INTIG- PULSE
Digital Inverter
MMA/TIG / Pulse TIG
Welding Machines

Operating manual

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Thank you for selecting WARPP brand inverter welding machine. In order to keep THE operator safe, away from unexpected accidents, and enjoy full benefits offered by our quality products during welding, please read the instruction in details prior to operation. Complying with procedures defined in this manual is always appreciated.

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Usage & Features

IN TIG series pulse TIG welders include 315 A, and 400A types, can Perform DC TIG, Pulse TIG, and DC MMA, used for mild steel, alloy steel, stainless steel, Copper, Silver, and Titanium welding. This series welder enjoy reasonable static characteristic and sound dynamic characteristic as well as comprehensive functions:

- **Soft switch Inverter, high efficiency and reliability, small size, light weight and portable**
- **Non-source power factor correcting technical, high PF(power factor)**
- **Multifunction, convenience, good adjustability**
- **Less spatter, less weld distortion, pretty weld formation.**
- **High success rate of arc-starting due to stronger pulse strike**
- **Pulse frequency, pulse ratio, pulse amplitude can be adjusted freely in wider range.**

Safety precautions

General safety precautions:

- Please strictly comply with rules defined in this manual to avoid unexpected accidents
- How to connect to power supply, select working area and use pressure gas, please comply with proper rules
- Not allow non-operator for entering working area
- Welding machine installation, inspection, maintenance, operation should be completed by authorized person.
- Don't use welding machine for unrelated purpose (Such as recharging, heating or pipe thawing)
- Must take safe precaution in case welder falling when it is put on the uneven ground

Avoid being electric shocked and burnt

- Never touch on the hot electrical units.
- Please instruct the authorized electrician to ground the welder case by using proper sized copper wire.
- Please instruct the authorized electrician to connect the welder to power supply by using proper- sized, well-insulated copper wire.
- When operating in the damp, space-limited area, must ensure well-insulated between body and work piece
- When operating at the high-rising location, must ensure safety by using safe net.
- Please power off the welder while no longer using.

Avoid breathing in hazardous welding fume or gas

- Please use specified ventilation to prevent being gas poisoned and asphyxiated
- Especially in the container where oxygen is depleted easily

Avoid being harmed by arc flash, hot spatter and slag

- Arc rays can injure your eyes and make your eyes feel uncomfortable.
- Hot spatter and slag can burn your skin.
- Please wear proper welding helmet, leather gloves, long- sleeved suit, cap, apron and boot before welding.

Preventing accidents from fire, explosion, container break

- Don't put flammable material in the working area. Hot spatter and hot weld can easily start a fire.
- Cable must be connected the work piece firmly to ensure good conductivity in case causing fire by resistance heat.
- Don't weld in the flammable gas or weld container which contains flammable material, otherwise it can cause explosion.
- Don't weld encapsulated container, otherwise it can break.
- Ensuring fire extinguisher at hand in case a fire break out.

Avoid being hurt by moving parts

- Never let the finger, hair, and cloth near the rotary cooling fan and wire feeder rollers.
- When feeding wire, don't let the bottom of gun near your eyes, face and body, to prevent being harmed by wire.

Avoid gas bottle falling or gas regulator breaking

- Gas bottle must be firmly fixed on the ground, else if injure will exerts on.
- Never place bottle under high temperature or sun light.
- Never let your face near gas outlet while turning on the gas valve to prevent from being hurt by pressure gas.
- Customer should use gas regulator provided by our company, and comply with the proper instruction.

Avoiding being hurt by welders while in transport

- When moving the welding machine by fork-lift truck or crane, nobody can be allowed for standing downright the route of the moving welder, in case being hurt by the falling welder.
- The ropes or wires which used for hanging up the welding machine must be strong enough to withstand corresponding tension strength. The rope or wire inclination hanging on the tackle must be no more than 30°.

Installation

1. Installing situation:

(1) Must place welding machine in the room where is no straight sunlight, no rain, less dust, low humidity, and temperature range of -10□ +40□

(2) The gradient of ground must be no more than 15°

(3) Ensure no wind at the welding position, or use screen to block the wind.

(4) The distance between welder and wall must be more than 20cm, between welders more than 10cm to ensure enough heat radiation.

(5) When using water cooled gun, must be care of not being frozen.

2 Requirement of input supply:

(1) Input volt must be standard sine wave, effective value 350 ~ 465V,frequency 50Hz/60Hz

(2) Unbalance degree of three phase volt must be no more than 5%

3. Power supply:

Product type		IN TIG-315 P	IN TIG-400 P
Power supply		3 phase AC380V	
Min. capacity	Power network	13.8KVA	18.4KVA
Input volt protection	Fuse	32 A	32 A
	Circuit breaker	32 A	32A
Cable size (cross-section)	Input side	$4mm^2$	$4mm^2$
	Output side	$35mm^2$	$50mm^2$
	Earth lead	$4mm^2$	$4mm^2$

Table1: The size of fuse and breaker in the table are for reference only.

4 Installation:

The input power of this series welding machines is three phase AC 350 ~ 465 V. Operator must use the properly disconnected switchboard or switch box(not outfitted by our company) which is equipped air switch or breaker, and make sure to ground the machine safely and firmly.

4.1 For MMA welding:

(1) Connect welding cable to welding machine tightly.
(2) Reset the circuit beaker on the rear panel of the machine
(3) Connect the input power cable to the disconnected switchboard, then power on.

4.2 For TIG welding:

(1) Well-connect welding cable with welder (+), and well-connect TIG torch with welder (-).
(2) Well-connect gas hose and gas source; well-connect water pipe and water source when using water cooled torch.
(3) Close air switch of the welder.
(4) Connect 3 phase cable with the switchboard and power it on.

Principle in Brief

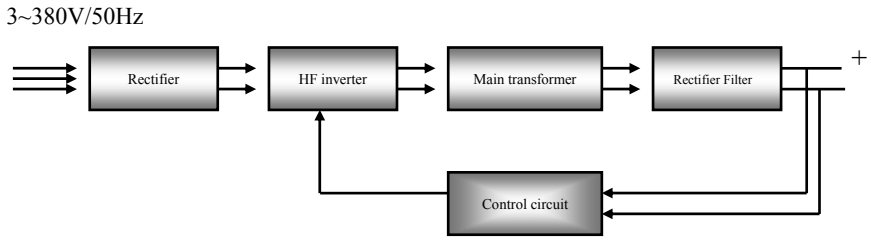


Fig 2 Block diagram of principle

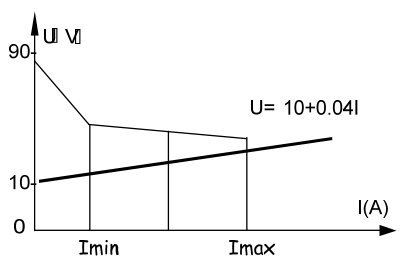


Fig 3a TIG Output Characteristic

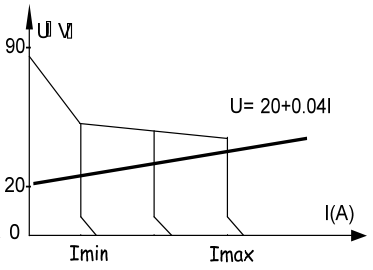


Fig 3b SMAW output characteristic

This series welding machines apply IGBT soft switch inverter technology. 3- phase input volt are rectified by rectifier, inverted into HF AC, reduced by HF transformer, rectified and filtered by HF rectifier, then output DC power suitable for welding. After this process, the welder's dynamically responsive speed has been greatly increased, so the welder size and weight are reduced noticeably result in energy saving. Power source enjoy sound anti-fluctuating ability and high-quality performance during external context changes (As to fluctuation in input power supply and extended welding cables). Easy to arc start, stable arc length, pretty weld formation and capability of continuous regulation the current of welding, arc-starting and arc force as well as time of down-slope add significant values to customers. They have down-slope, pre-gas flow and post-gas flow function due to reasonable logic circuit design.

Operating Instruction

1 Function introduction

1.1 Front panel illustration and parts number reference

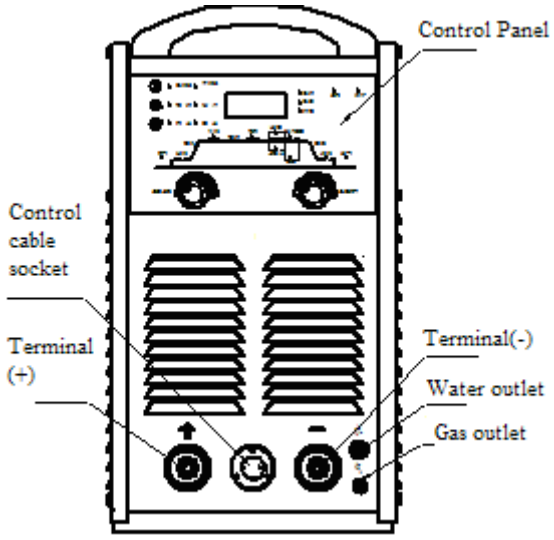


Fig.4: Front panel

1.2 Rear panel illustration and parts number reference

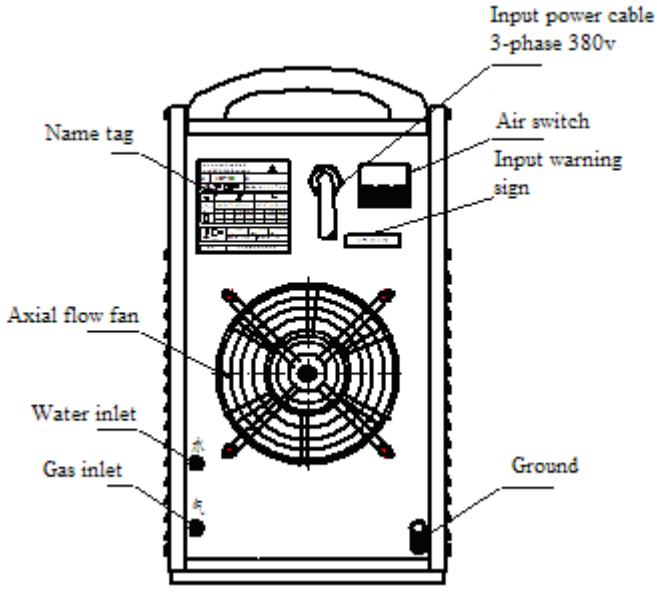


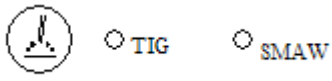
Fig.5: Rear panel

1.3 Control panel

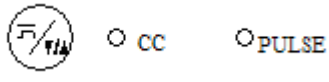
The machine's control panel drawing for mode selection and parameters preset shows as figure (6). Control panel includes LED alphanumeric display, tuning knob, diode indicator lamps.

Fig.6: Control panel

1.3.1 Mode selection and parameters preset



"TIG /MMA" shift



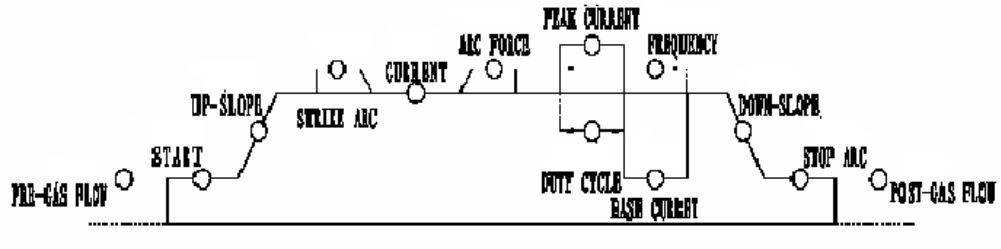
On "TIG": Switch between "Constant" DC TIG and "Pulse" DC TIG

On "MMA": Switch between "Amp" Display and "Volt" display

Switch between “2- Step” (Non-Autolock) and “4-Step” (Autolock) on TIG

“2-step” refers to start welding while push torch trigger, stop welding while releasing it.

“4-step” refers to starting-arc current while firstly pushing torch trigger, then current slopes up to where can welding normally while releasing it. When welding finished, current slopes down to where stops arc and stands while pushing it again, then stops output current while releasing it.



Glossary:

1 Pre-gas flow: time of gas flow before welding

2 Arc-starting: current of start arc

3 Up-slope: time of welding current slopes up

4 Arc-striking: current of start arc on MMA

5 Constant current: welding current in constant output state

6 Arc-force: current of arc- force on MMA

7 Peak value: Peak current of pulse output

8 Pulse ratio: time ratio between length of peak value current and length of whole single pulse, can be used for controlling penetration in all-position or thin sheet welding.

9 Pulse frequency: frequency of pulse output.

10 Base current: current of arc-stand in pulse output.

11 Down –slope: time of welding current slopes down

12 Crater filling: current of crater filling

13 Post-gas flow: time of gas flow after ending welding

Parameters selection knob: used to select parameters illustrated previously. Select consequently from left to right by tuning clockwise, select reversely by tuning counter-clockwise.

Parameter regulation knob: Used to adjust value of the selected parameters. Increase by tuning clockwise, reduce by tuning counter-clockwise. Press the knob and tune clockwise or counter-clockwise for quick preset.

“Water cooled/Air cooled” shift: Default set-up is “Water–cooled”. If “Air-cooled” is selected, then press on “Parameter Selection” and “Parameter regulation” knobs simultaneously for two seconds to eliminate “Water insufficient” protection in order to normal welding. Redo the same procedure to come back to the previous mode.

Welder can automatically save settled parameters for next time using while turning off the machine.

1.3.2 “Protection” indicator lamp: lights on yellow and stops welding automatically while in overheat or water insufficient, but will not light on while in normal welding.

1.3.3 Protection code:

□Display 804: overheat protection

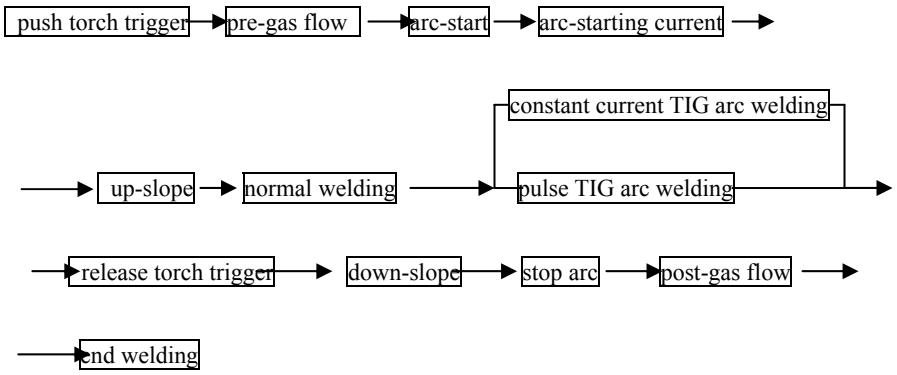
□Display 805: On TIG welding, push welding torch trigger for too long time in open load or trigger damaged.

□Display 806: water insufficient protection

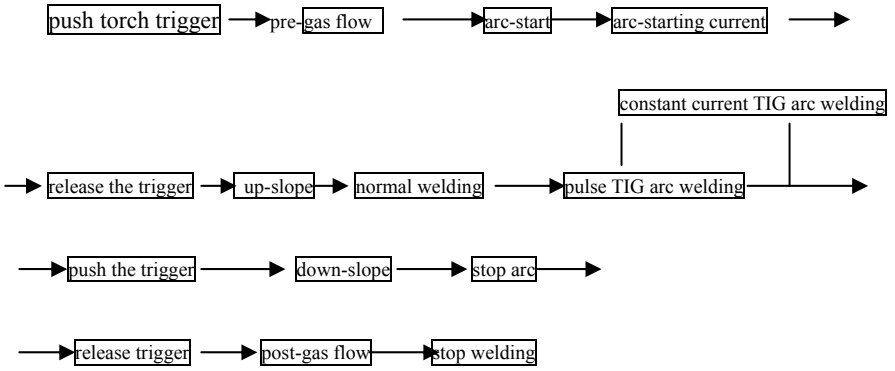
1.3.4 Power on/off lamp: display red when power on

2. Procedures of TIG welding

2.1”2-step”



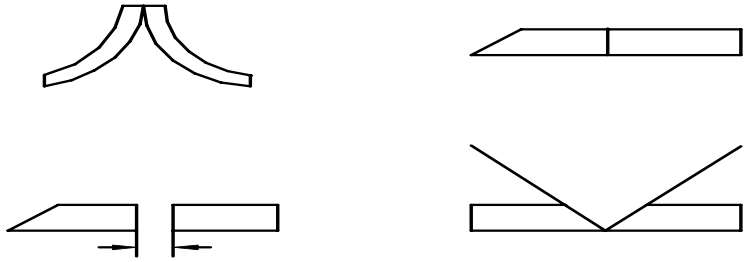
2.2”4-step”



3. Welding parameters

3.1 TIG welding parameters

Sheet thickness mm	Tungsten electrode diameter mm	wire diameter mm	Welding current A	Gas flow rate L/min	Clearance mm
0.4	1.0-1.6	0-1.0	5-30	4-5	1
1.0	1.0-1.6	0-1.6	10-30	5-7	1
1.5	1.0-1.6	0-1.6	50-70	6-9	1
2.5	1.6-2.4	1.6-2.4	70-90	6-9	1
3.0	1.6-2.4	1.6-2.4	90-120	7-10	1-2
4.0	2.4	1.6-2.4	120-150	10-15	2-3
5.0	2.4-3.2	2.4-3.2	120-180	10-15	2-3
6.0	2.4-3.2	2.4-3.2	150-200	10-15	3-4
8.0	3.2-4.0	3.2-4.0	160-220	12-18	4-5
12.0	3.2-4.0	3.2-4.0	180-300	12-18	6-8



3.2 MMA welding parameters

Work piece thickness mm	≤1	1 2	2 3	4 5	6 12	≥13
Welding electrode diameter mm	1.5	2	3.2	3.2 4	4 5	5 6
Welding current A	20 40	40 50	90 120	90 130	160 250	250 400

Warning: Should not open up case freely, the max volt inside machine will be 600V. Must take safe precautions to prevent from being electric shocked while in maintenance.

1. Apparently misunderstand failures

Normal phenomenon occurs in welding

(1) Welder doesn't work while in pretty low input volt.

(2) When welder has worked for a long time in high temperature or in high welding current context , the thermal-sensitive circuit breaker will tripped to stop welder working, protection lamp will light on and LED will show "804" protection code. Welder will automatically reinstate after merely running up for several minutes in open load (not necessarily shut down welder).

(3) When welder has worked for a long time in high temperature or in high welding current context, the circuit breaker on the rear panel will tripped to power off. When this situation occurs, please switch off the disconnected switchboard. Then halt the welder lasting at least five minutes to restart. When restarting the welder, please reset the circuit breaker firstly, then turn on the disconnect switchboard or switch box to power on welder, finally use for welding after running up for several minutes in open load.

2 Attention

1. The input volt range must be between 340-420V, and no phase missing.
2. Check if the ground leads are connected correctly and firmly.
3. Must wires welding cable to terminal plug socket firmly, otherwise will burn out the terminal which lead to welding process instability.
4. Power off as soon as finished welding
5. When use in outdoor, make sure welder be shielded from rains or snows, but don't block air circulation.

3. Troubleshooting

3.1 Routine checking procedure prior to maintenance

1. Check if the input volt has the phase to be lost, and range are between 340-420V.
2. Check if the power input cables are correctly and firmly.
3. Check if the ground leads are connected correctly and firmly.
4. Check if the cables are connected correctly and firmly

3.2 Regular troubleshooting & countermeasure .Refer to appendix A.

4. Periodical check and maintenance

1. Must removes dust from power resource with pressure air by authorized maintainer each year while checking if the jointers are loose. Must check frequently if quick plug or terminal sockets are loosely connected, knobs are loose, at least per month.
2. Must check if knobs are loose connection in time.

Technical Data

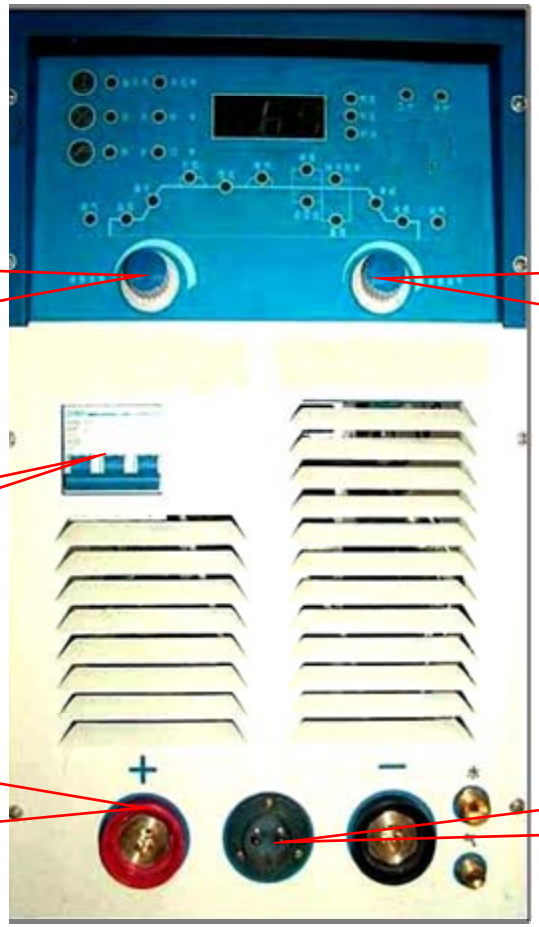
1. Main technical parameters

Item	IN TIG-315 P	IN TIG-400 P
Rated output volt	3 phase 350 ~ 465 V/50Hz	
Rated input volt	13.8KVA	18.4KVA
Rated input current	21A	28A
Duty cycle	35%	60
Pre-flow gas	0.1-15s	
Striking arc current	10 160A	
Slope up time	0.1-10s	
Arc-starting current	20-160A	
Constant current	5-315A	5-400A
Arc Force current	10-100A	10-200A
Peak current	5-315A	5-400A
Pulse percentage	1%-100%	
Pulse frequency	0.2-50Hz	
Base current	5-315A	5-400A
Slope down time	0.1-15s	
Stop-arc current	5-315A	5-400A
Post flow time	0.1-15s	
Efficiency	89	
Power factor	0.95	
Weight	30kg	35kg
Main transformer insulation grade	H	
Output reactor insulation grade	B	

Appendix A: Ordinary failures, probable cause & countermeasures

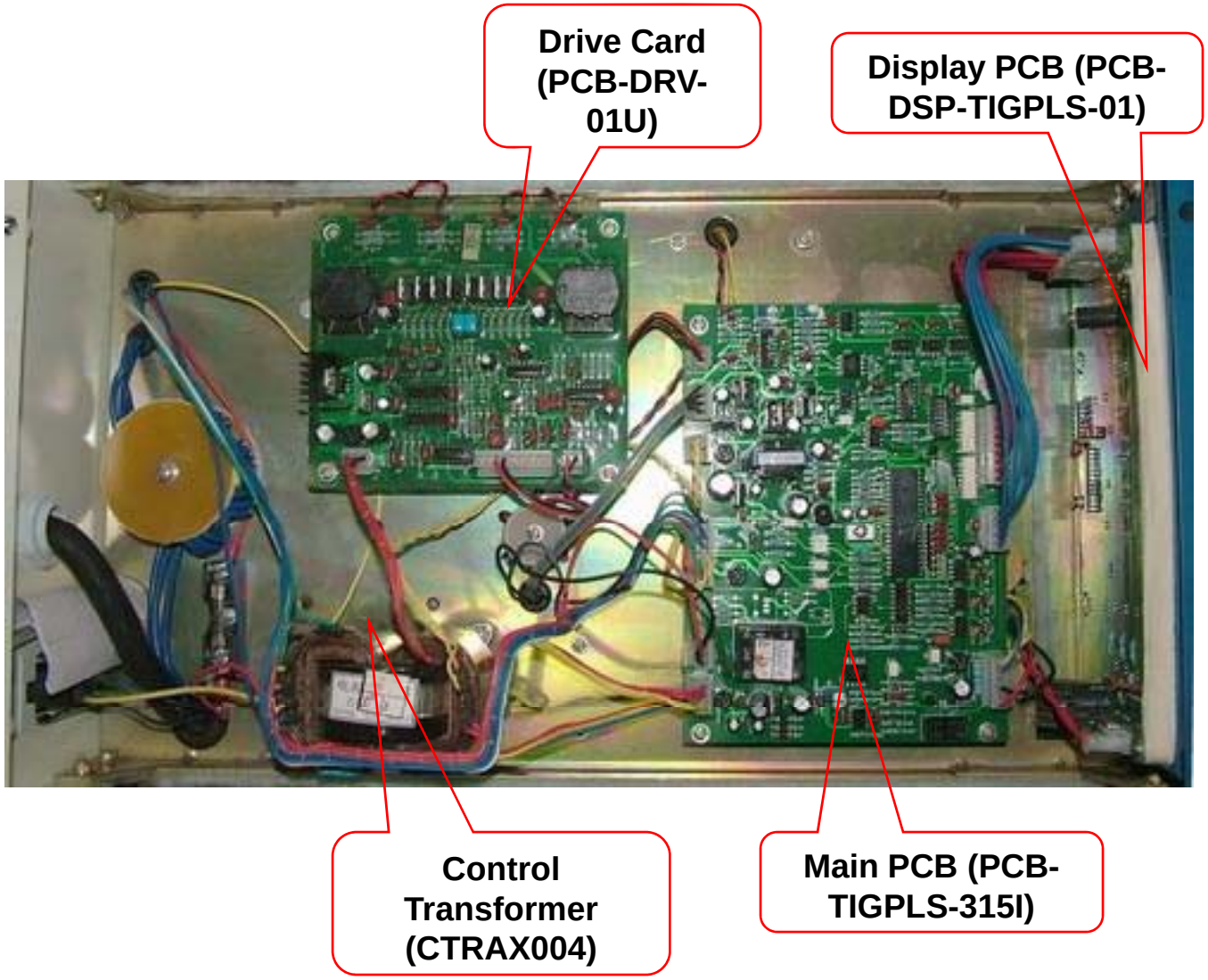
№	Trouble	Probable cause	Remedies
1	Indicator lamp does not light on and doesn't work when machine switches on.	Phase missing Fuse size 2A breaks Input cable break down	inspect power source Inspect fan, power source transformer and control board are in good condition or not Inspect cable
2	Air switch trips automatically while welder working on without big welding current for long time	The following components may probably damaged IGBT module, 3 phase rectified module, output diode module, other components Short circuited	Inspection and replacement
3	Welding current is not stable.	Phase missing Main control board is damaged.	Inspect power source Inspection and replacement
4	Welding current is not adjustable.	Conductive wires broken. Main control board is damaged. Coder damaged	Inspection and replacement
5	Protection code displays 804	Welding current is too big Context temperature is too high. Thermal relay is damaged	Needs zero load cooling Replace temperature relay
6	displays 805 protection code	torch is damaged torch trigger has been pushed for a long time in open load	□Inspect the torch and replace it □release the trigger

Front Panel

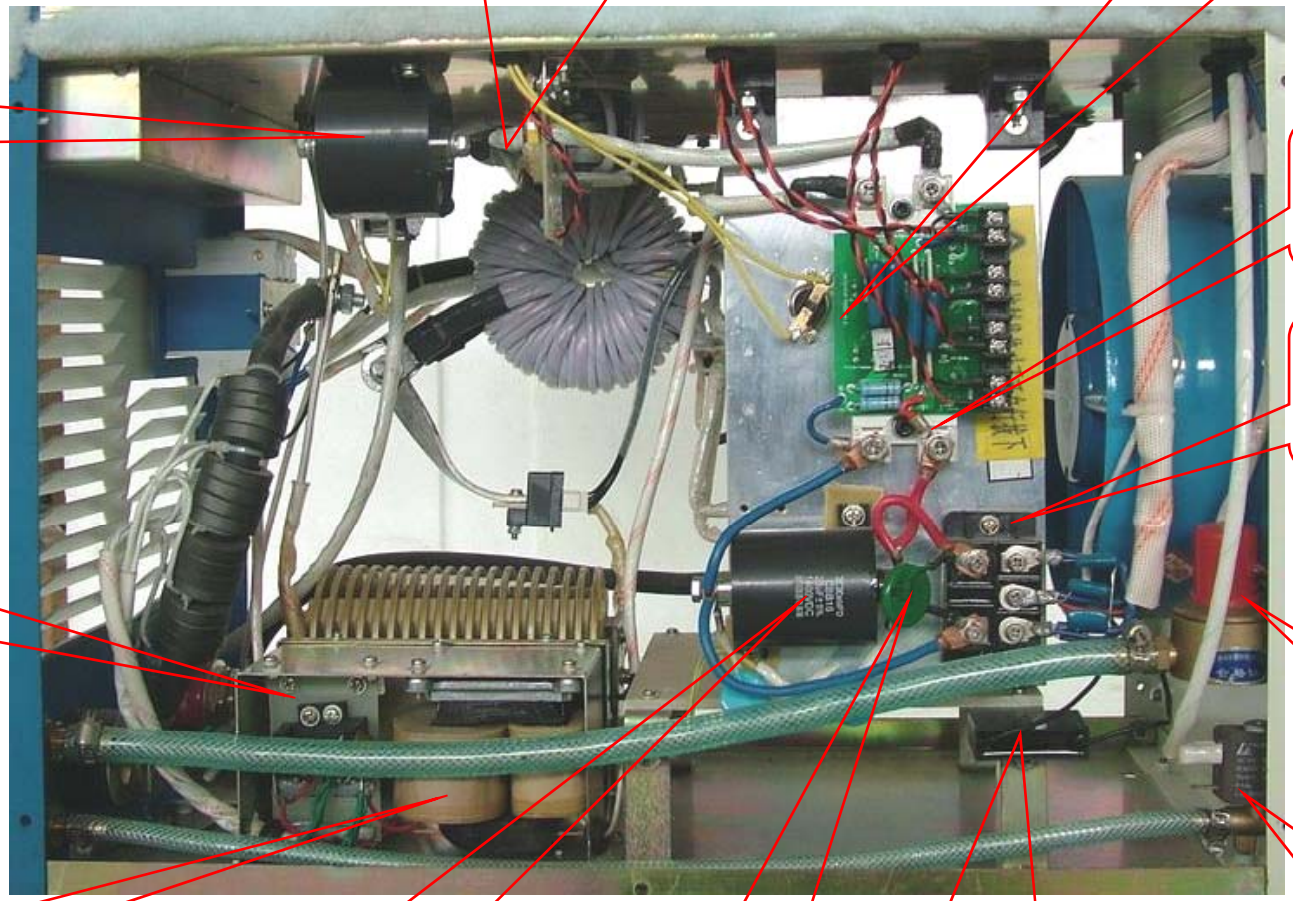

Encoder for Parameter Selection (ENC01)
Encoder for Parameter Setting (ENC01)
MCB (MCB001)
Output Connector EURO Type (OCN-EURO-S)
2 Pin Connector Male (CON2PNM)
+
−

Rear Panel

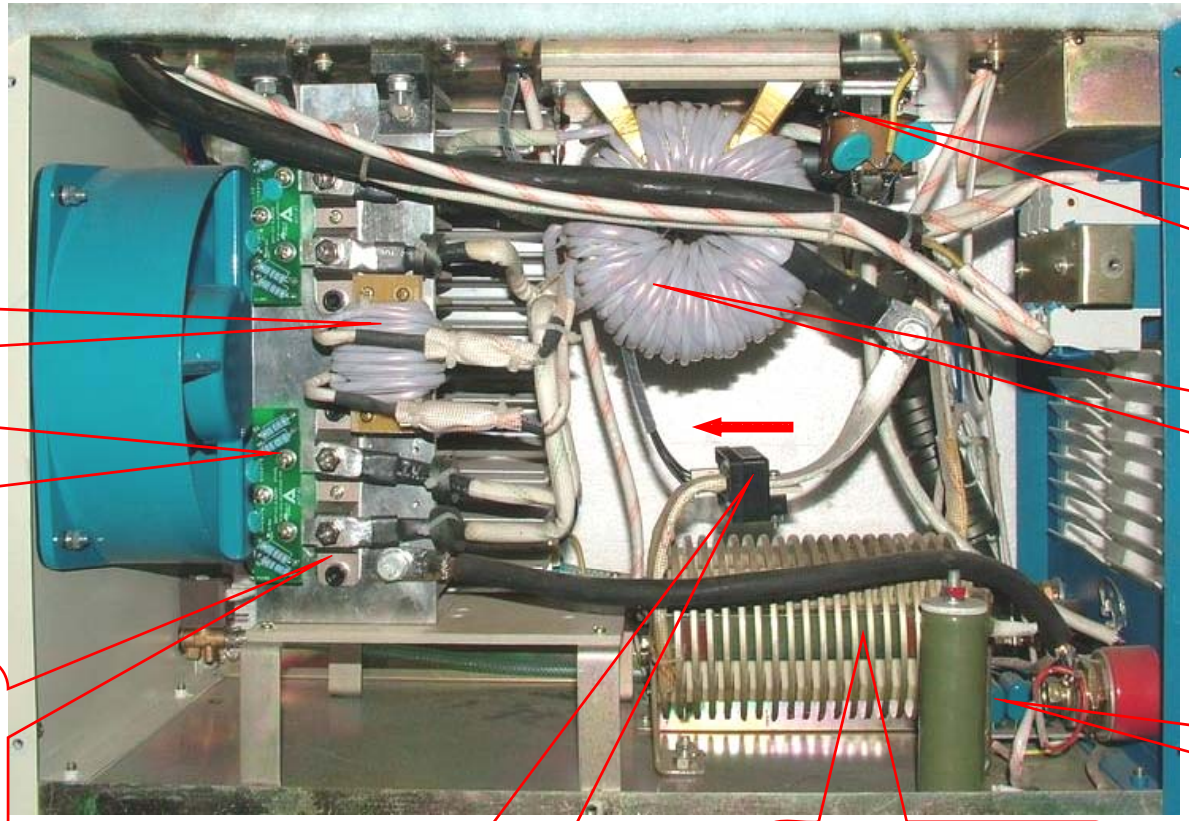
Top View


Drive Card (PCB-DRV-01U)
Display PCB (PCB-DSP-TIGPLS-01)
Control Transformer (CTRAX004)
Main PCB (PCB-TIGPLS-315I)

Right View


Over Current Protection PCB (PCB33)
SNUBBER CARD (PCB-SNB-04)
AC Capacitor (CAP002)
IGBT (IGBT50R12)
Input Bridge Module (IBDG003)
HF PCB (PCB-HF-01)
Water Flow Switch (WFS-50W)
HF Transformer (CTRA007)
DC Capacitor (CAP001)
MOV (MOV001)
Fan Capacitor (CAP005)
Solonaid Valve (SV001)

Left View


Secondary Thrust Coil (S-THCL)
Snubber PCB for Output FRM (PCB-SNB-OUT-01)
Output Rectifier Module (FRM001)
Insulation Transformer (INSTRX001)
Main Transformer (MTRAX006-P)
Isolation PCB (PCB-ISO-02)
Current Sensor (CS001)
Output Choke (CHK001)

List for the spares of INTIG-PULSE Series Machines				
DESCRIPTION	**INTIG-315 PULSE**		**INTIG-400 PULSE**	
	Part/Code	**SPEC.**	**Part/Code**	**SPEC.**
MAIN PCB	PCB-TIGPLS-315I		PCB-TIGPLS-400I	
DRIVE CARD	PCB-DRV-01U		PCB-DRV-01U	
DISPLAY PCB	PCB-DSP-TIGPLS-01		PCB-DSP-TIGPLS-01	
IGBT	IGBT50R12	NA	IGBT50R12	NA
SNUBBER CARD	PCB-SNB-04		PCB-SNB-04	
IGBT WITH SNUBBER CARD	IGBT50R12SNB	50R12SNB (50 Amps 1200V)	IGBT50R12SNB	50R12SNB (50 Amps 1200V)
INPUT BRIDGE MODULE	IBDG003	100 Amps 1200V	IBDG003	100 Amps 1200V
OUTPUT RECTIFIER MODULE	FRM001	200 Amps 400V	FRM001	200 Amps 400V
FAN	FAN002		FAN002	
DC CAPACITOR	CAP001	20UF 1400V	CAP001	20UF 1400V
AC CAPACITOR	CAP002	4 UF 500 V	CAP003	5UF 500V
MCB	MCB001	40 Amps	MCB002	40 Amps
INPUT SURGE SUPPRESSOR	ISS001		ISS001	
SNUBBER CAPACITOR	SCAP001	0.47UF 1200V	SCAP001	0.47UF 1200V
CONTROL TRANSFORMER	CTRAX004		CTRAX004	
OUTPUT CHOKE	CHK001		CHK001	
HF PCB	PCB-HF-01		PCB-HF-01	
HF PCB CAPACITOR	PCB22.01		PCB22.01	
SOLONAID VALVE	SV001		SV001	
INSULATION TRANSFORMER	INSTRX001		INSTRX001	
MOV	MOV001		MOV001	
ISOLATION PCB	PCB-ISO-02		PCB-ISO-02	
SNUBBER PCB FOR OUTPUT FRM	PCB-SNB-OUT-01		PCB-SNB-OUT-01	
ENCODER FOR PARAMETER SELECTION AND SETTING	ENC01		ENC01	
KNOB FOR THE POT (ENC)	KNOB001		KNOB001	
OVERCURRENT PROTECTION PCB	PCB33		PCB16	
MAIN TRANSFORMER	MTRX006-P		MTRX002	
FAN CAPACITOR	CAP05		CAP05	
OUT PUT CONNECTOR MACHINE SIDE	FST-PLG-F-01		FST-PLG-F-01	
OUT PUT CONNECTOR CABLE SIDE	FST-PLG-M-01		FST-PLG-M-01	
2 PIN CONNECTOR MALE	CON2PNM		CON2PNM	
2 PIN CONNECTOR FEMALE CABLE SIDE	CON-2-CM-F-01		CON-2-CM-F-01	
OUTPUT CONNECTOR EURO TYPE WITH STRIP	OCN-EURO-S		OCN-EURO-S	
CURRENT SENSOR	CS001		CS001	
SECONDARY THRUST COIL	S-THCL-315		S-THCL-400	
LED RED	LEDR01		LEDR01	
WATER FLOW SWITCH	WFS-50W		WFS-50W	
LED YELLOW	LEDR01		LEDY01	