SIMPLEST Bltouch/3Dtouch guide for Creality CR-10/CR-10s/Ender 2/Ender 3 printers V2 created by Danny Walmsley.

The aim of this guide is to bring auto bed leveling to the masses by making it simple and affordable for everyone. You can navigate the guide by using the hyperlinks in the Contents, Hope this helps ☺

Contents

Before you start

Make sure you have already loaded a Bootloader to the mainboard if you are using the CR-10, Ender 2 or Ender 3, if you haven't already; find out how to do this **HERE**. This is not necessary on the CR-10s.

This guide was made for this particular version of the TH3D firmware which you can download **HERE**. **If you follow the commands rather than line numbers, this guide should work for any firmware.**

Mounts used for y and x offsets -

https://www.thingiverse.com/thing:2763931 - *Fang*

https://www.thingiverse.com/thing:2493610 - *Stock*

Wanting to install the Bltouch/3Dtouch to your CR-10 or Ender 3? This guide uses a Pin 27 adaptor you can get one here –

UK/Europe – **https://www.ebay.co.uk/itm/CR-10-Pin-27-Board-for-BL-Touch-Autobed-Levelling-or-filament-sensor/173295377307?ssPageName=STRK%3AMEBIDX%3AIT&_trksid=p2057872.m2749.l2649**

USA – **https://www.th3dstudio.com/product/ezout-cr-10-filament-sensor-kit/**

AUS - **https://www.ebay.com.au/itm/113099279570?ViewItem=&item=113099279570**
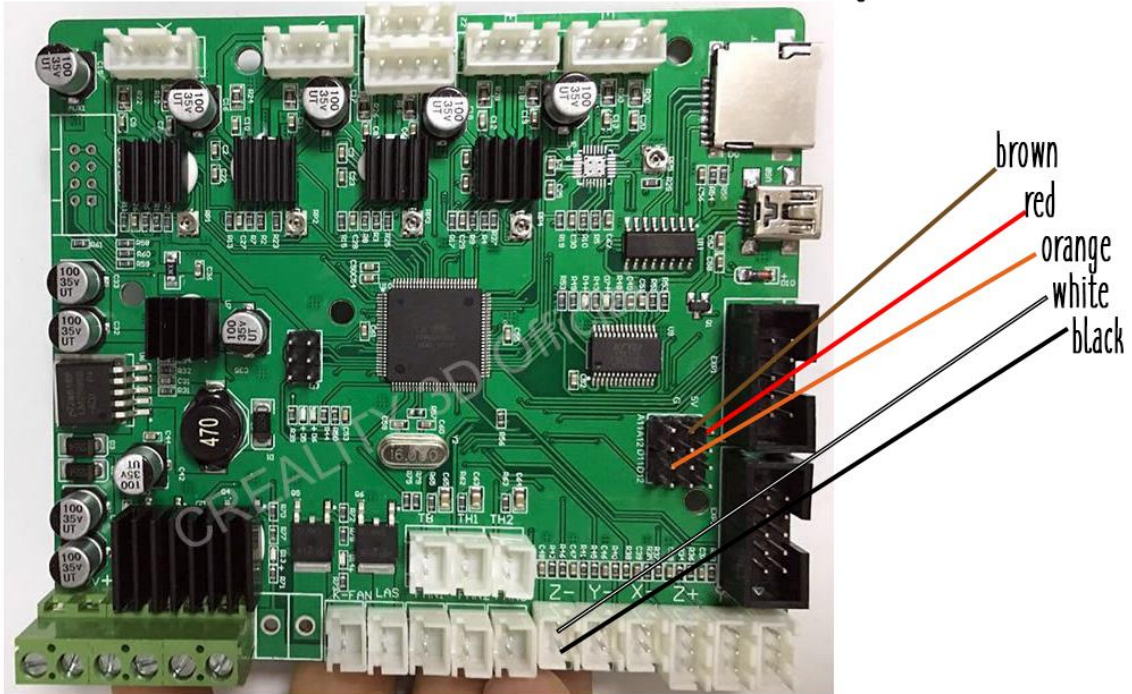
A comment looks like this when editing the firmware '//', uncomment means to remove the // in front of a command. A commented command will not run where as an uncommented command will. For example if //#define CR-10 uncommented would be #define CR-10.
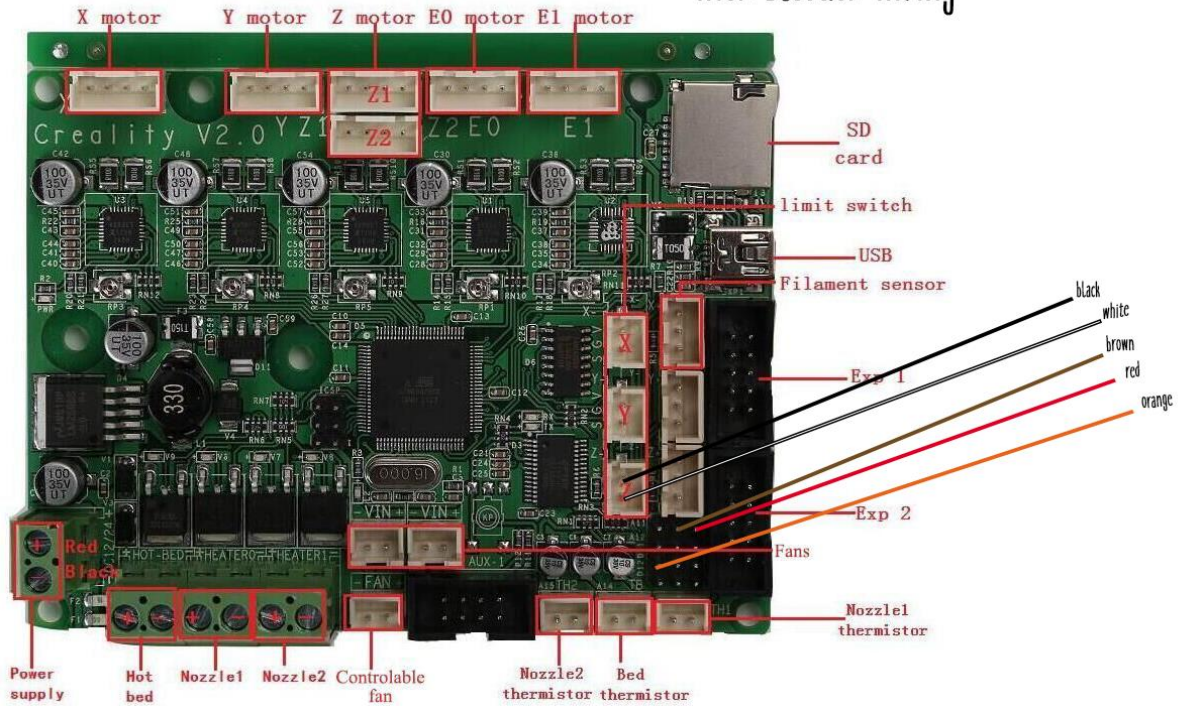
Printers

CR-10s /S4/S5/Mini

CR-10S V1.0 WIRING with bltouch wiring

- brown
- red
- orange
- white
- black

CR-10S Creality V2.0 wiring with bltouch wiring

X motor Y motor Z motor E0 motor E1 motor

SD card

limit switch

USB

Filament sensor

black
white
brown
red
orange

Exp 1

Exp 2

Fans

Nozzle1 thermistor

Red
Black

Power supply

Hot bed

Nozzle1

Nozzle2

Controlable fan

Nozzle2 thermistor

Bed thermistor

V2.0 & V2.1 board use the same pin-out for the BLtouch, if you have the V2.1 board follow the wiring guide for V2.0.

If you connect your bltouch and when auto homing the sensor doesn't register & the z axis keeps dropping pressing into your bed, turn your printer off, disconnect the power and invert the black and white connectors in the z limit switch header (put black where white was, put white where black was).

Extract the firmware you have downloaded and open the .bat file named '**OpenFirmwareWindows**'.
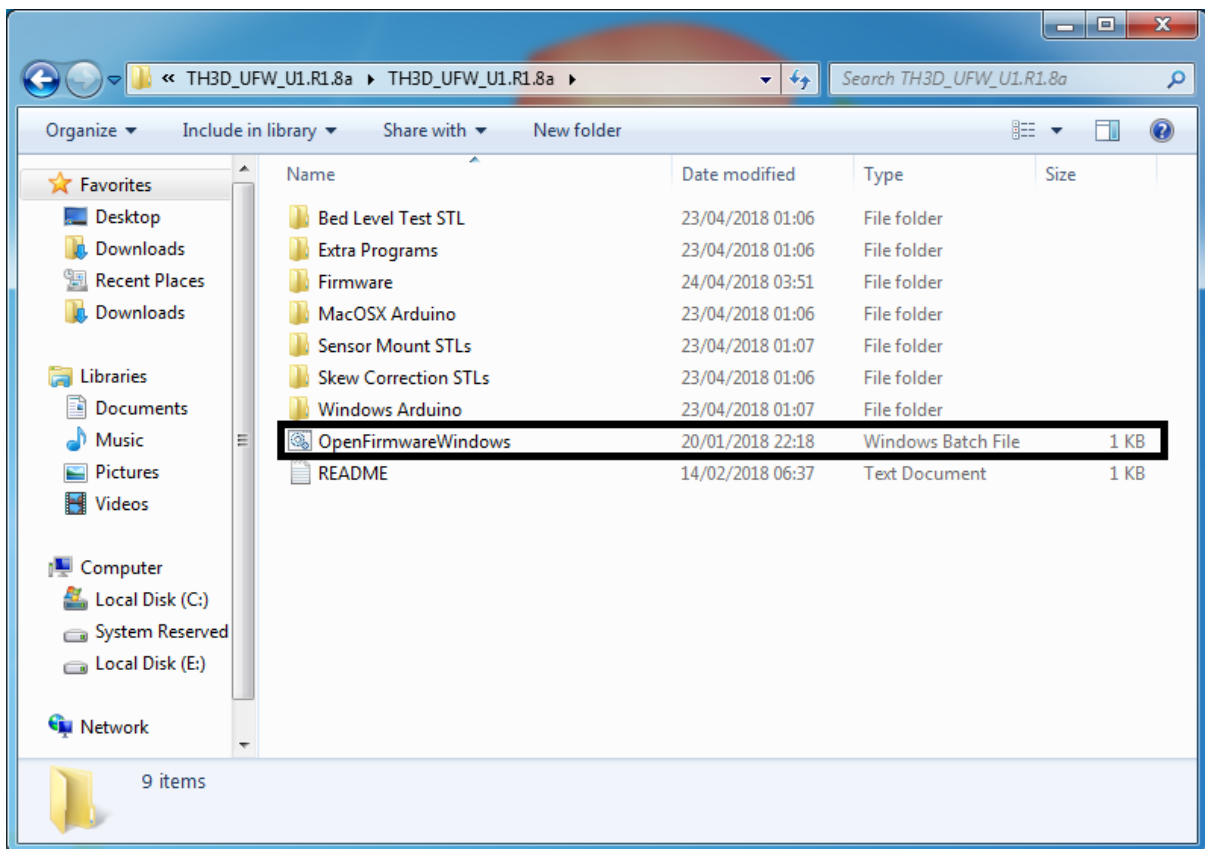
In **Configuration.h** tab:

- Go to lines **72-75** and un-comment which suits your configuration.

```
72 //#define CR10S
73 //#define CR10S_MINI
74 //#define CR10S_S4
75 //#define CR10S_S5
```

Before uncommenting	After uncommenting
//#define CR10S	#define CR10S

- Make sure line **96** remains commented out.

```
96 //#define EZABL_ENABLE
```

- Click line **97** and hit enter twice, now paste this into line 98, you can see an example of how this should look below:

  #define AUTO_BED_LEVELING_BILINEAR
  #define BLTOUCH
  #define SERVO0_PIN 11
  #define Z_SAFE_HOMING

```
 94 // EZABL Settings - Uncomment #define EZABL_ENABLE and uncomment your mount
 95 // type you are using to enable EZABL Bed Leveling features
 96 //#define EZABL_ENABLE
 97
 98 #define AUTO_BED_LEVELING_BILINEAR
 99 #define BLTOUCH
100 #define SERVO0_PIN 11
101 #define Z_SAFE_HOMING
102
103 // Probe Mounts
```

- Uncomment line **110**.

```
110 //#define CUSTOM_PROBE
```

Before uncommenting	After uncommenting
//#define CUSTOM_PROBE	#define CUSTOM_PROBE

- Go to line **379** and set **X** offset to mount offset (recommended mounts use **-40** for the **X** offset.)

```
379    #define X_PROBE_OFFSET_FROM_EXTRUDER -40
```

- Go to line **380** and set Y offset to mount offset (Recommended mounts use **-10** for the **Y** offset.)
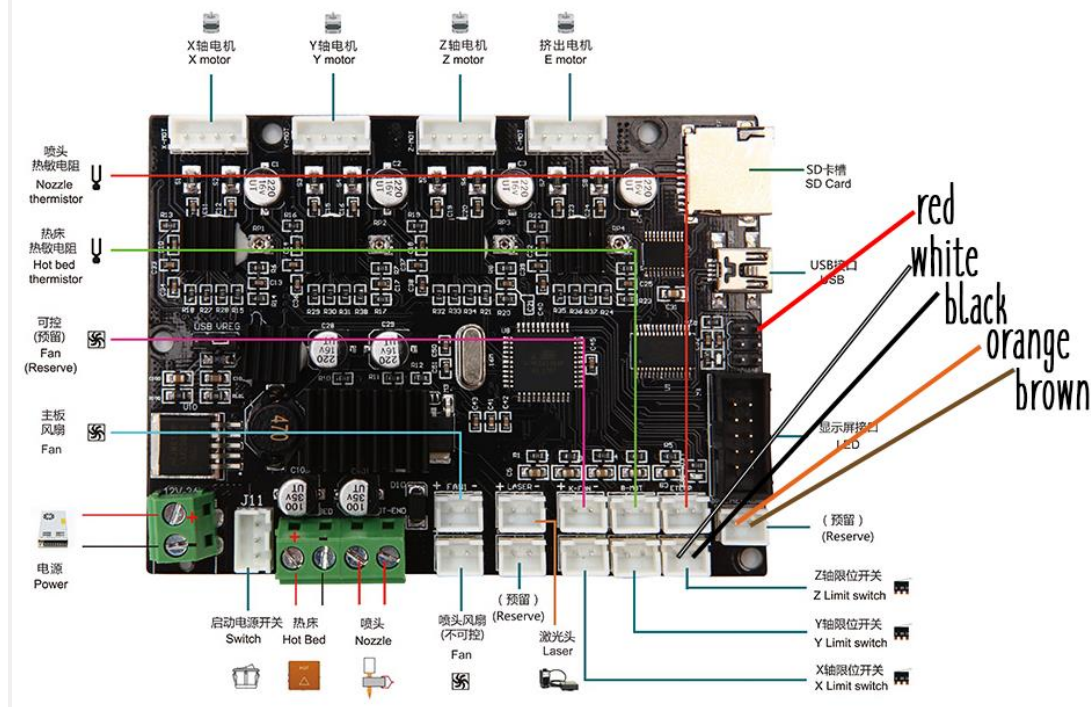
```
380    #define Y_PROBE_OFFSET_FROM_EXTRUDER -10
```

- Go to and uncomment line **335** if you want to set printer name to display on printer LCD.

```
335 //#define USER_PRINTER_NAME "Change Me"
```

- You should be done! Click upload in the top left of Arduino IDE.

Ender 2

Ender-2 Mainboard with bltouch wiring

If you connect your bltouch and when auto homing the sensor doesn't register & the z axis keeps dropping pressing into your bed, turn your printer off, disconnect the power and invert the black and white connectors in the z limit switch header (put black where white was, put white where black was).

Extract the firmware you have downloaded and open the .bat file named '**OpenFirmwareWindows**'.
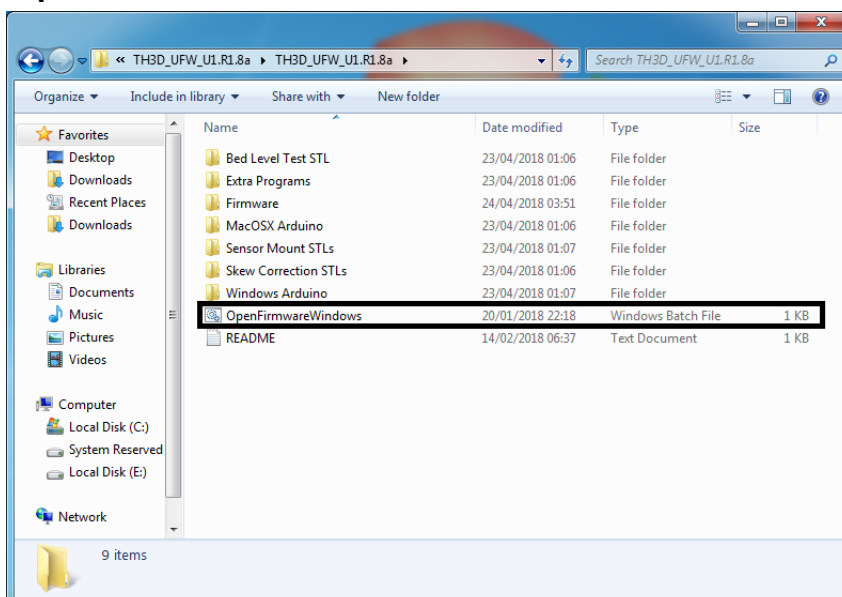
In **Configuration.h** tab:

- Go to and uncomment Line **110**.

```
110 //#define ENDER2
```

Before uncommenting	After uncommenting
//#define ENDER2	#define ENDER2

- Make sure line **114** is commented out.

```
114 //#define EZABL_ENABLE
```

- Click line **115** and hit enter twice, now paste this into line **116**:

  #define AUTO_BED_LEVELING_BILINEAR
  #define BLTOUCH
  #define SERVO0_PIN 29
  #define Z_SAFE_HOMING

```
112 // EZABL Settings - Uncomment #define EZABL_ENABLE and uncomment your mount
113 // type you are using to enable EZABL Bed Leveling features
114 //#define EZABL_ENABLE
115
116 #define AUTO_BED_LEVELING_BILINEAR
117 #define BLTOUCH
118 #define SERVO0_PIN 29
119 #define Z_SAFE_HOMING
120
121 // Probe Mounts (Ender 2 can use the same mounts as CR-10, Ender 2 Specific
```

- Go to and uncomment line **132**.

```
132 //#define CUSTOM_PROBE
```

Before uncommenting	After uncommenting
//#define CUSTOM_PROBE	#define CUSTOM_PROBE

- Go to line **379** and set **X** offset to mount offset (recommended mounts use **-40** for the **X** offset.)

```
379    #define X_PROBE_OFFSET_FROM_EXTRUDER -40
```

- Go to line **380** and set Y offset to mount offset (Recommended mounts use **-10** for the **Y** offset.)

```
380    #define Y_PROBE_OFFSET_FROM_EXTRUDER -10
```

- Go to and uncomment line **335** if you want to set printer name to display on printer LCD.

```
335 //#define USER_PRINTER_NAME "Change Me"
```

Before uncommenting	After uncommenting
//#define USER_PRINTER_NAME "Change Me"	#define USER_PRINTER_NAME "ChangednameE.g.CR-10BLTOUCH"

- Go to line **1319** in **configuration_backend.h** and comment it out.

```
1254 #define SDSUPPORT
```

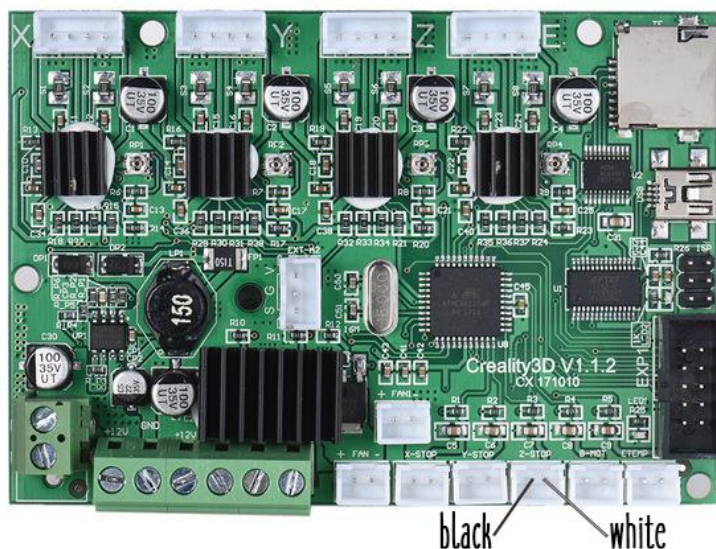| Before commenting	After commenting
#define SDSUPPORT	//#define SDSUPPORT

We have to disable SD card support to allow enough memory for the bltouch configuration, make sure you have something to print from afterwards (I recommend a Raspberry Pi running Octoprint.)

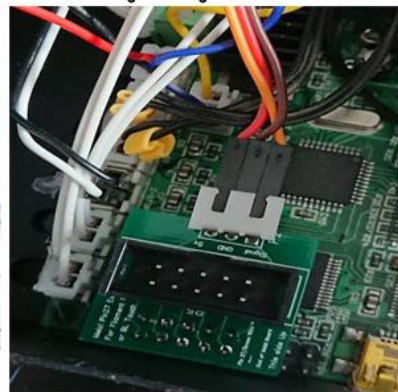- You should be done! Click **upload** in the top left of Arduino IDE.

Ender 3/CR-10

Since the Ender 3 and CR-10 use the same main board with the pin 27 adaptor this should work fine for both printers.

CR-10/ENDER 3 with bltouch wiring
red = power/ 5v
brown = negative/ground
orange - signal/servo

black   white

If you connect your bltouch and when auto homing the sensor doesn't register & the z axis keeps dropping pressing into your bed, turn your printer off, disconnect the power and invert the black and white connectors in the z limit switch header (put black where white was, put white where black was).

Extract the firmware you have downloaded and open the .bat file named '**OpenFirmwareWindows**'.
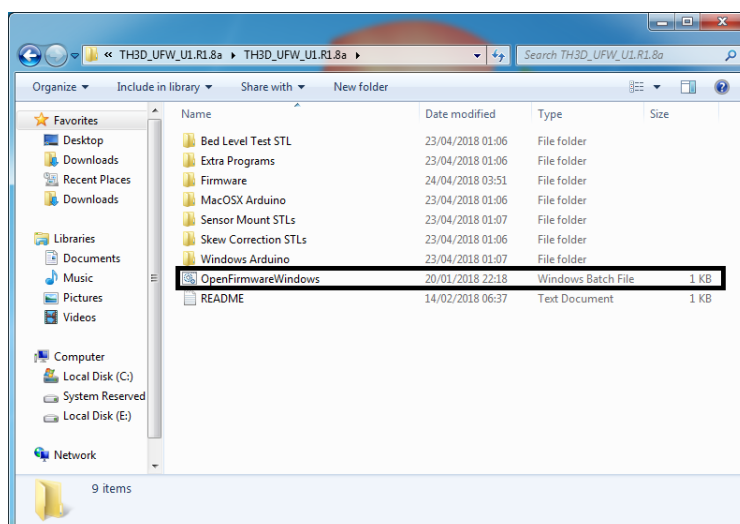
In **Configuration.h** tab:

- **FOR ENDER 3** - Go to and uncomment line **132**.

```
132 //#define ENDER3
```

Before uncommenting	After uncommenting
//#define ENDER3	#define ENDER3

- **FOR CR-10** - Go to and uncomment line **47**.

```
47 //#define CR10
```

Before uncommenting	After uncommenting
//#define CR10	#define CR10

- **FOR ENDER 3** - Make sure line **140** is commented out.

```
140 //#define EZABL_ENABLE
```

- **FOR CR-10** – Make sure line **54** is commented out.

```
54 //#define EZOUT_ENABLE
```

- **FOR ENDER 3** - Click line **141** and hit enter twice, now paste this into line **142**:

#define AUTO_BED_LEVELING_BILINEAR
#define BLTOUCH
#define SERVO0_PIN 27
#define Z_SAFE_HOMING

```
138 // EZABL Settings – Uncomment #define EZABL_ENABLE and unc
139 // type you are using to enable EZABL Bed Leveling feature
140 //#define EZABL_ENABLE
141
142 #define AUTO_BED_LEVELING_BILINEAR
143 #define BLTOUCH
144 #define SERVO0_PIN 27
145 #define Z_SAFE_HOMING
146
147
148 // Probe Mounts (Ender 3 uses the same mounts as CR-10)
```

- **FOR CR-10** - Click line **58** and hit enter twice, now paste this into line **60**:

  #define AUTO_BED_LEVELING_BILINEAR
  #define BLTOUCH
  #define SERVO0_PIN 27
  #define Z_SAFE_HOMING

```
56 // EZABL Settings - Uncomment #define EZABL_ENABLE and un
57 // type you are using to enable EZABL Bed Leveling featur
58 //#define EZABL_ENABLE
59
60 #define AUTO_BED_LEVELING_BILINEAR
61 #define BLTOUCH
62 #define SERVO0_PIN 27
63 #define Z_SAFE_HOMING
64
65 // Probe Mounts
```

- **FOR ENDER 3** - Uncomment line **155**.

```
155 //#define CUSTOM_PROBE
```

Before uncommenting	After uncommenting
//#define CUSTOM_PROBE	#define CUSTOM_PROBE

- **FOR CR-10** – Uncomment line **72**.

```
72 //#define CUSTOM_PROBE
```

Before uncommenting	After uncommenting
//#define CUSTOM_PROBE	#define CUSTOM_PROBE

SAME FOR BOTH ENDER 3 & CR-10

- Go to line **379** and set **X** offset to mount offset (recommended mounts use **-40** for the **X** offset.)

```
379    #define X_PROBE_OFFSET_FROM_EXTRUDER -40
```

- Go to line **380** and set Y offset to mount offset (Recommended mounts use **-10** for the **Y** offset.)

```
380    #define Y_PROBE_OFFSET_FROM_EXTRUDER -10
```

- Go to and uncomment line **335** if you want to set printer name to display on printer LCD.

```
335 //#define USER_PRINTER_NAME "Change Me"
```

Before uncommenting	After uncommenting
//#define USER_PRINTER_NAME "Change Me"	#define USER_PRINTER_NAME "ChangednameE.g.CR-10BLTOUCH"

- Go to line **1319** in **configuration_backend.h** and comment it out.

```
1254 #define SDSUPPORT
```

Before commenting	After commenting
#define SDSUPPORT	//#define SDSUPPORT

We have to disable SD card support to allow enough memory for the bltouch configuration, make sure you have something to print from afterwards (I recommend a Raspberry Pi running Octoprint.)

- You should be done! Click **upload** in the top left of Arduino IDE.

Configuring Z offset

Connect your printer over USB and Through your chosen terminal (Octoprint is my favourite but you can use cura, S3D, slicer, pronterface whatever is best for you) enter these commands -

M502 – Reset settings in printers EEPROM

M500 – Save settings in printers EEPROM

G28 – Auto home, this should home your printers axis's then move to the middle of the bed.

G1 F60 Z0 – This takes the nozzle to the printer's absolute Z position defined by the EEPROM.

From here in your chosen software find where you can control the printer and start to move the **Z** down in **0.1** increments, put a piece of paper under the nozzle and keep moving the Z down until the nozzle just scrapes the piece of paper, just like how you usually level your bed.

For example I will show you how to do this in my chosen software, Octoprint.
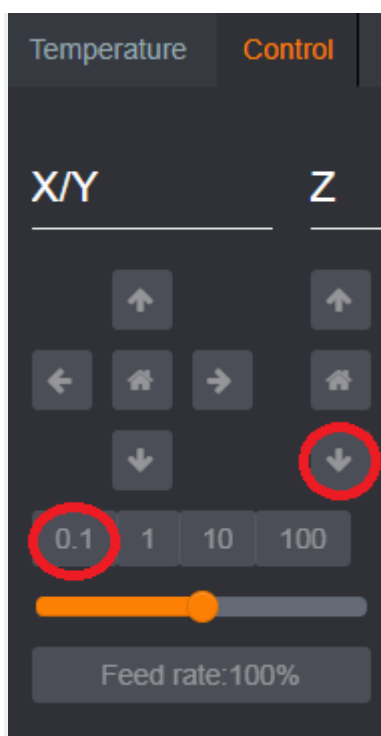
When you're at the correct height check the front of your printers LCD screen where it says Z on the right hand side, make a note of this.
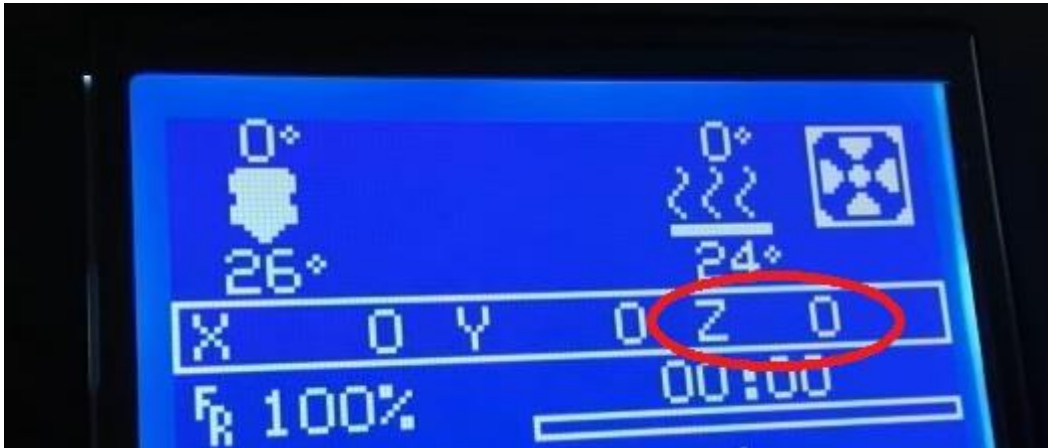
Now to set that as your Z offset by going back to your terminal and entering M851 followed by your offset you noted down in the last step, in the photo above the command would be **M851 Z0.00** but yours will look more **like M851 Z-0.90**.

M500 – Saves our offset we have just input to the printers EEPROM and you are finished setting your Z offset, the offset can also be accessed by the printers LCD under the motion tab for quick adjustments just be sure to save them afterwards via **M500** or Save to EEPROM on the printer.

Start-up GCODE

Once you have done all of the above you're so close to auto bed levelling prints but you need to add some GCODE to your Start-up script that your printer uses, this is done through your slicer.

Here is my Start-up GCODE for the the CR-10/s, Ender 2 and Ender 3, copy and paste this directly into your Start-up script in your slicer;

CR-10/s:
```
G21 ; (metric values)
G90 ; (absolute positioning)
M82 ; (set extruder to absolute mode)
M203 E80 ; (set extruder max to 80)
G28 ; (home all axis)
G29 ; (Auto Level)
G92 E0 ; (reset extruder)
G1 Z1.0 F3000 ; (move z up little to prevent scratching of surface)
G1 X0.1 Y20 Z0.2 F5000.0 ; (move to start-line position)
G1 X0.1 Y200.0 Z0.2 F1500.0 E15 ; (draw 1st line)
G1 X0.4 Y200.0 Z0.2 F5000.0 ; (move to side a little)
G1 X0.4 Y20 Z0.2 F1500.0 E30 ; (draw 2nd line)
; G1 E27 F1000 ; (retract filament 1mm)
G92 E0 ; (reset extruder)
G1 Z1.0 F3000 ; (move z up little to prevent scratching of surface)
M117 Printing...
```

Ender 2:
```
G21 ; (metric values)
G90 ; (absolute positioning)
M82 ; (set extruder to absolute mode)
M203 E80 ; (set extruder max to 80)
G28 ; (home all axis)
G29 ; (Auto Level)
G92 E0 ; (reset extruder)
G1 Z1.0 F3000 ; (move z up little to prevent scratching of surface)
G1 X0.1 Y20 Z0.2 F5000.0 ; (move to start-line position)
G1 X0.1 Y100.0 Z0.2 F1500.0 E15 ; (draw 1st line)
G1 X0.4 Y100.0 Z0.2 F5000.0 ; (move to side a little)
G1 X0.4 Y20 Z0.2 F1500.0 E30 ; (draw 2nd line)
; G1 E27 F1000 ; (retract filament 1mm)
G92 E0 ; (reset extruder)
G1 Z1.0 F3000 ; (move z up little to prevent scratching of surface)
```

M117 Printing...

<u>Ender 3:</u>
G21 ; (metric values)
G90 ; (absolute positioning)
M82 ; (set extruder to absolute mode)
M203 E80 ; (set extruder max to 80)
G28 ; (home all axis)
G29 ; (Auto Level)
G92 E0 ; (reset extruder)
G1 Z1.0 F3000 ; (move z up little to prevent scratching of surface)
G1 X0.1 Y20 Z0.2 F5000.0 ; (move to start-line position)
G1 X0.1 Y150.0 Z0.2 F1500.0 E15 ; (draw 1st line)
G1 X0.4 Y150.0 Z0.2 F5000.0 ; (move to side a little)
G1 X0.4 Y20 Z0.2 F1500.0 E30 ; (draw 2nd line)
; G1 E27 F1000 ; (retract filament 1mm)
G92 E0 ; (reset extruder)
G1 Z1.0 F3000 ; (move z up little to prevent scratching of surface)
M117 Printing...

You're now all set to hit print and enjoy auto bed leveling prints.

Misc & Extras

Remove all boot screens for faster boot times

In **Configuration_backend.h**

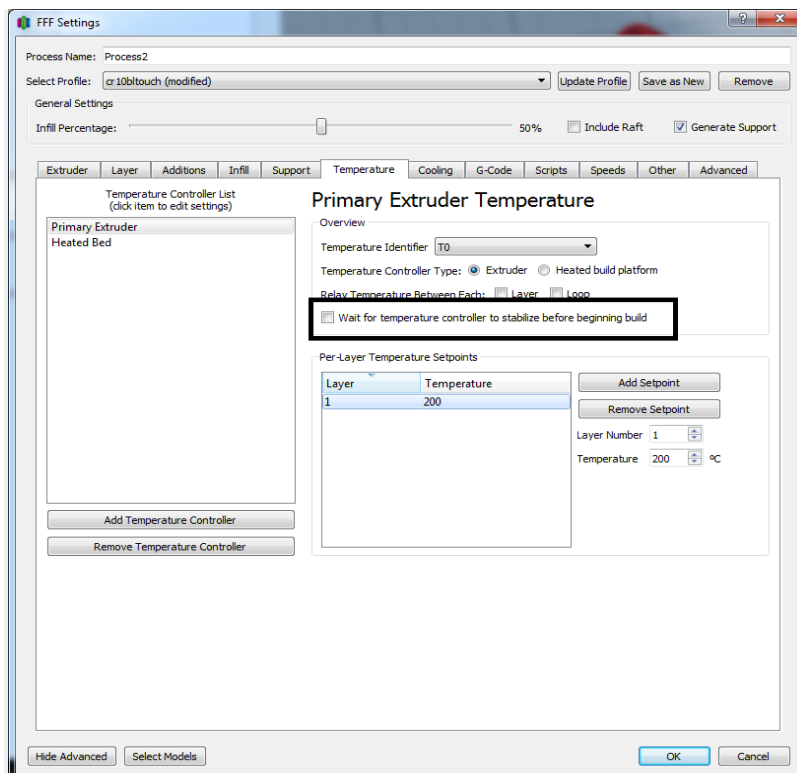- Comment out line **953.**

```
953     #define SHOW_SCREEN
```

Before commenting	After commenting
#define SHOW_SCREEN	//#define SHOW_SCREEN

- Comment out line **959.**

```
959 #define SHOW_CUSTOM_BOOTSCREEN
```

Before commenting	After commenting
#define SHOW_CUSTOM_BOOTSCREEN	//#define SHOW_CUSTOM_BOOTSCREEN

Control ooze while bed levelling runs (Simplify3D)

By un-checking this check box the auto leveling probing will begin before waiting for the nozzle to heat up avoiding oozing while your nozzle heats up. Only do this for the **Primary Extruder**.

CR-10 stock to CR-10s board

By un-checking this check box the auto leveling probing will begin before waiting for the nozzle to heat up avoiding oozing while your nozzle heats up. Only do this for the **Primary Extruder**.

If you are using a CR-10 with a CR-10s board in it you can use the stock screen and disable the none existent filament sensor easily.

In **Configuration.h** tab:

Uncomment Line **80** to disable the board looking for the sensor.

```
80 //#define CR10S_NOFILAMENTSENSOR
```

Before uncommenting	After uncommenting
//#define CR10S_NOFILAMENTSENSOR	#define CR10S_NOFILAMENTSENSOR

Uncomment line **85** and rotate your display cable 180 degrees and force into the LCD slot, this will work and has been tested.

```
85 //#define CR10LCD_CR10S
```

Before uncommenting	After uncommenting
//#define CR10LCD_CR10S	#define CR10LCD_CR10S