Buildbotics

Buildbotics 4-Axis CNC Controller
Getting Started

Enable

HOLDING
MM   1T   6.4048X
     1900QF   -31.7361Y
     2400QS   -29.2168Z
               -65.9889A

4-Axis CNC Controller

Contents

To our valued customers:

Thank you for choosing the Buildbotics 4-Axis CNC Controller. It is our sincere hope that it meets and exceeds your expectations in every way.

The Buildbotics Controller is fully Open-Source. You'll find all hardware and software design information for the Buildbotics CNC Controller on GitHub at:

github.com/buildbotics/

We'd be delighted to hear how you use the controller, and want to help resolve any problems that come up. Please consider joining our forum at:

forum.buildbotics.com

A comprehensive User Manual is available at:

docs.buildbotics.com

Of course, we understand that you would like to get going right away, so we've included a "Quick Start Guide" that will help you do exactly that.

Sincerely,
Doug Coffland &
Joseph Coffland
Buildbotics LLC Founders

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What's included:

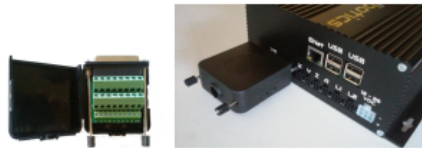The following items should be included with your purchase:

Included

Buildbotics CNC Controller

Logitech F310 game pad

DB25 breakout box

4 10 foot motor cables

48 inch DC power cable

2 12 inch Load cable stubs

You may have also purchased some add-on options. Please check for those options on the bill of materials (included at the end of this document) to verify that they were included as well.

If any of the equipment is missing, or if anything appears to have been damaged during shipment, please contact us at **1-(707)559-8539.**

Quick Start Guide Overview

Buildbotics CNC Controllers that were purchased after July 1st, 2018 do not require an external computer for control, but rather allow users to connect a monitor, a USB keyboard, and a USB mouse to configure and operate the controller. The ability to configure and operate the Buildbotics CNC Controller from another computer via an Ethernet or Wifi local area network is still provided. It's also possible to have local and network interface control simultaneously.
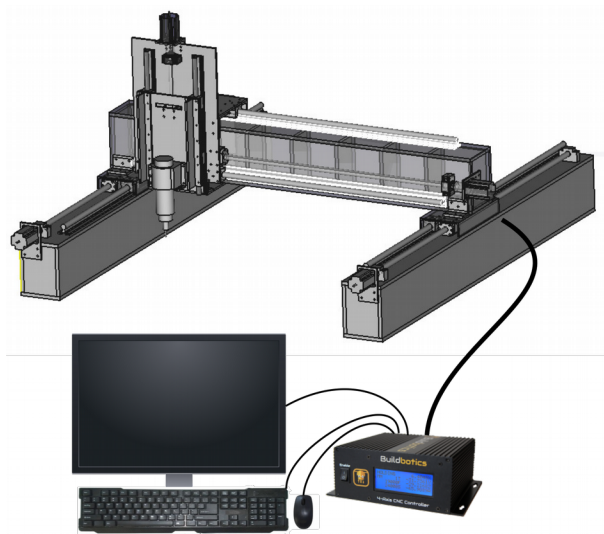
Local interface control
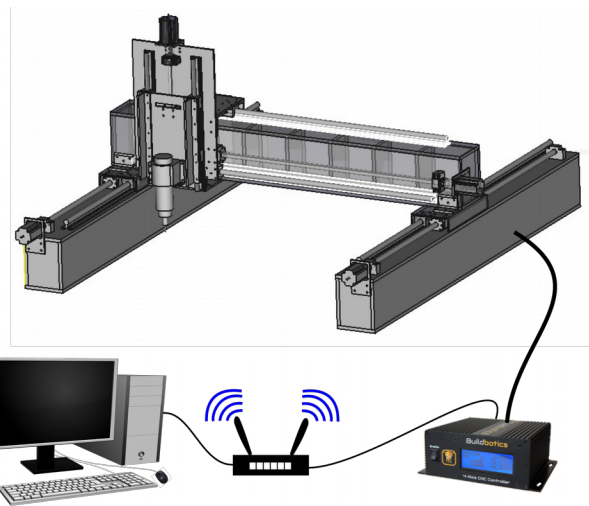
Network interface control

The following Quick Start Guides describe local interface control and network interface control.
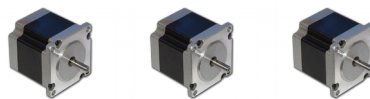
Quick Start Guide (Local interface)

Following this quick start guide section should get you up and running with a local monitor, keyboard, and mouse. Refer to the Buildbotics Controller Manual for more complete and concise descriptions.

Things you need

Stepper motors (NEMA 23 or smaller)

Buildbotics CNC Controller

Buildbotics premade motor cables

Four wire connectors for each motor. (16-22 AWG wire nuts work fine). You may want to solder final connections.

DC power supply that supplies between 12 and 36 Volts and a Buildbotics premade power supply cable.

Alternatively use a power adapter with a matching plug. The Meanwell GST280A24-C6P is an excellent choice.

Logitech F310 gamepad (if you plan to do local jogging)

Computer Monitor

Monitor Cable

USB Keyboard

USB Mouse

Manual or datasheet for your stepper motors.

Connections

Connect motors

Refer to the motor manual or datasheet to identify the A+, A-, B+, and B- coil wires. Attach the motors to the Buildbotics premade cables using the following table.

Motor wire	Premade cable wire color
A+	Red
A-	Black
B+	Yellow
B-	Purple

Connect gamepad (optional)

Plug the Logitech F310 USB gamepad into a "**USB**" port on the back of the controller.

Connect power supply

Attach the red wires on the premade power cable to the V+ connections on the power supply and the black wires to V-. Plug the premade power cable into the power connector, "**12-36VDC**", on the back of the controller. Alternatively, if you have a power adapter with a compatible connector (e.g. Meanwell GST280A-C6P), just plug it directly into the power connector.

Connect the monitor

Connect one end of the monitor cable to the port on the back of the Buildbotics Controller and the other end to the monitor. Plug the monitor into its power source (e.g. AC wall outlet) and turn it on. Configure the monitor input source on the monitor.

Connect the USB keyboard and mouse

Plug the USB keyboard and the USB mouse into USB ports on the back of the Buildbotics Controller.

Turn on the "Enable" switch

Plug in the power supply and turn on the "Enable" switch. The controller LCD screen will illuminate. The Buildbotics logo will appear on the monitor while the controller is booting. When the controller has fully booted, the Control Screen will appear.
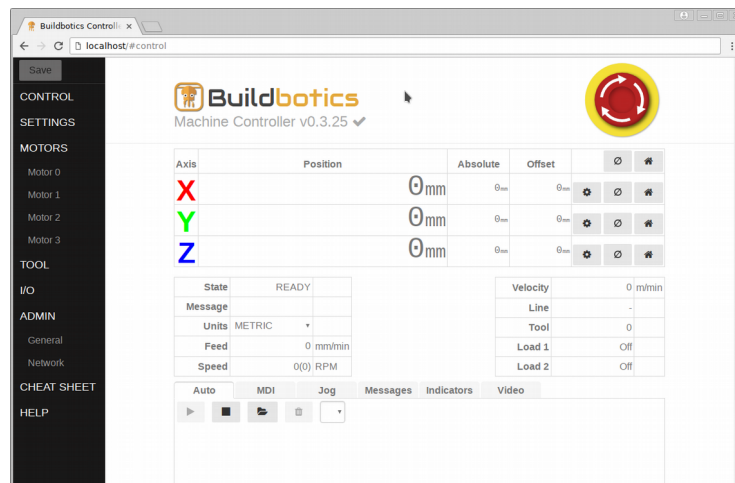

Jog motors (if gamepad attached)

This would be a good time to try your motors and game pad. Use the joysticks on the gamepad to move the motors. They should move (at least slowly) even though they have not yet been configured.

Configure motors

Access the configuration screen by selecting the motor label in the left panel of the web page. Motor 0 is associated with the port labeled "**X**" on the back of the controller. Motor 1 is labeled "**Y**", motor 2 is labeled "**Z**", and motor 3 is labeled "**A**".
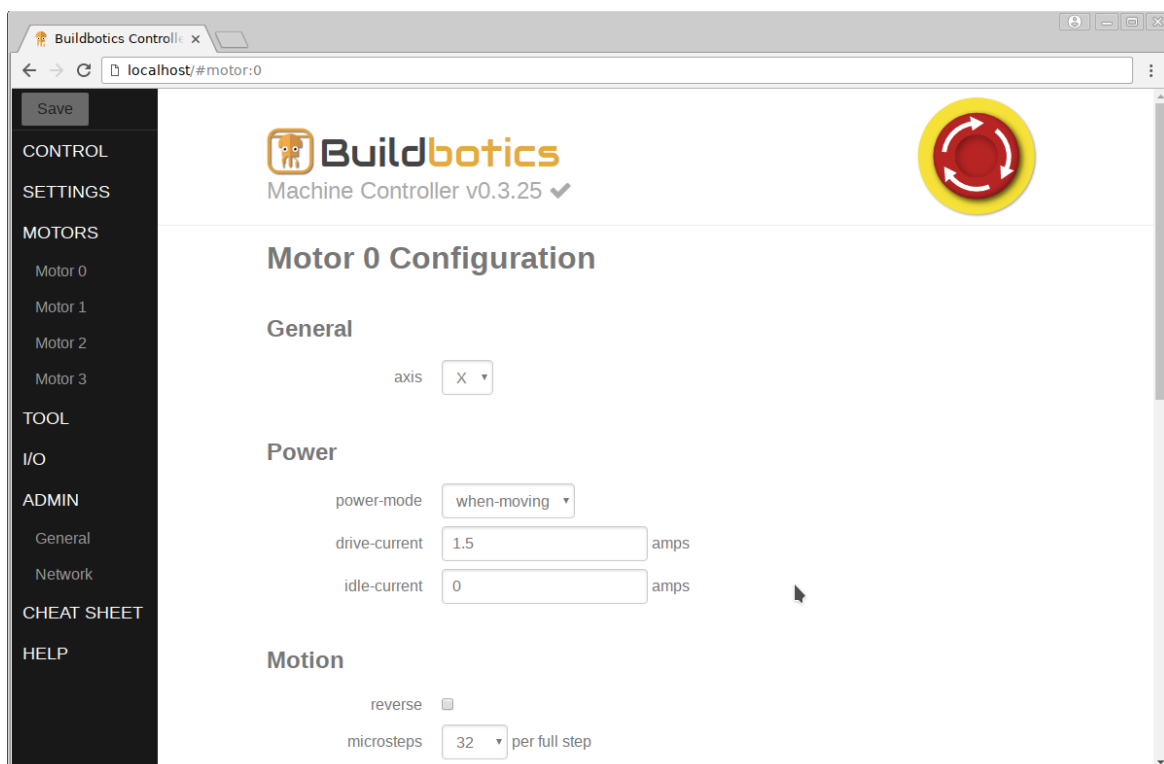
Do the following things at the configuration screen for each motor port:

- Assign the axis to the motor
- Set the "drive-current" to the full load current found in the motor manual.
- Set the "idle-current" to 0.
- Set the "step-angle" to the value found in the motor manual.

The remaining values can be set and adjusted based on experimentation with your machine.
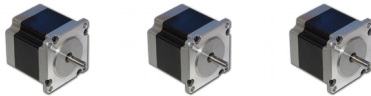
Quick Start Guide (Network interface)

Following this quick start guide should get you up and running with network interface control. Refer to the remainder of the manual for more complete and concise descriptions.

Things you need

Buildbotics CNC Controller

Stepper motors (NEMA 23 or smaller)

Buildbotics premade motor cables

Four wire connectors for each motor. (16-22 AWG wire nuts work fine). You may want to solder final connections.

DC power supply that supplies between 12 and 36 Volts and a Buildbotics premade power supply cable.

Alternatively use a power adapter with a matching plug. The Meanwell GST280A24-C6P is an excellent choice.

Logitech F310 gamepad (if you plan to do local jogging)

Ethernet cable

Ethernet local area network

A Computer on the same local network with a web browser installed.

Manual or datasheet for your stepper motors.

Connections

Connect motors

Refer to the motor manual or datasheet to identify the A+, A-, B+, and B- coil wires. Attach the motors to the Buildbotics premade cables using the following table.

Motor wire	Premade cable wire color
A+	Red
A-	Black
B+	Yellow
B-	Purple

Attach network cable

Plug the Ethernet network cable into the RJ-45,"**ENet**" connector on the back of the controller. Plug the other end into a jack on the local area network.

Connect gamepad (optional)

Plug the Logitech F310 USB gamepad into a "**USB**" port on the back of the controller.

Connect power supply

Attach the red wires on the premade power cable to the V+ connections on the power supply and the black wires to V-. Plug the premade power cable into the power connector, "**12-36VDC**", on the back of the controller. Alternatively, if you have a power adapter with a

compatible connector (e.g. Meanwell GST280A-C6P), just plug it directly into the power connector.

Turn on the "Enable" switch

Plug in the power supply and turn on the "Enable" switch. The controller LCD screen will illuminate. When "Ready" appears in the upper left corner, it is ready to operate.

Jog motors (if gamepad attached)

Use the joysticks on the gamepad to move the motors.

Connect via web browser

Open a browser on a computer that is connected to the same local network as the controller. Then, enter "bbctrl.local" in the address bar.
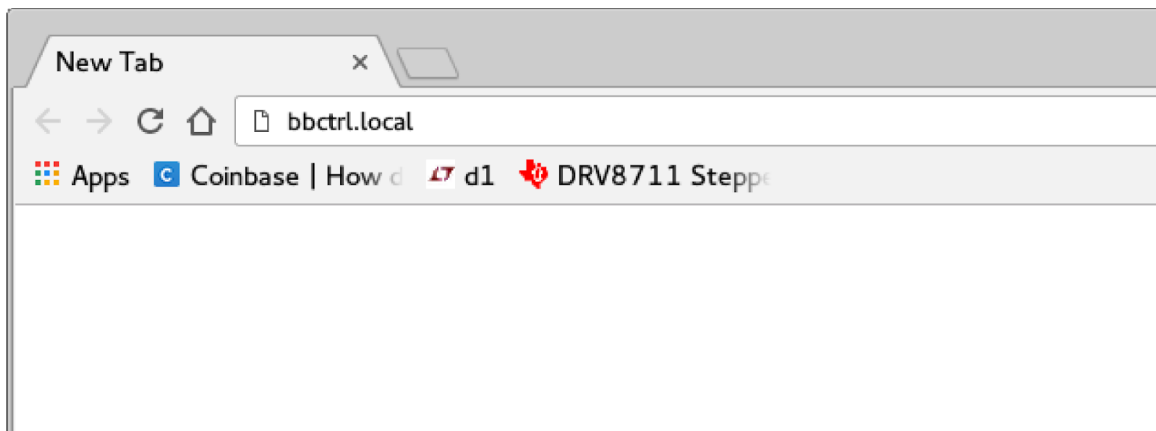
Configure motors

Access the configuration screen by selecting the motor label in the left panel of the web page. Motor 0 is associated with the port labeled "**X**" on the back of the controller. Motor 1 is labeled "**Y**", motor 2 is labeled "**Z**", and motor 3 is labeled "**A**".
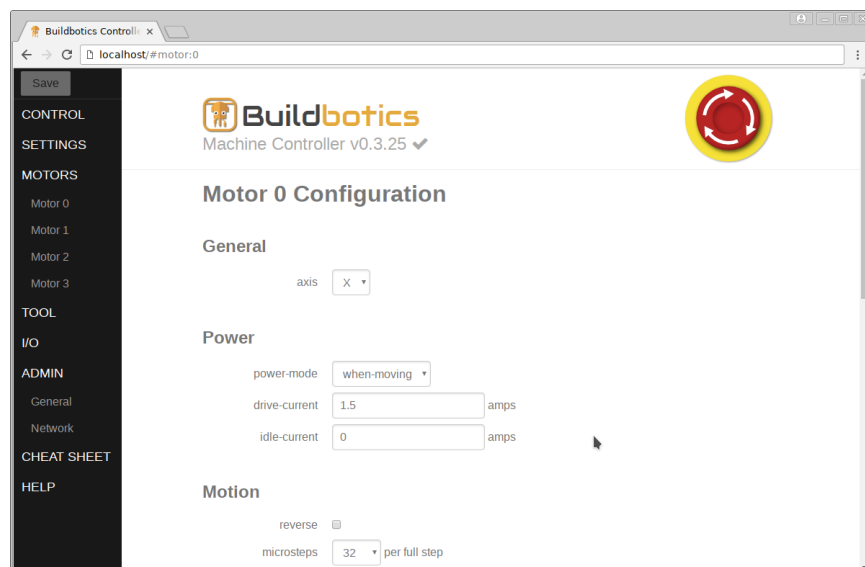
Do the following things at the configuration screen for each motor port:

- Assign the axis to the motor
- Set the "drive-current" to the full load current found in the motor manual.
- Set the "idle-current" to 0.
- Set the "step-angle" to the value found in the motor manual.

The remaining values can be set and adjusted based on experimentation with your machine.

Gamepad

A gamepad can be used to control movement on the X, Y, Z, and A axes, and to scroll through screens on the controller. The gamepad attaches to the Buildbotics CNC Controller via any of the four USB ports on the back panel. Once attached, the gamepad can be used to move the CNC head in any direction at various speeds.

While many gamepads can work, Buildbotics has tested the Logitech F310.

Gamepad Controls
The following image shows the control positions on the Logitech F310 gamepad. The exact position of other gamepads will differ.

The following table describes the actions that can be achieved using the gamepad.

Movement	Buttons	Comments
Simultaneous X and Y movement	**X/Y stick**	Causes the CNC head will move in the direction that the X/Y stick is moved.
X movement only	**X/Y stick** and **Horizontal Lock** simultaneously	Restricts movement to X-axis only
Y movement only	**X/Y stick** and **Vertical Lock** simultaneously	Restricts movement to Y-axis only
Simultaneous A and Z movement	**Z/A stick**	Causes up and down and rotational movement.
Z movement only	**Z/A stick** and **Vertical Lock** simultaneously	Causes up and down movement only.
A movement only	**Z/A stick** and **Horizontal Lock** simultaneously	Causes rotational movement only.
Very slow speed	**Speed 1**	Set movement speed to 1/128th of full speed.
Slow speed	**Speed 2**	Set movement speed to 1/32nd of full speed.
Medium speed	**Speed 3**	Set movement speed to 1/4th of full speed.
Full speed	**Speed 4**	Set movement speed to full speed.
Scroll to next	Press right	Moves to the next LCD display (Initial

LCD display	side of **Screen selector**	Display, Status Display, or Network Display)
Scroll to previous LCD display	Press left side of **Screen selector**	Moves to the previous LCD display (Initial Display, Status Display, or Network Display)

Note - There is a small switch on the back of the F310 gamepad that is labeled "**X**" and "**D**". It must be switched to the "**X**" position.

Run test program

Select "**Control**" from the left panel on the web page to open the Control screen. Then, use the "**Auto**" tab to upload new G-Code programs, select or delete existing programs. The G-Code program, that is loaded into the "**Auto**" tab, will be executed when the "**Play**" button is clicked.
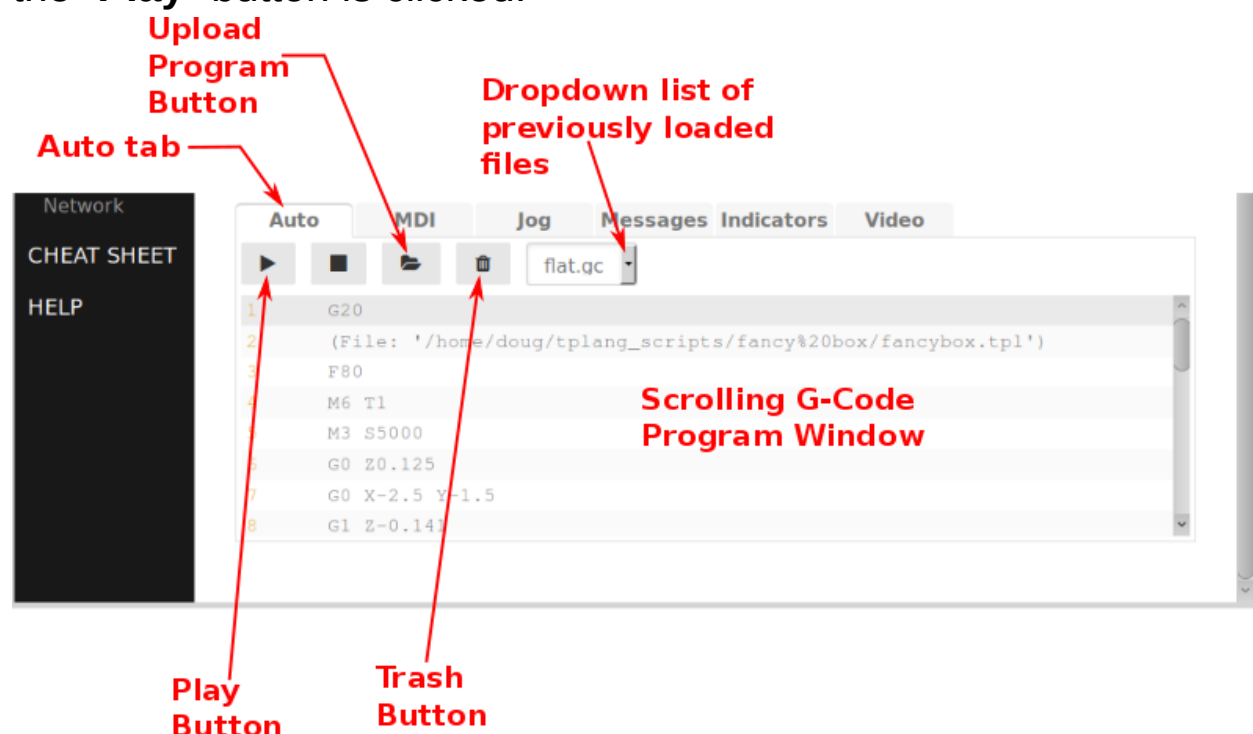
Software Upgrade

Go to the ADMIN->General page to update to the latest software. After clicking "Upgrade", you'll be prompted for the password. The default password is 'buildbotics'.

Next Steps

For more information, get the User Manual from:

docs.buildbotics.com