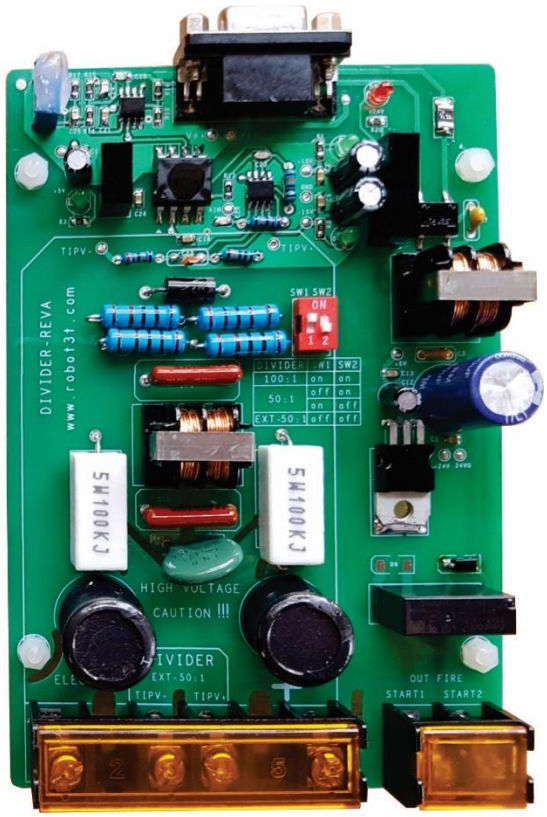
ROBOT3T

THC3T-02 STEP/DIR OPERATION MANUAL



Version 1.0.4

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1. Device information

1.1 Introduction

Compact THC3T-02 with Step/Dir output uses arc voltage to maintain a consistent distance from the plate while the torch is cutting. This allows the system to maintain proper torch height regardless of variations in the material, of flatness of the cutting bed.

Simplified block diagram:

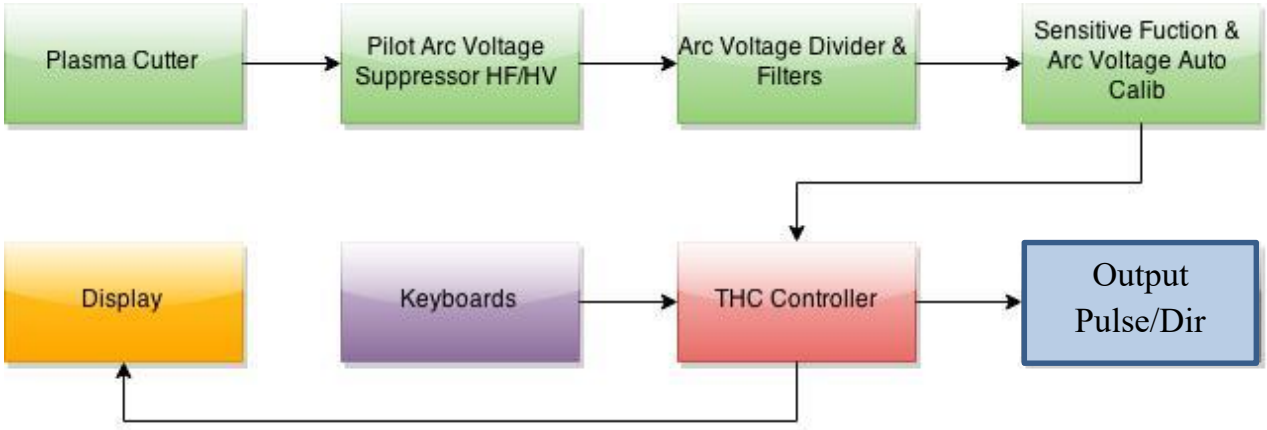


Fig1. Block diagram

The THC3T-02 package includes:

- 1 main board;
- 1 divider board;
- 1 potentiometer + cables.

1.2 Specifications

- Using the potentiometer to set height's torch;
- Voltage divider and noise to obtain the raw signal from the plasma cutting;
- Using signal processing algorithms to derive the voltage stability of the plasma;
- Apply an algorithm to support smooth motion, this is an advantage of Compact THC3T-02;

- Auto calib the arc voltage with any plasma cutter;
- Auto-detect ARC OK;
- Integrated voltage divider 1:50;
- Control directly the Z axes driver with Step/Dir signal, give high performance and more accuracy

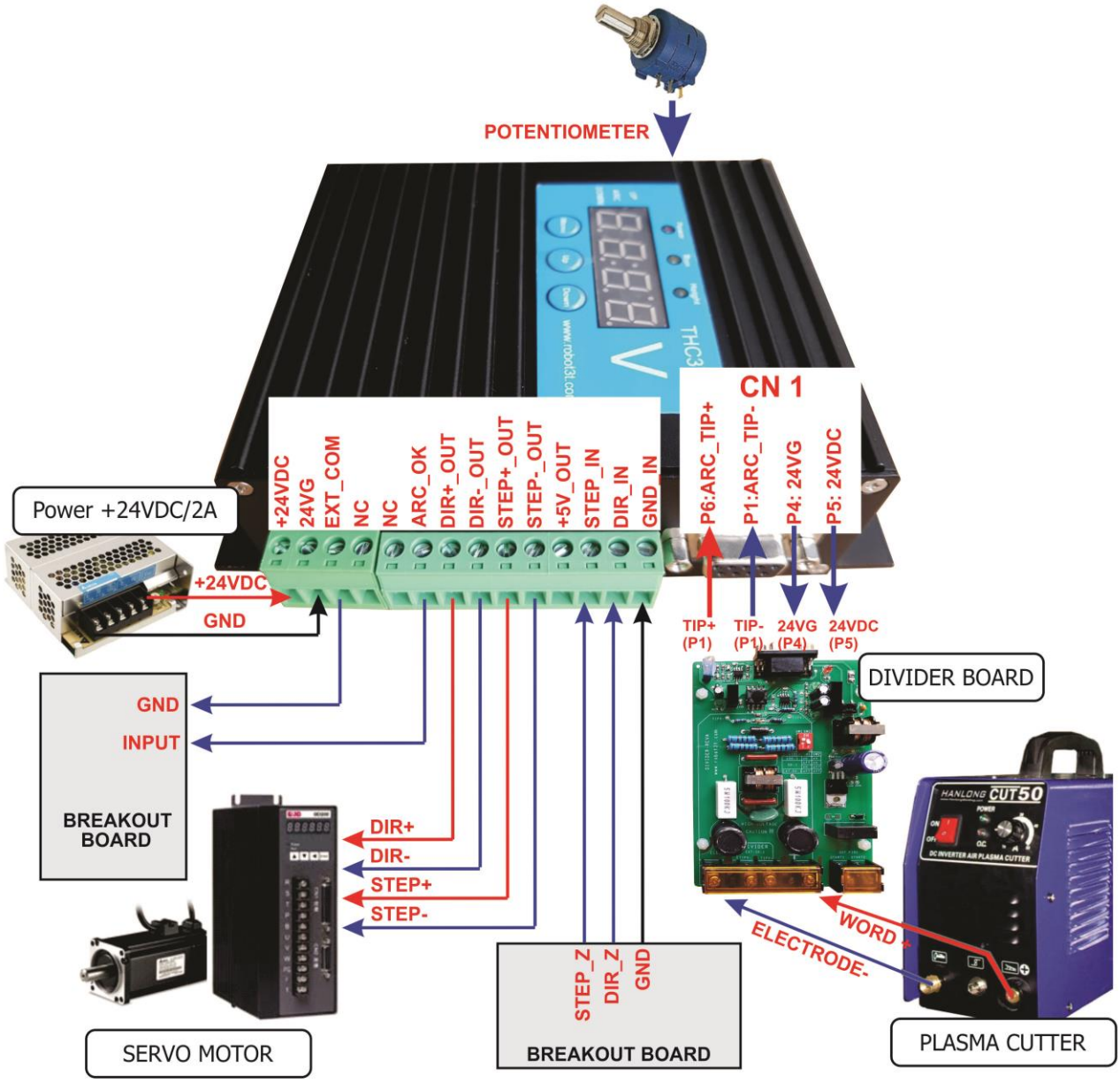


Fig2. Connection block diagram

1.3 Mainboard

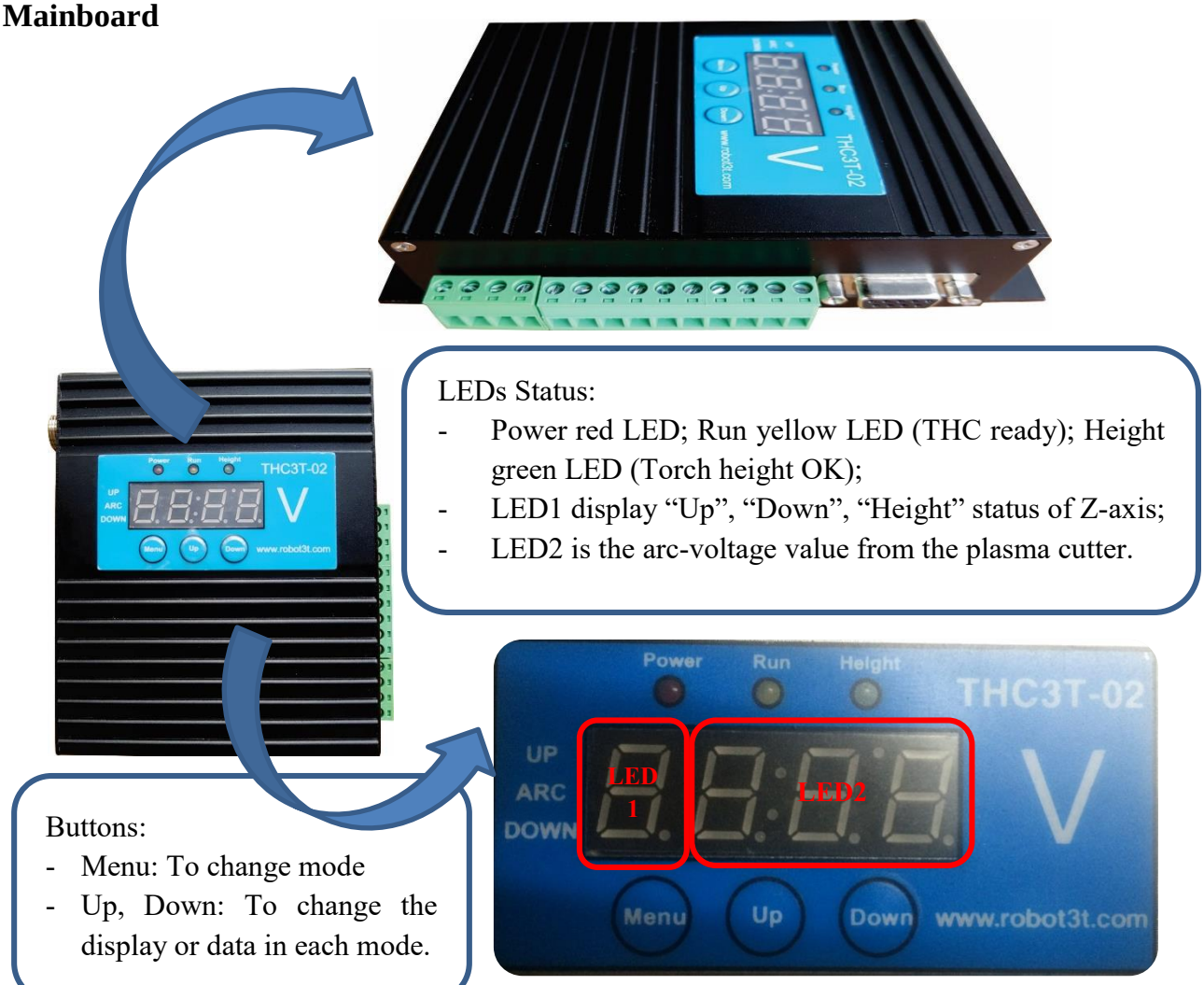


Fig3. Main board

The main parameters of the master board:

Table1. Main parameter

Parameter name	Acceptable
Supply voltage	+24VDC/2A ±10%
Maximum arc-voltage	660VDC
Maximum input voltage of 1:50 divider	+6.6VDC
Maximum current of output relays	150mA/100VDC
Weight	300g
External Dimensions (L * W * H)	95x110x45[mm]

1.4 Divider board

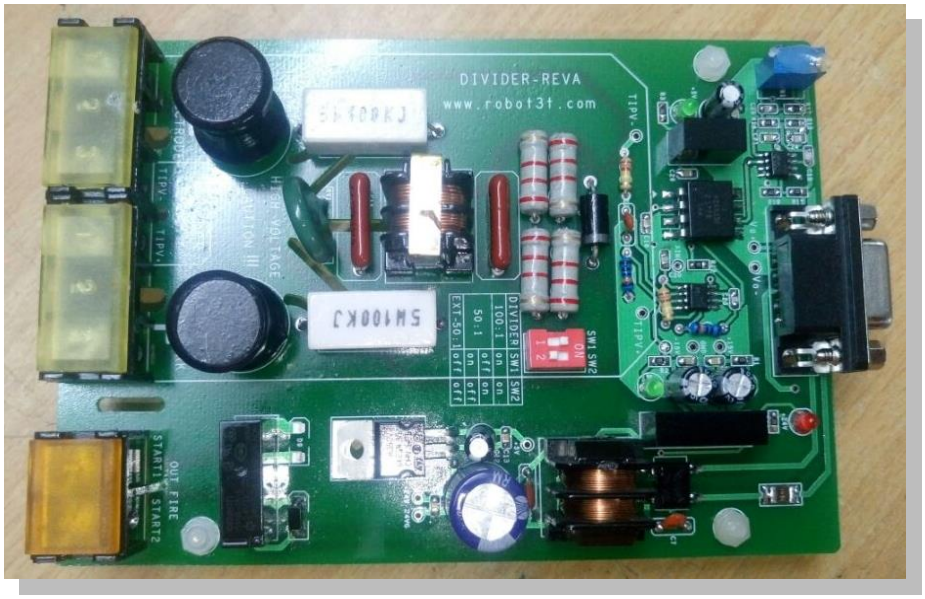
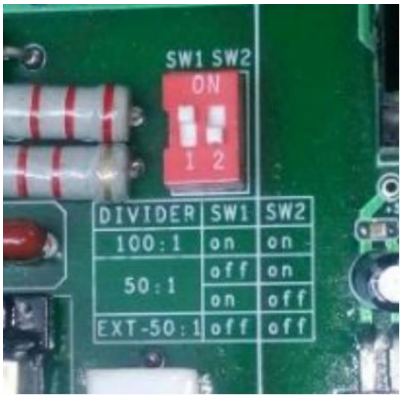


Fig4. DIVIDER board

SW MODE



DIVIDER	SW 1	SW 2	Description
100:1	ON	ON	Voltage divide ratio 1:100
50:1	OFF	ON	Voltage divide ratio 1:50
	ON	OFF	
EXT- 50:1	OFF	OFF	Voltage input of 1:50 divider EXT(extension)

2. Signals summary of THC3T-02

2.1 Power supply

Fig 5. Power Supply

2.2 Arc-voltage

When connecting directly, use the shortest possible cables for connecting the plasma cutter with THC controller - it is recommended the THC controller to be mounted directly at the plasma cutter.

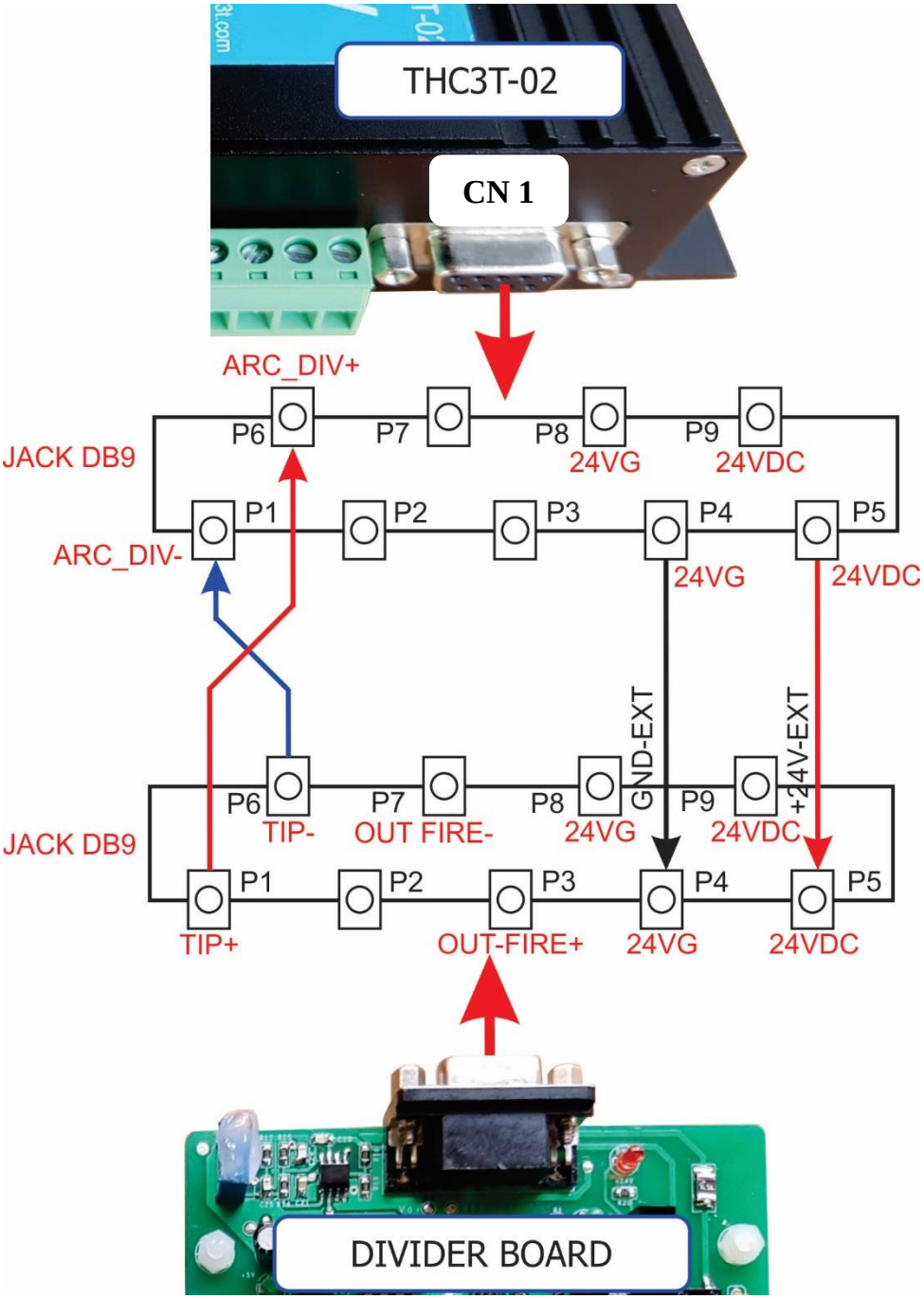


Fig 6. Connect Arc-voltage from DIVIDER board

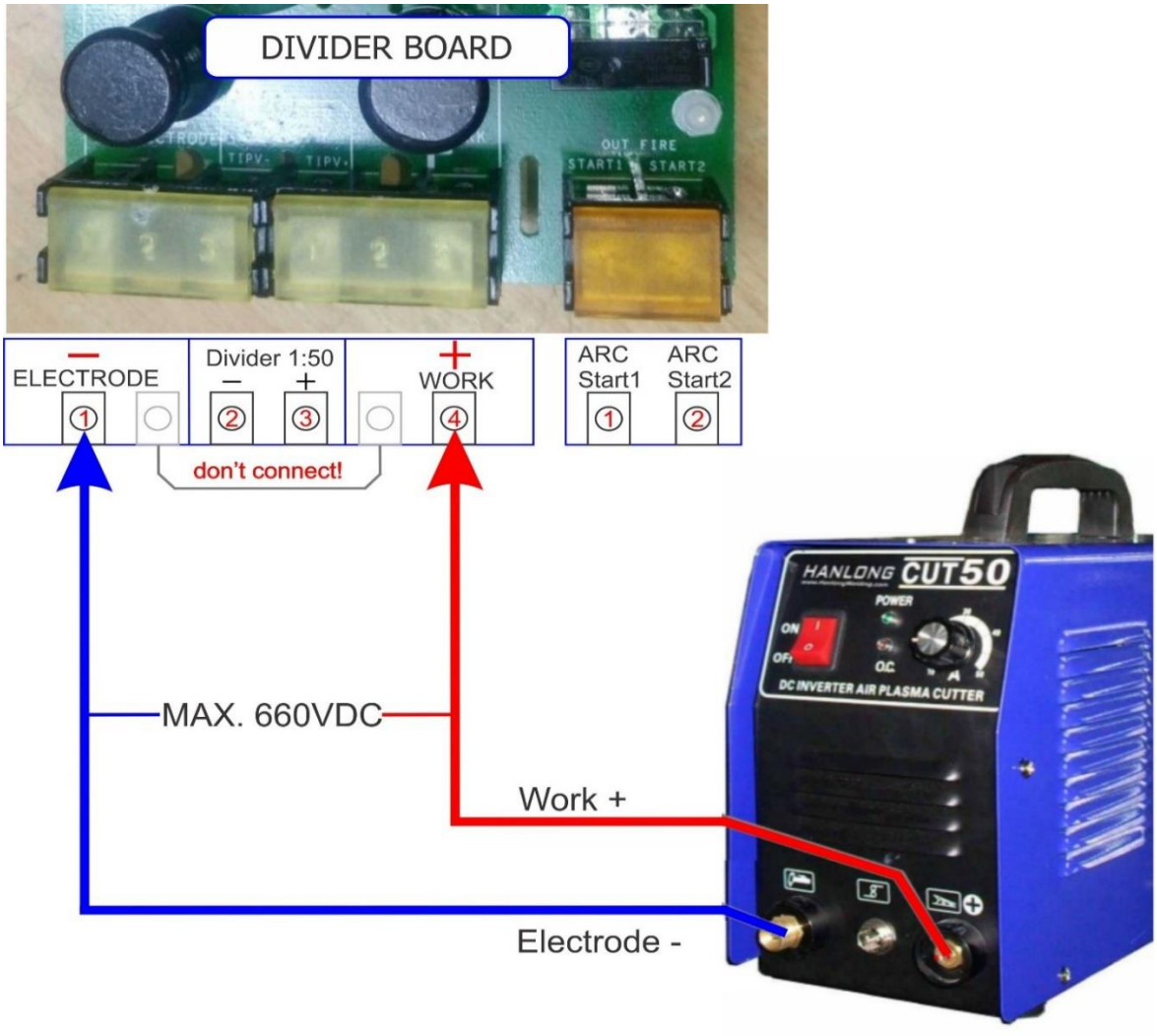


Fig 7: Connecting the plasma source with DIVIDER

While being a universal THC, accepting full raw arc voltage for most any plasma cutter on the market, an exciting new standard feature of this unit is the addition of a 1:50 divider for an extremely fast, simple installation on most major brands. There will most likely be a direct connection for this on the outside of the plasma cutter's unit. Please refer to your plasma cutter owner's manual.

An example of how to connect the THC controller's measurement input with the output of the very popular Hypertherm Powermax45® - The THC comes standard equipped with a low voltage output of 1:50 divider. This ratio is the

most commonly used division in most major brands and there will most likely be a plug for this connection on the outside of the cutter's unit.

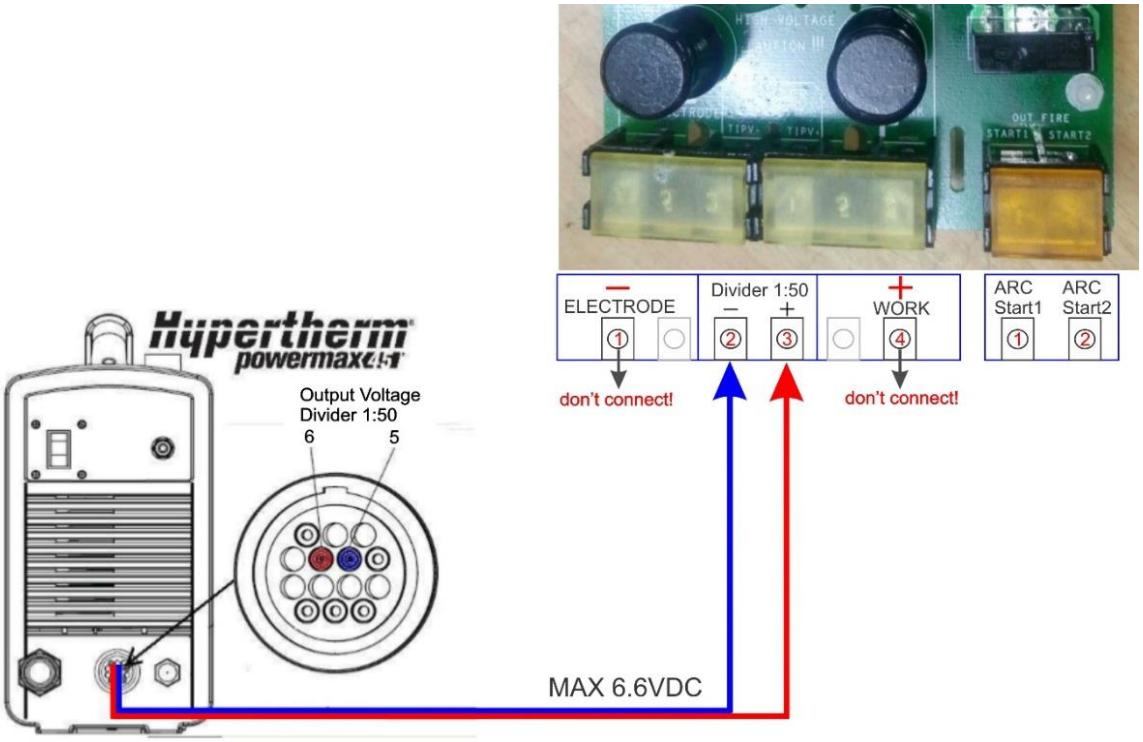


Fig 8. Plasma cutter with voltage divider 1:50 output

2.3 Potentiometer

To set height from torch to material by the potentiometer. (U mode on LEDs display)

Fig9. Connect potentiometer

2.4 Input Step/Dir (Opto)

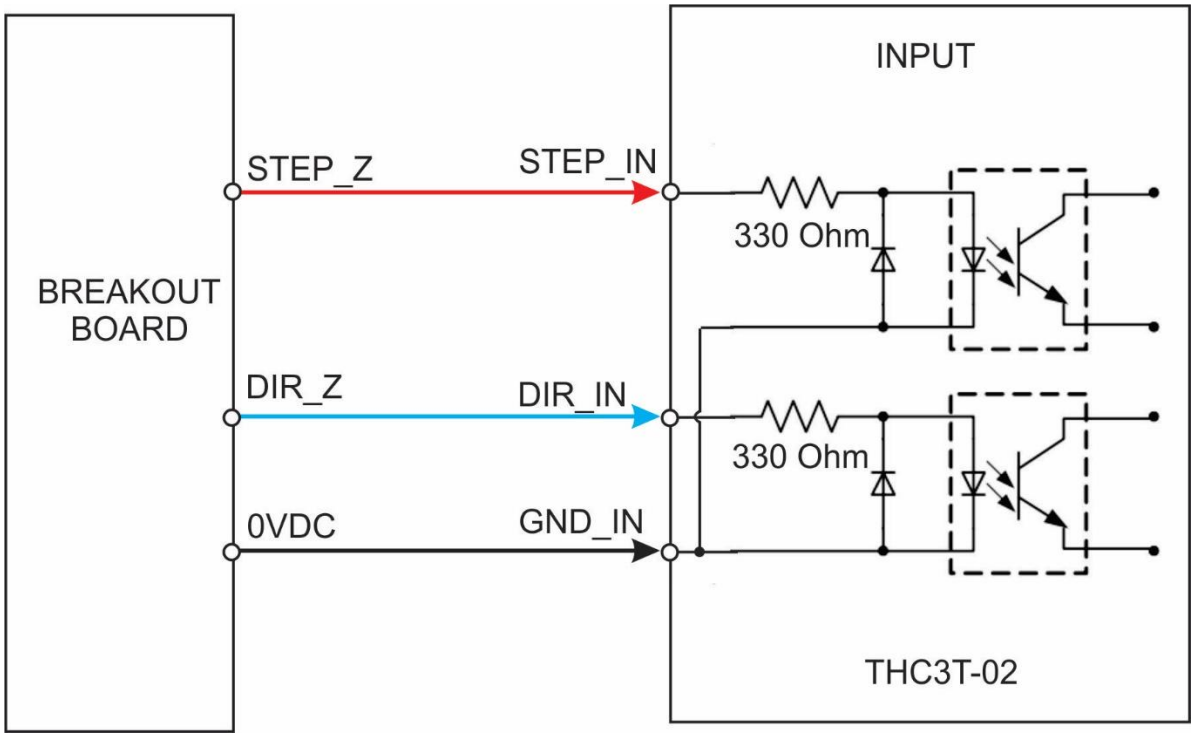


Fig10. Step/dir from breakout board

2.5 Output ARC_OK (Opto)

If the device operated at auto mode, ARC_OK signal is activated.

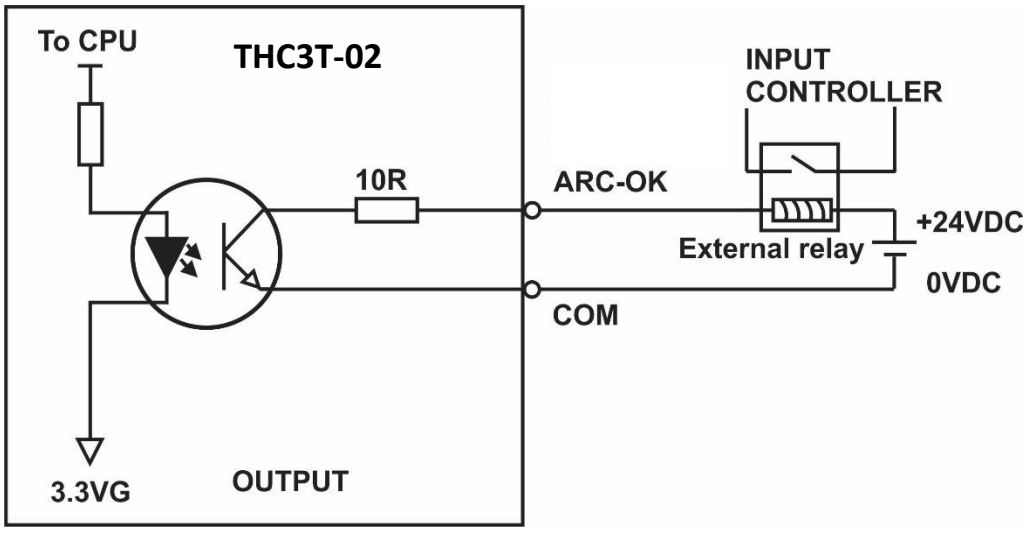


Fig11. ARC_OK output

2.6 Output Step/Dir to Driver-Z

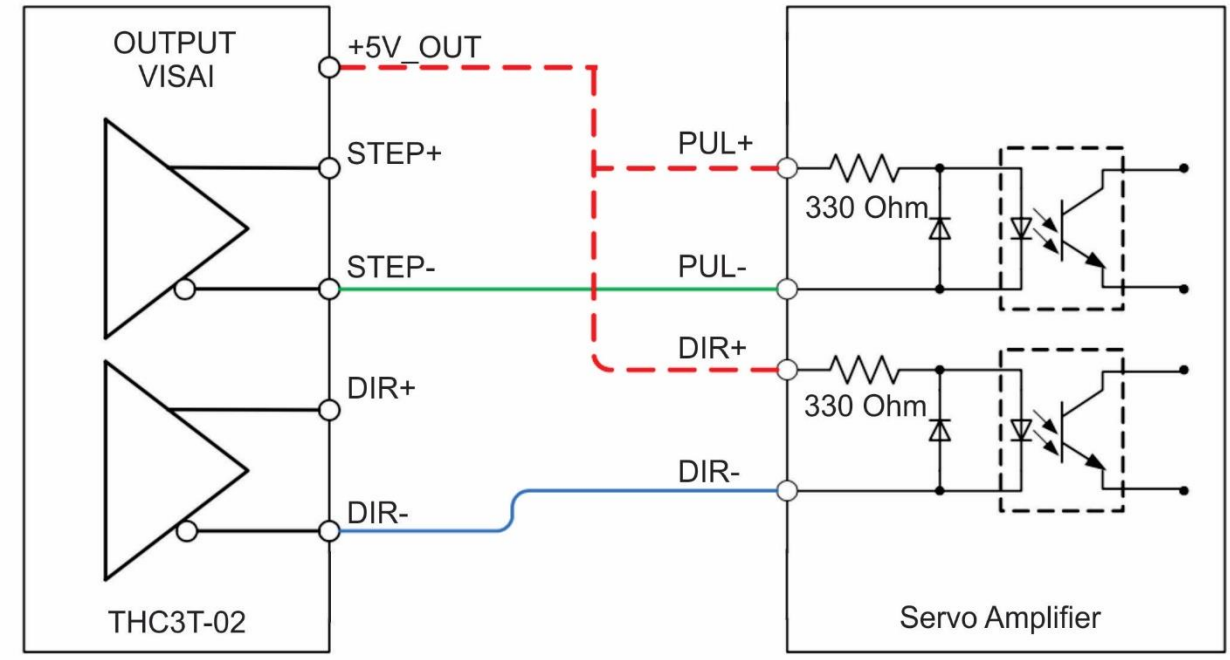


Fig12. Output Step/Dir to driver Z , option 1

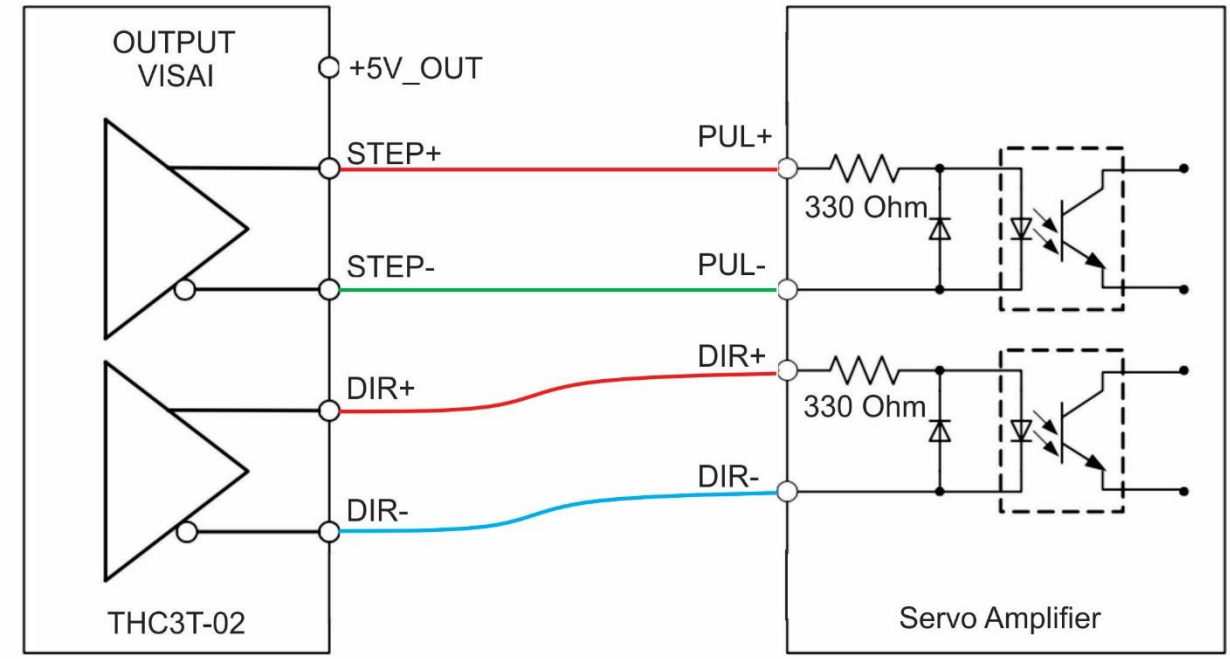


Fig13. Output Step/Dir to driver Z , option 2

3. Setup parameters

Press the "menu" button to choice mode need to set:

Table 2. Parameters on LED display

No	Mode	Value	Description
1	**U** 	Set-height U10 to U300	To set height from torch to material in auto mode by the potentiometer. factory setting: U=150
2	**A** 	Area for control A001 to A050	The device will change to auto mode when the arc voltage from: [Voltage Set - Area for control] to [Voltage Set + Area for control] factory setting: A=75
3	S 	Sensitive S100 to S800	This parameter determines the value respond of Z axis motion. factory setting: S=50
4	**P** 	Arc-voltage P000 to P300	Display the arc voltage value from the plasma cutter.
5	**d** 	Delay time d001 to d099	The delay time to send ARC_OK from 0.1 to 10s: THC will send ARC_OK signal after this delay, the main purpose is Z axis not move down at the first time of cutting. factory setting: d=10 (1s)
6	**v** 	Run speed v001 to v099	Change the speed of the motor from 0 to 100% of max speed. This parameter only affects in STEP/DIR version. factory setting: v = 30
7	**SW6** 	STEP/DIR or UP/DOWN MODE	<table><tr><td>Compact THC</td><td>SW1</td><td>SW2</td></tr><tr><td>**STEP/DIR**</td><td>**OFF**</td><td>**OFF**</td></tr><tr><td>UP/DOWN</td><td>ON</td><td>ON</td></tr></table>

8		Motor Direction	Changing the CW and CCW direction of the Z motor

4. Fast connect

- Step 1: Turn off the plasma cutter.
- Step 2: Connect power supply. (fig. 5)
  - After switching power on, red LED is turned on, the THC controller's display shows "cthc" message, a flashing voltage value is presented for 2 seconds and then run yellow LED blink → Turn off THC power and go to Step 3.
  - In case of, power LED, run LED or LED 4 digit 7 segment display not turn on → *Error.1-page.18*
- Step 3: Connect input pulse/dir from breakout board. (fig.10)

And setup motor tuning Z Axis on Mach3 controller, **Step Pulse =15 and Dir Pulse =15.**

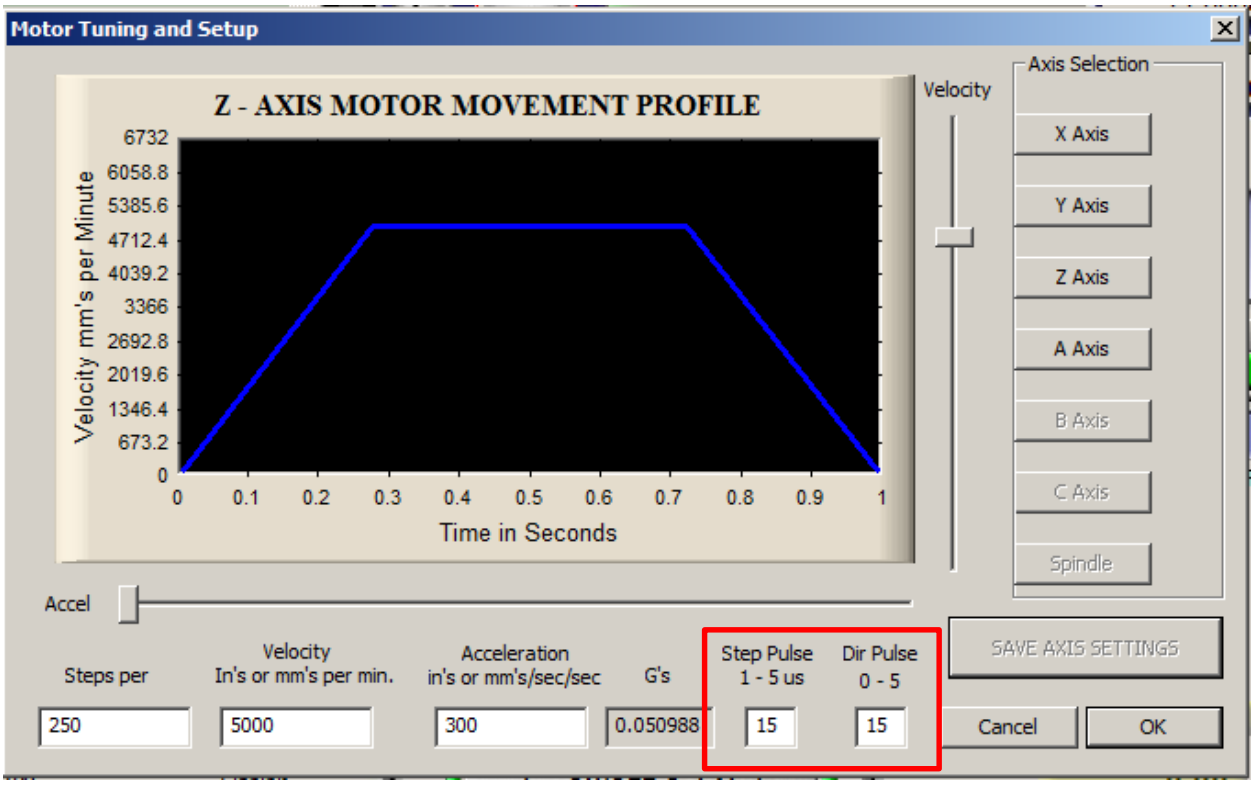


*Fig14. S*etup motor tuning Z Axis on Mach3 controller

- Step 4: Connect output pulse/dir to driver Z (fig.12 and fig. 13)
  - Turn on THC3T-01 and wait yellow LED blink → Jog up/down on MACH3 software to control Z-axis → OK → Turn off THC3T-02 and go to Step5;
  - In case of Z-axis can't go up/down → *Error.2-page.18*
- Step 5: Arc_Ok output. (fig.11)
- Step 6: Connect Arc-voltage (fig. 6&7)
  - Turn on THC3T-02 and wait yellow LED blink. Press the "menu" button 4-times to select "**P**" mode (fig.15)

Fig15. ARC-voltage parameter

  - **Turn on plasma cutter** and read arc-voltage area on LED display (example: Arc-voltage area from 110 to 120) →**Turn off plasma cutter** and go to step 7.
  - In case of, THC doesn't have arc-voltage → *Error.3-page.18*
- Step 7: Press "menu" button to select "**U**" mode and using the potentiometer to set "set-height" parameter value (fig.16)
  - Example: If the arc-voltage area on "**P**" mode from 145 to 155 then:

Set-height = (145+155)/2=150.

Fig16. Voltage set-point parameter

- Step 8: Press "menu" button to select "**A**" mode (fig.17). This parameter value set about 30. Device will change to auto mode when:

[Set-height – Area for control] < Arc_voltage < [Set-height + Area for control]

Example: "**U**" mode: Set-height = 150;

"**A**" mode: Area for control = 30.

Device will change to auto mode and turn on relay ARC_OK when:

120 < Arc_volatge < 180.

Fig17. Area for control parameter

Arc_voltage (P) = Set-height (U)	Height green LED turn on
Arc_voltage (P) > Set-height (U)	Z-axis goes down
Arc_voltage (P) < Set-height (U)	Z-axis goes up

- Step 9: Press "menu" button to select work-screen (fig.18) and turn on the plasma cutter to using.

Fig18. Area for control parameter

All parameters updated online during operation.

5. Fault processing

No.	Code	Name	Causes	Countermeasures
1	Error.1	Power fault	-The THC is broken; -The power is not connected; -The line of the power supply is broken;	-Replace the THC; -Connect the power supply; -Check that the power line is wired correctly; -Replace the power cable
2	Error.2	Step/dir fault	-The power of the breakout board and drive Z are not connected; -The line of step/dir from breakout board to THC is broken or not connected; -The line of step/dir from THC to drive is broken or not connected; -Configuration on MACH3 is not corrected; -The breakout board or drive-Z are broken; -The THC is broken;	-Check that the power line are wired correctly; -Check that the step/dir line is wired correctly or replace; -Check that the step/dir line is wired correctly or replace; -Check that configuration on MACH3; -Replace breakout board or drive-Z; -Replace the THC.
3	Error.3	Arc-voltage fault	-The power of the plasma cutter is not connected; -The line of arc-voltage from divider board to THC is broken or not connected; - The THC is broken;	-Connect the power supply; -Check that the step/dir line is wired correctly or replace; -Replace the THC.

6. Warranty Period and Coverage

6.1 Warranty Period

12 months after being shipped from our factory.

6.2 Warranty coverage

During the warranty period, we will repair without charge any problems on the board that occurredwhile it was being used appropriately, and where the cause of the problem is due to us.

However, the following cases will be not be covered by the warranty, even if the warranty period has not expired.

- Problems caused by inappropriate handling or use.
- Problems caused by using parts not made or approved by us.
- Problems caused by modifications made to the board that was not authorized by ROBOT3T.
- Problems caused by disasters, accidents, or fires.

We warranty only the product as delivered, and we do not accept responsibility for any loss caused by a fault in our product. We will repair the board when the user sends it to our plant

6.3 Notes on safety

Improper use or disregard of these warnings may result in the injury or death of people.

- Do not, in any manner, process, take apart, or make changes to this product.
- When installing this product, we recommend that if technical knowledge becomes necessary please consult a qualified mechanic.
- Do not operate this product with wet hands, wet gloves, or any wet clothing.
- Before turning the unit on, secure the safety of others, and read and understand

  all instructions. If you have any questions or concerns, do not continue.

- After assembly, secure protection of contact terminals from the operator's touch.

- For more information, please do not hesitate to contact us at:
  - E-mail: *sales@robot3t.com*
  - Website: *www.robot3t.com*

Thank you for purchasing ROBOT3T product.

Please read this manual carefully and keep it for future reference.