PTHC-II
Operation Manual



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ATTN: Before Using PTHC-Ⅱ,read the Operation manual detailly, especial Power Supply

Ⅰ、Summarize

PTHC-II plasma arc voltage height controller is equipped with constant current plasma . During cutting course, the current always equals the given current. And the cutting arc voltage will be changed with the fixed speed being the height of torch changing. When the distance gets farther, the arc voltage increases; On opposite, the arc voltage will decrease. PTHC-II plasma arc voltage height controller will inspect the voltage change, then control the distance between cutting torch and material via the lift motor. So that the arc voltage is fixed, the same is the height of cutting torch.

Generally, the instruction will list all the cutting parameters for some type of plasma. The user can refer to these parameters. Adjust the voltage in arc voltage height controller to match the selected current. The torch height will keep constant under regular speed. In fact, the user should set the arc voltage according to the height of the cutting torch.

In the status of automation , the arc voltage more high, then the height of the cutting torch more high

The appendix lists the plasma cutting parameters about some American HYPERTHERM plasma . Please refer to the instruction of plasma category to get more details.

In fact, the arc voltage height controller should have more assistant functions if it come true completely automatic cutting, the concept of the basic function as below.

A、 ARC-ON&ARC-OFF

ARC-ON is the act process that the plasma gets from static state to cutting. Contrarily, the ARC-OFF is. There are 2 types of ARC-ON. One is High Frequency input Arc style. The other is Touch input Arc style.。

At the moment that the high frequency input arc plasma produce the arc voltage. The high frequency voltage between electrode of plasma torch and nozzle will discharge, and then produce the plasma transferring arc. So the high frequency input arc plasma has prodigious interfere at the moment when producing the arc voltage. High Frequency input Arc is equipped in all Chinese plasma power and foreign plasma power (above 100A).

The electrode is closed to the nozzle before the touch input arc plasma producing the arc voltage. When starting, plus lower voltage. The plasma gas will unhinge the electrode from the nozzle being short circuit exists between the electrode and the nozzle. And then produce the electric arc; the plasma arc comes out in further. HYPERTHERM POWERMAX series plasma power is equipped the touch input arc. Touch Leading Arc has no high frequency voltage, so it has a little interference

B、 IHS

Before Arc-On, the cutting torch should move up to a height above the material. This process is IHS. If it is carried out automatically, we call it Automatic IHS.

The mode of Automatic IHS has itself character for each arc voltage height controller. Here are some of modes for your reference

1、The Inductive Proximity switch inspecting style via gas cylinder drived;

2、The Inductive Proximity switch directly inspecting style;

3、Plasma Shield protector IHS inspecting style;

Lift motor current inspecting style;

C、ARC transfer and Pierce transfer

ARC transfer: Arc-on signal is sent out after Plasma Arc-On bringing the transferring arc. The NC system will receive this signal. The NC system will run when the setup piercing time is up.

Pierce transfer: Setup the Piercing time. The NC system will run the cutting action after receiving the signal.

Ⅱ、Function and Characteristic

The persons who developed PTHC-II arc voltage height controller have many years' experience in developing and using. They sum up all the characteristics of Arc voltage height controllers which are made in China and Overseas.

1、PTHC-Ⅱ takes the high capability microprocessor as the core. Use of big screen chart and character LCD; American AD company high voltage isolating amplifier; PWM control transfer.

2、Divided voltage ratio matching input:

PTHC-Ⅱ will inspect the input voltage with divided voltage ratio 100:1。We will provide the isolated divided voltage controller ratio 100:1 when buying this product. At the meantime, an isolated divided voltage controller is assembled in the controller to isolate the Two times.

If the plasma controller has the divided voltage controller, the height controller can adjust the inner parameters to match it.

3、The Given Arc voltage and actual Voltage Shown together:

The give arc voltage can be adjusted on the control board as per the actual parameter. The actual voltage will be shown automatically after Arc-on, and kept on dynamic tracking status. On automatically, the error between Actual arc voltage and given arc voltage should be in the range of accuracy.

4、Simple parameter setup interface, big screen chart and character LCD display.

PTHC-II 4 keys setup parameter as below,

MEMU

ENTER

FUP

FDOWN

5、Skipping over the NC system , you can also process the Arc voltage height controlling simulating operation. The steps as below,

ARC TEST ：

IHS TEST

TORCH UP ↑

TORCH DN ↓

AUTO-HAND: during the auto-cutting, please operate this switch from "auto allow" to "auto forbid" if the auto adjusting height need to be cancelled.

6 、Manifold IHS style:

The IHS style as below:

A、The Inductive Proximity Switch style：Adopting this mode, user should design the tongs according the CAD drawing which is provided by our company. This mode is suitable for under-water cutting and all plasma IHS (above-water and under-water cutting). Especially the High frequency lead arc plasma and under-water cutting;

B、Plasma Shield protector IHS style：It is suitable for above-water cutting. The height controller will receive the signal after the protector touching to the material, and then control the torch height up to the given height. This mode is suitable for the touch input arc plasma of HYPPERM POWERMAX series. It is also used on high frequency input arc plasma via the external special orientation board.

C、Lift motor current inspecting style：The cutting torch should be fixed and irremovable if use this mode. During IHS, the torch touches to the material, the motor will be stopped. If so, the current of lift motor is more. The microprocessor inspects the current, The cutting touch will lift up to the given height of IHS .if the current exceeds the set value. This mode has no the crashworthy function during the cutting.

7、Plasma cutting torch crashworthy function

This function should work with the plasma cutting torch that the protector contacts the transducer. When the cutting torch touches to the material, the height controller will lift up the cutting torch fast and immediately to protect the torch. When using the switch IHS style, the switch is being ON status if the cutting torch touches to the material. So the controller will drive the cutting torch lift up fast and immediately. The protecting function is available.

8、Arc voltage auto-adjusted function:

User can setup this function available or not. When the wastage of the nozzle is rather heavy , the arc voltage will get higher. It is easy to make the cutting torch hit the working piece, so that the cutting torch and the material are all damaged. If setup the Arc voltage auto-adjust function, the given voltage will get higher automatically when the cutting torch touches to the material. It is valid to avoid loss. And please change the nozzle and electrode after finishing the working piece currently. If the arc voltage is rarely low lead to the cutting torch touch the material. The given arc voltage also will rise up. And then make the cutting torch run normally at last.

9、There are 19pcs adjustable parameter in the inner. They can match different plasma power and Mechanism charge.

10、Function module aviation socket

There are 6 pcs aviation sockets on the back of the height controller. The controller will pre-assemble all the functions well. The user can choose the appropriate connection by drawing subject to their need.

11、Two ways of machine running transfer. (Setup via parameter)

This controller can be setup via parameters. It can transfer both the Arc-on Signal and pierce signal. But they are alternative only

12、According the plasma current intensity, choose the relevant arc voltage accuracy. The adjustable range of arc voltage accuracy should be ±1V~±5V.

Ⅲ、Technical parameter

- Working voltage: AC/DC24+5%，50Hz/60Hz， Please prepare a isolated power, do not shared with others such as electronic valve . Especial Pay more attention the AC/DC 24V
- Lift motor: DC24V DC motor
- Drive mode: PWM
- Output current：1A-4A，it can get to 6A via changing the current to feedback the resistance.
- Output power: 100W, it can get to 150W via changing the current to feedback the resistance.
- Working temperature: Height controller -10∽60℃
- IHS style: Switch inspecting IHS (suitable for all plasma both above-water and under-water cutting), Plasma Shield Protector IHS (suitable for above-water cutting's touch leading arc voltage plasma)
- Motor current restrict IHS (backup function)
- Running transfer: Alternative Arc transfer and pierce transfer
- Divided voltage ratio:100:1
- Accuracy: ±1V∽±5V，adjustable
- Outer Dimension: Length X Width X Height: 310mmX270mmX95mm

Dry-cutting and Under-water cutting

1、Dry-cutting

Dry-cutting named above-water cutting. The cost of this cutting mode is little. And it is simply to control the cutting. The height of cutting torch is obviously. The cutting rate is about 20% higher than under-water cutting. But it can cause hot distortion and biggish arc and soot. It is dangerous for body and environment protection.

2、Under-water cutting

A、the strongpoint of under-water cutting

Plasma arc cutting can bring deleterious gas, metal soot, yawp, noises , arc and so on. All of them are dangerous for body. But the under-water cutting can reduce even eliminate the deleterious gas, and most of metal soot, depress the yawp and arc. At the same time, the hot distortion will be slight with under-water cutting.

B、Water cutting system configuration and working principle

Water-cutting system is made of the cutting mater shelf, water bed, gutter, gate valve, decompress valve, pressure watch, pipeline and so on. When the gas supplied by a mini-type air pressure machine, the cylinder is need. If the gas is from pipeline factory, the cylinder is no need required. The cutting material shelf should be in water bed.

Water bed working principle: assemble the air- water system at the bottom of cutting material shelf together with the base. It is very fast for filling water and effusing water. It is about 10 seconds for the whole process which is the filling water and effusing water. This method can save the ground.

It is a airtight container on the top of the air-water system. It is connected to the gutter by the hatch in the bottom.

The filling water principle is the interaction between water and air. The air enters into the water; the air will always run upward under same pressure because the air is lighter than water. So the top of system is filled by air. Then the water will be pressed to the gutter little by little. So the water line will rise up in the water bed until finishing the filling water. The water line will drop down if release the air in the top of the system.

Generally, during the under-water cutting, if the current exceed 200A, the material should be embedded 10～50 MM in the water; if the current is lower 200A, the part of the material in the water is underside of the material only.

C、Under-water cutting height auto-controller

The cutting torch is under the water during the cutting, the speed is so fast. It is difficult to observe the height of the cutting torch. So it is necessary to use the height auto-controller. Please use the approach switch IHS style during the under-water cutting.

Ⅳ、Working process

Mode 1: When the Arc-ON signal with "IAON" (the Arc-On signal with IHS) is available , the height controller should process the IHS firstly; Secondly auto-control the Arc-on, the height controller will send the signal of arc transfer and pierce transfer to the NC system after producing the transfer arc. At the mean time, the controller delay time to put the arc voltage into the single chip system. If "Auto Permitted is available in height controller and NC system has sent out AUTO height adjusted signal, the controller is on status of "Height Auto adjusted"

Mode 2：When the Arc-ON signal with "EAON" (the Arc-On signalwithout IHS) is available, the height controller will not process the IHS but control the plasma to Arc-on directly; the height controller will send the signal of arc transfer and pierce transfer to the NC system after producing the transfer arc. At the mean time, the controller delay time to put the arc voltage into the single chip system. If "Auto Permitted is available in height controller and NC system has sent out AUTO height adjusted signal, the controller is on status of "Height Auto adjusted

ATTN: When the NC system that you use can not receive the signal of arc-on and pierce, please delay the time to control the NC system's running. It just means that the NC system send arc-on signal to the height controller, delay time to run the NC system.

Ⅴ、the function of operating board

The sketch map of operating board as fig 1:

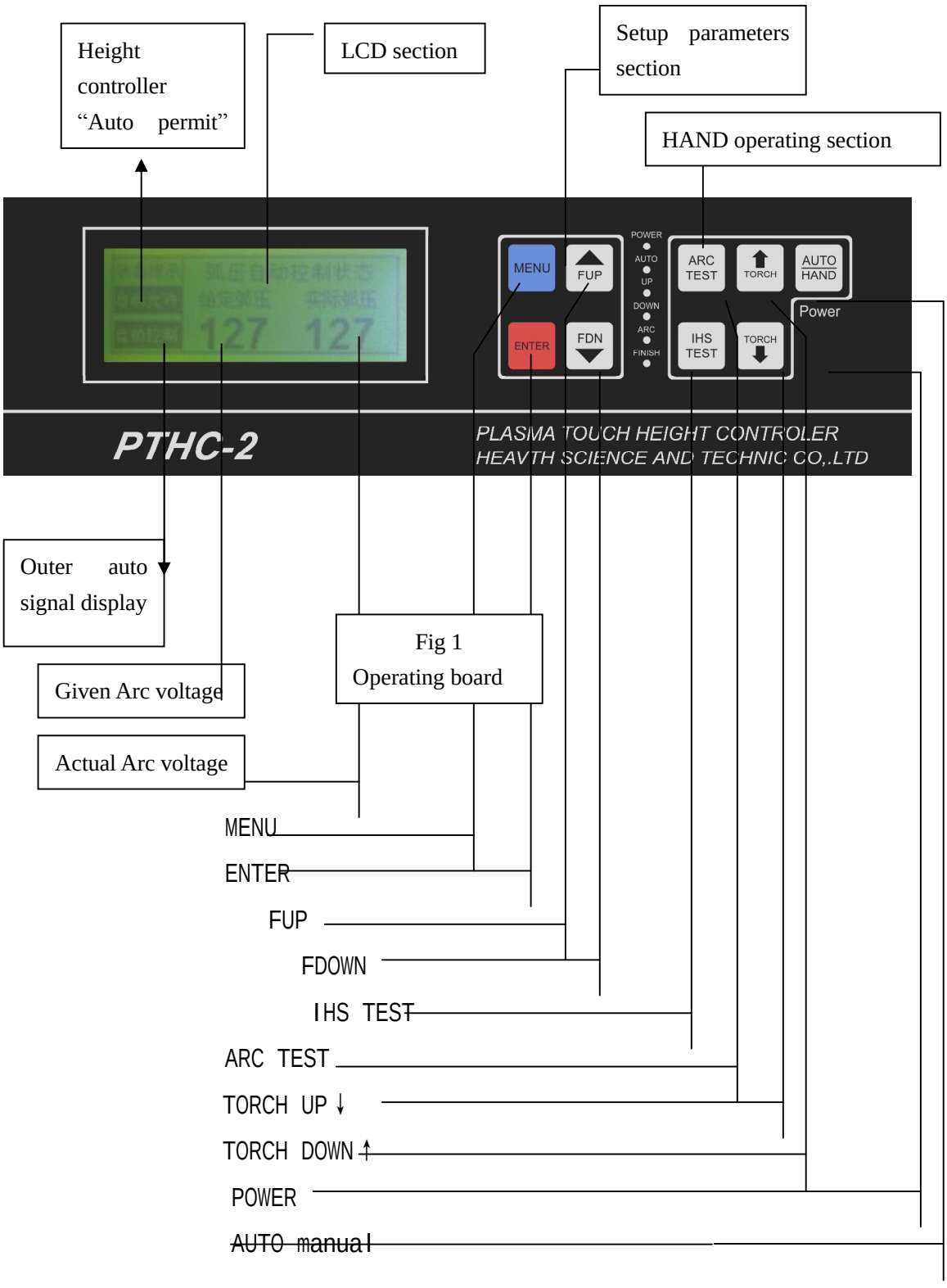


Fig 1
Operating board

1、display screen section

Working status: Display the Actual arc voltage, Given Arc voltage, Height controller AUTO/MANUAL status and outer controlling signal AUTO/MANUAL status.

On setup parameter status: Inspecting and watching the parameters

ATTN: They are the normally working status which is displayed on the above fig 1. The HAND operation section can be processed under this status only. Please push twice on the "MENU" button, the jacklight in LCD screen will be on or off. Select the status "QUIT" via "FUP" and "FDOWN", then go back to the working interface by pressing "ENTER".

If the input voltage is lower than AC23V, Please turn off the jacklight in the LCD screen.

2、Setup parameter function:

4 keys as,

MEMU;

ENTER;

FUP;

FDOWN。

Parameter setup has the working parameter setup "THC parameter setup" and "inner crytic parameter setup".

3、HAND operating function:

5 keys as,

ARC TEST: Arc test key is used for testing the plasma arc on, alternant working style. (ATTN: Alternant working style means this key is available for pressing one time, more unavailable.)

IHS TEST: IHS test key, alternant working style. The key is pressed once to process IHS until the whole process is over. If it is pressed once more or push the "TORCH" key, the process of IHS will quit.

TORCH UP ↑ and TORCH DOWN ↓:

AUTO HAND: Height controller "HAND and AUTO" shift key, alternant working style.

Ⅵ、basic parameter adjusted

Basic parameters will be shown via process the signal operating "MENU" in operating board. These parameters be adjusted frequently during the working process.

Working parameter setting depends on 3 keys only. When the machine is setting up, the working interface will be shown every time. Enter the working parameters setup interface as fig.2 after push "MENU" once.

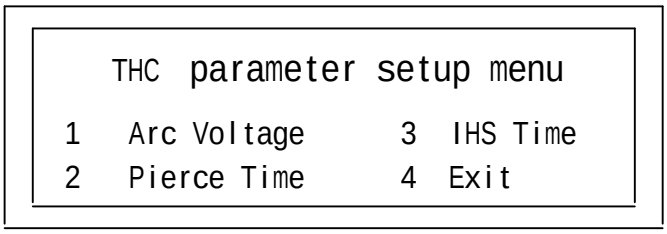


Fig 2: basic parameter setup menu

Setup method: Push "FUP" or "FDOWN" key, select the parameters that need to be setup. Pressing the "ENTER" key goes to the setup menu, change the parameters by "FUP" or "FDOWN" key. Then press "ENTER" to back to the foregoing menu. Press "EXIT" to back to the working interface.

HAND operating section is unavailable when it is on "parameter setup" status.

1)、Arc Voltage: Fig. 3 Set up the given arc voltage for cutting. Arc voltage is given. The height of cutting torch is fixed. The arc voltage should be adjusted as per the parameter list which is provided by manufacturer, Unit V.

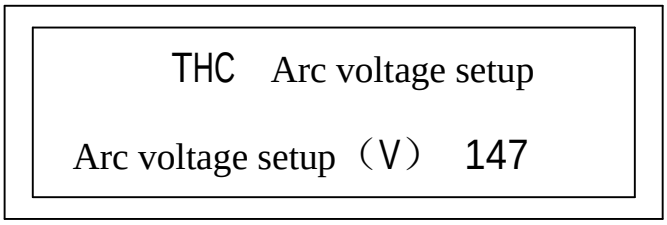


Fig.3: Arc voltage setup interface

2)、Pierce time: Fig.4. the pierce time setup should be along with the actual pierce time setup. The pierce time is different being the

thickness of armor plates. Unit: 0.1s. The setup is available if the crytic parameters PIERCE_ENABLE_SIGN is 1. It is unavailable if Zero is.

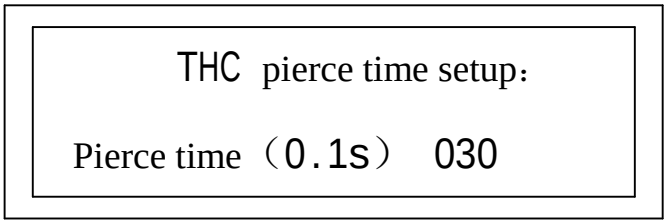


Fig.4: pierce time setup

3). IHS time: Fig.5. IHS time is the time that the cutting torch gets to the material and returns back the arc-on height during the IHS process. Unit: 10ms.

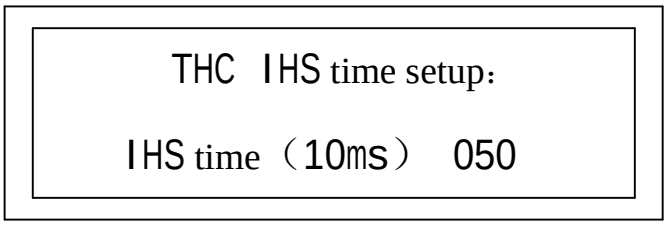


Fig.5: IHS time setup

Ⅶ、Inner parameters' setup

When the height controller enter into the working status as usually, please press "FUP" and "FDOWN" keys ,and then enter into the interface of inner crytic parameter setup. Total: 19 pcs crytic parameters.

Setup method: Press the key "ENTER" every time then enters into the next crytic parameter. Adjust the parameter by keys "FUP" and "FDOWN". Press the key "MENU" back to the working status.

1)、MAX_PWM: MAX_PWM setup. Fig.6.

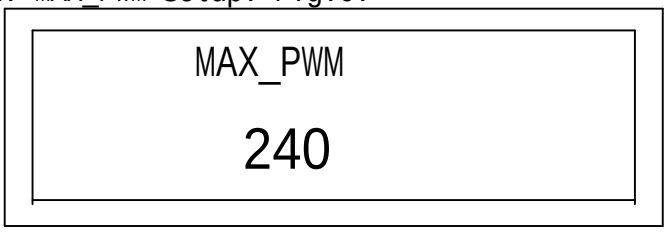


Fig.6: MAX PWM setup

The max running speed depends on the parameter. Setup the Max as 240, Minas 140. Generally, 240 is Normal. Please do not exceed 250. Initializevalue is 240.

2)、MIN_PWM：MIN_PWM setup. Fig.7.

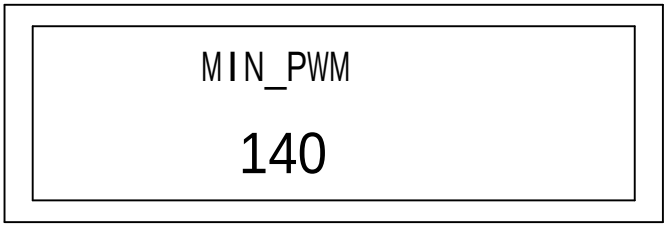


Fig.7: MIN_PWM setup

This parameter is the min running speed of the motor. MAX: 200, MIN: 140. Generally, 140 are normal. Initialize value is 140

3)、IHS_UP_PWM: The PWM during IHS rises to the given height. Fig.8.

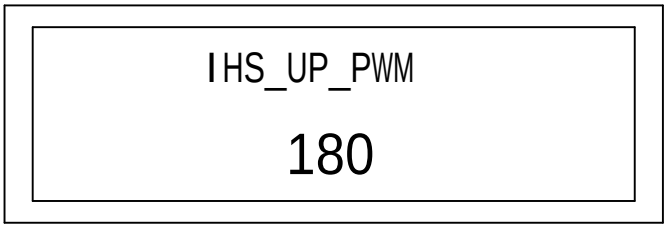


Fig.8: IHS raised PWM setup

When set up this parameter at IHS, the controller will raise the motor speed which is between the cutting torch and the height of original arc on after inspecting the arrival signal. Generally, the raised speed is larger the accuracy of IHS is more low. The speed is lower the accuracy is higher. Setup the Max: 240; Min: 140. The usual value is about 180. Initialization: 180.

4）.IHS_DOWN_ PWM：The PWM when IHS gets to lower.

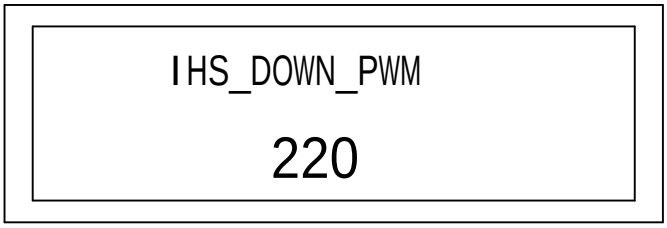


Fig.9: IHS DOWN PWM setup

The parameter is related with the motor speed when the cutting torch dropped. The speed can be higher when using. Under the approach switch IHS, suggested that the lower speed will avoid damaging the plasma cutting torch.

5). UP&DOWN_ PWM: UP&DOWN_ PWM on "HAND" status. Fig.10.

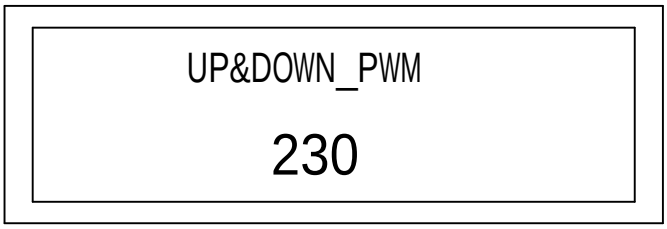


Fig.10: "HAND" UP&DOWN_ PWM SETUP

6)、ARC_MAX_ERROR：ARC_MAX_ERROR set up. Fig.11.

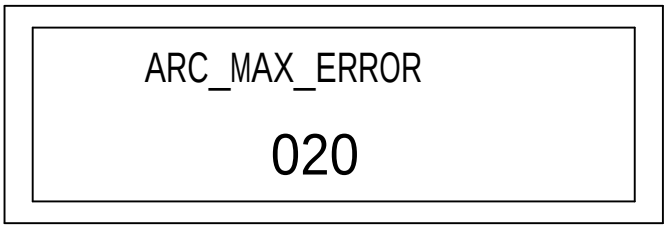


Fig.11: ARC_MAX_ERROR set up.

Set up the MAX: 030, Min: 010. Generally it is 020. Initialization: 020 During the cutting course, the cutting torch have the cutting crack (out-in line), the arc voltage will be raised immediately. If no ARC_MAX_ERROR, the cutting torch will bump to the material with high speed. The torch will be damaged. So setup this parameter can protect the cutting

torch.

7). DELAY_INPUT_TIME: Arc voltage delay input time setup. Fig.12.

The arc voltage will be affected seriously during the leading arc. So the arc voltage will be delay to put in the circuit.

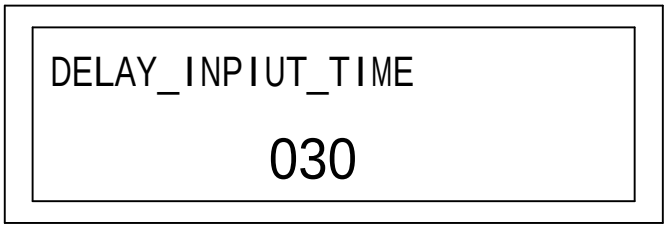


Fig.12: DELAY_INPUT_TIME setup

Initialization: 030

8）. AUTO_PWM_AMP: This parameter is used for setting up the PWM speed adjusted coefficient when the arc voltage is changing. The parameter is bigger, more sensitive for the height controller. But the running stability of the cutting torch will get lower. On opposite, the parameter is smaller, sensitive will be lower and the running stability will be higher. So a appropriate coefficient selected can get a good balance between the sensitive and stability. Fig.13.

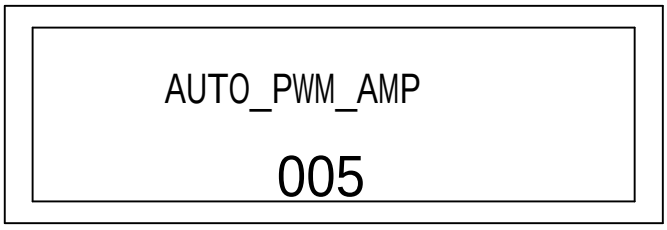


Fig.13: AUTO_PWM_AMP setup interface

Setup range: 005~020; generally it is 005. Initialization: 005

9）. UP_BRAKE_TIME: UP_BRAKE_TIME in reverse. Fig.14.

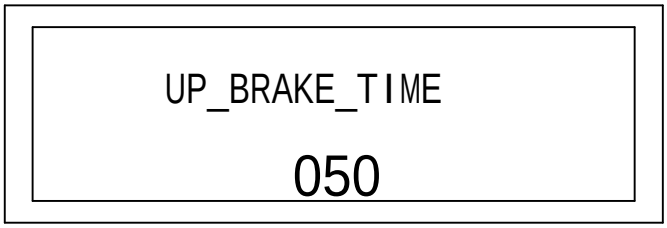


Fig.14: UP_BRAKE_TIME setup

This system equipped the reverse brake style to stop the running fleetly after moving up. The over-relaxing and over-rush of height controller will be abated via adjust this parameter. Initialization: 050

10). DOWN_BRAKE_TIME: DOWN_BRAKE_TIME in reverse. Fig.15.

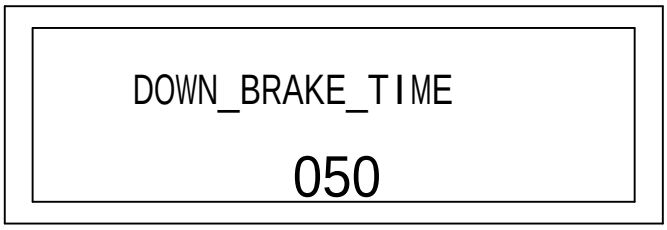


Fig.15: DOWN_BRAKE_TIME setup

This system equipped the reverse brake style to stop the running fleetly after moving down. The over-relaxing and over-rush of height controller will be abated via adjust this parameter. Initialization: 050. It is acceptable for this parameter as 70 if the motor power is 60W.

11). EMERG_LIFT_TIME: the time of Emergent lifting the gun when the cutting torch gets to the material.

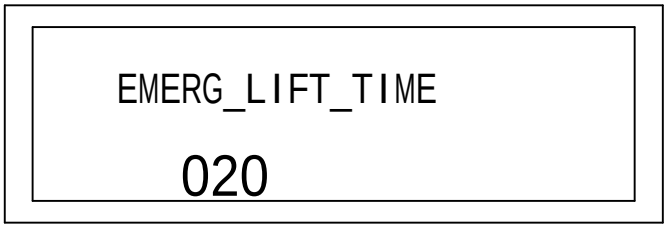


Fig.16: EMERG_LIFT_TIME setup

Unit: 10ms, generally it should be in the arrange 005~015. Initialization: 020

12). EMERG_LIFT_PWM: the PWM of emergent lifting (speed). Fig.17

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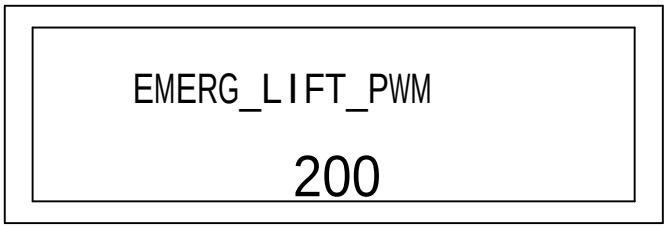


Fig. 17:EMERG_LIFT_PWM setup

Range: 140~240, initialization: 200

13). INTEL_ADJ_RANGE: Arc voltage intellectualized adjustable range

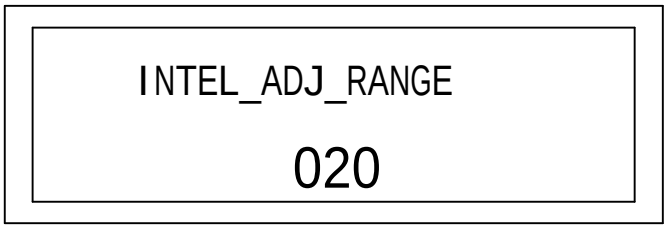


Fig.18: INTEL_ADJ_RANGE setup

Best range: 015~020. Initialization: 020

During the cutting, when the arc voltage setup is too low or the working time gets longer for the damageable parts, the arc voltage will be raised in the inner of plasma power, if the given arc voltage is unchanged, the height of cutting torch will fall down. So the cutting torch may get to the material. If it happened, the hitting protect circuit will be setting in height controller. The cutting torch will be raised instantaneous. If this situation happens many times continuous, the height controller will raise the give arc voltage to avoid any further hitting the material. When the arc voltage added is in this setup range, even if the hitting happens again, the arc voltage won't be raised. If so, client should inspect the accessory.

14). INTEL_ADJ_STEP: arc voltage intellectualized adjusting voltage range. Fig.19.

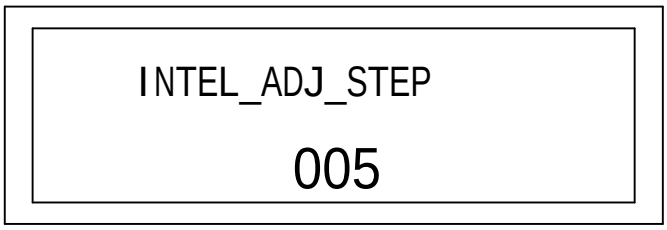


Fig.19: INTEL_ADJ_STEP setup

When setting it up as 005, the cutting torch will adjust 5V every time under intellectualized adjusting status. Generally, it is 003~005

15). INTEL_ADJ_SIGN: arc voltage intellectualized adjusting function available or not. Fig.20.

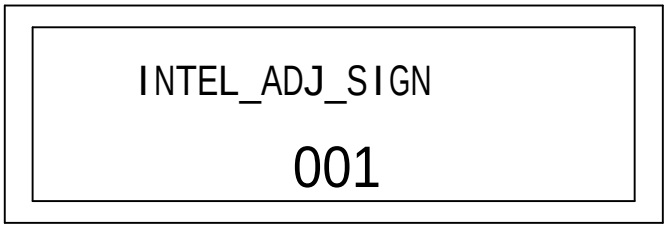


Fig.20: Arc voltage intellectualized adjusting function available or not SETUP

Set it up as 000, it means unavailable. If it is 001, that means intellectualized adjusting is available.

16). ARC_ACCURACY: arc voltage accuracy. Fig.21.

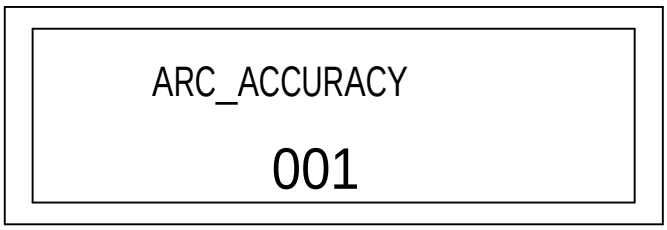


Fig.21: ARC_ACCURACY setup.

Setup range: 001~005.

When set it up as 001, the arc voltage accuracy is ±1V; if 005 is , the accuracy is ±5V. Initialization: 001.

17). PIERCE_ENABLE_SIGN: PIERCE_ENABLE_SIGN. Fig.22.

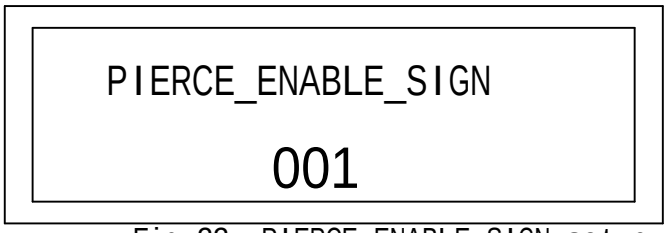


Fig.22: PIERCE_ENABLE_SIGN setup

Set it up as 000, output arc on finishing sign; set it up as 001, when the plasma arc on, the controller will executive the auto-pierce program. The pierce sign will be put out after the pierce processing. Initialization: 000.

18). IHS_CURRENT_LIMIT: IHS CURRENT LIMITED SETUP. FIG.23.

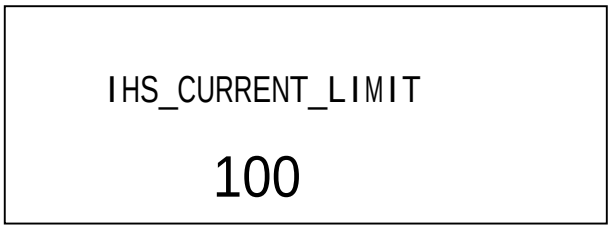


FIG.23: IHS CURRENT LIMITED SETUP.

Setup range: 020~255.

When set it up as 100, the Motor current is about 2A; When it is 200, the current is about 4A. Initialization: 100.

At the beginning of IHS, the driving current is bigger in the DC motor. So the system will inspect the motor current after delaying 500ms. This parameter setup is relative with the motor power. If the motor power is bigger, the parameter will be increased. Generally, this parameter is set up 100 to match the motor power with 20W; And 250 are for the motor with power 60W.

19). IHS_CURRENT_LIMIT_SIGN：IHS_CURRENT_LIMIT_SIGN setup. Fig.24

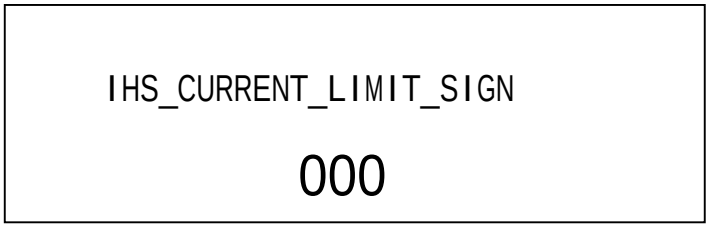


Fig.24: IHS_CURRENT_LIMIT_SIGN Setup

Setup value 000 is unavailable, 001 is available. All others are unavailable.

20)、TORCH_AUTO_MOVE_UP：Extinguish arc torch lift height.Fig.25

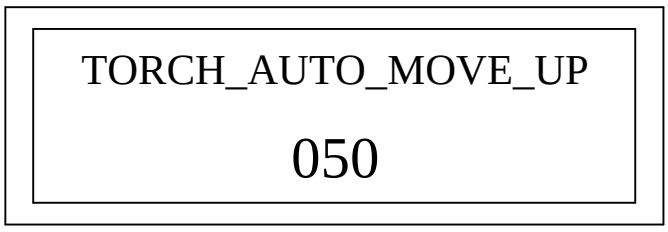


Fig.25: TORCH_AUTO_MOVE_UP

Setup range: 001~250. Initialization: 050. Unit: 10ms.

21)、PIERCE_MOVE_UP_SPEED：Dynamic Pierce torch lift up speed. Fig.26

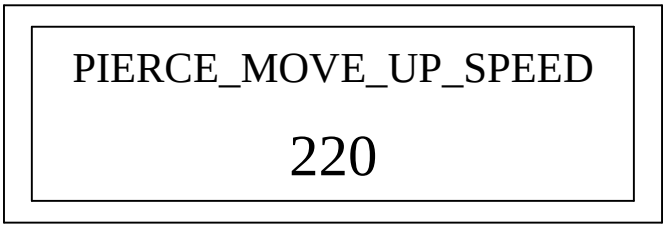


Fig.26: PIERCE_MOVE_UP_SPEED

Setup range: 140~250. Initialization: 240.

22)、PIERCE_MOVE_UP_TIME：Dynamic Pierce lift up height (time)。Fig.27

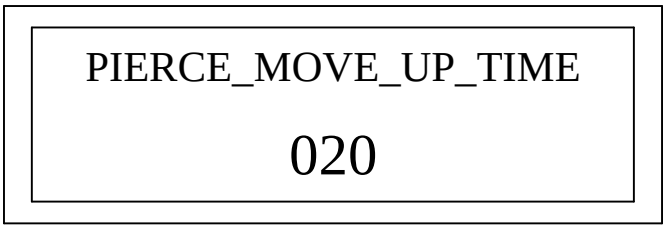


Fig.27: PIERCE_MOVE_UP_TIME

Setup range: 0~250. Initialization: 020. Unit: 10ms.

23)、PIERCE_OVER_DOWN_TIME：Dynamic pierce completion,The torch down time 。Fig.28

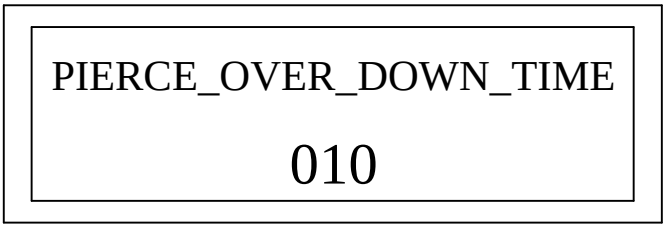


Fig.28: PIERCE_OVER_DOWN_TIME

24)、CHINESE_OR_ENGLISH：Choose language.

Set 000 to select Chinese, Set 001 to select English. Fig.29

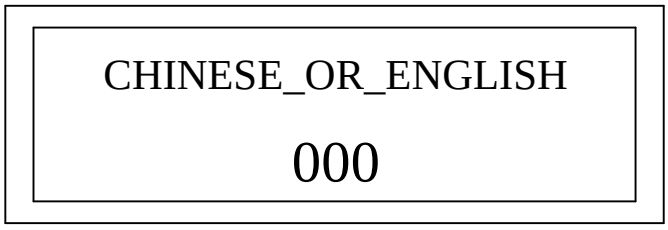


Fig.29: CHINESE_OR_ENGLISH

Ⅷ、Divided voltage board

Controlling the arc voltage must inspect the changing of plasma arc voltage. The plasma arc voltage equals the voltage that is between the pole and ground. The anticathode which put out the plasma power is connected to the ground. The Cathode connects to the pole which is in the cutting gun. So the voltage in the electrode is negative. When process the cutting, the arc voltage absolute value is usually higher than 100V. If so, the voltage must be divided in order to process the control in the controlling circuit.

ATTN: the voltage that put into the height controller is negative. If the polarity is connected in reverse, the Height Auto-adjusted is not available.

Isolated divided voltage style

Isolated divided voltage style makes the plasma arc voltage connect to the height controller after the voltage is divided and transacted by isolated operation magnifier. So the interference that comes from the voltage is rather low for adjusting the height. But the cost of isolated divided voltage controller is rarely high.

Please refer to fig.30 which is the isolated divided voltage controller principle sketch map.

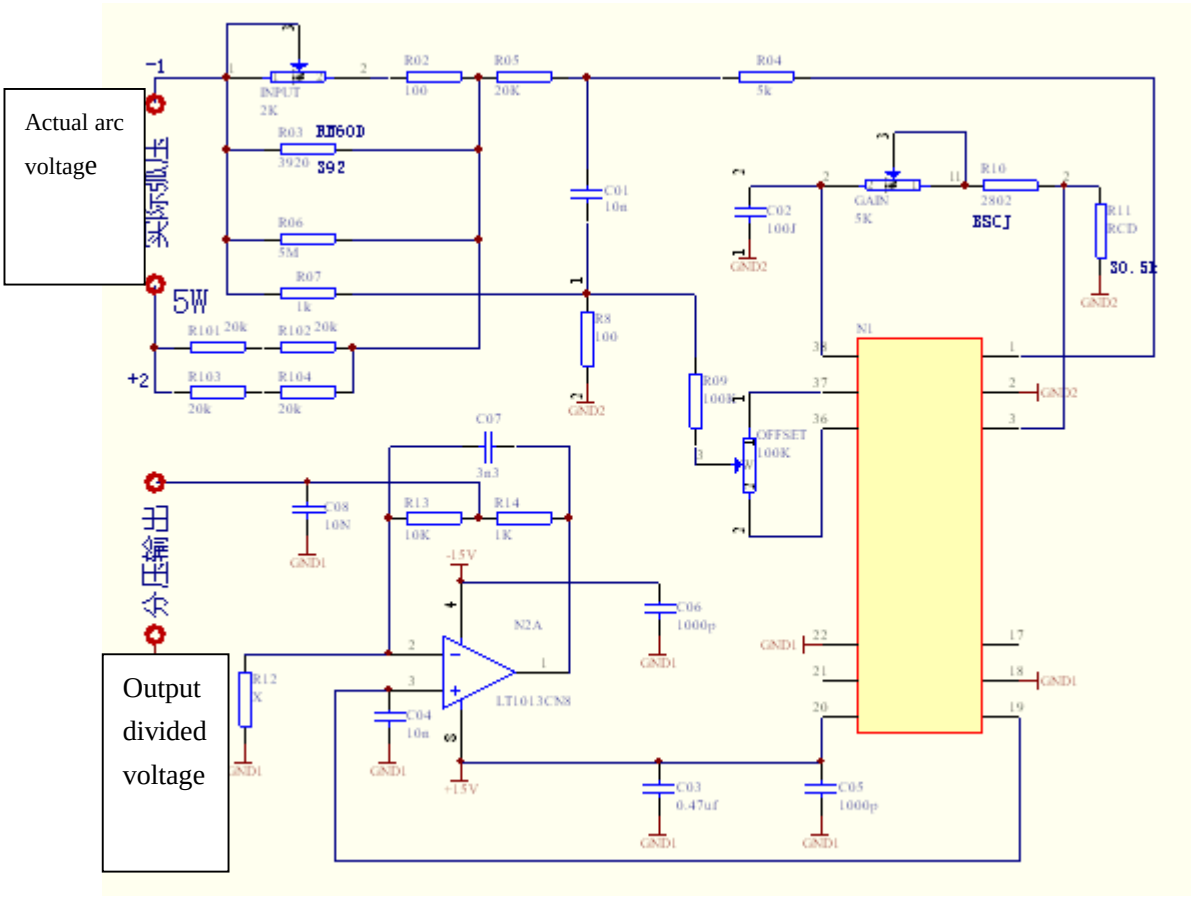


Fig.30: isolated divided voltage controller principle sketch map

Our company's isolated divided voltage ratio is 100:1. The divided voltage ratio is set up as 100:1 before our company's height controller leave factory.

ATTN: the voltage that put into the height controller is negative. If the polarity is connected in reverse, the Height Auto-adjusted is not available.

Ⅸ、IHS introduction

Two types of IHS style of height controller

1. Plasma Shield protector IHS inspecting style

The material of the protector should be metallic. They can transmit each other when it gets to the material. Please refer to fig.31 about the connection.

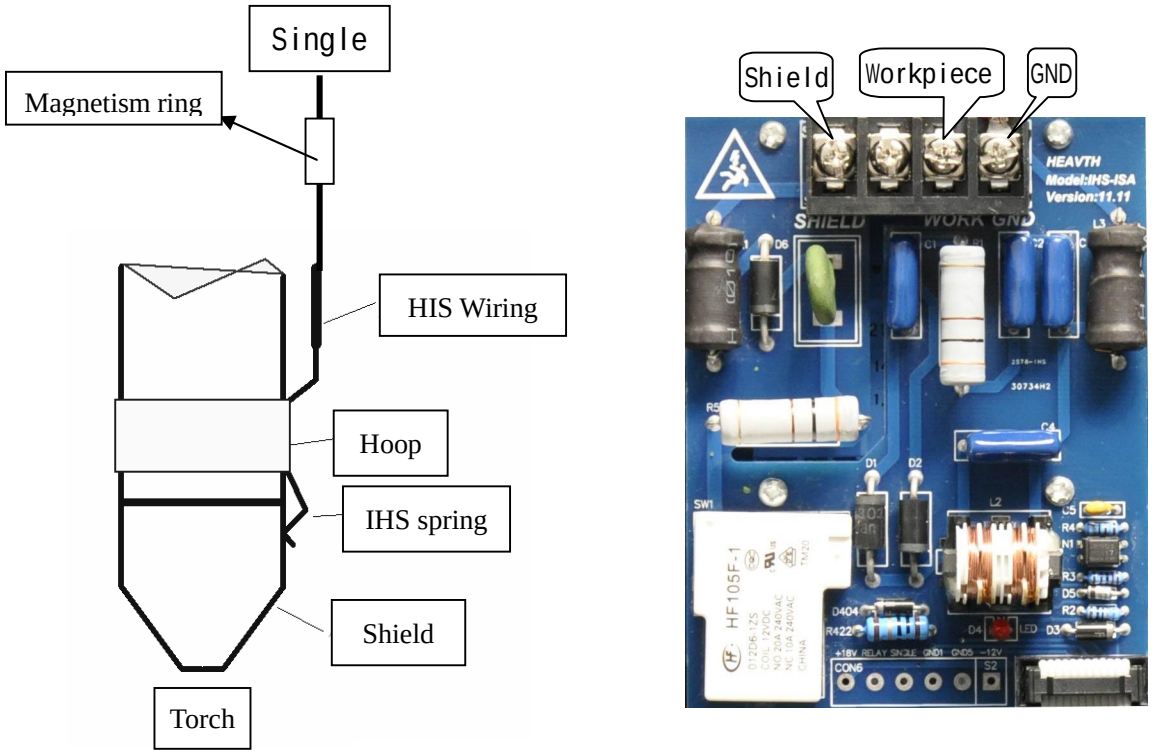
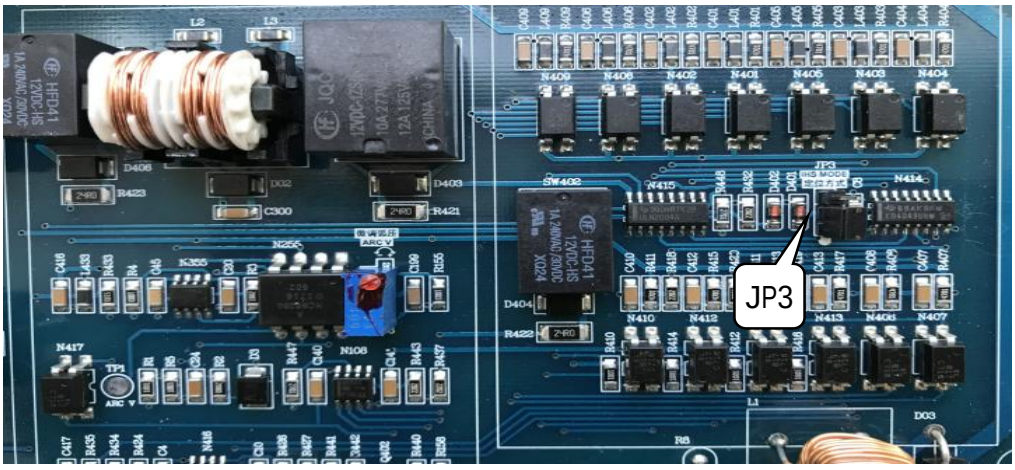


Fig.31: Shield IHS connection

ATTN：The cutting torch protector IHS inspecting style is suitable for abover-water cutting only.

Working process: After the height controller receives the arc-on signal which is sent out from NC system, the cutting torch will fall down immediately. When the protector get to the material, the height controller will receive this signal, and then control the cutting torch to rise to the given Height of IHS. The height controller will control the plasma to arc on after IHS.

ATTN: When adopt the protector IHS style, the circuit of JP3 should be short connected to up position.



2. inductive proximity switch IHS style(switch mode: NPN Mode, 2mm, outer diameter Φ12, the distance of screw thread:1.0mm)

When this style is adopted, the client should design the tongs according the IHS cutting torch tongs sketch map which is provided by our company. All the plasma IHS, whatever over-water cutting and under-water cutting, can adopt this IHS style. Please adopt the approach switch IHS style if you use the high frequency input arc plasma and under-water cutting.

The tongs sketch map: Please see the appendix

Before IHS, the approach switch is on approaching status. The cutting torch will rise once the switch is broken away.

Working process: After the height controller receives the arc-on signal which is sent out from NC system, the cutting torch will fall down immediately. When the cutting torch gets to the material, the approach switch will break away from the approaching spot. The height controller receives this signal, and then controls the cutting torch to rise to the given Height of IHS (the approach switch will reposition automatically during the rising). The height controller will control the plasma to arc on automatically after IHS. This IHS style is suitable for all plasma IHS. The approach switch is connected to the height controller via the SWITCH-IHS aviation socket.

ATTN: The JP3 should short connected to down position when adopt the inductive proximity switch IHS style to IHS. Or use proximity switch IHS and shield HIS together.

X、 Port circuit

1、 The power ports of PTHC-II arc voltage height controller

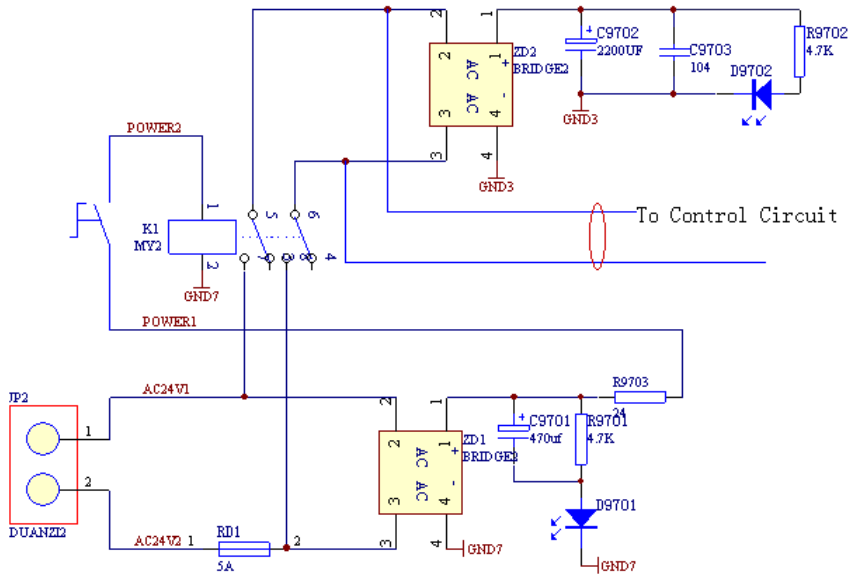


Fig.32: the drawing of power input

The power of PTHC-II arc voltage height controller is AC24V, connects to the height controller JP2 by the aviation socket which is marked with "POWER". Just as fig.32.

2、 The port connected to the plasma cutting torch. The mark of aviation socket is CON-GUN. The motor output port as fig. 33.

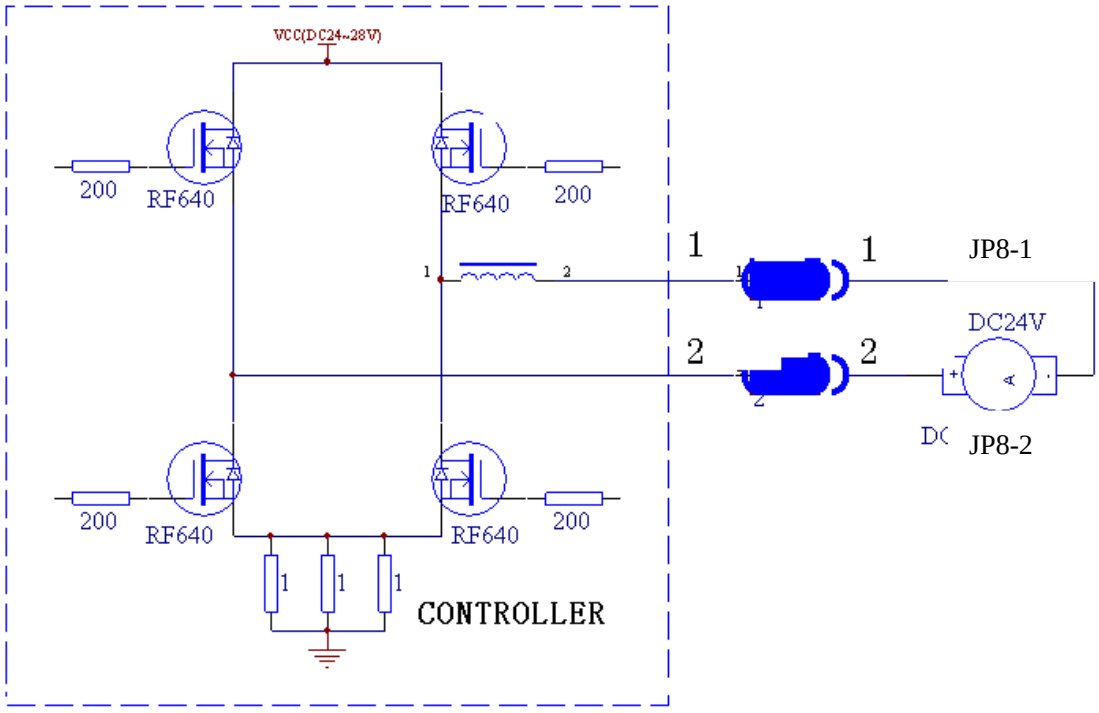


Fig.33: Drive motor output

The position limited ports for Lift up and drop down as fig.34.

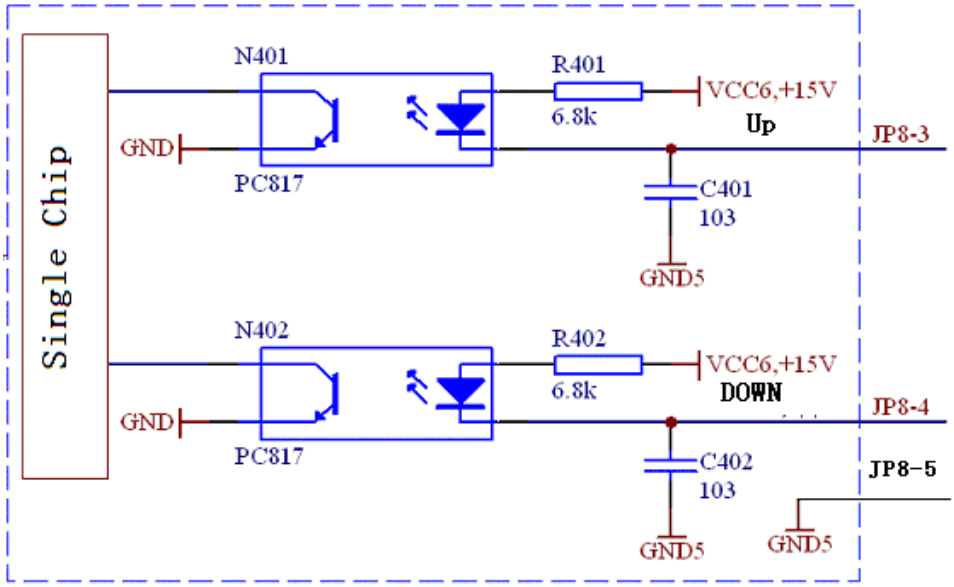


Fig.34: Position limited ports

ATTN: Position limited switch should meet the cutting – off spot usually.

3、The port connected to plasma

CON-PLASMA with 4 core aviation socket connects to the port JP6 in main board. The plasma ports are as fig.35.

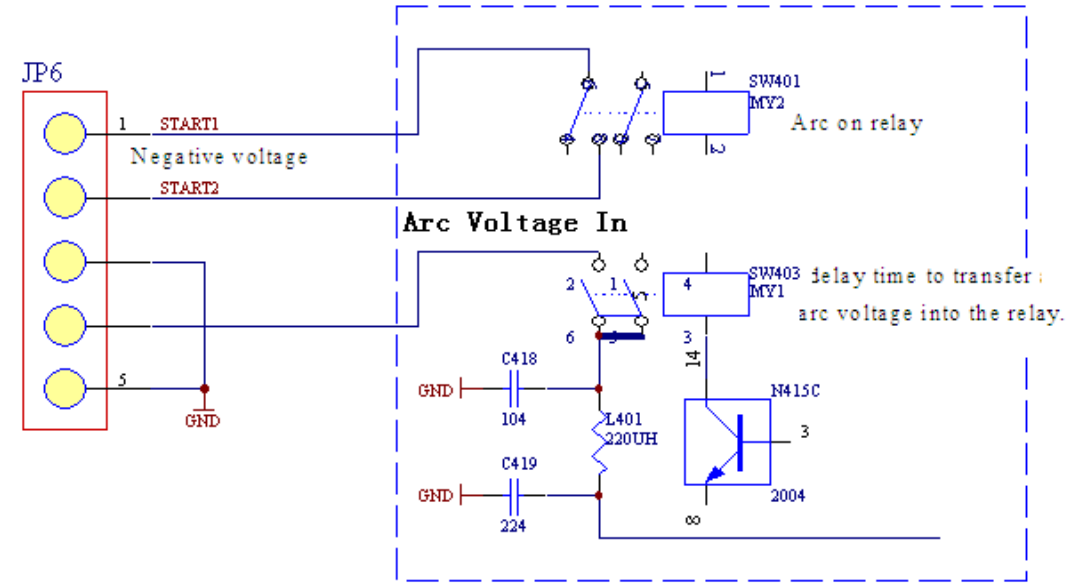


Fig.35: main board plasma ports

Plasma Arc on signal is controlled by main board relay in height

controller. The arc voltage will be postponed to enter into the main board.

3、 The ports to the NC system, the port circuit between height controller and NC system.

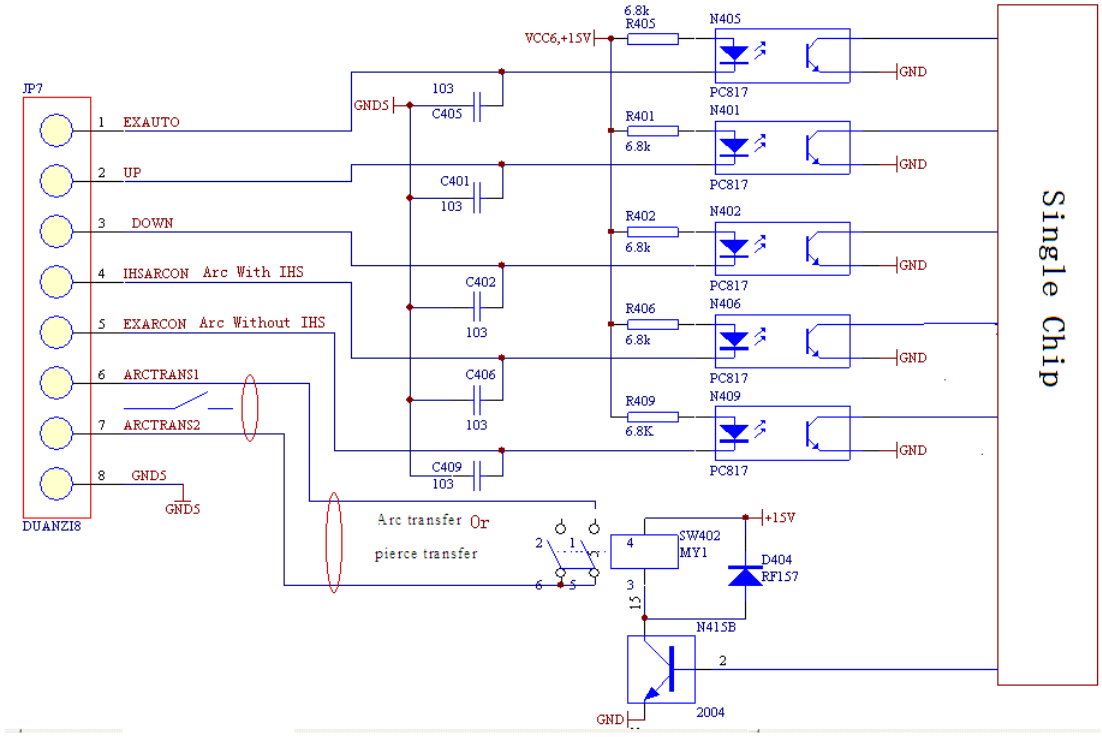


Fig.36: The port circuit between the singlechip and NC system

There are 6 ports with photo electricity insulated style between singlechip and NC system

A、AUTO/MANUAL signal (EXAUTO): AUTO depends on high electricity level, HAND with low electricity level.

B、UP: It will rise when low electricity level is available.

C、DOWN: It will drop when low electricity level is available.

D、IHS Arc-on signal (IHS ARC ON): It is available for low electricity level. IHS should be processed before working. The arc-on will be automatically once IHS finished.

E、The arc-on signal without IHS(EX ARC ON): It is available for low electricity level. Arc-on directly.

F、Arc transfer 1 and Pierce transfer 2 （ARCTRANS1、ARCTRANS2）: Signal type :relay

5、The Insulating IHS board .

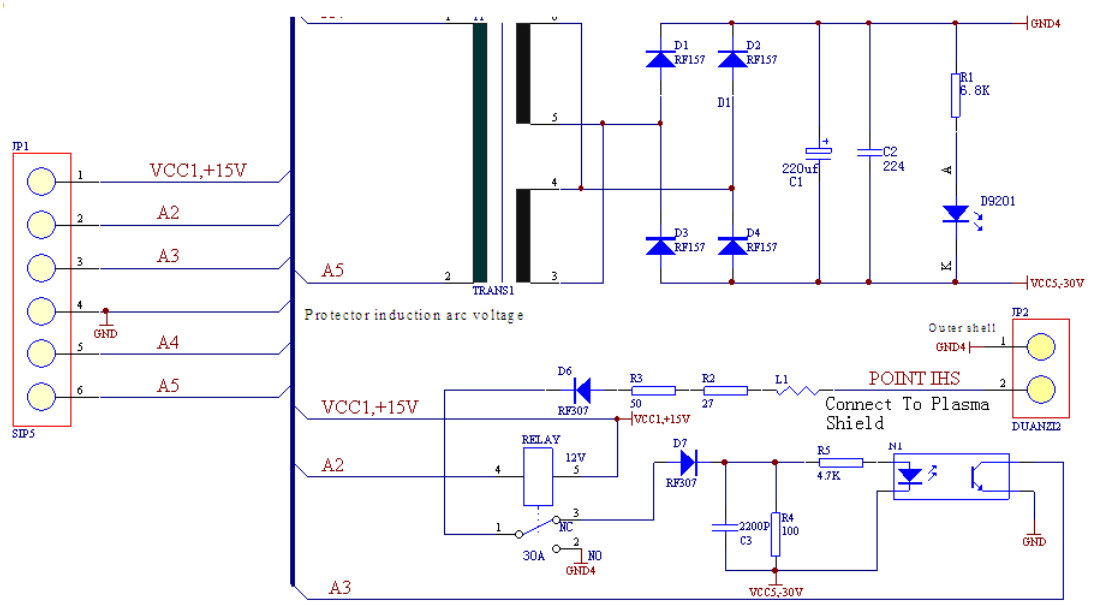


Fig.37: the insulating IHS board fixed on cutting torch

6、 Inductive Proximity switch IHS port

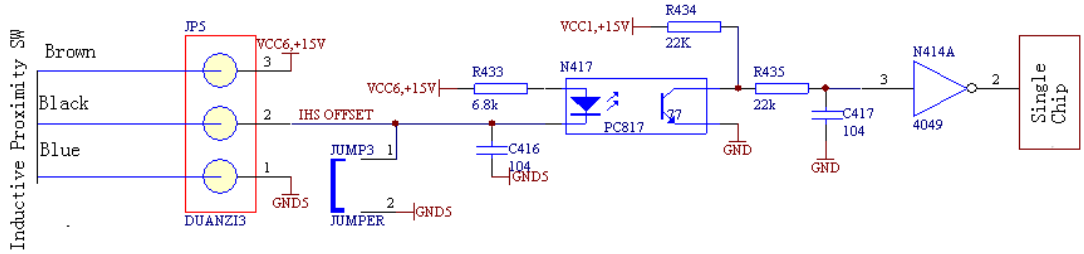


Fig. 39: inductive proximity switch IHS port。

7、current reactive circuit: Adjust W2 current and switch on/off relations as below,

current	1-8	2-7	3-6	4-5
4A	OFF	OFF	OFF	
3A	OFF	OFF	ON	
2A	OFF	ON	ON	
1A	ON	ON	ON	

Ⅺ、controlling connection

The connection style is as below:

A、above-water touch lead arc plasma protector IHS connection.
Ref. Chat 1.(Page 38)

B、above-water high frequency lead arc plasma protector IHS connection.
Ref.Chat 3, 2

C、inductive proximity switch IHS connection. Ref.Chat 4, 2

D、isolated divided voltage borad wiring diagram. Ref.Chat5

Ⅻ、Troubleshooting

NO.	Fault	cause	action
1	NO display on LCD screen, or darkly on screen	The error of Power AC24V is 5%.Maybe it is lower than 5%.	Rise up the voltage to AC26V.
2	the motor do not run or run in one direction	1.Drive IR2110 damaged	1、replace the IR2110
		2.No driving signal from the foregoing controlling	Replace the N303 (4071) N3 (4049) if they are damaged.
		3.over current error protect	Q301∽Q304（IRF640）maybe damaged
3	Turn on the power , cutting gun run upward all along	1. It is something wrong with the inductive proximity switch IHS on cutting torch. Maybe is on opening status.	Assemble the inductive proximity switch well.
		2. inductive proximity switch damaged.	Replace the inductive proximity switch (signal: 2MM, NPN type.)
4	Do not Arc-on after IHS	1. inductive proximity switch is damaged. No signal feedback.	Replace a new switch
		2. The IHS time is very short. No signal feed back	Prolong the IHS time

5	Arc voltage is unsteadily	Inspect the grounding wire(working lead connection) Inspect the water’s leakage or not and the air humidity.	
6	The system is no response from the period setting signal.	The display interface is on “parameter setup” status	Setup the interface on working status
7	Plasma is ARC ON before IHS	When processing EXARCON signal, the prolong time of NC system is too short.	Prolong the delay time to the NC system IHS.
8	The cutting torch can not arc-on.	1. Make sure the plasma power is on working status 2. Inspect the IHS pierce height. 3. Inspect the accessory of cutting torch。	
9	The plasma on the cutting torch can not transfer to the workpiece.	1. inspect the working lead connection 2. Inspect the accessory of cutting torch。	
10	The cutting torch is moved before the cutting torch pierces material.	It is very short for the delay time setup in operation menu “IHS time”	
11	The cutting torch drop toward the workpiece when the NC system is driving.	1. Increase the “Given arc voltage” setup 2.prolong the time of auto-enter in NC system 3.Reduce setup for the over arc voltage protecting value	

12	The plasma arc is off after arc transfer and pierce is bigger.	The prolong time is too long on the parameter setup interface "pierce time". (Before the machine moves, the plasma arc is easier to be off if the cutting torch stay at the position of pierce for long time.
13	During the protector IHS, the cutting torch gets to the material and do not rise.	1. The IHS time is too short. 2. The connection is not well between the induction lead and protector.
14	During the process of current limited IHS, at the beginning of IHS, the cutting torch lift up without reach the given position.	1. The current limited setup is rarely low. Please rise the current limited value 2. The current inspects the malfunction in the circuit. Under static, please revolve the potentiometer RP302 in clockwise. Make sure the voltage of foot 1 of N310 is -0.2V. If this situation is not improved, please adjust the voltage as -0.4V. 3. It is something wrong with the grounding wire.

PowerMax1250 Parameters List

Current	ARC (V)	Pierce time (Sec)	Thickness (MM)	Speed(MM/Min)
Steel	132	0.25	4.8	3556
	134	0.5	6.4	2667
80A	137	0.5	9.5	1549
	140	0.5	12.7	991
	145	1.0	15.9	660
	148		19.0	508
	150		22.2	381
	156		25.4	254

Current	ARC (V)	Pierce time (Sec)	Thickness (MM)	Speed(MM/Min)
Stainless	134	0.25	4.8	3556
80A	136	0.5	6.4	2616
	139	0.75	9.5	1372
	142	0.75	12.7	838
	145		15.9	559
	150		19.0	406
	153		25.4	229

Current	ARC (V)	Pierce time (Sec)	Thickness (MM)	Speed(MM/Min)
Aluminum	134	0.25	3.2	7493
80A	136	0.5	6.4	2896
	143	0.75	9.5	1524
	146	0.75	12.7	940
	154		19.0	483

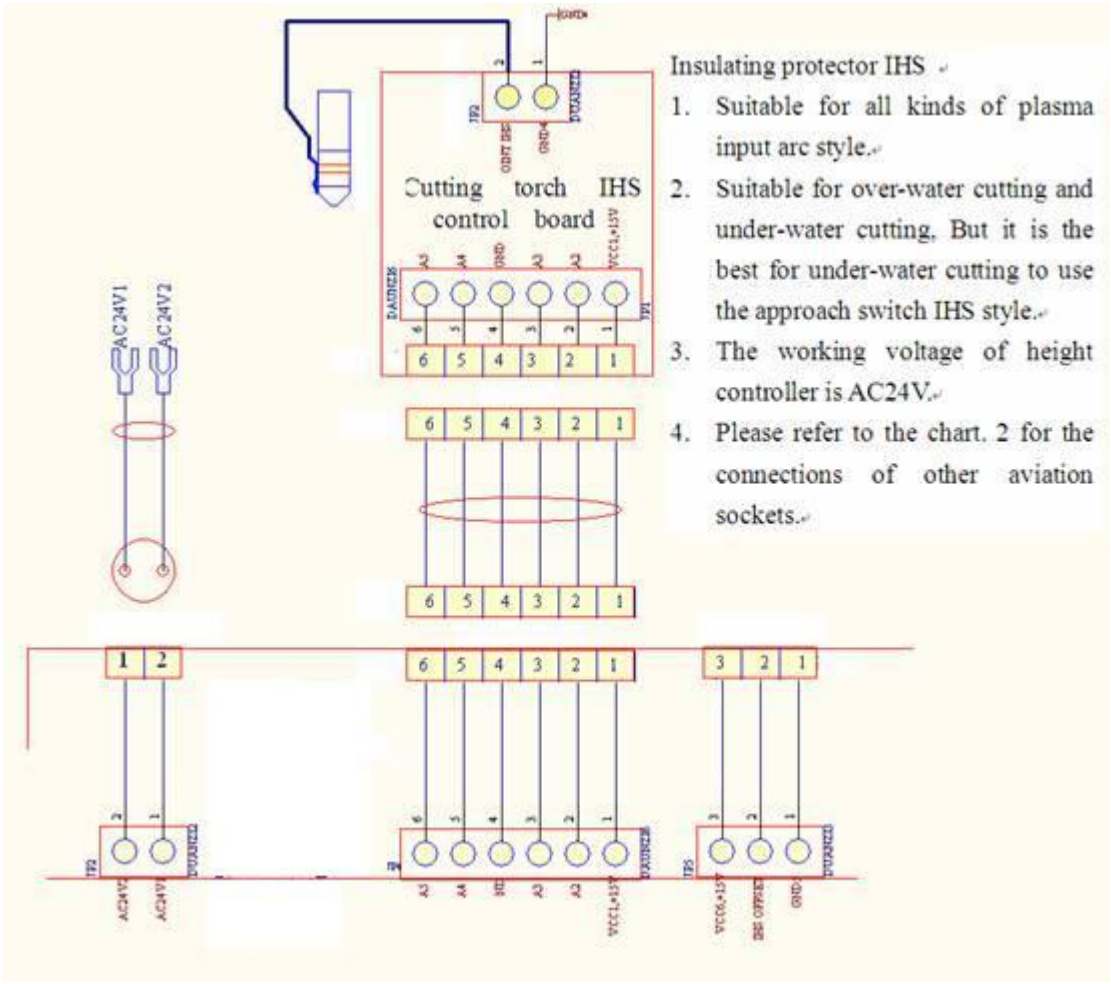
Current	ARC (V)	Pierce time (Sec)	Thickness (MM)	Speed(MM/Min)
Steel	147	0	0.5	10541
	148	0	0.8	8255
	149	0	1.3	5156
	152	0	1.5	2896
40A	144	0.25	1.9	5613
	146	0.5	3.4	2489
	147	0.75	4.7	1600
	149	1.0	6.4	1219

Current	ARC (V)	Pierce time (Sec)	Thickness (MM)	Speed(MM/Min)
Stainless	139	0	0.5	10414
25A	139	0	0.8	8179
40A	142	0.25	1.3	8509
	144	0.25	1.5	6172
	144	0.25	1.9	3658
	147	0.50	3.4	1778
	149	0.75	4.7	1118
	149	1.0	6.4	787

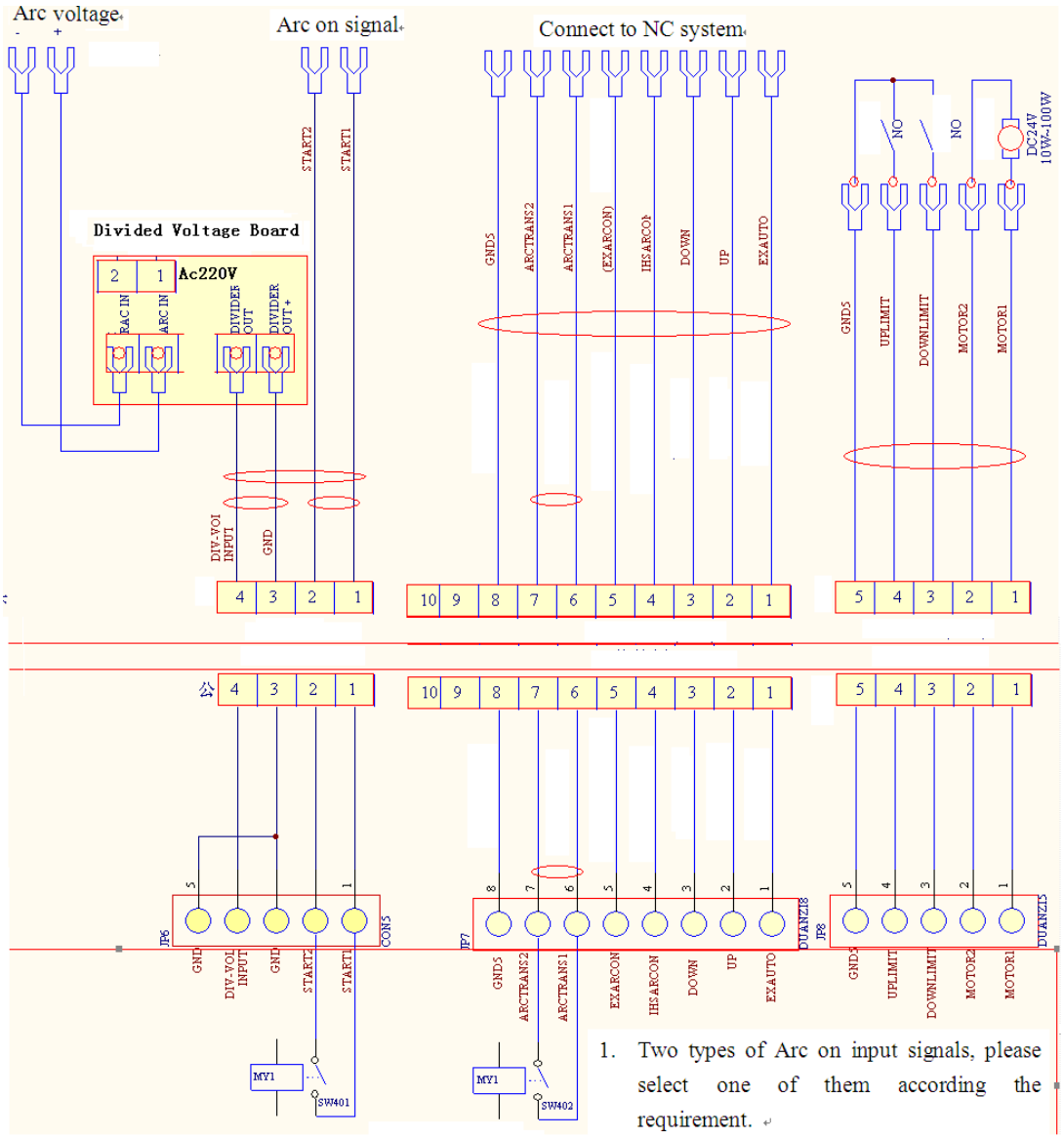
Current	ARC (V)	Pierce time (Sec)	Thickness (MM)	Speed(MM/Min)
Aluminum 25A	150	0	0.8	10084
	152	0	1.5	4420
40A	146	0.25	2.4	4826
	149	0.50	3.2	3378
	151	1.00	6.4	1245

Please refer to the plasma instruction for the details.

PTHC-2 Electrical Schematic(Chat 1 to Chat 5)

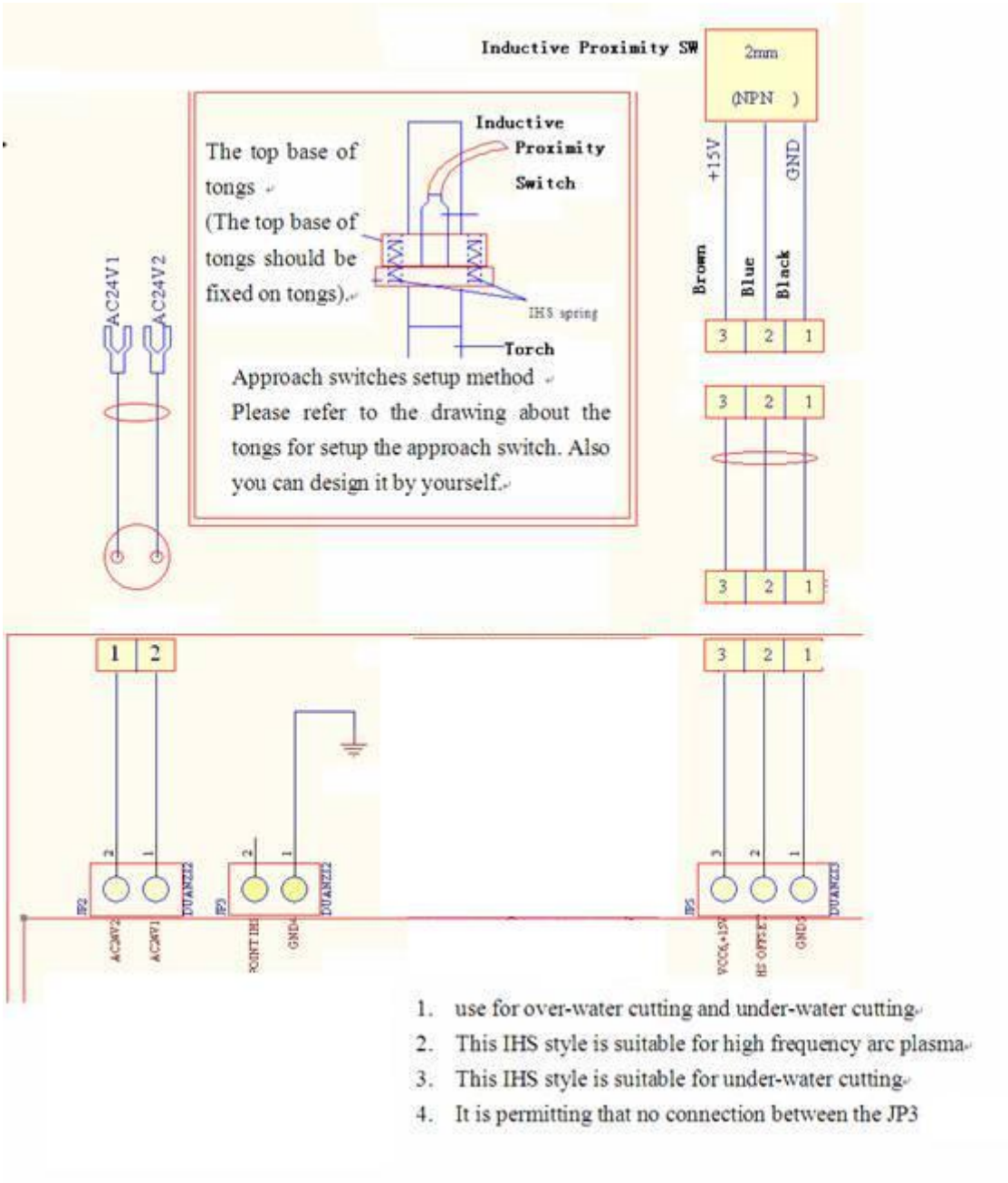


Chat 1

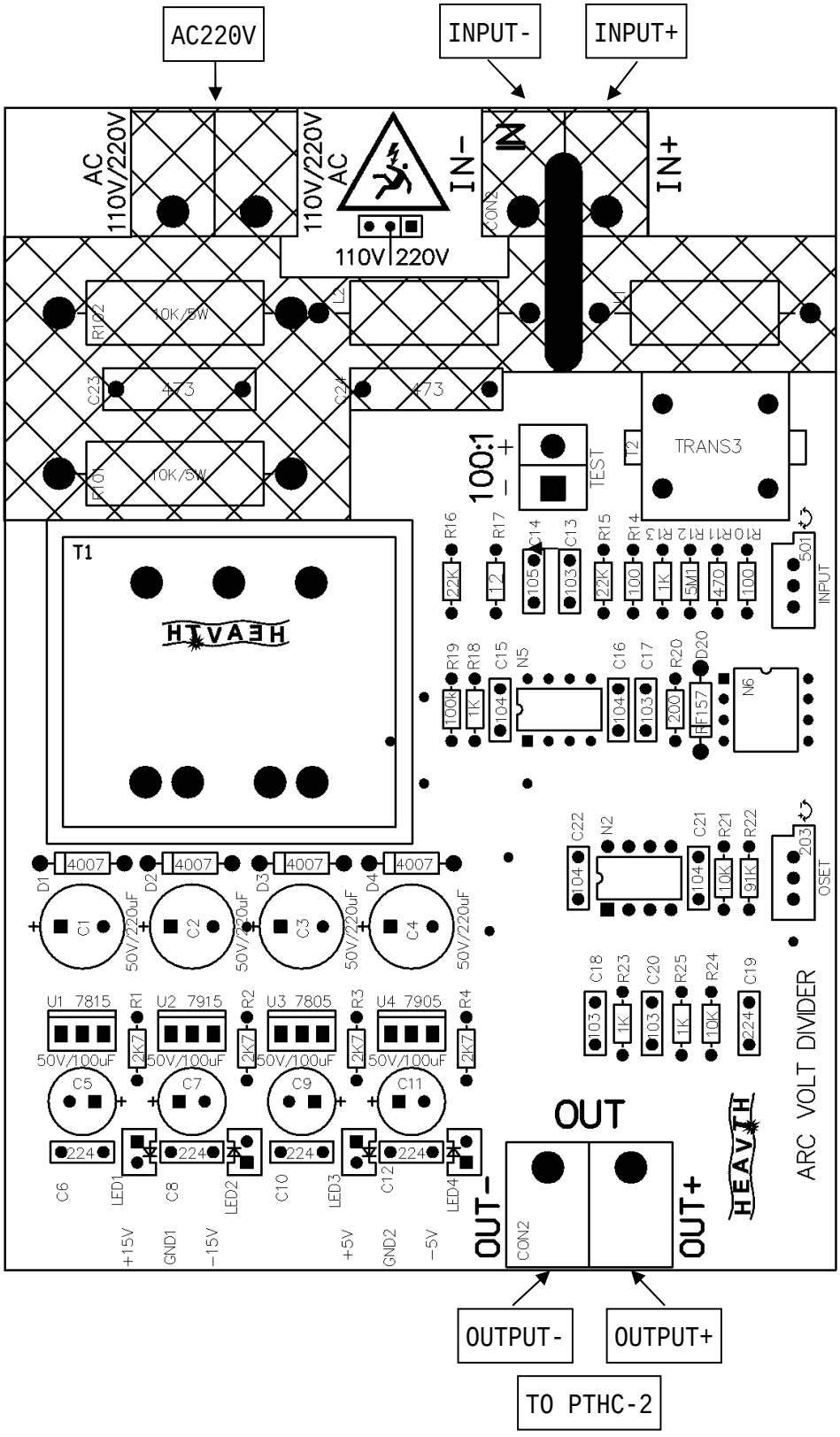


1. Two types of Arc on input signals, please select one of them according the requirement.
2. arc on finishing signal (JP7-PIN6,7) and arc on signal (JP6-PIN1,2) are type of relay
3. Please refer to the chart 5 about **Divided Voltage Board**

Chat2


Inductive Proximity SW
2mm
(NPN)
+15V
GND
Brown
Blue
Black
3
2
1
Inductive
Proximity
Switch
The top base of tongs
(The top base of tongs should be fixed on tongs).
IHS spring
Torch
AC24V1
AC24V2
Approach switches setup method
Please refer to the drawing about the tongs for setup the approach switch. Also you can design it by yourself.
1
2
JP2
JP3
JP5
AC24V2
AC24V1
GND
1. use for over-water cutting and under-water cutting
2. This IHS style is suitable for high frequency arc plasma
3. This IHS style is suitable for under-water cutting
4. It is permitting that no connection between the JP3

Char 4


AC220V
INPUT-
INPUT+
AC 110V/220V
110V/220V AC
110V 220V
IN-
IN+
CON2
R102 10K/5W
R101 10K/5W
C23 473
C24 473
L2
L1
100:1
TEST
T2
TRANS3
T1
R16 22K
R17 12
C14 105
C13 103
R15 22K
R14 100
R13 1K
R12 5M1
R11 470
R10 100
501
INPUT
R19 100k
R18 1K
C15 104
N5
C16 104
C17 103
R20 200
D20 BF157
N6
C22 104
N2
C21 104
R21 10K
R22 91K
203
OSET
D1 4007
D2 4007
D3 4007
D4 4007
C1 50V/220uF
C2 50V/220uF
C3 50V/220uF
C4 50V/220uF
U1 7815
U2 7915
U3 7805
U4 7905
R1 2K7
R2 2K7
R3 2K7
R4 2K7
50V/100uF
C5
C7
C9
C11
C18 103
R23 1K
C20 103
R25 1K
R24 10K
C19 224
224
C6
C8
C10
C12
LED1
LED2
LED3
LED4
+15V
GND1
-15V
+5V
GND2
-5V
OUT
OUT-
OUT+
CON2
HEAVTH
ARC VOLT DIVIDER
OUTPUT-
OUTPUT+
TO PTHC-2

Chat 5

Press the key “FPUP” and “FPDOWN” ,then enter into the cryptic parameters’ setup interface.

order	Parameter	Description	Default
1	MAX_PWM		240
2	MIN_PWM		140
3	IHS_UP_PWM		180
4	IHS_DOWN_PWM		220
5	UP&DOWN_PWM		230
6	ARC_MAX_ERROR		20
7	DELAY_INPUT_TIME		20
8	AUTO_PWM_AMP		5
9	UP_BREAK_TIME		50
10	DOWN_BREAK_TIME		50
11	EMG_LIFT_TIME		20
12	EMG_LIFT_PWM		230
13	INTEL_ADJ_RANGE		20
14	INTEL_ADJ_STEP		5
15	INTEL_ADJ_SIGN		1
16	ARC_ACCURACY		2
17	PEIRCE_ENABLE_SIGN		0
18	IHS_CURRENT_LIMT		100
19	IHS_CURRENT_LIMIT_SIGN		0
20	TORCH_AUTO_MOVE_UP		050
21	PIERCE_MOVE_UP_SPEED		220
22	PIERCE_MOVE_UP_TIME		000
23	PIERCE_OVER_DOWN_TIME		000
24	CHINESE_OR_ENGLISH		000