V.02-220214

OWNER'S MANUAL

TIG-250AI AC/DC WELDING MACHINE

NOTE: Please read this manual carefully before use.

Product Specifications and features are subject to change without notice. While every attempt has been made to provide the most accurate and current information possible at the time of publication, this manual is intended to be a general guide.

CE

WARNING! Please read these instructions before installing and commissioning the device.

1. GENERAL COMMENTS

Start-up and operation of the device can only be made after carefully reading this Operator's Manual.

Damage to the device due to improper handling will result in the loss of warranty rights.

It is forbidden to modify devices and interfere in its construction.

ATTENTION

Welding may endanger the safety of the operator and other persons in the vicinity. Therefore, special precautions should be taken during welding. Before welding, read the occupational health and safety regulations in force at the workplace.

During electric welding with MMA and TIG methods, there are the following hazards:

• ELECTRIC SHOCK

• NEGATIVE EFFECT OF ARROW ON EYES AND SKIN OF HUMAN

• POISON AND GAS DAMAGE

• BURNS

• NOISE

Prevention of electric shock:

- connect the device to a technically efficient electrical installation with proper protection
- assemble current wires with the device switched off,
- do not use handles and power cables with damaged insulation,
- in conditions of particular danger of electric shock (work in environments with high humidity and closed tanks) work with a helper supporting the work of the welder and watching over safety, use clothing and gloves with good insulating properties
- If you notice any irregularities, you should ask competent people to remove them.
- It is forbidden to operate the device with covers removed
- Do not touch the torch gun or gas interface when the device is connected and press the trigger, do not torch the electrode head when initiate arc

Prevention of the negative impact of the electric arc on the eyes and human skin:

• Wear protective clothing (gloves, apron, leather shoes),
• Use shields or protective shields with a properly selected filter,
• Use protective covers made of non-combustible materials and properly choose the color of the walls that absorb harmful radiation.

Prevention of poisoning by vapors and gases emitted during welding from electrode lagging and metal evaporation:

- use ventilation devices at work stations
- blow with fresh air when working in a confined space

Prevention of burns:

- Use appropriate protective clothing and footwear to protect against burns from arc radiation and spatter
- Avoid soiling the clothes with lubricants and oils that may lead to ignition of the clothing.

Prevention of negative impact of noise:

- Use earplugs or other noise protection measures,
- Warn of the dangers of nearby people.

Before starting the device:

- Check the condition of electrical and mechanical connections. It is forbidden to use handles and power cables with damaged insulation. Improper insulation of holders and power cords may result in electric shock,
- Ensure proper working conditions, ensure the right temperature, humidity and ventilation in the workplace. Outside of enclosed spaces, protect against atmospheric precipitation,

Persons operating the welder should:

- have the power to weld electric electrodes with coated electrodes and the TIG method,
- know and follow the health and safety regulations applicable when carrying out welding work,
- use appropriate, specialist protective equipment: gloves, apron, rubber boots, shield or welding helmet with a properly selected filter,
- be familiar with the contents of these operating instructions and operate the welder for its intended purpose

Any repairs to the device may only be made after disconnecting the plug from the mains socket. When the device is connected to the power it is not allowed to touch any elements constituting the welding current circuit with bare hands or through damp clothing. It is forbidden to remove the external covers when the device is connected to the power.

Maintenance and repair work may only be carried out by authorized persons subject to the safety and operating conditions applicable to electrical equipment.

2. GENERAL DESCRIPTION

The SYNERGIC welding machine is used for manual welding by direct current and alternating current using Manual Metal Arc (MMA) and Gas Tungsten Arc Welding (GTAW), also known as Tungsten Inert Gas (TIG) welding. In the design and construction of the device the latest developments in the field of PWM technology (pulse width modulation) and IGBT modules (bipolar transistors with an insulated gate) were used, thanks to which the welder is characterized by small size and low weight.

The ARC FORCE function is available during MMA welding. During TIG welding it is possible to regulate the rise and fall of current, pre-outflow and gas outflow as well as pulse and AC current parameters. The device has a memory of 10 sets of parameter settings for the TIG HF and MMA methods.

3. TECHNICAL PARAMETERS

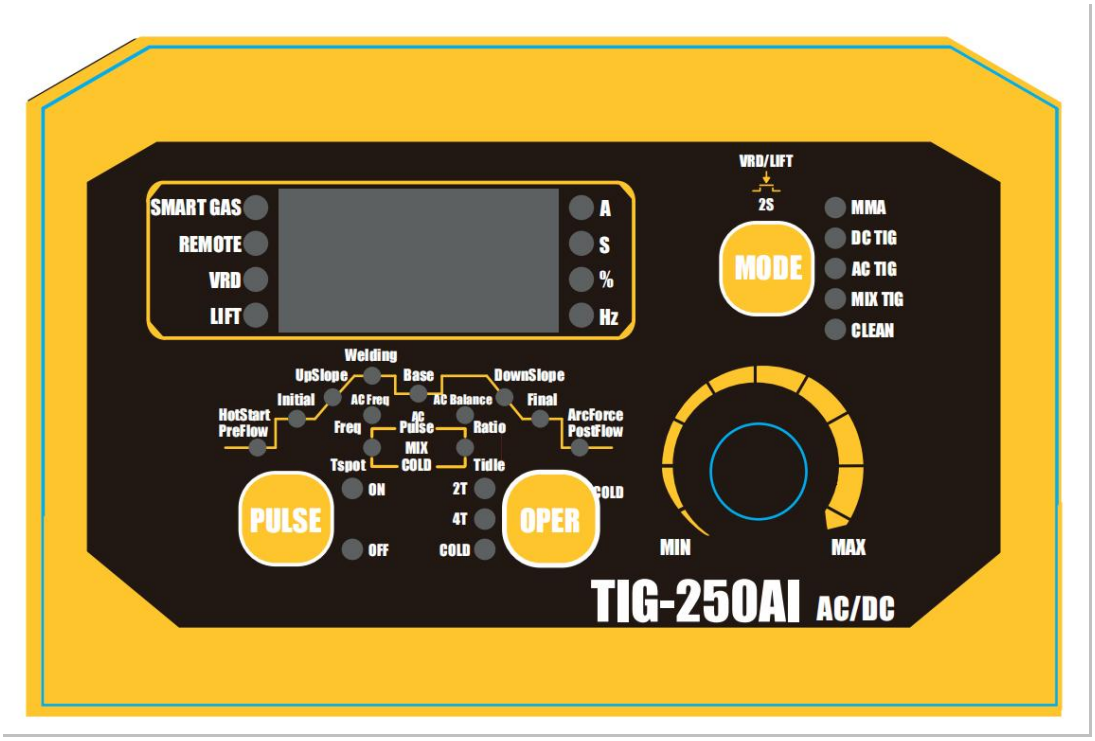
Model		TIG-250AI ACDC
Input Voltage(V)		1*220V-240V
Frequency (Hz)		50HZ/60HZ
Power Capacity (KVA)		7.1
Max Input Current (A)		38
No-load Voltage(V)		54V
Rated working cycle (%)		60
TIG/MMA Current range(A)		10~200/ 20~180
MMA Range of thrust current (%)		0-100
MMA Hot start range (%)		0-100
TIG	Pre air time S	0.1-5
	Start an arc %	10-100
	rise time S	0-10
	welding current A	10-250
	Base value %	10-100
	Communication frequency HZ	30-100
	Clean width %	15-50
	Pulse frequency HZ	0.2-500
	Duty cycle %	1-99
	MIX proportion %	10-90

	Descent time S	0-15
	Stop the arc %	10-100
	Post gas time	0.5-15
COLD	Welding time MS	1-999
	Interval time S	0.1-10
CLEAN	Cleaning current A	10-40
MMA	Electrode diameter (mm)	1.6, 2.0, 2.5, 3.2, 4.0
	Offset current (A)	±5A
TIG Tungsten diameter (mm)		1.0, 1.6, 2.0, 2.4, 3.2
efficiency (%)		85
power factor		0.93
Protection level (S)		IP23
Insulation level		F
size (mm)		420*160*240
weight (KG)		8

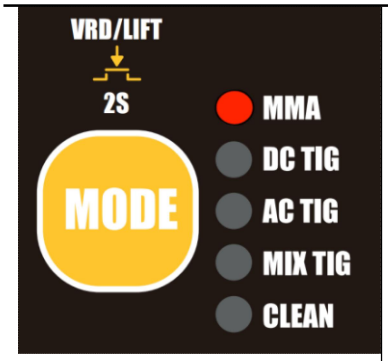
Level of security

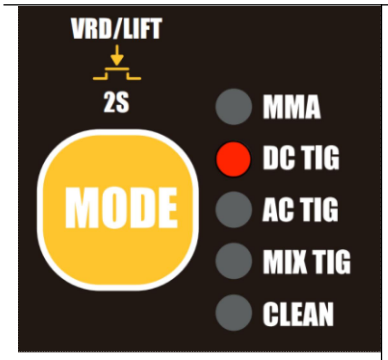
IP determines to what extent the device is resistant to solid and water contamination. IP23 means that the device is designed to work indoors and is not suitable for use in the rain.

4.Panel Instruction

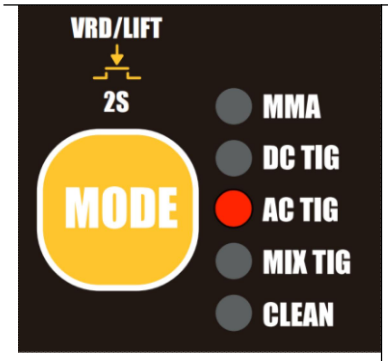
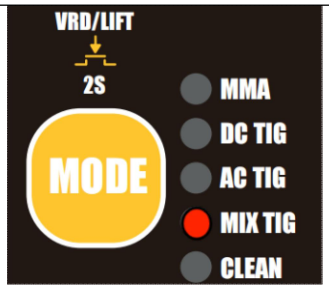
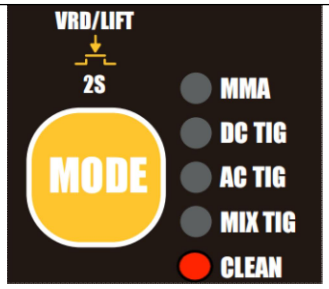


4.1 Mode option (In the non-welding working state)

	**MMA** *__DC MMA__ can weld a variety of electrodes such as basic electrode, acid electrode...

	**DC TIG** ***DC TIG** can be used for welding most metals except aluminum, magnesium and its alloys.

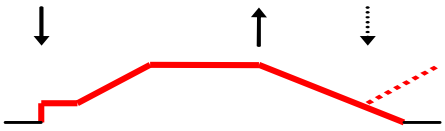
4.2 POLAR option (In the non-welding working state)

	**AC output** **AC TIG** can be used for aluminum, magnesium and its alloys.
	**AC/DC output** **MIX TIG** can be used for aluminum, magnesium and its alloys.Different ratios of DC and AC outputs can be selected based on the actual welding situation, such as 10% DC and 90% AC, for more efficient and aesthetically pleasing welding.
	**DC output** **CLEAN** Can be used for cleaning the weld bead after welding, making the weld bead clean and bright after welding.

4.3 PULSE option (In the non-welding working state)

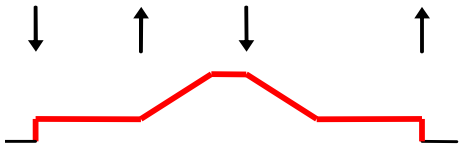
	**Open pulse**
	**Turn off pulse**

4.4 Welding torch on/off option (In the non-welding working state)

	**2T:** Pressing the switch in the grip handle will activate the ionizer and ignite the arc. Welding is carried out with the switch pressed. Releasing the switch will end welding. **Note:Foot Pedal is valid only 2T mode.** **(1)** Press and hold the handle button. The outflow of protective gas begins. Arc ignition, welding current increases from the minimum value to the set welding current value. During welding, the handle button should remain pressed. **(2)** Release the torch button, the welding current begins to drop. Welding current falls to the minimum value, the arc is extinguished; The solenoid valve closes the gas flow, completing welding.  **Note：** ↓means press handle button； ↑means release handle button
	**4T:** Pressing the switch in the grip handle will activate the ionizer and ignite the arc, then release the switch and conduct the welding with the released switch. Pressing the switch again will end welding. **(1)** Press and hold the handle button. The outflow of protective gas begins and keep in the arc ignition phase. **(2)** Release the handle button, welding current increases from the minimum value to the set welding current value.

(3) Press the handle button, the welding current drop to the value of the crater current.

(4) Release the handle button. The arc is extinguished, shielding gas flows out; The solenoid valve closes the gas flow, completing welding.



Note： ↓means press handle button； ↑means release handle button

SPOT: The welding time is limited by the settled time, and the other is same as 2T.

The "SPOT" method is mostly used for spot welding of thin plates. For materials that are easily deformed, the heat input can be precisely controlled.

(1) Press and hold the handle button. The outflow of protective gas begins.Arc ignition, welding current increases from the minimum value to the set welding current value.

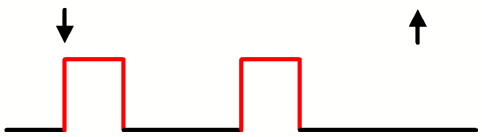
(2) Wait for the spot welding time to automatically extinguish the arc.

*If set spot time”0”, then starts Single spot welding function. Release the handle button and into “post gas”.

(3) If don’t set spot time”0”, then start Continuous spot welding function. When arrive in set spot time, arc will initiate again.

(4)
It is time to finish spot welding, the welding current begins to

Drop the minimum value, the arc is extinguished, shielding gas flows out. The solenoid valve closes the gas flow, release the button, completing welding.

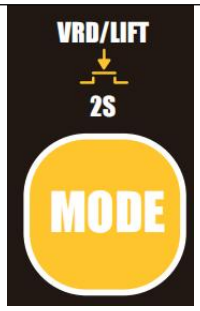


Note： ↓means press handle button； ↑means release handle button

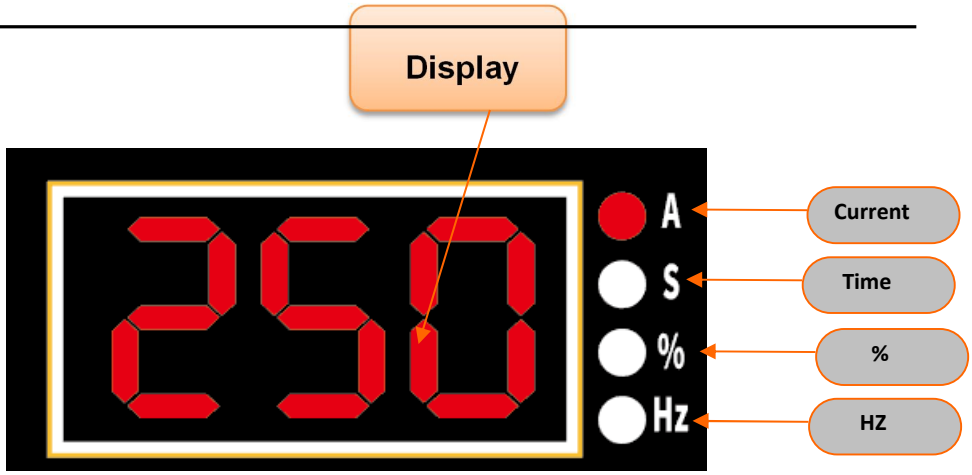
Note：**PULSE ON**

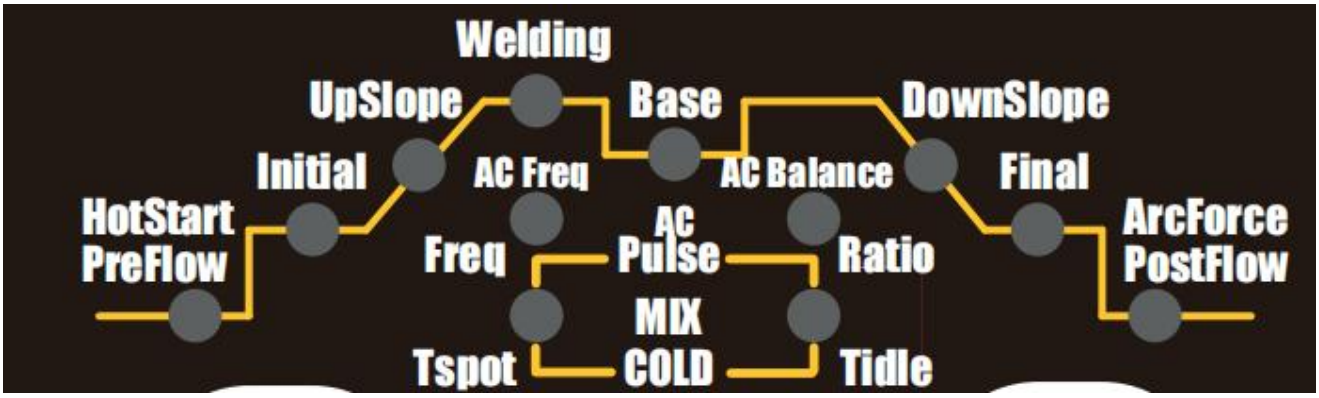
	 **LIFT TIG Press and hold this button for 2 seconds ON or OFF LIFT TIG**

4.5 MMA VRD OPTION (In the non-welding working state, press and hold knob actuator）

	**VRD OFF Press and hold this button for 2 seconds** The most commonly used method of MMA. After the machine is turned on, the machine outputs the maximum open circuit voltage, which is easy to start ARC.
	**VRD ON Press and hold this button for 2 seconds** Generally used in damp or enclosed workplace. After turning on the VRD function, the Open circuit voltage is less than 15V, which minimizes the risk of electric shock caused by a higher open circuit.

5.SETTING





HOT START & ARC FORCE - allows you to adjust the dynamics of the welding arc during MMA welding. The shortening of the arc length is accompanied by an increase in the welding current, which results in stabilization of the arc. Decreasing the value gives a soft curve and a smaller depth of penetration, while increasing the value causes deeper penetration and the possibility of short arc welding. When the large value of the ARC FORCE function is set, you can weld while maintaining an arc with a minimum length and high melting rate of the electrode. The adjustment range: 0 ~ 150%

PRE-FLOW - time from pressing the button in the grip handle and opening the gas valve until the arc is ignited. Usually should be more than 0,5s.
Adjustment range: 0.1~15.0s

INITIAL CURRENT - the current appearing in the circuit after pressing the button in the grip handle. The higher the initial current, the easier it is to ignite the arc.
Adjustment range(%): 10%~100%

UP SLOPE (Time of current increase) - welding current rise time from the initial current to the set welding current value.
Adjustment range: 0.0~15.0 s

WELDING CURRENT (Peak Amp) – main welding current
Adjustment range: 5 ~ Max Current

SPOT TIME (time of spot welding) – spot welding time
Adjustment range: 0.1~15.0 s

DUTY CYCLE(pulse duty) 

- duration of the impulse, allows you to adjust the depth of the penetration. The increase in width increases the depth of penetration, the reduction reduces the amount of heat entering the material, reducing the risk of burning thinner sheets or smaller elements

Adjustment range: 5~95% (>200Hz Duty 50%)

PULSE FREQUENCY - the frequency with which the value of the current pulse between the welding current and the base current changes.
Adjustment range: 0.2~250Hz / suggest at 200Hz

BASE CURRENT (Base Amp) **-** the current responsible for maintaining the welding process, the lower value of the current pulse. It makes it easier to control the amount of heat entering the material.
The base current adjustment is only possible during pulse welding
Adjustment range: 10%~100%

AC FREQUENCY  **-** the function is useful when welding aluminum. The higher the frequency, the more focused the arc will be. (it's not a better quality weld with higher frequency)
Adjustment range: 20~ 250 Hz/ suggest at 60Hz

AC BALANCE - The ratio of the duration of the positive to negative phase. The reduction of the balance results in the introduction of more heat into the material, resulting in a narrower weld and deeper penetration, and at the same time reduces the heat load of the tungsten electrode. Increasing the balance results in the introduction of less heat into the material, resulting in better cleaning, a broad joint and a shallower penetration, however, it significantly weighs the tungsten electrode.
Adjustment range: Sync Set ±10% Adjust

DOWN SLOPE (time of current descent) **-** time of transition current from the welding current to the final current.
Adjustment range: 0.0~15.0 s

FINAL CURRENT - current at the end of the weld sequence.
Adjustment range: 10%~100%

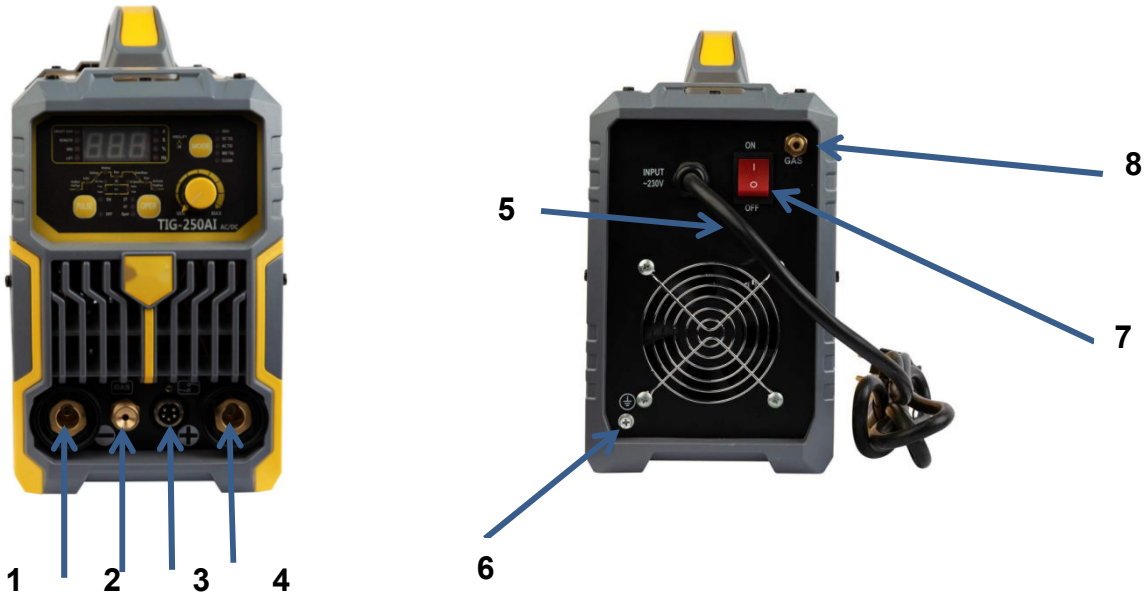
POST FLOW - time from quenching the arc to closing the gas valve to cover the solidifying weld pool from the air and to cool the tungsten electrode. Too short time of outflow may result in oxidation of the weld,

Adjustment range:0.5~15.0s

6.PREPARATION OF THE DEVICE FOR WORK

If the device is stored or transported in low temperatures, the device should be brought to the right temperature before starting work !!!

6.1DESCRIPTION OF OPERATION



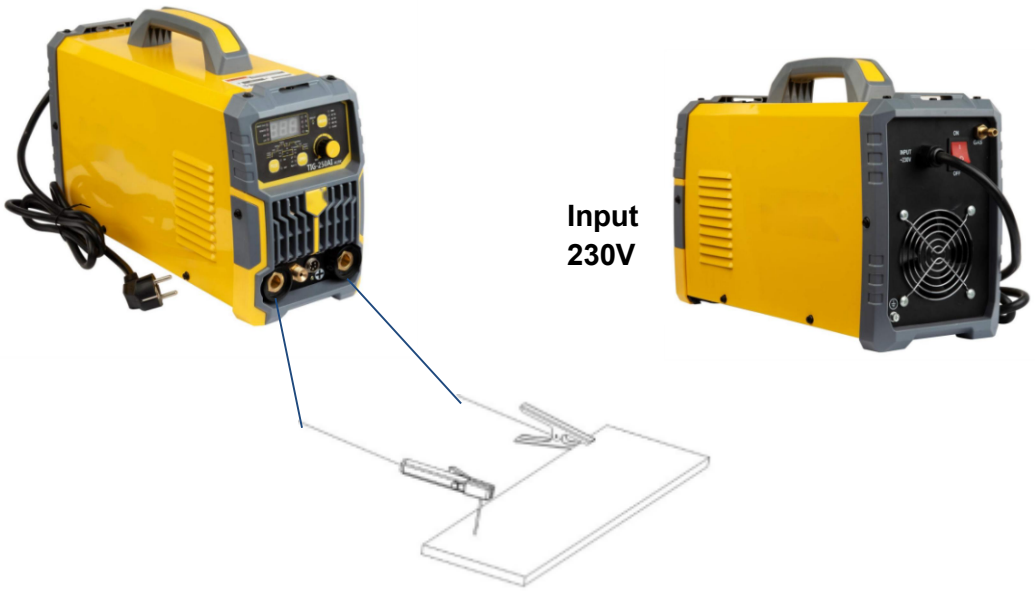
(1) Negative polarization socket"-" **(2)** gas connector

(3) remote socket **(4)** positive polarization socket"+"

(5) supply power wire **(6)** ground terminal **(7)** switch on/off **(8)** spigot shield gas

6.1MMA Method

The ends of the welding cables should be connected to the sockets (1) and (4) on the front panel, so that the polarity of the electrode is on the electrode holder. The polarity of the welding cable connection depends on the type of electrode used and is given on the electrode packaging. The ground cable clamp must be securely attached to the welded material. Connect the device's plug to a 230V 50Hz mains socket.



6.2Tig Method

The tig torch should be connected to gas connector(2) and remote socket (3) .

The gas pipe from the reducer should be led and attached to the gas connector (8) located on the back of the housing.
Connect the positive polarization socket (4) to the material to be welded with a wire with a earth clamp.
Connect the device's plug to a 230V 50Hz mains socket.

Note:If use lift tig torch, the torch will connect Negative polarization socket"-"(1) and gas connector(2).
Connect the positive polarization socket (4) to the material to be welded with a wire with a earth clamp.

7.PROBLEM AND SOLUTION

In case of malfunction of the device, before sending the welder to the service, check the list of basic failures and try to remove them yourself.

Any repairs to the device may only be made after disconnecting the plug from the mains socket.

SYMPTOMS	SOLUTION
The control panel does not light up, the fan does not work, no output voltage	1. Make sure that the switch is in the ON position 2. Check the protection and voltage in the network 3. Remove the housing and check the connection of all electrical plugs inside the device
The control panel is on, the fan is not working, no output voltage.	1. Check whether the device has been connected to a higher voltage network. If so, connect to the 230V grid and turn it on again 2. The power supply voltage is unstable and causes the overvoltage protection to be activated. Switch the device off for 2-3 minutes and switch it on again 3. The short-term switching on and off of the switch has triggered the overvoltage protection. Switch the device off for 2-3 minutes and switch it on again 4. There was another damage requiring repair by an authorized service center
The control panel is on, the fan is running, problems with arc ignition	Check the TIG torch, replace the consumables if they are worn
The control panel is on, the fan is running, problems with arc ignition	1. Check the terminals and the correct electrical conductivity of the electrode and ground wires 2. Check the connection of the TIG torch to the device, make sure that the pins in the socket are not broken or jammed. 3. Unscrew the handle of the TIG torch and check that the switch in the holder is working
Unsatisfactory weld quality during MMA welding, the electrode is bonded to the material being welded	1. Check the polarity of the welding cable connections 2. Check that the electrode is not wet. Replace the electrode. 3. The welder is powered from a generator set or a long extension with too small a cable cross section. Connect the device directly to the mains
Unsatisfactory weld quality for TIG welding	1. Replace consumable parts. Change the tungsten electrode or gas cylinder with higher quality materials 2. Check that shielding gas flows with the appropriate intensity 3. Check the gas supply hose, improve the hose and couplings connection and the condition of quick couplers 4. Check reducer.

List of codes:

	**Over current protection** The main power device of the welding machine is in the over-current working state, at this time the welding machine cuts off the output and the display shows “ALARM”.
	**Over heating protection** The welding machine is in an overload working state and the temperature of the main power device is too high. At this time, the welding machine cuts off the output and the display shows “ALARM”. There is no need to turn off the welding machine at this time, it will automatically return to normal state after the internal temperature of the welding machine drops.
	**Temperature detection failure** The internal temperature detection device of the welder is faulty or the contact is poor, the welder cuts off the output and the display shows “ALARM”. At this time, please turn off the welding machine and contact qualified maintenance personnel to inspect and repair the welding machine.
 **NOTE:At each shut down machine moment, E06 on the display is a normal shutdown operation!**	**Under voltage protection** When the internal auxiliary power supply of the welding machine plus 15V voltage is lower than the set undervoltage protection point, the under voltage protection will be triggered, and and the display shows “ALARM”. This fault is an internal auxiliary power output failure. Please turn off the welding machine and contact qualified maintenance personnel for inspection and repair the welding machine.

8.OPERATING INSTRUCTIONS

Operation of the device should take place in an atmosphere free from corrosive ingredients and high levels of dust. Do not place the device in dusty places, near grinders, etc. Dust and contamination with metal filings of control boards, wires and connections inside the device can lead to an electrical short circuit and consequent damage to the welder.

Avoid operation in environments with high humidity, in particular in situations of dew on metal elements.

In the case of dew on metal elements, for example, after entering a cool device into a warm room, wait until the dew disappears. It is recommended that when the machine is used outdoors, it should be placed under the roof in order to protect it from adverse weather conditions.

9.MAINTENANCE INSTRUCTIONS

As part of everyday service, keep the welder clean, check the condition of external connections and the condition of wires and electric cables.

Replace consumable parts regularly.

Periodically clean the device inside by blowing with compressed air to remove dust and metallic filings from the control plates as well as wires and electrical connections.

At least once every six months a general review and condition of electrical connections should be made, in particular:

- protection against electric shock

- insulation condition

- security system status

- correct operation of the cooling system

10.STORAGE AND TRANSPORT INSTRUCTIONS

The device should be stored at -10 ° C to + 40 ° C and relative humidity up to 80% free from corrosive fumes and dust. The transport of packaged devices should take place in covered transport means. During transport, the packed device should be secured against shifting and ensure their proper position.