Operator's Manual

ZD7 Power source

Save for future reference.

Date Purchased

Code:(ex: ZD7-1000)

Serial:(ex: D1234567)

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THANK YOU FOR SELECTING A QUALITY PRODUCT BY HYWD.

PLEASE EXAMINE CARTON AND EQUIPMENT FOR DAMAGE IMMEDIATELY

When this equipment is shipped, title passes to the purchaser upon receipt by the carrier. Consequently, claims for material damaged in shipment must be made by the purchaser against the transportation company at the time the shipment is received.

SAFETY DEPENDS ON YOU

HYWD arc welding and cutting equipment is designed and built with safety in mind. However, your overall safety can be increased by proper installation ... and thoughtful operation on your part.
DO NOT INSTALL, OPERATE OR REPAIR THIS EQUIPMENT WITHOUT READING THIS MANUAL AND THE SAFETY PRECAUTIONS CONTAINED THROUGHOUT.
And, most importantly, think before you act and be careful.

⚠ WARNING

This statement appears where the information must be followed exactly to avoid serious personal injury or loss of life.

⚠ CAUTION

This statement appears where the information must be followed to avoid minor personal injury or damage to this equipment.

KEEP YOUR HEAD OUT OF THE FUMES.

DON'T get too close to the arc. Use corrective lenses if necessary to stay a reasonable distance away from the arc.
READ and obey the Safety Data Sheet (SDS) and the warning label that appears on all containers of welding materials.
USE ENOUGH VENTILATION or exhaust at the arc, or both, to keep the fumes and gases from your breathing zone and the general area.
IN A LARGE ROOM OR OUTDOORS, natural ventilation may be adequate if you keep your head out of the fumes (See below).
USE NATURAL DRAFTS or fans to keep the fumes away from your face.
If you develop unusual symptoms, see your supervisor. Perhaps the welding atmosphere and ventilation system should be checked.

WEAR CORRECT EYE, EAR & BODY PROTECTION

PROTECT your eyes and face with welding helmet properly fitted and with proper grade of filter plate.
PROTECT your body from welding spatter and arc flash with protective clothing including woolen clothing, flame-proof apron and gloves, leather leggings, and high boots.
PROTECT others from splatter, flash, and glare with protective screens or barriers.
IN SOME AREAS, protection from noise may be appropriate.

BE SURE protective equipment is in good condition. Also, wear safety glasses in work area **AT ALL TIMES.**

SPECIAL SITUATIONS
DO NOT WELD OR CUT containers or materials which previously had been in contact with hazardous substances unless they are properly cleaned. This is extremely dangerous.
DO NOT WELD OR CUT painted or plated parts unless special precautions with ventilation have been taken. They can release highly toxic fumes or gases.
Additional precautionary measures
PROTECT compressed gas cylinders from excessive heat, mechanical shocks, and arcs; fasten cylinders so they cannot fall.
BE SURE cylinders are never grounded or part of an electrical circuit.
REMOVE all potential fire hazards from welding area.
ALWAYS HAVE FIRE FIGHTING EQUIPMENT READY FOR IMMEDIATE USE AND KNOW HOW TO USE IT.

SECTION A: WARNINGS

- **Always start and operate the engine in a well-ventilated area.**
- **If in an exposed area, vent the exhaust to the outside.**
- **Do not modify or tamper with the exhaust system.**
- **Do not idle the engine except as necessary.**

ARC WELDING CAN BE HAZARDOUS. PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY.
PACEMAKER WEARERS SHOULD CONSULT WITH THEIR DOCTOR BEFORE OPERATING.
BE SURE THAT ALL INSTALLATION, OPERATION, MAINTENANCE AND REPAIR PROCEDURES ARE PERFORMED ONLY BY QUALIFIED INDIVIDUALS.PERFORMED ONLY BY QUALIFIED INDIVIDUALS.

ELECTRIC AND MAGNETIC FIELDS MAY BE DANGEROUS

Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF).
Welding current creates EMF fields around wel ding cables and welding machines
EMF fields may interfere with some pacemakers, and welders having a pacemaker should consult their physician before welding.
Exposure to EMF fields in welding may have other health effects which are now not known.

All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:
Route the electrode and work cables together - Secure them with tape when possible.
Never coil the electrode lead around your body.
Do not place your body between the electrode and work cables. If the electrode cable is on your right side, the work cable should also be on your right side.
Connect the work cable to the workpiece as close as pos- sible to the area being welded.
Do not work next to welding power source.

ELECTRIC SHOCK CAN KILL

The electrode and work (or ground) circuits are electrically “hot” when the welder is on. Do not touch these “hot” parts with your bare skin or wet clothing. Wear dry, hole-free gloves to insulate hands.
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.

In addition to the normal safety precautions, if welding must be performed under electrically hazardous conditions (in damp locations or while wearing wet clothing; on metal structures such as floors, gratings or scaffolds; when in cramped positions such as sitting, kneeling or lying, if there is a high risk of unavoidable or accidental contact with the workpiece or ground) use the following equipment:

- Semiautomatic DC Constant Voltage (Wire) Welder.
- DC Manual (Stick) Welder.
- AC Welder with Reduced Voltage Control.

In semiautomatic or automatic wire welding, the electrode, electrode reel, welding head, nozzle or semiautomatic welding gun are also electrically “hot”.
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.
Ground the work or metal to be welded to a good electrical (earth) ground.
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 floor level, use a safety belt to protect yourself from a fall should you get a shock.

ARC RAYS CAN BURN.

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 helpers from the arc rays.

Protect other nearby personnel with suitable, non-flammabl e screening and/or warn them not to watch the arc nor expose themselves to the arc rays or to hot spatter or metal.

FUMES AND GASES CAN BE DANGEROUS.

Welding may produce fumes and gases hazardous to health.
Avoid breathing these fumes and gases. When welding, keep your head out of the fume. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone. When welding hardfacing (see instructions on container or SDS) or on lead or cadmium plated steel and other metals or coatings which produce highly toxic fumes, keep exposure as low as possible and within applicable OSHA PEL and ACGIH TLV limits using local exhaust or mechanical ventilation unless exposure assessments indicate otherwise. In confined spaces or in some circumstances, outdoors, a respirator may also be required.

Additional precautions are also required when welding on galvanized steel.
The operation of welding fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment and the specific welding procedure and application involved. Worker exposure level should be checked upon installation and periodically thereafter to be certain it is within applicable OSHA PEL and ACGIH TLV limits.
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.
Shielding 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 Safety Data Sheet (SDS) and follow your employer’s safety practices. SDS forms are available from your welding distributor or from the manufacturer.

WELDING AND CUTTING SPARKS CAN CAUSE FIRE OR EXPLOSION

Remove fire hazards 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.

CYLINDER MAY EXPLODE IF DAMAGED.

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.

SAFETY

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 situations. Refer to “Safety in Welding and Cutting” and the operating information for the equipment being used.

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”. For information, purchase “Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances”,

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, cuffless trousers, high shoes and a cap over your hair. Wear ear plugs 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.

Do not use a welding power source for pipe thawing.

CYLINDER MAY EXPLODE IF DAMAGED.

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.
- A safe distance from arc welding or cutting operat ions and any other source of heat, sparks, or flame.

Never allow the electrode, electrode holder or any other electrically “hot” parts to touch a cylinder.

Keep your head and face away from 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.

Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-l.

FOR ELECTRICALLY POWERED EQUIPMENT.

Turn off input power using the disconnect switch at the fuse box before working on the equipment.

Install equipment in accordance with the National Electrical Code, all local codes and the manufacturer’s recommendations.

Ground the equipment in accordance with the National Electrical Code and the manufacturer’s recommendations.

Contents

1. Introduction

The ZD7 (IGBT) inverter series multifunctional arc welding power source includes ZD7-630 ZD7-1000、ZD7-1250、ZD7-1600、ZD7-2000， Mainly suitable for submerged arc welding and carbon arc gouging, it can be used for welding carbon steel and alloy steel. Meets the requirements of GB15579.1-2013 standard.

The multifunctional arc welding power supply adopts a soft start mode, and the main power supply is controlled by a three-phase air switch. When the switch is closed, the main circuit has already borne the working voltage. The control signal and trigger pulse are controlled by the welding control box, greatly improving the service life and reducing the impact on the power grid. It has the characteristics of easy operation, simple maintenance, and high reliability.

2. Working Environment and Conditions

2.1. Environmental temperature: -10℃—40℃

2.2. Height above sea level: ≤1000M

2.3. Up to 90% relative humidity and the minimum temperature 25℃ on average in every month.

2.4. No gas, steam, chemical deposition, dust and mildew and other combustible materials which will influence the welding equipment are around the equipment.

2.5. The equipment should be put in Dry and Ventilated Place, preventing it from irradiation and rain.

3. **Technical** Parameters

Model	ZD5 (D)-630	ZD7-1000
Input power (3 Phase)	220V/60Hz 380V/50/60Hz 415V/50/60Hz 440V/60Hz	220V/60Hz 380V/50/60Hz 415V/50/60Hz 440V/60Hz
Rated Input Capacity(KVA)	32	51
Rated input current (A/V)	50/380	78/380
Rated duty cycle	100%	60%
Open circuit Voltage (V)	80	80
Rated welding Voltage(V)	44	44
Rated welding Current (A)	630	1000
Current range (A)	60-630	100-1000
Voltage range(V)	22-44	24-44
Protection grade	IP21	IP21
Dimension (mm)	750×410×720	700×400×950
Weight (kg)	79	99

ZD7-1250	ZD7-1600	ZD7-2000
220V/60Hz 380V/50/60Hz 415V/50/60Hz 440V/60Hz	380V/50/60Hz 415V/50/60Hz 440V/60Hz	380V/50/60Hz 415V/50/60Hz 440V/60Hz
64	98	107
98/380V	150/380V	165/380V
60%	60%	60%
80	80	80

44	44	44
1250	1600	2000
100-1250	100-1600	100-2000
24-44	22-44	22-44
IP21	IP21	IP21
710×450×1100	710X450X1100	760X510X1100
160	180	190

Note:

1. Cooling system adopts exhaust fan cooling mode.
2. Insulated class: F

4. Structure and Functions

4.1. Structure and feature

The ZD7 inverter series multifunctional arc welding power source mainly consists of a main transformer, inverter, reactor, control circuit board, frame, control panel, and input/output terminals. The functions of each component are introduced as follows:

① Main transformer: The iron core is made of nano magnetic core material, and the coil is wound with multiple strands of enameled wire to provide voltage reduction and isolation.

② Inverter: The three-phase 380V AC input is rectified by a rectifier to convert DC power into AC power, which is then stepped down by a main transformer and rectified again by diodes to output low-voltage DC power.

③ Reactor: plays a filtering role.

④ Control circuit board: including main control board and driver board. The main control board is used for sampling and controlling welding parameters; The driver board is used to drive high-power IGBT devices.

⑤ Panel: Used for operating and displaying parameters, various functions (see attached figure).

⑥ Input terminal: connected to a three-phase 380V power grid.

⑦ Output terminals: including positive and negative poles, each led outward through two terminal bolts.

⑧ Other:

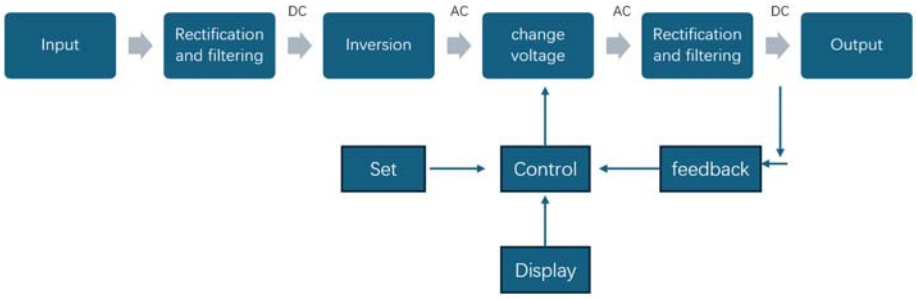
Fan: used for blowing cooling and temperature reduction.

Temperature relay: When the temperature of the multifunctional arc welding rectifier is too high, it will automatically protect.

Air switch: controls the three-phase on/off of the main power supply.

Control transformer: Provide the power required for the control board to achieve electrical isolation between strong and weak electricity.

4.2. **Working principle**



The three-phase AC power supply is input to the three-phase rectifier bridge through an air switch, and rectified into a high voltage DC of about 540V. This voltage is applied to the high-power IGBT device, and under the pulse control of about 20KHZ given by the main control board, a high-frequency pulse voltage is formed. The pulse voltage is applied to the primary side of the main transformer, and after being stepped down by the main transformer, it is sent to the diode for further rectification into the required DC voltage output.

The core control circuit of this system is the main control board. Its working principle is to obtain the current/voltage signal from the power output terminal, convert it and compare it with the given signal comprehensively, and provide it to the IGBT drive signal (output by the IGBT drive board), so that the IGBT inverter works in PWM mode, thereby ensuring that the arc welding power source obtains a constant output current/voltage.

5. Location

5.1. Winging rings are equipped on the welding tractor whish can realize swinging.

5.2. Welding tractor is packed by wooden case which realizes forklift conveying.

5.3. Shelter and the dry ventilated place is necessary, the temperature should be:-25℃~+55℃.

6. Installation and commissioning

Please firstly read this operator's manual carefully and check if all the accessories are complete.

6.1. Install and connect the arc-welding rectifier as per Sketch 7, the distance between the vent and the wall⩾800mm, the distance between the power source and the wall⩾100mm.

6.2. Earth the cover of the arc-welding rectifier (on the earthed mark, the cross section of the earth cable should ⩾16mm^2)

6.3. 3 phase power source incoming lines enter into the rectifier through the air switch, the technical parameters of the air switch capacity is as per the arc-welding rectifier's requirement (Connect with the 3 phase 380V electric net, the earth bolt behind the rectifier must be earthed reliably, otherwise it cannot run well and cause some part overheated)

6.4. Use a welding cable to connect the "+"output end of the arc-welding rectifier with the welding torch or welding clamp, as per the actual requirement, when connect with the positive welding cable, Use another welding cable to connect the "-" output terminal to the welded workpiece. (Note: All connecting bolts should be tightened, and the workpiece and cable must be reliably connected.)

6.5. If the distance between the welding machine and the machine head exceeds 10 meters, please increase the diameter of the welding cable to ensure that the voltage drop on the welding cable is less than 4V, otherwise it will cause arc breakage;

6.6. If there are other supporting equipment, please refer to the relevant instructions for installation and wiring in combination with them

Attention:

- The whole machine should be reliably grounded.
- All connecting parts should be tightened.
- Correctly use the function selection button.
- There is high voltage inside the machine, and non professional maintenance personnel are strictly prohibited from opening the machine casing or starting up for maintenance.
- Arc welding rectifier power supply is strictly prohibited from operating in phase loss.
- It is strictly prohibited to start the arc welding rectifier power supply directly in a short-circuit state at the output end.

- When the fan does not rotate after starting, it is strictly prohibited to continue using this machine.
- When the fluctuation of the three-phase power grid exceeds ± 10%, the use of this equipment is prohibited.
- Control cables should be avoided from being bent or tied with wire.3 phase electrical net wave is over ±10%, operation is prohibitive.
- Cable bending and binding by wire should be avoided.

7. Use and operation.

Before using the multifunctional arc welding rectifier power supply, please carefully check whether the installation and wiring are correct.
After confirming that there are no errors, close the air switch. At this time, the voltage and current meters on the welding power panel will have digital indications.
According to the welding method you are using, place the function selection in the corresponding position. If it is carbon arc gouging, please place the function selection in the "carbon arc gouging" position and adjust the parameter adjustment knob to set the output of the arc welding power source.
If there are other welding methods, please place the function selection in the corresponding position. The parameter adjustment knob on the multifunctional arc welding rectifier power supply can set the corresponding welding parameters. "Submerged arc welding" corresponds to the current, and "electric slag welding" corresponds to the voltage.
If the "remote/near control" switch is placed in the "remote control" position, parameter adjustment can only be made on the automatic welding trolley control box or other welding control boxes.
If any abnormal situations occur during the above operations, it may indicate a malfunction in the multifunctional arc welding rectifier power supply. Please refer to the "Common Malfunctions and Troubleshooting Methods" section of this manual for maintenance and repair.

8. Maintenance

After a certain period of use, dry compressed air or other methods should be used to clean the dust and dirt inside the arc welding rectifier to ensure its long-term normal operation and extend its service life.

Check the fasteners and wiring inside the machine for looseness or breakage, and if so, promptly eliminate them.

Attention: During dust removal, the power supply of the arc welding rectifier must be disconnected.

*During dust removal, it is not allowed to randomly tamper with the internal wiring of the machine or damage components.

Check the grounding status of the arc welding rectifier casing at any time to avoid accidental electric shock accidents.

Check the connection between the arc welding rectifier and the three-phase power grid at any time to avoid abnormal operation of the arc welding rectifier or local heating and damage to the joint.

Check the external connection bolts of the arc welding rectifier at any time to avoid abnormal operation of the arc welding rectifier or local heating and damage to the joint.

9. Troubleshooting

When the arc welding rectifier malfunctions, the following checks should be performed first:

Is the three-phase power supply voltage between 340V and 420V.

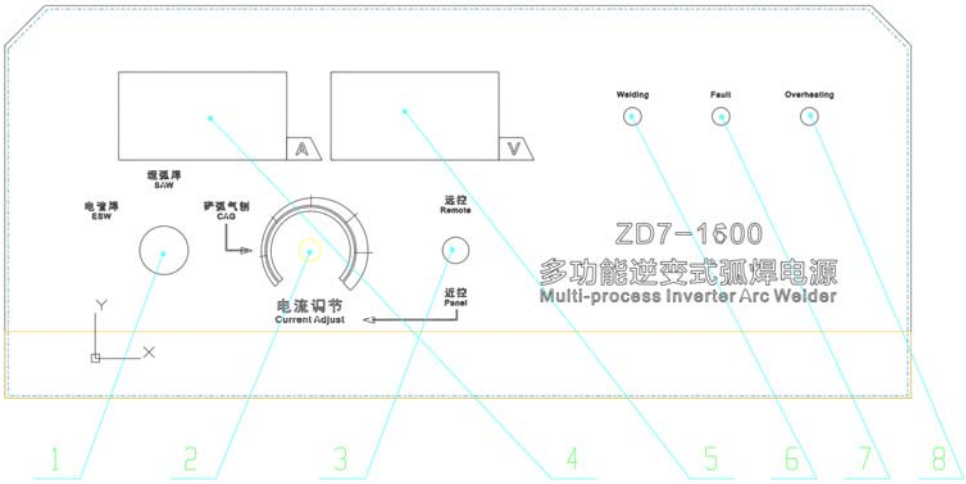
Is the three-phase power supply missing phase.

Is the input cable connection of the arc welding rectifier power supply reliable.

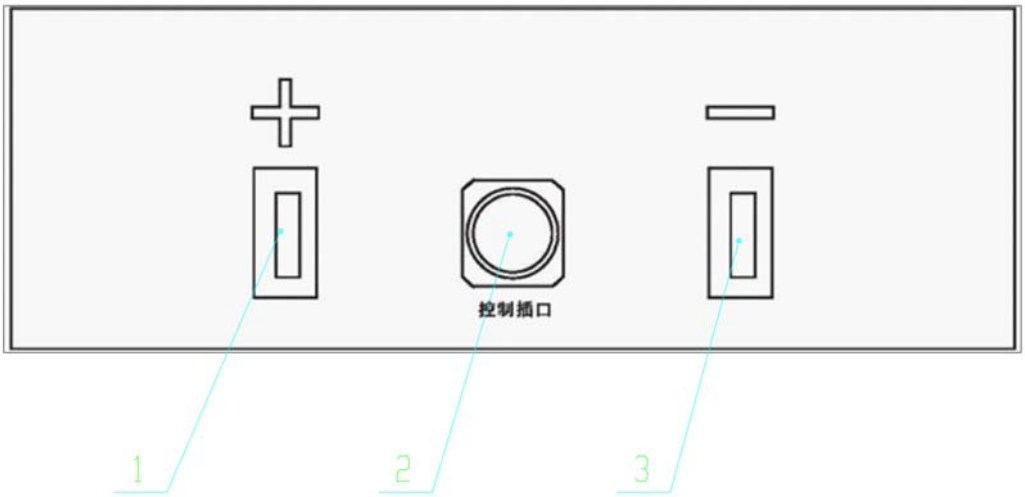
Attention: If you encounter other faults that cannot be eliminated, please immediately shut down and notify our company or local dealer as soon as possible. Do not repair without authorization to avoid the problem expanding or causing unnecessary losses.

Trouble	Cause	What to do
There is no display of voltage and ammeter	The air switch is not closed or damaged	Close the air switch or replace
	The fuse burned out	Replace the fuse
	The digital display is damaged	Replace the digital display
The fan never turns	The capacitance of the fan and fan is damaged	Replace the damaged part
	The fuse burned out	Replace the fuse
Unable to start	The near/remote switch is not in the near control position	Keep the switch in the close control position
	The fuse blows	Replace the fuse
	The main control board is damaged	Overhaul or replace the main control board
	Accidental interference causes automatic protection	Disconnect the power supply and close it again
	The temperature inside the machine is too high	Allow the machine to cool down before starting
	The control cable is disconnected	Check and rule out
The fault indicator is on	Grid voltage overvoltage or undervoltage	Once the voltage is normal, press the start button again
	IGBT is damaged	Replace the IGBT
The overheating indicator is on	The internal temperature of the arc welding power supply is too high or the temperature relay is damaged	Let the arc weld power supply rest for a while or replace the temperature relay
The welding is not normal	The main control board is damaged	Overhaul or replace the main control board
	The welding specification is unreasonable	Choose a reasonable welding specification
	The panel function is selected incorrectly	Choose the panel function correctly
	Wrong wiring	Connect correctly
The air switch tripped	Damaged components or damaged air openings	Troubleshoot and replace the damaged device

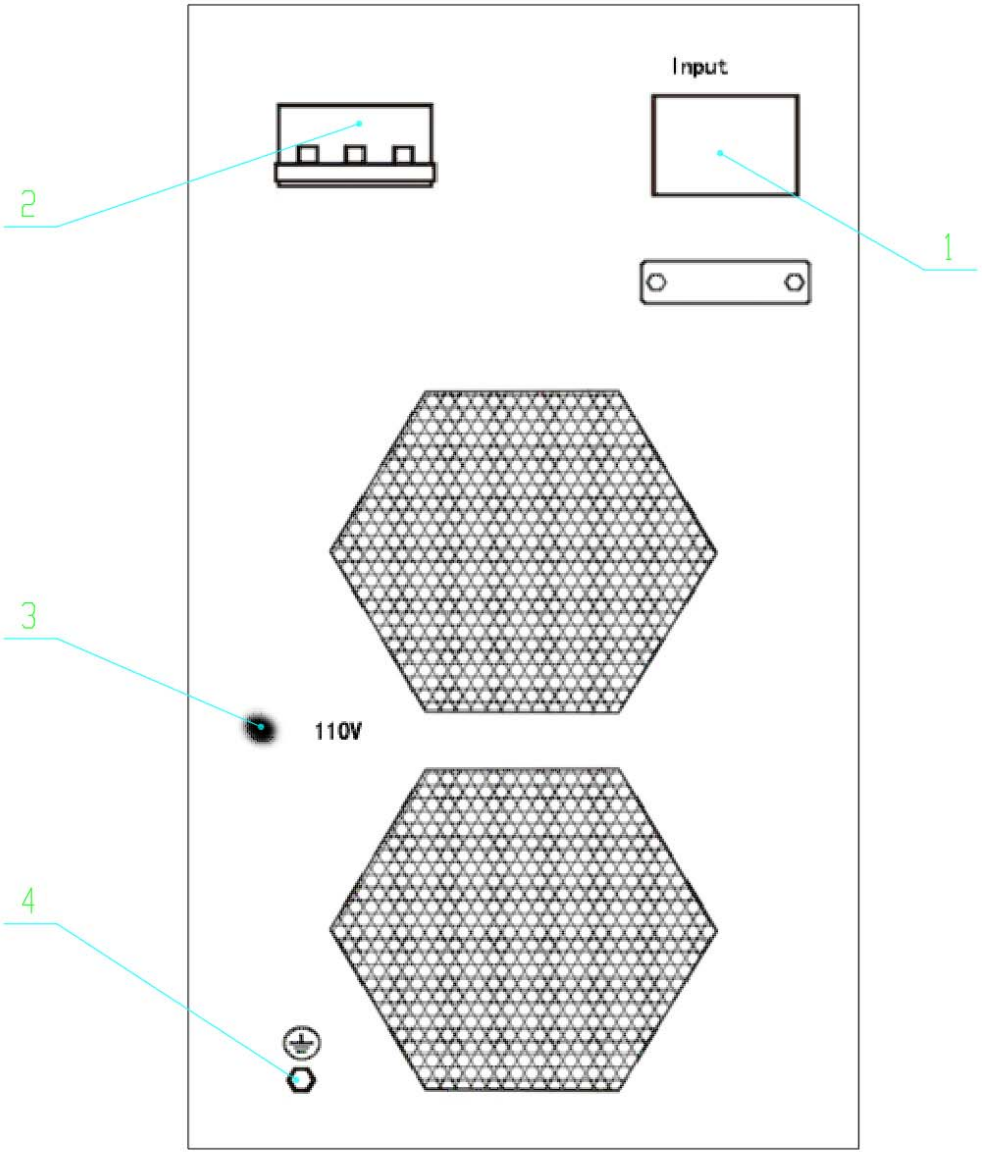
*When notifying our company, please provide as detailed a description of the fault phenomenon as possible so that your issue can be promptly addressed.



1. Function selection knob: Change the output characteristics to adapt to different welding processes.
2. Current adjustment knob: Set the welding current size (when the far/near control switch is in the near control position and the function selection knob is in the carbon arc gouging position).
3. Remote/local control selection switch: When placed in remote control, the arc welding power source is controlled by the machine head (submerged arc welding or electric slag welding); When placed in proximity control, the arc welding power source is controlled by the host (only carbon arc gouging).
4. Ammeter: displays preset or actual current values.
5. Voltage meter: displays preset or actual voltage values
6. Welding indicator: Indicates whether the arc welding power source is in the welding state, and the light is on during welding.
7. Fault indication: Indicates whether the arc welding power supply has malfunctioned, and the light will turn on when the fault occurs.
8. Overheating indicator: Indicates whether the arc welding power supply is overheated, and the light will turn on when overheated.



1. Positive cable connection
2. Control cable connection
3. Negative cable connection



1. Input cable connection point
2. Main switch
3. Fuse
4. Grounding point

Sketch 1 ZD7　Series power source principle