

Opt Lasers

PLH - 5000 engraving laser head



Product Description

This CNC sub-assembly is a high power engraving laser head with thermal protection and professional high speed driver. Its aluminum body assures proper heat transfer to metal holder or other heatsink.

PLHD-5000 driver ensures proper work of the laser head and protect laser diode from overheating. When the laser head reaches 40 degrees Celsius the orange red is starting to glow. Reaching 45 degrees makes the red diode to glow and yellow to blink and driver is switching off the laser diode for as long as the temperature is not lower than 40 degrees. It also sends low signal on the 5th pin on the output wires while in overheat mode. In case when the connection between driver and laser head is lost all three diodes blink. In this situation main power should be switched off and connection should be checked. 5V on 5th pin means that laser can be modulated. 0V means the opposite and laser circuit is switched off.

Turning collimating lens allows to change the beam focus distance. Additional window is protecting the lens from dust and smoke. Window is much easier to clean thanks to bigger size and flat surface. Air flow is needed to keep lens and window clean during operation. In order to turn lens and change focus distance front window cover should be removed (three M3 screws).

The module is not using G2 lenses but other aspherical single element lens. G2 lenses are popular because of the efficiency but it in this situation it is not the most important parameter. While engraving, power density is more important - unfortunately G2 lenses are not providing small beam spot (while focused).

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Our aspherical single element lens are working very similar to G2 lens. We also attach three element lens which are making bigger optical power loss but allows to obtain even smaller beamspot which helps to get bigger power density.

The laser head allows to cut or engrave materials such as wood, paper, leather, cardstock and many other. Thanks to full analog modulation it is possible to engrave in shades of grey or change the output power during turns. High speed modulation (up to 100 kHz) allows to use high movement speed during engraving even complicated patterns.

Module is using brand new NUBM 450nm diode (capable of 6W). Suggested current in datasheet is 3,5A we are using 3,6 - 3,7A to obtain >5W with single element lens.

Lifetime of laser diode is given as 10000h but it is manufacturer statement, real lifetime of the laser diode is closer to 5000h. To reach longer lifetime proper cooling should be applied.

Four mounting holes on the head allow to mount the engraving laser head on the moving part of the machine. Laser head can be mounted directly using four M4 screws which are also included.

It is also possible to buy a version with additional aluminium holder which allows to mount the engraving laser head on the moving part of the machine. Single 6 mm diameter hole is designed for compressed-air system tube (tube is not included). Holder can be mounted to the machine with M6 screws (2x M6 30 mm length screws are included).



Advantages of the PLH-5000 over the CLH-5000:

- Thermal protection shutdown over 45°C.
- LED indicators (temperature and warning).
- Output signal in overheat mode.
- HQ window protecting collimator from dust and smoke.
- Different mount type: in spindle holder or to the surface.
- Better heat transfer to laser head body.

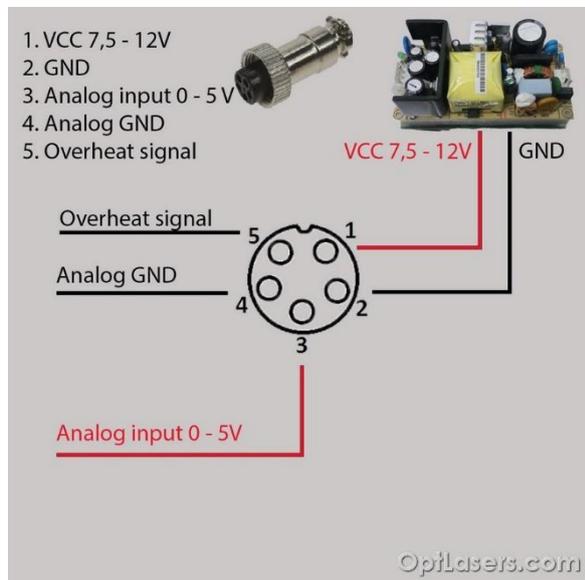
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Technical Data

Wavelength	445 nm
Output optical power at 20°C	5 W
Modulation	TTL or analog
Modulation frequency	Max 100kHz
Input voltage	7,5 - 12 V
Modulation voltage	0 - 5 V
Focus distance	Adjustable
Wires	High quality cable
Round part head diameter	43 mm
Max operating temperature	45°C
Thermal Protection	YES

Connection of the engraving laser head

Connecting engraving laser head is very simple and is using 5-pin connector. To each device 5-pin connector is included.



Caution:

Remember to use both of GND cables.

Pins #1 and #2 should be connected to proper power supply unit which also can be buy at our

website or together with laser head. Pins #3 and #4 should be connected with the source of 0 - 5 V signals which are responsible for power modulation. Pin #5 is an additional signal, which may be used by the user.

DO NOT PLUG IN OR PLUG OUT THE LASER HEAD FROM DRIVER DURING WORK.

Recommended power supply unit is 7,5V 5A. It is possible to use different one in the voltage range of 7 - 12V and current higher than 4A. For 12V power supply driver should be fixed to metal surface.

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Setting the focal length/distance

It is hard to measure the exact distance of waist of a beam from the laser head. In order to set the focus front cover should be removed (three M3 screws). Setting the focus distance should be firstly done by turning the lens and then, after making the lens not move, by using your Z axis in CNC machine. Focus depends on type of lens used and their distance from laser diode. Be careful not to unscrew the lens accidentally – the lens can fall down and get dirty/destroyed. For three element lens focus length should be in range between 120 and 40mm. For single element lens it should be in range between 100 and 20mm. Nevertheless accurate focus distance should be set according to the test made with your material. Front cover should be put back in its place after setting the focus.

Caution!

- Remember that it is not a toy.
- Laser radiation is dangerous even when scattered or reflected from any surface.
- Always use proper protection laser filter on your CNC machine dedicated to 430 - 480nm in order to avoid reflected radiation.
- Never point laser head at people or animals.
- Do not touch the beam, it may cause burns.

- Do not stare at the beam or the beam spot while the material is being cut.



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Recommendations and requirements

Modulation input can be used as TTL input with its logic levels of 0V and 5V or as an analog input. Analog modulation means that by using 2,5 V on ANG input you get 50% output power, analogically by using 4 V you get 80% output power, etc.

It is very important to ensure proper cooling so laser head is meant to be mounted in metal part, similar which is holding spindle.

Cleaning the optics is important since dirty optics reflect some % of power back to the diode what may be damage it irreparably.

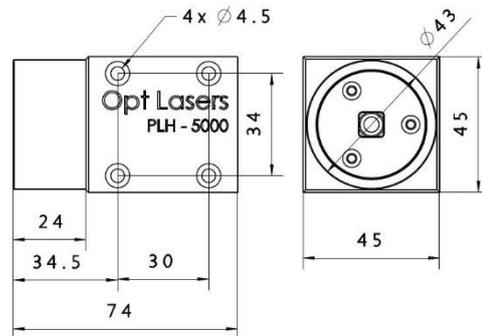
Air flow is very important during the engraving process since it is blowing out dark smoke which can cause optical obstacle for a laser beam.

Protection

This module has thermal protection system which protect laser diode from overheating.

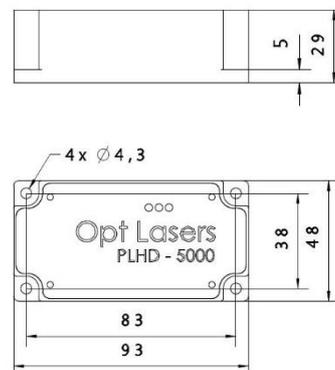
The analog input is protected by a 5V1 Zener diode on occasion there appears the voltage higher than 5V. Despite everything, this input should not be used with higher voltages.

The output of the driver is protected by Shottky diode which doesn't allow the reverse voltage to appear.



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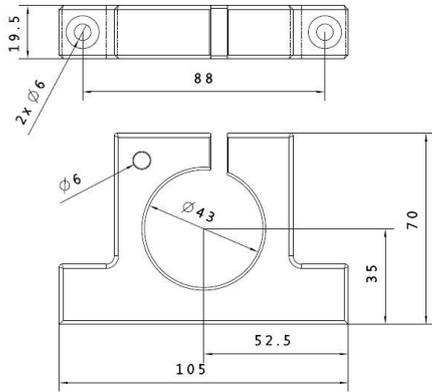
Dimensions of the PLH – 5000



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Dimensions of the PLHD - 5000

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Dimensions of the aluminum mount



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Additional components (depending on set, different parts are included)

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Parameters of cutting

Note, that this speeds and parameters are effects of tests and can be different for some materials, cooling systems as well setting of the focus distance.

Vinyl 2mm: 100mm/min; 5W; 1 pass (*)

Wood 3mm: 200mm/min; 5W; 3 passes (1 pass for each mm)

Plywood 10mm: 300mm/min; 5W; 10 passes (1 pass for each mm)

InchJet Photographic paper:

400mm/min; 5W; 1pass

Paper: 600mm/min 2W

Red Plexiglass 3mm: 100 mm/min 4 pass.
NO SMOKE

Laser have no effects on:

Transparent acrylic/plexiglass

*= the smoke must be removed quickly

