HF100

Capacitance Height Controller

TECHNICAL MANUAL

VISION：1702

HF100-L

For laser cutting accessories





HF100-F

For flame cutting accessories



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1. Important information

1.1 Service assistance and contact information

For service assistance, have the following information available:

• HF100 model, part and serial number located on a label

• Type of cutting application you are using

You can contact us:

TEL: 086-0519-89182619

FOX: 086-0519-89183619

The easy damage part: HF cable, Coaxial Tube, Flexible Coupling, Sensor ring are not in the scope of free maintenance.

1.2 Receiving and unpacking

After receiving the HF100 you should:

• Carefully, unpack and inspect the equipment.

• Compare the received shipment with the packing list.

• Report any damage to the carrier and your representative.

• Store equipment that will not be used in a clean, dry location.

• Take appropriate precautions to prevent moisture, dust and dirt from accumulating in storage and installation areas.

1.3 Safety considerations

Safety practices should not be an after thought. Before installing or servicing the controller, review and follow applicable policies and procedures to ensure worker safety. Machinery must be in a safe

state and you must be aware of any additional hazards that can arise.

1.4 Pre-installation considerations

Before installing the HF100:

• Check to be sure that you have all of the required parts.

• Check to be sure that the torch lifter motors you are using with the HF100 are within the acceptable range.

1.5 Configuring the lifter mechanics

Proper configuration of the torch lifter is an important factor for establishing the accuracy of your cutting system. Be sure that:

- Gear reduction is selected on the torch lifter so that the maximum suspension speed does not exceed 2000 mm/min (90 IPM). If higher accuracy is required, maximum suspension speed should be set to 1000 mm/min (40 IPM).
- Gears, racks and spindles have minimal backlash.
- Oversizing is avoided. The mass of moving parts, including armature inertia must be as small as possible. Motors with low nominal RPM are preferred.
- Only DC motors with the following ratings are used:

  MOTOR RATINGS： DC MOTOR

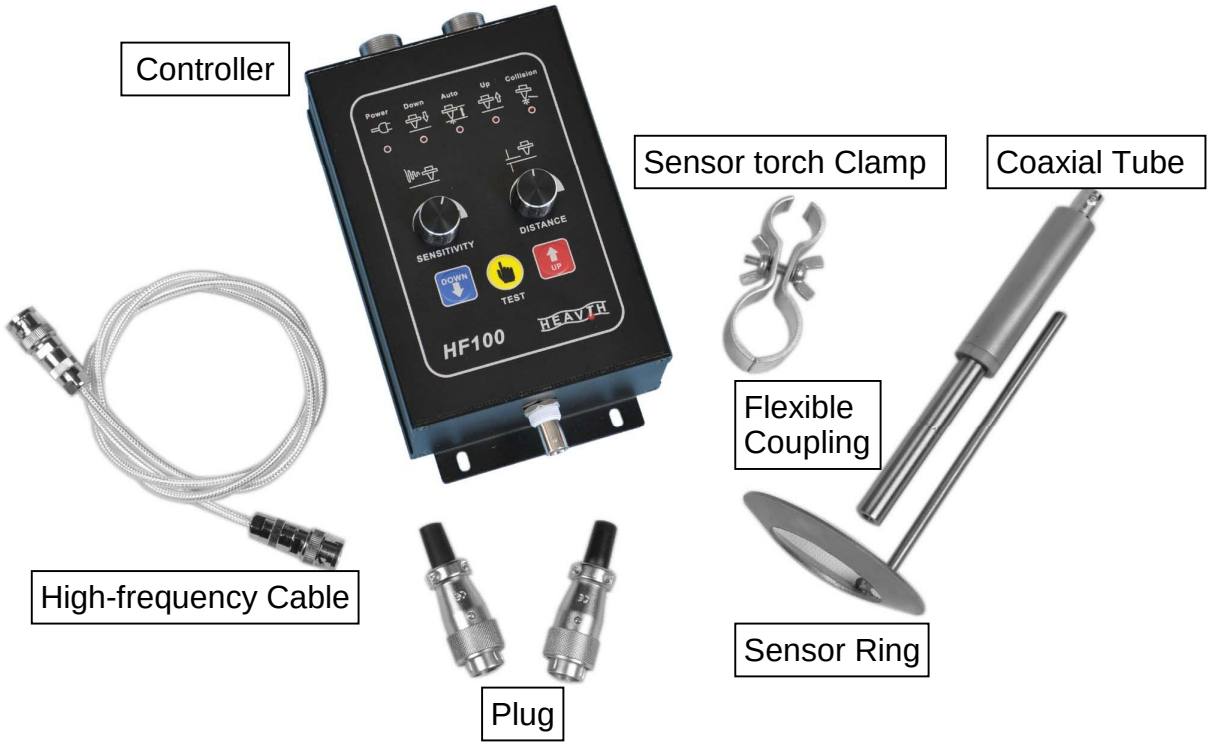
  MOTOR VOLTAGE： DC24V

  MAX CURRENT： 4A

1.6 Parts

HF100 Part Names(used for flame cutting or plasma cutting)：

HF100 capacitive Torch Height Controller

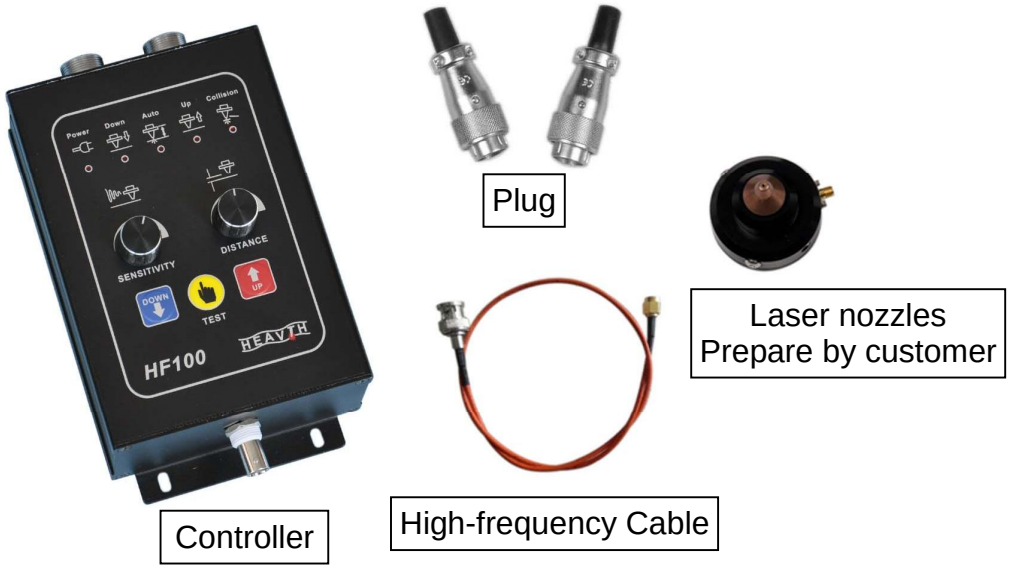


HF100 capacitive torch height controller can use for flame cutting, plasma cutting, laser cutting.

When HF100 used for flame cutting or plasma cutting, the sensor device can be used by our company's factory accessories, but when used for laser cutting, the sensor device is prepare by customer.

The laser nozzles are not included in the parts of the controller.

HF100 Part Names(used for laser cutting)：



For laser cutting, the controller is same as the flame cutting or plasma cutting controller, but the internal parameters are different from flame or plasma cutting.

2 General Description and Specifications

2.1 General Description

The cut quality for thermal cutting processes is affected by the amount of clearance between the torch tip and cutting material. Automatic control of the clearance span lets you make a smooth, quality cut at higher speeds with the least amount of dross.

HF100 lets you achieve and maintain the optimum amount of cut clearance and can provide the following economical advantages:

- Less preparation time because the HF100 controller

quickly establishes the correct amount of clearance.

- Increased productivity as a result of higher cutting speeds.
- Optimum cut quality, reducing or eliminating the need for secondary processing.
- Fully automatic CNC machines.

The HF100 controller also provides the following advantages:

- Clearance is measured using a capacitive system allowing reproducible setting and maintenance of the once adjusted clearance.
- The lifter motor is controlled by a transistorized H-bridge Pulse Width Modulated (PWM) amplifier using armature voltage feedback and adjustable current limitation.
- For automation purposes, the integrated control logic offers an In-position signal that can also be used to detect cut-outs or collision with tip-ups.
- Automatic retract of the torch if the high-frequency cable is broken or damaged. You can override this feature when in Manual mode and continue cutting until the problem can be corrected.
- Automatic retract in Manual mode if a collision occurs with work piece or tip-up. The retract action stops when collision is cleared.
- Upgrade compatible to HFA2 controller

HF100 Technical parameter

Power Supply： DC/AC24V±10%，50/60 Hz, 150 W

Lifter Motor： 24 VDC MOTOR

ENV. Temperature：

Control Box： -10℃∽60℃

HF Cable： -55℃∽200℃

Sense Distance： 1mm-30mm，adjustable。

Accuracy： ±0.2mm

HF Cable： 1000mm 75ohm

Sensor Type： Ring

Sensor Ring： Outer diameter 80 mm，

Inner diameter 40 mm

Housing dimensions：180 mm x 105 mm x 65 mm（L×W×D）

Weight： Controller box 0.9 kg

Control box with sensor components 1.3 kg

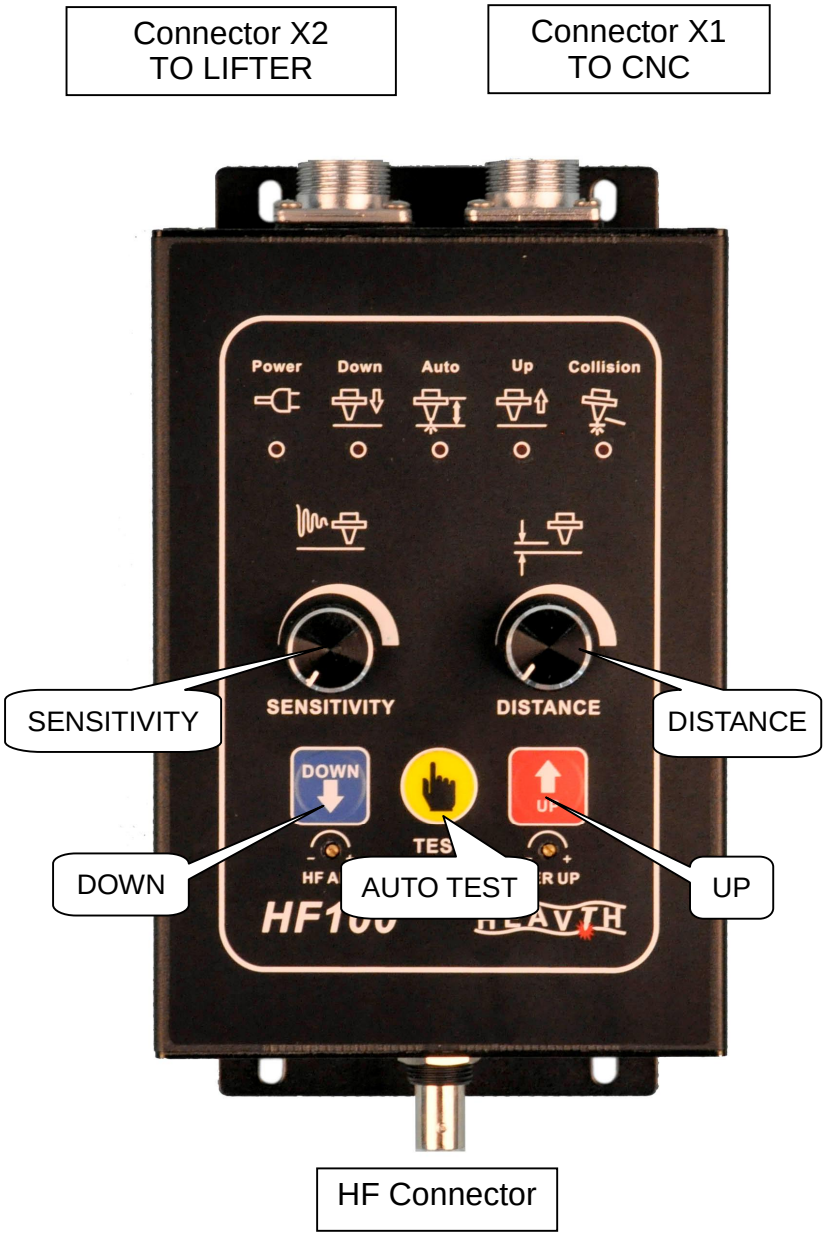
Dimensions：



Mounting Hole Size：



2.1.1 Front Panel Components



Function Description:

LED: Display the working status.

SENSITIVITY: Set automatic tracking sensitivity, Anti-clockwise turn set sensitivity lower, Clockwise turn set sensitivity higher. Set too high, the torch is easy to produce nod. Set too low, the torch track lifting speed is slow.

DISTANCE: Set automatic tracking height, Anti-clockwise turn set distance lower, Clockwise turn set distance higher. Set too low, the torch is easy to produce nod. Set too high, the torch tracking speed is slow.

UP/DOWN: Manual lifting torch.

TEST: Switch to automatic state and set tracking distance.

Note: When the factory tests the controller, it has been adjusted to the best state. Please do not adjust the following parameters without our confirmation.

HF ADJ: Adjust the automatic sensor circuit.

ERR UP: Adjust the high-frequency cable broken move up.

2.1.2 Modes

2.1.2.1 Auto mode

When the contacts of the Automatic/Manual switch are closed, the HF100 is in Automatic mode. The torch moves to the configured

clearance from the workpiece and maintains that location even when the position of the workpiece changes.

Using the Up/Down switch manually, and while in Automatic mode, overrides the automatic height adjustment configuration. When the Up/Down switch is released, the torch moves back to the clearance setting configured in the automatic height adjustment.

2.1.2.2 Manual mode

When the contacts of the Automatic/Manual switch are open, the HF100 is in Manual mode. The position of the torch is controlled using the Up/Down switches and the lifter moves at the maximum speed. When the Up/Down switch is released, the action of the lifter is stopped using dynamic braking to allow for exact manual positioning. If both the Up/Down inputs are operated at the same time, the torch moves upward.

2.1.3 Limit switches

Limit switches impede the movement of the torch lifter when they are triggered. The HF100 supports only normally

Closed limit switches so that malfunctioning limit switches can be recognized by the control.

3 Installation

The following section provides you with the procedure to follow when installing the HF100.

1. Attach the flexible coupling to the coaxial tube, Attach the sensor ring to the flexible coupling and tighten the screw.

2. Position the sensor so that the torch is aligned in the center of the ring to ensure proper operation.

3. Determine a mounting location for the HF100. To avoid overheating and potential damage to the control box from cutting process fumes, Do not above the torch.

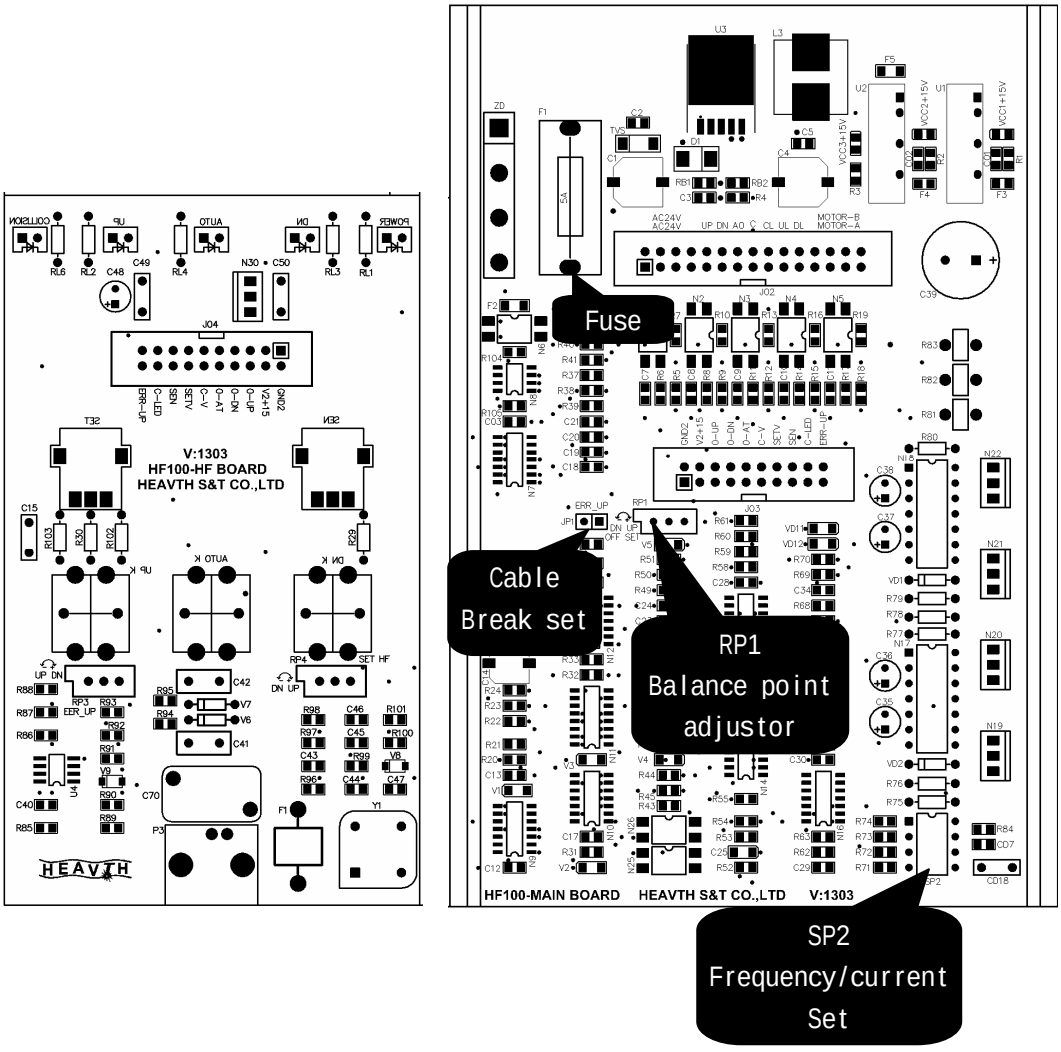
4. Attach the HF100 using four M4 screws with a maximum length of 3/10” (8 mm).7. Attach one end of a high-frequency cable to the top of the coaxial tube using the Bayonet Neill Concelman (BNC) connector. When determining the length of HF cable to use, be sure to choose a length that accommodates for the full lowering of the torch.

8. Attach the free end of the HF cable to the control box using the BNC connector.

9. Attach the wires from the lifter motor and lifter limit switches to a connector and then to the control box at the X2 receptacle. Be sure to install the key plug into the connector to prevent crossing the X1 and X2 connections. To reduce noise emission, 20 AWG

(0.5 mm2) shielded cable is recommended. Filters consisting of a resistor and capacitor can be connected only directly to the motor. Refer to Figure 7 for wiring connections.

3.1 Set controller



Fuse: This controller has installed 4A fuse, Please use the same model fuse to replace.

RP1: Balance point adjustor, set motor driver balance point.

Cable break: Jumper connect, enable HF cable break automatic rise; disconnect, disable HF cable break automatic rise.

Set DIP switch SP2 to configure the speed controller clock frequency and maximum lifter motor current value.

Setting Toggle Switch 1 of DIP Switch SP2：

Switch:	To the ON position	To the OFF position
1	18KHz	9KHz

Setting the controller clock frequency to 18 kHz requires that you take the proper shielding and grounding precautions when running the lines to the lifter motor.

Using a controller clock frequency of 9 kHz meets the 10 kHz interference suppression restrictions; however a whistling noise may be heard.

The position of toggle switches 2, 3 and 4 on DIP switch SP2 determine the maximum current for the lifter motor.

Setting Toggle Switches 2, 3 and 4 of DIP Switch SP2

Set the toggle switches to this position:			maximum current:
Switch 2	Switch 3	Switch 4	
OFF	OFF	OFF	4A
OFF	OFF	ON	3A
OFF	ON	ON	2A
ON	ON	ON	1A

3.1.1 Collision output to CNC

HF100 has Anti-collision function, it is effective on both manual/auto mode. When steel or other conductive item touches sensor ring, torch lift rise, and the collision signal is sent out from the Pin3 of 7-pin socket(OC door), when CNC receives this signal, machine pauses and waits for treatment of collision.

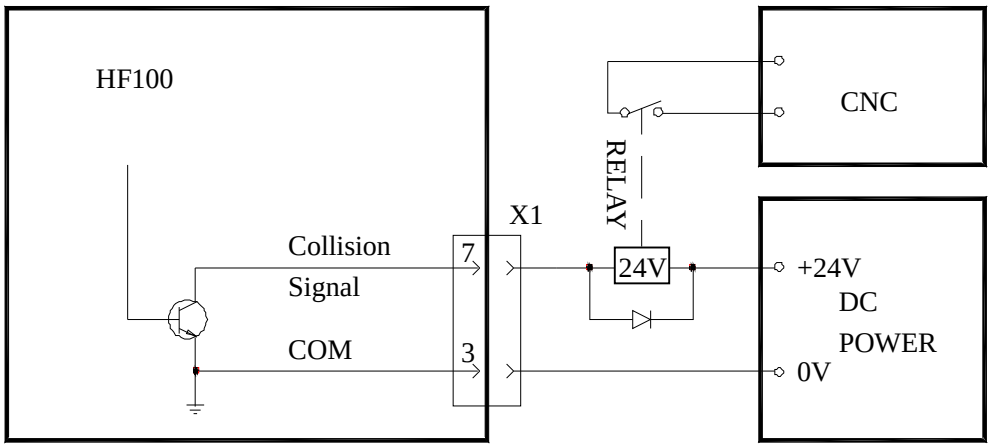
Collision Signal Details：

type：open-collector signal that can operate an external relay

connection： X1PIN 7、PIN 3

input voltage： 50 VDC maximum

input current： 0.2 Amp maximum (<1 mA of leakage)



4 Start-up checks

Before performing the start-up checks, be sure that you have successfully completed the installation steps.

1. Disconnect the Connector from the X1 receptacle.

2. Check the resistance between the Automatic/Manual and Up/Down switches using an ohmmeter.

Place one of the leads of the ohmmeter in pin number:	Place the other lead of the ohmmeter in pin number:	Then,	The ohmmeter display should show:
6	3	push the UP switch	<10 Ohms
5	3	push the DOWN switch	<10 Ohms
4	3	AUTO MODE	<10 Ohms

3. Connect the Connector to X1 and set the lifter to Manual mode.

4. Supply the power to the controller. The lifter must not move.

5. Verify the LED located on the front panel of the Controller.

6. Quickly push the Down switch. The torch lifter must travel downwards for as long as the switch is pressed. Quickly push the Up switch. The torch lifter must travel upwards for as long as the switch is pressed. If the lifter direction of travel does not correspond to the Up/Down switch, the field or armature connections of the lifter motor must be changed.

7. Verify the limit switch assignments correspond with torch lifter direction of movement by performing the following checks:

Move the Up/Down switch to the DOWN position and then trigger the corresponding down travel limit switch by hand. The lifter should stop when the limit switch is triggered.

Move the Up/Down switch to the UP position and then trigger the corresponding up travel limit switch by hand. The lifter should stop when the limit switch is triggered.

Operate the lifter manually. The lifter should stop when it hits the limit switch. Then you should be able to back-off of the triggered limit switch by reversing the direction of the lifter.

4.1 Adjusting the measuring system

After replacing a high-frequency cable or sensor ring, re-adjust the measuring system using the steps outlined below.

To adjust the measuring system, perform the following steps:

1. Check to be sure that the measuring system is completely installed and correctly wired. Double-check to be sure that the:

HF100 is connected to the sensor ring components by way of the appropriate HF cable.

The sensor is mounted on the torch and that the torch nozzle is positioned in the middle of the ring.

The following parts are connected to the protective conductor bus: machine earth ground (GND).torch table and ground screw on HF100 using a cable with a cross-section of 14 AWG (2.5 mm2).

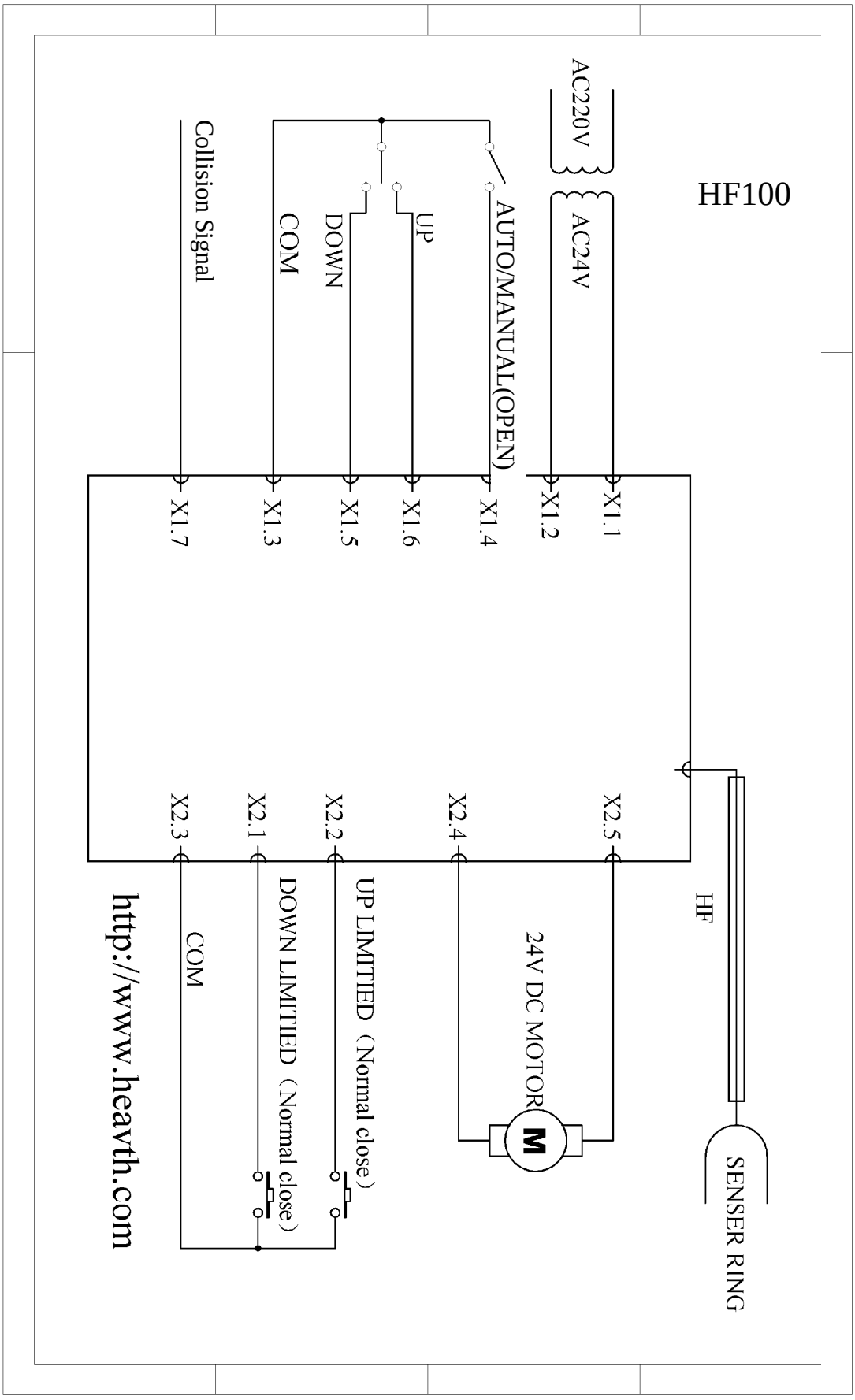
2. First, On Manual mode, lift torch up over 20mm to steel plate.

3. Turn the SENSITIVITY and DISTANCE in the middle position.

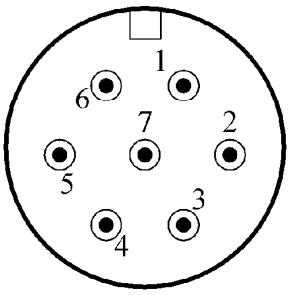
4. Press Auto Test button to turn Auto on, if torch lift down, means Auto Height is too low, then adjust HF ADJ clockwise to raise the auto height. If torch lift up, means Auto height is too high, turn anti-clockwise.

5. Configure the clearance distance and sensitivity.

5 DRAWINGS AND DIAGRAMS



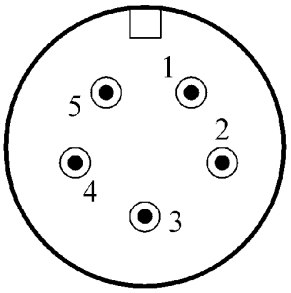
X1-TO CNC



1 — AC-24V
2 — AC-24V
3 — COM
4 — AUTO/MANUAL
5 — DOWN
6 — UP
7 —

Collision Signal

X2-TO TORCH



1 — DOWN LIMITED
2 — UP LIMITED
3 — COM
4 — MOTOR
5 — MOTOR