



# **IN MIG I Series Inverter CO2 MAG Welding Machines**

## **Operating Manual**

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Thank you for selecting WARPP brand inverter welding machine. In order to keep you 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 MIG I series inverter CO<sub>2</sub>/MAG welders are high-quality performers that can be used for all-purpose, semi-automatic CO<sub>2</sub> gas shield welding with solid or flux-cored wire( $\Phi$  1.2- $\Phi$  2.0mm)for welding mild steel and low alloy steel work pieces. This series welder enjoys reasonable static characteristic and sound dynamic characteristic.

- 👉 Inverter technology can ensure fairly good stability of output volt when fluctuation occurs in input primary volt or arc length changes, as well as startling arc self-adjustability and stable welding process.
- 👉 Less spatter, high deposit efficiency.
- 👉 Less weld distortion, good weld formation.
- 👉 High success rate of arc-starting due to stronger pulse strike
- 👉 Reducing molten ball while stopping arc
- 👉 Reducing labor intensity while welding long weld by using auto-lock function
- 👉 Stable wire feeding due to consistent output of power circuit
- 👉 Small, light and portable
- 👉 Energy-saving, low expense and flexible to various input primary quality.

## Safety Precautions



### **General safety precaution:**

- Please strictly comply with rules defined in this manual to avoid unexpected accidents
- How to connect power supply ,select working area and use pressure gas, please comply with proper rules
- Not allow non-operator to enter working area

- Welder installation, inspection, maintenance, and manipulation must be completed by authorized person.
- Don't use welding machine for unrelated purpose (Such as recharging, heating or pipeline thaw, etc.)
- Must take safe precaution in case welder falling when it is put on the uneven ground



#### **Avoid being electric shocked or burnt**

- Never touch on hot electrical units.
- Please instruct the authorized electrician to ground the welder frame 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 in the high-rising location, must ensure safety by using safe net.
- Please power off the machine while no longer welding.



#### **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, 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, hat, apron and boots before welding.



#### **Preventing from fire, explosion, container break accidents**

- 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 explode.
- Don't weld encapsulated container, otherwise it can break.
- Ensure a fire extinguisher at hand in case a fire breaks out.



#### **Avoid being hurt by moving parts**

- Never let the finger, hair, and cloth near the rotary cooling fan and wire feeder's 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.
- Operators should use gas regulator provided by our company, and comply with the proper instruction.



#### **Avoid being hurt by welding machine 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 welding machine.
- 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°

## **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  $-10^{\circ}\text{C} \sim +40^{\circ}\text{C}$
- (2) The gradient of ground must be no more than  $15^{\circ}$
- (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 380-440V, frequency 50Hz/60Hz
- (2) Unbalance degree of 3- phase volt must be no more than 5%

## **3 . Power supply:**

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

Product type		IN MIG-250 I	IN MIG-350 I	IN MIG-500 I	IN MIG-630 I
Power supply		3 phase AC380V			
Min. capacity	Power network	12KVA	22KVA	38KVA	54KVA
	Generator	20KVA	30KVA	50KVA	70KVA
Input volt protection	Fuse	20A	30A	50A	60A
	Circuit breaker	20A	32A	63A	100A
Cable size (cross-section)	Input volt	≥ 1.5mm <sup>2</sup>	≥ 2.5mm <sup>2</sup>	≥ 6mm <sup>2</sup>	≥ 10mm <sup>2</sup>
	Output volt	25mm <sup>2</sup>	35mm <sup>2</sup>	70mm <sup>2</sup>	95mm <sup>2</sup>
	Ground lead	≥ 1.5mm <sup>2</sup>	≥ 2.5mm <sup>2</sup>	≥ 6mm <sup>2</sup>	≥ 10mm <sup>2</sup>

#### 4. Installation:

This series welder is small, light and portable. They will be more convenient if place them on the trolleys. Ensure the location where to place the welder is even.

IN MIG-I series welders wire diagram as Fig. 1:

Preparation prior to operation procedure:

- (1) Connect the welder's terminal plug(-) to the work piece by welding cable
- (2) Connect the welder's terminal plug(+) to the wire feeder by control cable
- (3) Connect the welder's control cable socket to the wire feeder by control cable.

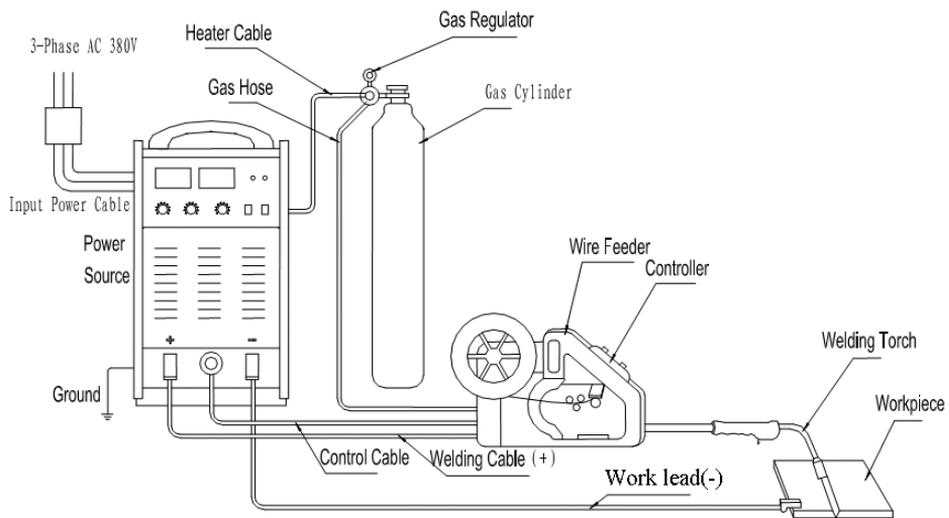


Fig.1: Wire diagram of IN MIG-I series welders

- (4) Connect feeder's gas hose to the regulator
- (5) Connect the regulator's heat-up cable to the welder's "gas heat-up power" cable socket. (on the rear panel)
- (6) Connect the welder's power cable to the disconnection switchboard, while grounds the lead safely.
- (7) Reset the circuit breaker on the welder's rear panel.

### 5. Operating procedure:

Reset the circuit breaker on the switchboard, then the welder's indicator lamp will turn on, and the cooling fan will spin. Press on the "Inch feeding" button on the feeder's controller, the feeder begin to feed wire. Preset the process parameters by regulating the controller, tuning the knob, and flipping the switch to proper location on the front panel of the welder. When the torch trigger is pulled, the feeder start to feed wire, and CO<sub>2</sub> will blow out of the nozzle, therefore it can be used for welding. Operators can select parameters from table listed below. Be sure to turn off the valve of gas bottle and unplug the power cord while stop welding.

Table 2

Welding current ( A )	Welding voltage ( V )	Suitable wire ( mm )
60~80	17~18	Φ 1.0
80~130	18~21	Φ 1.0、Φ 1.2
130~200	20~24	Φ 1.0、Φ 1.2
200~250	24~27	Φ 1.0、Φ 1.2
250~350	26~32	Φ 1.2、Φ 1.6
350~500	31~39	Φ 1.6
500~630	39~44	Φ 1.6

## Principle in Brief

### Block diagram of principle

3~380V/50Hz

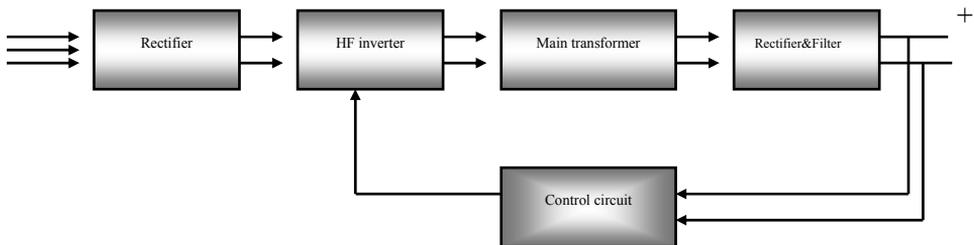


Fig. 2: Block diagram of principle

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. Power source enjoys good anti-fluctuating ability and high-quality performance

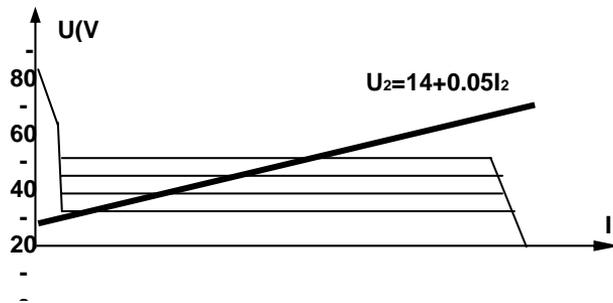


Fig 3: Output characteristic

Operating Instruction

**1. Front panel illustration and parts number reference**

Take IN MIG-500 I for example, front panel is illustrated below, other models are little different from this.

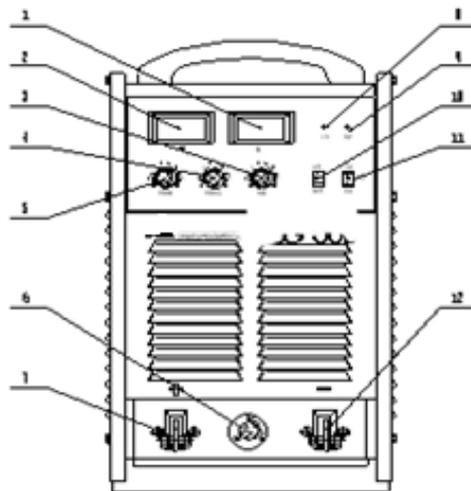


Fig.1: Figure of front panel

- (1) “Output Amp” meter  
Display relative feeding speed while in open load, and display practical value of current while in welding.
- (2) “Output volt” meter  
Display preset value of volt while in open load, and display practical value while in welding.
- (3) “Induction” regulation knob  
Altering welding stability, penetration and spatter volume.
- (4) “Crater filling Amp” regulation knob  
Adjusting current value in Auto-lock mode
- (5) “Crater filling volt” regulation knob  
Adjusting volt value in Auto-lock mode
- (6) Wire feeder’s control cable socket  
Connect to wire feeder’s control cable
- (7) Terminal lug ( + )  
Connect to wire feeder’s welding cable
- (8) “Power” indication lamp  
Lamp indicating whether power source is effectively connected to power supply.
- (9) “Protection” indicator lamp  
Welding machine will automatically stop working when it is overheat, and the lamp will be light on.
- (10) “Auto lock/ Non-Auto lock” mode switch  
Switch to “Non-Auto lock”, perform welding when push torch trigger, stop welding when release the trigger. This mode is suitable for short weld. To “Auto lock”, after successfully starting arc by push torch trigger, then you can perform welding by release the trigger, when you push torch trigger again, torch will turn into crater-filling situation which was preset by stop- arc knobs on the front panel. The welder will stop welding when release the trigger. This mode is suitable for welding long weld.

(11) Mode selection switch

When the switch is on “Gas test”, the electromagnetic valve will be opened, you can check if the airflow is normal. When on “Wire test”, you can check up the welding machine’s state, it is the same function as to push the weld torch trigger. When on “normal”, the welding machine is on normal working state.

(12) Terminal lug (-)

Wire work piece by work lead

**2. The rear panel and parts number reference**

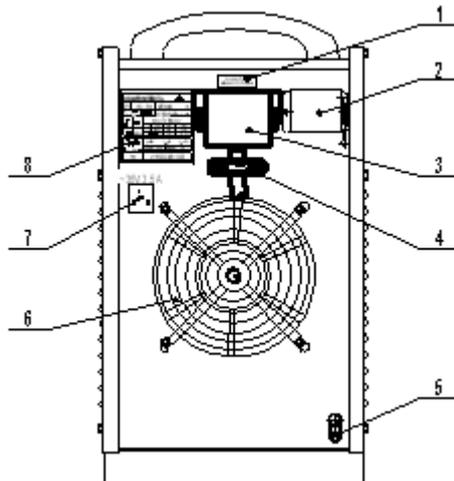


Fig.5: Rear panel

(1) Input warning sign

(2) Air switch

The function of air switch is to protect welding machine by automatic trip to turn-off power supply while in machine overload or failure. Normally, the switch flipped to upward which means power-on. Use switch on the disconnected switchboard or switchbox (customers prepare by themselves) to start or stop welding machine, avoiding using the air switch.

(3) Input power cable

The mixed-colored wire must be firmly grounded, the rest wires connect to 3-phase power (380v/50Hz) respectively.

(4) Plastic cable pincers

(5) Ground bolt

To ensure operators not to be harmed and welding machine to be working normally, make sure the ground bolt grounded firmly by ground lead specified in the table 1, or ground wire(mixed-colored) of the input power cord grounded firmly.

(6) Cooling fan

Cool down the heat components in the welding machine.

(7) Gas Heater power cable socket

Power socket wire to CO<sub>2</sub> regulator's heater coil

(8) Name tag

### **3. Controller**

This controller is fixed on the panel of wire feeder.

Panel illustration and parts number reference

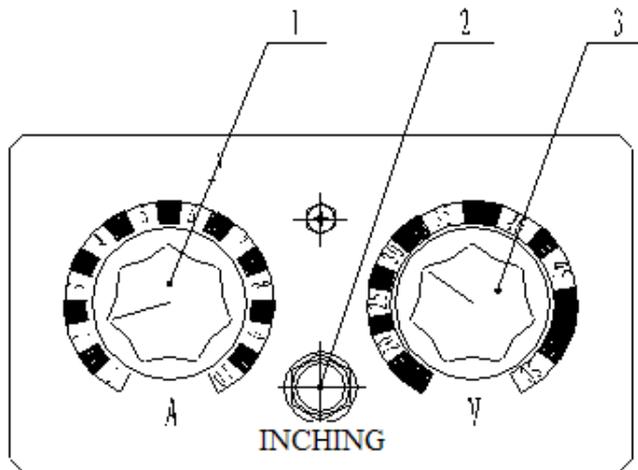


Fig. 6: Panel of controller

- (1) Current regulation knob  
Adjusting welding current
- (2) “Inching” button  
Used for quick wire feeding
- (3) Volt regulation knob  
Adjusting welding volt

Technical data

## 1. Main technical parameters

Table 3

№	Items	IN MIG-250 I	IN MIG-350 I	IN MIG-500 I	IN MIG-630 I
01	Voltage/ frequency	Three phase 380V±10 %/50Hz	Three phase 380V±10 %/50Hz	Three phase 380V±10 %/50Hz	Three phase 380V±10 %/50Hz
02	Rated input power	8KVA	14.4KVA	25KVA	35.8KVA
03	Rated input current	12A	21A	37A	54A
04	Rated duty cycle	60%	60%	60%	100%
05	Output current	60 ~ 250A	60 ~ 350A	60 ~ 500A	60 ~ 630A
06	Output voltage	12 ~ 30V	12 ~ 40V	15 ~ 50V	15 ~ 50V
07	Output open voltage	58V	58V	70V	70V
08	efficiency	□89%	□89%	□89%	□89%
09	Power factor	□0.87	□0.87	□0.87	□0.87
10	Wire diameter(mm)	Φ0.8 ~ Φ1.2	Φ1.0 ~ Φ1.6	Φ1.0 ~ Φ1.6	Φ1.0 ~ Φ2.0
11	Weight	20Kg	40Kg	50Kg	58Kg
12	Dimensions(m m <sup>3</sup> )	495×232× 495	576×297× 574	636×322× 584	686×322× 584
13	CO <sub>2</sub> gas flow rate	15 ~ 20L/min			
14	Insulation class of main transformer	H			

## Repair & Maintenance

In principle, welders' maintenance and repair should be completed by us or our authorized distributors. Customers can also be instructed by us or our authorized distributors to solve the problems which they come across in using.

### **1. Attentions:**

- (1) Rivet equipment name tag on the specified area of the case, otherwise the inside parts will be damaged possibly.
- (2) Connect welding cable to terminal lug firmly, otherwise the terminal lug will be burn out which will lead to welding process instability.
- (3) Prevent jointer of welding cable and terminal lug from contacting with other metals on the ground to avoid short circuit.
- (4) Operating carefully, don't make welding and control cable worn out or broken.
- (5) Never let welding machine be bumped into or stacked up by heavy objects.
- (6) Ensure good ventilation

### **2. Periodical checkup and maintenance**

- (1) Removes dust from power resource with pressure air by authorized maintainer every 3-6 months. Check if the jointers are loose.
- (2) Check regularly if cables are worn out, knobs are loose, and components of panel are damaged.
- (3) Change contact tip and wire feeder roller in time, and clean liner tube regularly.

### **3. Trouble shooting**

#### 3.1 Routine checking procedures prior to maintenance

Check if all front panel switches are on the proper positions

- (1) Check if the input volt has the phase missing, and range are between 340-420V.

- (2) Check if the input cable is connected correctly and firmly with the power source.
- (3) Check if the ground lead is connected correctly and firmly.
- (4) Check if the welding cables are connected correctly and firmly.
- (5) Check if gas regulator is in good situation and CO2 flows out normally.

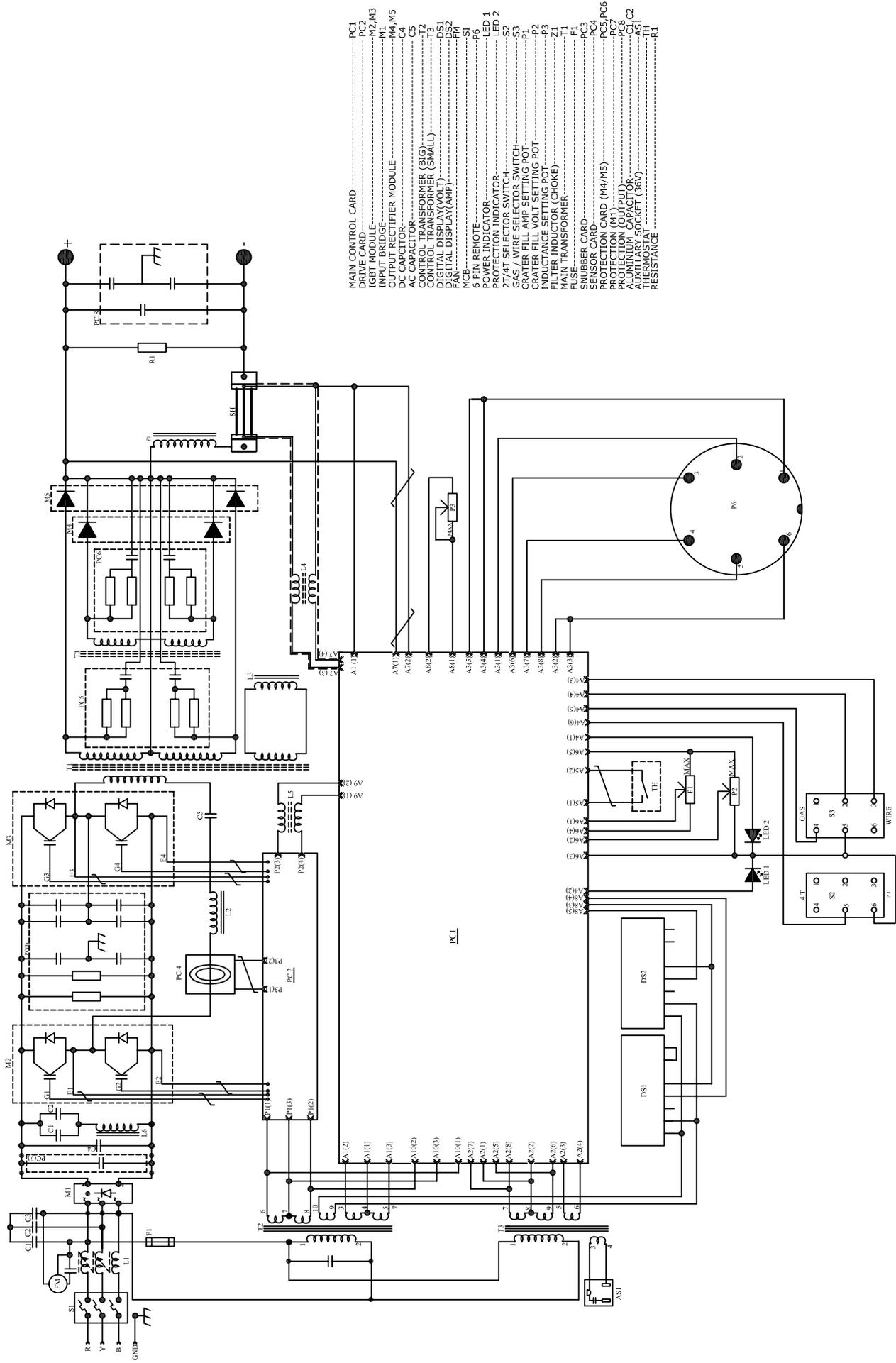
**Warning: Don't open up case uninstructed, the max volt inside machine is 600V. Take safe precautions to prevent from being electric shock while in maintenance.**

**Shut down power source before changing welding cable or torch.**

Appendix A: Common failures, probable cause & countermeasures

№	Trouble	Probable cause	Remedy
01	Indicator lamp does not light on when machine switches on.	(1) Phase missing (2) Air switch is damaged (3) Fuse is broken	(1) Check power supply (2) Change Air switch (3) Change fuse (2A)
02	Air switch tripped Immediately after the machine is switched on.	(1) Circuit breaker is lapsed. (2) IGBT module is damaged (3) 3-phase rectifier bridge is damaged. (4) Voltage-sensitive resistance damaged (5) Welder's control board is damaged	(1) Change air switch (2) Change IGBT module and driving board (3) Change 3-phase rectifier bridge Change (4) Voltage-sensitive resistor (5) Change Main Control board

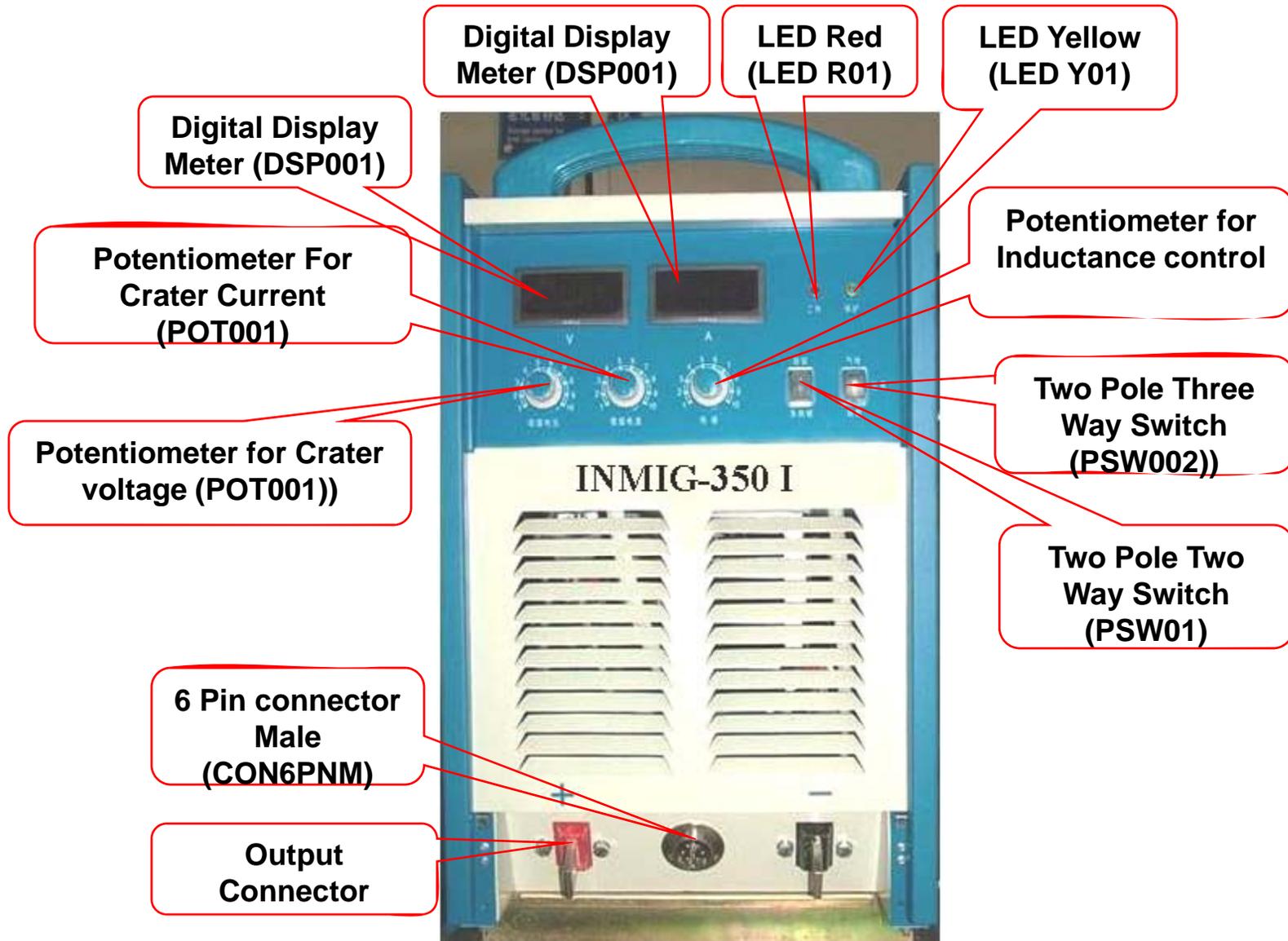
03	Air switch trips while in welding	(1) Welding machine operates in long term overload (2) Air switch is damaged	(1) Operating machine in rated duty cycle (2) Change air switch
04	Welding current can not be adjusted	(1) Wire feeder's control cable is broken or controller is damaged (2) Control board is damaged (1) Conductive wire connected the rectifier is broken	(1) Change control cable or controller (2) Change control board (3) Reconnect the broken wires
05	Instable arc welding, more spatter	(1) Incorrect welding parameters (2) Contact tip is worn out severely	(1) Fine tune parameters (2) Change contact tip
06	CO2 gas regulator can't heat	(1) CO <sub>2</sub> regulator is damaged (2) Heater cable is broken or shorten (3) Thermal-sensitive resistance in power source is damaged	(1) Change regulator repair heat cable change (2) Thermal-sensitive resistance
07	Push welding torch trigger, wire feeding is normal but airflow is blocked	(1) Control board is damaged (2) Electromagnet valve damaged	(1) Replace main control board (2) Replace electromagnet valve
08	Push welding torch trigger, wire feeder do not work and there is no open load volt display	(1) Torch trigger is damaged (2) Feeder's control cable is broken (3) Control board is damaged	(1) Replace welding torch (2) Repair control cable (3) Replace main control board



- MAIN CONTROL CARD.....PC1
- DRIVE CARD.....PC2
- IGBT MODULE.....M2,M3
- INPUT BRIDGE.....M1
- DC REGULATOR MODULE.....M4,M5
- DC CAPACITOR.....C1
- AC CAPACITOR.....C2
- CONTROL TRANSFORMER (BIG).....T2
- CONTROL TRANSFORMER (SMALL).....T3
- DIGITAL DISPLAY (VOLT).....DS1
- DIGITAL DISPLAY (AMP).....DS2
- PAN.....P1
- MCB.....S1
- 6 PIN REMOTE.....P6
- POWER INDICATOR.....LED 1
- PROTECTION INDICATOR.....LED 2
- Z1/41 SELECTOR SWITCH.....S2
- GRATER FILL AMP SETTING POT.....P3
- GRATER FILL VOLT SETTING POT.....P2
- INDUCTANCE SETTING POT.....P3
- FILTER INDUCTOR (CHOKE).....T1
- MAIN TRANSFORMER.....T1
- USER CARD.....F1
- SENSOR CARD.....PC4
- PROTECTION CARD (M4/M5).....PC5,PC6
- PROTECTION (M1).....PC7
- PROTECTION (OUTPUT).....PC8
- AUXILIARY CONTACT.....AS1
- AUXILIARY SOCKET (38V).....AS2
- THERMOSTAT.....TH
- RESISTANCE.....R1

CIRCUIT DIAGRAM FOR INMIG-350 I

# FRONT PANEL



# TOP VIEW

**Input surge Suppressor  
(ISS001)**

**Drive Card**

**Main PCB**

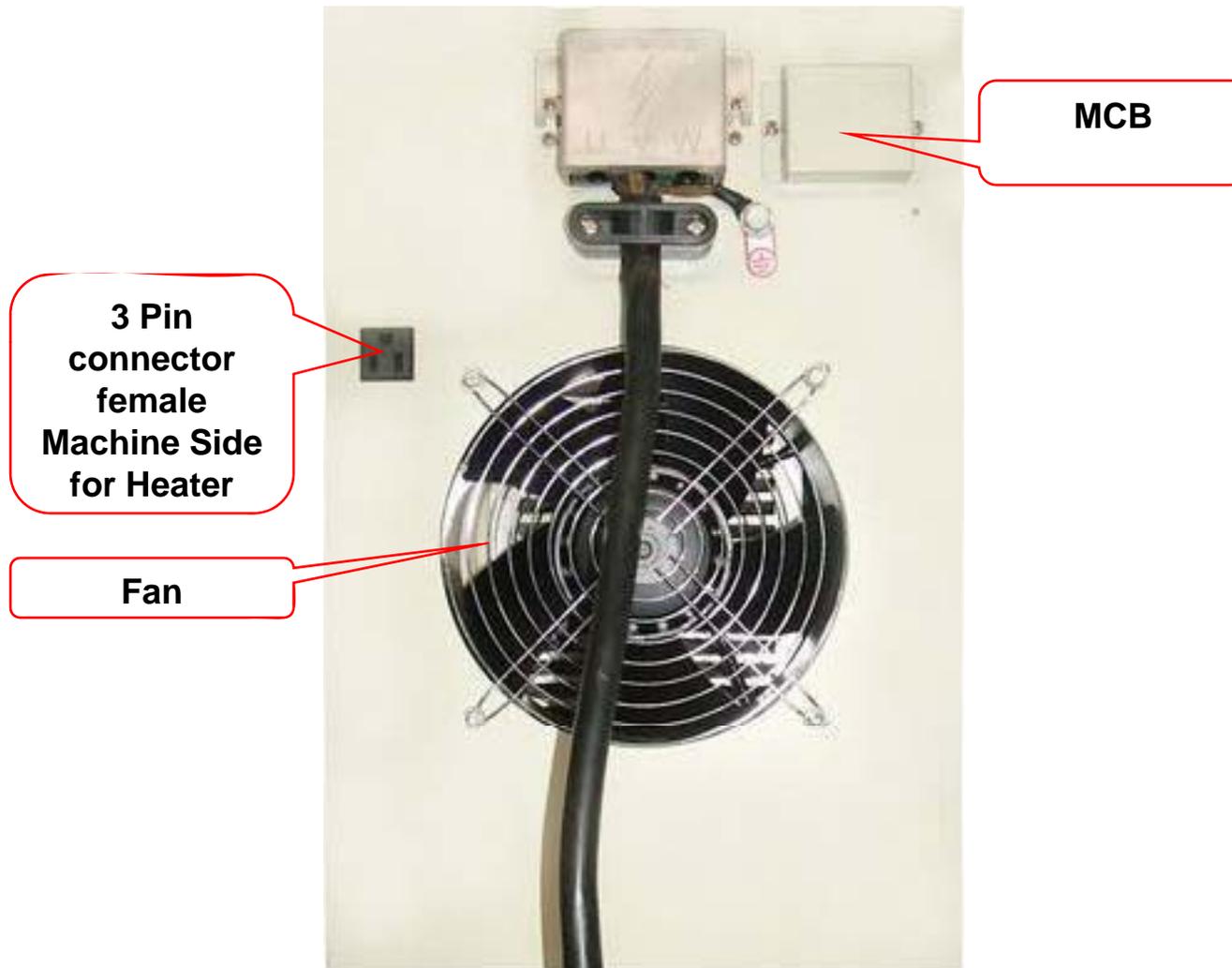


**MCB**

**Control Transformer  
For Wire Feed Motor  
(CTRAX003)**

**Control Transformer  
(CTRAX002)**

# REAR PANEL



# RIGHT VIEW

Thermal Cut-Out

IGBT

Over Current  
Protection  
PCB

Snubber  
Capacitor  
(SCAP001)

Resonant  
Coil

AC  
Capacitor

Snubber  
Card

Shunt

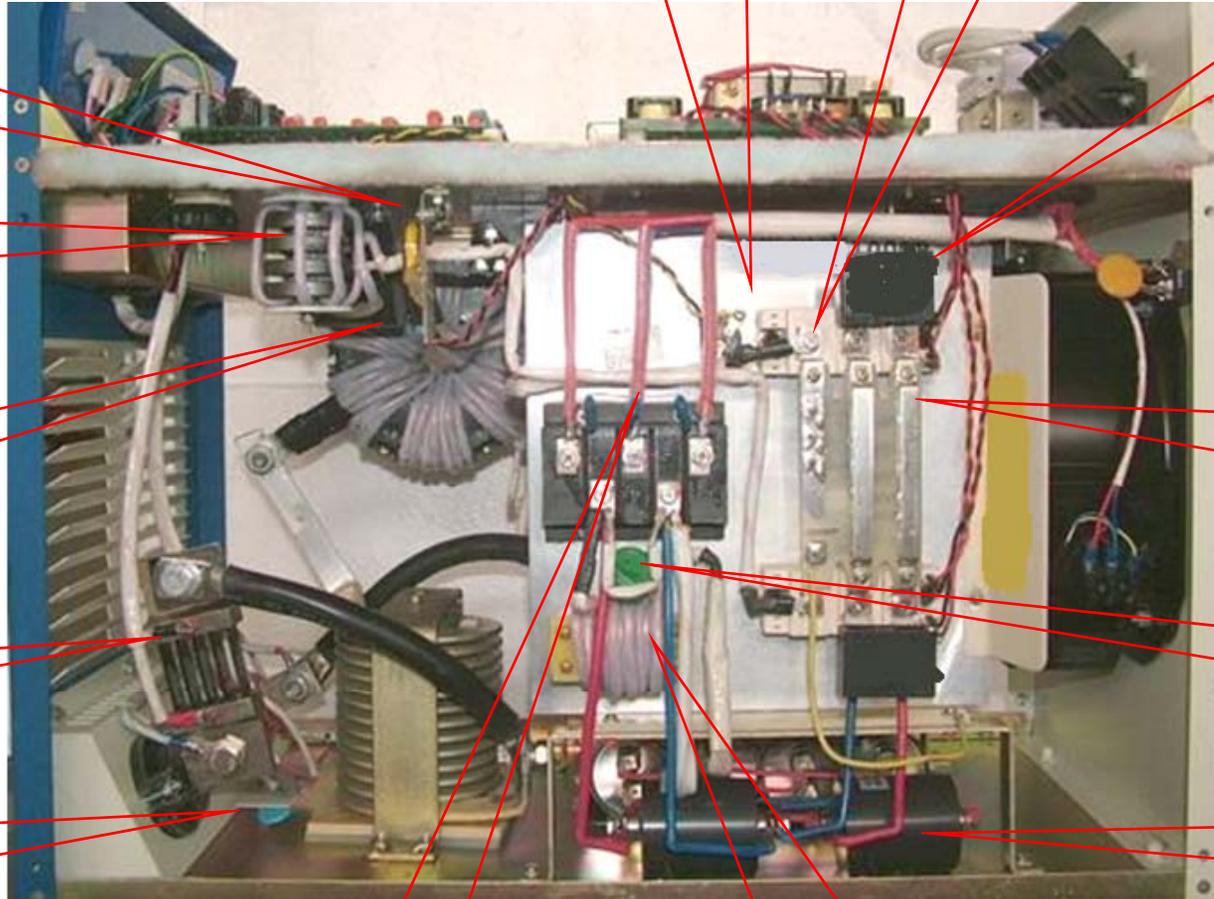
MOV  
(MOV001)

Isolation  
PCB

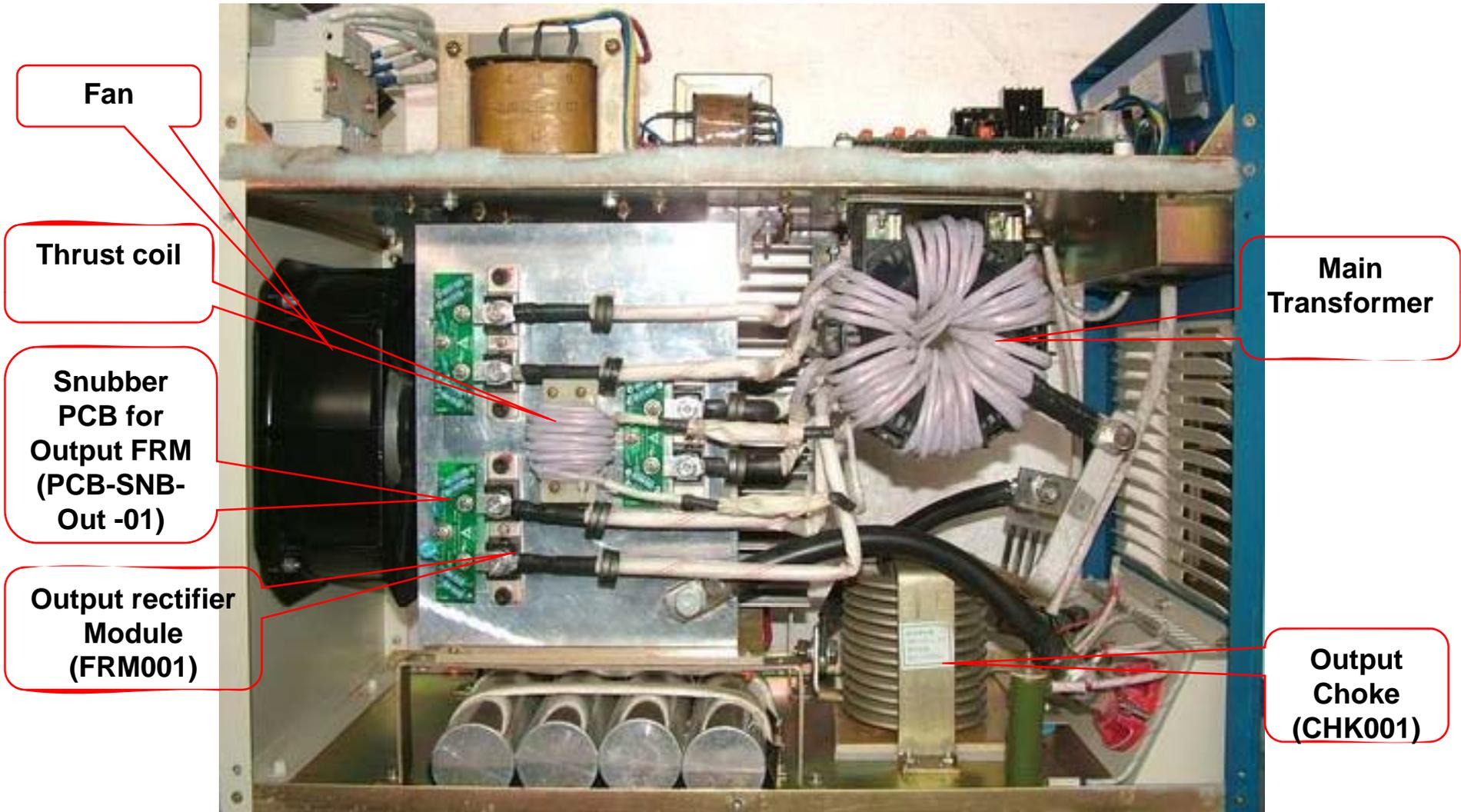
DC  
Capacitor  
(CAP001)

Input Bridge  
Module

Primary Thrust Coil



# LEFT VIEW



**List for the spares of INMIG-I Series**

DESCRIPTION	INMIG-250	INMIG-350 I	INMIG-500 I	INMIG-630 I
	Part Code	Part Code	Part Code	Part Code
MAIN PCB	PCB-MIG-250I	PCB-MIG-350I	PCB-MIG-500I	PCB-MIG-630I
DRIVE CARD	PCB-DRV-01	PCB-DRV-01	PCB-DRV-01L	PCB-DRV-01I
IGBT	IGBT5012	IGBT7512	IGBT10012	IGBT15012
INPUT BRIDGE MODULE	IBDG003	IBDG003	IBDG004	IBDG004
OUTPUT RECTIFIER MODULE	FRM001	FRM001	FRM001	FRM001
FAN	FAN001	FAN004	FAN005	FAN006
DC CAPACITOR	CAP001	CAP001	CAP001	CAP001
AC CAPACITOR	CAP002	CAP003	CAP003	CAP004
SNUBBER CARD	PCB-SNB-01	PCB-SNB-01	PCB-SNB-02	PCB-SNB-02
MCB	MCB001	MCB002	MCB002	MCB003
DIGITAL DISPLAY METER	DSP001	DSP001	DSP001	DSP001
INPUT SURGE SUPPRESSOR	ISS001	ISS001	ISS001	ISS001
SNUBBER CAPACITOR	SCAP001	SCAP001	SCAP001	SCAP001
CONTROL TRANSFORMER	CTRAX002	CTRAX002	CTRAX002	CTRAX002
CONTROL TRANSFORMER FOR WIRE FEED MOTOR (BIG)	CTRAX003	CTRAX003	CTRAX003	CTRAX003
MOV	MOV001	MOV001	MOV001	MOV001
SNUBBER PCB FOR OUTPUT FRM	PCB-SNB-OUT-01	PCB-SNB-OUT-01	PCB-SNB-OUT-01	PCB-SNB-OUT-01
POTENTIOMETER FOR CRATER CURRENT/CRATER VOLTAGE / INDUCTANCE	POT001	POT001	POT001	POT001
KNOB FOR THE POT	KNOB001	KNOB001	KNOB001	KNOB001
OVERCURRENT PROTECTION PCB	PCB-OC-250	PCB-OC-350	PCB-OC-500	PCB-OC-630
MAIN TRANSFORMER	MTRX005	MTRX006	MTRX007	MTRX008
FAN CAPACITOR	CAP05	CAP05	CAP05	CAP05
TWO POLE SWITCH FOR PANEL/REMOTE & V/A	PSW001	PSW001	PSW001	PSW001
TWO POLE THREE WAY SWITCH FOR WIRE TEST/ GAS TEST / NORMAL SELECTION	PSW002	PSW002	PSW002	PSW002
OUT PUT CONNECTOR MACHINE SIDE	FST-PLG-F-02	OUTCON001	OUTCON001	OUTCON001
OUT PUT CONNECTOR CABLE SIDE	FST-PLG-M-02	NA	NA	NA
6 PIN CONNECTOR MALE	CON6PNM	CON6PNM	CON6PNM	CON6PNM
SHUNT	SHUNT001	SHUNT001	SHUNT002	SHUNT002
LED RED	LEDR01	LEDR01	LEDR01	LEDR01
LED YELLOW	LEDY01	LEDY01	LEDY01	LEDY01

**WIRE FEEDER**

<b>WIRE FEEDER</b>				
WIRE FEEDER MOTOR WITH WIRE FEED MECHANISM	WFMTR002	WFMTR002	WFMTR003	WFMTR003
SOLANOID VALVE	SV002	SV002	SV002	SV002
EURO CONNECTOR FEEDER SIDE	EURO-BRASS-01	EURO-BRASS-01	EURO-BRASS-01	EURO-BRASS-01
PRESUURE ARM	PRARM001	PRARM001	PRARM001	PRARM001
PRESURE HOLDER	PRHLD001	PRHLD001	PRHLD001	PRHLD001
SUS TUBE	SUS001	SUS001	SUS002	SUS002
ROLER 0.8/1.0	INMIGRLR001	INMIGRLR001	INMIGRLR001	INMIGRLR001
ROLER 1.0/1.2	INMIGRLR002	INMIGRLR002	INMIGRLR002	INMIGRLR002
ROLER 1.2/1.6	Not Applicable	Not Applicable	INMIGRLR003	INMIGRLR003
POTENTIOMETER FOR CURRENT/VOLTAGE	POT002	POT002	POT002	POT002
INCHING SWITCH	INCSW001	INCSW001	INCSW001	INCSW001
KNOB FOR THE POT ( Black )	KNOB002	KNOB002	KNOB002	KNOB002