



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

Operating manual

WARPP ENGINEERS PVT. LTD.

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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 volt:

- (1) Input volt must be standard sine wave, effective value 380V±10% ,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	18.2KVA	25.5KVA
Input volt protection	Fuse	40A	40A
	Circuit breaker	63A	63A
Cable size (cross-section)	Input volt	4mm ²	4mm ²
	Output volt	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 380v/50Hz. 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 breaker 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

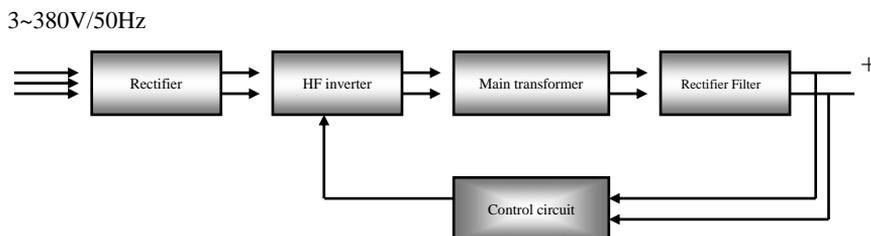


Fig 2 Block diagram of principle

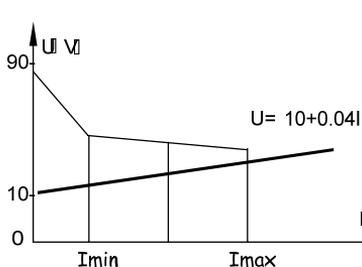


Fig 3a TIG Output Characteristic

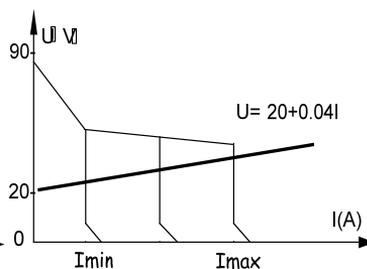


Fig 3b SMAW output characteristic

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

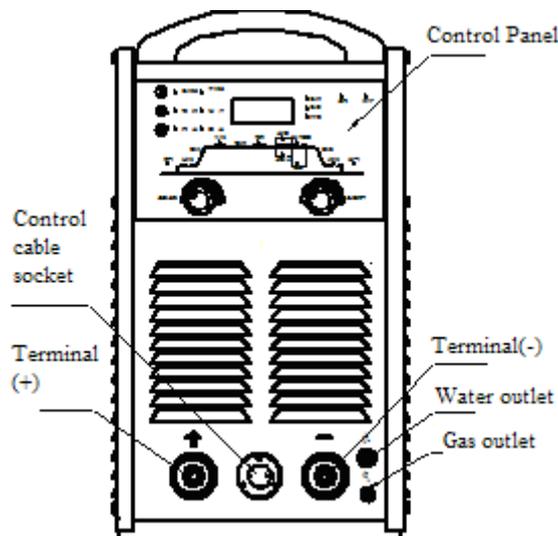


Fig.4: Front panel

1.2 Rear panel illustration and parts number reference

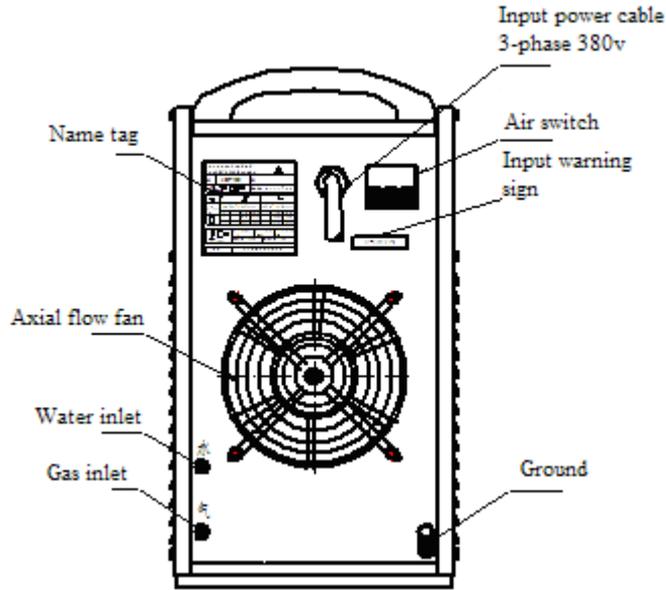


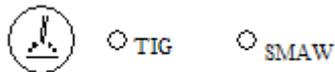
Fig.5: Rear panel

1.3 Control panel

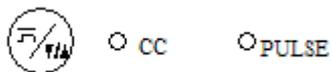
The machine's control panel drawing for mode selection and parameters preset shows as figure (6). Control panel includes LED alphanumeric display, tuning knob, diode indicator lamps.

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

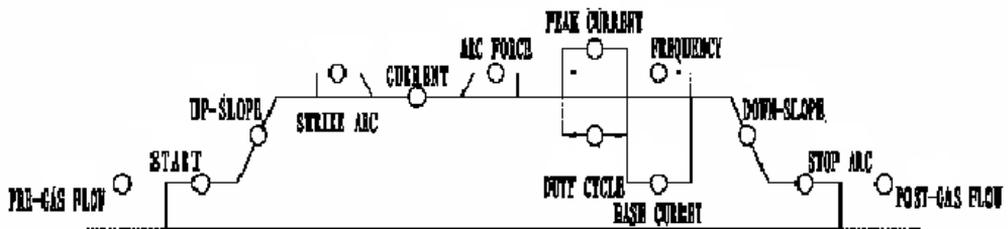


○ 2-STEP ○ 4-STEP

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

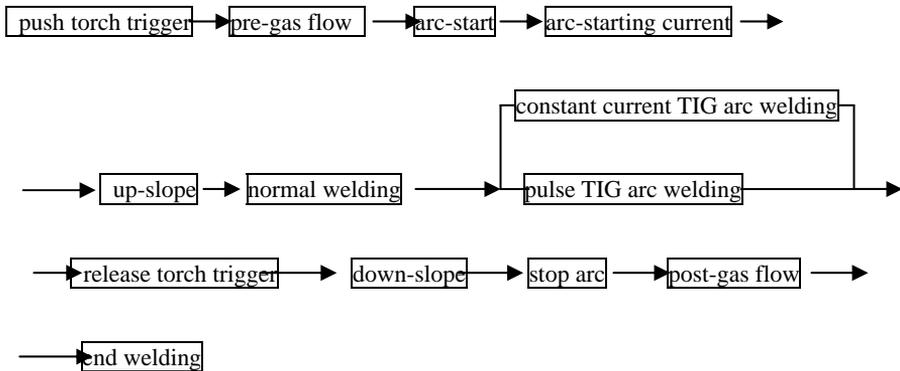
Display 805: On TIG welding, push welding torch trigger for too long time in open load or trigger damaged.

Display 806: water insufficient protection

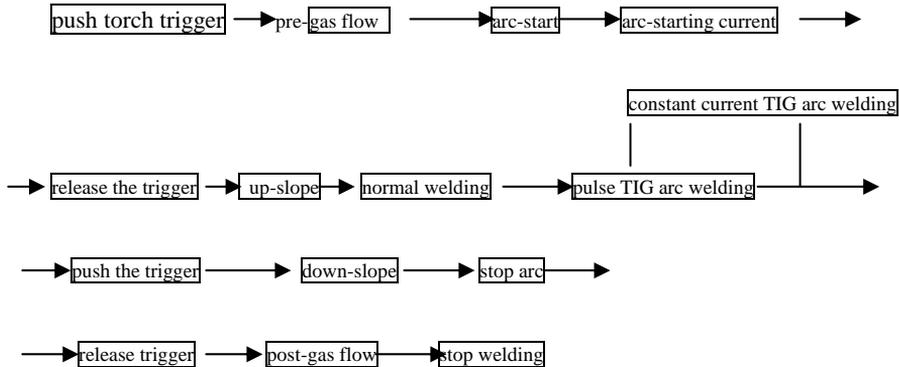
1.3.4 Power on/off lamp: display red when power on

2. Procedures of TIG welding

2.1 "2-step"



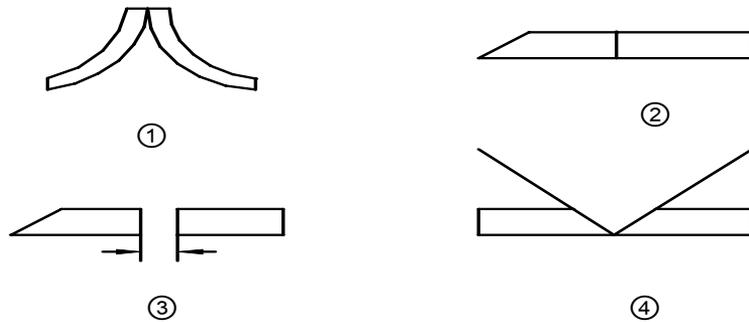
2.2 "4-step"



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

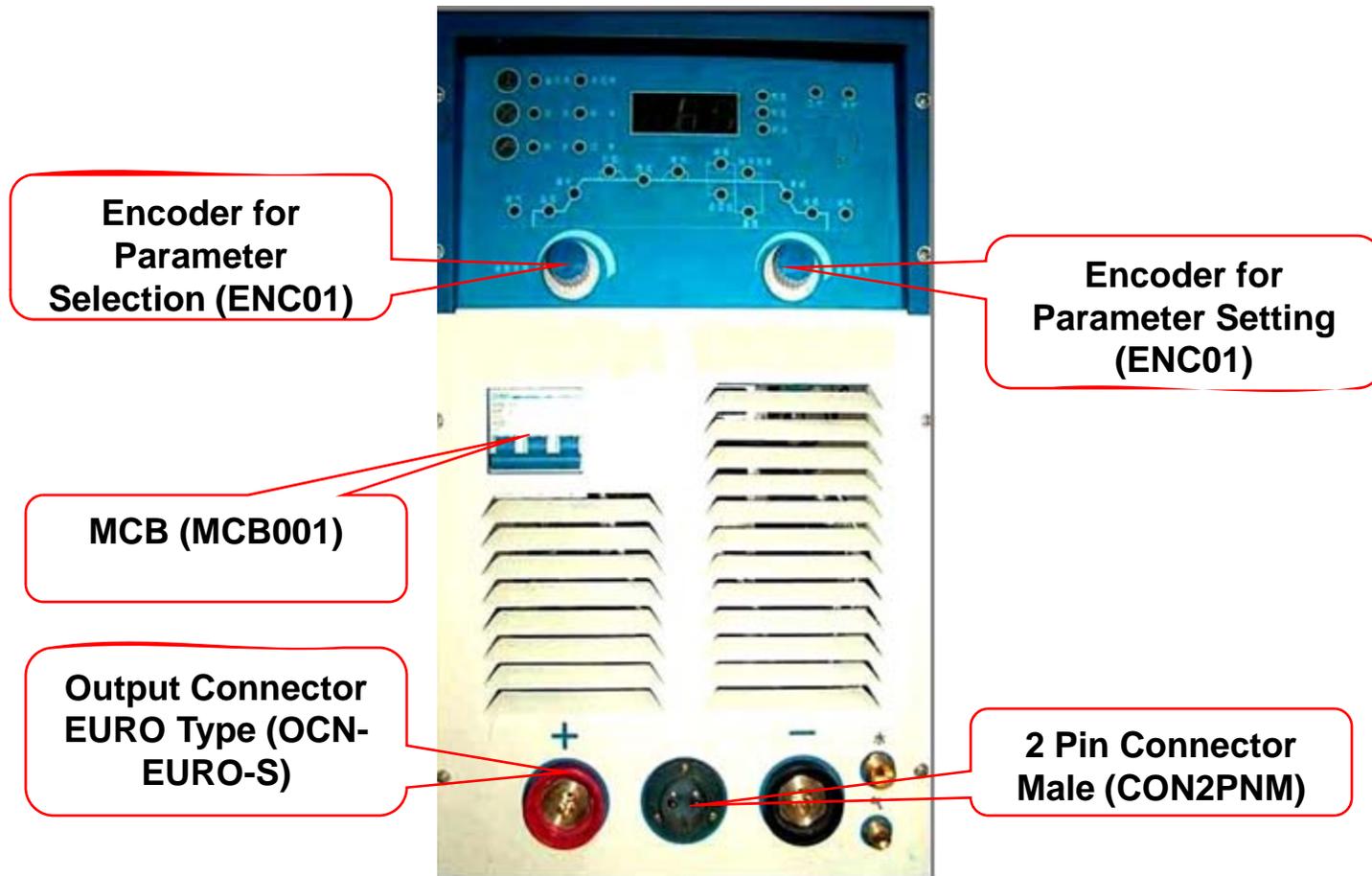
1. Main technical parameters

Item	IN TIG-315 P	IN TIG-400 P
Rated output volt	3 phase 380V±10%/50Hz	
Rated input volt	12.1KVA	17KVA
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.	<ul style="list-style-type: none"> ① Phase missing ② Fuse size (2A) breaks ③ Input cable break down 	<ul style="list-style-type: none"> ① inspect power source ② Inspect fan, power source transformer and control board are in good condition or not ③ Inspect cable
2	Air switch trips automatically while welder working on without big welding current for long time	<ul style="list-style-type: none"> ① The following components may probably damaged : IGBT module, 3 phase rectified module, output diode module, other components ② Short circuited 	Inspection and replacement
3	Welding current is not stable.	<ul style="list-style-type: none"> ① Phase missing ② Main control board is damaged. 	<ul style="list-style-type: none"> ① Inspect power source ② Inspection and replacement
4	Welding current is not adjustable.	<ul style="list-style-type: none"> ① Conductive wires broken. ② Main control board is damaged. ③ Coder damaged 	Inspection and replacement
5	Protection code displays 804	<ul style="list-style-type: none"> ① Welding current is too big ② Context temperature is too high. ③ Thermal relay is damaged 	<ul style="list-style-type: none"> ① Needs zero load cooling ② Replace temperature relay
6	displays 805 protection code	<ul style="list-style-type: none"> ① torch is damaged ② torch trigger has been pushed for a long time in open load 	Inspect the torch and replace it release the trigger

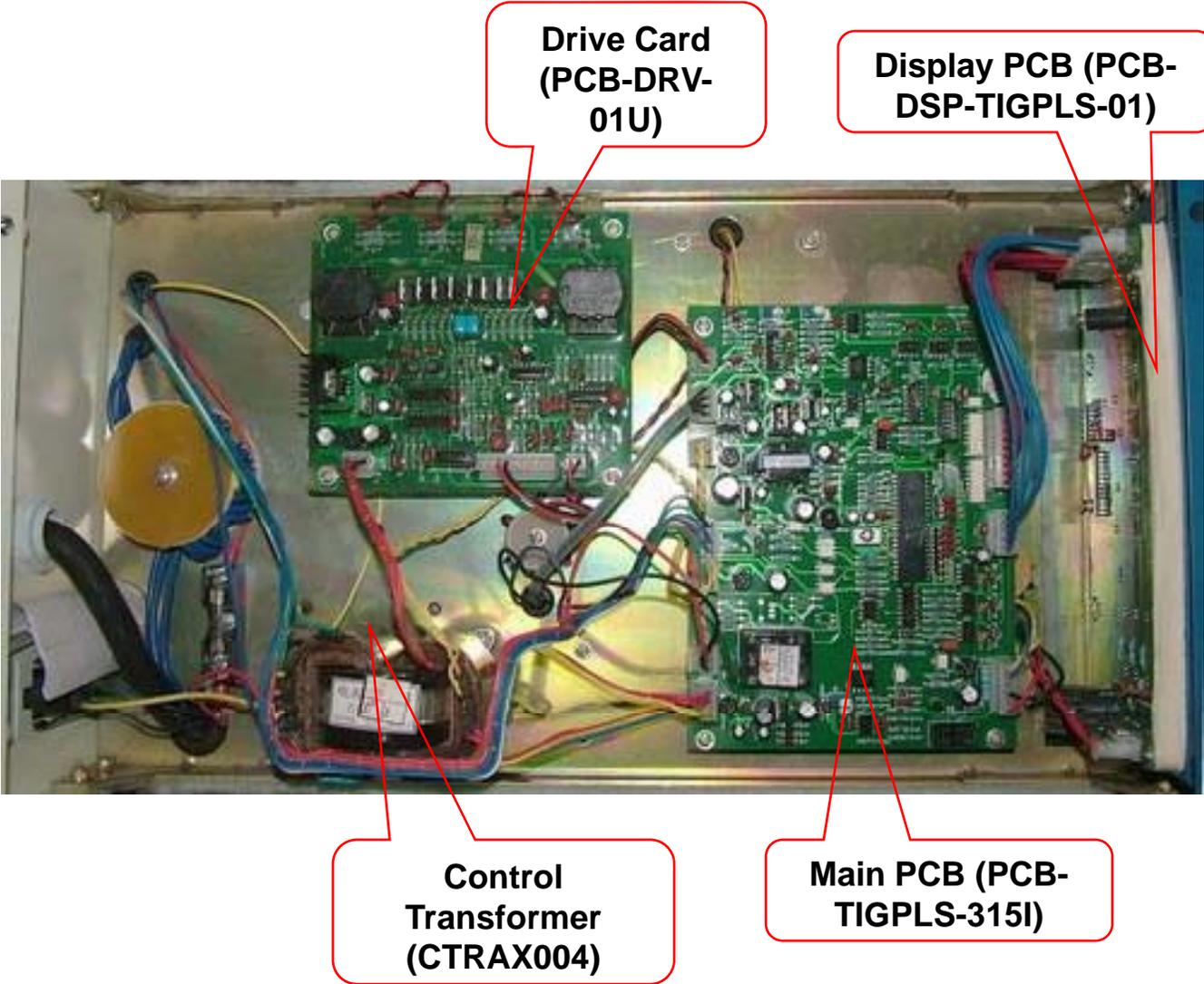
Front Panel



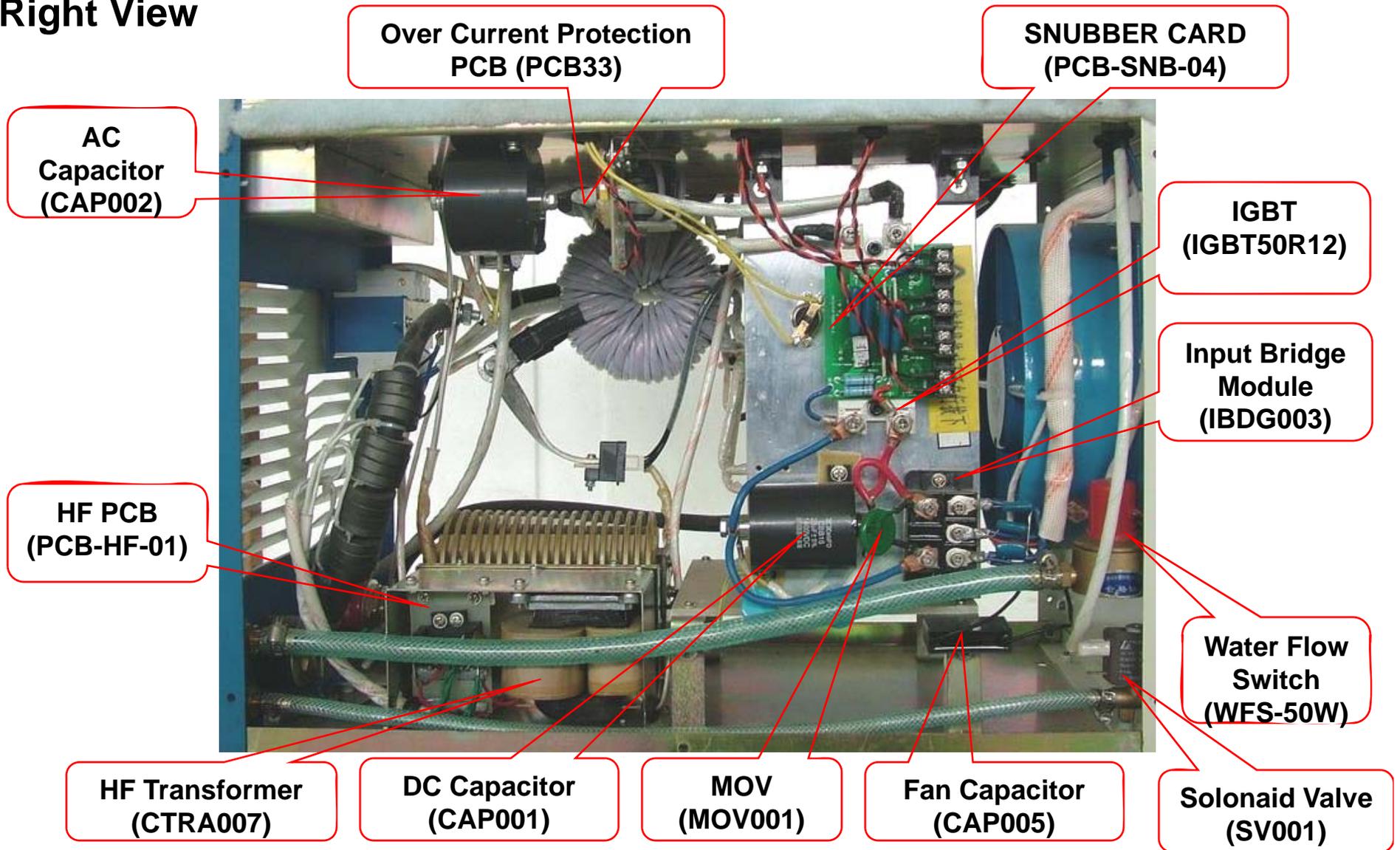
Rear Panel



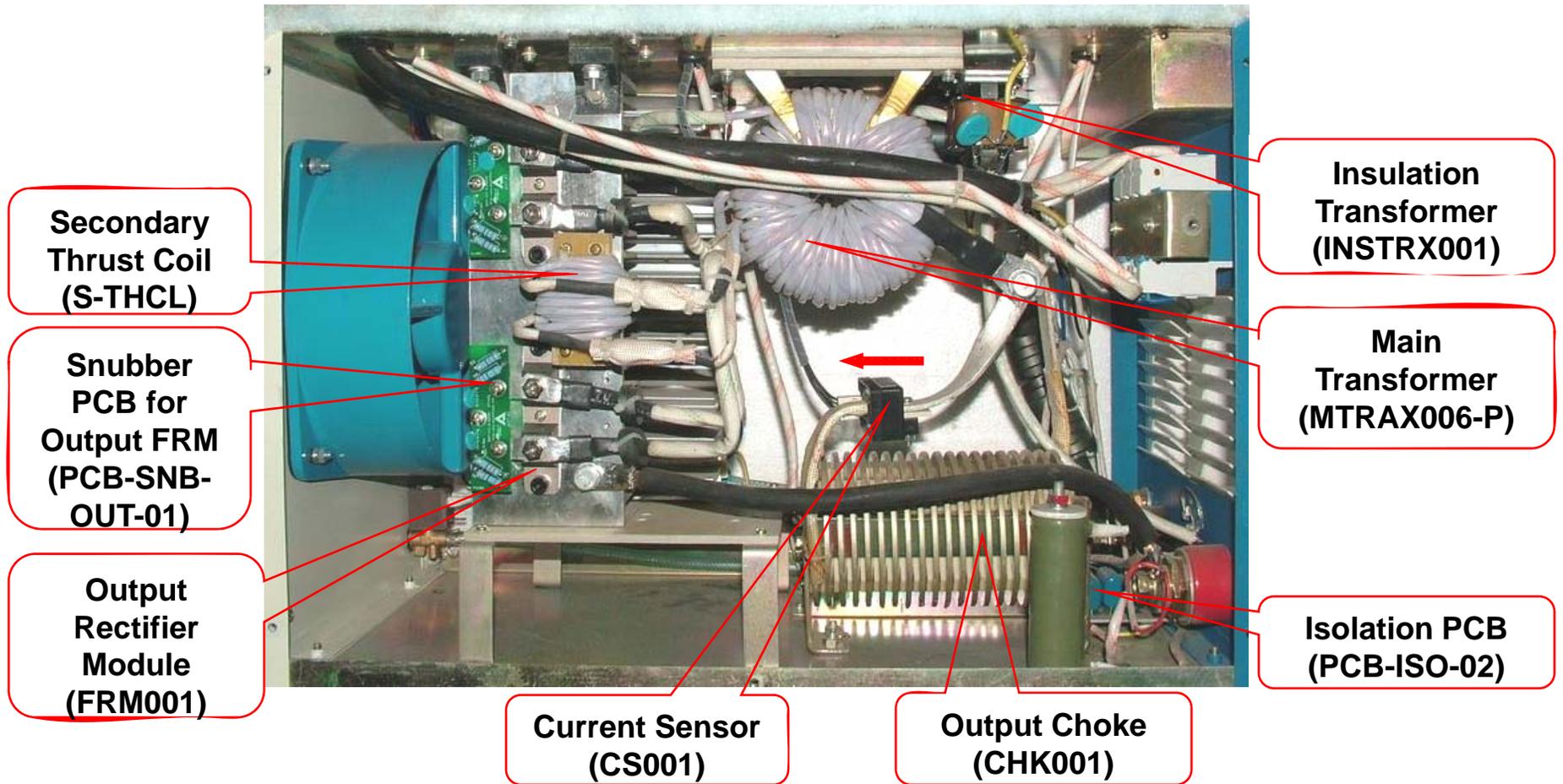
Top View



Right View



Left View



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2

3

4

A

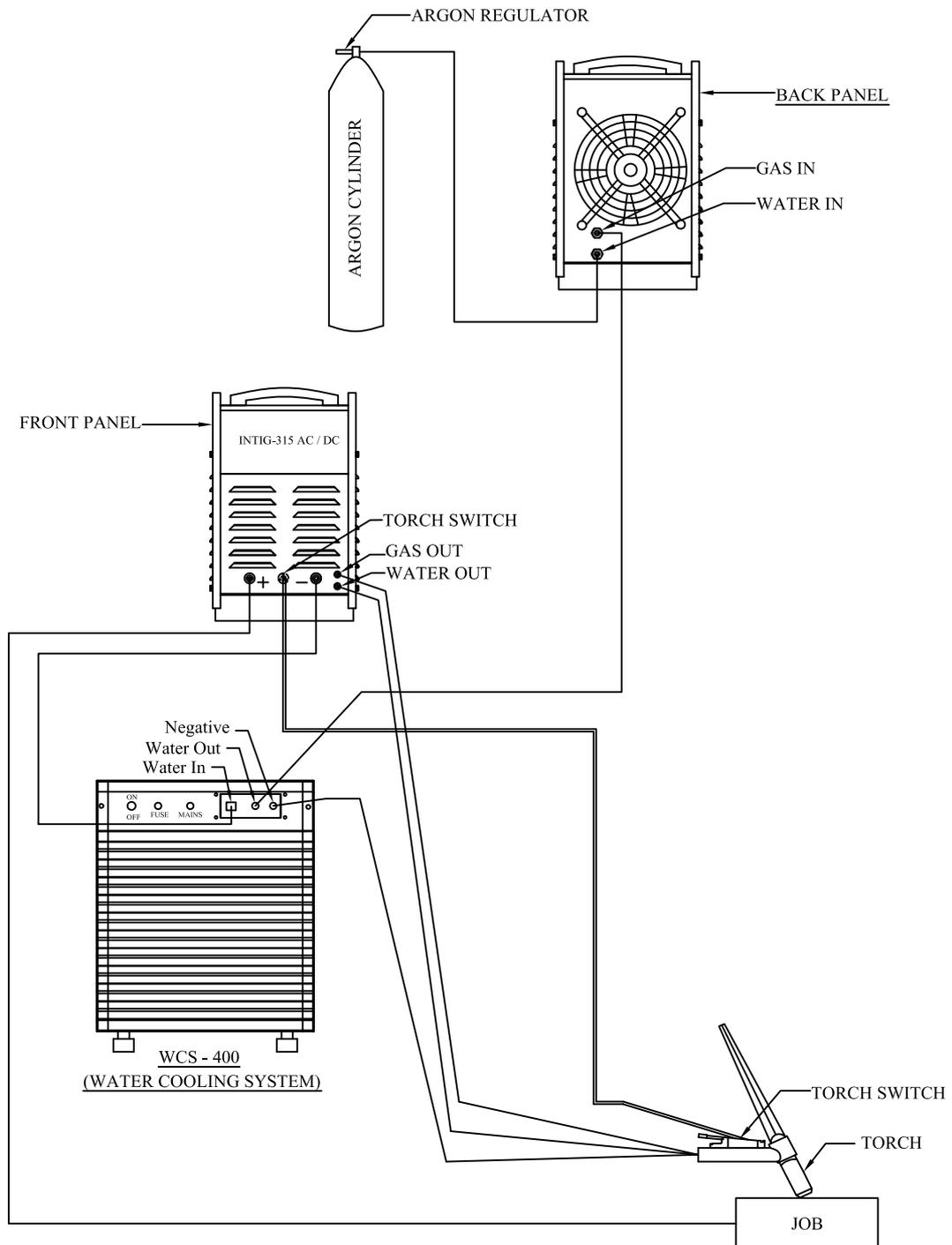
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REMOVE ALL SHARP EDGES BY 1.0x45°; UNLESS OTHERWISE SPECIFIED

ANGULAR DIMN.		SURFACE FINISH		WARPP ENGINEERS PVT.LTD.																					
		SYMBOL	MICRON	ISO 9001:2008 CERTIFIED COMPANY BORIVALI (E),MUMBAI-4000 66,(INDIA).PHONE:-022-2854 22 72/73/74.FAX:-022-2854 22 75. E-mail:-automation@warpp.co.in / Website:- www.warpp.co.in																					
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CHECKED & APPROVED	P.GOLLA	03-03-2014		PROJECTION: 	B17																				
30	120	± 20'	DIM.IN mm																						
120	400	± 10'																							
LINEAR DIMNS.																									
OVER	—	6	30	120	315																				
UPTO	6	30	120	315	1000																				
TOL.	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8																				

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3

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A

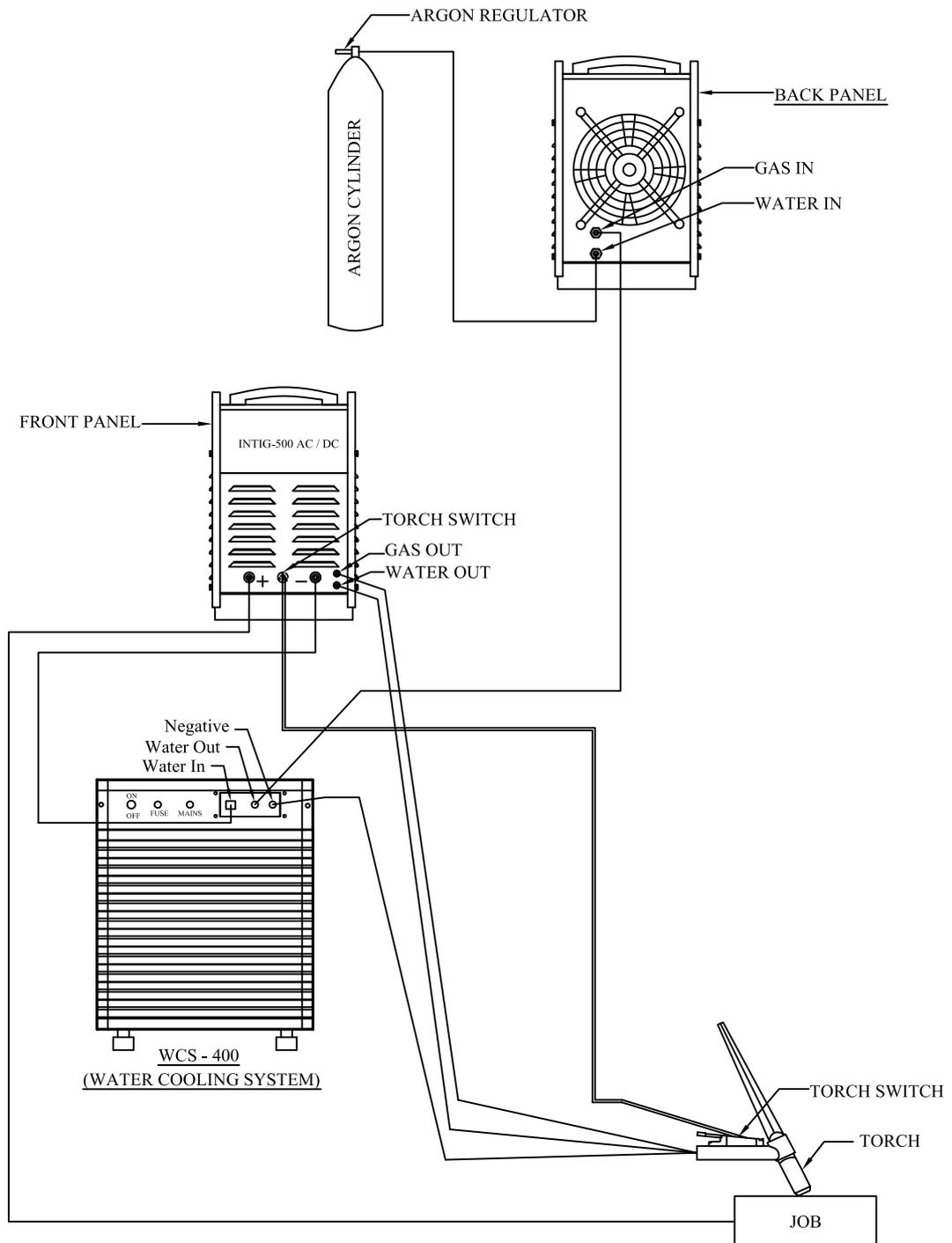
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		∇	8 - 25				
L		∇/∇	1.6 - 8	TITLE:- INTIG-400 PULSE WITH WCS-400			
		$\nabla/\nabla/\nabla$	0.025-1.6				
OVER	UPTO	TOL.	$\nabla/\nabla/\nabla/\nabla$	SUB TITLE:- INSTALLATION DIAGRAM			
1	6	$\pm 1^\circ$	MACHINING TOL.				
6	30	$\pm 30'$	OPEN DIMNS. AS	DRAWN S.GHOGALE DATE 27-02-2014 SIGN SCALE N.T.S SHEET 01 OF 001			
30	120	$\pm 20'$	DIM.IN mm				
120	400	$\pm 10'$		CHECKED & APPROVED P.GOLLA DATE 03-03-2014 SIGN PROJECTION: DRG. NO. B18			
LINEAR DIMNS.							
OVER	—	6	30	120	315		
UPTO	6	30	120	315	1000		
TOL.	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8		

List for the spares of INTIG-PULSE Series Machines		
DESCRIPTION	INTIG-315 PULSE	INTIG-400 PULSE
	Part/Code	Part/Code
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	IGBT50R12
SNUBBER CARD	PCB-SNB-04	PCB-SNB-04
IGBT WITH SNUBBER CARD	IGBT50R12SNB	IGBT50R12SNB
INPUT BRIDGE MODULE	IBDG003	IBDG003
OUTPUT RECTIFIER MODULE	FRM001	FRM001
FAN	FAN002	FAN002
DC CAPACITOR	CAP001	CAP001
AC CAPACITOR	CAP002	CAP003
MCB	MCB001	MCB002
INPUT SURGE SUPPRESSOR	ISS001	ISS001
SNUBBER CAPACITOR	SCAP001	SCAP001
CONTROL TRANSFORMER	CTRAX004	CTRAX004
OUTPUT CHOKE	CHK001	CHK001
HF PCB	PCB-HF-01	PCB-HF-01
HF PCB CAPACITOR	PCB22.01	PCB22.01
SOLENOID 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