

# Nighthawk CNC Controller



## Wiring a 12v Diode Laser Module



# Safety precautions

- Please read this entire guide before starting any work or modification
- Please ensure any relevant PPE equipment is worn or used when operating any CNC machine. This includes safety glasses for using any lasers.
- CNC machines can be dangerous and must be operated with diligence and safety in mind.

By using this guide, you acknowledge and agree that you are taking full responsibility for any damage to property, machinery, person or persons that could potentially occur as a result of using this guide. CNC3D PTY LTD will not be held liable or responsible in any way for the misuse or use of this guide.

**All 240V wiring MUST be done by a licensed electrician.  
Failure to do so can cause fire or electric shock!**

**DO NOT ATTEMPT ANY 240V WIRING  
WITHOUT AN ELECTRICAL LICENSE**

This modification will involve some low voltage DC wiring including stripping wires or soldering. Please pay close attention to diagrams as any mistake can cause damage to the controller or laser module!

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Failure to do so can cause fire or electric shock!**

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ELECTRICAL LICENSE**

**To complete this modification, you will need the following.**

3 or 4 Core Laser Cable  
Nighthawk Controller 10-pin Connector  
Small Flat-Blade Screwdriver

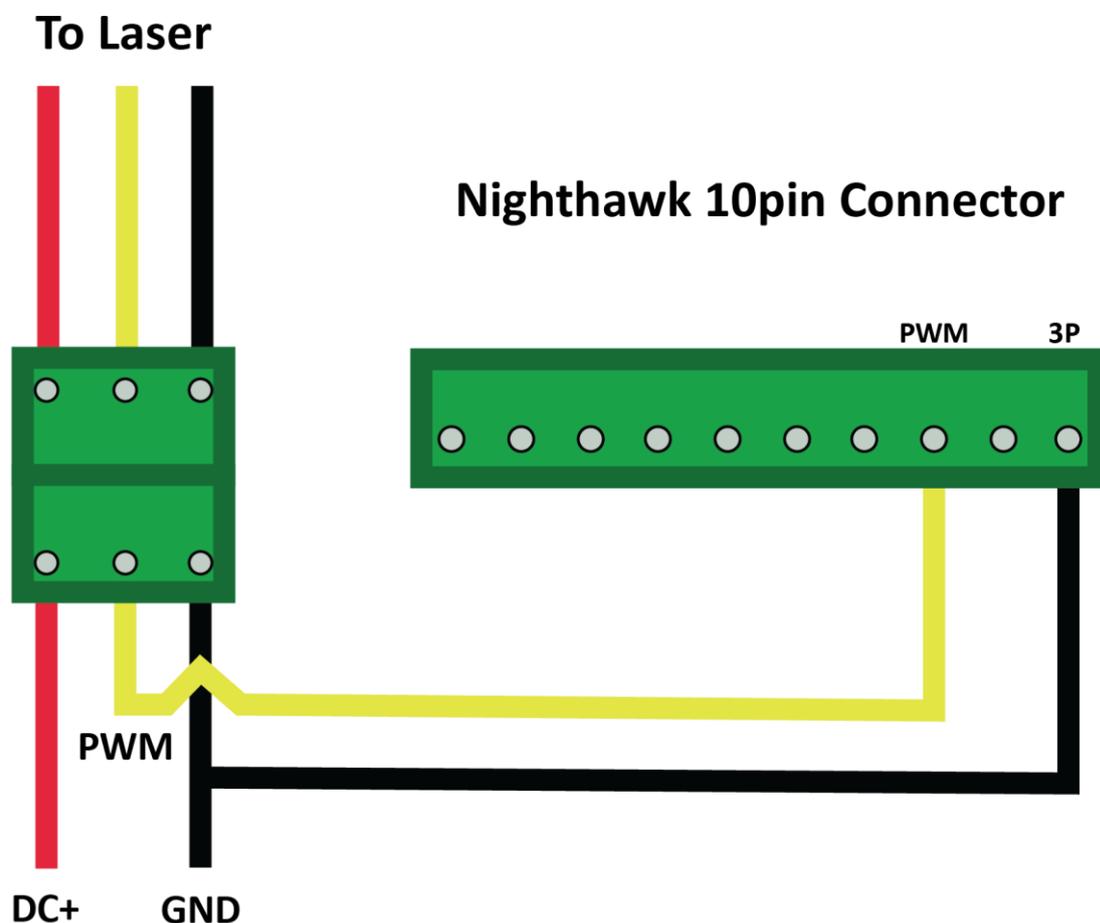
## Using your own Power Supply

**This step is for users who have provided their own power supply. If you have received the kit from CNC3D, or you plan on using the Nighthawk Controller to power the laser please skip to the next step.**

To power the laser but also allow the Nighthawk to control it, you will need to provide a path for the DC positive to get to the laser module but at the same time avoiding the Nighthawk's circuitry.

You will also need a path for the PWM control signal to get from the controller to the laser, as well as allowing the DC negative to get to the laser AND the Nighthawk so the PWM has a return path to the controller.

The wiring diagram is as follows:

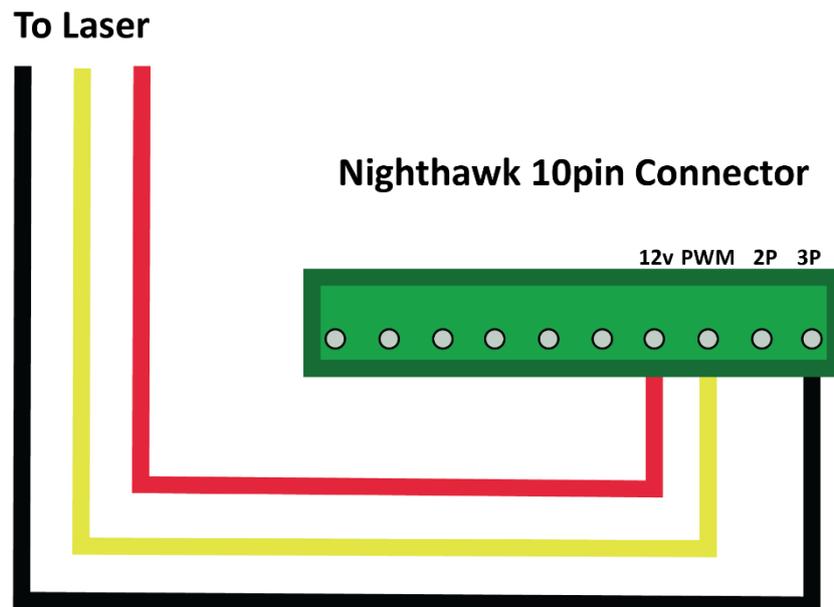


In this example, the DC+ and GND wires are coming from the power supply and are powering the laser. The yellow PWM wire on the supply side is coming from the PWM pin on the Nighthawk however it needs a return path which is the black wire in the 3P pin. This 3P wire needs to connect to the GND wire. It doesn't matter which side of the 3-Pin connector it goes to, but we have found it easier to connect on the supply side rather than the laser side.

## Using the Nighthawk 12v Supply – 3 Pin

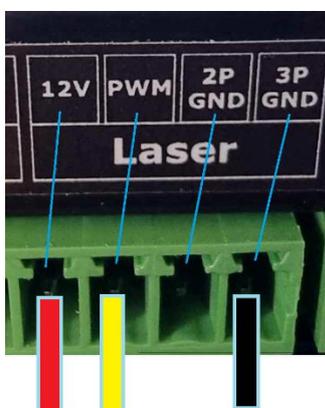
The Nighthawk Controller can power a 12v laser diode up to 15w, without any external power. These lasers generally use 3 wires which supply constant 12v and a PWM signal to control the laser's power output.

The wiring diagram is as follows:



Most diode laser modules will have a white JST connector on the laser housing for wiring, however there is no standard for wiring order, so make sure yours is labelled or check your user manual for the wiring orientation and match that with the plug in the Nighthawk.

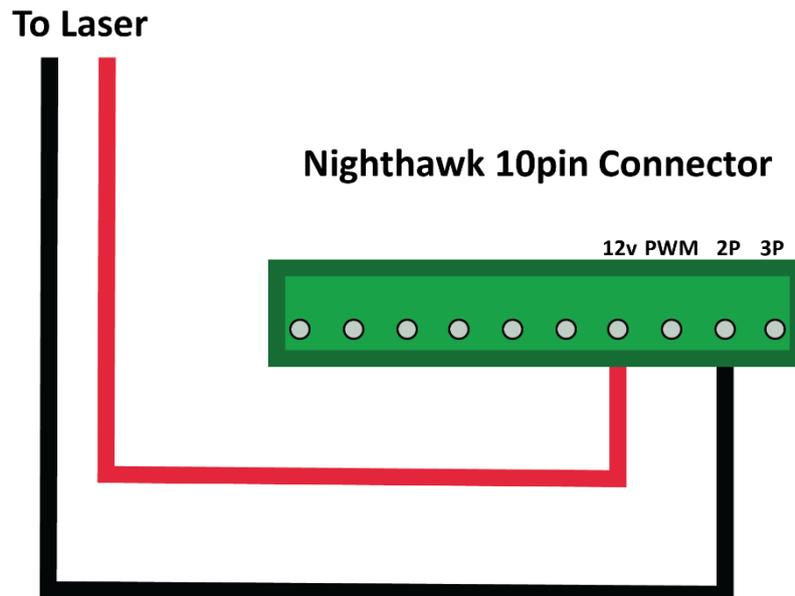
The pictures below are examples of a 15w diode laser wired to the Nighthawk controller for power and control.



## Using the Nighthawk 12v Supply – 2 Pin

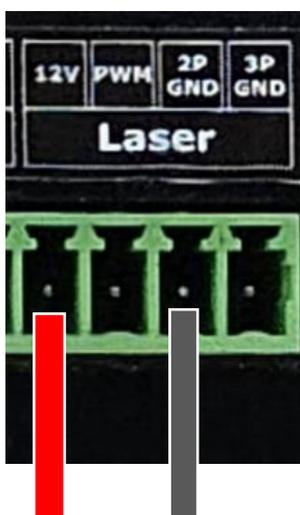
The Nighthawk Controller can power a 12v laser diode up to 15w, without any external power. There are some laser modules that use a 2-wire configuration instead of 3. These lasers do not have a PWM signal, instead they use a variable supply voltage.

The wiring diagram is as follows:



Most diode laser modules will have a white JST connector on the laser housing for wiring, however there is no standard for wiring order, so make sure yours is labelled or check your user manual for the wiring orientation and match that with the plugs in the Nighthawk.

The pictures below are examples of a 1w diode laser wired to the Nighthawk controller for power and control. This laser module uses a barrel-type connector instead of a white plug.



## Testing Your Laser

Now the laser's wired up, it's time to make sure it's working! With a Nighthawk controller, you will have full control over the laser through our Commander software.

### Step 1:

Plug in your laser, power on your Nighthawk, then connect to it in Commander.

Click over to the "Operations" tab in and check to see that you are in **Laser Mode**. You can switch between Laser and Spindle mode by selecting the correct one in the drop-down menu box.



The Maximum Speed/Power is simply a scale reference and is not related to actual power. For lasers a good number to put here is usually 1000 or 255, though 1000 makes things a lot easier. Whichever program you are using to create your laser job will also need to reflect this number!

In the "Run Job" tab in Commander you will now see "Laser Control" with a few options. M3 is an ON command and the number will set the power. This is where having an easy number like 1000 will come in handy. If you choose M3 and 1000, then click ON, the laser will fire at full power. If you select M3 and 500, the laser will fire at 50% power. M3 and 100 is 10% power etc.



**NOTE:** Clicking the 'On' button may not immediately fire the laser if you are in Laser mode, read through the next page for the reason!

Through testing, we have determined that the minimum percentage for the laser to fire from a Nighthawk is around the 6-10% range, so if you are unable to get your laser to fire at a low number, try M3 and 70 for a low power laser beam.

## Step 2:

Check your Nighthawk's firmware version! You can see it in the coloured bar at the very top of Commander when connected to your controller.



With Nighthawk Firmware version 2.3 and any future releases, the laser will only turn on if it has received an M3 or M4 (on) command, **AND** the machine has received a movement command.

The way the laser works in version 2.3 and onward is:

### If in Laser mode

When you click the “On” button in Commander, the command will be sent, but the laser will not fire.

When you click the “On” button in Commander, *then jog the machine*, the laser will turn on and fire at the requested power level. Even a jog of 0.1mm will work, it just needs to receive a command which enables the motors.

This safety feature is implemented at a firmware level and **cannot be disabled**. It is to prevent the laser from accidentally being turned on and staying focused on one point, which has a high potential for starting a fire.

**Note:** If you are setting up your job and need to power the laser to get it into focus, you will need to follow the instructions above on how to fire it on v2.3. If you are simply running the job you will not need to do anything special as the laser will receive the required commands already without your input.

### If in Spindle control mode

If your Nighthawk controller is set to Spindle control mode, the laser will fire with any On signal it receives, but your machine will run significantly slower during an engraving and will likely result in a worse looking job.

**Your laser is now set up and ready to go! Happy lasering!**



# Need help?

We have set up an online document with the most common problems our users run into when using lasers.

Click the link below or type it into a web browser to check it out if you are having problems!

<https://www.cnc3d.com.au/forum/support-faqs/laser-isn-t-firing>

Reach out to our friendly Support team.

**Phone:** +617 5522 0619 (9am-5pm AEST)

**Email:** solutions@cnc3d.com.au

**Website:** <https://www.cnc3d.com.au/nhc> OR via our Chat.

**Facebook:** <https://www.facebook.com/cnc3dau>

**Our FB Community:** <https://www.facebook.com/groups/cnc3dplayground>

We are always looking for feedback! If you have any suggestions regarding how we can re-word our manuals or support pages to make them easier to understand please let us know using the links above!

