SoftCircuits

User's Guide
Plasma Torch Height Controller (PTHCF-21)

November 2021

Version 1.1

This manual describes the operation of the SoftCircuits Plasma THC (PTHCF-21), a controller for the height of plasma cutter's torch.

SoftCircuits Cloud Innovation Pvt. Ltd.
Sultanpur Colony, New Delhi-110030
Delhi, India
Mail: connect@softcircuits.in
Web: www.softcircuits.in

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- SoftCircuits ("Seller") warrants that the Products will operate substantially in conformance with Seller's published specifications, when subjected to normal, proper and intended usage by properly trained personnel, for a period of six (6) months from the date of shipment to Buyer (the "Warranty Period").
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- No individual has authorization to alter the provisions of this warranty policy or its amendments.

Returned or Damaged Goods

- Do not return goods without the prior authorization from SoftCircuits or the dealer. Unauthorized returns will not be accepted. If your shipment was damaged in transit, you must file a claim directly with the freight carrier. SoftCircuits and its dealers are not responsible for shipping damages.
- All users of this equipment are required to become familiar with any regulations that apply in the user's area concerning the dumping of waste materials in or upon water, land, or air and to comply with such regulations.
- SoftCircuits is held harmless with respect to user's compliance with such regulation

Standards and Safety

	Install THC Modules in accordance with local and national electrical codes.
	**High Voltage Caution**: High voltages are generated by plasma cutters which may be hazardous to human life.
	**Ground Hazard:** Make sure the machine is properly grounded. No grounding may result in fatal electric shock and/or may damage electronic equipment.

Warning:

- Read and understand the entire manual very carefully before installation and operation of the Plasma THC. Please see the plasma cutter manufacturer's operating manual for information on eye, skin, and hearing protection, as well as other information required to safely operate the equipment.
- Extreme caution must be taken while operating plasma arc cutting systems, as there exist high voltages, presenting the risk of fatal shock and other health hazards. Sufficient protection must be provided for all risks associated with operation of plasma cutting systems.

The user must strictly comply with the following (not all inclusive):

- This device should not be installed by an unqualified person.
- Do not continue if you have any ambiguities regarding the device or the system operation. Contact SoftCircuits or an experienced person for assistance.
- The device should not be operated with wet hands, wet clothes or wet gloves.
- Do not touch any electrical connector, non-insulated element or non-grounded element. Take necessary measures to ensure that the terminal connectors are guarded against operator's touch.
- Making any repairs or modifications to the SoftCircuits plasma THC is strictly forbidden! Doing so will void the warranty and may cause injury or death of the operator or others.

Terms of Use

By proceeding with installation and use of this product, the user fully understands and agrees that neither SoftCircuits nor their distributors, are liable for any incident or event resulting in direct loss, indirect loss, injury, damage to property, or loss/damage of any kind. End user assumes all risks. If you do not agree to these terms in its entirety kindly do not proceed further, and return this product for a full refund.

Table of Contents

1. Introduction

Introducing the SoftCircuits Plasma THC

A Torch Height controller (THC) is the hardware that controls the position of the plasma cutter's torch relative to the material that is being cut by the plasma CNC. PTHCF-21 is a fully isolated Plasma THC which is designed to automatically control the plasma's torch height using a feedback mechanism. This THC can be used with any CNC control system which accepts torch Up and Down signals, eg. MACH 3, LinuxCNC, CNConv, Planet CNC etc. The main components of PTHCF-21 are shown in figure 1-1

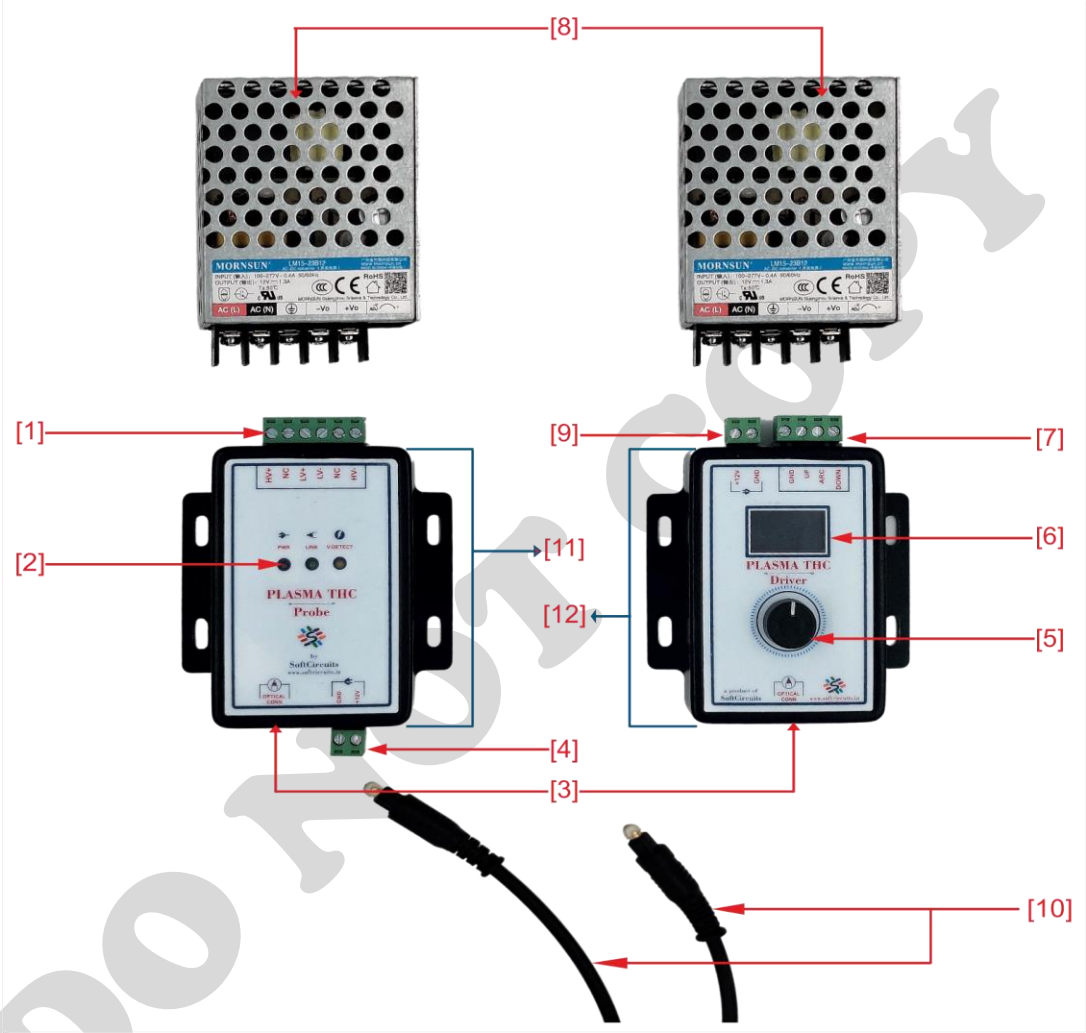


Figure 1-1 Parts of SoftCircuits Plasma THC

[1] 6-Pin connector	[7] 4-Pin connector to connect to CNC controller
[2] LED Indicators	[8] 12V Power supply
[3] Connectors for Optical cable	[9] Power input connector for THC Driver
[4] Power input connector for THC Probe	[10] Optical Cable
[5] Rotary Knob	[11] PTHC Probe Module
[6] OLED Display	[12] PTHC Driver Module

Package Contents

You will receive the following parts inside the SoftCircuits Plasma THC package:

- PTHC Driver Module
- PTHC Probe Module
- Power supply (2 units, one for the Driver and one for the Probe)
- Optical Cable

Main Features

- SoftCircuits Plasma THC, PTHCF-21, has a general purpose design that is compatible with all controllers that accept torch up and down signals.
- The OLED and rotary knob make the THC very easy to install, configure and operate.
- The Plasma THC has 2 parts - **PTHC-Driver** (controller unit) and the **PTHC-Probe** (for voltage sensing), which are connected via an optical cable.
- **PTHC-Probe** is installed close to the plasma source. It connects to plasma voltage and runs from a 12VDC supply (provided with the device).
- **PTHC-Driver** unit is installed closer to the CNC controller. It gives signal to the CNC controller for torch UP, DOWN and ARC OK. It operates via a 12VDC supply (provided with the device)
- These 2 modules are connected via an optical cable which suppresses any high voltage electrical interference, EMI, spikes etc, which are very common in plasma CNC and can damage the plasma CNC.
- There is a complete isolation between the plasma source and the CNC controller.
- A Robust and low noise design ensures that there is no machine malfunction due to electrical noise.

Technical Specifications

The technical specifications for the 3 main parts of THC (i.e. Plasma THC Driver, Plasma THC probe and Power supply modules) are shown in the following table:

Plasma THC Probe	
Input Power	12VDC , 500mA (included with the THC)
Operating Temperature	0°C to 40°C
Operating Humidity	95% RH
Arc voltage Range	20V to 300V
Duty Cycle	100%
Weight	150g
Dimensions (in mm)	61x92x29

Plasma THC Driver	
Input Power	12VDC , 500mA (included with the THC)
Operating Temperature	0°C to 40°C
Operating Humidity	95% RH
UP, DOWN, ARC OK signals	5V TTL
Duty Cycle	100%
Weight	150g
Dimensions (in mm)	61x92x40

Power supply

Power supply modules provided in the package for both Driver and Probe are identical, with the following ratings:

- Input voltage : 85 - 305VAC
- Output current : 1.3 A

Electrical Connections

The connections of the Plasma THC to the main CNC control system are shown in figure 1-2.

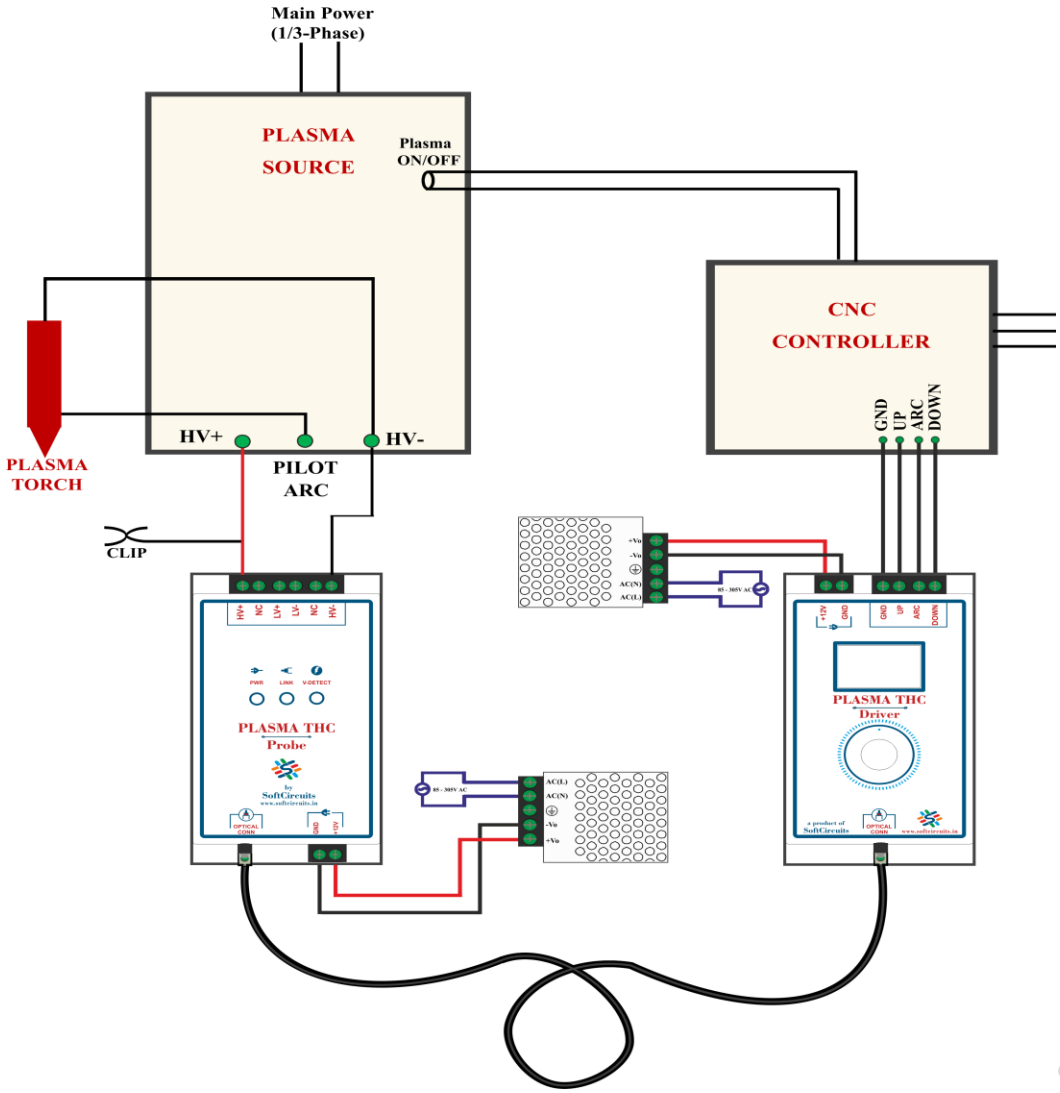


Figure 1-2 Electrical connections between THC and main CNC control system

Signals between Plasma Source and THC Probe:

- Plasma HV (HV+, HV-)

Signals between CNC controller and THC Driver:

- **Down:** This signal is generated by THC when an arc voltage higher than the SETPOINT is detected. This will send a signal to reduce the height of plasma torch so that the arc voltage is also reduced.
- **Arc OK**: This signal is sent when a stable plasma ignition is detected.
- **Up:** This signal is generated by THC when an arc voltage lower than the SETPOINT is detected. This will send a signal to increase the height of plasma torch so that the arc voltage is also increased.
- **Ground**: Common input terminal. Should be connected to the ground of the CNC controller.

Signals between THC Probe & THC Driver:

- **Optical cable connection:** THC probe and THC driver are connected via an optical cable to isolate the signals from the plasma source.

2. Settings & Operation

This section gives the details of menu options and factory default settings when a SoftCircuits Plasma THC device comes out of the box. Use this information to understand the device setup & operation and also to figure out what changes may be necessary for tailoring the controller to your exact needs.

Device Connections

Please refer to the figure 1.2 for the electrical connections of the device.

Device Power Up

Both the THC Driver and the Probe modules need a 12V power supply input.

- First connect the 12V output of the first power supply to the 2Pin power connector [9] of THC driver. The display will show text "Disconnected", since the THC Probe is not yet connected.
- Next, connect the 12V output of the other power supply to the 2Pin power connector [4] of THC Probe. The power LED [2] will glow, indicating the device power up, and the Link LED will start blinking.
- Then, you need to connect the Driver and Probe via the optical cable [10] provided with the product. The optical cable's endings have protective caps, so you should first remove these and then insert one end of the cable in the optical connector [3] of THC Driver and the other end in the optical connector [3] of THC Probe.

Device Startup

- Once the modules are powered up and connected, the OLED display [6] will show the Plasma voltage value (which is 0 in case plasma source is OFF or disconnected).
- Now, to set the value of Plasma voltage, press the Knob [5] once and the text "SET" will be highlighted, which means you can now set the value of the ***SETPOINT* Votage**. Now rotate the knob [5] to change the value and press the knob again to set the value.
- Initially you will be able to see the default SETPOINT voltage on the display. You can either check and continue with default settings or change the values to your plasma cutter's requirements.

Menu Options

- To enter the settings menu, long-press the knob button [5] for 5 seconds and all the parameters will be displayed.
- Now release the button and rotate the knob clockwise/anti-clockwise to move the cursor from one parameter to the other. You can select the highlighted parameter by pressing the knob once, and then rotate the knob to change the value, and again press the knob to set the desired value.
- Similarly, you can set all the parameters from the menu option and select exit when all values have been set.
- The MENU has following parameters:

MAX VOLT (MAXIMUM VOLTAGE)	It is the maximum Plasma voltage that you need to detect. The default value is set to 200 V.
MIN VOLT (MINIMUM VOLTAGE)	It is the minimum plasma voltage that you want to detect
VOLT SENS (VOLTAGE SENSITIVITY)	It is a voltage tolerance limit by which your plasma controller will try to adjust the height. When the difference in the current voltage of plasma and the SETPOINT voltage goes more than this voltage sensitivity value, then the UP or DOWN signal is generated according to the difference.
ARC DELAY	It is the delay in the Arc OK signal after the plasma starts. For example, if it is set to 500ms, then the Arc Ok signal will be generated 500ms after the Plamsa turns ON. This value can be increased or decreased as per user's requirements.
SIG TYPE (SIGNAL TYPE)	It is the type of signal on UP, DOWN & ARC OK pins. It is active low by default, and can be set to active high if required.
SET DEFAULT	Selecting this option will set all the parameters to default values.
TEST	This option is used to test whether the connection between THC Driver and the plasma CNC Controller is correct or not. Selecting "Test" option will show a submenu of "***torch up***", "***torch down***", "***arc ok***" and "***exit***". Selecting "torch up" will send signal on the torch up pin of the 4 pin connector of THC Driver. Similarly, the other 2 signals can be tested one-by-one. After testing the plasma CNC connections, user can press exit to go back to the main menu
SET (SETPOINT)	SET or SETPOINT VOLTAGE is the plasma arc voltage that is desired for the best finishing while cutting with the plasma.

Default Settings

The table 2-1 shows the default values of the menu options and the range of values which can be set for the parameters.

	Default Value	Value Range
MAX VOLTAGE	200 V	Upto 400V
MIN VOLTAGE	30V	Upto 10V
VOTAGE SENSE	1V	1V-10V
ARC DELAY	500 ms	500ms – 5s
SIGNAL TYPE	Active Low	Active High or Active Low
SETPOINT VOLTAGE	100V	Between MIN VOLTAGE & MAX VOLTAGE

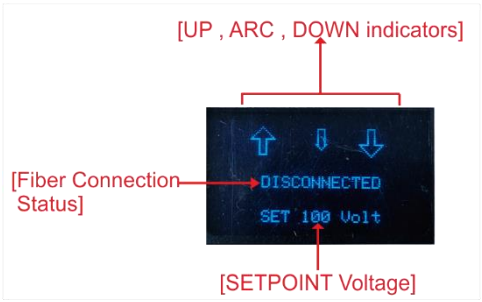
Table 2-1 Default settings and value range for configuration

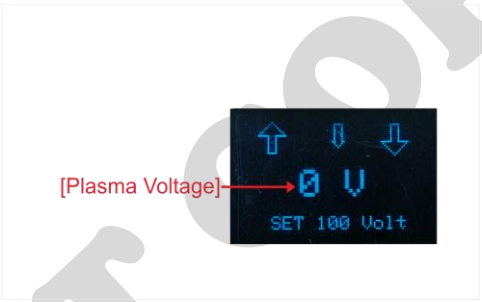
Please note – To ensure the safe operation of your plasma cutting system, please refer to the specifications of the plasma cutter that you are using, before setting the values of the parameters. The default values have been assigned according to the specifications of most commonly used plasma cutters.

Device Operation

The torch height controller constantly reads the voltage arising due to the changes in height of plasma source from the material and compares it to the SETPOINT. When the difference between present voltage and SETPOINT is more than the VOLTAGE SENSE value, the controller sends UP or DOWN signal respectively to compensate for the height change.

Display Indicators

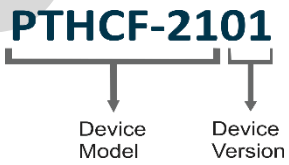




Device Versions

This manual describes the operation of the following Plasma THC part numbers:

- PTHCF-2100
- PTHCF-2101



3. Service Information

Technical Support and Service

For technical support, please go to our website at:

http://softcircuitsindia.com/

Service and Repair

If you need service or repair, please send a mail at
connect@softcircuits.in

Please specify the complete issue and we shall guide you through the further procedure.

**Please read the warranty information carefully before proceeding with the service or repair request*.