



Nighthawk CNC Controller

User Manual



Safety precautions

- Please read this entire manual before using your new Nighthawk controller or CNC3D Commander software.
- 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 controller and or any associated software, 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 product. CNC3D PTY LTD will not be held liable or responsible in any way for the misuse or use of this product.

All 110V/240V wiring MUST be done by a licensed electrician. Failure to do so can cause fire or electric shock!

**DO NOT ATTEMPT ANY MAINS WIRING WITHOUT
AN ELECTRICAL LICENSE**

Nighthawk Controller Form Factors

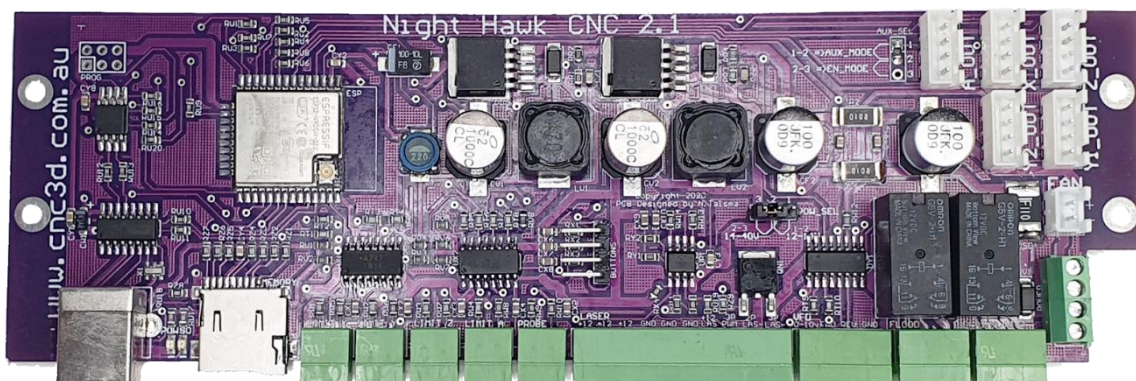
There are two available form factors of the Nighthawk Controller:
Full Stack and Stand-Alone Control Card.

Knowing which form factor Nighthawk you have will aid you when reading through this manual, as well as if you need to contact our support team for assistance.



Full-Stack Nighthawk

Includes steel case, stepper drivers, cooling fan, control buttons



Stand-Alone Nighthawk Card

Control Card and Antenna only. No fan, no case, no included drivers

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Nighthawk Controller Specifications

Input Voltage*

Full-Stack

14-40V DC (36v Recommended)

Stand-Alone

14-50V DC (24v-48v Recommended)

Power Usage

320W (max)

Onboard Drivers

4 x 4.5A (max)
(Full-Stack Only)

Total Axes

4 (XYYZA)

SD Support

MicroSD Class 10 (Up to 32Gb)

SD Format

FAT32 Required

WiFi Frequency

2.4GHz

Operating Frequency

240MHz

Antenna

4.5db Gain

Enclosure

Folded Steel

Mounting

Bench/Wall

Enclosure Finish

Powder Coating

*** WARNING: The Nighthawk does not come with a DC Power supply. CNC3D PTY LTD only recommend using certified power supplies for operating your Nighthawk. The use of an uncertified power supply will be deemed as improper use and void your warranty. If you are unsure if the power supply you plan on using is certified or have not yet selected a power supply, please confirm with a licensed electrician in your region.**

Hardware setup

This section relates to our Full-Stack controller.

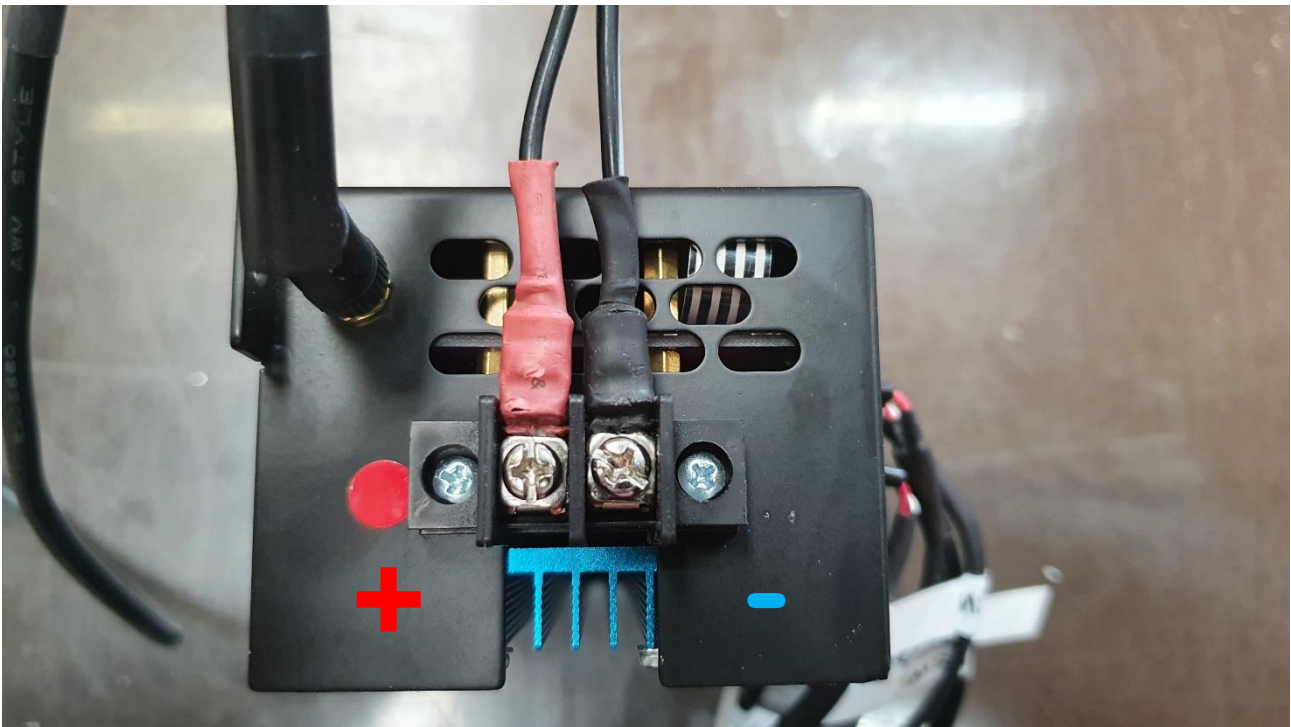
For stand-alone cards please skip to page 13

Did you get your Nighthawk controller with a CNC3D CNC machine or are you retrofitting your Nighthawk CNC Controller to an existing machine?

Every Nighthawk controller provided with our fully assembled machines is tuned by our team for the best performance and longevity. You will not need to change any hardware settings on your controller, you can skip this section and move on to the Connection setup section of these instructions on page 24.

Power input orientation

The positive terminal is located closest to the Antenna plug. Please ensure to use a 14V minimum power supply with a total wattage rating greater than 300w.



Setting your micro-stepping and current

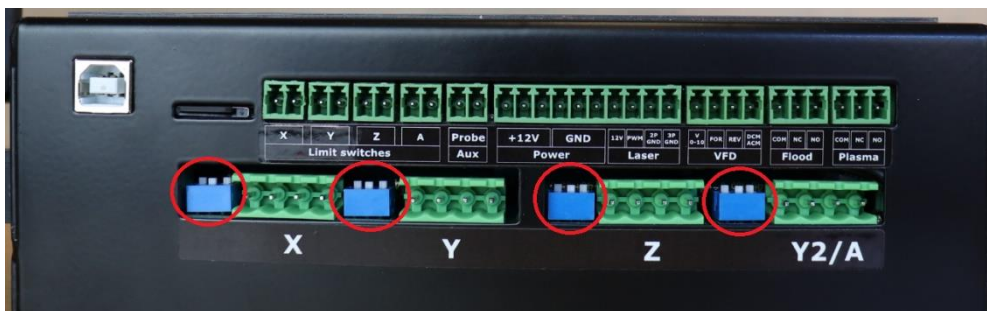
The drivers included with your controller have physical settings that can be adjusted to suit your needs these include micro-stepping and current output settings.

Note: Always ensure the unit is powered OFF and the USB cable is disconnected before performing any micro-stepping changes.

Setting Micro-stepping

Each drive has the option of **1 / [1, 2, 4, 8, 16]** micro-stepping settings. For most CNC routing applications, a **1/8** ratio is a good balance of torque, accuracy, and maximum speed.

The front of your Nighthawk controller shows 4 **blue** tactile switch blocks. These blocks are used to set your micro-stepping. They can be seen here:



A small pick or screwdriver can be used to set the micro-stepping from the front of the unit, or the controller cover can be removed to make setting the values easier, see below for removing cover.

Each of these switch blocks has 3 small switches for setting your micro-stepping.

The default on your controller will be 1/8.

Please note the ON position and switch number:



Micro-stepping settings chart

Set the switches for each drive in the order as per the table below to choose your micro-stepping options.

SW1	SW2	SW3	Pulse/rev	Microstep
OFF	OFF	OFF	Standby	Standby
OFF	OFF	ON	200	1
OFF	ON	OFF	400	2 (A)
OFF	ON	ON	400	2 (B)
ON	OFF	OFF	800	4
ON	OFF	ON	1600	8
ON	ON	OFF	3200	16
ON	ON	ON	Standby	Standby

Setting the current for each driver

Each driver can have its current set to match the motors you are using on your machine. As noted above, if you have purchased your machine from CNC3D and it came with a Nighthawk controller then the current has already been set for you and you will not need to do this step.

As a general rule you should always set the current of your motors slightly lower than the value as per your motor's datasheet.

There are 2 methods for setting your motors current, the first is a "quick" method and should be used with caution to ensure you do not overdrive your motors.

1. Remove the controller cover

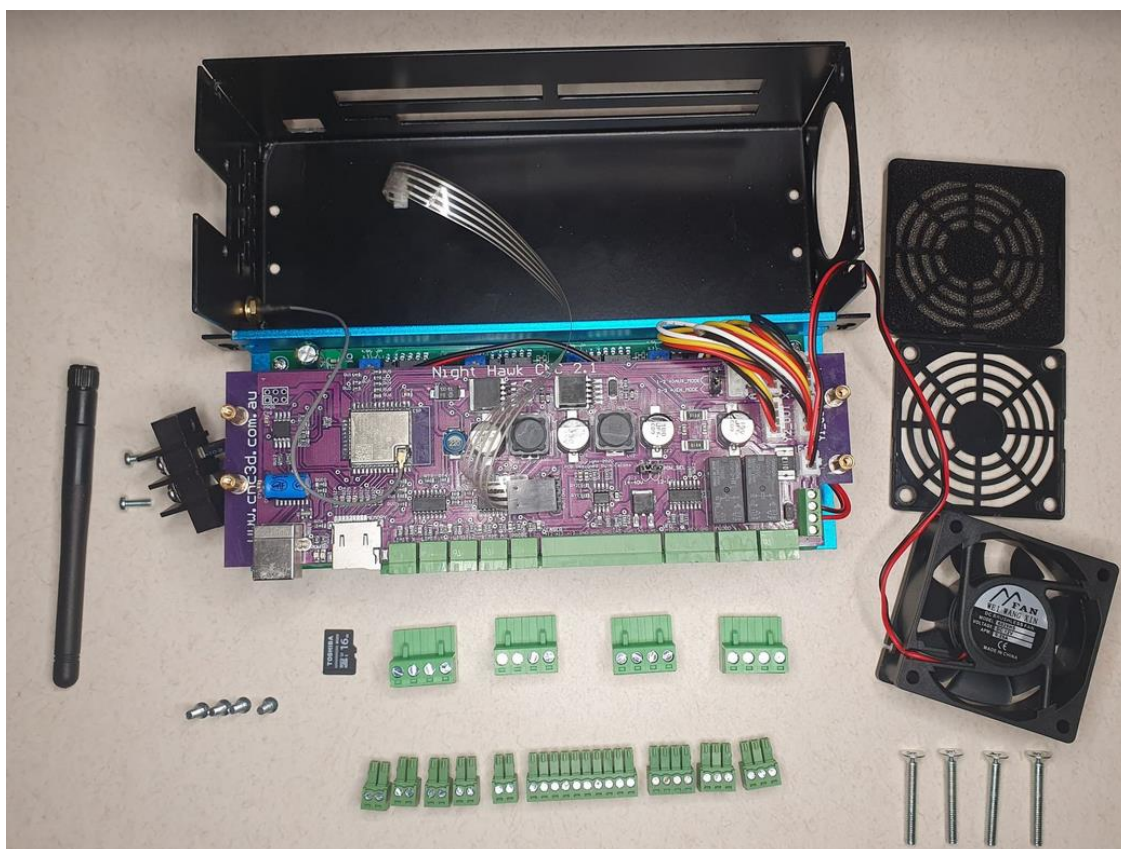
Ensure all plugs or leads on the front of the controller are unplugged and the SD Card is removed

Tip: Try using a flat head screwdriver to lever the plugs out gently:



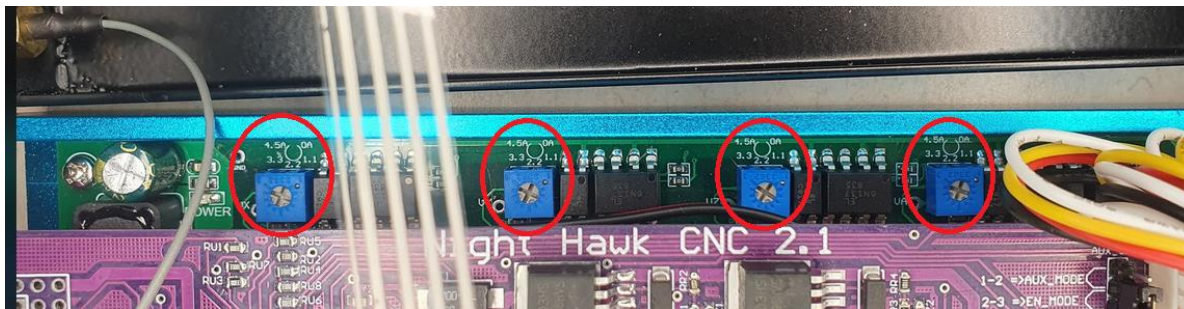
- Remove the plastic antenna (if attached) by unscrewing it from the gripped black plastic part of the antenna. The brass thread can stay attached to the case.
- Using a Phillips head screwdriver, carefully unscrew the black power connector from the controller housing. Take note of the orientation of the **RED** power cable to ensure it goes back in the same orientation.

- Carefully lever the fan cover off the side of controller to expose the bolts attaching the fan. Loosen these bolts and carefully remove the fan. Take care to ensure no stress is put on the fan cable in the cable slot. Remember the orientation of the fan. The Nighthawk is designed to have cool air blowing into the enclosure.
- Now remove the remaining 4 bolts on top of the enclosure. Once removed, carefully lever the front of the housing upward. It should lift away quite easily by using one hand to hold blue the heatsink at the bottom while removing the top cover. Now that the front cover is loose, flip it towards the back of the enclosure taking care not to unplug or damage any wires. Everything should look like this:

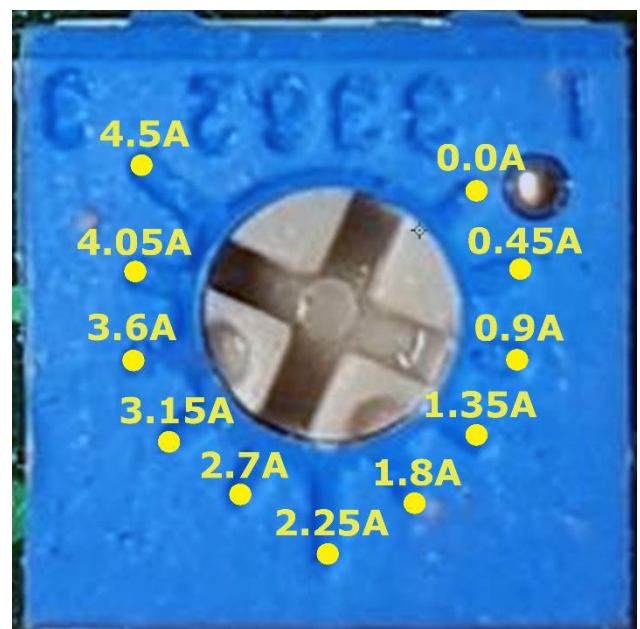
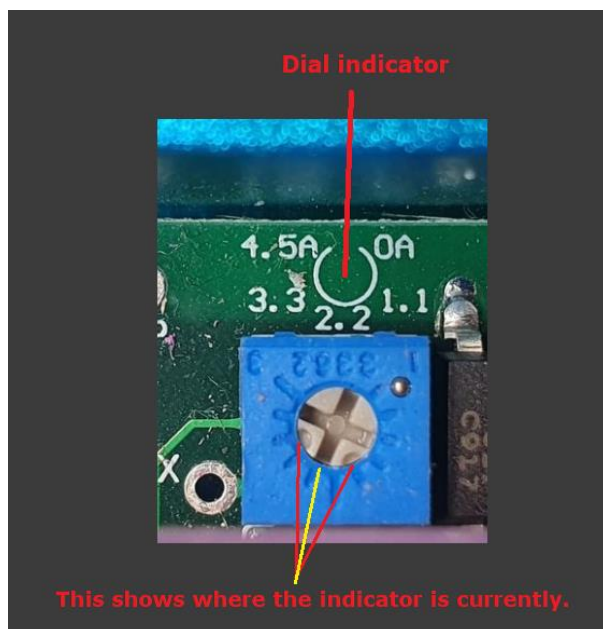


2. Set the current for each stepper.

There are 4 blue screw trim pots and setting guides at the rear of the controller on the lower green driver board, they are used for setting the current, see photo of what they look like:



Each dial has a guide above it to indicate roughly what the current setting is. The quick method for setting your current is by visually adjusting the dial using a small Phillips head screw driver. See diagram below of where the indicator is, there are 2 notches either side of it. See also below the approximate value of each chevron on the dial:



It is important to note that this is a very rough method of setting your motor current and the following finetuning method will be a better option.

Fine tuning your motor current

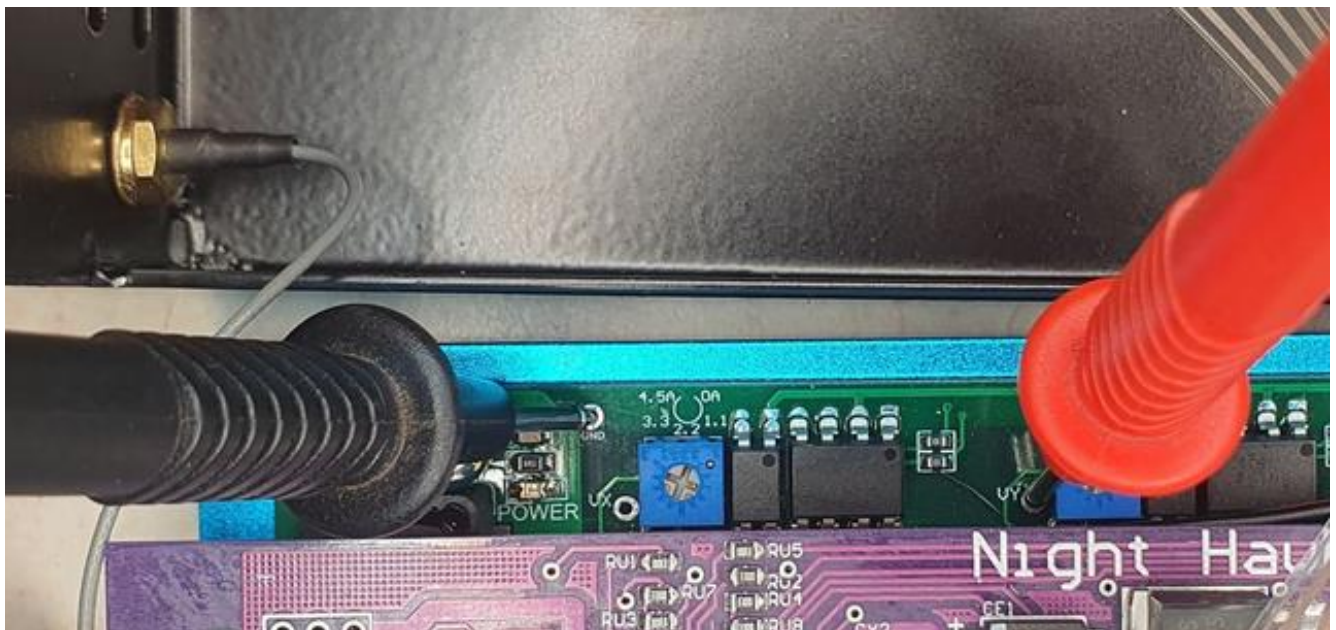
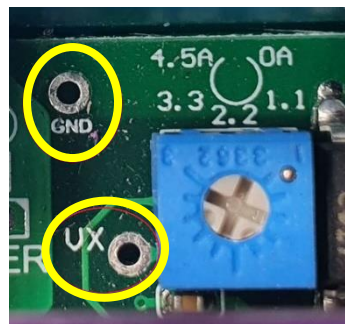
Firstly, you must connect power to the power input terminal on the side of the controller. Please be careful with the orientation of the connections.

Just to the left of each of the blue dials there is a small solder-tinned hole, these are labelled as **V(axis)** i.e: **VX**. These holes are used for precisely setting your motor current. There is also another hole on the far left of all the blue dials labelled "**GND**".

Using a multimeter set to voltage mode we can position the black probe on the GND hole on the board and position the red probe on the hole closest to the driver you wish to set.



Close-up image showing the location of the axis-specific voltage test point (VX) and the common ground location (GND)



Testing the voltage on VY using a multimeter with the black probe on GND and the red probe on VY

Once your multimeter probes are in position and a voltage is showing, use a small screw driver to carefully turn the blue dial being set, rotate clockwise to increase current and counter-clockwise to decrease the current. While turning, check the voltage change on your multimeter for the expected value.

The equations used for setting your current are:

$$\text{Current} = \text{Voltage} / 0.62$$

Which is equivalent to:

$$\text{Voltage} = \text{Current} \times 0.62$$

Current is represented in amps (A) and 1000mA = 1A

Based on these equations if we are trying to set our current to **3A** exactly we must have a reading of **1.86V**. As advised above, it is recommended to go slightly lower than the rated current. In this case we would set the voltage reading to **1.84V**.

Once you have set the current for each axis, you can power off the controller and reassemble the enclosure in the same order it came apart from, keeping on mind to ensure the power connector and fan go back in the same orientation. When fitting the enclosure back onto the electronics, take note to ensure the antenna cable, fan cable and ribbon cable are not pinched anywhere by the case. Also remember to re-attach the antenna. Once everything is fitted, use your fingers to push the fan cable back inside the enclosure. It should look like this:



Connecting your stepper motors

The drivers on your Nighthawk support the connection for 4-wire stepper motors. Generally, these motors have 2 pairs of motor poles. Connecting them to your controller should be relatively straight forward.

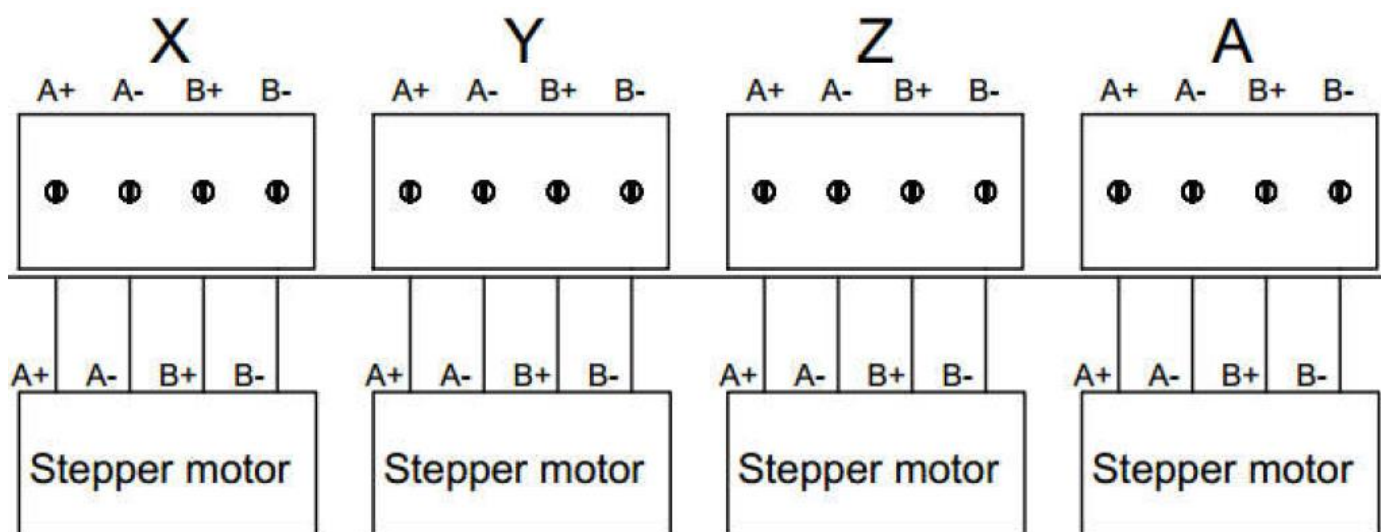
*****PLEASE NOTE*****

Always ensure the unit is powered OFF and the USB cable is disconnected before connecting or disconnecting any motors from your controller.

Use a small flat head screwdriver to attach your motor wires to the green plugs.

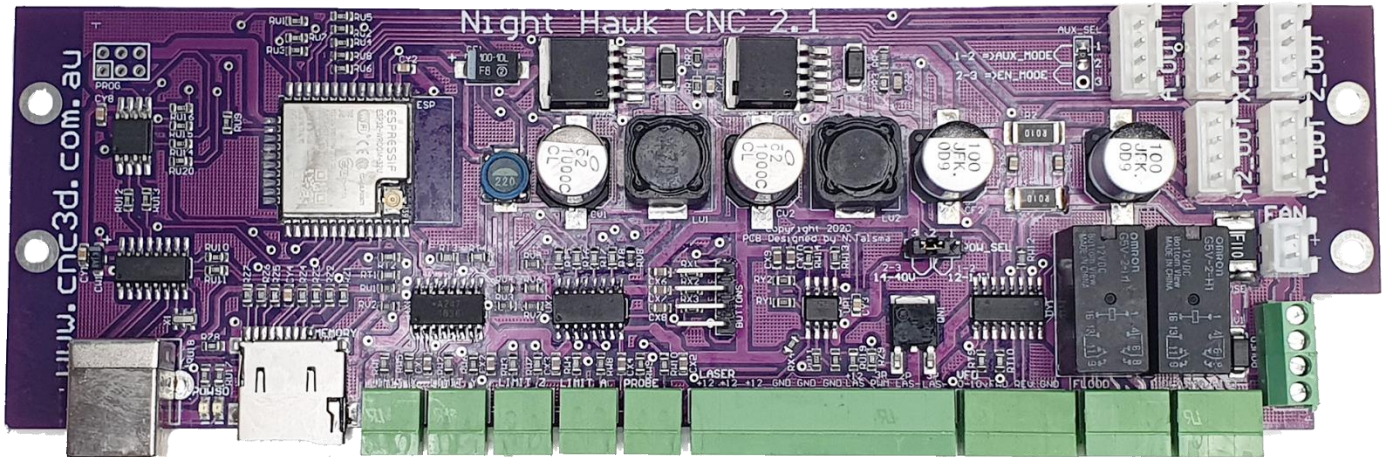
The motor connections are shown here, check your motors datasheet for the wiring colours of your motors to match them to the controller.

If your machine is set up to use separate motors for each Y axis, such as one of our QueenBee, QB2, YouCarve, Metal Storm or SharpCNC machines (XYYZ) then your Y2 motor will go into the A plug.



**You can now skip ahead to page 20 for connecting
Limit Switches**

Standalone Nighthawk Control Card

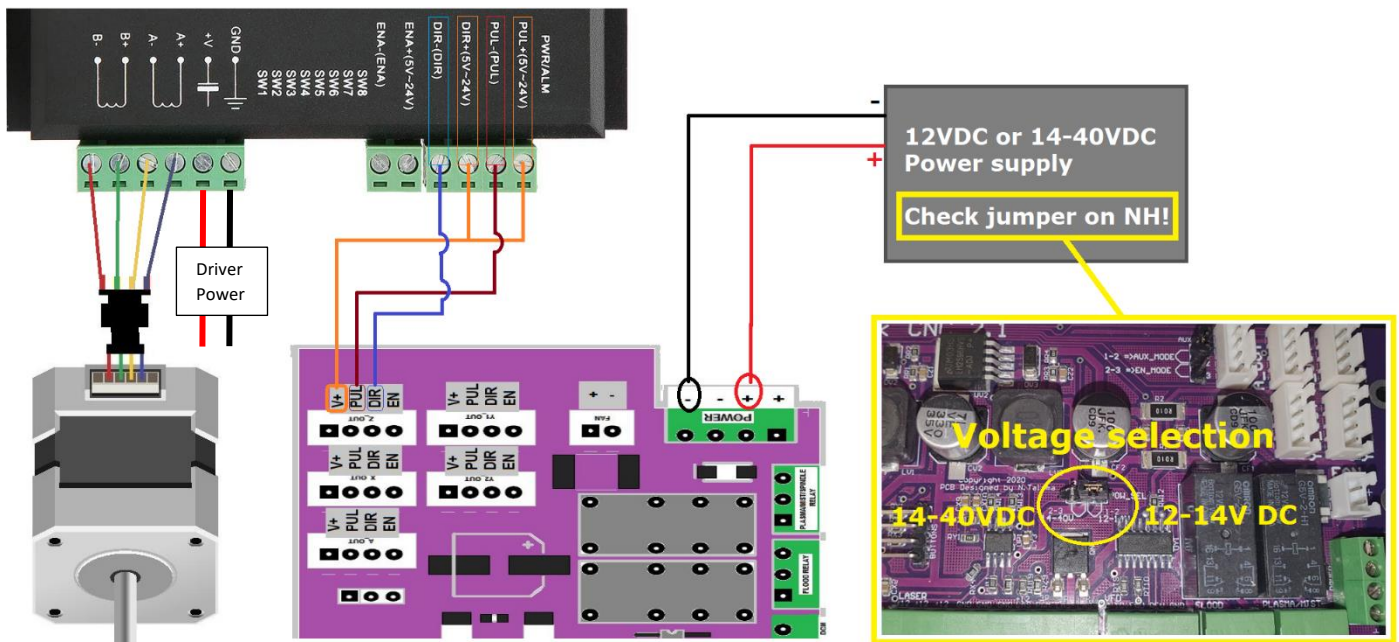


With the stand-alone card, you will need to use external stepper drivers to run your motors, this allows for high-power motors, closed-loop control as well as higher motor voltages than the Nighthawk card can manage on its own.

PLEASE NOTE: The maximum input voltage for the Stand-Alone Nighthawk Control Card is 50VDC.

Any higher will risk causing irreparable damage to the card and void your warranty.

Typical machine retrofit to external drivers



WARNING!

Failure to select voltage correctly may cause irreparable damage to the controller and your machine, please ensure you select this voltage correctly!

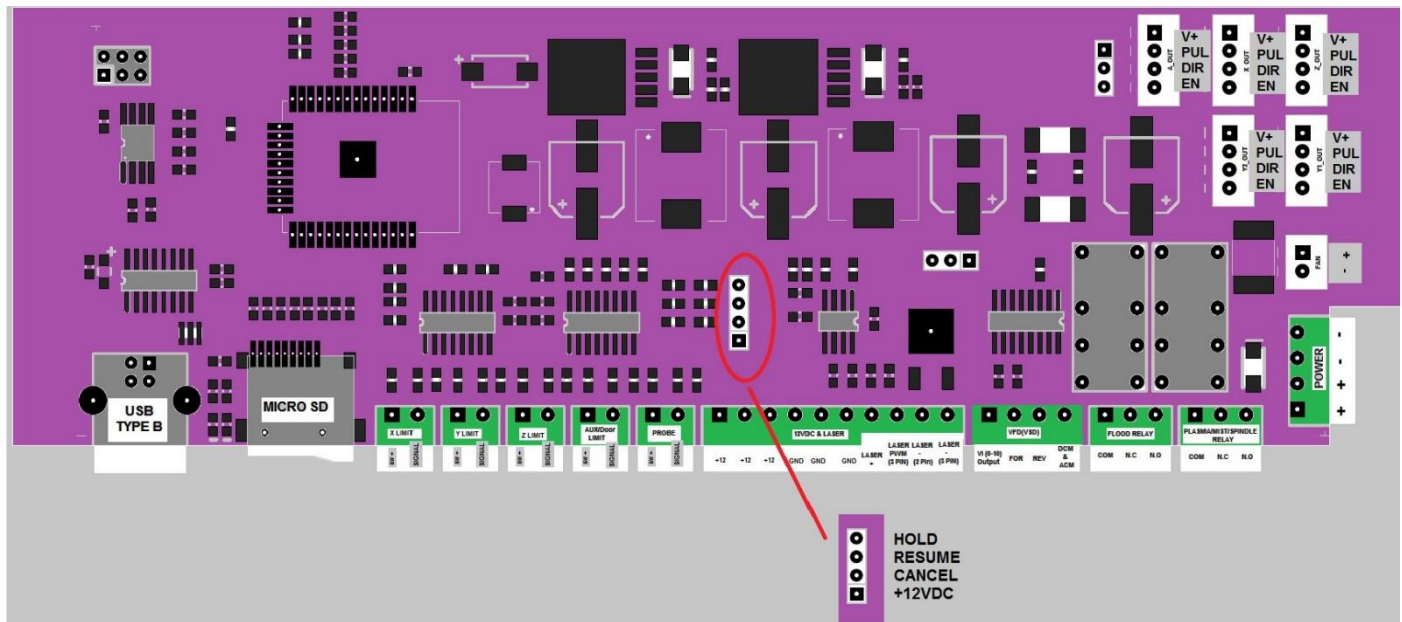
Nighthawk Control Card Connections/Pins

Connections	Type and PIN	Connector	Name on PCB	Function
Green Pluggable	INPUT 2	1	Limit X	X Limit Switch
Green Pluggable	INPUT 2	2	Limit Y	Y Limit Switch
Green Pluggable	INPUT 2	3	Limit Z	Z Limit Switch
Green Pluggable	INPUT 2	4	Limit A	Y2/A Limit Switch
Green Pluggable	INPUT 2	5	PROBE	Probe Input
Green Pluggable	OUTPUT 10	6	LASER and 12V POWER OUT	Laser Port and Proximity switch 12V supply Max 12.5V @ 2A
Green Pluggable	OUTPUT 4	7	VFD	VFD(VSD) Speed Control
Green Pluggable	DRY CONTACTS 3	8	FLOOD	Flood Relay (Dry Contacts) Max 30VDC @ 2A
Green Pluggable	DRY CONTACTS 3	9	PLASMA/MIST	Spindle Interlock/Plasma/Mist Relay (dry contacts) Max 30VDC @ 2A
TB BLOCK	POWER 4	10	POWER	POWER INPUT (12-14v or 14v to 40v) (POW_SEL 1-2) Min 12VDC Max 14VDC Dependent on POW_SEL JUMPER (POW_SEL 2-3) Min 14VDC Max 40VDC Limited Protection is provided by a self-resetting fuse.
White JST	OUTPUT 2	11	FAN	Fan (12VDC)
White JST	OUTPUT 4	12	Y1_OUT	Y1_OUT
White JST	OUTPUT 4	13	Z_OUT	Z_OUT
White JST	OUTPUT 4	14	Y2_OUT	Y2_OUT
White JST	OUTPUT 4	15	X_OUT	X_OUT
White JST	OUTPUT 4	16	A_OUT	A_OUT
AUX_SEL	Jumper 3	17	AUX_SEL	A_OUT MODE SELECTOR
POW_SEL	Jumper 3	18	POW_SEL	Enables/Disable Onboard 12V regulator

Wiring of External Control Buttons

The Nighthawk control card has pins to allow wiring of external E-stop, pause and resume buttons. These pins are highlighted below. On the control card these are bent at 90 degrees to the PCB.

The pins are active high and must connect to +12VDC to activate.



Wiring of VFD(VSD) to the Nighthawk for Speed Control

Numerous VFD drivers are available and as such no colour code is given for connection from the Nighthawk to the VFD. Instead, generic terms are being used in this manual.

VFD (INPUTS)

VI (0 to 10V) input

Forward input

Reverse input

DCM Common Terminal of Digital Ground
ACM Common Terminal of Analog Ground

Nighthawk (Outputs)

VFD, Connector 7 PIN 1

VFD, Connector 7 PIN 2

VFD, Connector 7 PIN 3

VFD, Connector 7 PIN 4

VFD, Connector 7 PIN 4

The Nighthawk uses a single common ground for both ACM and DCM as such you may need to jumper DCM and ACM on the VFD.

CNC3D cannot provide support for your VFD.

We test every Nighthawk card on a test bench which includes a VFD control test, and it will not be shipped until it passes. If your VFD is not responding to your Nighthawk card after setting Commander up to run it, it is a wiring or VFD settings problem and you should refer to your VFD manual.

We have created a “Cheat Sheet Guide” with ways to connect common VFDs. This is the extent of support we can offer for VFD wiring and settings. Click the link below or type it into an internet browser to view the document.

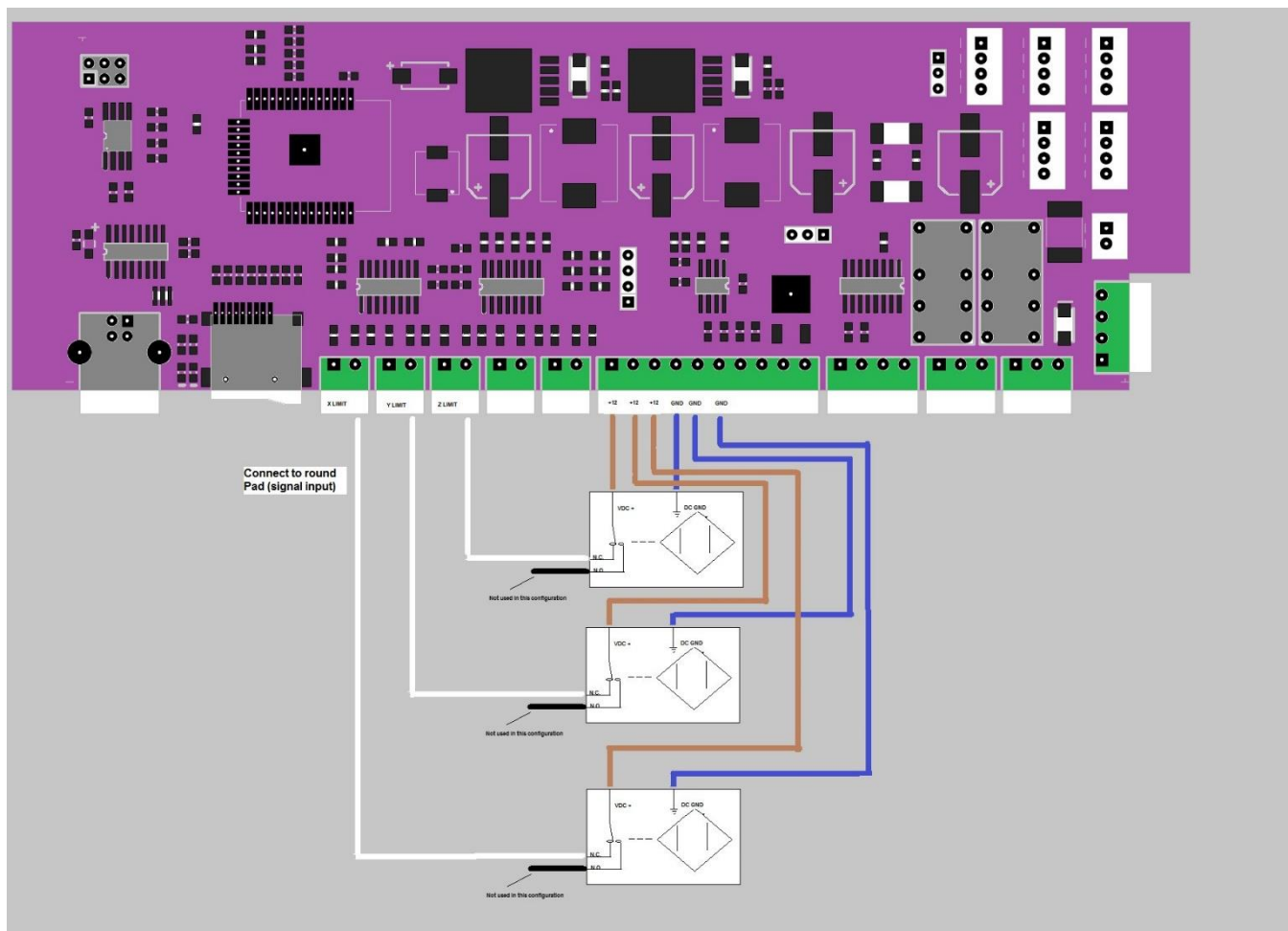
<https://libraries.sharpsoft.com.au/nighthawk/nh-vfd-guide.pdf>

Proximity Limit Switch Wiring

The Nighthawk is designed to work with PNP proximity switches and are the only supported type. **NPN proximity switches will not work.**

Normally Closed switches are the recommended type as any break in the circuit will cause the limit to trigger on that axis, resulting in safer operation.

Brown: +12 (10-pin plug)
Blue: GND (10-pin plug)
White: Limit Switch Input (round pad)
Black: Not used in this configuration

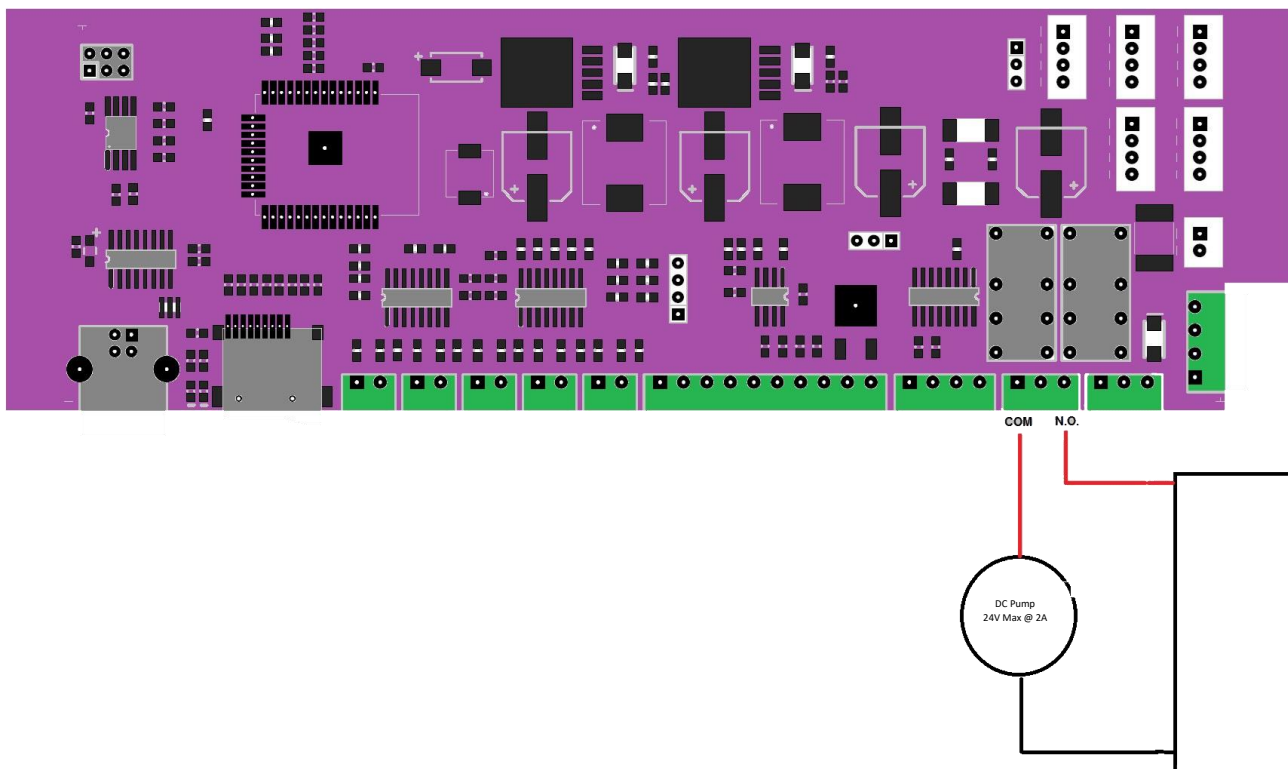


Relay Setups

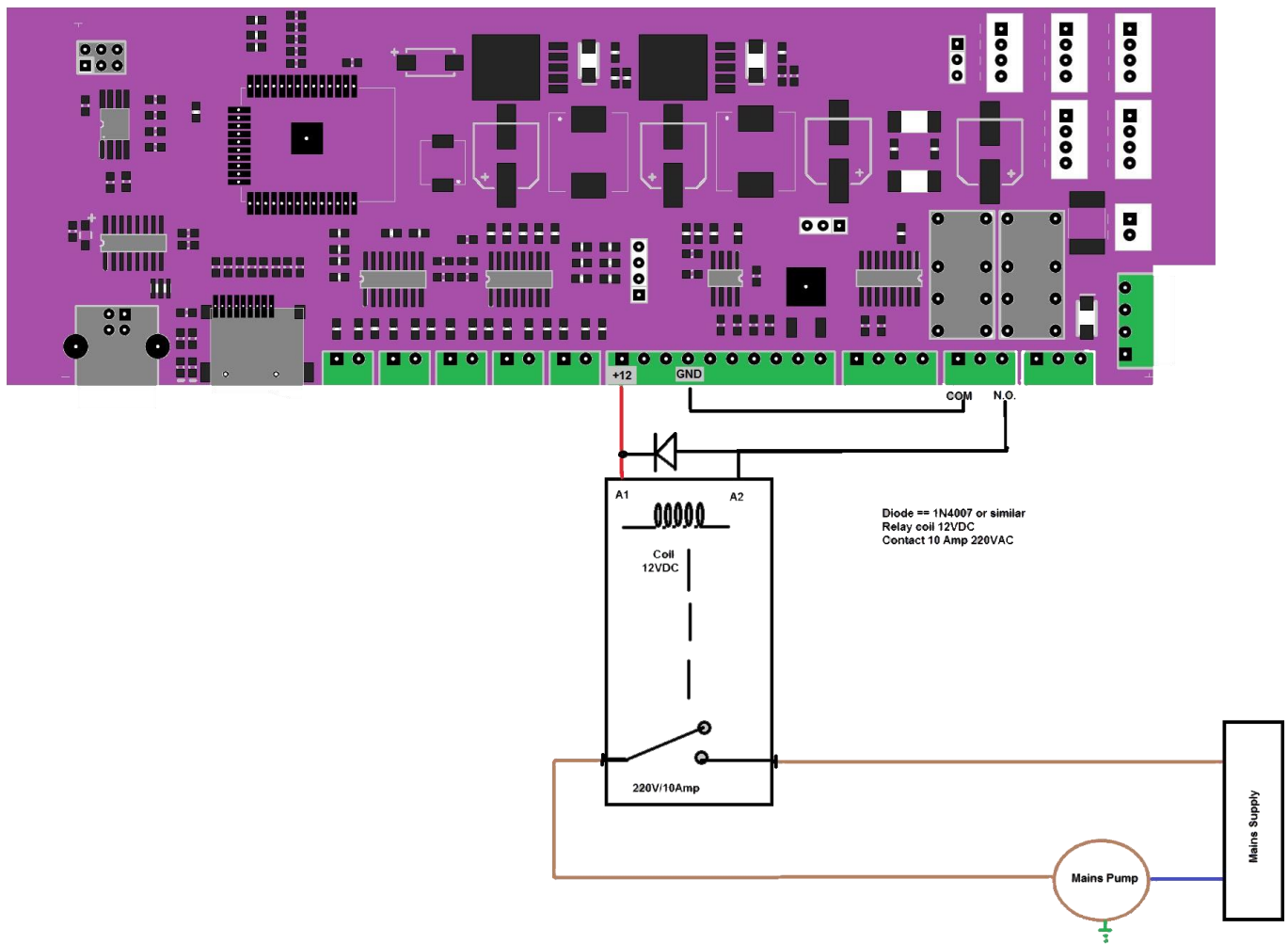
There are 2 relays on the Nighthawk Control Card which control the FLOOD and PLASMA ports. They are both dry contact relays and rated at 30VDC max @ 2A

These relays are not designed or rated for mains voltage or high current applications. If looking to control a 110/230V appliance such as an extractor or pump you will need an external mains voltage contactor. See below for an example setup.

Flood Relay (24VDC – Normally Open)



Using Flood Relay for Mains Voltage Applications

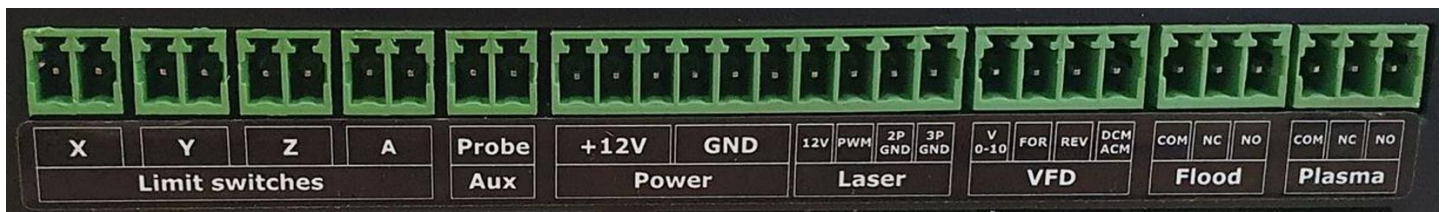


Connecting your other wires

The front of your controller has a label indicating the wiring for your limit switches, probe, laser and VFD connections. Use a small flat head screwdriver to secure wires to the connectors. It is recommended to use solder-tinned wires or bootlace crimped wires for a safe and secure fit.

**** Laser Warning ****

Care must be taken when attaching or working with any lasers. After connecting them to the controller, ensure that the laser is pointed away from any people or animals and that you are wearing appropriate laser PPE before powering on your controller.



Limit switches

X: The X axis limit switch. No polarity needed – either wire can go to either hole.

Y: The Y axis limit switch. No polarity needed – either wire can go to either hole.

Z: The Z axis limit switch. No polarity needed – either wire can go to either hole.

A: The A/Y2 axis limit switch. No polarity needed – either wire can go to either hole.

Aux

Probe: A probe connection. If issues occur when probing try swapping wire orientation.

Power

3 x +12V: General 12V rail. Maximum of 1A total – shared with laser 12V, *to be used for inductive limit switches only!*

3 x GND: General ground rail. Maximum of 1A total – shared with laser 12V, *to be used for inductive limit switches only!*

Please note: Take care to ensure these pins are never shorted. The internal resetting fuse should protect the controller but it is still not recommended to short these outputs.

Laser

12V: This pin is used for powering a 12V diode laser, it applies to both 2 pin and 3 pin lasers.

PWM: This is an intensity signal 0-5V, applies to 3 wire lasers only.

2P GND: This pin is used for the negative wire of a 2 pin laser.

3P GND: This pin is used for the negative wire of a 3 pin laser.

VFD

VO-10: This pin is used for setting the speed on most common VFDs, It is an analogue 0-10V varying output.

FOR: This is the signal wire to tell the VFD to spin forward.

REV: This is the signal wire to tell the VFD to spin in reverse.

ACM DCM: This pin is generally connected to the ACM and DCM ports on the VFD for control.

*Please note: You will need to refer to your VFD manual for instructions on setting these connections up. If unsure, reach out to a licensed electrician for assistance. Due to the large number of variations with VFD manufacturers and brands, **CNC3D can not provide support for setting this up.***

Flood

COM: This is a common pin between NC and NO pins – maximum 2A @24v

NC: This is a Normally Closed contact with the COM pin – maximum 2A @24v

NO: This is a Normally Open contact with the COM pin – maximum 2A @24v

Please note: These are relay outputs only. They are not powered. This relay is triggered when an M8 command is received by the controller and return to normal when an M9 is received.

Plasma

COM: This is a common pin between NC and NO pins – maximum 2A @24v

NC: This is a Normally Closed contact with the COM pin – maximum 2A @24v

NO: This is a Normally Open contact with the COM pin – maximum 2A @24v

Please note: These are relay outputs only. They are not powered. This relay is triggered when an M3, M4 or M5 command is received.

**This completes the hardware setup of your
Nighthawk Controller.**

Getting connected

Now that your hardware is set up, let's take control!

The first step is to connect power to your Nighthawk controller and download our Commander control software by clicking the link below or typing it into your internet browser.

<https://www.cnc3d.com.au/commander>

To use your Nighthawk CNC Controller, you will need to have a way of communicating with it from a PC so you can give it GCODE files as well as commands like movement and of course, running your jobs!

There are multiple options that you can use to connect to your Nighthawk CNC Controller – USB, WiFi, and Bluetooth.

USB (Not Recommended)

Your first instinct may be to use USB however this is the **least reliable way** to control and run your machine and it is heavily discouraged! While it's running the spindle will create lots of Electromagnetic Interference (EMI) and electrical noise which can cause the USB connection to drop out resulting in random job stoppages or irregular machine behaviour. We only recommend using the included USB cable for setting up wireless communications, then unplugging the cable and storing it in a drawer.

WiFi (Best Option)

The best possible way to run your Nighthawk controller is via WiFi and connecting the machine to an existing WiFi network such as a house or factory network.

The next preferable option is WiFi – Direct Access Point Mode which allows you to connect directly to the Nighthawk instead of connecting the Nighthawk to an existing network. This will be the best option if there is no network in the area where your Nighthawk is located or if you are using a mesh network/WiFi range extenders as the Nighthawk cannot connect to these networks. This works the same as connecting to a network, but the drawback is that the computer running the machine will not have access to the internet while running the machine.

Bluetooth (Backup Option)

The third option is connecting to the Nighthawk via Bluetooth from a compatible PC or Laptop (not a smartphone!)

Bluetooth works the same as USB without the physical cable so it will eliminate the risk of EMI and unpredictable machine behaviour.

WiFi (Connect to Existing Network)

Connecting your Nighthawk to an existing wireless network is the best and most reliable way to communicate with and control your Nighthawk controller. Keep in mind that your Nighthawk DOES NOT need internet access, it only needs access to the network so that computers and devices on the same network can communicate with it.

Note: There are some network configurations that the Nighthawk will not work with or will have limited connectivity.

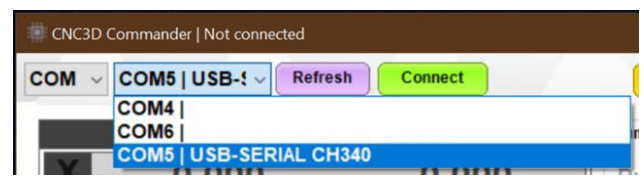
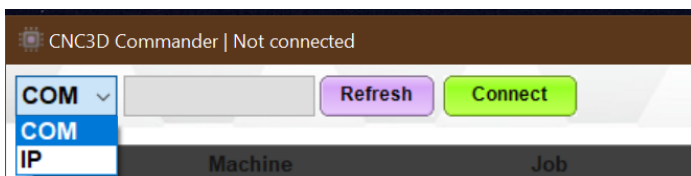
- Modern WiFi routers are often capable of putting out signals in both the 5.8GHz and 2.4GHz frequency bands. **The Nighthawk is only capable of interacting with and connecting to the 2.4GHz band.** If you are unsure which frequency band your network is, you will need to contact your router's manufacturer for help as our support team usually cannot help with this.
- Mesh networks are common in large properties where a single router isn't powerful enough to provide wireless signals to the entire property. We have solutions in place for these networks, but every network is different, and we cannot guarantee complete reliability with these networks.
- WiFi range extenders are common in large properties where a single router isn't powerful enough to provide wireless signals to the entire property. We have solutions in place for these networks, but every network is different, and we cannot guarantee complete reliability with these networks.

To get started with this process you will need to have a Windows PC located near the machine so you can connect to it with a USB cable.

Plug in your USB cable, turn on your PC, turn on the Nighthawk and open CNC3D Commander.

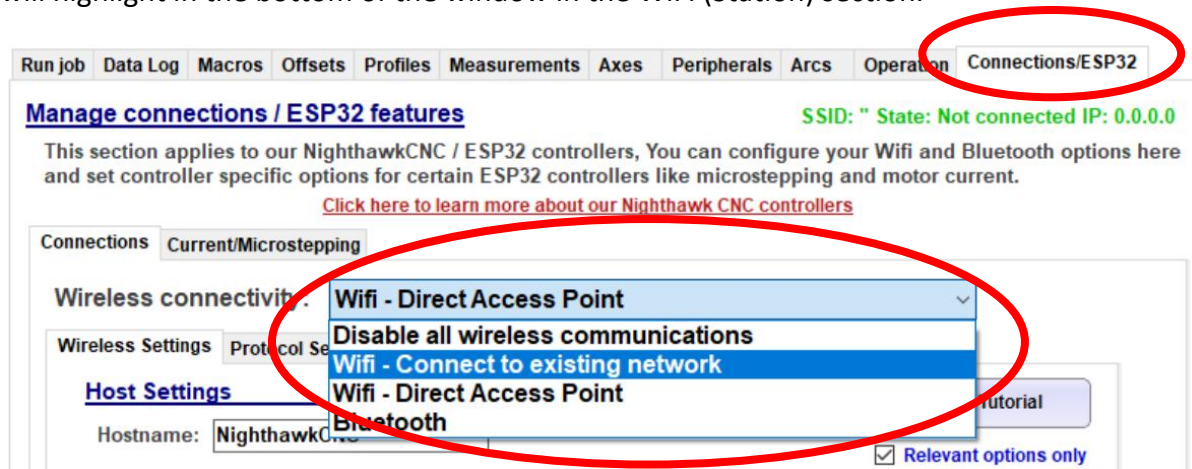
Note: If your Nighthawk is not installed automatically or detected by your PC, refer to the USB setup section of this guide.

Select COM in the first drop-down menu. In the second drop-down menu select the correct COM port, it should be the one that has CH340 in the description.



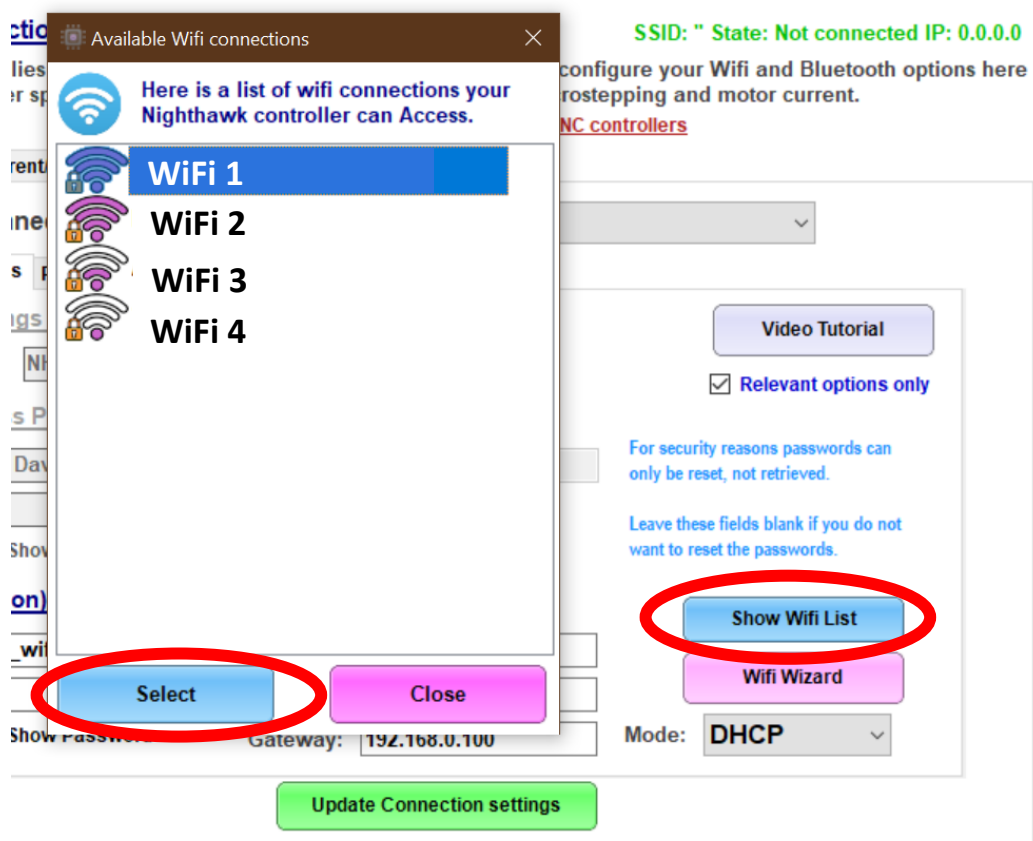
Once connected, you will need to clear the Alarm by clicking the E-stop button and then “Unlock” so the Alarm box changes to green, then click on the Connections/ESP32 tab to access the wireless settings.

In the drop-down box you will need to select WiFi – Connect to Existing Network and the relevant options will highlight in the bottom of the window in the WiFi (Station) section.



With the correct options highlighted, click on the “Show WiFi List” button to bring up the list of available WiFi networks that your Nighthawk can see.

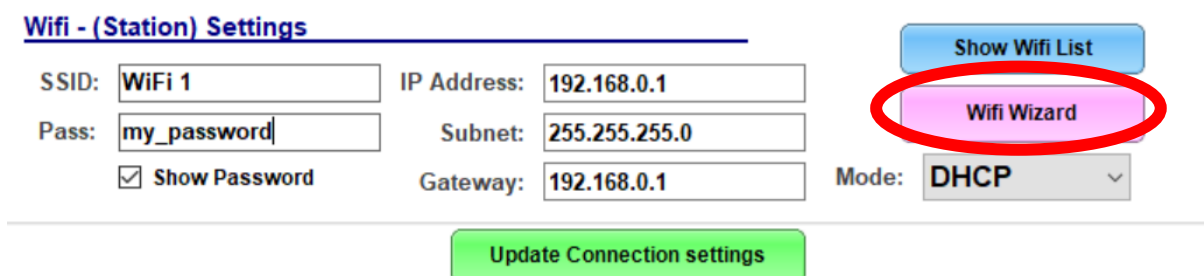
Pro Tip: Your network will usually be the one with the best signal, but not always!



Note: You may need to refresh the list by closing the window and clicking the WiFi list button again

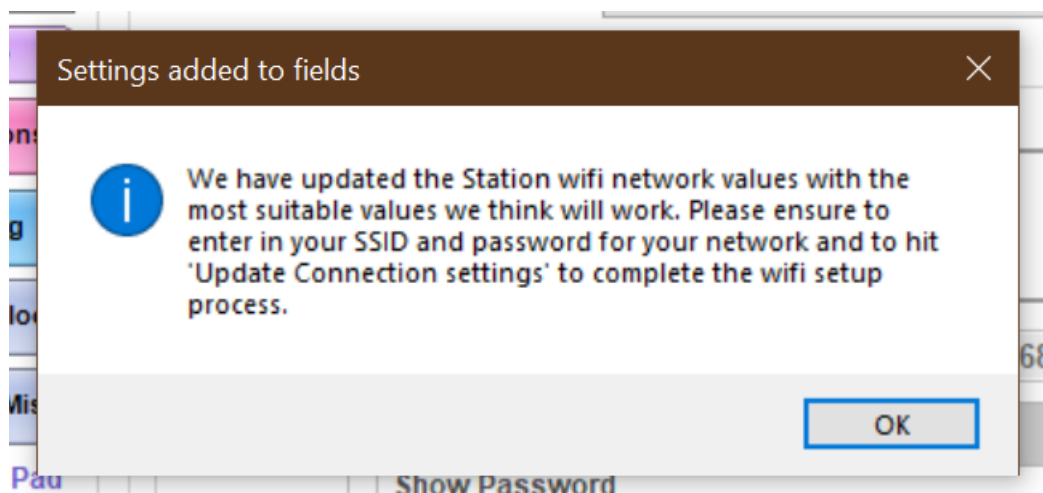
Highlight your network name, then click Select. This will put the network name you selected into the SSID box; you will then need to enter in your WiFi password. For now, you can leave the other boxes with numbers in them alone, and do not update settings just yet.

The next step is to click the WiFi Wizard button. This will automatically grab some details about your network from your computer and put them into the IP Address, Subnet and Gateway boxes. To do this your computer MUST be connected to the same network that you are setting up on your Nighthawk controller.



If your computer is connected to your WiFi network, you can click “Yes” on the popup box. The next box allows you to set the Nighthawk controller’s IP Address. For most users the default of 155 is perfect. If you do not need to assign a particular number here, you can leave it at 155.

Click OK to update the numbers and look for the popup to confirm it has been completed and click “OK”.

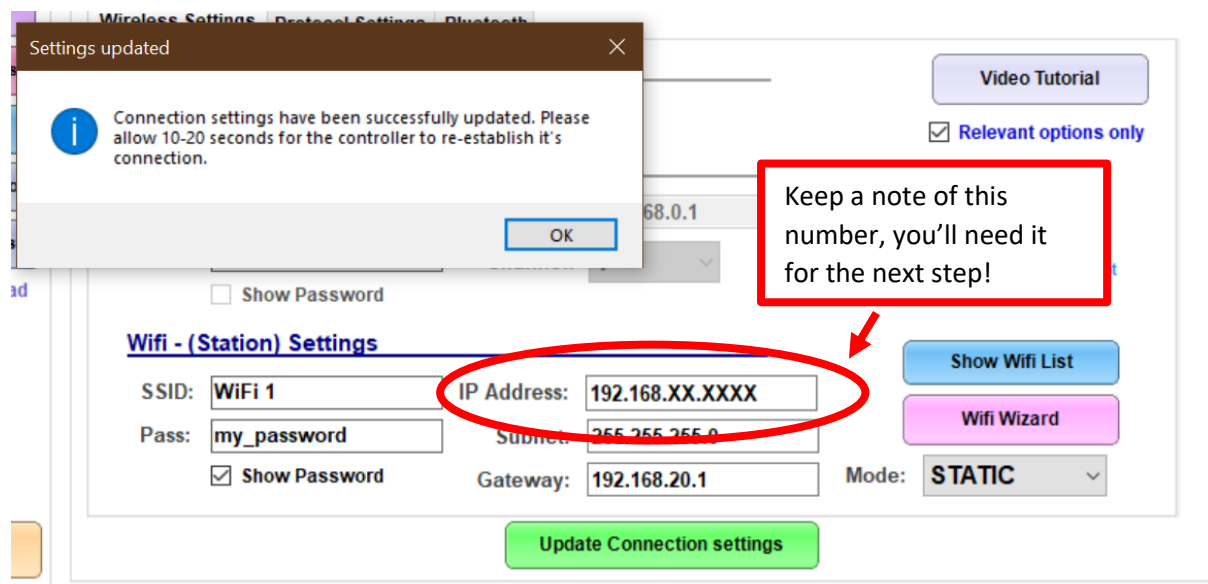


If you did not get a popup box telling you the settings have been updated, check to see if your machine is in an Alarm state in the bottom left corner of the Commander window next to the E-Stop. If you are in Alarm state you will need to clear it by clicking the E-stop button, then “Unlock” and re-do the process to update your settings.

You will see the numbers in IP Address, Subnet and Gateway may have changed to best suit your network, and the Mode box will read STATIC.

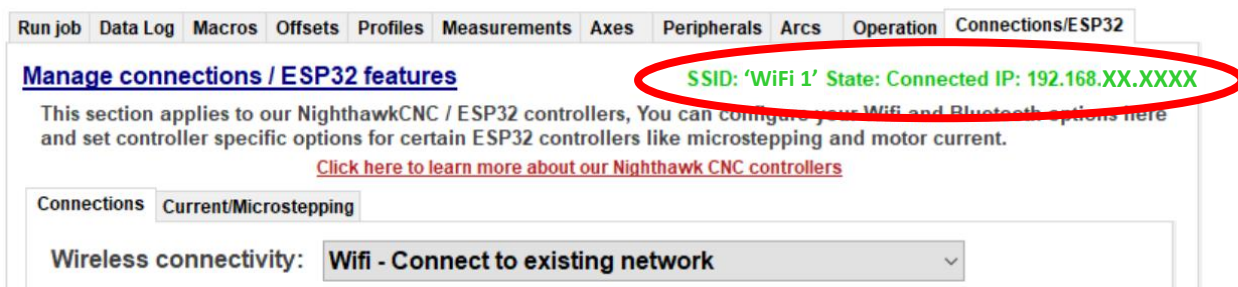
Pro Tip: Keep a note of the number in the IP Address box. All 4 number sets and . are vital!

You can now click “Update Connection Settings” and look for the popup box confirming the settings have been updated.



You should now click “Disconnect”, turn off your Nighthawk controller, wait 10-20 seconds, and then turn it back on.

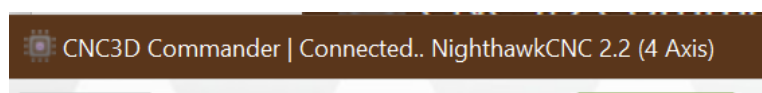
After powering the controller back on, you can click “Connect” to re-establish a connection via the USB cable after selecting the correct COM port and switch over to the Connections/ESP32 tab. If your connection was successful, you will see green text at the top right of the tab.



You can now click “Disconnect” at the top left of Commander, then change that first drop-down box to IP, and then type in the IP Address that was specified in the previous step and click “Connect”.



If everything was successful, Commander will light up and you will have full control of your machine. You will also see “Connected.. NighthawkCNC 2.2” in the coloured bar above the “Disconnect” button. You can ignore the description in the brackets eg: 4 Axis.



You can now unplug the USB cable from both the PC and the Nighthawk and continue to control your machine via your WiFi connection.

WiFi (Direct Access Point)

This connection method is only recommended if the one above does not work. We recommend trying the WiFi (Connect to Existing Network) option first.

If you do not have access to an existing wireless network, or your existing network setup is incompatible with your controller, you can connect directly to your Nighthawk using its own built-in WiFi signal.

Note: The PC used to run the Nighthawk will not have internet access while connected to your machine if using the Direct Access Point method.

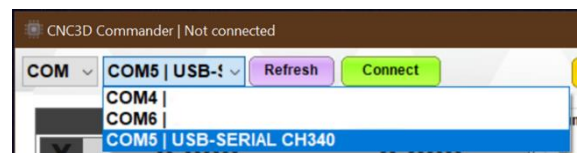
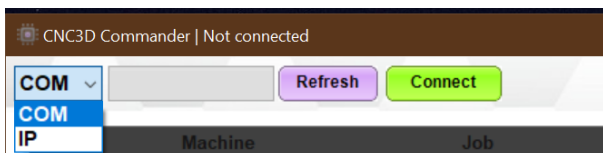
If you're using Easel or another web-based design suite to create your toolpaths, you will need to ensure you have downloaded your GCODE file or job file **BEFORE** connecting to your controller as you will not be able to do so while connected to your Nighthawk.

To get started with this process you will need to have a Windows PC located near the machine so you can connect to it with a USB cable.

Plug in your USB cable, turn on your PC, turn on the Nighthawk and open CNC3D Commander.

Note: If your Nighthawk is not installed automatically or detected by your PC, refer to the USB setup section of this guide.

Select COM in the first drop-down menu. In the second drop-down menu select the correct COM port, it should be the one that has CH340 in the description.



Once connected, you will need to clear the Alarm by clicking the E-stop button and then "Unlock" so the Alarm box changes to green, then click on the Connections/ESP32 tab to access the wireless settings.

In the first drop-down box you will need to select WiFi – Direct Access Point and the relevant options will highlight in the middle of the window in the WiFi (Access Point) section.

Run job Data Log Macros Offsets Profiles Measurements Axes Peripherals Arcs Operation **Connections/ESP32**

Manage connections / ESP32 features

This section applies to our NighthawkCNC / ESP32 controllers. You can configure your Wifi and Bluetooth options here and set controller specific options for certain ESP32 controllers like microstepping and motor current.

[Click here to learn more about our Nighthawk CNC controllers](#)

Connections **Current/Microstepping**

Wireless connectivity: **Wifi - Direct Access Point**

Wireless Settings **Protocol Settings** **Bluetooth**

Host Settings

Hostname: NighthawkCNC

Wifi (Access Point) Settings

SSID: NighthawkCNC IP Address: 192.168.0.1

Pass: Channel: 1

☐ Show Password

☒ Relevant options only

Wifi - (Station) Settings

SSID: WiFi 1 IP Address: 192.168.20.155

Pass: Subnet: 255.255.255.0

☐ Show Password Gateway: 192.168.20.1 Mode: STATIC

Show Wifi List

Wifi Wizard

Update Connection settings

The SSID, IP Address and Channel boxes should match the ones in the image above, these are the defaults and will work just fine. The Hostname box should be the same as the SSID, which is **NighthawkCNC** by default.

The Pass box is blank, though the default password has already been set on the controller. **You do not need to put anything in the Pass box unless you want to change the default password.**

If you do want to change the password from the default you can enter your desired password into the box.

If all your settings are correct, you can now click “Update Connection Settings” and look for the popup box confirming the settings have been updated and click “OK”.

If you did not get a popup box telling you the settings have been updated, check to see if your machine is in an Alarm state in the bottom left corner of the Commander window next to the E-Stop. If you are in Alarm state you will need to clear it by clicking the E-stop button, then “Unlock” and re-do the process to update your settings.

Connections **Current/Microstepping**

Wireless connectivity: **Wifi - Direct Access Point**

Wireless Settings **Protocol Settings** **Bluetooth**

Host Settings

Hostname: NighthawkCNC

Wifi (Access Point) Settings

SSID: NighthawkCNC IP Address: 192.168.0.1

Pass: Channel: 1

☐ Show Password

☒ Relevant options only

Wifi - (Station) Settings

SSID: WiFi 1 IP Address: 192.168.20.155

Pass: Subnet: 255.255.255.0

☐ Show Password Gateway: 192.168.20.1 Mode: STATIC

Show Wifi List

Wifi Wizard

Settings updated

Connection settings have been successfully updated. Please allow 10-20 seconds for the controller to re-establish it's connection.

OK

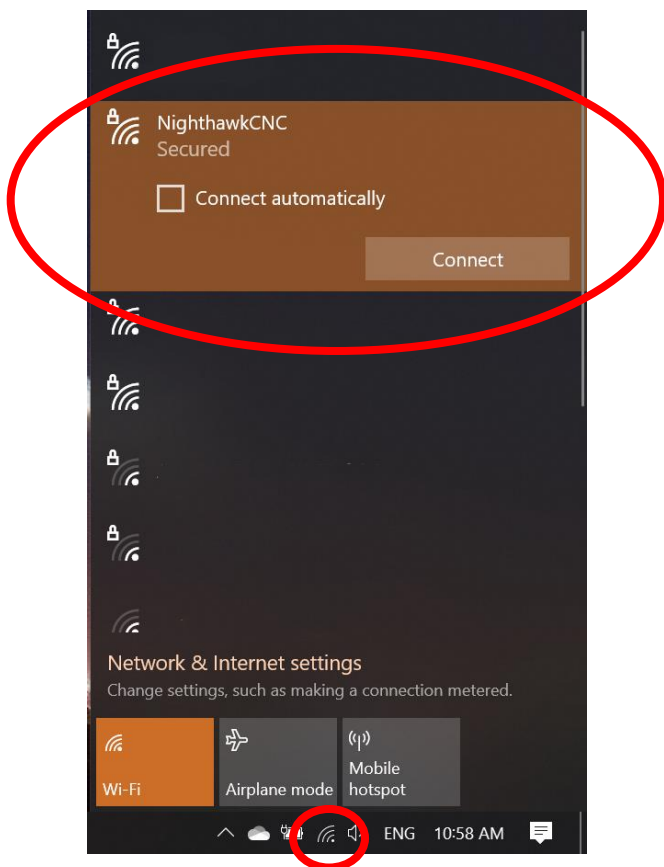
Update Connection settings

You should now click “Disconnect”, turn off your Nighthawk controller, wait 10-20 seconds, and then turn it back on.

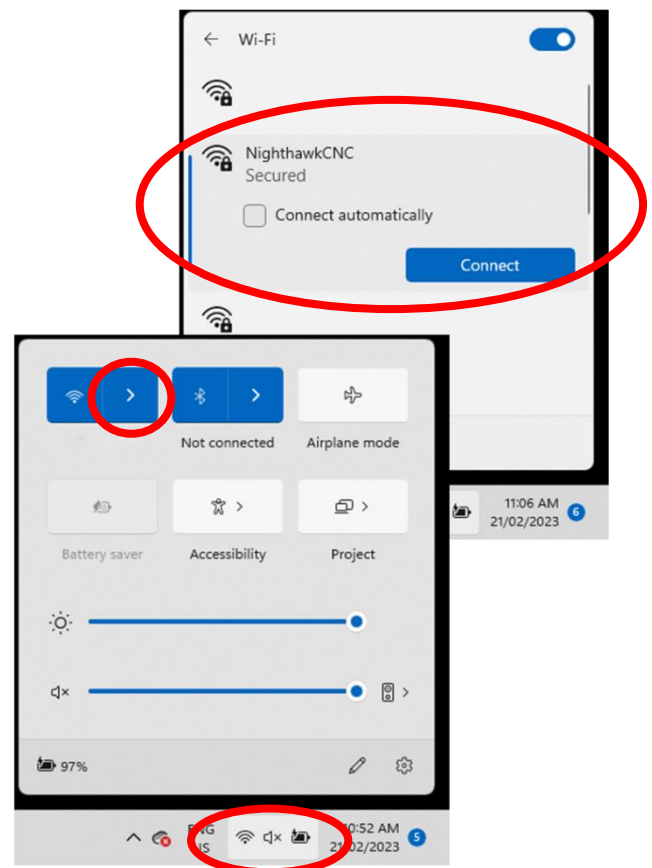
After powering your Nighthawk back on, you will need to connect your PC to the Nighthawk’s wireless signal. You will need to do this from your PC’s WiFi selection settings, not in our Commander software.

Please Note: PCs will vary due to the different versions of Windows operating system that are available. Because of this yours might look a little different to the pictures below. If you are unsure on how to navigate the next step on your particular PC you may need to get help from your PC retailer’s technical support as this is specific to your computer and is not a part of CNC3D Commander software.

Look for the WiFi signal in the bottom-right corner of your computer screen. Open the menu to see the available wireless networks and look for the NighthawkCNC network.



Windows 10



Windows 11

After selecting the NighthawkCNC network in the list, click ‘Connect’ and enter the password.

If you did not specify a password in the previous step, your default password will be 12345678 with no spaces between the numbers or any other characters.

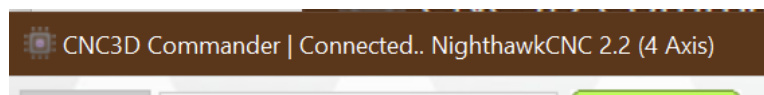
Your PC may take a minute or so to connect to the Nighthawk as it is verifying the connection. Once your PC is connected you will see “No Internet, secured” or “Connected Without Internet” written below the “NighthawkCNC” WiFi name.

You can now switch back to our Commander software.

In the top-left corner of Commander you will need to change the first drop-down box to “IP” and the second box will need to read **192.168.0.1** you do not need to enter the :23. Click ‘Connect’ and Commander will add the :23 to the end of the IP address and connect to your Nighthawk.



If everything was successful, Commander will light up and you will have full control of your machine. You will also see “Connected.. NighthawkCNC 2.2” in the coloured bar above the “Disconnect” button. You can ignore the description in the brackets eg: 4 Axis.



You can now unplug the USB cable from both the PC and the Nighthawk and continue to control your machine via your WiFi connection.

Note: When the connection to your Nighthawk drops by either turning off the machine, moving your PC out of range or by using the Emergency Stop button, you may need to go through the steps above to reconnect to your NighthawkCNC WiFi Network before attempting to connect to your Nighthawk in Commander.

Bluetooth

This connection method is only recommended if neither of the WiFi options work for you. We recommend trying the WiFi (Connect to Existing Network) option first.

Bluetooth connections work the same as a USB connection without the drawbacks of having a physical wire plugged into the Nighthawk, so it is impervious to EMI interruption.

Bluetooth and USB connections work by sending every line of code to the Nighthawk one-by-one so if anything interrupts that connection you run the risk of your machine stopping mid-job or uncontrolled machine movement. This can be something as simple as your computer going to sleep or a laptop losing power so if you are certain you must use a Bluetooth connection to control your machine make sure you have disabled all power saving options in your PC and are plugged into power if using a laptop.

Contact your PC retailer's technical support if you need assistance with disabling these features.

Please Note: Bluetooth will only work with a Windows laptop or desktop computer with Bluetooth capabilities, it is not intended for use with a smartphone or iPad.

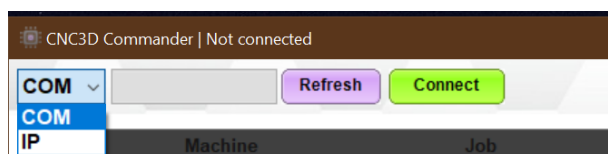
Most modern laptop computers will have a Bluetooth adapter built into the computer, however if not you can use a plug-in Bluetooth adapter which are readily available from most electronics retailers.

To get started with this process you will need to have a Windows PC located near the machine so you can connect to it with a USB cable.

Plug in your USB cable, turn on your PC, turn on the Nighthawk and open CNC3D Commander.

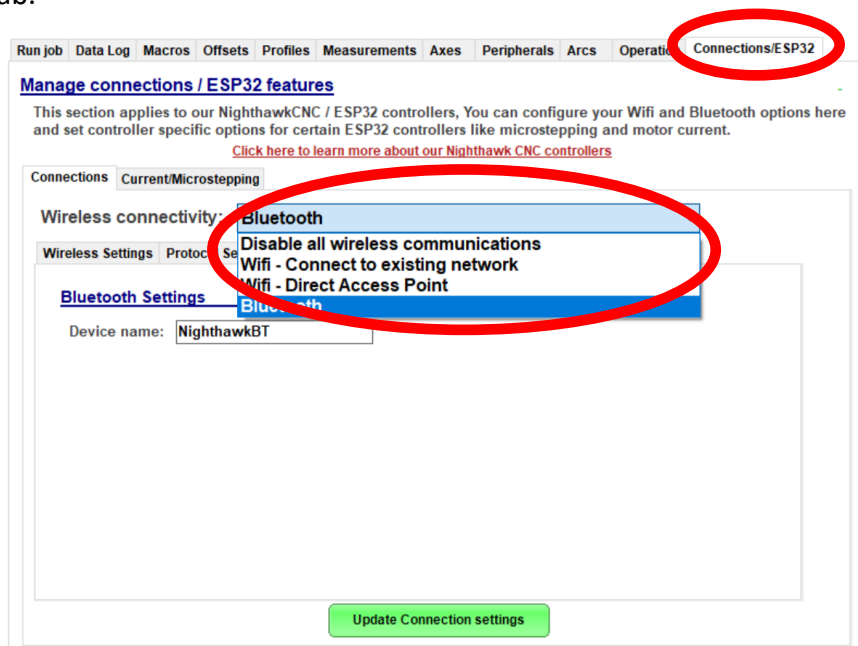
Note: If your Nighthawk is not installed automatically or detected by your PC, refer to the USB setup section of this guide.

Select COM in the first drop-down menu. In the second drop-down menu select the correct COM port, it should be the one that has CH340 in the description.



Once connected, you will need to clear the Alarm by clicking the E-stop button and then "Unlock" so the Alarm box changes to green, then click on the Connections/ESP32 tab to access the wireless settings.

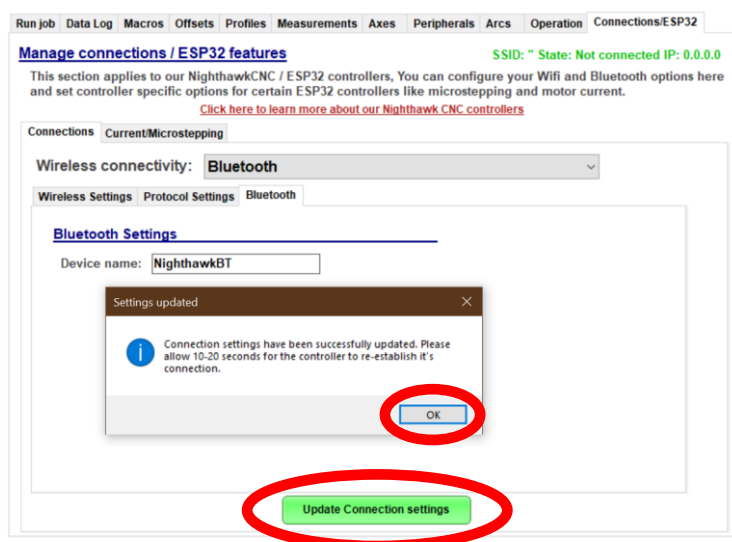
In the first drop-down box you will need to select Bluetooth and Commander will switch over to the Bluetooth settings tab.



From here you can set the Device Name, however leaving it as the default **NighthawkBT** is perfectly fine.

This will be all the settings you need to change in Commander so you can now click “Update Connection Settings” and look for the popup box confirming the settings have been updated and click “OK”.

If you did not get a popup box telling you the settings have been updated, check to see if your machine is in an Alarm state in the bottom left corner of the Commander window next to the E-Stop. If you are in Alarm state you will need to clear it by clicking the E-stop button, then “Unlock” and re-do the process above to update your settings.



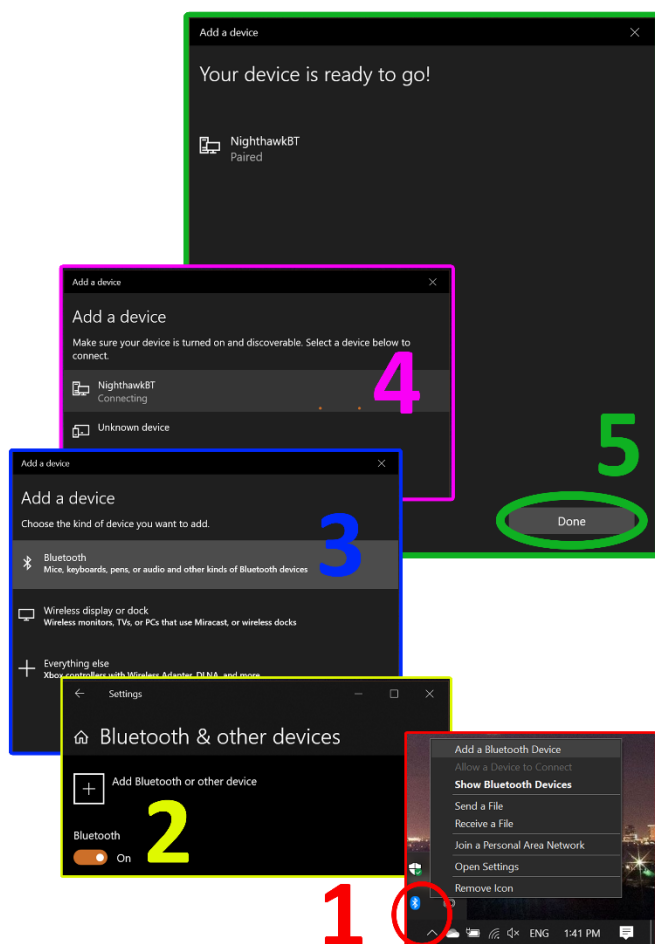
You should now click “Disconnect”, turn off your Nighthawk controller, wait 10-20 seconds, and then turn it back on.

After powering your Nighthawk back on, you will need to connect your PC to the Nighthawk's Bluetooth signal. You will need to do this from your PC's Bluetooth selection settings, not in our Commander software.

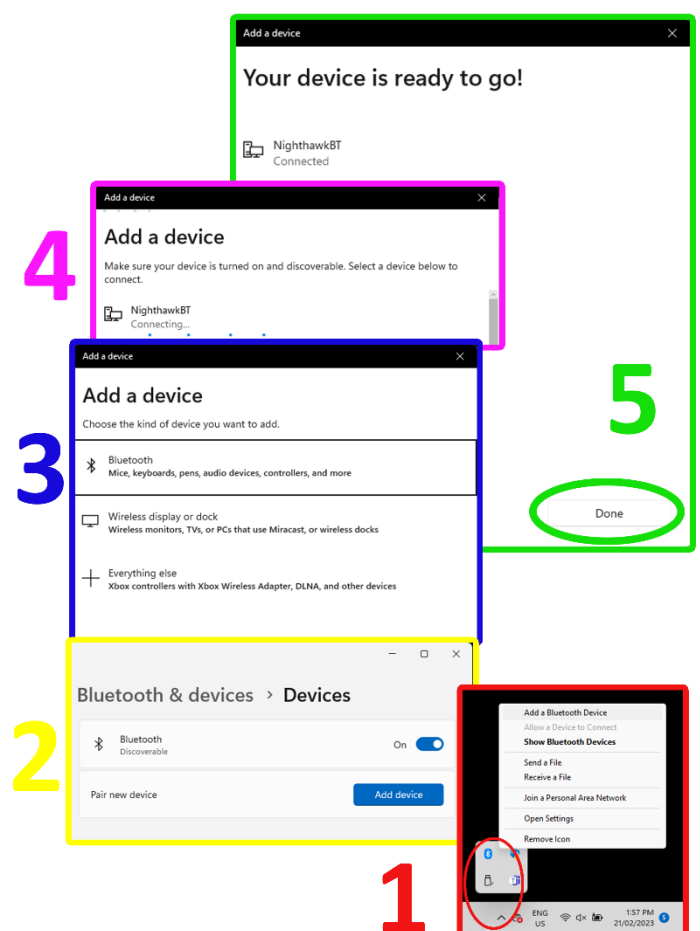
Please Note: PCs will vary due to the different versions of Windows operating system that are available. Because of this yours might look a little different to the pictures below. If you are unsure on how to navigate the next step on your particular PC you may need to get help from your PC retailer's technical support as this is specific to your computer and is not a part of CNC3D Commander software.

Look for the Bluetooth symbol in the bottom-right corner of your computer screen. You may need to click the ^ to see it. Open the menu and select 'Add a Bluetooth Device' and another window will open. Click 'Add Bluetooth or Other Device' then 'Bluetooth'.

It will then search for available Bluetooth devices and should find the **NighthawkBT** device. If you changed the device name in the previous step then you should see that name show up now. Click on it and it will attempt to connect. Once it shows as 'Paired' you have successfully connected, and it will show up in your 'Other Devices' section of the window.



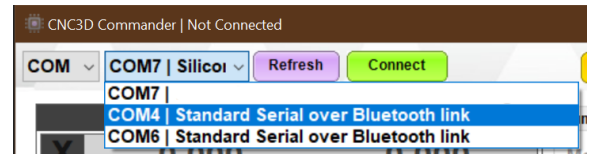
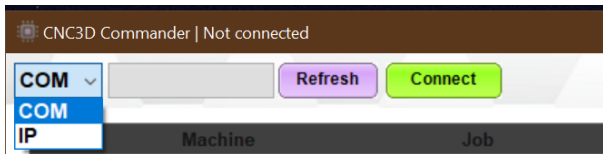
Windows 10



Windows 11

It may be necessary for you to wait a minute or two while your computer installs the device after the first time connecting. After the installation is complete you can switch back over to Commander.

Select COM in the first drop-down menu. In the second drop-down menu you should now see the option for 'Standard Serial over Bluetooth link'. There will be two different COM numbers associated with both links.

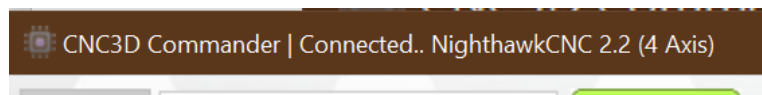


Unfortunately, it is not currently possible for Commander to tell you which the correct COM port is to select as your computer doesn't differentiate between them. One of them will work and the other will not, though often it's the lower number that is the correct one.

Choose one of the available Bluetooth link COM ports and click 'Connect'. If Commander stops responding for a few seconds then it is likely the wrong one and you can click 'Disconnect'.

Select the other Bluetooth link and click 'Connect'.

If everything was successful, Commander will light up and you will have full control of your machine. You will also see "Connected.. NighthawkCNC 2.2" in the coloured bar above the "Disconnect" button. You can ignore the description in the brackets eg: 4 Axis.



You can now unplug the USB cable from both the PC and the Nighthawk and continue to control your machine via your Bluetooth connection.

Note: If the connection to your Nighthawk drops by either turning off the machine, moving your PC out of range or by using the Emergency Stop button, you may need to go through the steps above to reconnect to your NighthawkBT Bluetooth connection before attempting to connect to your Nighthawk in Commander.

USB

This connection method is only recommended if NONE of the wireless options work for you. We recommend trying the WiFi (Connect to Existing Network) option first.

USB is the last resort when choosing how to run your machine. We recommend USB for initial setup **ONLY** and **NEVER** for running jobs. Spindles, routers, or plasma torches will create lots of Electromagnetic Interference (EMI) and electrical noise which can cause the USB connection to drop out resulting in random job stoppages or uncontrolled machine behaviour.

If you have no other choice but to use USB, for example in a secure area where wireless devices are not permitted, then you must use a high-quality USB cable that has magnetic ferrules attached to it, as well as disabling certain features of your PC.

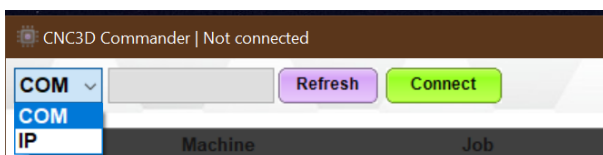
USB connections work by sending every line of code to the Nighthawk one-by-one so if anything interrupts that connection you run the risk of your machine stopping mid-job or uncontrolled machine movement. This can be something as simple as your computer going to sleep, a laptop losing power or even just turning on the cutting tool. So, if you are certain you must use a USB connection to run your machine make sure you have disabled all power saving options in your PC and are plugged into power if using a laptop.

Contact your PC retailer's technical support if you need assistance with disabling these features as they are specific to your PC and not part of our Commander software.

To get started with this process you will need to have a Windows PC located near the machine so you can connect to it with a USB cable.

Plug in your USB cable, turn on your PC, turn on the Nighthawk and open CNC3D Commander.

Select COM in the first drop-down menu. In the second drop-down menu select the correct COM port, it should be the one that has CH340 in the description.

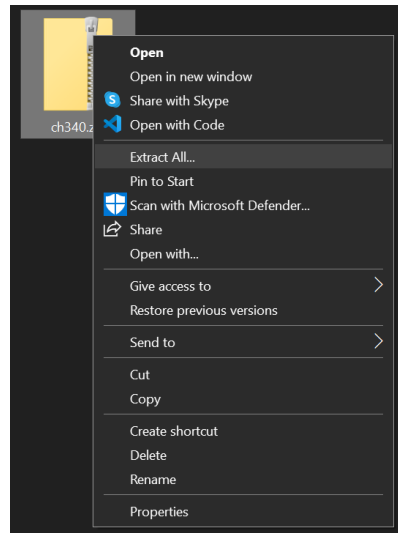


If you do not have any COM ports, or no COM ports with the CH340 description then it's likely that you do not have the correct CH340 driver installed. You will need to download the driver by clicking the link below or typing it into a browser window from your computer.

<https://libraries.sharpssoft.com.au/nighthawk/ch340.zip>

You will also need to turn off your Nighthawk and unplug the USB cable from your computer.

When the download is complete, navigate to your downloads folder and look for the **ch340.zip** file. You will need to 'unzip' this folder before you can use the contents. It's as easy as right-clicking on the file and selecting the 'Extract All' option. The next window will ask you to specify a location for the files to be saved. Take a note of the location and click 'Extract'. When the extraction process finishes it should open the location of the extracted files.

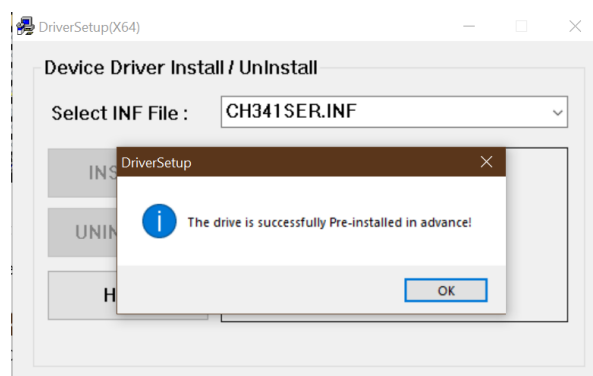
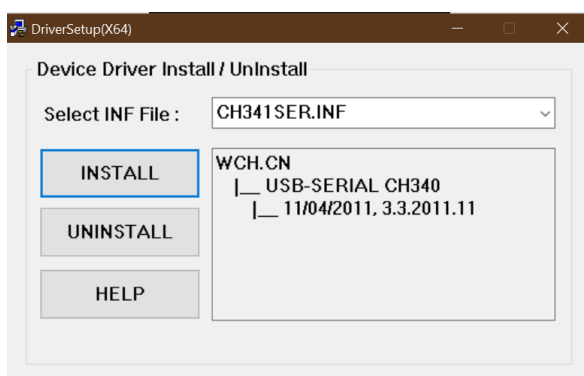


Open the 'CH340' folder, look for the 'Setup.exe' file and open it.

Name	Date modified	Type	Size
DRVSETUP64	21/02/2023 3:10 PM	File folder	
CH341PT.DLL	21/02/2023 3:10 PM	Application extension	7 KB
CH341S64.SYS	21/02/2023 3:10 PM	System file	57 KB
CH341S98.SYS	21/02/2023 3:10 PM	System file	20 KB
ch341SER.CAT	21/02/2023 3:10 PM	Security Catalog	10 KB
CH341SER.INF	21/02/2023 3:10 PM	Setup Information	6 KB
CH341SER.SYS	21/02/2023 3:10 PM	System file	39 KB
CH341SER.VXD	21/02/2023 3:10 PM	Virtual device driver	20 KB
SETUP.EXE	21/02/2023 3:10 PM	Application	82 KB

If you get a security popup asking if you would like to allow this program to run or make changes to your device, make sure you click 'Yes' or the program will not run.

When the program opens it will already have some information pre-loaded. All you need to do it click 'Install'. If successful you will get a message which reads "The drive is successfully pre-installed in advance".

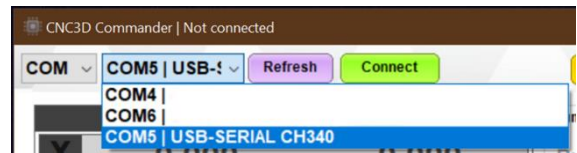
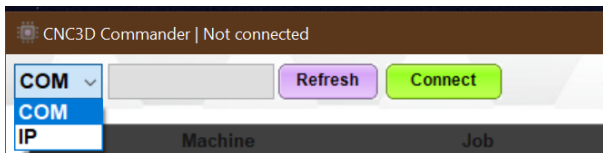


If you get a message box saying “Drive Install Failure” you simply need to click ‘Uninstall’ to uninstall any older drivers that are interfering with the installation, then click ‘Install’ once it has finished uninstalling.

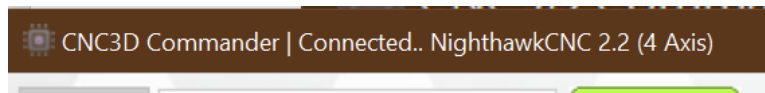
When the driver is installed you can close the installation program.

Now that your CH340 driver is installed, you can turn on your Nighthawk, plug the USB cable back into your computer and switch back to our Commander software.

Select COM in the first drop-down menu. In the second drop-down menu select the correct COM port, you should now see one that is labelled CH340. Click ‘Connect’.



If everything was successful, Commander will light up and you will have full control of your machine. You will also see “Connected.. NighthawkCNC 2.2” in the coloured bar above the “Disconnect” button. You can ignore the description in the brackets eg: 4 Axis.



Accessing via Web-Portal (Any device with WiFi and a web browser)

If you have your Nighthawk controller connected to an existing network or in direct access point mode, you can use any device with a WiFi connection and a web browser to control your machine. For example a smartphone or tablet.

If your Nighthawk is connected to an existing network you can access it using the assigned IP address from the connection steps listed above, but only if the device you're using is connected to the same WiFi network.

Note: Only one device can be connected to your Nighthawk through a browser at a time so if you can't connect from your mobile device, check to see if another device on your network is already connected.

If your Nighthawk is in direct access mode (which is the default), you can connect to the NighthawkCNC WiFi from your smart device using the details set up in the steps above. You will need the WiFi name and IP address. The defaults are listed below for easy reference but if you have changed them from the defaults you will need to use those instead.

Pro tip for Mac users: We recommend using Chrome browser instead of Safari to get the most from your Nighthawk Controller.

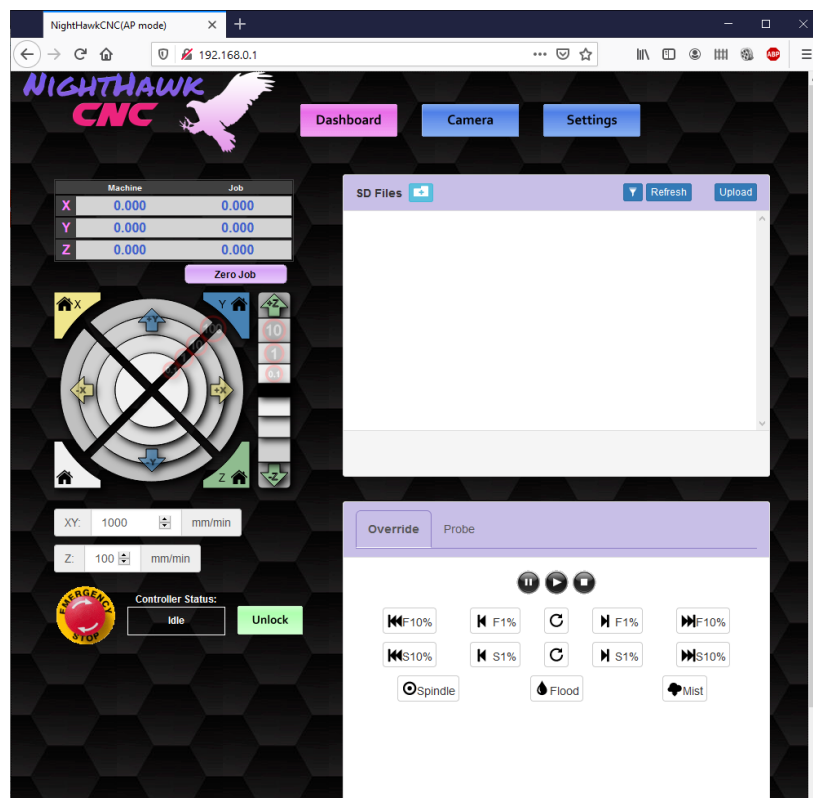
The default network details are:

Network: NighthawkCNC

Password: 12345678

Default IP: 192.168.0.1

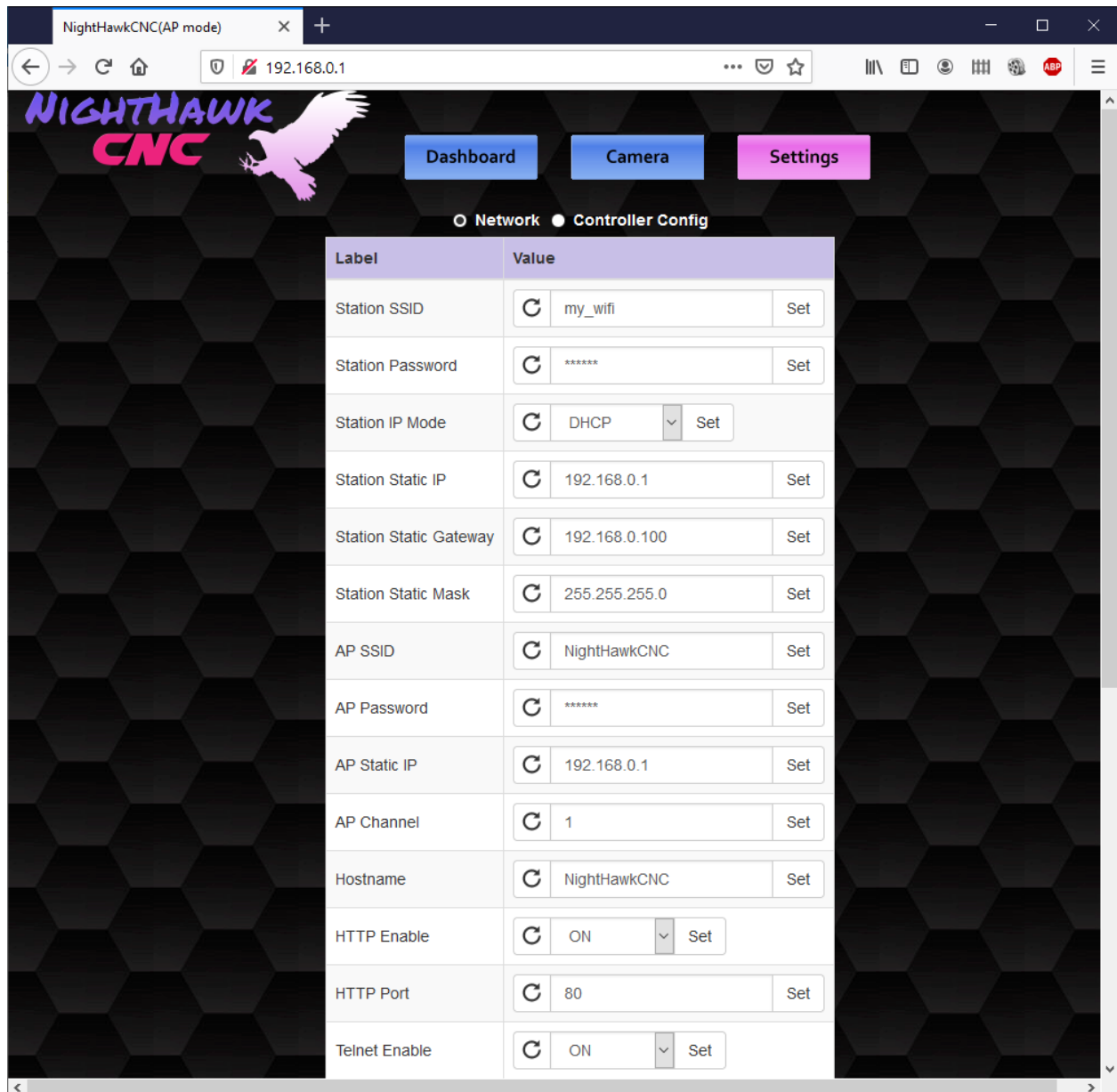
Assuming you are using a browser on a PC, the interface should look like this:



To start configuring your controller Click on the “Settings” button at the top right. This will expose the network configuration options and general CNC settings. It is possible from the Web portal to configure any settings you would like to change including your connection type.

Note: If you have already set up your Nighthawk through our Commander software, do not change any of these settings.

Network settings

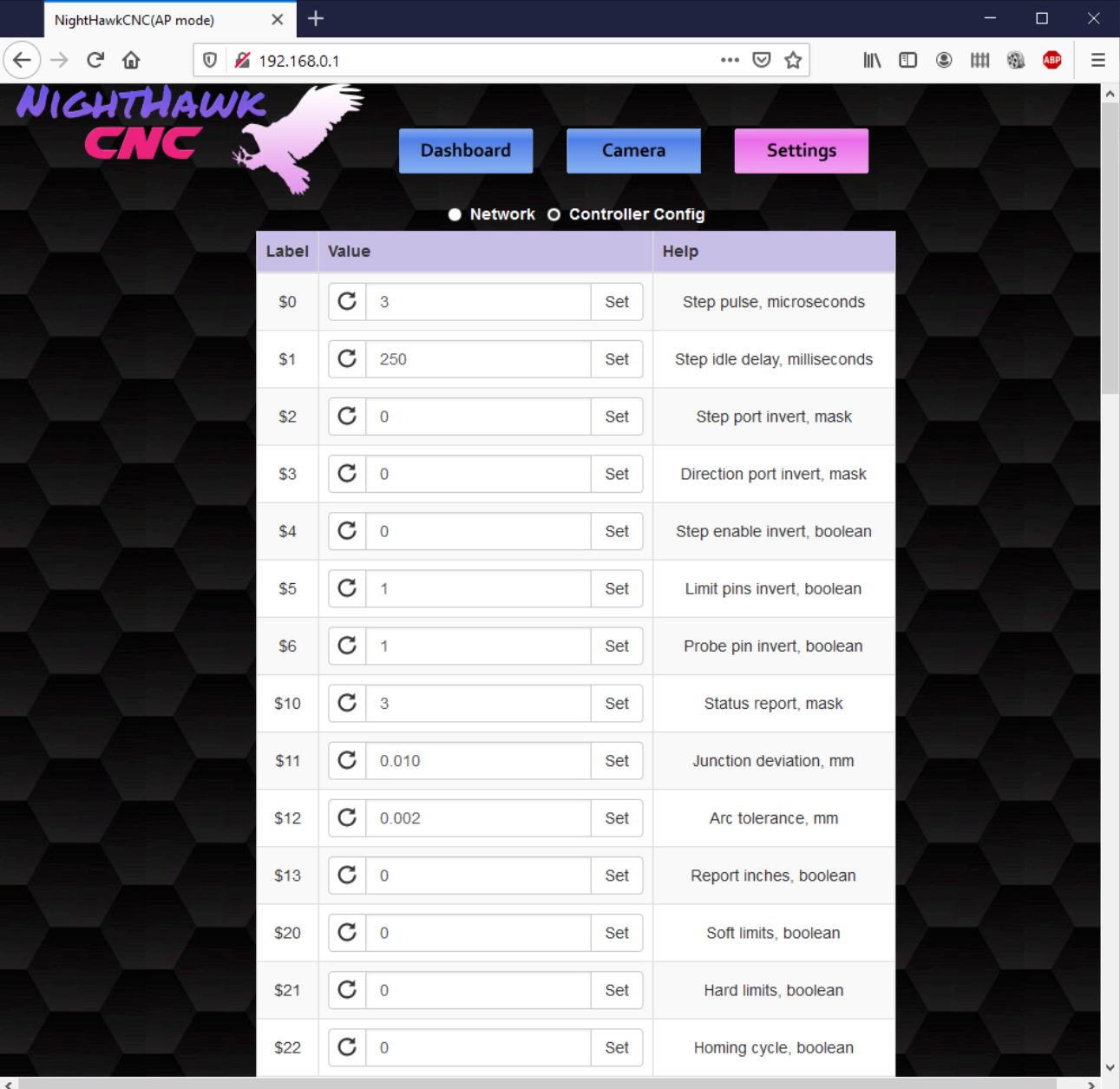


Label	Value
Station SSID	<input type="text" value="my_wifi"/> Set
Station Password	<input type="password" value="*****"/> Set
Station IP Mode	<input type="text" value="DHCP"/> Set
Station Static IP	<input type="text" value="192.168.0.1"/> Set
Station Static Gateway	<input type="text" value="192.168.0.100"/> Set
Station Static Mask	<input type="text" value="255.255.255.0"/> Set
AP SSID	<input type="text" value="NightHawkCNC"/> Set
AP Password	<input type="password" value="*****"/> Set
AP Static IP	<input type="text" value="192.168.0.1"/> Set
AP Channel	<input type="text" value="1"/> Set
Hostname	<input type="text" value="NightHawkCNC"/> Set
HTTP Enable	<input type="text" value="ON"/> Set
HTTP Port	<input type="text" value="80"/> Set
Telnet Enable	<input type="text" value="ON"/> Set

CNC Settings

Do not change these setting unless you are certain that you must! Setting these to the wrong values can cause your machine to behave unexpectedly or crash!

If you have a pre-assembled CNC3D machine such as a QueenBee, QB2, Metal Storm or YouCarve, these will already be set for you.



Label	Value	Help
\$0	<input type="text" value="3"/> Set	Step pulse, microseconds
\$1	<input type="text" value="250"/> Set	Step idle delay, milliseconds
\$2	<input type="text" value="0"/> Set	Step port invert, mask
\$3	<input type="text" value="0"/> Set	Direction port invert, mask
\$4	<input type="text" value="0"/> Set	Step enable invert, boolean
\$5	<input type="text" value="1"/> Set	Limit pins invert, boolean
\$6	<input type="text" value="1"/> Set	Probe pin invert, boolean
\$10	<input type="text" value="3"/> Set	Status report, mask
\$11	<input type="text" value="0.010"/> Set	Junction deviation, mm
\$12	<input type="text" value="0.002"/> Set	Arc tolerance, mm
\$13	<input type="text" value="0"/> Set	Report inches, boolean
\$20	<input type="text" value="0"/> Set	Soft limits, boolean
\$21	<input type="text" value="0"/> Set	Hard limits, boolean
\$22	<input type="text" value="0"/> Set	Homing cycle, boolean

Need help?

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!

