OPERATION & MAINTENANCE MANUAL

MODEL - INTIG 250 PULSE

DC Pulse Argon Arc Welding Machine

WARPP ENGINEERS PVT.LTD.

SUERVEY NO. 36/15, UNIQUE INDUSTRIAL COMPLEX ,

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Safety Depends on You

Our arc welding and cutting equipment are designed and built with ample safety consideration. However, proper installing and operating the machine can increase your safety.
DO NOT INSTALL, OPERATE OR REPAIR THIS EQUIPMENT CASUALLY WITHOUT READING THIS MANUAL THROUGHOUT.

Special Attention (Very Important):

1. BE SURE TO AVOID THE WELDING MACHINE FALLING DOWN WHEN IT IS PLACED ON THE GRADIENT GROUND.
2. IT'S FORBIDDEN UNFREEZING THE PIPELINE BY THE WELDING MACHINE.
3. THE SHIELD RANK OF THIS SERIES OF WELDING MACHINES IS IP23E.
4. The rated duty cycle of this welding machine is 60%, there is protection function when the machine is overloading used. When it's protected and no power output, must wait and after the temperature back to normal, then use again.
5. When welding current is lower than 200A, the argon gas flow is 4-8L/min, when welding current is higher than 200A, the argon gas flow is 8-15L/min.

Purchase Date : _____

Serial Number : _____

Machine Type : _____

Purchase Place :

1 **Electric shock**: The welding circuits are not insulated when welding. If you touch the two output electrodes of the machine with your bare skin at the same time, it will lead to electric shock, sometimes even fatal dangers. Users need to follow the items below to avoid electric shocks:

- If possible, lay some insulating materials, which are dry and large enough, in your working field. Otherwise, use the automatic or semiautomatic welding machine, DC welding machine as possible as you can.
- Components in the automatic and semiautomatic welding machine such as the welding wire reel, feed wheel, contact tip and welding head are all electriferous.
- Always be sure the machine has been connected perfectly to the work piece with the work cables and should be as close as possible to the working area.
- The work piece should be grounded perfectly.
- Make sure that the insulating material of the electrode holder, the grounding clamp, the welding cable and the welding head are not affected by damp, mildewed or spoilt, and be replaced momentarily.
- Never dip the electrode in water for cooling.
- Never touch electriferous parts of two welding machines at the same time, because this voltage is supposed to be two times of welding voltage while the grounding mode is not clear.
- While working high above the ground or other places having the risk of falling, please be sure to wear safety belt to avoid losing balance caused by electric shock.

2 **Arc**: Use an arc welding mask to protect your eyes and skin from sparks and the rays of the arc, pay special attention to the filter glass, which must be conformable to the national standard.

- Use clothing made from durable flame-resistant material or sailcloth to protect your skin from hurting by the arc rays.
- Remind other nearby personnel before working lest arc rays hurt them by accident.

3 **Fumes and Gases**: Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. While working in limited room, use enough ventilation and/or exhaust to keep fumes and gases away from the breathing zone, or use the respirator. Do not weld at the same time when using of degreasing, cleaning or spraying operations. The heat and rays of the arc can react with these gases to form phosgene, a highly toxic gas,.

- Some protective gases used in welding might displace the oxygen in the air, and can lead to hurt or even death.
- Read and understand the manufacturer's instructions for this equipment, and validate the health certification of consumptive materials, make sure they are asepsis and innocuity.

4 **Spatter**: Spatter can cause fire or explosion.

- Remove fire hazards from the welding area. Remember that spatter from welding can easily go through small cracks and touch fire hazards. Keep the safety of all kinds of lines going though welding area, including hydraulic lines in the wild.
- Where compressed gases are to be used in the field, special precautions should be used to prevent explosion.
- When not welding, make certain that no electriferous part is touching the work piece or the work stage. Accidental contact can create a fire hazard.
- Do not weld containers or lines, which are not proved to be innocuity.
- It is very dangerous to heat, cut or weld tanks or containers at entry holes. Does not start work until the proper steps have been taken to insure that there are no flammable or toxic gases there.
- Spatter might cause burn. Wear leather gloves, heavy shirt, cuffless trousers, high shoes and a cap over your hair to prevent from burning by spatter. Wear the ear shield when performing sideways or face up welding. Always wear safety glasses with side shields when being in a welding area.
- The welding cables should be as close to the welding area as possible, and the short, the better. Avoid welding cables going through the building framework, lifting chains, AC or DC cables of other welding machines and appliances. The welding current is strong enough to damage them while having short circuit with them.

5 **Cylinder**: Damage of it might cause explosion.

- Make sure that the gas in the storage cylinder is qualified for welding, and the decompression flow-meter, the adapter and the pipe are all in good condition.
- Make sure that the installation of cylinder is by the wall and bundled tightly by a chain.
- Be sure to put the cylinder in the working space with no crash or shake, and far from welding area.
- It is forbidden to touch cylinder with the welding clamp or the work cables.

CONTENTS

1. Overview :

INTIG 250 PULSE series TIG welding machine adopts the high power IGBT, the invert frequency reaches 20KHZ. The small mid-frequency transformer replaced the heavy industrial frequency transformer, which with advantages as: high efficiency, low non-load loss, stable current, energy saving, material saving and high reliability etc.

INTIG 250 PULSE series TIG arc welding machine has all functions required by welding technique: high frequency arc striking, gas pre-send (adjustable), initial current (adjustable), current up-slope (adjustable), current down-slope (adjustable), crater current (adjustable), gas post-off etc. Except for DC welding mode, the INTIG 250 PULSE series has pulsed welding mode, the advantage is: welding current high and low interchange working, so it has better arc and stronger weld seam which is decided by the welding machine parameter.

This series of welding machine can used for almost all metal work pieces except magnesium-aluminum alloy, such as stainless steel, pipeline, boiler, aerospace equipment etc.

2. Working condition & Environment:

a. Input Power
   i. The exact input voltage wave shape should be sine wave, the frequency fluctuation should be no more than ±1% of the rated value ;
   ii. The fluctuation of input voltage must be within +15% of the rated value;
   iii. The unbalance rate of input voltage should be ≦5%.

b. Environment
   i. Ambient temperature ranges:Welding temperature range: -10℃~+40℃, Transportation and Storage temperature range: -25℃~+55℃
   ii. Relative humidity: ≤50% @ 40℃
       ≤90%@20℃
   iii. The dust, acid, corrosive gas or material around should not exceed the normal content, except the one produced during welding;
   iv. Operating altitudes: less than 1000m;
   v. Wind speed should be no more than 1m/s;
   vi. Keep the machine inside and dry all the times, do not locate where the machine is exposed to direct sunlight and rain.

2. Specification and parameter

Model *Item*		***INTIG 250 PULSE***	
Input power		*3～ 415V±15% 50／60 Hz*	
Rated Input Capacity (KVA)	*TIG*	*7.5*	
	MMA	*10*	
Rated Input Current (A)	*TIG*	*10*	
	MMA	*14*	
Rated Output Voltage (V)	*TIG*	*17.6*	
	MMA	*27.6*	

Rated Open Circuit Voltage (V)	*TIG*	*75*			
	MMA	*75*			
Power factor	*TIG*	*0.93*			
	MMA	*0.91*			
Efficiency (η)	*TIG*	*82%*			
	MMA	*86%*			
Rated Duty Cycle (%)		*60%*			
Hot Start Current Range (A)		*0～120*			
Arc Force Current Rage (A)		*0～120*			
Gas Pre-flow Time (S)		*0～5*			
Arc Striking Current Range (A)		*5～250*			
Current Up-slope Time (S)		*0～10*			
Welding current (A)		*5～250*			
Pulse Peak Current Range (A)			*5～250*		
Pulse Background Current Range (A)			*5～250*		
Pulse Frequency Range (Hz)			*0.2～99.9*		
Pulse Duty Ratio Range			*5%～95%*		
Current Down-slope Time Range (S)		*0～10*			
Crater Current Range (A)		*5～250*			
Gas Post-flow Time (S)		*0～20*			
Cooling mode		*Air Cooling*			
Isolation Grade		*H*			

Ingress Protection	*IP23*	
*Dimension (L*W*H)*	*460X270X390*	
Net Weight (KG)	*24*	

4.System description

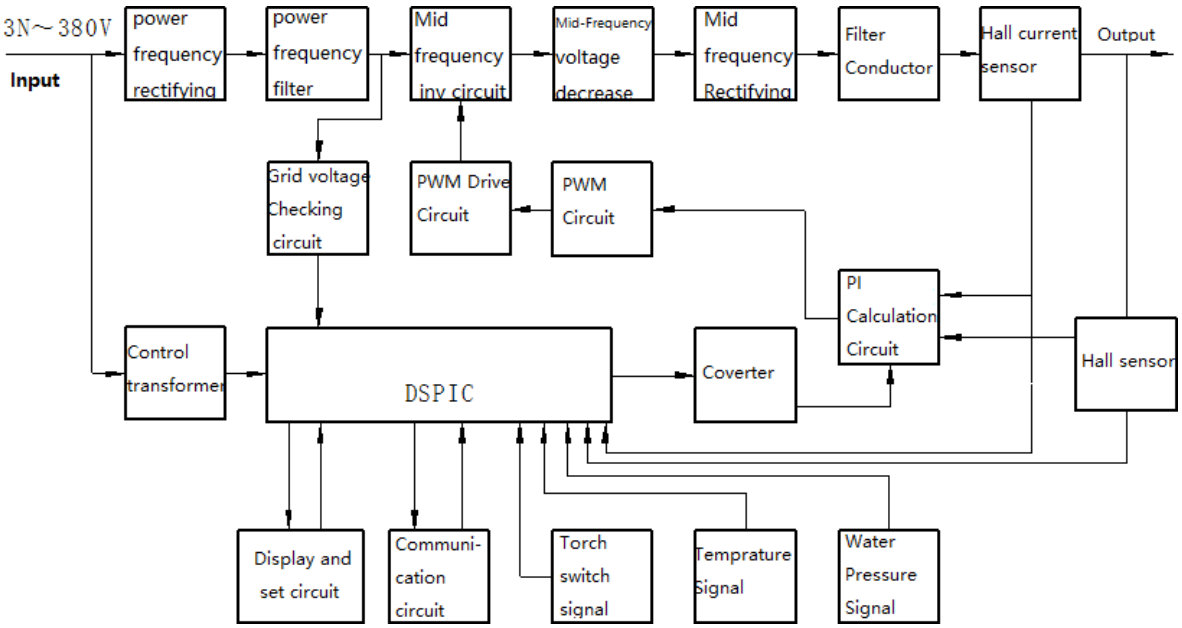
a. Working principle

INTIG 250 PULSE series welding machine adopts IGBT as the main circuit switch. The three-phase AC input power inverted to 20KHz mid-frequency current through the rectifier of the full bridge. Then through the filter and current negative feedback control to get the constant adjustable welding current.

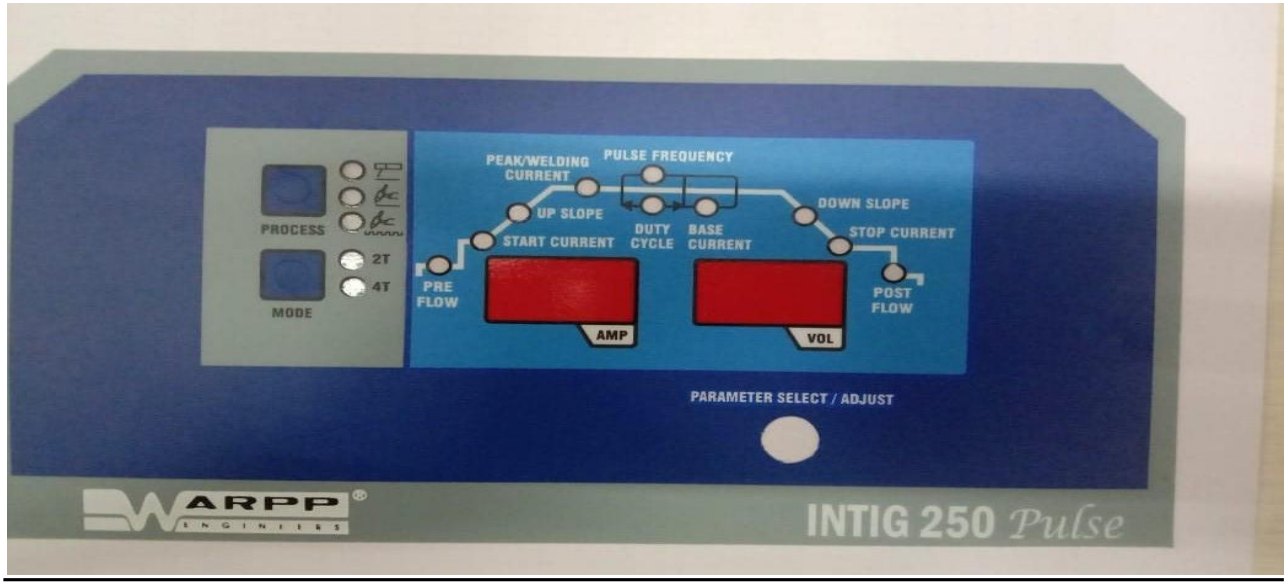
The control circuit will control the output current through the adjusting of the pulse width. The negative feedback signal, which is the real welding current get from the output current sensor, put into the special PWM circuit after compared with the current adjust signal, then output the driving pulse to control the IGBT, so that the output current will keep stable to get descending external characteristic.

This machine has functions of gas pre send, gas post cut off, HF arc striking, current up-slope, current down-slope. All these functions are controlled by the digital signal controller automatically.

b. Working circuit diagram



5.Front Panel description



PARAMETER SETTING FOR INTIG 250 PULSE

DESCRIPITON OF INDICATION AND SWITCH :

This LED indicates the welding is in the MMA or SMAW mode .

This LED indicates the welding is in the TIG mode .

This LED indicates the welding is in the PULSE mode .

This LED indicates the welding is in the 2 Trackmode. (Applicable only in TIG Mode).

This LED indicates the welding is in the 4 Track mode . (Applicable only in TIG Mode)

PREFLOW :This LED indicates the preflow time before the GAS.

START CURRENT : This LED indicates the Start Current or `Hand Arc welding current state output.

UP SLOPE :This LED indicates the time taken for machine to reach

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it welding current from its start current.

PEAK CURRENT :This LED indicates the Welding current during welding & arc welding normal output state.

5. 

PULSE FREQUENCY :This LED indicates the operating frequency of PULSE output (applicable in PULSE MODE).

6. 

DUTY CYCLE :This LED indicates the ON / OFF TIME OF pulse frequency output.

BASE CURRENT :This LED indicates the base current during off time of pulse output (Applicable in PULSE MODE).

7. 

DOWN SLOPE :This LED indicates the time taken for machine to reach its Arc current from its welding current.

STOP CURRENT : This LED indicated the current value before the are welding quenching.

POST FLOW :This LED indicates the continues flow timing after welding.

PROCESS :This SWITCH is used for selection of MMA , TIG Or PULSE WELDING.

MODE :ThisSWITCH is used for selection of 2 Track Or 4 Track welding.

VOLT/AMP :This is digital display for voltage and current display.

6.Installation :

a. The power supply of this machine is 3~ 415V 50/60HZ, user should prepare the switchboard and install the air switch (breaker) and ground cable. Connect the green-yellow wire of the three-phase input cable to the grounding wire on the switchboard reliably according to the below table:

Item Model	Sectional area of power cable (mm2)	Air switch (A)	Sectional area of ground cable (mm2)
INTIG 402 PULSE	≥2.5	40	≥25

b. - Connect the argon gas to the air inlet through reducing valve (Use Φ6 air hose);
c. - When work as Tig, connect "+" terminal to work-piece firmly; when work as MMA, connect the "+" terminal according to different electrode;
d. - Welding torch connection: Air cooling torch: connect the torch gas hose with the "Gas outlet "on the welding machine, connect the torch control plug with the "Torch Switch"on the welding machine, connect the main cable with "-" terminal on the welding machine;

7. Operation :

e. Turn on the power switch, the welding machine start to check by itself, the digital meters and indicators on panel lights on together for 1.5 seconds and lights off 0.5 seconds, then display normally;
f. - Press the torch trigger switch & adjust the argon gas flow according to different welding technology.
g. - Set the "pulse on/off" according to different welding technology, press the "Pulse current" key to do that. If choose "pulse off", set the welding current by adjusting the encoder; if choose "pulse on", set the "peak current", "PWM ratio", "Pulse frequency" and "base current", press left/right selection key to choose the parameters need to be set;
h. - Set the "gas pre-flow time", "arc starting current", "Up-slope time", "down- slope time","crater current" and "gas post-flow time" according to different welding technology;
i. Welding operation:
    i. Two steps: take the tungsten electrode close to the work-piece about 1~3mm, press the welding torch switch without loosen, it starts weld normally after current up-slope, when finish welding, loosen the welding torch switch, the current down-slope to crater current. After welding, please don't take away the welding torch at once, should wait the gas post-flow time finish, to protect the weld crater and tungsten electrode;
    ii. Four steps: take the tungsten electrode close to the work-piece about 1~3mm, press the welding torch switch without loosen, after arc striking, find the welding position, then loosen the welding torch switch, the welding current will increase to the set current, it starts weld normally , when finish welding, press the welding torch switch again, the current down-slope to crater current, loosen the torch switch, arc stop and the welding finish. After welding, please don't take away the welding torch at once, should wait the gas post-flow time finish, to protect the weld crater and tungsten electrode
j. MMA: connect the work-piece too "+'"-" according to different welding technology; after connecting the ground cable and electrode holder, set the welding current/arc force current/hot starting current according to electrode
diameter; before welding, the welding machine output 18V ～ 20V DC voltage, when the instant moment that electrode touch the work-piece, the welding
machine output welding current and start the normal welding, after arc stop, the open circuit voltage will remain 1 second.

8 Maintenance :

For safety, the welding machine should be maintained and checked regularly, when check the inner or outside connecting terminals, do cut off the power distribution box(or the breaker).

Daily notes:

Check if there is any abnormal noise, vibration or smell;
Check if there is abnormal heating on the joint of cables;
Check if the cooling fan working well;

Checking items in 3~6 months period:

The electrical connection: check the fastening screws on cables, to find if there is any loosen, rust or poor connecting and so on;
Grounding cable: check if the welding machine is grounded well

Clean the dust inside the machine: this work should be done every half a year, with dry compressed air.

Adjust the high frequency: never touch the spark electrodes (the distance of the spark electrodes should be 1mm), when the electrode surface is rough or polluted, polish it. Before touching the electrodes, please discharge them, and then adjust the distance to 1mm.

9. Trouble shooting:

Problem	Possible reasons	Trouble shooting
1. When machine energized, the circuit breaker trip	Three phase bridge rectifier was may damage	Replace the rectifier ;
	IGBT damage	Replace IGBT
2. No output current		
	Cooling fan not work, or overload cause overheat, then temperature relay protect	Repair the cooling fan and do not overload
	Temperature relay may damage	Replace the temperature relay
3. No Arc striking	Machine output terminal not connect reliably with the work piece	Reliably connect the work piece and output terminal
	Torch trigger or plug wire may damage	Replace the torch trigger and well connect the plug
4. There is no output voltage, but noise from the machine	FRD may damage	Replace the FRD
5. Difficult to strike arc	Work piece too dirty	Clean the workpiece
	Tungsten quality not good	Replace good tungsten
6. Cannot turn off the argon gas.	PW03 damage ;	Replace PW03 ;
	There are substance in gas valve ;	Clean the air valve
	Check gas/auto selection switch does not set to auto position ;	Put the switch to auto position ;
	The spring in the air valve may have elastic shortage	open the air valve and extend the spring
7. No argon	The voltage of the air valve coil is insufficient or the coil was burnt	Check the coil voltage（~36V） or replace the air valve
	PW03 damage ;	Replace PW03 ;

8. There is burnt smell from the machine	Some components was burnet or there are wires short circuit.	Replace the damaged components or deal with the short circuit parts ;
9. Machine not work, but the overload indicator on	Machine overload	Stop welding, let the machine rest for 10min without load
	Cooling fan damage	Replace cooling fan
10. Arc break during welding or the machine not work, but the lack voltage indicator on	Water pressure too low or no water let in	Connect water
	The water checking switch damage	Replace the water checking switch

10 Spare Parts List :

No	Spare Name	Part No.	
1	MCB	SP02488	
2	Rectifier bridge	SP01901	
3	IGBT	SP01871	
4	Filter Capacitor	SA00033	
5	Cooling fan	SP01321	
6	Display PCB	SP01928 D	
7	Main PCB	SP01928 M	
8	Drive PCB	SP01229	
9	Control T/F	SP00899	
10	Output Diode	SP02703	
11	Power T/F	SA00038	
12	Choke	SP02650	

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