



**COMBO SERIES
CC/CV BASED
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

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- 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.

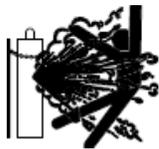


WELDING AND CUTTING SPARKS can cause fire or explosion.

- 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.

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- 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.
- 8.b. Install equipment in accordance with the manufacturer’s recommendations.
- 8.c. Ground the equipment in accordance with the manufacturer’s recommendations.

Principle & Technical data

COMBO 500 ID Block diagram of principle

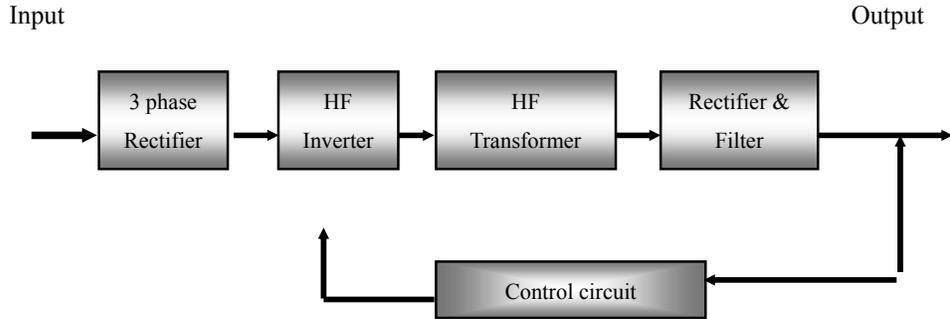


Figure 1: Block diagram of principle

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.

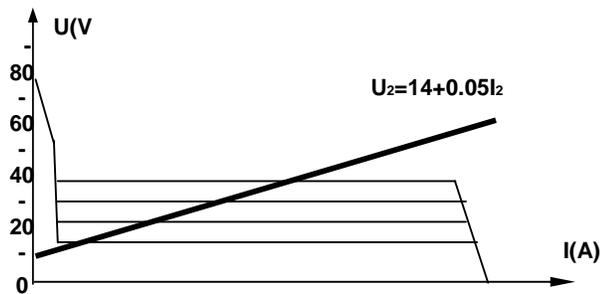


Figure 2: CV Volt-Ampere curve

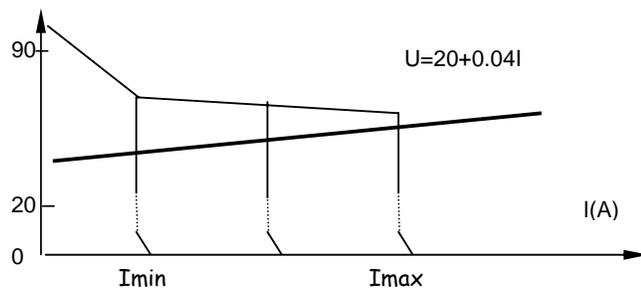


Figure 3: CC Volt-Ampere curve

1. Main technical parameters

№	Items	COMBO 500 ID
01	Voltage/frequency	Three phase 400V/50Hz
02	Rated input power	25KVA
03	Rated input current	37A/27A
04	Rated duty cycle	60%
05	Output current	60 ~ 500A
06	Output voltage	15 ~ 50V
07	Output open voltage	70V
08	Efficiency	□89%
09	Power factor	□0.87
10	Wire diameter (mm)	1.0~1.6
11	Electrode diameter (mm)	2 ~ 6
12	Carbon rod diameter (mm)	3 ~ 8
13	Weight	50Kg
14	Dimensions (mm)	636×322×584
15	CO ₂ gas flow rate	15-20L/min
16	Insulation class of main transformer	H
17	Insulation class of output reactor	B

Table 1: Parameter Specification

2. Main circuit diagram

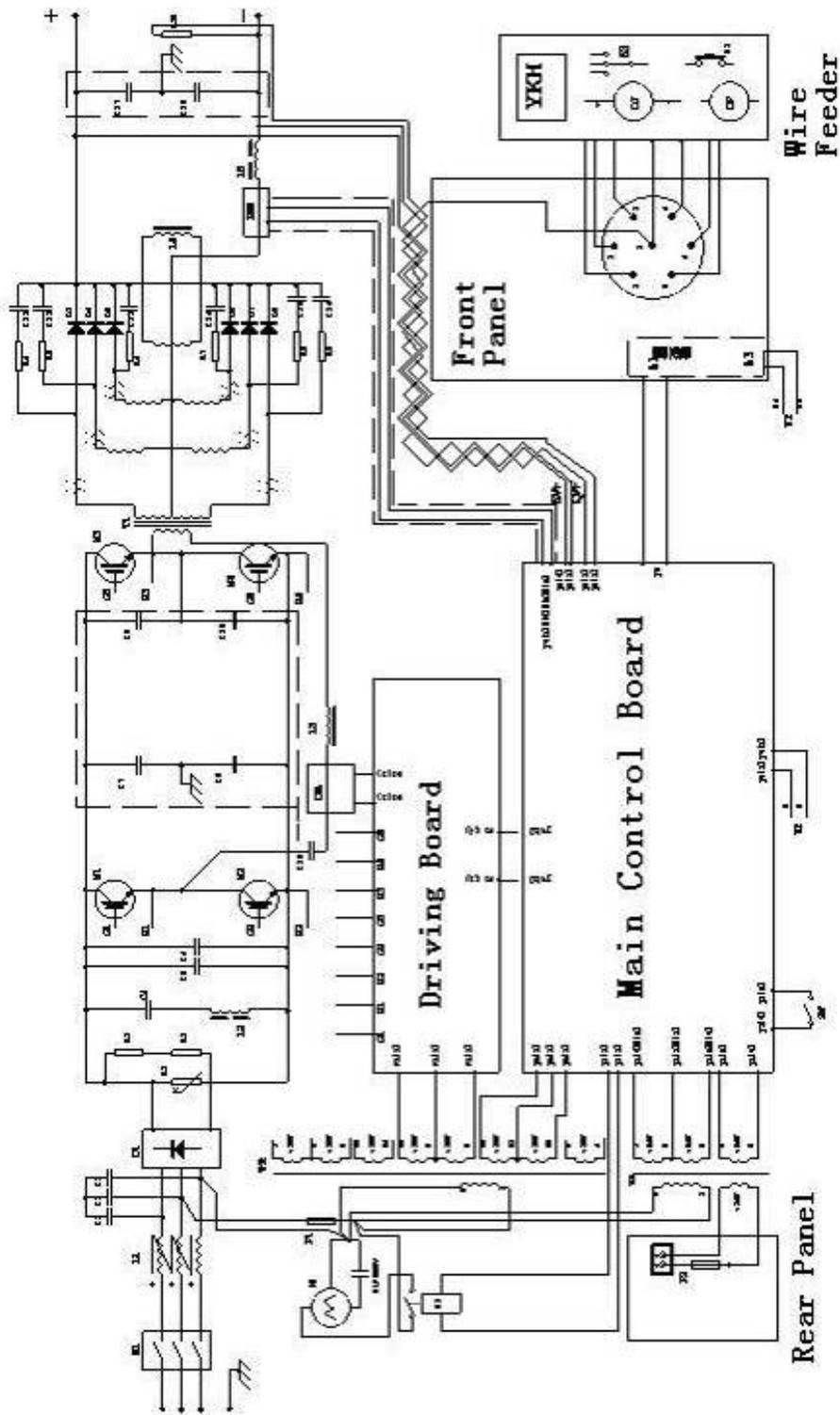


Figure 4: Main Circuit Diagram

3. Main components list

No.	Item	Model
1	Circuit breaker	DZ47-D-60A 3P
2	3-phase rectifier module	MDS100-16 (large)
3	Polypropylene capacitor	MFD-DA01-1400V-20Uf
4	IGBT module	SKM100GB128D
5	Polypropylene capacitor	MFD-DA01-500V-5Uf
6	Main transformer	NBC-500□
7	Fast recovery diode module	DKR200AB60
8	Transformer for ZKB/QDBI	AMIG-500□
9	Transformer for ZKB/QDBII	AMIG-500□
10	Fuse	UFE 2A
11	Fan	AK2072HB (220V)
12	Thermal switch	JUC-079F/70±5□-1D-A
13	IGBT protection board	NBC-500□
14	Drive board	NBC-500□
15	Main control board	NBC-500Xa
16	Varistor	MYL1-625/5
17	Current exchange inductor	ZX7-400□
18	Quick socket	Trak-BE 35-70mm ²
19	Current sensor	HAS600-S

Table 2: Main Components List

Features & Application

COMBO 500 ID series inverter CO₂/MAG welders, which are high-quality performers with CV (constant volt) and CC (constant current) output characteristic, can be used for semi-automatic CO₂ gas shield welding or SMAW with solid or flux-cored wire(Φ1.0-Φ1.6mm)for welding mild steel and low alloy steel work pieces. This series welder enjoys reasonable static characteristic and sound dynamic characteristic.

Features and benefits:

- ◆ Capable of presetting welding current or wire feeding speed and 10 memory locations for jobs.
- ◆ Featured function of wire diameter selection.
- ◆ Enjoying spot welding function.
- ◆ Enjoying unified adjustment function.
- ◆ Self-diagnostic function with error code display.
- ◆ Equipped with 485 commutation port unit, easily coupled with a cable of automatic welding.
- ◆ Optional digital remote control box.
- ◆ Perfect functions of starting arc and reducing melting ball while stopping arc.
- ◆ Capable of operation with extended 50M long welding cable.
- ◆ M type can perform SMAW and Carbon Arc Gouging.

Applications:

- ◆ Suitable for mild steel and alloy steel welding.
- ◆ Electric power, petrochemical Constructions.
- ◆ Automobiles.
- ◆ Metal shop.
- ◆ Equipment manufacture.
- ◆ Boiler Pressure container manufacture.
- ◆ Shipyards.
- ◆ Steel structure workshops.
- ◆ Light and heavy industries.

1 . Pre-installation

1.1 Installation Environment

The COMBO 500 ID is 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 400V, frequency 50Hz.
- Unbalance degree of 3-phase volt must be no more than 5%.
- Power supply

Product type		COMBO 500 ID
Power supply		3-phase AC 400V
Min. capacity	Power network	38KVA
	Generator	50KVA
Input volt protection	Fuse	50A
	Circuit breaker	63A
Cable size (cross-section)	Input volt	≥6mm ²
	Output volt	70mm ²
	Ground lead	≥6mm ²

Table 3: Power supply connection

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

2. 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.

COMBO 500 ID connection chart as Figure 5:

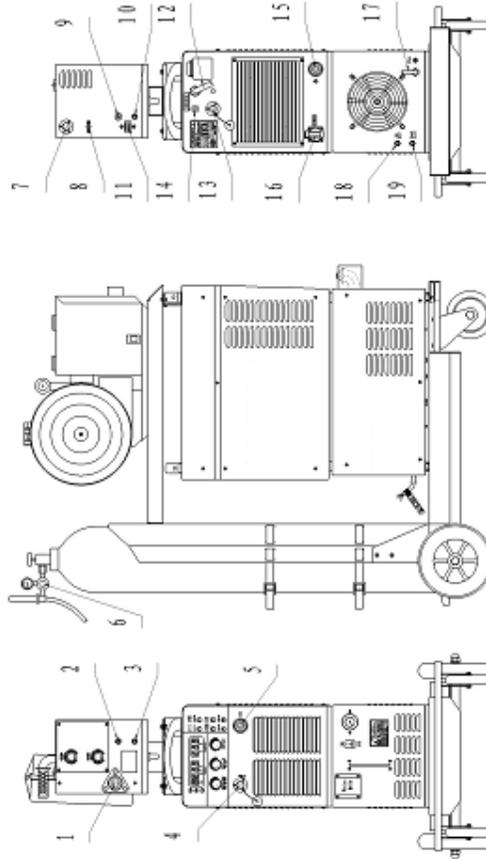


Figure 5: Connection Chart for COMBO 500 ID

Procedure for assembling the machine (Refer to Figure 5)

Parts numbers reference:

- 1) Quick socket for welding torch (+)
- 2) Water outlet
- 3) Water inlet
- 4) Digital controller socket
- 5) Quick socket (-)
- 6) CO₂ gas regulator
- 7) Wire feeder control socket
- 8) Gas inlet of wire feeder

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- 9) Water inlet of wire feeder
 - 10) Water outlet of wire feeder
 - 11) Connecting terminal lug of wire feeder (+)
 - 12) Input power cable of welder
 - 13) Welder control socket
 - 14) Wire hole for water cooler power cable
 - 15) Quick socket (+)
 - 16) Output socket for heating CO₂ gas
 - 17) Input power cable of water cooler
 - 18) Water outlet of water cooler
 - 19) Water inlet of water cooler

3. Preparation procedure prior to welding: (refer to figure 5)

- (1) Mount the water cooler (optional), welder, wire feeder and gas cylinder to the trolley fitly.
- (2) Connect the socket No.15 to lug No.11 on the rear panel diagram by using wire feeder welding cable.
- (3) Connect the socket No.13 to socket No.7 on the rear panel diagram by using wire feeding control cable (can be coated by a cover).
- (4) Connect the gas inlet No.8 on the rear panel diagram to the gas regulator No.6 by using gas hose.
- (5) Connect the water outlet No.18 to the water inlet No.9 on the rear panel diagram by using water hose (for water cooled type).
- (6) Connect the water inlet No.19 to the water outlet No.10 on the rear panel diagram by using water hose (for water cooled type).
- (7) Connect the socket No.16 to the heating cable of the CO₂ gas regulator.
- (8) Connect the digital controller (optional) to the socket No.4 on the front panel of welder (can be coated by a cover).
- (9) Connect the workpiece to the socket No.5 on the front panel of welder.
- (10) Connect the welding torch to the socket No.1 on the front panel of wire feeder.
- (11) Connect the welding torch to the water inlet and water outlet on the front panel of wire

feeder (for water cooled type, the torch is optional).

- (12) Connect the power input cable of water cooler to the power supply, and ensure the earth lead is firmly grounded. When the water cooler is powered by welder, this step can be neglected.
- (13) Connect the input 3-phase power cable to the power supply, and ensure the earth lead is firmly grounded.
- (14) Turn on air switch on the rear panel of the welder.

4. 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 CO₂ 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.

Welding current (A)	Welding voltage (V)	Suitable wire (mm)
60~80	17~18	Φ1.0
80~130	18~21	Φ1.0、Φ1.2
130~200	20~24	Φ1.0、Φ1.2
200~250	24~27	Φ1.0、Φ1.2
250~350	26~32	Φ1.2、Φ1.6
350~500	31~39	Φ1.6
500~630	39~44	Φ1.6

Table 4: Recommended welding parameters

When on SMAW mode, reset the circuit breaker on the switchboard, adjust the parameters on the control board, then the welding work can be starting. Customer should refer to parameters defined in table 5 showing below:

Work piece thickness (mm)	< 1	2	3	4 ~ 5	6 ~ 12	≥13
Electrode diameter (mm)	1.5	2	3.2	3.2 ~ 4	4 ~ 5	5 ~ 6
Welding current (A)	20 ~ 40	40 ~ 50	90~110	90~130	160~250	250~400

Table 5: SMAW welding parameters

1. Front panel illustration and parts number reference

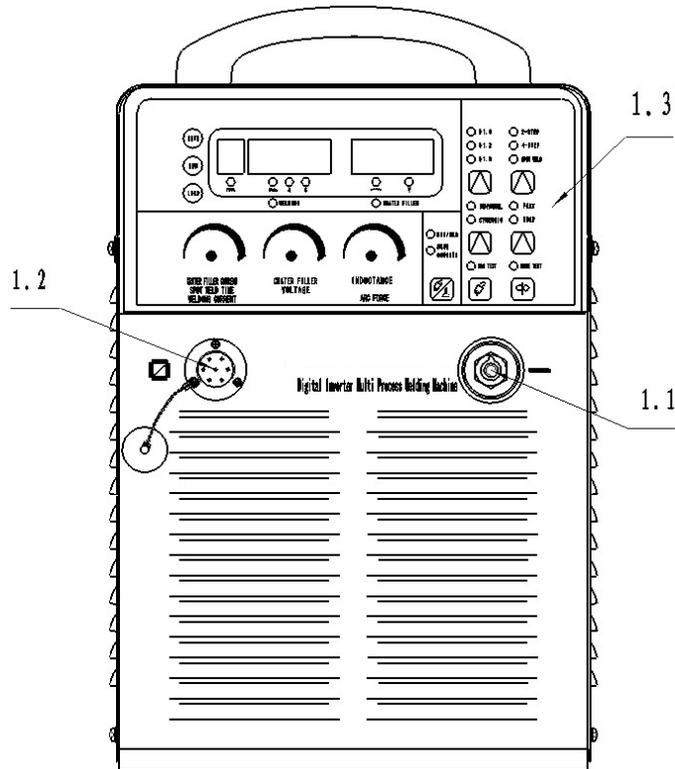


Figure 6: Front panel

1.1 Quick socket (-)

Connect work piece by work lead

1.2 RD-I digital controller cable socket

1.3 Control panel

The welder's control panel is used for functional selection and some welding parameters adjustment. The panel includes nixietubes window, knobs, touch keys and LED indicators.

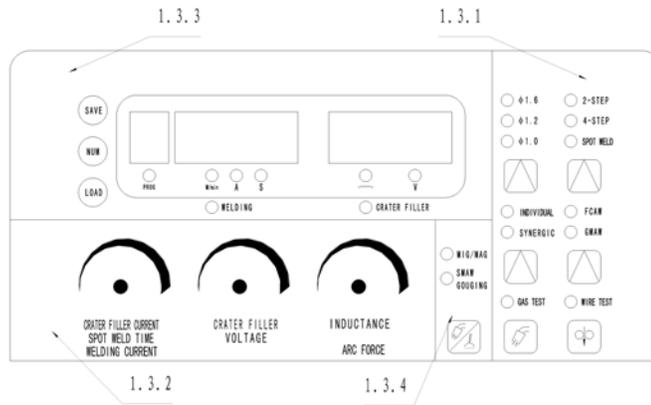


Figure 7: Welding machine control panel

1.3.1 Functional selection

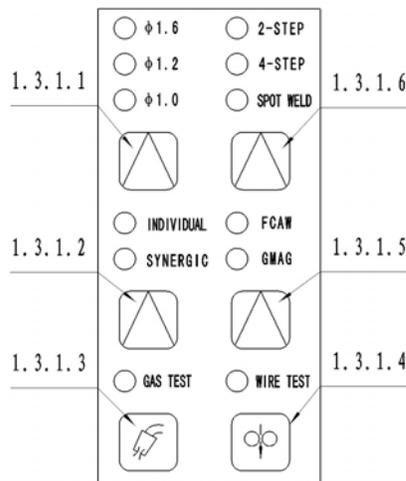


Figure 8: Function selection key

1.3.1.1 Wire diameter selection key

Selecting wire diameter between $\Phi 1.6$ 、 $\Phi 1.2$ and $\Phi 1.0$ mm, and the respective LED will lights on.

1.3.1.2 “Individual/Synergic” selection key

Select individual/synergic mode. On “Individual” mode, welding current and voltage can be adjusted individually by regulating controller of wire feeder. On “Synergic” mode, welding voltage automatically match up to welding current. Fine tunes welding voltage by regulating “Crater filling” knob.

1.3.1.3 “Gas test” key

Gas flows out for about 30 seconds when pressed on. Stop gas flowing when pressed again in 30 seconds.

1.3.1.4 “Wire test” key

Wire feeding when pressing on the key. Stop feeding when releasing the key. (The same function as to press the inching button on the wire feeder controller)

1.3.1.5 “FCAW/GMAW” selection key

1.3.1.6 Mode selection key

Selecting 2-step, 4-step or arc spot weld.

- (1) 2-step: Perform welding when push torch trigger, stop welding when release the trigger.
- (2) 4-step: After successfully starting arc by push torch trigger, then you can perform welding by release the trigger, when you pull torch trigger again, torch will turn into crater-filling condition 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.
- (3) Arc spot welding: After successfully starting arc by pull torch trigger, the welder will stop welding automatically at the end of arc spot welding. If release the trigger during arc spot welding, the welder will stop welding immediately.

1.3.2 Parameters set-up

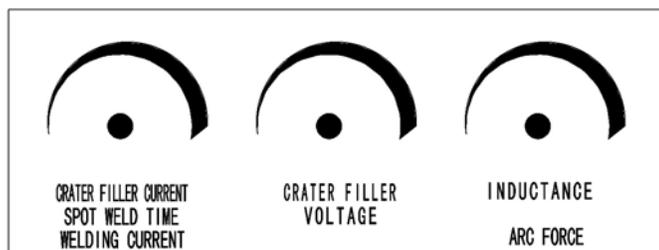


Figure 9: Parameters setting knob

(1) “Crater filling current/Arc spot welding time” knob

While in “4-step”, be used for adjusting crater filling current.

While in “Arc spot welding time”, adjusts arc spot welding time from 0.5 to 5 seconds.

(2) “Crater filling voltage” knob

While in “4-step”, be used for adjusting crater filling voltage.

(3) “Inductance” knob: Altering welding stability, penetration and spatter volume.

1.3.3 Save/Display

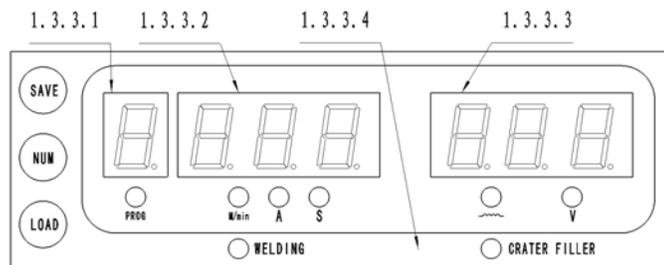


Figure 10: Display area

1.3.3.1 Number Nixietube

Displays number 0 to 9 of the corresponding welding parameter. Operators can save or load relative welding parameter by welding requirement.

- (1) “Num” selection key: Press this key, the number of corresponding welding parameter will display from 0 to 9 in turn.
- (2) Save: Press this key, the number will flash for three seconds. During this time, press it again to save the preset welding parameters displaying on the windows.
- (3) Load: Pressing on the key, the welding parameters which are represented by present number will display on the windows to be ready for using. While in loading, the PROG lamp will light on and the represented welding parameters are not adjustable. Repress the key to quit the parameters loading.

1.3.3.2 Current nixietube

Display wire feeding speed, welding current and arc spot welding time

- (1) “M/min” Indicator lamp will light on when displaying preset speed of wire feeding
- (2) “A” indicator lamp will light on when displaying welding current. Displays preset current while in open load, displays practical value in welding.
- (3) “S” indicator lamp will light on when displaying arc spot time.
- (4) Pressing on “Crater filling current” and “Crater filling volt” knobs simultaneously for one second, the Amp nixietube will display values altering

between preset welding current and preset wire feeding.

1.3.3.3 “Volt” nixietube

Display inductance and volt.

- (1) When regulating inductance, the nixietube will display value of inductance and “” lamp will light on. The adjustable range of inductance is from 1 to 50.
- (2) When regulating welding current by tuning “crater filling current” knob or “Volt regulation” knob on the controller, the nixietube will display volt and “V” indicator lamp will light on.

Displays preset volt while in open load, displays practical value in welding.

1.3.3.4 Welding status indicator lamp

- (1) When regulating welding parameters, the “Welding” lamp will light on and the nixietube will display welding parameters.
- (2) When regulating crater filling parameters, the “Crater filling” lamp will light on and the nixietube will display crater filling parameters. The nixietube resume displaying welding parameters after stopping regulating for three seconds.

1.3.4 Panel control welding mode

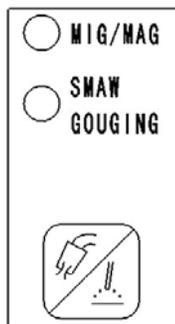


Figure 11: Panel control welding model

When the wire feeder isn't connected, the welder is in panel control mode. Press this knob can switch the working mode between MIG/MAG and SAWA gouging.

2. The rear panel and parts number reference

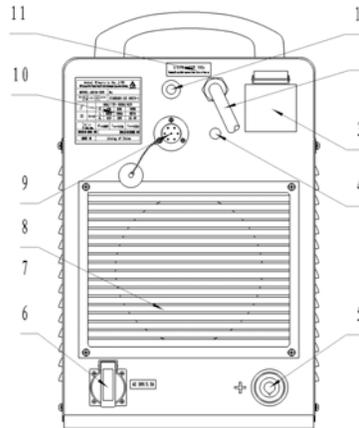


Figure 12: Rear panel

(1) Wire hole for water cooler power cable

When the water cooler is powered by the power source, this hole will be closed. When the water cooler is powered by the welder following the customer's demand, the power cable of the cooler will pass this hole from the inside of welder.

(2) Input power cable

The mixed-colored wire must be firmly grounded, the rest wires connect to 3-phase power (400V/50Hz) respectively.

(3) Circuit breaker

It protects welding machine by automatic trip to turn-off power supply while in machine overload or failure.

(4) Fuse

(5) Quick socket (+)

Connect to terminal lug of wire feeder (+).

(6) Output socket for heating CO₂ gas (AC36V)

Connect to heating winding of the gas regulator.

(7) Window blind

For ventilation and protecting the welder.

(8) Cooling fan

Cool down the heat components in the welding machine.

(9) Control socket

Connect to wire feeder control socket.

(10) Specification plate

(11) Input warning mark

3. Controller

This controller is fixed on the panel of wire feeder. Panel illustration and parts number reference:

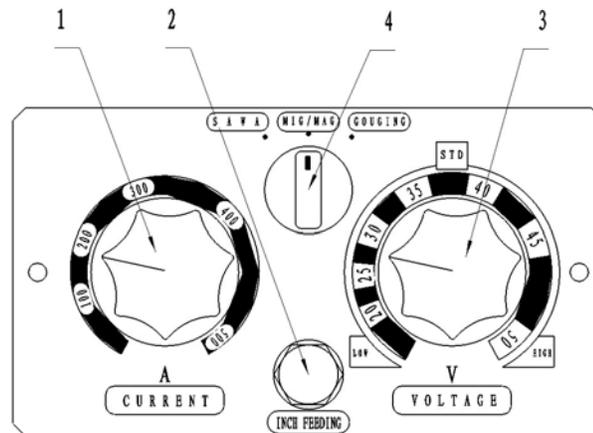


Figure 13: Panel of controller

(1) Current regulation knob

Adjusting welding current

(2) “Inching” button

Used for quick wire feeding

(3) Volt regulation knob

Adjusting welding volt

(4) Working mode selecting switch

When the wire feeder is connected, the welder is in remote control status, and the working mode selecting switch is no use. Use this switch to select welder working mode among MIG/MAG, SMAW and SAVA Gauging.

4. Water cooler

Water cooler is a kind of light and movable inner circulating water-cooled machine. It can be used in cooling down the water-cooled torch. The capacity of the cooler is 10 L. Other technical parameters are shown as the following table.

Item	Unit	COMBO 500 ID
Rated input voltage	V	Single phase 400V
Rated input current	A	0.9
Rated frequency	Hz	50/60
Cooling water capacity	L	10
Cooling Style		Air-cooled
Cooling water circulating style		Inner circulating
Circulating water flux	L/min	3
Circulating water distance	m	18
Cooling ability	W	3000
Radiation Area	m ²	0.6
Pump power	W	260
Pump output rpm	r/min	2860
Dimension	mm	630×342×327
Weight	kg	28

Table 6: Water cooler technical parameters

4.1 Instructions

Warning: The case must be well-connected with the earth. It must be maintained and repaired by qualified people. The case shouldn't be opened freely.

4.1.1 Environment situation

- 1) Air temperature scale: 0 ~ 40°C
- 2) Air relative humidity: When it is 40°C, the humidity is ≤50%. When it is 20°C, the humidity is ≤90%.
- 3) Dust, acid and corrosive air or substance around the machine is no more than normal content.

4) Prevent from direct light of the sun and rain.

5) Keep 20-cm-distance from the wall.

4.1.2 Prevent Frostbite

In winter, when the cooler is used in some place where the water may be frozen, please add glycerol antifreeze (other antifreeze may bring unexpected results to pump and other machines). Drain out the cooling-water if necessary.

4.1.3 Microorganism anti-grow substance

There're some microorganisms in the cooling water. They grow and choke the path. Microorganism anti-grow substance can prevent this phenomenon. Its effect will depend on the water quality, so you can have a try first.

4.1.4 Please refer to the related welder and torch instructions before you use it.

4.2 Operating instructions

4.2.1 Front panel

1) Water inlet

Put the fresh water in the cooler through the water inlet.

2) Water gauge

Supply the water in time according to the water level.

3) Specification plate

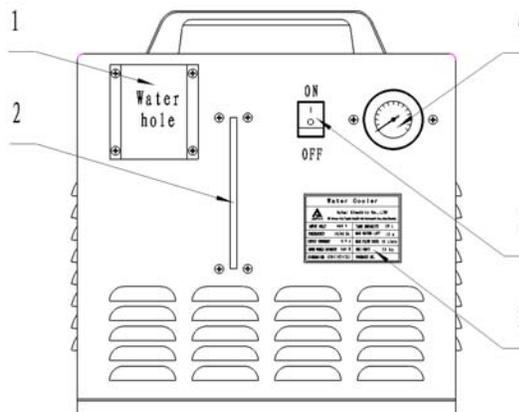


Figure 14: Front panel of water cooler

4) Manometer

Observe the pressure and the flux of water from here.

5) Switch

Turn on the switch, the indicator will light on, and the water cooler will begin to work.

4.2.2 Rear panel

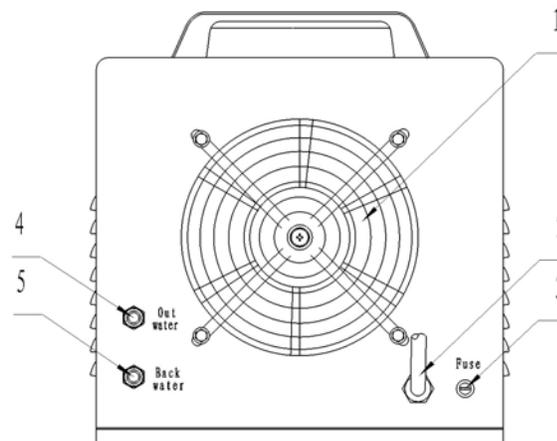


Figure 15: Rear panel of water cooler

1) Cooling fan

Cool down the heat components in the welding machine.

2) Input powder cable

It is 3-pin cable. The yellow-green wire must be firmly grounded, the rest two wires connect to corresponding 3-phase power supply (400V/50Hz).

3) Fuse

The fuse will melt down when the water pump or cooling fan has some faults.

4) Water outlet

5) Water inlet

4.2.3 Operating procedure

4.2.3.1 Add water to water tank

Inject fresh water through the water inlet. Impure water may cause faults.

The water level should be proper. Watch the water level meter to make sure the water not be overflowed.

After connecting the torch and water cooler, the water will start circulating. The water level will become lower, please add water if needed.

Attention for adding water:

Avoid the water flowing to the welder or other equipments.

The water must be added to the cooler before the machine works, because the pump may meet some faults if in open load.

4.2.3.2 Operation

- 1) Turn on the power switch, and the cooling fan and water pump motor will start to work. The cooling water will cycle in the torch.
- 2) After the welding work, firstly make sure the torch is completely cooled, then turn off the power switch of the cooler.

4.3 Repair and maintenance

In order to use the equipment safely, please ask qualified people to repair and maintain it periodically. Please contact us when the users have unsolvable problems.

Attention: In order to keep you safe you shouldn't open the case freely. Prevent from being electric shocked when you repair it.

- 1) Check and repair the connecting parts.

Please check if there are bad connections or insulation broken.

- 2) Earth lead

Please check if the case is grounded firmly.

- 3) Clean out the inside dust

Radiator with dust may reduce the radiating effect. Please clean it every 6 months using dry compressed air.

- 4) Replacement of cooling water

Please replace the cooling water every month, the furring will cause water pump motor can not work and jam cooling water cycle of the torch. If water pump still can not work after replacing the water, please use screwdriver or other tools to drive the motor axletree.

How to drain water: Connect another water hose to the water outlet.

4.4 Ordinary failures

- Water pump motor does not work

- 1) Input powder cable broken or fuse burns out.
- 2) Capacitor burns out and needs to be replaced.
- 3) Water freezes in winter.
- 4) The motor blocks up, repair the motor.

- The cooling water does not cycle

- 1) The water is insufficient in the water tank.
- 2) Torch or water hose is jammed (impurities in or water freezes)
- 3) Impellers abraded seriously, need to be replaced.

5. DR-I digital controller.

This controller is optional. When using, plug the control cable into the socket (Seeing fig.5: 1.2 control socket for RD-I digital controller). For specific using instruction, please refer to operating manual of RD-I Digital Controller.

Note: When the digital controller is connected, the wire feeder control panel and the welder control panel will be disabled. All the parameters will be adjusted on RD-I controller.

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 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 360~440V (Input power 3 phase 400V/50HZ)
- 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: 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.

No	TROUBLE	CAUSES	WHAT TO DO
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 (2A)
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 (3) Replace (4) Replace (5) Replace
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 (1) Conductive wire connected the rectifier is broken	(1) Replace 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) Change contact tip
06	CO2 gas regulator can't heat	(1) CO ₂ regulator is damaged (2) Heater cable is broken or shorten (3) Thermal-sensitive resistance in power source is damaged	(1) Replace (2) Repair heat cable change (3) Replace
07	Push welding torch trigger, wire feeding is normal but airflow is blocked	(1) Control board is damaged (2) Electromagnet valve damaged	(1) Replace (2) Replace
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

Table 7: Trouble Shooting Table

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 earthing the welding circuit, see note. In other cases it could involve constructing an electromagnetic screen enclosing the welding power source and the work 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 earthing 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 work 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 not 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.