



## PlasmaSens user's manual v1.1

---



**Please read the following notes**

1. All information included in this document is current as of the date this document is issued. Such information, however, is subject to change without any prior notice.
2. PoLabs does not assume any liability for infringement of patents, copyrights, or other intellectual property rights of third parties by or arising from the use of PoLabs products or technical information described in this document. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of PoLabs or others. PoLabs claims the copyright of, and retains the rights to, all material (software, documents, etc.) contained in this release. You may copy and distribute the entire release in its original state but must not copy individual items within the release other than for backup purposes.
3. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of the products and application examples. You are fully responsible for the incorporation of these circuits, software, and information in the design of your equipment. PoLabs assumes no responsibility for any losses incurred by you or third parties arising from the use of these circuits, software, or information.
4. PoLabs has used reasonable care in preparing the information included in this document, but PoLabs does not warrant that such information is error free. PoLabs assumes no liability whatsoever for any damages incurred by you resulting from errors in or omissions from the information included herein.
5. PoLabs devices may be used in equipment that does not impose a threat to human life in case of the malfunctioning, such as: computer interfaces, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment, and industrial robots.
6. Measures such as fail-safe function and redundant design should be taken to ensure reliability and safety when PoLabs devices are used for or in connection with equipment that requires higher reliability, for example: traffic control systems, anti-disaster systems, anticrime systems, safety equipment, medical equipment not specifically designed for life support, and other similar applications.
7. PoLabs devices shall not be used for or in connection with equipment that requires an extremely high level of reliability and safety, as for example: aircraft systems, aerospace equipment, nuclear reactor control systems, medical equipment or systems for life support (e.g. artificial life support devices or systems), and any other applications or purposes that pose a direct threat to human life.
8. You should use the PoLabs products described in this document within the range specified by PoLabs, especially with respect to the maximum rating, operating supply voltage range and other product characteristics. PoLabs shall have no liability for malfunctions or damages arising out of the use of PoLabs products beyond such specified ranges.
9. Although PoLabs endeavors to improve the quality and reliability of its products, semiconductor products have specific characteristics such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Further, PoLabs products are not subject to radiation resistance design. Please be sure to implement safety measures to guard them against the possibility of physical injury, and injury or damage caused by fire in the event of the failure of a PoLabs product, such as safety design for hardware and software including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures.
10. Usage: the software in this release is for use only with PoLabs products or with data collected using PoLabs products.
11. Fitness for purpose: no two applications are the same, so PoLabs cannot guarantee that its equipment or software is suitable for a given application. It is therefore the user's responsibility to ensure that the product is suitable for the user's application.
12. Viruses: this software was continuously monitored for viruses during production, however the user is responsible for virus checking the software once it is installed.
13. Upgrades: we provide upgrades, free of charge, from our web site at [www.poscope.com](http://www.poscope.com). We reserve the right to charge for updates or replacements sent out on physical media.
14. Please contact a PoLabs support for details as to environmental matters such as the environmental compatibility of each PoLabs product. Please use PoLabs products in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. PoLabs assumes no liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
15. Please contact a PoLabs support at [support.poscope.com](mailto:support.poscope.com) if you have any questions regarding the information contained in this document or PoLabs products, or if you have any other inquiries.
16. The licensee agrees to allow access to this software only to persons who have been informed of and agree to abide by these conditions.
17. Trademarks: Windows is a registered trademark of Microsoft Corporation. PoKeys, PoKeys55, PoKeys56U, PoKeys56E, PoKeys57U, PoKeys57E, PoKeys57CNC, PoScope, PoLabs, PlasmaSens and others are internationally registered trademark

## PlasmaSens user's manual

Description .....	4
Features.....	4
Connectors and pinout.....	5
Connection to PoKeys57CNC.....	6
Connection to the plasma cutter equipment.....	7
1. Direct connection .....	7
2. Divided voltage connection.....	8
Mach3 - PlasmaSens configuration .....	9
Grant of license .....	10

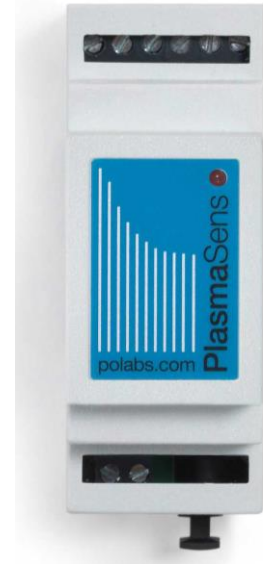
## Description

PlasmaSens is a torch height sensor for using with plasma cutter equipment. In a combination with a PoKeys57CNC controller, PlasmaSens is reliable torch height controller (THC).

PlasmaSens provides an accurate arc voltage measurement based on modern microprocessor's technology. Efficient and precise cutting of material depends on torch distance from a workpiece and appropriate plasma arc. The arc voltage is proportional to the distance between the torch and the workpiece and should stay as equal as possible across the entire cutting surface. Therefore plasma's voltage data is important for a Z-axis position update.

With a mains AC power supply built-in and a total optical output isolation, PlasmaSens is very simple for physical installation and safe to use. The device offers two arc voltage level inputs. High voltage input up to 350 VDC or low voltage input (without 1:50 internal divider) up to 10 VDC. Optical output also solves possible electromagnetic disturbance issues, caused by plasma cutter's arc. Use of PlasmaSens increases operation reliability of CNC equipment.

If you are not using PoKeys57CNC controller you can use our universal PlasmaSensOut device at receiver side. With programmable output signals: Up, Down and Arc OK, it's compatible with the most CNC controller boards on the market. More information you can find on our website.

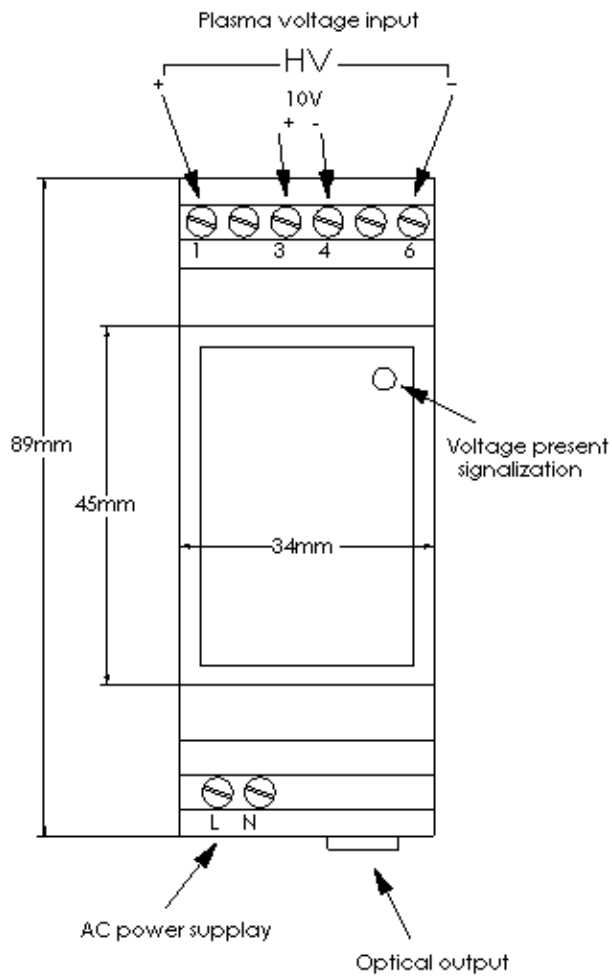


## Features

- Plasma voltage measurement up to 350 V
- Main AC power supply (110 VAC-230 VAC/50-60 Hz)
- Additional input for divided plasma voltage (1:50) up to 10 V
- Plasma voltage present signalization
- Full optical output isolation; transmitter and receiver connected over an optical fiber cable
- Plugin support Mach3 and Mach4
- DIN-rail mountable housing

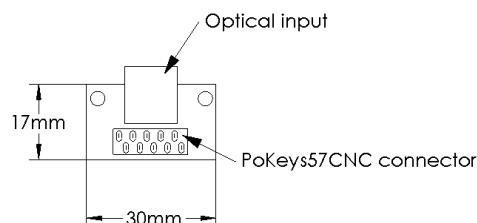
## Connectors and pinout

PlasmaSens device:



Terminal pin	Function
L	AC Power supply (95 VAC -260 VAC @50 Hz-60 Hz)
N	
1	+ HV input from plasma cutter equipment (350 V max)
3	+ divided voltage from plasma cutter equipment (10 V max)
4	- divided voltage from plasma cutter equipment
6	- HV input from plasma cutter equipment
Optical output	Optical fiber cable -TOSLINK connector (included)

PlasmaSens receiver adapter board for PoKeys57CNC:



## Connection to PoKeys57CNC

The PlasmaSens device already comes with the receiver board, an optical fiber cable and a flat cable for connection to PoKeys57CNC. Just connect transmitter and receiver using fiber cable and plug receiver to the red connector (PoExtension2) on PoKeys57CNC board.

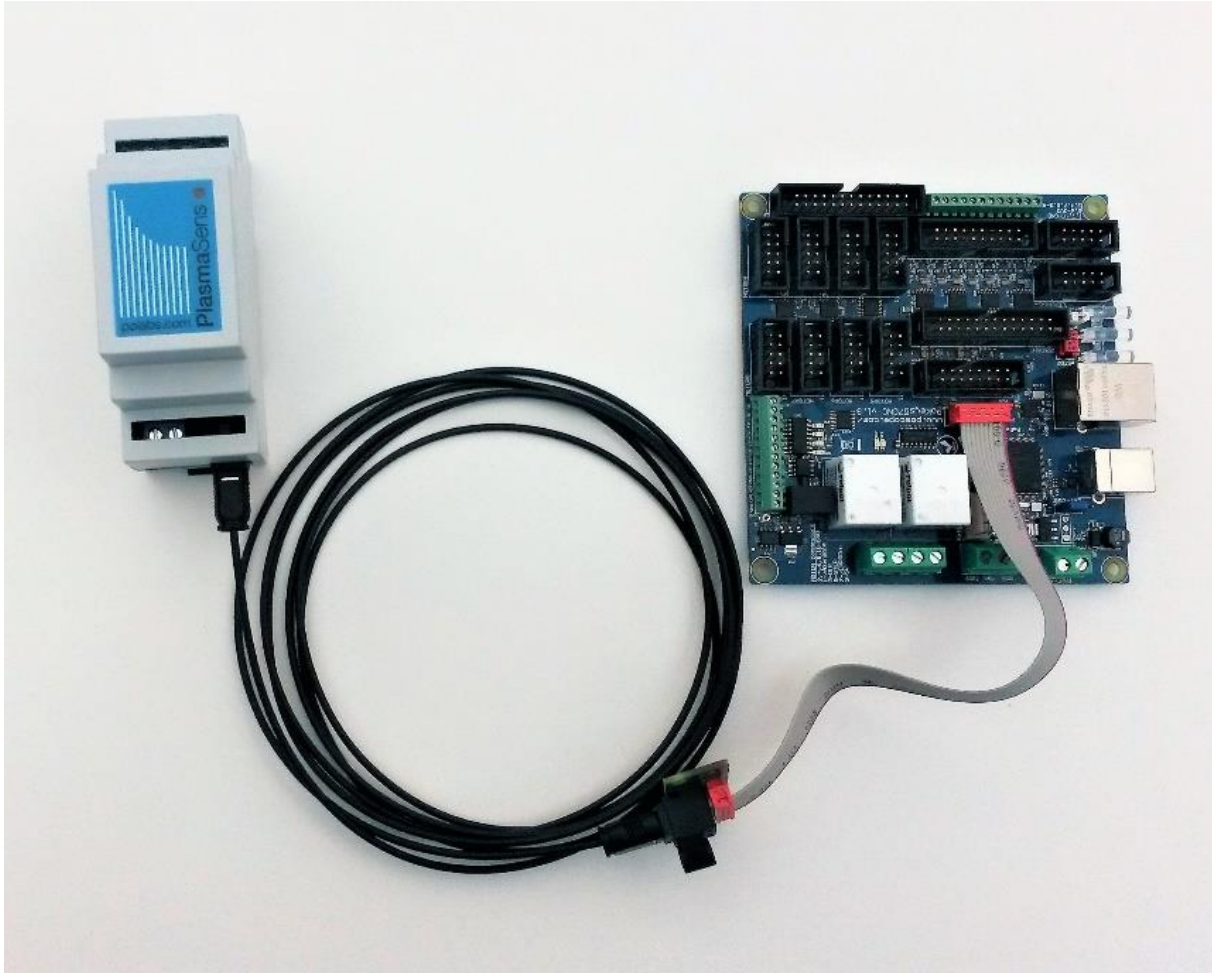


Figure 1: Connection PlasmaSens to PoKeys57CNC board

## Connection to the plasma cutter equipment

The PlasmaSens device is prepared for two possible connection to the plasma cutter equipment.

A 300 V input for direct connection and 10 V input for connection using divided plasma cutter output.

**Only one input can be used at a time!**

### 1. Direct connection

In case your plasma cutter does not support voltage divided output, you should connect it directly to HV input as shown in Figure 2.

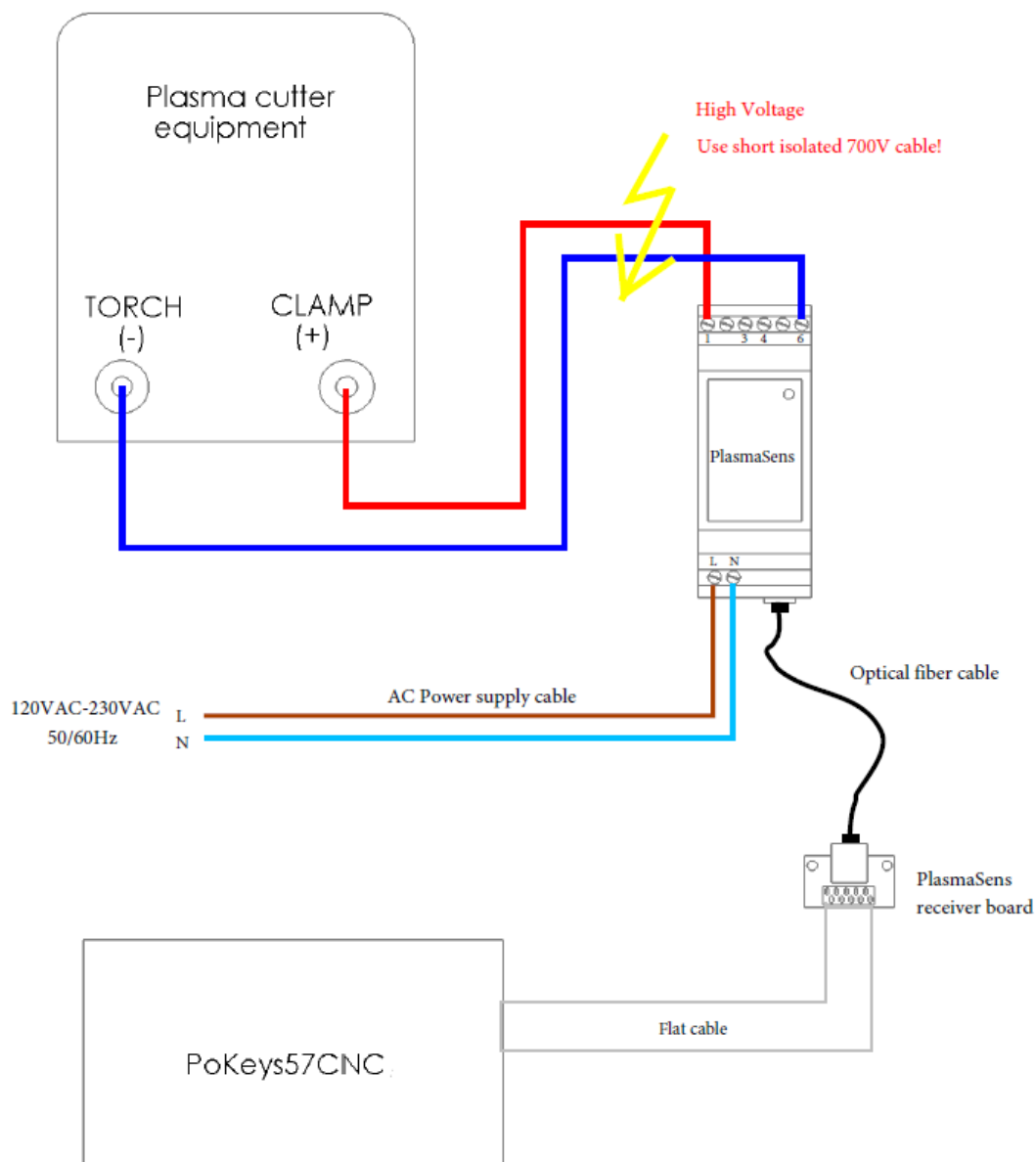


Figure 2: Connection PlasmaSens to Plasma cutter equipment - directly

## 2. Divided voltage connection

For connection using divided voltage output note the following instruction (Figure 3).

Please refer to your plasma cutter owner's manual for detailed information about divided output voltage and connector pinout. Remember PlasmaSens 10 V input is prepared for voltage divider 1:50 and so it will only measure correct input voltage for that ratio. In case of a different divider ratio, reference high parameter should be calculated as plasma cutter voltage divided by plasma cutter voltage output ratio multiplied by 50.

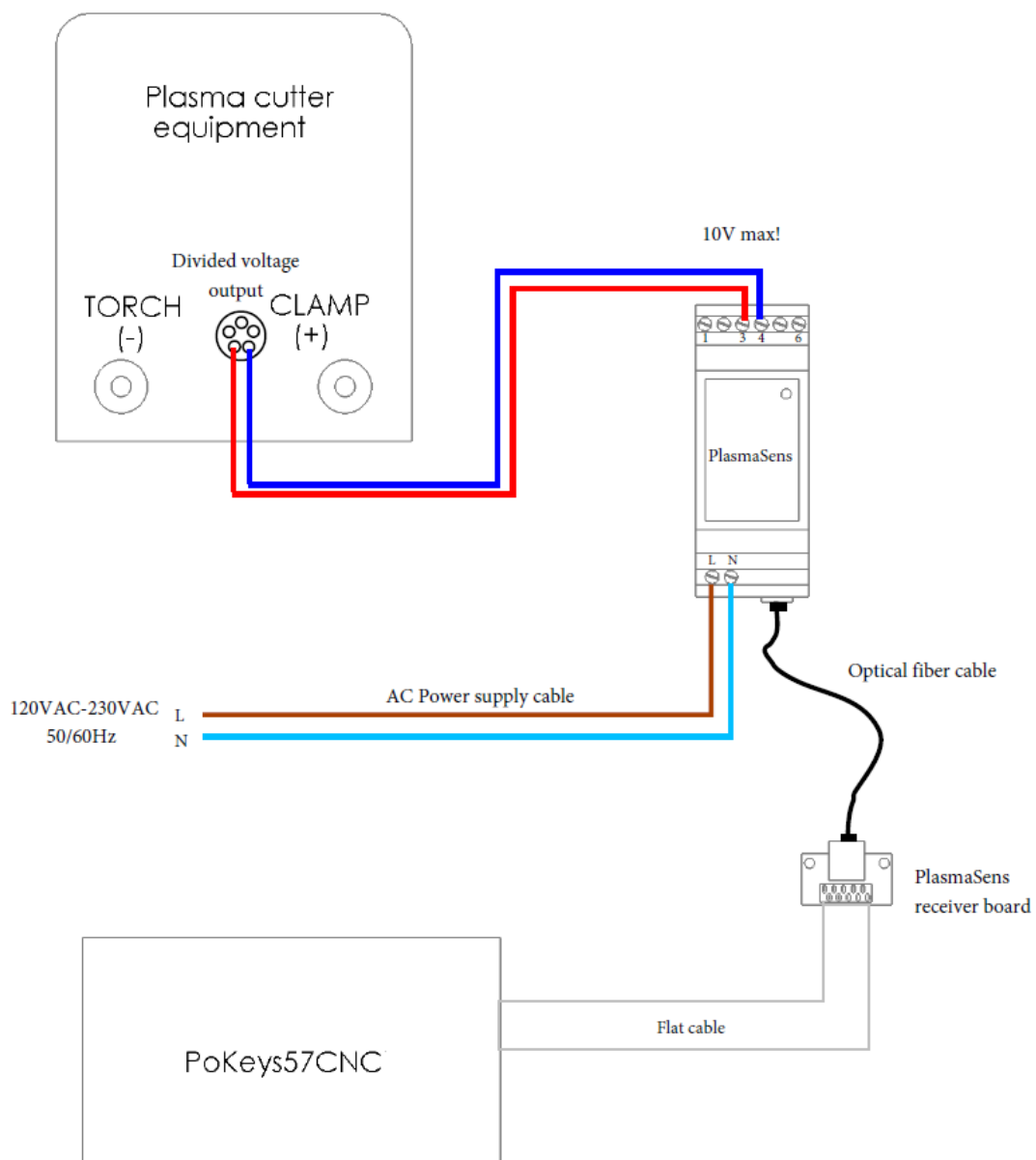


Figure 3: Connection PlasmaSens to Plasma cutter equipment using divided voltage output



## Mach3 - PlasmaSens configuration

Download and install the latest PoKeys Mach3 plugin from [www.poscope.com](http://www.poscope.com). Look for PoKeys setup package, which also includes Mach3 plugin.

Power on PlasmaSens and PoKeys57CNC controller. Run Mach3 software. The PlasmaSens configuration and default THC settings will be configured automatically.

In Mach3 software under *Plugin Control-> Configure PoKeys57CNC->Device settings* you will find *Pulse engine settings* tab. You can change following parameters:

**Reference Height** – desired arc voltage (please refer to your plasma cutter owner's manual)

**Deadband** – voltage hysteresis (voltage frame around reference height, a range where the position of the Z-axis is kept stationary)

**Gain** – correcting motion gain (reduce the gain if the torch height is oscillating)

**Arc OK range** – voltage range where THC is enabled (reference height  $\pm$  arc OK range)

**Anti-dive limit** – arc voltage that disables THC. If voltage goes higher than Anti-dive limit, the Z-axis position will not be updated. The parameter's value must be higher than Reference height. This functionality can be enabled or disabled by checking or unchecking the parameter.

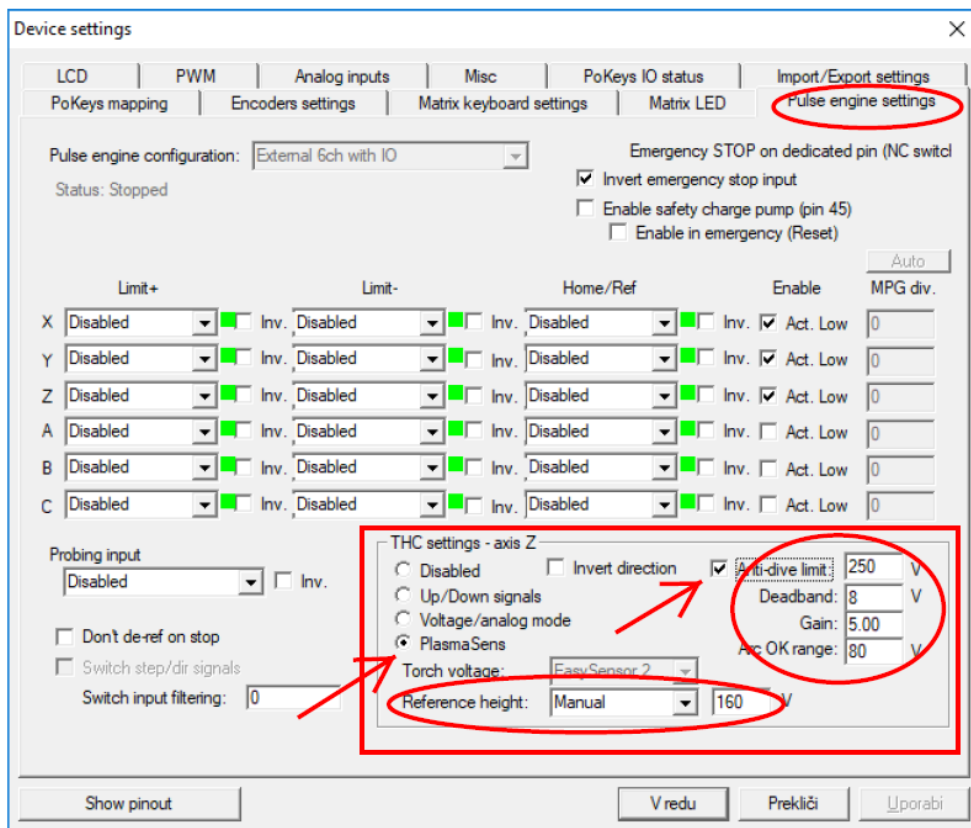


Figure 4: PoKeys Mach3 plugin setup window

## Grant of license

The material contained in this release is licensed, not sold. PoLabs grants a license to the person who is using any compatible PoLabs product, subject to the conditions listed below.

### ***1. Access***

The licensee agrees to allow access to this manual only to persons who have been informed of and agree to abide by these conditions.

### ***2. Usage***

The informations in this release is for use only with PoLabs products.

### ***3. Copyright***

PoLabs claims the copyright of, and retains the rights to, all material (software, documents etc) contained in this release. You may copy and distribute the entire release in its original state, but must not copy individual items within the release other than for backup purposes.

### ***4. Liability***

PoLabs and its agents shall not be liable for any loss or damage, howsoever caused, related to the use of PoLabs equipment or software, unless excluded by statute.

### ***5. Fitness for purpose***

No two applications are the same, so PoLabs cannot guarantee that its equipment or software is suitable for a given application. It is therefore the user's responsibility to ensure that the product is suitable for the user's application.

### ***6. Mission Critical applications***

Because the software runs on a computer that may be running other software products, and may be subject to interference from these other products, this license specifically excludes usage in 'mission critical' applications, for example life support systems.

### ***7. Errors***

This manual was continuously monitored for errors during production, however the user is responsible for error checking the manual once it is used.

### ***8. Support***

There could be errors in these manual, but if you found some, please contact our technical support staff, who will try to fix the problem within a reasonable time.

### ***9. Upgrades***

We provide upgrades, free of charge, from our web site at [www.poscope.com](http://www.poscope.com). We reserve the right to charge for updates or replacements sent out on physical media.

### ***10. Trademarks***

Windows is a registered trademark of Microsoft Corporation. PoKeys, PoKeys55, PoKeys56U, PoKeys56E, PoKeys57U, PoKeys57E, PoKeys57CNC, PoScope, PoLabs, PoExtBus, PoExtBus Smart, PoRelay8, PlasmaSens and others are internationally registered trademarks.

support: [www.poscope.com](http://www.poscope.com)