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.
- Provide adequate protection for all risks associated with plasma cutting.
- 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 operator's touch.

Here are the addresses where you can get help if you encounter problems:

- 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.

1. Device information

1.1 Introduce

Compact THC3T-01 with Up/down 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:

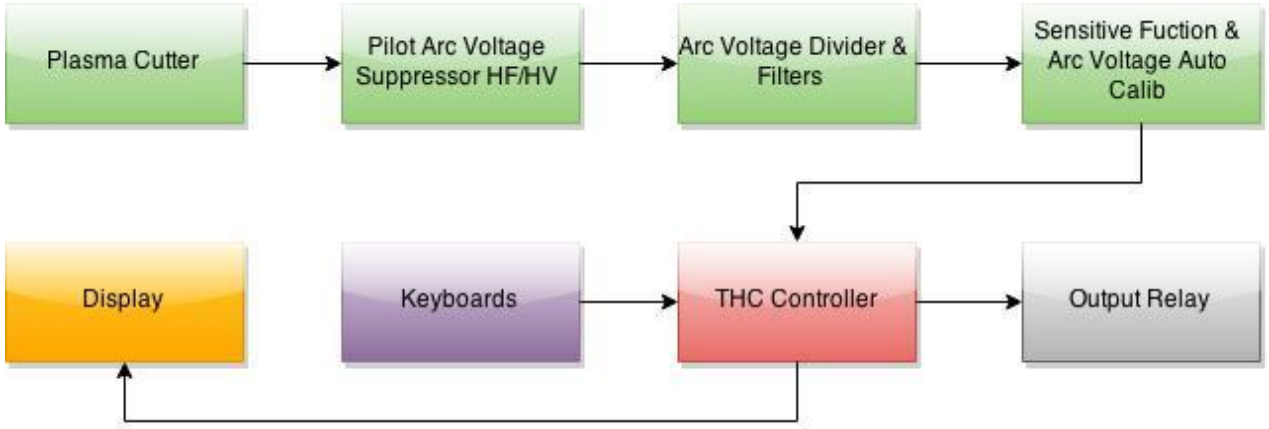

Fig1. Block diagram

The THC3T-01 package includes:

- 1 main board;
- 1 divider board.

1.2 Specifications

- 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 a algorithm to support smooth motion, this is a advantage of Compact THC3T-01;
- Auto calib the arc voltage with any plasma cutter;
- Auto detect ARC OK;
- Easy to connection, just three outputs: UP, DOWN, ARC OK
- Integrated voltage divider 1:50;
- This version is specify to integrated with Mach3 software.

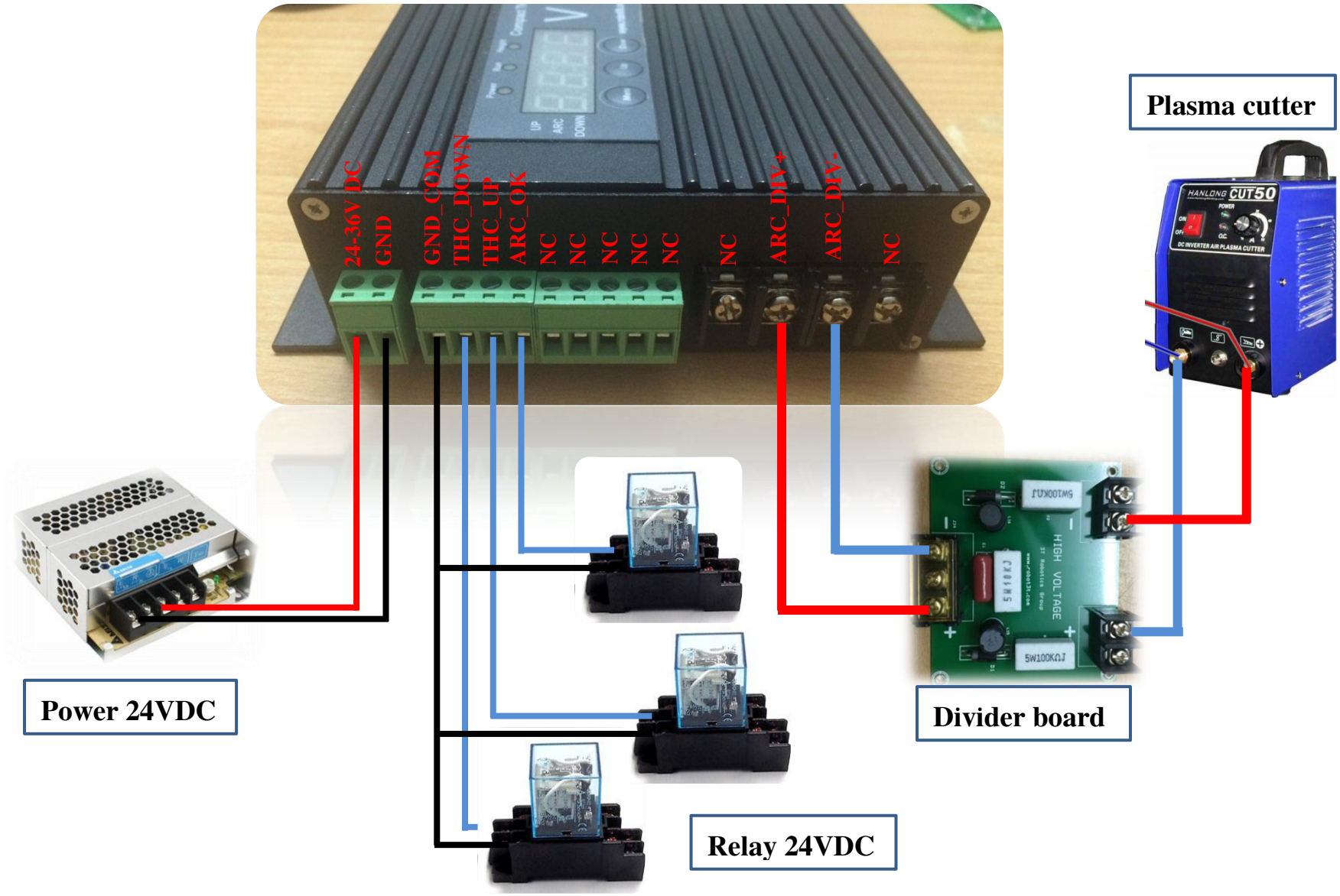

Fig2. Connection diagram

1.3 Main board

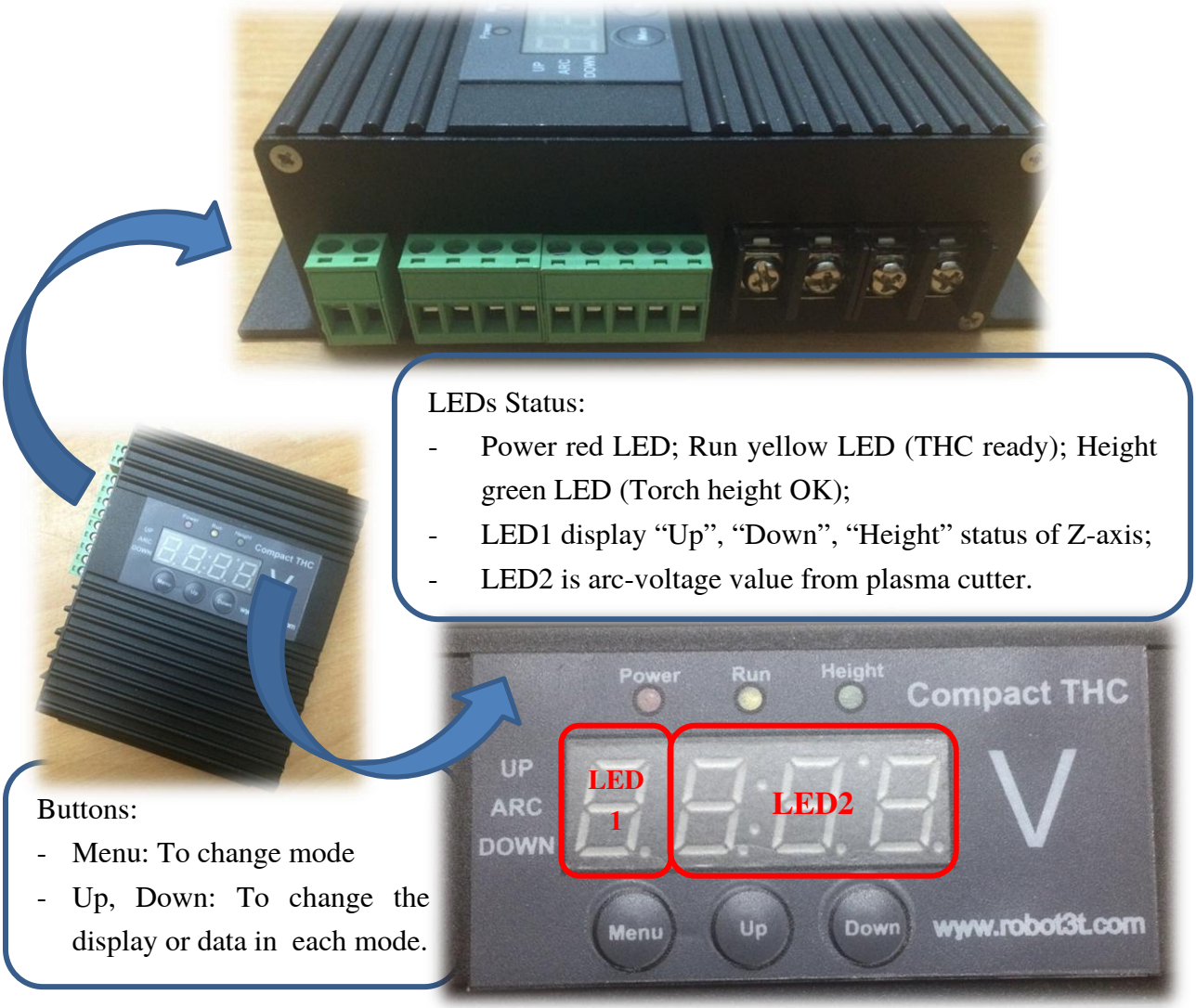

Fig3. Main board

The main parameters of the master board:

Parameter name	Acceptable
Supply voltage	24 - 36V DC
Maximum arc-voltage	1000VDC
Maximum input voltage of 1:50 divider	10VDC
Maximum current of output relays	150mA/100VDC
Weight	300g
External Dimensions (L * W * H)	95x110x45[mm]

Table1. Main parameter

1.4 Divider board

Fig4. Divider board

2 Setup parameters

Press “menu” button to choice mode need to set:

No	Mode	Value	Description
1	**U** 	Set-point U10 to U300	To set height from torch to material in auto mode.
2	**A** 	Area for control A001 to A050	Device will change to auto mode when the arc voltage from: [Voltage Set - Area for control] to [Voltage Set + Area for control]
3	**S** 	Sensitive S100 to S800	This parameter determines the value respond of Z axis motion.
4	**P** 	Arc-voltage P000 to P300	Display the arc voltage value from plasma cutter

Table2. Parameters on LED display

3 Signals summary of THC3T-01

3.1 Power supply

Fig5. Power Supply

3.2 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.

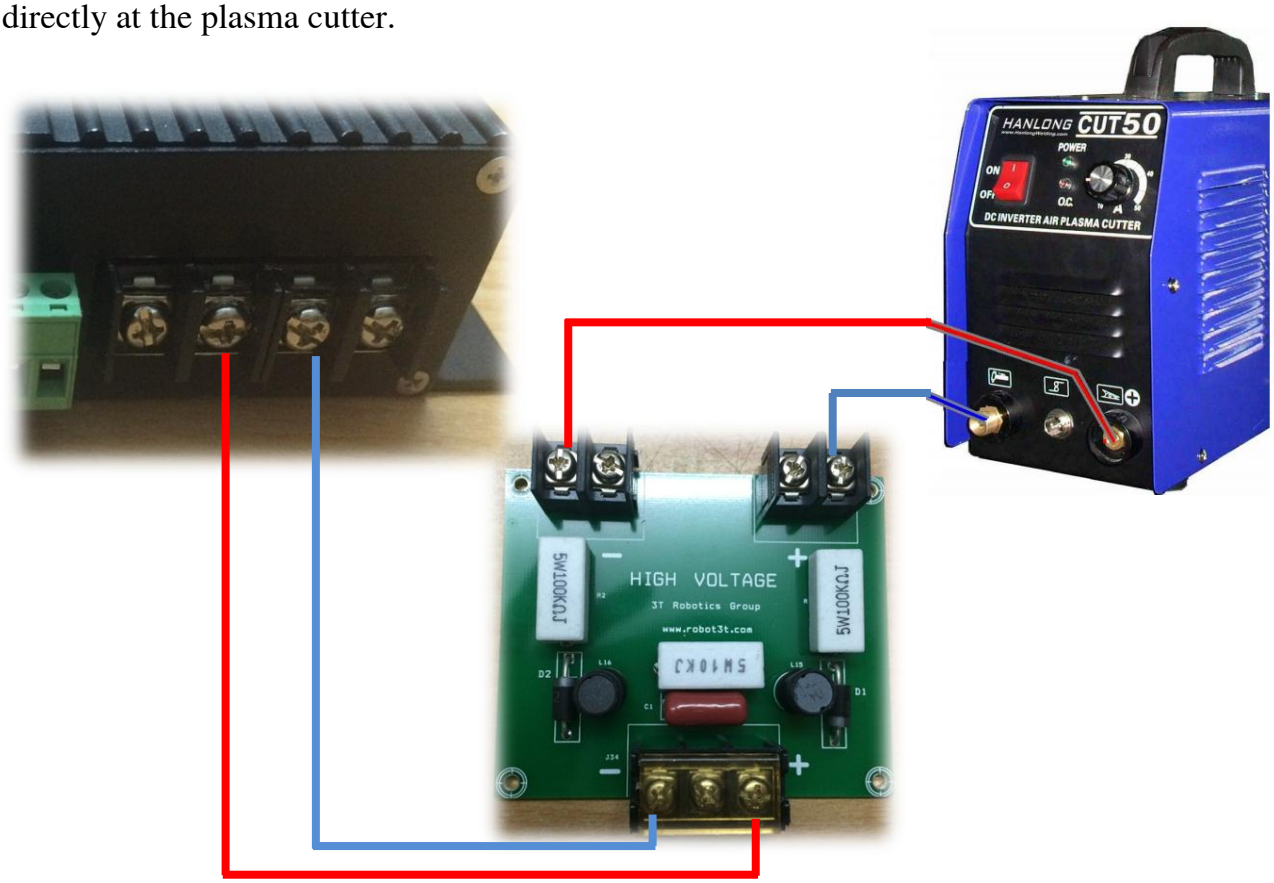

Fig6. Connect Acr-voltage from divider board

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.

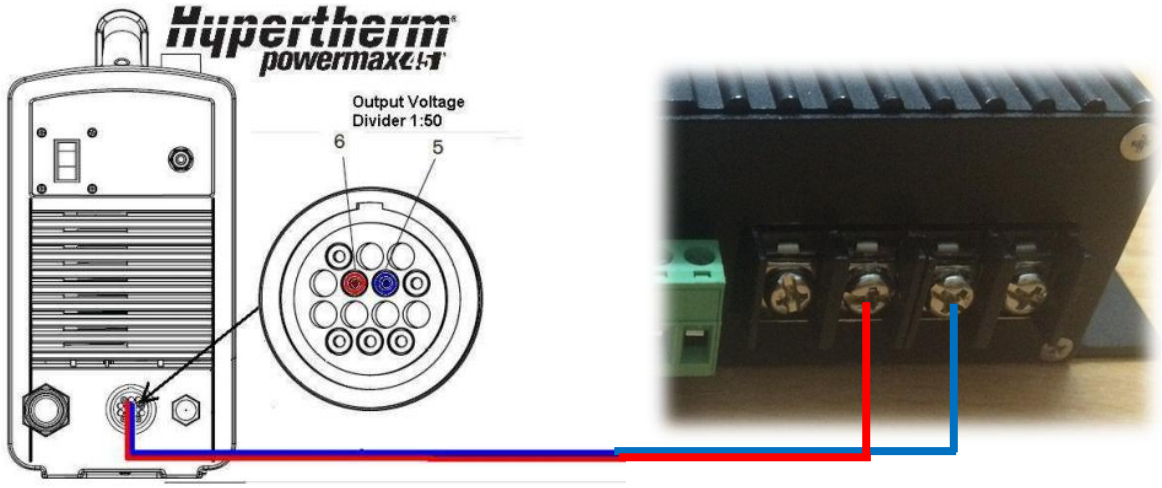

Fig7. Plasma cutter with voltage divider 1:50 output

3.3 ACR_OK output

If the device operated at auto mode, ARC_OK signal is activated (active-high)

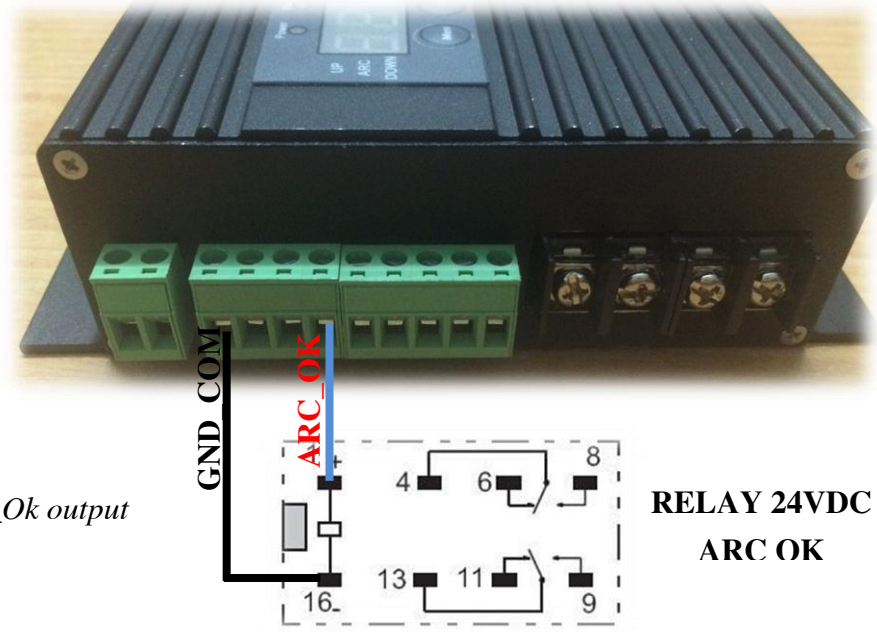

Fig8. Arc_Ok output

3.4 THC_UP & THC_DOWN outputs

Outputs is activated when the measured voltage is lower (UP) or higher (DOWN) than the voltage set-points (active HIGH).

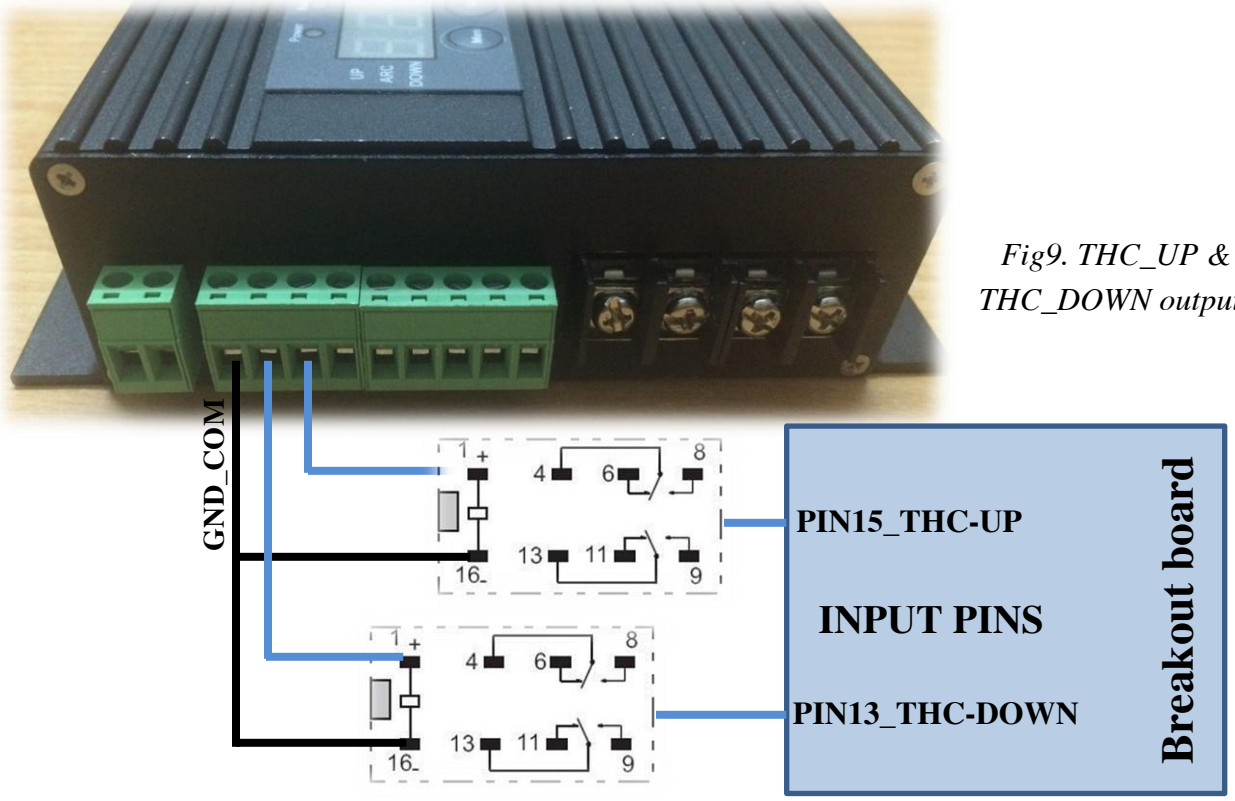

Fig9. THC_UP & THC_DOWN outputs

4. Fast connect

- Step 1: Turn off plasma cutter.
- Step 2: Connect power supply.

Fig10. Power supply

- After switching power on, red LED is turn on, the THC controller's display shows "thc" 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.12*

- Step 3: Connect Arc_Ok output.

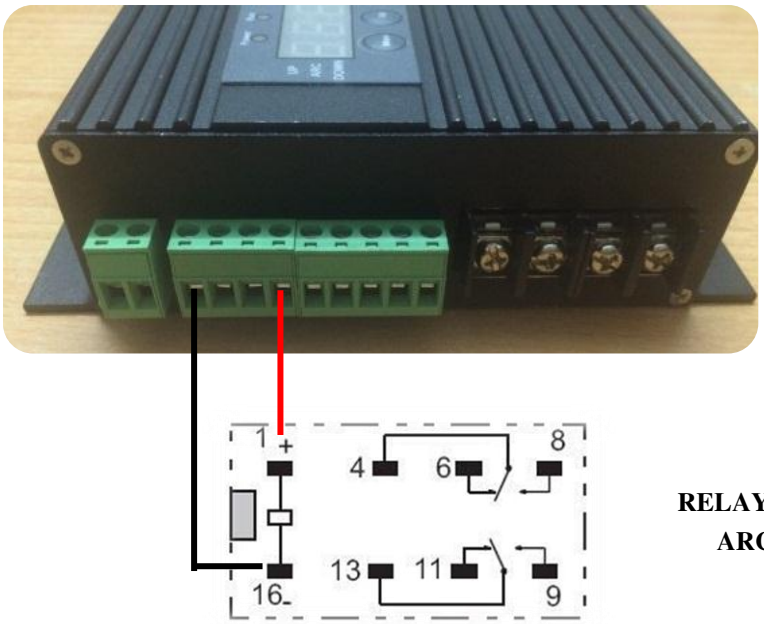

Fig11. Connect with relay Arc_ok

RELAY 24VDC
ARC OK

- *Step4: Connect THC_UP & THC_DOWN outputs*

- Step5: Connect Arc-voltage (page.6&7)
  - Turn on THC3T-01 and wait yellow LED blink. Press "menu" button 4-times to select "**P**" mode (fig.12-page.10).

Fig12. 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 6.
  - In case of, THC don't have arc-voltage → *Error.2-page.13*
- Step 6: Press "menu" button to select "**U**" mode and using "up", "down" buttons to set "set-point" parameter value (fig.13-page.10)
  - Example: If arc-voltage area on "**P**" mode from 145 to 155 then:

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

Fig13. Voltage set-point parameter

- Step 7: Press "menu" button to select "**A**" mode (fig.14-page.11). This parameter value set about 30. Device will change to auto mode when:

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

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

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

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

  120 < Arc_volatge < 180.

Fig14. Area for control parameter

Arc_voltage = Set-point	Height green LED turn on
Arc_voltage > Set-point	THC_DOWN signal is activated
Arc_voltage < Set-point	THC_UP signal is activated

- In case of, THC3T-01 operate at auto mode, relay Up, Down or ARC_OK not turn on → *Error.3-page12*

➢ Step 8: Press "menu" button to select work-screen (fig.15-page.11) and turn on plasma to using.

Fig15. Area for control parameter

<u>All parameters updated online during operation.</u>

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 power supply is broken;	-Replace the THC; -Connect the power supply; -Check that the power line are wired correctly; -Replace the power cable
2	Error.2	Arc-voltage fault	-The power of 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 arc-voltage line are wired correctly or replace; -Replace the THC.
3	Error.3	Outputs fault	-The line of relay to THC is broken or not connected; -Don't have arc-voltage; -**[Arc voltage > (set-point) + (Area of control)]** or **[Arc-voltage < (set-point) – (area of control)]**	-Check that the relay line are wired correctly or replace; -Check that the arc-voltage line are wired correctly or replace; -Set parametes on "U" mode and "A" mode.

Table 3. Fault

6. Example for MACH3 configuration:

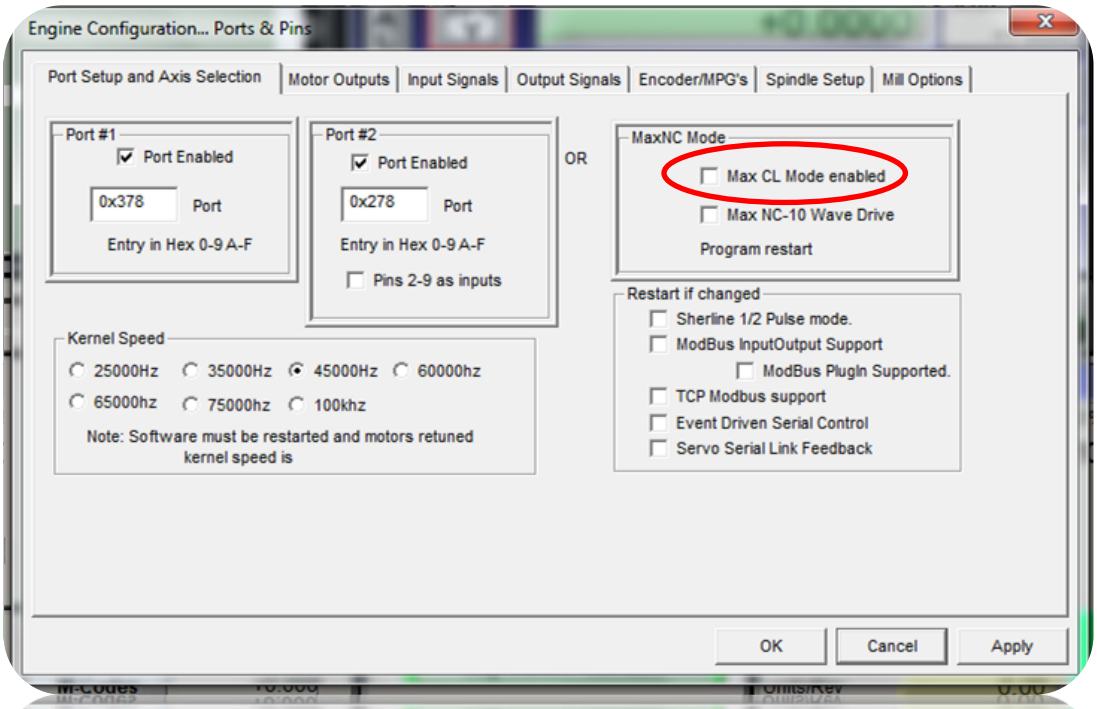

Fig16. Port setup and Axis selection

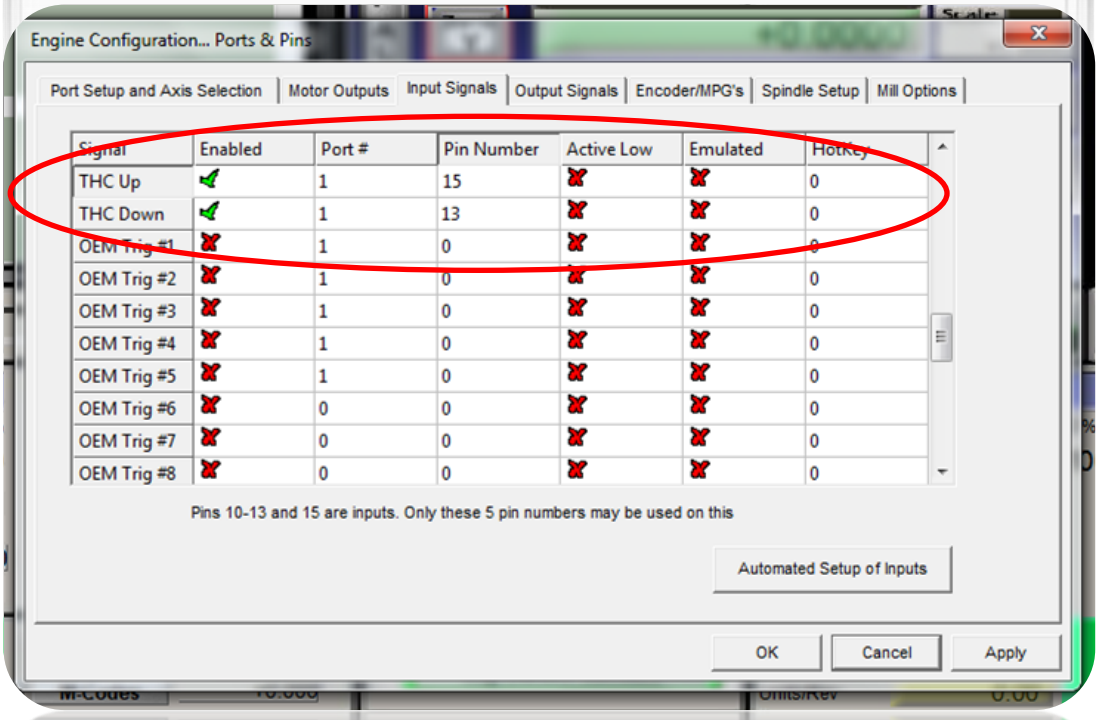

Fig17. Input signals

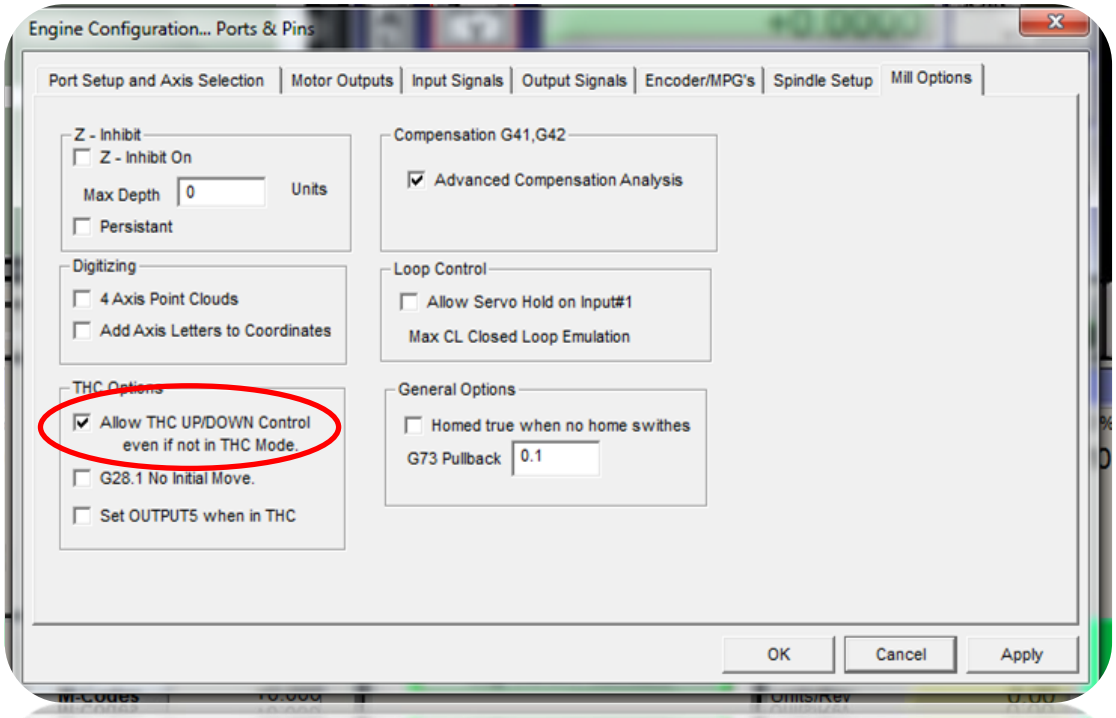

Fig18. Mill options

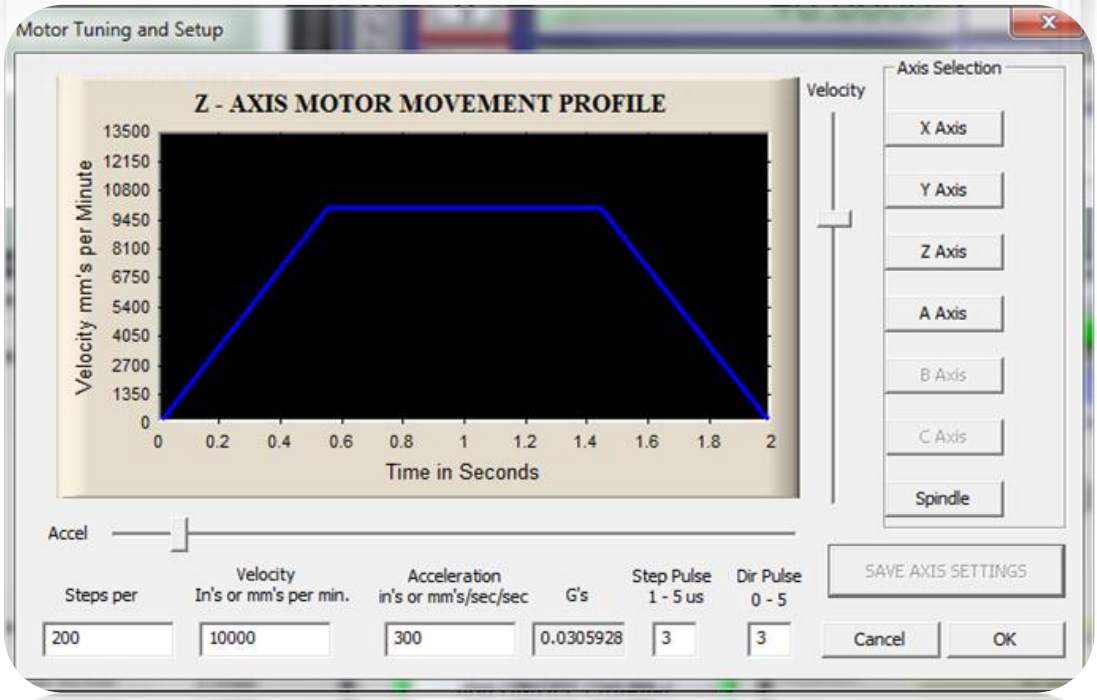

Fig19. Motor turning Z axis

User need to config steps per, velocity and acceleration suitable to your system.