

ASSEMBLY INSTRUCTIONS

INTRODUCTION

INTRODUCTION

- **Target :**

Provide a visual guide of the various steps required to assemble the «i3 Metal Motion» 3D printer.

- **Designers of the i3 Metal Motion :**

eMotion Tech : <http://www.emotion-tech.com>

Hugo FLYE
Mohamad KOUBAR
Tom LOPEZ

- **Author of this document :**

eMotion Tech : <http://www.emotion-tech.com>

Anthony BERNA

- **Photographics credits :**

Pictures and 3D representations made by eMotion Tech :
<http://www.emotion-tech.com>

- **Sources :**

<http://reprap.org/wiki/reprap>

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- **Update :**

Last update : 07/02/2018

- **Useful links :**

You can find more informations on the following links :

eMotion Tech's website : <http://www.emotion-tech.com>
RepRap community : <http://reprap.org/wiki/reprap>



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PRESENTATION OF THE I3 METAL MOTION

The latest creation of the eMotion Tech company, the I3 Metal Motion promises stability and accuracy.

With all our knowledge and experience acquired with our previous printers, we wanted to propose an elegant and reliable solution to the problems encountered on many 3D printers on the market.

The I3 Metal Motion will seek to become a symbol of durability and robustness, a precision tool at your disposal.

The I3 Metal Motion is, first of all, a solid steel frame that makes it easy to build in compare to any classic I3, with a low number of components. We have searched to develop a heavy and solid structure, including reinforcements in order to minimize vibrations and maximize the stability.

A sharper and reliable extrusion

The whole extrusion system is mounted on a steel carriage that avoids the distortions that most of the plastic parts are victims. For a higher ergonomics and quality, we have brought our solutions :

- a disengageable extruder to take off or engage the filament with a simple fingers pressure.
- Manual extrusion of the filament made by a molded wheel to have a very sharp flow.
- No clearances or empty space on the path of the filament, so it's possible to print with every kind of filament available on the market (PLA, ABS, G-fil, G-Carbon, eMotion Flex...)

Here are the features of the I3 Metal Motion :

- Dimensions : Height 440mm, Width 400mm, Depth 430mm
- Print volume : 200x200x200mm
- Thickness of the layers : from 100 to 350 microns
- Compatible filaments : 1.75mm diameter, PLA, ABS, G-Fil, M-Fil, Flex
- Heating bed : yes, up to 110 ° C.
- Rated print speed : > 80mm / s
- Maximum movement speed : 200mm / s
- Nominal movement speed : 150mm / s
- Average accuracy (X, Y) : 100 microns
- Average accuracy (Z) : 50 microns
- Electronics type : eMotronic and TF card
- Microcontroller : LPC1768, 32-bit ARM Cortex-M3 at 100MHz
- Print with Hexagon 1.75mm extrusion head (interchangeable nozzles)
- Nozzle outlet : Ø 0.4 mm by default (modifiable a posteriori)
- Operating System : Win XP, Vista, 7, 8, 10, Ubuntu 12+, Mac OS X
- USB connectivity
- Interfacing : LCD screen with TF card reader
- Power supply : 24 Volts / 320 Watts

The kit includes :

All the spare parts of the kit
A spool of 500 grams of PLA

SAFETY INSTRUCTIONS

General safety instructions

NEVER LEAVE THE PRINTER WORKING WITHOUT SUPERVISOR.

The nozzle can reach 270°C, **do not touch the nozzle while the printer is working.**

A supervisor is needed when the printer is used with young people.

KEEP PRINTER AWAY FROM CHILDREN AND ANIMALS

Operate in a ventilated room. Plastic vapors 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 own responsibility. Safety can be improved by :

- Housing protection
- Smoke detector

Electrical safety

The power supply provided is labelled CE. The power supply is protected against short-circuit and do not need any modification. The I3 Metal Motion operate at 24V and is not concerned by the low voltage directives.

Further informations

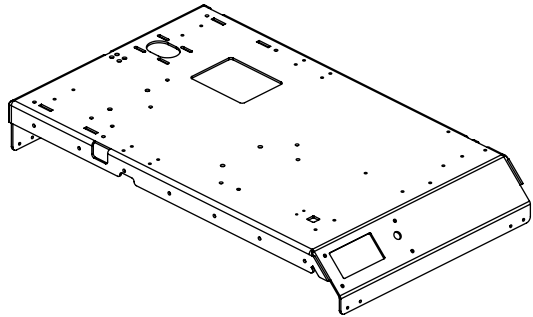
Informations above are not exhaustive.

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

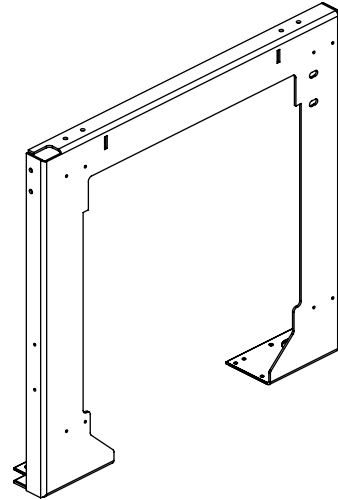
We assume no liability for loses, injuries or damages due to assembly, transporting, storage or removal of the product.

BILLS OF MATERIAL

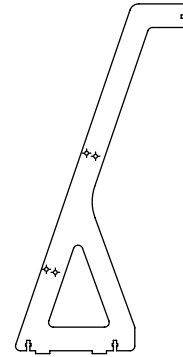
A. Metal parts



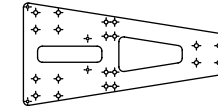
1 x Lower part



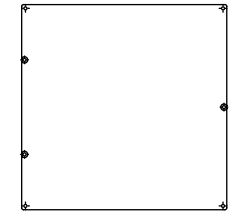
1 x Frame



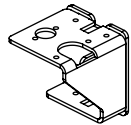
2 x Reinforcement



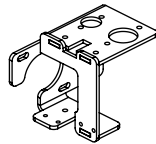
1 x Y axis carriage



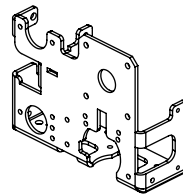
1 x Y axis plate



1 x Z axis carriage
left side



1 x Z axis carriage
right side



1 x X axis carriage

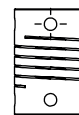
B. Mechanical parts



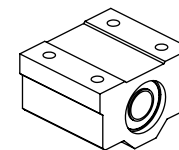
4 x Rod \varnothing 8 x 290 mm
2 x Rod \varnothing 8 x 360 mm



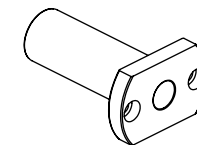
2 x \varnothing 8 mm lead screw
2 x Trapezoidal nut drive



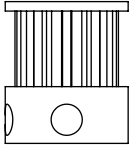
2 x Coupling



3 x Linear bearing block



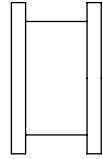
4 x Flanged linear
bearing



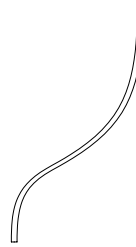
2 x GT2 pulley



2 x GT2 belt

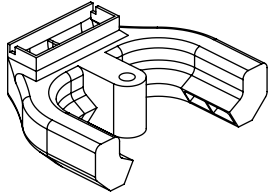


2 x Idler pulley kit

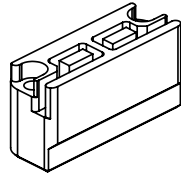


1 x PTFE tube

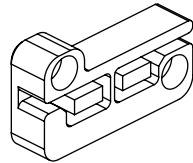
C. 3D printed parts



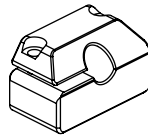
1 x Fan duct



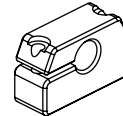
1 x Y axis belt holder



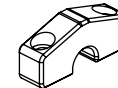
1 x X axis belt holder



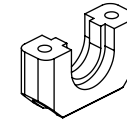
4 x Y axis rod holder



4 x Z axis rod holder



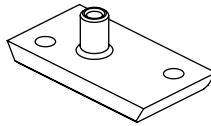
4 x X axis rod holder



1 x Hexagon bracket

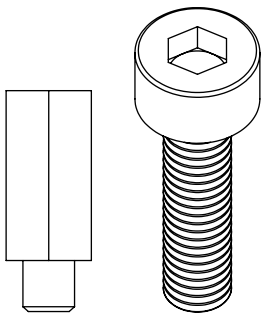


1 x Leveling sensor holder



1 x Filament guide

D. Hardware



10 x M2,5 x 8 mm screw

5 x M2,5 x 12 mm screw

50 x M3 x 8 mm screw

30 x M3 x 12 mm screw

25 x M3 x 20 mm screw

4 x M3 x 22 mm screw

20 x M4 x 6 mm screw

15 x M3 nut

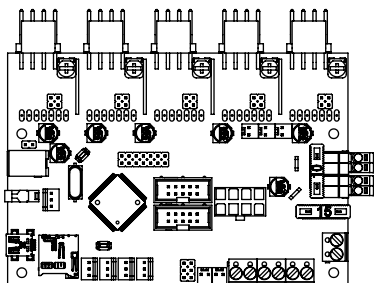
15 x Ø 3 mm x height 3 mm spacer

5 x Ø 3 mm x height 5 mm spacer

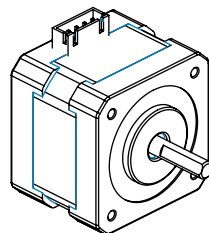
5 x Ø 3 mm x height 10 mm spacer

13 x Ø 3 mm washer

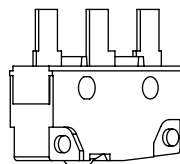
E. Electronic



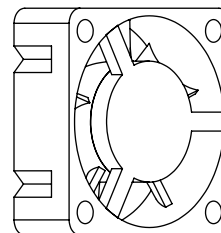
1 x eMotron
1 x TF Card



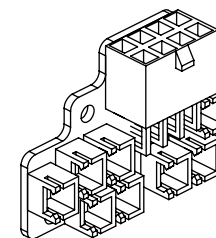
5 x Nema 17 Motor



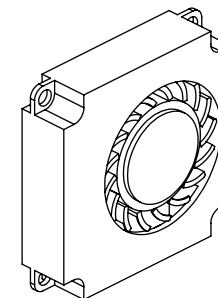
3 x Endstop
(colored connector)



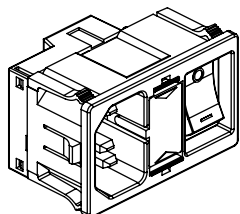
1 x 3 cm fan



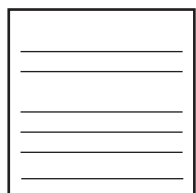
1 x EBoard



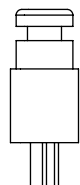
1 x Blower fan



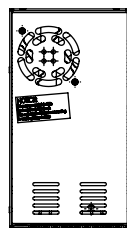
1 x IEC connector



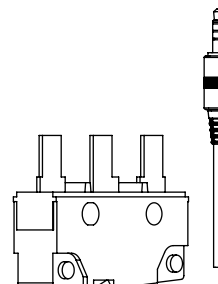
1 x Heating patch



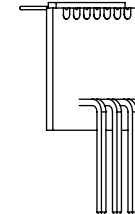
1 x Reset button



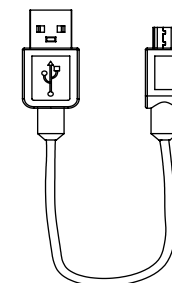
1 x Power supply



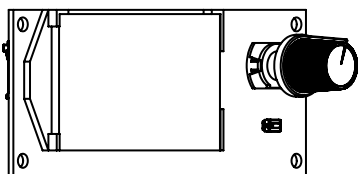
1 x Calibration probe



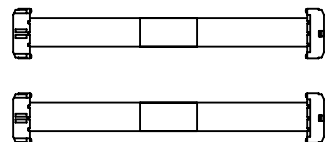
1 x Motor driver



1 x USB cable

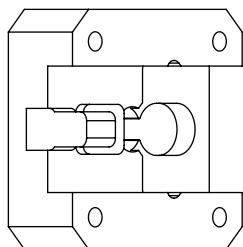


1 x LCD screen
and TF card reader

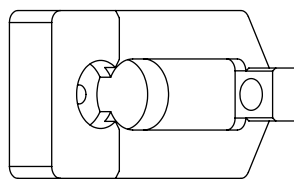


2 x Ribbon cable

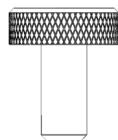
F. Extruder kit



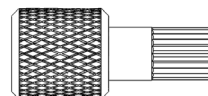
1 x Body
extruder



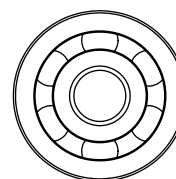
1 x Mobile
extruder



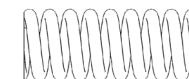
1 x M5 x 12 mm
knurled screw



1 x Driving wheel

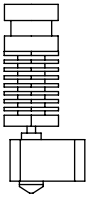


1 x 693zz
bearing

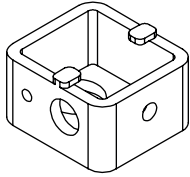


1 x Spring

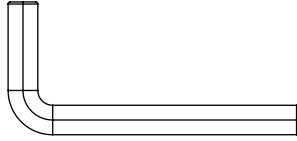
G. Hexagon kit (hotend)



1 x Hexagon hotend



1 x Silicon sleeve

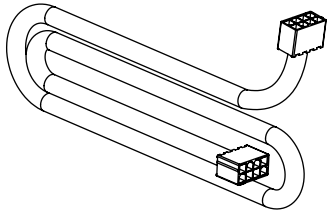


1 x 3 Allen key



1 x 4.5 wrench

H. Cables and extensions



- 1 x 20 mm motor's cable
- 2 x 50 mm motor's cable
- 1 x Thermistor
- 1 x Heater cartridge
- 1 x Blue endstop
- 4 x Power supply cable
- 1 x Reset button
- 2 x IEC On/Off cable
- 1 x IEC VCC cable

- 1 x IEC GND cable
- 1 x IEC EARTH cable
- 1 x JACK endstop
- 1 x Extruder extension
- 1 x Z carriage extension
- 2 x endstop
- 1 x 220V power supply cable
- 1 x Mini USB cable

I. Autres

- 1 x bag of grease
- 1 x bag of zip ties



MECHANICAL ASSEMBLY

ASSEMBLY OF THE LCD SCREEN

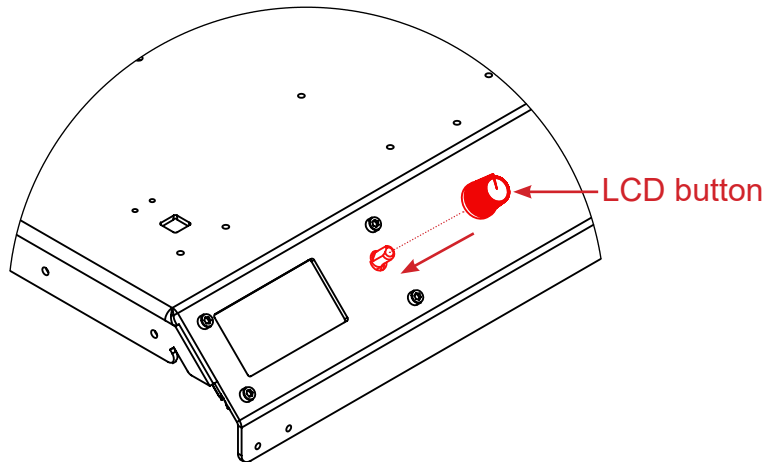
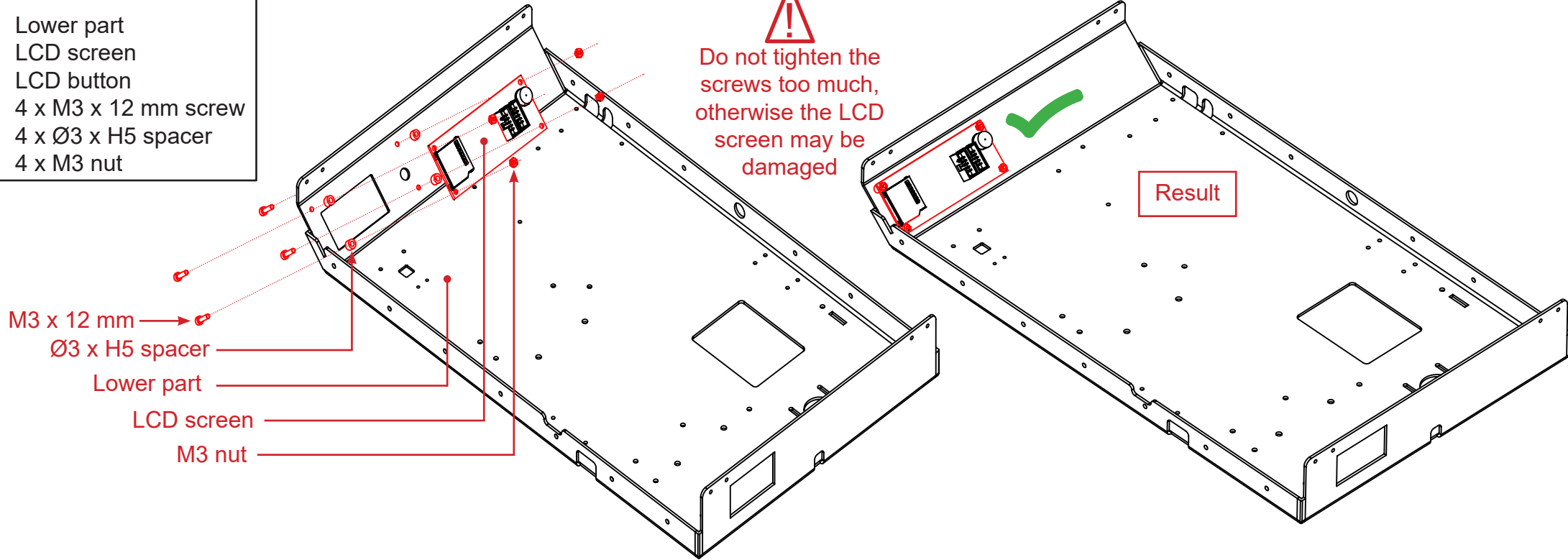
Needed parts :

- Lower part
- LCD screen
- LCD button
- 4 x M3 x 12 mm screw
- 4 x Ø3 x H5 spacer
- 4 x M3 nut

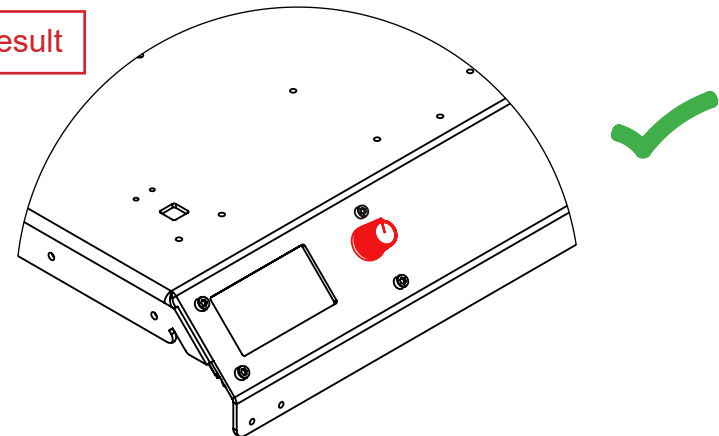
Target : mount the LCD screen on the lower part



Do not tighten the screws too much, otherwise the LCD screen may be damaged



Result

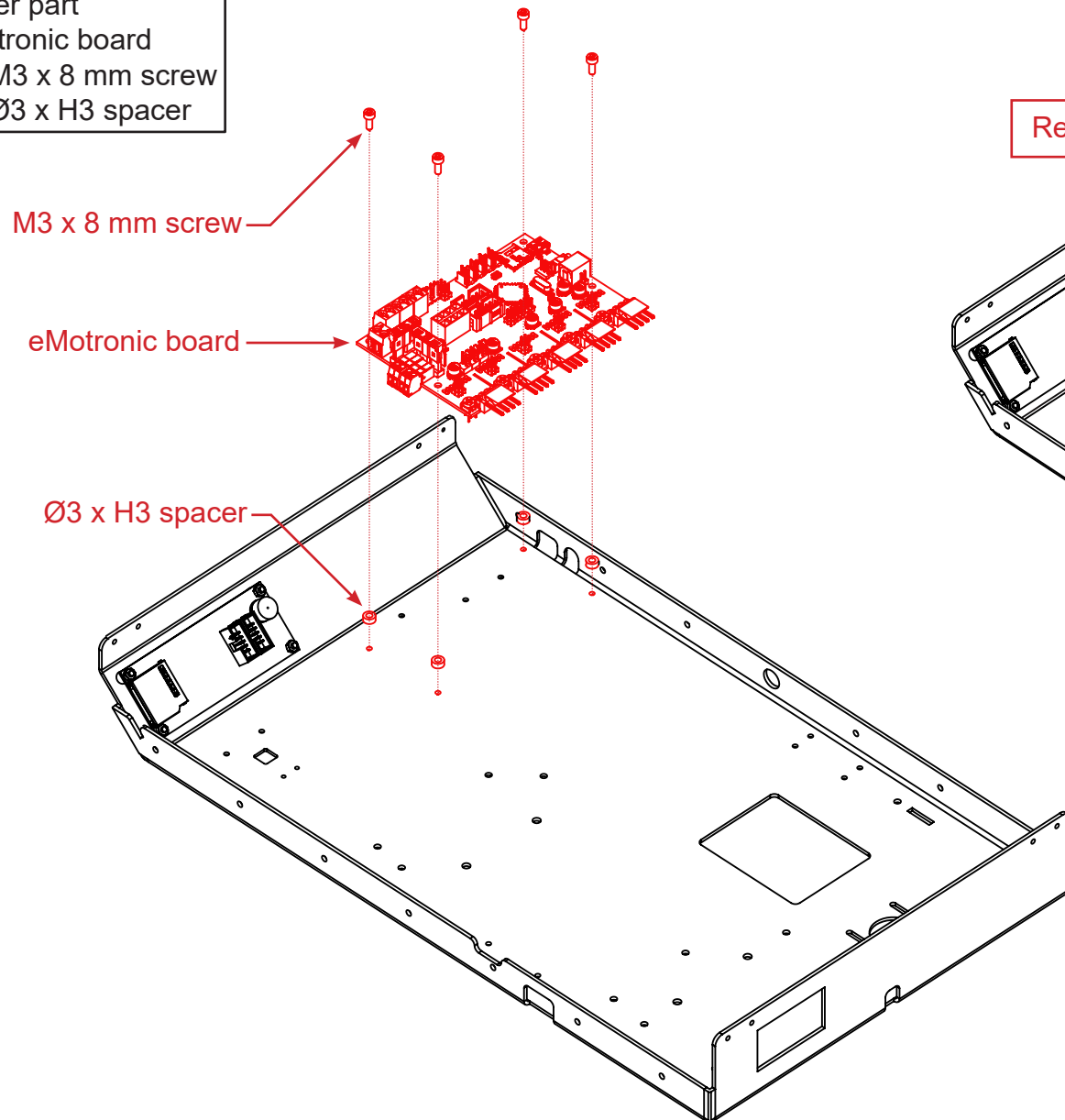


ASSEMBLY OF THE ELECTRONIC BOARD

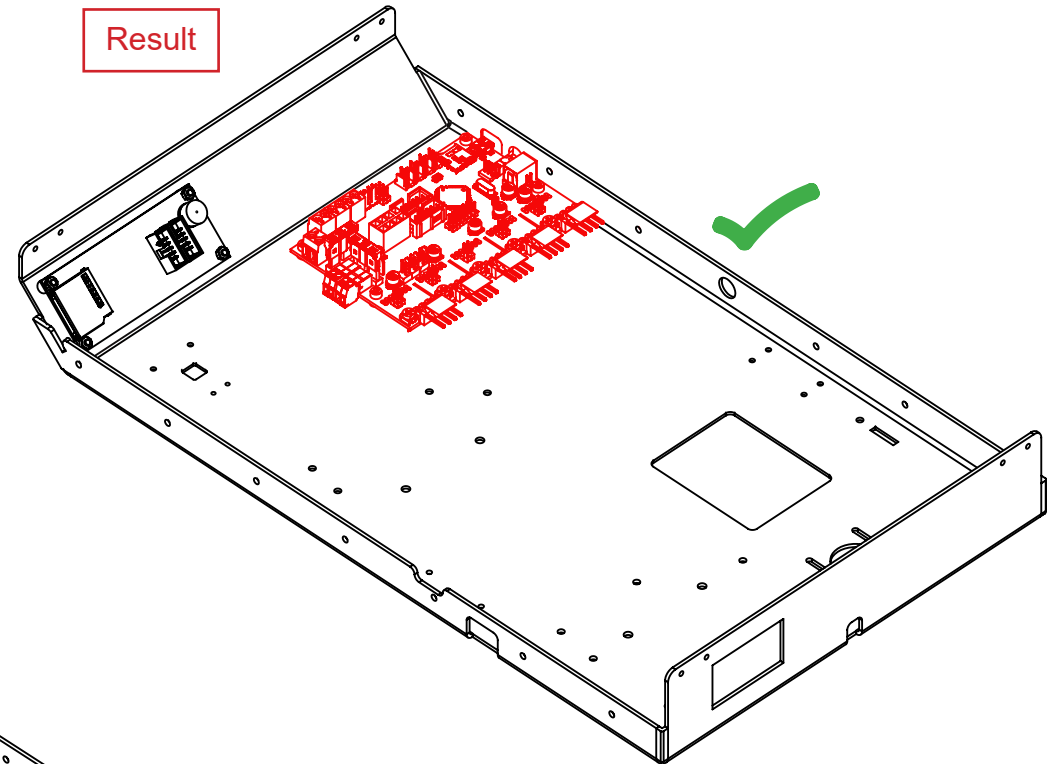
Needed parts :

- Lower part
- eMotronic board
- 4 x M3 x 8 mm screw
- 4 x Ø3 x H3 spacer

Target : mount the electronic board on the lower part



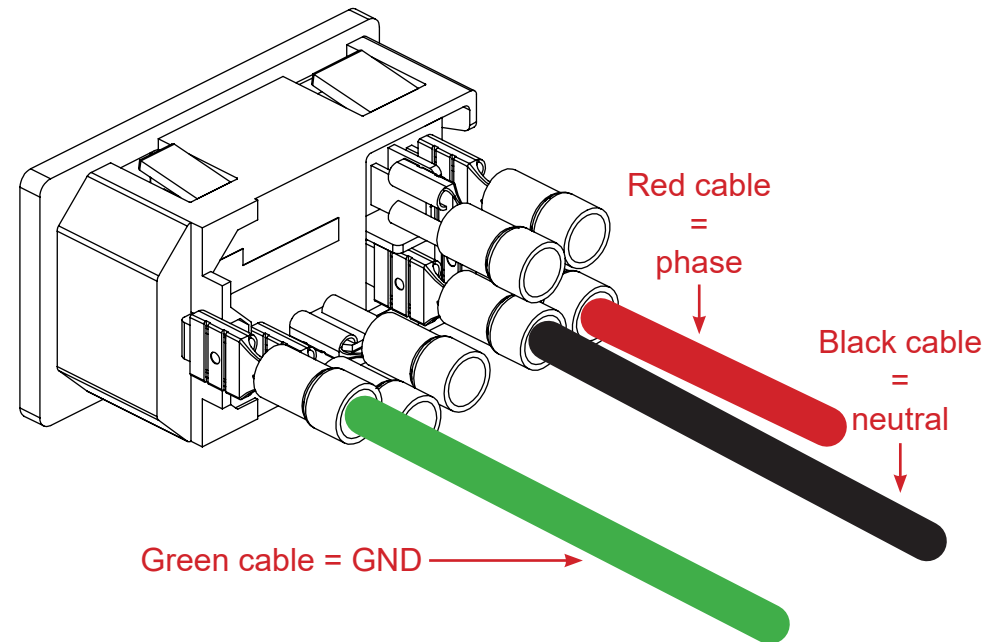
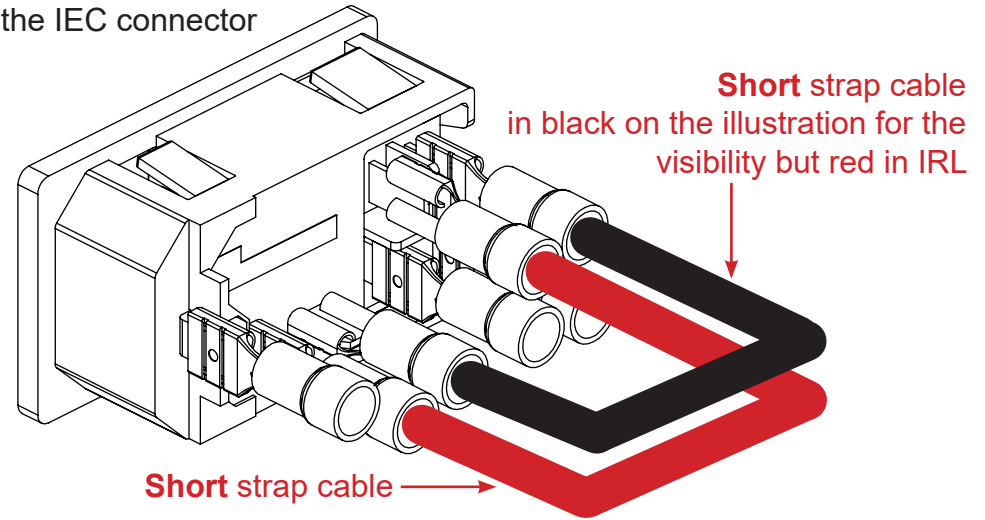
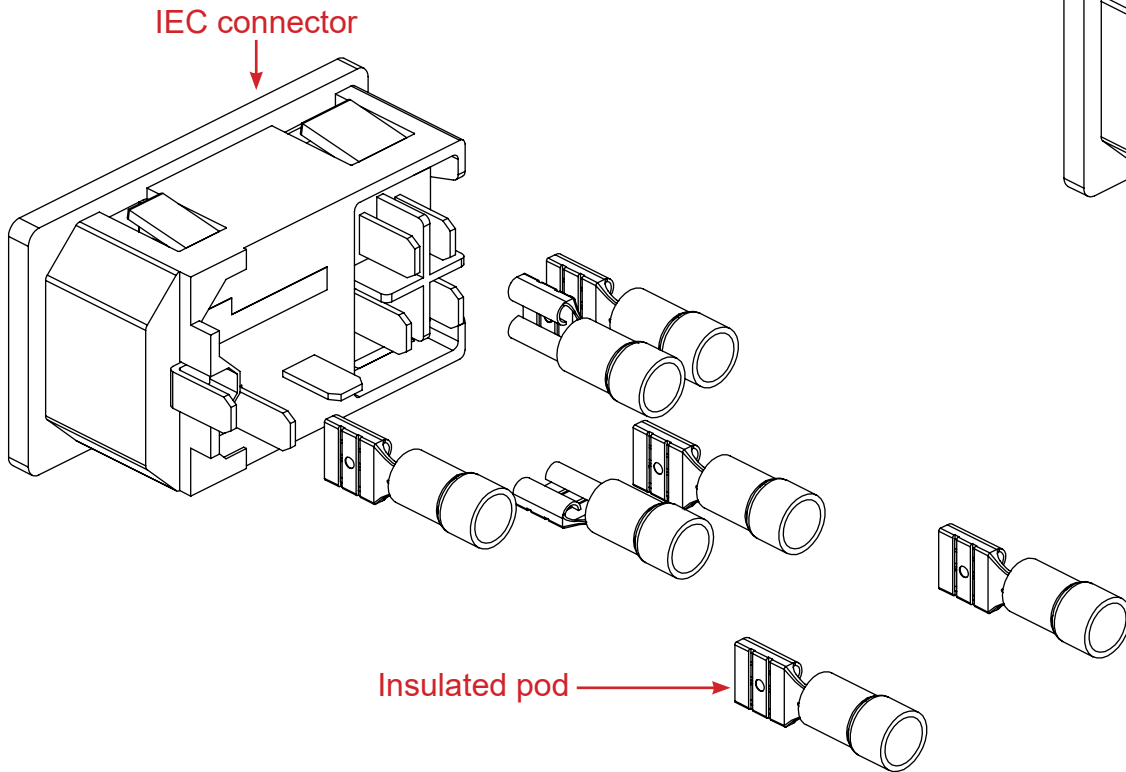
Result



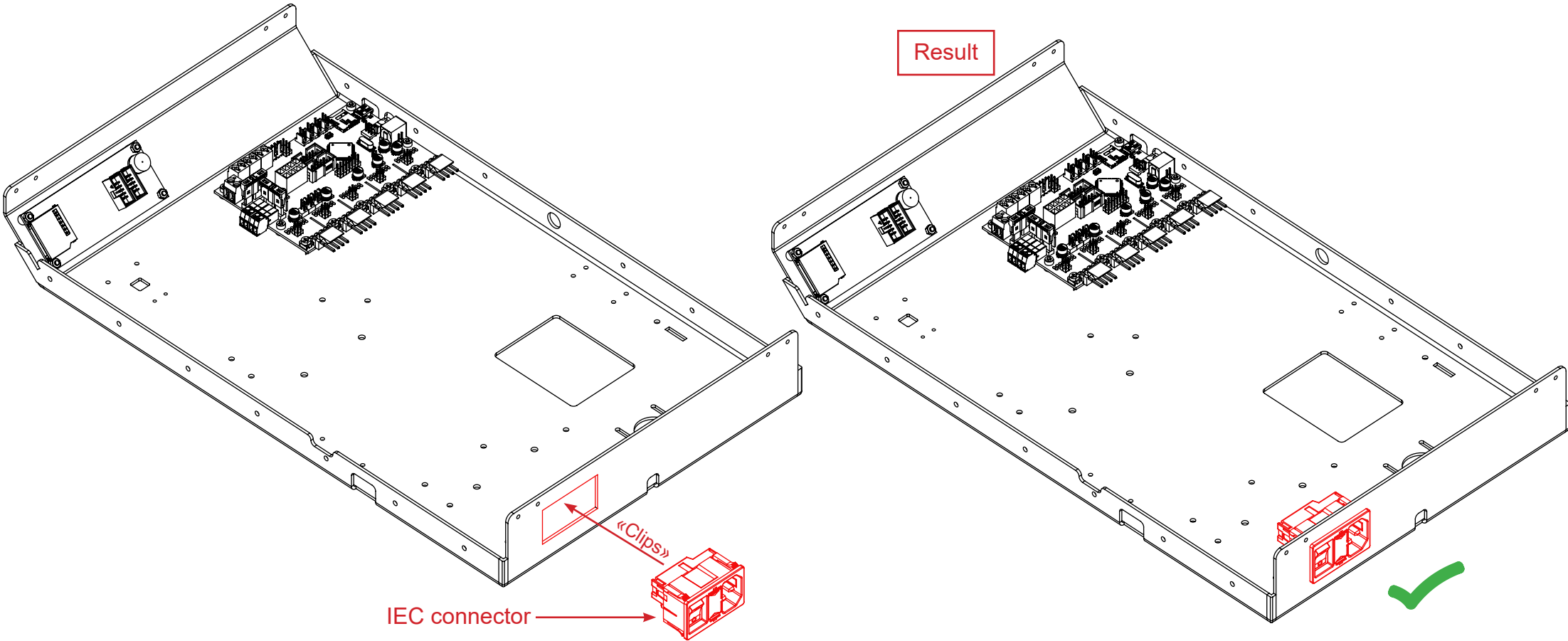
ASSEMBLY OF THE IEC CONNECTOR

- Needed parts :**
- Lower part
 - IEC connector
 - 2 x Short strap cable

Target : preparation of the two cables of the IEC connector



Target : mount the IEC connector on the lower part

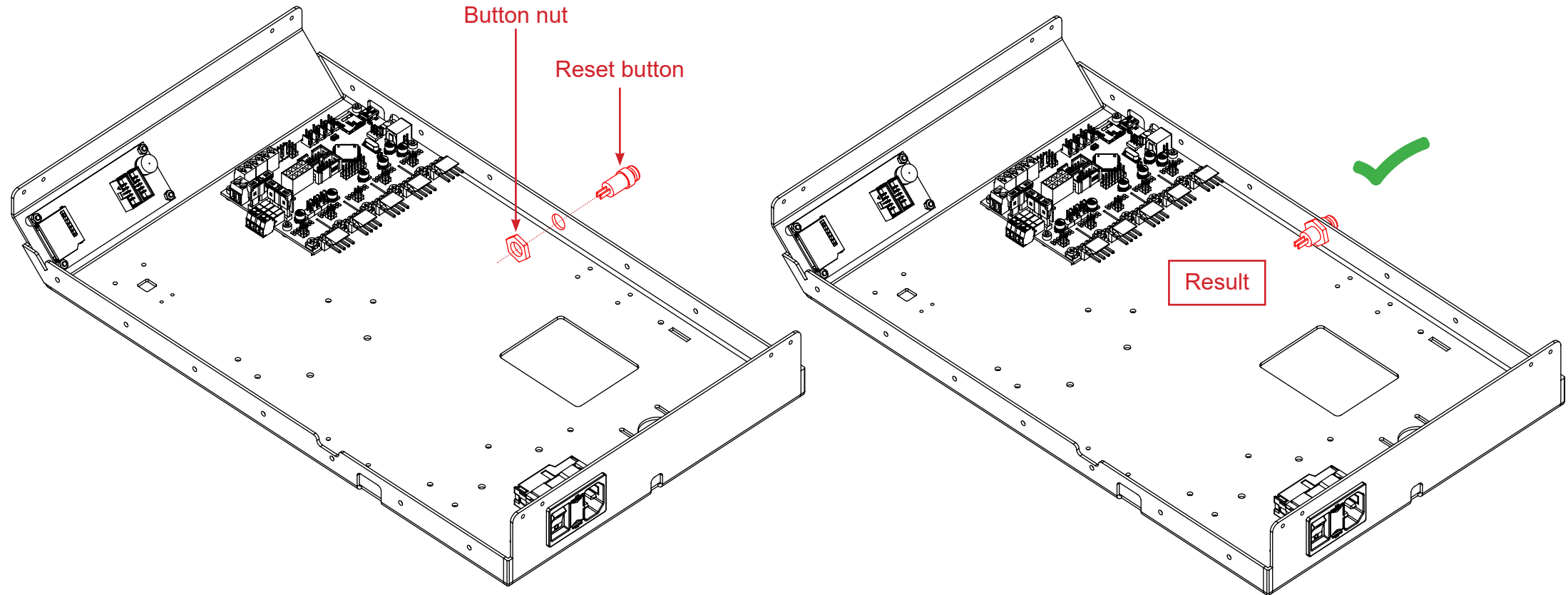


ASSEMBLY OF THE RESET BUTTON

Needed parts :

- Lower part
- Reset button

Target : mount the reset button on the lower part

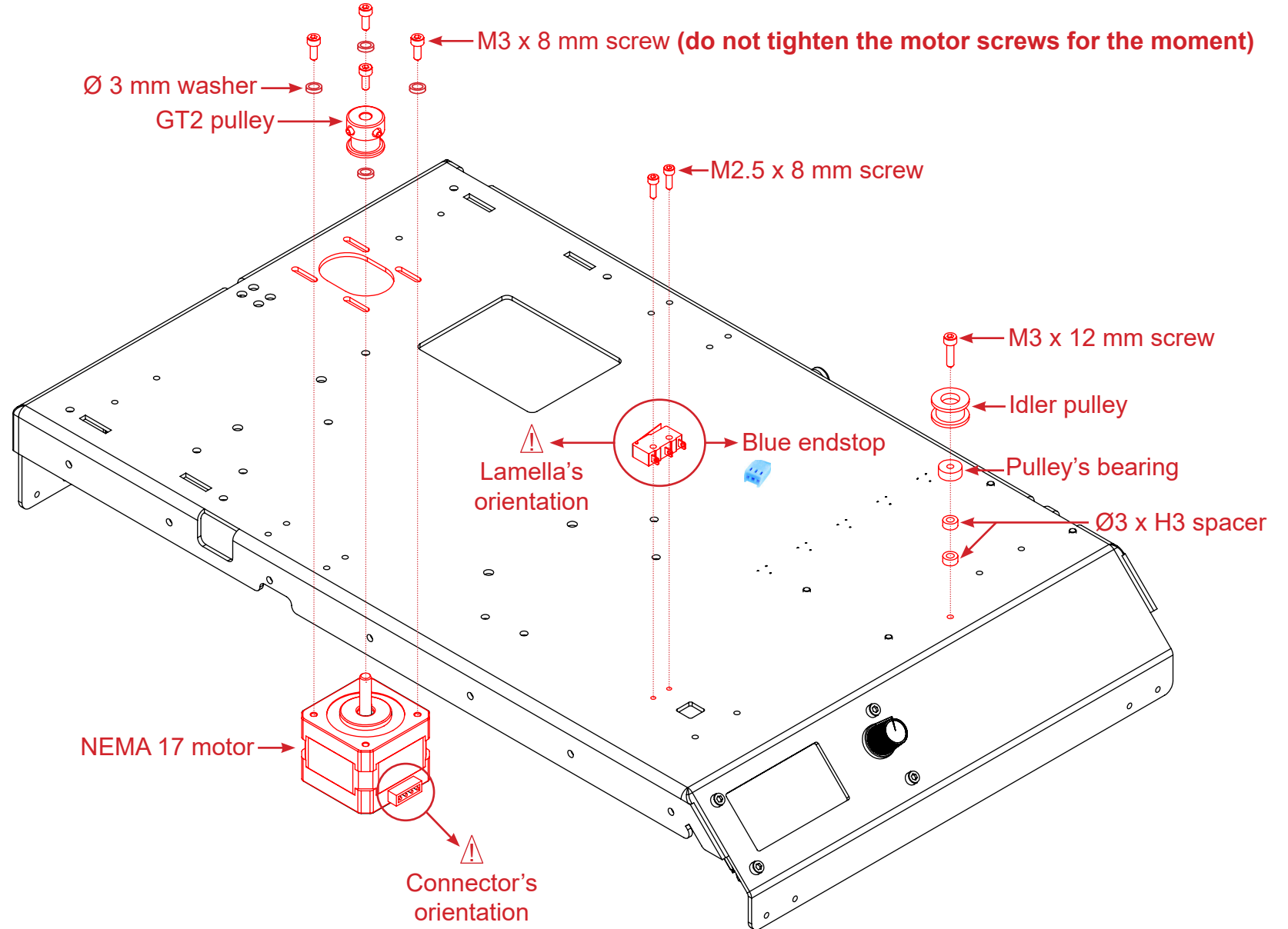


ASSEMBLY OF THE Y AXIS (part 1)

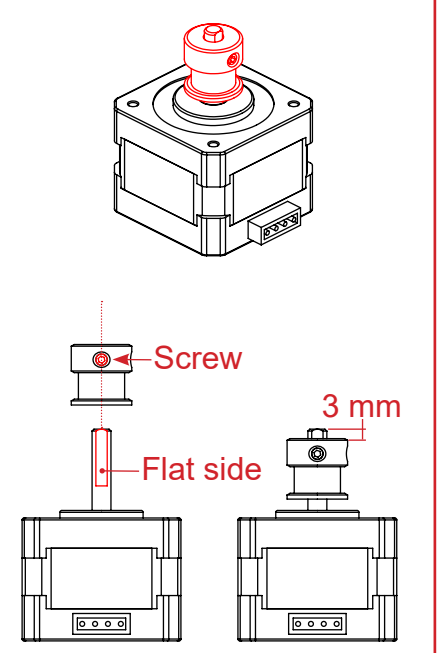
Needed parts :

- Lower part
- Nema 17 motor
- Blue endstop
- GT2 pulley
- Idler pulley
- Pulley bearing
- 4 x M3 x 8 mm screw
- 1 x M3 x 12 mm screw
- 2 x M2.5 x 8 mm screw
- 2 x Ø3 x H3 spacer
- 4 x Ø 3 mm washer

Target : mount the motor, pulleys and the Y axis endstop on the lower part

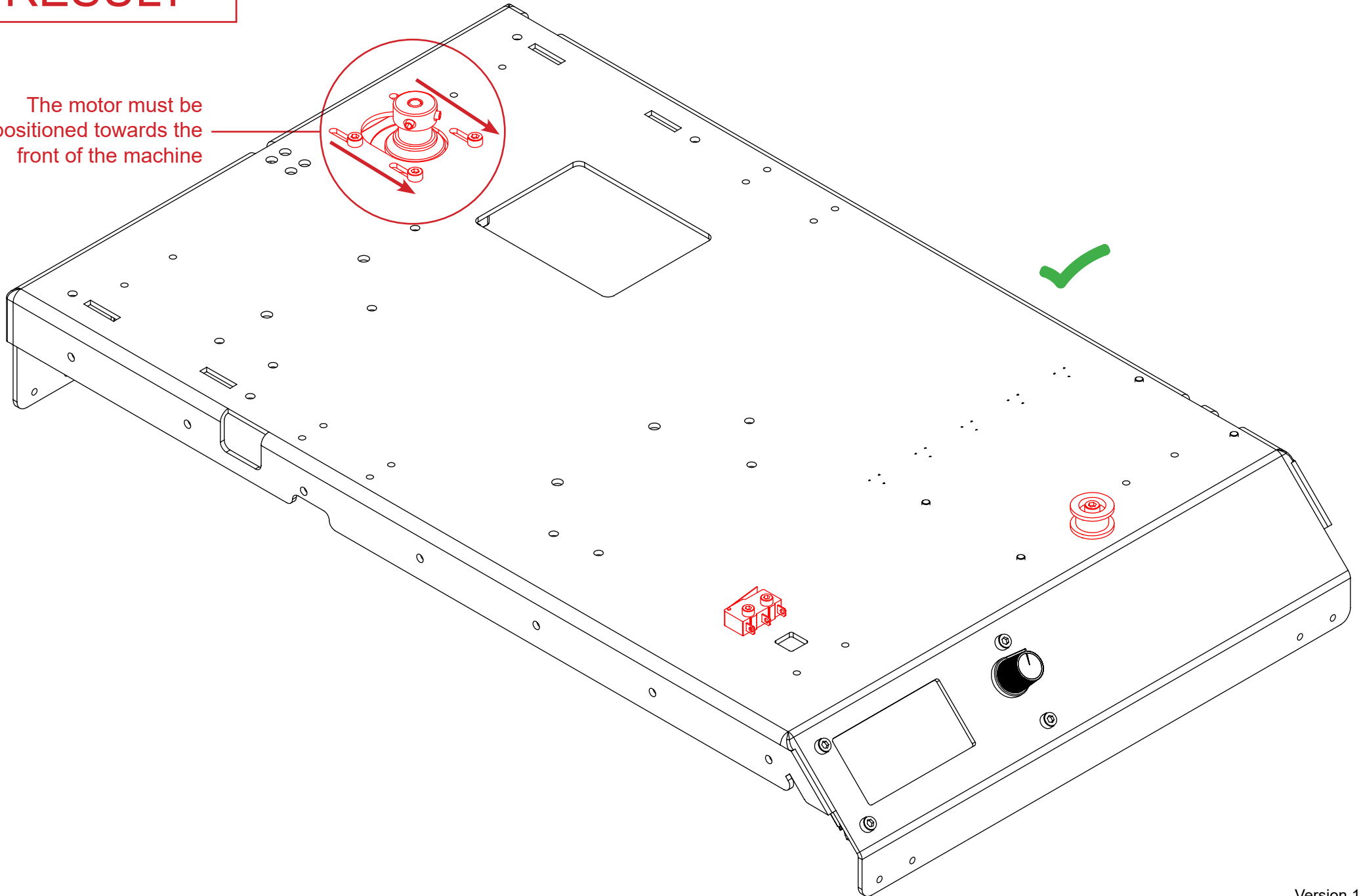


The grub screw must be in contact with the flat part of the axis.



RESULT

The motor must be positioned towards the front of the machine

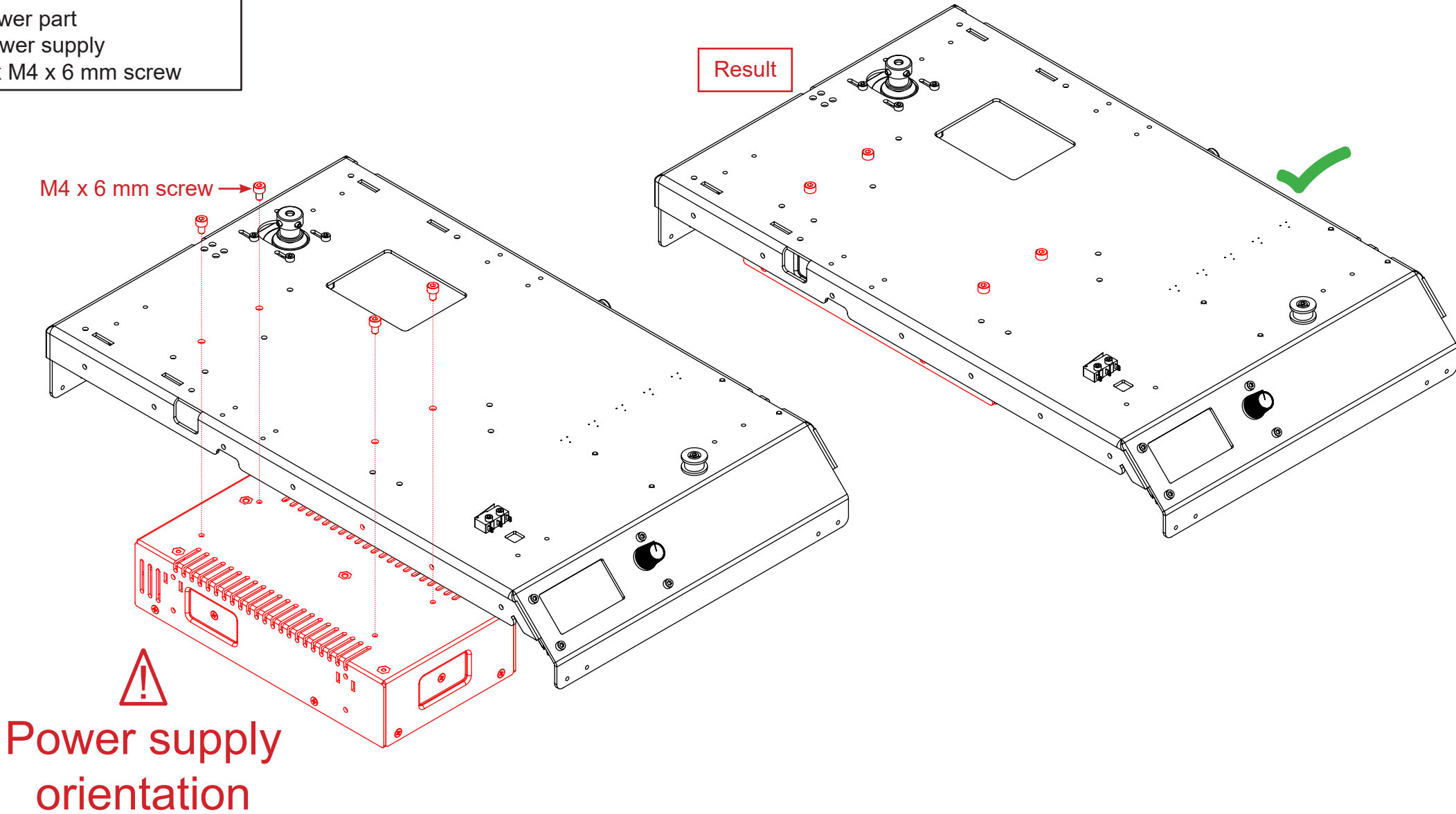


ASSEMBLY OF THE POWER SUPPLY

Needed parts :

- Lower part
- Power supply
- 4 x M4 x 6 mm screw

Target : mount the power supply on the lower part

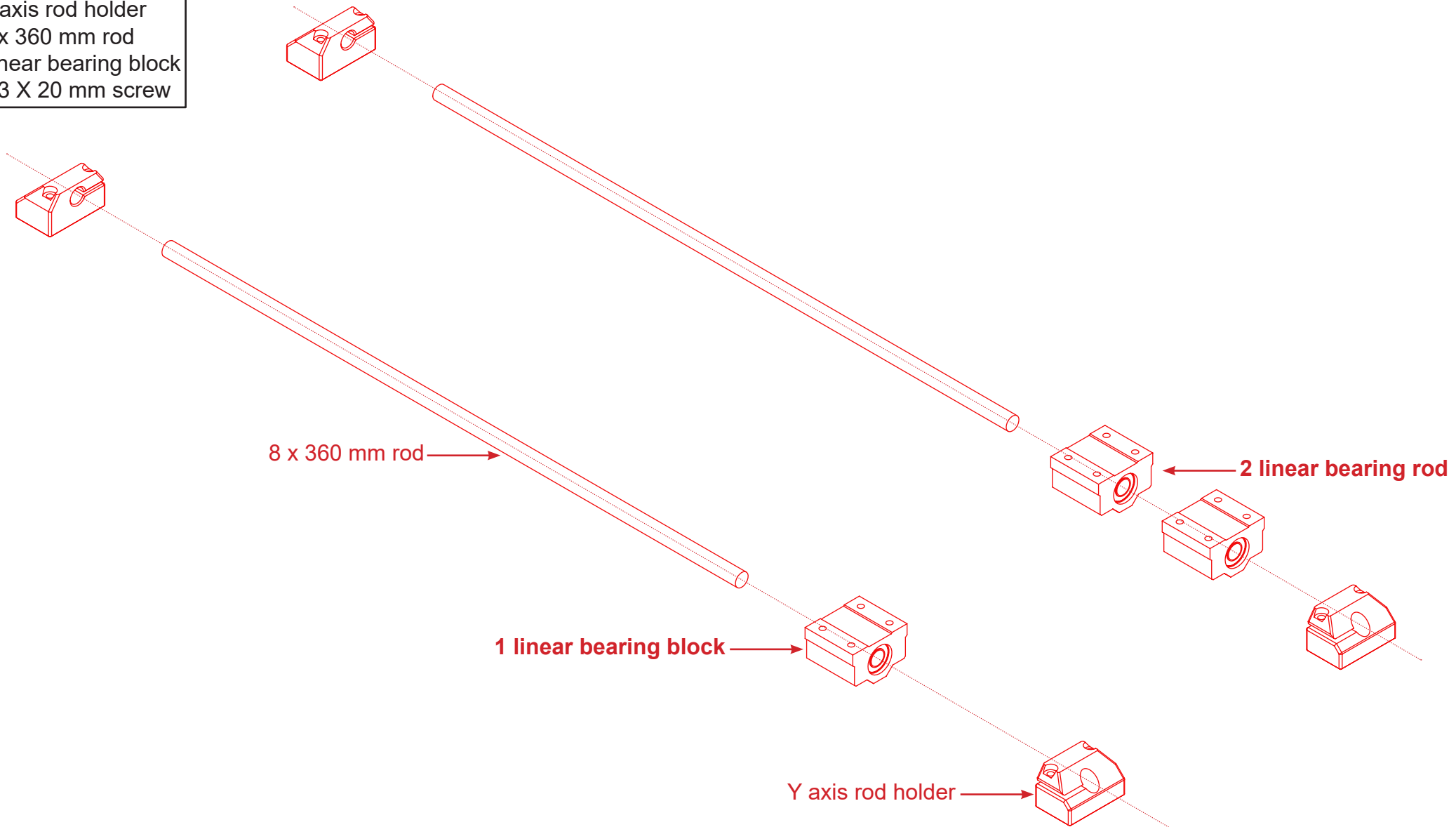


ASSEMBLY OF THE Y AXIS (part 2)

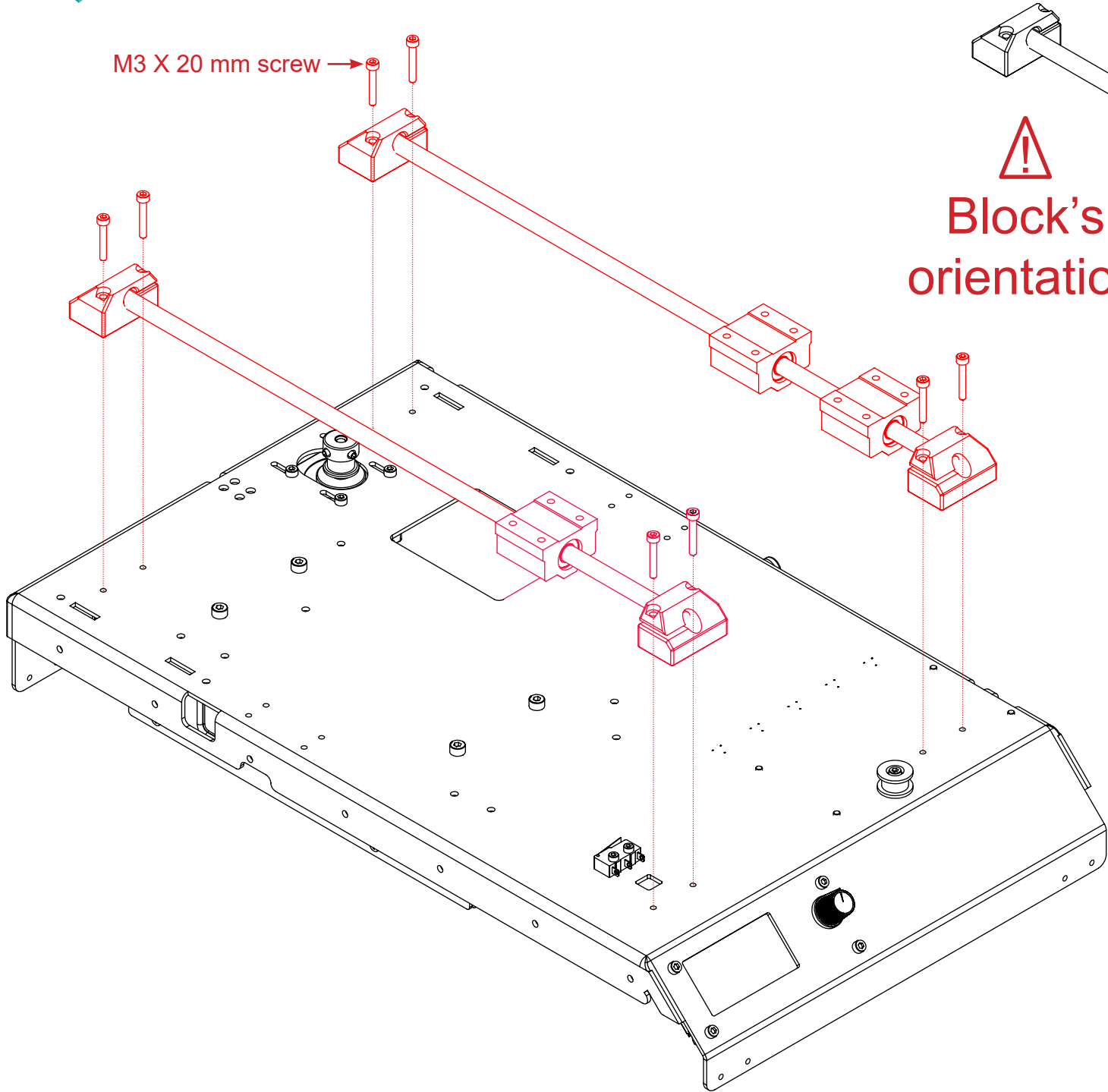
Needed parts :

- Lower part
- 4 x Y axis rod holder
- 2 x 8 x 360 mm rod
- 3 x Linear bearing block
- 8 x M3 X 20 mm screw

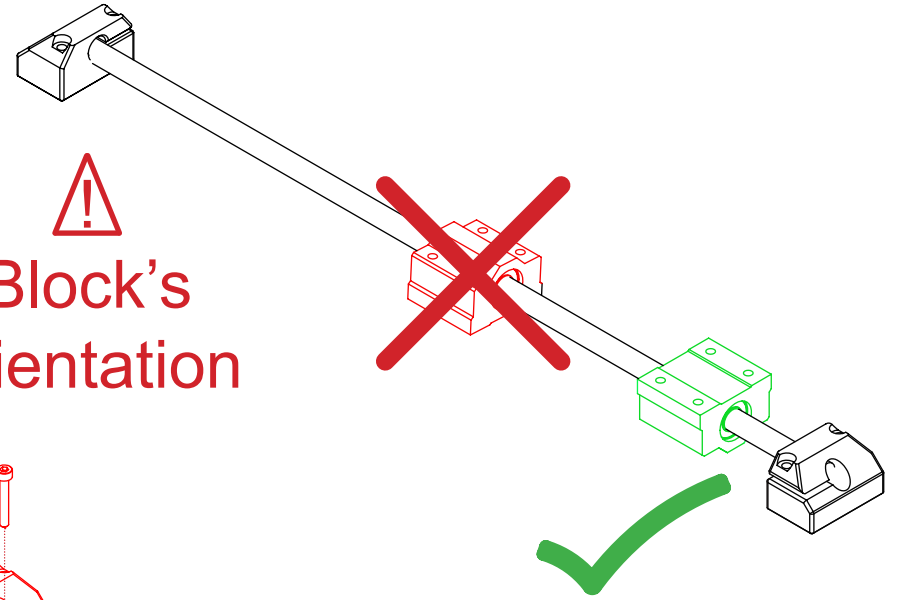
Target : mount rods, bearing blocks and holders on the lower part.



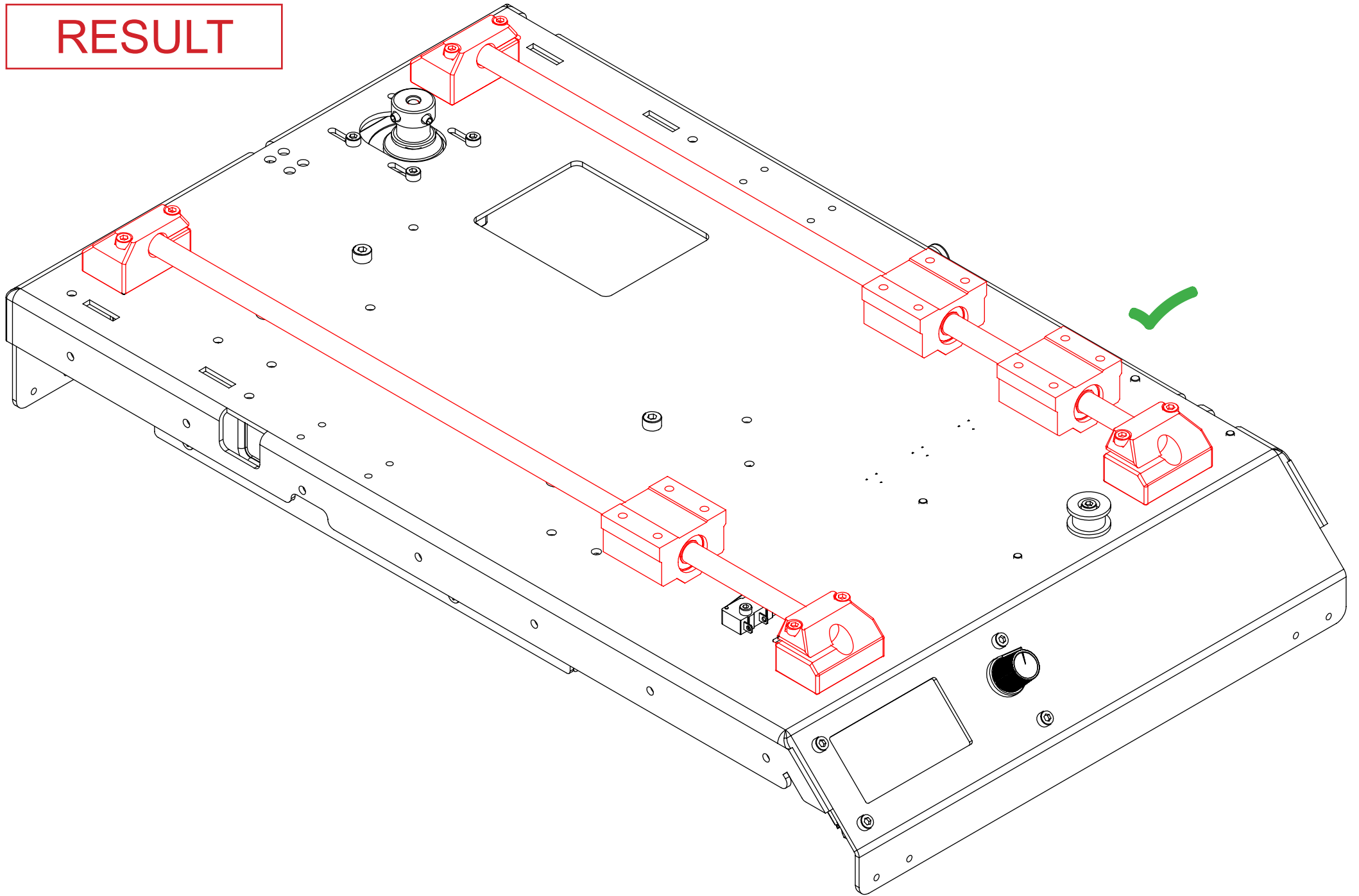
M3 X 20 mm screw




**Block's
orientation**



RESULT

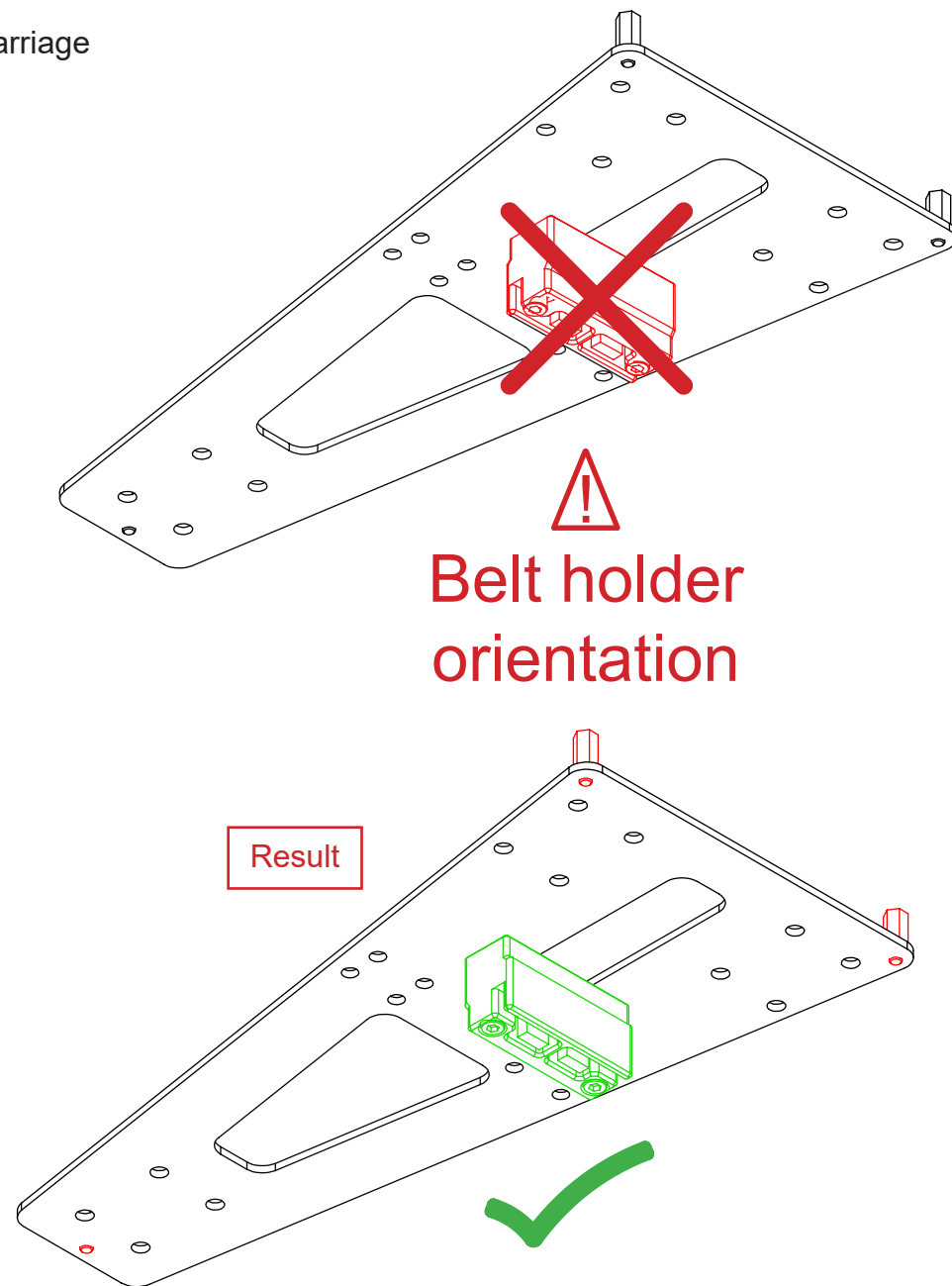
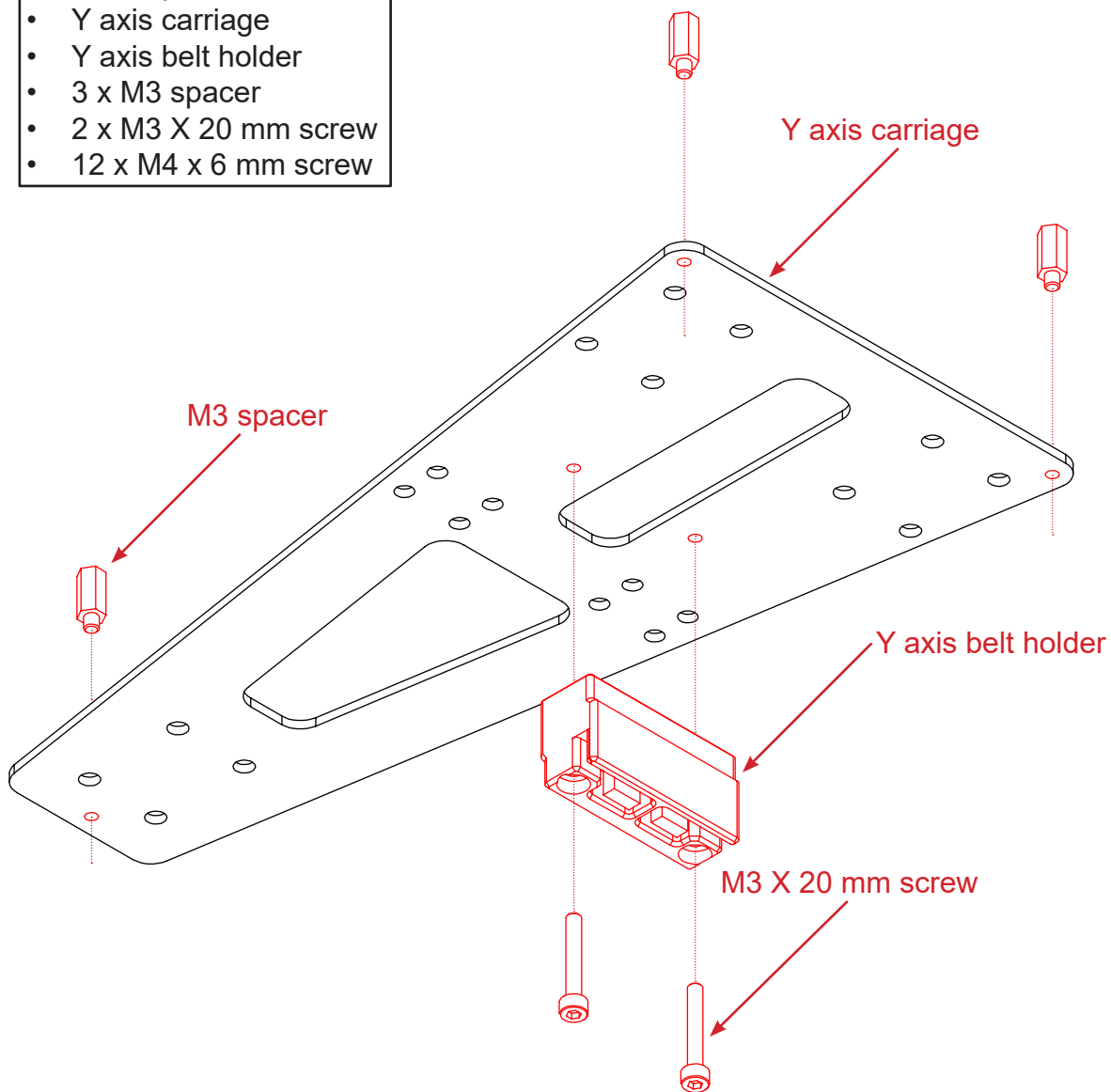


ASSEMBLY OF THE Y AXIS CARRIAGE

Needed parts :

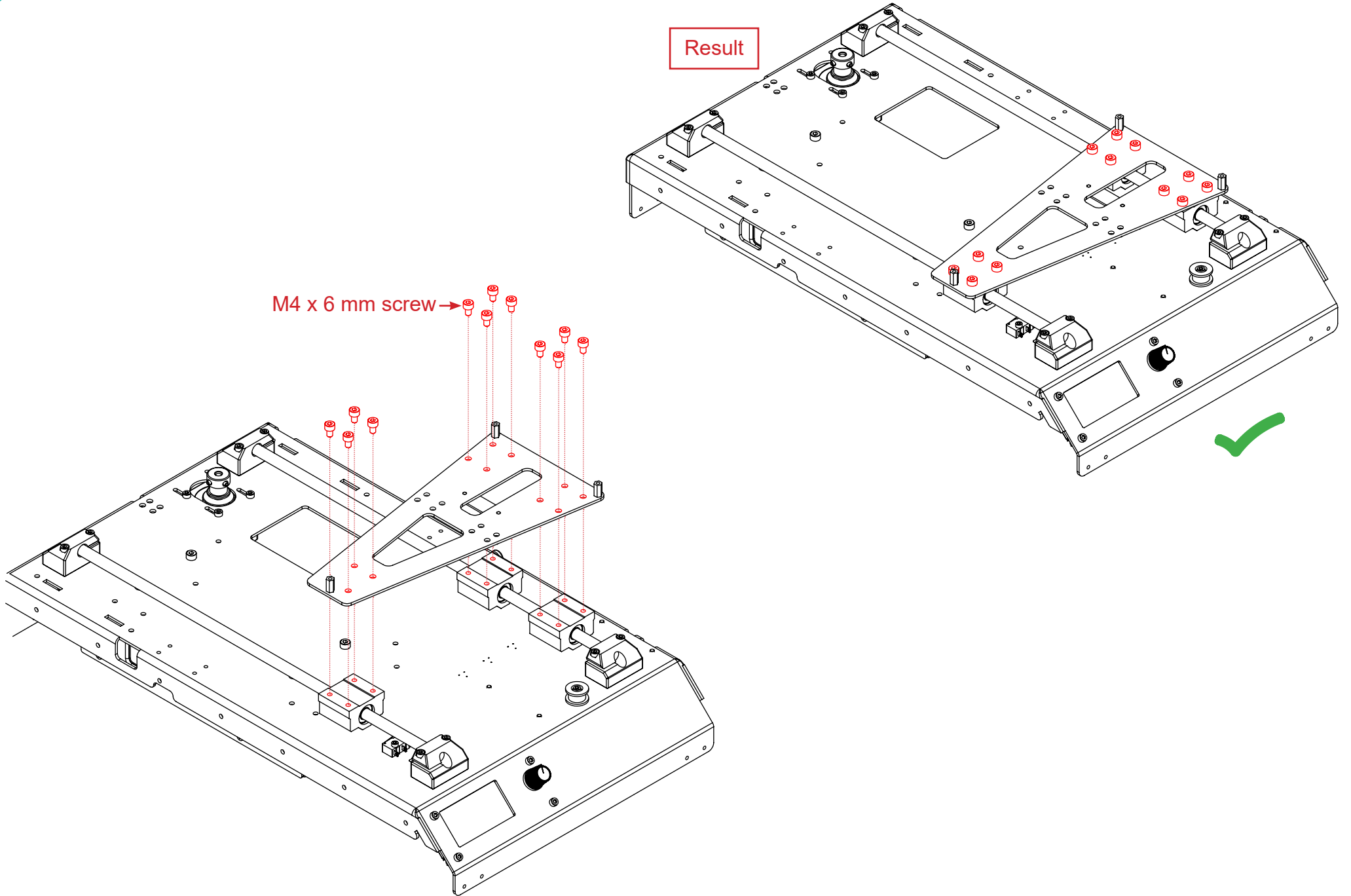
- Lower part
- Y axis carriage
- Y axis belt holder
- 3 x M3 spacer
- 2 x M3 X 20 mm screw
- 12 x M4 x 6 mm screw

Target : mount the different elements of the Y axis carriage



Result

M4 x 6 mm screw →

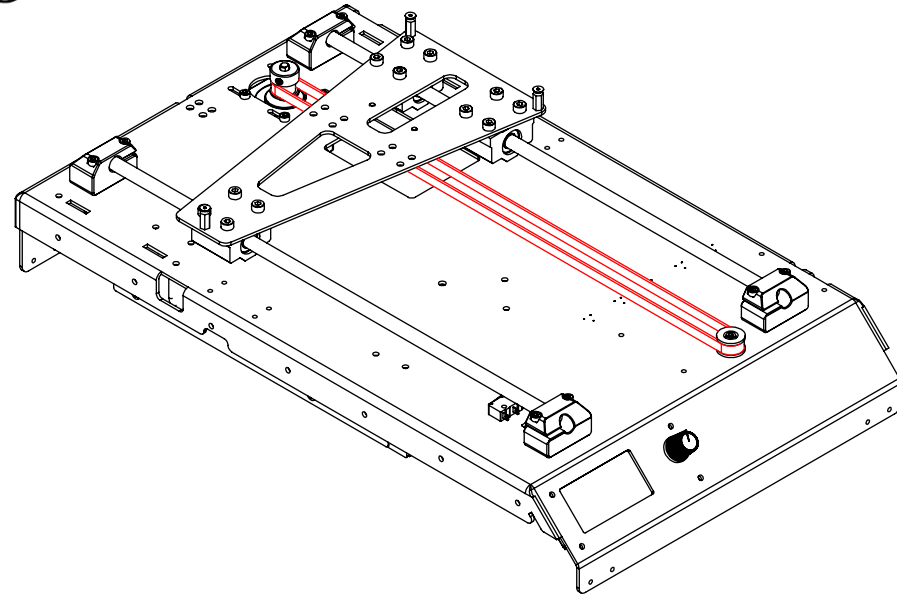


ASSEMBLY OF THE BELT OF THE Y AXIS

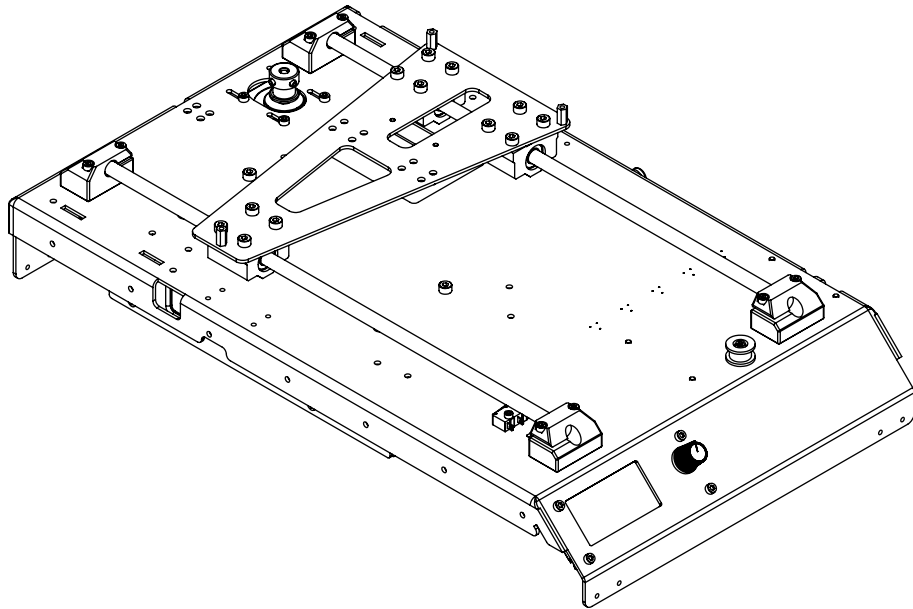
- Needed parts :**
- Lower part
 - GT2 pulley

Target : mount the Y axis belt with the carriage and the lower part

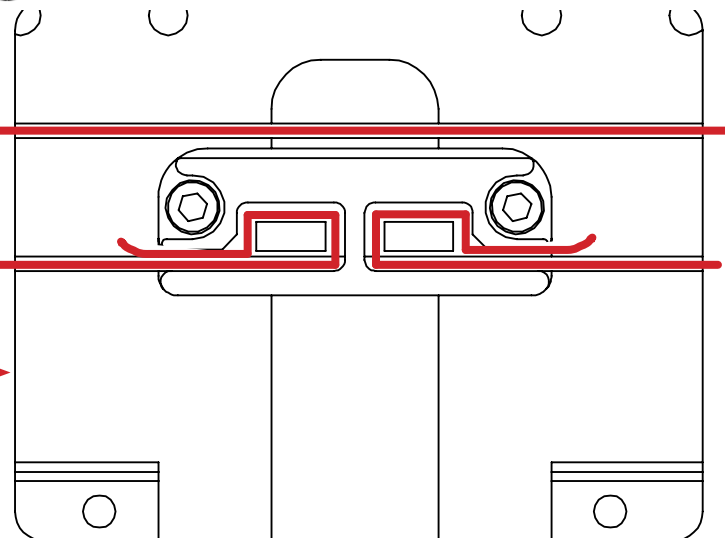
② Place the belt around the pulleys like illustrated below :



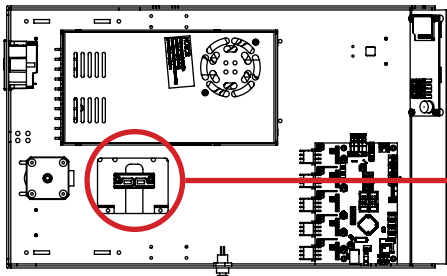
① Place the carriage like this :



④ Make loops to attach the belt

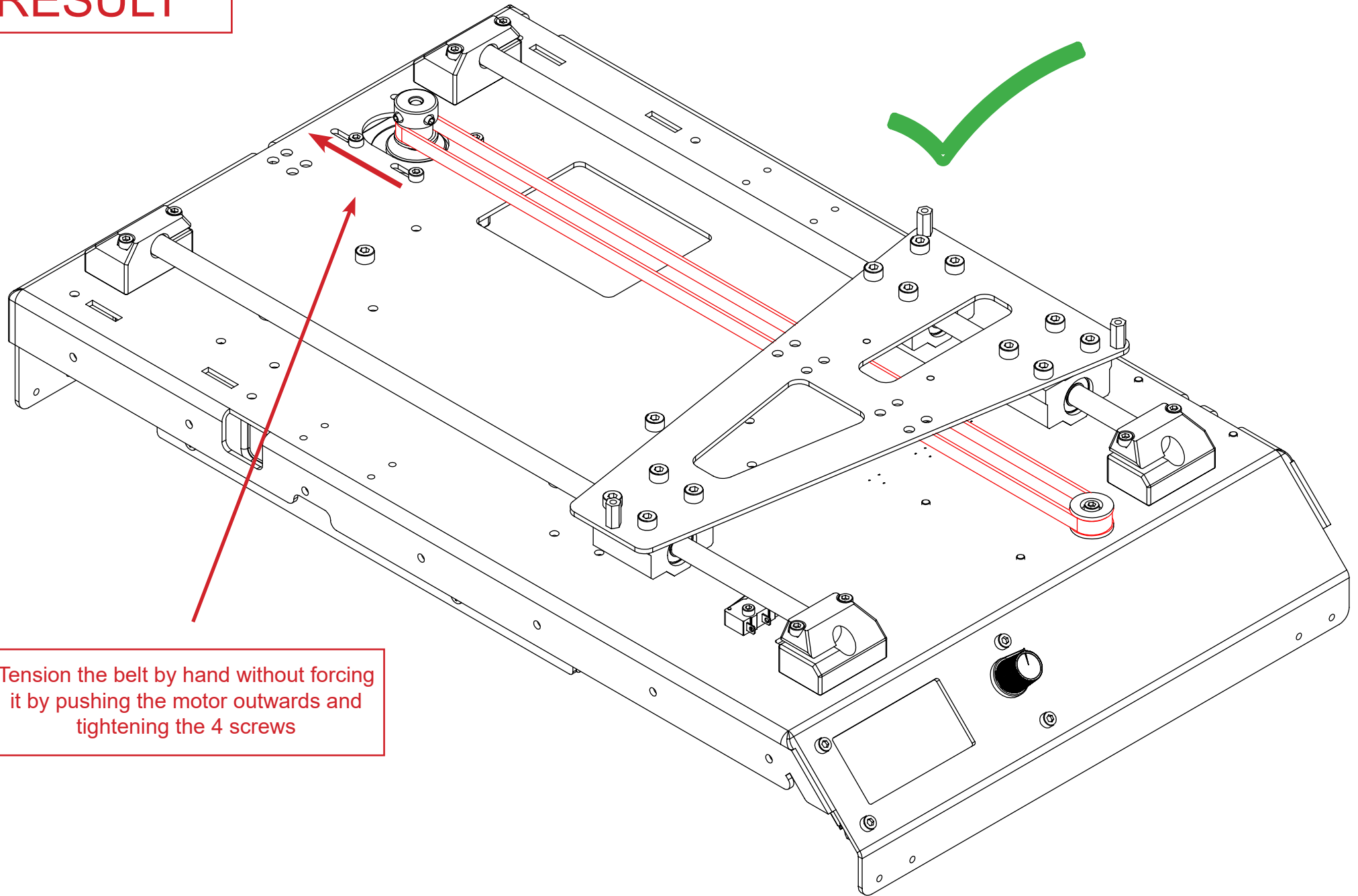


③ Turn over the machine to access the «belt holder» passage.



belt tension next page

RESULT



Tension the belt by hand without forcing it by pushing the motor outwards and tightening the 4 screws

ASSEMBLY OF THE Y AXIS PLATE Y

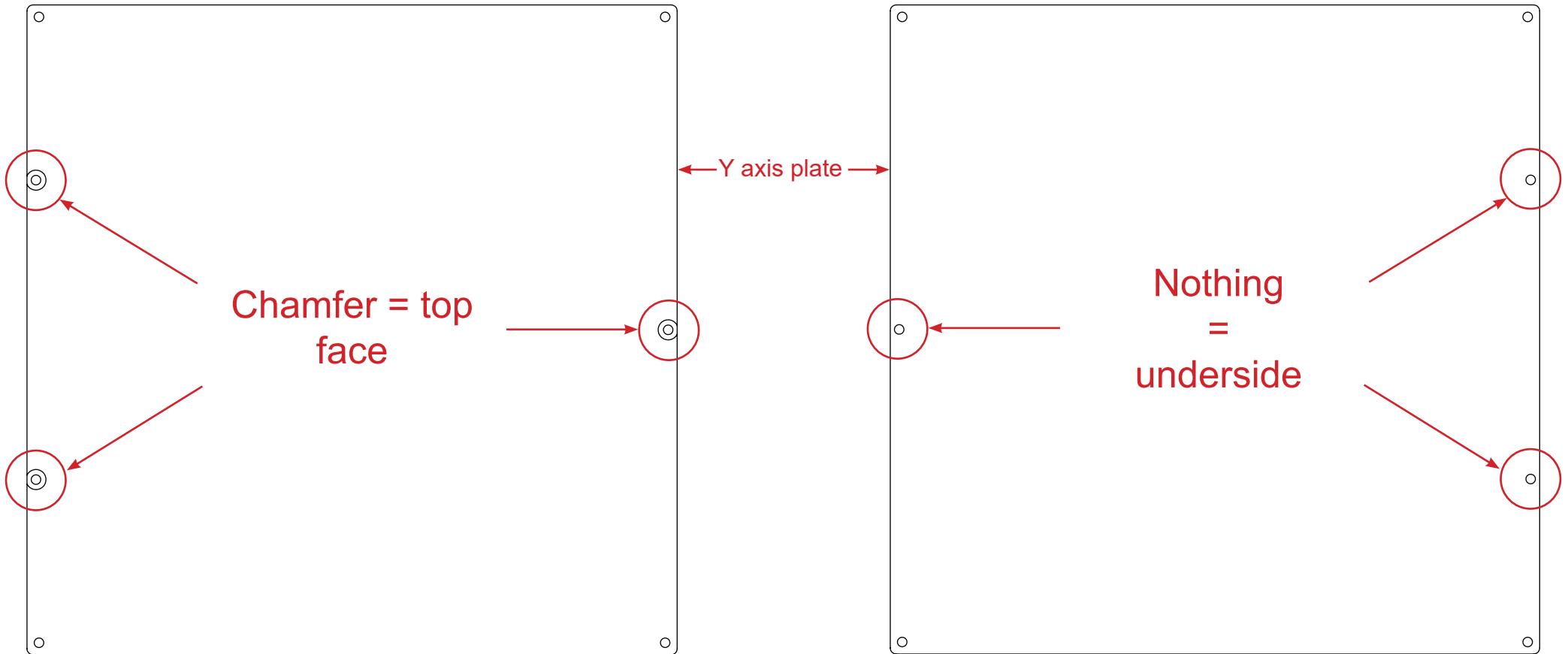
Needed parts :

- Lower part
- Y axis plate
- Heating patch
- 3dBedFix patch
- 3 x M3 x 8 mm countersunk
heah screw

Target : mount the heating plate of the Y axis on the machine

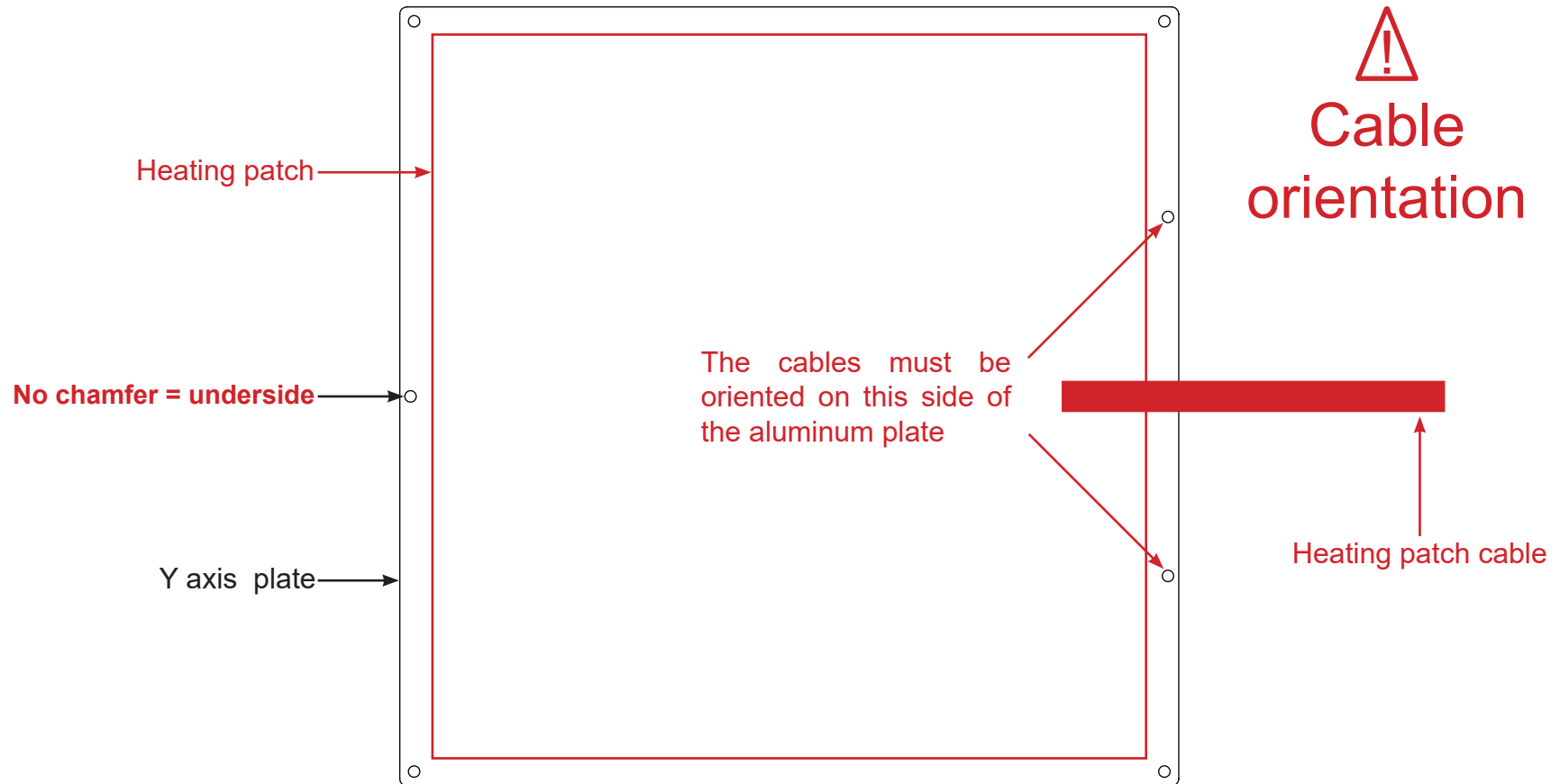


Please visually identify both sides
of the plate

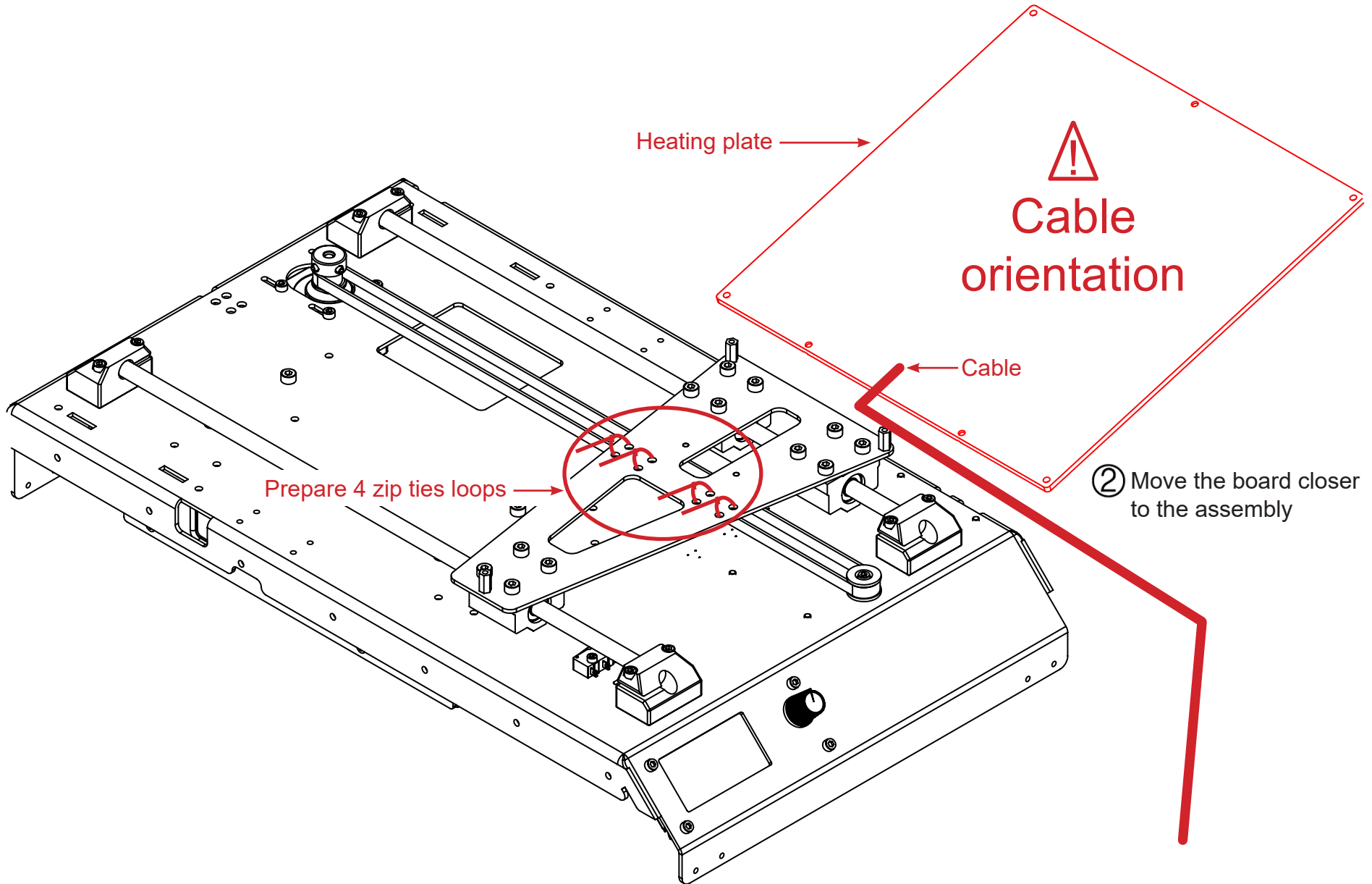


Target : fix the heating patch on the **lower side** of the Y axis plate

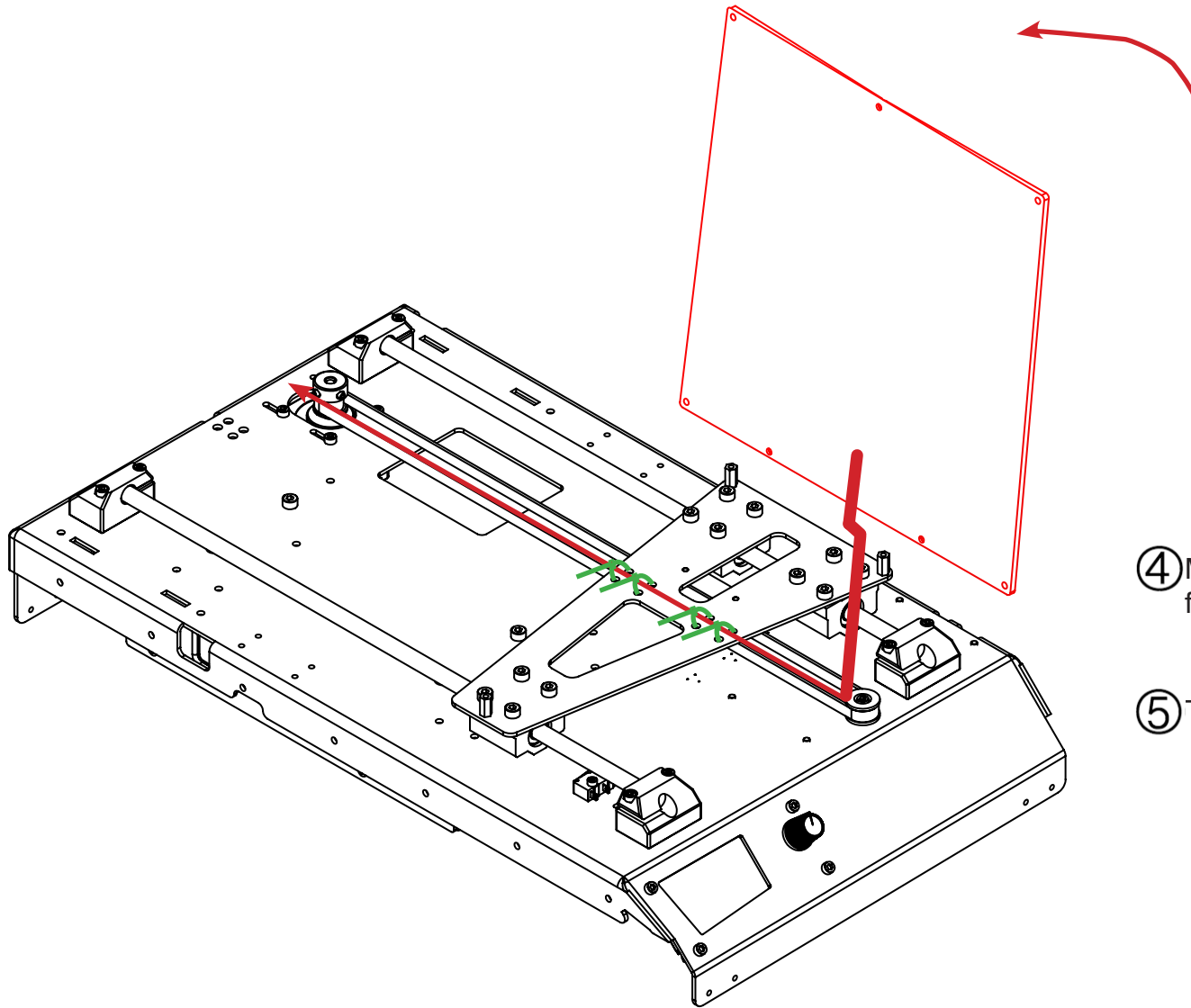
- ① Remove the adhesive protection of the heating patch («3M» inscription side)
- ② **Fix the heating patch on the lower side of the Y axis plate (pay attention to the orientation of the cable)**



① Make 4 loops with 4 zip ties through the eight holes as shown below.

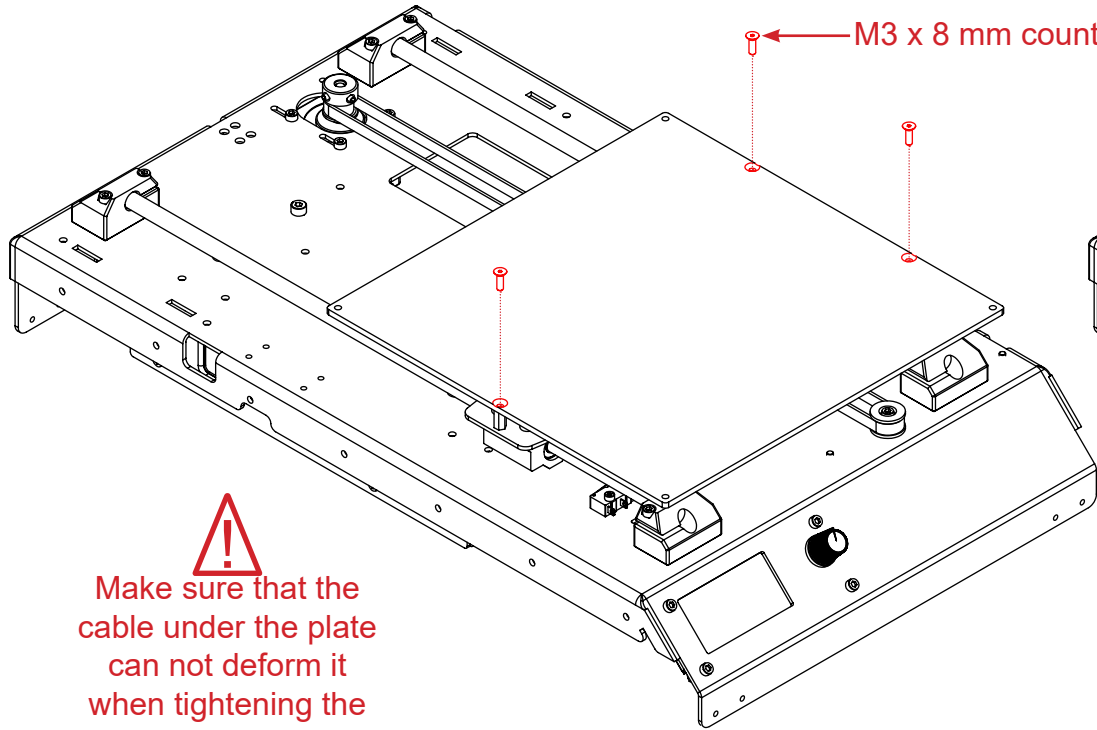


③ Pass the plate's cables in the zip ties loops

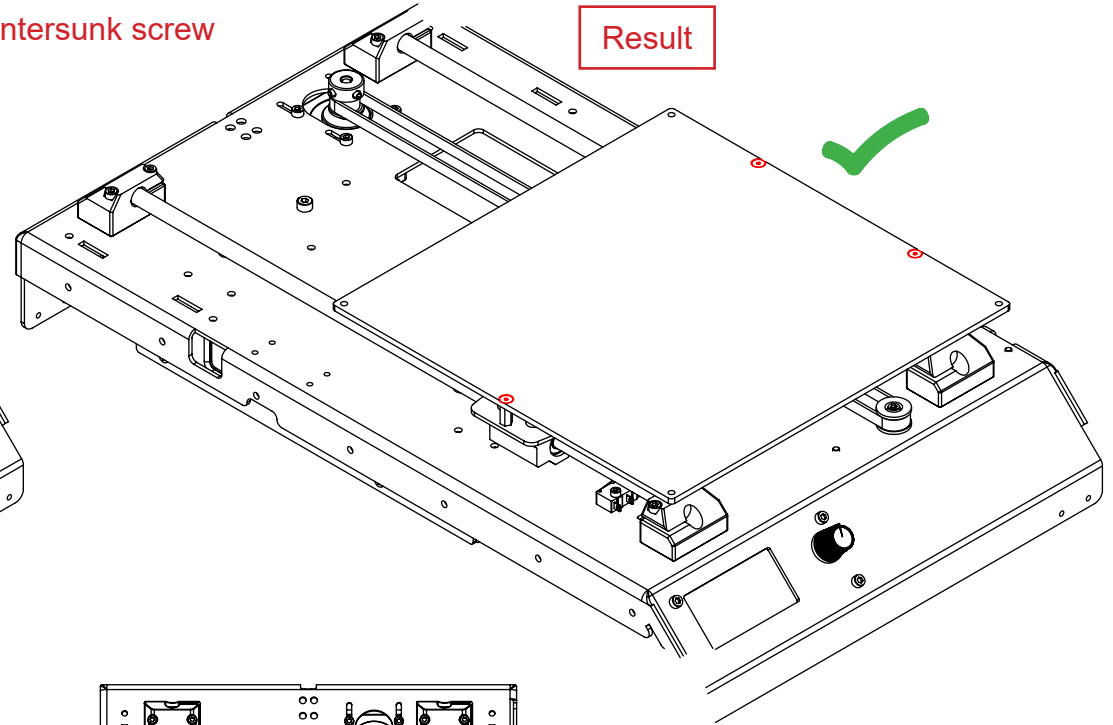


④ Make sure the cable does not exceed from the right-side of the plate

⑤ Tighten the zip ties to hold the cable

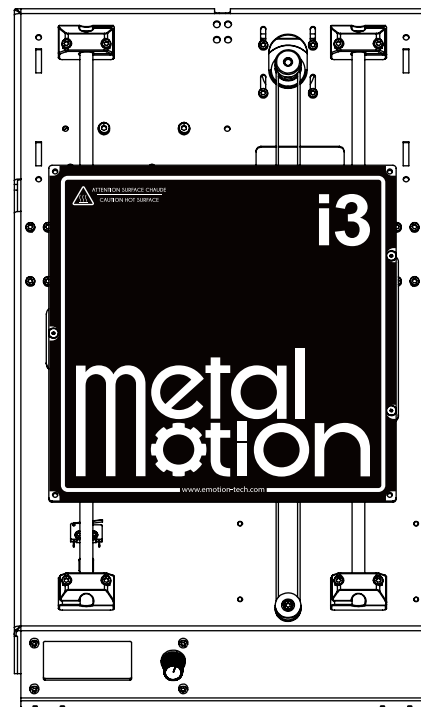



Make sure that the cable under the plate can not deform it when tightening the screws



If the 3dBedFix patch is not already fixed to the heating plate, apply it by removing the «3M» adhesive protection first.

Be carefull, the adhesive is very strong !



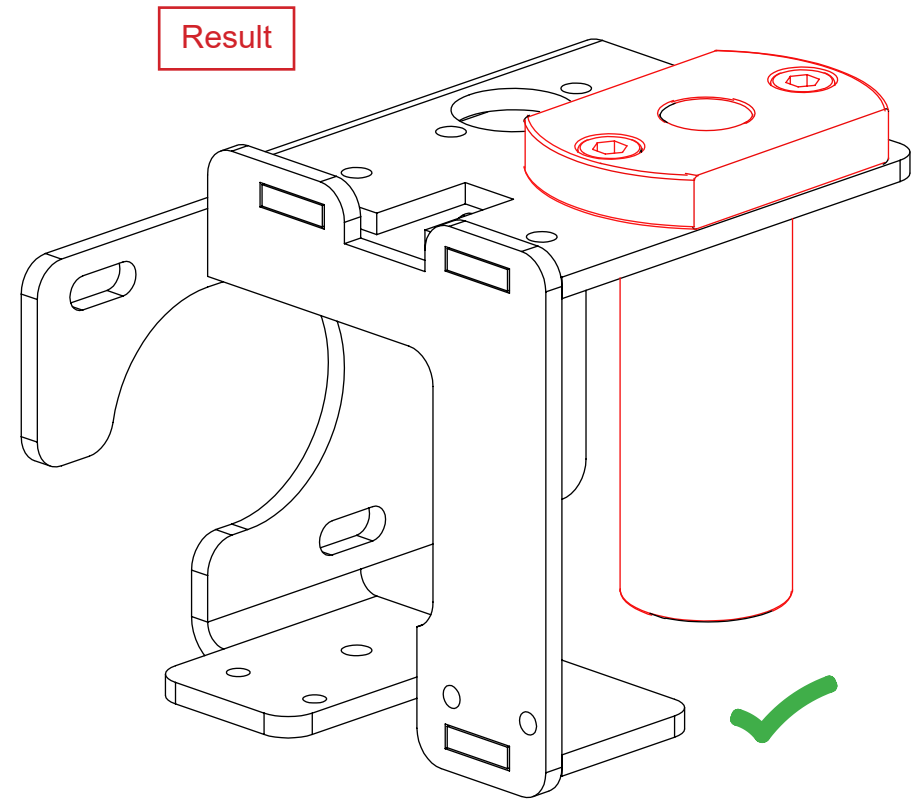
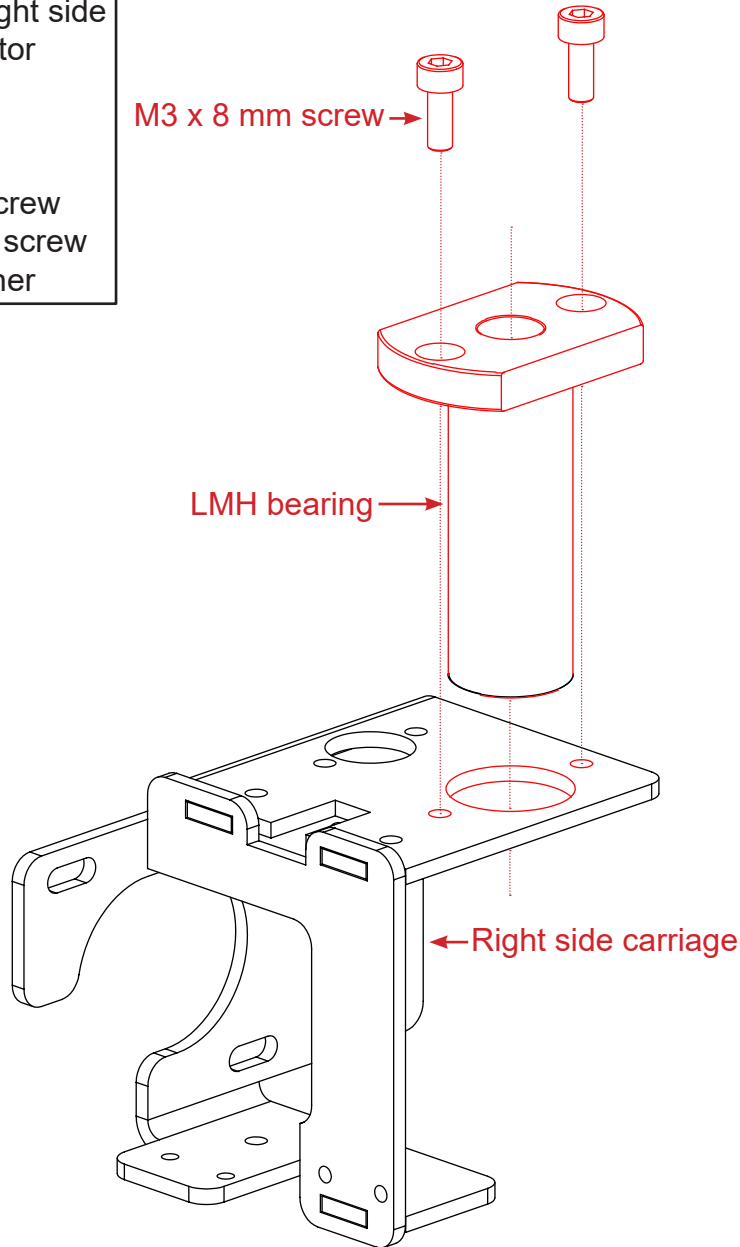
Result



ASSEMBLY OF THE Z AXIS CARRIAGE (RIGHT SIDE)

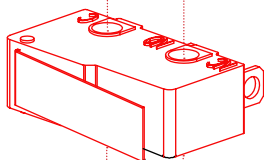
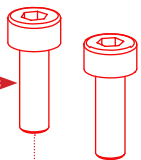
- Needed parts :**
- Z axis carriage right side
 - 1 x NEMA 17 motor
 - 2 x endstop
 - 1 x GT2 pulley
 - 1 x LMH bearing
 - 5 x M3 x 8 mm screw
 - 4 x M2.5 x 8 mm screw
 - 3 x Ø 3 mm washer

Target : mount the different parts of the right side Z carriage



MECHANICAL ASSEMBLY

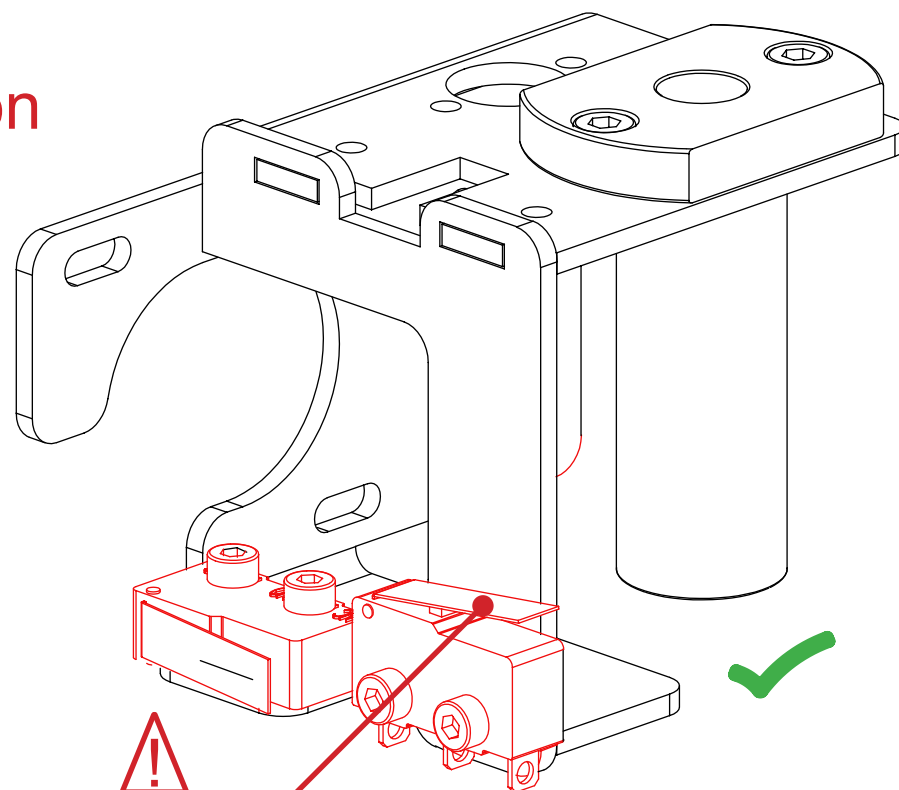
M2.5 x 8 mm screw →



← Endstop

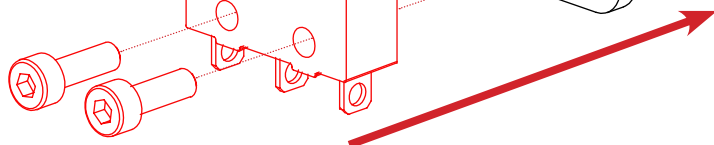

**Endstop
lamella
orientation**

Result

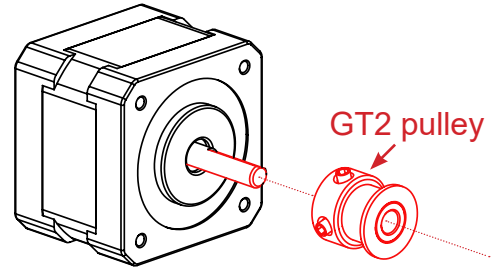
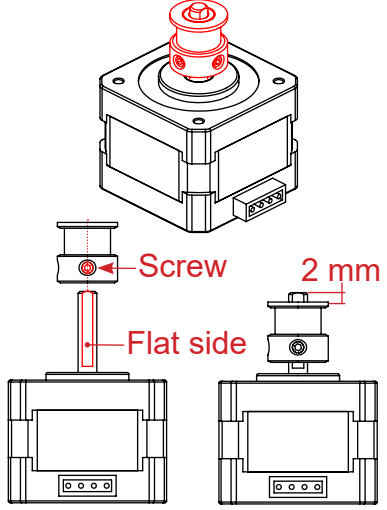



Endstop with
long lamella

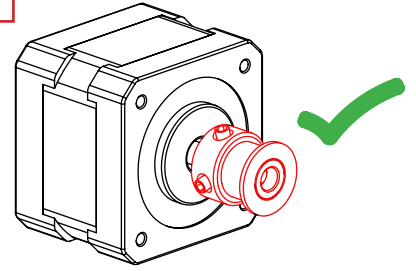
Endstop with
long lamella



The grub screw must be in contact with the flat part of the axis.



Result



Nema motor

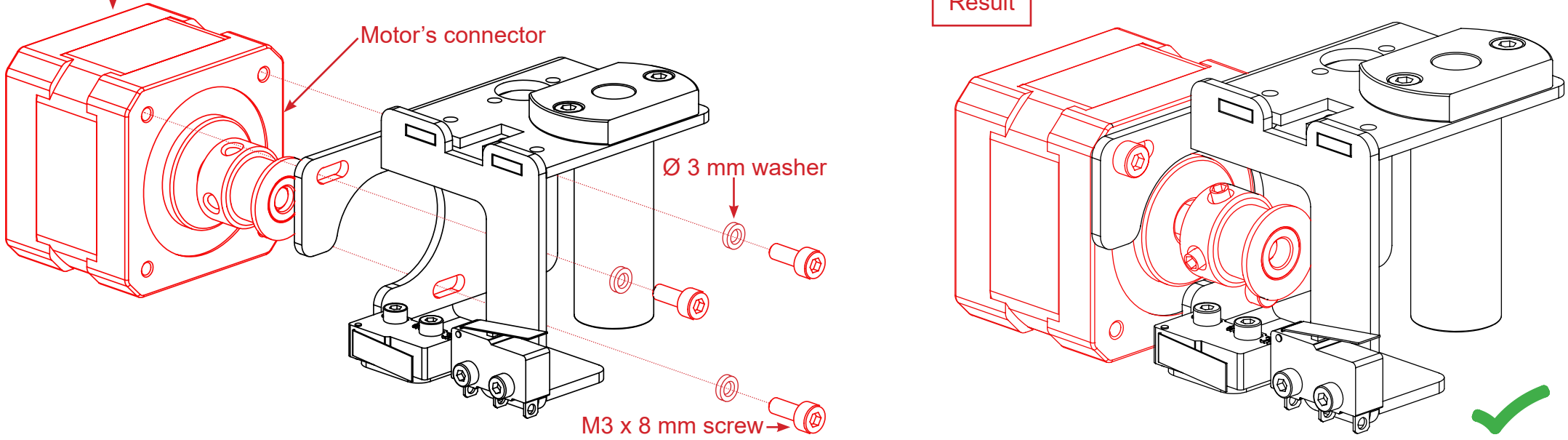
Motor's connector

Ø 3 mm washer

M3 x 8 mm screw

Do not tighten the motor fixing screws for the moment

Result

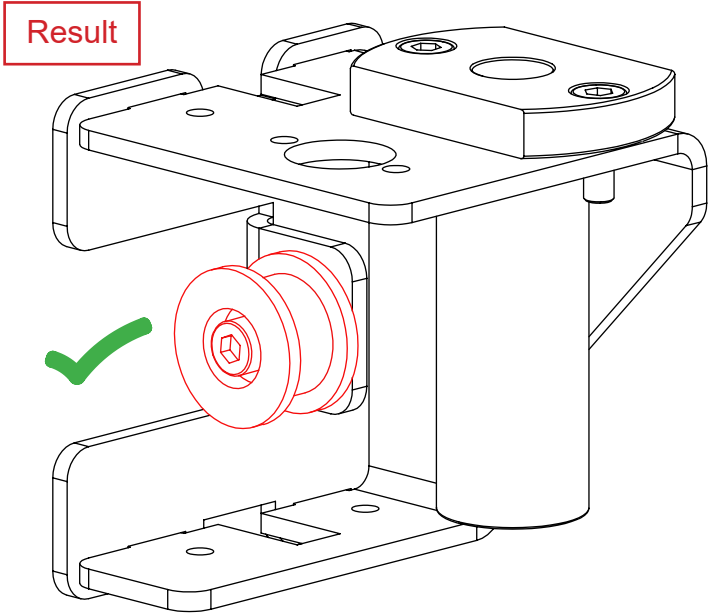
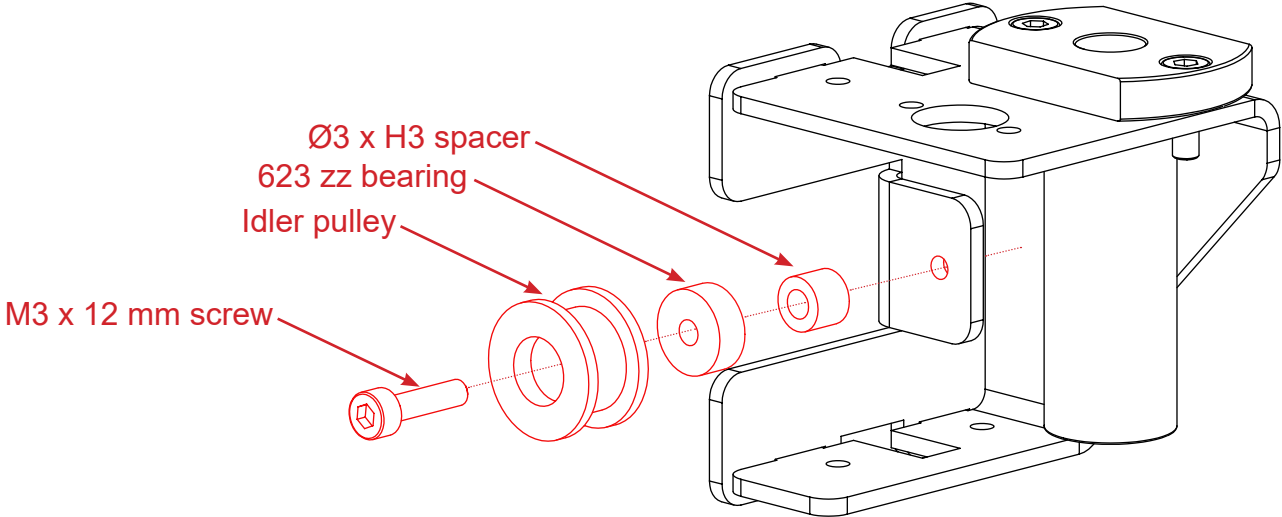
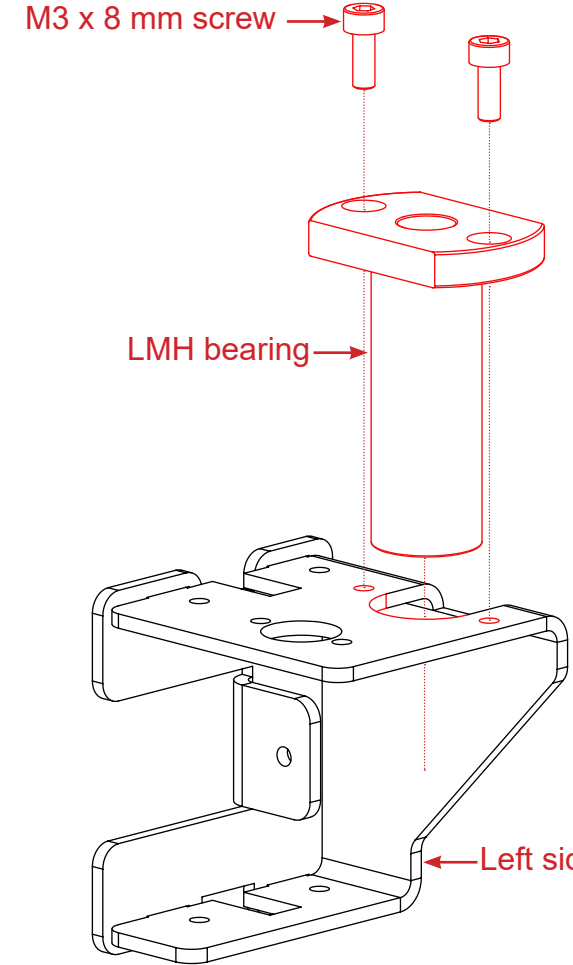


ASSEMBLY OF THE Z AXIS CARRIAGE (LEFT SIDE)

Needed parts :

- Z axis carriage left side
- Idler pulley
- 623 zz bearing
- 1 x LMH bearing
- 2 x M3 x 8 mm screw
- 1 x M3 x 12 mm screw
- Ø3 x H3 spacer

Target : mount the different parts of the left side Z carriage



PRINTHEAD ASSEMBLY

Target : mount the differents components of the Hexagon printhead.

Needed parts :

- 1 x Hexagon printhead
- 1 x Heater cartridge
- 1 x Thermistor
- 1 x Silicon sleeve

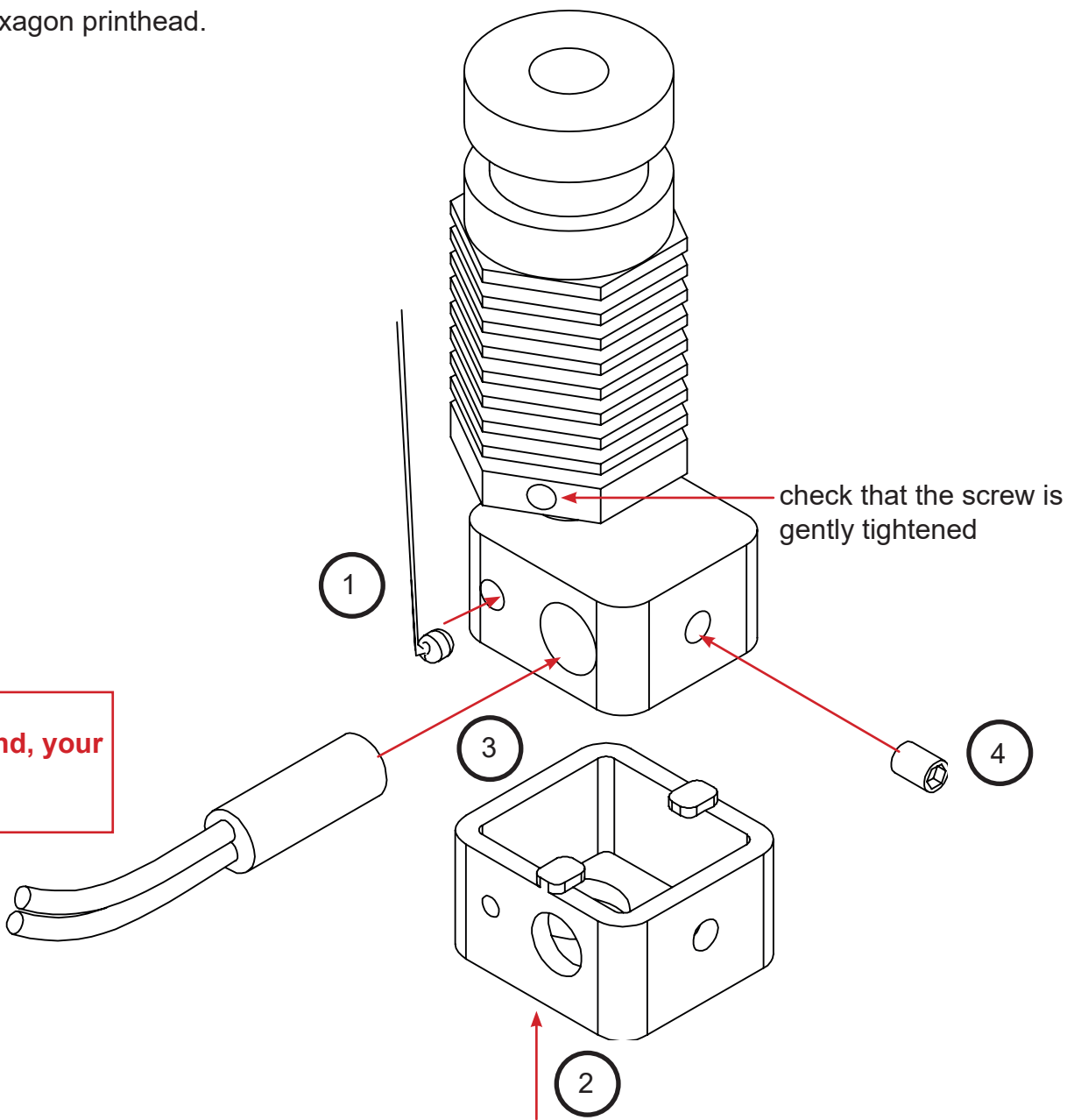
1°) thermistor into the heating block
(fold the thermistor's cables)

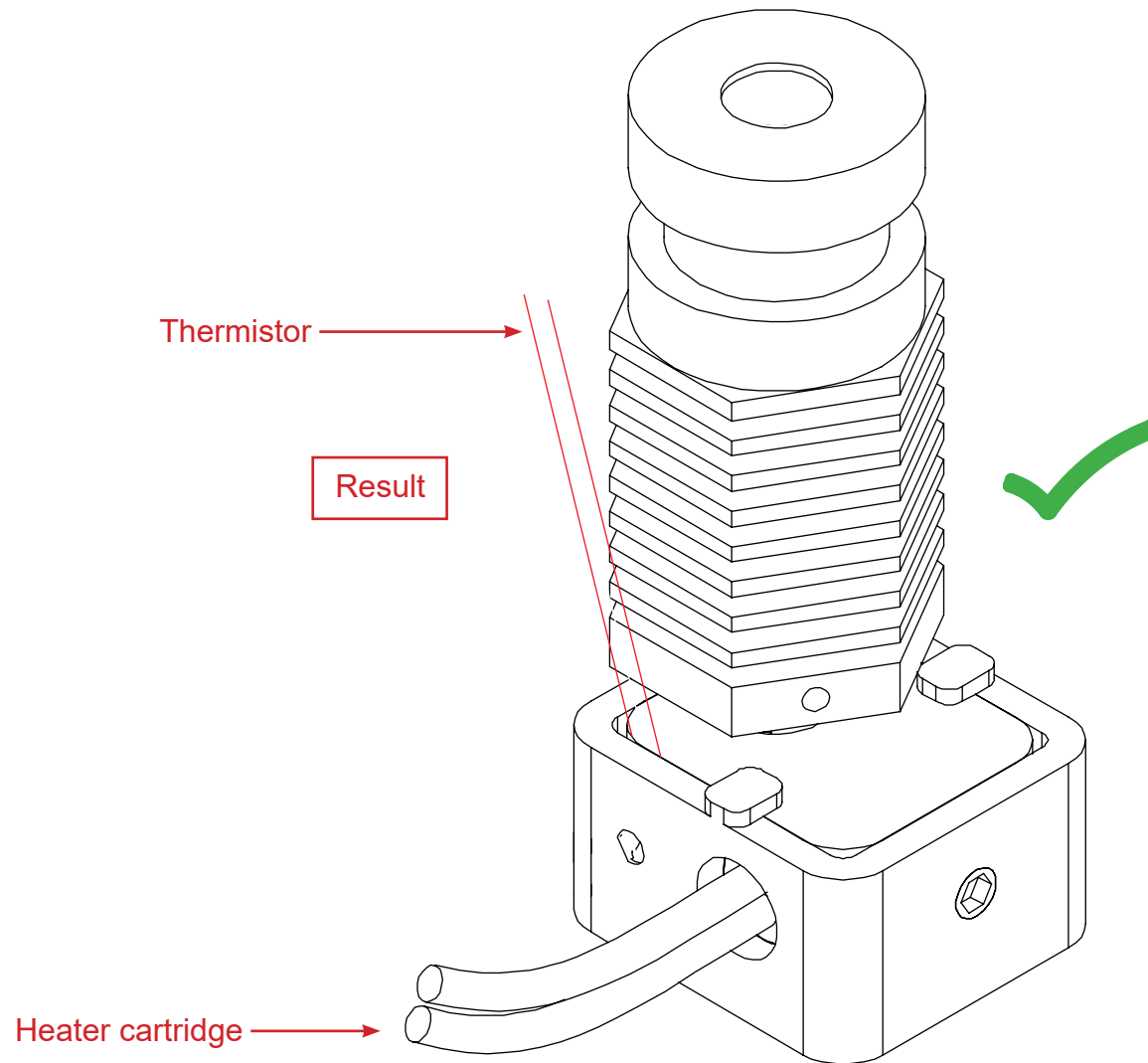
2°) silicon sleeve on to the heating block

3°) heater cartridge into the heating block

4°) grub screw in the heating block

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





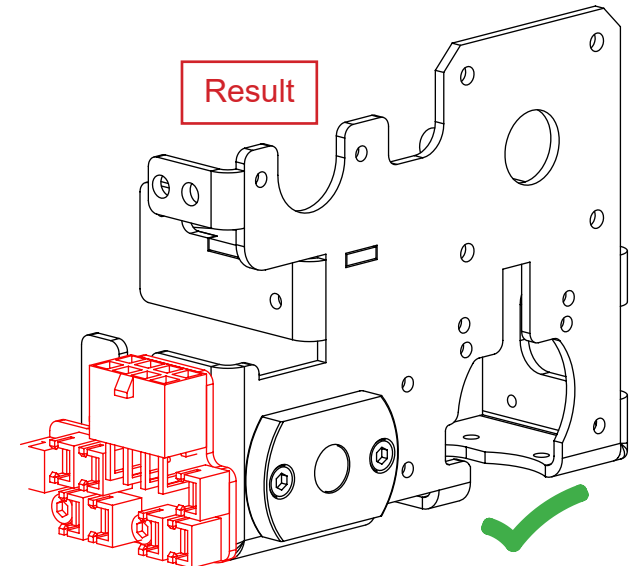
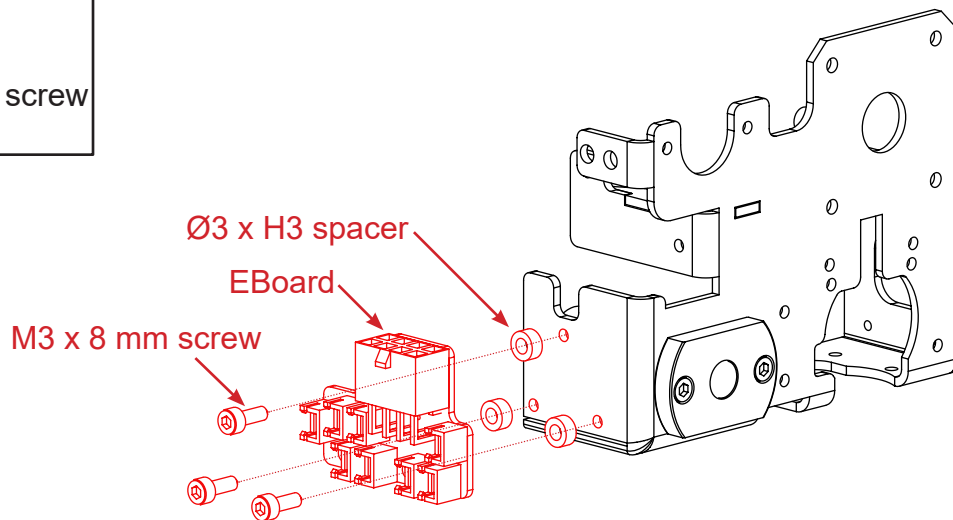
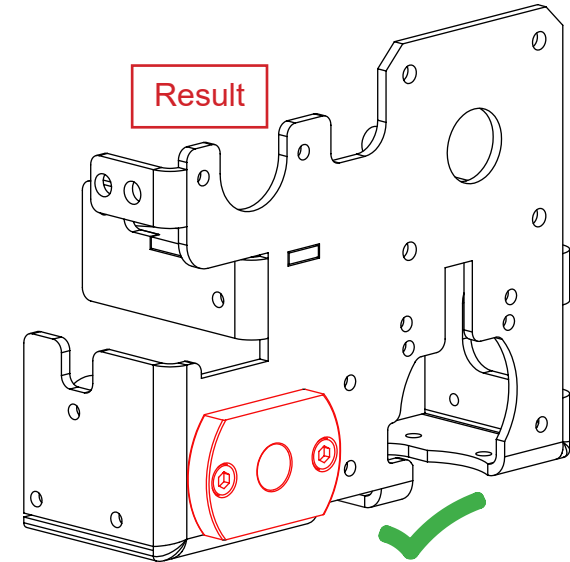
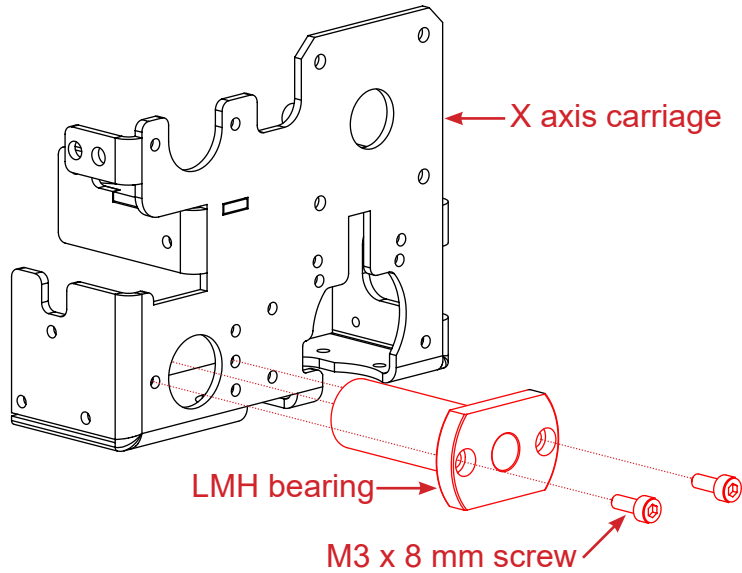
Important: make sure that the red shrink sleeves on the cartridge cables are properly protecting the metal parts and preventing short circuits.

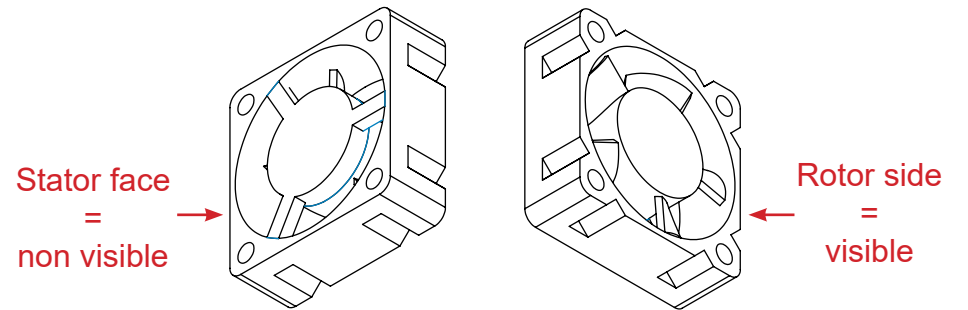
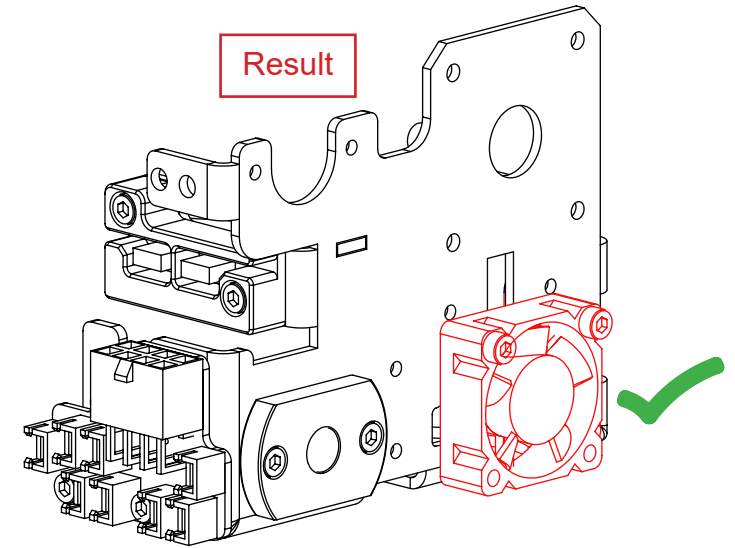
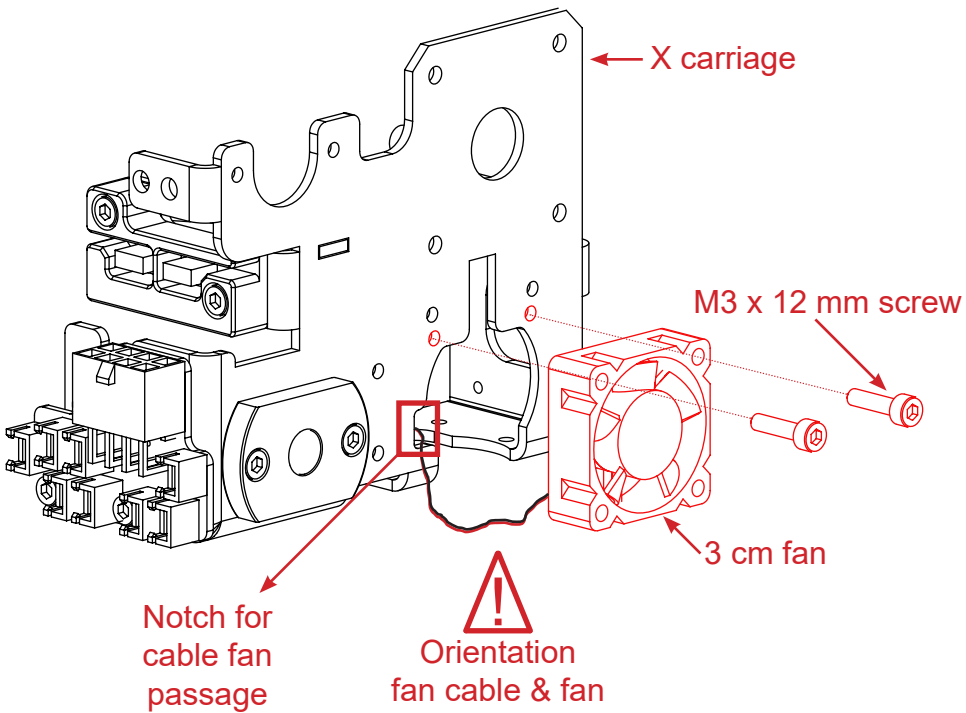
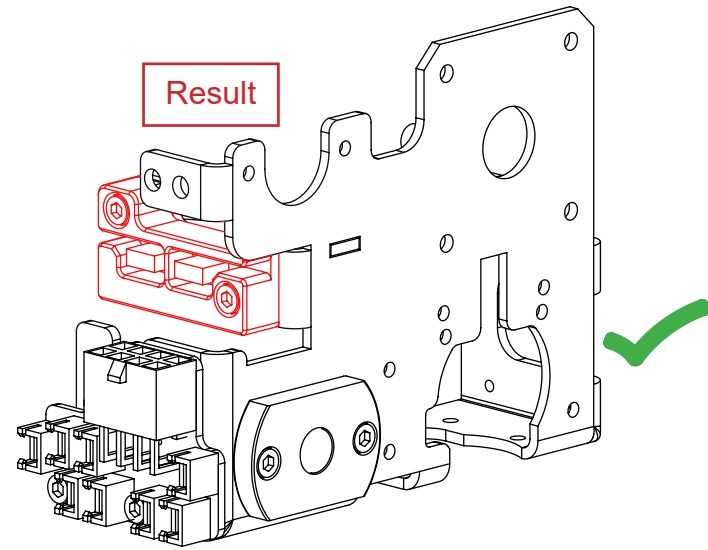
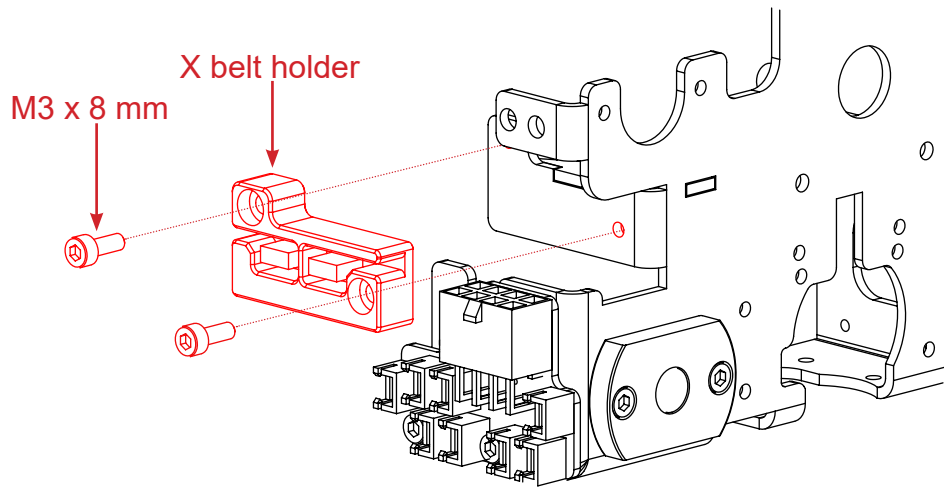
ASSEMBLY OF THE X AXIS

Needed parts :

- NEMA 17 motor
- EBoard
- 3 cm fan
- Blower fan
- X belt holder
- Fan duct
- Hexagon bracket
- Hexagon printhead
- X axis carriage
- 1 x Extruder body
- 1 x Extruder mobile
- 1 x LMH bearing
- 1 x Driving wheel
- 1 x 693 zz bearing
- 1 x Spring
- 2 x M2.5 x 8 mm screw
- 10 x M3 x 8 mm screw
- 5 x M3 x 12 mm screw
- 4 x M3 x 22 mm screw
- 3 x Ø3 x H3 spacer
- 1 x M5 x 22 mm knurled screw
- 2 x Ø 3 mm washer

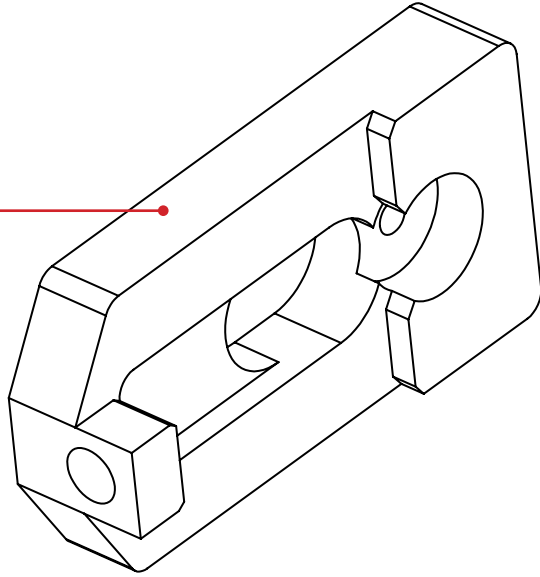
Target : mount the different parts of the X axis carriage





①

Extruder mobile



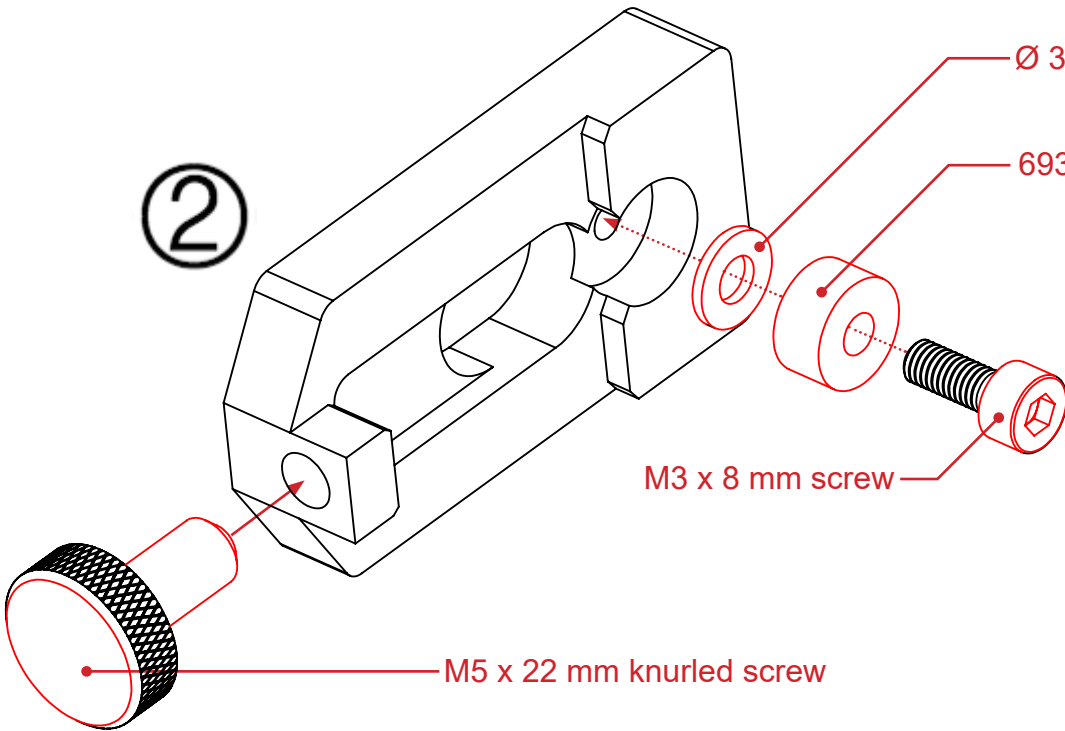
②

Ø 3 mm washer supplied in the bag

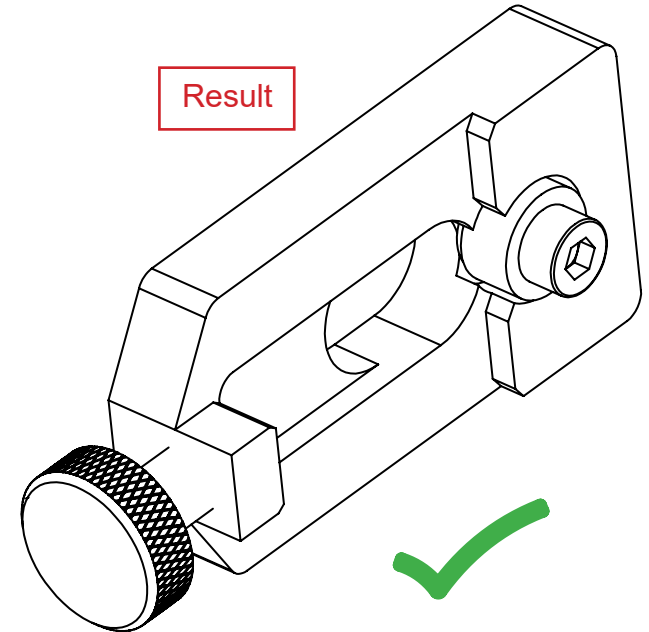
693 zz bearing

M3 x 8 mm screw

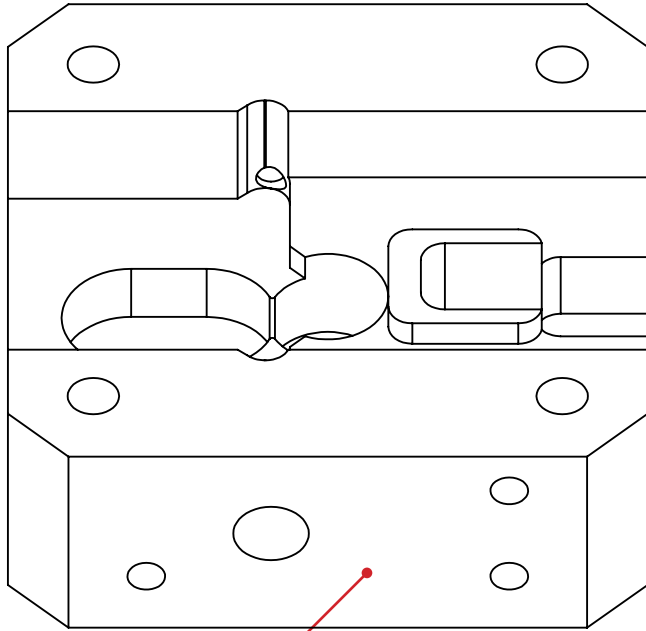
M5 x 22 mm knurled screw



Result

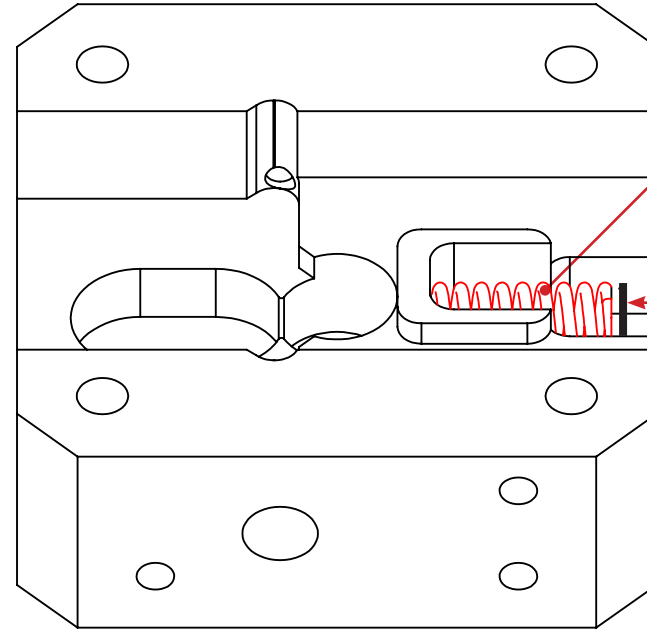


③



Extruder body

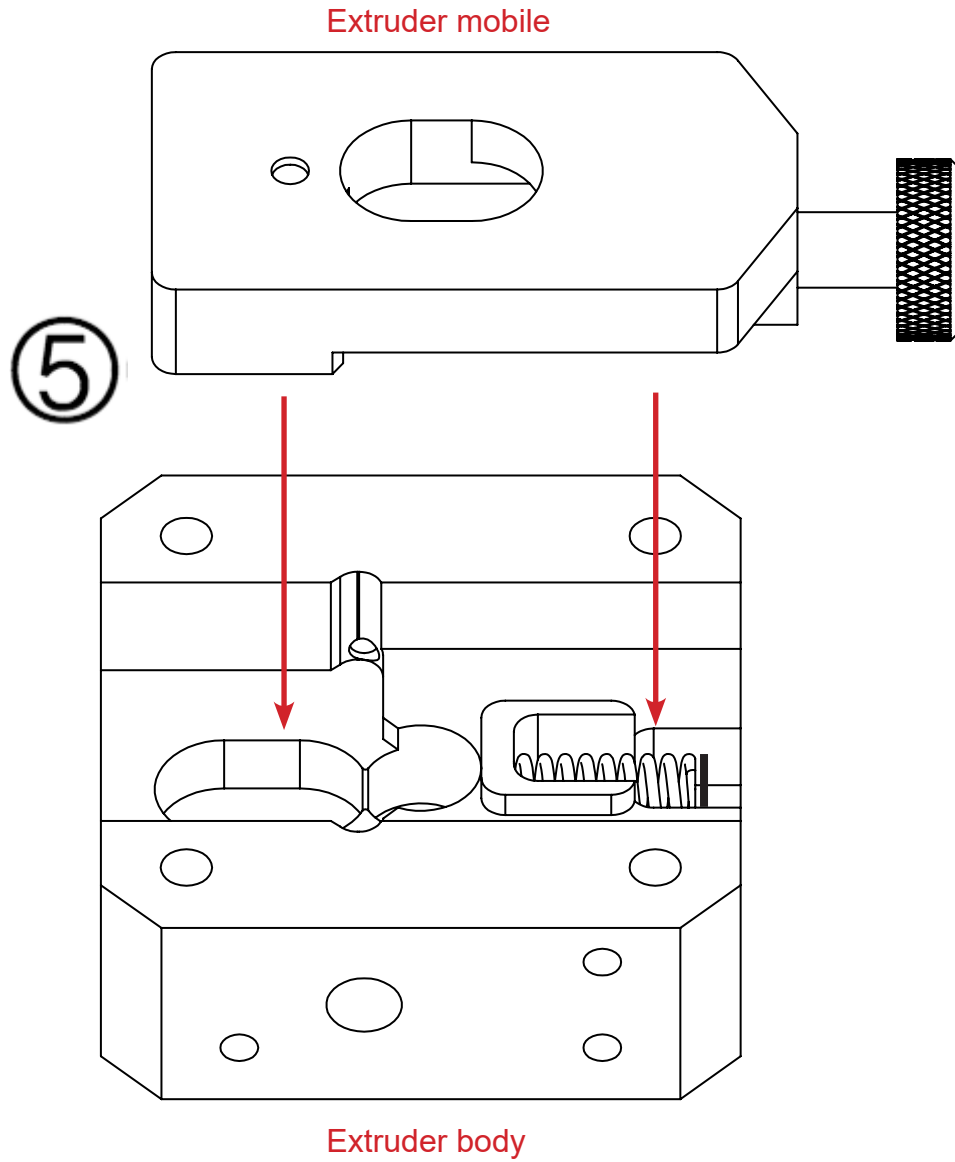
④



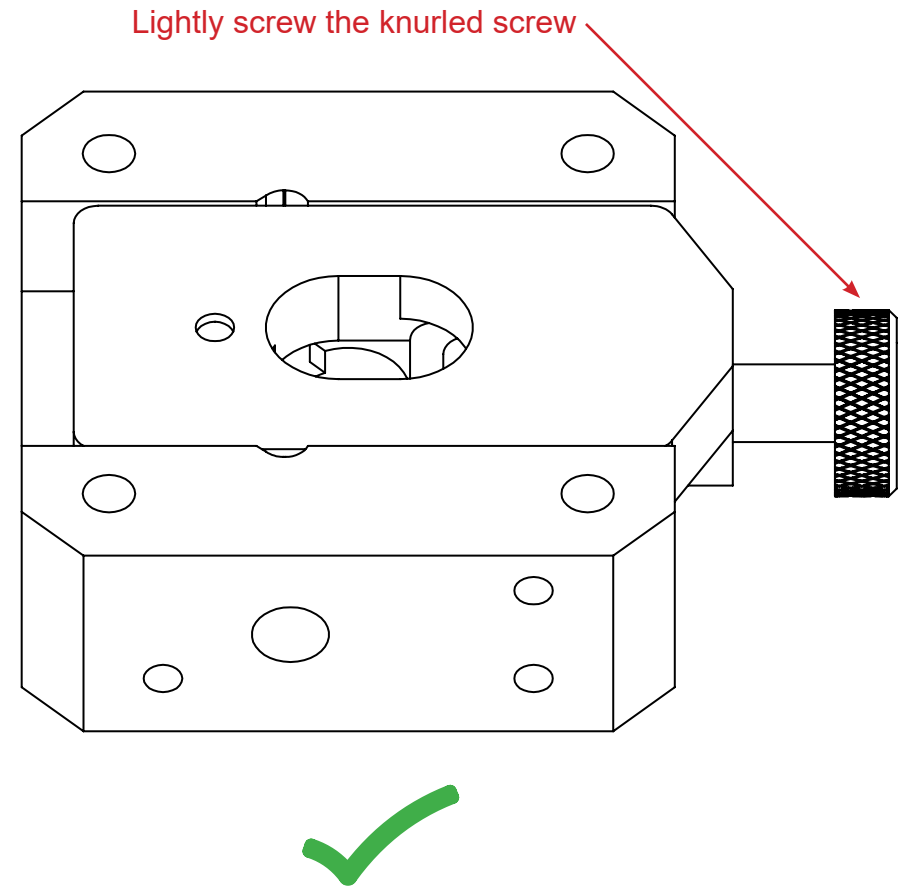
Spring

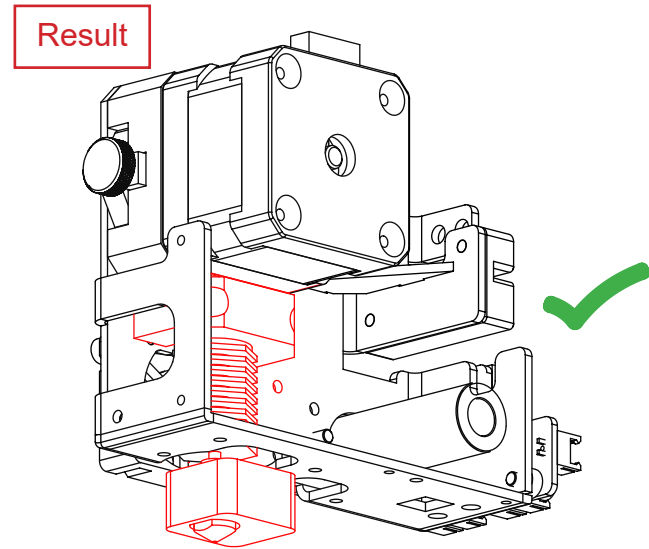
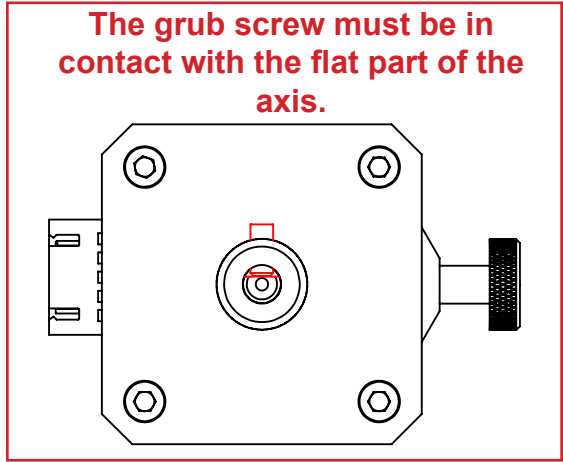
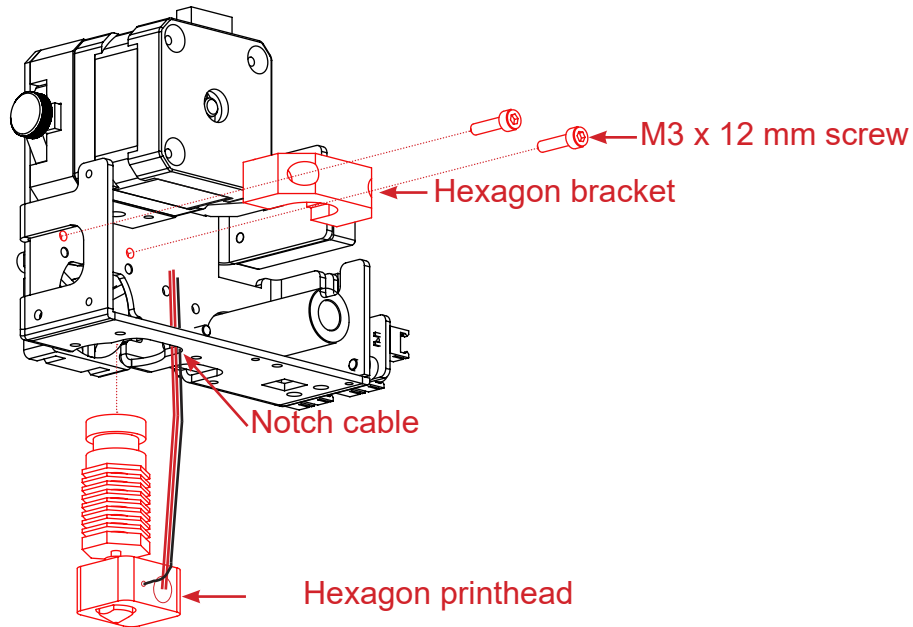
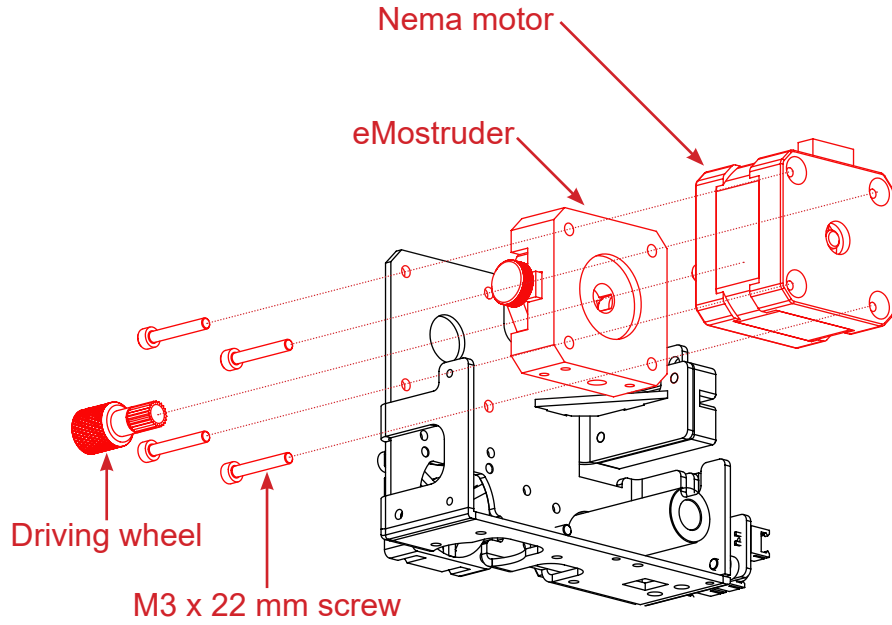
Ø 3 mm washer
supplied in the
bag

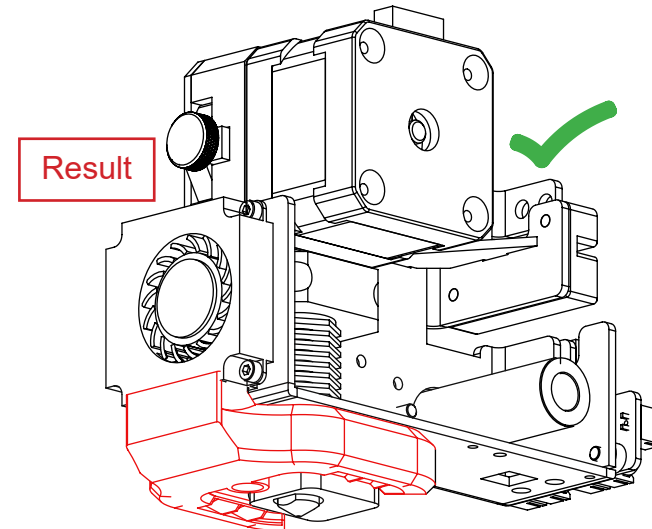
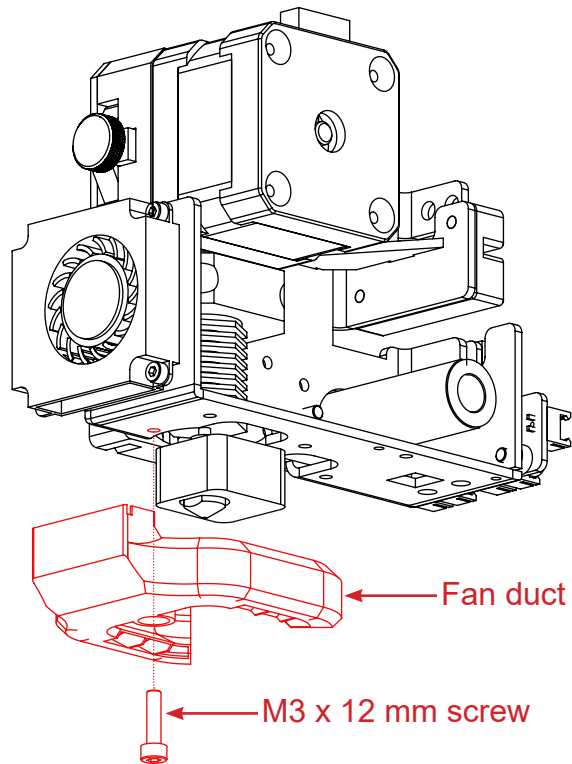
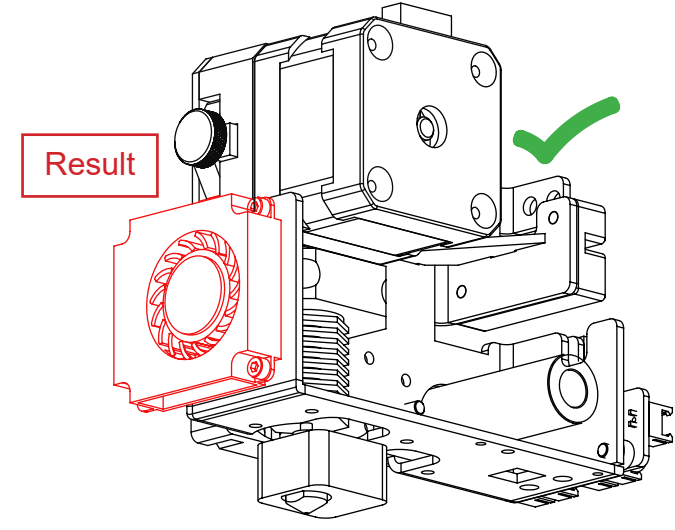
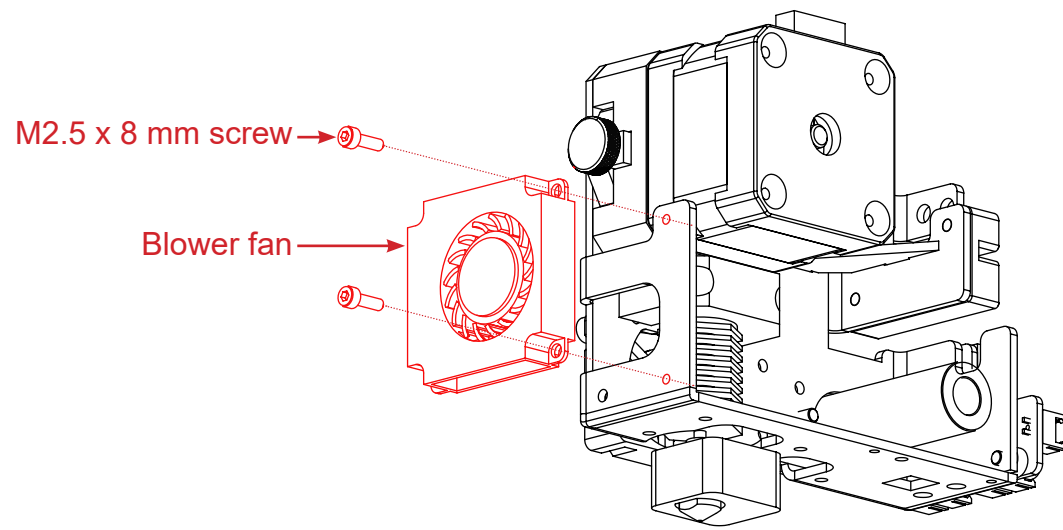
Place the «Extruder Mobile» on the «Extruder Body».
Warning: the spring and the washer must stay in their place.

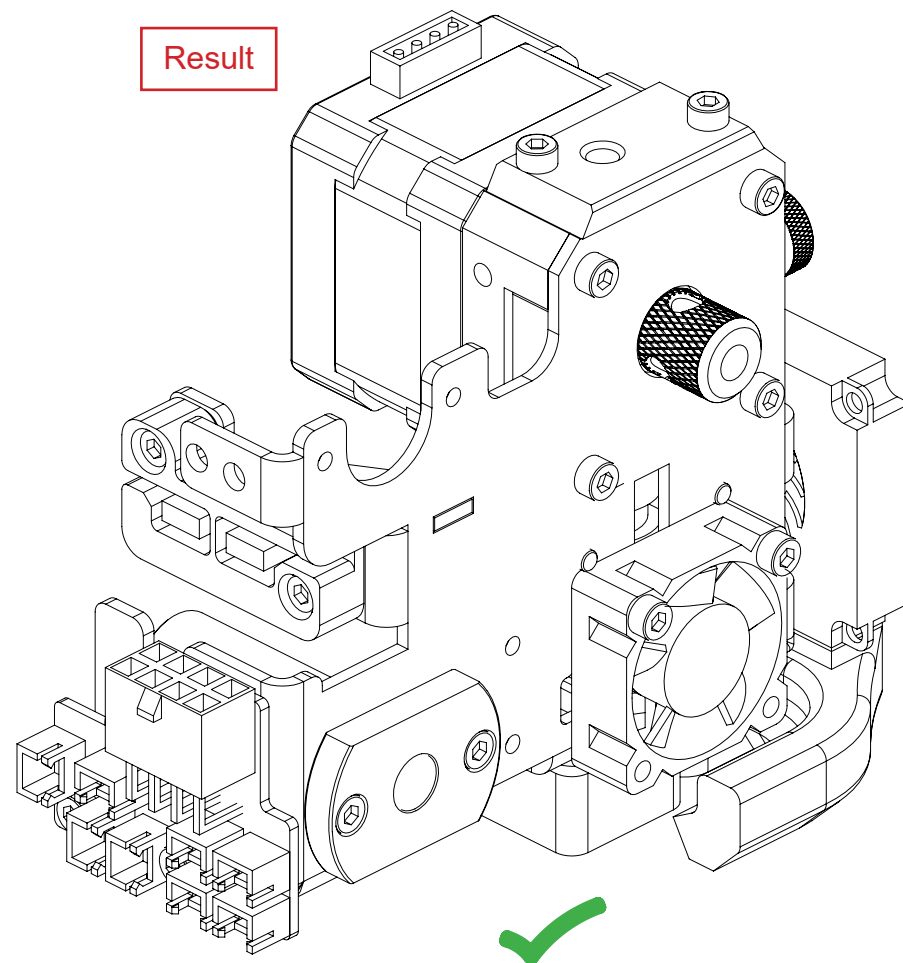
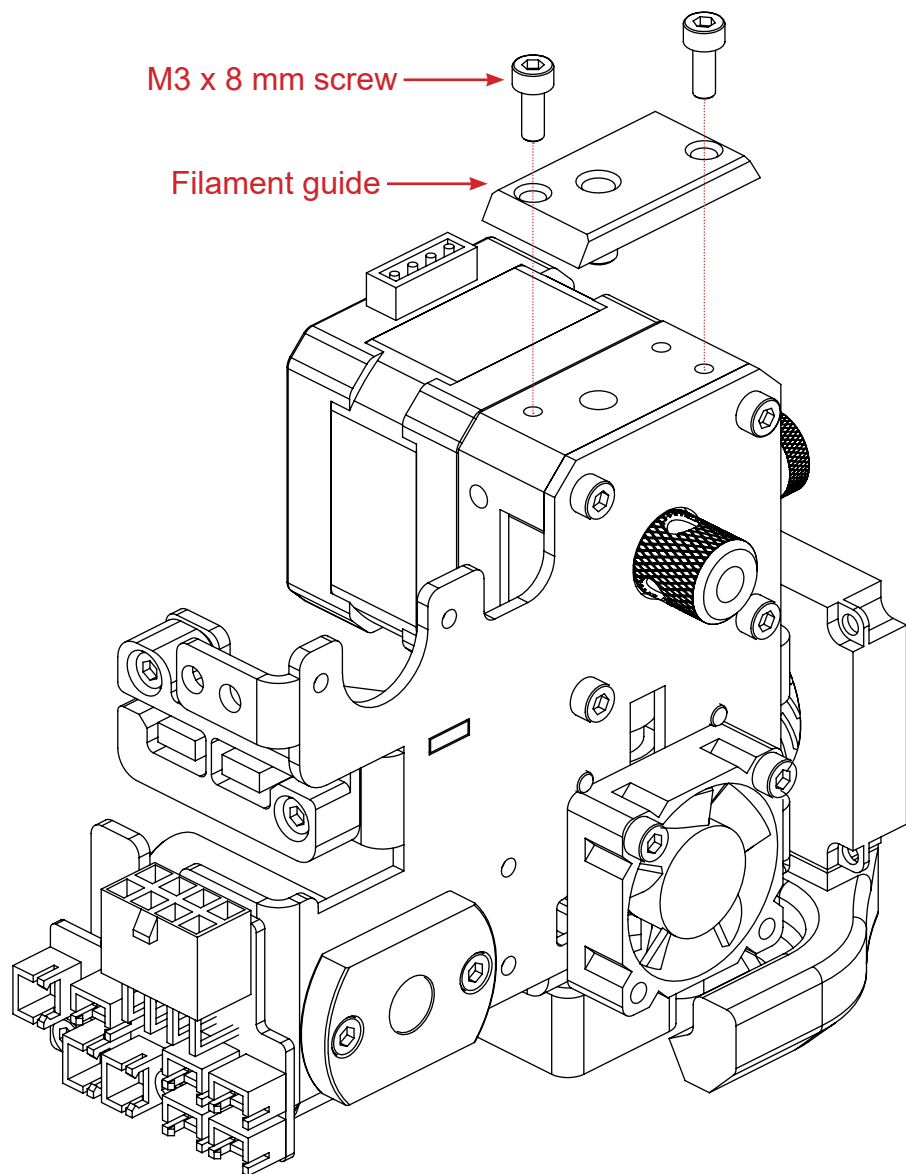


Result







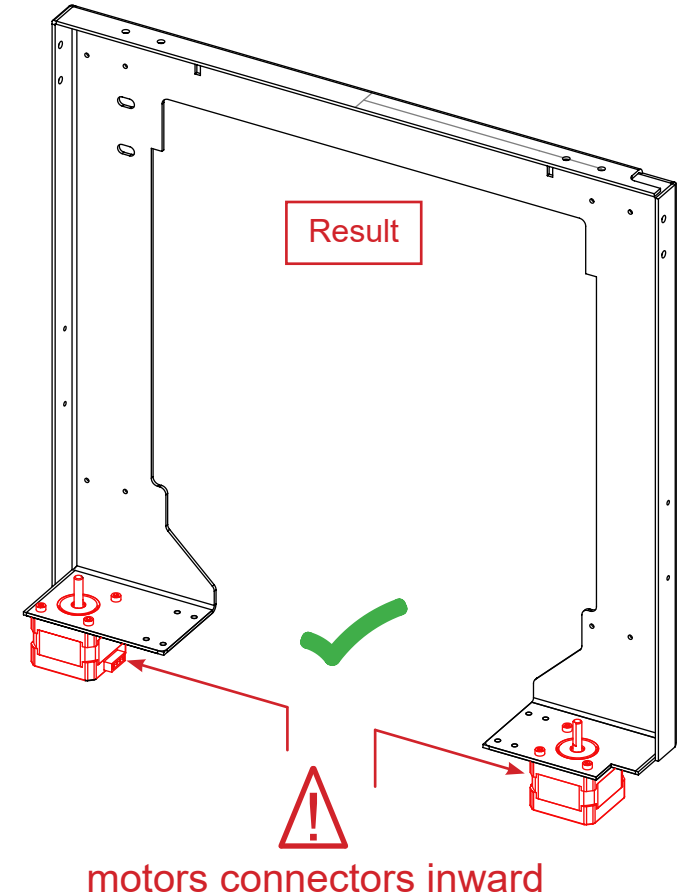
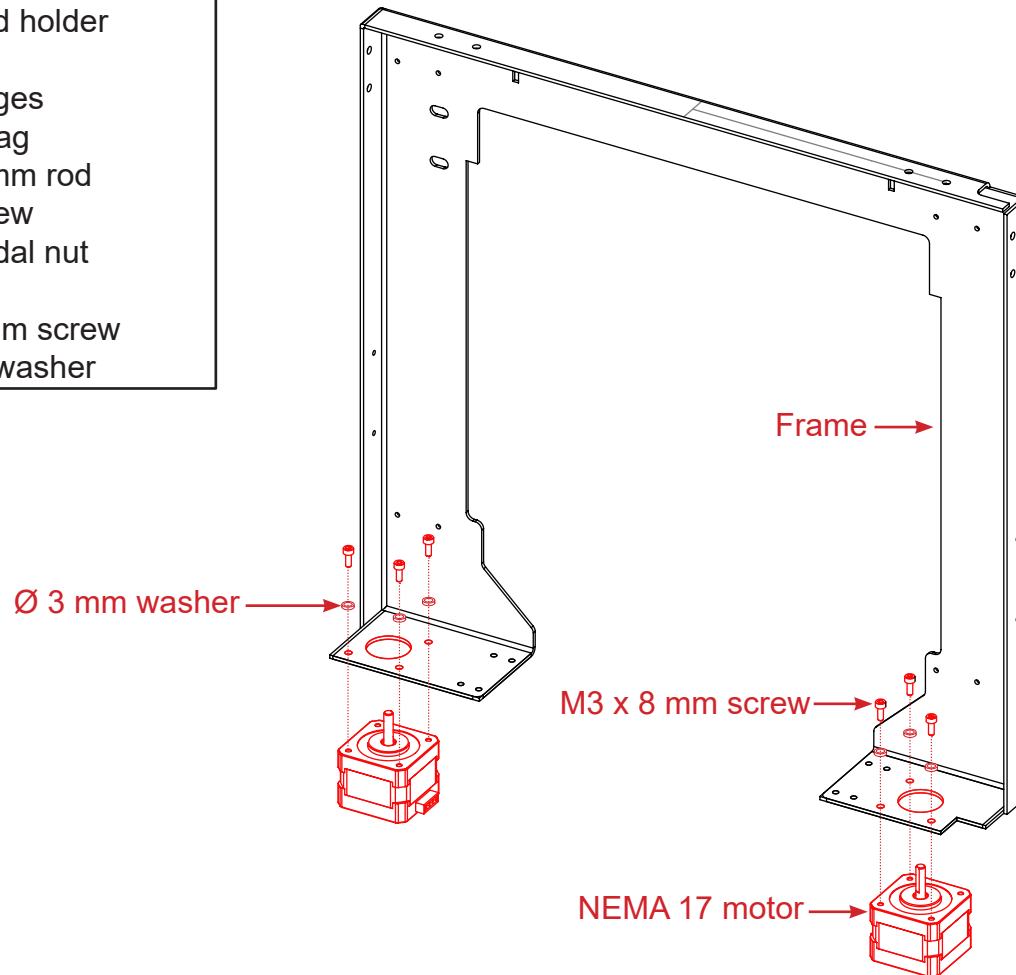


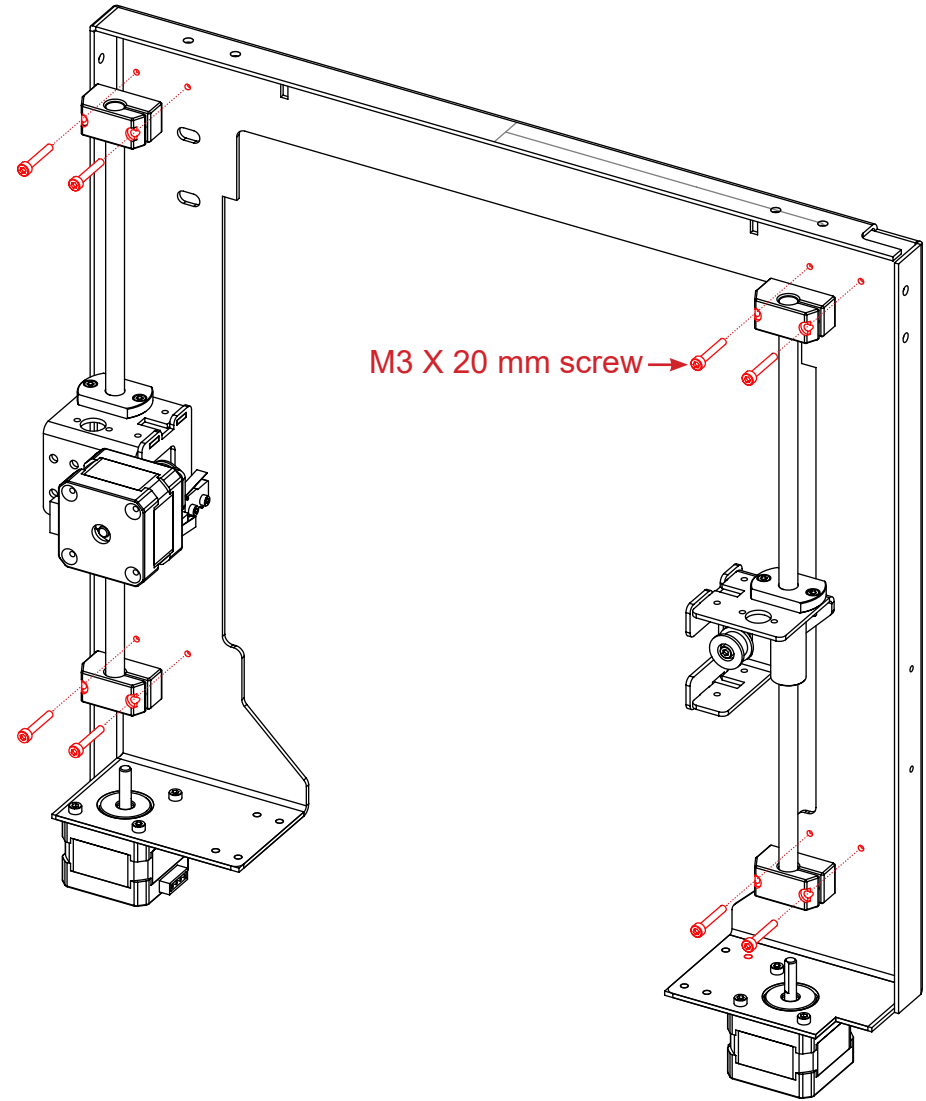
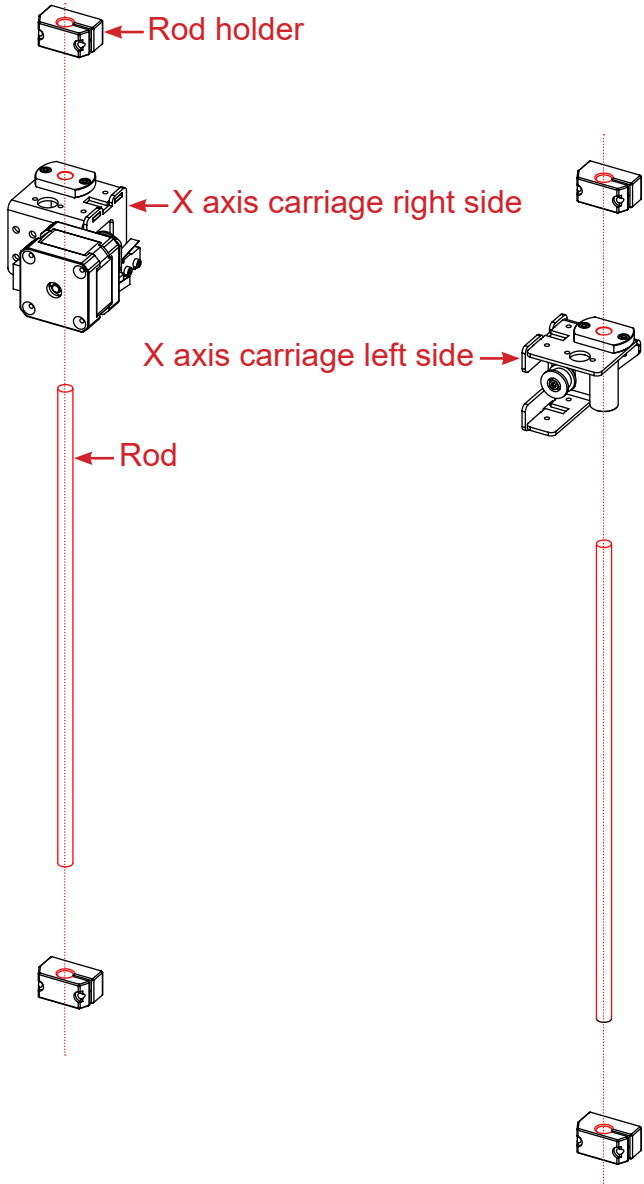
ASSEMBLY OF THE Z AXIS

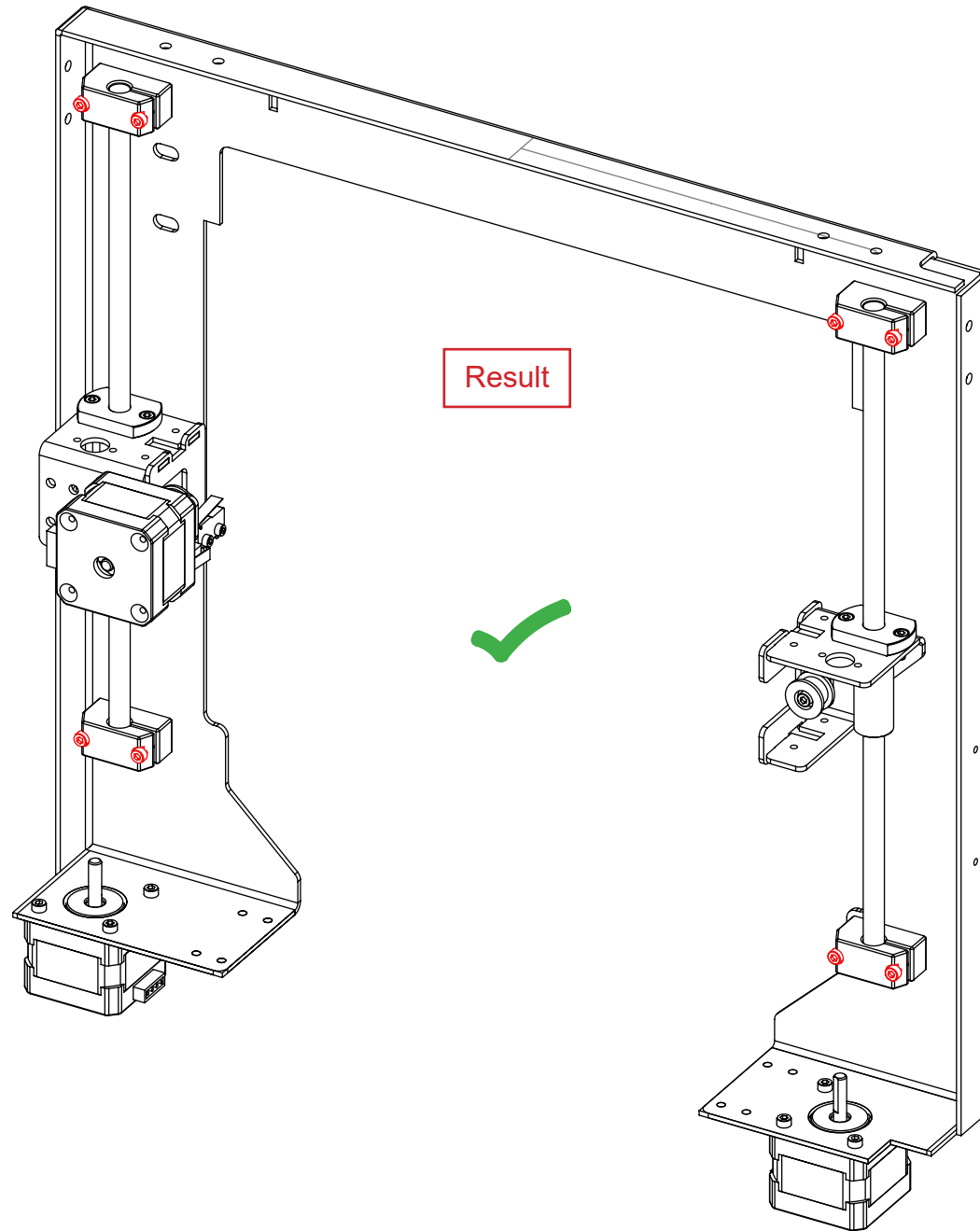
Needed parts :

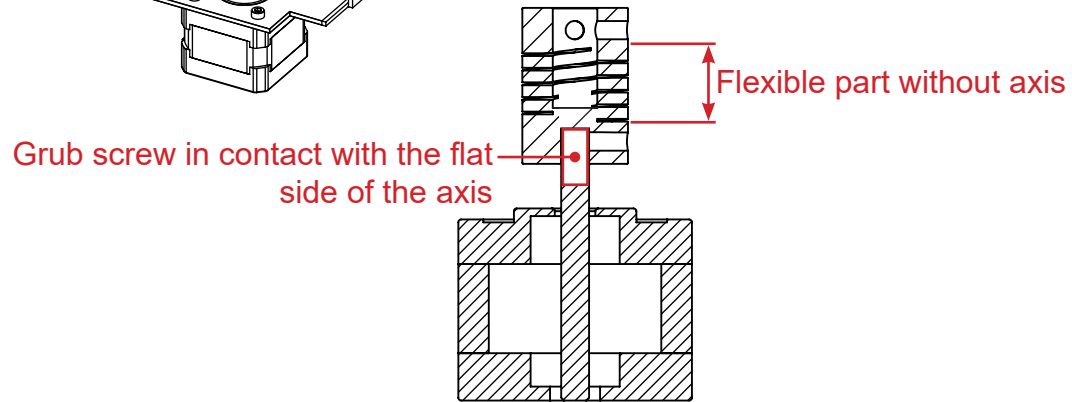
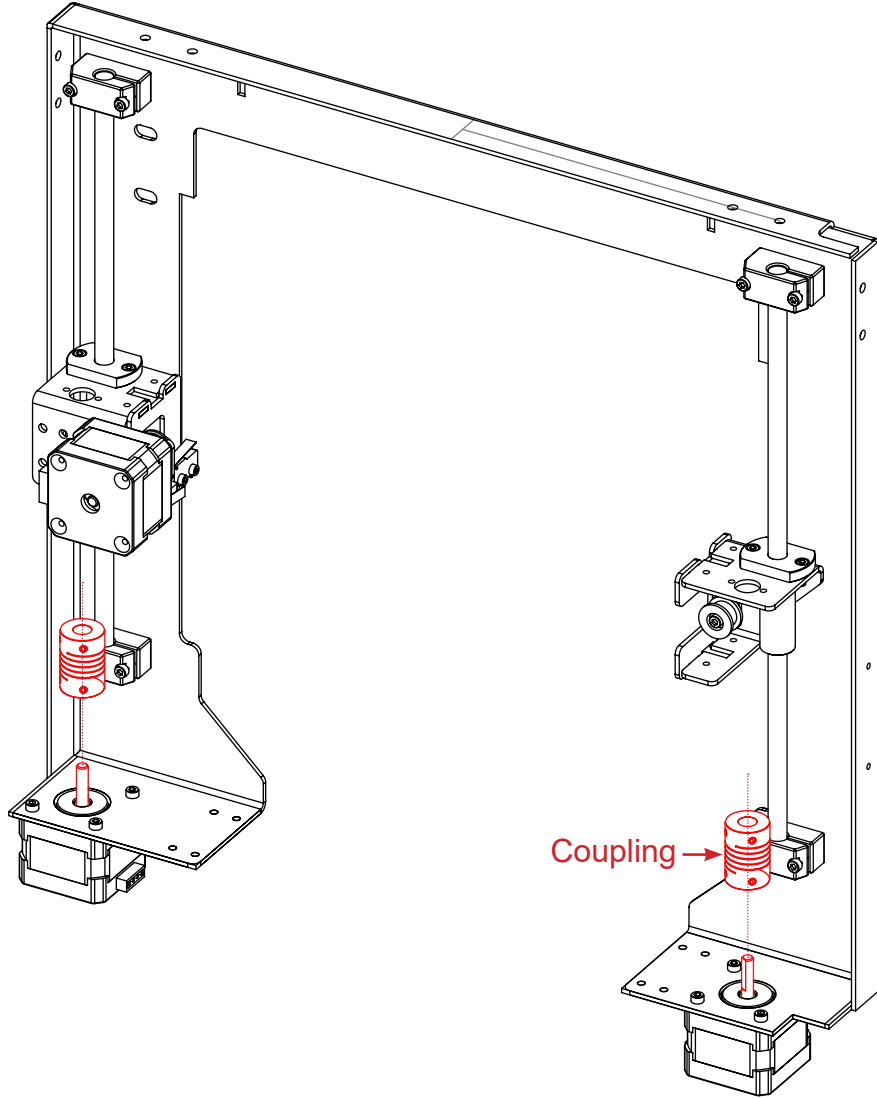
- 2 x NEMA 17 motor
- 4 x Z axis rod holder
- Frame
- Z axis carriages
- 1 x grease bag
- 2 x 8 x 290 mm rod
- 2 x Lead screw
- 2 x Trapezoidal nut
- 2 x Coupling
- 6 x M3 x 8 mm screw
- 6 x Ø 3 mm washer

Target : mount all the elements constituting the Z axis







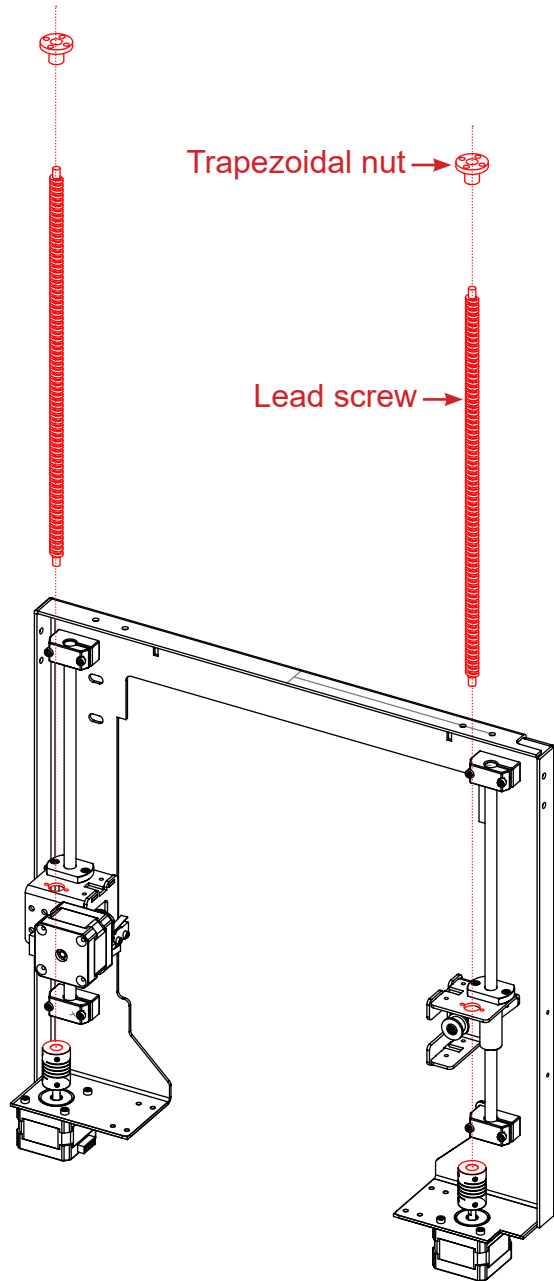


Tighten the screws

Result

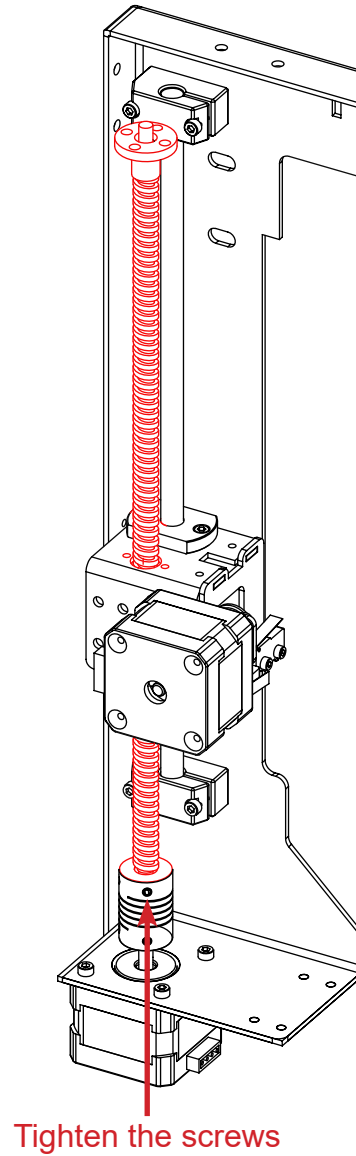


Tighten the screws



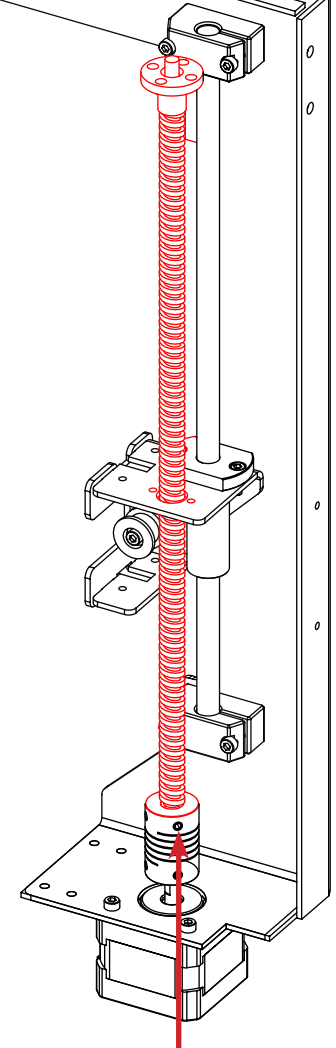
Trapezoidal nut →

Lead screw →

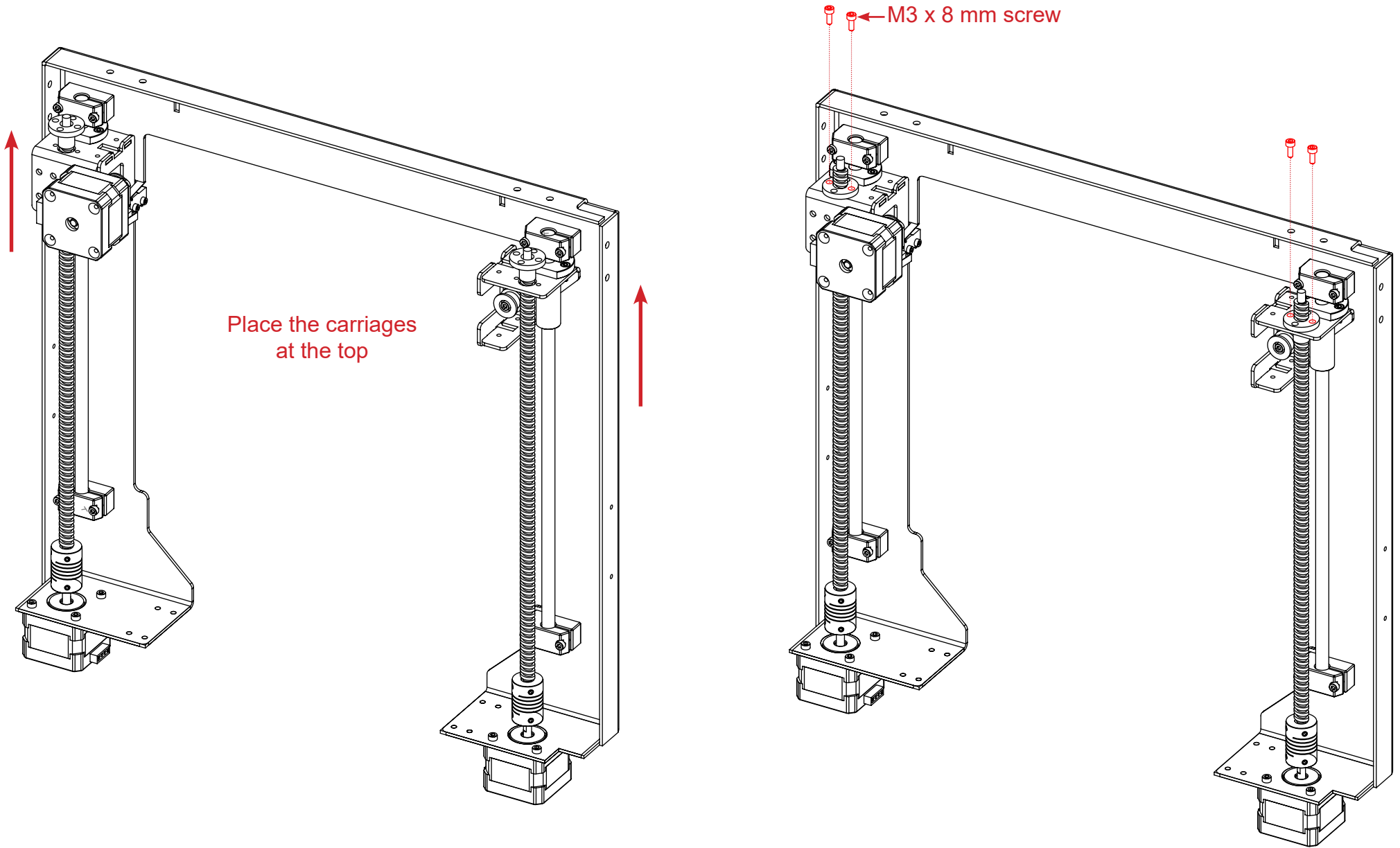


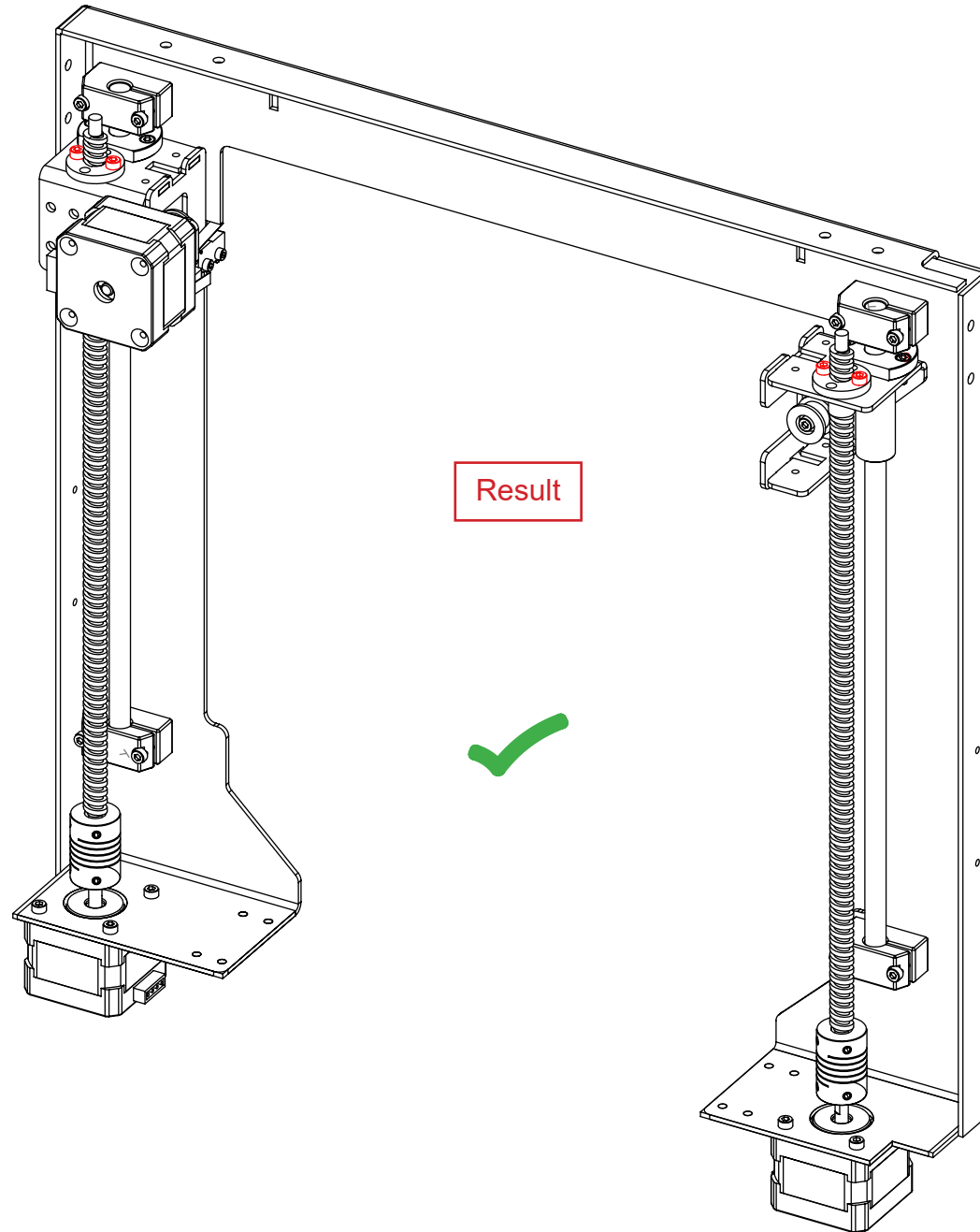
Tighten the screws

Result



Tighten the screws



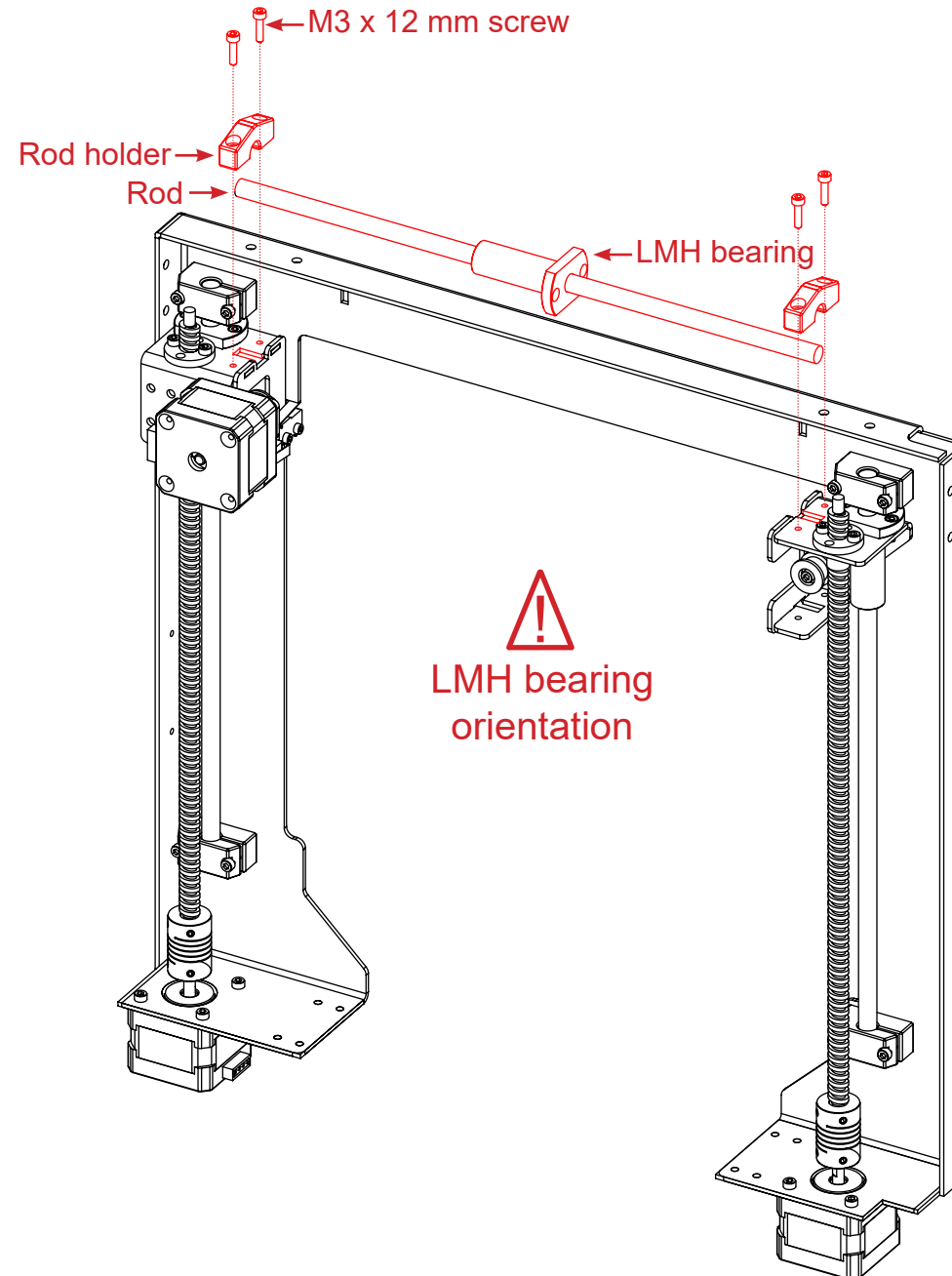


ASSEMBLY OF THE X AXIS

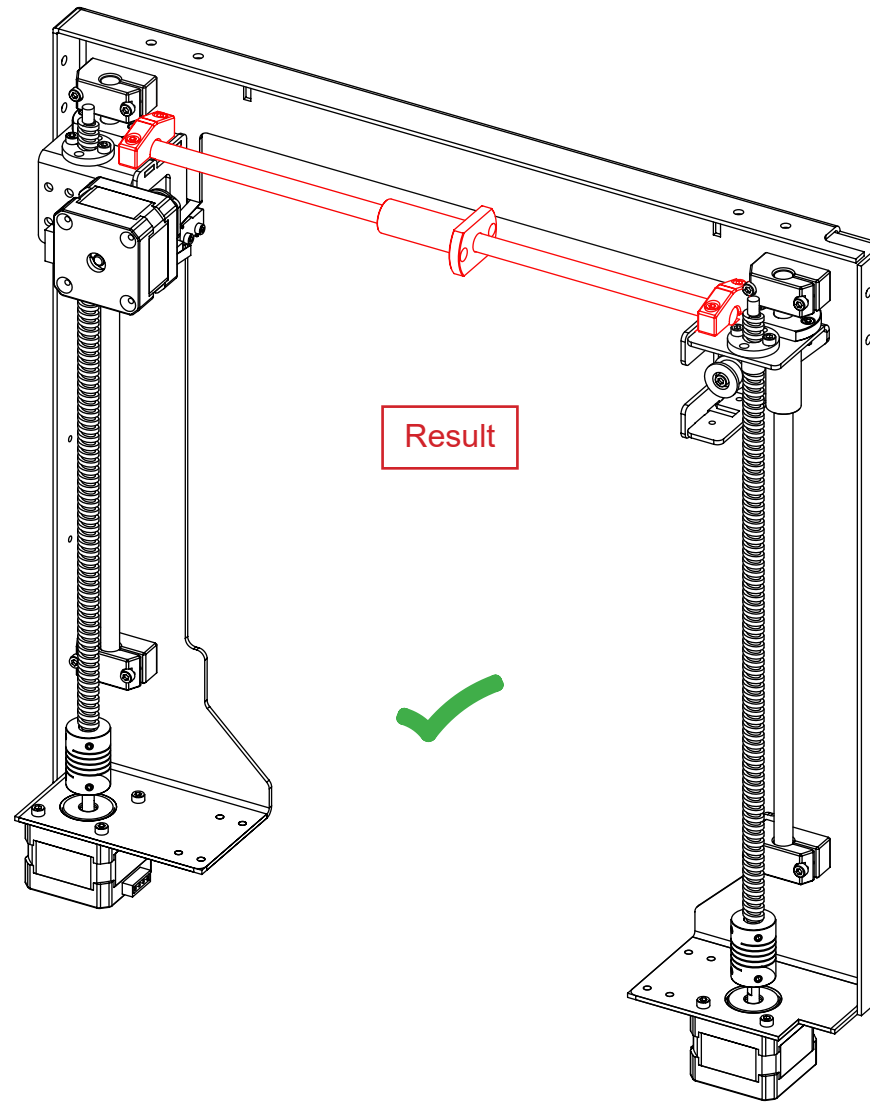
Needed parts :

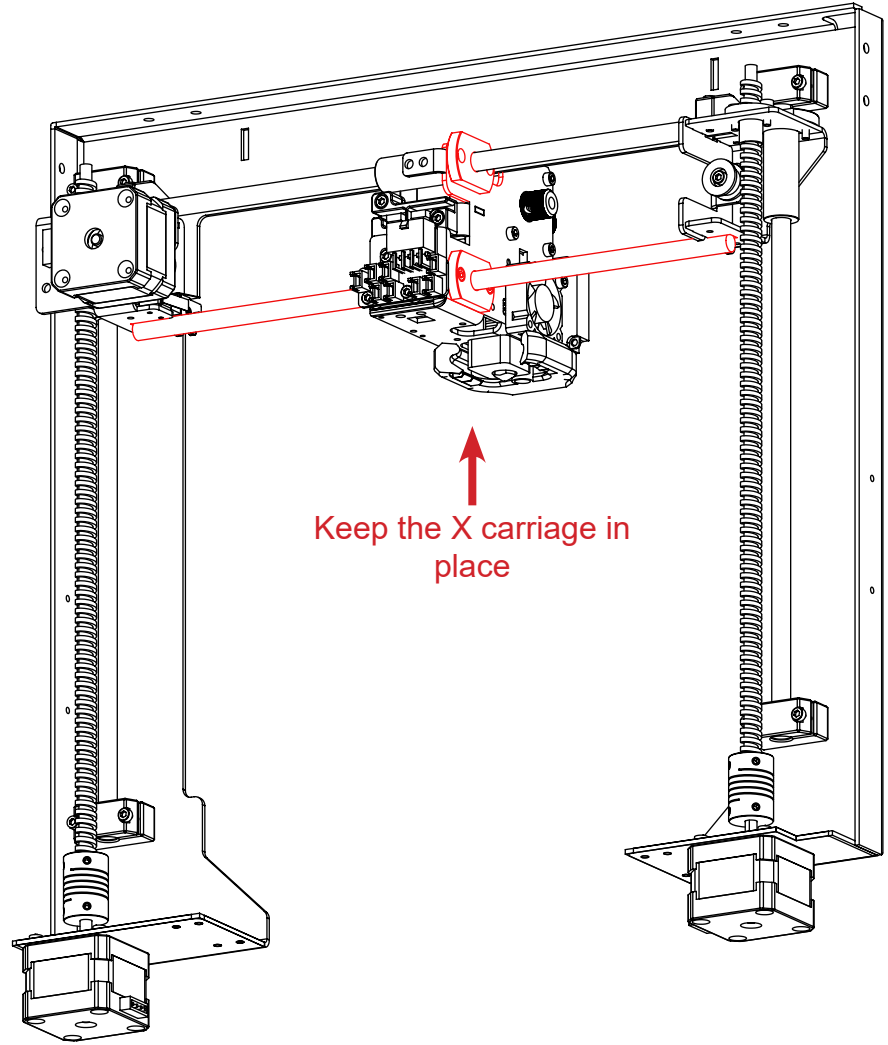
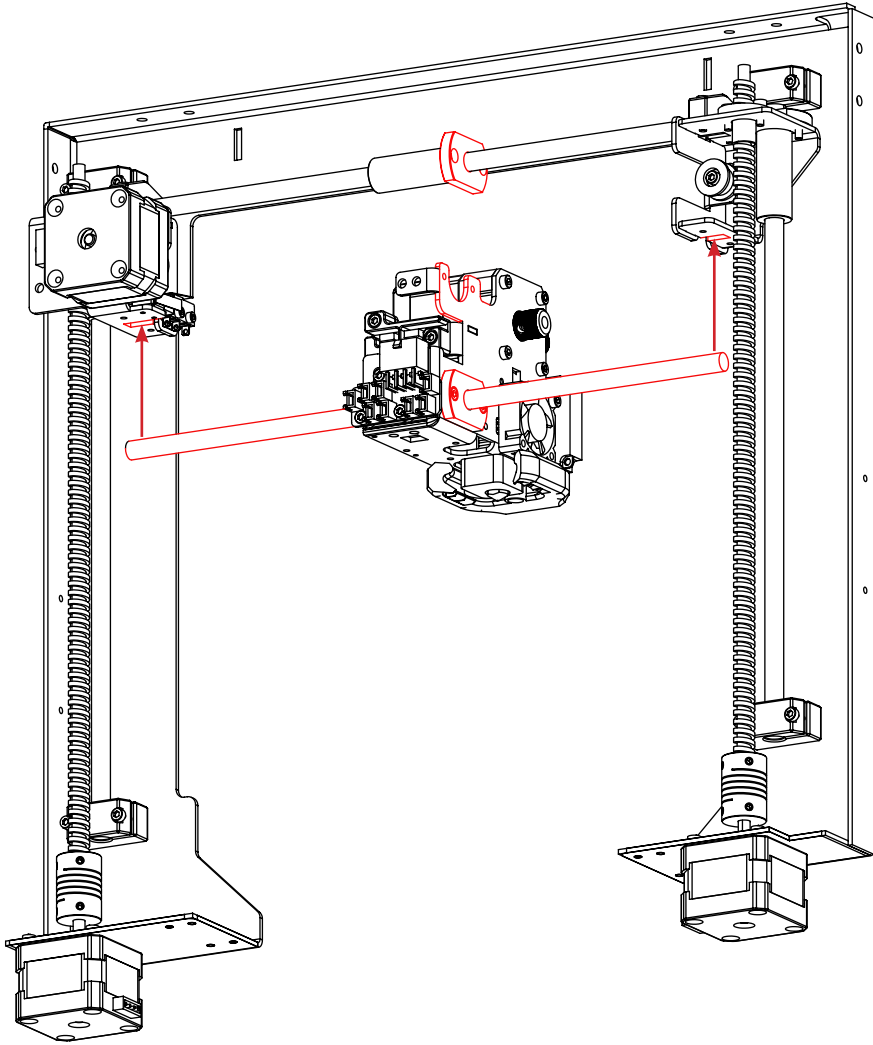
- 4 x Rod holder axe X
- Frame
- X axis carriage
- 2 x 8 x 290 mm rod
- 1 x LMH bearing
- 1 x GT2 pulley
- 2 x M3 x 8 mm screw
- 8 x M3 x 12 mm screw

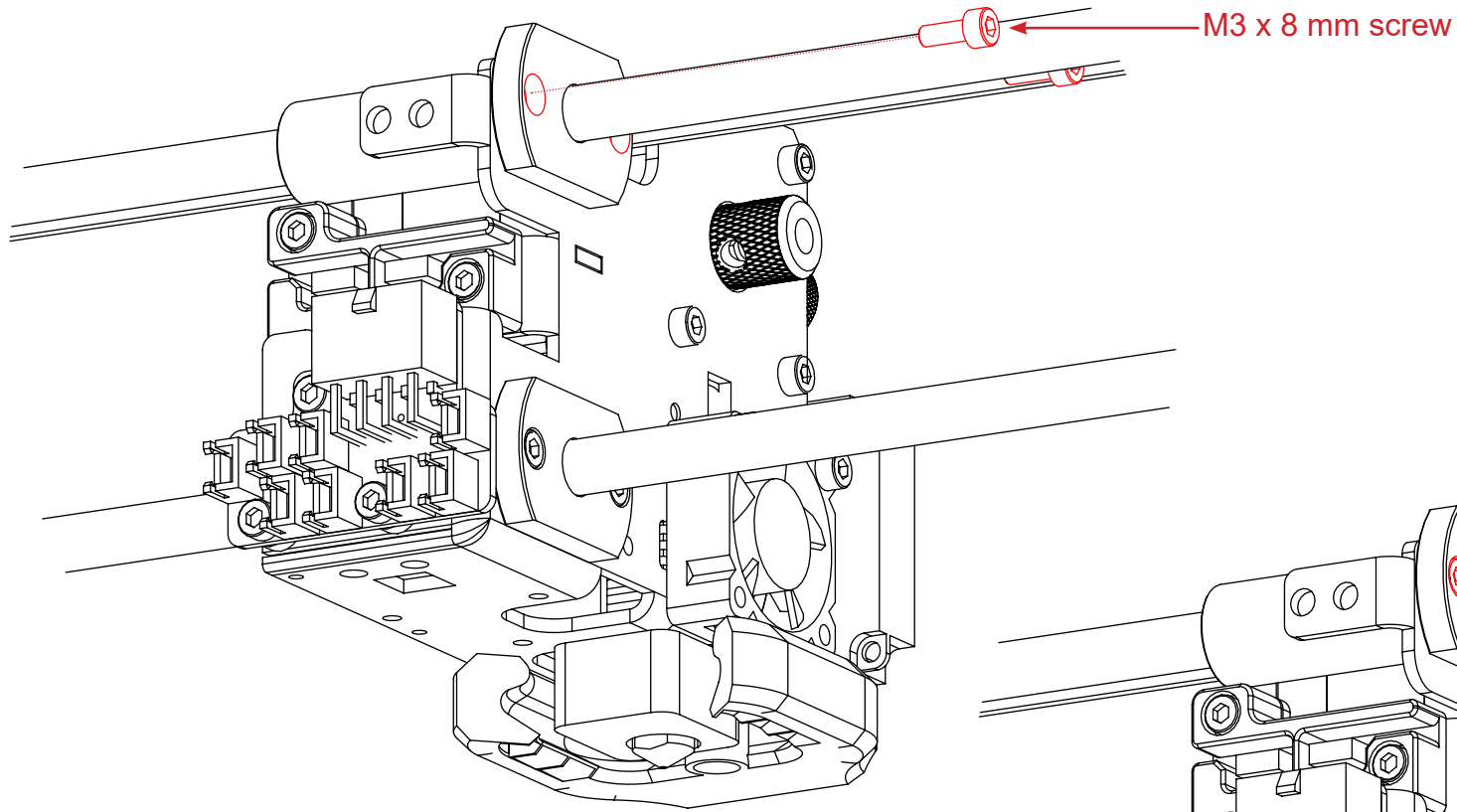
Target : mount the X axis with the Z axis



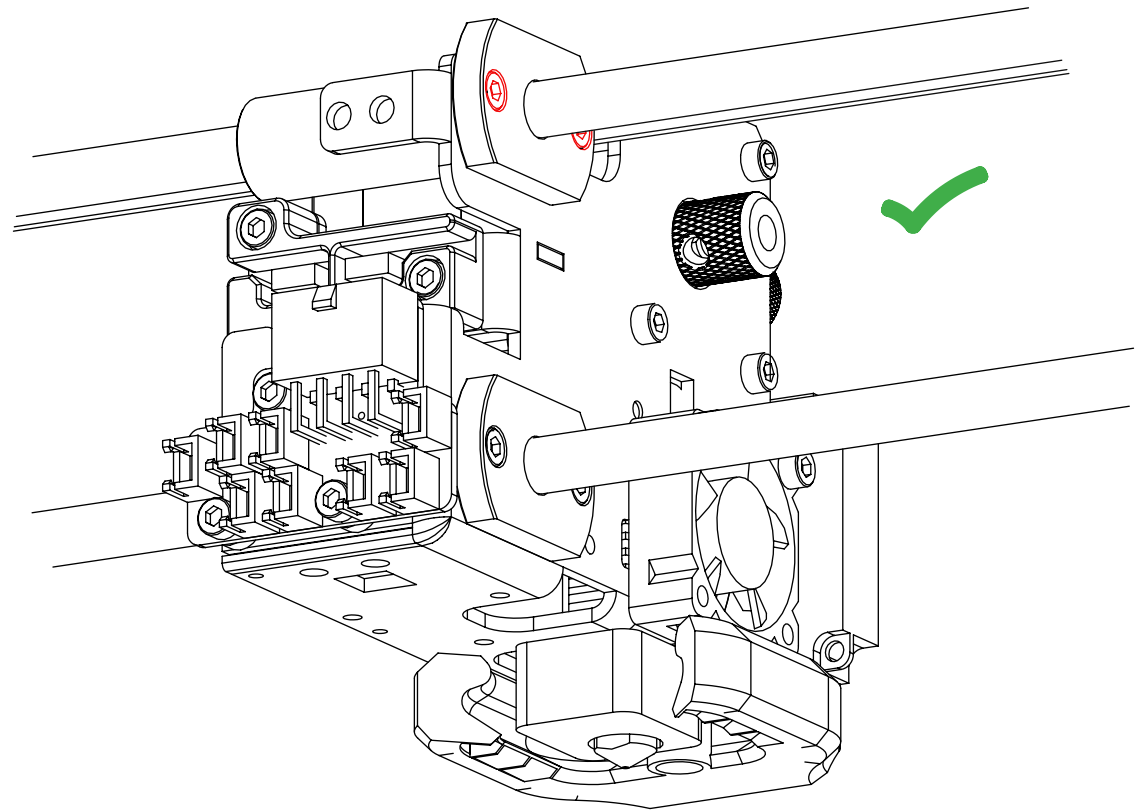
Adjust the height of the two carriages by turning the aluminum couplers so that the rod is as parallel as possible to the horizontal edge of the frame.

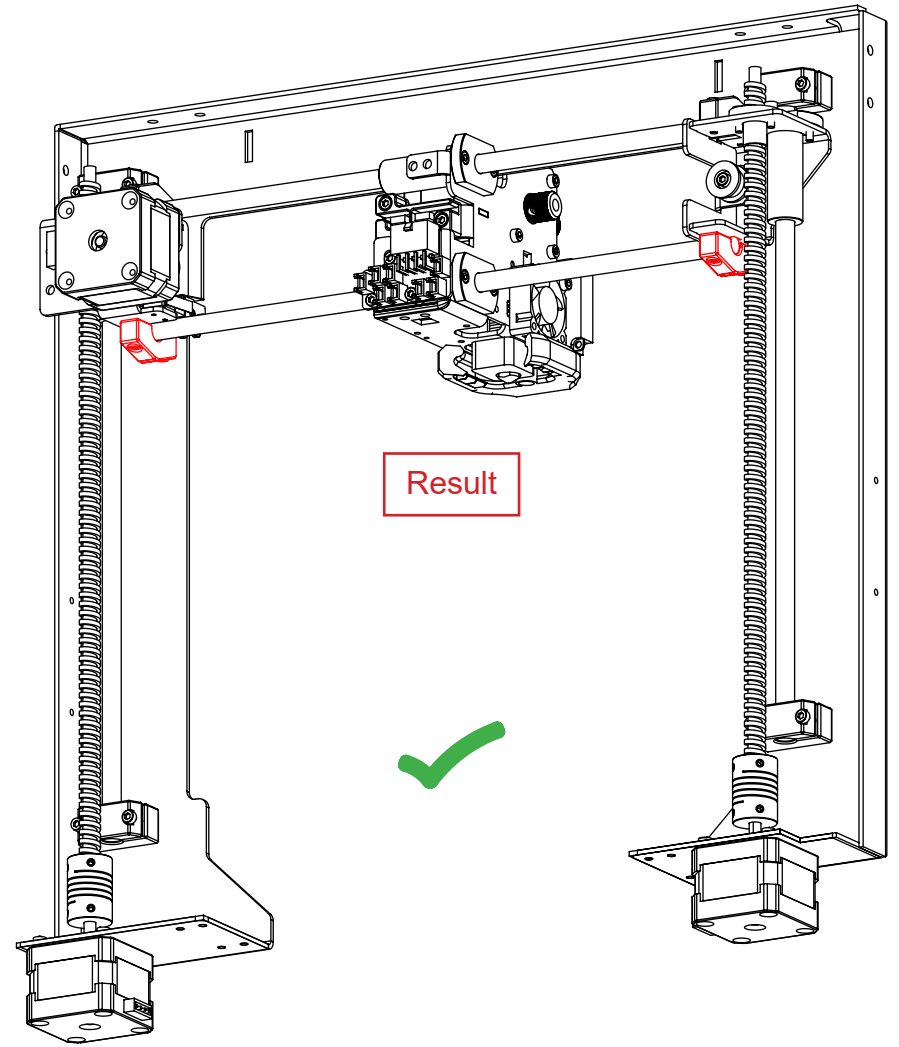
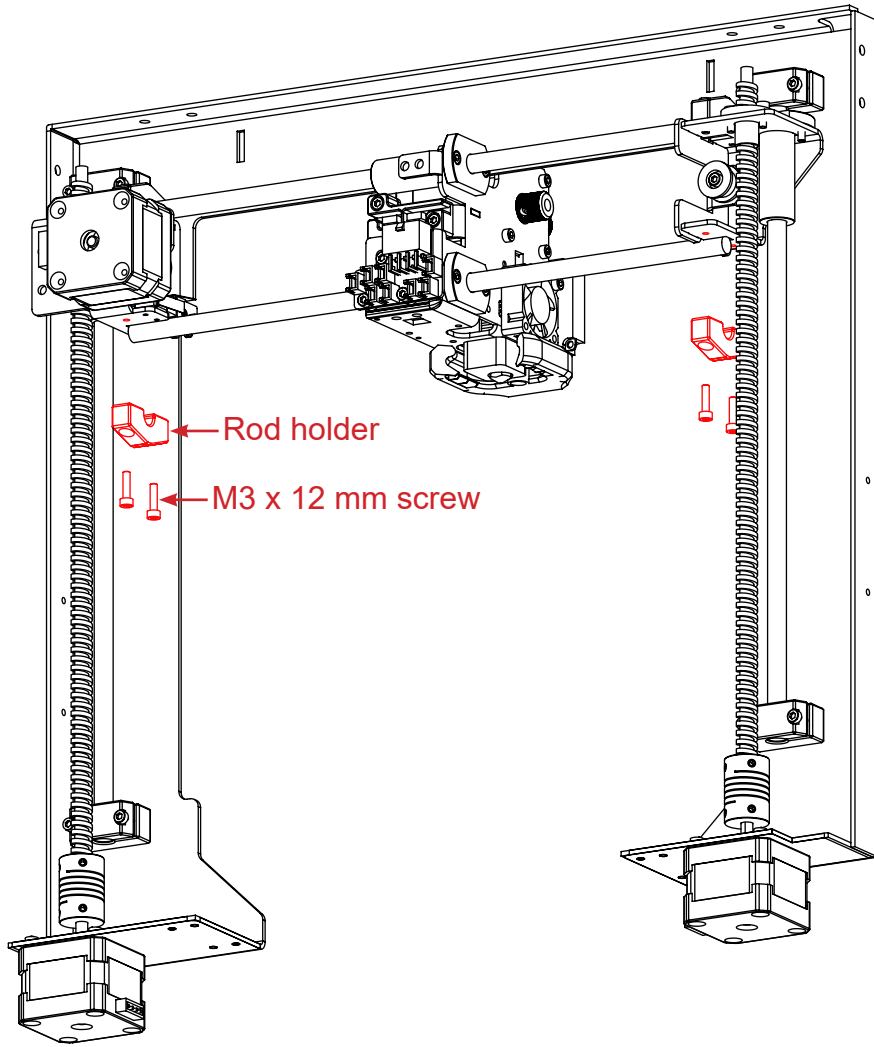




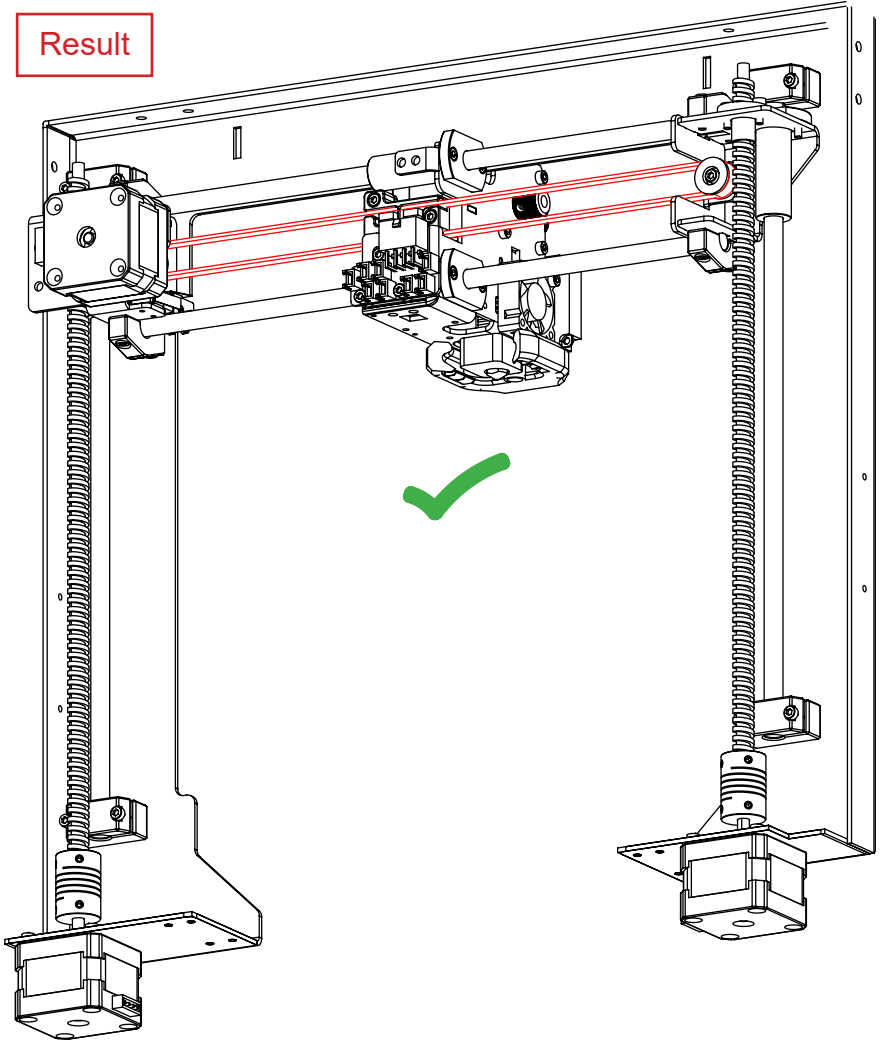
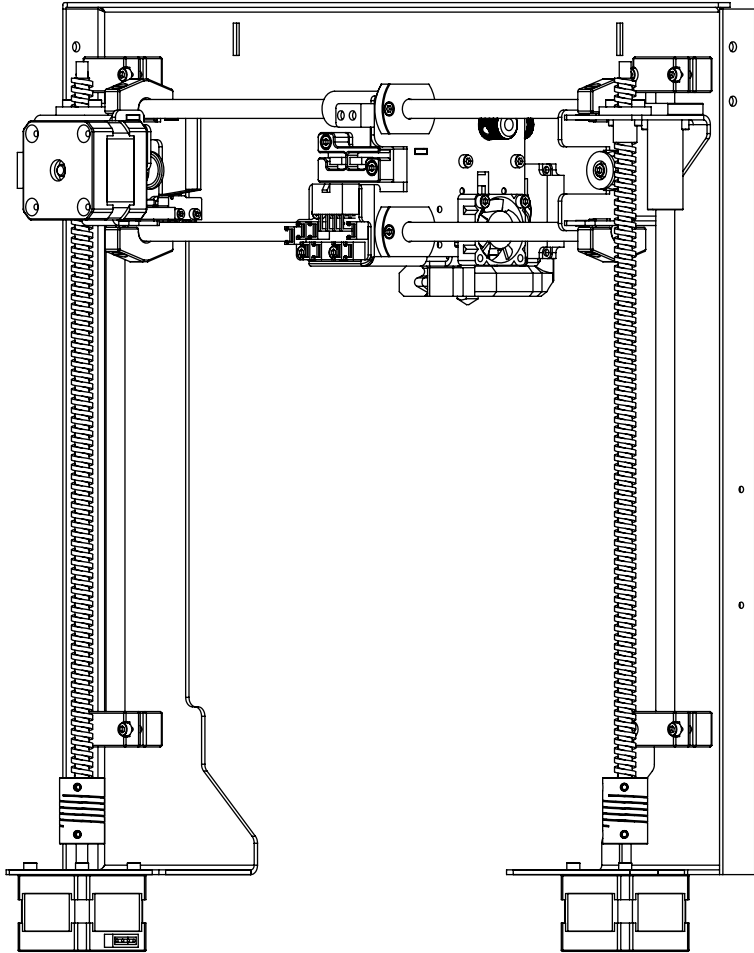


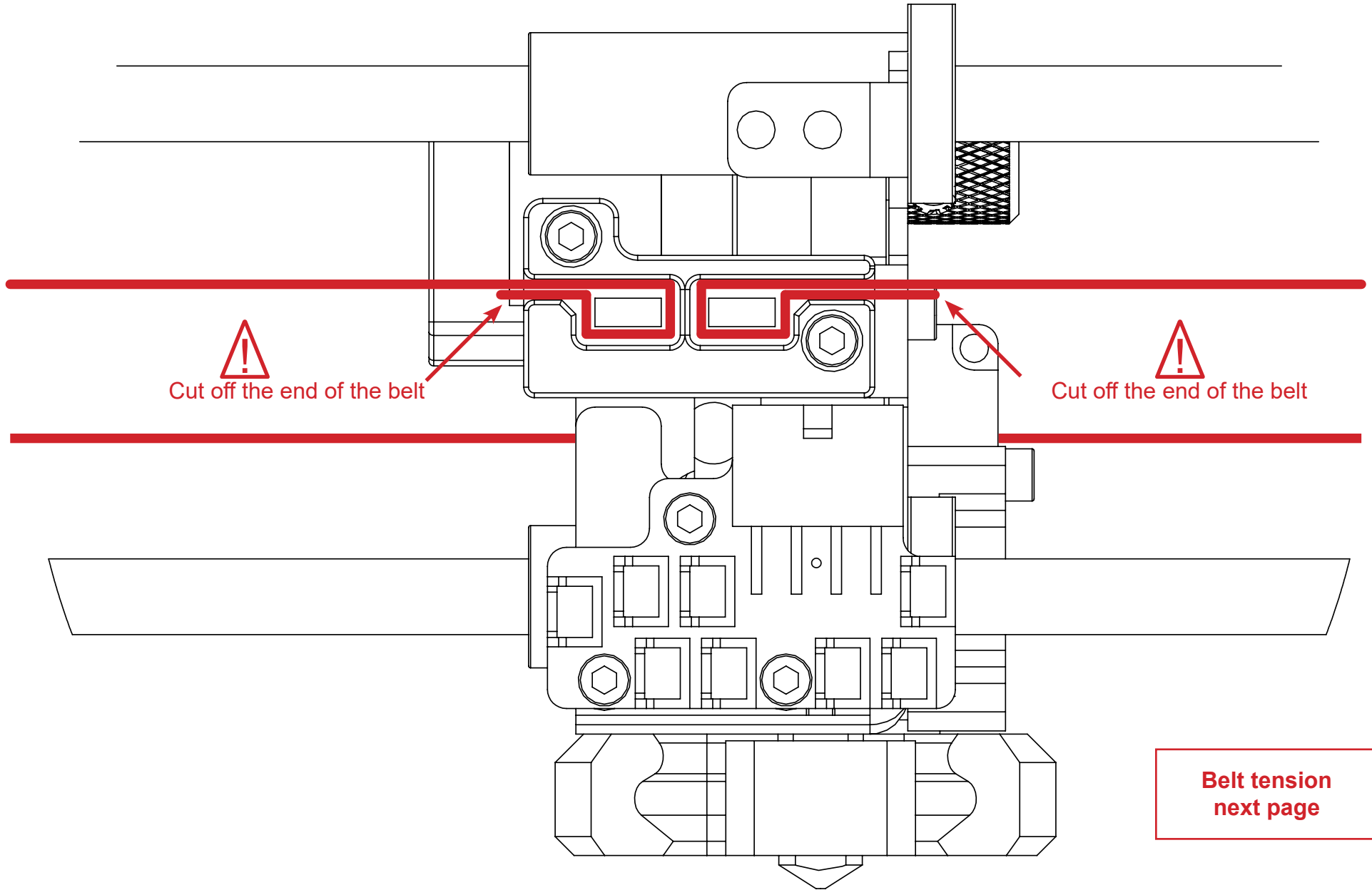
Result



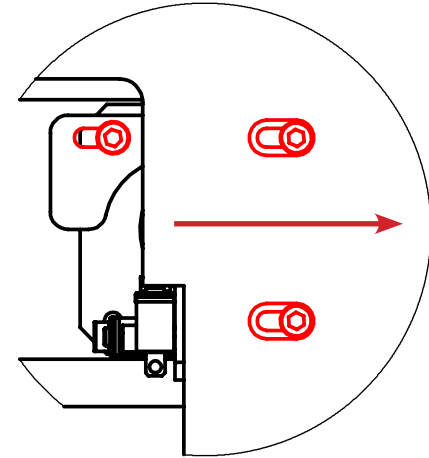
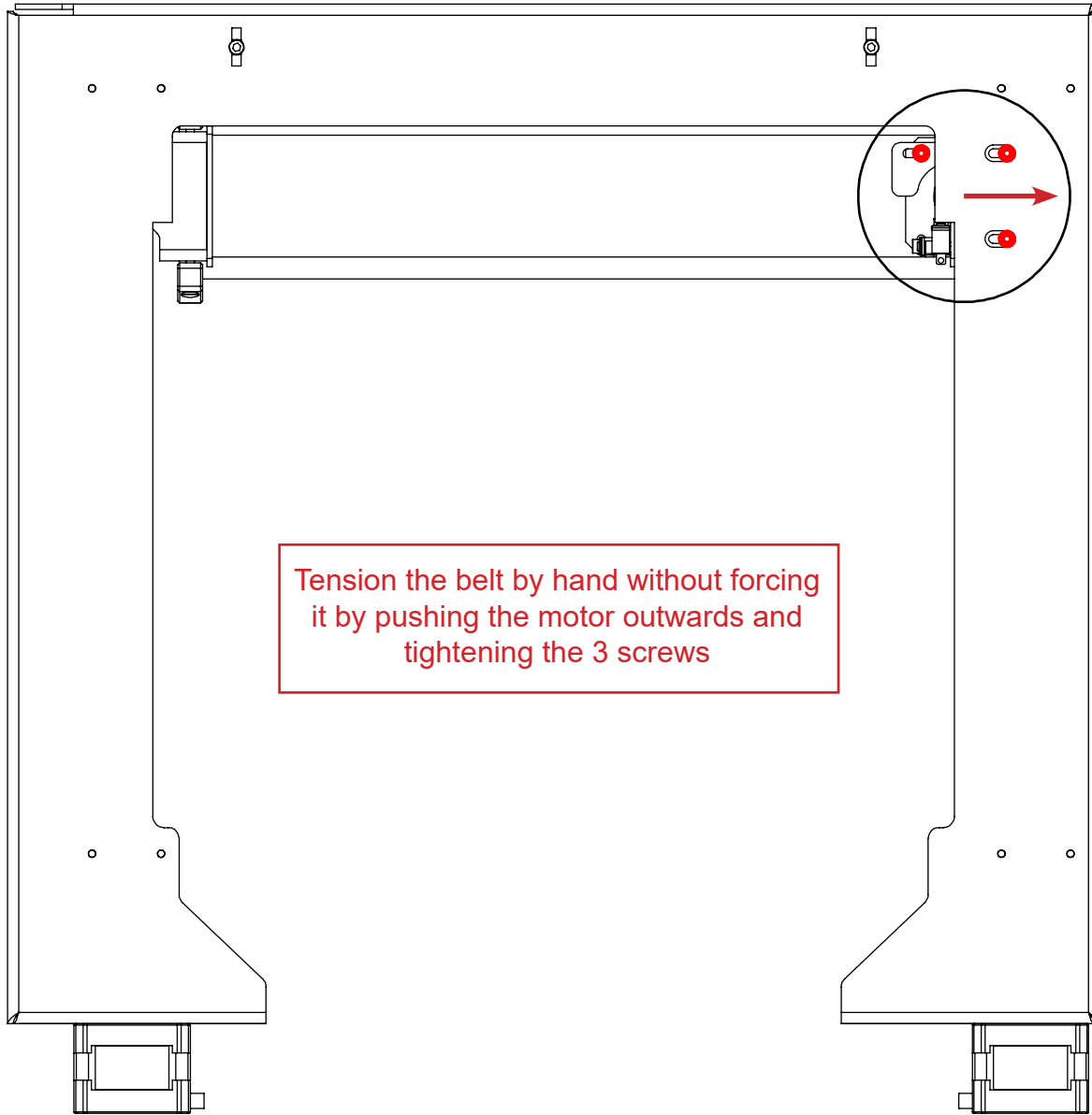


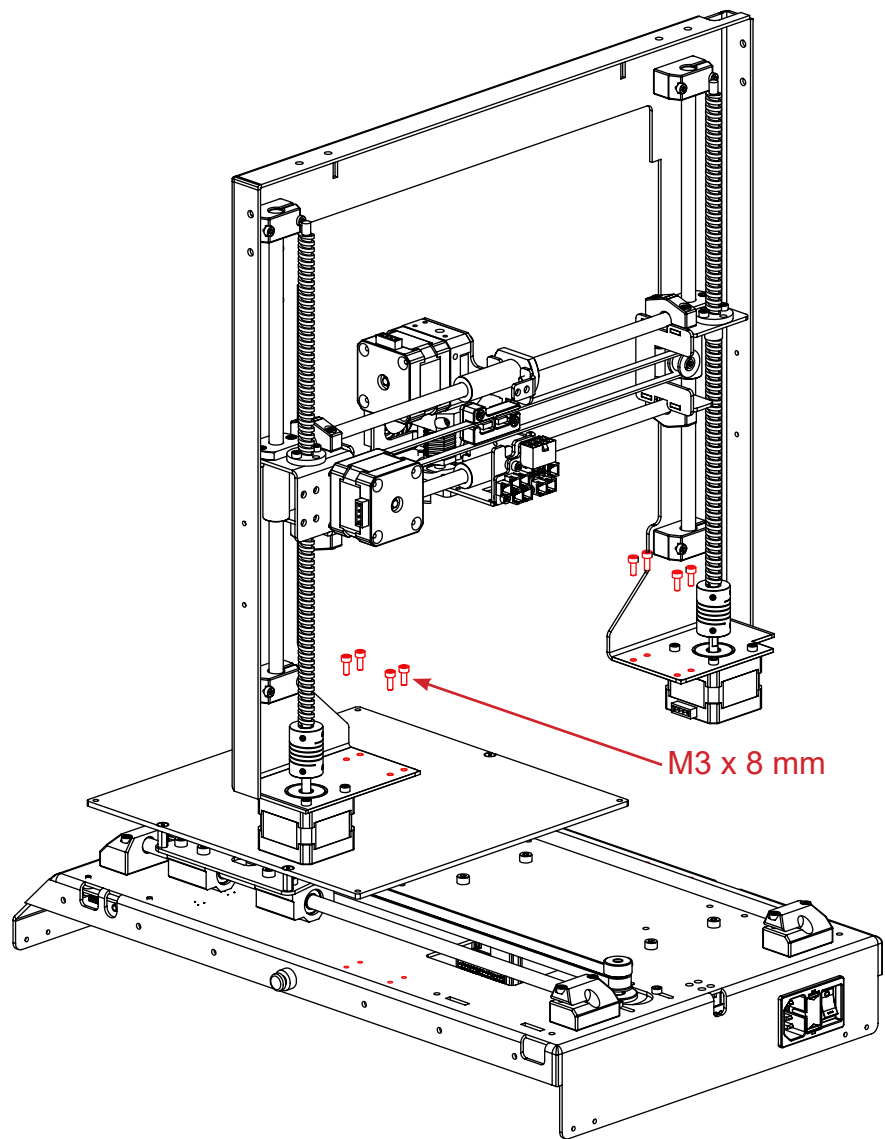
Place the belt around the pulleys and as shown below :



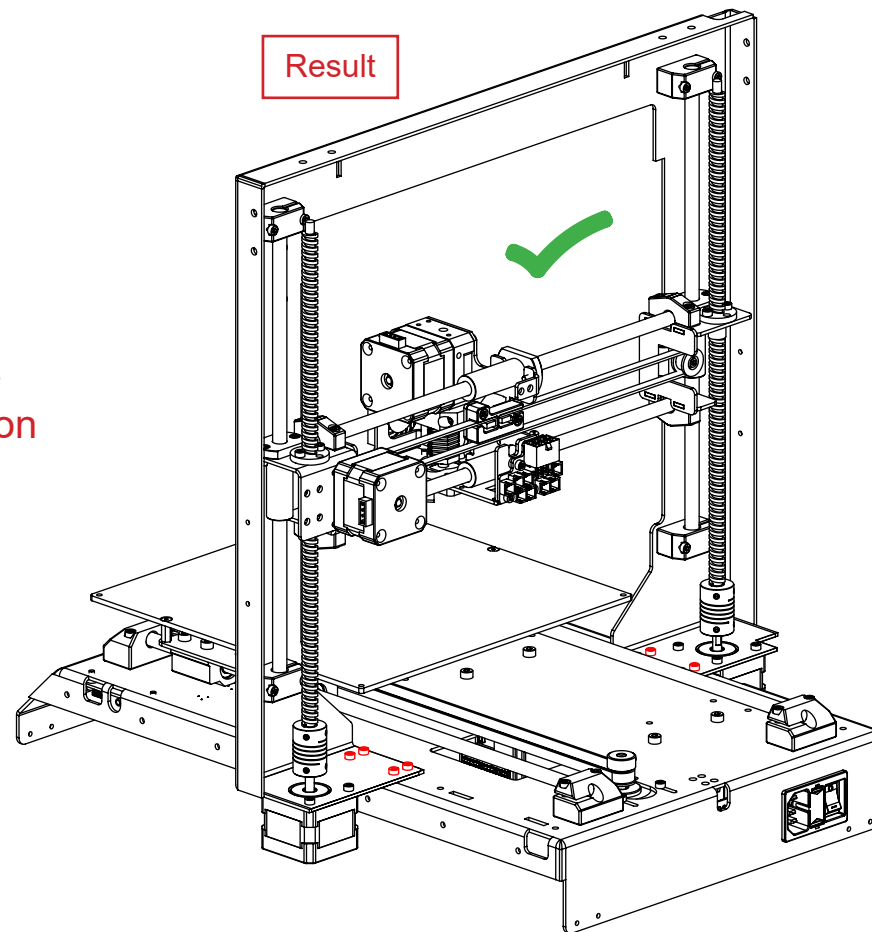


**Belt tension
next page**

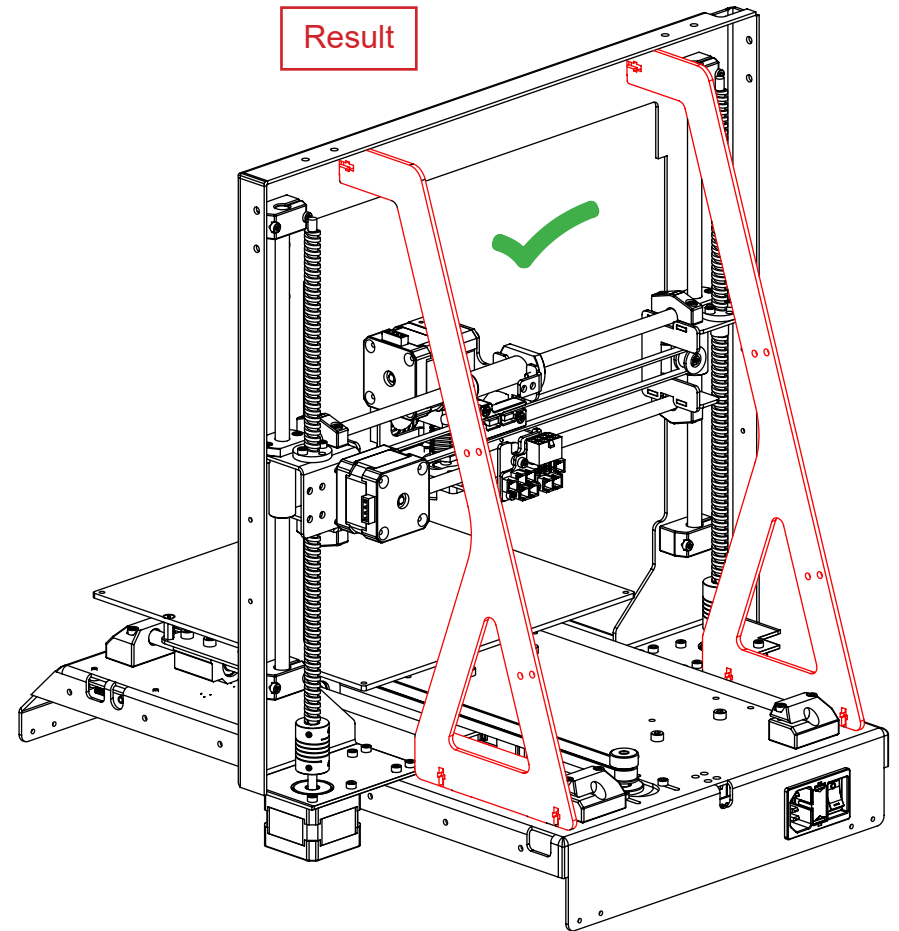
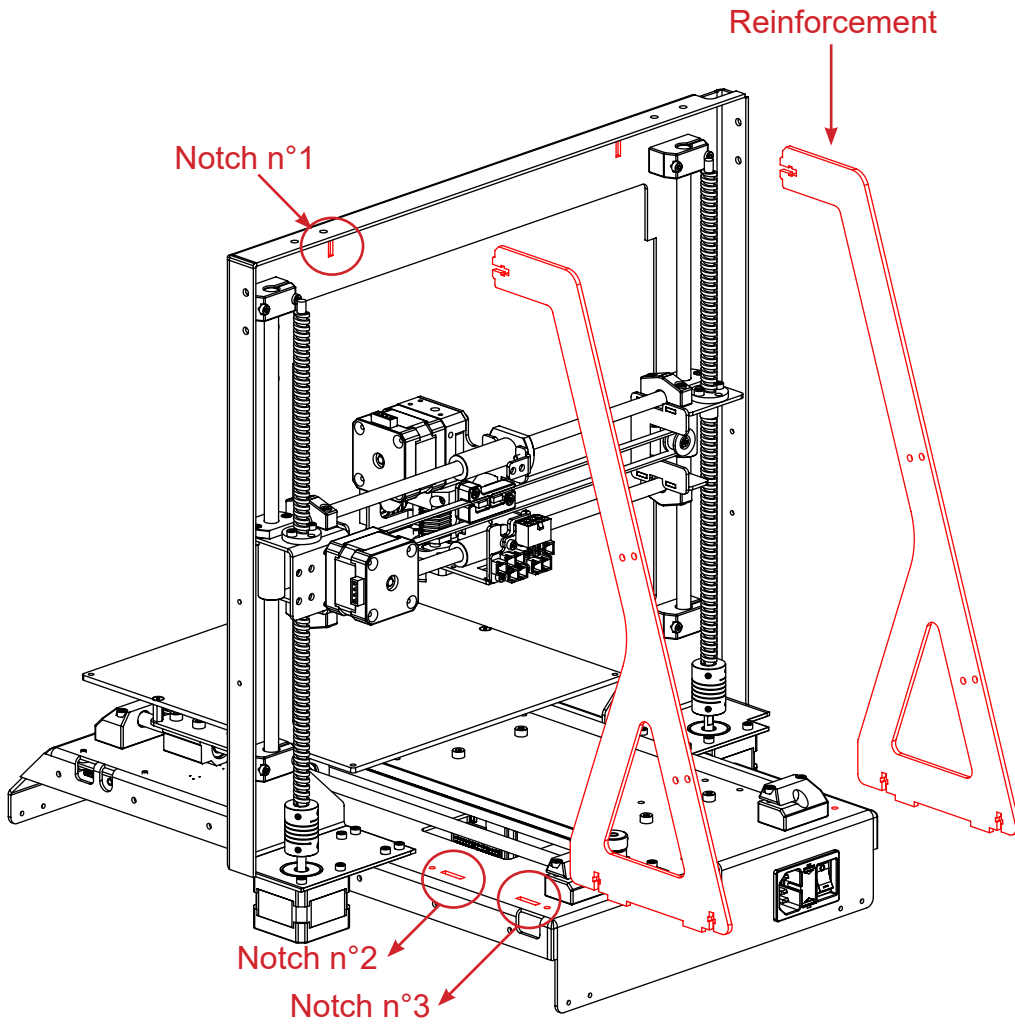






Frame
orientation

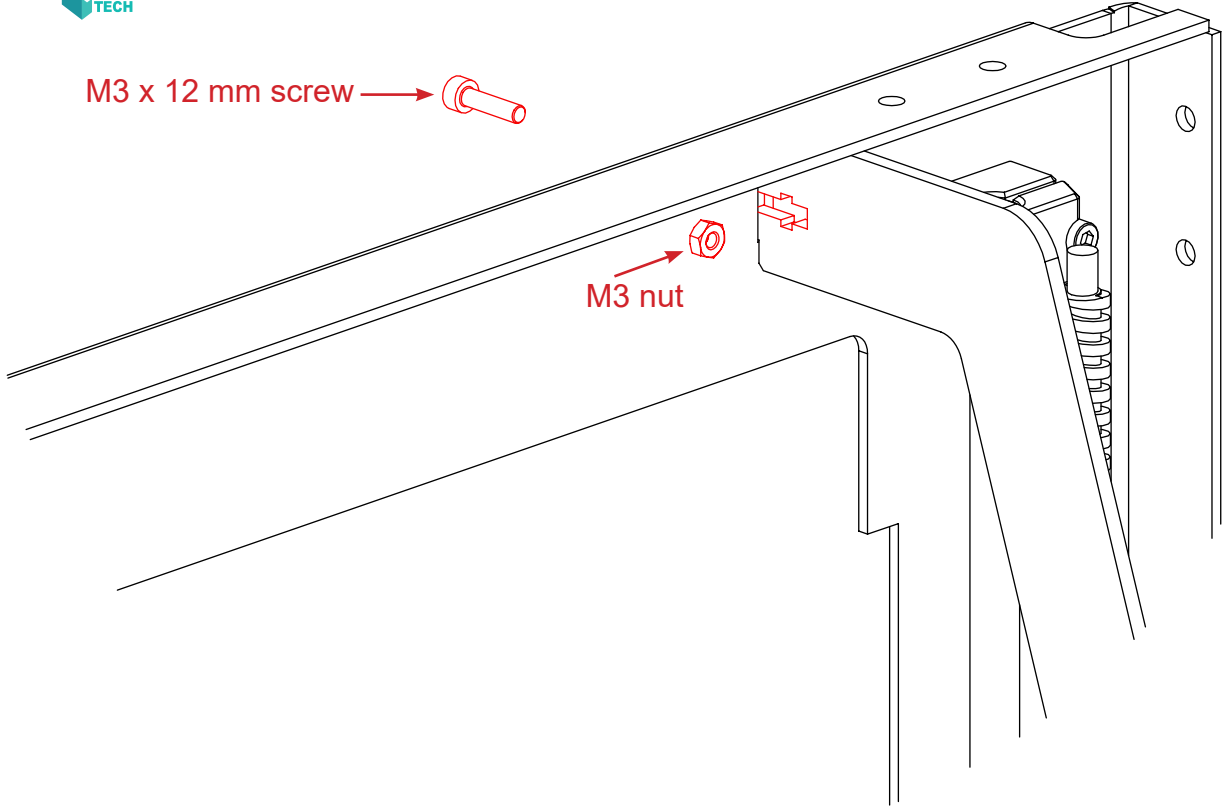


Place the reinforcements in their notches

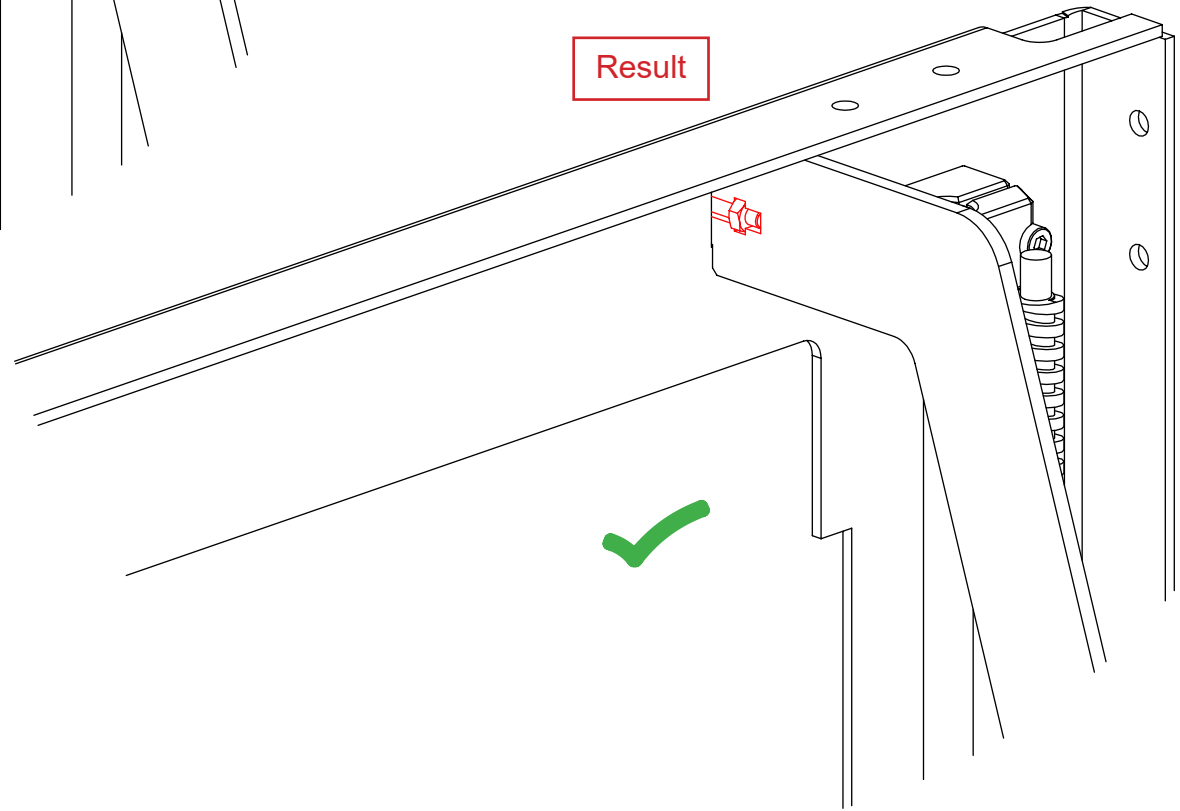


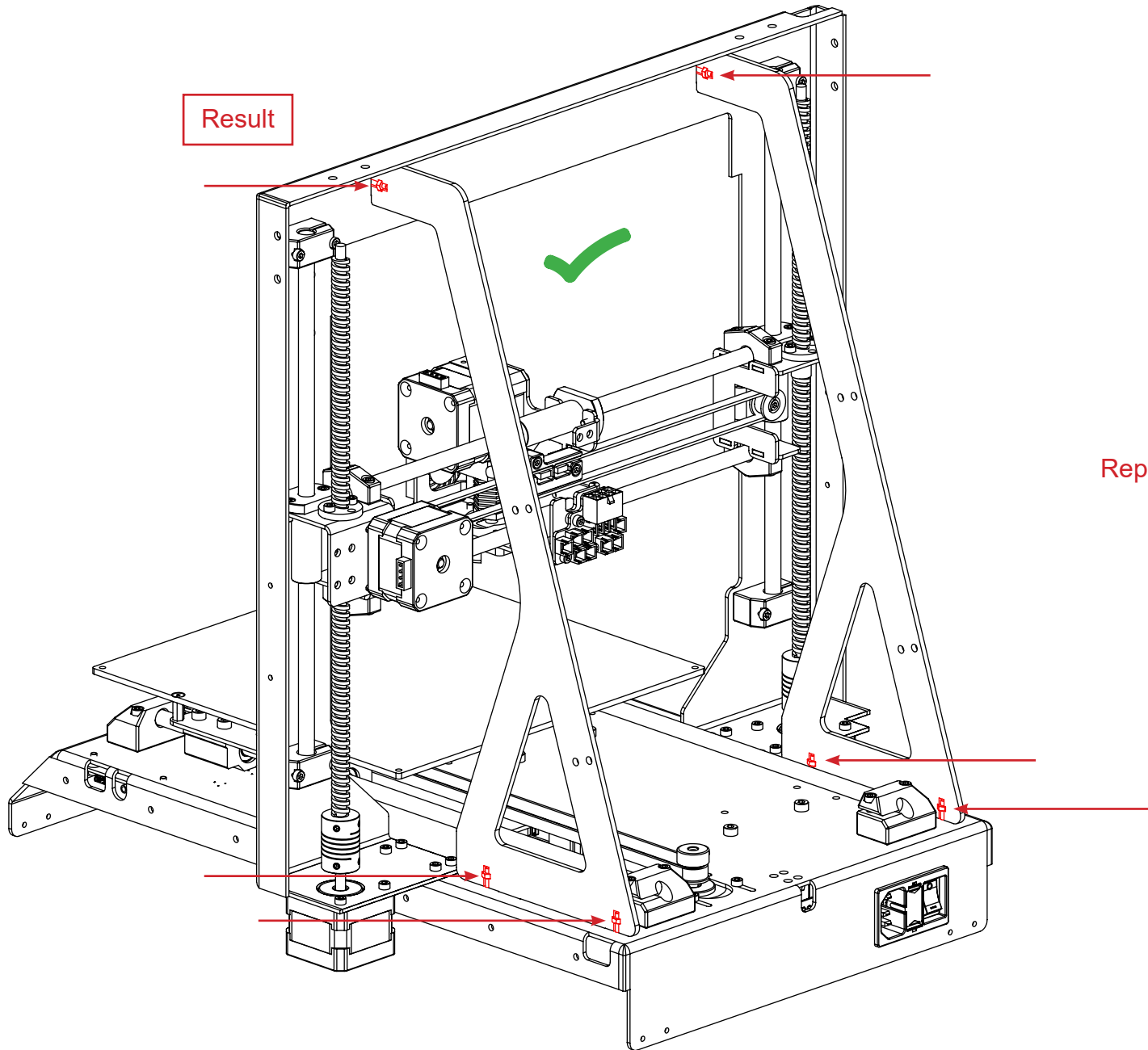
M3 x 12 mm screw → 

M3 nut → 



Result





Result



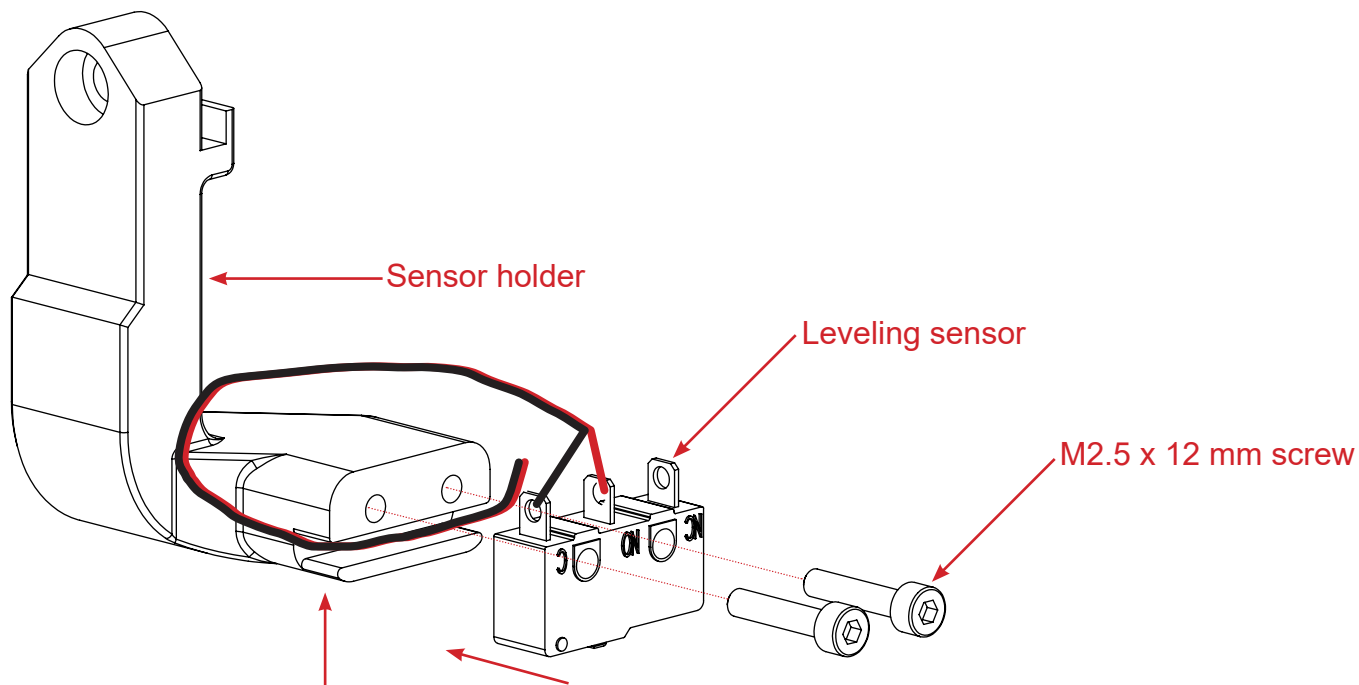
Repeat the fixing operation for each of the reinforcements

ASSEMBLY OF THE LEVELING SENSOR

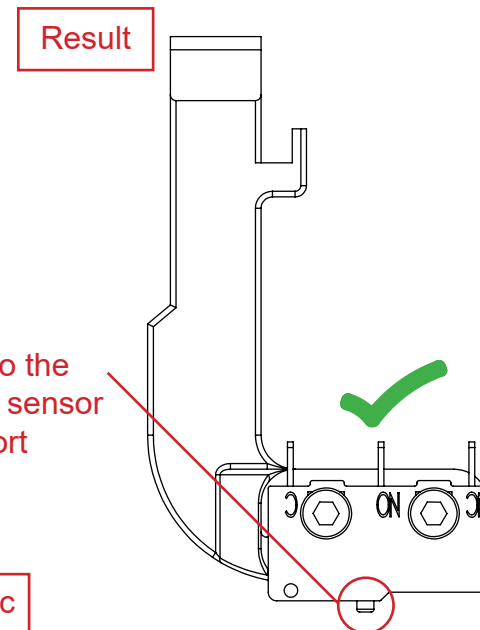
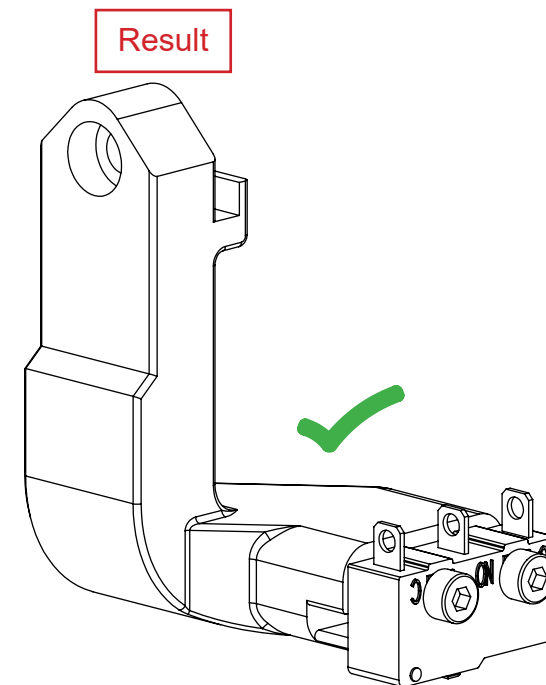
Needed parts :

- Sensor holder
- Leveling sensor
- 2 x M2.5 x 12 mm screw

Target : mount the leveling sensor



Make a loop with the sensor cable and insert it into the passage



Pay attention to the orientation of the sensor on its support

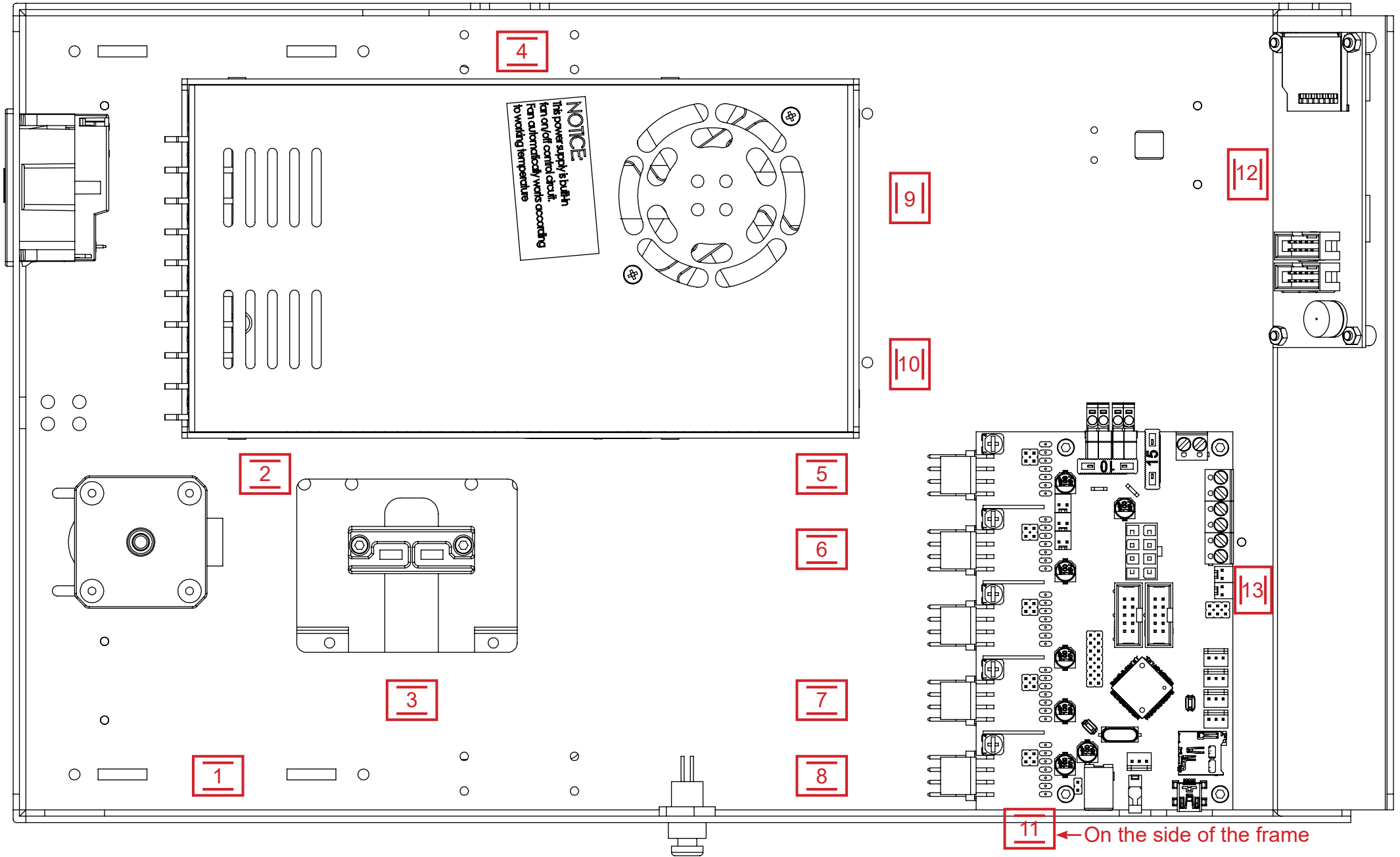
This element will be mounted on the 3D printer before the automatic calibration phase which will be described in the user's instructions.



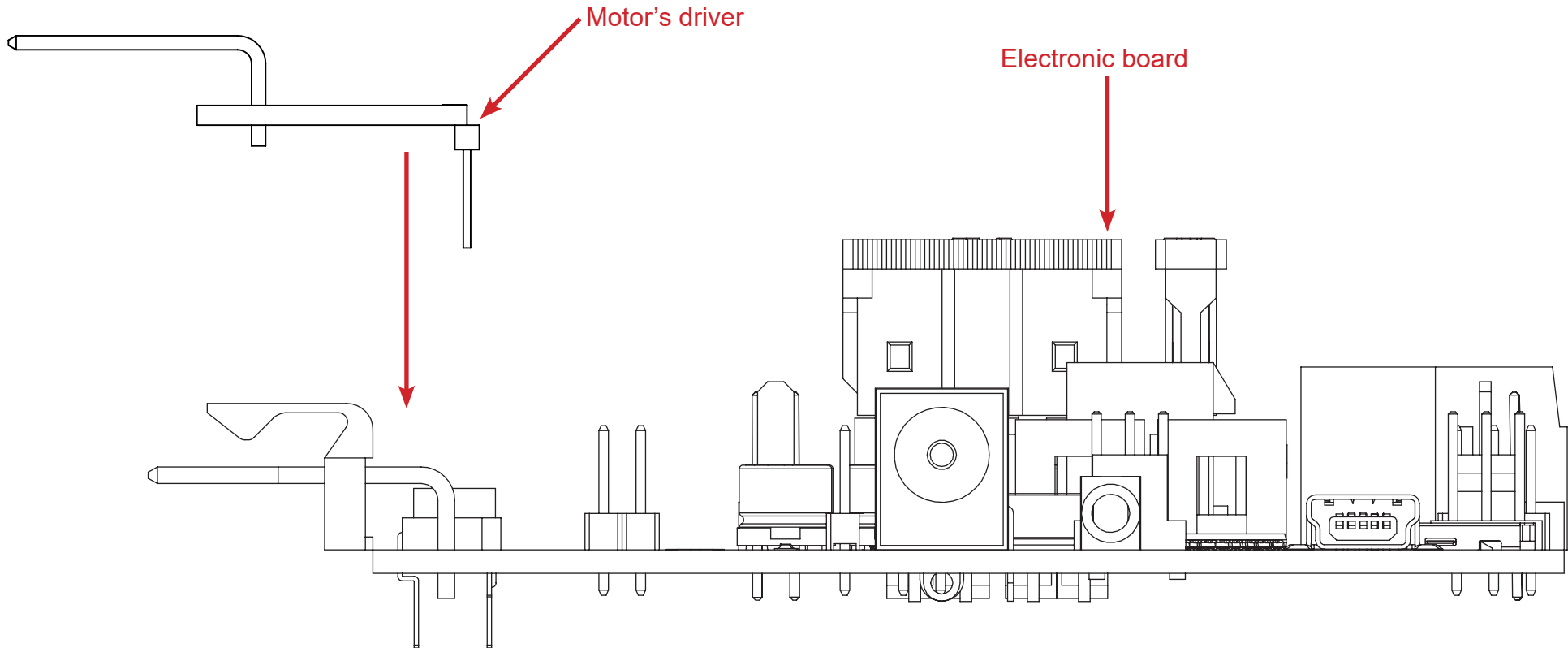
ELECTRONIC ASSEMBLY

ELECTRONIC ASSEMBLY

Target : place and stick the thirteen cable ties on the lower part

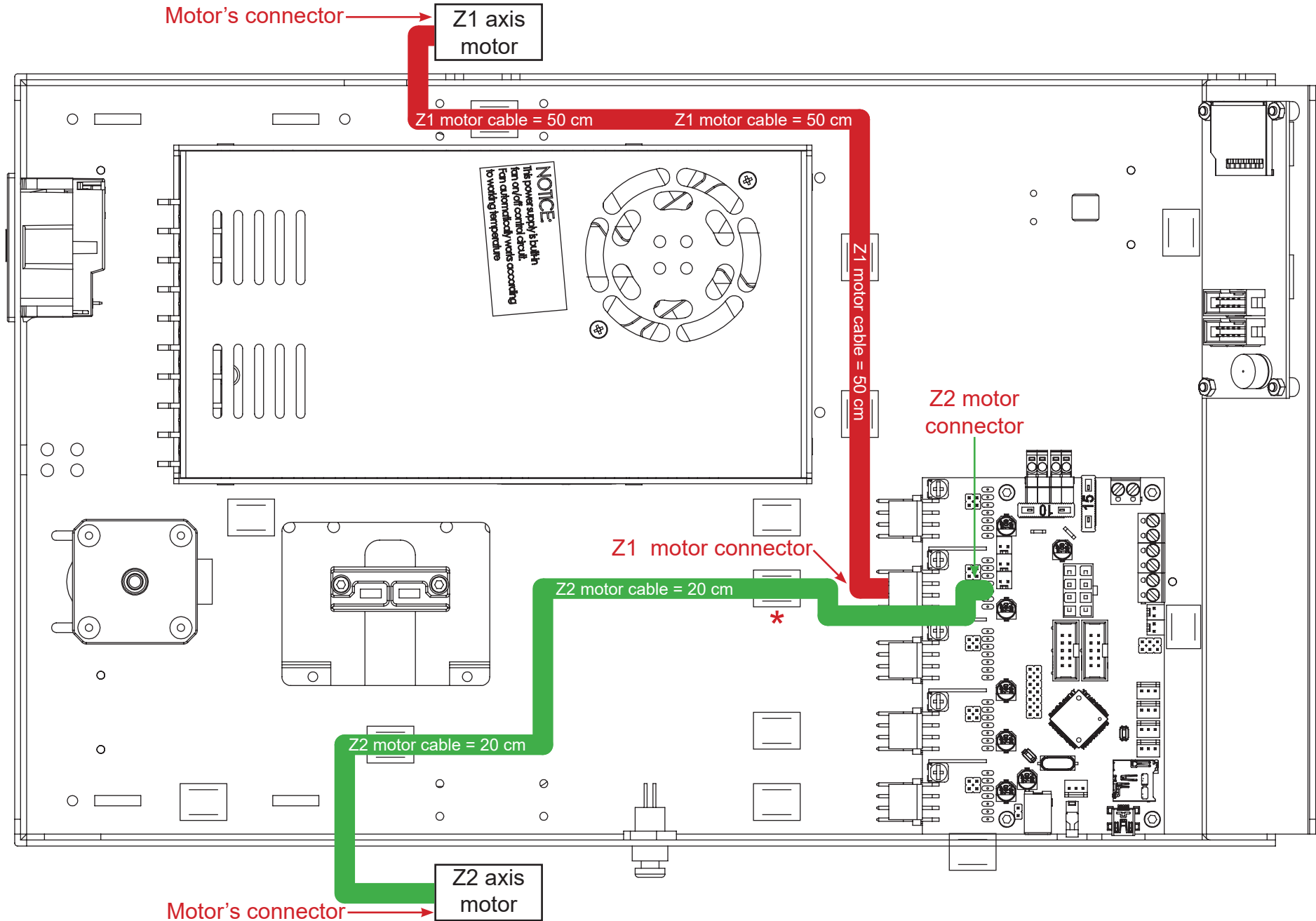


Target : connect the additional motor driver above the first intended for the Z axis

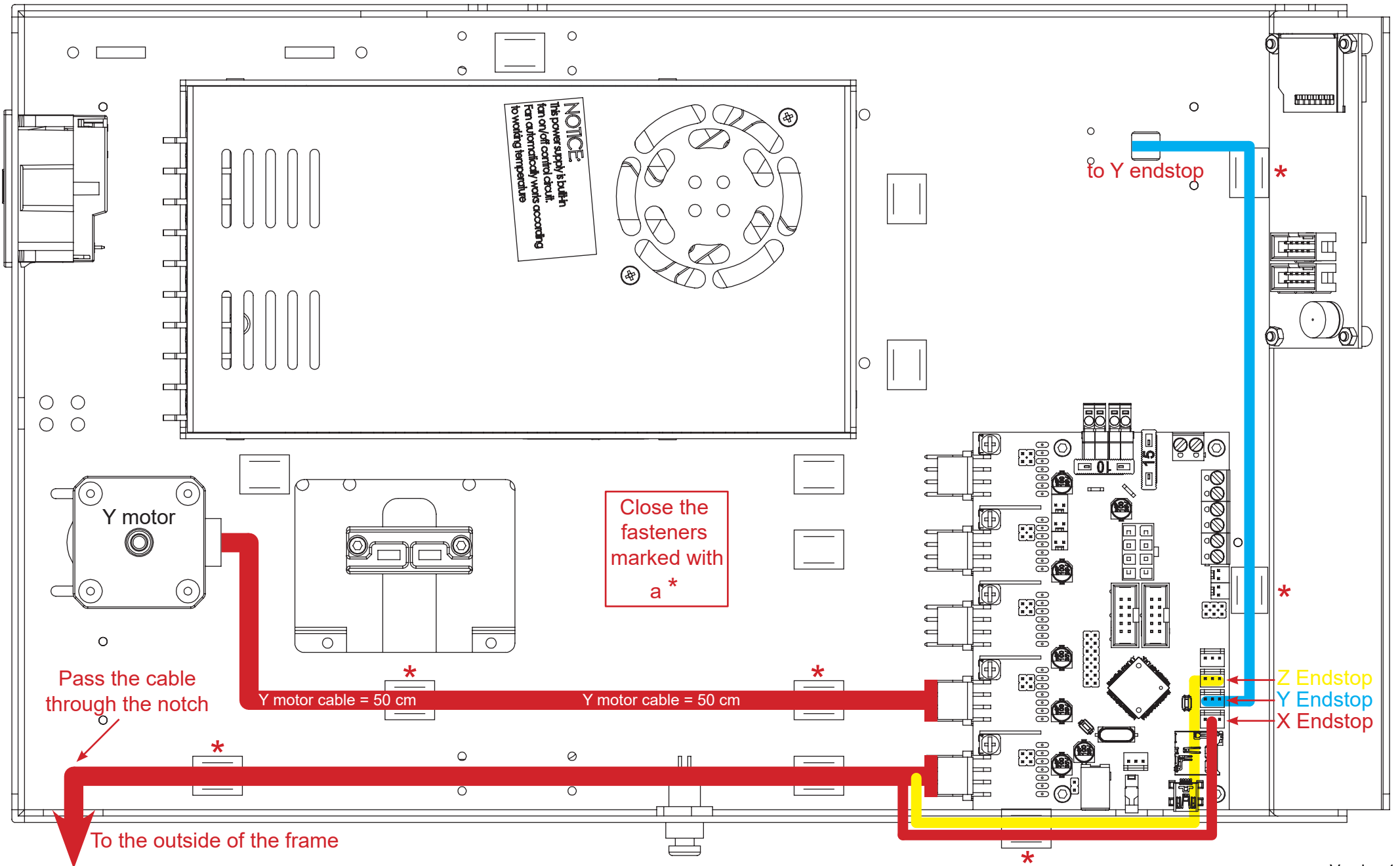


ELECTRONIC ASSEMBLY

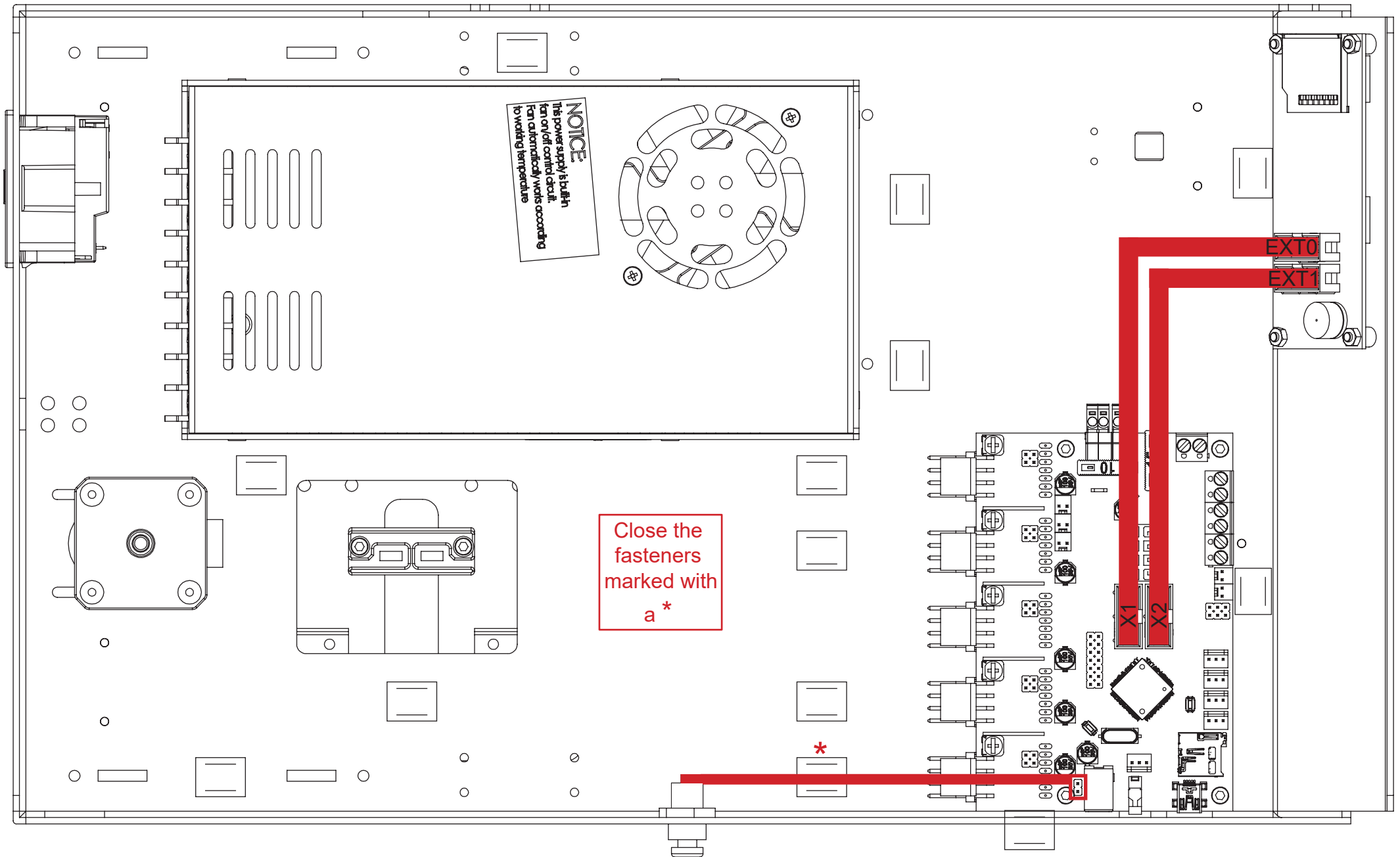
Target : pass the Z axis motor cables in their dedicated fasteners



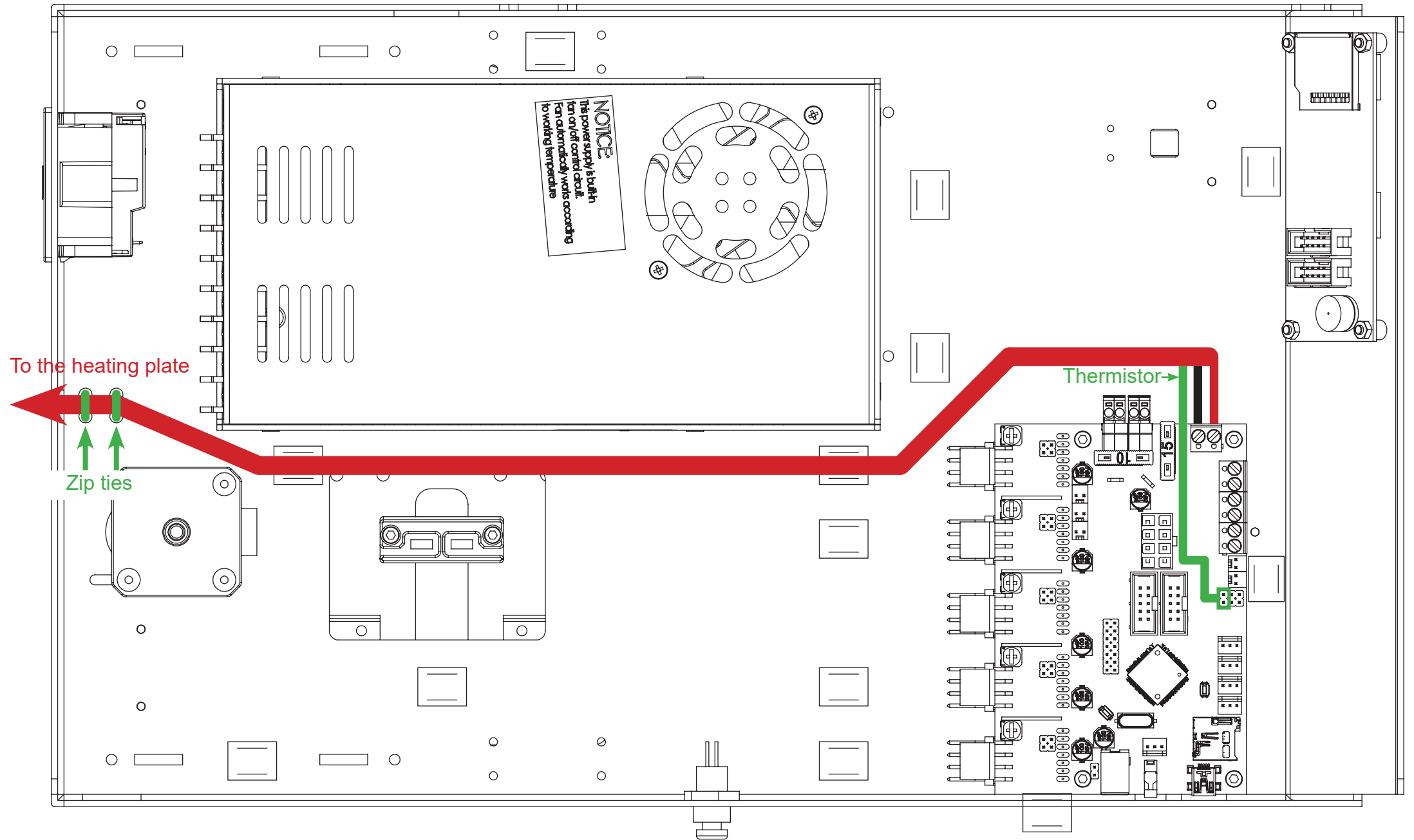
Target : connect the X and Y axis motor and endstop sensors



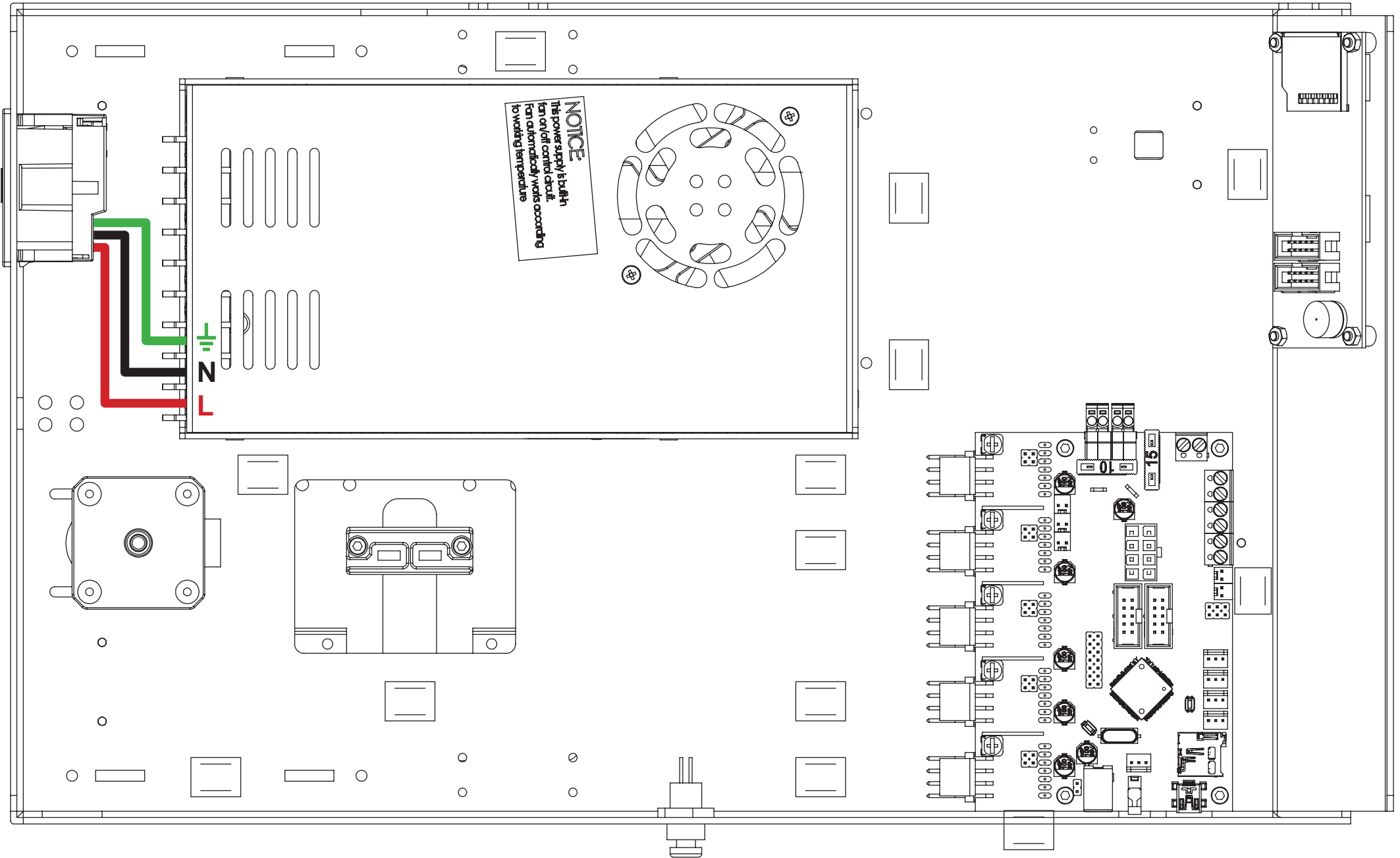
Target : connect the LCD screen and the reset button to the eMotronic board



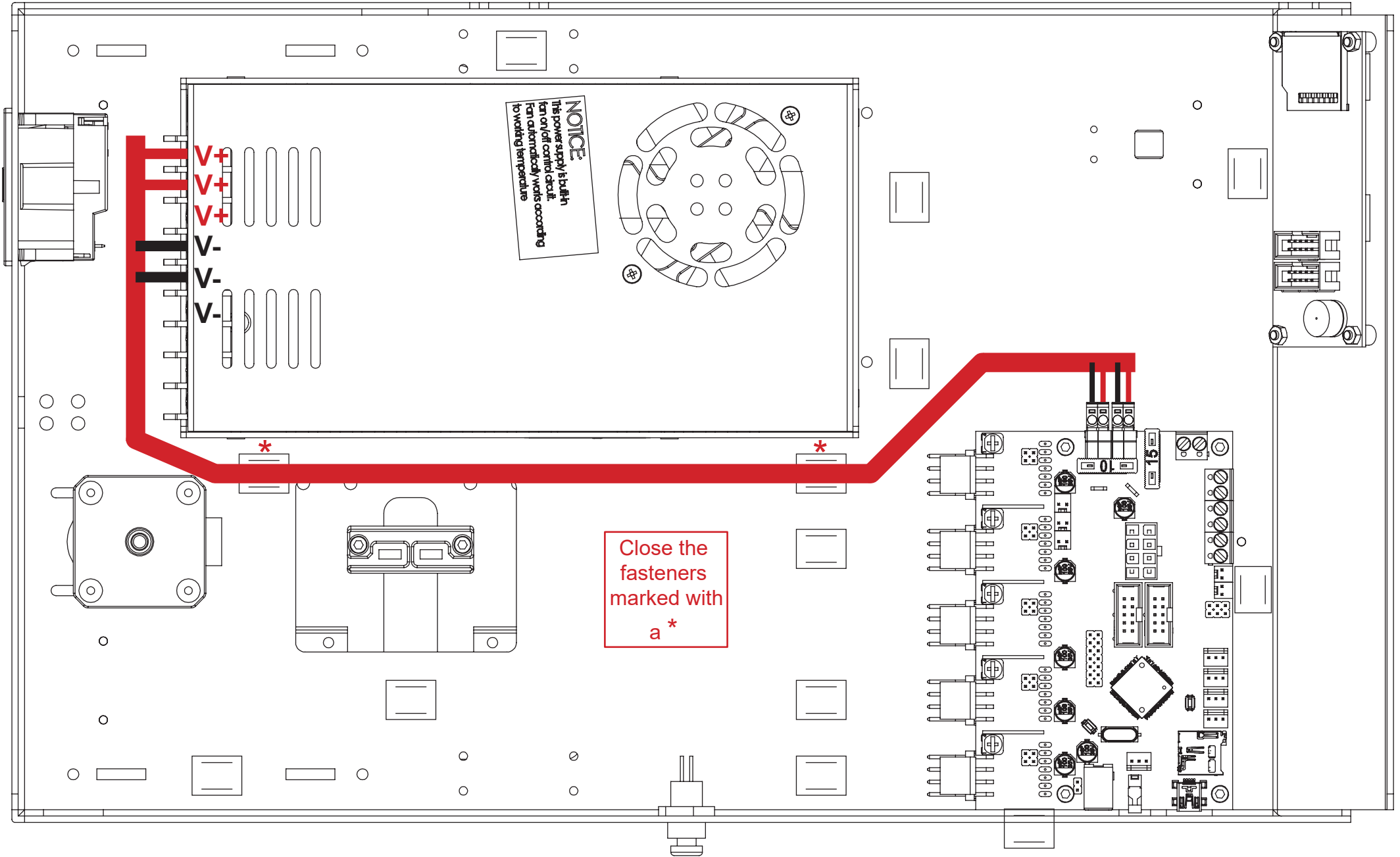
Target : connect the heating patch cables to the eMotronic board



Target : connect the IEC connector to the power supply

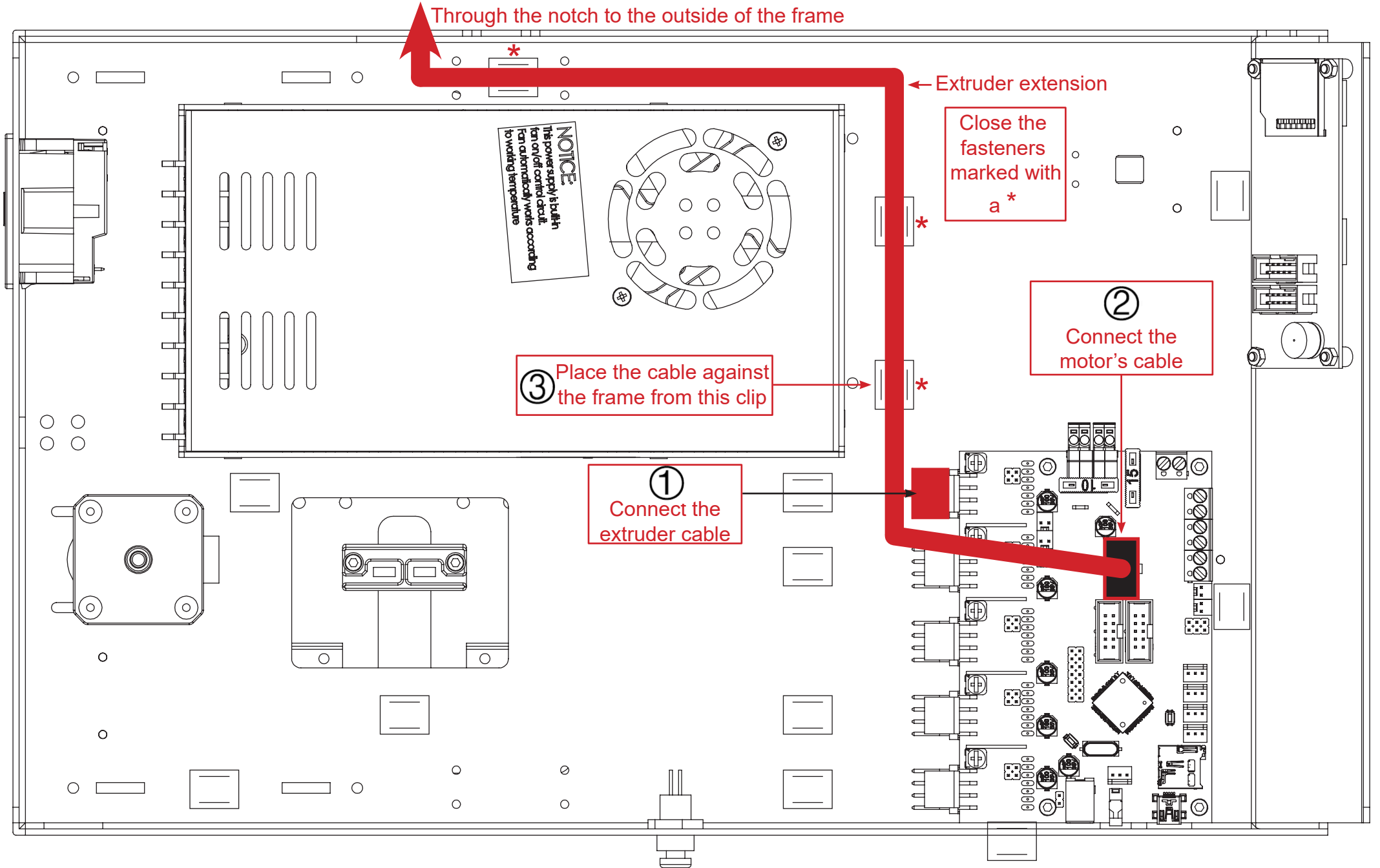


Target : connect the power supply to the eMotron board

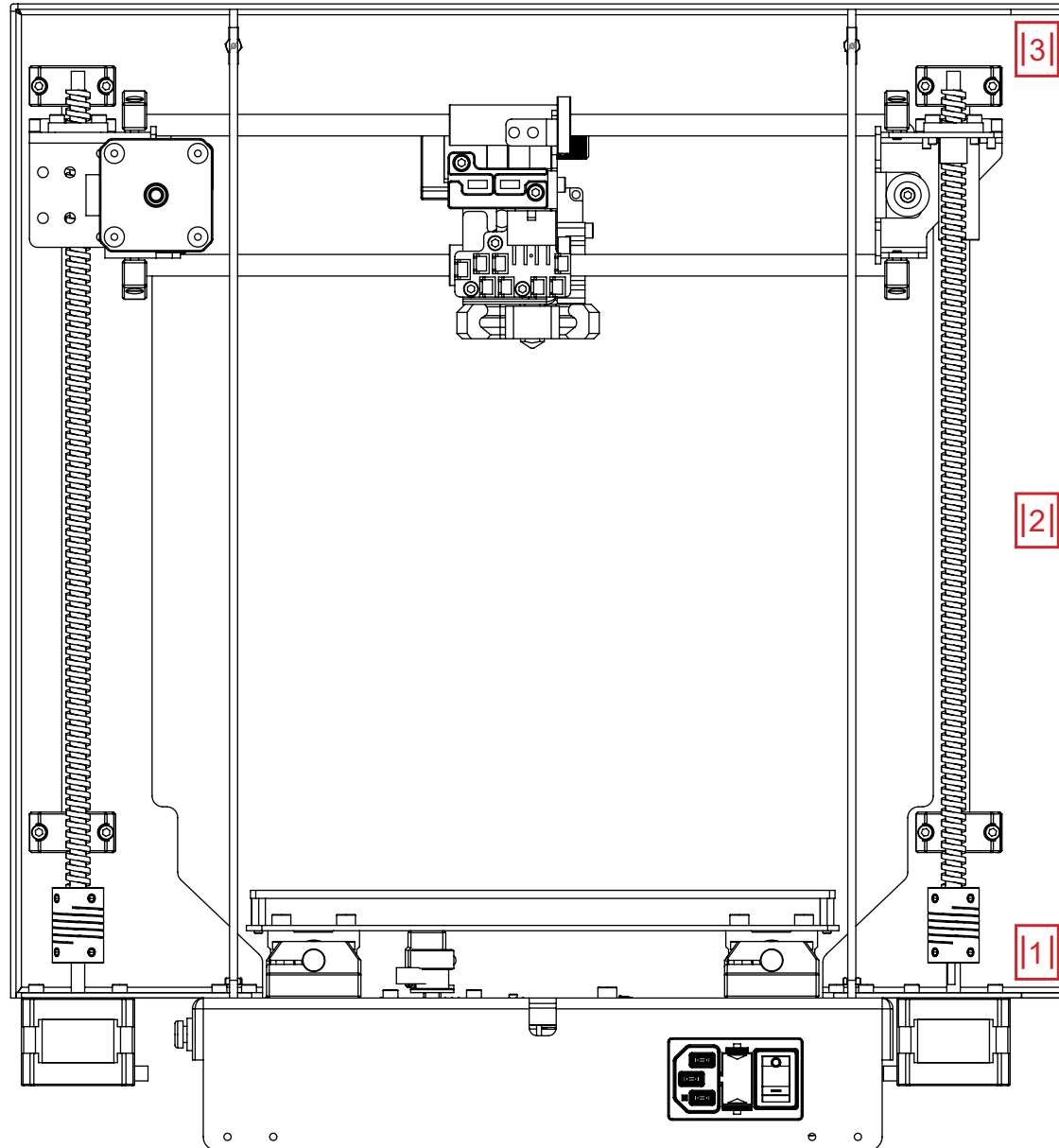


ELECTRONIC ASSEMBLY

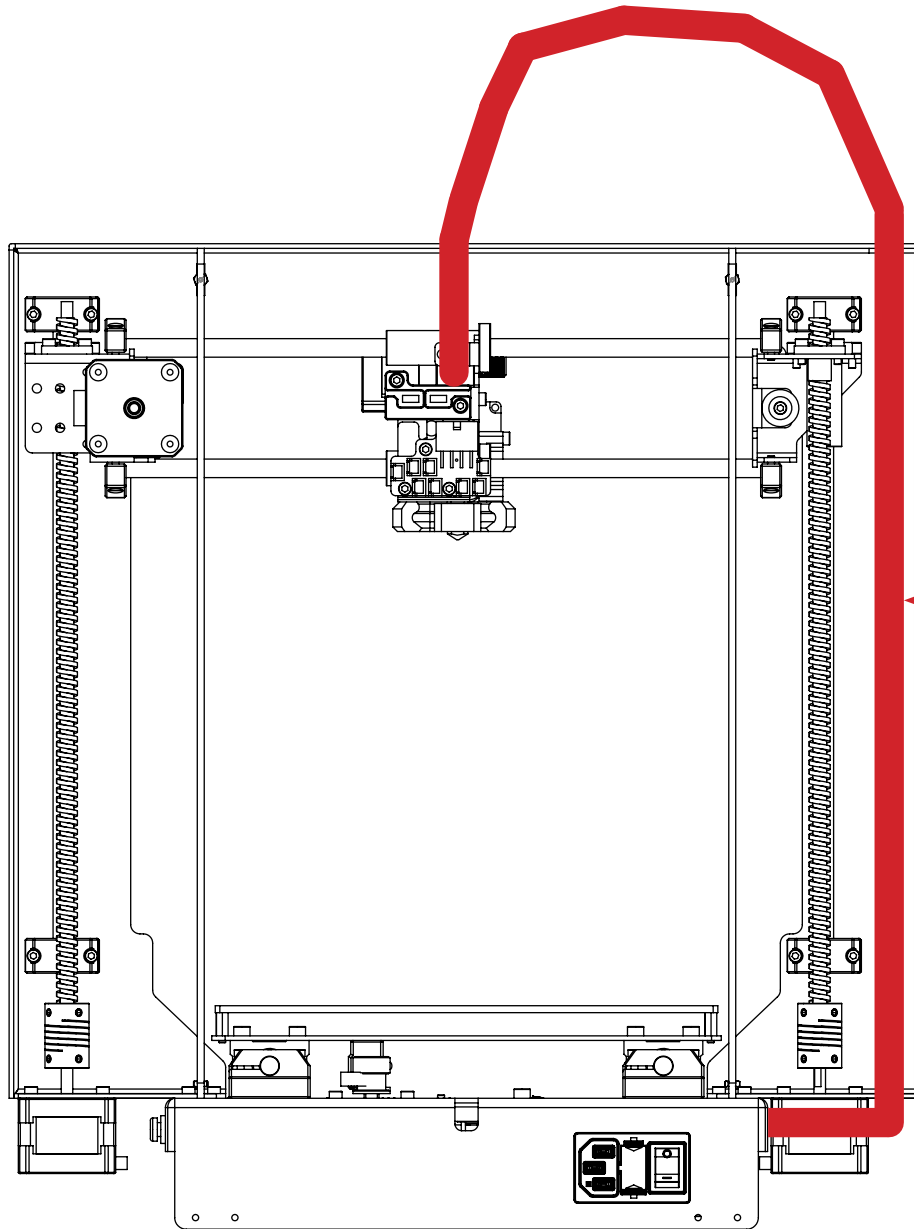
Target : pass the extruder's cable into its dedicated passage



Target : fix the cable ties on the frame for the extrusion extension



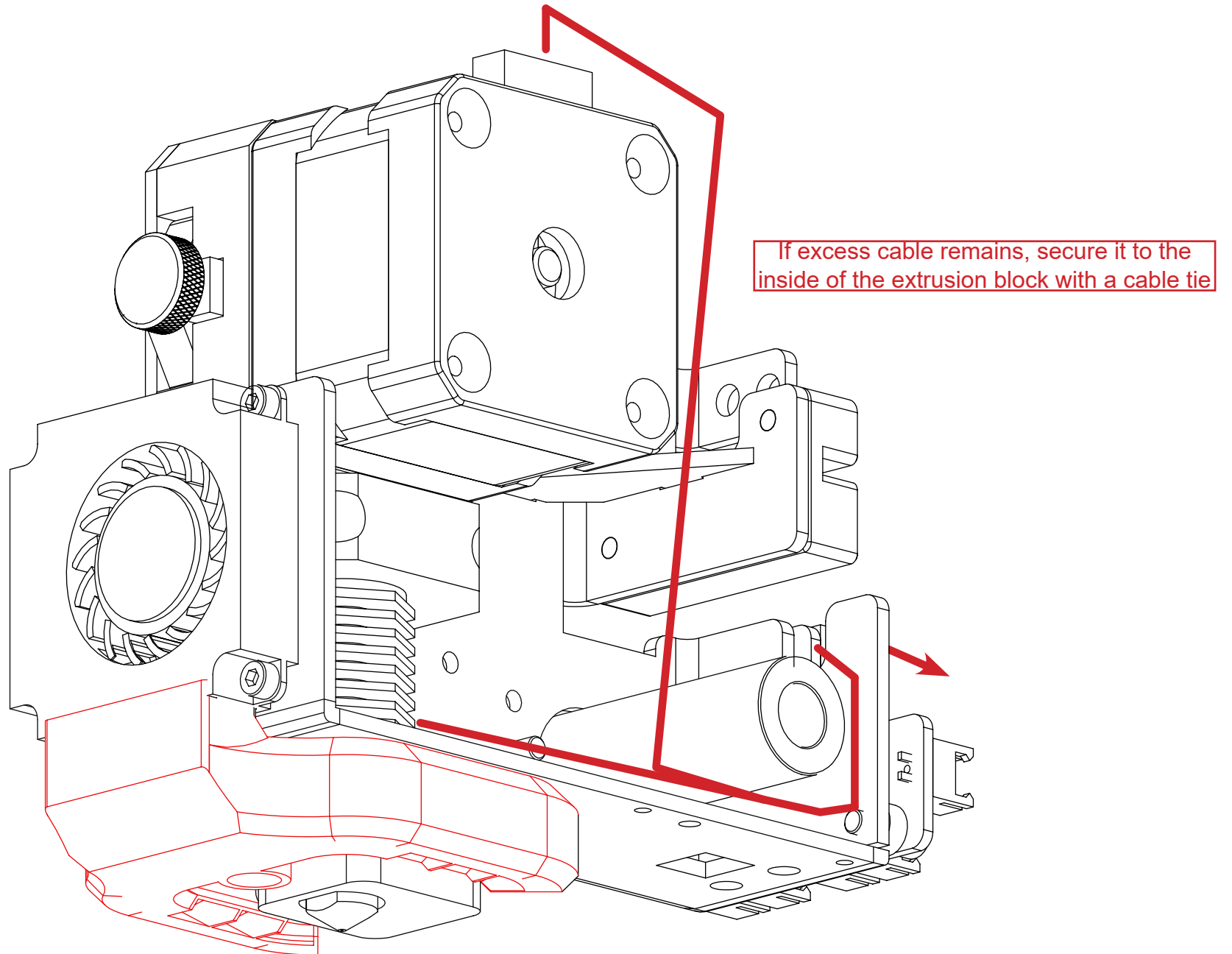
Target : pass the extrusion extension along the frame, make a loop and go to the EBoard



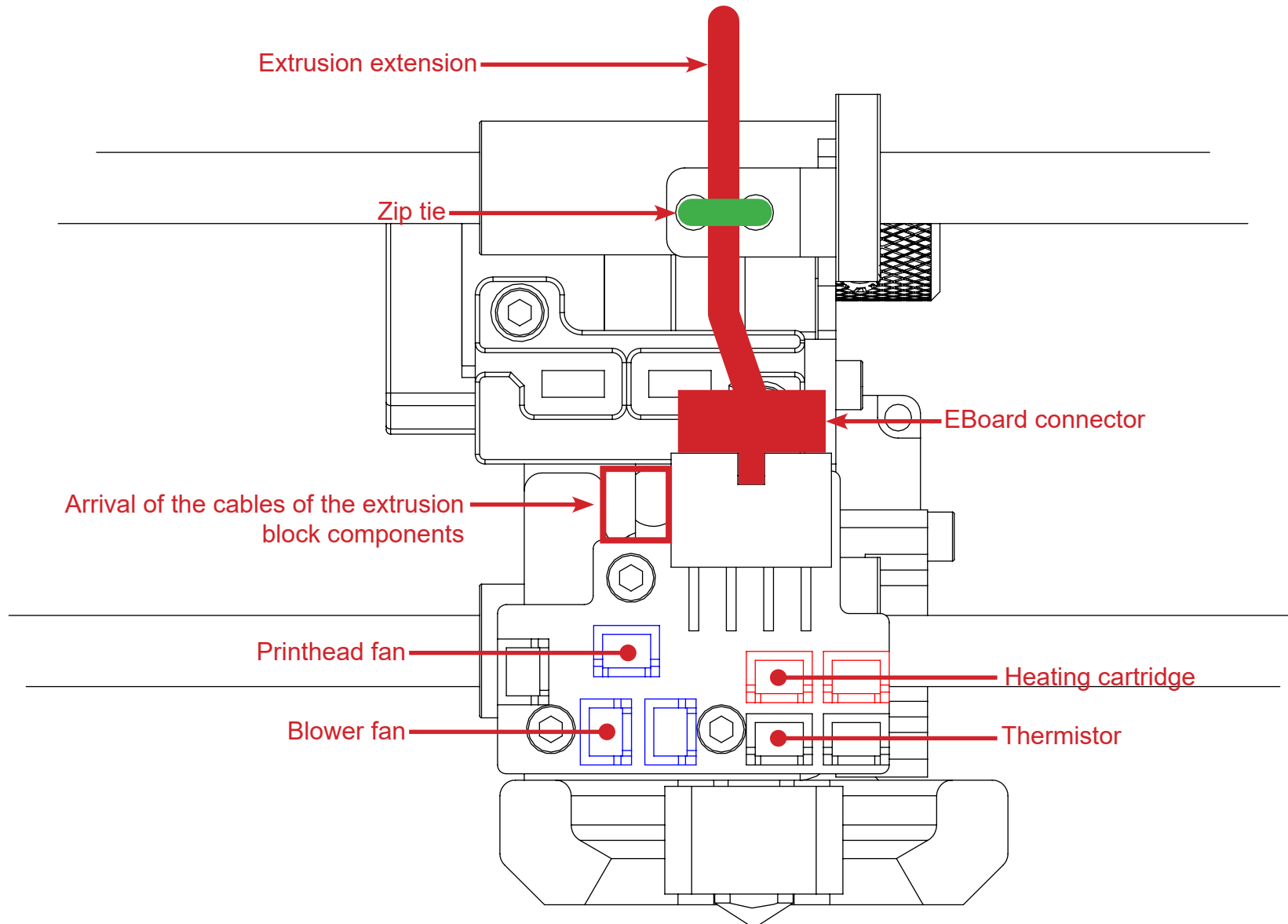
← Extruder extension

Close the cable ties to secure the extruder extension

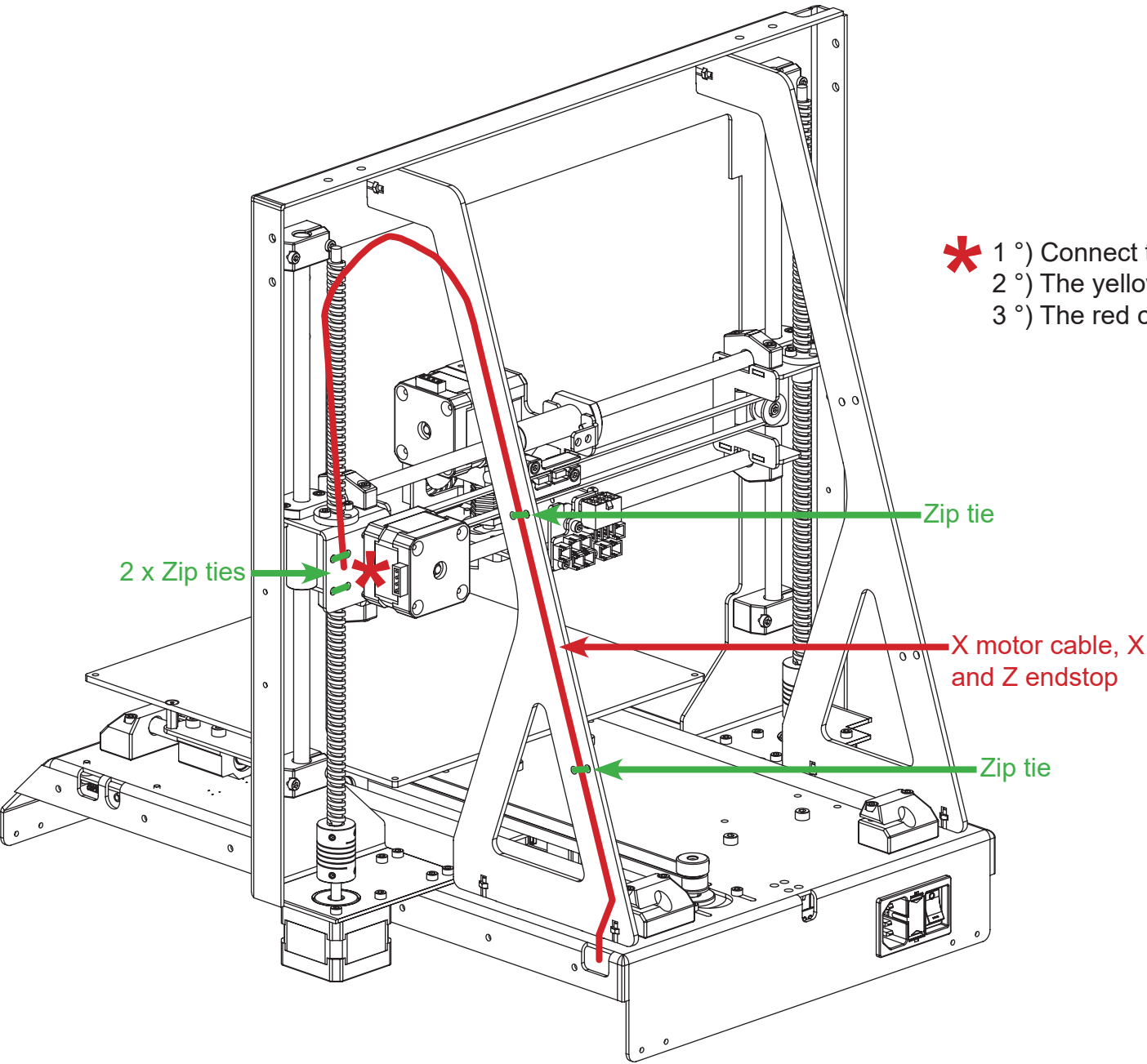
Target : pass the cables of the components of the extrusion block



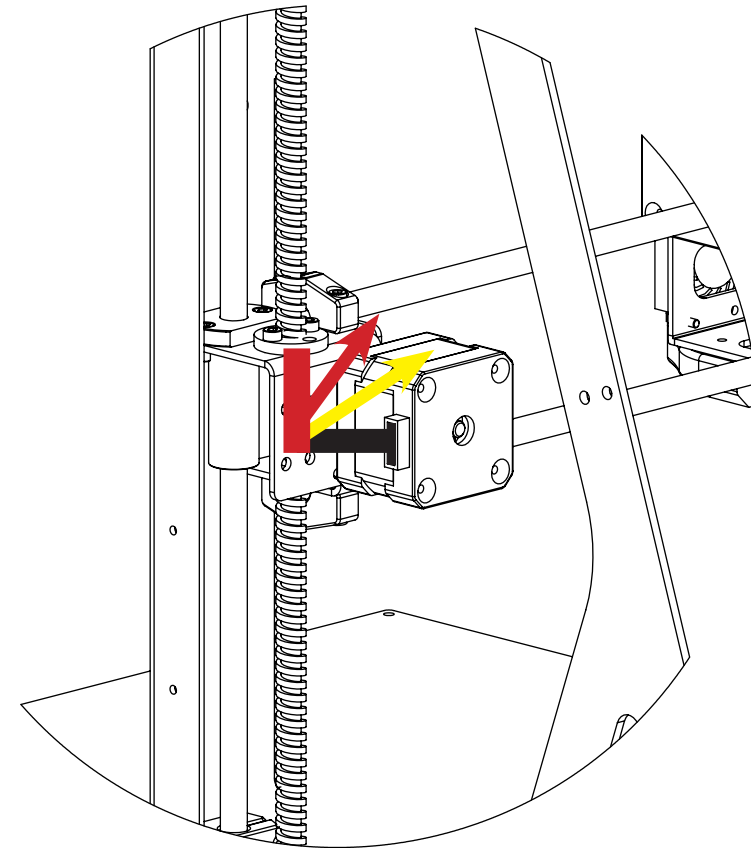
Target : wire the extrusion block components on the EBoard board



Target : pass the X axis cable along the left brace, loop up, fix everything and connect to the components



- * 1 °) Connect the motor cable to the motor
- 2 °) The yellow cable connector on the Z endstop (long lamella)
- 3 °) The red cable connector on the X endstop (short lamella)



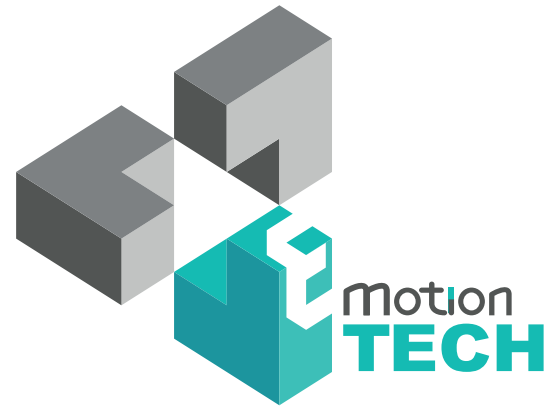
CONGRATULATIONS !

Your 3D printer is now fully assembled !

You can now apply the white grease on the lead rods and also on the smooth rods without fear of putting the grease everywhere.

Now, please follow the user's guide !





Thank you for choosing the 3D printer

I3 METAL MOTION !

www.emotion-tech.com