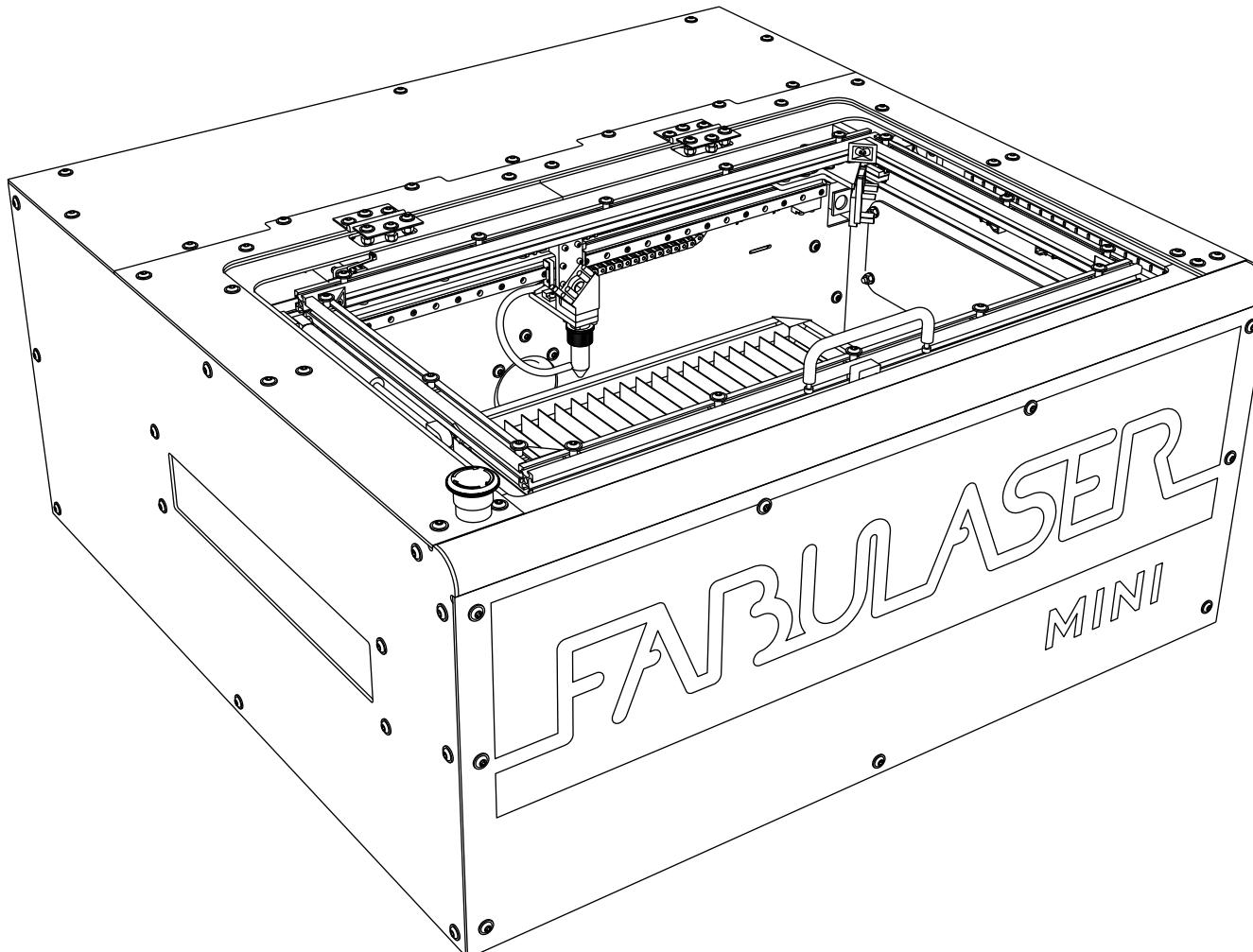


ASSEMBLY MANUAL OF THE FABULASER MINI

Step by step instructions



ASSEMBLY MANUAL BY

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MACHINE HARDWARE BY

Daniele Ingrassia /

InMachines Ingrassia GmbH



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HOW TO USE THIS MANUAL

This manual provides you a step-by-step guide on how to assemble the Fabulaser Mini laser cutter machine. It was developed to be visually instructive, with only necessary text support.

When the step is complex, it is divided into substeps.

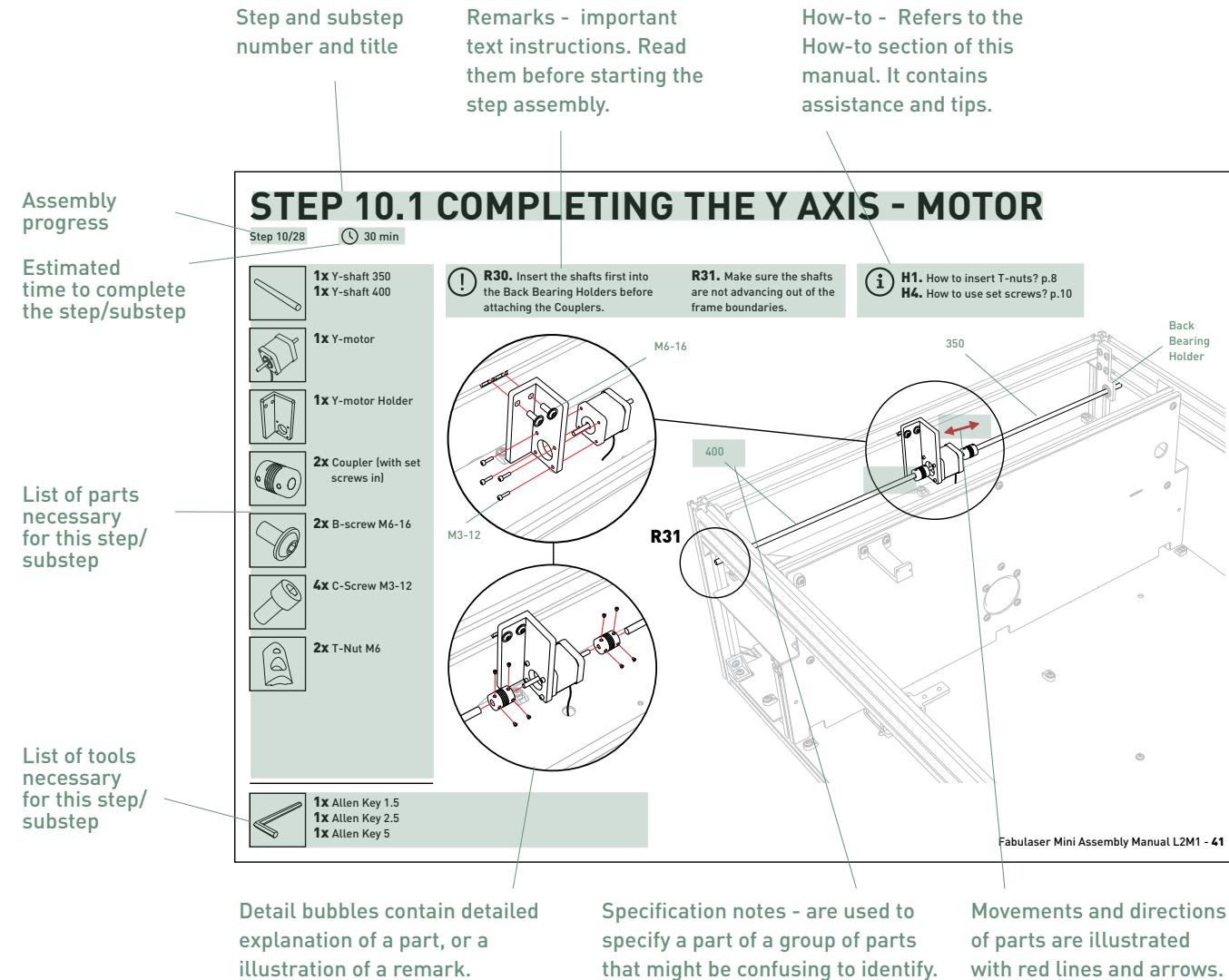
Colors are often used to aid and facilitate the identification of parts. If it is necessary to print this manual, make sure to print it in color. However, we highly recommend you to use it digitally to save paper and ink.

Please read the safety instructions before starting the assembly.

Start each step or substep by separating the necessary parts and tools. Then, read the remarks and how-to's related to the step, since they contain important information regarding the assembly. After that you can start assembling by following the visual instructions of the main image and detail bubbles.

In the images, the parts that are already assembled are colored grey, to facilitate the visualization of what needs to be done in the step/substep.

The wires that are already fixed are not always illustrated, also to facilitate the visualization on what needs to be focused.



SAFETY INSTRUCTIONS

- ! Read these safety instructions carefully before starting the assembly of the machine.

During the building of FabuLaser Mini, it is mostly required to assemble mechanical parts. However, in some steps, it is required to deal with potentially dangerous situations, due to the involvement of water, electricity and laser light. It is, therefore, really important to follow the safety rules, and to have an adult supervision.

For steps involving **wiring and electricity**, it is highly recommended to read carefully the following instructions before connecting the machine to the electricity power socket (220V) :

- Verify if the cables are not damaged from the packaging, or being damaged during/after the assembly.
- Make sure the cables are firmly connected (check it by pulling it lightly after connecting).
- Make sure cables are correctly connected by double-checking the connections with the wiring diagrams and instructions.
- Make sure there are no short-circuits in the wiring. It is recommended to use a multimeter with the “beep” diode function. It is mostly important, to check if there is not a short-circuit between: Line and Neutral; 24V+ and 24V-.
- Verify if the endstop switches, window switches and the emergency button are functional; it is possible to check them with a multimeter with the “beep” diode function.
- Make sure the “Laser +” cable is well isolated.

For the steps involving the calibration of the **laser beam** path, the following safety rules must be observed before starting it:

- Make sure to execute the laser calibration with minimum

2 people: one checking the laser path and the other operating the computer.

- Make sure your computer is running only the UGS software and nothing else; if the UGS is running too slow, try it with another computer.
- Do not use your phone and lower its volume to avoid distractions.
- Make sure to do the calibration in a room without anything flammable that could potentially set on fire.
- Make sure to do the calibration in a room without other people involved.
- Make sure the calibration is done far away from the windows, or that the windows' blinds are closed.
- Make sure to alert other people of what you are doing, to avoid that somebody enters the room suddenly without notice.
- Make sure that all mechanical parts have been correctly installed and that the moving parts can move freely.
- Make sure that all the wiring has been correctly connected and that it has been tested beforehand with the electricity power socket (220V).
- Make sure the water connections have been firmly done and that the water is flowing to the proper direction.
- Make sure the Water Chiller is switched on.
- Always wear transparent plastic safety goggles.
- Always wear long clothes.
- Be ready to push the emergency button if the laser stays on, or if the beam is going to the wrong direction.
- Make sure to have all the Mirror Holders, the Laser Head and the Mirrors installed before starting the calibration. (check Step 21)
- Make sure the laser tube is installed pointing to the correct direction; the end with a hole, through which the laser will come out, should be pointing to the First Mirror.
- Make sure the laser tube is not damaged, cracked, or leaking water from any point.

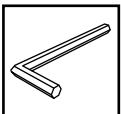
- Make sure the laser path is hitting the mirror(s); if not sure, use something to block the laser beam from hitting anything on the first test. It is recommended to use a flat wood plank.
- Never stand in the direction of the laser beam.
- Remove only the necessary housing parts. Keep the rest attached as a protection.
- Always close the machine window to activate the window switches.
- Make sure to not stick the tape to the mirror, but only to the holders.
- Use a masking tape which is thick enough. Make a single test to make sure it does not set on fire. If it is too thin, it is possible to use two pieces of tape overlapped.
- If possible, have close to you a fire extinguisher, or a bucket full of water.

Additional safety rules for the **water connection** of the machine:

- Make sure the Water Chiller has water inside (5 liters) and that all the tubes' connections have been done before starting it (check Step 19 and 25.)
- Make sure no water is leaking from any point/junction/connection.
- Make sure the tubes are not bent and/or blocked anywhere.
- Make sure the machine is disconnected from the electricity power socket while testing the water implant (check Steps 6, 16 and 24).

LIST OF TOOLS NEEDED

Before starting, check if you have all the necessary tools to avoid unexpected interruptions during the assembly.



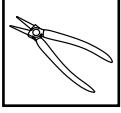
1x Allen Key 1.5
1x Allen Key 2.5
1x Allen Key 3



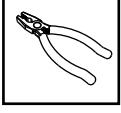
1x Wrench 5
1x Wrench 5.5
1x Wrench 7



1x Cutter



1x Needle Nose Plier



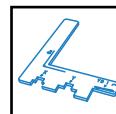
1x Small Plier



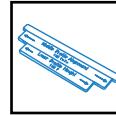
1x Screwdriver
Phillips



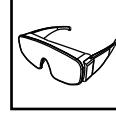
1x Screwdriver
slotted small



2x Template 1
(included)



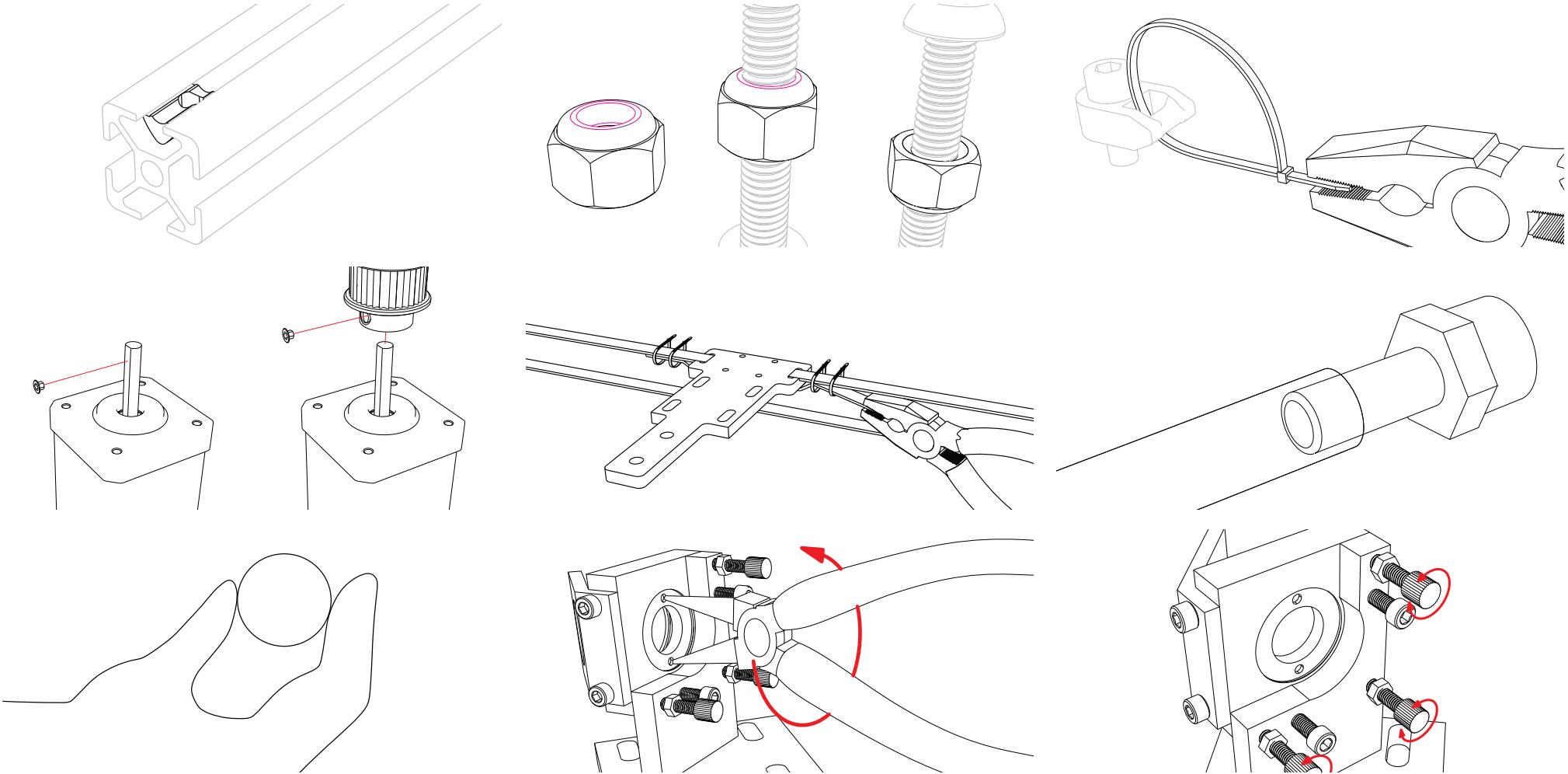
2x Template 2
(included)



1x Plastic Safety
Goggles

HOW-TO SECTION

Instructions and tips to assist the assembly



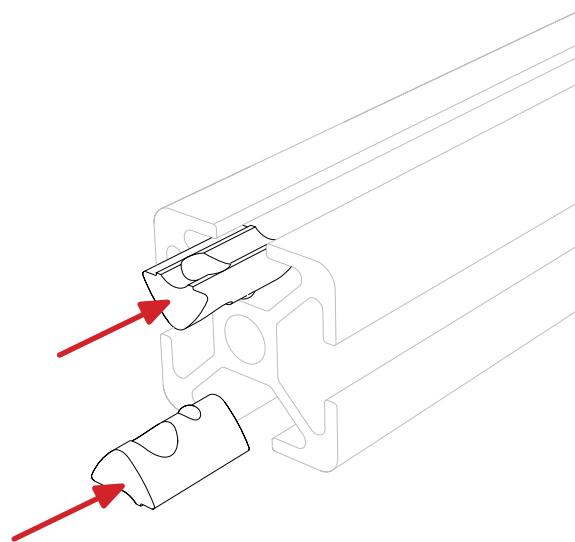
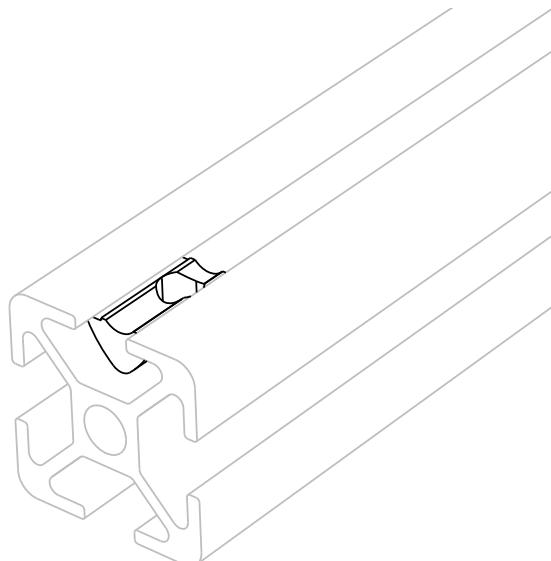
H1. HOW TO INSERT A T-NUT IN A PROFILE

T-nuts need to be inserted in the profiles to enable the screws to be fixed. The correct position of the T-nut is with the ball pointing towards the center of the profile.

There are two different ways of inserting a T-nut into a profile.

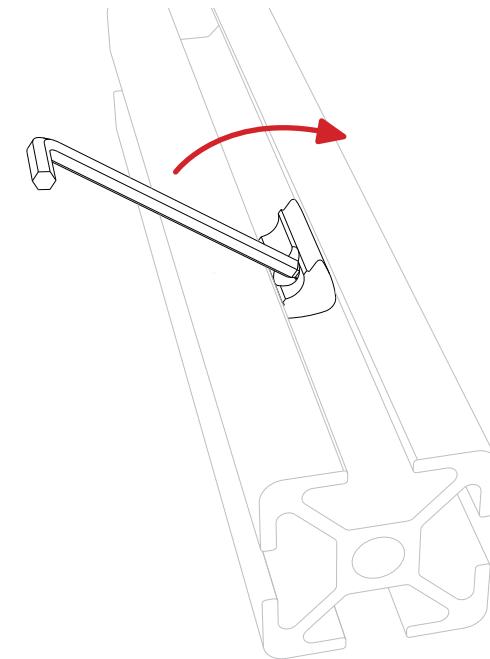
Option 1

If the profile is not yet blocked at the ends, the T-nut can be inserted from the side of the profile, by sliding it in the slit in the correct position.



Option 2

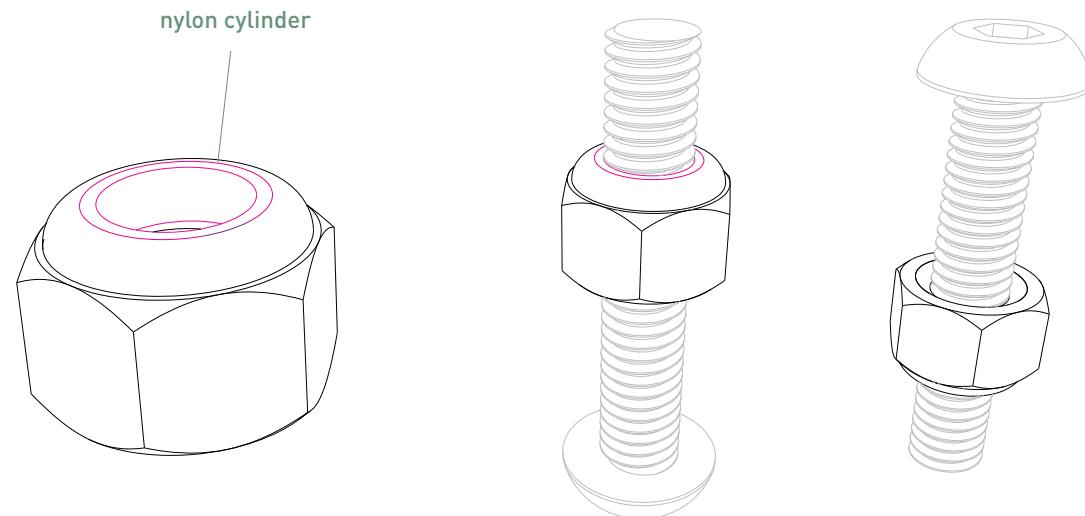
Insert the T-nut sideways in the profile slit. Using a small screwdriver or an allen key, stick the tool in the T-nut hole and turn it to the correct position.



H2. HOW TO USE LOCK NUTS

Lock Nuts have a nylon cylinder inserted in them which prevents them from getting loose. The nylon cylinder is always coloured so it's easy to recognise which side it is in.

The Lock Nut can be attached onto screws in only one direction i.e. the nylon needs to point away from the screw head.



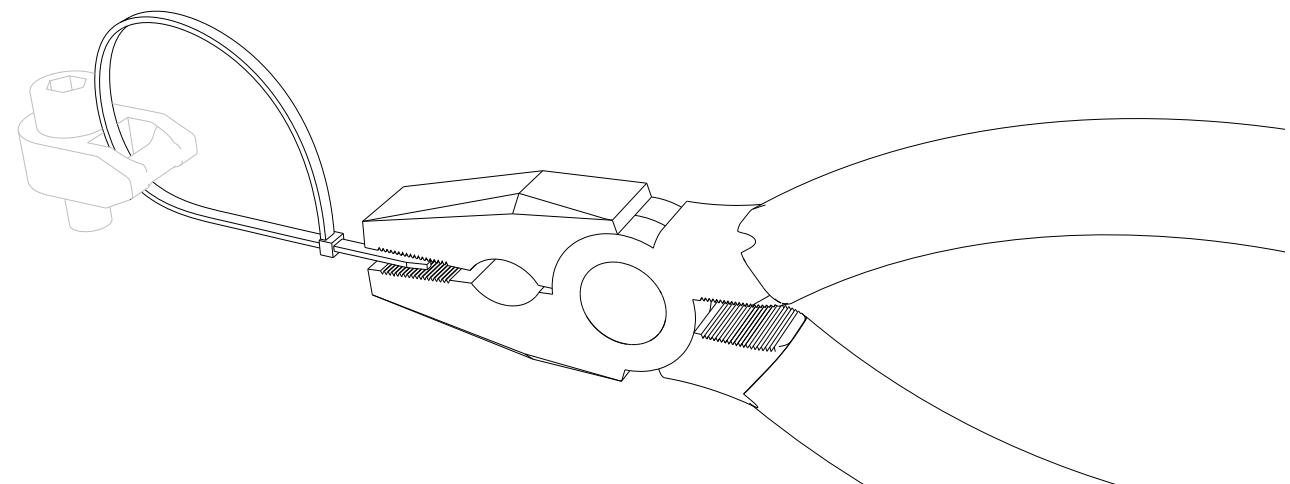
H3. HOW TO USE CABLE TIES

The Cable Ties are mainly used in combination with the Wire Fixers to fix the cables and tubes.

Please look at the orientation of the Cable Ties: the flat side of the head should be facing inwards.

To tighten it, use the pliers to have a better grip.

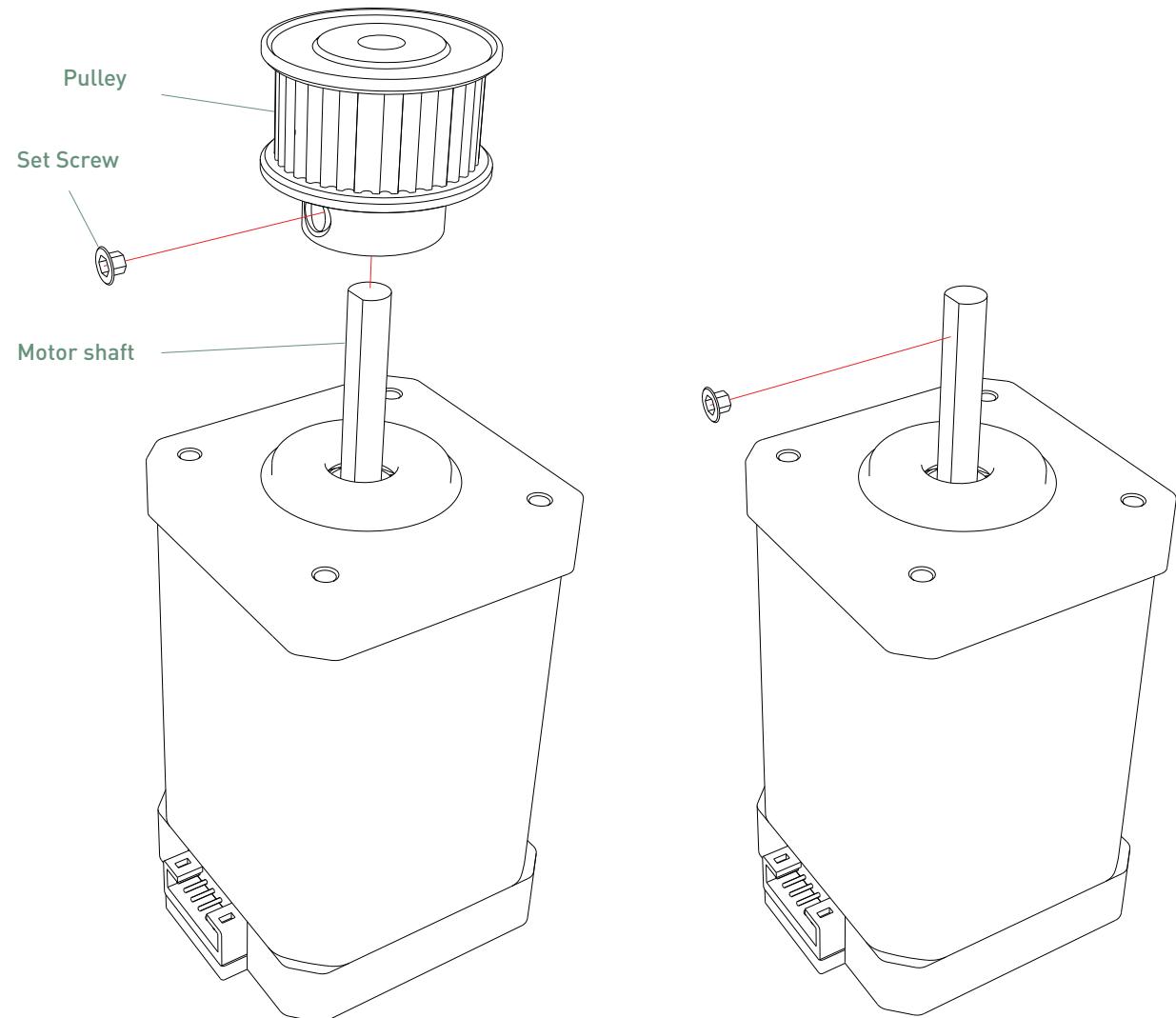
After tightened, cut the excess of the Cable Tie.



H4. HOW TO USE SET SCREWS

Set Screws are small screws used to fix parts (such as Pulleys) on motor shafts.

They have to be tightened against the flat side of the motor shaft as illustrated here.



H5. HOW TO TIGHTEN THE BELT

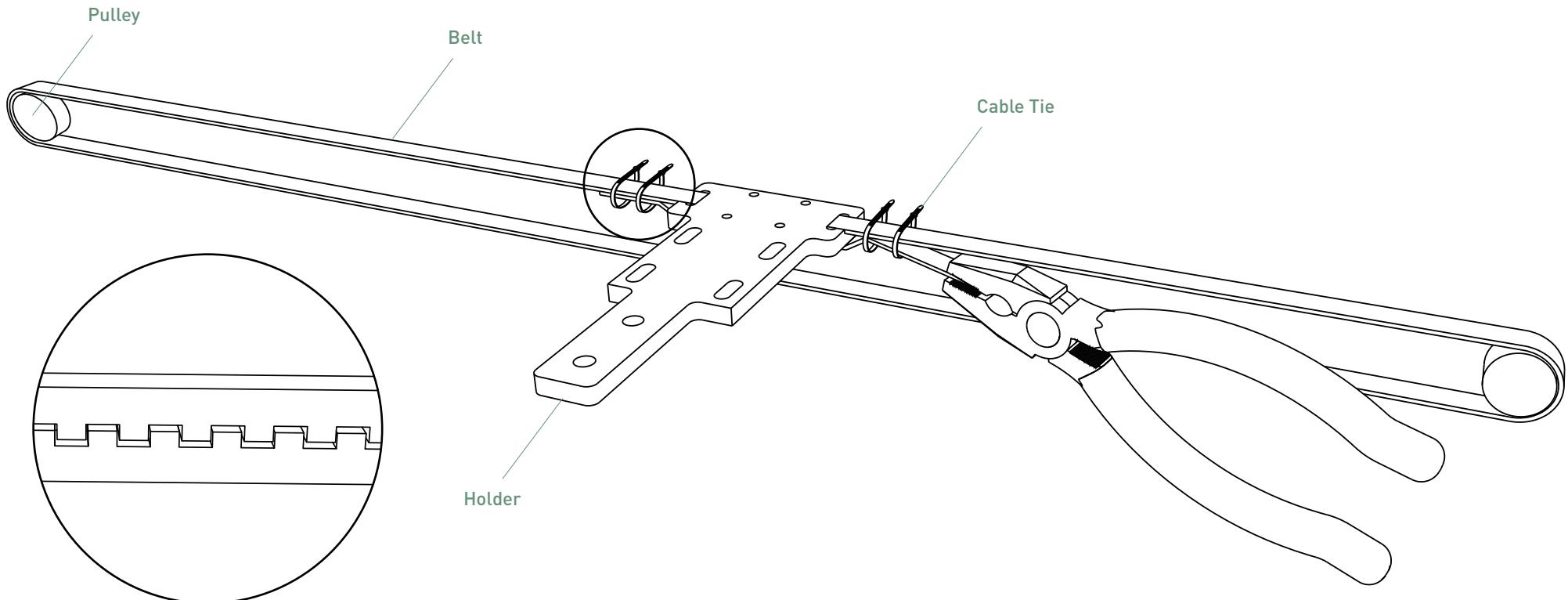
There has to be some tension on the belts in order for the X and Y-axis to move smoothly.

To tension the belt, first tie one of its ends to the holder using two cable ties, tightening them very well.

Pass the belt around the pulleys, and then through the other handle of the holder. With pliers, pull the end of the belt, using some strength to create the desired tension.

Tighten the Cable Ties on the belt while pulling it with the plier in order to keep the tension. Make sure that the teeth of the belt are gripping when tightened. This helps the belt to keep the tension.

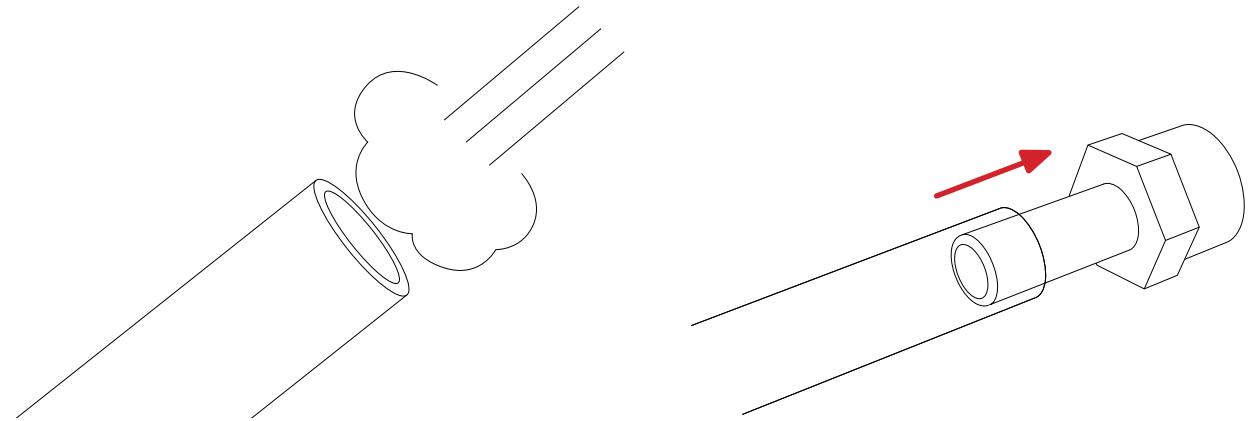
After tying the ends of the belt, cut its excess close to the Cable Ties.



H6. HOW TO INSERT THE TUBES EASILY

If the inside of the tube is moist, it becomes easier to slide the connectors and Laser Tube in.

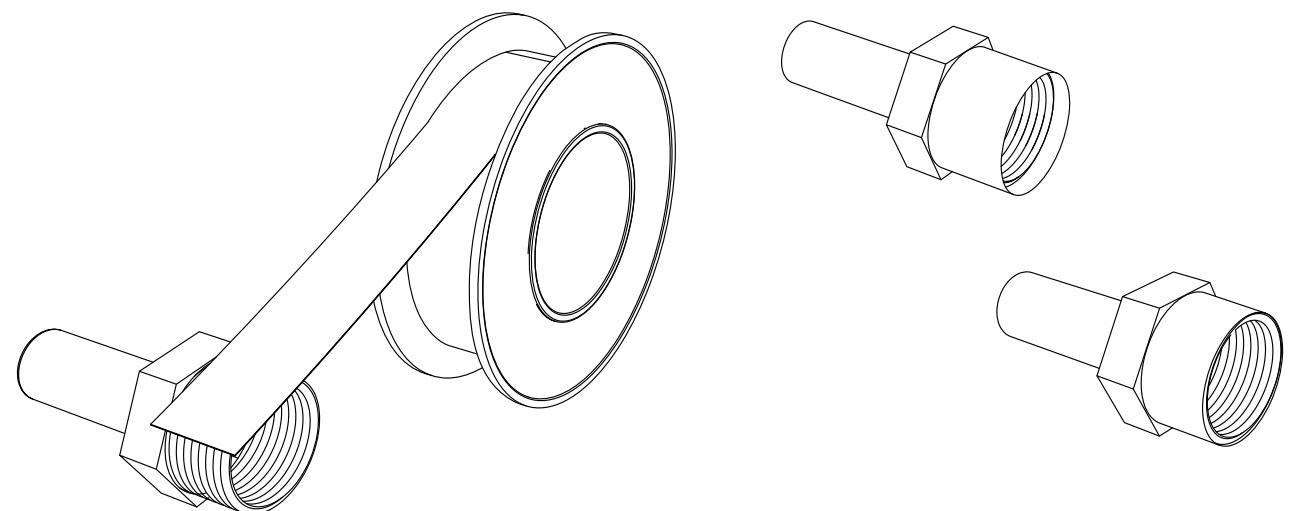
For that purpose, blow the end of the tube using your breath.



H7. HOW TO USE TEFLON TAPE

Wrap the teflon tape around the thread clockwise.

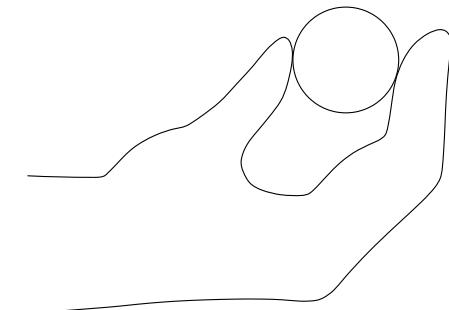
Remove any teflon tape sticking out of the thread, otherwise particles will block the cooling circuit.



H8. HOW TO HOLD THE MIRROR

The mirrors used in the Mirror Holders are small discs in 2 sizes (20 mm and 25 mm). The 20 mm mirrors have one opaque side and one mirrored side. The mirrored side is used to redirect the laser beam. The 25 mm mirror have two mirrored sides. Use the yellow side to redirect the laser beam.

The mirrored sides have to stay clean in order to reflect the laser beam properly. For this reason, it is very important to not touch them. The mirror has to be held carefully on the sides. Any dirt, scratch marks or grease will influence negatively the results of the cut and engraving.

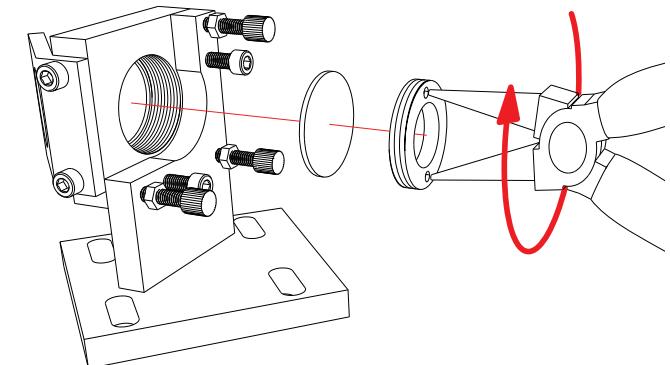
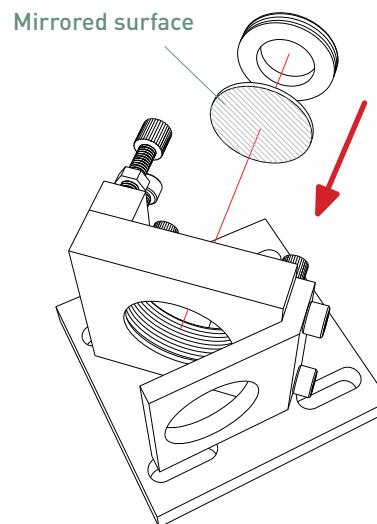
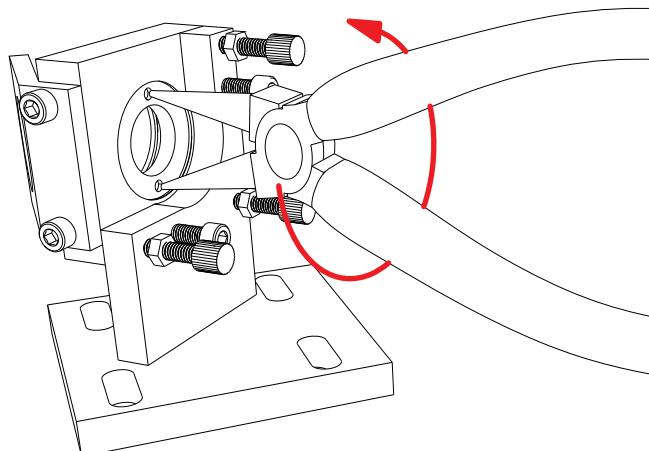


H9. HOW TO INSERT THE MIRROR

To insert the mirror, first remove the ring by unscrewing it with the Needle Nose Pliers. The ring has two indents for this purpose.

Remember to hold the mirror on the sides. DO NOT TOUCH THE MIRRORED SURFACE. Insert the mirror in the correct position as illustrated.

Once the mirror is in, put the ring back and tighten it loosely with the Needle Nose Pliers. If you tighten too hard it might crack the mirror.



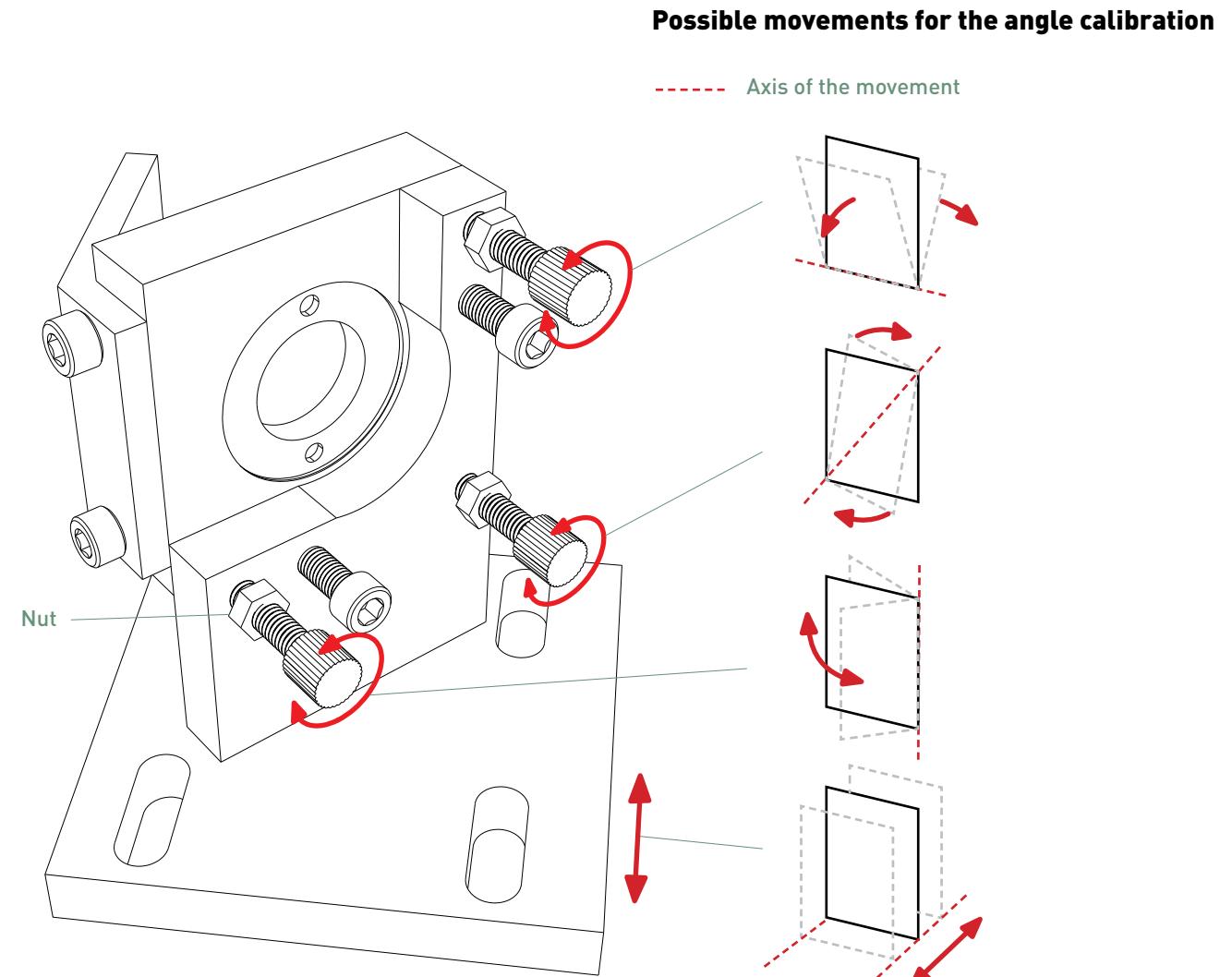
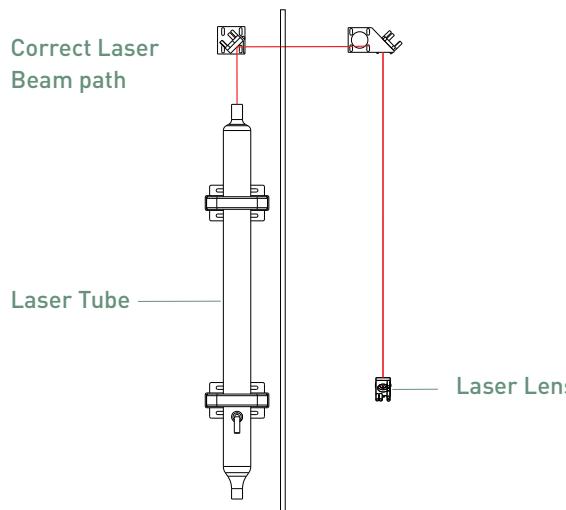
H10. HOW TO CALIBRATE THE MIRROR ANGLE

For the machine to cut and engrave well, it is important that the laser beam is directed correctly to the Laser Lens. The mirrors are responsible to redirect the beam. For that, they need to be positioned in the correct angle.

Each Mirror Holder contains 3 knobs. By rotating each knob, the angle of the mirror can be calibrated in different directions as shown in the image. Also, the entire Mirror Holder can be moved back and forth if necessary.

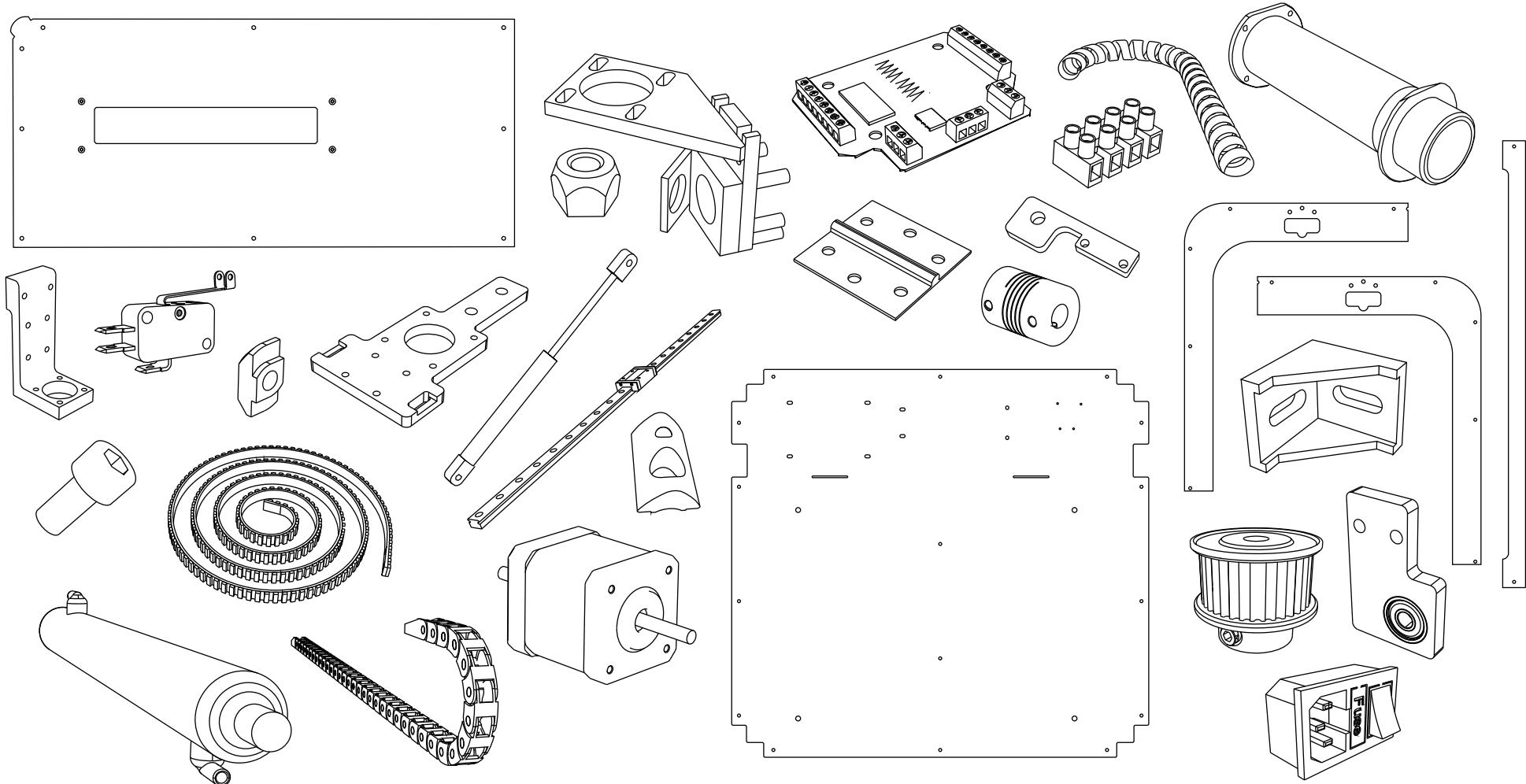
The knobs push the corners of the holder, tilting the mirror. To facilitate the calibration, reset the holder by unscrewing the knobs until they are not touching the holder.

After the calibration, tighten the nuts very carefully to fix the desired position.



ARE YOU READY?

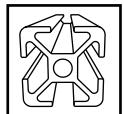
Let's start!



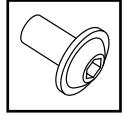
STEP 1. BUILDING THE BOTTOM FRAME

Step 1/33

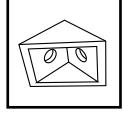
⌚ 20 min



3x Profile 30-770
2x Profile 30-800



12x B-screw M6-12



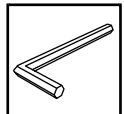
6x Bracket 30



12x T-nut M6



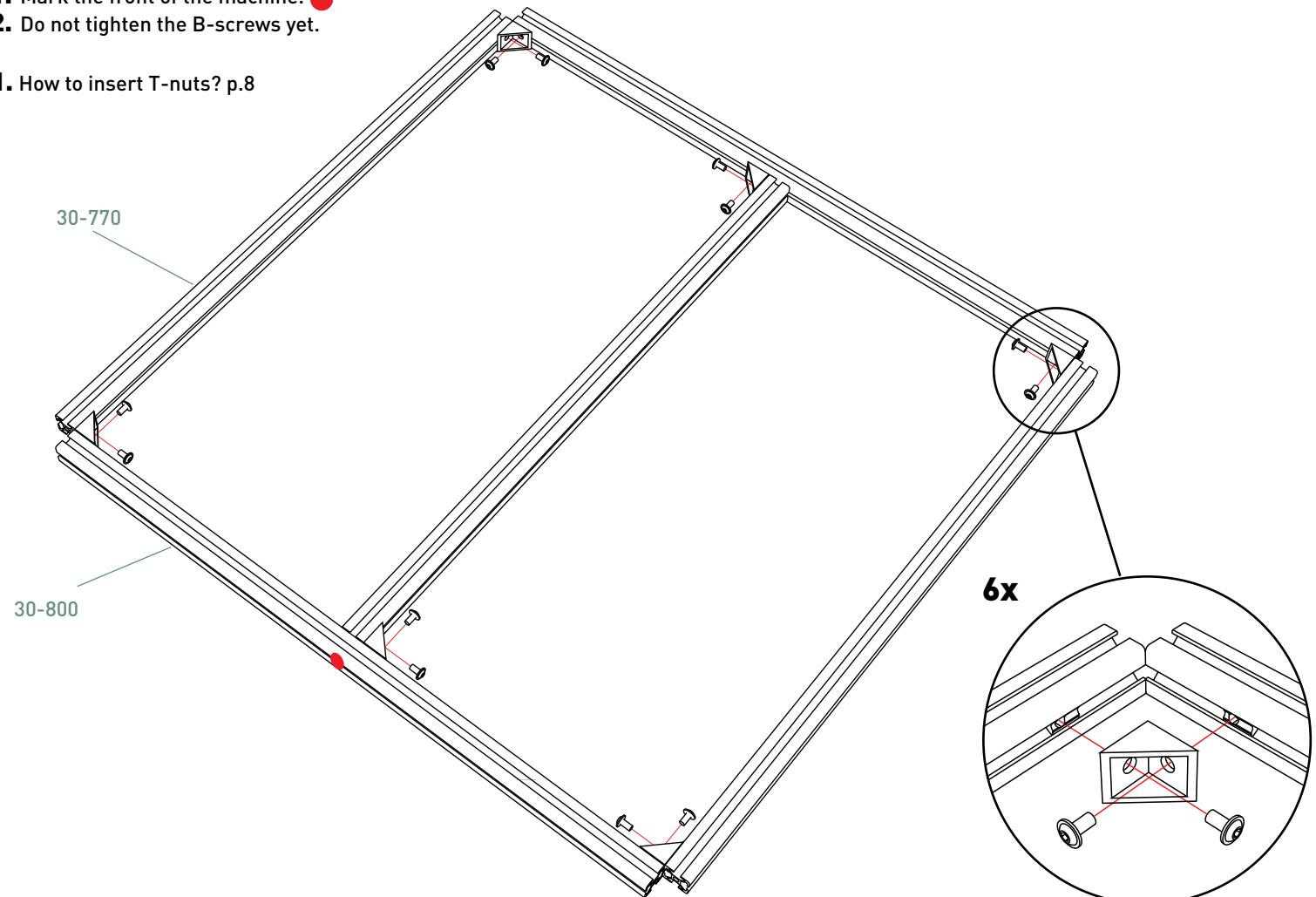
1x Red Dot Sticker



1x Allen Key 1.5
1x Allen Key 5

❗ **R1.** Mark the front of the machine. 
R2. Do not tighten the B-screws yet.

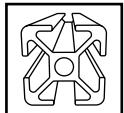
ℹ **H1.** How to insert T-nuts? p.8



STEP 2.1 ATTACHING THE CORNER PROFILES

Step 2/33

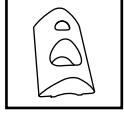
⌚ 30 min



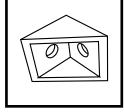
2x Profile 30-380
2x Profile 30-350



16x B-screw M6-12



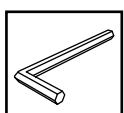
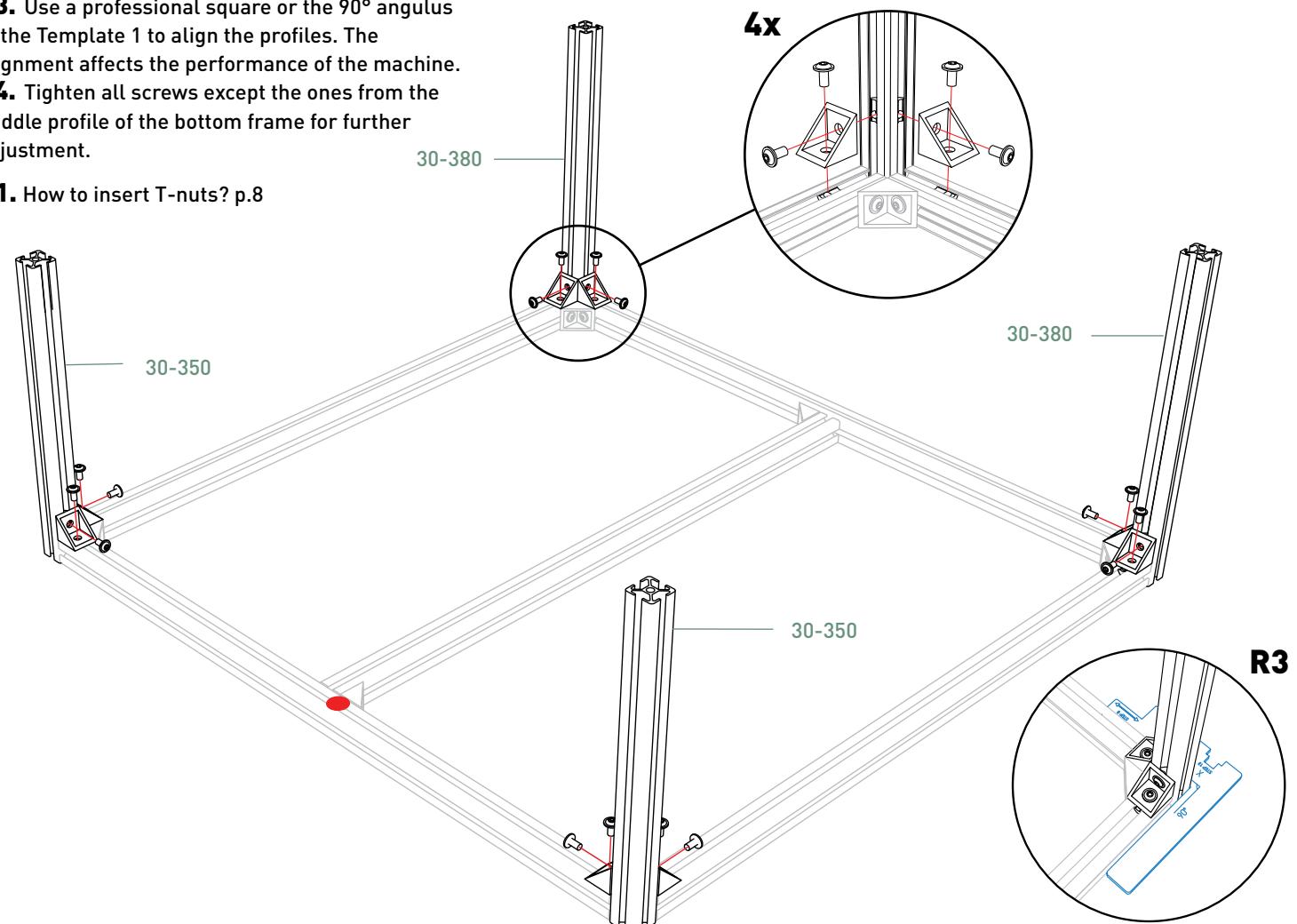
16x T-nut M6



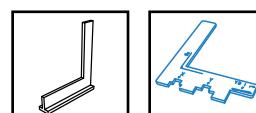
8x Bracket 30

- ! **R3.** Use a professional square or the 90° angulus of the Template 1 to align the profiles. The alignment affects the performance of the machine.
R4. Tighten all screws except the ones from the middle profile of the bottom frame for further adjustment.

- ! **H1.** How to insert T-nuts? p.8



1x Allen Key 1.5
1x Allen Key 5

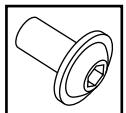


1x Square **or**
1x Template 1

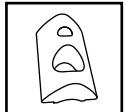
STEP 2.2 ATTACHING THE WIRE FIXERS

Step 2/33

⌚ 10 min



3x B-screw M6-16



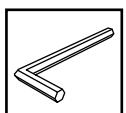
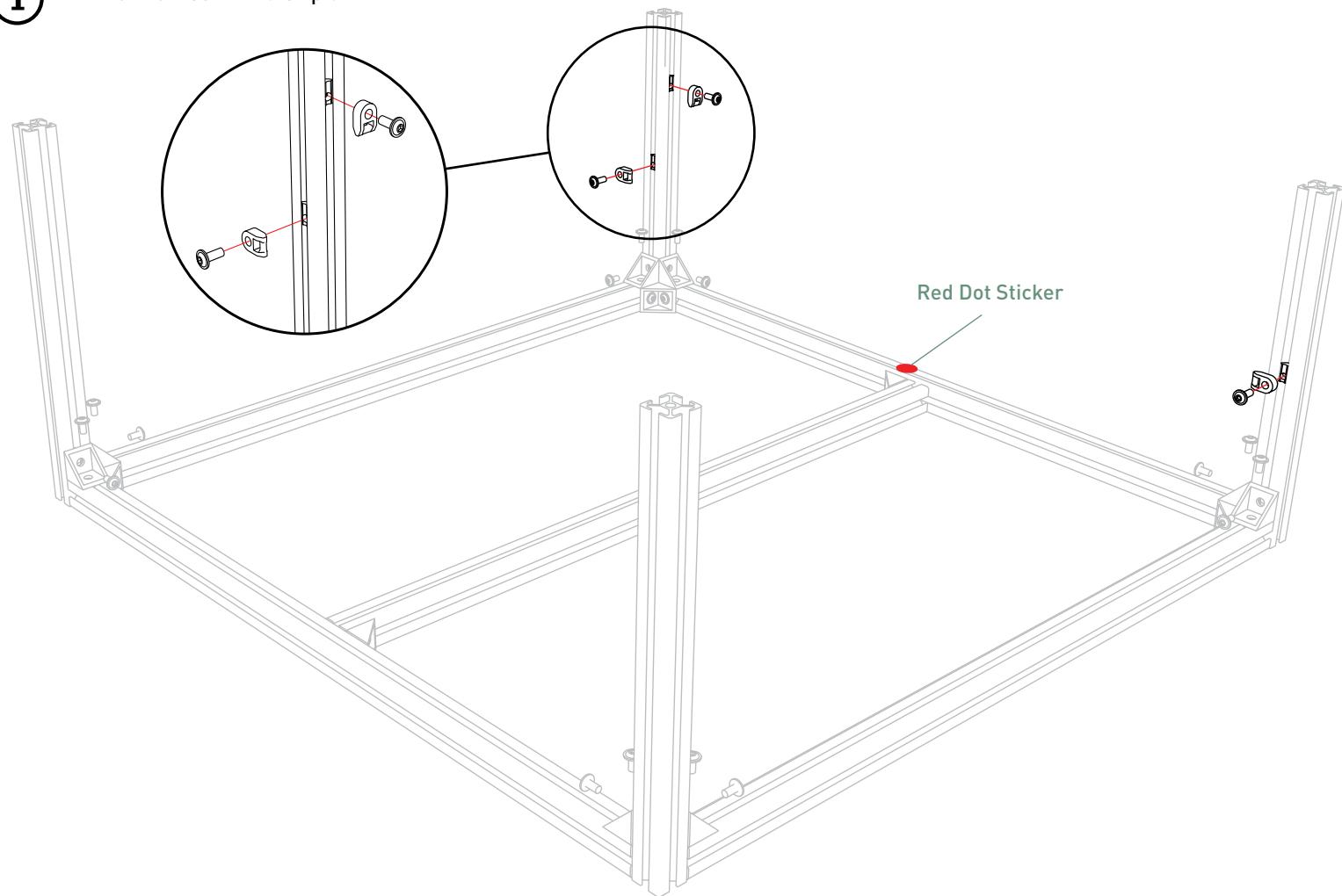
3x T-nut M6



3x Wire Fixer



H1. How to insert T-nuts? p.8



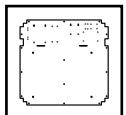
1x Allen Key 1.5

1x Allen Key 5

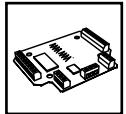
STEP 3.1 PREPARING THE BOTTOM PANEL

Step 3/33

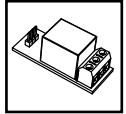
⌚ 30 min



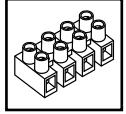
1x Bottom Panel



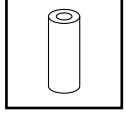
1x Converter PCB



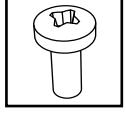
1x Relay



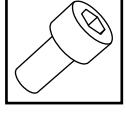
2x Terminal Block



12x Standoff



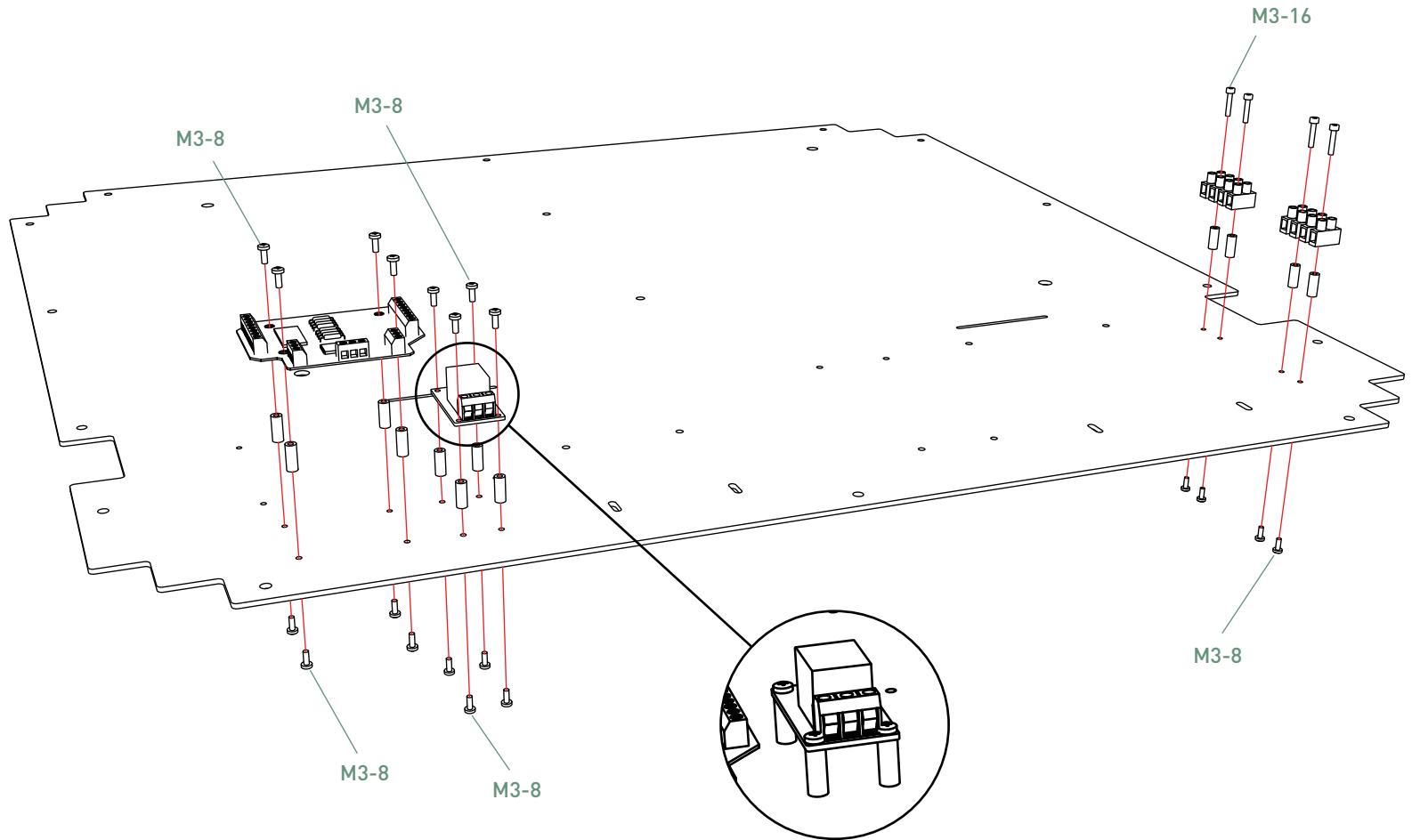
20x Plastic-screw
M3-8



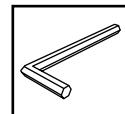
4x C-screw M3-16



R5. Remove the protective foils
from the panel.



1x Screwdriver
Phillips

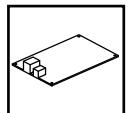


1x Allen Key 2.5

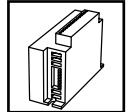
STEP 3.2 PREPARING THE BOTTOM PANEL

Step 3/33

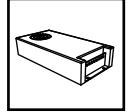
⌚ 30 min



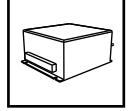
1x Laser Controller



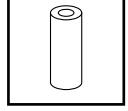
2x Motor Driver



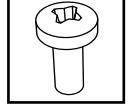
1x Motor Power Supply



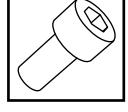
1x Laser Power Supply



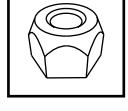
4x Standoff



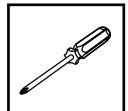
8x Plastic-screw M3-8



8x C-screw M4-12



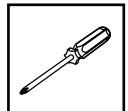
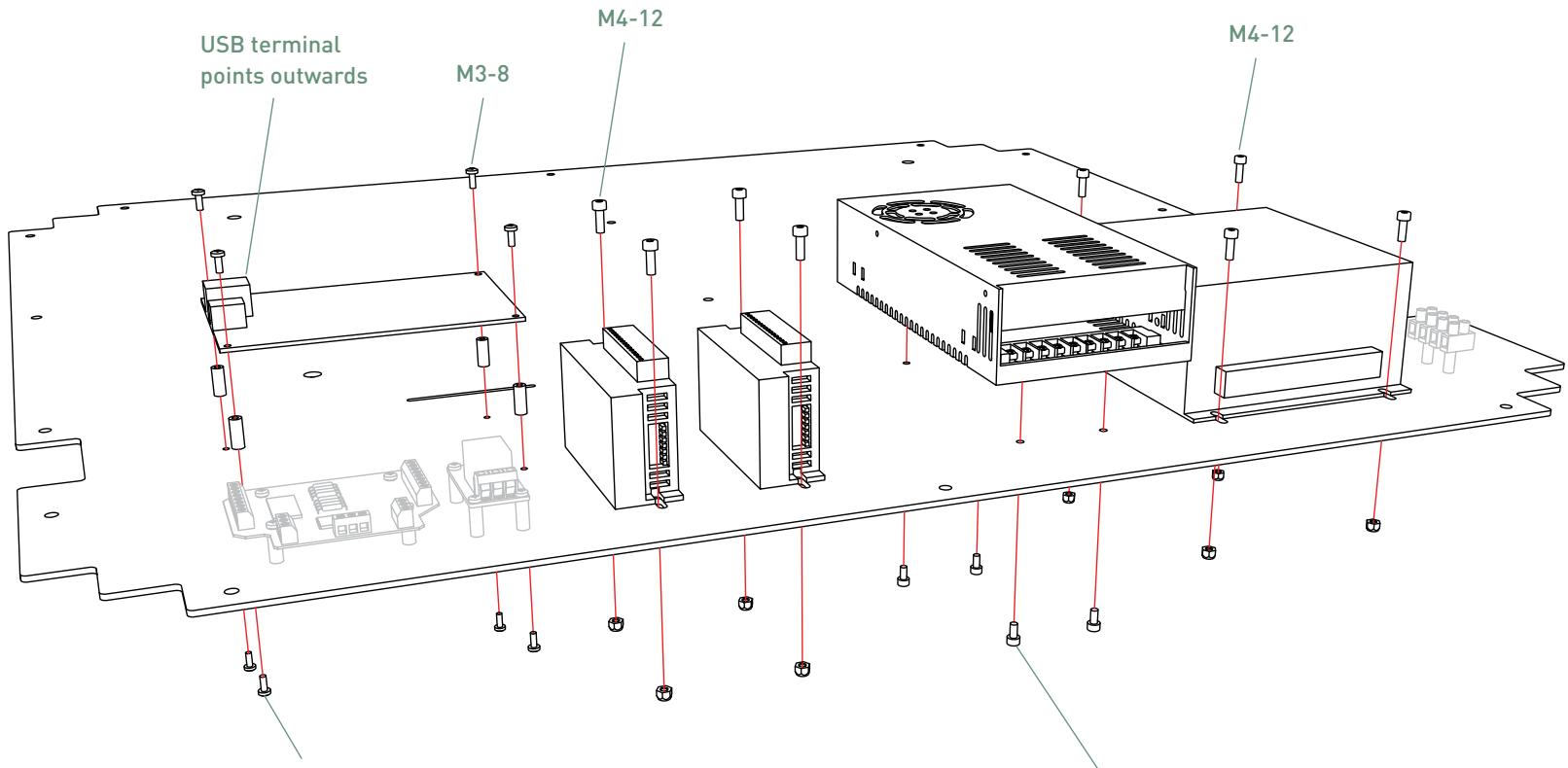
4x C-screw M4-8



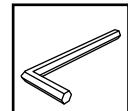
8x Lock Nut M4



H2. How to use Lock Nuts? p.9



1x Screwdriver
Phillips



1x Allen Key 3

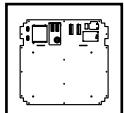


1x Small plier **or**
1x Wrench 5.5

STEP 4. ATTACHING THE BOTTOM PANEL

Step 4/33

⌚ 20 min



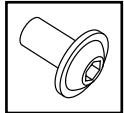
1x Prepared Bottom Panel (Step 3)



16x T-nut M6



14x Wire Fixer



14x B-screw M6-16
2x B-screw M6-12



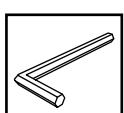
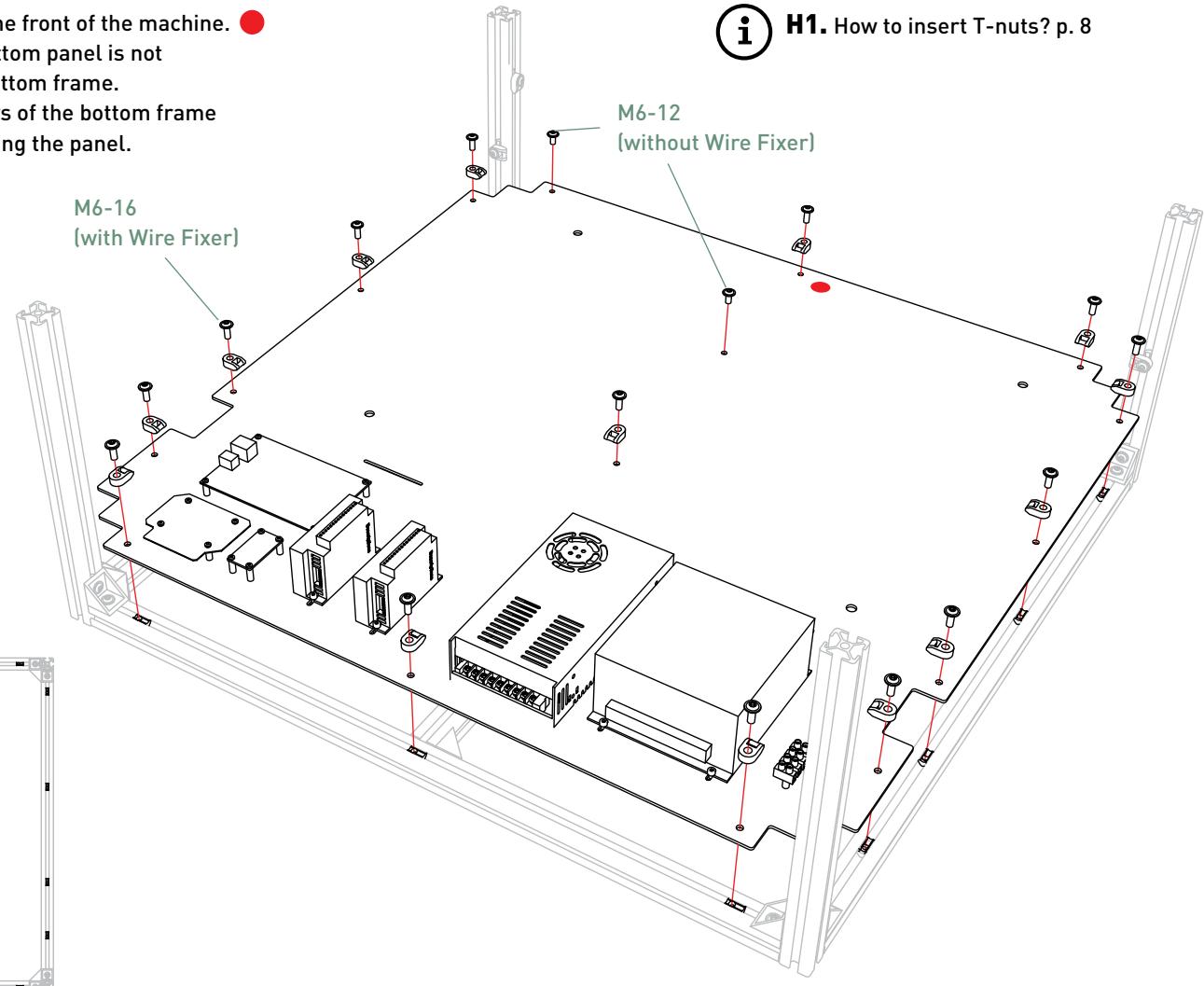
R6. Pay attention to the front of the machine.

R7. Make sure the bottom panel is not protruding from the bottom frame.

R8. Tighten the screws of the bottom frame middle profile after fixing the panel.



H1. How to insert T-nuts? p. 8

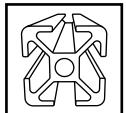


1x Allen Key 1.5
1x Allen Key 5

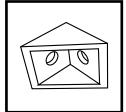
STEP 5.1 INSTALLING THE SEPARATOR PANEL PROFILES

Step 5/33

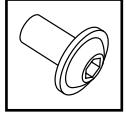
⌚ 10 min



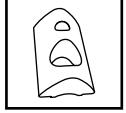
2x Profile 30-150



2x Bracket 30



4x B-screw M6-12

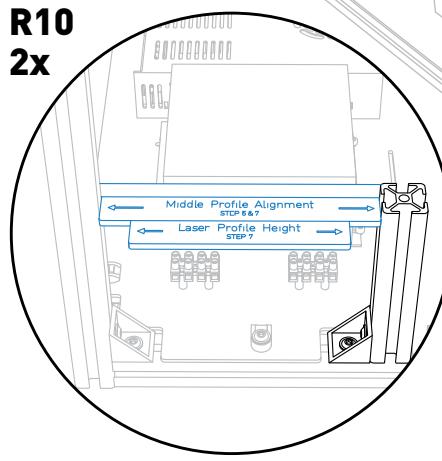


4x T-nut M6

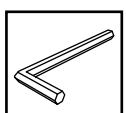
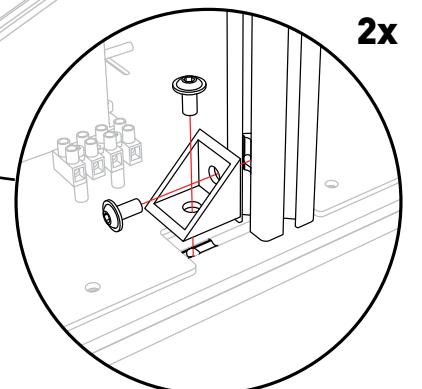
- R9.** Align the brackets and profiles perfectly on the sides. They should not protrude from the bottom frame sides.
R10. Use the Template 2 (Middle Profile Alignment) to measure the distance from the back vertical profile.

- H1.** How to insert T-nuts? p. 8

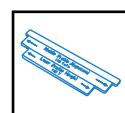
**R10
2x**



2x



1x Allen Key 1.5
1x Allen Key 5

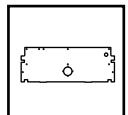


1x Template 2

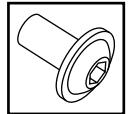
STEP 5.2 INSTALLING THE SEPARATOR PANEL

Step 5/33

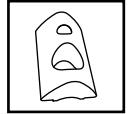
⌚ 10 min



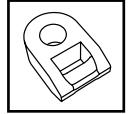
1x Separator Panel



1x B-screw M6-12
1x B-screw M6-16



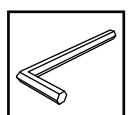
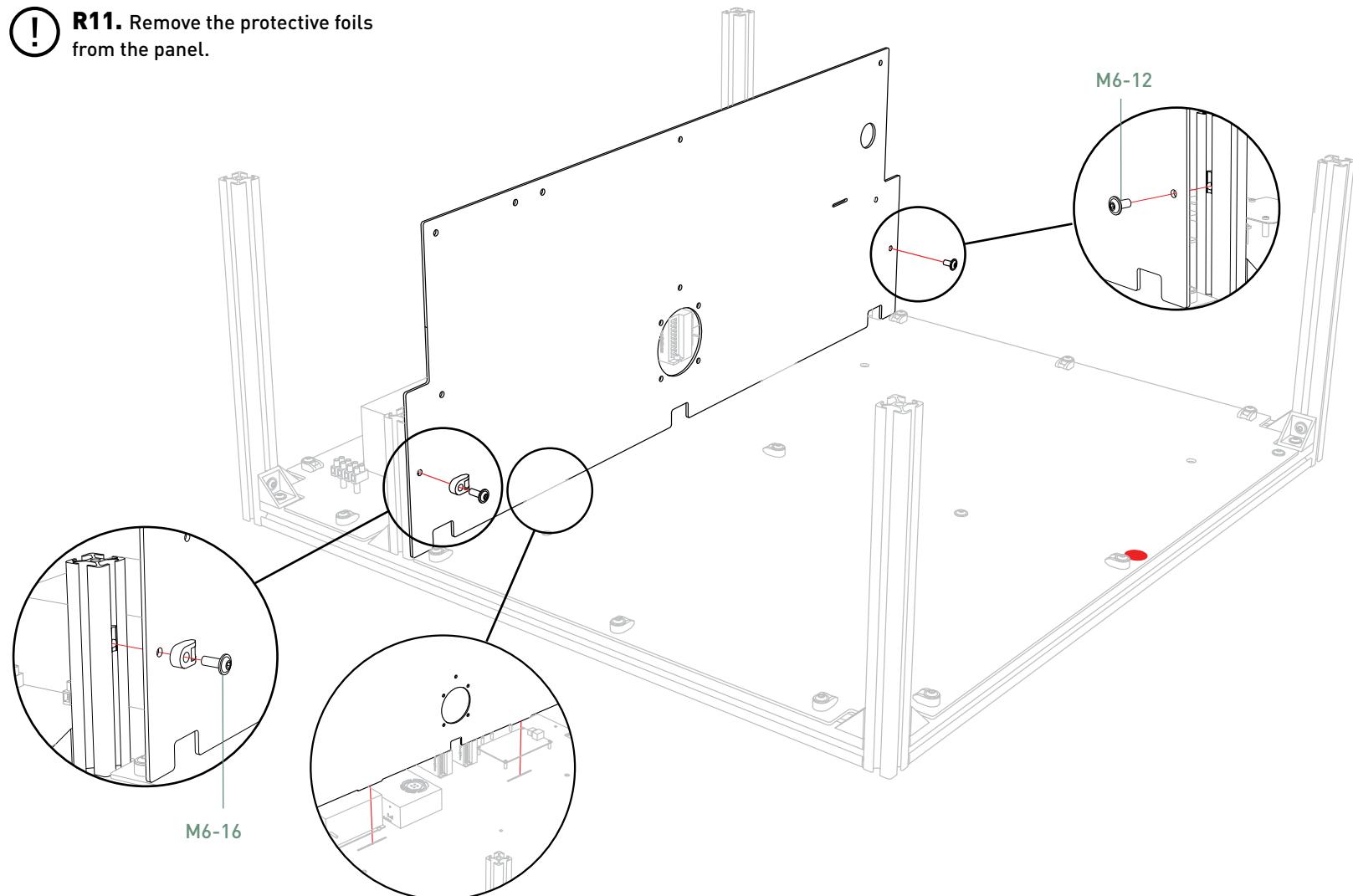
2x T-nut M6



1x Wire Fixer



R11. Remove the protective foils from the panel.

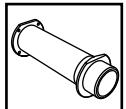


1x Allen Key 1.5
1x Allen Key 5

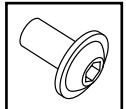
STEP 5.3 ATTACHING THE EXHAUST TUBE

Step 5/33

⌚ 15 min



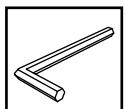
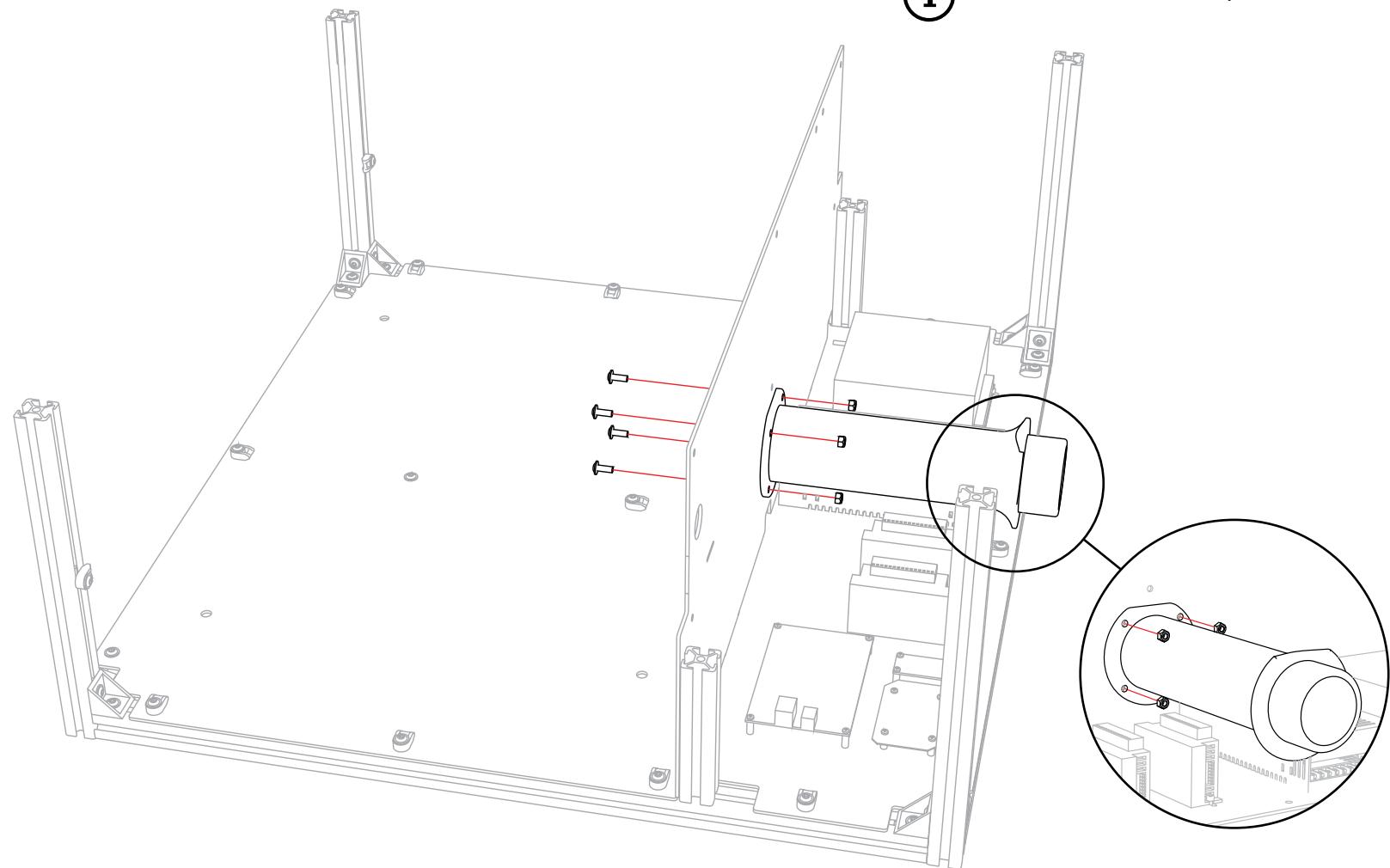
1x Exhaust



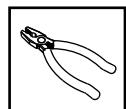
4x B-screw M6-16



4x Lock Nut M6



1x Allen Key 5

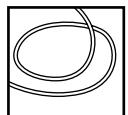


1x Small plier **or**
1x Wrench 10

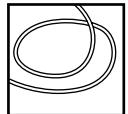
STEP 6.1 WIRING AC

Step 6/33

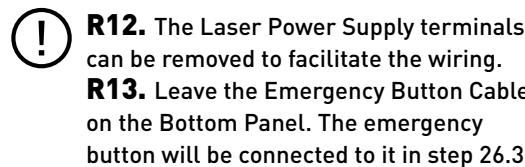
15 min



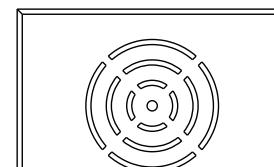
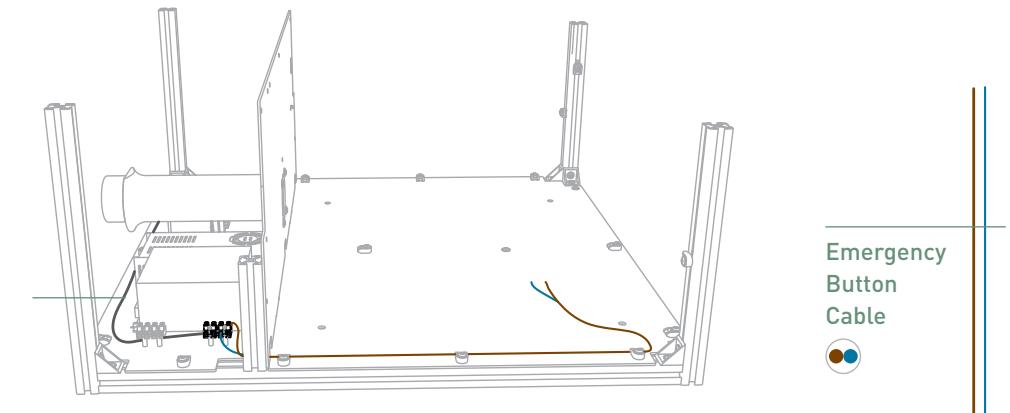
1x Laser + Motor
Power Cable



1x Emergency Button
Cable 



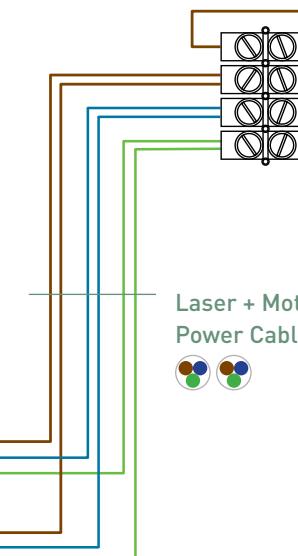
Laser + Motor Power
Cable passes under
the Exhaust Tube



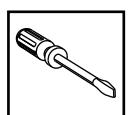
Motor Power Supply



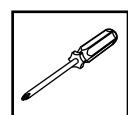
Laser Power Supply



Laser + Motor Power Cable



1x Screwdriver
slotted small

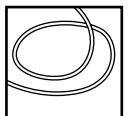


1x Screwdriver
Philips 6

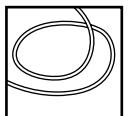
STEP 6.2 WIRING DC 1

Step 6/33

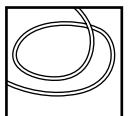
⌚ 30 min



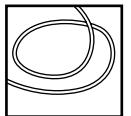
1x Controller Power Cable



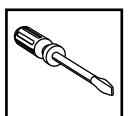
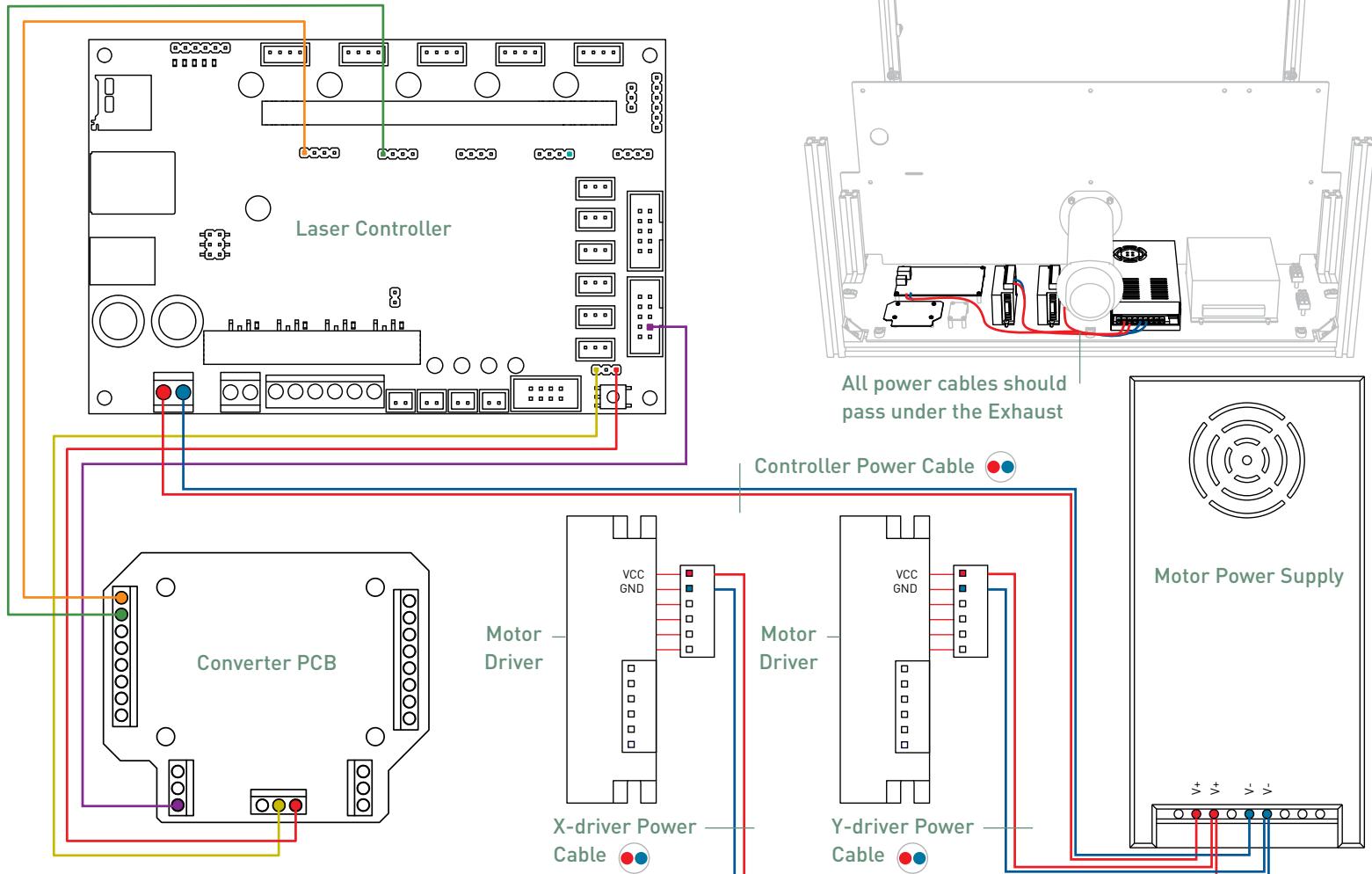
5x Jumper Cable



1x X-driver Power Cable



1x Y-driver Power Cable



1x Screwdriver slotted small

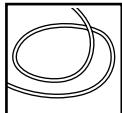


1x Screwdriver Philips 6

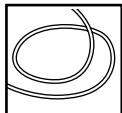
STEP 6.3 WIRING DC 2

Step 6/33

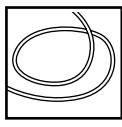
⌚ 15 min



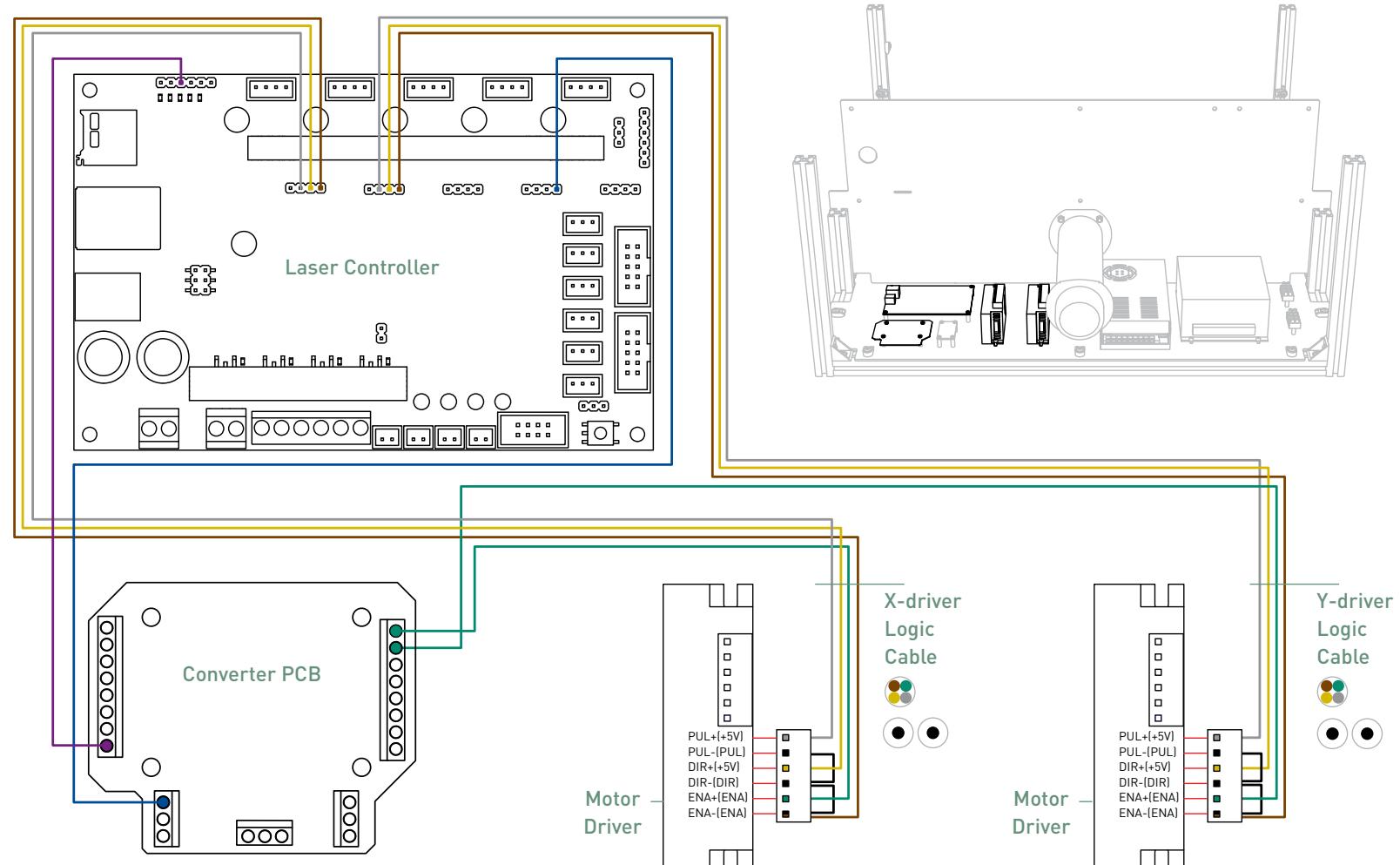
**1x X-driver Logic
Cable**



**1x Y-driver Logic
Cable**



2x Jumper Cable



**1x Screwdriver
slotted small**

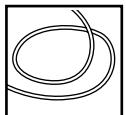


**1x Screwdriver
Philips 6**

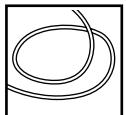
STEP 6.4 WIRING DC 3

Step 6/33

⌚ 20 min



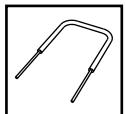
1x Laser Logic Cable
+ Resistor



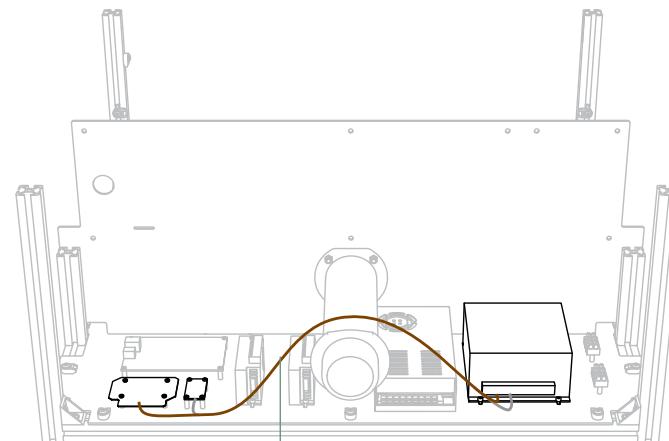
4x Jumper Cable



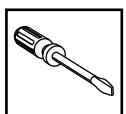
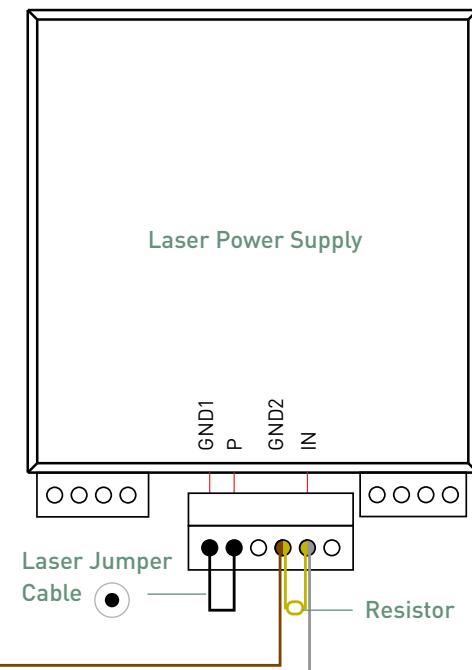
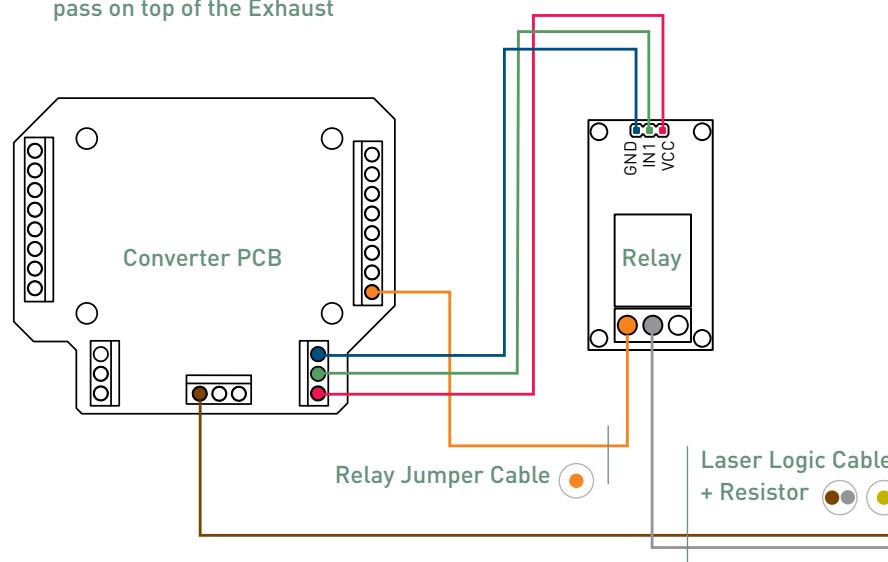
1x Laser Jumper
Cable



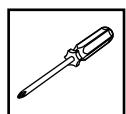
1x Relay Jumper
Cable



R14. The Laser Power Supply terminals can be removed to facilitate the wiring.



1x Screwdriver
slotted small



1x Screwdriver
Philips 6

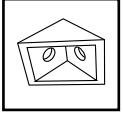
STEP 7.1 ATTACHING THE BACK PROFILE

Step 7/33

⌚ 20 min



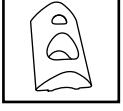
1x Profile 30-800



2x Bracket 30



4x B-screw M6-12



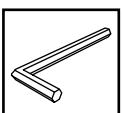
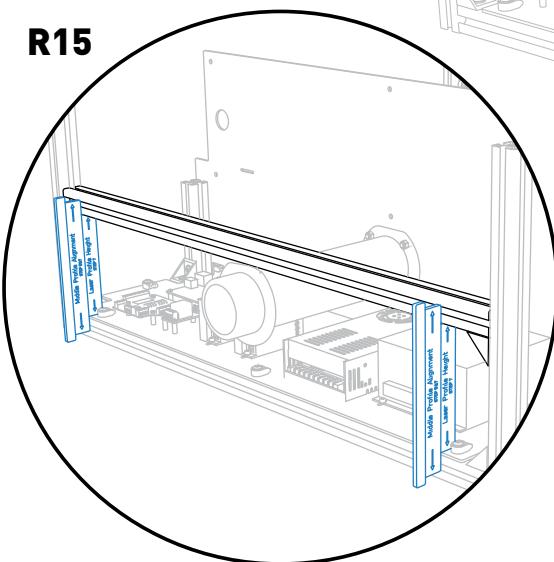
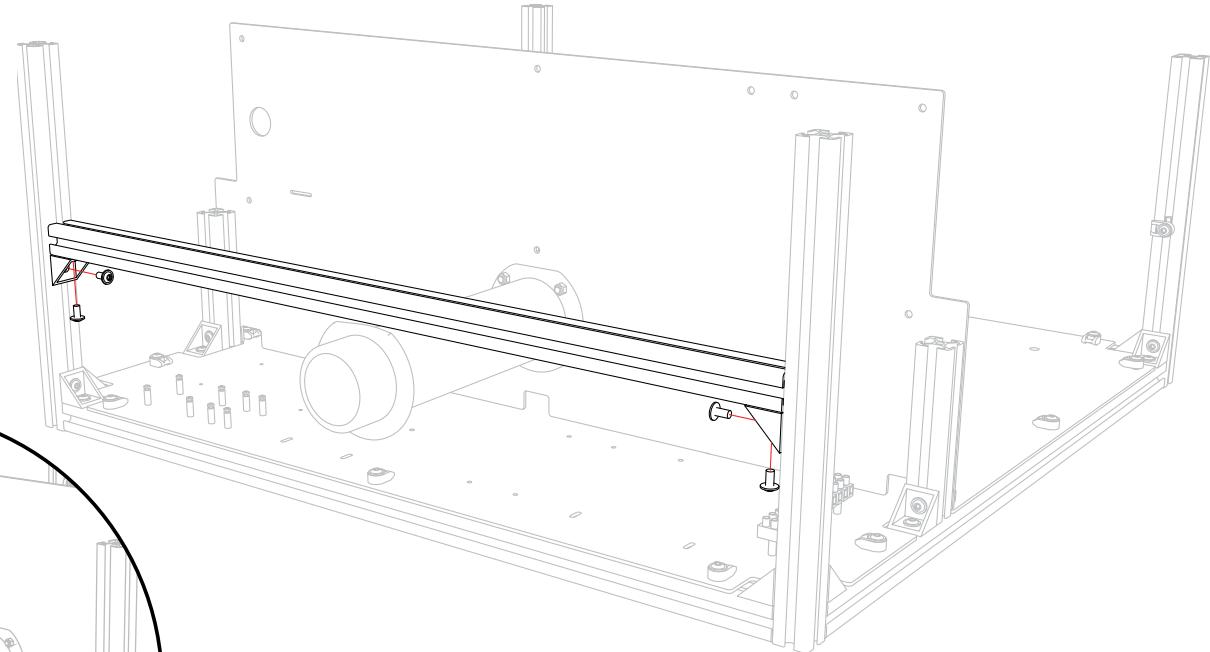
4x T-nuts M6



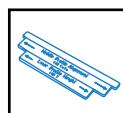
R15. Use 2x Templates 2 (Laser Profile Height) to align the profile.



H1. How to insert T-nuts? p.8



1x Allen Key 1.5
1x Allen Key 5



2x Template 2

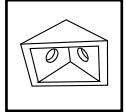
STEP 7.2 ATTACHING THE MIDDLE PROFILE

Step 7/33

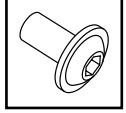
⌚ 20 min



1x Profile 30-860



2x Bracket 30



7x B-screw M6-12



7x T-nuts M6

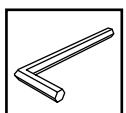
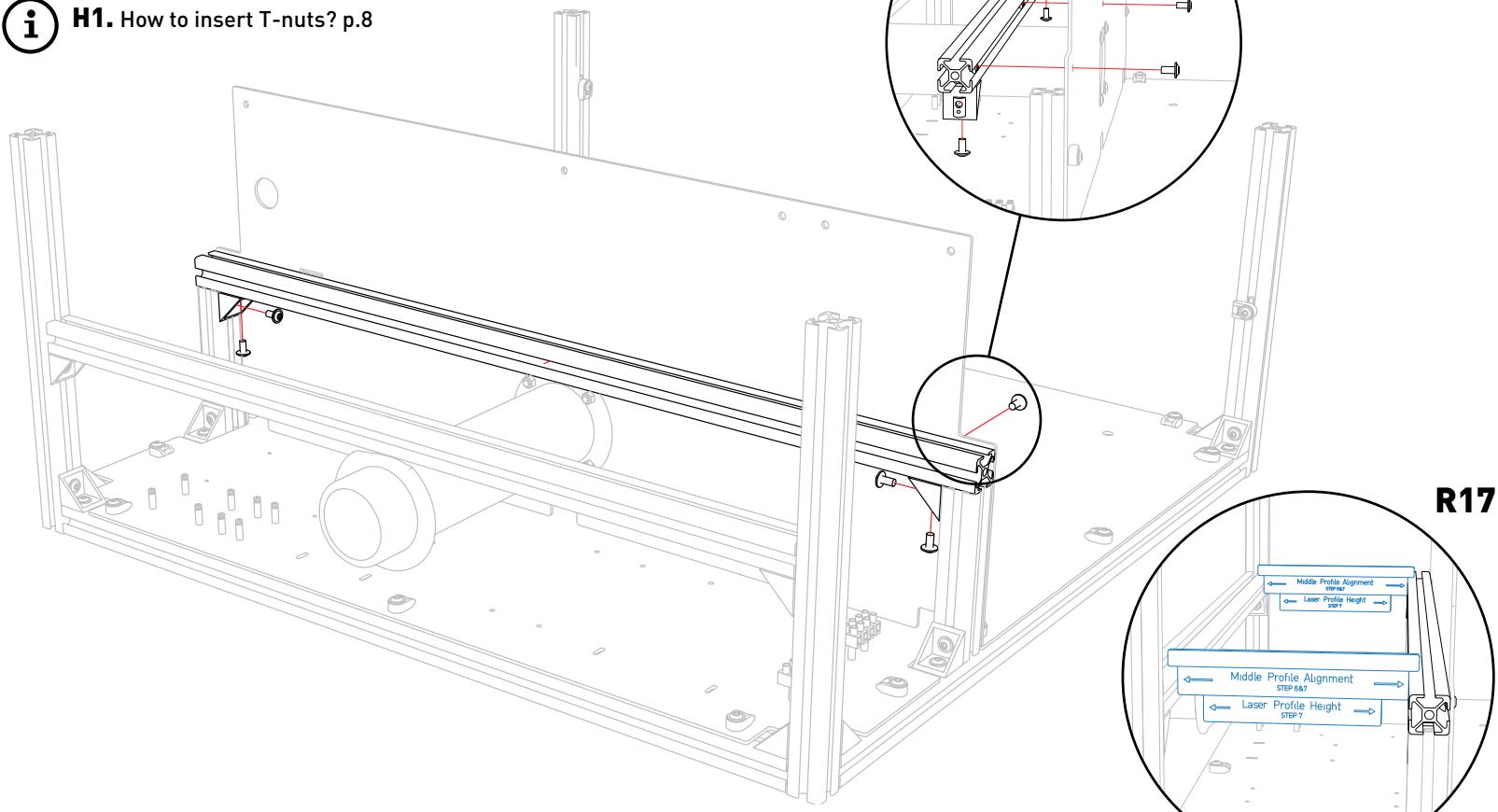


R16. Insert the T-nuts in the profile and align them with the Separator Panel holes, before fixing the brackets.

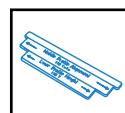
R17. Use the Templates 2 (Middle Profile Alignment) to fix profile with the correct distance from the back profile.



H1. How to insert T-nuts? p.8



1x Allen Key 1.5
1x Allen Key 5

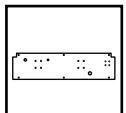


2x Template 2

STEP 7.3 ATTACHING THE LASER PANEL

Step 7/33

⌚ 15 min



1x Laser Panel



6x B-screw M6-16



6x T-nut M6



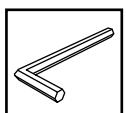
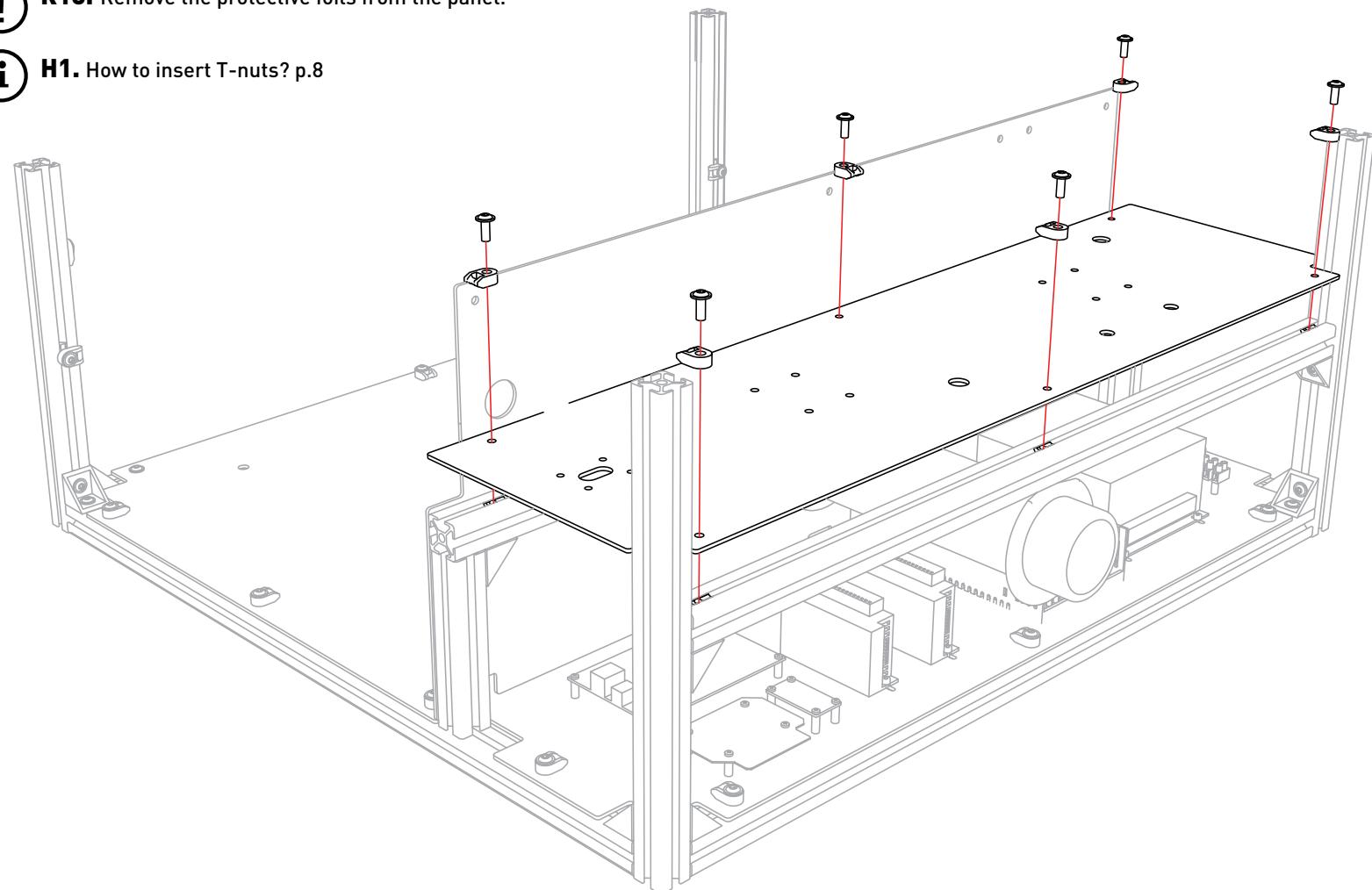
6x Wire Fixer



R18. Remove the protective foils from the panel.



H1. How to insert T-nuts? p.8



1x Allen Key 5

1x Allen Key 1.5

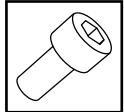
STEP 8.1 PREPARING THE Y AXIS - GUIDES

Step 8/33

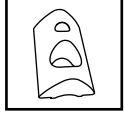
⌚ 10 min



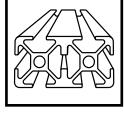
2x Linear Guide Y



20x C-screw M3-12



20x T-nut M3

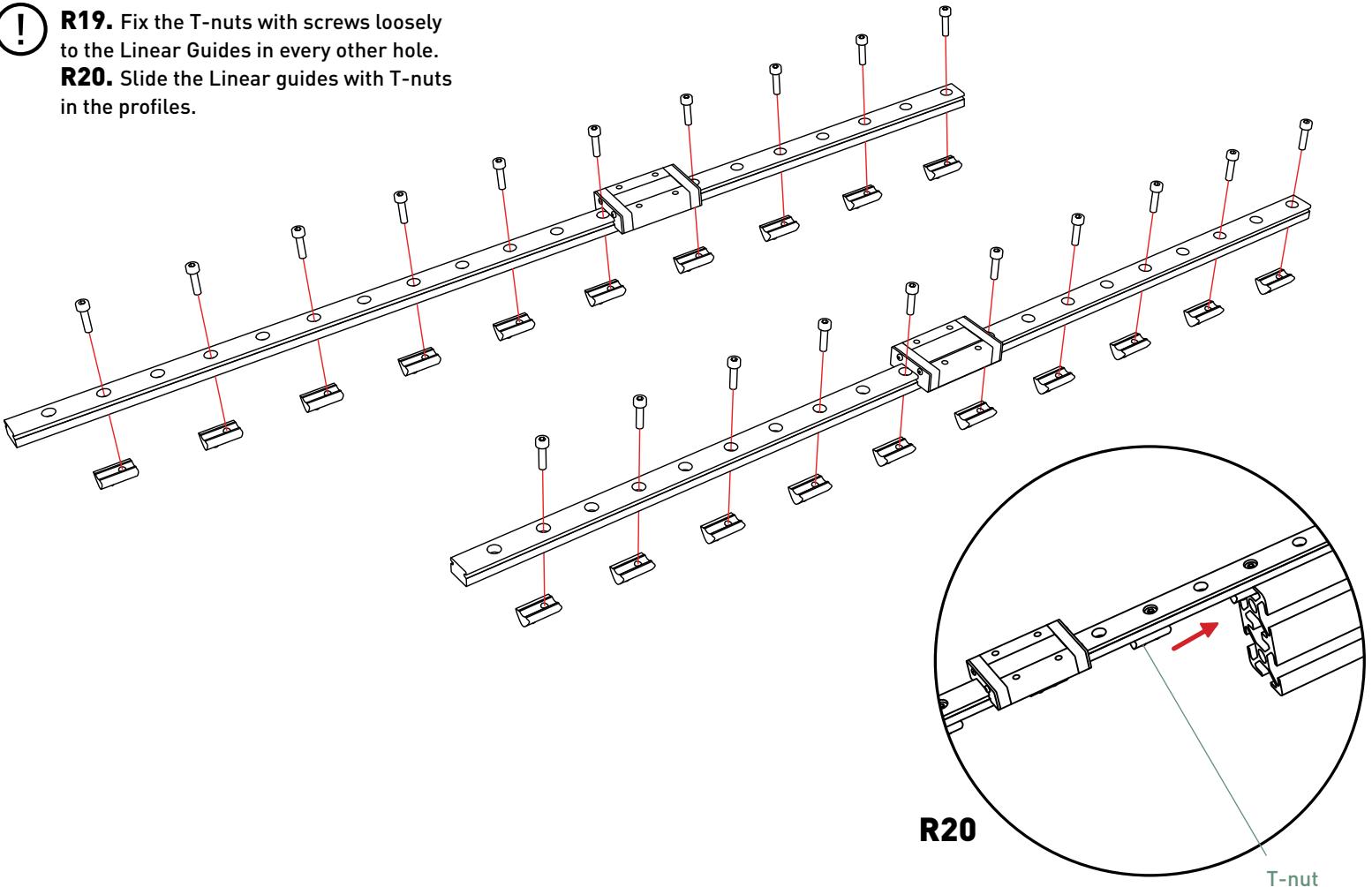


2x Profile 3060-770



R19. Fix the T-nuts with screws loosely to the Linear Guides in every other hole.

R20. Slide the Linear guides with T-nuts in the profiles.



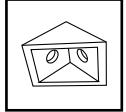
STEP 8.2 PREPARING THE Y AXIS - BRACKETS

Step 8/33

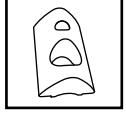
⌚ 10 min



4x B-screw M6-12



2x Bracket 30



4x T-nut M6

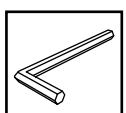
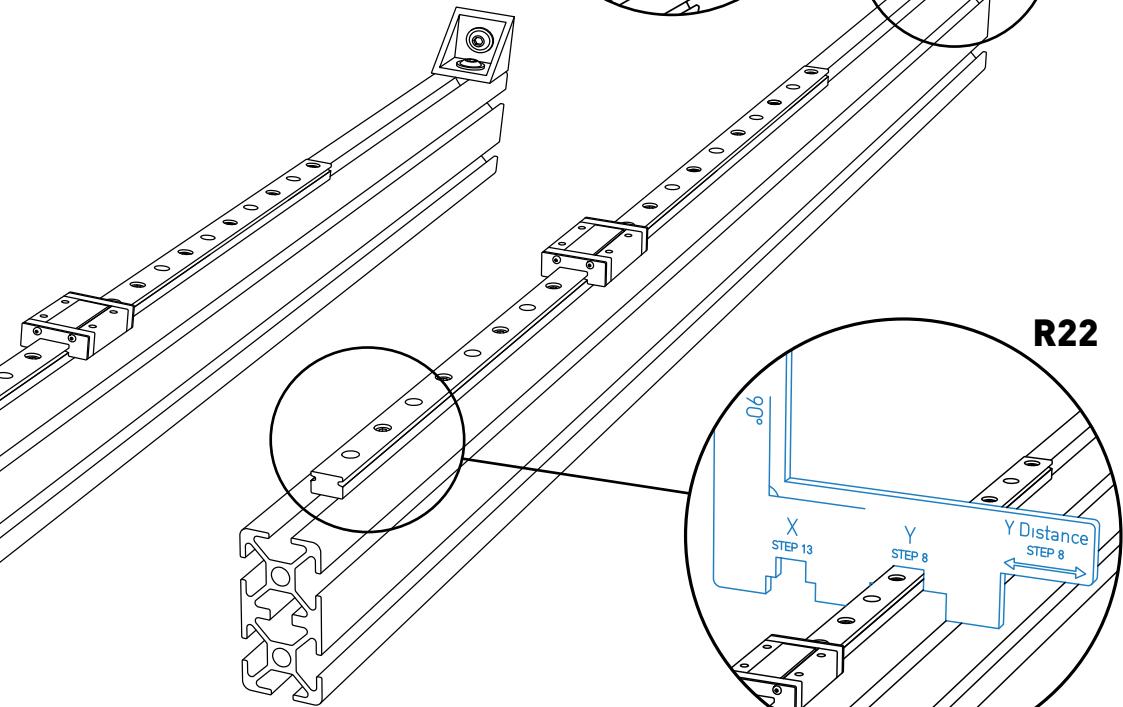
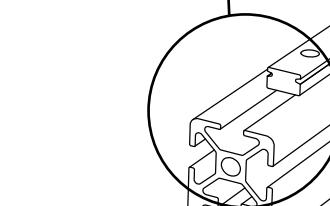
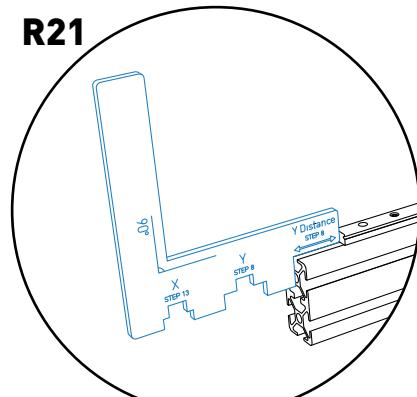


R21. Use the Template 1 (Y Distance) to position the Linear Guide in the correct distance to the end of the profile.

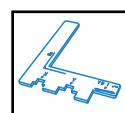
R22. Use the Template 1 (Y) to align the Linear Guide in the middle of the profile and tighten the screws, starting with the extremities ones.

R23. Don't tighten the B-screws and T-nuts of the Brackets yet.

R21



1x Allen Key 1.5
1x Allen Key 5

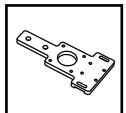


1x Template 1

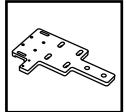
STEP 8.3 PREPARING THE Y AXIS - HOLDERS

Step 8/33

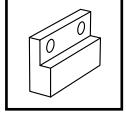
⌚ 10 min



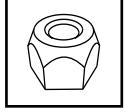
1x X-holder Left



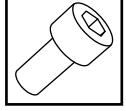
1x X-holder Right



1x Y-endstop Magnet

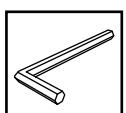
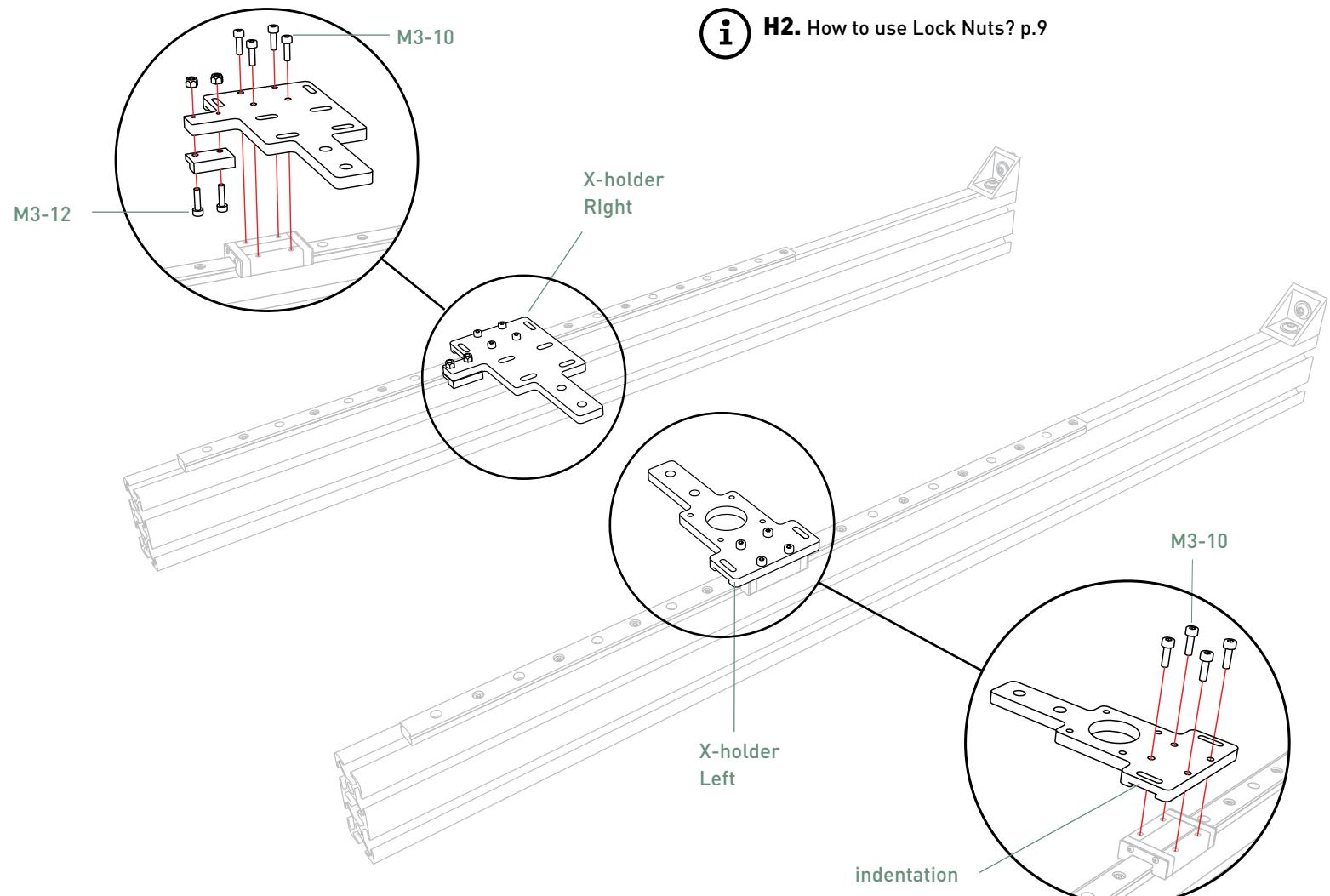


2x Lock Nut M3



8x C-screw M3-10

2x C-screw M3-12



1x Allen Key 1.5
1x Allen Key 2.5

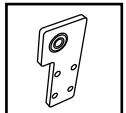


1x Small plier **or**
1x Wrench 5.5

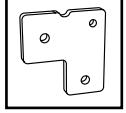
STEP 8.4 PREPARING THE Y AXIS - HOLDERS

Step 8/33

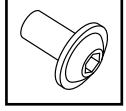
⌚ 10 min



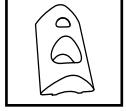
2x Back Bearing Holder



2x Front Pulley Holder



12x B-screw M6-12

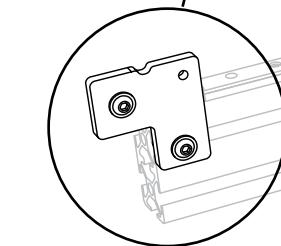
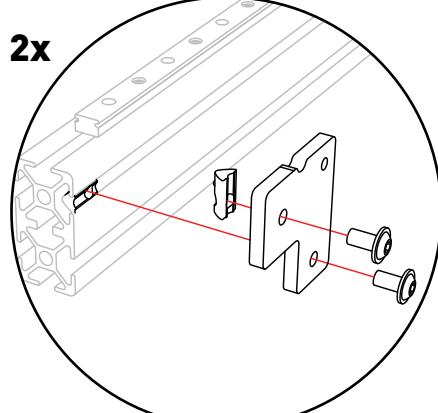


12x T-nut M6

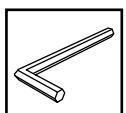
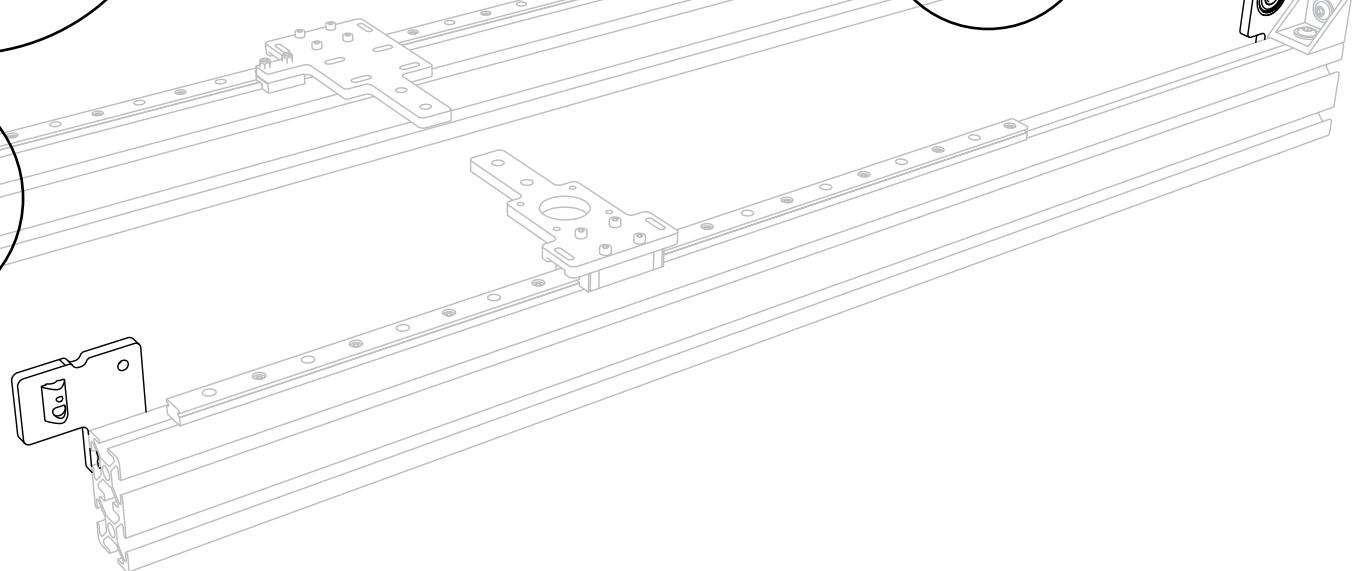
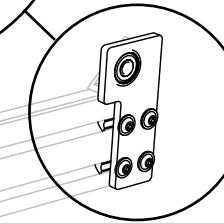
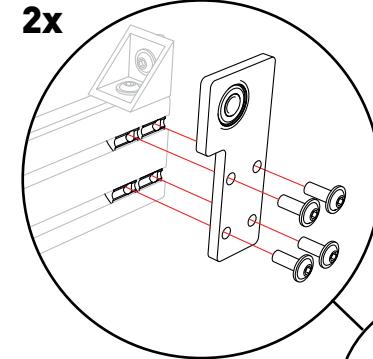


R24. Don't tighten the screws yet.

2x



2x

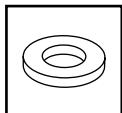


1x Allen Key 5

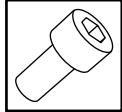
STEP 8.5 PREPARING Y AXIS - PULLEYS

Step 8/33

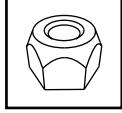
⌚ 15 min



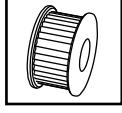
12x Washer M6



2x C-screw M6-40



2x Lock Nut M6



2x Y-pulley Front

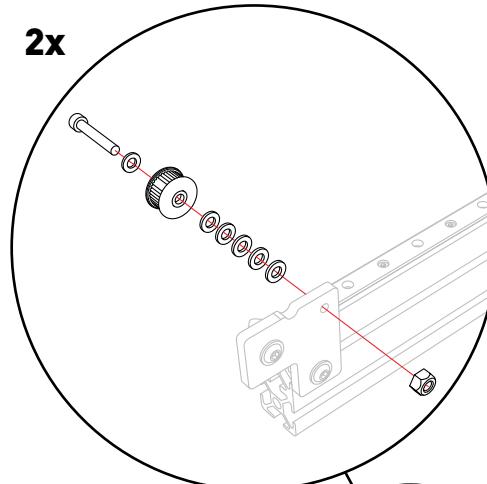


R25. Don't fully tighten the screws. The pulleys should be able to rotate freely.

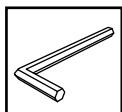
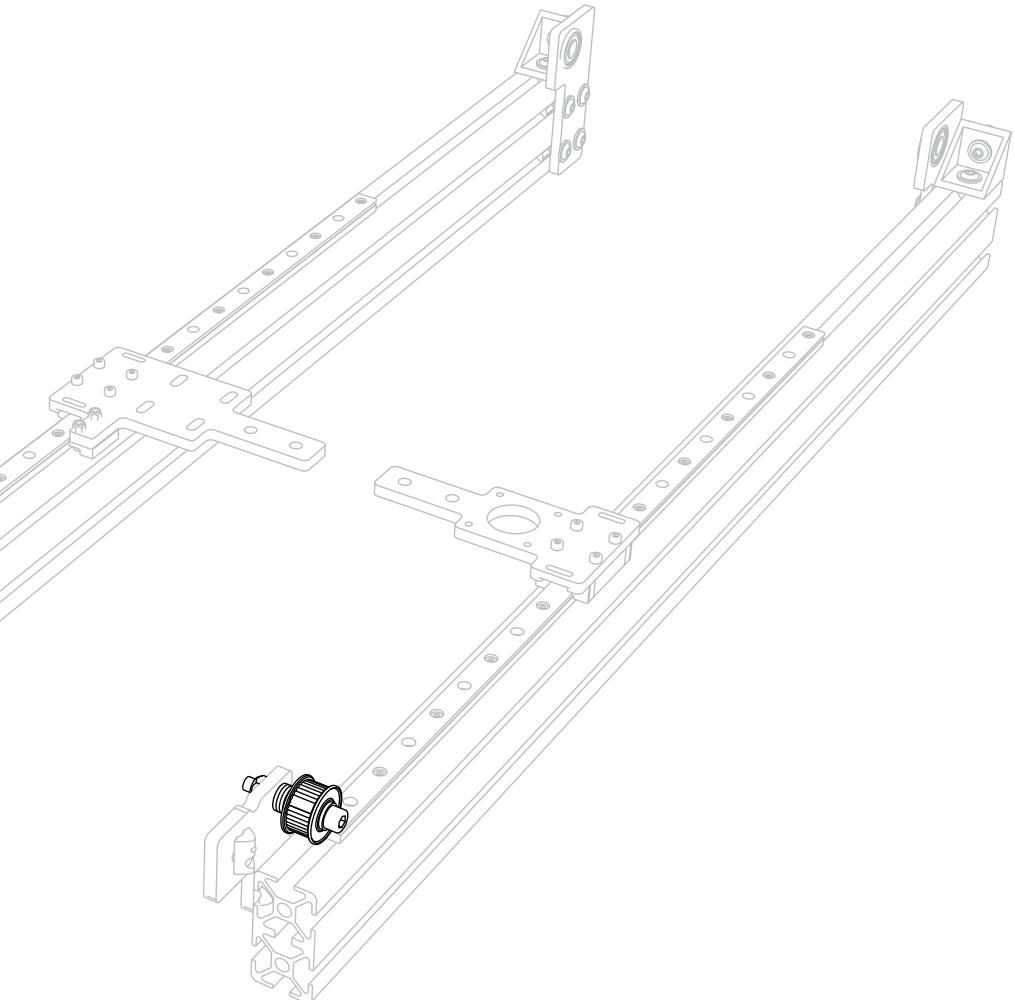


H2. How to use Lock Nuts? p.9

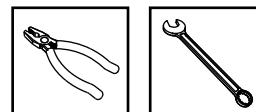
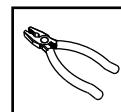
2x



R25



1x Allen Key 5

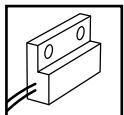


1x Small plier **or**
1x Wrench 10

STEP 8.6 PREPARING THE Y AXIS - SWITCHES

Step 8/33

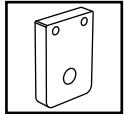
⌚ 10 min



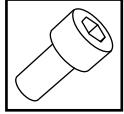
1x Y-endstop Sensor
+ X-endstop Sensor
+ Endstop Cable



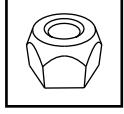
R26. The Y-endstop Sensor is connected to the X-endstop Sensor, which will be fixed in step 15.1.



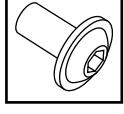
1x Y-endstop Holder



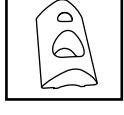
2x C-screw M3-12



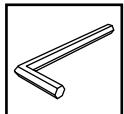
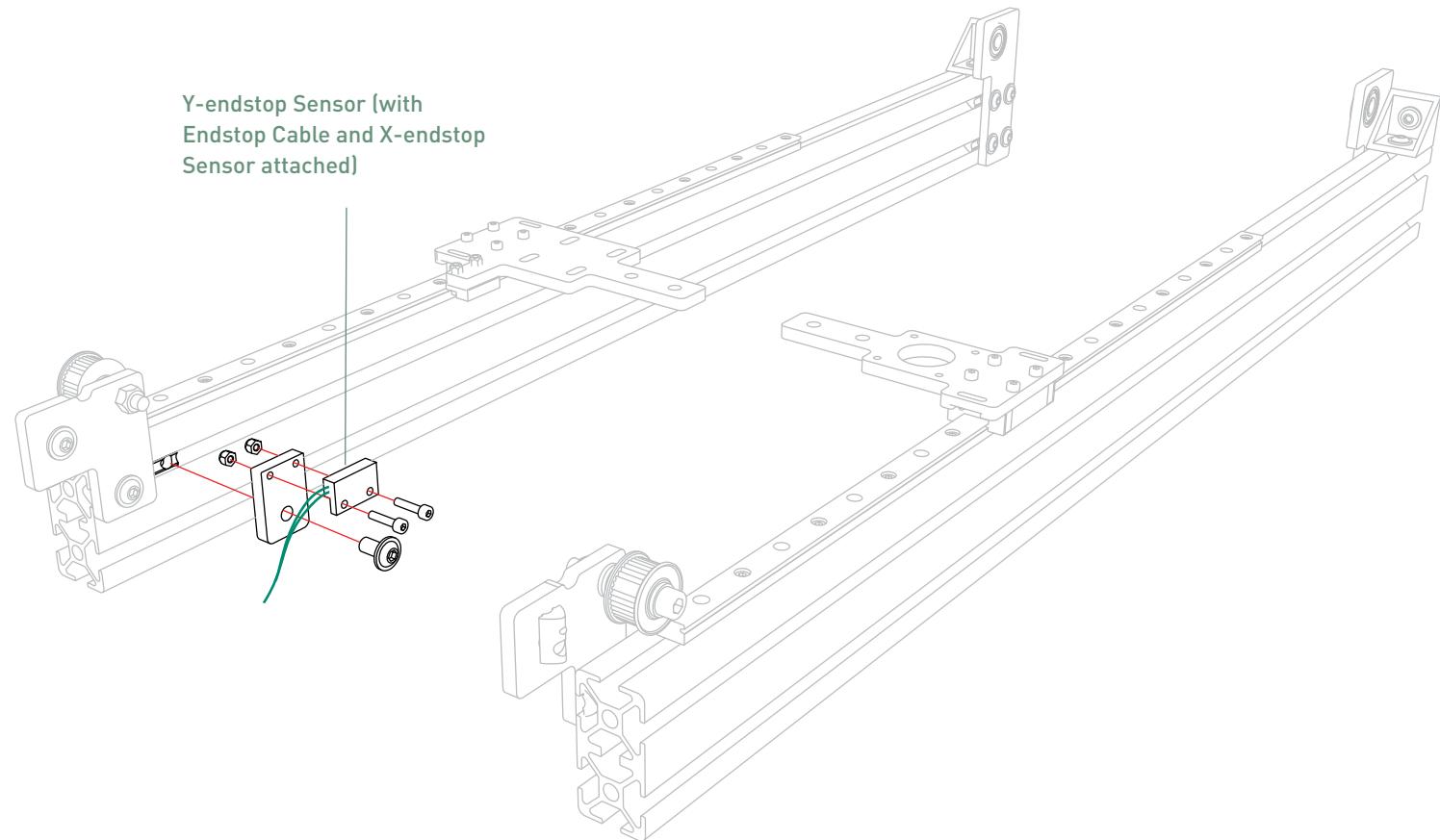
2x Lock Nut M3



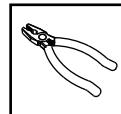
1x B-screw M6-12



1x T-nut M6



1x Allen Key 2.5
1x Allen Key 5



1x Small plier **or**
1x Wrench 5.5

STEP 9.1 COMPLETING THE FRAME - SIDES

Step 9/33

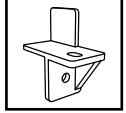
⌚ 25 min



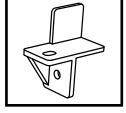
2x Prepared Y-axis
Left (Step 8)



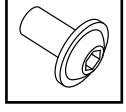
2x Prepared Y-axis
Right (Step 8)



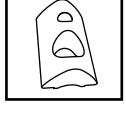
1x Front Spacer Left



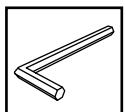
1x Front Spacer Right



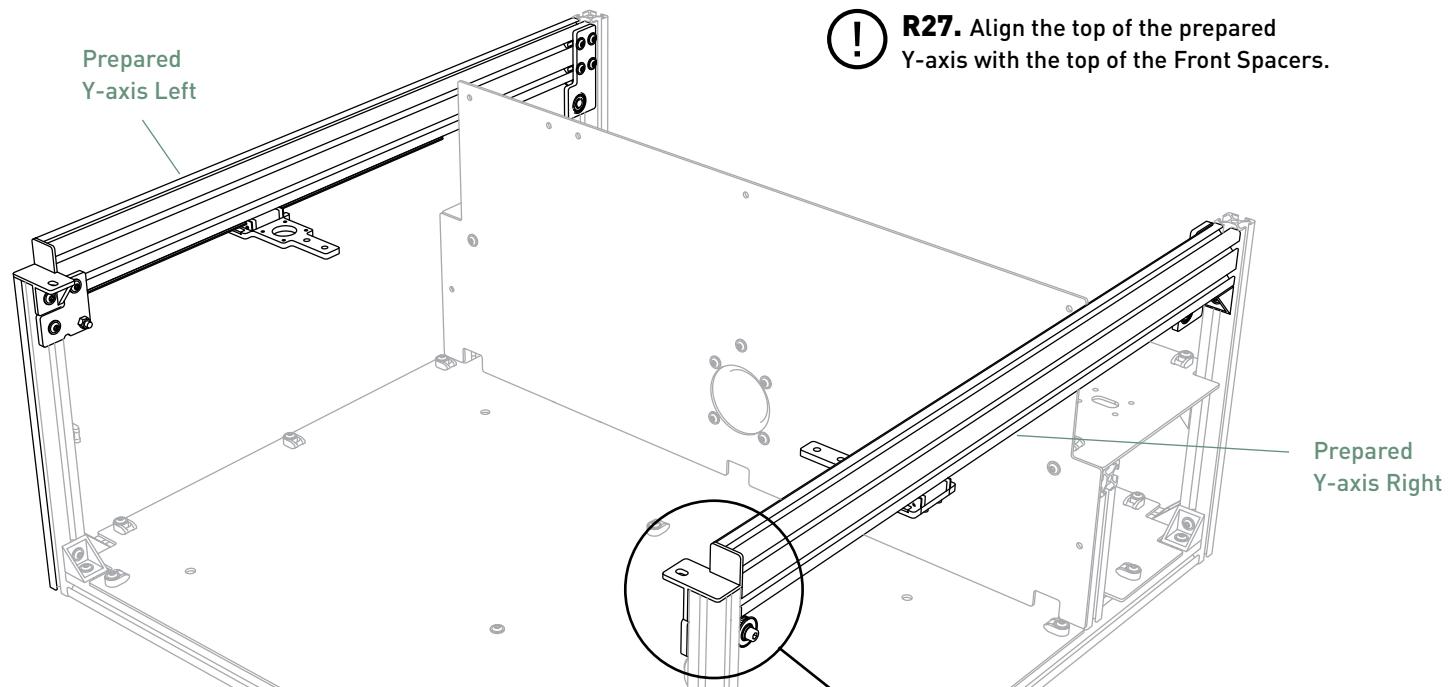
2x B-screw M6-12



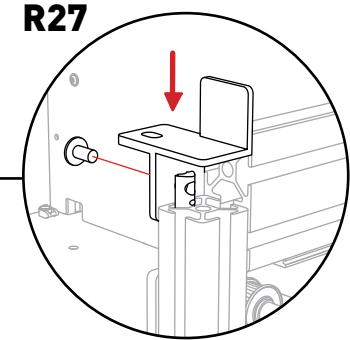
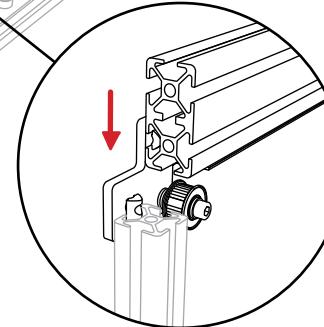
2x T-nut M6



1x Allen Key 5



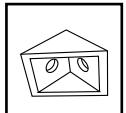
R27. Align the top of the prepared
Y-axis with the top of the Front Spacers.



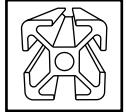
STEP 9.2 COMPLETING THE FRAME - BACK

Step 9/33

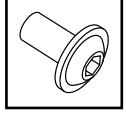
⌚ 15 min



2x Bracket 30



1x Profile 30-800



4x B-screw M6-12

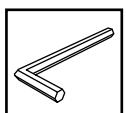
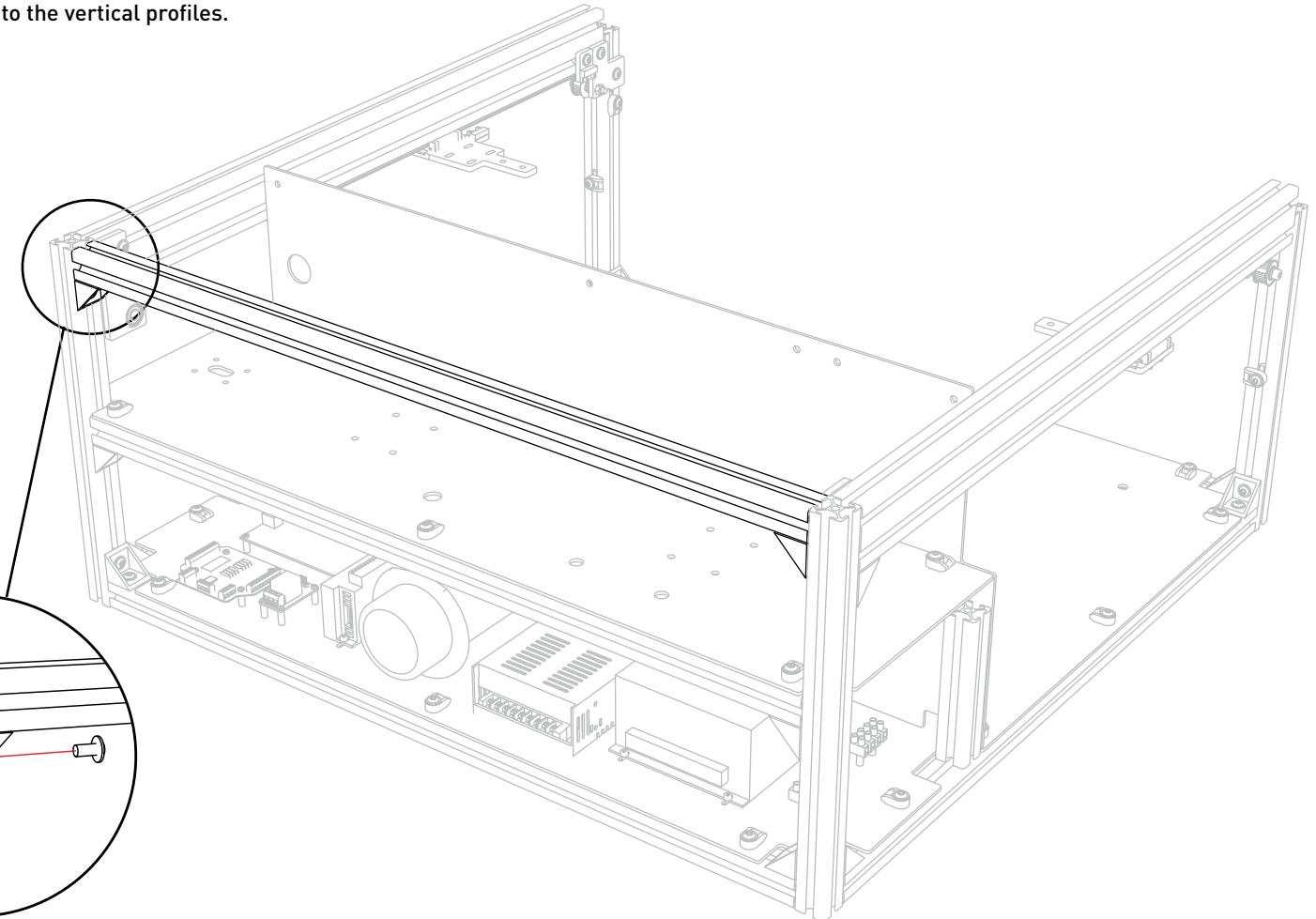
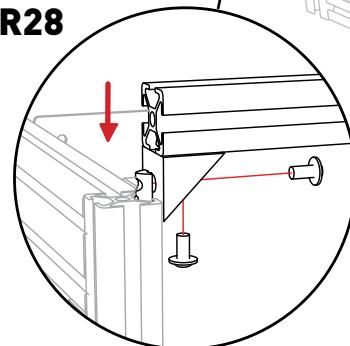


4x T-nut M6



R28. Attach the brackets and T-nuts to the profile first and then slide them into the vertical profiles.

R28

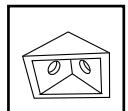


1x Allen Key 5

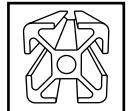
STEP 9.3 COMPLETING THE FRAME - MIDDLE

Step 9/33

⌚ 20min



2x Bracket 30



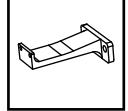
1x Profile 30-800



6x B-screw M6-12
3x B-screw M6-16



9x T-nuts M6



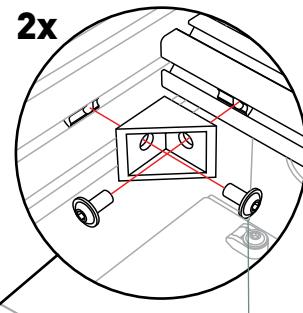
1x Switch Holder



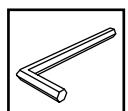
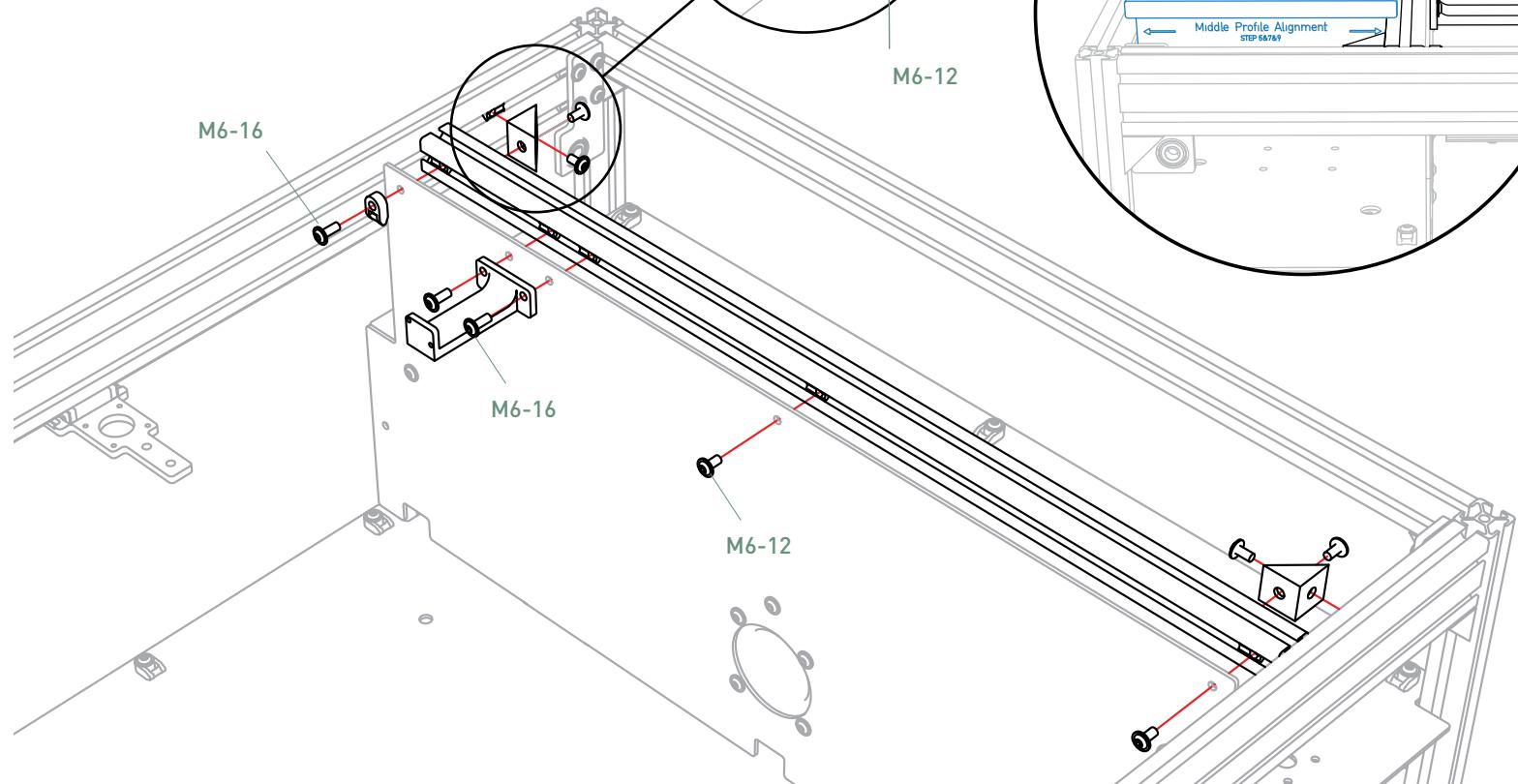
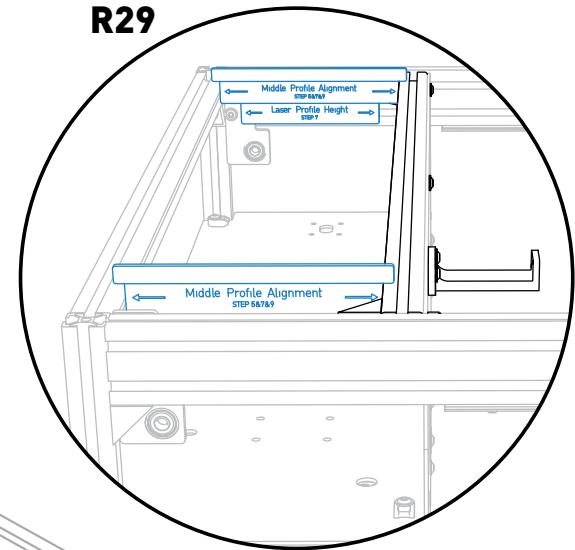
1x Wire Fixer

! **R29.** Use 2x Templates 2 to measure the distance to the back profile and tighten all the B-screws.

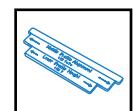
i **H1.** How to insert T-nuts? p.8



M6-12



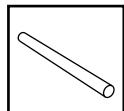
1x Allen Key 1.5
1x Allen Key 5



2x Template 2

STEP 10.1 COMPLETING THE Y AXIS - MOTOR

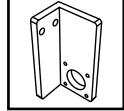
Step 10/33 ⏰ 25 min



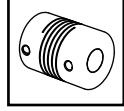
1x Y-shaft 350
1x Y-shaft 400



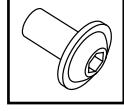
1x Y-motor



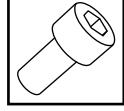
1x Y-motor Holder



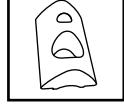
2x Coupler (with set screws in)



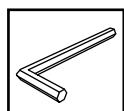
2x B-screw M6-16



4x C-screw M3-12



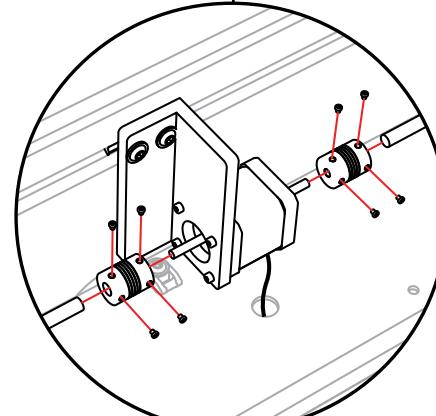
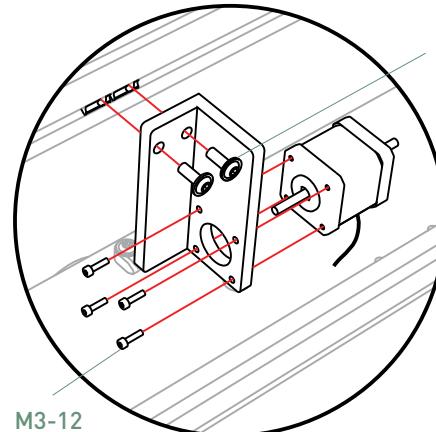
2x T-nut M6



1x Allen Key 1.5
1x Allen Key 2.5
1x Allen Key 5



R30. Insert the shafts first into the Back Bearing Holders before attaching the Couplers.

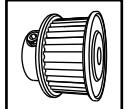


STEP 10.2 COMPLETING THE Y AXIS - BELTS

Step 10/33  30 min



8x Cable Tie



2x Y-pulley Back
(with set screws in)



2x Y-belt

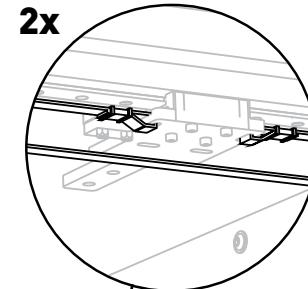


R32. Both belts should have more or less the same tension after fixed.

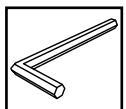
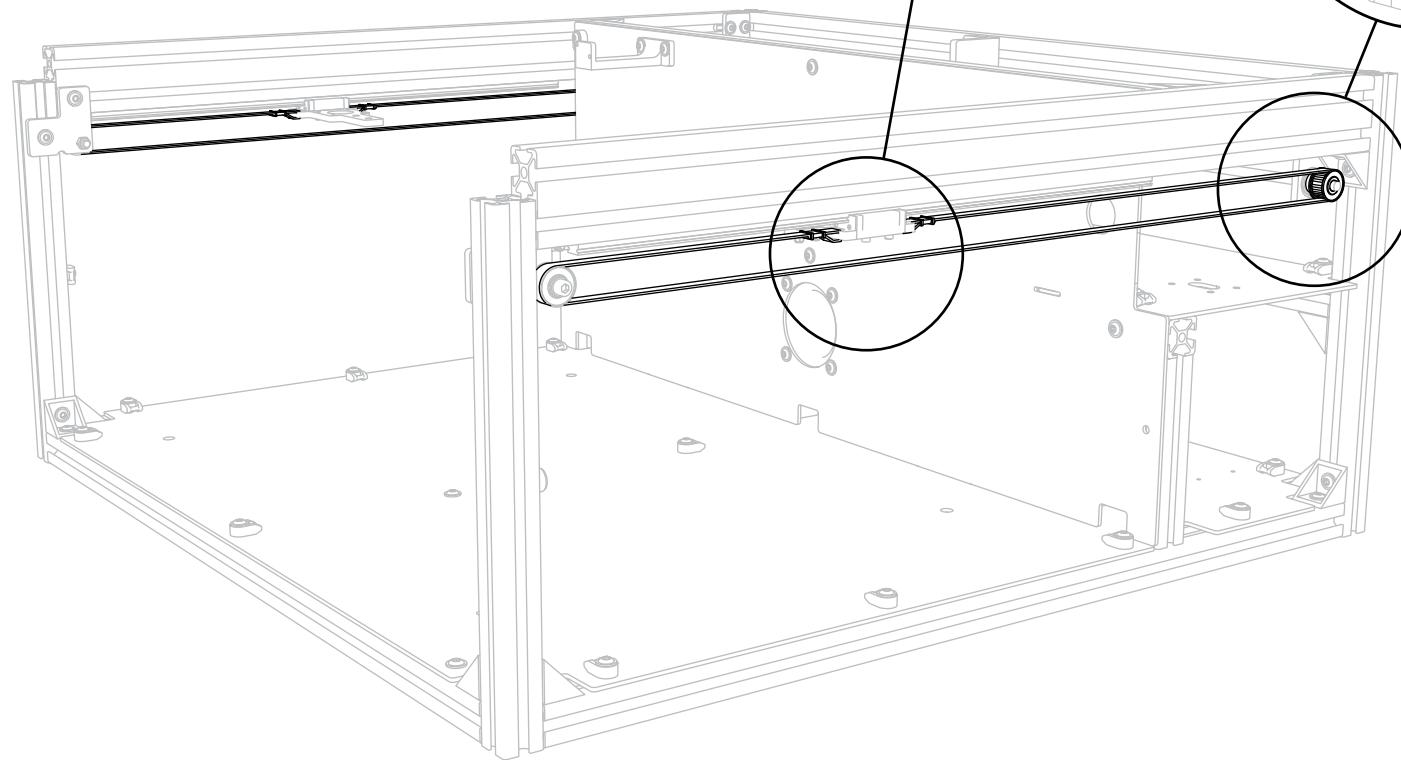
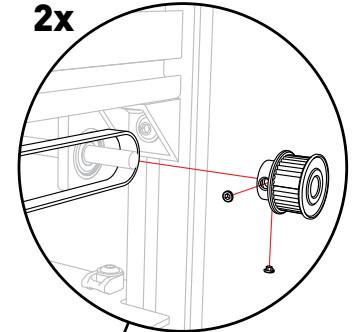


- H3.** How to use cable ties? p.9
- H4.** How to use set screws? p.10
- H5.** How to tighten the belt? p.11

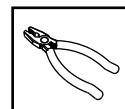
2x



2x



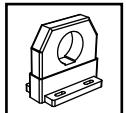
1x Allen Key 1.5



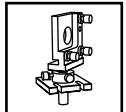
1x Small plier

STEP 11. INSTALLING LASER PATH

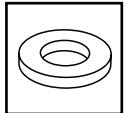
Step 11/33 ⏰ 25 min



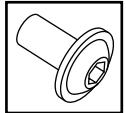
2x Laser Tube Holder



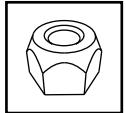
1x Mirror Holder 25



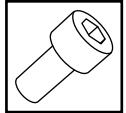
4x Washer M5



8x B-screw M6-20



8x Lock Nuts M6
4x Lock Nuts M5



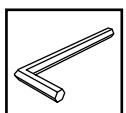
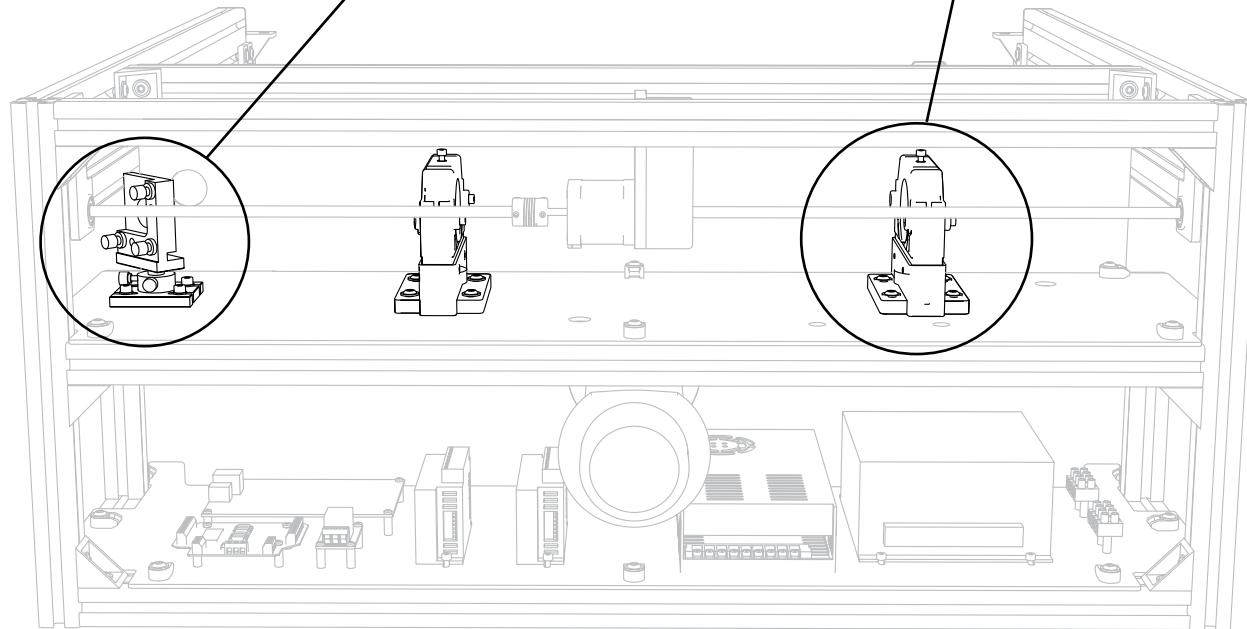
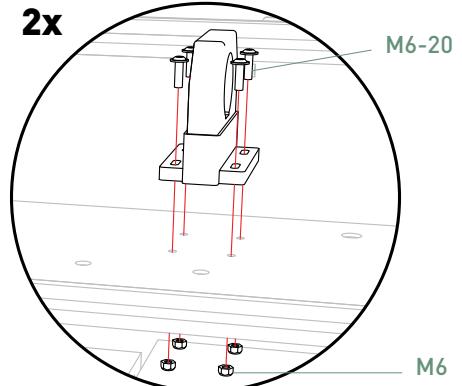
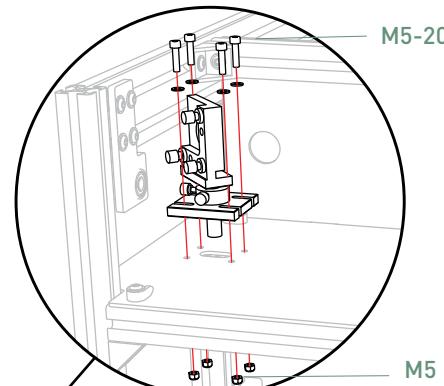
4x C-screw M5-20



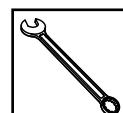
R33. Don't fully tighten the screws for fine adjustment of the laser beam.



H2. How to use Lock Nuts? p.9



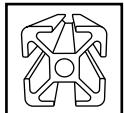
1x Allen Key 4
1x Allen Key 5



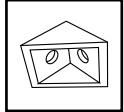
1x Wrench 8
1x Wrench 11

STEP 12.1 PREPARING THE BED - FRAME

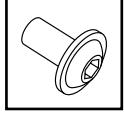
Step 12/33  15 min



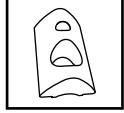
2x Profile 30-400
2x Profile 30-600



4x Bracket 30



8x B-screw M6-12



4x T-nut M4
4x T-nut M6

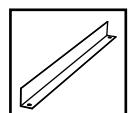
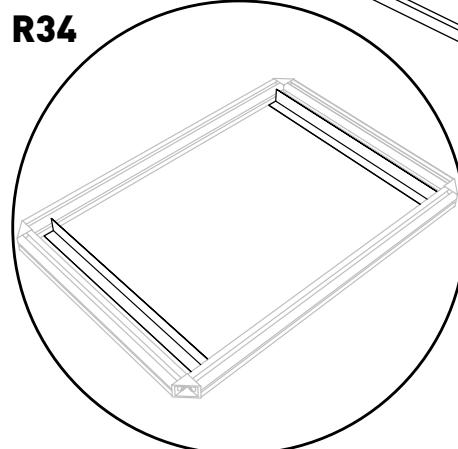


R34. Make sure the lamellas fit
inbetween the profiles.

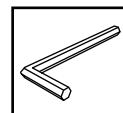


H1. How to insert T-nuts? p.8

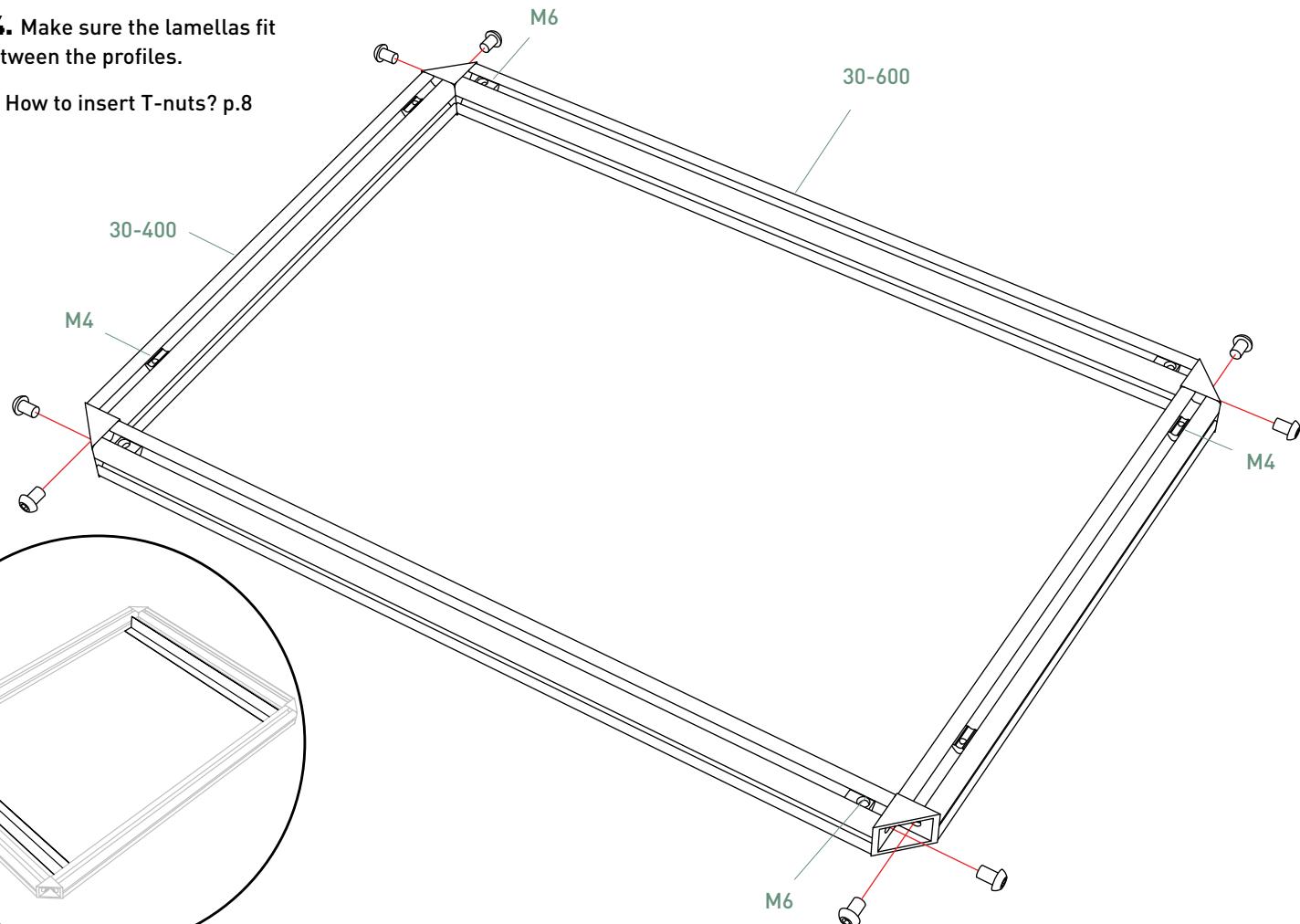
R34



2x Lamellas



1x Allen Key 5

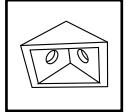


STEP 12.2 PREPARING THE BED - LAMELLA SUPPORT

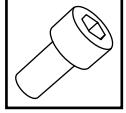
Step 12/33  15 min



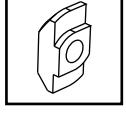
2x Profile 20-660



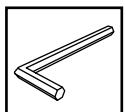
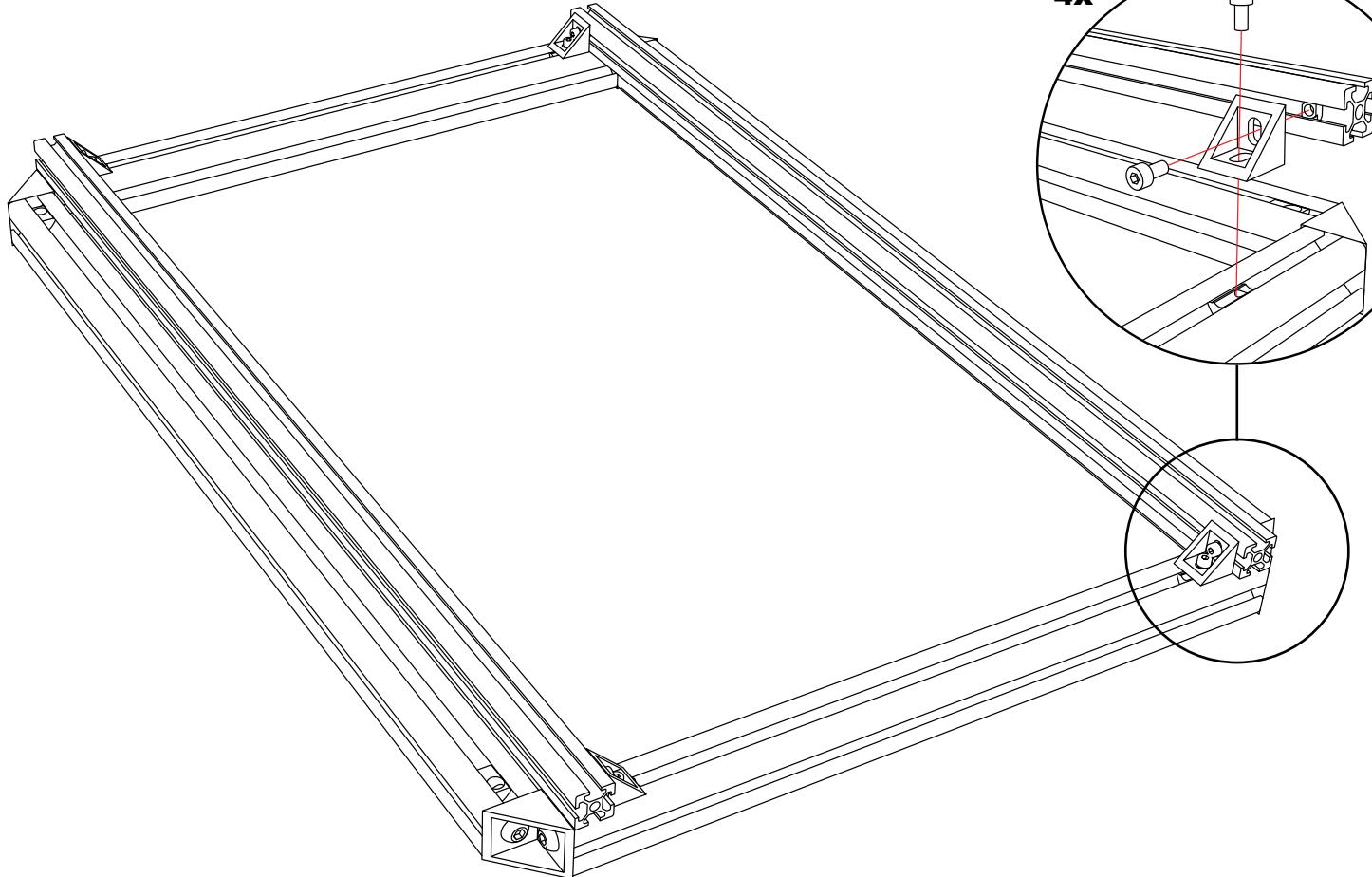
4x Bracket 20



8x C-screw M4-8



4x Hammer Nut M4



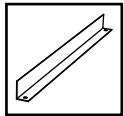
1x Allen Key 1.5

1x Allen Key 3

STEP 12.3 PREPARING THE BED - LAMELLAS

Step 12/33

⌚ 25 min



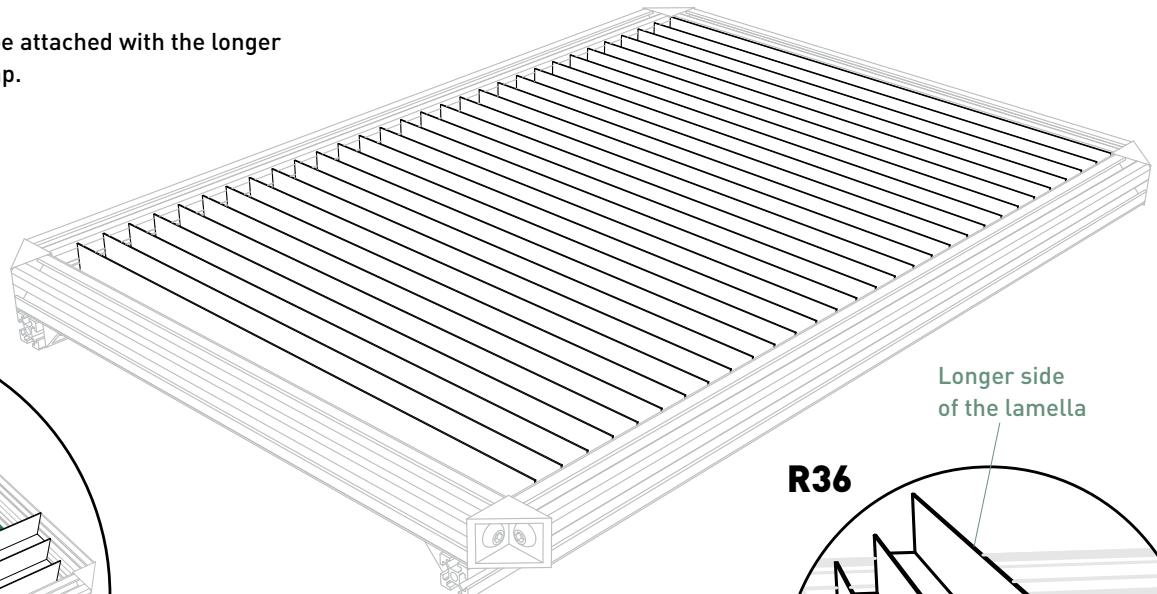
30x Lamella



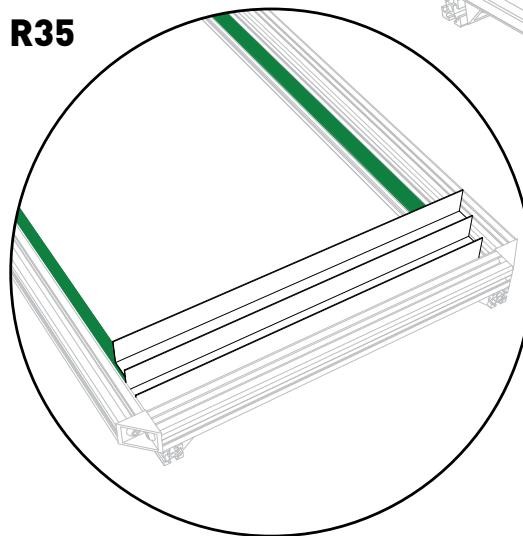
R35. Turn the bed and fix the double-side tape on the Profile 20-660. Do not cut the exceeding tape in width.

R36. Attach each lamella by firmly pressing it against the tape, to have a strong adhesion. Make sure there are no gaps inbetween the lamellas. The shorter side of the lamella should be facing down.

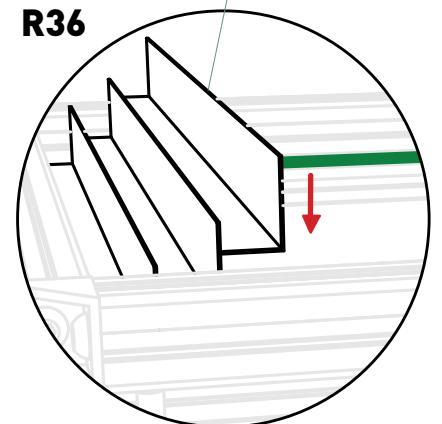
R37. The last lamella should be attached with the longer side facing down to close the gap.



R35



R36



2x Double-sided tape



1x Cutter

STEP 12.4 PREPARING THE BED - BED SUPPORT

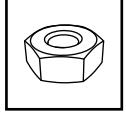
Step 12/33 ⏰ 10 min



4x Bed Leg



4x Bed Adjuster



4x Nut M6

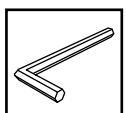
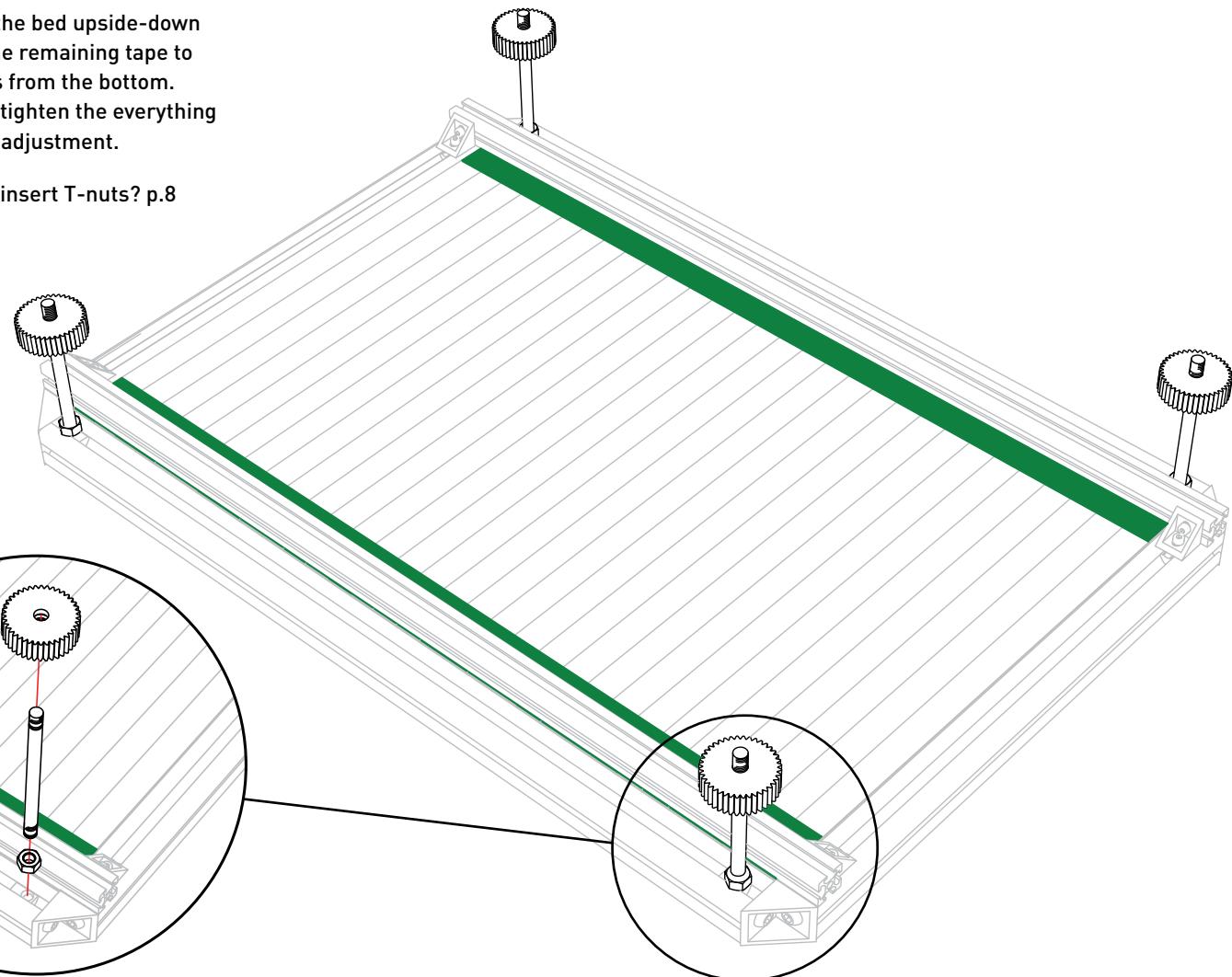


R38. Turn the bed upside-down and press the remaining tape to the lamellas from the bottom.

R39. Don't tighten the everything yet for later adjustment.



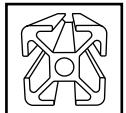
H1. How to insert T-nuts? p.8



1x Allen Key 1.5

STEP 13.1 PREPARING THE X AXIS - GUIDE

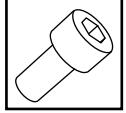
Step 13/33  15 min



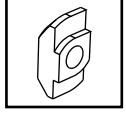
1x Profile 20-700



1x Linear Guide X



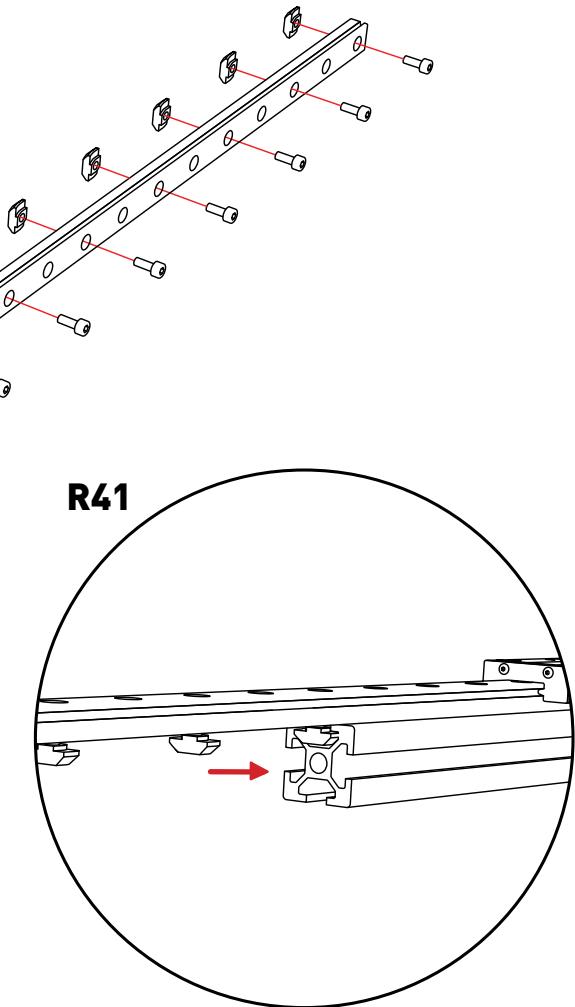
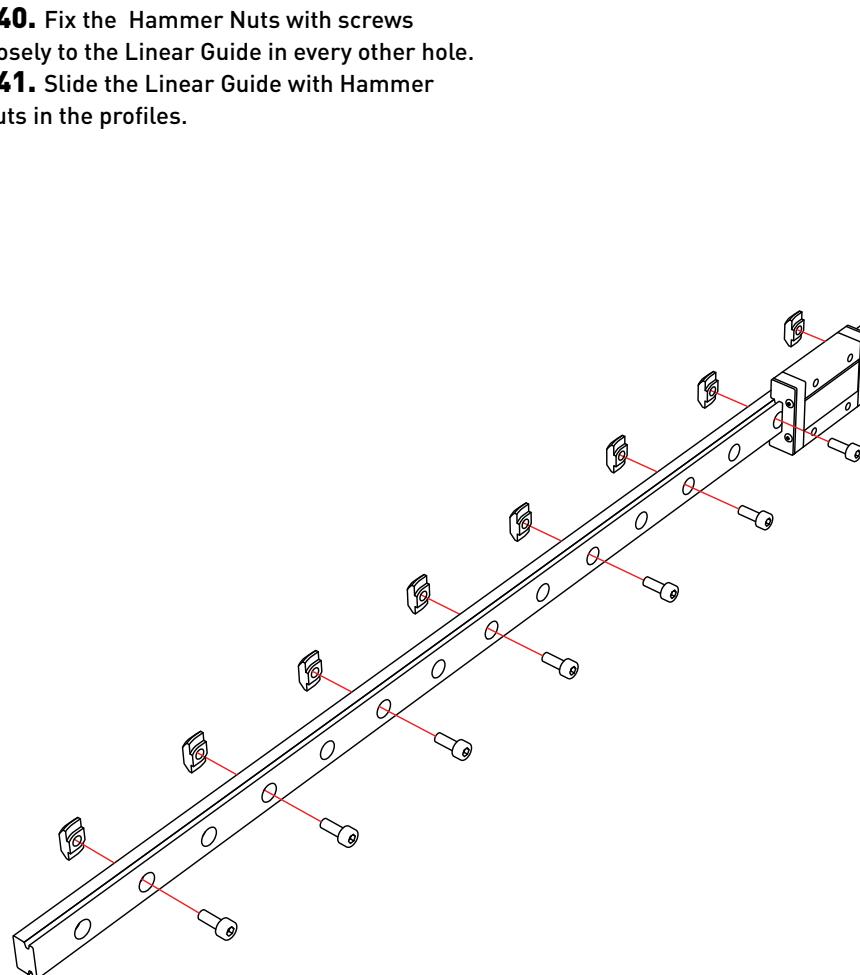
14x C-screw M3-8



14x Hammer Nut M3



- R40.** Fix the Hammer Nuts with screws loosely to the Linear Guide in every other hole.
R41. Slide the Linear Guide with Hammer Nuts in the profiles.



STEP 13.2 PREPARING THE X AXIS - HOLDER

Step 13/33  20 min



4x C-screw M3-8

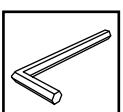
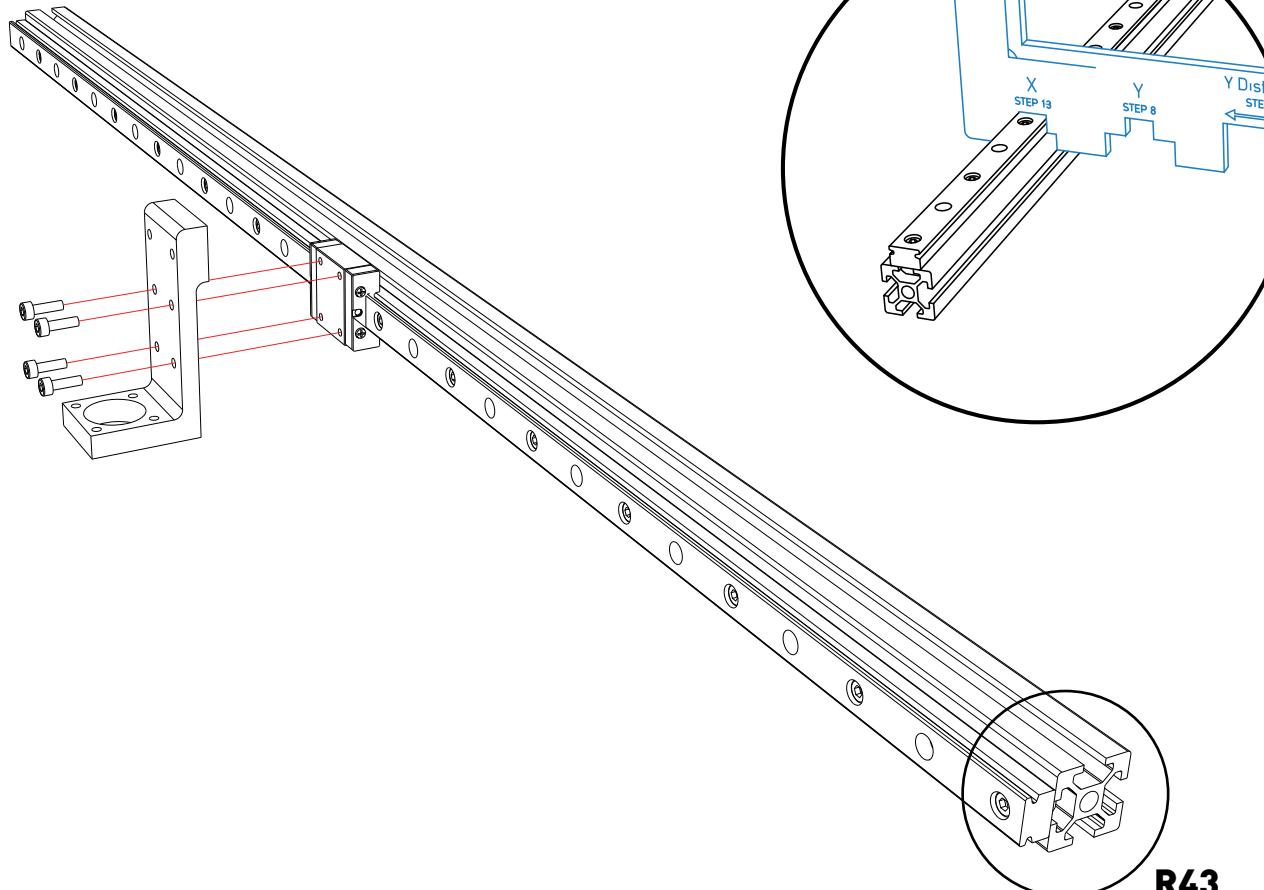


1x Laser Head Holder

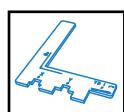


R42. Use the Template 1 (X) to align it and tighten the screws, starting with the extremities ones.

R43. Align the ends of the linear guide and the profile.



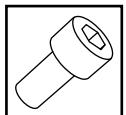
1x Allen Key 2.5



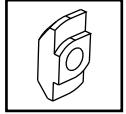
2x Template1

STEP 13.3 PREPARING THE X AXIS - HOLDER

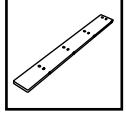
Step 13/33  10 min



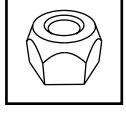
4x C-screw M5-12
2x C-screw M3-30



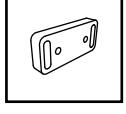
4x Hammer Nut M5



1x Chain Holder



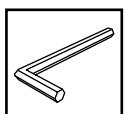
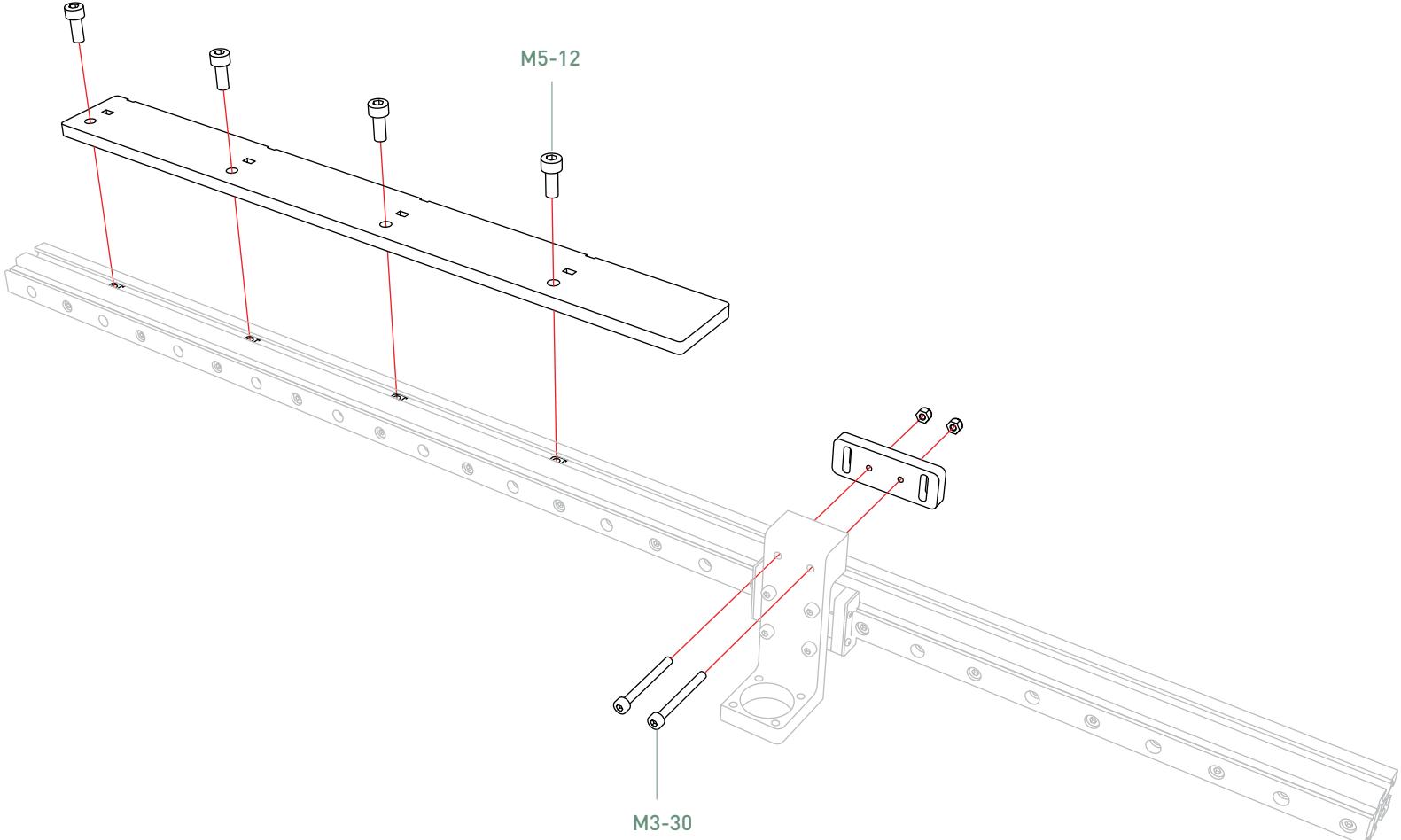
2x Lock Nut M3



1x X-Belt Attacher



H2. How to use Lock Nuts? p.9



1x Allen Key 2.5
1x Allen Key 4



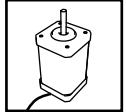
1x Small plier **or**
1x Wrench 5.5

STEP 14.1 INSTALLING THE X AXIS 1

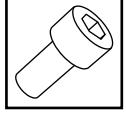
Step 14/33  20 min



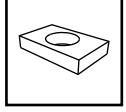
1x Prepared X-axis
(Step 13)



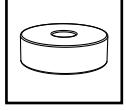
1x X-motor



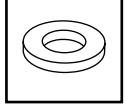
4x C-screw M3-10
3x C-screw M6-10
1x C-screw M6-35



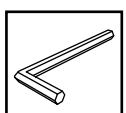
4x Flat Nut M6



1x X-bearing



2x Washer M8 Big
10x Washer M6

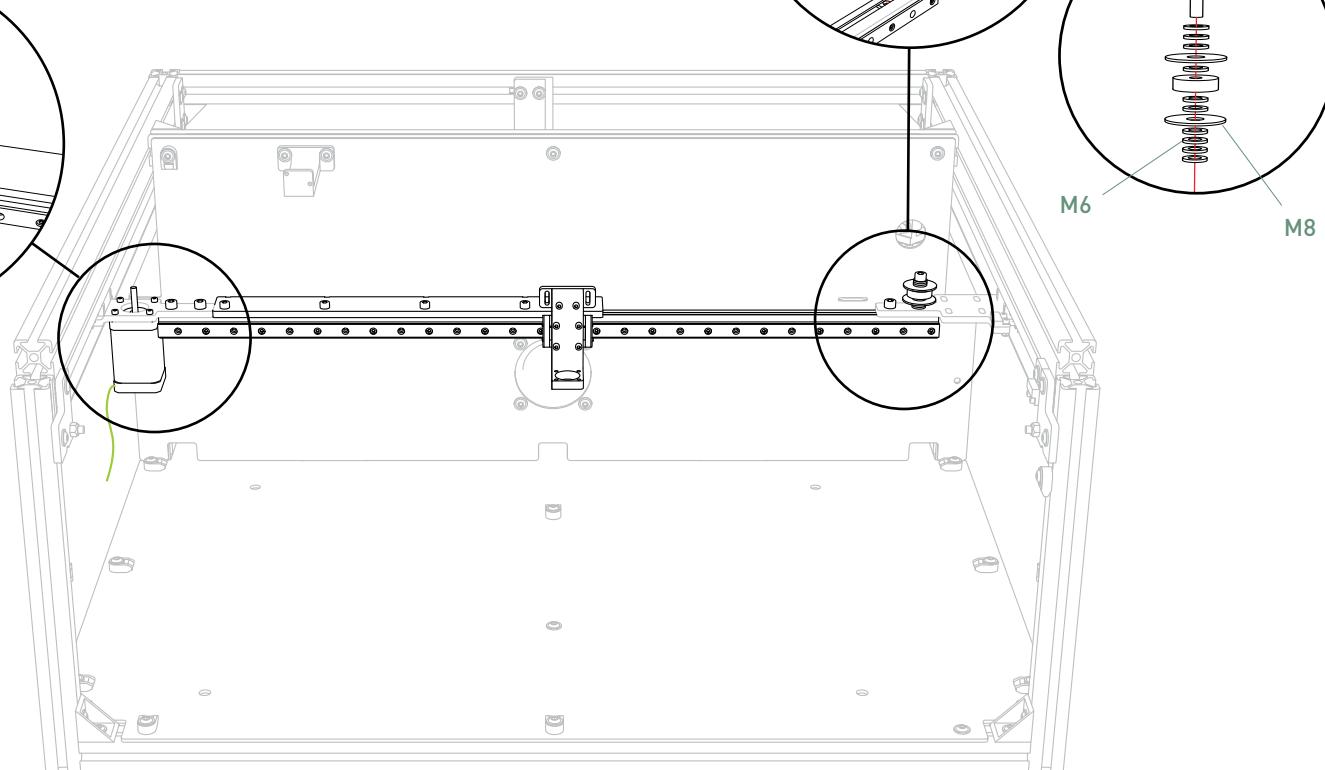
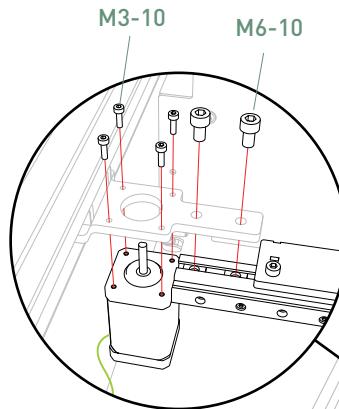


1x Allen Key 2.5
1x Allen Key 5



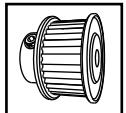
R44. Slide in the Flat Nuts before fixing the prepared X-axis.

R45. Do not tighten the screws of the X-axis profile for precision alignment.

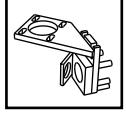


STEP 14.2 INSTALLING THE X AXIS 2

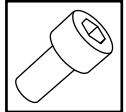
Step 14/33  20 min



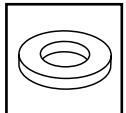
1x X-pulley (with set screws in)



1x Mirror Holder 20



4x C-screw M5-20



4x Washer M5



4x Lock Nut M5



R46. Tighten one of the set screws of the Pulley to the flat side of the motor shaft.

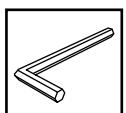
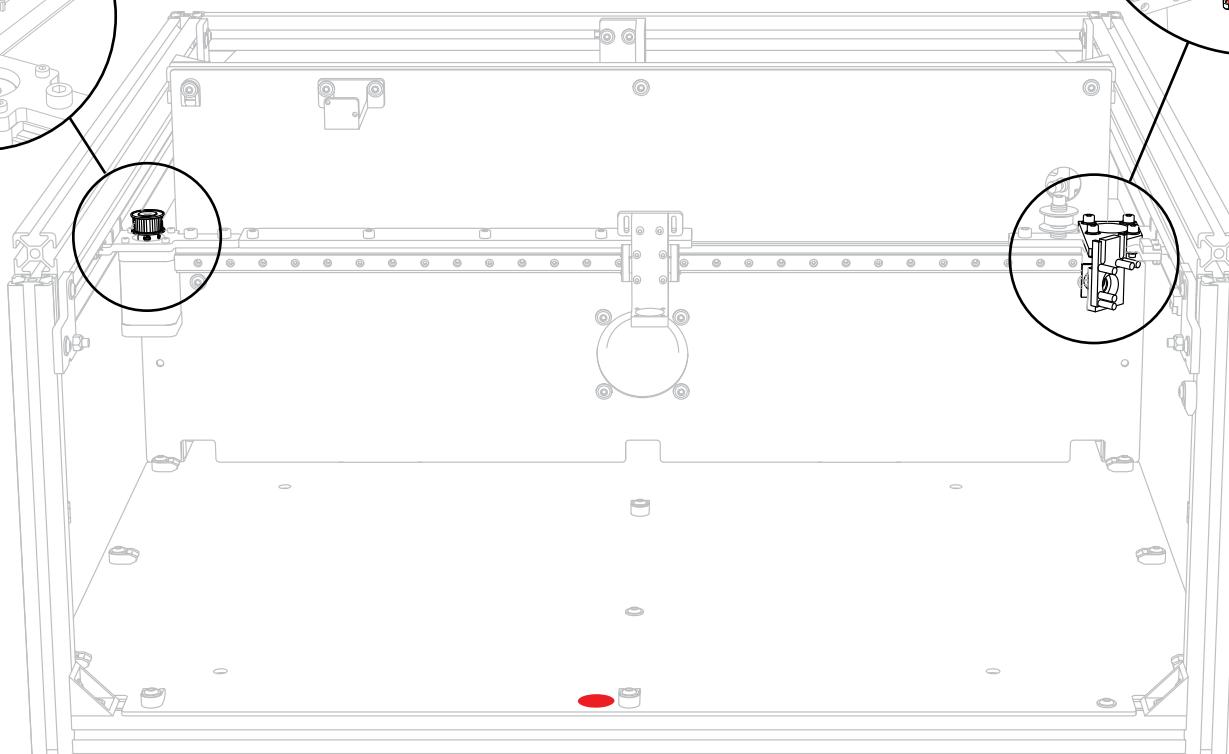
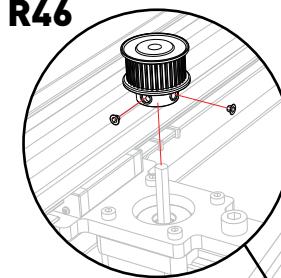
R47. Do not tighten the screws of the Mirror Holder 20 for precision alignment.



H2. How to use Lock Nuts? p.9

H4. How to use set screws? p.10

R46



1x Allen Key 2.5
1x Allen Key 4



1x Small plier **or**
1x Wrench 8

STEP 14.3 INSTALLING THE X AXIS 3

Step 14/33  30 min



1x X-belt



4x Cable Tie

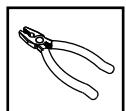
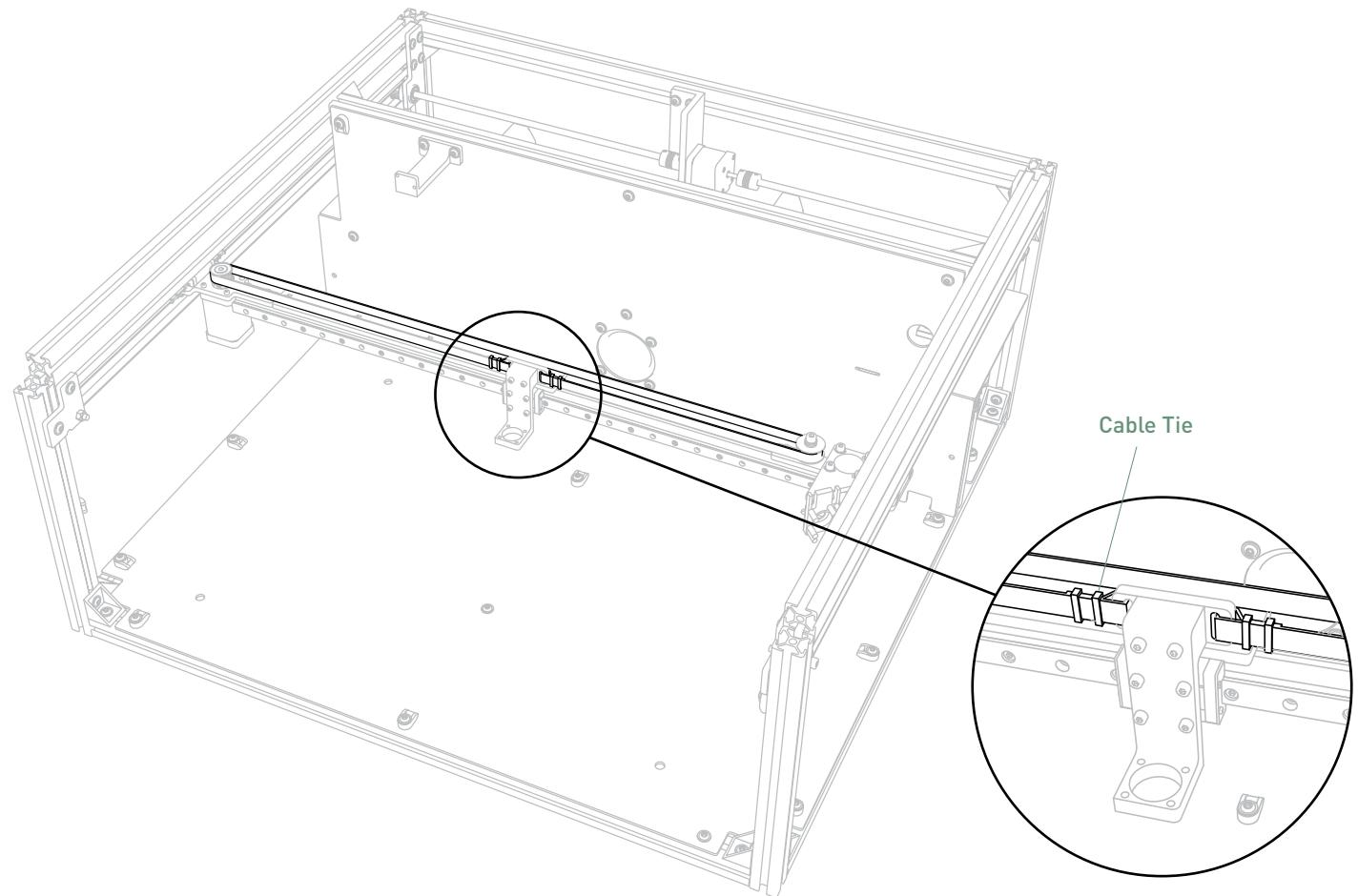


R48. Make sure the belt is horizontal by adjusting the height of the pulley on the motor shaft.



H3. How to use cable ties? p.9

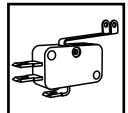
H5. How to tighten the belt? p.11



1x Small plier

STEP 15.1 INSTALLING THE SWITCHES

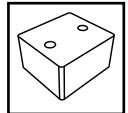
Step 15/33  40 min



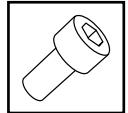
1x Window Switch



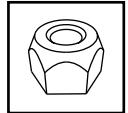
3x B-screw M3-8



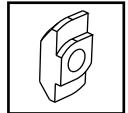
1x X-endstop Holder



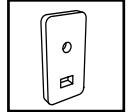
4x C-screw M3-20



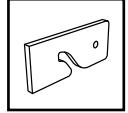
2x Lock Nut M3



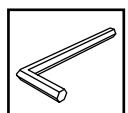
5x Hammer Nut M3



2x X-wire Fixer



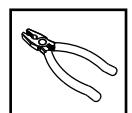
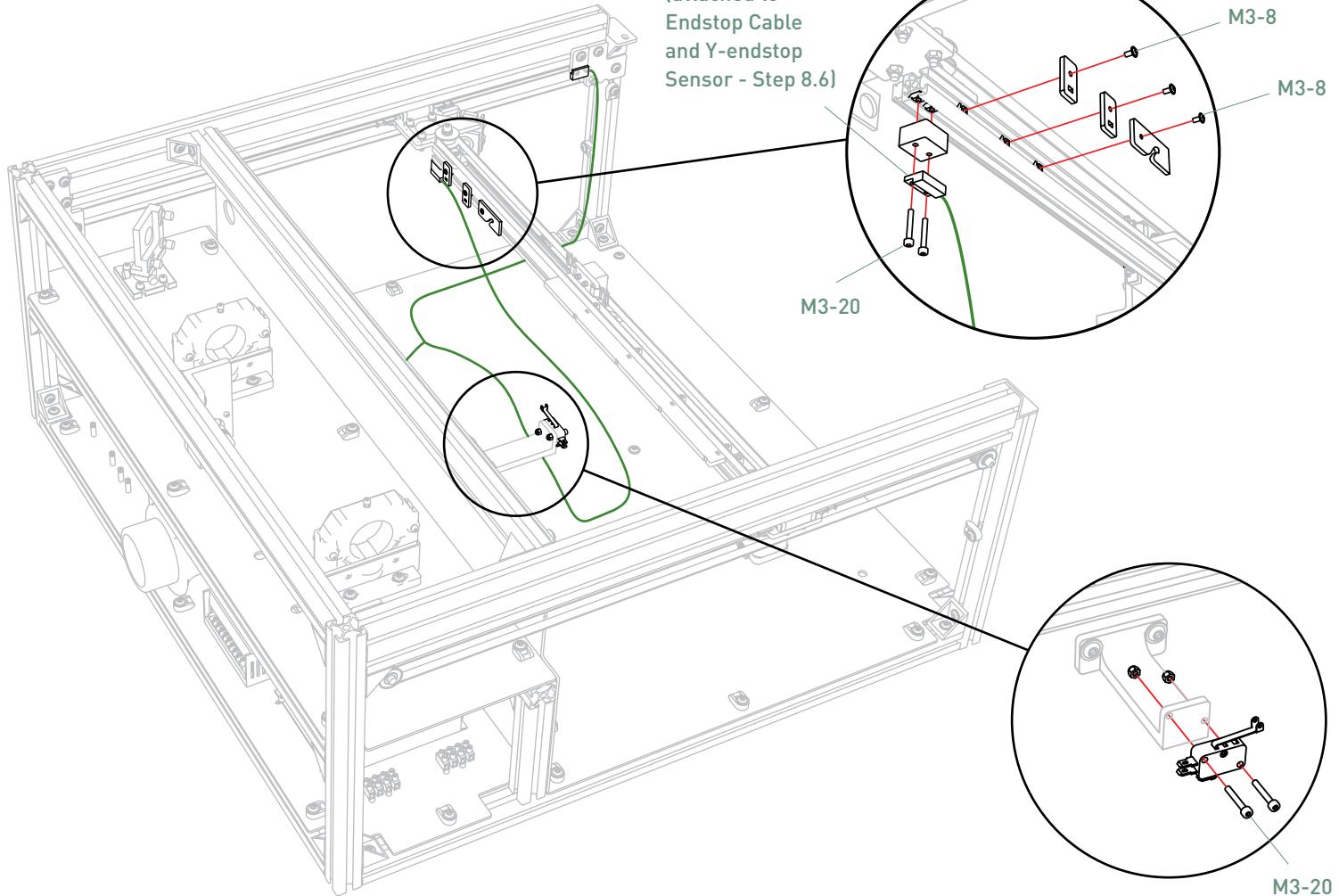
1x X-wire Inserter



1x Allen Key 2.5



H2. How to use Lock Nuts? p.9

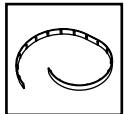


1x Small plier **or**
1x Wrench 5
1x Wrench 5.5

STEP 15.2 INSTALLING THE LED STRIPS

Step 15/33

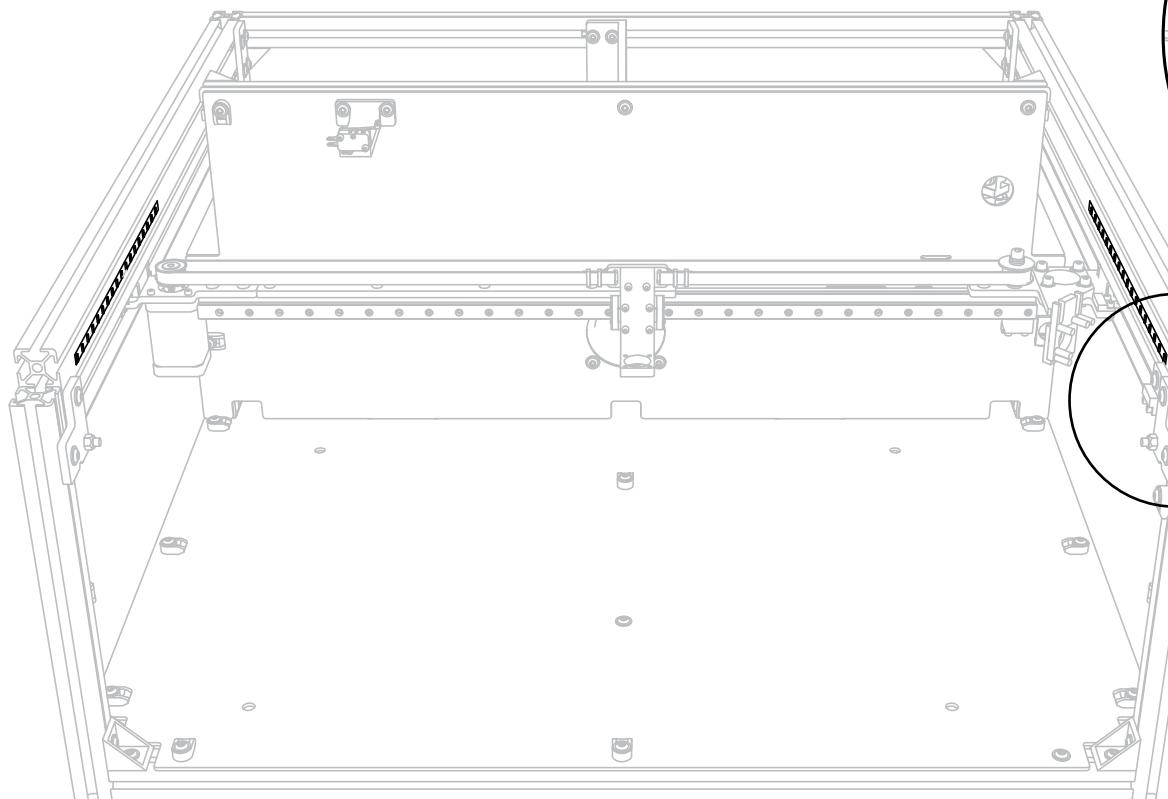
⌚ 10 min



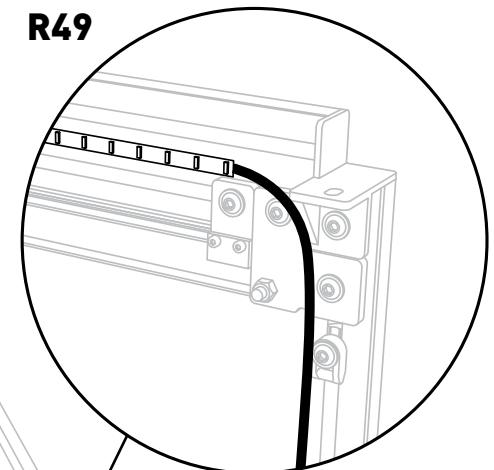
2x LED Strip



R49. Remove the protective paper from the LED Strips and tape them on the side of the Profiles 3060-770 with the cables pointing to the front of the machine.



R49

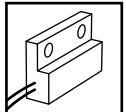


STEP 16.1 WIRING 1

Step 16/33



12x Cable Ties



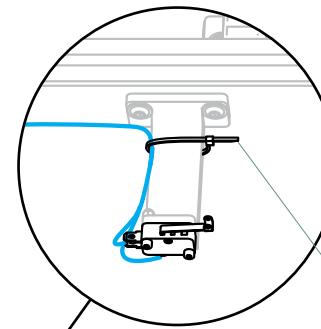
1x Window Sensor



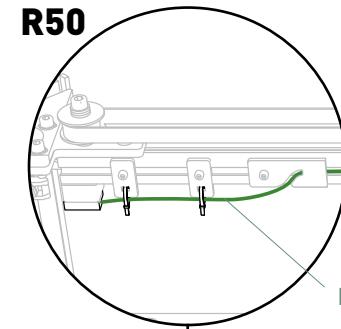
R50. Insert the Endstop Cable into the profile using the X-wire Inserter

R51. Colors are only illustrative.

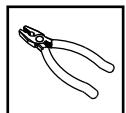
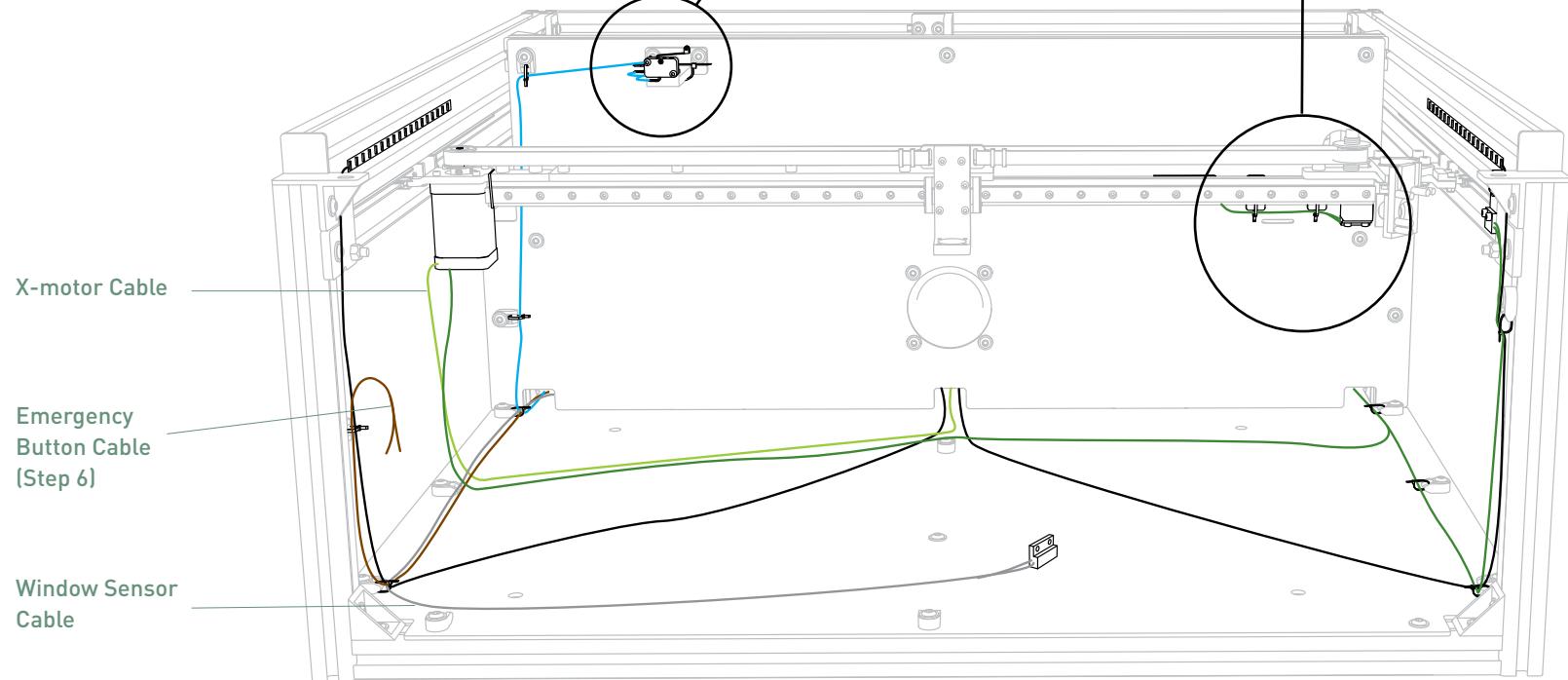
i H3. How to use Cable Ties? p.9



Cable Tie



Endstop Cable

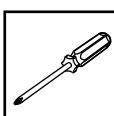
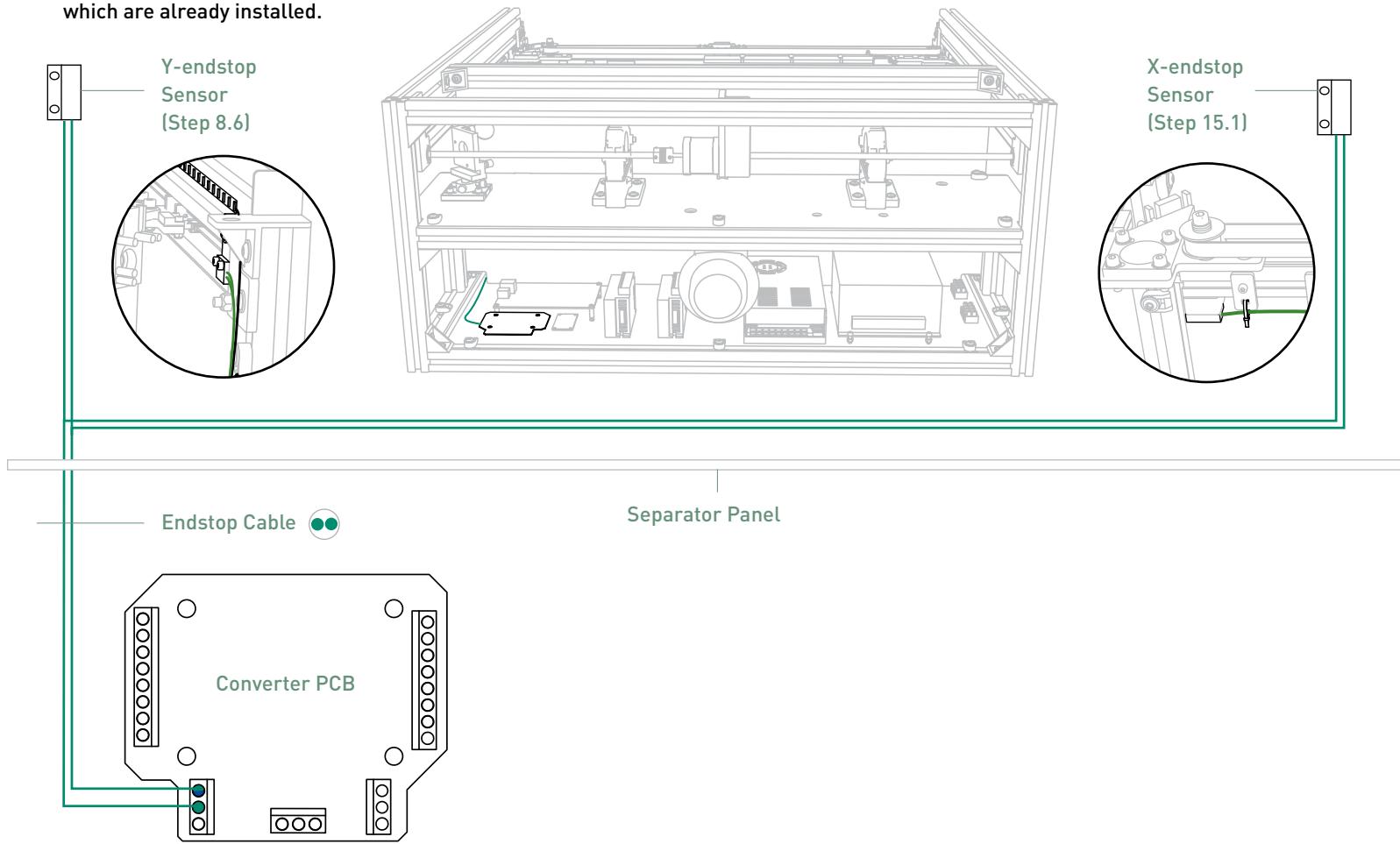


1x Small plier

STEP 16.2 WIRING 2

Step 16/33  10 min

- R52.** The Endstop Cable is attached to the Y-endstop and X-endstop, which are already installed.



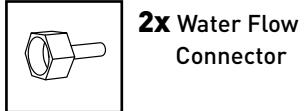
1x Screwdriver
Phillips

STEP 16.3 WIRING 3

Step 16/33  20 min



1x Water Flow Sensor

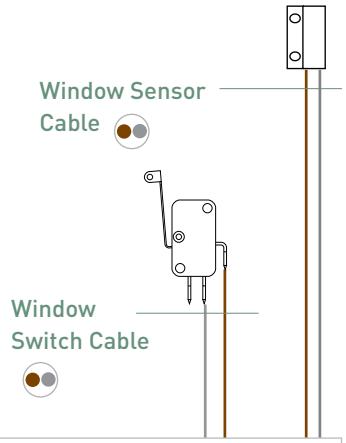
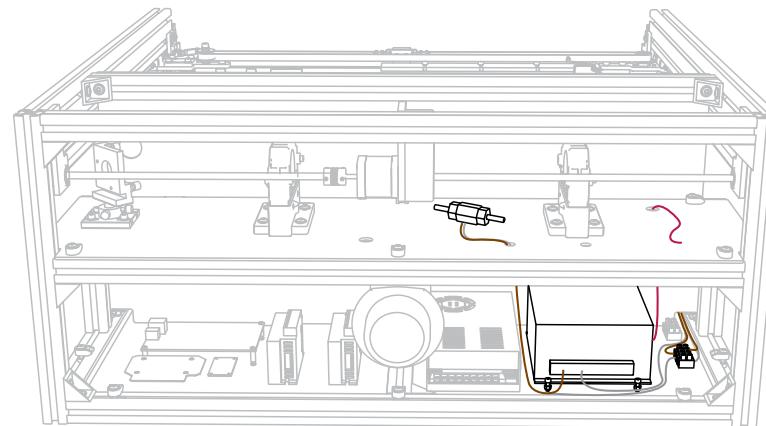
2x Water Flow
Connector



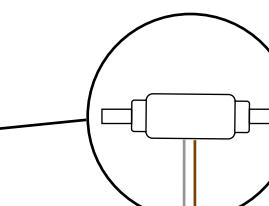
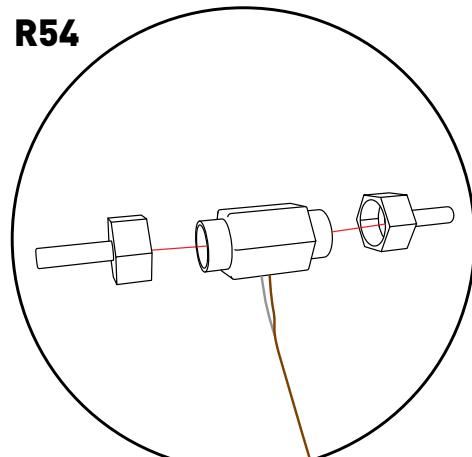
1x Teflon Tape

R53. The Laser Power Supply terminal can be removed to facilitate the wiring.
R54. Use Teflon tape to attach the Water Flow Connectors to the Water Flow Sensor.

i **H3.** How to use Cable Ties? p.9
H3. How to use Teflon Tape? p.12

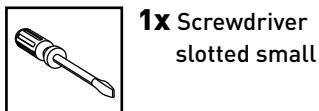
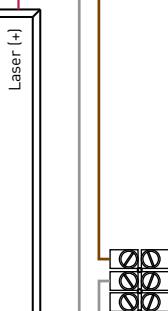
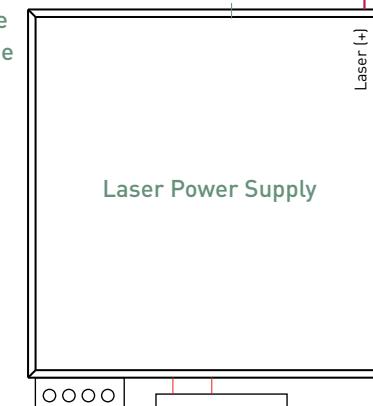


R54

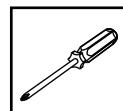


Waterflow
Sensor Cable


Laser (+) Cable
(attached to the
Laser Power
Supply)

1x Screwdriver
slotted small



1x Screwdriver
Phillips



1x Wrench 24

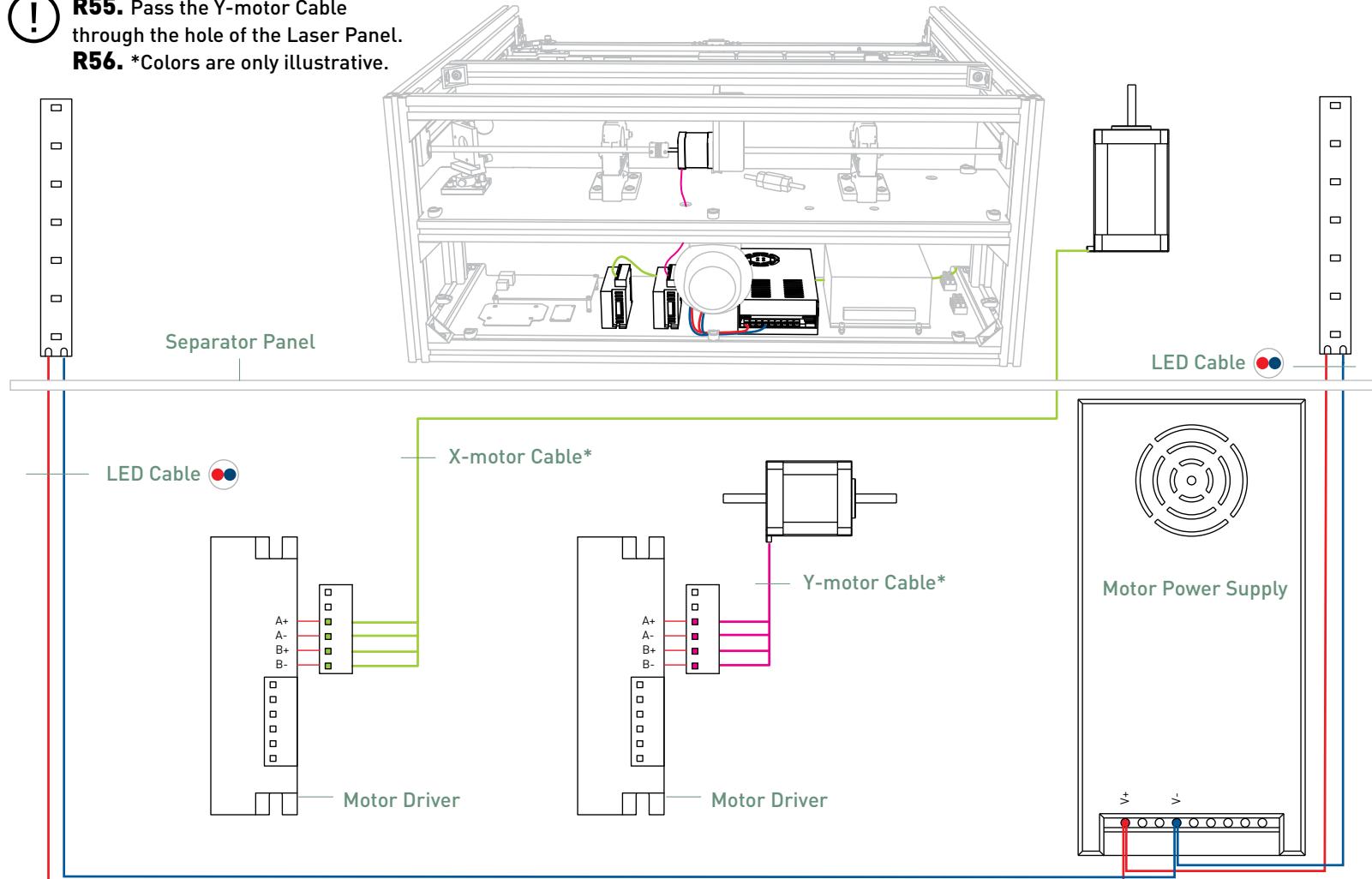
STEP 16.4 WIRING 4

Step 16/33  20 min

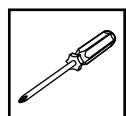


R55. Pass the Y-motor Cable through the hole of the Laser Panel.

R56. *Colors are only illustrative.



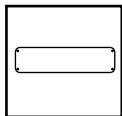
1x Screwdriver
slotted small



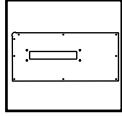
1x Screwdriver
Phillips

STEP 17.1 PREPARING THE SIDE PANELS

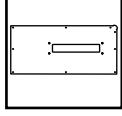
Step 17/33 ⏰ 20 min



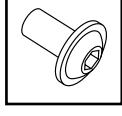
2x Air Panel



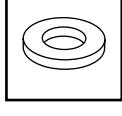
1x Right Panel



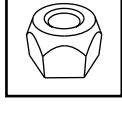
1x Left Panel



8x B-screw M6-20



24x Washer M6



8x Lock Nut M6

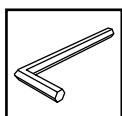
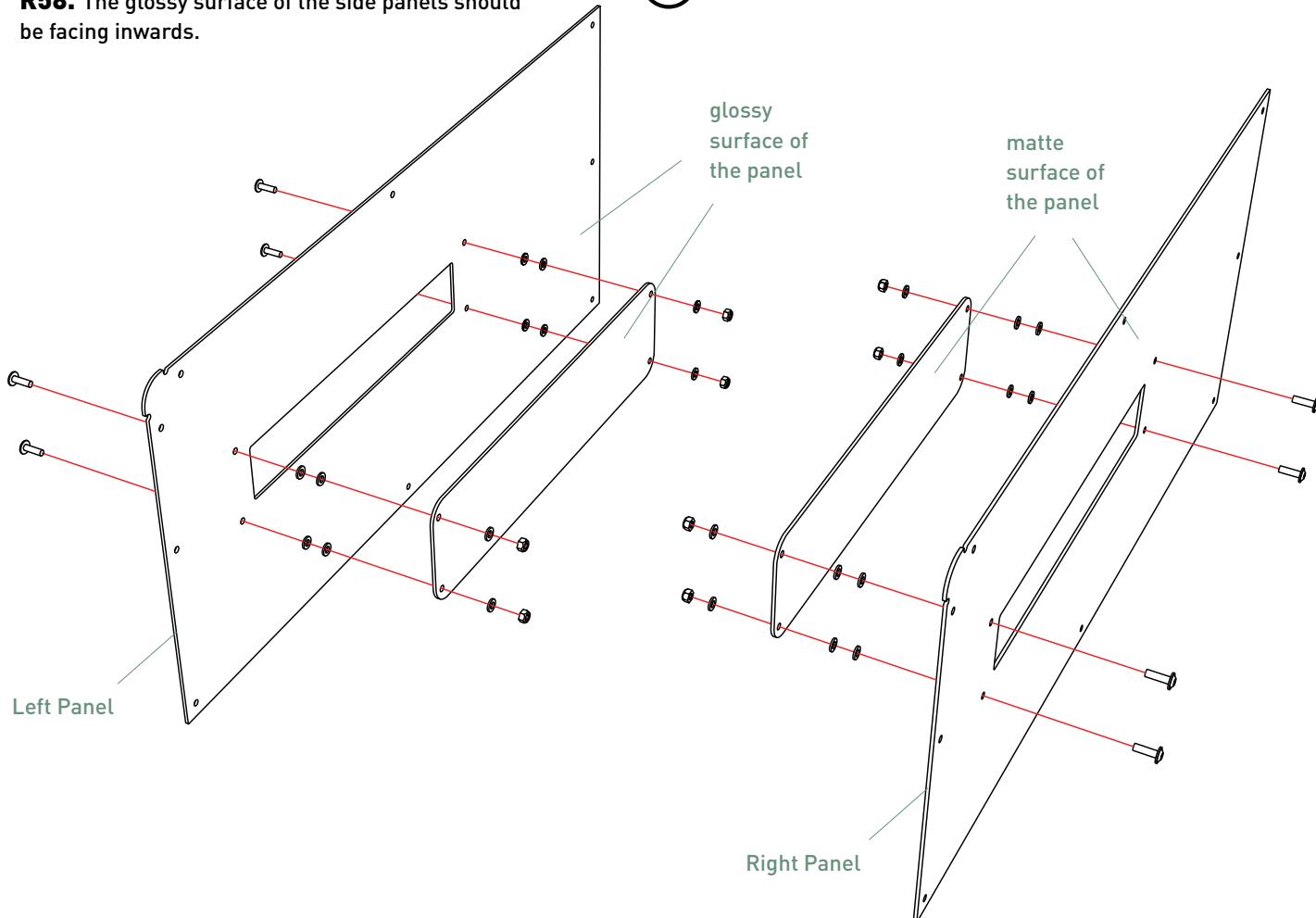


R57. Remove the protective foils from the panels.

R58. The glossy surface of the side panels should be facing inwards.



H2. How to tighten Lock Nuts? p.9



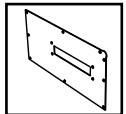
1x Allen Key 5



1x Wrench 10 **or**
1x Small plier

STEP 17.2 ATTACHING THE LEFT PANEL

Step 17/33 ⏰ 15 min



1x Prepared Left Panel
(Step 17.1)



9x B-screw M6-12



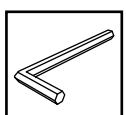
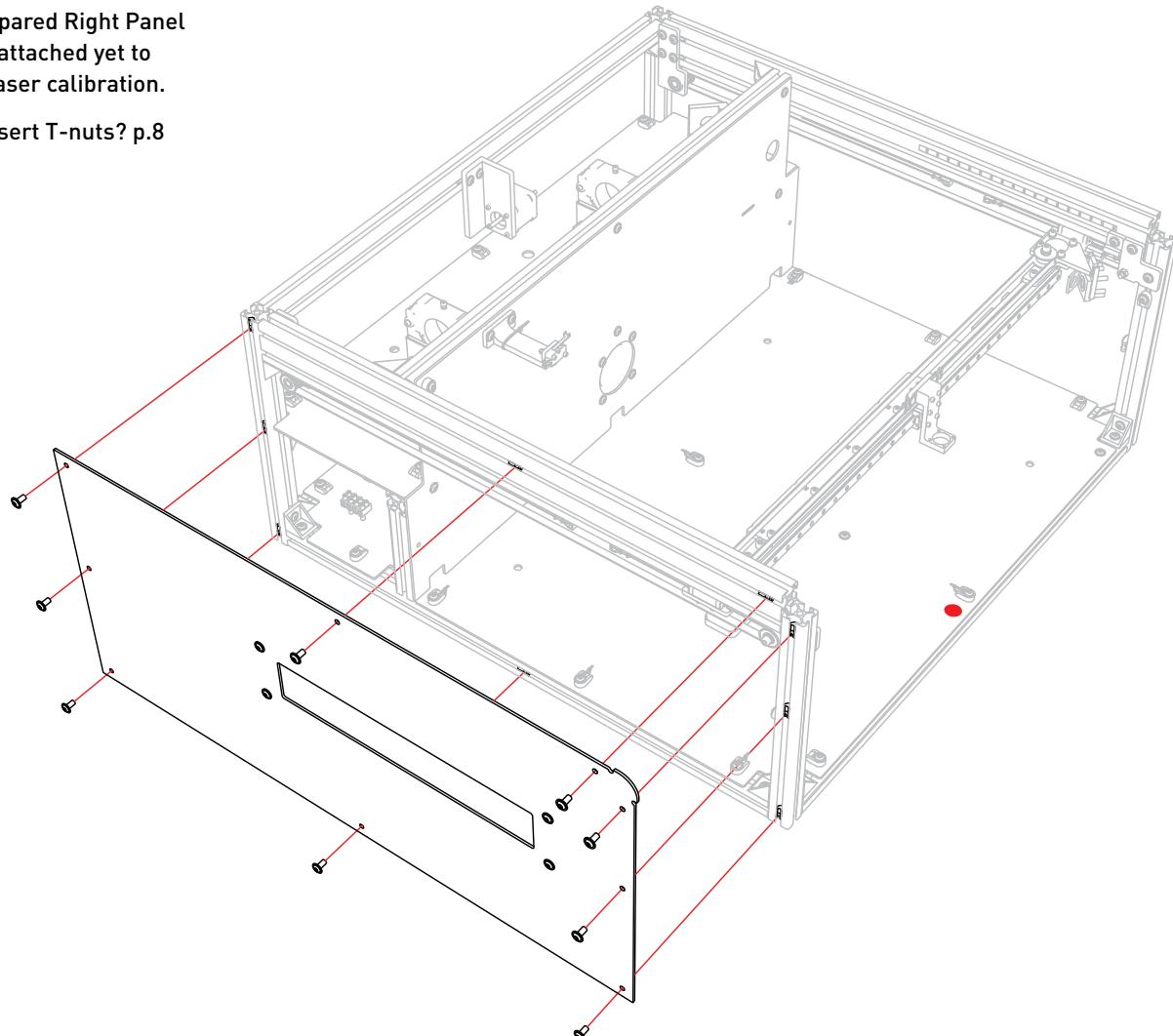
9x T-nut M6



R59. The Prepared Right Panel should not be attached yet to facilitate the laser calibration.



H1. How to insert T-nuts? p.8



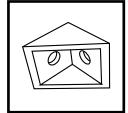
1x Allen Key 5

STEP 17.3 ATTACHING THE FILLETED PROFILE

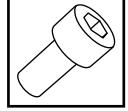
Step 17/33  30 min



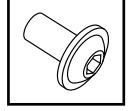
1x Profile Fillet



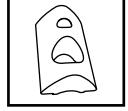
2x Front Bracket



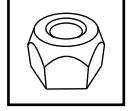
3x C-screw M3-12



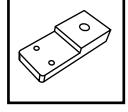
4x B-screw M6-12
1x B-screw M6-16



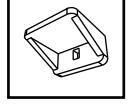
5x T-nut M6
1x T-nut M3



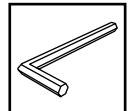
2x Lock Nut M3



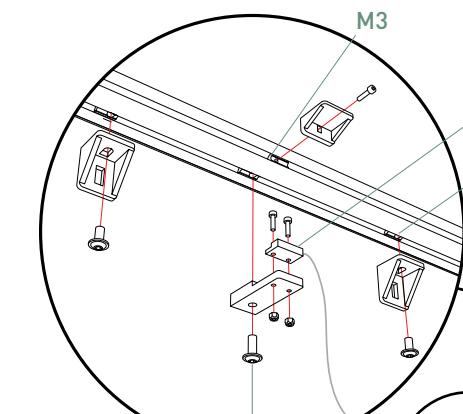
1x Window Sensor Holder



1x Front Window Holder



1x Allen Key 2.5
1x Allen Key 5

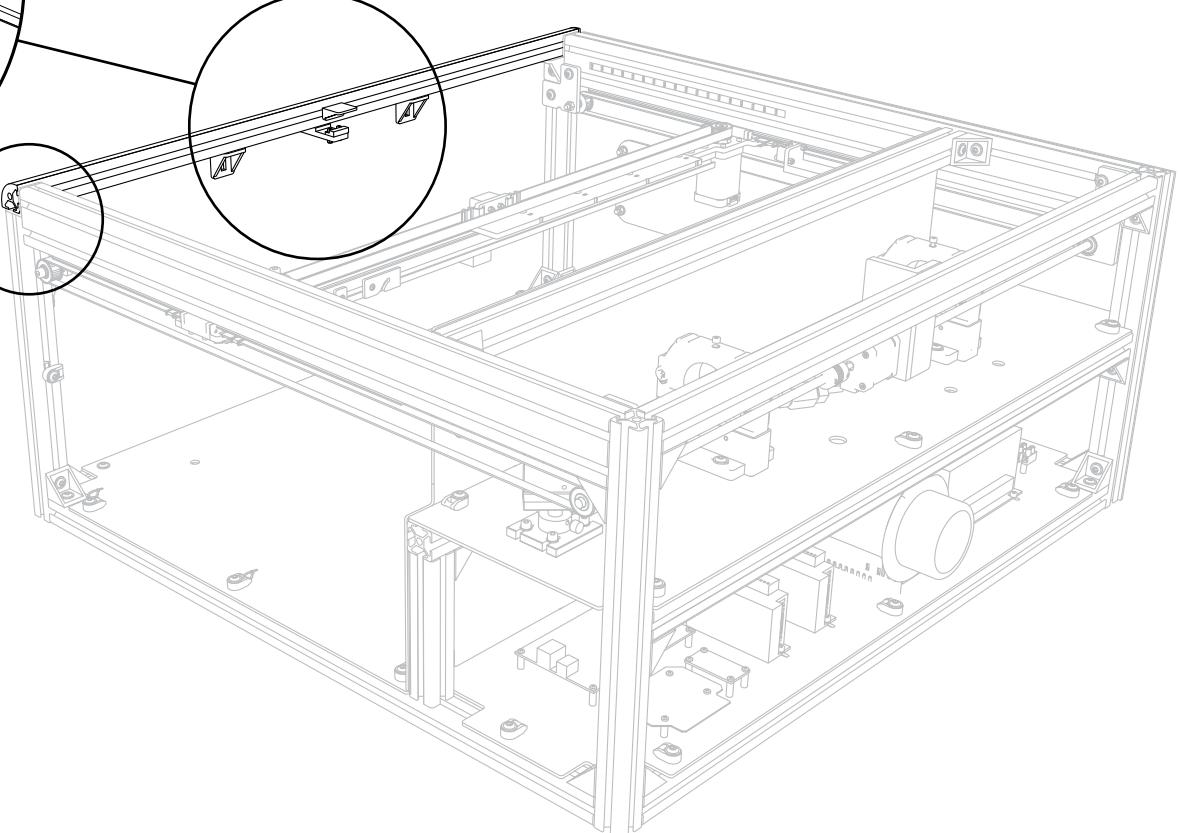
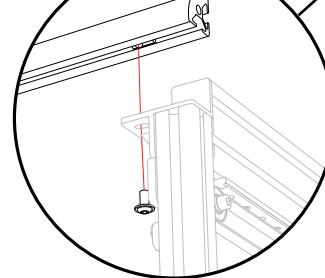


Window Sensor
(installed in step 16.1)

M6

M6-16

2x



1x Wrench 10 **or**
1x Small plier

STEP 17.4 ATTACHING THE FRONT PANEL

Step 17/33  20 min



1x Front Panel



7x B-screw M6-12
2x B-screw M6-16



7x T-nut M6



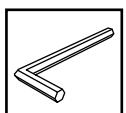
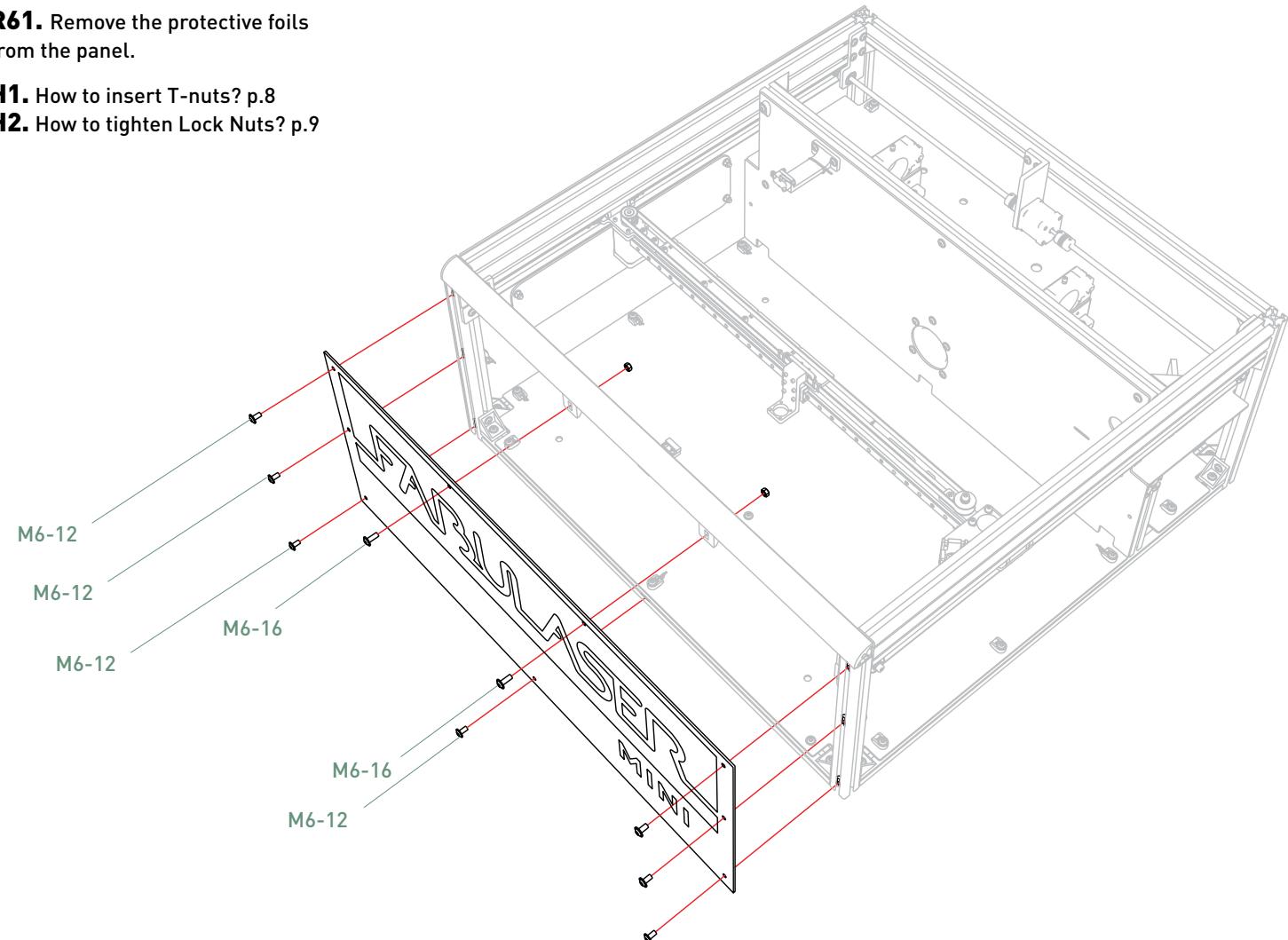
2x Lock Nut M6



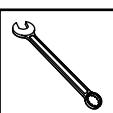
R61. Remove the protective foils from the panel.



H1. How to insert T-nuts? p.8
H2. How to tighten Lock Nuts? p.9



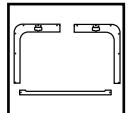
1x Allen Key 5



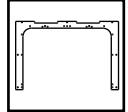
1x Small plier **or**
1x Wrench 10

STEP 18.1 PREPARING THE TOP PANELS

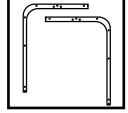
Step 18/33 ⏰ 45 min



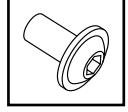
1x Sub Panels
(3 pieces - Left,
Right and Front)



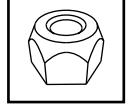
1x Top Front Panel



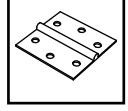
1x Spacers Panels
(2 pieces - Left
and Right)



11x B-screw M6-16
6x B-screw M6-20



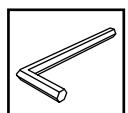
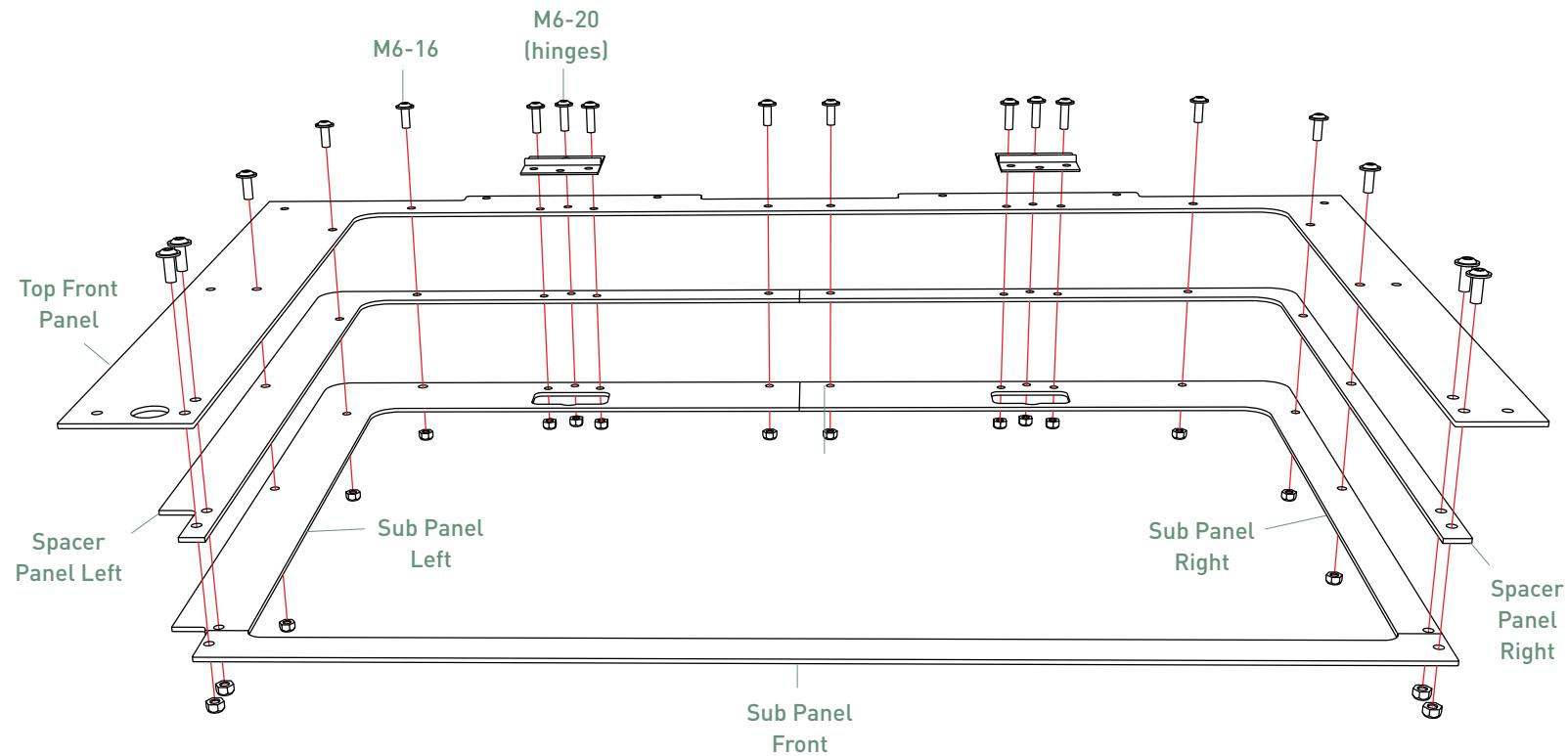
17x Lock Nut M6



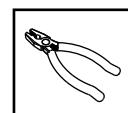
2x Hinge

! **R62.** Remove the protective foils from the panels.
R63. The glossy surface of the panels should be
facing down.

i **H2.** How to use Lock Nuts? p.9



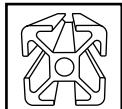
1x Allen Key 5



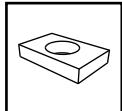
1x Small plier **or**
1x Wrench 10

STEP 18.2 PREPARING THE WINDOW FRAME

Step 18/33  10 min



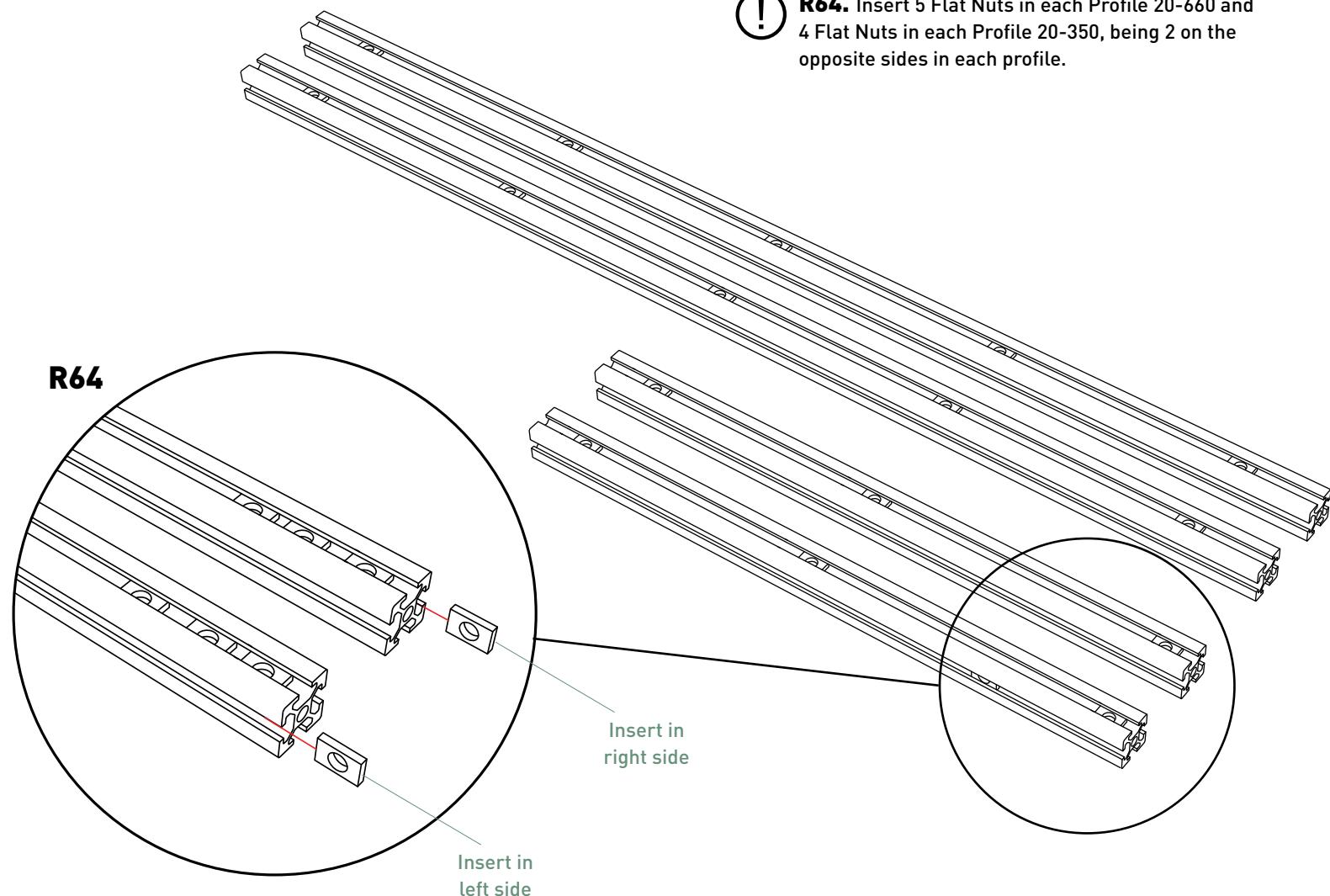
2x Profile 20-660
2x Profile 20-350



18x Flat Nut M6



R64. Insert 5 Flat Nuts in each Profile 20-660 and 4 Flat Nuts in each Profile 20-350, being 2 on the opposite sides in each profile.

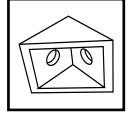


STEP 18.3 ASSEMBLING THE WINDOW FRAME

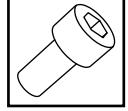
Step 18/33  30 min



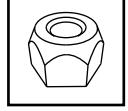
4x Prepared Profiles
(Step 18.2)



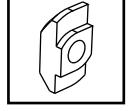
4x Bracket 20



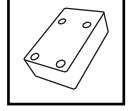
2x C-screw M3-16
2x C-screw M3-20
8x C-screw M4-8



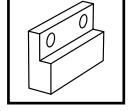
3x Lock Nut M3



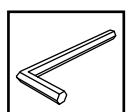
8x Hammer Nut M4
2x Hammer Nut M3



1x Window Magnet Holder



1x Window Magnet



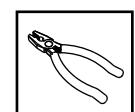
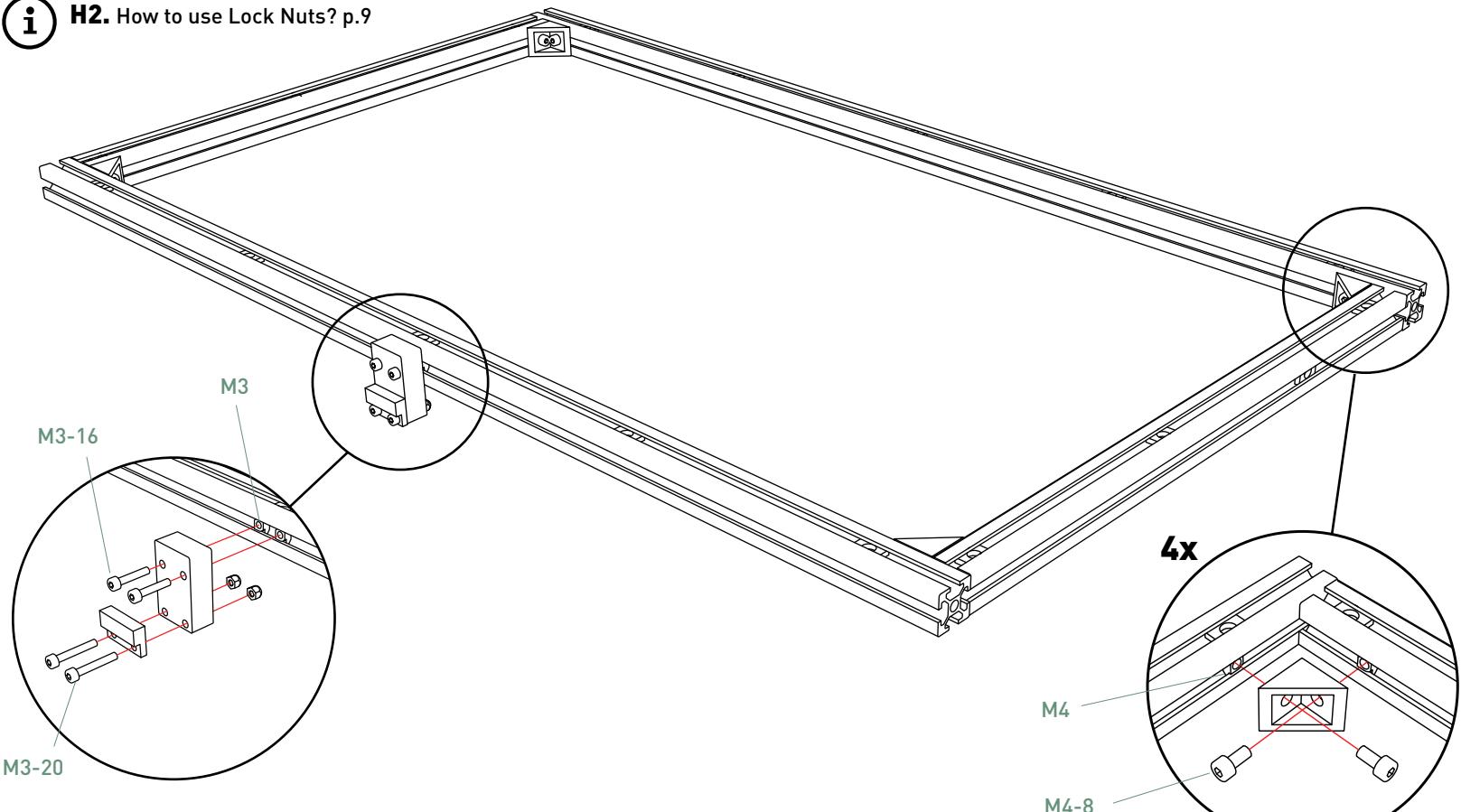
1x Allen Key 2.5
1x Allen Key 3



R65. Do not tighten the screws
of the Window Magnet Holder for
later adjustments.



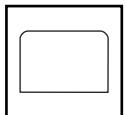
H2. How to use Lock Nuts? p.9



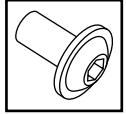
1x Small plier **or**
1x Wrench

STEP 18.4 ATTACH WINDOW TO FRAME

Step 18/33 ⏰ 20 min



1x Window



16x B-screw M6-10



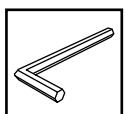
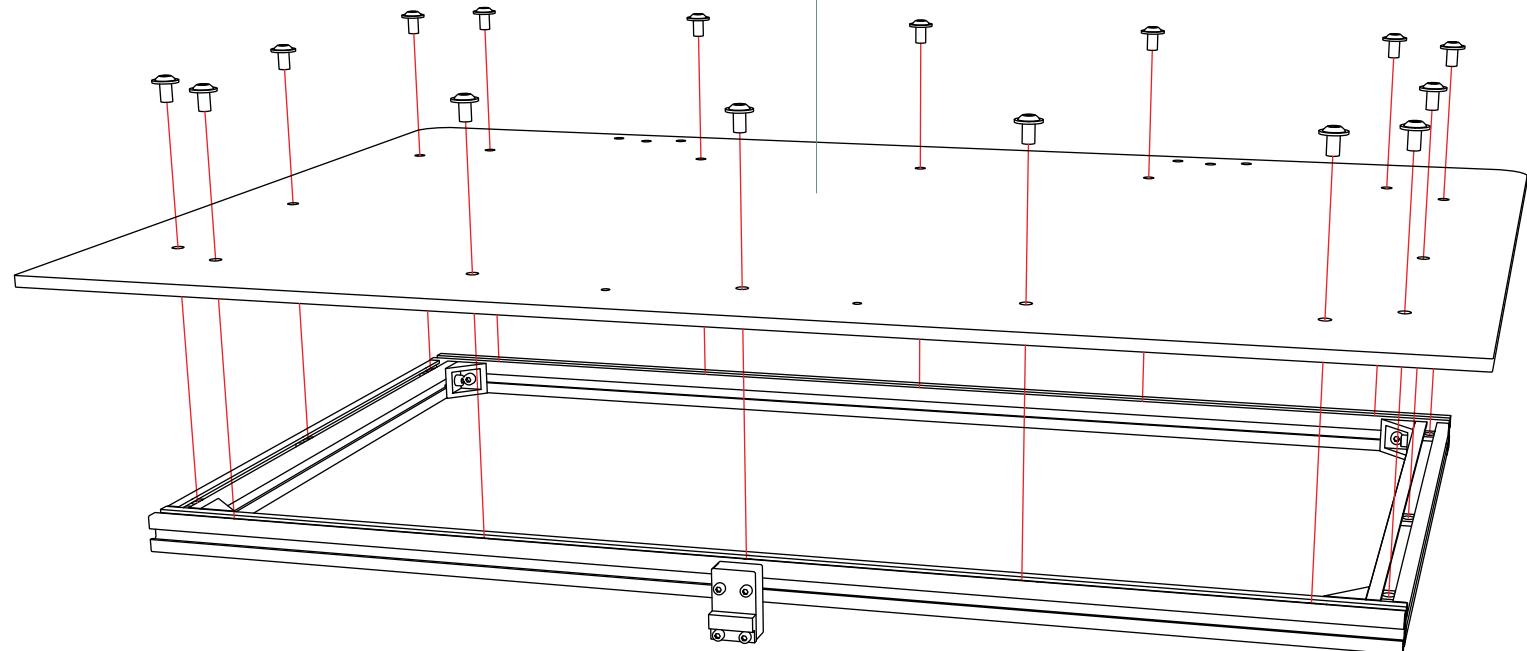
R66. Pay attention to the indication of top and bottom of the Window.

R67. Remove the protective foils of the Window.

R68. Be careful not to scratch the surface of the Window.

R69. Do not tighten the screws too hard. It might break the acrylic.

Top side

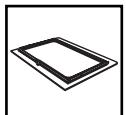


1x Allen Key 5

STEP 18.5 FIXING THE WINDOW

Step 18/33

⌚ 30 min



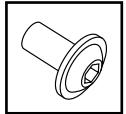
1x Prepared Window
(Step 18.4)



R70. Do not tighten the screws too hard.
It might break the acrylic.



1x Top Panel Set
(Step 18.1)



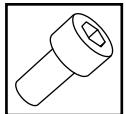
6x B-screw M6-16



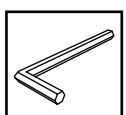
6x Lock Nut M6



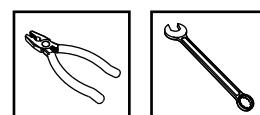
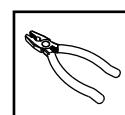
1x Handle



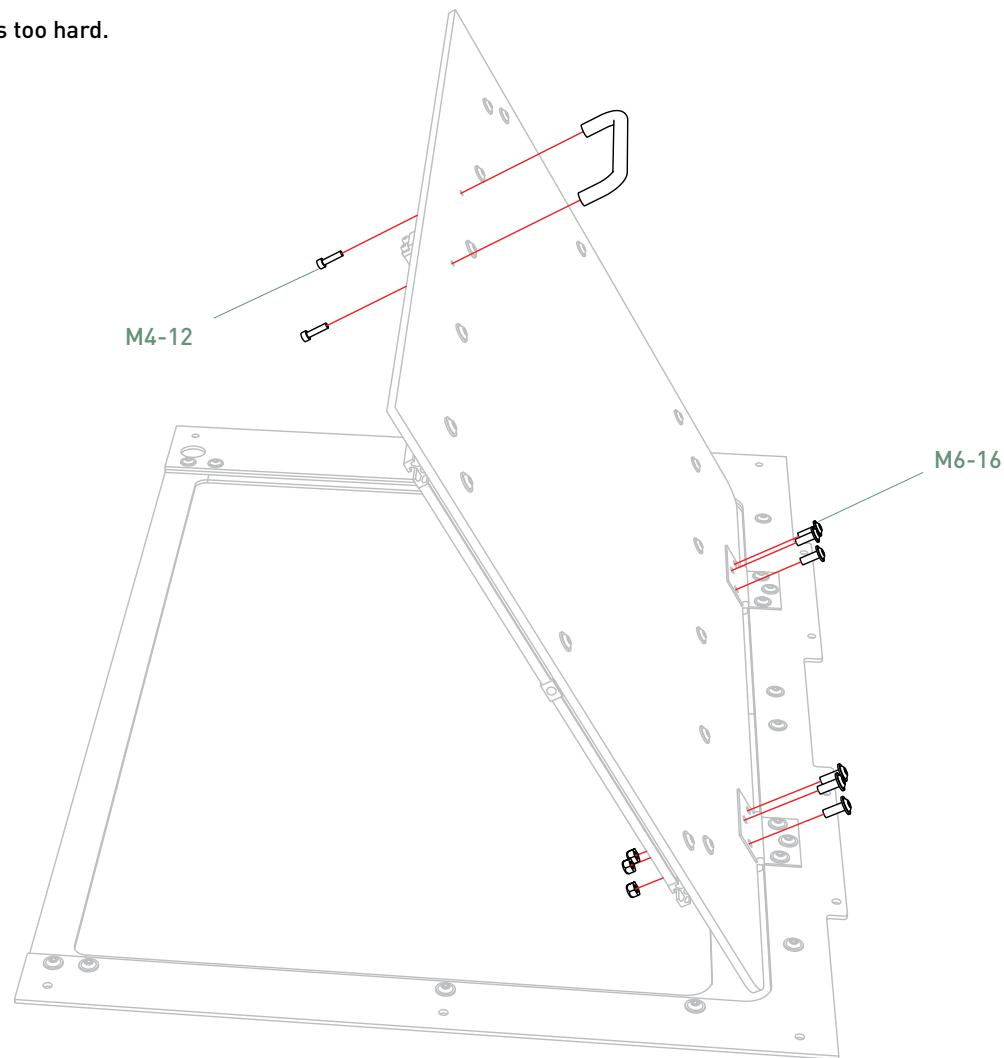
2x C-screw M4-12



1x Allen Key 3
1x Allen Key 5



1x Small plier **or**
1x Wrench 10



STEP 19.1 INSTALLING LASER TUBE

Step 19/33

⌚ 30 min

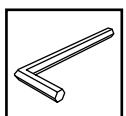
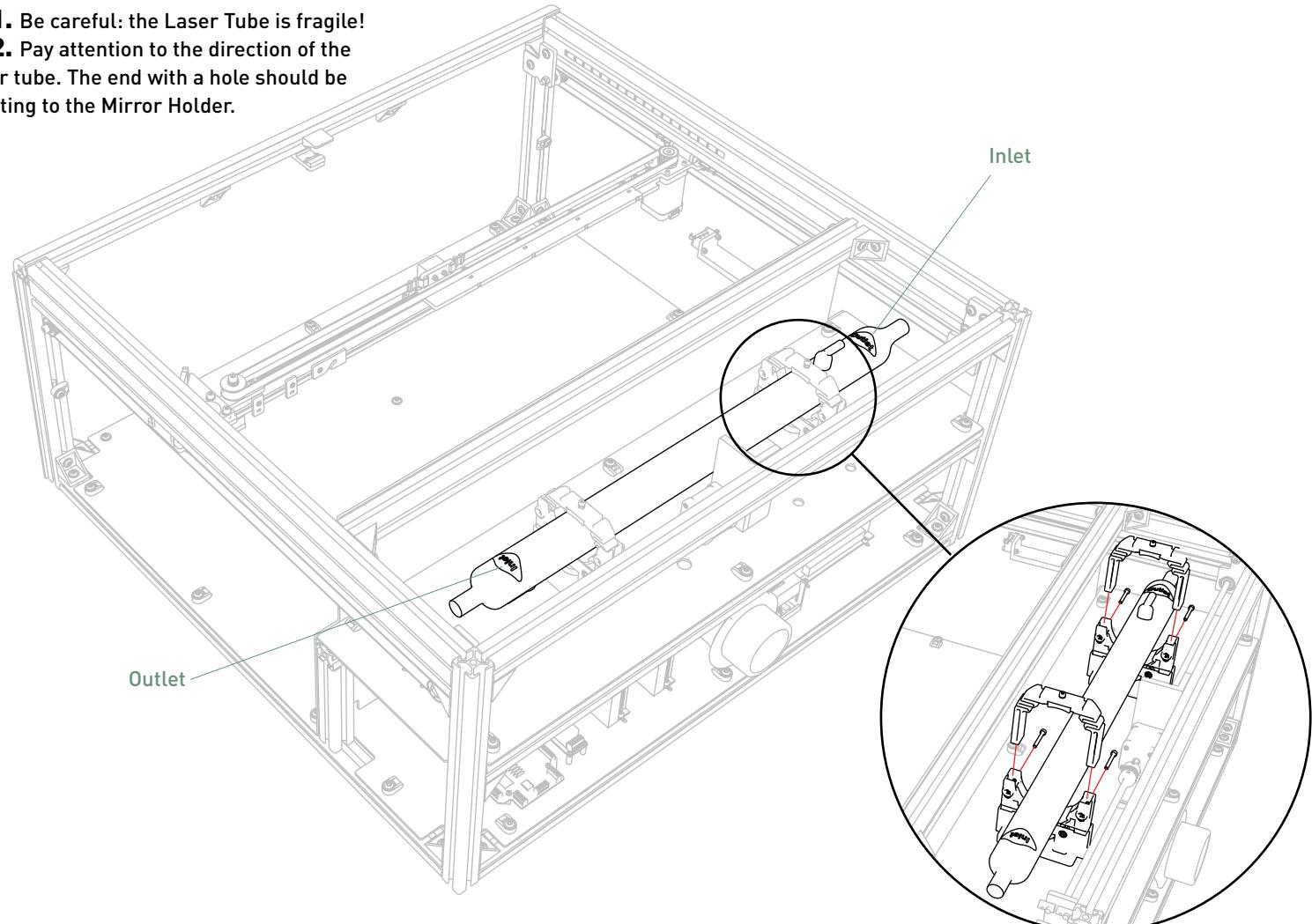


1x Laser Tube



R71. Be careful: the Laser Tube is fragile!

R72. Pay attention to the direction of the laser tube. The end with a hole should be pointing to the Mirror Holder.

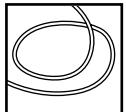


1x Allen Key 3

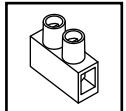
STEP 19.2 WIRING LASER TUBE

Step 19/33

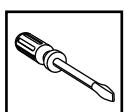
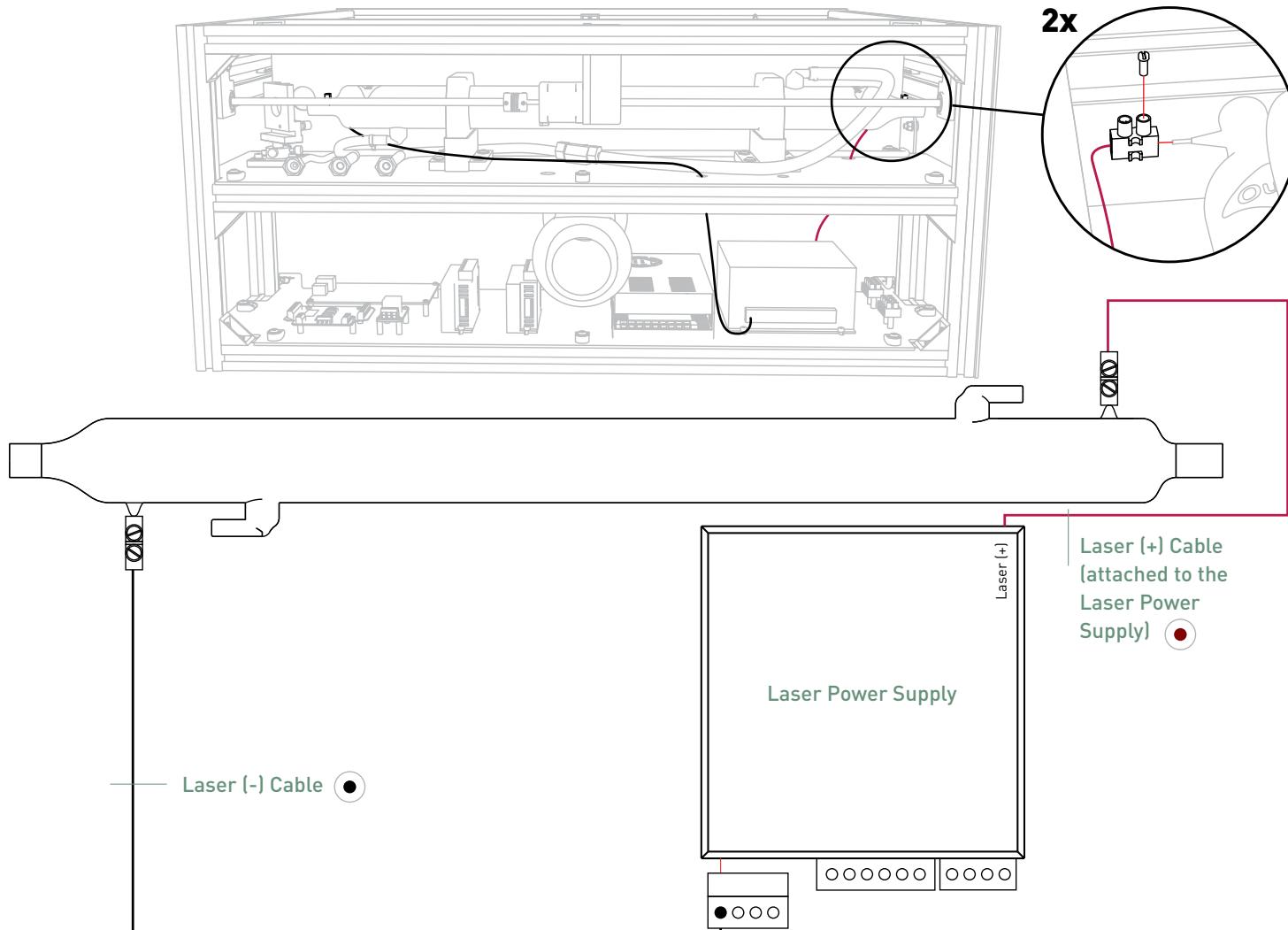
⌚ 15 min



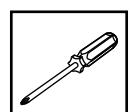
1x Laser (-) Cable



2x Laser Attachment



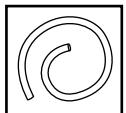
1x Screwdriver
slotted small



1x Screwdriver
Phillips

STEP 19.3 INSTALLING THE WATER AND AIR TUBES

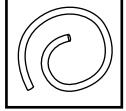
Step 19/33  25 min



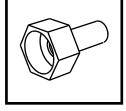
1x Water Outlet Tube
Inside



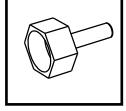
1x Water Inlet Tube
Inside (2 pieces)



1x Air Tube Inside



2x Water Connector
Inside



1x Air Connector
Inside



7x Cable Ties



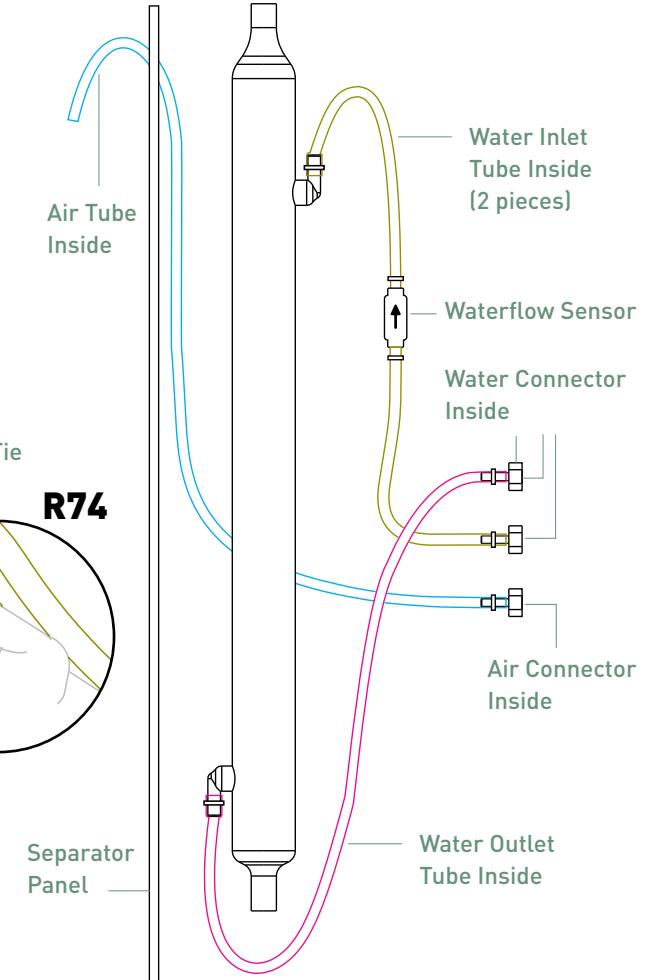
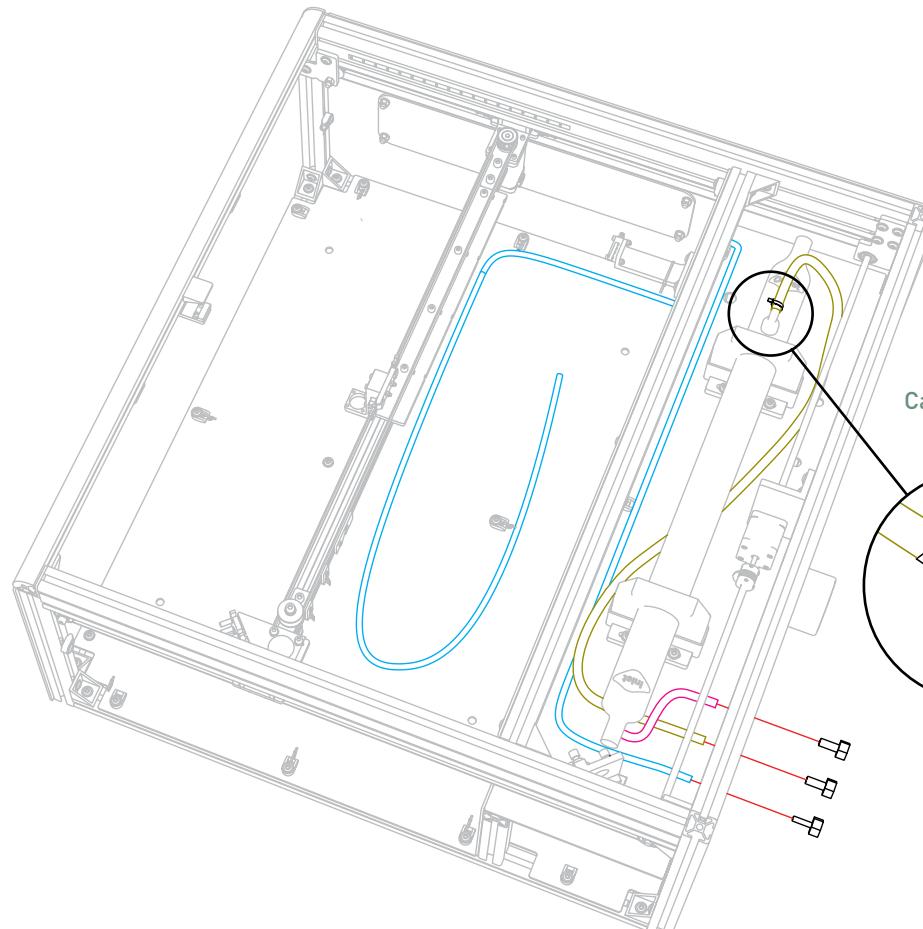
R73. Pay attention to the direction
of the Water Flow Sensor.

R74. Fix the tubes with Cable Ties.



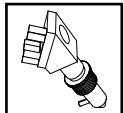
H3. How to use cable ties? p.9

H6. How to insert the tubes easily? p.12

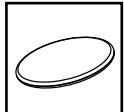


STEP 20.1 INSTALLING THE LASER HEAD

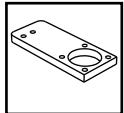
Step 20/33  15 min



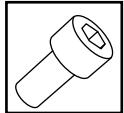
1x Laser Head



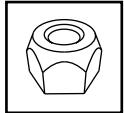
1x Mirror 20



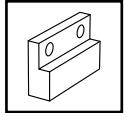
1x Chain End Holder



2x C-screw M3-12
4x C-screw M3-16



2x Lock Nut M3



1x X-magnet



R75. Do not touch the mirrored surface!

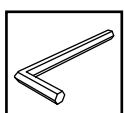
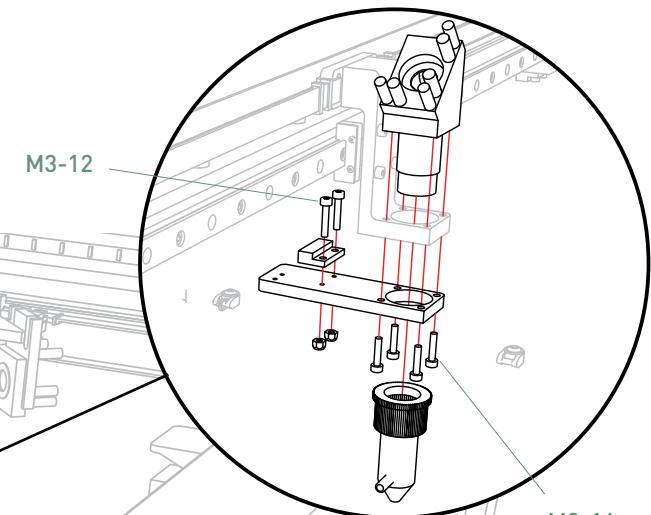
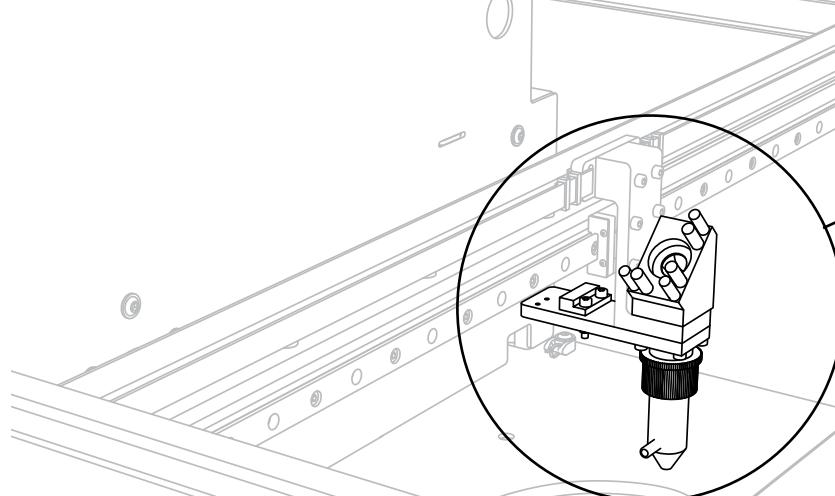
R76. Insert the mirror in the Laser Head.



H2. How to use Lock Nuts? p.9

H8. How to hold the mirror? p.12

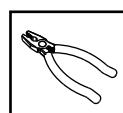
H9. How to insert the mirror? p.13



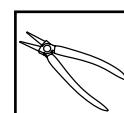
1x Allen Key 2.5



1x Wrench 5.5



1x Small plier



1x Needle Nose Pliers

STEP 20.2 INSTALLING THE CHAIN

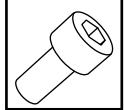
Step 20/33  15 min



1x Chain



4x Cable Ties



2x C-screw M3-12



2x Lock-nut M3



R77. Remove the excess segments of the Chain.

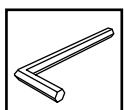
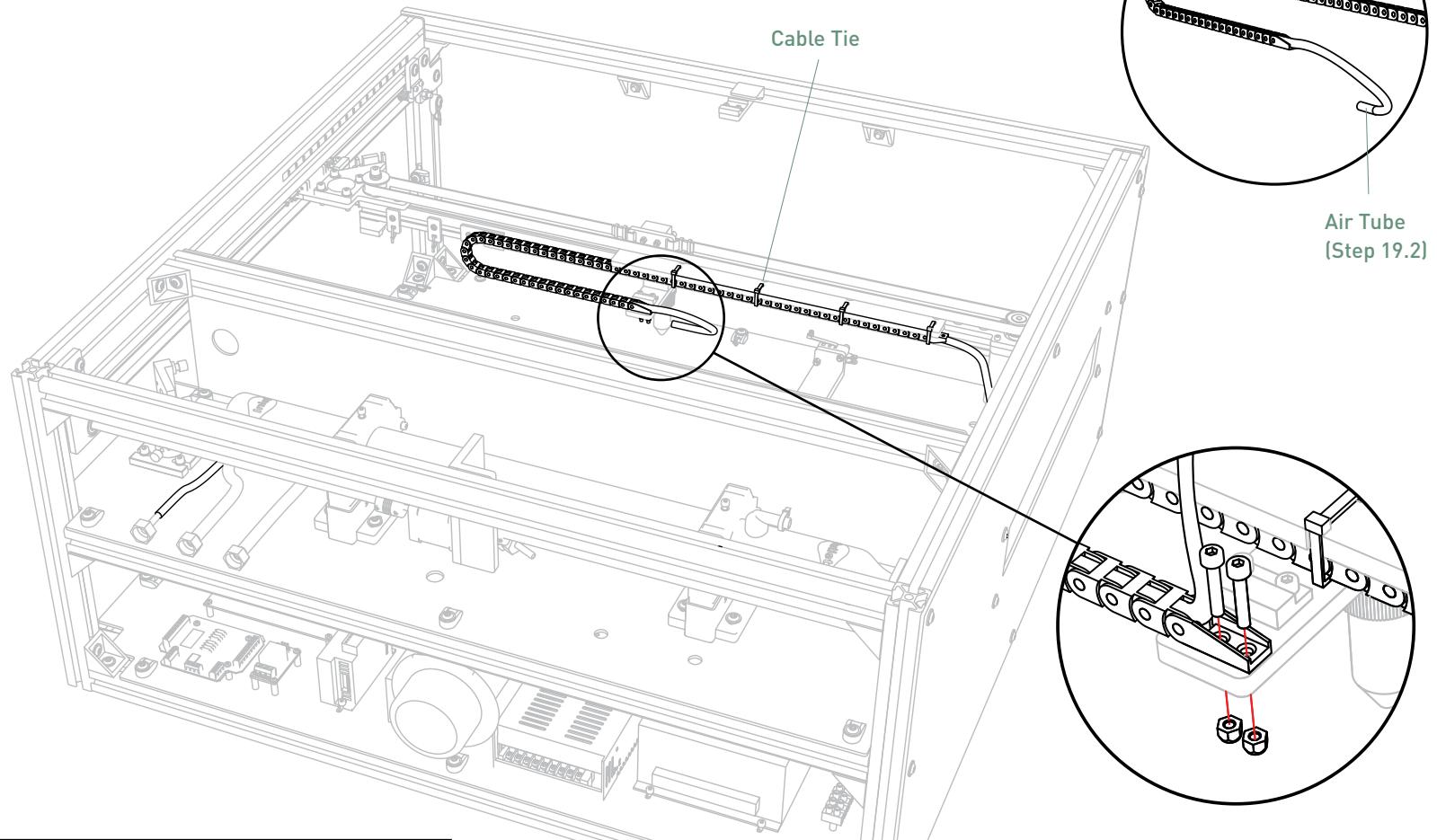
R78. Insert the Air Tube in the Chain.

R79. Make sure the length of the tube is good for the movements of the X-Axis and cut the excess.

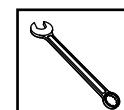
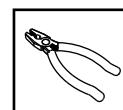


H2. How to use Lock Nuts? p.9

H3. How to use cable ties? p.9



1x Allen Key 3
1x Allen Key 5

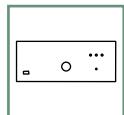


1x Small plier **or**
1x Wrench 10

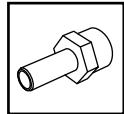
STEP 21.1 PREPARING BACK PANEL - CONNECTORS

Step 21/33

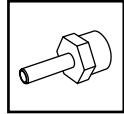
⌚ 15 min



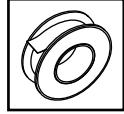
1x Back Panel



2x Water Connector Outside



1x Air Connector Outside



1x Teflon Tape

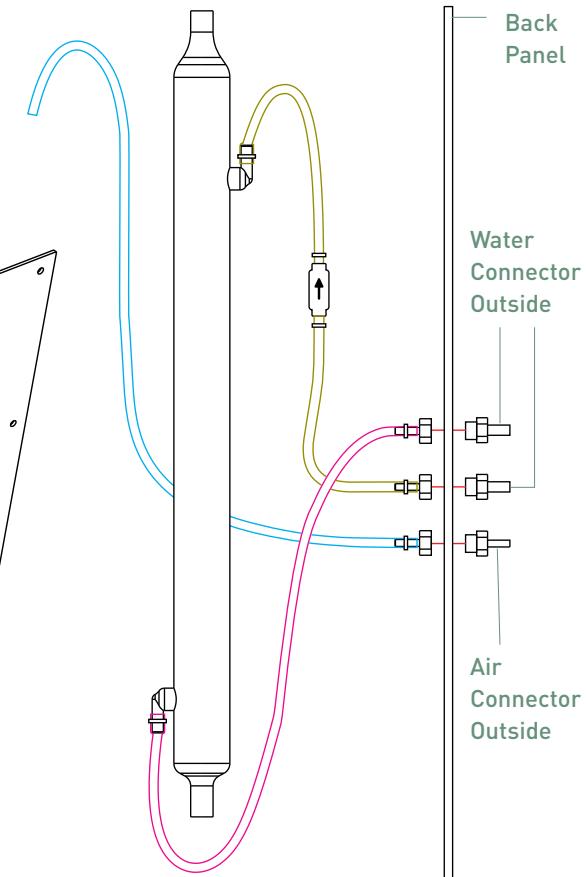
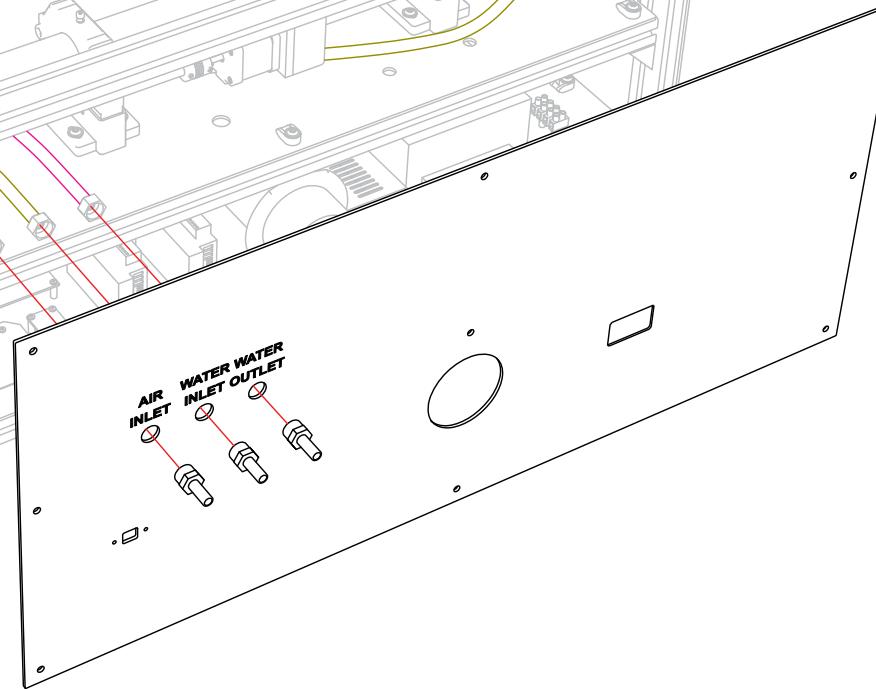
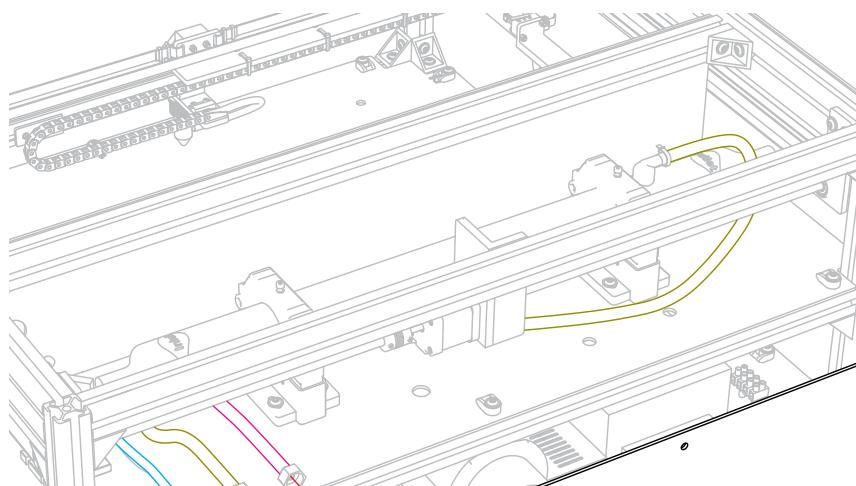


R80. Remove the protective foils of the panel.

R81. Use the Teflon tape on the connectors



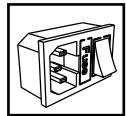
H7. How to use Teflon tape? p.12



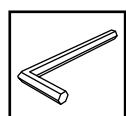
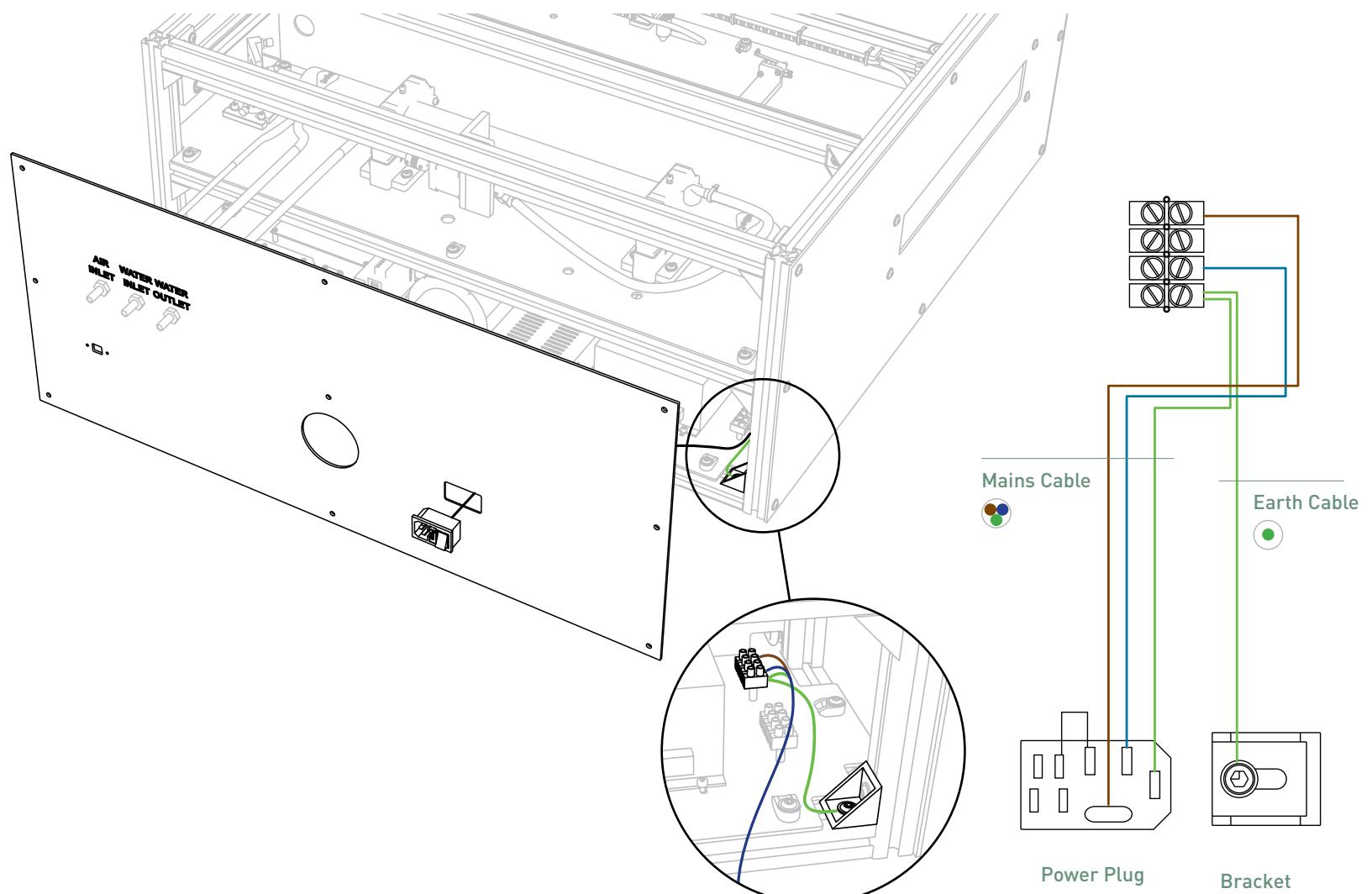
STEP 21.2 PREPARING BACK PANEL - POWER PLUG

Step 21/33

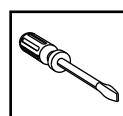
⌚ 30 min



1x Power Plug +
Mains Cable +
Earth Cable



1x Allen Key 1.5
1x Allen Key 3
1x Allen Key 5

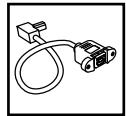


1x Screwdriver
slotted small

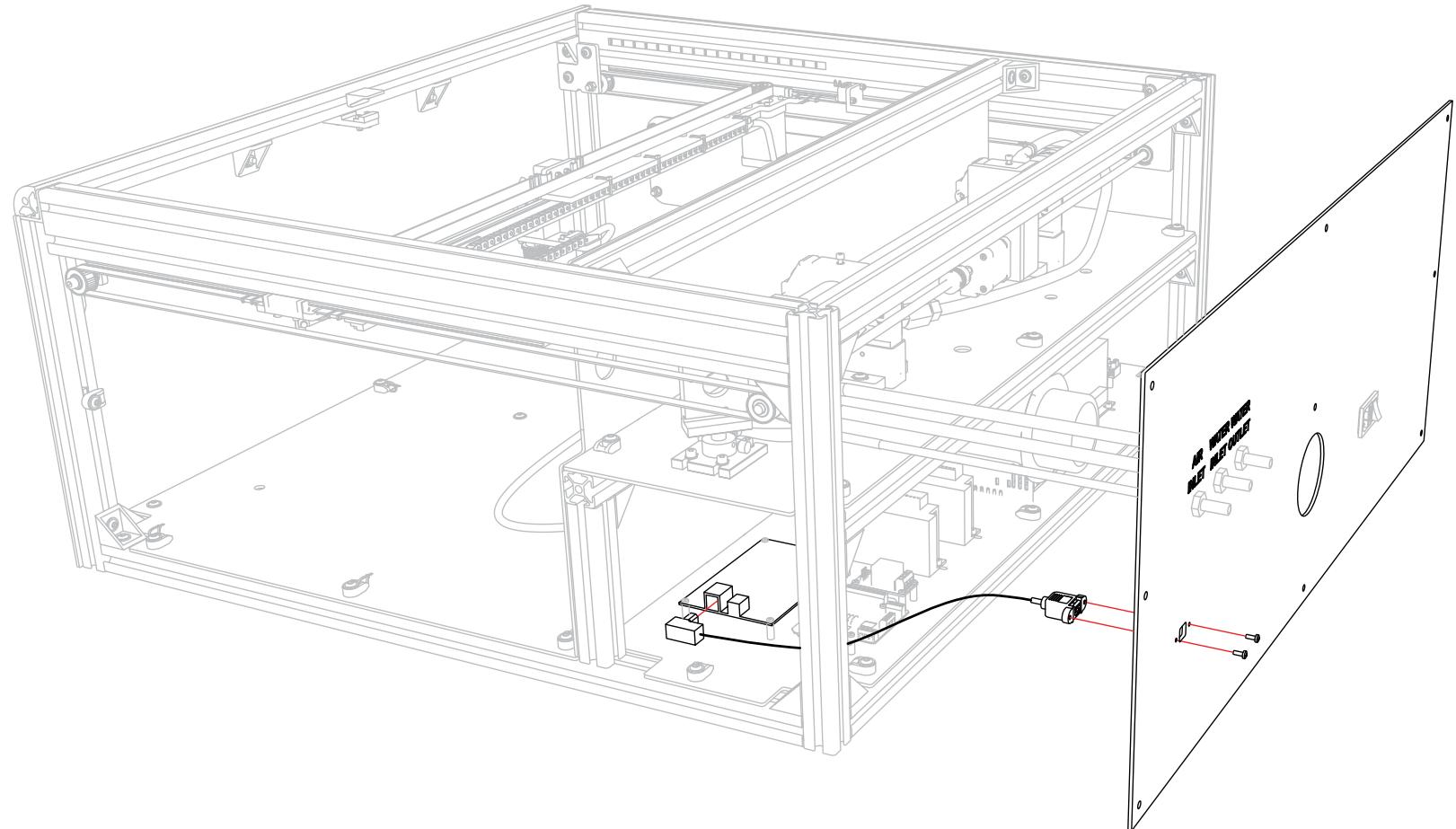
STEP 21.3 PREPARING BACK PANEL - USB

Step 21/33

⌚ 15 min



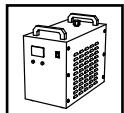
1x USB Cable Inside



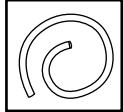
1x Screwdriver
Phillips

STEP 22. CONNECTING THE CHILLER

Step 22/33 ⏰ 20 min



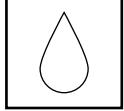
1x Water Chiller



2x Water Tube
Outside



4x Cable Ties



1x 5L distilled water
(not included)



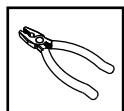
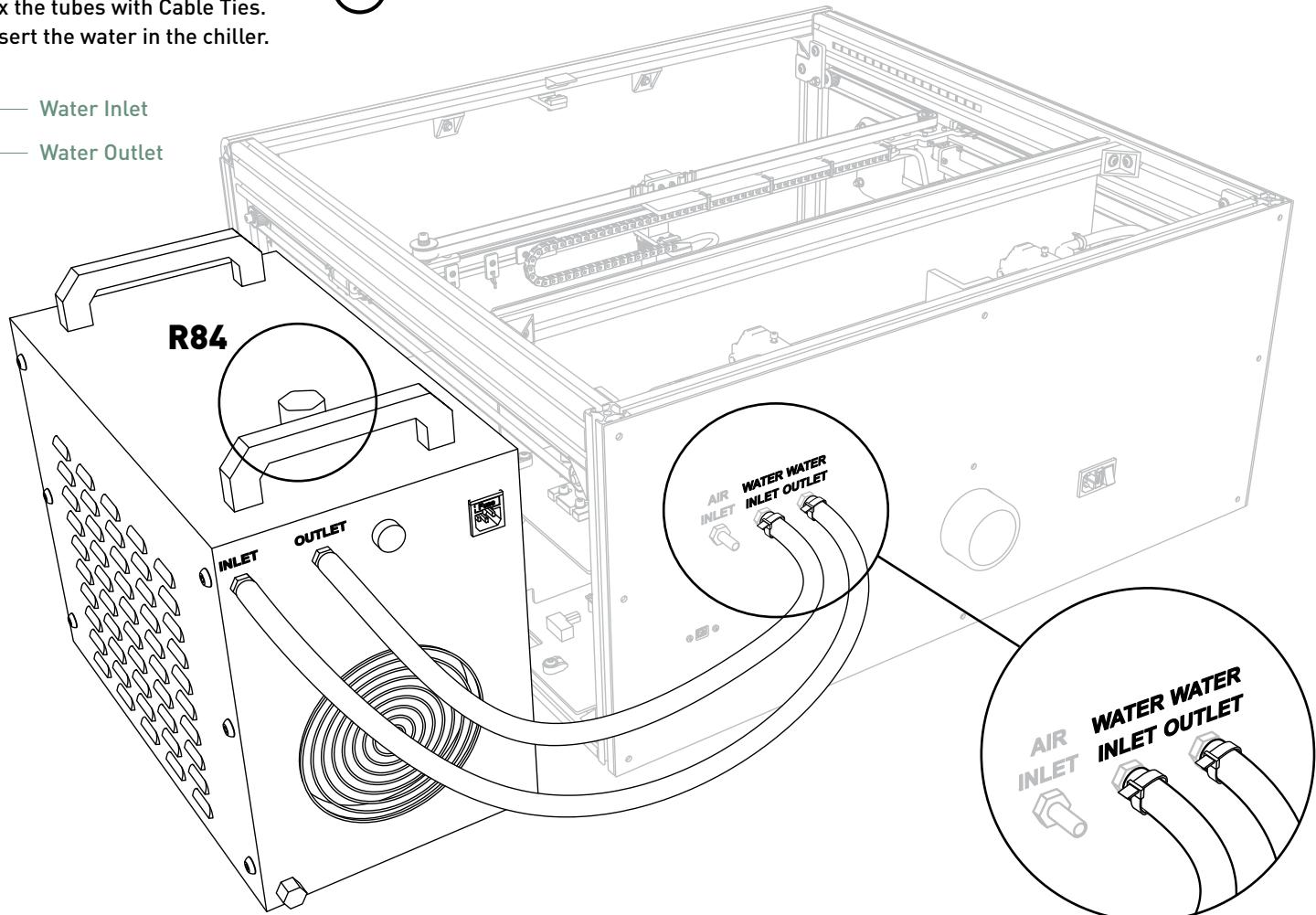
- R82.** Connect inlet to outlet.
- R83.** Fix the tubes with Cable Ties.
- R84.** Insert the water in the chiller.



- H7.** How to use Teflon tape? p.12

Chiller Outlet — Water Inlet

Chiller Intlet — Water Outlet



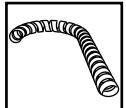
1x Small plier



1x Wrench 19

STEP 23.1 ORGANIZING THE WIRES - FRONT

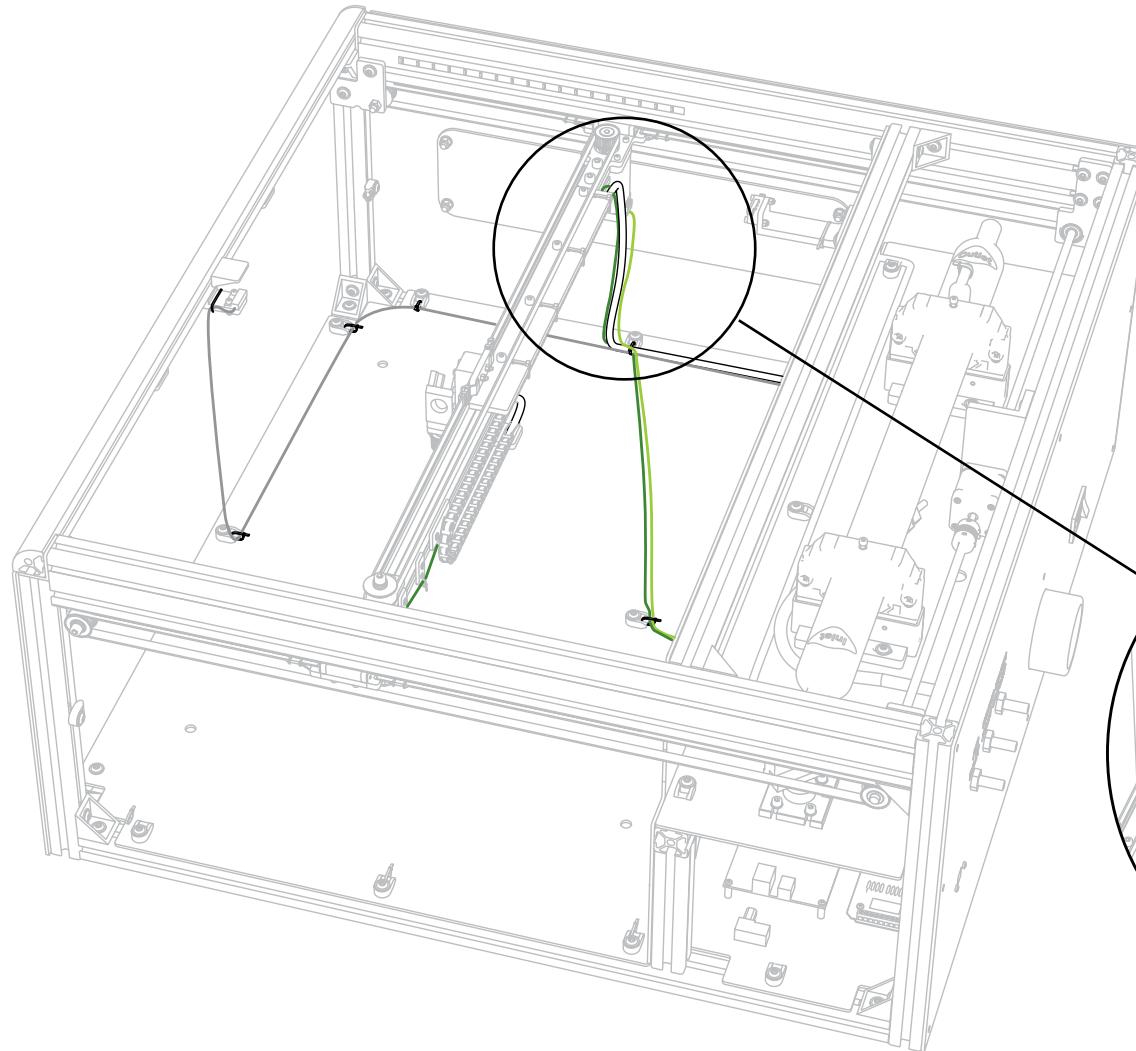
Step 23/33  20 min



1x Cable Wrapper



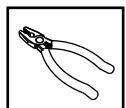
6x Cable Tie



R85. Make sure the X-axis can move freely without stressing the wires, then tighten the cable ties and cover the moving wires and tube with the cable wrapper.

R86. Make sure nothing is crossing the laser path.

R87. Tighten all cable ties in the front.



1x Small plier

STEP 23.2 ORGANIZING THE WIRES - BACK

Step 23/33

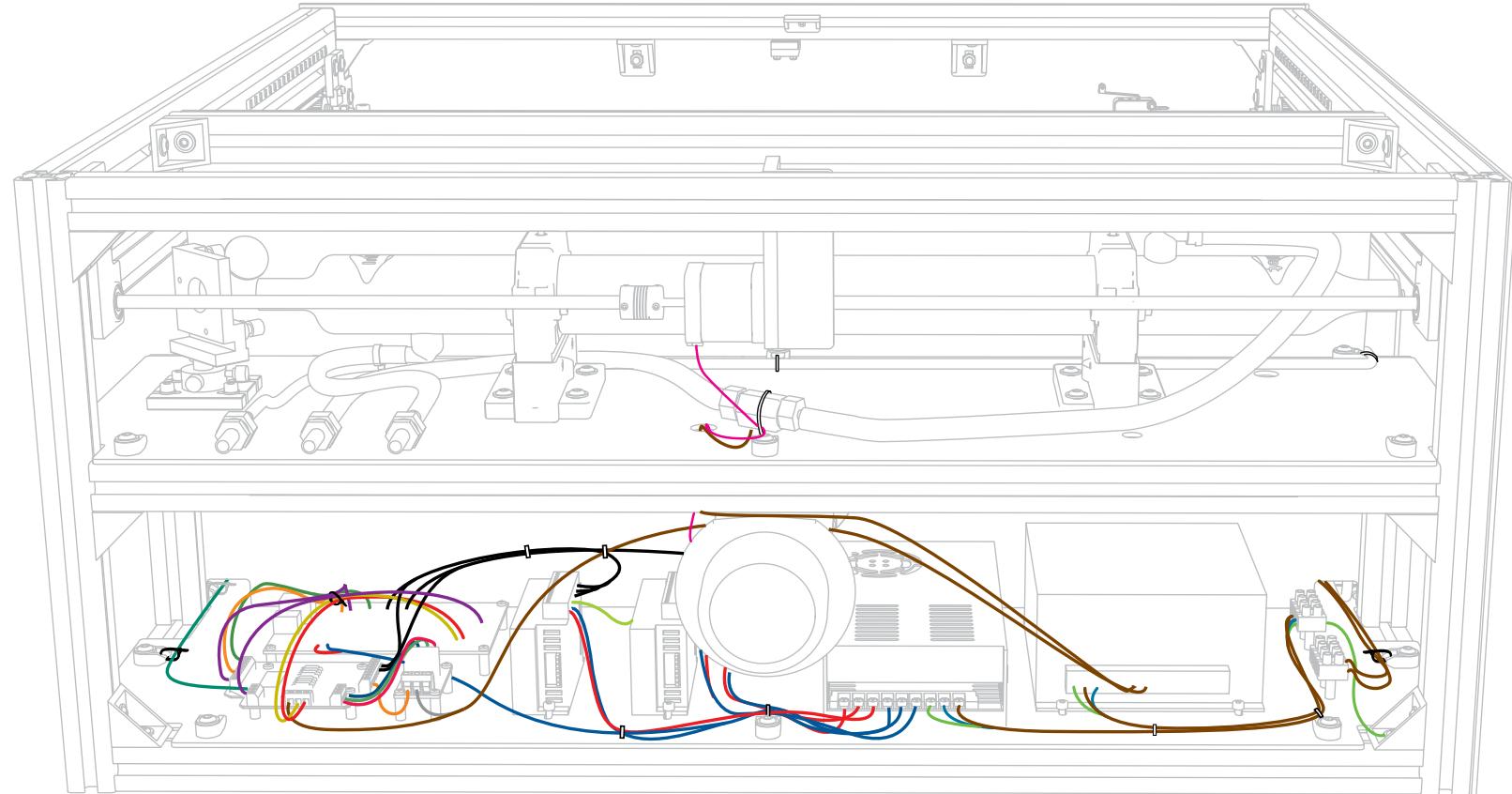
⌚ 15 min



10x Cable Ties



R88. Separate logic and power cables as much as possible to avoid interference.



1x Small plier

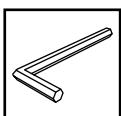
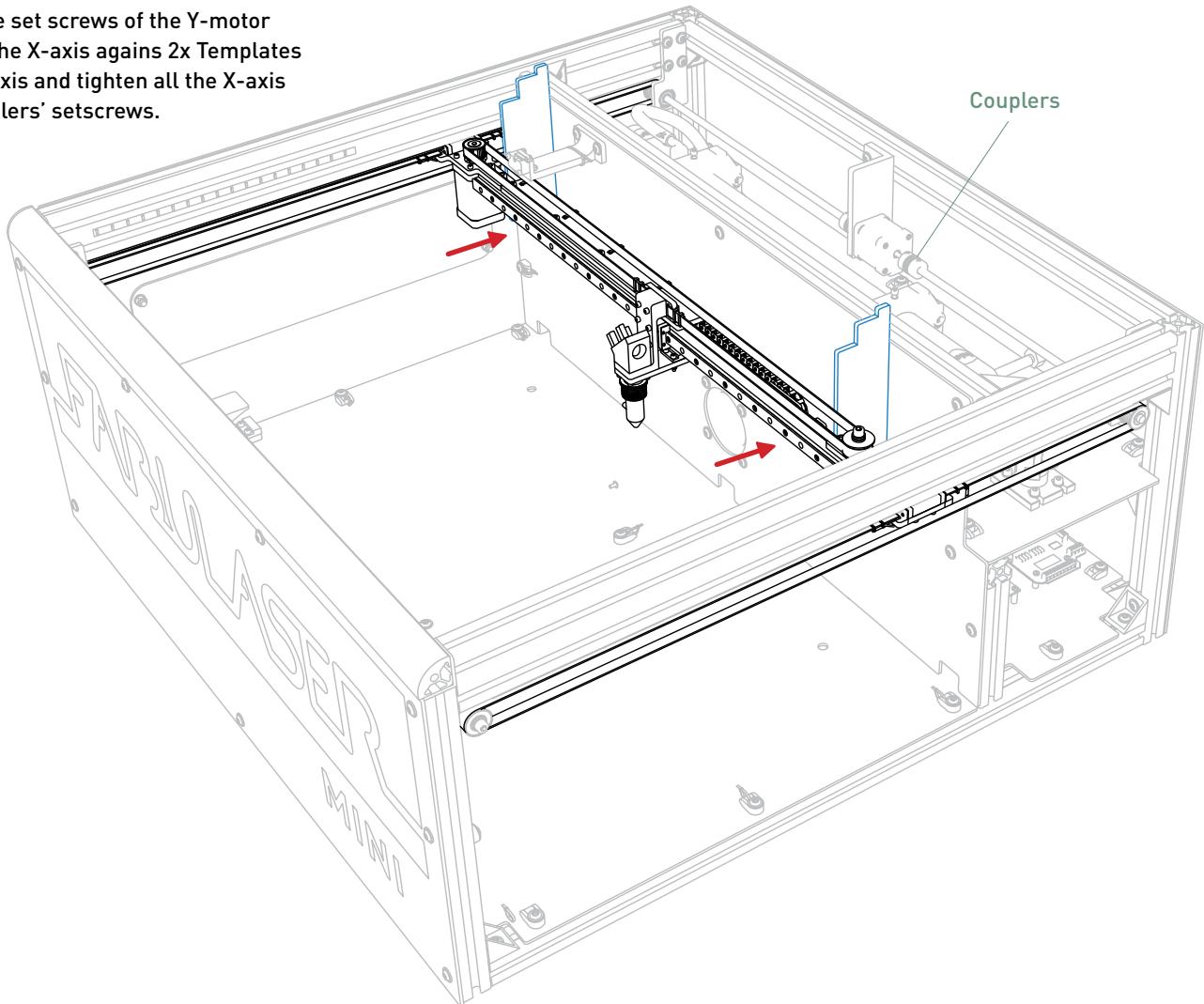
STEP 24. ALIGNING THE Y-AXIS

Step 24/33

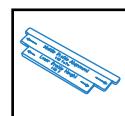
⌚ 15 min



R89. Loosen the set screws of the Y-motor Couplers. Push the X-axis against 2x Templates 2 to align the Y-axis and tighten all the X-axis screws and Couplers' setscrews.



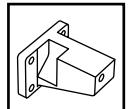
1x Allen Key 1.5
1x Allen Key 3
1x Allen Key 5



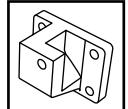
2x Template 2

STEP 25. INSTALLING THE PISTONS

Step 25/33  40 min



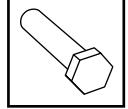
1x Piston Support Left



1x Piston Support Right



1x Window Piston Left
1x Window Piston Right



1x H-screw M6-30
1x H-screw M6-60



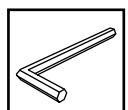
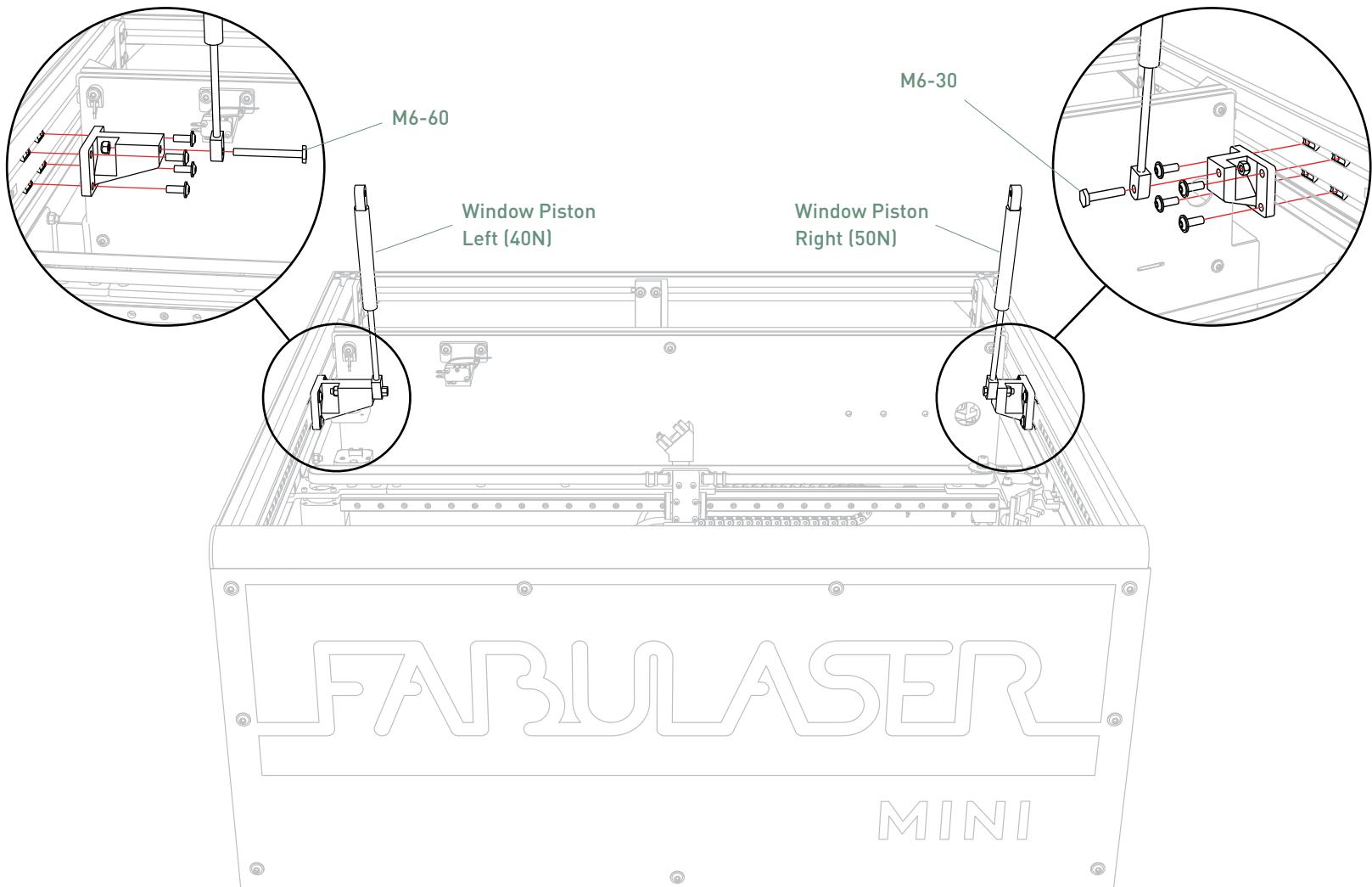
8x B-screw M6-16



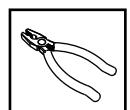
8x T-nut M6



2x Lock Nut M6



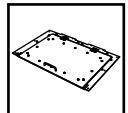
1x Allen Key 3
1x Allen Key 5



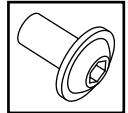
1x Small plier **or**
1x Wrench 10

STEP 26.1 INSTALLING TOP PANELS SET

Step 26/33  20 min



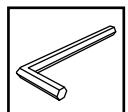
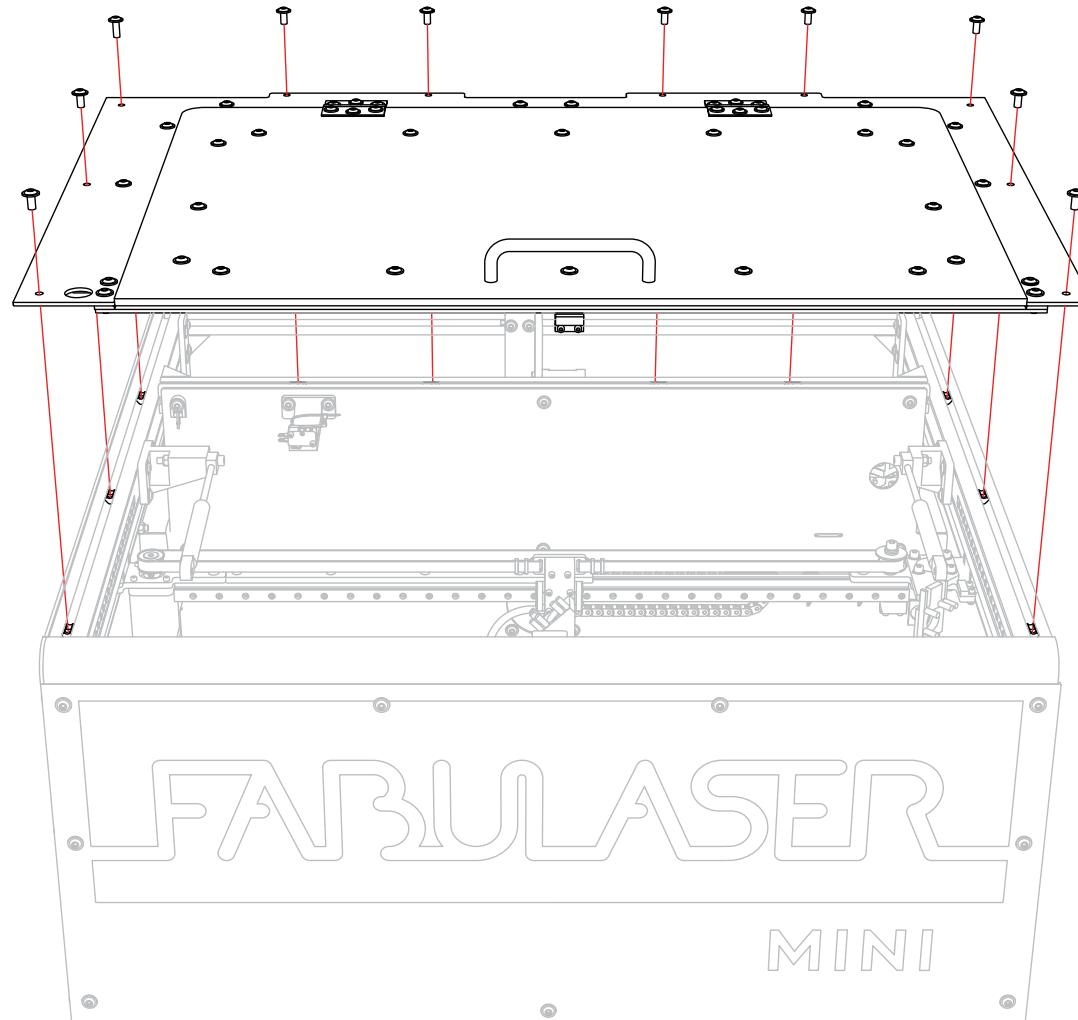
1x Prepared Top Panels and Window (Step 18)



10x B-screw M6-12



10x T-nut M6

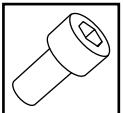


1x Allen Key 1.5
1x Allen Key 5

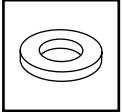
STEP 26.2 FINALIZING THE WINDOW

Step 26/33

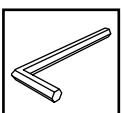
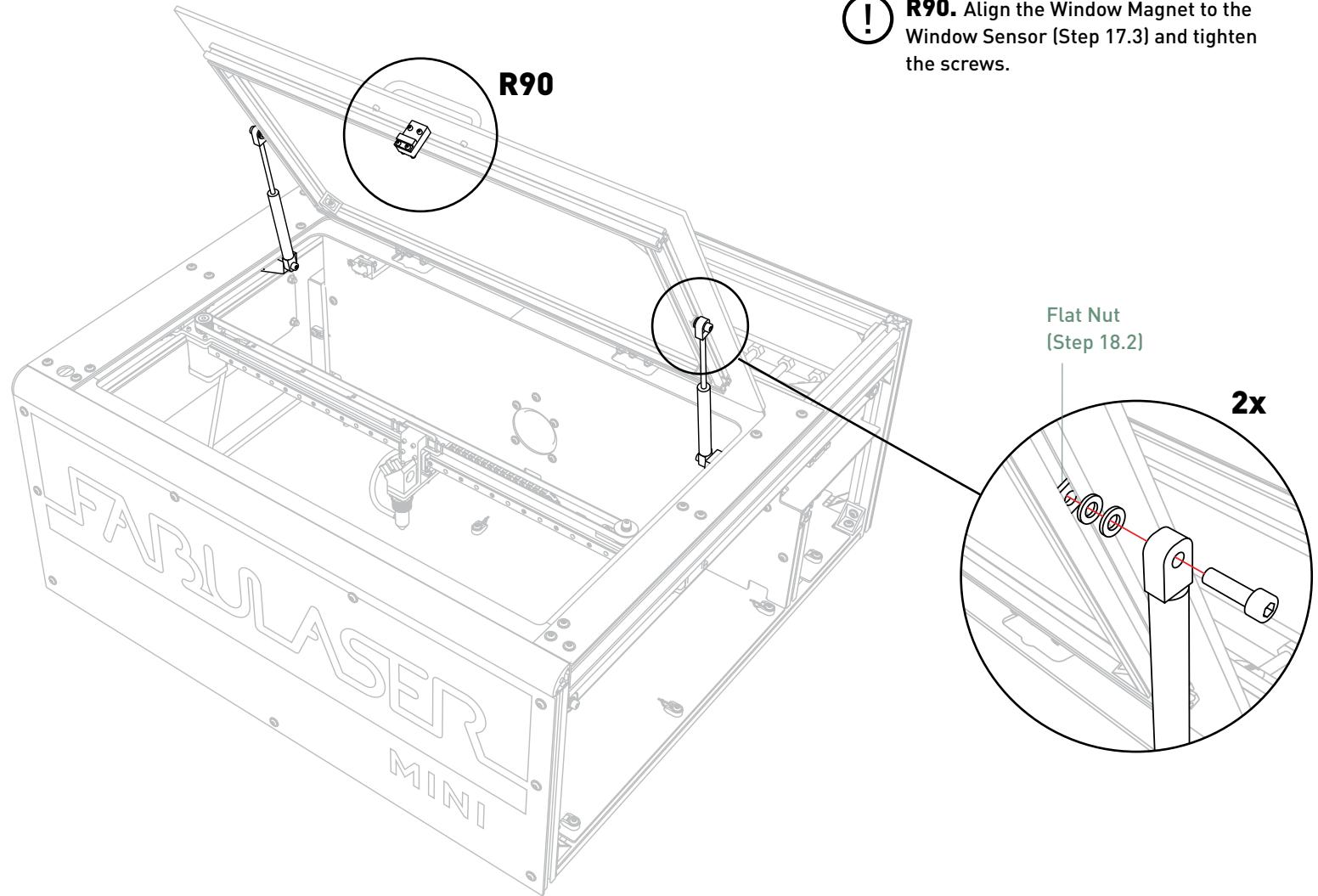
⌚ 20 min



2x C-screw M6-20



4x Washer M6

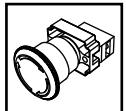


1x Allen Key 5

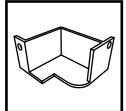
STEP 26.3 INSTALLING THE EMERGENCY BUTTON

Step 26/33

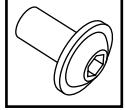
⌚ 10 min



1x Emergency Button
(with screws in)



1x Cover



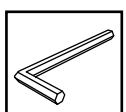
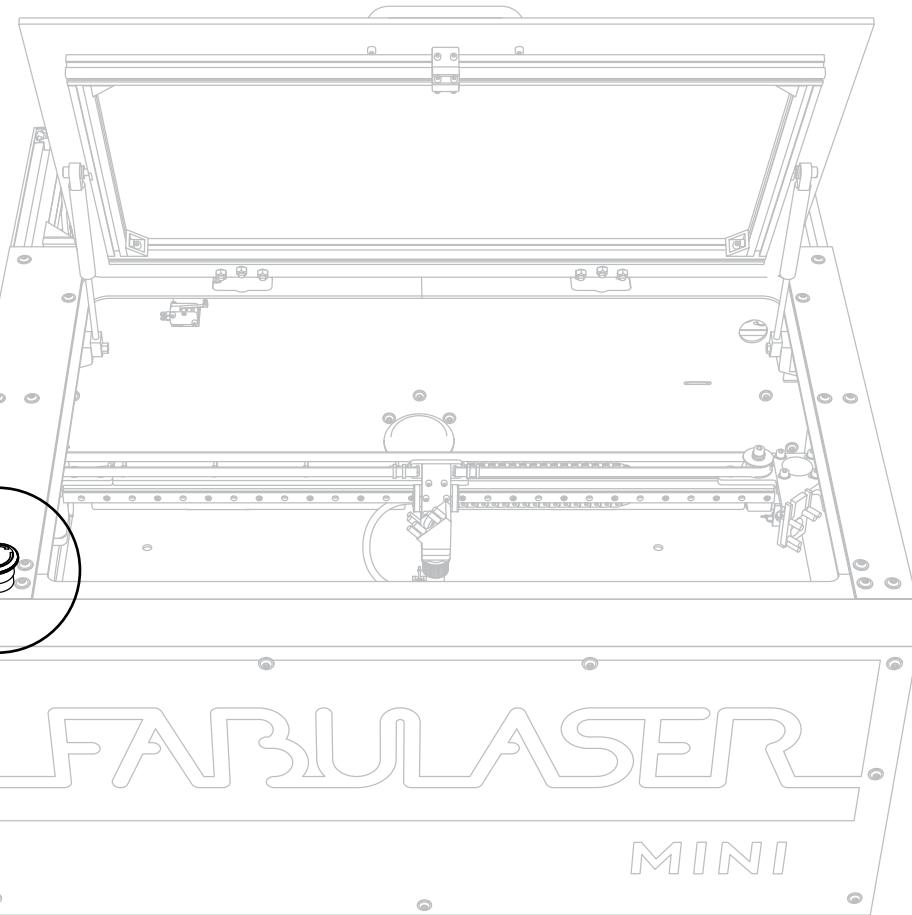
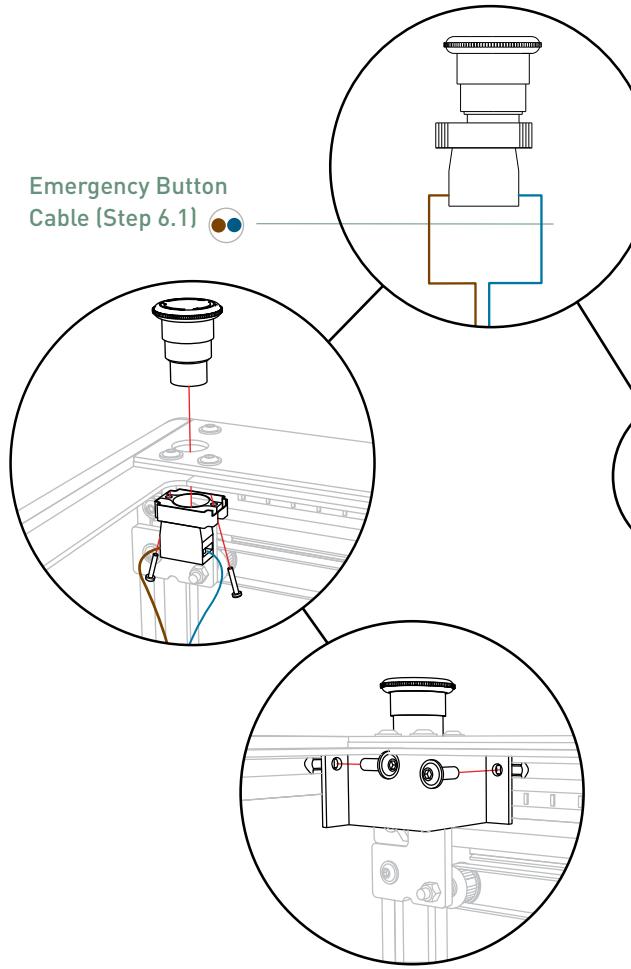
2x B-screw M6-12



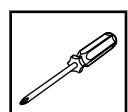
2x T-nut M6



R91. Attach the Emergency Button Cable to the Emergency Button installed in Step 6.1.



1x Allen Key 5



1x Screwdriver
Phillips

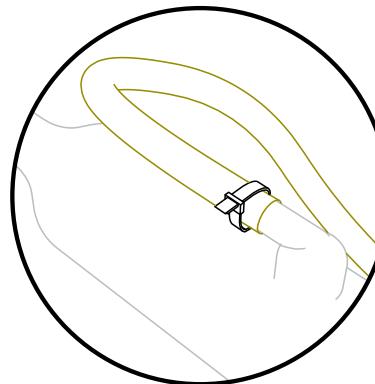
STEP 27. FINAL CHECKING AND ADJUSTMENTS

Step 27/33

⌚ 30 min

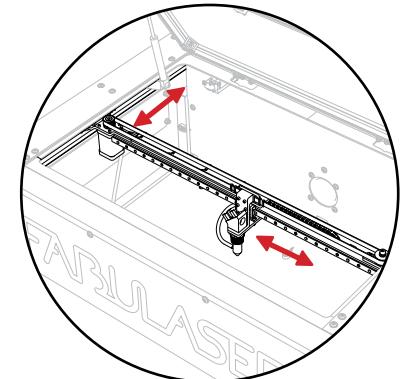
Securing the water flow

- Make sure all tubes connections are securely tightened with a cable tie or clamps.
- Connect the water chiller to the power and leave it on for 5 min observing if there is any water leaking from the water connections. If it leaks, redo the connection.



Checking the mechanics

- Make sure that the Y and X-axis are aligned and moving smoothly (if you move them too fast there will be a noise).
- Make sure the belts are tight enough and equally.



Checking the closures

- Make sure there is no open gap in the housing, checking inbetween all the panels and frame.
- Tighten all screws except the ones fixing the mirror holders.
- Check if the window is closing properly and well aligned to the top panel set.

Securing the laser path

- Make sure all parts are securely fixed and nothing can get in the way of the the laser path. If necessary use more cable ties.
- Make sure the cable ties are tightened.

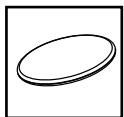
Checking the electronics

- Double check if all wiring connections are correct.
- Connect the machine to the power and turn it on and off quickly to check if the power connections are correct.
- Test the emergency button by pressing it while the machine is on. It should turn off immediately.
- Check if the Window Sensor and switch are working by ???

STEP 28.1 THE LASER BEAM OVERVIEW

Step 28/33

⌚ 10 min



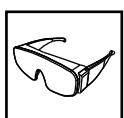
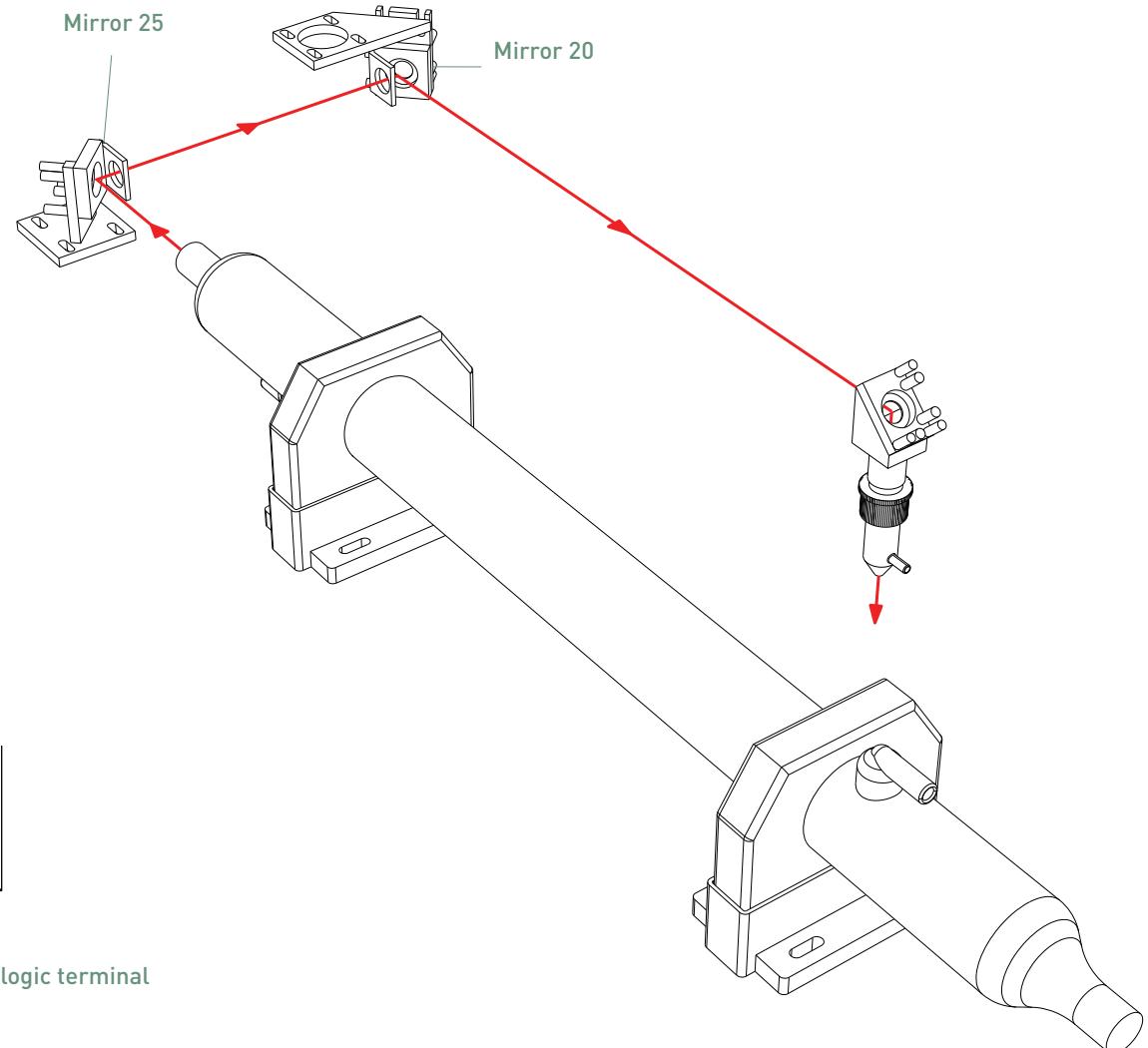
1x Mirror 20
1x Mirror 25



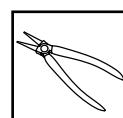
- R92.** Insert the mirrors in the Mirror Holders carefully.
R93. Wear clothes that cover most of the body and safety goggles during the whole step.
R94. Do not stand in the direction of the laser beam during the shootings.
R95. Remove the logic of the Laser Power Supply to enable the shootings through the Laser Power Supply button.
R96. To shoot the laser, quickly press the button of the Laser Power Supply.
R97. Use two overlapping pieces of tape to calibrate the laser. Only one piece will burn too much and possibly create fire.



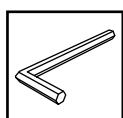
- H8.** How to hold the mirror? p.12
H9. How to insert the mirror? p.13



1x Safety Goggles



1x Needle Nose Pliers

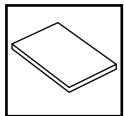


1x Allen Key 2.5

STEP 28.2 LASER TEST AND LASER TUBE ALIGNMENT

Step 28/33

⌚ 10 min



1x Wood Plank
(aprox. 15 x 15 mm)



R98. Place the wood plank in front of the laser to make the first test.

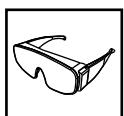
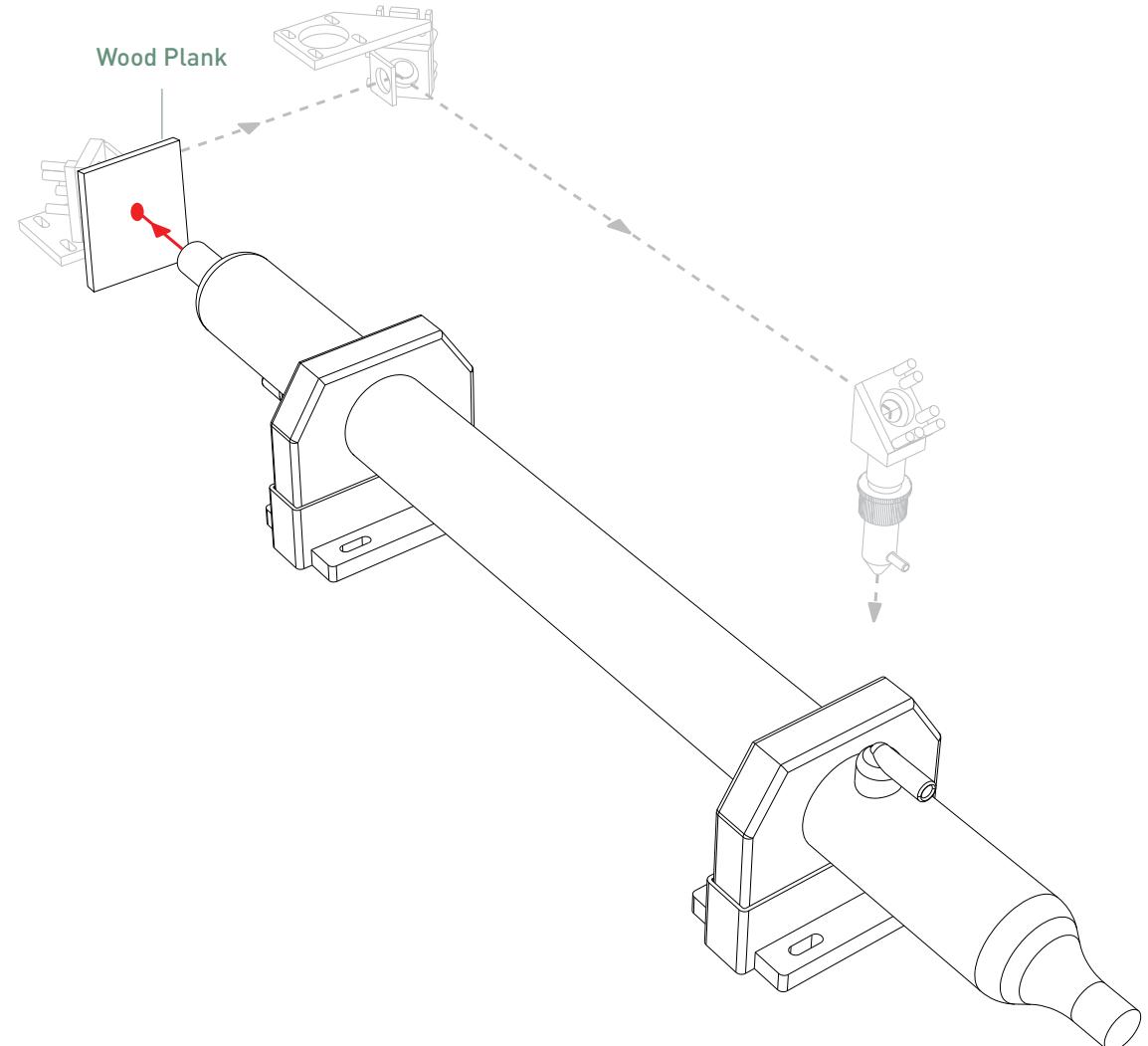
R99. Turn on the machine and the water chiller.

R100. Quickly press the button of the Laser Power Supply.

R101. Turn off the machine to check the result.

R102. Align the laser tube with the Laser Panel, making sure both Laser Holders have the same distance from the panel's edge.

R103. Tighten the screws of the Laser Holders and Mirror Holders enough to be able to move them with some strength for a fine calibration.

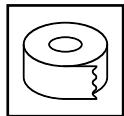


1x Safety Goggles

STEP 28.3 LASER CALIBRATION - FIRST MIRROR

Step 28/33

⌚ 20 min



1x Masking Tape

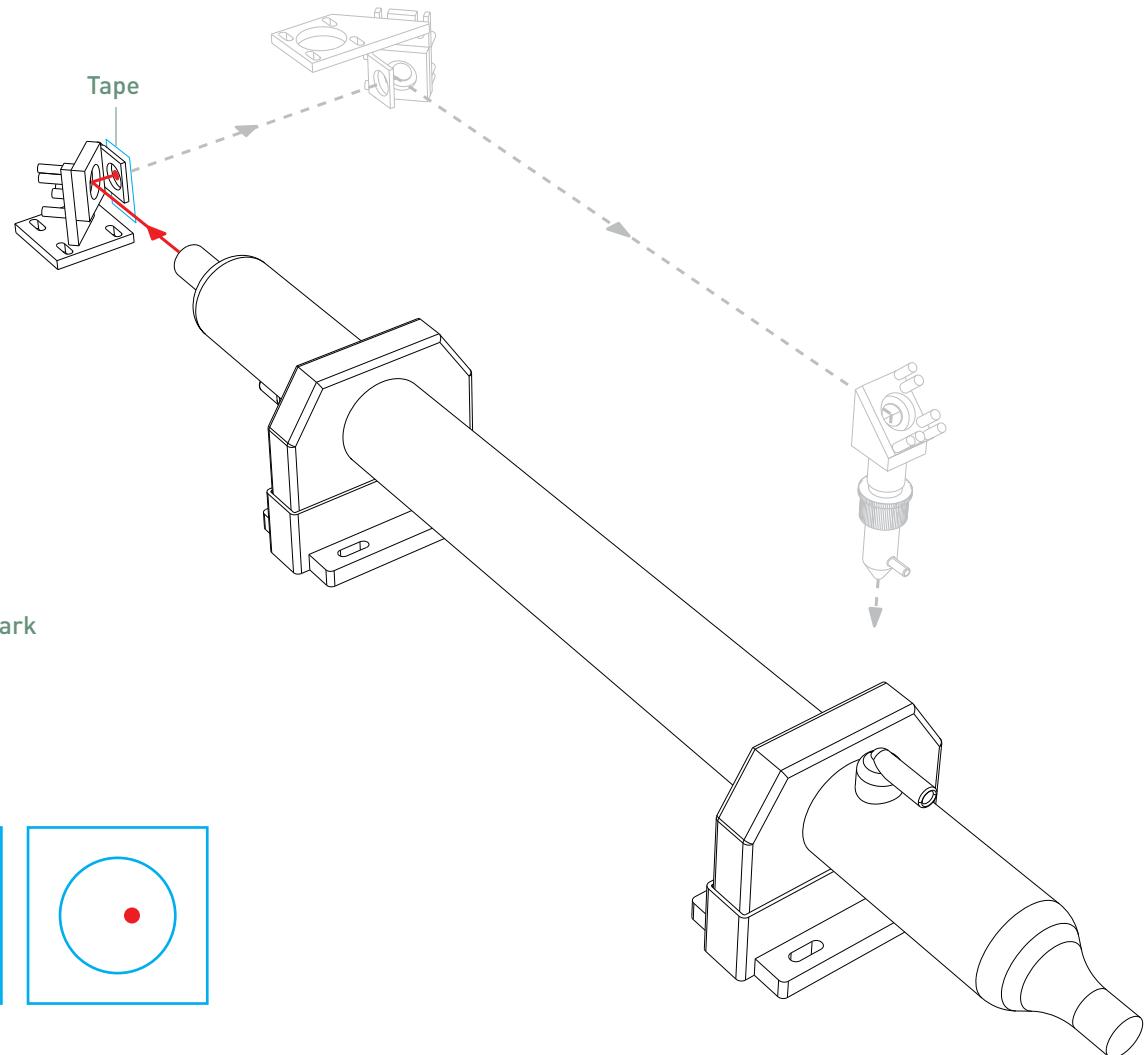


R104. Place the double layered tape on the outer frame of the first Mirror Holder. Press on the inner border of the frame to mark the tape with the frame shape.

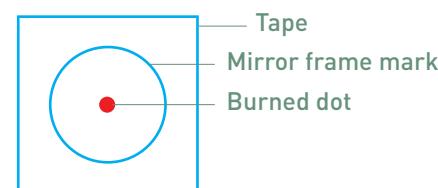
R105. Calibrate the angle of the mirror until the burned dot is more or less in the center of the frame mark.



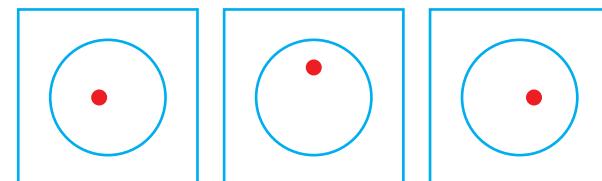
H10. How to calibrate the mirror angle? p.14



Correct result



Wrong results



1x Safety Goggles

STEP 28.4 LASER CALIBRATION - SECOND MIRROR

Step 28/33

⌚ 20 min



1x Masking Tape



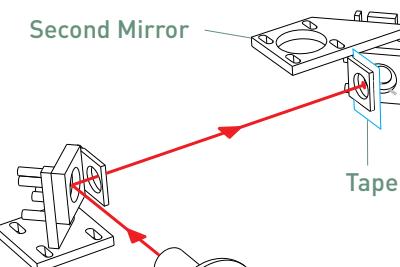
R106. The goal of this step is to align the laser beam with the Y-axis.

R107. Start by moving the X-Axis as close as possible to the Separator Panel. Place the double tape on the outer frame of the second Mirror Holder and shoot the laser.

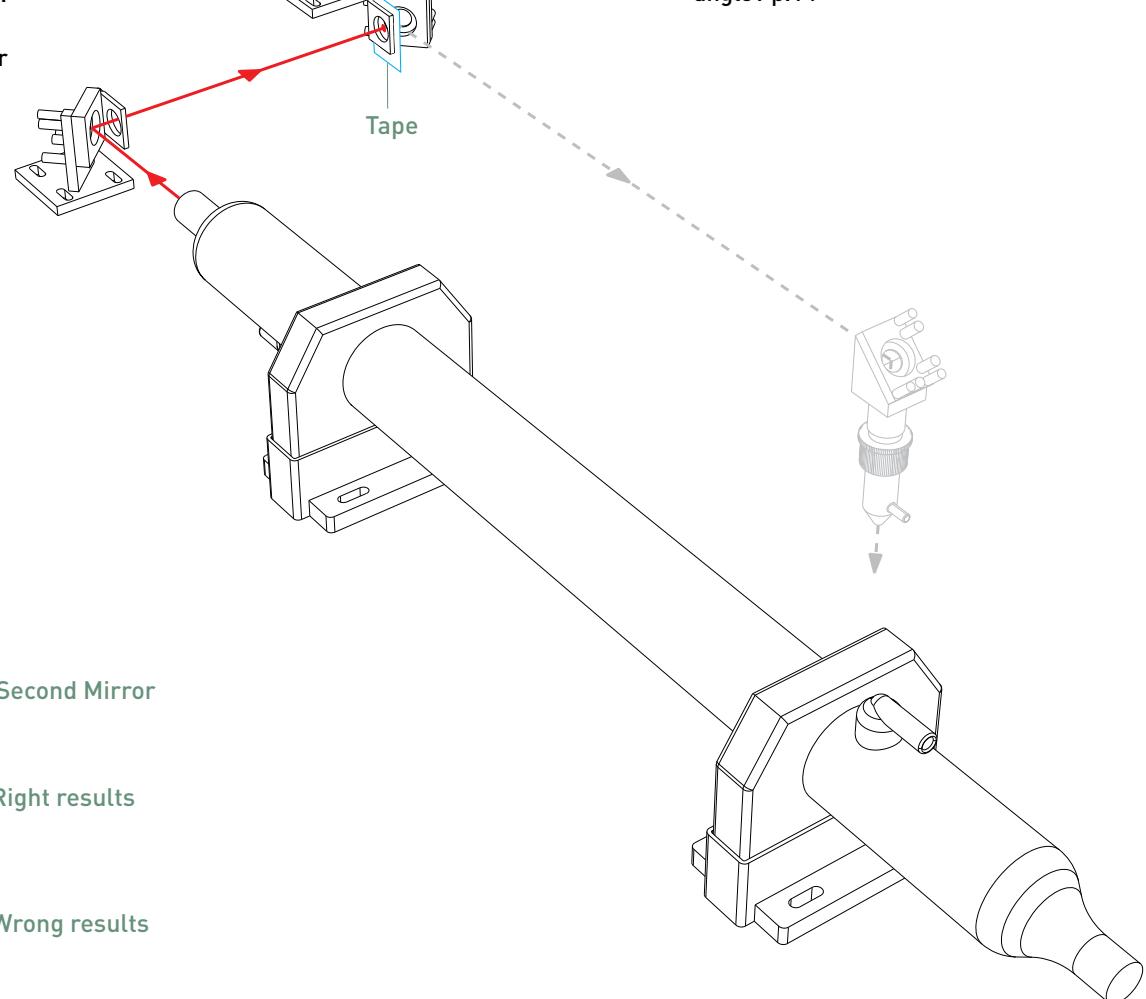
R108. Move the second mirror to the mid-range position and add one layer of tape on top of the previous tape. Shoot the laser again and observe the position of the first and second burned dots.

R109. Calibrate the mirror aiming to align the dots and repeat the process until the dots are overlapping.

R110. In this stage it is more important that the dots are overlapping than centralized.



H10. How to calibrate the mirror angle? p.14



1x Safety Goggles

STEP 28.5 LASER CALIBRATION - SECOND MIRROR

Step 28/33

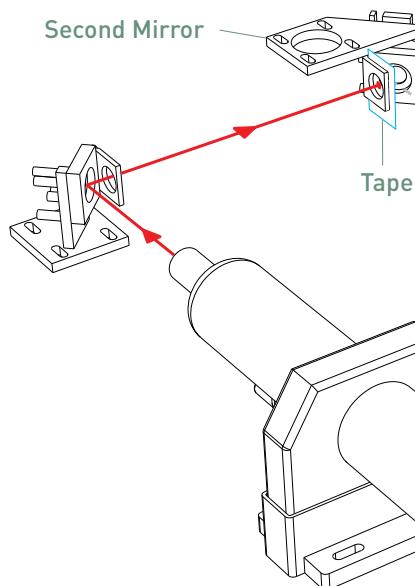
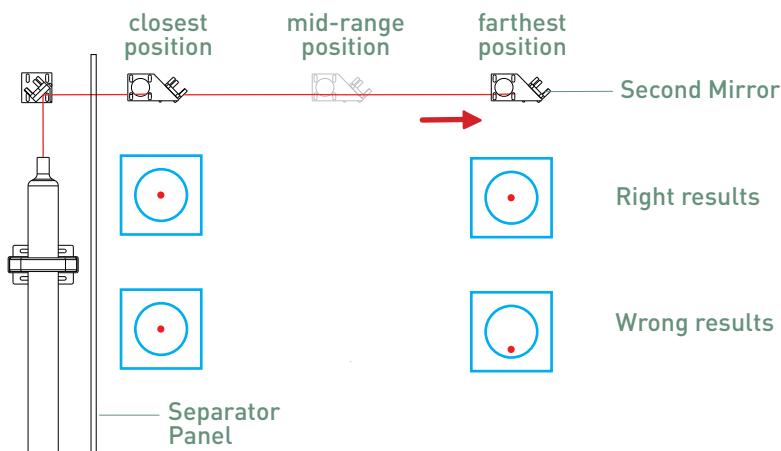
⌚ 15 min



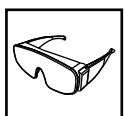
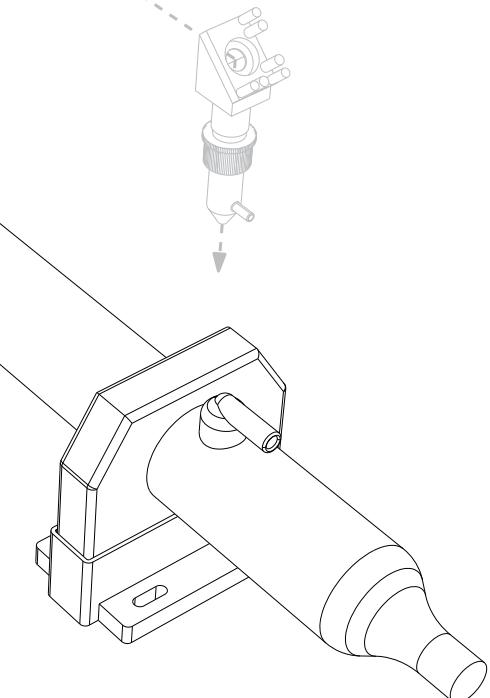
1x Masking Tape



R111. Repeat the process described in the previous substep but this time alternating between closest position and farthest position.



H10. How to calibrate the mirror angle? p.14



1x Safety Goggles

STEP 28.6 LASER CALIBRATION - LASER HEAD

Step 28/33

⌚ 30 min



1x Masking Tape

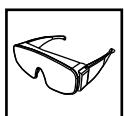
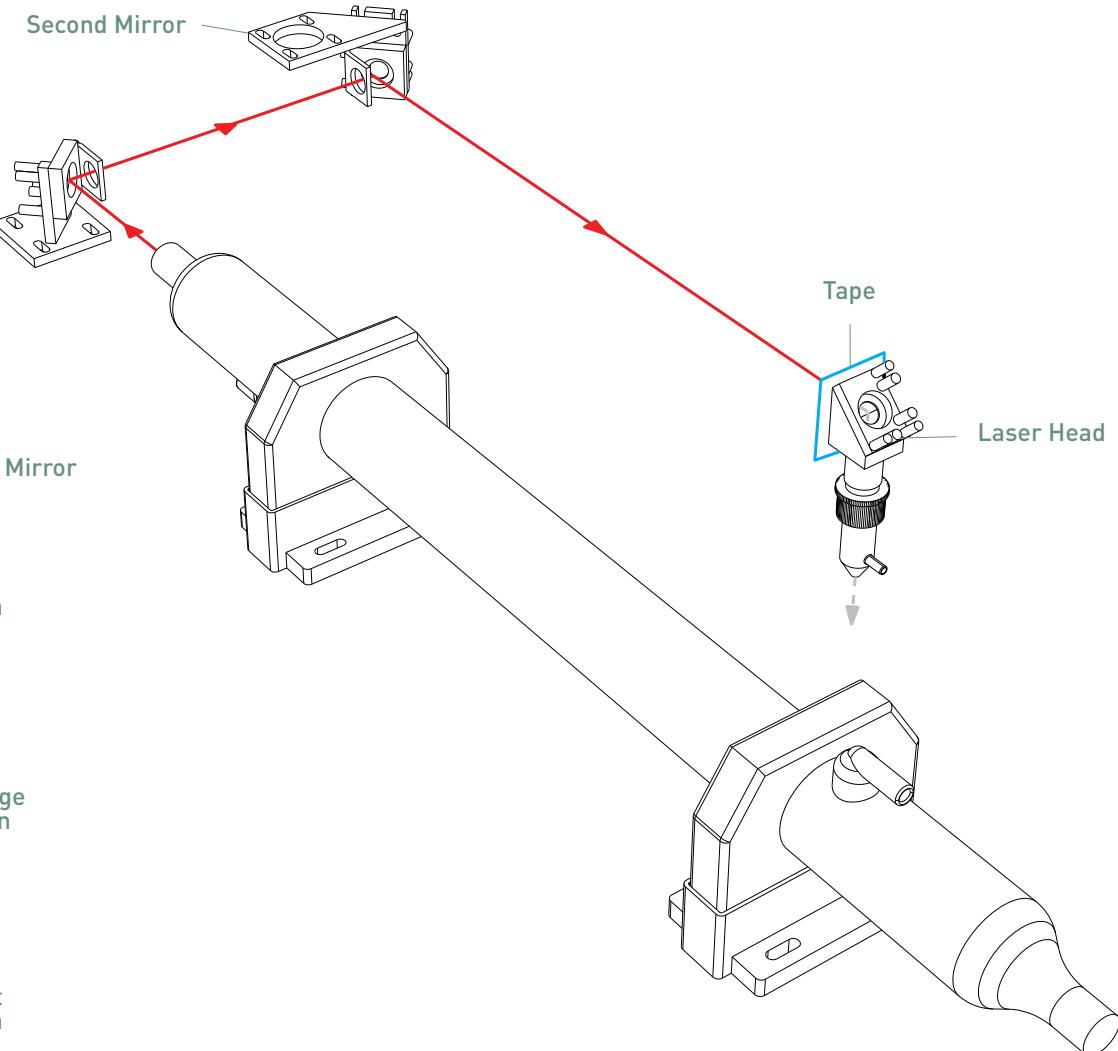
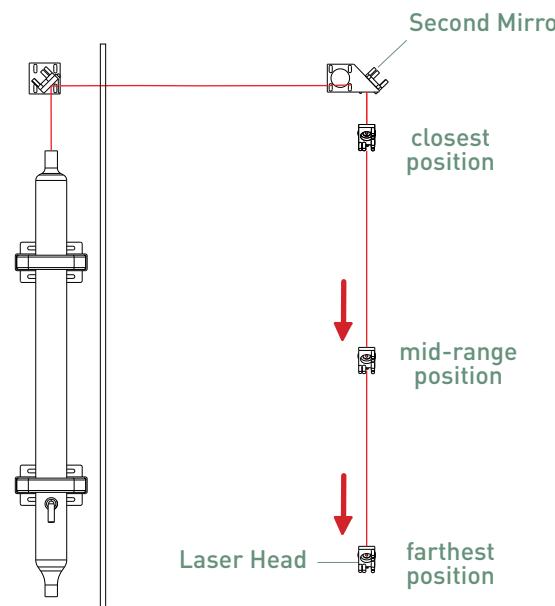


R112. Move the second Mirror Holder to the mid-range position and the Laser Head as close as possible to the Second Mirror.

R113. Place a double tape on the outer frame of the Laser Head and repeat the calibration explained in step 28.4, aligning first the closest position with the mid-range position, and then to the farthest position.



H10. How to calibrate the mirror angle? p.14



1x Safety Goggles

STEP 28.7 LASER CALIBRATION - LASER HEAD

Step 28/33

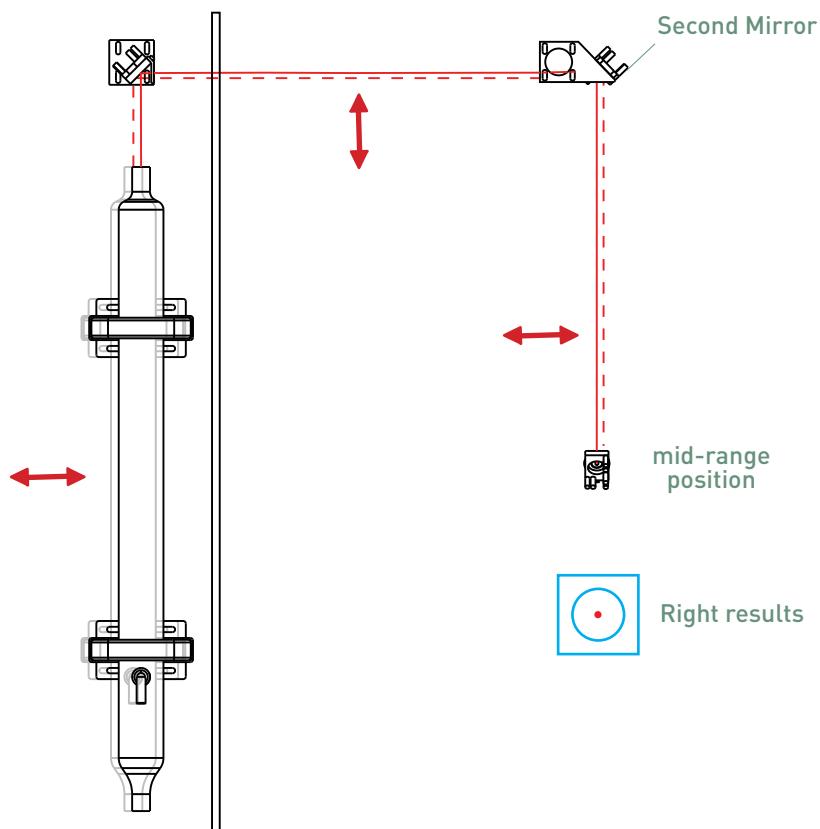
⌚ 15 min



1x Masking Tape



R114. Now that the beam is aligned and perpendicular, it is necessary to centralize the beam in the Laser Head.



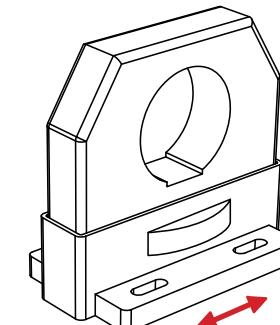
R115. To not lose the current alignment, tighten the nuts of the Mirror Holders and try to centralize the beam by moving the laser tube (move both holders equally left or right, up or down)

R116. If the beam cannot be centralized by moving the laser tube, move the entire Mirror Holder carefully.

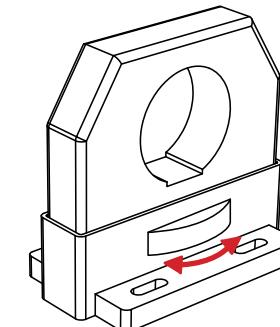
R117. After moving check if the beam is still aligned by performing steps 28.4, 28.4 and 28.6 again.



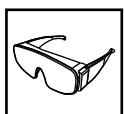
H10. How to calibrate the mirror angle? p.14



Move the Laser tube holder left or right to move the Laser Tube left or right.



Rotate the knob to move the Laser Tube up or down.



1x Safety Goggles

STEP 28.8 LASER CALIBRATION - LASER HEAD

Step 28/33

⌚ 20 min



1x Masking Tape

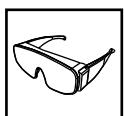
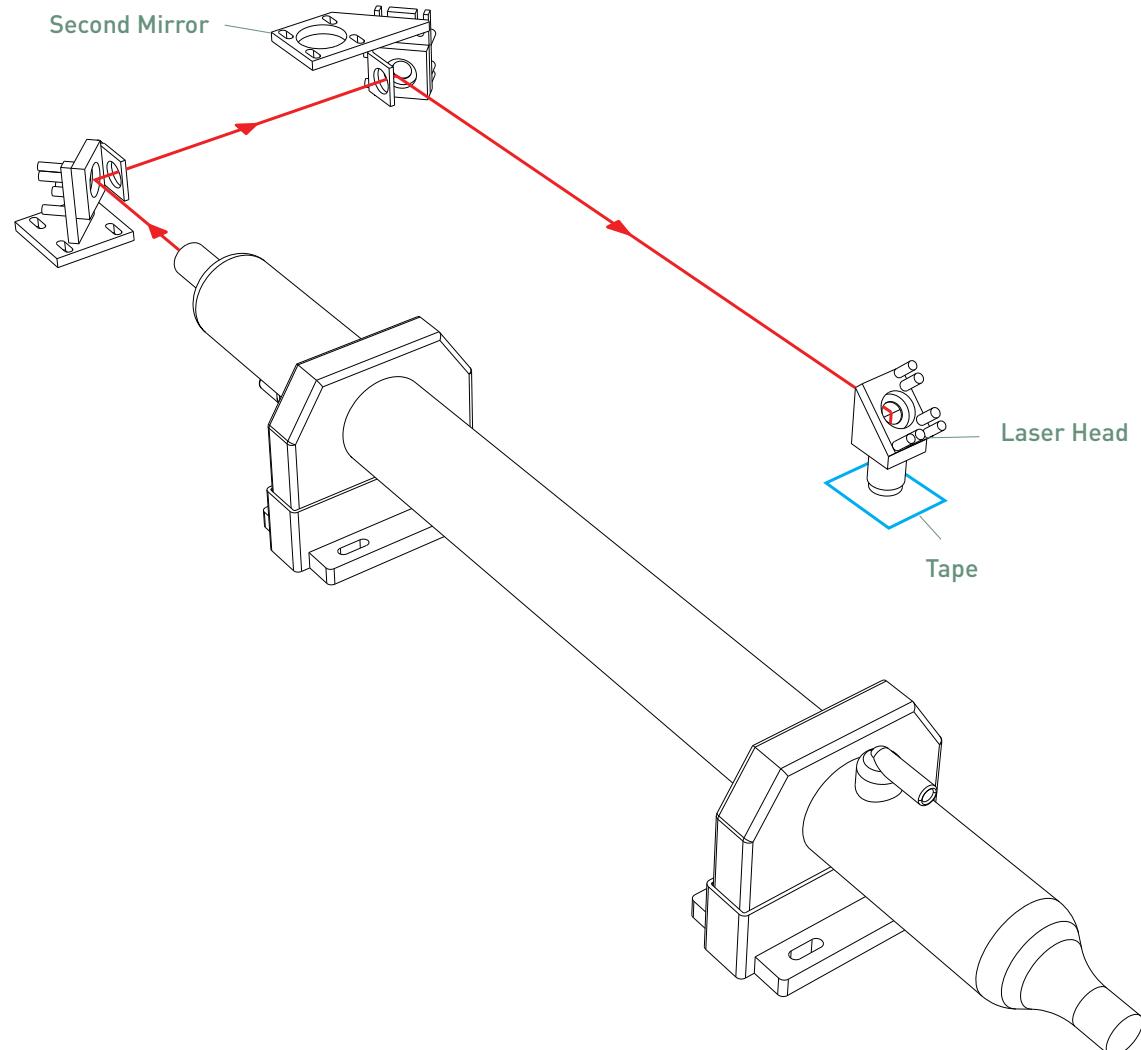


R118. Open the Laser Head and tape a piece of tape on the open tube. Press the tape against it to mark the circle area.

R119. Calibrate the mirror angle until the burn mark is in the middle of the circle.



H10. How to calibrate the mirror angle? p.14



1x Safety Goggles

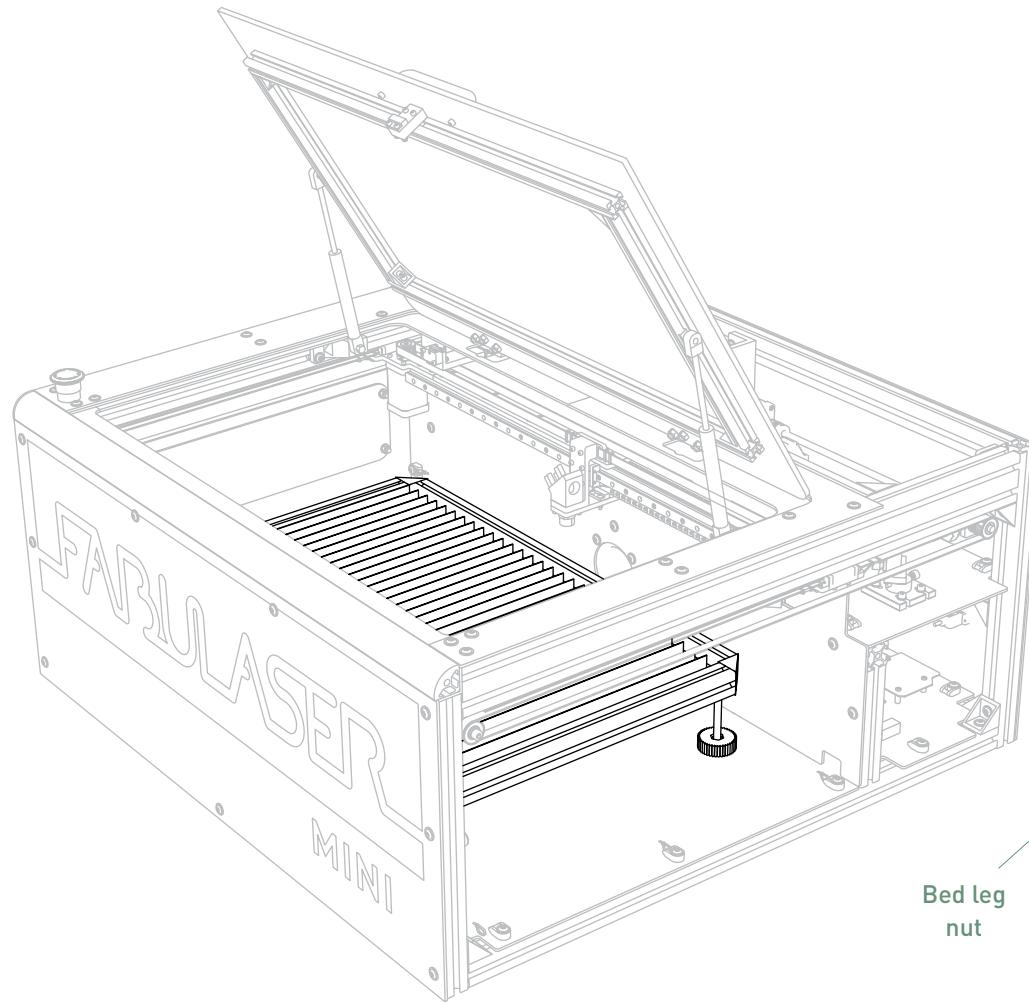
STEP 29. INSERTING THE BED

Step 29/33

⌚ 5 min

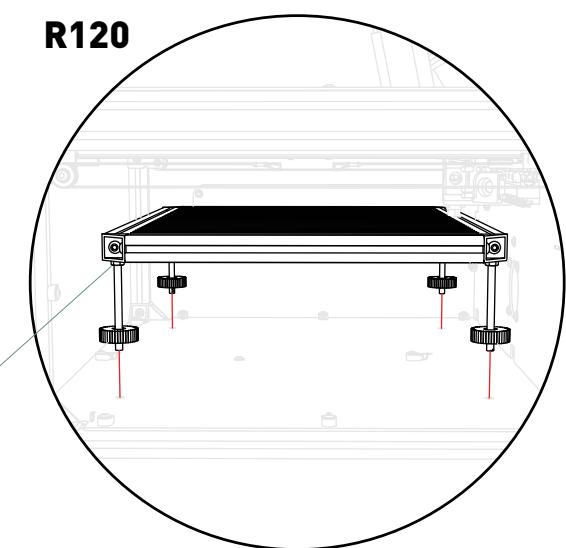


1x Prepared Bed
(Step 12)



R120. Adjust the position of the bed legs to fit the holes in the Bottom Panel and fix them by tightening the nuts.

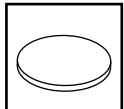
R120



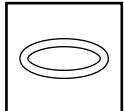
1x Wrench

STEP 30. INSERTING THE LENS

Step 30/33  10 min



1x Laser Lens

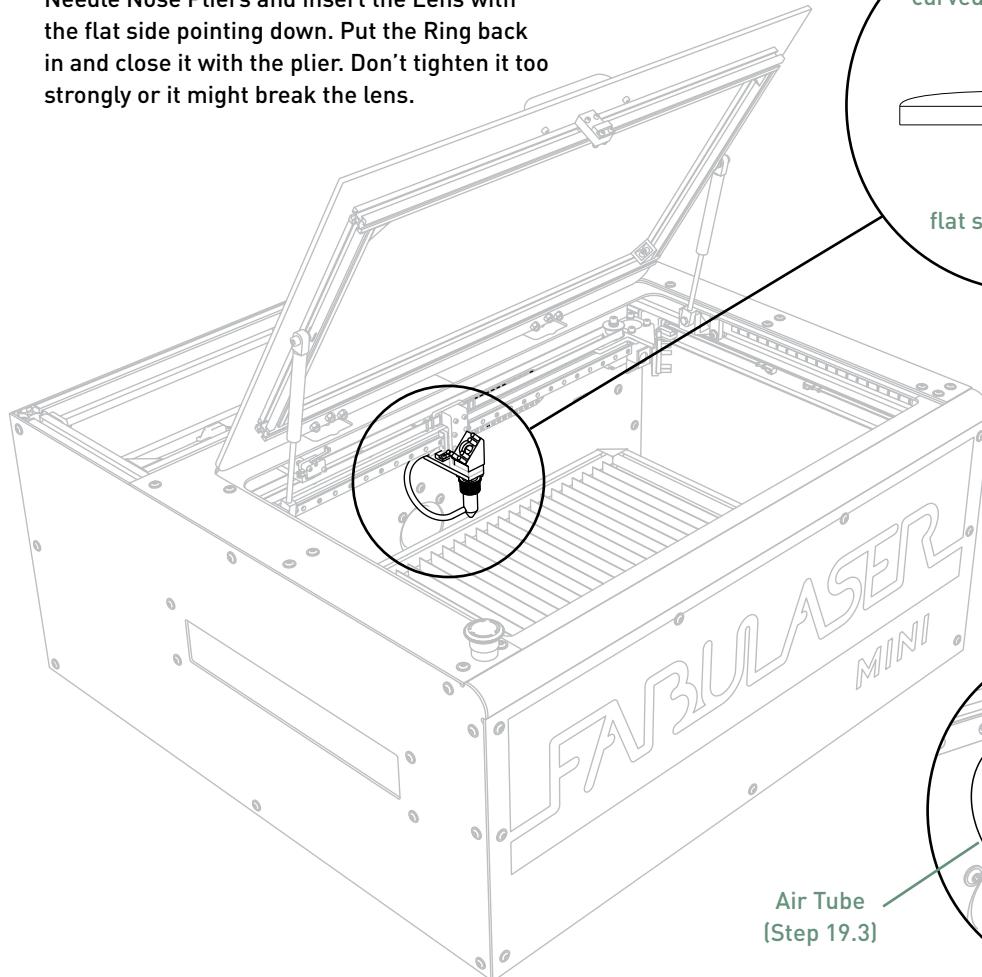


2x Rubber Ring



R121. DO NOT TOUCH THE LENS SURFACES.

R122. Open the ring of the Laser Head with Needle Nose Pliers and insert the Lens with the flat side pointing down. Put the Ring back in and close it with the plier. Don't tighten it too strongly or it might break the lens.



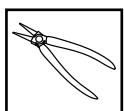
R122

curved side of the lens

flat side of the lens

Lens Rubber Ring

Air Tube
(Step 19.3)



1x Needle Nose Plier

STEP 31.1 INSTALLING RIGHT SIDE PANEL

Step 31/33  15 min



1x Prepared Side Panel Right (Step 17.1)



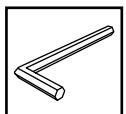
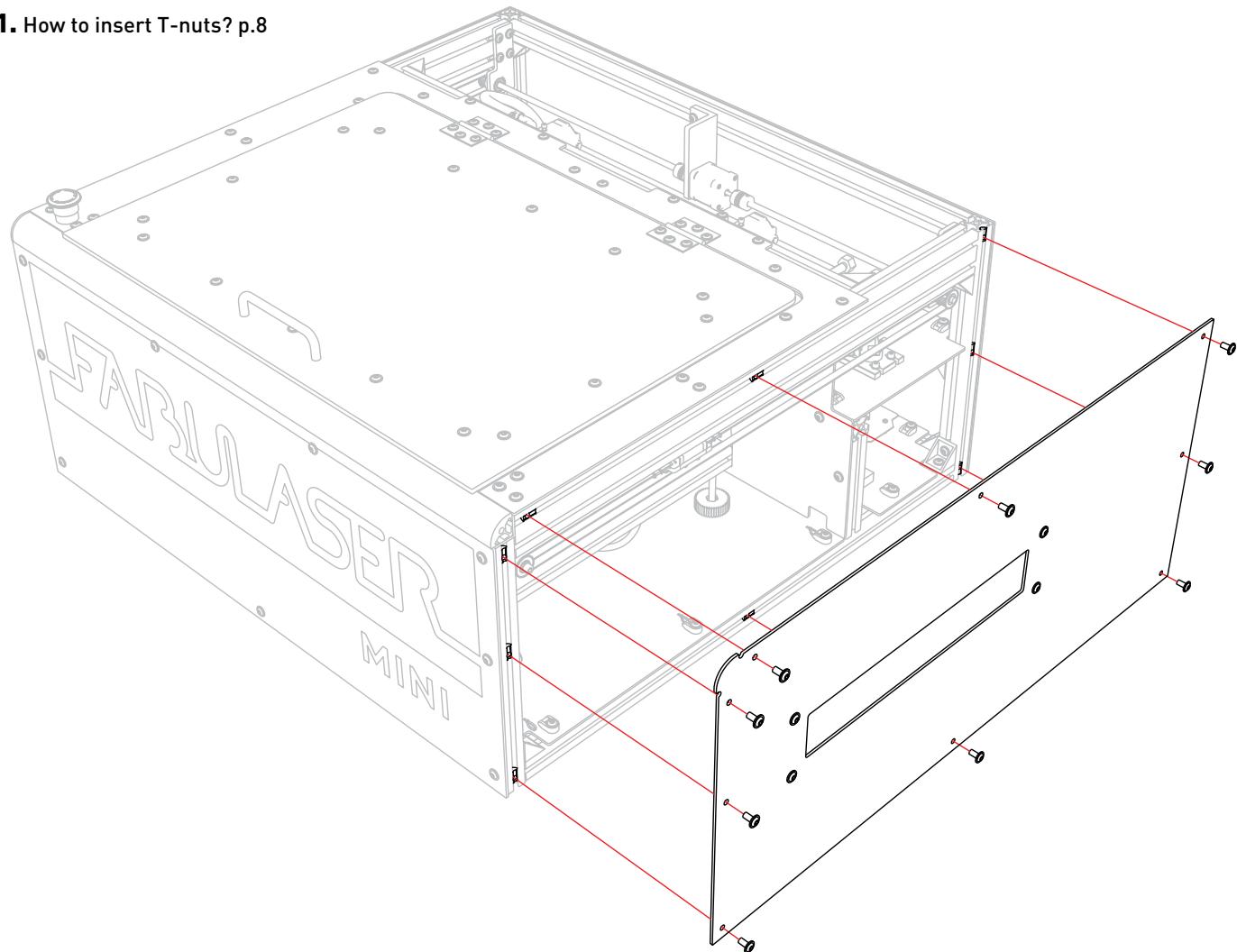
9x B-screw M6-12



9x T-nut M6



H1. How to insert T-nuts? p.8



1x Allen Key 1.5
1x Allen Key 5

STEP 31.2 SAFETY STICKERS - INSIDE

Step 31/33

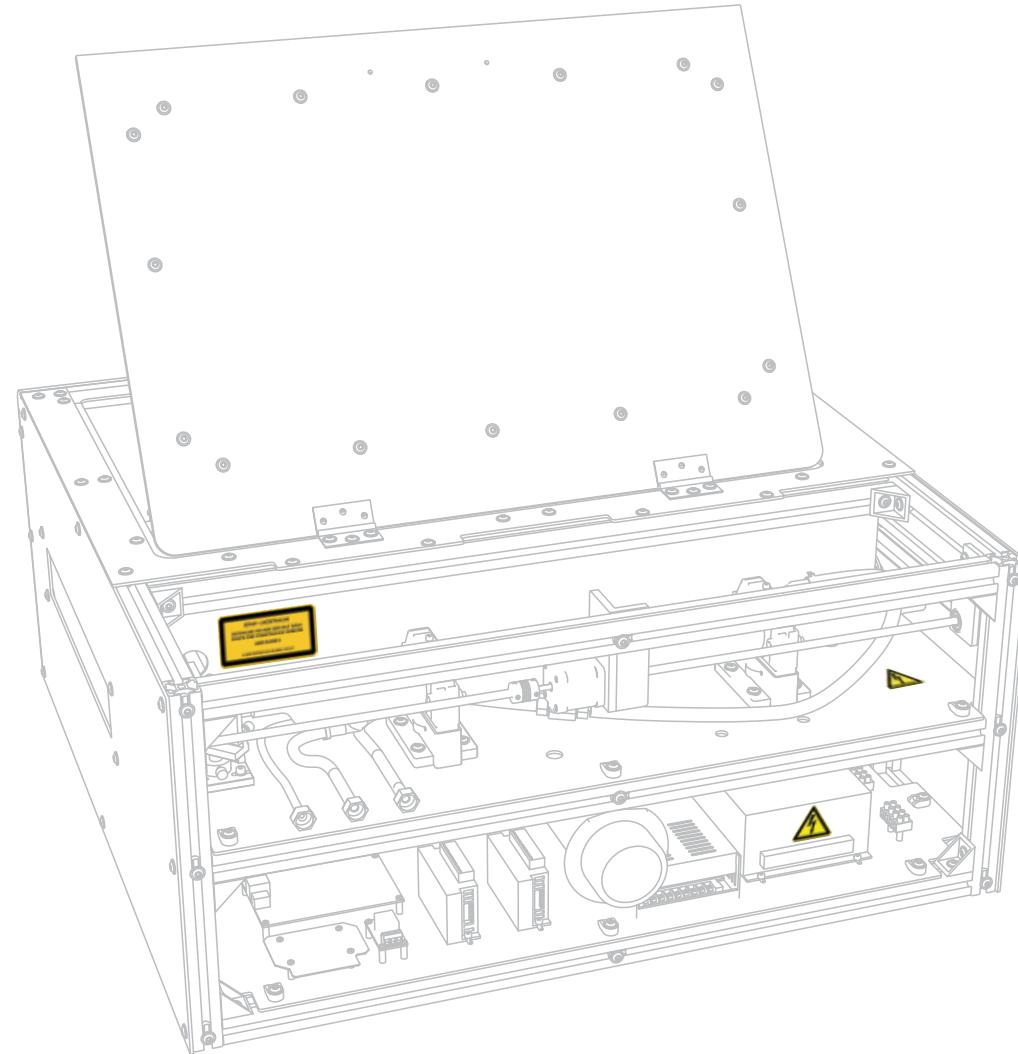
⌚ 5 min



2x High Voltage
Sticker

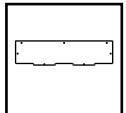


1x Danger Laser
Sticker



STEP 31.2 INSTALLING TOP BACK PANEL

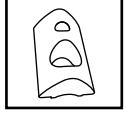
Step 31/33  15 min



1x Top Back Panel



8x B-screw M6-12



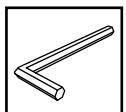
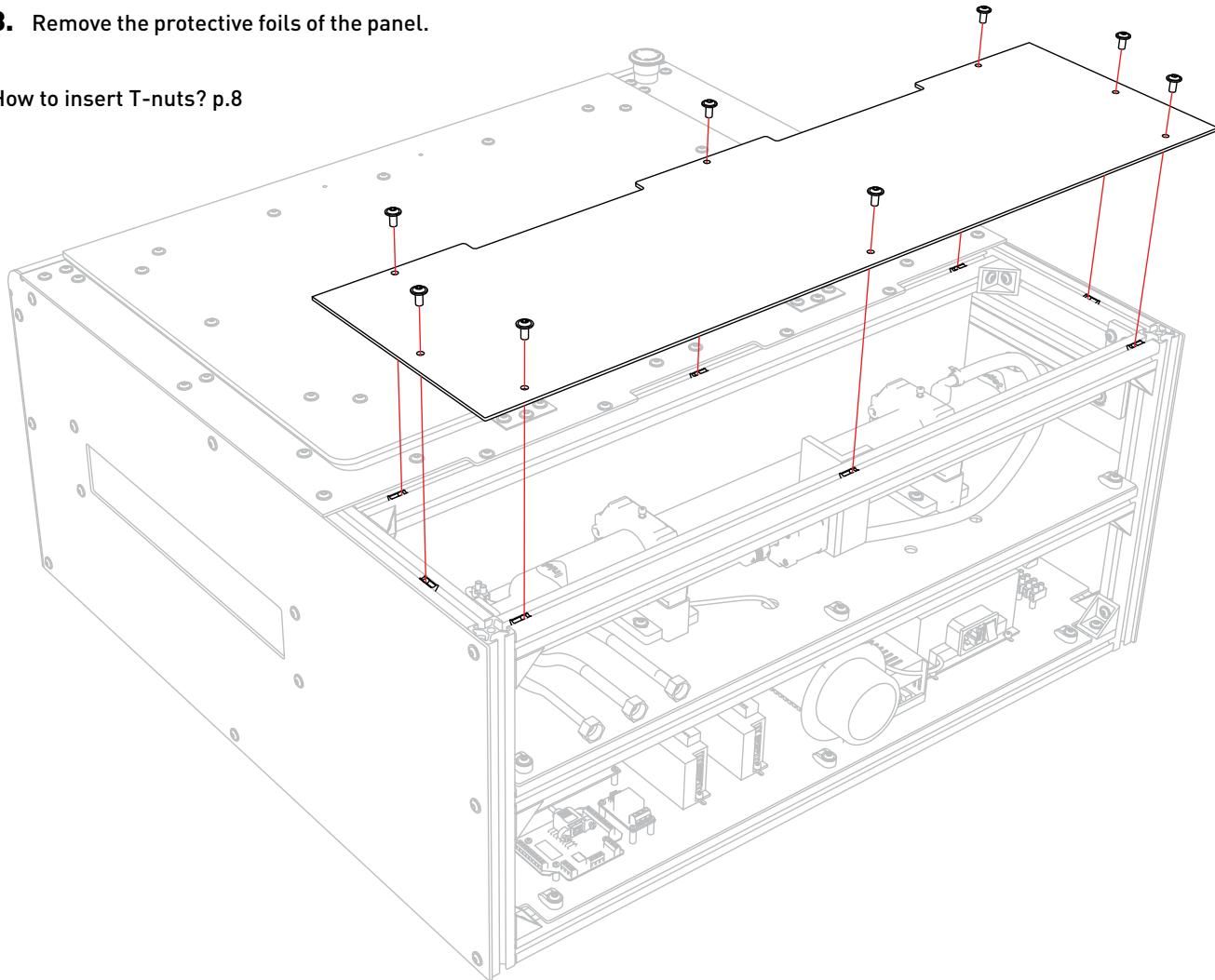
8x T-nut M6



R123. Remove the protective foils of the panel.



H1. How to insert T-nuts? p.8



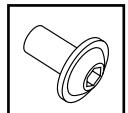
1x Allen Key 1.5

1x Allen Key 5

STEP 31.3 INSTALLING BACK PANEL

Step 31/33

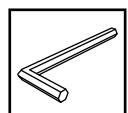
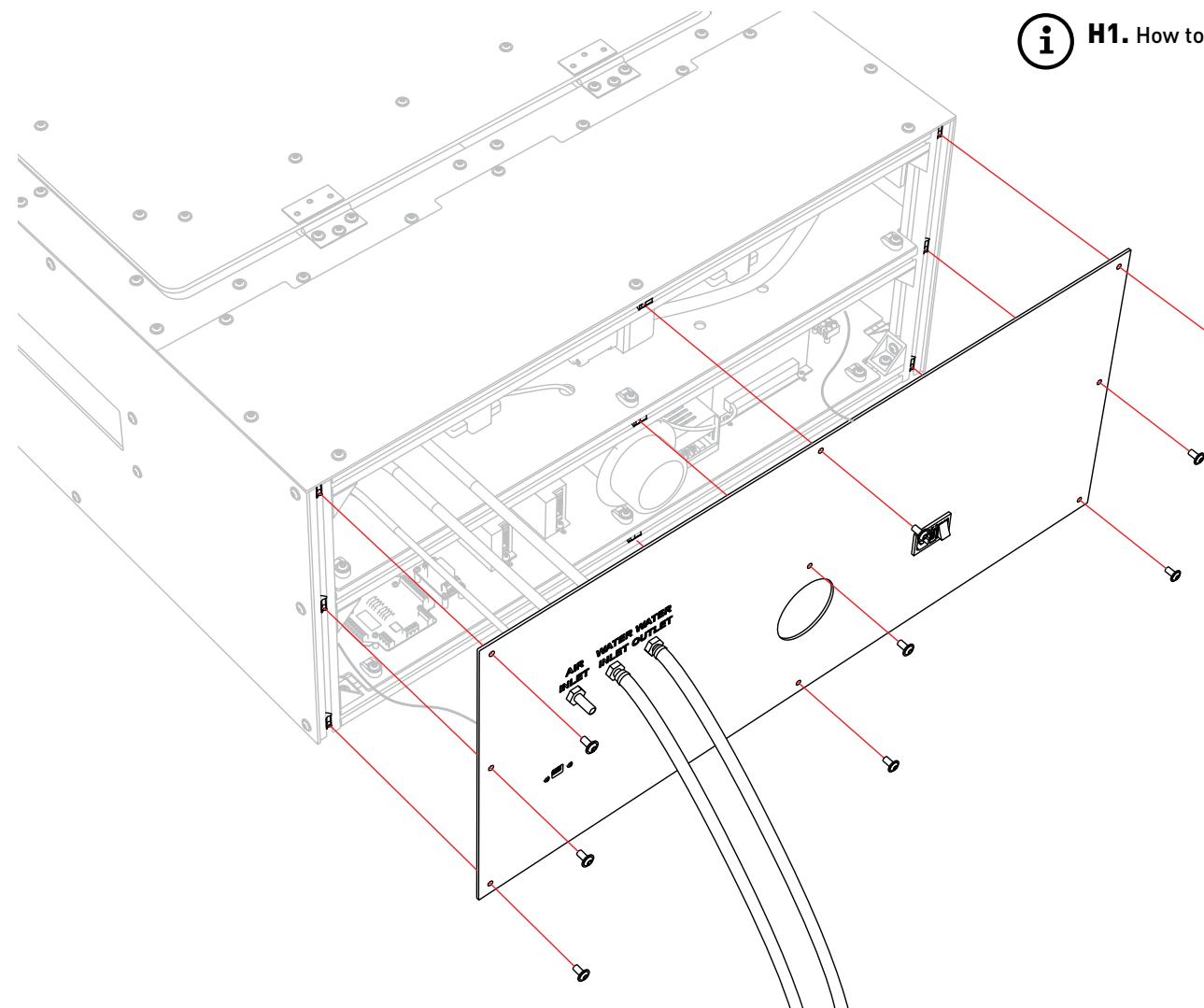
⌚ 20 min



9x B-screw M6-12



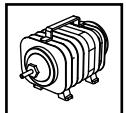
9x T-nut M6



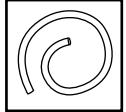
1x Allen Key 1.5
1x Allen Key 5

STEP 32. ATTACHING AIR COMPRESSOR

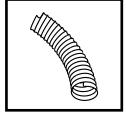
Step 32/33  20 min



1x Air Compressor
(purchased
separately)



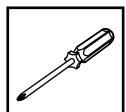
1x Air Tube Outside



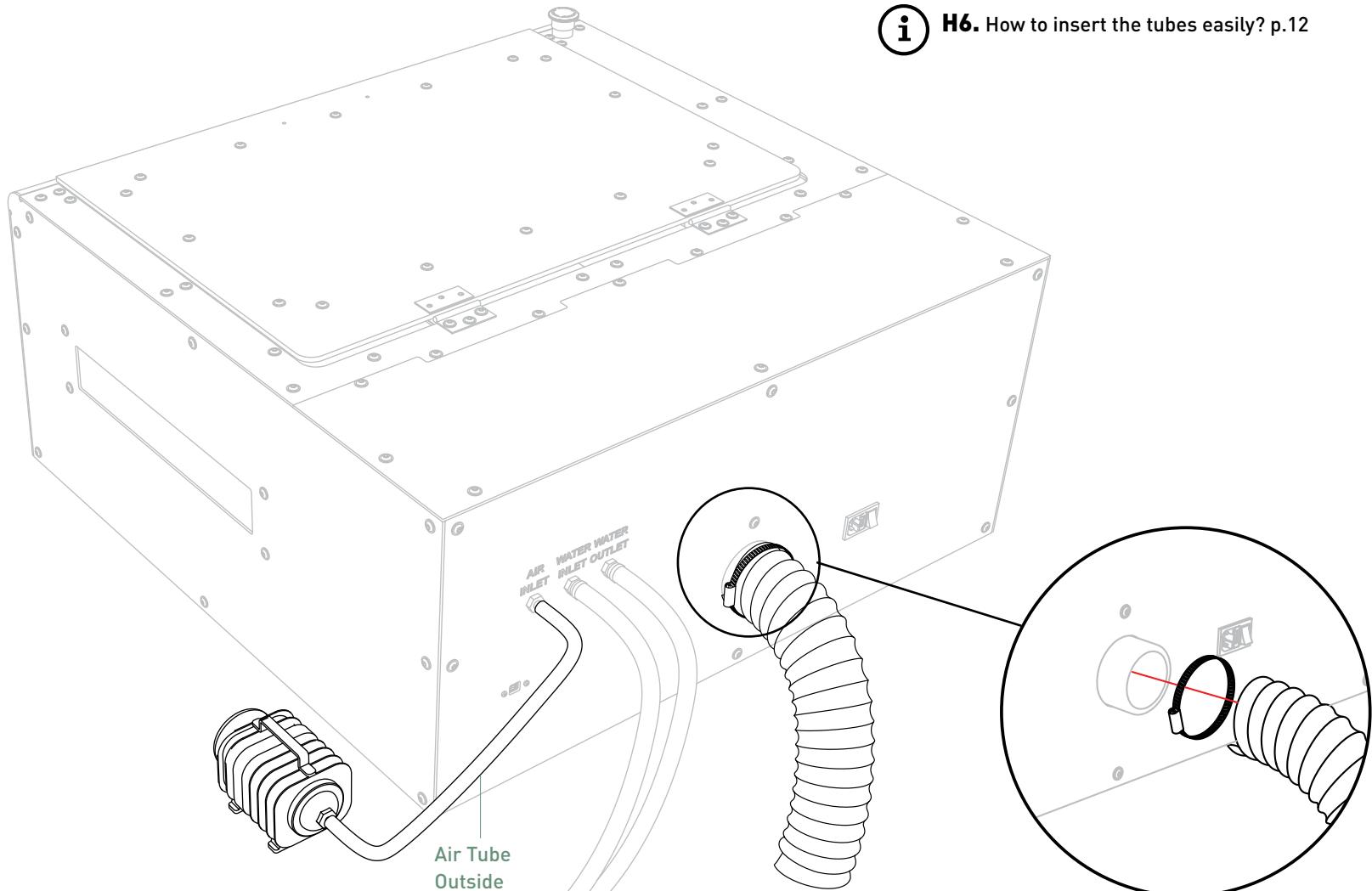
1x Exhaust Hose



1x Hose Clamps



1x Screwdriver
Phillips



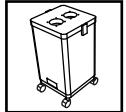
STEP 33. ATTACHING THE AIR FILTER

Step 33/33

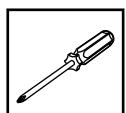
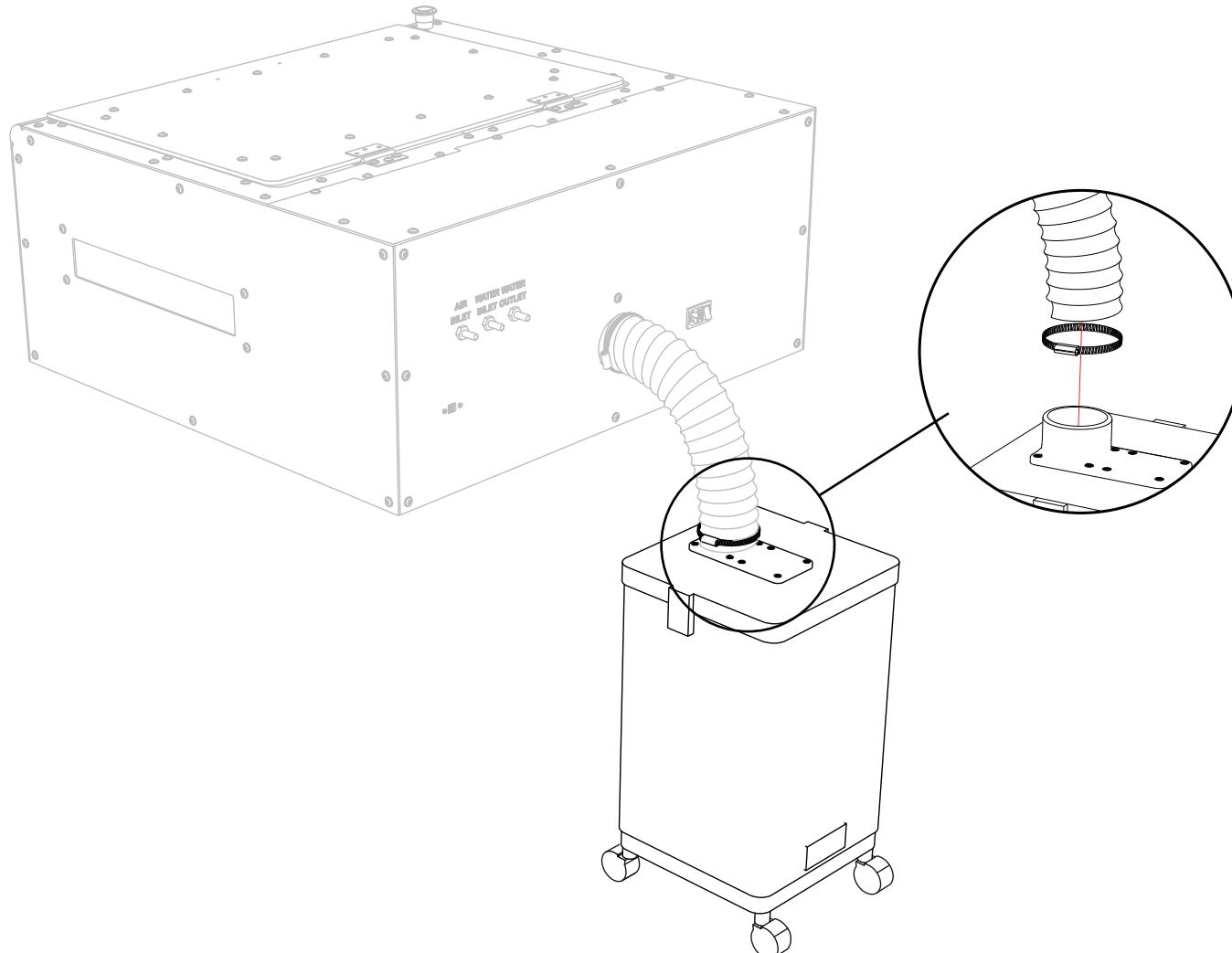
⌚ 20 min



1x Hose Clamps



1x Air Filter



1x Screwdriver
Phillips

STEP 34.1 SAFETY STICKERS - BACK

Step 34/33

⌚ 5 min



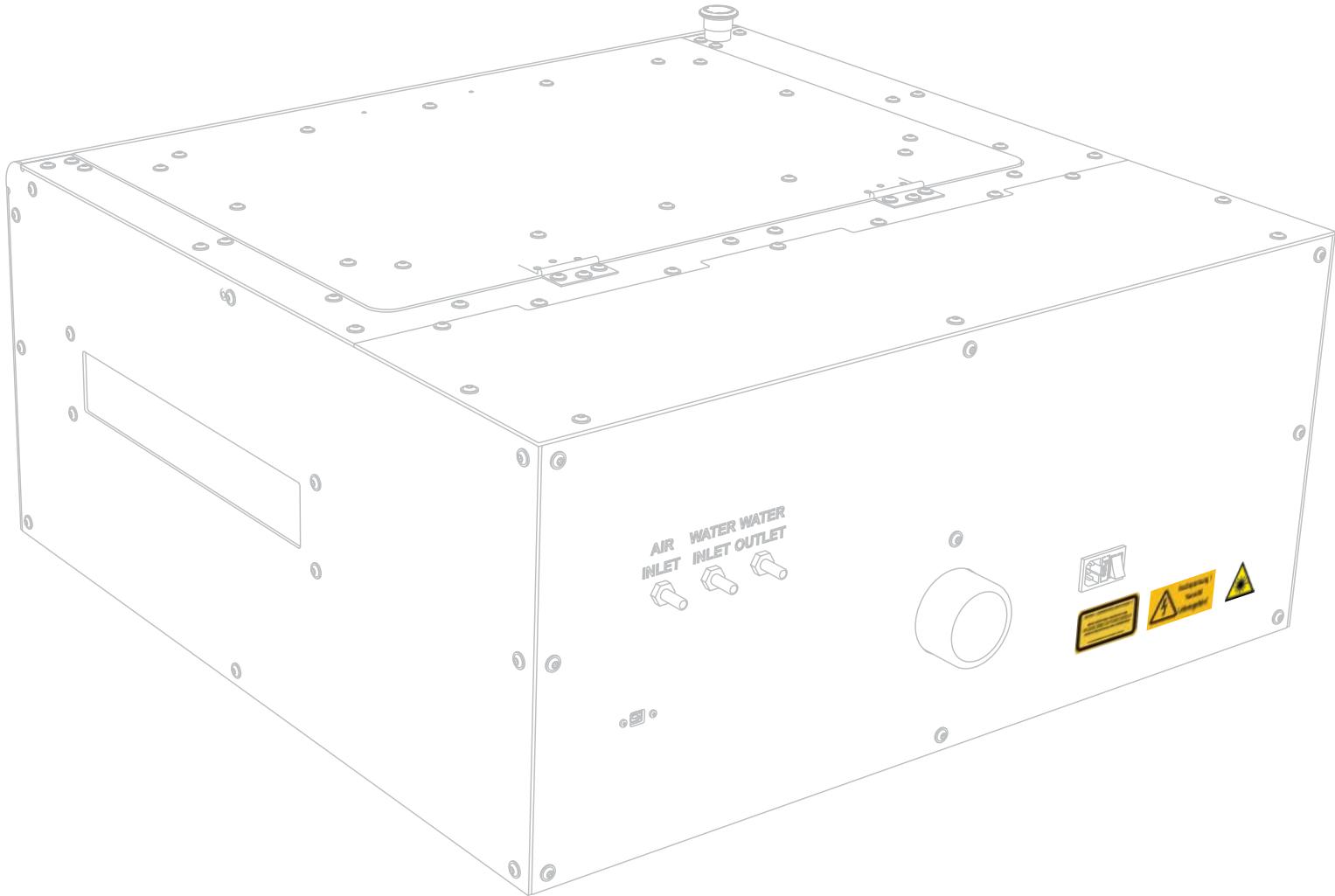
1x Laser Class
Sticker



1x High Voltage
Extended Sticker



1x Laser Beam
Sticker



STEP 34.2 SAFETY STICKERS - TOP

Step 34/33

⌚ 5 min



1x Caution Sticker



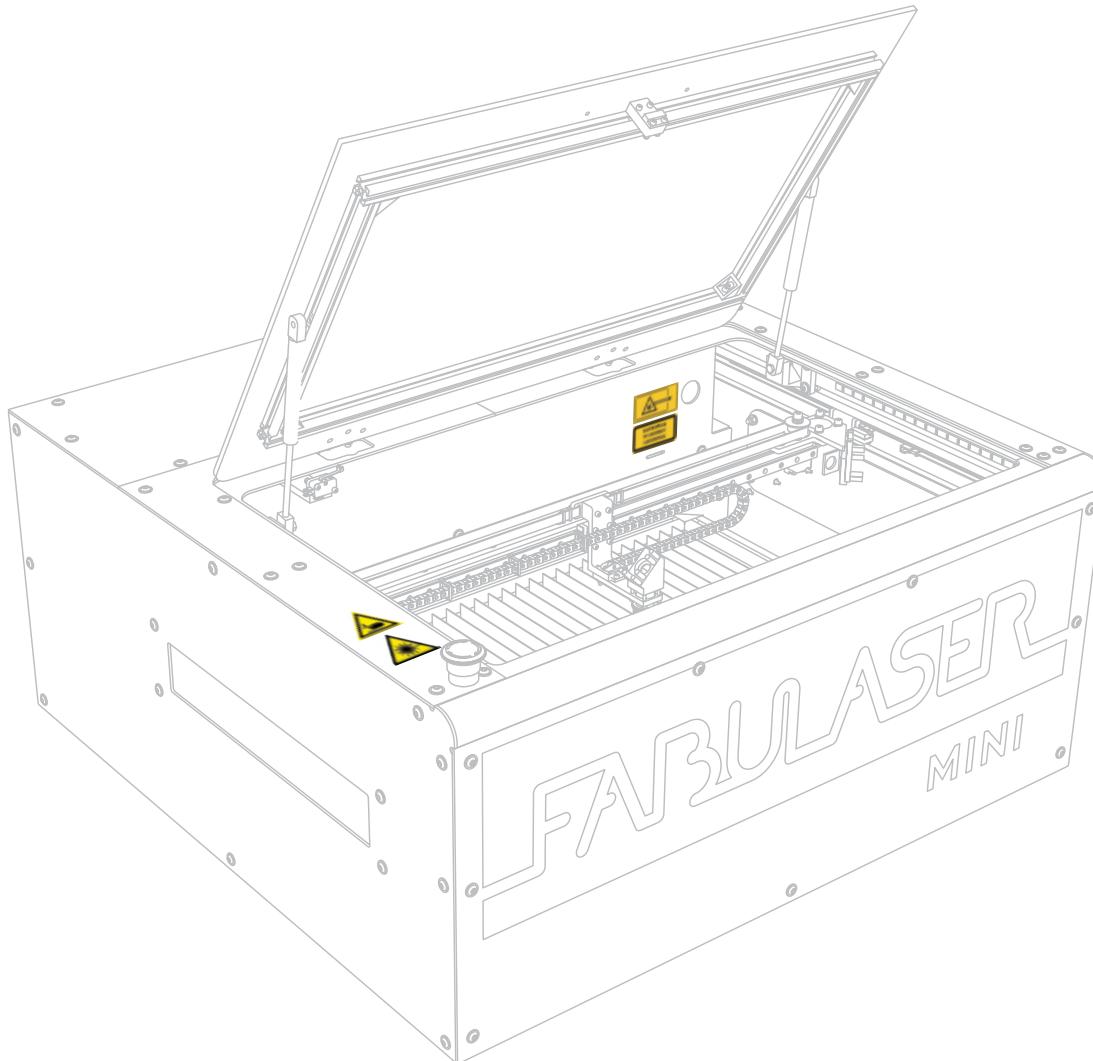
1x Laser Beam
Sticker



1x Laser Path
Sticker



1x Invisible Laser
Sticker

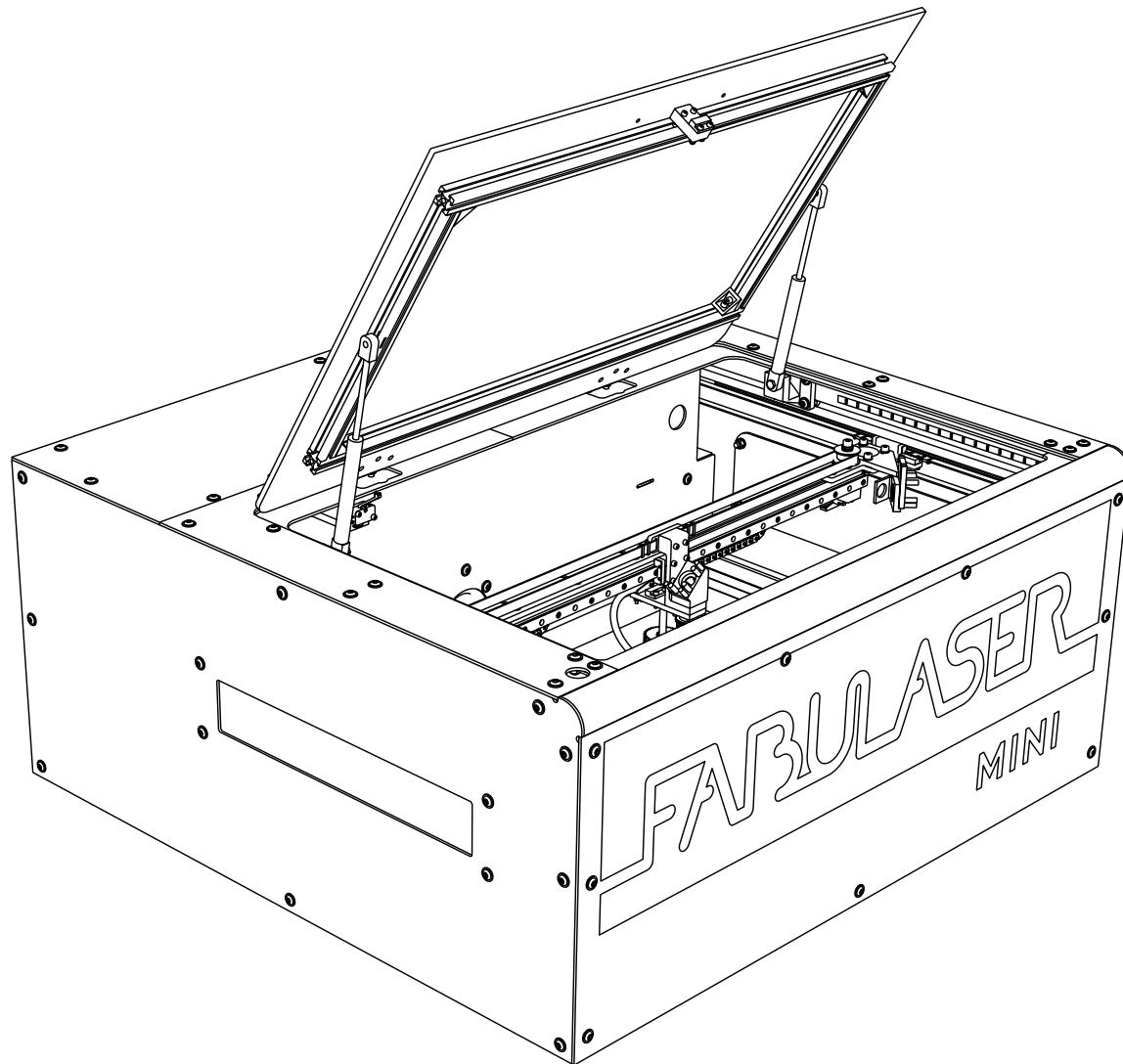


STEP 35. CELEBRATE!

Congratulations! You just finished assembling a complete laser cutter machine!

Now your Fabulaser Mini is ready to assist you on your projects.

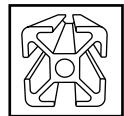
Have fun!



TROUBLESHOOTING

PROBLEM	CHECKS AND SOLUTIONS	PROBLEM	CHECKS AND SOLUTIONS
The machine axis are not moving	<ul style="list-style-type: none">• The machine is not switched on.• The power plug is disconnected.• The fuse, located inside the main power plug, is open or has been removed.• The Stepper Power Supply does not receive electricity; check the relevant connections.• The Stepper Power Supply is damaged; check if there are 24V with a multimeter.• The Stepper Shield does not receive the 24V; check the relevant connections.• If only one axis does not move, maybe that one Stepper Driver is damaged; change it and try again.• The couplers, belts or pulley are loose; check them.• The Endstop Switches are triggered; check if the axis are away from them and/or anything is blocking them.	The laser is not firing	<ul style="list-style-type: none">• The machine is not switched on.• The power plug is disconnected.• The fuse, located inside the main power plug, is open or has been removed.• The laser power supply does not receive electricity; check the relevant connections.• The laser tube does not receive power; check Laser+ and Laser- connections.• The chiller is switched off (the water flow sensor is not active); switch the water chiller on.• The laser window is open; close it.• The laser path lost its calibration; check it with masking tape, see “how to calibrate” the laser. (Step 21)• The window switches and relative cables are damaged; check them and change them in this case.• The GCode is wrong and does not contain any “M3” and “SXX” values.• The “Laser Comm” cable is damaged; check it.• The Laser Power Supply wiring is not correct; check it.
It is not possible to connect to the machine	<ul style="list-style-type: none">• Within the UGS software, check if you are using the correct COM port (serial port); change it in this case.• Check if the baud rate is 9600, change it in this case.• Check if the USB to Serial connections are correct.• The Arduino could be damaged; check if the green light (located into the Arduino board) is on.		
The machine stops in the middle of a job	<ul style="list-style-type: none">• Check if the stepper motor cables are not close to the USB to Serial Cable.• Check if your PC is not blocked and/or too slow.• Check if the USB to Serial has not been accidentally removed.• Check if the endstop have not been triggered during the job.• Check if the chiller has not been powered off accidentally.		

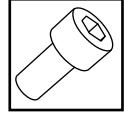
LIST OF PARTS



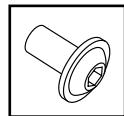
2x Profile 3060-770
2x Profile 30-150
2x Profile 30-350
2x Profile 30-380
2x Profile 30-400
2x Profile 30-600
3x Profile 30-770



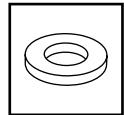
1x Profile Fillet



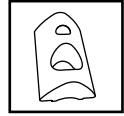
20x C-Screw M3-8
12x C-Screw M3-10
31x C-Screw M3-12
10x C-Screw M3-16
10x C-Screw M3-20
2x C-Screw M3-30
20x C-Screw M4-8



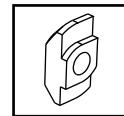
16x B-Screw M6-10
130x B-Screw M6-12
71x B-Screw M6-16



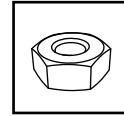
8x Washer M5
50x Washer M6
2x Washers M8 Big



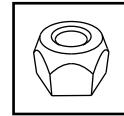
25x T-nut M3
4x T-nut M4
173x T-nut M6



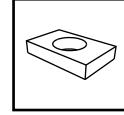
16x Hammer Nut M3
12x Hammer Nut M4
4x Hammer Nut M5



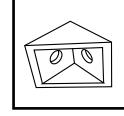
10x Nut M6



16x Lock Nut M3
8x Lock Nut M4
8x Lock Nut M5



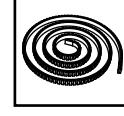
22x Flat Nut M6



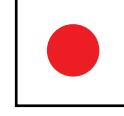
4x Bracket 20
30x Bracket 30
4x Bed Connector 20



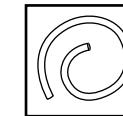
2x Linear Guide Y
1x Linear Guide X



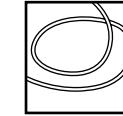
1x X-belt
2x Y-belt



1x Red Dot Sticker

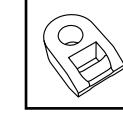


1x Water Outlet Tube Inside
1x Water Inlet Tube Inside

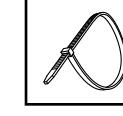


1x Power Cable
1x Laser Power Cable
1x Main Power Cable
1x Emergency Button

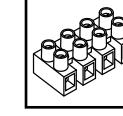
Cable
1x Earth Cable
1x Back Window Switch Cable
1x Front Window Switch Cable
1x Endstop Cable



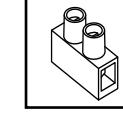
24x Wire Fixer



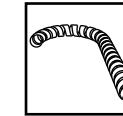
200x Cable Tie



2x Terminal Block

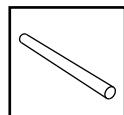


2x Laser Attachment

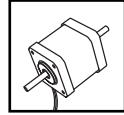


1x Cable Wrapper

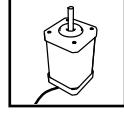
LIST OF PARTS



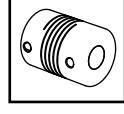
1x Y-shaft 350
1x Y-shaft 400



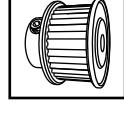
1x Y-motor



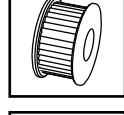
1x X-Motor



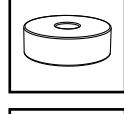
2x Coupler



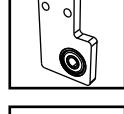
2x Y-pulley Back
1x X-pulley



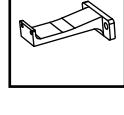
2x Y-pulley Front



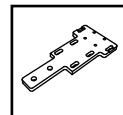
1x X-bearing



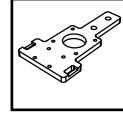
2x Y Back Bearings Holder



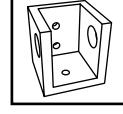
1x Back Window Switch Holder



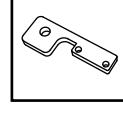
1x X-Holder Right



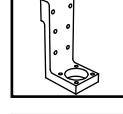
1x X-Holder Left



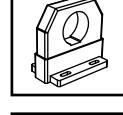
2x Y Front Pulley Holder Left



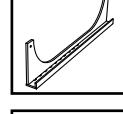
1x X-Endstop Holder



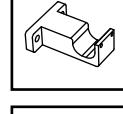
1x Laser Head Holder



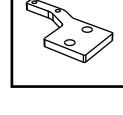
2x Laser Tube Holder



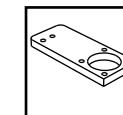
1x Chain Holder



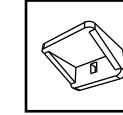
1x Front Window Switch Holder



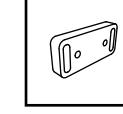
1x Y-Endstop Holder



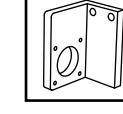
1x Chain End Holder



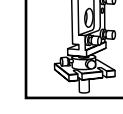
1x Front Window Holder



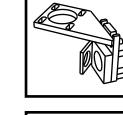
1x X-Belt Attacher



1x Y-Motor Attachment



1x Mirror Holder 25



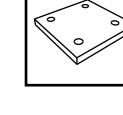
1x Mirror Holder 20



1x Laser Head

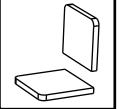
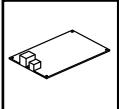
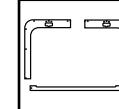
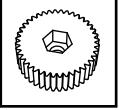
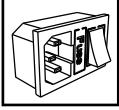
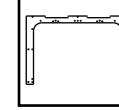
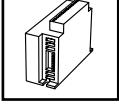
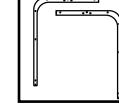
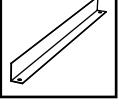
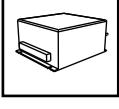
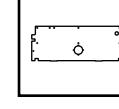
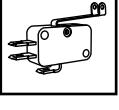
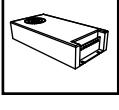
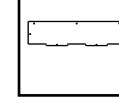
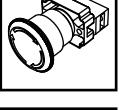
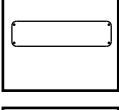
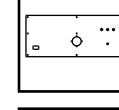
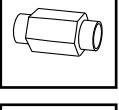
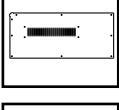
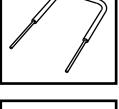
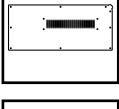
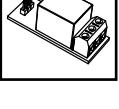
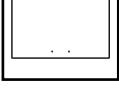
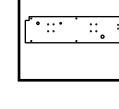


4x Rubber Ring

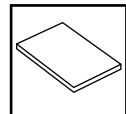


3x Second Mirror Support

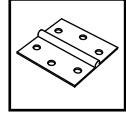
LIST OF PARTS

	2x Pair of Frame Spacers		1x Laser Controller		1x Top Front Inside Panel (3 pieces)
	4x Bed Adjuster		1x Power Plug + Mains Cable + Earth Cable		1x Top Front Panel
	4x Threaded Rod M8-120		2x Motor Drive		1x Window Spacers (2 pieces - Left and Right)
	30x Lamella		1x Laser Power Supply		1x Internal Separator Panel 330 x 870 mm
	1x Window Switch		1x Motor Power Supply		1x Top Back Panel
	1x Emergency Button		2x Air Intake Panel		1x Back Panel
	1x Water Flow Sensor		1x Side Panel Right		1x Front Panel
	1x Laser Jumper 1x Main Power Jumper		1x Side Panel Left		1x Bottom Panel 800 x 760 mm
	1x Relay		1x Window Panel		1x Laser Panel 230 x 870 mm

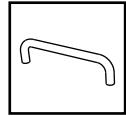
LIST OF PARTS



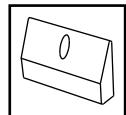
1x Wood Plank



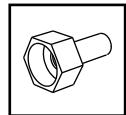
2x Hinge



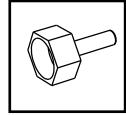
1x Handle



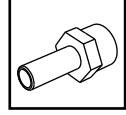
1x Window Back Support



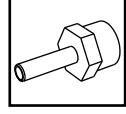
2x Water Connector Inside



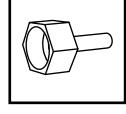
1x Air Connector Inside



2x Water Connector Outside

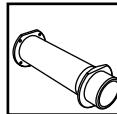


1x Air Connector Outside

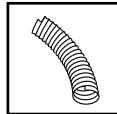


2x Water Flow Connector

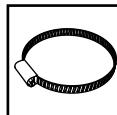
1x Foot Switch



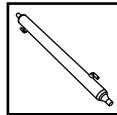
1x Exhaust Tube Inside



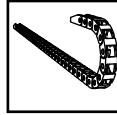
1x Exhaust Hose



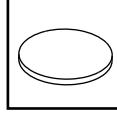
3x Hose Clamps



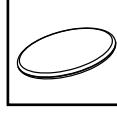
1x Laser Tube



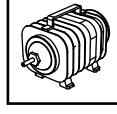
1x Chain



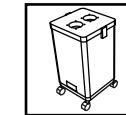
1x Lens



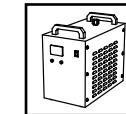
2x Mirror 20
1x Mirror 25



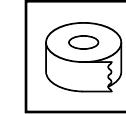
1x Air Compressor



1x Air Filter



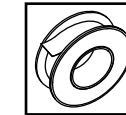
1x Water Chiller



1x Masking Tape

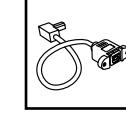


1x Double-sided Tape

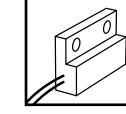


1x Teflon Tape

1x Radial Fan

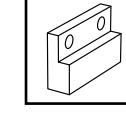


1x USB Cable Inside



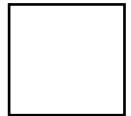
1x Window Sensor

1x Y-endstop Sensor
+ X-endstop Sensor
+ Endstop Cable

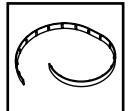


1x Window Magnet
1x X-endstop Magnet
1x Y-endstop Magnet

LIST OF PARTS



2x Fuse

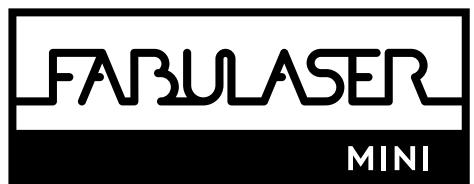


2x LED Strip



1x Window Piston
Left

1x Window Piston
Right

**FABULASER.NET**

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