

ARCBRO®

CHC-200F SERIES

Capacitor Torch Height Controller Manual CHC-200F



Operator Manual

ARCBRO | Revision 2 | English

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Preview

Thanks for choosing ARCBRO THC!

CHC-200F Capacitor Height Controller is a newly designed capacitor height controller,

- ❖ A. The power supply of the height controller can be AC24V or DC24V.
- ❖ B. CHC-200F is designed with a comprehensive design method of ARM and analog control.
- ❖ C. The height controller has an intelligent status detection function, which can automatically detect the in-position status, collision status, and high-frequency cable disconnection status.
- ❖ D. The high-frequency cable can be arbitrarily changed between 800mm --1800mm, and the height can be adjusted automatically to adapt to the change of the length of the high-frequency cable.
- ❖ E. In the stop state or automatic state, collision occurs automatically to the highest point.
- ❖ F. In the case of high-frequency cable disconnection, the automatic cannot be turned on, and a disconnection alarm will be generated.

Safety and precautions:

- ◆ Before using this product, be sure to read the instruction manual of the height controller carefully to avoid unnecessary losses caused by installation or operation errors.
- ◆ Non-professionals or unauthorized persons are not allowed to open the height controller for maintenance!
- ◆ Do not put liquid on the height controller to avoid entering the height controller.
- ◆ Pay attention to dust, do not let metal dust etc. enter the height controller.
- ◆ When transporting, please handle with care to avoid damage.

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- ◆ The grounding position marked with the height controller must be well grounded, and the grounding resistance is $\leq 1\Omega$.
- ◆ The rising and falling directions on the height controller panel must be consistent with the movement direction of the lifting mechanism.
- ◆ Please do not install the height controller in the place of heat source, the normal working temperature of the height controller is $-10^{\circ}\text{C} \sim 60^{\circ}\text{C}$.
- ◆ Take corresponding protective measures in high temperature, humidity, dusty or corrosive gas environment.
- ◆ When your products have special needs, please contact us in time.

Special statement:

The height controller of our company has been tested and copied before leaving the factory. All parameters have been adjusted. Please do not change the parameters without permission!

Due to product updates, subject to change without notice!

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1. Product description

1.1 Introduction

CHC-200F Capacitor Height Controller is a newly designed product that uses high-performance 32-bit Cortex-M3 core ARM processor, combined with analog closed-loop circuits, and has the characteristics of the old CHC-200E height controller with high real-time control. , Innovative realization of the automatic identification and calibration of the sensor probe, better practical functions such as anti-collision, disconnection protection and manual two-speed control.

1.2 Working principle and scope of application

The working principle of the CHC-200F capacitive height adjustment controller: It detects the distance by detecting the capacitance between the metal probe ring and the metal workpiece, and controls the motor actuator to maintain a constant setting between the probe ring and the metal workpiece. Set distance.

CHC-200F capacitance adjustment is suitable for flame cutting of CNC cutting equipment, non-high-frequency arc-ignited plasma cutting with current below 100A above water (do not use high-frequency arc-ignited plasma power) and all equipment that requires automatic height control.

1.3 Basic parameters

- ❖ Power supply: AC24V+10%,50Hz/60Hz or DC24V,18V~30V.
- ❖ Support Motor: DC24V motor.
- ❖ Drive mode: PWM.
- ❖ Output current: 1A-4A.
- ❖ Output Watt: 100W.
- ❖ Work temperature: -10~60℃.
- ❖ Automatic height adjustment range within accuracy: 1mm-25mm from the surface of the workpiece.
- ❖ Accuracy: ±0.1mm (related to mechanical structure)
- ❖ Lifter speed: 1m/min ~ 4 m/min (over 4m/min, Please contact supplier) .
- ❖ High-frequency cable length (HF-cable): 200mm~1800mm.

1.4 Application

The CHC-200F capacitance height controller can be used for flame cutting, plasma cutting, laser cutting and other equipment that needs automatic height adjustment.

2. Height controller system composition

The standard factory accessories of CHC-200F height controller are suitable for flame cutting or plasma cutting; when used in other occasions, please design and install by yourself.

2.1 Composition of height controller

The CHC-200F height controller is composed of a height controller control box host and accessories HF high-frequency cable, probe ring, elastic connector, mounting handle (matching device), and holder. The installation diagram is shown in Figure 2-1.

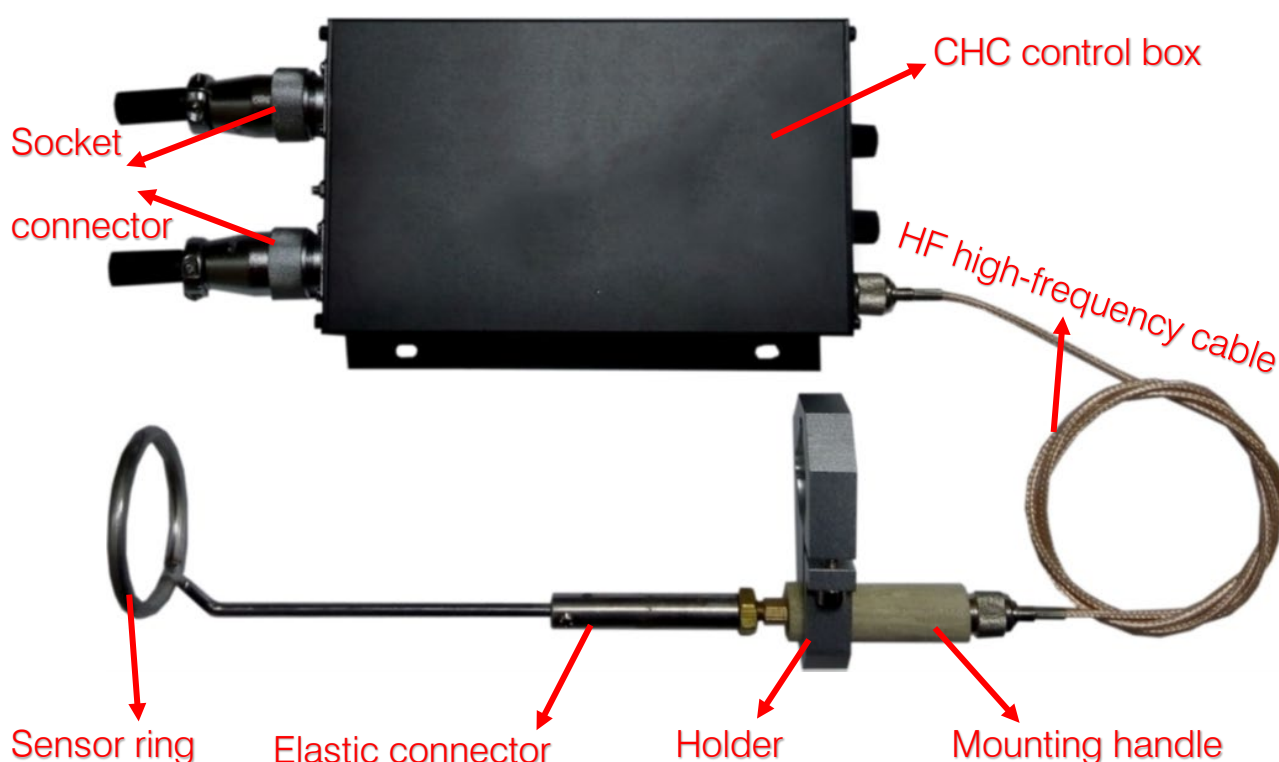


Figure 2-1 CHC composition structure diagram

2.2 CHC installation dimensions

The external dimension of CHC main body is length * width * height: 176mm * 105mm * 50mm. The installation dimensions are shown in Figure 2-2.

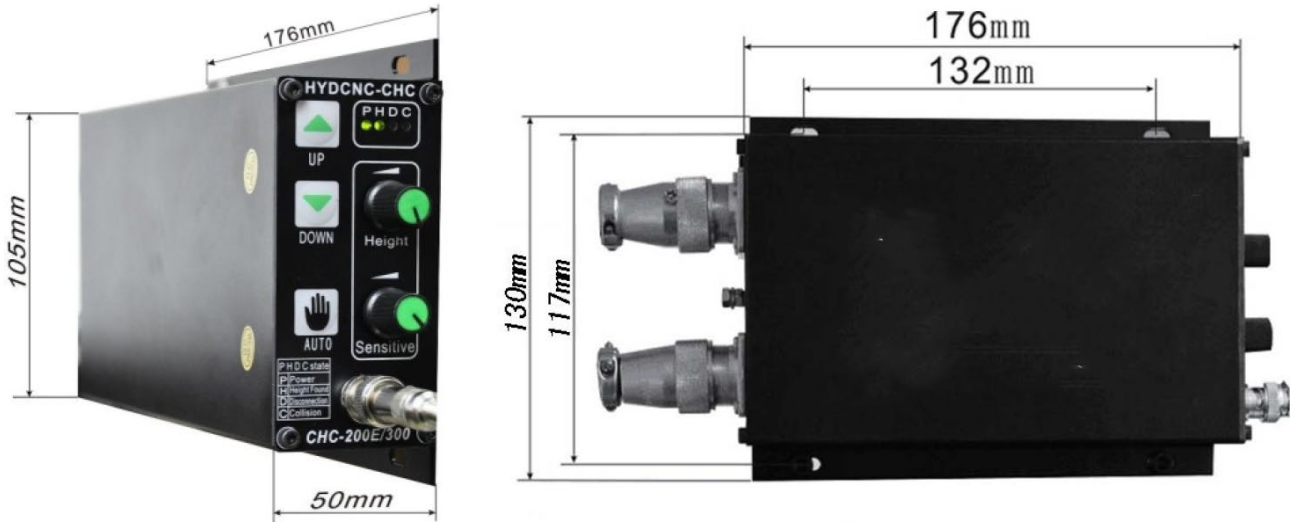


Figure 2-2 Dimensions and installation dimensions

3. THC control and connection

3.1 Operation panel intro.



Indicators:

P Power: Power indicator, green. Off means no power supply. At the auto mode, the “P” light will be on all the time. At the manual mode, if the height from sensor ring to material is close to the setting height, then “P” light will be flashing.

H Height Found: Turn on when torch reaches auto height, green.

D Disconnection: Disconnection indicator, red. When HF cable is unconnected or disconnected, it turns on. On auto mode, if disconnection happens, torch would keep lifting up until it’s solved.

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C Collision: Turn red when sensor ring collision happens, both on manual/auto mode. Torch would keep lifting up until collision disappears. At this moment, press Down doesn't work. If HF cable short-connected with shield net, it is same as collision to THC.

Buttons on operation panel:

Up/Down Button

It is active on any mode. Priority is always given to Manual mode. For UP and Down, priority's given to UP. In case HF gets problem, it's always on UP mode, so the Down doesn't work.

Auto Button

Press the AUTO button, THC is always on Auto Mode, no matter there is a auto signal from outside or not. During cutting, THC needs to work on Auto Mode and it should be controlled by CNC, having nothing to do with this Auto button.

If at alarming or abnormal status, it appears the "D" and "C" lights on, then could press this "Auto" button to recover it.

Height

It is used to adjust cutting torch height during Auto Mode. Height increases when it is turned clockwise. At the first commissioning, turn clockwise maximum to reach the highest height.

Sensitive

On Auto Mode, the Sensitive increases when it is turned clockwise.

Sensor ring Port

One end of HF Cable link with the socket, the other end link with the sensor ring groupware.

3.2 THC Connectors

As figure 3-2 shows, CHC-200F has only two connectors for installation, one is to CNC (X1-CNC) the other one is to lifter motor (X2-TORCH).

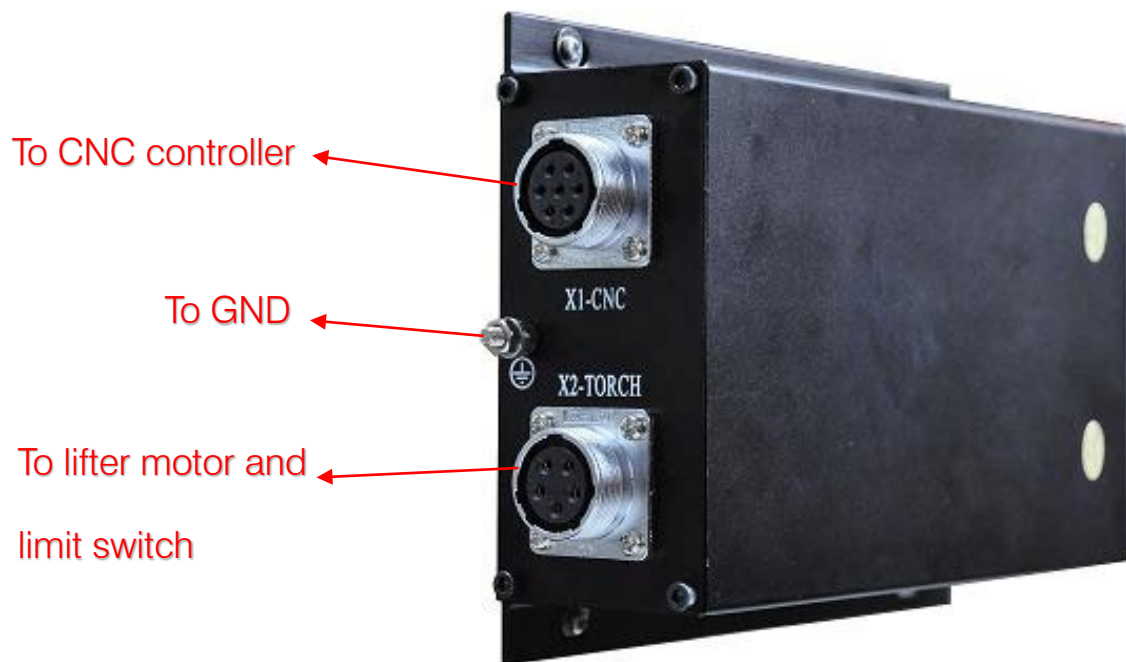


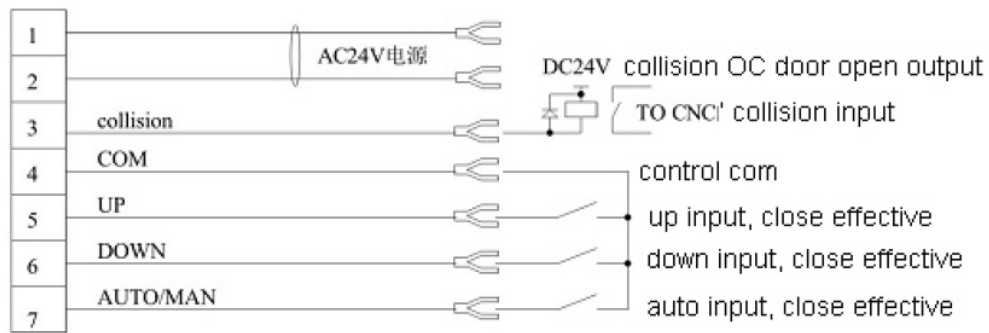
Figure 3-2

3.2.1. X1- CNC(TO CNC)

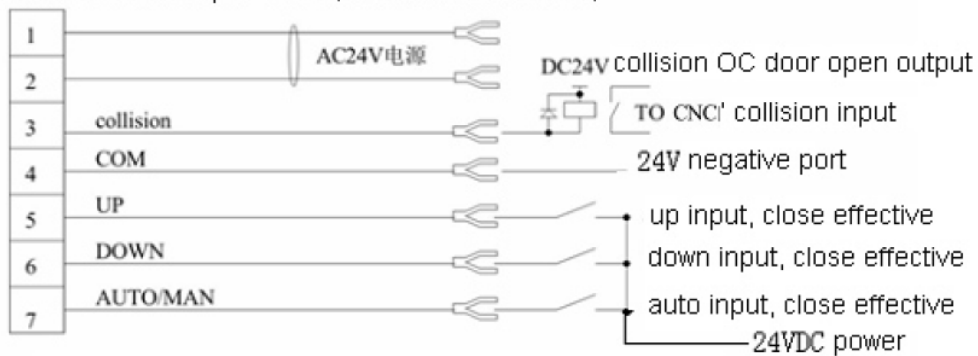
It is a 7-pin socket, pin definition as follow:

Pin(s)	Signal	Description
1,2	Power	AC24V, 50/60Hz Power supply > motor's+20W
3	Collision	Collision output to CNC, OC door open output Max drive current :200mA
4	COM	I/O COM
5	UP	Up control, low-level effective
6	DOWN	Down control, low-level effective
7	Auto/Man	Auto control, low-level effective

7-pin socket connection



When collision output works, connection as follow,

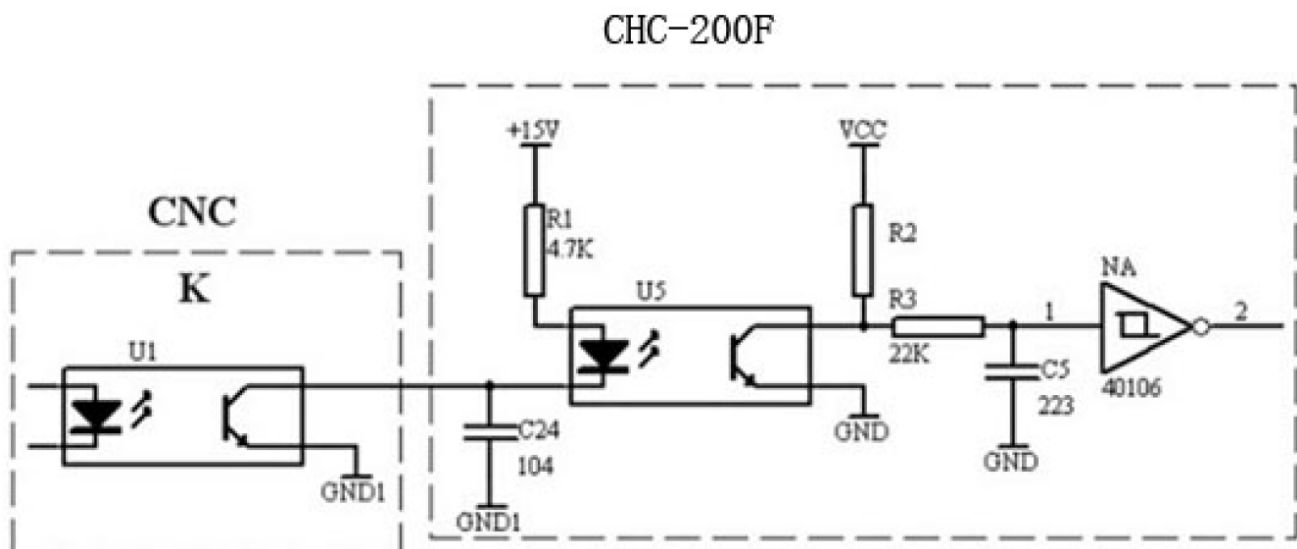


If collision output used, DC 24V power negative should connect to COM
change JP3 Jumper position to control 24VDC input

Figure 3-3

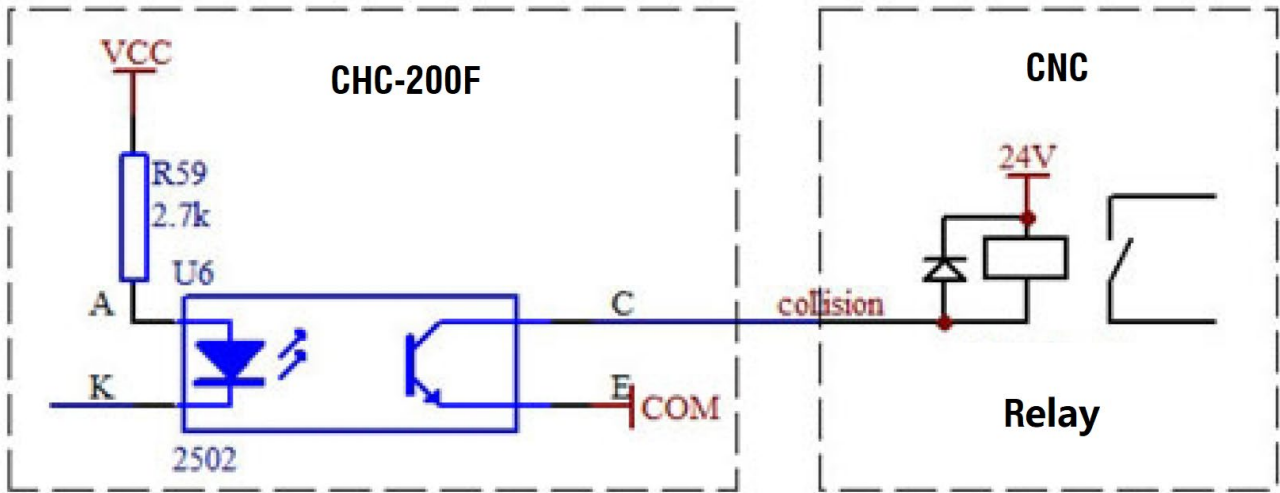
CHC-200F to CNC (X1-CNC),input/output both use optical isolation, UP/DOWN/AUTO is external signal input to THC, Collision output from THC. All those signals share same COM.DF The input/output shows as:

Input circuit:



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Output circuit:



3.2.2 X2-TORCH (to torch lifter motor)

It is a 5-pin socket, pin definition as follow.

Pin(s)	Signal	Description
1,2	DC Motor Drive(Output)	DC motor drive output Drive. DC24Vmotor directly. Max 100W PWM
3	Down LIMIT (Input)	Down limit input. Limit switch normally closed. Short connect pin3 and 5 (optical ISOLATED).
4	UP LIMIT (Input)	UP limit input. Limit switch normally closed. Short connect pin4 and 5 (optical ISOLATED).
5	LIMIT COM	COM

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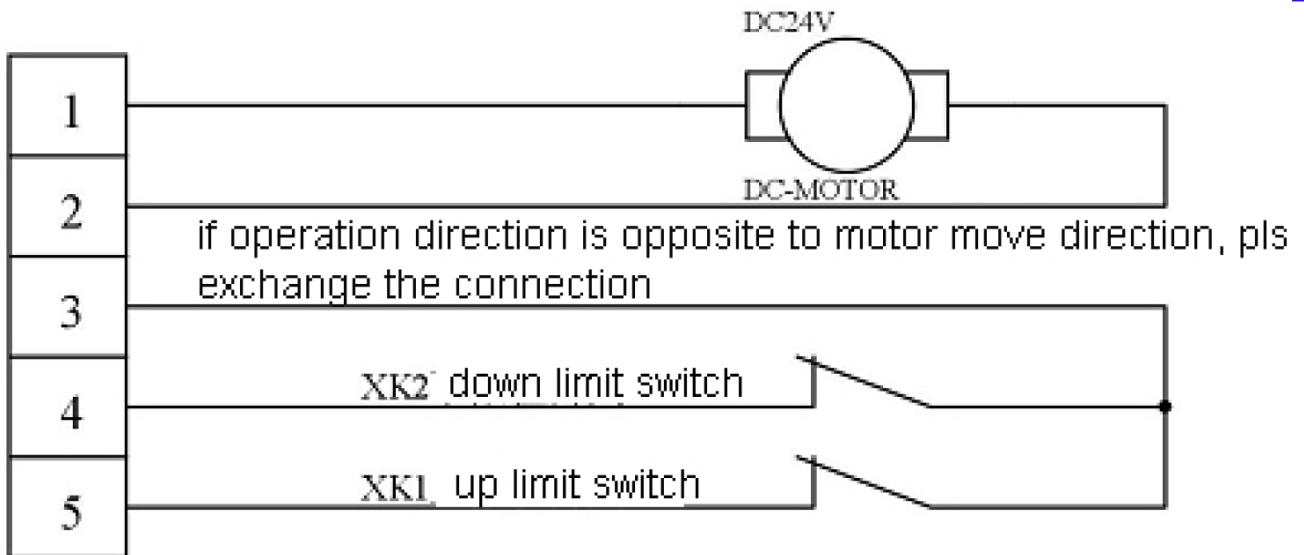


Figure 3-5

Note:

- ❖ Pin 1, 2 are DC motor connector, H bridge drive, PWM speed control.
- ❖ CHC-200F limit switch must be normally closed contact, when one side limit is open, The move at this direction must be stopped, but the other direction move is still effective. Limit switch connection as figure 3-6.

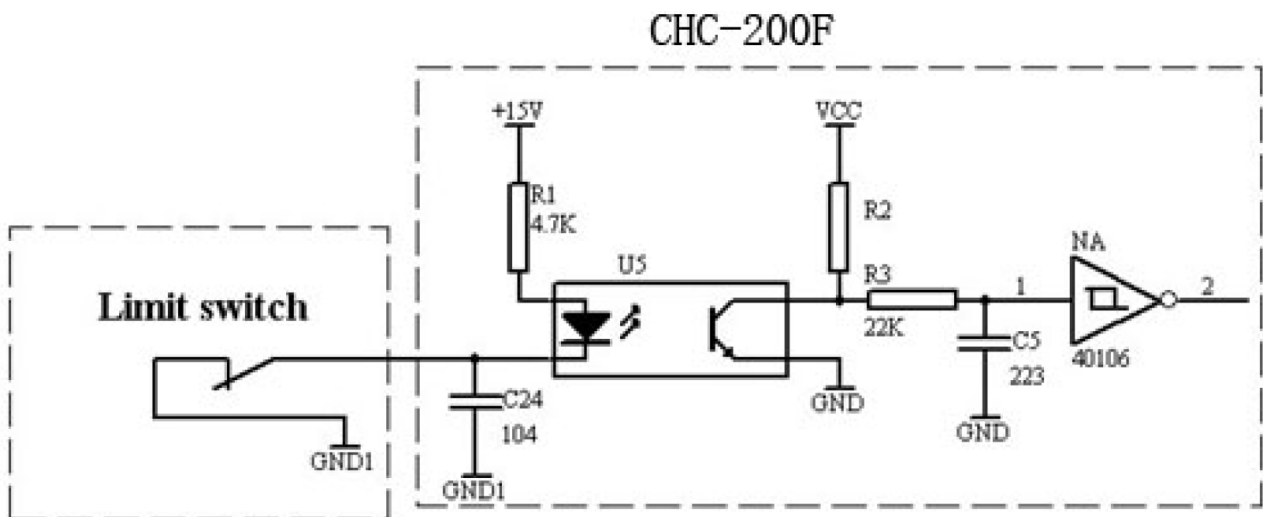
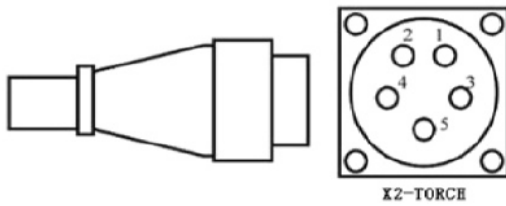
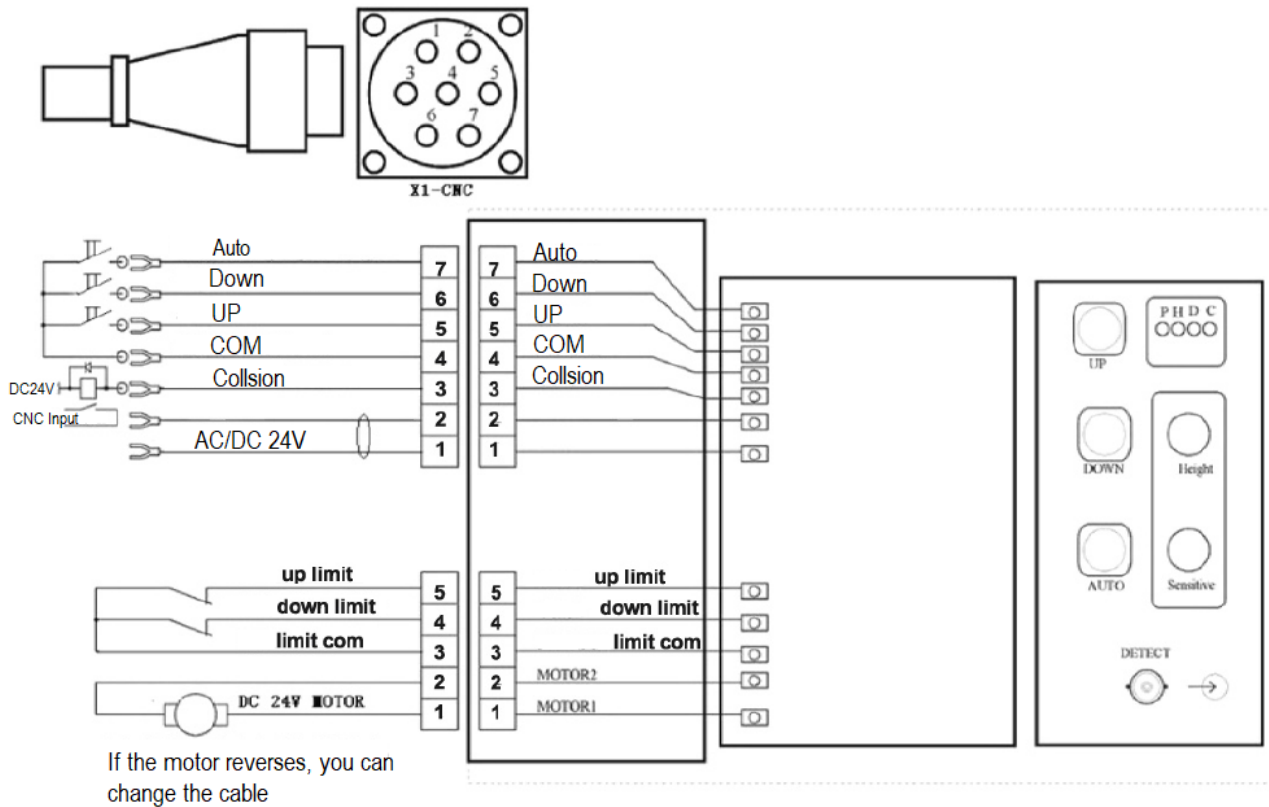


Figure 3-6 Limit input

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3.3 Complete THC wiring



Complete THC Wiring

4. Installation and Commissioning.

4.1 Installation

4.1.1 Sensor ring installation

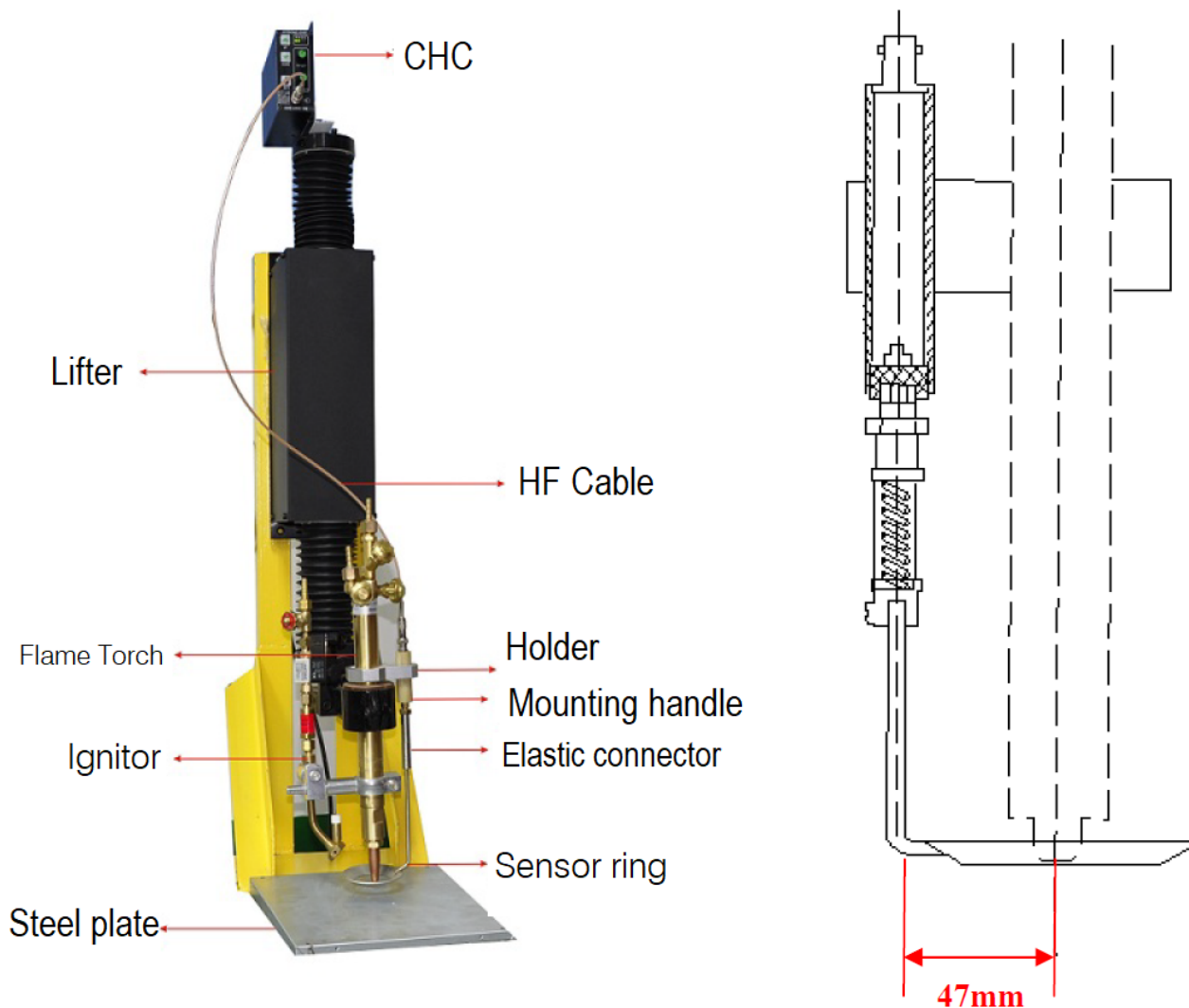


Figure 4-1 flame cutting installation

Note: The flame torch and ignitor is not the parts of the CHC-200F

Installation of sensor ring: According to our years practice, sensor ring should be installed lower about 1~2mm than torch head to avoid the edge effect during cutting edge of workpiece, and it anti-collision more effectively, as showed in Figure 4-1.

While on plasma cutting, the sensor ring shall be installed little higher than the torch head, to avoid the effect of plasma arc voltage, and it needs a special insulation part supplied from HYD.

4.2 Commissioning.

4.2.1 Test after installation

Up/Down connects with GND, motor moves up and down, firstly make sure on Manual mode, torch up/down is same direction as Up/Down control button.

Auto/Manual connects with GND, THC is on Auto Mode. When it's unconnected, the manual mode is active.

On Auto mode, if the sensor ring is not connected with THC and THC is under disconnection protection, the indicator "D" Disconnection would turn on, cutting torch would keep lifting up. If sensor ring is connected with THC, the cutting torch should stop at a position via adjusting the **Height** button (THC finds the Auto Height).

On Auto Mode, the height of cutting torch is under control of **Height** button. At first commission, always turn clockwise maximum to get the highest height, then turn anti-clockwise, the height decreases. If adjusting the height is too low, when cutting torch touches the workpiece; motor will be on a shocking-state.

THC always drives motor to make sensor ring close to the Balance Position (the set Auto Height), and it stops when ring is around the Balance Position, 0.2m lower or higher). The closer, the more slowly the motor runs.

Auto sensitivity meets the request of THC when sensor ring is 5—20mm away from workpiece.

4.2.2 Commissioning Step

-1. Install the THC according to the "4.1 Installation", offer the enough power supply to THC (CHC-200F can use the AC/DC 24V, power must be twice than motor's).

-2. When power on, check the **red indicator lights** ("D", "C") to confirm the connection ok or not. "D" light is on, means disconnection; please check the HF cable, insulator, elastic connector and sensor ring are connected well or not. "C" light is on, means collision, it might be short-circuit occur between the sensor ring to torch or HF cable short-circuit.



Fig 4-2 Disconnection



Fig4-3 Collison



Fig4-4 Auto setting(D.C flashing)

“D” light is on, could operate it up/down manually; at auto mode, torch will keep lifting up “C” light is on, THC will control the torch to go up until the up limit. After collision, will send out the collision signal in 0.3s to CNC controller, the torch will be lifting up until up limit.

-3. When “D” and “C” lights are off, please test the “UP”/ “DOWN” buttons. “UP”---torch goes up; “DOWN”---torch goes down; if the torch moves opposite way, please exchange the connection of the “MOTOR1” and “MOTOR2” shown in Fig 3-5. If the motor don’t move, please check the UP-limit switch and Down-limit switch.

-4. After all function test ok, then do the auto setting height work. First, please turn the “Height” knob at the middle position, And press the “UP” and “DOWN” with 2s at the same time, THC begin to detect and set. During the setting process, the torch goes up to the up-limit first, and goes down in 10s after automatically detecting, the “D” and “C” lights will continue flashing until finishing the auto setting work.

-5. After complete the auto setting work, can set the cutting height via adjust the “Height” knob, Then controlled by the CNC controller via connecting “TO CNC” port.

-6. At Auto mode, any metal material touch the sensor ring, torch will go up 2s, and “D” light is flashing. If the metal is taken off, the torch goes up too, and “D” light flashes. When this situation “D” light flashes, you can press the “AUTO” and “DOWN” button to recover the THC or receiving the auto signal from CNC controller to recover it.

4.3 THC driver circuit commission

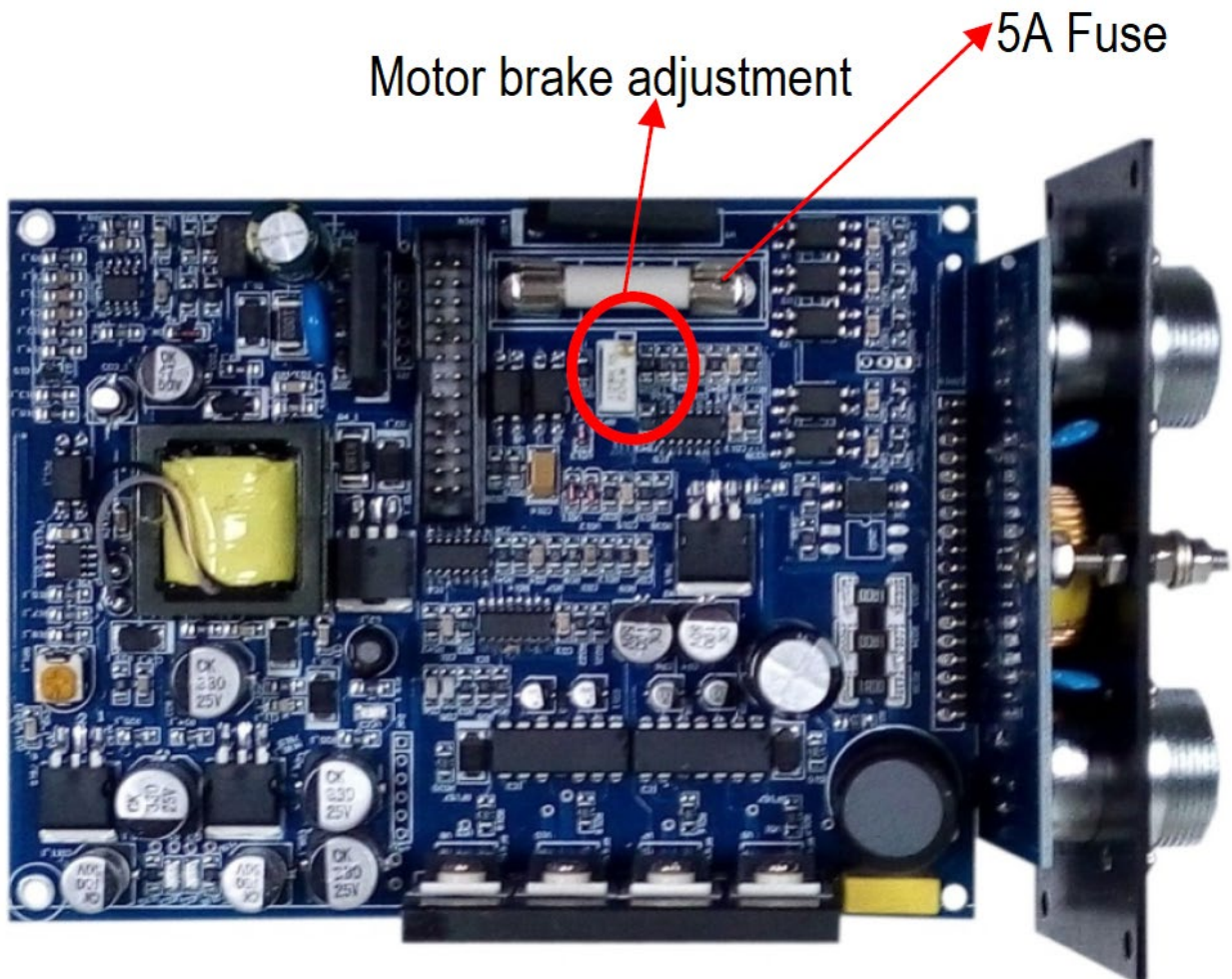


Fig 4-5 THC POWER AND DRIVE CIRCUIT BOARD

-1. Motor brake adjustment

This potentiometer RP3 is to adjust the motor stop's brake. Before delivery, we have adjust it well, please do not adjust before inquiry.

-2. About a little noise of the motor when at the balance position

It's normal, as the driver circuit is adopting the H-bridge circuit, with the PWM drive way. PWM is 9KHz, when at the auto balance mode, the motor will be with a little noise.

Note: CHC-200F has been adjusted well before delivery, please DO NOT adjust the THC's inside circuit without permission.