



Steel Roller kit

Assembly sequence

Preface

In order to obtain the best result, it is advisable to carefully follow the assembly sequence step by step.

Pay particular attention to the indications regarding the insertion of special nuts in the grooves of the profiles.

The assembly refers in particular to the **Creality Ender 3 PRO** printer but can also be used for the other versions of the **Ender 3 series**.

Before starting assembly, it is advisable to read this manual completely.

Assembly is very simple if you follow all the steps in the right sequence, reading the various paragraphs will certainly take longer and more boring than the real execution.

eDrawing© 3D sketches

A particular **eDrawing©** 3D visualization system is supplied on digital support, with **Steel Roller Kit**.

The **eDrawing© format** consists of an executable program that allows you to view **the three-dimensional drawing** of the entire structure and individual parts.

These designs are available:

- **Front cylinder** - 3D view of the front cylinder
- **Rear cylinder** - 3D view of the rear cylinder
- **Steel Roller** - 3D view of the entire structure of the Kit

Once the executable has been launched, it is possible, in addition to the single detail, also for the entire structure:

- **Rotate**
- **Zoom in**
- **To measure**
- **To blow up**
- **Isolate**
- **To separate**
- **See section**
- **See in transparency**

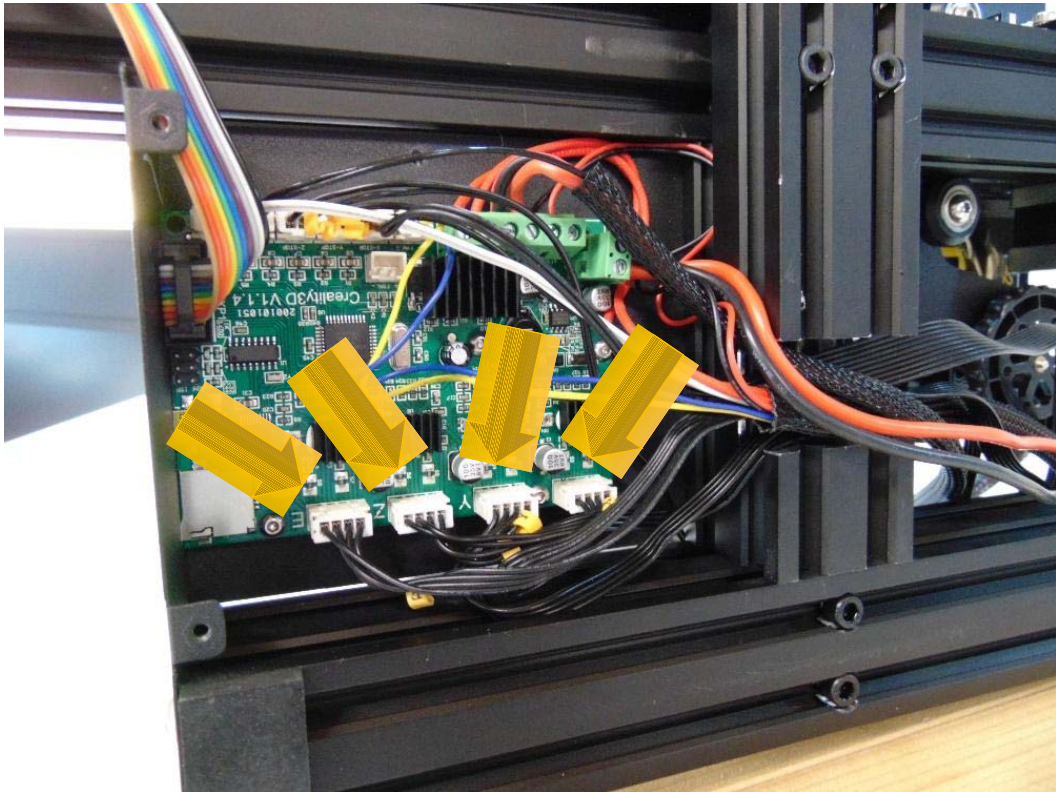
For clarity in the display, some details are not present such as:

- Screws, nuts, washers and angle pieces.

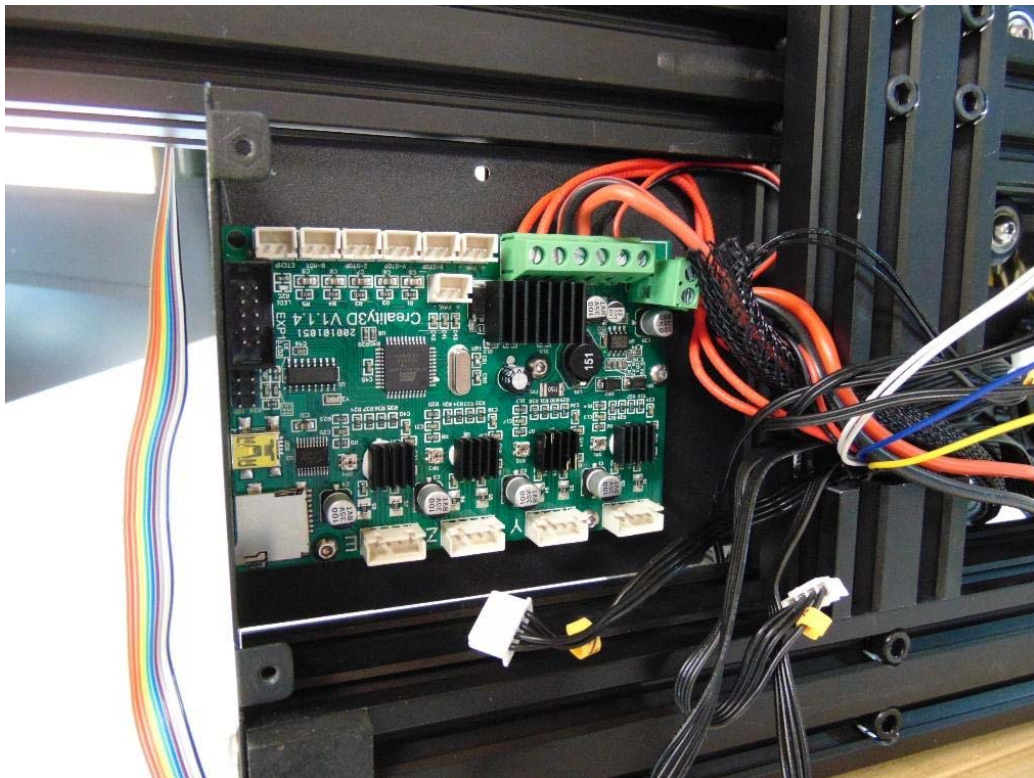
We recommend that you become familiar with this tool as it allows a detailed guide to the implementation, in particular for the arrangement of the various components.

It is important to print all the documentation and always keep it ready to view for facilitating the consultation during the assembly phases.

- 7) Remove the four (4) connectors of the X-Y-Z-E motors (if these are fixed with hot glue, first remove it using a small knife and tweezers).

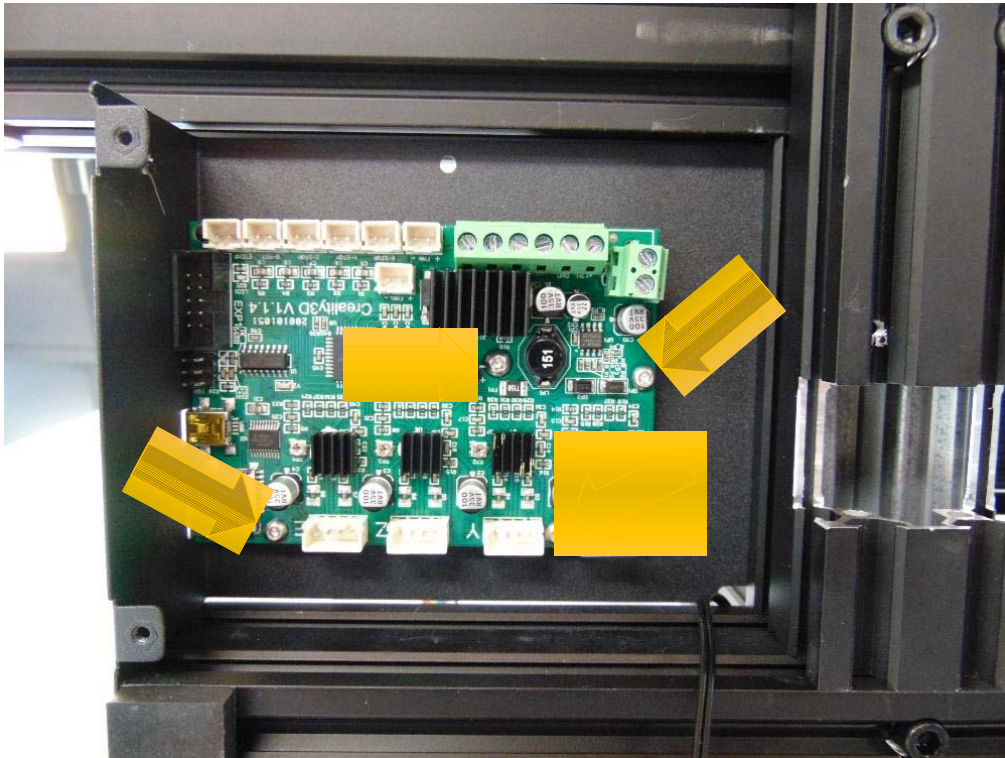


- 8) Remove the cables from the display, the sensors, the limit switches and the wire cooling fan (if these are fixed with hot glue, first remove it using a small knife and tweezers).

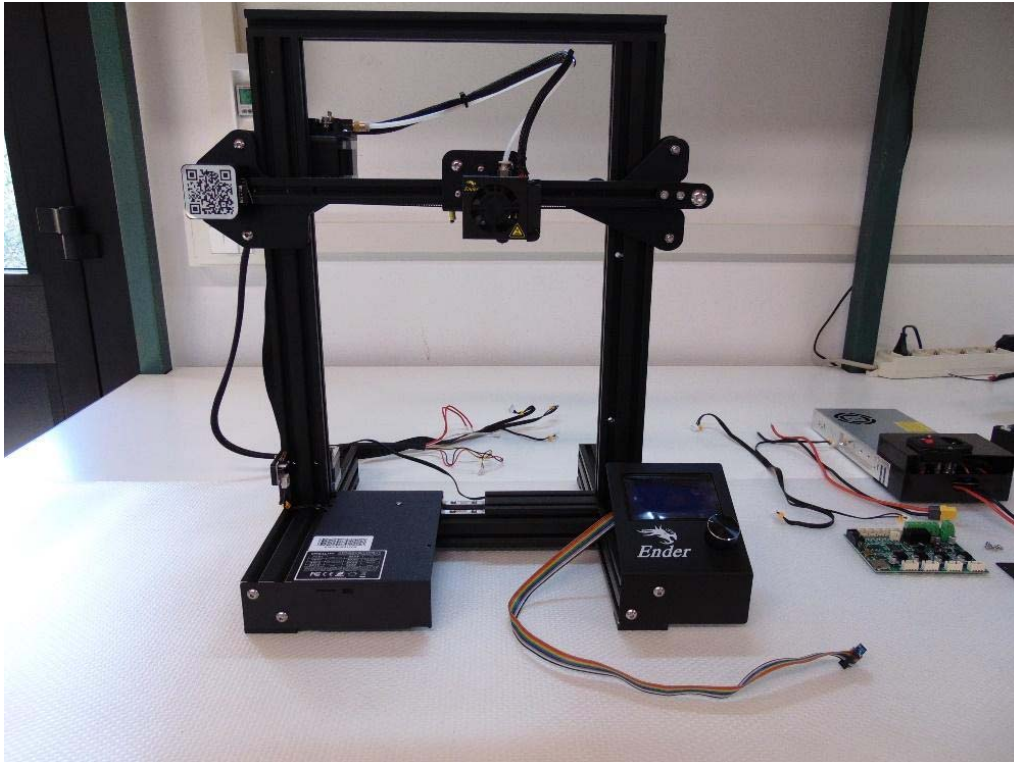


- 9) Tag the position of the cables in the terminals (red cable "+", black cable "-"), the first two terminals have no sign, since they are those of the extruder resistance. Even the second pair of

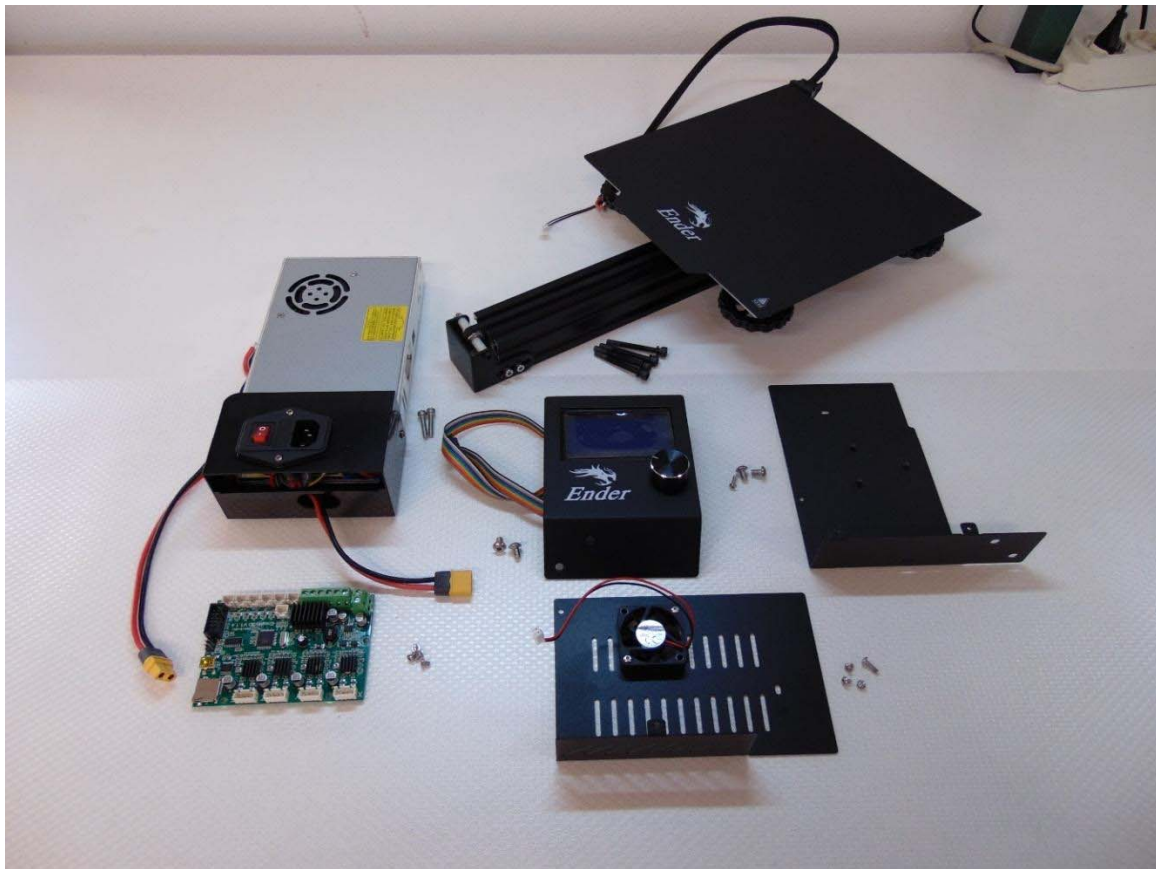
12) Remove the four (4) screws that hold the motherboard.



13) Supporting the Y axis structure, remove the 4 screws that secure the Y axis structure.



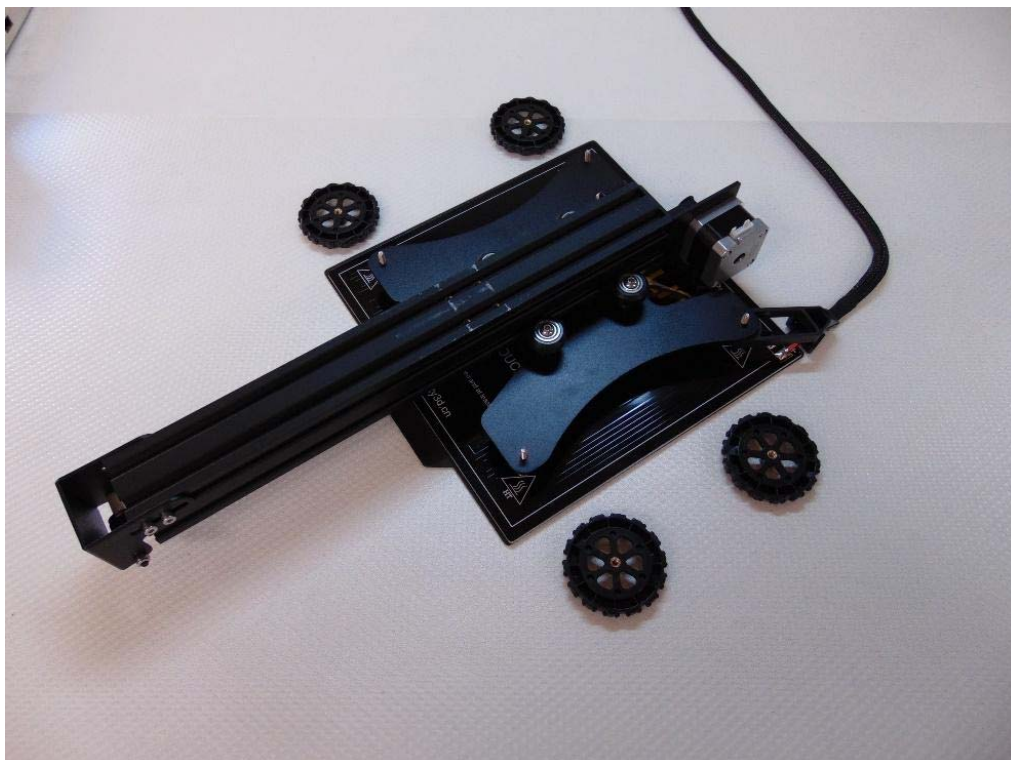
These are the pieces disassembled up to now.



Attention: if you want to keep the heated bed intact with its magnetic table and, if necessary, later restore the printer to its initial configuration, it is advisable to purchase a replacement heated bed, easily available on the market.

In this case, you can skip steps 16 to 21.

16) Unscrew the 4 wheels that hold the heated surface together with the Y axis structure.



BOOTLOADER

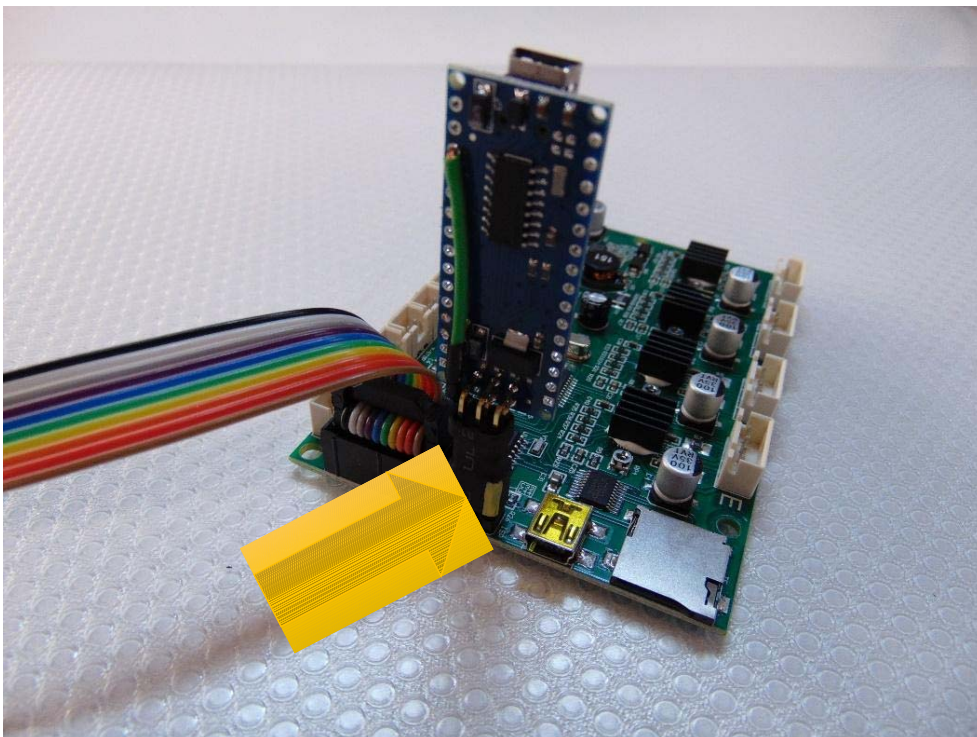
Different procedures must be followed depending on the type of motherboard installed on your 3D printer.

On web you can find numerous videos (tutorials) relating to the installation of the specific bootloader.

If the version 1.1.5 motherboard is already installed on your 3D printer, it is not necessary to install the specific bootloader, as it is already present.

The procedure using our **ISP programmer (available on request)** is illustrated below.

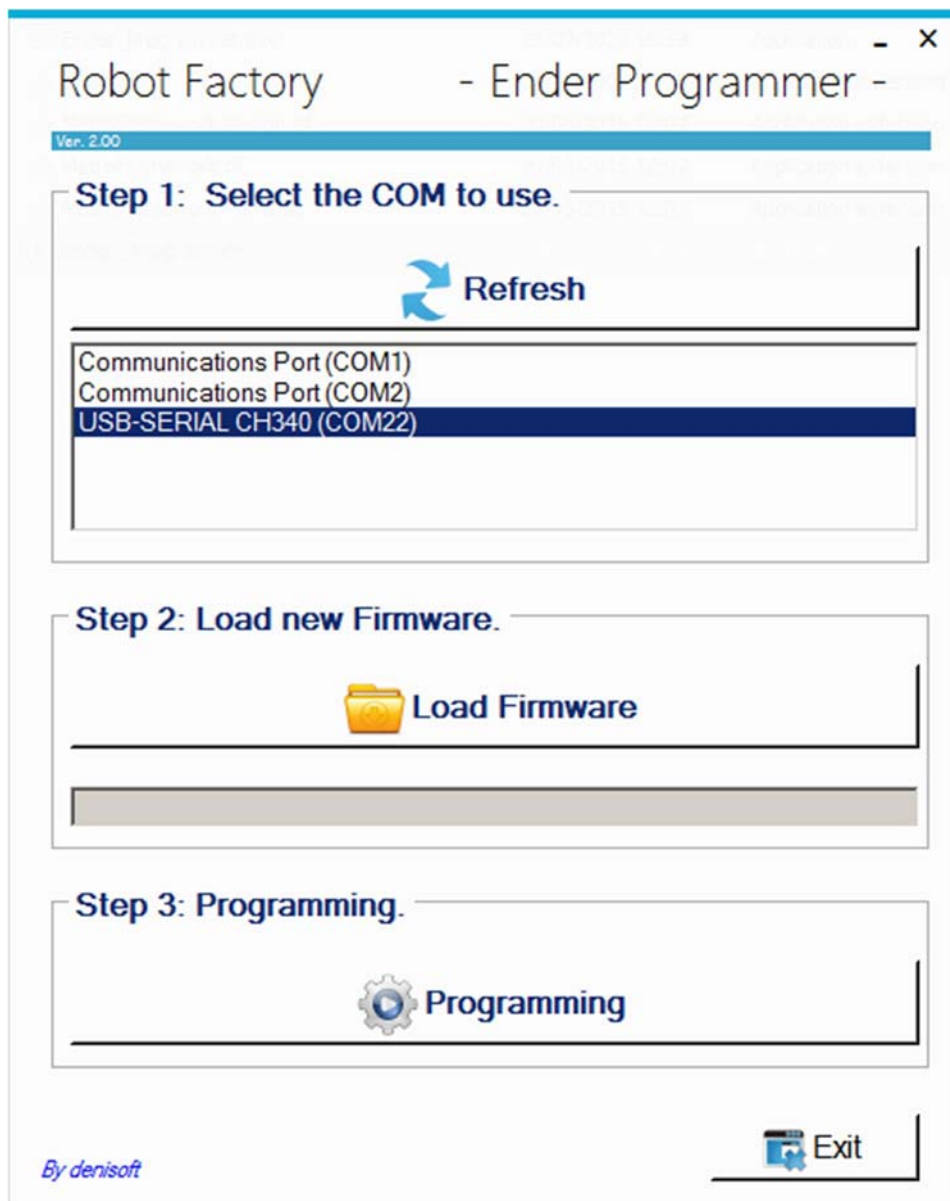
- 1) Download the **Arduino IDE** from the Web (link provided with documentation).
- 2) Install the **U8glib** library (supplied with documentation).
- 3) Add the **Sanguino card** to the **Arduino IDE** (link provided with documentation).
- 4) Install the **CH341SER** drives (supplied with documentation).
- 5) Connect the display to the motherboard using the existing cable.
- 6) Connect our **ISP programmer** (pay attention to the correct direction - see yellow reference)



INSTALL THE FIRMWARE

Whether you have installed the new bootloader (old version of motherboard), or if the bootloader was already installed (new version of motherboard), follow these steps:

- 1) Copy the **Marlin_1.1.9.1_SR** folder (supplied with the documentation) to the **C:** drive of your PC.
- 2) Unzip the **Ender_Programmer** file (supplied with the documentation) in the **C:** drive of your PC, following this operation the **C:\Ender_Programmer** folder will be created (the file is self-extracting).
- 3) From the **C:\Ender_Programmer** folder, start the **Ender_Programmer.exe** executable (if you prefer it, you can copy the start icon in the folder to the Desktop and start the program from here).
- 4) Select the port from which the motherboard is recognized (**Select the COM to use**)

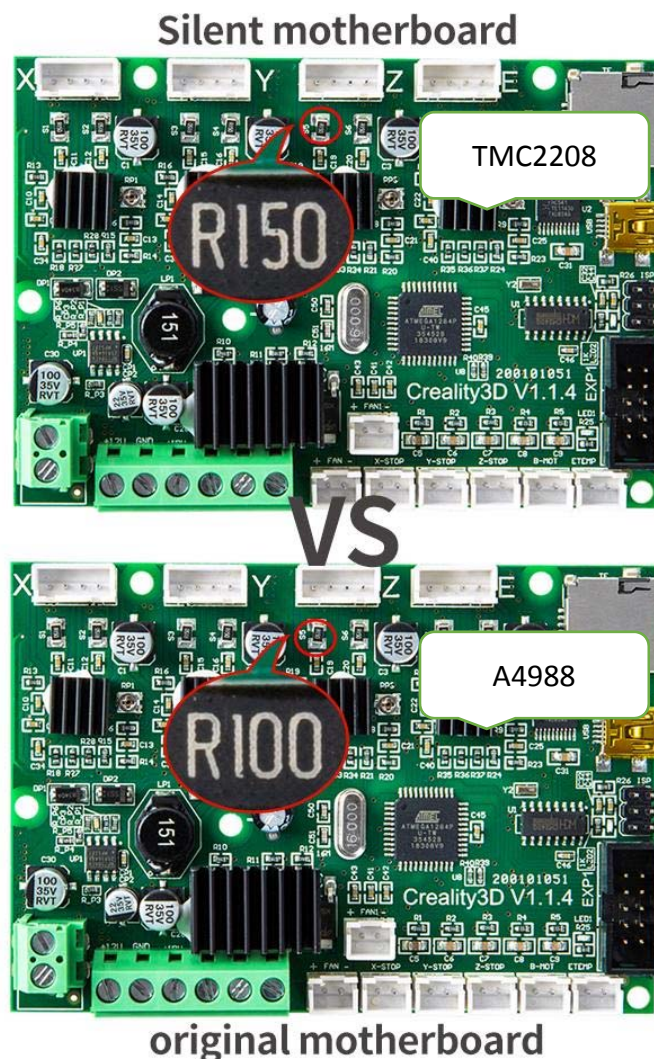


ADJUSTMENT OF THE TRIMMER OF THE Y AXIS DRIVE

Since the **Sanyo 103-H5210-4240** motor with a bipolar current of 1A is supplied **with the Steel-Roller Kit**, it is necessary to change the reference voltage (**Vref**) of the Y axis by acting on the relative trimmer.

To do this, it is necessary to distinguish the type of drive installed on the motherboard (if the **A4988** or the **TMC 2208** - integrated circuit - is present) since the reference voltage (Vref) is different for each integrated circuit.

Attention: the latest version **V1.1.4 motherboard** already mounts the **TMC 2208** integrated circuit, this is identified as the same motherboard mounts the resistors **from S1 to S8** with a value of **150 ohm (R150)** instead of those of **100 ohm (R100)**.



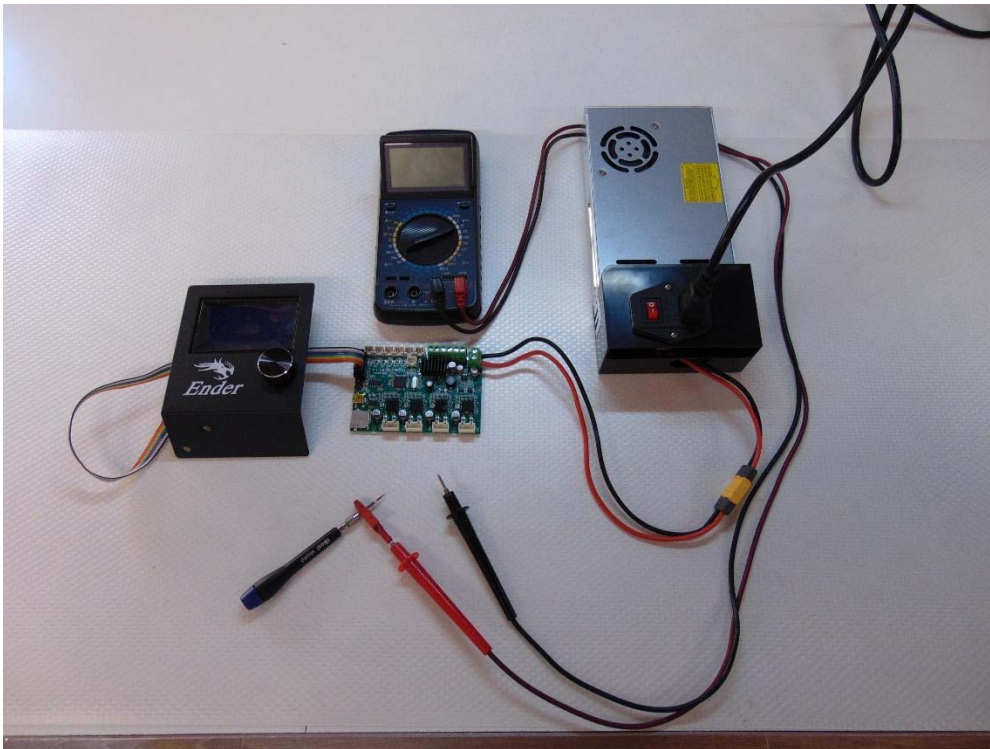
On the web you can still find a lot of information about it.

Both cases are addressed below.

1st case – A 4988 drive - Vref 0.734 volts approx.

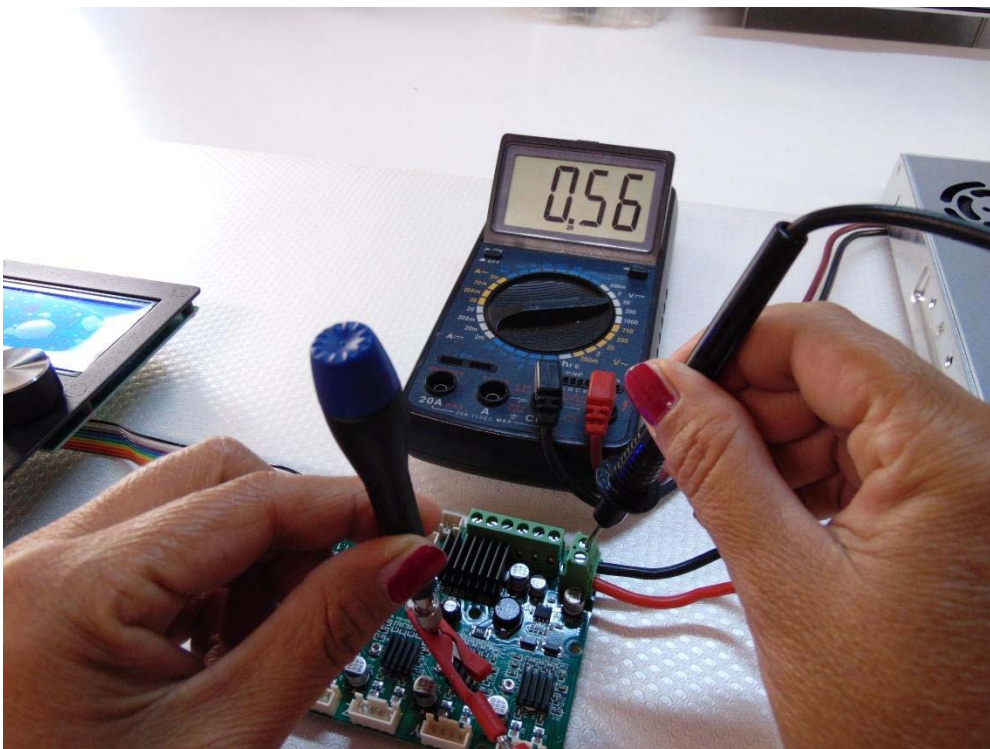
2nd case – TMC 2208 drive - Vref voltage 1.411 volts approx.

Connect the **power supply** and the **display** to the **motherboard**, get an excellent digital multimeter and **connect the negative lead** to the **negative terminal** (black cable) and the **positive lead** to a small **screwdriver** with an insulated handle.

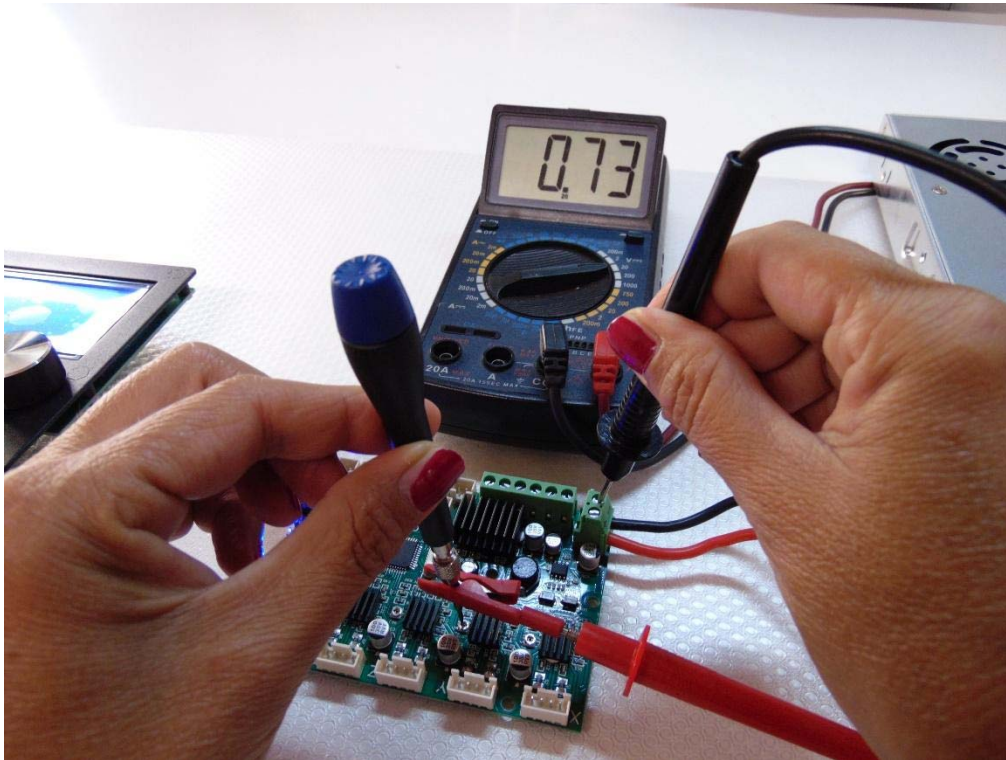


Select on the multimeter a voltage of 20 volts DC full scale (or a value close to it if the multimeter is different from the one used here).

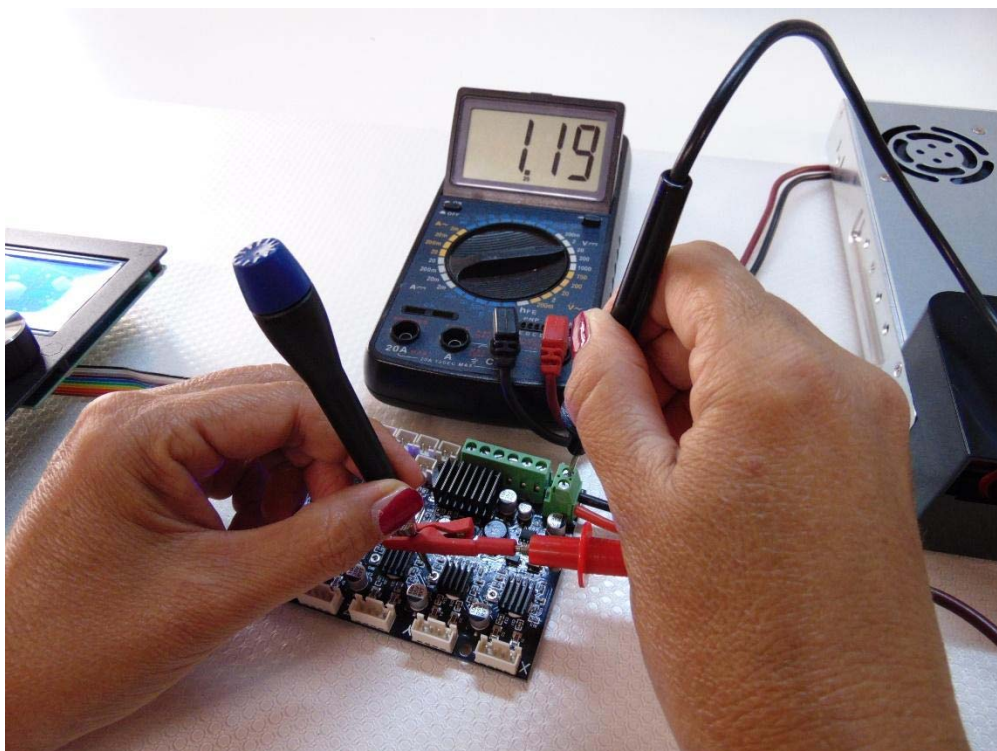
In case the drive used in V 1.1.4 is the **A4988** integrated circuit - In the multimeter the initial voltage will be equal to **0.56 volt**



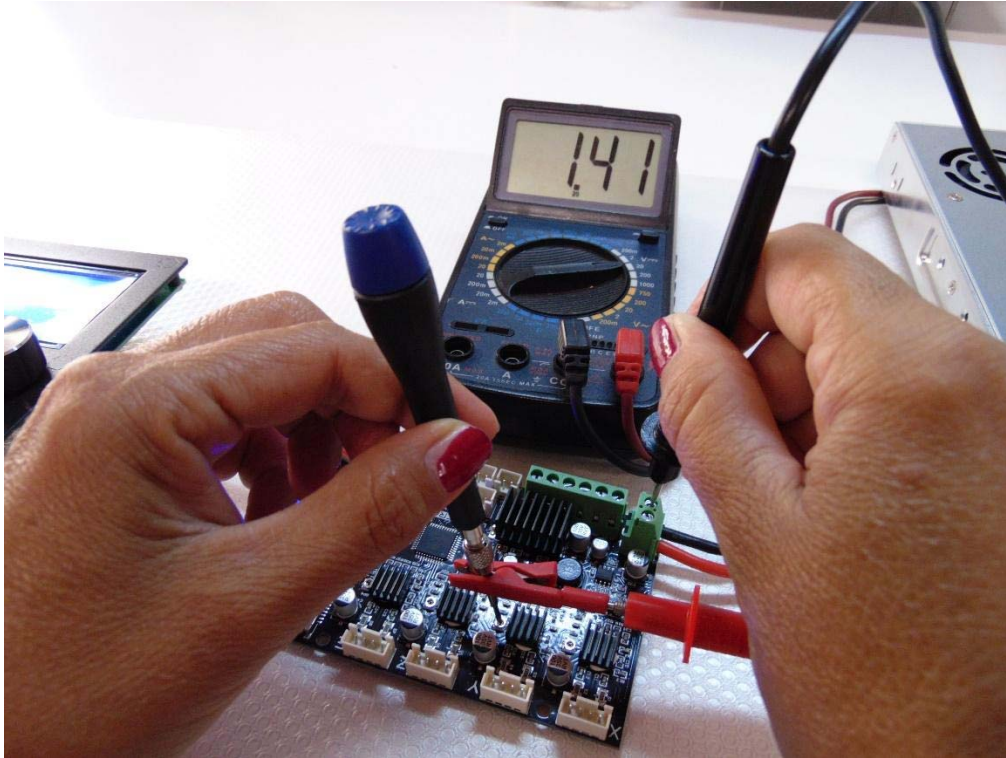
Slowly turn the trimmer up to **0.73 volt**.



If the drive used in **V 1.1.4** is the **TMC 2208** integrated circuit or the motherboard is **V 1.1.5** – On the multimeter the initial voltage will be equal to **1.19 volt**.



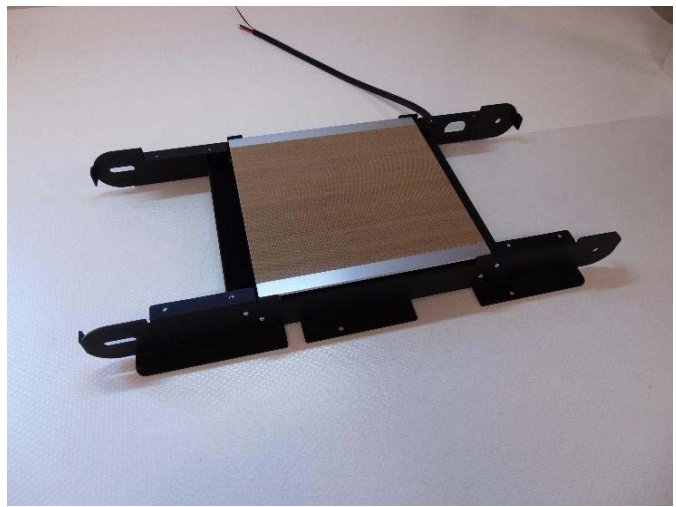
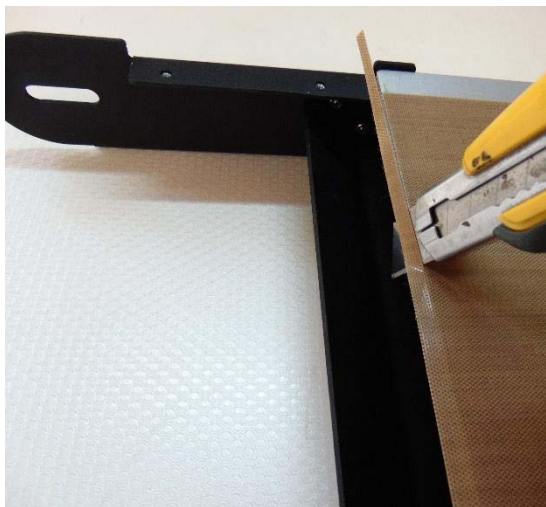
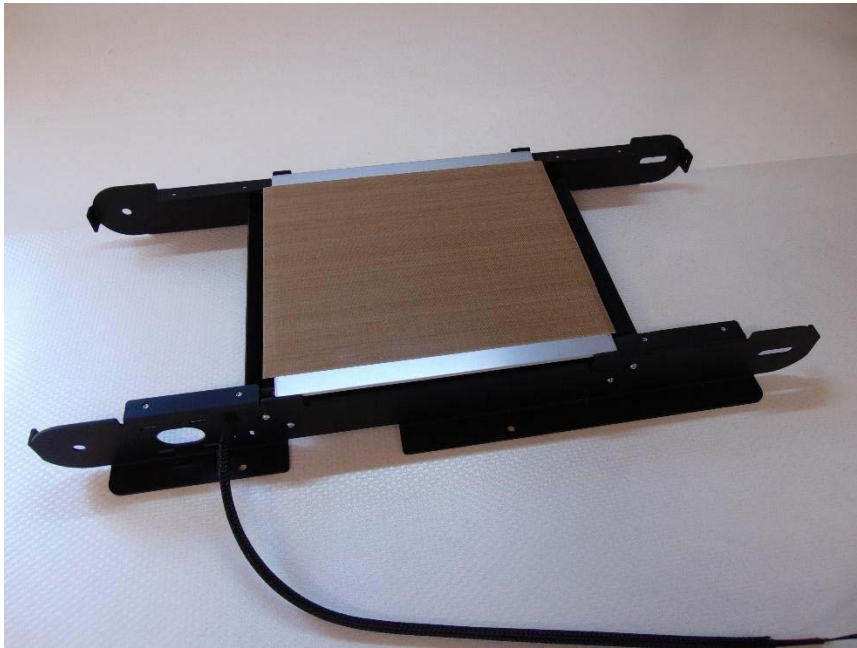
Slowly turn the trimmer up to **1.41 volt**.



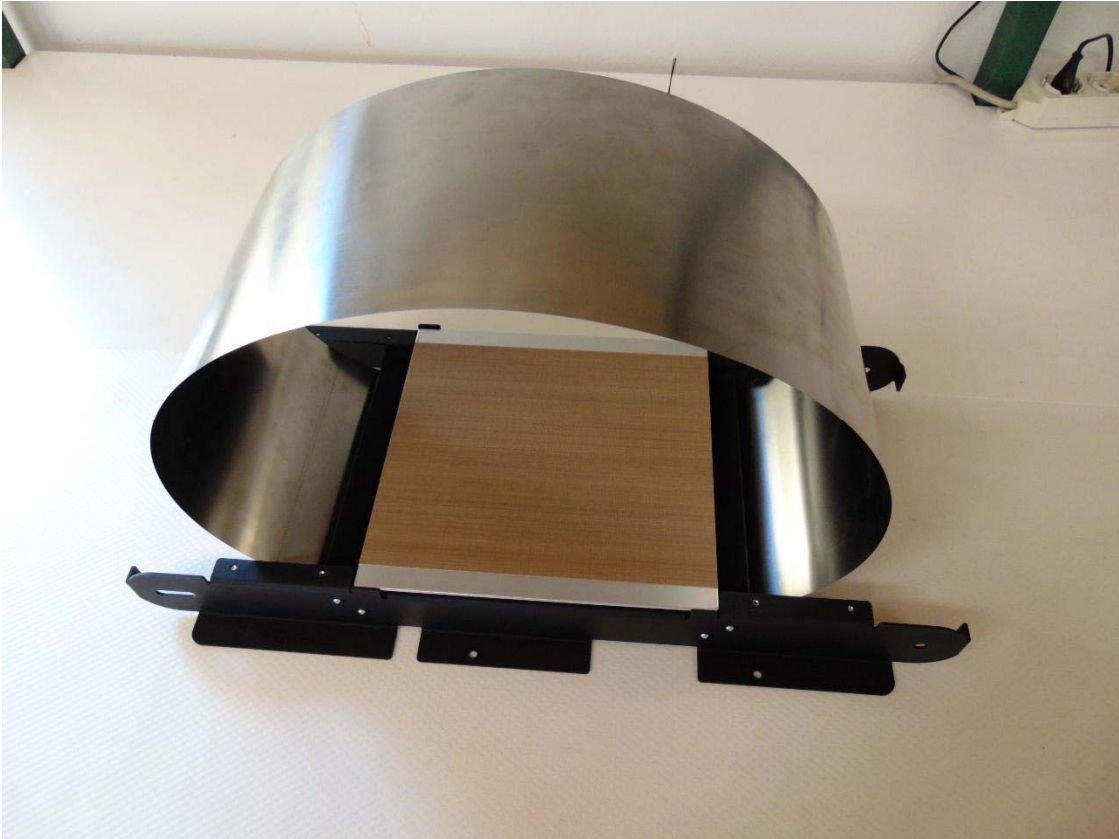
With this last operation the entire preparation phase was completed.

After carefully cleaning the top with turpentine or isopropyl alcohol, apply the **Teflon adhesive** to the heated bed.

Attention apply the **Teflon adhesive** as centered as possible, taking care to cut the two ends with a cutter as close as possible to the edges, also press the upper part very well so that it sticks stably.

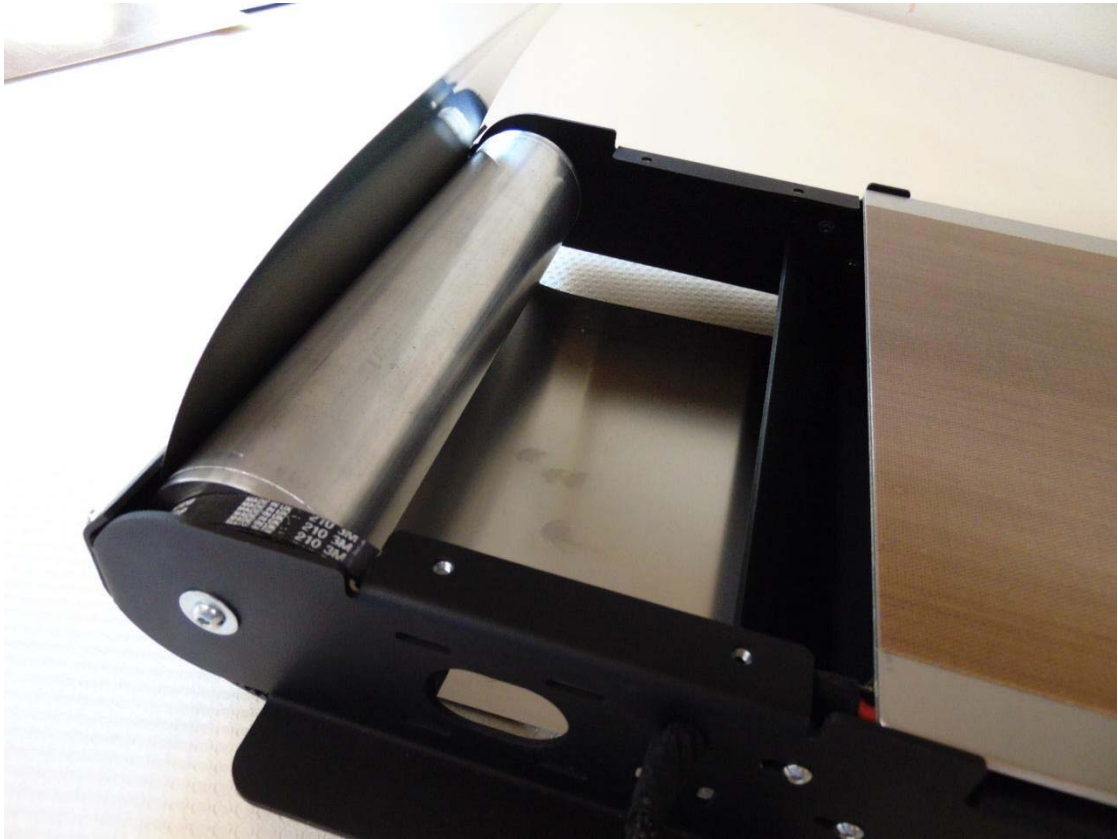


Belt assembly

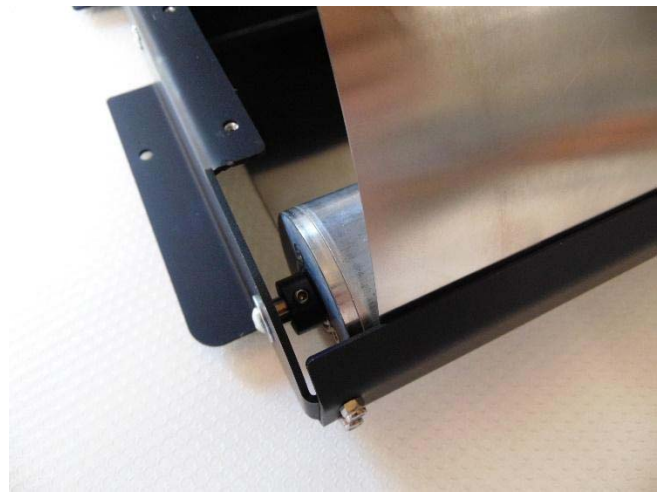
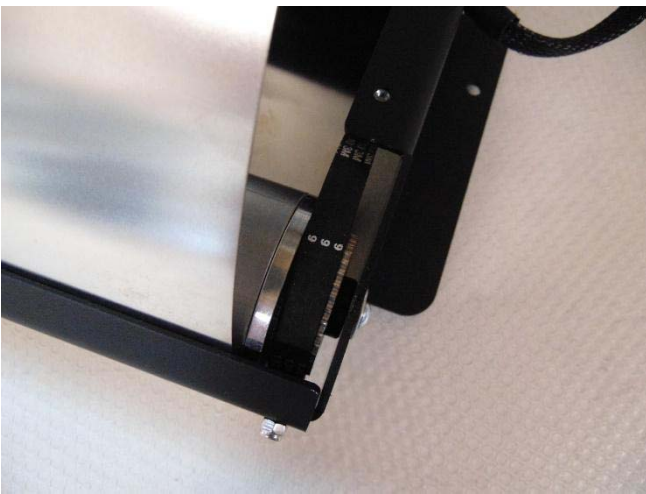


Pay attention to the direction and the side where the hole for the limit switch is present.

The tape should be inserted with the upper (joint) overlapping part towards the front and the hole on the motor side.

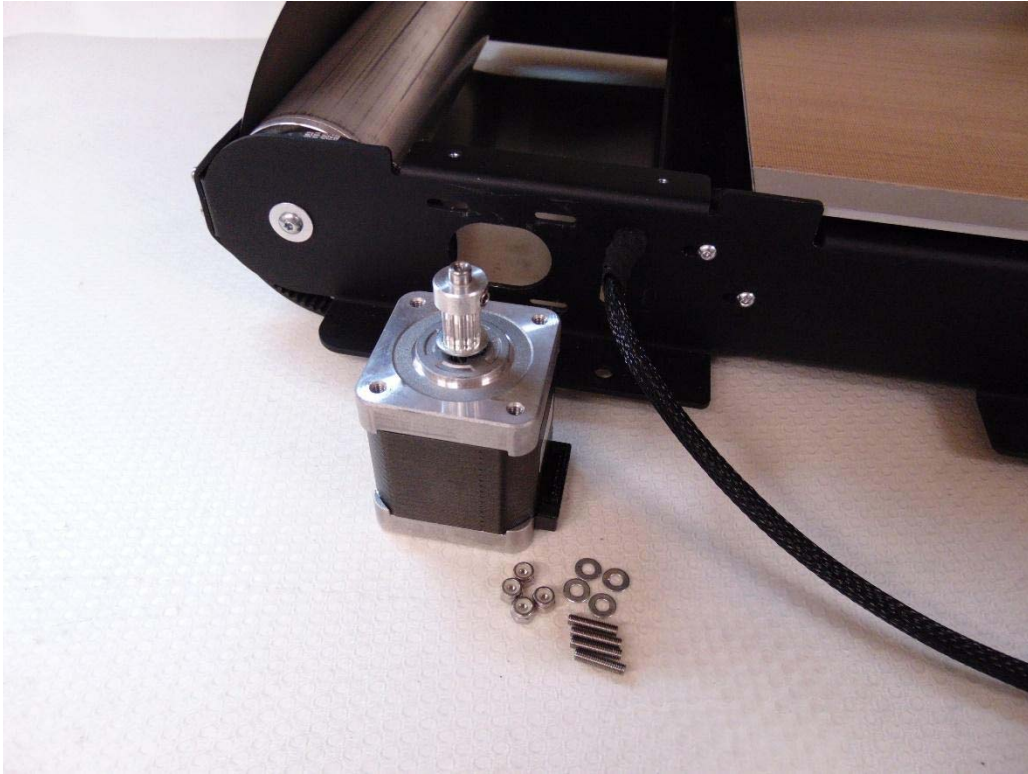


Pay attention to the position of the spacer block and the block to stop the cylinder in the correct position.



Push the cylinder to the right so that it rests on the spacer block, place the block with screw on the left side, remember to tighten the block screw.

Axis motor insertion



Required components:

- 4 grub screws M3 x 12
- 4 washers dia 3
- 4 self-locking nuts M3
- 1 10-tooth pinion

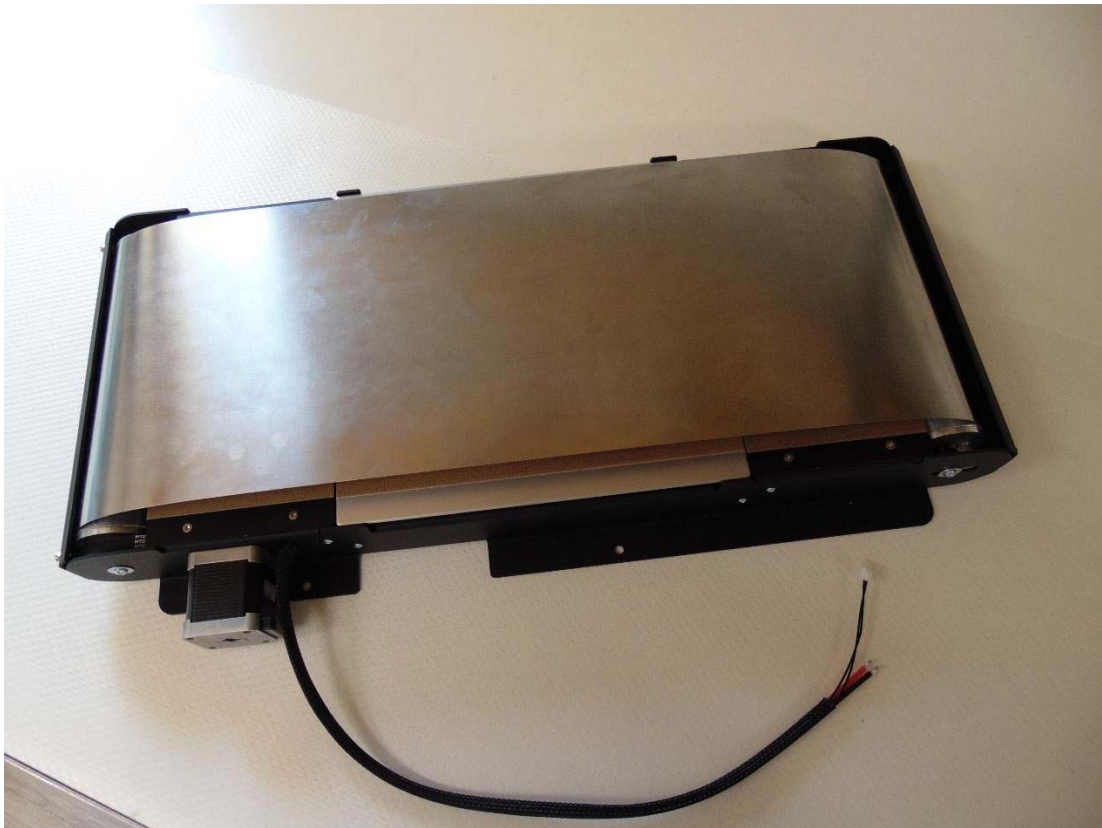
Insert the pinion on the motor axis with the part with the screws facing outwards.



Screw the four grub screws into the four holes of the motor and lock them.

Insert the motor in the provided hole (the connector must be positioned towards the front), insert the four washers and screw the nuts into the dowels.

Insertion



Required components:

- 8 countersunk head screws with hexagon socket M3 x 10

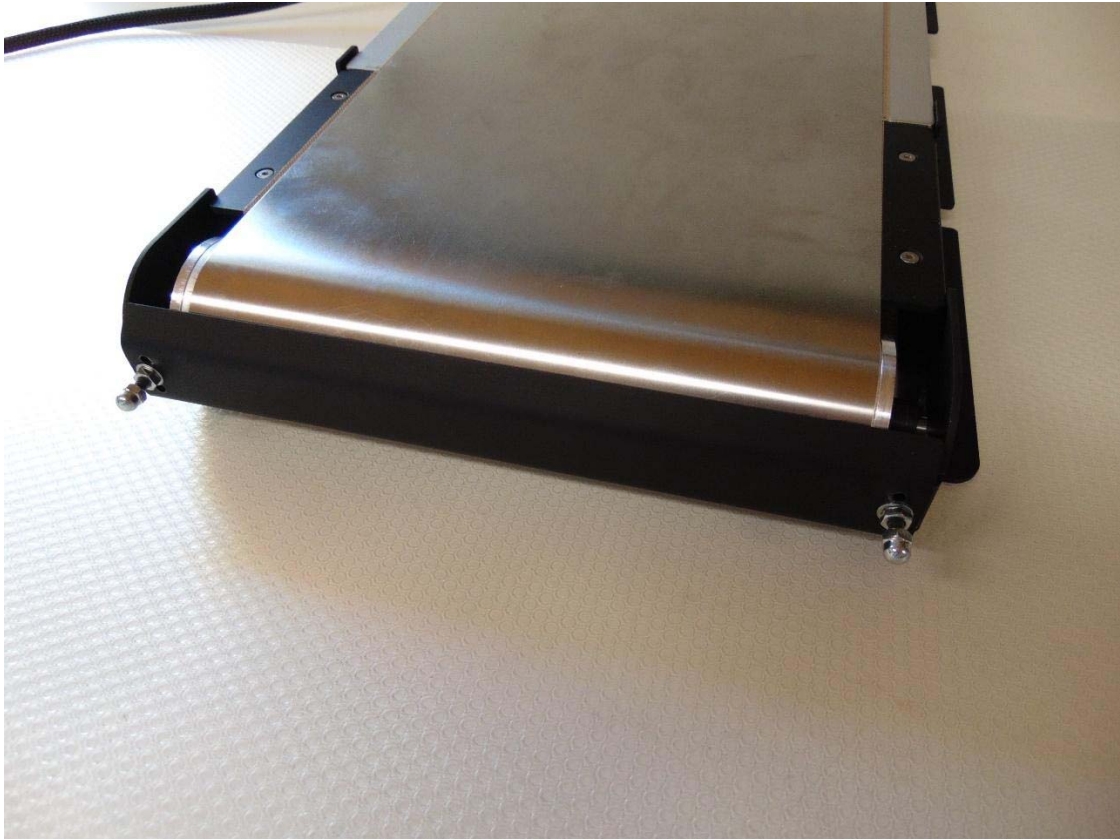
Thread the previously prepared additional tops through the tape, fix them to the structure with screws.



Tension the belt using the nuts used as tensioners, move the belt forward and backward several times to check both the tension and the correct path (the belt must remain central).

Warning: do not overtighten the belt, it may have difficulty moving!

In case the belt tends to move to one side, slightly stretch the tensioner on that side.

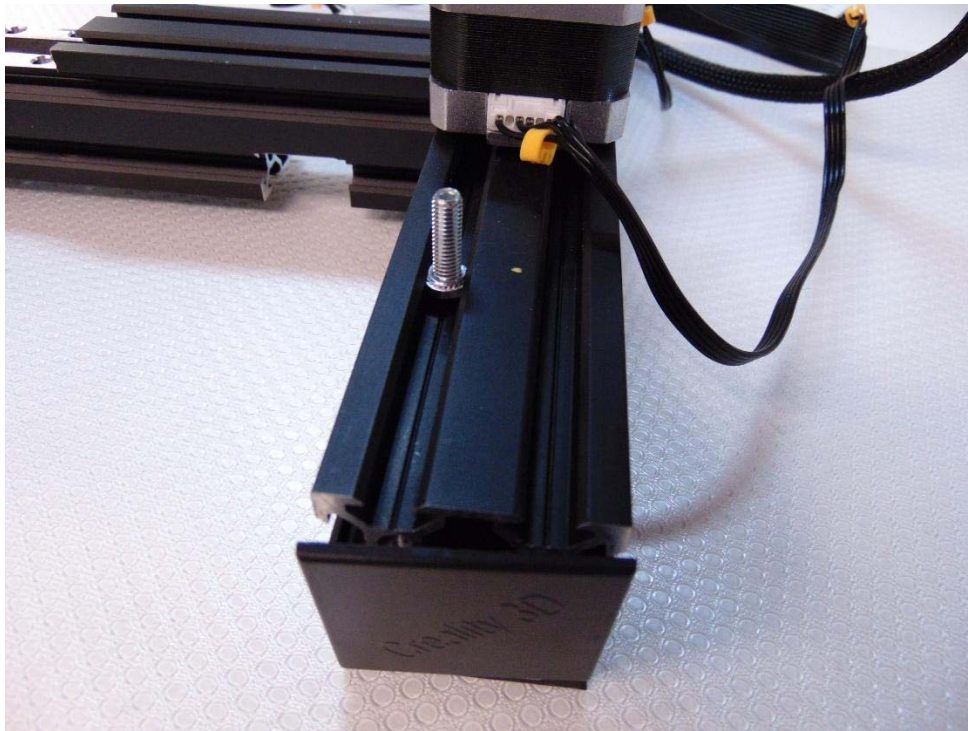


If, thanks to the different tension of the tensioners, the perfect centering of the belt is not obtained, slightly move the two additional planes (by loosening the screws) from the part where the belt tends to move.

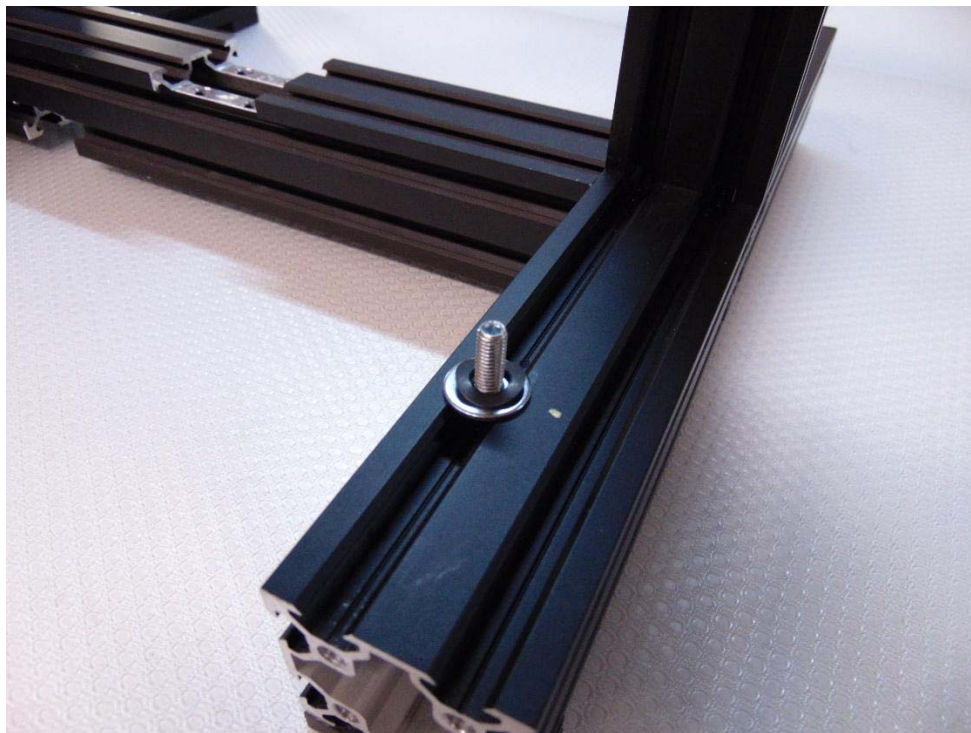
Screw the cap nuts into the grub screws to protect the tie rods.

Tighten the drive belt by moving the motor to the front, lock the four nuts that lock the motor in place with a 5.5 mm wrench.

Attention: a correct belt tension allows a correct movement of the belt without game.



Once the grub screw are locked with a 2.5 mm L wrench, checking the correct positioning, insert the oversized flat washers and the elastic ones.



Note: In the package there are more elastic washers in case you need greater thicknesses.

Position the **Steel-Roller** so that the grub screw enter the prepared holes (if necessary, loosen the grub screw and move them slightly, then locking them firmly).



Insert the washer and screw the four M5 nuts on the grub screw with an 8 mm spanner.

Attention: do not lock yet, the fixing will be adjusted later to allow, through the elastic washers, the perfect alignment of the plan with respect to the X axis.

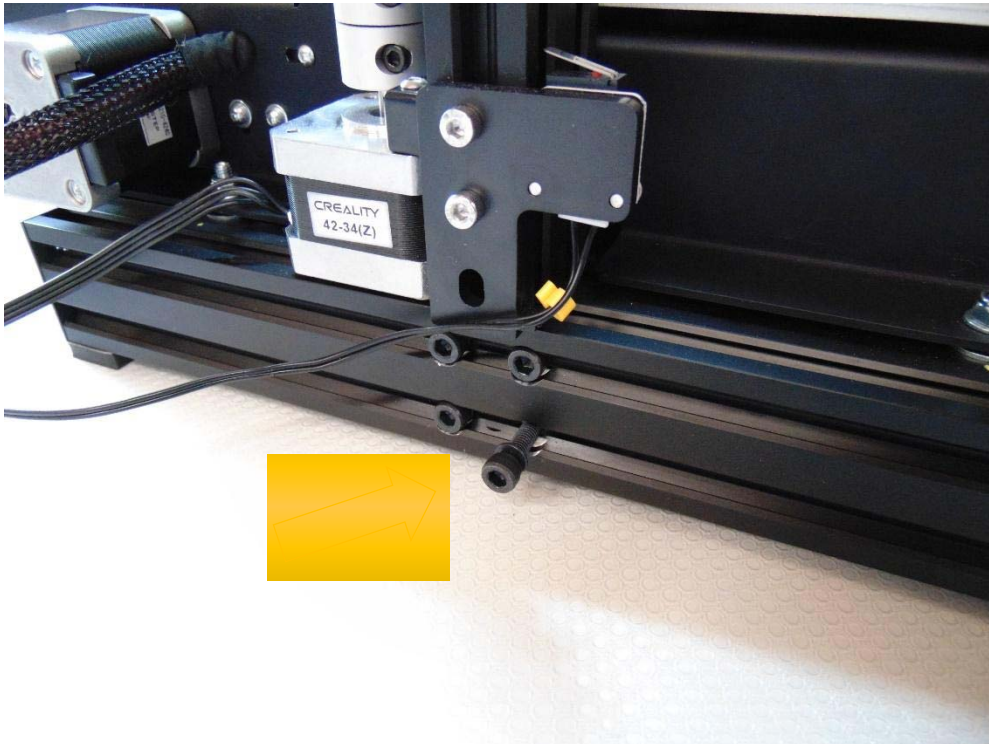


It is advisable to adjust the nuts using the L wrench and the fixed wrench at the same time.

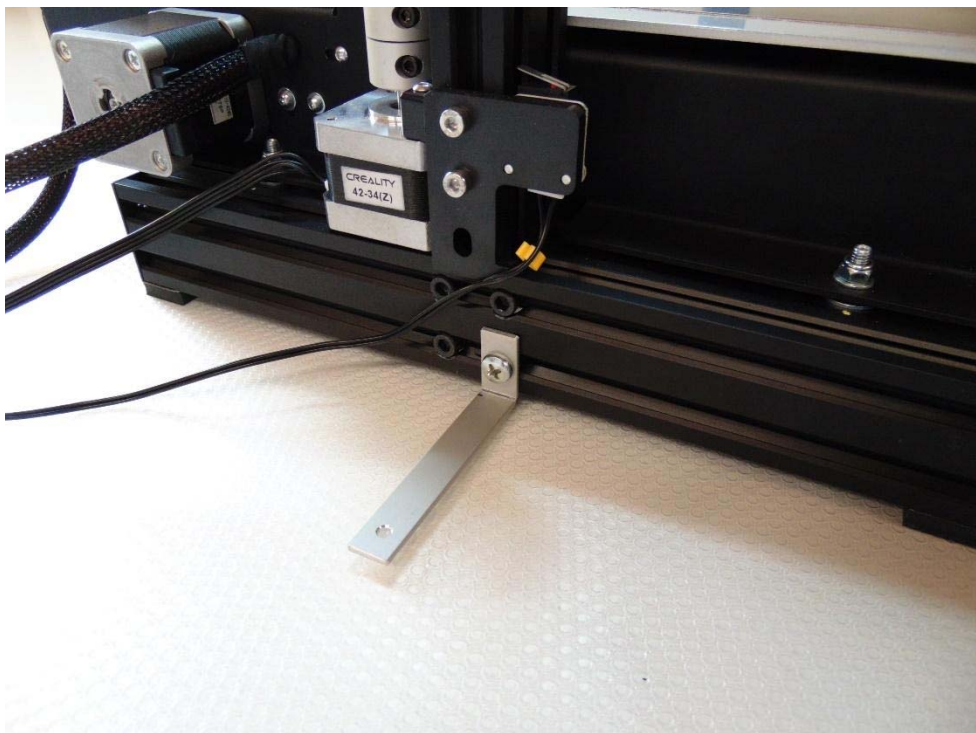
WHAT TO ASSEMBLE AND HOW

Since the drives in the motherboard **heat up particularly** and in the original version the electronics container is positioned under the heated surface (very inconvenient even for maintenance) with the cooling fan downwards (therefore with limited air movement), we recommend moving the container **outside** and for this **we have prepared an additional support**.

Remove the lower right screw from the left side.

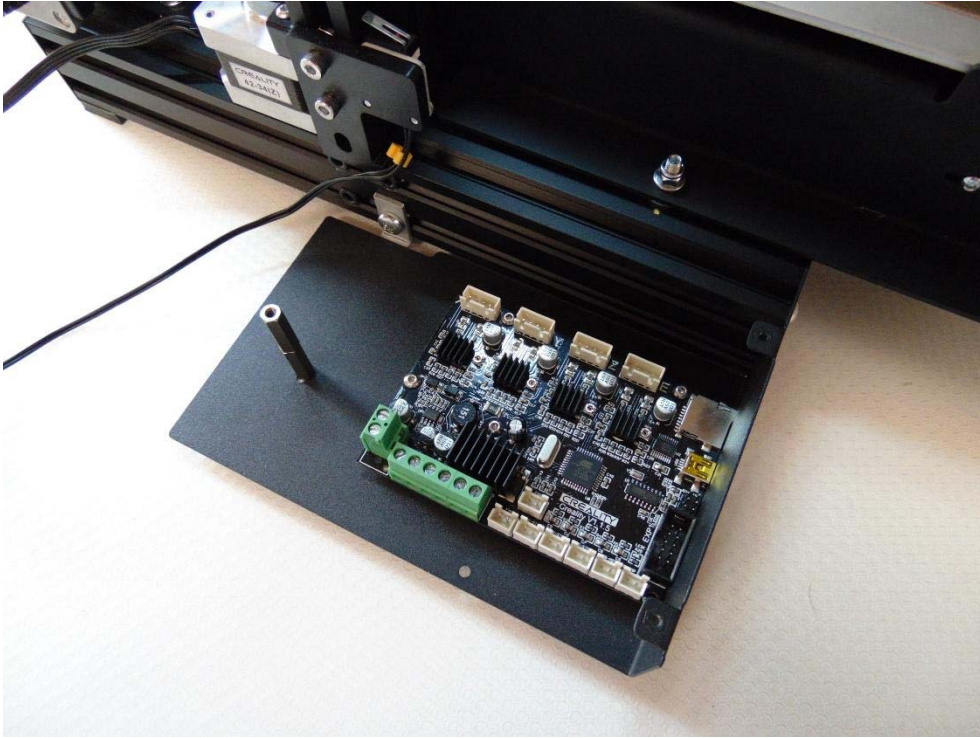


Insert the additional support and lock it with the new screw provided.

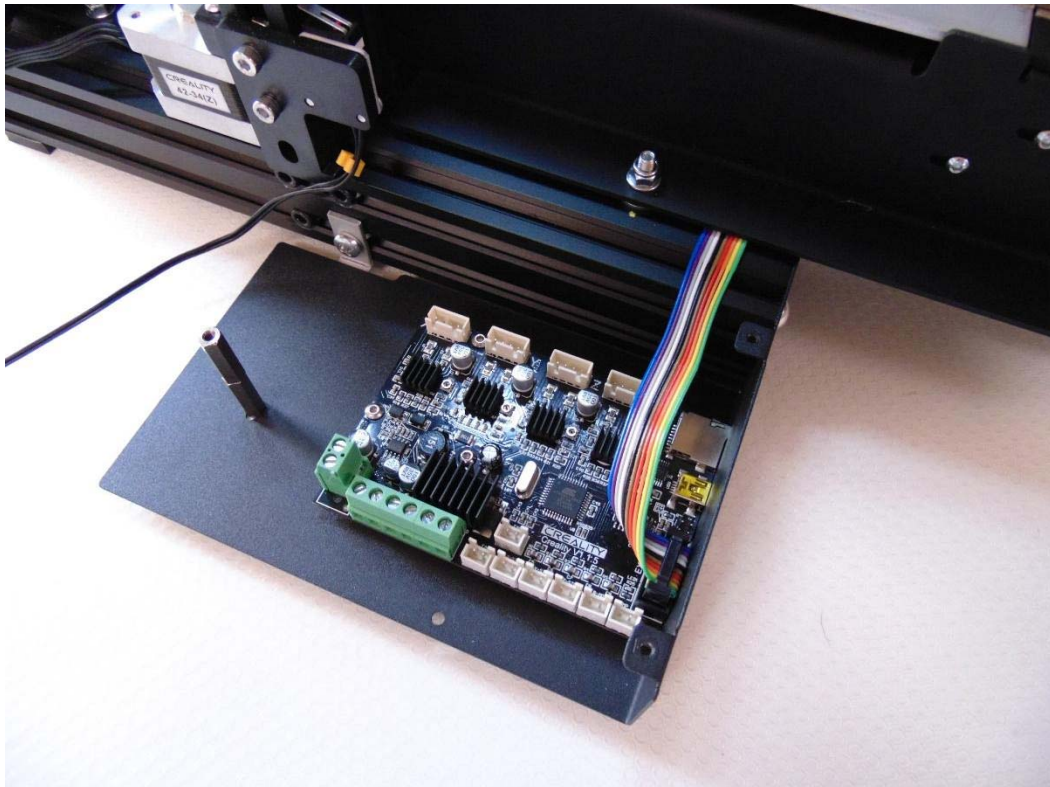


Rest the container and fix it to the front with the screws previously removed.

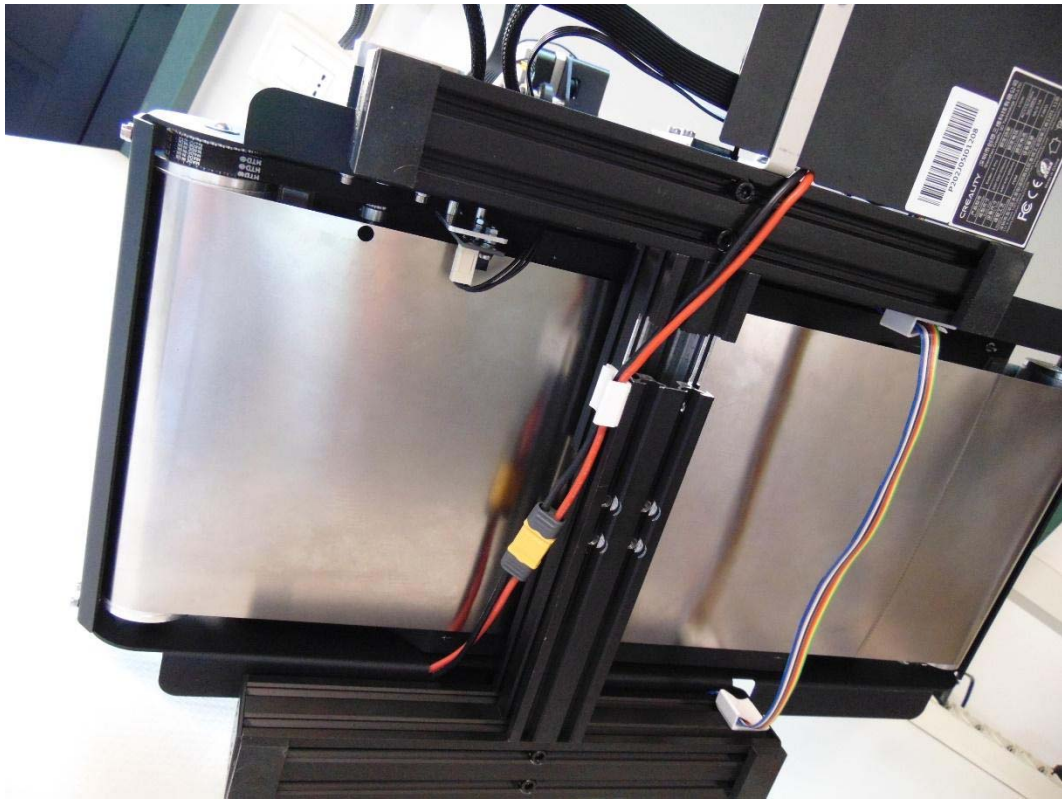
Secure the motherboard with the four previously removed screws.



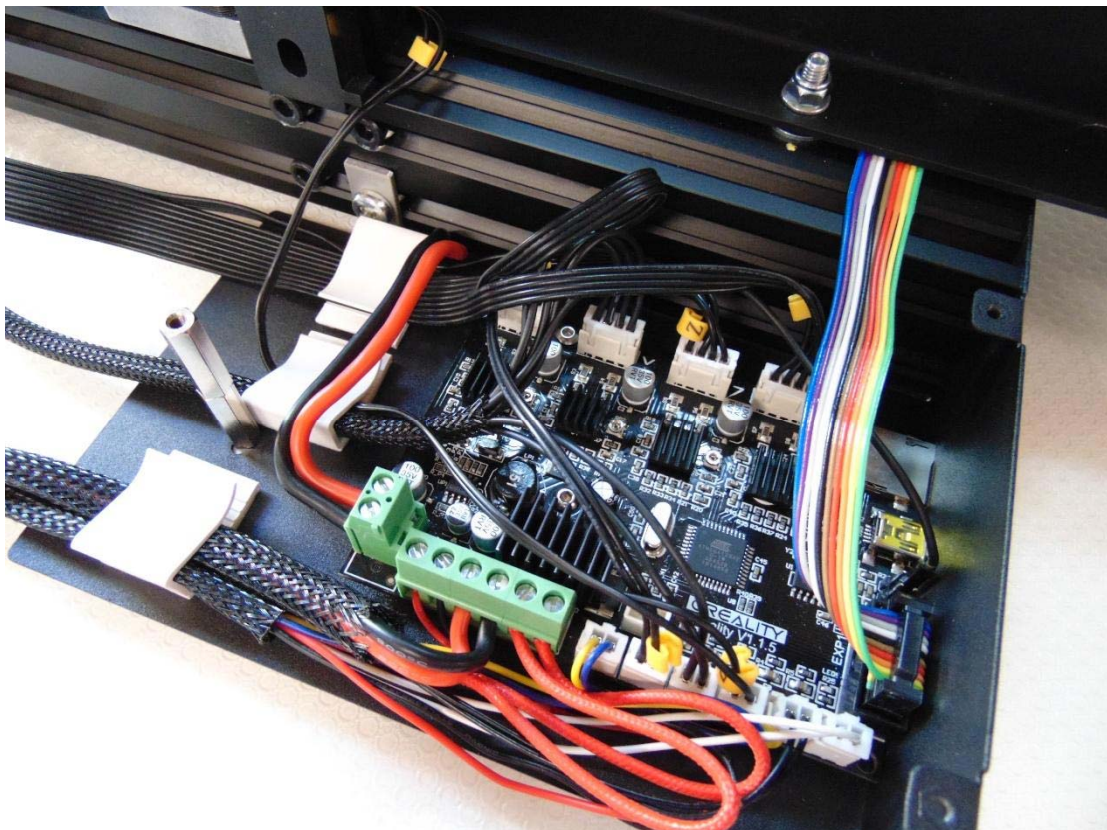
Connect the display cable as shown, passing it between the frame and the **Steel Roller**.



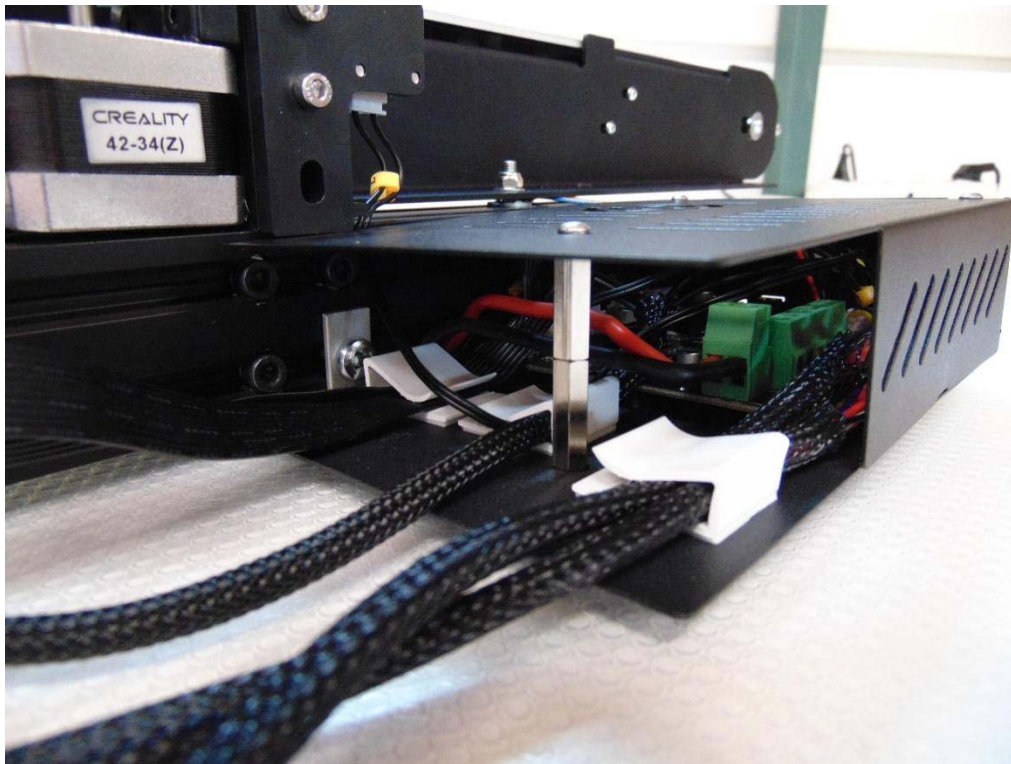
Fix the power supply in its place and pass the cables between the structure and the **Steel Roller** from the right side, position the adhesive and fix the cables, then pass them between the structure and the electronics box.



Referring to the initial part (**WHAT TO ASSEMBLE AND HOW**), reposition all the remaining connectors and cables in their place, fixing them with the stickers provided (see figure).



What the finished wiring will look like at the end.





Robot Factory S.r.l. - Via Caltana, 59 - 30035 Mirano (Venezia) - P.IVA: 03654900277

Tel./Fax: +39 (0)41 5770270 Mobile: +39 338 7159853

Site: www.robotfactory.it - E-mail: robot@robotfactory.it

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