TH3D EZOut V2 Filament Sensor Kit Installation

V2.3 – 10/01/19

Getting Started

Welcome to the EZOut kit Installation guide. This is for the filament sensor kit version only.

You will need the following to install the kit:

1. The TH3D EZOut V1/V2 Kit
    a. If you have the Standard (MKS/Tornado/CR-10S)/Wanhao D6 a heat gun or hair dryer to install the heatshrink.
2. Tools to open your control box
3. Windows PC To Flash the Firmware
    a. Firmware is downloadable from our website at http://Firmware.TH3DStudio.com
    b. Some machines like the CR-10, Ender 3, and Wanhao i3 need their bootloader flashed. See here on how to flash: https://www.th3dstudio.com/knowledge-base/cr-10-bootloader-flashing-guide/

If you ordered the EZOut board for a BL Touch please consult the Marlin documentation and BL Touch documentation for setup. Support is only included on the full filament sensor kit. See below for how to connect to your machine. CR-10/Ender 3 puts Pin 27 on the S pin. Ender 2 puts pin 29 on the S pin.

DO NOT EVER PLUG OUR SENSOR INTO YOUR PRINTER BOARD WITHOUT OUR EZOUT BOARD, THIS CAN CAUSE A SHORT DUE TO WIRING DIFFERENCES ON OUR SENSOR VS ENDSTOP CONNECTIONS.

Supported Machines:

- **CR-10 (ALL Sizes)**
- **CR-10S (ALL Sizes)**
- **Ender 2/3/3 Pro/5**
- **CR-20**
- **Wanhao i3**
- **Wanhao D6**
- **MKS Boards (Tornado/Folgertech FT-5/CR-10S)**
    - **If you have a custom machine and need help with the firmware setup/wiring, please contact us @ Support@TH3DStudio.com**

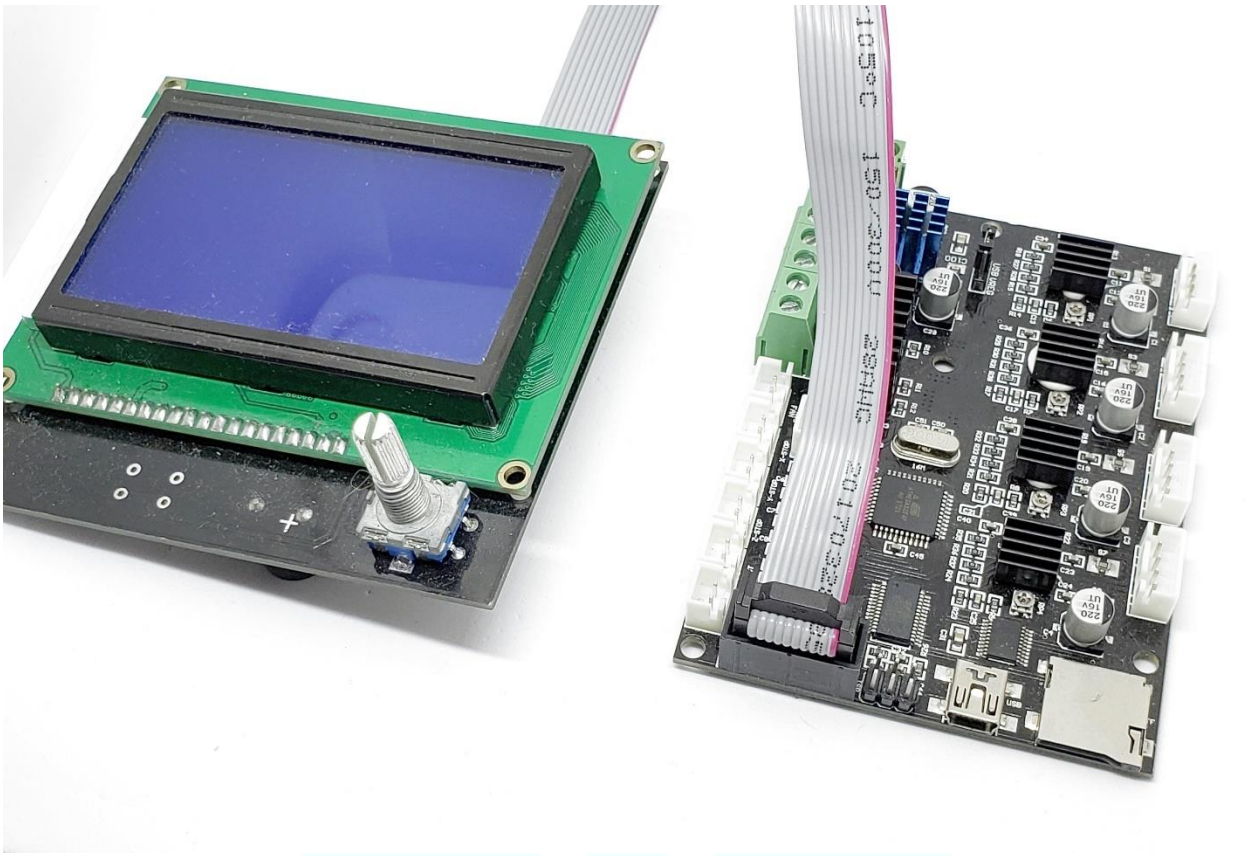
CR-10/Ender 3/Ender 3 Pro/Ender 5 Installation

CR-10 - Open your control box and remove the power supply. You do not need to disconnect the wires from the power supply, just move it out of the way so you can see your board. In the guide we have a CR-10/Ender3 Style Board outside of the control box so we can clearly show you where things plug in. Your board may be a different color/than the one shown here.

Ender 3/3 Pro/5 – Open your control area housing. There will be a fan connected to this. Make sure not to pull on it. Put the top cover aside while installing this kit and then reinstall in the same way you took it apart. Route the new filament sensor cable out the same direction as the hotend/extruder wires. In the guide we have a CR-10/Ender3 Style Board outside of the control box so we can clearly show you where things plug in. Your board may be a different color/than the one shown here.

If you have a CR-10S board and want to connect the EZOut V1 please see the added information at the end of the guide. The install process is the same except it is connected to EXP1 (the CR-10S has 2 LCD headers, EXP1 and EXP2). See notes on Page 28 for the CR-10S Board.

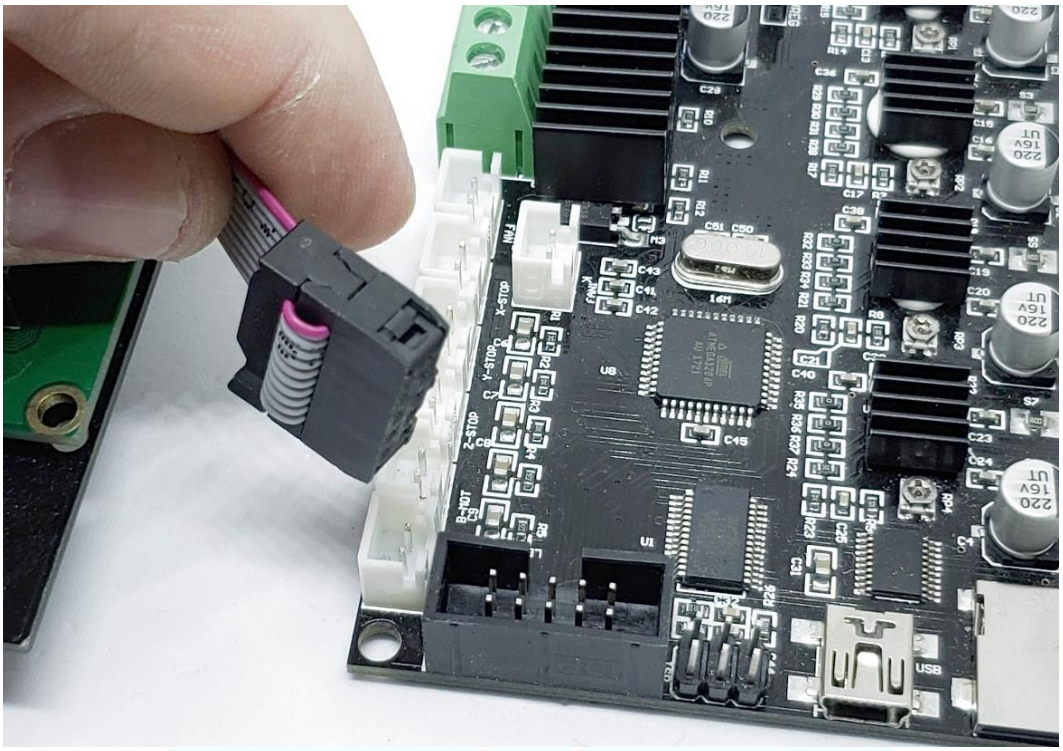
The new EZOut V2 for the CR-10S connects to the X+ endstop connector.



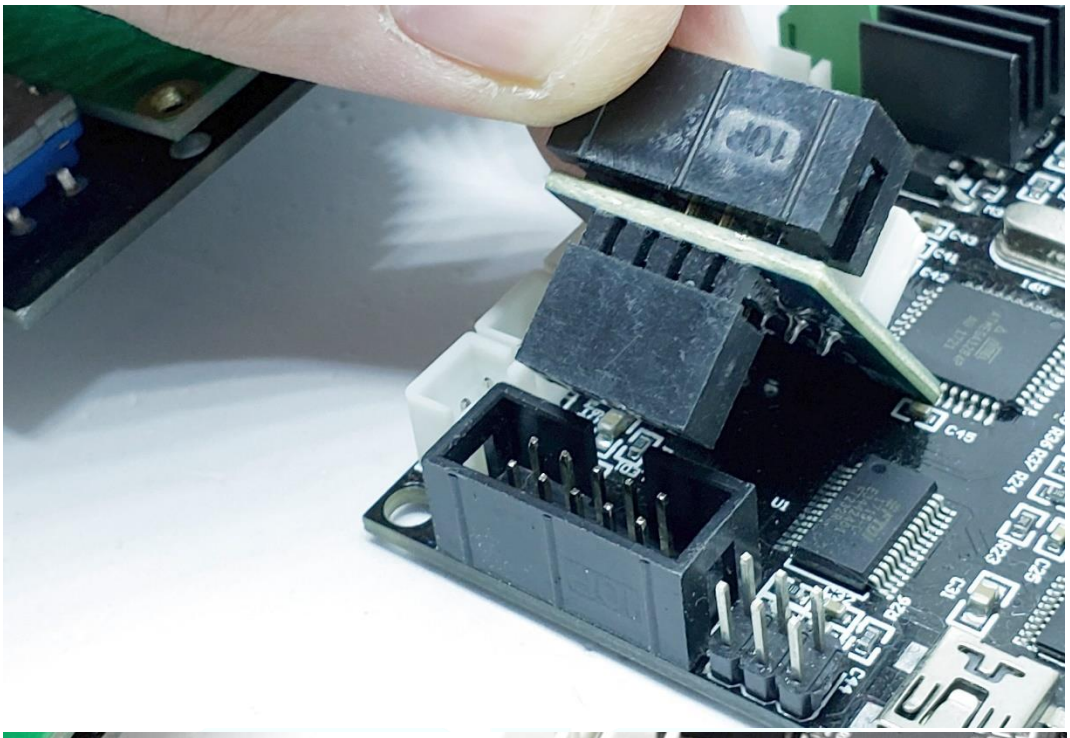
You will want to update your firmware before installing the kit. The firmware installs the same way as our others and you can find the complete flashing guide for the firmware and bootloader here: http://Firmware.TH3DStudio.com. Look for the “EZOUT” lines in the firmware and uncomment for your machine.

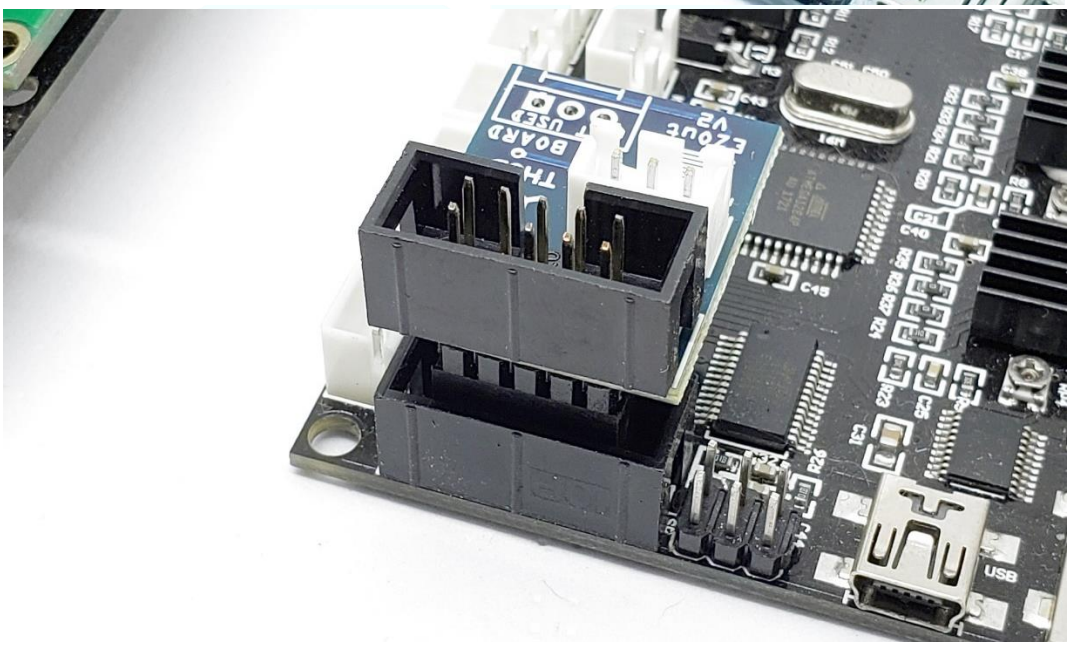
If you installed the firmware correctly the speaker will emit a continuous beep. You may now unplug the printer from USB and all power then proceed with the installation steps below.

1. Unplug your LCD Cable from the CR-10/Ender3 Board and note the tab on the one side of the LCD cable.

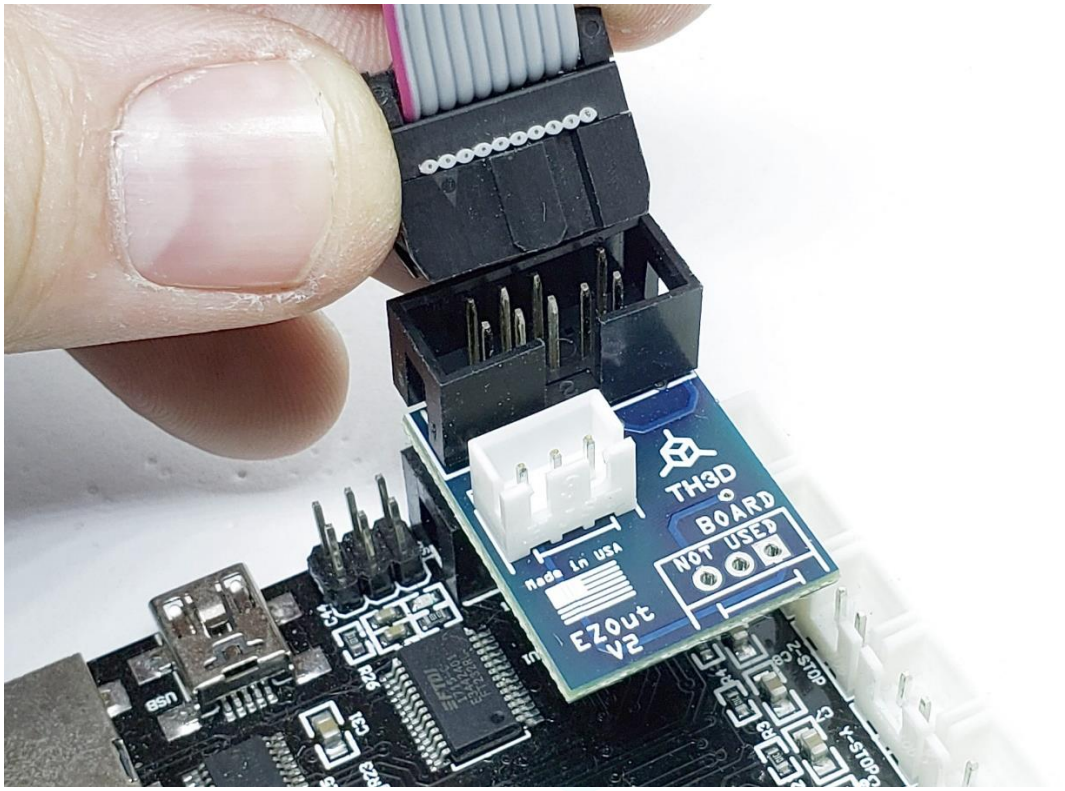


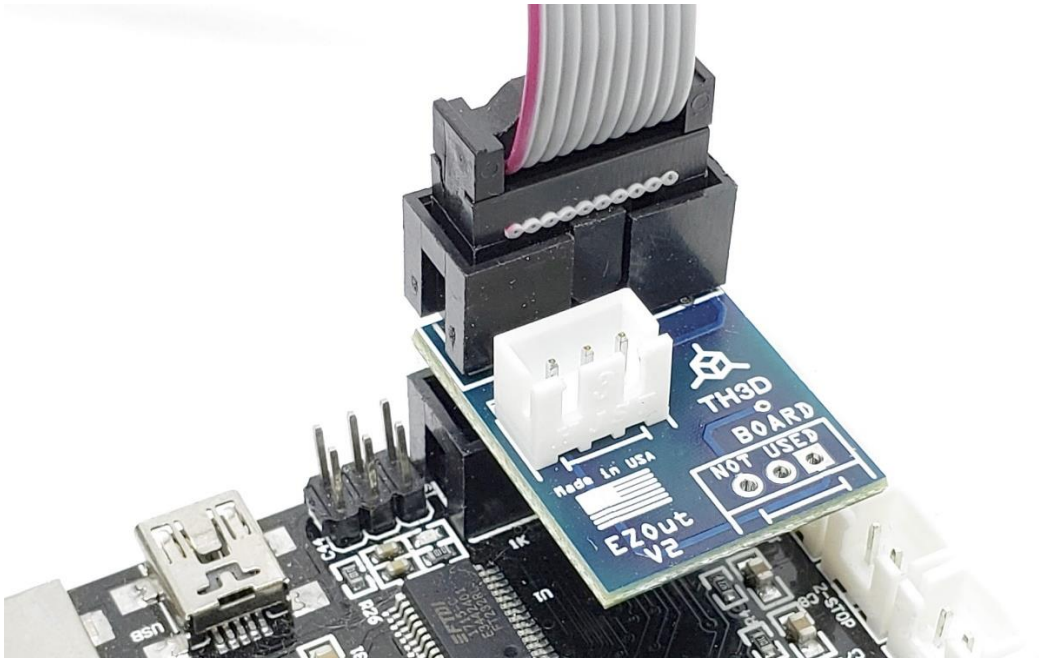
2. Insert the EZOut module as shown. Make sure the EZOut plug covers ALL the LCD header pins. If you do not it will not work.



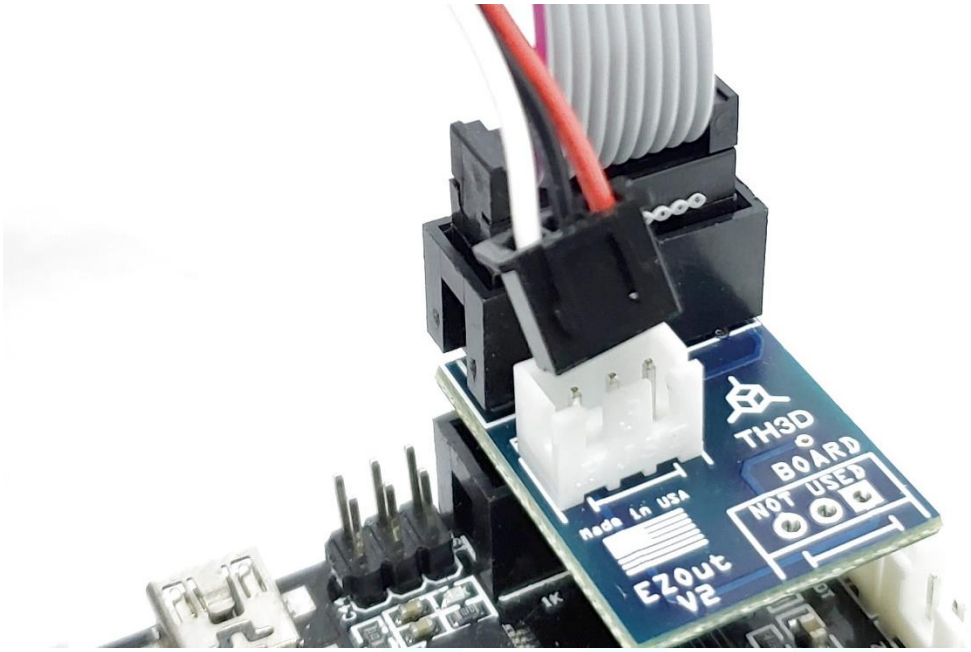


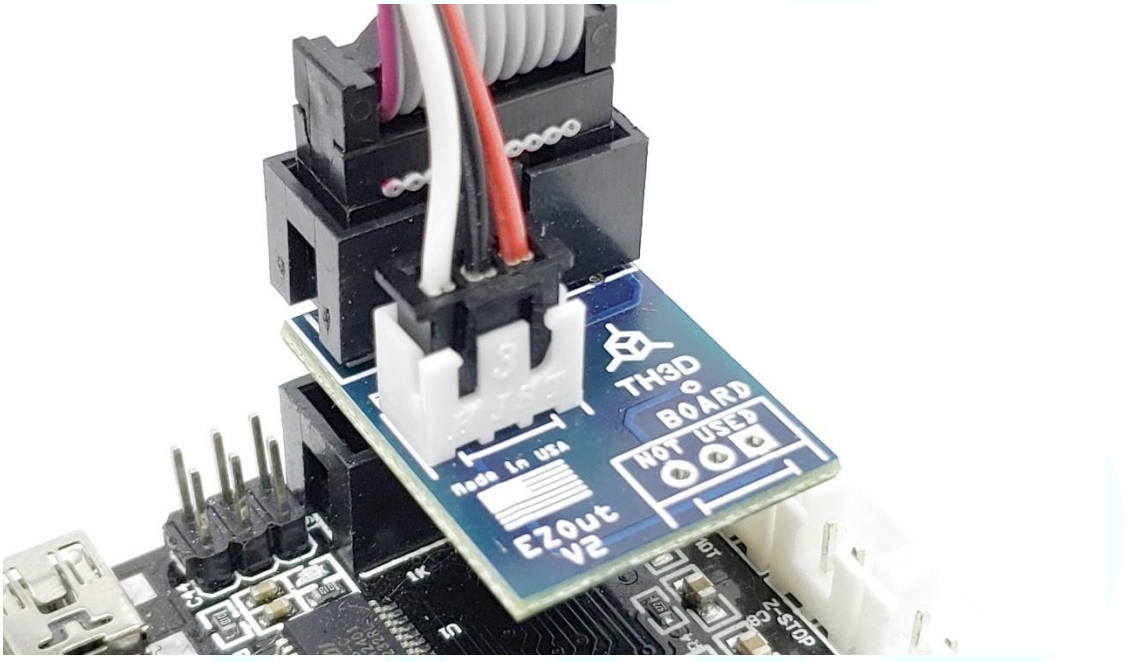
3. Connect your LCD Cable to the EZOut board. Pay attention to the tab on the LCD Cable. This tab should face the white filament sensor connector on the EZOut board. Make sure you line up the pins on the plug with the pins on the EZOut board as well. See the pictures below.



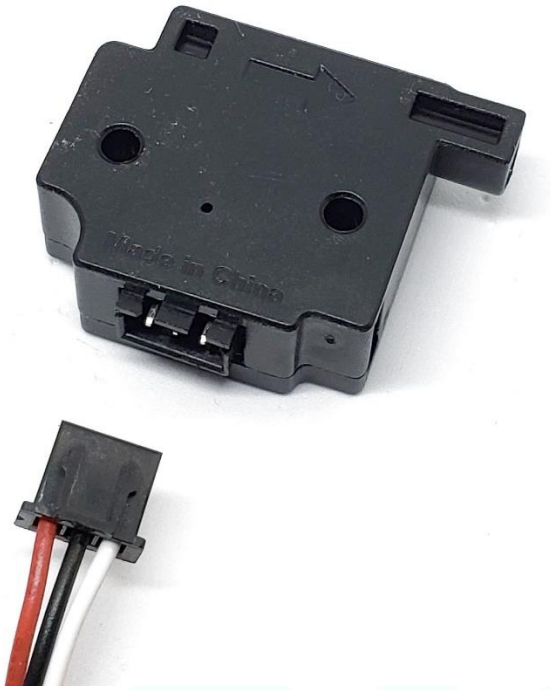


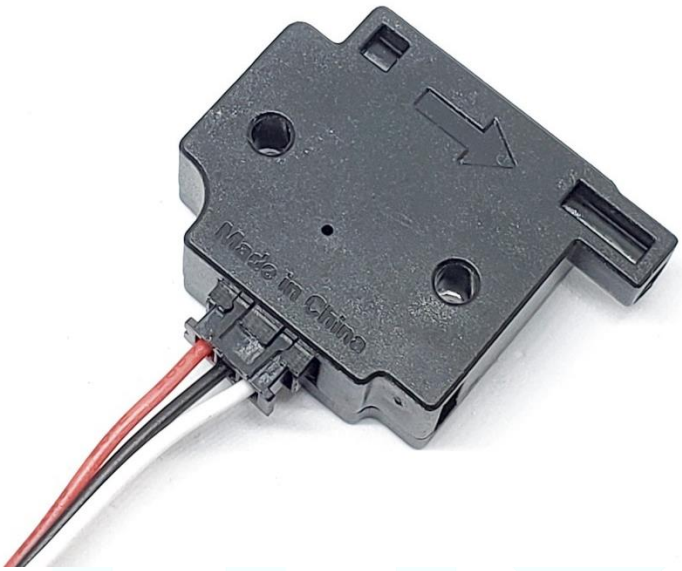
4. Connect the filament sensor cable to the EZOut Module. It will only insert one way.



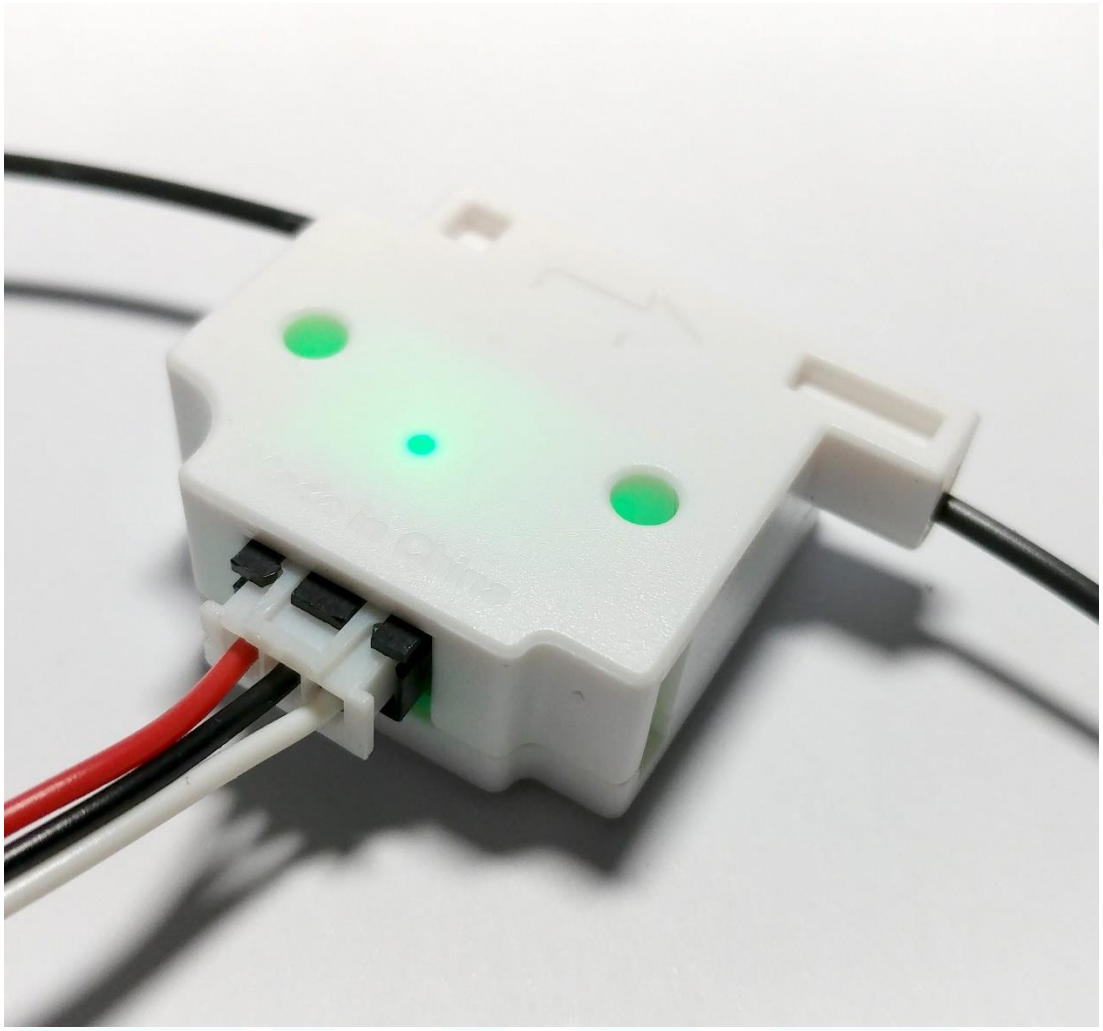


5. At this point you can route the other end of the cable out of your control box and connect the end that is outside the control box to the filament sensor.





6. You can now power up your printer. The LCD should come on and if you insert filament into the sensor the LED in the sensor will turn on.

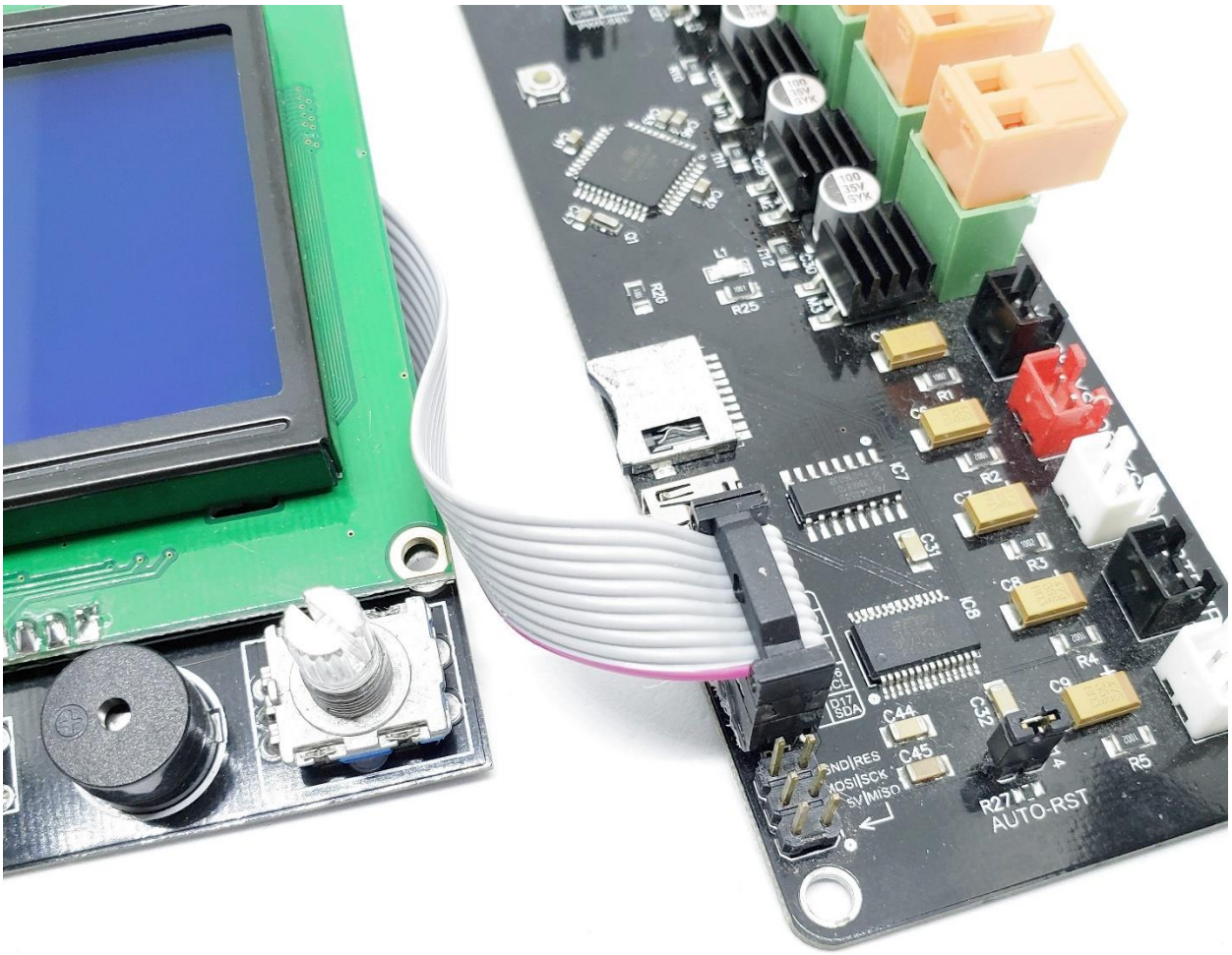


7. The last thing to do is update your slicer starting code by adding the M75 command to the starting script. All you need to add is M75 at the top of the starting script (our example has a note after it so we remember what it is for).

```
M75; Start Timer and Engage Filament Monitor
G1 X0 Y20 Z0.2 F3000 ; get ready to prime
G92 E0 ; reset extrusion distance
G1 F200 E25 ; extrude 3mm of filament
```

Wanhao i3 Installation

Open your control box and remove the power supply. You do not need to disconnect the wires from the power supply, just move it out of the way so you can see your board. In the guide we have the board outside of the control box so we can clearly show you where things plug in.

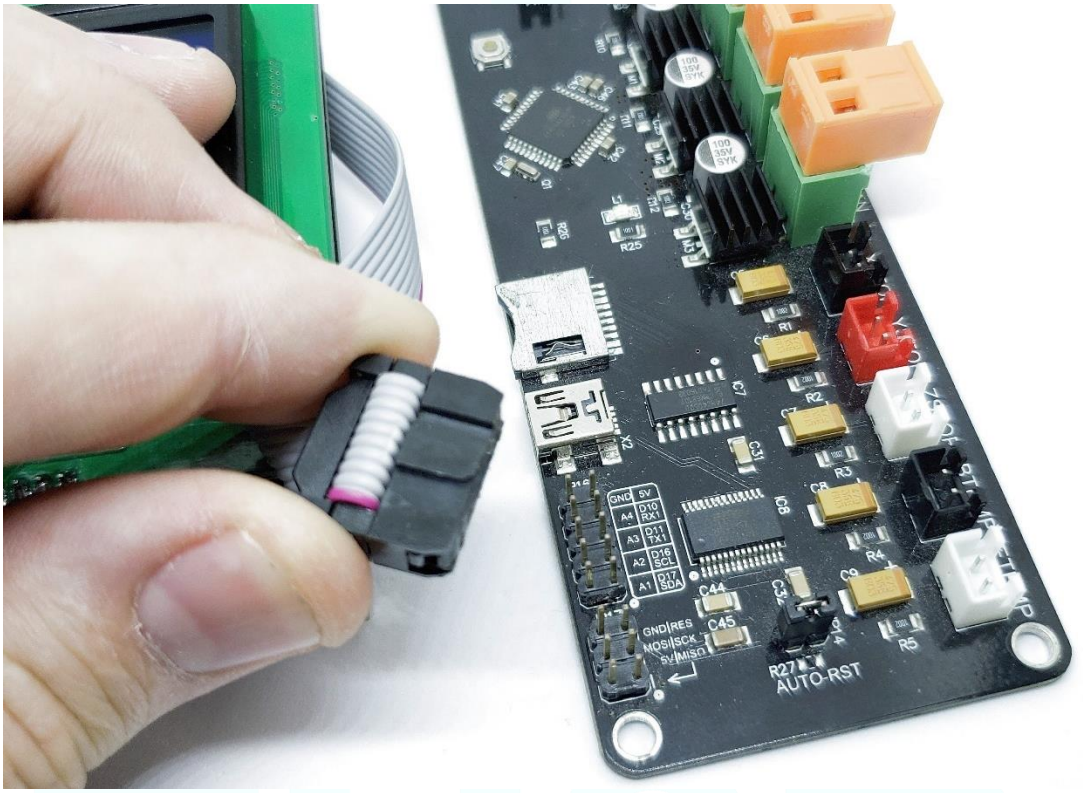


You will want to update your firmware before installing the kit. The firmware installs the same way as our others and you can find the complete flashing guide for the firmware and bootloader here: http://Firmware.TH3DStudio.com. Look for the “EZOUT” lines in the firmware and uncomment for your machine.

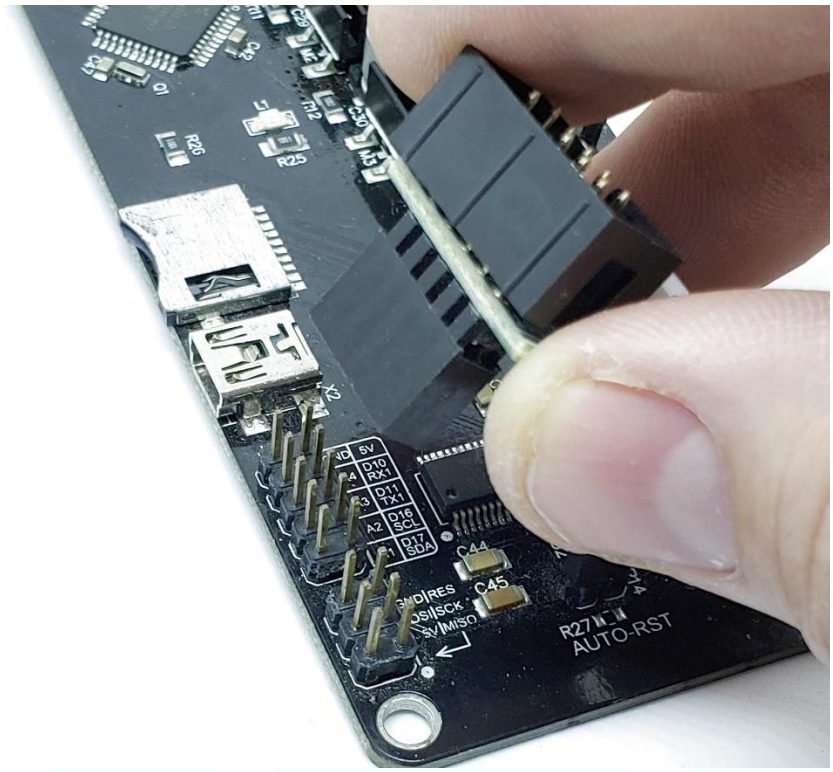
Make sure you download the EZOut (or EZABL if you are using this with an EZABL kit) firmware. You will use those files instead of the standard ones mentioned in the flashing guide.

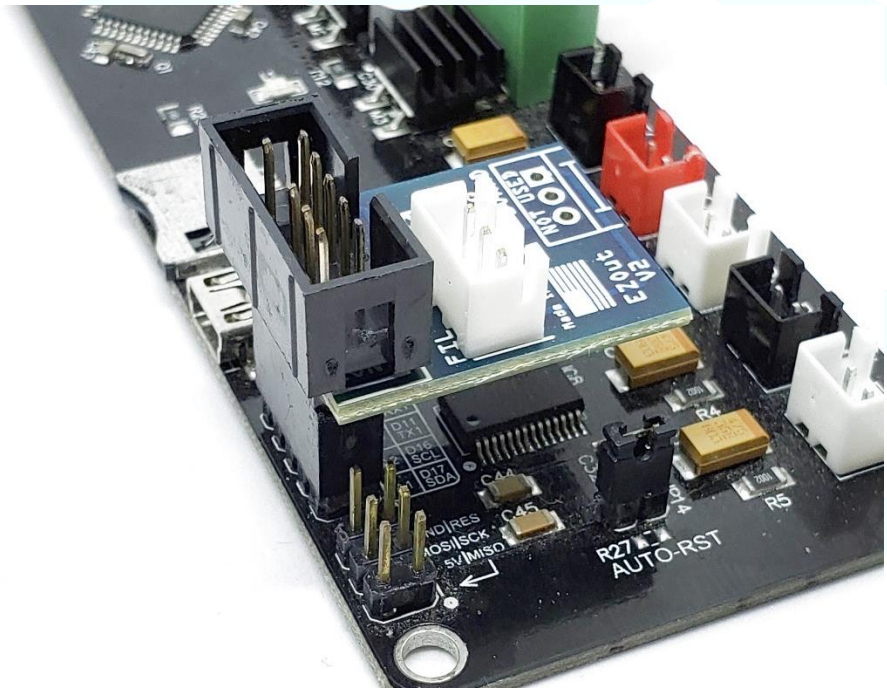
If you installed the firmware correctly the speaker will emit a continuous beep. You may now unplug the printer from USB and all power then proceed with the installation steps below.

1. Unplug your LCD Cable from the Wanhao i3 Board and note the tab on the one side of the LCD cable.

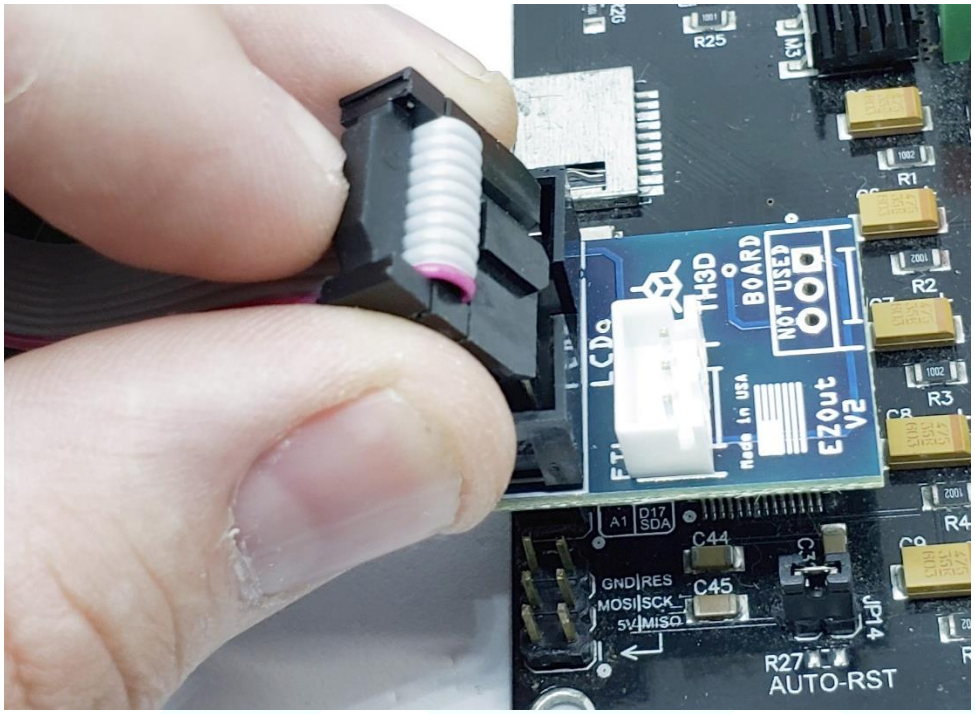


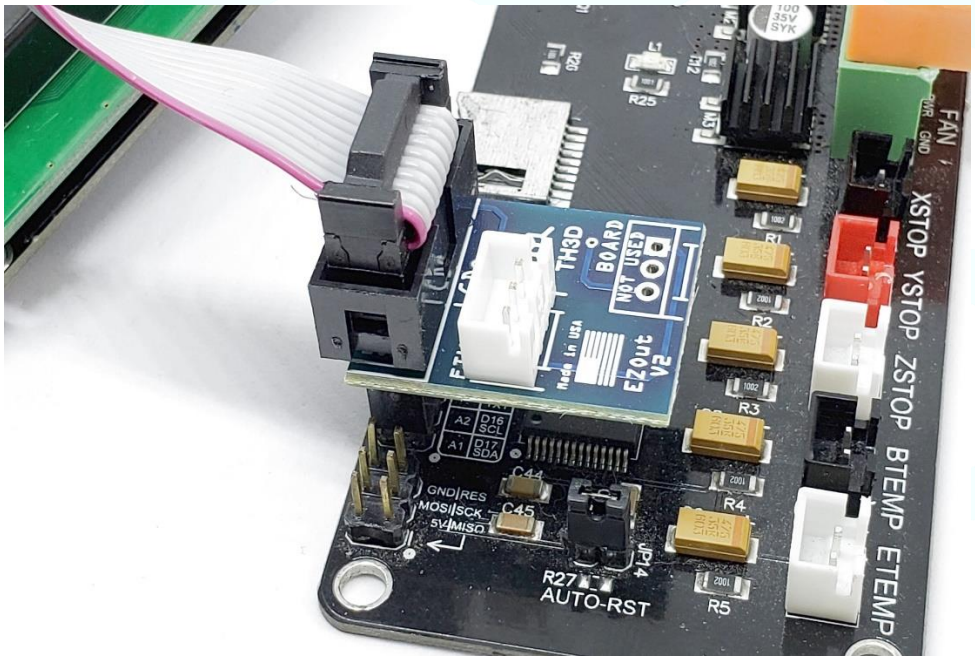
2. Insert the EZOut module as shown. Make sure the EZOut plug covers ALL the LCD header pins. If you do not it will not work.



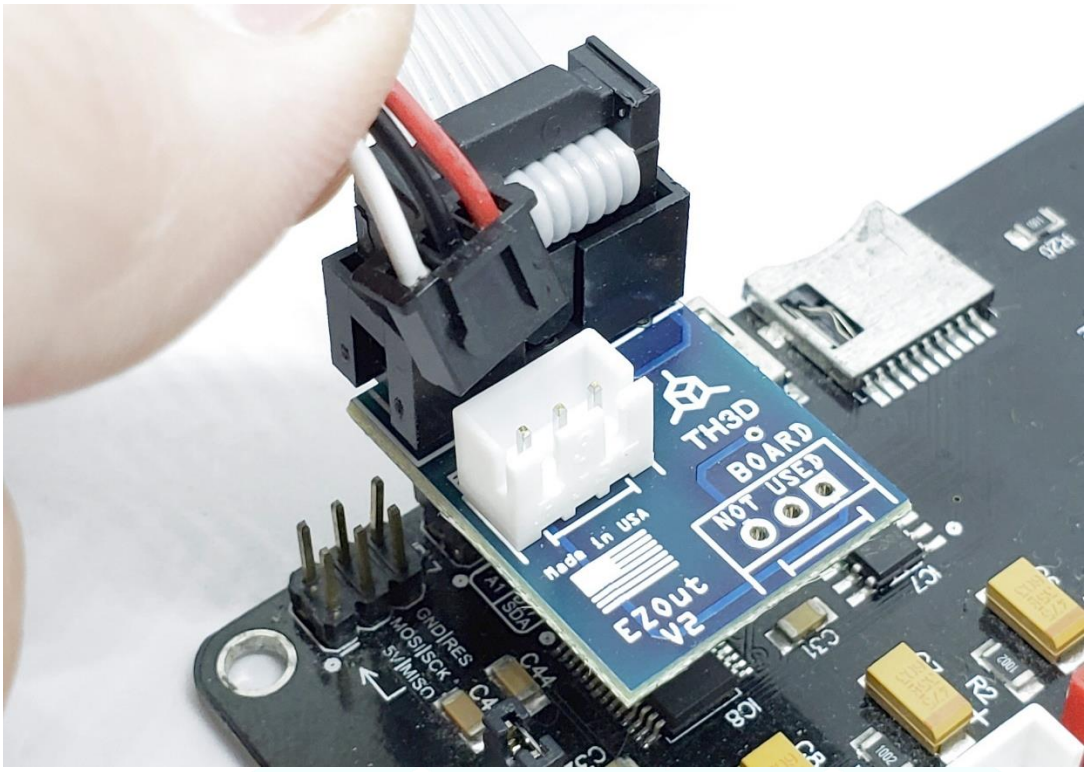


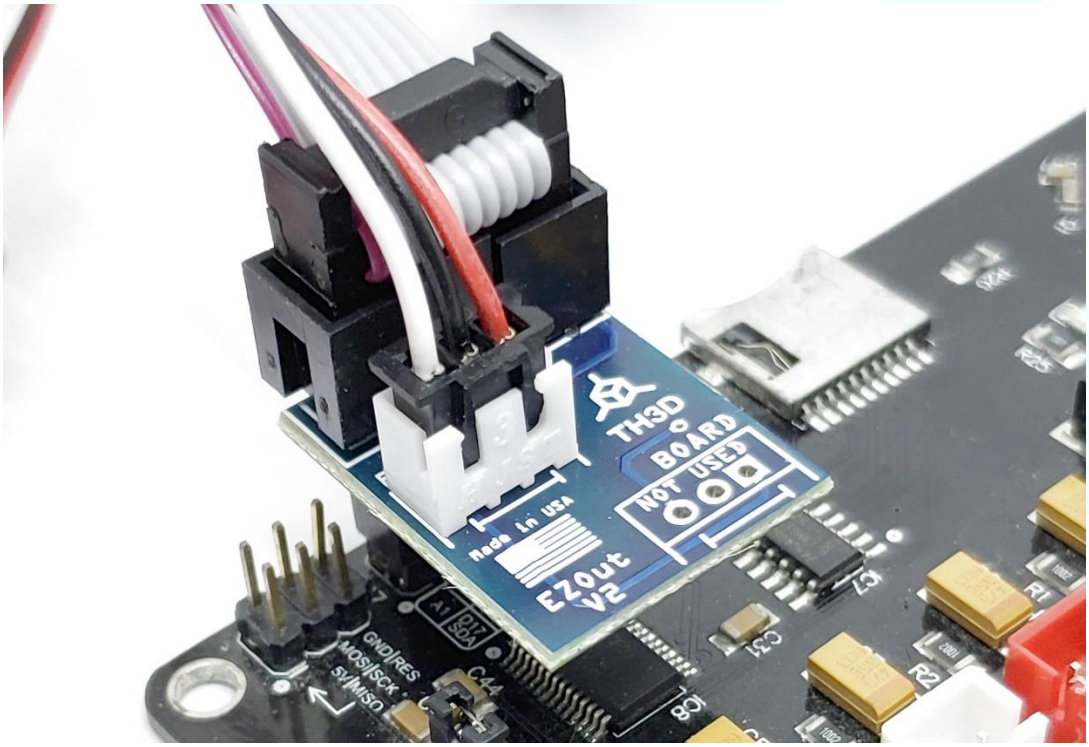
3. Connect your LCD Cable to the EZOut board. Pay attention to the tab on the LCD Cable. This tab should face the white filament sensor connector on the EZOut board. Make sure you line up the pins on the plug with the pins on the EZOut board as well. See the pictures below.



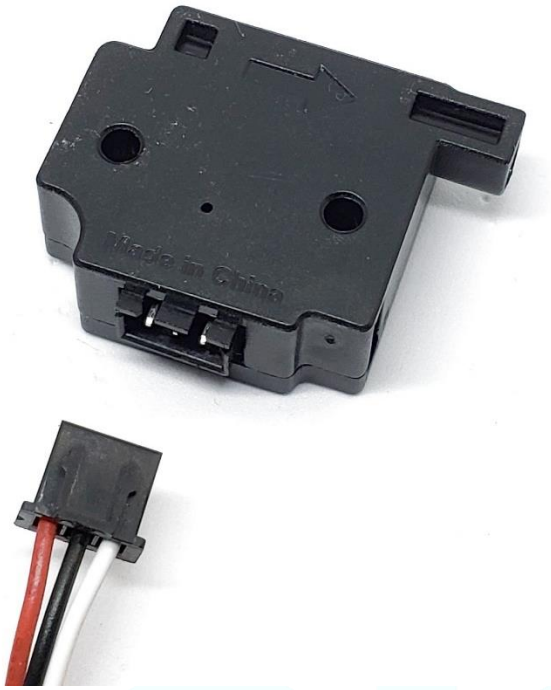


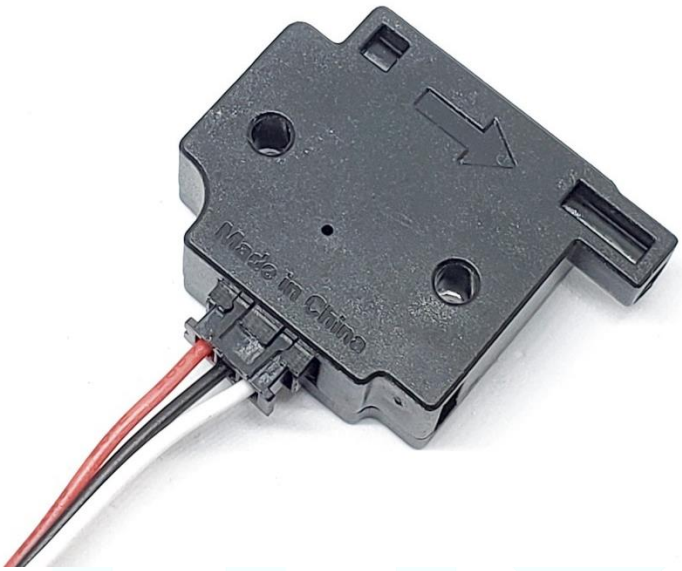
4. Connect the filament sensor cable to the EZOut Module. It will only insert one way.



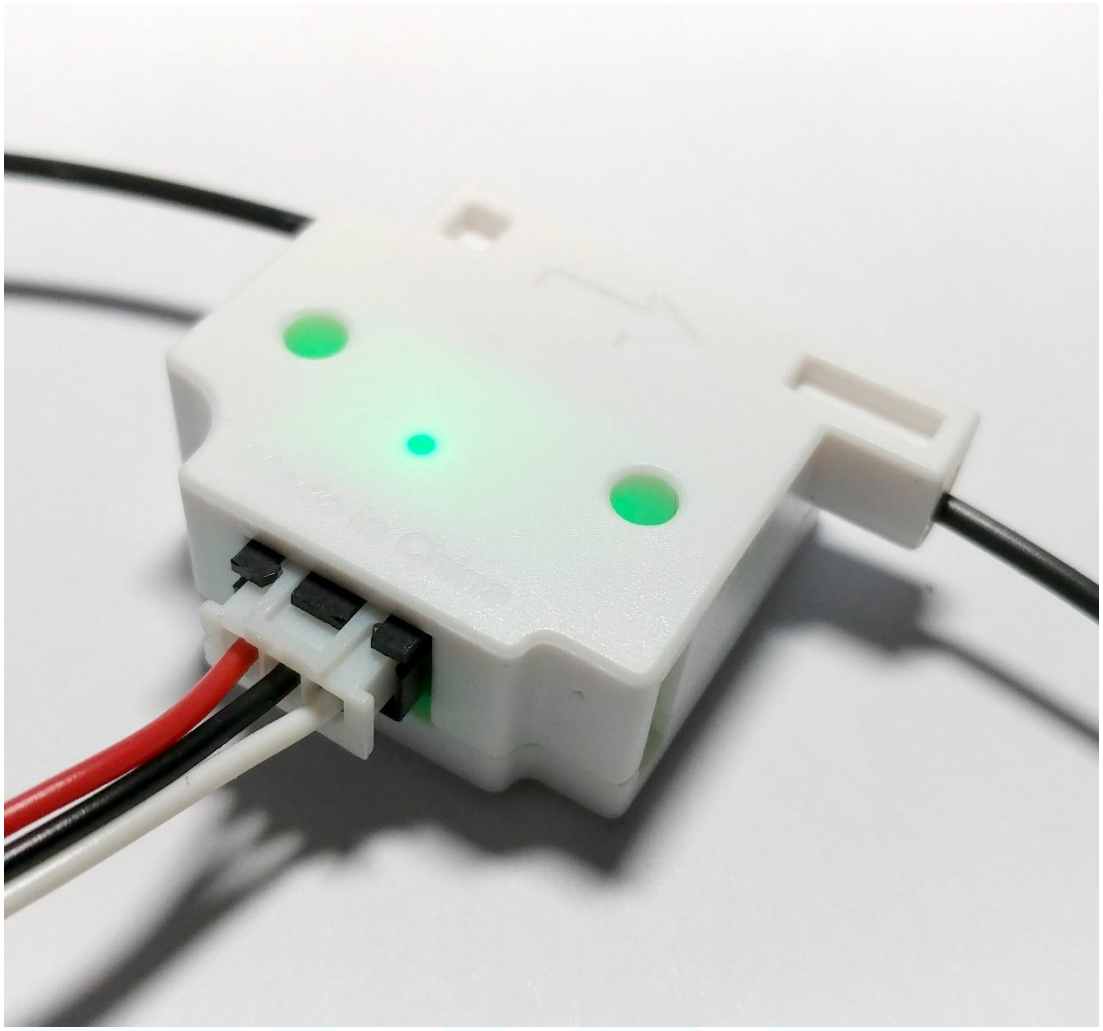


5. At this point you can route the other end of the cable out of your control box and connect the end that is outside the control box to the filament sensor.





6. You can now power up your printer. The LCD should come on and if you insert filament into the sensor the LED in the sensor will turn on.

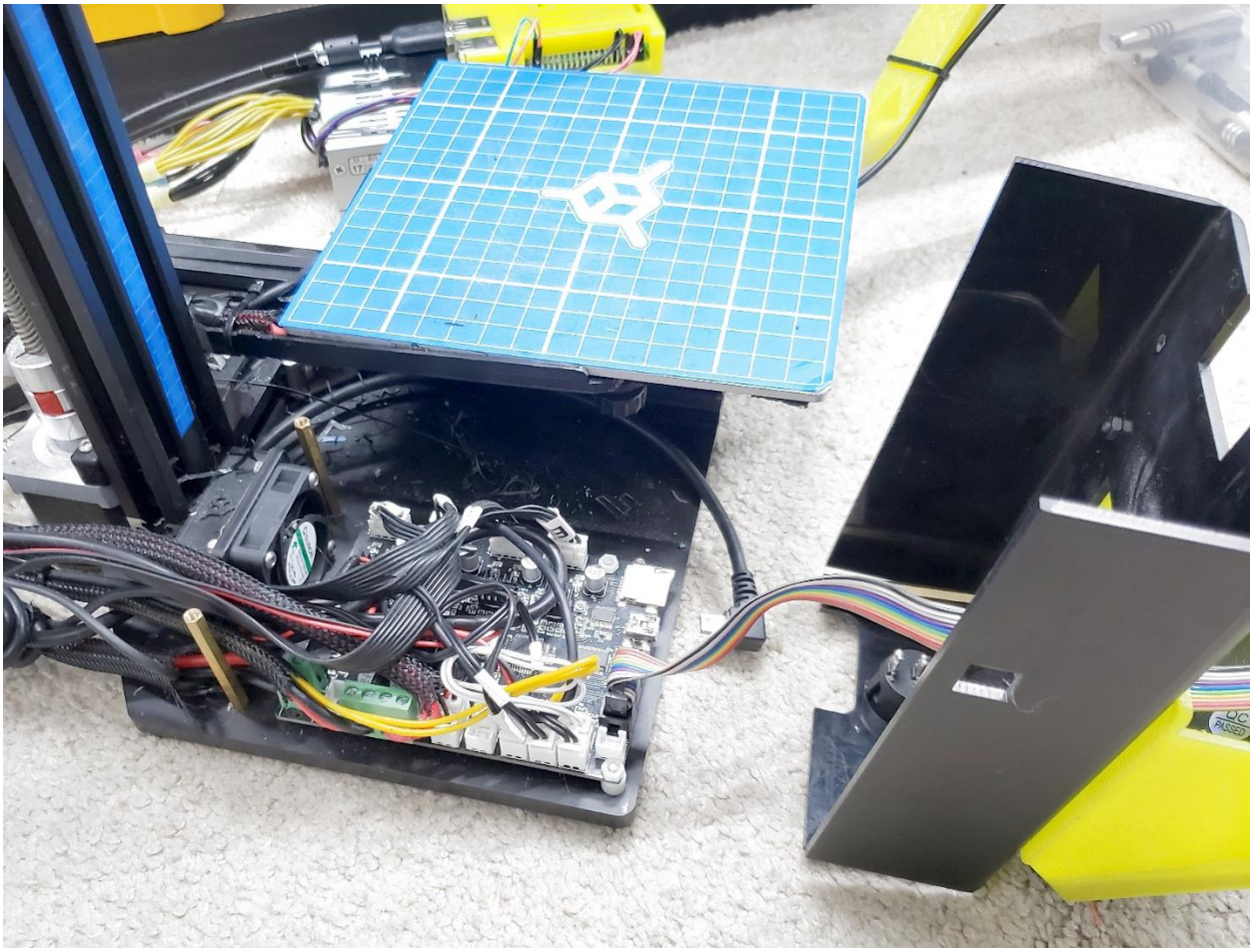


7. The last thing to do is update your slicer starting code by adding the M75 command to the starting script. All you need to add is M75 at the top of the starting script (our example has a note after it so we remember what it is for).

```
M75; Start Timer and Engage Filament Monitor
G1 X0 Y20 Z0.2 F3000 ; get ready to prime
G92 E0 ; reset extrusion distance
G1 F200 E25 ; extrude 3mm of filament
```

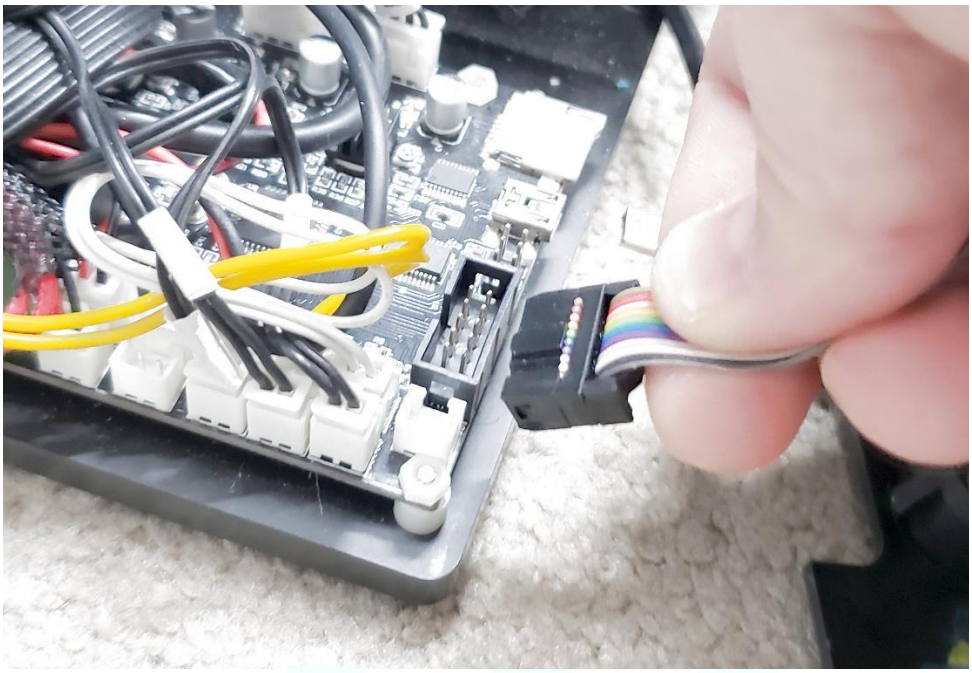
Ender 2 Installation

Open your control box (where the LCD is). You do not need to disconnect the wires, just move them out of the way so you can see your board.

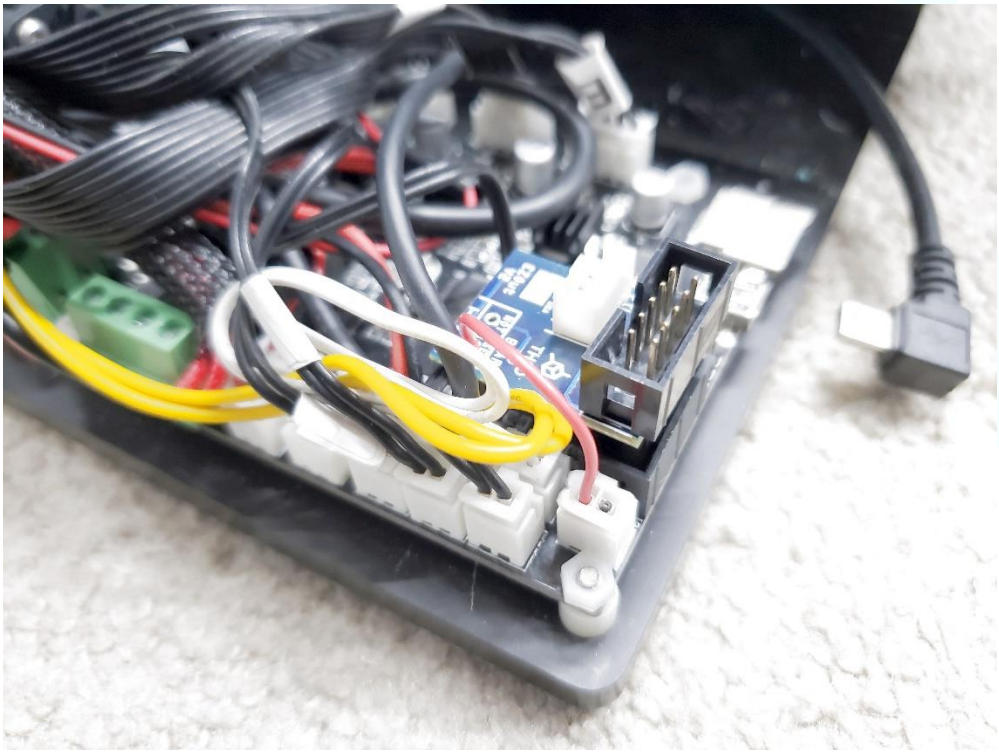


You will want to update your firmware before installing the kit. The firmware installs the same way as our others and you can find the complete flashing guide for the firmware and bootloader here: http://Firmware.TH3DStudio.com. Look for the “EZOUT” lines in the firmware and uncomment for your machine.

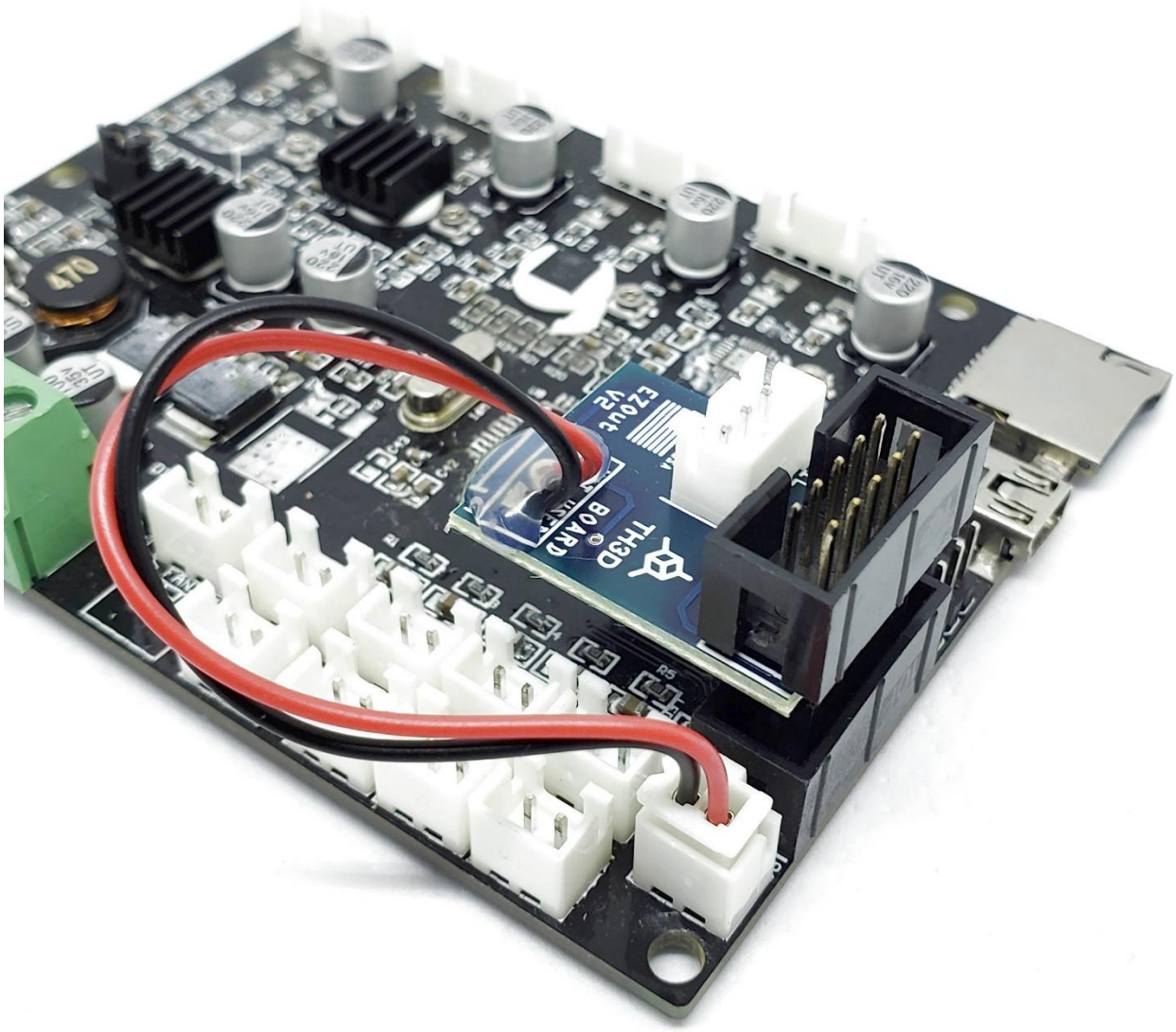
1. Unplug your LCD Cable from the Ender 2 Board and note the tab on the one side of the LCD cable.



2. Insert the EZOut module as shown. Make sure the EZOut plug covers ALL the LCD header pins. Connect the 2 pin red/black cable to the “CHECK” header next to the LCD Socket. If you do not it will not work.

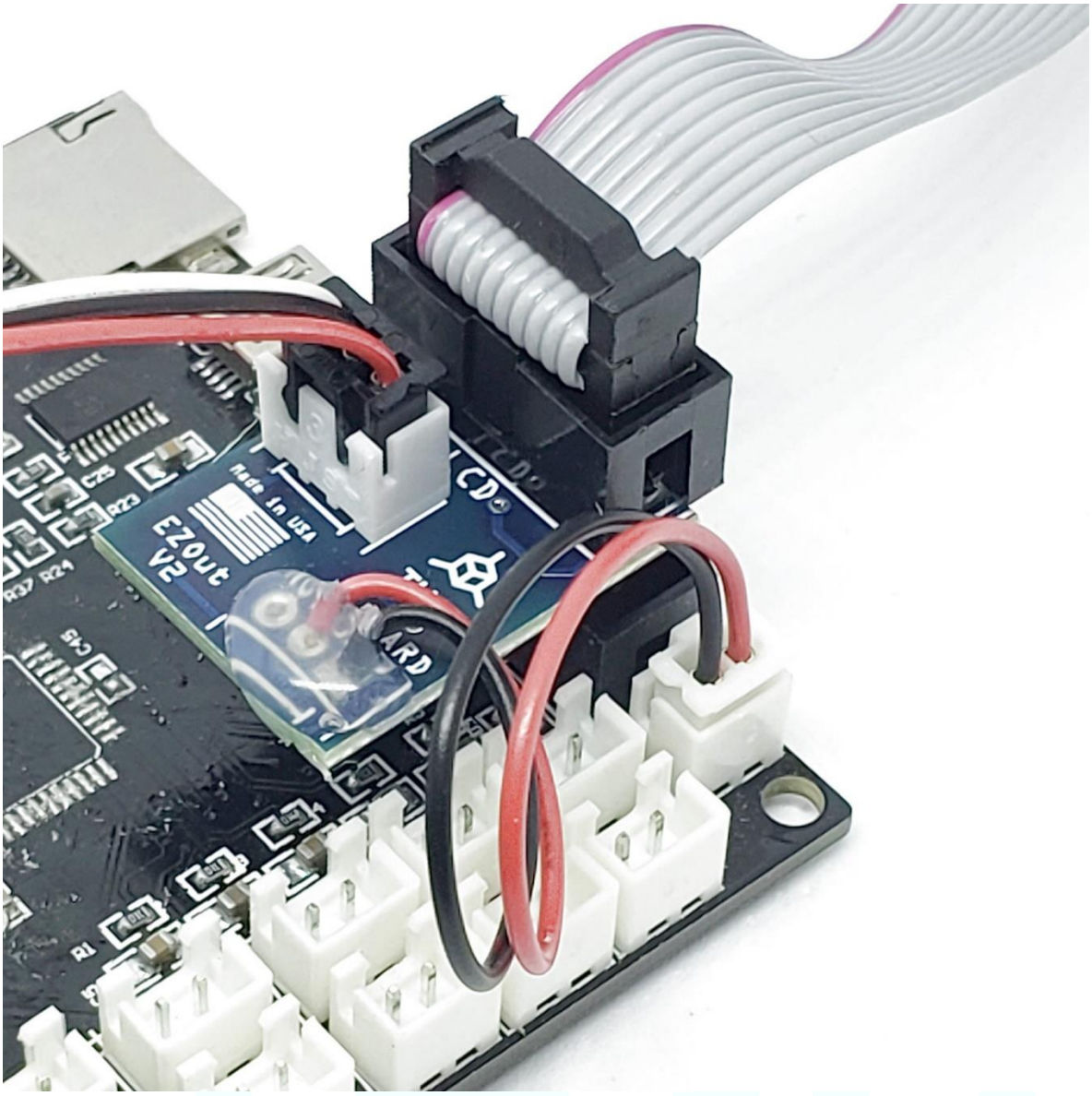


3. Connect your LCD Cable to the EZOut board. Pay attention to the tab on the LCD Cable. This tab should face the white filament sensor connector on the EZOut board. Make sure you line up the pins on the plug with the pins on the EZOut board as well. See the pictures below.

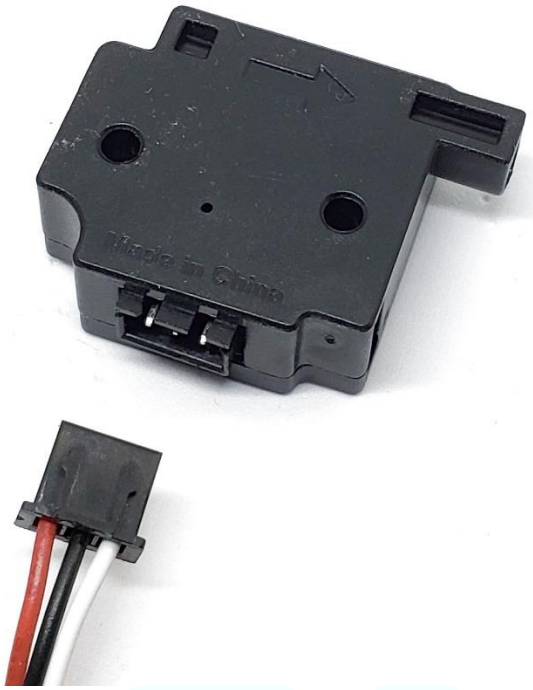


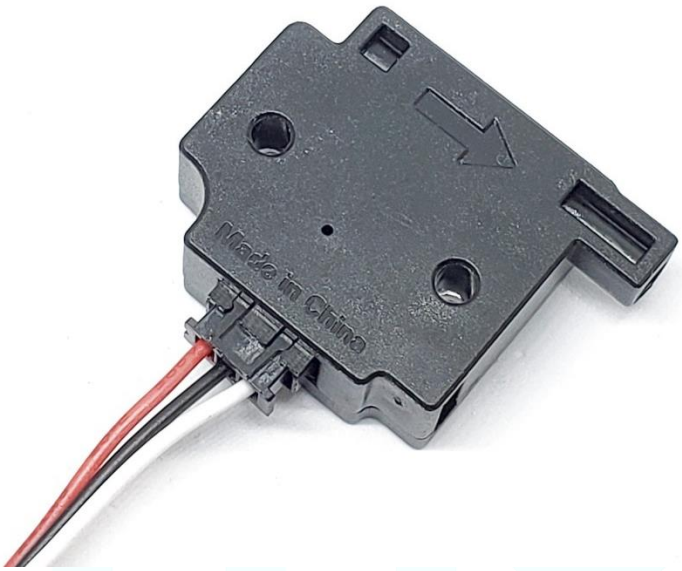
Notice the 2 Pin red/black cable connected to the white "CHECK" header to the right of the LCD connection. This must also be connected for the kit to work.

4. Connect the 3 pin filament sensor cable to the EZOut Module. It will only insert one way.

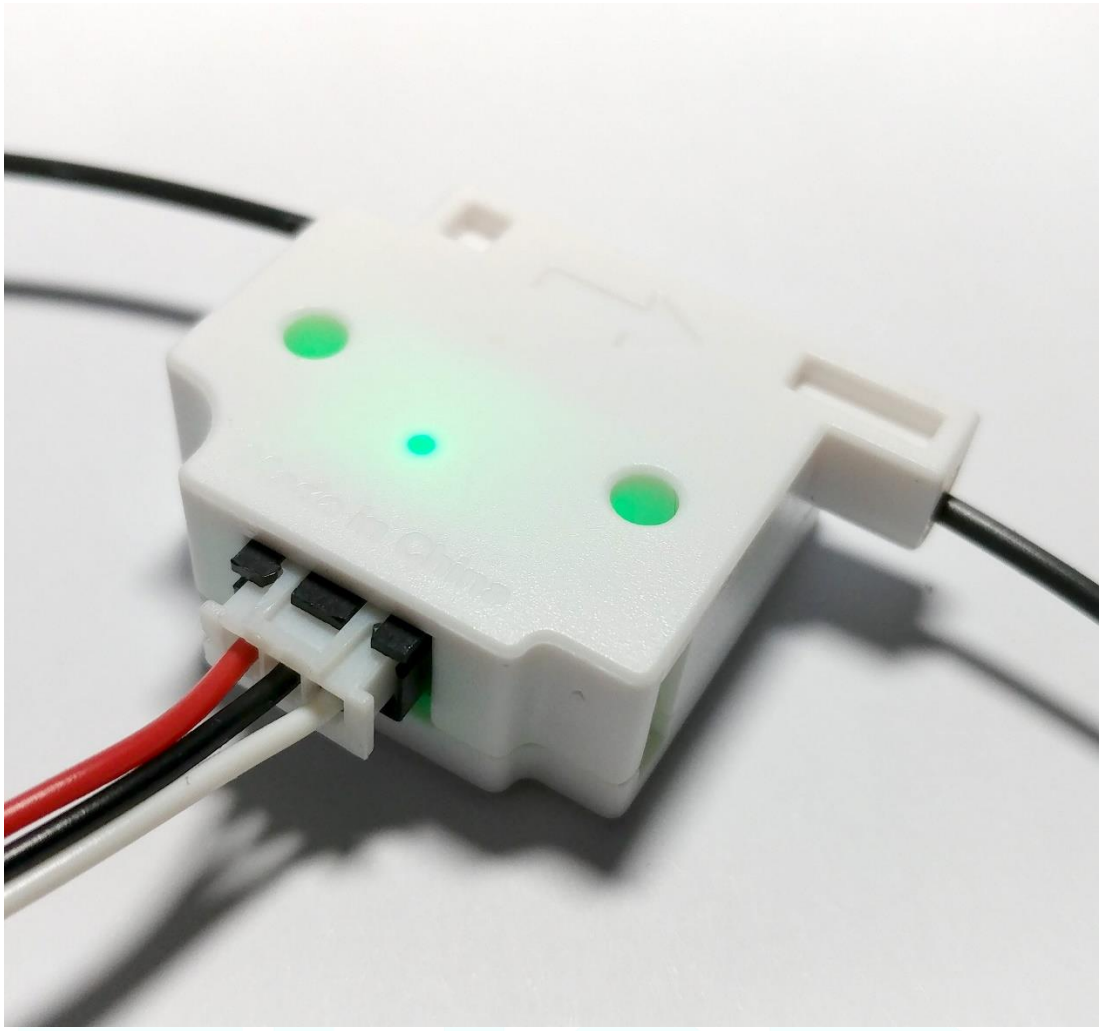


5. At this point you can route the other end of the cable out of your control box and connect the end that is outside the control box to the filament sensor.





6. You can now power up your printer. The LCD should come on and if you insert filament into the sensor the LED in the sensor will turn on.

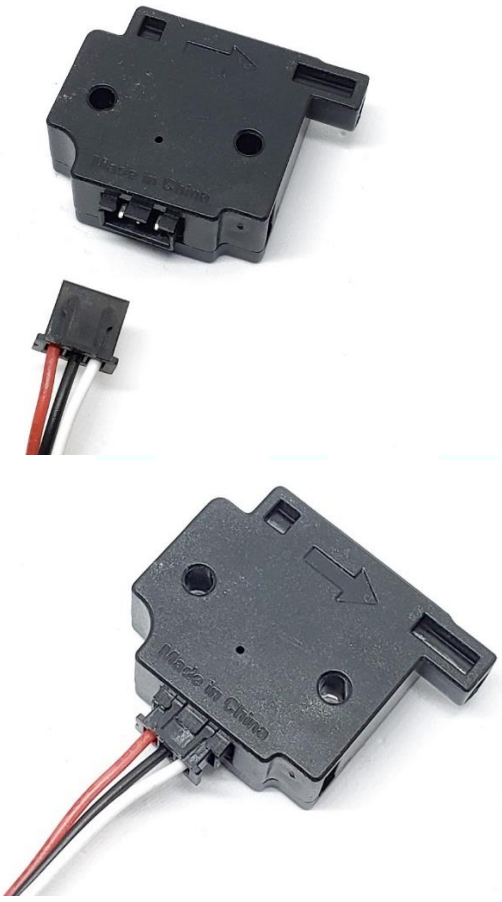


7. The last thing to do is update your slicer starting code by adding the M75 command to the starting script. All you need to add is M75 at the top of the starting script (our example has a note after it so we remember what it is for).

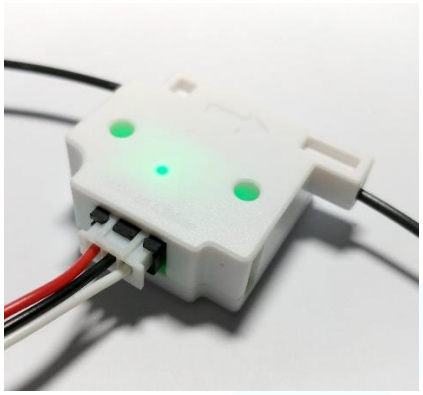
```
M75; Start Timer and Engage Filament Monitor
G1 X0 Y20 Z0.2 F3000 ; get ready to prime
G92 E0 ; reset extrusion distance
G1 F200 E25 ; extrude 3mm of filament
```

Wanhao D6

1. You will want to update your firmware before installing the kit. The firmware installs the same way as our others and you can find the complete flashing guide for the firmware here: http://Firmware.TH3DStudio.com. Look for the “EZOUT” lines in the firmware and uncomment for your machine.
2. Open the bottom of your Wanhao D6.
3. Connect the short cable from the J9/Analog Header on the D6 board to the “BOARD” header on our EZOut V2 board.
4. Connect the long filament sensor cable to the header labeled “FIL” on our EZOut V2 board.
5. Put the heatshrink over the EZOut V2 board and shrink with a heat gun or if you are careful a lighter.
6. Route the filament sensor cable out the rear of the printer and connect to the sensor.
7. At this point you can route the other end of the cable out of your control box and connect the end that is outside the control box to the filament sensor.



8. You can now power up your printer. The LCD should come on and if you insert filament into the sensor the LED in the sensor will turn on.

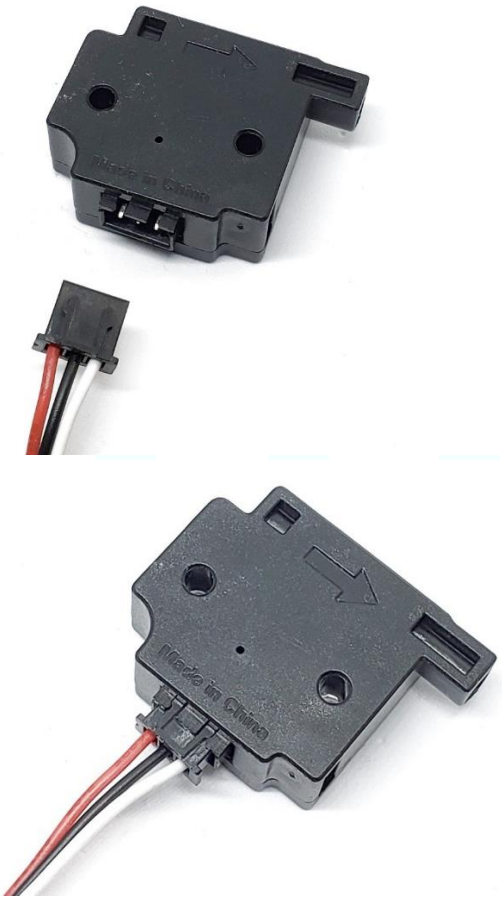


9. The last thing to do is update your slicer starting code by adding the M75 command to the starting script. All you need to add is M75 at the top of the starting script (our example has a note after it so we remember what it is for).

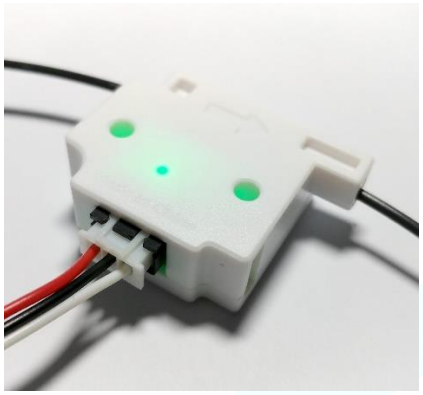
```
M75; Start Timer and Engage Filament Monitor
G1 X0 Y20 Z0.2 F3000 ; get ready to prime
G92 E0 ; reset extrusion distance
G1 F200 E25 ; extrude 3mm of filament
```

MKS/Tornado/CR-10S/CR-20/FT-5

1. You will want to update your firmware before installing the kit. The firmware installs the same way as our others and you can find the complete flashing guide for the firmware here: http://Firmware.TH3DStudio.com. Look for the “EZOUT” lines in the firmware and uncomment for your machine.
2. Open the machine to get to your board.
3. Connect the short cable from the X+ Endstop Header on the printer control board to the “BOARD” header on our EZOut V2 board.
4. Connect the long filament sensor cable to the header labeled “FIL” on our EZOut V2 board.
5. Put the heatshrink over the EZOut V2 board and shrink with a heat gun or if you are careful a lighter.
6. Route the filament sensor cable out the rear of the printer and connect to the sensor.
7. At this point you can route the other end of the cable out of your control box and connect the end that is outside the control box to the filament sensor.



8. You can now power up your printer. The LCD should come on and if you insert filament into the sensor the LED in the sensor will turn on.

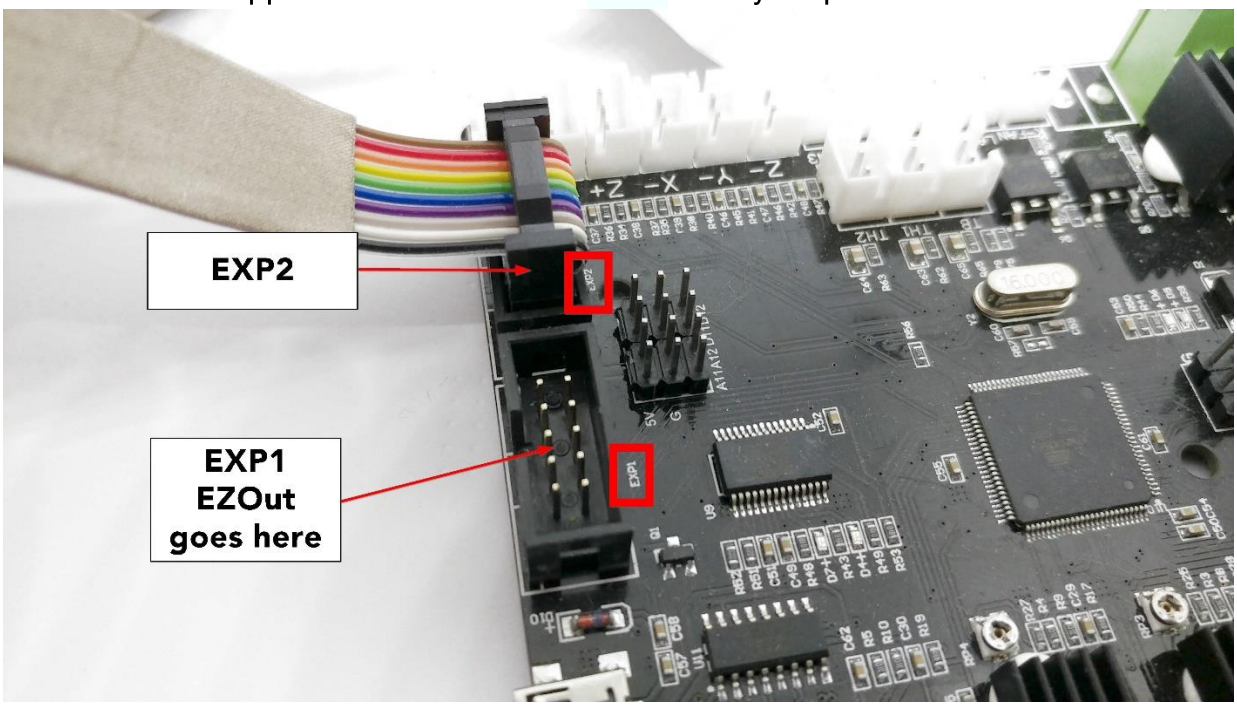


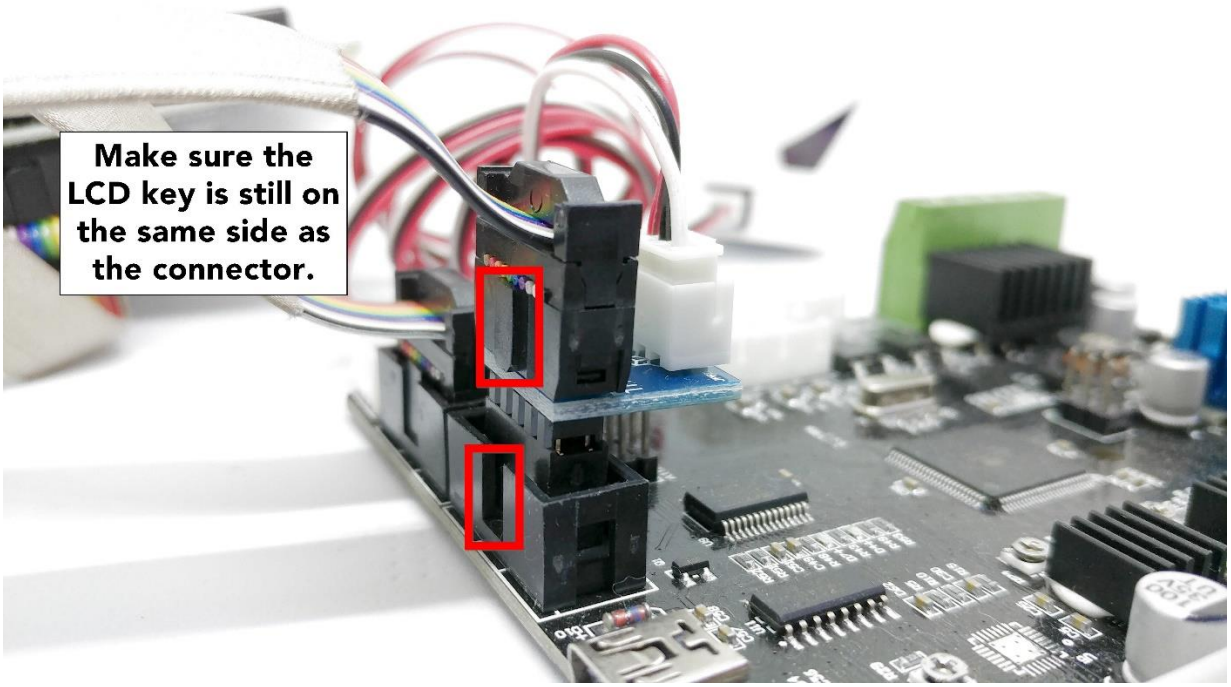
9. The last thing to do is update your slicer starting code by adding the M75 command to the starting script. All you need to add is M75 at the top of the starting script (our example has a note after it so we remember what it is for).

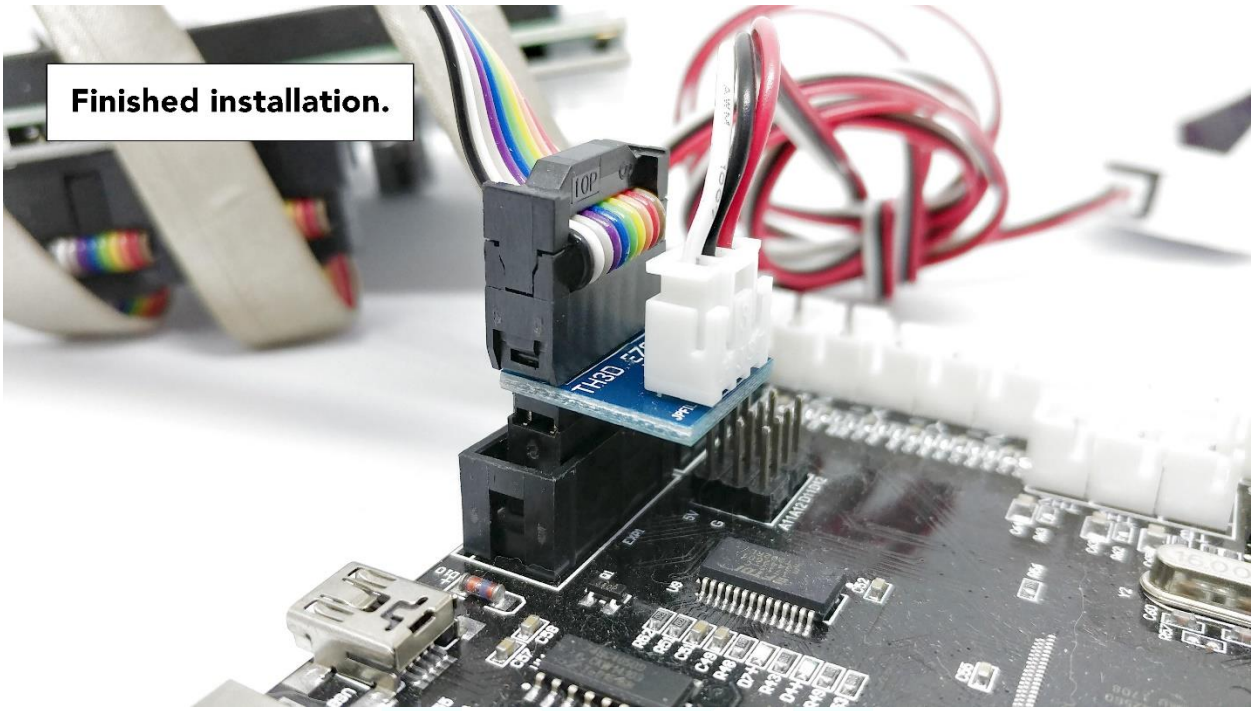
```
M75; Start Timer and Engage Filament Monitor
G1 X0 Y20 Z0.2 F3000 ; get ready to prime
G92 E0 ; reset extrusion distance
G1 F200 E25 ; extrude 3mm of filament
```

CR-10S Board EZOut V1 Install Notes

The EZOut V1 system works with the CR-10S board as well and is supported in our Unified Firmware. It installs the same way except the CR-10S board has 2 LCD connections. One is labeled EXP1 and one is labeled EXP2. The EZOut board connects to EXP1. See below pictures. The “keyed” portion of the LCD cable on the CR-10S LCD is opposite of the CR-10 so make sure your pictures match ours below.







This is the only difference between installing on a CR-10S over the CR-10. All other steps are the same.

On later EZout V1 (and V2) kit revisions we have a keyed connector now to protect the pins. You can force the LCD plug into the connector. Some users have just used a side cutter to remove the keyed part of the CR-10S LCD plug from the plug.

The EZOut kit is intended for the CR-10 board but after users requested support for the CR-10S board we tested it and found it is able to be supported aside from the keyed connector note above.

Using the Sensor

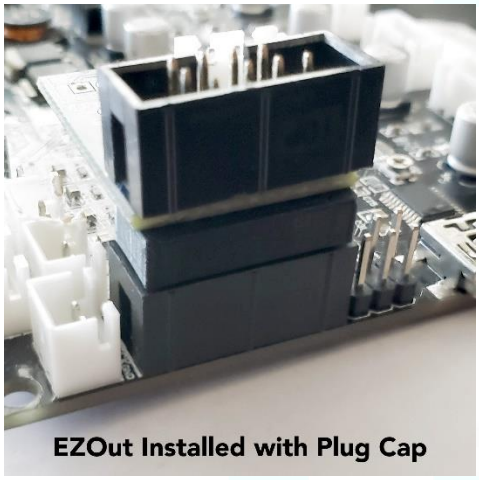
Now when you load filament you will pass it through the sensor before it goes into the printer extruder. You can leave the sensor sitting on the filament, make sure your sensor wire has enough slack on it for tall prints.

Make sure you insert the filament in the direction the arrow on the sensor is pointing. If you have a print where you do not want filament monitoring then just insert a piece of filament in the sensor and set it to the side.

If you try to print without the sensor connected or without filament in it the printer will NOT start the print. Filament MUST be present at all times when this kit is installed otherwise the printer will pause the print.

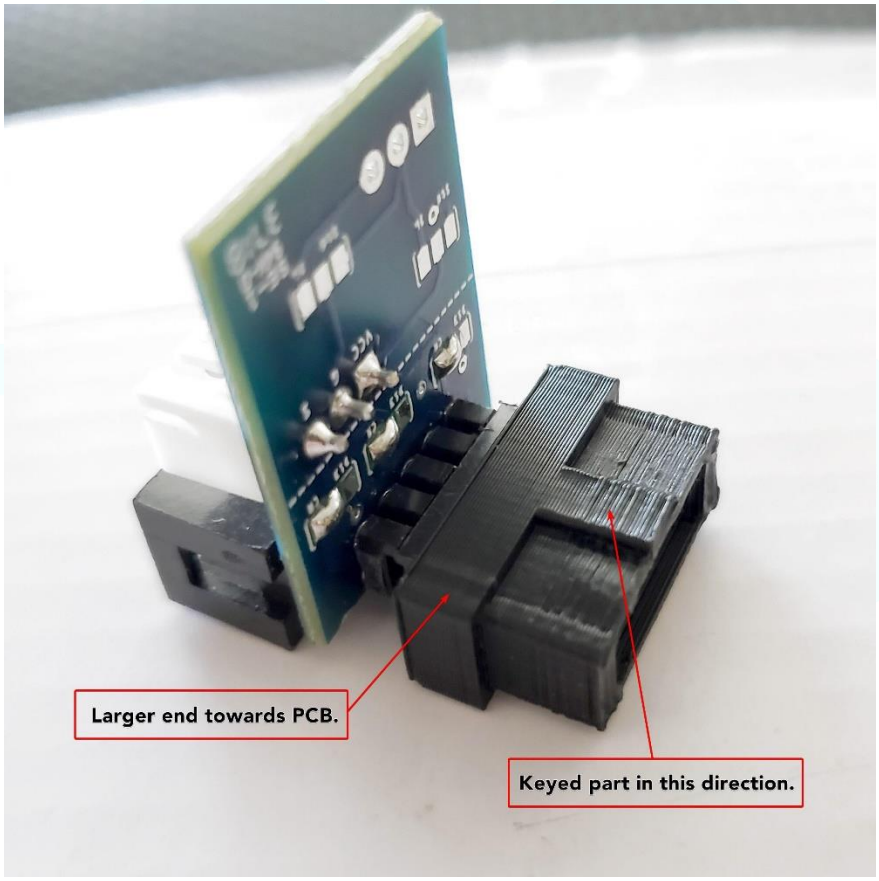
EZOut Plug Cap Guide

If you are having a hard time aligning the plug into your LCD connection there is a small printable file on the product page and in the installation guide folder in the latest Unified Firmware that is a quick print. This slips over the plug to prevent mis-aligning the plug in the LCD connector. See below. EZOut V2 kits shipped after 12/1/2018 will have these included in the package for the CR-10/Ender 3 & Ender 2 Versions.



EZOut Installed with Plug Cap

EZOut Plug Cap



Legal

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

By purchasing and installing this kit 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 install this or any modification.

You are assuming all risk associated with this modification.

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

Timothy Hoogland/TH3D Studio 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 this kit.

Warranty

This kit comes with a full 90 day warranty against any failed component of the kit.

If you have a problem with the unit you can contact us at Support@TH3DStudio.com and I will setup an RMA. ALL SALES ARE FINAL.

****International customers – Depending on the shipping cost you may be required to pay all or some of the shipping for RMA issues*****

Change Log

- V1.0 – First Version
- V1.0.1 – Added note about beeper and firmware after firmware installation
- V1.1 – Added CR-10S Update with pictures
- V1.2 - Added CR-10S Notes and note about new keyed connector
- V2 – Added Wanhao i3 Guide Updated CR-10/Ender3 to new EZOut V2
- V2.1 – Added Ender 2, D6, and Standard Kit installation info
- V2.2 – Added notes about EZOut Cap STL
- V2.3 – Added Ender 3 Pro and Ender 5 to titles