

ARCBRO®

THC-300-3 SERIES

Arc Voltage Plasma Torch Height Controller Manual – THC-300-3



Operator Manual

ARCBRO | Revision 2 | English

Date of issue: August, 2019

Preview

Thanks for choosing ARCBRO THC.

PTHC is our new generation of AVTHC, with follow new features,

1. Support Torch retaining cap IHS or Nozzle Contact (ohmic contact) IHS with any HF plasma.....Great anti-interference improvement.
2. PTHC has much higher accuracy than old XPTHCs, standard accuracy is 1V, Enough to support HD plasmas.

SAFETY:

- ❖ (Note:XPTHC-300-3 use AC24V or DC20-36V power supply !) Please read this manual fully before use XPTHC-300-PT.
- ❖ DO NOT open cabinet of THC unless trained technician.
- ❖ DO NOT adjust the sealed resister.
- ❖ Turn off Power supply when THC is unused.
- ❖ DO NOT put liquid on THC.
- ❖ Attention Anti-dust work, DO NOT let metal dust into THC.

Installation Note:

- ◆ XPTHC-300-3 power supply is AC24V or DC24V.
- ◆ GND Must follow THC instruction, GND resister $\leq 1\Omega$.
- ◆ UP/DOWN on THC must be same to Z-axis Lifter.
- ◆ To avoid interference, follow cables please use shield cable (Connection between CNC controller and THC, to motor, to voltage divider, to IHS card), especially the cable from THC to voltage divider, please use shield twisted pair cable, and shield net connected at THC side.

To Customer:

- ❖ We only supply to re-seller as CNC cutting machine manufacturer, engineering company... end-user please contact our local distributor for product supplying.
- ❖ We offer technical support to all distributors and users of our product.

IMPORTANT NOTE:

- ◆ All our THCs have been tested on CNC cutting machine in our workshop before delivery, all commissioning work was done. Please DO NOT change the setting without informing your supplier.

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1. Brief Intro

1.1 Product name and model

Arc voltage Torch height controller XPTHC-300-3

1.2 Application

XPTHC-300-3 supports almost all plasma cutters on market like Hypertherm, Thermal Dynamics...

And it supports all CNC cutting controllers on market like Hypertherm, Thermal Dynamics industrial level controllers or Mach3 such DIY controllers, because XPTHC-300-3 can start Auto Height control with or without Auto enable signal from CNC. But with Auto enable/disable signal from CNC, THC would work better.

1.3 Specification

- ❖ Power supply: AC24V \pm 10%, 50Hz/60Hz or DC24V \pm 10%, 18V~30V.
- ❖ Support Motor: DC24V motor.
- ❖ Drive mode: PWM.
- ❖ Output current: 1A-4A.
- ❖ Output Watt: 100W.
- ❖ Work temperature: -10 \sim 60 $^{\circ}$ C.
- ❖ Initial sense mode: Proximity switch IHS & Torch retaining cap IHS.
- ❖ Voltage divide ratio: 50:1.
- ❖ Accuracy: \pm 1V \sim \pm 2V,
- ❖ Lifter speed: 0.8m/min \sim 4 m/min (over 4m/min, Please contact supplier).
- ❖ Set arc voltage range: 30V \sim 250V.adjustable.

Test Max cutting speed: 24000mm/min (Related to customer's lifter voltage, speed and sensitive setting.)

1.4 Components

XPTHC-300-3 consists of follow parts.

1.4.1 Standard package

XPTHC-300-3standard package includes five parts: (Figure1-1)



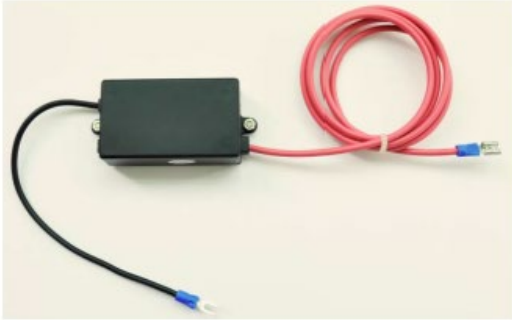
XPTHC-300-3 Control module*1



XPTHC-IHS controller*1



NPN-NO-2mm Proximity switch*1



HV retaining cap cable*1(Optional)

- A. XPTHC-300-3 control module: Installed somewhere easy for operation.
- B. PTHC-IHS: IHS controller: Installed on Lifter, easy for connection of retaining cap IHS cable and proximity switch.
- C. HV retaining cap cable: Red side installed on retaining cap or nozzle, black side connected IHS controller.
- D. Proximity switch: mode: HS-C12-N11, NPN, effective distance: 2mm.

1.5 Basic function and features

Auto Initial Height Sensing (IHS), Dual speed IHS

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When XPTHC-300-3 auto IHS , it use Dual speed IHS. It automatically calculates the fast-falling delay according to the rising delay set by the P8 parameter, then switch to slow down. After the positioning signal is detected, the torch will rise rapidly and finish IHS. Dual speed IHS can better protect the torch, and can improve the positioning accuracy. When the P8 parameter set less than 6 , Dual speed IHS cancel.

Proximity Switch HIS :

XPTHC-300-3 use NPN Proximity Switch , In normal operation, the switch is in contact. The proximity switch can be replaced with a contact switch also. In any state ,when the torch touch plate and when detection circuit action , XPTHC-300-3 will control the torch in IHS position. The distance between torch and plate , can be setting by "IHS HEIGHT" key. If the proximity switch in dis-contact state, THC will control torch rise up rapidly , until to up limit , in the same time will have collision signal. The proximity switch with anti-collision function.

Retaining cap IHS :

Use retaining cap IHS require plasma with metal retaining cap. During IHS process, according to torch touch plate triggering signal. After THC receiving the signal, will control torch rise up to IHS position. This function requires the user to choose when ordering.

Setting Arc volt and Actual Arc volt monitoring function:

Before arc start, the display shows set arc.

After send arc start signal and detected the arc signal, display shows Actual volt according to pierce delay.

Complete cutting the torch lifting automatically:

When cnc controller closed cutting signal, THC will control the torch rise up time (P8 parameter setting), will protect torch when torch empty run.

Arc enable output (Pierce completed output):

Set Button "PERICING HEIGHT" set Pierce delay time, to delay output this signal. The signal is detected by detecting whether there has a arc signal, The output signal is the relay switch output . Output by CNC sockets PIN6 and PIN8. PIN8 is COM.

Automatically operation:

After CNC controller send start cutting signal, THC will finish HIS automatically----Arc start Detected.

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Arc---Pierce delay Pierce finished. After CNC controller received pierce finished signal, will control machine start cutting until cutting end.

Torch Anti-Collision Function :

We designed Touch-Up circuit for Anti-Collision Function. No matter it is on Auto Control Model or Manual Control Model, when torch head touches the workpiece, THC would automatically lift torch up to IHS height. So with XPTHC-300-3 even in Manual Control Mode, user no needs to worry about torch head crashing.

1.6 Work process

1.6.1 Work process with IHS

Automatic work flow:

When CNC send out Arc Start Signal(IHSARCON), THC starts with IHS, then send Arc Start Signal to plasma, after plasma start, THC delay lead in arc voltage from plasma(set pierce delay time), THC send Arc Feedback(arc ok) Signal to CNC to start Cut after arc voltage lead in. If THC is on Auto Model, and CNC Auto Control enabled, then cutting is under THC Auto control.

1.6.2 Work without IHS

When CNC send out Arc Start Signal (EXARCON), THC starts without IHS, lifts torch to the set height (set via button SET-IHS), then send Arc Start Signal to plasma, after plasma start, THC delay lead in arc voltage from plasma (set pierce delay time), THC send Arc Feedback(arc ok) Signal to CNC to start Cut after arc voltage lead in. If THC is on Auto Model, and CNC Auto Control enabled, then cutting is under THC Auto control.

Generally we don't suggest customer use work without IHS!!!

1.7 Installation

XPTHC-300-3 installation as Figure 1.3

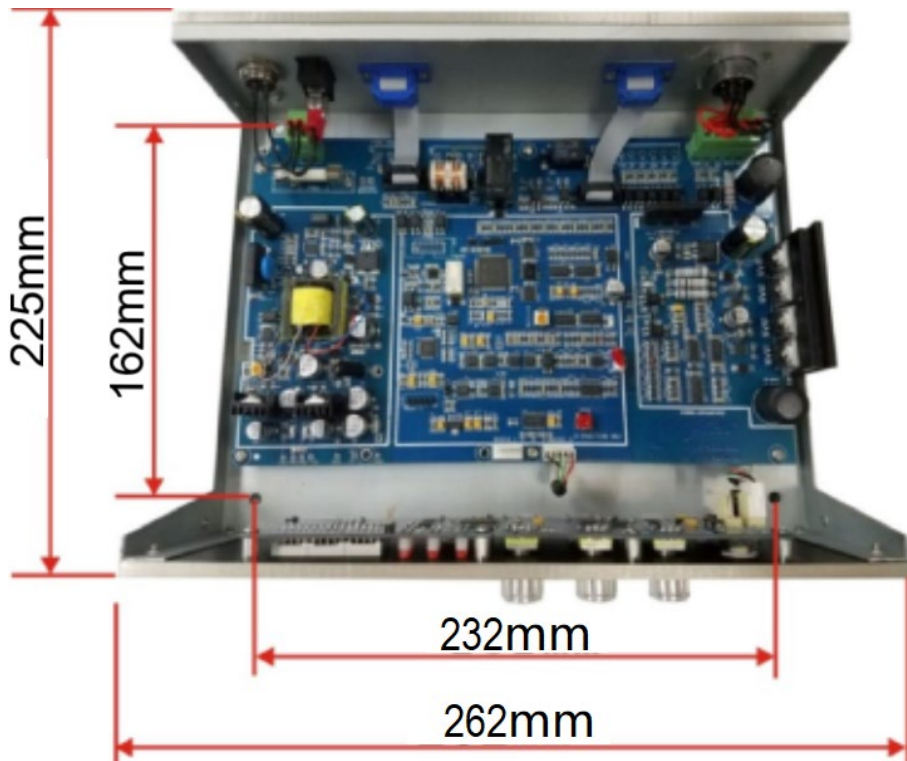
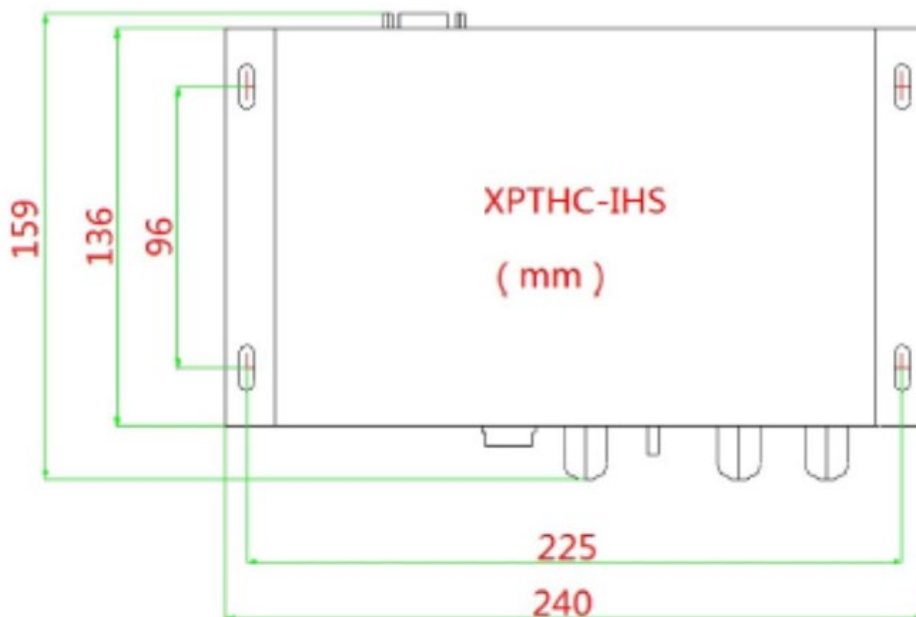


Figure 1-3 XPTHC-300-3 installation

PTHC-IHS IHS controller installation as Figure 1-4:



2. XPTHC-300-3 Function and Setting

2.1 XPTHC-300-3 operation panel

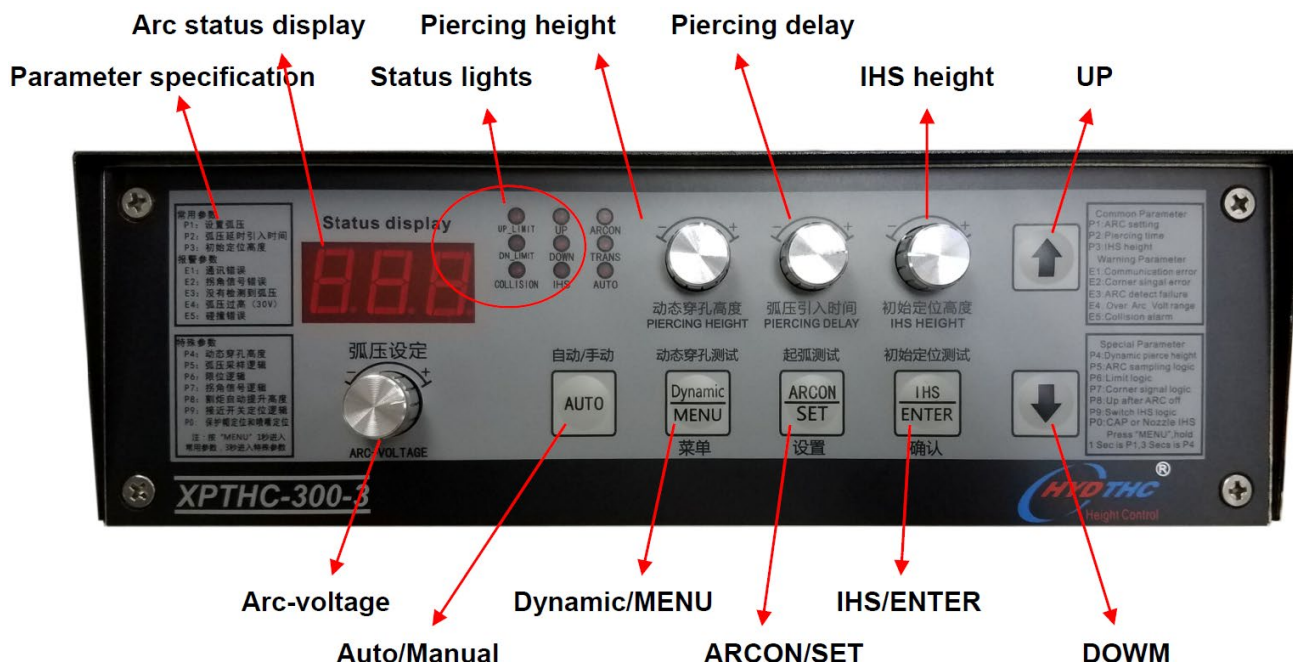


Figure 2-1 Operation panel

Arc Voltage Status display:

Before Arc Start it shows the Set Arc Voltage, after it shows the Actual Arc Voltage.

Adjust Buttons:

Set Arc Voltage:

Based on the thickness of steel plate being cut and cutting speed, it shall be set according to the parameter offered by Plasma, and it will be showed on operation panel. Set Arc Voltage decides the distance between Torch and workpiece during cutting, the higher the arc is, the higher the Torch Height will be. On Auto mode, adjust the Set Voltage means adjusting the Torch Height.

Arc and status display:

For display the specifics and the status of the THC. before the arc start It display the set arc , after arc start piercing delay process and detected the real arc, it will change to display the actual arc.

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IHS HEIGHT:

Set Initial Height, turn clockwise, the height increases. The default value is 20, which is 10 milliseconds per unit, or 0.01 seconds, with a maximum of 99.

PIERCING DELAY:

100 milliseconds per unit, or 0.1 seconds, the default is 10, that is, 1 second. The maximum value is 60, that is, 6 seconds. Set the Delay Time from Plasma Start to CNC starts cut (delay lead in arc voltage into THC), the Arc feedback (arc ok) signal would be sent to CNC only after arc voltage is detected by THC.

Advise:MAX200 set 30, HF plasma set 10, POWERMAX and Thermal Dynamics A series set less than 10. Below 2mm sheet set less than 5.

PIERCING HEIGHT:

In units of 10 milliseconds, or 0.01 seconds, the default value is 0, that is no dynamic perforation. The maximum value is 99.

This button use for setting after cutting. Dynamic piercing is suitable for more than 10mm

Keys:

IHS / Enter:

Normal state: Press one time, it would check IHS one time, which is used to check whether it is a workable IHS or not.

Parameter setting state: Parameter enter key.

AUTO:

Set THC Auto or Manual mode. Meanwhile enables the Auto Signal between connectors of CNC and THC.

Dynamic / MENU:

Stoped state: Dynamic piercing test key, use for test piercing height .

Parameter setting state: Still press Menu for 2 secs



Three digital display boxes showing P1, P2, and P3.

Still press for 4 secs, setting special parameter:



Seven digital display boxes showing P4, P5, P6, P7, P8, P9, and P0.

In auto state, press this key can be set Arc voltage, it is use for check the set arc voltage and actual arc voltage error.

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ARCON / SET:

Have two test states:

1. Arcon test: In Stop state, press this key to arc start for plasma, after 3 secs it will be close.
2. Press 2 secs is effective, do IHS firstly, then arc start and change to actual arc voltage. After 3 secs end.

UP / DOWN:

1. In Stop state use for control torch UP and DOWN movement.
2. In AUTO state use for change the arc voltage in the same time change the torch's height. Press once time will change 1V.

In parameter state, use for change parameter number and parameter value.

LED lights:

UP_LIMIT: Torch move to UP limit position the light will be ON.

DN_LIMIT: Torch move to down limit position the light will be ON.

Collision: When THC detected torch touch to workpiece, the light will be ON. The collision signal send by retaining cap or proximity switch. The THC get collision signal, will control torch move UP.

NOTE: IN IHS process, this light twinkle one time is normally.

UP: Turn on when torch lift up.

DOWN: Turn on when torch lift down.

IHS: Initial Height light. When THC in IHS process the light will be ON.

ARCON: Turn on when THC sends arc start signal out. If arc start with IHS enable, this indicator is off until IHS completed.

AUTO: On means THC is on Auto Mode, off means on manual mode. The lead on must the three conditions have to be completed: 1, CNC Auto Height Control (THC) enables; 2, THC is on Auto Model; 3, arc voltage has been lead in THC;

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TRANS: Turn on when THC receives arc feedback signal, and sent out Arc OK signal to CNC.

Note:

A. When THC on Auto Mode, the 5 indicators all should be ON, if anyone is OFF, that means Auto Mode failed, please check the reason according to indicators.

B. The indicators on Operation panel, demo THC from Torch down—Touch workpiece—arc start--arc feedback--Auto on, please check the failure reason from the one by one steps.

In Stop state, UP and DOWM key is usefully for control torch up and down movement. After arc start, press MENU use for monitor setting Arc voltage, press UP and DOWM use for change setting Arc voltage or Raw arc voltage. Can be enter into “parameter setting” in Stop state only.

Note: method to download the default specifics: press “AUTO” and “MENU” at the same time, then press “IHS”

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2.2 XPTHC-300-3 Parameter Setting and Alarm Diagnose

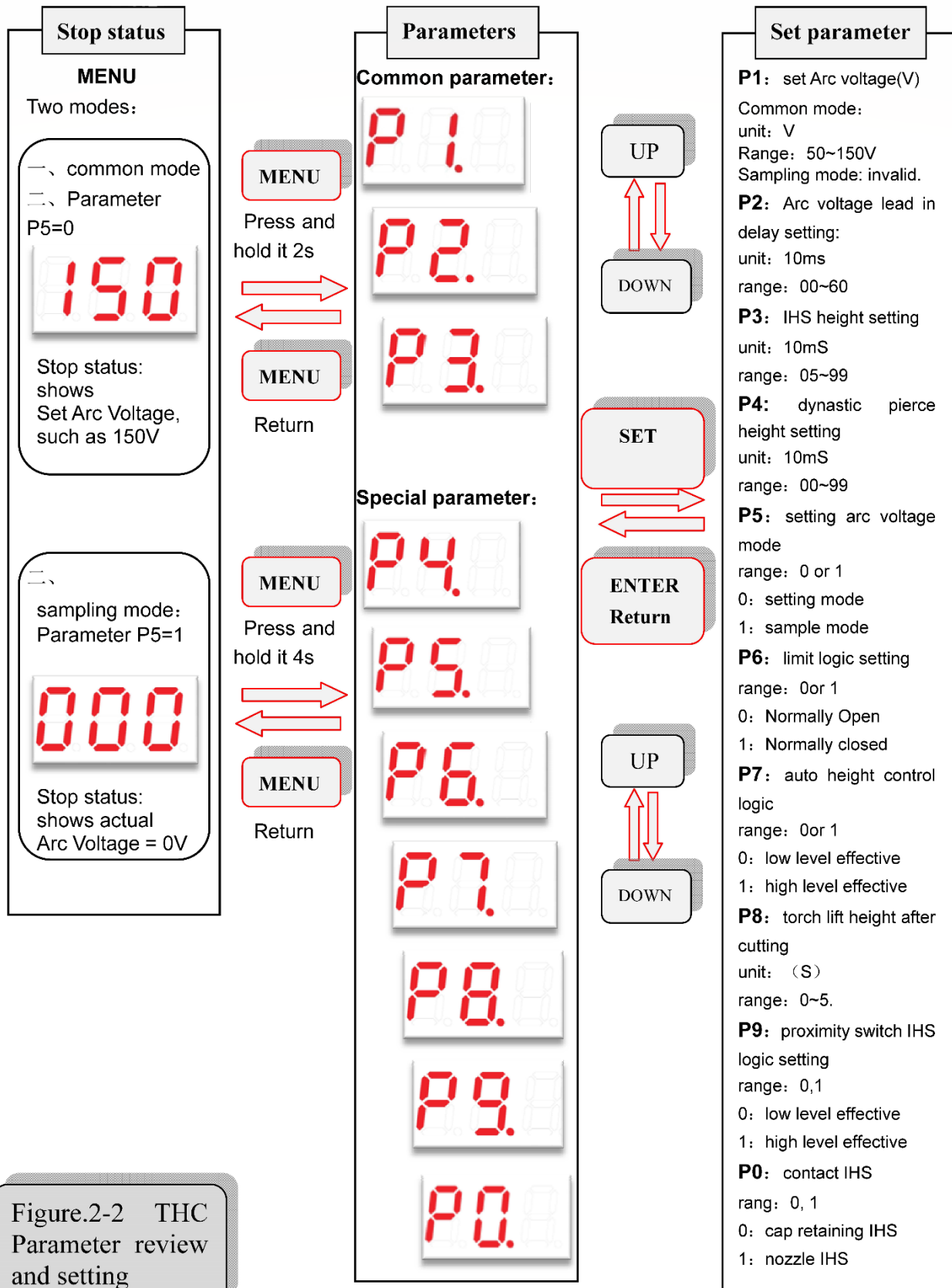


Figure.2-2 THC Parameter review and setting

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2.3 Parameters details

Common parameters					
Parameter No	Parameter Name	Default value	Unit	Range	Function and Description
P1	Set arc voltage	130	V	50~250	Set arc voltage mode effective. Set a arc voltage before cutting, it can be adjusted by "UP" or "DOWN" to change the setting arc voltage during cutting.
P2	Set lead in arc voltage	1	10mS	00~60	When THC sends the arc start signal to plasma, then will delay the lead in arc voltage to THC, thus will has the anti-interference function to THC. This parameter is also for dynastic pierce setting. It's set via the time of the Arc start to Arc ok. Such as if it needs 3s for the Arc start process, then it should be set to 30.
P3	Set IHS height	0.4	10mS	01~99	This IHS height can be get from the IHS test on the operation panel. It relates to the speed of the torch.
Special parameter					
P4	Dynamic pierce height	0	10mS	00~99	This height is for the plasma arc piercing's height, to protect the torch consumables.
P5	arc voltage sample logic	0		0,1	When set "0", the setting arc voltage by "P1" is for the cutting height during auto work. When set "1", via the CNC's corner signal, when the THC is opened the AUT function, and take the actual arc voltage as the cutting arc voltage during auto work. In this mode, it's required the CNC with high speed up to the setting speed to open the auto mode, this is the at the IHS height during cutting, it can be used for bevel cutting. During the cutting, it could be adjust the "UP" and "DOWN" to change the arc voltage sample, the cutting height won't b changed during the whole cutting work until loose Arc.

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P6	limit logic	0		0,1	0:limit Normally open;1:limit Normally closed. When the connection is not match to the "P6"parameter's setting, then the UP limit and Down limit LED light will be turned on.
P7	auto signal logic	0		0,1	0: corner logic close auto; 1: corner logic open auto. Note: This signal needs to be matched with CNC setting.
P8	torch lift height after cutting	1	S	0~5	Torch lift height after cutting Range:0~5s
P9	Proximity switch logic IHS0			0,1	0:low level effective,1: high level effective. If using the NPN(NO) proximity switch, the "P9" should be "1"; If using the NPN(NC) proximity switch, the "P9" should be "0" (NO: normally open; NC: normally closed.)
P0	Contact IHS	0		0, 1	0: cap retaining IHS, it should be '0'. 1: nozzle IHS, it should be '1'.

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2.4 Alarm codes details

Alarm code instruction			
Alarm code	Description	Alarm reason	Solution
E1	Communication error	The cables between the operation panel and the THC control module are with connection problem.	<ol style="list-style-type: none"> 1. Connect the cables well again, checking the if it's poor contact or not; 2. Checking the wiring connection if correct or not; 3. Circuit board fault; 4. Will be solved after correct connection.
E2	Corner signal Problem	Check the connection and set of Corner signal if correct or not. If incorrect, it will be with "E2" alarm when arc start or IHS.	Change the CNC auto/corner signal logic. If it couldn't be changed from CNC, then please change the "P7" parameter on THC. It'll be solved when set correct at the Stop work status.
E3	Not detected the Arc voltage	Don't detect the arc voltage signal from voltage divider during cutting.	<ol style="list-style-type: none"> 1. Check the connection between the voltage divider to Plasma. 2. Check the connection between the Voltage divider to THC. 3. When E3 alarm after 3S, the torch will lift to the setting height, and cut off the arc start automatically. 4. It'll be solved when the signal is correct at the stop-work status.
E4	Over-voltage protection	The actual arc voltage is over 50V than the setting arc voltage during cutting	<ol style="list-style-type: none"> 1. Setting arc voltage is too low. 2. The Dynastic pierce height is too high, please decrease "P4" parameter value. 3. The auto signal is send from CNC to THC too early. 4. Plasma problem, plasma consumables etc. 5. It'll be solved after the arc voltage is normal. It doesn't affect the cutting, but it'll turn off the AUTO status.
E5	Collision warning	If the proximity switch is active before cutting or during cutting, it means there's collision, if over 0.2s will have the E5 alarm. Meanwhile send out the collision signal to CNC.	<ol style="list-style-type: none"> 1. Checking the Micro switch and its connection. 2. Proximity switch problem, change a new one. 3. It must press the "MENU" button to cancel the "E5" alarm after all are checked ok.

2.5 XPTHC-300-3 Sensitivity and Motor Plug-Braking Setting

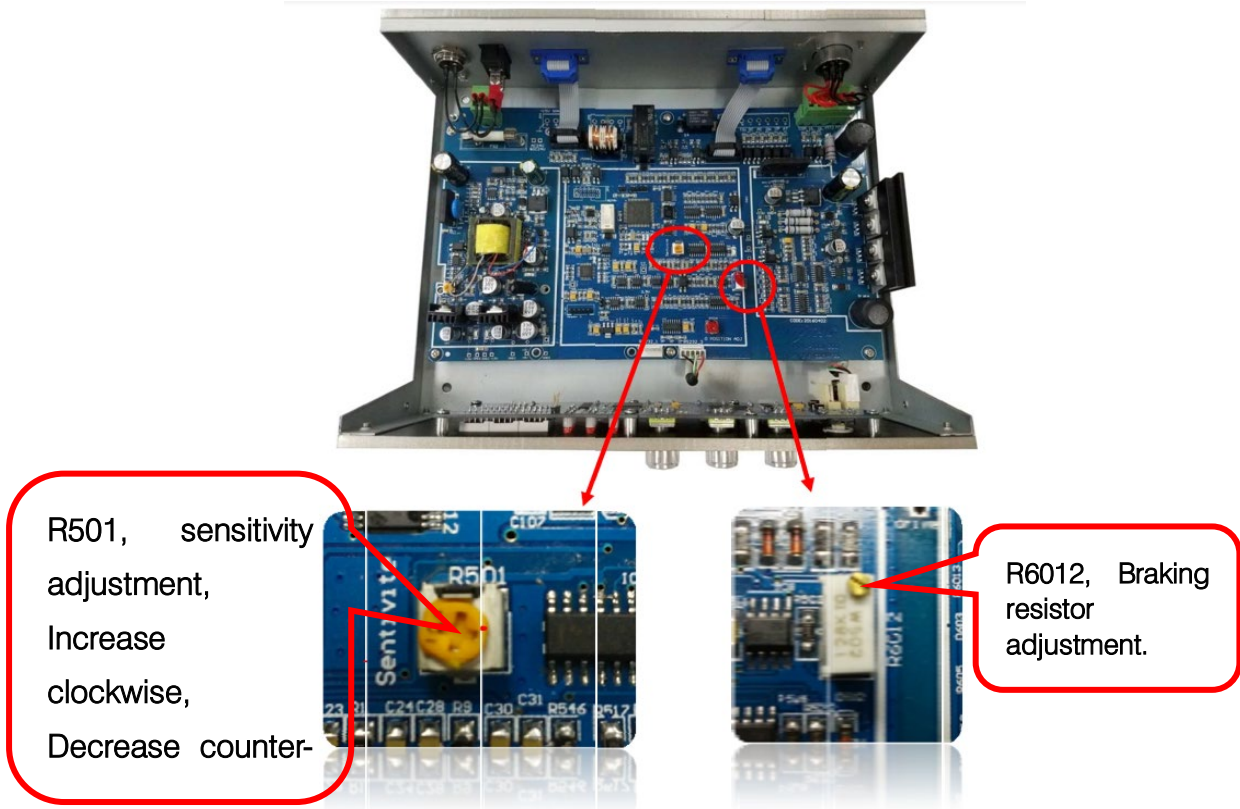


Figure 2-3

The sensitivity of XPTHC-300-PT can adjust by resistor R501, the location as Figure.3-3

The sensitive of THC decides the cutting accuracy. As the difference of torch lifter design and speed, it needs to adjust the THC sensitive for different lifters. Sensitive increases on clockwise, decrease on counter-clockwise.

Note: If sensitive is too high, torch would shake, so please test it carefully.

Sensitive should be set according to the difference between Actual Arc and Set Arc, the difference is ok when it is around 1-3V, if over 3V, the sensitive needs to be increased.

Sensitive matters to the quality of lifter. If the motor can lift torch up/down on below 3V start voltage, then .it is a suitable lifter for XPTHC-300-3.

XPTHC-300-3 adopts reverse connection brake to achieve brake quickly, by adjusting the resistor R6012 on PCB board at suitable range.

As Figure2-3, the reverse connection brake has been checked before delivery, usually no need to adjust. But as device aging, stability after working a period, will cause brake deviation, users can adjust accordingly.

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3. XPTHC-300-3 interface connectors

XPTHC-300-3 in plasma cutting mode, the connect show as follow:

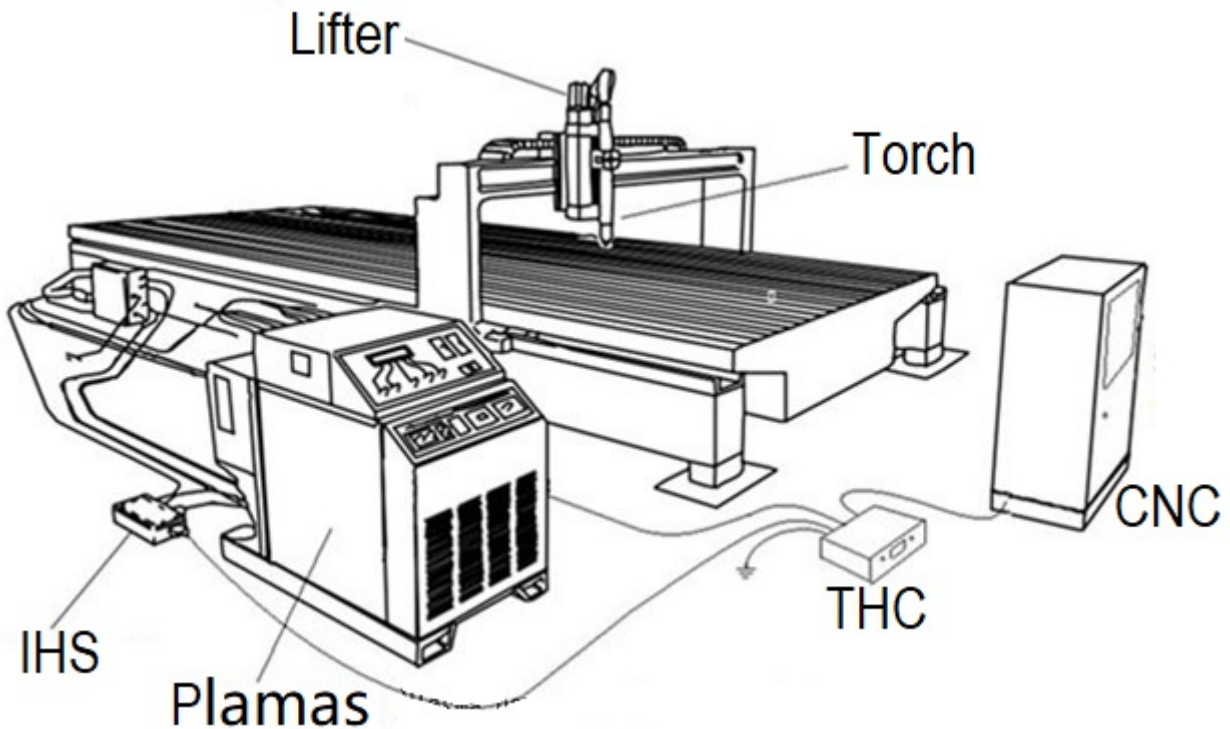


Figure 3-1

XPTHC-300-3 THC module interface connectors:

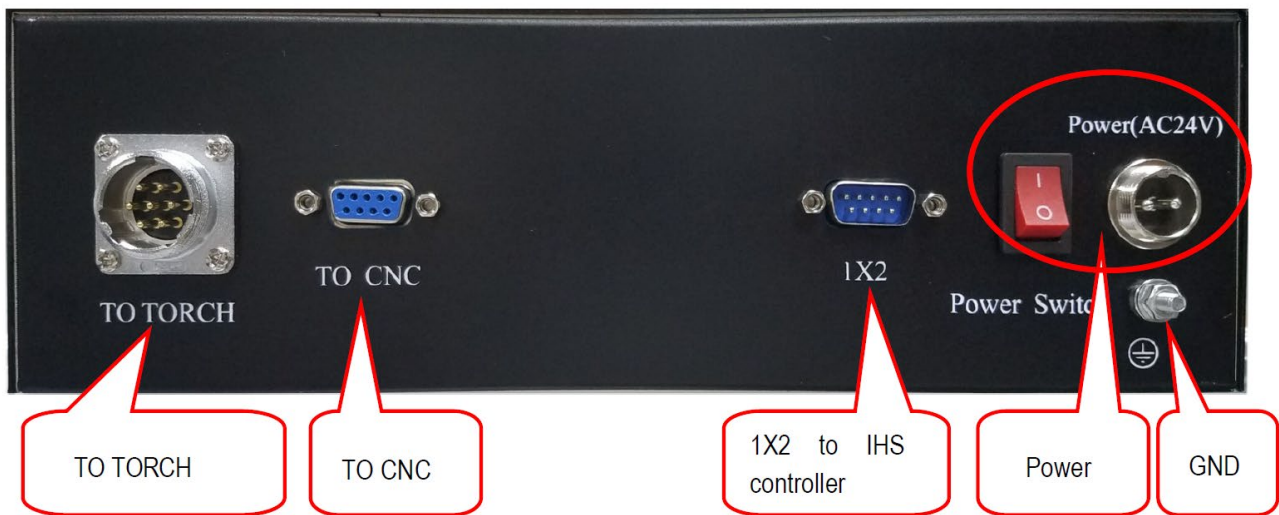


Figure 3-2 XPTHC-300-3

Note: XPTHC-300-3 input power support both AC24V and DC24V.

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3.1 Power

XPTHC-300-3 supports DC24V and AC24V power supply both, But we suggest DC24V would be better. Connected to THC via Φ16 socket, as right picture shows,



24V power depends on DC24v motor's watt, formula as follow:

$$\text{Power supply} \geq 2 * \text{Motor Watt} + 25W$$

Please offer separate power supply for THC, and THC cabinet must be grounded.

3.2 Lifter interface (TO TORCH)

Torch connector uses 7-pin socket to connect with motor, showed as follow:

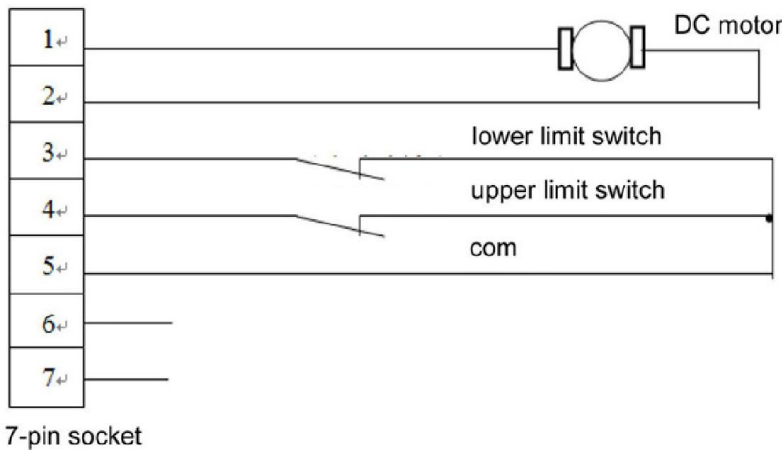


Figure 3-3 TO TORCH

TO TORCH interface:

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

3.3 Interface to CNC controller I/O (TO CNC)

XPTHC-300-3 connects to CNC via DB9, as Figure 2-6,

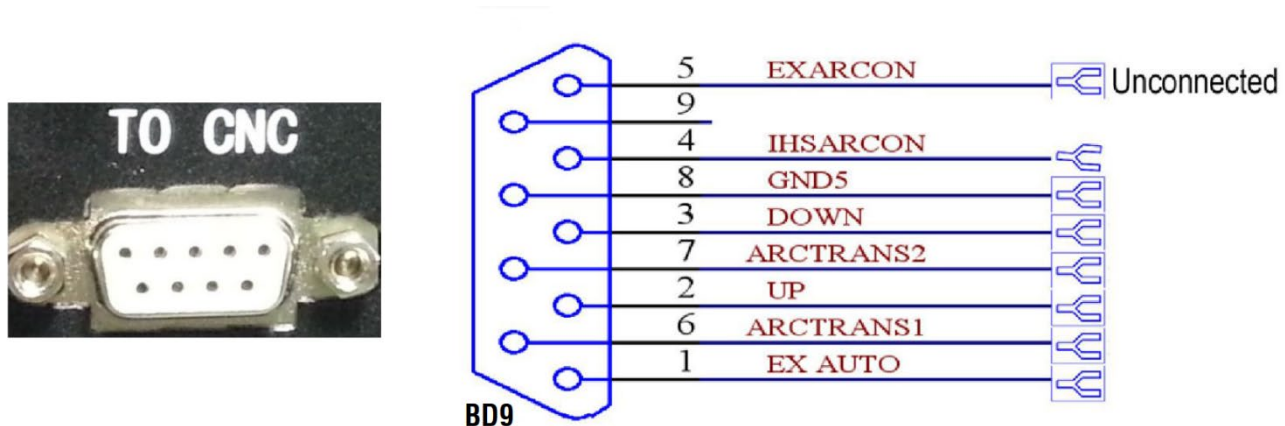


Figure 3-5 XPTHC-300-3

Note:

- ❖ All communication with CNC is isolated, original set is Low Level effective.
- ❖ Arc OK signal (ARCTRANS1, ARCTRANS2) is a switch signal.

TO CNC Pin definition as follow:

Pin(s)	Signal	Description
1	AUTO	Auto signal, low-level effective, Controlled by CNC's corner signal or THC enable signal, pin8 is control Com
2	UP	Up signal, low-level effective pin8 is control Com
3	DOWN	Down signal, low-level effective pin8 is control Com
4	ARC ON with IHS	Arc start with IHS, low-level effective pin8 is control Com
5	EX ARC ON	Arc start without IHS, low-level effective pin8 is control Com
6,7	Arc ok signal RELAY OUT	Connect to CNC's arc feedback signal input Relay output
8	Control COM	Isolation control COM
9	Collision output	Optical isolation, OC door output, Max :200mA

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3.4 XPTHC-IHS controller connector (1X2)

There has a XPTHC-IHS controller in XPTHC-300-3 package, it can be compatible with old XPTHC-200 and XPTHC-300II. XPTHC-IHS integrated with retaining cap IHS, proximity switch IHS and isolation voltage divide output functions.

3.4.1 IHS SELECT

XPTHC-IHS support proximity switch IHS and retaining cap IHS.

Retaining cap IHS and proximity switch IHS can be used at the same time. if anyone of them detected signal will be complete IHS process. Generally, retaining cap IHS will complete the IHS process firstly, but if the workpiece oxidation or has a protective layer of insulation, then retaining cap IHS is noneffective.

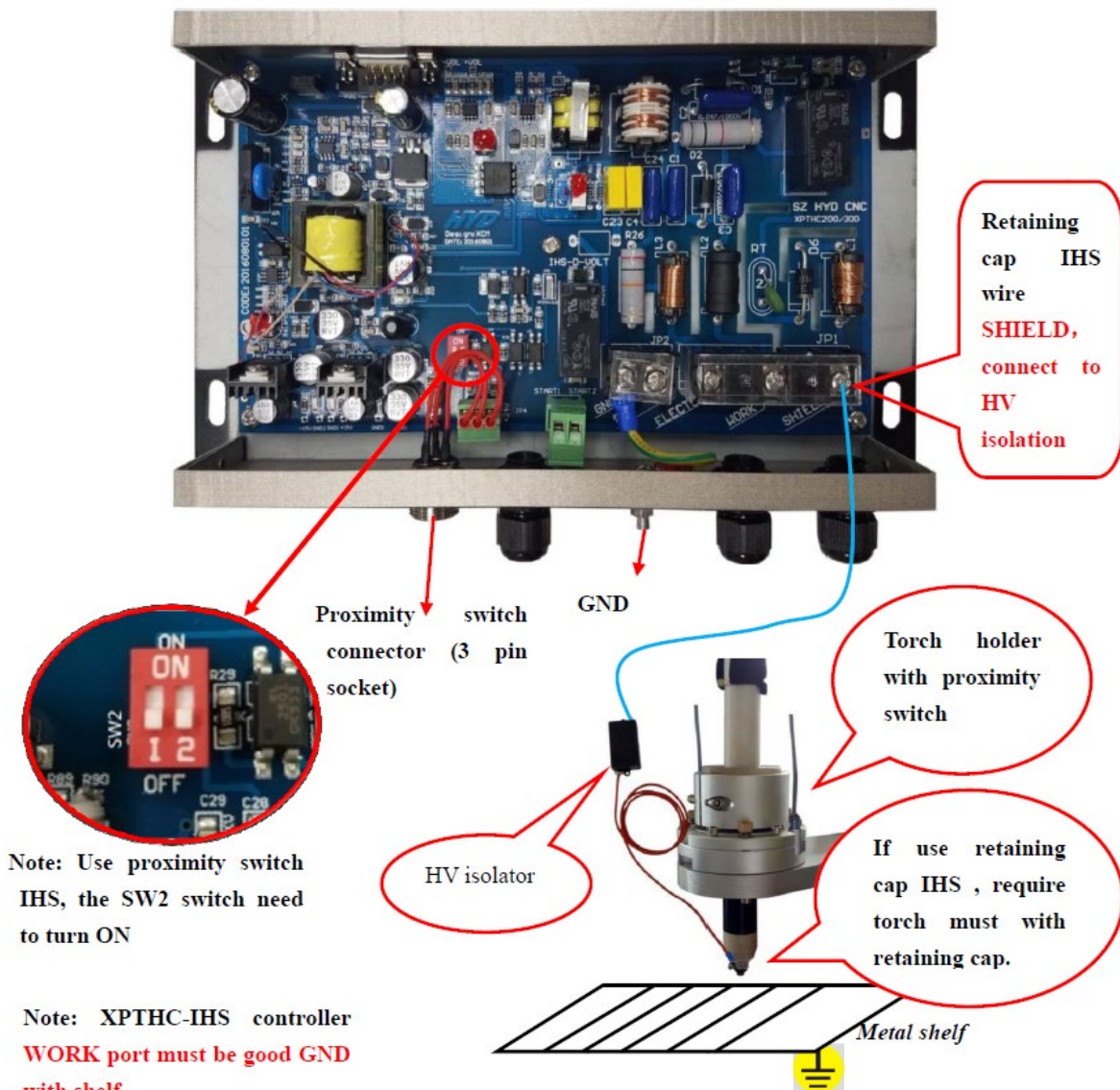


Figure 3-3 IHS

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Note:

- A. Please connect cable to retaining cap by SHIELD hole.
- B. The GND must be grounded and the cable cross-section > 4mm².
- C. It must use High voltage retaining cap IHS cable if use Ohmic contact IHS.

Cap retaining working process:

THC receives arc start signal from CNC, lift torch down, when torch retaining cap touches steel, THC lift torch up to set IHS height. After IHS, THC control plasma to start arc.

XPTHC-300-3 is recommended proximity switch IHS, which can do IHS and anti-collision function job both.

If SW2 ON means both retaining cap IHS and proximity switch IHS workable, anyone of it can complete IHS process.

If SW2 ON, but proximity switch not connected, torch would keep lifting up, so it should turn SW2 OFF or short the IHS controller's Signal and COM.

Pin(s)	Signal	Description
1	COM	Proximity switch power negative
2	Signal	Proximity switch signal
3	+15V	Proximity switch power positive

When adopts proximity switch, must make two switches SW2 on in IHS box, then proximity switch is available. As XPTHC-IHS box can only receive NPN close signal.

To IHS more accurate and stable, can use two Proximity switches connected as Figure4-4 shows, any one of them effective, THC can receive this signal.

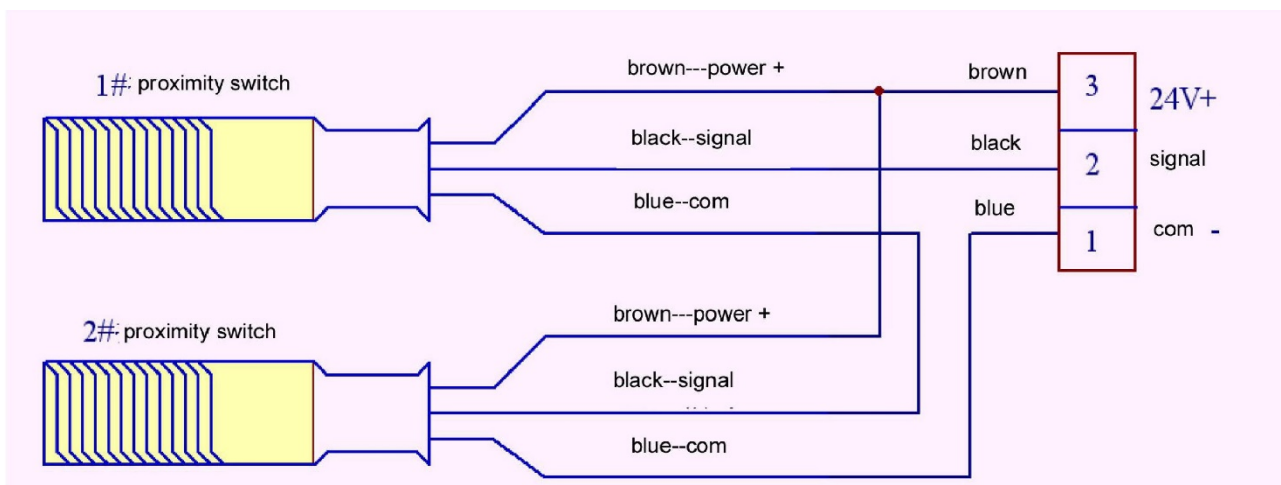


Figure 3-4

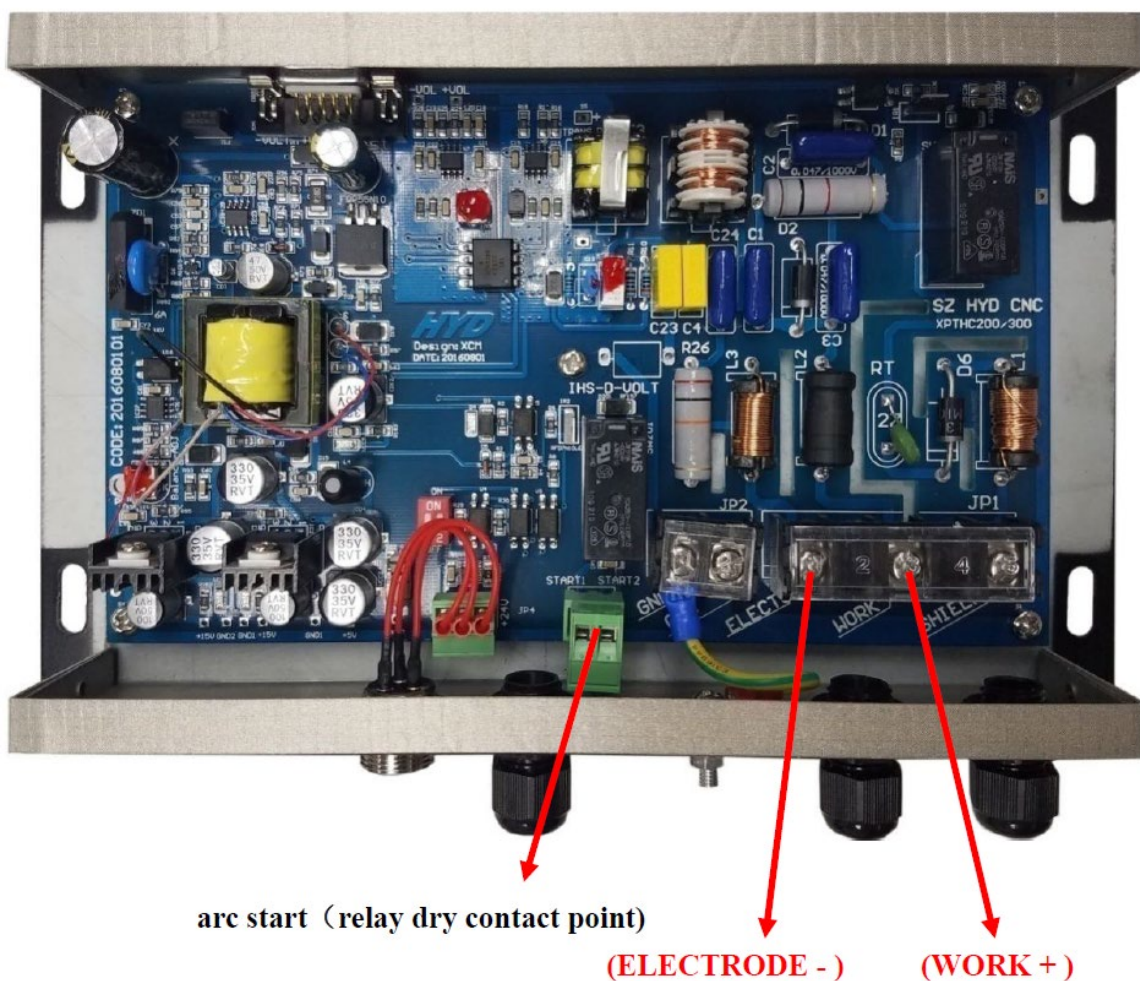
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Work Process: Once THC received Arc Start signal from CNC, torch moves down, when it reaches workpiece, Proximity Switch leaves proximity position, THC receive. This signal, lifts torch to the set height, (Proximity Switch recovers during lifting). After IHS, THC drives plasma Start Arc.

3.4.2 Isolation voltage divide

Arc voltage THC controls the torch height by receiving the plasma arc voltage. The voltage between electrode and workpiece is plasma arc voltage, the absolute value is over 100V in commonly, as voltage is high, it must be divided, then enter into control circuit.

Plasma Arc Voltage is divided by Voltage Divider (offered with THC) on 50:1 via none isolate voltage divide, lead into THC after processed by Isolation Circuit. Arc voltage has little effect on THC after Isolation Circuit.



arc start (relay dry contact point)

(ELECTRODE -)

(WORK +)

Note:

1. The arc lead in THC is negative, if the pole mis-connected, the arc will shows 250V and with E4 alarm, THC can not work.
2. For China HF plasma, the Actual arc output should be connected at plasma's rectifier output, not connect directly to Electrode and Work where have serious HF interference during arc starting time.

4. XPTHC-300-3 Wiring diagram

4.1 Wiring diagram

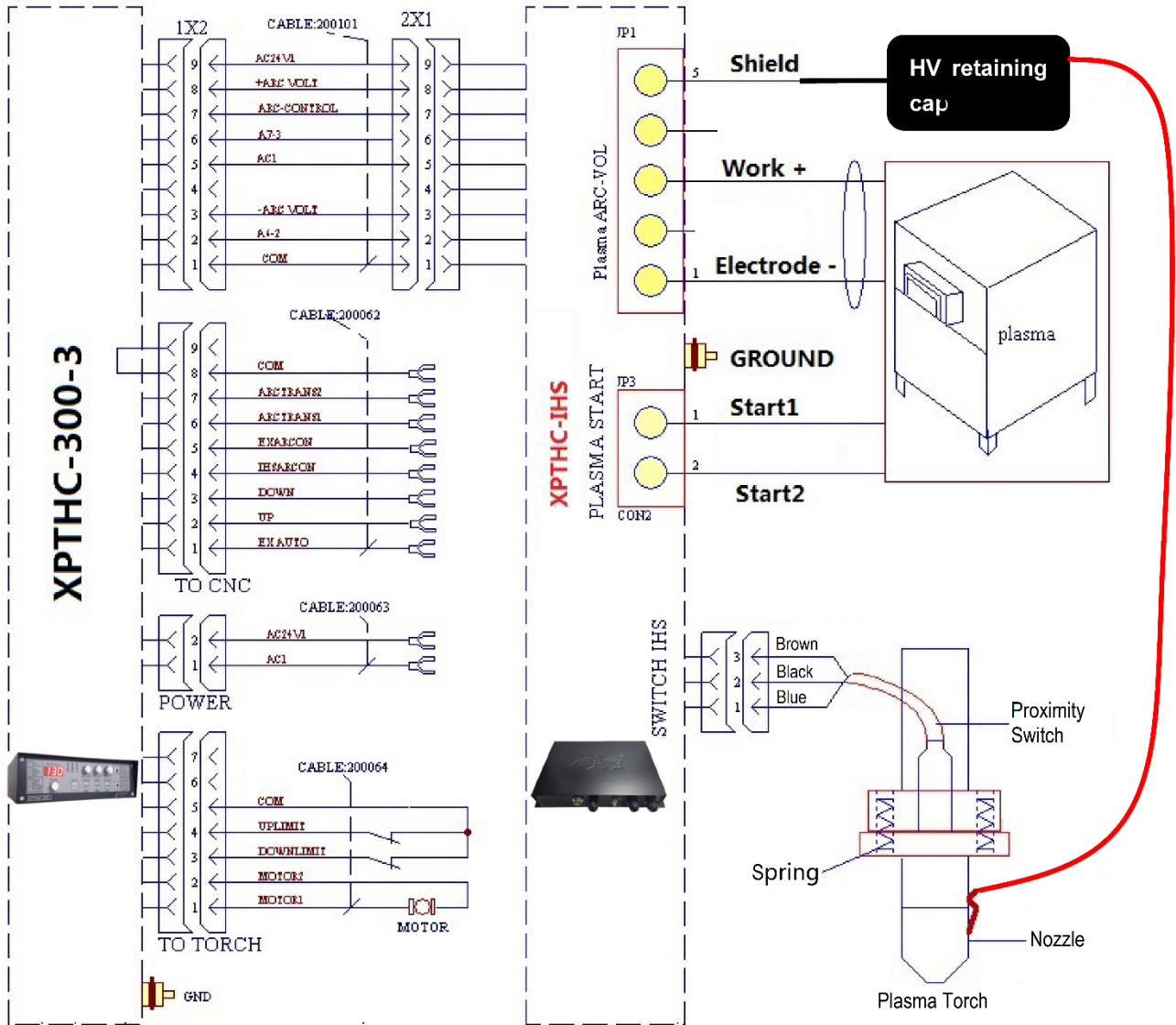


Figure 4-1 XPTHC-300-3 wiring diagram

5. Trouble and advise

5.1 Common troubles

Item	Problem	Reason	Solve solution
1	LED screen no value, blank screen	Multimeter has no voltage +5V	Check +5V VCC5
2	Motor can't rotate or rotate to one direction (limit is normal)	1. driver IR2104 damaged	1. Change IR2104
		2. driver voltage +15V, trouble	check the driver voltage VCC4
		3. over current protection	D606 ↔ D609 (IRPF250) may damaged, or maybe mechanical stuck
3	When power on, the torch always up (NPN type switch IHS)	1. proximity switch installation problem, is open status.	make sure proximity switch installation ok
		2. proximity switch is damaged	Change proximity switch (detection distance 2mm, NPN normally open)
4	Can't start arc after IHS	1. proximity switch is damaged, no signal return	Change proximity switch
		2. IHS time is too short, no signal return	Extend the IHS time
5	Arc voltage not stable	1. Check GND 2. Check if there plasma power source cooling water leakage 3. Sensitivity value is large	
6	Machine moves before pierce finishing	SET-PIERE set time is short	1. extend SET-PIERCE time 2. adopts arc feedback signal from plasma
7	Torch fire before IHS finishing	Adopts EXARCON, CNC IHS time too short	1. extend CNC IHS time 2. circuit fault
8	Torch can't fire	1. Make sure the plasma work status is normal. 2. Check the height of pierce is proper. 3. Check torch consumable. 4. Retaining cap IHS, there is iron dross in electrode and nozzle, cause short connect.	

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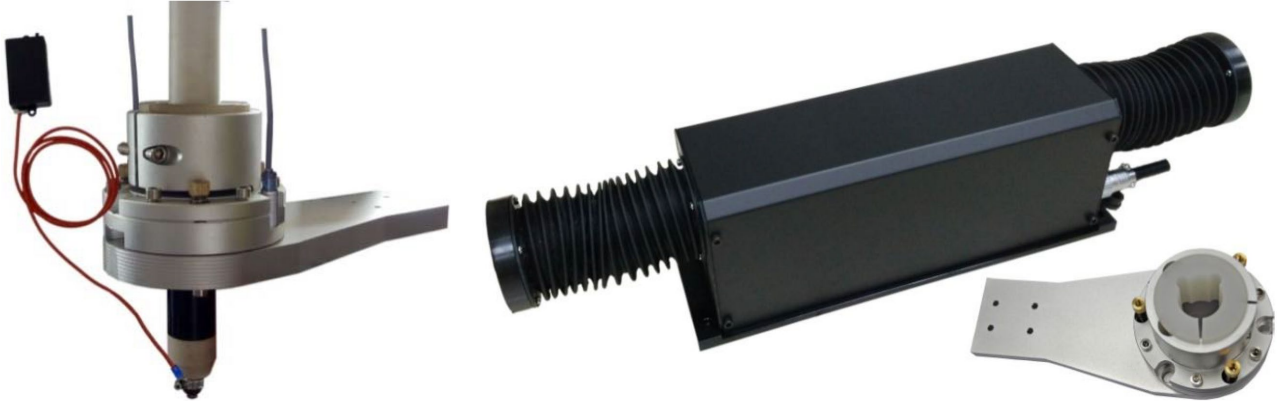
9	Torch please arc can't go to workpiece	1. check plasma cable connection. 2. check if there plasma consumable is damaged.
10	Torch moves before pierce finishing	1. Extend the pierce time in CNC. 2. extend SET-PIERCE time.
11	CNC starts moving, torch down at once	1. extend set arc voltage value. 2. delay auto time in CNC check the corner signal or auto signal in CNC
12	Plasma arc die out after pierce	Extend setting time (before machine moves, plasma arc will die out if wait for much time after torch pierce, it often happens when cutting thin metal)
13	When IHS, torch touch metal not up	1. IHS time too short 2. induction cable connect to retaining cap not well circuit fault
14	Torch metal and always down, don't start arc	1. induction cable connect to retaining cap not well 2. proximity switch is damaged THC sample signal open circuit or connection not good
15	Torch shaking, not stable	Sensitivity too large, please reduce it refer to 3.5 circuit fault
16	THC auto follow too slow	Sensitivity too low, please increase it refer to 3.5
17	Arc break in cutting, arc enable continue to output, machine don't stop	As THC detects the arc voltage signal, there still actual voltage after arc break, THC consider plasma is working. Solve solution: adopts plasma arc feedback signal.

5.2 Some advise:

1. When Torch Retaining Cap IHS adopted, we suggest customers use Anti-Collision Fixture to fix cutting torch and lifter and connected it with Torch Retaining Cap. In practice, when the contact between Retaining Cap and workpiece is weak (especially the workpiece is Rusty or Dirty steel plate,) Proximity Switch IHS takes effect; it is more effective to protect cutting torch. If Torch Retaining Cap IHS and Proximity Switch IHS both installed, both will be active during cutting.
2. When use Torch Retaining Cap function, IHS controller must be connect well .
3. When it is using proximity switch function, we suggest try some more proximity switches, and all switched by external circuit, install as Figure 3.4.1.
4. When the CNC can not receive the Arc Start Enable signal, it should use Time-Delay to run the CNC. In other word, after CNC sent Arc Start signal, delay the CNC Running.

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5. THC cable connected with motor must be shield cable, and must be away from plasma cable, to avoid lead in high voltage of Pilot Arc into THC control circuit.
6. When use HF plasma . The actual arc pressure sampling position, please connect the position of the plasma rectifier output (attached the Note of HF plasma as reference).



Note for HF Plasma:

1. Cable from THC to lifter motor should be shield cable, shield net connected to the socket.
2. THC'S cables must be installed over 50mm away from plasma torch's cable. So is CNC's cable to avoid HF interference from HF pilot arc.
3. The cable in and out of voltage divider must be shield cable, it should be 2 cables connected to 4 PIN SOCKET(To Plasma), separate the plasma arc start cable and arc voltage output of voltage divider.