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PRINTING GUIDES

Install and configure BLTouch / 3DTouch in Marlin 2.0.x (MKS Gen, SKR, Anet A8, RAMPS)



Peter

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📷 BLTouch / 3DTouch

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Send me a **BLTouch /**

3DTouch sensor from the Geeetech brand. I

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usually use optical infrared sensors for my printers, but I wanted to try the **BLTouch sensors** since none had fallen yet by my hands. So I got down to work for **Configure BLTouch with BabyStepping** in the last Marlin available today and satiate my curiosity.

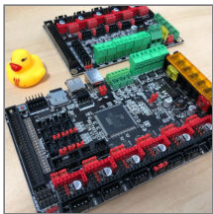
I have always used leveling sensors on my machines, as leveling the four corners of the printing surface with a folio is definitely not my thing. Nor do I see it practical and much less precise, although at this point I surely disagree with some reader 😊

I have to say that I tried quite a few inductive and capacitive sensors, I even opted for the **original PINDA 2**, which is very comfortable to install since **is one of the few that actually powers 5V** and gives quite a bit of precision. But it didn't convince me either. In each and every one of them a common denominator, the detection distance varies depending on the metal and even the temperature of the bed.

It's something I don't like at all. It doesn't give me any sense of precision, since what I'm looking for is an immutable (or at least minimal) measurement. Having a component that according to the conditions of use works differently has no meaning whatsoever. I don't want to calibrate that distance again if I change the filament from PLA to ABS, it's a hassle.

...ors, which I love, we
...iations since under
...ey do not affect the type
...erature. And with the
...ince they are completely
...mechanical sensors (hence my desire to try it).

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2.0.x.x)



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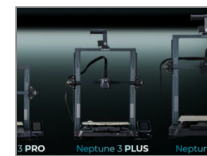
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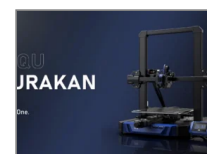
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3. Where can I buy a BLTouch / 3DTouch?
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7. Initial script (GCODE commands)
8. Configuring the offset

Voxelab,
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ng the
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Introduction

Before starting I have to confess that I do not have a commercial 3D printer as many of you may have (**Anet A8** , **Ender3** or **Artillery X1** for example). I had a commercial at the beginning (a completely disaster), so I decided to design and manufacture my own to my liking and needs.

However, you should not worry because when configuring the BLTouch sensor **the options to be modified in the Marlin firmware will be exactly the same** . The only thing that will vary will be the connections, but we will indicate some examples so that you do not have any problem in its corresponding section.

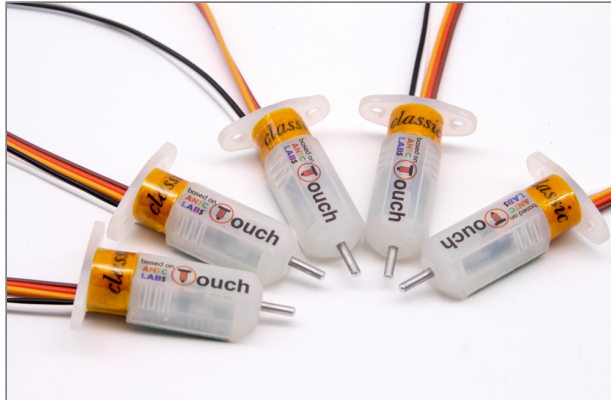
only discuss the options
BLTouch / 3DTouch. If
ely configure Marlin do
ne **Complete guide:**

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Configure Marlin 2.0.3 from scratch and not die trying that you also have available on our website.

Why use BLTouch / 3DTouch?



The main reason for me would be not having to be leveling 4 corners with a sheet of paper or making squares in bed. If we make the leveling of the printing surface in the 4 corners, when you are leveling one another it is unbalanced. In the end, so that everything is square, you end up making several passes, especially if you are a precision maniac.

So the question is extremely simple. Why not install a leveling sensor to level at a single central point in the bed (**SAFE_HOMING**), and let Marlin generate the mesh of points and worry about the rest? That's what Marlin is for, to make life easier for us.

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you can install capacitive or inductive sensors. It's not these types of sensors that measure the temperature of the bed. The higher the temperature, the more the range. So you can not

leave a fixed value for PLA and another for ABS.

In addition, on aluminum the detection range of capacitive and conductive sensors is considerably reduced with respect to using steel or iron. Another negative point since if you use glass you will be very fair and in any failure your nozzle will go through the glass with the consequent risk of breakage.

BLTouch / 3DTouch sensors are mechanical, so they are not affected by heat, humidity or the type of material on your printing surface.

Furthermore, **the connection of the BLTouch / 3DTouch sensors to the boards is relatively simple** and you do not need to carry out any electronic modification as it happens in other sensors. Some Chinese sensors indicate operating ranges from 6-36v, nothing is further from reality. If you feed them at minimum values they don't work, so you have to feed them at 12v.

The problem comes when you have to send the signal (S) to your electronic board, if you don't regulate that voltage (with additional electronics) you can burn the port as it happened to me in my MKS Gen v1.4. The result was that the Z- was completely unusable for me having inserted 12v. in a 5v input. It is not a major problem, you can change within the Marlin firmware and indicate that for Z- we

Z+, but you have to make ations.

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Where can I buy a BLTouch / 3DTouch?

You can buy this type of sensor in any online store, since they are very common in the world of 3D printing. Below I leave you two affiliate links to Amazon and Banggood. Of course you can buy them wherever you want, there are dozens of pages.

If you decide to acquire it through these links, it is my duty to tell you that **a small commission will go to the 3DWork.io project and we will be eternally grateful to you.** In this way we can continue writing 3D printing guides and articles on interest. Or alternatively, you can follow us on our social networks.

BLTouch Original (Antclabs)			
3DTouch			
Bigtreetech 3DTouch v3.0			
Creality 3D BLTouch v2			

Or if you wish, you can use our component search engine **Markets.sx**, where you can compare prices in different Marketplaces (Amazon. Aliexpress. Banggood, etc.) with a

very easily.

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Configure BLTouch / 3DTouch in Marlin



Well, let's start configuring our Marlin firmware to support BLTouch / 3DTouch sensors. As I explained in the previous article of **Configure Marlin 2.0.3 from scratch**, to activate the options you simply have to uncomment them. This is done by removing the two bars in front of each **#define**, this way the compiler can make use of them and add them to the final firmware.

We will start the configuration by editing the file **Configuration.h** with your favorite text editor (mine is **Sublime**). Once you have edited it, we are going to indicate to our dear Marlin that our 3D printer has a limit switch (sensor) on the Z axis. We will proceed to uncomment the **USE_ZMIN_PLUG options**.

```
// Specify here all the endstop connect
// Almost all printers will be using
// extra connectors. Leave undefined
#define USE_XMIN_PLUG
#define USE_YMIN_PLUG
#define USE_ZMIN_PLUG
#define USE_XMAX_PLUG
#define USE_YMAX_PLUG
#define USE_ZMAX_PLUG
```

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Now we uncomment the option

Z_MIN_PROBE_USES_Z_MIN_ENDSTOP_PIN.

```
/**
 * Z_MIN_PROBE_USES_Z_MIN_ENDSTOP_PIN
 *
 * Enable this option for a probe con
 */
#define Z_MIN_PROBE_USES_Z_MIN_ENDSTO
```

And in this other line of the code we are going to indicate that our installed sensor is a **BLTouch / 3DTouch**, which for Marlin come to be the same.

```
/**
 * The BLTouch probe uses a Hall effe
 */
#define BLTOUCH
```

If we use a self-leveling sensor (either BLTouch or any other), we must indicate to Marlin the position of the sensor with respect to our print nozzle. This will necessarily be separated and we will define it as coordinates and in millimeters.

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is 37mm to the right of
behind it, so I would put
s. You must measure
on your printer (do not


```

/**
 * Z Probe to nozzle (X,Y) offset, re
 *
 * In the following example the X and
 *
 * #define NOZZLE_TO_PROBE_OFFSET {
 *
 *      +-- BACK ---+
 *      |              |
 *      L      (+) P      R &&lt;---
 *      E      |      I
 *      F      (-) N (+)  G &&lt;---
 *      T      |      H
 *              (-)      T
 *      |              |
 *      O-- FRONT --+
 *      (0,0)
 *
 * Specify a Probe position as { X, Y
 */
#define NOZZLE_TO_PROBE_OFFSET { 37,

```

Now we must uncomment the **AUTO_BED_LEVELING_BILINEAR** function and then the **RESTORE_LEVELING_AFTER_G28** function, so that they remain active in our firmware.

```

/**
 * Choose one of the options below to
 * and behavior of G29 will change de
 *
 * If using a Probe for Z Homing, en
 *
 * - AUTO_BED_LEVELING_3POINT
 *   Probe 3 arbitrary points on the
 *   You specify the XY coordinates o
 *   The result is a single tilted pl
 *
 * - AUTO_BED_LEVELING_LINEAR
 *   Probe several points in a grid.
 *   You specify the rectangle and th
 *   : is a single tilted pl
 *
 * - AUTO_BED_LEVELING_BILINEAR
 *   Probe several points in a grid.
 *   Specify the rectangle and th
 *   : is a mesh, best for 1
 *
 * - AUTO_BED_LEVELING_UBL (Unified B

```

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```

*   A comprehensive bed leveling sys
*   of other systems. UBL also inclu
*   Validation and Mesh Editing syst
*
* - MESH_BED_LEVELING
*   Probe a grid manually
*   The result is a mesh, suitable f
*   For machines without a probe, Me
*   leveling in steps so you can man
*   With an LCD controller the proce
*/
//#define AUTO_BED_LEVELING_3POINT
//#define AUTO_BED_LEVELING_LINEAR
#define AUTO_BED_LEVELING_BILINEAR
//#define AUTO_BED_LEVELING_UBL
//#define MESH_BED_LEVELING

/**
*   Normally G28 leaves leveling disab
*   this option to have G28 restore th
*/
#define RESTORE_LEVELING_AFTER_G28

```

Once the type of self-leveling that we want Marlin to carry out is configured, we will indicate with the **GRID_MAX_POINTS** parameters the number of probes (or tests) to be carried out. I usually make 9 checkpoints before each print, you can expand or reduce it, that is up to you.

```

// Set the number of grid points per
#define GRID_MAX_POINTS_X 3
#define GRID_MAX_POINTS_Y GRID_MAX_PO

```



And since I always like to do HOMING in the

safety, I activate the
tion.

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_HOMING

```
#if ENABLED(Z_SAFE_HOMING)
#define Z_SAFE_HOMING_X_POINT ((X_BED
#define Z_SAFE_HOMING_Y_POINT ((Y_BED
#endif
```



Now we will save the **Configuration.h** file and edit a new file called **Configuration_adv.h**. The difference compared to Configuration.h is that it offers us more detailed customization options, and experimental or in development functions.

In my printer I use a leveling function available in Marlin 2 called **BABYSTEPPING**. This function allows me to calibrate the height of my leveling sensor in the center of the bed **once** with a sheet of paper.

Later, the printer will perform 9 probe points automatically at the beginning of each print. This way I won't have to go corner by corner unnecessarily to calibrate my bed. By default it is deactivated, so we will activate the **BABYSTEPPING** option, as I show you below:

```
#define BABYSTEPPING
#if ENABLED(BABYSTEPPING)
  // #define BABYSTEP_WITHOUT_HOMING
  // #define BABYSTEP_XY // Also enable
  #define BABYSTEP_INVERT_Z false // Ch
  #define BABYSTEP_MULTIPLICATOR_Z 20 /
  #define BABYSTEP_MULTIPLICATOR_XY 1

  #define DOUBLECLICK_FOR_Z_BABYSTEPPING
  #if ENABLED(DOUBLECLICK_FOR_Z_BABYSTEPPING)
    #define DOUBLECLICK_MAX_INTERVAL 1250
    // time may be added to m
    #define BABYSTEP_ALWAYS_AVAILABLE //
    #define BABYSTEP_Z_WHEN_IDLE // Jump to
    #define BABYSTEP_Z_WHEN_IDLE //
    #define BABYSTEP_Z_IDLE_MULTIPLICATOR 1 /
```

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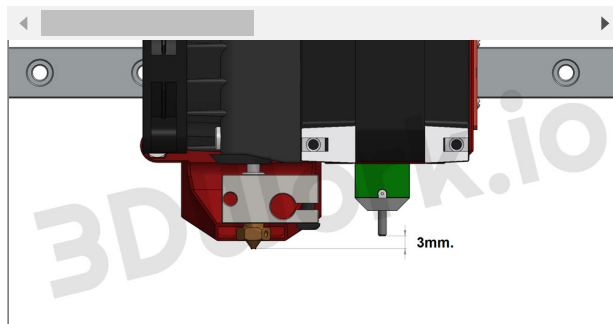
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```
//#define BABYSTEP_DISPLAY_TOTAL // D

#define BABYSTEP_ZPROBE_OFFSET // Com
#if ENABLED(BABYSTEP_ZPROBE_OFFSET)
//#define BABYSTEP_HOTEND_Z_OFFSET //
#define BABYSTEP_ZPROBE_GFX_OVERLAY /
#endif
#endif
```

Well, these would be the basic options to configure your BLTouch. Of course, you can configure much more parameters such as limits, polls, travel speeds, etc. But for starters it is more than enough.

Installing BLTouch / 3DTouch



Regardless of where it is located with respect to the X and Y axes, which are the ones you must configure in Marlin, you have to position the BLTouch / 3DTouch sensor at a certain distance in height from your nozzle.

It is logically has to be within its range of action. When the probe is retracted, it must be

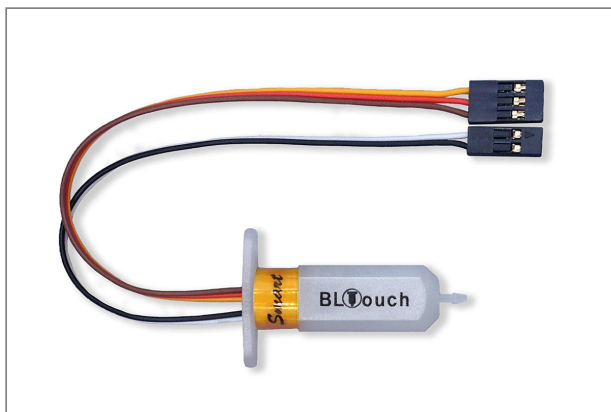
otherwise we will have
n it is extended, it must
eters below the nozzle to

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The recommended is 2mm. As I have seen in some places, but it was a little short after some tests and I decided to set it to 2.5mm. that works for me correctly. Of course, this distance is at your absolute choice, it is only a guideline value.

BLTouch / 3DTouch electronic connection



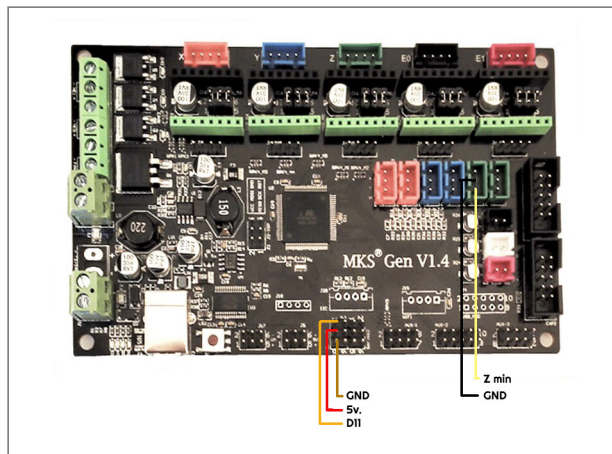
As you can see in this image, the BLTouch / 3DTouch leveling sensors have two connection cables. One with three pins and the other with two pins, which will be the ones we will need to connect to our electronics.

In my case, I use MKS Gen v1.4, so the connection couldn't be easier (just like in RAMPS). Below I leave you 2 images so you can see where the BLTouch would be connected on my board, and on a RAMPS board, much more common than the one I own.

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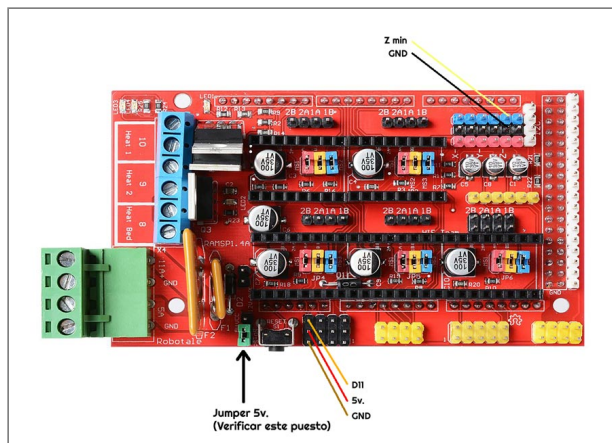
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board connection



Very easy as you have been able to check, click on those 2 sites and that's it. When you turn on the printer you will see that the sensor does a little checking (unfolds and retracts the probe).

RAMPS board connection



This connection is similar, but you must make sure that you have the jumper activated, so we will make sure that the level sensor reaches the 5v. necessary (very important).


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connection

I leave you an example of my startup script on each print:

```
G28          ; Make HOME on all axes
G29          ; Auto-leveling command
G1 Z5 F5000  ; Nozzle up
M75          ; Launch timer
```



Configuring the offset

To finish, and having activated **BabyStepping** you will have your own menu called **Offset**. You can access it before the printing process and during (yes, you read me correctly) the printing process by pressing the button twice on your display.

In this way, and in real time, you can adjust the

making the first printing
e a perfect fit. To me this
d impression, the truth is

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Once you have made the offset settings, don't forget to save the value in memory. You should have an option called **Record to EEPROM**, as long as you have supported it in your Marlin. If you can't find it, you can alternatively run the command M500 (Save settings). This will store all the current settings in your EEPROM permanently.

If you have read the complete article, I congratulate you. It would not be surprising if he had left me something in the pipeline, if so, do not hesitate to notify me in the comments at the end of the article **Install and configure BLTouch / 3DTouch in Marlin 2.0.x (MKS Gen, SKR, Anet A8, RAMPS)**.

Finally remind you, as always, that you can find us on our Telegram channel full of maniacs by 3D printing at [next link](#), or on our social networks (don't forget to follow us if you like the web).

If you wish, you can find other interesting articles in 3DWork at the following links:

- [Complete guide SKR v1.4 / v1.4 Turbo with TMC2209 Sensorless drivers and Display TFT35](#)

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