TH3D EZBoard

Documentation

V1.9 – 6/17/20

Getting Started

Welcome to the TH3D EZBoard Documentation!

Almost everything is plug and play. Make sure to unplug your printer from the wall before installing this or any other parts on your printer. We will cover the connections on the board and then go over adding things like filament sensors, EZABL, BL Touch, and the E3D PT100 high temp sensor, all optional accessories. **If you are also installing an EZABL do the EZBoard installation first and then follow the EZABL installation guide to setup the EZABL.**

Do NOT use a "Pin 27" or "EZOut" Board with the EZBoard. Use of these will damage the EZBoard and it is not tested to work with the EZBoard. Headers for a BL Touch (Servo) and filament sensor (Fil. Sensor) are directly available on the board so no adapters are needed. You can use our filament sensor (or the stock Creality filament sensor) AND a BL Touch at the same time.

When using a filament sensor use the cable that is included with it. Do not use a Creality cable with our EZOut sensor as this will short the board due to differences in the sensor wiring and vice versa (Creality sensor with our EZOut cable).

Always double check your connections before powering on. Incorrect connections will damage the board and damage due to improper use or wiring is not covered under the included warranty. If you are not sure about your wiring you can contact our support with pictures for verification or post in one of our TH3D Communities.

Any wires entering screw terminals must be bare wire or use ferrules. Many printer companies tin the wires and it is incorrect. Make sure that screws on terminals are tight so they get good contact. Inserting wires that have tinned ends and/or failure to tighten the terminals all the way will eventually cause damage to the terminals that is not covered under warranty.
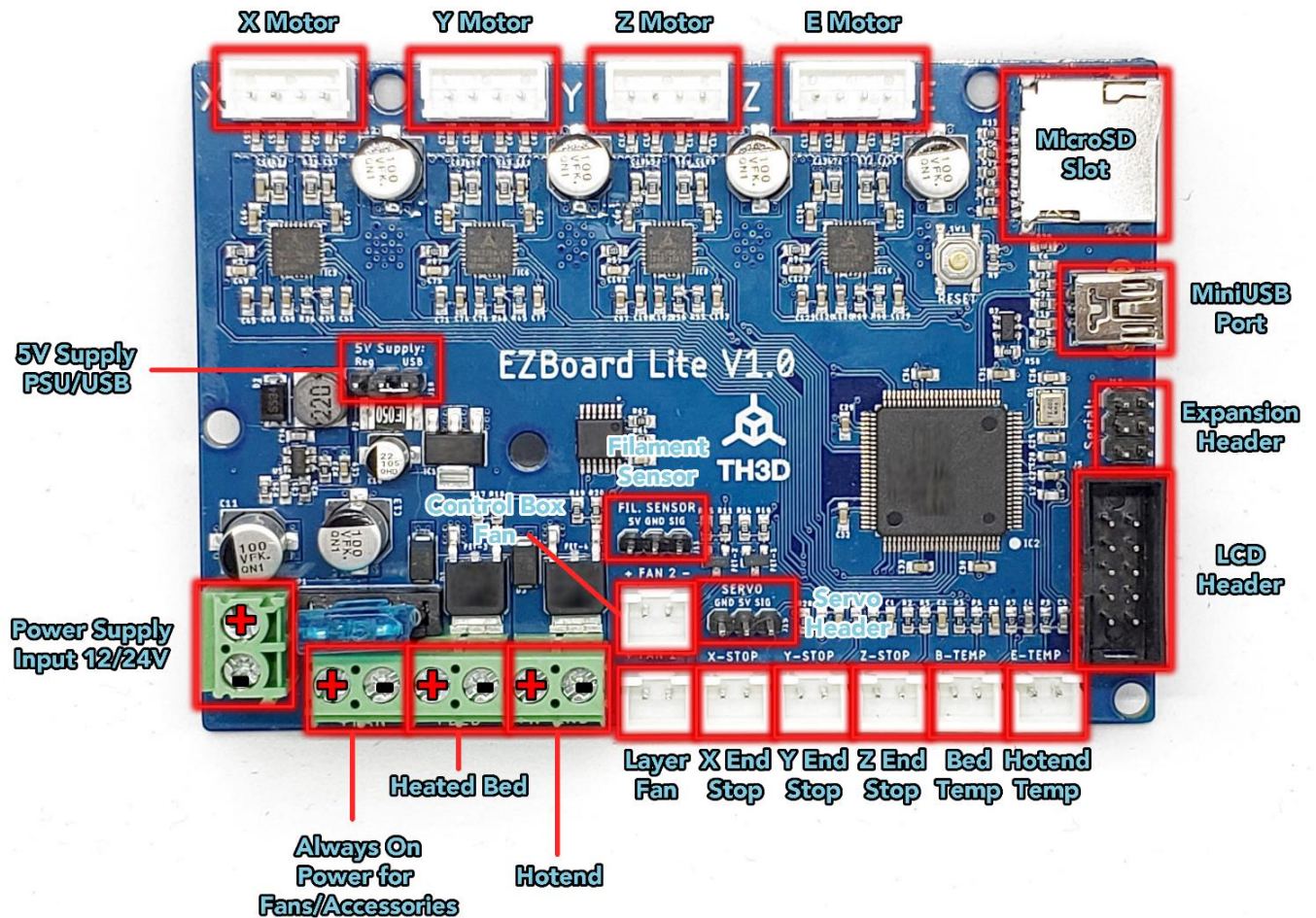
If you need help with your EZBoard (purchased after 3/1/2020) it comes with standard support. You can contact us through the Contact Us link on our website. We also have sections in our communities to get help outside of business hours and they are linked below.

TH3D Community Links:

Forum: https://Forum.TH3DStudio.com Discord: http://Discord.TH3DStudio.com

Facebook Group: https://www.facebook.com/groups/th3dstudio/

Board Connections

Connection Notes

Power Outputs – All power outputs for your heaters and fans will output whatever your power supply input is. Meaning if you have a 24V printer it will output 24V.

5V Supply Jumper – This should always be set to the "Reg" side of the jumper block. If it is not then the board will not work unless USB is connected. Our board will power off when set to "Reg" when the PSU for the printer is turned off. Unlike other boards ours does not back-feed power into the VIN and it will not stay on when connected to Octoprint if you cut the printer power off. This jumper provides full isolation of the 5V from the USB and the onboard 5V regulator on the board.

Power Input Terminal (VIN) – The terminal labeled VIN is where the power from your printer power supply is connected to. Make sure to get the positive (+) and negative (-) correct when connecting them.

Fan Terminal – For your fans that are always on (control box fans on CR-10(S) machines and hotend heatsink fans) connect these to the Always On screw terminal labeled "Fan" on our board. If they have a connector snip them off and strip them before inserting into the screw terminal. Pay attention to the positive (+) and negative markings (-) on the connections. If connected the wrong way it will damage the fans and/or the board. This is for always on fans only, not your layer fan that cools the plastic when printing.

Heated Bed Terminal (Bed) – This is where your heated bed heater wiring connects to. Polarity is not important unless you are running an external MOSFET. If running an external MOSFET make sure to get the polarity (+/-) correct

Hotend Terminal (H-End) – This is where your hotend heater wiring connects to. Polarity is not important unless you are running an external MOSFET. If running an external MOSFET make sure to get the polarity (+/-) correct

Fan 1 (Layer Fan) – This is used for your layer fan that cools the filament. Pay attention to the positive (+) and negative markings (-) on the connection. If connected the wrong way it will damage the fans and/or the board. On Creality machines this is usually a yellow/blue wire and yellow is positive. Our headers are setup to match the stock connectors. But it doesn't hurt to double check.

Fan 2 (Control Box Fan(s)) – This is used for machines like the Ender3/Ender5 that have a 40mm fan directly over the board. This fan will turn on/off with your motors to keep the drivers cool. Pay attention to the positive (+) and negative markings (-) on the connection. If connected the wrong way it will damage the fans and/or the board. On Creality machines this is usually a red/black wire and red is positive. Our headers are setup to match the stock connectors. But it doesn't hurt to double check.

Endstops – Connect your X and Y endstops to the corresponding endstop header on our EZBoard. They are labeled X-Stop and Y-Stop.

Z Endstop (Z-Stop) – If connecting the stock endstop just plug it into the Z-Stop port. If connecting an EZABL or other ABL sensor you may need to reverse the Z wiring. Use M119 to verify if the sensor is reading triggered/open correctly. If there is no change then switch your Z endstop wires (or if you have the EZABL Pro flip the Z switch on the board) and test again.

Thermistors (Hotend and Bed) – These connect to the E-Temp and B-Temp headers. E-Temp is for the hotend thermistor and B-Temp is for the bed thermistor. Make sure to inspect the thermistors for any damage to the wires or overtightening of the screw holding the hotend thermistor.

X Motor (X) – Connect your X motor to the motor connection with the X next to it. Refer to the picture in this guide as they are highlighted as to what connector is for what motor in case the markings on the board are not clear enough.

Y Motor (Y) – Connect your Y motor to the motor connection with the Y next to it. Refer to the picture in this guide as they are highlighted as to what connector is for what motor in case the markings on the board are not clear enough.

X Motor (E) – Connect your E motor to the motor connection with the E next to it. Refer to the picture in this guide as they are highlighted as to what connector is for what motor in case the markings on the board are not clear enough.

Z Motor (Z) – By default there is 1 Z motor connection. If you ordered with the Dual Z Motor adapter you will have the PCB and wire included in your order. This is to connect 2 Z steppers to the 1 Z header if your machine has 2 motors. Make sure to cover the rear of the adapter PCB with the STL we provide or electrical tape to prevent shorting

When you do this enable the "DUAL_Z_MOTORS" option in the firmware to increase the Z stepper driver amperage to drive the 2 motors. When enabling the CR-10S or SV01 options this is enabled automatically in the latest firmware.

LCD Connection – If you have a single cable LCD like what is on the Ender 3, Ender 5, or CR-10 just plug it into the LCD header on the board. If you have a dual cable LCD you will need to use the optional Creality Dual Cable LCD adapter board to connect your LCD to our board.

NOTE: If you have a dual cable LCD that has the EXP3 header on it then you can use that instead of the dual cable LCD adapter board. Just use one of the stock cables and the 2nd will be not used. Some have EXP3 silkscreened on the board but not physically installed. If you have one that has EXP3 physically installed you can use that instead of the dual cable connection.

Installing the Creality Dual Cable LCD Adapter board:
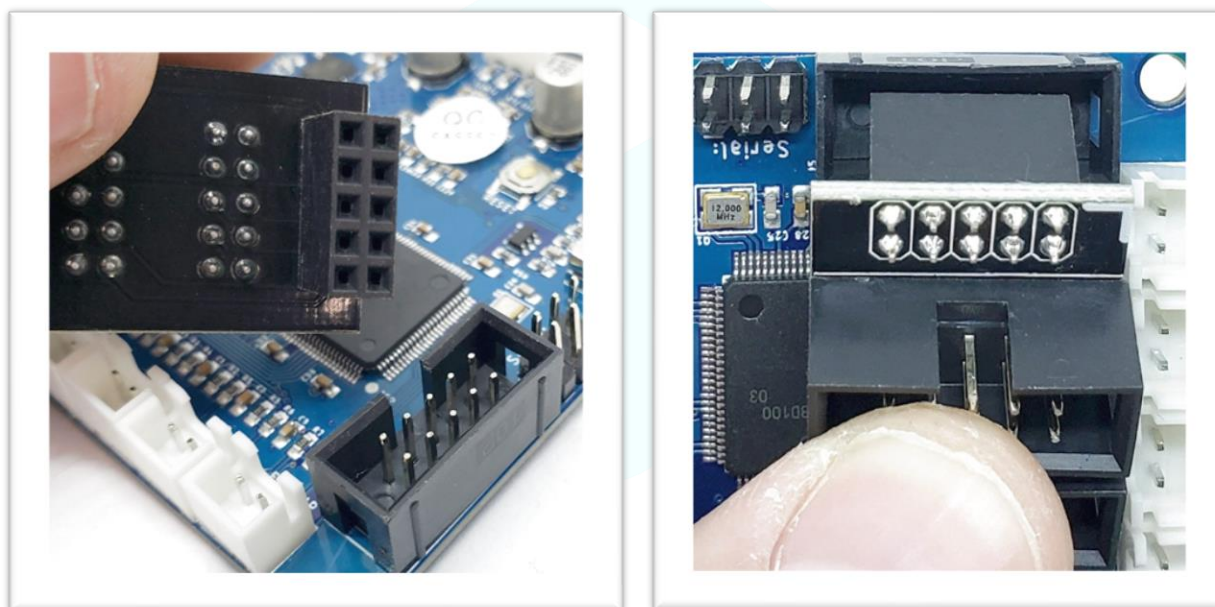
Make sure to align the adapter in the socket. It will cover ALL the pins. Mis-aligning the adapter can damage the board/LCD and make the LCD not work. The board will hang over the EZBoard PCB as shown in the below pictures.

There are no firmware changes needed when using the Creality Dual LCD Adapter as all pin changes are handled on our board.

If your board came with a pullup board this is ONLY for the Ender3/5 machines with a single LCD cable. Do not use this on the dual cable versions.

The board edges will align with the edges of the LCD header socket. Once you have it installed you can connect the cable that goes to EXP1 on your LCD to the EXP1 plug on the board and same for EXP2. EXP1 is the one furthest from the LCD header connection.
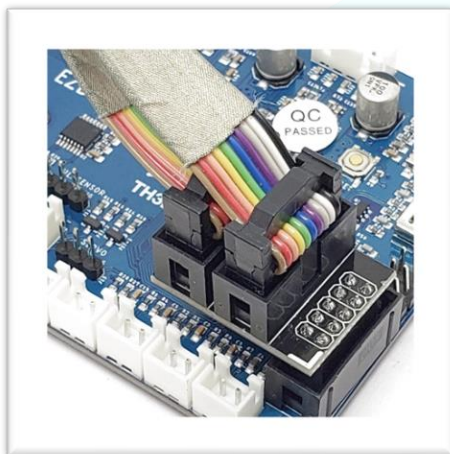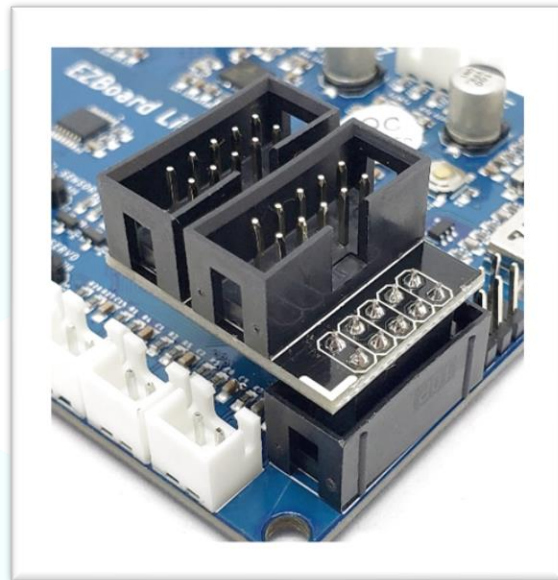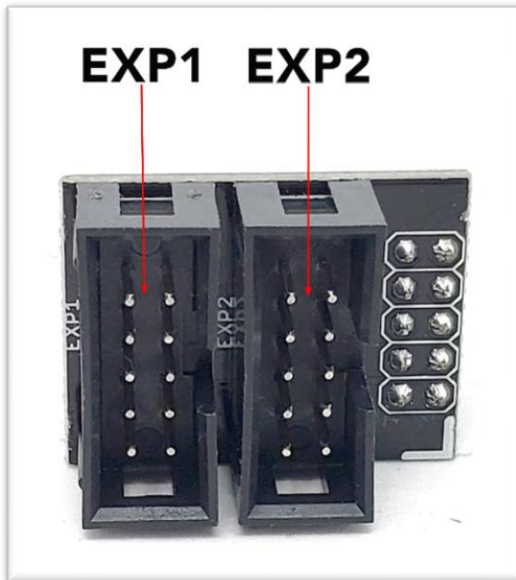
Filament Sensor – This is marked on the board as "Fil Sensor". There are 2 sensors currently supported. Our EZOut sensor and the Creality/Sovol sensor. Depending on the sensor you are using enable the corresponding sensor in the firmware when you update it. Only use the wire that came with whatever sensor you have. Do not mix a Creality cable with our EZOut sensor or vice versa.

Only the EZOut sensor itself is needed, if you have an EZOut already you will NOT need the EZOut adapter board to use it with our board. We sell just the sensor in the shop.

Creality/Sovol Sensor Connection. The RED wire lines up with the "5V" pin and the yellow wire lines up with the "SIG" pin.
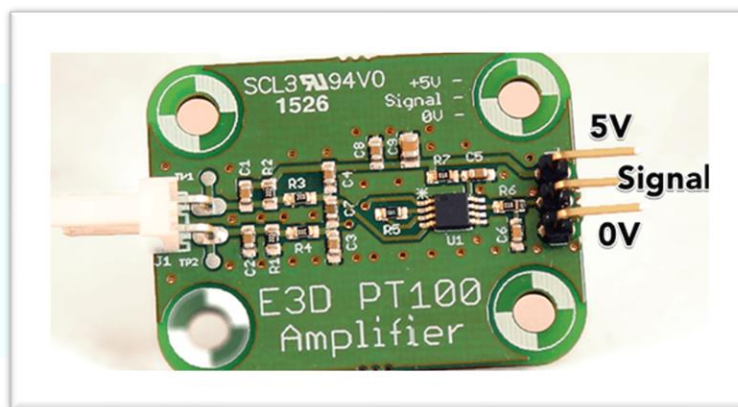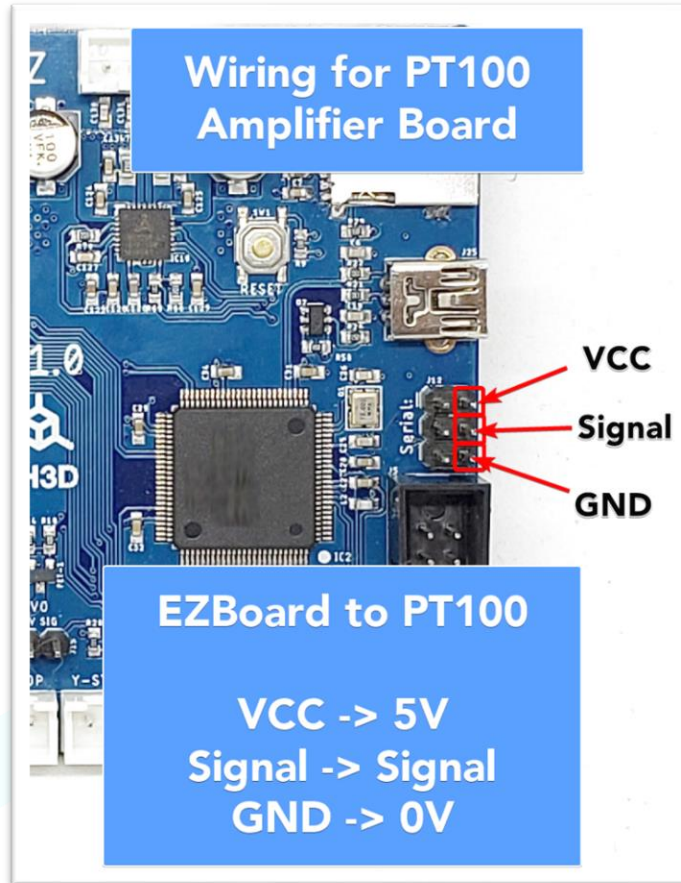

EZOut Sensor Connection. The RED wire lines up with the "5V" pin and the white wire lines up with the "SIG" pin.

Connecting the filament sensor cable backwards or incorrectly WILL short out the board and is not covered under warranty. Make sure it covers ALL 3 pins on the header.

E3D PT100 Temperature Sensor w/ Amplifier Board

<u>NOTE: Firmware U2.R1.7 or higher required.</u>

Picture from E3D Website: https://e3d-online.com/pt100-amplifier-board, annotations added by TH3D for pinouts

Only the specific E3D PT100 board shown above has been tested to work with our board. Any other amplifier boards from other vendors and/or variations of amplifier boards may not work and/or cause damage to the EZBoard. We recommend the E3D version.

SERVO (BL TOUCH) Header – This is used for connecting a servo or an ABL sensor like the BL Touch. The Signal, 5V, and GND pins are marked on the PCB. Be sure to connect them to your servo/BLTouch in the correct order. Incorrectly connecting these can short out your sensor and/or the board. Below is the wiring for a genuine BL Touch sensor. We strongly do NOT recommend using a BL Touch clone as they are inferior quality and may damage your control board. **Some BL Touch 3rd party harnesses use Blue for the ground instead of Brown.** For the BTT BL Touch harness see our knowledge base for the color conversion.

You can also use this header for connecting the EZABL if you have issues with it on the Z Endstop (some V3 Kits need to connect here). See our article here: https://www.th3dstudio.com/knowledgebase/ezabl-ezboard-not-triggering-fix/
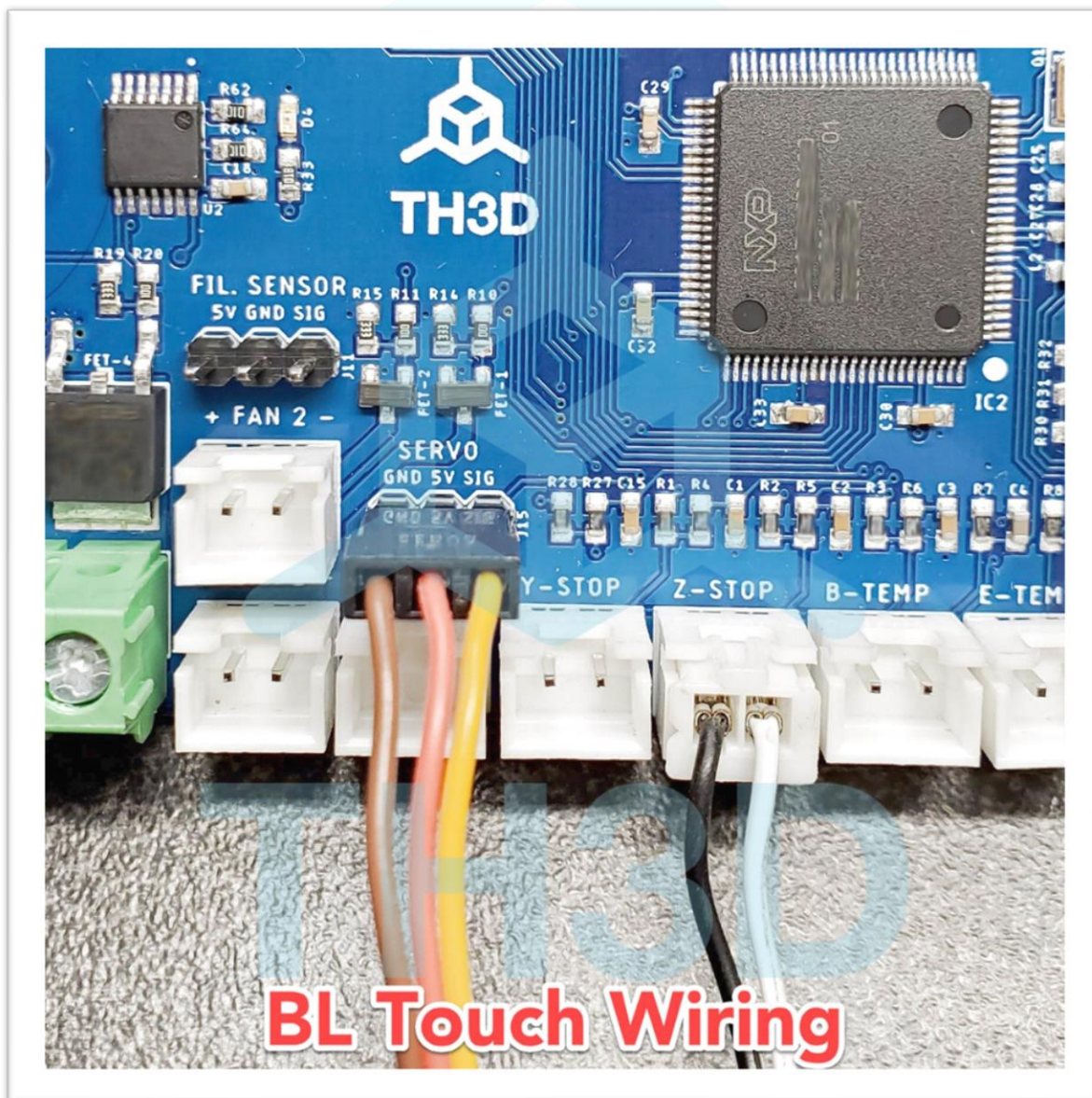
Firmware Setup

Since the firmware is going to be updated at a much faster rate than this installation guide please refer to the Firmware Download page here:
https://www.th3dstudio.com/knowledgebase/ezboard-installation-guide/

It is HIGHLY recommended to use the EZFirmware website to setup the firmware for your board.

We have an automated web compiler that is VERY easy to use and does not require any software installation your computer. Head over to
https://EZFirmware.TH3DStudio.com to get your firmware for your EZBoard.

You can still compile locally with VSCode but if you are having issues with your local PC compiling use the EZFirmware website. It is recommended to use VSCode instead of ATOM since PlatformIO is discontinuing support ATOM.

To setup VSCode see the PDF in \Installation Guides\EZBoard\VSCode to setup VSCode to compile the firmware.

Ender 5/Ender 5 Pro Notes

If you have an Ender 5 machine check that your Z axis moves 10mm when you tell it to move 10mm. Some machines are shipping with new leadscrews that have different steps/mm. If yours only moves 5mm when told to move 10mm then you need to enable the ENDER5_NEW_LEADSCREW option in the firmware and update the board again.

You can also look at the steps/mm setting in the stock board by going to Control>Motion>Steps/mm and see if Z shows 400 or 800. If it shows 800 then you need to use the ENDER5_NEW_LEADSCREW option for your machine.

FAQ

Can I power a Raspberry Pi board from the 5V pins on the EZBoard?

No. This will cause damage to the board and blow the 1A fuse for the 5V rail on our board. Do not try to power a Raspberry Pi from your EZBoard.

Will the EZBoard work with Octoprint?

Yes. It will work just like the stock control board.

What is the EZBoard Baud Rate?

The default USB baud rate for the serial interface is set to 115200 just like the Creality stock boards for compatibility with existing slicer setups and other programs you would use with the stock board.

What voltage does the EZBoard work with?

The EZBoard works on 12-24V DC.

Can I use Marlin 2.0 with the EZBoard if I do not want to use the TH3D Firmware?

Yes. Our board is in the official Marlin 2.0 release. If you do use Marlin 2.0 instead of our Unified Firmware we will not be able to provide technical support at no charge as our support does not cover this use case.

Can I use a normal 12864LCD with the EZBoard?

Yes. You will also need the Creality Dual Cable LCD adapter board as well and the SD slot will not function on the LCD itself. You will still use the MicroSD slot on our board for your MicroSD card.

Do I need to power off my printer when working on it?

Yes. This is important as wiring mishaps can happen and damage the board. This includes when you are working on the hotend or doing a nozzle change. If doing a nozzle change heat the hotend up to 240C then cut power to the printer power supply. Make sure you do not damage any of the thermistor or heater lines when changing your nozzle. Damaging these lines can cause a short between the wires that will kill the board. After working on the hotend check resistances across wires to make sure they are reading correctly and there are no connections between wires where there shouldn't be connections (like heater power lines to heater thermistor lines).

Legal

Full terms available on https://www.TH3DStudio.com/terms/

1 on 1 support is included on all EZBoard purchased made after 3/1/2020 along with a 6 month warranty against normal failure of the product.

Damage to the product that is a result of mishandling of the printer and its components and/or improper installation are NOT covered under warranty.

By purchasing and install these parts you agree to the below terms and the terms of service on: https://www.TH3DStudio.com/terms/

There are many things you can do to your printer installing this or any modification.

You are assuming all risk associated with this modification.

If a 3rd party product causes damage to our board this is not covered under warranty. This includes failed parts on the printer itself that can cause shorts into IO pins (like a hotend failure). It is recommended to regularly check your machine for defects in the wiring and mechanicals to prevent damage to your machine and our board.

You understand that this and/or any modifications to your printer can and/or may void your manufacturer warranty (if any).

TH3D Studio LLC is not to be held liable for any damage to your printer, home, person, or anything else due to issues that may arise from improper installation or failure of these parts.

Change Log

- V1.0 – Initial Version
- V1.1 – Added PT100 Wiring Notes and other warnings that were already on the product pages and installation download pages. Fixed typo where MKS was stated instead of EZBoard. Added VSCode note.
- V1.2 – Added link to binary firmware request thread. Added note about pullup board. Added note on main page about wire terminals and proper installation.
- V1.3 – Added BL Touch Wiring Picture. Added EZFirmware information.
- V1.4 – Added notes about mixing filament sensor cables. Updated to remove ATOM as recommended IDE, use VSCode
- V1.5 – Added picture of E3D PT100 board with pinout annotations on the pins. Updated legal section. Added FAQ Page.
- V1.6 – Dual Z Adapter Board is no longer included since not all machines need it. Updated the verbiage in the guide to state that it is an optional addon.
- V1.7 – Added note in firmware section about Ender 5/Ender 5 Pro and the new leadscrews that have been found on those models
- V1.8 – Added notes about EZABL installation guide as this guide does not cover it. Updated the filament sensor section to state Creality/Sovol as they use the same wiring. Added additional notes for the BL Touch Wiring Information.
- V1.9 – Legal section update: Updated that support is included on boards bought after 3/1/2020. Added general common-sense guidelines for working on your 3D printer to the FAQ section. Added more connection sections to clarify all the connections on the board.