

Digital Inverter AC/DC Pulse TIG Welding Machine



TIG-300PI AC/DC

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.

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.

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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 Dangers



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.

Protective Measures for 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 fittings 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

	<p>Moving parts, such as fans, rotors and belts, can be hazardous.</p>
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	TIG-300PI AC/DC
Item	Value
Rated input voltage	3PH---AC380V±15% 50/60Hz
Rated input power :	12.0KVA
Rated input current :	16.5A
Rated duty cycle :	60%
Output current range :	10A~300A(TIG) / 20A~250A(MMA)
Open circuit voltage :	70V
Pulse frequency :	0.5Hz-100Hz
Duty cycle:	20%-80%
AC frequency:	50Hz-150Hz
AC cleaning width:	20%-50%
Current up slope time (S):	0.1-5
Current down slope time (S):	0.1-5
Gas pre-flow time (S):	0-10
Gas post-flow time (S):	5-25
Package dimensions(mm) :	630*315*530
N.W.:(kg) :	22

Product Description

This welding machine in the AC/DC TIG series, inverts the 50/60Hz power supply to a high-frequency, high-voltage power supply of up to 20KHz. The inversion process is facilitated by a powerful IGBT device followed by step-down rectification and pulse-width modulation (PWM) technology producing a high-power DC output

suitable for welding. The advanced inverter technology allows for the construction of a smaller volume and light-weight, stable and reliable transformer with a 30% improved efficiency.

Added to the advantages of the inverted power supply, the machine has good dynamic characteristics and performance, offers a stable arc and good quality welding as well as ease of control.

Welding machines in this inverter series are suitable for also welding non-ferrous metals, including stainless steel, alloy steel, carbon steel, copper, and aluminium. These machines are widely used in, amongst others, electric power construction, building construction, furniture manufacturing, hardware and kitchen equipment production. In AC current mode, Al-alloy materials can be welded such as bicycle frames and indoor/outdoor decorative items.

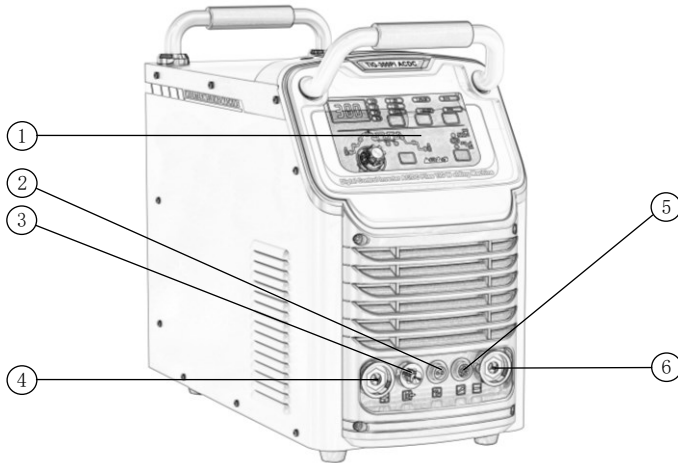
The inverter welding machines in this series are manufactured in accordance with IEC60974-1 <Arc Welding Equipment - Part 1: Welding Power Sources >. Safety Requirements for Arc Welding Equipment.

1. Product Functions and Features:

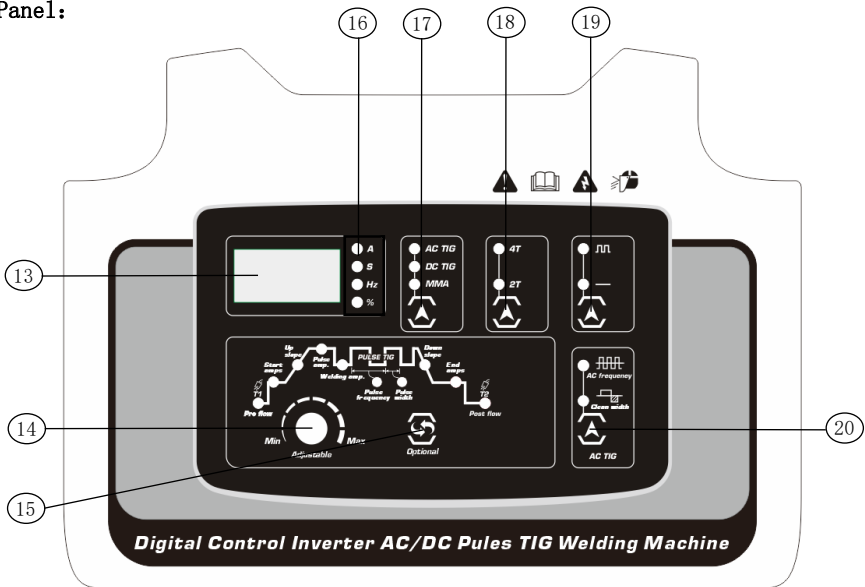
- 1.1. Multi-function, digital-controlled welding machines featuring DC TIG, pulsed DC TIG, pulsed AC TIG and MMA welding in one simple designed, light and small size unit.
- 1.2. Multi-layer control circuit boards ensure high reliability and a long service life.
- 1.3. The secondary inverter technology produces a pure square wave output, excellent arc-force performance and a wide cleaning range, a combination ensuring high quality welding results.
- 1.4. Easy arc start facilitated by the high-frequency, high-voltage arc ignition circuit and stable, reliable arc performance.
- 1.5. Pulsed welding with adjustable pulse frequency ensuring high-quality welding on thin metal sheet, dissimilar metals, varying thickness materials and even for double-sided forming welds.
- 1.6. Foot control available to adjust current freely, improve welding efficiency, reduce welding difficulties and ensure welding quality. Increase current for rapid heating and decrease current to generate a weld seam.
- 1.7. Overheat protection improves machine reliability.

2. Appearance Diagram

TIG-300PI AC/DC



Panel:



1 Control panel

2 Control cable connection socket: Connects the control cable of the TIG welding torch or the pedal switch.

3	Gas electric outlet: Connect gas electric plug of the TIG welding torch.
4	Terminal socket - negative pole (-): Connect TIG welding torch. In MMA mode, connect electrode holder cable set in direct current electrode negative way, connect earth clamp cable set in direct current electrode positive way.
5	Remote control line socket: Connects to the remote control box or to the remote pedal switch.
6	Terminal socket - positive pole (+): In DC TIG mode, connect earth clamp cable set. In MMA mode, connect earth clamp cable set in direct current electrode negative way, connect electrode holder cable set in direct current electrode positive way.
13	Digital diode display: Displays function values and real-time current output.
14	Welding parameter adjustments and selections : Rotate to adjust the parameter values.
15	Parameter selection push button: In TIG mode selections can be made from the following: pre-flow, start amps, upslope, peak amps, duty cycle, pulse frequency, base amps, downslope and post-flow . When the corresponding light is lit, the selected item can be adjusted to the required value.
16	Parameter light: The corresponding parameter is adjustable when the light is lit.
17	Welding process push button: Select between TIG and MMA and the machine is operable when the corresponding indicator light is lit.
18	2T/4T: Press the button to select between 2T (continuous arc) and 4T (arc stopping) and the corresponding light indicates the selected mode.
19	Pulse: Pressing this button allows selection between pulse and non-pulse welding. The selected mode is active when the corresponding light is lit.
20	AC frequency / AC clean width: While in AC TIG welding mode, press the button to select between AC frequency and AC clean width . The corresponding light indicates the selected mode.

3. TIG Mode Parameter Adjustments

3.1. Pre-Flow

Indicates the gas flow prior to arc start. Pre flow duration is adjustable from 0s to 10s.

3.2. Start Amps:

Indicates the startup amperage adjustable from 10A to approximately 300A when the trigger is pressed. It serves to preheat the material.

3.3. Up Slope

Indicates the time from the arc-start up to the preset power level. It is adjustable between 0.1 and 5s.

3.4. Peak Amps

In the pulsed welding mode, the peak current is high and can melt the welding wire and the weld pool to form a welding seam. Also called pulse current, it can be adjusted between 10A and approximately 300A.

3.5. Base Amps

The lower amperage for each pulse is set. It not only serves arc maintenance but also arc stability and assists preheating of the following weld pool. Base Amps are adjustable between 10A and 300A.

3.6. Duty Cycle

It expresses the percentage each pulse cycle spends at peak amperage per second. The wider the pulse, the larger the weld pool of the welding seam and vice versa. Duty cycle is adjustable between 20% and 80%.

3.7. Pulse Frequency

Refers to the number of pulse cycle changes per second per unit time and is adjustable between 0.5Hz and 100Hz.

3.8. AC Frequency

Not adjustable in DC TIG mode. A low frequency is suited for high-current wide-seam welding, while high frequency is suited for thin sheet and narrow seam welding since it increases the melting speed and force. It is adjustable between 50Hz and 150Hz

3.9. AC Clean Width

In the AC TIG welding process, it indicates the percentage adjustment of negative and positive AC half-wave widths which cleans the oxidised surface of a workpiece. It is adjustable between 20% and 50%.

3.10. Downslope

Indicates the time the welding current is stepped down to end the arc. It is adjustable between 0.1 and 5s.

3.11. End amps

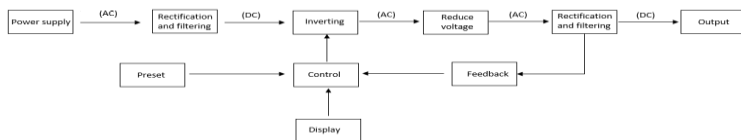
Indicate the reduced welding current at the end of the process and is aimed at obviating the formation of a crater at the completion of the weld. It is adjustable between 10A and 300A.

3.12. Post flow

Indicates the time gas continues to flow after completion of the weld. The continued gas flow will prevent oxidation of the molted metal, ensuring quality of the weld seam and also act as a coolant. It is adjustable between 5 and 25s.

Working Principle

1. Diagram Explaining Working Principle



- 1.1. A bridge rectifier converts AC to DC;
- 1.2. After secondary rectification and reactor filtering, output welding current is delivered that meets the welding requirements;
- 1.3. Controlled by PWM the IGBT inverts the DC to 20KHz AC which is transmitted via a high-frequency transformer;
- 1.4. The in-time protection circuit provides signals to the PWM warning for overheat and over-current situations;
- 1.5. A closed-loop control system ensures a good anti-grid fluctuation ability and an excellent cutting 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° .
- 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 $380\text{V}\pm 10\%$ 50/60Hz. Three phase voltage unbalance should be $\leq 5\%$.
wave.

Model	TIG-300PI AC/DC
Power supply:	AC380V±15% 50/60Hz 3PH
Rated input current:	16.5
Input cable:	≥2.5mm ²
Output cable:	35mm ²
Ground cable:	≥4mm ²

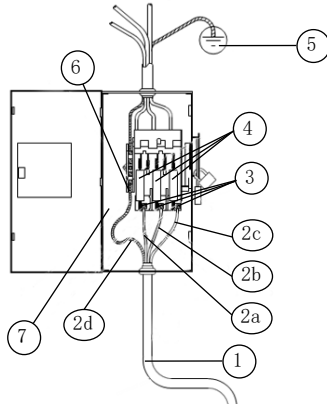
3. Main Power Supply Connection

		
	Pay attention to prevent electric shock	Wear goggles

Take note of the following when the 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 three phase AC, 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 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's welding station and not in contact with the work table or the welding machine.
- 4.3. Connect the gas hose firmly from the flowmeter outlet to the gas inlet situated at

the back of the welding machine. Gas leakage is not allowed.

- 4.4. Adjust the flowrate in accordance with the manufacturer's recommendation.
Generally, 5 -10 litres/min.

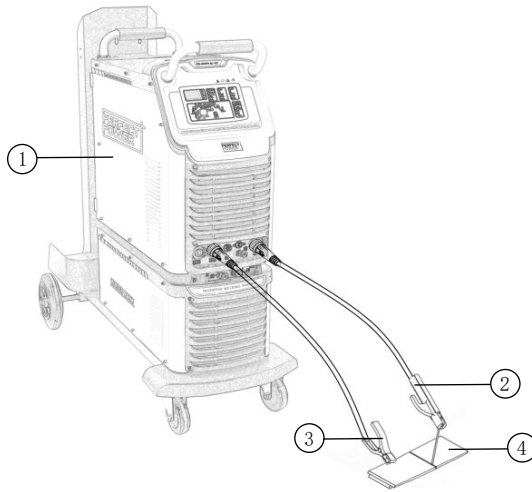
Brief Procedure for the welding operation

1. 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 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.
- 1.4. 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.

2. TIG Welding Procedure

- 2.1. Securely connect the earth cable and the TIG welding torch.
- 2.2. Ensure the Argon gas assembly consisting of cylinder, regulator, flow meter and hose are connected and clamped tightly to the copper inlet connector on the rear panel of the machine.
- 2.3. Switch the power on and ensure the power light is lit and the fan is operational.
- 2.4. Select TIG mode on the front panel and set the required parameters. Direct the torch towards the workpiece and start the welding process. If required, adjust the parameters during the welding process. A guideline table for TIG welding parameters is detailed below.
- 2.5. Turn off the machine and the electric control box once welding task is completed
- 2.6. Schematic diagram in TIG mode:



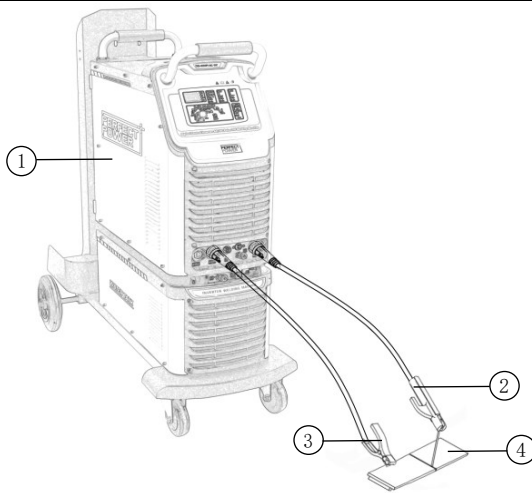
Direct Current Electrode Negative (DCEN): Suitable for acid electrode welding.

Direct Current Electrode Positive (DCEP): Suitable for alkaline and cellulose electrode welding.

No.	Item	No.	Item
1	Welding machine	3	Earth clamp
2	Electrode holder	4	Work piece

3. MMA Welding Procedure

- 3.1. Securely connect the earth cable and the electrode holder cable.
- 3.2. Switch the power on and ensure the power light is lit and the fan is operational.
- 3.3. Select MMA mode on the front panel and preset the welding current in accordance with electrode specifications. (Consult the reference table below).
- 3.4. Start the welding process according to normal procedure.
- 3.5. Turn off the machine and the electric control box once welding task is completed.
- 3.6. Schematic diagram in MMA mode:



Direct Current Electrode Negative (DCEN): Suitable for acid electrode welding.

Direct Current Electrode Positive (DCEP): Suitable for alkaline and cellulose electrode welding.

No.	Item	No.	Item
1	Welding machine	3	Earth clamp
2	Electrode holder	4	Work piece

4. Guideline Table for TIG Welding Parameters

Parameters are bases on the workpiece material. When a workpiece with thickness $\geq 4.0\text{mm}$ is welded, multi-layer and multi-pass welding is recommended.

Thickness (mm)	Amperage (A)	Diameter of tungsten electrode (mm)	Diameter of wire (mm)	Gas flow (L/min)	
				Stainless steel	Titanium
0.3~0.5	10~40	1.0	1.0	4	6
0.5~1.0	20~40	1.0	1.0	4	6
1.0~2.0	40~70	1.6	1.6	4~6	6~8
2.0~3.0	80~130	2.0~2.4	2.0	8~10	8~10
3.0~4.0	90~150	2.4~3.2	2.5	10~12	10~12
4.0	110~150	2.4~3.2	3.0	10~14	12~14

5.0	120 ~ 180	2.4 ~ 3.2	3.0	10 ~ 15	12 ~ 15
6.0	150 ~ 200	2.4 ~ 3.2	3.0	10 ~ 15	12 ~ 15
8.0	160 ~ 220	3.2 ~ 4.0	3.2 ~ 4.0	12 ~ 18	14 ~ 18
12.0	180 ~ 240	3.2 ~ 4.0	3.2 ~ 4.0	12 ~ 18	14 ~ 18

5. Guideline Table for TIG AC Welding Parameters

Parameters are bases on aluminium alloy welding

Thickness (mm)	Amperage (A)	Diameter of tungsten electrode (mm)	Diameter of wire (mm)	Gas flow (L/min)
0.6	25~40	1.0~1.6	0~1.0	4~5
1.0	40~60	1.0~1.6	0~1.6	4~7
1.5	60~90	1.0~1.6	0~1.6	6~9
2.5	80~120	1.6~2.4	1.6 ~ 2.4	6~9
3.0	100~160	1.6 ~ 2.4	1.6 ~ 2.4	7~10
4.0	130~200	2.4	1.6 ~ 2.4	10~15
5.0	150 ~ 250	2.4 ~ 3.2	2.4 ~ 3.2	10~15
6.0	200 ~ 280	2.4 ~ 3.2	2.4 ~ 3.2	10~15
8.0	250 ~ 300	3.2 ~ 4.0	3.2 ~ 4.0	12~18

6. Guideline Table for MMA welding

Electrode diameter (mm)	Welding current range (A)	Welding Voltage range (V)	Thickness of the work piece (mm)
Φ1.6	44~84	21.8~23.4	1.5~2.0
Φ2.0	60~100	22.4~24.0	2
Φ2.5	80~120	23.2~24.8	2.5~3.0
Φ3.2	110~130	24.4~25.2	3~4.5
Φ4.0	160~210	26.4~28.4	5~8
Φ5.0	200~270	28.0~30.8	6~15

7. Possible Welding Deficiencies

The following deficiencies are related to situations outside the the electronic circuits and are mostly attributed to accessories, gas and power supply and external circumstances. These can be circumvented by controlling the environmental factors.

7.1. Blackened Welding Spots

This phenomenon indicates that the welding spot is oxidised owing to insufficient protection. The following remedial actions can be pursued.

- 7.1.1. Check the efficiency of Argon gas flow and pressure. As a general rule the pressure in the cylinder should be above 0.5 mPa. If not, exchange or refill the cylinder.
- 7.1.2. Check the Argon gas-flow meter. Ensure the correct flow-rate for the job at hand and, in any case, should not be below 3l/min.
- 7.1.3. Ensure that the gas flow through the torch is unobstructed.
- 7.1.4. Ensure that the gas is of good quality.
- 7.1.5. Strong air flow in the welding environment may influence cover-gas efficiency.

7.2. Difficult Arc Start or Easy Arc Break

- 7.2.1. Only use a good quality tungsten electrode.
- 7.2.2. Tungsten electrodes that have not been sharpen processed are less likely to perform successful arc start and can cause arc instability.

7.3. The Output Current is Below the Rated Value

Power supply which deviates from the rated value, will have a consequential effect on the maximum and set-current output value at the torch end. Under-power input will result in under-power output.

7.4. Unstable Output Current During the Welding Operation.

Grid-voltage changes and interference from other electrical equipment can have an influence on current output.

7.5. Excessive Burn-up of the Tungsten Electrode.

The distance between electron emission from the workpiece and the electrode is too

long resulting in intense heating of the tungsten electrode. The duty cycle should be readjusted.

7.6. Oxide Layer on Aluminium Weld.

Duty-cycle setting is not long enough and needs readjustment or the secondary inverter is faulty.

Maintenance

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

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.

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	Power switch fails.	Power switch broken.	Replace the power switch.
		Rectifier bridge broken.	Replace the bridge rectifier..
		Internal short circuit.	Check the internal wiring for a short circuit.
2	Machine turned on, power light off, fan not operational, no welding power output.	Phase loss on power supply.	Check power supply and phase-loss problem.
		Damaged power switch on back panel.	Replace the power switch.
		Grid power failure.	Check the power grid.

No.	Problem	Root cause	What to do
3	Power light is lit, digital meter works and fan operational, the error indicator light is lit.	Damaged fly-back transformer.	Replace fly-back transformer.
		Damaged IGBT.	Replace IGBT.
		Damaged fast recovery diodes.	Replace fast recovery diodes.
		Fault at control circuit.	Check control circuit and replace control board.
4	Power light is lit, digital meter works and fan operational, error indicator light not lit, no high-frequency discharge sounds when torch trigger is activated, no no-load output.	Poor contact or loose torch trigger wire.	Reconnect or fasten torch trigger connecting wire.
		Damaged torch trigger or broken torch control wire.	Replace torch trigger.
		Fault at control circuit.	Check control circuit and replace control board.
5	Digital meter works and fan operational, error indicator light is lit, no no-load output.	Overheated power supply owing to insufficient ventilation.	Improve conditions for ventilation.
		Ambient temperature too high.	Auto recovery after 5 to 10 minutes.
		Duty cycle exceeded.	Auto recovery after 5 to 10 minutes.

No.	Problem	Root cause	What to do
6	Power light is lit, digital meter works and fan operational, solenoid valve in order, no high-frequency discharge sounds, error indicator light not lit.	Poor contact of arc ignition coil primary wire.	Fasten the connecting wire.
		Oxidation on spark-gap assembly or spark gap distance too great.	Remove the oxide film and readjust the gap to 1mm.
		High-frequency arc ignition-circuit device damaged.	Determine and replace damaged components.
		Fly-back transformer damaged.	Replace the fly-back transformer.
		Poor contact on high-temperature wire terminal of main transformer.	Tighten terminal block.
		Fault at control circuit.	Check control circuit and replace control board.
7	Digital meter works and fan operational, error indicator light not lit, high-frequency discharge sounds, no no-loud output, no gas flow.	Gas-flow problem at the gas hose.	Check the inlet gas hose.
		Solenoid valve broken.	Replace the solenoid valve.
		If problem persists after checking and replacement of solenoid valve, there is a fault in the control circuit.	Replace the control board.
		Gas and electricity socket is obstructed.	Check the gas and electricity socket hole.