

wilkinsonstar.com



# MIG Series

MIG/MAG/MMA Separate wire feed welding machine  
Order code JM-250S (MIG 250S)



## OPERATOR MANUAL



# Your new product

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Thank you for selecting this Jasic Technology, Wilkinson Star product.

This product manual has been designed to ensure that you get the most from your new product. Please ensure that you are fully conversant with the information provided paying particular attention to the safety precautions. The information will help protect yourself and others against the potential hazards that you may come across.

Please ensure that you carry out daily and periodic maintenance checks to ensure years of reliable and trouble free operation.

Wilkinson Star Limited are a leading supplier of equipment in the UK and our products are supported by our extensive service network. Call your distributor in the unlikely event of a problem occurring. Please record below the details from your product as these will be required for warranty purposes and to ensure you get the correct information should you require assistance or spare parts.

Date purchased \_\_\_\_\_

From where \_\_\_\_\_

Serial Number \_\_\_\_\_

(The serial number will normally be located on the equipment data plate on the underside of the machine or on the rear panel)

Please note products are subject to continual development and may be subject to change without notice



# 1

## Safety Precautions

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

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. Operators should respect the safety of other persons.



### **Prevention against electric shock**

The equipment should be installed by a qualified person and in accordance with current standards in operation. It is the users responsibility to ensure that the equipment is connected to a suitable power supply. Consult with your utility supplier if required

If earth grounding of the work piece is required, ground it directly with a separate cable.

Do not use the equipment with the covers removed.

Do not touch live electrical parts or parts which are electrically charged.

Turn off all equipment when not in use.

Cables (both primary supply and welding) should be regularly checked for damage and overheating. Do not use worn, damaged, under sized, or poorly jointed cables.

Ensure that you wear the correct protective clothing, gloves, head and eye protection.

Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work ground.

Never touch the electrode if you are in contact with the work ground, or another electrode from a different machine.

Do not wrap cables over your body.

Ensure that you take additional safety precautions when you are welding in electrically hazardous conditions such as damp environments, wearing wet clothing, and metal structures. Try to avoid welding in cramped or restricted positions.

Ensure that the equipment is well maintained. Repair or replace damaged or defective parts immediately. Carry out any regular maintenance in accordance with the manufacturers instructions.



### **Safety against fumes and welding gases**

Locate the equipment in a well-ventilated position.

Keep your head out of the fumes. Do not breathe the fumes.

Ensure the welding zone is in a well-ventilated area. If this is not possible provision should be made for suitable fume extraction.

If ventilation is poor, wear an approved respirator.

Read and understand the Material Safety Data Sheets (MSDS's) and the manufacturer's instructions for metals, consumable, coatings, cleaners, and de-greasers.

Do not weld in locations near any de-greasing, cleaning, or spraying operations. Be aware that heat and rays of the arc can react with vapours to form highly toxic and irritating gases.



Do not weld on coated metals, unless the coating is removed from the weld area, the area is well ventilated, and while wearing an air-supplied respirator. The coatings on many metals can give off toxic fumes if welded.



### **Prevention against burns and radiation**

Arc rays from the welding process produce intense, visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin.

Wear an approved welding helmet fitted with a proper shade of filter lens to protect your face and eyes when welding or watching

Wear approved safety glasses with side shields under your helmet.

Never use broken or faulty welding helmets.

Always ensure there are adequate protective screens or barriers to protect others from flash, glare and sparks from the welding area. Ensure that there are adequate warnings that welding or cutting is taking place.

Wear suitable protective flame resistant clothing.

The sparks and spatter from welding, hot work pieces, and hot equipment can cause fires and burns

Welding on closed containers, such as tanks, drums, or pipes, can cause them to explode.

Accidental contact of electrode to metal objects can cause arcs, explosion, overheating, or fire.

Check and be sure the area is safe and clear of inflammable material before carrying out any welding.



### **Protection against noise**

Some welding and cutting operations may produce noise.

Wear safety ear protection to protect your hearing.



### **Protection from moving parts**

When the machine is in operation keep away from moving parts such as motors and fans. Moving parts, such as the fan, may cut fingers and hands and snag garments.

Protections and coverings may be removed for maintenance and controls only by qualified personnel, after first disconnecting the power supply cable.

Replace the coverings and protections and close all doors when the intervention is finished, and before starting the equipment.

Take care to avoid getting fingers trapped when loading and feeding wire during set up and operation.

When feeding wire be careful to avoid pointing it at other people or toward your body.

Always ensure machine covers and protective devices are in operation.



### **Precautions against fire and explosion**

Avoid causing fires due to sparks and hot waste or molten metal

Ensure that appropriate fire safety devices are available near the cutting / welding area.

Remove all flammable and combustible materials from the cutting / welding zone and surrounding areas

Do not cut/weld fuel and lubricant containers, even if empty. These must be carefully cleaned before they can be cut/welded.

Always allow the cut/welded material to cool before touching it or placing it in contact with combustible or flammable material.

Do not work in atmospheres with high concentrations of combustible fumes, flammable gases and dust.

Always check the work area half an hour after cutting to make sure that no fires have begun.



### **Risks due to magnetic fields**

The magnetic fields created by high currents may affect the operation of pacemakers or electronically controlled medical equipment.

Wearers of vital electronic equipment should consult their physician before beginning any arc welding, cutting, gouging or spot welding operations.

Do not go near welding equipment with any sensitive electronic equipment as the magnetic fields may cause damage.



## RF Declaration

Equipment that complies with directive 2004/108/EC concerning electromagnetic compatibility (EMC) and the technical requirements of EN60974-10 is designed for use in industrial buildings and not those for domestic use where electricity is provided via the low voltage public distribution system. Difficulties may arise in assuring class A electromagnetic compatibility for systems installed in domestic locations due to conducted and radiated emissions.

In the case of electromagnetic problems, it is the responsibility of the user to resolve the situation. It may be necessary to shield the equipment and fit suitable filters on the mains supply.

## LF Declaration

Consult the data plate on the equipment for the power supply requirements.

Due to the elevated absorbance of the primary current from the power supply network, high power systems affect the quality of power provided by the network. Consequently, connection restrictions or maximum impedance requirements permitted by the network at the public network connection point must be applied to these systems.

In this case the installer or the user is responsible for ensuring the equipment can be connected, consulting the electricity provider if necessary.



### Materials and their 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.



### Handling of Compressed gas cylinders and regulators

All cylinders and pressure regulators used in welding operations should be handled with care.

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

Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.

Always secure the cylinder safely

## Never deface or alter any cylinder



# 2

## Product Overview

The JM-250S is a portable inverter MIG/MAG/MMA machine with the following features.

### Advanced IGBT inverter technology

High inverter frequency design greatly reduces the size and weight of the welder.

Reduction in magnetic and resistance loss enhances the welding efficiency and energy saving effect.

Working frequency is beyond audio range, which almost eliminates noise pollution.

### Electronic control mode

Closed loop feedback control provides a stable voltage output, and workable mains voltage fluctuation of  $\pm 15\%$ .

Adjustable welding voltage matching the welding current precisely gives excellent welding characteristics.

A unique welding dynamic characteristic control circuit provides a stable arc, low spatter, high welding efficiency and excellent weld appearance. .

Removing wire tip ball after welding; high no-load voltage and soft start wire feeding results in a excellent arc ignition.

Welds a wide range of wires from 0.6~1.6mm diameter.

### Improved functional design

With the wire feeder separate from the welding source, the welding operation can be carried out at a wider range.

Lightweight and portable

Simple user friendly controls.

Both spot welding and continuous welding are optional, and work piece burn-through can be avoided when welding sheet metal in spot welding mode.

Both MMA and MIG/MAG (GMAW) are available, and various welding requirements can be met.

2T and 4T welding modes

Wire inch button





# 3

## Technical data

JM-250S	
Rated input voltage (V)	3-phase 400V AC±15%, 50/60Hz
Rated input current (A)	12.1
Rated power supply capacity (KVA)	8.4
Output current range (MMA)	10~220A
Welding current range (A)	35~250
Welding voltage range (V)	14~32
No-load voltage (V)	52
Wire feed speed range (m/min)	1.5~16
Wire diameter applicable (mm)	0.8/1.0
Rated duty cycle @ 40° C	250A@60%
Efficiency (%)	85
Power factor	0.93
Protection class	IP21S
Overall size (mm)	510×196×385
Weight (kg)	15

Product design may vary due to customer requirements.

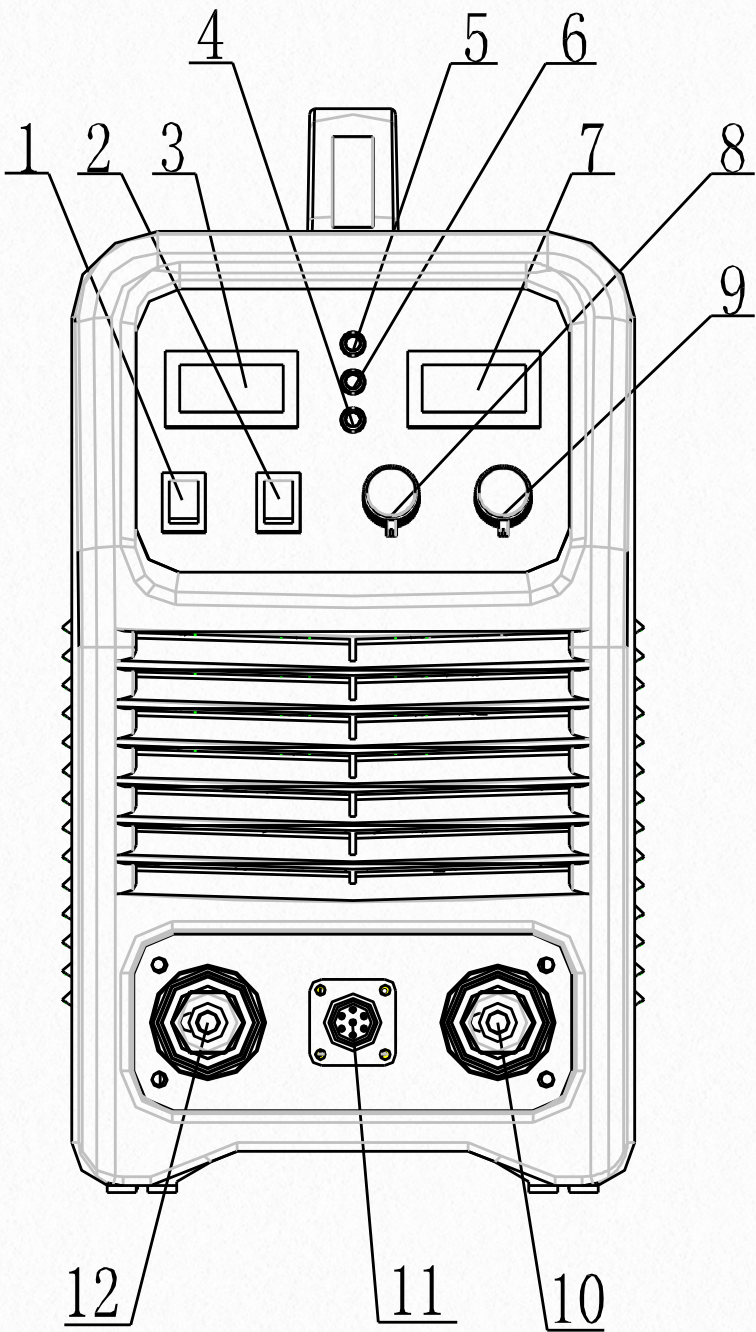


# 4

## Controls

### Front view

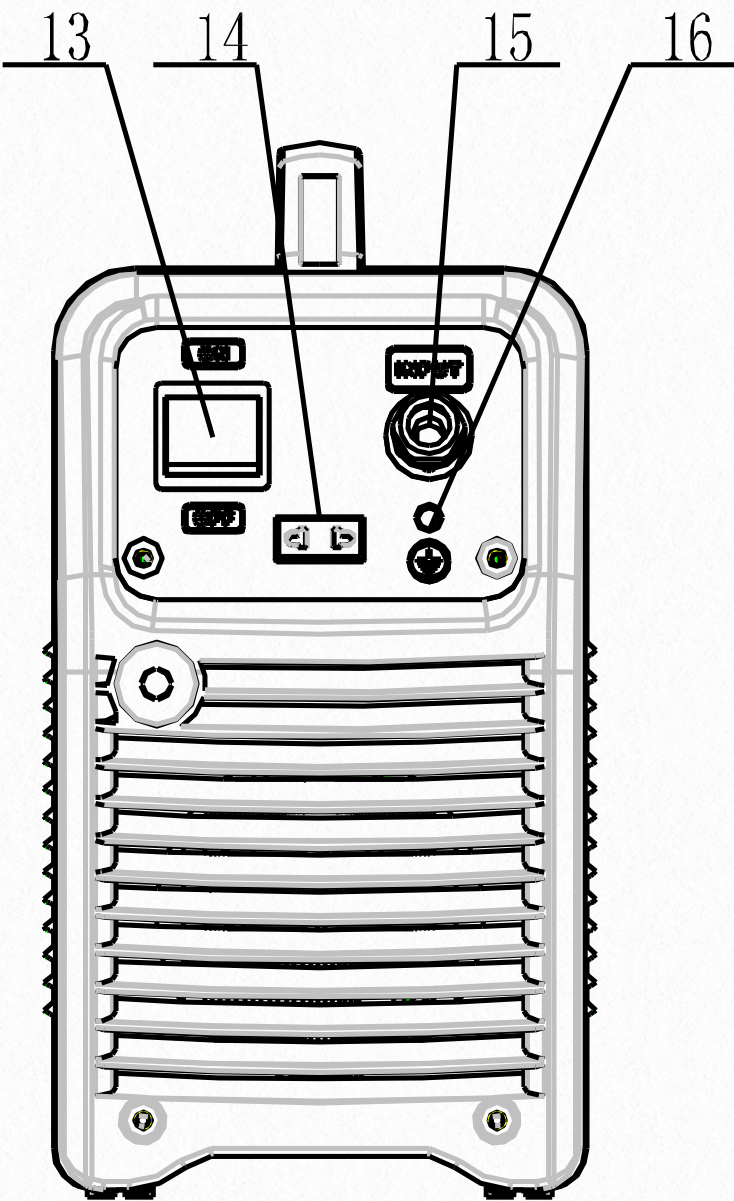
- 1. Spot welding/continuous welding switch
- 2. MMA/MIG switch
- 3. Voltmeter
- 4. Over current LED
- 5. Power LED
- 6. Overheating LED
- 7. Ammeter
- 8. Current control knob in MMA
- 9. Inductance control knob
- 10. “ – ” output terminal
- 11. Connector for the wire feeder
- 12. “ + ” output terminal





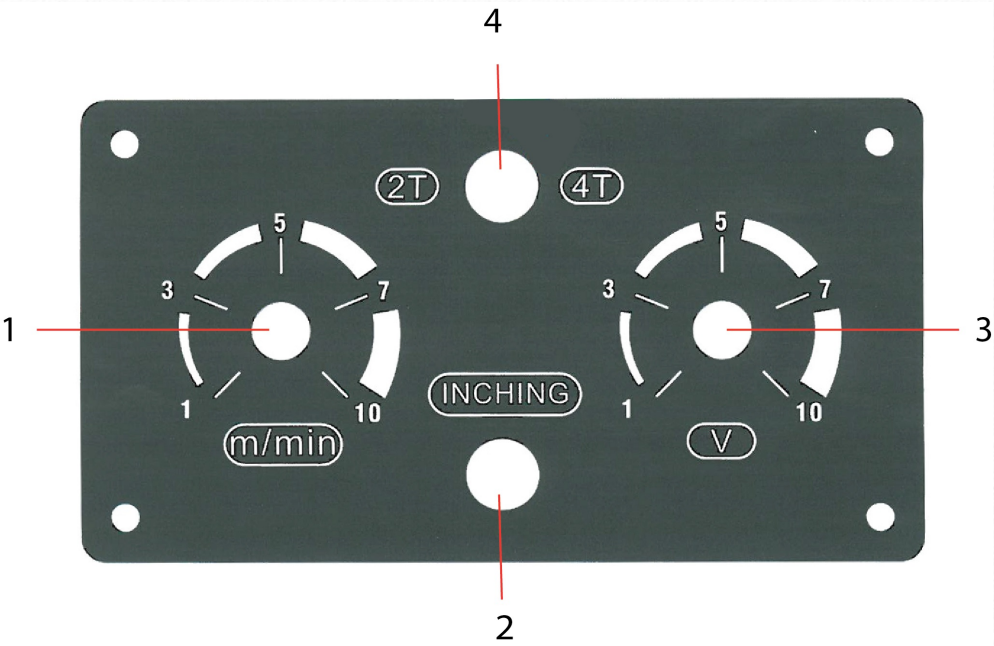
**Rear View**

- 13 Power switch
- 14 Socket for the heater
- 15 Input power cord gland
- 16 Ground terminal



**Wire feed control**

- 1. Welding current control knob
- 2. Manual wire feeding switch
- 3. Welding voltage control knob
- 4. 2T / 4T Selector switch





# 5

## Installation

### Unpacking

Check the packaging for any signs of damage.

Carefully remove the machine and retain the packaging until the installation is complete.

### 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.

### 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.

### Output connections

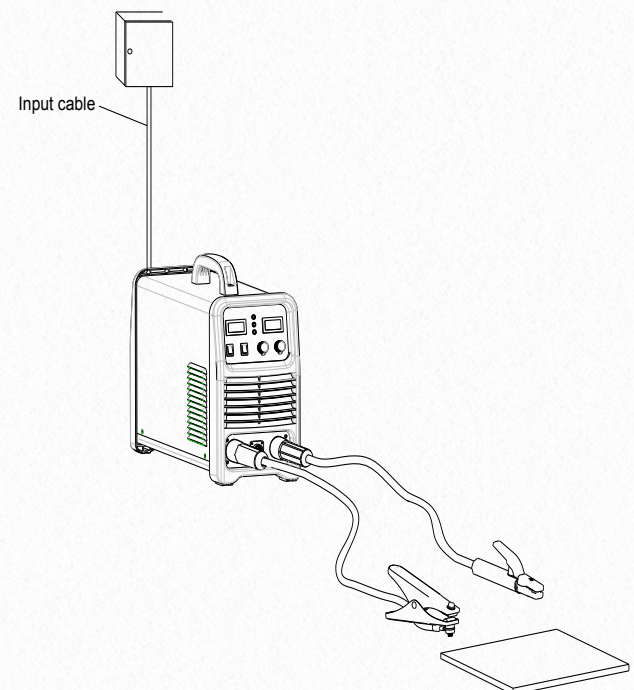
#### *Electrode polarity*

In general when using manual arc welding electrodes the electrode holder is connected to the positive terminal and the work return to the negative terminal. Always consult the electrode manufacturer's data sheet if you have any doubts.

### MMA welding

Insert the cable plug with electrode holder into the “+” socket on the front panel of the welding machine, and tighten it clockwise.

Insert the cable plug of the work return lead into the “-”



socket on the front panel of the welding machine, and tighten it clockwise

### Scratch Start TIG

When using the machine for scratch start TIG welding (set to MMA mode) the TIG torch should be connected to the negative terminal and the work return to the positive terminal


### MIG / MAG (GMAW)

Connect the wire feeder to the welding source with the interconnection control cable, and tighten the connector.

Connect one end of the welding cable to the “+” output terminal of the welding source and the other end to the back panel of the wire feeder.

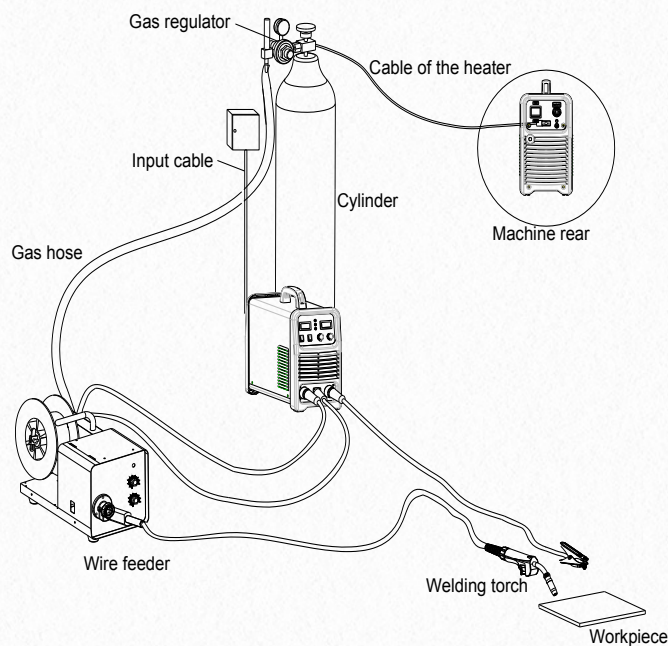
Insert the quick plug at one end of the work return cable into the “-” socket on the front panel of the welding source, and clamp the work piece with the work clamp at the other end of the work return cable.



Insert the welding torch into the “” output socket on the front panel of the wire feeder, and tighten it. Manually thread the welding wire into the torch body.

Insert the quick plug of the interconnection cable set into the “+” output terminal of the welding machine, and tighten it clockwise. Connect the other end of the interconnection on the rear of the wire feed unit

Insert the multi pin plug of the interconnection cable set into the control cable socket of the welding machine and connect the other end of the control cable into the rear of the wire feed unit



Avoid excessive exposure of the cylinder to high temperature or sunlight.

Always keep the cylinder in an upright position

Always fix the cylinder securely

Before the installation of gas regulator, open and close the valve for several times in order to remove the dust on the joint.

Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.

Leakage of shield gas affects welding performance, so tighten the cylinder valve joint with a spanner. Check for leaks

## Installation of the wire spool

Install the wire spool on the spindle adapter on the wire feeder, locating the hole on the wire spool to the fixing pin on the spindle adapter.

Select the correct size feed drive roll according to the size of welding wire.

Release the pressure arm of the wire feeder to thread the wire through the guide tube, and into the drive roll groove. Adjust the pressure arm, ensuring no sliding of the wire. Too high pressure will lead to wire distortion, which will affect wire feeding.

Press the inch wire feeding button to thread the wire out of the torch head.

## Installation of the cylinder

Connect the cylinder equipped with a regulator to the gas inlet on the wire feeder with a hose, and tighten it with a hose clamp.

Please note:



# Operation

Before starting any welding activity ensure that you have suitable eye protection and protective clothing. Also take the necessary steps to protect any persons within the area.

## MMA

After connecting the welding leads as detailed you will need to switch on the machine. The power LED will be lit and the fan running.

Switch the MMA/MIG switch to MMA.

Set the amperage on the machine using the MMA current control knob to a value suitable for the electrode being used. Please see below a guide to amperages required. Ensure you check that you have the electrode polarity correct. Inductance can be adjusted using the inductance control on the front panel of the machine

Electrode Diameter (mm)	Recommended Welding Current (A)
1.0	20~60
1.6	44~84
2.0	60~100
2.5	80~120
3.2	108~148
4.0	140~180
5.0	180~220
6.0	220~260

## MIG/MAG

- 1) After being installed as above, and the power switch on the back panel being switched on, the machine is started. At this time, the ammeter displays the preset wire feed speed value, and the voltmeter displays the preset voltage value. Open the cylinder valve, and switch the gas check switch to the “GAS CHECK” position. Adjust the gas regulator to get the correct gas flow. After setting, switch the gas check switch to the “Welding” position.
- 2) Get the correct arc conditions by adjusting the inductance control knob. Turn the knob counterclockwise to get lower inductance and harder arc; turn it clockwise to get higher inductance and softer arc. Generally, select harder arc at lower current, while select softer arc at higher currents.
- 3) Select the correct welding current and welding voltage by adjusting the current control knob and voltage control knob on the wire feeder.
- 4) Select 2T or 4T operation mode. In 2T mode, the arc is ignited by pushing the torch trigger, and arc stops by releasing the torch trigger. In 4T mode, welding can be continued when releasing the torch trigger after arc is ignited, and at this time, welding instructions should be set by adjusting the current control knob and voltage control

knob on the wire feeder. When pushing the torch trigger again, the machine enters into crater welding, and at this time. Crater parameters should be set by adjusting the crater/welding current control knob and crater voltage control knob on the front panel of the machine.

The actual current and voltage values are displayed on the front panel of the machine. When the torch trigger is released, welding ends. 2 seconds after welding ends, the gas supply will be cut off.

## Gas selection

Metal inert gas welding (MIG): Uses Argon (Ar), Helium (He) or Ar-He mixtures as the shield gas, and it mainly used for welding aluminium and its alloys.

Metal active gas welding (MAG): Uses Argon (Ar) mixed with a certain amount of CO<sup>2</sup> / O<sup>2</sup> as the shield gas, and it usually used in short circuit transfer and spray transfer. It can be applicable to flat position welding, vertical position welding, overhead position welding and all-position welding, and it mainly used for welding carbon steel, high strength low alloy steel and stainless steel. Welding robots mostly use the MAG process.

CO<sub>2</sub> (carbon dioxide) gas shielded arc welding (CO<sub>2</sub> welding): It uses CO<sub>2</sub> as the shield gas, and is usually used in globular transfer and short circuit transfer to implement welding. It can be used to weld in different positions. As compared with other welding methods, CO<sub>2</sub> welding has many advantages, though it produces more spatters, CO<sub>2</sub> welding is widely used for general metal structure welding.

### 1) Welding current setting

Set the welding current after the above preparation. Short

Welding wire $\phi$ (mm)	Applicable current (A)	Optimal current (A)
0.8	50~120	70~100
1.0	70~180	80~120
1.2	80~350	100~200

circuit transfer is mainly for electrode wires of diameter 0.6~1.2mm. As a guide for short circuit welding set the welding current according to the table below.

### 2) Welding speed selection

The welding quality and productivity should be taken into consideration for the selecting of welding speed. In the case that the welding speed increases, it weakens the protection



effect and quickens the cooling. As a consequence, it is not good for weld bead shaping. In the event that the speed is too slow, the workpiece will be burned through, and a good weld bead will be unavailable. In practical operation, the welding speed should not exceed 50cm/min.

3) Wire Stick-out

The increase of the stick-out can improve the productivity, but too long stick-out may lead to excessive spatter, wire breaking and unstable welding. Generally, the stick-out should be 10 times as the welding wire diameter.

4) Shield gas flow selection

The protection effect is the primary consideration. Besides, the protection effect of inner-angle welding is better than that of external-angle welding, so the gas flow in inner-angle welding should be lower. Less or no shield gas is needed in FCAW. Refer to the table below for the recommended gas flow rates.

Welding mode	Welding with thin wire	Welding with thick wire	Welding with thick wire under high current
Gas flow (L/min)	5~15	15~20	20~25

For welder training please visit our Academy website at

[www.wilkinson-welding-academy.com](http://www.wilkinson-welding-academy.com)



# 6

## Maintenance and troubleshooting

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.

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 on 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 machine

Period	Maintenance item
Daily examination	<p>Carry out a full visual inspection. Check for any damage to the machine, leads, cables and connections. Replace where necessary.</p> <p>Switch on the machine and check for any warning Led's and general operation</p>
Monthly examination	<p>Using the dry compressed air to clean the inside of arc welding machine. Especially check for build up of dust / debris on intake grills, main voltage transformer, inductance, IGBT module, the fast recover diode and PCB, etc. Take care when blowing electronic components and do not dislodge any wiring connections</p> <p>Check the security of output connections and plugs. Replace if signs of overheating.</p>
Yearly examination	<p>Carry out an annual service. Check earth continuity and insulation resistance of the machine at the relevant points.</p> <p>PLEASE NOTE THIS WORK SHOULD BE CARRIED OUT BY A TRAINED COMPETENT PERSON.</p>

### Troubleshooting



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 maybe potential danger 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 opening the case.

### Protection LED warnings

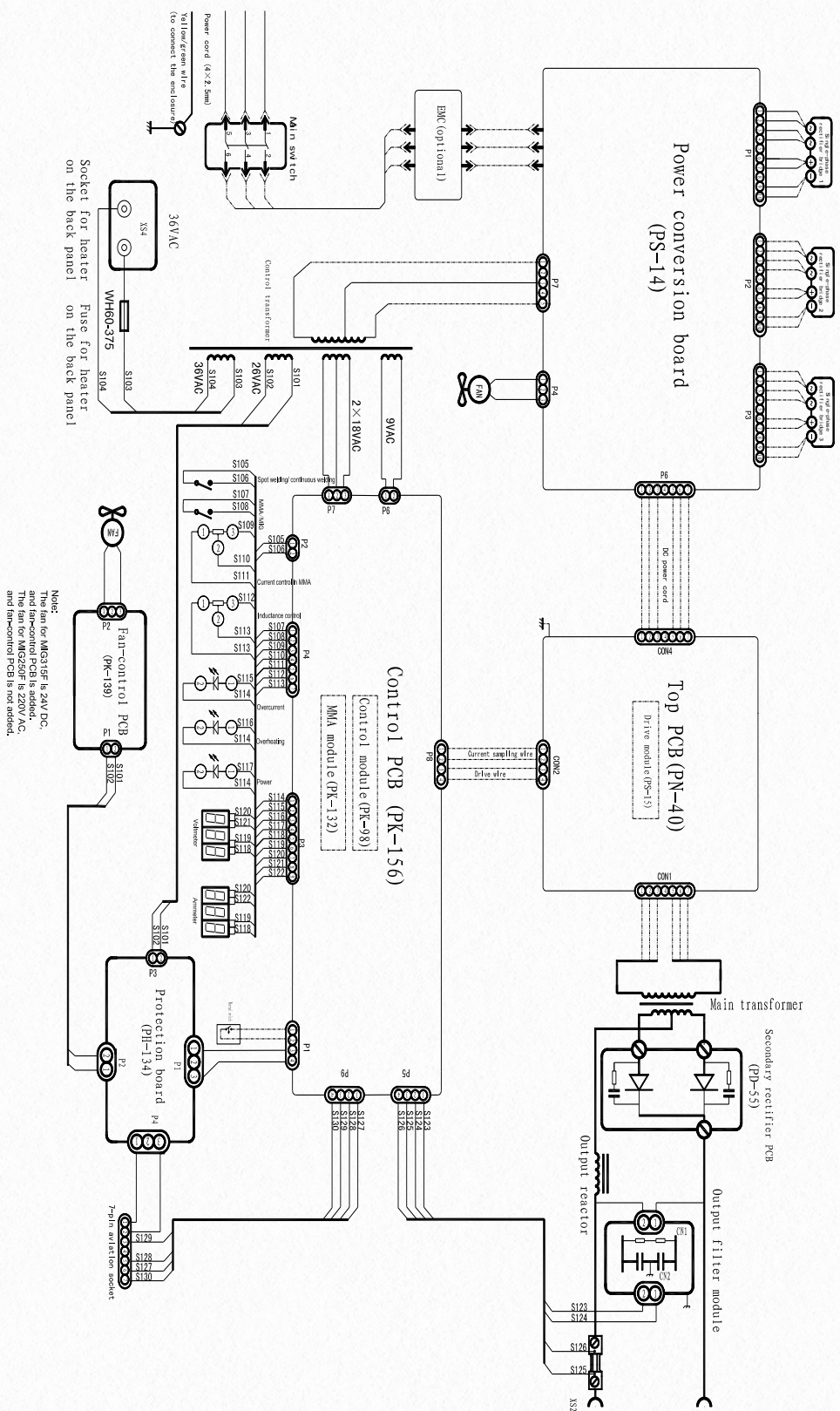
<p>Over current LED</p> 	<p>If the over current LED is on during welding, it indicates that the machine fails or accidental interference occurs. Restart the machine. If the phenomenon cannot be eliminated, shut down the machine and contact the service center of our company.</p>
<p>Overload LED</p> 	<p>If the overload LED is on during welding, it indicates that the main circuit is overheated and the machine will stop welding.time that welding.It is unnecessary to shut down the machine, but just wait for the overload LED to go out, and then welding can be continued.</p>



Malfunction Phenomena	Solution
The protection LED is on.	<ol style="list-style-type: none"> <li>Overheating protection <ol style="list-style-type: none"> <li>Check the welding current and working time. Operate according to the data shown in the operator's manual.</li> <li>Check the fan's running status when welding. If the fan does not work, check if there is a power supply of 230V: If the power supply is normal, check the fan; if the power supply is abnormal, check the connecting cable of the power supply.</li> <li>Replace the thermal switch if it is damaged.</li> </ol> </li> <li>Over current protection: This indicates a machine fault or an accidental break-off caused by interference. Restart the machine. If over current problem still exists, contact the service centre..</li> </ol>
No response when pushing the torch trigger and the protection LED is off.	<ol style="list-style-type: none"> <li>Check if the power LED and the digital meter illuminate.</li> <li>Check if the torch trigger is in good contact, and check if the welding torch is correctly connected.</li> <li>Check if the wire feeder is correctly connected.</li> </ol>
When the torch trigger is pushed, wire feeder works and gas comes out, but there is no output current, and the protection LED is off.	<ol style="list-style-type: none"> <li>Check if the work cable is in good contact.</li> <li>Check if the wire feeder cable is connected correctly.</li> <li>Check if the welding torch is damaged.</li> </ol>
There is output current when pushing the torch trigger to feed gas, but the wire feeder does not feed wire.	<ol style="list-style-type: none"> <li>Check if the control cable of the wire feeder is broken.</li> <li>Check if the wire feeder is blocked.</li> <li>Check if the wire feed PCB of the welding machine fails.</li> <li>Check if the wire feeder is damaged.</li> </ol>
Welding can be carried out when pushing the torch trigger, but the current is too high, the voltage can not be adjusted, and the no-load voltage is too high.	<ol style="list-style-type: none"> <li>Check if the control cable of the wire feeder is broken.</li> <li>Check if the control PCB of the welding machine fails.</li> <li>Check if the voltage/current feedback wire breaks.</li> </ol>
Welding can be carried out when pushing the torch trigger, but the current is too high, the voltage can not be adjusted, and the no-load voltage is too high.	<ol style="list-style-type: none"> <li>Check if the control cable of the wire feeder is broken.</li> <li>Check if the control PCB of the welding machine fails.</li> <li>Check if the voltage/current feedback wire breaks.</li> </ol>
Weld bead is not well protected.	<ol style="list-style-type: none"> <li>Do not move the welding torch away immediately when stopping welding, so that the shield gas can protect the weld bead.</li> <li>Prolong the post-flow time of the shield gas, and contact our company.</li> </ol>
The gas regulator cannot be heated.	<ol style="list-style-type: none"> <li>Check if the plug of the heater is well plugged in.</li> <li>Check if the resettable fuse inside the machine is in good condition.</li> <li>Check if the heater inside the gas regulator is damaged.</li> </ol>
There is no gas flow when the torch trigger is pushed, but the wire feeder works normally.	<ol style="list-style-type: none"> <li>The control PCB is damaged.</li> <li>The solenoid valve is clogged or damaged.</li> </ol>
Excessive spatter in MMA.	The output polarity connection is incorrect. Exchange the polarity.



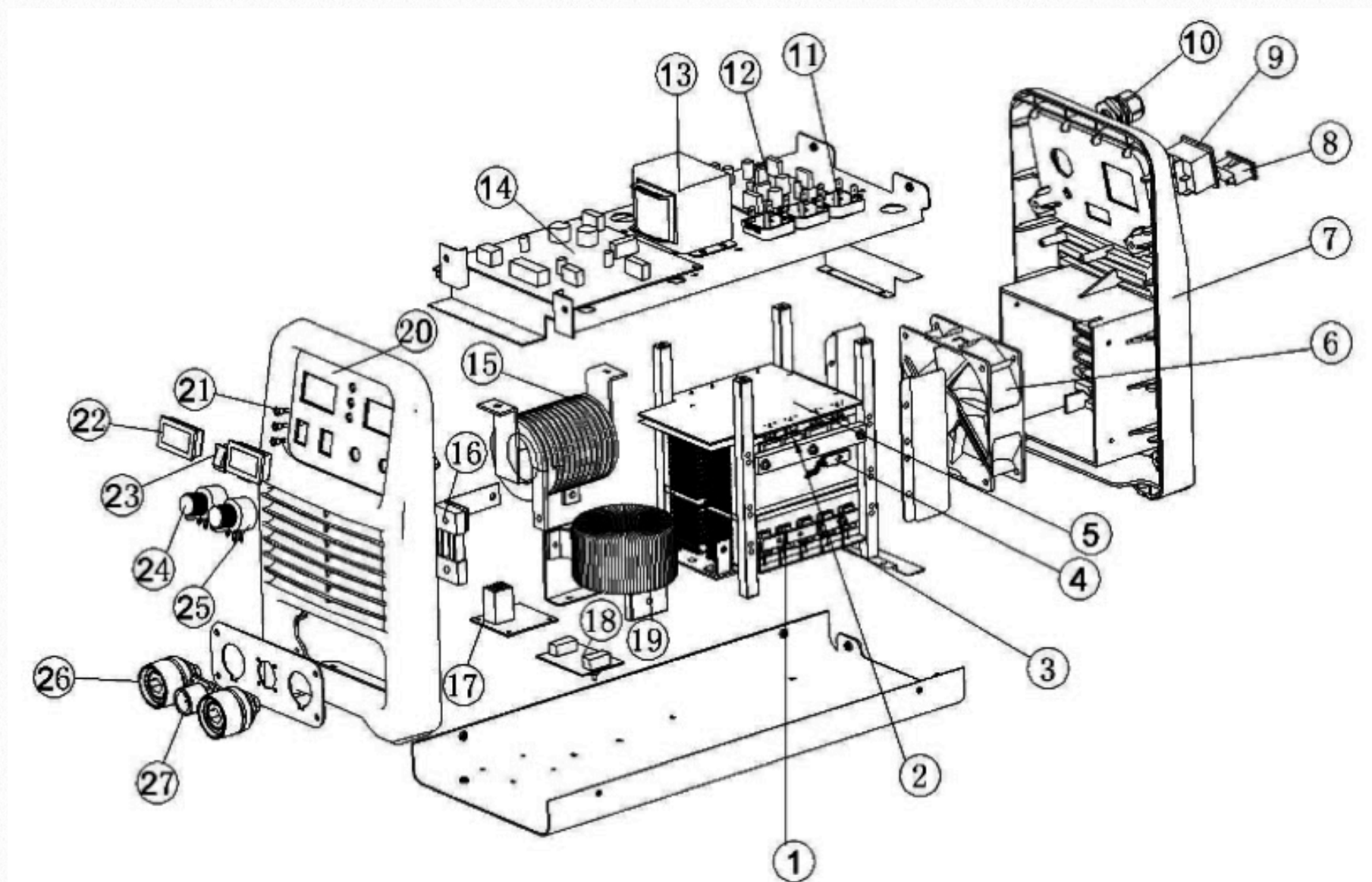
# 7 Electrical schematic





# 8

## Parts list

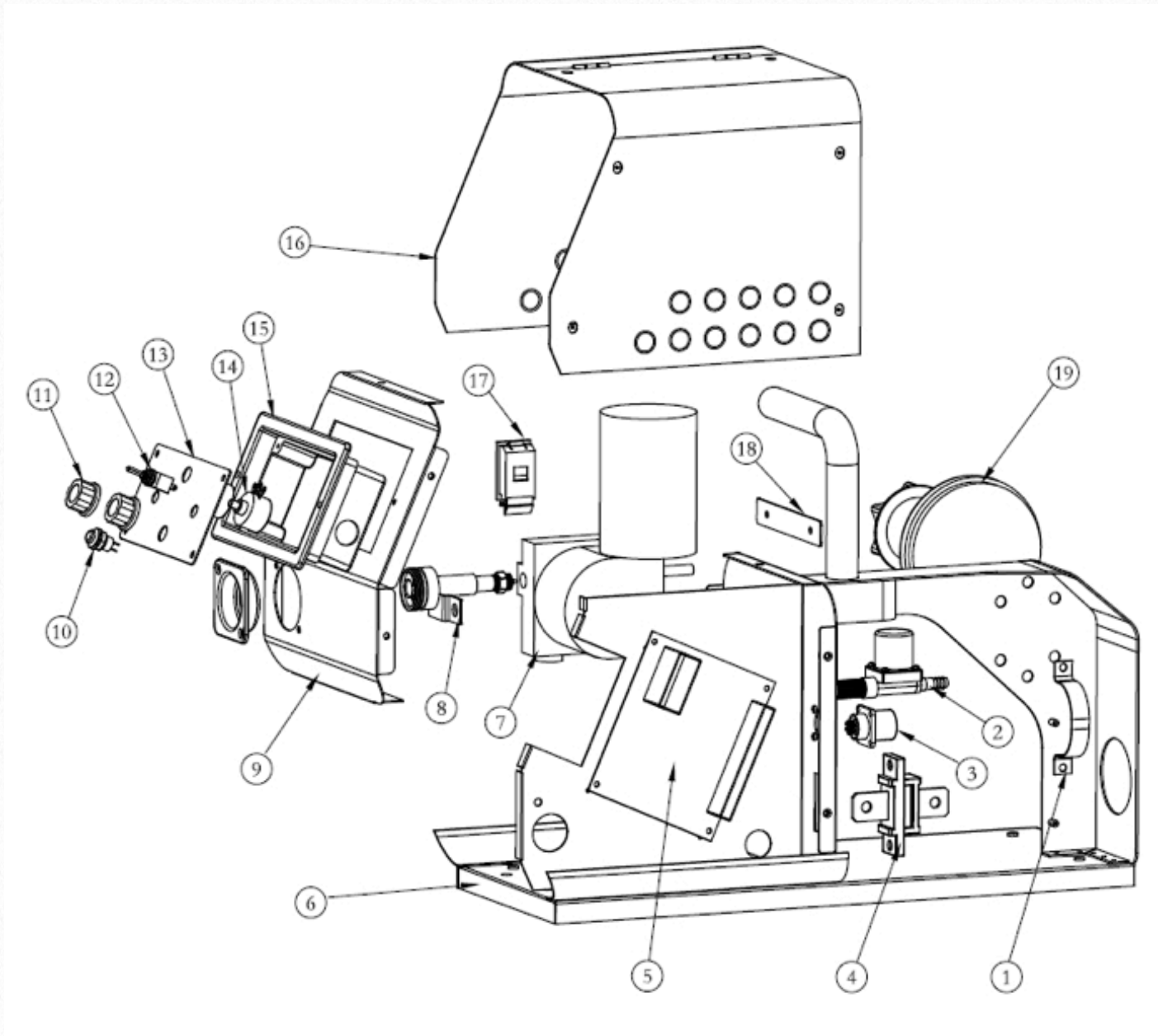




No.	Part no	Description	No.	Part no	Description
1	10007258	Rectifier	15	10002022	Reactor
2	10007258	IGBT	16	10016437	Diverter
3	10044601	Rectifier Plate	17	10044604	Fender apron
4	10002401	Thermal switch	18	10000920	Output absorbing board
5	10044603	Inverter board	19	10006075	Main transformer
6	10001867	Fan	20	10014690	Front Panel
7	10013342	Back panel	21	10001577	Indicator Light
8	10021881	Square sockets	22	10006795	Digital Meter
9	10004955	Power switch	23	10004944	Transform switch
10	10021912	Line button	24	10006507	MMA Current Potentiometer
11	10001146	Silicon bridge	25	10006507	Inductance Potentiometer
12	10044596	Power adapter plate	26	10021855	Quick socket
13	10042496	Transformer	27	10003254	Seven pin socket
14	10044595	Control board			



WIRE FEED UNIT



No.	Part no	Description	No.	Part no	Description
1	10004893	Interconnection clamp	11	10004921	Knob
2	10044629	Solenoid valve	12	10044628	2T/4T switch
3	10044632	Socket	13	10015217	Control Panel
4	10021855	Output Terminal	14	10044630 10044640	Potentiometer
5	10044600	Wire Feeding PCB Board	15	10015526	CS501B Remote Plastic Box
6	10045742	Bottom panel	16	10012376	Wire Feeder Cover
7	10003814	Wire Feeder	17	10016524	Door Catch
8	10003831	Central socket	18	10015767	Platen
9	10015216	Front Panel	19	10016681	Spool for wire feede
10	10044633	Inching button			



# **JM MIG Series MIG/MAG/MMA WELDING MACHINE**

## **Order code JM-250S (MIG 250S)**

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Product is subject to change without notice