MIGMATIC 250

MIG/MAG Power Source

Instruction manual

MIGMATIC 250

Instruction manual
For
Installation, Operation & General maintenance

CONTENTS

SAFETY

Users of ESAB welding equipment have the ultimate responsibility for ensuring that anyone who works on or near the equipment observes all the relevant safety precautions. Safety precautions must meet the requirements that apply to this type of welding equipment. The following recommendations should be observed in addition to the standard regulations that apply to the workplace.

Trained personnel well acquainted with the operation of the welding equipment must carry out all the work. Incorrect operation of the equipment may lead to hazardous situations, which can result in injury to the operator and damage to the equipment.

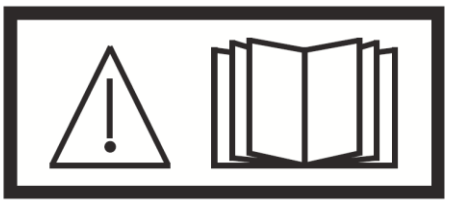
1. Anyone who uses the welding equipment must be familiar with:
   - its operation
   - location of emergency stops
   - its function
   - relevant safety precautions
   - welding

2. The operator must ensure that:
   - no unauthorized person is stationed within the working area of the equipment when it is started up.
   - no one is unprotected when the arc is struck

3. The workplace must:
   - be suitable for the purpose
   - be free from drafts

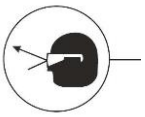
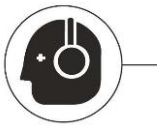
4. Personal safety equipment
   - Always wear recommended personal safety equipment, such as safety glasses, flameproof clothing, and safety gloves.
   - Do not wear loose—fitting items, such as scarves, bracelets, rings, etc., which could become trapped or cause burns.

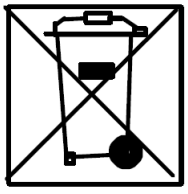
5. General precautions
   - Make sure the return cable is connected securely.
   - Only a qualified electrician may carry out work on high voltage equipment.
   - Appropriate fire extinguishing equipment must be clearly marked and close at hand.
   - Lubrication and maintenance must not be carried out on the equipment during operation.



Read and understand the instruction manual before installing or operating.
ESAB can provide you with all necessary welding protection and accessories.

WARNING
Arc welding and cutting can be injurious to yourself and others. Take precautions when welding.
Ask for your employer's safety practices which should be based on manufacturers' hazard data.

	*ELECTRIC SHOCK – Can kill* • Install and earth the welding unit in accordance with applicable standards. • Do not touch live electrical parts or electrodes with bare skin, wet gloves or wet clothing. • Insulate yourself from earth and the workpiece. • Ensure your working stance is safe.
	*FUMES AND GASES – Can be dangerous to health* • Keep your head out of the fumes. • Use ventilation, extraction at the arc, or both, to take fumes and gases away from your breathing zone and the general area.
	*ARC RAYS – Can injure eyes and burn skin.* • Protect your eyes and body. Use the correct welding screen and filter lens and wear protective clothing. • Protect bystanders with suitable screens or curtains.
	*FIRE HAZARD* • Sparks (spatter) can cause fire. Make sure therefore that there are no inflammable materials nearby.
	*NOISE – Excessive noise can damage hearing* • Protect your ears. Use earmuffs or other hearing protection. • Warn bystanders of the risk.
	MALFUNCTION – Call for expert assistance in the event of malfunction. PROTECT YOURSELF AND OTHERS!
	CAUTION! *This product is solely intended for arc welding*

	Do not dispose of electrical equipment together with normal waste! In accordance with national law, electrical equipment that has reached the end of its life must be collected separately and returned to an environmentally compatible recycling facility. As the owner of the equipment, you should get information on approved collection systems from the local representative. By applying this Directive you will improve the environment and human health

ASSEMBLING

The complete Installation should consist the following instruments.

	Description	Type	Quantity
1.	Welding Power Source	MIGMATIC 250 Power Source	1
2.	Wire Feeder	MIGMATIC WIRE FEEDER with accessories	1
3.	Welding Torch	PSF 250	1
4.	CO_2 Regulator cum Flowmeter or CO_2 Regulator with Flowmeter		1
5.	CO_2 Heater Core		1

ACCESSORIES LIST FOR MIGMATIC 250 MIG/MAG WELDING POWER SOURCES

Fuse, element 3A	2 piece
Fuse, element 8A	1 piece
Instruction Manual	1 piece

RATING OF MIGMATIC 250 MIG/MAG WELDING POWER SOURCE

Characteristics	Constant Potential Type
Input	
Supply Voltage phase & frequency	3 phase, 415 V ±10 %, 50 Hz
Maximum Input Current	13 Amps
Maximum Rating	9.5 KVA at 60% duty cycle
Output	
Output current range	40-250 Amps
Max. Output current at 60% Duty Cycle	250 Amps
Max. Output Current at 100% Duty Cycle	190 Amps
Open circuit voltage control	16-34 volts DC
Type of Welding Voltage Control	In 10 Steps single Knob control
Welding time	0.2-2 Sec.
Interval time	0.2-2 Sec.
Class of Insulation	Class ‘H’
Cooling	Forced Air Cooled
Approximate dimension (LXWXH) in mm	620*390*580
Weight (Approximate)	78 kg.

CAUTIONS FOR INSTALLATION

Capacity of Equipment

Input Voltage	415 VAC ±10 %
Number of Phase & Frequency	3 phase, 50 Hz
Maximum rating of Equipment	9.5 KVA
Capacity of Fuse (B Class)	16 Amps HRC
Output Cable	More than 38 mm^2

- Provide a Switch Box per one Welding Power Source and use designated fuse. Of 32 Amps.
- Tolerance of Power Voltage Variation is ± 10% of rated input voltage.
- In case SFU is not used, use 63 Amps MCB.

Installation Place

- Install in the place where less moisture and dust exit. Avoid direct sunlight and rain, and maintain ambient temperature within –10º to 45º C.
- If there are any walls, then the Welding Power Source and feeder unit has to be kept at a distance of more than 20 cm from the wall.
- In case more than one system has to be installed side by side, then the minimum gap between the adjacent systems has to be maintained at 20 cm.
- Keep the Gas Cylinder in a separate stand.
- Use a shield to protect the welding arc in case of excessive air draft.

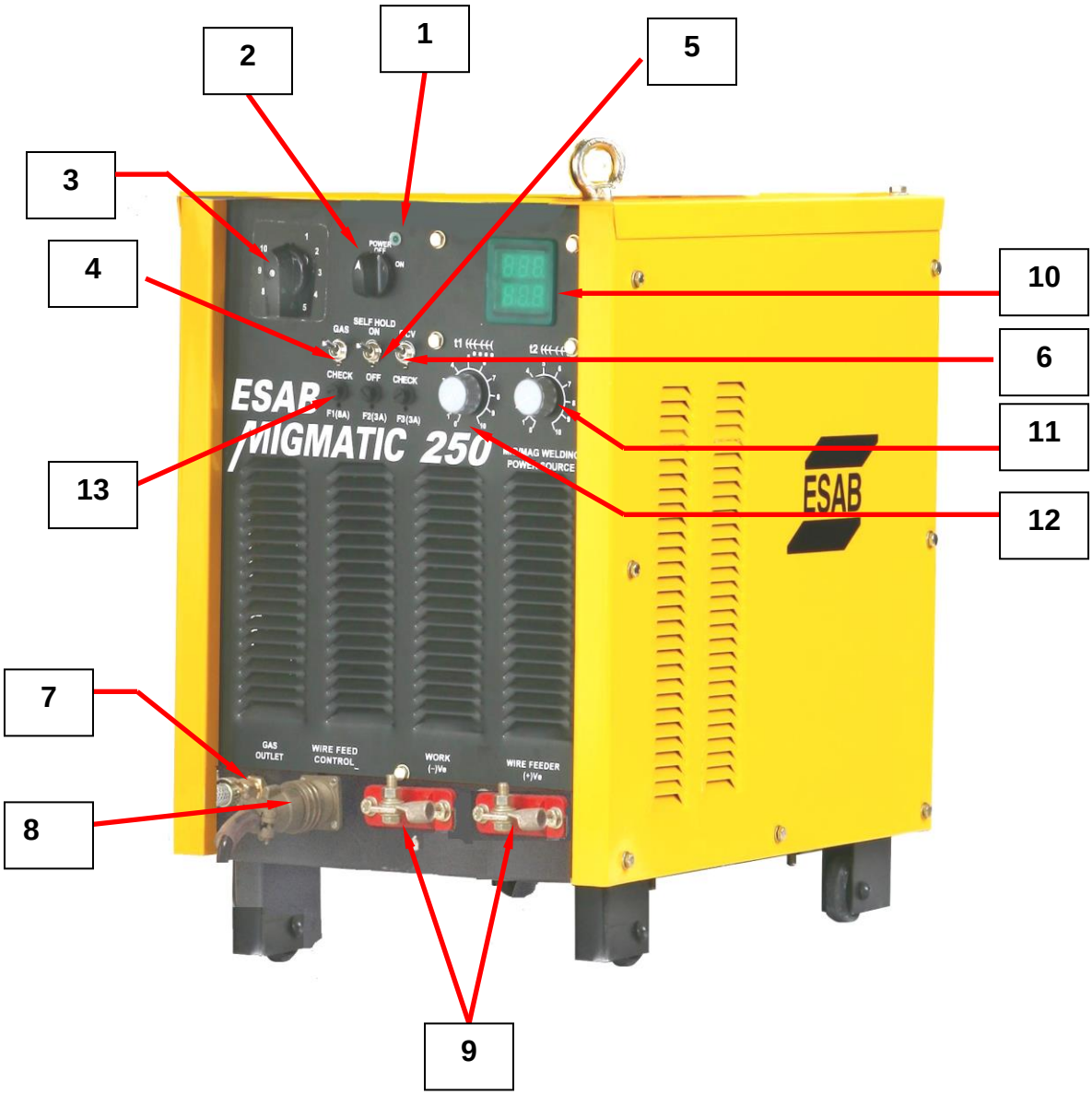
Ventilation

Adequate ventilation is recommended at the place of Installation.

- In case of the area is more than 300 square meters (per unit), no ventilation is required, provided the room is not completely air tight.
- In case of the area is less than 300 square metes and the torch is used in fixed condition, and if the welding is continuously performed, adequate ventilation is recommended with the help of vent fan or exhaust duct.

ITEMS FOR INSTALLATION

No.	Item
1.	MIGMATIC 250 Welding Power Source
2.	Wire feeder (Migmatic)
3.	Welding Torch PSF 250
4.	Base Metal
5.	Gas Regulator
6.	Gas cylinder
7.	Switch Box
8.	Return Cable with Earth Clamp
9.	Inlet Gas Hose from Gas cylinder to Welding Machine
10.	CO_2 Heater with cable for connection to socket on Machine



List of Items

Item No.	Description / Code
1	Power ON Lamp / 1651685051
2	Power ON-OFF Selector Switch / 1651685115
3	Voltage Selector Switch. / 0466401001
4	Gas Check Switch / 1651685177
5	Self-Hold ON/ OFF Selector Switch / 1651685116
6	OCV Check Switch / 1651685177
7	Gas Outlet to Welding Torch /
8	Socket for Wirefeeder Control cable connection /
9	Output Power Terminals / 1651685125
10	Digital V/ A Meter / 1611642301
11	Stitch Welding Timer Control /
12	Spot Welding Timer control
13	Control Fuses

WELDING OPERATION

The welding operation can be adjusted from the front panel of the power source.

1. The ON/OFF switch on the front panel switches on the Power Source. This will cause the light emitting diode on the front panel to light up. Cooling fan will start rotating.

2. Gas Supply Check:

   To ensure the gas supply before welding and purge the air out of gas line, Gas Check switch is pressed to 'check' position. The shielding gas will start flowing. After confirmation of gas flow the switch is released and it will automatically return-to weld position.

3. Welding Voltage Adjustment

   The welding voltage (OCV) is set by turning the voltage selector switch. The value of voltage set can be seen on the Voltmeter provided on the front panel by operating the 'OCV Check' Switch.

   Caution:

   a) Keeping the 'O.C.V. check' switch pressed, do not turn the welding voltage selector switch. For correct operation every time the voltage selector switch is turned from 0 to 10 or reverse, the 'O.C.V. check' switch should first be released.

   b) The welding voltage selector switch should not be operated on load, i.e. while welding torch switch must be released before the voltage is adjusted.

Welding Current Control

The wire feed speed control potentiometer on the wire feeder unit does welding current control.

SEAM WELDING

- The welding voltage and current are selected as described above. The torch switch is pressed and the welding process starts.

- First do a sample weld on a clean piece of plate. Some of the common problems, which may be encountered during CO_2 welding, are described below.

- The weld lies on top of the material and does not flow out. Remedy: Increase the setting of the voltage selector switch to a higher value.

- Holes are burnt in the material. Welding current too high. Remedy: Reduce the current.

- Welding wire seems to bounce the workpiece. Remedy: Reduce wire feed speed control so that wire has time to fuse. (This fault can also be caused by contaminated material or a poorly connected earth return).

- Arc tends to run up towards the contact nozzle. The cause of this is probably a low wire feed speed- the setting has to be increased. The wire slipping in the feed rollers pressure can also cause it. It can be adjusted by adjusting the Pressure Arm. A third cause could be a faulty contact tip, replace it.

On releasing the torch switch, welding will stop.

Self-Hold Function:

When the self-hold switch is ON, the arc is produced when the torch switch is ON and then self-hold is maintained even though the torch switch is turned OFF. To stop the welding, press torch switch once again and release it. Welding will be stopped.

SPOT WELDING

In most cases spot welding is done from one side to join two overlapping plates.
For spot welding, select the timer setting (t1) by switching on and setting the spot welding timer on the front panel. The spot welding time can be set Steplessly between 0.2 to 2 seconds.

SPOT WELDING PROCESS
The torch switch is pressed and welding starts. When the set spot weld time (t1) has elapsed the process is automatically interrupted without the torch switch needing to be released.

A new welding process commences when the torch switch is pressed again.
In spot welding Maximum plate thickness is about 2 mm. If the plates are of different thickness, weld from thin side.

STITCH WELDING
This form of welding is suitable when working with very thin or inferior plate or when the gap size is large since it gives cooler weld.

Switch on the potentiometer (t1) and then set for welding time (graded 1-10). Switch on the potentiometer (t2) and then set it for interval duration (off time) (graded 1-10) Both welding time and interval duration can be set Steplessly between 0.2 and 2 sec.
Welding voltage and current are set as described earlier.

Stitch welding process

The torch switch is pressed to start the welding process. When the set welding time has elapsed, the process is automatically interrupted and start, again after the set interval duration and the process is repeated. The stitch welding process continuous as long as the torch-switch is pressed. The molten pool of metal is cooler and the risk of burning through is considerably reduced.

MAITENANCE & INSPECTION

The maintenance and inspection should be carried out only after the switches in the switch box are certainly turned OFF.

Try to maintain and inspect the set regularly as per the following guidelines.

a) **Regular Inspection**

Every 3-6 months, depending on operation frequency:

Inspection Portion	Inspection Point	Maintenance Method
Fuse box	Fastening & Looseness at the Connection. Confirmation of proper fuse	Refer to Equipment Capacity.
Input and Output Connections	Fastening & Looseness at the Connection. Confirmation of Insulation	Fasten first and Tape
Electro-magnetic Conductor	Confirmation of Abrasion at Contact Points	Replace with new ones
Interior of Welding Power Source	Sedimentation Of Dust. Trace of Overheat.	Blow off dust with Compressed Air.

b) **Cautions to Insulation Voltage – Proof Test & Insulation Resistance Measurement Test:**

Careless execution of Dielectric Strength test and Insulation Resistance Measurement will cause damage to the Power Source since diodes and other semiconductor parts are widely used in the unit. When these are to be performed in accordance with the bylaws of your company, the following points should be kept in mind :

- Remove input cable from main supply and short-circuit the three input terminals.
- Take off the cable that is connected to two output terminals and short-circuit the two output terminals.
- Short-circuit the diode block.
- Remove the three grounding conductors. (Take off the top cover, the remove two grounding conductors – one near the control transformer, another near the electromagnetic contractor. Take off the right side panel, and remove the grounding conductor near the leg of the main transformer).
- Disconnect the Wirefeeder from the Power Source.

AFTER SALES SERVICE

In case of any abnormality observed during usage of the equipment, which could not be rectified at site, please contact immediately Area Sales Manager of the nearest unit of ESAB INDIA LIMITED with the following details:

(1) Serial number of the equipment & type

(2) Nature of the complaint with the relevant details, if possible and the details of Input Supply.

(3) Date of purchase of the equipment and the date of commissioning.

The qualified and trained service teams of ESAB INDIA LIMITED, located of at the zonal head quarters render the after sales service to the customers and also assist in intelligent selections of Welding equipment & consumable for various application.

FAULT FINDIG

Fault	Cause	Corrective Action
On switching on the Power Source the fan does not rotate	Fuse F3(3A) has Opened.	Check and replace fuse
	Fault In AC Input supply	Check the three phase AC supply.
Power LED does not glow on switching on the Power Source	Fuse (8A) has blown	Check & replace fuse
	Fuse F2 (3A) has blown	Check & replace fuse
On pressing O.C.V. check switch the contactor does not energize	Fuse F2 (3A) has blown	Check & replace fuse
	Thermostat opened due to overheating	Allow the Power Source to cool
Wire does not feed on pressing Torch Switch	Fuse F1 (8A) has blown	Check & replace fuse
	Disconnection of the wire feeder's control cable or improper contact of the connector.	Check the Wirefeeder connection to the Power Source.
	Fault of Printed Circuit board	Replace Printed Circuit board
On pressing the torch switch no voltage is available on the output terminals.	One of the three fuses have blown	Check and replace fuse
	Fault of PCB	Replace PCB
Maximum Open circuit voltage is not available	One phase of Input supply is missing	Check & Correct AC Input Supply
	Main Rectifier Bridge faulty	Check and replace
The Input Supply Mains connection SFU or MCB trips repeatedly	Main Rectifier Bridge faulty	Check and replace
No Gas Flow	Damaged Gas hose	Replace the Gas hose
	Mingled impurities in the gas passage	Blow off the impurities etc
	No operation of solenoid valve	Replace if found faulty
	PCB faulty	Check and replace
Self hold switch ON Contractor OFF by releasing torch switch	Fault of PCB	Replace PCB.

MM 250 WIREFEEDER UNIT

RATING

Parameter		Value
Applicable wire diameter		0.8 mm to 1.2 mm
Wire feed motor		18V, D.C. Max
Applicable wire spool	Shaft Dia	50 mm
	Outer Dia	280 mm or less
	Width	105 mm or less
Length of cable and hose		5 Mts
Weight (Without Inter-Connection)		6 Kgs

ACCESSORIES SUPPLIED ALONG WITH THE WIREFEEDER

Gas hose Assembly (2 Mts.)	1
Roller V groove 0.8/1.2 mm H/W	1
Hose Clip	1
Allen Key	1

CONNECTION

Connect power cable, control cable and gas hose firmly to the respective place of welding power source.

Welding cable : Output terminal-Wirefeeder (+) of power source

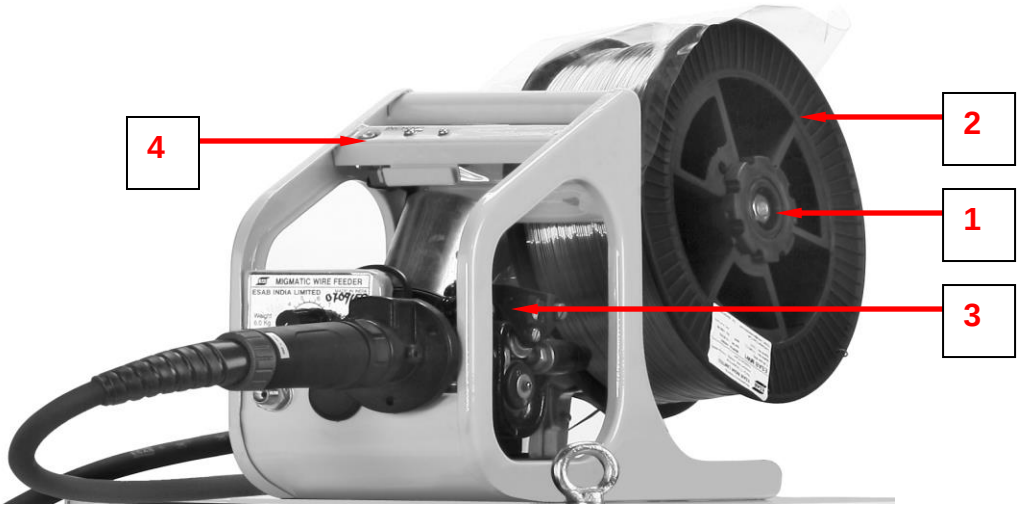
Control cable : Plug socket for wire feed control of the welding power source

Gas hose : Gas outlet fitting of the welding power source.

PREPARATION FOR USE

Feed roller fixing:

Select the feed roller as per the wire diameter & confirm the size of the groove before fixing.



Wire Setting

Loosen the spool locknut-**1**

Place the Wire Spool-**2**

Lock with the Nut

Lift the Pressure Arm-**3**
and
Insert wire
2-3 cm in SUS Tube

Replace the Pressure Arm. Set local pressure with lever knob

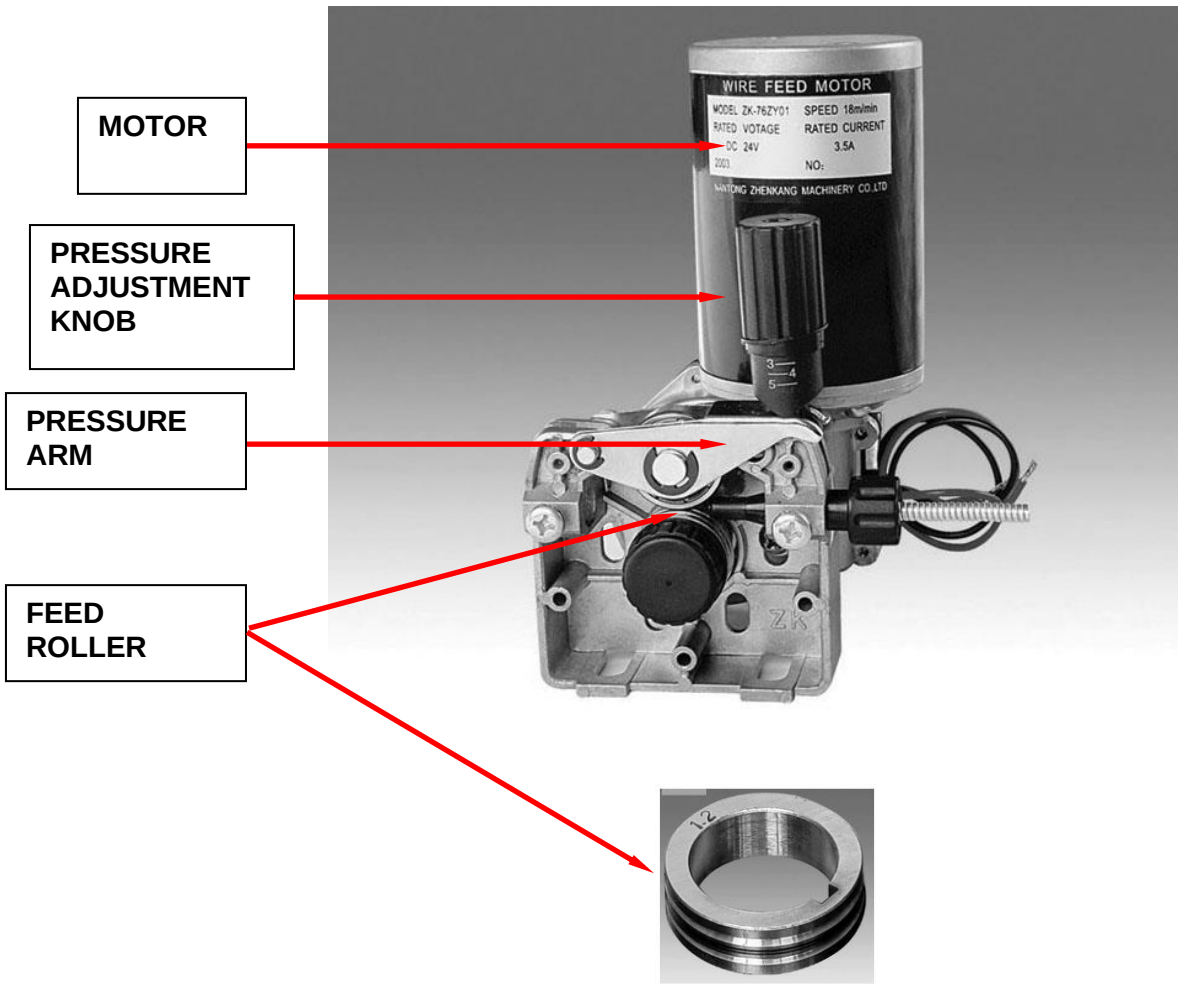
Wire Inching

Turn Power Source ON

Press Inch Button-**4** of Wire Feeder

Release inch button when wire comes out 1-2 cm from Torch tip

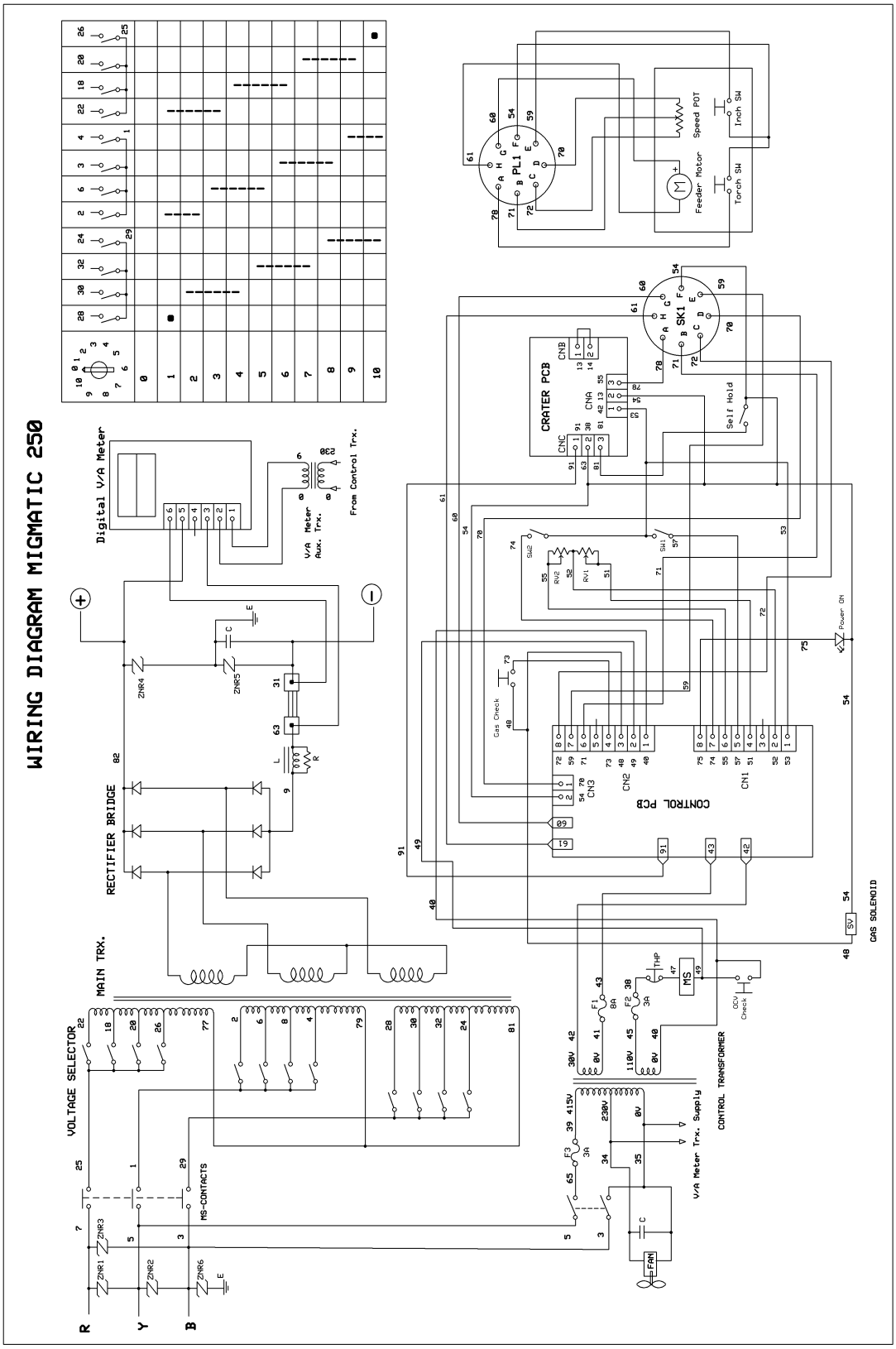
MOTOR AND FEEDROLL BLOCK ASSEMBLY



MAINTENANCE

- SUS Tube: Wipe of dust or dirt once a week
- Feed Roller: If the groove is badly deformed or worn out, change the roller V-groove as per the diameter of the wire used.

WIRING DIAGRAM



SPARES LIST FOR MIGMATIC 250 POWER SOURCE

ITEM CODE	DESCRIPTION	SPARES HOLDING FOR	
		1-5	6 AND ABOVE
1651686015	CRATER PCB MIG-250	1	2
0466401001	VOLTAGE SELECTOR SWITCH	1	2
1611642018	FUSE ELEMENT 3A	2	4
1611642301	DIGITAL V/A METER	1	2
1651684041	COOLING FAN	1	2
1651685051	POWER ON LED LAMP (GREEN)	2	4
1651685055	FUSE ELEMENT 8 AMP	2	4
1651685060	GAS VALVE 2PORT/2WAY DC 24V	1	2
1651685115	POWER ON/ OFF SWITCH	1	2
1651685116	SELF HOLD ON / OFF SELECTOR SWITCH	1	2
1651685125	OUTPUT TERMINAL	2	4
1651685177	GAS CHECK / OCV CHECK SWITCH	1	2
1651685225	FUSE HOLDER	2	4
1651685236	INPUT TERMINAL BLOCK	1	2
1651686003	ASSY MAIN TRANSFORMER-AL-M250	-	1
1651686009	CONTROL PCB- MM 250	1	2
1651686086	POTENTIOMETER WITH SWITCH (TIMER)	2	4
1651686092	CHOKE RESISTOR	1	2
1651686104	SHUNT 300A	1	2
1651686109	CONTACTOR 25A/110V AC COIL	1	2
1651686122	CONTROL TRANSFORMER (M)-M250	1	2
1651686460	DIODE BRIDGE PTS 400	1	2
4651686002	ASSY CHOKE	-	1

SPARES LIST FOR MIGMATIC 250 WIRE FEEDER

ITEM CODE	DESCRIPTION	SPARES HOLDING FOR	
		1-5	6 AND ABOVE
1651685206	POTENTIOMETER 5K	1	2
1651686013	CONNECTOR 8 PIN SOCKET	1	2
1651686903	MOTOR WITH FEED UNIT ASSEMBLY	1	2
1651688375	WIRE INCH SWITCH	1	2

WELDING TORCH PSF 250

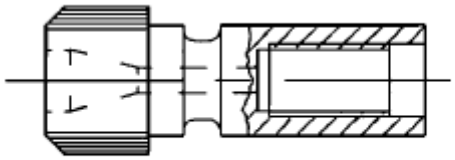
RATED SPECIFICATIONS:

MODEL PSF 250 ORDERING CODE: 4650692900- PSF 250 3 M 4650692901- PSF 250 4.5 M		
Permitted Welding Current at 60 % Duty cycle	CO_2	250A
	Mixed Gas, Argon (Al)	225A
Cooling system	Self cooled	
Torch shape	Curved type with 360 degree swiveling facility	
Recommended Gas Flow	8-13 litres / min.	
Recommended Wire Diameter	0.8-1.0 mm	
Weight	3 m hose interconnection hose package	3 m hose interconnection hose package
	1.8 Kg	2.5 Kg

OPERATION

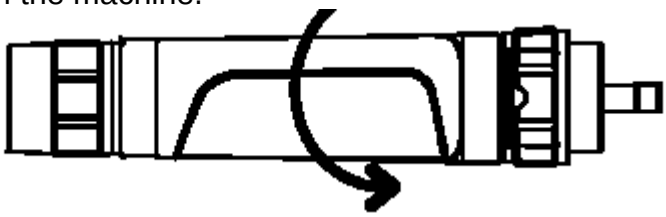
- Contact Tip: The Hole size of the contact tip is determined by the diameter of wire, type of shielding gas and current setting.
- Wire Liner: Recommended to use spiral steel wire liner (supplied as standard with Torch) for all types of wires except Aluminium. PTFE Wire Liners are suitable for use with Aluminium.

- Replacing the Wire Liner:
    1. Fit the correct nipple



EURO Connection

    2. Remove Gas Nozzle and Tip Adaptor
    3. Fit the wire liner in the hose package
    4. Cut the wire guide to the correct length. During cutting, the welding torch must be extended with the wire guide fully inserted into the rear connector. Remove sharp edges of liner after cutting.
    5. Re-fit the Tip adaptor and gas nozzle.
    6. Fit the Torch on the machine.



a) Turn the connecting section counterclockwise until resistance is met

b) The wire guide should go in

- Gas Nozzle: There is a spatter-protector fitted inside the gas nozzle. This must be in position during welding in order to prevent the welding spatter jamming and thereby causing a short-circuit in the swan neck.
- Gas Protection: Several factors come into play for good gas protection. The most important ones are:
    1. Selection of Gas—Mixed Gas and Argon require a greater flow rate than $CO_{2.}$
    2. Flow rate should be set as per requirement.
    3. Welding Current—higher currents require greater gas flow.
    4. Position of Welding joint—Vertical position requires greater gas flow.
    5. Types of Welding joint—External corner joints require greater gas flow than butt joints. Conversely, fillet joints require lesser gas flow.
    6. Angle of Welding Torch to the joint—Angling the torch at less than 45° may result in poor gas protection.

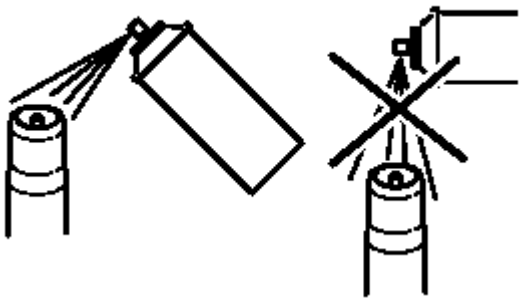
MAINTENANCE

Regular maintenance reduces downtime

- Each time the wire bobbin is changed, the welding hose should be removed from the Gas cylinder and machine and blown clean with compressed air.
- The wire end must not have sharp edges when it is being inserted in the Wire Liner, especially PTFE Liner.

TIPS AND NOZZLES

- Remove the gas nozzle, spatter protector, tip adaptor and contact tip.
- Clean any spatter from the gas nozzle, tip adaptor and contact tip so that the shielding gas can flow freely, thus eliminating the risk of a short-circuit.
- Check and replace if necessary any worn out tips and nozzles.
- Spatter protector must be replaced once its front end has worn thin.
- Select contact tip to suit wire diameter.
- Mount the fittings.
- Anti-spatter spray should be used with caution, as increased presence of the spray in nozzle diminishes gas protection and increases danger of spark-over.



- The gas nozzle and front parts of torch must be kept free of weld spatter. Spray anti-spatter agent at an angle into the gas nozzle from two directions. Use ESAB Anti spatter agent to prevent spatter sticking.
- The contact tip has to be replaced when the hole has become more than twice the wire diameter. The new tip must be screwed on properly to its base.

CONSUMABLE ACCESSORIES APPLICABLE FOR THE TORCH

DESCRIPTION		SPARES CODE	HOLDING
TIPCU-CR-ZR	0.8 (M6)	1651691921	5
	1.0 (M6)	1651691909	5
	1.2 (M6)	1651691911	5
	1.6 (M6)	1651691630	5
	1.6 (M8)	1651691910	5
TIPCU Std	0.8 (M6)	1651691923	5
	1.0 (M6)	1651691924	5
	1.2 (M6)	1651691904	5
	1.2 (M8)	1651691928	
Plastic Nut for swan neck		1651691050	2
Swan neck		4651691975	2
Gas Nozzle std (14 mm)		1651691964	1
Gas Nozzle con (12 mm)		1651691967	1
TIP adapter M6		1651691986	1
Micro switch		1651691960	1
Protective sleeve		1651691045	1
Spatter guard		1651691982	1
Central Connector		1651691896	1

GAS METAL ARC WELDING
Welding Defects, Possible Causes And Corrective Actions

This welding process produces high quality welds when proper welding procedures are used. The absence of flux of electrode covering eliminates slag inclusions in the weld. Some dross formation may occur when highly deoxidized steel electrodes are used, and it should be removed before the next weld bead or pass is made.

Inert gas shielding provides excellent protection of the weld area from oxygen and nitrogen contamination. Hydrogen is virtually eliminated as a cause of cracking in the weld and heat – affected zones of low alloy steels. On the other hand, the process permits welding of carbon steels with the use of CO_2 gas shielding.

Weld defects may occur with GMS welding when the process variables, materials for welding procedures are improper. Some of the defects specifically related to this process, their probable causes and recommended corrective actions are given below.

	Possible causes	Corrective actions
	1. Weld metal cracks	
A.	Too high a weld depth to width ratio	Increase the arc voltage or decrease the welding current to widen the weld bead and decrease the penetration
B.	Too small a weld bead (particularly fillet and root beads)	Decrease the travel speed to increase the cross section of the bead.
C.	Rapid cooling of the crater at the end of a weld	Use a higher current to reduce the cooling rate. Fill craters adequately. Use a back step welding technique to end the weld on top of a finished bead.
	2. Inclusions	
A.	Use of multiple pass, short circuiting arc welding (film type inclusions)	Remove any glossy dross islands from the weld bead before making subsequent passes.
B.	High travel speeds (film type inclusions)	Reduce the travel speed. Use a more highly deoxidized electrode. Increase the arc voltage.

Possible causes		Corrective actions
3. Lack of penetration		
A.	Improper point preparation	Joint design must be adequate to provide access to the bottom of the grove while maintaining proper nozzle-to-work distance and arc characteristics. Reduce root face height. Provide or Increase the root opening in butt joints.
B.	Improper welding technique	Position the electrode at the proper travel angle to achieve maximum penetration. Keep the arc on the leading edge of the weld pool.
C.	Inadequate heat input	Increase electrode feed to obtain higher welding current. Maintain proper nozzle-to-work distance.
4. Porosity		
A.	Inadequate shielding gas coverage	Increase the shielding gas flow to displace all air from the weld area. Decrease the shielding gas flow to avoid turbulence and entrapment of air in the gas. Remove spatter from the interior of the gas nozzle. Eliminate drafts (from fans, open doors, etc.) blowing into the welding arc. Use a slower travel speed. Reduce the nozzle-to- work distance. Hold the gun at the end of the weld until the molten crater solidifies.
B.	Electrode contamination	Use only clean and dry electrode wire. Eliminate pickup of lubricant on electrode in the wire feeder or conduit.
C.	Work piece contamination	Remove all grease, oil, rust, paint and dirt from work surfaces before welding. Use a more highly deoxidizing electrode.
D.	Arc voltage too high	Reduce operating voltage
E.	Excess nozzle-to-work distance	Reduce electrode extension.

	Possible causes	Corrective actions
5. Excessive melt-through		
A.	Excessive heat input	Reduce the electrode feed rate and arc voltage. Increase the travel speed. Reduce excessive root opening. Increase root face height.
6. Incomplete fusion		
A.	Weld zone surfaces not free of film or scale	Clean all groove faces and weld zone surfaces of any mill scale or impurities prior to welding.
B.	Insufficient heat input	Increase the electrode feed and the arc voltage. Reduce the travel speed.
C.	Too large a weld pool	Reduce arc weaving to produce a more controllable weld pool.
D.	Improper welding technique	When using a weaving technique, dwell momentarily on the groove faces. Keep the electrode directed at the leading edge of the weld pool.
E.	Improper joint design	Maintain the included angle of the groove joint large enough to allow access to the bottom of the groove using proper electrode extension and arc characteristics. Change the groove design to a “J” or “U” type.

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