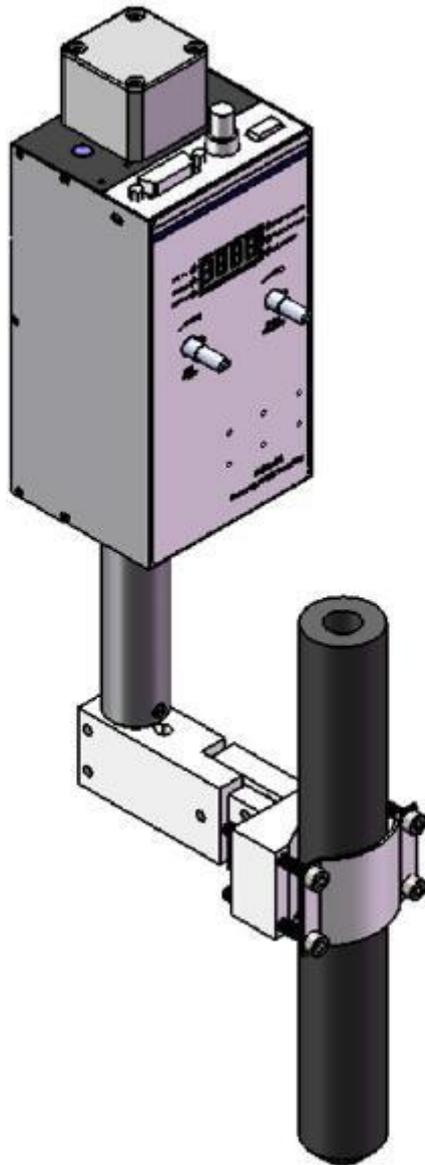


## Torch Height Controller SH-HC31 Manual



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## **Safety notice**

Please carefully read the manual before using the product.

## **Safety operation**

Users must follow safety operation rules made by the country and the company.

## **Mechanical danger**

Operation and repair of automation equipment are a little dangerous and are careful. Please be far away from the working equipment. Please control the equipment by correctly using the panel's buttons. Don't wear so loose clothes when using and repairing the equipment.

## **High-voltage danger**

Be careful of electric shock during operation. Please install the equipment according to its manual. Don't touch cables or wires after power on. Only professional maintenance personal can open the controller. When the equipment has problems, power should be off and then repair.

## **Power isolation**

Please check whether power is right, DC24V before power on.

## **Good ground-connection**

All parts of the cutting machine and the controller should connect ground.

The most effective method of reducing plasma interference is to use shielding wire and good ground-connection. Controller's ground wire diameter should be over 4 mm<sup>2</sup>, and try to keep a shorter distance to the ground. DC24V ground (-) must break with ground.

## **Controller maintenance**

When the controller can't work normally, you need to check relative hardware or wire connection after power off. Don't open the controller to repair without professional personnel. Please feel free to let us know when the controller has problems.

## **Warranty statement**

Guarantee period: within 12 month after leaving our company.

Guarantee terms: during guarantee period any problems under normal operations.

During guarantee period, we charge for out of guarantee terms.

We charge for all problems out of guarantee period.

**Following situations are beyond guarantee:**

Any damage under abnormal operation or accident damage;

Damaged by plug in and out of the controller when power on;

Natural disasters;

Repair, disassemble, retrofit, etc. at random without our allowance.

## Chapter 1 General Introduction

### 1-1 basic index

Processor: industrial ARM chip

Display: 4-digit nixie tube

Max. stroke: 100mm

Auto height adjustment range: 2-30mm

Height adjustment accuracy:  $\pm 0.5\text{mm}$

Auto height adjustment speed: 3000mm/min (max.)

Communication: 485\*1

Power supply: DC24V, 3A

Working temperature:  $0^{\circ}\text{C} \sim +40^{\circ}\text{C}$

Storage temperature:  $-40^{\circ}\text{C} \sim +60^{\circ}\text{C}$

### 1-2 technical feature

SH-HC31 is the upgrade model of SH-HC30. Besides previous advantages of “integration of

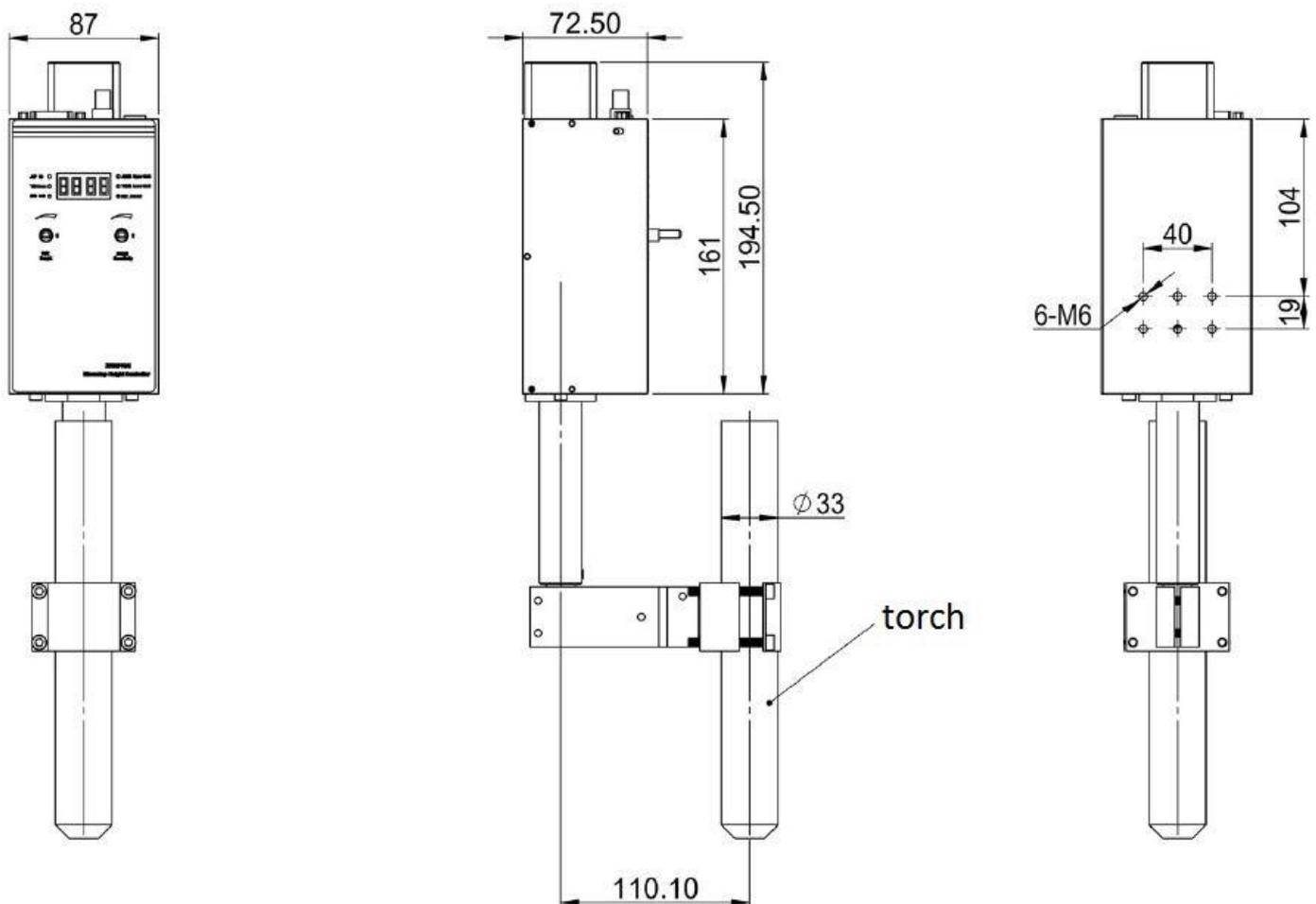
control and mechanical parts”, “stepper motor & driver” and “one-key calibration”, it adds new features as below,

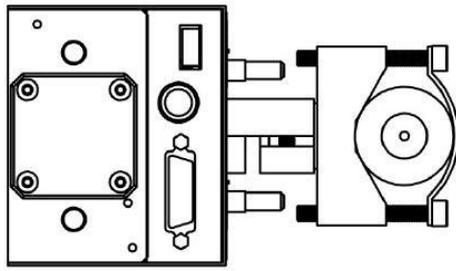
**Knobs for height and sensitivity adjustment:** it can statically and dynamically adjust the height and the sensitivity and save the result. The pulse adjustment knob has better lifetime and reliability than contact-type potentiometer.

**Industrial ARM processor:** all new ARM embedded core replaces the previous the single chip. The processing speed is faster and anti-interference ability is stronger.

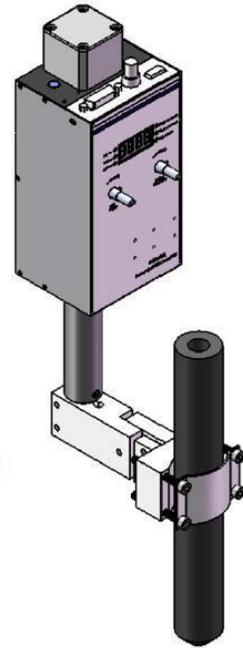
### 1-3 installation

Plasma (arc voltage)

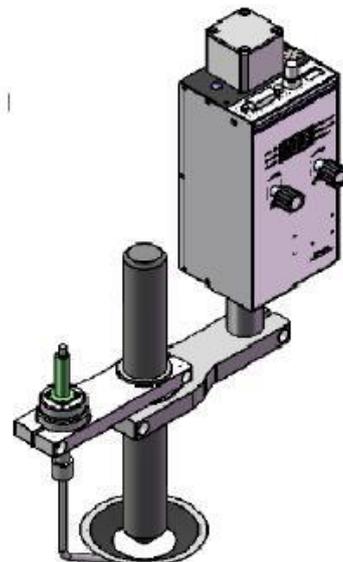
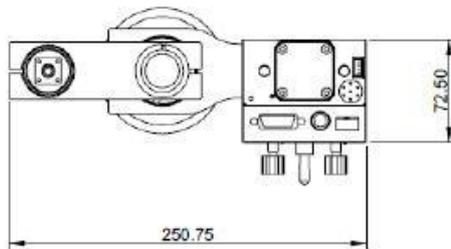
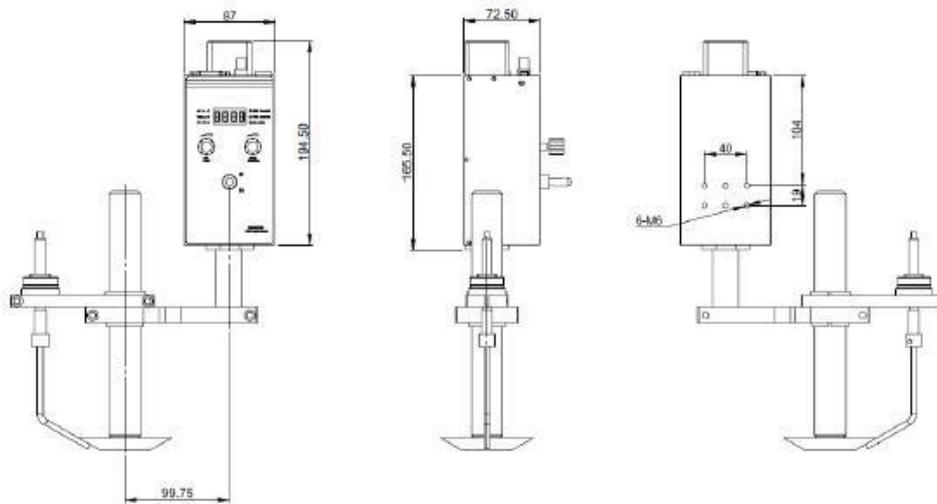




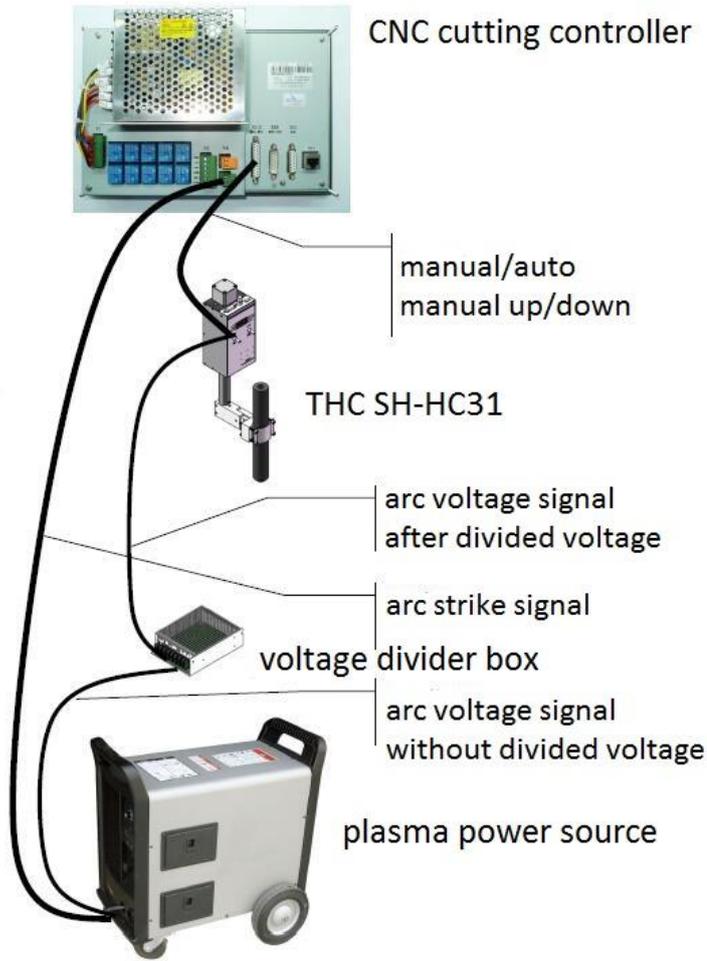
torch diameter  $\leq 34\text{mm}$   
 installation thread M6  
 installation dimension is the same as model SH-HC30



### Flame (capacitance)



## 1-4 connection

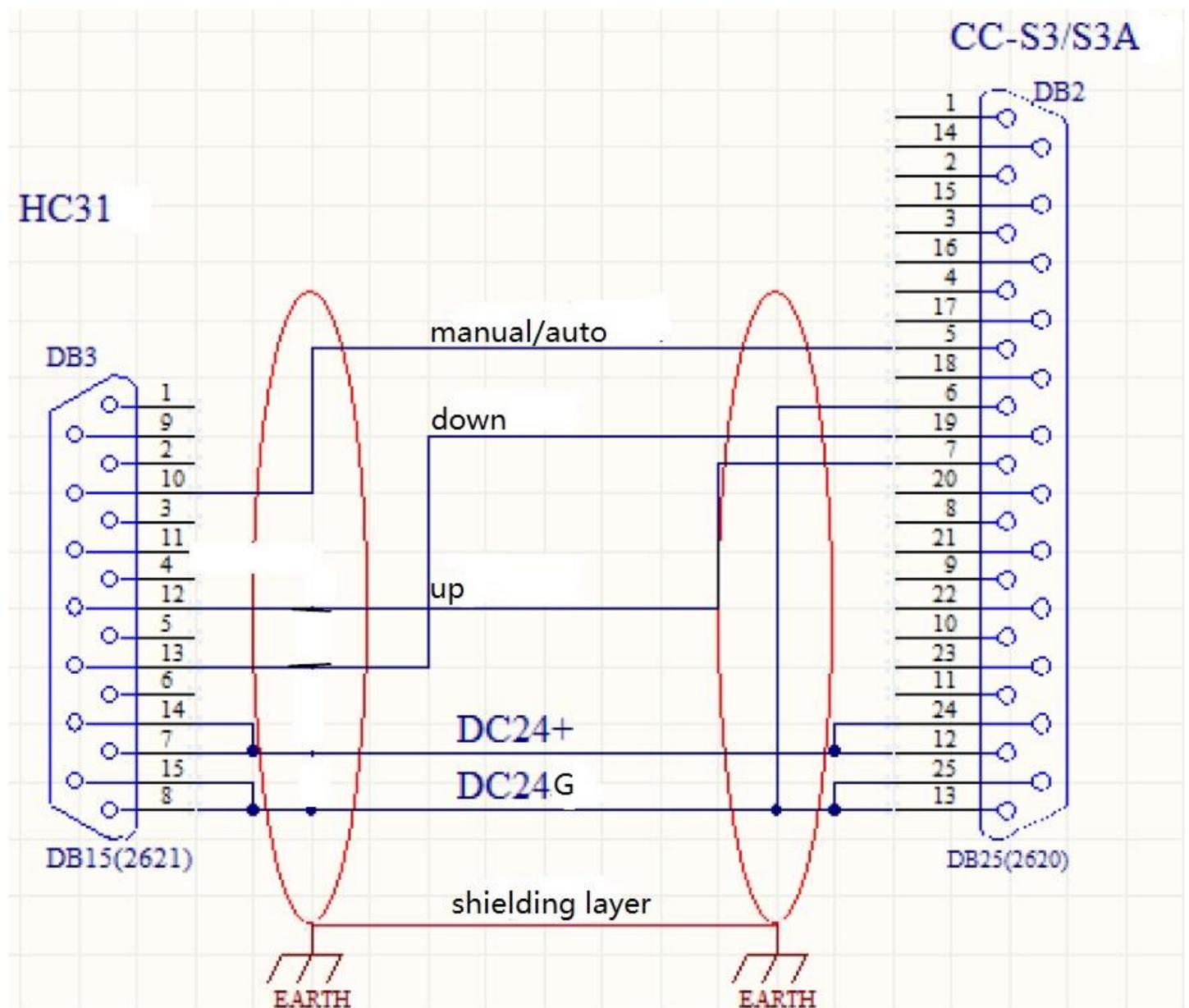


### SH-HC31 15-pin port definition

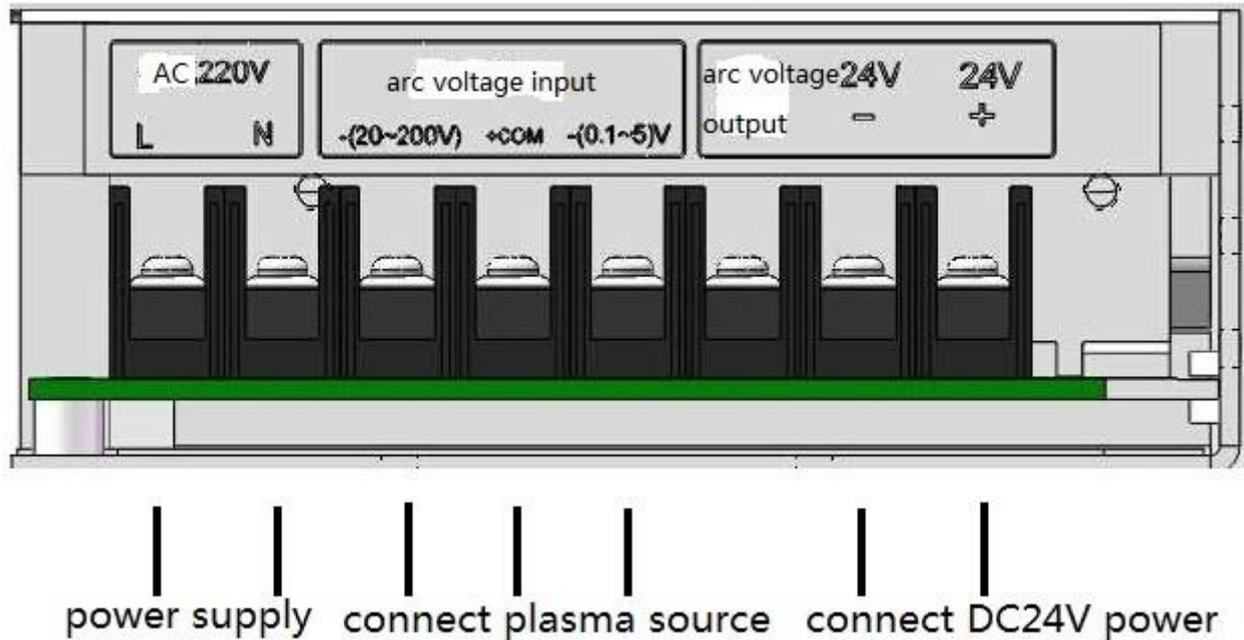
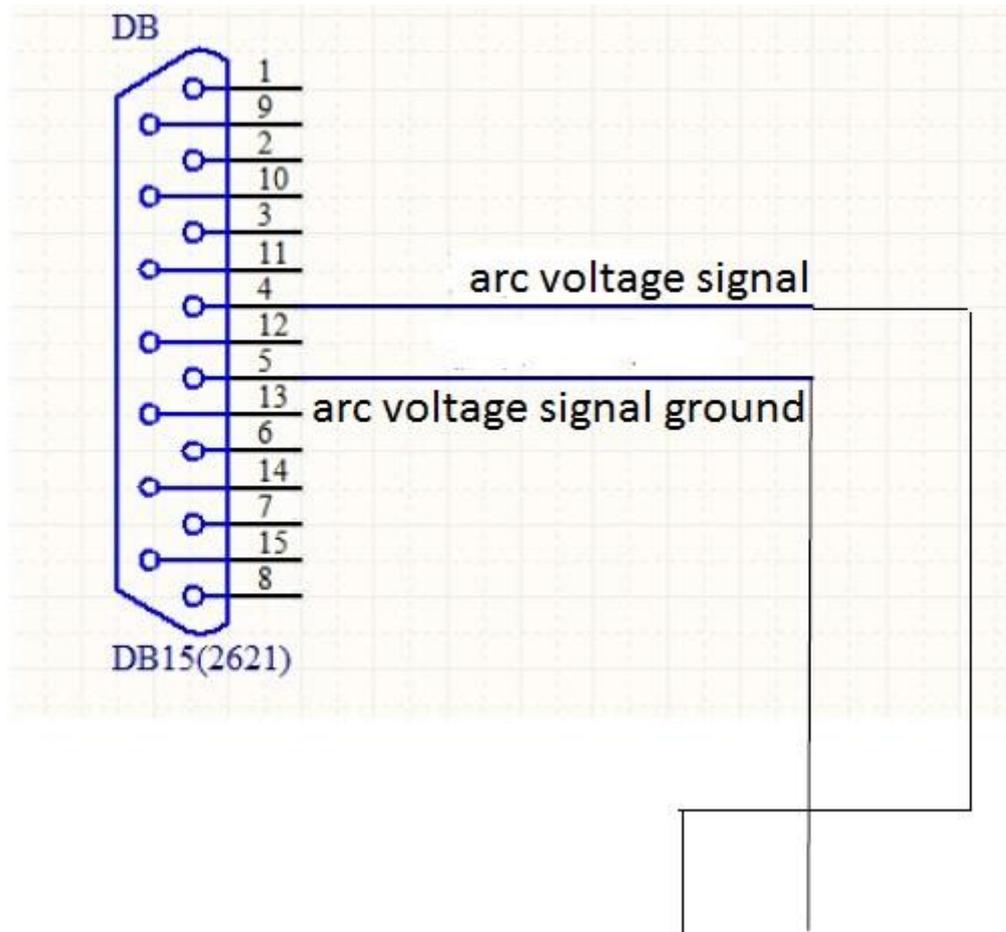
Pin No.	Definition	Instruction
4	Arc voltage signal	Connect arc voltage signal of plasma power source, input range DC0-5V. If plasma power source has no DC0-5V, then a voltage divider box needs to be connected.
5	Arc voltage signal ground	Connect arc voltage signal ground of plasma power source
7, 14	DC24V+	Connect DC24V+
8, 15	DC24VG	Connect DC24VG
10	Manual/auto	Connect output of CNC cutting controller or external switch, 24V signal, high level is manual mode, low level is auto mode.

11	Plasma/flame	Connect output of CNC cutting controller or external switch, 24V signal, high level is plasma mode, low level is flame mode.
12	Up	Connect output of CNC cutting controller or external switch, 24V signal, low level is effective.
13	down	Connect output of CNC cutting controller or external switch, 24V signal, low level is effective.

**The connection (plasma mode) of SH-HC31 and CNC cutting controller CC-S3/CC-S3A**



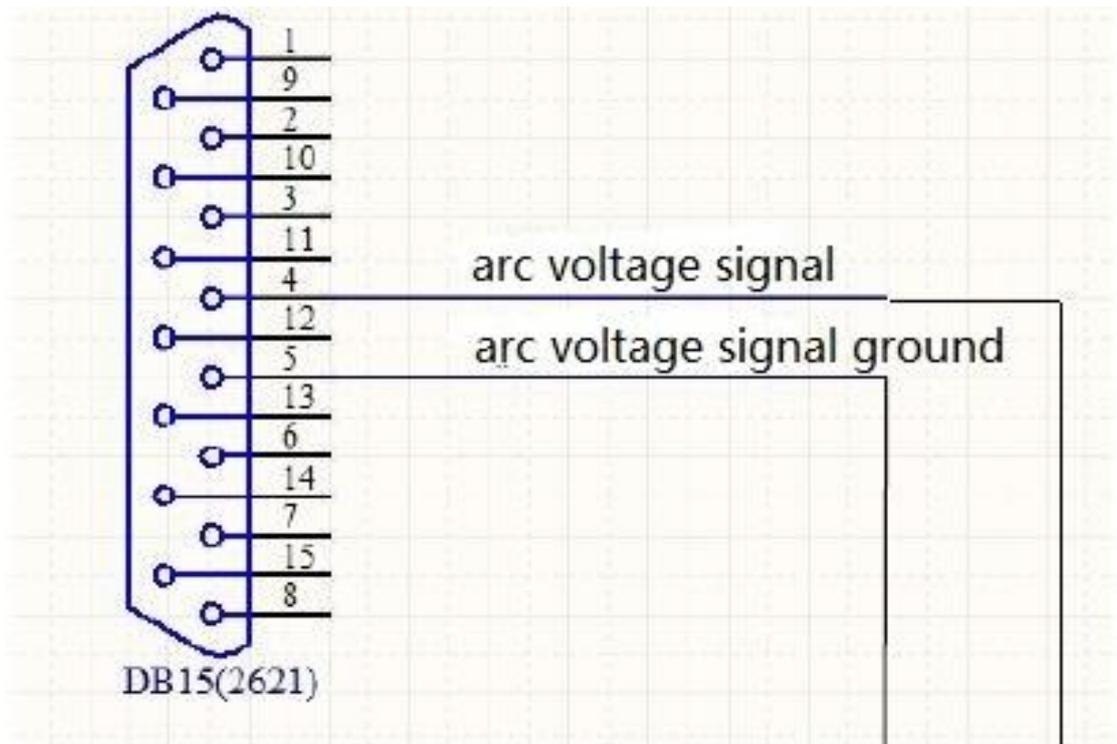
## The connection (plasma mode) of SH-HC31 and voltage divider box AHD1



If plasma power source is original arc voltage(1:1) , then connect  $-(20\sim 200)V$  input.

If plasma power source is 50:1 arc voltage, then connect  $-(0.1\sim 5)V$ . And open the voltage divider box, break the jumper JP2 and connect JP1.

The connection (plasma mode) of SH-HC31 and the voltage divider box AHD2

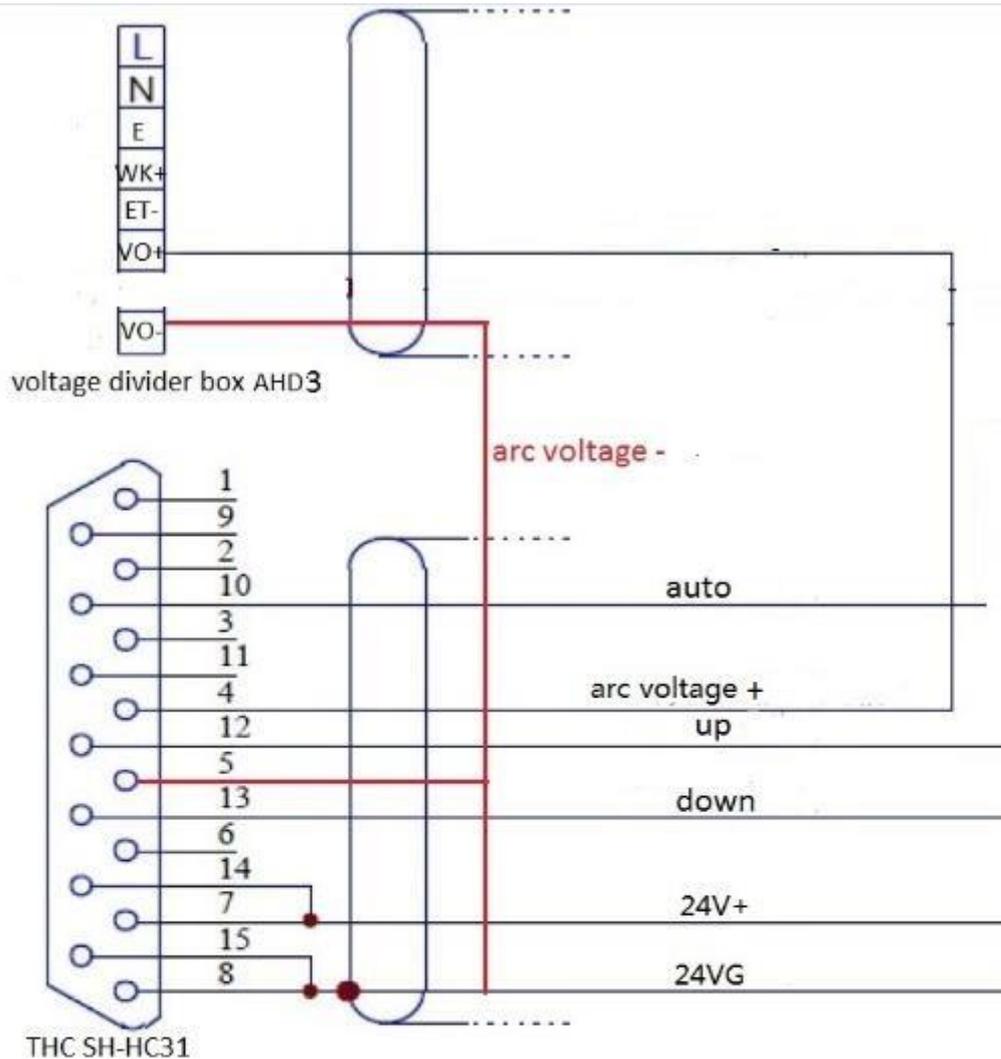
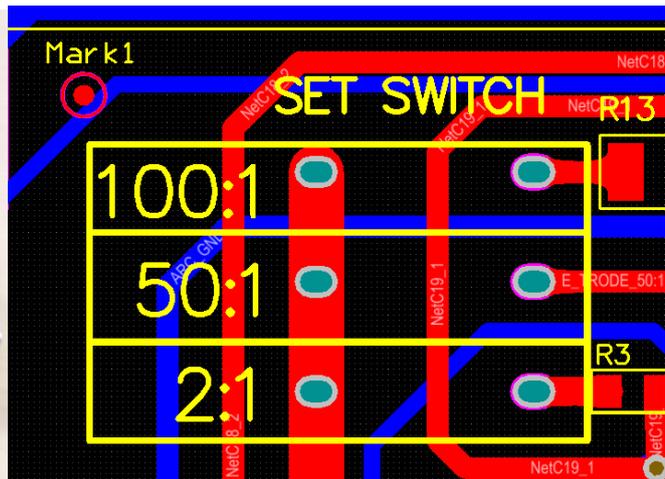


connect original arc voltage  
of plasma power source

connect AC220V power supply

connect DC24V-

## The connection (plasma mode) of SH-HC31 and the voltage divider box AHD3



voltage divider box AHD3

1 L & 2 N: connect AC100~240V power supply

3 E: connect ground

4 WK+ & 5 ET-: connect arc voltage of plasma power source

If arc voltage output of plasma power source is 1:1, then only jumper 100:1 inside divider is connected.

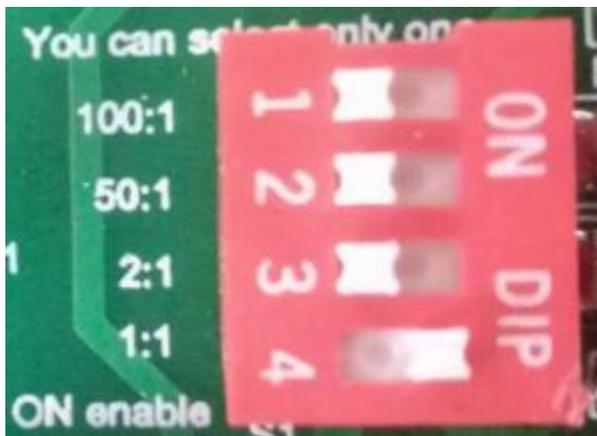
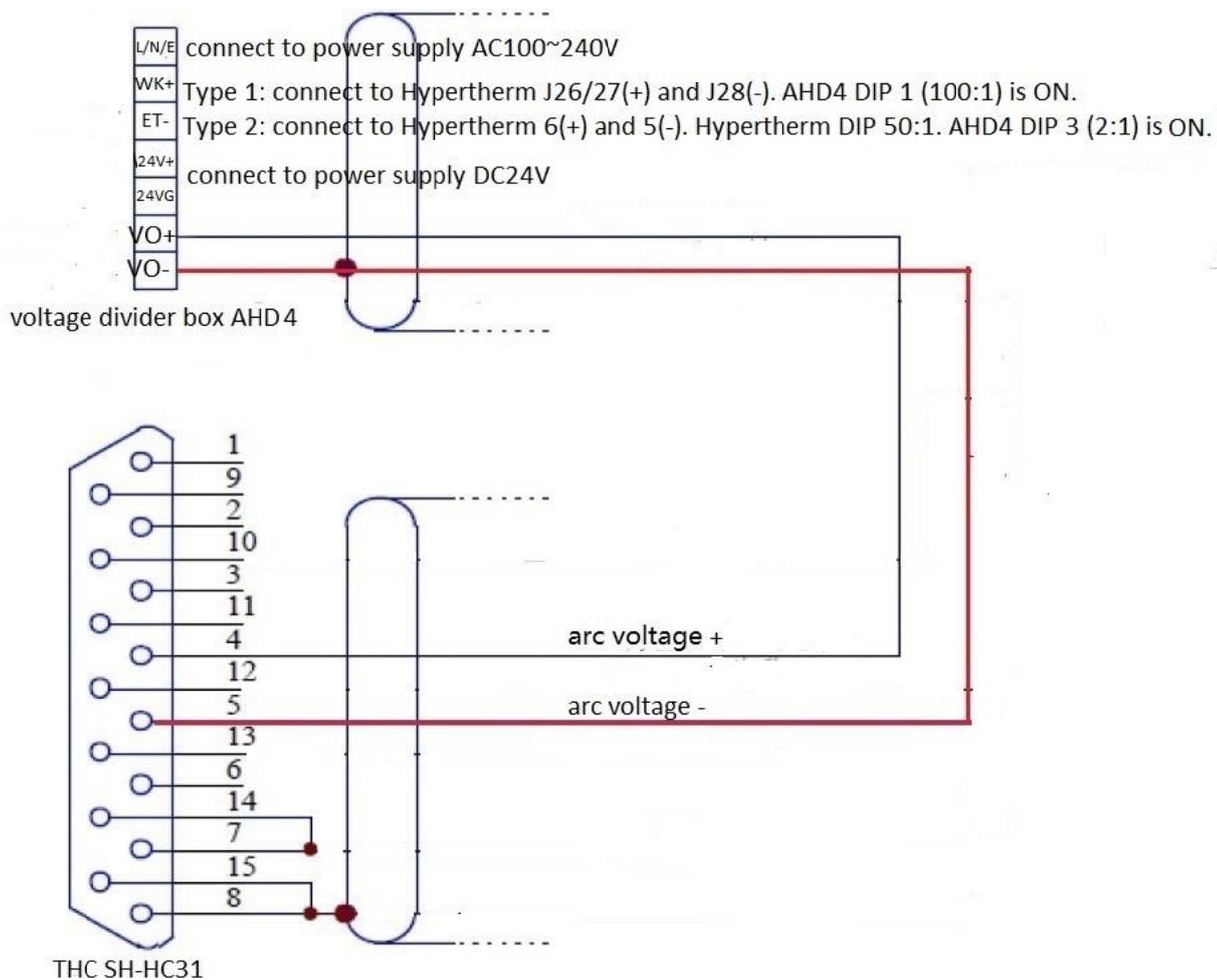
If arc voltage output of plasma power source is 50:1, then only jumper 2:1 inside divider is connected.

6 & 7: not connect

8 VO+: connect pin 4 of SH-HC31

9 VO-: connect pin 5 of SH-HC31 & 24VG

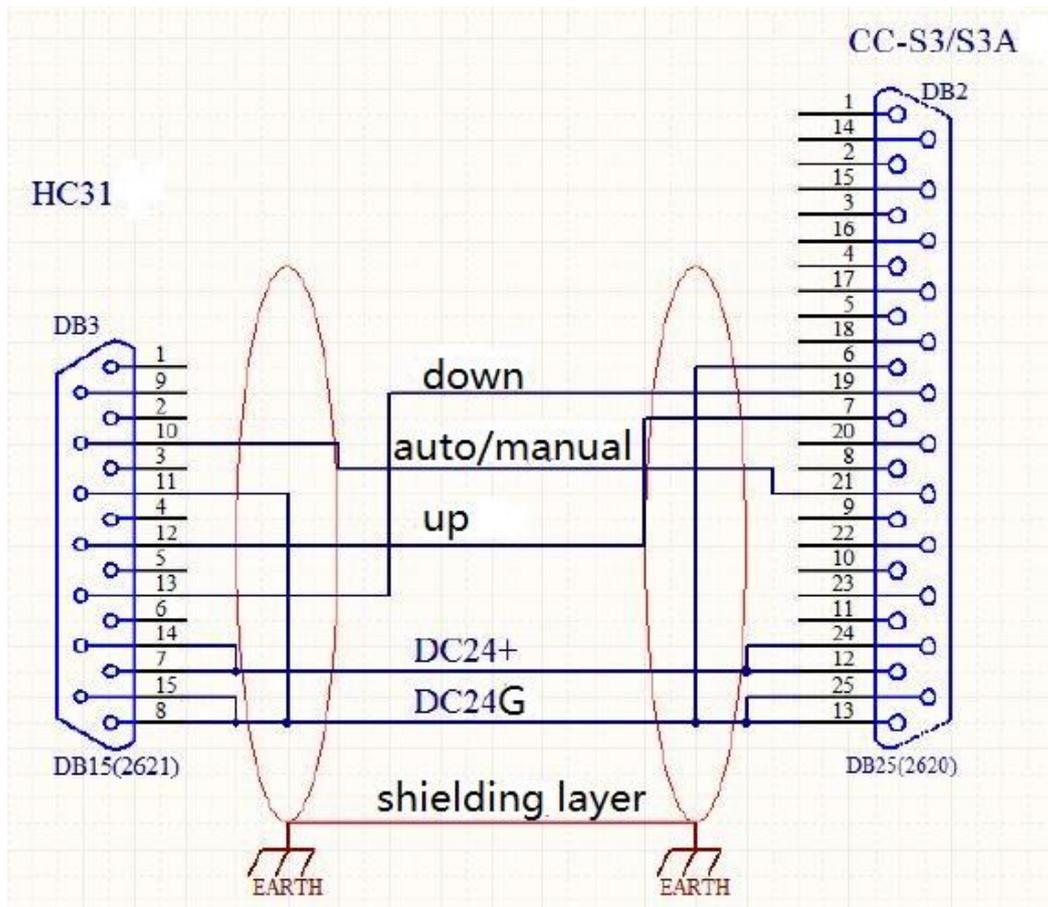
## The connection (plasma mode) of SH-HC31 and the voltage divider box AHD4



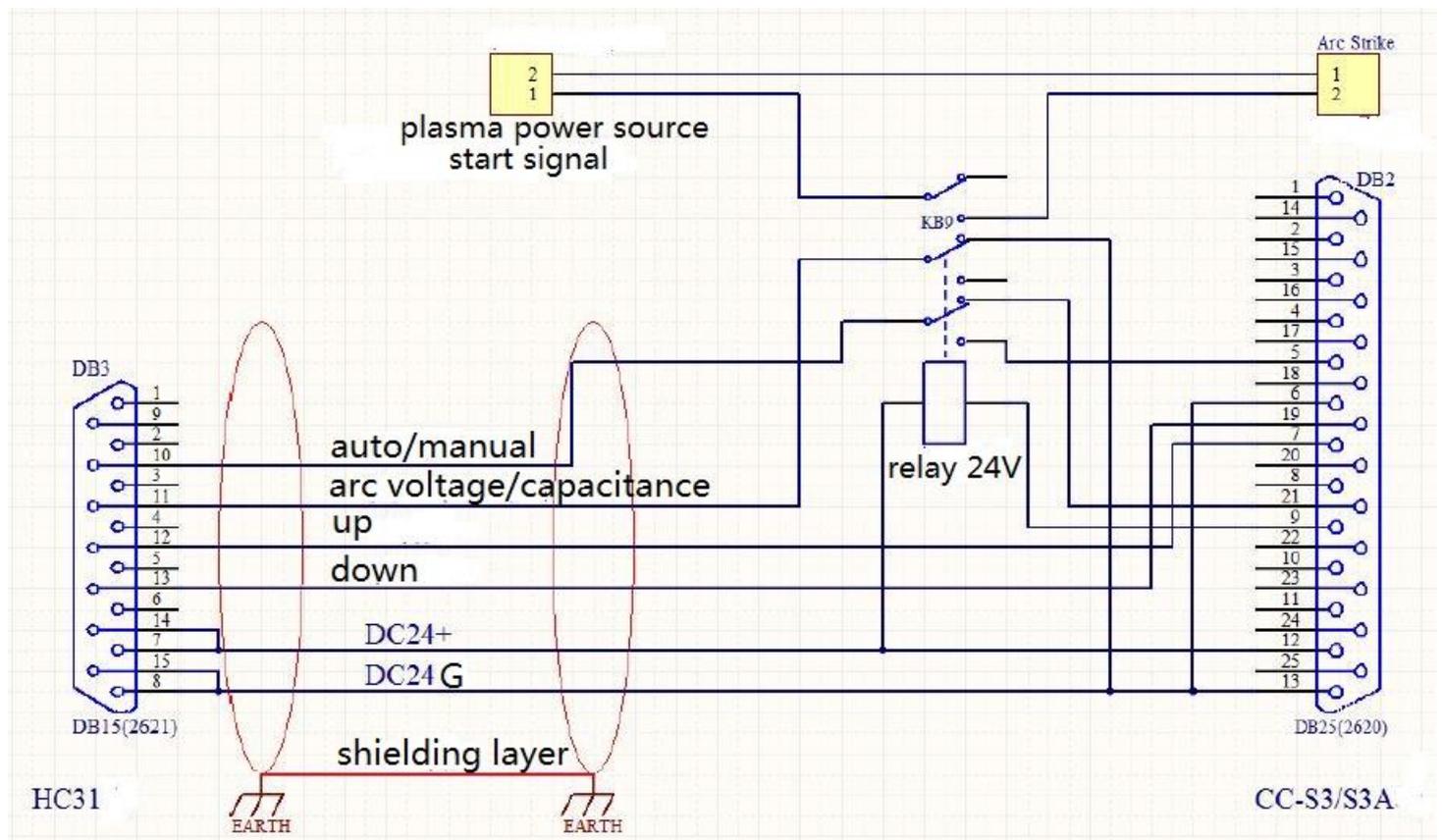
If the plasma power is raw arc voltage, then connect to WK+ and ET-. And AHD4 only DIP 1 (100:1) is ON.

If the plasma power is 50:1 arc voltage, then connect to WK+ and ET-. And AHD4 only DIP 3 (2:1) is ON.

The connection (flame mode) of SH-HC31 and CNC cutting controller CC-S3/CC-S3A



The connection (plasma & flame mode) of SH-HC31 and CNC cutting controller CC-S3/CC-S3A



An external relay is needed. Its coil connects pin 9 of CNC cutting controller. When change to plasma mode, pin 9 output is low, and the relay works for following purposes:

1. auto/manual signal, change from flame mode pin 21 to plasma mode pin 5.
2. arc voltage/capacitance switch signal, change to arc voltage mode after breaking DC24VG.
3. plasma arc strike output of CNC cutting controller is connected.

## Chapter 2 Quick Start

### 2-1 panel



### Instruction



Height knob, adjust and set cutting height.

In the plasma mode and the manual mode, press it to display b value (location height/pierce height), then set.



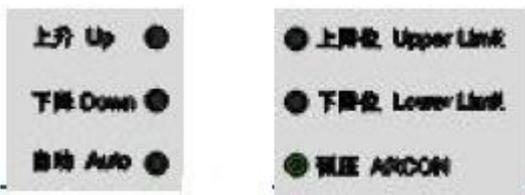
Sensitivity knob, adjust and set the sensitivity.

In the plasma mode and the manual mode, press it for one-button location, the torch moves down, and touches the zero point switch, and then moves up to the location height and stops.

In the flame mode and the manual mode, press it 2s for one-button calibration.



LED screen, display settings and working information



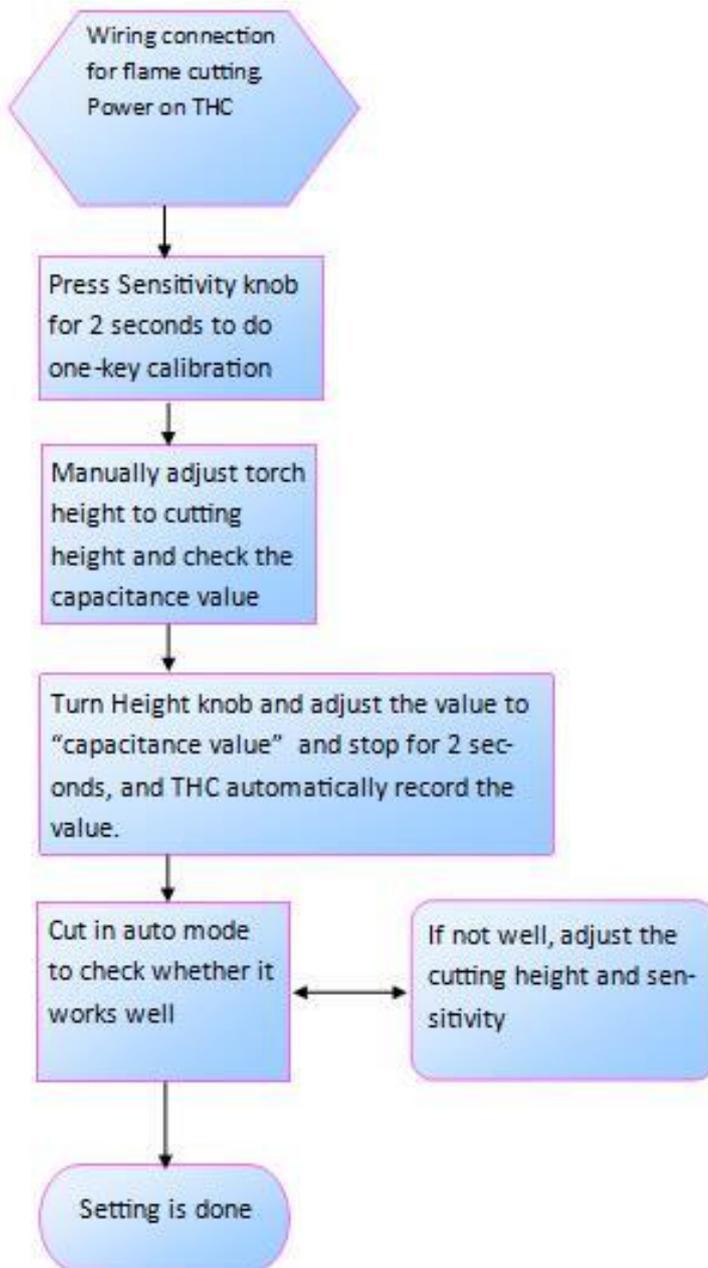
Indicator lights, display working states

## 2-2 Quick start procedure

### plasma mode

Power on it, choose the plasma mode → press the sensitivity button for the initial location (and press the height button to adjust b value) → manually cut a line to check the arc voltage value in LED screen → set that arc voltage value for auto height → start auto cutting to check the height (adjust the arc voltage height and sensitivity) → finish setting.

## Flame mode



2-3 display and state

LED display

U: plasma mode, range 30~250

C: flame mode, range 3~30

E: sensitivity, range 1~10

b: initial location height/pierce, range 1~20mm

H: maximum adjustment speed when auto cutting, 5~50

L: initial adjustment speed when auto cutting, 1~20

P: up/down speed in manual mode, 20~80

d: auto adjustment speed ratio (the bigger the value is, more slowly the speed adjusts)

Indicator lights

Up: move up

Down: move down

Auto: in the auto mode. When the light off, in the manual mode

Upper limit

Lower limit

Arc voltage: there is arc voltage signal input

2-4 error alarm

EE01: cancel auto, press the sensitivity button to cancel the error

EE02: it fails to save settings and power off THC and power on again.