USER MANUAL

Digital Inverter Welding Machine

You will always get respond.
We firmly believe that the passion of creation will never reduce.

CONTENTS

PREFACE

Thanks for choosing our products.
Please check carefully whether the equipment is damaged during transportation or different from the packing list, when you receive it.
If there is any problem, please contact your local distributor or our company in time.

This manual includes the relevant information of installation, technical specifications, operation, troubleshooting and routine maintenance. For best performance and proper maintenance, please read this manual carefully before installation, usage and maintenance.

This equipment should be repaired only by professional maintenance personnel.

Please forgive us if there are any omissions in the content. To provide better service,we welcome your valuable feedback and suggestions.
The contents of this manual are subject to change without notice.

SAFETY WARNING

For the safety of you and others, please read this manual carefully before installation or operation!
It may harm you or others during usage, so please be well protected while welding.

Electric shock can be life-threatening!

- Install the grounding device according to the application standard. (The ground terminal of the rear panel should be grounded reliably. Beware of electric shock!)

- Do not touch electric components or welding rods when users' skin is bare, or users wear wet gloves or wet clothing.

- Make sure that you are insulated from the ground and workpieces.
- Make sure that your workplace is safe

Smoke can be harmful to health!

- Head should be out of smoke.

- Use powerful ventilation or exhaust facilities to exhaust smoke.

Arc radiation can damage your eyes and burn your skin!

- Flying sparks can cause fire or burn users' skin. Arc radiation can damage your eyes and skin.

- Protect the bystander from injury with approved helmet or curtain.

- Wear approved helmet with filters and wear protective clothing to protect your eyes and body.

Fire

- Welding spark can cause fire. Please make sure that there are no flammable or explosive materials in the welding workplace.

- Welding machines should keep a certain distance from the flammable materials such as waste oil and clothes.

- Fire-fighting facilities must be prepared by users and placed in specially marked locations.

Excessive noise is harmful to people's hearing!

- Wear ear shields or wear other hearing protectors to protect your hearing.

- Noise has cause potential damage to bystanders' hearing.

Seek help from professionals when you are in trouble!

- If there is any problem during installation and operation, please follow the instruction of this manual.

- If you still can't fully understand after reading, or if you can't solve the problem according to the guidelines of this manual, you should immediately contact your supplier or the company's service center for professional help.

Safety guide for accident prevention

The staff who are operating or in the vicinity should have a full understanding of the safety measures. Safety depends on the joint efforts of all of us.

All the operation must follow the rules below:

- Follow the operating instructions.
- Be operated by professional technicians.
- User should keep in mind that operating errors can cause accidents, harm the users or damage equipments.

All operators must master the following knowledge before operation:

- Equipment control.
- Equipment operation.
- All effective safety procedures.

To make it easy for everyone to use, each switch, knob, button, ammeter, etc. is marked, giving a clear indication of its function.

Notice

- The welding equipment enclosure must be reliably grounded (at the grounding mark on the rear panel) to avoid accidental electric shock.

- All connecting bolts should be tightened, and workpieces and cables must be securely connected, otherwise the machine will not work properly, cause uneven heating or even damage to the connector.

- There is high voltage inside the machine, and non-professional maintenance personnel are strictly forbidden to open the shelf or repair the machine.

- Arc welding rectifier is strictly prohibited to run in phase loss.

- It is strictly forbidden to continue using the welding equipment when the fan does not rotate after power-on.

- It is forbidden to use the welding equipment when the fluctuation of the three-phase power grid exceeds ±10%.

- The automatic air switch on the arc welding rectifier should normally be closed. Do not pull when loading to avoid damage.

- Adhere to the use of appropriate personal safety equipments, such as goggles, masks or protective gloves for welders. Do not wear loose-fitting clothing such as ties, bracelets, etc. that are easily wrapped around the equipment.

- 。
- Please check the emergency and safety devices everyday

- The power must be cut off after welding or before leaving the welding workplace temporarily.

- Please check the arc welding rectifier before and after use. When the machine doesn't work properly, its cause must be ascertained and excluded before the equipment is used normally.

- The power must be cut off before inspection and maintenance. Do not open the shelf until the power is cut off to avoid electric shock.

APPLICATIONS AND FEATURES

1.1 APPLICATIONS

This welding machine is a high performance universal semi-automatic MIG/MAG welding machine using with Ar or CO_2. It can be used with Φ0.8~ Φ1.2mm diameter aluminum (4043, 5356) welding wires, flux cored wires and solid wires for welding aluminum , aluminum alloy, low carbon steel and low alloy steel components. This series of inverter welding machine has reasonable static characteristics and good dynamic performance. The welding machine is manufactured in accordance with the safety requirements of GB15579.1-2004 arc welding equipment and the technical requirements of JB/T7824-1995 inverter arc welding rectifier.

The model number of this welding equipment is in accordance with the GB/T10249-1998 welding machine model preparation method standard.

1.2 FEATURES

Digital CPU control system supports precise digital output and multipurpose usage.

- IGBT high frequency soft switching inverter technology ensures stable and reliable IGBT welding, with fast dynamic response.

- Closed-loop control system allows highly stable welding voltage under the network voltage fluctuation and arcing length variation, strong self-adjusting arcing and stable welding procedures.

- Less welding spatter and high metal deposition rate.

- Good welding formation and minimized welding deformation.

- Arcing with strong pulse ensures high successful rate of arc initiation.

- High stable power supply allows stable wire feeding.

- Perfect protection circuit is safe, reliable and easy for troubleshooting.

- Compact size, light weight, energy-efficiency, high loading duty rate and noiseless arc welding rectifier.

- Reasonable structure, concise layout, easy to repair.

2 INSTALLATION INSTRUCTION

2.1 INSTALLATION WORKPLACE

(1) It should be installed indoor out of direct sunlight, rain, humidity and dust. The ambient temperature ranges from -10℃ to ±40℃.
(2) The slope of the ground shall not exceed 15°.
(3) There should be no wind in the welding workplace. If not, set up a shelter.
(4) The welding machine is more than 20cm away from the wall, and the distance between the welding machines is more than 50cm.
(5) When using water-cooled welding torch, remember anti-freezing.

2.2 QUALITY OF SUPPLY VOLTAGE

(1) The waveform should be a standard sine wave with an effective value of 380V ± 10% and a frequency of 50Hz / 60Hz.
(2) Three-phase voltage imbalance rate: ≤5%

Ground Cable	≥1.5mm	≥1.5mm	≥2.5mm	≥6mm

Note: The capacities of fuses and circuit breakers in the above table are for reference only.

2.3 EQUIPMENT INSTALLATION

The welding machine is small, light, easy to carry and movable based on welders' need. It will be more convenient if the machine is equipped with trolley. Remember to place it on the flat ground. Power and equipment installation must be carried out by professionals.

2.4 EQUIPMENT OPERATION

Close the automatic air switch on the switchboard, then the working indicator of the welding machine is on and the fan rotates. Press the manual wire feeding button and the wire is quickly delivered. Turn the knob and switch on the controller and front panel according to the usage requirements. The wire feeder rotates the wire after pressing the torch switch. Gas is supplied from the nozzle of the welding torch for normal welding. After welding, turn off the gas and the power supply.

3 WORKING PRINCIPLE

3.1 SCHEMATIC

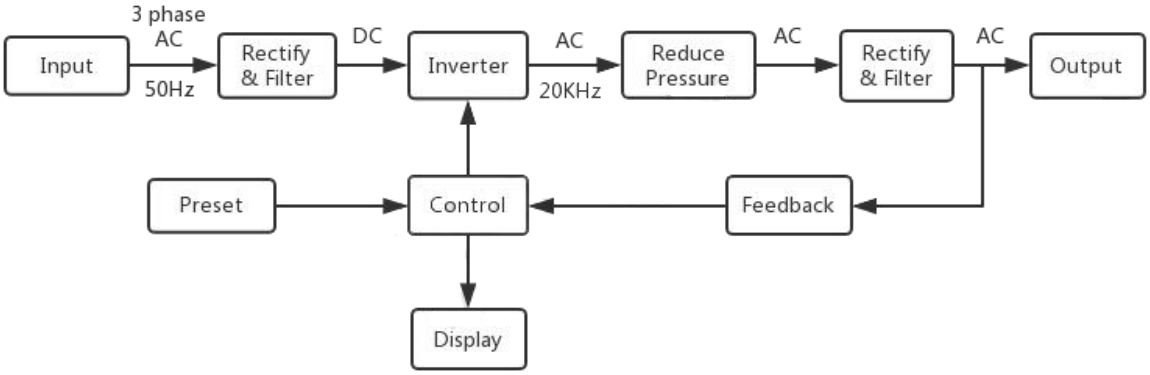


Diagram 2 Schematic Diagram

This machine adopts IGBT soft-switching inverter technology. Firstly, the three-phase AC 380V 50Hz input power is rectified and filtered by power frequency, so it is converted into 20KHz intermediate frequency AC power by the IGBT inverter. Then it is stepped down by the intermediate frequency transformer. Besides, it is rectified and filtered to change into required DC output for welding. These processes speed up the dynamic response, make the welding machine smaller and lighter. Closed-loop control mode allows power supply with good resistance to grid fluctuation and excellent welding performance

3.2 WELDING MACHINE OUTPUT FEATURES

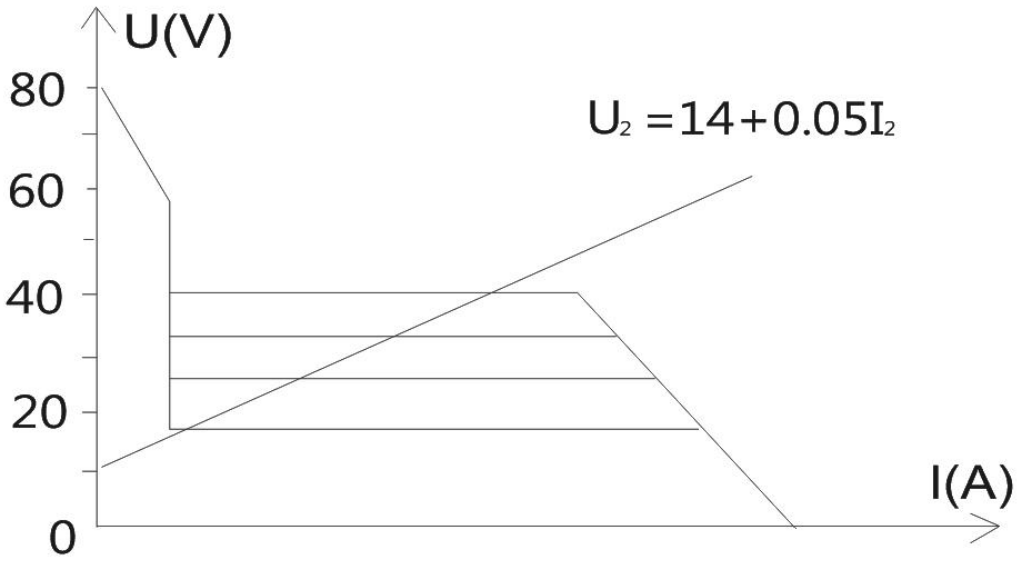
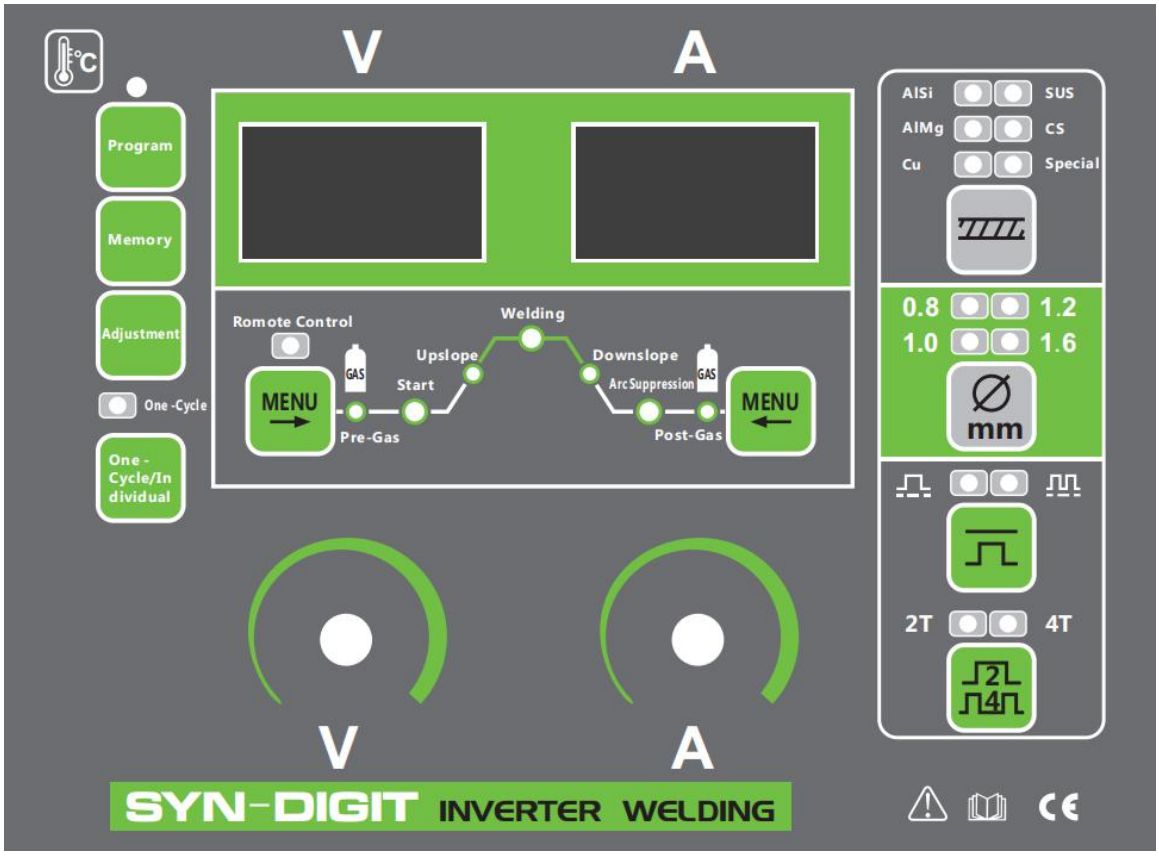


Diagram 3 Welding Machine Output Features

4 OPERATION INSTRUCTIONS

4.1 CONTROL PANEL



1) Program Button

Press program button shortly, it will display Prg 00x. x represents the current program number. Select program numbers by a current encoder, then press 5 seconds to save welding parameters in the present program number.
Program numbers range from 000 to 005.

2) Memory Button

Save welding condition and parameters to the present program number.

3) Adjustment Button

① Non One-Cycle Parameter Setting
Select parameters by function keys.

a) P-1 Parameters	Default: 100	Range: 0~300
b) P-2 Parameters	Default: 100	Range: 0~300
c) P-3 Double Pulse Frequency	Default: 0	Range: 0~10
d) P-4 Parameters	Default: 15	Range: 1~100
e) P-5 Parameters	Default: 15	Range: 1~100
f) P-6 Inductance	Default: 35	Range: 1~100
g) P-7 Parameters	Default: 19	Range: 10~Max Welding Output

② One-Cycle Parameter Setting
Select parameters by function keys.

a) P-1 Parameters	Default: 0	Range: -20~20
b) P-2 Parameters	Default: 0	Range: -20~20
c) P-3 Double Pulse Frequency	Default: 0	Range: -20~20
d) P-4 Parameters	Default: 0	Range: -20~20
e) P-5 Parameters	Default: 0	Range: -20~20
f) P-6 Inductance	Default: 0	Range: -20~20
g) P-7 Inductance	Default: 0	Range: -20~20

③ Press Adjustment Button for 5 seconds, to switch to manual electrode welding.

4) One-Cycle Button
Switch between One-Cycle M ode and Non One-Cycle Mode. When the indicator is on, it is One-Cycle Mode.

5) "V" is voltmeter
It displays rated voltage when there is no operation, or the actual output voltage when triggering the torch or welding.

6) "A" is Ammeter
It displays rated current when there is no operation or the actual output current when triggering the torch or welding.

7) Welding Parameter Setting
① Welding Auxiliary Parameter Setting

Press the left or right buttons to switch auxiliary parameters.

Pr 1 Pre-Gas Time (Pre-Gas indicator is on)	Default: 0.2S	Range: 0.2S-10S
Pr2 Arc Starting Setting (Start indicator is on)	Default: 16V/50A	Voltage Range: 10V-Max Welding Output Current Range: 10A-Max Welding Output
Pr3 Current Upslope Speed (Upslope indicator is on)	Default: 0.2S	Range: 0.2S-10S
Pr5 Current Downslope Speed (Downslope indicator is on)	Default: 0.2S	Range: 0.2S-10S
Pr 6 Arc Suppression Setting (Arc suppression indicator is on)	Default: 16V/50A	Voltage Range: 10V-Max Welding Output Current Range: 10A-Max Welding Output
Pr7 Post-Gas Time (Post-Gas indicator is on)	Default: 0.2S	Range: 0.2S-10S

② Control Function of Wire Feeder

Press left button for 5 seconds, to switch to the control function of wire feeder. It is controlled by the panel when the indicator is off, and by wire feeder when the indicator is on.

Default: Panel Control.

③ Switching Function of Arc Condition

Press right button for 5 seconds to switch arc condition. It is weak arcing when the indicator is off, or strong arcing when the indicator is on.

Default: Weak Arcing.

8) Welding Voltage Encoder

To adjust the rated voltage.

9) Welding Current Encoder

To adjust the rated current.

10) Wire Materials Button
Press the wire material button. There are 6 optional materials.

11) Wire Diameters Button
Press the wire diameter button. There are 4 optional wire diameters.

12) Pulse Button
Common gas-shielded welding, single pulse gas-shielded welding and double pulse gas shielded welding are optional.

Related indicator is on. When two indicators are off, it is common gas-shielded welding

13) Arc Suppression Button
Welding torch 2T and 4T are optional and indicated by relevant indicators. 2T is without arc suppression, while 4T is arc suppression.

14) Abnormal Temperature Indicator
The indicator is on when the temperature of the main machine is abnormal.

5 USAGE AND MAINTENANCE PRECAUTIONS

5.1 PREPARATION BEFORE USAGE

Connect the input cable to the power grid as required.

Notice:

- Connect three thicker wires to the phase lines of the three-phase power supply, regardless of the phase sequence. Wiring must be correct and secure, otherwise it will damage the equipment or endanger personal safety.
- Make sure that the air switch on the rear panel of the welding machine is on, and the power switch of the switchboard is off.

Notice:

- Generally the air switch should be on. **Do not touch it when it is loading to avoid damage.**
- Choose suitable welding cable. Connect the connector, control cable, welding gun and ground wire.

Notice:

Tighten cable connections to keep them in good contact. Operators can tighten the quick couplings with the socket in clockwise direction, and loosen in counterclockwise direction. Otherwise the connector will be burnt out.

5.2 USAGE PRECAUTIONS

(1) Rivet the nameplate with device numbers on the specific location of the machine casing upper cover. If not, it will damage internal components.

(2) The connection between the welding cable and the welding machine terminal should be tight and reliable. Otherwise, the connector will be burnt out and lead to instable welding.

(3) Do not contact the exposed copper parts of welding cables or welding machine terminal to the metal objects on the ground, in order to prevent short-circuit.

(4) Do not use broken welding cable and control cable.

(5) Do not hit the welding machine or make it deformation. Do not put

heavy objects on it.
(6) Ensure smooth ventilation.

5.3 ROUTINE INSPECTION AND MAINTANENCE

Professional maintenance personnel should remove dust from the welding power source by compressed air every three to six months. At the same time, check whether the fastener is loose in the machine
(1) Check frequently whether the cable and panel components are damaged, or the adjusting knob is loose.
(2) Change contact tips and wire feed rolls in time. Clean wire feed hoses frequently.

5.4 MALFUNCTIONS AND TROUBLESHOOTING

Check the following items before maintenanc

5.5 COMMON MALFUNCTIONS, CAUSES AND TROUBLESHOOTING

Diagram 5

NO	MALFUNCTIONS	CAUSES	TROUBLESHOOTING
01	Indicator doesn't work when power on.	① Phase loss. ② Broken automatic air switch of the rear panel. ③ Broken Fuse.	① Check the power supply. ② Replace the automatic air switch. ③ Replace the fuse (2A)
02	Automatic air switch of the rear panel automatically powered off immediately when the welding machine is on.	① Broken automatic air switch. ② Broken IGBT module. ③ Broken three phase rectifier. ④ Broken varistor. ⑤ Broken control panel.	① Replace the automatic air switch. ② Replace the IGBT module and driving circuit board. ③ Replace the three phase rectifier. ④ Replace the varistor. ⑤ Replace the control panel.
03	Automatic air switch of the rear panel automatically powered off when welding.	① Overload operation for a long time. ② Broken air switch.	① Use the welding machine in accordance with the loading rate. ② Replace the air switch.
04	Welding current is unadjustable.	① Broken control cable or controller of wire feeder. ② Broken control circuit board. ③ Broken cables at both ends of the internal shut.	① Replace the control cable or controller of wire feeder. ② Replace the control circuit board. ③ Connect cables at both ends of the internal shut.
05	Unstable arcing and heavy spatter	① Wrong welding specifications. ② Severe worn contact tip.	① Adjust welding specifications cautiously. ② Replace the contact tip.

06	CO_2 gas regulator does not heat up.	① Broken CO_2 gas regulator. ② Heating cable is broken or short-circuit. ③ Broken heating supply thermistor.	① Replace the CO_2 gas regulator. ② Repair the heating cable. ③ Replace the heating supply thermistor
07	Press the torch switch, the wire feeds normally, but the gas path is blocked.	① Broken circuit board. ② Broken electromagnetic valve.	① Replace the circuit board. ② Replace the electromagnetic valve.
08	Press the welding torch switch, but the wire feeder doesn't work.	① Broken welding torch switch. ② Broken control cable of wire feeder. ③ Broken circuit board.	① Replace the welding torch. ② Repair the control cable of wire feeder. ③ Replace the circuit board.

5.5 COMMON WELDING DEFECTS, CAUSES AND TROUBLESHOOTING

WELDING DEFECTS	CAUSES
Gas Hole	① Impure gas or insufficient gas supply. ② Mixed with air when welding. ③ Preheater doesn't work. ④ Heavy wind or insufficient wind protection ⑤ Nozzle is blocked by spatters ⑥ The distance between the nozzle and workpiece is too large. ⑦ The surface of welding zone is contaminated, oil, rust and moisture are not removed. ⑧ Arc is too long or the arc voltage is too high. ⑨ Insufficient silicon and manganese of welding wire.
Undercut	① Arc is too long or the arc voltage is too high. ② Excessive welding speed. ③ Excessive welding current. ④ The welding wire is not in the right position. ⑤ Inappropriate movement of welding wire.

Lack of Penetration	① Welding current is too low or wire feeding is uneven. ② Arc voltage is too low or too high. ③ Welding speed is too fast or too slow in the groove. ④ Groove angle and the clearance is too small ⑤ The welding wire is not in the right position.
Poor welding Deformation	① Wrong process parameters. ② The welding wire is not in the right position. ③ Offset the center of wire feeding roller. ④ Improper adjustment of wire straightening mechanism ⑤ Contact tip is loose.
Pear-shaded Crack	① Excessive welding current. ② Groove is too narrow. ③ Arc voltage is too low. ④ The welding wire is not in the right position.
Unstable Arc	① Contact tip is loose, damaged or with excessive diameter compared with welding wire. ② Wire spool is unevenly rotated, groove of wire feeding roller is worn, pressurized roller isn't sturdy, or guide wire is with high resistance, etc. ③ Welding current is too low, and arc voltage fluctuates. ④ Extending length of welding wire is too long. ⑤ There is rust, paint and oil on the weldments. ⑥ Improper placement of the ground wire.
Splatter	①Insufficient inductance during short circuit transition, which is too large or too small. ② Improper welding current and arc voltage. ③ Welding wire and weldments are not clean enough.

6 TRANSPORTATION AND STORAGE

The welding equipment is a precise equipment, which can be damaged by strong vibration or collision.
The welding equipment is packed by carton box or wooden box, handling by manual work or forklift. Avoid tilting, tipping, and strong collision and vibration of the machine.
The welding equipment should be stored in a rainproof, dry and ventilated environment, and the storage ambient temperature is from -25 °C to 55 °C.