ASSEMBLY INSTRUCTIONS

Version 1.1

RepRap

motion TECH

µdelta

Introduction

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- **Sources :**

http://reprap.org/wiki/RepRap
http://www.repetier.com/

- **License :**

- **Update:**

Last update : 25/06/2014

- **Links:**

Reprap community: http://reprap.org/wiki/RepRap

Repetier-Host: http://www.repetier.com/

3D models database: http://www.thingiverse.com/

µDelta introduction

µDelta is developed by eMotion Tech. This new 3D printer is easy to assemble and to operate without loss of performances.

Data sheet:

DATAS

- Printing surface Ø110 x 190mm
- Layer height [0,1 - 0,35]
- Electronic type Teensylu + 4 Stepsticks (integrated firmware)
- Motors NEMA 17
- Belt Type GT2
- Extrusion Head Hexagon 0.4
- Dimensions : Height 440mm Width 250mm Depth 250mm
- Nominal printing speed 70mm/s
- Max speed 200mm/s
- Nominal speed 130mm/s
- Average precision 100 microns
- Average precision (Z) 50 microns
- Operating system Windows™ XP, Windows™ Vista, Windows™ 7+, Ubuntu 12+
- Consumable PLA 1.75mm
- Provided with Repetier preset for µDelta
- Connectivity USB
- Power supply provided yes, 12V 120W

STRUCTURE

- Laser cut Acrylic 5mm
- Extruder core printed in ABS with 0.2mm layer height
- Smooth rod 8mm
- Manufactured Plate plywood 12mm

ERGONOMY

Easy to mount: A 3D printer kit with an intuitive assembly

- Simple electronic, no soldering
- Easy wiring and assembly
- Belt adjustment with ergonomic belt tensioners

Easy to calibrate: A simplified software

- Fully software calibration
- Pre-configured open-source software (no firmware upload required, Repetier Host and Slic3r pre-configured)

Easy to maintain

- Quick height adjustment with the software

OPTIMISATION AND UPGRADE

You can improve the µDelta by adding the following option (soon available on eMotion Tech website):

- Spool holder with fan
- LCD screen controller to print without computer
- Lighting with circular LED
- Heated bed

Safety instructions

General safety instructions

ALWAYS HAVE ADULT SUPERVISON WHEN USING THE PRINTER.

The nozzle can reach 270°C, **TO AVOID BURNING, DO NOT TOUCH THE NOZZLE WHILE THE PRINTER IS WORKING.**

KEEP THE PRINTER AWAY FROM CHILDREN AND ANIMALS.

OPERATE IN A VENTILATED ROOM. Plastic fumes effects are not known. In case of use in a closed room we recommend the use of an extractor fan.

The addition of protections is your responsibility. Safety can be improved by:

- An emergency stop button
- Housing protection
- Smoke detector

CE marking

µDelta is a 3D printer kit. It includes all the parts you need for assembling but does not include additional protections.

Electrical safety.

The power supply provided is labelled CE. The Power supply is protected against short-circuit and do not need any modifications. The µDelta operate at voltage of 12V and is not concerned by the low voltage directive.

Further information

Information above are not exhaustive.

We used sources of information we consider as reliable. However, we cannot guarantee that all these information are true and complete.

We assume no liability for loses, injuries or damages due to assembly, transporting, storage, use, assembly, transporting or removal of the product.

ASSEMBLY

Bill of materials

A. Printed parts

1x Core

12x rod clamp

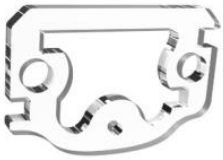
1x filament guide

B. Acrylic parts

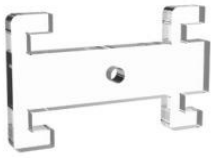
Acrylic parts can be covered with protection and it may remain pieces of plastic. Remove it before use

We provide additional parts.

1. Tensioner



6x eM 1



6x eM 2

2. Slider

6x eM 3

6x eM 4

6x eM 5

3. Motor holder

3x eM 7

6x eM 6

4. Extruder

2x eM 8

1x eM 9

1x eM 10

2x eM 11

1x eM 12

1x eM 13

C. Smooth rods and connecting rods

6x Ø8x400mm smooth rod

6x Connecting rod

D. Mechanical parts

9x Linear bearing

1x Spring

3x 624 ball bearing
1x 604 ball bearing

1x drive wheel

3x GT2 Belt

3x GT2 Pulley

A. Screws, nuts and washers

6x M3x10mm screw
14x M3x20mm screw
20x M3x25mm screw
15x M3x30mm screw
11x M3x50mm screw
4x M4x25mm screw
6x M2.5x16mm screw
3x Wood screw

61x M3 nut
4x M3 wing nut
8x M4 nut
6x M2.5 nut

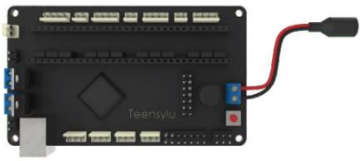
76x Ø3mm washer
7x Ø4mm small washer
5x Ø4mm big washer

1x M4 Nylstop nut

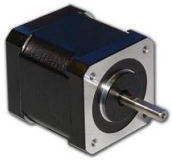
8x M3 grub screw

We provide more Screws nuts and washer than necessary.

B. Electronics



1x Teensylu



4x Nema 17 motor

3x endstop

2x Fan 3x3

4x stepstick

1x Power supply

C. Additional parts

1x inferior frame

1x superior frame

1x Print bed

1x Ø4xM6mm pneufit

1x Ø4x 1/8 ”pneufit

1x braided sleeve

1x PTFE tube

30x Zip tie

3x pad

1x adhesive tape

D. Hexagon kit

1x Hexagon hot end

1x Thermistor

1x cartridge heater

1x Hex key 3

1x Wrench 4.5

A. Options

Parts of the following section are not included in the basic µDelta kit. You can find them on eMotion Tech website.

1x Spool holder frame

3x Chock

1x 6x6 fan

8x Spool holder clamp

4x Ø8mm rod

4x 608 ball bearing

16x M3x20 or M3x25 screw

16x M3 nut

1x LED

Tools

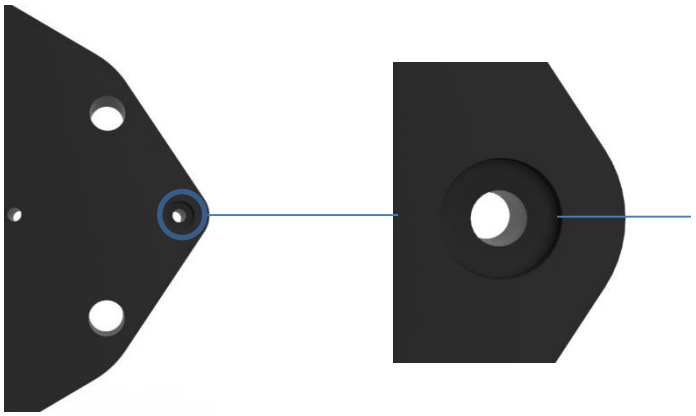
- Mallet
- Slot screw driver
- Philips screw driver
- ceramic screwdriver
- Wrench 5,5 and 7
- Wrench 4,5(provided)
- Hex key (provided)
- Long nose pliers
- Cutting pliers
- utility knife
- Meter

Mechanical assembly

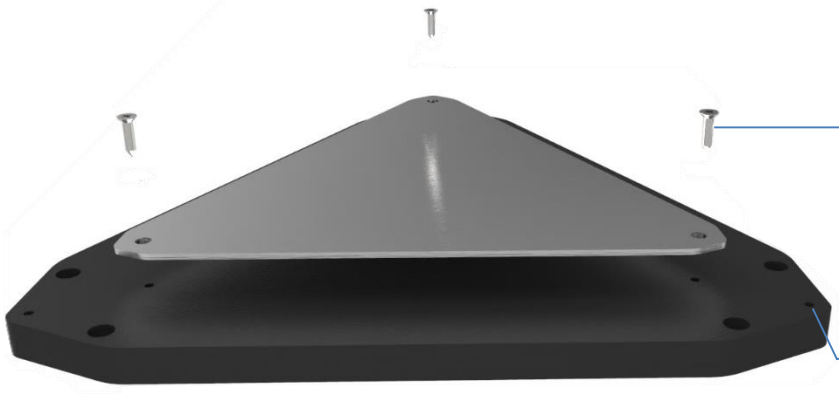
A. Bottom assembly

1. Inferior frame

- **1x** Inferior frame
- **6x** Ø8x400mm smooth rod
- **1x** Print bed
- **3x** Wood screw



Big hole downward



Wood screw (x3)

Small hole upward

Use a mallet to insert **completely the rod without exceeding the plate.**

Smooth rods must be normal to the inferior frame

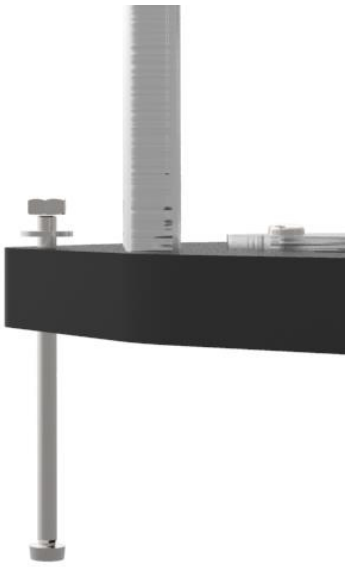
2. Tensioner

- **6x** eM1
- **6x** eM2
- **3x** 624 ball bearing
- **3x** M3x50 screw
- **3x** M4x25 screw
- **3x** Ø3mm washer
- **3x** Ø4mm big washer
- **6x** Ø4mm small washer
- **3x** M3 nut
- **6x** M4 nut

M3 nut
Tighten **against the frame**

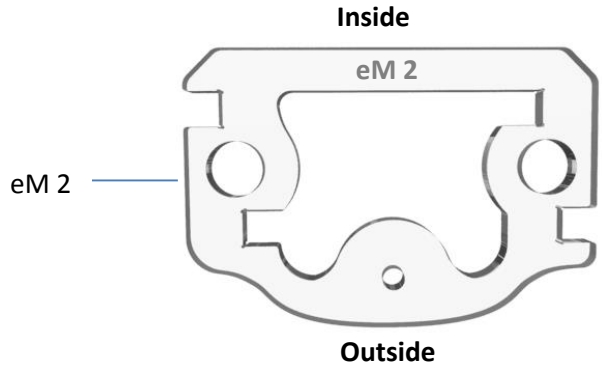
Ø3 washer

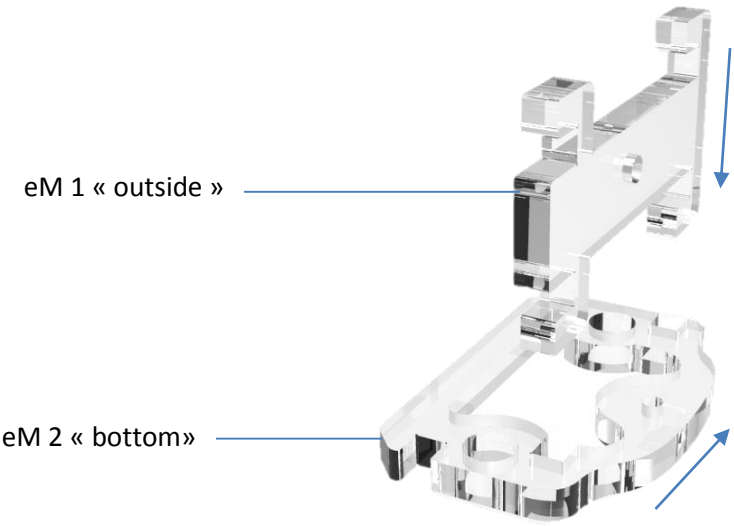
M3x50 screw

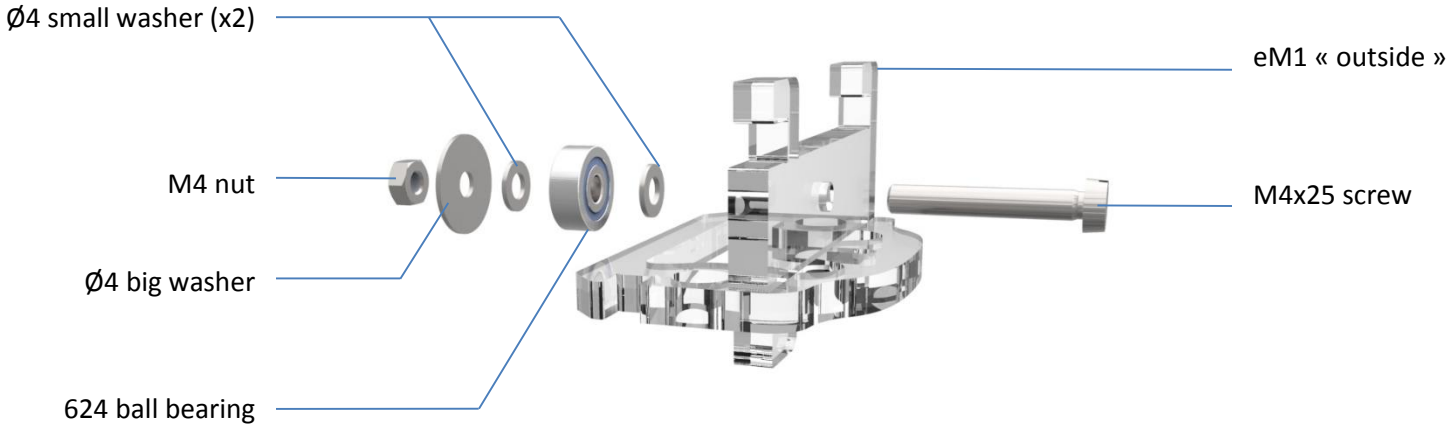


Repeat this operation for each corners

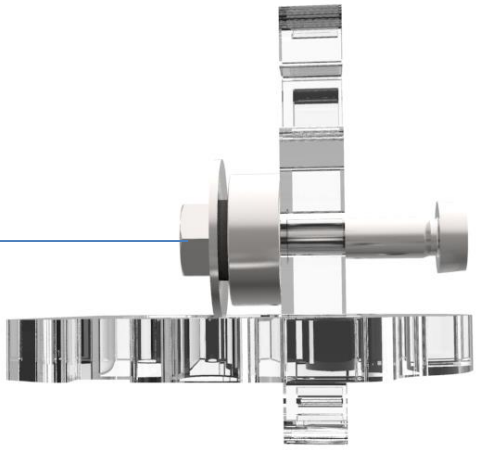
Acrylic parts can be covered with protection and it may remain pieces of plastic. Remove it before use

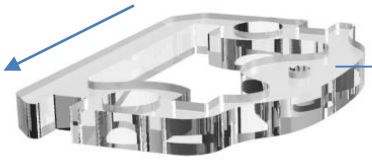




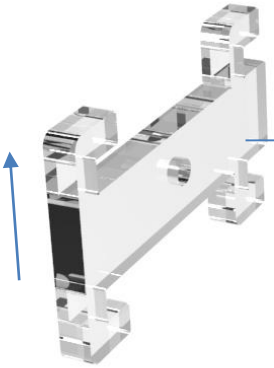


Nut **at the end of the screw**

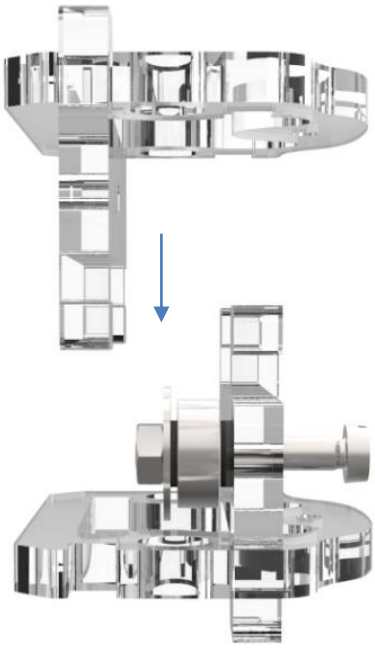




eM 2 « top »

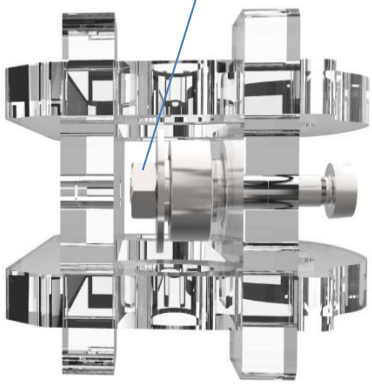


eM 1 « inside »



Tighten nuts moderately to avoid breaking Acrylic parts

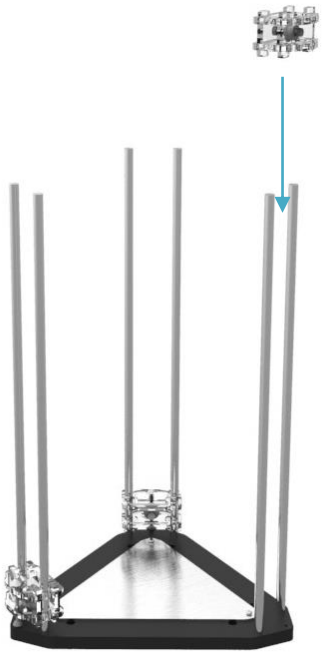
Tighten **against the washer**

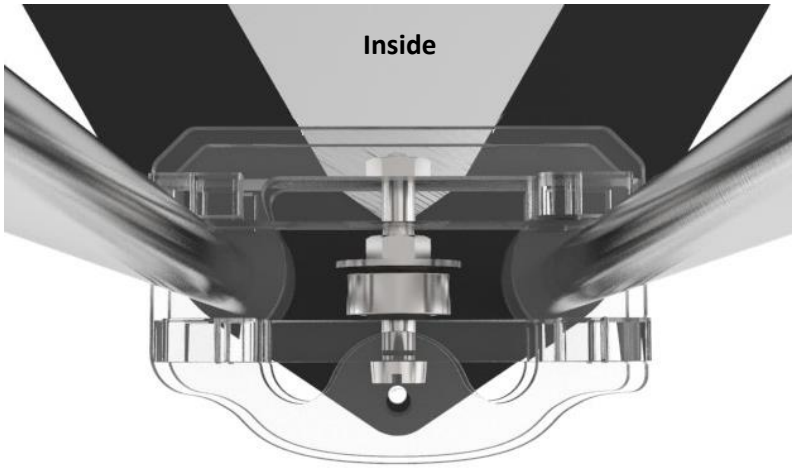


M4 nut

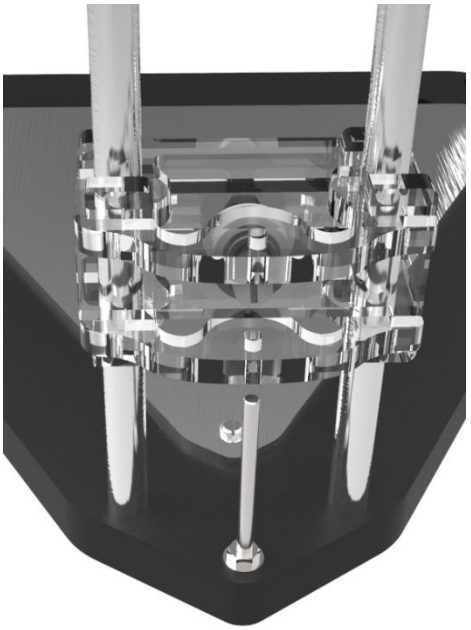
Tighten **moderately**

You can add a drop of glue to maintain the nut on position





Do not put the screw trough the slider

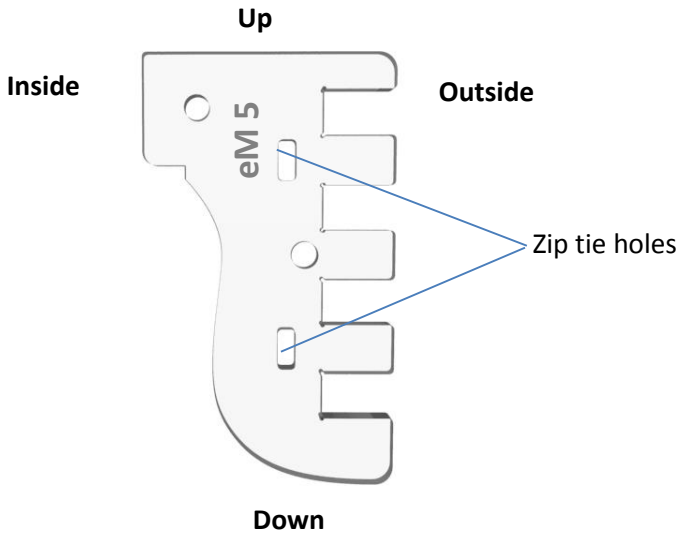


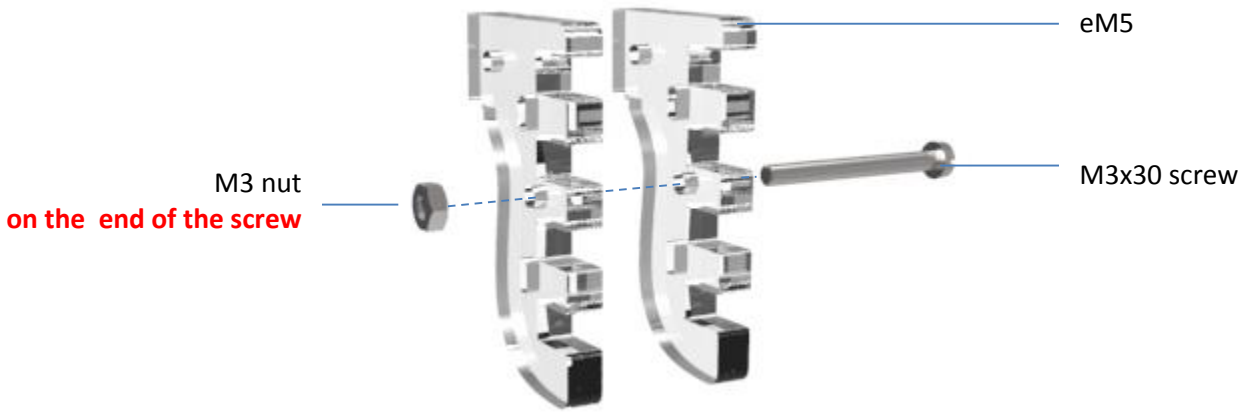
Repeat the operation for the others tensioners.

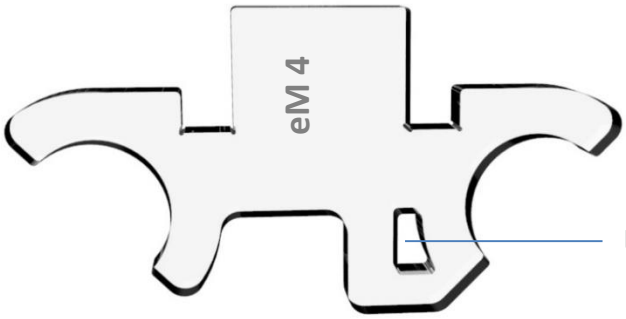
3. Sliders

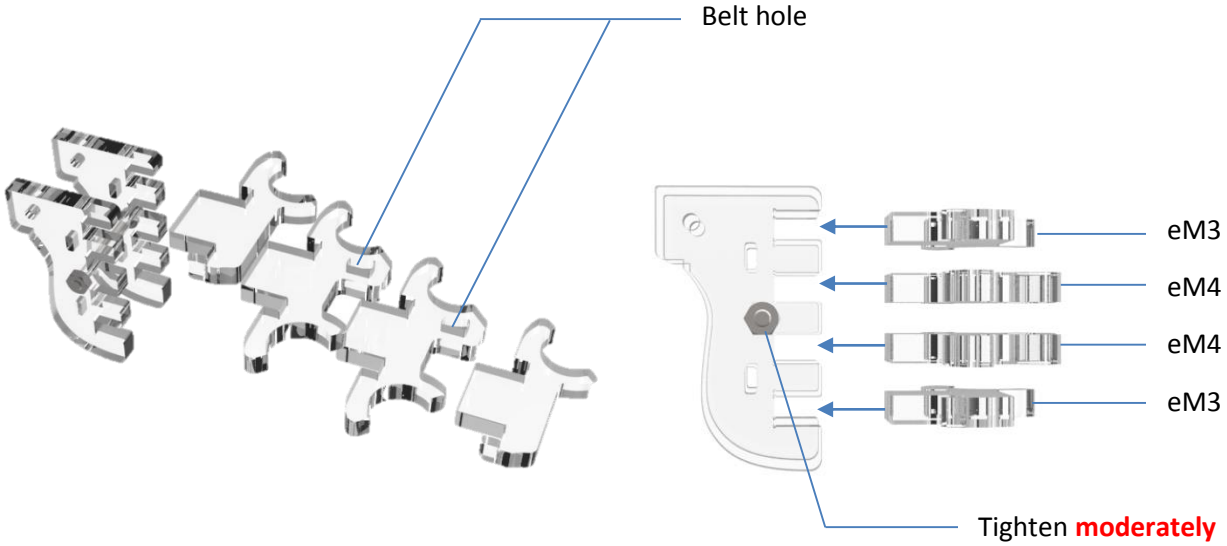
- **6x** eM3
- **6x** eM4
- **6x** eM5
- **12x** Zip tie
- **9x** Linear bearing
- **3x** M3x30 screw
- **3x** M3 nut

Assemble all sliders in the same way.

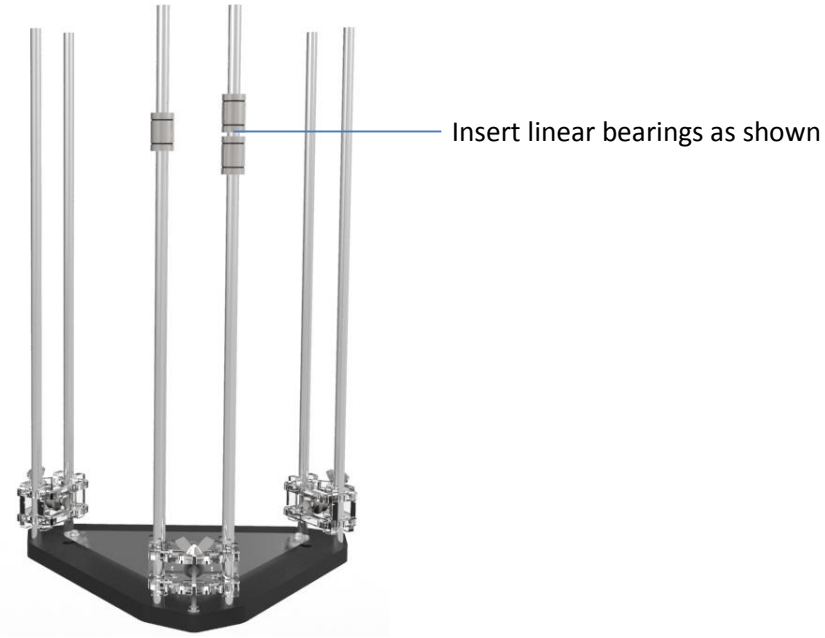


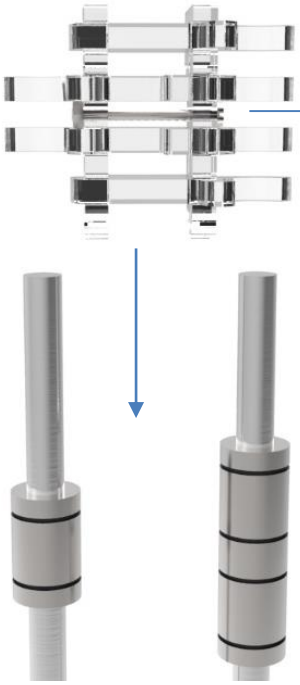






After tightening the screw, eM3 parts may move, it is not a problem.

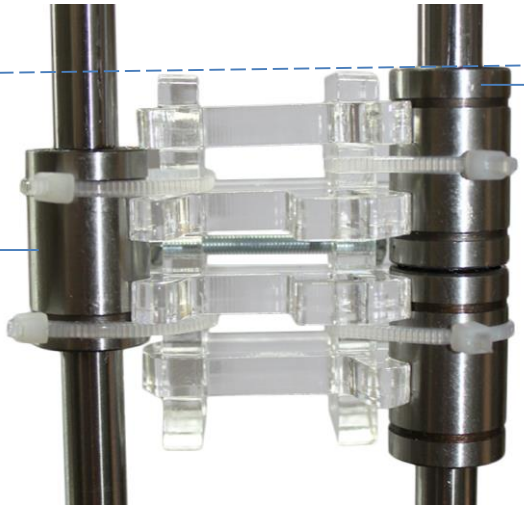




The four fixations must be on the same side than the two linear bearings

Insert a zip tie in each hole. Tighten the zip ties to fasten the slider.

This bearing must be centered.



This bearing must **not exceed** the slider

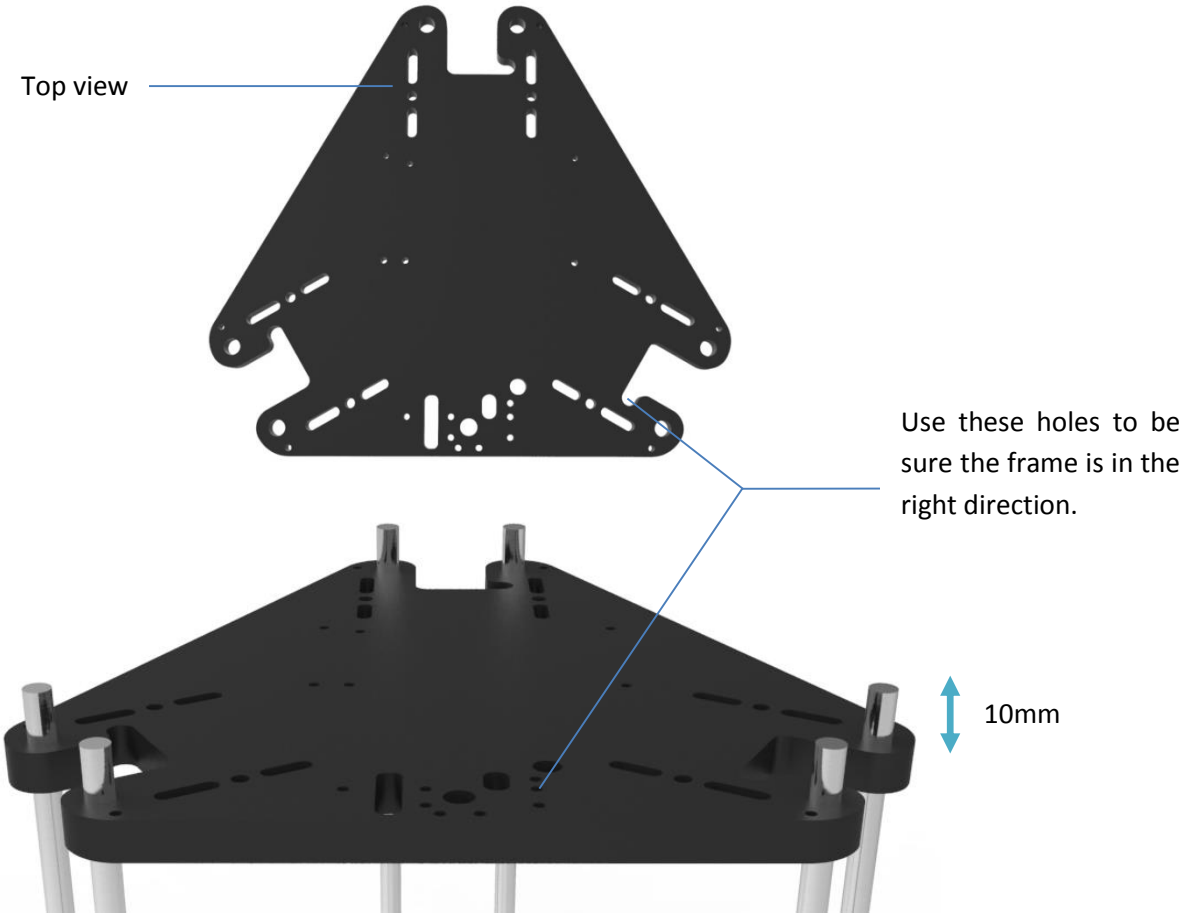
B. Top assembly

1. Motor holder assembly

- **3x** eM7
- **6x** eM6
- **1x** Superior Frame
- **3x** Nema 17 motor
- **3x** GT2 pulley
- **3x** Endstop
- **1x** Ø4x 1/8 ”pneufit
- **12x** Rod clamp
- **1x** Filament guide
- **6x** M2.5x16 screw
- **6x** M3 grub screw
- **6x** M3x10 screw
- **6x** M3x20 screw
- **12x** M3x25 screw
- **6x** M3x30 screw
- **6x** M2.5 nut
- **18x** M3 nut
- **30x** Ø3 washer

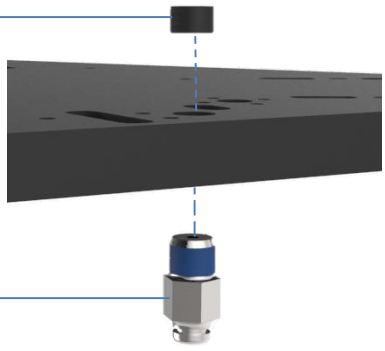
Make sure to insert the superior frame correctly.

The frame must easily slide. Do not use the mallet to insert it.



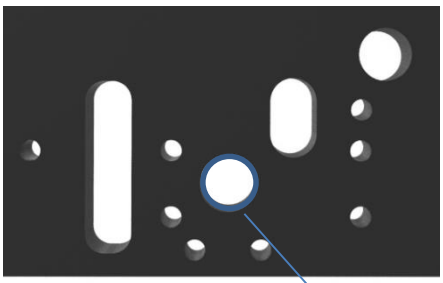
Filament guide

The side with the big hole is the upper side.



Ø4x 1/8 ”pneufit

Tighten **moderately**

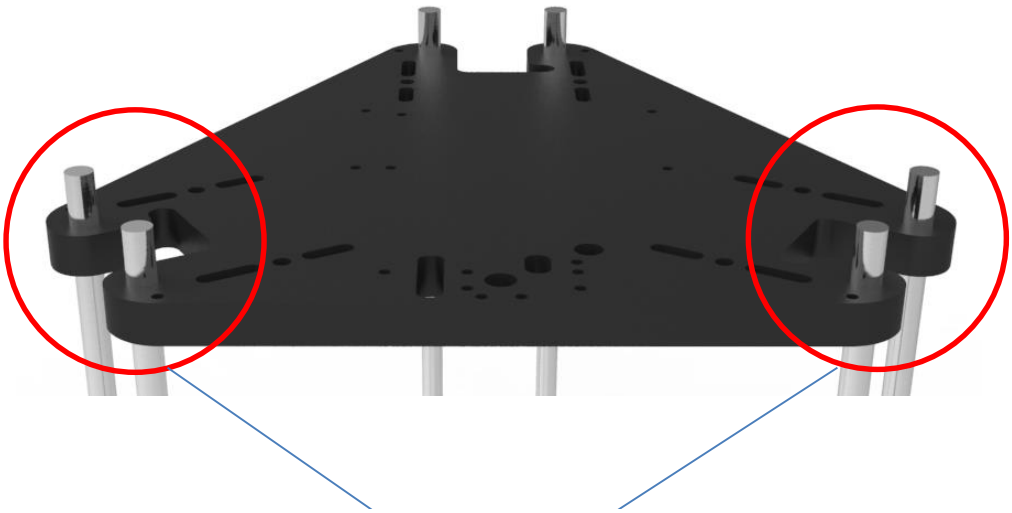


Pneufit hole

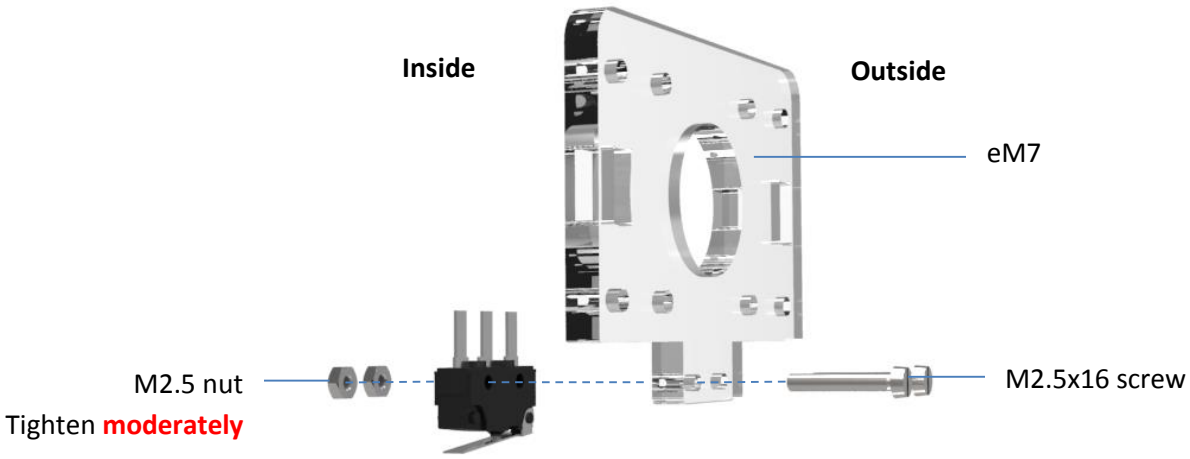
Be careful, the following step is very important!

You have to compare the wire length of the three endstops :

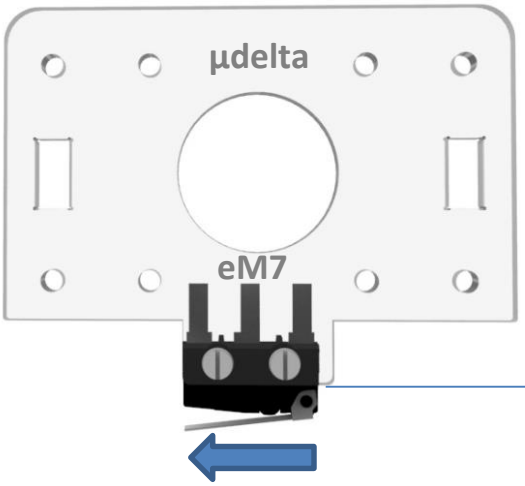
- If the **3 wires** have the **same length**, this information may not apply to you. Go to the next page.
- If you have **2 wires longer**, you have to use this endstop for the motor holder shown below.



Use the long wired endstops for these motors holders

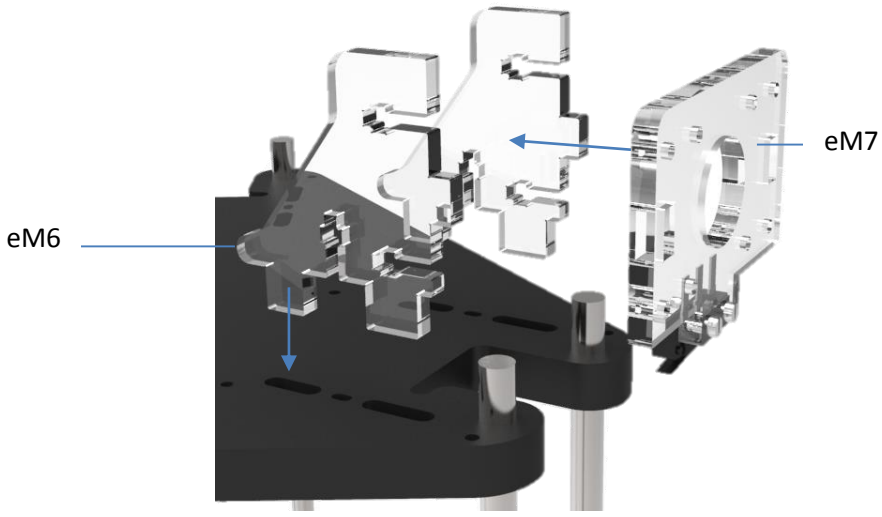


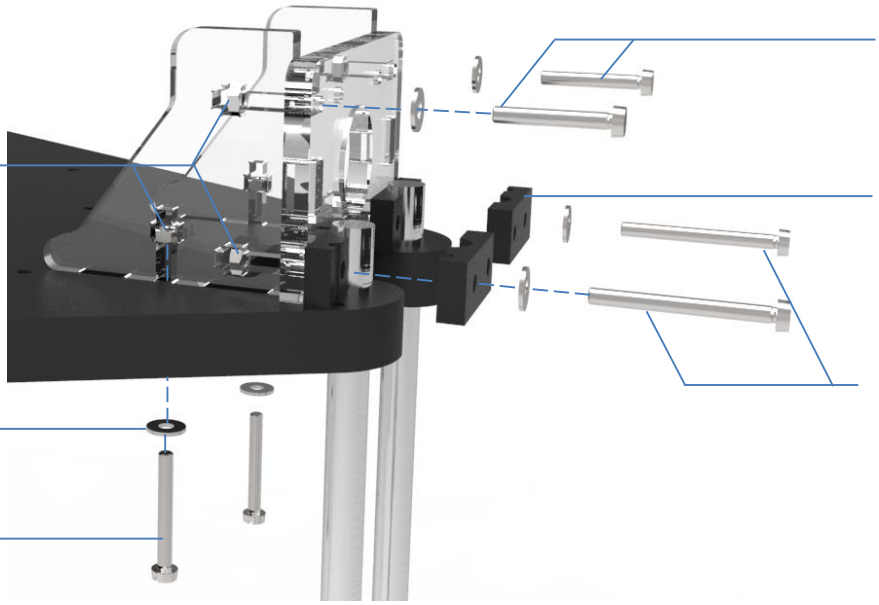
To improve the visibility we do not represent endstops wires

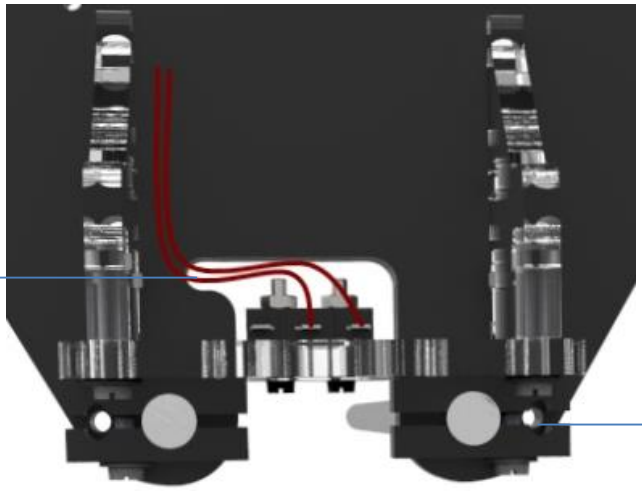


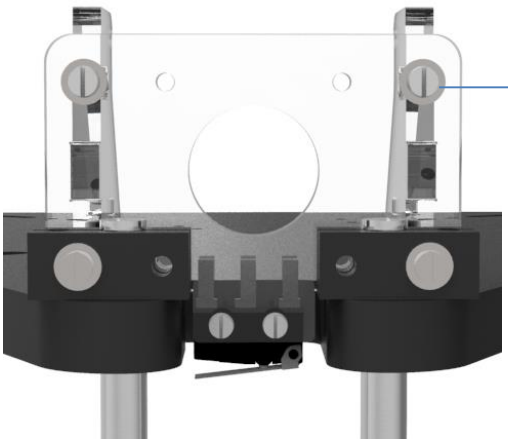
You must assemble the endstop as shown in the left figure

Push the endstop on the left when you tighten it



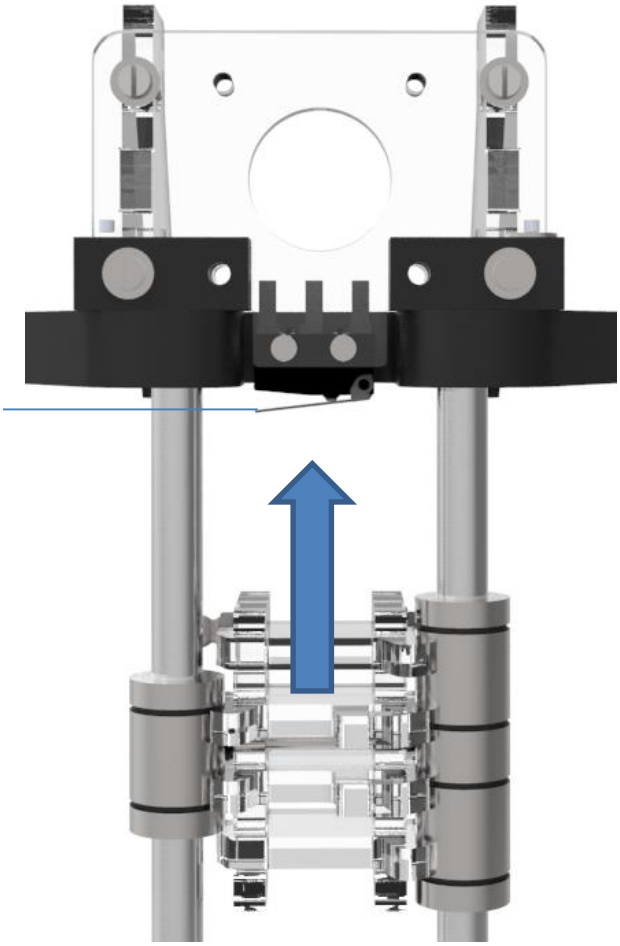

M3x20 screw (x2)
Tighten moderately
M3 nut (x6)
Rod clamp (x4)
M3x30 screw (x2)
Position without tighten
Ø3 washer (x6)
M3x25 screw (x2)
Tighten moderately


Wire hole
Make sure of positioning
the rod clamp correctly.


Front view

Check that the slider switches the endstop:

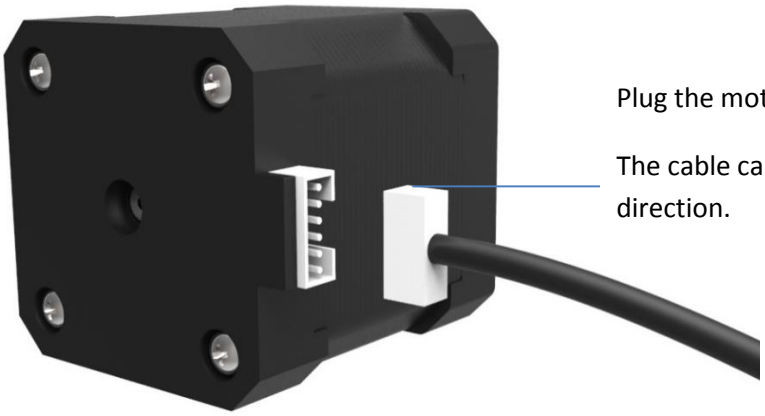
You must hear a “CLICK”



If the slider doesn’t switch the endstop there are two solutions:

You have to push the endstop on the left when you tighten it.

You have to disassemble and assemble the endstop properly

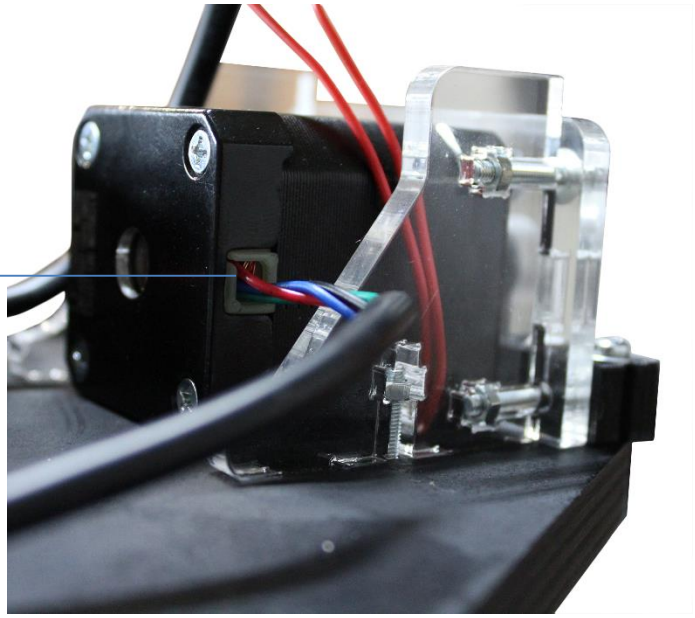


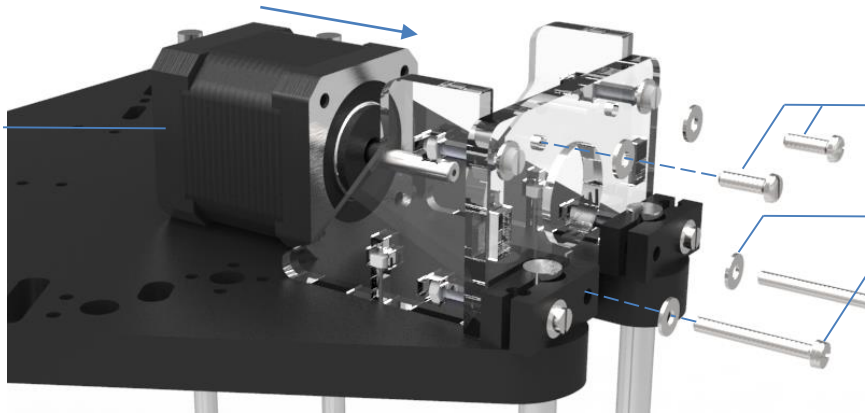
Plug the motor cable

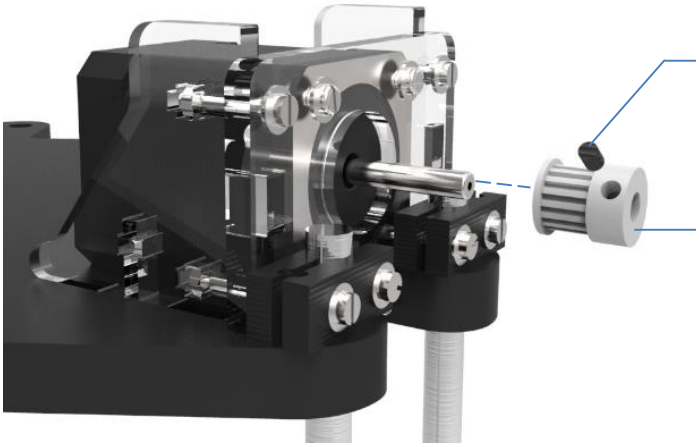
The cable can be plugged in only one direction.

Position wires on the edge

Put the endstop wires through the hole

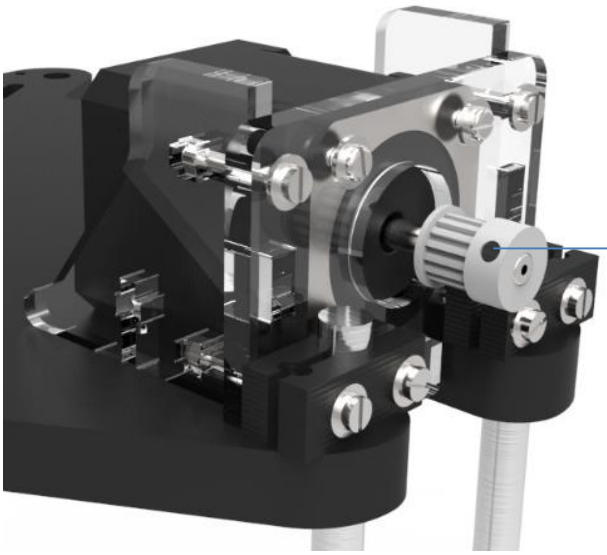






Grub screw (if you can, choose a long one)

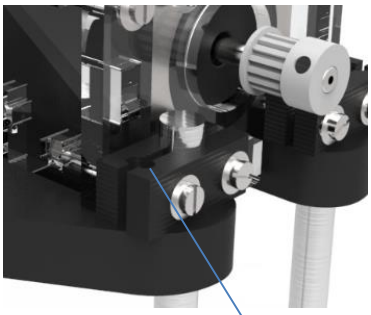
Position the pulley at the end of the shaft, in the right direction.



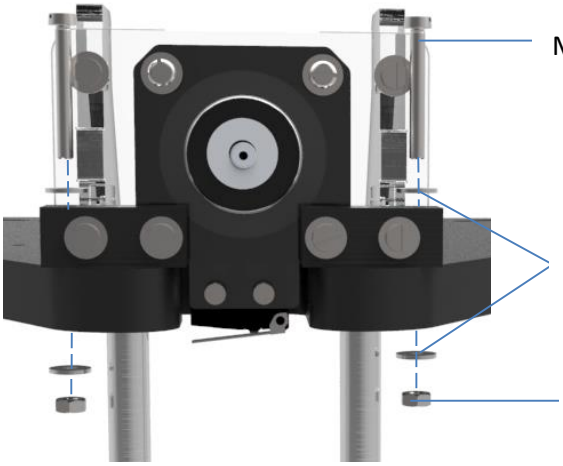
Tighten the grub screw

2. Superior frame fixation

- **6x** M3x30 screw
- **12x** Ø3 washer
- **6x** M3 nut



Use this hole



M3x30 screw (x2)

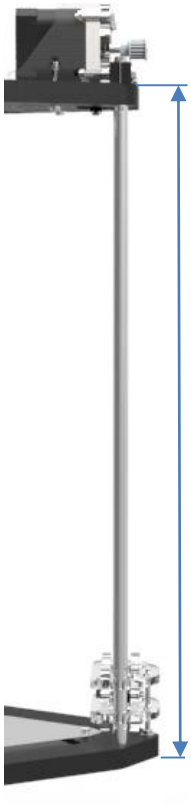
Ø3 washer (x4)

M3 nut (x2)

Tighten moderately

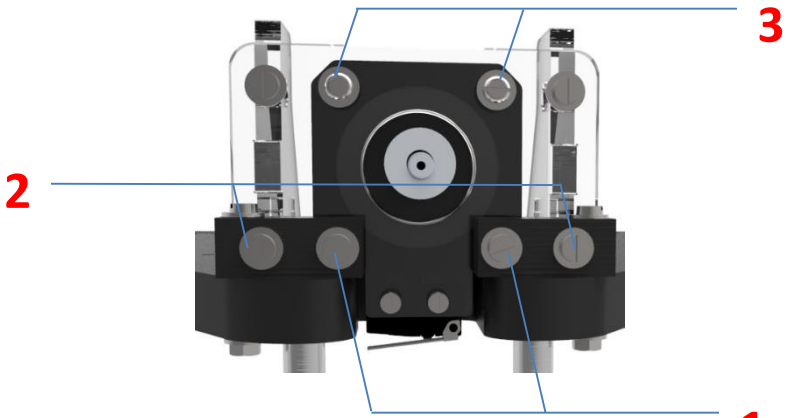
This operation is essential. This will influence your printing quality

Measure the distance between the bottom of the inferior frame and the top of the superior frame. **This distance must be 388mm for each smooth rod.**



388 mm

Once the frame is well positioned, tighten moderately the screws in the order below

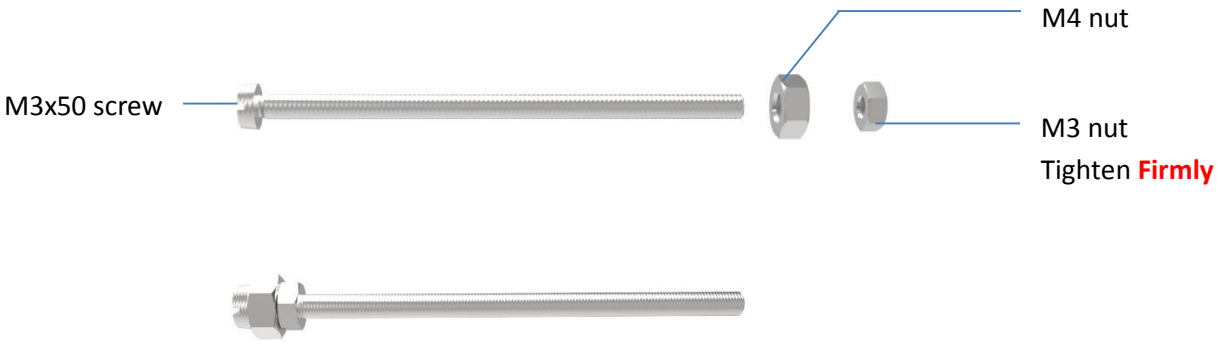


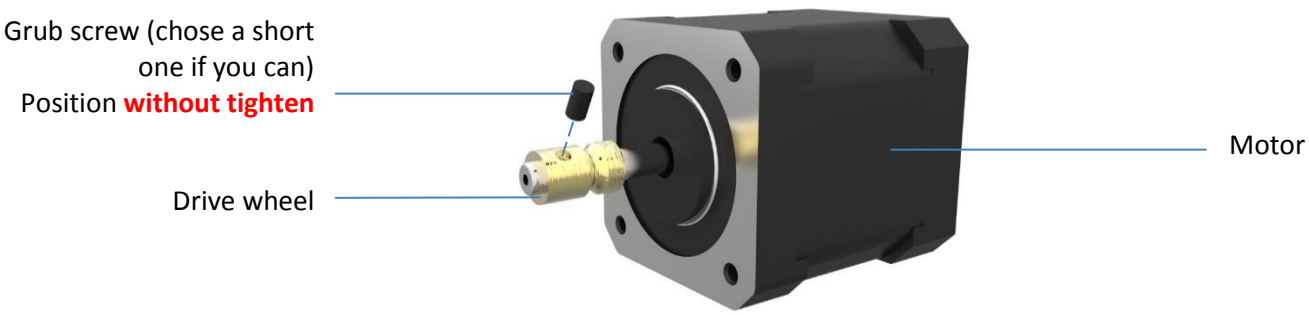
Repeat this operation for the other rods. **The height of the frame must be the same for all the rods.**

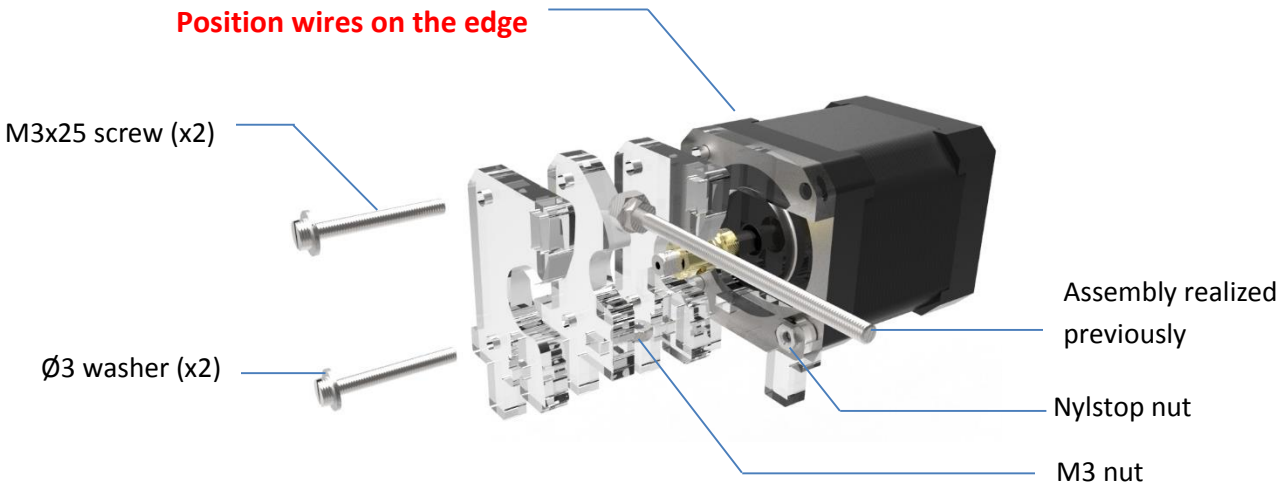
At the end of this step check the height of each rods.

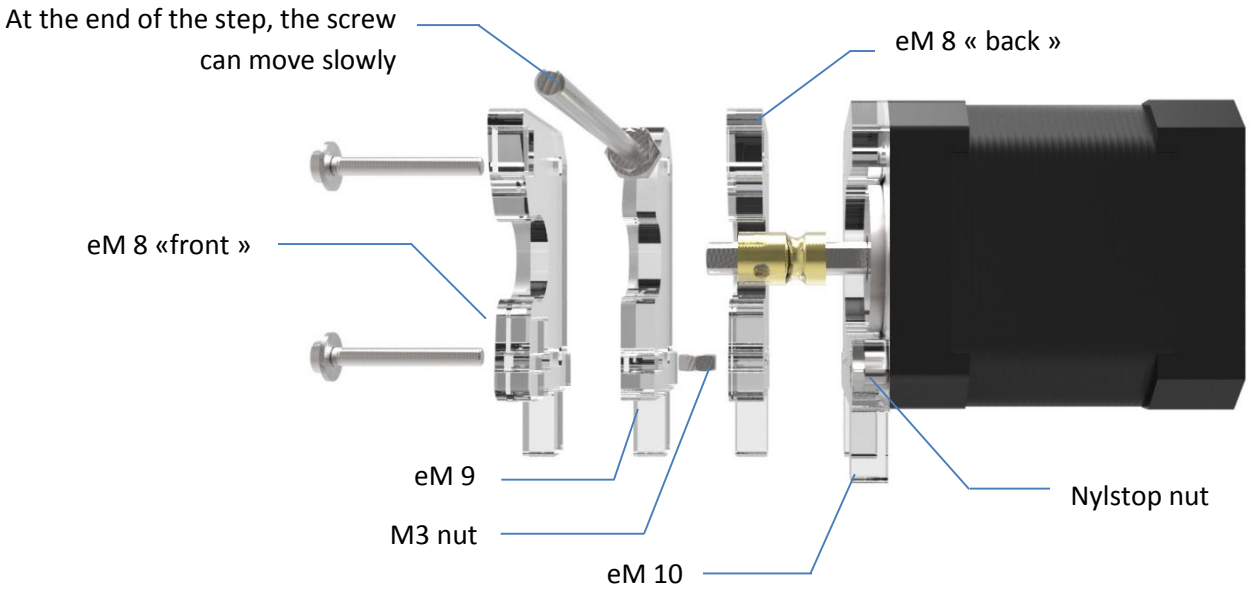
3. Extruder assembly

- **2x** eM8
- **1x** eM9
- **1x** eM10
- **2x** eM11
- **1x** eM12
- **1x** eM13
- **1x** 604 ball bearing
- **1x** Drive wheel
- **1x** Spring
- **1x** Nema 17 motor
- **4x** M3x25 screw
- **2x** M3x20 screw
- **1x** M4x25 screw
- **1x** M3x50 screw
- **4x** M3 nut
- **2x** M4 nut
- **1x** Nylstop nut
- **1x** M3 Wing nut
- **7x** Ø3 washer
- **1x** Ø4 small washer
- **2x** Ø4 big washer

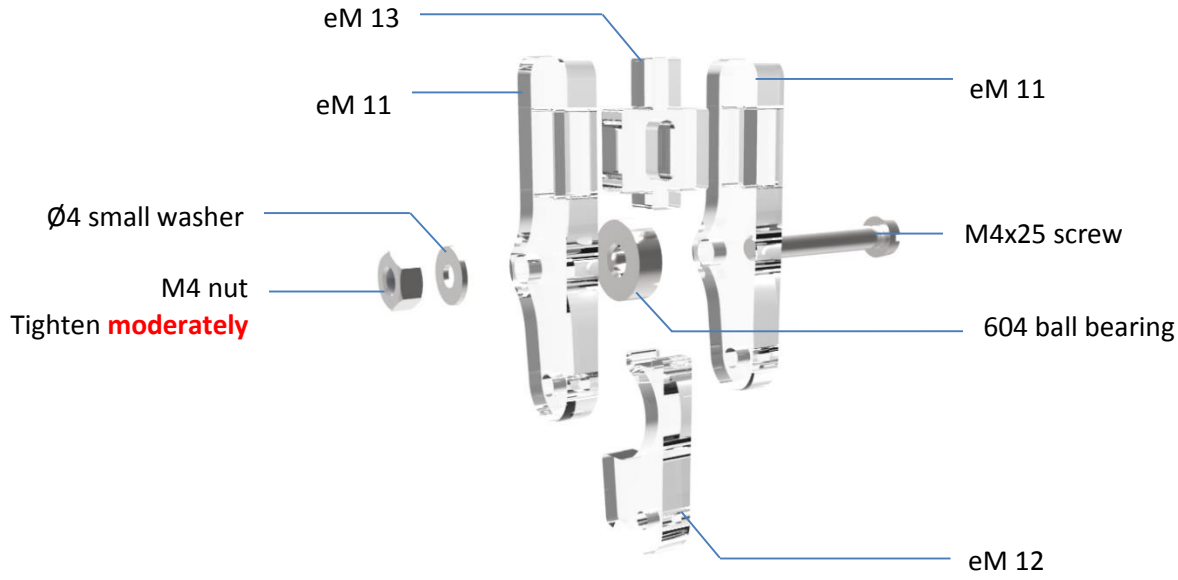


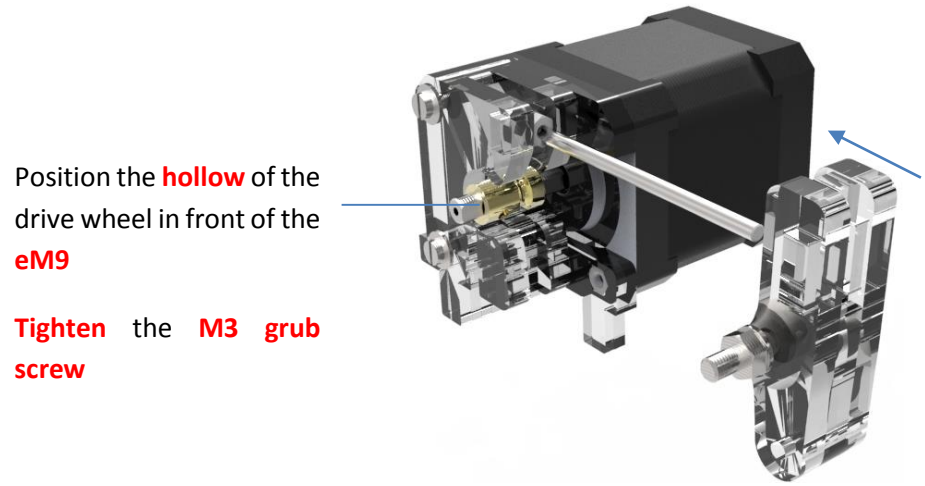


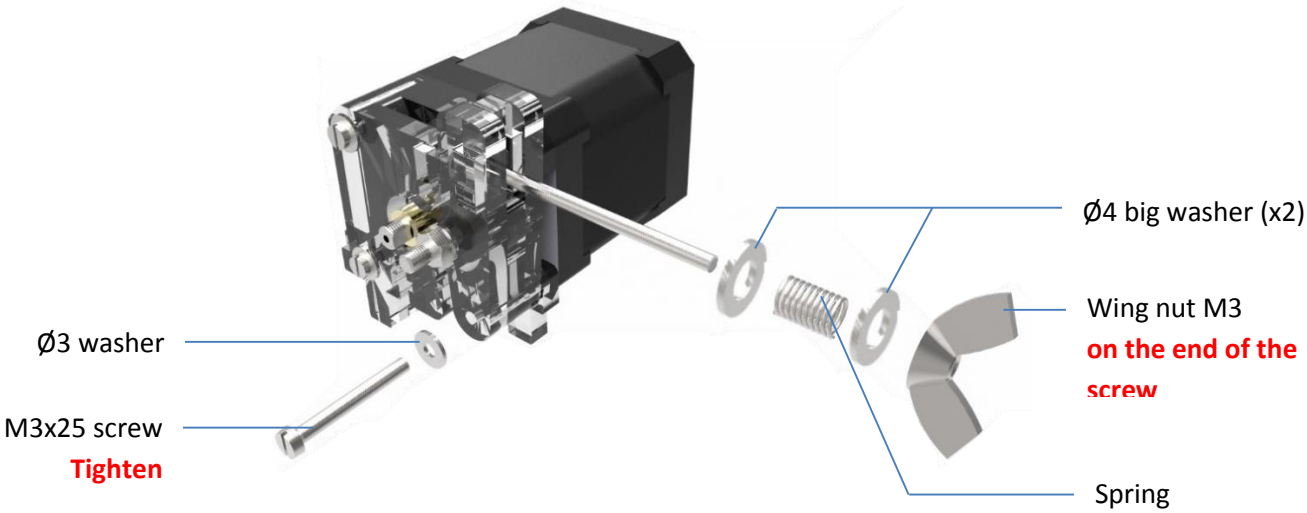




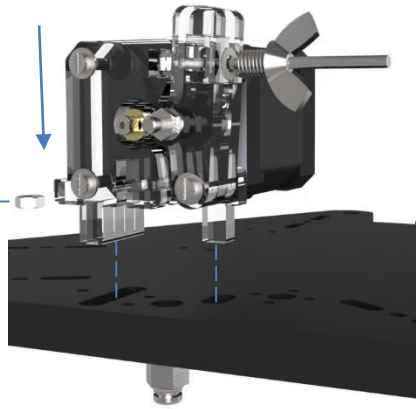
Position the M4 nut of the M3x50 screw between the two eM8. Position the M3 nut into the eM8 “back”

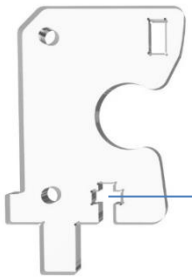

eM 13
eM 11
eM 11
Ø4 small washer
M4 nut
Tighten **moderately**
M4x25 screw
604 ball bearing
eM 12


Position the **hollow** of the drive wheel in front of the **eM9**
Tighten the **M3 grub screw**


Ø4 big washer (x2)
Wing nut M3
on the end of the screw
Ø3 washer
M3x25 screw
Tighten
Spring

M3 nut
Place in the nut hole





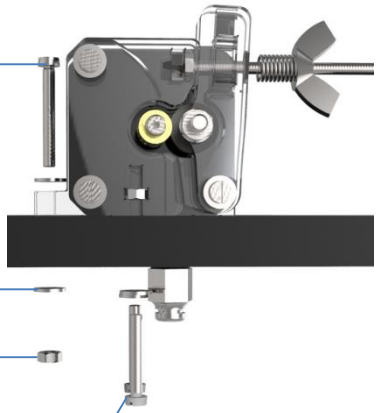
Nut hole

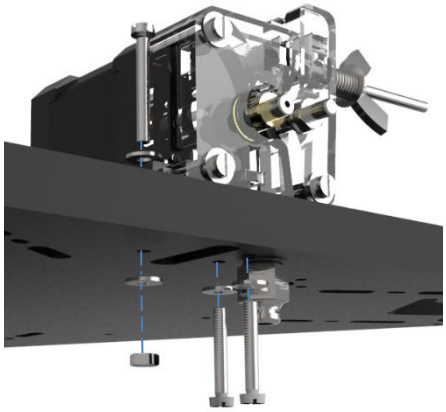
M3x25 screw
Tighten **moderately**

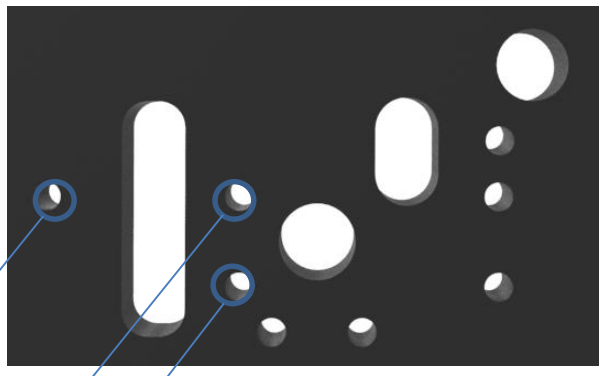
Ø3 washer (x4)

M3 nut

M3x20 screw (x2)
Tighten **moderately**



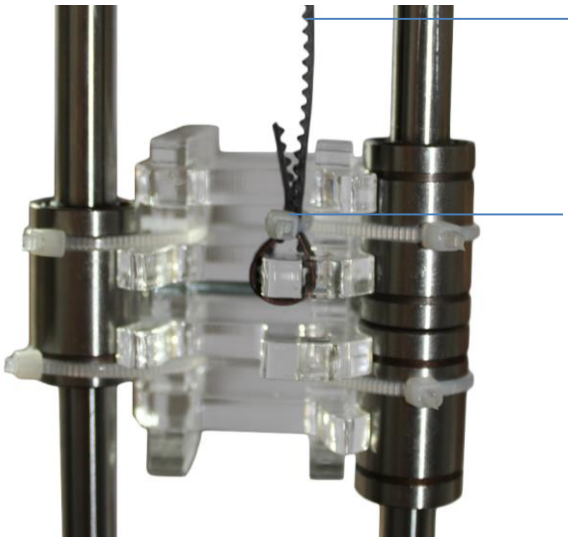




Screw holes

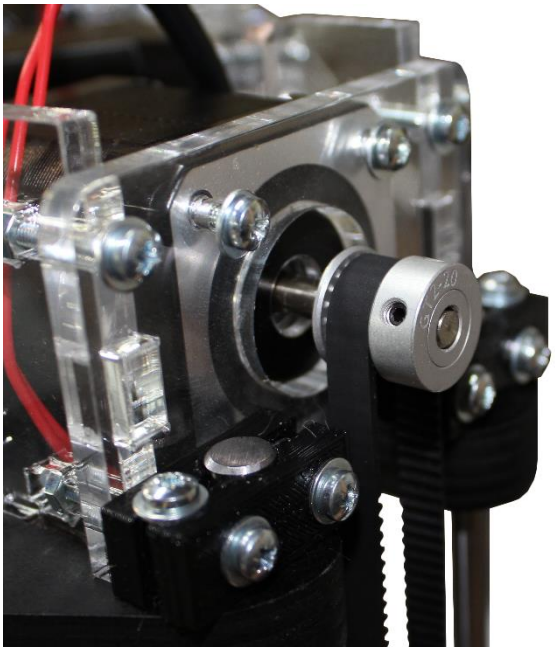
C. Belt positioning.

- **3x** Belt
- **18x** Zip tie
- **3x** Ø3 Washer
- **3x** M3 wing nut



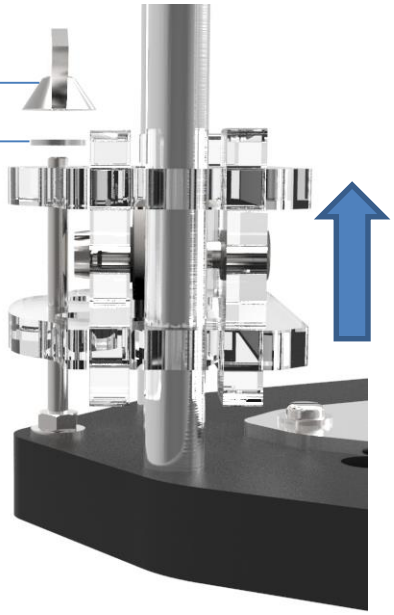
Teeth in this direction

Fasten one end of the belt with a zip ties. Position the zip tie **as close as possible** to the slider

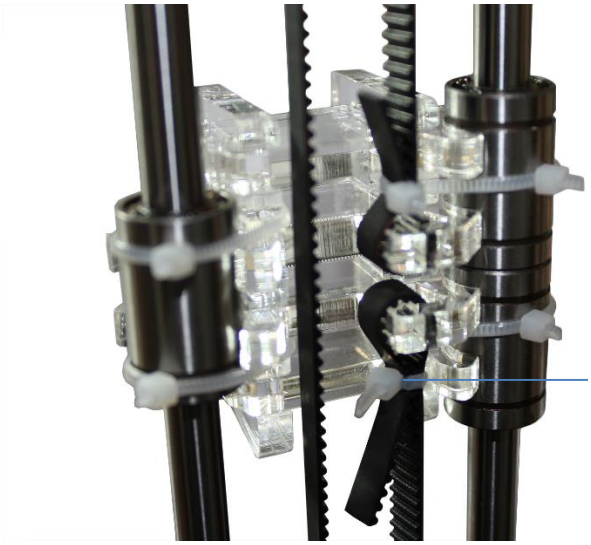


Wing nut **at the end of the screw**

Ø3 washer



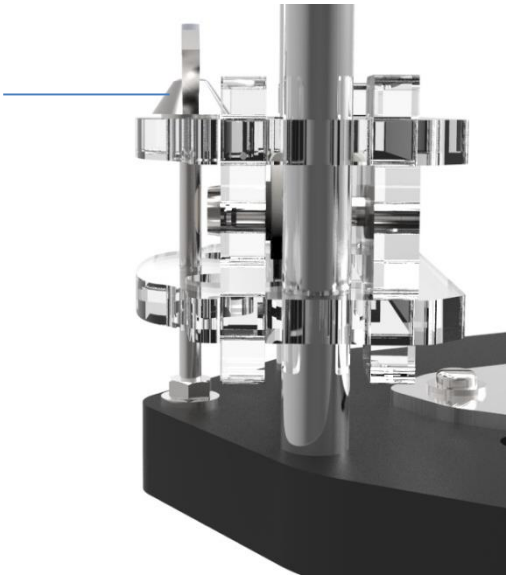
Once the wing nut is positioned, push the tensioner through the nut



Fasten the free end of the belt and fix it with a Zip ties.

Make sure the belt is **slightly tight**

Tighten the wing nut to tight the belt.

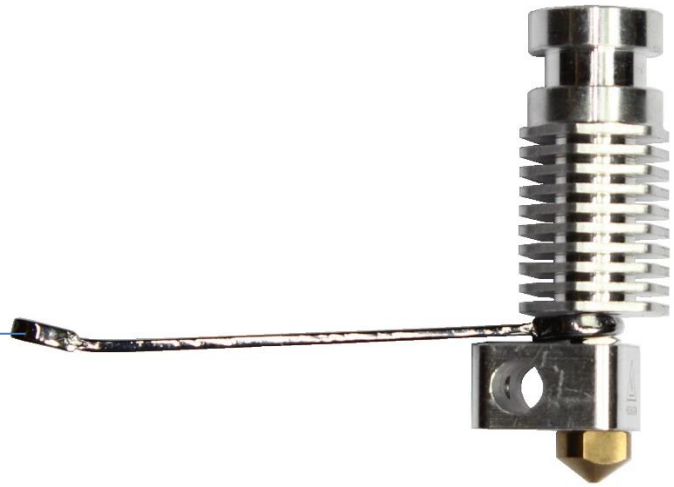


Repeat the operation with the others sliders.

Core

A. Core assembly

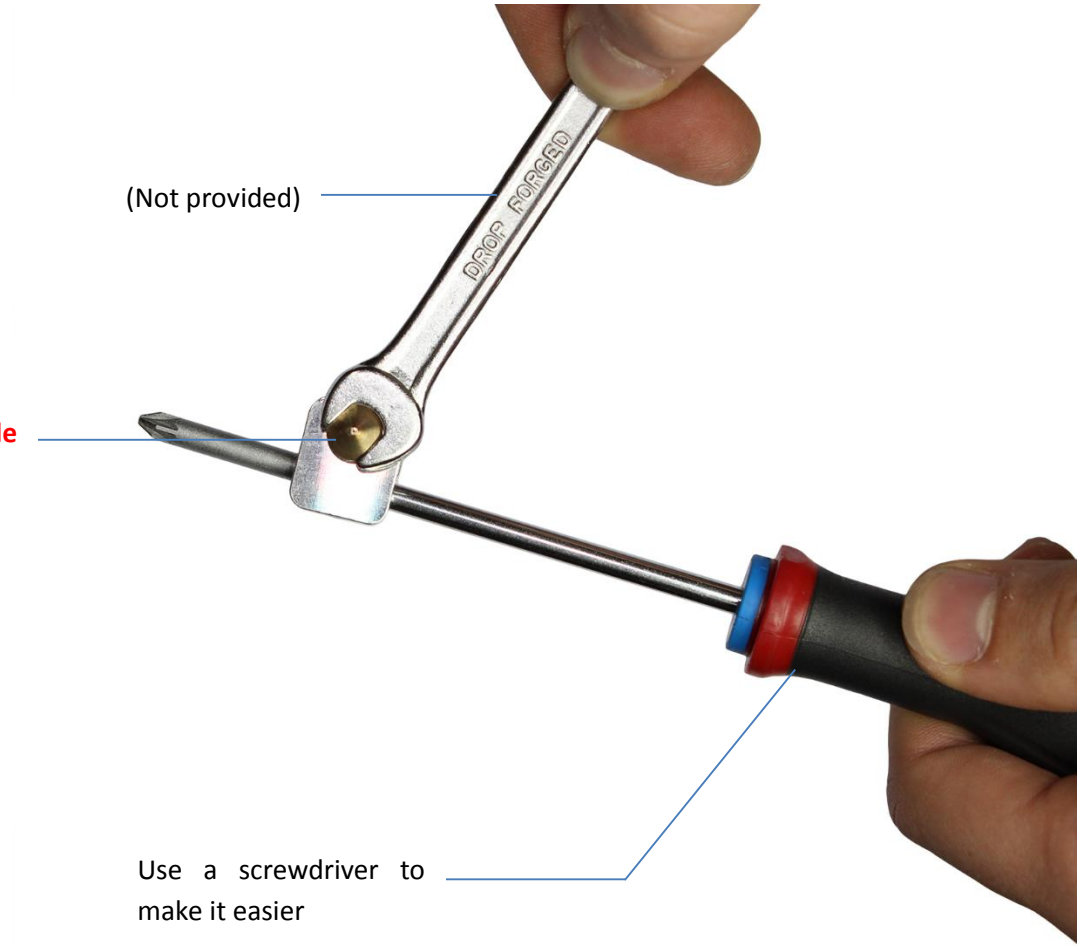
- **1x** core
- **1x** Hexagon 1.75 kit
- **2x** 3x3 Fan
- **6x** M3x20 screw
- **4x** Ø3 washer
- **1x** Ø4xM6mm pneufit
- **3x** Zip tie

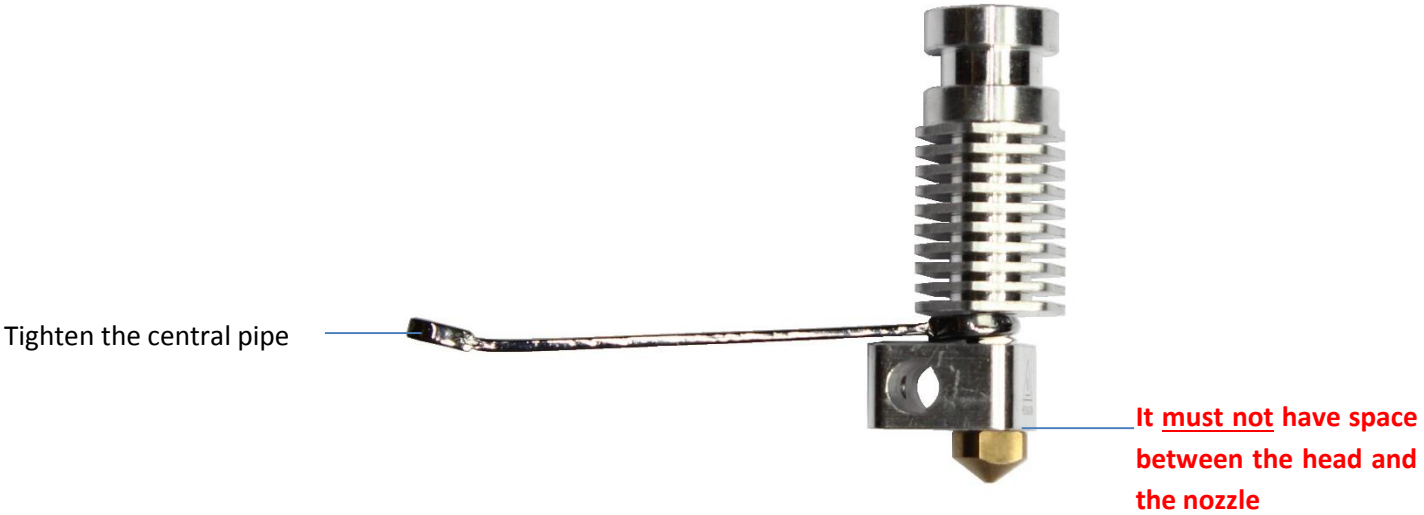


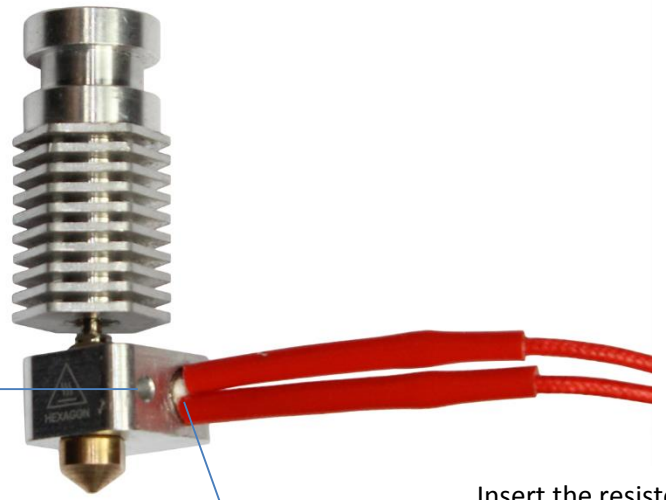
Untighten the central pipe

(key provided)

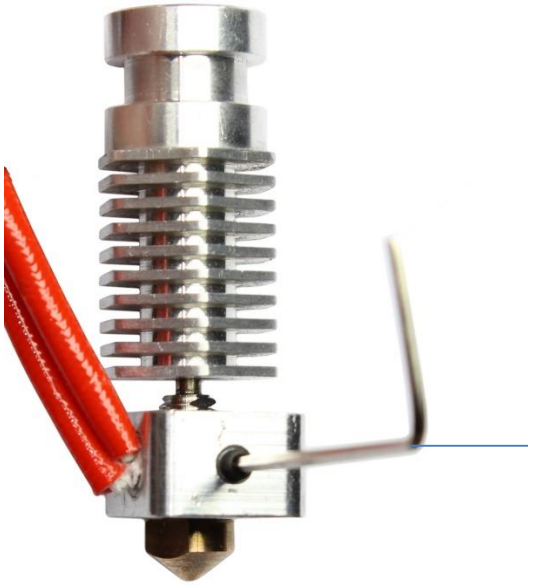
Use a screwdriver to make it easier


(Not provided)
DROP FORGED
Tighten the nozzle
Use a screwdriver to make it easier


Tighten the central pipe
It must not have space between the head and the nozzle



If you cannot insert the cartridge heater, file slightly the 6mm hole.

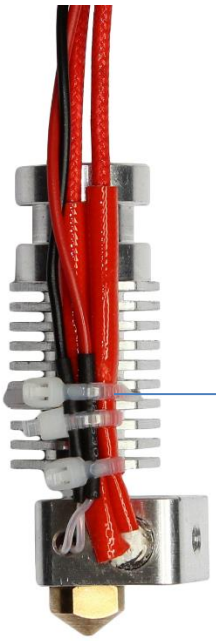


Insert the thermistor

Maintain the positioning with Zip ties.

Be careful! If the thermistor goes out of the hot end, your printer could be damaged.

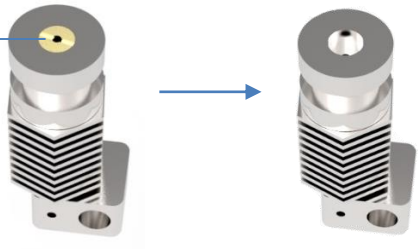
You can use a drop of high temperature silicone to maintain the thermistor into the hot end. (Not provided)

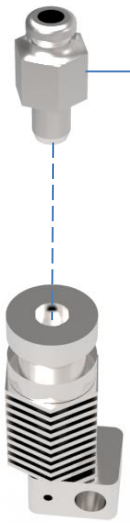


Fasten the cables to the hot end with a zip tie. (**do not position it too high**)

The zip tie must be positioned **around** the Hexagon

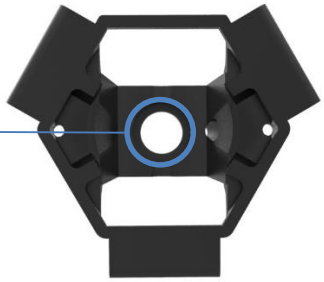
Unscrew the filament guide





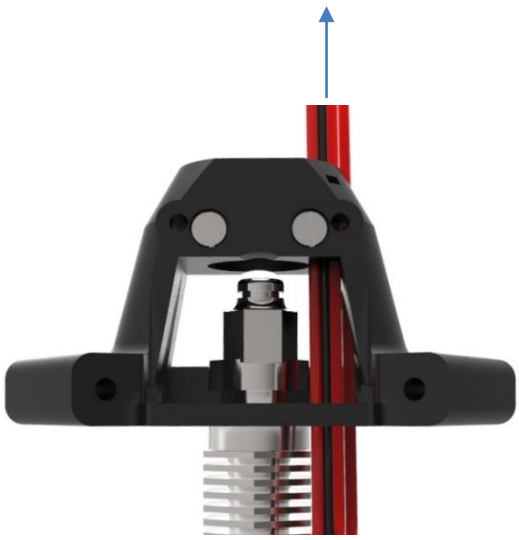
Screw the Ø4xM6mm pneufit

Make sure the core is free of impurities.



Put the cables through the wire hole.

If you have LED put the cables through the hole



M3x20 screw (x2)
Tighten moderately

Hexagon
Position against the core
before screwing

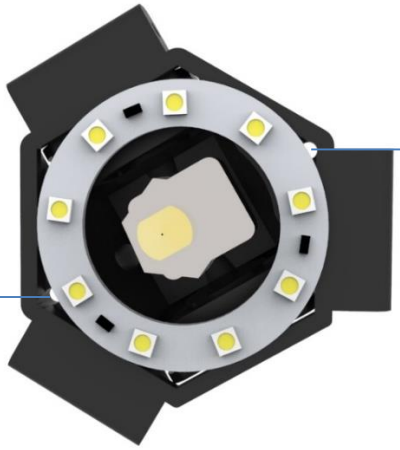
This side must be oriented toward the hot end

Place the wires of the fan on the same side than the resistor wires

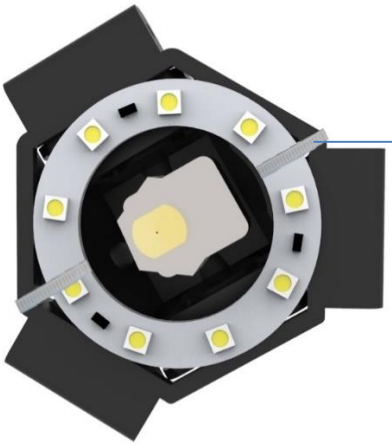
B. LED (optional)

Parts of the following section are not included in the basic µDelta kit. You can find them on eMotion Tech website.

- **1x** LED
- **2x** Zip ties



Position LED using an **alternating tightening** to **center** it.



C. Connecting rods positioning.

- **6x** Connecting rod
- **18x** M3 nut
- **6x** M3x50 screw
- **12x** Ø3 washer

Check this nut is tighten.

You can add glue to maintain the assembly.

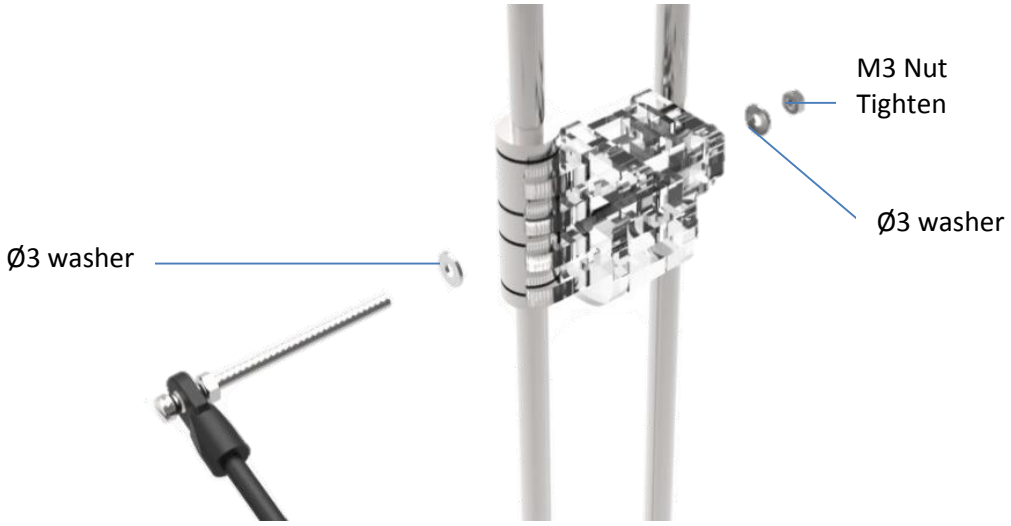
M3x50 screw

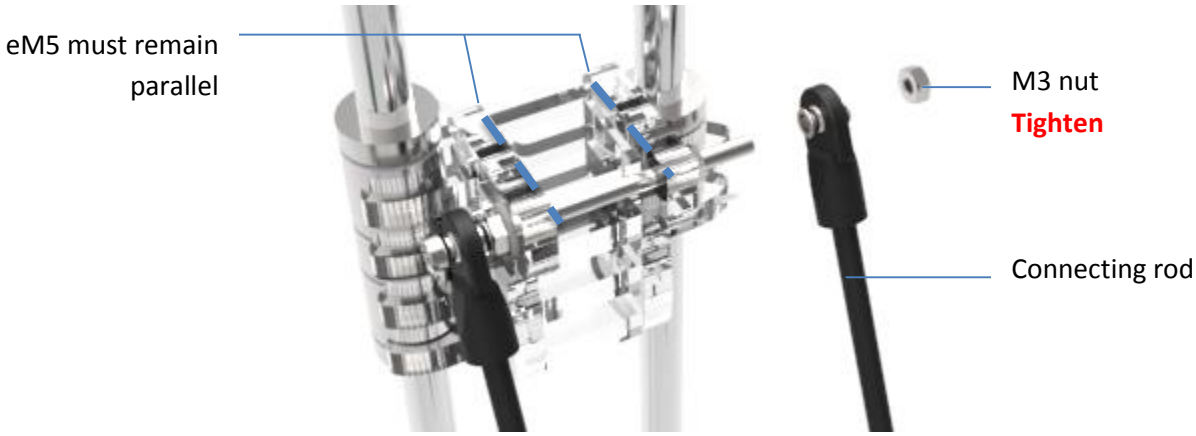
Connecting rod

M3 nut

Tighten firmly

The assembly must not twist the slider.





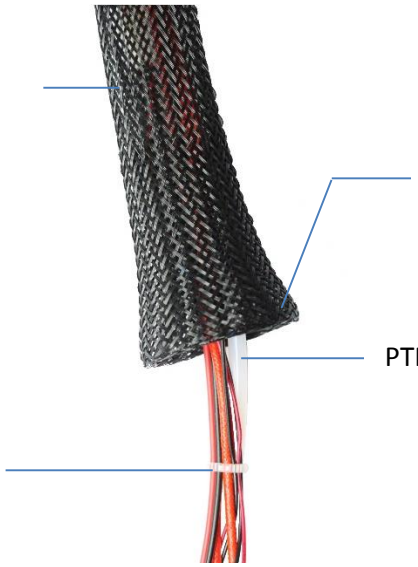
Repeat the operation with the other sliders and for the core.

Finishing

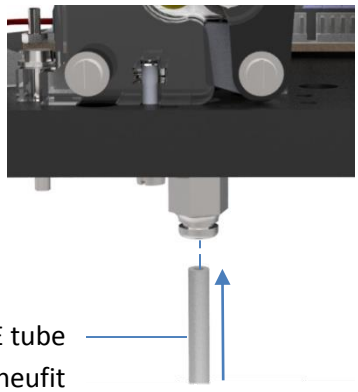
- **1x** PTFE tube
- **8x** Zip tie
- **1x** braided sleeve
- **3x** pad
- **1x** adhesive tape
- **1x** M3x50 screw
- **1x** M3 nut
- **1x** Ø3 washer

Push the cables and the PTFE tube trough the braided sleeve

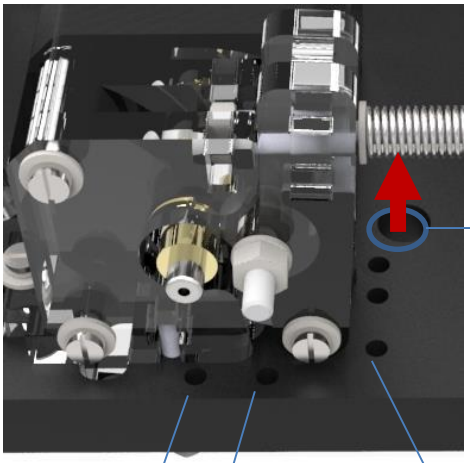
Fasten the cables with zip ties



PTFE tube length must be 35cm. cut carefully the end of the PTFE tube if they are flattened



Push the PTFE tube into the pneufit

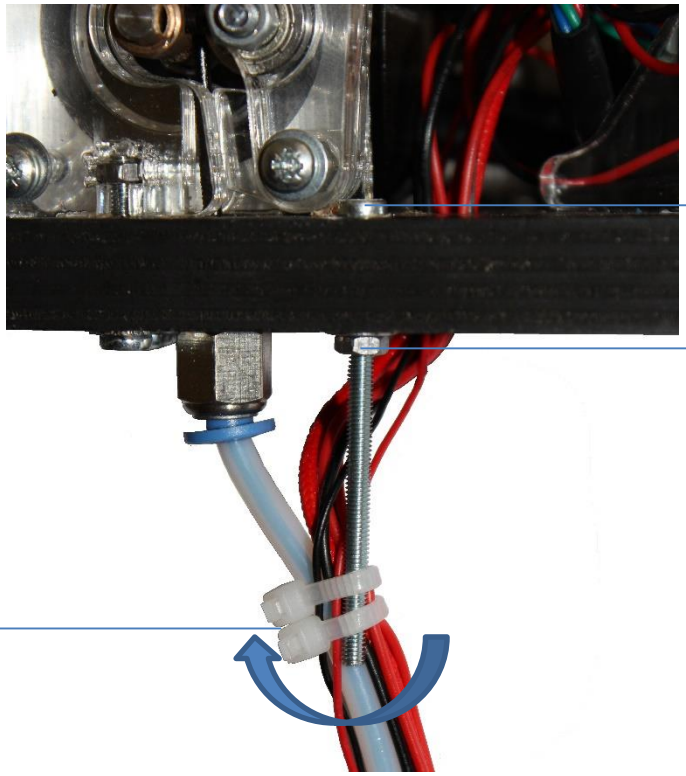


Push the cables through the hole.

Zip tie holes

Fasten the braided sleeve to the frame with zip ties

Screw hole



M3x50 screw

Ø3 washer
M3 nut
tighten

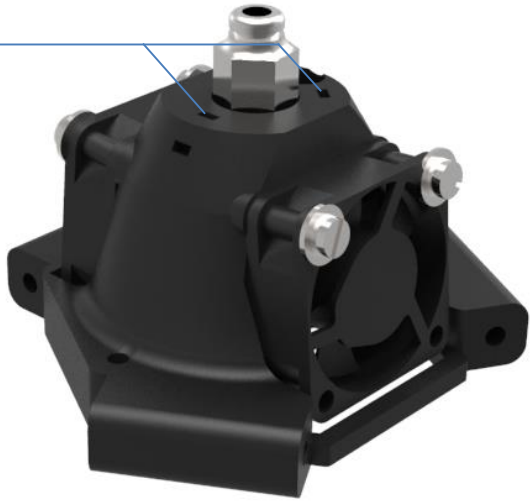
Fasten the wires and the PTFE tube with two zip ties.

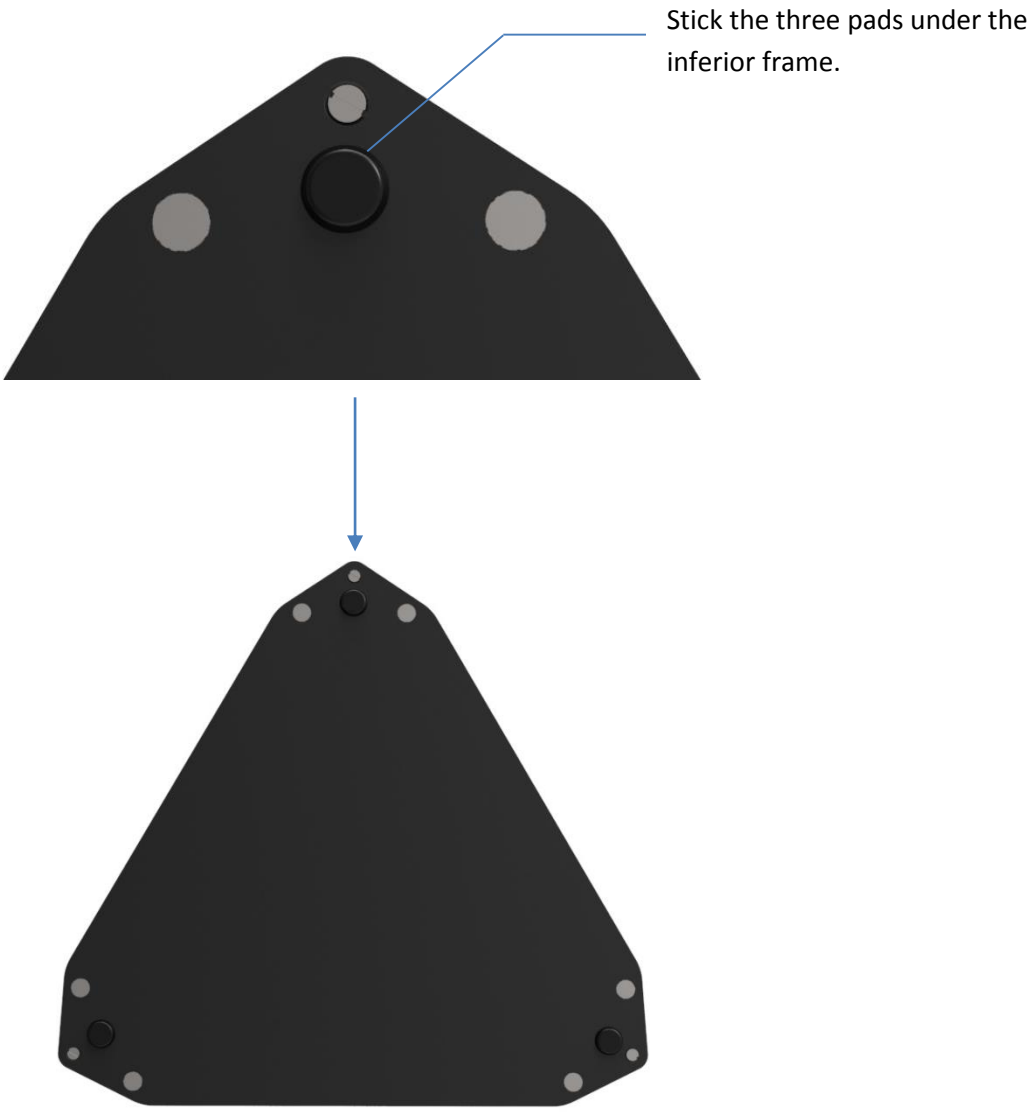
You can bend the screw to reduce strain in PTFE tube.

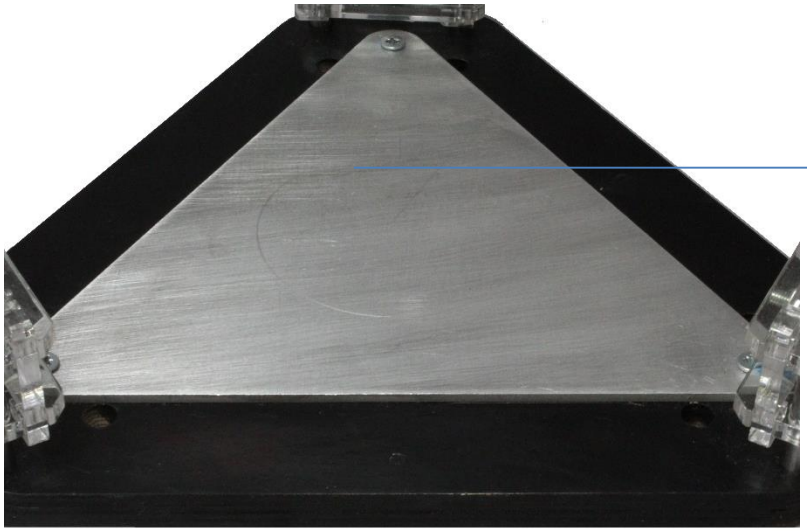
This screw prevent the sleeve from blocking the end stops.

Zip tie holes

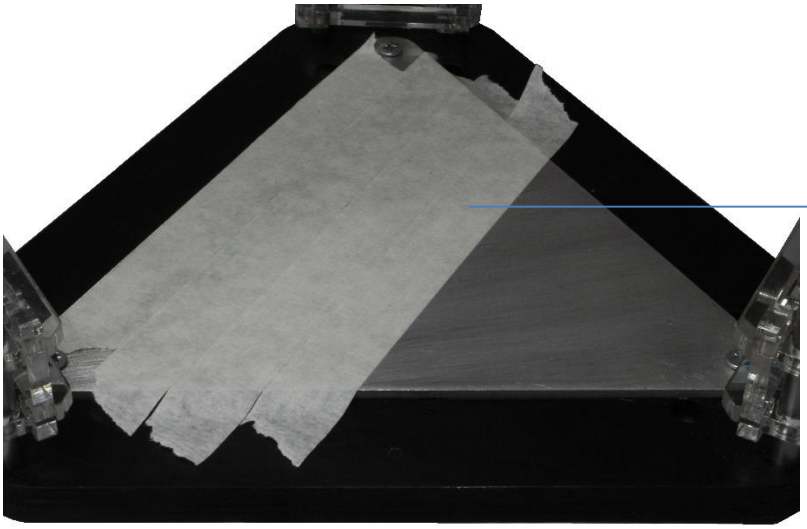
Fasten the braided sleeve to the core with zip ties



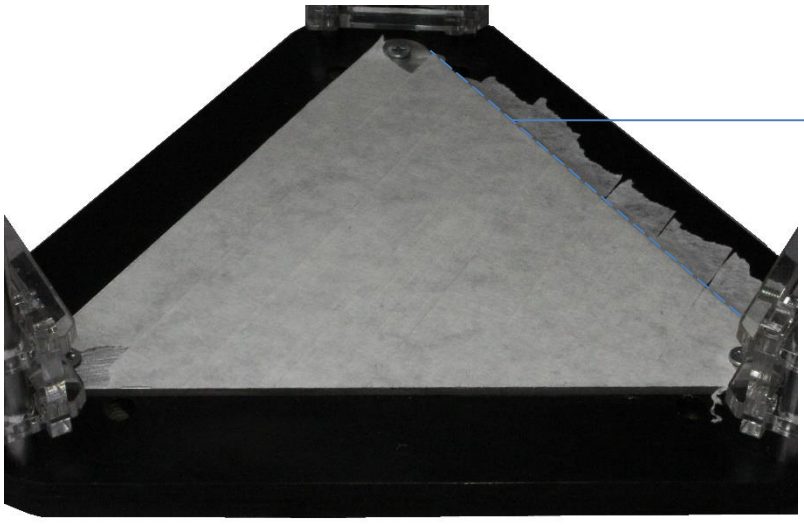

Stick the three pads under the inferior frame.



Remove the dust



Cover the bed with adhesive tape

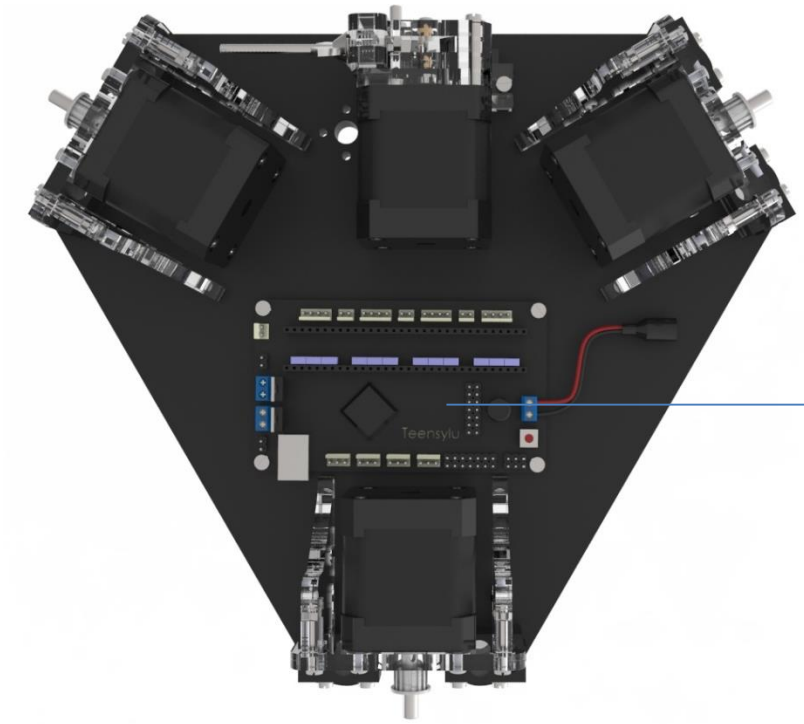


Cut the adhesive tape with a utility knife

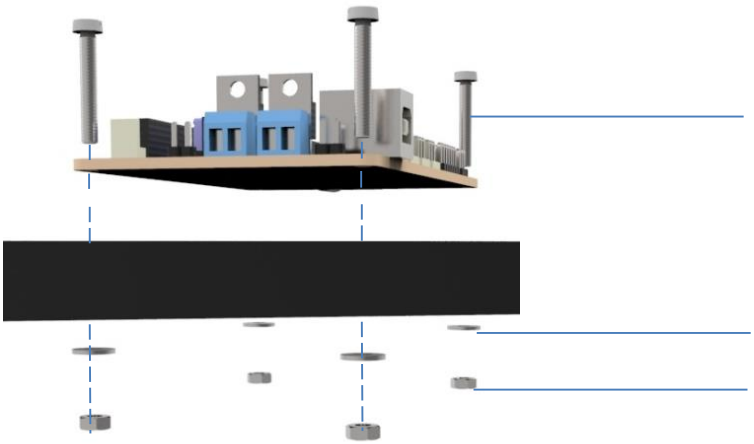
Electronics assembly

A. Teensylu

- **1x** Teensylu
- **4x** M3x25 screw
- **8x** M3 nut
- **4x** Ø3 washer



You must position the teensylu as shown on this image.



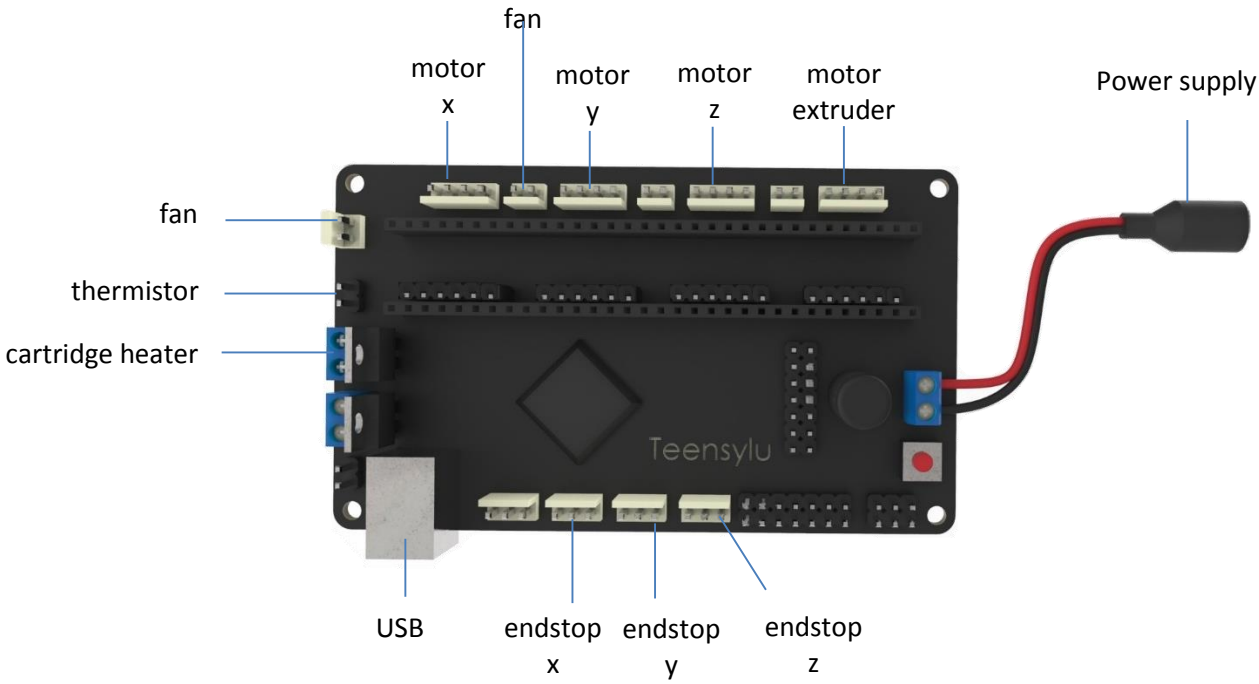
M3x20 screw (x4)

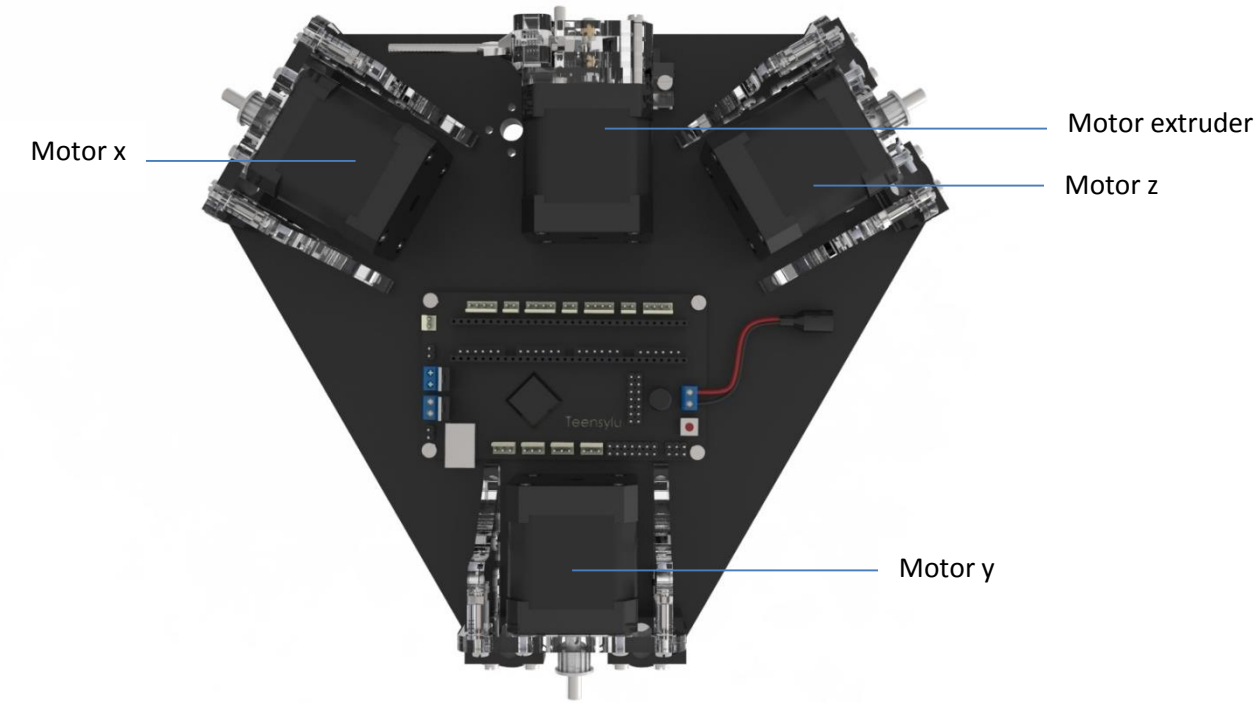
Ø3 washer (x4)

M3 nut (x8)
Tighten moderately

B. Connections

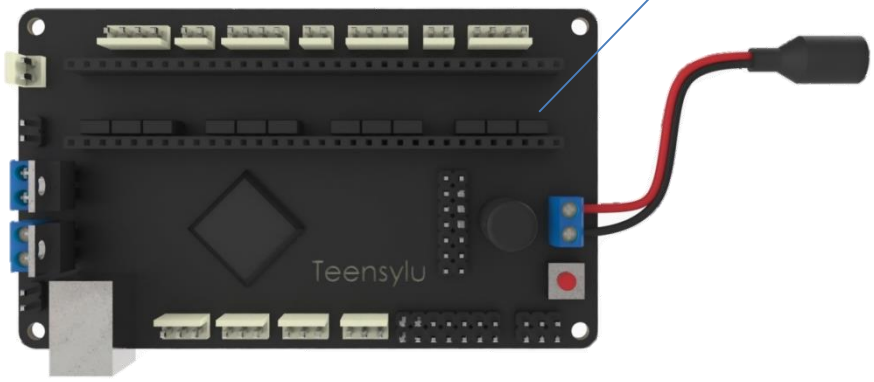
Wiring id detailed in the next page





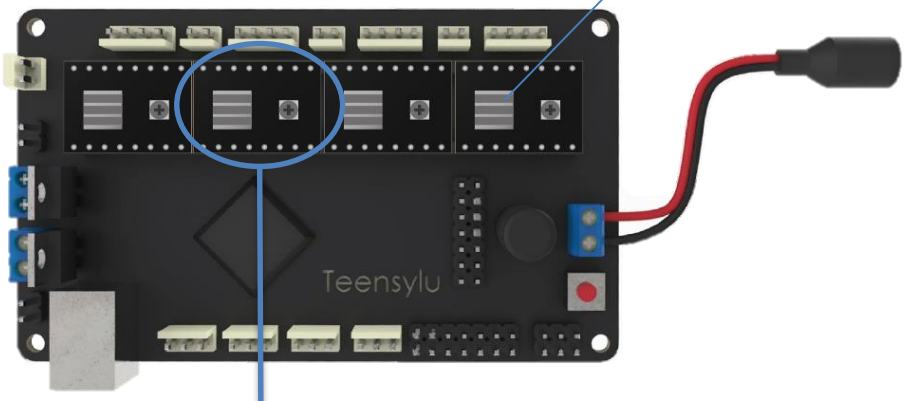
4. Stepsticks

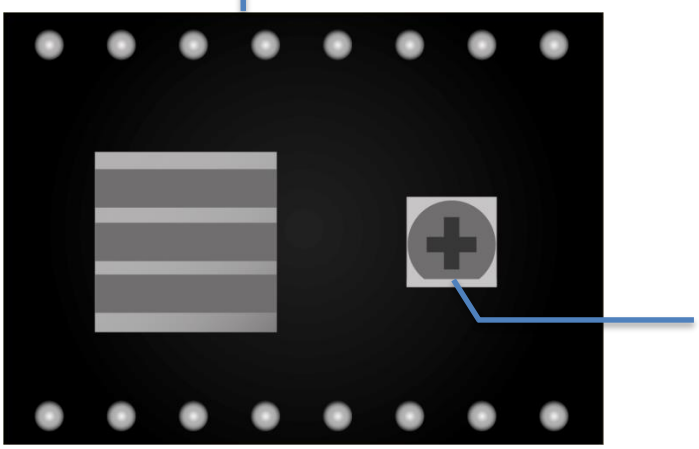
Make sure that you have 12 jumpers connected to the teensylu



Be careful: The orientation is very important!
(A wrong connection of the stepstick could cause **permanent damage**)

Plug the stepstick according to the illustration.



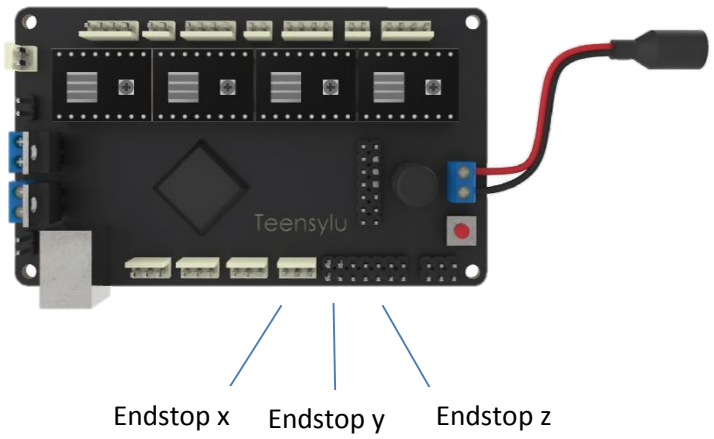


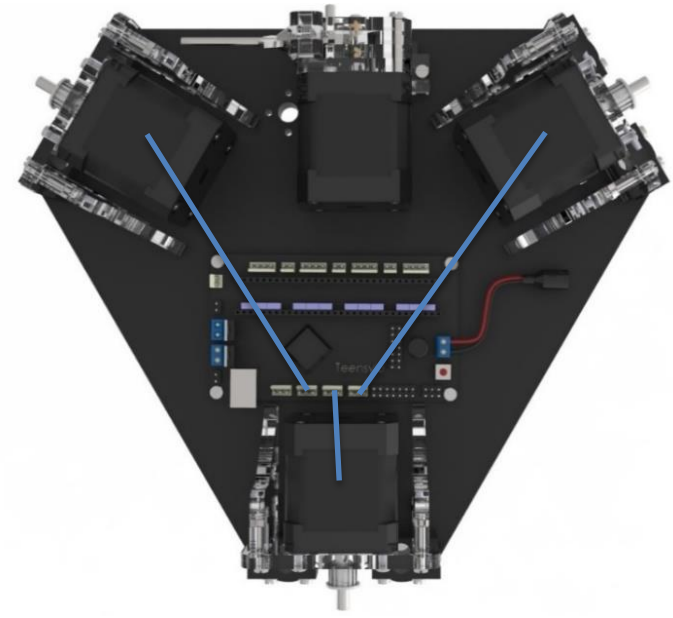
Make sure the flat is positioned as shown the image.

5. Endstops

Plug the endstops according to the illustration below. The endstops can be plugged in only one orientation.

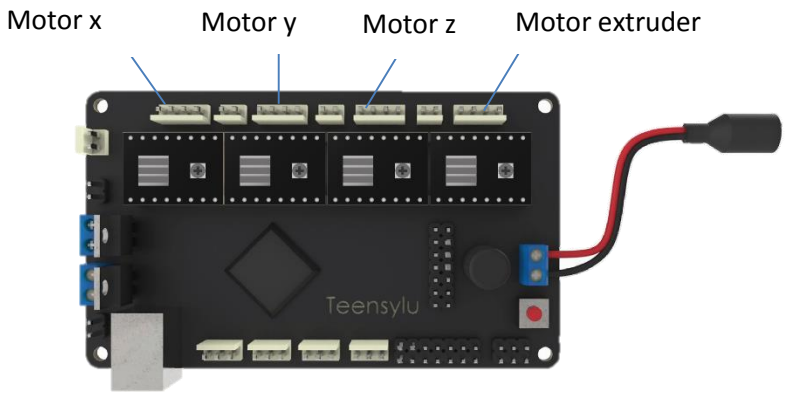
If you cannot plug the endstop , we provide extensions.

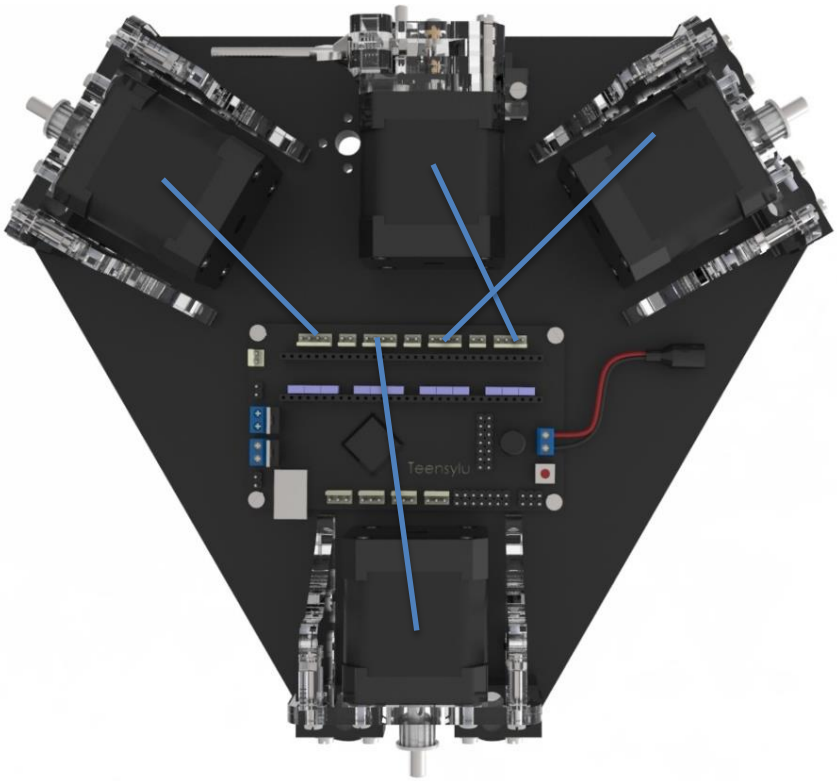




6. Motors

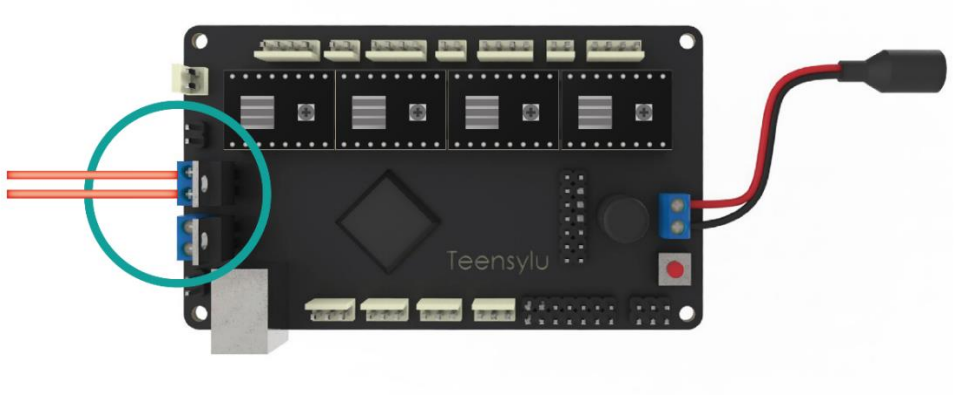
Plug the motors according to the illustration below. The motors can be plugged in only one orientation.





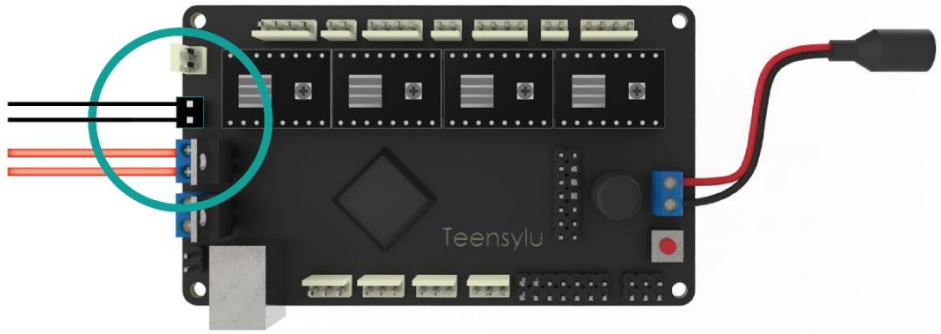
7. Cartridge heater.

Screw the cable of the cartridge heater.



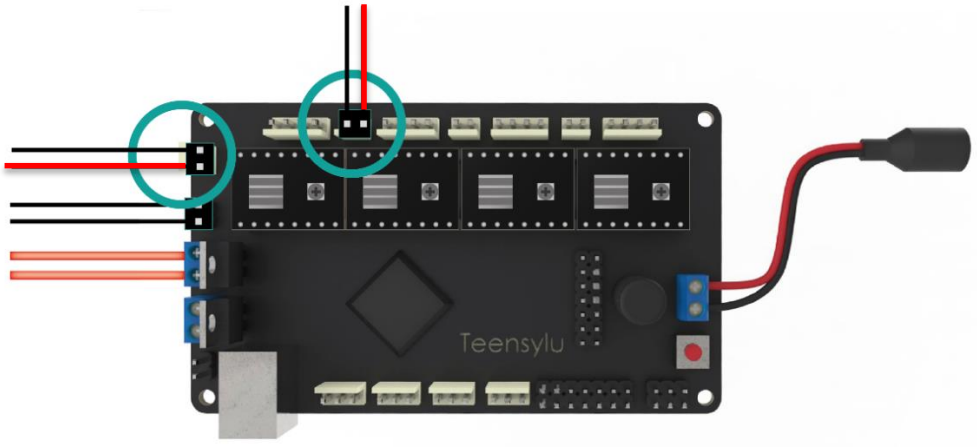
8. Thermistor

Plug the thermistor.



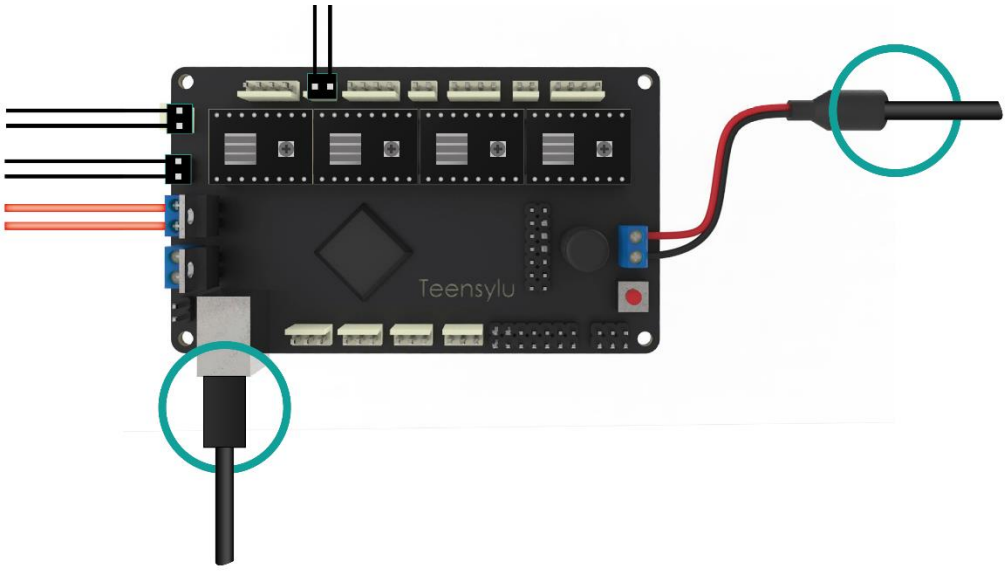
9. Fans

Plug the fans according to the illustration below. The fans can be plugged in only one orientation.



10. USB and power supply

Plug the USB cable and the power supply.

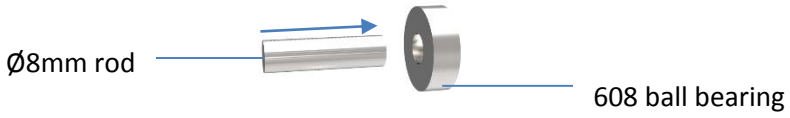


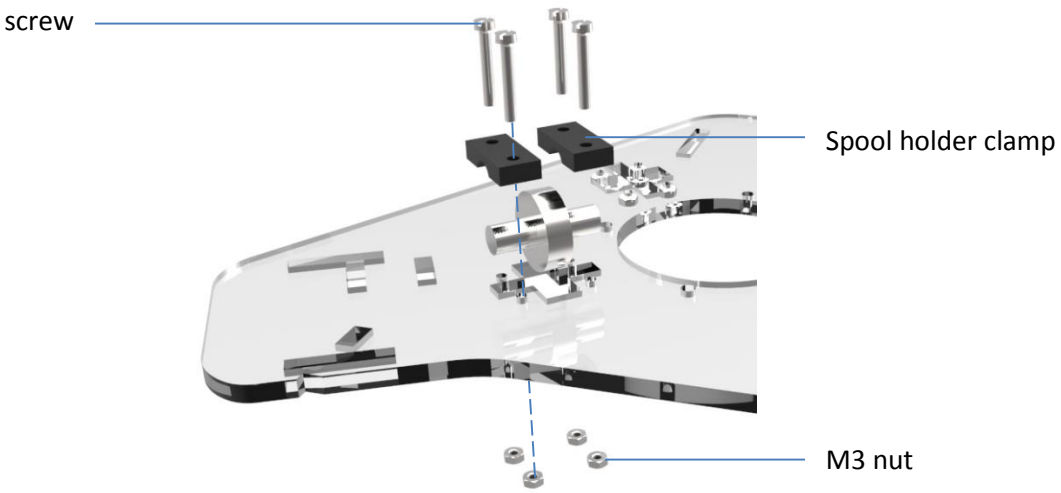
Annex 1: Spool holder

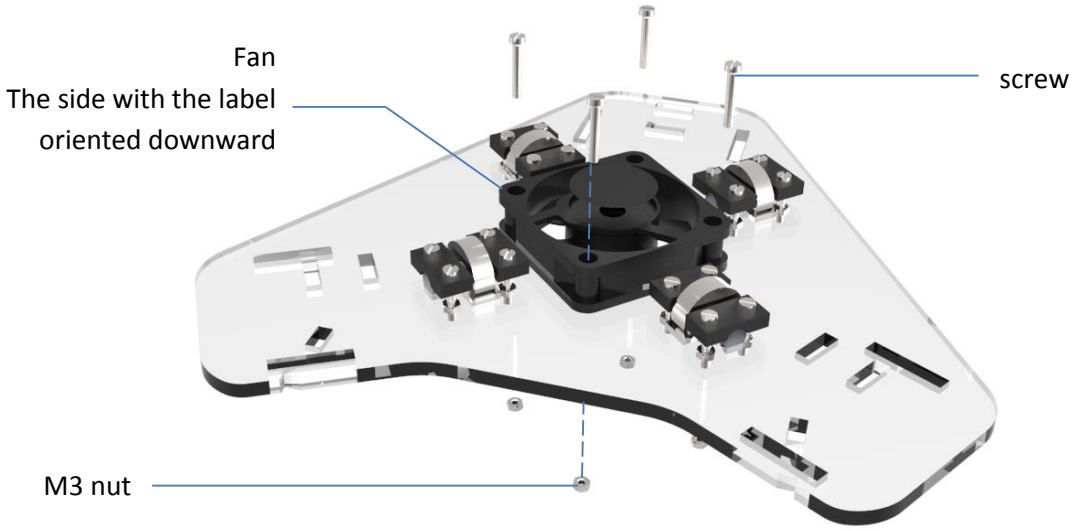
A. Assembly

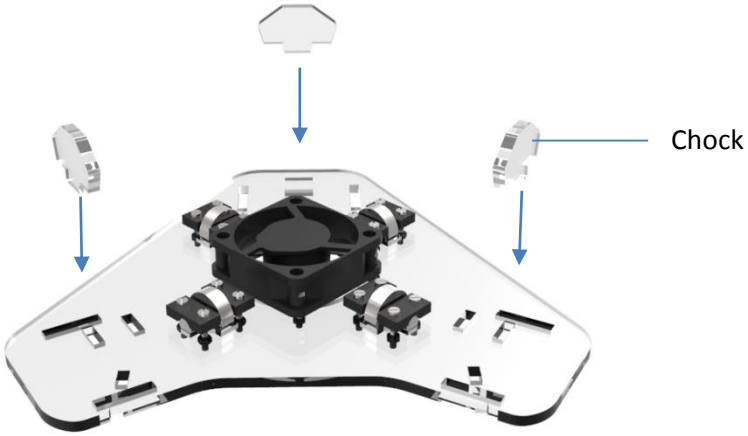
Parts of the following section are not included in the basic µDelta kit. You can find them on eMotion Tech website.

- **4x** Ø8mm rod
- **4x** 608 ball bearing
- **1x** 6x6 fan
- **3x** Chock
- **1x** Spool holder frame
- **20x** M3x20 or M3x25 screws (both can be used)
- **20x** M3 nut
- **8x** spool holder clamp



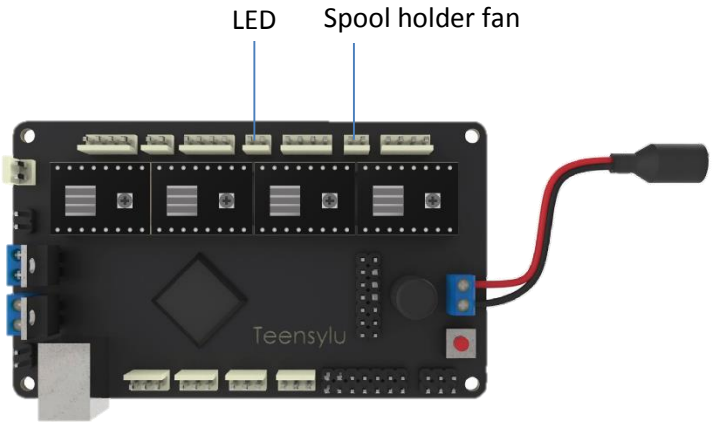



Fan
The side with the label
oriented downward
screw
M3 nut


Chock

B. Connections

Plug the fan and the LED according to the illustration below. They motors can be plugged in only one orientation.



CONGRATULATION