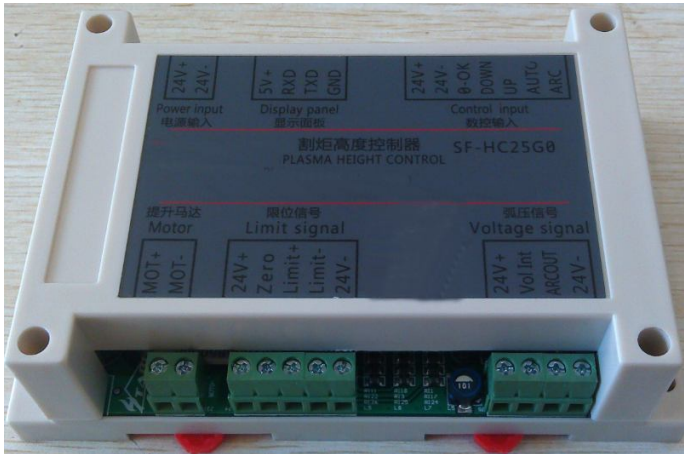
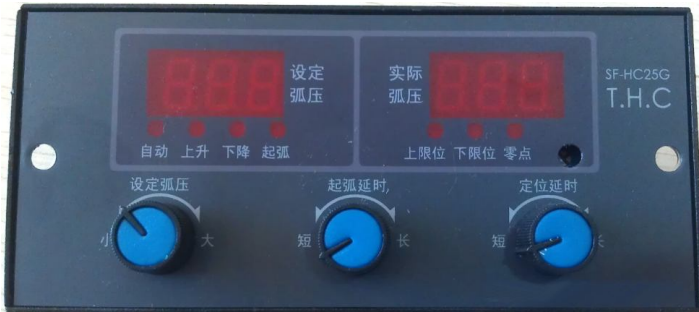


# SF-HC25G Plasma Height Control

## Manual V1.2



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# 1 Overview

## 1.1 Technical Features

This product adopts 32-bit arm as the core,two groups of three digital tube display, using the numerical control mode. Internal do not contain linear adjustment devices, greatly improve the stability.

- Speed parameters can be changed, it can make any change according to the lifting mechanism and plasma source power.
- The circuit adopts the SMT without any adjustable elements; the all-digital technology assures the high reliability of product.
- Simple operation,two groups of digital tube displays set arc voltage and actual arc voltage, concise and straightforward. Only three knob to set parameters.
- The interfaces are simple and easy to control, suitable for all numerical control system of plasma cutting, and can also use alone
- Adopting the proximity switch initial positioning method.
- PWM output, speed adjustable level 255, precise control of motor speed, several current setting, and short circuit protection.
- Anti-collision function, when the nozzle touches the plate, CNC controller will quickly lift the torch to a certain distance, and protect the nozzle effectively.
- All input and output adopt photoelectric isolation, plasma voltage feedback using linear photoelectric isolation, and independent power source, it can be well compatible with various brands of imported plasma source power with voltage-divide.
- Integrate judgment and feedback function of arc start success.

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## 1.2 Main Technical Data

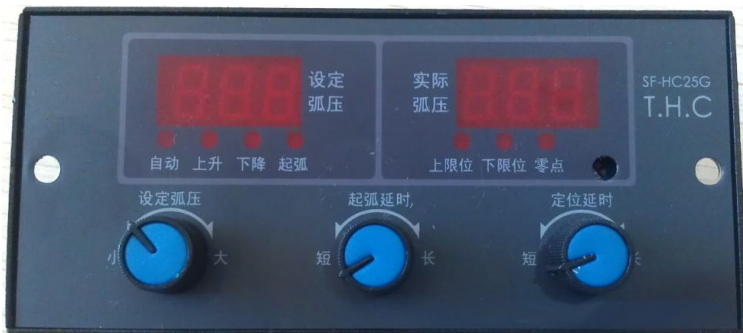
- Power Supply: DC24V±10% 3 A
- Applicable Motor: 24V DC Brush Motor
- Drive Mode: PWM
- Output Current: <input current of power supply
- Initial Positioning Method: proximity switch(Normally open and close is set through jumper cap)
- Max Control Precision: ±1 V
- Case Dimension: mainframe 145X90X42  
panel 120X55X40
- Working Environment Temperature: -10~60 °C
- Weight: 0.6Kg
- Detecting System: isolation of arc voltage divide board (B2version)

## 2 Installation

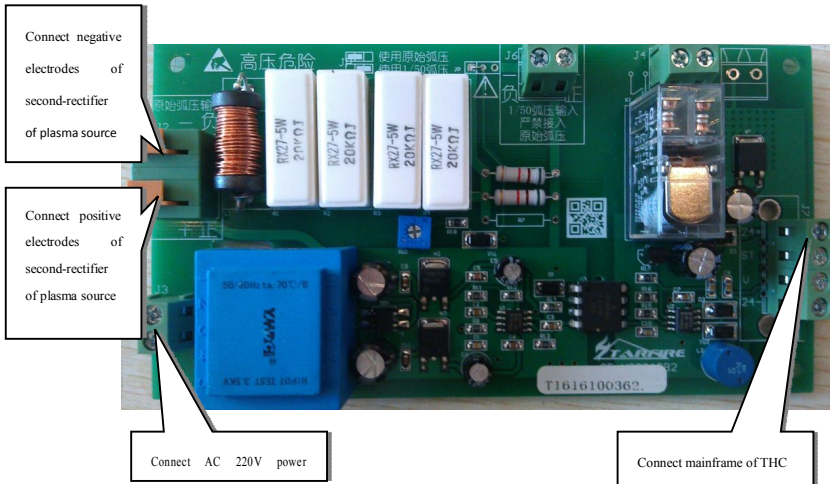
### 2.1 Installation



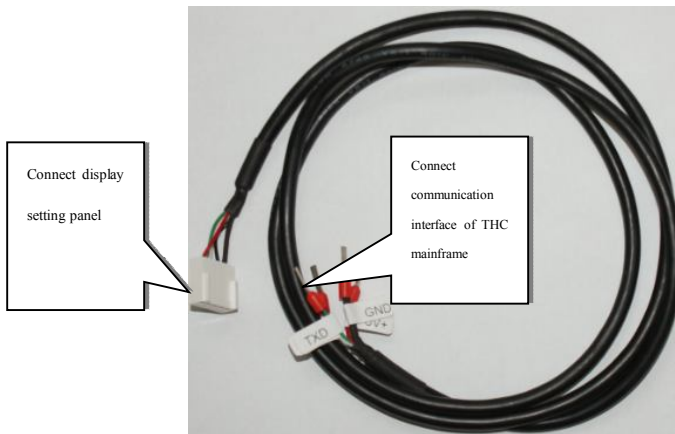
2-1-1 CNC Controller Mainframe



2-1-2 Display Setting Panel

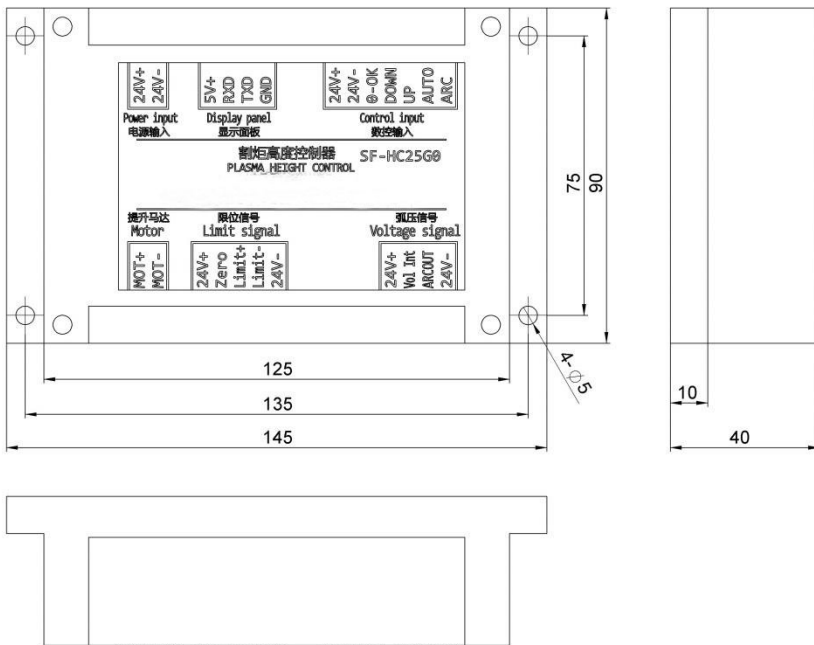


2-1-3 Arc-divide Board



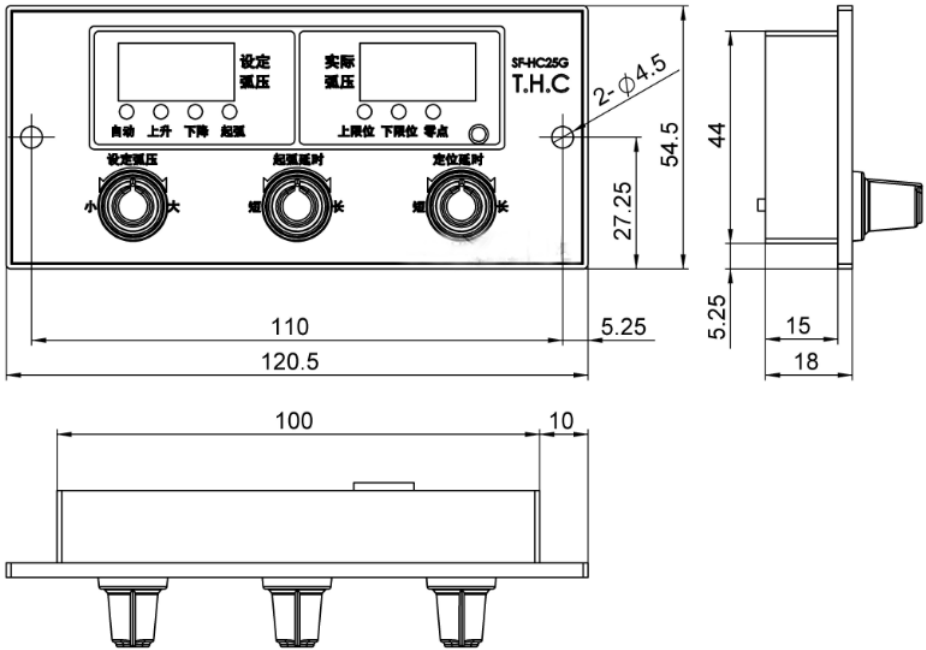
2-1-4 Communication Cable

The four M4 screw hole on bottom of height controller is used for fixing the box body onto the installation plate. The size is shown in figure 2-1-5. You can also use DZ47 type of guide rail to install.



2-1-5

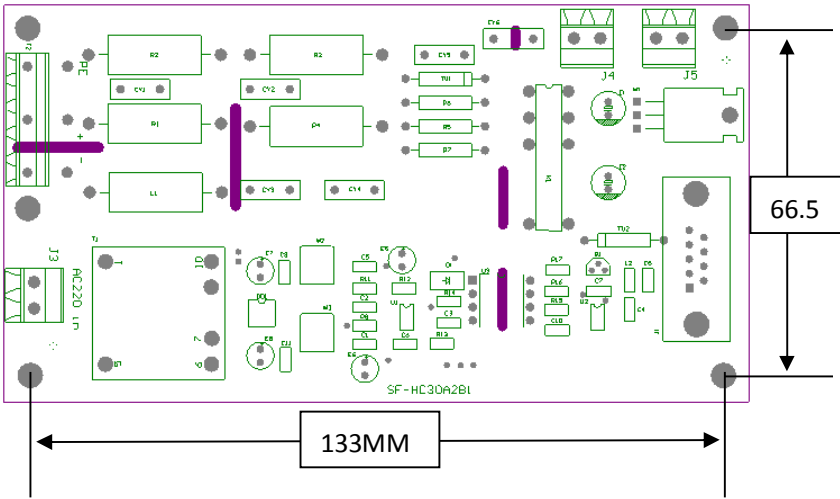
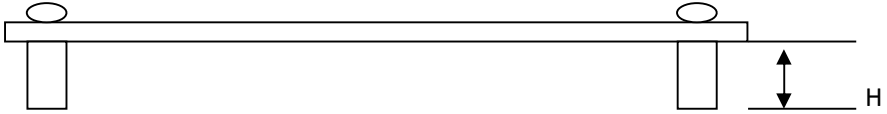
Display setting panel uses two M4 screw to install, dimensions are as shown in figure 2-1-6.



2-1-6



Arc-divide board uses four M3 screw to install, the dimensions are as displayed in figure 2-1-7. H is not less than 10mm.



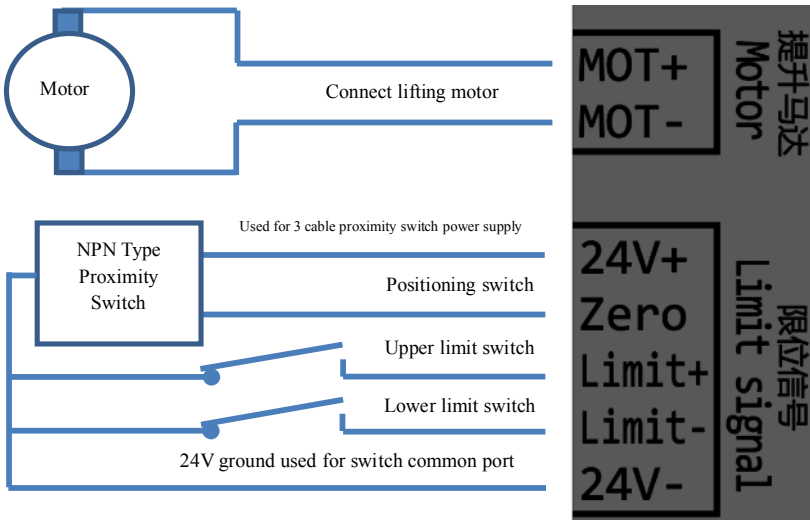
2-1-7

## 2.2 Electric Installation and Connection

### 2.2.1 Interface Definition

2-2-1 Connect Lifting Mechanism

Mark	Property	Description	Notes
MOT+	output	Lifting motor+	
MOT-	output	Lifting motor-	
24V+	output	Used for 3 cable proximity switch power supply	Cannot be used for other power
Zero	input	Initial -positioning input-proximity switch mode	
Limit+	input	Upper limit	
Limit-	input	Lower limit	
COM	Common port	Common port of positioning and limit switch	



2-2-1

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Normally open type limit switch is recommended.

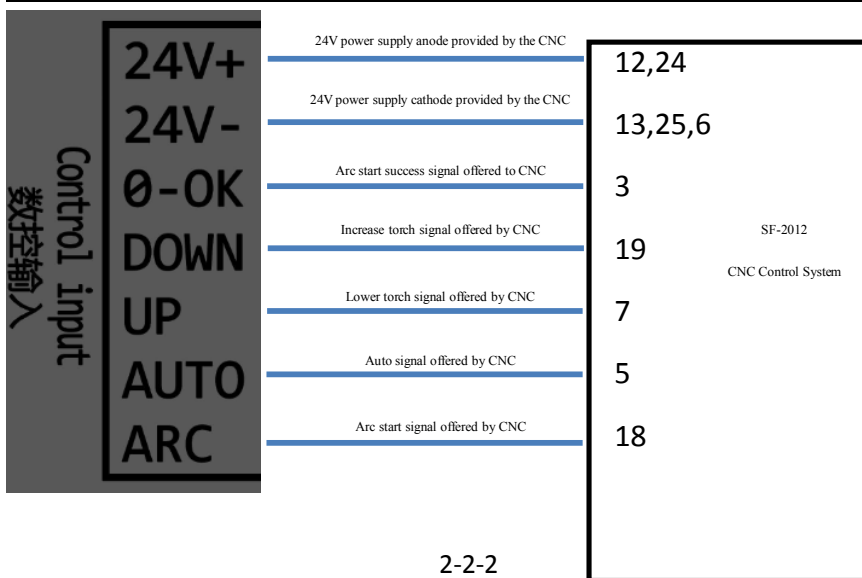
NPN normally open type of initial positioning switch is recommended.(wire connection method is shown in appendix.)

Initial positioning switch can also use the way of protective cap+relay.

### 2-2-2 Connect CNC Control System

Mark	Property	Description	Notes
24V+	input	Connect the power supply anode of CNC system output interface	Provided by CNC interface
24V-	input	Connect the power supply cathode of CNC system output interface	
0-OK	output	Feedback signal for arc start success	Output is 0V
DOW	input	Manual down signal-connect down output signal of CNC	Low active
UP	input	Manual up signal-connect up output signal of CNC	Low active
AUTO	input	Manual-Auto transfer switch(M38,corner signal)	Low active
ARC	input	Arc start input-connect arc start output signal of CNC	Low active

**Notes:** when using this CNC system, all wire in the above form are directly connected to the input and output interface of the CNC, relay is not needed to convert.It's best to use shielded cable.

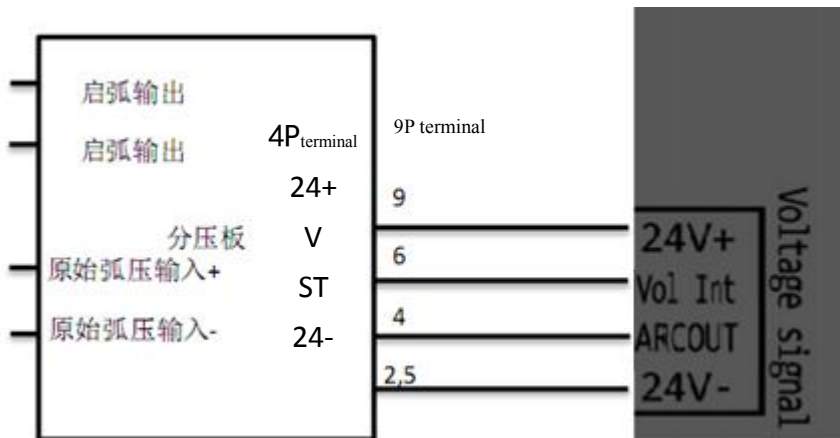


2-2-2

Wire connection diagram when working with SF-2012 CNC cutting machine control system

### 2-2-3 4 pin connector—connect plasma source

Mark	Property	Description	Notes
24V+	Power supply	Anode of arc-divide board 24V power supply	Cannot be used for other purpose
VOL INT	input	Input after voltage divided	
ARCOUT	output	Arc start signal of output to arc-divide board	
24V-	Power supply	ground of arc-divide board 24V power supply	

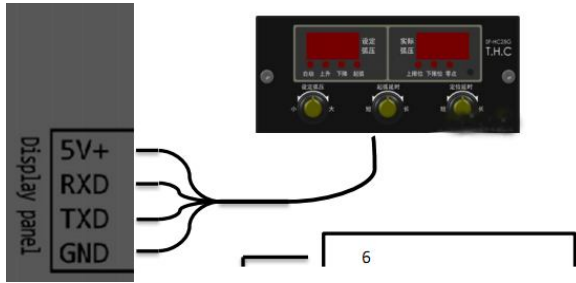


2-2-3

**Notes:** arc start output need to use an intermediate relay, which is included in the arc-divide board.

### 2-2-4 5 PIN interface-connect panel

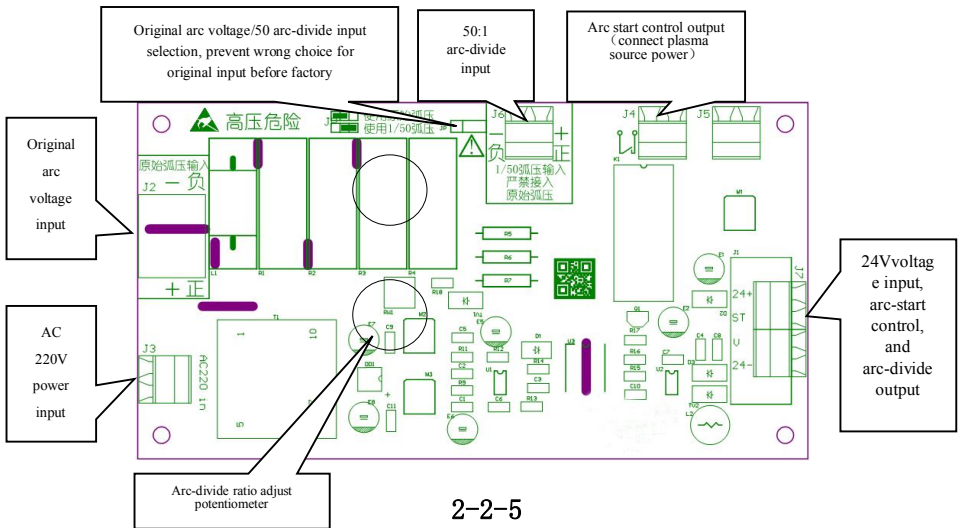
Mark	Property	Description	Notes
5V+	Power supply	Supply power to Panel 5V	Cannot be used for other purpose
RXD	input	Input of serial data	
TXD	output	Output of serial data	
GND	Power supply	Panel power supply ground	
GND	Power supply	Used as a shield	



This cable is included in the random accessories, 100cm in length.

### 2.2.2 Function of Arc-divide Board

The arc-divide board is a function block which proportionally reduces the voltage after making arc of plasma cutting torch, then transform the voltage into a low-voltage signal reflecting the height between cutting nozzle and material plate, and it is necessary fitting for height control in plasma cutting. Arc-divide board can choose install location according to needs, but recommend to install it within the plasma source power, the interface of the arc-divide board is shown in figure 2-2-5



If clockwise rotation, voltage division ratio increase (maximum 110:1), e.g. Output voltage become low, take 100V input voltage as an example, if adjust the voltage division ratio to maximum (110:1), THC displays 45V.

If counterclockwise rotation, voltage division ratio decrease (minimum 40:1), e.g. Output voltage become high, take 100V input voltage as an example, if adjust the voltage division ratio to minimum (40:1), THC displays 125V.

Arc-divide ratio adjustment potentiometer is set as 50:1 before factory, try not to adjust.

definition version	24V anode	Arc-start control	Arc-divide output	24Vground
<b>9pin plug</b>	<b>9</b>	<b>4</b>	<b>6</b>	<b>2, 5</b>
<b>Screw terminal</b>	<b>24+</b>	<b>ST</b>	<b>V</b>	<b>24-</b>

### 3 Parameter details

There are three Usual parameters and two Debugging parameters: 1. Set voltage; 2. Arc start delay; 3. Position delay. These three parameters can directly set by the buttons on the display.

#### 1. Set voltage

Can adjust this parameter any time use the “Height” button, the Left display is the voltage the customer set, (unit/V). In the auto cut mode, the customer can set the distance between the plate to nozzle, make actual voltage close to the set voltage. This parameter can understand to the distance (height). Details parameter should reference to the plasma source.

#### 2. Arc start delay

Pierce time should depends on actual pierce time, different plate thickness and different current the time is different.

#### 3. Position delay

Position delay time is the mean, at first initial position, torch go down touch the plate, the time from torch touch the plate to go up to a set height. The different lifter need different time.

### 3. Speed parameter

This parameter is Debugging parameter, can use the screwdriver to adjust.

Clockwise to decrease and counterclockwise to increase.

This parameter will effect the motor rotation speed and the THC reaction time. Please

See the photo 3-1.

### 4. Position limit switch

S1 jumper in the 1 and 2 , it is low effective, used for Normally closed switch;  
S1 jumper in the 2 and 3 , it is high effective, used for Normally opened switch; The  
factory default is Low effective. The location of this parameter please see the photo  
3-2.

### 5. Position switch valid or invalid

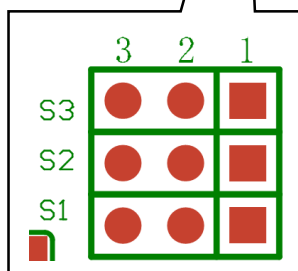
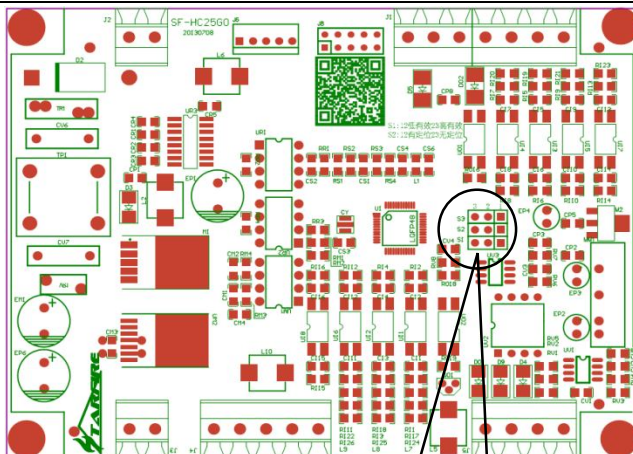
S2 jumper in the 1 and 2 , it is Position valid, S2 jumper in the 2 and 3 , it  
is Position invalid. please see the photo 3-2.



3-1

Speed and  
reaction speed





3-2

---

## 4 Manual Guide

**Specific terms explanation** : Control signal valid, means input signal and the corresponding com(24V-) is a circle.

THC controller will do the self-test after the power on. Self-test terms: Display and main controller display the Version no, Display and main controller communication, motor work or not.

If the self-test can't success, the Digital screen display abnormal or up/down limit led light and don't perform any operation.

If the self-test success, the THC work, it have two mode: Manual and AUTO

### 4.1 Manual Operation

Manual up signal (UP): valid, torch goes up

Manual down signal (DOW): valid, torch goes down

Manual down signal (DOW): Longtime valid, operate Position

Arc start signal (ARC): valid, first "Position", then control the plasma source to arc start

### 4.2 Auto Operation

The conditions of Automatic torch height control:

1. ARC Start signal valid (ARC)
2. Automatic signal (AUTO) valid
3. Suitable plasma cut voltage ( (SET VOLTAGE-50)~(SET VOLTAGE+60) )

**Initial position:** after the lifter receive the arc start signal, THC ask the lifter goes down. Zero signal valid, that mean torch have touch the plate, THC ask the lifter goes up, goes up time mean "IHS TIME", "IHS TIME" finish, mean the Initial position is finished.

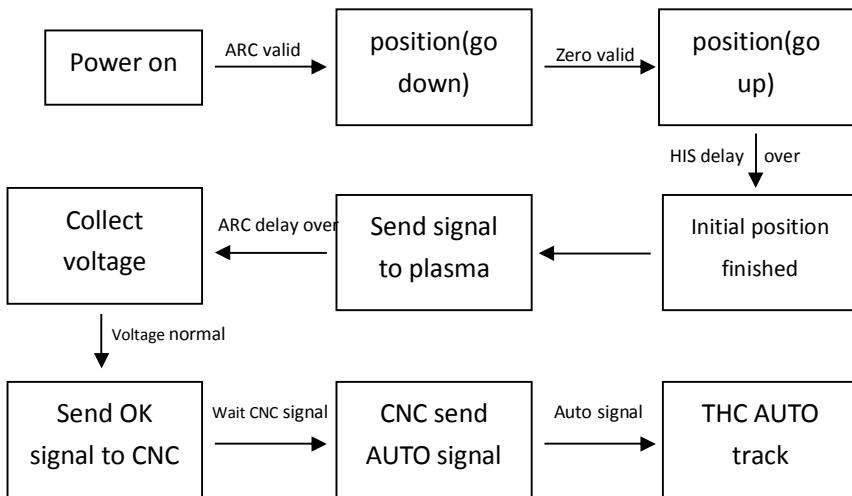
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**ARC OUTPUT:** After the Initial position, output the ARC START signal to the plasma source, wait some time when the voltage is stable, it will collect arc voltage

**ARC Success feedback:** during some time, make arc voltage to normal range, that mean arc start is success, THC will send the (0-OK) signal to the CNC controller.

### AUTO TRACK

After send the (0-OK) signal, the CNC controller think the arc start is success, it can make the cut, at this time when the CNC send “AUTO” signal to the THC, the THC will go to track.



AUTO function timing diagram

---

# 5 Some M Command Between CNC and THC

## 5.1 CNC directly control the output port

M12/M13	<b>ARC START SWITCH</b> , M12(on), M13(off)
M14/M15	<b>Torch up switch</b> , M14(on), M15(off)
M16/M17	<b>Torch down switch</b> , M16(on), M17(off)
M38/M39	THC auto/manual switch M38(auto) M39 (manual)

## 5.2 M Function Fixed Cycle

M07 Pierce fixed cycle

Plasma cut operation as follow

M07

1. Torch down (torch down delay, see M71)
2. open arc start switch
3. If select arc test “0”(don't test arc voltage) in the parameter table, then it don't test the voltage delay pierce delay (second)
4. If select arc test “1”(test arc voltage) in the parameter table, then it will test the voltage, wait “arc finish success”
5. Delay “THC AUTOMATIC DELAY”
6. Open THC (M38),run the next step

M08 off cut fixed cycle

Plasma cut as follow:

M08

1. Off THC (M39)
2. Off arc switch
3. Torch up (M70)

---

### 5.3 Advice Some Parameter (SF-2012 CNC)

#### Plasma mode

Initial position test 0;

Initial position test logic 0;

Torch position delay 0;

Torch up delay(M70) 1 sec;

Torch down delay(M71) 0 sec;

ARC voltage test 1;

Pierce delay 0;

Corner off THC distance 10mm;

Early end arc distance 2mm;

THC AUTO signal delay 3sec.

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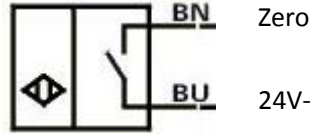
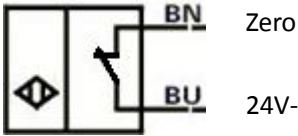
## 6 Trouble Shooting

**Trouble table**

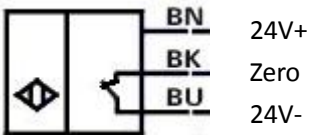
<b>Trouble</b>	<b>Test term</b>	<b>methods</b>
Motor don't turn	Power supply	Power on
	Power voltage	Test voltage
	Motor block	Reduce load
No display	Test power supply	Power on
Just display one	Check communication cable	Reconnect or change new cable
Upper limit alarm	Run over mechanical value	Check high limit switch
lower limit alarm	Run over mechanical value	Check low limit switch
Upper and lower limit both light but can operate	Short circle	Check motor cable
Signal unstable	Plate should fixed ground	Fixed ground
fluctuated	Sensitive too low	Enlarge sensitive
Low accuracy	Sensitive too big	Reduce sensitive

# 7 Appendix

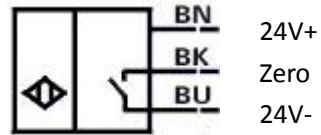
## Different switch connect methods



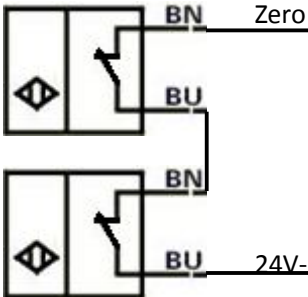
2 cable NPN normally closed



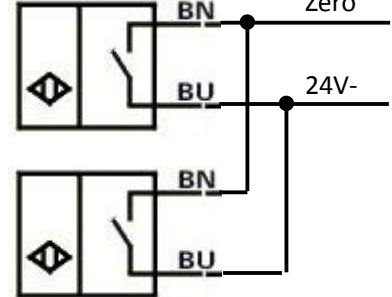
2 cable NPN normally open



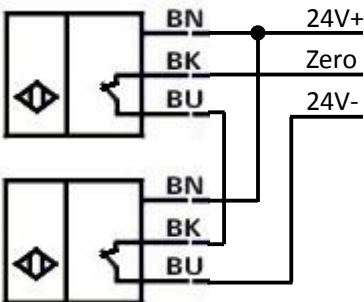
3 cable NPN normally closed



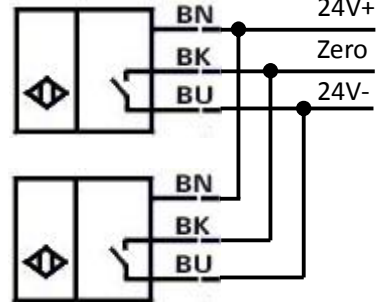
3 cable NPN normally open



2 cable NPN normally closed, series connection



2 cable NPN normally open, in parallel



3 cable NPN normally closed, series connection

3 cable NPN normally open, in parallel