



**TIG200PACDC PFC**

**TIG200PACDC**

**IGBT INVERTER WELDER**

**Thank you for selecting this new JASIC welder equipment!**

This operating manual contains important information on the use and maintenance of this product, as well as safe handling of the product. Please refer to technical parameters of the equipment in Technical Parameter section in this manual, and read the manual carefully before using the equipment for the first time. For your own safety and that of your working environment, please pay particular attention to the safety instructions in the manual and operate the equipment according to the instructions. For more information on JASIC products, please contact JASIC Technology, consult an authorized JASIC dealer or visit JASIC website at [www.jasictech.com](http://www.jasictech.com).

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**Disclaimer**

**Shenzhen JASIC Technology Co., Ltd.** solemnly promises that this product is manufactured according to relevant domestic and international standards, and that this product conforms to EN60974-1 International Safety Standard. Patents protect the relevant design scheme and manufacturing technology adopted in this product.

1. Whilst every effort has been made to ensure that the information contained within this manual is complete and accurate, no liability can be accepted for any errors or omissions. Please note products are subject to continual development and may be subject to change without notice.
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**For your safety, please read this manual carefully before installing and operating this JASIC equipment.**

**Pay extra attention to all content marked with "  ".**

**All operations must be carried out by professional, suitably qualified persons!**

# 1. Safety precautions

## 1.1. General safety



### SAFETY INSTRUCTION

These general safety norms cover both arc welding machines and plasma cutting machines unless otherwise noted.

It is important that users of this equipment protect yourselves and others from harm or even death.

The equipment must only be used for the purpose it was designed for. Using it in any other way could result in damage or injury and in breach of the safety rules.



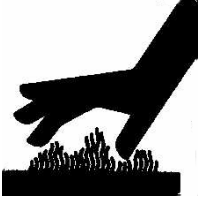

Only suitably trained and competent persons should use the equipment.

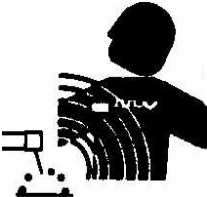


Pacemaker wearers should consult your doctor prior to using this equipment

PPE and workplace safety equipment must be compatible for the application of work involved.

Always carry out a risk assessment before carrying out any welding or cutting activity

	<p><b>Only qualified personnel should operate this machine!</b></p> <ul style="list-style-type: none"> <li>·Always use the appropriate personal protective equipment.</li> <li>·Always pay attention to the safety of other persons around the welding zone</li> <li>·Do not carry out any maintenance with the power on the machine</li> </ul>
	<p><b>Electric shock—May cause serious injury or even death!</b></p> <ul style="list-style-type: none"> <li>·The equipment should be installed by a qualified person and in accordance with current standards in operation. It is the user's responsibility to ensure that the equipment is connected to a suitable power supply. Consult with your utility supplier if required. Do not use the equipment with the covers removed.</li> <li>·Do not touch live electrical parts or parts, which are electrically charged.</li> <li>·Turn off all equipment when not in use.</li> </ul>
	<p><b>Fumes and gases—May be hazardous to your health.</b></p> <p>Locate the equipment in a well-ventilated position and keep your head out of the welding fume.</p> <p>Do not breathe the welding fume.</p> <p>Ensure the welding zone is well ventilated and provision should be made for suitable local fume extraction system to be in place.</p> <p>If ventilation is poor, wear an approved air fed welding helmet or respirator.</p> <p>Read and understand the Material Safety Data Sheets (MSDS's) and the manufacturer's instructions for metals, consumable, coatings, cleaners and de-greasers.</p> <p>Do not weld in locations near any de-greasing, cleaning or spraying operations.</p> <p>Be aware that heat and rays of the arc can react with vapors to form highly toxic and irritating gases.</p>

	<p><b>Arc rays—May injure the eyes and burn the skin.</b></p> <p>Welding arc rays from all welding processes produce intense, visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin.</p> <ul style="list-style-type: none"> <li>·Wear an approved welding helmet fitted with an appropriate shade of filter lens to protect your face and eyes when welding or watching.</li> <li>·Wear approved safety glasses with side shields under your helmet.</li> <li>·Never use broken or faulty welding helmets.</li> <li>·Always ensure there are adequate protective screens or barriers to protect others from flash, glare and sparks from the welding area.</li> <li>·Ensure that there are adequate warnings that welding or cutting is taking place.</li> <li>·Wear suitable protective flame resistant clothing, gloves and footwear.</li> </ul>
	<p><b>Precautions against fire and explosion</b></p> <p>Avoid causing fires due to sparks and hot waste or molten metal.</p> <p>Ensure that appropriate fire safety devices are available near the welding and cutting area.</p> <p>Remove all flammable and combustible materials from the welding, cutting and surrounding areas.</p> <p>Do not weld or cut fuel and lubricant containers, even if empty. These must be carefully cleaned before they can be welded or cut.</p> <p>Always allow the welded or cut material to cool before touching it or placing it in contact with combustible or flammable material.</p> <p>Do not work in atmospheres with high concentrations of combustible fumes, flammable gases and dust.</p> <p>Always check the work area half an hour after cutting to make sure that no fires have begun.</p> <p>Take care to avoid accidental contact of electrode to metal objects. This could cause arcs, explosion, overheating or fire.</p>
	<p><b>Risks due to hot material ·</b></p> <p>The welding process will create hot metal, sparks and drips of molten metal, so it's very important to ensure the operator is equipped with full PPE and to always ensure there are adequate protective screens or barriers to protect others from flash, glare and sparks from the welding area. Hot surfaces will create fires and will burn any exposed skin.</p> <p>Always protect your eyes and body. Use the correct welding screen and filter lens and wear full PPE protective clothing.</p> <p>Do not touch any hot surfaces or parts bare handed.</p> <p>Always allow hot surfaces and parts to cool down first before touching or moving.</p> <p>If you are required to move hot parts, ensure you use proper tools and insulated welding gloves (PPE) to prevent burns to your hands and arms.</p>
	<p><b>Noise—Excessive noise may be harmful to hearing</b></p> <ul style="list-style-type: none"> <li>·Protect your ears by ear shields or other hearing protectors.</li> <li>·Give warning to nearby personnel that noise may be potentially hazardous to hearing.</li> </ul>

	<p><b>Risks due to magnetic fields</b></p> <p>The magnetic fields created by high currents may affect the operation of pacemakers or electronically controlled medical equipment.</p> <p>Wearers of vital electronic equipment should consult their physician before beginning any arc welding, cutting, gouging or spot welding operations.</p> <p>Do not go near welding equipment with any sensitive electronic equipment as the magnetic fields may cause damage.</p> <p>Keep the torch cable and work return cable as close to each other as possible throughout their length, this can help minimize your exposure to harmful magnetic fields.</p> <p>Do not wrap the cables around the body.</p>
	<p><b>Protection from moving parts</b></p> <p>When the machine is in operation keep away from moving parts such as motors and fans.</p> <p>Moving parts, such as the fan, may cut fingers and hands and snag garments.</p> <p>Protections and coverings may be removed for maintenance and controls only by qualified personnel after first disconnecting the power supply cable.</p> <p>Replace the coverings and protections and close all doors when the intervention is finished and before starting the equipment.</p> <p>Take care to avoid getting fingers trapped when loading and feeding wire during set up and operation.</p> <p>When feeding wire be careful to avoid pointing it at other people or towards your body.</p> <p>Always ensure machine covers and protective devices are in operation.</p>
	<p><b>Troubleshooting</b></p> <p>Before arc-welding machines are dispatched from the factory, they have already been checked thoroughly. The machine should not be tampered with or altered. Maintenance must be carried out carefully. If any wire becomes loose or is misplaced, it may be potentially dangerous to user!</p> <p>Only professional maintenance personnel should repair the machine!</p> <p>Ensure the power is disconnected before working on the machine. Always wait 5 minutes after power switch off before removing the panels.</p> <p>If you still do not fully understand or cannot solve the problem after reading the instructions in this manual, you should contact the supplier or JASIC's service center immediately for professional help.</p>

## 1.2. Other precautions



### **Warning! Location**

The machine should be located in a suitable position and environment. Care should be taken to avoid moisture, dust, steam, oil or corrosive gases. Place on a secure level surface and ensure that there is adequate clearance around the machine to ensure natural airflow.



**Warning!** The handle or strap on the welder is only suitable for manual lifting of the welder. If mechanical equipment such as crane is used to lift the welder, please ensure the welder is secured with suitable lifting equipment.



### **Warning!**

#### **Input connection**























Before connecting the machine, you should ensure that the correct supply is available. Details of the machine requirements can be found on the data plate of the machine or in the technical parameters shown in the manual. The equipment should be connected by a suitably qualified competent person. Always ensure the equipment has a proper grounding.

**Never connect the machine to the mains supply with the panels removed.**

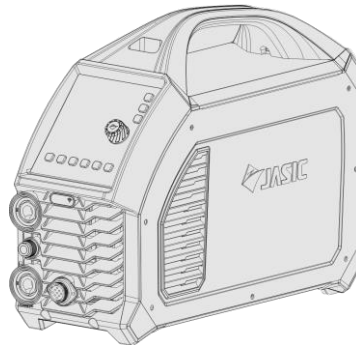
- 1) When the operator's movement is limited by the surroundings (for example, the operator can only bend his knees, barefoot, or lie down during operation), the operator shall practice proper insulation and avoid direct contact with conductive parts on the equipment.
- 2) Do not use the welder in closed containers in narrow spaces where conductive components cannot be removed.
- 3) Do not use the welder in humid environments where the operator is prone to the risk of electric shock.
- 4) Do not weld in sunlight or rain, and no water or rainwater shall seep into the welder.
- 5) Do not perform gas shielded welding in an environment with strong air flow.
- 6) Avoid welding in dusty area or environment with corrosive chemical gas.
- 7) The ambient temperature must be between -10° C and 40°C during operation and between -25°C and 50°C during storage.
- 8) Welding shall be carried out in a relatively dry environment, and the air humidity shall not exceed 90%.
- 9) The inclination of the welder shall not exceed 10°.
- 10) Ensure that the input power supply voltage does not exceed 15% of the rated voltage of the machine.
- 11) Beware of falling when welding at heights.



## 2. Description of symbols

 <b>Warning! Read the Manual</b>	<b>A</b> Current unit "A"
 <b>WEEE tag</b>	<b>S</b> Time unit "S"
 <b>Overheat indicator</b>	<b>%</b> Percentage
 <b>Overcurrent indicator</b>	<b>Hz</b> Frequency unit "Hz"
 <b>VRD function indicator</b>	 <b>Lift TIG mode</b>
 <b>Warning tag</b>	 <b>Wireless remote control indicator</b>
 <b>MMA mode</b>	 <b>Pairing of minimalist wireless remote controller (optional)</b>
 <b>MMA current</b>	 <b>Remote control key</b>
 <b>Hot start current of MMA</b>	 <b>Smart gas</b>
 <b>Arc force of MMA</b>	 <b>Water cooler function</b>
 <b>Other function switching</b>	 <b>Parameter adjustment and confirmation key</b>
 <b>Welding mode switching</b>	 <b>DC mode</b>
 <b>HF arc starting mode</b>	 <b>Pulse mode</b>

### 3. Product overview



This is a digital inverter AC/DC welder featuring advanced technology which provides complete functions and excellent performance. It **supports AC TIG (optional square wave, triangular wave and sine wave), AC pulse TIG, DC TIG, DC pulse TIG, SMAW (DC), and TIG spot welding (DC/AC), and can be widely used for precise welding of an extensive range of materials.** The unique electrical structure and air passage design inside the machine increases the dissipation of heat generated by power devices, thus improving the duty cycle of the machine. Benefitting from the unique air passage, the equipment can effectively prevent damage to power devices and control circuits from dust drawn in by the fan, thus greatly improving the reliability of the equipment.

**Note: The functions described below are only an overview of the series. The specific functions may depend on the model.**

The main functions are:

- ◆ Multiple welding modes and optional torch control mode.
- ◆ Real-time output current display: Easily displays the output state of the welder.
- ◆ Dynamic LED display of operating state: Immediately displays the current operating state.
- ◆ Anti-stick function: Prevents the welding electrode from sticking to the workpiece during welding.
- ◆ VRD function: Protects the operator from high-voltage electric shock when the machine is not working.
- ◆ MMA hot start function: Makes MMA arc starting easier and more reliable.
- ◆ Smart fan control: Prolongs the lifespan of the fan and reduces accumulation of dust inside the machine.
- ◆ TIG welding: Supports both contact and non-contact arc starting. Non-contact arc starting includes a high-voltage arc starting circuit for a high arc starting success rate.
- ◆ Parameters are automatically saved before shutdown, and the settings are restored after starting again.
- ◆ Compatible with various remote control methods: The plus version supports analog/digital remote control torch, wired/wireless foot pedal controller, and wireless handheld remote controller in TIG mode, and supports wired/wireless handheld remote controller in MMA mode; and the standard version supports analog remote control torch, wired foot pedal controller and wired handheld remote controller. Of course, wireless remote control requires a separate special receiver module and remote controller.

## 4. Technical parameters

Item	Unit	Parameters	
Model	/	TIG200PACDC PFC	TIG200PACDC
Input voltage	VAC	AC115±15%~230V±15%	AC230V±15%
Input frequency	Hz	50/60	50/60
Rated input current (AC230V)	A	21.1@TIG 22.7@MMA	25@TIG 27@MMA
Rated input current (AC115V)	A	32.2@TIG 34.1@MMA	/
Rated input power (AC230V)	kVA	4.7@TIG 5.6@MMA	6.0@TIG 7.0@MMA
Rated input power (AC115V)	kVA	3.5@TIG 3.9@MMA	/
Output current range (TIG)	A	230V: 5~200 115V: 5~160	5~200
Output current range (MMA)	A	230V: 10~160 115V: 10~120	10~160
Rated working voltage (AC230V)	V	18@TIG 26.4@MMA	18@TIG 26.4@MMA
Rated working voltage (AC115V)	V	16.4@TIG 14.8@MMA	/
Arc force current range	A	0~40	0~40
Hot start current range	A	0~80	0~80
No-load voltage	V	65	60
VRD voltage	V	11.5	11.5
AC output frequency	Hz	20~250	20~250
AC balance	%	20~60	20~60
Base current	A	5~200	5~200
Pulse frequency (DC)	Hz	0.5~200	0.5~200
Pulse frequency (AC)	Hz	AC frequency: 20Hz Pulse frequency: 0.5-2Hz	AC frequency: 20Hz Pulse frequency: 0.5-2Hz
		AC frequency: 250Hz Pulse frequency: 0.5-25Hz	AC frequency: 250Hz Pulse frequency: 0.5-25Hz
Pulse duty factor	%	10~90	10~90
Pre-flow time	S	0~3	0~3
Post-flow time	S	0~15	0~15

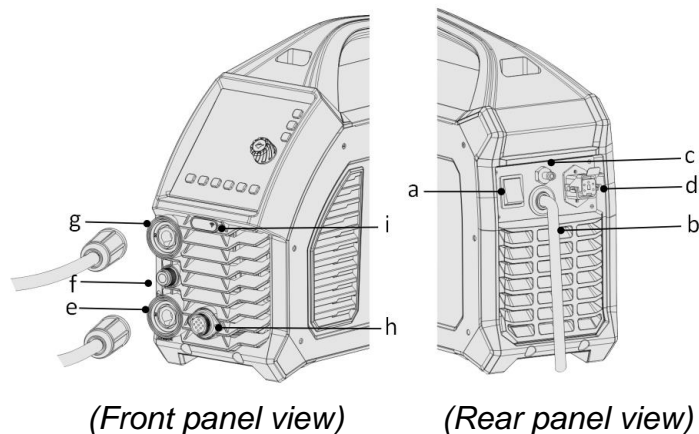
Up-slope time	S	0~10	0~10
Down-slope time	S	0~10	0~10
Spot welding time	S	0.1-10	0.1-10
Arc start mode	/	HF arc starting and lift arc starting	HF arc starting and lift arc starting
Duty cycle	%	TIG: 25% MMA: 30%	TIG: 25% MMA: 20%
Efficiency	%	80	80
Power factor	/	0.95	0.75
Insulation class	/	H	H
Protection class	/	IP23S	IP23S
Dimensions L*W*H	mm	490*165*341	490*165*341
Dimensions of package L*W*H	mm	735*230*440	735*230*440
Net weight	Kg	11.8	11.7
Overall total weight	Kg	16.8	16.8
Characteristics	/	CC	CC
Pollution level	/	Grade 3	Grade 3

## 5. Installation



**Warning!** All connections shall be made with the power supply is turned off.  
**Warning!** Electric shock may cause death; after power failure, there is still a high voltage on the equipment, do not touch the live parts on the equipment.  
**Warning!** Incorrect input voltage may damage the equipment.  
**Warning!** This product meets the requirements of Class A equipment in EMC requirements and is not to be connected to a residential low-voltage power supply grid.

### 5.1. External interface description



- a. Power switch
- b. Input power cord
- c. Inlet nozzle
- d. Water cooler socket (plus version only)
- e. Negative polarity
- f. TIG welding torch gas connector
- g. Positive polarity
- h. 9-pin aviation socket (plus)/7-pin aviation socket (standard)
- i. Wireless receiver module (plus: optional; standard: N/A)

## 5.2. Power installation

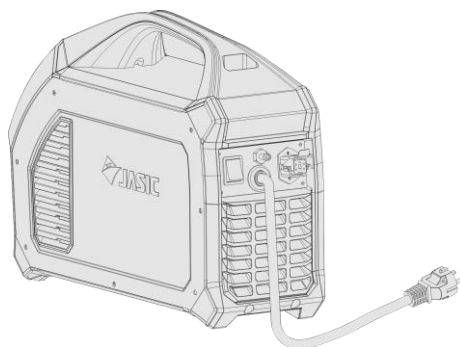


**Warning! The electrical connection of equipment shall be carried out by suitably qualified personnel.**

**Warning! All connections shall be made after the power supply is off.**

**Warning! Incorrect voltage may damage the equipment.**

- 1) Connect the welder with voltage grade corresponding to its input voltage. Do not connect it to the wrong grade.
- 2) Ensure that the input power cable is in good contact with the power terminal or socket.
- 3) Ensure the input voltage value is within the specified input voltage range.
- 4) Ground the power supply well. (As shown in the diagram, the European plug has a grounding terminal, so no additional grounding is required.)
- 5) Ensure that the power switch of the welder itself is turned off.

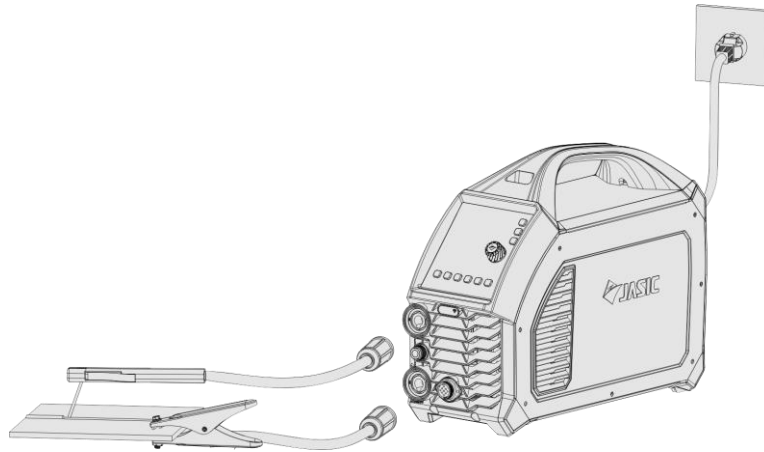


(Wiring diagram)

### **NOTE!**

**If the input cable needs to be extended, please use a cable with larger cross-sectional area to reduce the voltage drop, 3x2.5mm<sup>2</sup> or more is recommended.**

### 5.3. MMA electrode holder and earth cable connection



(Wiring diagram)

Pay attention to the polarity of wiring before performing MMA welding. Generally, there are two connection methods of DC welder: DCEN and DCEP.

DCEN: The electrode holder is connected to the negative polarity, and the workpiece is connected to the positive polarity;

DCEP: The electrode holder is connected to the positive polarity, and the workpiece is connected to the negative polarity.

The operator can also choose DCEN based on the base metal and electrode. Generally speaking, DCEP is recommended for basic electrodes (i.e., electrode connected to the positive polarity), while no special provisions are made for acid electrodes.

- 1) Ensure that the power switch of the welder is turned off.
- 2) Insert the cable plug with electrode holder into the corresponding socket on the front panel of the welder and tighten it clockwise.
- 3) Insert the cable plug with earth clamp into the corresponding socket on the front panel of the welder and tighten it clockwise.

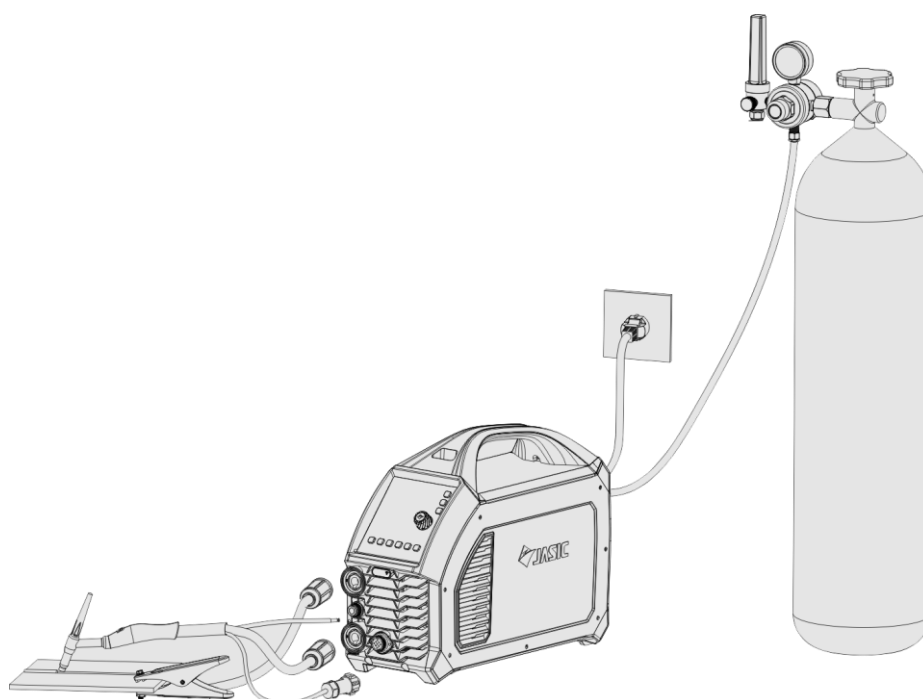
**NOTE! If you want to use long secondary cables (Electrode holder cable and earth cable), you must ensure that the cross-sectional area of the cable is increased appropriately in order to reduce the voltage drop due to the cable length.**

## 5.4. TIG welding torch and earth cable connection

- 1) Ensure that the power switch is turned off.
- 2) Insert the cable plug with the earth clamp into the positive socket on the front panel of the welder and tighten it clockwise.
- 3) Insert the cable plug of the welding torch into the corresponding negative socket on the front panel of the welder and tighten it clockwise.

**Note! The positive and negative polarities should not be reversed as this will prevent normal welding operation.**

- 4) Insert the gas connector of the welding torch into the gas outlet on the front panel.
- 5) Connect the gas hose of the argon cylinder to the inlet nozzle on the rear panel of the machine.

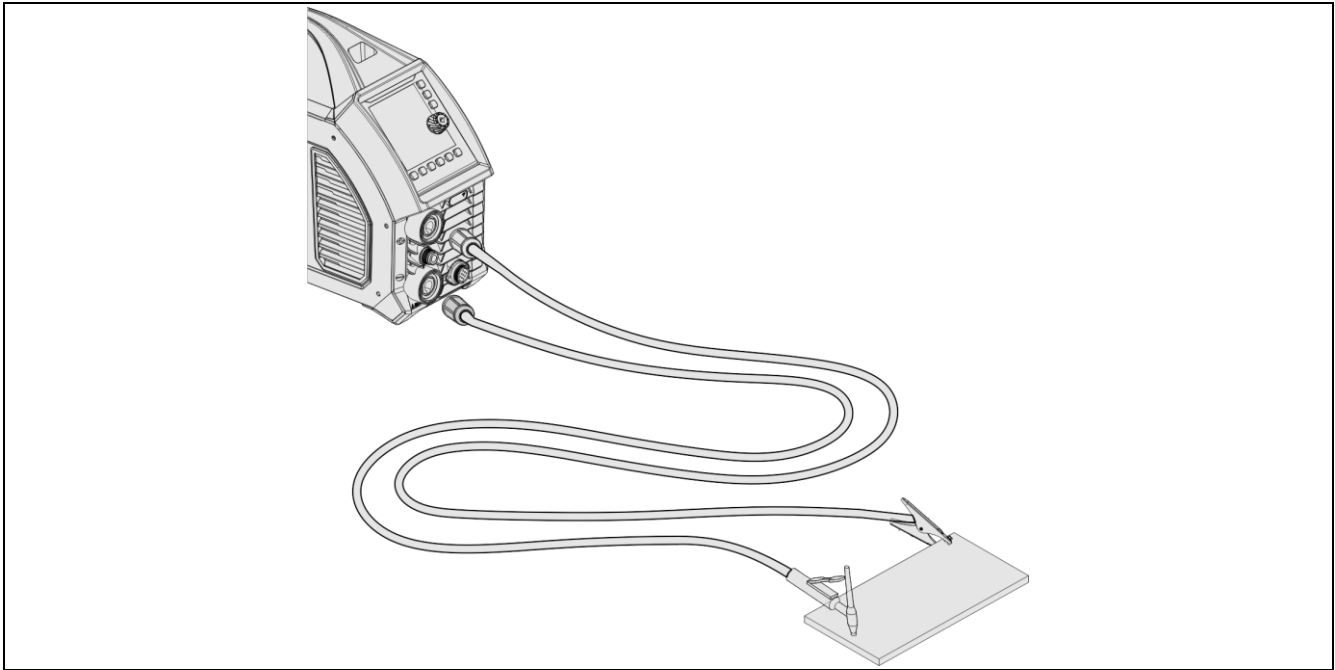


(Wiring diagram)

**NOTE! If you want to use long secondary cables (TIG torch cable and earth cable), you must ensure that the cross-sectional area of the cable is increased appropriately in order to reduce the voltage drop due to the cable length.**

- 6) In AC TIG welding mode, shorten the power cable as much as possible. If the cable must be extended, pay attention to the following:
  - Bind the cables for the base metal and the welding torch together.
  - Straighten the cable as much as possible.
  - If the cable cannot be straightened, place the welding torch cable across the base metal.

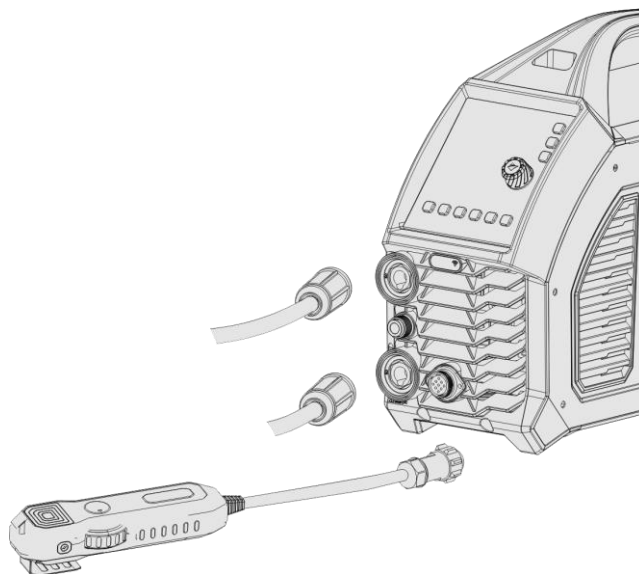




- If excessive cable must be wound up, refer to the following good practices

Bad practice	Good practice
Do not wind up the excessive cable along the same direction.	Wind up the same number of turns in the cable winding direction and the opposite direction, and stack them together.
<p>The diagram shows the welding power source and workpiece. The excess cable is wound into a coil. The winding direction is indicated by a curved arrow. A large red 'X' is placed in the bottom left corner of the diagram area.</p>	<p>The diagram shows the welding power source and workpiece. The excess cable is wound into a coil. The winding direction is indicated by a curved arrow. A large green checkmark is placed in the bottom left corner of the diagram area.</p>

## 5.5. Wired handheld remote controller connection (optional)

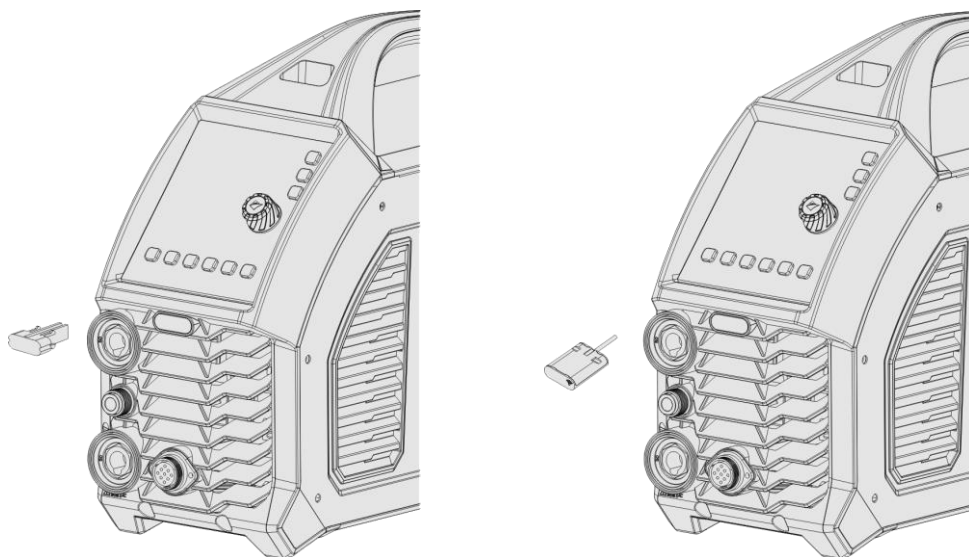


(Wiring diagram)

Insert the aviation plug of the handheld remote controller directly into the corresponding aviation socket of the machine.

**NOTE: Please check that the machine supports wired handheld remote controller before installation.**

## 5.6. Installation of wireless receiver module (optional)



(Installation drawing)

Remove the plug shown in above left figure, and refit into the space the wireless receiver module shown in above right figure.

- 1) Remove the screws on the left cover of the machine.
- 2) Remove the buckle inside the front panel of the machine and pull out the plug.
- 3) Insert the wireless receiver module to the front panel, and then connect the connection line

of the receiver module to the CN2 socket on the control panel PK-442.





**Note! Check with the seller whether the hardware and software versions of the machine support wireless remote controller before purchasing.**









## 6. Control panel







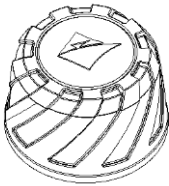
### 6.1. HD digital panel


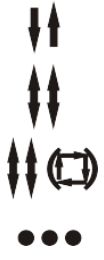





### 6.2. Function table of plastic display panel

a	Enable remote control		<ol style="list-style-type: none"> <li>1. Before welding, press the remote control function key  to enable the remote control function;</li> <li>2. If the indicator  is on, it indicates that the remote control function is enabled. If the remote controller is connected, the remote controller controls the welding current. If no remote controller is not connected, the welding current is controlled by the panel adjuster.</li> <li>3. If the indicator  is off, it indicates that the remote</li> </ol>
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			control function is disabled; and the welding current is controlled by the panel adjuster.
b	Protection indicators		If the overheat indicator is on, it indicates that the welder is in overheat protection and the has stopped output.
			If the overcurrent indicator is on, it indicates that the welder is in overcurrent protection and the has stopped output.
			If the VRD indicator is on, it indicates that the VRD function is enabled.
c	Parameter and error code display		The meter shows the parameter value; "A" is the current unit indicator. The "A" indicator will flash when it is switched to the current parameter. "S" is the time unit indicator. The "S" indicator will be on when it is switched to the time parameter. "%" is the duty ratio indicator. The "%" indicator will be on when it is switched to duty-ratio parameters. "Hz" is the frequency unit indicator. The indicator will be on when it is switched to frequency.
d	Smart gas		If the indicator  is on, it indicates that the machine is in Smart gas mode. This function automatically matches the appropriate post-flow time according to the user's welding specifications, which can effectively save the amount of argon.
e	Water cooler control (plus version only)		<p>1. Press the water cooler control key  to enable or disable water-cooled mode.</p> <p>2. If the indicator  is on, it indicates that water-cooled mode is enabled. If current is output during welding, the water in the water cooler will circulate; if there is no current output, the water will stop circulating after 5 minutes.</p> <p>3. Water-cooled mode is recommended when using the water-cooled torch; otherwise, the welding torch will be easily damaged.</p>
f	TIG parameters	<b>T<sub>pre</sub></b>	Pre-flow time indicator. When the indicator is on, it indicates the pre-flow protection time.
		<b>I<sub>s</sub></b>	Initial current indicator. When the indicator is on, it indicates the initial current.
		<b>T<sub>up</sub></b>	Up-slope time indicator. When the indicator is on, it indicates the time until the initial current reaches the

			peak current.
		<b>I<sub>p</sub></b>	Peak current indicator. When the indicator is on, it indicates the welding current.
		<b>I<sub>b</sub></b>	Base current indicator. When the indicator is on, it indicates the pulse base current.
		<b>T<sub>down</sub></b>	Down-slope time indicator. When the indicator is on, it indicates the time until the peak current drops to the finish current.
		<b>I<sub>f</sub></b>	Finish current indicator. When the indicator is on, it indicates the finish current.
		<b>T<sub>post</sub></b>	Post-flow time indicator. When the indicator is on, it indicates the post-flow time.
		 Hz	AC frequency indicator. When the indicator is on, it indicates the AC frequency.
			AC balance indicator. When the indicator is on, it indicates the ratio of tungsten anode time to the AC cycle.
			Duty-ratio indicator. When the indicator is on, it indicates the ratio of peak current time to pulse period.
		 Hz	Pulse frequency indicator. When the indicator is on, it indicates the pulse frequency.
		<b>T...</b>	Spot welding time indicator. When the indicator is on, it indicates the spot welding time.
		 Hz	Mixed frequency indicator. When the indicator is on, it indicates the mixed AC frequency.
			Mixed duty-cycle indicator. When the indicator is on, it indicates the ratio of DC time to the mixture period.
g	Parameter adjustment knob		<ol style="list-style-type: none"> <li>1. Rotate the adjustment knob to adjust the parameters.</li> <li>2. Rotate the knob clockwise to increase the value, and counterclockwise to decrease the value.</li> <li>3. When the knob is rotated, the adjustment is displayed in the parameter display area. The progress bar on the left side of the knob is adjusted proportionally with the value.</li> </ol>





h	Function selection		<p>Press the welding mode button to switch the welding mode.</p> <ol style="list-style-type: none"> <li>1. AC TIG indicator. When the indicator is on, it indicates that the machine is in AC TIG mode. AC output is suitable for welding aluminum and magnesium and their alloys.</li> <li>2. DC TIG indicator. When the indicator is on, it indicates that the machine is in DC TIG mode. DC output is suitable for welding carbon steel, copper and stainless steel.</li> <li>3. Mixed AC-DC indicator. When the indicator is on, it indicates that the machine is in Mix AC_DC mode. Mixed AC-DC output is suitable for welding thicker aluminum and magnesium and their alloys.</li> <li>4. MMA indicator. When the indicator is on, it indicates that the machine is in MMA mode.</li> </ol>
			<p>Press the operation mode key to switch the operation mode.</p> <ol style="list-style-type: none"> <li>1. 2T indicator. When the indicator is on, it indicates that the machine is in 2T mode.</li> <li>2. 4T indicator. When the indicator is on, it indicates that the machine is in 4T mode.</li> <li>3. Repeat mode indicator. When the indicator is on, it indicates that the machine is in cycle mode.</li> <li>4. Spot welding indicator. When the indicator is on, it indicates that the machine is in spot welding mode.</li> </ol>
			<p>Press the pulse selection key to switch between pulse and no pulse.</p> <ol style="list-style-type: none"> <li>1. No-pulse indicator. When the indicator is on, it indicates there is no pulse.</li> <li>2. Pulse indicator. When the indicator is on, it indicates pulse mode.</li> </ol> <p>Generally, the low-frequency pulse frequency is 0.5-10Hz. The interaction between heating and cooling can reduce deformation by reducing the average current. Low-frequency pulse current, coupled with proper welding speed, can form fish-scale welds. It is also convenient to use the wire filling device with low-frequency pulses to optimize the weld formation. The pulses oscillate the molten pool and improve the microstructure of the weld. High-frequency pulses can enhance the concentration and stiffness of the arc.</p>

			Stable arcs can increase the depth of the molten pool and improve the welding speed.
			<p>Press the waveform selection key to switch the output waveform in AC mode.</p> <ol style="list-style-type: none"> <li>1. Square wave indicator. When the indicator is on, it indicates that the machine is in square wave mode. Standard AC square waves quickly switch polarity, enjoying high arc stability, good dynamic characteristics, and strong ability to clean aluminum oxide film. This mode is suitable for welding a wide range of aluminum and aluminum alloys.</li> <li>2. Triangular wave indicator. When the indicator is on, it indicates that triangular wave mode is selected. Triangular waves reduce the heat input, so the weld can form rapidly, reducing the welding deformation. This mode is suitable for thin-plate welding.</li> <li>3. Sine wave indicator. When this indicator is on, it indicates that sine wave mode has been selected. Sine waves have less arc noise and are softer.</li> </ol>
			<ol style="list-style-type: none"> <li>1. Press the MMA parameter key to switch the function.</li> <li>2. Welding current indicator. When the indicator is on, it indicates that the MMA welding current has been selected.</li> <li>3. Hot start indicator. When the indicator is on, it indicates that MMA hot start current has been selected.</li> <li>4. Arc-force current indicator. When the indicator is on, it indicates that the MMA arc-force current has been selected.</li> </ol>

## 6.3. Use of remote controller

### 6.3.1 Wireless remote controller

1) **Wireless pairing:** Before welding, press and hold the panel remote control function key



 and the pairing key of the wireless simple remote controller at the same time for two seconds to pair the wireless remote controller. During pairing, the blue wireless receiver module indicator  flashes; after successful pairing, the remote control mode indicator  will be on. At the same time, the blue indicator  of the wireless receiver module will remain on and the welder display window will display "OK".

2) **Disconnecting the wireless connection:** After the remote controller is successfully


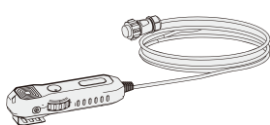
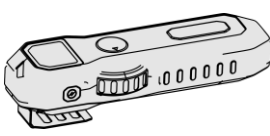
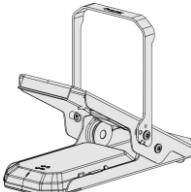
paired, press and hold the pairing key of the wireless remote controller, or the remote control function key on the panel, and the wireless connection will be disconnected. After disconnecting, the display window of the welder will display "FAL", and the green indicator

 of the wireless receiver module will remain on.

### 6.3.2 Wired remote controller

Press the remote control key , and the remote control indicator  will turn on; insert the aviation plug of the wired remote controller into the aviation socket to adjust the welding current through the remote controller.


### 6.3.3 Optional remote control models

Type	Name	Model	Host receiver module	Welding mode	Picture
Wired	Analog torch trigger	10K potentiometer Analog welding torch	None	TIG	/
	Digital torch trigger	Digital welding torch	None	TIG	/
	Wired foot remote controller	FRC-01(P1S3)	None	TIG	
	Wired handheld remote controller	HRC-01(P1S1)	None	MMA	
Wireless	Wireless handheld remote controller	HRC-02(P1S2)	Yes	TIG/MM A	
	Wireless foot remote controller	FRC-02(P1S4)	Yes	TIG	



## 6.4. Other functions

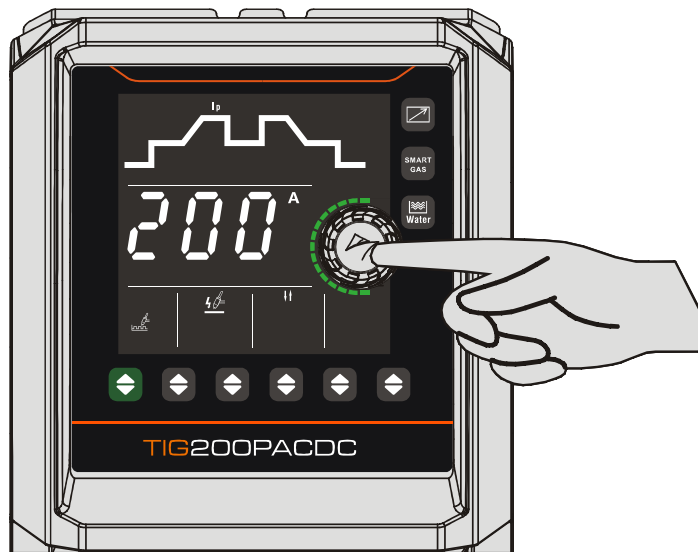
### 6.4.1 Standby

- 1) Press and hold the "Current Setting Encoder" key for 2s to start the countdown. After the 3s countdown is over, the panel displays "F01"; press the key again to enter standby response time settings.
- 2) Rotate the "Current Setting Encoder" to adjust the standby response time, increasing clockwise and decreasing counterclockwise. (The standby response time includes four levels: 0, 5, 10, 15, where 0 means disabled, and other numbers correspond to the response time, in minutes. The default value is 10.)
- 3) After adjusting the standby response time, press the "Current Setting Encoder" key to save the current settings.
- 4) Press the welding mode key  to complete the operation and exit.
- 5) The standby function is only available in TIG mode. If the machine is not used within the set response time, it will enter standby state, and only the middle bar of the first digit on the display panel will flash at a frequency of 1Hz. The machine will wake up immediately when the torch trigger, operation panel, or remote controller is used.




Standby function indicator


### 6.4.2 Input overvoltage and undervoltage protection



### Enter the Engineer mode

- 1) Press and hold the "Current Setting Encoder" key for 2s to start countdown. After the 3s countdown is over, the panel displays "F01". Rotate the "Current Setting Encoder" key clockwise to adjust the parameter to "F02", and press the key again to enter the input overvoltage and undervoltage protection settings.
- 2) Rotate the "Current Setting Encoder" key to adjust the overvoltage and undervoltage protection state, increasing clockwise and decreasing counterclockwise (0: not enabled; 1: enabled).
- 3) After adjusting the standby response time, press the "Current Setting Encoder" key to save the current settings.
- 4) Press the welding mode key  to complete the operation and exit.  
(The standard machine only supports overvoltage protection function, and this function is enabled by default.)

### 6.4.3 Restore factory settings

Press and hold the welding mode key  for 5s to restore factory settings. After holding for 1s, the display window will start to count down from 3. When the countdown ends, the factory settings are restored. If the button is released before the countdown ends, the restoration will not take place. The factory settings are as shown in Table 6-8.



Welding mode	Pre-flow time (s)	Initial current (A)	Up-slope time (s)	Peak current (A)	Base current (A)	Down-slope time (s)	Finish current (A)	Post-flow time (s)	Spot welding time (s)	Pulse frequency (Hz)	Duty cycle (%)	Welding current (A)	Hot start current (A)	Arc-force current (A)
DC TIG	0.5	20	0.5	100	—	0.5	20	2	1	—	—	—	—	—
DC pulse TIG	0.5	20	0.5	100	50	0.5	20	2	—	50	50	—	—	—
MMA	—	—	—	—	—	—	—	—	—	—	—	100	30	30


Welding mode	Pre-flow time (s)	Initial current (A)	Up-slope time (s)	Peak current (A)	Base current (A)	Down-slope time (s)	Finish current (A)	Post-flow time (s)	Spot welding time (s)	Pulse frequency (Hz)	Duty cycle (%)	AC frequency (Hz)	AC balance (%)	—
AC TIG	0.5	20	0.5	100	—	0.5	20	2	1	—	—	20	20	—
AC pulse TIG	0.5	20	0.5	100	50	0.5	20	2	—	50	50	20	20	—

Welding mode	Pre-flow time (s)	Initial current (A)	Up-slope time (s)	Peak current (A)	Base current (A)	Down-slope time (s)	Finish current (A)	Post-flow time (s)	Mixed frequency (Hz)	Mixed duty cycle (%)	AC frequency (Hz)	AC balance (%)	—	—
Mixed TIG	0.5	20	0.5	100	—	0.5	20	2	2	20	20	20	—	—

### 6.4.4 Barcode display



View barcode

Press and hold the Current Setting Encoder and Welding Mode keys  simultaneously for 3s to view the machine barcode. Press any key or rotate the encoder to immediately exit the barcode display. If you do not perform any operation on the panel, the barcode automatically exits after 20s.

### 6.4.5 VRD function




**Warning! The electrical connection of the machine must be completed by electricians with qualification certificates.**

**Warning! Electric shock may cause death; after power failure, the machine will still have high voltage, so do not touch the live parts.**

The MMA VRD mode is enabled by default in factory settings, and the user can disable it as required.

- 1) Open the right cover of the machine with the machine powered off;
- 2) Turn the DIP switch SW1 to "12" on the control panel PK-442 to disable VRD;
- 3) Put the cover back and turn on the power; switch to MMA mode and the VRD indicator

 will be on. At this time, the no-load voltage of the welder is 11.5V.

## 7. Welding function operation



**Warning!** Before turning on the power supply make sure that the electrode holder or welding torch is connected to the output, do not touch the workpiece and earth clamp. Otherwise, an unexpected arc may be started when the power is turned on in the case of MMA by default. This can cause damage to the workpiece and to personnel.



**Warning!** Be sure to wear appropriate protective equipment during welding operation. Arcs, spatter, smoke, and high temperatures produced in the welding process may cause injury to personnel.



**Warning!** After the power supply is turned off, the output voltage of the welder may continue for a period and then drop slowly. Please do not touch the conductive part of the output before the panel is extinguished.

### 7.1. Function table

Rotate the encoder to select different welding parameters as required. Regardless of no-load or welding mode, parameter selection and adjustment can be carried out without affecting the welding. Switch the mode by rolling. "●" indicates that the parameter is optional, and "x" means not optional.

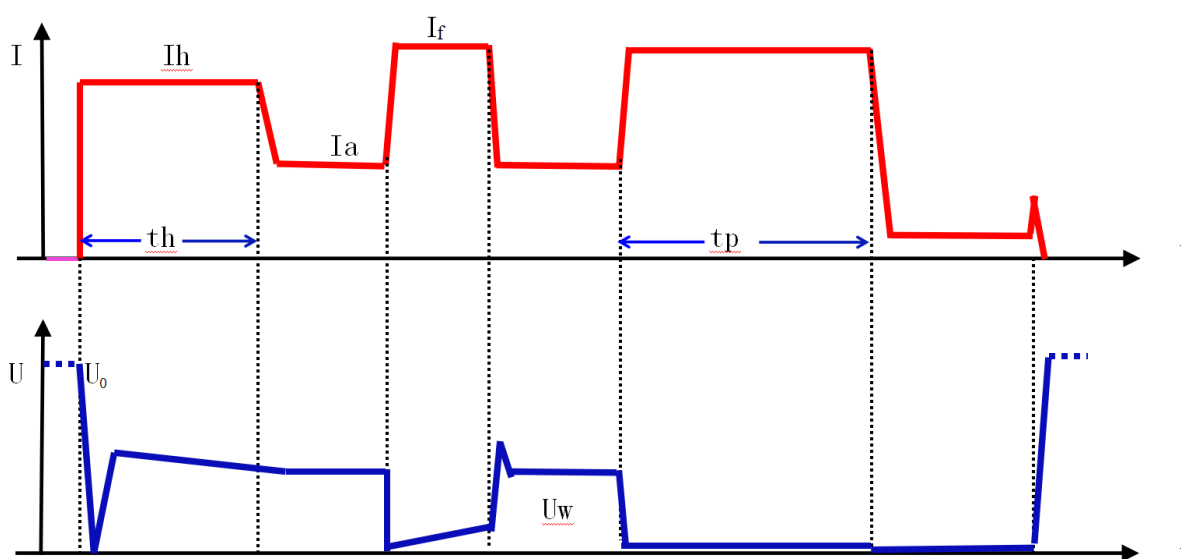
Welding mode	Torch trigger mode	MMA current	Hot start current	Arc-force current
MMA	None	●	●	●

Welding mode	Torch trigger mode	Pre-flow time	Initial current	Up-slope time	Peak current	Base current	Down-slope time	Finish current	Post-flow time	Spot welding time	AC frequency	AC balance	Pulse frequency	Pulse duty cycle
DC TIG	2T	●	●	●	●	x	●	●	●	x	x	x	x	x
	4T	●	●	●	●	x	●	●	●	x	x	x	x	x
	Repeat	●	●	●	●	x	●	●	●	x	x	x	x	x
	Spot welding	●	x	x	●	x	x	x	●	●	x	x	x	x
DC pulse TIG	2T	●	●	●	●	●	●	●	●	x	x	x	●	●
	4T	●	●	●	●	●	●	●	●	x	x	x	●	●
	Repeat	●	●	●	●	●	●	●	●	x	x	x	●	●
AC TIG	2T	●	●	●	●	x	●	●	●	x	●	●	x	x
	4T	●	●	●	●	x	●	●	●	x	●	●	x	x
	Repeat	●	●	●	●	x	●	●	●	x	●	●	x	x

	Spot welding	•	×	×	•	×	×	×	•	•	•	•	×	×
AC pulse	2T	•	•	•	•	•	•	•	•	×	•	•	•	•
	4T	•	•	•	•	•	•	•	•	×	•	•	•	•
TIG	Repeat	•	•	•	•	•	•	•	•	×	•	•	•	•

Welding mode	Torch trigger mode	Pre-flow time	Initial current	Up-slope time	Peak current	Base current	Down-slope time	Finish current	Post-flow time	Spot welding time	AC frequency	AC balance	Mixed frequency	Mixed duty cycle
Mixed TIG	2T	•	•	•	•	×	•	•	•	×	•	•	•	•
	4T	•	•	•	•	×	•	•	•	×	•	•	•	•
	Repeat	•	•	•	•	×	•	•	•	×	•	•	•	•

## 7.2. MMA operation



MMA electrode welding process

1.  $I_h$  (hot start current) =  $I_{\Delta h}$  (arc starting current) +  $I_a$  (welding current); the hot start time is fixed at  $t_h$ , which helps the arc start, and reduces the sticking tendency of welding electrode and workpiece during arc starting. The magnitude of hot start current is generally determined based on the type, specification, and welding current of the welding electrode. For welding electrodes with sound arc start performance and small diameter, generally select small hot start current; large welding current also has little requirement for hot start current. The hot

start time is correlated with the arc starting current – the greater the current, the shorter the arc start time.

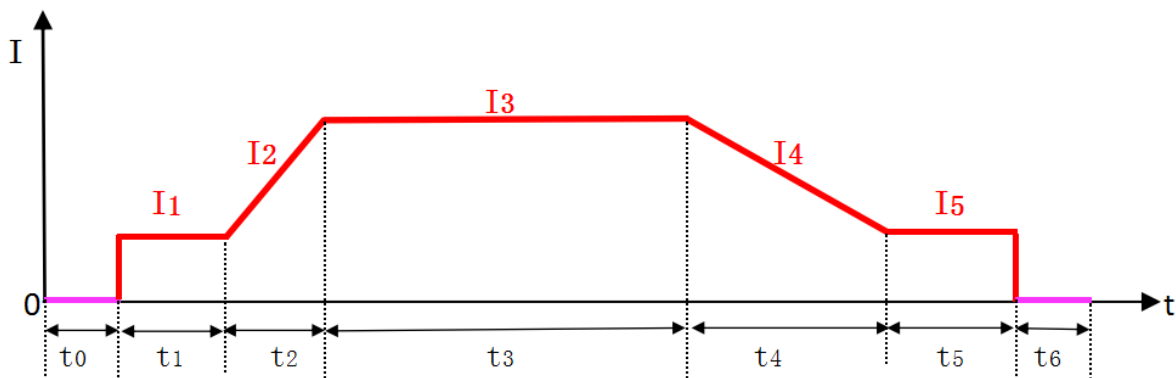
2.  $I_f$  (plus arc force current) =  $I_{\Delta f}$  (arc force current) +  $I_a$  (welding current). Use the electrode diameter, set current and process requirements to determine the arc force current. High arc force settings lead to faster metal transfer and non-sticking electrode but with some spatter. Lower arc force settings provide a smooth arc with less spatter and good weld seam formation, but sometimes the arc is soft or the welding electrode can stick. The arc force should be increased especially when welding thick electrodes under small current. Generally, the arc force is should be set to 20-40A.

3. After the short-circuit time exceeds  $T_p$ , it enters anti-sticking electrode current, which is smaller, until the electrode is separated from the workpiece.

4.  $U_0$  is open circuit voltage and  $U_w$  is working voltage. When not performing MMA welding, the welder outputs the open circuit voltage  $U_0$  or the VRD voltage.

## 7.3. TIG operation

### 7.3.1 DC TIG



DC TIG current waveform

I1-Initial current

I2-Current corresponding to the up-slope time

I3-Peak current

I4-Current corresponding to down-slope time

I5-Finish current

t0-Pre-flow time

t1-Initial current period

t2-Up-slope time

t3-Peak current period

t4-Down-slope time

t5-Finish current period

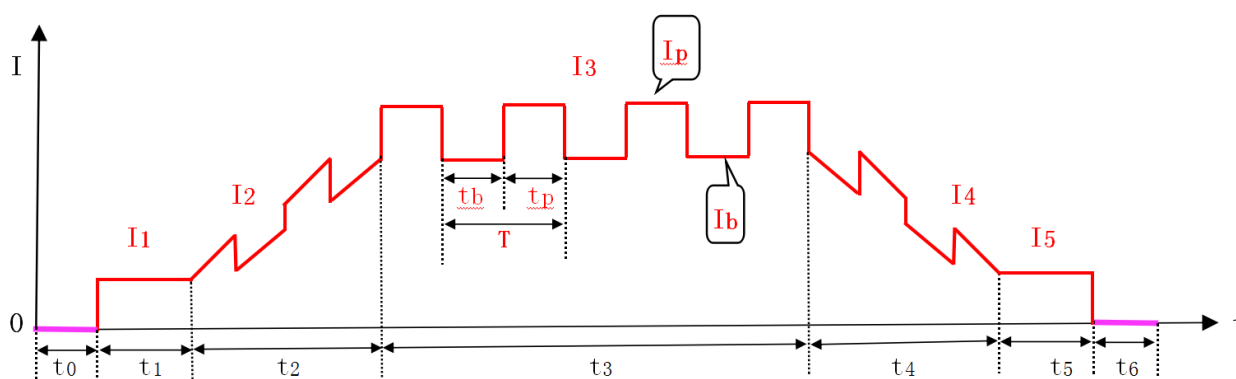
t6-Post-flow time

- Initial current (I1): The initial current is the current after the torch trigger is pressed to start the arc, which should be determined according to the process requirements. A large initial current makes it easy to start the arc, but it should not be too large when welding thin plates, otherwise, it may burn through the workpiece. After the arc is started in 4T operation, the current remains at the initial current to achieve the purpose of preheating the workpiece or

lighting.

- Up-slope time ( $t_2$ ): Refers to the time as the current slowly rises from the initial current to the peak current, which can be determined according to the usage and process requirements.
- Peak current ( $I_3$ ): Set by the user according to the actual process requirements.
- Down-slope time ( $t_4$ ): Down-slope time refers to the time when the current drops from the peak to the finish current, which can be determined according to the usage and process requirements.
- Finish current ( $I_5$ ): In 4T operation mode, the arc is not extinguished after the current down-slope and remains in a state of continuous arcing, which can avoid weld defects or large craters caused by immediately cutting off the output. The operating current in this state is called the finish current, which should be determined according to the process requirements.
- Pre-flow time ( $t_0$ ): Refers to the time from pressing the torch trigger to sending argon gas to arc starting. Generally, it should be greater than 0.5s to ensure that the gas has been sent to the welding torch at normal flow when discharging arc initiation. It should be increased when the gas pipe is long.
- Post-flow time ( $t_6$ ): Refers to time from cutting off the welding current to turning off gas the valve in the welder. It should be determined according to the usage conditions and process requirements; too long will cause waste of argon gas, but too short will cause oxidation of the weld. The time shall be longer for AC TIG and special material welding.

### 7.3.2 DC pulse TIG



DC pulse TIG welding current waveform

- |   |                                |
|---|--------------------------------|
| I1-Initial current                            | t0-Pre-flow time               |
| I2-Current corresponding to the up-slope time | t1-Initial current period      |
| I3-Set pulse current                          | t2-Up-slope time               |
| I4-Current corresponding to down-slope time   | t3-Peak current running period |
| I5-Finish current                             | t4-Down-slope time             |
| IP-Pulse peak current                         | t5-Finish current period       |
| Ib-Pulse base current                         | t6-Post-flow time              |
|   | tb-Pulse base time             |

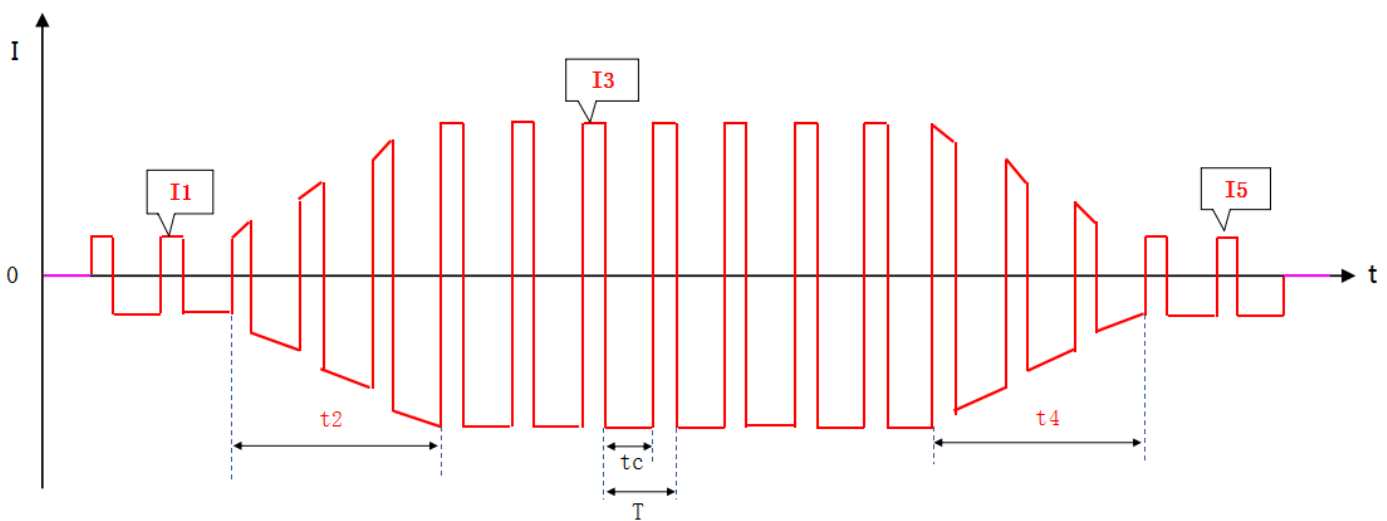


$t_p$ -Pulse peak time  
 $T$ -Pulse period

Pulse TIG includes all DC TIG parameters, except that the parameters are set differently. The parameters will not be explained again here. In addition, there are 4 adjustable parameters, which are explained separately in conjunction with the figure:

- Peak current ( $I_p$ ): Maximum pulse current, adjusted according to the process requirements.
- Base current ( $I_b$ ): Minimum pulse current, adjusted according to the process requirements.
- Pulse frequency ( $1/T$ ):  $T=t_p+t_b$ , adjusted according to the process requirements.
- Duty cycle ( $100\%*t_p/T$ ): the percentage of peak current duration in the pulse cycle, adjusted according to the process requirements.

### 7.3.3 AC TIG



AC TIG welding current waveform

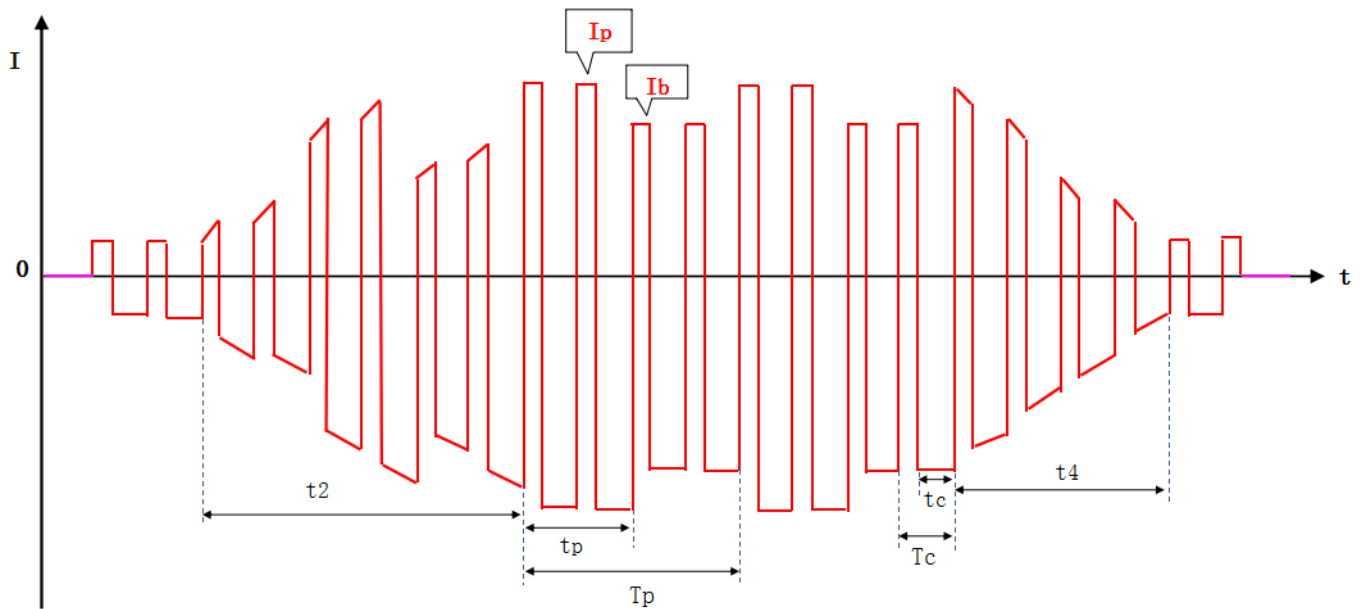
- I1-Initial current
- t2-Up-slope time
- I3-Set AC peak current
- t4-Down-slope time
- I5-Finish current
- tc-Cleaning current time
- T-AC period

AC TIG supports square, triangular and sine output waveforms. AC and DC TIG have the same pre-flow time and post-flow time, but the other parameters are explained separately in conjunction with the figure:

- Initial current (I1), peak current (I3) and finish current (I5): These three parameters are set approximately equal to the effective values of the actual welding current, and can be adjusted as required.
- AC frequency ( $1/T$ ): Can be adjusted as required.
- AC balance ( $100\%*t_c/T$ ): Generally, the current of the positive tungsten electrode in AC welding is called the cleaning current. Its main function is to break the dense oxide layer of the workpiece, and AC balance represents a portion of the cleaning current, generally

10-40%. When the value is small, the arc is concentrated, the fusion depth is large, and the fusion width is small, and vice versa.

### 7.3.4 AC pulse TIG welding



Current waveform of AC pulse TIG Welding

$t_c$ -Cleaning current time

$T_c$ -AC period

$t_p$ -Pulse peak time

$T_p$ -Pulse period

$t_2$ -Up-slope time

$t_4$ -Down-slope time

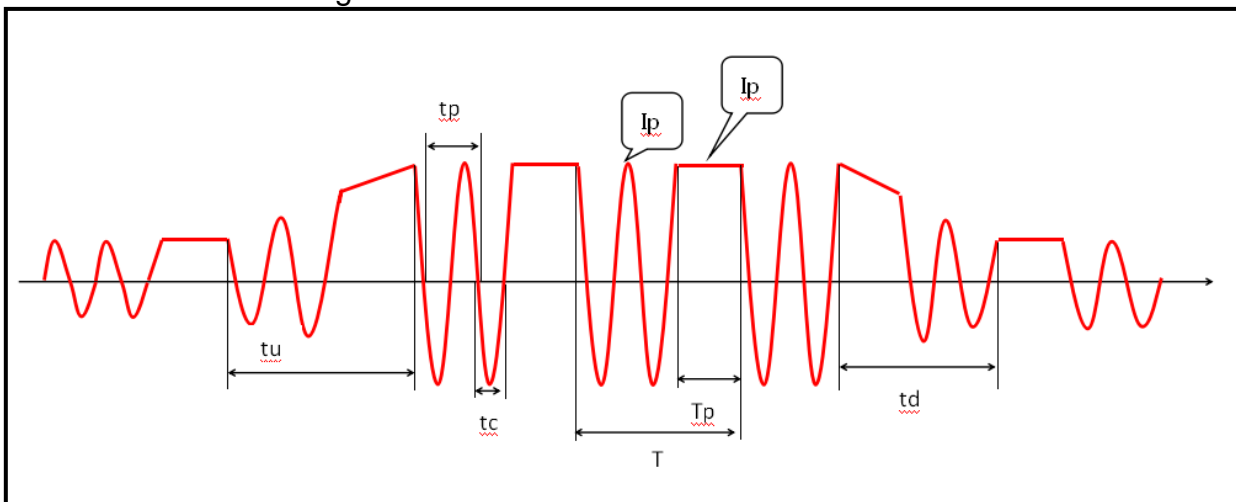
$I_p$ -Peak current

$I_b$ -Base current

- AC frequency ( $1/T_c$ ): Can be adjusted according to process requirements.
- Pulse frequency ( $1/T_p$ ): Can be adjusted according to process requirements.
- Duty cycle ( $100\% \cdot t_p/T_p$ ): Can be adjusted according to process requirements.
- AC balance ( $100\% \cdot t_c/T_c$ ): Can be adjusted according to process requirements.
- AC pulse TIG welding supports square, triangular and sine output waveforms. AC pulse TIG welding is basically the same as AC square wave TIG welding, but its welding current is controlled by a low-frequency pulse, and therefore changes with the pulse value to form peak and base current, which are the (average) peak and (average) base values of the low-frequency pulse.
- In AC pulse mode, the pulse frequency range is affected by AC frequency and frequency division factor. The minimum frequency division factor is 10, and the maximum is 2 times the

AC frequency. Therefore, the pulse frequency range is 0.5Hz to AC frequency/10Hz; the user can select any frequency within that range. When the AC frequency changes, the AC frequency/actual frequency of the current pulse is equal to the frequency division factor, and is updated. After the frequency division factor is determined, the current AC frequency/division factor is set equal to the actual frequency of the current pulse and is saved, so the pulse frequency does not change. After setting the AC frequency and pulse frequency, the frequency division factor is determined, which is equal to the AC frequency/pulse frequency. Example: if the AC frequency is set to 100Hz, the pulse frequency range is 0.5-10Hz. Set AC frequency to 100Hz at the first time, then the pulse frequency is set to 5Hz for the first time, the current frequency division factor is  $100/5=20$ . If the AC frequency is updated to 70Hz, the frequency division factor is  $70/5=14$ ; that is, the frequency division factor is variable, but the pulse frequency is constant. **In other words, the AC frequency affects the pulse frequency range, but after the pulse frequency is determined, it is no longer affected by the AC frequency.**

### 7.3.5 Mixed TIG welding



Current waveform of mixed TIG welding

Note: tc-Cleaning current time

tp-AC period

tp-DC running time

T-Mixed cycle

tu-Upslope time

td-Downslope time

Ip-Peak set current

- AC frequency ( $1/tp$ ): Can be adjusted according process requirements.
- Mixed frequency cycle ( $1/T$ ): Can be adjusted according to process requirements.
- Duty cycle ( $100\% \cdot Tp/T$ ): Can be adjusted according to process requirements.
- AC balance ( $100\% \cdot tc/tp$ ): Can be adjusted according to process requirements.
- Mixed TIG welding supports the combination of square, triangular, and sine waveforms with DC.
- In mixed TIG mode, the frequency range of the welding is affected by the AC frequency and frequency division factor. The minimum frequency division factor is 10, and the maximum AC

balance is equal to the AC frequency. Therefore, the frequency range of mixed TIG welding is 1Hz to the AC frequency/10Hz, and the user can select any frequency within the range. When the AC frequency changes, the AC frequency/actual frequency of the current mixed TIG welding is equal to the frequency division factor, and is updated. After the frequency division factor is determined, the current AC frequency/frequency division factor is equal to the actual frequency of the current mixed TIG welding and is saved, so it does not change. After setting the AC frequency and mixed TIG frequency, the frequency division factor is determined as the AC frequency/mixed TIG frequency. Example: If the AC frequency is set to 100Hz, the mixed TIG frequency range is 1-10Hz. Set the AC frequency to 100Hz at the first time and then the mixed TIG frequency is set to 5Hz for the first time, the current frequency division factor is  $100/5=20$ . If the AC frequency is updated to 70Hz, the frequency division factor is  $70/5=14$ ; that is, the frequency division factor is variable, but the mixed TIG frequency is constant. **In other words, the AC frequency affects the frequency range of mixed TIG welding, but after the mixed TIG frequency is determined, it is no longer affected by the AC frequency.**

### 7.3.6 Welding mode description of TIG welding torch

TIG operation mode has a special convention, which specifies the mode or method of controlling the welding current change by different operations of torch trigger during TIG (DC, pulse, AC TIG, or mixed TIG) welding. The introduction of TIG operation strengthens the application of the torch trigger remote control function, so the user can obtain a practical welder remote controller without additional investment.

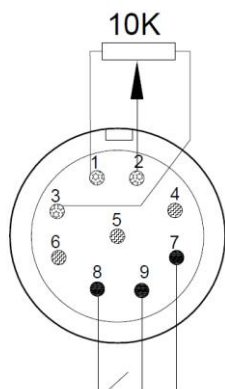
The TIG mode is determined according to the process requirements and operator preference. The symbols in the diagram are as follows:

<b>Legend for commonly-used torch trigger operations</b>			
↓	Press the torch trigger	↑	Release the torch trigger

Mode No.	Operation Schedule	Torch trigger operation and typical DC TIG current curve
1	Spot welding mode: 1. Press the torch trigger to start the arc to the set value; 2. The arc extinguishes after the spot welding finishes running for the set time.	
2	2T mode: 1. Press the torch trigger to increase the arc up to the designated peak current 2. Release the trigger to slowly extinguish the arc 3. If the trigger is pressed again before	

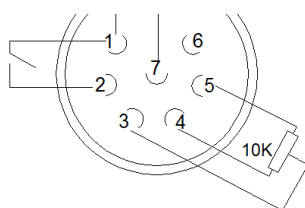
	the arc is extinguished, it will slowly increase to the peak current	
3	<p>4T mode:</p> <ol style="list-style-type: none"> <li>1. Press the torch trigger to start the arc to the initial value</li> <li>2. Release the trigger to slowly increase to the peak current</li> <li>3. Press the trigger to slowly drop to the finish current</li> <li>4. Release the trigger to extinguish the arc</li> </ol>	
4	<p>Repeat mode:</p> <ol style="list-style-type: none"> <li>1. Press the torch trigger to start the arc to the initial value</li> <li>2. Release the trigger to slowly increase to the peak current</li> <li>3. Press the trigger to slowly drop to the finish current</li> <li>4. Release the trigger to slowly step up to the peak current</li> <li>5. Repeat steps 3 and 4 until the arc is extinguished by pressing the torch trigger twice within 300ms.</li> </ol>	



### 7.3.7 Use of foot pedal controller



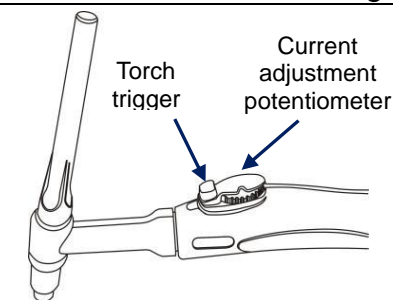
9-pin aviation socket of foot pedal controller

7-pin aviation socket of foot pedal controller

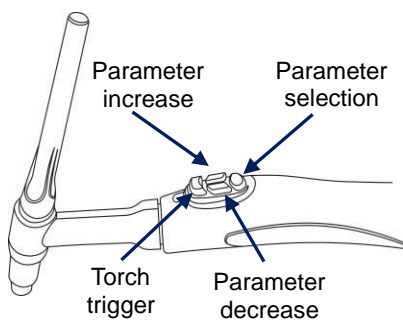


1. The foot remote controller consists internally of a switch and potentiometer, as shown in the figure.
  2. Use a dedicated cable to connect the remote controller to pins 1, 2, 3, 8 and 9 of the torch trigger's aviation socket on the front panel of the welder.
  3. Under no load, press the key  to turn the indicator  on. At this time, the foot pedal controller is in remote control mode.
  4. Adjust the maximum welding current on the panel to start welding.
  5. Step on the foot remote controller to start the arc, generally using the non-contact arc starting mode. After it is started, the welding current will be controlled by the foot remote controller, using the maximum output of the current setting.
  6. Pin 2 is the common potentiometer port. When the foot remote controller current is at the minimum, the resistance of pins 1 and 2 is 10kΩ, and of pins 2 and 3 is 0Ω; when the current is at the maximum, the resistance of pins 1 and 2 is 0Ω, and of pins 2 and 3 is 10kΩ.
- Note: The foot pedal controller is optional. Select it before placing an order if required.

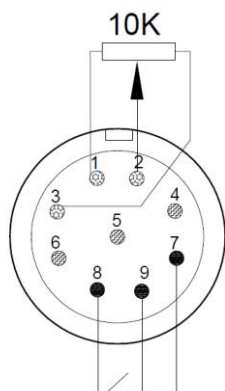
### 7.3.8 Use of wired welding torch



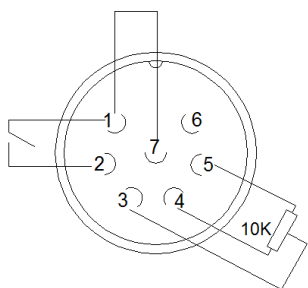
Analog welding gun



Digital welding gun



9-pin aviation socket of analog torch





7-pin aviation socket of analog torch

1. Wired welding torch include digital and analog types, as shown in the following figure.

2. Use a dedicated cable to connect the analog welding torch to pins 1, 2, 3, 8 and 9 of the torch trigger's aviation socket on the front panel of the welder; connect pin 7 of the torch to pin 9.

Pin 2 is the common potentiometer port. When the torch control value is 0 and the current value is at the minimum, the resistance of pins 1 and 2 is 10kΩ, and of pins 2 and 3 is 0Ω; when the roller value is at the maximum and the current value is at the maximum, the resistance of pins 1 and 2 is 0Ω, and of pins 2 and 3 is 10kΩ.

3. Use a dedicated cable to connect the digital welding torch to pins 4, 5, 6, 8 and 9 of the torch trigger's aviation socket on the front panel of the welder. Pin 4 decreases the value, pin 5 increases the value, and pin 6 is 2T/4T. Pin 7 of the digital torch is reserved.

4. Under no load, press the key  to turn on the indicator . At this time, the welding torch is in torch control mode.

5. When using the analog welding torch, set the welding parameters on the panel to start welding. During welding, the potentiometer can be used to adjust the welding current from the minimum to the set value.

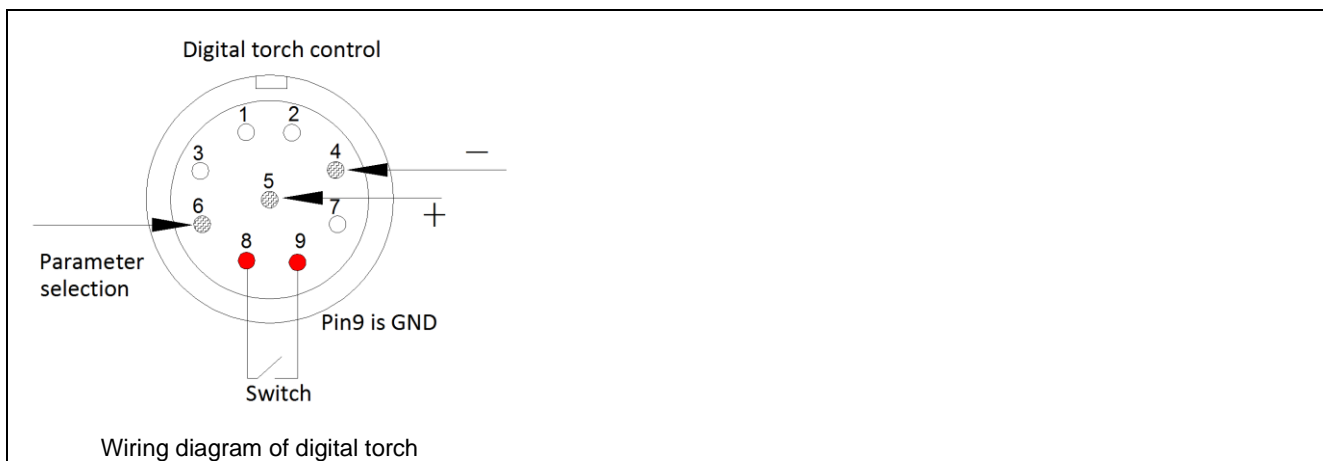
6. When using the digital welding torch, the Parameter Selection key on the torch can be used to switch the adjustment parameter; Parameter Increase and Parameter Decrease can be used to adjust the parameter value; and Torch Trigger on the welding torch can be used to control the output mode.

#### 6.1 Wiring method:

Torch trigger: Pins 8-9; +: Pins 5-9; -: Pins 4-9



Functional parameter selection: Pins 6-9 (Pin 9 is GND)

**Note: The analog and digital welding torches are optional. Specify before placing an order if required.**



### 7.3.9 Water cooler connector (for plus version only)

Water cooler connector

1. Pins 1 and 2 are power output ports for the water cooler, and pins 3 and 4 are the abnormal signal inputs.
2. Under no load, press the key  to turn on the indicator . The welder will enter the water-cooled mode.
3. After welding, the water cooler will continue to operate for 5 minutes. If there is no welding operation within 5 minutes, water-cooled mode will be automatically disabled.

Note: The welder can only use the original supporting water cooler. Do not use water coolers purchased from other manufacturers.



## 8. Maintenance



### Warning!

The following operation requires sufficient professional knowledge on electric aspects and comprehensive safety knowledge. Make sure the input cable of the machine is disconnected from the electricity supply and wait for 5 minutes before removing the machine covers.

**Please note: The following should only be carried out by an authorised electrical technician.**

### 8.1. Power supply maintenance

In order to guarantee that the arc welding machine works efficiently and in safety, it must be maintained regularly. Operators should understand the maintenance methods and means of arc welding machine operation. This guide should enable customers to carry out simple examination and safeguarding by oneself, try to reduce the fault rate and repair times of the arc-welding machine, so as to lengthen service life of arc welding machines.

<u>Period</u>	<u>Maintenance item</u>
Daily examination	Check the condition of the machine, mains cables, welding cables and connections. Check for any warnings LEDs and machine operation.
Monthly examination	Disconnect from the mains supply and wait for at least 5 minutes before removing the cover. Check internal connections and tighten if required. Clean the inside of the machine with a soft brush and vacuum cleaner. Take care not to remove any cables or cause damage to components. Ensure that ventilation grills are clear. Carefully replace the covers and test the unit. <b>This work should be carried out by a suitably qualified competent person.</b>
Yearly examination	Carry out an annual service to include a safety check in accordance with the manufacturers standard (EN 60974-1). <b>This work should be carried out by a suitably qualified competent person.</b>

### 8.2. Welding torch maintenance

In TIG mode, the TIG welding torch is used to clamp the electrode, conduct electricity and transport argon gas.

Regular maintenance of welding torch is one of the most important measures to ensure its normal operation and improve its life. In order to ensure normal maintenance, the wearing

parts of the torch should have spares, including the collet, nozzle, sealing mesh, insulating washer, etc. Common faults of the welding torch include overheating, gas leakage, water leakage, poor gas protection, power leakage, nozzle burn out, and cracking. The causes of these faults and troubleshooting methods are as shown in the following table:

Symptom	Reasons	Troubleshooting
The welding torch is overheated	The welding torch capacity is too small	Replace with a welding torch with one with large capacity
	The cooling water pipe is blocked, resulting in blockage or low cooling water flow	Blow the cooling pipe with compressed air to clear the blockage
	The collet fails to clamp the tungsten electrode	Replace the collet or electrode cap
Water leakage	The sealing ring is aged	Replace the sealing ring
	The water pipe joint is damaged or not fastened	Reconnect the water pipe and tighten it
	The weld between the welding torch and the water inlet pipe is leaking	Open it to repair the welding
Air leakage	The sealing ring has aged	Replace the sealing ring
	The connecting thread is loose	Tighten it
	The gas inlet pipe joint is damaged or not fastened	Cut off the damaged joint, reconnect and tighten the replaced gas intake pipe or reliably wrap the damaged area
	The gas inlet pipe has been damaged by heat or aging	Replace the gas inlet pipe
Electric leakage	The torch head is wet due to leakage or other reasons	Find the cause of water leakage, and fully dry the electrode holder
	The torch head is damaged or the live metal part is exposed	Replace the torch head or wrap the exposed electrified metal part with adhesive tape
Poor gas protection	The welding torch is leaking	Eliminate the leakage
	The nozzle diameter is too small	Replace with a nozzle of larger diameter
	The nozzle is damaged or cracked	Replace with a new nozzle
	The gas circuit in the welding torch is blocked	Blow the circuit with compressed air to clear the blockage
	The gas screen has been damaged or lost during	Replace with a new gas screen

	disassembly and assembly	
	The argon gas is impure	Replace with qualified argon gas
	The gas flow is too large or small	Adjust the gas flow properly
Arc is started between the electrode holder and tungsten electrode or welding torch	The collet and tungsten electrode have poor contact, or arc is started when the tungsten electrode contacts the base metal	Replace the collect or repair
	The collet and welding torch have poor contact	Connect the collect and welding torch properly

## 9. Troubleshooting



**Warning!** Before arc welding machines are dispatched from the factory, they have already been checked thoroughly. The machine should not be tampered with or altered. Maintenance must be carried out carefully. If any wire becomes loose or is misplaced, it may be potentially dangerous to user! Only professional maintenance personnel should repair the machine! Ensure the power is disconnected before working on the machine. Always wait 5 minutes after power switch off before removing the panels.

### 9.1. Common malfunction analysis and solution



The symptoms listed here may be related to the accessories, gas, environmental factors, and power supply you use. Please try to improve the environment and avoid such situations.

#### Elimination of general problems in MMA

Symptom		Reasons	Troubleshooting
After startup, the fan does not turn or the wire feeding speed is abnormal		The air temperature may be too low or the fan may be damaged	When the temperature is too low, leave the machine work for a while. The temperature in standby will rise, then fan will resume normal operation. If it is still not working, it is necessary to replace the fan.
MMA	Hard to start the arc	Arc hot start current is low Or the hot start time is short	Increase arc start current or arc start time
	Unstable arc or excessive molten pool during arc start	Arc start current is high Or the arc start time is long	Reduce arc start current or start time appropriately
	Cannot start	The power cord is not connected	Connect the power cord

	normal arc	properly	
	Welding slag difficult to remove	Low arc force	Increase the arc force
	Hot electrode holder	The rated current of the electrode holder is too low	Change the electrode holder with a high current one
	Arc is easily interrupted	Low mains voltage	Use after the mains power is normal
Other faults			Please contact the maintenance personnel of JASIC Technology Co. Ltd

**Elimination of general problems in TIG**

Symptom		Reason	Troubleshooting
After startup, the fan does not turn or the wire feeding speed is abnormal		The air temperature is too low or the fan is damaged	If the temperature is too low, let the machine work for a period of time, and the standby temperature will rise, then fan will rotate normally. If it is still not working, replace the fan
<b>TIG welding</b>	No current is output when torch switch is pressed	Some TIG modes allow welding to end when the switch is pressed	Release the torch switch and start over
		Welding circuit is blocked	Check the welding circuit and reconnect it
	No discharge after pressing the torch switch to start the arc when starting the arc at high frequency	The torch switch is not plugged in	Plug in the torch switch
		Excessive spark gap of discharge plate	Adjust the spark gap on the discharge plate (to about 0.8 mm)
	Rapid tungsten electrode burnout	Welding torch is connected to the wrong polarity	Switch two plug positions
Blackening of solder joints	Welds are not effectively protected and become oxidized	(1) Ensure that the valve of argon cylinder is open and there is enough pressure. Generally, if the cylinder pressure is lower than 0.5 MPa, it must be refilled. (2) Check whether the argon flow rate is normal. You can select the flow rate according to the welding current condition, but too low a flow rate may lead to	

			<p>insufficient shielding gas to cover all weld joints. It is suggested that the argon flow rate be no less than 5L/min, no matter how small the current.</p> <p>(3) Check whether the gas path is leaking, or whether the gas purity is too low.</p> <p>(4) Check whether there is strong ambient air flow in the environment.</p>
	<p>Hard to start arc Arc is easily interrupted</p>	<p>Poor quality or serious oxidation of the tungsten electrode</p>	<p>(1) Replace the tungsten grade with better quality.</p> <p>(2) Grind off the tungsten oxide layer.</p> <p>(3) Increase the post-flow delay time to avoid tungsten oxidation.</p>
	<p>Unstable current when welding</p>	<p>The voltage of the power grid fluctuates seriously or the joint contact with the power grid is poor. Serious interference from other electrical equipment.</p>	<p>(1) Check whether the power grid is normal and connect the power connector.</p> <p>(2) Use different power cords to connect equipment that could seriously interfere with welder.</p>
<p>Other faults</p>			<p>Please contact the maintenance personnel of JASIC Technology Co. Ltd</p>

## 9.2. Alarm and solutions

<b>Error code</b>	<b>Category</b>	<b>Possible cause</b>	<b>Countermeasure</b>
E10	Overcurrent protection	Continuously output the maximum capacity current of welder	Restart the welder. If overcurrent protection alarm is still active, contact the after-sales department.
E31	Undervoltage protection	Input network voltage is too low	Turn off the machine and restart it. If this the alarm cannot be eliminated and the grid voltage remains too low, check the power grid voltage and wait for the grid to be normal before welding. If the grid voltage is normal and the alarm persists, contact professional maintenance personnel.
E32	Overvoltage protection	Input network voltage is too high	Turn off the machine and restart it. If the alarm cannot be eliminated and the grid voltage remains too high, check the power grid voltage and wait for the grid to be normal before welding. If the grid voltage is normal and the alarm

			persists, contact professional maintenance personnel.
E55	Data error alarm	Memory chip problem	Turn off the machine and restart it. If the alarm cannot be eliminated, contact professional maintenance personnel.
E60	Overheat protection	Output rectifier diode temperature is too high	Do not turn off the machine. Wait for a while, and then continue welding after the indicator goes out.
E61	Overheat protection	Inverter IGBT temperature is too high	Do not turn off the machine. Wait for a while, and then continue welding after the indicator goes out.
E71	Water tank alarm	Lack of water	Turn off the machine and restart it. If the alarm cannot be eliminated, contact professional maintenance personnel.

**Note! After applying the above countermeasures, the alarm still cannot be lifted or reappears after lifting. Please contact professional maintenance personnel.**

## 10. Packaging, transportation, storage and waste disposal

### 10.1. Transportation requirements

In the process of handling the equipment, it should be handled with care, and should not be dropped or severely impacted. Avoid moisture and rain during transportation.

### 10.2. Storage conditions

Storage temperature: -25 °C ~ + 50 °C

Storage humidity: relative humidity ≤ 90%

Storage period: 12 months

Storage site: indoors with no corrosive gas and air circulation

### 10.3. Waste disposal



## Disposal

The equipment is manufactured with materials, which do not contain any toxic or poisonous materials dangerous to the operator.

When the equipment is scrapped, it should be dismantled separating components according to the type of materials.

Do not dispose of the equipment with normal waste. The European Directive 2002/96/EC on Waste Electrical and Electronic Equipment states the electrical equipment that has reached its end of life must be collected separately and returned to an environmentally compatible recycling facility.

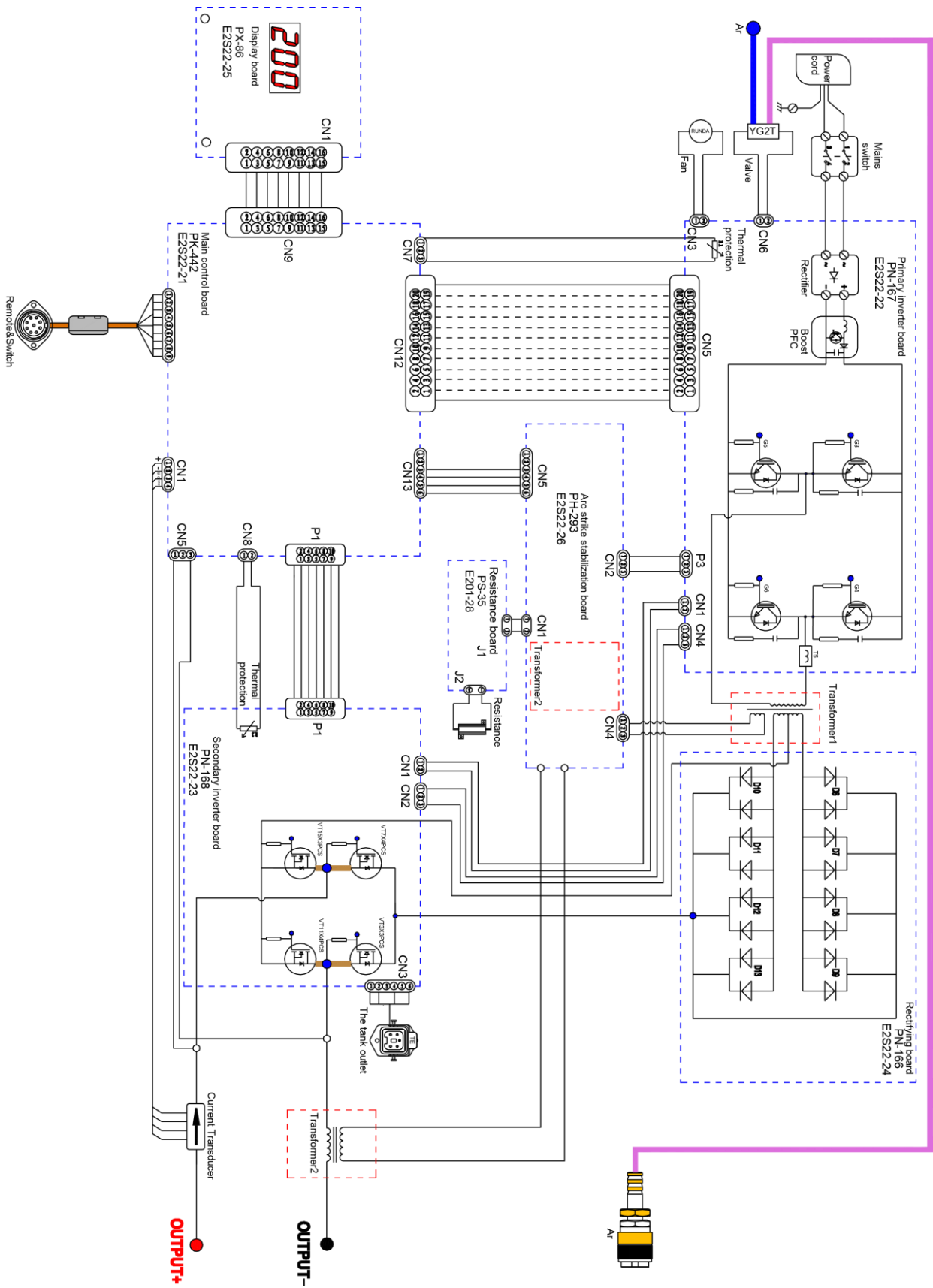
In order to comply with WEEE regulations in your country you should contact your supplier.

## **RoHS compliance declaration**

We herewith confirm, that the above mentioned product does not contain any of the restricted substances as listed in EU Directive 2011/65/EC in concentrations above the limits as specified therein.

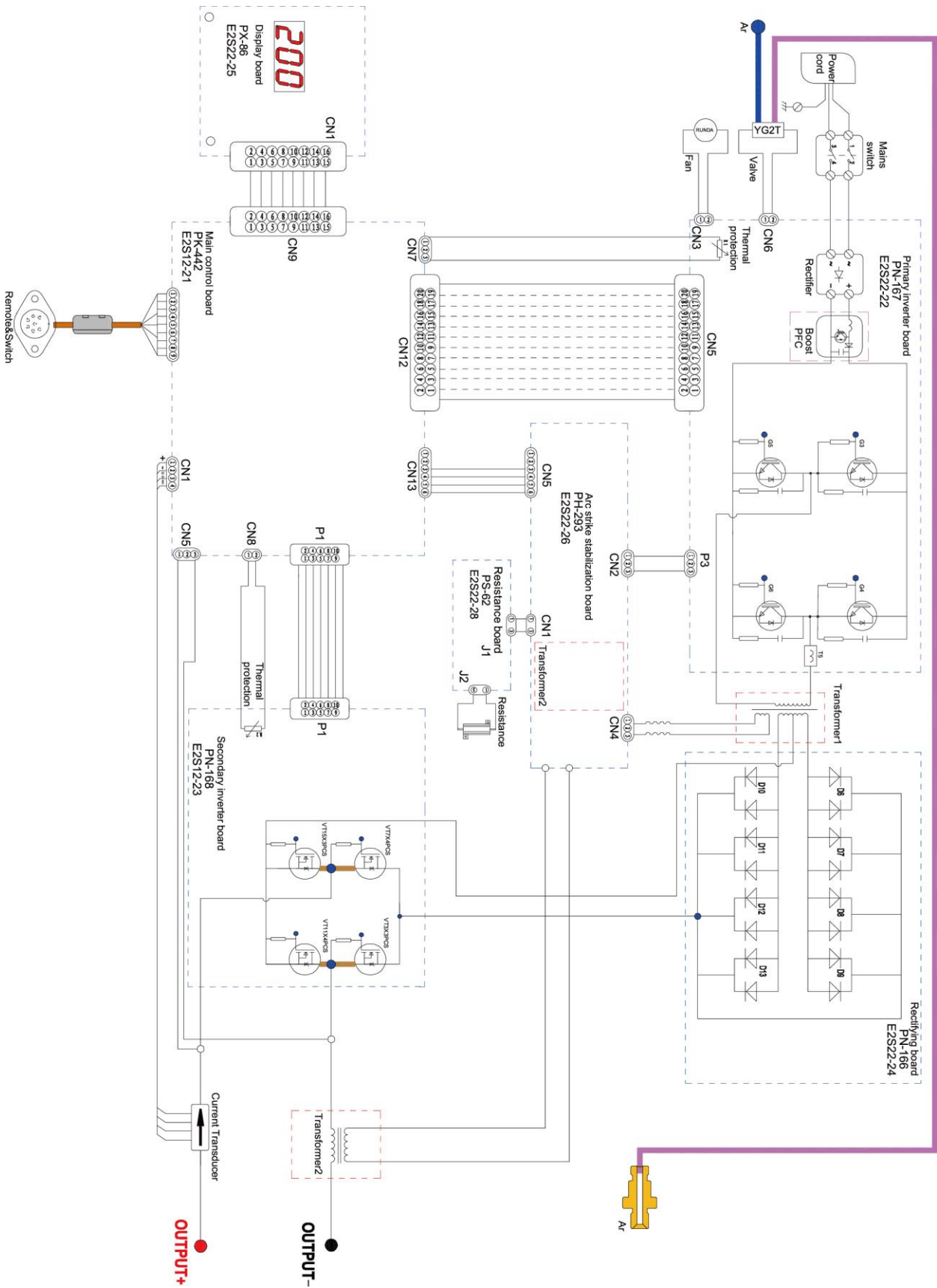
**Disclaimer:** Please note that this confirmation is given to the best of our present knowledge and belief. Nothing herein represents and/or may be interpreted as warranty within the meaning of the applicable warranty law.

# Appendix 1: Wiring diagram (plus)

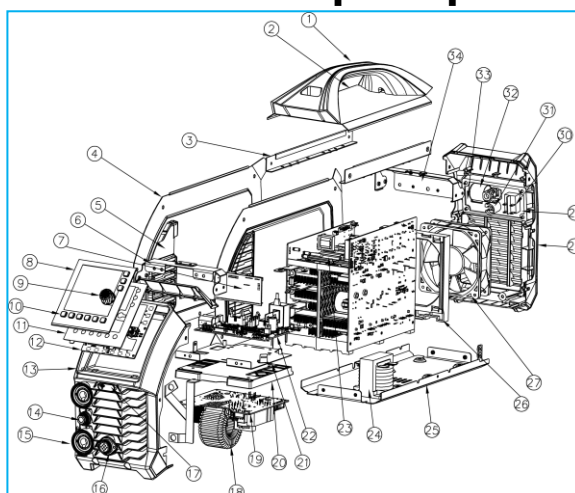




## Appendix 2: Wiring diagram (standard)



## Appendix 3: List of common spare parts 1

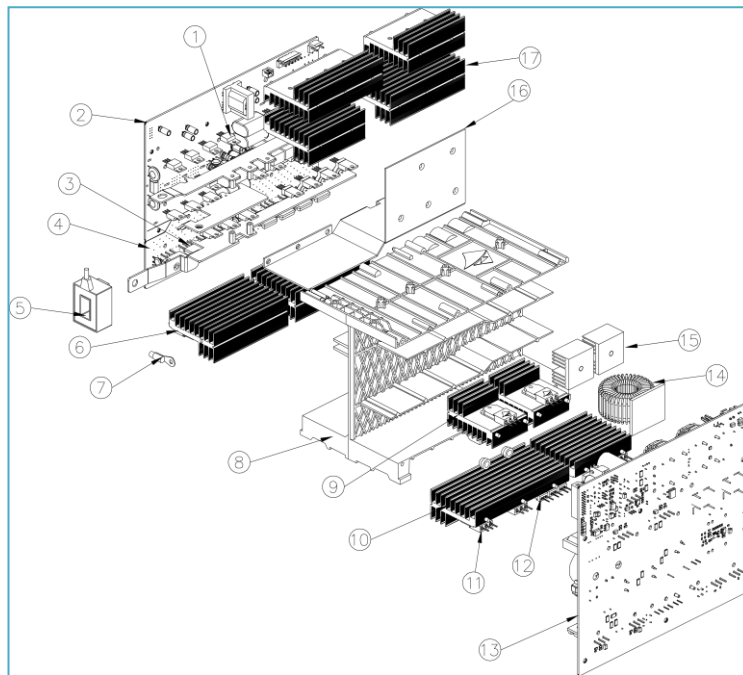


List of spare parts

SN	Material code	Name	Quantity	SN	Material code	Name	Quantity
1	10084166	Handle	1	21	10084192	Control panel mount	1
2	10084064	Upper part of machine cover	1	22	51000884	Large control panel	1
3	10084160	Beam	1	23	10056163	Small arc stabilizing board	1
4	10084068	Side cover	1	24	51000821	Main transformer (with PFC)	1
5	10084195	Louver	1		51000820	Main transformer	1
6	10084066	Front panel bracket	1	25	10084383	Chassis	1
7	51000881	Small control panel	1	26	10084196	Fan bracket	1
8	10084430	Acrylic front panel	1	27	51000956	DC fan	1
9	10083484	Knob	1	28	10084109	Rear panel	1
10	10084650	Silicon button	1	29	10084163	Rear panel support plate	1
11	10084392	Display panel mount	1	30	10071118	Power switch	1
12	51000844	Display panel	1	31	51000659	Power cord	1
13	10084193	Front panel	1	32	51000658	Solenoid valve	1
14	10081143	Outlet nozzle	1	33	51000657	Water cooler socket (plus)	1
15	10021855	Quick socket	1	34	10084057	Rear panel support	1

16	51001819	7-pin remote receptacle	1				
	51000660	9-pin remote receptacle	1				
17	10083487	Bluetooth plug	1				
18	10051952	Arc starting transformer	1				
19	51000847	Arc stabilizing board	1				
20	10084264	Plastic mount of arc stabilizing board	1				

## Appendix 4: List of common spare parts 2



### List of spare parts

SN	Material code	Name	Quantity	SN	Material code	Name	Quantity
1	51000093	Mosfet	1	12	10064645	Rectifier diode 2	1
2	51000872	Secondary inverter main board	1	13	51000858	Primary inverter main board (with PFC)	1
3	10081176	Rectifier diode 1	1		51001066	Primary inverter	1

						main board	
4	51000854	Rectifier board	1	14	51000456	PFC inductor (for PFC)	1
5	10084373	Current sensor	1	15	10050418	Heat sink 4	1
6	10084338	Heat sink 1	1	16	10084138	Aluminum connector	1
7	51000796	Thermal resistor	1	17	51000852	Heat sink 5	1
8	10084197	Inverter wind shield	1				
9	10084337	Heat sink 2	1				
10	10084340	Heat sink 3	1				
11	51000601	IGBT	1				