ZD5-630/1000/1250/1600
THYRISTOR RECTIFIED AUTOMATIC SUBMERGED ARC WELDING MACHINE

OPERATOR’S MANUAL
(PLEASE READ CAREFULLY BEFORE OPERATION)

CHENGDU HUAYUAN ELECTRIC EQUIPMENT CO., LTD.
**Safety Depends on You**

HUAYUAN arc welding and cutting equipments are designed and built with ample safety consideration. However, proper installing and operating the machine can increase your safety.

**DO NOT INSTALL, OPERATE OR REPAIR THIS EQUIPMENT CASUALLY WITHOUT READING THIS MANUAL THROUGHOUT.**

**Special Notes (Very Important):**

1. Pay attention to avoiding the machine falling down when it is placed on the gradient ground.
2. It is forbidden to unfreeze the pipeline by the cutter.
3. The shield rank of this series of cutter is IP21S, so working in rain is not suitable.
4. The external static characteristic of this series welding machine includes CC and CV mode. The rated duty cycle is 100%, which means the machine can work continuously at the rated cutting current. The machine has the function of thermal protection. When the internal temperature exceeds a set temperature, thermal protection moves on and the abnormity indicator lamp on the panel turns ON, then there is no output in machine. The machine can become normal and work only after the internal temperature drops down and the abnormity indicator lamp on the panel turns OFF.

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**Purchase Date:**

**Serial Number:**

**Machine Model:**

**Purchase Place:**
Cautions

Arc and arc rays can hurt.

All performing welding workers ought to have health qualification from the authority organization to prevent you and others from arc radiation and burn. It should be prevented for children to enter into dangerous area as well.

Be careful reading the following important items and the welder safety byelaw from the authority organization. Be sure that qualified professionals perform all installation, maintenances and repair procedures.

1 Electric shock: The welding circuits are not insulated when welding. If you touch the two output electrodes of the machine with your bare skin at the same time, it will lead to electric shock, sometimes even fatal dangers. Users need to follow the items below to avoid electric shocks:

- If possible, lay some insulating materials, which are dry and large enough, in your working field. Otherwise, use the automatic or semiautomatic welding machine, DC welding machine as possible as you can.
- Components in the automatic and semiautomatic welding machine such as the welding wire reel, feed wheel, contact tip and welding head are all electriferous.
- Always be sure the machine has been connected perfectly to the work piece with the work cables and should be as close as possible to the working area.
- The work piece should be grounded perfectly.
- Make sure that the insulating material of the electrode holder, the grounding clamp, the welding cable and the welding head are not affected by damp, mildewed or spoilt, and be replaced momentarily.
- Never dip the electrode in water for cooling.
- Never touch electriferous parts of two welding machines at the same time, because this voltage is supposed to be two times of welding voltage while the grounding mode is not clear.
- While working high above the ground or other places having the risk of falling, please be sure to wear safety belt to avoid losing balance caused by electric shock.

2 Arc: Use an arc welding mask to protect your eyes and skin from sparks and the rays of the arc, pay special attention to the filter glass, which must be conformable to the national standard.

- Use clothing made from durable flame-resistant material or sailcloth to protect your skin from hurting by the arc rays.
- Remind other nearby personnel before working lest arc rays hurt them by accident.

3 Fumes and Gases: Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. While working in limited room, use enough ventilation and/or exhaust to keep fumes and gases away from the breathing zone, or use the respirator. Do not weld at the same time when using of degreasing, cleaning or spraying operations. The heat and rays of the arc can react with these gases to form phosgene, a highly toxic gas.

- Some protective gases used in welding might displace the oxygen in the air, and can lead to
hurt or even death.
Read and understand the manufacturer’s instructions for this equipment, and validate the health certification of consumptive materials, make sure they are innocuous.

<table>
<thead>
<tr>
<th>4 Spatter: Spatter can cause fire or explosion.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove fire hazards from the welding area. Remember that spatter from welding can easily go through small cracks and touch fire hazards. Protect all kinds of lines going though welding area, including hydraulic lines in the wild. Where compressed gases are to be used in the field, special precautions should be used to prevent explosion. When welding stops, make certain that no live part is touching the work piece or the work stage. Accidental contact can create a fire hazard. Do not weld containers or lines, which are not proved to be innocuous. It is very dangerous to heat, cut or weld tanks or containers at entry holes. Does not start work until the proper steps have been taken to insure that there is no flammable or toxic gas. Spatter might cause burn. Wear leather gloves, heavy shirt, cuffless trousers, high shoes and a cap over your hair to prevent from burning by spatter. Wear the ear shield when performing sideways or face up welding. Always wear safety glasses with side shields when being in a welding area. The welding cables should be as close to the welding area as possible, and the short, the better. Avoid welding cables going through the building framework, lifting chains, AC or DC cables of other welding machines and appliances. The welding current is strong enough to damage them while having short circuit with them.</td>
</tr>
<tr>
<td>5 Cylinder: Damage of it might cause explosion.</td>
</tr>
<tr>
<td>Make sure that the gas in the storage cylinder is qualified for welding, and the decompression flow-meter, the adapter and the pipe are all in good condition. Make sure that the installation of cylinder is by the wall and bundled tightly by a chain. Be sure to put the cylinder in the working space with no crash or shake, and far from welding area. It is forbidden to touch cylinder with the welding clamp or the work cables. Avoid facing the cylinder while installing the decompression flow-meter or the gasometer. When not working, please tighten the valve.</td>
</tr>
<tr>
<td>6 Power: (For electrically powered welding and cutting equipment) Turn off input power before installation, maintenances and repair, so that avoid accident.</td>
</tr>
<tr>
<td>HUAYUAN welding equipment is I class safeguard equipment; please install the equipment in accordance with the manufacturer’s recommendations by specific persons. Ground the equipment perfectly in accordance with the manufacturer’s recommendations.</td>
</tr>
<tr>
<td>7 Power: (For engine driven welding and cutting equipment)</td>
</tr>
<tr>
<td>Work in ventilated place or outdoors.</td>
</tr>
</tbody>
</table>
| Do not add fuel near to fire or during engine starting or welding. When not working, add fuel after engine is cooling down; otherwise, the evaporation of hot fuel would result in dangers. Do not splash fuel out of the fuel tank, and do
not start the engine until complete evaporation of the outside fuel.

<table>
<thead>
<tr>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make sure that all the safeguard equipments, machine cover and devices are all in a good condition. Be sure that arms, clothes and all the tools do not touch all the moving and rotating components including V belt, gear and fan etc. Sometimes having to dismantle some parts of the device during maintenance, but must keep safety awareness strongly every time. Do not put your hand close to fans and do not move the brake handle while operating. Please remove the connection between the engine and the welding equipment to avoid sudden starting during maintenances. When engine is hot, it is forbidden to open the airtight cover of the radiator water tank to avoid hurt by the hot vapor.</td>
</tr>
</tbody>
</table>

| 8 Electromagnetic: Welding current going through any area can generate electromagnetic, as well as the welding equipment itself. Electromagnetic would affect cardiac pacemaker, the cardiac pacemaker users should consult one’s doctor first. The effect of electromagnetic to one’s health is not confirmed, so it might have some negative effect to one’s health. Welders may use following method to reduce the hazardous of electromagnetic: a. Bundle the cable connected to the work piece and the welding cable together. b. Do not enwind partially or entirely your body with the cable. c. Do not place yourself between the welding cable and the ground (work piece) cable, if the welding cable is by your left side, then the ground cable should be by your left side too. d. The Welding cable and the ground cable are as short as possible. e. Do not work near to the welding power source. |

| 9 Lift Equipment: carton or wooden boxes package the welding machines supplied by HUAYUAN. There is no lifting equipment in its wrapper. Users can move it to the prospective area by a fork-lift truck, and then open the box. If having rings, the machine can be transited using rings. While HUAYUAN Welding Machine Manufacture reminds users, there is possible risk to damage the welding machine. It is better to push the welding machine moving in use of its rollers unless special situations. Be sure that the appurtenances are all removed off when lifting. When lifting, make sure that there is no person below the welding machine, and remind people passing by at any moment. Do not move the hoist too fast. |

| 10 Noise: HUAYUAN Welding Machine Manufacture reminds users: Noise beyond the limit (over 80 db) can cause injury to vision, heart and audition depending on oneself. Please consult local medical institution. Use the equipment with doctor’s permission would help to keeping healthy. |
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1. Product Introduction

1.1 Instruction on Model

Model: ZD5-1000

- Rated welding current
- SCR rectified
- Multi-characteristic
- Arc welding rectifier

1.2 Usage & Features

ZD5-630/1000/1250/1600 Arc Welding Rectifier is a multi-function power source with constant-voltage and constant-current characteristics. Except for submerged automatic welding, it also can be used as welding power sources for stick welding, air carbon arc gouging, electro-slag welding. The power source has adopted double inverse star SCR rectifier circuit with balance reactor, which has high adjusting accuracy, good dynamic characteristic, can auto-compensate for voltage fluctuation of grid voltage rapidly and ensure no fluctuation effect of grid voltage to welding voltage and welding current.

1.3 Main technical Specifications

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Model</th>
<th>ZD5-630</th>
<th>ZD5-1000</th>
<th>ZD5-1250</th>
<th>ZD5-1600</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input supply voltage</td>
<td>3-phases</td>
<td>380V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated welding voltage (V)</td>
<td></td>
<td>44V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated welding current (A)</td>
<td>630</td>
<td>1000</td>
<td>1250</td>
<td>1600</td>
<td></td>
</tr>
<tr>
<td>Current adjusting range (A)</td>
<td>120~630</td>
<td>100~1000</td>
<td>100~1250</td>
<td>200~1600</td>
<td></td>
</tr>
<tr>
<td>Open circuit voltage (V)</td>
<td></td>
<td>75V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated load duty cycle (%)</td>
<td>60/40° C</td>
<td>100/40° C</td>
<td>60/40° C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated input capacity (KVA)</td>
<td>51</td>
<td>69</td>
<td>83</td>
<td>106</td>
<td></td>
</tr>
<tr>
<td>Rated input current (A)</td>
<td>77.6</td>
<td>105</td>
<td>126</td>
<td>161</td>
<td></td>
</tr>
<tr>
<td>Required input wire (mm²)</td>
<td>16</td>
<td>25</td>
<td>25</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>Efficiency</td>
<td>83%</td>
<td>83%</td>
<td>82%</td>
<td>82%</td>
<td></td>
</tr>
<tr>
<td>Dimensions (length × width × height) mm</td>
<td>905x510x700</td>
<td>950x650x810</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>290</td>
<td>370</td>
<td>370</td>
<td>390</td>
<td></td>
</tr>
<tr>
<td>Insulation Grade</td>
<td></td>
<td>F</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protection Grade</td>
<td></td>
<td>IP21S</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. Installation

2.1 The copper-core cross section of matched input wire can not be less than the value listed in above table.

2.2 The copper-core input wire on the back of power source is connected to the output terminal of customer’s breaker, and the fuse can be used after its capacity is increased by 20% as per the rated input current of power source.

2.3 Open the panel cover on the below of machine front side, connecting the welding cable with the (+) pole and (-) pole of power source. The cross section of welding cable can not be less than the required standard, namely, for ZD5-630, it should be $\geq 100\text{mm}^2$, for ZD5-1000/1250, it should be $\geq 140\text{mm}^2$, for ZD5-1600, it should be $\geq 190\text{mm}^2$

2.4 When ZD5 power source is used as automatic submerged arc welding and electro-slag welding, the multi-core control cable plug must be connected to the control socket firmly.

3. Work principle

3.1 Electric principle diagram

3.2 Main electric principle diagram of ZD5

(See appendix 1)
4. Control panel function and operation

(it is shown as diagram below)

Figure 1 control panel function diagram

4.1 Ammeter: Indicate the actual welding current;
4.2 Voltmeter: Indicate the actual welding voltage;
4.3 Welding current adjustment: Adjusting the welding current, only when the machine is used in stick welding or air carbon arc gouging.
4.4 Fuse: It is the control power source fuse inside ZD5 power source. The fuse value is 3A.
4.5 Abnormal indicator: Over load or over heat occurred to rectifier bridge, this indicator is on;
4.6 Power indicator: Turn on the power switch, this indicator is on.
4.7 Function selection switch: selecting the welding mode: stick/air carbon arc gouging, submerged arc welding and electro-slag welding.
4.8 Characteristic selection switch: Selecting the constant-voltage and constant-current characteristic, but this switch can work only under submerged arc welding mode.
4.9 Power switch: Switch on/off the machine.
5. Maintenance and repair

Attention: Must cut off the power supply firstly before maintenance and repair.

5.1 Maintenance

※ The customer should periodically open the machine shell to clear the dust according to the usage state and the environment conditions, in order to prevent the electric parts of the machine from being affected by damp dust, which may cause short-circuit and break down the machine;

※ The customer should periodically check the connecting cable to ensure the cable installed reliably.

5.2 Repair

Attention: Only qualified technicians should perform troubleshooting work on the machine.

※ Before open the machine shell, please check as follows at first:
  a. Please check the three phases voltage, which should meet national standard.
  b. Check if the fuse on the front control panel is fused or not.
  c. Be sure the welding cable and work cable connected reliably.

5.3 Troubleshooting & Repair

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Troubleshooting</th>
</tr>
</thead>
</table>
| 1. Turn power on, the indicator does not illuminate. | 1. Input power lacks one phase  
2. The fuses on the front panel is broken  
3. The indicator is damaged. | 1. Check three phases;  
2. Replace the fuses;  
3. Replace the indicator; |
| 2. Turn power on, the cooling fan doesn’t work | 1. Input power lacks one phase  
2. The fuses on the front-panel is broken;  
3. The Cooling fan is damaged; | 1. Check three phases;  
2. Replace the damaged fuse;  
3. Repair or replace cooling fan; |
| 3. abnormal shock inside machine or power switch trips, when it is open load. | 1. At least one thyristor is damaged  
2. The main transformer is short circuit; | 1. Check the six thyristors and replace damaged thyristor;  
2. Check all connecting wire of the main transformer, and eliminate the short circuit. |
<p>| 4. Welding current is | 1. Input wire lacks one | 1. Check three phases |</p>
<table>
<thead>
<tr>
<th>out of control.</th>
<th>phase.</th>
<th>2. Check the connecting wire of sensor, and have it connected firmly.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. The connecting wire of current hall sensor installed on outlet end inside machine is loosen;</td>
<td></td>
<td>3. Repair or replace the main PCB;</td>
</tr>
<tr>
<td>3. The main PCB is damaged;</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5. Turn on the power switch, there is no sticking arc under stick welding mode.</th>
<th>1. Welding cable is connected loosely.</th>
<th>1. check the welding cable, making it connected firmly.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. The main PCB is damaged, resulting in no open voltage;</td>
<td>2. Repair or replace the main PCB;</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>6. During welding, the arc extinguishes suddenly and no arc striking immediately, after a moment the machine work normally again.</th>
<th>1. The machine is over load, which cause over heat protection of temperature relay.</th>
<th>1. Pay attention to ambient temperature and rated duty cycle.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. The temperature relay is damaged.</td>
<td>2. Replace the temperature relay with same model.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7. Abnormal indication is on, but on other action in machine</th>
<th>1. cooling fan is damaged or over load, welding machine is overheat.</th>
<th>1. change cooling fan or restart machine after 30 minutes.</th>
</tr>
</thead>
</table>

※Attention: If the troubles cannot be resolved, please inform our local agent of the specific problems or contact us directly.

6. Packing list

- ZD5 -630 or 1000 or 1250 or 1600 power source 1 set
- Instruction manual 1 copy
- Qualified certificate 1 copy
- Electric schematic 1 copy
- Maintenance card 1 copy
The final explanation right is reserved to Huayuan Company!

If there is any change in the manual, please forgive not to inform separately!

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