



**Huayuan Welder®**  
— 止於至善 —

# **ZX7-400MB neo**

**INVERTER DC ARC WELDING MACHINE**

# **MANUAL INSTRUCTION**

**(PLEASE READ CAREFULLY BEFORE OPERATION)**



### ***Safety Depends on You***

Huayuan arc welding and cutting equipment is designed and built with safety in mind. However, your overall safety can be increased by proper installation ... and thoughtful operation on your part.

**DO NOT INSTALL, OPERATE OR REPAIR THIS EQUIPMENT WITHOUT READING THIS MANUAL AND THE SAFETY PRECAUTIONS CONTAINED THROUGHOUT.**

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## 1. Safety warnings

**For your and other's safety, please follow the list below before welding:**

Operator must be qualified according with the state standard

1.1. In order to prevent electric shock accidents, the welding machine and the welded work piece must be reliably connected to the grounding device, and the grounding device should meet the relevant national standards. The welding circuits are not insulated when welding. If you touch the two output electrodes of the machine with your bare skin at the same time, it will lead to electric shock, sometimes even fatal dangers. The protective equipment worn during welding must be dry and insulated.

1.2. Make sure the machine is off when install, repair or maintain the machine, and all these need to be done by technical person.

1.3. Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. While working in limited room, use enough ventilation and/or exhaust to keep fumes and gases away from the breathing zone, or use the respirator. Do not weld at the same time when using of degreasing, cleaning or spraying operations. The heat and rays of the arc can react with these gases to form phosgene, a highly toxic gas,

1.4. The machine must be far away from the explosive items. Don't weld well-closed container. It is dangerous to weld the box hole, you should make sure there is no flammable or toxic gas before welding.

1.5. Machine need to be checked by technical person if drop down or collision happen

- 1.6. When working high above the ground, safety belt must be needed
- 1.7. The machine insulation grade is IP23S
- 1.8. Put the machine on the inclined place need to avoid tilting.
- 1.9. Use the machine for pipeline thawing is prohibited
- 1.10. Electromagnetic would affect cardiac pace maker, the cardiac pacemaker users should consult one's doctor first. The effect of electromagnetic to one's health is not confirmed, so it might have some negative effect to one's health. Welders should reduce the hazardous of electromagnetic
- 1.11. This Machine is with CC mode with rated duty cycle 35%, that means machine working 3.5min need rest 6.5 min, when the machine over the rated duty cycle, the inside temperature will be increased, then the machine will protect itself, the overheat indicator on the panel will on, welding can't continue. Only when the temperature inside the machine cool down, the overheat indicator off, then the machine can continue to work.
- 1.12. The machine is with carton package, light weight, no lifting device.
- 1.13. The electromagnetic compatibility of the welder is classified as Class A.

## 2. Product Summary

### 2.1 Main Features

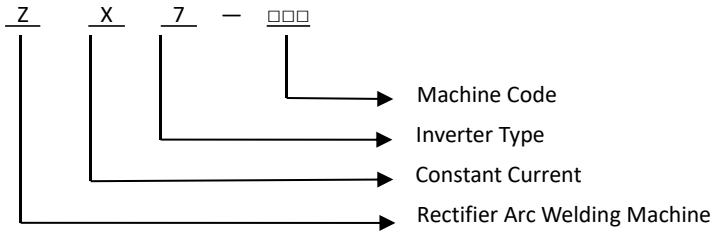
ZX7-400MB neo is one of our company latest energy-saving power source, its technical index and welding technology are very excellent, with a very high comprehensive technical index, is an ideal alternative to AC arc welding machine.

It is mainly used in carbon steel welding. Widely use in ordinary steel structure, construction site, machinery manufacturing equipment maintenance, hardware parts manufacturing and other welding fields.








Its advantage as follows:

- Good dynamic characteristic, stable arc, good performance, little spatter
- Wide distribution voltage: 380VAC±60VAC
- Arc force adjust function
- Hot current adjust function
- Welding current preset function
- Lack voltage, over heat protection function
- Input voltage fluctuation compensation function, keep stable output current
- High efficiency, Low non-load loss
- Small volume, light weight, easy to move

2.2 Model Description



2.3 Symbol Instruction

	Read instruction manual		Ground connecting
	Positive		Negative
	Parameter +/-		Current
	MMA		

### **3. Working Environment**

#### **3.1 Environment condition**

- Operating altitudes: less than 1000m
- Temperature ranges:
- Operating temperature range:  $-10^{\circ}\text{C}\sim+40^{\circ}\text{C}$
- Storage temperature range:  $-25^{\circ}\text{C}\sim+55^{\circ}\text{C}$
- Relative humidity: at  $40^{\circ}\text{C}$ :  $\leq 50\%$ ; at  $20^{\circ}\text{C}$ :  $\leq 90\%$
- Do not place in an environment where dust, acids, corrosive gases or substances exceed normal levels, except for those generated during the welding process
- Avoid direct sunlight and rain.

#### **3.2 Power supply condition**

- Power supply:  $3\sim 380\text{V}/50\text{Hz}$ ,
- Range of the fluctuation of voltage  $< \pm 15\%$ ,
- Frequency Fluctuation range  $< \pm 1\%$ ,
- Three-phase voltage imbalance ratio  $< \pm 5\%$ ;
- When using the engine generator: the output power of generator is more than twice the rated input power of the welding power supply, and the compensation coil is provided.

#### **3.3 Safety precautions**

- Open and check the machine: only qualified personnel should perform to avoid danger or machine damage
- Turn off input power before open the machine, do not touch the electrical conductors to avoid electric shock.
- Pay attention to reducing dust in the welding machine environment to avoid causing electrical short circuits.
- Welding may produce fumes and gases hazardous to health. Use enough ventilation and exhaust at the arc to keep fumes and gases away from the breathing zone.
- Arc rays may cause eye injury, please do not watch the arc nor expose to the arc rays.
- Before welding, ensure spatter does not contact flammable or explosive materials, and prevent spatter from entering the machine's air intake.



## 4. Technical Specifications

### 4.1 Parameter

Item	Unit	Parameter
Input Power	V/Hz	3~380±15% 50 / 60
Rated Input Capacity	KVA	17.4
Rated Input Current	A	25
Rated Open Circuit Voltage	V	80
Rated Duty Cycle	-	35% (40℃)
Efficiency	-	88.6%
Power factor	-	0.941
Energy Efficiency Grade	-	2
Output Current range	A	20~400
Arc Force Current Range	A	0~150
Hot Start Current Range	A	0~120
Suitable Electrode Diameter	mm	≤Φ6
Power Source Cooling Mode	-	Air Cooling
Insulation Grade	-	F
Ingress Protection	-	IP23S
Dimension(L×W×H)	mm	425×215×445
Net Weight	kg	18

\* Rated duty cycle 35% means, take 10min as the working cycle, the welding machine work 3.5min under the rated current status, rest for 6.5min. When the welding machine work more than 3.5min, the temperature in the machine will higher than the setting value, the overload indicator will on, and machine no output until the temperature in the machine lower to the setting value. When the overload indicator off, the machine can work again.

### 4.2 Welding electrode and related parameter setting

Electrode Diameter (mm)	2.0	2.5	3.2	4.0	5.0
Welding Current (A)	40~60	50~80	90~130	160~210	200~270

## 5. Working Principle

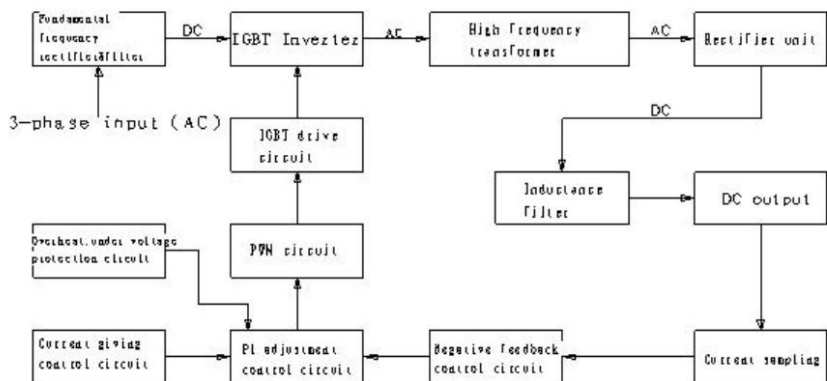
### 5.1 The Working Principle of the Product

ZX7-400MB neo welding machine adopts IGBT as the main circuit switch. Three-phase AC power is rectified by a full-bridge industrial frequency rectifier and then converted into a 20kHz high-frequency voltage through an inverter circuit. The high-frequency voltage is stepped down by a high-frequency transformer, and after rectification by fast-recovery diodes, it outputs a low-voltage, high-current welding current.

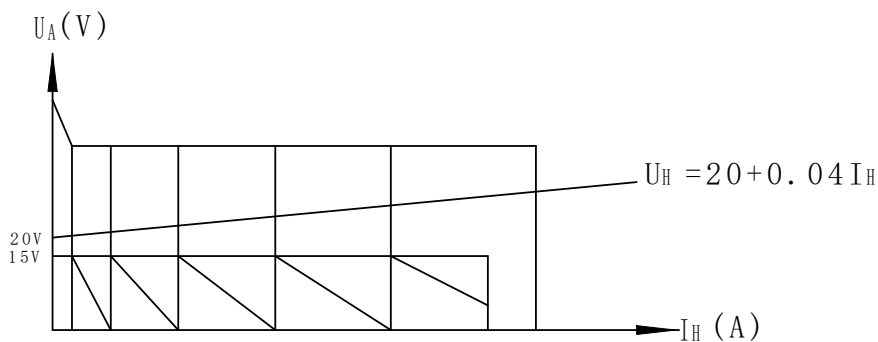
The control circuit will control the output current through the adjusting of the pulse width. The negative feedback signal, which is the real welding current get from the output current sensor, put into the special PWM circuit after compared with the current adjust signal, then output the driving pulse to control the IGBT, so that the output current will keep stable to get descending external characteristic.

Force current function: the control circuit will increase the current when the welding voltage less than 17V, so that the electrode will not stick with the workpiece to enlarge the arc penetration.

## 5.2 Principle diagram



## Welding machine output CC/CV feature diagram



### 5.3 Elements list

No.	Code	Item	Model
1	V1	Bridge rectifier	MDS50/16F1
2	V2	IGBT module	MG50HF12TLC1
3	TA1	Hall sensor	TKC500BR
4	QF1	Air switch	NXB-63 3P-D40A
5	EV1	Fan	RD9238B24L(5000rpm/min)
6	RP1、RP2、RP3	Potentiometer	RVS28P-B472-K16X
7	AP1	PCB	PZ08
8	KT1 KT2	Temperature relay	KSD305A-75℃±3D SHUT
9	C4	Filter capacitor	CBB88 50UF/800VAC
10	TC1	Control transformer	TZ04-A1

## 6. Installation and Adjustment

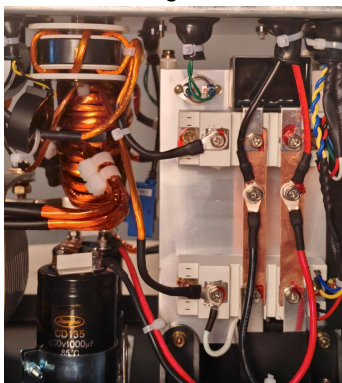
### 6. 1. Open the package and check

Check if there is any damage of the machine, if all the accessories is complete according to the packing list.

### 6. 2. Installation

This machine requires 3 phase 380v/50Hz power input, so the related power cable and distribution box is needed, as well as the circuit breaker and ground lead. Reliably connect the protective ground and the yellow-green wire which on the back of the machine.

**Kind reminder:** If the user uses the generator to supply the power source, The generator module is recommended to ensure the stability of the welding process and the reliability. The specific installation diagram is as follows:



**Fix the generator module with M5\*12 screws in the chassis, and then connect**

to the cable.

### 6. 3. Requirement Condition

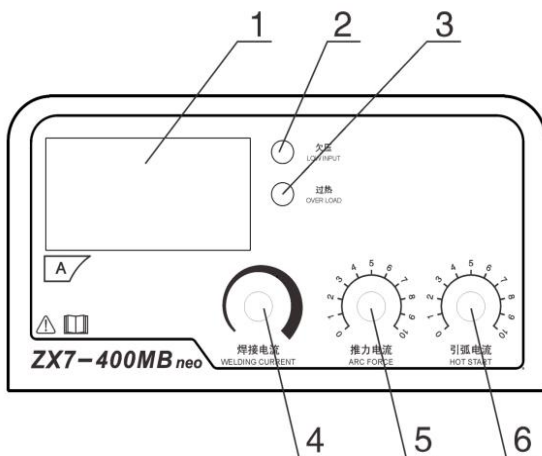
Model	CSA for input copper wire(mm <sup>2</sup> )	Breaker capacity (A)	Switch capacity (A)	CSA for ground lead cable (mm <sup>2</sup> )
ZX7-400MB neo	≥4	32	40	≥4

#### Warning:

- Completely read the operator's manual before installation, strictly follow the installation requirements.
- The 3 phase input cable should steadily connected, any one of the three disconnect or poor connect will cause abnormal work.
- Slowly and softly adjust the rotary knob, do not continue to turn when it reaches the endpoint.
- If there is significantly worse of the performance during the welding process, the machine should be stopped to check.
- The potentiometers on the control circuit has different functions, they have been routinely tested before delivery, please do not adjust.
- Only qualified personnel should perform this welding machine.
- Wear protective garments such as gloves, heavy shirts, trousers and high shoes according to the related safety precautions.
- Power off immediately if the abnormal indicator on, then check the input voltage, cooling fan motor, or if there is lack-phase or overheat. Then turn on the machine again when it cooled down, if still have problem, please contact Huayuan company.

## 7. Usage and Operation

### 7. 1. ZX7-400MB neo Front panel function



1. Digital display
2. Low input indicator light
3. Over load indicator light
4. Welding current adjusting knob
5. Arc force adjusting knob
6. Hot start adjusting knob

### 7. 2. Operating Instruction

When the machine energized, the green indicator on the front panel on, The ammeter has a preset current display, the welding machine is ready to work.

#### A. Welding Current Adj.

Turn the welding current adjust knob, the current display will show the preset current which will be used during welding process

Turn the arc force current knob to adjust the force current value

Turn the hot start current knob to meet the arc start requirements

The current display shows the exact welding current during the welding process

**B. Arc Force current adjust**

When use small current to weld, properly adjust the arc force current can increase the short circuit current value to avoid electrode stick with work piece, so that the molten drop can easily pass through to complete welding. Usually for the average current welding, the arc force current can decrease even to zero, so that it can reduce spatter.

**C. Hot start current adj.**

When use small current welding, properly adjust the hot current can increase the arc striking success ratio.

**D. Cooling fan control**

Cooling fan will work when welding start and stop 8.5 minutes after welding stop



## 8. Maintenance and Repair

### 8.1 Note

A turn off the power supply when repair and maintain the machine

B The machine adopts large capacity and high voltage filter capacitor, open the machine case 5 minutes after power off

### 8.2 Maintenance

A. Check the connections regularly

B. Clean the machine regularly, open the machine and flow the dust with compressed air

## 9. Trouble Shooting

TROUBLES	POSSIBLE CAUSE	RECOMMENDED COURSE OF ACTION
When machine powered on, the circuit breaker trip	1. Three phase bridge rectifier may damaged 2. The capacitor which parallel with the three phase bridge rectifier may damaged. 3. IGBT may damaged	1. change the bridge rectifier 2. change the capacitor 3. Replace PCB and IGBT
When machine powered on, there is no preset current indication	1. The protective fuse on the back of the machine may break 2. Lack phase 3. PCB AP1 Broken 4. Digital display broken	1. Replace fuse 2. Check the input power 3. Change the AP1 4. Change the digital display
When machine powered on, the power indicator on, but no voltage	1. PCB AP1 may damage 2. IGBT module may damage 3. ammeter may damage	1. Replace AP1 2. Replace IGBT module 3. Replace ammeter

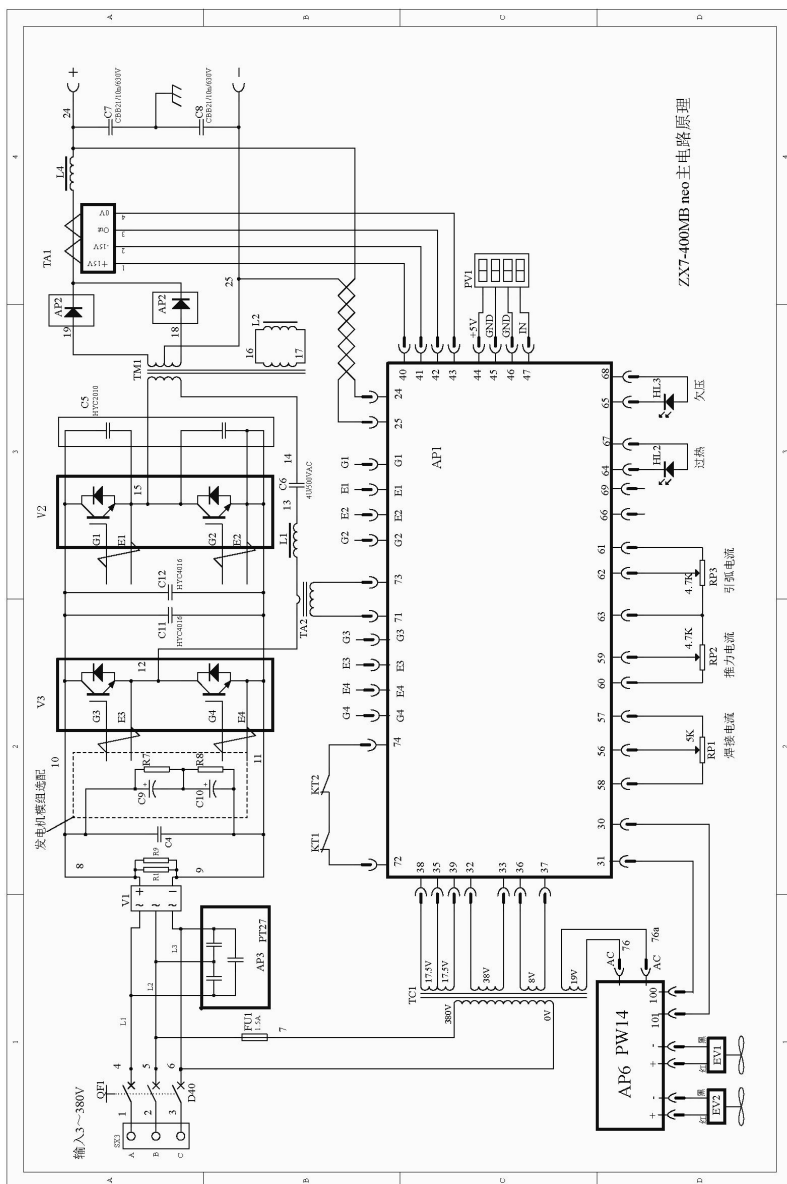
indication		
No OCV, there is abnormal noise from the machine	FRD on the main circuit is damaged	1. Check and replace the FRD
The OCV is normal, but arc interruption occurs during welding	Lack-phase	Check the input power
Arc interruption during the welding process	1. Welding cable and work piece with poor connection 2. Protective fuse break	1.check the welding cable 2.Replace the fuse(1.5A)
Machine not work, but the overload indicator on	1. Cooling fan damaged cause overheat protection 2. Over-load use cause over heat protection	1. Replace cooling fan 2. Stop welding, let the machine operate for 10min without load

**Attention:** Only qualified technicians should perform troubleshooting work on the machine. If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, please contact us for technical assistance.

## 10. Package List

1. ZX7-400MB neo Inverter DC Arc Welding Machine 1set
2. Fast Connector 2pcs
3. Documents (Guarantee card, operator's manual, quality certificate)  
1 for each

## 11. Product Diagram





No.	Code	Name	Specification	Qty	
1	TM1	Main transformer	homemade	1	
2	L1	Saturation inductance	homemade	2	
3	L2	Linear inductance	homemade	1	
4	R1 R9	resistance	RJ17-2W-1M	1	
5	R3-R6	resistance	RJ-0.5W-10K	1	
6	TA1	Hall sensor	TKC500BR	1	
7	TA2	Current detection coil	T311908-375Ts(black and white lead 300m)	1	
8	QF1	Air switch	NXB-63 3P-D40A	1	
9	EV1 EV2	Cooling fan	RD9238B24L(5000rpm/min)	1	
10	TC1	Control transformer	TZ04-A1	1	
11	SX1 CS2	Quick connector holder	DKJ-70-1(European)red and black for each	1	
12	FU1	Lead fuse	5*20(1.5A)	1	
13	AP2	Printed board	PT10	1	
14	V2 V3	IGBT module	MG50HF12TLC1	2	
15	V1	Three phase rectifier	MDS50/16F1	1	
16	PV1	Digital display	HYD5135W-10V-1	2	

17	KT1 KT2	Temperature relay	KSD305A-75℃±3D shut		
18	C4	Capacitor	50μF/800VDC	1	
19	C6	Capacitor	CBB84-4μF/500VAC	1	
20	C5	Soft-switch capacitor	HYC2010	1	
21	C7 C8	Capacitor	CBB21-10nF-630V	1	
22	HL1	Indicator light	Φ5red(set)	1	
23	HL2	Indicator light	Φ5yellow(set)	1	
24	RP1-RP 3	potentiometer	RVS28P-B472-K16X	3	
25	SX3	Junction box	87*50	1	
26	AP1	Printed board	PZ08(with smart fan)	1	
27	R7 R8	Resistance	PL05	1	Generator module is optional
28	C9 C10	Electrolytic capacitor	CD293D-400V-1000μF (with clamps)	1	
29	AP3	Printed board	PT27	1	
30	L4	Filter reactor	homemade	1	
31	C11	capacitor	HYC4016	1	
32	AP6	Fan rectifier	PW14-B1	2	

The final explanation right is reserved to Huayuan Electric Equipment Co., Ltd.  
If there is any change in the manual, please forgive not to inform separately!

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