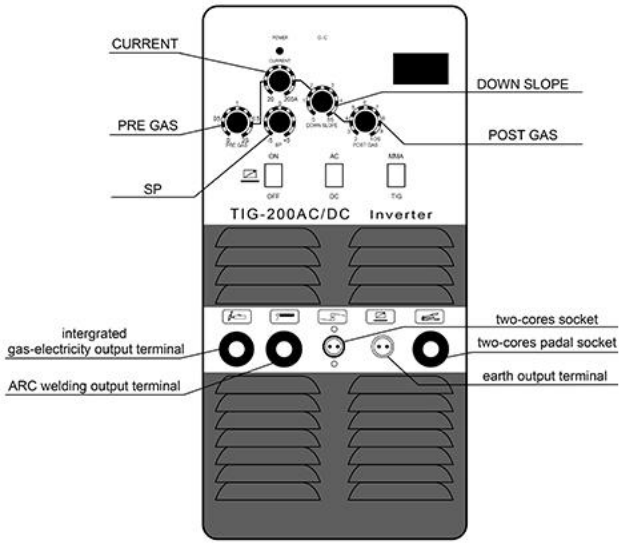
1) Pre-flow time adjustment knob: It is used to guarantee welding quality. The argon gas should arrive at the welding position before turning on the current when take a welding operation. The button is used for adjusting the arriving time difference between argon gas and arc.

2) Current adjustment knob: The knob is used for current adjusting. The knob is available only when the hand/foot transfer switch locates at “OFF” position.

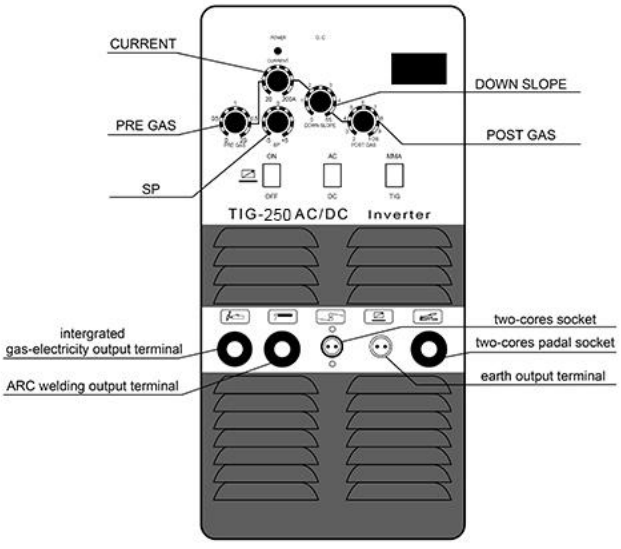
3) Duty ratio adjustment knob: The current will invert in positive and negative direction circularly when take a argon arc welding operation. It is positive current time when current flows from tungsten needle to workpiece, and it is suitable for welding because the tungsten needle has a lower heat quantity and the heat is centralized at one point. It is negative current time when current flows from workpiece to tungsten and the oxidized surface can be removed at that time. In such condition, we can get a better welding quality but the tungsten needle is easy to be burnt from serious heating. The knob can adjust positive and negative current time ratio. The positive and negative time is 50% each when it locates at “0” position. And the positive current time becomes longer and negative current time becomes shorter when it locates at “+5” position. Turn the knob in anticlockwise direction and you will get a contrary result.

**Note: Smaller duty ratio should be used when the current is bigger. For example: select a duty ration below 30% for current above 200A. Bigger duty ratio should be used when the current is smaller. For example: select a duty ratio above 50% for current below 100A.**

**AC.DC TIG-200 control panel**




**AC.DC-250, AC.DC TIG-315 Control panel**

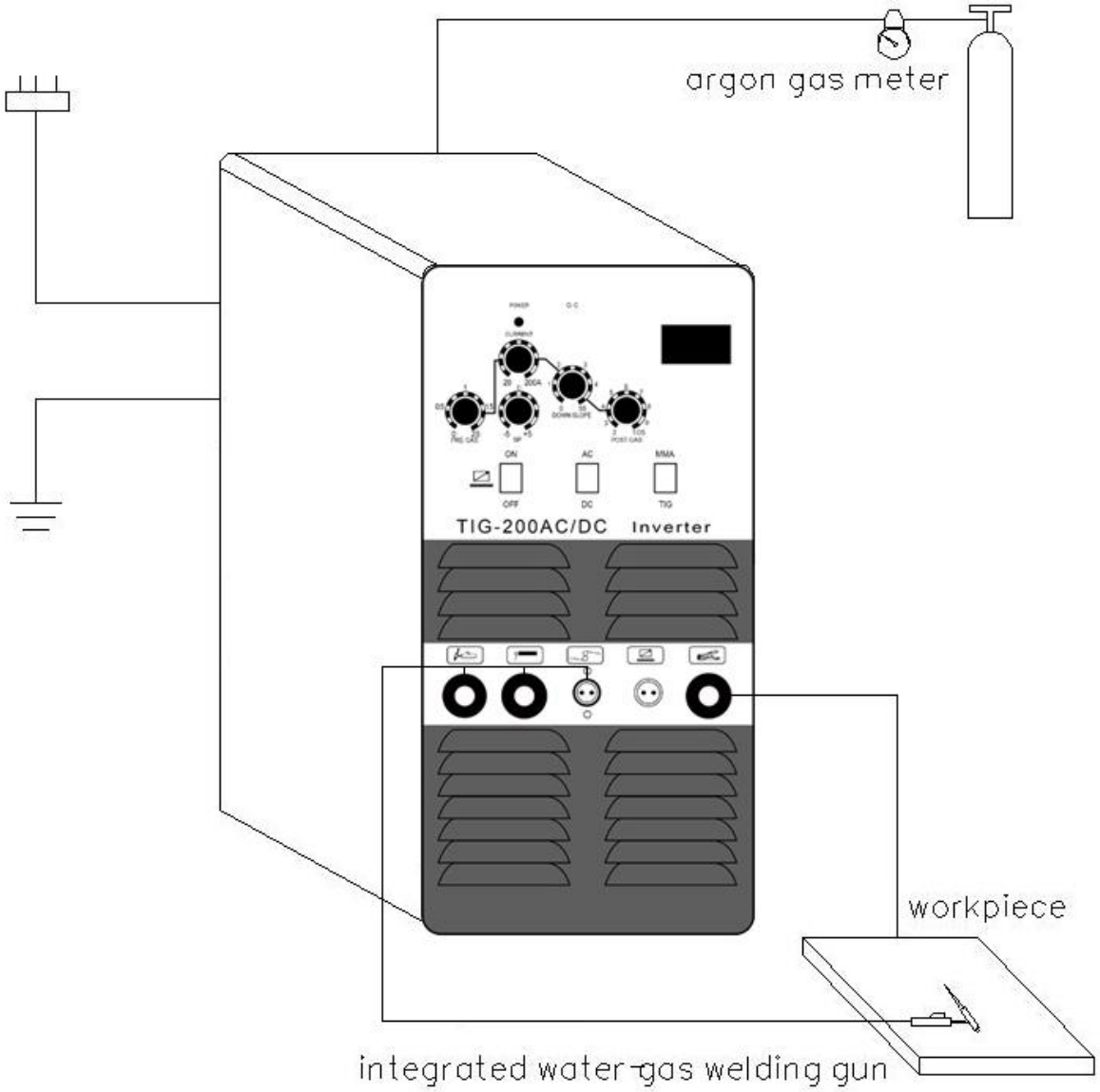


# Installation

6. When control the welding machine with foot switch, the two-cores and three-cores plugs of foot switch should be connected with the two-cores and three-cores sockets on the control panel of the welding machine.
7. Connect the power cord with voltage-matched distribution chamber according to the input voltage grade of welding machine. The connected voltage must be correct. The power voltage should varies in a permitted range at the same time.

The welding machine can be operated after finishing the above installation operations.

**Sketch map for installation of AC.DC TIG-200 model**




# Installation

## Application of AC argon arc welding

1. Locate the “AC/DC transfer switch” at “AC” position.
2. Turn on the power switch and the fan inside the machine start rotating.

3. Turn on the argon gas switch and adjust gas flow to rated value( see flow meter).

4. Adjust the ratio of positive and negative current time according to oxidized condition of welded workpiece.

5. The solenoid valve is active after pressing the switch on welding torch and a sound generated by high-frequency spark discharging in the welding machine will be heard. And the argon gas will flow from welding torch nozzle at the same time. Note: for the first time of welding operation, the switch should be pressed for several seconds before welding to exhaust all air in the gas pipeline. Argon gas will still flow out for seconds after stopping welding operation. And it is a special design to protect welding point before it is cooled. So the welding gun should be removed only after it is kept at the welding position for a period of time when the electric arc is closed.

6. Set the hand/foot switch according to actual requirement.

   1） The current is controlled by knob on the control panel when the transfer switch locates at “OFF” position.

   2） The current is controlled by foot switch when the transfer switch locates at “ON” position and the knob on control panel is unavailable. The stepping force has a direct ratio compared with welding current, and more force is applied on the switch, and bigger current is gotten.

7. Adjust pre-flow, post-flow and decay time according to actual requirement.

8. 2-4 mm distance should be kept between tungsten electrode and welded workpiece. High frequency discharge will be generated between the welding gun electrode and workpiece. The arc starting spark in welding machine disappears immediately after igniting arc starting. The welding machine can operate normally at that time.

## Application of DC argon arc welding:

1. Locate the “AC/DC transfer switch” at “DC” position.
2. Turn on the power switch and the fan inside the machine start rotating.
3. Turn on the argon gas switch and adjust gas flow to rated value( see flow meter ).
4. Same operations as items 5.6.7.8 in the application of AC argon arc welding.

**Warning!**

Strictly prohibit inserting and pushing the cable or plugs in the course of welding because the operations may hurt the operator and damage machine.

## Maintenance

**Warning!**

All the maintenance and examination must be carried on after cutting off the power. Please make sure that the power plug is pulled out before opening the casing.

1. Dust should be blown away with dry and clean compressed air termly; The welding machine should be cleaned every day if it is operated under the circumstance of polluted air.
2. Pressure of the compressed air should be appropriate so as to protect the small components inside the welding machine.
3. Examine circuits in the welding machine regularly and make sure they are connected correctly and firmly (especially the plugs and components). If they are rusty or loose, abrasive paper can be used to remove the rust or oxide film, and they should be reconnected and fixed.
4. Water or vapor are prevented from entering the welding machine, which should be dry if the state above occurs, and insulation state should be checked with megohmmeter (insulation status of connected nodes, as well as connected nodes and casing). The welding machine can work continually only when everything is normal.
5. If the welding machine will not be used for a long time, it should be put back into the original packing case and stored in dry circumstance.

## Before inspection

**Warning!**

**Blindfold experience and incautious inspection may cause troubles for the formal inspection. When the machine is on position, and the voltage of bare parts in the machine is dangerous. Any direct or indirect contact may bring about shock hazard, even death!!!**

**Note:** During warranty period, maintenance free guarantee provided by supplier will out of service if the user inspects and repairs the welding cut power without our permit.

## Notice and Preventive Measures

### 1. Environment

1) The welding operation requires a relative dry environment and air humidity should not be beyond 90%.

2) The surrounding temperature should be kept in a range from -10℃ to 40℃.

3) The water or rainwater is prohibited from permeating into the welding machine, and the welding operation shouldn’t be done in the sun or rain.

4) The welding operation shouldn't be done in the dust or environment containing corrosive gas.

5) The welding operation shouldn't be done in the environment of strong airflow.

### 2. Safety keys

The welding machines can automatically stop work when the setting standards, like the electric network voltage, the output current and built-in temperature are exceeded because of the protection circuits of over-voltage, over-current and over-heat. But the welding machine can be also damaged when it is over-uses( e.g. over voltage), therefore the following matters should be noticed:

1) Assure good ventilation!

   The welding machine is small welding machine. The natural ventilation can't satisfy the machine's cooling demands once a larger current passes through it when it works. Therefore a fan is mounted inside the machine for cooling the machine and making it run stably. The user should ensure the ventilated place isn't covered and stemmed. The distance between welding machine and the surrounding objects is at least 0.3m. The good ventilation very important for the machine to work better and use longer.

2) Over-load is prohibited!

   The users should remember to observe the maximum permission load current (should be corresponding with selected load endurance ratio) and keep it not exceeding the maximum permission load current.

   Over-current would shorten the machine's life and even burn-out the machine.

3) Over-voltage is prohibited!

   The power voltage is listed in the table of "main performance parameters". The welding current keeps in the allowable range because of the machine's voltage autocompensation circuit in common case. The users ought to know the welding machine may be damaged if the power voltage exceeds allowable value and take corresponding precautionary measures.

4) The back of every welding machine is attached a grounding screw marking a sign of grounding. A cable with section of at least 6mm$^2$ is used for grounding to release static electricity and prevents the accidents caused by electricity leakage.

5) The welding machine should suddenly enter protection state and stop working if the load endurance ratio is exceeded. This indicates standard load endurance ratio is already exceeded and over heat triggers temperature controlling switch. Therefore the machine stops working and the yellow indicator lamp lights at the same time. The power plug needn't be pulled out cause the cooling fan can continuously runs and cools the welding machine. The welding process can be continued when the red indicator lamp extinguishes and the temperature falls into the standard range.

## Possible problems in welding:

The status listed below may be related with fitting parts, gas, environment and power supply. Please try to improve the condition and avoid the following circumstances appears.

### A. Welded dots become black:

It shows that the welded dots are not protected effectively and oxidized. You can check:

1. Make sure the valve of the argon gas bottle is open and have enough pressure which is generally not lower than 0.5MPa, or else, the bottle should be refilled.

2. Make sure that the flow of argon gas is enough. You can choose different flow in terms of various welding current, but too little flow may lead to protected gas's stiffness is inadequate and can't cover all the welded dots. We propose that the flow of argon gas can't be smaller than 3l/min no matter how small the current is.

3. The simplest way to check whether there is gas being sent out is putting your hand near the nozzle to check

whether the gas circuit of the welding torch is blocked.

4.Unsealed gas circuit or gas with low purity may affect the quality of welding.

5. Strong airflow may degrade the welding quality.

### B. Arc is hard to start and easy to break:

1. Make sure the tungsten electrode is of good quality. Tungsten electrode of poor quality may lead low ability of discharge.
2. Tungsten electrode which is not sharp may make arc hard to start and unsteady.

### C. Output currant is lower than rated value:

Deviant Supplied voltage will lead the mismatch of the output current and setting value. When supplied voltage is lower than the rated value, the maximum output current may be lower than rated value.

### D. Unsteady current during the operating:

It may be related with factors below:

1. Voltage change of electric network;
2. Severely interference of electric network or other electrical equipment.

### E .Serious burned tungsten electrode:

The tungsten electrode has a long electron emission time because the duty ratio is bigger and the electrode is over heated.

### F. Oxidized film on aluminum workpiece surface can not be exposed when welding:

1. Wrong position selection.
2. Insufficient duty ratio adjustment.
3. Double-times invert MOSFET is damaged.

## Troubleshooting

### AC.DC TIG-200

| Failure phenomenon | Measures |
|---|---|
| Power indicator does not light, and fan does not rotate, but no welding output. | 1. The power switch is damaged .<br>2. Check the power network connected with input cable and assure it is available.<br>3. Check input cable and find out any short circuit. |
| Power indicator lights, but fan does not rotate or stops after several rotations, and no welding output. | 1. The welding machine may wrongly connected with 380V power supply, so over-voltage protection circuit is active. Connect the machine to 220V power supply and restart.<br>2. Unstable 220V power supply(thin and long input cable) or the input cable drops on power network and over-voltage protection circuit is active. Increase the diameter of input cable or fasten the connecting point of input cable. Turn off the welding machine and restart it after 2-3 minutes.<br>3. Continuously turn on and off the power switch in a very short time and over-voltage protection circuit is active. Turn off the welding machine and restart it after 2-3 minutes.<br>4. The cable between switch and power board is loose, pls re-tight it.<br>5. 24V relay on the main circuit of power board is inactive or damaged. Check the 24V power supply and relay. |
| Fan rotates and abnormal indicator does not light, and no “susurrus” sound generated by high frequency discharge, and no arc starting for “rubbing arc welding” | 1. Check the voltage between the VH-07 inserter on MOS board and power board with multimeter and the value should be around DC308V.<br>2. There is a green indicator used on auxiliary power supply of MOS board, if it does not light, that mean the auxiliary power supply is inactive. Pls find out where the failure locates or contact with dealer.<br>3. Check connecting wires in the machine and find out any bad connection. |

| | |
|---|---|
| | 4. If you are failure in control circuit, pls find out the root cause or contact with dealer.<br>5. The control wire on welding gun is broken. |
| Abnormal indicator does not light, and "susurrus" sound generated by high frequency discharge is heard, but no welding output. | 1. The welding gun cable is broken.<br>2. The grounding wire is broken or it is connected with welded workpiece.<br>3. The anode output terminal or gas-electricity output terminal of welding gun is loosing from the connecting position inside the machine. |
| Abnormal indicator does not light, and no "susurrus" sound generated by high frequency discharge, and no welding output. | 1. There is bad connection between the primary wire of arc starting transformer and power supply board, re-tight it.<br>2. The discharging electrode is oxidized or the distance is longer, pls remove oxidized film or adjust the distance to 1mm.<br>3. Individual component of high frequency arc starting circuit is damaged, find it and replace it. |
| Abnormal indicator lights, and no output. | 1. It may caused by over-current protection, pls turn off the machine and restart it after the indicator extinguishes, the machine will operate normally.<br>2. It may caused by over-heat protection, do not turn off the machine, and wait around 2-3 minutes, and the machine will operate normally.<br>3. It may caused by inverter circuit failure. Unplug the power terminal of master transformer on the MOS board(near the VH-07 inserter), and restart the machine.<br>1) if the abnormal indicator remains lighting, turn off the machine and unplug the power terminal of high frequency arc starting power supply (near the VH-07 inserter),and then restart the machine.<br>a. Individual MOFSET on MOS board is damaged if the abnormal indicator remains lighting.<br>b. The voltage increasing transformer of high frequency arc starting circuit in power supply board is damaged if the abnormal indicator does not light.<br>2) If the abnormal indicator does not light:<br>a. The transformer on middle board may be damaged, pls check the primary inductance and Q value with bridge circuit.<br>b. The double-times rectifier of transfer may be broken through individually, pls find it and replace it with a same model one.<br>4. It may caused by short circuit in the feedback circuit. |
| Oxidized film on aluminum workpiece surface can not be exposed when welding. | 1. Wrong position selection.<br>2. Insufficient duty ratio adjustment.<br>3. Double-times invert MOSFET is damaged. |
| Serious burned tungsten electrode. | The duty ratio is out of specification, pls reduce it. |

# Troubleshooting

## AC.DC TIG-250, AC.DC TIG-315

| Failure phenomenon | Measures |
|---|---|
| Power indicator does not light, and fan does not rotate, and no welding output. | 1. The air switch should be good or closed.<br>2. Check the power network connected with input cable and assure it is available.<br>3. Thermal resistor(4 pieces) on the power supply board may be damaged (usually caused by inactive DC24V relay or bad contact).<br>4. This is malfunction on power board or base board without any output of DC537 voltage.<br>5. The auxiliary power supply of control panel fails. |
| Fan rotates, but abnormal indicator does not light, and no "susurrus" sound generated by high frequency discharge, and no arc starting for "rubbing arc welding". | 1. Check connecting wires in the machine and find out any bad connection.<br>2. Failure in control circuit, pls find out the root cause or contact with dealer.<br>3. The control wire on welding gun is broken. |
| Abnormal indicator does not light, but "susurrus" sound generated by high frequency discharge is heard, and no welding output. | 1. The welding gun cable is broken.<br>2. The grounding wire is broken or it is connected with welded workpiece.<br>3. The anode output terminal or gas-electricity output terminal of welding gun is loosing from the connecting position inside the machine. |
| Abnormal indicator does not light, and no "susurrus" | 1. There is bad connection between the primary wire of arc starting transformer and power supply board, re-tight it. |

| | |
|---|---|
| sound generated by high frequency discharge, “rubbing arc welding” can start arc | 2. The discharging electrode is oxidized or the distance is too long, pls remove oxidized film or adjust the distance to 1mm.<br>3. Individual component of high frequency arc starting circuit is damaged, find it and replace it.<br>4. The manual argon welding transfer switch is damaged. |
| Abnormal indicator lights, and no output. | 1. It may be caused by over-current protection, pls turn off the machine and restart it after the indicator extinguishes, and the machine will operate normally.<br>2. It may caused by over-heat protection, do not turn off the machine, and wait around 2-3 minutes, and the machine will operate normally.<br>3. It may caused by inverter circuit failure. Unplug the power terminal of master transformer on the MOS board(near the VH-07 inserter), and restart the machine.<br>a) if the abnormal indicator remains lighting, turn off the machine and unplug the power terminal of high frequency arc starting power supply (near the VH-07 inserter), and restart the machine.<br>i. Individual MOFSET on MOS board is damaged if the abnormal indicator remains lighting.<br>ii. The voltage increasing transformer of high frequency arc starting circuit in power supply board is damaged if the abnormal indicator does not light.<br>b) Connect the power cord of failed inverter, and unplug the power cord of master transformer, and restart the machine :<br>i. If the abnormal indicator does not light, the transformer on middle board may be damaged. Pls check the primary inductance and Q value with bridge circuit.<br>ii. The double-times rectifier of middle board may be broken through individually, pls find it and replace it with a same model one.<br>4. It may be caused by short circuit in the feedback circuit. |
| Oxidized film on aluminum workpiece surface can not be exposed when welding. | 1. Wrong position selection.<br>2. Insufficient duty ratio adjustment.<br>3. Double-times invert MOSFET is damaged. |
| Serious burned tungsten electrode. | The duty ratio is out of specification, reduce it. |