

KeyGree

# ARC SERIES MANUAL

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*Do it easy, comfortable, trustable.*

# MODELS

## ARC-400T/ARC-500T



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## PREFACE

Dear users, thank you for using our inverter welder. 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. The product conforms to GB15579 standard;
4. This product complies with the electromagnetic compatibility requirements for type A equipment.

The Instruction 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 applicable standard.
- Do not touch live parts while bare skin or wearing wet gloves or clothes.
- Insure you to insulate appearance with the ground and the work piece.
- The cover plate must be covered before power on, otherwise it may cause electric shock.
- Make sure that 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 can replace the parts.
- Do not drop foreign objects such as thread ends, screws, gaskets and metal bars into the welder when replacing parts.
- After replacing the circuit board, the internal connection of the welder shall be correct before the welder can be operated, otherwise there is a risk of property damage.

#### Precautions for Use



#### **Fume/smoke dust — it may be harmful to health.**

- Welding would produce lots of gases and fumes that are harmful to the body. Avoid inhalation into the respiratory tract.
- Keep your head away from fumes while welding. Adopt adequate ventilation or exhaust facilities to keep smoke and gas away from the breathing area, and maintain good ventilation in the working environment.



#### **Arc radiation — it may damage your eyes and burn your skin.**

- Use an appropriate welding mask and wear protective clothing to protect your eyes and body.
- Use an appropriate mask or curtain to protect bystanders from harm.





#### **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.
- Stay away from power sources as much as possible to minimize the impact of electromagnetic fields.



#### **Improper use and operation may cause fire or explosion**

- Sparks from welding may cause fire. Please confirm that there is no flammable material near the welding station and pay attention to fire safety.
- Ensure that there is a fire extinguishing device nearby and a trained person who can use fire extinguishers proficiently.
- Do not weld sealed containers.
- Do not use the welder for thawing pipelines.



#### **Hot workpiece may cause severe burns**

- Do not touch hot workpieces with bare hands.
- Let the welding gun cool down for a while after continuous operation.



#### **Noise — excessive noise is harmful to hearing.**

- Protect your ears. Use ear shields or other hearing protectors.
- Warn bystanders of the potential damage to their hearing caused by noise.



#### **Moving parts may cause personal injury**

- Avoid moving parts (such as fans).
- Protective devices such as doors, panels, covers and baffles must be tightly closed and put in the right place.



#### **Fault — seek professional help when in trouble.**

- If you encounter difficulties during installation and operation, please follow relevant contents of this manual for troubleshooting.
- If you do not fully understand it after reading, or if you cannot solve the problem according to the guidelines in this manual, you should 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 the electrolytic capacitor on the printed board may explode when burned.
- The plastic parts such as front panels will produce toxic gas when burned.
- Please dispose of it as industrial waste.

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# CHAPTER I PRODUCT OVERVIEW

## 1.1 Model explanation

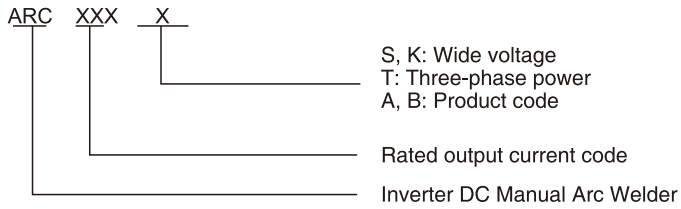


Figure 1-1: Model coding

## 1.2 General technical parameters

See Table 1-1 for the general technical parameters of the welder.

Table 1-1 General Technical Parameters

| Item                     | Model    |          |
|--------------------------|----------|----------|
|                          | ARC-400T | ARC-500T |
| Rated Input Voltage(V)   | 3P 380V  | 3P 380V  |
| Frequency(Hz)            | 50/60    |          |
| Input Capacity(KVA)      | 10.4     | 12.7     |
| Output Power(KW)         | 7.5      | 9.2      |
| No-Load Voltage(V)       | 66       | 68       |
| Current Range(A)         | 30-400   | 30-500   |
| Max Output Current(A)    | 250      | 290      |
| Electrode Diameter(MM)   | 5        | 5        |
| Rated Working Voltage(V) | 30       | 31.6     |
| Electrode Diameter(MM)   | 4        | 5        |
| Duty Cycle(%)            | 60       | 60       |
| Efficiency(%)            | 80       | 80       |

### 1.3 Dimension and weight

Table 1-3 External Dimension and Weight of the Welder

| Item                       | ARC-400T    | ARC-500T    |
|----------------------------|-------------|-------------|
| External dimension (L×W×H) | 420×220×410 | 510×245×450 |
| Weight (kg)                | 10.35       | 14.7        |

### 1.4 Standard set

#### Factory configuration list:

- Instruction manual×1
- Quick plug×2/OT terminal×2

### 1.5 Description of functions and features

**ARC series is our inverter welder manufactured with advanced inverter technology, which is a more mature and stable product series.**

- Superior IGBT inverter technology, frequency up to 20-30KHz, smaller volume, lighter weight, higher efficiency, and more energy-saving;
- Leading control mode, advanced control scheme, and significantly improved performance;
- Suitable for welding all kinds of acidic and basic electrodes;
- With hot arc initiation, high no-load voltage and thrust compensation functions, making the welding arc more stable, little spatters, easy arching;
- Wide applications including advertisement and decoration, construction and installation, steel structures, machining, pipelines, etc.;
- Strong capability to adapt to grid voltage, double-voltage automatic switching (wide voltage K series);630A or above models can be used for carbon arc air gouging.

### 1.6 System characteristics

#### 1) Cyclic duration factor

Rated load duration rate refers to the percentage of the normal working time of the welder in the rated maximum output current state and the period, with 10 minutes as a period. Continued use of the welder beyond the rated load duration will cause it to overheat, and frequent use beyond the rated load will accelerate aging or even cause damages.

#### 2) Output characteristics:

The static external characteristics of this series welder are descending characteristics, meaning that when the welder is working, the load voltage will instantly drop from 60-90V to about 30V at no load.

## 1.7 Operating conditions and use environment

### 1) Service environment

- Ambient temperature range: working: -10~+40°C, transportation and storage state: -25~+55°C.
- It should be put in a dry and ventilated location and protected from direct sunlight or rain.

### 2) Power supply quality

- Power supply: 2~220V50Hz, 2~380V50Hz, 3~380V50Hz. Please pay attention to the junction box tips for correct selection.
- Voltage fluctuation range  $\pm 10\text{-}20\%$  (20% for wide voltage series, 10% for single power supply).
- When using the engine generator: The generator output power is required to be greater than 1.5 times the rated input power of the welding power source, and a bucking coil should be available.

## CHAPTER II INSTALLATION AND WIRING

### 2.1 Installation requirements

- Note: Please strictly follow the following steps for installation and commissioning!
- Electrical connection must be carried out after turning off the power switch of the distribution box!
- The protection level of the welder is IP21S, which shall not be used in the rain without cover!
- It is forbidden to use the welding power source for pipe thawing!

#### 1) Input line connection

- To ensure personal safety and avoid electric shock accidents, please connect the earth wire (yellow and green wires) to the distribution box earthing device reliably.
- The cross-sectional area of the conductors for the distribution box shall meet the requirements of maximum input capacity.

Table 1-1 Input Cable Cross-Sectional Area Reference

| Item   | ARC-400T | ARC-500T |
|--|----------|----------|
| Power Cable Cross-Sectional Area(mm <sup>2</sup> ) | ≥4       | ≥4       |
| Earth Wire Cross-Sectional Area(mm <sup>2</sup> )  | ≥2.5     | ≥2.5     |
| Switching capacity                                 | 40A      | 63A      |

#### 2) Output line connection

- Insert the cable plug of the welding clamp and the cable plug of the earth clamp into the quick outlet on the front panel of the welder respectively and screw them clockwise.
- Operators can also choose the DC positive connection method according to the base metal and the electrode. In general, DC reverse connection (i.e., connecting the electrode to the negative pole) is recommended for basic electrode, whereas for acid electrode, there is no particular requirement.

DC positive connection method: welding clamp to negative pole and workpiece to positive pole  
 DC reverse connection method: welding clamp to positive pole and workpiece to negative pole

### 3) Working Connection Diagram

Manual Welding Connection Diagram

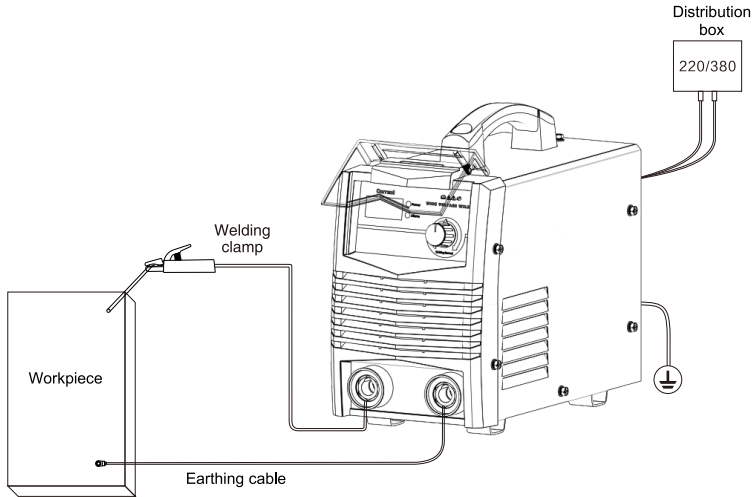


Table 2-1 Welding Procedure Cheat Sheet

| Electrode Specification (mm) | Recommended Welding Current (A) | Round Carbon rod Specification (mm) | Recommended Welding Current (A) |
|------------------------------|---------------------------------|-------------------------------------|---------------------------------|
| 2.0                          | 60~100                          | 6                                   | 350-450                         |
| 2.5                          | 80~120                          | 8                                   | 450-550                         |
| 3.2                          | 108-148                         | 10                                  | 550-630                         |
| 4.0                          | 160~200                         | 12                                  | 750-850                         |
| 5.0                          | 200~250                         |                                     |                                 |
| 6.0                          | 250~300                         |                                     |                                 |

**Note:** This table applies to mild steel welding. As for other materials, please refer to relevant materials and the process manual.

## 2.2 Do's and don'ts

- The installation area should be firm enough to support the welder.
- It is forbidden to install the welder in places where water splashes may be generated, such as water pipes.
- Welding operations must be performed in a relatively dry environment where the air humidity is normally not greater than 90%.
- Do not perform welding in dusty or corrosive gas-containing areas.
- Do not place the welder on a table top with an inclination greater than 15°.

The welder has been installed with overvoltage, overcurrent and overheating protective circuits. When the grid voltage, output current and internal temperature exceed the set standards, the welder will stop working automatically; but excessive use (such as excessive voltage) will still cause damage to the welder, so the following matters shall be noticed:

### Ensure good ventilation

When the welder is in operation, there is a large working current passing through, and natural ventilation cannot meet the cooling requirements of the welder, so there is a fan inside to effectively cool the welder to make it work smoothly. Check whether the ventilated place is covered or blocked. Make sure the distance between the welder and surrounding objects is less than 0.3m.

### 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.

### Prohibit overload

Operators shall use the welder according to its allowable load duration rate and maintain the welding current within the maximum allowable load current. Current overload will remarkably shorten the life of the welder or even burn it.

If the welder exceeds the standard load duration rate in working, it may suddenly enter the protection state and stop working. This indicates that once the standard load duration rate is overtaken, it will heat up to trigger the temperature control switch to stop the welder, and the yellow indicator light on the front panel is on at the same time. In this case, do not pull out the power plug. Let the fan cool down the welder. When the yellow indicator light is off and the temperature drops to the standard range, start welding.

## CHAPTER III OPERATING INSTRUCTIONS

### 3.1 Operating method

- After correct installation, turn on the power switch and push the power switch in the "ON" position.
- Then, the power indicator light will be on and the fan inside the welder will start rotating.
- Workpiece selection is based on workpiece requirements. Improper selection may lead to unstable arc, massive spatters, sticky electrodes, etc. In such case, the quick plug can be easily replaced to change the polarity.

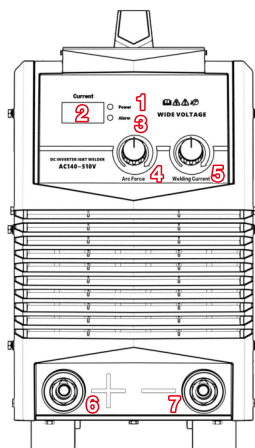
- If the workpiece is too far away from the welder (50-100m) and all secondary wires (welding handle wire and earth wire) are long, the guide line with a larger cross-sectional area should be chosen to reduce the cable voltage drop.

Table 3-1 Recommended Output Cable Cross-Sectional Area

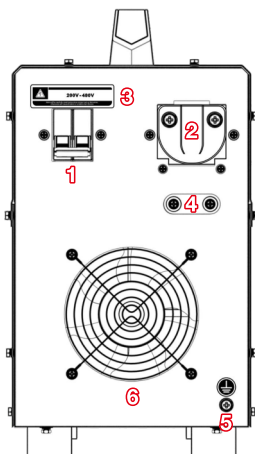
| Model                             | ARC-315K            | ARC-400(Q/K/A/T)     | ARC-500(Q/B/A/T)     | ARC-630A            | ARC-1000A           |
|-----------------------------------|---------------------|----------------------|----------------------|---------------------|---------------------|
| Output cable cross-sectional area | ≥ 25mm <sup>2</sup> | 25-35mm <sup>2</sup> | 35-50mm <sup>2</sup> | ≥ 70mm <sup>2</sup> | ≥ 95mm <sup>2</sup> |

### 3.2 Panel function

| S/N | Part Name                | Part Function   |
|-----|--------------------------|---|
| 1   | Power indicator light    | Indicating that the welder is in power up state if turned on  |
| 2   | Data display instrument  | Displaying the preset current value   |
| 3   | Overheat indicator light | Warning that the internal temperature is too high and in the overheat protection state if turned on |
| 4   | Thrust control knob      | Adjusting the thrust current magnitude  |
| 5   | Current control knob     | Adjusting the output current magnitude  |
| 6   | Positive output terminal | Connecting the welding output cable   |
| 7   | Negative output terminal | Connecting the welding output cable   |



| Model | Part Name      | Part Function                            |
|-------|----------------|--|
| 1     | Power switch   | Controlling input power ON and OFF       |
| 2     | Input terminal | Connecting the power input power cord    |
| 4     | Input sign     | Marking input voltage range              |
| 5     | Fillet         | Fixing the power cord                    |
| 6     | Earth stud     | Connecting the power cord earth wire     |
| 7     | Radiator fan   | Forcing air cooling and heat dissipation |





# 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**

- Routine inspection is vital for the high use performance and safe operation of the welder.
- The routine inspection shall be conducted according to items in the table below, and cleaning or replacement shall be conducted if necessary.
- For the purpose of ensuring the high performance of the welder, the components provided or recommended by our company shall be used for the replacement of components.

Table 4-1 Routine Inspection Contents of the Welder

| Item               | Inspection Requirements  | Remarks   |
|--------------------|--|---|
| Front panel        | Check whether parts and components are damaged or loose;<br>Check whether the quick output socket is tightened;<br>Observe whether the fault indicator light is on.  | The quick outlet terminal on the front panel is the item of regular inspection. In case of any nonconformity, the interior of the welder shall be checked, the fastener supplemented, or the components replaced. |
| Rear panel         | Check whether the input power cord and the buckle are intact and whether the air inlet is clear and free of foreign objects.   |   |
| Upper cover        | Check whether the bolt is loose.   | In case of nonconformity, the fastener shall be supplemented or the component replaced.   |
| Bottom plate       | Check whether the screws on the bottom plate are loose.  |   |
| Routine inspection | Check whether there is color fading or overheating;<br>Check whether the sound of the fan is normal when the welder is working;<br>Check whether there is odor, abnormal vibration and noise when welding. | If abnormal conditions occur, check the inside of the welder.   |

Table 4-2 Routine Inspection Contents of the Cable

| Item        | Inspection Requirements  | Remarks  |
|-------------|--|--|
| Front panel | Check whether the safety earth wire falls off, including the working earth wire and the welder earth wire.   | In case of conformance, the fastener shall be supplemented or the component replaced.  |
| Rear panel  | Check whether the insulation layer of the cable is worn or damaged or whether the conductive parts are exposed;<br>Check whether the cable is stretched by abnormal external force;<br>Check whether the cable is firmly connected with the workpiece. | To ensure safe and normal welding, appropriate methods should be used for comparison inspection according to the conditions on the job site. |

#### 4.2 Regular inspection

##### ATTENTION

To ensure safety, regular inspections must be carried out by professionals. Regular inspection must be carried out after the power supply of the distribution box and the unit are turned off to avoid causing electric shock, burns and other personal injuries. Because of the capacitor discharge, it is necessary to cut off the power supply of the welder and wait for 5 minutes before inspection.



##### CAUTION

- All maintenance and repair work must be done with the power completely disconnected. Please make sure the power is unplugged before opening the housing.
- When the welder is energized, keep your hands, hair and tools away from the live parts inside such as fan in case of personal injury or damaging the welder.



##### REGULAR INSPECTION

- Check the internal circuit connection of the welder regularly to make sure that the circuit connection is correct and the connection head is firm (especially the insert connector or component). If rust or looseness is found, sand paper should be used to grind off the rust layer or oxidation film, reconnect it and tighten it.
- Check all cable insulated leathers regularly for any breakage, or else bind up or replace the cable.



##### BEWARE OF STATIC ELECTRICITY

- To avoid electrostatic damage to semiconductor components and circuit boards, please wear anti-static devices, or by touching the metal parts of the case to remove static electricity beforehand touching the wiring conductor and circuit board inside the welder.



### KEEP DRY

- Avoid water or water vapor entering the welder. Dry it if damped inside. Then, 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 abnormalities are found.
- If the welder is idle for a long time, put it in the original packaging case and stored in a dry environment.



### PAY ATTENTION TO MAINTENANCE

- To ensure the long-term normal use of the equipment, regular inspection must be carried out. Regular inspection should be meticulous, including internal inspection and cleaning of the equipment.  
Regular inspection is usually carried out once every 6 months, but if the welding site is full of dust or oily fumes, 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

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

| Failure  | Troubleshooting   |
|--|---|
| <p>The power indicator light/gauge does not light up.<br/>The fan does not run and there is no welding output.</p> | <p>a. Check whether the power network pressure is normal.<br/>b. Check whether the input cable is reliably connected to the power switch and whether the power switch can be turned on and off normally.<br/>c. Check whether circuit board patchcords are reliably connected.<br/>d. Check whether the rectifier, IGBT single tube, and secondary rectifier diode are damaged; if damaged, replace them.<br/>e. First charge it with electricity. Set the digital multimeter to DC voltage 1000V, measure the power board DC supply (220V: 310V; 380V: 540V). If there is, replace the main board, or else change the power board.</p> |
| <p>The power indicator light/gauge is on.<br/>The fan does not run and there is welding output.</p>                | <p>a. The power supply part of the fan is damaged. Check and replace.<br/>b. The fan is damaged. Replace it.</p>  |

| Failure   | Troubleshooting  |
|---|--|
| When the fan is running, the welding output current is not stable or not controlled by the potentiometer (sometimes high, sometimes low). | <ul style="list-style-type: none"> <li>a. Check whether the power network pressure is normal.</li> <li>b. Check whether the patchcord on the control board is reliably connected or in poor contact.</li> <li>c. Check whether the current potentiometer is damaged. Replace it if so.</li> <li>d. Change the main board</li> </ul>  |
| The fan rotates, and the power indicator light or gauge is on, no welding output.   | <ul style="list-style-type: none"> <li>a. There is break or poor contact at the output end connection.</li> <li>b. Use a multimeter to measure the supply voltage from the power supply board to the main board to see if it is (220V: 310V; 380V: 540V); if not, the rectifier may be disconnected or the patchcord is not properly removed or the electrolytic capacitor leaks.</li> <li>c. IGBT single tube or IGBT module is damaged. Replace it.</li> <li>d. The control circuit board is faulty. Replace it.</li> <li>e. The diode on the secondary rectifier board is damaged. Replace it.</li> </ul> |
| The fan rotates, the abnormality indicator light on, no welding output.   | <ul style="list-style-type: none"> <li>a. Overheat protection, which can recover 5-10 minutes later. In the meantime, check whether the fan is working normally.</li> <li>b. The temperature control switch is damaged and normally closed. Replace it.</li> <li>c. The main board is damaged. Replace it.</li> </ul>  |
| The welding clamp is hot.   | <ul style="list-style-type: none"> <li>a. The rated current of the welding clamp is less than the actual current used. Change to a larger welding clamp.</li> <li>b. Check whether the fastening screw or handle wire of the welding clamp is securely connected.</li> </ul>   |
| Massive splatter  | Output polarity connection is not reasonable. Adjust the output positive and negative polarities.  |

## 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 procedure, or contact your local dealer.

Our company promises to guarantee the product for one year. The warranty period is based on the purchase time recorded on the warranty card or purchase invoice. If the damage is caused due to abnormal use, it is beyond the scope of warranty but can be handled in a maintenance way.

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