MANUAL BOOK

WM-500SI
CO2/MAG/MIG/ AUTOMATIC WELDING MACHINE

ANUGRAH DUTA NIAGA

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This operating manual can be fit for WM500SI series welding machines. The technical data are measured with power supply 3 phase 380V, the data will be changed when you use different voltage such as 400V and 415V, etc.

MIG Series Block diagram of principle shown as Figure 1

Input (3~380V/50Hz)

Output

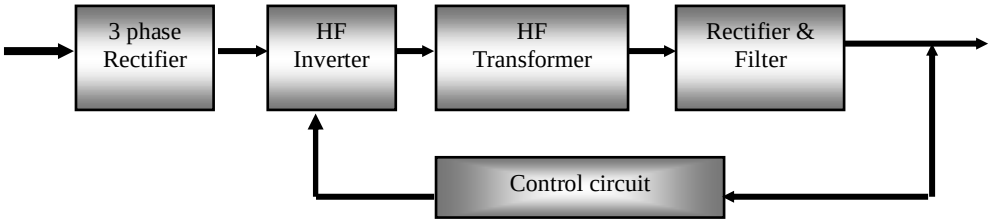

Figure 1: Block diagram of principle

This series welding machines apply IGBT soft switch inverter technology. 3-phase input volt 380V 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.

MIG Series Volt-Ampere Curve as shown in Figure 2:

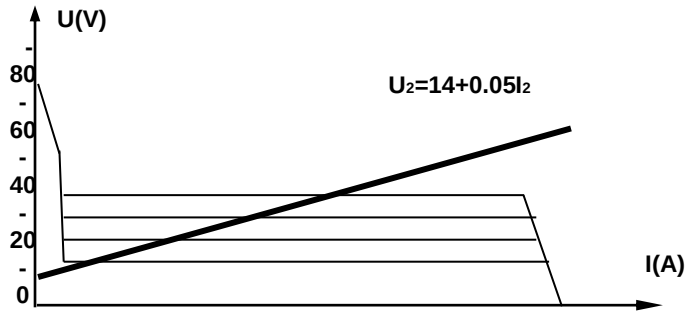

Figure 2: WM-500SI Curve

1. Main technical parameters

Items	WM500SI
Input voltage	3-phase 380V±10% /50Hz
Rated input power (KVA)	25
Rated input current (A)	38
Rated duty cycle	60%
Output current range (A)	60～500
Output voltage range (V)	15～50
Output open voltage	81
Power factor	≥0.87
Wire diameter (mm)	1.0～1.6
Weight (Kg)	50
Dimensions (mm^3)	636×322×584
CO_2 gas flow rate (L/min)	15～25
Protection class	IP23
Insulation class	H (Main Transformer)
	B (Output Reactor)

Table 1: Parameter Specification WM-500SI

2. Main circuit diagram

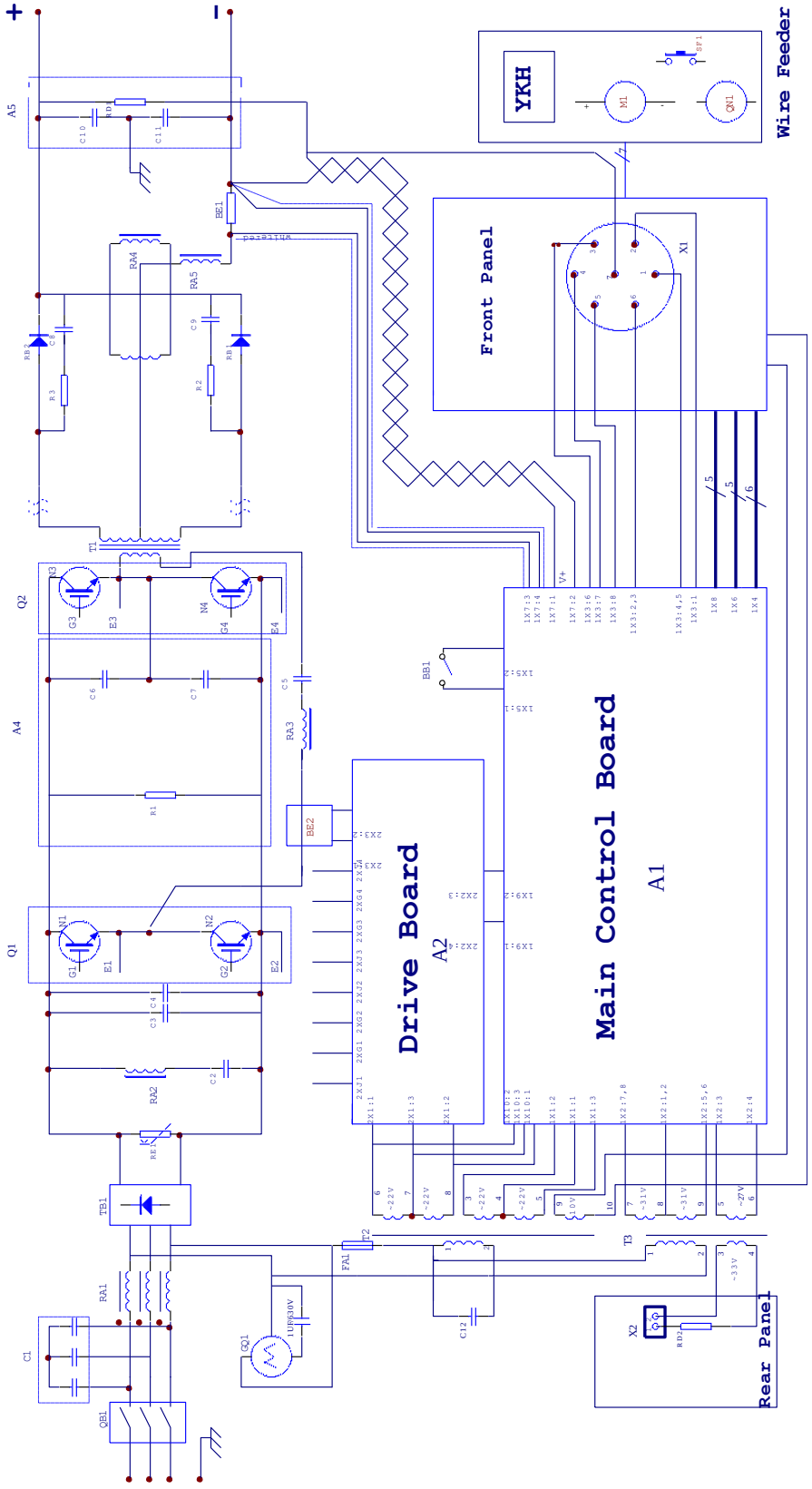

Figure 3: Circuit Diagram WM-500SI

3. Main components list

No.	Tab	Item	Stock No.	Quantity	Remark
1	QB1	Circuit breaker	745011-00023	1	
2	TB1	3-phase rectifier module	735005-00003	1	
3	C3	Polypropylene capacitor	722001-00070	2	
4	Q1/Q2	IGBT module	735007-00037	2	
5	C5	Polypropylene capacitor	722001-00074	1	
6	T1	Main transformer	220629-00015	1	
7	RB1/RB2	Fast recovery diode module	735006-00019	3	
8	T2	Transformer for ZKB/QDB I	763001-00067	1	
9	T3	Transformer for ZKB/QDB II	763001-00062	1	
10	FA1	Fuse	745007-00022	1	
11	GQ1	Fan	746001-00017	1	
12	BB1	Thermal switch	745008-00006	1	
13	A4	IGBT protection board	220005-00007	1	
14	A2	Drive board	764002-00011	1	
15	A1	Main control board	210580-00069	1	

Table 2: Key Spare Parts WM-500SI

Features & Applications

This inverter CO_2/MAG welders are high-quality performers that can be used for all-purpose, semi-automatic CO_2 gas shield welding with solid or flux-cored wire for welding mild steel and low alloy steel work pieces. This series welder enjoys reasonable static characteristic and sound dynamic characteristic.

Features and benefits:

- 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.
- **Machine can provide long distance welding (up to 50m).**

Installation Guide

1. Pre-installation

1.1 Installation Environment

The MIG series welding machines are designed for use in adverse environments. Examples of environments with increased adverse conditions are

- In locations in which freedom of movement is restricted, so that the operator is forced to perform the work in a cramped (kneeling, sitting or lying) position with physical contact with conductive parts;
- In locations which are fully or partially limited by conductive elements, and in which there is a high risk of unavoidable or accidental contact by the operator;
- In wet or damp hot locations where humidity or perspiration considerably reduces the skin resistance of the human body and the insulation properties of accessories;
- Environments with adverse conditions do not include places where electrically conductive parts, in the near vicinity of the operator, which can cause increased hazard, have been insulated;

1.2 Installation Location

Be sure to locate the welder according to the following guidelines:

- In areas, free from moisture and dust.
- Ambient temperature between 0 degrees C to 40 degrees C.
- In areas, free from oil, steam and corrosive gases.
- In areas, not subjected to abnormal vibration or shock.
- In areas, not exposed to direct sunlight or rain.
- Place at a distance of 12" (304.79mm) or more from walls or similar boundaries that could restrict natural airflow for cooling.

1.3 Power Source Connections

Warning

Thermal Arc advises that this equipment be electrically connected by a qualified electrician.

ELECTRIC SHOCK can kill; SIGNIFICANT DC VOLTAGE is present after removal of input power.

DO NOT TOUCH live electrical parts.

- SHUT DOWN welding power source, disconnect input power employing lockout/tagging procedures.
- Lockout/tagging procedures consist of padlocking line disconnect switch in open position.
- Removing fuses from fuse box, or shutting off and red-tagging circuit breaker or other disconnecting device.

1.4 Power Supplier Requirements

- Input volt must be standard sine wave, effective value 380V, frequency 50Hz.
- Unbalance degree of 3-phase volt must be no more than 5%.
- Power supply:

Product type		WM-500SI
Power supply		3 phase AC 380V /50Hz
Min. capacity	Power network	45KVA
	Generator	60KVA
Input volt protection	Fuse	50A
	Circuit breaker	63A
Cable size (cross-section)	Input volt	≥6mm^2
	Output volt	50mm^2
	Ground lead	≥6mm^2

Table 3: Power supply connection

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

1.5. Machine Assembling Guide:

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.

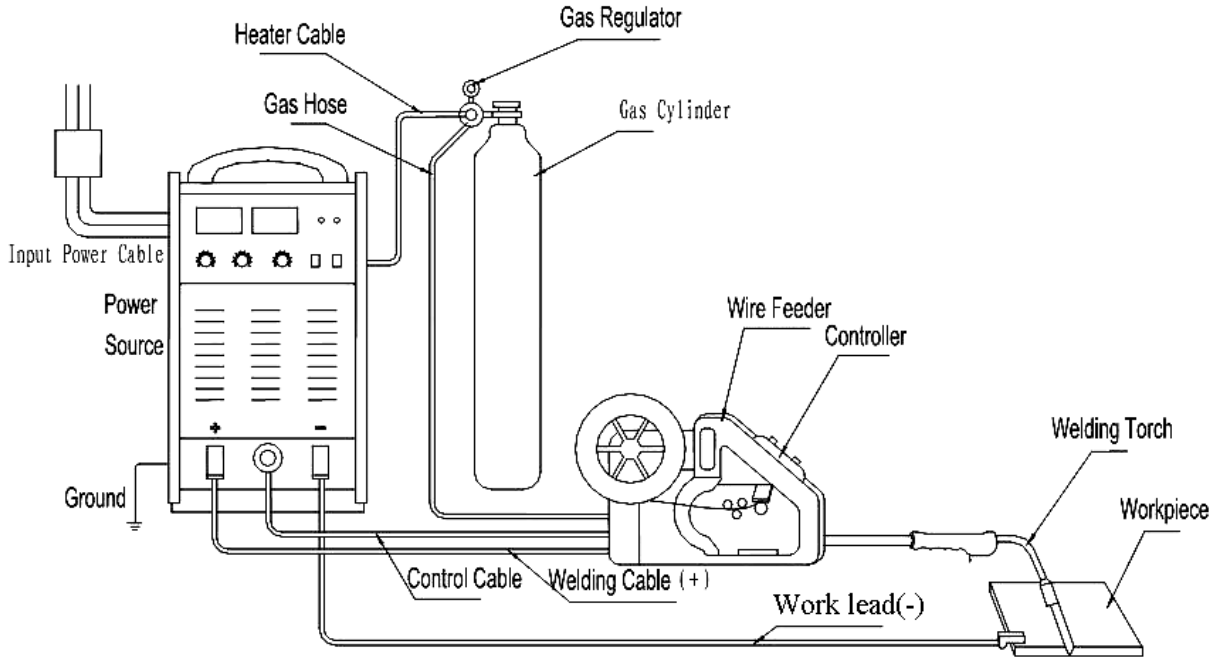

Figure 4: Connection Chart for WM-500SI

Operation Guide for Connection:

(1) Connect the welder's terminal plug (-) to the work piece by work lead.

(2) Connect the welder's terminal plug (+) to the wire feeder by welding cable.

(3) Connect the welder's control cable socket to the wire feeder by control cable.

(4) Connect feeder's gas hose to the regulator.

(5) Connect the regulator's heater cable to the welder's "gas heater 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.

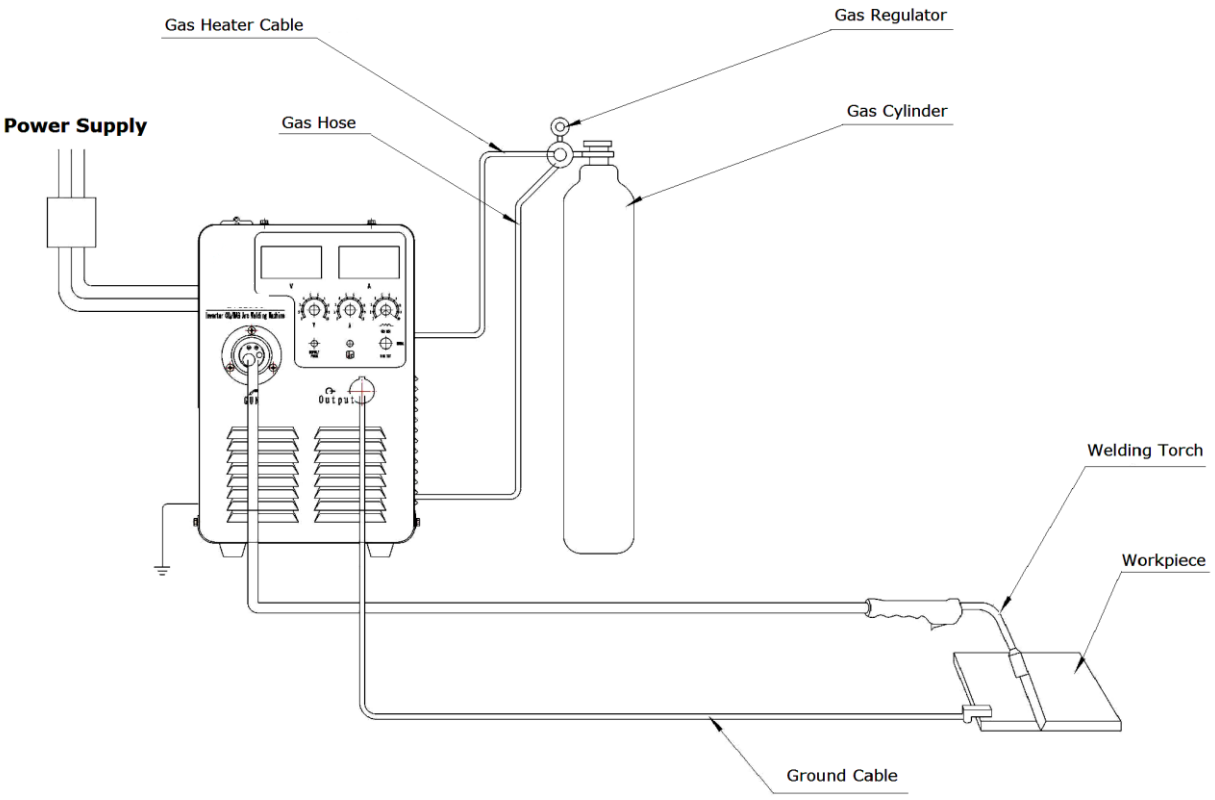

Figure 5: Connection Chart for WM-500SI

Operating Guide for connection:

(1) According to the wire diameter, choose suitable wire feeding tube and contact tip.

(2) Choose suitable wire feeding roller according to wire type, adjust the pressure value by the pressure handle.

(3) Install wire spool, feeding wire to the torch via wire feeding rollers.

(4) Press “wire test” button, make the wire outside of torch to 10mm.

(5) Connect the work piece by ground cable.

(6) Connect the torch to welding machine’s torch connection.

(7) Connect gas hose of welding machine to gas regulator.

(8) Use heating power output socket on rear panel (AC36V) to supply power to heater of CO_2.

(9) Connect 3-phase power supply, and ensure good grounding.

(10) Turn on the circuit breaker that is on rear panel.

1. WM500SI Panel l illustration and parts number reference

1.1 WM500SI Front panel and parts number reference

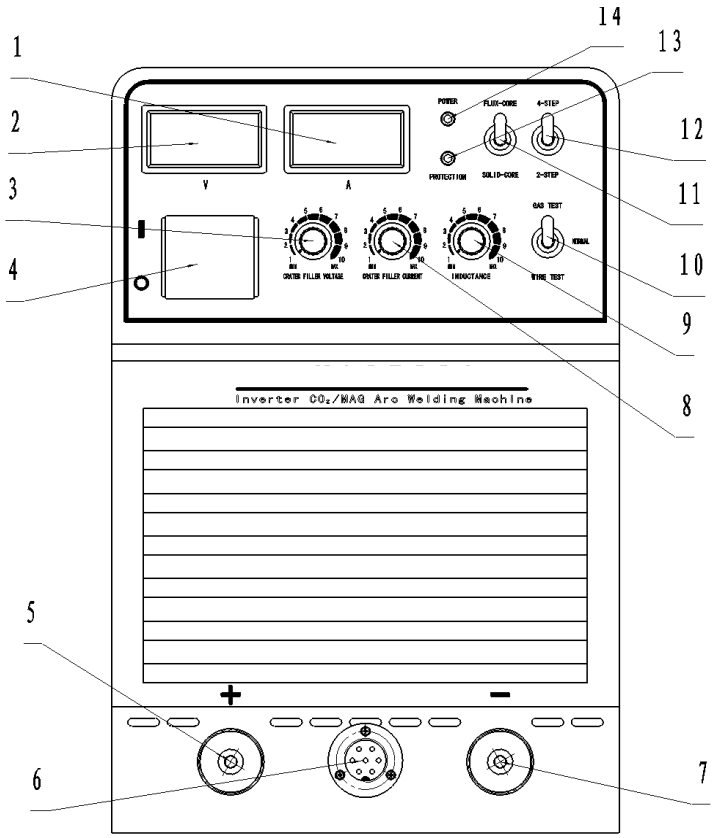

Figure 6: Front Panel (WM500SI)

(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) "Crater filling volt" regulation knob

Adjusting volt value in 4-step mode

(4) Circuit breaker

The function of circuit breaker 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 them) to start or stop welding machine, avoiding using the circuit breaker.

(5) Terminal lug (+)

Connect to wire feeder's welding cable

(6) Wire feeder's control cable socket

Connect to wire feeder's control cable

(7) Terminal lug (-)

Wire work piece by work lead

(8) "Crater filling Amp" regulation knob

Adjusting current value in 4-step mode

(9) "Inductance" regulation knob

Altering welding stability, penetration and spatter volume.

(10) 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.

(11) Wire selection switch

To select flux-core or solid-core

(12) "4-step/ 2-step" mode switch

Switch to "2-step", perform welding when push torch trigger, stop welding when release the trigger. This mode is suitable for short weld. To "4-step", 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.

(13) "Protection" indicator lamp

Welding machine will automatically stop working when it is overheat, and the lamp will be light on.

(14) "Power" indication lamp

Lamp indicating whether power source is effectively connected to power supply.

1.2 MIG500A rear panel & parts number

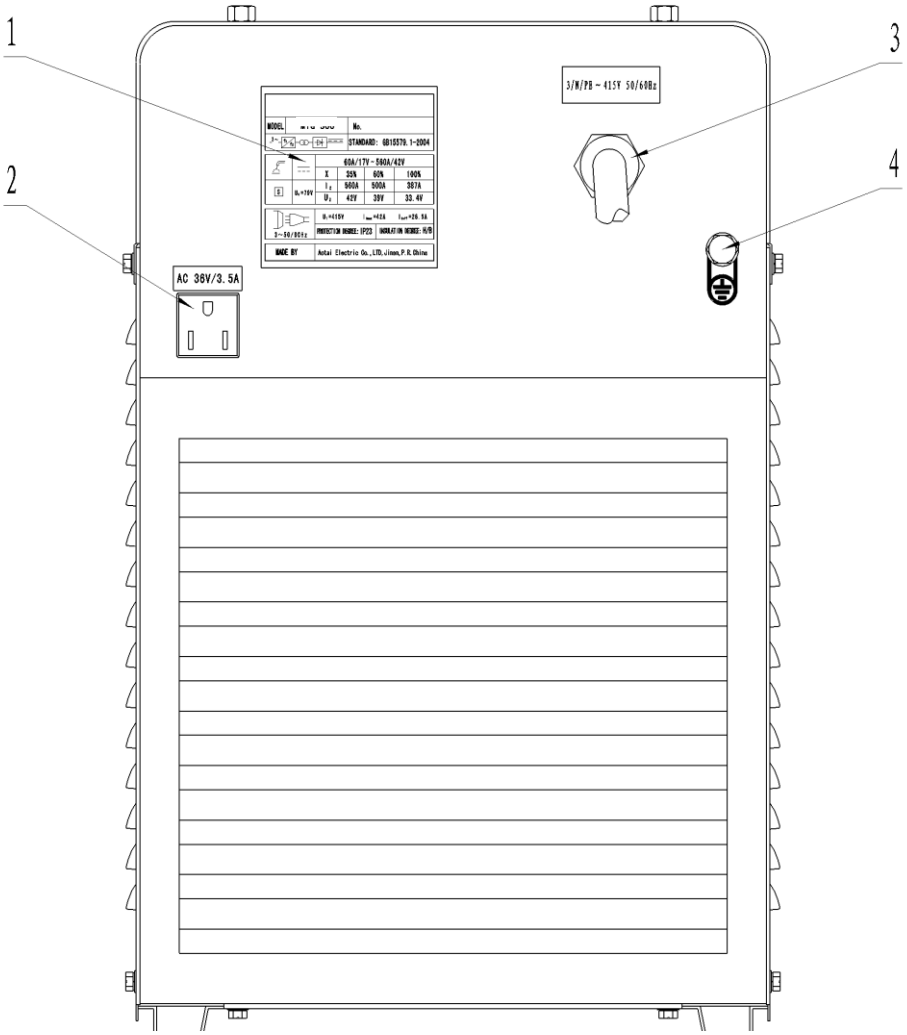

Figure 7: Rear Panel (WM500SI)

(1) Specification plate

(2) Gas Heater power cable socket (AC36V)

Connect to CO_2 regulator's heating coil

(3) Input power cable

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

(4) 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 6, or ground wire (mixed-colored) of the input power cord grounded firmly.

2. Controller

This controller is fixed on the panel of wire feeder.

Panel illustration and parts number reference

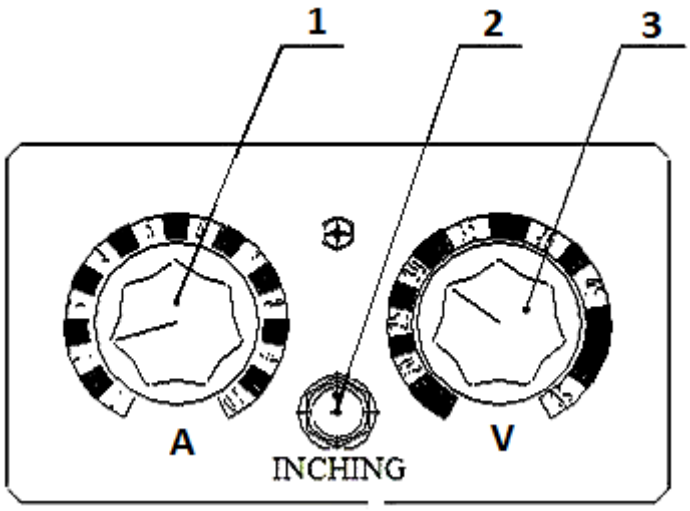

Figure 8: Panel of wire feeder controller

(1) Current regulation knob

Adjusting welding current

(2) “Inching” button

Used for quick wire feeding

(3) Volt regulation knob

Adjusting welding volt

Repair & Maintenance

WARNING: Have a qualified electrician do the maintenance and troubleshooting work. Turn the input power off, using the disconnect switch at the fuse box before working inside the machine.

1. Cautions:
   - Rivet equipment name tag on the specified area of the case, otherwise the inside parts will possibly be damaged.
   - Connect welding cable to terminals firmly, otherwise the terminals will be burn out which will cause the instability of welding process.
   - Avoid welding cable and control cable being broken, and prevent welding machine from being short circuit.
   - Never let welding machine be bumped into or stacked up by heavy objects.
   - Ensure good ventilation.
   - Under high temperature, if work with large current for long period, welder may shut down automatically due to thermal protection acts .At this point, let the machine runs under open-load for a few minutes, and it will be automatically recover.
   - Under high temperature, if work with large current for long period, welder may shut down automatically due to circuit breaker trips. Cut off the power supply to the electricity switchboard on frame, and wait for 5 minutes to turn on the circuit breaker on the power source fist then connect the power supply to the electricity switchboard on frame. And leave the machine runs under open-load condition for a while.
   - After welding, cut off the gas supply and the power supply.
2. General maintenance
   - Remove dust from power resource with pressure air by qualified individuals every 3-6 months. Check if the jointers are loose.
   - Check regularly if cables are worn out, knobs are loose, and components of panel are damaged.
   - Check regularly if cables are tightly connected to cable connecting terminals in case of terminals being burnt out.
   - Clean and replace Contact Tip in time.

3. Procedure for regular checking prior to maintenance
    - Check if all front panel switches are on the proper positions.
    - Check if the input volt has the phase missing, and range are between 340~420V.
    - Check if the input cable is connected correctly and firmly with the power source.
    - Check if the ground lead is connected correctly and firmly.
    - Check if the welding cables are connected correctly and firmly.
    - Check if gas regulator is in good situation and gas flows out normally.

WARNING: Have a qualified electrician do the maintenance and trouble shooting work. Turn the input power off, using the disconnect switch at the fuse box before working inside the machine. Don't open up case uninstructed, the max volt inside machine is 600V. Never discharge high voltage to welder case with welding torch! Shut down power source before changing or repairing welding cable or torch.

№	Trouble	Probable cause	Remedy
01	Indicator lamp does not light on when machine switches on.	(1)Phase missing (2)Circuit breaker is damaged (3)Fuse is broken	(1)Check power supply (2)Replace (3)Replace
02	Circuit breaker trips immediately after the machine is switched on.	(1)Circuit breaker is collapsed. (2)IGBT module is damaged (3)3-phase rectifier bridge is damaged. (4)Varistor is damaged (5)Welder's control board is damaged	(1)Replace (2)Replace IGBT module and drive board (3) Replace (4) Replace (5) Replace main control board
03	Circuit breaker trips while in welding	(1)Welding machine operates in long term overload (2)Circuit breaker is damaged	(1)Operating machine in rated duty cycle (2) Replace
04	Welding current can not be adjusted	(1)Wire feeder's control cable is broken or controller is damaged (2)Control board is damaged (3)Conductive wire connected the rectifier is broken	(1)Change control cable or controller (2)Replace (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)Replace
06	CO_2 gas regulator can't heat	(1)CO_2 regulator is damaged (2)Heater cable is broken or shorten (3)Thermistor in power source is damaged	(1)Replace (2)Check and repair (3)Replace
07	Push welding torch switch, wire feeding is normal but airflow is blocked	(1)Control board is damaged (2)Electromagnet valve is damaged	(1)Replace (2)Replace
08	Push welding torch switch, wire feeder do not work and there is no open load volt display	(1)Torch switch 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

Table 4: Trouble Shooting Table