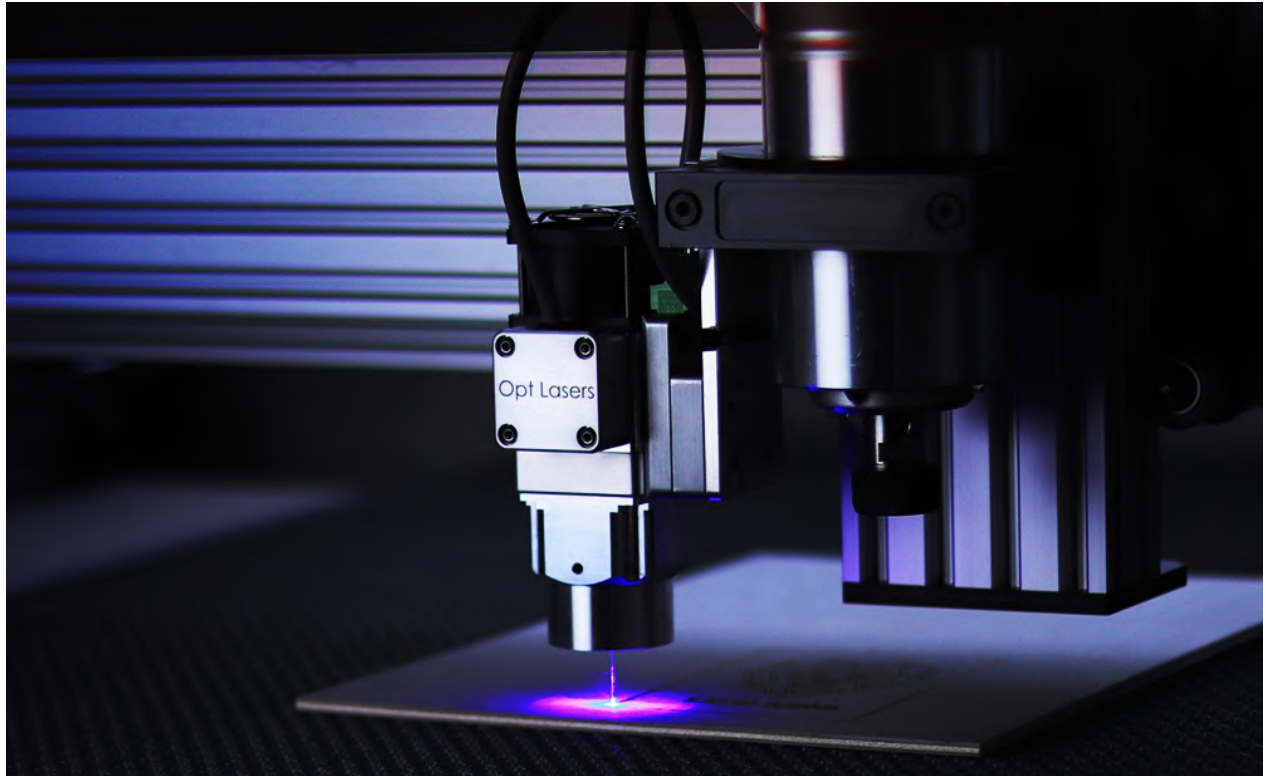


Opt Lasers GRAV

CNC Machines Laser Upgrade Instructions



This part of the documentation is connected with popular CNC machines Laser Upgrades. Basically, with the help of the PLH3D-CNC Adapter, it is possible to connect the laser head to almost any CNC machine and turn it into laser engraver. A very important thing besides the connection is G-Code generating. It differs from the standard G-Code. The laser needs to be switched off during the idle movement while spindle can be left rotating. The most similar thing in Laser and Spindle G-code is the power and the rotation speed. PWM signal is controlling the rotation speed of the spindle while the same signal can be used to control the laser power. Usually, it is done with S0 - S255 command but different CNC Software and Controllers are using different values, for example, S0 - S1000.

Opt Lasers GRAV

Acro System & BlackBox Set-Up Manual for 2W and 6W Laser Heads



ACRO

Contact and Shipping:

Tomorrow's System Sp. z o.o.

Okulickiego 7/9 hala G39

05-500 Piaseczno

Poland

tel.: +48 515 180 752

e-mail:

contact@optlasers.com

Company Information:

Tomorrow's System Sp. z o.o.

Pułaskiego 125/35

15-337 Białystok

Poland

NIP: PL5423238556

REGON: 200866868

1. Introduction

The Acro System Machine, featuring a lightweight body and the ease of a straightforward assembly, is an ideal choice for being put together with smaller, lightweight laser engraving heads, such as the ones from PLH3D-2W and PLH3D-6W series.

It is designed in particular for hobbyists and entrepreneurs looking for a cost-effective and unperplexing solution.

The utilization of the PLH3D-2W and PLH3D-6W series' laser heads enables you to cut or engrave on softer materials, such as plywood, wood, leather and a diverse range of plastics.

Due to its uncomplicated build, the z-axis is not regulated automatically, but it can be adjusted manually to a set height by anchoring it in place with screws.

The ACRO System machines can be found in several sizes, with the following work ranges:

ACRO 55 - Axis X 12" (300mm)/ Y 12" (300mm)/ Z 2 ¾" (~70mm)

ACRO 510 - Axis X 12" (300mm)/ Y 30" (800mm)/ Z 2 ¾" (~70mm)

ACRO 1010 - Axis X 30" (800mm)/ Y 30" (800mm)/ Z 2 ¾" (~70mm)

ACRO 1510 - Axis X 50" (1300mm)/ Y 30" (800mm)/ Z 2 ¾" (~70mm)

ACRO 1515 - Axis X 50" (1300mm)/ Y 50" (1300mm)/ Z 2 ¾" (~70mm)

The base prices (not including any laser heads) of the Acro System machines are in the range of 290USD - 420USD.

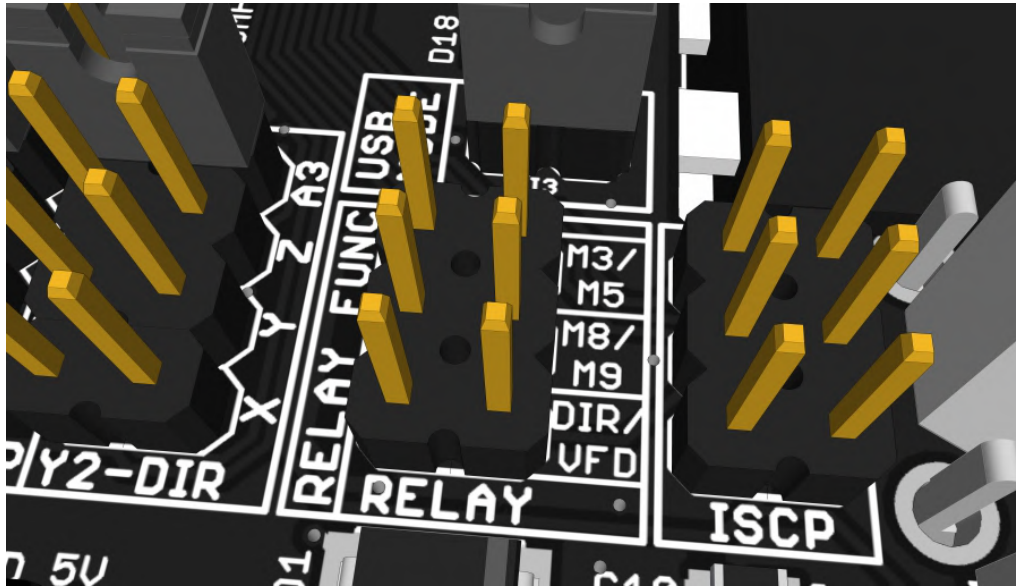
The OpenBuilds' website offers thorough step-by-step instructions and video guides on how to assemble, plug-in and configure the device. It also provides quite intuitive and straightforward free software that allows the user to generate the OpenBuilds Control G-code to command the machine.

2. Included Parts

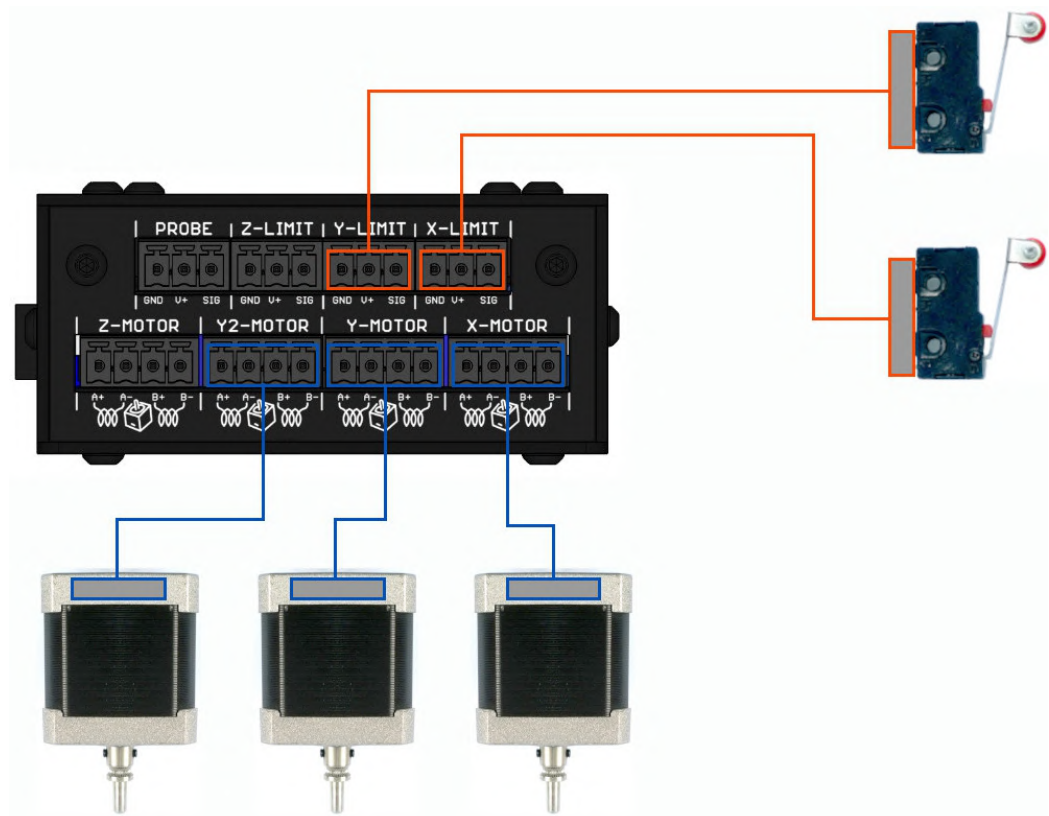


3. Wiring setup.

3.1. **Caution:** Please begin by removing the jumper, found in the “Relay Func” section of the BlackBox, before connecting it to the ACRO machine and the laser head. It will prevent the excessive wear of the relay. A detailed description of the BlackBox Controller configuration can be found on the manufacturer’s website. OpenBuilds -> BlackBox.



3.2. For the next step, please run the cables from the Acro machine’s peripherals (motors & limit switches). These cables need to be plugged into the BlackBox as shown on the diagram below:



3.3. Depending on the ACRO System's size and the laser head employed, a suitable cable should be made ready.

3.3.1. In case of PLH3D-2W laser head, the 5m [PLH3D-2W Laser Head Cable](#) is required.



3.3.2. In case of PLH3D-6W laser head, the 5m [PLH3D-CNC Adapter to Laser Head Cable](#) is required.



3.3.2.1. The cable for connecting the laser head can be placed inside a corrugated conduit leading to the laser head mount.



3.3.2.2. In order to run the cable through the conduit please unscrew the green terminal block. Once the cable reaches the other side, screw the green terminal block back on.

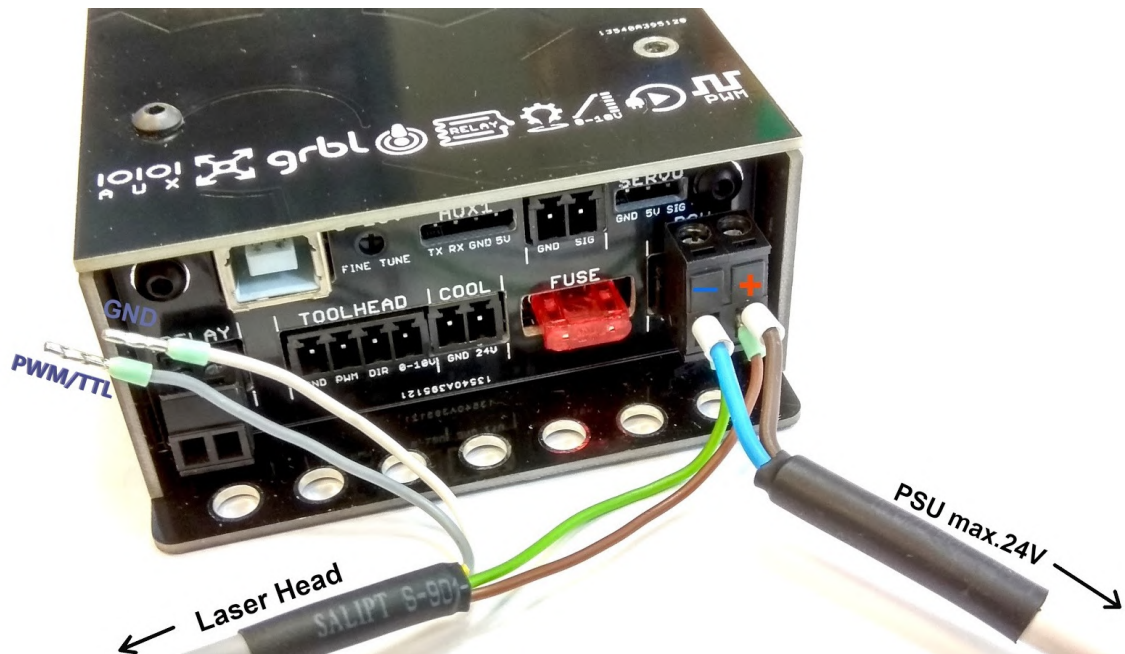
3.3.2.3. Please remember to screw the green terminal block back on in a correct fashion:



3.3.2.4. The picture above shows how the correct placement of the wires should look like.

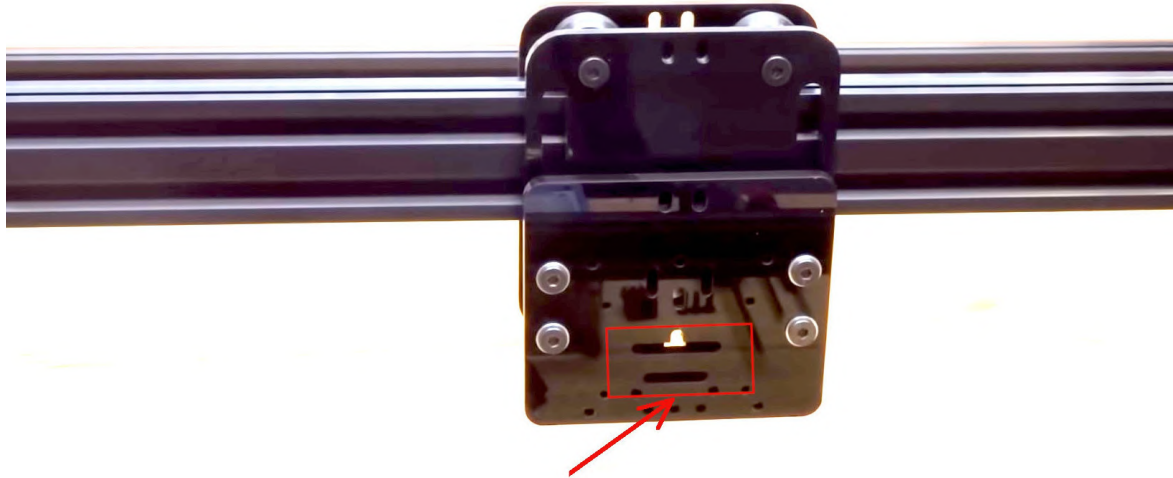
4. Setting up the Power Supply.

For the next part, please plug in the 24V Power Supply Unit (PSU) on the opposite side of the BlackBox. The PSU will also supply power to the PLH3D laser head.



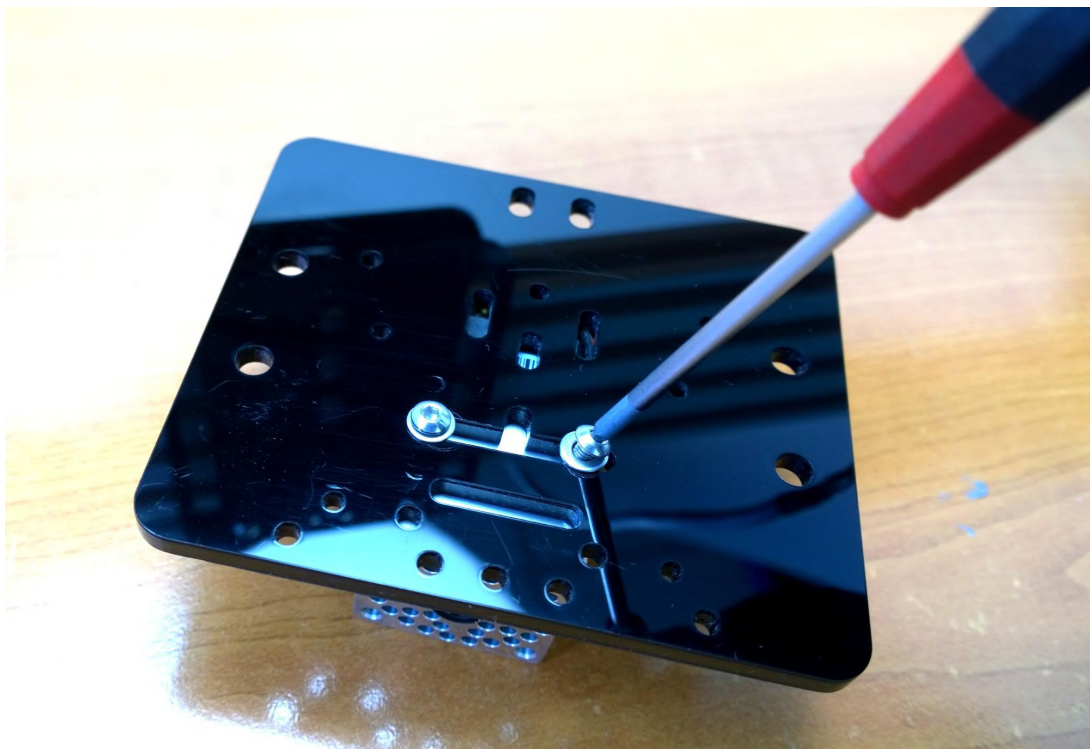
5. Mounting Setup

5.1 The laser head should be screwed to the front attachment plate first, then to the dedicated slotted holes on the x-axis carriage of the system.



5.2 Mounting the PLH3D-2W Laser Head

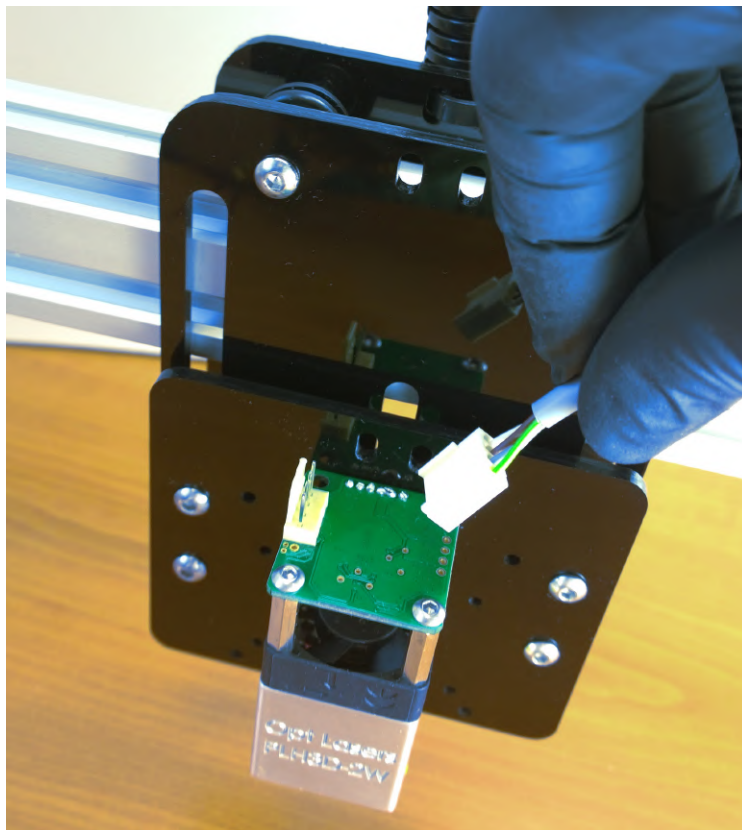
5.2.1 The PLH3D-2W laser head ought to be screwed to the front attachment plate with two M3x8 cylindrical screws.



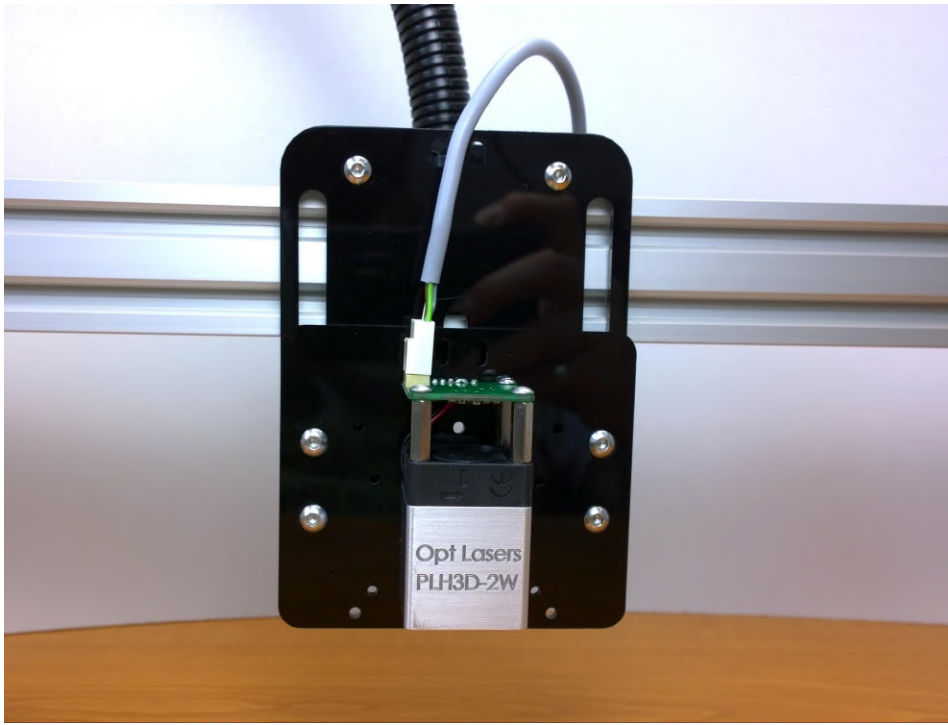
5.2.2. After that, please fasten the front plate to the x-axis carriage, while remembering to put spacers between the two plates.



5.2.3. The terminal block should be plugged into the corresponding socket of the PLH3D-2W laser head:

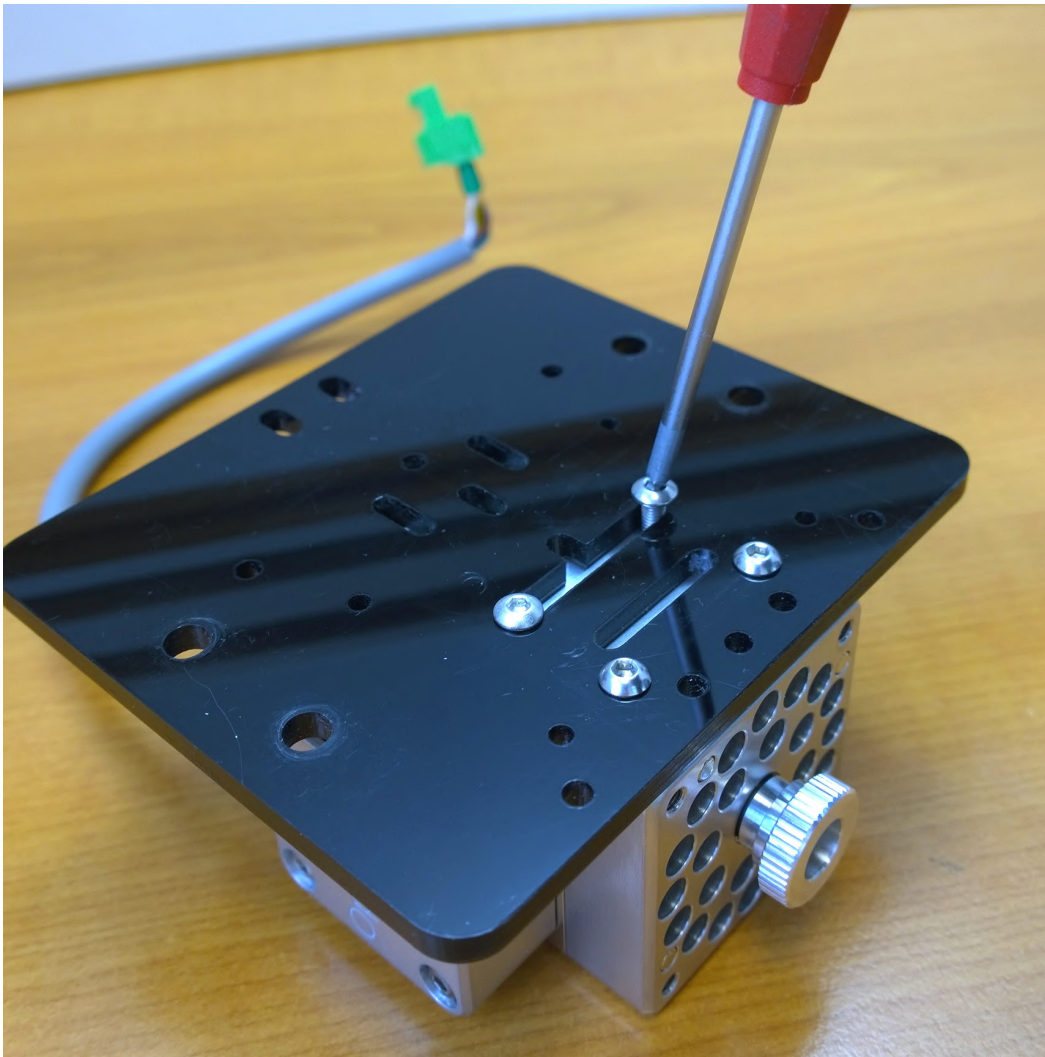


5.2.4. Once the connector has been plugged in, it is important to check whether the cable protrudes well and doesn't obstruct the carriage.

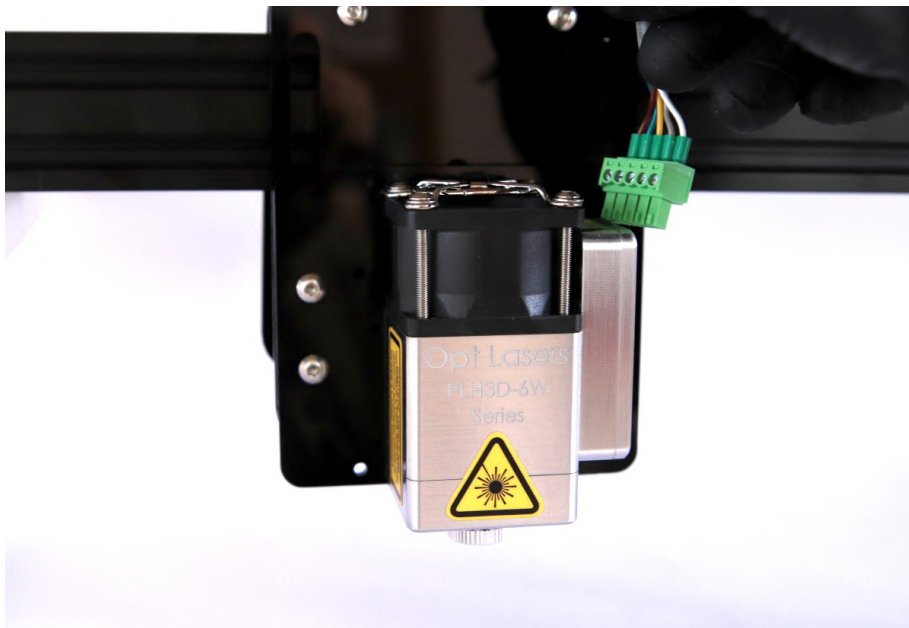


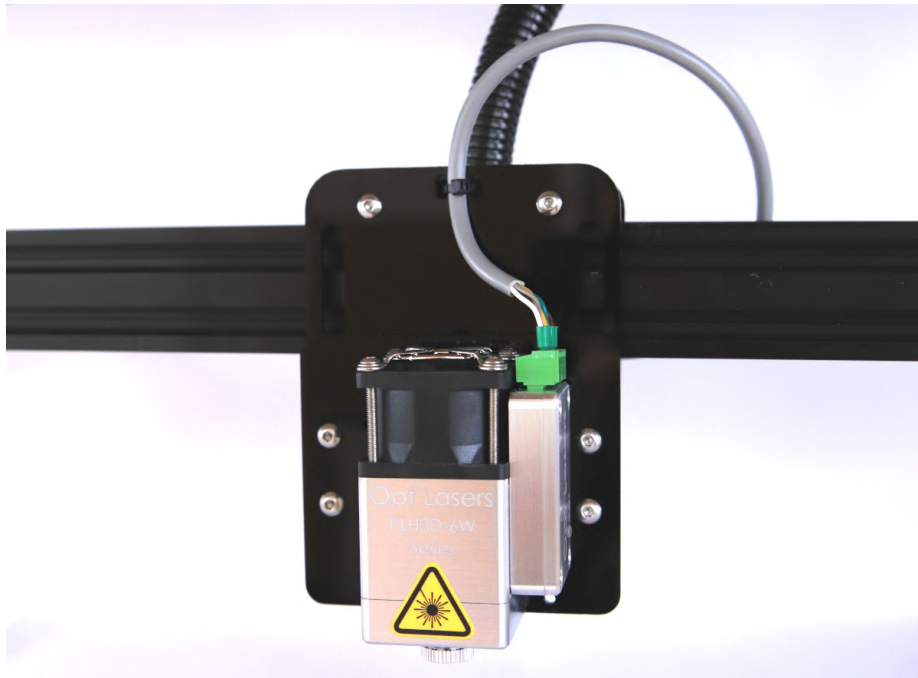
5.3 Mounting the PLH3D-6W Laser Head.

5.3.1 The PLH3D-6W Laser Head is to be fastened to the front plate with four M3x8 screws. Then, similarly as in the case of the PLH3D-2W Laser Head, spacers need to be added between the front plate and the slotted holes on the x-axis carriage.



5.3.2. The secured laser head ought to be connected to a formerly prepared cable and a connector that is included in the PLH3D-6W set.

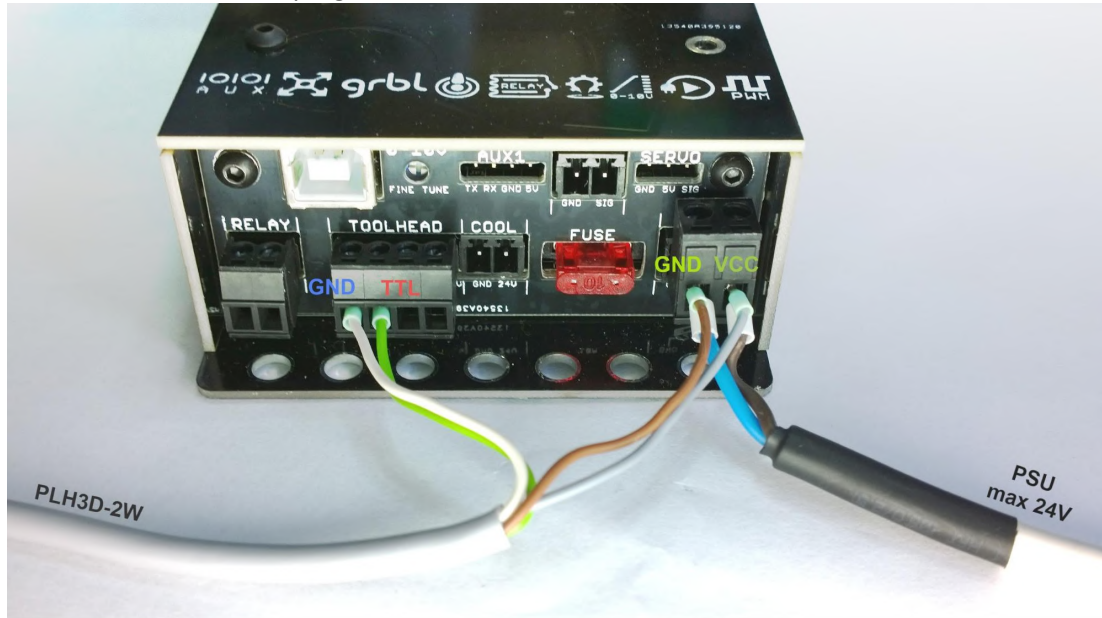




6. Setting-up the PLH3D Laser Head.

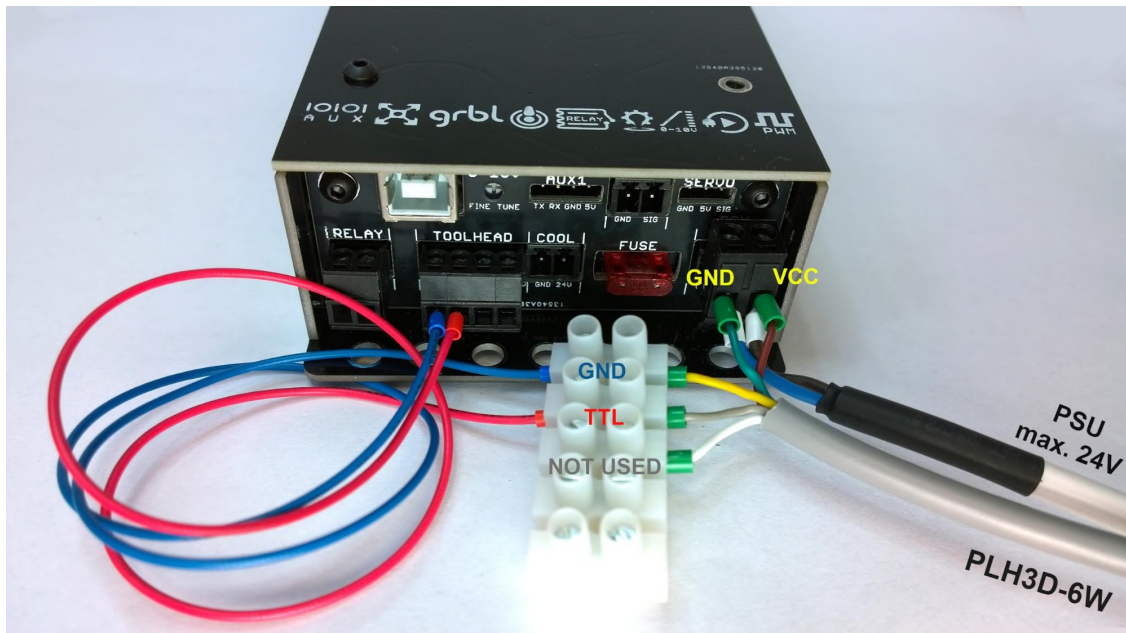
6.1. For the next step, the PLH3D Laser Head is to be plugged into the BlackBox Controller.

6.2. The PLH3D-2W Laser Head ought to be connected with the dedicated 5m 4 conductor wire. Bear in mind that the TTL cable running from the laser head needs to be plugged into the PWM hole of the plug.



6.3. The PLH3D-6W laser head, just like the PLH3D-2W laser head, can be powered with the same power supply that powers the BlackBox. Nevertheless, it is recommended to use a separate power supply due to an elevated power consumption and the occurrence of adverse inductive side-effects.

The recommended option is to use the [PLH3D-CNC Adapter](#) together with an additional power supply (not included with the CNC Adapter on purchase), and a dedicated BlackBox cable.



7. PLH3D-CNC Adapter Settings

The PLH3D-CNC Adapter should have the “0” program set. A detailed description can be found in the CNC Adapter’s Manual on the Opt Lasers’ website.

BlackBox Motion Control System	0	<div><div></div><div></div><div></div></div> <div>POWER ARMED LASER</div>	ENABLE1=any ENABLE2=any
--------------------------------	---	---	----------------------------

It is possible to check the program set by following the instructions underneath:

To check or to set up the option:

1. Turn the key switch off.
2. Press and hold the mode button.
3. Turn the key switch on while holding the button.
4. Wait approximately one second.
5. Release the button.
6. LEDs will show a combination corresponding to the current setting (see table above).
7. To step to the next setting press the button.
8. To save the current setting, wait five seconds with the button released. To quit without saving, turn the key switch off before five seconds elapses.

The option set is kept in a non-volatile memory and remains unchanged during power-off.

8. Software setup.

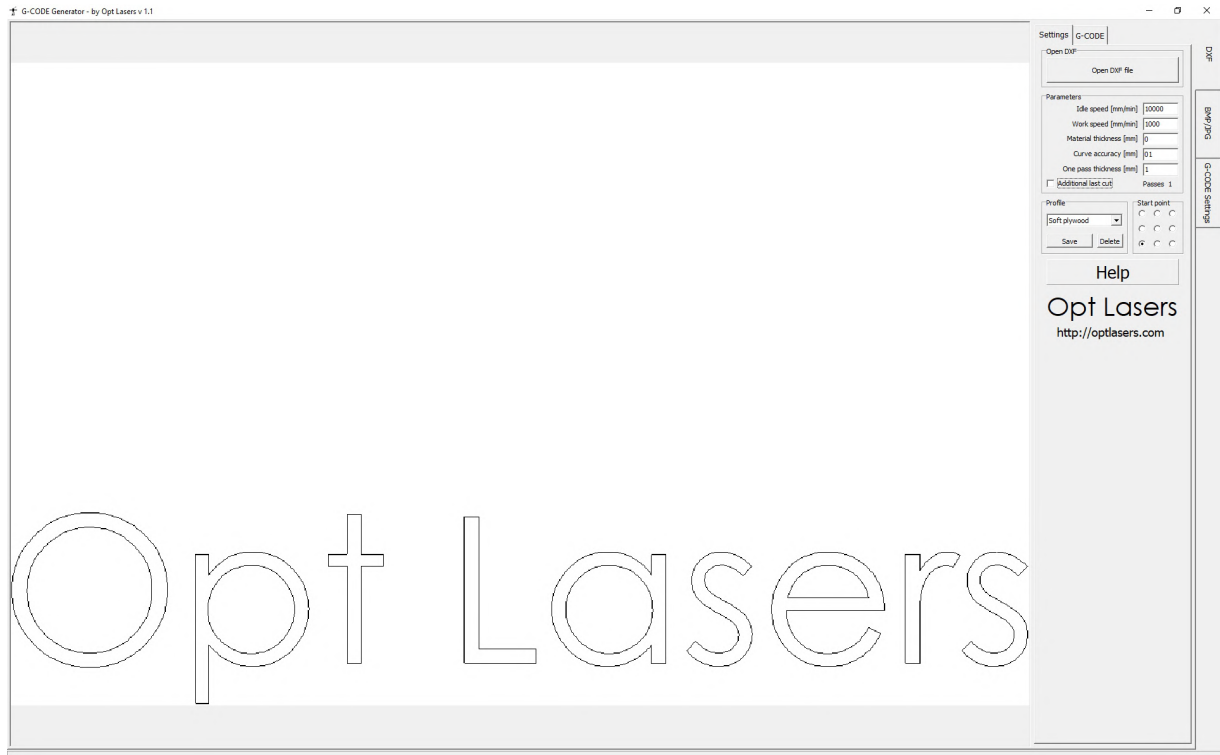
To cut or engrave, it is necessary to generate the appropriate G-code using the following commands:

M4	Laser ON
M5	Laser OFF
SXXX	PWM duty where XXX is a number between 0 and 1000 (e.g.: 0 = 0% and 255 = 100%)

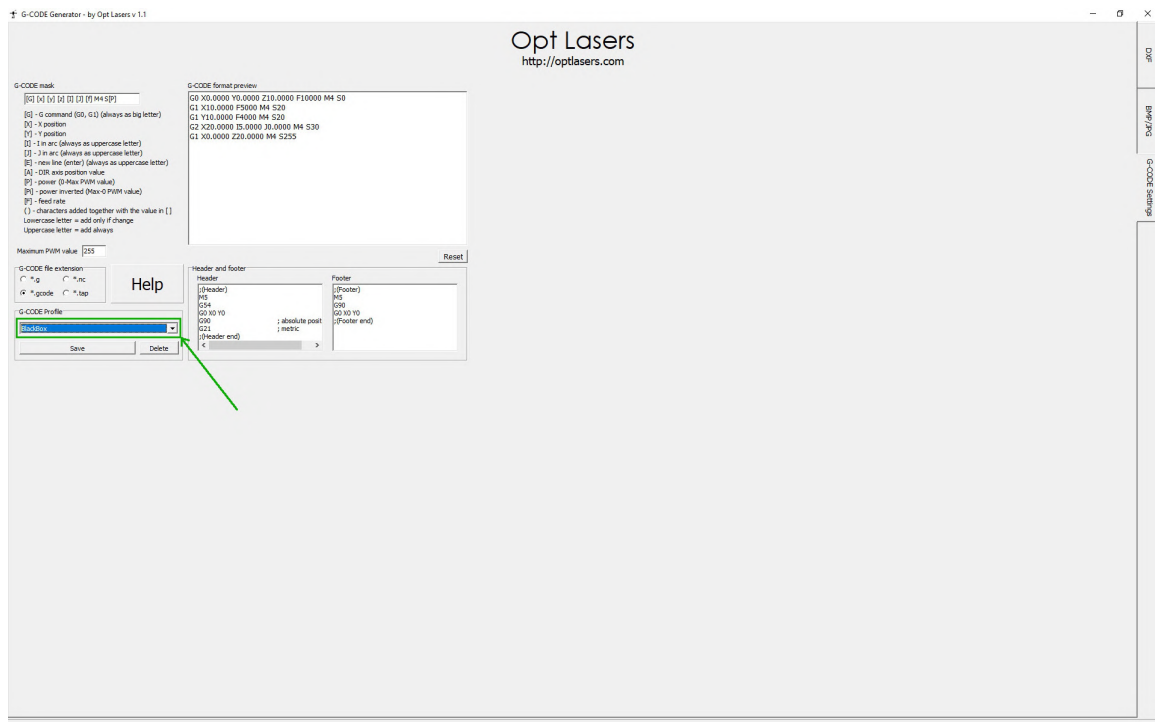
9. First Time Operation

9.1. G-CODE Generator (Opt Lasers) and the OpenBuilds Control program

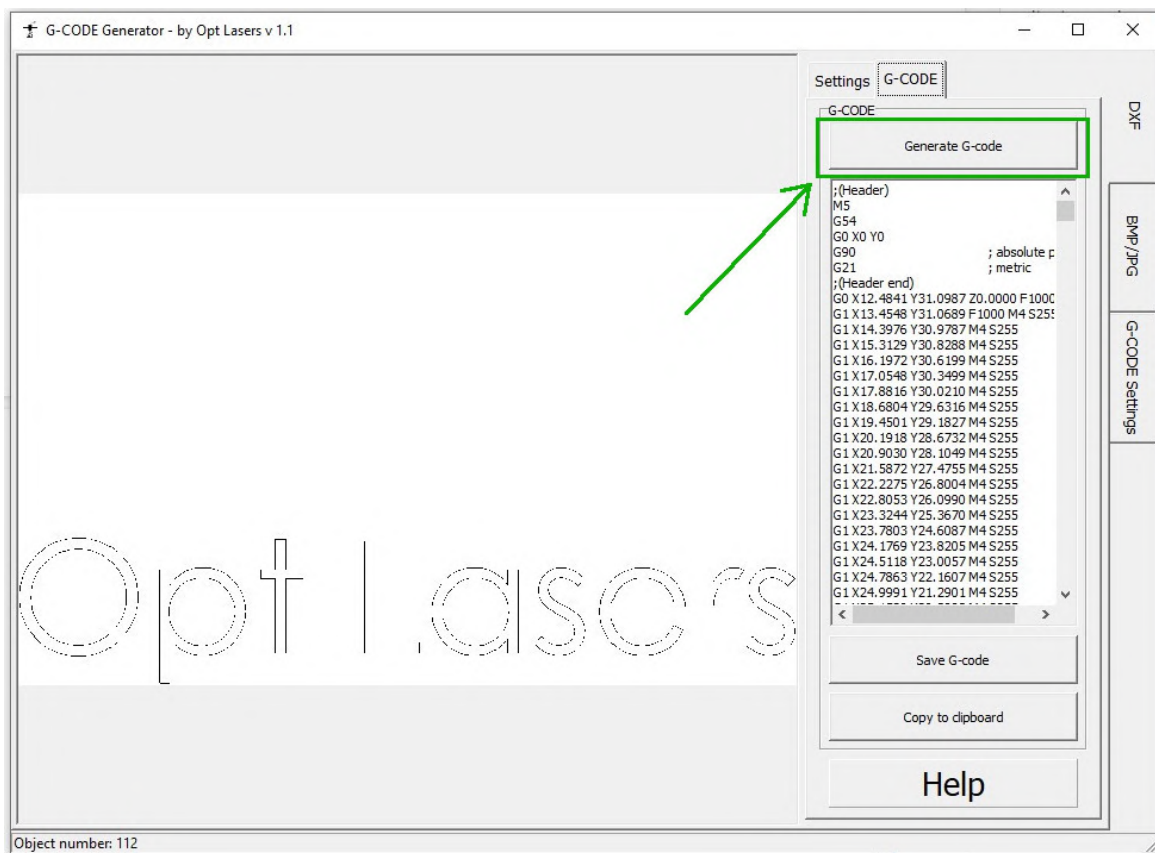
9.1.2. Open the G-CODE generator, which can be downloaded for free from optlasersgrav.com. In the DXF/Settings tab, set parameters like in the picture below.



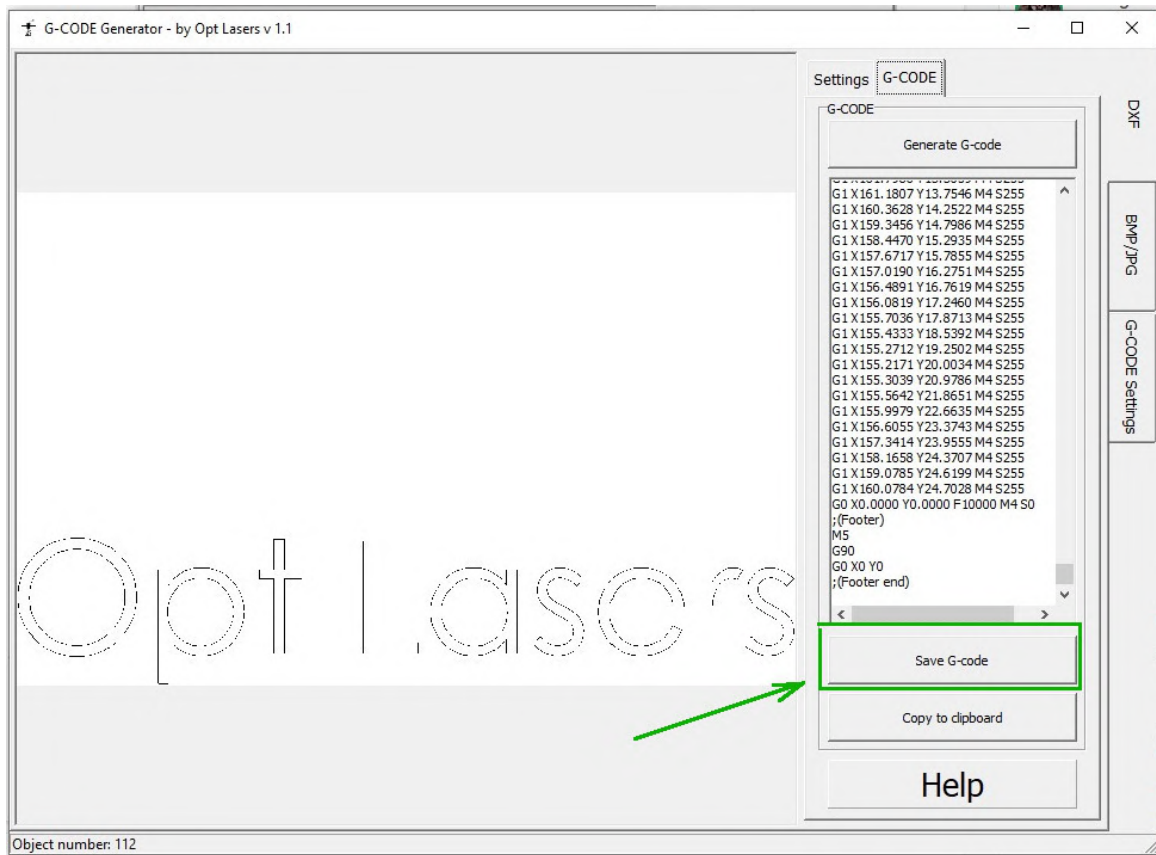
9.1.3. In the G-Code Generator's Settings tab, please choose the BlackBox profile.



9.1.4. In the DXF/G-Code tab, click the “Generate G-code” button.

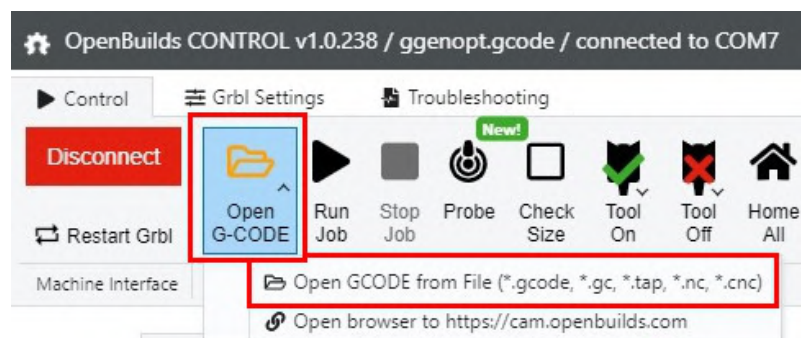


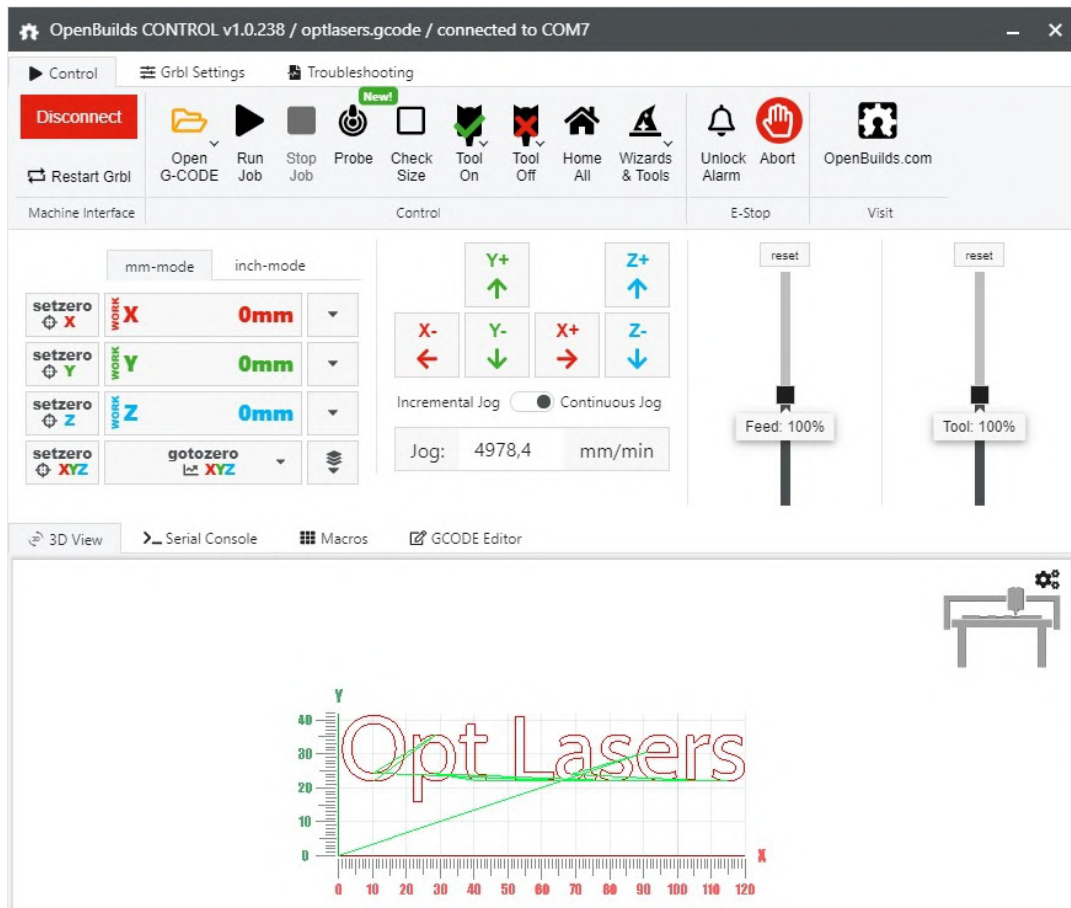
9.1.5. Next, click the “Save G-code” button to name your G-code file and save it in a convenient location.



9.1.6. Now the previously saved G-code file can be loaded.

9.1.7. Please open the OpenBuilds Control program and click the *Open G-CODE* button, then choose your desired g-code file.





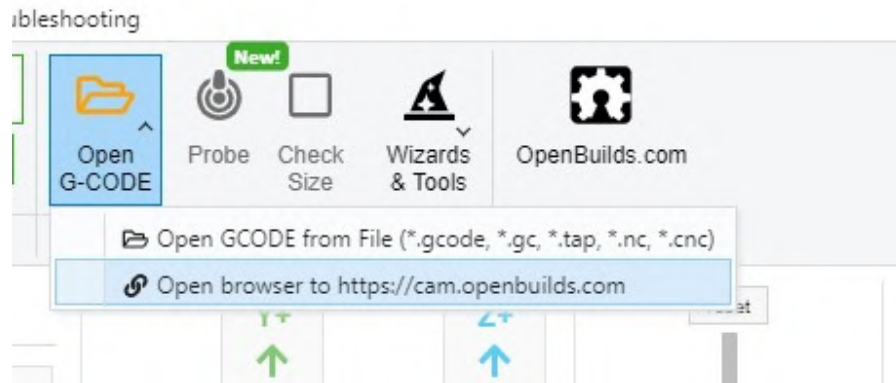
9.1.8. Once the opened G-code file has been loaded, please click the "Run Job" button.

9.1.9. Put the Safety Glasses on!

9.1.10. Use the key and the "ARM/DISARM" button to turn on the PLH3D-CNC Adapter and arm the laser head. POWER and ARMED LEDs should light up.

9.2. The *cam.openbuilds.com* generator and the OpenBuilds Control program.

9.2.1. Please open the *cam.openbuilds.com* webpage, where you can find a g-code generator.



9.2.2. Once the webpage has been loaded, a window pops up that allows the machine configuration. Please choose your controller and your machine model from the list.

Application Settings

Welcome to OpenBuilds CAM
Please configure the application below

- 1 **Install CONTROL**
Used to Connect to and control you machine. If you already have it installed, please run the application, or

Windows
Mac
Linux

Windows CONTROL (EXE)
v1.0.238
- 2 **Select your controller**
Sets approximate defaults below, which should suffice for most users

OpenBuilds BlackBox 4X
▼
- 3 **Select your Machine**
Sets approximate defaults below, which should suffice for most users

OpenBuilds Workbee 1010
▼

9.2.3. In the fourth section, namely “Select your Tool initialization”, please choose “Turn Laser on and Off: Dynamic Power (M4/M5)”.

4

Select your Tool initialization

Sets approximate defaults below, which should suffice for most users

5

Turn Spindle on and Off (M3/M5)

Turn Laser on and Off: Constant Power (M3/M5)

Turn Laser on and Off: Dynamic Power (M4/M5)

Plotter Pen Up/Down (M3S / M3S)

Enable Misting/Cooling: (M8/M9)

9.2.4. In the 5th section, the selected g-code settings and commands are shown.

5

Customise Defaults

From your machine and controller choice above we have prepopulated the settings below. If you have any custom requirements, please customise the settings below

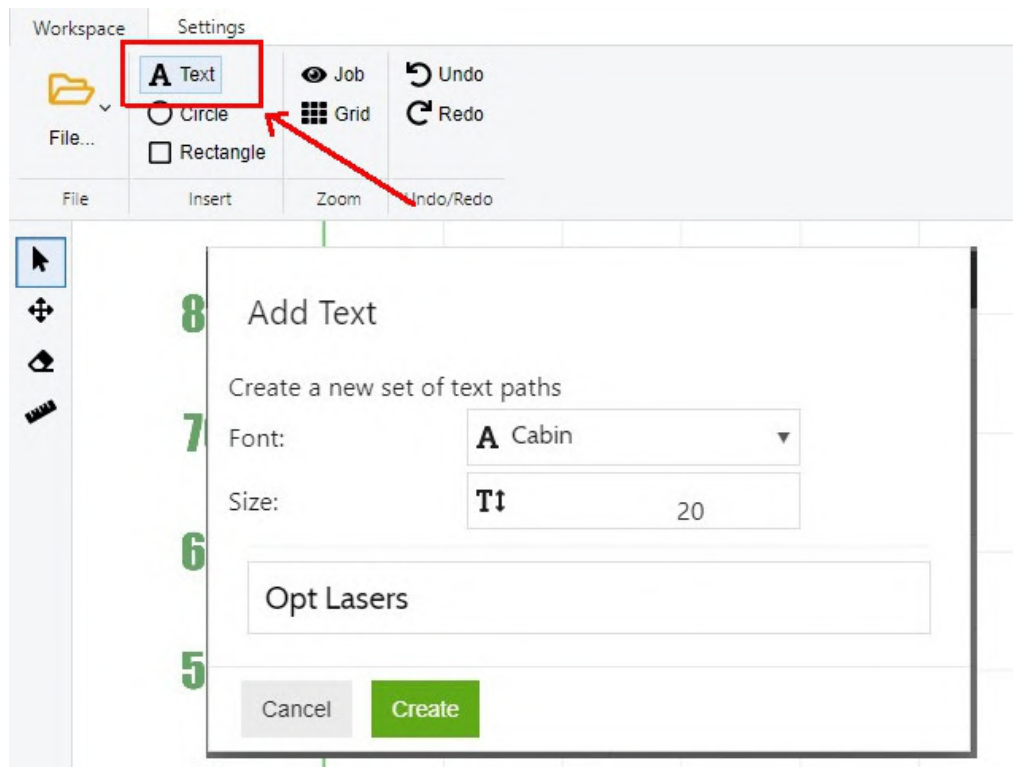
X-Axis Length	824	mm
Y-Axis Length	780	mm
Z-Axis Length	122	mm
Spindle / Laser Command	S	
Power/Speed Scale	0 to 255	
Power/Speed on new-line	<input type="checkbox"/>	
Rapid Move Command	G0	
Linear Move Command	G1	
Start G-Code	G54; Work Coordinates G21; mm-mode G90; Absolute Positioning M4; Dynamic Power Laser On	
End G-Code	M5; Laser Off	

Advanced

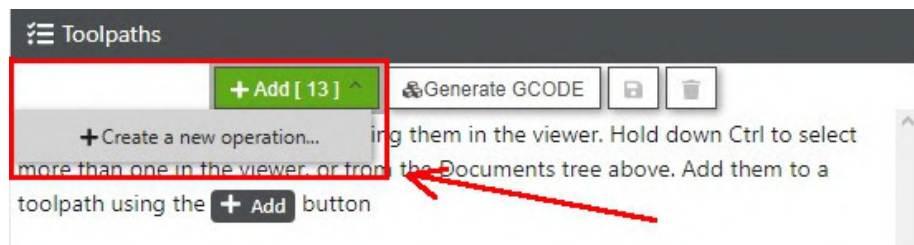
Change application behaviour to suit your specific needs

Plasma: Initial Height Sensing G-Code	G0 + clearanceHeight + G32.2 Z-30 F100 G10 P2 L1 Z0
Performance: Disable Tool-Width Preview	<input type="checkbox"/>
<p>This can speed up toolpath calculations, but will disable the toolpath-width preview: You'll only see the centerline of the toolpath, not the width of the cut. Helps slow PCs work better</p>	

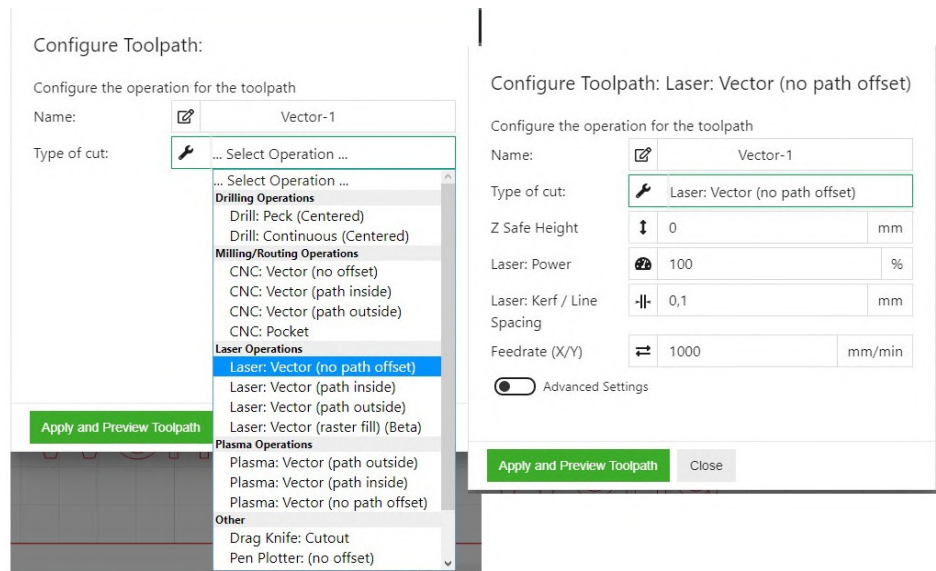
9.2.5. For the next step, let's create a sample text or a shape.



9.2.6. Please highlight the text, then click the “+Add” button, located in the Toolpaths section. Subsequently, please click the “+Create a new operation...” button.



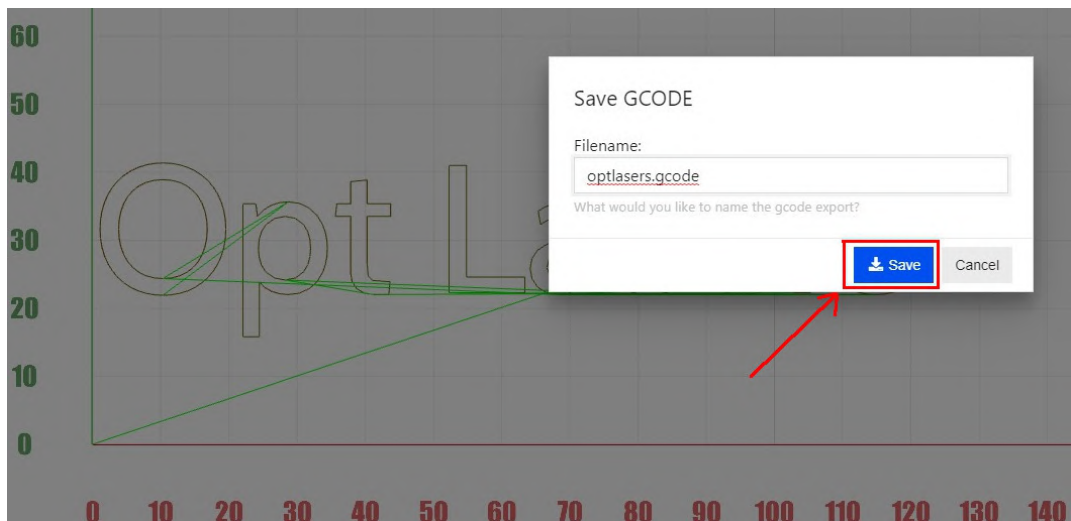
9.2.7 Please select the desired “Type of cut”, cutting speed and the laser power. Next, save your settings please.



9.2.8. Once the settings have been saved, for a g-code to be generated, please click the “Generate G-Code” button.



Please save the generated G-code by clicking the “Save” button.

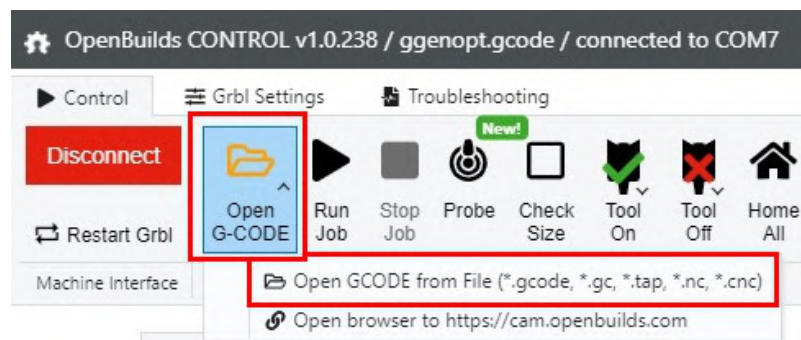


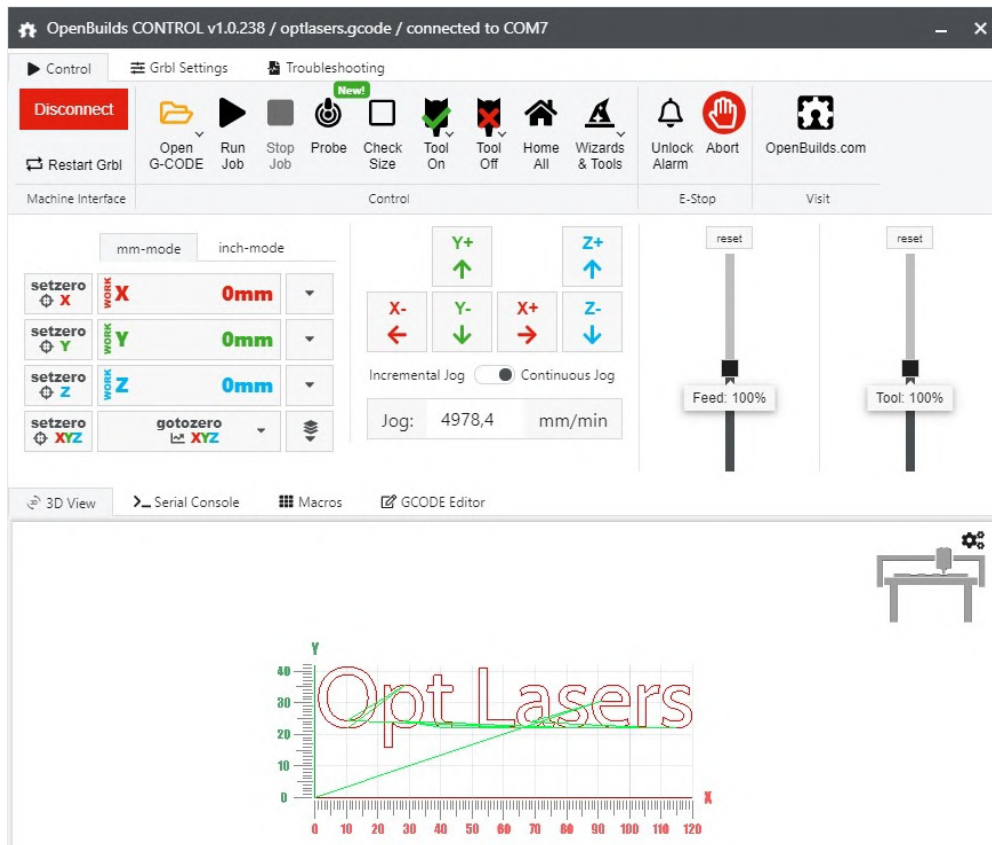
9.2.9. Next, please launch the OpenBuilds Control program and verify whether the setting \$30 (Maximum spindle speed, RPM), located in the GRBL Settings, is set to 255. Please set it to 255 in case it is not.

\$30	Maximum spindle speed, RPM	255	RPM
------	----------------------------	-----	-----

9.2.10. Now, the formerly saved g-code file can be loaded.

Click the “Open G-CODE” button and select your g-code file of choice.





9.2.11. Once the preset G-code file has been loaded, please click the “Run Job” button.



Sample G-code generated by the G-Code Generator software application can be found at: optlasersgrav.com -> Support/Manuals -> Laser Upgrade Instruction -> CNC Machines Laser Upgrade Instructions -> Acro System & BlackBox Set-Up Manual for 2W and 6W Laser Heads