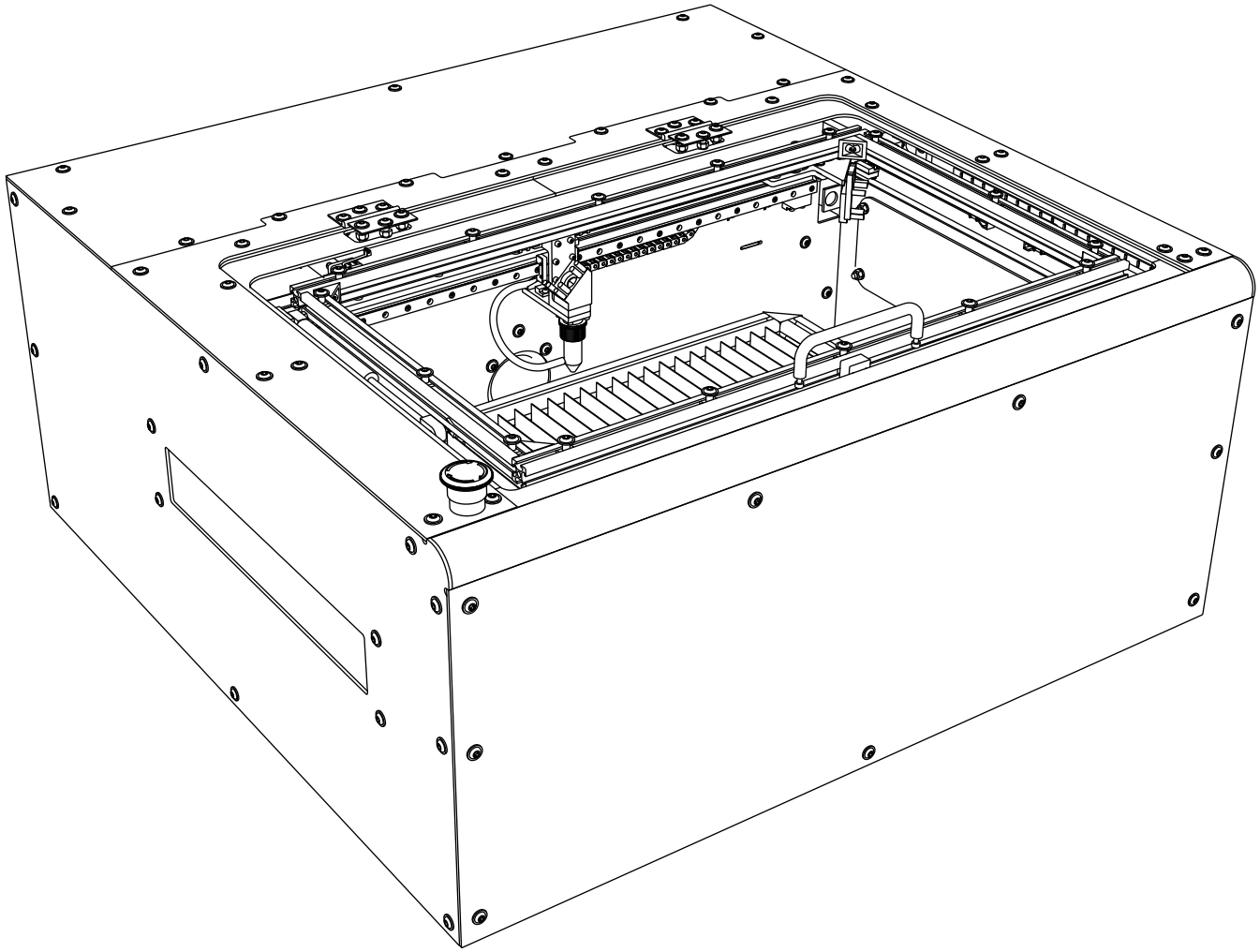
ASSEMBLY MANUAL OF THE OLSK SMALL LASER

Step by step instructions



ASSEMBLY MANUAL BY
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MACHINE HARDWARE BY
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HOW TO USE THIS MANUAL

This manual provides you a step-by-step guide on how to assemble the OLSK Small 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.

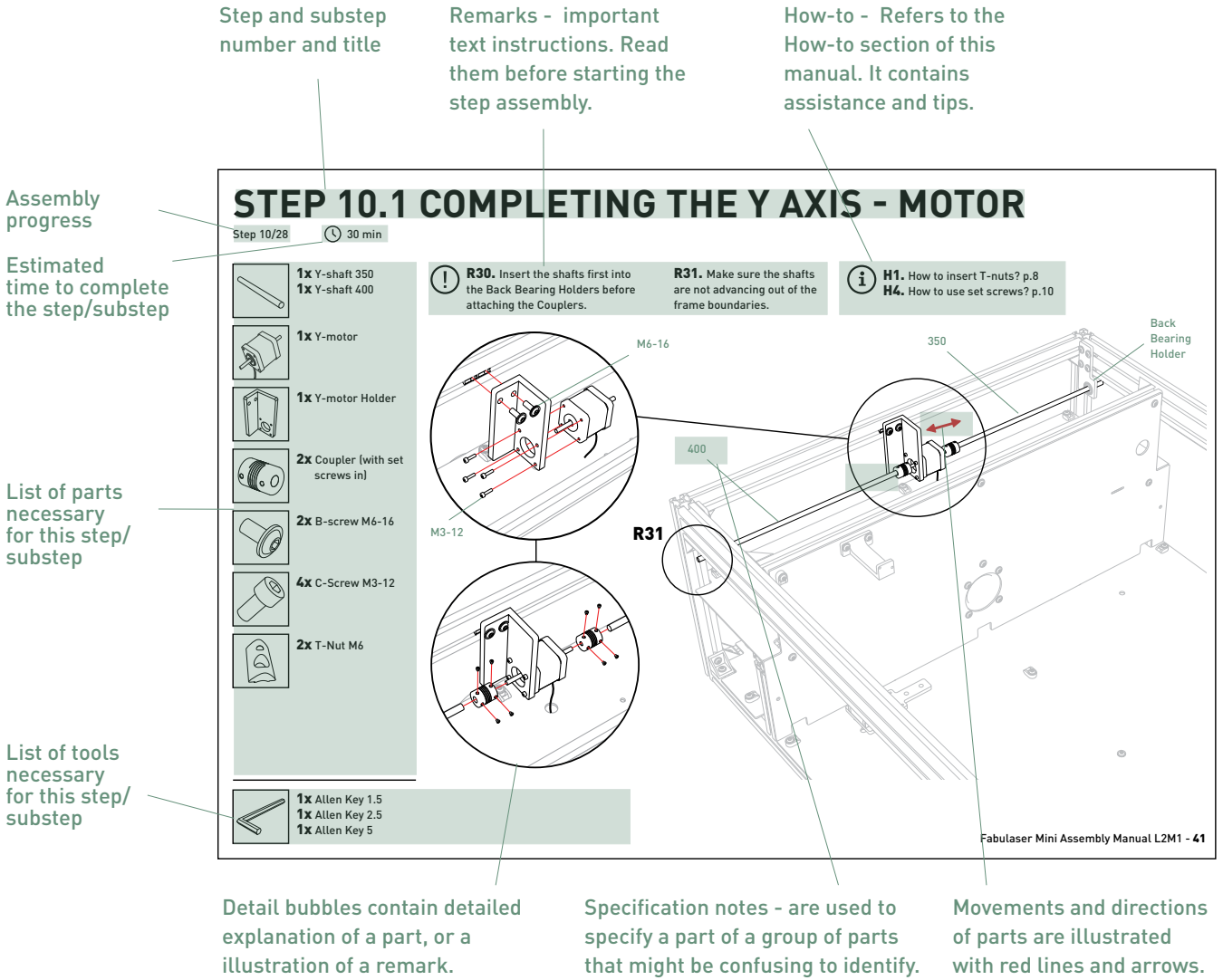
Colors are often used to aid and facilitate the identification of parts. If it is necessary to print this manual, make sure to print it in color. However, we highly recommend you to use it digitally to save paper and ink.

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 facilitated 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 OLSK Small Laser, 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:

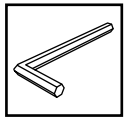
- Make sure to execute the laser calibration with minimum 2 people: one checking the laser path and the other operating the computer.
- Make sure your computer is running only the UGS software and nothing else; if the UGS is running too slow, try it with another computer.
- Do not use your phone and 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 googles.
- 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.



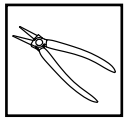
1x Allen Key 1.5
1x Allen Key 2.5
1x Allen Key 3

1x Allen Key 4
1x Allen Key 5
1x Allen Key 5.5

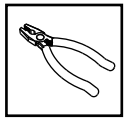
1x Wrench 5
1x Wrench 5.5
1x Wrench 7

1x Wrench 8
1x Wrench 10
1x Wrench 11

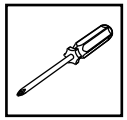
1x Cutter



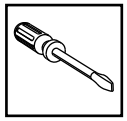
1x Needle Nose Plier



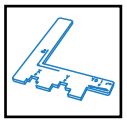
1x Small Plier



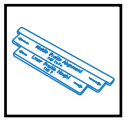
1x Screwdriver Phillips



1x Screwdriver slotted small



2x Template 1 (included)

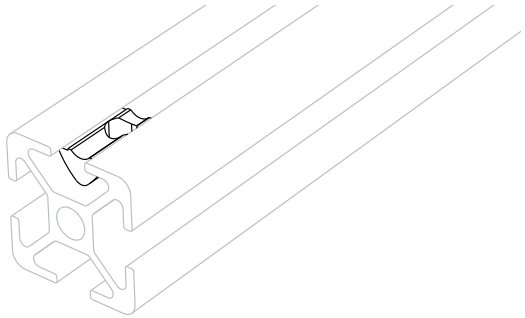


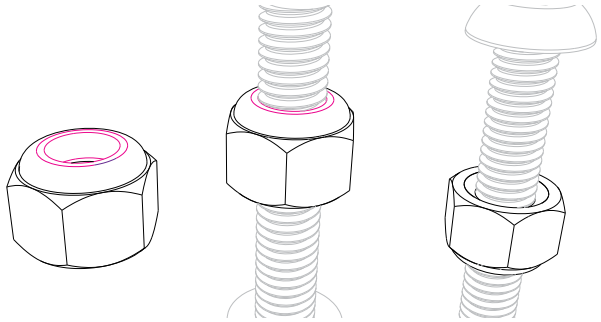
2x Template 2 (included)

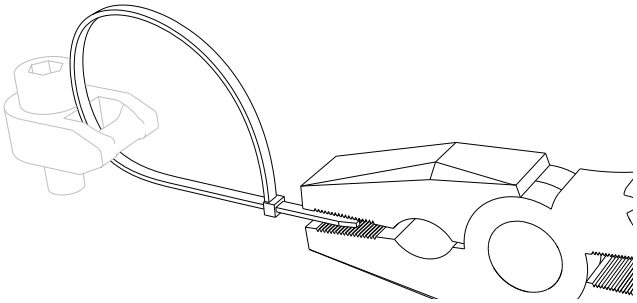
1x Plastic Safety Goggles

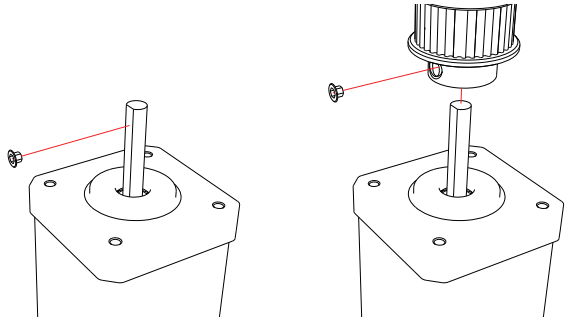
HOW-TO SECTION

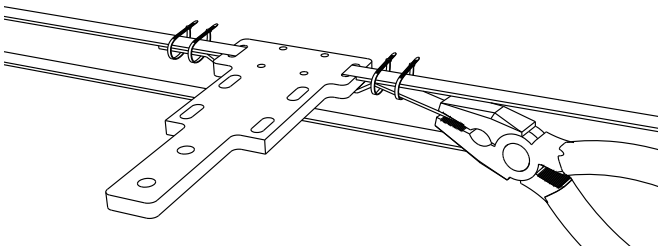
Instructions and tips to assist the assembly

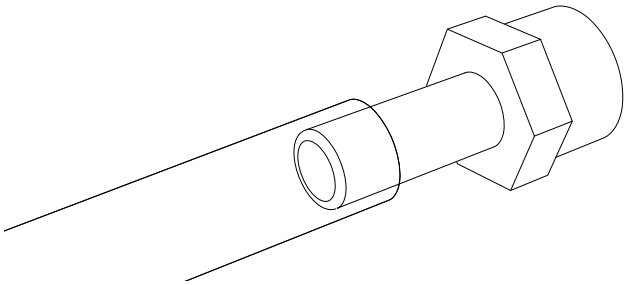


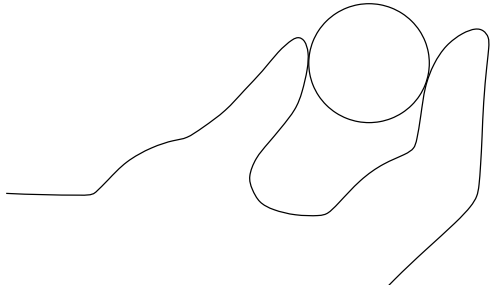


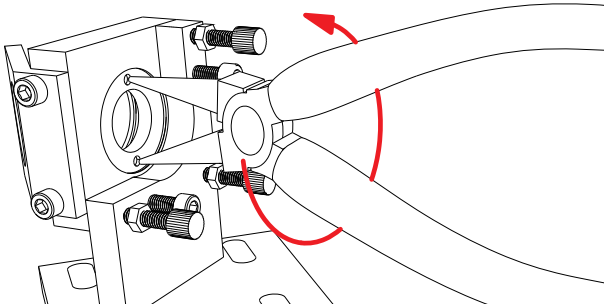


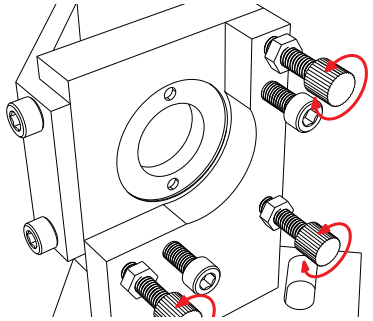








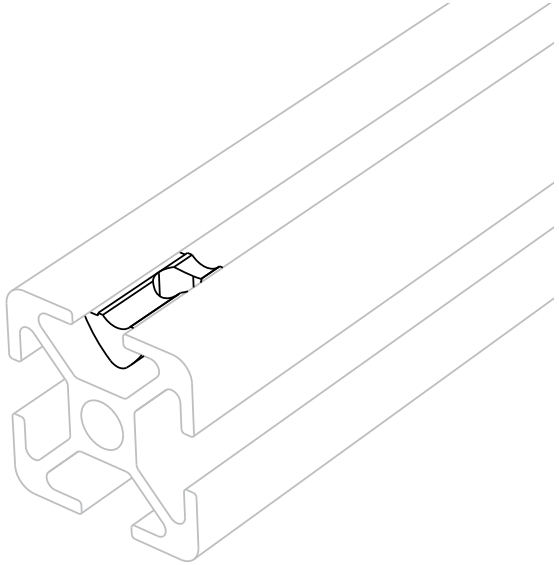




H1. HOW TO INSERT A T-NUT IN A PROFILE

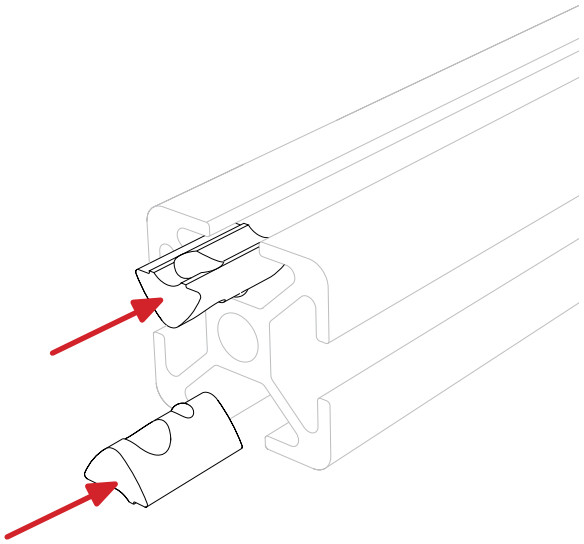
T-nuts need to be inserted in the profiles to enable the screws to be fixed. The correct position of the T-nut is with the ball pointing towards the center of the profile.

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



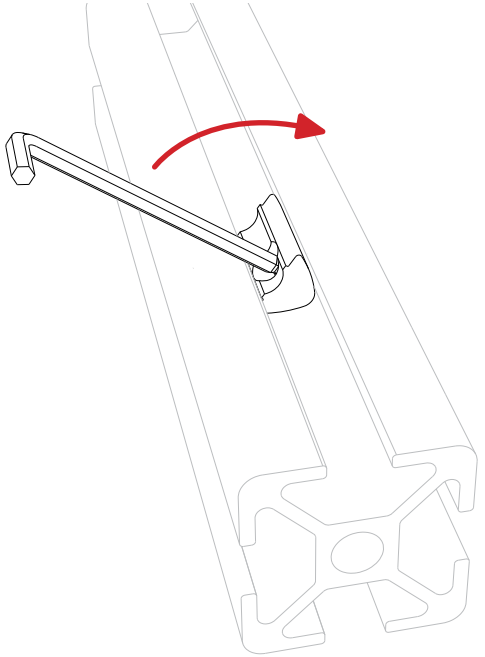
Option 1

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

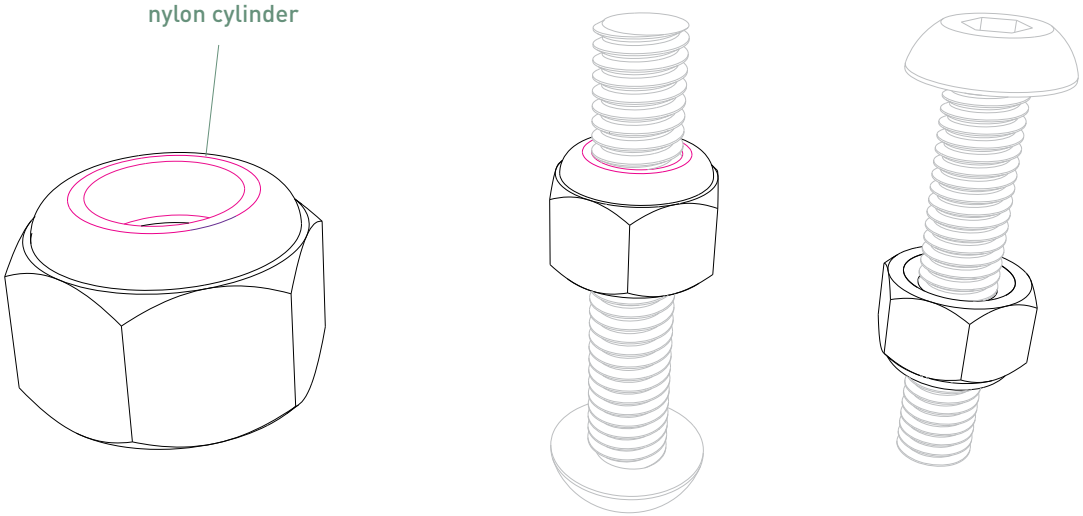
Insert the T-nut sideways in the profile slit. Using a small screwdriver or an allen key, stick the tool in the T-nut hole and turn it to the correct position.



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.



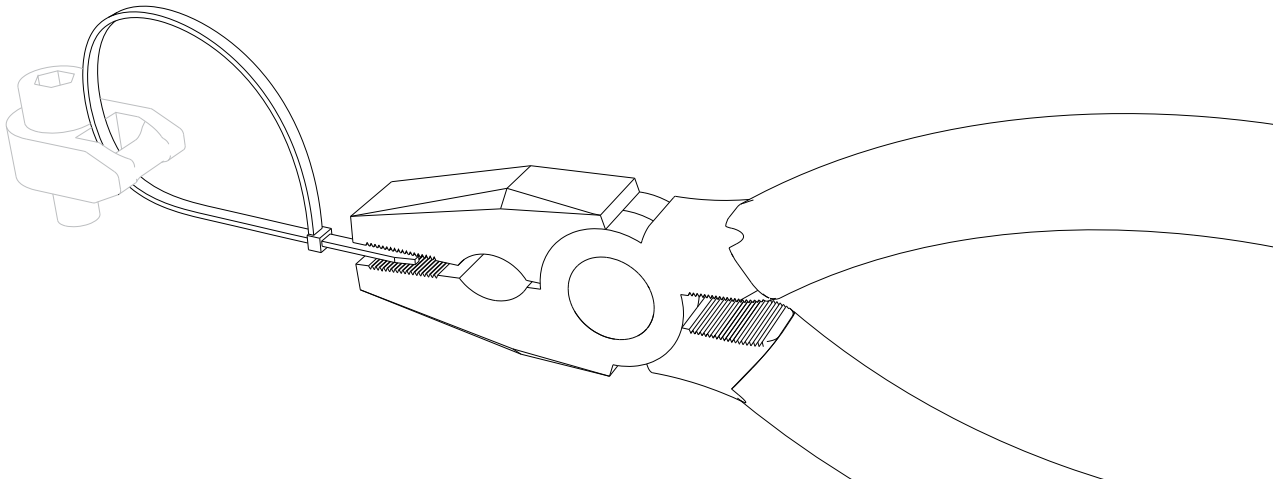
H3. HOW TO USE CABLE TIES

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.

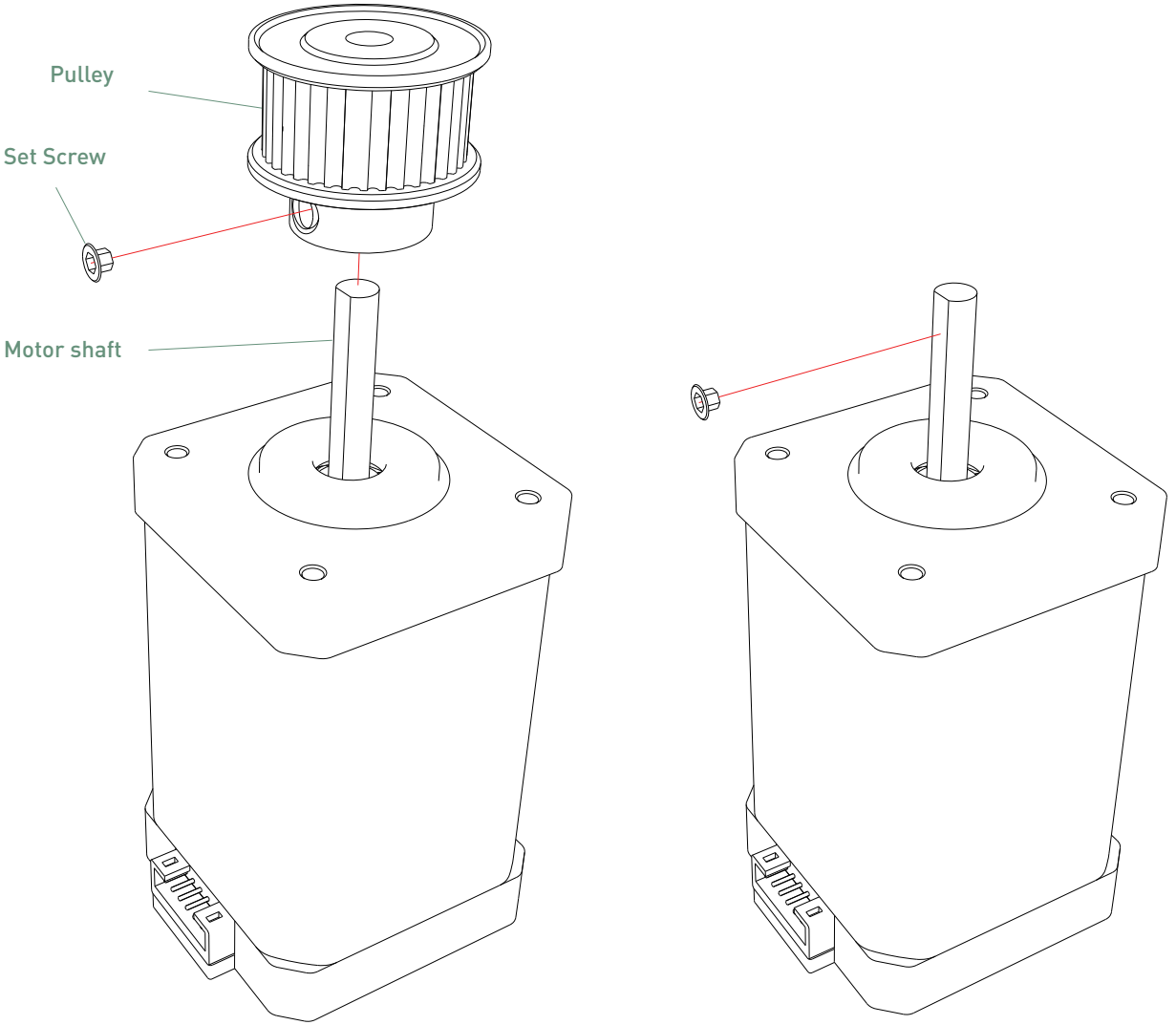
After tightened, cut the excess of the Cable Tie.



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

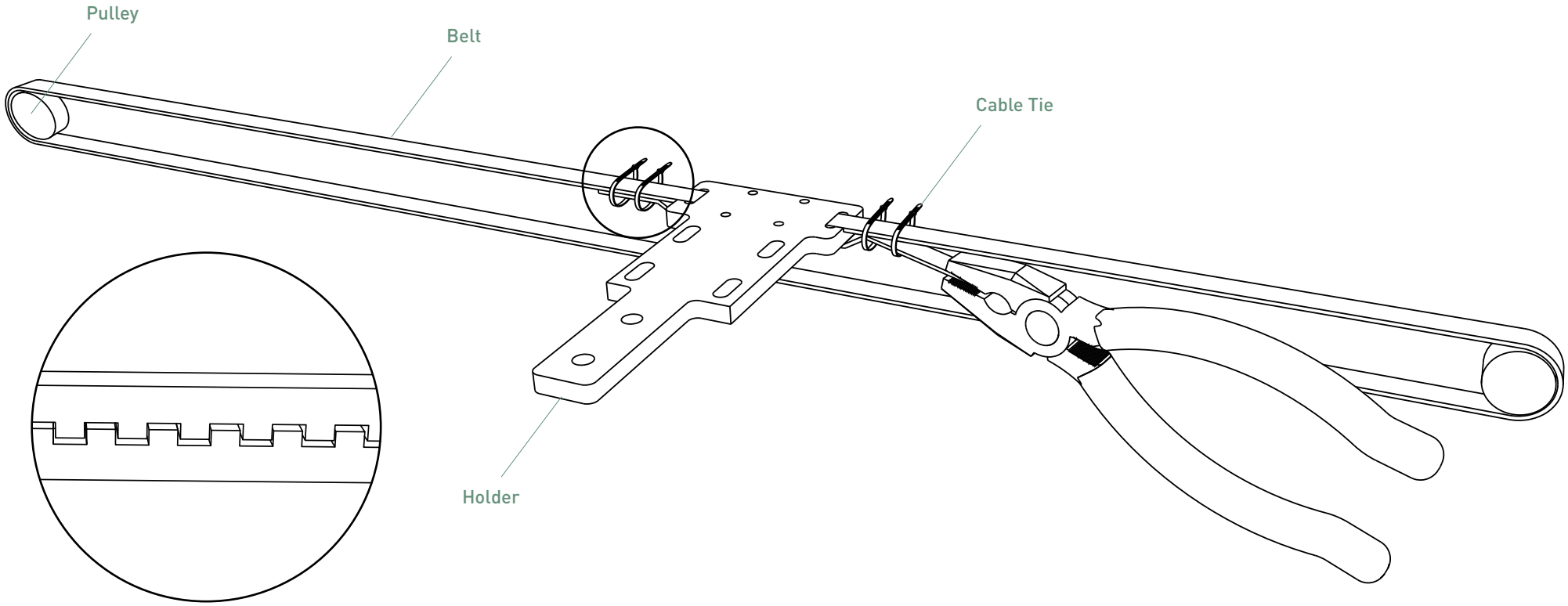
There has to be some tension on the belts in order for the X and Y-axis to move smothly.

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 throught the other handle of the holder. With pliers, pull the end of the belt, using some strengh 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.

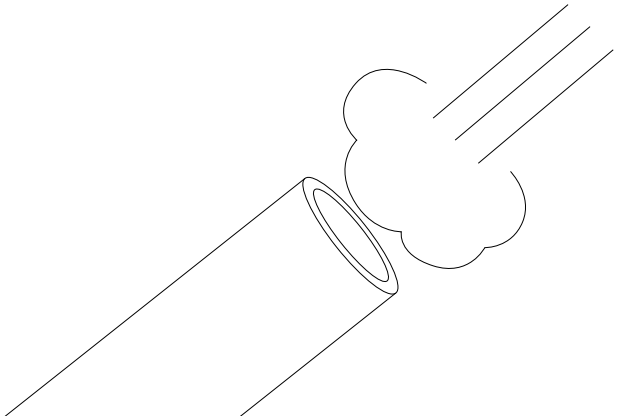
After tying the ends of the belt, cut its excess close to the Cable Ties.

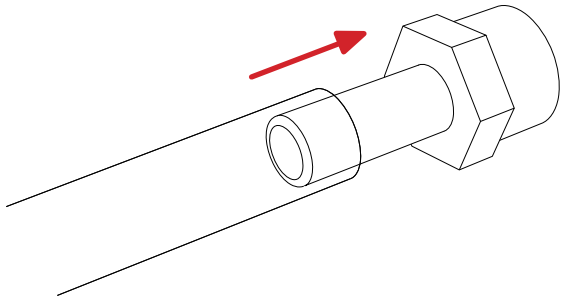


H6. HOW TO INSERT THE TUBES EASILY

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.

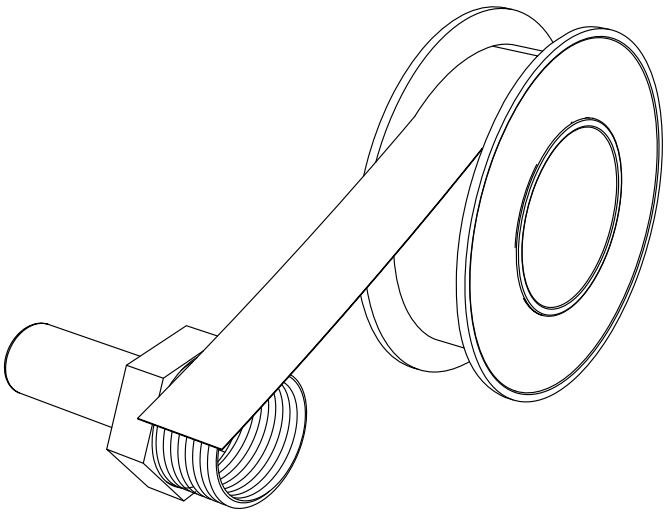


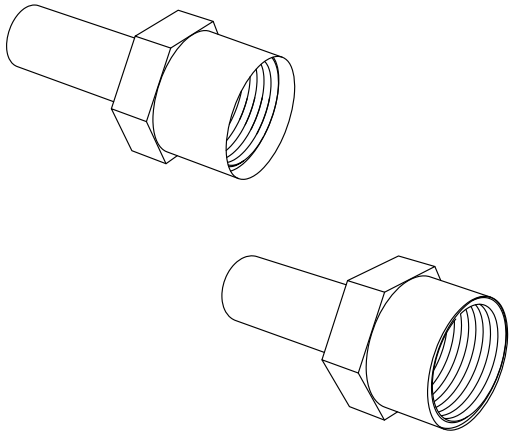


H7. HOW TO USE TEFLON TAPE

Wrap the teflon tape around the thread clockwise.

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

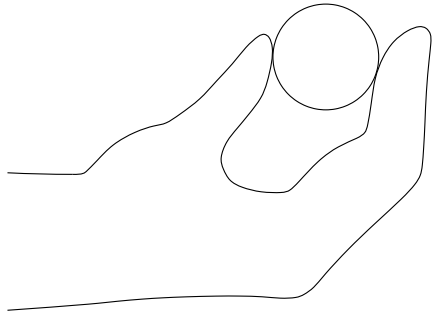




H8. HOW TO HOLD THE MIRROR

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.

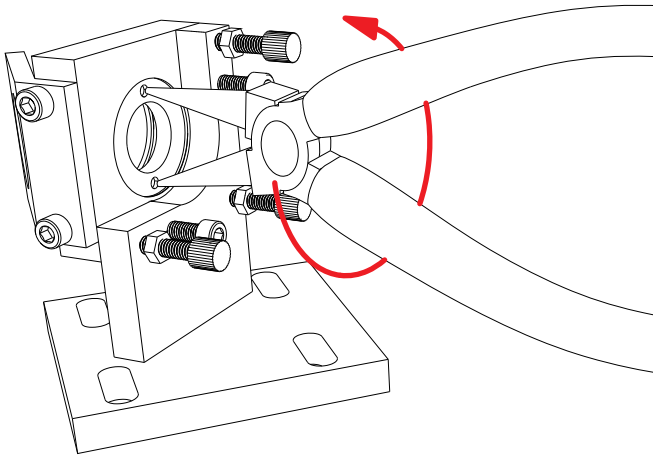


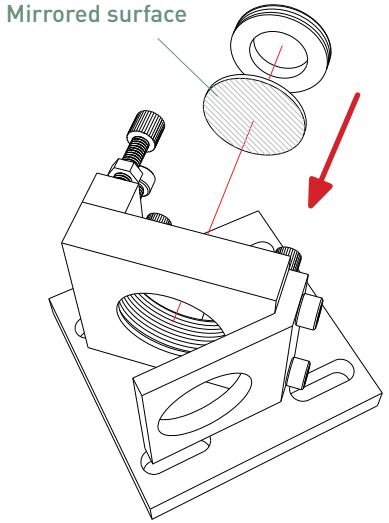
H9. HOW TO INSERT THE MIRROR

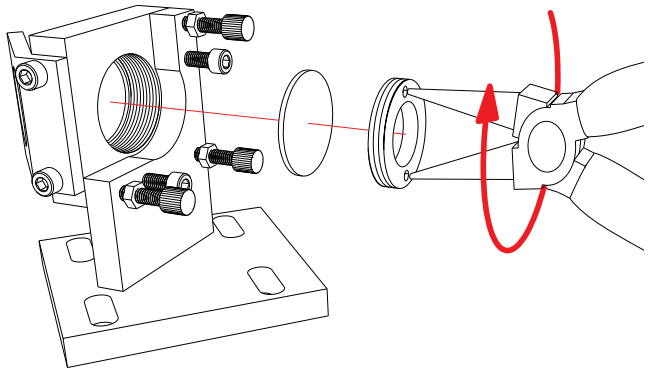
To insert the mirror, first remove the ring by unscrewing it with the Needle Nose Pliers. The ring has two indents for this purpose.

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.







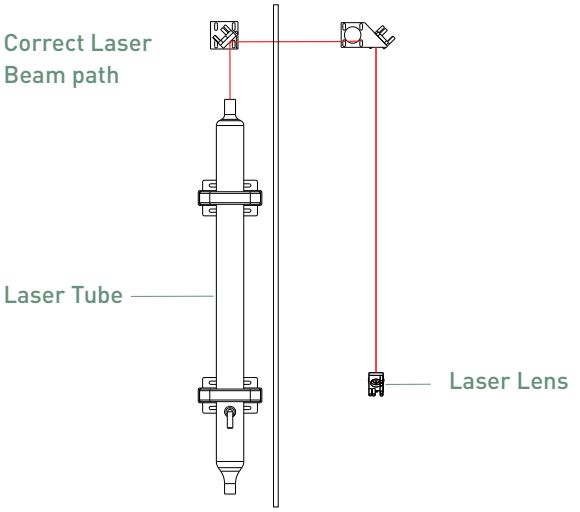
H10. HOW TO CALIBRATE THE MIRROR ANGLE

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.

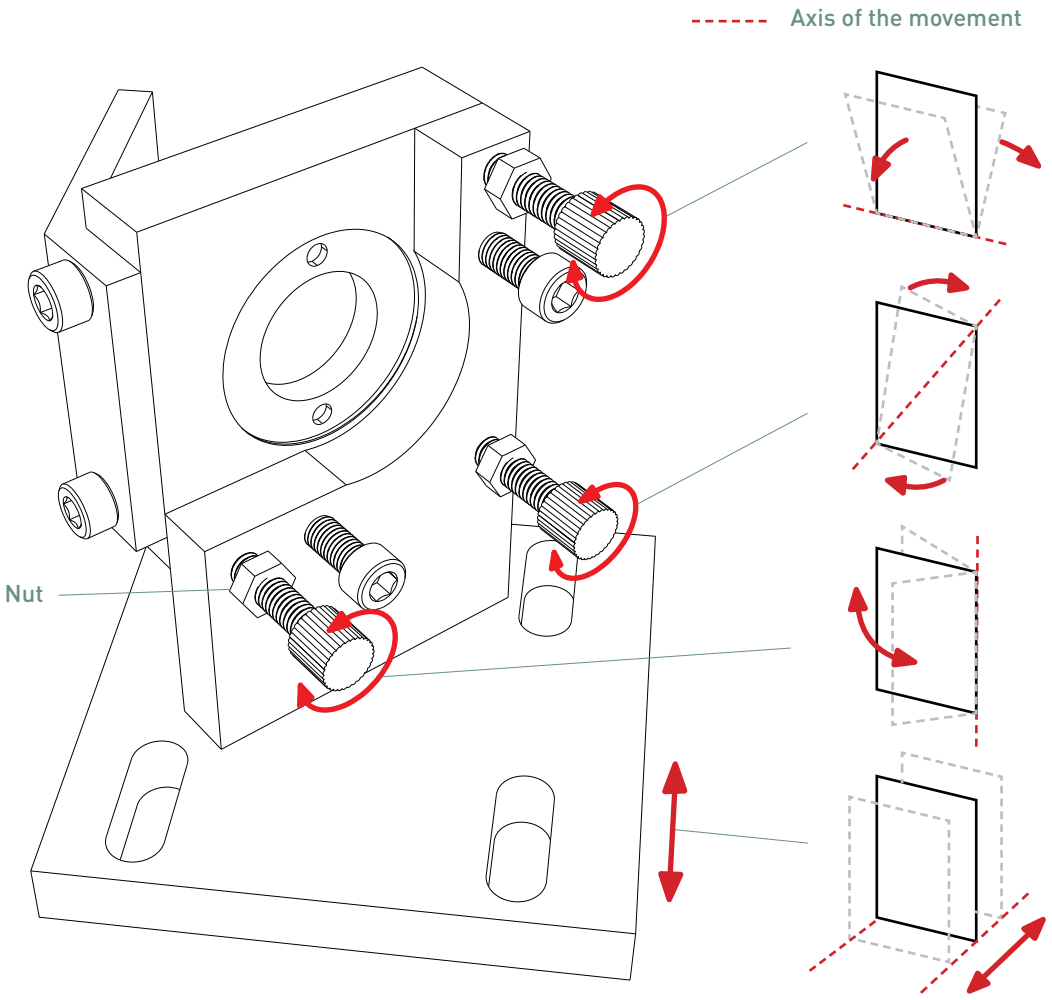
Each Mirror Holder contains 3 knobs. By rotating each knob, the angle of the mirror can be calibrated in different directions as shown in the image. Also, the entire Mirror Holder can be moved back and forth if necessary.

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.

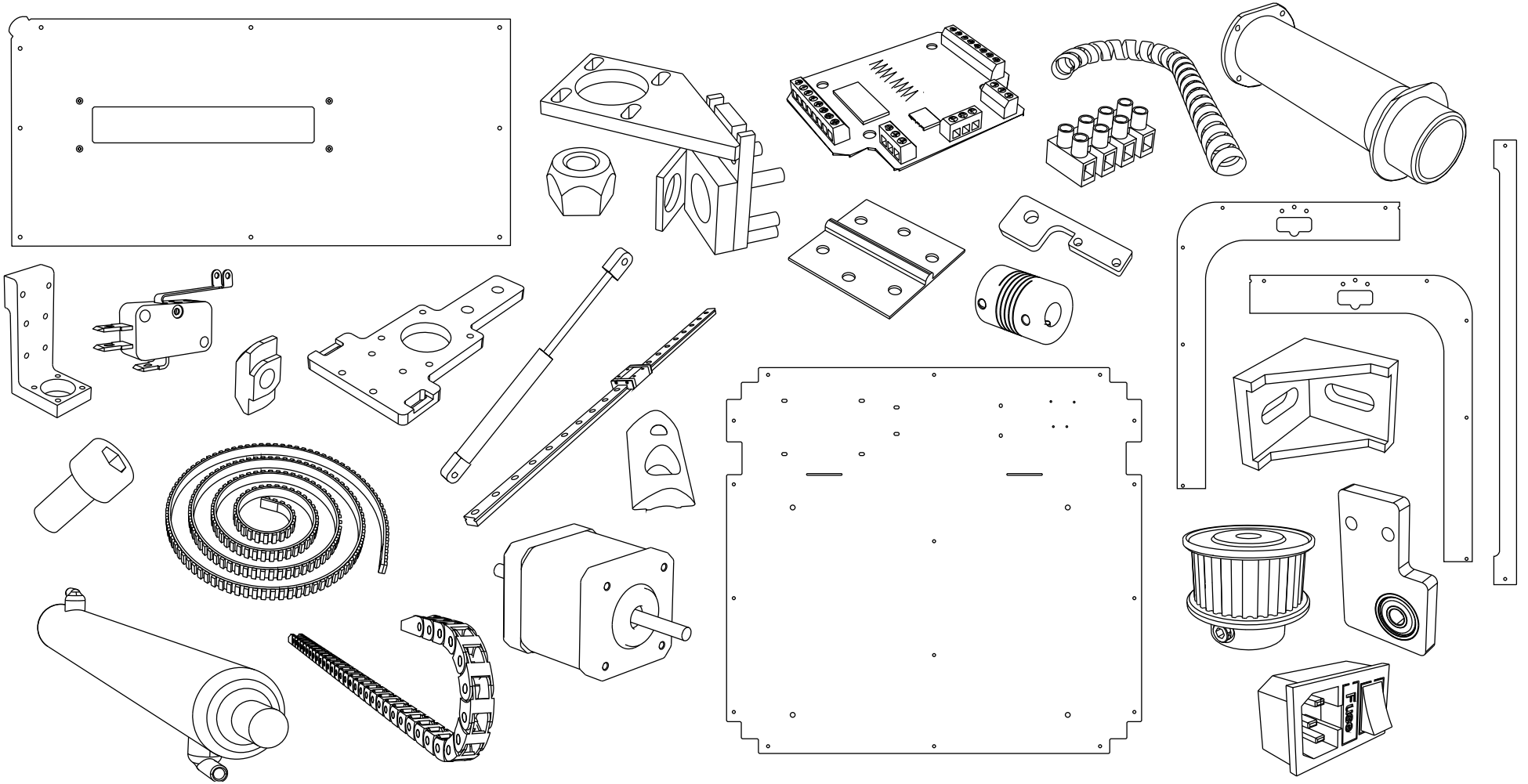


Possible movements for the angle calibration



ARE YOU READY?

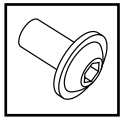
Let’s start!



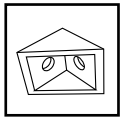
STEP 1. BUILDING THE BOTTOM FRAME

Step 1/33 20 min

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



12x B-screw M6-12



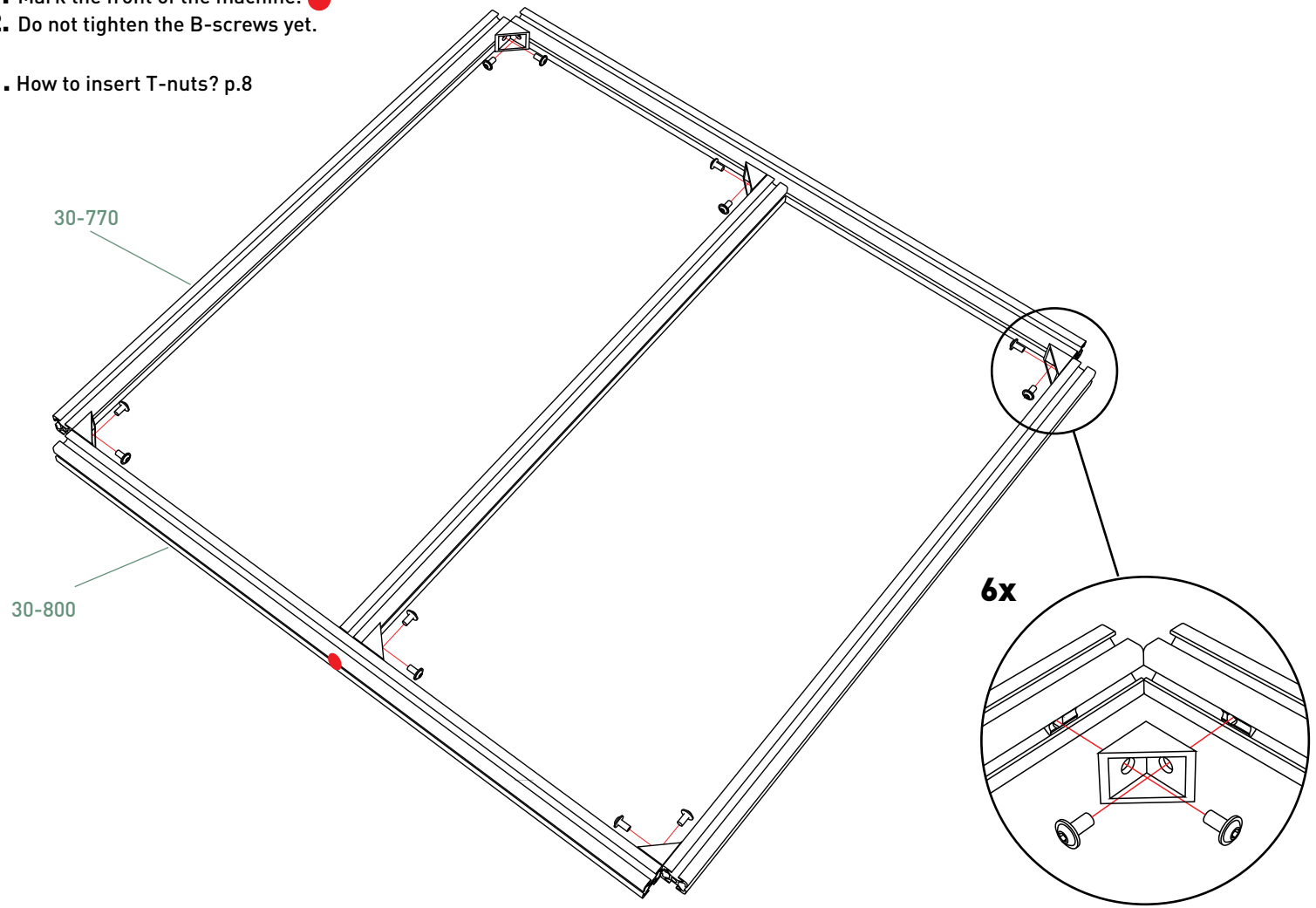
6x Bracket 30

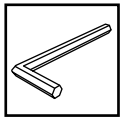
12x T-nut M6

1x Red Dot Sticker

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

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

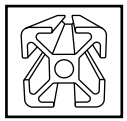




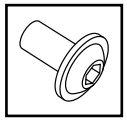
1x Allen Key 1.5
1x Allen Key 5

STEP 2.1 ATTACHING THE CORNER PROFILES

Step 2/33 30 min

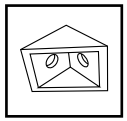


2x Profile 30-380
2x Profile 30-350



16x B-screw M6-12

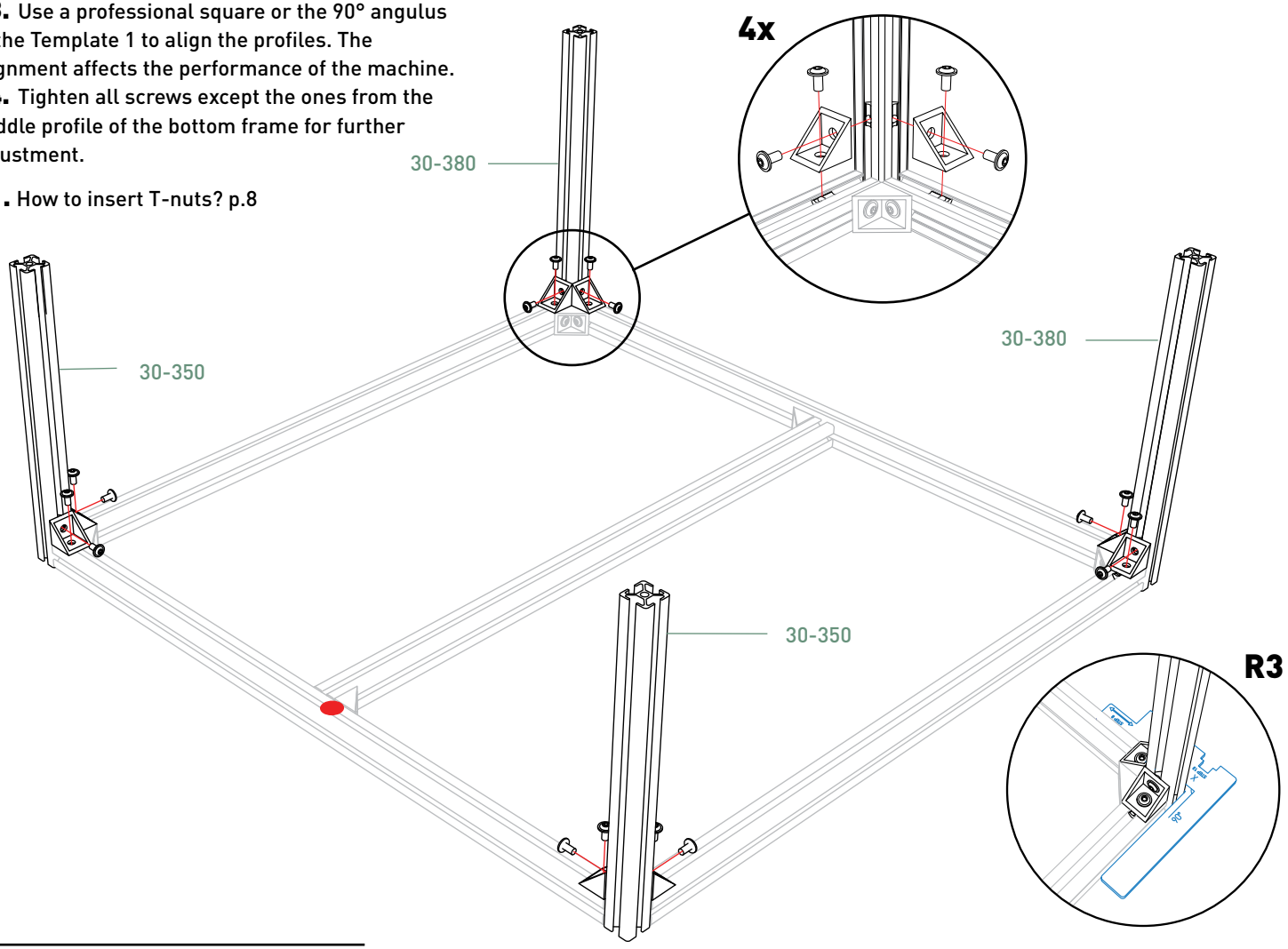
16x T-nut M6

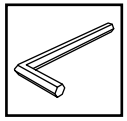


8x Bracket 30

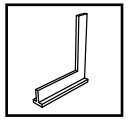
R3. Use a professional square or the 90° angulus of the Template 1 to align the profiles. The alignment affects the performance of the machine.
R4. Tighten all screws except the ones from the middle profile of the bottom frame for further adjustment.

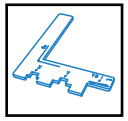
H1. How to insert T-nuts? p.8





1x Allen Key 1.5
1x Allen Key 5

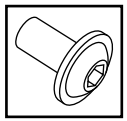




1x Square **or**
1x Template 1

STEP 2.2 ATTACHING THE WIRE FIXERS

Step 2/33 10 min

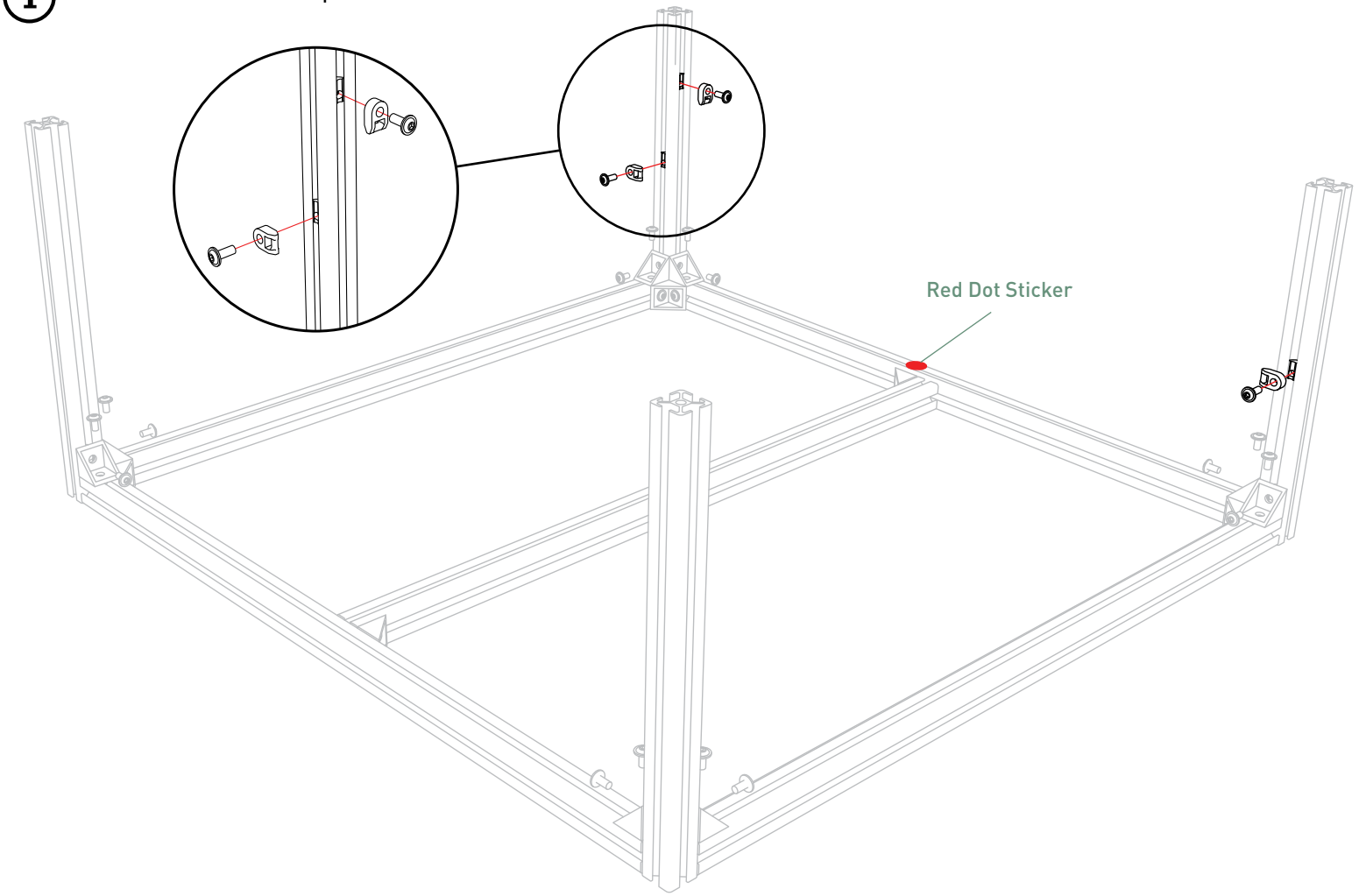


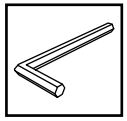
3x B-screw M6-16

3x T-nut M6

3x Wire Fixer

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

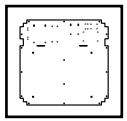




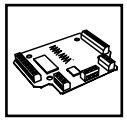
1x Allen Key 1.5
1x Allen Key 5

STEP 3.1 PREPARING THE BOTTOM PANEL

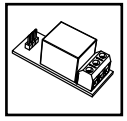
Step 3/33 30 min



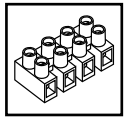
1x Bottom Panel



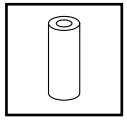
1x Converter PCB



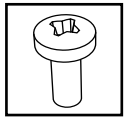
1x Relay



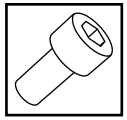
2x Terminal Block



12x Standoff

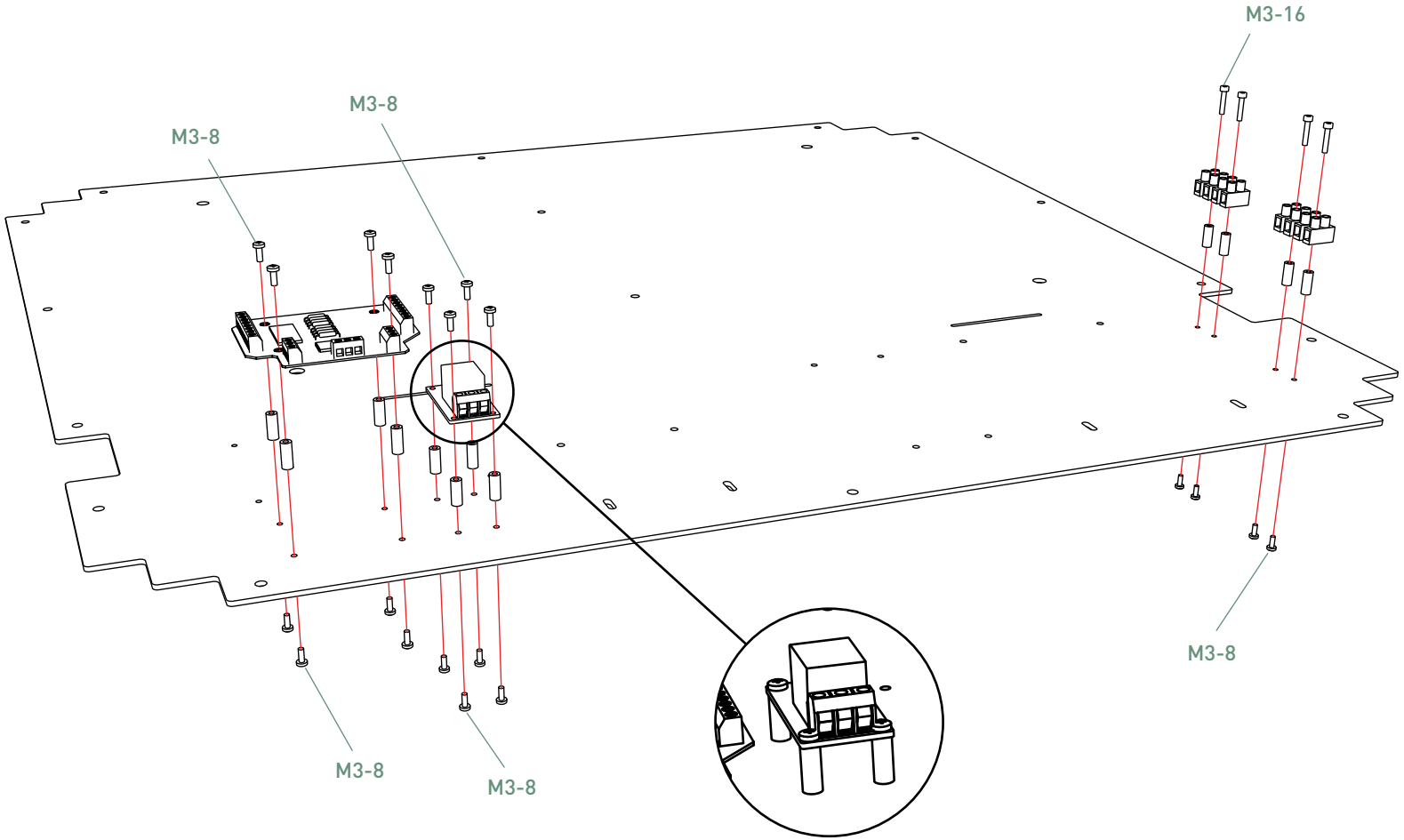


20x Plastic-screw M3-8

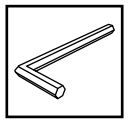


4x C-screw M3-16

R5. Remove the protective foils from the panel.



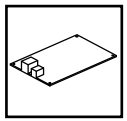
1x Screwdriver Phillips



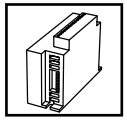
1x Allen Key 2.5

STEP 3.2 PREPARING THE BOTTOM PANEL

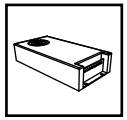
Step 3/33 30 min



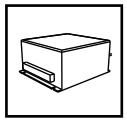
1x Laser Controller



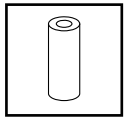
2x Motor Driver



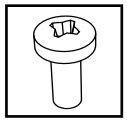
1x Motor Power Supply



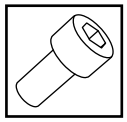
1x Laser Power Supply



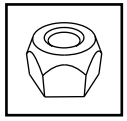
4x Standoff



8x Plastic-screw M3-8

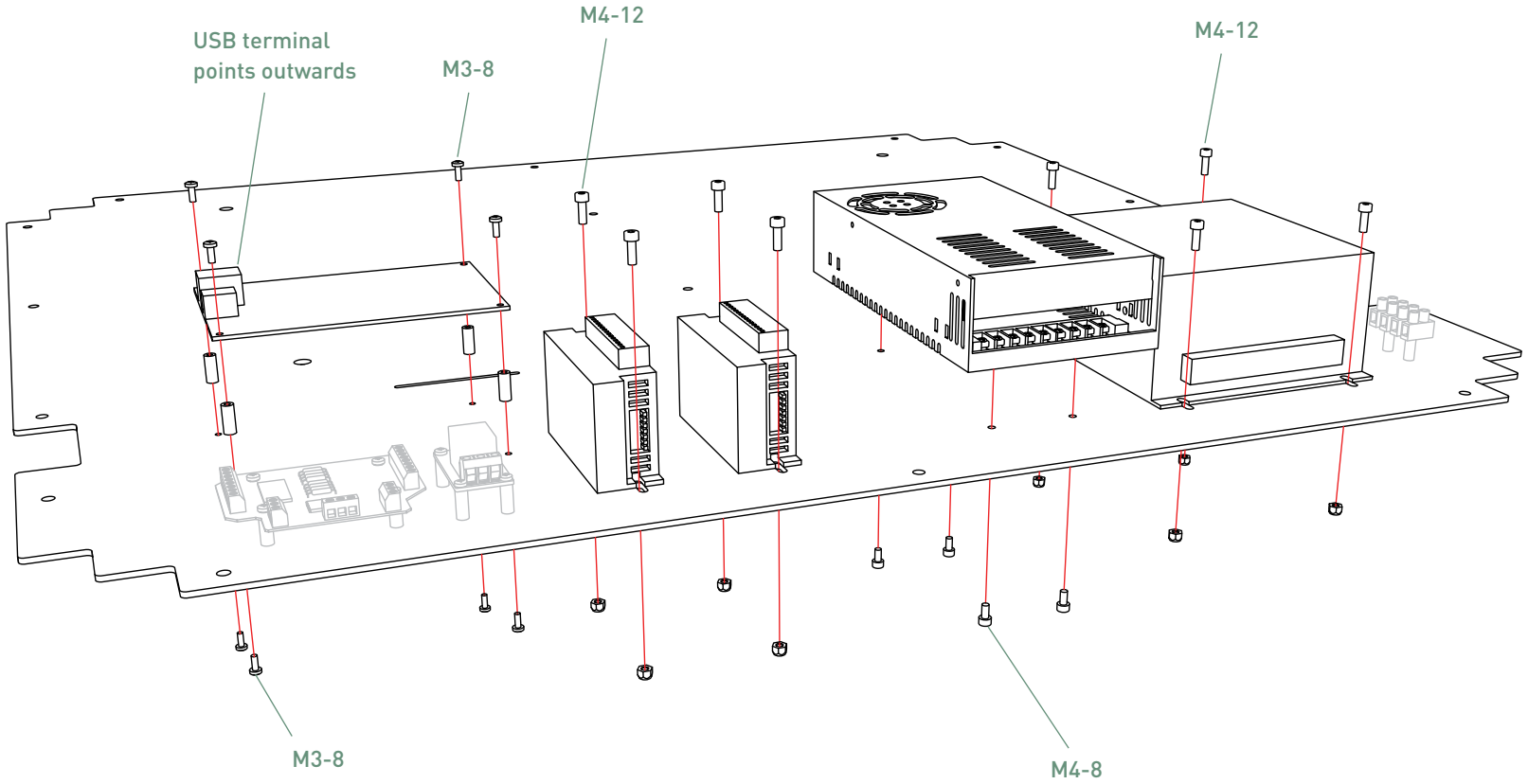


8x C-screw M4-12
4x C-screw M4-8

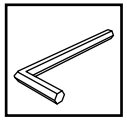


8x Lock Nut M4

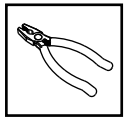
H2. How to use Lock Nuts? p.9



1x Screwdriver Phillips



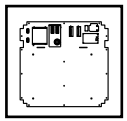
1x Allen Key 3



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

STEP 4. ATTACHING THE BOTTOM PANEL

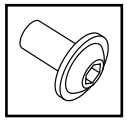
Step 4/33 20 min



1x Prepared Bottom Panel (Step 3)

16x T-nut M6

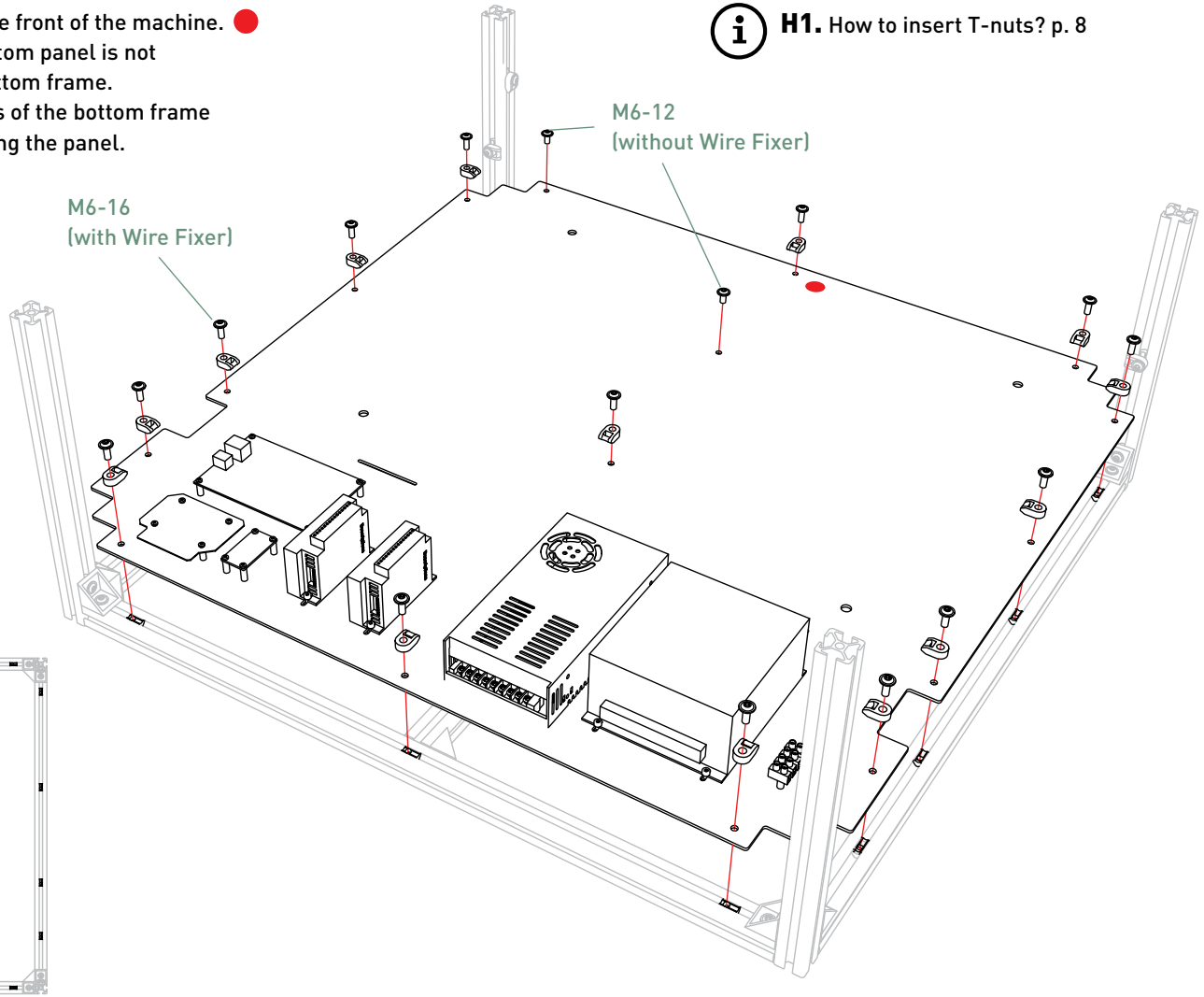
14x Wire Fixer



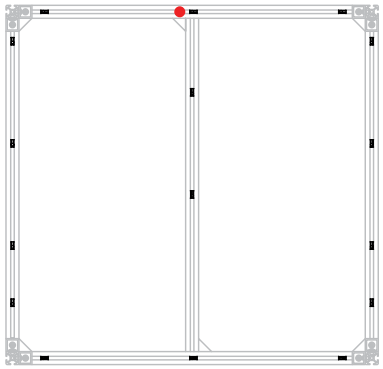
14x B-screw M6-16
2x B-screw M6-12

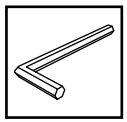
R6. Pay attention to the front of the machine.
R7. Make sure the bottom panel is not protruding from the bottom frame.
R8. Tighten the screws of the bottom frame middle profile after fixing the panel.

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



Position of the T-nuts

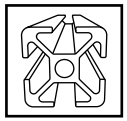




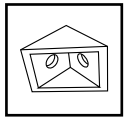
1x Allen Key 1.5
1x Allen Key 5

STEP 5.1 INSTALLING THE SEPARATOR PANEL PROFILES

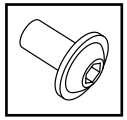
Step 5/33 10 min



2x Profile 30-150



2x Bracket 30

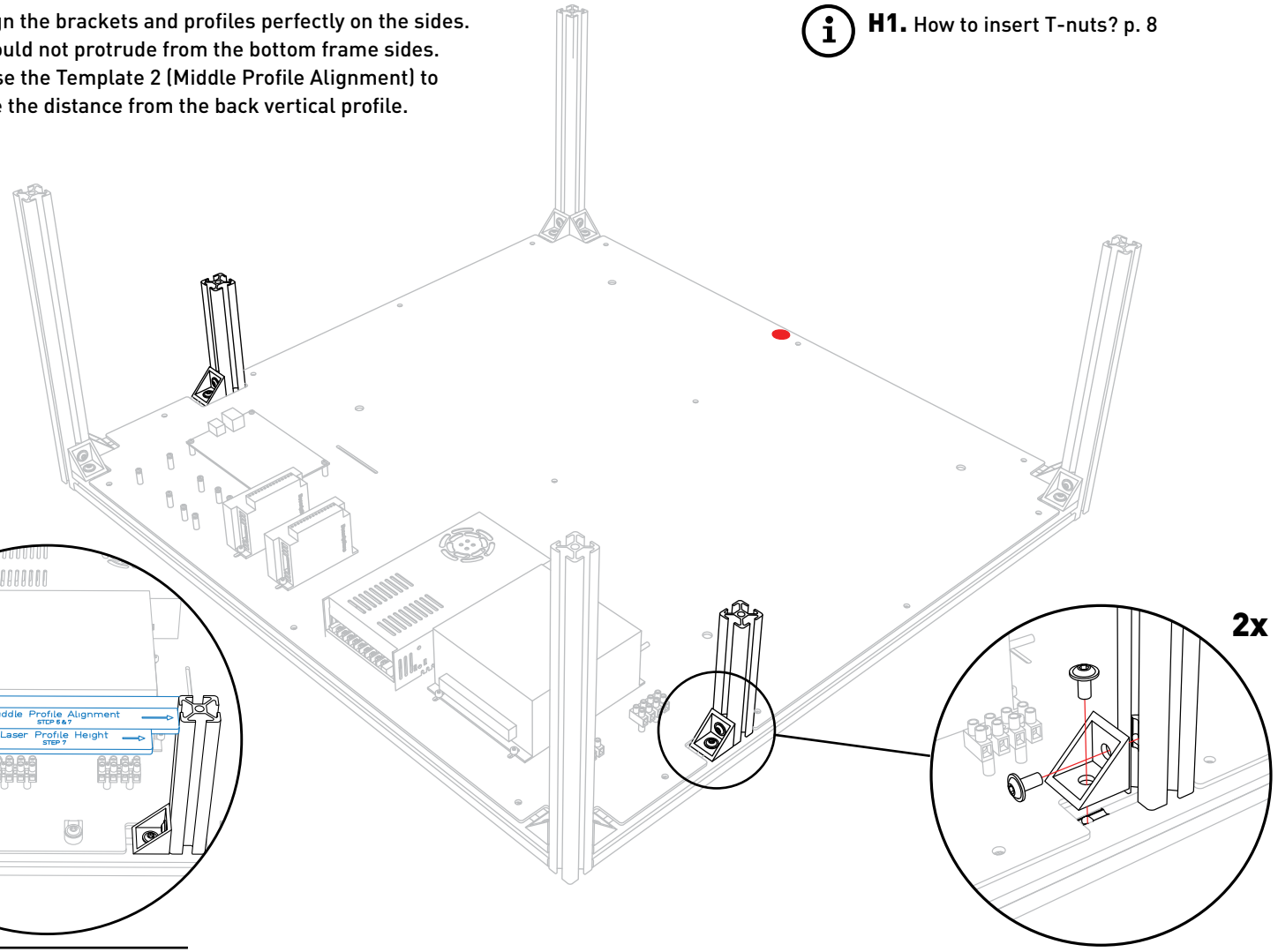


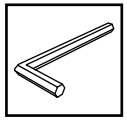
4x B-screw M6-12

4x T-nut M6

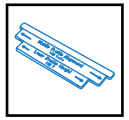
R9. Align the brackets and profiles perfectly on the sides. They should not protrude from the bottom frame sides.
R10. Use the Template 2 (Middle Profile Alignment) to measure the distance from the back vertical profile.

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





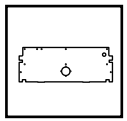
1x Allen Key 1.5
1x Allen Key 5



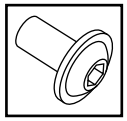
1x Template 2

STEP 5.2 INSTALLING THE SEPARATOR PANEL

Step 5/33 10 min



1x Separator Panel

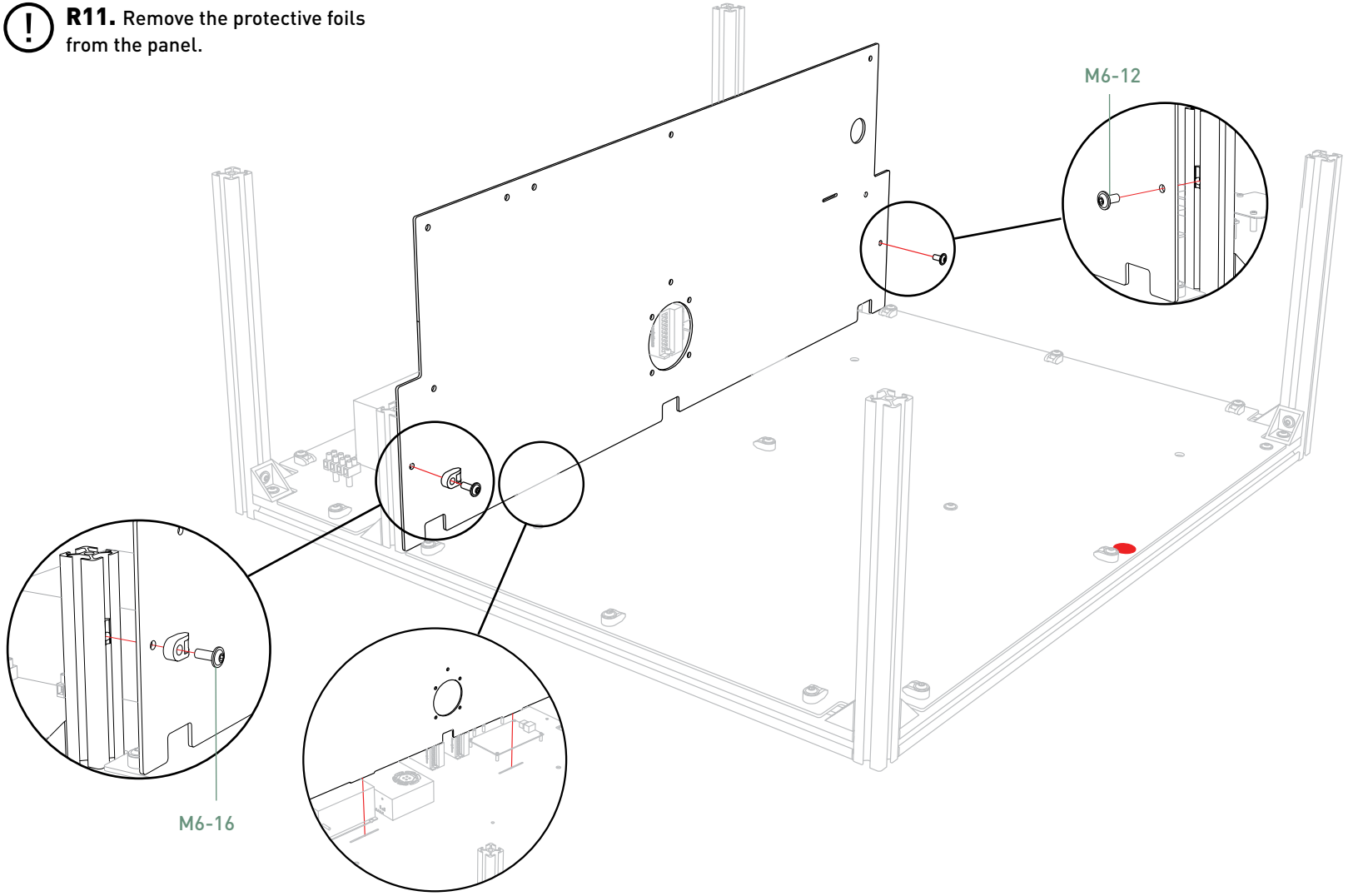


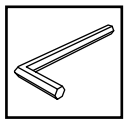
1x B-screw M6-12
1x B-screw M6-16

2x T-nut M6

1x Wire Fixer

R11. Remove the protective foils from the panel.

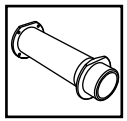




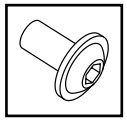
1x Allen Key 1.5
1x Allen Key 5

STEP 5.3 ATTACHING THE EXHAUST TUBE

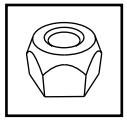
Step 5/33 15 min



1x Exhaust

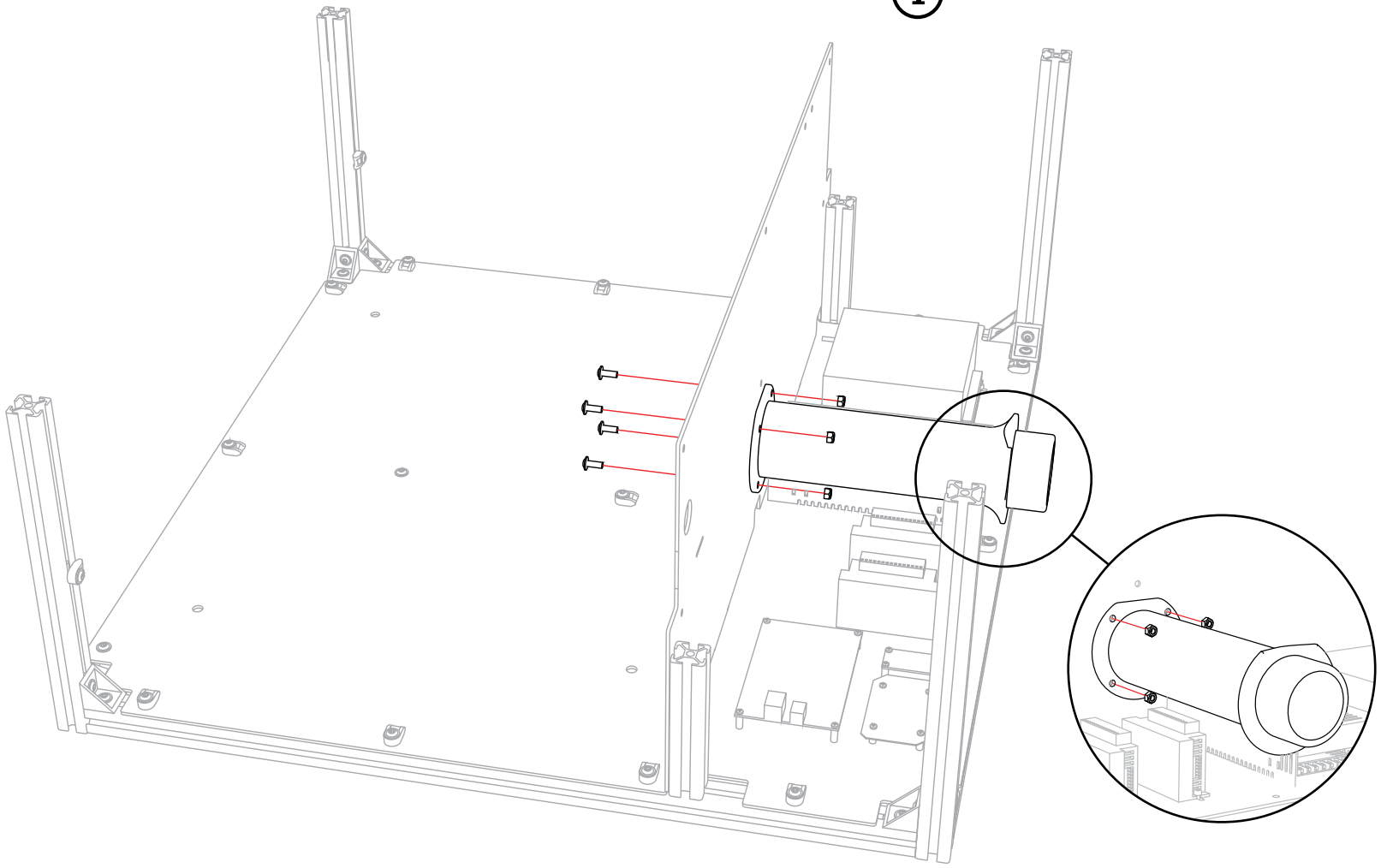


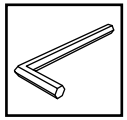
4x B-screw M6-16



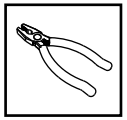
4x Lock Nut M6

H2. How to use Lock Nuts? p.9





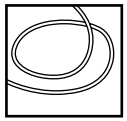
1x Allen Key 5



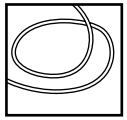
1x Small plier **or**
1x Wrench 10

STEP 6.1 WIRING AC

Step 6/33 15 min

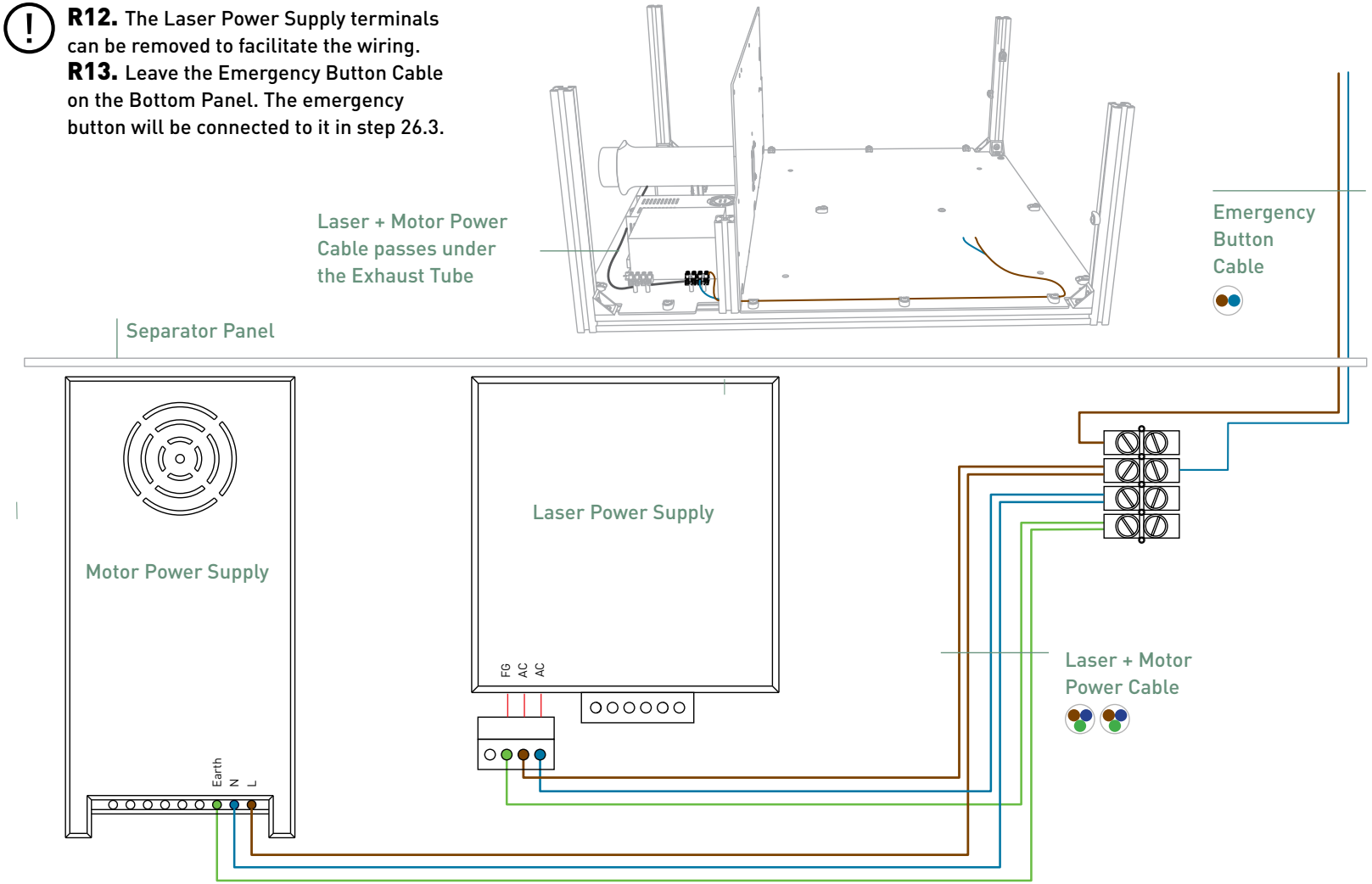


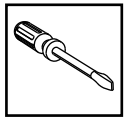
1x Laser + Motor Power Cable



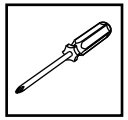
1x Emergency Button Cable

R12. The Laser Power Supply terminals can be removed to facilitate the wiring.
R13. Leave the Emergency Button Cable on the Bottom Panel. The emergency button will be connected to it in step 26.3.





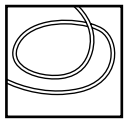
1x Screwdriver slotted small



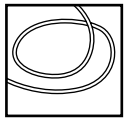
1x Screwdriver Philipps 6

STEP 6.2 WIRING DC 1

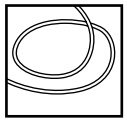
Step 6/33 30 min



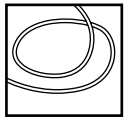
1x Controller Power Cable



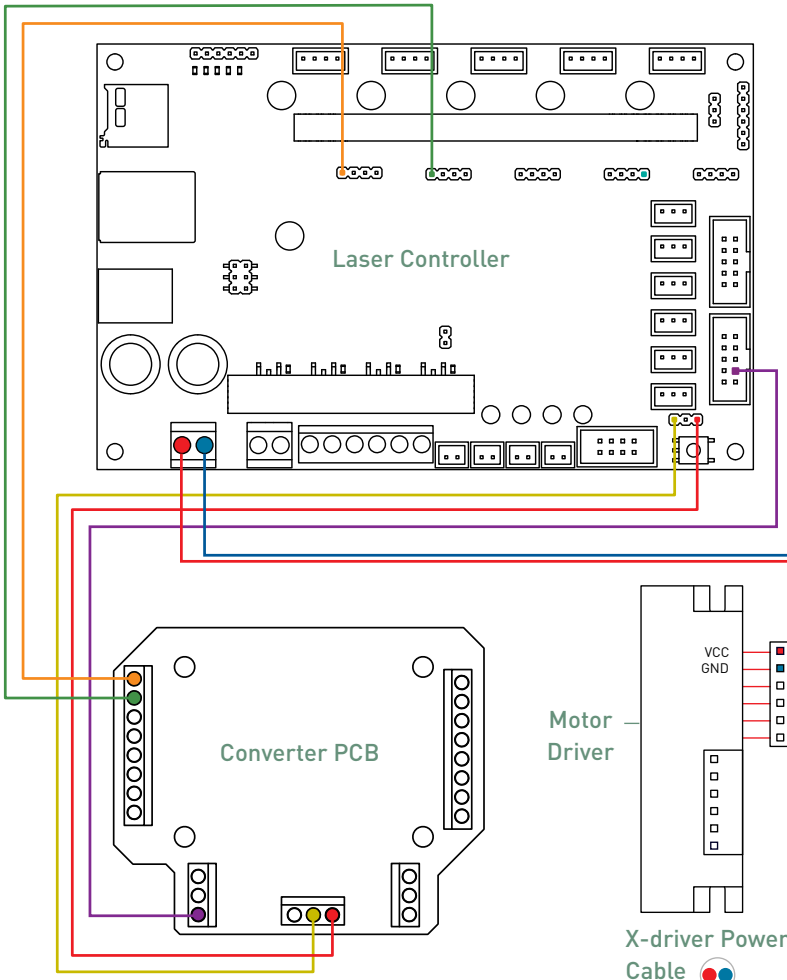
5x Jumper Cable

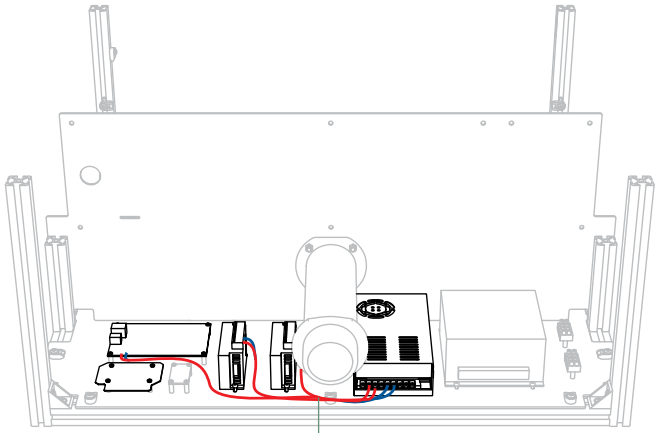


1x X-driver Power Cable

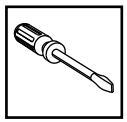


1x Y-driver Power Cable

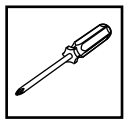




All power cables should pass under the Exhaust



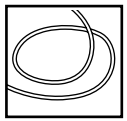
1x Screwdriver slotted small



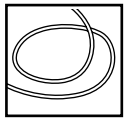
1x Screwdriver Philipps 6

STEP 6.3 WIRING DC 2

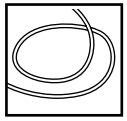
Step 6/33 15 min



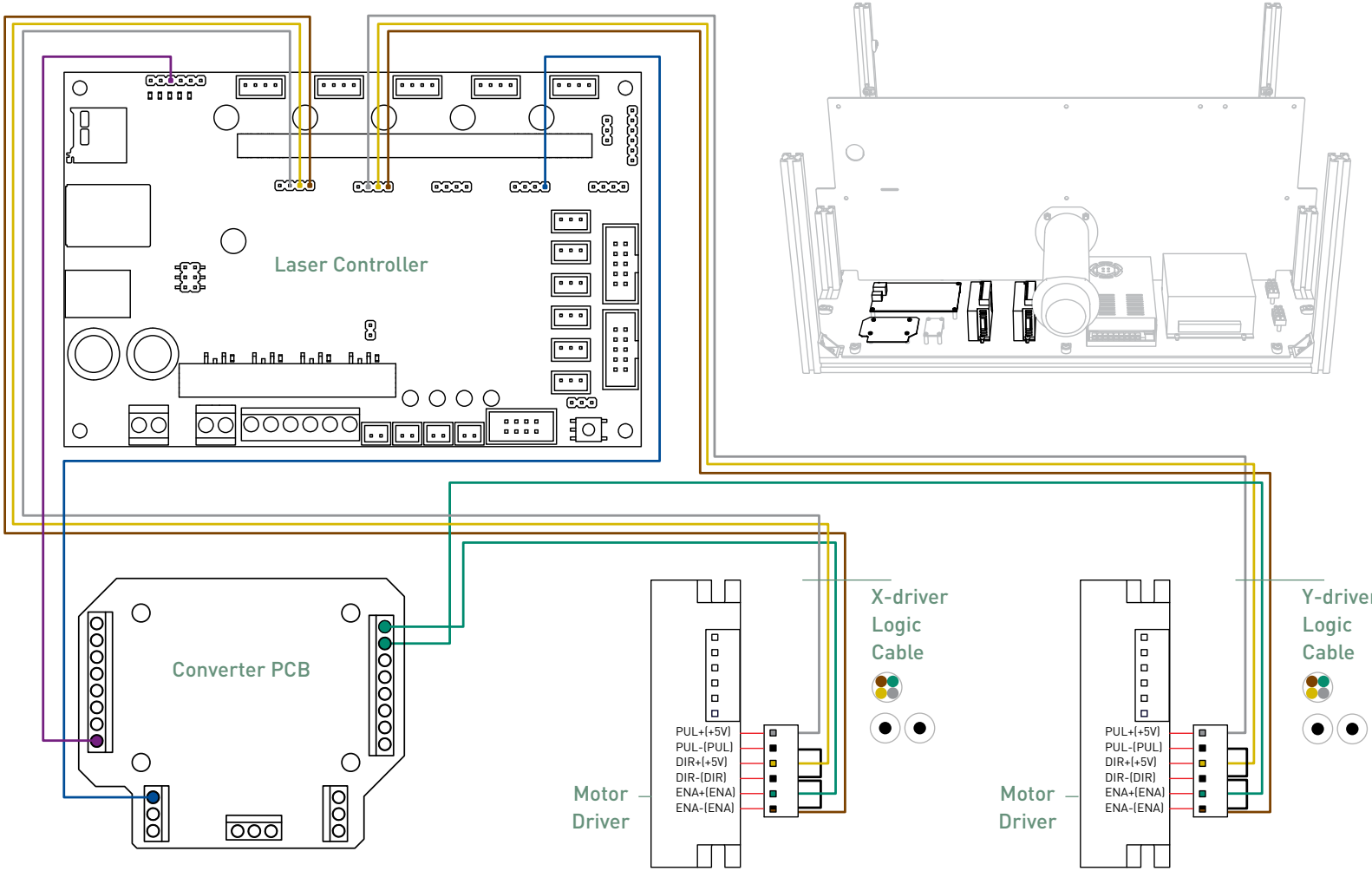
1x X-driver Logic Cable

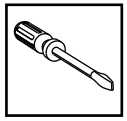


1x Y-driver Logic Cable

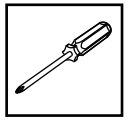


2x Jumper Cable





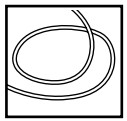
1x Screwdriver slotted small



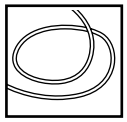
1x Screwdriver Philipps 6

STEP 6.4 WIRING DC 3

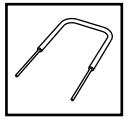
Step 6/33 20 min



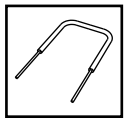
1x Laser Logic Cable + Resistor



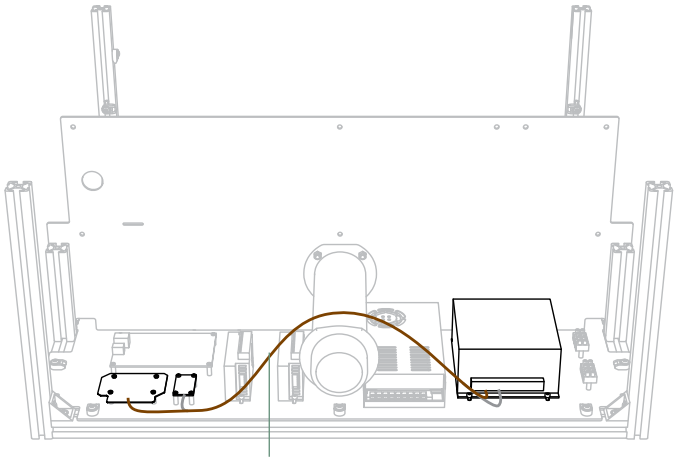
4x Jumper Cable



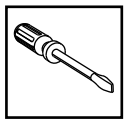
1x Laser Jumper Cable



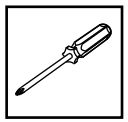
1x Relay Jumper Cable



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



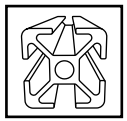
1x Screwdriver slotted small



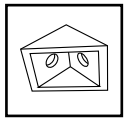
1x Screwdriver Philipps 6

STEP 7.1 ATTACHING THE BACK PROFILE

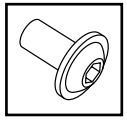
Step 7/33 20 min



1x Profile 30-800



2x Bracket 30

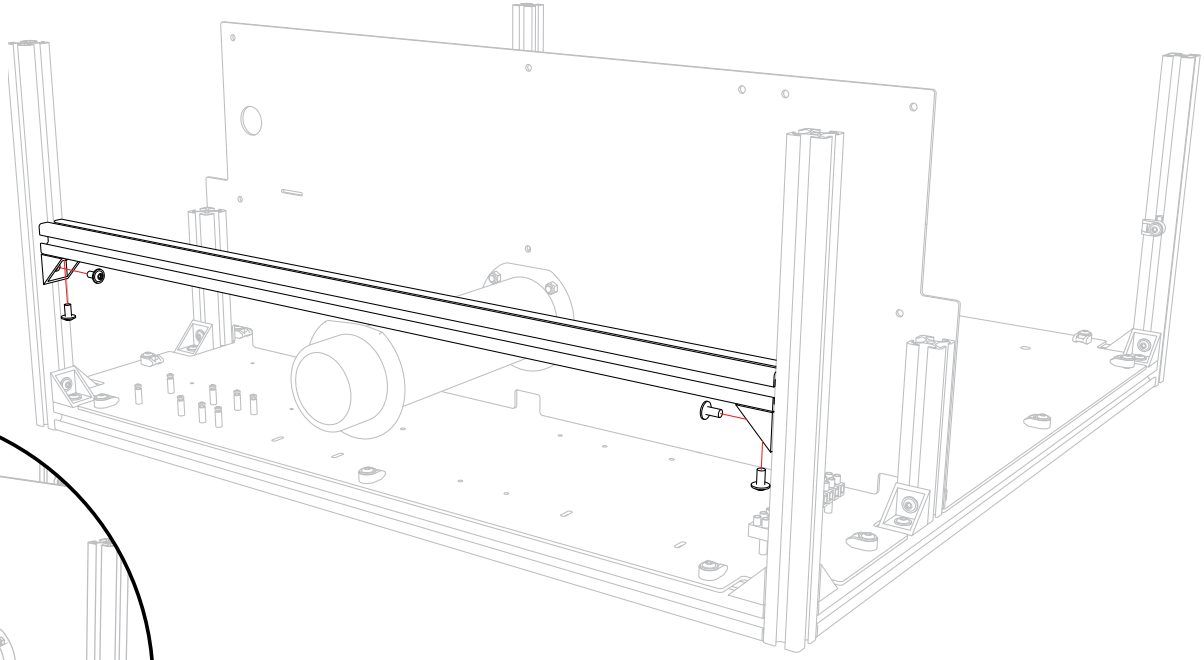


4x B-screw M6-12

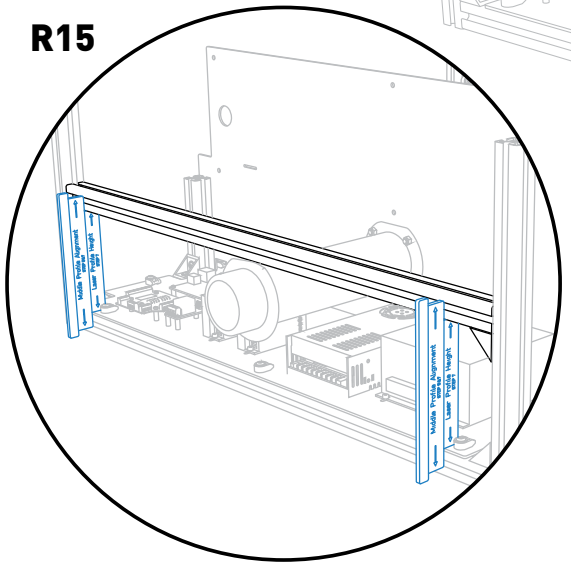
4x T-nuts M6

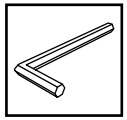
R15. Use 2x Templates 2 (Laser Profile Height) to align the profile.

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

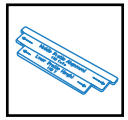


R15





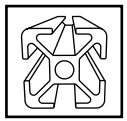
1x Allen Key 1.5
1x Allen Key 5



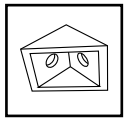
2x Template 2

STEP 7.2 ATTACHING THE MIDDLE PROFILE

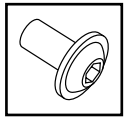
Step 7/33 20 min



1x Profile 30-860



2x Bracket 30

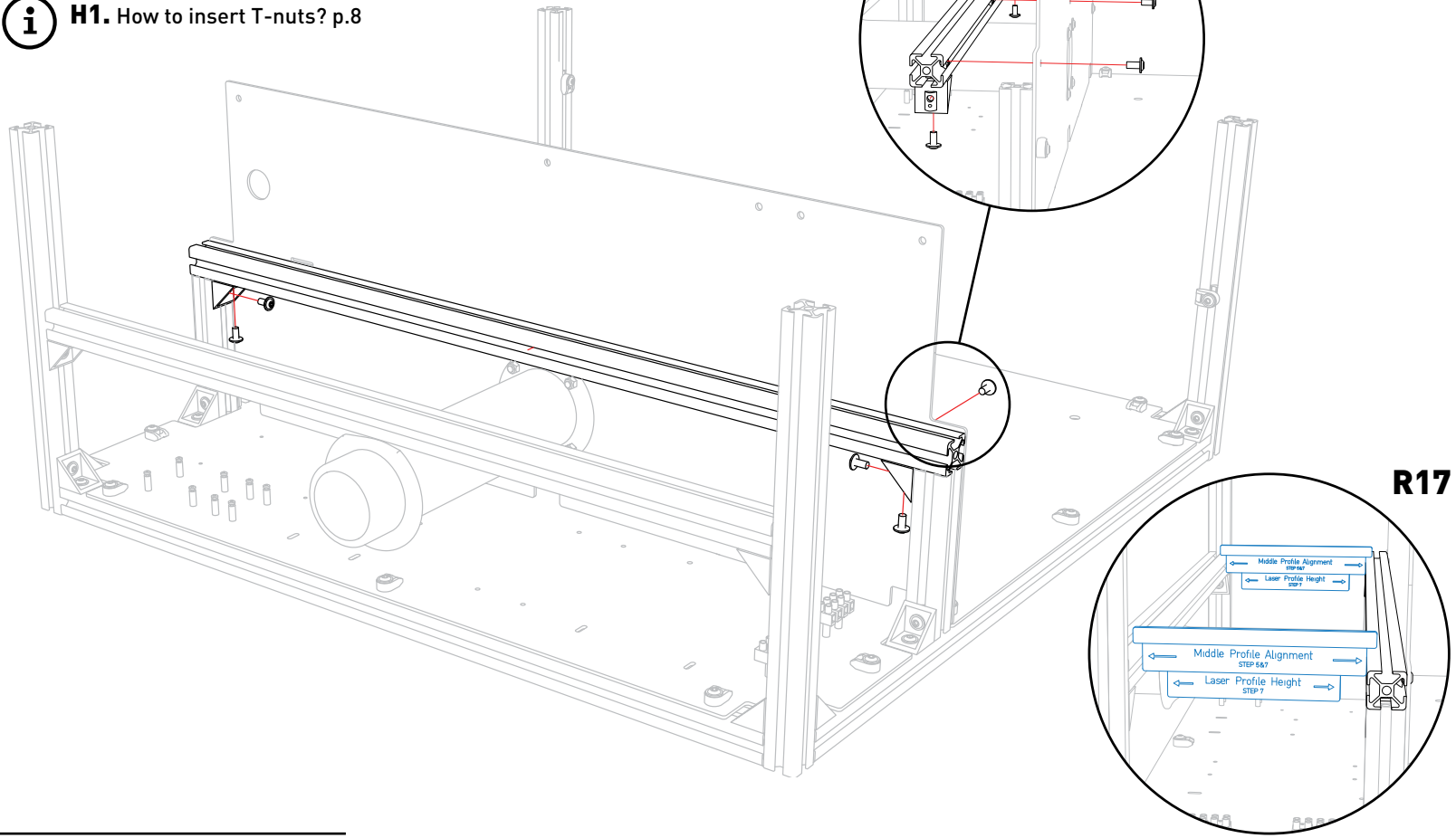


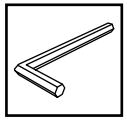
7x B-screw M6-12

7x T-nuts M6

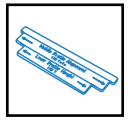
R16. Insert the T-nuts in the profile and align them with the Separator Panel holes, before fixing the brackets.
R17. Use the Templates 2 (Middle Profile Alignment) to fix profile with the correct distance from the back profile.

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





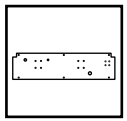
1x Allen Key 1.5
1x Allen Key 5



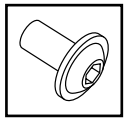
2x Template 2

STEP 7.3 ATTACHING THE LASER PANEL

Step 7/33 15 min



1 x Laser Panel



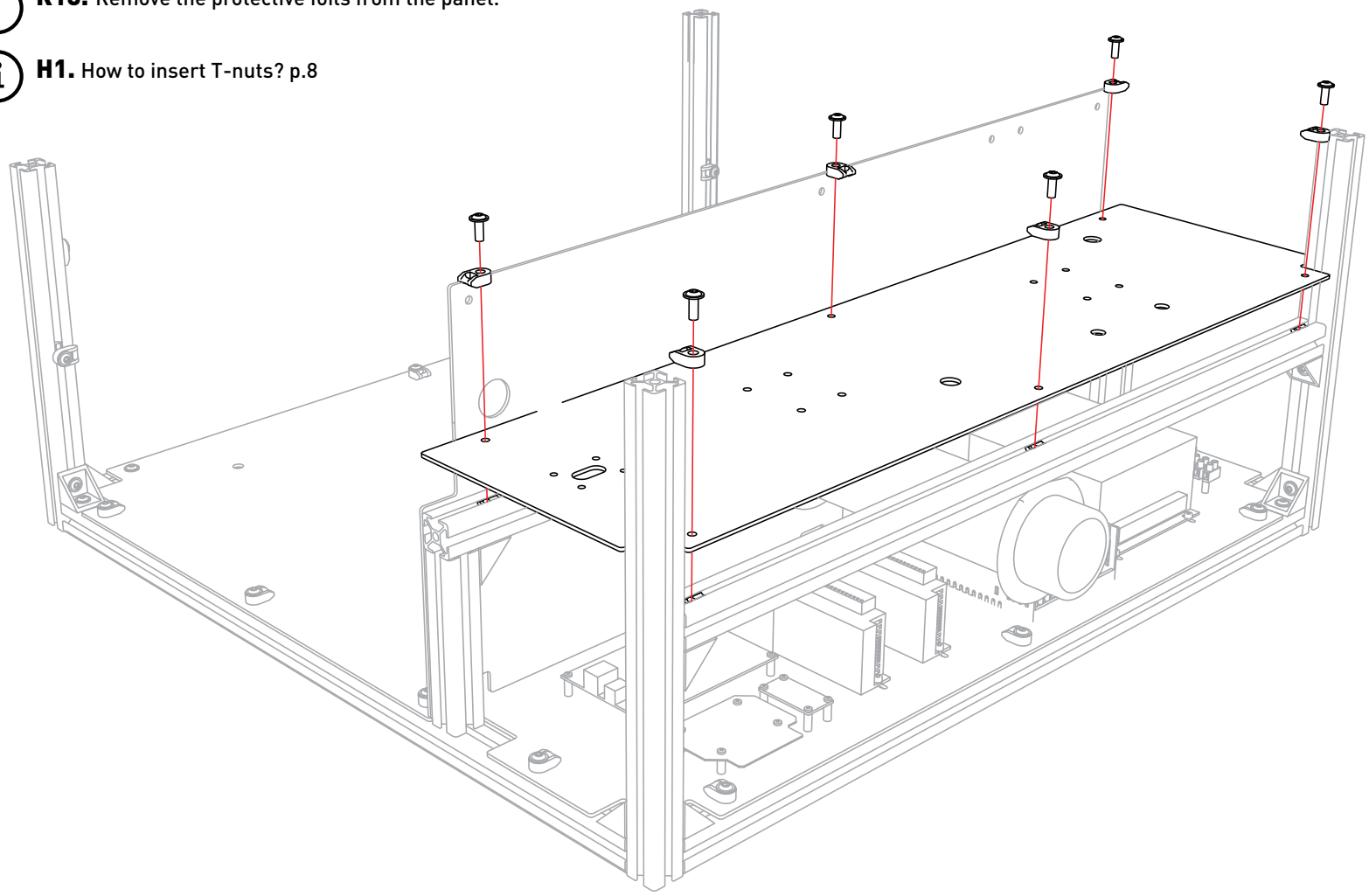
6x B-screw M6-16

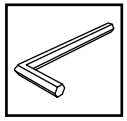
6x T-nut M6

6x Wire Fixer

R18. Remove the protective foils from the panel.

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



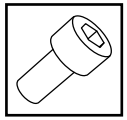


1x Allen Key 5
1x Allen Key 1.5

STEP 8.1 PREPARING THE Y AXIS - GUIDES

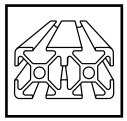
Step 8/33 10 min

2x Linear Guide Y



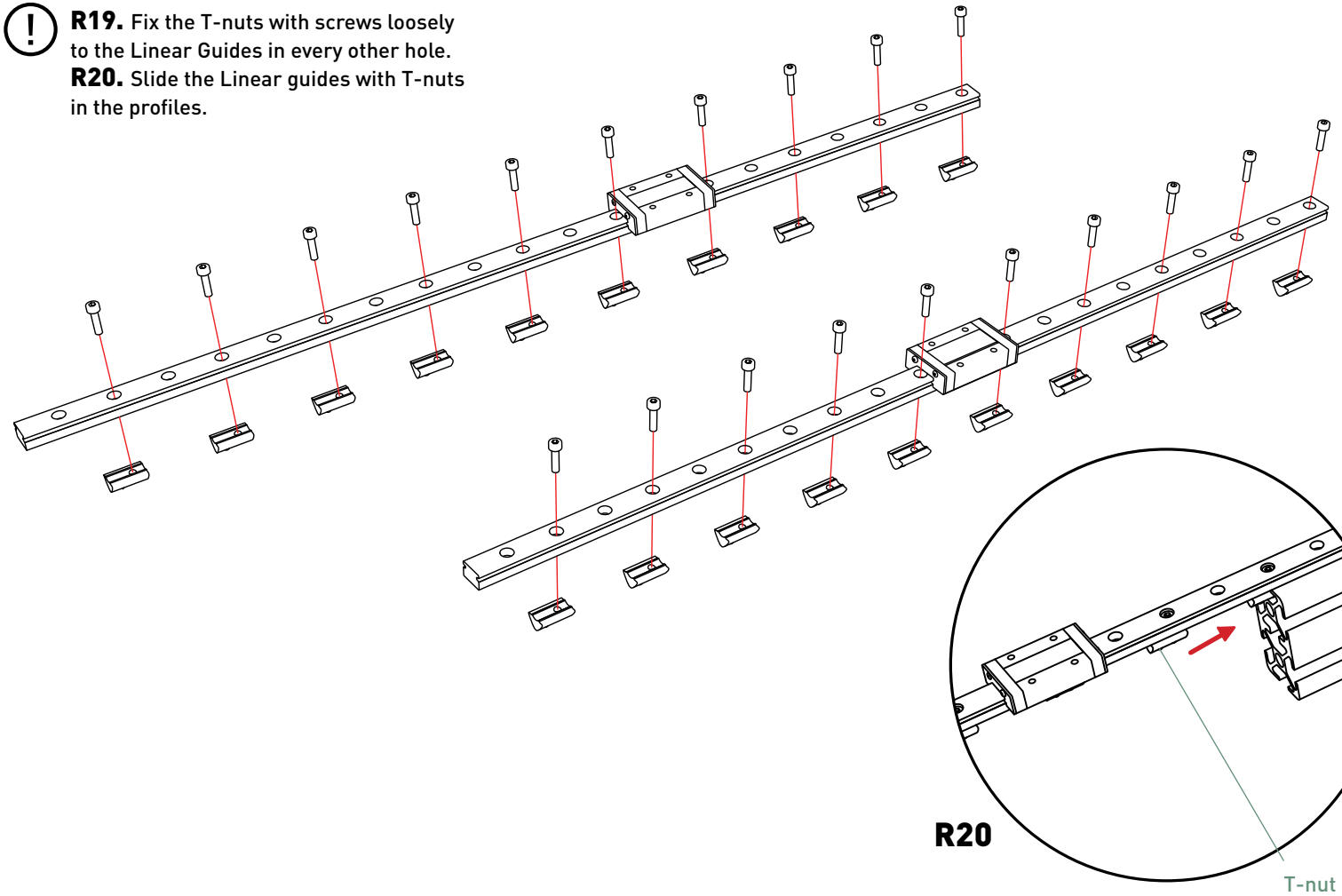
20x C-screw M3-12

20x T-nut M3



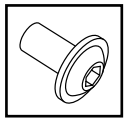
2x Profile 3060-770

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.

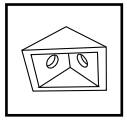


STEP 8.2 PREPARING THE Y AXIS - BRACKETS

Step 8/33 10 min



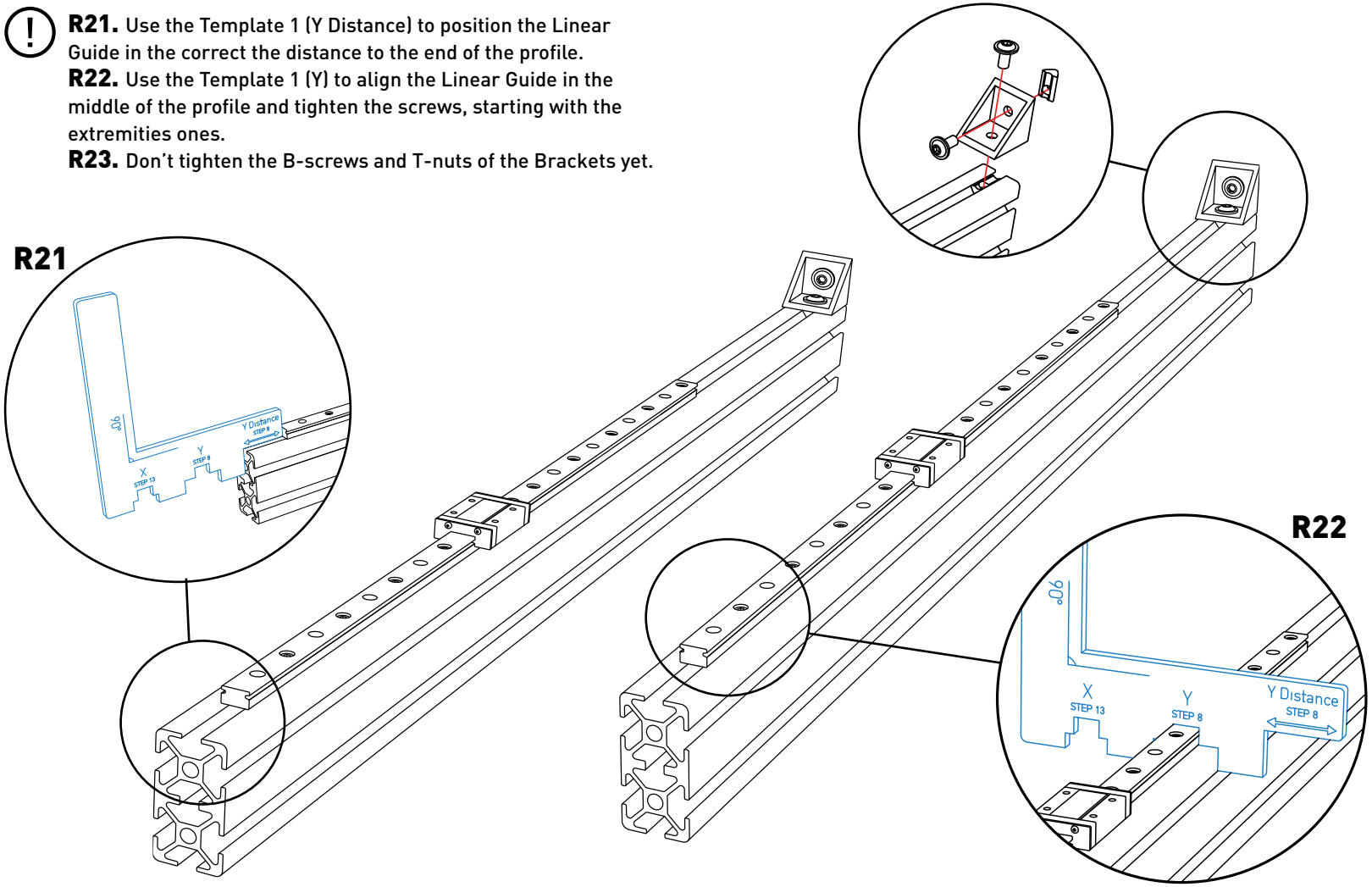
4x B-screw M6-12

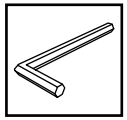


2x Bracket 30

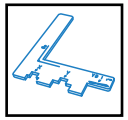
4x T-nut M6

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





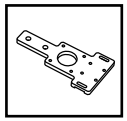
1x Allen Key 1.5
1x Allen Key 5



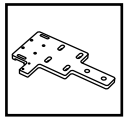
1x Template 1

STEP 8.3 PREPARING THE Y AXIS - HOLDERS

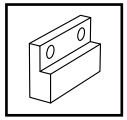
Step 8/33 10 min



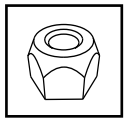
1x X-holder Left



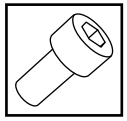
1x X-holder Right



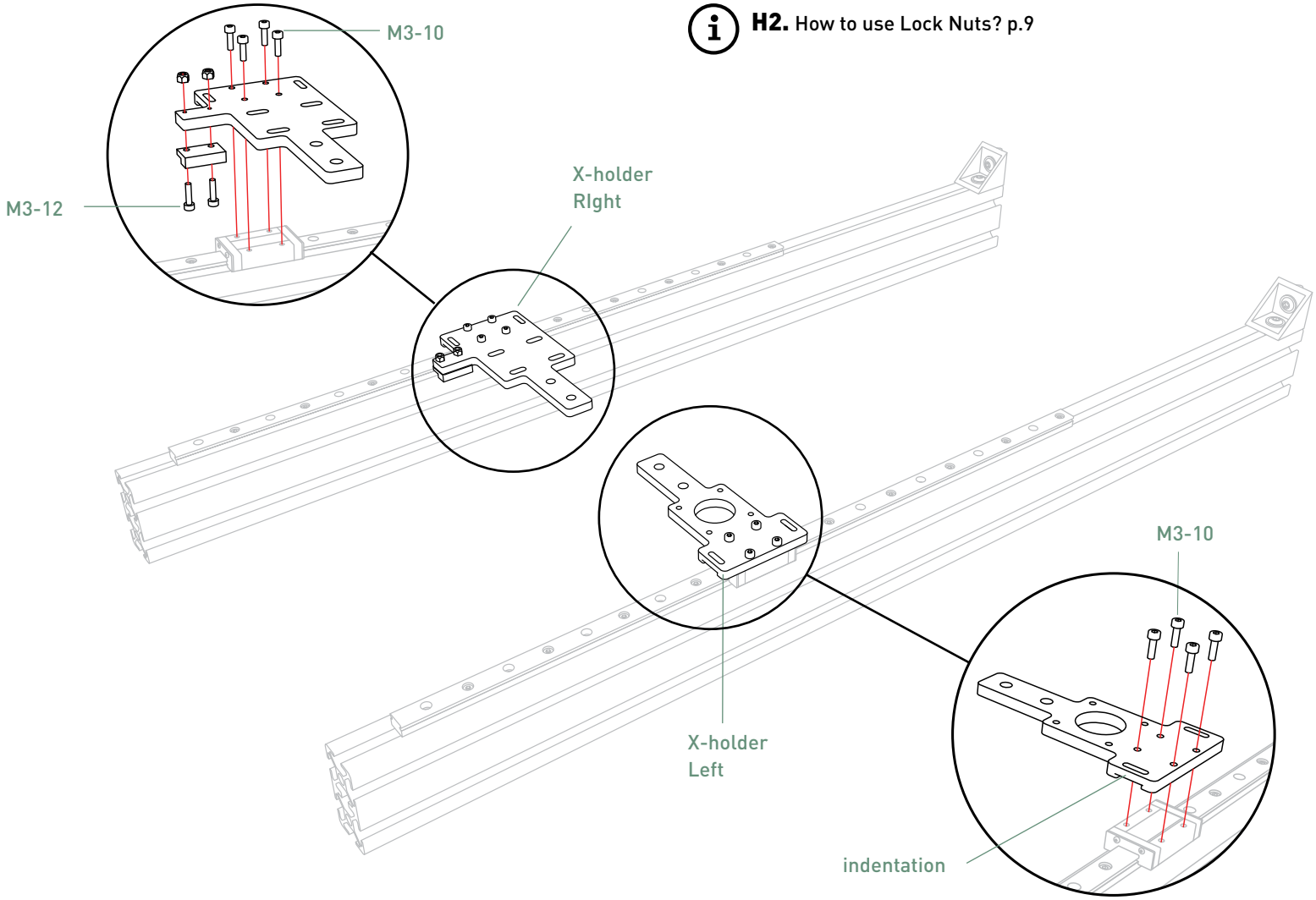
1x Y-endstop Magnet



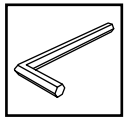
2x Lock Nut M3



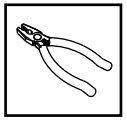
8x C-screw M3-10
2x C-screw M3-12



H2. How to use Lock Nuts? p.9



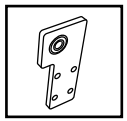
1x Allen Key 1.5
1x Allen Key 2.5



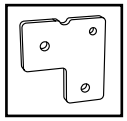
1x Small plier **or**
1x Wrench 5.5

STEP 8.4 PREPARING THE Y AXIS - HOLDERS

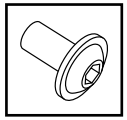
Step 8/33 10 min



2x Back Bearing Holder



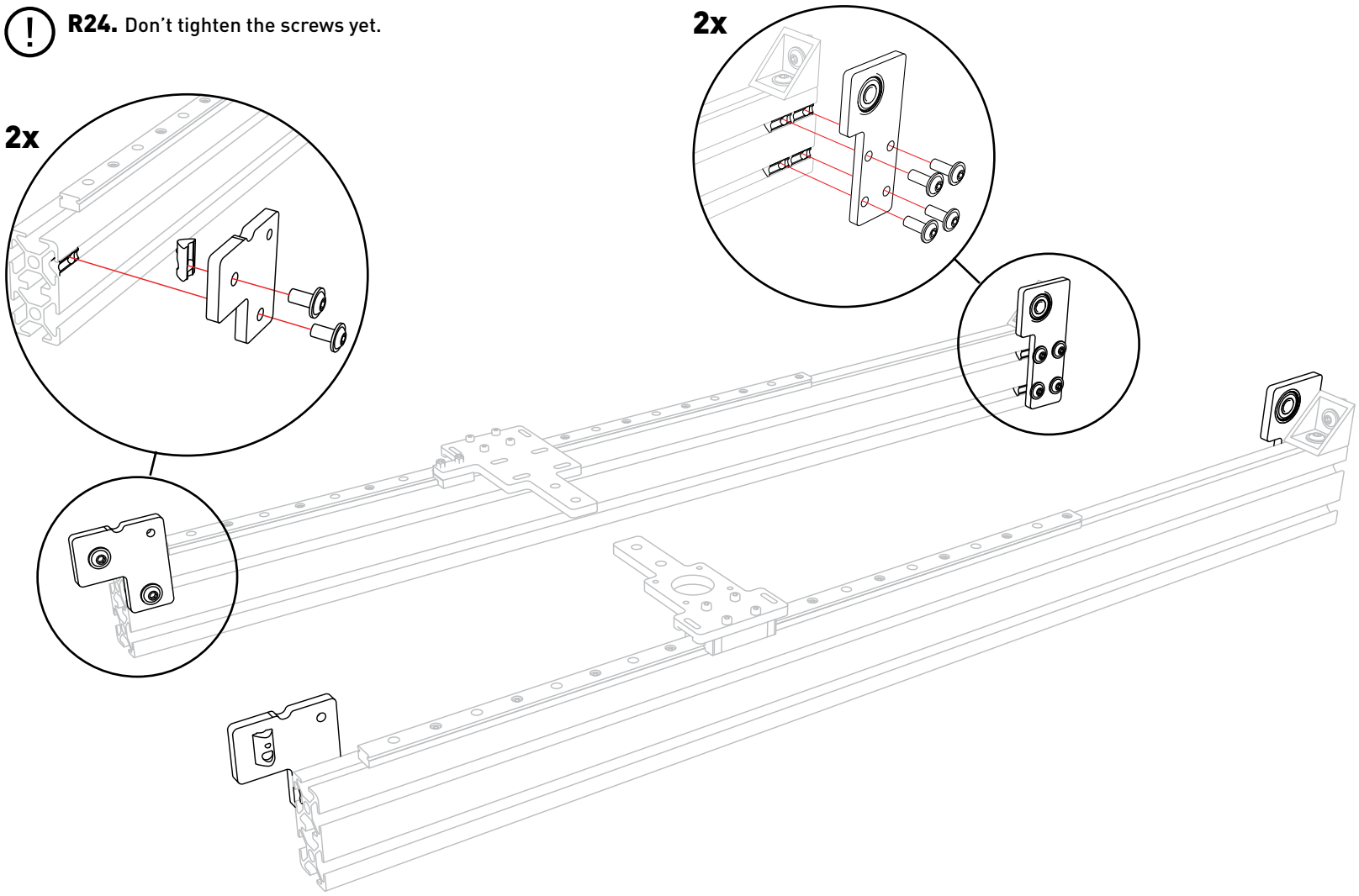
2x Front Pulley Holder

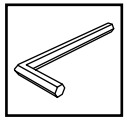


12x B-screw M6-12

12x T-nut M6

R24. Don't tighten the screws yet.

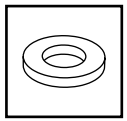




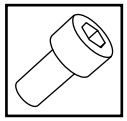
1x Allen Key 5

STEP 8.5 PREPARING Y AXIS - PULLEYS

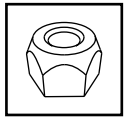
Step 8/33 15 min



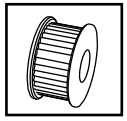
12x Washer M6



2x C-screw M6-40



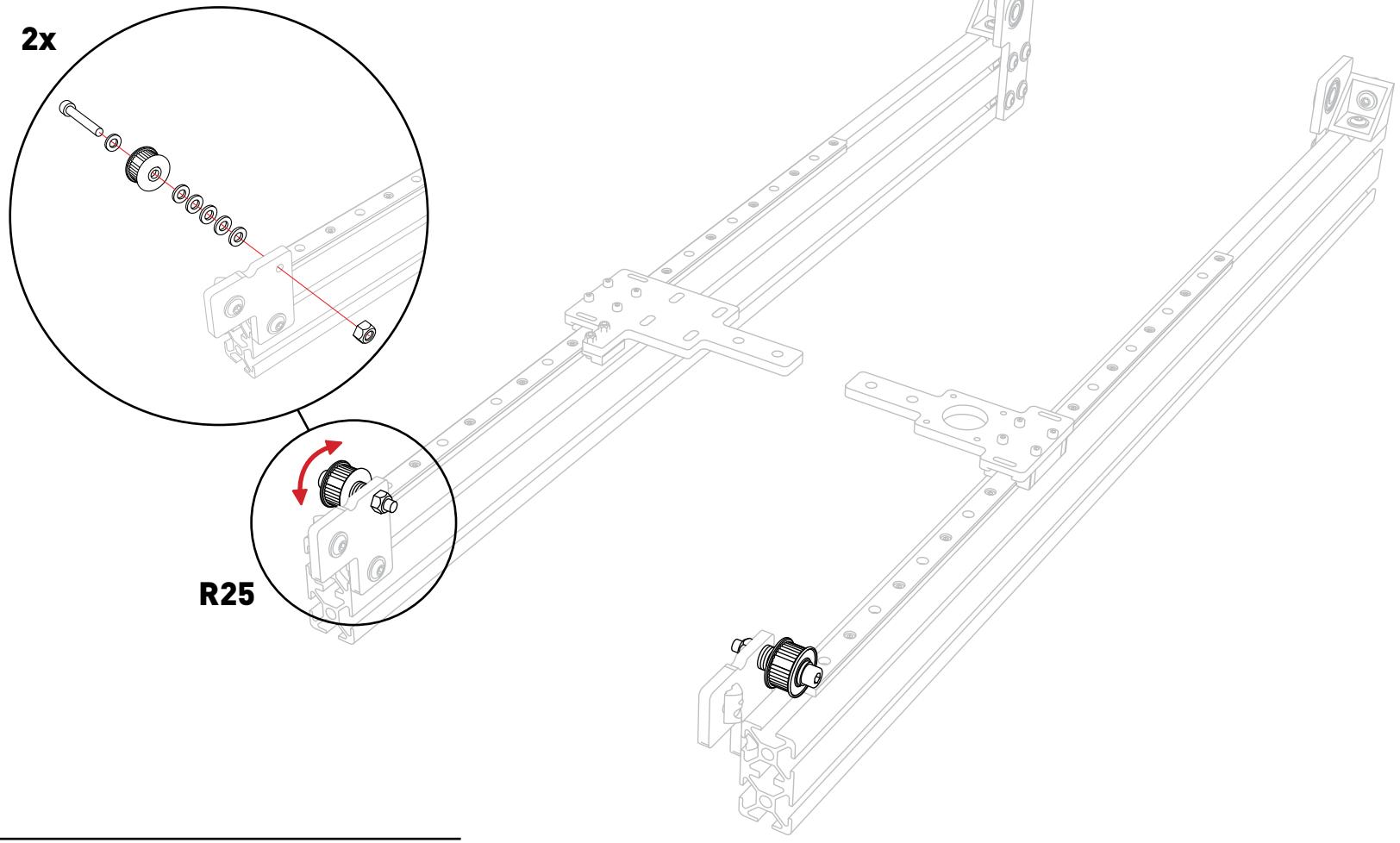
2x Lock Nut M6

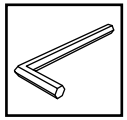


2x Y-pulley Front

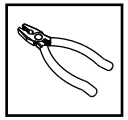
R25. Don't fully tighten the screws. The pulleys should be able to rotate freely.

H2. How to use Lock Nuts? p.9





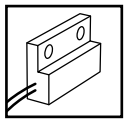
1x Allen Key 5



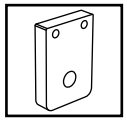
1x Small plier **or**
1x Wrench 10

STEP 8.6 PREPARING THE Y AXIS - SWITCHES

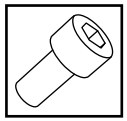
Step 8/33 10 min



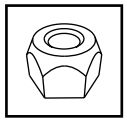
1x Y-endstop Sensor
+ X-endstop Sensor
+ Endstop Cable



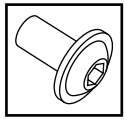
1x Y-endstop Holder



2x C-screw M3-12



2x Lock Nut M3

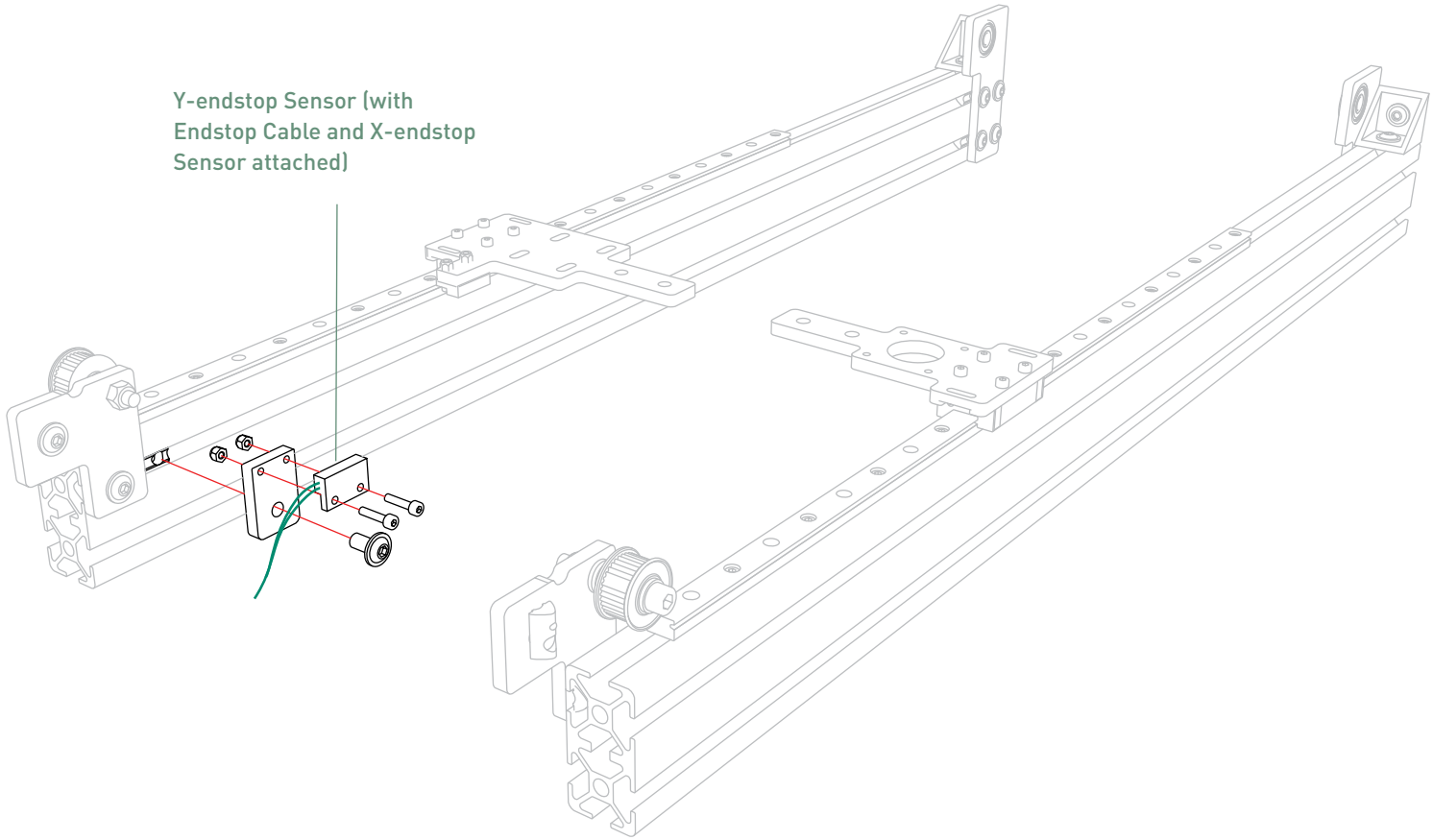


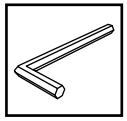
1x B-screw M6-12

1x T-nut M6

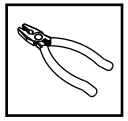
R26. The Y-endstop Sensor is connected to the X-endstop Sensor, which will be fixed in step 15.1.

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





1x Allen Key 2.5
1x Allen Key 5

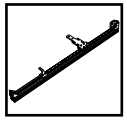


1x Small plier **or**
1x Wrench 5.5

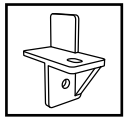
STEP 9.1 COMPLETING THE FRAME - SIDES

Step 9/33 25 min

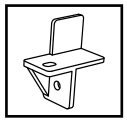
2x Prepared Y-axis Left (Step 8)



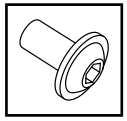
2x Prepared Y-axis Right (Step 8)



1x Front Spacer Left

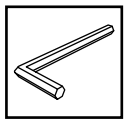


1x Front Spacer Right

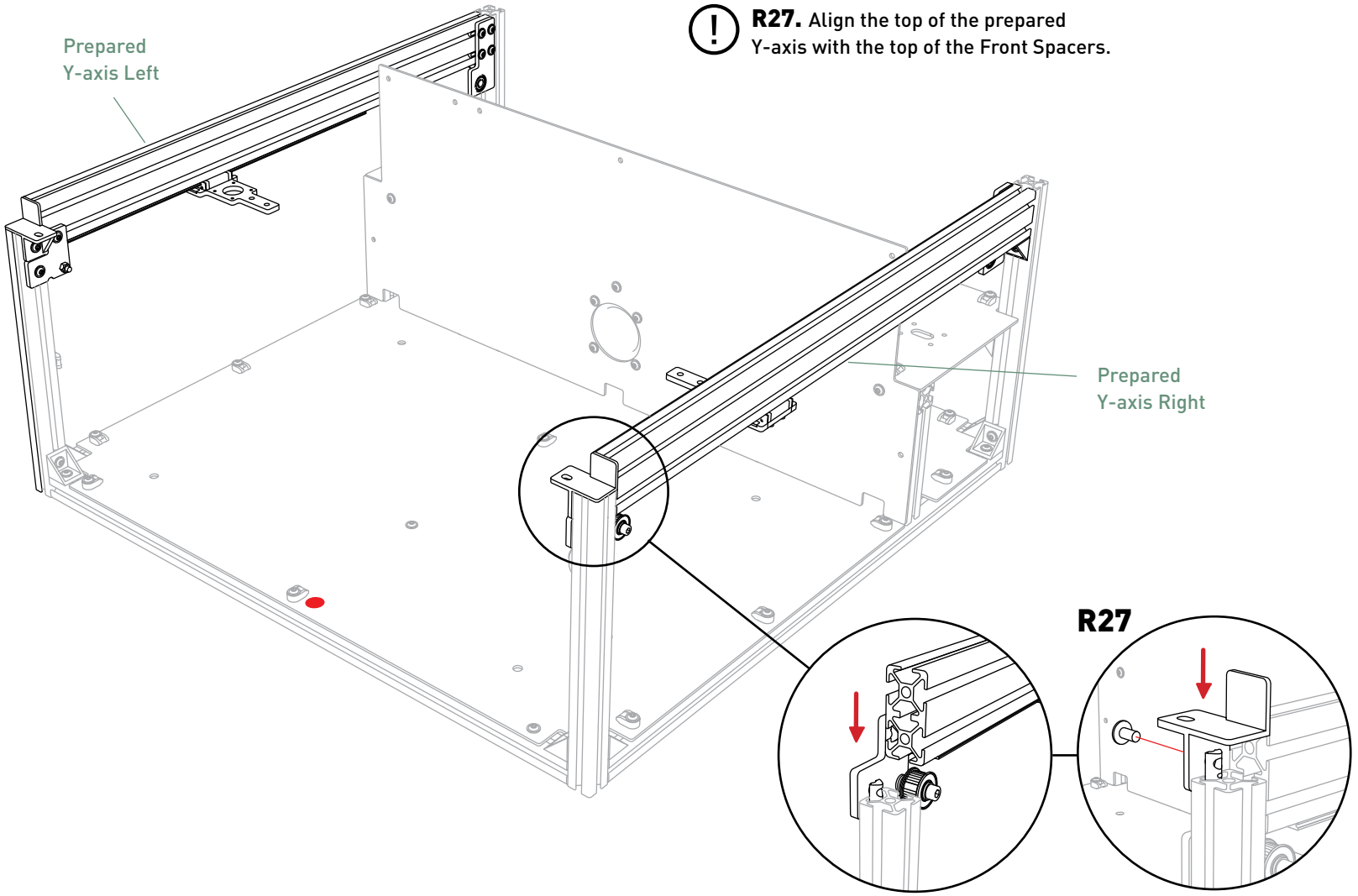


2x B-screw M6-12

2x T-nut M6

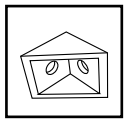


1x Allen Key 5

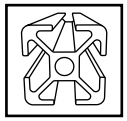


STEP 9.2 COMPLETING THE FRAME - BACK

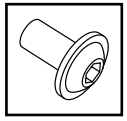
Step 9/33 15 min



2x Bracket 30



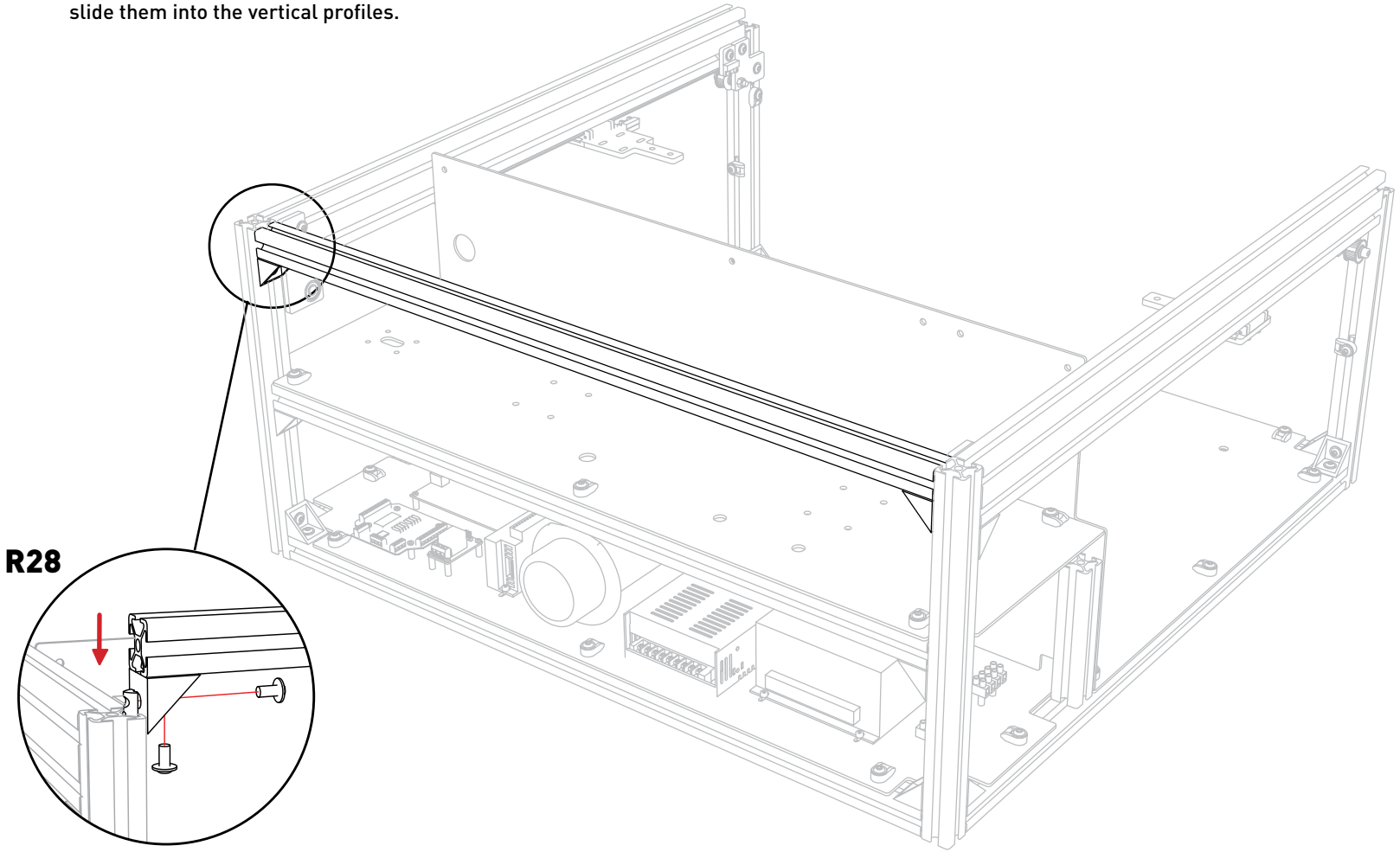
1x Profile 30-800

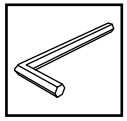


4x B-screw M6-12

4x T-nut M6

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

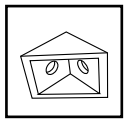




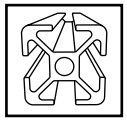
1x Allen Key 5

STEP 9.3 COMPLETING THE FRAME - MIDDLE

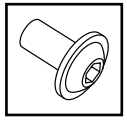
Step 9/33 20min



2x Bracket 30

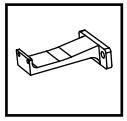


1x Profile 30-800



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

9x T-nuts M6

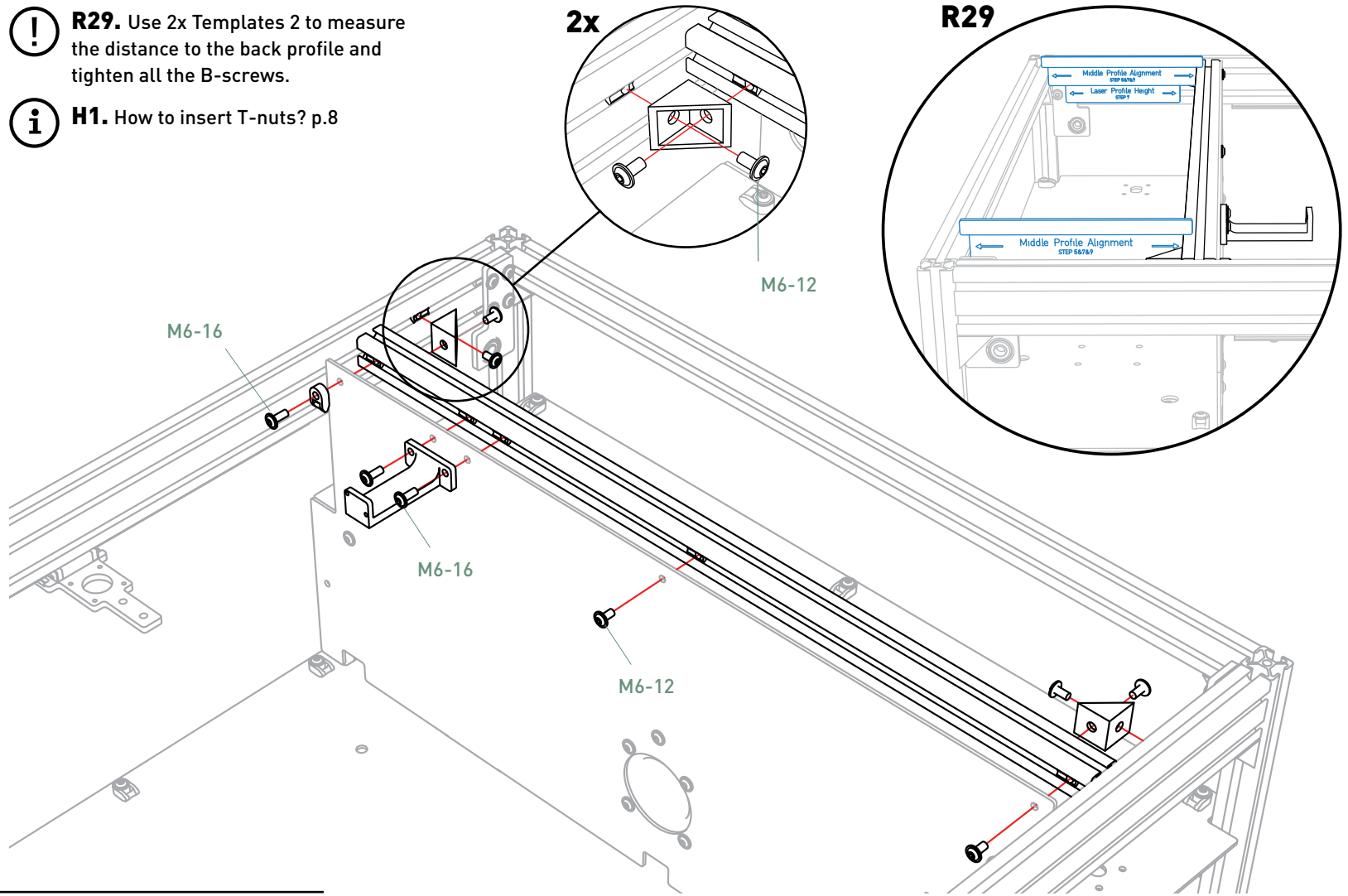


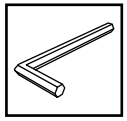
1x Switch Holder

1x Wire Fixer

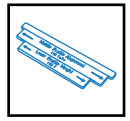
R29. Use 2x Templates 2 to measure the distance to the back profile and tighten all the B-screws.

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





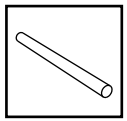
1x Allen Key 1.5
1x Allen Key 5



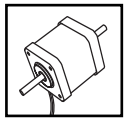
2x Template 2

STEP 10.1 COMPLETING THE Y AXIS - MOTOR

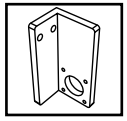
Step 10/33 25 min



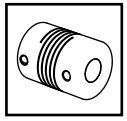
1x Y-shaft 350
1x Y-shaft 400



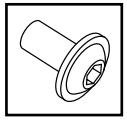
1x Y-motor



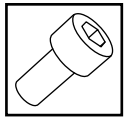
1x Y-motor Holder



2x Coupler (with set screws in)



2x B-screw M6-16



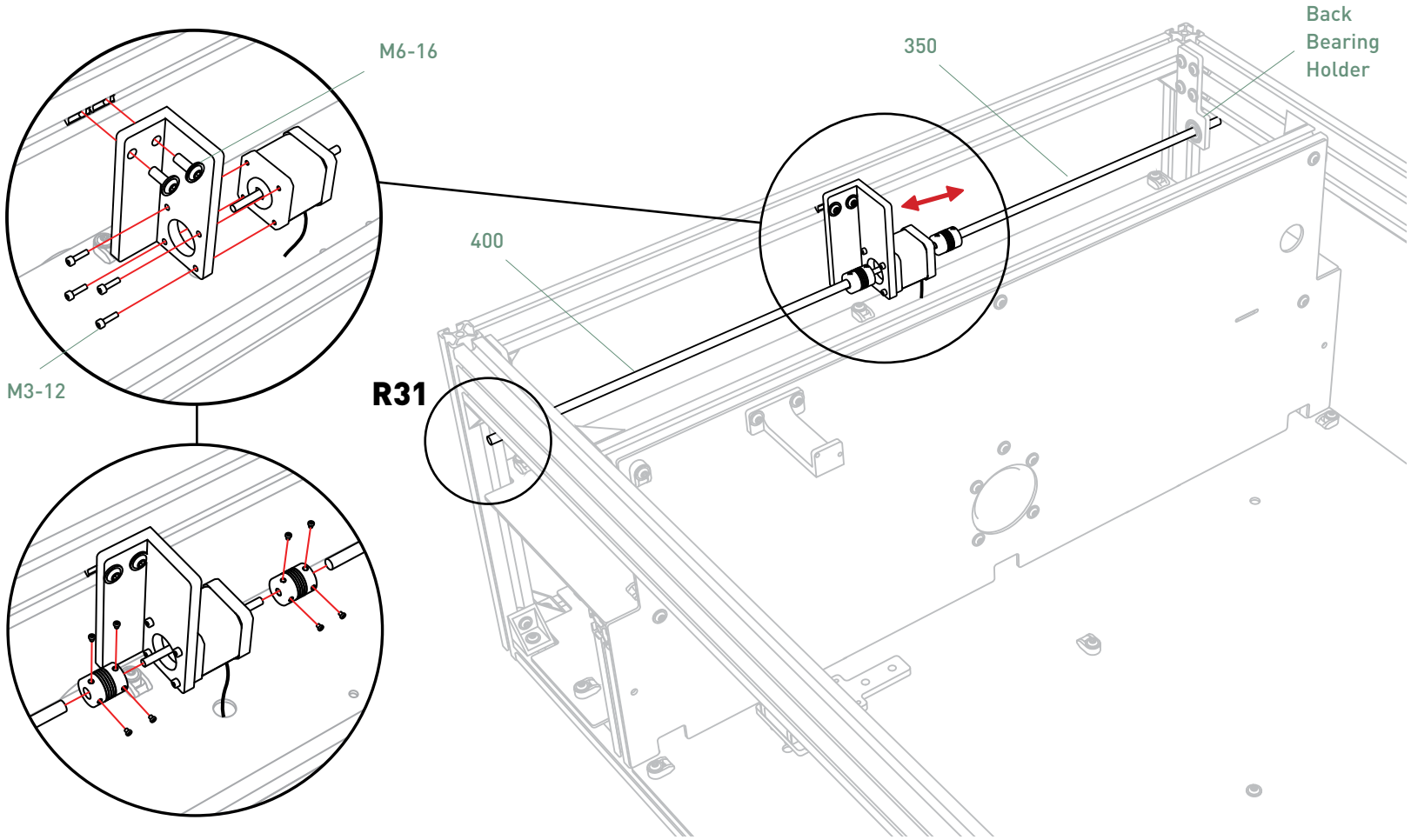
4x C-screw M3-12

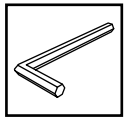
2x T-nut M6

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

R31. The shafts should be inserted in the Couplers as much as possible. They should not advance out of the frame boundaries.

H1. How to insert T-nuts? p.8
H4. How to use set screws? p.10



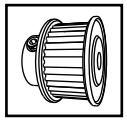


1x Allen Key 1.5
1x Allen Key 2.5
1x Allen Key 5

STEP 10.2 COMPLETING THE Y AXIS - BELTS

Step 10/33 30 min

8x Cable Tie

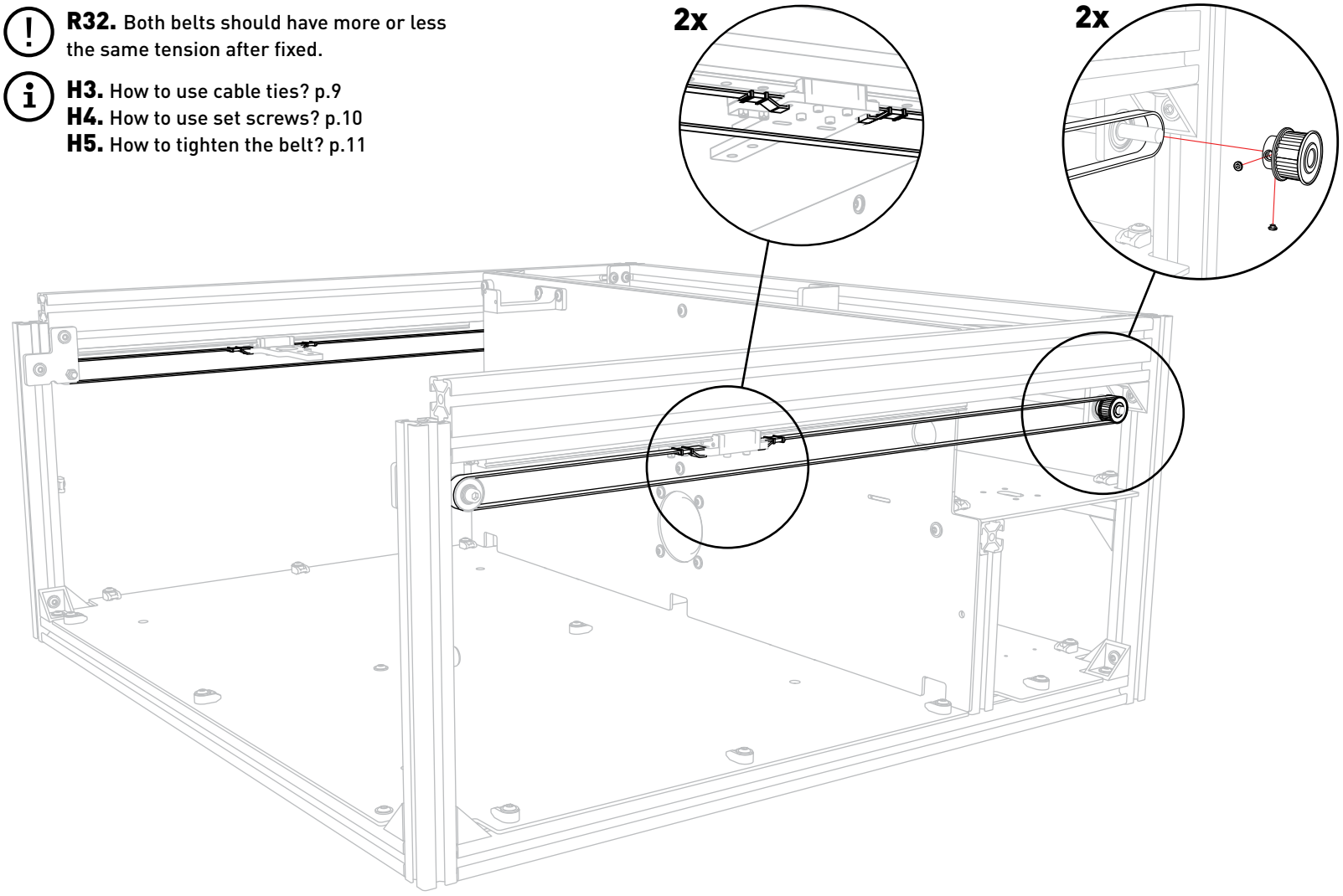


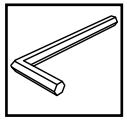
2x Y-pulley Back (with set screws in)

2x Y-belt

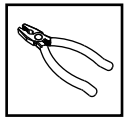
R32. Both belts should have more or less the same tension after fixed.

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





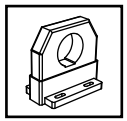
1x Allen Key 1.5



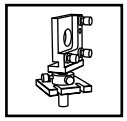
1x Small plier

STEP 11. INSTALLING LASER PATH

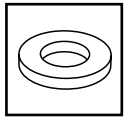
Step 11/33 25 min



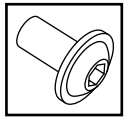
2x Laser Tube Holder



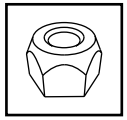
1x Mirror Holder 25



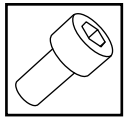
4x Washer M5



8x B-screw M6-20



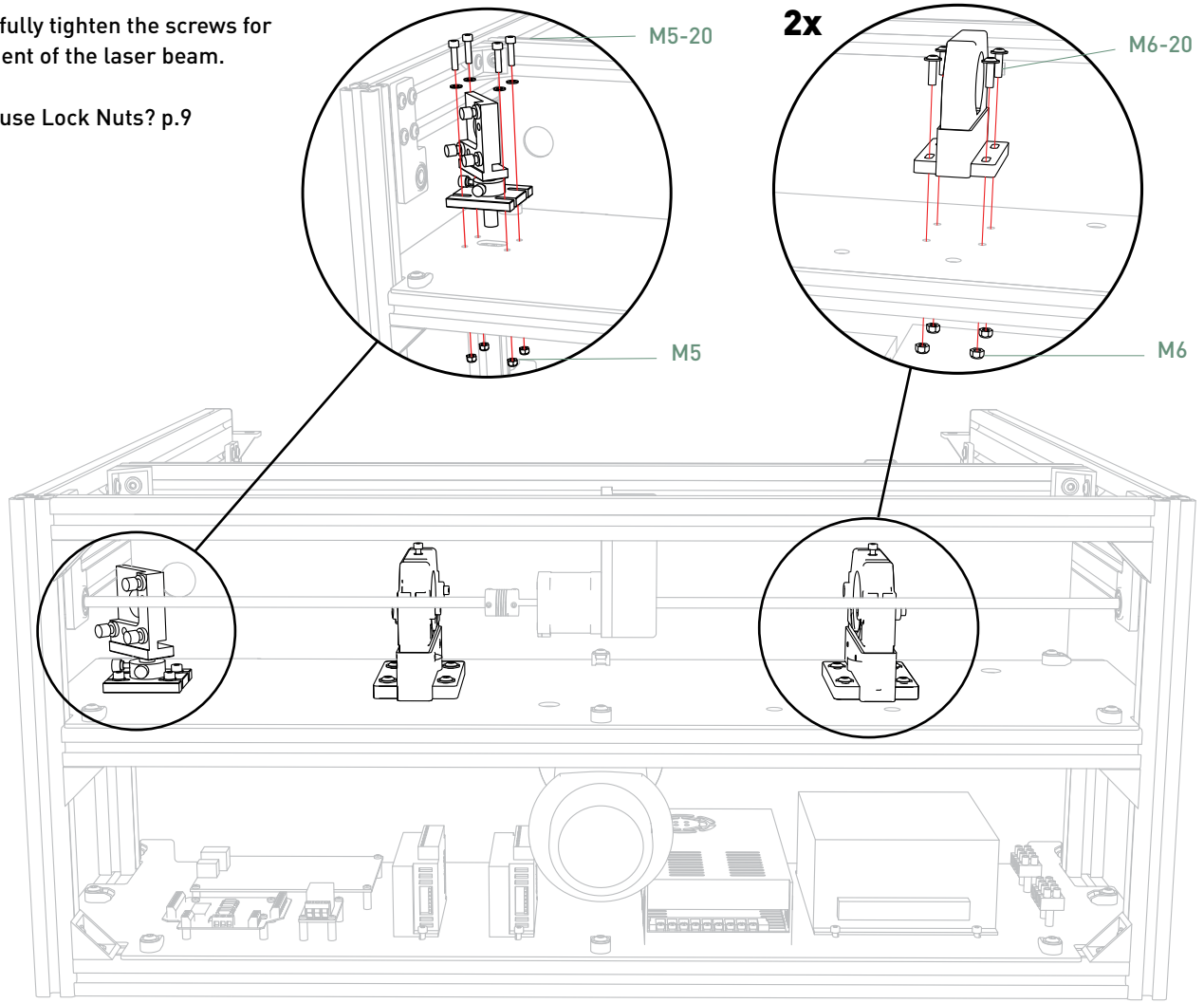
8x Lock Nuts M6
4x Lock Nuts M5

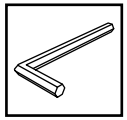


4x C-screw M5-20

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

H2. How to use Lock Nuts? p.9



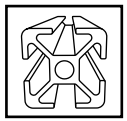


1x Allen Key 4
1x Allen Key 5

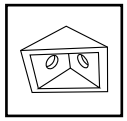
1x Wrench 8
1x Wrench 11

STEP 12.1 PREPARING THE BED - FRAME

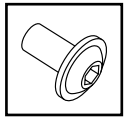
Step 12/33 15 min



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



4x Bracket 30

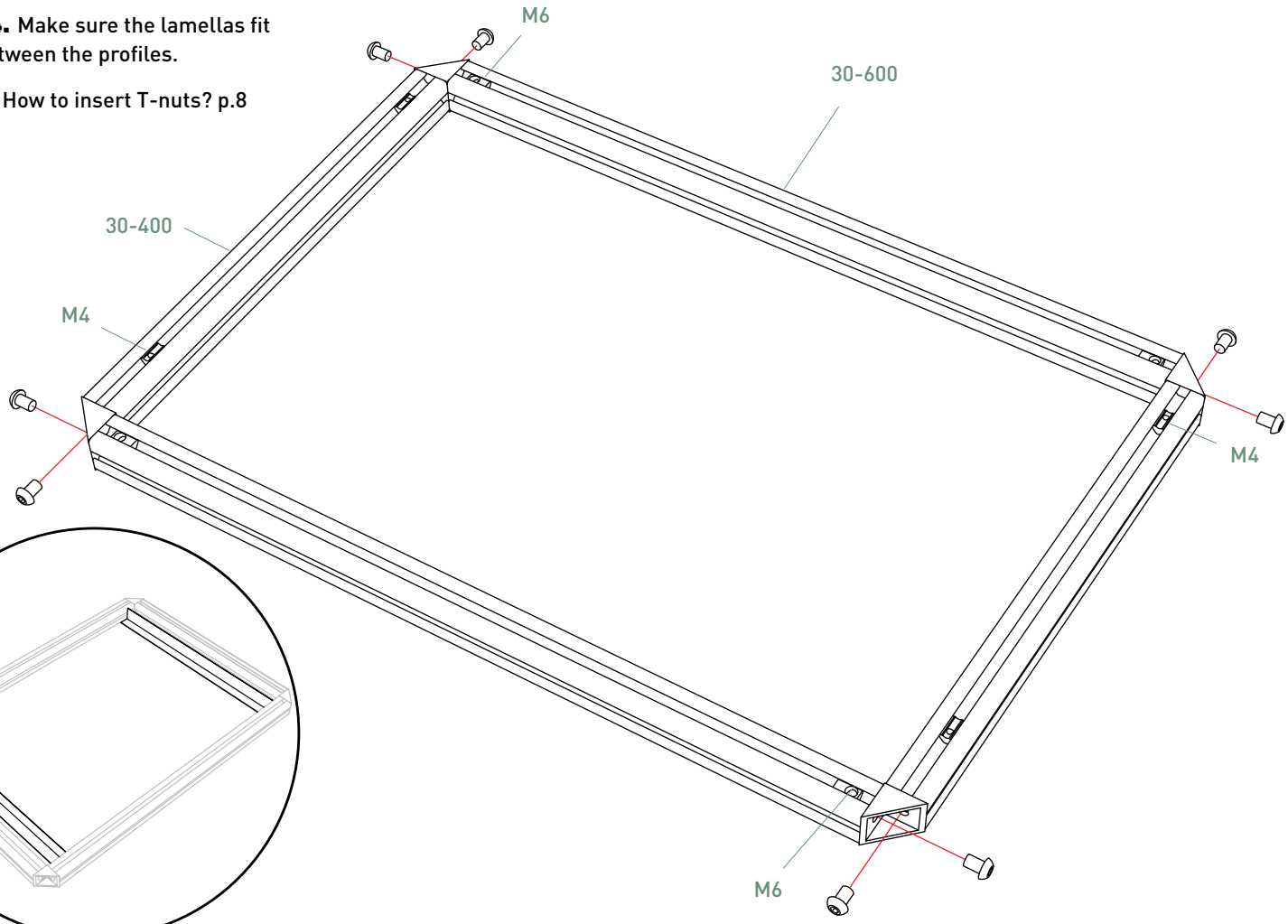


8x B-screw M6-12

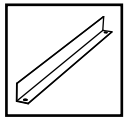
4x T-nut M4
4x T-nut M6

R34. Make sure the lamellas fit inbetween the profiles.

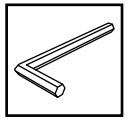
H1. How to insert T-nuts? p.8



R34



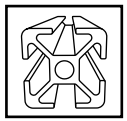
2x Lamellas



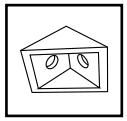
1x Allen Key 5

STEP 12.2 PREPARING THE BED - LAMELLA SUPPORT

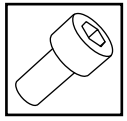
Step 12/33 15 min



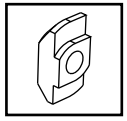
2x Profile 20-660



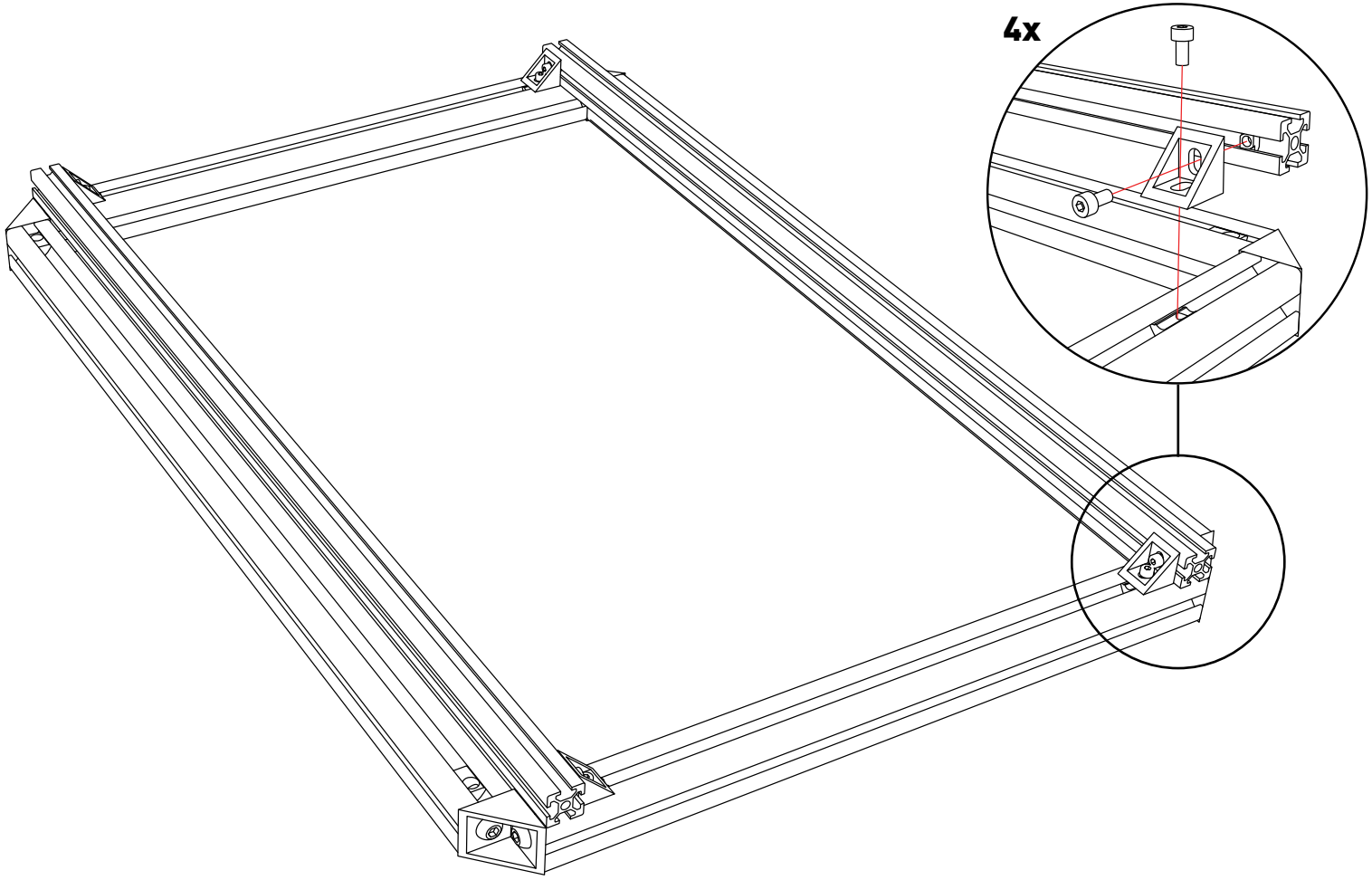
4x Bed Connector

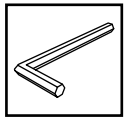


8x C-screw M4-8



4x Hammer Nut M4

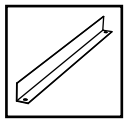




1x Allen Key 1.5
1x Allen Key 3

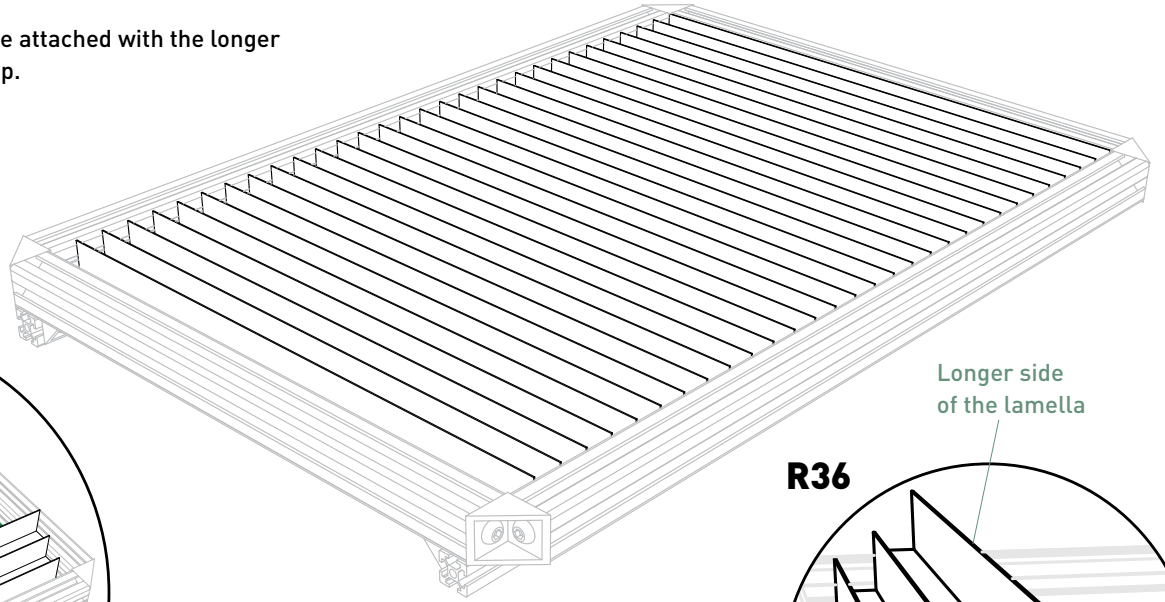
STEP 12.3 PREPARING THE BED - LAMELLAS

Step 12/33 25 min

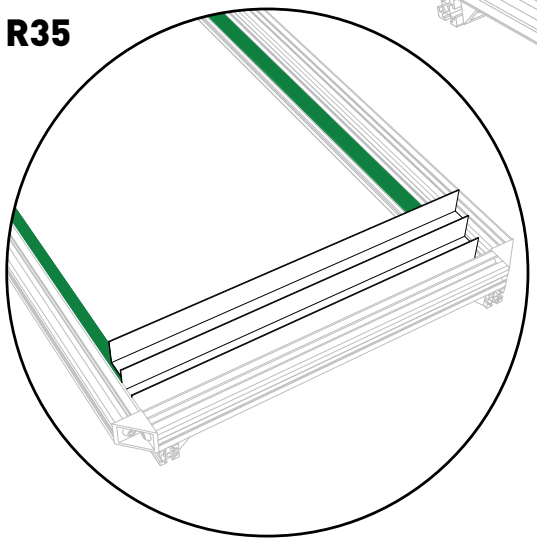


30x Lamella

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

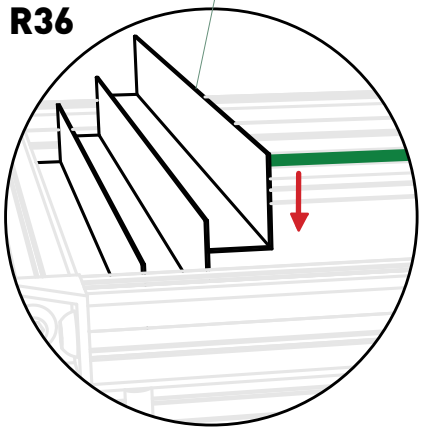


R35



Longer side of the lamella

R36



2x Double-sided tape

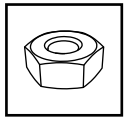
1x Cutter

STEP 12.4 PREPARING THE BED - BED SUPPORT

Step 12/33 10 min

4x Bed Leg

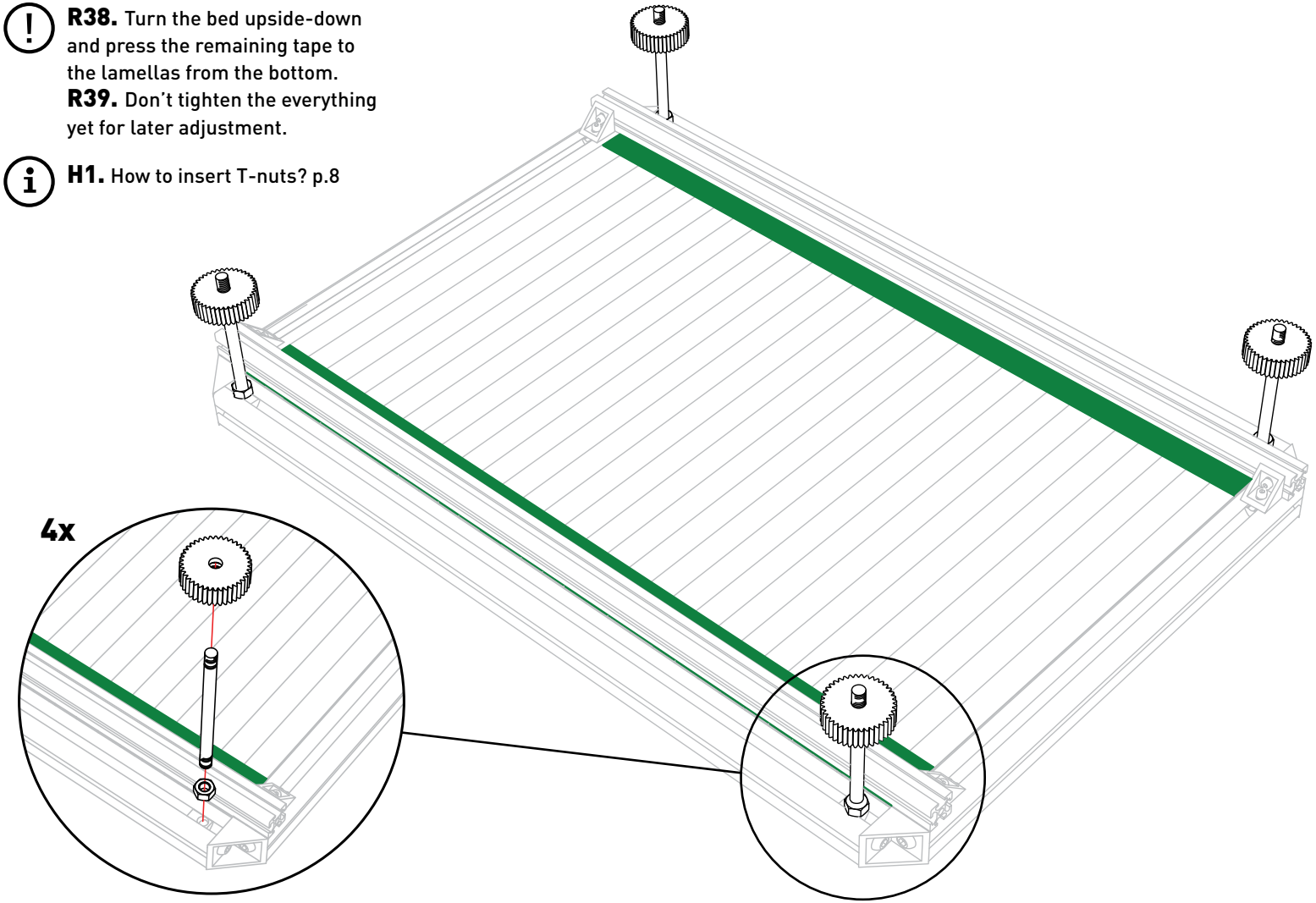
4x Bed Adjuster

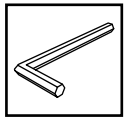


4x Nut M6

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

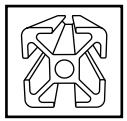




1x Allen Key 1.5

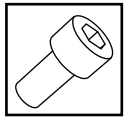
STEP 13.1 PREPARING THE X AXIS - GUIDE

Step 13/33 15 min

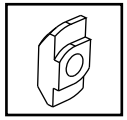


1x Profile 20-700

1x Linear Guide X

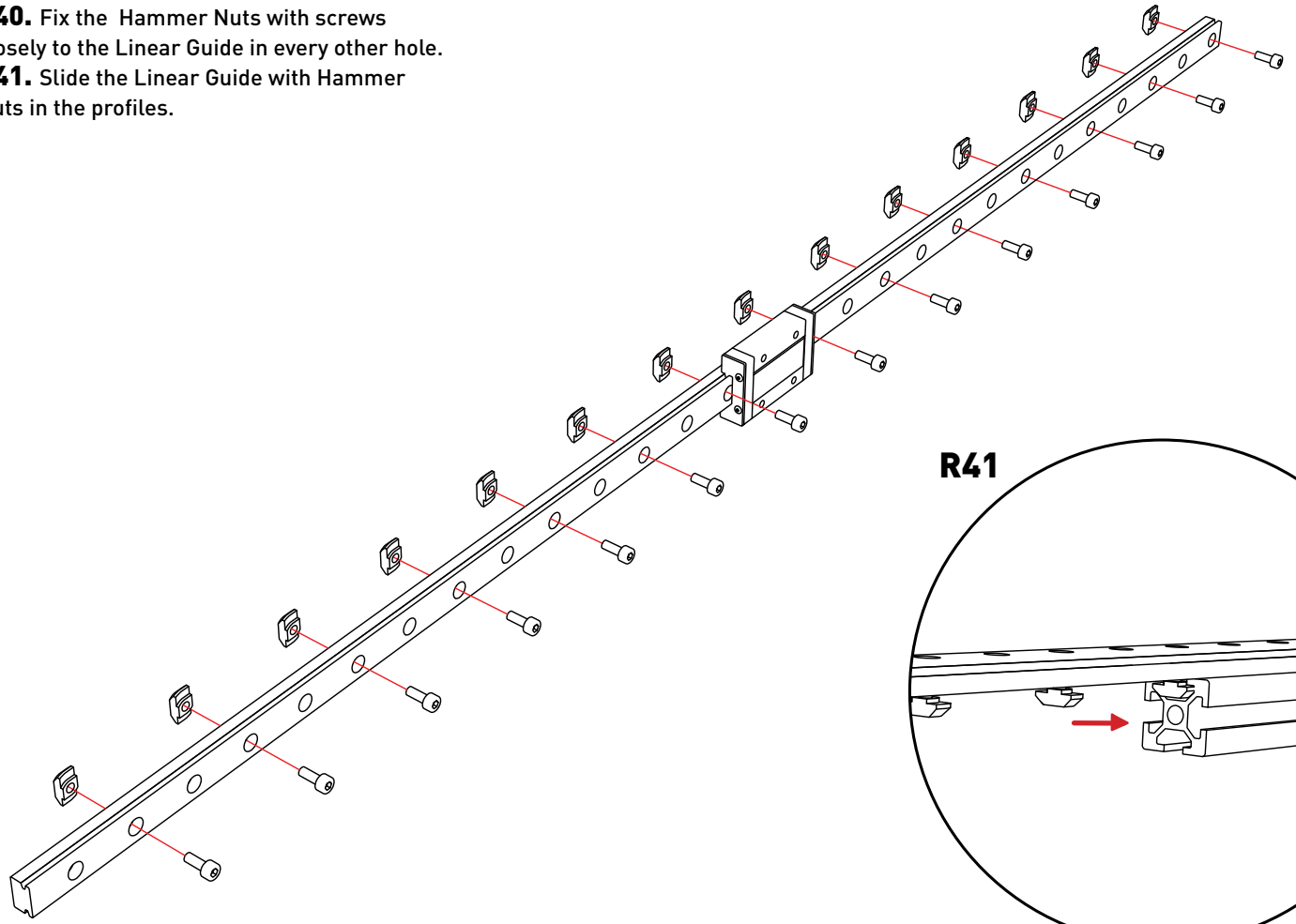


14x C-screw M3-8



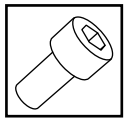
14x Hammer Nut M3

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.

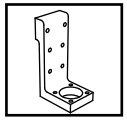


STEP 13.2 PREPARING THE X AXIS - HOLDER

Step 13/33 20 min

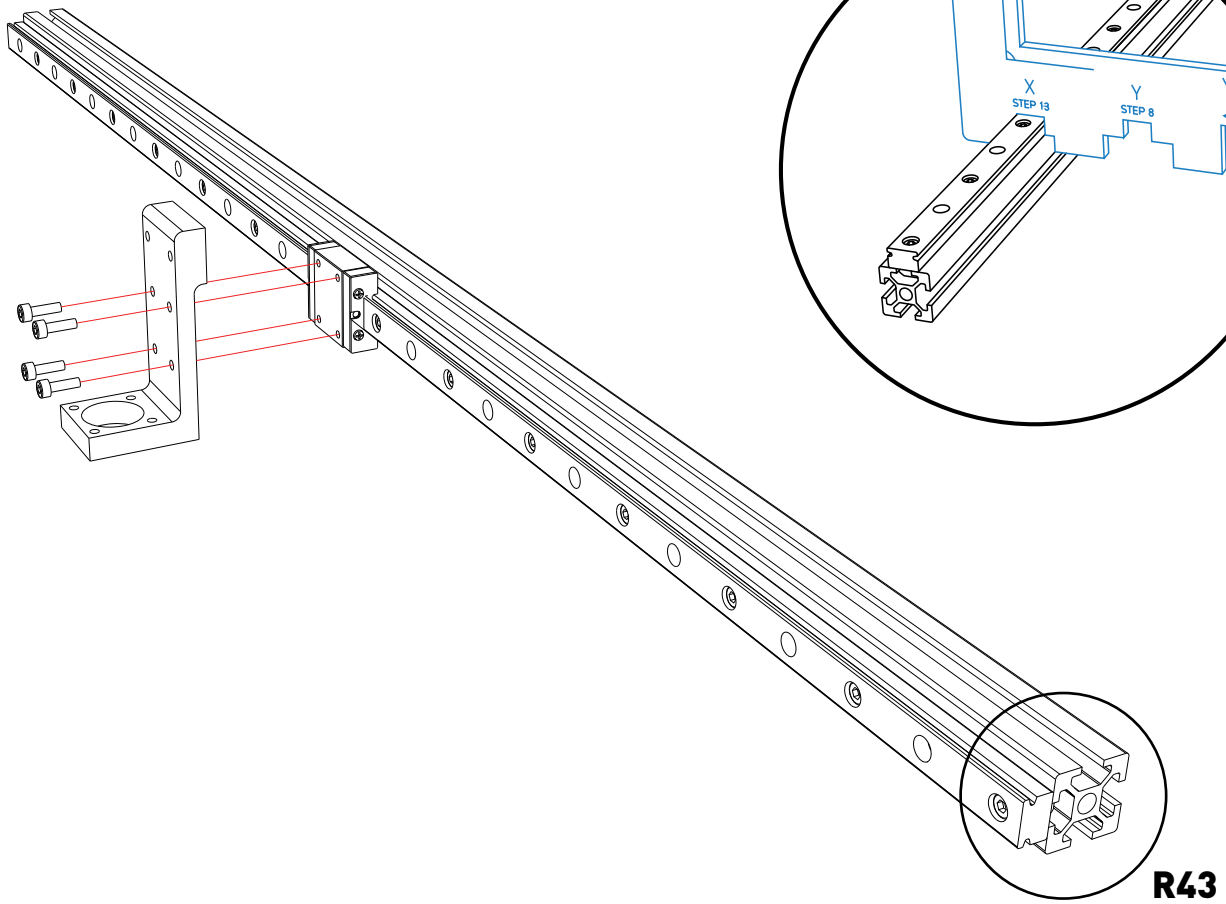


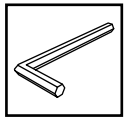
4x C-screw M3-8



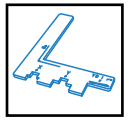
1x Laser Head Holder

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.





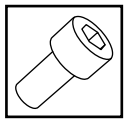
1x Allen Key 2.5



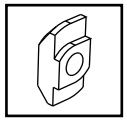
2x Template1

STEP 13.3 PREPARING THE X AXIS - HOLDER

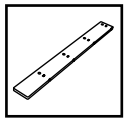
Step 13/33 10 min



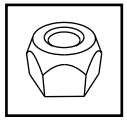
4x C-screw M5-12
2x C-screw M3-30



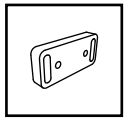
4x Hammer Nut M5



1x Chain Support

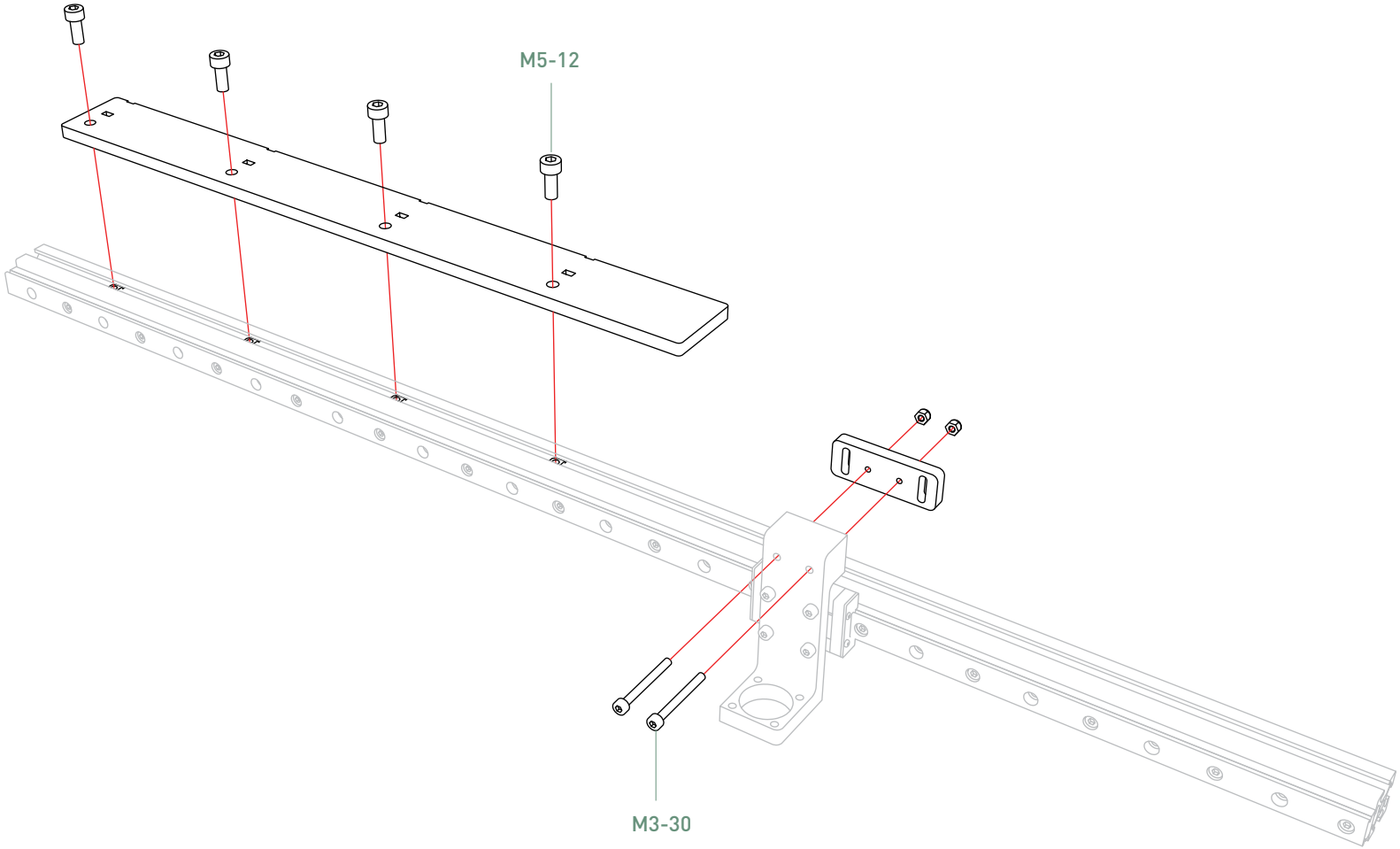


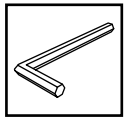
2x Lock Nut M3



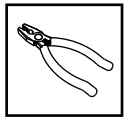
1x X-Belt Attacher

H2. How to use Lock Nuts? p.9





1x Allen Key 2.5
1x Allen Key 4

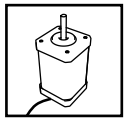


1x Small plier **or**
1x Wrench 5.5

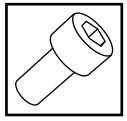
STEP 14.1 INSTALLING THE X AXIS 1

Step 14/33 20 min

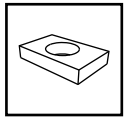
1x Prepared X-axis (Step 13)



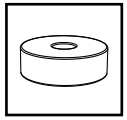
1x X-motor



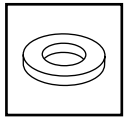
4x C-screw M3-10
3x C-screw M6-10
1x C-screw M6-35



4x Flat Nut M6

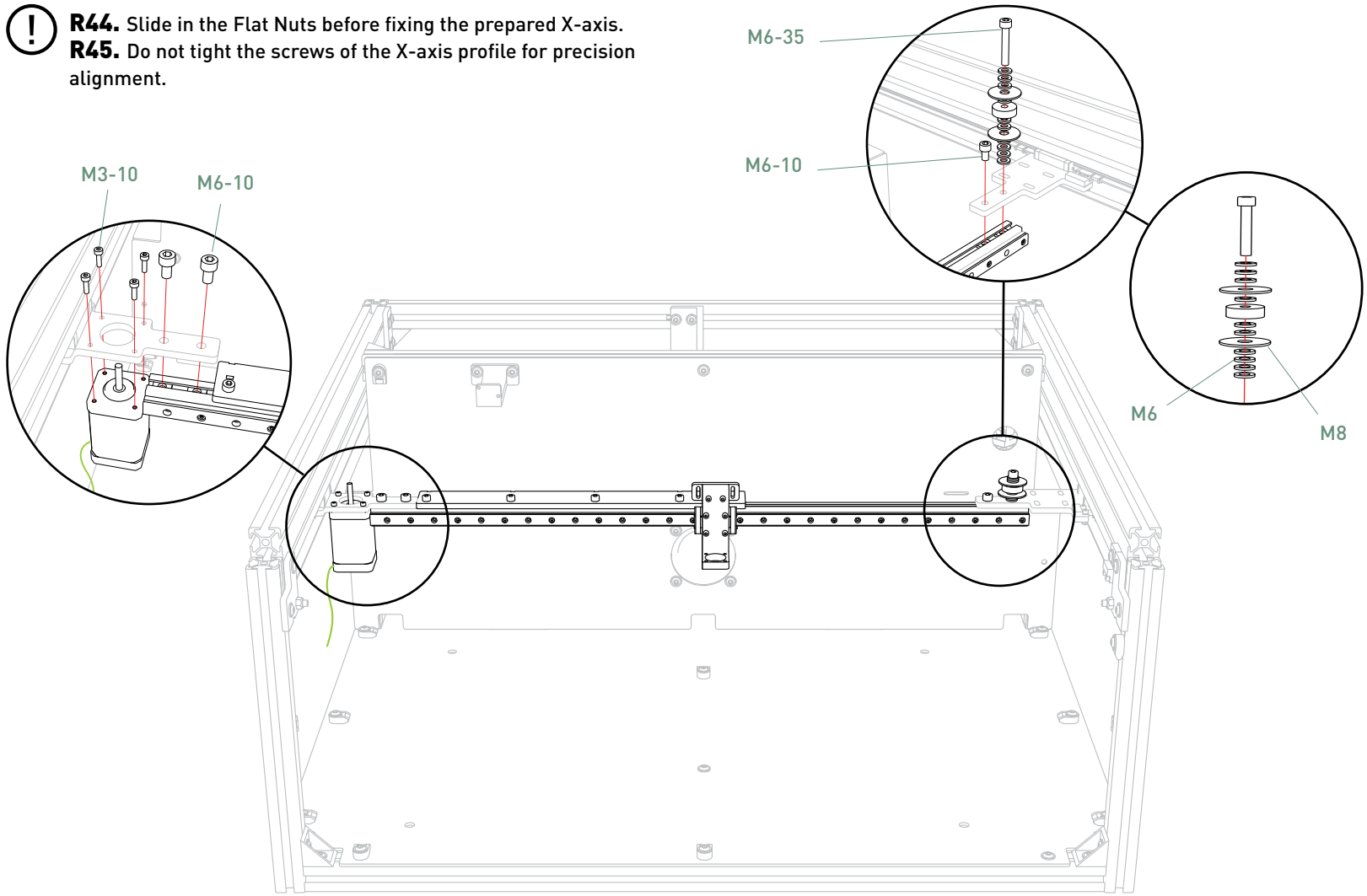


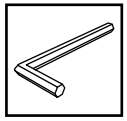
1x X-bearing



2x Washer M8 Big
10x Washer M6

R44. Slide in the Flat Nuts before fixing the prepared X-axis.
R45. Do not tight the screws of the X-axis profile for precision alignment.

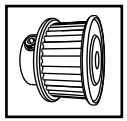




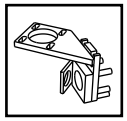
1x Allen Key 2.5
1x Allen Key 5

STEP 14.2 INSTALLING THE X AXIS 2

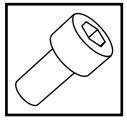
Step 14/33 20 min



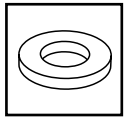
1x X-pulley (with set screws in)



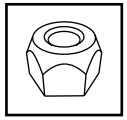
1x Mirror Holder 20



4x C-screw M5-20



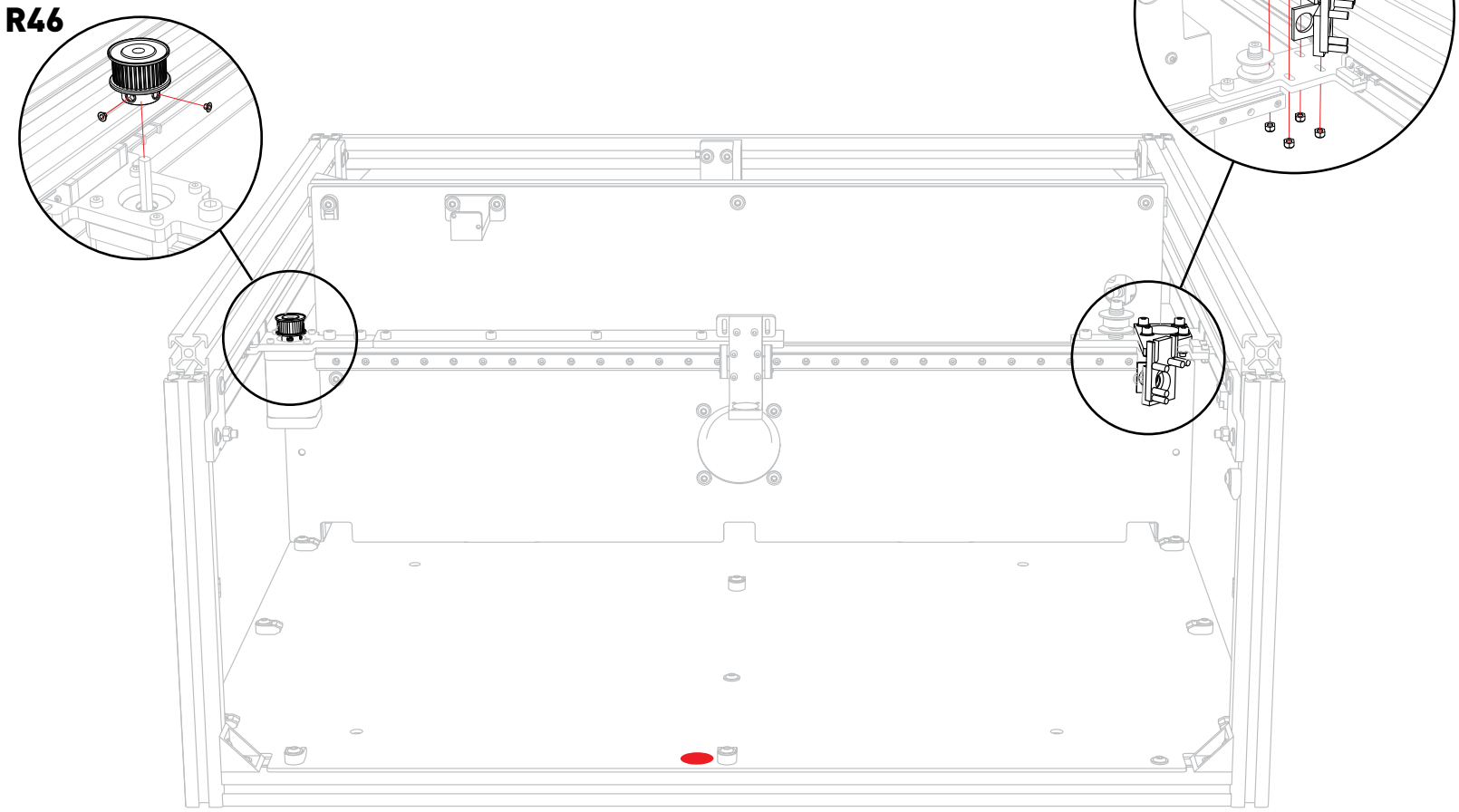
4x Washer M5

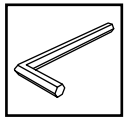


4x Lock Nut M5

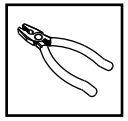
R46. Tighten one of the set screws of the Pulley to the flat side of the motor shaft.
R47. Do not tighten the screws of the Mirror Holder 20 for precision alignment.

H2. How to use Lock Nuts? p.9
H4. How to use set screws? p.10





1x Allen Key 2.5
1x Allen Key 4



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

STEP 14.3 INSTALLING THE X AXIS 3

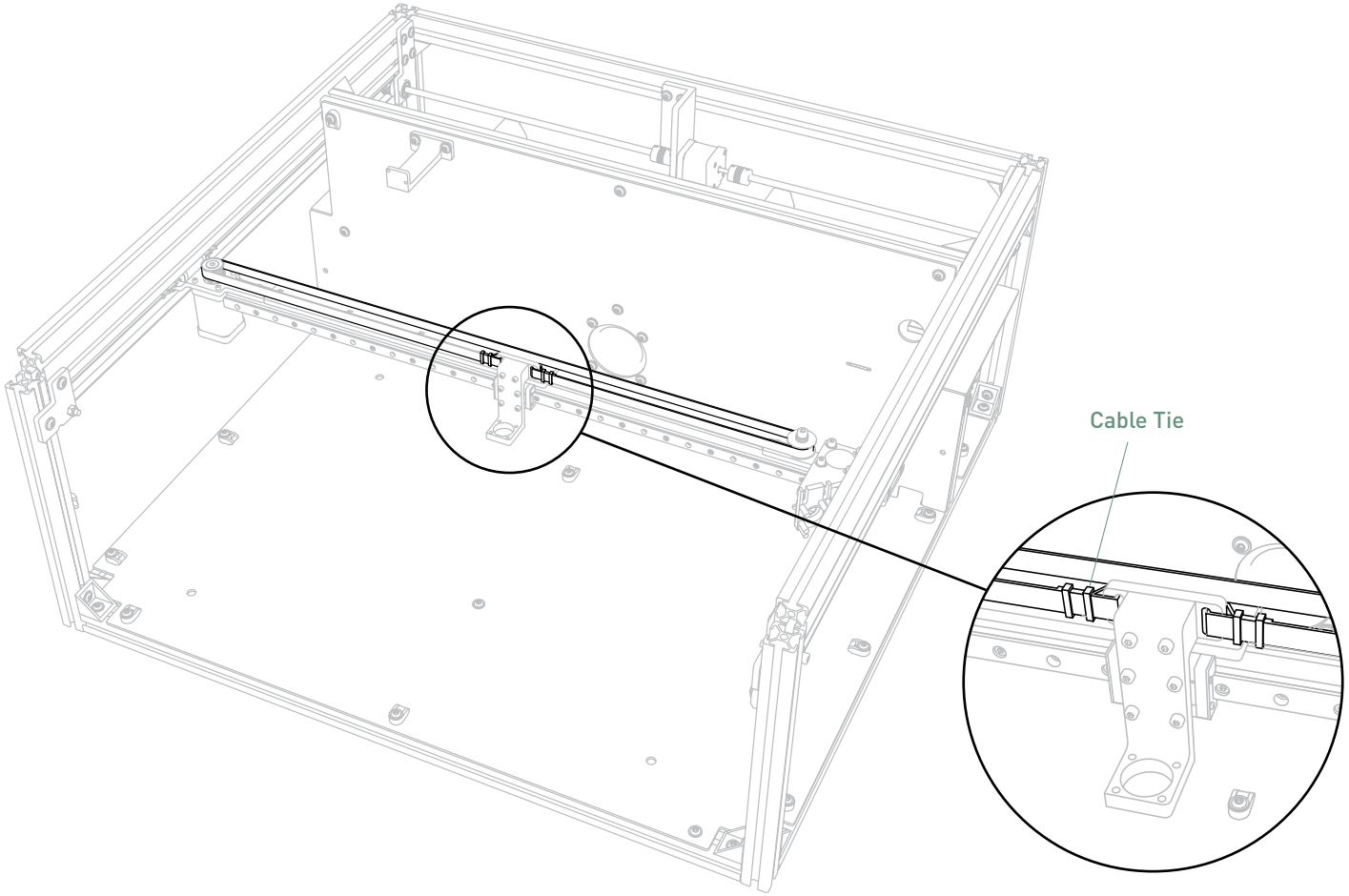
Step 14/33 30 min

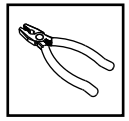
1x X-belt

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

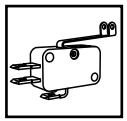




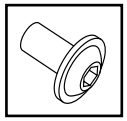
1x Small plier

STEP 15.1 INSTALLING THE SWITCHES

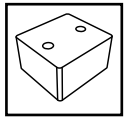
Step 15/33 40 min



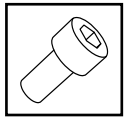
1x Window Switch



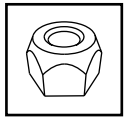
3x B-screw M3-8



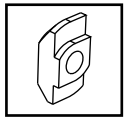
1x X-endstop Holder



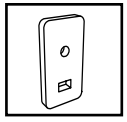
4x C-screw M3-20



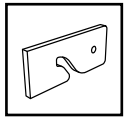
2x Lock Nut M3



5x Hammer Nut M3

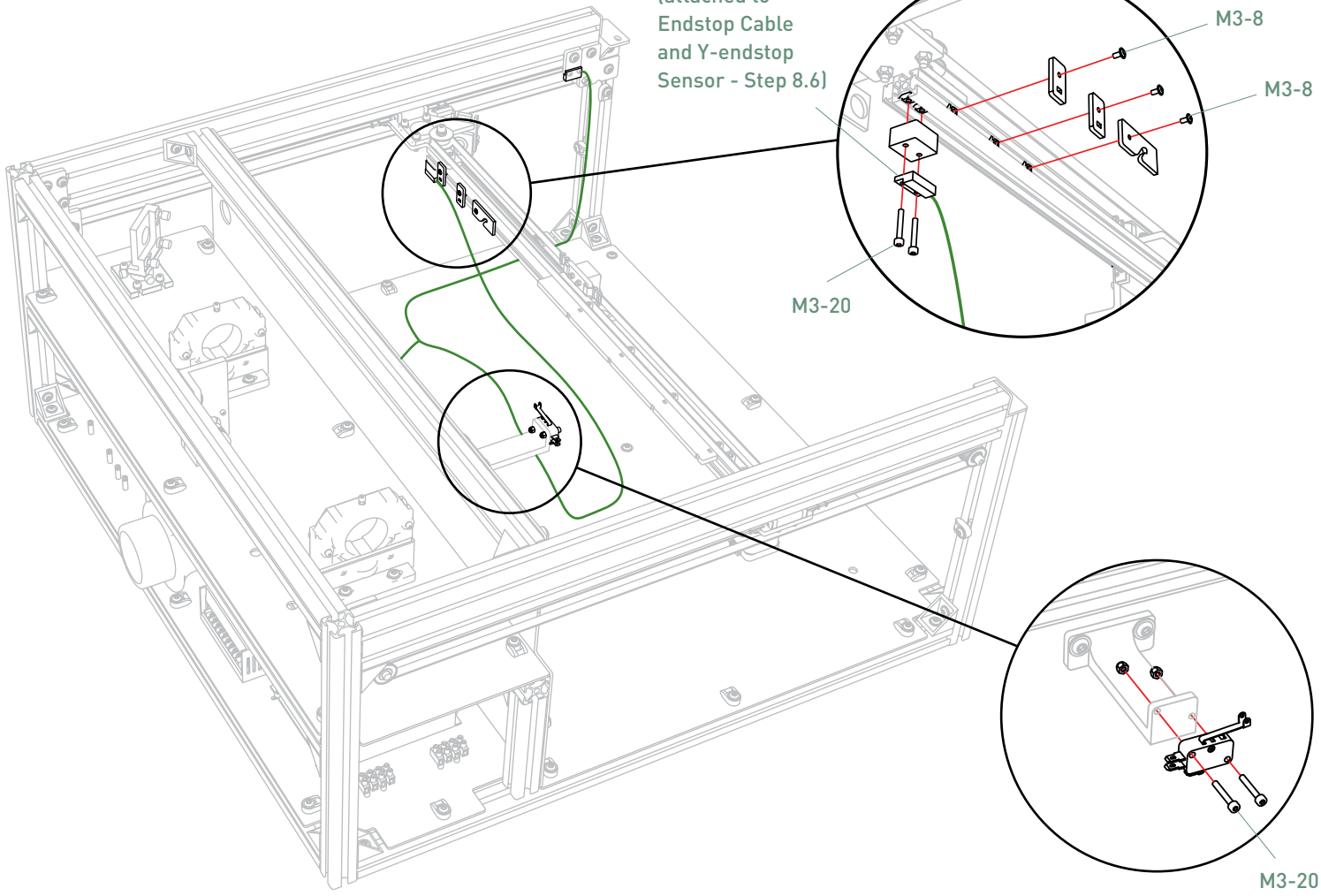


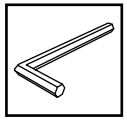
2x X-wire Fixer



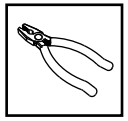
1x X-wire Inserter

H2. How to use Lock Nuts? p.9





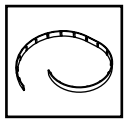
1x Allen Key 2.5



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

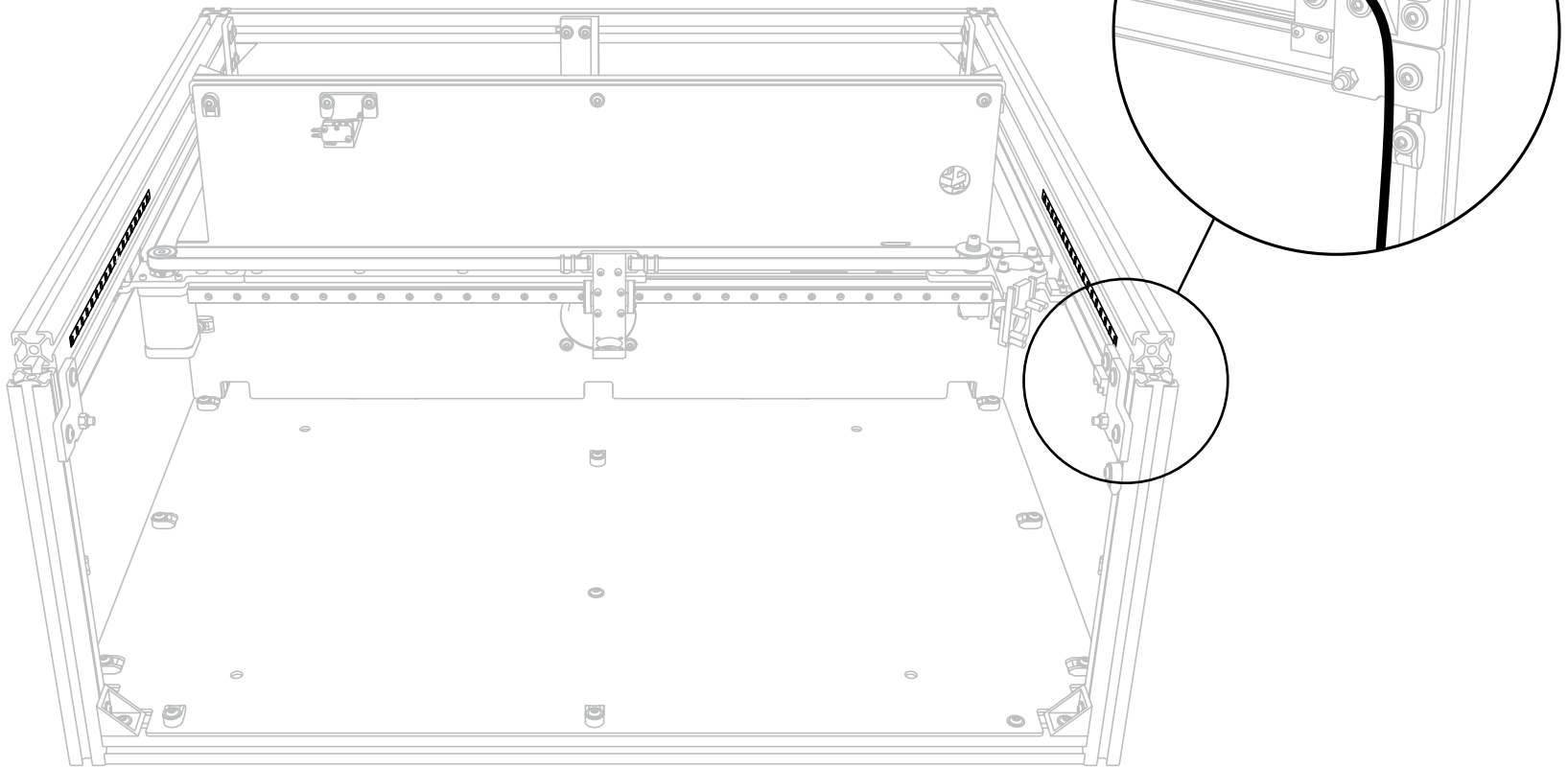
STEP 15.2 INSTALLING THE LED STRIPS

Step 15/33 10 min



2x LED Strip

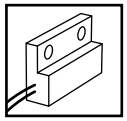
R49. Remove the protective paper from the LED Strips and tape them on the side of the Profiles 3060-770 with the cables pointing to the front of the machine.



STEP 16.1 WIRING 1

Step 16/33 20 min

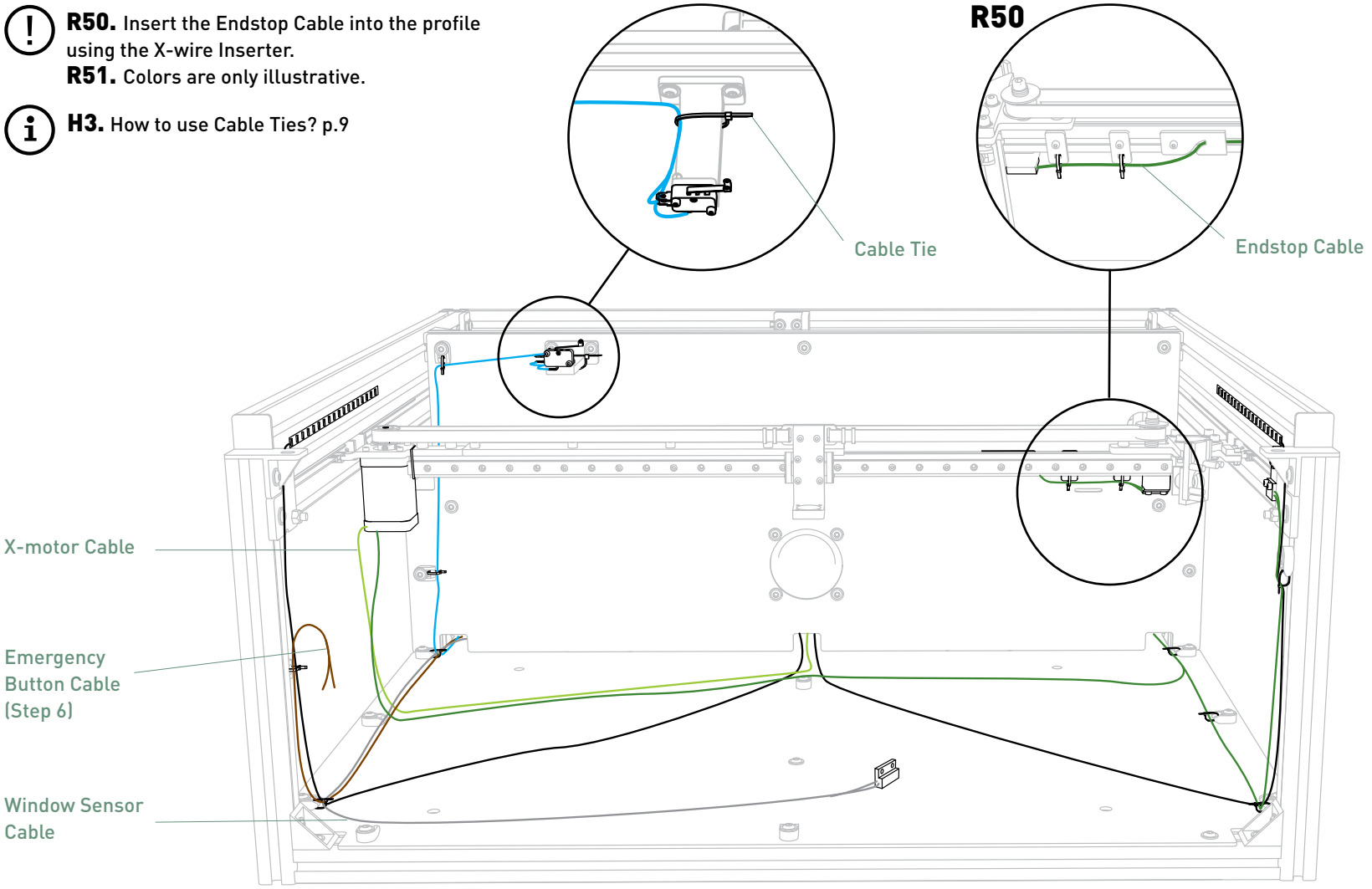
12x Cable Ties

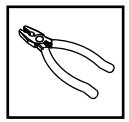


1x Window Sensor

R50. Insert the Endstop Cable into the profile using the X-wire Inserter.
R51. Colors are only illustrative.

H3. How to use Cable Ties? p.9



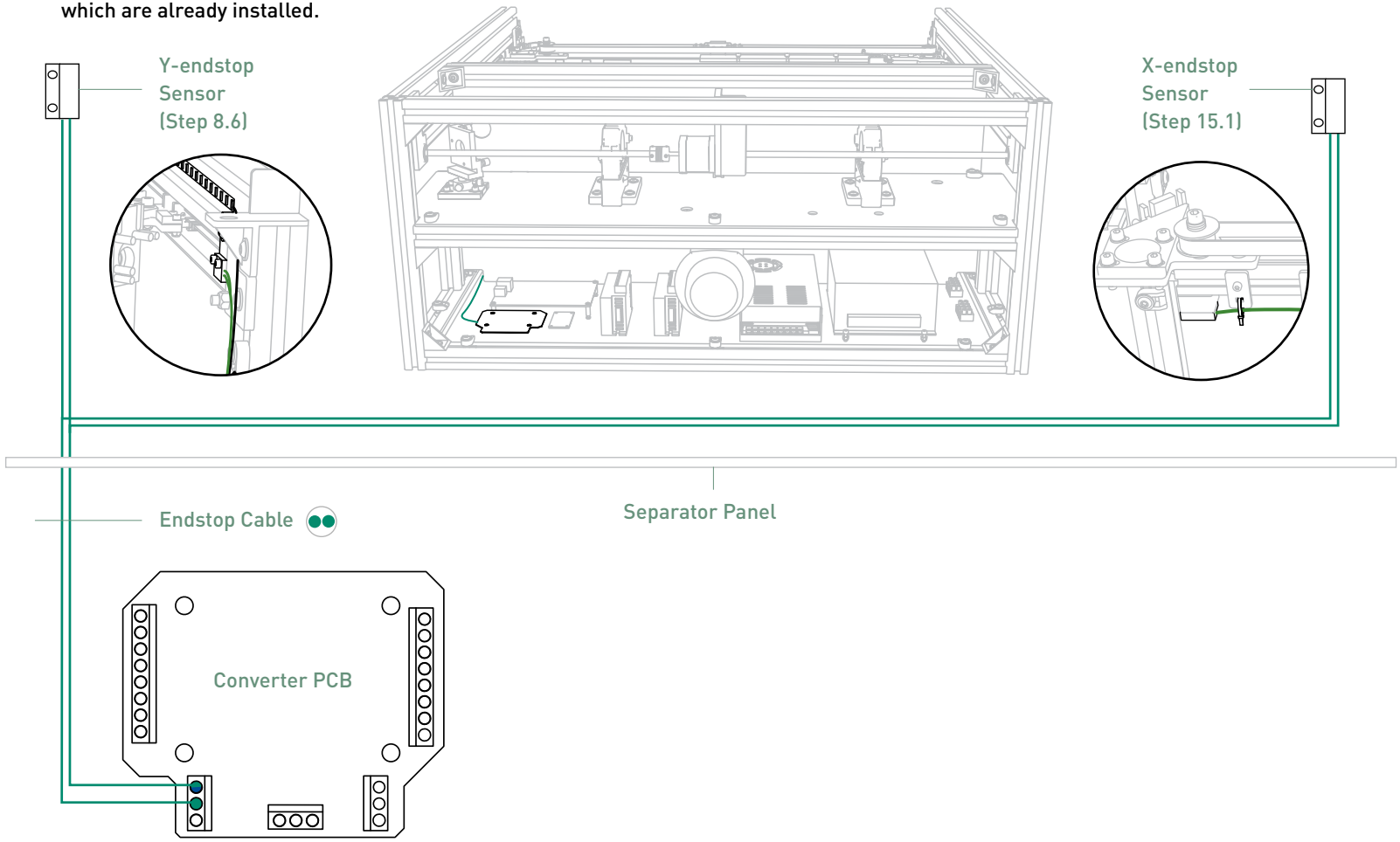


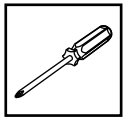
1x Small plier

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.

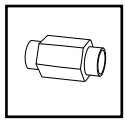




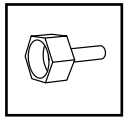
1x Screwdriver
Phillips

STEP 16.3 WIRING 3

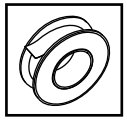
Step 16/33 20 min



1x Water Flow Sensor



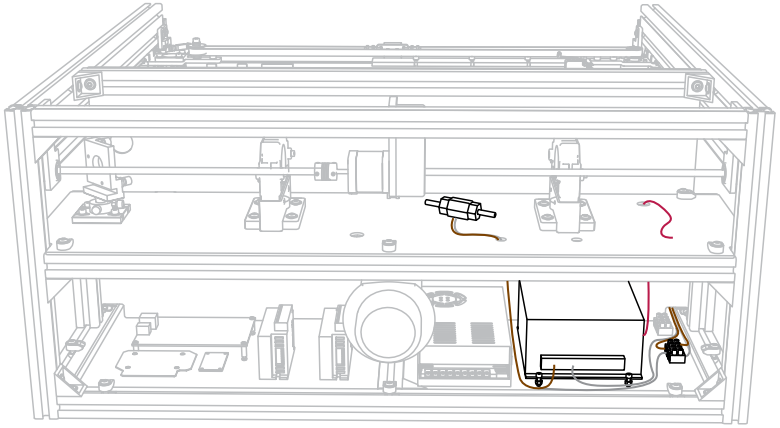
2x Water Flow Connector

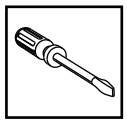


1x Teflon Tape

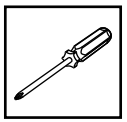
R53. The Laser Power Supply terminal can be removed to facilitate the wiring.
R54. Use Teflon tape to attach the Water Flow Connectors to the Water Flow Sensor.

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





1x Screwdriver slotted small



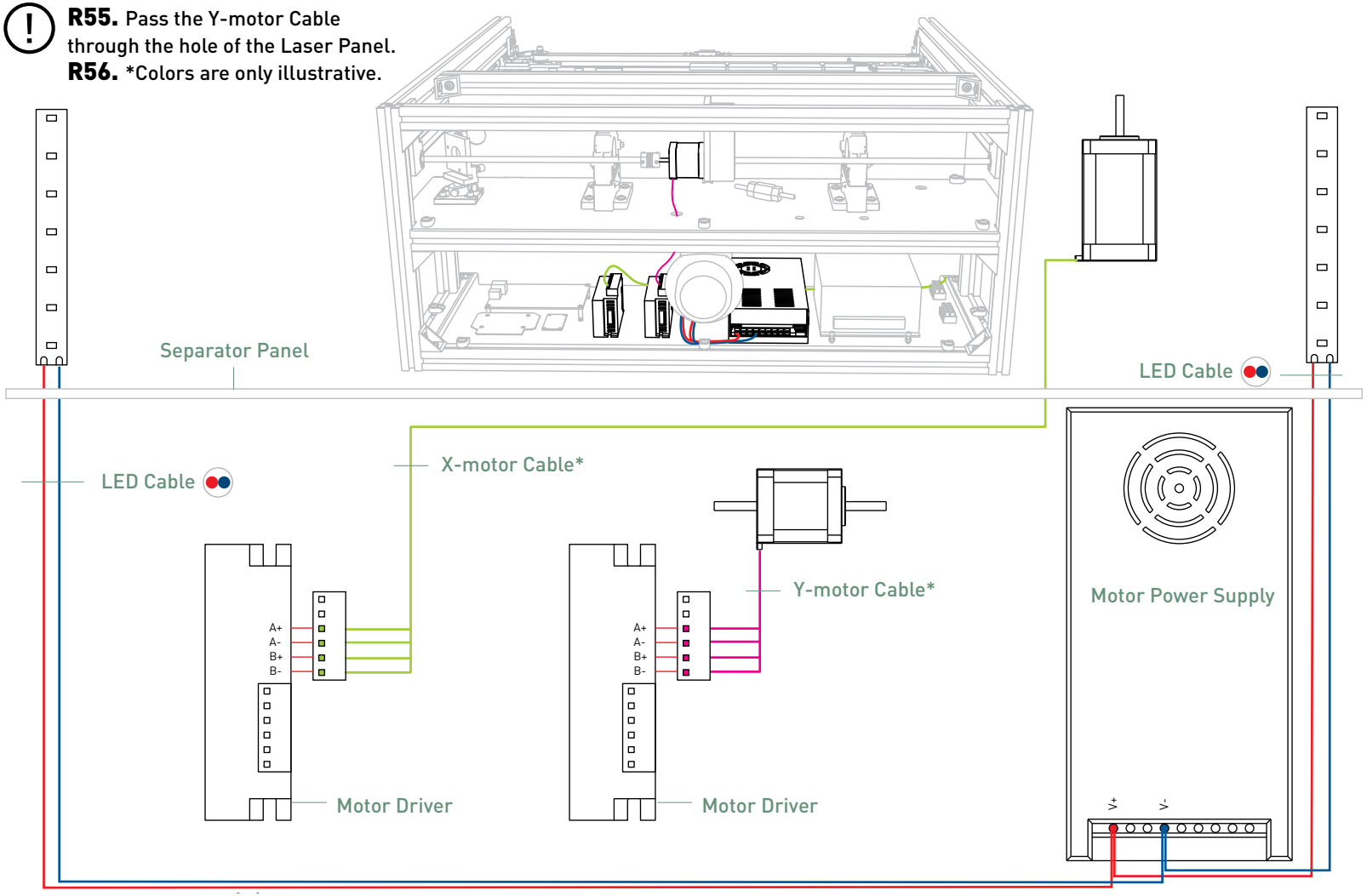
1x Screwdriver Phillips

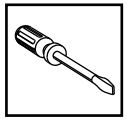
1x Wrench 24

STEP 16.4 WIRING 4

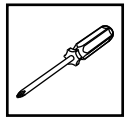
Step 16/33 20 min

R55. Pass the Y-motor Cable through the hole of the Laser Panel.
R56. *Colors are only illustrative.





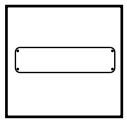
1x Screwdriver slotted small



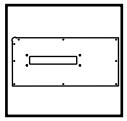
1x Screwdriver Phillips

STEP 17.1 PREPARING THE SIDE PANELS

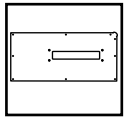
Step 17/33 20 min



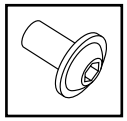
2x Air Panel



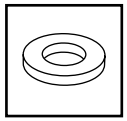
1x Right Panel



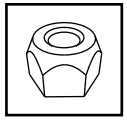
1x Left Panel



8x B-screw M6-20



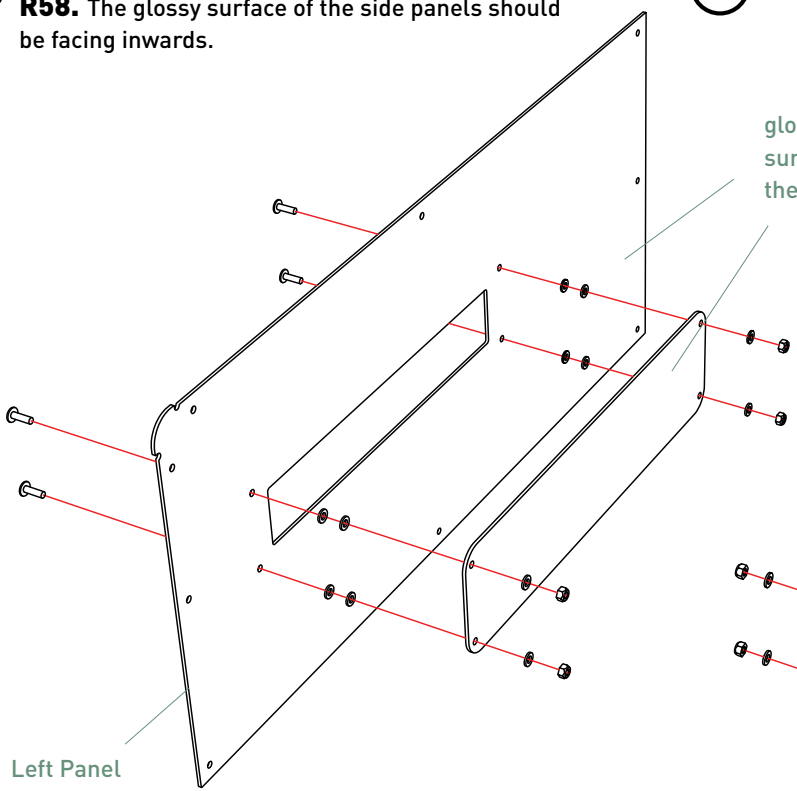
24x Washer M6

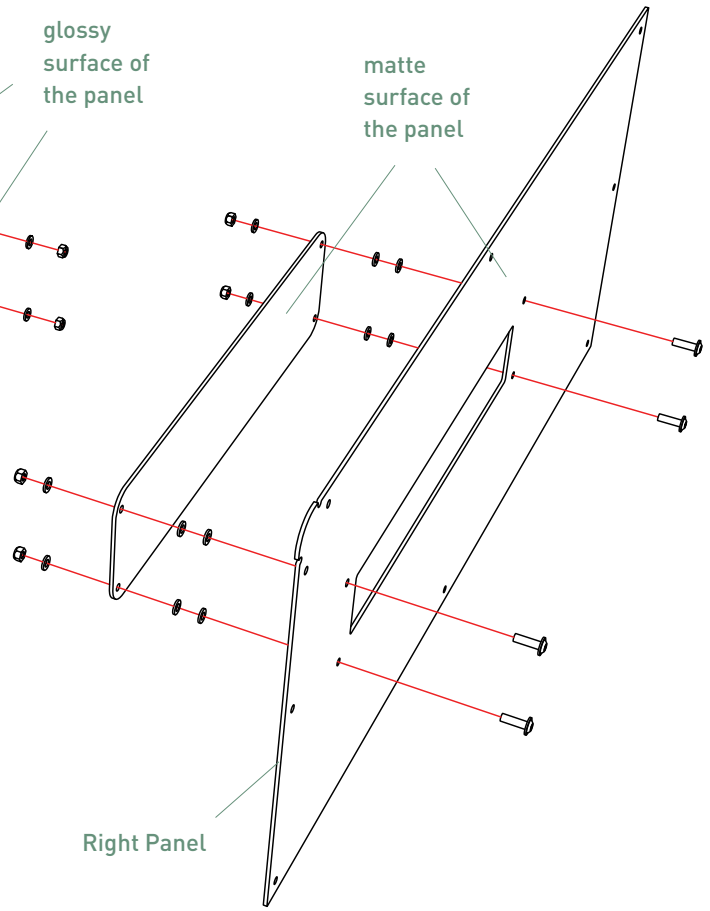


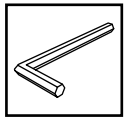
8x Lock Nut M6

R57. Remove the protective foils from the panels.
R58. The glossy surface of the side panels should be facing inwards.

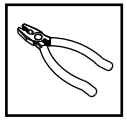
H2. How to tighten Lock Nuts? p.9







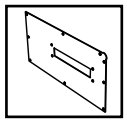
1x Allen Key 5



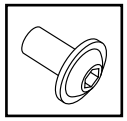
1x Wrench 10 **or**
1x Small plier

STEP 17.2 ATTACHING THE LEFT PANEL

Step 17/33 15 min



1x Prepared Left Panel (Step 17.1)

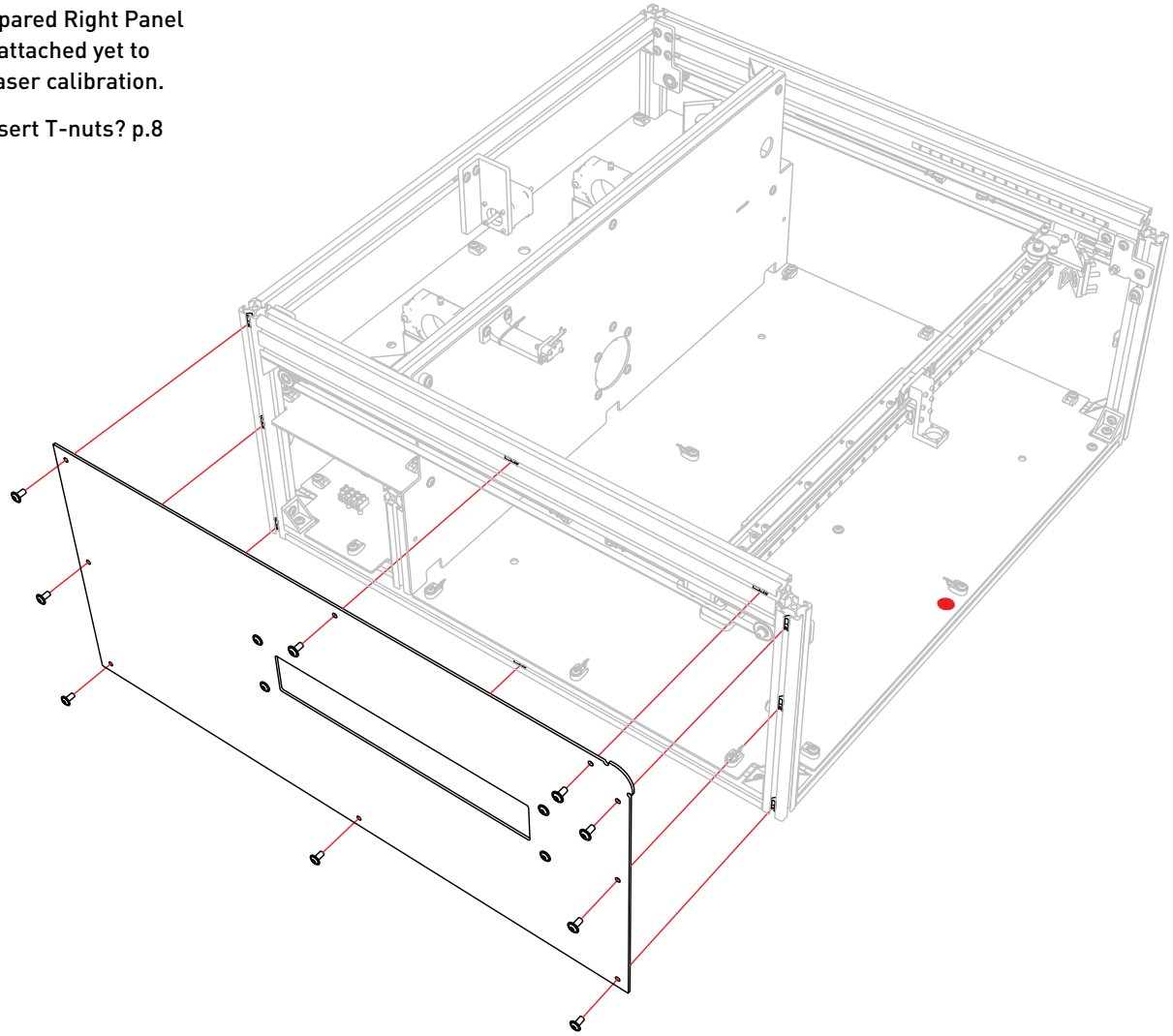


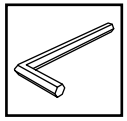
9x B-screw M6-12

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



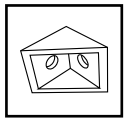


1x Allen Key 5

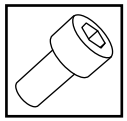
STEP 17.3 ATTACHING THE FILLETED PROFILE

Step 17/33 30 min

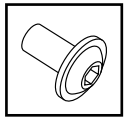
1x Profile Fillet



2x Front Bracket

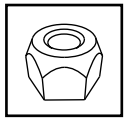


3x C-screw M3-12

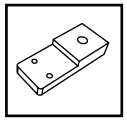


4x B-screw M6-12
1x B-screw M6-16

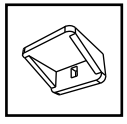
5x T-nut M6
1x T-nut M3



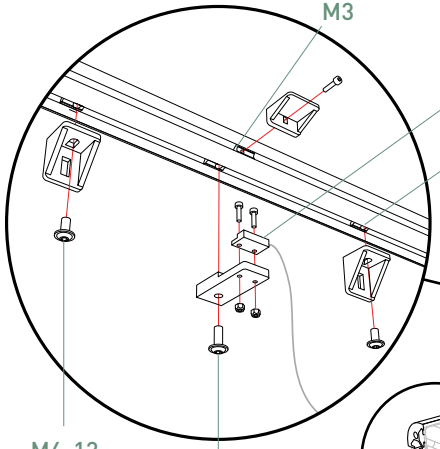
2x Lock Nut M3

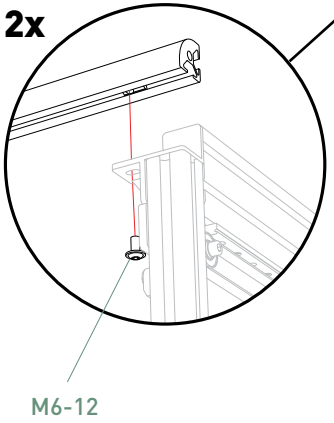


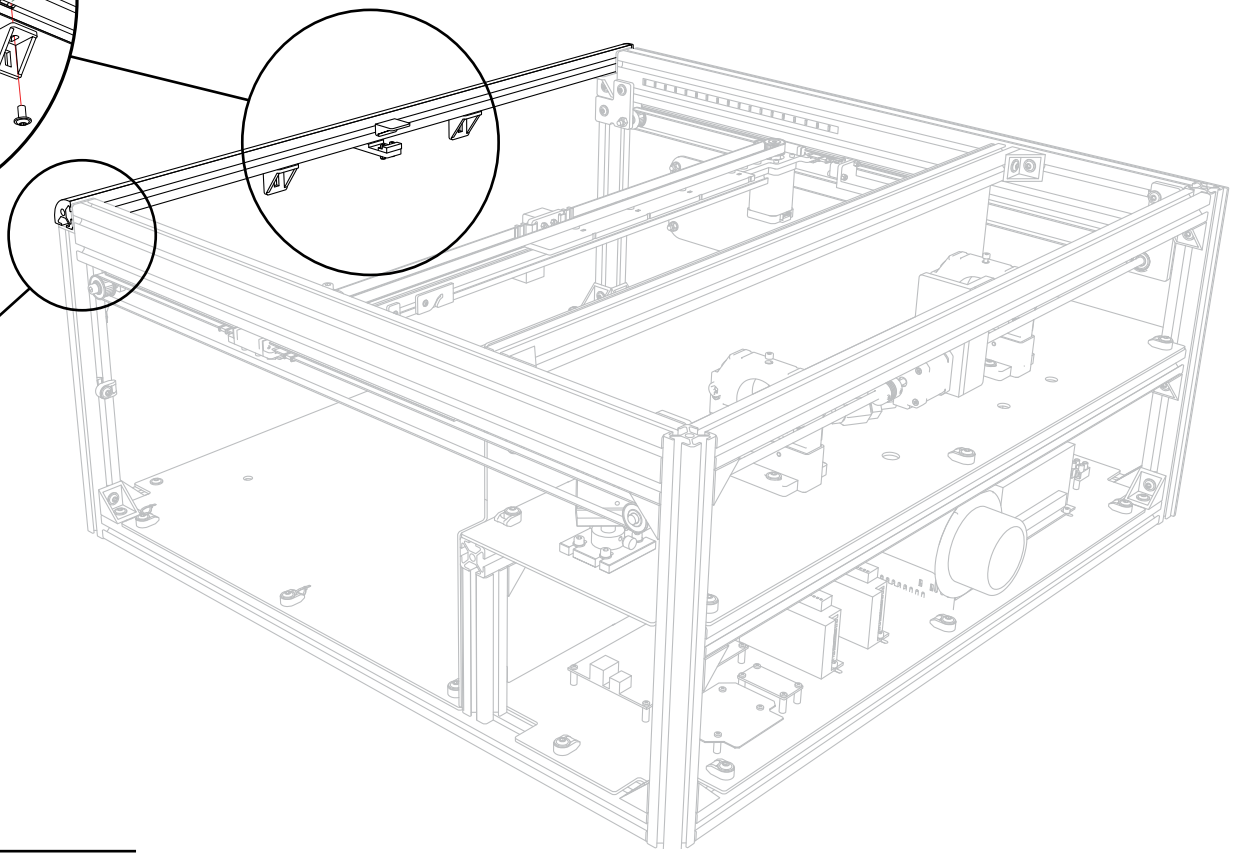
1x Window Sensor Holder



1x Front Window Holder

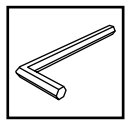




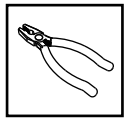


R60. Do not tighten the screws yet for later adjustments.

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



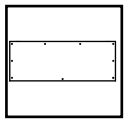
1x Allen Key 2.5
1x Allen Key 5



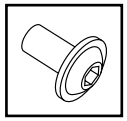
1x Wrench 10 **or**
1x Small plier

STEP 17.4 ATTACHING THE FRONT PANEL

Step 17/33 20 min

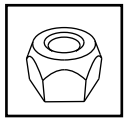


1x Front Panel



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

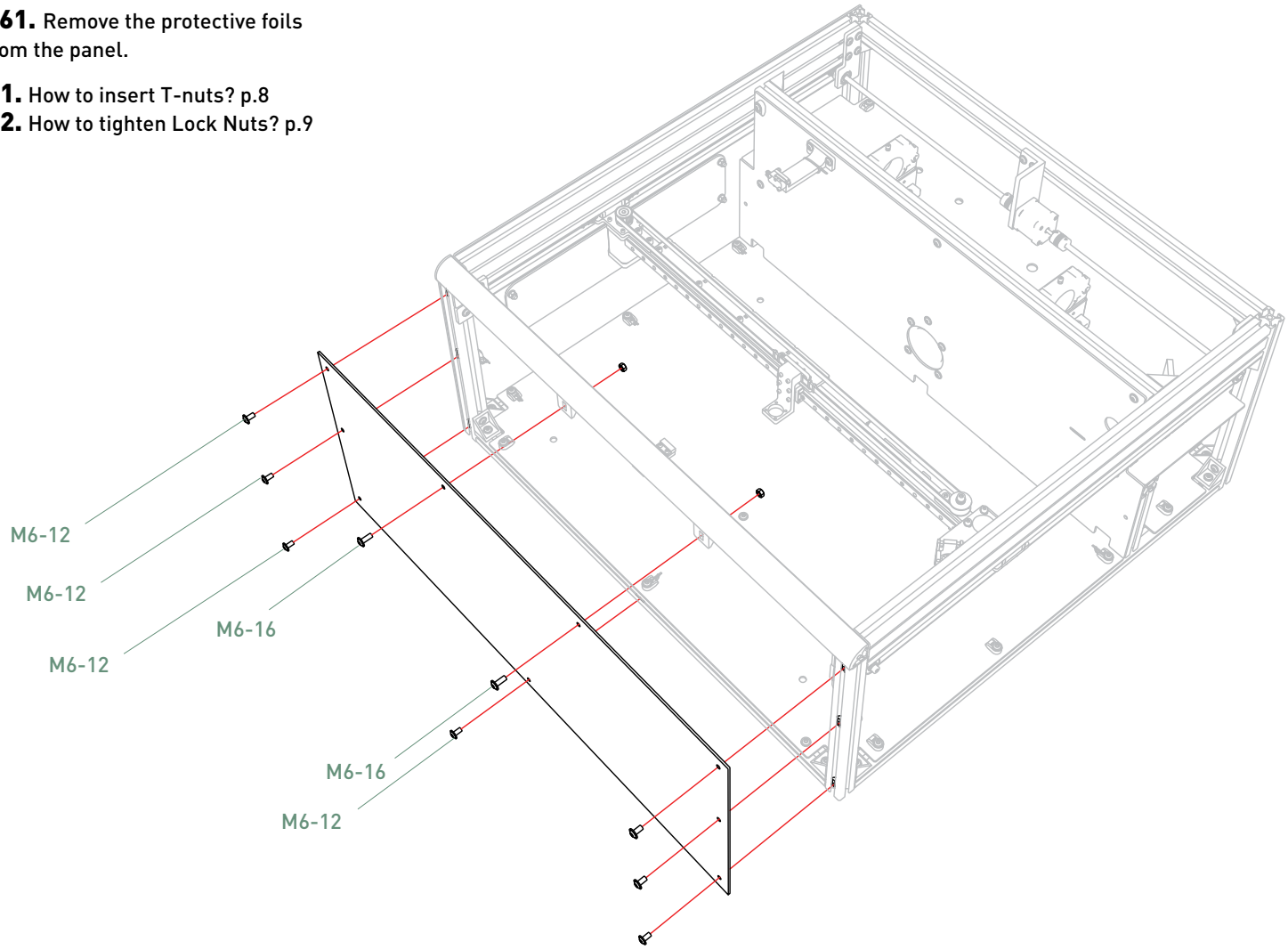
7x T-nut M6

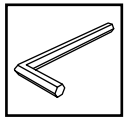


2x Lock Nut M6

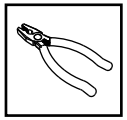
R61. Remove the protective foils from the panel.

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





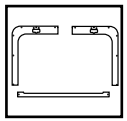
1x Allen Key 5



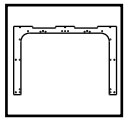
1x Small plier **or**
1x Wrench 10

STEP 18.1 PREPARING THE TOP PANELS

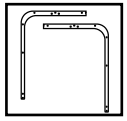
Step 18/33 45 min



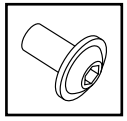
1x Sub Panels (3 pieces - Left, Right and Front)



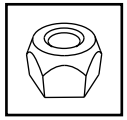
1x Top Front Panel



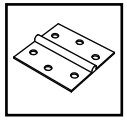
1x Spacers Panels (2 pieces - Left and Right)



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



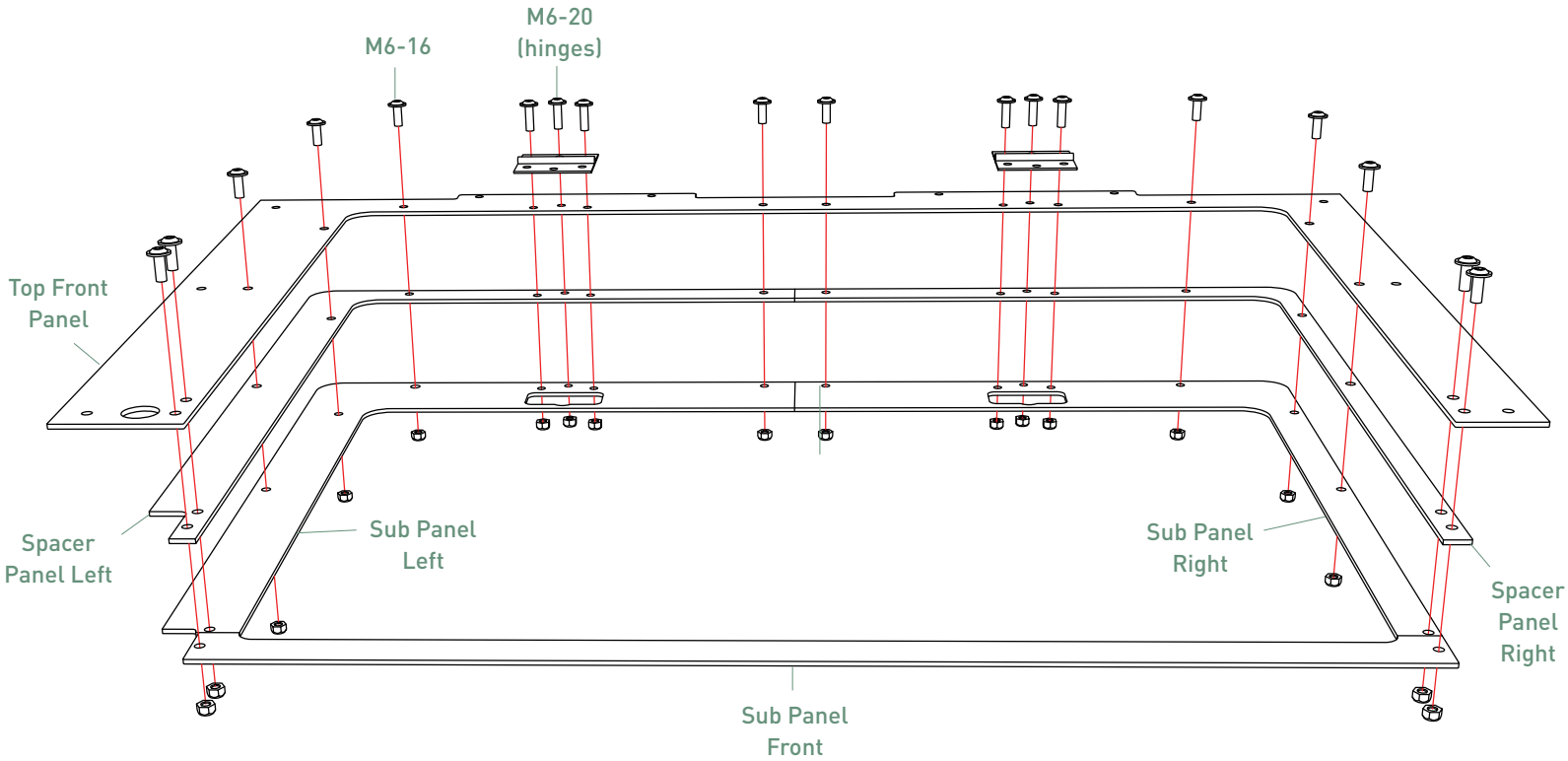
17x Lock Nut M6

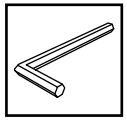


2x Hinge

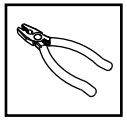
R62. Remove the protective foils from the panels.
R63. The glossy surface of the panels should be facing down.

H2. How to use Lock Nuts? p.9





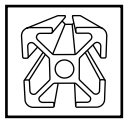
1x Allen Key 5



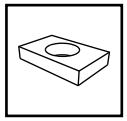
1x Small plier **or**
1x Wrench 10

STEP 18.2 PREPARING THE WINDOW FRAME

Step 18/33 10 min

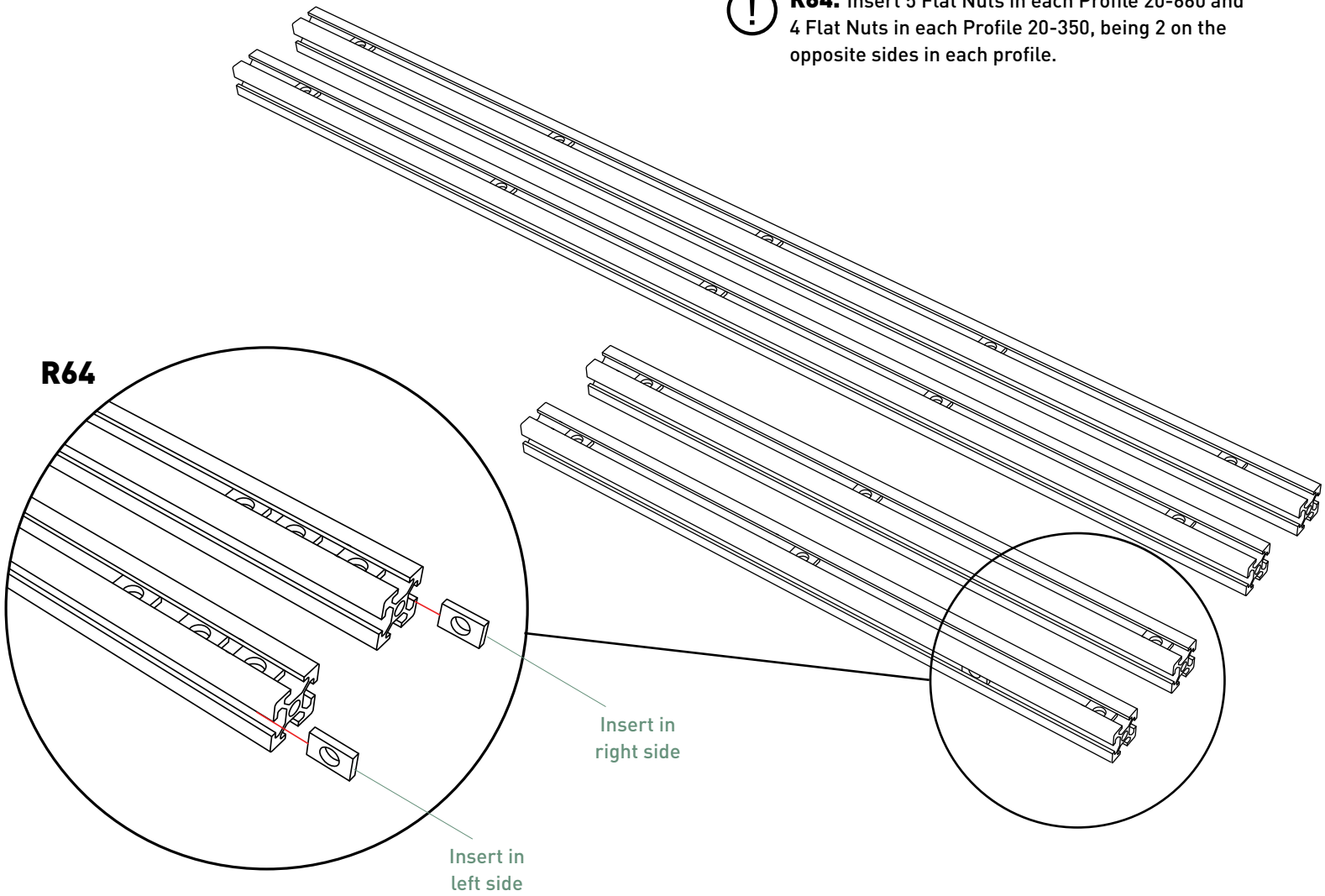


2x Profile 20-660
2x Profile 20-350



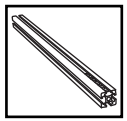
18x Flat Nut M6

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.

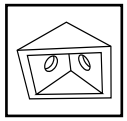


STEP 18.3 ASSEMBLING THE WINDOW FRAME

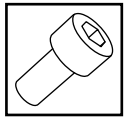
Step 18/33 30 min



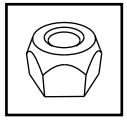
4x Prepared Profiles (Step 18.2)



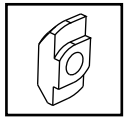
4x Bracket 20



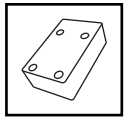
2x C-screw M3-16
2x C-screw M3-20
8x C-screw M4-8



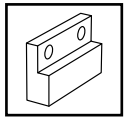
3x Lock Nut M3



8x Hammer Nut M4
2x Hammer Nut M3



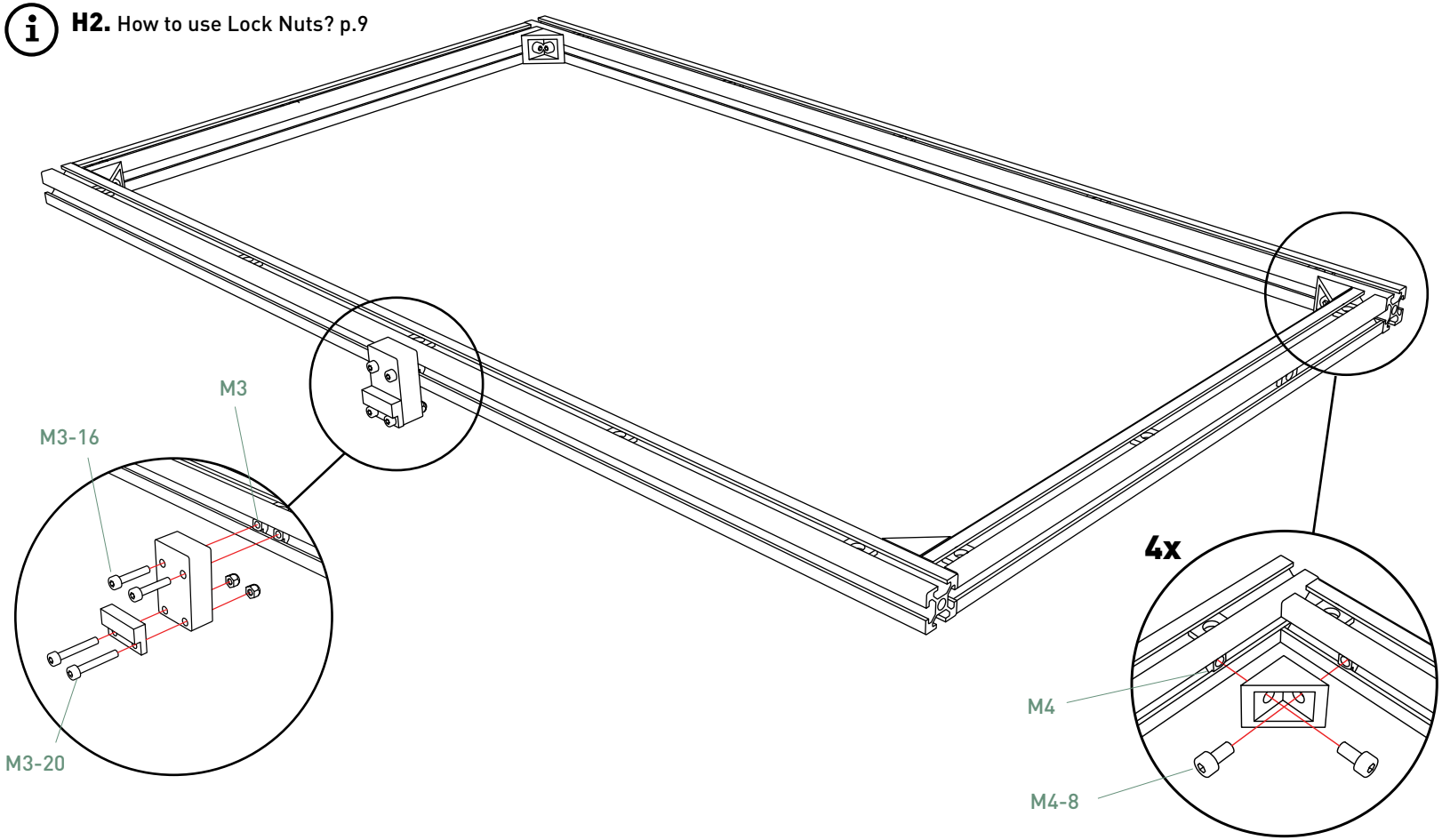
1x Window Magnet Holder

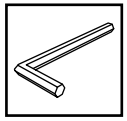


1x Window Magnet

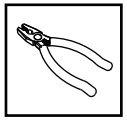
R65. Do not tighten the screws of the Window Magnet Holder for later adjustments.

H2. How to use Lock Nuts? p.9





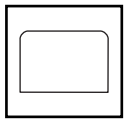
1x Allen Key 2.5
1x Allen Key 3



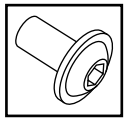
1x Small plier **or**
1x Wrench

STEP 18.4 ATTACH WINDOW TO FRAME

Step 18/33 20 min

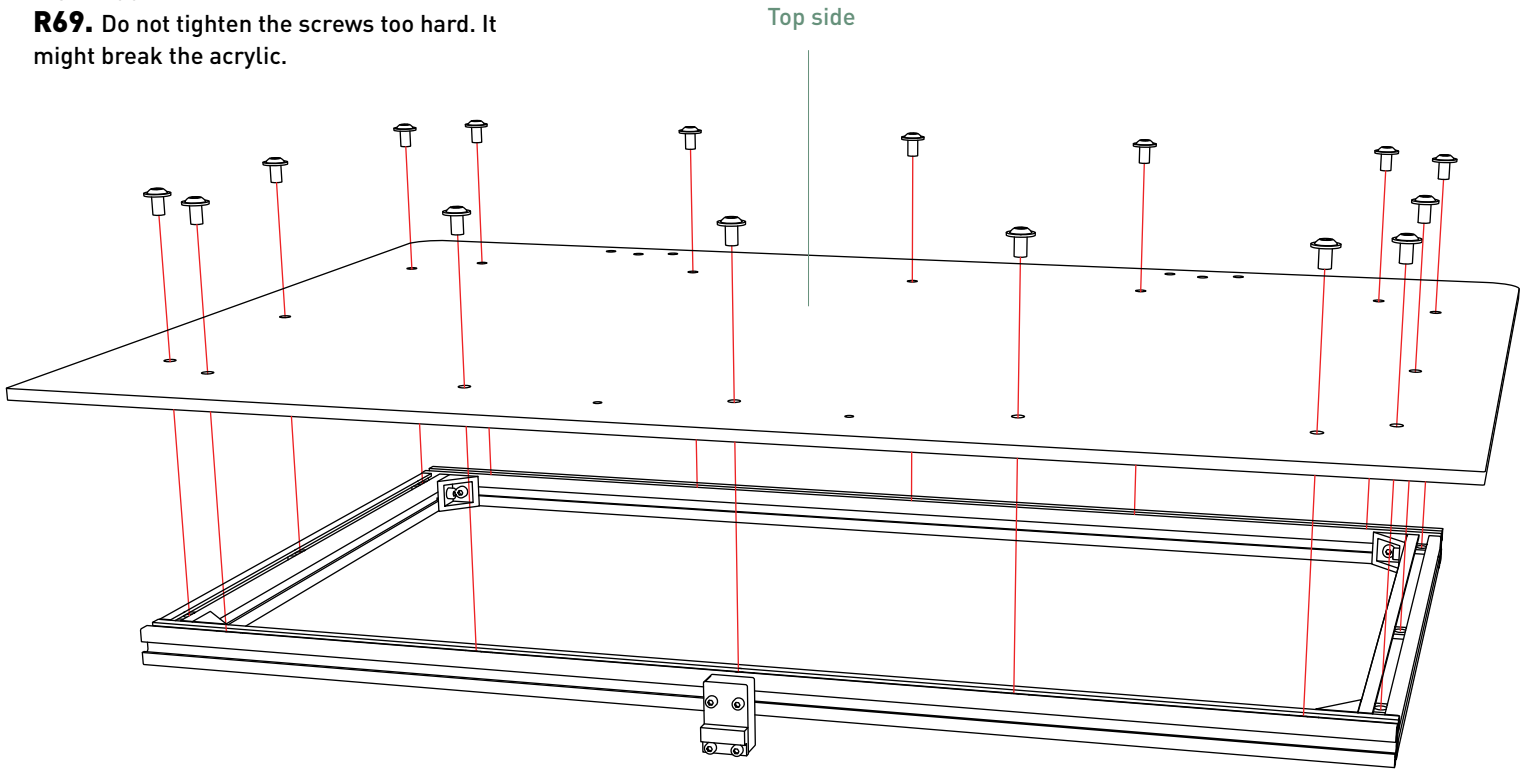


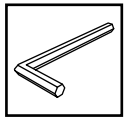
1x Window



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.



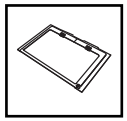


1x Allen Key 5

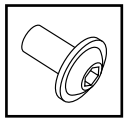
STEP 18.5 FIXING THE WINDOW

Step 18/33 30 min

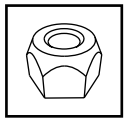
1x Prepared Window (Step 18.4)



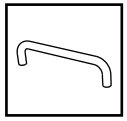
1x Top Panel Set (Step 18.1)



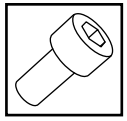
6x B-screw M6-16



6x Lock Nut M6



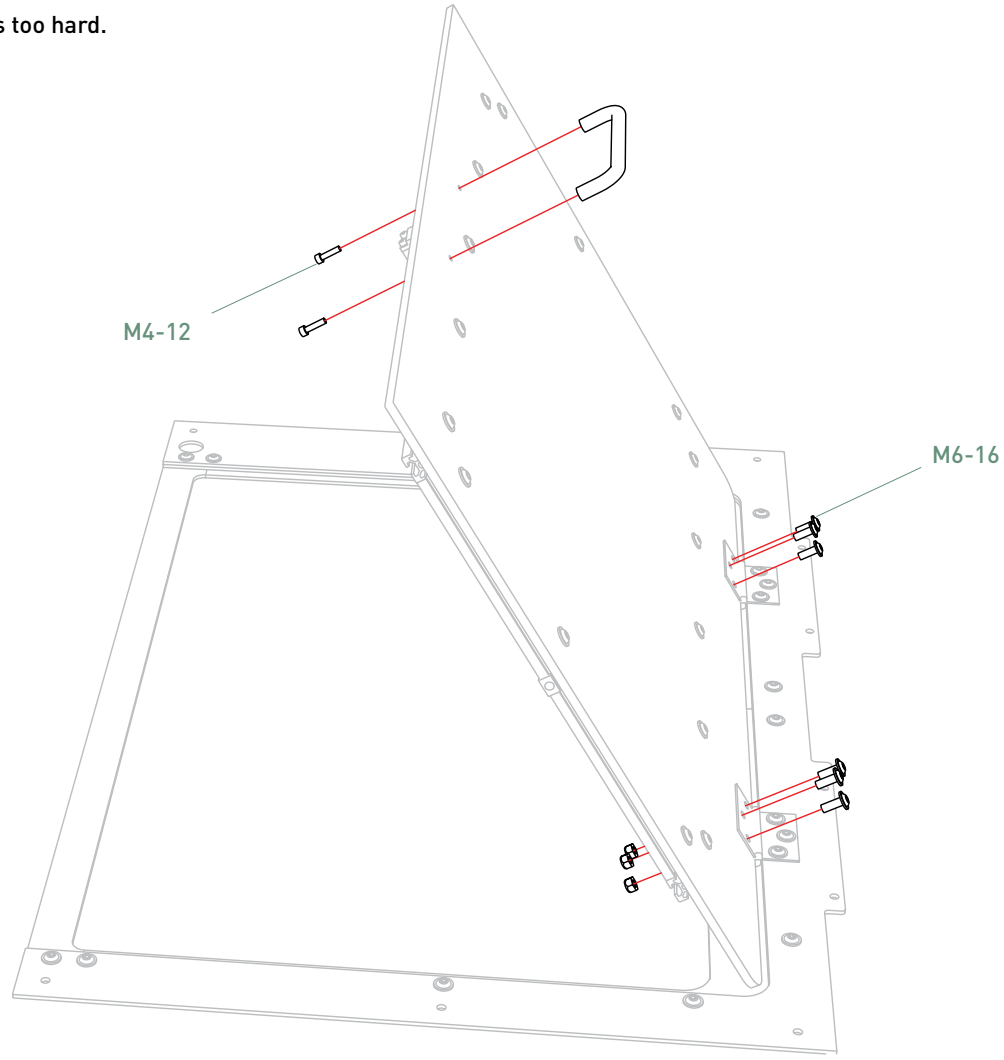
1x Handle

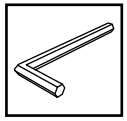


2x C-screw M4-12

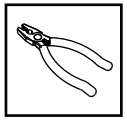
R70. Do not tighten the screws too hard. It might break the acrylic.

H2. How to use Lock Nuts? p.9





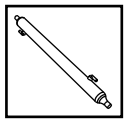
1x Allen Key 3
1x Allen Key 5



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

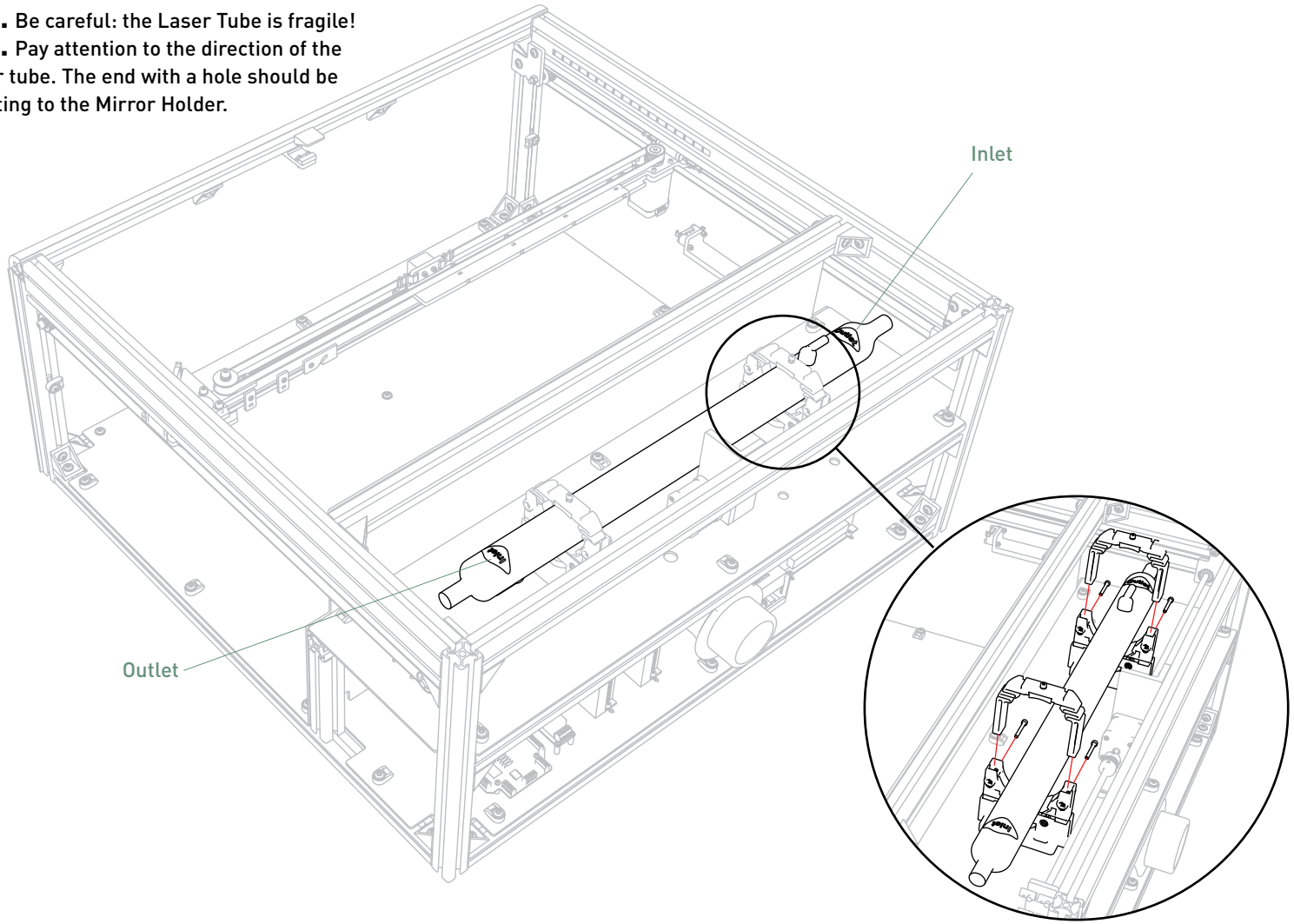
STEP 19.1 INSTALLING LASER TUBE

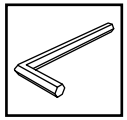
Step 19/33 30 min



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.

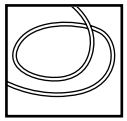




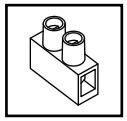
1x Allen Key 3

STEP 19.2 WIRING LASER TUBE

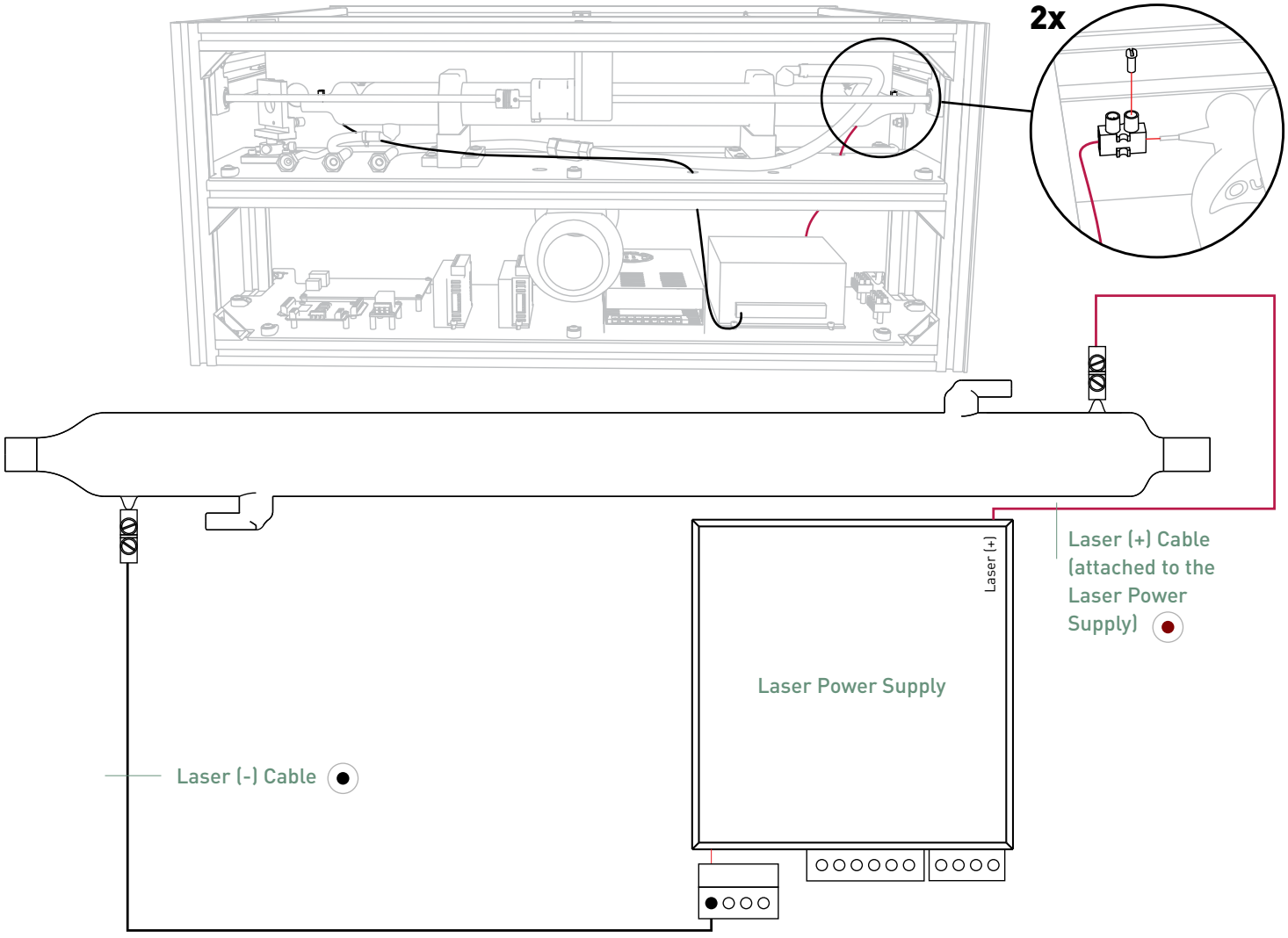
Step 19/33 15 min

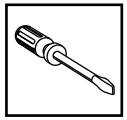


1x Laser (-) Cable

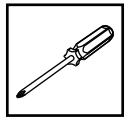


2x Laser Attachment





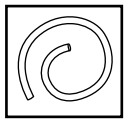
1x Screwdriver slotted small



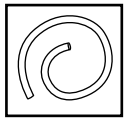
1x Screwdriver Phillips

STEP 19.3 INSTALLING THE WATER AND AIR TUBES

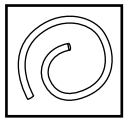
Step 19/33 25 min



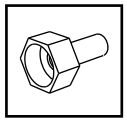
1x Water Outlet Tube Inside



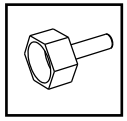
1x Water Inlet Tube Inside (2 pieces)



1x Air Tube Inside



2x Water Connector Inside

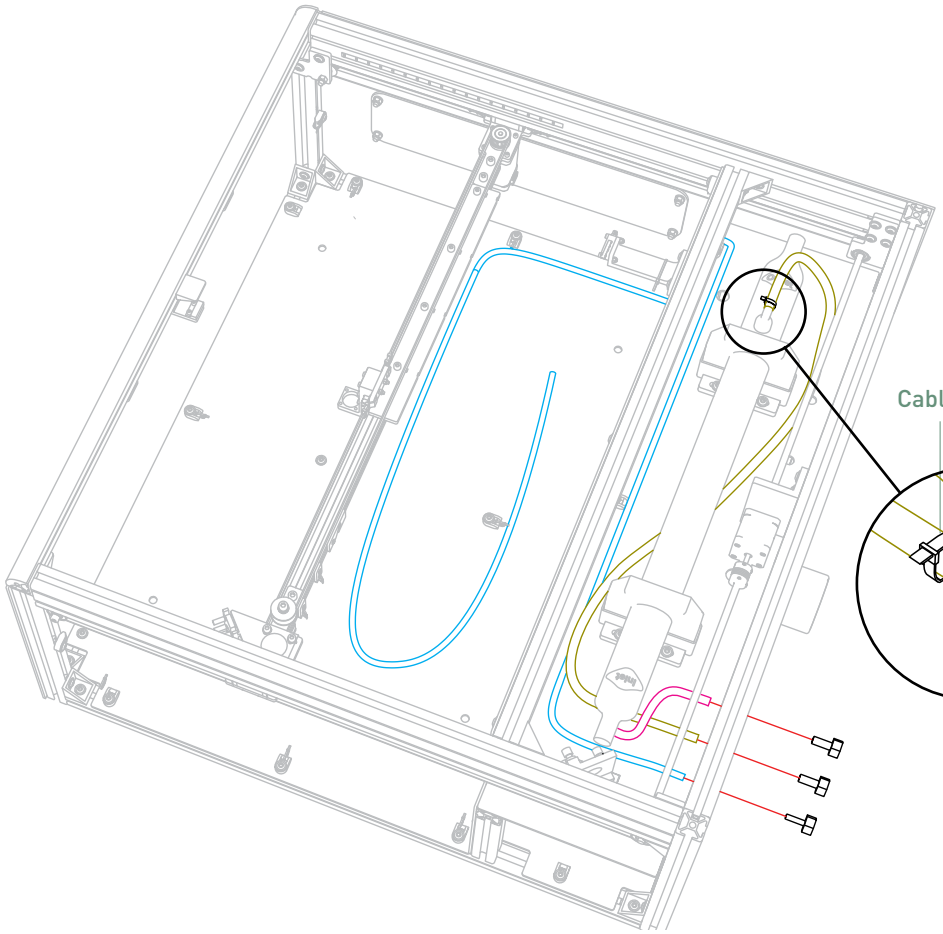


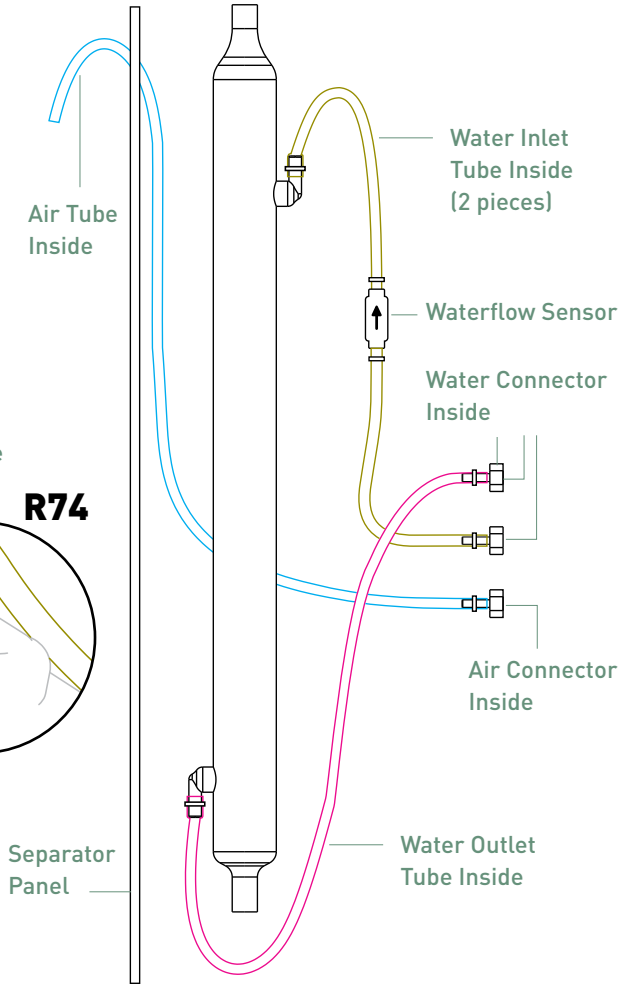
1x Air Connector Inside

7x Cable Ties

R73. Pay attention to the direction of the Water Flow Sensor.
R74. Fix the tubes with Cable Ties.

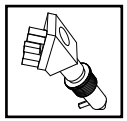
H3. How to use cable ties? p.9
H6. How to insert the tubes easily? p.12



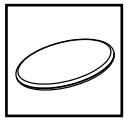


STEP 20.1 INSTALLING THE LASER HEAD

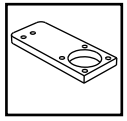
Step 20/33 15 min



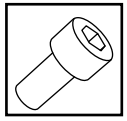
1x Laser Head



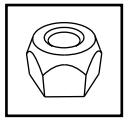
1x Mirror 20



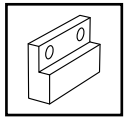
1x Chain End Holder



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



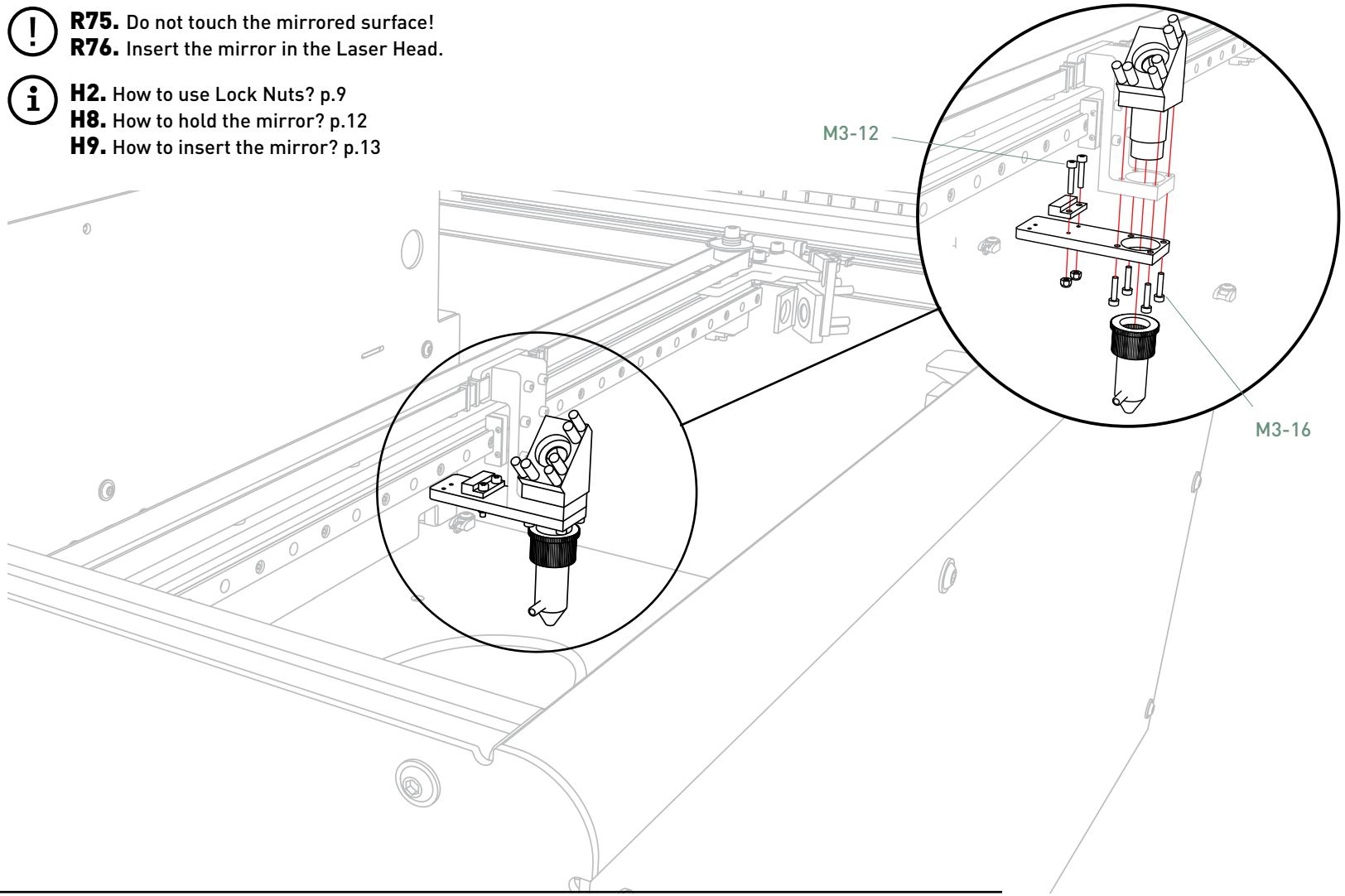
2x Lock Nut M3

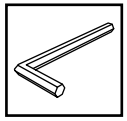


1x X-magnet

R75. Do not touch the mirrored surface!
R76. Insert the mirror in the Laser Head.

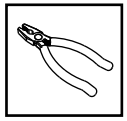
H2. How to use Lock Nuts? p.9
H8. How to hold the mirror? p.12
H9. How to insert the mirror? p.13



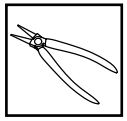


1x Allen Key 2.5

1x Wrench 5.5



1x Small plier



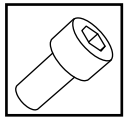
1x Needle Nose Pliers

STEP 20.2 INSTALLING THE CHAIN

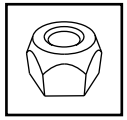
Step 20/33 15 min

1x Chain

4x Cable Ties



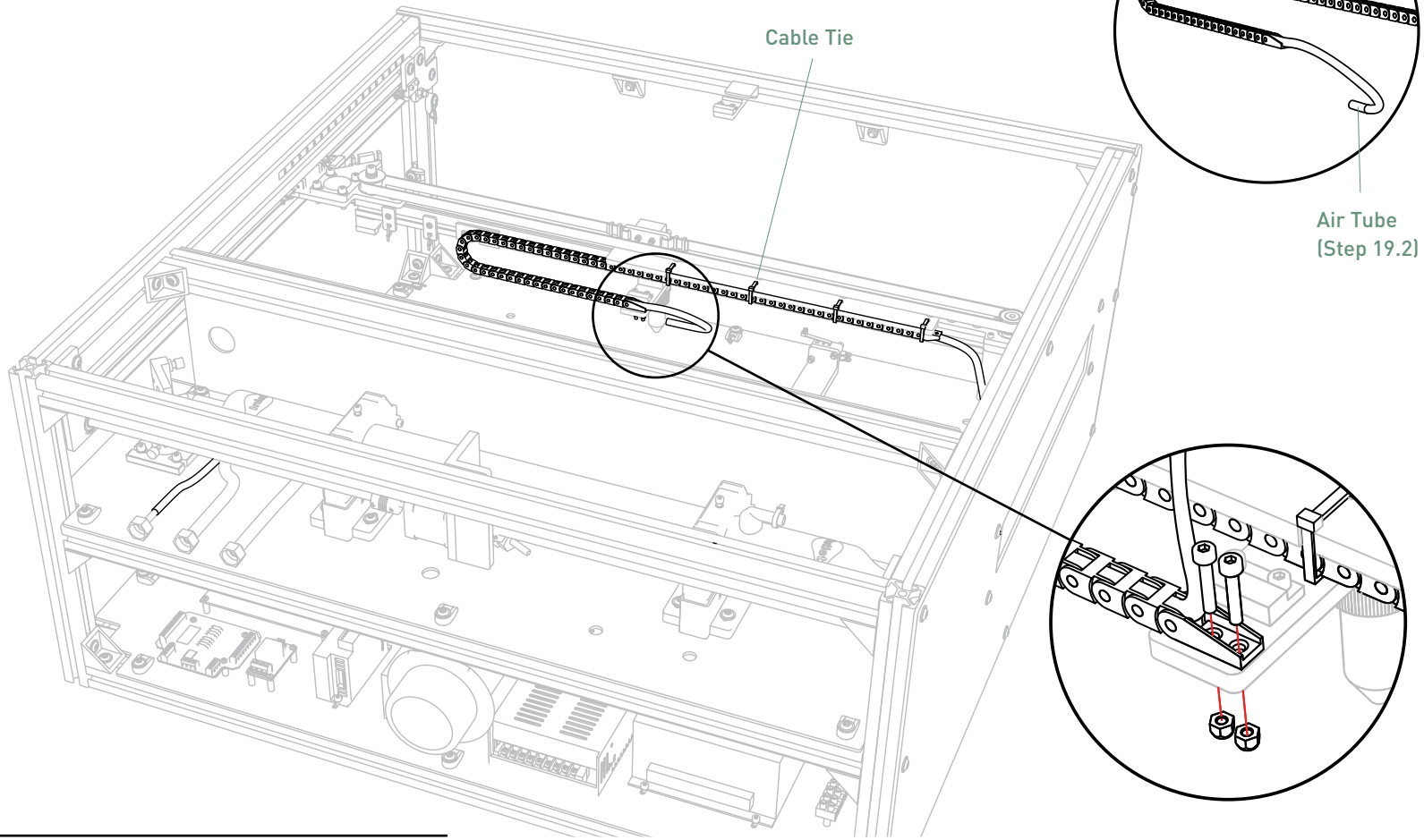
2x C-screw M3-12

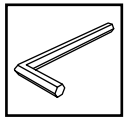


2x Lock-nut M3

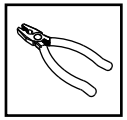
R77. Remove the excess segments of the Chain.
R78. Insert the Air Tube in the Chain.
R79. Make sure the lengh of the tube is good for the movements of the X-Axis and cut the excess.

H2. How to use Lock Nuts? p.9
H3. How to use cable ties? p.9





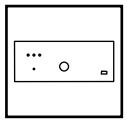
1x Allen Key 3
1x Allen Key 5



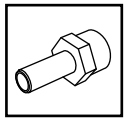
1x Small plier **or**
1x Wrench 10

STEP 21.1 PREPARING BACK PANEL - CONNECTORS

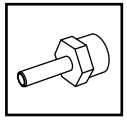
Step 21/33 15 min



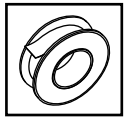
1x Back Panel



2x Water Connector Outside



1x Air Connector Outside

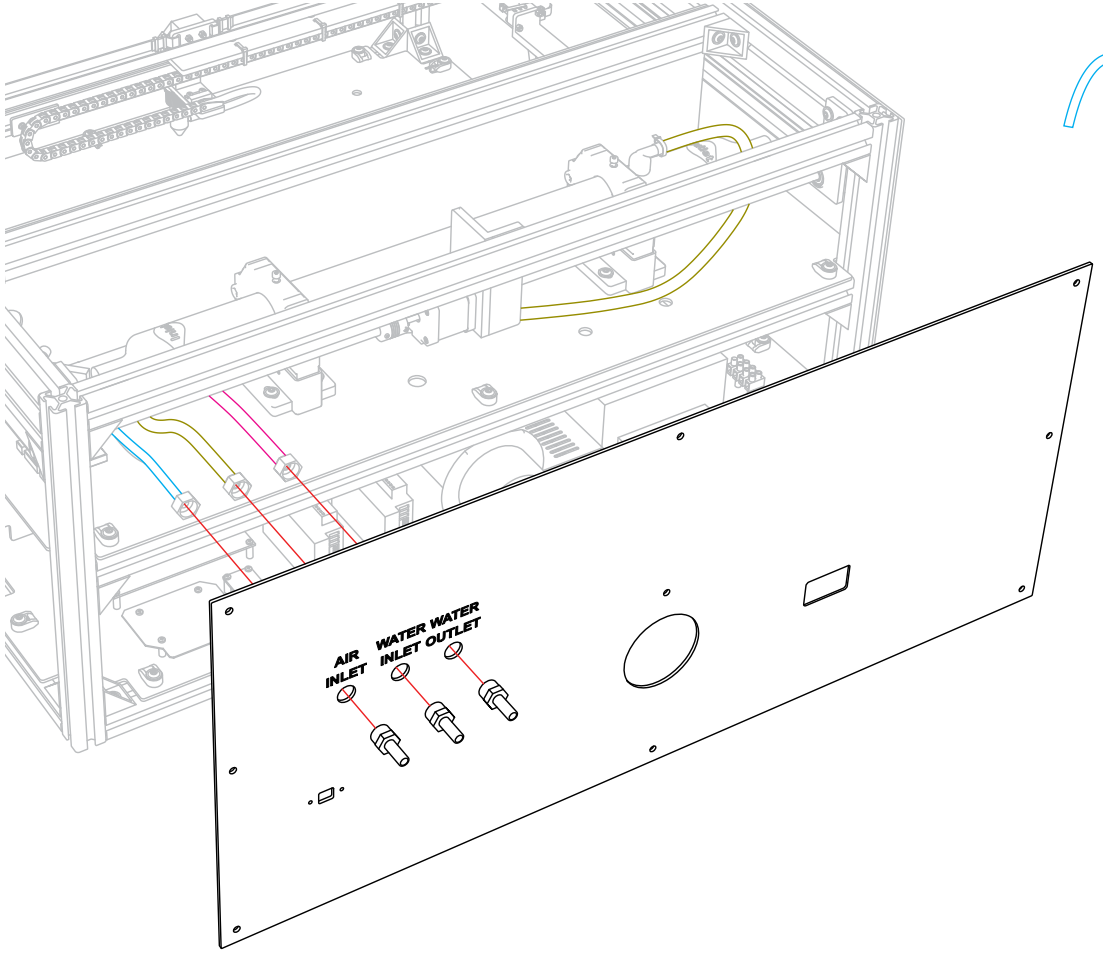


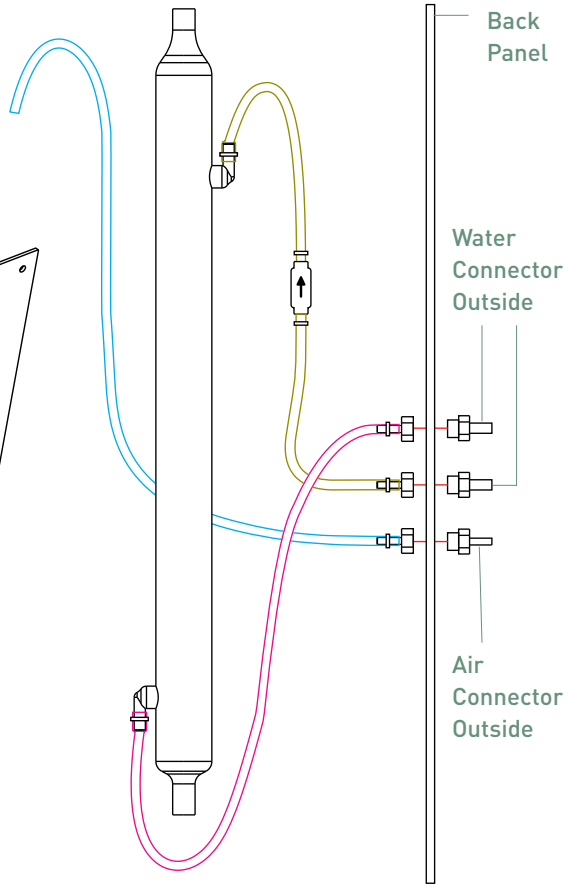
1x Teflon Tape

R80. Remove the protective foils of the panel.

R81. Use the Teflon tape on the connectors

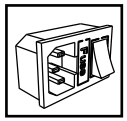
H7. How to use Teflon tape? p.12



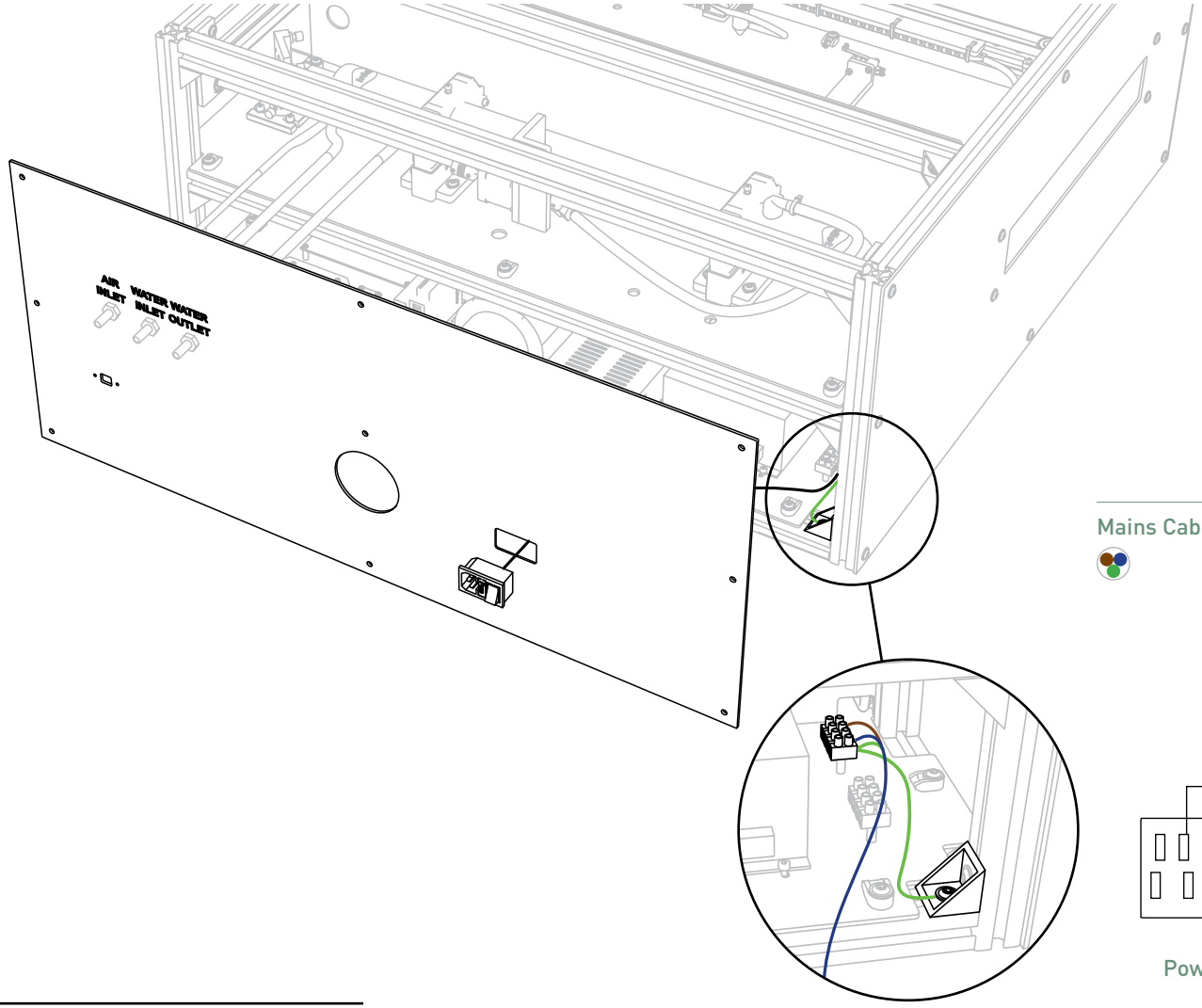


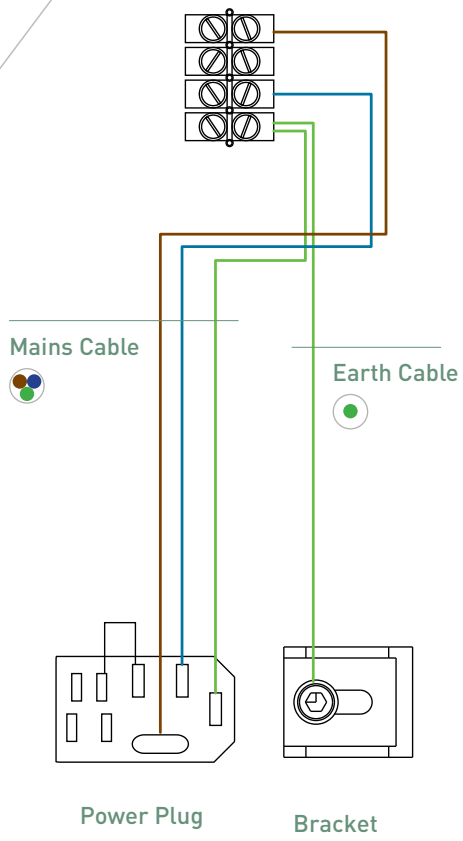
STEP 21.2 PREPARING BACK PANEL - POWER PLUG

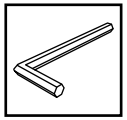
Step 21/33 30 min



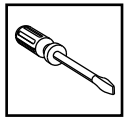
1x Power Plug +
Mains Cable +
Earth Cable







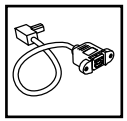
1x Allen Key 1.5
1x Allen Key 3
1x Allen Key 5



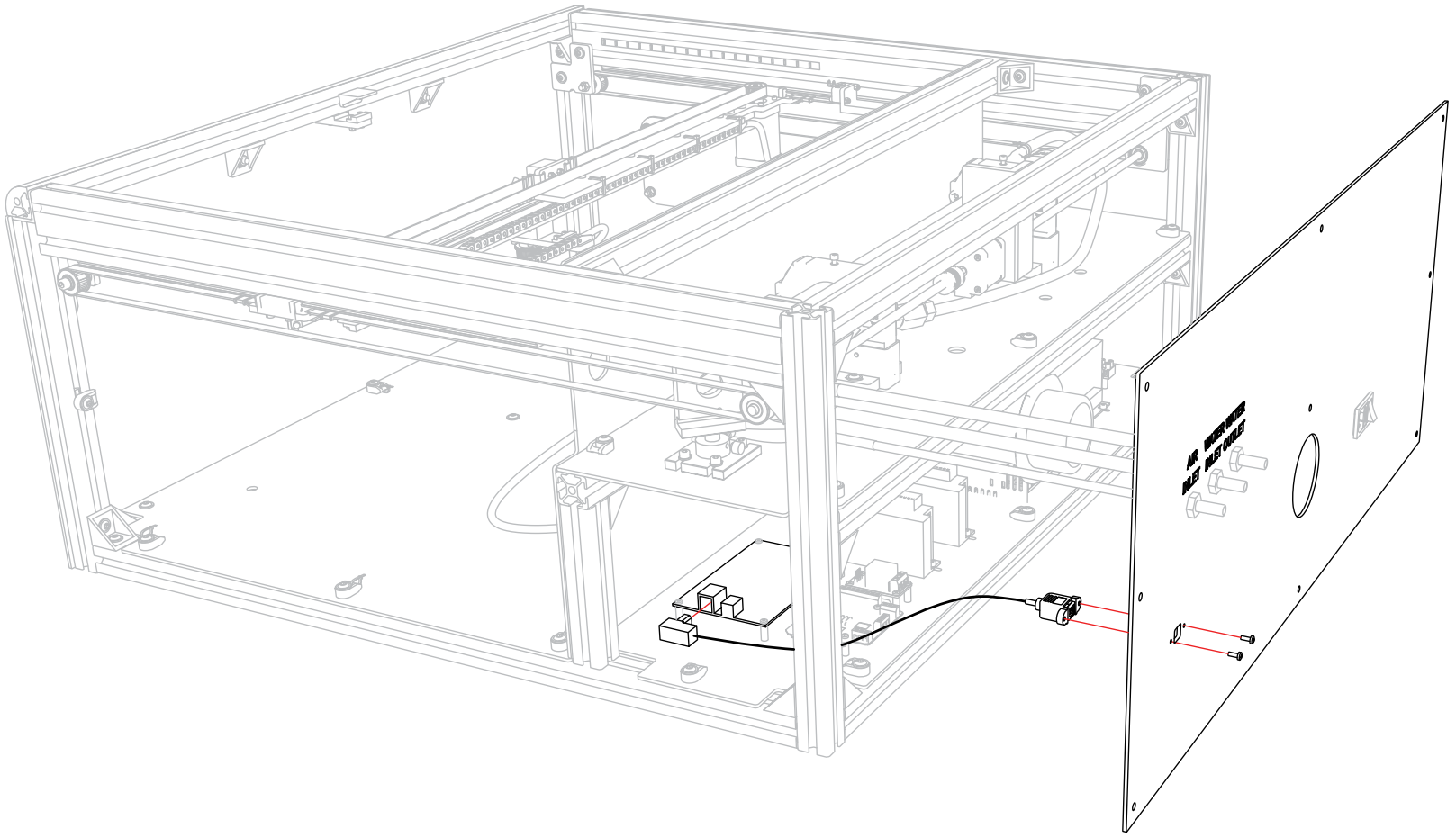
1x Screwdriver
slotted small

STEP 21.3 PREPARING BACK PANEL - USB

Step 21/33 15 min



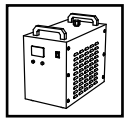
1x USB Cable Inside



1x Screwdriver
Phillips

STEP 22. CONNECTING THE CHILLER

Step 22/33 20 min



1x Water Chiller

2x Water Tube Outside

4x Cable Ties

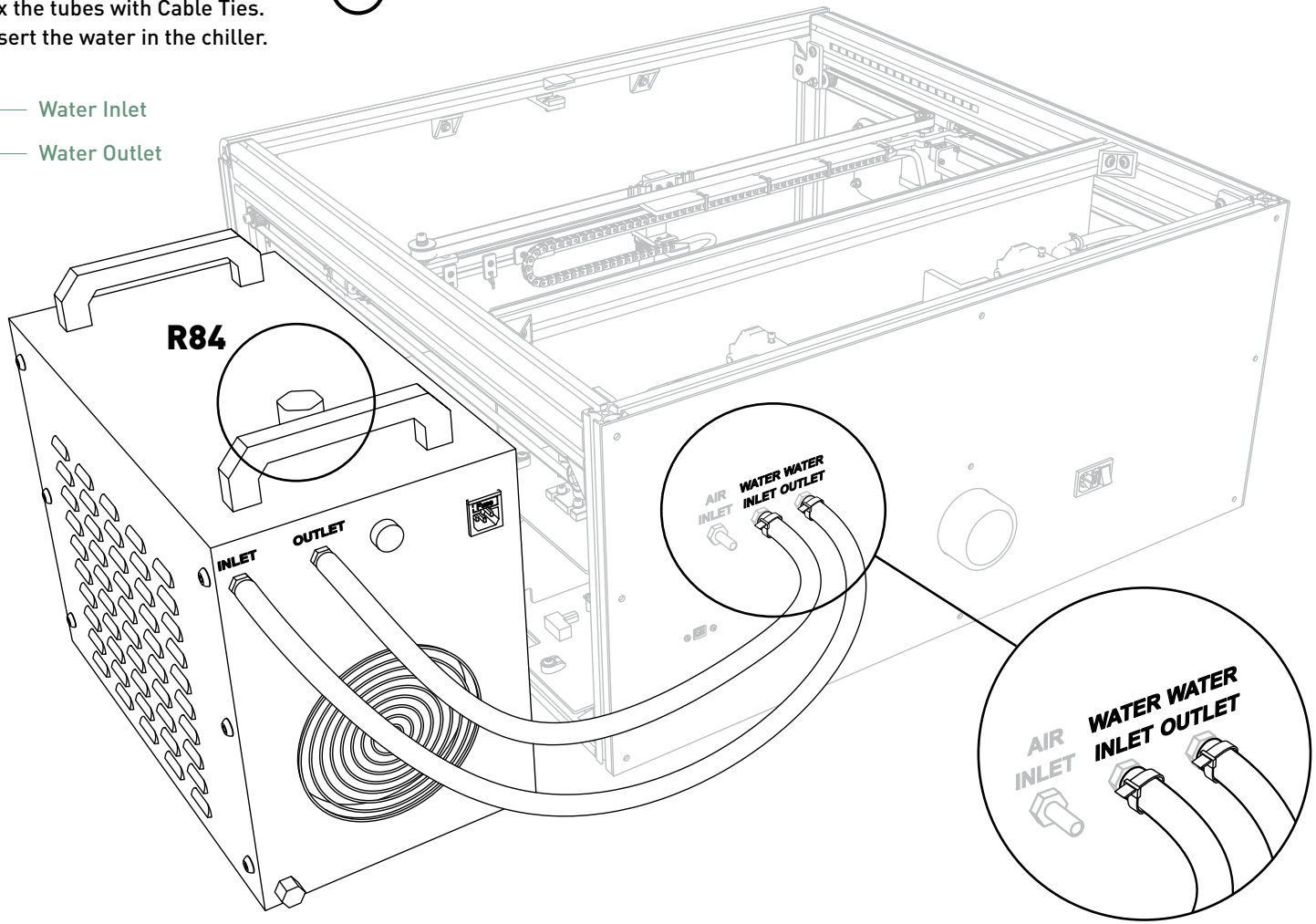
1x 5L distilled water (not included)

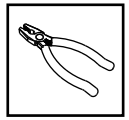
R82. Connect inlet to outlet.
R83. Fix the tubes with Cable Ties.
R84. Insert the water in the chiller.

H7. How to use Teflon tape? p.12

Chiller Outlet —— Water Inlet

Chiller Intlet —— Water Outlet



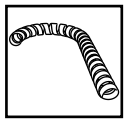


1x Small plier

1x Wrench 19

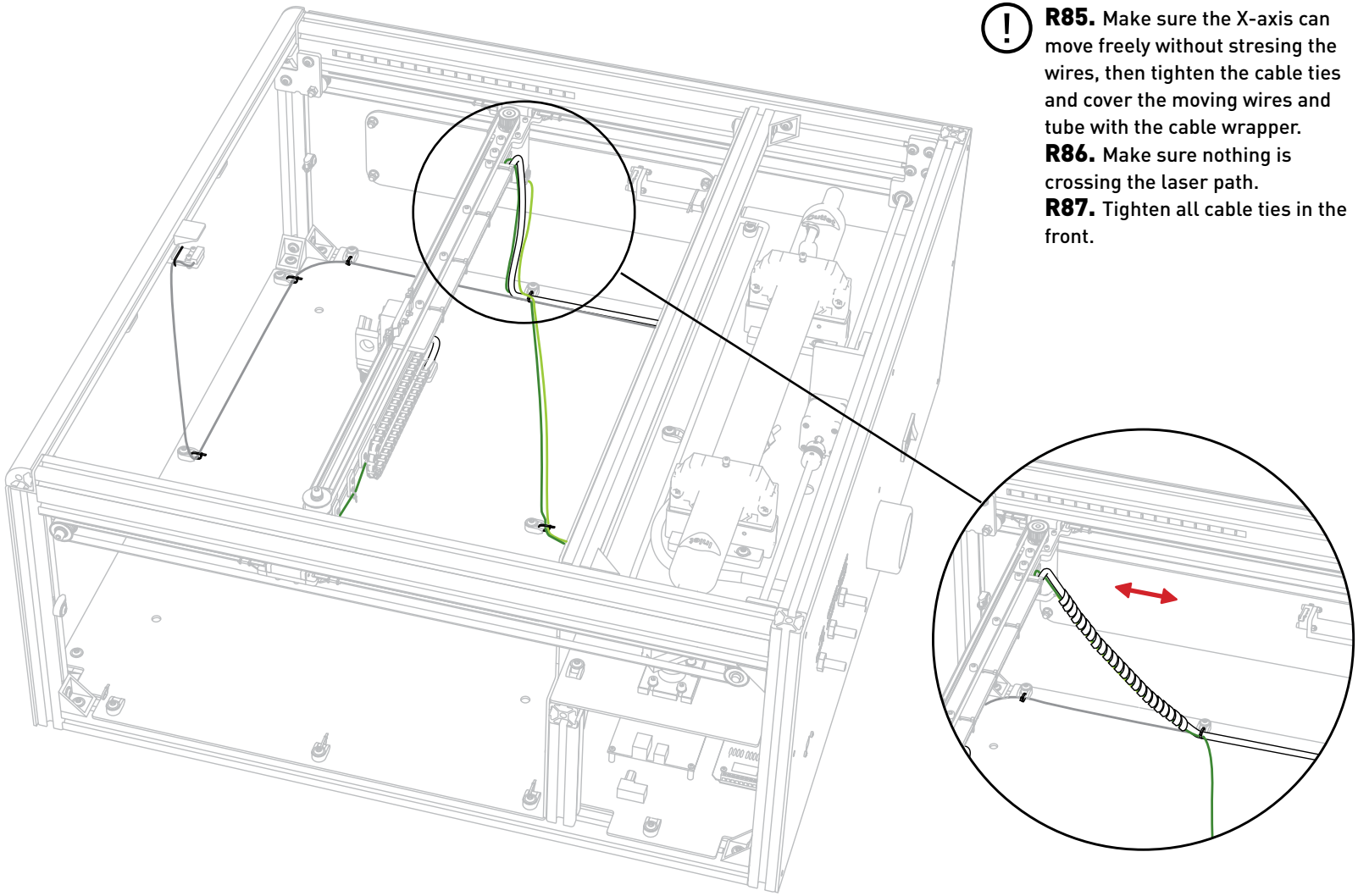
STEP 23.1 ORGANIZING THE WIRES - FRONT

Step 23/33 20 min

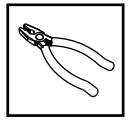


1x Cable Wrapper

6x Cable Tie



R85. Make sure the X-axis can move freely without stresing 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.



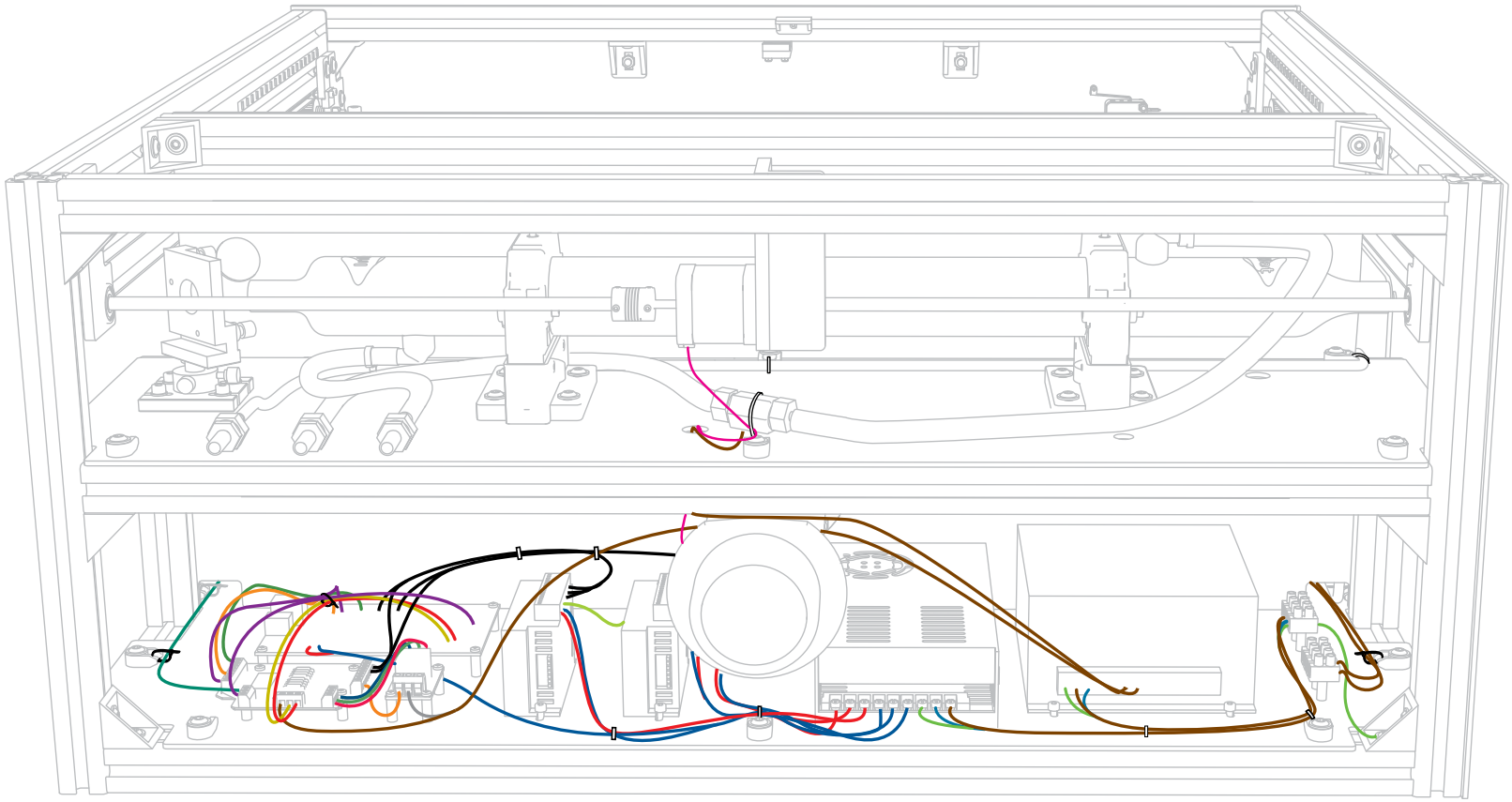
1x Small plier

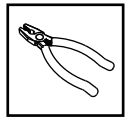
STEP 23.2 ORGANIZING THE WIRES - BACK

Step 23/33 15 min

10x Cable Ties

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



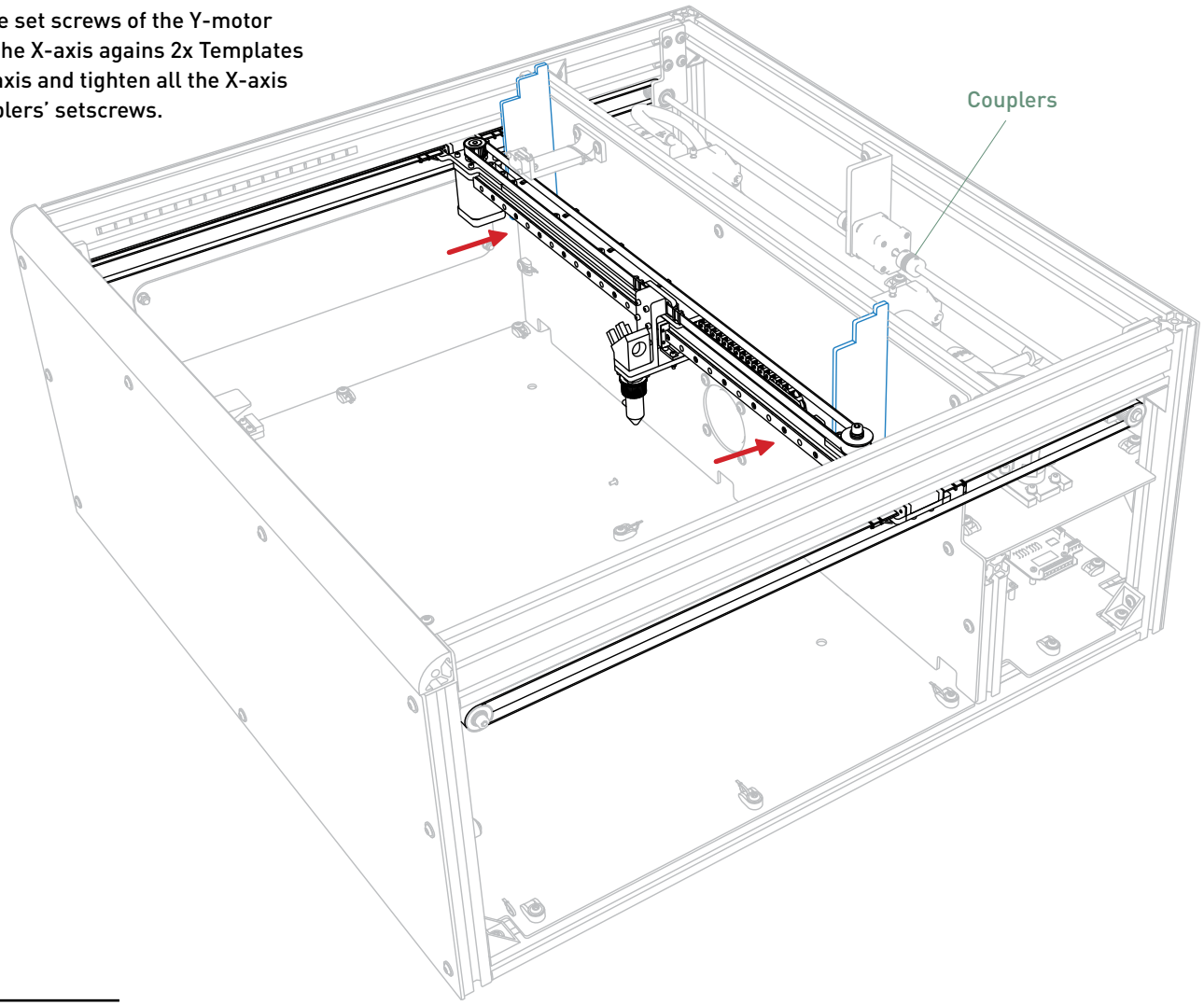


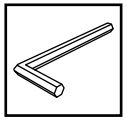
1x Small plier

STEP 24. ALIGNING THE Y-AXIS

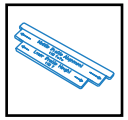
Step 24/33 15 min

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





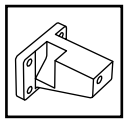
1x Allen Key 1.5
1x Allen Key 3
1x Allen Key 5



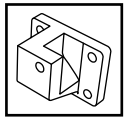
2x Template 2

STEP 25. INSTALLING THE PISTONS

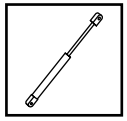
Step 25/33 40 min



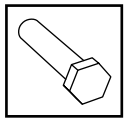
1x Piston Support Left



1x Piston Support Right



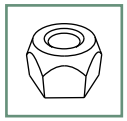
1x Window Piston Left
1x Window Piston Right



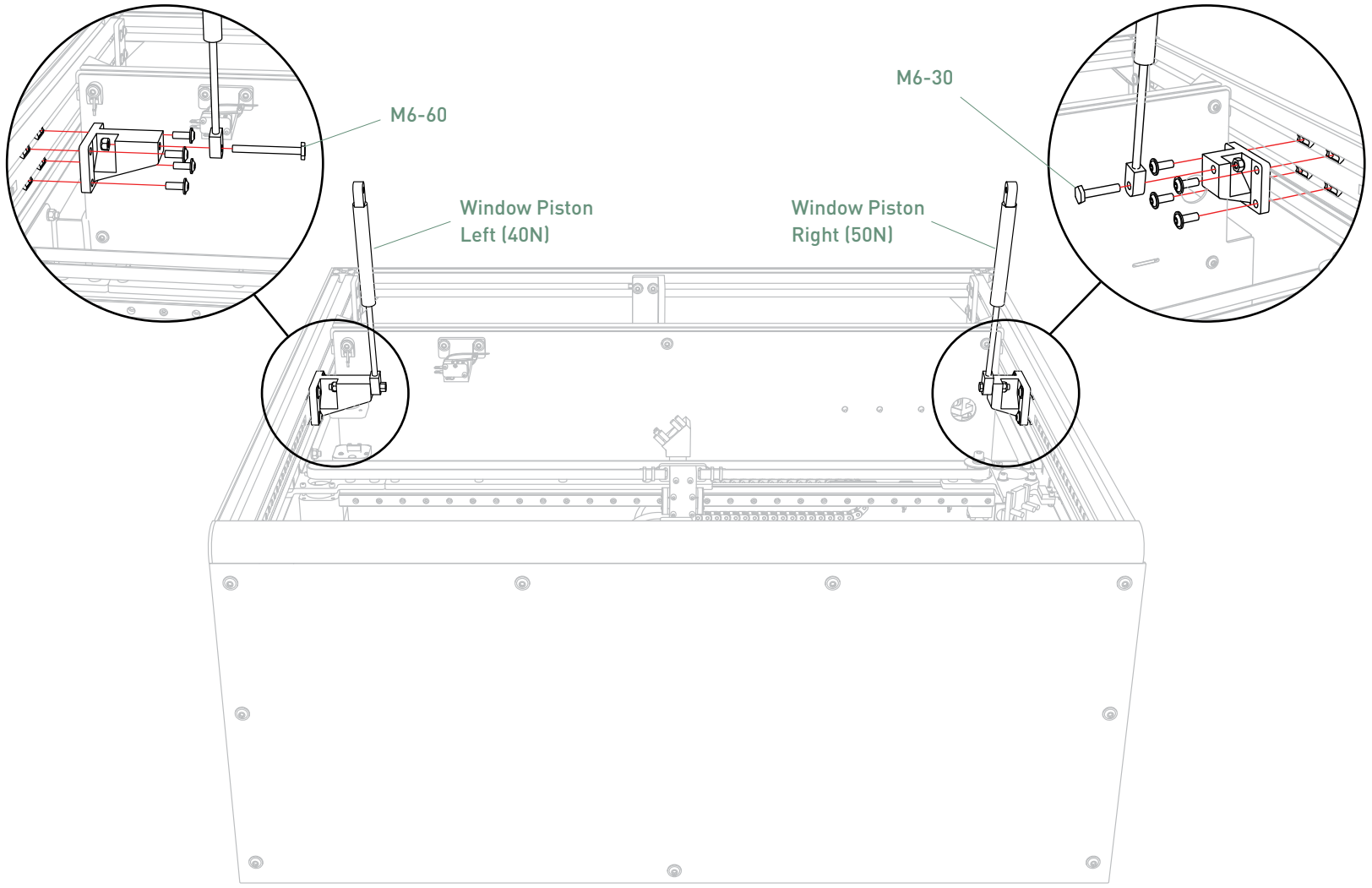
1x H-screw M6-30
1x H-screw M6-60

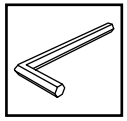
8x B-screw M6-16

8x T-nut M6

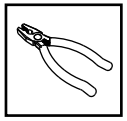


2x Lock Nut M6





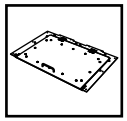
1x Allen Key 3
1x Allen Key 5



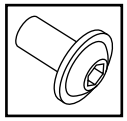
1x Small plier **or**
1x Wrench 10

STEP 26.1 INSTALLING TOP PANELS SET

Step 26/33 20 min

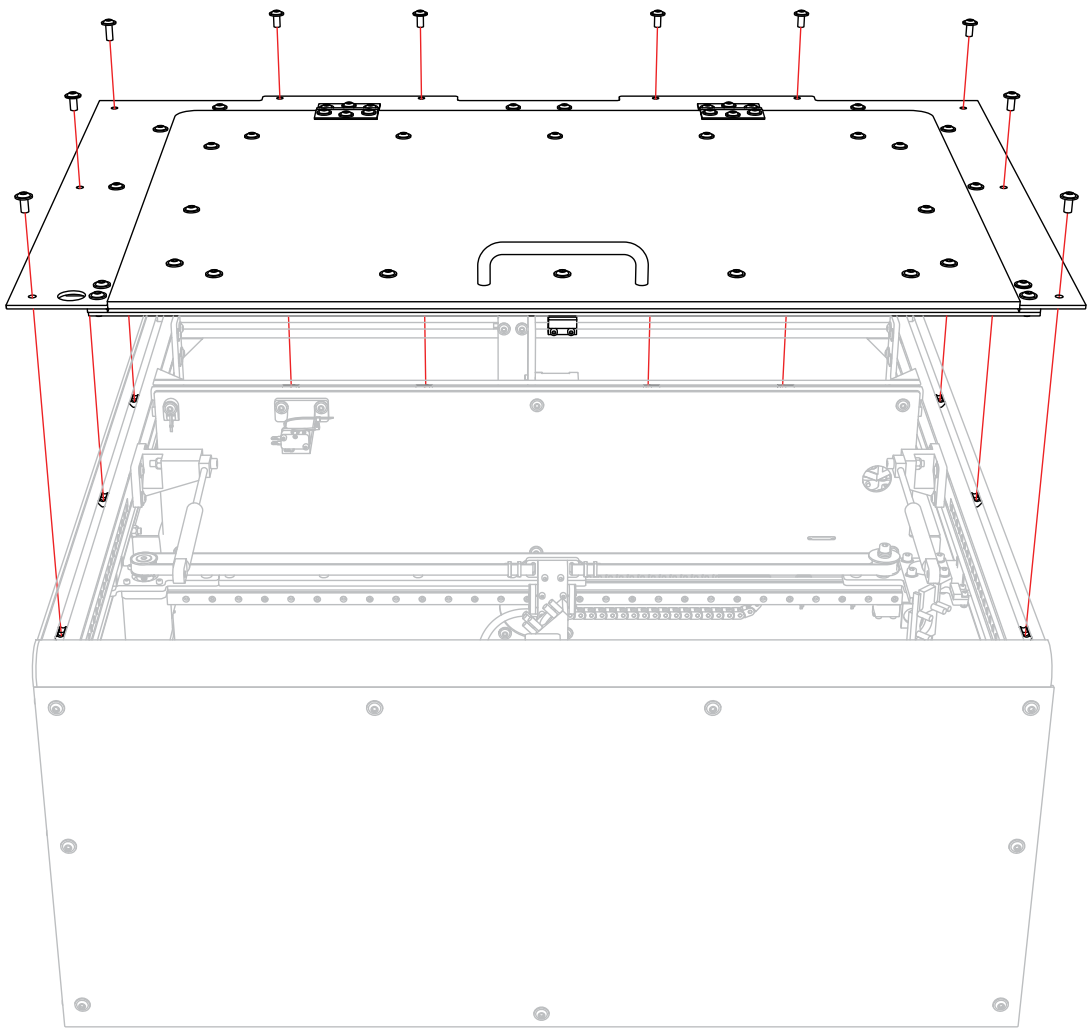


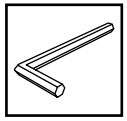
1x Prepared Top Panels and Window (Step 18)



10x B-screw M6-12

10x T-nut M6

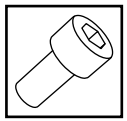




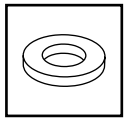
1x Allen Key 1.5
1x Allen Key 5

STEP 26.2 FINALIZING THE WINDOW

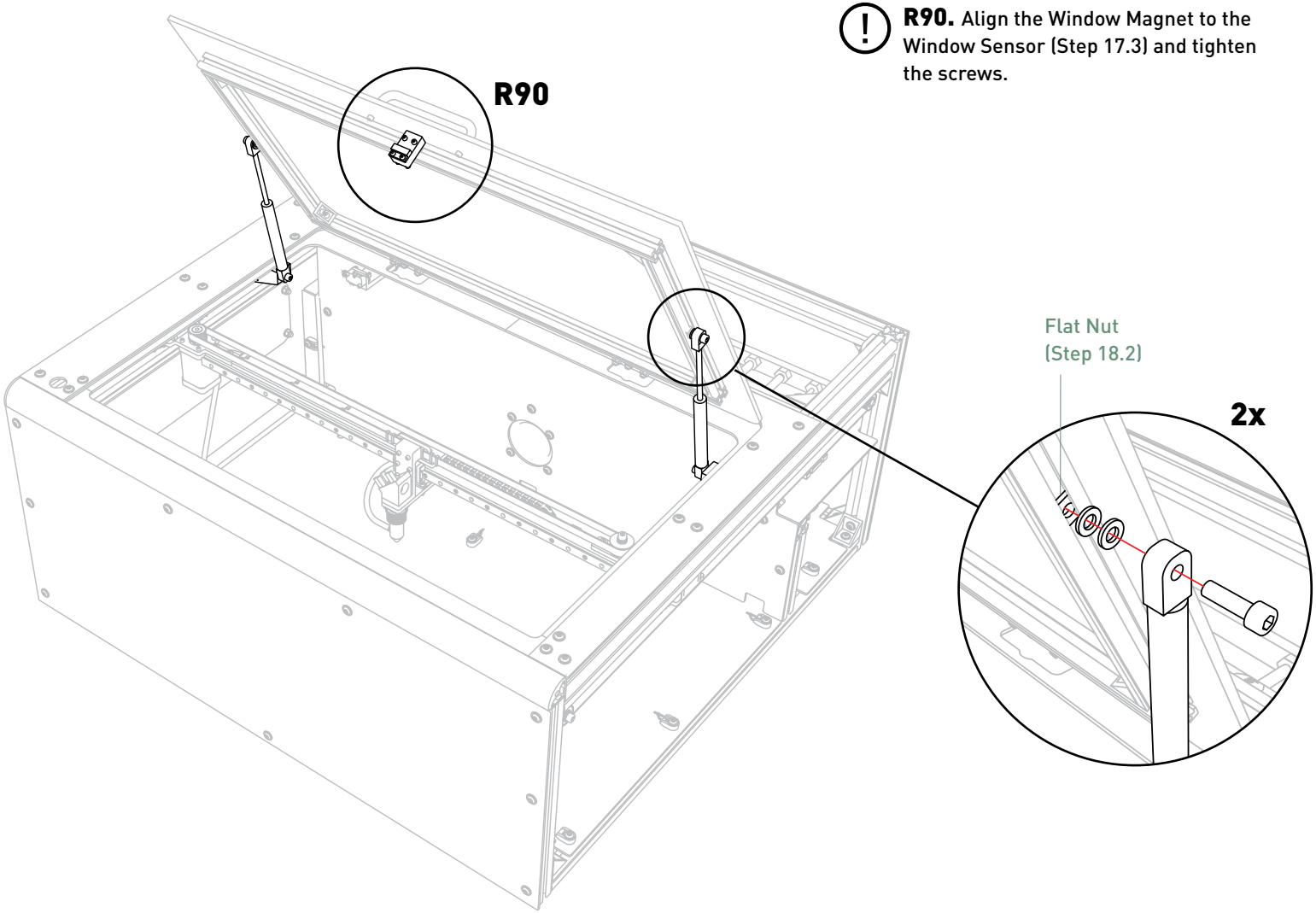
Step 26/33 20 min



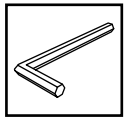
2x C-screw M6-20



4x Washer M6



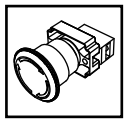
R90. Align the Window Magnet to the Window Sensor (Step 17.3) and tighten the screws.



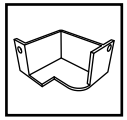
1x Allen Key 5

STEP 26.3 INSTALLING THE EMERGENCY BUTTON

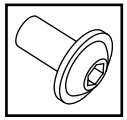
Step 26/33 10 min



1x Emergency Button (with screws in)



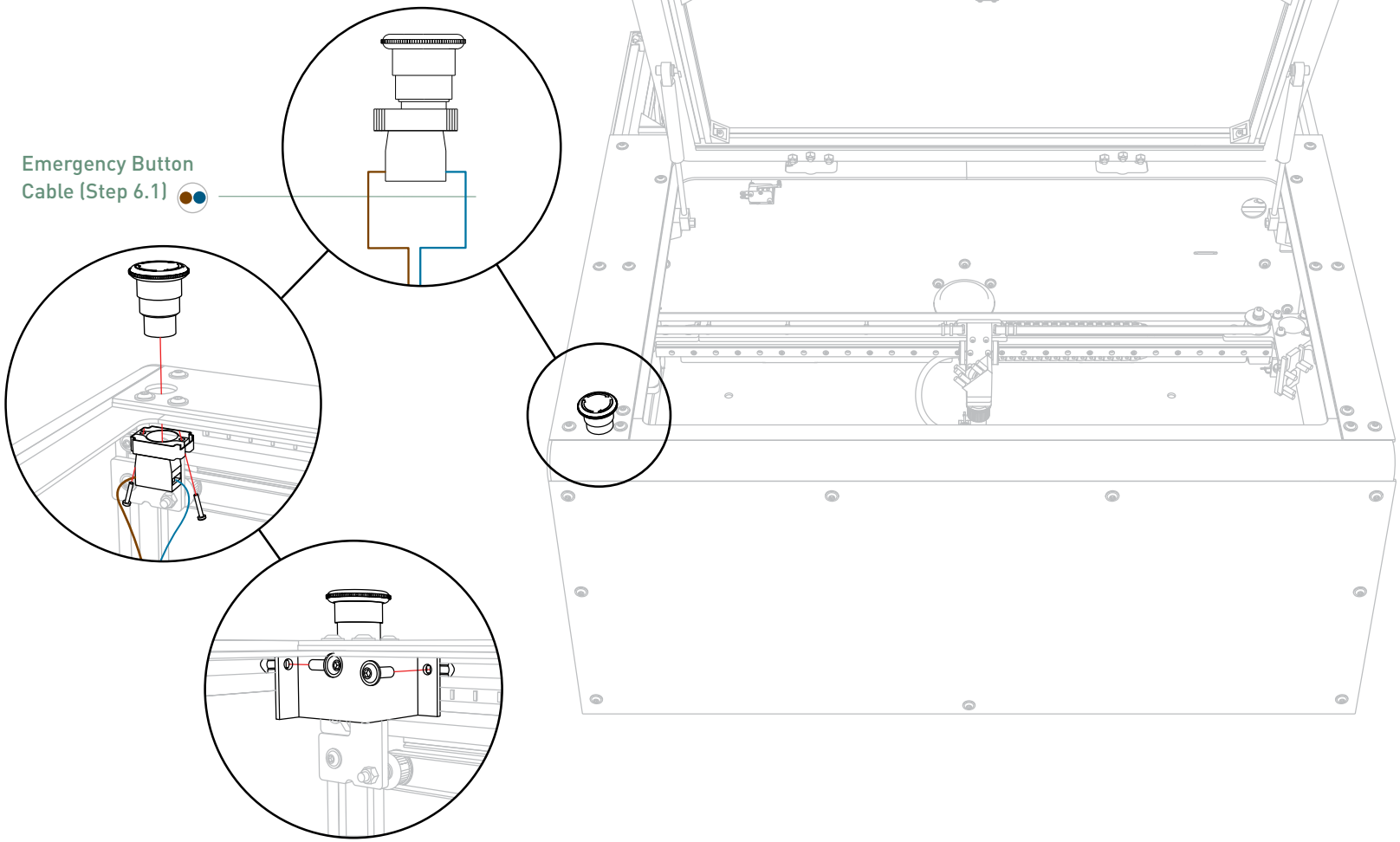
1x Cover

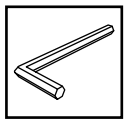


2x B-screw M6-12

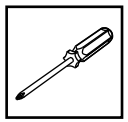
2x T-nut M6

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





1x Allen Key 5



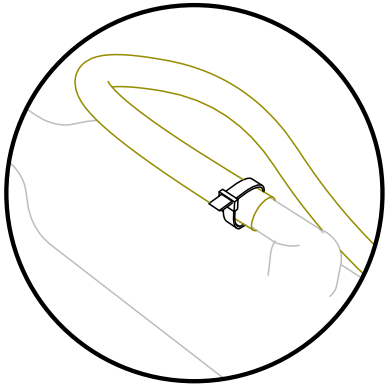
1x Screwdriver Phillips

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 fron the water connections. If it leaks, redo the connection.



Checking the closures

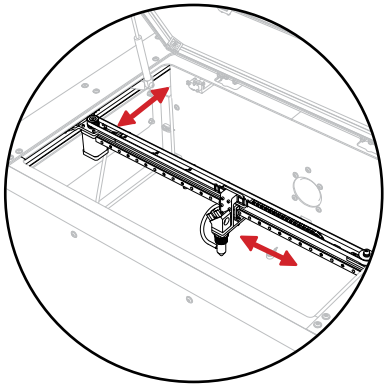
- Make sure there is no open gap in the housing, checking inbetween all the panels and frame.
- Tighten all screws except the ones fixing the mirror holders.
- Check if the window is closing properly and well aligned to the top panel set.

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 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 equaly.

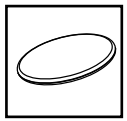


Checking the electronics

- 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

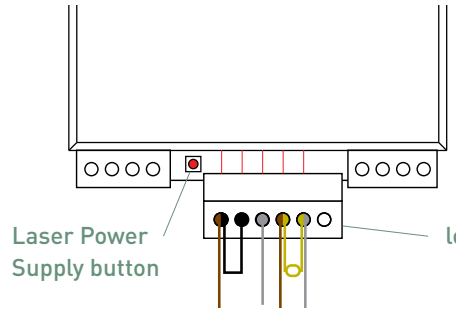
Step 28/33 10 min

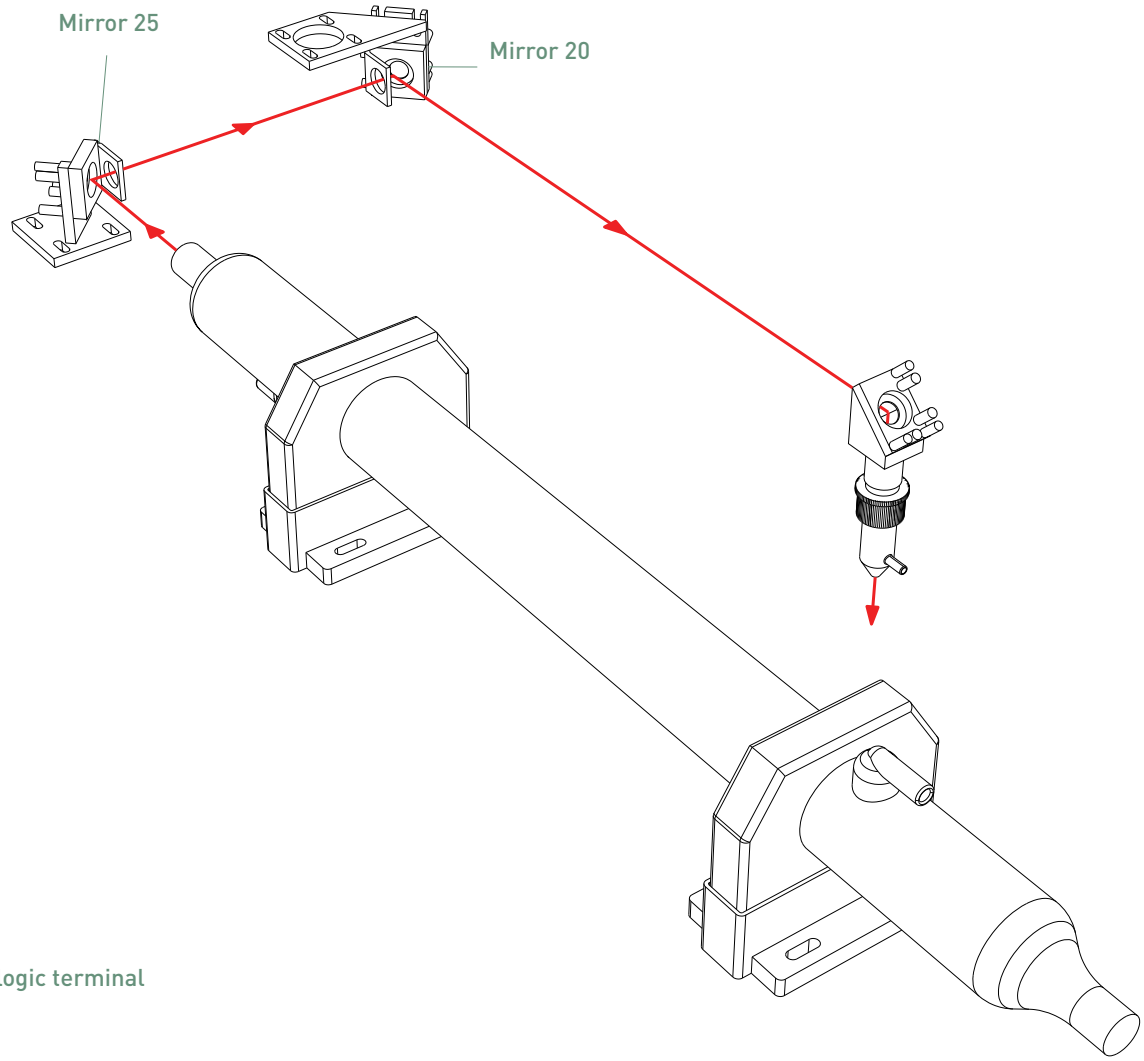


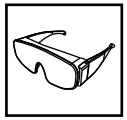
1x Mirror 20
1x Mirror 25

R92. Insert the mirrors in the Mirror Holders carefully.
R93. Wear clothes that cover most of the body and safety googles 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.

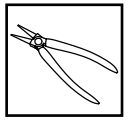
H8. How to hold the mirror? p.12
H9. How to insert the mirror? p.13



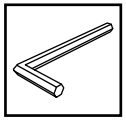




1x Safety Goggles



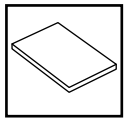
1x Needle Nose Pliers



1x Allen Key 2.5

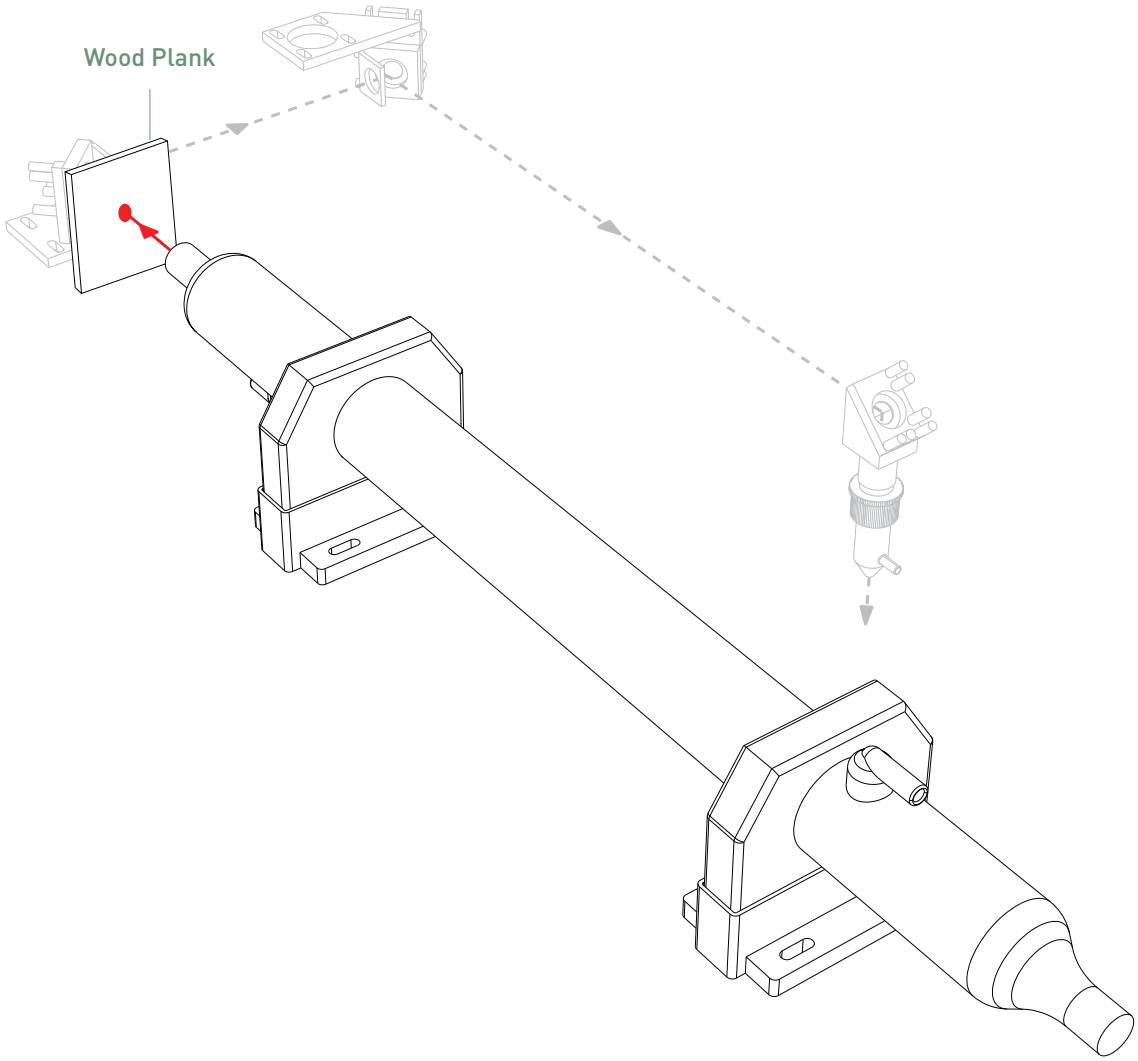
STEP 28.2 LASER TEST AND LASER TUBE ALIGNMENT

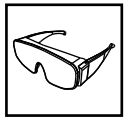
Step 28/33 10 min



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

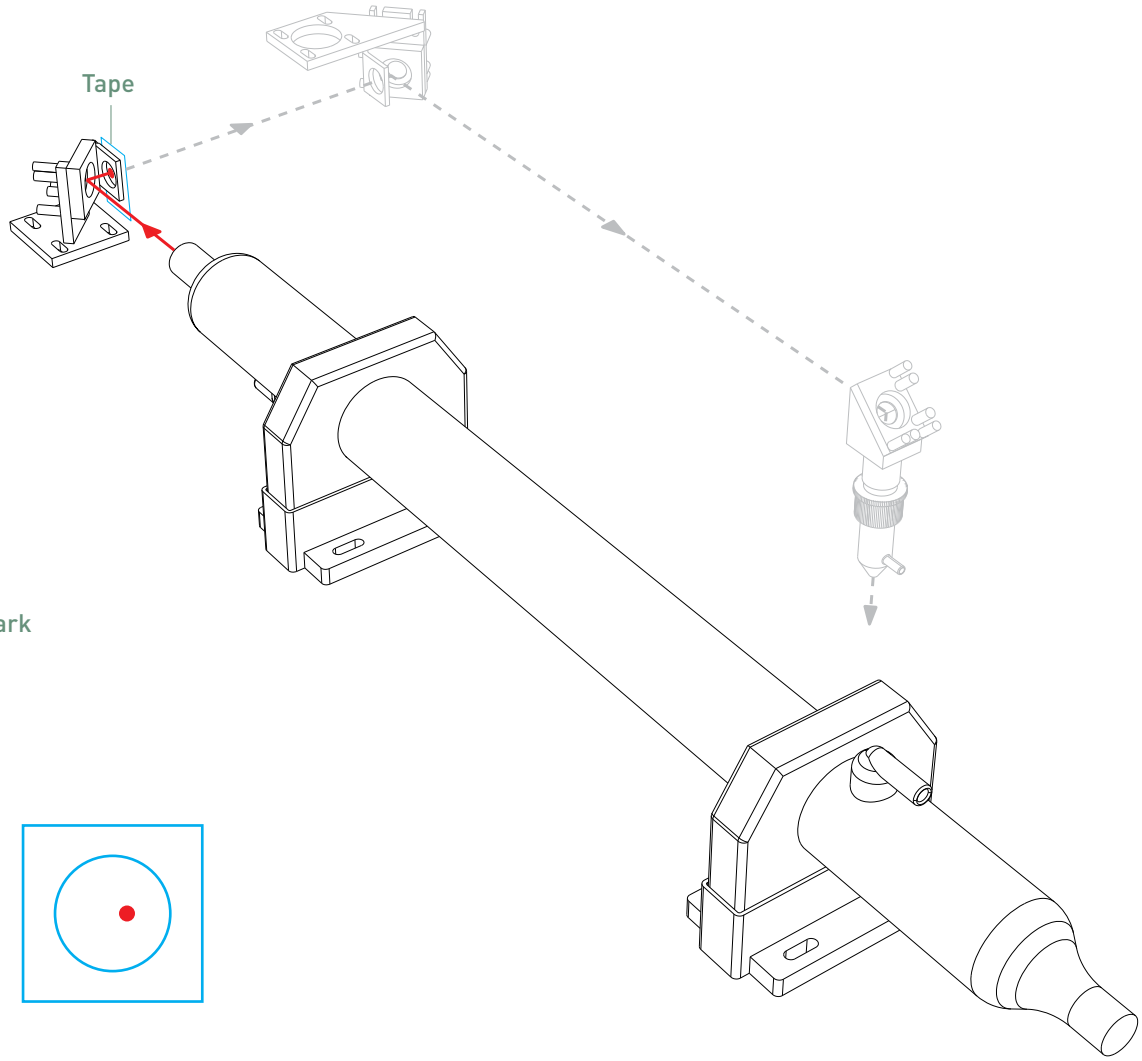
Step 28/33 20 min

1x Masking Tape

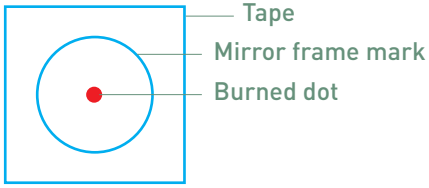
R104. Place the double layered tape on the outer frame of the first Mirror Holder. Press on the inner border of the frame to mark the tape with the frame shape.

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

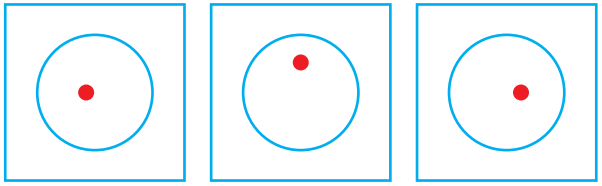
H10. How to calibrate the mirror angle? p.14

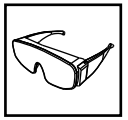


Correct result



Wrong results





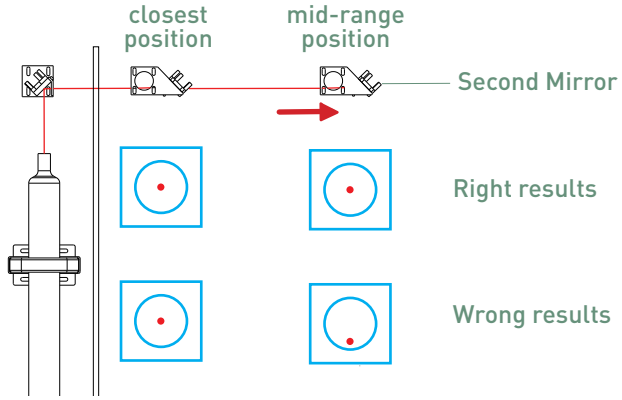
1x Safety Goggles

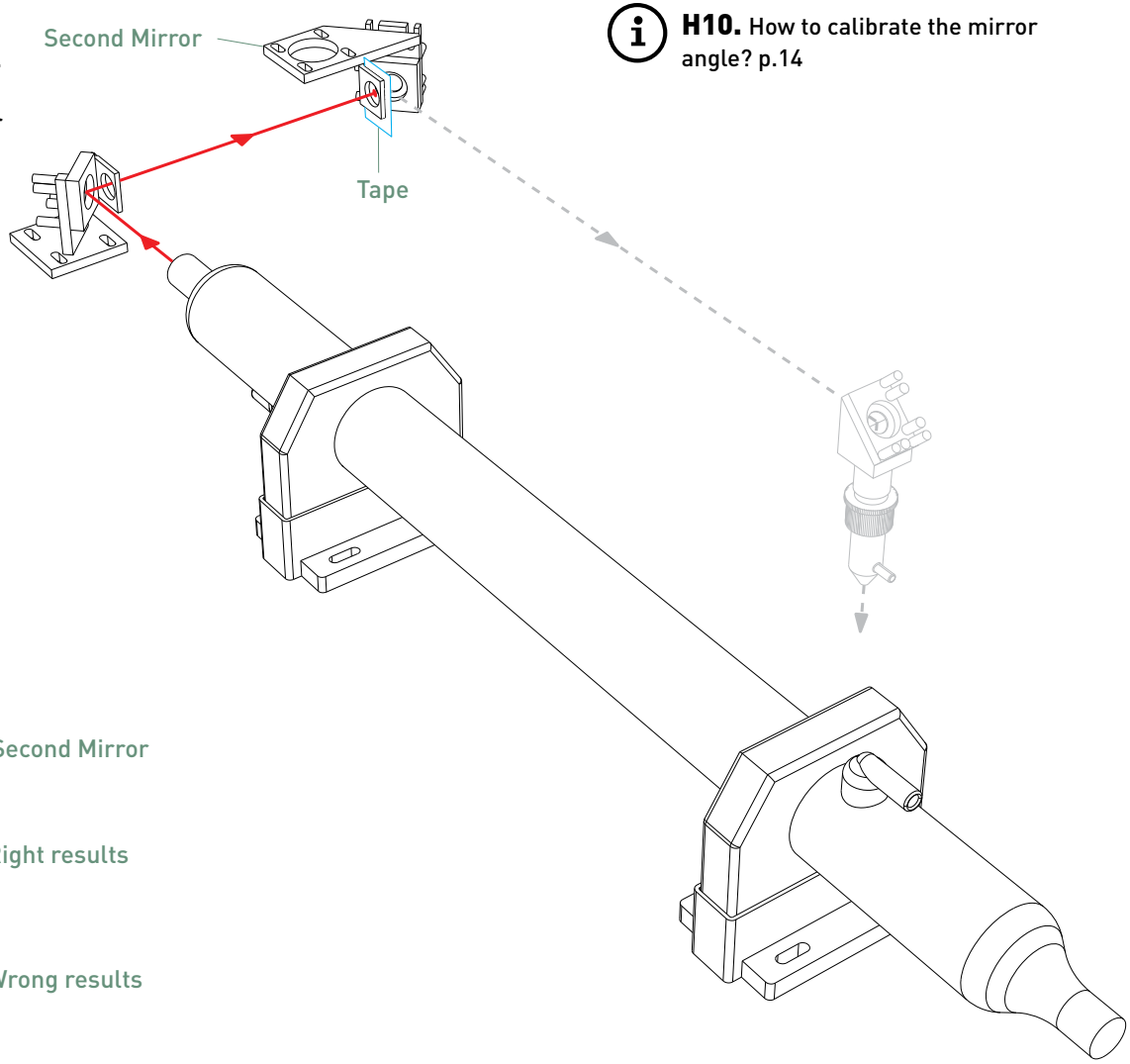
STEP 28.4 LASER CALIBRATION - SECOND MIRROR

Step 28/33 20 min

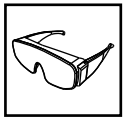
1x Masking Tape

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

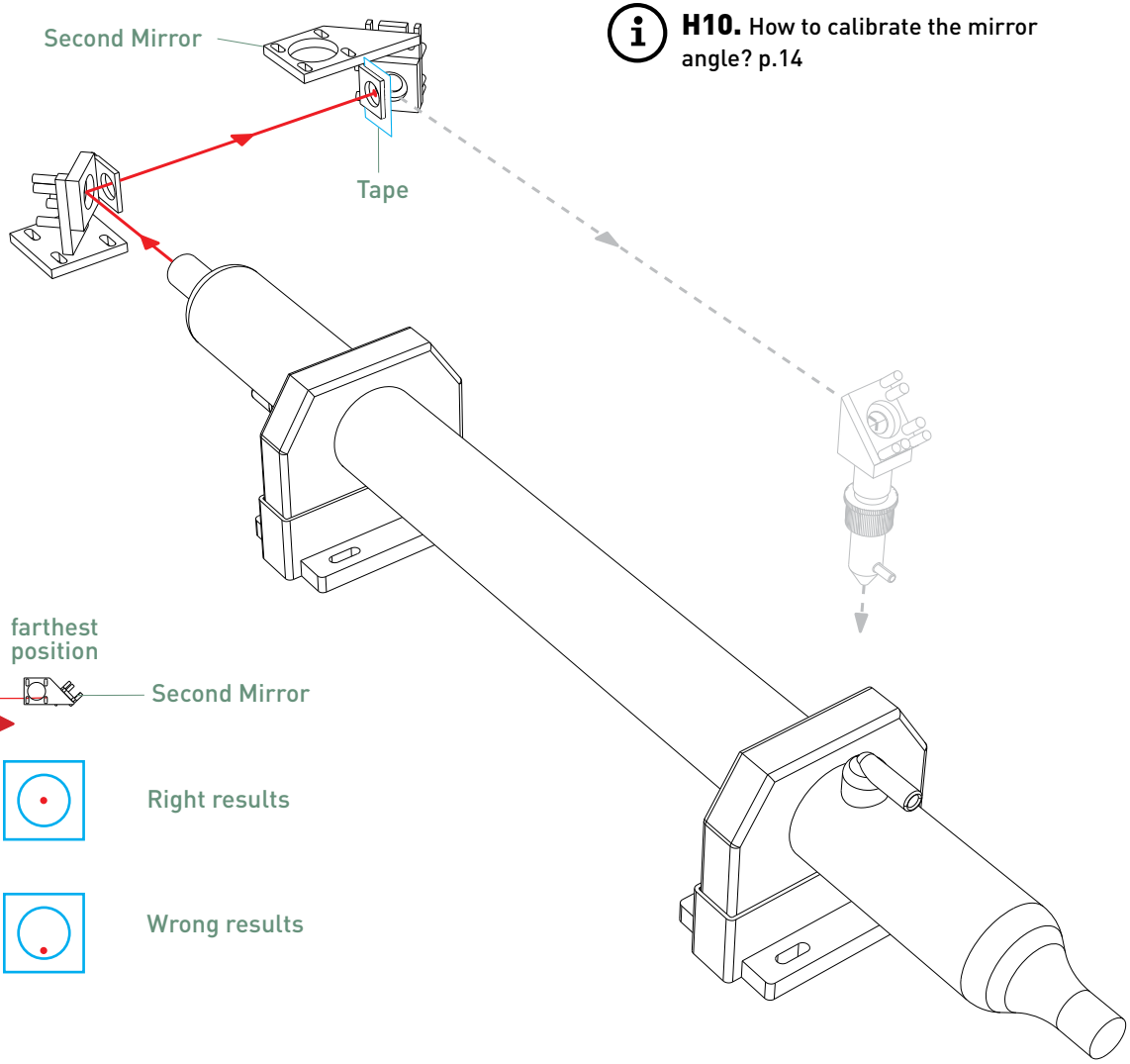
STEP 28.5 LASER CALIBRATION - SECOND MIRROR

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

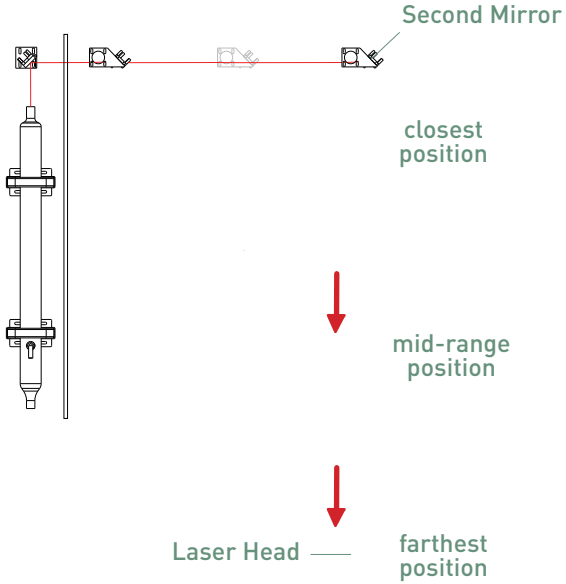
Step 28/33 30 min

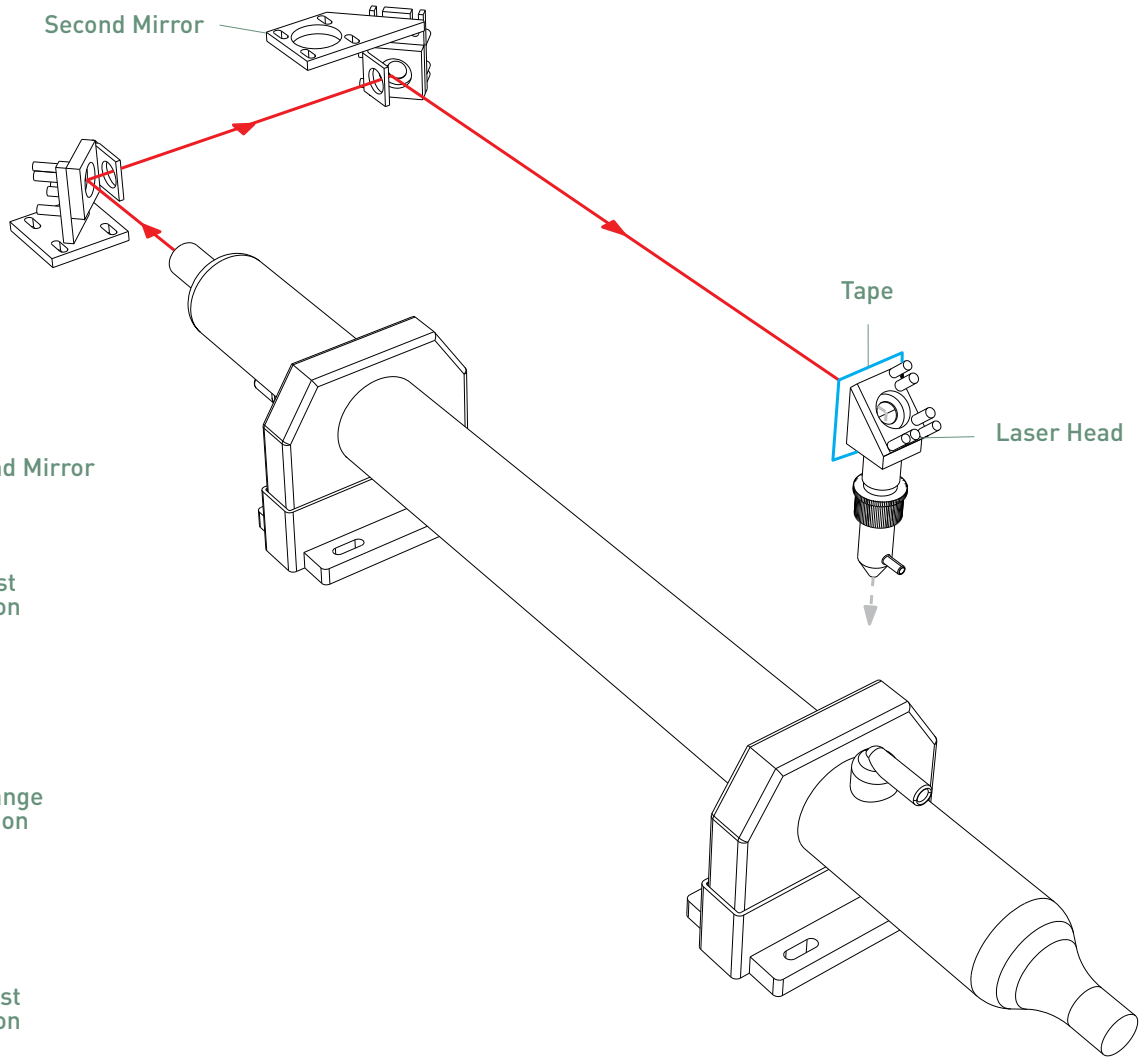
1x Masking Tape

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

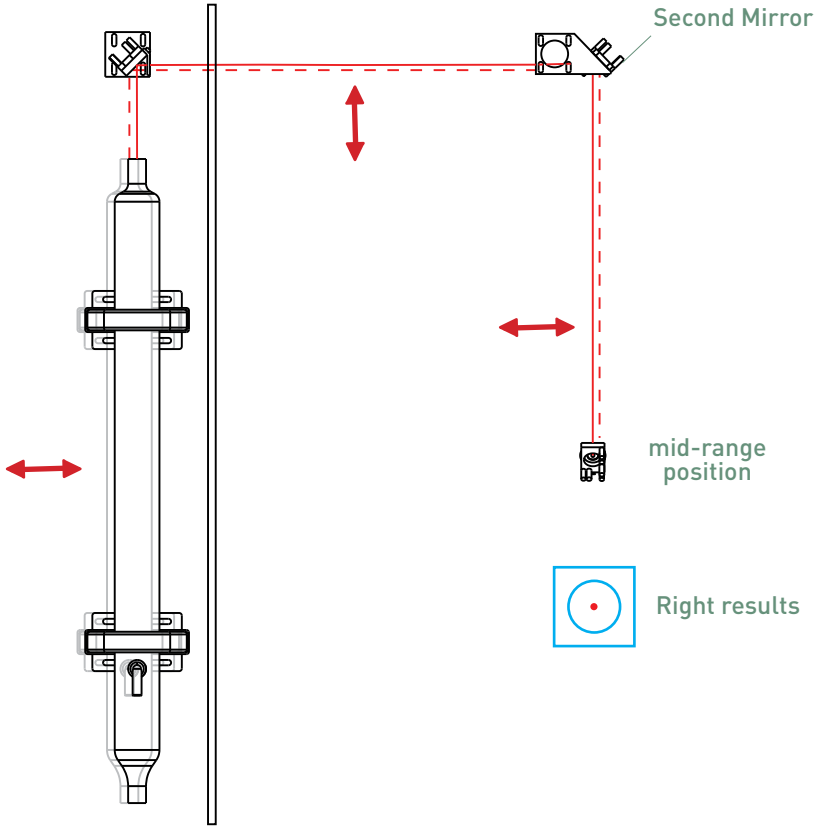
R114. Now that the beam is aligned and perpendicular, it is necessary to centralize the beam in the Laser Head.

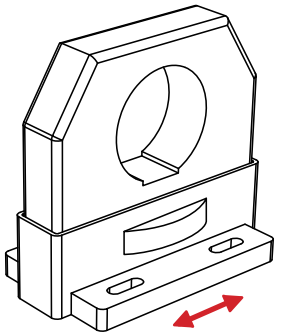
R115. To not lose the current alignement, tighten the nuts of the Mirror Holders and try to centralize the beam by moving the laser tube (move both holders equaly left or right, up or down)

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

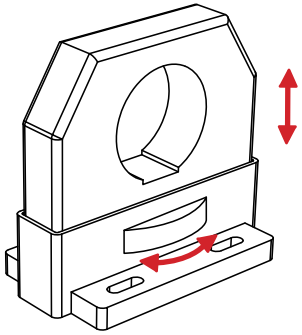
R117. After moving check if the beam is still aligned by performing steps 28.4, 28.4 and 28.6 again.

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

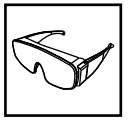




Move the Laser tube holder left or right to move the Laser Tube left or right.



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



1x Safety Goggles

STEP 28.8 LASER CALIBRATION - LASER HEAD

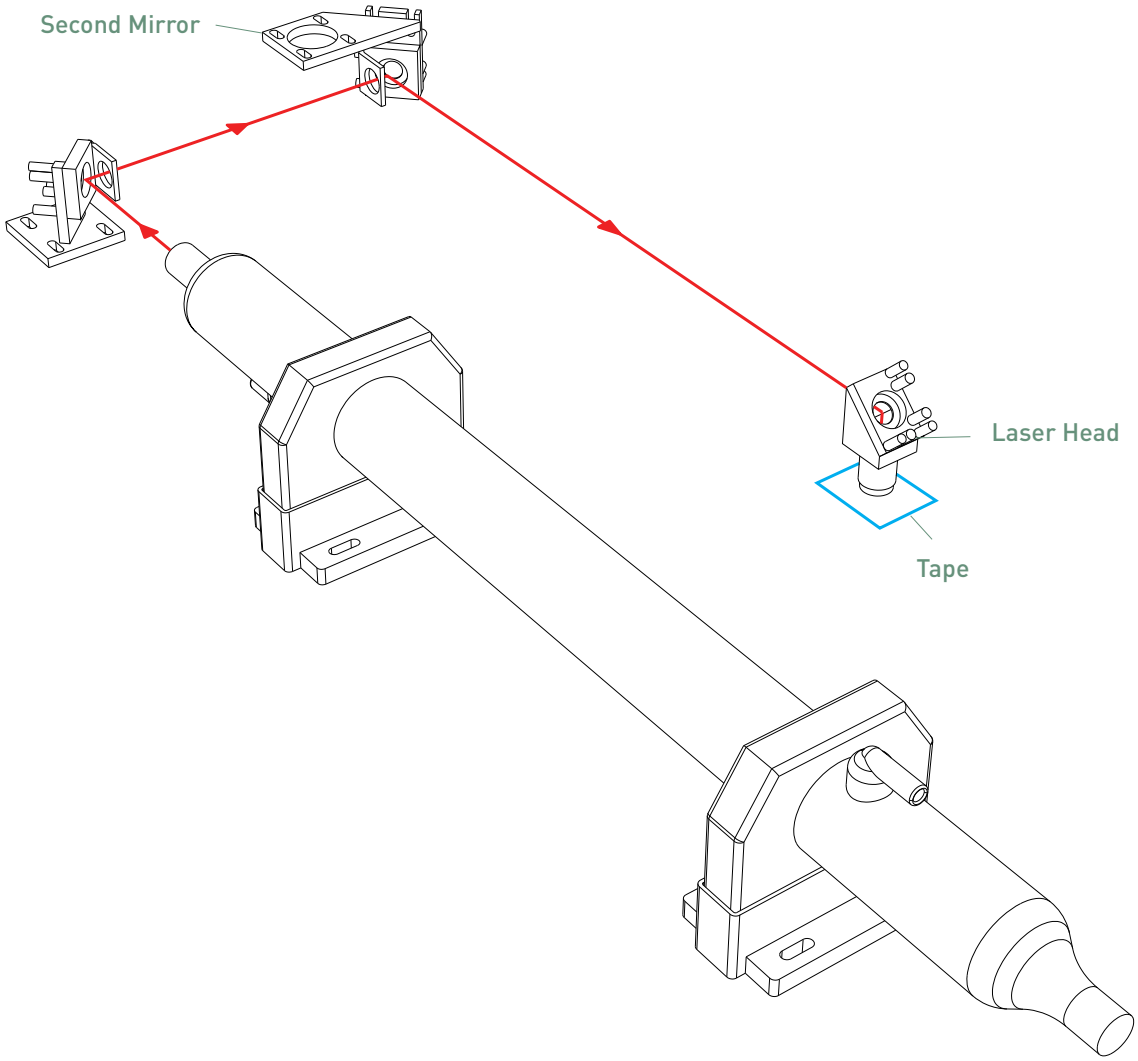
Step 28/33 20 min

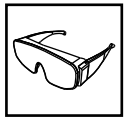
1x Masking Tape

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



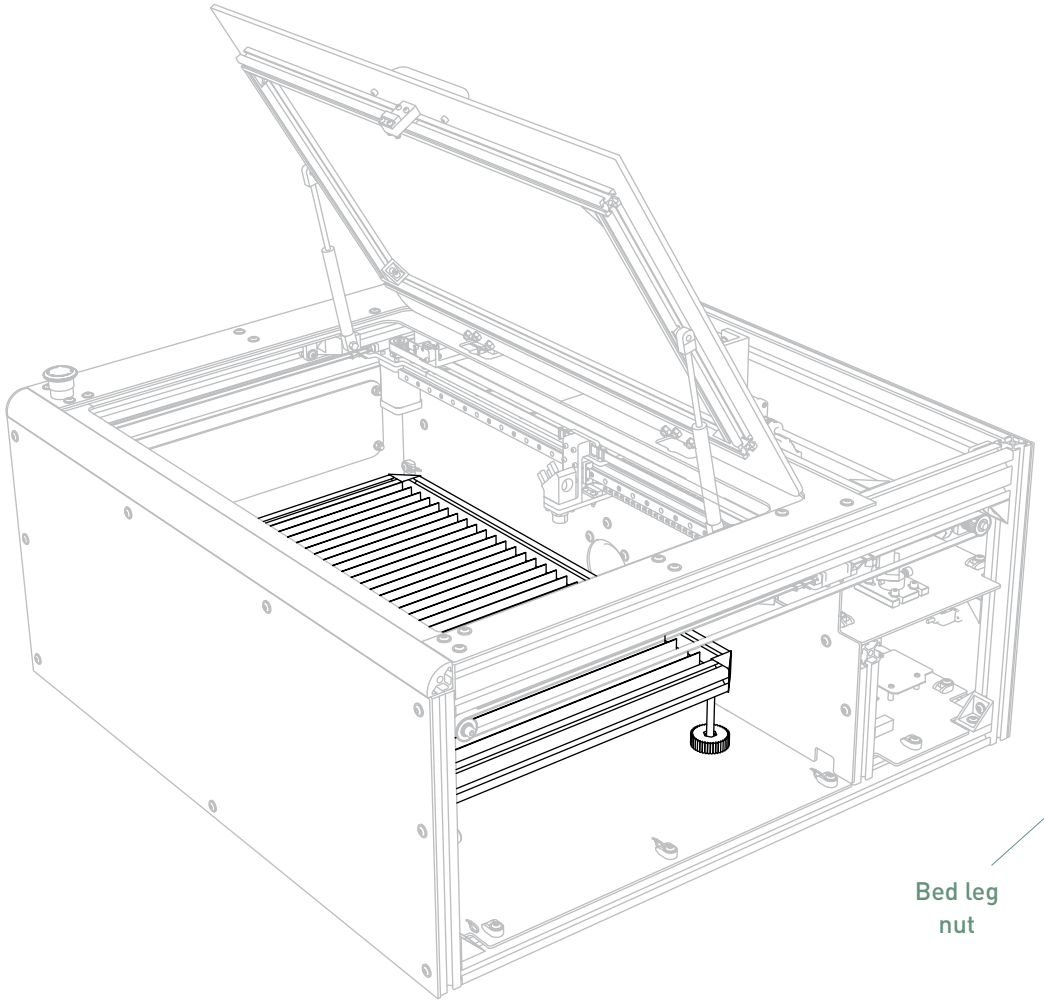


1x Safety Goggles

STEP 29. INSERTING THE BED

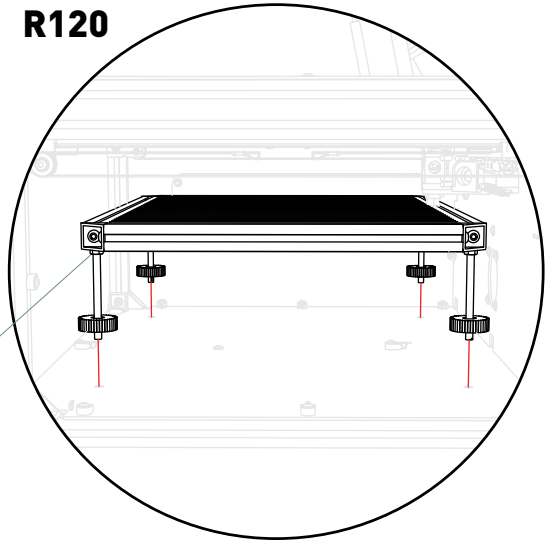
Step 29/33 5 min

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.

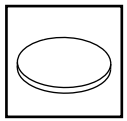
R120



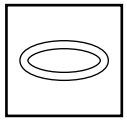
1x Wrench

STEP 30. INSERTING THE LENS

Step 30/33 10 min

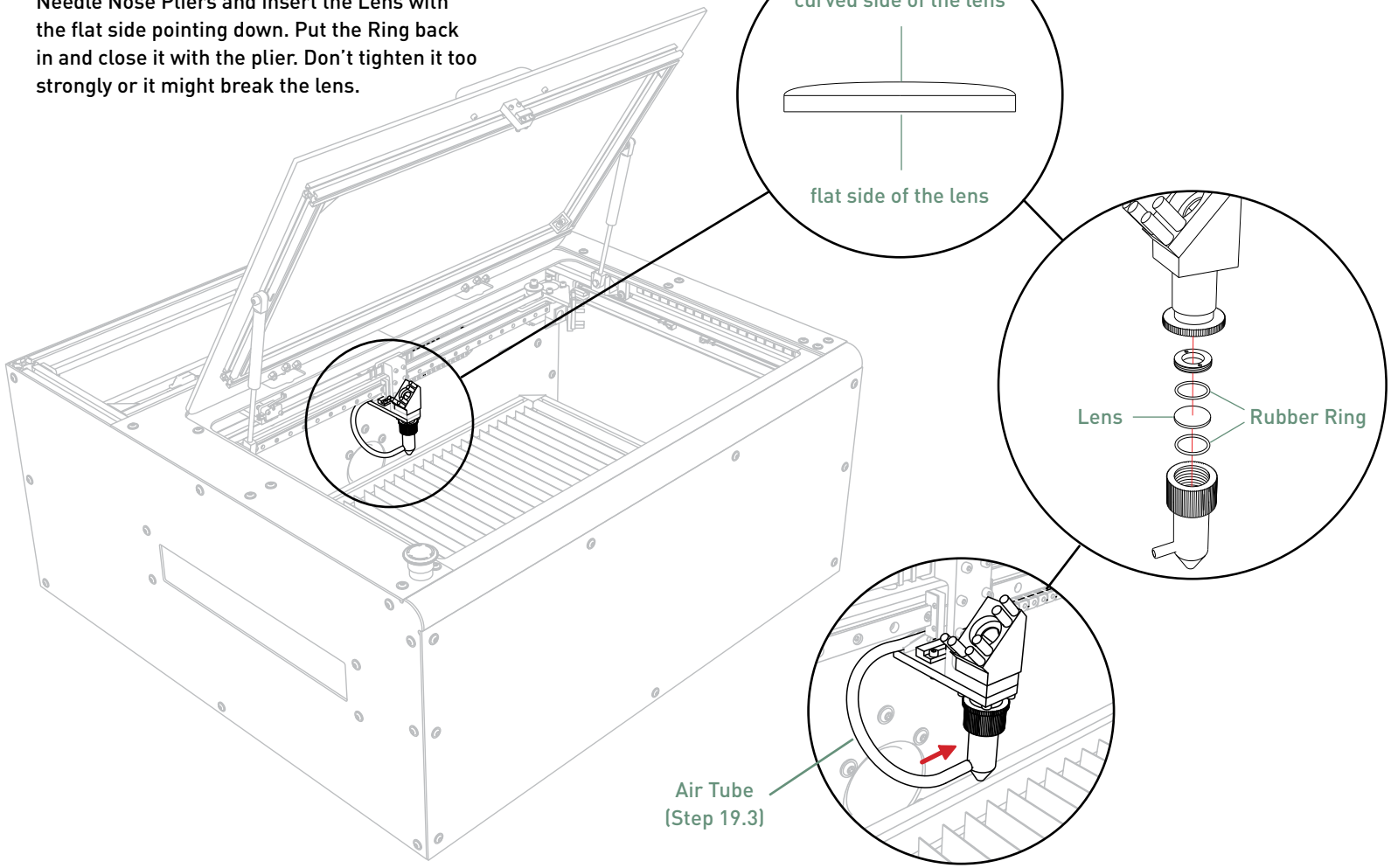


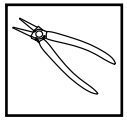
1x Laser Lens



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.

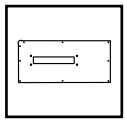




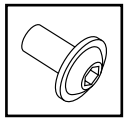
1x Needle Nose Plier

STEP 31.1 INSTALLING RIGHT SIDE PANEL

Step 31/33 15 min



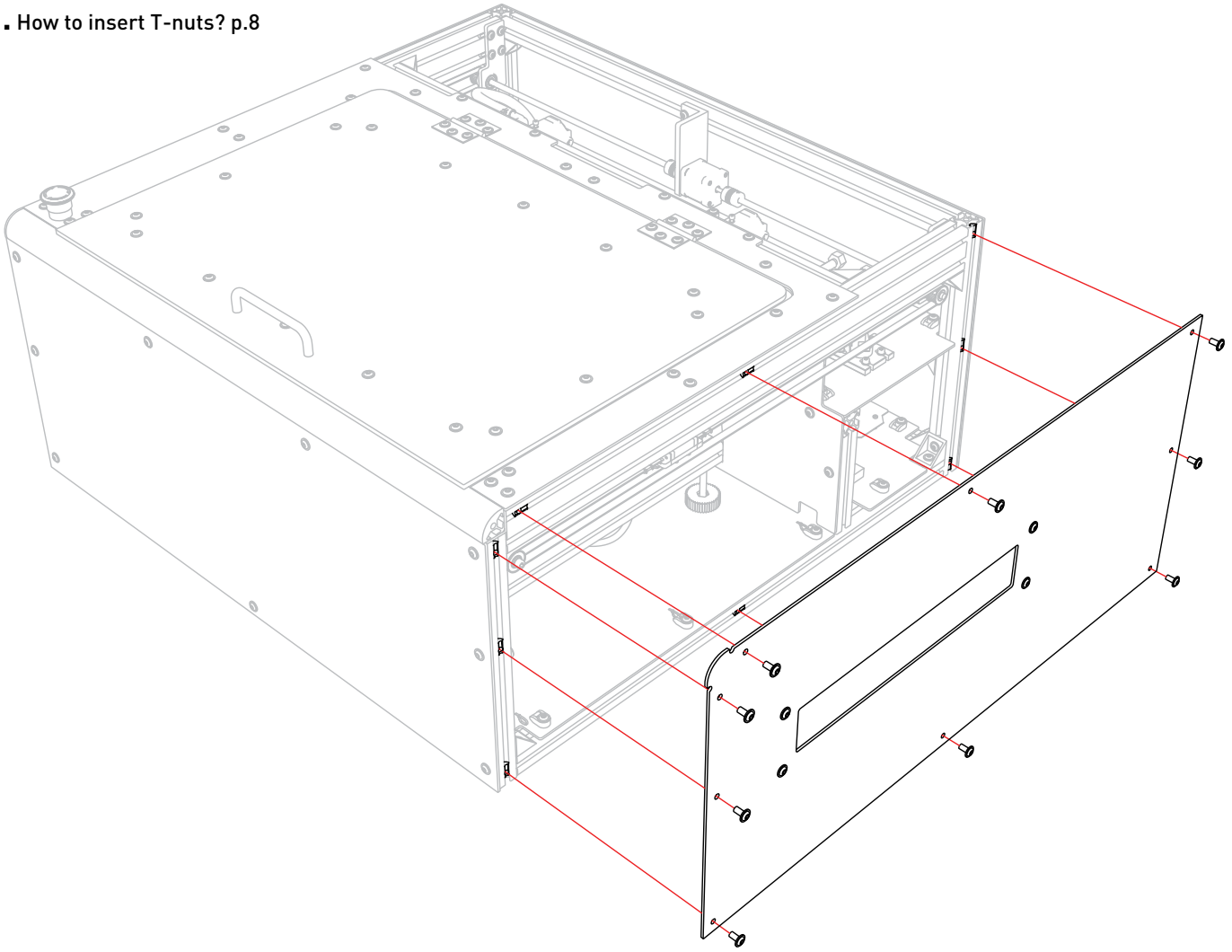
1x Prepared Side Panel Right (Step 17.1)

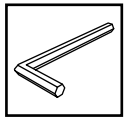


9x B-screw M6-12

9x T-nut M6

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





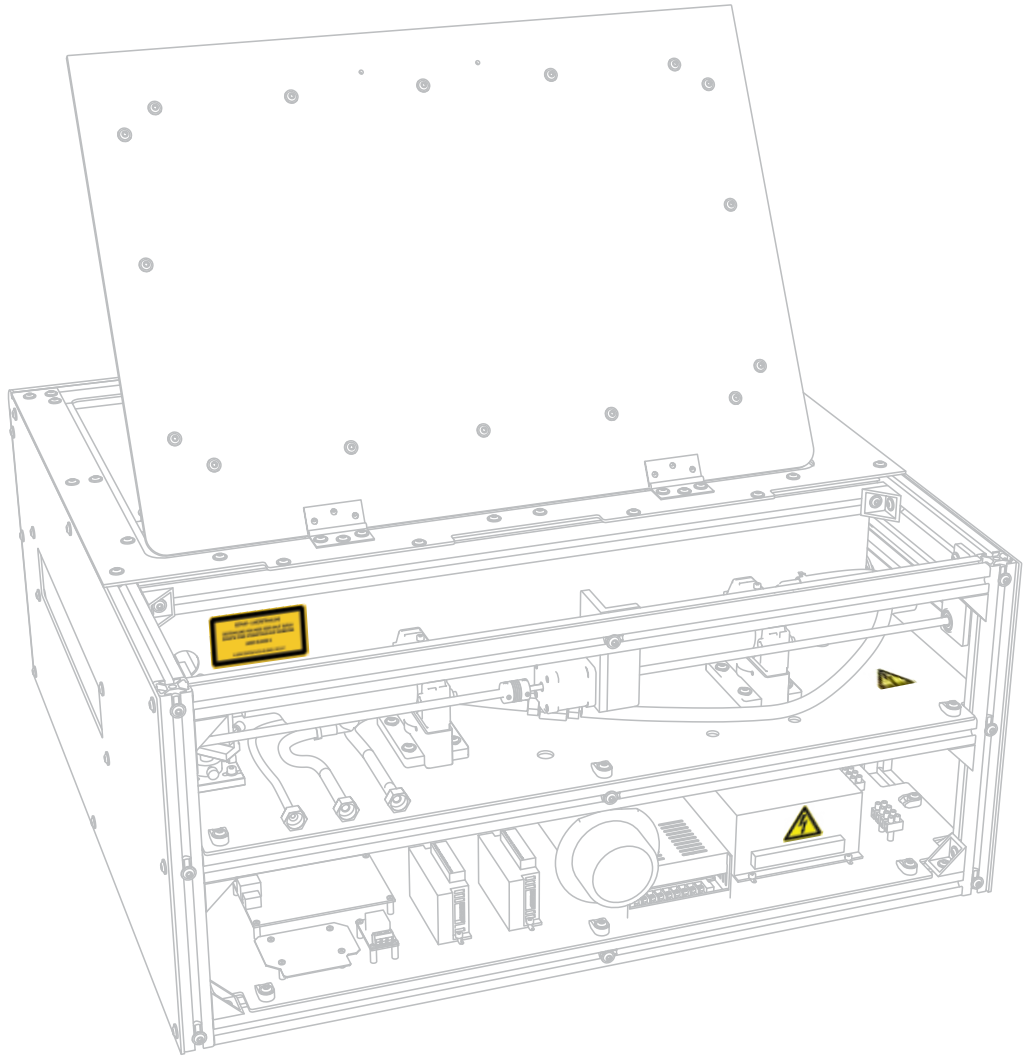
1x Allen Key 1.5
1x Allen Key 5

STEP 31.2 SAFETY STICKERS - INSIDE

Step 31/33 5 min

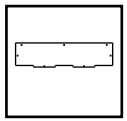
2x High Voltage Sticker

1x Danger Laser Sticker

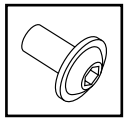


STEP 31.2 INSTALLING TOP BACK PANEL

Step 31/33 15 min



1x Top Back Panel

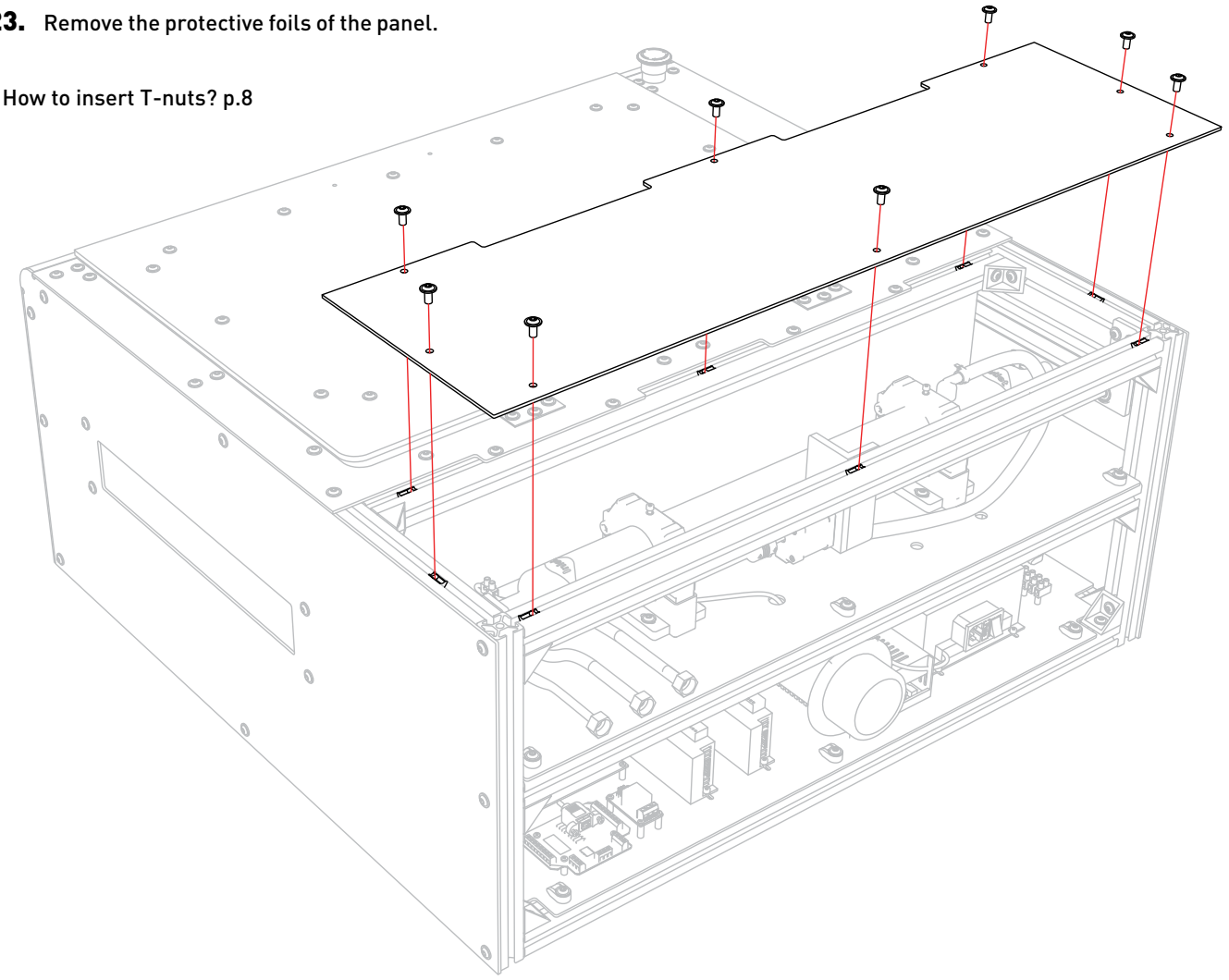


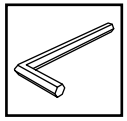
8x B-screw M6-12

8x T-nut M6

R123. Remove the protective foils of the panel.

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

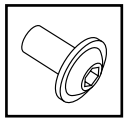




1x Allen Key 1.5
1x Allen Key 5

STEP 31.3 INSTALLING BACK PANEL

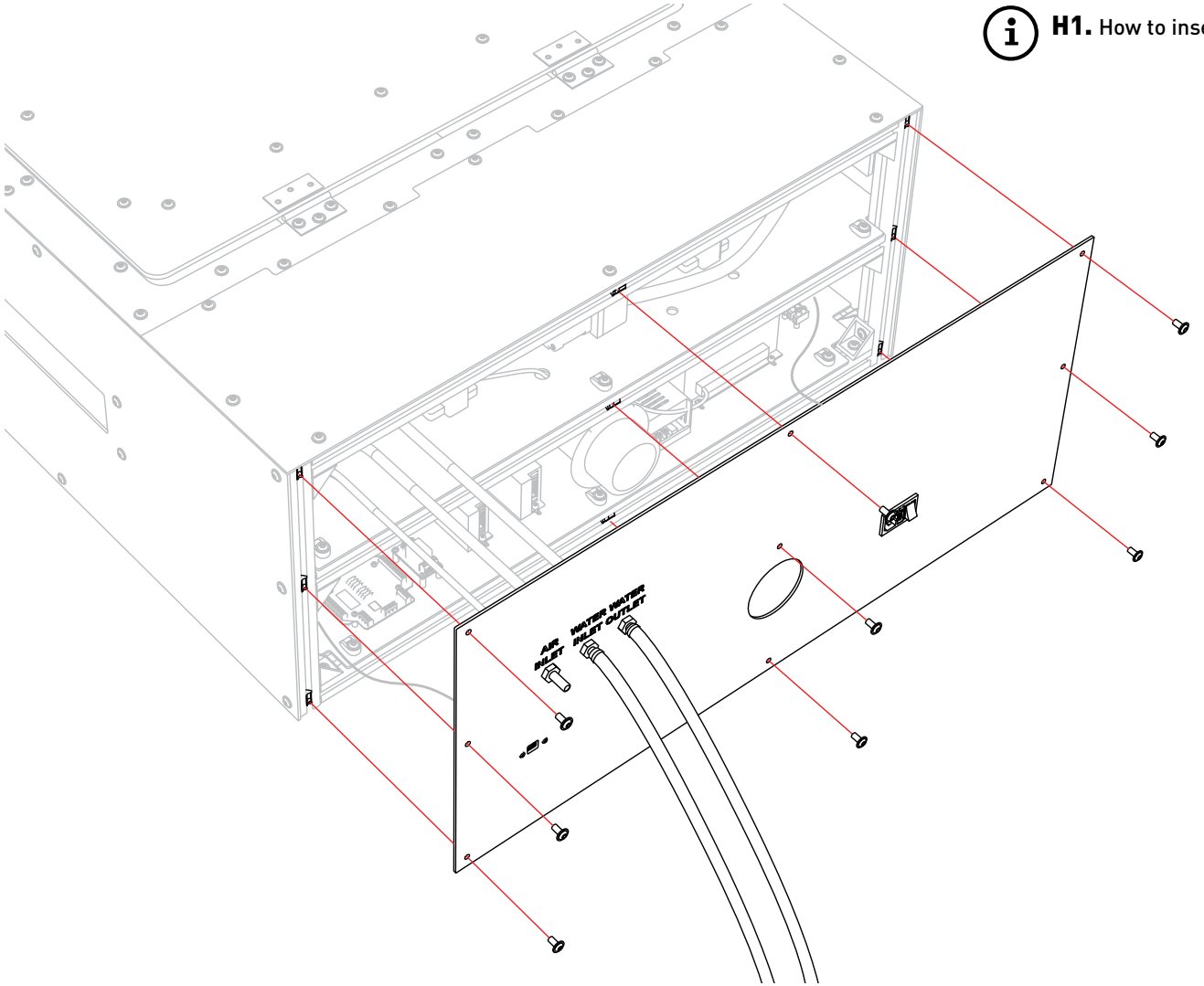
Step 31/33 20 min

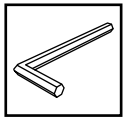


9x B-screw M6-12

9x T-nut M6

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

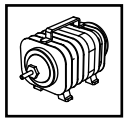




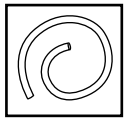
1x Allen Key 1.5
1x Allen Key 5

STEP 32. ATTACHING AIR COMPRESSOR

Step 32/33 20 min



1x Air Compressor (purchased separetely)



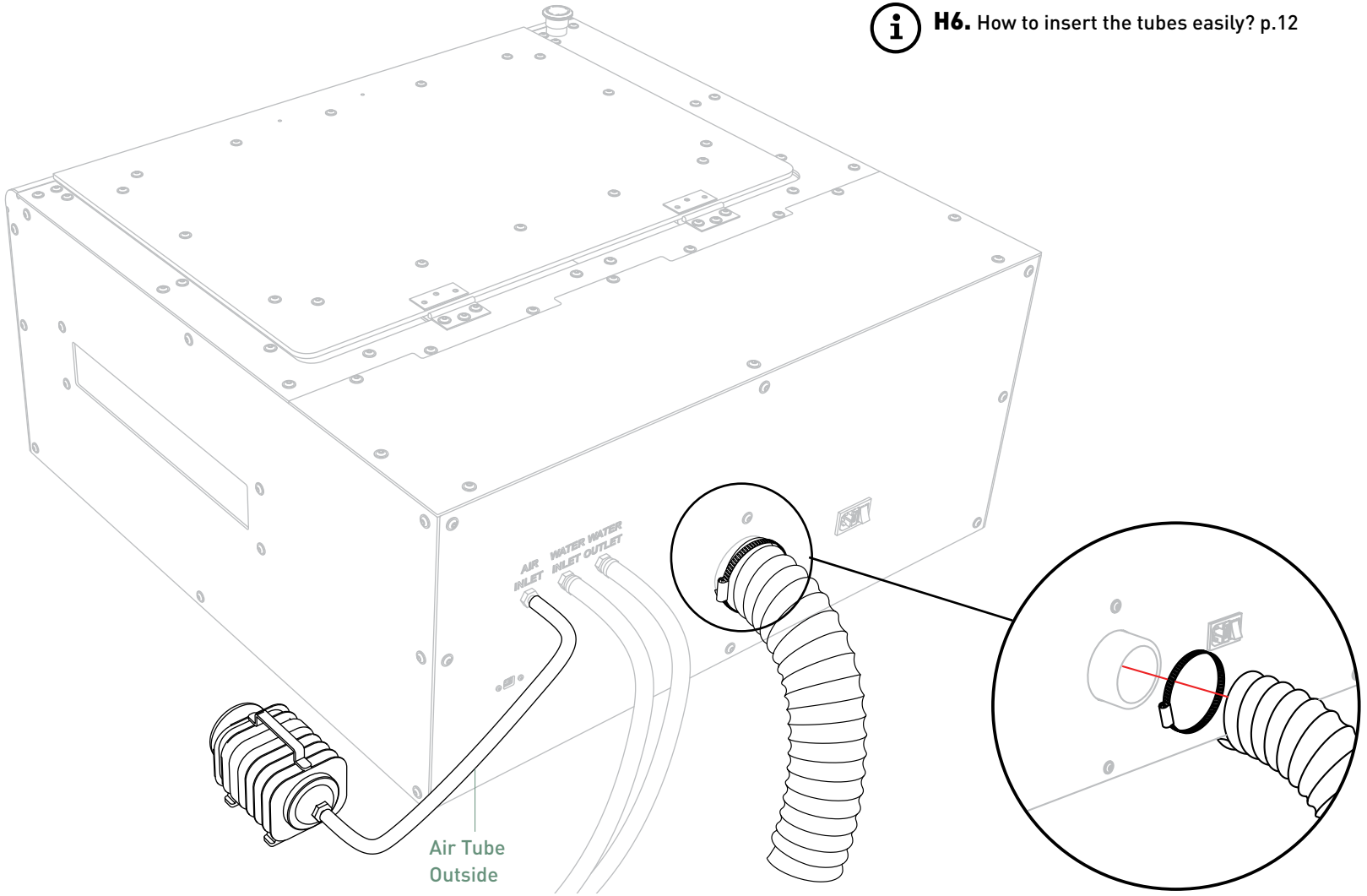
1x Air Tube Outside

1x Exhaust Hose

1x Hose Clamps

1x Screwdriver Phillips

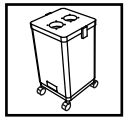
H6. How to insert the tubes easily? p.12



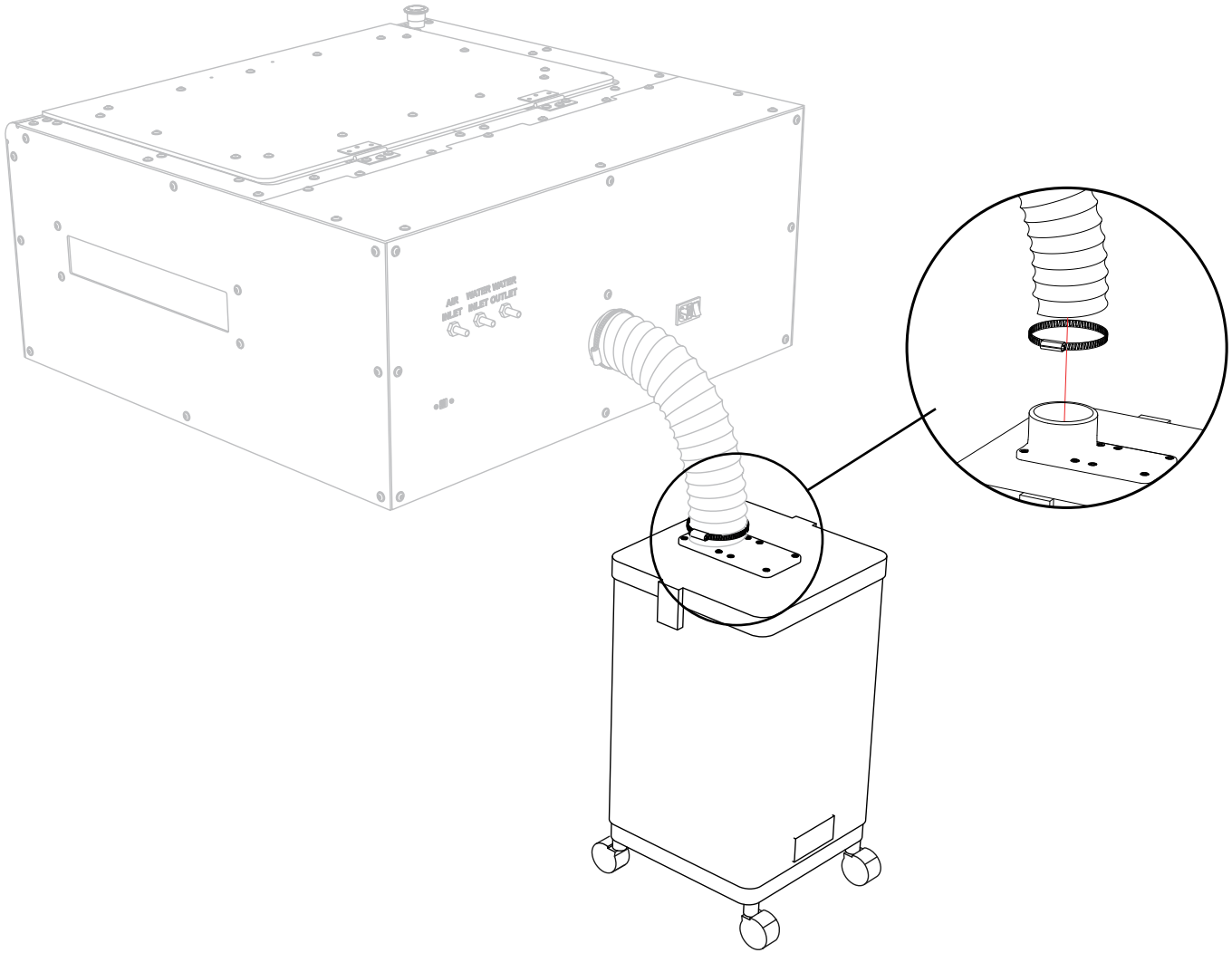
STEP 33. ATTACHING THE AIR FILTER

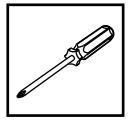
Step 33/33 20 min

1x Hose Clamps



1x Air Filter





1x Screwdriver
Phillips

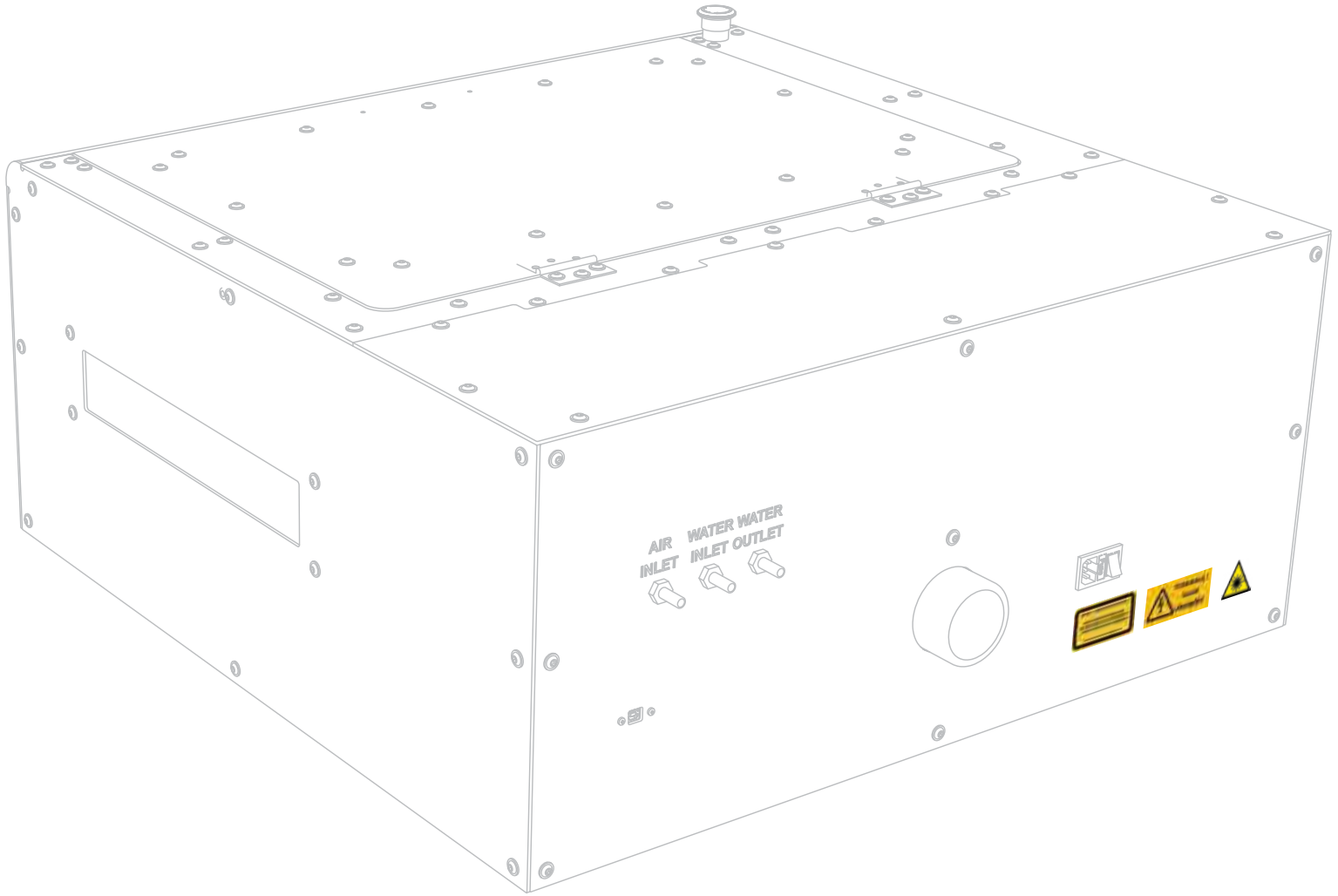
STEP 34.1 SAFETY STICKERS - BACK

Step 34/33 5 min

1x Laser Class Sticker

1x High Voltage Extended Sticker

1x Laser Beam Sticker



STEP 34.2 SAFETY STICKERS - TOP

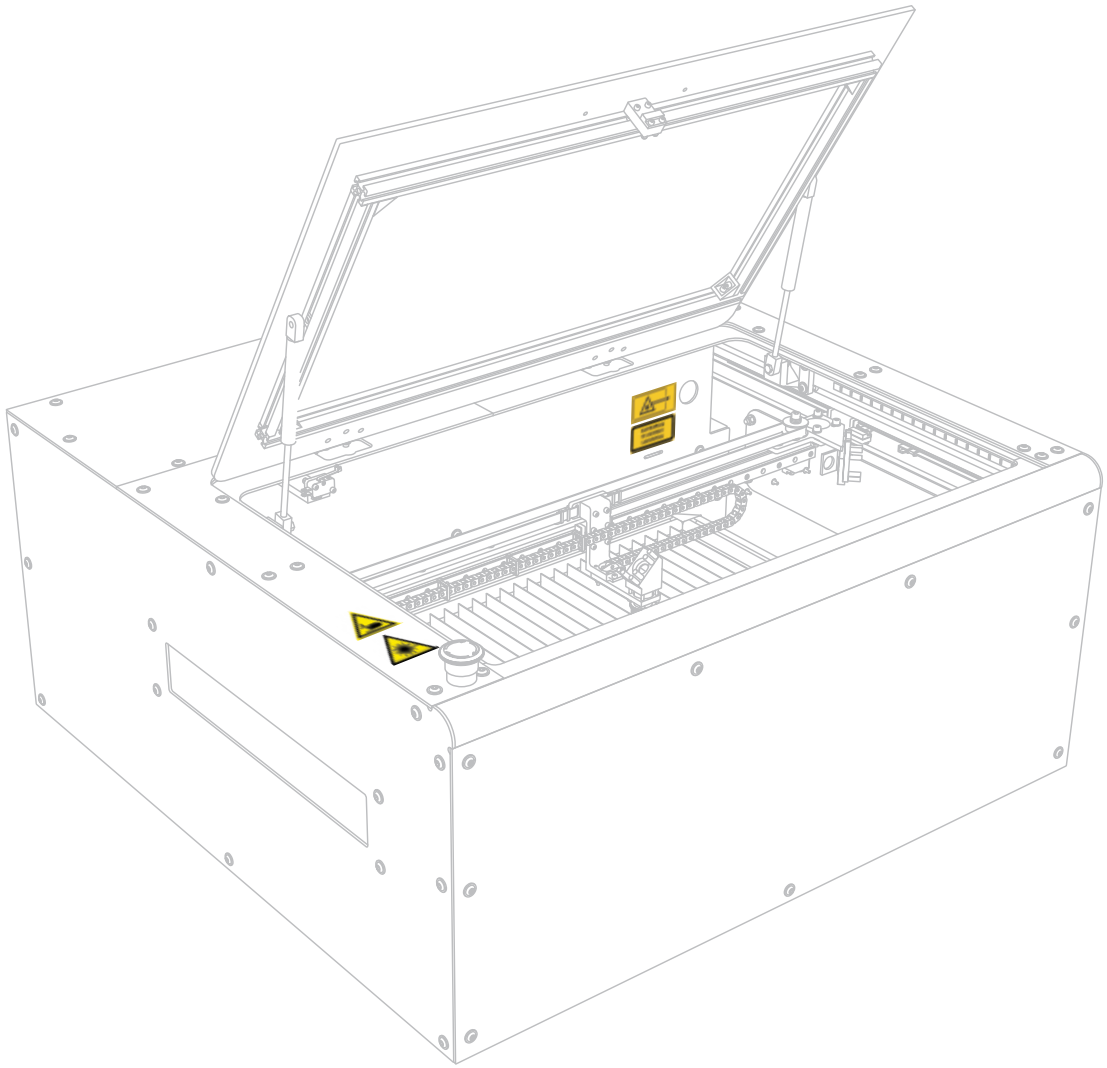
Step 34/33 5 min

1x Caution Sticker

1x Laser Beam Sticker

1x Laser Path Sticker

1x Invisible Laser Sticker

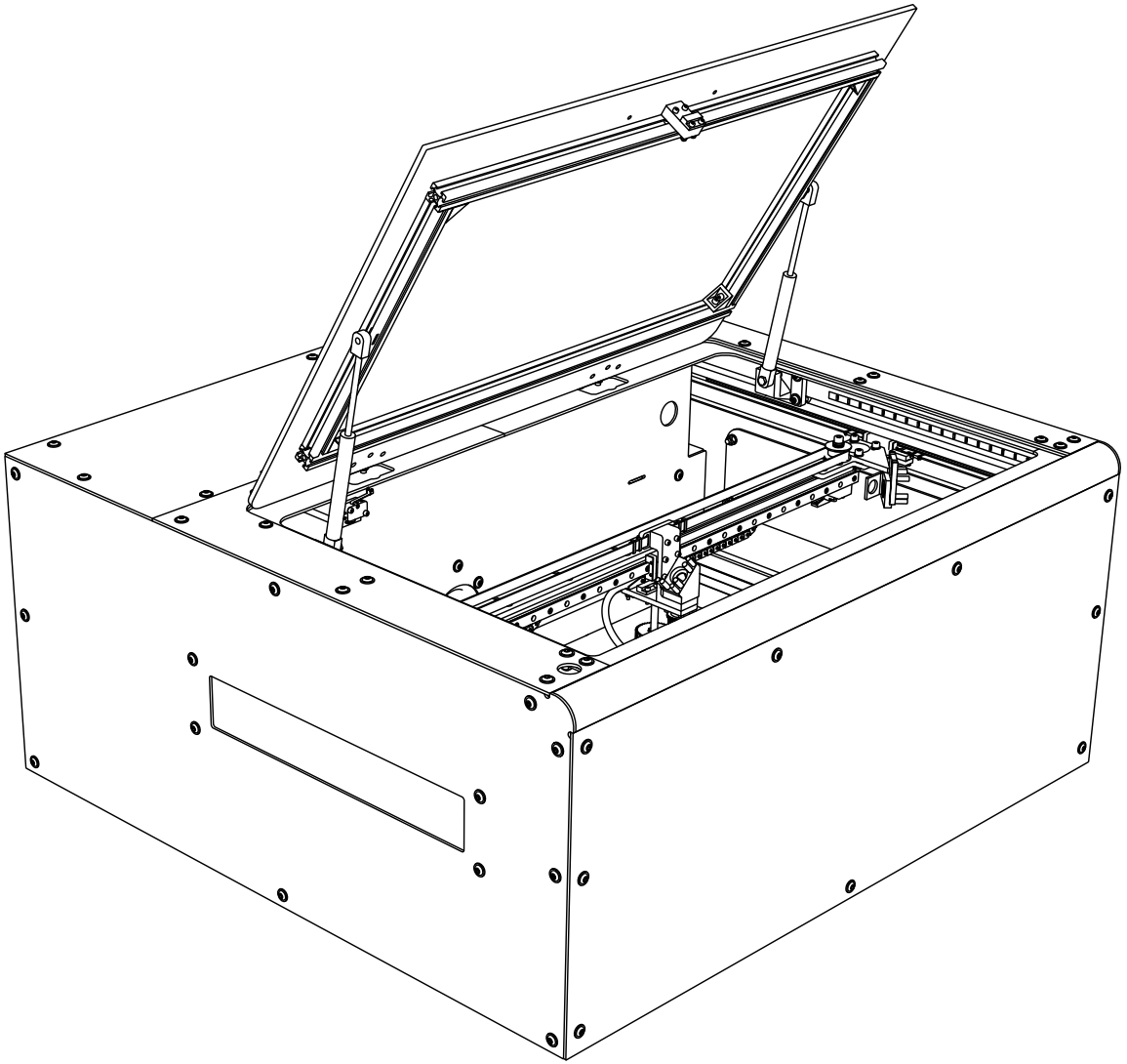


STEP 35. CELEBRATE!

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

Now your OLSK Small Laser is ready to assist you on your projects.

Have fun!

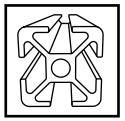


TROUBLESHOOTING

PROBLEM	CHECKS AND SOLUTIONS
The machine axis are not moving	• 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.
It is not possible to connect to the machine	• 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	• 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.

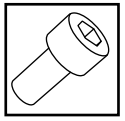
PROBLEM	CHECKS AND SOLUTIONS
The laser is not firing	• The machine is not switched on. • The power plug is disconnected. • The fuse, located inside the main power plug, is open or has been removed. • The laser power supply does not receive electricity; check the relevant connections. • The laser tube 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.

LIST OF PARTS

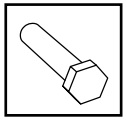


2x Profile 3060-770
2x Profile 30-150
2x Profile 30-350
2x Profile 30-380
2x Profile 30-400
2x Profile 30-600
3x Profile 30-770
5x Profile 30-800
1x Profile 30-860
4x Profile 20-660
1x Profile 20-700
2x Profile 20-350

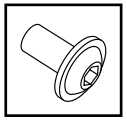
1x Profile Fillet



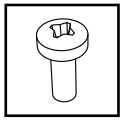
20x C-Screw M3-8
12x C-Screw M3-10
31x C-Screw M3-12
10x C-Screw M3-16
10x C-Screw M3-20
2x C-Screw M3-30
20x C-Screw M4-8
10x C-Screw M4-12
4x C-Screw M5-12
8x C-Screw M5-20
3x C-Screw M6-10
2x C-Screw M6-20
1x C-Screw M6-35
2x C-Screw M6-40



1x Hexagon Screw M6-30
1x Hexagon Screw M6-60

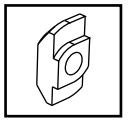


16x B-Screw M6-10
130x B-Screw M6-12
71x B-Screw M6-16
22x B-Screw M6-20
5x B-Screw M3-8

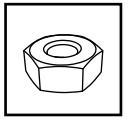


30x Plastic Screw M3-8

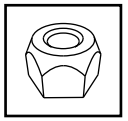
25x T-nut M3
4x T-nut M4
173x T-nut M6



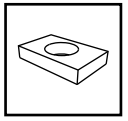
16x Hammer Nut M3
12x Hammer Nut M4
4x Hammer Nut M5



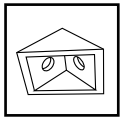
10x Nut M6



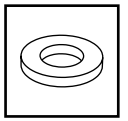
16x Lock Nut M3
8x Lock Nut M4
8x Lock Nut M5
48x Lock Nut M6



22x Flat Nut M6



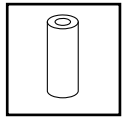
4x Bracket 20
30x Bracket 30
4x Bed Connector 20
2x Front Bracket



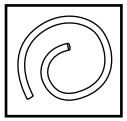
8x Washer M5
50x Washer M6
2x Washers M8 Big

1x X-belt
2x Y-belt

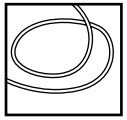
1x Red Dot Sticker



16x Standoff



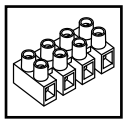
1x Water Outlet Tube Inside
1x Water Inlet Tube Inside
1x Air Tube Outside
1x Air Tube Inside
4x Water Tube Outside



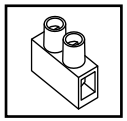
1x Power Cable
1x Laser + Motor Power Cable
1x Emergency Button Cable
1x X-driver Power Cable
1x Y-driver Power Cable
1x Controller Power Cable
1x X-driver Logic Cable
1x Y-driver Logic Cable
1x Laser Logic Cable + Resistor
1x Laser (-) Cable
1x USB Cable
40x Jumper Cable

25x Wire Fixer

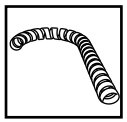
200x Cable Tie



2x Terminal Block

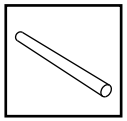


2x Laser Attachment

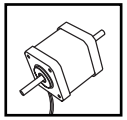


1x Cable Wrapper

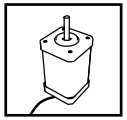
LIST OF PARTS



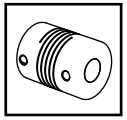
1x Y-shaft 350
1x Y-shaft 400



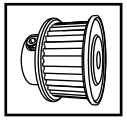
1x Y-motor



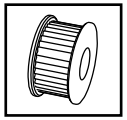
1x X-Motor



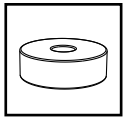
2x Coupler



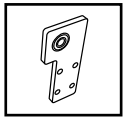
2x Y-pulley Back
1x X-pulley



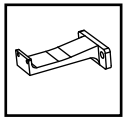
2x Y-pulley Front



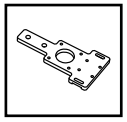
1x X-bearing



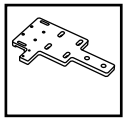
2x Back Bearing Holder



1x Switch Holder

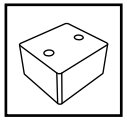


1x X-holder Right

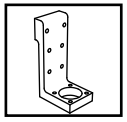


1x X-holder Left

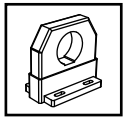
2x Linear Guide Y
1x Linear Guide X



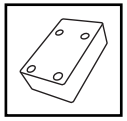
1x X-endstop Holder



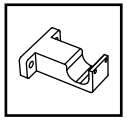
1x Laser Head Holder



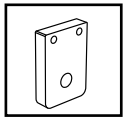
2x Laser Tube Holder



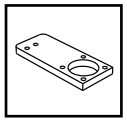
1x Window Magnet Holder



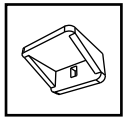
1x Front Window Switch Holder



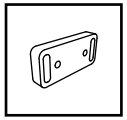
1 x Y-endstop Holder



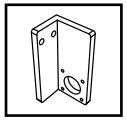
1x Chain End Holder



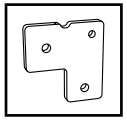
1x Window Holder



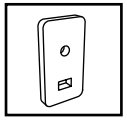
1x X-belt Attacher



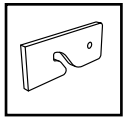
1x Y-Motor Holder



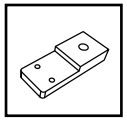
2x Front Pulley Holder



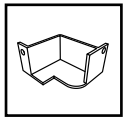
2x X-wire Fixer



1x X-wire inserter



3x Window Sensor Holder

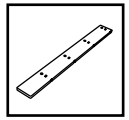


1x Cover

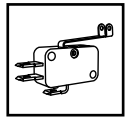
LIST OF PARTS

2x Front Spacer Left

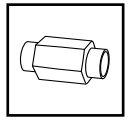
2x Front Spacer Right



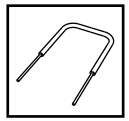
1x Chain Support



1x Window Switch

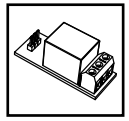


1x Water Flow Sensor

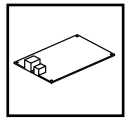


1x Laser Jumper Cable

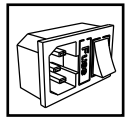
1x Relay Jumper Cable



1x Relay

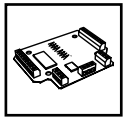


1x Laser Controller

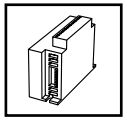


1x Power Plug + Mains Cable + Earth Cable

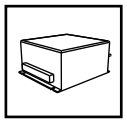
5x Focus Tool



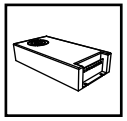
1x Converter PCB



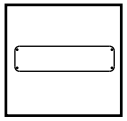
2x Motor Drive



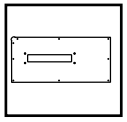
1x Laser Power Supply



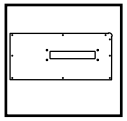
1x Motor Power Supply



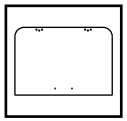
2x Air Panel



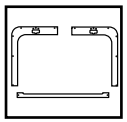
1x Right Panel



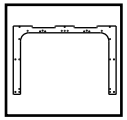
1x Left Panel



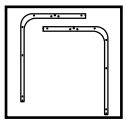
1x Window



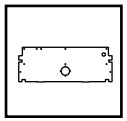
1x Sub Panels (3 pieces - Left, Right and Front)



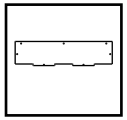
1x Top Front Panel



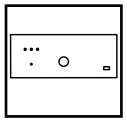
1x Spacer Panels (2 pieces - Left and Right)



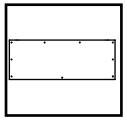
1x Separator Panel



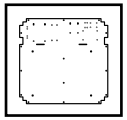
1x Top Back Panel



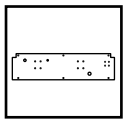
1x Back Panel



1x Front Panel

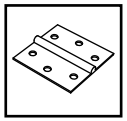


1x Bottom Panel

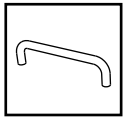


1 x Laser Panel 230 x 870 mm

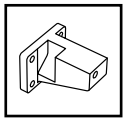
LIST OF PARTS



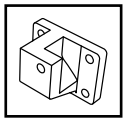
2x Hinge



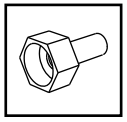
1x Handle



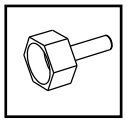
1x Piston Support Left



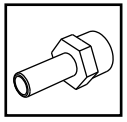
1x Piston Support Right



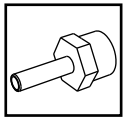
2x Water Connector Inside



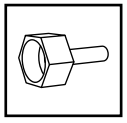
1x Air Connector Inside



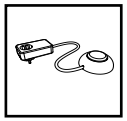
2x Water Connector Outside



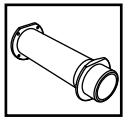
1x Air Connector Outside



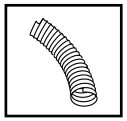
2x Water Flow Connector



1x Foot Switch

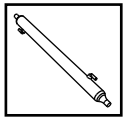


1x Exhaust



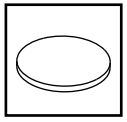
1x Exhaust Hose

3x Hose Clamps

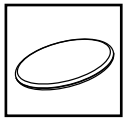


1x Laser Tube

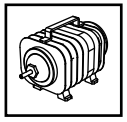
1x Chain



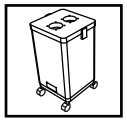
1x Lens



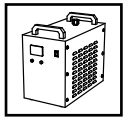
2x Mirror 20
1x Mirror 25



1x Air Compressor



1x Air Filter

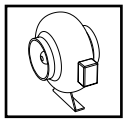


1x Water Chiller

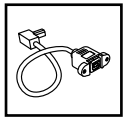
1x Masking Tape

1x Double-sided Tape

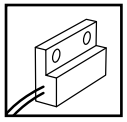
1x Teflon Tape



1x Radial Fan

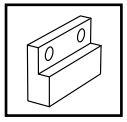


1x USB Cable Inside



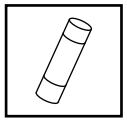
1x Window Sensor

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

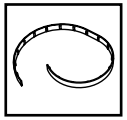


1x Window Magnet
1x X-endstop Magnet
1x Y-endstop Magnet

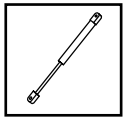
LIST OF PARTS



2x Fuse

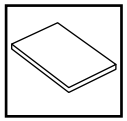


2x LED Strip

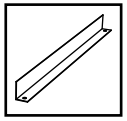


1x Window Piston Left

1x Window Piston Right

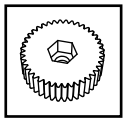


1x Wood Plank

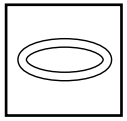


30x Lamella

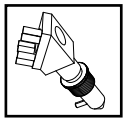
4x Bed Leg



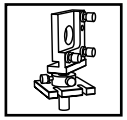
4x Bed Adjuster



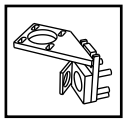
4x Rubber Ring



1x Laser Head



1x Mirror Holder 25



1x Mirror Holder 20

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