Digital Inverter Pulsed Gas Metal Arc Welding Machine

MODELS

MIG-350 PLUS & MIG-500 PLUS

Operation Manual

Read this manual carefully before installing, operating and maintaining the machine.

Description: This machine is designed and built to weld ferrous and non-ferrous metals.

Disclaimer: The information, illustrations and instructions described in this manual are based on the latest product information available at the time of publication. The manufacturer and distributors reserve the right to modify the contents of this manual at any time. Modifications may result following product modifications and the manufacturer and distributors are not obliged to notify any organization or individual of such modifications. Welding work must be executed only by professionally trained and qualified individuals. Therefore, the manufacturer and distributors will only accept responsibility for product quality. No liability, joint or several, shall be accepted for incidents including but not limited to loss of profit resulting from omissions or misdirection that may be printed in this operation manual. This manual will contain as far as possible preventive and safe operation measures related to the equipment but cannot exclude the occurrence of accidents. Therefore, the manufacturer and distributors shall not be liable for any direct or indirect, joint or several liability for any incidental or consequential damages which may occur. For detailed health and safety information, the relevant professional agencies and manufacturers of consumables such as welding materials and flux should be contacted.

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Warranty Exclusions:

- ✓ Consumable items such as welding wires, welding flux, fuses, quick connectors, drive rollers, tension rollers, etc.
- ✓ Machine damages caused by incorrect voltage input or power surges.
- ✓ Machine or parts malfunction owing to incorrect connections or user operation.
- ✓ Illegal disassembly or re-fitment of the machine without permission of the manufacturer, resulting in damage or malfunction.
- ✓ Accidental damage during shipment, transportation and storage.
- ✓ Damage owing to incorrect handling, natural disaster and other force majeure occurrences.

CONTENTS

Safety Precautions

The equipment is designed for use by qualified personnel who have completed professional training and have obtained a qualification certificate as a welder. The operator shall have sufficient professional knowledge of welding, cutting and circuitry. The machine should be operated only after having read and fully understood all the safety precautions and warnings contained in this manual and those generally applicable to welding operations. The risk of personal injury and damage to equipment is reduced by safety precautions being followed when using tools and equipment. This machine is easy to operate and the selection of its functions is straight forward. Improper use and maintenance will reduce the safe operation of the machine and the following safety precautions must be followed:

1. The operator must be suitably qualified and certificated before operating the equipment.
2. A qualified professional should be employed to ensure that the machine and all cables are properly connected, grounded and installed.
3. Personal protective equipment approved by the local safety authority must be used. All relevant safety procedures must be adhered to.
4. Before operation, insulation layers on wires and cables as well as connection sequences should be inspected and corrected if required.
5. Repairs and maintenance should be carried out by qualified technicians only after the machine has been disconnected from the electricity supply.
6. Operating the machine in a humid environment may result in a short circuit or may cause an electric shock to the operator.
7. Modifications to the machine or equipment are not allowed.
8. The disposal of scrap machine parts and equipment must comply with local regulations.

Warnings

Welding and cutting operations are specialised operations which present a certain degree of risk. Professional training, correct operating procedures and protective measures reduce the accident risk and damage to equipment.

Personal Safety Protection	
	**Welding and cutting operations generate noise, bright light and high-temperature sparks which will cause harm to human hearing, eyes and skin unless personal protective measures are implemented and proper operational instructions are adhered to.**
1	Wear flame retardant personal protective equipment (PPE) such as gloves, overalls, welding helmets with correct shading filter, shoes and aprons to protect against thermal radiation, sparks and hot metal particles.
2	Hot sparks and metal fragments can cause skin damage. Avoid clothes with front pockets and button-up sleeves and collars.
3	Use appropriate flame-retardant shields or curtains to protect bystanders from arc radiation and high temperature sparks. Bystanders also need to wear a protective helmet fitted with a shading filter to protect face and eyes or a pair of spectacles fitted with shading filters
4	Avoid burns and scalds by not touching a welded work piece with bare hands.
Fire and Explosion Hazards	
	**Welding and cutting operations generate high-temperature flames and arc which can cause fires and explosions. The same applies to welding slag and sparks..**
1	Operators and bystanders must be protected from arc, sparks and metal fragments.
2	The welding/cutting area should be free from flammable and explosive materials. Should these materials be required in the welding/cutting process, flame retardant covers should be applied.
3	Care should be taken to avoid fire hazards from cracked floors and walls.

4	Welding and cutting on sealed gas tanks will cause explosions. These operations are prohibited.
5	Welding and cutting areas must be provided with adequate fire extinguishing equipment. Regular testing for efficiency of this equipment is compulsory as is training of staff in the use of the equipment.
6	Once the welding/cutting operation is completed, check for any high temperature spark or metal which might cause a fire and immediately dispose of it. If necessary, employ the assistance of a firefighter.

Electricity Hazards

Electric shock can cause serious injury or even death to the individual when contact is made with live wires. Humid conditions can add to the risk and great care should be taken when welding or cutting machines are used in these conditions.

1	Reliable grounding of machine and work piece as well as a secure ground clamp, is important.
2	Insulation layers of electric wires and cables must be checked regularly for wear and replaced if necessary.
3	All equipment used and clothing worn during the welding/cutting operation should be free from moist and kept dry.
4	Do not make direct body contact with any live electrical parts.
5	Wearing rubber-insulated shoes and standing on an insulated platform greatly reduce the risk of accidental shock.
6	Refrain from replacing the ground cable on the machine with wires not suitable for the task.
7	The machine operates on high voltage and capacitors remain charged even after power is switched off. Removing covers for maintenance procedures must only be executed by qualified professionals.

Electromagnetic Fields

Electric current flowing through a conductor produces magnetic fields (EMF). The discussion on the topic of the effects of EMF on the human body is ongoing worldwide and up to the present no evidence has been forthcoming proving negative effects on health.

	However, it would be wise to limit exposure to EMF as far as possible and the following procedures are suggested:
1	Welders and cutters with cardiac pacemaker implants should obtain medical advice on the effects of EMF on the implant.
2	Welders should minimise the possibility of electromagnetic field damage through the following methods.
2.1	Route the electrode and ground cables together and, where possible, secure them with tape.
2.2	Do not wrap wires and cables around arms or coil power cables around body parts. If possible, keep cables away from the body.
2.3	Keep the distance between the ground clamp to the workpiece and the electrode as short as possible.
2.4	Keep a safe distance between the operator and the welding/cutting machine.
Protection from Fumes and Gases	
	**During the welding or cutting process, fumes can be produced which may be detrimental to health.**
1	The working area should be well ventilated and welding/cutting activities should not be executed in confined spaces. Eye, nose or throat discomfort can be the result of inadequate ventilation.
2	Welding and cutting in or near locations where chlorinated hydrocarbon vapours are produced such as degreasing, cleaning and spraying operations, should not be undertaken since phosgene, a highly toxic gas as well as other irritants can be reaction products.
3	The industry offers a variety of respiratory masks and must be used in conditions where clean breathing air is required.
Gas Cylinder Safety	
	**Gas leaks can occur on cylinders connected to welding/cutting operations if the system is not properly managed and maintained. A ruptured cylinder or relief valve can cause serious injury or can even be fatal.**

1	Gas cylinders should be kept away from extreme temperatures and fire sources. Scratching on cylinder walls with hard objects should be avoided.
2	A flowmeter should be installed on the gas cylinder in use in accordance with the manufacturer's operating instructions. Quick-coupling connectors must not be used and gas hose fitting should be tested for leaks.
3	Gas cylinders must always be kept upright and chained or belted to a cylinder trolley, base, wall, post or shelf. Never fix a gas cylinder to a worktable or machine: It can become party to an electrical circuit and explode.
4	Ensure that the cylinder valve is closed when not in use. If there is no hose connected to the flowmeter then cover the outlet with a dust cap.

Protection Against Moving and Rotating Parts		
		**Moving parts, such as fans, rotors and belts, can be hazardous.**
1	Ensure that all protective covers, doors and panels on the machine are closed or securely intact before starting an operation.	
2	Ensure that maintenance on machines are only carried out by qualified technicians.	
3	Ensure that hands, hair, clothing and tools are safely out of range from moving and rotating parts.	

Packaging and Transportation

1. Pay attention to and comply with packaging, storage and transportation instructions which are clearly identified on the containers.
2. Always handle all containers with care.
3. Equipment must be stored in waterproof, moisture proof and well-ventilated facilities within the temperature range -25°C - 55°C.

Parameters

Model	MIG-350	MIG-500
Parameters Name	**Value**	
Rated input voltage:	3PH--AC380V±10% 50/60Hz	
Rated input power:	15.8kVA	24.4kVA
Rated input current:	24A	37A
Rated duty cycle:	60%	60%
Output current range:	30~350A	30~500A
Output no-load voltage:	65V	65V
Power factor:	≥0.93	≥0.93
Efficiency:	≥85%	≥85%
Wire diameter (DIRM):	Φ0.8~1.6mm	Φ0.8~1.6mm
Gas flow:	15~20L/min	15~20L/min
Insulation class:	F	F
Dimension（mm）:	1030*550* 850（main body） 750*360*550（wire feeder）	
Net weight:	59kg（main body） 22kg（wire feeder）	79kg（main body） 24kg（wire feeder）

Product Description

This semi-automatic, high-performance, inverter pulse MIG machine is designed for Argon or CO2 and mixed-gas welding on aluminium, aluminium alloys, low-carbon steel, low-alloy steel, stainless steel and copper. Aluminium welding wire (4043/5356), carbon steel (ER50-6/ER70S-6) wire and stainless steel wire as well as other solid or flux-cored wires can be used.

The machine offers good dynamic performance and static characteristics. Like other machines in this series, it meets the GB15579.1-2013 safety requirements for arc

welding equipment and the JB/T7824-1995 requirements for inverter arc-welding rectifiers. It also complies with the GB/T10249-1998 standards of electric welding machines.

1. Product Functions and Features:

1.1. Multiple functions combined in one machine. Digital ARM+MCU control system ensuring precise digital output.

1.2. Good reliability combined with rapid dynamic response ensured by the IGBT high-frequency, soft-switch inverter technology.

1.3. The closed-loop control system guarantees a stable welding voltage in cases of grid-voltage and arc-length fluctuation. Self-adjustment of arc length and a stable welding process are remarkable characteristics.

1.4. Negligible splatter and a high metal deposition rate.

1.5. Good quality welding seam with very small deformation.

1.6. High arc-ignition success rate with a strong pulse-start arc.

1.7. Smooth wire feed assisted by a stable power supply.

1.8. Up to 10 sets of stored welding programs allow saving in operating time.

1.9. A special four-step function suits the welding of metals with good thermal conductivity while offering perfect welding quality.

1.10. Various interfaces available for connecting welding robots and other welding machines.

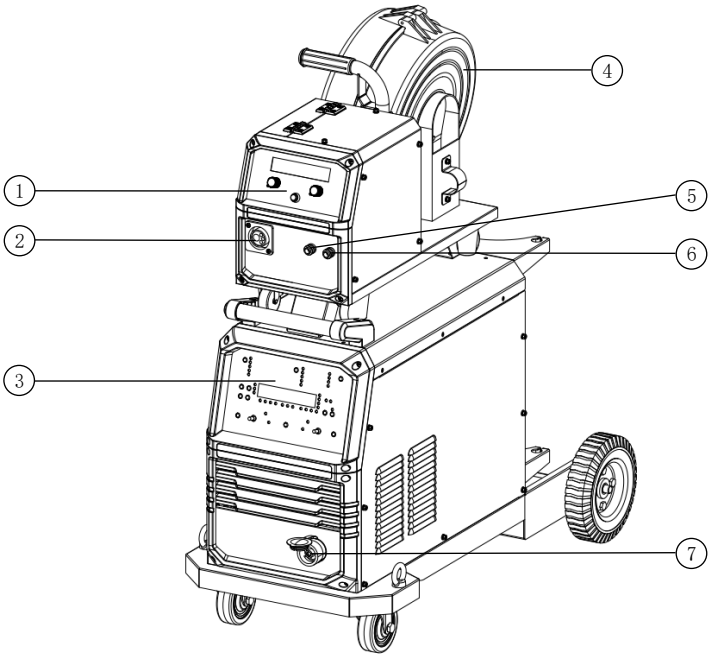
1.11. Safe and reliable protection circuit and easy system for fault finding.

1.12. High efficiency and energy saving, high load duration and no-noise rectifier.

1.13. Reasonable structure, simple layout and easy maintenance.

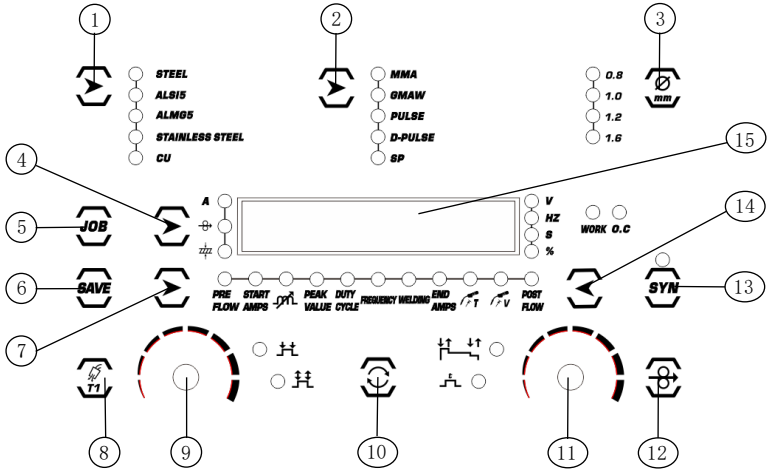
2. Appearance Diagram:

MIG-350/500



1	**Control panel for wire feeder**
2	**Euro-standard torch connector:** Connect the welding torch**.**
3	**Control panel:** Welding parameter settings and display.
4	**Wire-reel snail shell:** Welding wire dust prevention.
5	**Backwater outlet:** Connects to the backwater outlet on the water cooler.
6	**Water outlet:** Connects to the water outlet of the water cooler.
7	**Terminal sockets - negative pole (-):** Securely connect the earth cable.

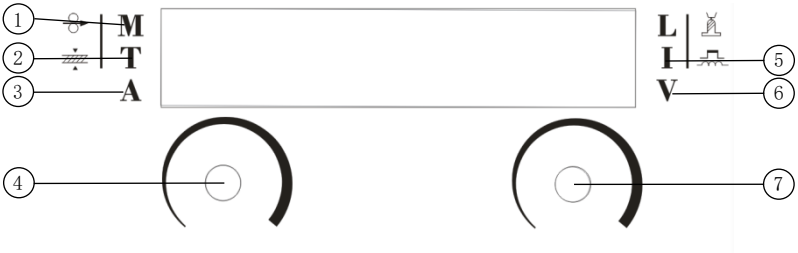
Power Source Control Panel



1	**Welding material selection button:** Select either **Steel , AlSi , AlMg , Stainless Steel , Cu.** The corresponding selection light is lit.
2	**Welding process selection button:** Select either **MMA, GMAW , Pulse MIG , Double pulse MIG** and **Spot welding.** The corresponding selection light is lit.
3	**Wire diameter selection button:** Select either **0.8, 1.0, 1.2, 1.6.** The corresponding selection light is lit.
4	**Right menu option button:** Set values such as current, wire feed speed, thickness, time; The value can be set when the corresponding light is lit.
5	**Memory button:** Ten sets (0 - 9) of adjusted welding parameters can be recalled and saved during each operation.
6	**Save button:** Save the finished welding parameters**.**
7	**Right menu option button:** When this button is tapped, the following selections are displayed successively and set when the corresponding selection is lit - **front gas, inductance, burn-back voltage, burn-back time, rear gas** and other related parameters.
8	**Gas button:** Press and hold the gas button to start the gas flow inspection. Releasing the button will stop the gas flow**.**
9	**Current adjustment dial:** Turn the dial to adjust the current output.
10	**Operation mode selection button:** Select between the following four

	options: **two steps** (without arc closing), **four steps** (with arc closing), **spot welding**, **special four step**.
11	**Voltage adjustment dial:** Turn the dial to adjust voltage output.
12	**Inching Wire Feed button:** Press and hold the button to start wire feed, release the button to stop wire**.**
13	**SYN button:** Indicator light is lit in SYN state. Pulse welding is forced to use SYN.
14	**Left menu option button:** When this button is tapped, the following selections are displayed successively and set when the corresponding selection is lit - **front gas, inductance, burn-back voltage, burn-back time, rear gas** and other related parameters.
15	**Data display screen:** Each function, parameter setting value, actual parameter value and related information is displayed on the screen.

Wire-feed Display Panel



1	**Wire-feed speed display:** The wire-feed speed is displayed in m/min under the ruling current.
2	**Workpiece thickness display:** The reference thickness of the workpiece that can be welded under the ruling current, is displayed.
3	**Current display:** In the static condition, the preset current is displayed and the actual current is displayed during the welding operation.
4	**Left knob:** Click the knob to select between 1. 2 and 3 above and then turn the knob to set the corresponding parameter. The corresponding parameter on the main body will be adjusted and displayed automatically. Press and hold the knob for 3 seconds - the wire feed will start. Press the knob again and wire feed will stop.

5	**Inductance display:** Arc force (arc stiffness) will be displayed
6	**Voltage display:** In the static condition, the preset voltage is displayed and the actual arc voltage is displayed during the welding operation. When the torch trigger is pressed without contact to the workpiece, the no-load voltage is displayed.
7	**Right knob:** Click the knob to select between ⑤ and ⑥ above and then turn the knob to set the corresponding parameter. The corresponding parameter on the main body will be adjusted and displayed automatically. Press and hold the knob for 3 seconds and the gas valve will open. Press the knob again and the gas valve will close.

Note: The three parameters of current, wire-feed speed and material thickness are linked. When one of the parameters are adjusted, the other two are automatically adjusted to fit the combination.

The built-in highly intelligent technology is so sophisticated that a myriad internal parameters are recalled from the database once any of the three parameters are adjusted and a revised welding program is automatically set. This greatly simplifies the welding operation since it only requires input of the basic parameters and the optimum parameter combination will be introduced by the system.

3. Specific Welding Parameters:

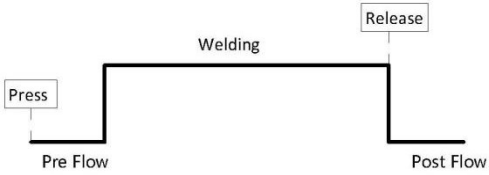
Welder type	MIG-350	MIG-500	Default
Pre-flow time (GPR)	0-3 S		0.1S
Start amps	30-350A	30-500A	100A
Inductance	1-10		5
Peak value	30-350A	30-500A	100A
Duty cycle	10-90%		50%
Frequency	0.1-9.9Hz		1.2 Hz
End amps	30-350A	30-500A	100A
Burnback time (BURN)	0-0.5S		0.2S
Burnback voltage	-5-5V		0V
Gas-lag time (GPO)	0-20		1S

4. Welding-mode Setting

There are four optional operation modes for this welding machine:

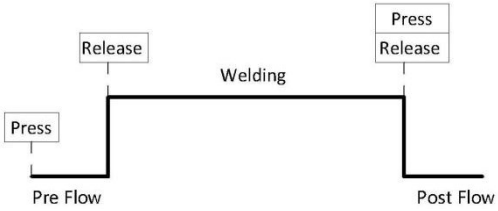
4.1. 2T Mode 

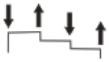
Press and hold the torch trigger to continue the welding operation. Release the trigger to end the operation. welding operation.



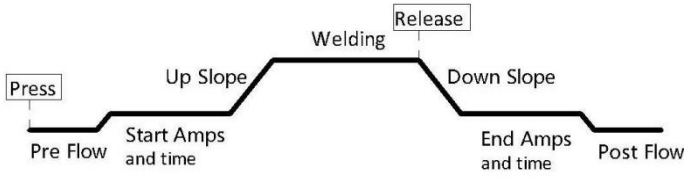
4.2. 4T Mode 

Press and hold the torch trigger until the arc is activated. Release the trigger and continue the welding operation according to the welding current. Press and release the switch to end the operation.



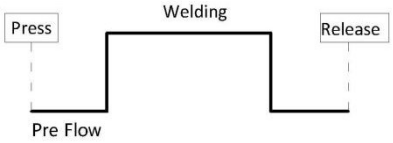
4.3. Special 4T Mode 

Press the torch trigger and the welding operation will be carried out according to the initial welding current setting. Release the trigger and the operation will continue according to the welding current. Press the trigger again and the operation will continue according to the arc current. Release the trigger and the operation is terminated..



4.4. Spot Welding Mode

Press and hold the torch trigger and the spot weld will be performed according to the welding current. After the spot time has elapsed, the operation is terminated.



5. Welding-wire Selection

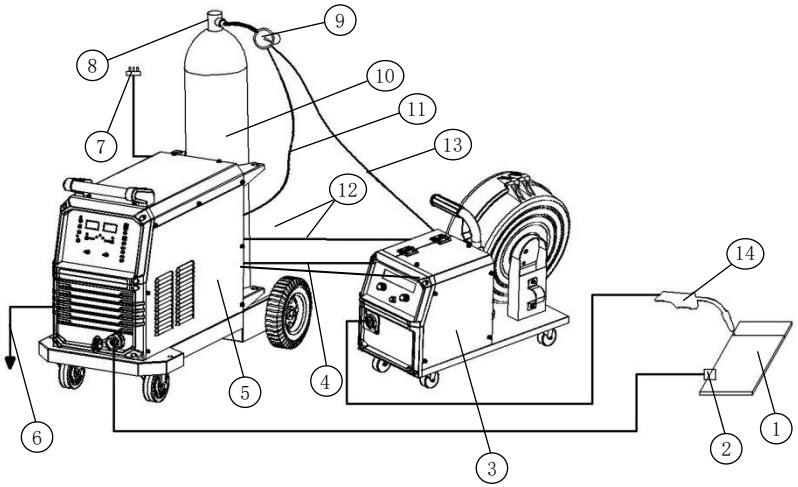
The suggested wire type and shield gas for different workpiece materials are detailed in the following table. For welding aluminium plate, Ø1.2mm wire is normally recommended. For copper, stainless steel and carbon steel, Ø1.0mm or Ø1.2mm wire is normally recommended.

Welding method	Wire type	Diameter (mm)	Workpiece material	Shielding Gas
MIG/MAG Pulse welding	Al-Si Alloy	Ø 0.8 Ø 1.0 Ø 1.2 Ø 1.6	Soft Al:4043、4047	≥99.99%Ar
	Al-Mg Alloy		Hard Al：5356、5183、MgAl5	≥99.99%Ar
	Pure aluminum		1070、1100	≥99.99%Ar
	Copper		Cu18、Cu19、CuSi3、CuAl9	≥99.99%Ar
	Stainless Steel		304、316、312、308	98%Ar+2%CO_2
	Carbon steel		Carbon steel	80%Ar+20%CO_2

MIG/MAG SYN welding	Carbon steel	Ø0.8、Ø 1.0、Ø 1.2、Ø 1.6	Carbon steel	100%CO_2

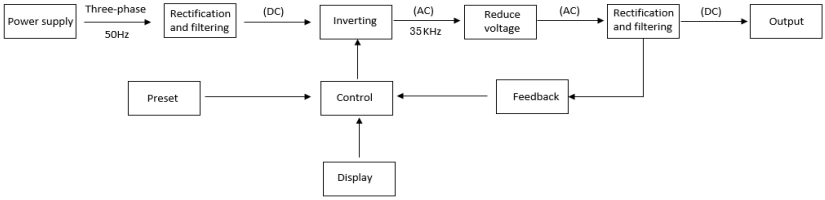
Working principle

1. Welding Machine Working Diagram



No.	Item	No.	Item
1	Welding piece	**8**	Gas cylinder valve
2	Earth clamp	**9**	Gas flowmeter
3	Wire feeder	**10**	Gas cylinder
4	Inner connecting cable	**11**	Flowmeter heater power cord
5	Welding machine	**12**	Signal cable
6	Earth cable	**13**	Gas hose
7	Power cord	**14**	Welding torch

2. Diagram Explaining Working Principle



2.1. A bridge rectifier converts AC to DC;

2.2. Controlled by PWM, the IGBT inverts the DC to 20Khz AC and transmits it through a high-frequency transformer;

2.3. After secondary rectification and reactor filtering, the output current is sufficient to meet the welding requirements;

2.4. The in-time protection circuit provides signals to the PWM warning for overheat and over-current situations;

2.5. The closed-loop control method is adopted to make the welding power source have good anti-grid fluctuation ability and excellent welding performance.

Installation and Wiring

1. Location Requirements

1.1. The machine should not be installed in an area where it is exposed to direct sunlight or rain but where the humidity is as low as possible and the ambient temperature is within the range of -10 °C - 40 °C.

1.2. The machine should be installed on a flat, preferable level surface but, in any case not on a surface with an inclination of more than 10 degrees.

1.3. The machine should not be operated in a work station exposed to wind. Should a windy environment be unavoidable, suitable screening should be installed.

1.4. In order to allow for efficient ventilation, a clear space of at least 20cm should be allowed in front of and behind the machine as well as at least 10cm at each side.

2. Power Input Requirements

The power supply waveform should be the standard sin wave, the rated voltage 380V±10% 50/60Hz. Three phase voltage unbalance should be ≤ 5%.

Model No.	MIG-350	MIG-500
Parameter Name	**Value**	
Input power:	AC380V±10% 50Hz 3PH	
Min Capacity of Power Grid:	15.8kVA	24.4kVA
Min Capacity of Generator:	24kVA	30kVA
Fuse Input Protection:	24A	37A
Input cable:	≥4mm^2	≥6mm^2
Output cable:	50mm^2	70mm^2
Grounding cable:	≥1.5mm^2	≥1.5mm^2

Note: The specifications of fuse and circuit breaker in the above table are for reference only.

3. Main Power Supply Connection

Pay attention to prevent electric shock

Wear goggles

Warning: Take note of the following when the welding machine is connected to the main power supply:

3.1. The connection must be carried out by a qualified electrician or technician.

3.2. The connection must be in compliance with national and local regulations.

3.3. Before the connection is carried out, the main power supply to the control box must be switched off.

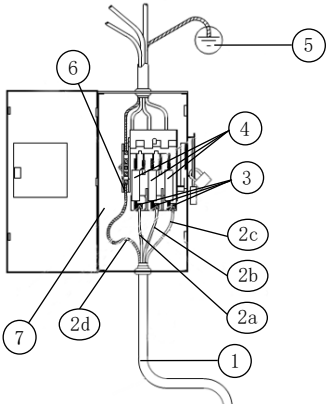
3.4. An earth cable set must be securely connected from the machine to the work-piece. The machine must be earthed.

3.5. Ensure that the required power supply of the machine (as printed on its nameplate) corresponds to the main power supply.

3.6. The connection screws on the terminal block must be tight ensuring a solid connection between the machine cable wires and the main power supply.

3.7. The correct wiring procedure is explained in the following diagram:

Wiring of single phase AC 380V 50/60Hz welding machine



No.	Item	No.	Item
1	Power cord	**3**	Terminal block
2a	Live wire L1	**4**	Overcurrent protection device
2b	Live wire L2	**5**	GND
2c	Live wire L3	**6**	Earth wire terminal block
2d	Earth wire	**7**	Electric control box

4. Gas-cylinder Connection

Explosion hazard

Prevent gas inhalation

Wear goggles

Warning: The following safety instructions are important when connecting a gas cylinder to the welding machine.

4.1. The cylinder must be fixed upright to a wall, cylinder rack or support. Its centre of gravity can cause the cylinder to topple resulting in injury and material damage.

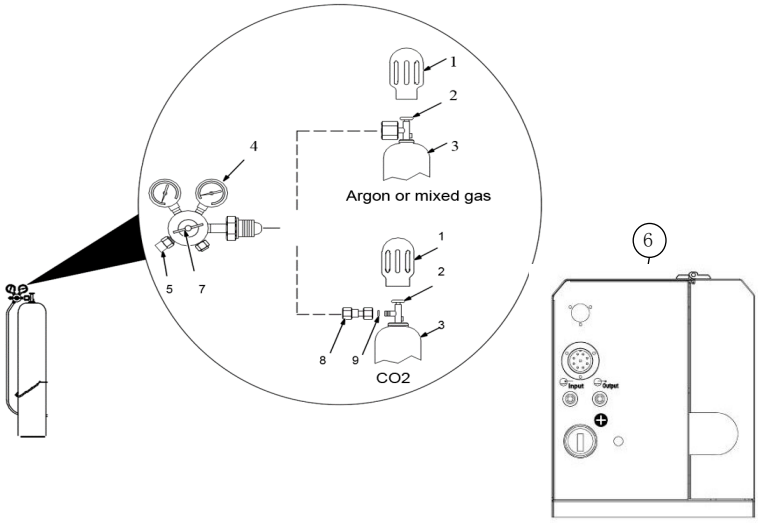
4.2. The cylinder must be placed out of reach of the operator and not in contact with the work table, work-piece or the welding machine.

4.3. Position yourself beside the valve and remove the air valve cover. ① Carefully open the valve slowly. ② slightly allow the gas flow to clear the valve outlet from dust and dirt ②.

4.4. Mount the flowmeter ④ to the cylinder ③.

4.5. Connect the gas hose firmly from the flowmeter outlet ⑤ to the gas inlet ⑥ situated at the back of the welding machine. Gas leakage is not allowed.

4.6. Adjust the flowrate in accordance with the manufacturer's recommendation. Generally, 15 -20 litres/min.

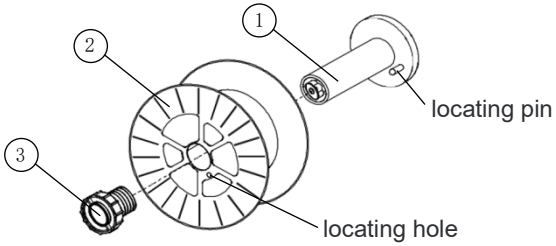


No.	Item	No.	Item
1	Cap	6	Gas inlet
2	Cylinder valve	7	Pressure regulating valve
3	Cylinder	8	CO_2 adapter
4	Regulator/Flowmeter	9	O-ring
5	Regulator/Flowmeter connector		

5. Installation and Adjustment of Wire Spool

5.1 Installation of Wire Spool

Installation of 15kg（Ø300mm）wire spool



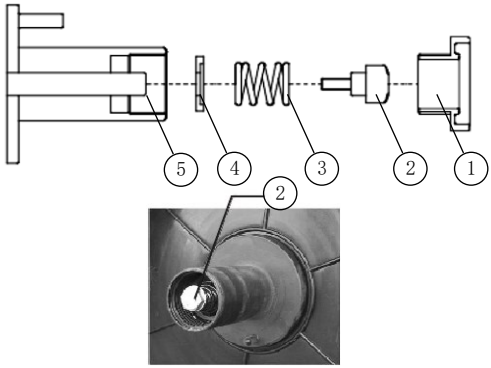
No.	Item	No.	Item
1	Wire spool hub shaft	3	Hub nut
2	Wire spool		

Align the locating pin on the shaft① with the locating hole on the spool②, slide the spool② onto the hub shaft① and fasten the hub nut③ as explained below in clause

5.2. Brake Force Tension Adjustment

Applying a hexagon socket wrench, adjust the screw fastener② to adjust the braking tension of the spool. If the tension is too loose then the wire will unravel once the spool stops. If the tension is too tight it will increase motor load.

Wire Spool Hub Kit



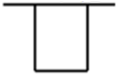
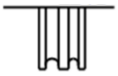
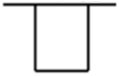
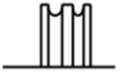
No.	Item	No.	Item
1	Hut nut	4	Limit stop
2	Screw fastener	5	Wire spool hub shaft
3	Speed limit spring		

6. Wire Feeder

6.1. Composition

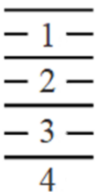
No.	Item	No.	Item
1	Pressure regulating handle	3	Drive roll
2	Tensioner roller		

6.2. Selection of Tensioner Roller and Drive Roll

	Non-groove	U groove	Non-groove
Tensioner roller			
Drive roll			
	V groove	U groove	knurled
V groove roll:	Suited for hard wires such as carbon steel and stainless steel wire.		
U groove roll:	Suited for soft wires such as aluminium and aluminium alloy wires.		
Knurled roll:	Suited for flux-cored wires.		

6.3. Wire-feed Pressure Selection

The wire-feed pressure scale is etched on the pressure-regulating handle① and prescribes the approximate pressure scale to be selected for use on different wire materials and diameters

	Diameter / Pressure / Drive roll	Ø0.8mm	Ø1.0mm	Ø1.2mm/ Ø1.6mm
	V groove roll	2	2	2
	U groove roll	1.5	1.5	1.5
Pressure scale	Knurled roll			2

The actual pressure scale to be used will be determined by the length of the torch cable, the type of welding torch and welding wire as well as wire-feeding conditions. After adjustment of the drive roll, press the tensioner roller. Should the wire slip when exiting the contact tip, readjust.

！Attention:

- **Take care not to apply excessive pressure which will result in wire being deformed and coatings being damaged.**
- **Excessive pressure will also result in faster drive-roll wear.**

7. Installation of Wire Liner and MIG Torch

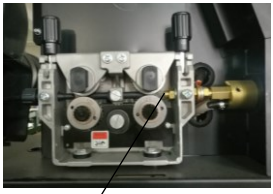
In order to ensure a smooth and successful welding operation, it is important that the correct liner and contact tip be installed.

Guide tube material	Wire hardness	Welding wire type
Steel	Hard	Solid carbon steel, stainless steel
Teflon	Soft	Aluminum, aluminum alloy, copper, copper alloy

7.1 Installation of Steel Wire Guide-tube

		
①Install the steel wire liner into the welding torch.	②Insert the wire guide tube into the Euro adapter.	③Set up the welding torch into the Euro adapter

7.2. Teflon Wire Liner Installation

		
①Install the Teflon wire liner into the torch leaving approximately 60mm of the liner outside the torch.	②Set up the welding torch into the Euro adapter.	③Wire liner should be left about 5mm outside.

! Take care:

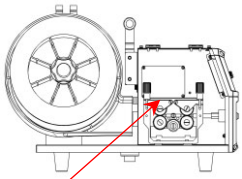
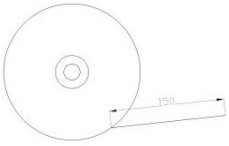
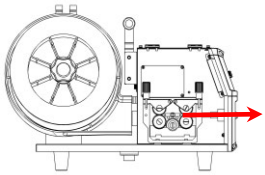
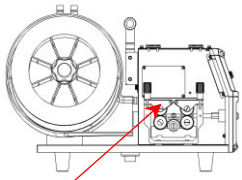
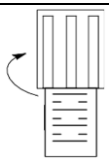
- **Ensure the wire liner is not too tight or too loose else this will increase the feeding resistance resulting in feeding instability.**
- **Ensure all torch quick-connectors are securely tightened. Loose connections will cause a voltage drop resulting in overheated equipment.**

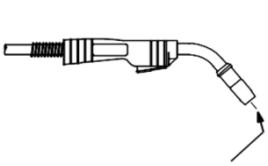
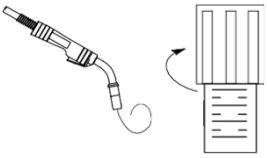
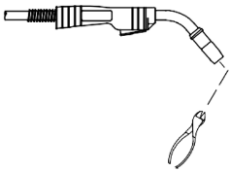
8. Installation and Adjustment of Welding Wire

			
	Prevent injuries caused by wire	**Prevent injuries caused by moving parts**	**Wear goggles**

! Take care:

◆ **The wire speed generated by the feeder is relatively fast and safety during the installation and adjustment process is of prime importance. Never point the welding torch nozzle to a face or other body part. The speed of the wire exiting the nozzle can cause a nasty jab.**

Installation Steps		
 a) Open the Tensioner roller.	 b) Pull approximately 150mm wire from the spool.	 c) Feed the wire through the wire feeder, into the torch and tighten the wire by hand.
 d) Close the tensioner and feed the wire by pressing the manual wire-feed button.	 e) Rotate the pressure regulating handle to adjust the tension on the welding wire in accordance with the guideline parameters in table 6.3.	 f) Remove the contact tip to allow the wire to freely feed through the torch

 g) Reinstall the contact tip after the wire has emerged from the torch.	 h) In order to avoid slipping, recheck the wire-feeding pressure and adjust if required.	 i) Allow approximately 10 to 15mm wire outside the contact tip and cut the excess.

Brief Instruction for Welding Operation

1. Preparation Before Welding

1.1. Wear the necessary welding protection equipment such as helmet, mask, earplugs, protective clothing, gloves, insulating safety shoes.

1.2. Confirm the electrical grid connected to the welding machine is consistent with the correct power supply of the machine.

1.3. Confirm the gas in the gas cylinder is sufficient, no damage to the gas hose and flowmeter.

1.4. Confirm that the insulation layers on all the wires and cables of the welding machine are intact and that the cable set is secure and correctly connected to the machine.

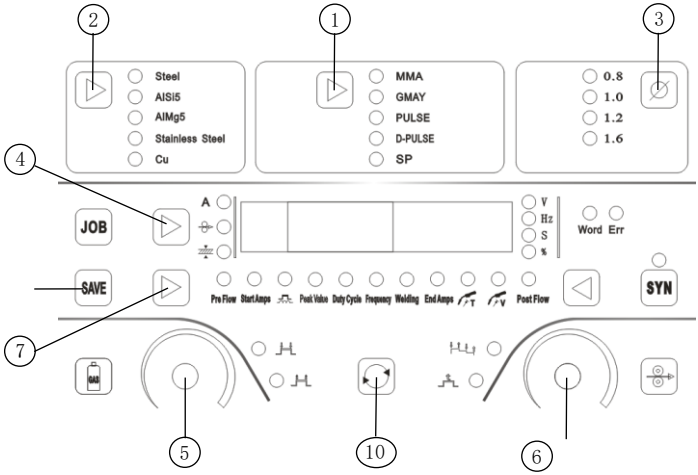
1.5. Confirm the machine is freely vented and that the vents on the machine are not obstructed and no objects are lying on the machine body.

1.6. Switch on the machine and ensure the indicator light is lit and the fan is operational.

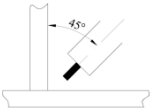
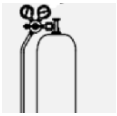
1.7. Press the manual wire feeding button and make sure it is operating correctly.

1.8. Set the required parameters on the control panel, press the trigger switch on the torch and ensure wire feed and gas flow is operational.

2. Welding Process When Welding Aluminium



Steps	Content	Description
1		Securely connect the welding torch and earth cable set to the machine.
2		Ensure the earth clamp is connected near the welding zone.
3		Select the suitable spool of wire and mount it over the feeder hub as explained in clause 5.1.
4		Check the brake force tension is sufficient as explained in clause 5.2.
5		Select the suitable drive roll and tensioner rollers as explained in clause 6.2. Adjust the pressure as explained in clause 6.3.
6		Allow approximately 10 to 15mm wire outside the contact tip and cut the excess.

7	Press ①	Press button ① until **pulse** lights up.
8	Press ②	Press button ② until **AlSi** lights up.
9	Press ③	Press button ③ and select **Ø1.2 .**
10	Press ④	Press button ④ and when indicator '**A**' lights up, turn **knob** ⑤ to a current value applicable to the thickness of the workpiece.
11	Press ⑥	Press button ⑥ and turn knob ⑥ to an acceptable arc length.
12	Press ⑦	Press button 7 and when indicator "  "is lit, turn knob ⑥ to the arc force (usually set at level 5) appropriate for the requirements of the process.
13	Press ⑩	Press button ⑩ and select the mode as two-step. 
14		Depending on the position of the welding seam, the torch should be tilted at an angle suited to the seam: If the joint is formed by two pieces at 90° angle, the torch and the workpiece should be approximately 45° and between the torch and seam approximately 60°. If the seam between two pieces is flat, the torch should be perpendicular to the workpiece and approximately 60° to the seam. Once the torch is positioned, the welding operation can commence.
15		After completion of the operation, the gas cylinder valve must be shut off and the power supply turned off.

The welding parameters of the completed operation can be saved and stored under a job number and recalled for future use.

Maintenance

Safe operation of the machine is dependent on regular maintenance and, if necessary, replacement of worn or defective parts.

1. Daily Precautionary Checks

1.1. For any abnormal vibrations, sounds or odours.

1.2. For any sign of overheating on cable connections.

1.3. Whether the power switch is operational and the fan operates smoothly when the machine is switched on.

1.4. Whether cables are correctly connected, insulated and in sound order.

1.5. Torch consumables are subject to wear and tear and should be replaced when worn..

2. Three to Six Monthly Check List

2.1. Dust Removal

Remove the side cover plate and clean off all parts with dry compressed air. Since the effective cooling of the machine is dependent on a designed air flow pattern, it is important to return the side cover plate after the cleaning operation. Not paying attention to this detail, will result in over-heating of and consequent damage to the transformer and semi-conductor parts.

2.2. Wire Feeder Parts

The guide tube, drive rolls and tensioner rollers are subject to wear and tear and should be checked and replaced if worn.

Common machine malfunctions and solutions

⚠ **Warning：Machine maintenance and repair must be carried out by qualified technicians. The operating voltage in the machine can be up to 600V and it is important that power be cut at the machine and at the control box before covers are removed and repairs carried out. A cooling-down period of at least 5 minutes is required before commencement of any inspection and repairs. This will allow the capacitor to fully discharge.**

1. Inspection Before Overhaul

1.1. Check if the line voltage on the three-phase power supply is within the range of 340V - 420V and, that all phases on a three-phase system are intact.

1.2. Check if the power cable as well as the earth wire is firmly connected.

1.3. Check whether the wiring connections are correct and firmly connected.

2. Common Machine Problems and Troubleshooting

No.	Problem	Root cause	What to do
1	Machine is switched on but indicator light not lit.	One of power supply phases down.	Check power supply phases and rectify.
		Automatic air switch damaged.	Replace the automatic air switch.
		Blown fuse.	Replace fuse.
2	Machine switched on, auto air switch trips immediately.	Failure of auto air switch.	Replace auto air switch.
		IGBT damaged	Replace IGBT and drive circuit board.
		Three-phase bridge rectifier damaged.	Replace three phase bridge rectifier
		Varistor damaged.	Replace the varistor.
		Machine control board damaged.	Replace the control board.
3	Auto air switch trips during welding process.	Long-term overload.	Machine to be operated in accordance with duty cycle.
		Auto air switch damaged.	Replace the auto air switch.
4	Welding current not adjustable.	Broken control cable of wire feeder or controller.	Replace wire feeder control cable or the controller.
		Control board damaged.	Replace the control board.
		Wire at both ends of the diverter inside the machine is broken.	Replace the control board.

No.	Problem	Root cause	What to do
5	Unstable arc and excessive spatter.	Welding parameters do not match or irregular operation.	Readjust parameters or improve operation.
		Badly worn contact tip.	Replace contact tip.
6	CO_2 regulator does not heat the gas.	CO2 regulator damaged.	Replace CO2 regulator.
		Broken thermistor on the heating supply.	Replace the thermistor.
7	When the torch trigger is pressed and held, wire feed is normal but no gas flow.	Damaged control circuit board.	Replace the control circuit board.
		Damaged solenoid valve.	Replace the solenoid valve.
8	When the torch trigger is pressed and held, wire feeder fails and there is no indication of open circuit voltage.	Torch trigger damaged.	Replace the torch or trigger.
		Broken wire feeding control.	Repair the wire feeding control cable.
		Damaged control circuit board.	Replace the control circuit board.

3. Common Welding Imperfections and Analysis

No.	Trouble	Causes
1	Blowhole	1. Impure gas or insufficient gas supply. 2. Absorption of air during welding. 3. Failed preheater. 4. Poor gas shielding owing to strong wind. 5. Torch nozzle blocked by spatter. 6. Too great a distance between nozzle and workpiece. 7. Polluted welding surface with oil and dust or moisture caused from insufficient cleaning not sufficiently removed. 8. Arc length too long and voltage too high. 9. Insufficient silicon and manganese content in welding wire.
2	Undercut	1. Impure gas or insufficient gas supply. 2. Absorption of air during welding. 3. Failed preheater. 4. Poor gas shielding owing to strong wind. 5. Torch nozzle blocked by spatter. 6. Too great a distance between nozzle and workpiece. 7. Polluted welding surface with oil and dust or moisture caused from insufficient cleaning not sufficiently removed. 8. Arc length too long and voltage too high. 9. Insufficient silicon and manganese content in welding wire.
3	Incomplete penetration	1. Low welding current and uneven wire-feed speed. 2. Arc voltage too low or too high. 3. Inside the beveled edge the welding speed is too slow or too fast. 4. Beveled gap too small. 5. Welding wire out of position and not aligned with the centre of the welding bead.

No.	Trouble	Causes
4	Poor weld formation	1. Incorrect Process parameters. 2. Incorrect Position and alignment of welding wire. 3. Centre deviation of wire-feed roller. 4. Incorrect of wire straightening mechanism. 5. Loose conductive nozzle.
5	Pear-shaped bead crack	1. Too high welding current. 2. Too narrow groove. 3. Too low arc voltage. 4. Incorrect position and alignment of welding wire.
6	Unstable welding arc	1. Loose or worn contact tip or too large in diameter for the wire thickness. 2. Uneven wire spool rotation: excessive wear on the groove of the drive roll and the pressure from the tensioner roller not adequate. 3. Too low welding current and fluctuation of arc voltage. 4. Excessive dry elongation of welding wire. 5. Surface pollution of the workpiece by rust, paint or grease. 6. Earth cable not properly connected.
7	Spatter	1. Inductance during short-circuit transition too high or too low. 2. Incorrect matching of welding current and arc voltage. 3. Welding wire and workpiece not properly cleaned.