NB-350/500/630HD

MIG/MAG/CO_2 WELDING MACHINE

MANUAL INSTRUCTION

(PLEASE READ CAREFULLY BEFORE OPERATION)

Safety Depends on You

Huayuan arc welding and cutting equipment are designed and built with safety in mind. However, your overall safety can be increased by proper installation.

DO NOT INSTALL, OPERATE OR REPAIR THIS EQUIPMENT WITHOUT READING THIS MANUAL AND THE SAFETY PRECAUTIONS CONTAINED THROUGHOUT. And, most importantly, think before you act and be careful.

Special Attention (Very Important):

- **AVOID FALLING DOWN WHEN THE WELDING MACHINE IS PLACED ON THE INCLINED PLANE.**
- **IT'S CAN NOT BE USED FOR UNFREEZING PIPELINES.**
- **THE SHIELD RANK OF THIS SERIES OF WELDING MACHINE IS IP21S, AND IT IS NOT SUTABLE FOR WORKING IN THE RAIN.**

Purchase Date：_____

Serial Number：_____

Machine Type：_____

Purchase Place：_____

Cautions	Arc and arc rays may harm health.

Arc welding can be hazardous. All performing welding workers ought to have health qualification that provided by authority organization. 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 all installation, operation, maintenance and repair procedures are performed only by qualified individuals.

1 **Electric shock can kill**: 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. Users need to follow the below items to avoid electric shocks:

- 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. Otherwise, use automatic or semiautomatic welding machines, DC welding machines as possible as you can.
- In semiautomatic or automatic wire welding, the electrode,electrode reel, welding head, nozzle or semiautomatic welding gun are also electrically"hot".
- 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.
- Ground the work or metal to be welded to a good electrical(earth) ground.
- Maintain the electrode holder, work clamp, welding cable and welding machine in good, safe operating condition. Replace damaged insulation.
- Never dip the electrode in water for cooling.
- 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.
- When working above floor level, please do wear safety belt to avoid falling or losing balance on electric shock.

2 **Arc rays can burn**: 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 to nation standards.

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

3 **Fumes and Gases can be dangerous**: 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.

- 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.
- 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.
- Read and understand the manufacturer's instructions for this equipment and the consumables to be used, including the material safety data sheet (MSDS) and follow your employer's safety practices. Make sure they are asepsis and innocuity.

4 **Spatter**: Welding or cutting spatter can cause fire or explosion.

- Remove fire hazards 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.
- Where compressed gases are to be used in the field, special precautions should be used to prevent explosion.
- When not welding, make certain that no electriferous part is touching the work piece or the work stage. Accidental contact can create a fire hazard.
- Do not weld containers or lines, which are not proved to be innocuity.
- 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”.
- Spatter might cause burn. Wear leather gloves, heavy shirt, cuffless trousers, high shoes and a cap over your hair to prevent from burning by spatter. Wear the ear shield when performing sideways or face up welding. Always wear safety glasses with side shields when being in a welding area.
- The welding cables should be as close to the welding area as possible, and the short, the better. Avoid welding cables going through the building framework, lifting chains, AC or DC cables of other welding machines and appliances. The welding current is strong enough to damage them while having short circuit with them.

5 **Cylinder may explode if damaged.**

- Make sure that the gas in the storage cylinder is qualified for welding, and the decompression flowmeter, the adapter and the pipe are all in good condition.
- Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.
- Be sure to put the cylinder in the working space with no crash or shake, and far from welding area.
- Never allow the electrode, electrode holder or any other electrically“hot”parts to touch a cylinder.
- Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.
- Valve protection caps should always be in place and hand tight except when the cylinder is in use or connected for use.

6 **Power**: (For electrically powered welding and cutting equipment) Turn off input power before installation, maintenance and repair to avoid accidents.

- Huanyuan welding equipment is I class safeguard equipment; please install the equipment in accordance with the manufacturer’s recommendations by specific persons.
- Ground the equipment perfectly in accordance with the manufacturer’s recommendations.

7 **Power**:(For engine driven welding and cutting equipment)

- Work in ventilated place or outdoors.

- Do not add fuel near to fire or during engine starting or welding. When not working, add fuel after engine is cooling down; otherwise, the evaporation of hot fuel would result in dangers. Do not splash fuel out of the fuel tank, and do not start the engine until complete evaporation of the outside fuel.

- Make sure that all the safeguard equipments, machine cover and devices are all in a good condition. Be sure that arms, clothes and all the tools do not touch all the moving and rotating components including V belt, gear and fan etc.
- Sometimes some parts of the equipment have to be dismantled during maintenance, but you still have to keep the strongest safety awareness .
- Do not put your hand close to fans and do not move the brake handle while operating.
- Please remove the connection between the engine and the welding equipment to avoid sudden starting during maintenances.

■ When engine is hot, it is forbidden to open the airtight cover of the radiator water tank to avoid hurt by the hot vapor.

8 **Electromagnetic**: Welding current going though any area can generate electromagnetic, as well as the welding equipment itself.

■ Electromagnetic would affect cardiac pacemaker, the cardiac pacemaker users should consult one's doctor first.

■ The effect of electromagnetic to one's health is not confirmed, and it might have some negative effect to one's health.

■ Welders may use following method to reduce the hazardous of electromagnetic:

a. Bundle the cable connected to the work piece and the welding cable together.

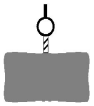
b. Do not enwind partially or entirely your body with the cable.

c. Do not place yourself between the welding cable and the ground (work piece) cable, if the welding cable is by your left side, then the ground cable should be by your left side too.

d. The Welding cable and the ground cable are as short as possible.

e. Do not work near to the welding power source.

9 **Lifting equipment**: carton or wooden boxes package the welding machines supplied by Huayuan. There is no lifting equipment in its wrapper. Users can move it to the prospective area by a fork-lift truck, then open the box.



■ If there are rings, the machine can be transited by rings. While Huayuan Welding Machine Manufacture reminds users, there is potential risk to damage the welding machine. So it is better to push the welding machine by its rollers unless special situations.

■ Be sure that the appurtenances are all removed off when lifting.

■ When lifting, make sure that there is no person below the welding machine, and remind people passing by at any moment.

Do not move the hoist too fast.

10 **Noise**: Huayuan Welding Machine Manufacture reminds users: Noise beyond the limit (over 80 db) can cause injury to vision, heart and audition depending on oneself. Please consult local medical institution. Use the equipment after doctor's permission would help to keep healthy.

CONTENT

1 Summary

1.1 Working principal

The input three-phase AC 380VAC50HZ(50HZ) is rectified and supplied to the IGBT inverter to produce 20 kHz AC. This AC is transformed by the high–frequency transformer and rectified; then goes into the output of DC power. Please check the figure 1 and 2 electrical schematic diagram of NB-350HD and NB-350HD.

1.2 Application

It is suitable for welding mild steel, stainless steel, aluminum and their alloy.

It is fit for flat welding, vertical position welding, over-head position welding, horizontal position welding and across welding and all position welding.

Both for solid welding wire and flux-cored welding wire with the diameter of Φ0.8, Φ1.0,Φ1.2,Φ1.6.

1.3 Main features

Appearance

- Nice human-computer interface, easy to operate;

Function

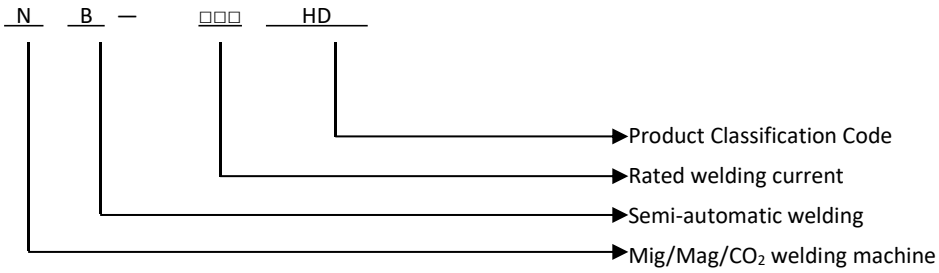
- This machine is digital controlled, the welding parameter and process can be precisely preset;
- With two welding process of stick welding and gas shield welding;
- The current working parameter can be real-time stored;
- with parameter storing and calling functions with 20 channels(10 channels for stick welding and 10 channels for gas shielding welding);
- Welding parameter can be centralized adjusted, easy to operate;
- With protection functions when over-voltage,under-voltage, default phase and over-load;
- With protection functions when false tripping the gas shied welding;
- 100% Heavy rated duty cycle, the machine can work under 40℃ without stopping;
- There is wireless network interface, the machines can be centralized controlled or managed by computer;

Advance features

- Good capacity of resisting disturbance, the welding is stable;
- The key components are all world famous brand with excellent quality;
- The driving board and main control board are separated, components are modularization designed, which is easy to repair and transport;
- High voltage and slow wire feeding speed at arc striking stage, the arc striking is stable and fast;
- A unique feedback control circuit of arc voltage and current is adapted, which make the welding is stable with low spatter and excellent weld;
- With selection function of different wire diameter, arc character of different wire diameter can be automatically fit to get the best welding performance;
- Use double driving wire feeder, very stable wire feeding;
- Excellent F.T.T - Globule control circuit makes positive striking of arc;
- The welding parameter on start, welding and crater can be separately adjusted, the weld quality is highly improved;
- PWM inverter technique is adapted, the frequency can achieve 20KHz with high speed of dynamic response.

2 Operation notice

2.1 Model instruction



2.2 Safety

For you and others safety, please read the below items carefully!

The welding machine must be grounded well

In case of any electric shock accidents, please do connect the green/yellow input cable to ground very well!

The safety protective equipment must be wear

In case of ultraviolet ray, hard light hurt and harmful gas, please do wear the protective equipment, make sure the ventilation device is working well;

The gas cylinder must be fixed well, in case of crashing;

The machine and working area should keep away from those flammable things.

Prevent sundries from getting into the machine and sharp thing from cutting cables.

Prevent the machine from damage by falling or hitting. Once it falls or be hit, the machine cannot be used again without professional checking.

2.3 Working environment

If the work conditions fall short of the below items, the working performance may not meet the technical criterion, and the machine will be damaged.

The machine should be put on where there is low humidity, little dust and no direct sunlight, rain, flammable things, corrosive gas and materials.

Avoid metal sundries entering into the power source.

The distance between the power source and wall or other close things should be more than 30cm. The distance between two machines should be more than 30cm.

It should be operated in where there's no wind.

It should be operated in where the altitude is less than 1000m.

2.4 Power input

Power supply : 3～50HZ380VAC

The fluctuation range of distribution voltage:＜±15%

The fluctuation range of frequency: ＜±1%

The imbalance rate of three-phase voltage :＜±5%

While using engine generator, the output power should be two times larger than the rated input power of the welding power source and compensation coil is needed.

2.5 Connections and installation

Connection between the welding equipment and other equipment.(As Figure 1)

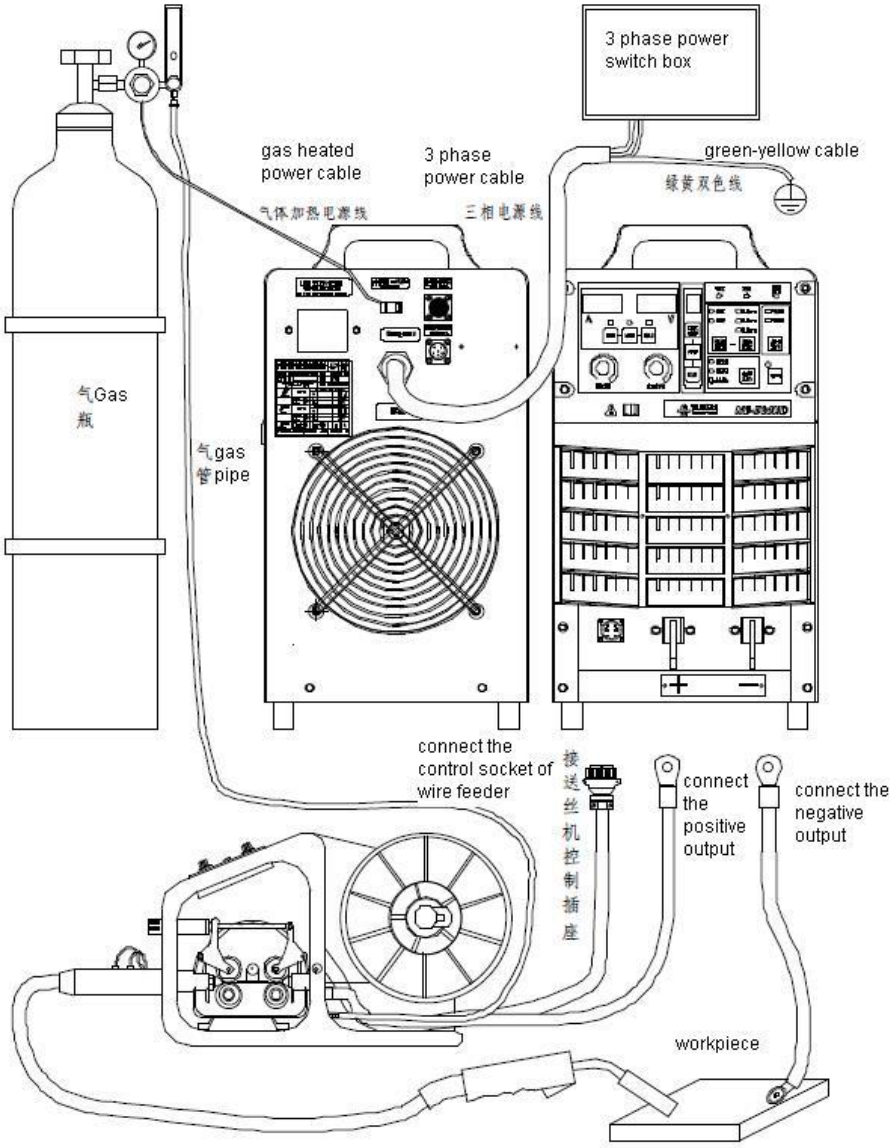


Figure 1

2.6 Components name and Function Introductions

2.6.1 Function instruction of front panel

Take the NB-500HD as a sample, the function of NB-350HD is the same, please check the figure 2 as reference:

1) Current adjusting knob.....To adjust the welding current

When work as MIG/MAG/CO_2, when the start indicator lights, it adjusts the start current, then the crater indicator lights, it adjusts the crater current;

When work as stick welding, it set and display the welding current;

2) Voltage adjusting knob.....To adjust the voltage, when the start indicator lights, it adjusts the start voltage, then the crater indicator lights, it adjusts the crater voltage;

3) Current meter.....To set and display the welding current. Before welding, it displays the set current value, when welding, it displays the real welding current value;

4) Voltage meter.....To set and display the welding voltage. Before welding, it displays the set voltage value, when welding, it displays the real welding voltage value;

5) Start choosing knob.....it lights the start indicator light, only if when the special 4-step indicator light is on, this knob can work. When work as MIG/MAG/CO_2, press down this knob more than 5 seconds, enter into centralized control mode;

press down this knob more than 5 seconds again, quit centralized control mode;

6) Crater choosing knob.....it lights the crater indicator light, only if when the 4-step or special 4-step indicator light is on, this knob can work.

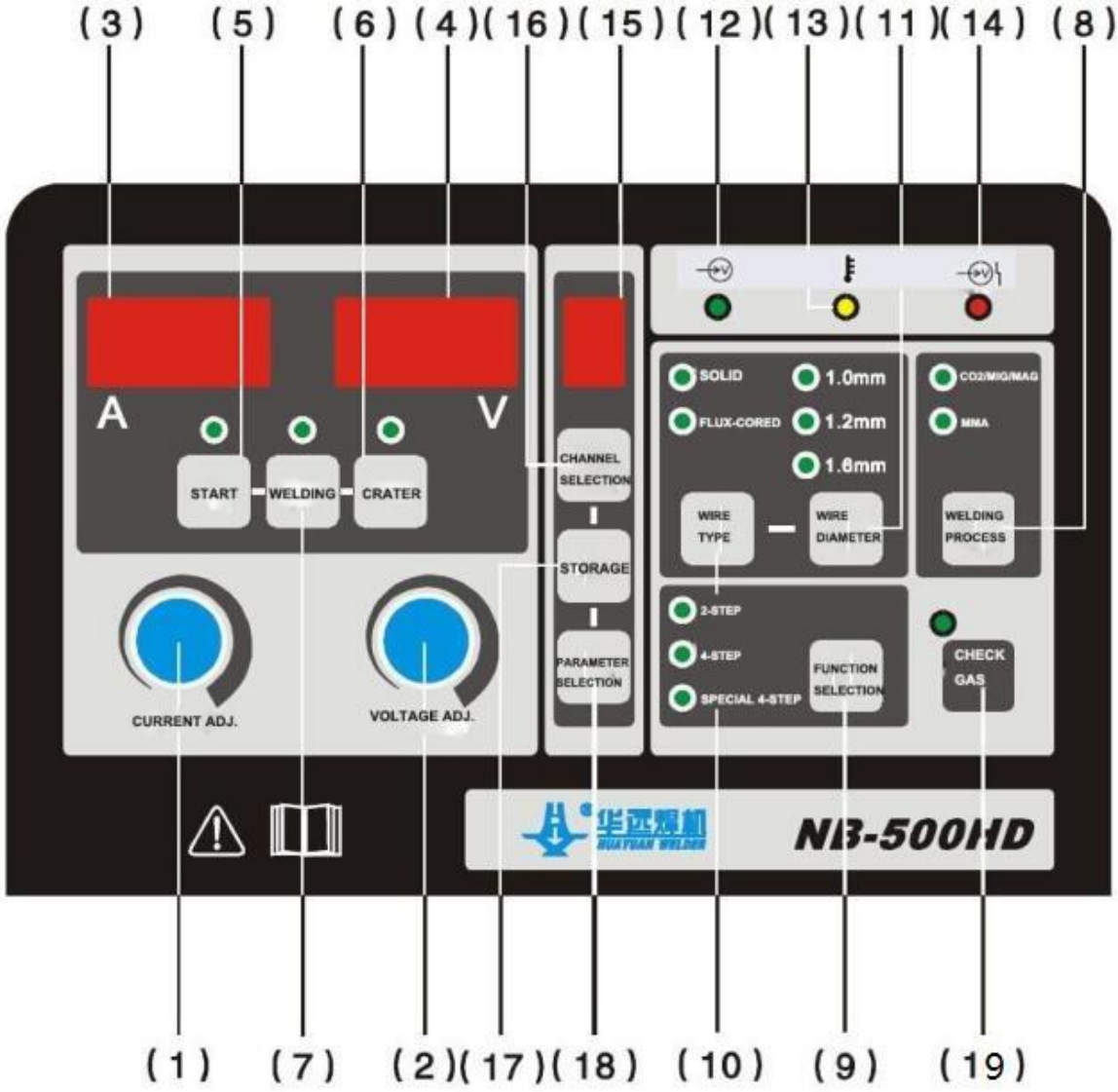


Figure 2 NB-500HD Function instruction of front panel

7) Welding choosing knob.....it lights the welding indicator light, then the welding current and voltage can be adjusted on the wire feeder panel;

8) When CO_2/MIG/MAG indicator lights, it works as CO_2/MIG/MAG DC welding;

When MMA indicator lights, it's works as MMA welding;

9) Function selection knob.....to selection the functions

When the 2-step indicator lights, it's in 2-step status;

When the 4-step indicator lights, it's in 4-step status;

When the special 4-step indicator lights, it's in special 4-step status;

10) Wire type choosing knob.....to choose the welding wire

When the solid indicator lights, it means the solid wire is suitable for welding;

When the flux-cored indicator lights, it means the flux-cored wire is suitable for welding;

11) Wire diameter choosing knob.....to choose the wire diameter

When Φ1.0mm indicator lights, it means 1.0mm wire is suitable for welding;

When Φ1.2mm indicator lights, it means 1.2mm wire is suitable for welding;

When Φ1.6mm indicator lights, it means 1.6mm wire is suitable for welding;

12) Power knob.....when this indicator lights, it means the machine is on power;

13) Over-heating indicator.....when this indicator lights,it means the machine is over-heat, then check the cooling fan or the environmental temperature;

14) Voltage abnormal indicator.....when this indicator lights, it's possible problems of over voltage, under voltage or phase default;

15) Channel display.....it displays the channel from "0"～"9";

16) Channel selection knob.....to choose channel

When it's not in channel calling status, press this knob to change the "0"～"9" channel in order cycle;

When it's in channel calling status, press this knob to quit;

17) Storage knob.....when this indicator lights, press it to store the present welding parameter in channel;

18) Parameter selection knob.....when this indicator lights, press it to call and lock the welding parameter that displayed in the channel;

19) Check gas knob.....Control the protecting gas on/off, press this knob to switch the indicator light.

Displaying instruction:

The preset current of MIG/MAG/CO_2 is based on wire extension when welding, it's only a reference, there will be some big difference when welding, that's normal, adjust again according to the real welding condition.

The digital meter and indicator lights may flicker, that's normal.

2.6.2 Function instruction of rear panel

Function instruction of rear panel please refer to the figure 3

（1） Three phase input power cable.....to connect with the distribution box, please connect the green-yellow wire with earth cable well.

（2） Power over current protection switch.....when something wrong with the welding machine, it breaks to protect the machine. This switch is only for protection, please make another power switch when use machine.

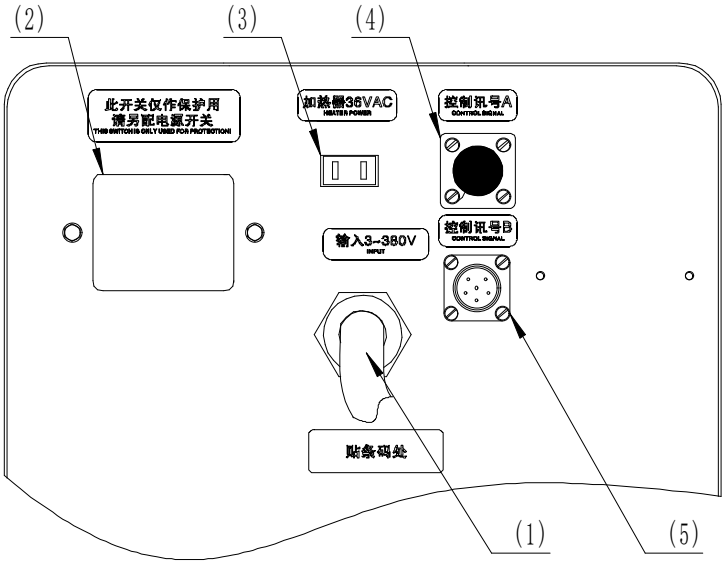


Figure 3

（3） The power connector of heater.....it's the connector of gas heater, the output voltage is 36VAC.

（4） Control signal A.....it output arc striking signals, receive commond signals of current/voltage, for the controlling of some automatic equipment.(This connector is optional)

（5） Control signal B.....it's a wireless network management connector.

2.6.3 Function instruction of wire feeder panel

Function instruction of wire feeder panel please refer to the figure 4:

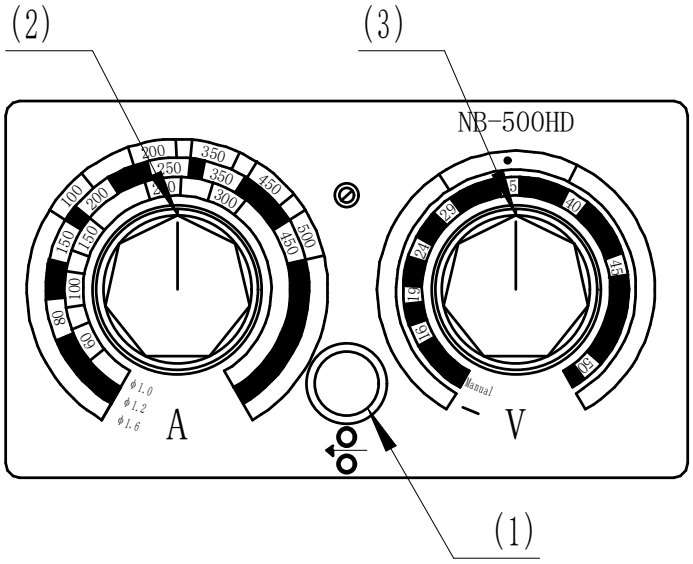


Figure 4

（1）Manual wire feeding knob.....press this knob, the wire will feed out. The wire feeding speed can be adjusted by welding current knob. When use small size wire, please do use slow wire feeding, in case of bending;

（2）Welding current adjusting knob.....to adjust the welding current;

(3) Welding voltage adjusting knob.....to adjust the welding voltage;

3 Connecting and grounding

3.1 Input cable and earth cable

The user should choose the power cables, switches, fuses and power switches that on the switchboard according to the table below

Sheet 1 Switchboard specification

SPEC	NB-350HD	NB-500HD	NB-630HD
Switch capacity (A)	40	63	100
Fuse capacity (A)	32	40	63
Sectional area of power cable (mm^2)	4	6	8
Sectional area of ground cable (mm^2)	4	6	8

Make sure the power source is cut off before connecting. Do not connect with wet hands.Do not place anything on the power supply cable. Make sure all the connections are reliable.Connect the green-yellow wire of the three-phase input cable to the grounding wire on the switchboard reliably.

3.2 The cable connection of stick welding terminal

Method and requirements:

Cut the power and then start to connect;

Connect the copper connector of workpiece cable to the '+' and '--' output socket that on the welding power source. When it is negative connection, the welding electrode holder should be connected to the '+'. When it is positive connection， the welding electrode holder should be connected to the '--'

The welding cable and workpiece should be reliably connected by bolts, and keep good contact.

3.3 Connections of Gas-shielded Welding

(1) Connections of the output terminal cable

Please make sure the power switch is cut off before connecting.

Connect the copper connector of wire feeder cable to '+' output that on the welding power source;

Connect the copper connector of workpiece cable to '--' output that on the welding power source, connect the other side to workpiece with bolts;

Insert the aviation plug(six cores) of control cable into the control socket(six cores) of wire feeder, then tighten the ring nut, connect the other side of control cable to wire feeder.

(2) Connections of the power source, wire feeder and welding torch(please refer to figure 1)

Methods and requirements

Make sure the power switch is cut off before connecting;

Wire feeders that produced by our company are requested to match with the certain welding machine. Otherwise the welding performance maybe bad and even damage the machine;

Insert the aviation plug(six cores) of control cable into the control socket(six cores) of wire feeder, then tighten the ring nut;

Aim the control plug of the welding gun at the guide slot, then insert it into the control output socket (2 pins), then tighten the ring nut. After the connector of welding torch aiming at guide slot, you can insert it completely. And then turn 90° by clockwise rotation and tighten the bolts; Connect the gas pipe of welding torch to the gas output connector of wire feeder, and then tighten the nuts.

(3) Connections of the gas cylinder and gas adjustor

Methods and requirements

Install the gas adjustor to the gas cylinder, and screw down the nuts.

Connect the aero plug of the gas heater to the heater's power source socket on the back panel of the machine, and screw down the nuts.

Connect the windpipe of the wire feeder to the gas output connector of the gas heater, fix it by a tightener.

When used as CO_2 shield welding, make sure the gas meet the requests of welding. Otherwise welding defeat may appear.

When used as MAG welding, make sure the mixed gas meet the requests of MAG welding. To avoid the mixed gas being asymmetrical, please use compounding device of proportioned gases.

4 The operation of stick welding(MMA)

Turn on the power switch of distribution box.

Turn the welding model switch to the manual welding model.

Before welding, make sure the output terminal of the welding machine is connected to the welding cable reliably according to the section 2.2 above. The welding current is adjusted by the current adjustment knob on the panel.

Please wear fur glove and safety shoes, wear a shield filter glass that match with different welding current.

5 The operation of MIG/MAG/CO_2 welding

(Please read this manual carefully and operate according to it strictly)

5.1 Preparation and checking before operation

5.1.1 The preparation of safety protection

Please prepare and wear the safeguards as below figure 5

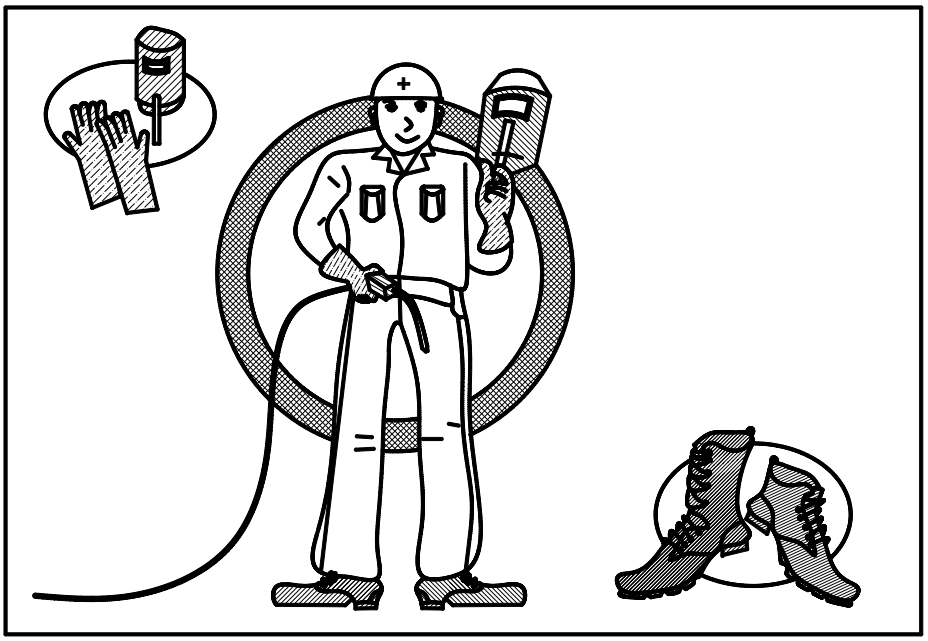


Figure 5

a) Wear fur gloves and safety shoes to protect the skin and bare parts;

b) Wear a shield filter glass that match with different welding current to protect eyes;

c) There should be ventilation in the welding place to prevent breathing in deleterious gas.

Sheet 2 The selection principal and reference of filtering glass

Welding current	100A or below	100A～300A	300Aor above
Photoprotection degree	No.09 ,No.10	No.11 ,No.12	No.13 , No.14

5.1.2 Checking after connection

Check out all the items according to the section 3.3 “Connections of Gas-shielded Welding”, make sure there’s no error.

Check out all the items according to the section 2.4 “Input power condition” to meet all the requests.

5.1.3 The adjustment of swift and gas flow meter

First, turn on the power switch of distribution box;

Second, turn the welding model switch to the “MIG/MAG/CO_2” welding model;

Third, turn the “welding wire’s type ”switch and the “welding diameter” switch to the right position to meet the type and diameter of welding wire;

Fourth, turn the “Gas-supply” switch to “check gas” position;

Fifth, turn on the gas valve of the cylinder, and then adjust the switch of the flow meter slowly to meet the value needed;

Sixth, turn the “gas supply” switch to “welding” position.

5.1.4 Installation of the welding wire

① First, make sure that the size of the wire feeding slot at the outer side of the wire feeding wheel fits with the diameter of the used welding wire (please refer to Figure 6), otherwise, dismantle the wire feeding wheel and choose suitable diameter wire, install the wheel and make the slot be at the outer side perfectly;

② Install the welding wire reel to the welding wire reel’s axis, adjust the baffle of the welding wire reel’s axis to be spread,screw down the manual nut.

🔔 Notice: in case of wire reel dropping, please do pull back the wire reel baffle.

③ Pull back the wire reel baffle;

④ Pull down the handle;

⑤ Lift the press-arm;

⑥ Let welding wire go through the wire rectification wheel (or guide pipe), wire feeding wheel slot, then insert into the guide tip

To adjust the press-arm handle

Press the welding wire with press-arm, and then pull up the handle to press the press-arm, circumgyrate the handle with

suitable strength;

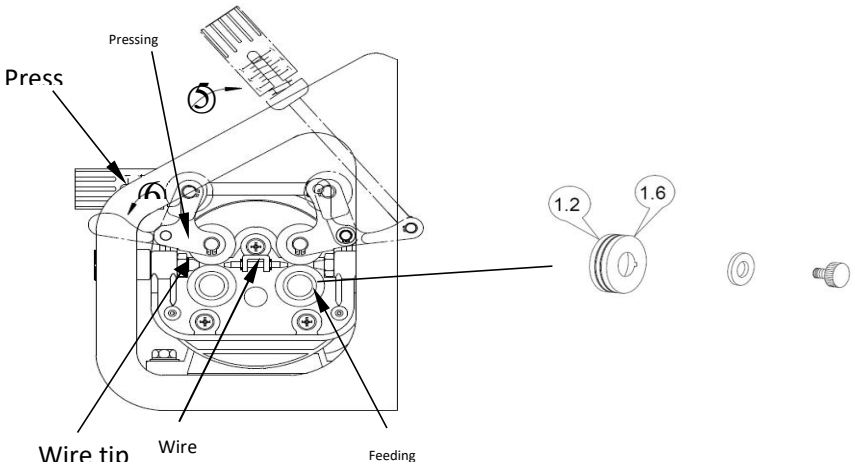
Sheet 3 The recommend value of press-arm

The recommend value of press-arm	
Wire diameter	The reference scale
Φ1.6	5~6
Φ1.2	5~6
Φ1.0	3~4
Φ0.8	2~3

Check up the tip of welding torch, whose aperture diameter should meet the diameter of the wire

Danger! When start the welding torch, please do not get it close to eyes, face and body. It hurts!

Press “manual wire feeding” button on the control box of wire feeder, adjust “welding current adjustment” knob for a proper feeding speed. You can loosen the button until there is 15—20mm wire outside of welding torch.



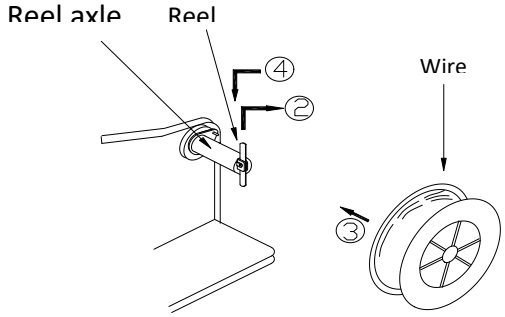


Figure 6

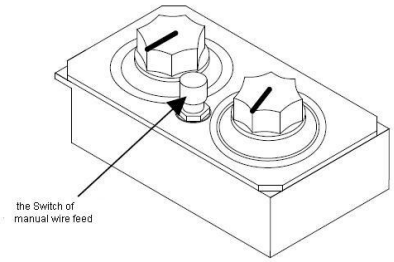


Figure 7

5.2 Basic operation instruction

There are three welding processes of 2 step, 4 step and special 4 step swift by the” function selection” knob.

5.2.1 Welding operation with arc ending function (4 step)

(1) Features:

The main features of the 4 step welding function is the ability to fill up the hollows when ending weld, which can be propitious to connect the start-point and end-point of the welding seam continuously;

it's Mainly used in welding long and middle -thick work-piece;

The self-lock will be canceled if the arc is stopped for more than 0.5s.

(2) Operating instruction:

□ Press the function selection knob to light the step 4;

□ After on standby state, press the welding torch switch, it begins to feed gas and come into the gas pre-flow state. After feeding gas for some time, welding voltage appears, then coming into the arc starting state and begins to feed wire slowly. After successful arc starting, the wire feeding speed will become normal, and then welding current appears. Now you can loosen the torch switch, it's on self-lock state. Simultaneously, adjust the "welding voltage adjustment" knob and the "welding current adjustment" knob for the best performance of welding;

□ When welding is finishing, press the welding torch switch again, and it come into arc ending adjustment state. Then, set the arc ending voltage and current by adjusting the relative knobs on the welding power panel (or adjust them to the needed values respectively in advance, commonly to the 60～70% of the normal welding current) , thus you can control and adjust the effect of filling up hollows at the end of welding. Then loosen the welding torch`s switch again, wire feeding stops immediately, it will come back to burn state, the welding voltage will decrease and become back burn voltage. When the welding current becomes zero, arc quenches, gas feeding stops, and the welding finishes.

5.2.2 Welding operation with arc ending function (2 step)

（1） Features:

□ When it's on this step, press the torch switch to start welding, and loosen the torch switch to stop welding;

□ It's suitable for locating welding, spot welding, short weld welding, also suitable for welding thin plates;

□ Compare to 4 step, there is no process of arc ending on 2 step;

（2） Operating instruction

□ Press the function selection knob to light the step 2;

□ After on standby state, press the welding torch switch, it begins to feed gas and come into the gas pre-flow state . After feeding gas for some time, welding voltage appears, then coming into the arc starting state and begins to feed wire slowly. After successful arc starting, the wire feeding speed will become normal, and then welding current appears. But you can`t loosen the switch now. Simultaneously, adjust the "welding voltage adjustment" knob and the "welding current adjustment"knob for the best performance of welding;

□ When welding is finishing, loosen the welding torch switch, wire feeding stops immediately, and become back burn state, The welding voltage will decrease and becomes back burn voltage. When welding current becomes zero, arc quenches, gas sending stops, and the welding finished.

5.2.3 Welding operation with start welding function (Special 4 step)

（1） Features:

□ Compare to 4-step, there is a arc start welding process on special 4-step.

（2） Operating instruction:

□ Press the function selection knob to light the step 4;

□ Compare to 4-step, there is a arc start welding process on special 4-step. After arc striking, it enter in start welding process, then press the "special 4-step" knob. Adjust the current and voltage adjusting knob to adjust the start current and voltage of start welding, loosen the torch switch and start to weld.

6 The usage of extended output cable

The connection cable on this series of machine is allowed to be lengthened between power source and wire feeder, but the below regulations have to be followed:

□ The extended cables must be bigger than that with the machine. Because the resistance of cable will increase if cable length extend, and the increase of the cable's voltage drop will make against the welding. Moreover, the smaller cable sectional area is, the greater influence will be;

□ When lengthening the cable, the shorter, the better;

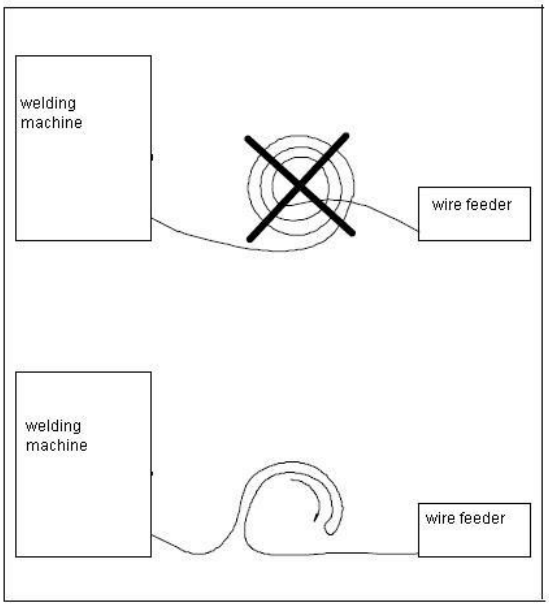


Figure 8 Coil the welding cable like this

□

When lengthening cable, get the cable straight. And coil the cables like figure 8.

Figure 8 Coil the welding cable like this

7 Specifications

7.1 Technical parameter

Sheet 4 Main technical specification

Parameter / Model		NB-350HD	NB-500HD	NB-630HD
Rated input voltage		3～380/415V 50/60Hz		
Rated input capacity		18.0KVA	24.7KVA	36.2KVA
Rated current		350A	500A	630A
MIG/MAG/CO_2	Output current	40～350A	60～500A	60～630A
	Output voltage	16.0～31.5V	17～39V	17～44V
MMA	Output current	60～350A	60～500A	60～630A
	Output voltage	22.4～34V	22.4～40V	22.4～44V
Start current		40～350A	60～500A	60～630A
Start voltage		16.0～40.0V	16.0～50.0V	16.0～50.0V
Crater current		40～350A	60～500A	60～630A

Crater voltage	16.0～40.0V	16.0～40.0V	16.0～40.0V
Rated duty cycle	60%	100%	100%
Suited wire diameter	Solid0.8mm 1.0mm1.2mm	Solid1.0mm1.2mm1.6mm	Solid1.0mm1.2mm1.6mm
	Flux-cored 0.8mm 1.0mm1.2mm	Flux-cored 1.0mm1.2mm1.6mm	Flux-cored 1.0mm1.2mm 1.6mm
Protection class	IP21S		IP21S
Dimension (L*W*H)	550×290×540mm	630×295×545mm	690×320×570mm
Weight	32Kg	39Kg	54Kg

The rated duty cycle is 60%, that means in a 10 minutes working period, the machine will run for 6 minutes under rated welding current and rest for 4 minutes. The Rated duty cycle is 100%,that means in a 10 minutes working period, the machine will run for 10 minutes under rated welding current without rest. If the machine works over the rated duty cycle, the inner temperature will rise and exceed the fixed threshold. In order to avoid worsening the performance or even burning out the machine, there is heat protection on this series of welding machine. When the inner temperature exceeds the fixed, he heat protection begins to work, the overload indicator lamp lights, at this time the machine has no output. Wait until the temperature is below the fixed and the overload indicator lamp is turned off, the machine recovers and go on welding.

7.2 Instruction of some key words

□ The meaning with arc ending and without arc ending (2 step and 4 step)

Generally , except the welding with very low current, there will be a small crater at the end of weld, the terminology is “arc crater”. This crater is caused by arc pressure and the solidification contraction of melt metal. Generally speaking, the bigger welding current is, the bigger crater is. Sometimes, the arc crater may cause welding defeats, so it should be as small as possible. We call the method of filling the “arc crater” as “arc crater filling weld”, and the standard current value set is 60～70% of the welding current.

When the welding ends, operate the welding torch switch and change into the arc ending welding program with lower current than the welding current, we call it 4 step. 4 step means there is no control program of filling up the arc hole. Operate the welding torch switch and end the welding with normal welding current.

□ What is centralized adjustment

When adjust the welding current on wire feeder, the welding voltage will be adjusted automatically, this function is called as centralized adjustment.

□ What is the slow wire feeding speed of arc striking

To get stable arc striking, decrease the feeding speed and let it below the normal wire feeding speed, this control process is called the control of slow wire feeding of arc striking. The slowdown speed is called the slow wire feeding speed of arc striking

□ What is burn-back time

After welding, wire feeder is not stop even if the welding torch switch is shut down because of inertia. So there will be some more wire drive out from the torch, thus the wire will adhere to the workpiece, or it will cause difficulty in arc striking next time. In order to avoid this defeat, it is necessary to deal with it inside the welding machine, so that after shutting down the welding torch switch, the output voltage will still exist for a short time to burn the wire. This process time is burn-back time. This time varies because of differences in welding conditions, the resistance of welding feeding tube and the length of output cable.

7.3 Welding condition examples

The values in Sheet 5 and Sheet 6 are reference value in standard conditions.

When welding, please amend the real parameters according to the real material and welding position to get the best welding performance.

Sheet 5 Fillet welding example sheet

		Plate thickness (mm)	Welding fillet length (mm)	Wire diameter (mm)	Welding current (A)	Welding voltage (V)	Welding speed (cm/min)	Wire extension (mm)	Gas flow (L/ min)
T joint flat fillet welding	Slow speed condition	1.0	2.5~3	0.8	70~80	17~18	50~60	10	10~15
		1.2	3~3.5	1.0	85~90	18~19	50~60	10	10~15
		1.6	3~3.5	1.0,1.2	100~110	18~19.5	50~60	10	10~15
		2.0	3~3.5	1.0,1.2	115~125	19.5~20	50~60	10	10~15
		2.3	3~3.5	1.0,1.2	130~140	19.5~21	50~60	10	10~15
		3.2	3.5~4	1.0,1.2	150~170	21~22	45~50	15	15~20
		4.5	4.5~5	1.0,1.2	180~200	23~24	40~45	15	15~20
		6	5~5.5	1.2	230~260	25~27	40~45	20	15~20
		8, 9	6~7	1.2,1.6	270~380	29~35	40~45	25	20~25
		12	7~8	1.2,1.6	300~380	32~35	35~40	25	20~25
	High speed condition	1.0	2~2.5	0.8	140	19~20	150	10	15
		1.2	3	0.8	140	19~20	110	10	15
		1.6	3	1.0, 1.2	180	22~23	110	10	15~20
		2.0	3.5	1.2	210	24	110	15	20
		2.3	3.5	1.2	230	25	100	20	25
		3.2	3.5	1.2	260	27	100	20	25
		4.5	4.5	1.2	280	30	80	20	25
		6	5.5	1.2	300	33	70	25	25
Overlap joint flat fillet welding(thin plate)	Low speed condition	0.8		0.8	60~70	16~17	40~45	10	10~15
		1.2		0.8	80~90	18~19	45~50	10	10~15
		1.6		0.8	90~100	19~20	45~50	10	10~15
		2.3		0.8	100~130	20~21	45~50	10	10~15
				1.0,1.2	120~150	20~21	45~50	10	10`15
		3.2		1.0,1.2	150~180	20~22	35~45	10~15	10~15
		4.5		1.2	200~250	24~26	40~50	10~15	10~15
	High speed condition	2.3~3.2		1.2	220	24	150	15	25
					300	26	250	15	25
Fillet joint thin plate	Low speed condition	1.6		0.8	65~75	16~17	40~45	10	10~15
		2.3		0.8	80~100	19~20	40~45	10	10~15
		3.2		1.0, 1.2	130~150	20~22	35~40	15	10~15
		4.5		1.0, 1.2	150~180	21~23	30~35	15	10~15

Sheet 6 I shape butt welding example sheet

		Plate thickness (mm)		Welding fillet length (mm)	Gap distance G（mm）	Welding current (A)	Welding voltage (V)	Welding speed (cm/min)	Wire extension (mm)	Gas flow (L/min)
I shape butt welding	Low speed condition	0.8		0.8	0	60～70	16～16.5	50～60	10	10
		1.0		0.8	0	75～85	17～17.5	50～60	10	10～15
		1.2		0.8	0	80～90	17～18	50～60	10	10～15
		1.6		0.8	0	95～105	18～19	45～50	10	10～15
		2.0		1,1.2	0～0.5	110～120	19～19.5	45～50	10	10～15
		2.3		1,1.2	0.5～1	120～130	19.5～20	45～50	10	10～15
		3.2		1,1.2	1～1.2	140～150	20～21	45～50	10～15	10～15
		4.5		1,1.2	1～1.5	170～185	22～23	40～50	15	15
		6	surface	1.2	1.2～1.5	230～260	24～26	40～50	15	15～20
			Inside	1.2	1.2～1.5	230～260	24～26	40～50	15	15～20
		9	surface	1.2	1.2～1.5	320～340	32～34	40～50	15	15～20
			Inside	1.2	1.2～1.5	320～340	32～34	40～50	15	15～20
	High speed condition	0.8		0.8	0	89	16.5	120	10	15
		1.0		0.8	0	100	17	120	10	15
		1.2		0.8	0	110	18	120	10	15
		1.6		1,1.2	0	160	19	120	10	15
		2.0		1,1.2	0	180	20	80	15	15
		2.3		1,1.2	0	200	22	100	15	20
		3.2		1.2	0	240	25	100	15	20

8 Trouble shooting and Repairing

8.1 ※ Firstly check the below situation with the multi meter if anything wrong

Three-phase input power should be 380±57VAC, check if there is phase lack or over voltage fluctuation;

Whether the three-phase power switch at the switchboard is damaged; Whether the fuse and electrical power wire are installed reliably, Otherwise it will cause phase lack or they are not connected tightly, so the welding machine will work abnormally.

The control cable of the wire feeder is easy to be broken, check the related pins of the two connector plugs with six pins at the ends of the control cable to be conductive, whether the welding cable is connected reliably, and the work-piece is connected tightly.

Whether the welding torch switch and the wire connected are damaged or open circuit; whether the nozzle, conduct tip , conduct tip's seat and shunt are burned out and damaged;

Note: This welding machine adopts large capacity, high voltage and electrolytic capacitor filter, it cannot be opened until the three-phase power is shut down more than 10 minutes.

8.2 Common troubles and troubleshooting

Sheet 7 Common troubles and troubleshooting

Problem	Possible reasons	Troubleshooting
1, Turn on power, the indicator lamp doesn't light, the digital meter doesn't light.	1. Phase lack; 2. Power switch is damaged; 3. Power control fuse (3A) is melted;	1. Check the three-phase power; 2. Replace input power switch; 3. Replace Power control fuses;
2. Welding machine does not work, the abnormal indicator lamp lights	1. Phase lack; 2. Three-phase power is under voltage;	1. Check the three-phase power to make sure it meet the requirements of the machine;
3. There is no output voltage and there is noise inner the machine	1. The fast recovery diode of the main circuit is damaged;	1.Check and replace the damaged fast recovery diode;
4. Welding machine doesn't work, over heat indicator lamp lights	1. The temperature is too high; 2. When welding, cooler fans rotate slowly or don't work, which leads to bad cooling; 3. Temperature relay is damaged;	1. Welding machine will become normal after rest for some time; 2. Check the fans power or change cooling fans; 3. Replace temperature relay;
5. Welding wire feeder works, but there is no wire feeding or the feeding isn't stable.	1. Wire press wheel is not pressed tightly; 2. The type of wire feeding slot doesn't match the welding wire; 3. The tip is jammed because of the spatters; 4. The wire feeding wheel is abraded; 5. The wire feeding tube of the welding torch is jammed; 6. The curving semi-diameter of the welding torch cable is too small;	1. Press tightly; 2. Replace wire feeder wheel slot; 3. Clean the spatters in the tip; 4. Change wire feeding wheel; 5. Blow off the dust with the dry compressed air or replace a right one with the same type; 6. Make the curving semi-diameter of welding torch cable over 300mm;
6. The feeder don't work after pressing down the torch switch or there is no open circuit voltage	1. The control cable of the wire feeder is broken; 2. Short circuit of welding gun switch; 3. The PCB is broken;	1. Replace the control cable; 2. Check control wire of the welding torch switch; 3. Repair or replace the PCB;
7. Many pores in the welding seam	1. CO_2 gas is not pure; 2. The gas flow is not enough; 3. There is rust or oil in the welding seam; 4. The wind is strong when welding; 5. The path of CO_2 is jammed or air leak; 6. Valve doesn't work; 7. The nozzle is distorted;	1. Use pure CO_2 gas; 2. Adjust the gas flow; 3. Clean the welding seam; 4. The precaution against wind should be adopted; 5. Check the path; 6. Check the voltage 24VDC of the valve winding; 7. Replace the nozzle;
8. Current /voltage is out of control	1. Poor connection on control cable plugs; 2. Control cables are broken; 3. It's in lock status of wireless network management; 4. Current /voltage adjust potentiometer is damaged;	1. Check the connection of control cable; 2. Replace the control cable; 3. Press the welding knob on front panel more than 5s, after lighting the channel choosing, press the welding knob again for more than 5s; 4. Replace the potentiometer;

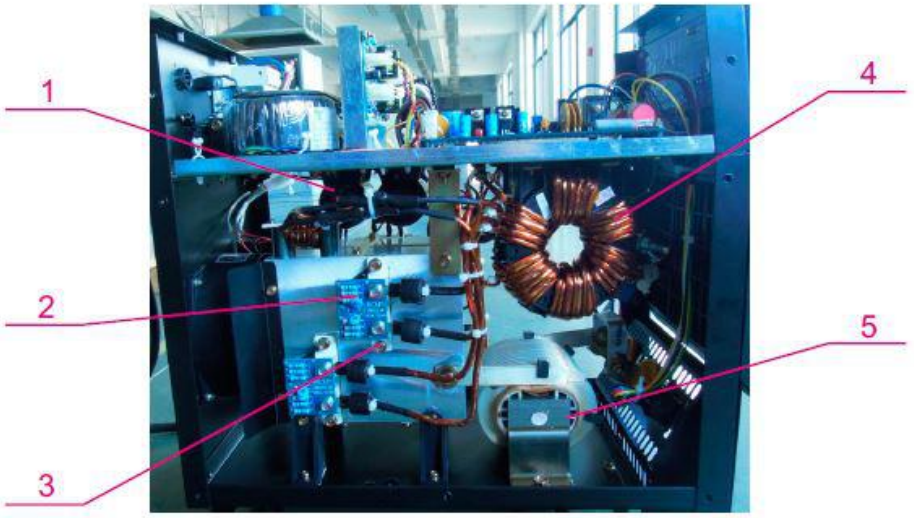
Problem	Possible reasons	Troubleshooting
	5．The PCB is damaged.	5. Repair or replace the PCB.
9. Wire feeding starts without pressing down the welding torch switch	1．The wire connecting welding gun is short circuit； 2．Control cable of the wire feeder has short circuit； 3．The manual button of wire feeding is damaged；	1．Repair or change welding gun； 2．Repair or change control cable； 3．Change the manual button of wire feeding；
10．Gas heater frosts	1. The input power fuses of the heater (5A) is burned ； 2. The resistance wire of the heater is broken ；	1. Replace the fuse with the same type； 2. Repair or replace the heater；
11．The current isn't stable, and there is too much spatter	1．Welding criterion is wrong； 2．The quality of wire is bad； 3．There is rust or oil on the welding device or wire； 4．Too much fluctuation of distribution voltage； 5．The stick out of the wire is too long ； 6．Choose wrong position of the wire diameter select switch； 7．The type of wire feeding slot doesn't match the welding wire； 8．Problems in the protective gas； 9．Incorrect type of the tip or the aperture of the tip becomes too big; 10．Too much feculence in the wire feeding tube，the resistance of the feeding wire is too large； 11．The ground cable becomes loose；	1．Adjust the welding criterion again； 2．Change wire； 3．Clean the welding device and wire； 4．The fluctuation of the line voltage can't exceed ±15%； 5．The stick out should be about 10 times than the wire diameter； 6．Take a right position of wire diameter select switch； 7．Replace wire feeding wheel slot； 8．Use the purer gas； 9．Replace tip； 10．Clean the wire feeding tube； 11．Fix the cable connected to the ground tightly；

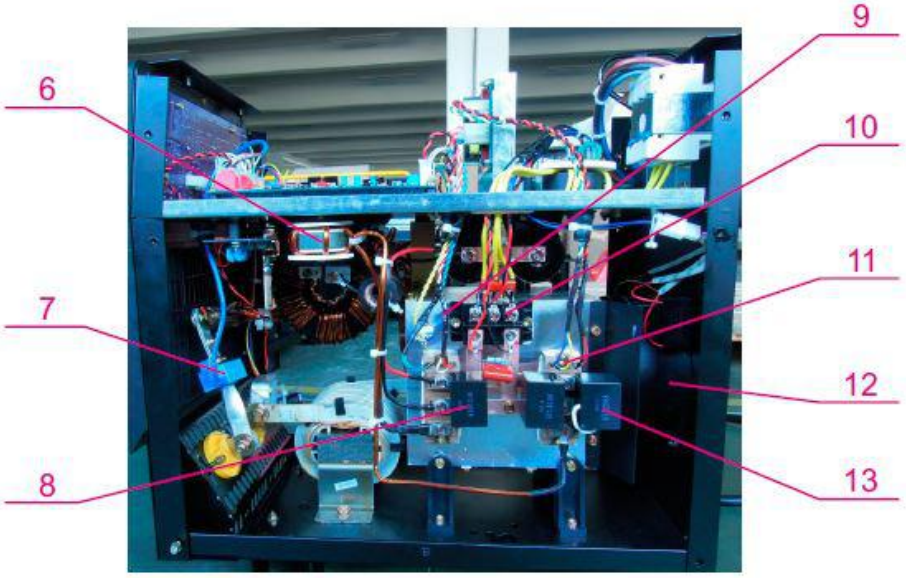
ATTENTION:

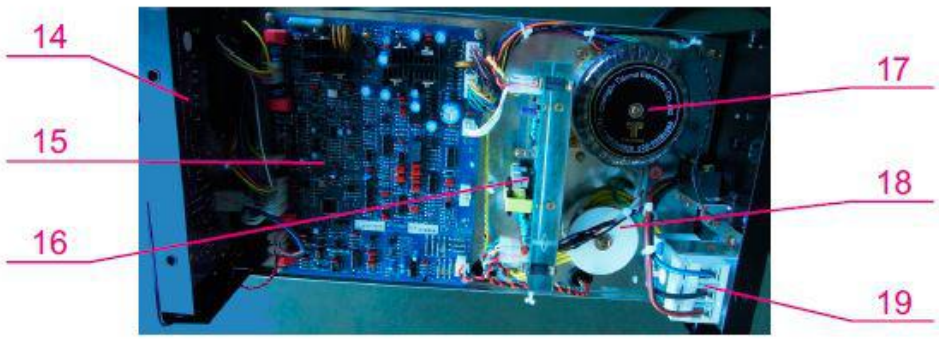
Only qualified technicians are allowed to perform troubleshooting work on the machine. If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact our service department for technical assistance.

8.3 Main parts list

NB-350HD

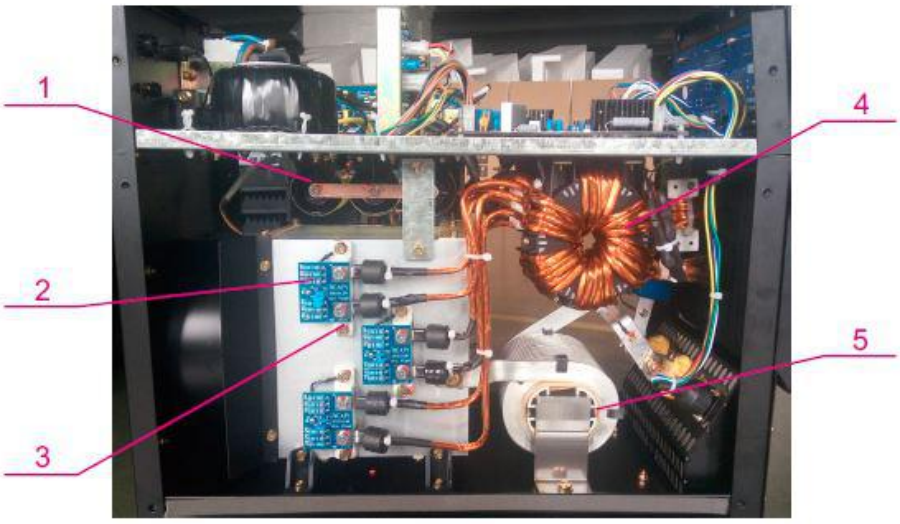


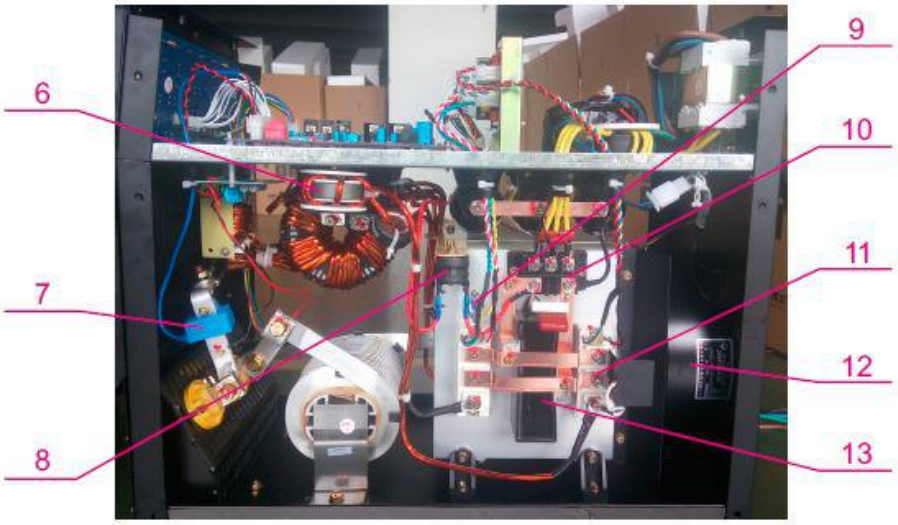


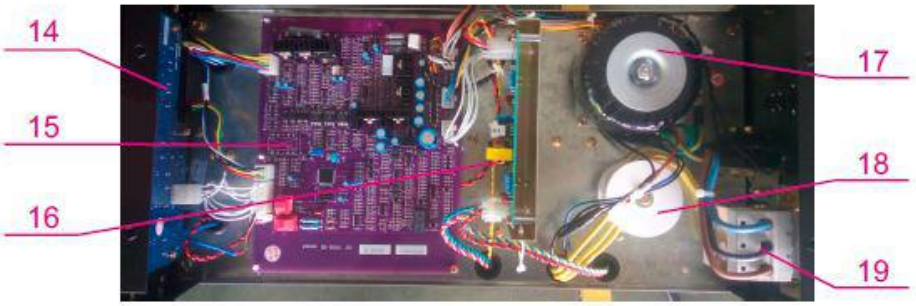


No.	Item	Model	Note
1	Capacitor	100μF-500V AC	
2	PCB	RCAP1	
3	Diode	200A/400V or 600V	
4	Main transformer		
5	Filter reactor		
6	Saturation inductance		
7	Hall sensor	TKC500BR	
8	Capacitor	HYC4006	
9	Temperature relay	KSD305A shut 75℃	
10	Bridge rectifier	MDS75-12	
11	IGBT	75A/1200V	
12	Cooling fan	150FZY2-D/AC200	
13	Capacitor	HYC2008	
14	PCB	PN03	
15	PCB	PN02	
16	PCB	PT05	
17	Control transformer	HYBYQ-NBI-2	
18	Three phase input inductance		
19	Air breaker	DZ47-63/3P D40	

NB-500HD

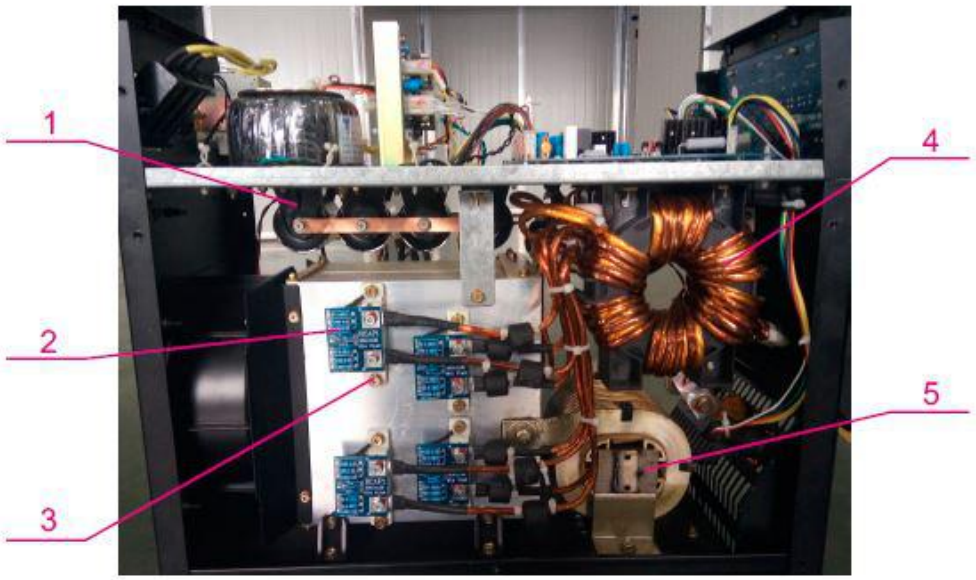


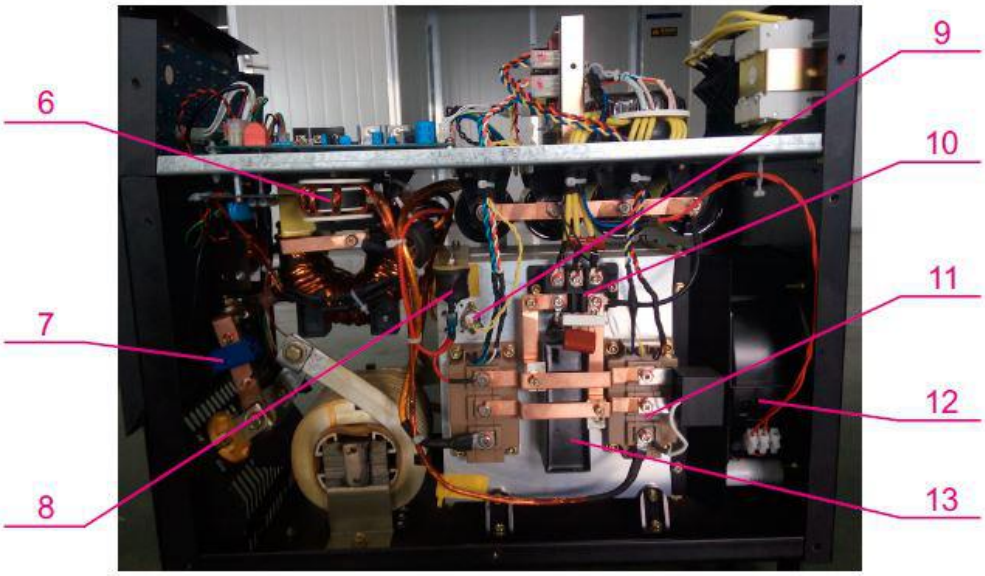




No.	Item	Model	Note
1	Capacitor	100μF-500V AC	
2	PCB	RCAP1	
3	Diode	MMF200ZB040DK1	
4	Main transformer		
5	Filter reactor		
6	Saturation inductance		
7	Hall sensor	TKC500BR	
8	Choke inductance	LT03-A1	
9	Temperature relay	KSD305A shut 75℃	
10	Bridge rectifier	MDS100-12	
11	IGBT	2MBI100VA-120-50	
12	Cooling fan	200FZY2-D/AC200	
13	Capacitor	HYC4001	
14	PCB	PN03	
15	PCB	PN02	
16	PCB	PT05	
17	Control transformer	HYBYQ-NBI-2	
18	Three phase input inductance		
19	Air breaker	DZ47-63/3P D63	

NB-630HD





No.	Item	Model	Note
1	Capacitor	100μF-500V AC	
2	PCB	RCAP1	
3	Diode	MMF200ZB040DK1	
4	Main transformer		
5	Filter reactor		
6	Saturation inductance		
7	Hall sensor	TKC500BR	
8	Choke inductance	LT03-A1	
9	Temperature relay	KSD305A shut 75℃	
10	Bridge rectifier	MDS100-12	
11	IGBT	CM150DC-24NFM	
12	Cooling fan	200FZY6-SF/AC200	
13	Capacitor	HYC4001	
14	PCB	PN03	
15	PCB	PN02	
16	PCB	PT05	
17	Control transformer	HYBYQ-NBI-2	
18	Three phase input inductance		
19	Air breaker	DZ47-63/3P D63	

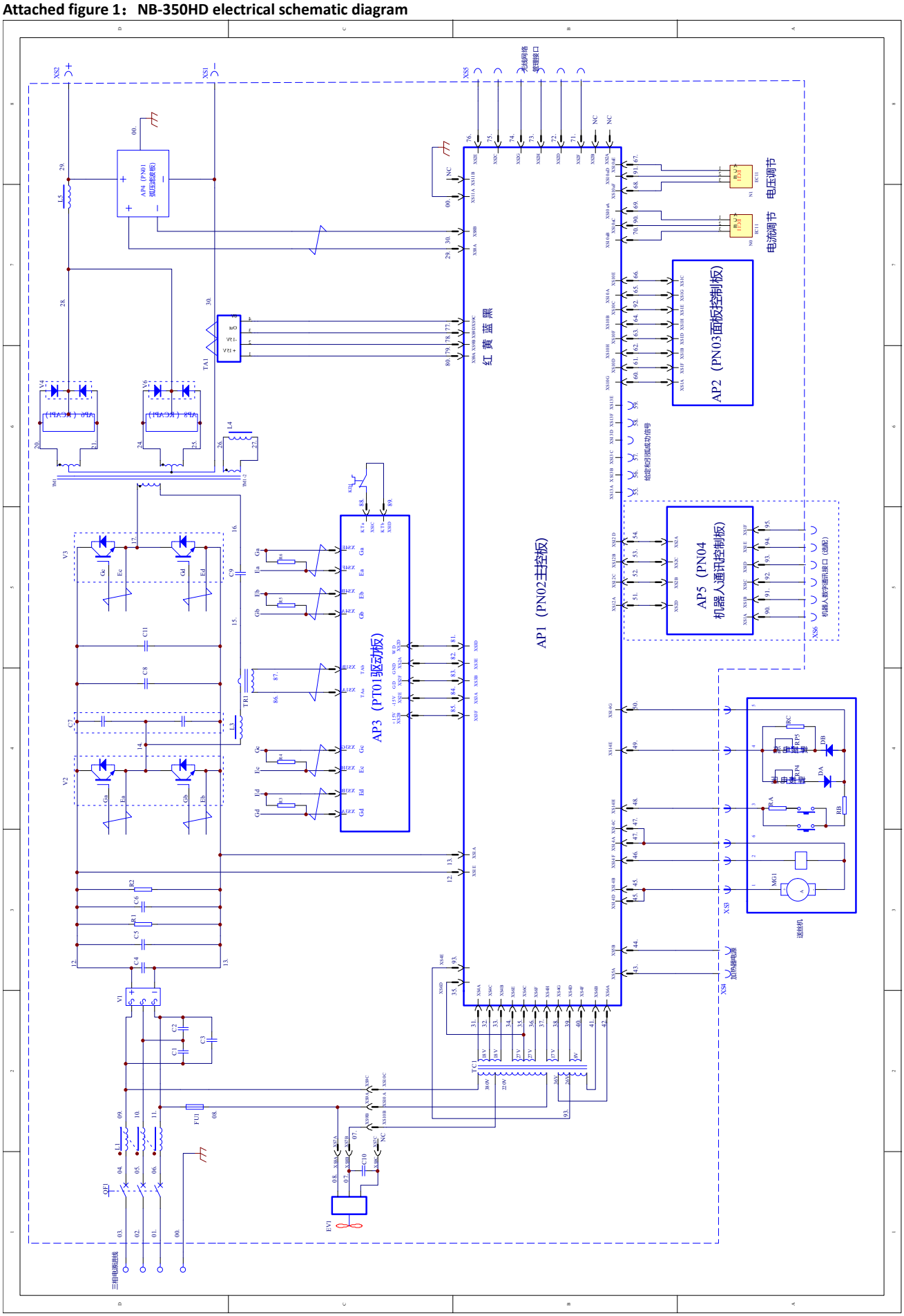
9 Packing list

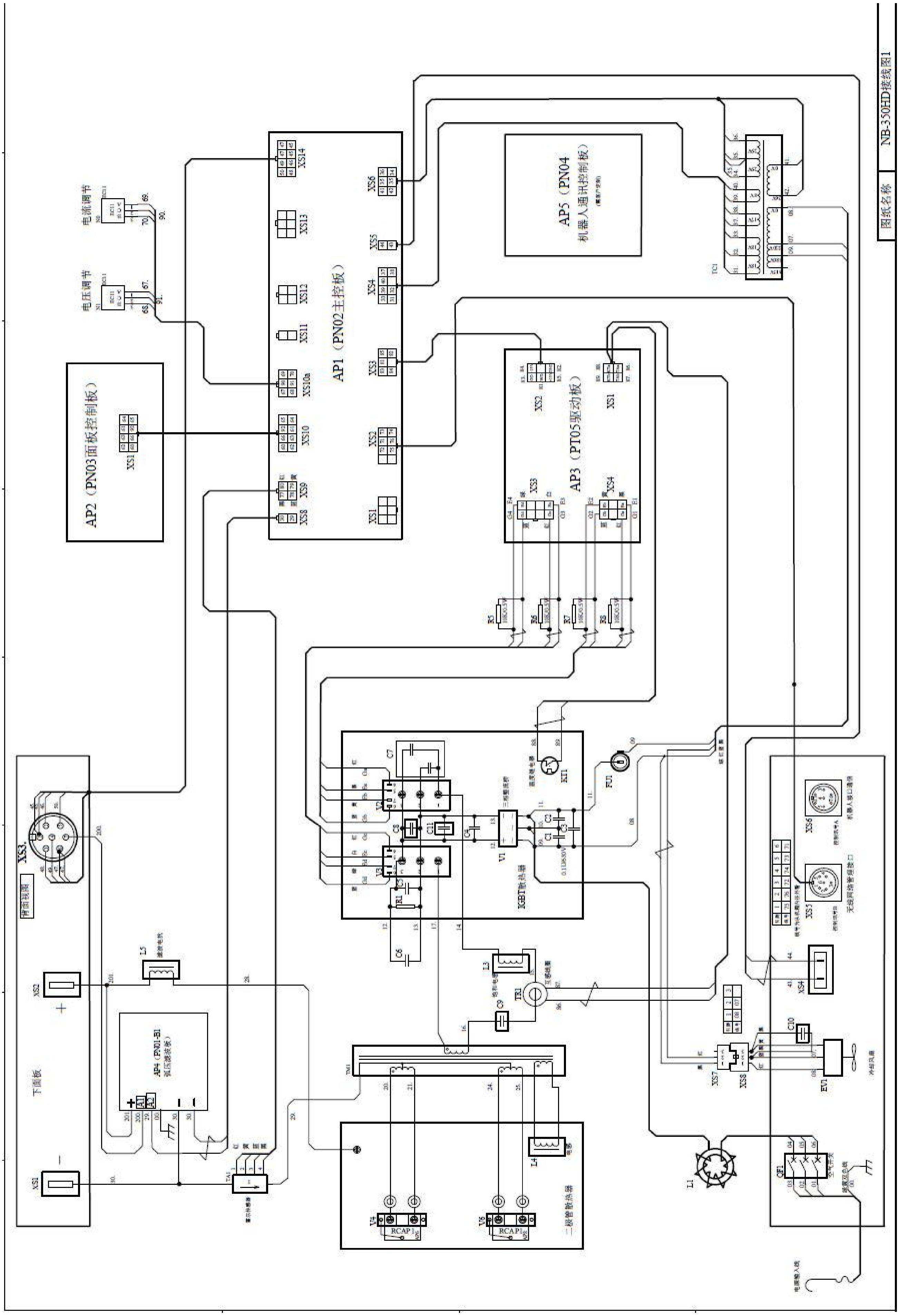
Sheet 8 Packing list

No.	Name	Model		Qty	Remarks
1	Welding power source	NB-350HD	NB-500HD	1	
2	Welding torch	HT-350A,with Φ1.0contact tube	HT-500A,with Φ1.2contact tube	1	3 meters cable
3	Welding cable	35 mm^2×10m	50 mm^2×10m	1	
4	Control cable	6×0.75 10.3m, the machine terminal is P28J3Q pin, the other terminal is Panasonic 6 cored hole		1	One-to-one connect
5	Strengthen air tube	Φ8, 13 meters		1	
6	CO_2 heater	YCQ-5A		1	
7	Contact tube	Φ0.8 、Φ1.2	Φ1.0 、Φ1.6	EACH 1	
8	Wire feeder	With SB-10C-350 (double driving 24V)	With SB-10C-500 (double driving 24V, motor model is 120SN10-CQ)	1	Panasonic connector
9	Block	Φ8-16		2	
10	Ground cable	35 mm^2×1.8m	50 mm^2×1.8m	1	
11	Allen wrench	M4、M5、M6 each		1	
12	Wire feeding rolls	Φ1.0-Φ1.2		2	
13	Fuse	1.5A		2	
14	Documents	Operation manual, certificate, warranty		1	

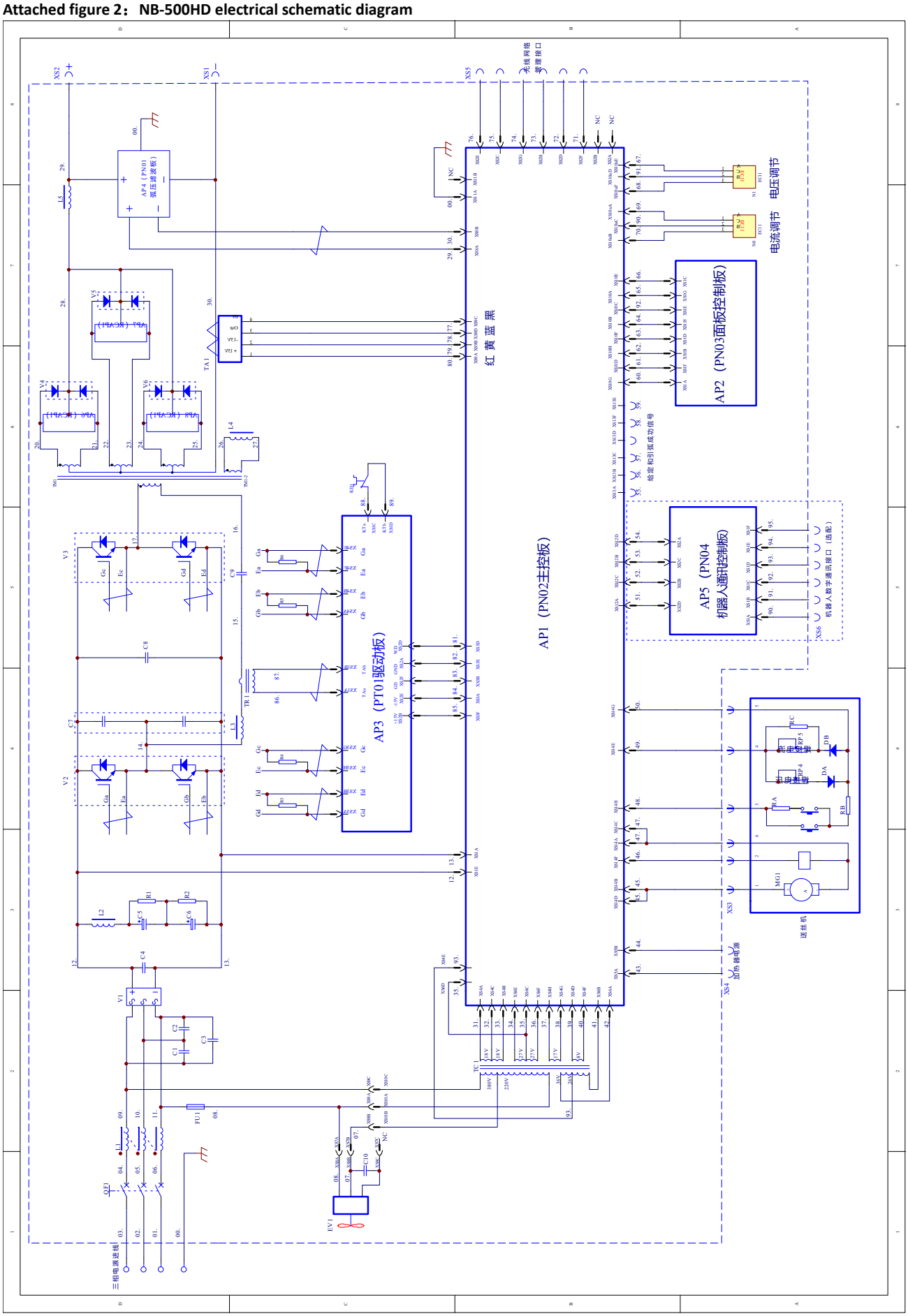
Note: The configuration of Aluminum is different.

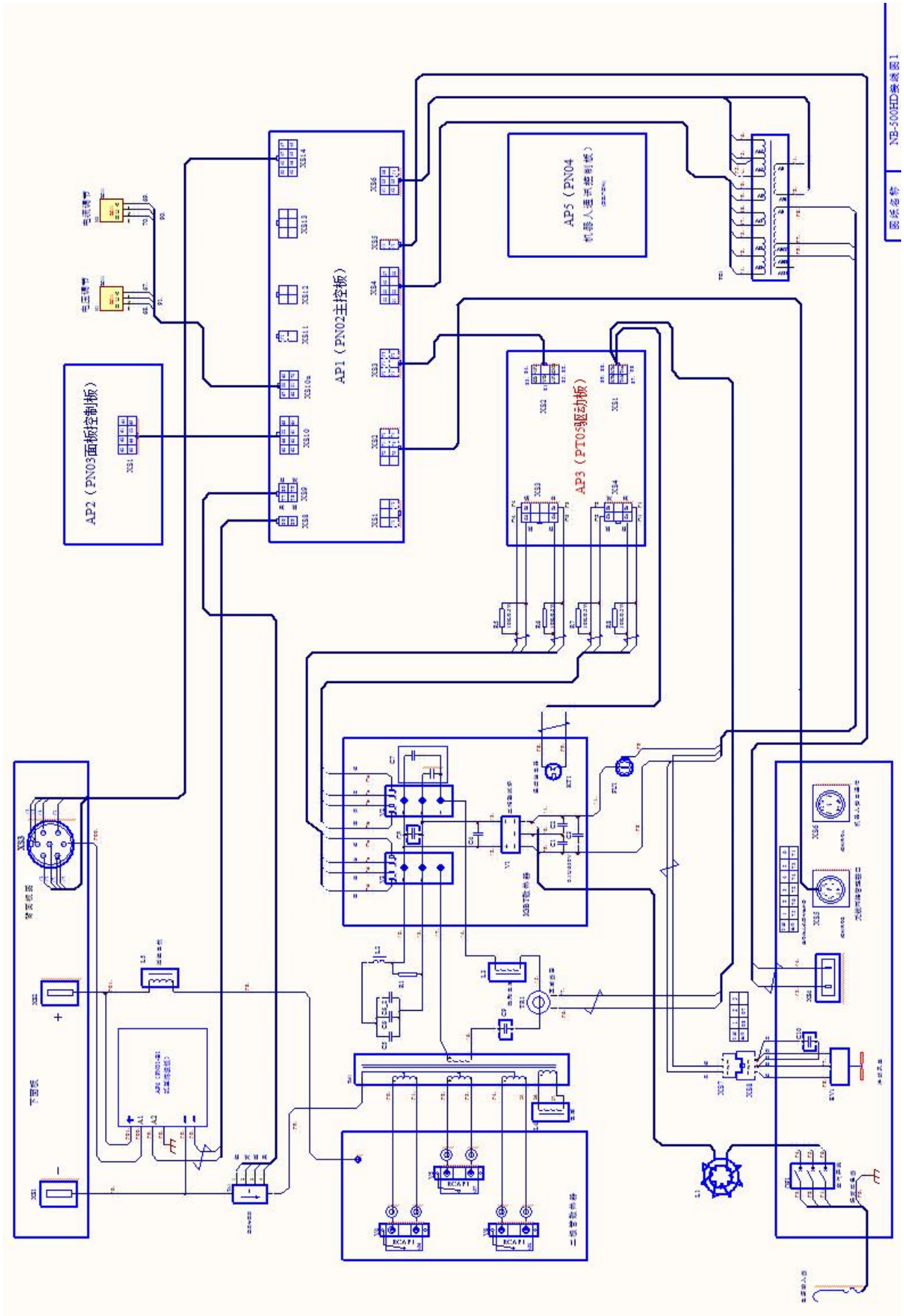
Attached figure 1：NB-350HD electrical schematic diagram



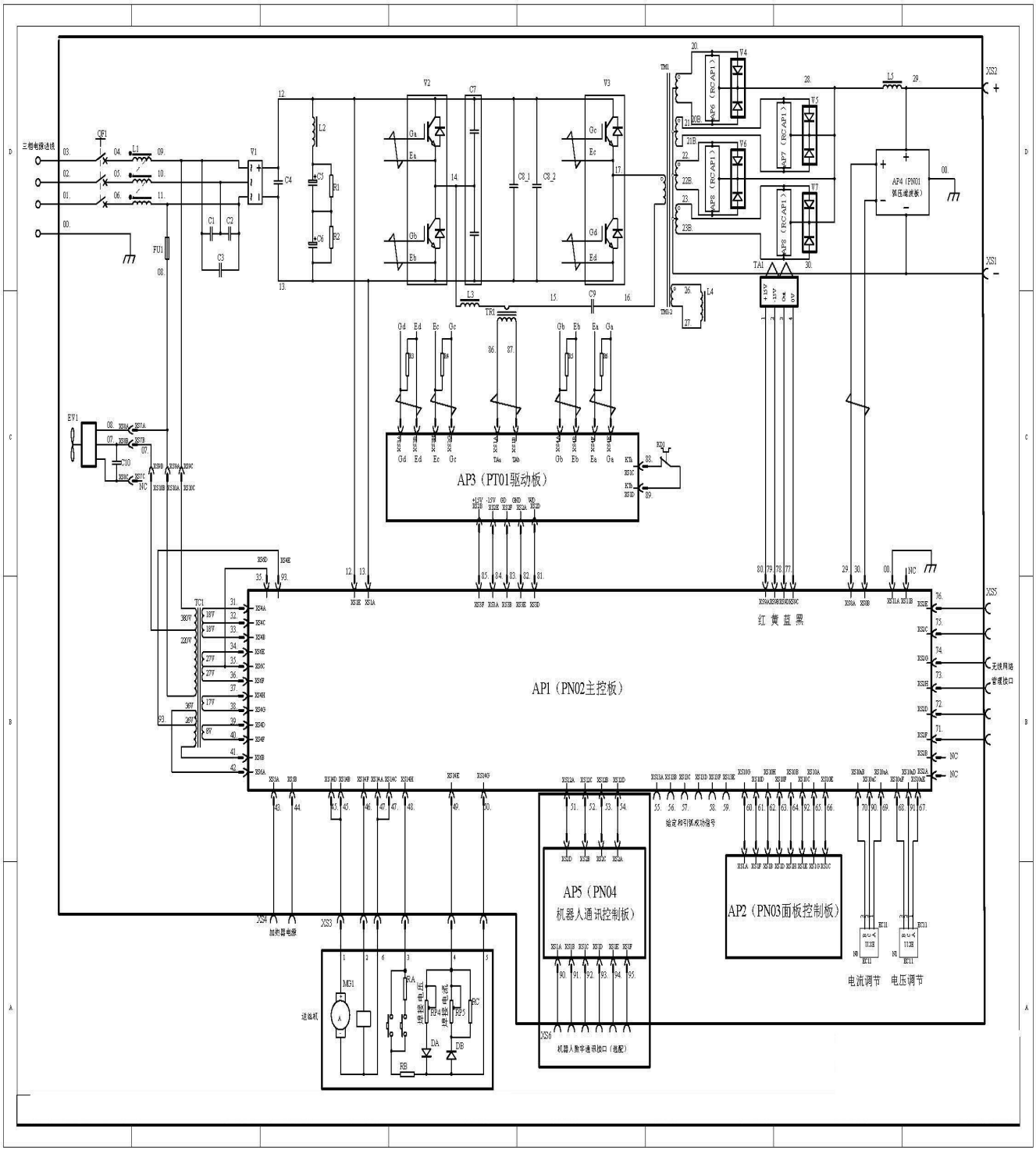

NB-350HD接线图1
图纸名称
AP1（PN02主控板）
AP2（PN03面板控制板）
AP3（PT05驱动板）
AP5（PN04
机器人通讯控制板）
电压调节
电流调节
IGBT散热器
二极管散热器
下面板
背面视图
冷却风扇
空气开关
电源输入线
机器人接口插座
无线遥控接收接口

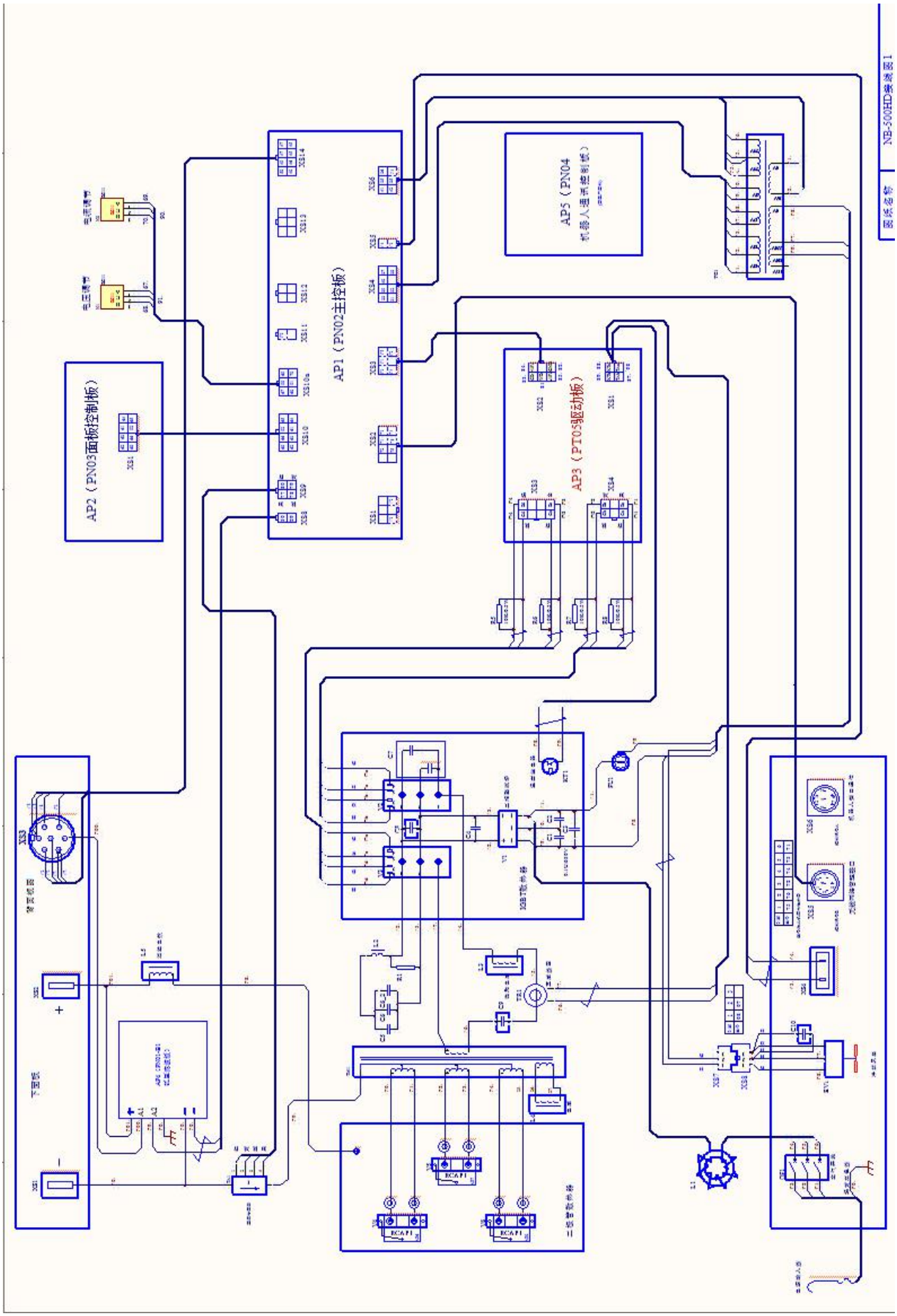
Attached figure 2：NB-500HD electrical schematic diagram




AP1（PN02主控板）
AP2（PN03面板控制板）
AP3（PT05驱动板）
AP5（PN04
NB-500HD焊接图1

Attached figure 2：NB-630HD electrical schematic diagram




AP1（PN02主控板）
AP2（PN03面板控制板）
AP3（PT03驱动板）
AP5（PN04
NB-500HD焊接图1

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If there is any changes in the user's manual, forgive not to inform separately!

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