PULSE MIG
WELDING MACHINE

OPERATING MANUAL

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Safety Precautions

ARC WELDING CAN BE HAZARDOUS. PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. PACEMAKER WEARERS SHOULD CONSULT WITH THEIR DOCTOR BEFORE OPERATING.BE SURE THAT ONLY QUALIFIED INDIVIDUALS PERFORM ALL INSTALLATION, OPERATION, MAINTENANCE AND REPAIR PROCEDURES

For Engine Powered equipments

1.a. Turn the engine off before troubleshooting and maintenance work unless the maintenance work requires it to be running.

1.b. Operate engines in open, well-ventilated areas or vent the engine exhaust fumes outdoors.

1.c. Do not add the fuel near an open flame welding arc or when the engine is running. Stop the engine and allow it to cool before refueling to prevent spilled fuel from vaporizing on contact with hot engine parts and igniting. Do not spill fuel when filling tank. If fuel is spilled, wipe it up and do not start engine until fumes have been eliminated.

1.d. Keep all equipment safety guards, covers and devices in position and in good repair. Keep hands, hair, clothing and tools away from V-belts, gears, fans and all other moving parts when starting, operating or repairing equipment.

1.e. In some cases it may be necessary to remove safety guards to perform required maintenance. Remove guards only when necessary and replace them when the maintenance requiring their removal is complete. Always use the greatest care when working near moving parts.

1.f. Do not put your hands near the engine fan. Do not attempt to override the governor or idler by pushing on the throttle control rods while the engine is running.

1.g. To prevent accidentally starting gasoline engines while turning the engine or welding

generator during maintenance work, disconnect the spark plug wires, distributor cap or magneto wire as appropriate.

1.h. To avoid scalding, do not remove the radiator pressure cap when the engine is hot.

ELECTRIC AND MAGNETIC FIELDS may be dangerous

2.a. Electric current flowing through any conductor causes localized Electric and Magnetic Fields(EMF). Welding current creates EMF fields around welding cables and welding machines.

2.b. EMF fields may interfere with some pacemakers, and welders having a pacemaker should consult their physician before welding.

2.c. Exposure to EMF fields in welding may have other health effects which are now not known.

2.d. All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:

2.d.1. Route the electrode and work cables together-Secure them with tape when possible.

2.d.2. Never coil electrode lead around your body.

2.d.3. Do not place your body between your electrode and work cables. If the electrode cable is on your right side, the work cable should also be on your right side.

2.d.4. Connect the work cable to the work piece as close as possible to the area being welded.

2.d.5. Do not work next to welding power source.

ELECTRIC SHOCK can kill

3.a. The electrode and work (or ground) circuits are electrically “hot” when the welder is on. Do not touch these “hot” parts with your bare skin or wet clothing. Wear dry, hole-free gloves to insulate hands.

3.b. Insulate yourself from work and ground using dry insulation. Make certain the insulation is

large enough to cover your full area of physical contact with work and ground.

In addition to the normal safety precautions, if welding must be performed under electrically hazardous conditions (in damp locations or wearing wet clothing; on metal structures such as floors, gratings or scaffolds; when in cramped positions such as sitting, kneeling or lying, if there is a high risk of unavoidable or accidental contact with the work piece or ground) use the following equipment:

Semiautomatic DC Constant Voltage (Wire) Welder

DC Manual (Stick) Welder

AC Welder with Reduced voltage control

3.c. In semiautomatic or automatic wire welding, the electrode, electrode reel, welding head, nozzle or semiautomatic welding gun are also electrically “hot”.

3.d. Always be sure the work cable makes a good electrical connection with the metal being welded. The connection should be as close as possible to the area being welded.

3.e. Ground the work or metal to be welded to a good electrical (earth) ground.

3.f. Maintain the electrode holder, work clamp, welding cable and welding machine in good, safe operating condition. Replace damaged insulation.

3.g. Never dip the electrode in water for cooling.

3.h. Never simultaneously touch electrically “hot” parts of electrode holders connected to two welders because voltage between the two can be the total of the open circuit voltage of both welders.

3.i. When working above floor level, use a safety belt to protect yourself from a fall

ARC RAYS can burn.

4.a. Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing open arc welding. Head shield and filter lens should conform

4.b. Use suitable clothing made from durable flame-resistant material to protect your skin and that of your helpers from the arc rays.

4.c. protect other nearby personnel with suitable, non-flammable screening and/or warn them

not to watch the arc nor expose themselves to the arc rays or to hot spatter or material.

FUMES AND GASES can be dangerous

5.a. Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. When welding, keep your head out of the fume. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone. When welding with electrodes which require special ventilation such as stainless or hard facing or on lead or cadmium and plated steel and other materials or coatings which produce highly toxic fumes, keep exposure as low as possible and below Threshold Limit Values (TLV) using local exhaust or mechanical ventilation. In confined spaces or in some circumstances, outdoors, a respirator may be required. Additional precautions are also required when welding on galvanized steel.

5.b. The operation of welding fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment and the specific welding procedure and application involved. Worker exposure level should be checked upon installation and periodically thereafter to be certain it is within applicable

5.c. Do not weld in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products.

5.d. Shielding gases used for arc welding can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.

5.e. Read and understand the manufacturer’s instructions for this equipment and the consumables to be used

5.f. Also see item 1.b.

WELDING AND CUTTING SPARKS can cause fire or explosion.

6.a. Remove fire hazardous from the welding area. If this is not possible, cover them to prevent the welding sparks from starting a fire. Remember that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas. Avoid welding near hydraulic lines. Have a fire extinguisher readily available.

6.b. Where compressed gases are to be used at the job site, special precautions should be used to prevent hazardous situations.

6.c. When not welding, make certain no part of the electrode circuit is touching the work or ground. Accidental contact can cause overheating and create a fire hazard.

6.d. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been “cleaned”.

6.e. Vent hollow castings or containers before heating, cutting or welding. They may explode.

6.f. Sparks and spatter are thrown from the welding arc. Wear oil free protective garments such as leather gloves, heavy shirt, high shoes and a cap over your hair. Wear ear plugs when welding out of position or in confined places. Always wear safety glasses with side shields when in a welding area.

6.g. Connect the work cable to the work as close to the welding area as practical. Work cables connected to the building framework or other locations away from the welding area increase the possibility of the welding current passing through lifting chains, crane cables or other alternate circuits. This can create fire hazards or overheat lifting chains or cable until they fail.

6.h. Also see item 1.c.

6.i. Do not use a welding power source for pipe thawing.

CYLINDER may explode if damaged.

7.a. Use only compressed gas cylinders containing the correct shielding gas for the process used and properly operating regulators designed for the gas and pressure used. All hoses, fittings, etc. should be suitable for the application and maintained in good condition.

7.b. Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.

7.c. Cylinders should be located:

Away from areas where they may be struck or subjected to physical damage, A safe distance from arc welding or cutting operations and any other source of heat, sparks, or flame.

7.d. Never allow the electrode, electrode holder or any other electrically “hot” parts to touch a cylinder.

7.e. Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.

7.f. Valve protection caps should be always be in place and hand tight expect when the cylinder is in use or connected for use.

FOR ELECTRICALLY powered equipment

8.a. Turn off input power using the disconnect switch at the fuse box before working on the equipment.

Principle & Technical data

1. Main technical parameters

№	Item	PMIG 350 ID	PMIG 500 ID
01	Voltage/frequency	3-phase 380V / 50Hz	
02	Rated input power	14.4KVA	25KVA
03	Rated input current	21A	37A
04	Rated duty cycle	60%	
05	Output current	25~350A	25~500A
06	Output voltage	14~40V	14~50V
07	Output open voltage	90V	
08	efficiency	□89%	
09	Power factor	□0.87	
10	Wire diameter(mm)	Φ0.8、Φ1.0、Φ1.2、Φ1.6	
11	Weight	45Kg	50Kg
12	Dimensions (mm^3)	636×322×584	
13	Gas flow rate	15~20L/min	
14	Insulation class of main transformer	H	
15	Insulation class of output reactor	B	

Table 1: Parameter Specification

2. Main circuit diagram

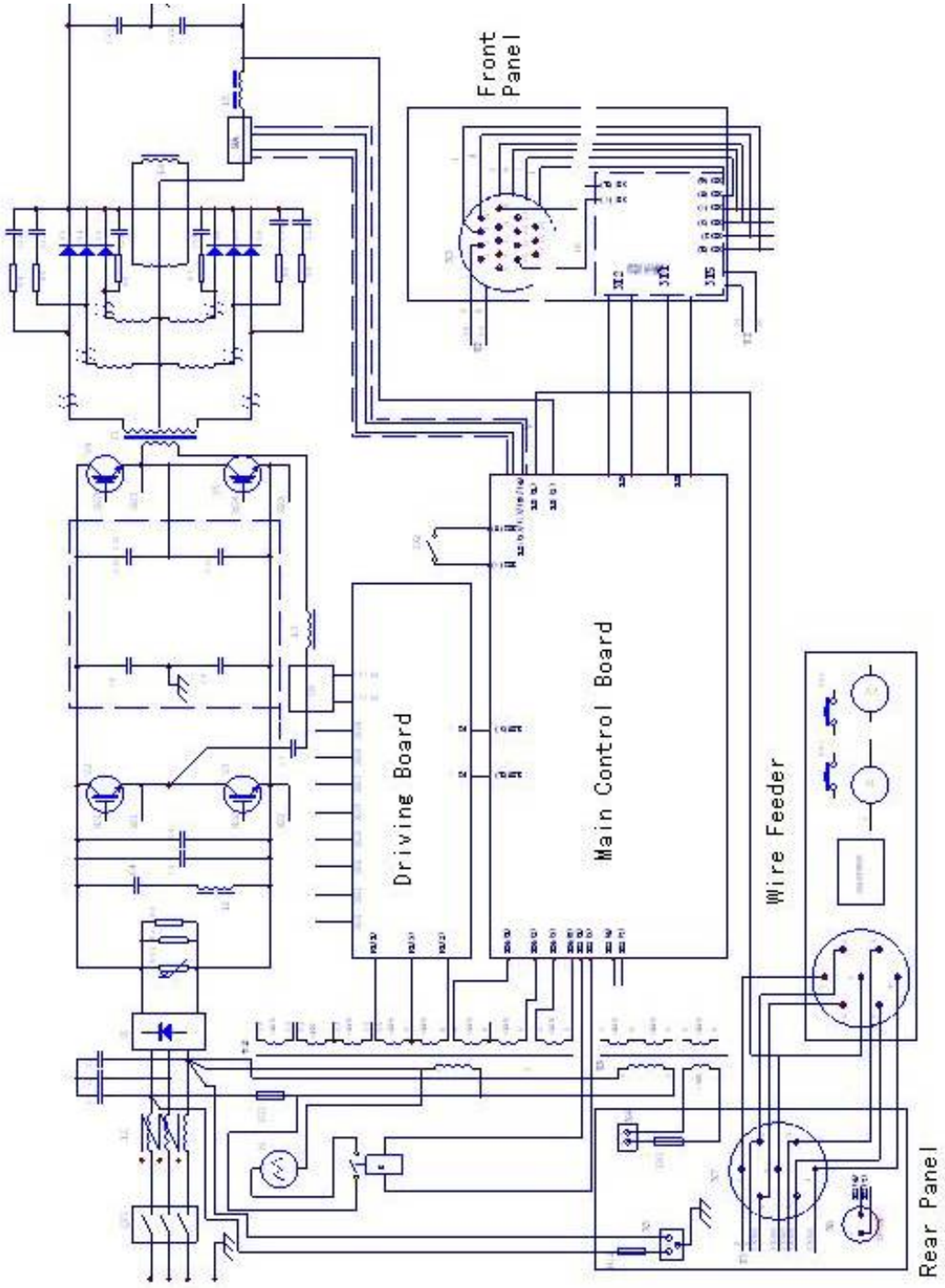
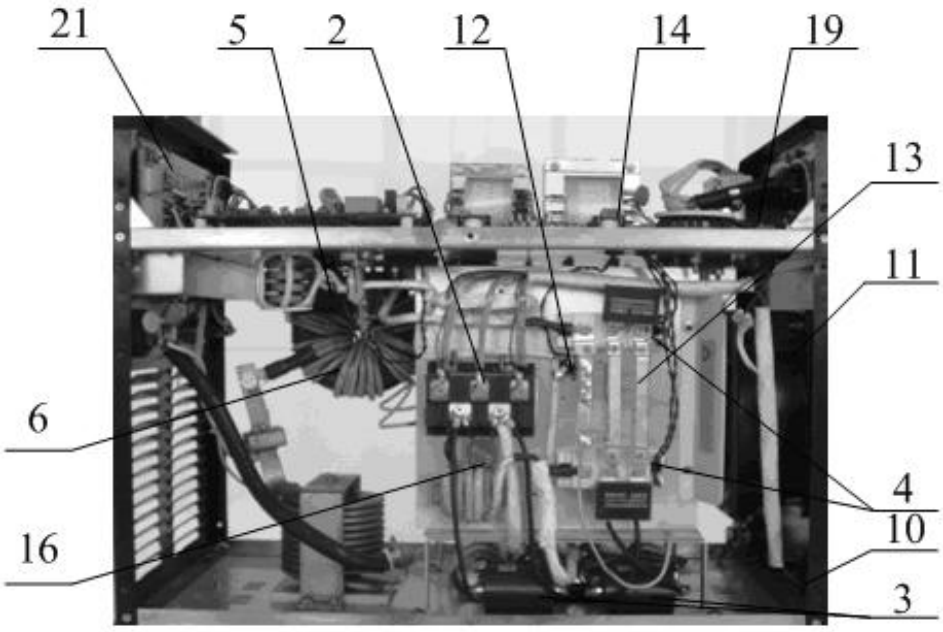


Figure 1: Main Circuit Diagram

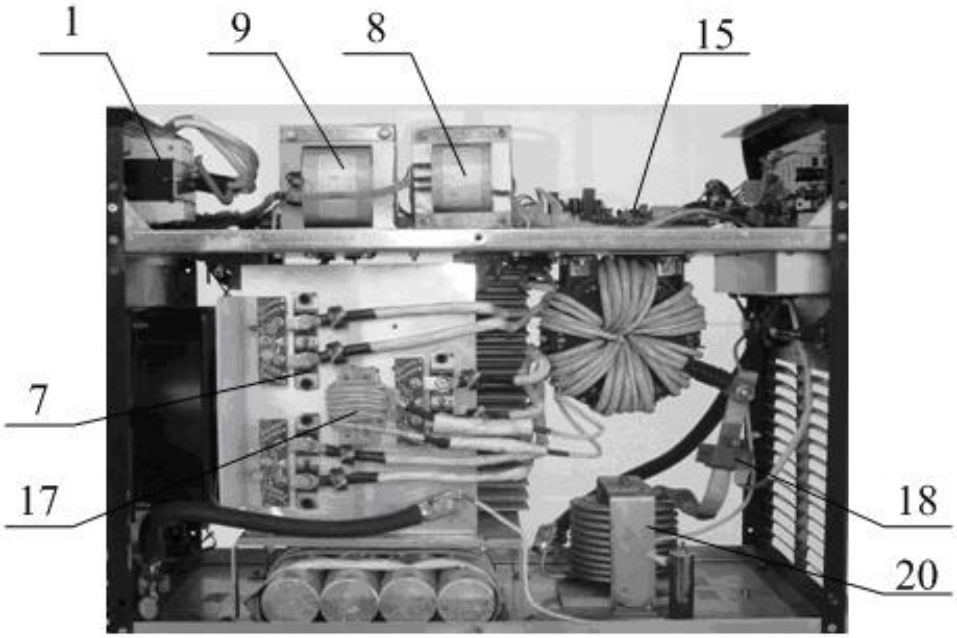
3. Main components list

No.	Item
1	Circuit Breaker
2	3-phase rectifier module
3	Polypropylene capacitor
	IGBT module
5	Polypropylene capacitor
6	Main transformer
7	Fast recovery diode module
8	Transformer for ZKB/QDBI
9	Transformer for ZKB/QDBII
10	Fuse
11	Fan
12	Thermal Switch
13	IGBT protection board
14	Drive board
15	Main control board
16	Varistor
17	Current exchange inductor
18	Current Sensor
19	Solid-state Replay
20	Output reactor
21	Display board

Table 2: Main Components List



Right Side View



Left Side View

Figure 2: Schematic structure

Features & Application

PMIG-ID series inverter MIG/MAG welders, which are high-quality performers, can be used for semi-automatic CO_2, Ar or mix gas shield welding. This series have been widely applied in welding carbon steel, Al-Mg alloy and stainless steel.

Features and benefits:

- Completely digitalized control system, to achieve precise control of the welding process, increase the arc stability
- Full-digital control systems for wire feeder, and make wire feeding more precisely and stable
- Built-in welding expert database, which provide intelligent welding parameters
- Friendly operating interface, unified adjustment, and easy to operate.
- Capable for storing 100 sets of user-defined parameters
- Flexible digital communication interfaces, convenient to equipped with automated welding

Applications:

- Pulse MIG welder PMIG350 ID / 500 ID is suitable for Al-Mg alloy, Al-Si alloy, mild steel and stainless steel welding.
- Aluminum products.
- Shipyards.
- Locomotive industry.
- Chemical and other process industry.
- Boiler Pressure Container manufactures.
- Automotive.

Welding process	Wire type	Wire diameter (mm)	Alloy type	Protection gas
MIG/MAG (Pulse welding)	Al-Mg alloy	Φ1.0 Φ1.2 Φ1.6	LF2--LF16 5005 5052 5182 5356	100%Ar
	Al		L1—L5 1060, 1035, 1100, 1200, 1370	
	Al-Si alloy		LT1 4A11 4043 4047	
	Stainless steel	Φ0.8 Φ1.0 Φ1.2 Φ1.6	304, 308, 309, 316 and other Austenite stainless steel wires	97.5％Ar+2.5%CO2
	Carbon steel		E70	80%Ar+20% CO2
MIG/MAG (Unified DC welding)	Carbon steel	Φ0.8 Φ1.0 Φ1.2 Φ1.6	E70	100% CO2

Table 3: Pulse MIG series welding choice guide

1 . Pre-installation

1.1 Installation Environment

The PMIG-ID series 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 415V, frequency 50Hz.
- Unbalance degree of 3-phase volt must be no more than 5%.
- Power supply

Product type		PMIG350 ID	PMIG500 ID
Power supply		3-phase AC380V	3-phase AC380V
Min. capacity	Power network	22KVA	38KVA
	Generator	30KVA	50KVA
Input protection	Fuse	30A	50A
	Circuit breaker	32A	63A
Cable size (cross-section)	Input volt	≥2.5mm^2	≥6mm^2
	Output volt	35mm^2	70mm^2
	Earth lead	≥2.5mm^2	≥6mm^2

Table 4: Power supply connection

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

2. Front /Rear panel illustration and parts reference

Figure 3: Front panel

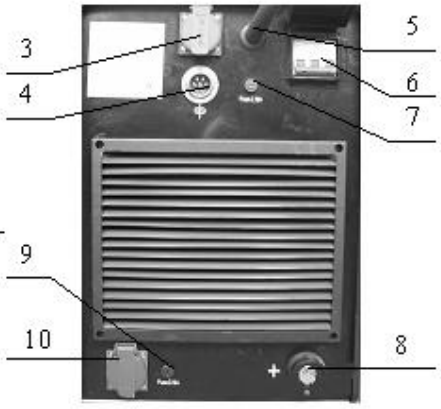


Figure 4: Rear panel

（1）Digital communication socket KC1

（2）Output terminal（-）

（3）Power supply for gas heater KC3

（4）Wire feeder control socket KC2

（5）Power input cable

（6）Circuit breaker

（7）Fuse（2A 5×20）

（8）Output terminal（ + ）

（9）Fuse（2A 5×20）

（10）Power supply for water cooler KC4

3. Machine Assembling Guide:

There is trolley installed at the bottom of the machine, very convenient for moving. Machine needs be settled in even and dry places with smooth ventilation.

PMIG-ID connection chart as Figure 5:

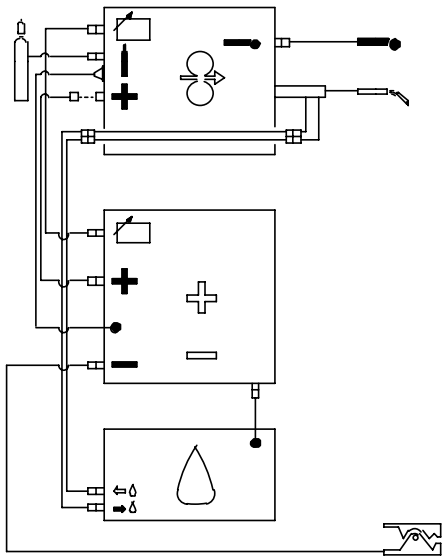


Figure 5: wire connection chart

(1) Connect the welder output terminal (-) and work piece with grounding cable

(2) Connect the welder output terminal (+) and wire feeder with welding cable

(3) Connect the control socket of the wire feeder (on the rear panel of the wire feeder) and wire feeder control socket (on the welder rear panel) with control cable

(4) Connect the wire feeder to the gas regulator

(5) Connect the gas heater power supply (on the rear panel of welder) KC3

(6) Connect the water cooling machine power supply (on the rear panel of welder) KC4

(7) Connect the 3-phase industry power supply; ensure the ground cable reliable grounding

(8) Turn on the circuit breaker

1. Control Panel of welding machine

The welder's control panel is used for functional selection and welding parameters adjustment. The panel includes nixie tubes display window, knobs, touch keys and LED indicators. As shown in Figure 6.

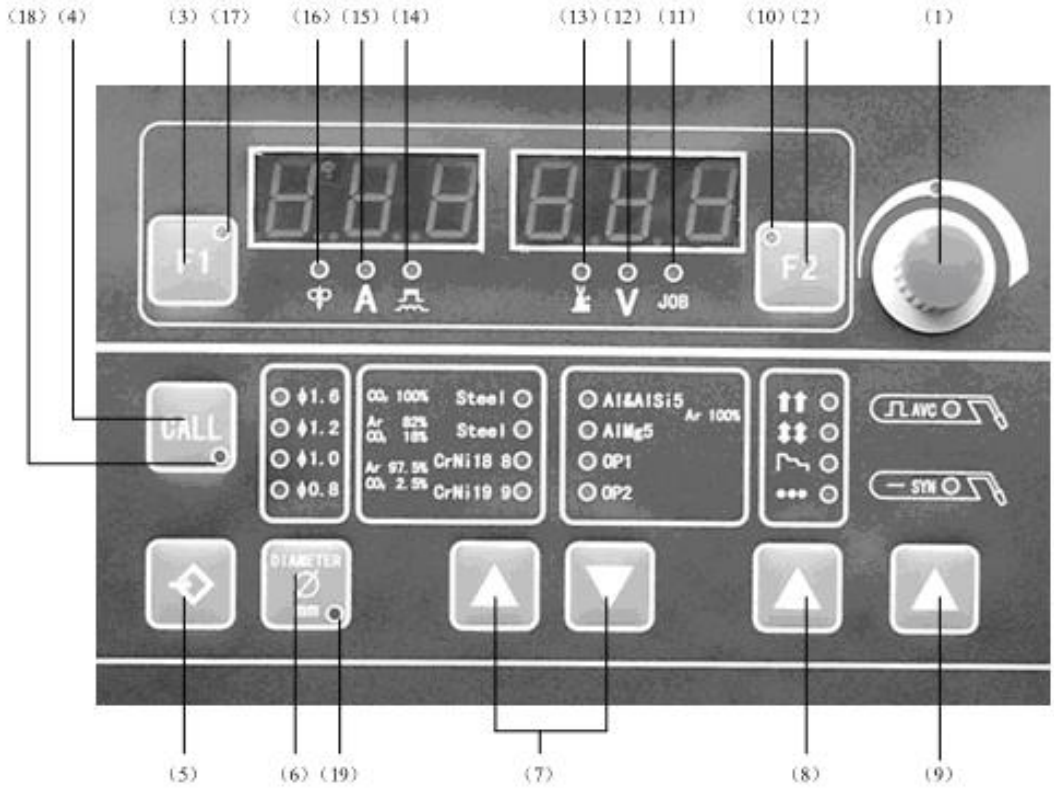


Figure 6: Control panel

（1）Adjustment knob

Adjust the parameters. When the light on, this knob can be used to adjust parameters

（2）Parameters selection Key F_2

Select parameters from following for adjustment：.

- Arc Length Adjustment
- Welding Voltage
- Job (Channel) No

（3）Parameters selection Key F_1

Used to select parameters from following for adjustment:

- Wire feeding Speed
- Welding Current
- Molten Droplet Transfer Force/ Arc Strength

（4）CALL Key

Load stored set of parameters

（5）SAVE Key

Used to enter the Set Menu or used for saving set parameters

（6）Wire Size Selection Key

（7）Wire Material Selection Key

Select wire material and shield gas type

（8）Torch Operating Mode Selection Key

Selecting operating modes from following

- 2-step mode of operation (conventional mode of operation)
- 4-step mode of operation (self-lock mode)
- Special 4-step mode of operation
- Spot-welding operation mode.

（9）Pulse/ CV　Modes Selection Key

Select Pulse or CV (constant voltage) Welding Mode according to welding requirement

- CV: regular CO2/MAG welding.
- Pulse: Pulse MIG/MAG Welding. It is suitable for welding the non-ferrous metal such as Al-Mg alloy, Al, and Al-Si alloy, and the ferrous metal such as carbon steel, low-alloy steel and stainless steel. It can realize that one pulse one drop, less spatter, low heating input, good weld formation. The protecting gas always be pure Ar or the mixture gas.

（10）F2 selection key Indicator

（11）Job (Channel) No Indicator

（12）Welding Voltage Indicator

（13） Light for Arc Length adjustment

Used for Arc Length adjustment

- - Reduce Arc Length
- 0 Standard Arc Length
- + Increase Arc Length

（14）Molten Droplet Transfer Force /Arc Strength adjustment

- During Pulse MIG / MAG welding, used for continuously regulation of the Molten Droplet Transfer Force
  - - Reduce Molten Droplet Transfer Force
  - 0 Standard Molten Droplet Transfer Force
  - + Increase Molten Droplet Transfer Force
- During regular MIG / MAG welding, used for continuously regulation of the Arc Strength
  - - Arc is harder and more stable
  - 0 Medium Arc Strength
  - + Arc is softer and less spatter

（15）Welding Current Indicator

Open-load displays preset current, display welding current during welding.

（16）Wire Feeding Speed Indicator (m/min)

（17）F1 Selection Key Indicator

（18）CALL Program Mode Indicator

（19）Sub-Menu Parameters Regulation Indicator

2. Sub-Menu Parameters Regulation Guide

As shown in Figure 7:

- Press SAVE Key (#5) and Wire Size Selection Key (#6) simultaneously, Sub-Menu Parameters Regulation Indicator will on, and enter Sub-Menu Parameters Regulation Mode, Press SAVE Key (#5) again will exit the Sub-Menu Parameters Regulation Mode.
- Use Wire Size Selection Key (#6) to choose the parameters that need be adjusted, turn the knob (#1) to regulate the value of parameters. When adjusting P01, P02 (listed in Table 5), use F1 key to switch the parameter to Current, then turn Knob (1) to adjust the value.

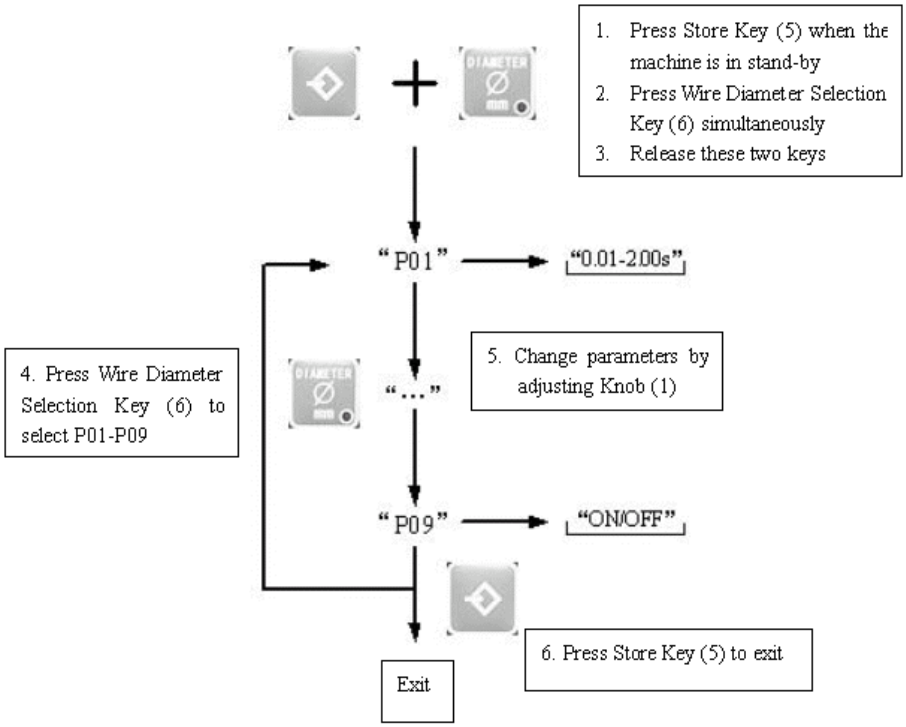


Figure 7: Sub-Menu Parameters Regulation Guide

Parameters that can be adjusted in Sub-Menu Mode are shown in Table 5.

Item	Parameters	Setting range	Min. Value	Factory Setting
P01	Burn back time	0.01-2.00s	0.01s	0.08s
P02	Slow wire feeding speed	1.0-21.0 M/min	0.1 M/min	2.1 M/min
P03	Pre-gas time	0.1-10.0s	0.1s	0.20s
P04	Post-gas time	0.1-10.0s	0.1s	1.0s
P05	Start period Current	30-500A	1A	130A
P06	Crater filling Current	30-500A	1A	135A
P07	Transitional Period	0.1-10.0s	0.1s	2.0s
P08	Spot welding time	0.5-5.0s	0.1s	3.0s
P09	Panel Control Selection	OFF/ON	——	OFF
P10	Water Cooling Selection	OFF/ON	——	OFF

Table 5: Sub-Menu Parameters Reference

Press the regulation Knob (1) for 3 seconds; all parameters will be set as Factory Setting

3. Job (Program) Mode

"Job" (Program) mode the quality of welding in both semi-automatic and fully automatic welding situations. Under "Job" operating mode, operator can store and access as many as 100 different operations records.

- **- - / nPG there** is NO program stored in this channel
- **PrG** there is program stored in this channel
- **Pro** there is a program being stored in this channel

3.1 Procedure for store welding program

There is no pre-stored program for new machine; To call the process, must first store welding program. Use the following steps to store welding programs:

1. Set standard welding parameters that will be stored during "Program "Mode.
2. Press SAVE key (#5) enter SAVE mode, the number displayed is the channel number
3. Use Knob (#1) to select channel for storing the program

4. Hold SAVE key (#5), the left screen will display the channel number. Note: If there is already program in the selected channel, the new program will cover the old program, and this operation is not reversible.
5. Hold SAVE key (#5) until the left window displays "PrG" , that means that the store operation complete successfully.
6. Press SAVE key (#5) again to exit the STORE Mode

3.2 CALL/LOAD program

After storing procedure, all saved programs can be called /loaded to use when necessary. Followings are the procedure to CALL/load saved program

1. Press CALL key (#4), and the indicator (#18) is on, the window shows the channel which has been called last time, use F1 and F2 to displays all called parameters, and all related information such as torch operating mode / welding mode will display too.
2. Use Knob (#1) to choose calling different channel
3. Press SAVE key (#4) again will exit CALL/ LOAD Mode.

4. Welding Parameters Guide

Recommend welding parameters are as shown in the Table 6, 7, 8, 9

4.1 Welding Type–I welding parameters for Low-carbon steel solid wire is shown as Table 6

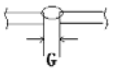
	Thickness (mm)	Gap G(mm)	Wire Diameter (mm)	Welding Current (A)	Welding Voltage (V)	Welding Speed (cm/min)	Gas Flow Rate (L/min)
Welding Type –□ 	0.8	0	0.8	60~70	16~16.5	50~60	10
	1.0	0	0.8	75~85	17~17.5	50~60	10~15
	1.2	0	0.8	80~90	17~18	50~60	10~15
	2.0	0~0.5	1.0，1.2	110~120	19~19.5	45~50	10~15
	3.2	0~1.5	1.2	130~150	20~23	30~40	10~20
	4.5	0~1.5	1.2	150~180	21~23	30~35	10~20
	6	0	1.2	270~300	27~30	60~70	10~20
		1.2~1.5	1.2	230~260	24~26	40~50	15~20
	8	0~1.2	1.2	300~350	30~35	30~40	15~20
		0~0.8	1.6	380~420	37~38	40~50	15~20
	12	0~1.2	1.6	420~480	38~41	50~60	15~20

Table 6: Welding Type–I welding parameters for Low-carbon steel solid wire

4.2 Welding Type –□ welding parameters for Low-carbon steel solid wire is shown as Table 7

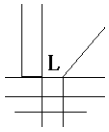
	Thickness (mm)	Wire Diameter (mm)	Welding Current (A)	Welding Voltage (V)	Welding Speed (cm/min)	Gas Flow Rate (L/min)	Memo
Welding Type –□ 	1.0	0.8	70~80	17~18	50~60	10~15	L=1~2
	1.2	1.0	85~90	18~19	50~60	10~15	L=1~2
	1.6	1.0,1.2	100~110	18~19.5	50~60	10~15	L=1~2
		1.2	120~130	19~20	40~50	10~20	L=1~2
	2.0	1.0,1.2	115~125	19.5~20	50~60	10~15	L= 2~3
	3.2	1.0,1.2	150~170	21~22	45~50	15~20	L= 2~3
		1.2	200~250	24~26	45~60	10~20	L= 2~3
	4.5	1.0,1.2	180~200	23~24	40~45	15~20	L= 3~4
		1.2	200~250	24~26	40~50	15~20	L= 3~4
	6	1.2	220~250	25~27	35~45	15~20	L= 3~4
		1.2	270~300	28~31	60~70	15~20	L= 3~4
	8	1.2	270~300	28~31	55~60	15~20	L= 4~6
		1.2	260~300	26~32	25~35	15~20	L= 4~6
		1.6	300~330	30~34	30~35	15~20	L= 4~6
	12	1.2	260~300	26~32	25~35	15~20	L= 4~6
		1.6	300~330	30~34	30~35	15~20	L= 4~6

Table 7: Welding Type –□ welding parameters for Low-carbon steel solid wire

4.3 Pulse MAG welding parameters for Low-carbon steel wire & Pulse MAG welding parameters for Stainless steel wire are shown as Table 8

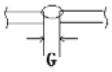
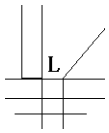
Welding Position	Thickness (mm)	Wire Diameter (mm)	Welding Current (A)	Welding Voltage (V)	Welding Speed (cm/min)	Distance from Conduct Tip to the base metal (mm)	Gas Flow Rate (L/min)	Memo
Welding Type –□ 	1.6	1.0	80~100	19~21	40~50	12~15	10~15	
	2.0	1.0	90~100	19~21	40~50	13~16	13~15	
	3.2	1.2	150~170	22~25	40~50	14~17	15~17	
	4.5	1.2	150~180	24~26	30~40	14~17	15~17	
	6.0	1.2	270~300	28~31	60~70	17~22	18~22	
	8.0	1.6	300~350	39~34	35~45	20~24	18~22	
	10.0	1.6	330~380	30~36	35~45	20~24	18~22	
Welding Type –□ 	1.6	1.0	90~130	21~25	40~50	13~16	10~15	L= 1~2
	2.0	1.0	100~150	22~26	35~45	13~16	13~15	L= 2~3
	3.2	1.2	160~200	23~26	40~50	13~17	13~15	L= 2~3
	4.5	1.2	200~240	24~28	45~55	15~20	15~17	L= 3~4
	6.0	1.2	270~300	28~31	60~70	18~22	18~22	L= 3~4
	8.0	1.6	280~320	27~31	45~60	18~22	18~22	L= 4~6
	10.0	1.6	330~380	30~36	40~55	20~24	18~22	L= 4~6

Table 8: Pulse MAG welding parameters for Low-carbon steel wire & Pulse MAG welding parameters for Stainless steel wire

4.4 Pulse MIG welding parameters for Aluminum alloy wire is shown as Table 9

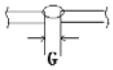
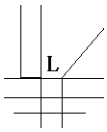
Welding Position	Thickness (mm)	Wire Diameter (mm)	Welding Current (A)	Welding Voltage (V)	Welding Speed (cm/min)	Distance from Conduct Tip to the base metal (mm)	Gas Flow Rate (L/min)	Memo
Welding Type –□ 	1.5	1.0	60~80	16~18	60~80	12~15	15~20	
	2.0	1.0	70~80	17~18	40~50	15	15~20	
	3.0	1.2	80~100	17~20	40~50	14~17	15~20	
	4.0	1.2	90~120	18~21	40~50	14~17	15~20	
	6.0	1.2	150~180	20~23	40~50	17~22	18~22	
Welding Type –□ 	1.5	1.0	60~80	16~18	60~80	13~16	15~20	L= 1~2
	2.0	1.0	100~150	22~26	35~45	13~16	15~20	L= 2~3
	3.0	1.2	100~120	19~21	40~60	13~17	15~20	L= 2~3
	4.0	1.2	120~150	20~22	50~70	15~20	15~20	L= 3~4
	6.0	1.2	150~180	20~23	50~70	18~22	18~22	L= 3~4

Table 9: Pulse MIG welding parameters for Aluminum alloy wire

Error Code

During the event of failure, the welder will automatically display the error code. Refer to Table 10 to show the phenomenon, the reasons for and solutions.

Error Code	TROUBLE	CAUSES	WHAT TO DO
E01	Torch fault when turn on the machine	The Torch Switch is OFF when machine is ON	Turn off the machine, reset the torch switch
E02	Torch Switch fault	No current output after pressing torch switch for 2s	Release Torch Switch
E03	Given parameter is abnormal	No given signal	Check given signal wire
E04	Over-heat protection	The welding machine is over heat; Thermal Switch fault	Shut down the welding machine and wait for cooling; Replace
E05	Voltage feedback is abnormal	Voltage Feedback Wire is broken; Main Control Board is damaged	Check and repair; Replace
E06	Over-current protection	Short circuit of Output; Current Sensor fault	Check and repair; Replace
E07	Communication is abnormal	Communication cable is broken	Check and repair
E08	Wire feeding is abnormal	The current of Wire Feeder Motor is too large	Check and repair
E09	Water-cooling is abnormal	No circulating water in water cooling system	Check and repair

Table 10: Error Code Explanation

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.

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 air switcher trips. Cut off the power supply to the electricity switchboard on frame, and wait for 5 minutes to turn on the air switcher 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 370~460V.
- 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

NO	TROUBLE	CAUSES	WHAT TO DO
1	Instable arc, weld forming black; lots of spatter, and more short-circuit	Gas mixing ratio wrong	1) Stainless steel：Ar+(2~5)%CO2 2) Carbon steel: 80% Ar+20%CO2 3) Al-Mg：100% Ar 4) Carbon steel (Flat characteristic)：100% CO2
2	Welding seam has gas cavity	1) Gas flow leak or inappropriate 2) Surface is not clean	1) Check Gas hose and torch, the gas flow should be 15~20L/min. 2) Clean the workpiece
3	No penetration, the base metal does not melt, pulsed current was not obvious	Current Sensor is damaged	Replace
4	Too many short-circuit, a lot of spatters	1) Inappropriate welding parameters selection 2) Contact tip is worn out	1) Adjust parameters and inductance 2) Replace
5	Contact tip is burnt out; Welding voltage and current are not adjustable.	1) Wire feeder control cable or potentiometer is damaged 2) Voltage Sensor is damaged 3) Current Sensor is damaged	1) Replace 2) Replace Main Control Board 3) Replace
6	Difficult to arc-start	1) Slow wire feeding speed is not appropriate. 2) Bad contact of welding cable	1) Adjust slow wire feeding speed 2) Check and repair
7	Wire feeding instability	1) Wire Feeder fault 2) Wire guiding tube is damaged 3) Contact tip is worn out	1) Check Wire Feeder and Wire Feed Roller 2) Replace 3) Replace
8	CO2 gas regulator can't heat	1) CO2 regulator is damaged 2) Heater cable is broken or shorten 3) Thermistor is damaged	1) Replace regulator 2) Repair heater cable 3) Replace
9	Press torch switch, wire feeding is normal but gas-flow is blocked	1) Control board is damaged 2) Electromagnetic valve is blocked or damaged 3) Control Cable is broken	1) Replace 2) Repair or replace 3) Connect
10	Press torch switch, wire feeder does not work and there is no open load voltage display	1) Torch switch is damaged 2) Wire Feeder's control cable is broken 3) Control board is damaged	1) Replace welding torch 2) Repair control cable 3) Replace

Table 11: Trouble Shooting Table

Wire Feeder

This wire feeder is a full digital control close type design machine, as shown in Figure 8.

Figure 8：Closed type wire feeder

1. Wire feeder Interface and Control

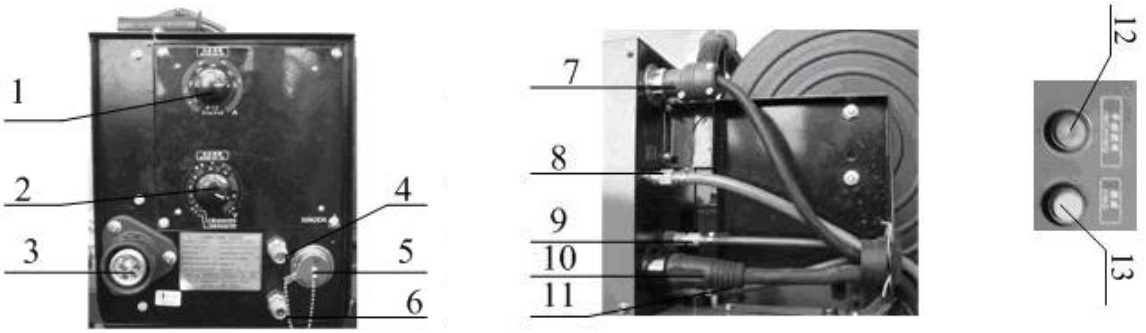


Figure 9: Front view and side view if wire feeder

(1) Current Regulation Knob

(2) Voltage Regulation Knob

(3) Torch Connector

(4) Water Outlet

(5) Digital Communication Socket

(6) Water Inlet

(7) Wire Feeder Control Socket

(8) Gas Hose Inlet

(9) Water Outlet

(10) Welding Cable Socket

(11) Water Inlet

(12) Manual Wire Feeding Button

(13) Gas Test Button

2. Wire Feeder Wiring Diagram

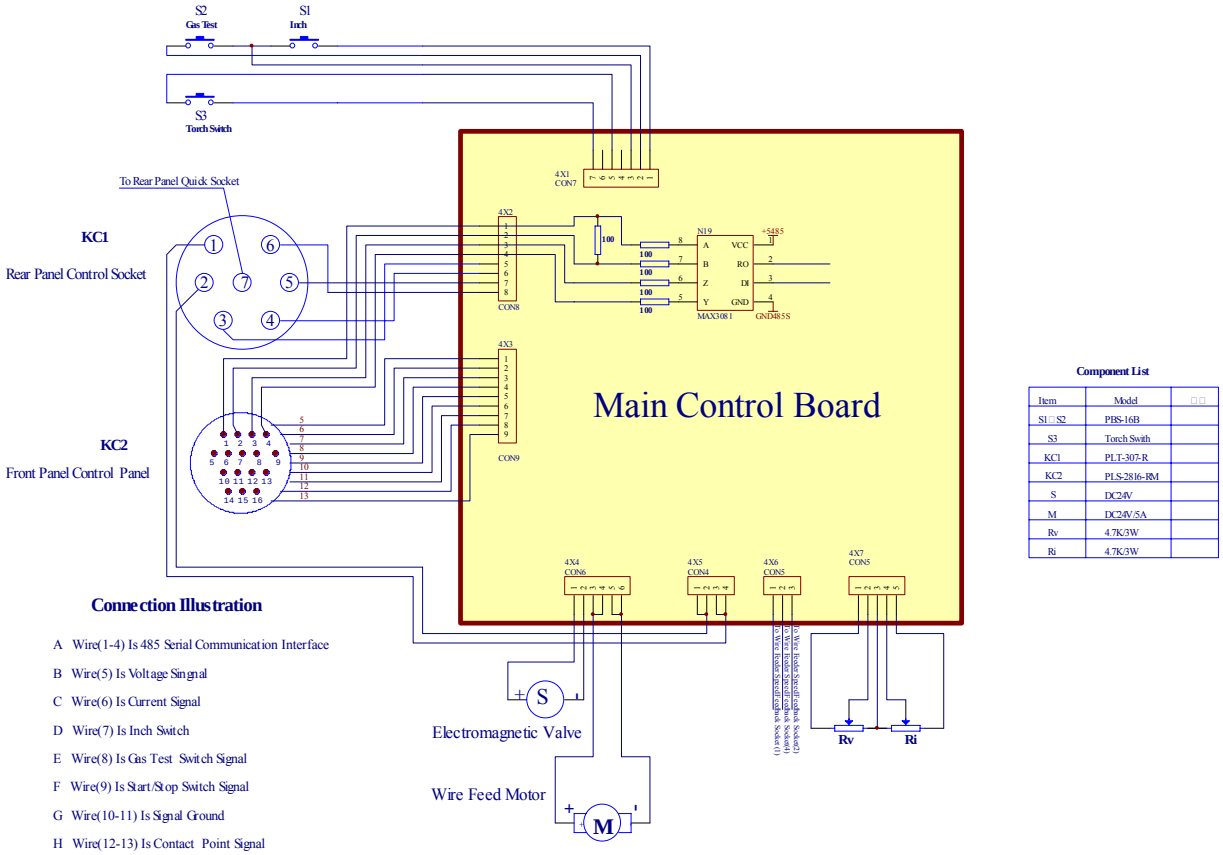


Figure 10: Wire Diagram of Wire Feeder

3.Wire Feeder structure:

Wire Feeder structure, as Figure 11:

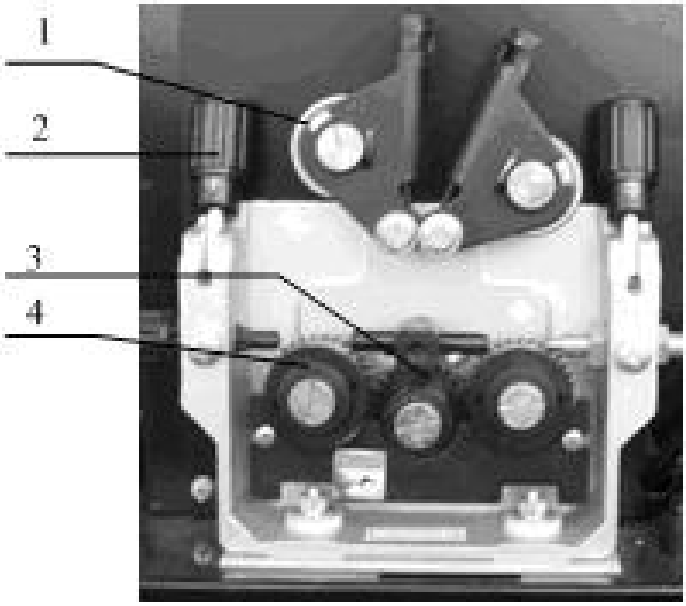


Figure 11: Wire Feeder Structure

(1) Pressing Handle

(2) Wire Pressing Roller

(3) Driving Gear

(5) Wire Feed Roller

4. Wire Feeder Roller and Installation

There is a scale for wire feeding pressure on the Pressing Handle, Different materials and sizes of the wires are corresponding to different pressures value, refer to Table 12 and Figure 12 for detail. The data in the table is only for reference, the actual pressure regulator norms must be adjusted based on torch model, cable length, type of welding torch, welding wire type and size.

- Type 1 for hard wire, such as carbon steel wire, stainless steel wire.
- Type 2 for soft wire, such as Aluminum wire and AL alloys wire, copper wire and cooper Alloy wire.
- Type 3 for flux cored wire.

Regulating the pressure of feeding rollers with the pressure handle, ensure the wire go through the guiding tube smoothly, and there should be a bit brake force where the wire come out from the conductive tip to avoid the wire feed rollers skidding.

Note: Too much pressure will cause wire crushed, and the wire coating will be damaged, and it will cause feed rollers wear out, and increase the wire feeding resistance

DIAMETER / SCALE / TYPE	φ0.8	φ1.0	φ1.2	φ1.6
1	3	3	2.5	2.5
2	3.5	3.5	3	3
3	—	—	3	3

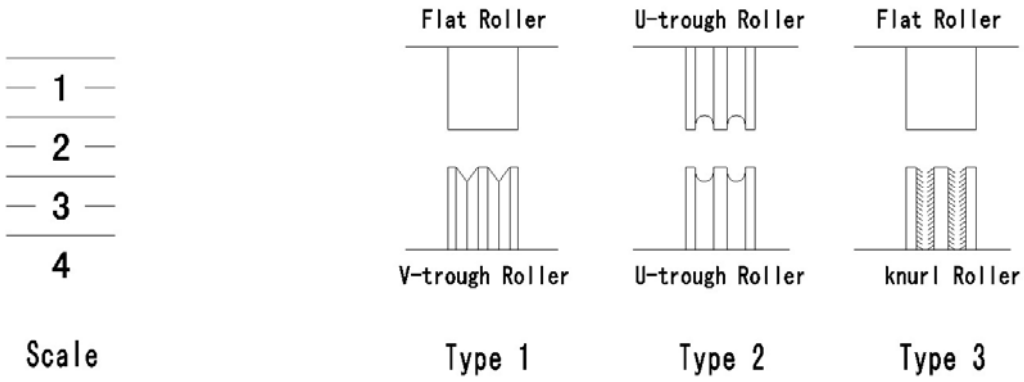


Figure 12: Wire Feeder Operating Instruction

5. Torch assembling Guide

In order to ensure the smooth progress of welding, Ensure that the wire feeding tube and the conductive tip are matching with the torch mode. The wire feeding tube used must fit the wire sizes and wire materials. Steel wire hose is for hard wires, such as carbon steel wire, stainless steel wire. Teflon wire hose is for soft wire, such as Aluminum and Aluminum alloys, also for copper and copper alloy wire. If the wire hose is too tight or too loose, it will increase resistance for wire feeding or cause wire feeding instable. Tightening torch's quick plug, to avoid the torch or wire feeder being over heat due to the loose contact.

Installation guide for steel wire hose is as shown in Figure 13:

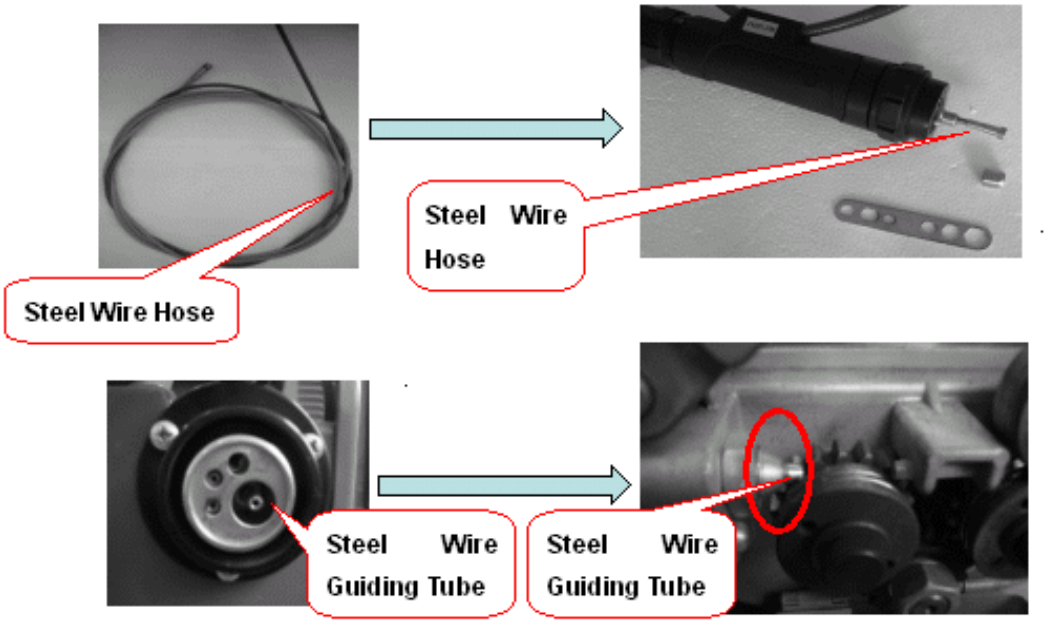
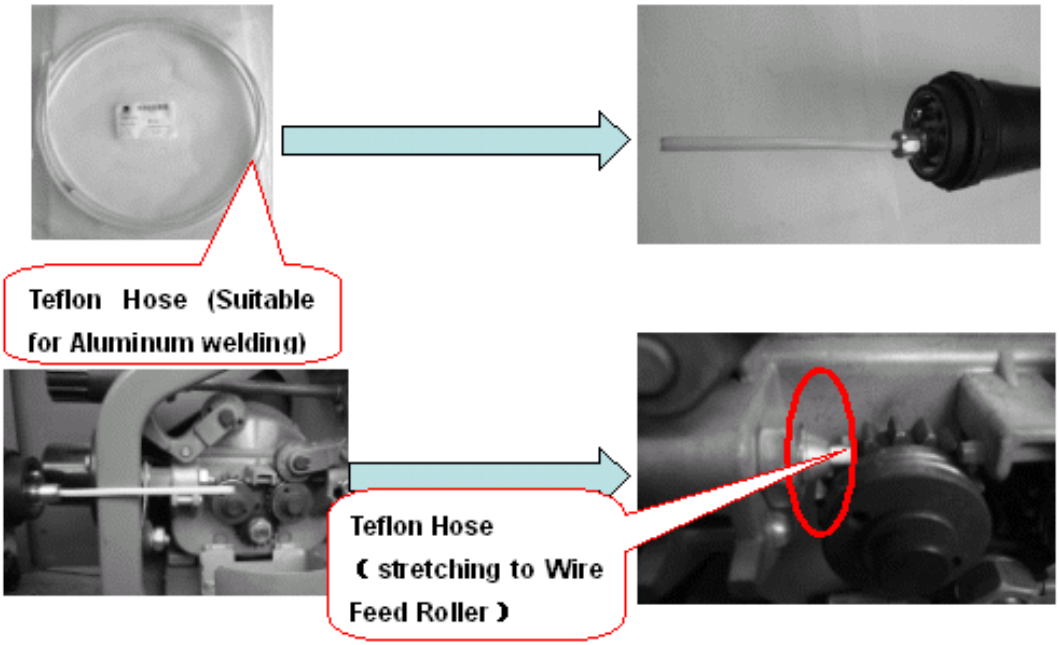


Figure 13: Installation guide for steel wire hose

Installation guide for Teflon wire hose is as shown in Figure 14:



:

Figure14: Installation guide for Teflon wire hose

6. Brake force of wire spool adjustment

Use screw wrench to turn the Brake Force Control Screw (#1) as shown in Figure 15. The brake force must be appropriate, ensure the wire round the wire spool will not become too loose and prevent the wire scattering. If the brake force is too large, it will increase the wire-feeding load. Generally the faster the wire is feeding, the greater is the brake force.

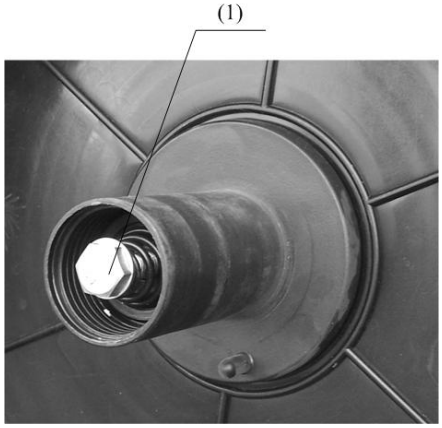


Figure 15: Brake Force Control Screw

7. Manual wire feeding & Gas Test

Press the button to launch the manual wire feeding, wire feed motor works and start feeding wire, turn current adjustment knob to adjust the wire feed speed. Release the button and manual wire feeding will stop.

Click the gas test button will open the gas valve, the wire feeder and welder will not work the gas test will last less than 60 seconds, re-click the gas test button will stop gas flow.

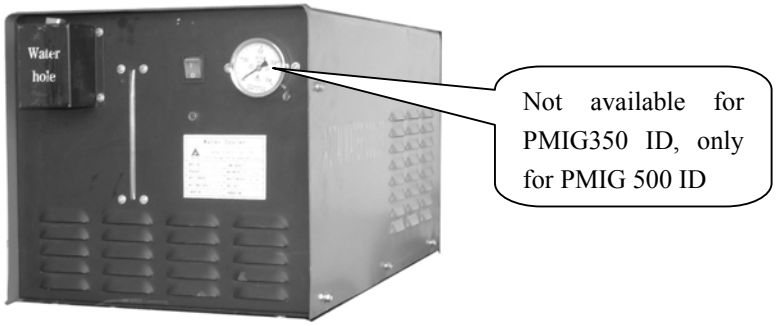


Figure 16: Water Cooling Machine

Water Cooling Machine is as shown in Figure 16; it needs maintain the appropriate amount of coolant. During the cold weather, apply anti-freeze solutions to prevent damage

1. Front / Rear panel of Water Cooling Machine:

Front / Rear panel of Water Cooling Machine is as shown in Figure 17:

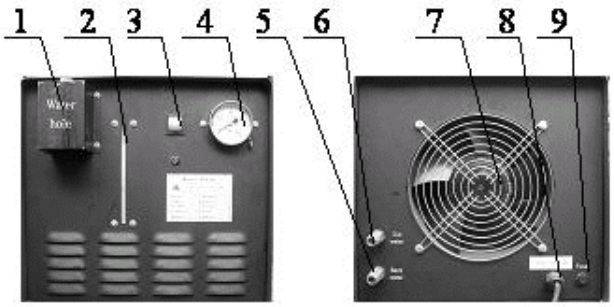


Figure 17: Front / Rear panel of Water Cooling Machine

(1) Water Hole for filling water

(2) Water Level Indicator

(3) Power Switch

(4) Water Pressure Meter (Not available for PMIG350ID, only for PMIG500 ID)

(5) Water Inlet

(6) Water Outlet

(7) Fan

(8) Power Input Cable

(9) Fuse

Appendix A

1. General

The user is responsible for installing and using the arc welding equipment according to the manufacturer's instructions. If electromagnetic disturbances are detected, then it shall be the responsibility of the user of the arc welding equipment to resolve the situation with the technical assistance of the manufacturer. In some cases this remedial action may be as simple as earthling the welding circuit, see note. In other cases it could involve constructing an electromagnetic screen enclosing the welding power source and the word complete with associated input filters. In all cases electromagnetic disturbances shall be reduced to the point, where they are no longer troublesome.

NOTE: The welding circuit may not be earthed for safety reasons. Changing the earthling arrangements should only be authorized by a person who is competent to assess whether the changes will increase the risk of injury.

2. Assessment of area

Before installing arc welding equipment the user shall make an assessment of potential electromagnetic problems in the surrounding area. The following shall be taken into account:

1) Other supply cables, control cables, signaling and telephone cables, above, below and adjacent to the arc welding equipment;
2) Radio and television transmitters and receivers;
3) Computer and other control equipment;
4) Safety critical equipment, for example guarding of industrial equipment;
5) The health of the people around, for example the use of pacemakers and hearing aids;
6) Equipment used for calibration or measurement;
7) The immunity of other equipment in the environment is compatible. The user shall ensure that other equipment being used in the environment is compatible. This may require additional protection measures;
8) The time of day that welding or other activities are to be carried out.

3. Methods of reducing emissions

1) Public supply system

Arc welding equipment should be connected to the public supply system according to the manufacturer's recommendations. If interference occurs, it may be necessary to take additional precautions such as filtering of the public supply system. Consideration should be given to shielding the supply cable of permanently installed arc welding equipment, in metallic conduit or equivalent. Shielding should be electrically continuous its length. The shielding should be connected to the welding power source so that good electrical contact is maintained between the conduit and the welding power source enclosure.

2) Maintenance of the arc welding equipment

The arc welding equipment should be routinely maintained according to the manufacturer's recommendations. All access and service doors and covers should be closed and properly fastened when the arc welding equipment is in operation. The arc welding equipment should not be modified in any way, except for those changes and adjustments covered in the manufacturer's instructions. In particular, the spark gaps of arc striking and stabilizing devices should be adjusted and maintained according to the manufacturer's recommendations.

3) Welding cables

The welding cables should be kept as short as possible and should be positioned close together, running at or close to the floor level.

4) Equipotent bonding

Bonding of all metallic components in the welding installation and adjacent to it should be considered. However, metallic components bonded to the word piece will increase the risk that the operator could receive an electric shock by touching these metallic components and the electrode at the same time. The operator should be insulated from all such bonded metallic components.

5) Earthling of the work piece

Where the work piece is nor bonded to earth for electrical safety, nor connected to earth because of its size and position, for example ships hull or building steelwork, a connection bonding the work piece to earth may reduce emissions in some, but not all instances. Care should be taken to prevent the earthling of the work piece increasing the risk of injury to users, or damage to other electrical equipment. Where necessary, the connection of the work piece to earth should be made by a direct connection to the work piece, but in some countries where direct connection is not permitted, the bonding should be achieved by suitable capacitance, selected according to national regulations.

6) Screening and shielding

Selective screening and shielding of other cables and equipment in the surrounding area may alleviate problems of interference. Screening of the entire welding installation may be considered for special applications.