

Table of Contents

1. Introduction	9
Step 1 - Preparing the upgrade kit	10
Step 2 - Getting the necessary tools	10
Step 3 - Additional utilities for this guide	11
Step 4 - Labels guide	11
Step 5 - Spare bag	12
Step 6 - Printed parts - versioning	12
Step 7 - Printed parts - self printing	13
Step 8 - Printable parts - Silver to Black PSU	13
Step 9 - Printed parts post-processing	14
Step 10 - We are here for you!	15
Step 11 - Pro tip: inserting the nuts	16
Step 12 - View high resolution images	16
Step 13 - Important: Electronics protection	17
Step 14 - Reward yourself	18
Step 15 - How to successfully finish the assembly	19
Step 16 - Prepare your desk	20
1a. Parts check	21
Step 1 - Introduction	22
Step 2 - Preparing the printer	22
Step 3 - Heatbed inspection	23
Step 4 - X-axis smooth rods inspection	23
Step 5 - Y-axis smooth rods inspection	24
Step 6 - Printer frame inspection	24
Step 7 - Can I open the Haribo?	25
Step 8 - Let's get started	25
1b. Printer disassembly	26
Step 1 - Tools necessary for this chapter	27
Step 2 - Opening the electronics box	27
Step 3 - Disconnecting cables	28
Step 4 - Removing the Einsy-base	28
Step 5 - Removing the Einsy-door	29
Step 6 - Removing the heatbed	29
Step 7 - Dismantling cable management	30
Step 8 - Removing the LCD assembly	30
Step 9 - Dismantling the Y-axis: removing the belt	31
Step 10 - Removing the Y-axis assembly	31
Step 11 - Removing the Z-axis-tops	32
Step 12 - Removing the cable-holder	32
Step 13 - Removing the X-axis assembly	33
Step 14 - Removing the Z-axis motors	33
Step 15 - Removing the Z-axis-bottoms	34
Step 16 - Removing the Y-motor	34
Step 17 - Disconnecting the power cables (Black PSU)	35
Step 18 - Disassembling the Y-carriage: belt	35
Step 19 - Dissassembling the Y-carriage: rod holders	36
Step 20 - Disassembling the Y-carriage: bearings	36
Step 21 - Removing the X-axis motor	37
Step 22 - Disassembling the X-axis: Removing the pulley	37
Step 23 - Removing the X-axis smooth rods	38

Step 24 - Removing the X-axis bearings	38
Step 25 - Removing the X motor pulley	39
Step 26 - For new users of black PSU	39
Step 27 - Parts summary I.	40
Step 28 - Parts summary II.	40
Step 29 - Don't throw away	41
Step 30 - Can I take a gummy bear yet?	41
Step 31 - Well done	42
1c. Parts preparation	43
Step 1 - Tools necessary for this chapter	44
Step 2 - Removing the heatbed cable cover	44
Step 3 - Removing the heatbed thermistor	45
Step 4 - New heatbed thermistor: parts preparation	45
Step 5 - Preparing the heatbed and thermistor	46
Step 6 - Covering the thermistor	46
Step 7 - Fixing the thermistor in place	47
Step 8 - M3nEs nuts: parts preparation	47
Step 9 - Inserting the M3nEs nuts	48
Step 10 - Cable clips: parts preparation	48
Step 11 - Installing the cable clips	49
Step 12 - Installing the cable clips	49
Step 13 - PG-front-case: parts preparation	50
Step 14 - Assembling the PG-front-case	50
Step 15 - Stickers and labels: parts preparation I.	51
Step 16 - Stickers and labels: parts preparation II.	51
Step 17 - xLCD-cover sticker (optional)	52
Step 18 - xLCD-cover sticker (optional)	52
Step 19 - PG-case sticker (optional)	53
Step 20 - PG-case sticker (optional)	53
Step 21 - Sticking the serial number label	54
Step 22 - Safety label (optional)	54
Step 23 - Parts summary I.	55
Step 24 - Parts summary II.	55
Step 25 - Don't throw away	56
Step 26 - Still no sweets?	56
Step 27 - That's it	57
2. Frame assembly	58
Step 1 - Tools necessary for this chapter	59
Step 2 - xBuddy box: parts preparation	59
Step 3 - Mounting the xBuddy box: parts preparation	60
Step 4 - Mounting the xBuddy box	60
Step 5 - Mounting the xBuddy box	61
Step 6 - Mounting the xBuddy box	61
Step 7 - Applying the thermal pads	62
Step 8 - Mounting the xBuddy board	62
Step 9 - Attaching the zip ties	63
Step 10 - Preparing Y-belt-idler (part 1)	63
Step 11 - Preparing Y-belt-idler (part 2)	64
Step 12 - Mounting the Y-belt-idler	64
Step 13 - Assembling the Y motor: parts preparation	65
Step 14 - Assembling the Y motor	65
Step 15 - Assembling the Y-motor-holder	66
Step 16 - Assembling the Y-motor-holder	66
Step 17 - Attaching the Y-motor-holder	67

Step 18 - Haribo	68
Step 19 - It's done!	68
3. X-axis & X-carriage assembly	69
Step 1 - Tools necessary for this chapter	70
Step 2 - X-axis assembly: parts preparation	70
Step 3 - Assembling the X-end-motor	71
Step 4 - Assembling the X-end-motor	71
Step 5 - Assembling the X-end-idler	72
Step 6 - Assembling the X-end-idler	72
Step 7 - Assembling the X-end-idler	73
Step 8 - Mounting the bearings: parts preparation	73
Step 9 - Lubricating the bearings INFO	74
Step 10 - Lubricating the bearings: parts preparation	75
Step 11 - Lubricating the bearing	75
Step 12 - Lubricating the bearing	76
Step 13 - Inserting the bearings: X-end-motor	76
Step 14 - Inserting the bearings: bearing pads	77
Step 15 - Covering the bearings: X-end-motor	77
Step 16 - Inserting the bearings: X-end-idler	78
Step 17 - Assembling the X-axis: parts preparation	78
Step 18 - Assembling the X-axis: Marking the bearings	79
Step 19 - Assembling the X-axis: parts preparation (lubricating)	79
Step 20 - Lubricating the bearing	80
Step 21 - Lubricating the bearing	80
Step 22 - Assembling the X-axis: Inserting smooth rods	81
Step 23 - Assembling the X-axis: mounting the X-end-motor	81
Step 24 - Assembling the X-carriage: parts preparation	82
Step 25 - Assembling the X-carriage	82
Step 26 - Attaching the spacers	83
Step 27 - Attaching the spacers	83
Step 28 - Assembling the X-carriage-clip: parts preparation	84
Step 29 - Assembling the X-carriage-clip	84
Step 30 - Attaching the X-carriage-clip	85
Step 31 - Attaching the X motor: parts preparation	86
Step 32 - Attaching the X motor	86
Step 33 - Attaching the X motor: mounting the pulley	87
Step 34 - Guiding the X belt: parts preparation	87
Step 35 - Guiding the X belt: X-end-idler	88
Step 36 - Guiding the X belt: X-end-motor	88
Step 37 - Guiding the X belt: X-carriage	89
Step 38 - Assembling the X-carriage: final check	89
Step 39 - Haribo	90
Step 40 - It's done!	90
4. Z-axis assembly	91
Step 1 - Tools necessary for this chapter	92
Step 2 - Assembling the Z-bottoms: parts preparation	92
Step 3 - Assembling the Z-bottoms	93
Step 4 - Z motor assembling: parts preparation	93
Step 5 - Attaching the rubber pads	94
Step 6 - Installing the Z motors	94
Step 7 - Z motor cable adapter: parts preparation	95
Step 8 - Connecting the Z motor cable adapters	95
Step 9 - Connecting the Z motors	96
Step 10 - Mounting the X-axis assembly: parts preparation	96

Step 11 - Mounting the X-axis and smooth rods	97
Step 12 - Assembling the X-axis and smooth rods	97
Step 13 - Installing the X-axis assembly	98
Step 14 - Assembling the trapezoidal nuts	98
Step 15 - Installing the Z-top parts: parts preparation	99
Step 16 - Placing the Z-top parts	99
Step 17 - LoveBoard: parts preparation	100
Step 18 - Assembling the LoveBoard	100
Step 19 - Connecting the extruder main cable	101
Step 20 - Mounting the extruder main cable	101
Step 21 - Connecting the extruder main cable: parts preparation	102
Step 22 - Connecting the extruder main cable	102
Step 23 - Covering the X-carriage: parts preparation	103
Step 24 - Covering the X-carriage: inserting the nylon filament	103
Step 25 - Attaching the X-cover-back	104
Step 26 - Guiding the main-cable: parts preparation	105
Step 27 - Wrapping the extruder main cable	106
Step 28 - Wrapping the textile sleeve	106
Step 29 - Ext-cable-holder: parts preparation	107
Step 30 - Ext-cable-holder: parts preparation	107
Step 31 - Wrapping the X motor cable	108
Step 32 - Attaching the Ext-cable-holder	108
Step 33 - Assembling the Ext-cable-holder	109
Step 34 - Assembling the Ext-cable-holder	109
Step 35 - Connecting the X motor cable adapter	110
Step 36 - Attaching the Ext-cable-holder	110
Step 37 - Reward yourself!	111
Step 38 - Here it is!	111
5. Nextruder assembly	112
Step 1 - Tools necessary for this chapter	113
Step 2 - Filament sensor: parts preparation	113
Step 3 - Assembling the filament sensor	114
Step 4 - Assembling the filament sensor	114
Step 5 - Nextruder idler assembly: parts preparation	115
Step 6 - Assembling the extruder idler	115
Step 7 - Assembling the extruder: parts preparation I.	116
Step 8 - Assembling the extruder: parts preparation II.	116
Step 9 - Assembling the extruder	117
Step 10 - Assembling the gearbox	117
Step 11 - Assembling the PG-ring	118
Step 12 - Assembling the PG-assembly	118
Step 13 - Checking the PG-assembly	119
Step 14 - Assembling the Nextruder idler	119
Step 15 - Covering the planetary gear	120
Step 16 - Assembling the Idler-swivel: parts preparation	120
Step 17 - Assembling the Idler-swivel	121
Step 18 - Assembling the Idler-nut	121
Step 19 - Mounting the Idler-swivel assembly	122
Step 20 - Attaching the extruder: parts preparation	122
Step 21 - Assembling the heatsink	123
Step 22 - Attaching the extruder	123
Step 23 - Connecting the NTC thermistor	124
Step 24 - Assembling the hotend fan: parts preparation	124
Step 25 - Assembling the hotend fan	125

Step 26 - Inserting the hotend assembly: parts preparation	125
Step 27 - Inserting the hotend assembly	126
Step 28 - Connecting the hotend cables	126
Step 29 - Assembling the fan-door: parts preparation	127
Step 30 - Assembling the fan door	127
Step 31 - Assembling the fan-door	128
Step 32 - Assembling the fan-door	128
Step 33 - Assembling the fan-door	129
Step 34 - Assembling the fan-door	129
Step 35 - Connecting the extruder cables	130
Step 36 - Connecting the print fan	130
Step 37 - LoveBoard: Wiring check	131
Step 38 - Covering the LoveBoard: parts preparation	131
Step 39 - Covering the LoveBoard	132
Step 40 - Covering the LoveBoard	132
Step 41 - Tensioning the X-axis belt	133
Step 42 - Belt tension check	134
Step 43 - Testing the X-axis belt	134
Step 44 - Haribo time!	135
Step 45 - The extruder is assembled	135
6. xLCD assembly	136
Step 1 - Tools necessary for this chapter	137
Step 2 - xLCD assembly: parts preparation	137
Step 3 - xLCD assembly: parts preparation (part 2)	138
Step 4 - xLCD assembly: inserting the square nuts	138
Step 5 - Installing the xReflector sticker	139
Step 6 - Assembling the xLCD-support-right	139
Step 7 - Installing the PE Faston	140
Step 8 - Assembling the xLCD-support-left	140
Step 9 - xLCD cables: parts preparation	141
Step 10 - Connecting the PE cable	141
Step 11 - Attaching the knob	142
Step 12 - Attaching the xLCD assembly	142
Step 13 - Guiding the xLCD cable	143
Step 14 - Black vs Silver PSU	143
Step 15 - Connecting the PSU (Black PSU): parts preparation	144
Step 16 - Connecting the PSU (Black PSU): PE cable	144
Step 17 - Power cables info (Black PSU)	145
Step 18 - Connecting the PSU (Black PSU)	146
Step 19 - Connecting the power panic (Black PSU)	147
Step 20 - Guiding the Z motor right cable (Black PSU)	147
Step 21 - Guiding the power cable bundle (Black PSU)	148
Step 22 - Guiding the power cables (Black PSU)	148
Step 23 - Y motor cable adapter (Black PSU): parts preparation	149
Step 24 - Connecting the X and Y motor cables (Black PSU)	149
Step 25 - Connecting the PSU cable (Black PSU): parts preparation	149
Step 26 - Connecting the PSU cables (Black PSU): PE cable	150
Step 27 - Connecting the PSU cables (Black PSU)	150
Step 28 - PSU - PE cable (Silver PSU): parts preparation	151
Step 29 - Inserting M3nEs nut (Silver PSU)	151
Step 30 - Guiding the PE cable (Silver PSU)	152
Step 31 - Connecting the PE cables (Silver PSU)	152
Step 32 - Connecting the extended PE cable (Silver PSU)	153
Step 33 - Guiding the Z motor right cable (Silver PSU)	153

Step 34 - Guiding the power cable bundle (Silver PSU)	154
Step 35 - Guiding the power cables (Silver PSU)	154
Step 36 - Power panic extended cable (Silver PSU): parts preparation	155
Step 37 - Extending the power panic cable (Silver PSU)	155
Step 38 - Y motor cable adapter (Silver PSU): parts preparation	156
Step 39 - Connecting the X and Y motor cables (Silver PSU)	156
Step 40 - Connecting the PE cable (Silver PSU)	157
Step 41 - Connecting the PSU cables (Silver PSU)	157
Step 42 - Connecting the power panic cable (Silver PSU)	158
Step 43 - Securing the PSU cables	158
Step 44 - Guiding the Z motor left cable	159
Step 45 - Connecting the xLCD cables	159
Step 46 - Connecting the extruder main cable	160
Step 47 - Time for energy delivery!	160
Step 48 - Almost there!	161
7. Y-carriage & Heatbed assembly	162
Step 1 - Tools necessary for this chapter	163
Step 2 - Heatbed cable assembly: parts preparation	164
Step 3 - Heatbed cable assembly (part 1)	164
Step 4 - Heatbed cable assembly (part 2)	165
Step 5 - Heatbed cable assembly (part 3)	165
Step 6 - Covering the heatbed cables: parts preparation	166
Step 7 - Assembling the heatbed-cable-cover-bottom	166
Step 8 - Assembling the heatbed-cable-cover: nylon filament	167
Step 9 - Assembling the heatbed-cable-cover-bottom	167
Step 10 - Assembling the heatbed-cable-cover-top	168
Step 11 - Wrapping the textile sleeve	168
Step 12 - Y-carriage variations	169
Step 13 - Y-carriage (old): parts preparation	169
Step 14 - Y-carriage (old): parts preparation (lubricating)	170
Step 15 - Lubricating the bearing (old)	170
Step 16 - Lubricating the bearing (old)	171
Step 17 - Assembling the bearing clips (old)	171
Step 18 - Installing the bearing on the Y-carriage (old)	172
Step 19 - Aligning the bearing (old)	172
Step 20 - Installing the bearings on the Y-carriage (old)	173
Step 21 - Y-axis: smooth rods holders (old)	173
Step 22 - Inserting smooth rods into Y-carriage (old)	174
Step 23 - Y-carriage: parts preparation (new)	175
Step 24 - Y-carriage (new): parts preparation (lubricating)	175
Step 25 - Lubricating the bearing (new)	176
Step 26 - Lubricating the bearing (new)	176
Step 27 - Assembling the bearing clips (new)	177
Step 28 - Installing the bearing on the Y-carriage (new)	177
Step 29 - Aligning the bearing (new)	178
Step 30 - Installing the bearings on the Y-carriage (new)	178
Step 31 - Positioning of the bearings (new)	179
Step 32 - Y-axis (new): smooth rods holders	179
Step 33 - Inserting smooth rods into Y-carriage (new)	180
Step 34 - Preparing Y-rod-holder	180
Step 35 - Mounting the Y-rod-holder parts	181
Step 36 - Installing the Y-carriage	181
Step 37 - Aligning the smooth rods	182
Step 38 - Assembling the Y belt: parts preparation	182

Step 39 - Assembling the Y belt	183
Step 40 - Assembling the Y belt	183
Step 41 - Assembling the Y belt holder	184
Step 42 - Assembling the Y belt tensioner	184
Step 43 - Assembling the Y belt tensioner	185
Step 44 - Tensioning the Y belt	185
Step 45 - Belt tension check	186
Step 46 - Aligning the Y belt	186
Step 47 - Installing the Expansion joints: parts preparation	187
Step 48 - Preparing the expansion joints	187
Step 49 - Installing the Expansion joints	188
Step 50 - Attaching the heatbed: parts preparation	188
Step 51 - Attaching the heatbed	189
Step 52 - Tightening the heatbed	189
Step 53 - Guiding the heatbed cables: parts preparation	190
Step 54 - Guiding the heatbed cables	190
Step 55 - Covering the heatbed cables	191
Step 56 - Verify all connections once more!	191
Step 57 - Installing the ESP module: parts preparation	192
Step 58 - Installing the ESP module	192
Step 59 - Covering the xBuddy box: parts preparation	193
Step 60 - Covering the xBuddy box	193
Step 61 - Covering the xBuddy box	194
Step 62 - Assembling the double spool holder (part 1)	194
Step 63 - Assembling the double spool holder (part 2)	195
Step 64 - Assembling the Filament guide: parts preparation	195
Step 65 - Filament guide assembly (part 1)	196
Step 66 - Filament guide assembly (part 2)	196
Step 67 - Haribo time!	197
Step 68 - That's it	197
8. Preflight check	198
Step 1 - Attaching the print sheet	199
Step 2 - Firmware update (part 1)	200
Step 3 - Firmware update (part 2)	200
Step 4 - Wizard - Selftest start	201
Step 5 - Wizard - Loadcell Test	201
Step 6 - Wizard - Gearbox Alignment	202
Step 7 - Wizard - Filament Sensor Calibration	202
Step 8 - Wizard complete	203
Step 9 - Reward yourself!	203
Step 10 - Loading a filament	204
Step 11 - Printable 3D models	204
Step 12 - PrusaSlicer for MK3.9	205
Step 13 - PrusaLink and Prusa Connect	205
Step 14 - Quick guide for your first prints	206
Step 15 - Prusa knowledge base	206
Step 16 - Join Printables!	206
Manual changelog MK3.9 upgrade	207
Step 1 - Version history	208

1. Introduction



STEP 1 Preparing the upgrade kit

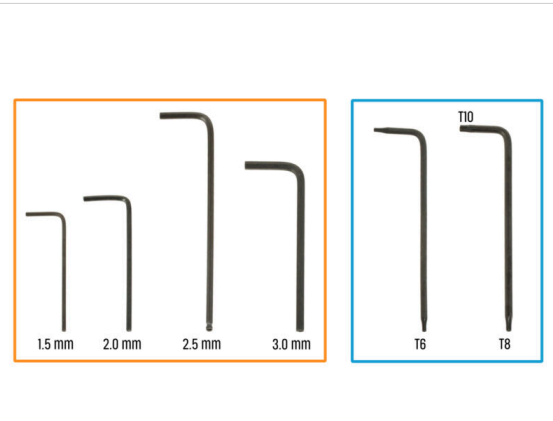
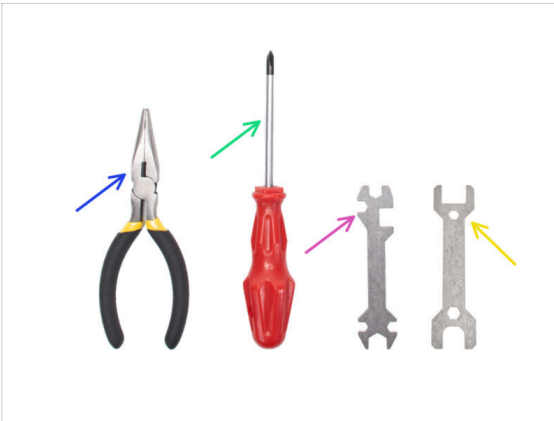


● Welcome to our step-by-step guide on upgrading your Original Prusa i3 MK3/MK3S/MK3S+ to the **Original Prusa MK3.9**.

● Prepare the upgrade kit received from Prusa Research.

⚠ **WARNING:** Before you start disassembling the printer, ensure that **you have successfully printed all the required parts** for the upgrade.

STEP 2 Getting the necessary tools



● **The package includes:**

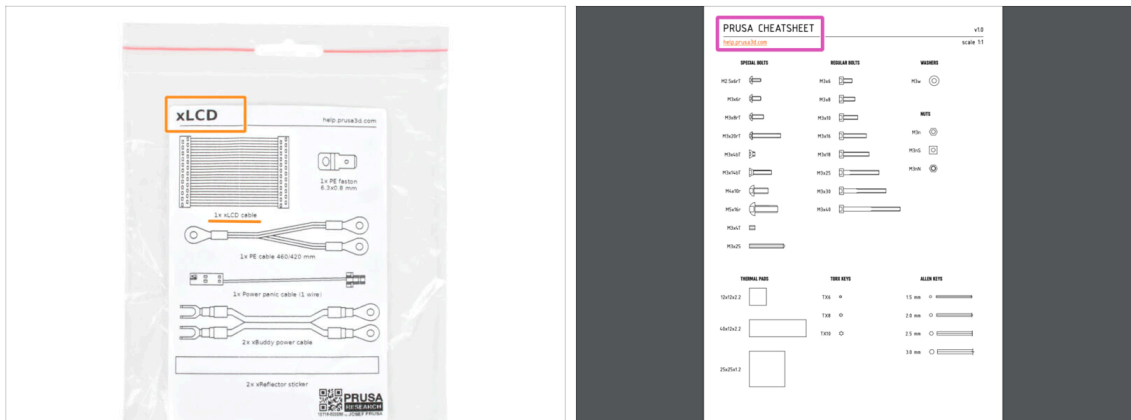
- Needle-nose pliers (1x)
- Philips (PH2) screwdriver (1x)
- Universal wrench (1x)
- Wrench size 13 mm (1x)
- Torx key set
- Allen key set

STEP 3 Additional utilities for this guide



- ◆ **Some steps in the manual will require commonly available items to help you with assembly (not included in the kit):**
- ◆ Scissors - *For cutting a bag with bearings*
- ◆ Permanent marker - choose black or another dark color. *The marker will come in handy a few chapters further, for marking bearings and magnets.*
- ◆ Paper towels or piece of cloth - *For wiping residual grease off the bearings and smooth rods and as a soft pad for preparing the Y-carriage assembly.*

STEP 4 Labels guide



- ◆ All the boxes and bags including parts for the build are labeled.
- ◆ The labels include the list of contents and part count.
- ◆ You can download a **Cheatsheet** with 1:1 fastener drawings from our site prusa.io/cheatsheet-mk4s. Print it at 100 %, don't rescale it, otherwise, it won't work.
- i For PRUSA veterans: Fasteners are divided into individual bags according to its type. Not into packages for individual chapters, as it was with previous printers.

STEP 5 Spare bag



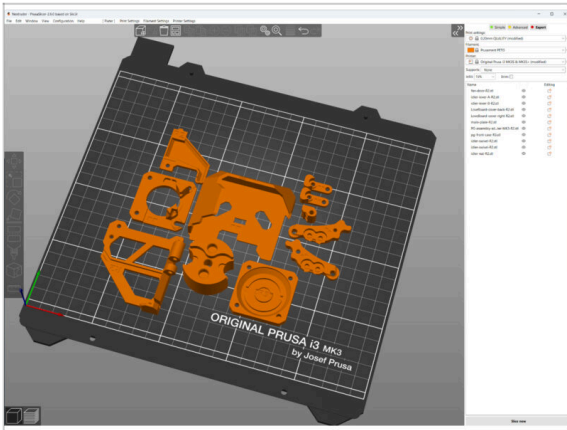
- There is a bag with spare parts like thermal pads, springs, etc.
- Spare fasteners are included in each bag of fasteners. The numbers in parentheses below the fastener picture indicate the number of extra pieces added to the SPARE package.

STEP 6 Printed parts - versioning



- Most of the 3D printed parts on Original Prusa MK3.9S are marked with their version.
 - E, F and Gx series** (e.g. E1) - those parts are printed on Prusa Research farm and are distributed with the kit.
 - R, S and Tx series** (e.g. R1) - those parts are available for download at prusa.io/printable-parts-mk4s. They are identical to the factory ones.
- i** In case you have issues while assembling the printer with the certain printed part, please try to find this label and tell it to our support team.

STEP 7 Printed parts - self printing



⚠ Before we start disassembly, you need to print all the necessary parts.

- Filaments (PETG) for printing all necessary parts are included in the UPGRADE package.
- G-codes and STL files are available on our website: prusa.io/printable-parts-mk4s
- ⓘ For printing individual parts it is recommended to use PrusaSlicer with 0.2 mm layer height, GRID infill at 15 %, no supports!
- ⓘ Fan-shroud must be printed from ASA/PC/ABS only!!! We include this part in the upgrade package.

STEP 8 Printable parts - Silver to Black PSU



- This step is for users who have purchased the **black 24V 240W PSU** (Power Supply Unit) and would like to replace an existing silver power supply unit during the upgrade.

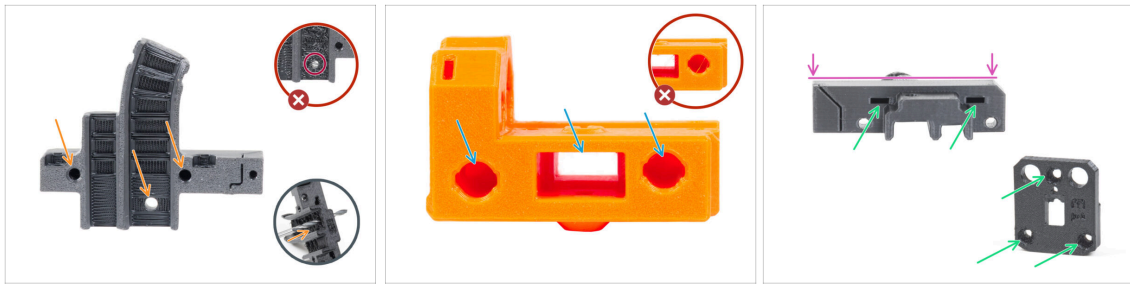
● **For this replacement, the following parts need to be printed in addition:**

- PSU-cover (1x)

ⓘ Download the part from xLCD category on prusa.io/printable-parts-mk4s

⚠ Print the parts according to the prescribed print settings in the description on Printables.com.

STEP 9 Printed parts post-processing



- ◆ **Some parts might require post-processing** in order to be ready for assembly.
- ◆ **In general for all printed parts** (We will use just a few parts as an example):
 - ◆ Each hole for a screw, nylon filament, etc. must be clean and free of any strings. If there are any remnants of filament inside the hole, hand drill the holes with a 3mm drill bit. **Do not use electric power tools!**
 - ◆ All other holes, for example for the smooth rods, must be perfectly clean. If there is any filament residue inside the hole, use a heat gun to melt it.
 - ⓘ Optimal temperature for the heat gun is 250 °C (482 °F) and blow on the parts from a distance of 10 - 15cm (4 - 6 inches).
 - ◆ Check the square and hexagon nut holes. **There must be no filament debris inside.**
 - ◆ Check the parts for straightness. For example, by placing it on a clean table surface. Bent parts can cause problems during installation and subsequent use of the printer.

⚠ **Do not modify any parts unless instructed to do so.**

STEP 10 We are here for you!

2. Frame assembly
3. X-axis & X-carriage assembly
4. Z-axis assembly
5. Extruder assembly

1. Tools necessary for this chapter
2. Filament sensor: parts preparation
3. Assembling the filament sensor
4. Assembling the filament sensor
5. Next extruder idler assembly: parts preparation
6. Assembling the extruder idler
7. Assembling the extruder: parts preparation I
8. Assembling the extruder: parts preparation II
9. Assembling the extruder
10. Assembling the gear
11. Assembling the planetary gear
12. Assembling the planetary gear
13. Assembling the Next extruder idler
14. Covering the planetary gear
15. Assembling the idler: parts preparation

Step 13 Assembling the Next extruder idler

- Insert the idler assembly between the PG-ring and the extruder motor. There is a cutout for the spacer in the main-plate. Line up the idler spacer with the hole in the PG-ring.
- Secure both parts with grub screw 3x25. Do not overtighten the screw! The grub screw protrudes from the PG-ring after tightening.
- Apply a small amount of Prusa Lubricant all around the PG-ring and PG-assembly teeth.
- Tip: apply a small amount of lubricant to the tip of the zip tie and then spread the lubricant over the gears.
- Using a paper towel, wipe off any excess lubricant on the front surfaces.

2 comments

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SUBMIT

Chat now

- Lost in the instructions, missing screw or cracked printed part? **Let us know!**
- You can contact us using the following channels:
 - Using comments under each step.
 - Using our 24/7 live chat here at help.prusa3d.com
 - Writing an email to info@prusa3d.com

STEP 11 Pro tip: inserting the nuts



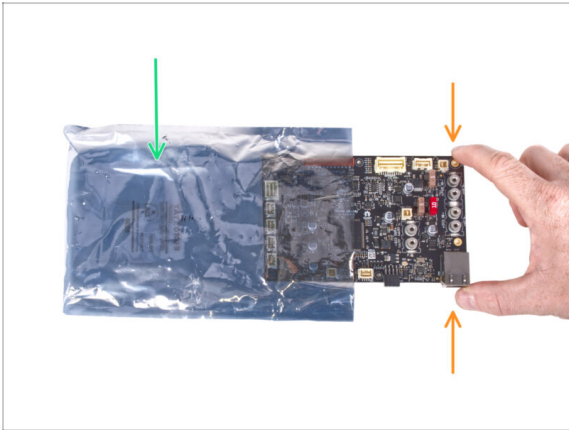
- 3D printed parts are very precise, however, there still might be a tolerance in the printed part and same goes for the size of the nut.
- Therefore it might happen, that the nut won't fit easily in or might be falling out. Let's see, how to fix it:
 - **Nut won't fit in:** use a screw with a thread along its entire length (typically: M3x10, M3x18) and screw it from the opposite side of the opening. While tightening the screw, the nut will be pulled in. Remove the screw afterwards.
 - **Alternative option:** you can use X-holder tool included in the package. Insert any screw (typically: M3x10 or M3x18) and screw the nut fully on the tip of the thread. Push the nut into the printed part and remove the screw with X-holder.
 - **Nut keeps falling out:** Use a piece of tape to fix the nut temporarily in place, as soon as you insert the screw in, you can remove the tape. Using glue isn't recommended as it can partly reach into the thread and you won't be able to tighten the screw properly.
- Every time we recommend using the "screw pulling technique", you will be reminded with Joe's avatar ;)
- ⓘ Parts in the pictures are used as an example.

STEP 12 View high resolution images



- When you browse the guide on help.prusa3d.com, you can view the original images in high resolution for clarity.
- Just hover your cursor over the image and click the Magnifier button ("View original") in the top left corner.

STEP 13 Important: Electronics protection



⚠ WARNING: Make sure to **protect the electronics against electrostatic discharge (ESD)**. Always unpack the electronics right before you need them!

Here are some **tips to prevent damage to the electronics:**

- **Keep the electronics inside the ESD bag** right until you are asked to install them.
- **Always touch the sides of the board only** while handling it. Avoid touching the components on the surface.
- **Before you touch the electronics** use any conductive (metal) structure nearby to neutralize the possible static charge from your hands.
- Be extra cautious **in rooms with carpets**, which are often a source of electrostatic energy.
- Clothes made of wool or certain synthetic fabrics can easily gather static electricity too. It is safer to wear cotton clothing for the assembly.


STEP 14 Reward yourself




- ◆ Based on the feedback, building the MK3.9 printer is even more enjoyable compared to the MK3S+. However, you should still treat yourself for every finished chapter. Look in the box and find bag of Haribo Bears.
- ⚠ **The biggest issue from our experience** (MK3S+, MK3S, MK3, MK2S, ...) is inadequate bear consumption. Many of you didn't have enough gummy bears for all chapters, some even ate them all before they started!
- ◆ After years of thorough scientific research, we came to a solution => At the end of each chapter, you will be told a specific amount of bears to consume.
- ◆ Eating incorrect amount than prescribed in the manual might lead to sudden boost of energy. Please consult a professional in the closest candy store.
- ⚠ **Hide the Haribo for now!** From our experience an unattended bag with sweets will suddenly disappear. Confirmed by multiple cases all around the World.

STEP 15 How to successfully finish the assembly

Step 25 Attaching the spacers








- Insert two M3n nuts to the X-carriage-back.
- ① Use the screw pulling technique.
- From the opposite side, insert the M3x10 screw into the X-carriage-back. The screw must protrude from the "front" side of the part.
- Attach the spacer 10 mm on the M3x10 screw and tighten the screw. **Note the cutout of the same shape as the spacer. It must fit perfectly and must not rotate.**



2 comments

 **To successfully finish the upgrade please follow all these:**

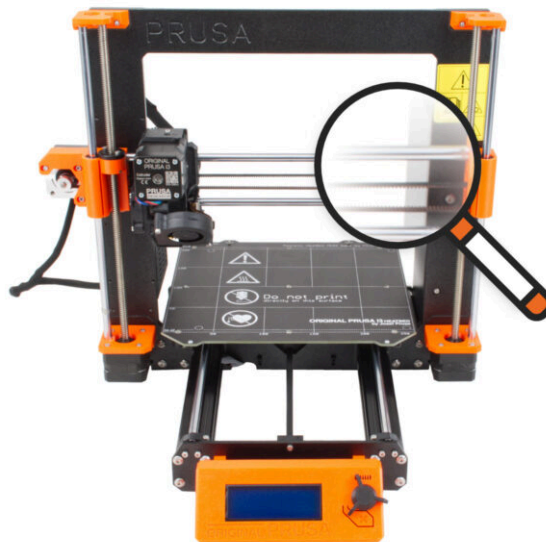
-  **Always read all the instructions at the current step first**, it will help you to understand what you need to do. Don't cut or trim unless you are told to!!!
-  **Don't follow pictures only!** It is not enough, the written instructions are as brief as they could be. **Read them!**
-  Read the comments from the other users, they are a great source of ideas. We read them too and based on your feedback improve the manual and the entire assembly.
-  **Use a reasonable force**, the printed parts are tough, but not unbreakable. If it doesn't fit, check your approach twice.
-  **Most important: Enjoy the build, have fun.** Cooperate with your kids, friends or partners.

STEP 16 Prepare your desk



- Tidy up your desk! Tidying up decreases the probability of losing small parts.
- **Clear your workspace.** Make sure you have enough room. A nice clear flat workbench will get you the results you are aiming for.
- **Let there be light!** Make sure you are in a well-lit environment. Another lamp or even an extra flashlight will probably come in handy.
- Prepare something to contain the plastic bags and the removed packing materials so you can recycle them afterwards. Make sure there are no important parts being discarded.

1a. Parts check



STEP 1 Introduction



- Some parts on your printer can be used for upgrading, it is essential to check their condition before you start upgrading. This chapter will guide you through the visual inspection of all these parts. If you find a part in poor condition, you have plenty of time to order a new one and continue using the printer in the meantime.

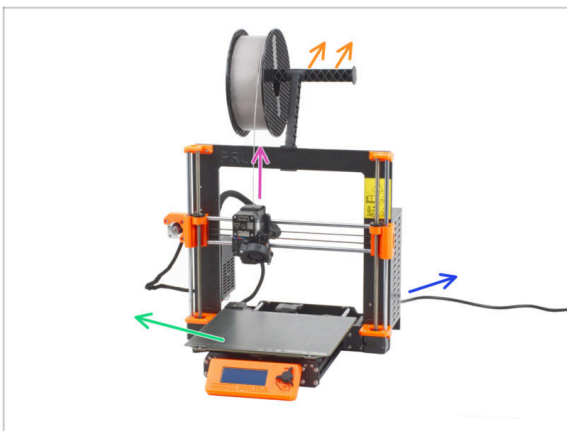
⚠ Do not disassemble or disconnect anything until prompted.

i The following instructions use the MK3S+ printer as an example. **Some parts may be slightly different from previous models.**

- Any parts that are found to be in poor condition during the inspection can be replaced with new parts. Everything is available in our [eshop](#).

i Please note that you have to be logged in to access all parts.

STEP 2 Preparing the printer



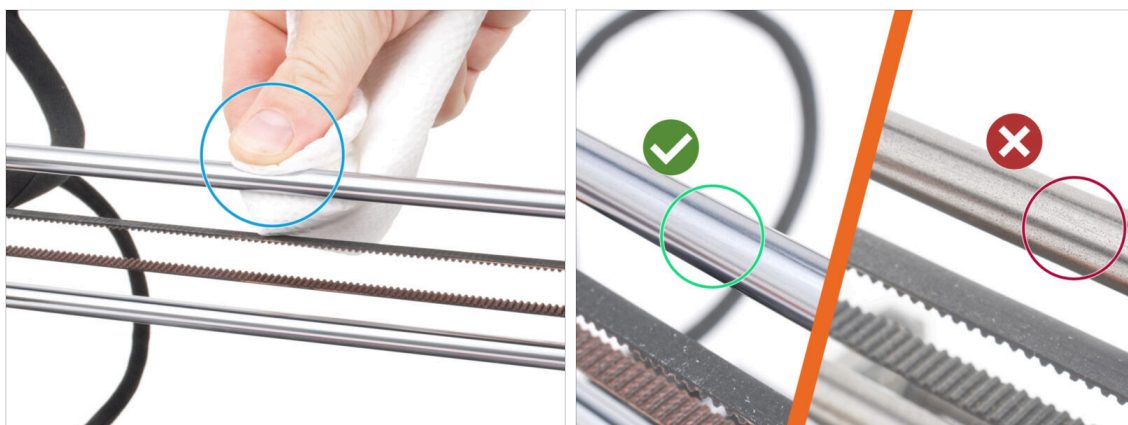
- Before start handle the printer, make sure that:**
 - Filament is unloaded from the extruder.
 - Spool holder is removed from the printer.
 - Flexible steel sheet is removed from the heatbed.
 - Printer is turned OFF and the power cable is unplugged from the PSU (power supply unit).

STEP 3 Heatbed inspection



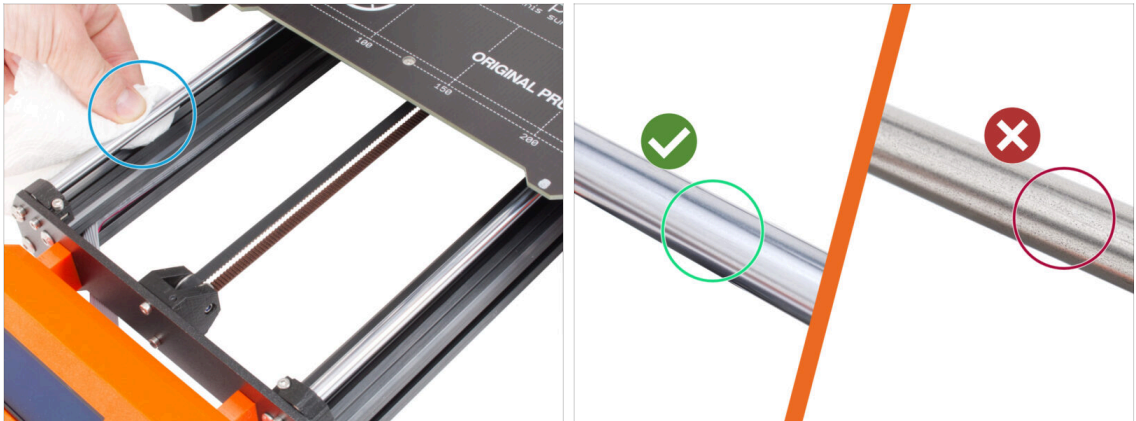
- Carefully inspect the surface of the heatbed. If you find any major scratches (up to the copper layer) consider replacing it with a new piece.

STEP 4 X-axis smooth rods inspection



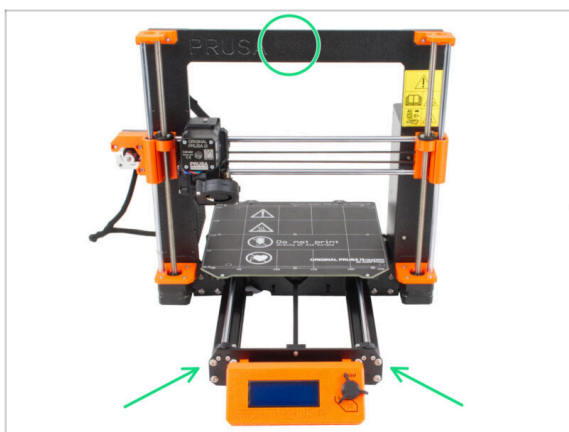
- Wipe the dirt from the entire length of the smooth rods with a paper towel.
- **Carefully inspect the surface of the smooth rods up close.**
 - The surface must be clean, smooth, and without corrosion.
 - If you find a rough scratch, corrosion, or rough surface, it is **highly recommended replacing with a new piece**. Buy a new **Smooth rod X-axis** (8x370 mm) in our [eshop](#)
 - Likewise, if the **smooth rods are scratched or the bearing travel on the rods is not smooth (they really stutter)**, we recommend ordering new LM8UU bearings as well. Buy new LM8UU bearings in our [eshop](#).

STEP 5 Y-axis smooth rods inspection



- Wipe the dirt from the entire length of the smooth rods with a paper towel.
- **Carefully inspect the surface of the smooth rods up close.**
 - The surface must be clean, smooth, and without corrosion.
 - If you find a rough scratch, corrosion, or rough surface, it is **highly recommended replacing with a new piece**. Buy a new **Smooth rod Y-axis** (8x330 mm) in our [eshop](#)
 - Likewise, if the **smooth rods are scratched or the bearing travel on the rods is not smooth (they really stutter)**, we recommend ordering new **LM8UU bearings** as well. Buy new LM8UU bearings in our [eshop](#).

STEP 6 Printer frame inspection



- Visually inspect all metal parts of the printer frame.
- ⚠ It is highly recommended to **replace a mechanically damaged frame** (bent, broken) with a new one. All parts are available in our [eshop](#).
- ⓘ Any scratches and scuffs are of no significance for the upgrade. In this case, it is up to your discretion to replace the parts.

STEP 7 Can I open the Haribo?



Keep the Haribo bag closed for now!



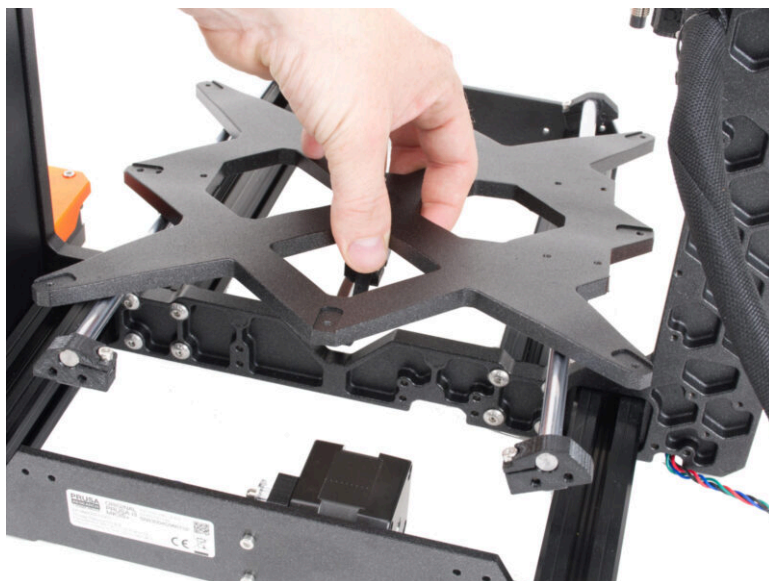
This dose of energy is primarily for printer assembly. **Wait until you are prompted to open it.**

STEP 8 Let's get started

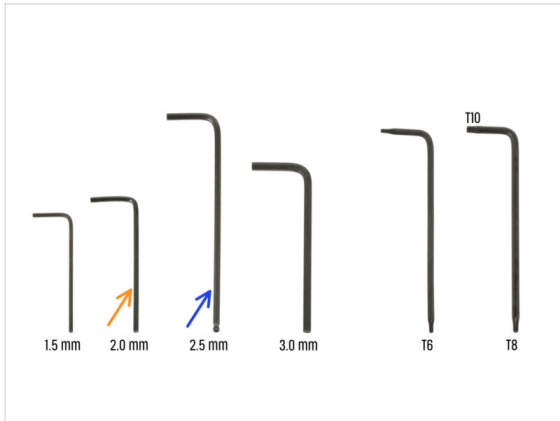


Everything checked? So, let's start with disassembling the printer. Go to the next chapter.

1b. Printer disassembly

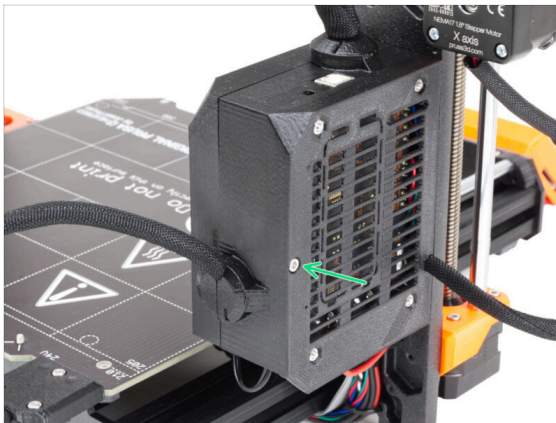


STEP 1 Tools necessary for this chapter



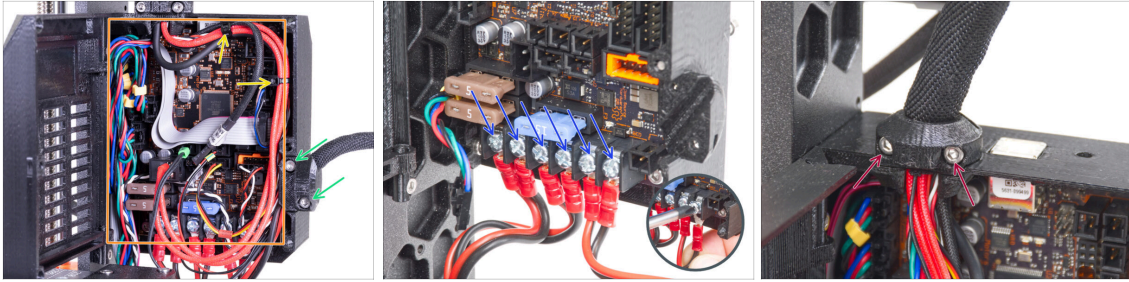
- **For this chapter, please prepare:**
- Needle-nose pliers *for cutting zip ties*
- Philips (PH2) screwdriver
- 2.0 mm Allen key *for heatbed screws*
- 2.5mm Allen key *for all M3 screws*

STEP 2 Opening the electronics box



- Loosen the screw on the Einsy-base.
- Open the Einsy-door to access the electronics.

STEP 3 Disconnecting cables



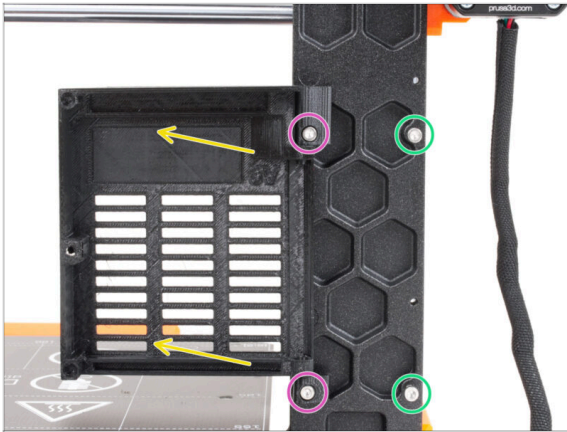
- ◆ Some units may have cable bundles secured with zip ties. Carefully cut the zip ties.
 - ⚠ **Avoid cutting the cables.** Although no cable of electronic parts will be needed for the upgrade, you can keep them for a project of your own.
- ◆ Release two screws in the heatbed-cable-clip and remove it from the printer.
- ◆ Disconnect all cables from the Einsky board.
 - i Cable management, Einsky board, and wiring colors may vary between printer models.
 - i Some of the cables have a safety latch on the connector. Press the latch before disconnecting.
- ◆ Release the screws on all power cables and disconnect them from the Einsky board using the screwdriver.
- ◆ Release two screws in the extruder-cable-clip and remove it from the printer.

STEP 4 Removing the Einsky-base



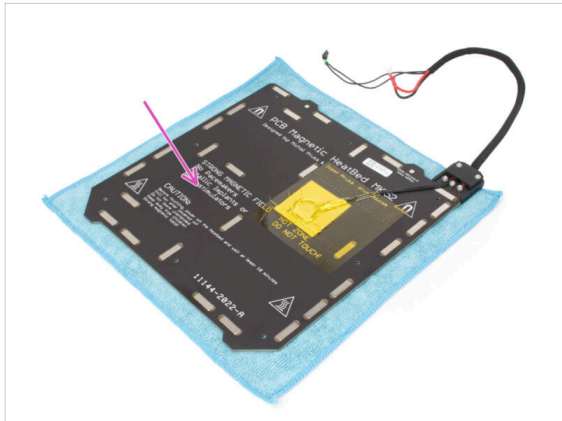
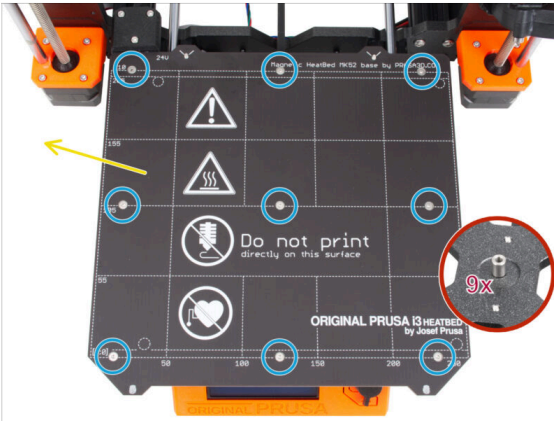
- ◆ Inside the Einsky-base, loosen the screw under the Einsky (electronics board).
 - i No need to remove the screw completely at this time.
- ◆ From the opposite side of the Einsky-base, locate the screw behind the cooling fins and loosen it, no need to remove it.
- ◆ Grasp the Einsky-base and slide it out of the printer frame.

STEP 5 Removing the Einsy-door



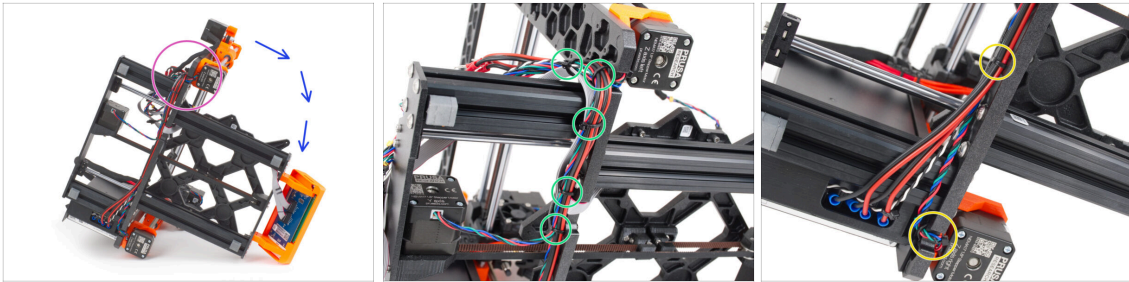
- ◆ Release two screws securing the hinges.
- ◆ Remove the Einsy-door with the hinges from the printer frame.
- ◆ Remove the remaining two screws from the frame.

STEP 6 Removing the heatbed



- ◆ Release nine countersunk screws securing the heatbed.
- ◆ Remove the heatbed from the Y-carriage.
- ⚠ After removing the heatbed, there are nine unattached spacers on the Y-carriage. Watch out, they tend to fall off. After removing them, count them all to be sure.
- ⓘ You will no longer need these parts for the upgrade. We are more concerned that this small part is not found later by your child or your dog and that no injury occurs.
- ◆ We recommend placing the heatbed temporarily on a piece of clean cloth or other soft pad.

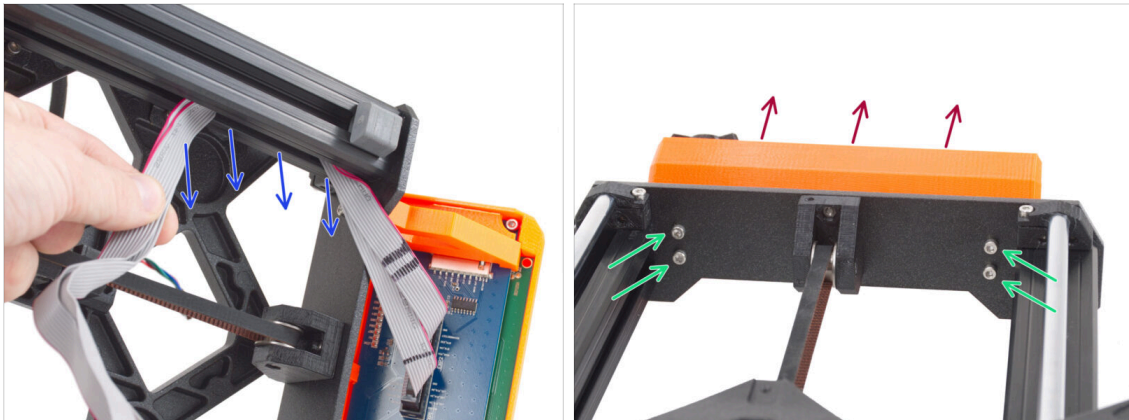
STEP 7 Dismantling cable management



- Place the printer on the side with the PSU.
- Focus on the left Z-axis motor.
- Cut the zip ties securing the cable bundle.
- ❗ The number of zip ties may vary between printer models.
- Cut the zip ties in the right Z-axis motor.
- Leave the cables free for now.

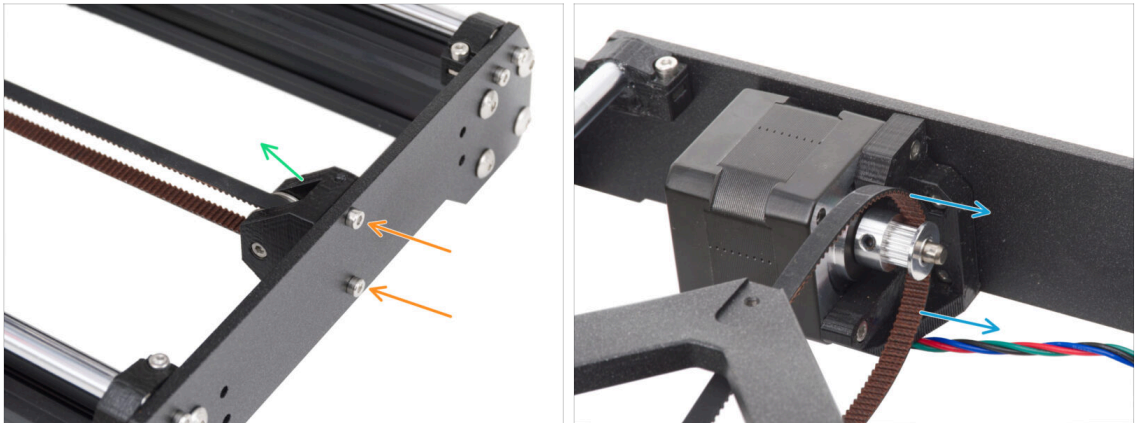
⚠ **Check the condition of the Y and Z motor cables.** If the zip ties have been too tight for a long time, the cables may be damaged.

STEP 8 Removing the LCD assembly



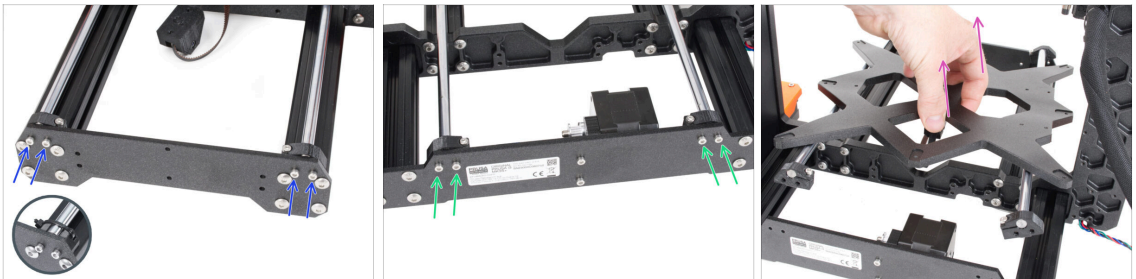
- Carefully remove the LCD cables from the extrusion.
- Place the printer back on its feet.
- Release four M3 screws securing the LCD assembly in the front plate.
- Remove the LCD assembly from the printer.

STEP 9 Dismantling the Y-axis: removing the belt



- 🔵 Release two M3 screws securing the Y-belt-idler in the front plate.
- 🟢 Remove the Y-belt-idler from the front plate. Leave it free "inside" the frame for now.
- 🔵 Take the belt off the GT2-16 pulley on the Y-axis motor.

STEP 10 Removing the Y-axis assembly



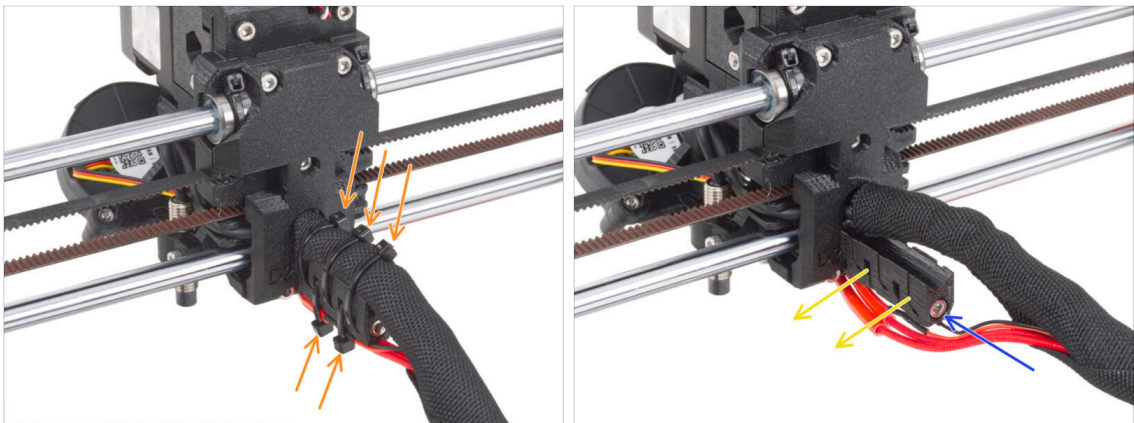
- 🔵 Release and remove two M3 screws securing each Y-rod-holder in the front plate.
 - ⓘ Note: MK3 and MK3S printers have different Y-rod-holder designs. At this point, the difference doesn't matter.
- 🟢 Release and remove two M3 screws securing each Y-rod-holder in the rear plate.
- 🟡 Remove the entire Y-axis assembly from the printer.
- ⚠️ **Do not remove any parts from the assembly at this time.**

STEP 11 Removing the Z-axis-tops



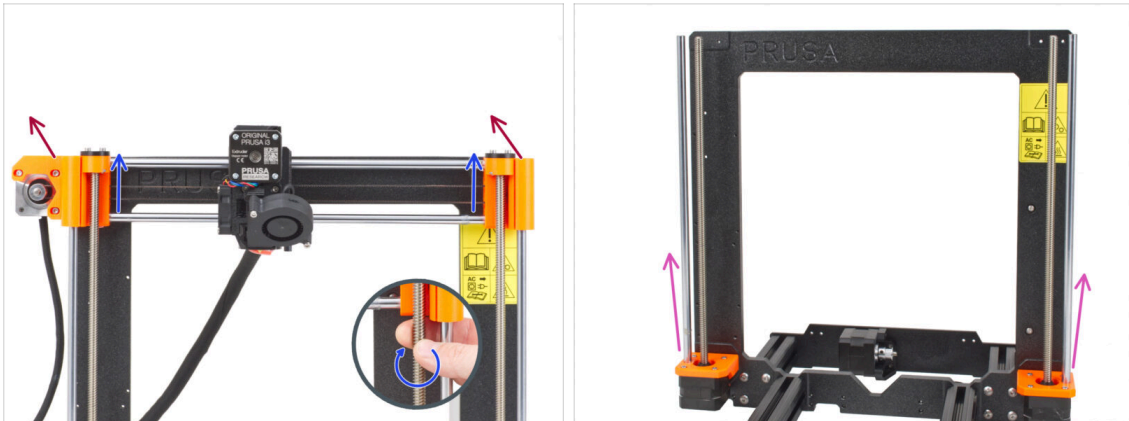
- On the Z-axis-top-left, release two M3 screws.
- Remove the Z-axis-top-left from the printer.
- On the Z-axis-top-right, release two M3 screws.
- Remove the Z-axis-top-right.

STEP 12 Removing the cable-holder



- From the back of the extruder, cut three zip ties at the top of the textile sleeve wraps the cable bundle. And two zip ties on the underside of the cable-holder.
- ⓘ Some MK3 units may have a rubber spiral wrap instead of the textile sleeve.
- Loosen the M3 screw securing the cable-holder.
- Remove the cable-holder from the extruder.

STEP 13 Removing the X-axis assembly



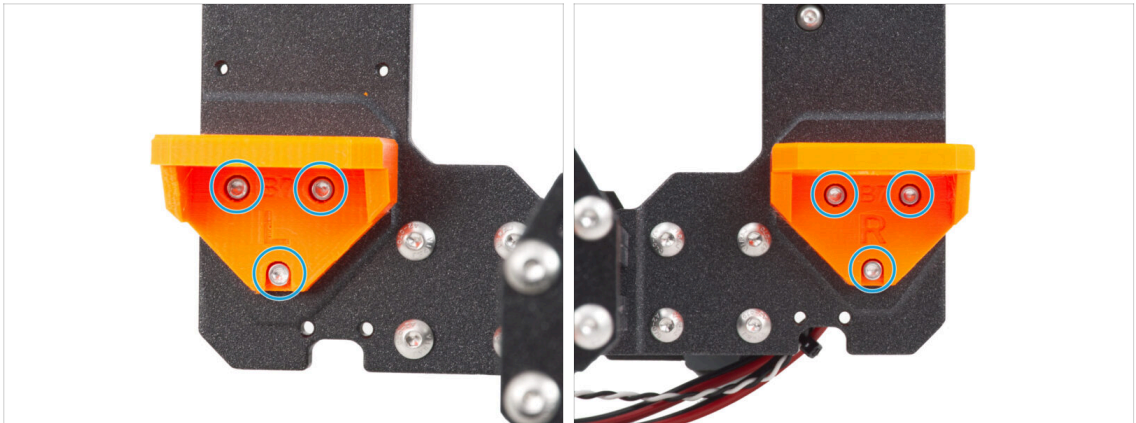
- ➡ From the front side of the printer, rotate both threaded Z-axis rods in parallel to move the X-axis assembly upwards. Stop when the trapezoid nuts of the X-axis assembly come out of the threaded rods.
- ➡ Remove the X-axis assembly from the printer.
- ➡ Pull out both Z-axis smooth rods from the Z-bottoms.

STEP 14 Removing the Z-axis motors



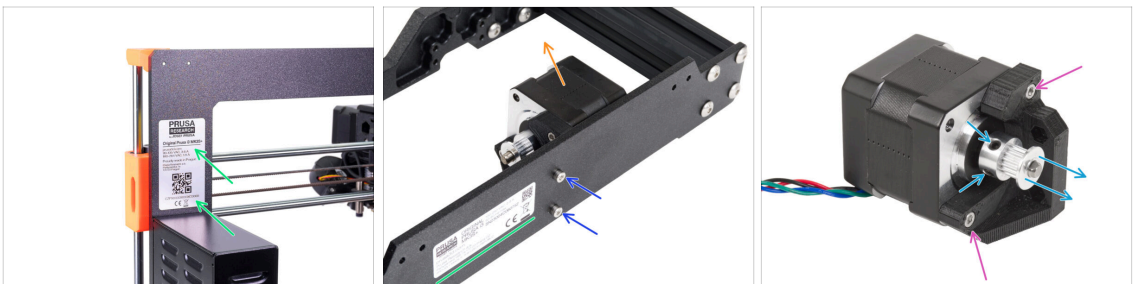
- ➡ Release four M3 screws from both Z-bottom securing the Z-axis motors.
- ➡ Remove the motors by pulling them out from underneath.
- ⓘ **Do not discard the Z motors! Keep them aside.** You will need them for the MK3.9S upgrade.

STEP 15 Removing the Z-axis-bottoms



- ◆ Release three M3 screws on both Z-axis-bottom-right and Z-axis-bottom-left.
- ◆ Remove the Z-axis-bottoms from the printer.

STEP 16 Removing the Y-motor



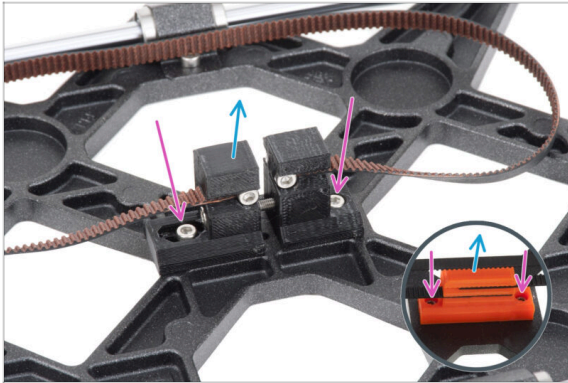
- ◆ Peel off the sticker with the serial number of your printer. After the printer upgrade is complete, you will stick the label with the new serial number.
- ◆ From the back of the printer, release two M3 screws securing the Y-axis motor assembly on the rear plate.
- ◆ Remove the Y-axis motor assembly from the printer.
 - ① The serial number label can be on the back of the rear plate or on the back of the printer above the PSU.
- ◆ Release two M3 screws on the Y-motor-holder and remove it from the motor.
- ◆ Loosen both grub screws in the pulley and remove the pulley from the motor. **Keep the Y motor for later.**
 - ① The upgrade kit includes a new pulley. Keep this old one aside to avoid mixing them up.

STEP 17 Disconnecting the power cables (Black PSU)



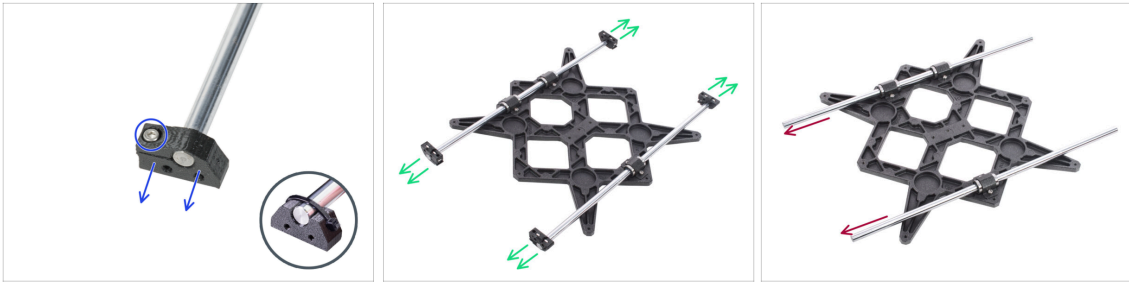
- ① This step is intended for the **black PSU only**. If you have the silver PSU, skip this step.
- Place the printer frame on its left side (the side without the PSU).
- Focus on the cables guiding from the PSU.
- Release two M3 screws inside the PSU-cover.
- Remove the PSU-cover from the PSU.
- Disconnect all power cables from the PSU.
- Disconnect the power panic cable from the PSU.

STEP 18 Disassembling the Y-carriage: belt



- ① Now the printer is disassembled into subassemblies. Some subassemblies require even minor surgery. Let's get started.
- Take the Y-axis assembly.
- Release two M3 screws securing the Y-belt-holder and Y-belt-tensioner.
- ① MK3 has a different-looking part Y-belt-holder. However, the procedure is the same.
- ① The Y-carriage part may differ from the picture depending on your printer model.
- Remove the belt assembly from the Y-carriage.

STEP 19 Dissassembling the Y-carriage: rod holders



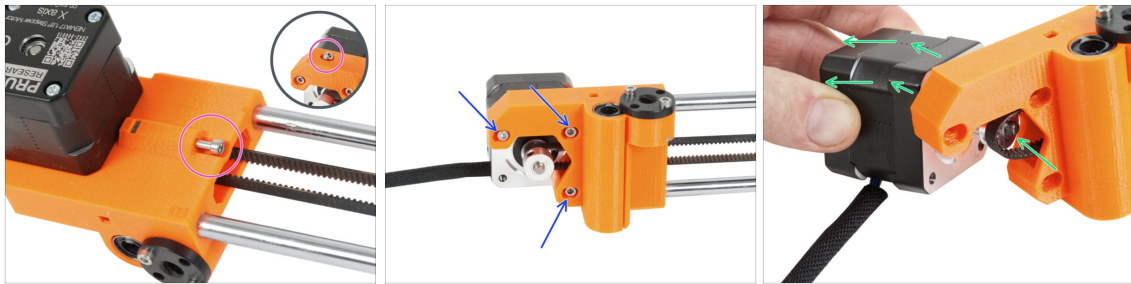
- There are the M3 screws on the Y-rod-holders. Loosen the screw and take the Y-rod-holder off the rod.
- ① MK3 and MK3S use a zip tie instead of a screw. Cut off the zip tie and remove the Y-rod-holder from the rod.
- Do the same with all four Y-rod-holders.
- Remove the smooth rods from the Y-carriage assembly.

STEP 20 Disassembling the Y-carriage: bearings



- Release two screws on each bearing clip on the Y-carriage.
- ① MK3 and MK3S have U-bolts instead of bearing clips secured with two M3nN nuts on the opposite side.
- ① Early MK3S+ units have bearing clips secured by two M3nN nuts on the opposite side.
- Remove the bearing clip and the bearing.
- In this way, remove all three bearings from the Y-carriage.
- ① **New bearings are not part of the MK3.9S upgrade kit.** If the bearings have been functioning properly thus far, retain them for the MK3.9S upgrade. However, if they have significant substantial wear, it is advisable to purchase new bearings from our [eshop](#).

STEP 21 Removing the X-axis motor



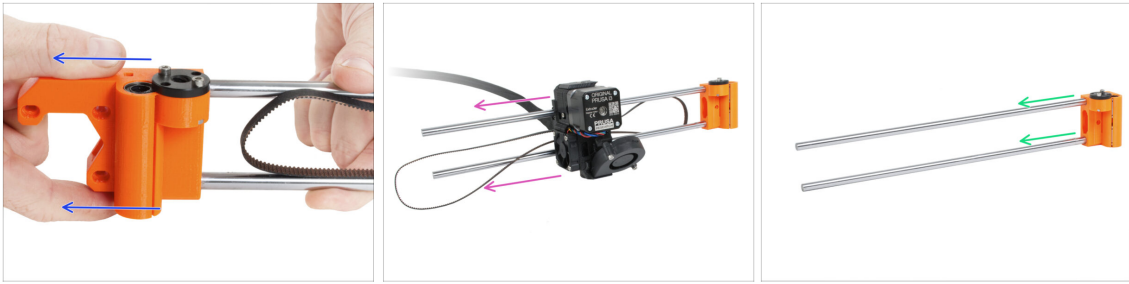
- ◆ Loosen the tensioning screw on the X-end-motor on the X-axis.
 - ⓘ Note that the screw position may vary depending on the printer model.
- ◆ Release three M3 screws securing the X-axis motor.
- ◆ Pull the X-axis motor and pulley out of the belt and remove it from the X-axis.

STEP 22 Disassembling the X-axis: Removing the pulley



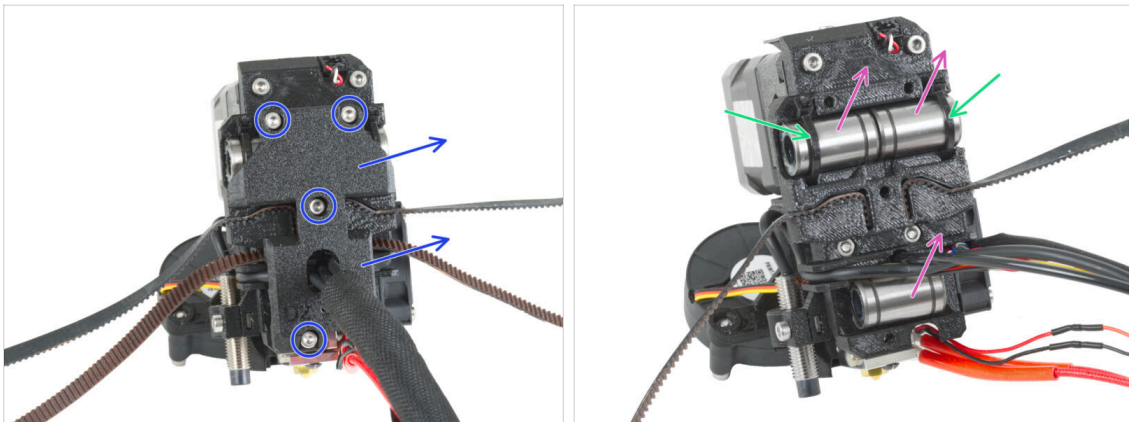
- ◆ Remove the M3 screw securing the pulley in the X-end-idler.
- ◆ Pull the pulley and the belt out of the X-end-idler.
 - ⓘ Put the pulley aside, you don't need it anymore.

STEP 23 Removing the X-axis smooth rods

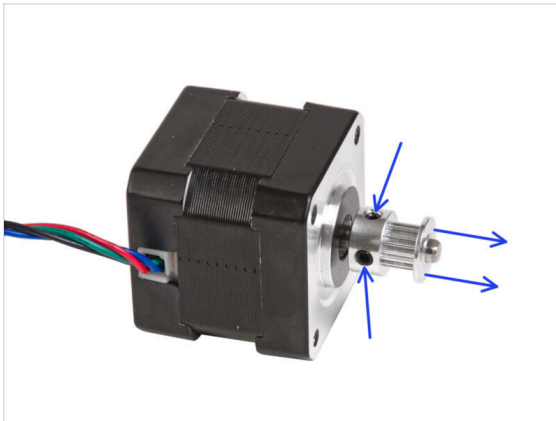


- ◆ Pull the X-end-motor from the X-axis assembly.
 - ⚠ It can be difficult to remove the part and more force is required. **Use extreme caution to avoid injury.**
- ◆ Slide the extruder assembly completely from the X-axis assembly.
- ◆ Pull out both smooth rods from the X-end-idler.
 - ⚠ It can be difficult to remove the parts and more force is required. **Use extreme caution to avoid injury.**
- ◆ Keep the smooth rods aside, you will need them for the upgrade.

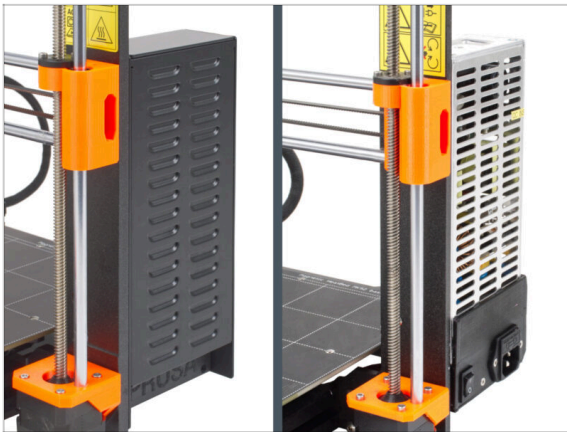
STEP 24 Removing the X-axis bearings



- ◆ Release all the M3 screws securing the X-carriage-back on the back of the extruder assembly and remove it.
- ◆ Cut off the zip ties securing both upper bearings.
- ◆ Take off all LM8UU bearings from the extruder.
- ◆ Visually check their condition again. If they are in good condition, put them aside to use later when upgrading your printer.
 - i Alternatively, you can use the LM8UU bearings from the X-ends that have not been subjected to so much stress during the printing. However, removing them is more difficult.

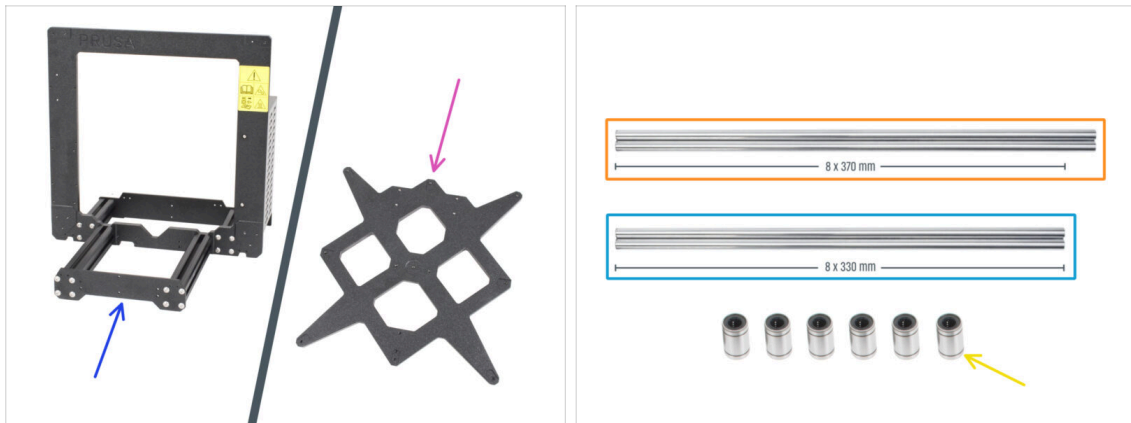
STEP 25 Removing the X motor pulley

- Loosen both grub screws in the pulley and remove the pulley from the motor. **Keep the X motor for later.**
 - ❗ The upgrade kit includes a new pulley. Keep this old one aside to avoid mixing them up.
- Release two M3 screws on each trapezoid nut mounted on both X-ends.
- Remove the trapezoid nuts from the X-ends. **Keep the trapezoidal nuts for later.**

STEP 26 For new users of black PSU

- If you've bought the black 24V 240W PSU, visit the dedicated installation guide here: [How to replace the silver PSU with the black PSU](#).
- ⚠ Don't forget to get back to this manual afterwards.

STEP 27 Parts summary I.



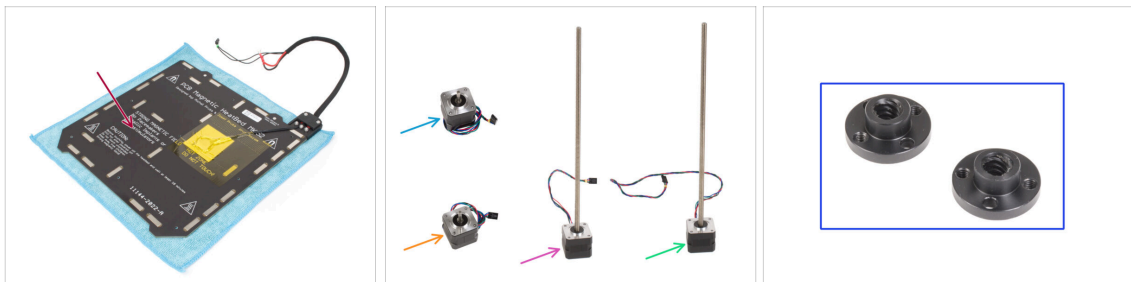
- The printer and its subassemblies are disassembled into individual parts. Let's show which parts will be needed for the next steps to upgrade the printer.

- **Prepare the following parts for the next chapters:**

- Printer frame with the PSU (1x)
- Y-carriage (1x)
- Smooth rod 8x370 mm (2x) *X-axis*
- Smooth rod 8x330 mm (2x) *Y-axis*
- LM8UU bearing (6x) *from X and Y-axis*

i The list continues in the next step...

STEP 28 Parts summary II.



- Heatbed assembly (1x)
- X motor (1x)
- Y motor (1x)
- Z motor left (1x)
- Z motor right (1x)
- Trapezoidal nut (2x)

STEP 29 Don't throw away



- Retain the power cord to the PSU, flexible steel sheet(s) and spool holder to use the printer.

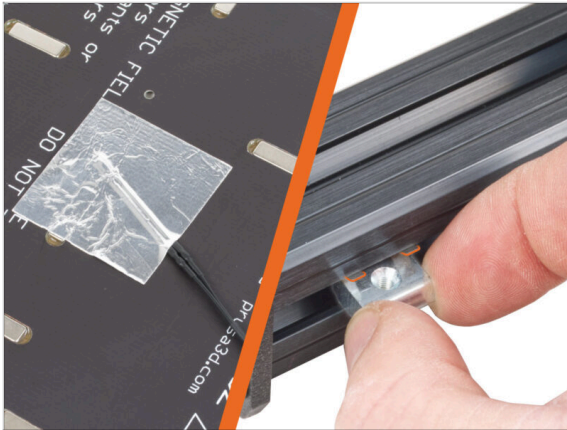
⚠ **You will no longer need the parts not listed for the upgrade. Keep them aside to avoid mixing with new parts.**

STEP 30 Can I take a gummy bear yet?



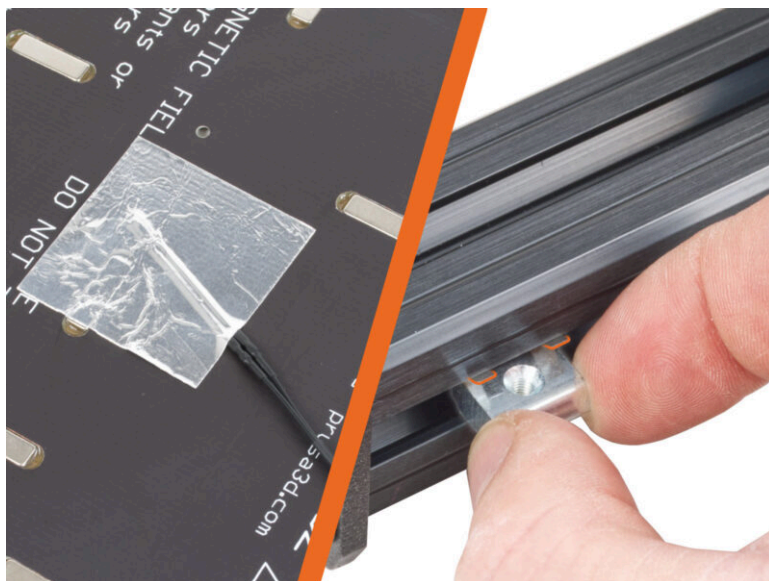
- No gummy bears yet? **Please hold on.**
- We do not want to keep you waiting, but the correct dosage of gummy bears is very important for the whole procedure.

STEP 31 Well done

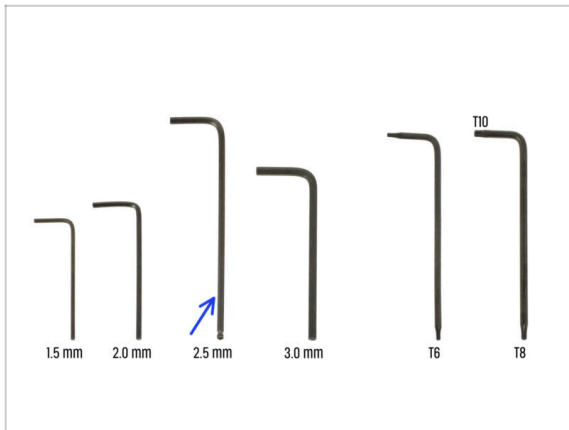


- Go to the next chapter **1.c Part preparation**

1c. Parts preparation

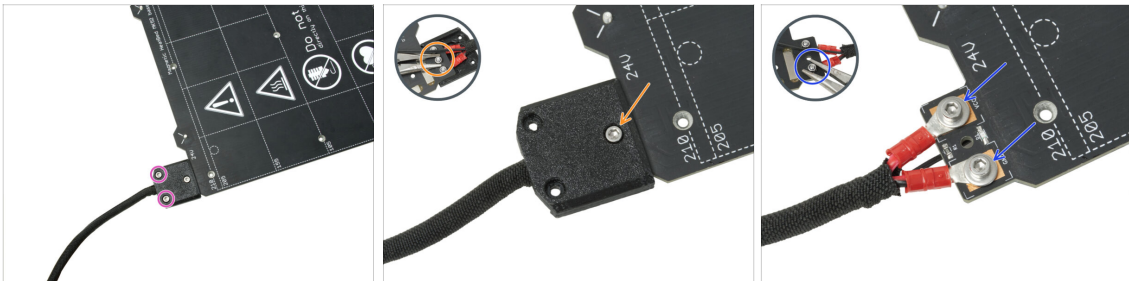


STEP 1 Tools necessary for this chapter



- For this chapter, please prepare:
- 2.5mm Allen key

STEP 2 Removing the heatbed cable cover



In the upcoming steps, you will replace the old heatbed thermistor (from your previous printer model) with a new version that is compatible with MK4S, MK3.9S, and MK3.5S.



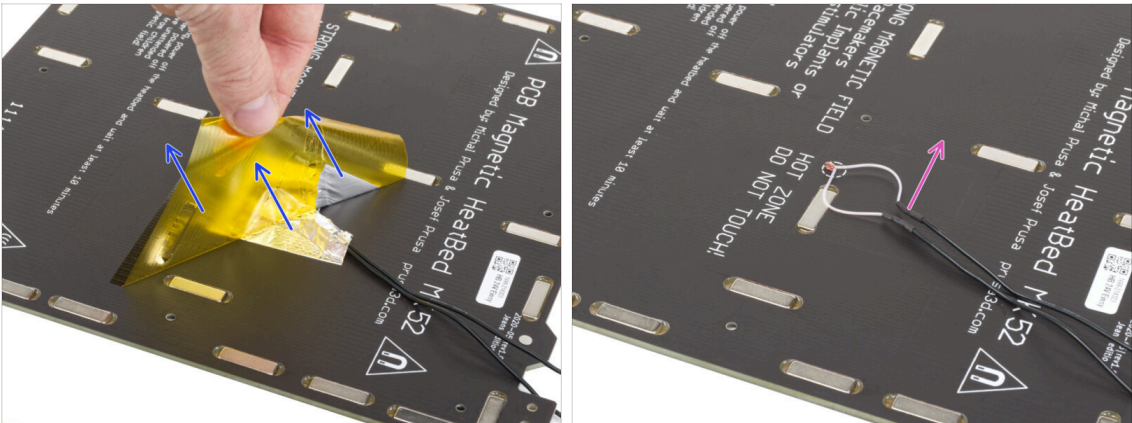
If you purchased a new heatbed with the upgrade kit — commonly for users with printers featuring 2+1 screws on the old heatbed — ensure that the new thermistor is pre-installed. You can easily verify this by checking for a white connector at the end of the thermistor cable. The presence of this connector indicates that the new thermistor is already in place and you can skip to [M3nEs nuts: parts preparation](#)



This part may vary slightly in the design of the cover, location of the screws and number of the screws.

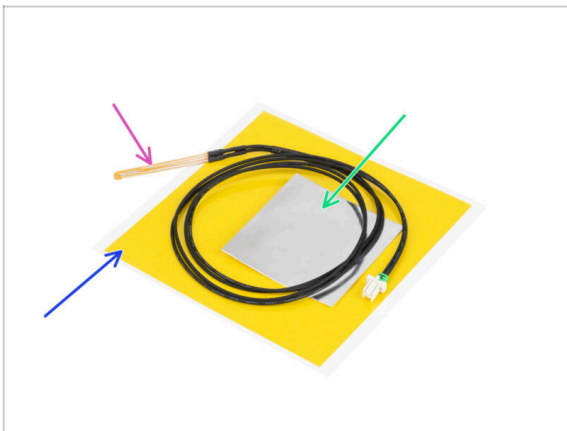
- Remove the screws fixing the cable bundle.
- Remove the screw securing the cover. From the underside, grasp the middle M3nN nut with the pliers while loosening the screw.
- Remove the cover.
- Release the screws fixing the heatbed power cables and remove the cables from the heatbed. From the underside, grasp the M3nN nuts with the pliers while loosening the screws.

STEP 3 Removing the heatbed thermistor



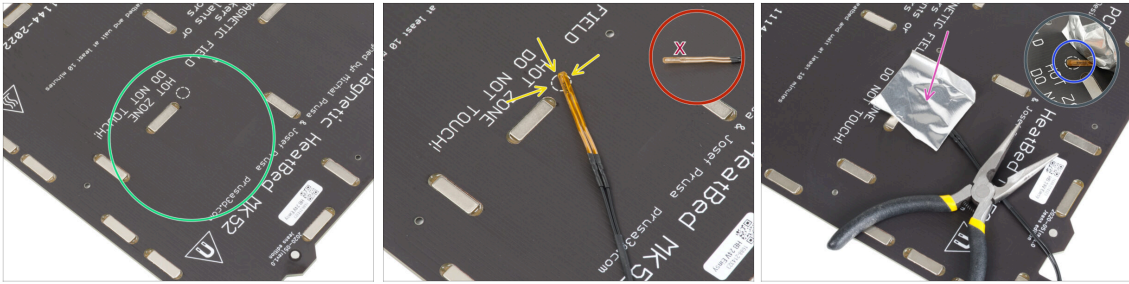
- From the bottom side of the heatbed, peel off the yellow Kapton tape and silver aluminum tape.
- Remove the heatbed thermistor cable from the heatbed.

STEP 4 New heatbed thermistor: parts preparation



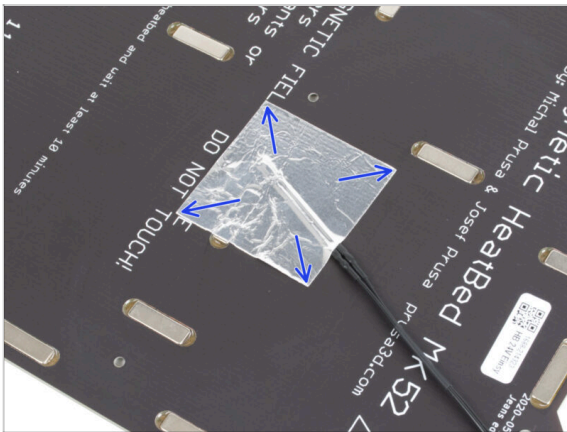
- For the following steps, please prepare:
- MK4 Heatbed thermistor (1x)
- Kapton tape (1x)
- Aluminum tape (1x)
- ⚠ **Pay attention to the instructions!**
The "yellow" Kapton tape tends to curl up and you won't be able to restore its initial shape!!
- ⓘ All the necessary parts can be found in the **Heatbed thermistor set bag**.

STEP 5 Preparing the heatbed and thermistor



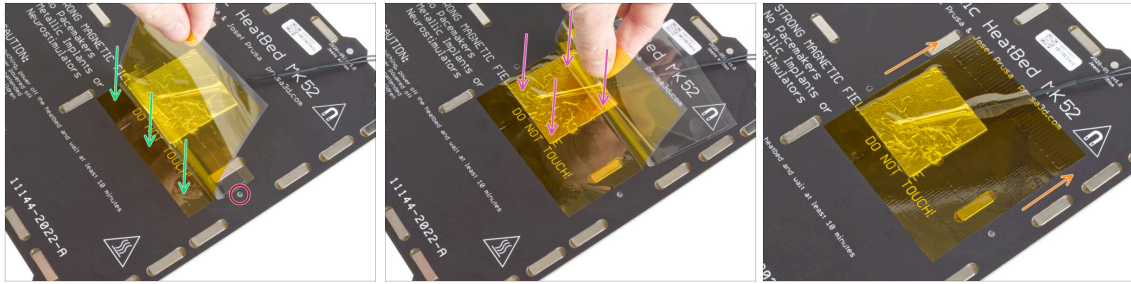
- After you have removed the thermistor and the tapes, clean the entire board to remove any grease. You can leave the glue, which was under the aluminum tape.
- Place the thermistor on the heatbed. **The tip of the thermistor must be in the circle.**
 - ⚠ If you miss this spot, the printer will read incorrect temperature values.
 - ⚠ Note which side the sensor is attached to the heatbed.
- ⬛ Take the silver aluminium tape and carefully peel off the protective film.
- Glue the tape to the heatbed, **BUT ONLY** in the centre of the thermistor (inside the circle shape). We need to double-check the correct position.
- Peel or bend the tape slightly, to reveal the tip of the thermistor.

STEP 6 Covering the thermistor



- Maintain the thermistor position and cover it with aluminum tape. Ensure that the whole thermistor sensor is covered with the tape.

STEP 7 Fixing the thermistor in place



- ⚠ Now it is time to apply the final "yellow" Kapton tape. **DON'T PEEL OFF the entire tape, it will curl up!!!**
- 🟢 Peel off about 1 cm (0.5 inches) strip of the Kapton tape and stick it to the heated bed, like in the picture. Ensure the tape is properly connected.
- ⚠ **Make sure the Kapton tape does not overlap any screw holes in the heated bed.**
- 📌 The Kapton tape has a bigger area than the silver tape. Make sure the silver tape is overlapped from all sides.
- 🟡 Continue with gluing the tape and stop for a second above the area with the thermistor. Pay great attention to sticking the tape everywhere.
- 🟠 Finish gluing the tape to the heated bed. Double-check the entire surface is properly connected.

STEP 8 M3nEs nuts: parts preparation



- 🔧 For the following steps, please prepare:
- 🟠 M3nEs nut (2x)

STEP 9 Inserting the M3nEs nuts



- ✦ Insert the M3nEs nut into the left short extrusion (side without the PSU). Insert the side with the spring (metal plate) first.
- ✦ Push the entire nut inside the extrusion using your finger.
- ✦ Use this method for both M3nEs nuts. The exact position of the nuts doesn't matter at this time.

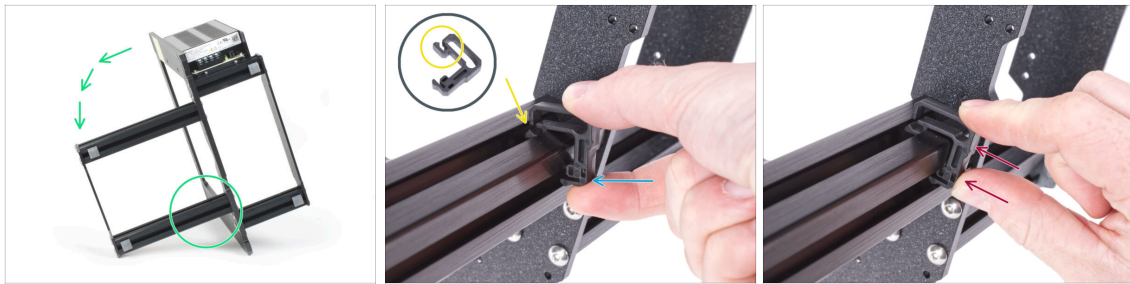
STEP 10 Cable clips: parts preparation



✦ **For the following steps, please prepare:**

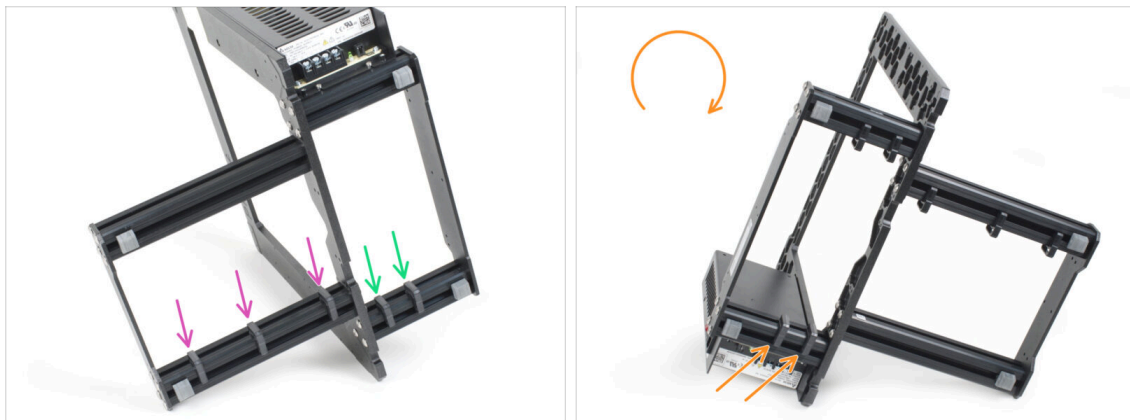
- ✦ Cable clip (7x)

STEP 11 Installing the cable clips



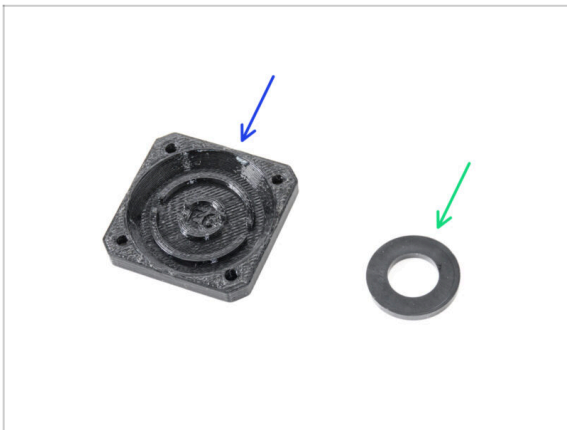
- Turn the frame like in the picture and focus on the marked area
- Take one of the cable clips and hook the side with the clip into the inner groove of the lower longer extrusion. There is a hook on the part, see the detail.
- Place the other end of the clip on the underside of the extrusion.
- Use more force to push on the bottom side of the cable clip. It must fit into the groove and you must feel it "click" in.

STEP 12 Installing the cable clips



- Install three clips to the long extrusion.
- Install two clips to the short extrusion.
- Turn the frame, install two clips to the second short extrusion.

STEP 13 PG-front-case: parts preparation



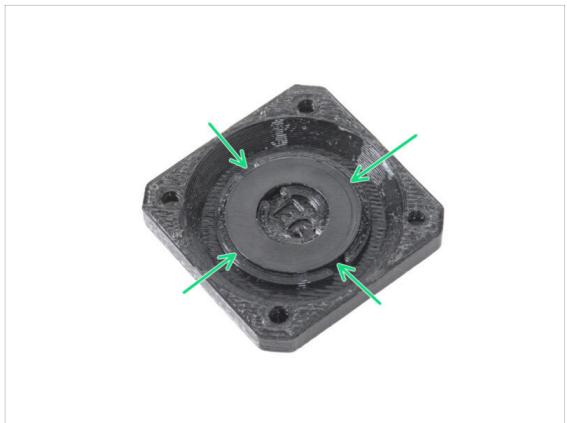
● For the following steps, please prepare:

● PG-front-case (1x)

● Spacer 13x24x2.5 (1x) *can be black or white*

ⓘ Spacer 13x24x2.5 can be found in the **NEXTRUDER** bag and it can be black or white.

STEP 14 Assembling the PG-front-case



● Place the spacer into the circular recess in the PG-front-case and **push it all the way down. Note the correct orientation of the washer.**

⚠ **The side of the washer with the three circles must not face up! Otherwise, the planetary gear won't work properly.**

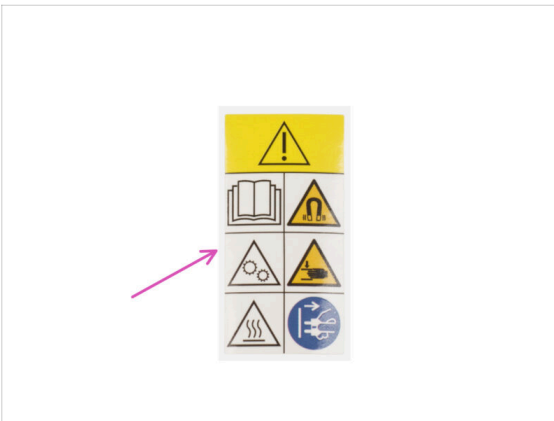
● Make sure the washer is pushed evenly into the printed part.

STEP 15 Stickers and labels: parts preparation I.



- For the following steps, please prepare:
- ⓘ All the stickers and labels can be found in the **UPDATE STICKERS** bag.
- xLCD-cover (1x)
- PG-front-case (1x)
- xLCD-cover MK3.9 sticker (1x) *rectangular shape, optional*
- PG-case MK3.9 sticker (1x) *square shape, optional*
- Serial number label (1x) *silver label*
- ⓘ The list continues in the next step...

STEP 16 Stickers and labels: parts preparation II.



- For the following steps, please prepare:
- ⓘ All the stickers and labels can be found in the **UPDATE STICKERS** bag.
- Safety label (1x)
- Cleaning pad (1x)

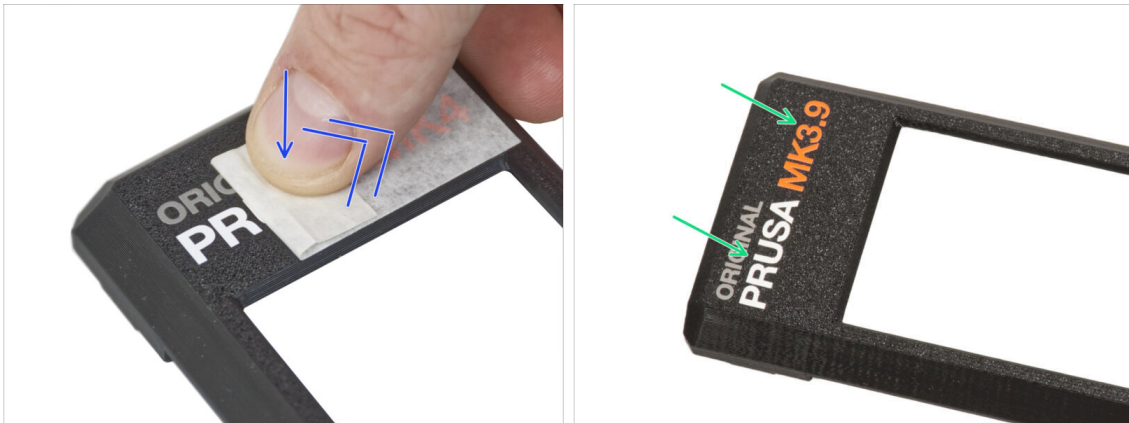
STEP 17 xLCD-cover sticker (optional)



⚠ This and the following step are optional. Also, please **BE PATIENT**, smaller letters require more effort in order to be transferred and glued properly.

- 🔵 Using the cleaning pad, clean the side without the circle hole on the xLCD-cover.
- 🟢 Peel off a piece of the protective layer and carefully glue the sticker on the xLCD-cover. Maintain the sticker aligned with the edges of the display cover. Start on the bottom side.
- 📄 ⓘ Notice the white PRUSA lettering through the sticker. **Compare the orientation with the second picture.**
- 🟡 After gluing the sticker, run your finger along the entire length of the sticker in all directions to ensure perfect adhesion.

STEP 18 xLCD-cover sticker (optional)



⚠ This process requires patience and care. Perfect adhesion depends on proper degreasing of the part and the ambient temperature.

- 🔵 Start slowly peeling off the application layer. Lightly press the layer onto the lettering as you peel it off. Observe whether all the letters are glued on.
- 🟢 After peeling off the application layer, check that the final look matches the picture.

STEP 19 PG-case sticker (optional)



- ⚠ This and the following step are optional. Also, please **BE PATIENT**, smaller letters require more effort in order to be transferred and glued properly.
- 🔵 Using the cleaning pad, clean the front side of the PG-case.
 - 🟡 Peel off a piece of the protective layer and carefully glue the sticker on the PG-case. Maintain the sticker aligned with the edges of the cover.
 - 🟠 See the detail to ensure the **correct orientation of the sticker**. Use the screw holes as a guide.
 - 🟢 After gluing the sticker, run your finger along the entire length of the sticker in all directions to ensure perfect adhesion.

STEP 20 PG-case sticker (optional)



- ⚠ This process requires **patience and care**. Perfect adhesion depends on proper degreasing of the part and the ambient temperature.
- 🔵 Start slowly peeling off the application layer. Lightly press the layer onto the lettering as you peel it off. Observe whether all the letters are glued on.
 - 🟢 After peeling off the application layer, check that the final look matches the picture.

STEP 21 Sticking the serial number label



⚠ This step is required in order to provide warranty! Don't throw the label away!

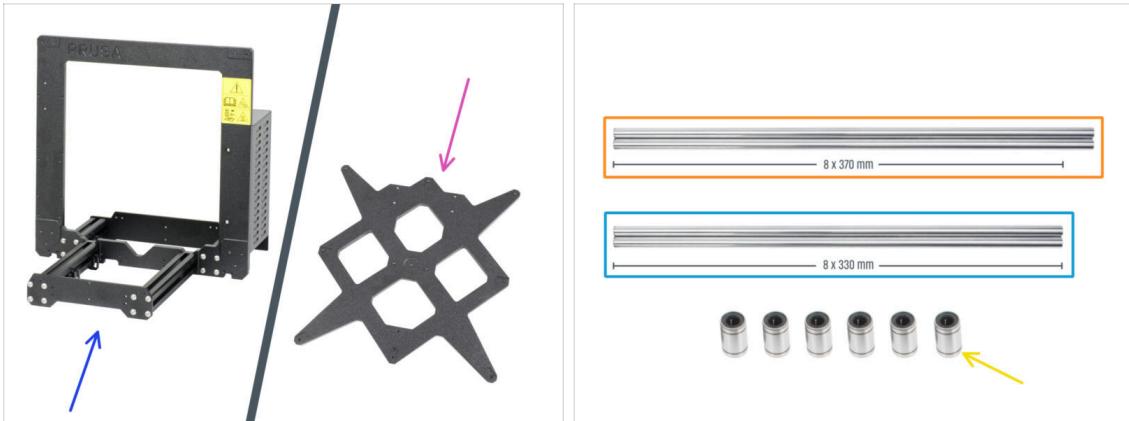
- Peel off the protective layer from the rear side of the label.
- Glue the label on the left side of the rear plate. Make sure, the surface is clean. Use the supplied cleaning pad.

STEP 22 Safety label (optional)



- Take a look at the front side of the printer frame. There should be a yellow safety label on the right side of the frame.
 - Peel off the label.
 - Use the supplied cleaning pad to wipe the area where the label was applied.
 - Take a new safety label. Peel off the bottom protective layer from the label and glue the label on the clean surface of the frame.
- (i) Please note** that the following pictures in the manual were taken with a previous (yellow) version of the safety sticker. This is because they were taken before the new sticker was available.

STEP 23 Parts summary I.

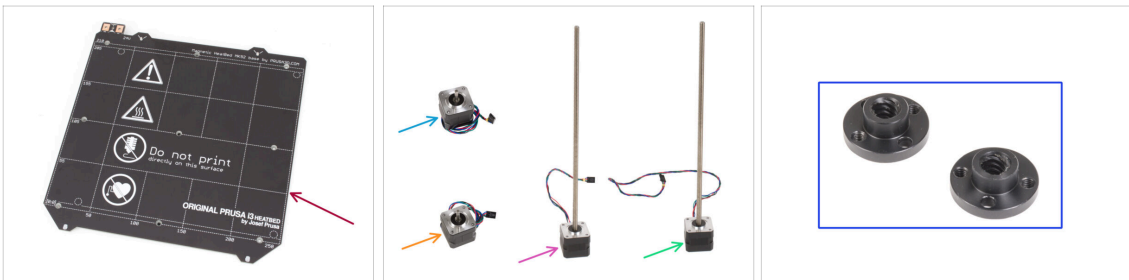


Put aside the following prepared parts for the next chapters:

- Printer frame with the PSU (1x)
- Y-carriage (1x)
- Smooth rod 8x370 mm (2x) X-axis
- Smooth rod 8x330 mm (2x) Y-axis
- LM8UU bearing (6x) from X and Y-axis

The list continues in the next step...

STEP 24 Parts summary II.



- Heatbed (1x)
- X motor (1x)
- Y motor (1x)
- Z motor left (1x)
- Z motor right (1x)
- Trapezoidal nut (2x)

All the parts you printed for the upgrade.

STEP 25 Don't throw away



- Retain the power cord to the PSU, flexible steel sheet(s) and spool holder to use the printer.

⚠ You will no longer need the parts not listed for the upgrade. Keep them aside to avoid mixing with new parts.

STEP 26 Still no sweets?



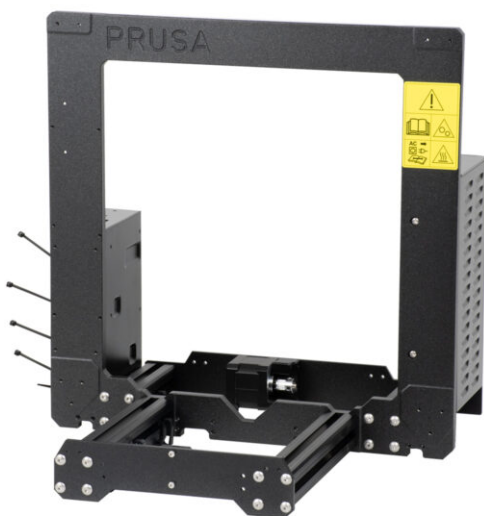
- Please don't open the bag yet.
- But you are getting close to your first taste ;).

STEP 27 That's it

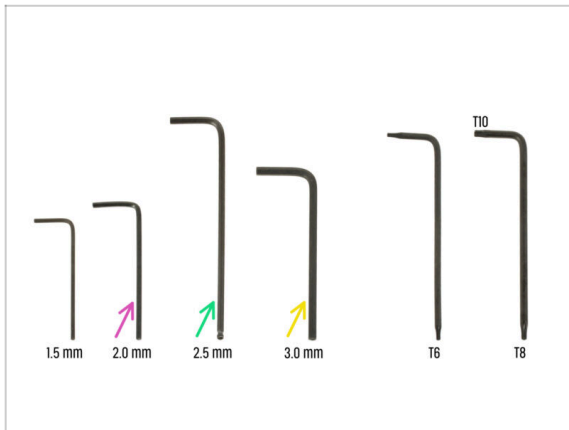


- Once you have all of the parts listed, proceed with upgrading your printer.
- Enjoy the assembly.

2. Frame assembly



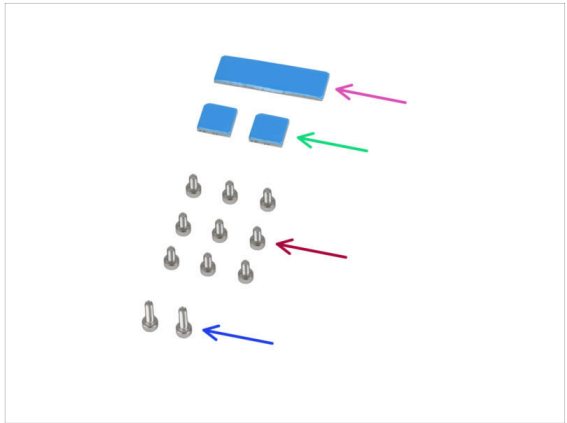
STEP 1 Tools necessary for this chapter



● **For this chapter, please prepare:**

- ◆ 2.0mm Allen key for tightening the grub screws
- ◆ 2.5mm Allen key for most of the M3 screws on the assembly
- ◆ 3mm Allen key for M5 screws used on the frame

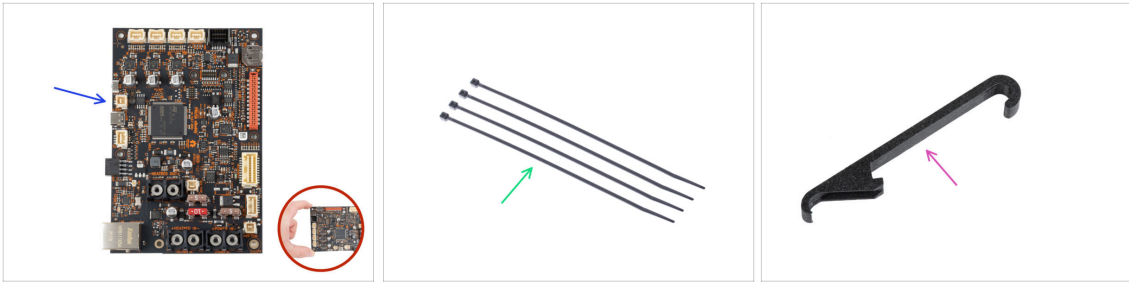
STEP 2 xBuddy box: parts preparation



● **For the following steps, please prepare:**

- ◆ xBuddy box (1x)
- ⓘ xBuddy box is located in the box with plastic parts.
- ◆ Thermal pad 40x12x2.2 mm (1x)
- ◆ Thermal pad 12x12x2.2 mm (2x)
- ◆ M3x6 screw (9x)
- ◆ M3x10 screw (2x)
- ⓘ The list continues in the next step...

STEP 3 Mounting the xBuddy box: parts preparation



● For the following steps, please prepare:

● xBuddy board (1x)

⚠ **Always touch the sides of the electronics board while manipulating it. Avoid touching the chips, capacitors and other parts of the electronics.**

● Zip tie (4x)

● X-holder (1x)

STEP 4 Mounting the xBuddy box



● Turn the printer so that the **extrusion profiles with shorter lengths are facing towards you.**

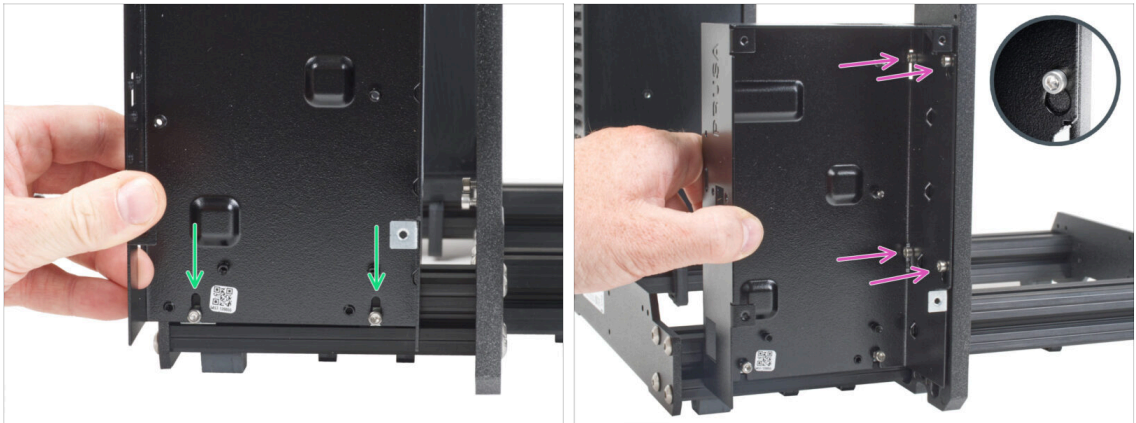
ⓘ Most of the following pictures are taken on the latest version of the printer frame. The frame has hexagonal recesses on its back side. This is just a design element. The latest frame design is functionally identical with the previous ones.

● Insert four M3x6 screws to the back of the frame (side with shorter extrusions), so they resemble a rectangular pattern. Tighten the screws fully into the frame to clean the threads. Then loosen the screws, **leaving a gap of at least 3 mm between the screw head and the frame.**

⚠ **Make sure you are using the correct holes.**

● Insert two M3x10 screws into the M3nE nuts in the second short extrusion. Turn them only 3-4 times by using a 2.5mm Allen key, just for the screws to be kept in place.

STEP 5 Mounting the xBuddy box



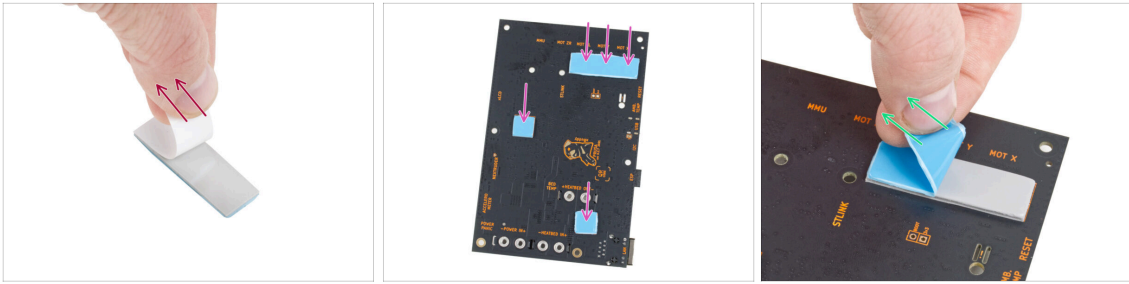
- Attach the xBuddy box on the M3x10 screws in the extrusion. **Do not tighten the screws at the moment!**
- Slide the xBuddy box to the frame and attach the box to all 4 screws in the frame. The screws must fit into the top part of the "key" hole. See the detail.

STEP 6 Mounting the xBuddy box



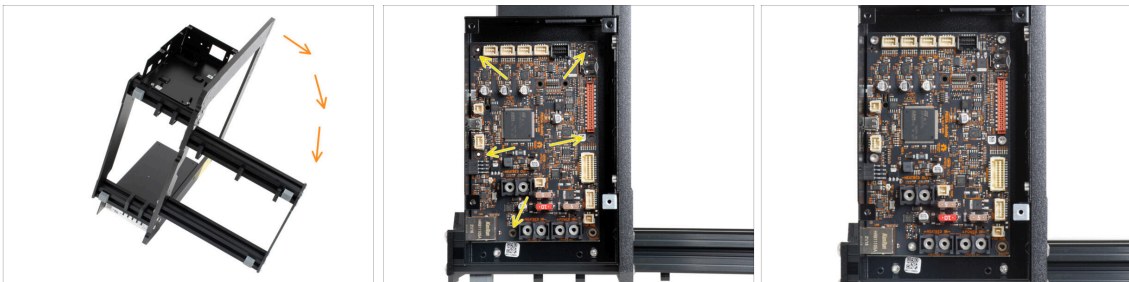
- Fully tighten all four M3x6 screws to secure the xBuddy box.
- ⓘ Be careful when tightening the "rear" top screw. Use the shorter side of the Allen key for final tightening.
- Fully tighten both M3x10 screws in the M3nE nuts.

STEP 7 Applying the thermal pads



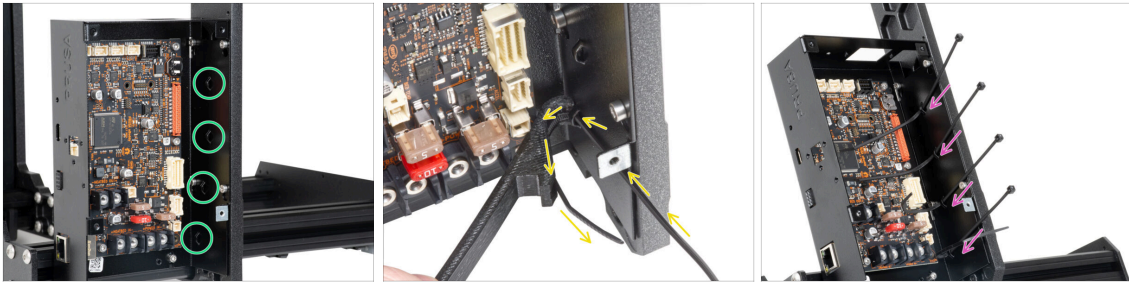
- Peel off the white protective layer from all thermal pads.
- ⚠ **Always touch the sides of the electronics board while manipulating it. Avoid touching the chips, capacitors and other parts of the electronics.**
- Attach the pads onto the back of the xBuddy board. There are markings that indicate the correct size and positions.
- ⓘ The surface to which the pads are stuck must be cleaned of grease. This will ensure better adhesion.
- ⚠ **For the protection of the board's electronic components, we strongly recommend placing the xBuddy board on the soft pad. You can use the original xBuddy bubble wrap package.**
- Peel off the blue protective layer from all thermal pads.

STEP 8 Mounting the xBuddy board



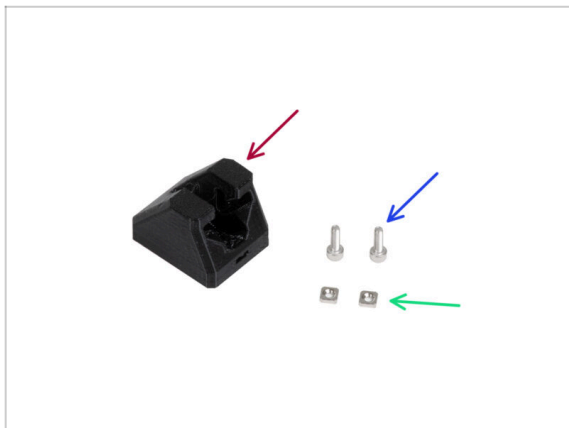
- For better access to the xBuddy box, carefully place the frame on the side with the PSU.
- Insert the xBuddy board into the xBuddy box. **Before fully attaching it completely, center the holes** in the board with the holes (columns) in the xBuddy box
- Fix the position of the xBuddy board by inserting **five M3x6 screws**. **Do not fully tighten the screws**. A few turns are enough for now.
- ⚠ **Put aside your instinct and leave the hole on the bottom right empty.**
- Fully tighten all five screws. **But very carefully**, otherwise you can damage the electronics board.

STEP 9 Attaching the zip ties



- Take a closer look at the xBuddy box. There are four perforations on the metal case.
- i** You can place the frame on the PSU side for better access to the xBuddy box.
- !** **Proceed very carefully. Be careful not to damage the connectors or capacitors on the xBuddy board.**
- Use the X-holder as a zip tie guidance. Place the X-holder behind the lowest perforation like in the picture. Push the zip tie through the protrusion to the X-holder. Keep protruding 3 - 5 cm of the zip tie from the perforation.
 - !** Note the correct orientation of the zip tie. The teeth on the zip tie must be on the visible side.
- Use this procedure for all four protrusions.
- !** **Do not discard the X-holder. You will need it later again.**
- Place the printer back on its "feet".

STEP 10 Preparing Y-belt-idler (part 1)



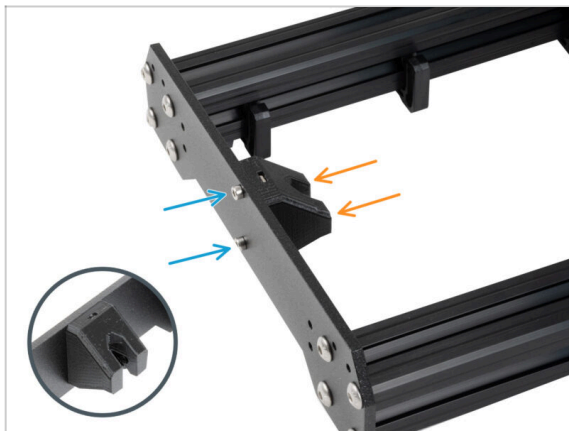
- For the following steps, please prepare:**
- Y-belt-idler (1x)
- M3x10 screw (2x)
- M3nS nut (2x)

STEP 11 Preparing Y-belt-idler (part 2)



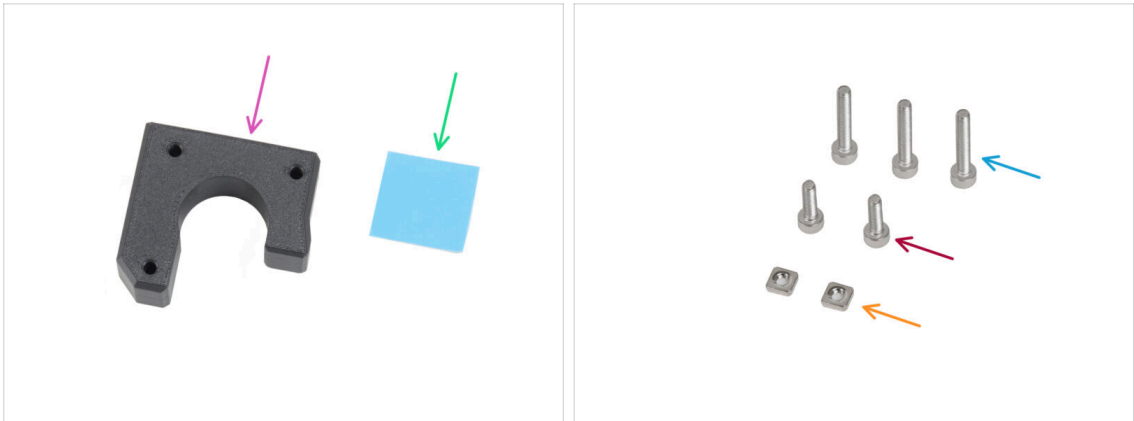
- Insert two M3nS nuts into the Y-belt-idler.
- ❗ There is a groove in the hole for pushing the nut all the way in with an Allen key.

STEP 12 Mounting the Y-belt-idler



- Arrange the frame so that the longer extrusions are facing you.
- Attach the Y-belt-idler from "inside" to the front plate. **Note the correct orientation of the part.**
- Secure the Y-belt-idler with two M3x10 screws.

STEP 13 Assembling the Y motor: parts preparation

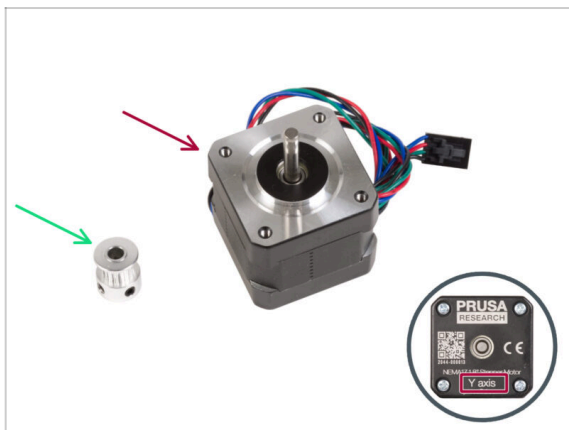


For the following steps, please prepare:

- Y-motor-holder (1x)
- Thermal pad 25 x 25 x 1.2 mm (1x)
- M3x18 screw (3x)
- M3x10 screw (2x)
- M3nS nut (2x)

The list continues in the next step...

STEP 14 Assembling the Y motor



For the following steps, please prepare:

- Y motor (1x) use the one you removed from the printer

Ensure you are using the correct motor, there is a label on the bottom of the casing. The reason is, each motor has different cable length.

- GT2-16 pulley (1x)

STEP 15 Assembling the Y-motor-holder



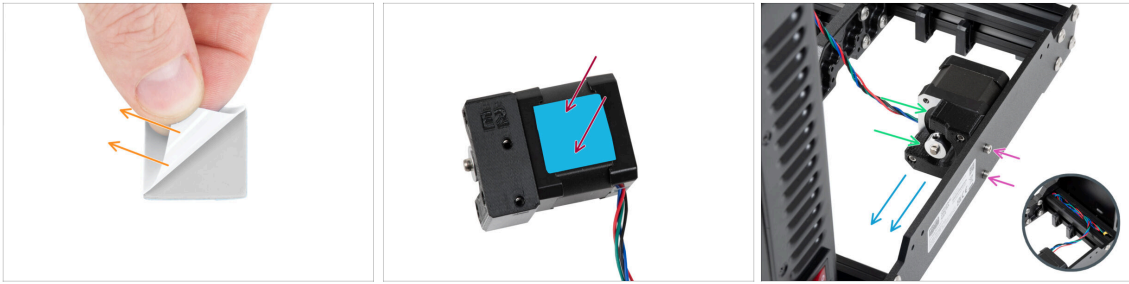
- Insert the M3nS nut into the corresponding openings on the top side of the Y-motor-holder. Using the Allen key, push the nut all the way in.
- Insert the M3nS nut all the way into the part from the side.
- Place the Y motor like in the picture. Use the motor cable as a guide.
- Attach the Y-motor-holder onto the Y motor and join both parts together with three M3x18 screws.

STEP 16 Assembling the Y-motor-holder



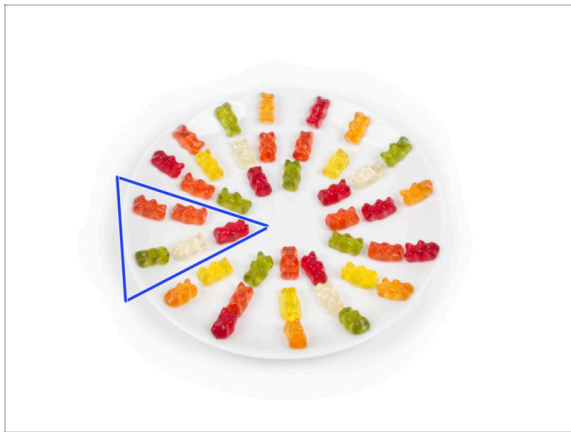
- There is a flat part on the motor shaft. Rotate the shaft, so the flat part is facing you through the opening in the Y-motor-holder.
- Attach the pulley on the shaft and ensure that one of the grub screws is facing the flat part of the shaft. **Do not tighten the grub screw yet.**
- ⚠ **Note the CORRECT ORIENTATION of the pulley.**
- Put one of the Allen keys on the **MOST TOP surface** of the printed part, like in the picture. And align the pulley with the Allen key.
- When the pulley is aligned, tighten the grub screw in the pulley against the flat part of the **shaft**. **Then rotate the pulley and tighten the second grub screw.**

STEP 17 Attaching the Y-motor-holder





- Peel off the white protective film from the thermal pad 25x25x1.2 mm on the Y motor.
 - ⓘ The side with the white film is more adhesive. If you have a thermal pad with a blue protective film on both sides, the side doesn't matter.
- Stick the thermal pad on the Y motor and **peel off the second protective layer** from it.
 - ⓘ The surface to which the pad is stuck must be cleaned of grease. This will ensure better adhesion.
- Place the Y-motor-holder onto the inner side of the rear plate of the frame.
- Ensure the correct orientation. The pulley must be facing towards the PSU.
- Attach the Y-motor-holder by using two M3x10 screws.
- To keep the Y motor cable safe during the assembly, temporarily hide it in the extrusion on the xBuddy box side.

STEP 18 Haribo



 **Carefully and quietly** open the bag with the Haribo sweets. High level of **noise** might attract nearby predators!

- Spread the entire contents of the bag on a clean plate and arrange them according to the picture. The color doesn't matter that much.
-  The total number in your package may vary slightly. However, the exact number is important. If any gummy bears are missing, please go to your nearest candy store immediately.
- Eat five gummy bears.
-  **Did you know that** gummy bears were first created by a German candy maker named Hans Riegel in the 1920s.

STEP 19 It's done!

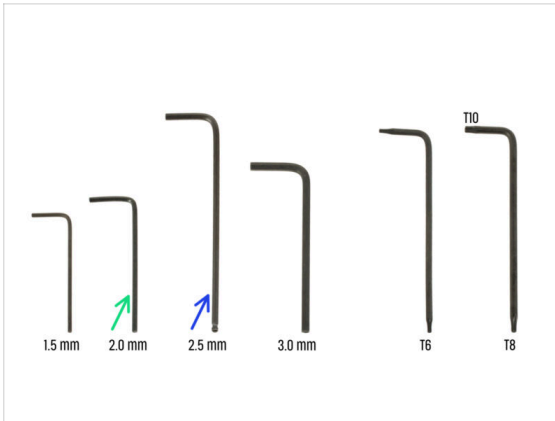


- Compare the final look of the assembly with the picture.
- So that was an easy start, wasn't it? Good job anyway!
- Now, let's play with the next chapter: **3. X-axis & X-carriage assembly**

3. X-axis & X-carriage assembly

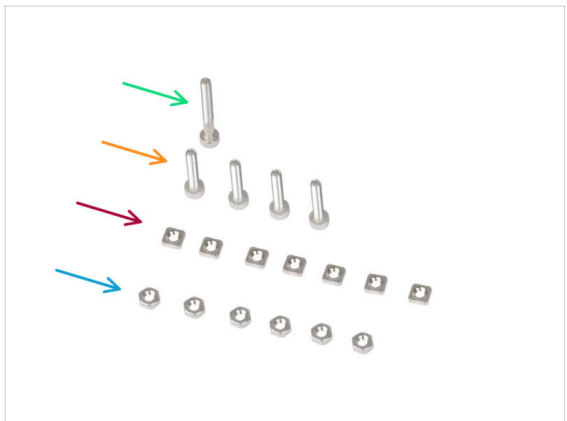
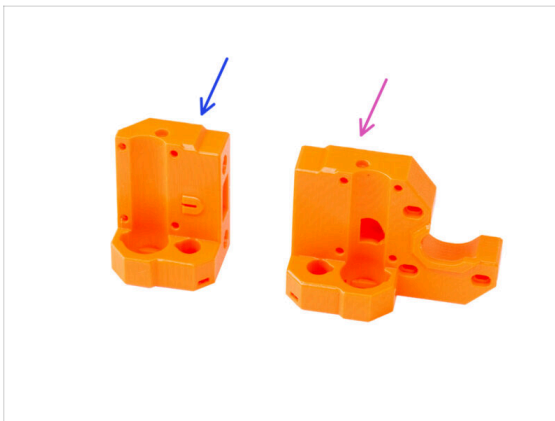


STEP 1 Tools necessary for this chapter



- **For this chapter, please prepare:**
- 2.0mm Allen key
- 2.5mm Allen key
- Permanent marker (*not included in the kit*)

STEP 2 X-axis assembly: parts preparation



- **For the following steps, please prepare:**
- X-end-idler (1x)
- X-end-motor (1x)
- M3x25 screw (1x)
- M3x16 screw (4x)
- M3nS nut (7x)
- M3n nut (6x)

STEP 3 Assembling the X-end-motor




- Insert four M3n nuts into the holes on the backside of the X-end-motor.

i Use the screw pulling technique.

- Insert and tighten the M3nS nut into the plastic part.

- Screw the M3x25 screw into the plastic part. Do not tighten the screw completely. Keep the screw head aligned with the top surface of the part.

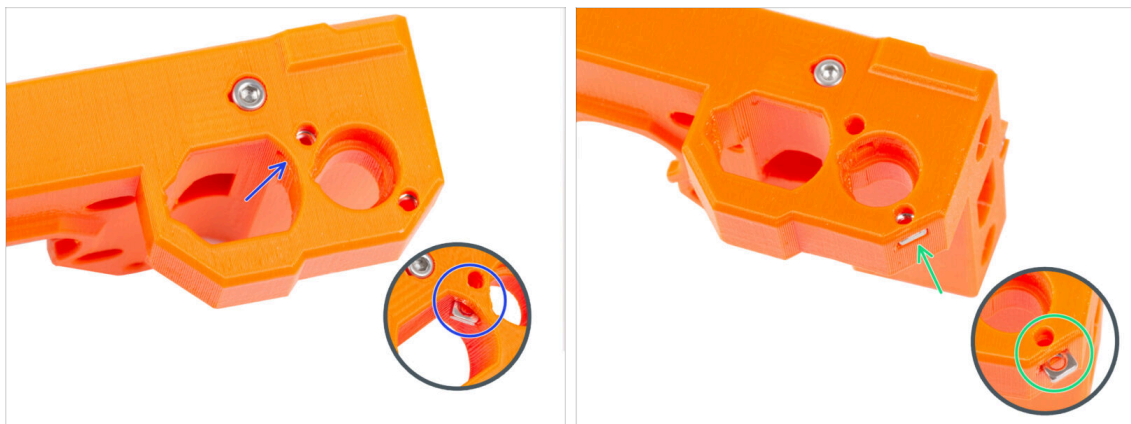
- From the "bottom" side of the part, insert and tighten the M3x16 screw.

 There is no thread in the plastic part, no nut. The screw cuts a thread into the plastic when tightened.

! **Make sure you are using the correct length of the screw M3x16, not M3x18. If you're not sure, always compare the dimensions of the screws with the cheatsheet.**

- Insert and tighten one M3x16 screw from the "top" side of the part.

STEP 4 Assembling the X-end-motor

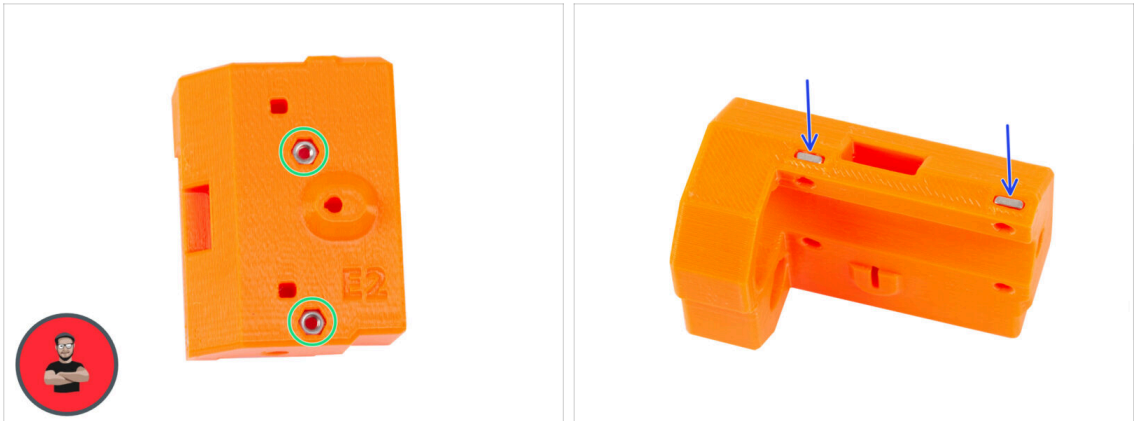


- From inside the oval opening, insert the M3nS nut into the X-end-motor.

- From the side, insert the second M3nS nut into the part.

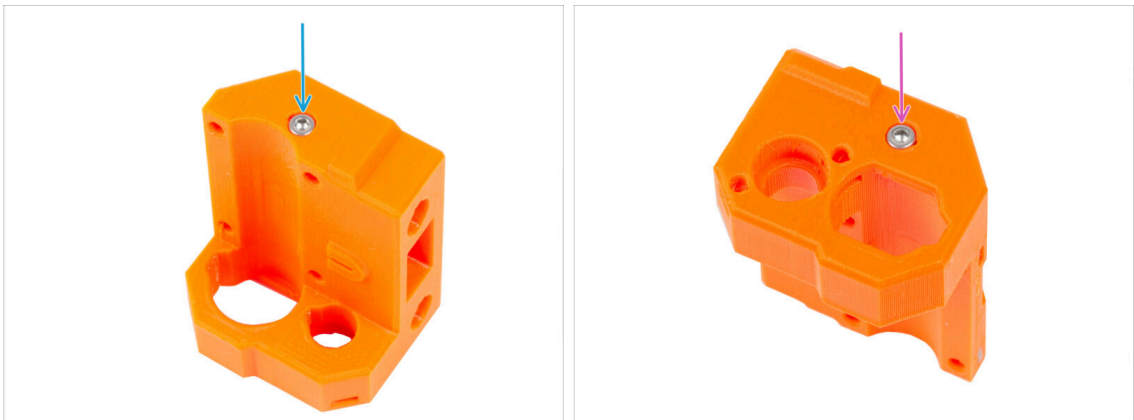
! **Do not put too much pressure on the nut to avoid damaging the opposite printed wall.**

STEP 5 Assembling the X-end-idler



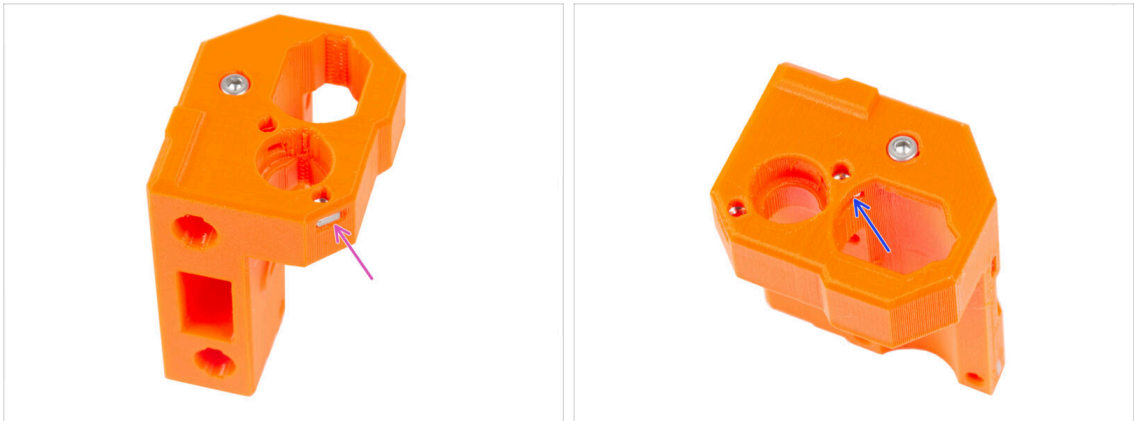
- Insert two M3n nuts into the holes on the backside of the X-end-idler.
- ⓘ Use the screw pulling technique.
- Insert two M3nS nut from the side to the plastic part.

STEP 6 Assembling the X-end-idler



- ⚠ **Make sure you are using the correct length of the screw M3x16, not M3x18. If you're not sure, always compare the dimensions of the screws with the cheatsheet.**
- From the "bottom" side of the part, insert and tighten the M3x16 screw.
- 📌 There is no thread in the plastic part, no nut. The screw cuts a thread into the plastic when tightened.
- Insert and tighten the second M3x16 screw from the "top" side of the part.

STEP 7 Assembling the X-end-idler

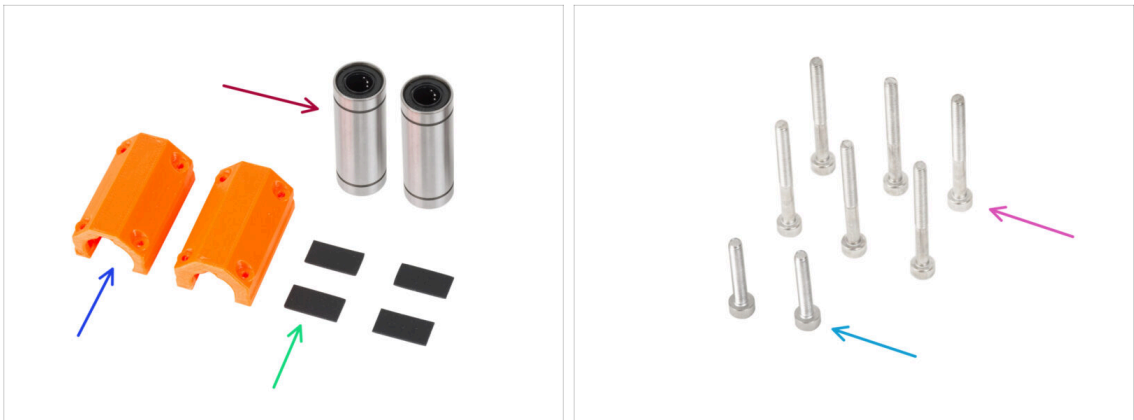


✿ Insert the M3nS nut into the X-end-idler from the side.

⚠ Do not put too much pressure on the nut to avoid damaging the opposite printed wall.

● From inside the oval opening, insert the M3nS nut into the X-end-idler.

STEP 8 Mounting the bearings: parts preparation



⬛ For the following steps, please prepare:

🔴 LM10LUU linear bearing (2x)

● X-end-clip (2x)

🟢 Rubber pad 20x10x1 mm (4x)

✿ M3x30 screw (6x)

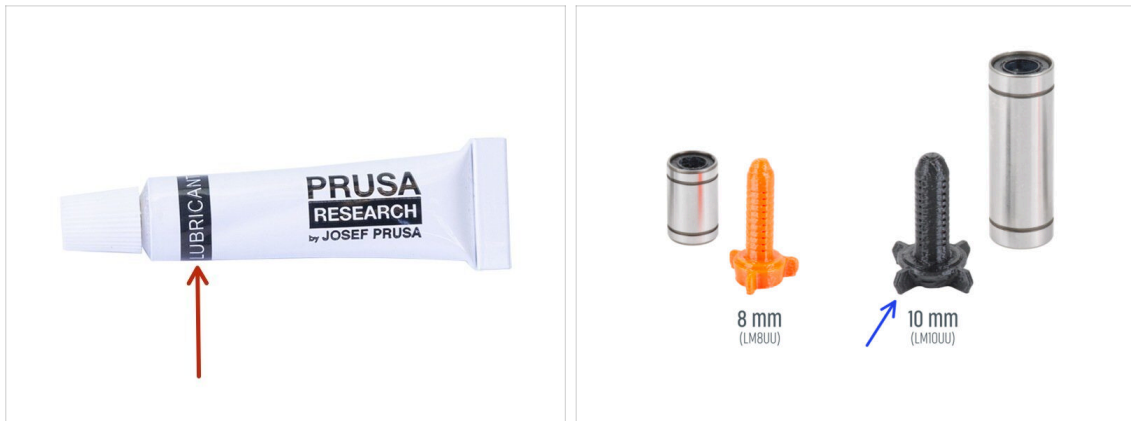
● M3x18 screw (2x)

STEP 9 Lubricating the bearings INFO



- **To identify if the bearings require lubrication, check the packaging:**
 - Bearings pre-lubricated by Prusa company are shipped in a **blue bag**. If you have pre-lubricated bearings, go to [Inserting the bearings: bearing pads](#).
 - If your **bearings did not come in this specific packaging**, the **bearings must be lubricated**. Proceed to the following steps with instructions for proper lubrication of the bearings.

STEP 10 Lubricating the bearings: parts preparation



● For the following steps, please prepare:

● Prusa lubricant (1x)

● Prusa lubricant applicator 10mm (1x) for LM10LUU bearings

❗ There are two versions of the Prusa lubricant applicator in your kit. Each with a different size.

● Several paper towels to wipe oil and grease from the bearing surface.

⚠ **Each bearing must be lubricated before mounting on the printer. Follow these instructions carefully.**

⚠ **Use the lubricant wisely, less is better!** The lubricant will be used for all bearings and gearbox. The amount in the tube is sufficient. Follow the instructions regarding proper amount for each bearing. Using too much of the lubricant can cause issues.

STEP 11 Lubricating the bearing



❗ Use any piece of fabric as a pad to protect your working surface from grease.

⚠ **Make sure the bearing is clean inside.**

● Wipe the preservative oil off the bearing surface with a paper towel.

● It is necessary to lubricate all 4 rows of balls inside the bearing.

● Open the lubricant and pierce the hole in the tube with the tip in the cap.

● Screw the tube into the applicator.

● Carefully slide the entire bearing onto the applicator.

STEP 12 Lubricating the bearing



- Turn the tube and applicator counterclockwise until you feel a slight resistance. This means that the holes in the applicator are aligned with the ball rows.
- Gently press the tube to push the lubricant into the ball rows of the bearing.
- Remove the bearing from the applicator and look at the amount applied inside. Take a look at the third picture, which shows a sufficient amount of lubricant inside the bearing.
- ⚠ **The grease must be spread evenly over all four ball rows inside the bearing. There must not be too much grease, a thin layer is enough. Take a closer look at the last picture.**
- **Proceed the same from the opposite side of the bearing. The lubricant in the LM10LUU bearing must be applied along its entire length.**
- Wipe off excess grease on the outside of the bearing with a paper towel.
- Use this procedure for both LM10LUU bearings.

STEP 13 Inserting the bearings: X-end-motor



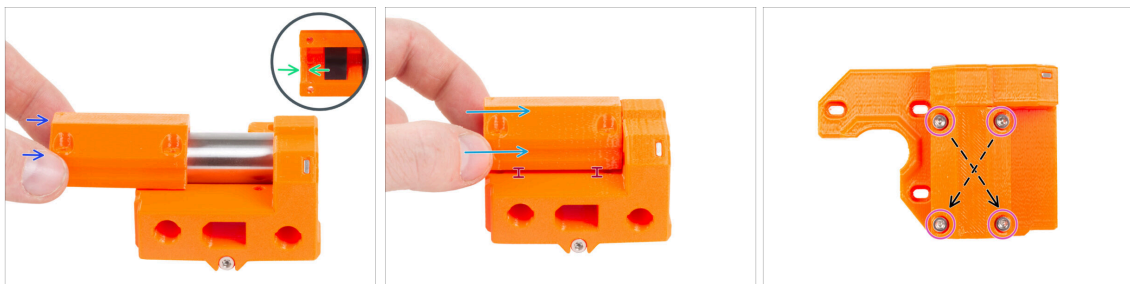
- Insert and push one LM10LUU bearing all the way into the X-end-motor.
- Position the bearing like in the picture. The ball rows must be oriented to "X".

STEP 14 Inserting the bearings: bearing pads



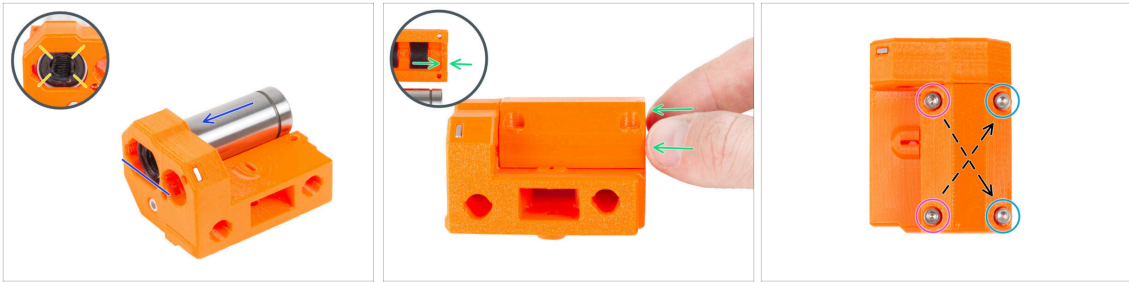
- Take one X-end-clip. Notice, there are two rectangular pockets inside the plastic part.
- Place the rubber pads into both pockets by pushing the finger on them.
- Apply the same procedure for both X-end-clips.

STEP 15 Covering the bearings: X-end-motor



- Place the X-end-motor with the bearing as shown.
- Take the X-end-clip and notice the protrusion on the inside of the part. The protrusion must be behind the edge of the bearing (pictured on the left side of the bearing).
- In this position, slide the X-end-clip onto the edge of the bearing.
- Very carefully slide the X-end-clip onto the entire length of the bearing.
- ⚠ Hold the X-end-clip slightly raised from the bottom surface of the X-end-motor. Pushing on the X-end-clip from the top may deform the rubber pads inside the part.
- Insert four M3x30 screws into the X-end-clip. Tighten the screws diagonally.
- Tighten the screws completely, **but diagonally**.

STEP 16 Inserting the bearings: X-end-idler



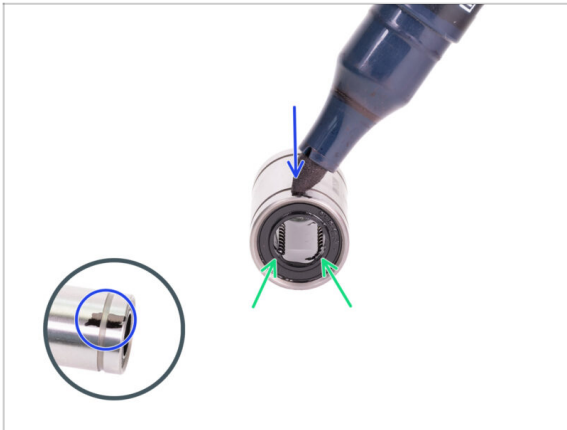
- Insert and push the second LM10LUU bearing all the way into the X-end-idler.
- Position the bearing like in the picture. The ball rows must be oriented to "X".
- Slide the remaining X-end-clip onto the bearing in the same way as in the previous step. Do not forget to orient the part correctly.
- **There are two types of the screws for the X-end-clip on the X-end-idler:**
 - Insert two M3x30 screw into the holes on the **left side**.
 - Insert two M3x18 screws into the holes on the **right side**.
 - Tighten the screws completely, **but diagonally**.

STEP 17 Assembling the X-axis: parts preparation



- **For the following steps, please prepare:**
 - ⚠ **Notice that you have received three different lengths of smooth rods. We recommend arranging them all side by side, for easier comparison of their sizes.**
 - Smooth rod 8x370 mm (2x) *the longest couple*
 - ⓘ Wipe off the preservative oil from the smooth rods with a paper towel or a piece of cloth.
 - LM8UU bearing (3x)

STEP 18 Assembling the X-axis: Marking the bearings



- Wipe grease from the outer surface of the bearing with a paper towel.
- Position the bearing so that you can see two rows of balls. Like in the picture.
- Make a mark with a permanent marker on the outer surface of the bearing, in the middle above two rows of balls.
- Use the same procedure for the remaining two bearings.
- ⓘ We will use these markings in the upcoming chapters to achieve the desired bearing orientation.


STEP 19 Assembling the X-axis: parts preparation (lubricating)







- For the following steps, please prepare:
- Prusa lubricant applicator 8mm (1x)
- Prusa lubricant (1x) for LM8UU bearings
- Several paper towels to wipe oil and grease from the bearing surface.
- ⚠ **Each bearing must be lubricated before mounting on the printer. Follow these instructions carefully.**

STEP 20 Lubricating the bearing










 Use any piece of fabric as a pad to protect your working surface from grease.

 **Make sure the bearing is clean inside.**

-  Wipe the preservative oil off the bearing surface with a paper towel.
-  It is necessary to lubricate all 4 rows of balls inside the bearing.
-  Screw the tube into the applicator.
-  Carefully slide the entire bearing onto the applicator.

STEP 21 Lubricating the bearing



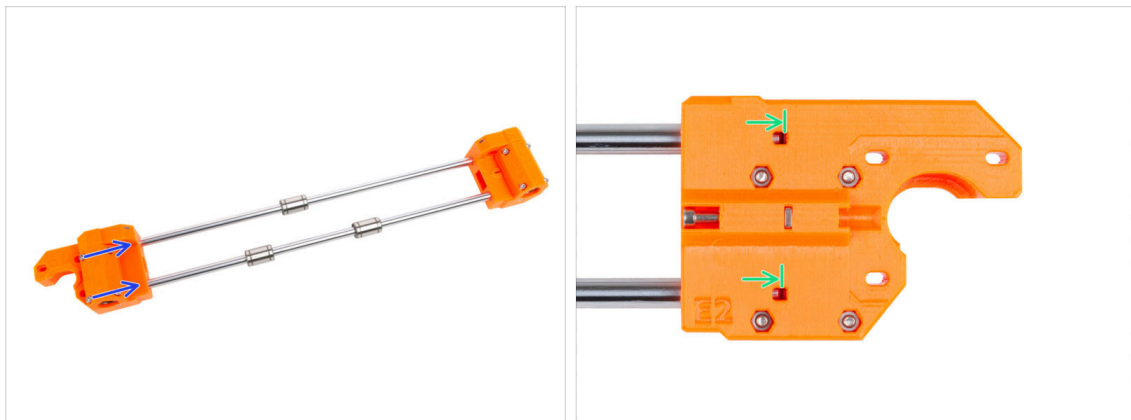
-  Turn the tube and applicator counterclockwise until you feel a slight resistance. This means that the holes in the applicator are aligned with the ball rows.
-  Gently press the tube to push the lubricant into the ball rows of the bearing.
-  Look at the front of the bearing. When the applicator pushes the lubricant out (around the black gasket), stop pressing the tube. Hold the bearing with the other hand during the lubricating.
-  **The grease must be spread evenly over all four ball rows inside the bearing. There must not be too much grease, or too little. Take a closer look at the last picture.**
-  Wipe off excess grease on the outside of the bearing with a paper towel.
-  Use this procedure for all three bearings.
-  The bearings may leave excess grease on the smooth rods after their installation. Wipe off any residue with a paper towel.

STEP 22 Assembling the X-axis: Inserting smooth rods



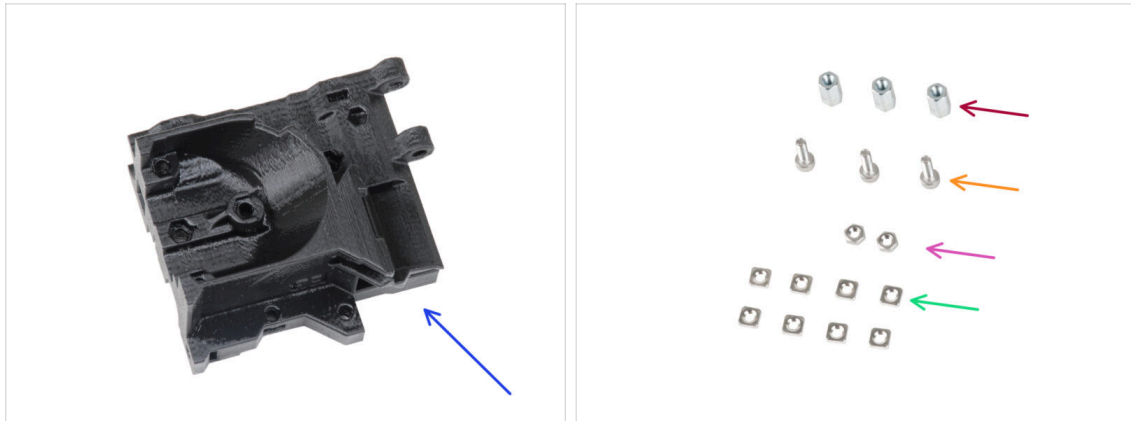
- ✦ Insert the smooth rods all the way into the X-end-idler.
- ⚠ **Insert the rods very carefully. Do not tilt the rods too much.**
- ✦ **Carefully and gently** slide three bearings onto the smooth rods. One bearing on the upper rod and two bearings on the lower rod. See the picture. Orientation of the markings doesn't matter at this moment
- ⓘ In case you manage to push out balls from the bearings, please count them. One or two balls are ok, if there are more of them, please consider ordering new bearings.
- ✦ Through the inspection hole check if the smooth rods are in touch with the screws inside the part.

STEP 23 Assembling the X-axis: mounting the X-end-motor



- ✦ Carefully slide the X-end-motor fully onto both smooth rods.
- ✦ Through the inspection hole check if the smooth rods are in touch with the screw.

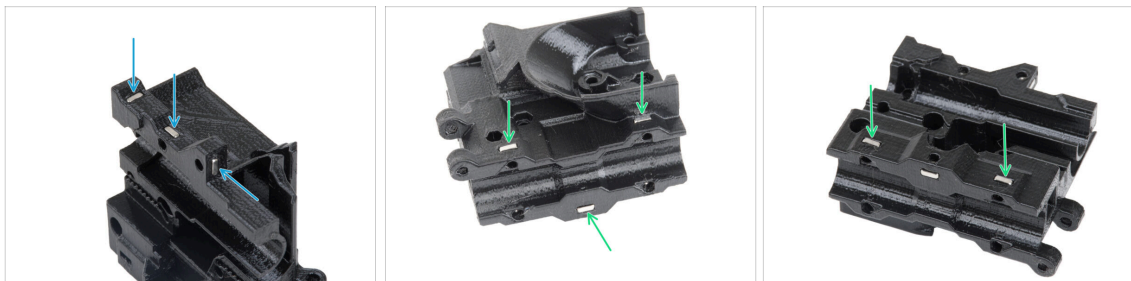
STEP 24 Assembling the X-carriage: parts preparation



● For the following steps, please prepare:

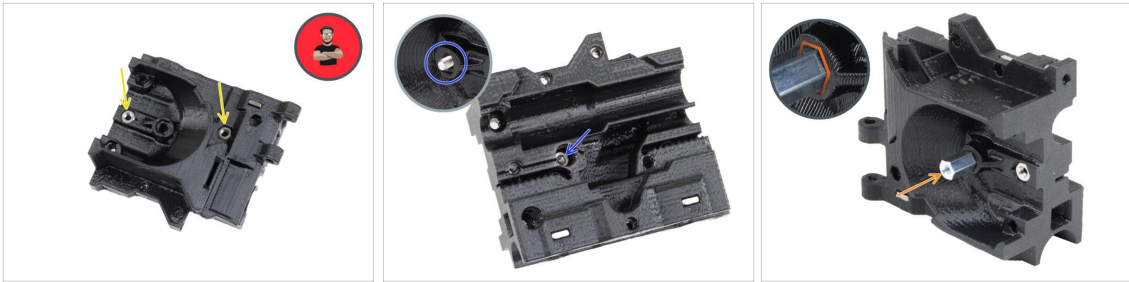
- X-carriage (1x)
- Hex spacer M3x10 (3x)
- M3n nuts (2x)
- M3x10 screw (3x)
- M3nS nut (8x)

STEP 25 Assembling the X-carriage



- Locate the protrusions on the X-carriage part and insert three M3nS nuts into the square holes.
- From the "bottom" of the part, insert five M3nS nuts into the part.

STEP 26 Attaching the spacers



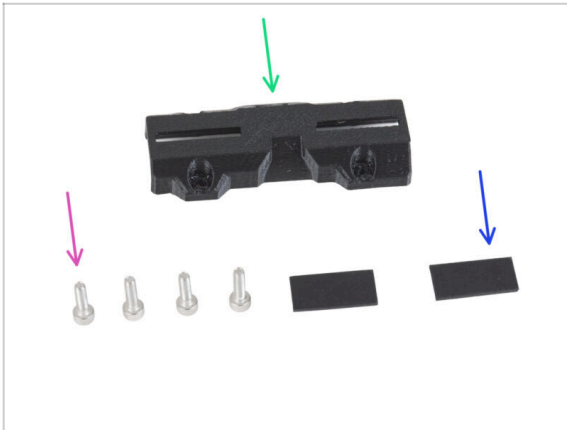
- ✦ Insert two M3n nuts to the X-carriage-back.
 - ❶ Use the screw pulling technique.
- ✦ From the opposite side, insert the M3x10 screw into the X-carriage-back. The screw must protrude from the "front" side of the part.
- ✦ Attach the hex spacer on the M3x10 screw and tighten the screw. **Note the cutout of the same shape as the spacer. It must fit perfectly and must not rotate.**

STEP 27 Attaching the spacers



- ✦ Push two M3x10 screws through the X-carriage
- ✦ From the "front" side of the X-carriage, attach two hex spacers on the protruding M3x10 screws in the same way described in the previous step. Tighten the screws.

STEP 28 Assembling the X-carriage-clip: parts preparation



● For the following steps, please prepare:

- X-carriage-clip (1x)
- M3x10 screw (4x)
- Rubber pad 20x10x1 mm (2x)

STEP 29 Assembling the X-carriage-clip



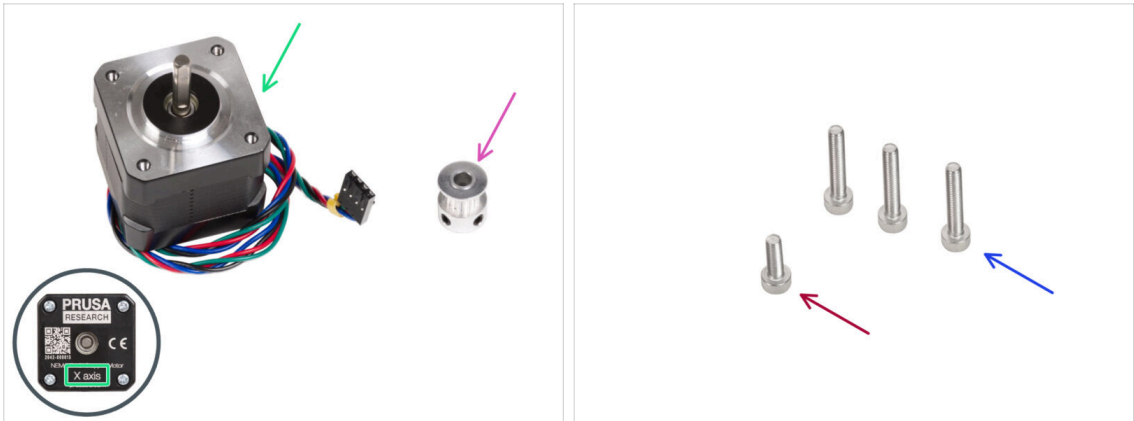
- Place two rubber pads into the rectangular pockets inside the X-carriage-clip.

STEP 30 Attaching the X-carriage-clip



- Place the X-axis assembly oriented as shown. Make sure the back of the X-end-motor is facing up.
- ⚠ **CAUTION: Make sure you have the parts oriented correctly.**
- Attach the X-carriage on both bearings on the lower rod. See the orientation of the X-carriage-motor on the picture.
- Leave the upper bearing out of the X-carriage for the time being.
- Slide both lower bearings all the way into the pockets in the X-carriage and align them with the outer surface of the X-carriage.
- Rotate both bearings so that the marking is facing you (down).
- Cover the bearings with the X-carriage-clip and secure it by four M3x10 screws. **Do not fully tighten the screws at the moment.**

STEP 31 Attaching the X motor: parts preparation



For the following steps, please prepare:

X motor (1x) use the one you removed from the printer

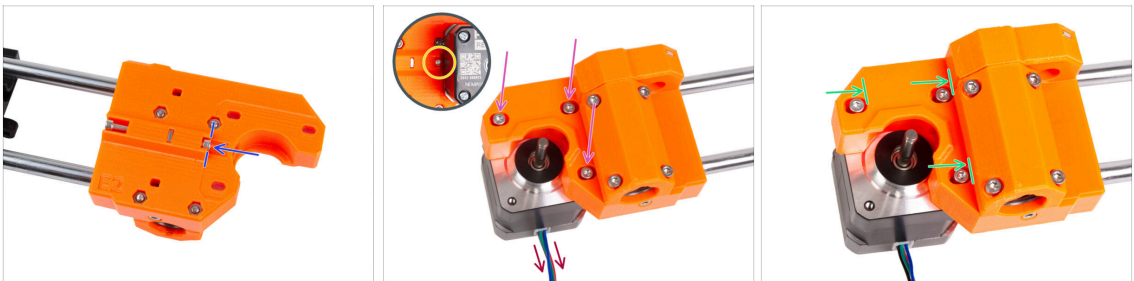
⚠ **Ensure you are using the correct motor**, there is a label on the bottom of the casing. The reason is, each motor has different cable length.

GT2-16 pulley (1x)

M3x18 screw (3x)

M3x10 screw (1x)

STEP 32 Attaching the X motor



Insert the M3x10 screw into the X-end-motor. Line up it with the edge of the plastic protrusion. Do not tighten the screw, there is no thread inside, just insert it freely.

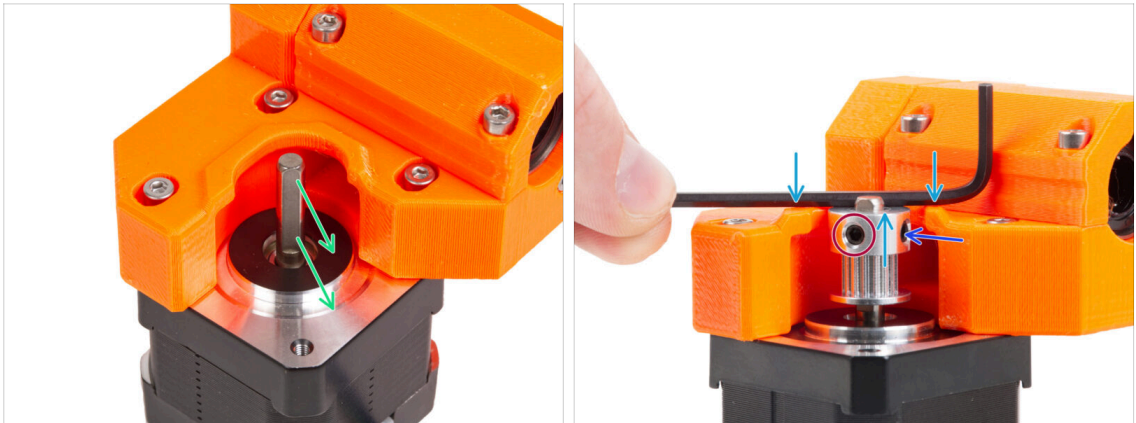
Place the X-end-motor on the X motor. Secure it by three M3x18 screws. **Tighten the screws just slightly.** We will adjust them later on.

⚠ **Note the correct X motor orientation.** The cable must be facing you.

Make sure that the "tension" screw on the X motor side does not fall out during handling.

Position the motor so that the screws are at the inner end of the oval holes.

STEP 33 Attaching the X motor: mounting the pulley



- There is a flat part on the motor shaft. Rotate the motor shaft with the flat part facing through the opening in the X-end-motor.
- ⚠ Slide the Pulley on, note the **CORRECT** orientation. Compare it with the second picture!
- Place any of the Allen keys on the top surface, like in the picture and align the pulley with the Allen key.
- **One of the grub screws must be facing directly against the flat part of the shaft.** Slightly tighten the grub screw.
- Rotate the pulley and tighten the second grub screw.

STEP 34 Guiding the X belt: parts preparation



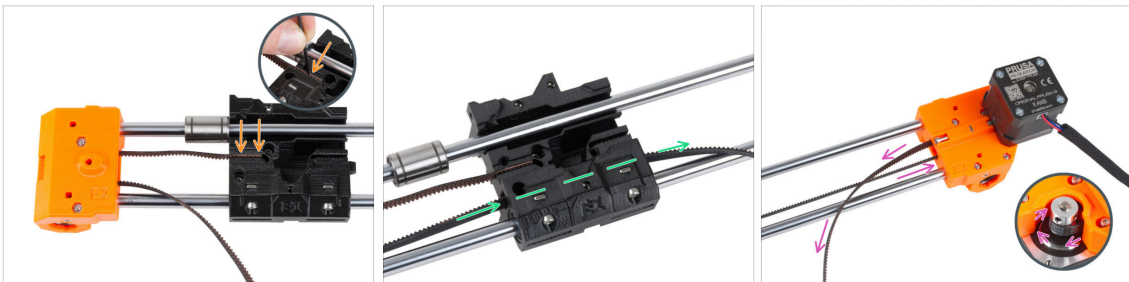
- **For the following steps, please prepare:**
- X belt (1x)
- Pin H8 2.9x20 (1x)
- GT2-20 Idler pulley (1x)


STEP 35 Guiding the X belt: X-end-idler



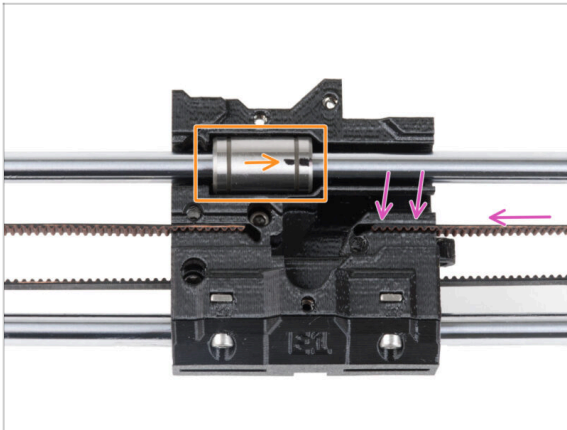
- Guide the X belt around the Idler pulley.
- Insert the "clamped" pulley with the belt inside the X-end-idler.
- Align the hole in the pulley with the left hole in the plastic part.
- After aligning the pulley, push the pin through the plastic part and the pulley. Push the pin all the way in using the Allen key.
- Pull lightly on the belt to secure the position of the pulley. You will see the pin in the hole slide inside the part. Once the pulley is secured, the pin is not visible at all.

STEP 36 Guiding the X belt: X-end-motor



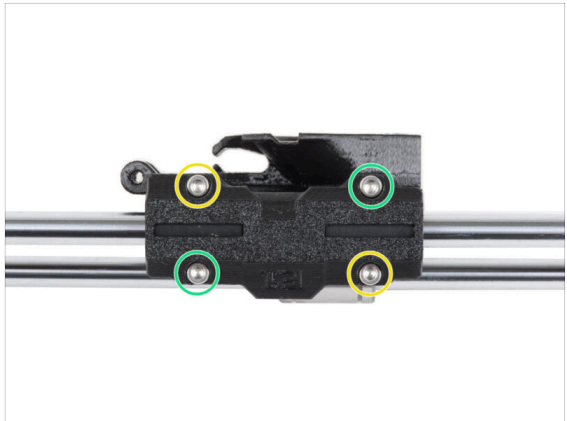
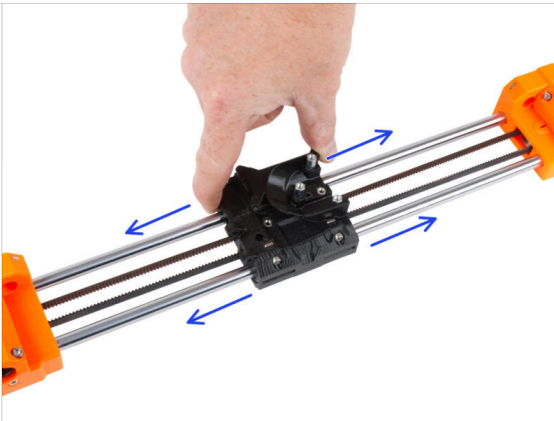
-  Leave the upper bearing free for now.
- Insert the "upper" end of the belt into the groove in the X-carriage. Push it all the way in using the Allen key.
- Push the "lower" end of the belt through the belt channel in the X-carriage.
- Guide the belt through the X-end-motor around the pulley and back to the X-carriage.

STEP 37 Guiding the X belt: X-carriage



- ◆ Guide the X belt to the X-carriage and push it to the groove in the plastic part as far as possible. Push it all the way in using the Allen key.
- ⓘ The belt must not be too loose (sagging). We will adjust its tension later.
- ◆ Place the upper bearing into the recess in the X-carriage. The marking must be facing you, like in the picture.

STEP 38 Assembling the X-carriage: final check



- ◆ Move with the X-carriage side to side several times to check that the movement is smooth.
- ◆ After you ensure that the movement is smooth, fully tighten the screws on the X-carriage-clip in this order:
 - ◆ Upper left screw
 - ◆ Lower right screw
 - ◆ Upper right screw
 - ◆ Lower left screw
- ◆ Move the X-carriage several times to both sides and check the movement is still smooth.

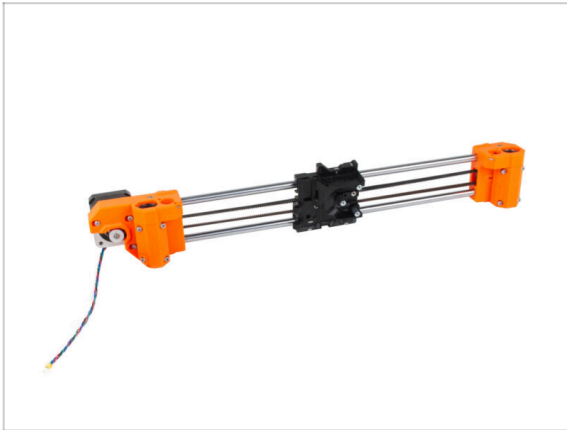
STEP 39 Haribo



🔵 Eat five gummy bears.

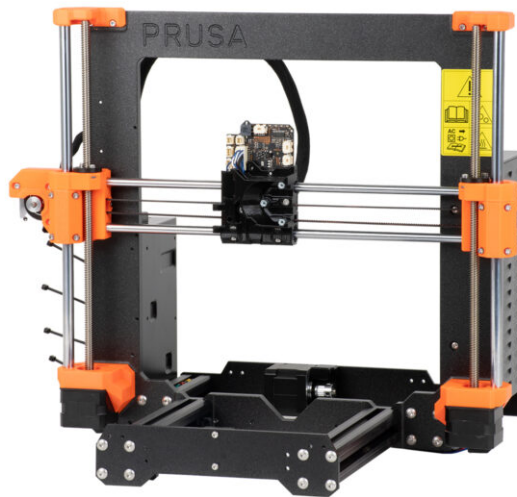
📘 **Did you know that** the original gummy bears were inspired by the dancing bears of Europe, and Riegel named them "Gummibärchen," which means "little rubber bears" in German.

STEP 40 It's done!

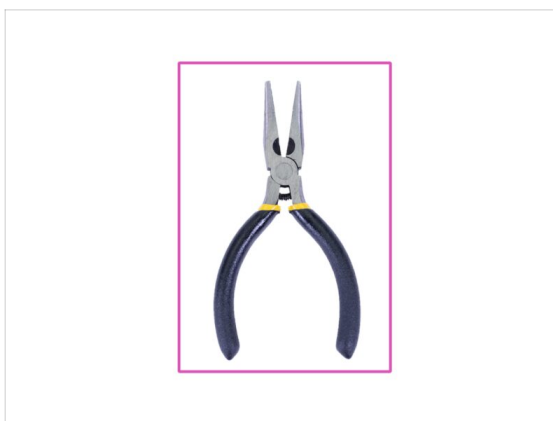
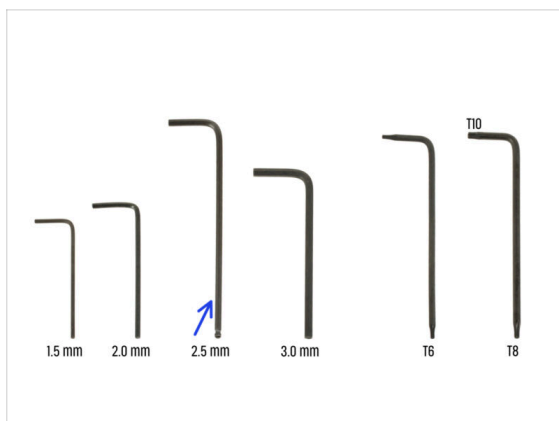


- 🛠 Compare your assembly with the picture.
- 🛠 Everything is OK? **Nice job**, you just successfully assembled the X-axis assembly.
- 🛠 Let's go the next chapter: **4. Z-axis assembly**

4. Z-axis assembly



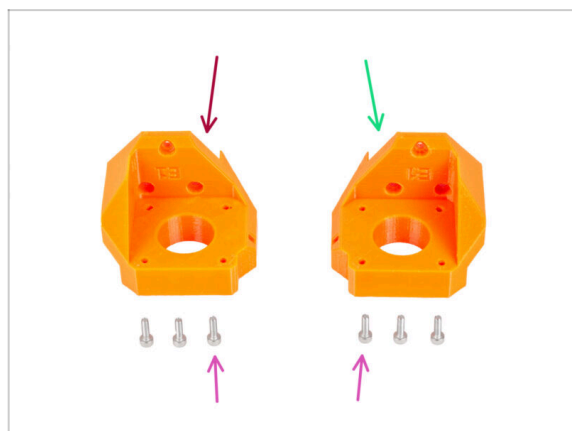
STEP 1 Tools necessary for this chapter



● For this chapter, please prepare:

- 2.5mm Allen key
- Needle-nose pliers

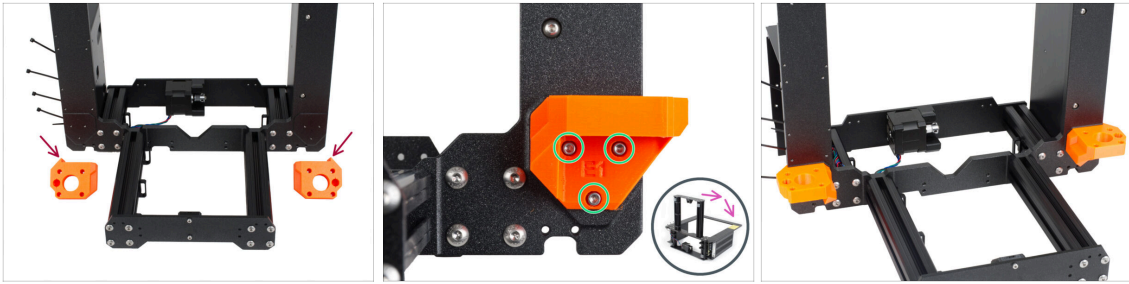
STEP 2 Assembling the Z-bottoms: parts preparation



● For the following steps, please prepare:

- Z-bottom left (1x)
- Z-bottom right (1x)
- M3x10 screw (6x)

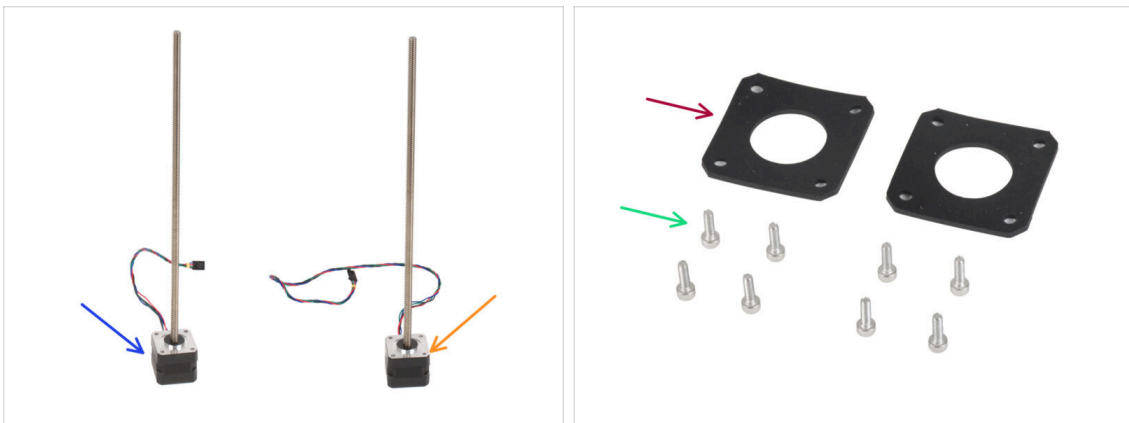
STEP 3 Assembling the Z-bottoms



⚠ WARNING: Printed parts aren't the same! There are left and right pieces. See the protrusion (tooth) on each part. For the right side of the frame, there is a protrusion on the right side of the plastic part and vice versa.

- 🟢 Attach both Z-bottoms to the frame and secure each part with three M3x10 screws.
- 💜 Tip: you can turn the printer on its back side for better access to the Z-bottom installation. It is recommended to place a cardboard pad under the printer to protect your workbench and the printer against scratches.
- 📄 In case of increased resistance during tightening, try to run the screws through the threaded hole first without the printed part. Then remove the screws and attach the printed part.

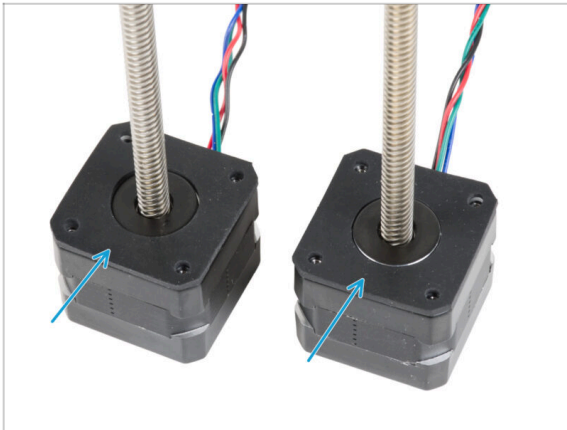
STEP 4 Z motor assembling: parts preparation



🛠 For the following step, please prepare:

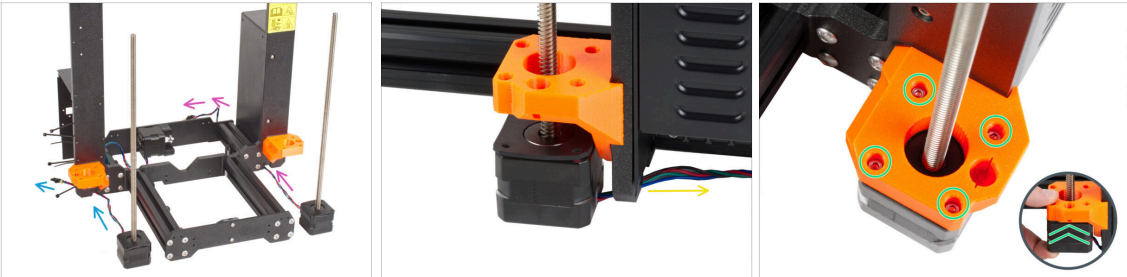
- 🟡 Z motor left (shorter cable) use the one you removed from the printer
- 🟠 Z motor right (longer cable) use the one you removed from the printer
- 🟢 M3x10 screw (8x)
- 🔴 Rubber pad 42x42x2 mm (2x)

STEP 5 Attaching the rubber pads



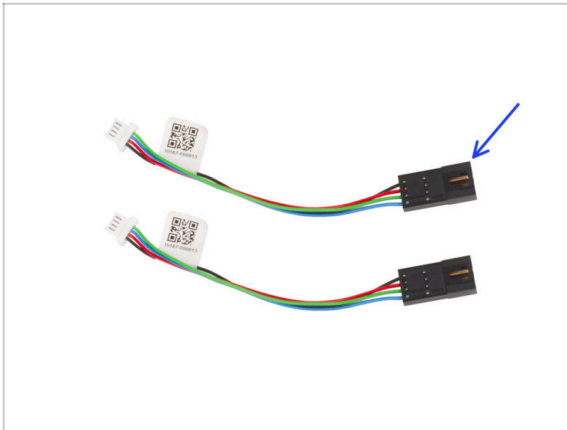
- Place both rubber pads onto the motor surface. **Make sure the holes in the pads are aligned with the holes in the motors.**

STEP 6 Installing the Z motors



- Place the Z motor left (short cable) next to the left Z-bottom.
- Place the Z motor right (long cable) next to the right Z-bottom.
- The motor cables must guide under the frame to the PSU (right) and xBuddy Box (left).
- Push each motor through the Z-bottom and secure it with four M3x10 screws. **Do not tighten them completely at the moment.**

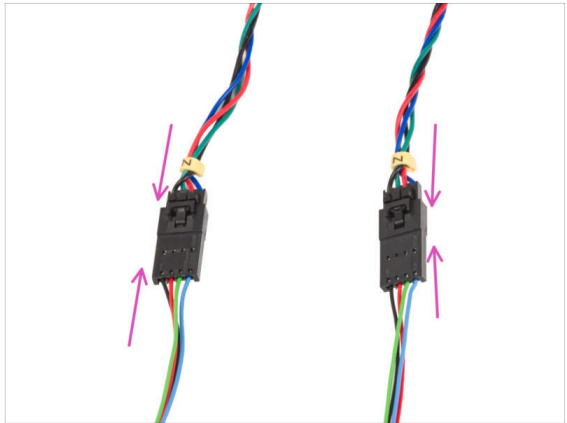
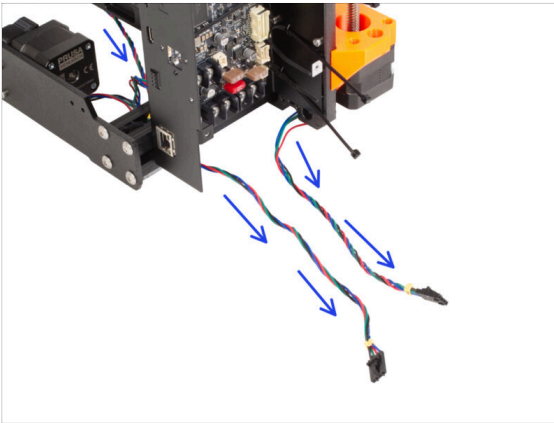
STEP 7 Z motor cable adapter: parts preparation



For the following steps, please prepare:

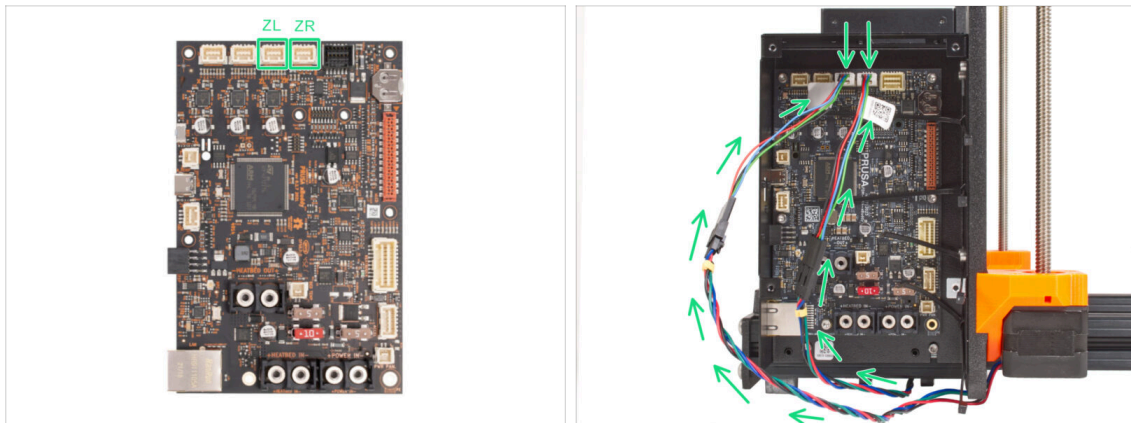
- Motor cable adapter (2x)

STEP 8 Connecting the Z motor cable adapters



- Guide both the Z motor cables under the frame towards the xBuddy Box.
- Plug both Z motor connectors to the motor cable adapters.

STEP 9 Connecting the Z motors



- Connect the cables to the third and fourth slots on top of the xBuddy Board. Connect the cable from the left Z motor to the left slot on the xBuddy board and the right motor cable to the right slot.

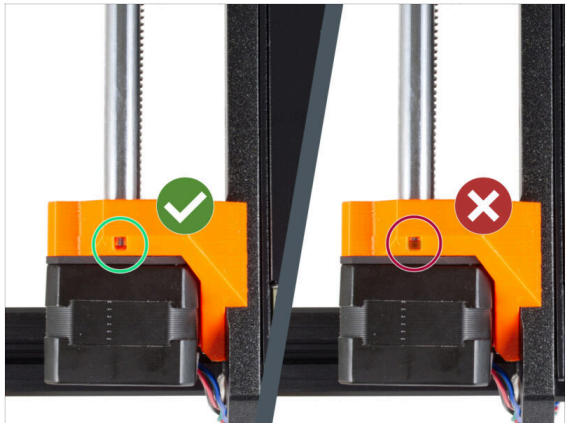
STEP 10 Mounting the X-axis assembly: parts preparation



■ **For the following steps, please prepare:**

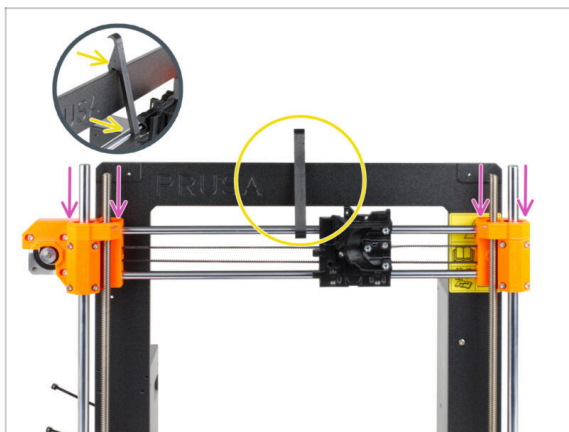
- Trapezoidal nut (2x)
- M3x10 screw (4x)
- Smooth rod 10 x 325 mm (2x)
- X-holder (1x)

STEP 11 Mounting the X-axis and smooth rods



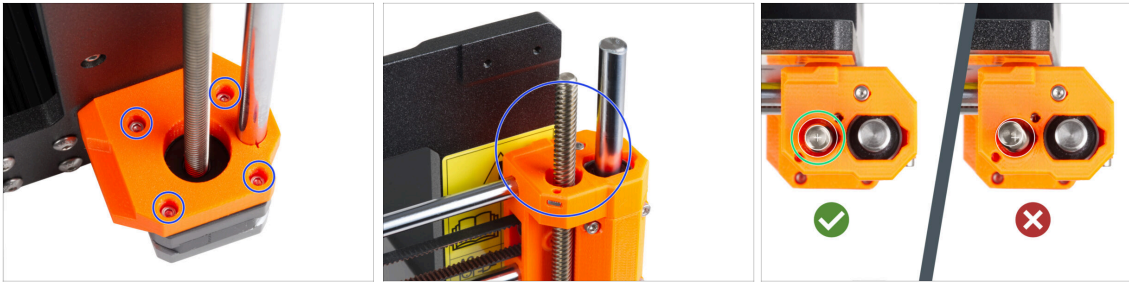
- ◆ Gently insert the smooth rods into Z-bottoms. **Do not apply too much force and do not tilt the rod!**
- ❗ If the smooth rods are dirty or have too much preservative oil on them, wipe them with a paper towel.
- ⚠ Through the inspection hole in both Z-bottoms, check if the rod is completely inserted. **There must be no gap between the smooth rod and the bottom of the hole.**

STEP 12 Assembling the X-axis and smooth rods



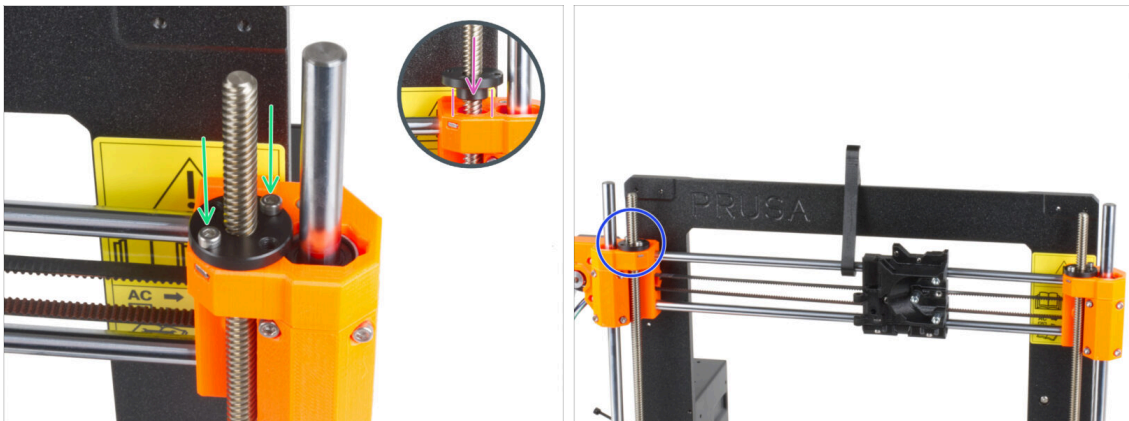
- ◆ Carefully slide the X-axis assembly onto the Z-axis smooth rods.
- ◆ **Secure the position of the X-axis to the frame.** Engage the X-holder **IN THE CENTER** of the X-axis by the top smooth rod and then by the printer frame.
- ⚠ It is important to place the X-holder at the center of the frame and the X-axis. If not, the centering results could be inaccurate.

STEP 13 Installing the X-axis assembly



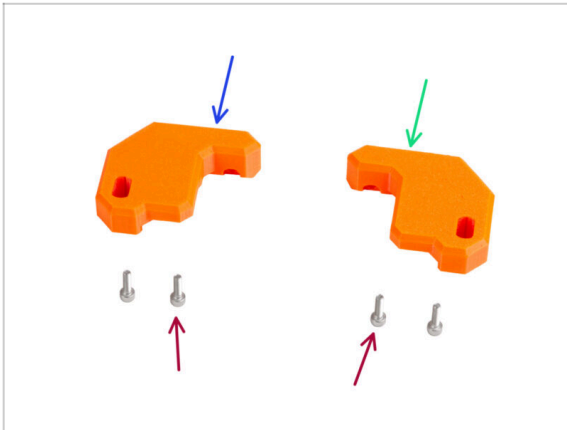
- ❗ Centering the threaded rods of the Z motors is important. However, it doesn't have to be perfect. See the following instructions for more:
 - Start with the **right Z motor**.
 - By carefully and gradually tightening the individual screws holding the Z motor, align the threaded rod in the X-end-idler. **Watch the threaded rod move while tightening.** Tightening the right front screw tilts the top of the rod to the rear left - and vice versa. **Tighten all screws firmly.**
 - ⚠ Take a look at the threaded rod from the top. **The threaded rods should be close to the center of the X-end-idler hole as much as possible.** The threaded rod shouldn't touch the surface of the printed part. See the third picture.
 - **PROCEED THE SAME WITH THE LEFT Z MOTOR.**

STEP 14 Assembling the trapezoidal nuts



- Screw the trapezoidal nut onto the right threaded rod. **Note the correct orientation of the nut.** The smaller diameter of the nut must fit into the hole in the X-end. If it does not, the threaded rod is incorrectly centered.
- Secure the trapezoidal nut with two M3x10 screws. It does not matter which holes in the nut you use.
- ❗ There may be a small gap between the trapezoidal nut and the printed part. Tightening the two screws will cling the nut completely to the part.
- In the same way, install the second trapezoidal nut on the X-end-motor (left threaded rod).

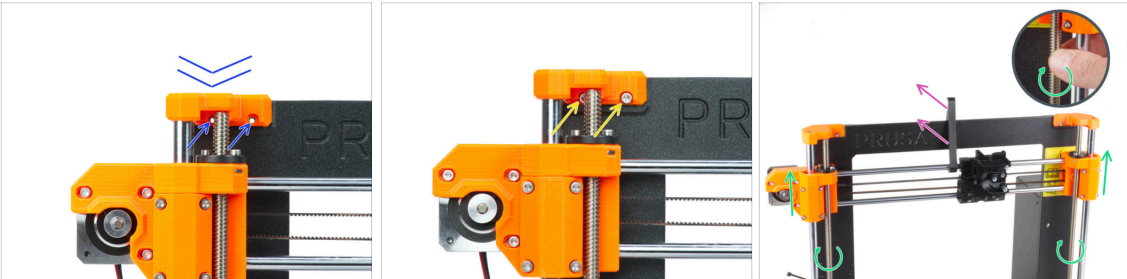
STEP 15 Installing the Z-top parts: parts preparation



● For the following steps, please prepare:

- Z-top-left (1x)
- Z-top-right (1x)
- M3x10 screw (4x)

STEP 16 Placing the Z-top parts



- Place the Z-top-left on the rods and align it with the frame, and align the holes in the plastic parts with the holes in the frame.
- Use two M3x10 screws to attach the Z-top-left.
- ⚠ **Don't use excessive force during tightening.** In case of increased resistance, try to run the screws in from the other side of the frame first to "clean up" the threaded hole. Then return to the front side.
- ⓘ Tip: move the X-axis a few centimeters down for make some space if you can't reach the screw behind the rod.
- Repeat this step on the other side of the frame with Z-top-right printed part.
- Rotate both threaded rods in parallel to move the X-axis assembly a few centimeters higher to release the X-holder.
- Remove the X-holder from the printer.

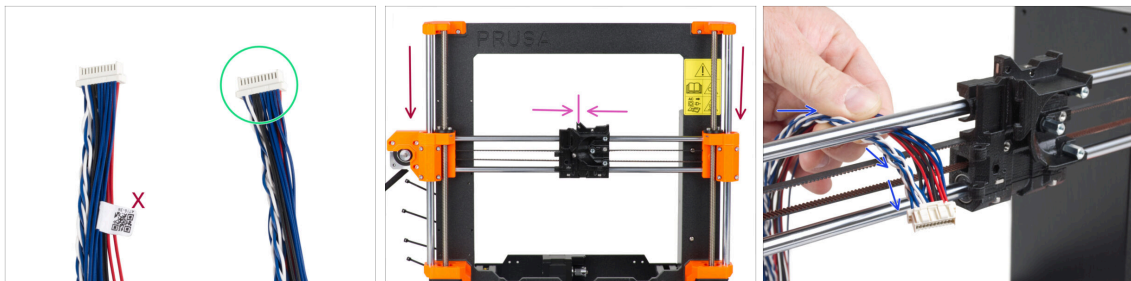
STEP 17 LoveBoard: parts preparation



■ **For the following steps, please prepare:**

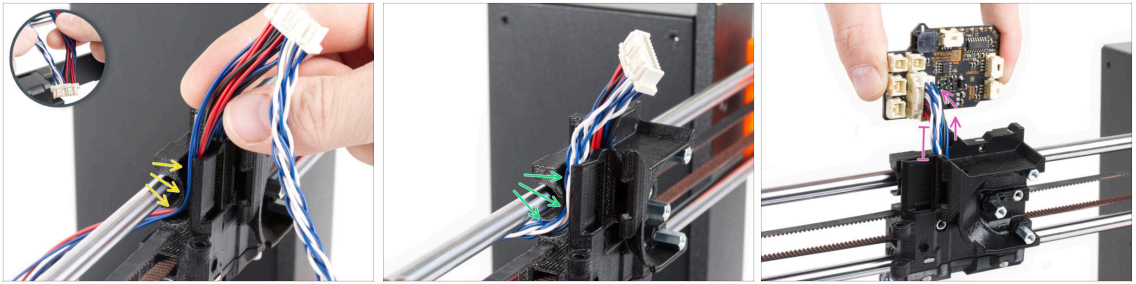
- LoveBoard (1x) *included in the ELECTRONICS BOX*
- Extruder main cable (1x)
- M3x6 screw (1x)

STEP 18 Assembling the LoveBoard



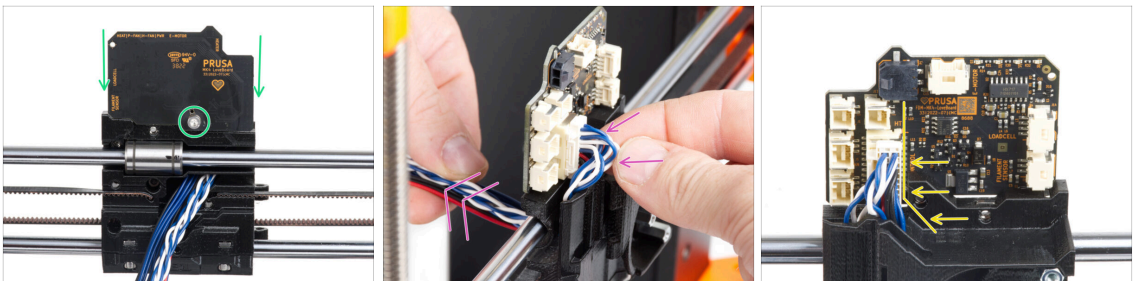
- Take the end of the extruder main cable without the white label.
- Move the X-axis assembly to the center of the Z-axis height.
- Move the X-carriage approximately to the center of the X-axis.
- From the back of the printer, guide the extruder main cable to the front of the printer through the gap between the belt and the upper rod.

STEP 19 Connecting the extruder main cable



- Divide the twisted wires and straight cables from each other.
- **First, guide the straight cables** through the channel in the X-carriage.
- **Then guide the twisted cables** through the channel.
- Connect the extruder main cable to the LoveBoard. Leave the extruder main cable extended approximately 2 centimeters (0.8 inches).

STEP 20 Mounting the extruder main cable



- Attach the LoveBoard to the back of the X-carriage and secure it with the M3x6 screw.
- Very gently pull on the extruder main cable bundle to reduce the bundle on the connector side. There must be a minimal loop. Otherwise, the cable will interfere with other parts in the next chapter.
- The cables must not interfere with the extruder motor compartment.

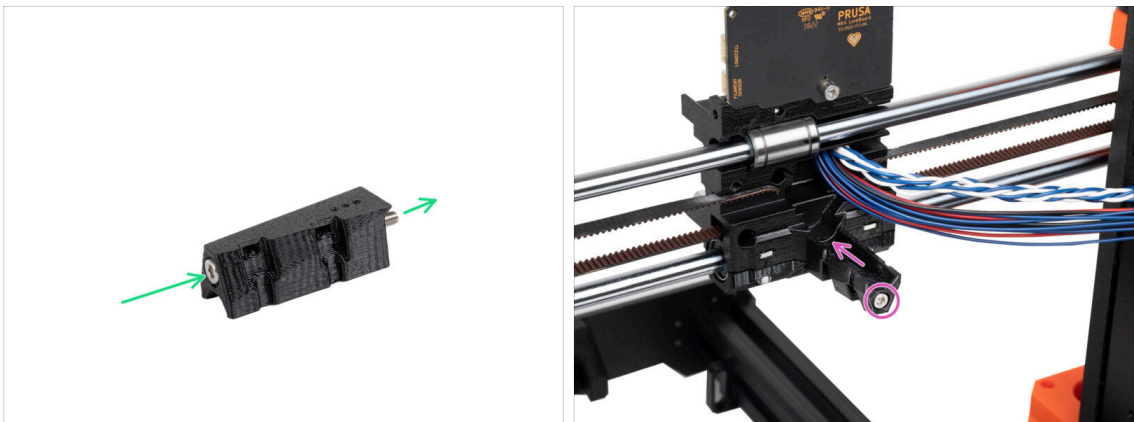
STEP 21 Connecting the extruder main cable: parts preparation



● For the following steps, please prepare:

- X-carriage-cable-holder (1x) *with the screw hole*
- M3x40 screw (1x)

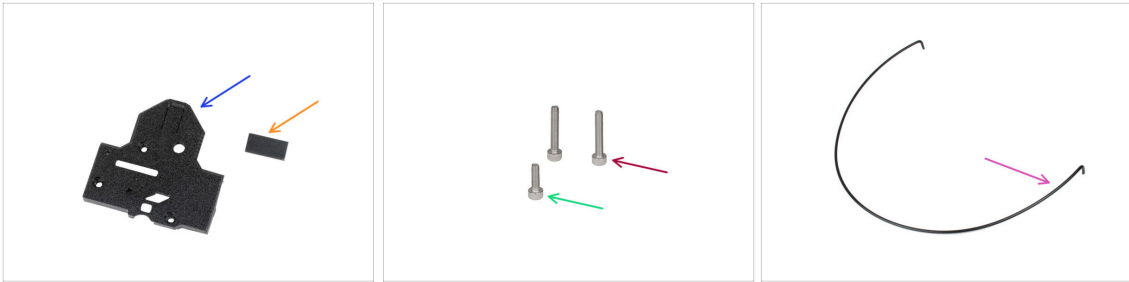
STEP 22 Connecting the extruder main cable



- Push the M3x40 screw through the X-carriage-cable-holder.
- Attach the X-carriage-cable-holder to the X-carriage underneath the extruder main cable and tighten the M3x40 screw.

⚠ **Do not pinch any wire of the extruder main cable!**

STEP 23 Covering the X-carriage: parts preparation



For the following steps, please prepare:

X-carriage-back (1x)

Rubber pad 20x10x1 (1x)

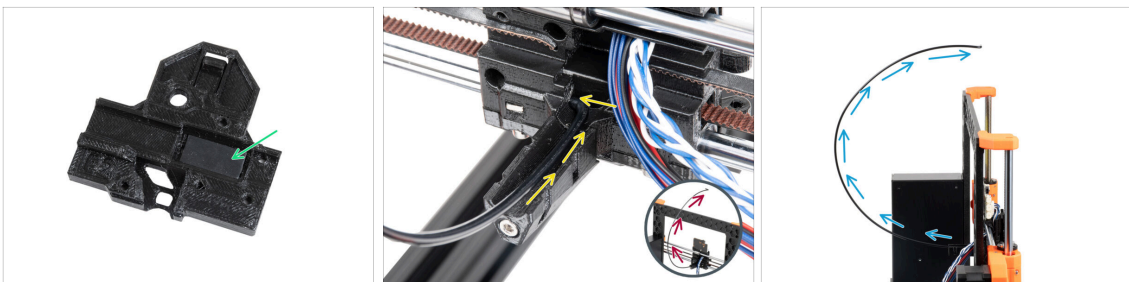
i The rubber pad 20x10x1 can be found in the Z-AXIS bag.

M3x18 screw (2x)

M3x10 screw (1x)

Nylon 3x555 mm (1x)

STEP 24 Covering the X-carriage: inserting the nylon filament



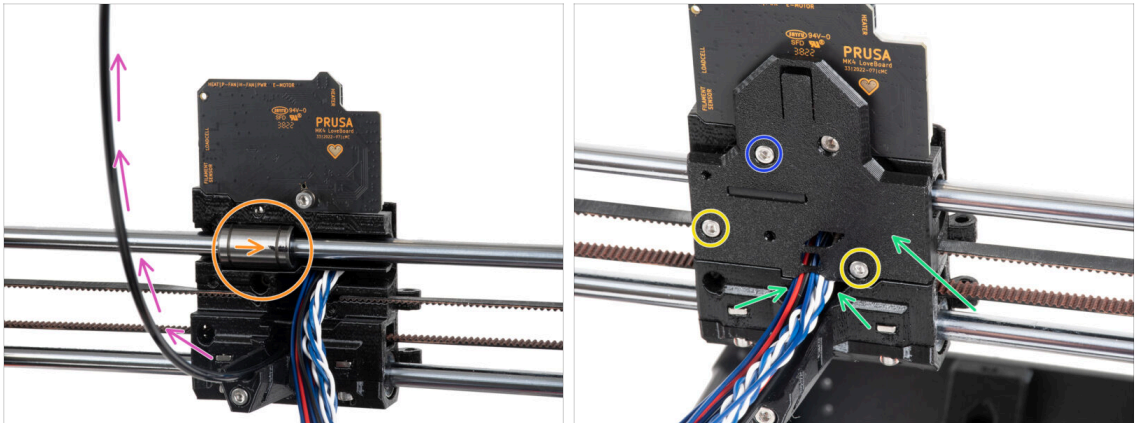
Place the rubber pad into the rectangular pocket in the X-carriage-back.

Insert one of the bent ends of the nylon filament into the hole located on the left side of the extruder main cable channel in the X-carriage.

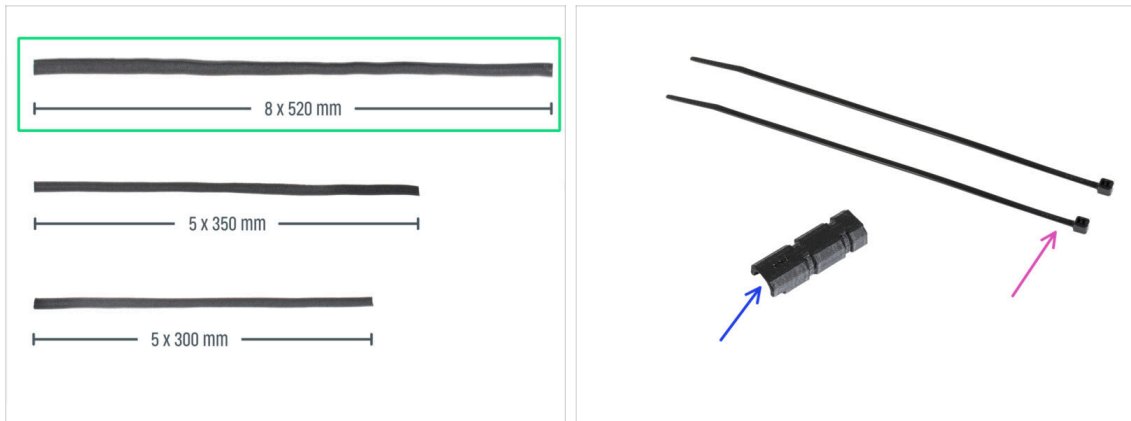
⚠ The nylon filament must CURVE UPWARDS. Not down, not to sides. See the detail.

After the nylon filament holds in the X-carriage, check that it inclines upwards as seen in the picture. If it is pointing down instead, re-install the nylon filament into the X-carriage by the other bent end and check again.

STEP 25 Attaching the X-cover-back



- **Before we cover the back of the X-carriage, make sure that:**
 - the upper bearing is in the pocket inside the X-carriage and the marking is facing you
 - the nylon filament is pointing upwards
- Place the X-carriage-back on the X-carriage and arrange the main cable wires like in the picture.
- ⚠ **Be careful, no wire must be pinched!**
- Secure the X-carriage-back with two M3x18 screws.
- Insert and tighten the M3x10 screw into the upper hole in the X-carriage-back.

STEP 26 Guiding the main-cable: parts preparation

● **For the following steps, please prepare:**

- Textile sleeve 8x520 (1x)

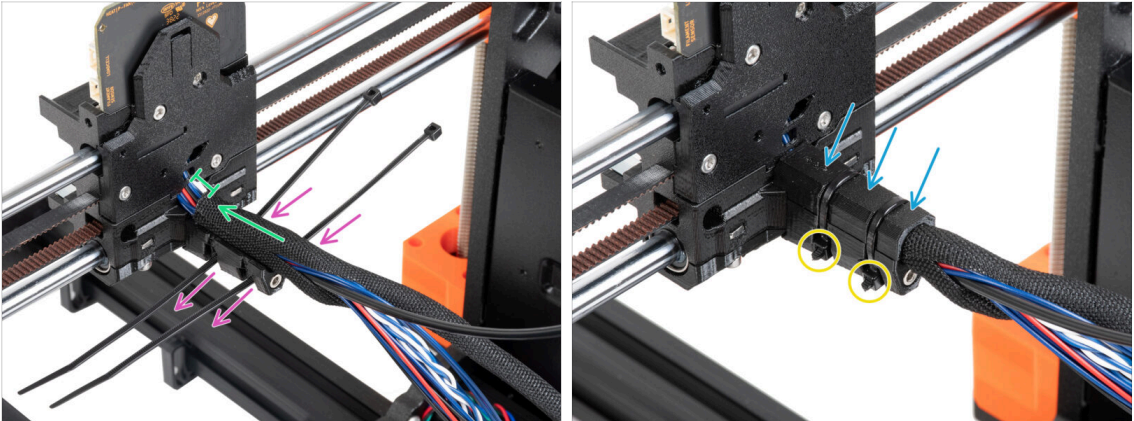
① The are three different textile sleeve sizes in your kit package. You can always make sure by comparing their lengths.

① The ends of the textile sleeves are heat-sealed at the factory to prevent ripping. To open them, the sealed end joints must be cut or torn.

- Zip tie (2x)

- X-carriage-cable-holder-cover (1x)

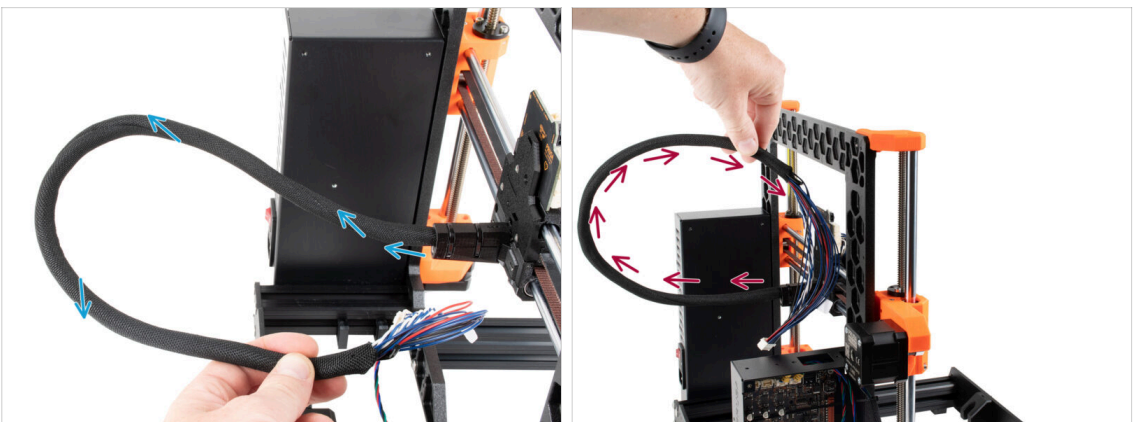
STEP 27 Wrapping the extruder main cable



- ✿ Push two zip ties through the X-carriage-cable-holder. See the correct orientation of the zip ties.
- ✿ Wrap the extruder main cable and the nylon filament near the X-carriage with the textile sleeve. Keep a 1 cm (0.39 inches) gap between the sleeve and the X-carriage. Wrap just this part near the joint, for now, we will continue wrapping the bundle in the next step.
- ✿ Cover it with X-carriage-cable-holder-cover.
- ✿ Tighten both zip ties so that the "heads" fit into the pockets in the plastic part. Cut off the excess zip tie.

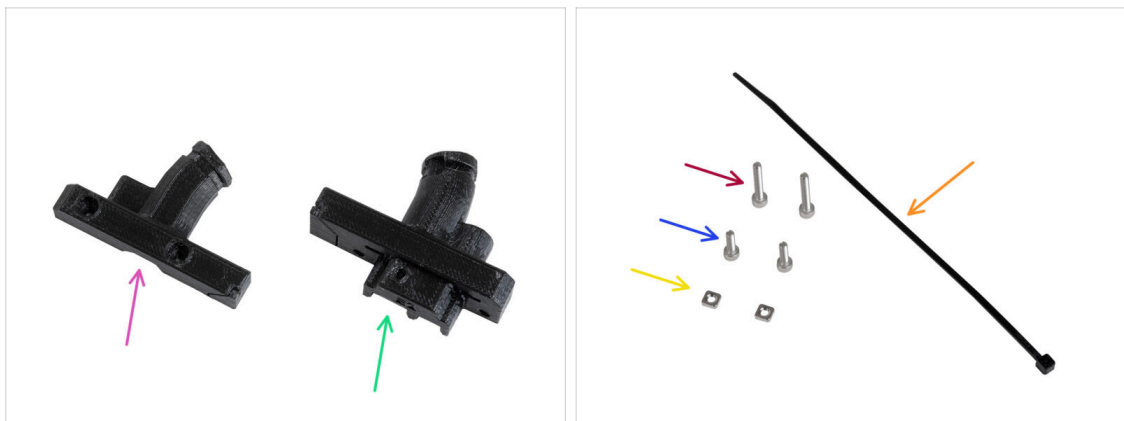
⚠ **It is important that the heads of the zip ties are seated in the pockets.** Otherwise, they may collide with the printer frame during X-axis calibration and the calibration could fail.

STEP 28 Wrapping the textile sleeve



- ✿ Wrap the textile sleeve around the extruder main cable and nylon filament.
 - Proceed in a spiral motion around the bundle so that it is tightly bound together.
- ✿ Hold the cable bundle upwards while wrapping and continue until it is fully wrapped.

STEP 29 Ext-cable-holder: parts preparation



For the following steps, please prepare:

Ext-cable-holder-b (1x)


Ext-cable-holder-a (1x)

Zip-tie (1x)

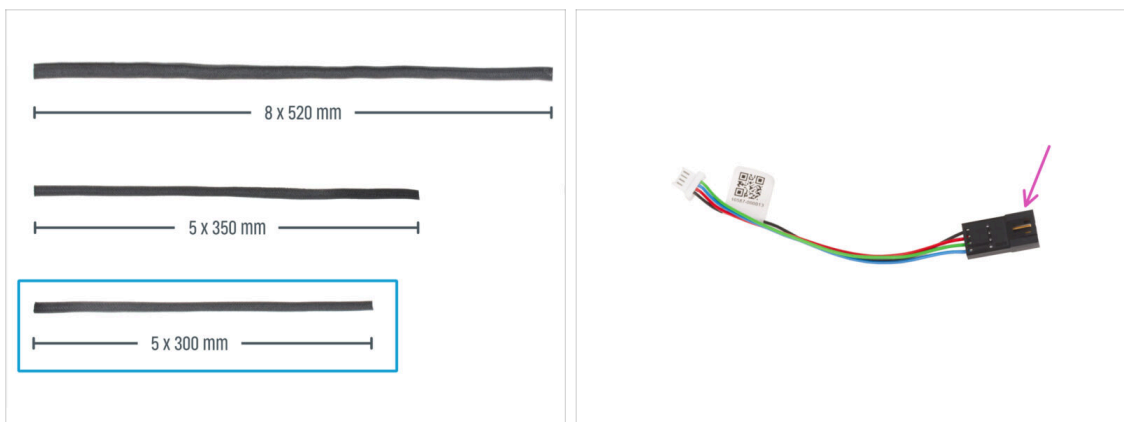
M3x18 screw (2x)

M3x10 screw (2x)

M3nS nut (2x)

 The list continues in the next step...

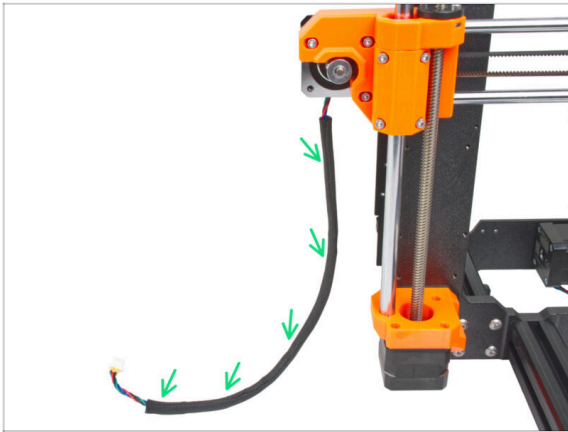
STEP 30 Ext-cable-holder: parts preparation



Textile sleeve 5x300 mm (1x)

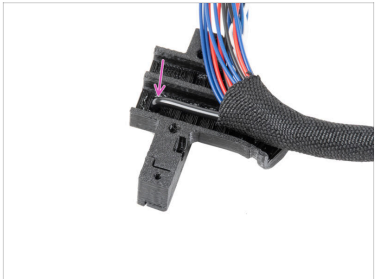
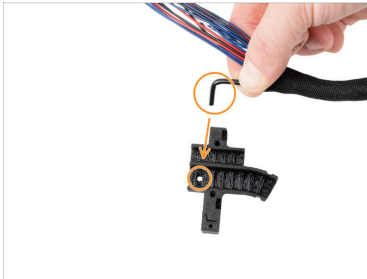
Motor cable adapter (1x)

STEP 31 Wrapping the X motor cable



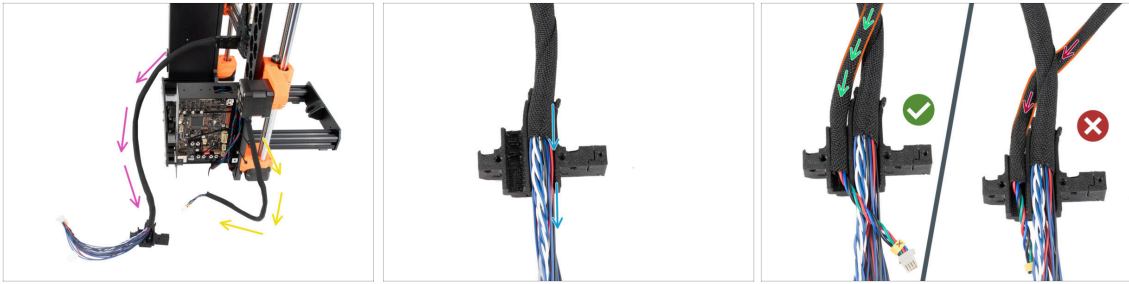
- Wrap the X motor cable to the textile sleeve.
- i** It's alright that the textile sleeve doesn't go over the full length of the motor cable.

STEP 32 Attaching the Ext-cable-holder



- Insert two M3nS nuts all the way into the Ext-cable-holder-a.
- Take the bent end of the nylon filament. And locate the hole in the Ext-cable-holder-a.
- Push the bent part of the nylon filament into the hole in the Ext-cable-holder-a.

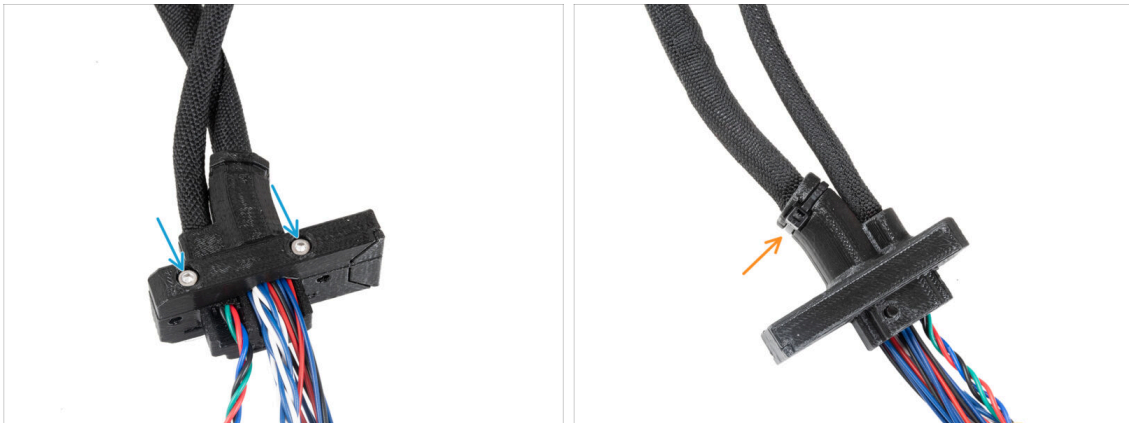
STEP 33 Assembling the Ext-cable-holder



- ◆ Guide the extruder main cable freely from the printer. Do not twist or rotate it.
- ◆ Guide the X motor cable freely from the printer.
- ◆ Insert the extruder main cable in the cable channel in the Extr-cable-holder-a.
- ◆ Take the X motor cable and guide it **over the extruder main cable** through the left channel in the Ext-cable-holder-a.

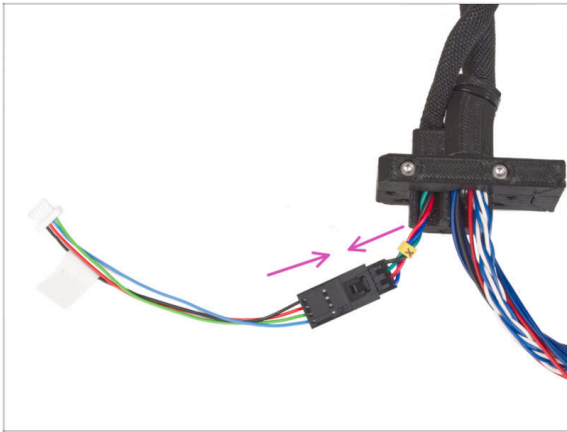
⚠ Guiding the X motor cable behind the main cable could cause problems with axis travel when printing.

STEP 34 Assembling the Ext-cable-holder



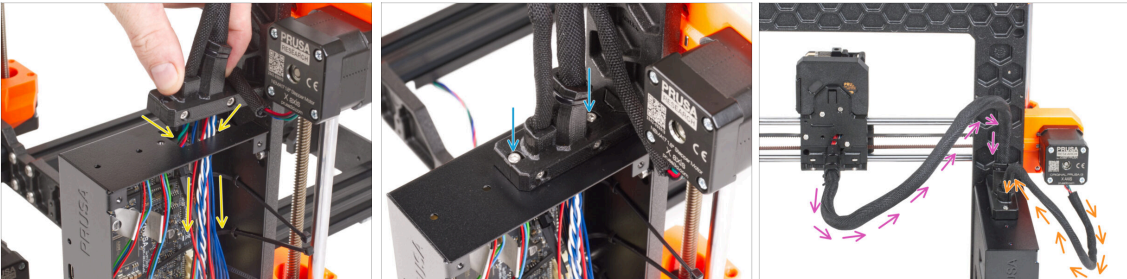
- ◆ Cover the cables with the Ext-cable-holder-b and secure it with two M3x18 screws.
- ◆ Secure the Ext-cable-holder together with the zip tie in the groove. Tighten up the zip tie and cut off the excess of the zip tie.

STEP 35 Connecting the X motor cable adapter



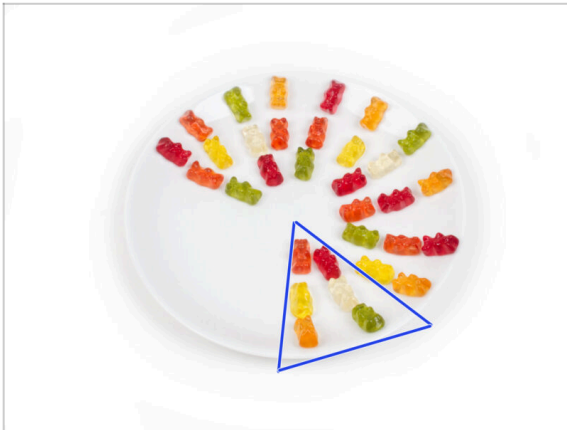
- Plug the X motor cable guiding from the Ext-cable-holder to the motor cable adapter.

STEP 36 Attaching the Ext-cable-holder



- Push the X-axis motor cable and the extruder main cable through the hole in the xBuddy box to the electronics.
- ⚠ Double-check that the **X motor cable does not guide behind the extruder main cable**. Compare it with the picture.
- Attach the Ext-cable-holder onto the xBuddy box with the two M3x10 screws.
- Leave the cables free in the xBuddy box for now. We will connect them later on.
- According to the third picture, compare the guiding of the extruder main cable. Note the curve of the cable guide.
- Compare the guiding of the X motor cable.

STEP 37 Reward yourself!



◆ Eat six gummy bears.

ⓘ **Did you know that** in 2014, a gummy bear-inspired emoji was added to the Unicode Standard, allowing gummy bear enthusiasts to express their love for the candy in digital conversations.

STEP 38 Here it is!

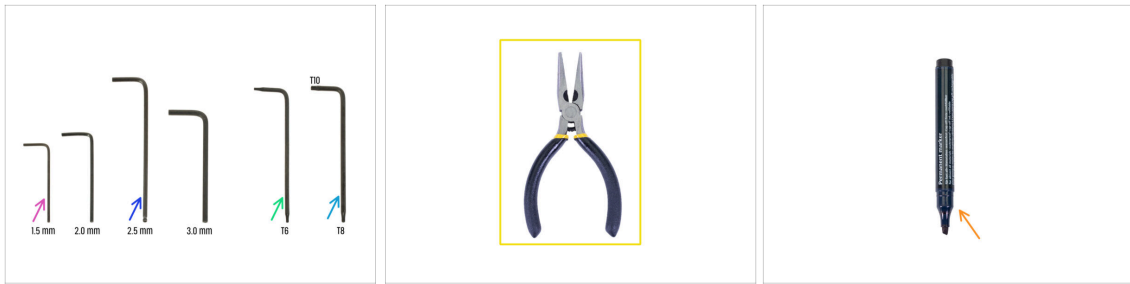


- ◆ Compare your build with the picture.
- ◆ Everything is right? Congratulations! You have successfully assembled the Z-axis with some other small things.
- ◆ So, let's continue with the next chapter: **5. Nextruder assembly**







5. Nextruder assembly



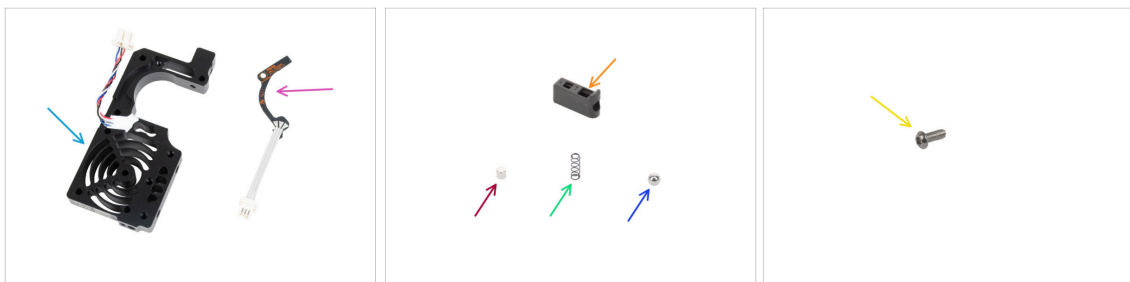
STEP 1 Tools necessary for this chapter










For this chapter, please prepare:

-  1.5mm Allen key
-  2.5mm Allen key
-  Torx key TX6
-  Torx key TX10/8
-  Needle-nose pliers
-  Permanent marker

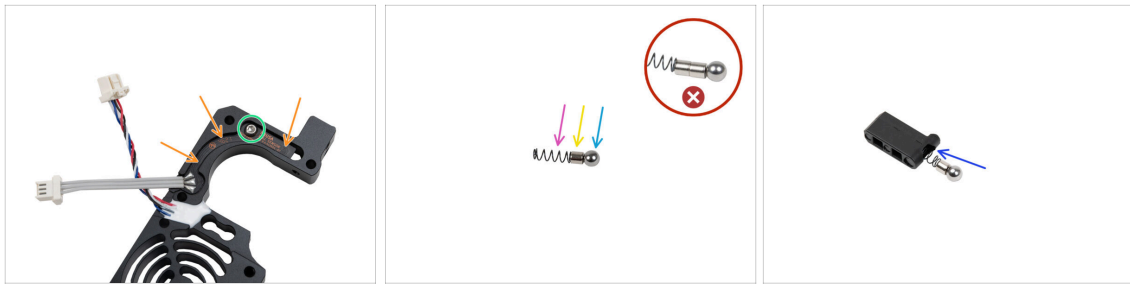
STEP 2 Filament sensor: parts preparation



For the following steps, please prepare:

-  Nextruder heatsink (1x)
-  Hall filament sensor (1x)
-  Prusa ball holder (1x)
-  Magnet 3x3x3 mm (1x)
-  Spring 3x9 mm (1x)
Note: the small spring can sometimes be stuck in the large spring in the package. Carefully inspect the contents of the bag.
-  Steel ball 4 mm (1x)
-  M2.5x6rT screw (1x)

STEP 3 Assembling the filament sensor



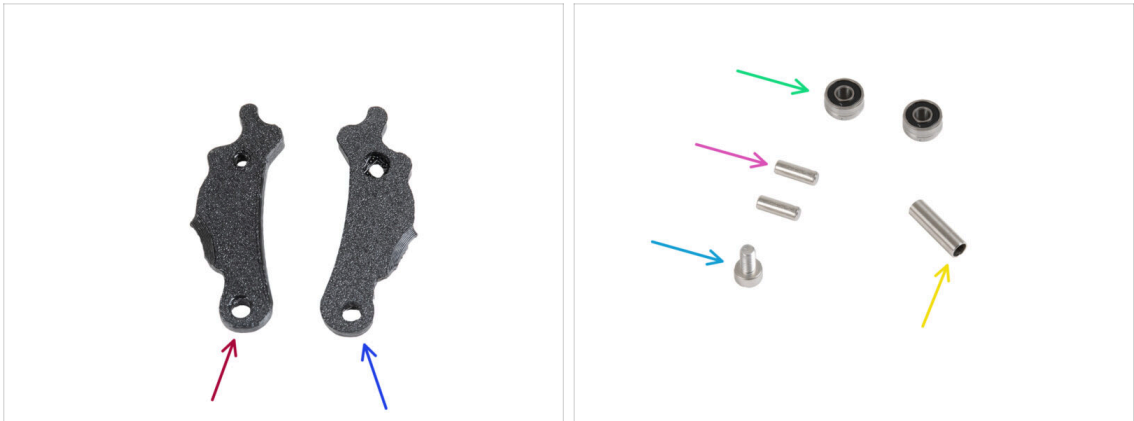
- Place the Hall filament sensor into the similarly shaped pocket in the heatsink.
- Fix it with M2.5x6rT screw. Tighten it very carefully, you can crack the electronics board.
- Assemble the Prusa ball holder in the following order:
 - Steel ball
 - Magnet
 - Spring
- ⚠ Be sure to **insert only one magnet**. One extra magnet is included as a spare. The magnets may snap together and appear as one. Check carefully.
- Insert these parts into the Prusa ball holder with the steel ball up.

STEP 4 Assembling the filament sensor



- Insert the Prusa ball holder assembly into the heatsink. Make sure the steel ball part is closer to the side of the heatsink.
- ⚠ Note the **correct orientation of the Prusa ball holder assembly**. There is a protrusion on the part. The protrusion must be facing down.
- Push the assembly into the heatsink.

STEP 5 Nextruder idler assembly: parts preparation



For the following steps, please prepare:

- Idler-lever-b (1x)
- Idler-lever-a (1x)
- Bearing 693 2RS (2x)
- Pin 2.9x8.5 (2x)
- M3x6 screw (1x)
- Tubular spacer 13.2x3.8x0.35 (1x)

STEP 6 Assembling the extruder idler



- Insert the pin 2.9x8.5 into each bearing 693 2RS, as seen in the picture.
- Place both bearings with the pins into the Idler-lever-b.
- Close it up with the Idler-lever-a part and secure it with the M3x6 screw. **Do not overtighten the screw.** Both bearings must be able to rotate without significant resistance.
- From the same side, push the tubular spacer into the assembly. The "bottom" of the tubular spacer must be flush with the bottom part of the Idler assembly.

STEP 7 Assembling the extruder: parts preparation I.

For the following steps, please prepare:

PG-case (1x) *you will use it later*

i If your package contains an injection-molded PG-case, these instructions are for a different model. These parts are for MK4S and MK3.9S printers. Please visit help.prusa3d.com to find the correct manual.

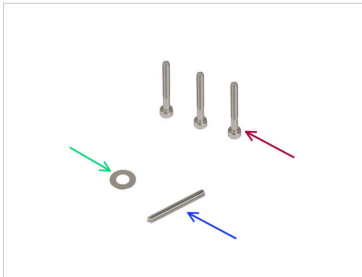
Main-plate (1x)

PG-assembly-adapter (1x)

PG-assembly (1x)

PG-ring (1x)

i The list continues in the next step...

STEP 8 Assembling the extruder: parts preparation II.

Extruder motor (1x)

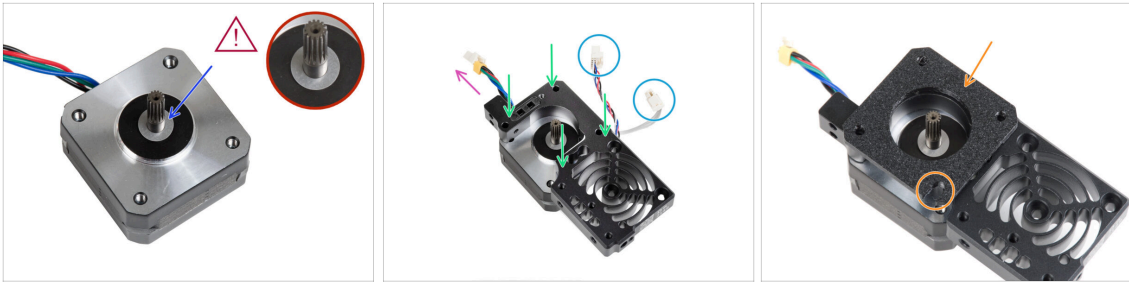
M3x25 screw (3x)

Spacer 5x10x0.1 mm (1x)

Socket set screw M3x25 (1x)

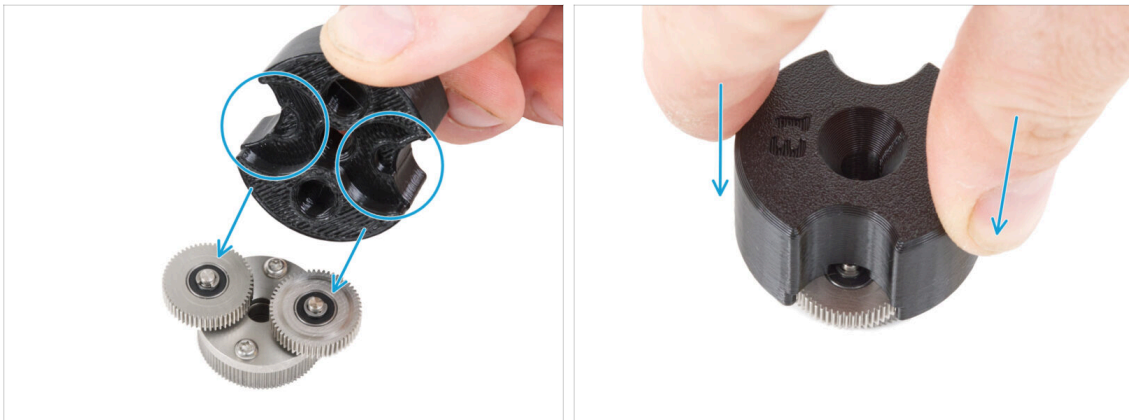
Lubricant (1x)

STEP 9 Assembling the extruder



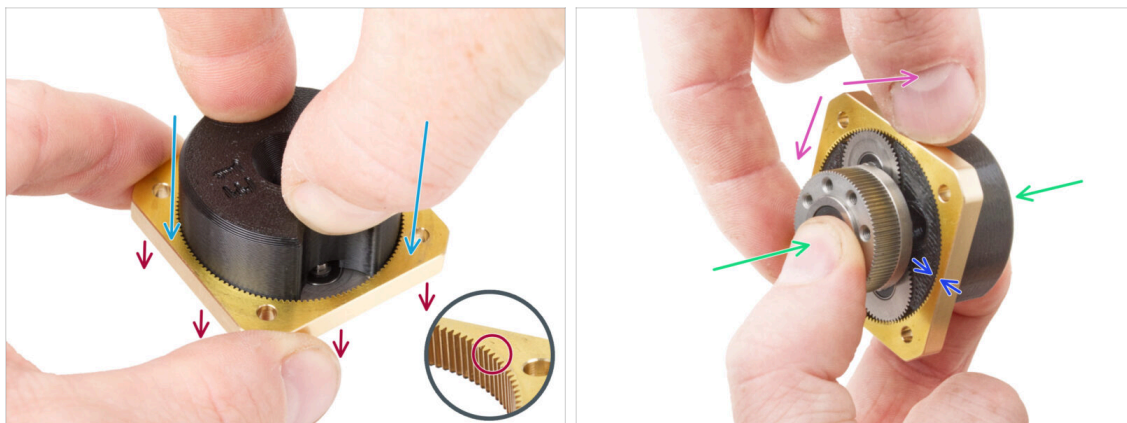
- Attach the 5x10x0.1 spacer over the shaft on the extruder motor.
 - Place the heatsink on the extruder motor. Note the orientation of both parts.
 - The motor cable must be facing "up".
 - The heatsink cables must be on the right side.
 - Place the main-plate on the heatsink. Note the orientation of the part. Use the cutout as a guide.
- ⚠ Before proceeding to the next step, make sure that the 5x10x0.1 spacer is placed on the extruder motor.

STEP 10 Assembling the gearbox



- ⓘ **The following instructions need to be done correctly and carefully.** Achieve better understanding and successful assembly by watching the video alongside the guide: prusa.io/PG-assembly
- After watching the video, follow the steps in this guide.
 - Attach the PG-assembly-adapter on the PG-assembly. Note the pockets for the gears in the adapter.

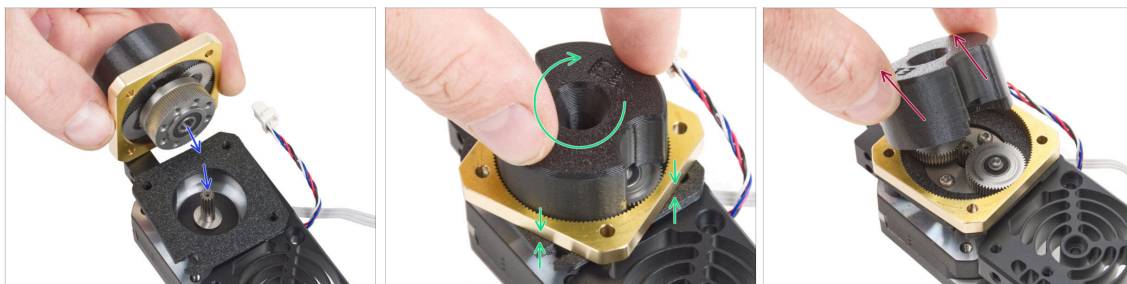
STEP 11 Assembling the PG-ring



⚠ Do not assemble the gearbox without the PG-assembly-adapter. This tool is intended to ensure that the gears are correctly fit together.

- ➡ Slide the PG-ring onto the adapter.
- ➡ Note there is a chamfer on one side of the PG-ring teeth. This side must be facing down (to the PG-assembly).
- ➡ Grasp the entire assembly in one hand so that it can be rotated with the PG-ring.
- ➡ With the other hand, slide the PG-ring onto the PG assembly in a wobbling motion (move the PG-ring left and right repeatedly) - a quarter turn is enough.
- ➡ Stop when the surfaces of the gears are approximately flush with the surface of the PG ring.

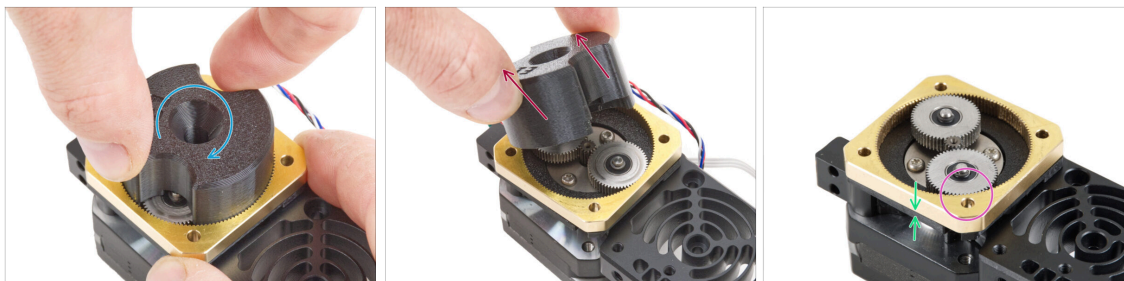
STEP 12 Assembling the PG-assembly



⚠ Proceed very carefully in this step.

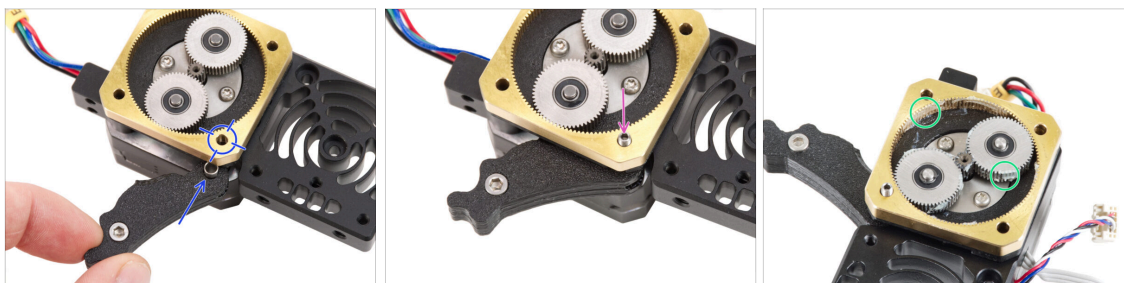
- ➡ Maintain the position of the PG-assembly and attach it on to extruder motor shaft.
- ➡ Very gently and freely rotate with the whole PG assembly (PG-assembly-adapter, PG-assembly and PG-ring) until it drops down so that there is no gap between the assembly and the main-plate. **Do not push on the assembly.**
- ➡ Remove the PG-assembly-adapter.

STEP 13 Checking the PG-assembly



- Attach the PG-assembly-adapter back on the PG-assembly again to verify that all parts are properly seated.
- Rotate with the PG-assembly-adapter. **The PG assembly must be easy to rotate without having to exert much force.**
- Remove the PG-adapter. You will no longer need it during assembly. We recommend keeping it for maintenance.
- Ensure that the PG-assembly is not sticking out above the PG-ring. It should be positioned lower than the level of the PG-ring's surface or at the same level as the ring.
- There must be a minimal gap between PG-ring and the Main-plate. If you see a significant gap, remove the planetary gear assembly and reposition it again.

STEP 14 Assembling the Nextruder idler



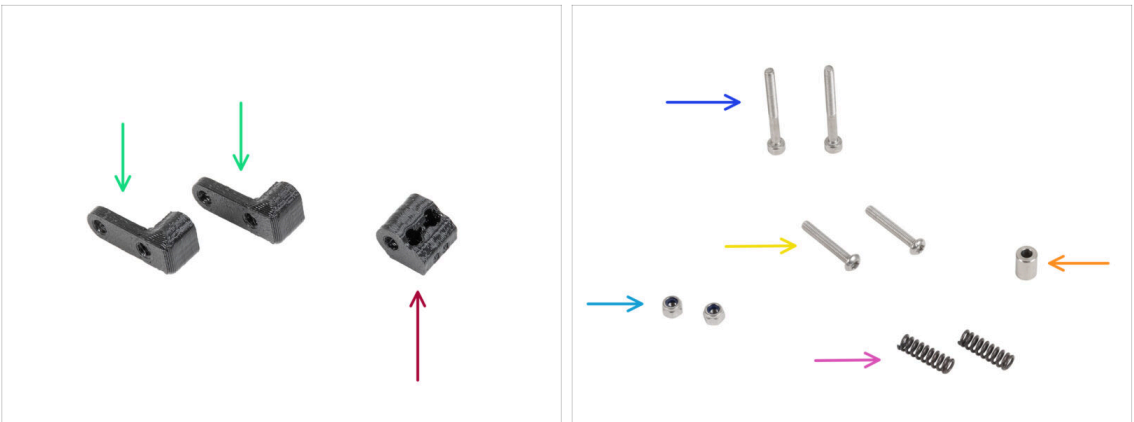
- Insert the idler assembly between the PG-ring and the extruder motor. There is a cutout for the spacer in the main-plate. Line up the idler spacer with the hole in the PG-ring.
- Secure both parts with the socket set screw 3x25. **Do not overtighten the screw! The screw protrudes from the PG-ring after tightening.**
- Apply a small amount of Prusa Lubricant all around the PG-ring and PG-assembly teeth.
- ① Tip: apply a small amount of lubricant to the tip of the zip tie and then spread the lubricant over the gears.
- Using a paper towel, wipe off any excess lubricant on the front surfaces.

STEP 15 Covering the planetary gear



- Take the PG-cover and **make sure the plastic ring is already inserted** in the part.
- The color of the plastic ring might vary. The properties are the same.
- Cover the planetary gear and secure the PG-case with three M3x25 screws. **Do not overtighten the screws!**

STEP 16 Assembling the Idler-swivel: parts preparation

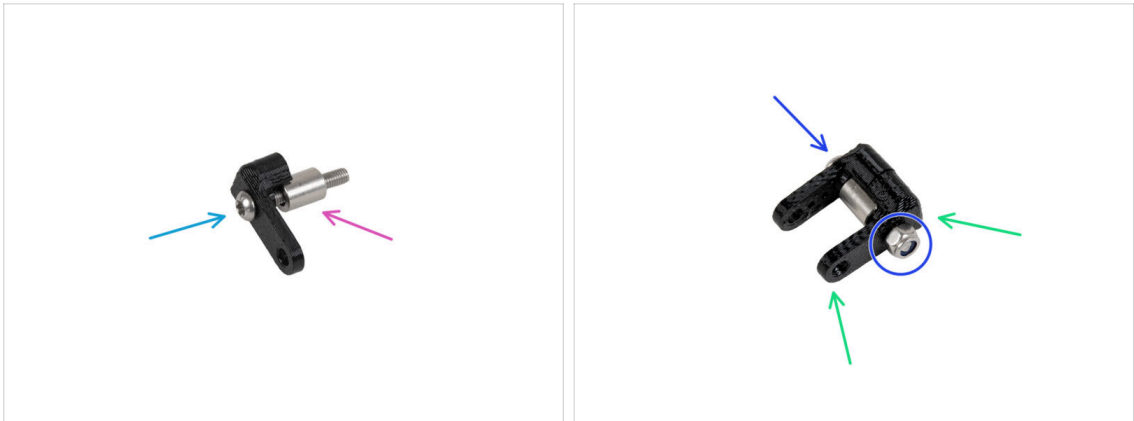


● For the following steps, please prepare:

- Idler-nut (1x)
- Idler-swivel (2x)
- M3x30 screw (2x)
- M3x20rT screw (2x)
- M3nN nut (2x)
- Spring 15x5 (2x)
- Spacer 6x3.1x8 (1x)

● In some older packages this part is called "Spacer 5.5 mm".

STEP 17 Assembling the Idler-swivel



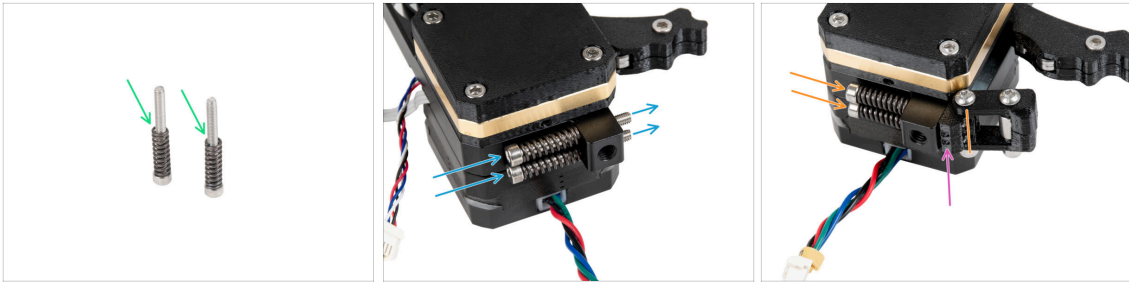
- Push the M3x20rT screw all the way through one of the idler-swivel.
- Slide the spacer onto the screw.
- Place the second idler-swivel from the opposite side on the screw.
- From the other side, attach the M3nN nut onto the screw. Hold the nut using the universal wrench and tighten the screw. **Tighten just lightly!** The spacer must rotate freely.

STEP 18 Assembling the Idler-nut



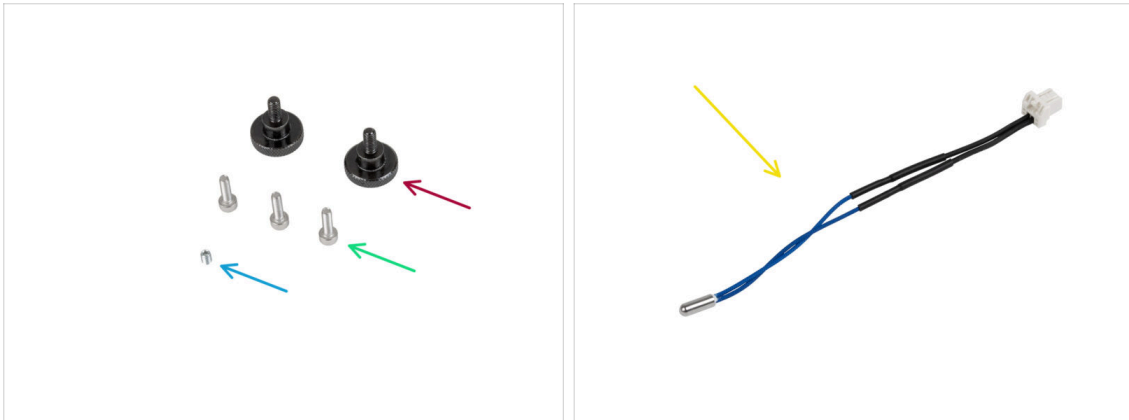
- Insert the Idler-nut into the Idler-swivel assembly. Make sure that both parts are oriented correctly according to the picture.
- Secure both parts together by inserting the M3x20rT screw from the same side, like the first screw.
- Secure the screw with M3nN nut. **Do not overtighten the nut.** It must be possible to move with the Idler-swivel on the Idler-nut.

STEP 19 Mounting the Idler-swivel assembly



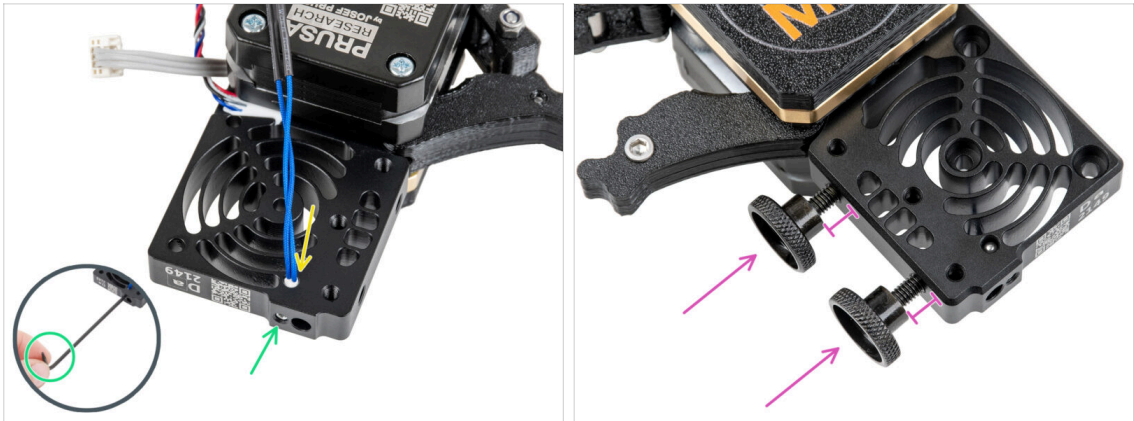
- Attach the spring 15x5 on both M3x30 screws.
- Push the two screws with the springs through the holes in the protrusion on the heatsink. There are no threads inside.
- Attach the Idler-swivel assembly on the screws. See the correct orientation of the Idler-nut. The side with version marking must be visible. See the picture.
- Tighten both screws. **Stop tightening as soon as the screw tips reach the front face of the idler nut.**

STEP 20 Attaching the extruder: parts preparation



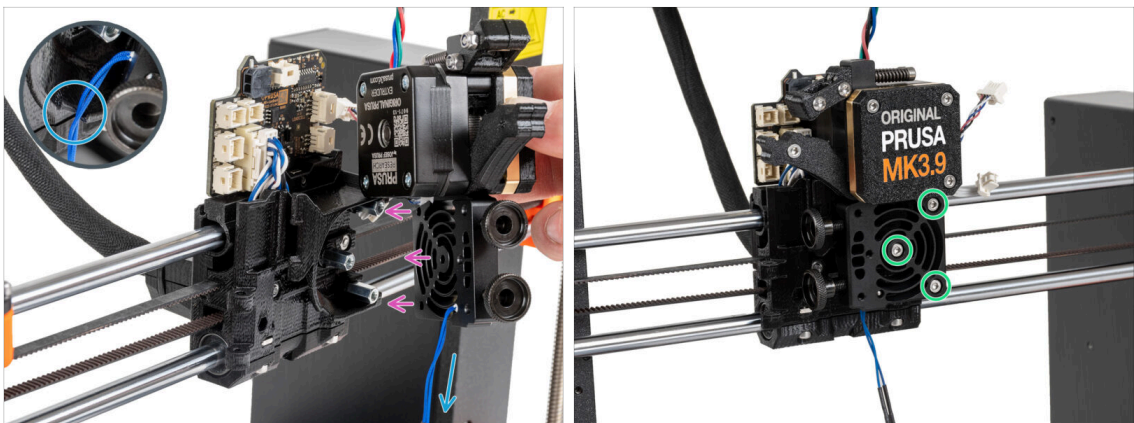
- **For the following steps, please prepare:**
- Thumb screw (2x)
- M3x10 screw (3x)
- M3x4T grub screw (1x)
- NTC thermistor 90 mm (1x)
- i The color variant of the cable may vary.

STEP 21 Assembling the heatsink



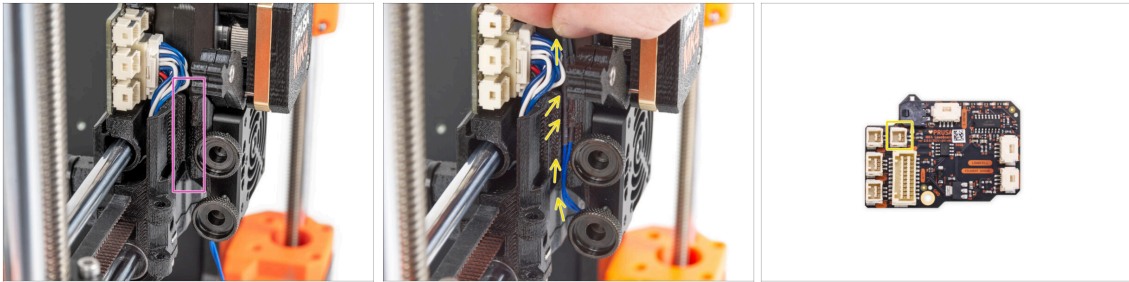
- ✦ On the extruder motor side, insert the NTC thermistor into the hole in the heatsink.
- ✦ Secure it with the M3x4T grub screw. Screw it all the way in. **Tighten gently, but firmly** using two fingers and the short side of the T6 Torx key. Applying more force may cause permanent damage to the thread.
- ✦ Insert two thumb screws into the heatsink. Do not tighten them completely. Two turns are enough for now.

STEP 22 Attaching the extruder



- ✦ Place the Nextruder onto the spacers on the X-carriage.
- ✦ There is a cutout in the plastic part. Guide the thermistor cable through this cutout.
⚠ **DO NOT PINCH ANY OF THE CABLES!**
- ✦ Align the heatsink holes with the spacers on the X-carriage and join both parts together with three M3x10 screws. Start with the middle one.

STEP 23 Connecting the NTC thermistor



- ◆ Locate the cable channel on the left side of the X-carriage. We will guide some of the cables through this channel in the following steps
- ◆ Guide the NTC thermistor through the cable channel in the X-carriage up to the LoveBoard slot and connect it.

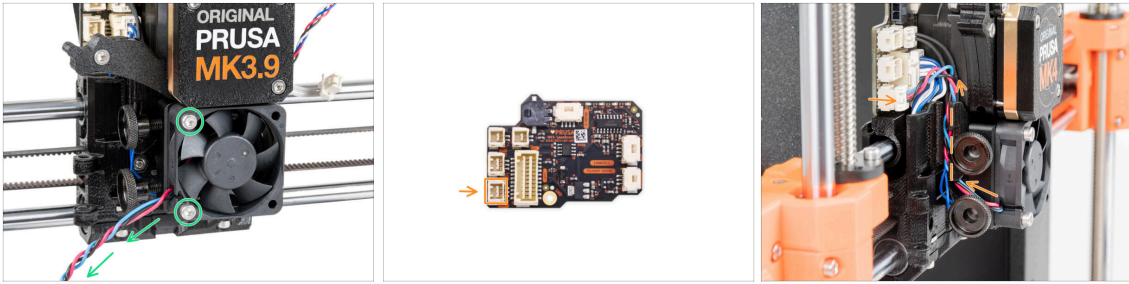
STEP 24 Assembling the hotend fan: parts preparation



◆ For the following steps, please prepare:

- ◆ Hotend fan (1x)
- ◆ M3x18 screw (2x)

STEP 25 Assembling the hotend fan



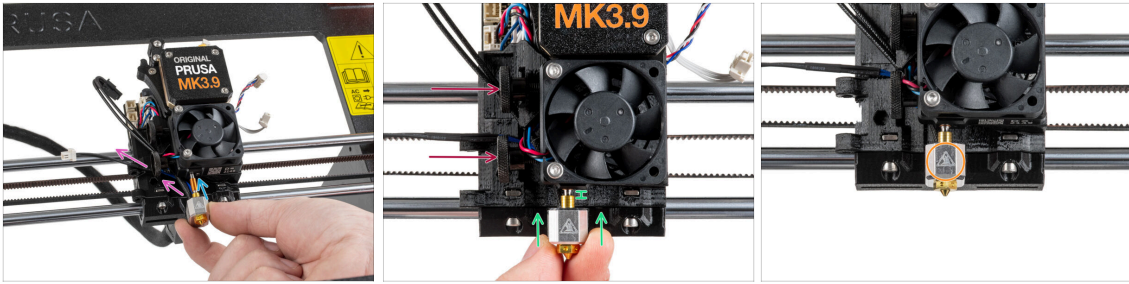
- Attach the hotend fan onto the heatsink with two M3x18 screws on the left side. **Tighten the screw gently, but firmly**, otherwise the plastic housing may crack. The **cable must be pointing towards the lower-left corner**.
- ⚠ There is a sticker on the hotend fan, the sticker must be on the rear side of the fan - not visible.
- Guide the fan cable between the thumb screws under the cable channel up and connect it to the **lower slot** on the LoveBoard.

STEP 26 Inserting the hotend assembly: parts preparation



- For the following steps, please prepare:
- Hotend assembly (1x)

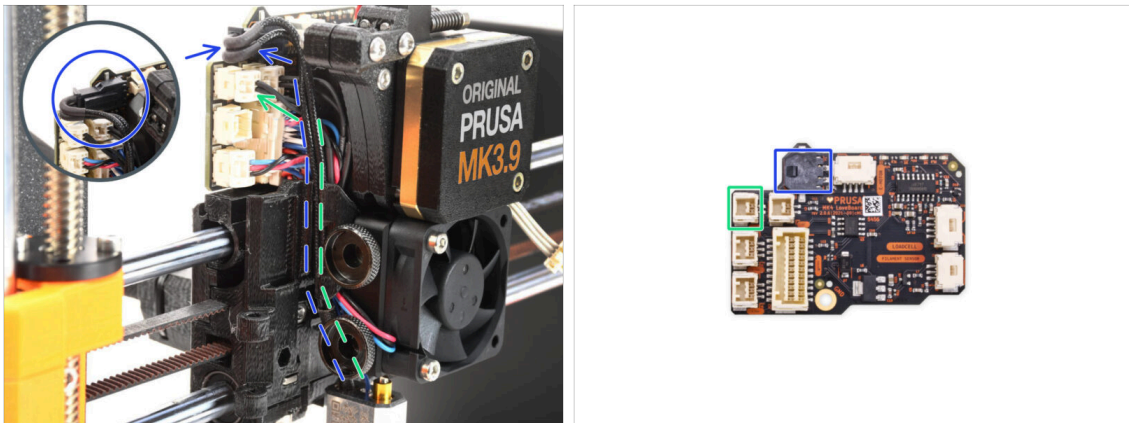
STEP 27 Inserting the hotend assembly



- ◆ Locate the hole in the heatsink from the bottom of the extruder and insert the hotend into the heatsink.
- ◆ Guide the hotend cables freely to the left.
- ◆ Push the hotend assembly all the way into the heatsink. There should be approximately a 2 mm gap between the heatsink and the brass part of the nozzle.
- ◆ While pushing the hotend assembly in, **firmly tighten both thumb screws**.

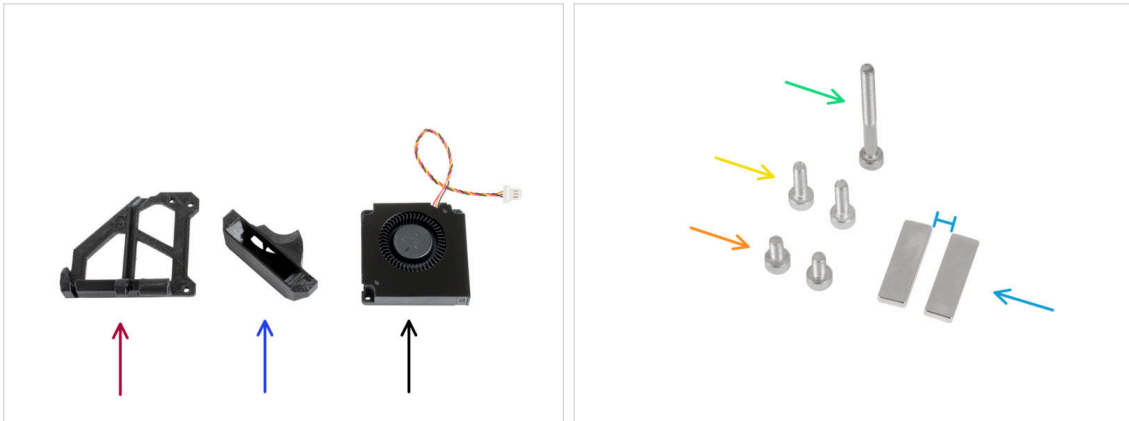
⚠ **Avoid pinching any cable between the screws and the heatsink!**
- ◆ Orient the hotend assembly so that the HOT symbol on the heaterblock faces forward.

STEP 28 Connecting the hotend cables



- ◆ Guide the hotend thermistor through the cable channel in the X-carriage and connect it to the LoveBoard.
- ◆ Guide the hotend heater through the cable channel in the X-carriage and connect it to the LoveBoard.

STEP 29 Assembling the fan-door: parts preparation



For the following steps, please prepare:

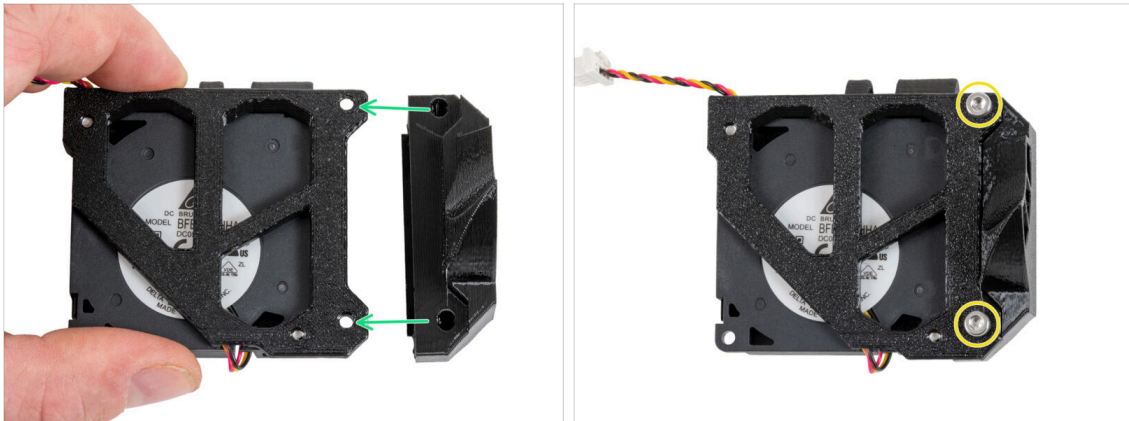
- Fan-door (1x)
- Fan-shroud (1x)
- Print fan (1x)
- M3x30 screw (1x)
- M3x10 screw (2x)
- M3x6 screw (2x)
- Magnet 20x6x2 (2x) **Keep the magnets apart in a sufficient distance. They can break each other!**

STEP 30 Assembling the fan door



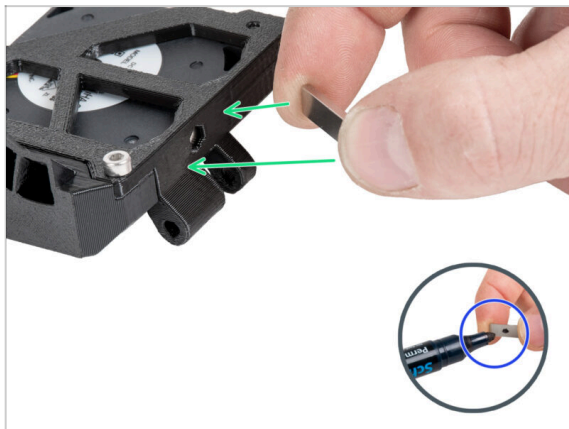
- Insert the magnet into the pocket on the inside of the fan-door.
- Arrange the print fan as seen in the picture. Guide the cable through the channel in the plastic part. Keep a small gap between both parts.
- Turn (close) the fan around and attach it to the fan-door by using two M3x6 screws.
- Pull the fan cable **very gently** to reduce the slack as much as possible.

STEP 31 Assembling the fan-door



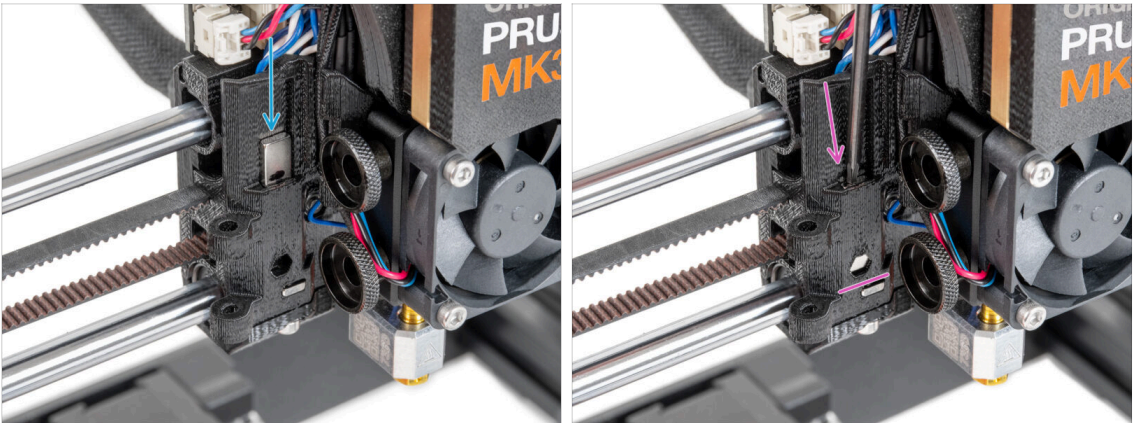
- Turn the fan-door assembly as shown.
- Attach the fan-shroud to the fan-door and align the holes in both parts.
- Join both parts together with two M3x10 screws.

STEP 32 Assembling the fan-door



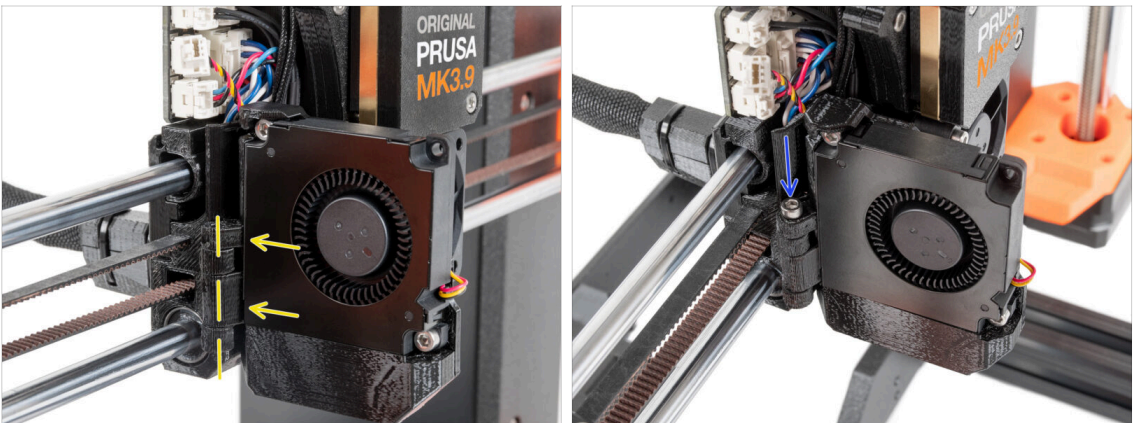
- ⓘ It is recommended to prepare the permanent marker for this step.
- Slowly get the free magnet close to the magnet in the fan-door and find out which two sides are attracted to each other.
- ⚠ **Be careful that the magnets do not stick together, it will be difficult to separate them.**
- Mark the sides that are attracted to each other with a permanent marker.

STEP 33 Assembling the fan-door



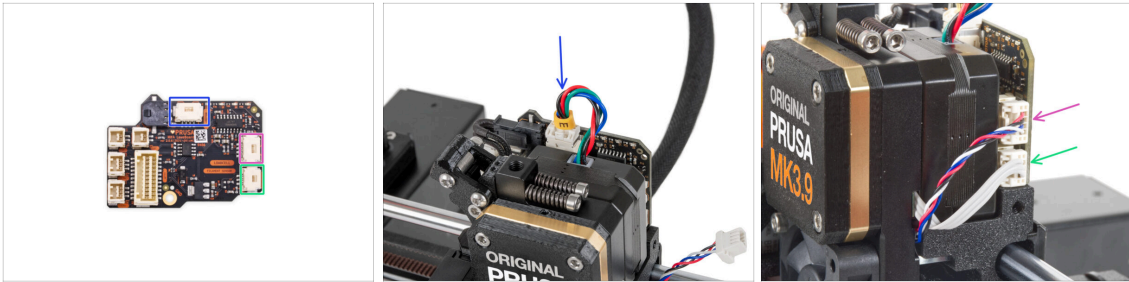
- Locate the hole for the magnet on the left side of the X-carriage.
- ⚠ Before inserting the magnet into the part, **double-check that the marked part of the magnet is FACING YOU**. The magnet cannot be removed from the part afterward.
- Insert the magnet into the hole so that the marked side is facing out of the X-carriage (to you).
- Push the magnet all the way down.

STEP 34 Assembling the fan-door



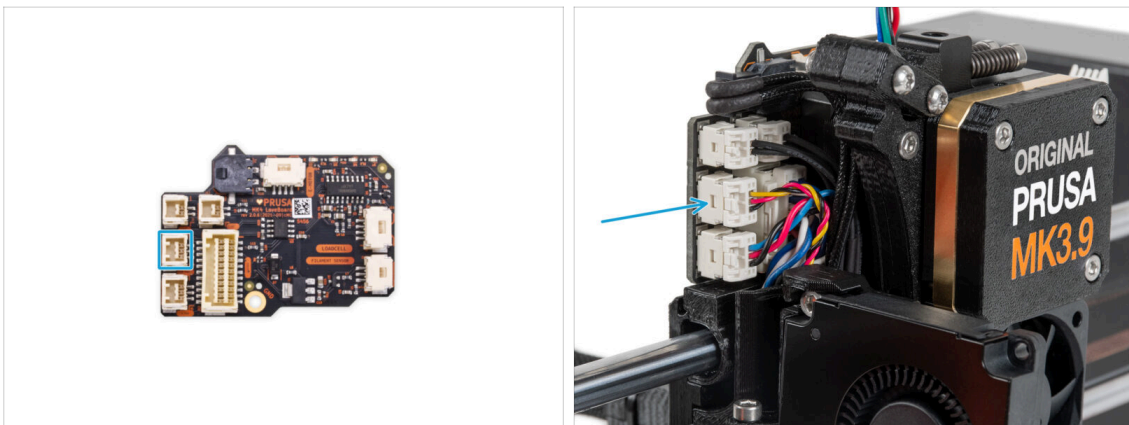
- Attach the fan-door hinge into its counterpart in the X-carriage. Holes in both parts must be aligned
- Insert the M3x30 screw in the hinge on the fan-door. Fully tighten the screw, then loosen it by a quarter turn. **The fan-door must move freely!**

STEP 35 Connecting the extruder cables



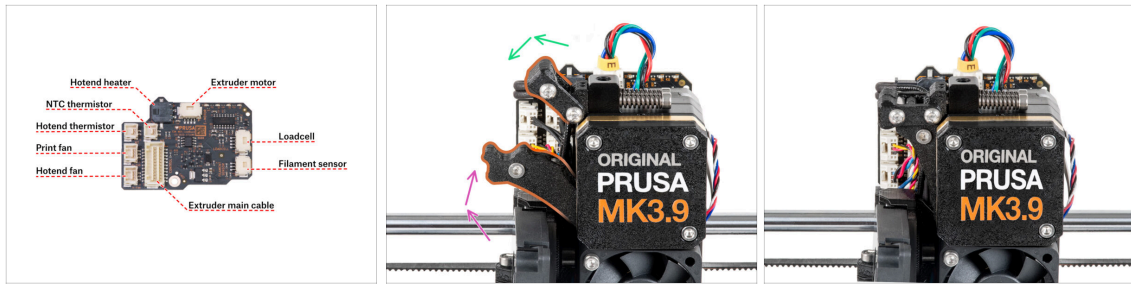
- Connect the Extruder motor cable to the connector on the top side of the LoveBoard.
- Connect the Loadcell cable coming from the right of the heatsink to the upper slot on the right side of the LoveBoard.
- Connect the filament sensor cable to the lower slot on the right side of the LoveBoard.

STEP 36 Connecting the print fan



- Connect the print fan cable to the **middle slot** on the left side of the Loveboard.

STEP 37 LoveBoard: Wiring check

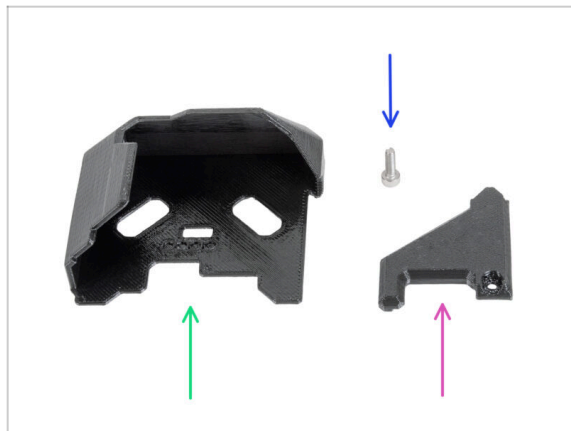


⚠ Before covering the electronics, check the connection of all cables. Click on high-resolution preview in the top left corner.

● **Close the idler mechanism before proceeding to the next step if you haven't already done so. Use the following sequence:**

- Close the extruder idler to the extruder
- Close the idler-swivel and lock it over the extruder idler assembly

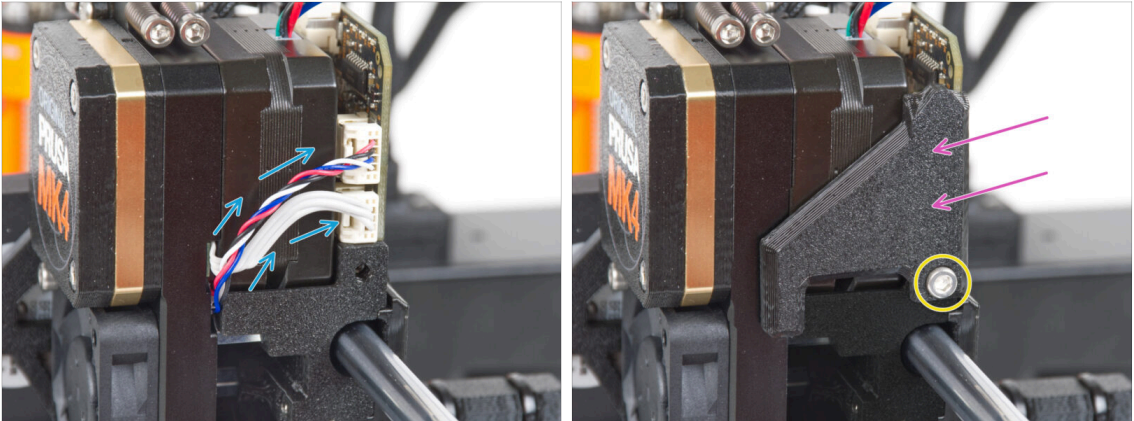
STEP 38 Covering the LoveBoard: parts preparation



● **For the following steps, please prepare:**

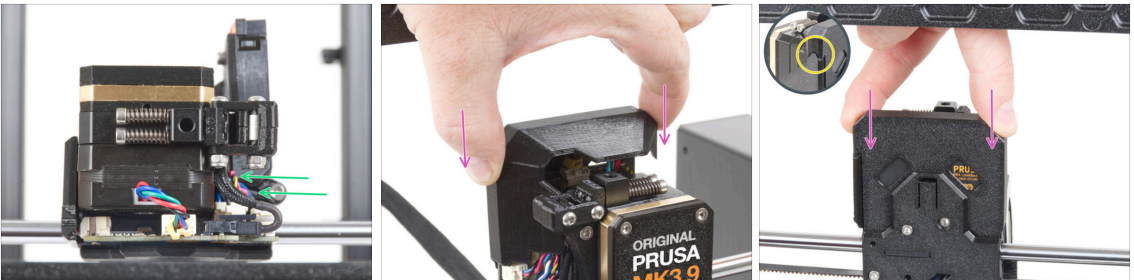
- LoveBoard-cover (1x)
- LoveBoard-cover-right (1x)
- M3x10 screw (1x)

STEP 39 Covering the LoveBoard



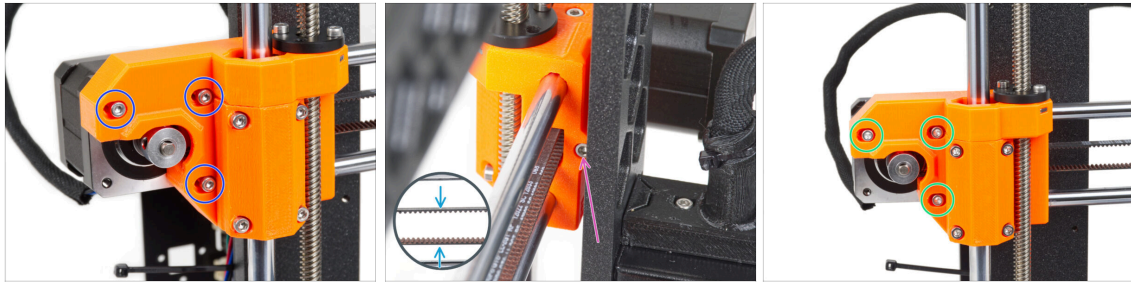
- Curve and arrange the cables on the right side of the extruder as you can see in the picture.
- Cover the cables with the LoveBoard-cover-right.
 - ⚠ **Do not pinch the cables!**
- Secure it with the M3x10 screw.
 - ⚠ **Make sure the LoveBoard-cover-right fits snugly against the right side of the extruder.** If not, it may cause the X-axis test to fail during the self-test because it will prevent the X-carriage assembly from moving all the way to the right.

STEP 40 Covering the LoveBoard



- Push all cables to the extruder to make more space around them. See the picture.
- Slide the Loveboard-cover on the extruder. And push it all the way down.
 - ⚠ **Be careful not to pinch any cables.**
- Ensure that the two plastic covers fit together perfectly.

STEP 41 Tensioning the X-axis belt



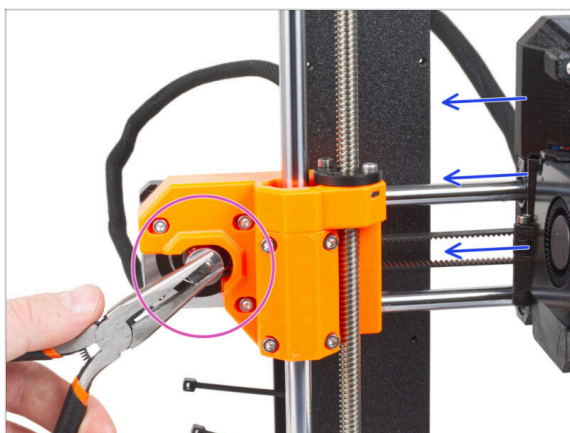
- i** In this step, we will finish tensioning the belt. Please read the instructions first, your belt might have proper tension already, then there is no need for additional screw adjustment.
- First, slightly release all the screws holding the motor, otherwise, the "tensioner" won't work (the motor must be able to move).
 - Using ball-end Allen key start tightening the screw on the rear side of the X-end-motor, but after each turn or two check the tension in the belt.
 - For the optimal performance, the belt must be a bit harder to press with your fingers. Move the extruder all the way to the X-end-idler and try the belt tension in the middle of the X-axis.
 - When you achieve optimal tension, please tighten the screws again.

STEP 42 Belt tension check



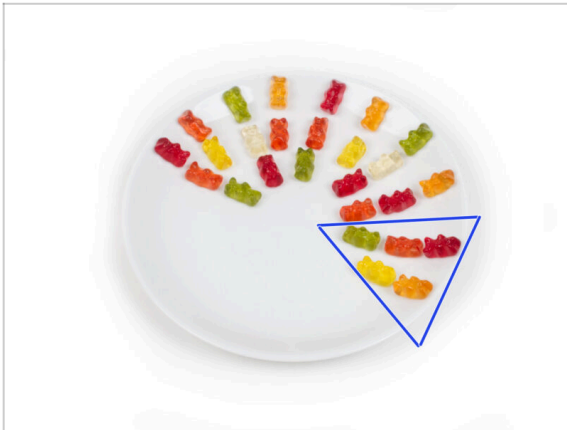
- ❗ This step is recommended, but optional. If you don't have a phone at your disposal, continue to the next step. You can do this check later on.
- 🛠 To verify or fine-tune the X or Y-axis belt tension on your printer, visit prusa.io/belt-tuner and open up the webpage on your mobile device. Or using your phone, scan the QR code in the picture.
- 🛠 Watch the instructional video on prusa.io/belt-tuner-video and fine-tune your X belt tension, if required.
- ❗ The belt tuner app was tested on multiple phones and should work across all most common phone manufacturers. However, in some rare cases it might not work as expected. Please state your brand and model in the comments below the step.

STEP 43 Testing the X-axis belt



- 🛠 Use the technique described below to test if the belt is properly stretched.
- 🔴 Grasp and hold the flat part of the X motor shaft with pliers. This will prevent it from rotating in the pliers.
- 🔵 Move the extruder towards the X motor. Don't use excessive force.
- 🛠 If the belt is stretched properly, you should feel a resistance and the extruder won't move at all. If the belt is too loose, it will deform (create a "wave") and jump over the teeth on the pulley.

STEP 44 Haribo time!

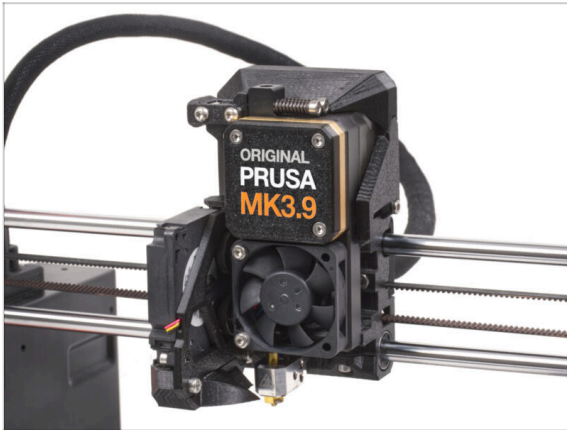


◆ Eat five gummy bears.



Did you know that gummy bears have a long shelf life, typically lasting for up to two years if stored properly in a cool and dry place. But don't do that now.

STEP 45 The extruder is assembled



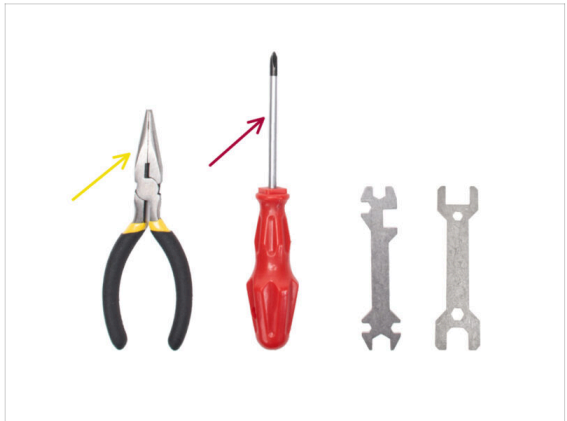
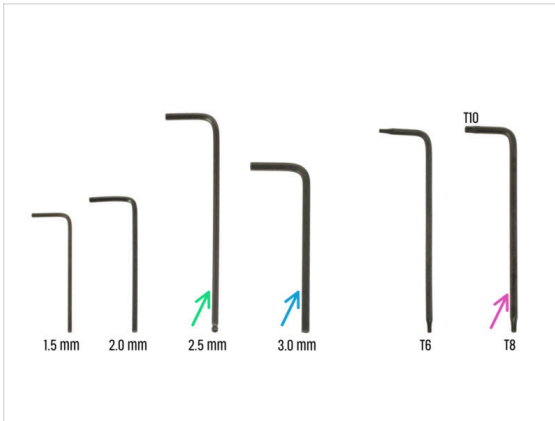
◆ That was tough. But we made it!

◆ Let's go the next chapter: **6. xLCD assembly**

6. xLCD assembly



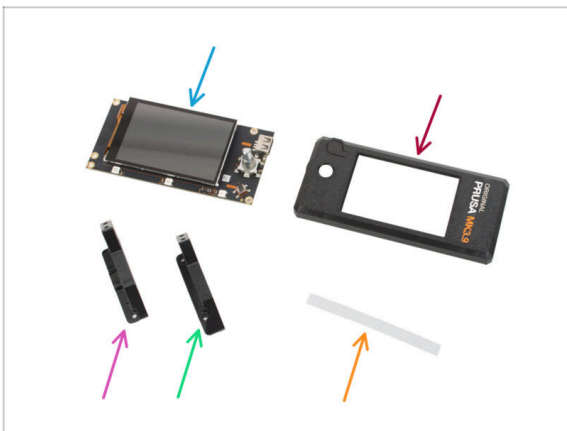
STEP 1 Tools necessary for this chapter



● For the following steps, please prepare:

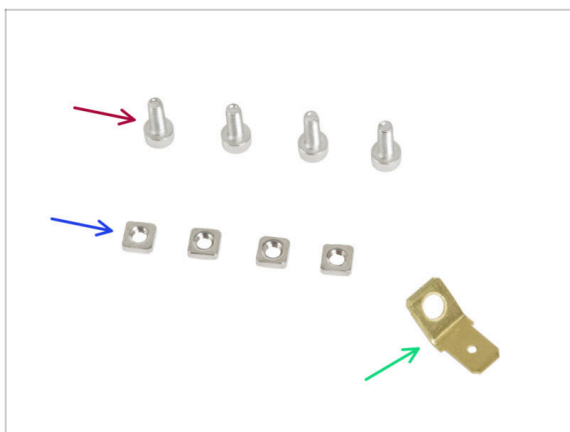
- 2.5mm Allen key
- 3.0mm Allen key *for silver PSU version*
- Needle-nose pliers for tightening and cutting zip ties
- Torx key T8/10
- Phillips screwdriver

STEP 2 xLCD assembly: parts preparation



● For the following steps, please prepare:

- xLCD (1x)
- ⚠ Remove the protective film from the xLCD screen.
- xLCD-cover (1x)
- xLCD-support-right (1x)
- xLCD-support-left (1x)
- xReflector sticker set (1x)
- ⓘ The list continues in the next step...

STEP 3 xLCD assembly: parts preparation (part 2)

- M3x8 screw (4x)
- M3nS nut (4x)
- PE Faston 6.3x0.8 (1x)

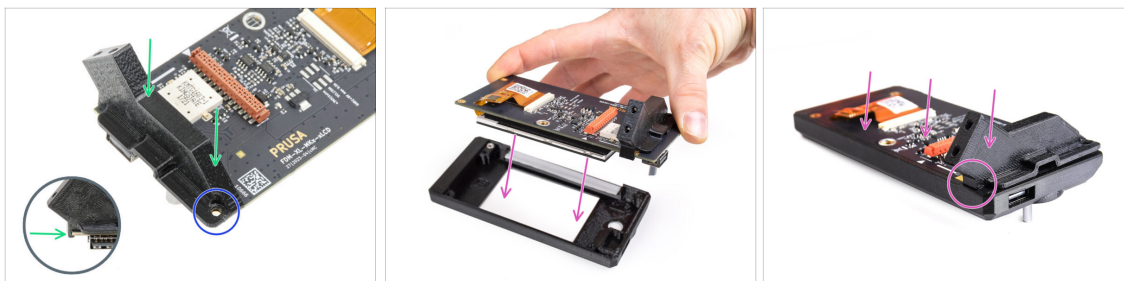
i In some following steps, you may notice photos of the xLCD-cover with imprinted graphics (MK4 logo, reset button). This is because we have used the identical steps and photos from the MK4 assembly instructions.

STEP 4 xLCD assembly: inserting the square nuts

- Insert two M3nS nuts into the xLCD-support-left and xLCD-support-right.

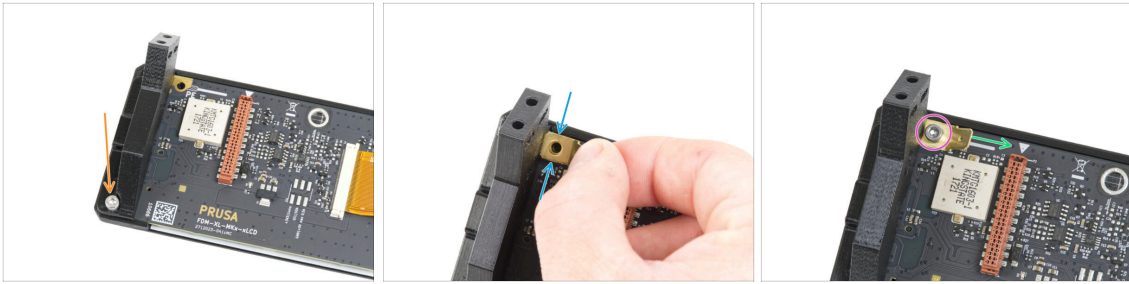
STEP 5 Installing the xReflector sticker

- ◆ Peel off one of the individual adhesive xReflector sticker.
 - ❗ If the sticker is damaged during peeling, there is an extra sticker in the SPARE package.
- ◆ Position the xReflector sticker strip so that it lines up with one side and both the edges of the "gutter" in the xLCD-cover. Continue to lay down the xReflector sticker strip towards the other side of the gutter.
- ◆ Press the xReflector sticker strip all the way into the gutter so it adheres to the xlcd-cover.

STEP 6 Assembling the xLCD-support-right

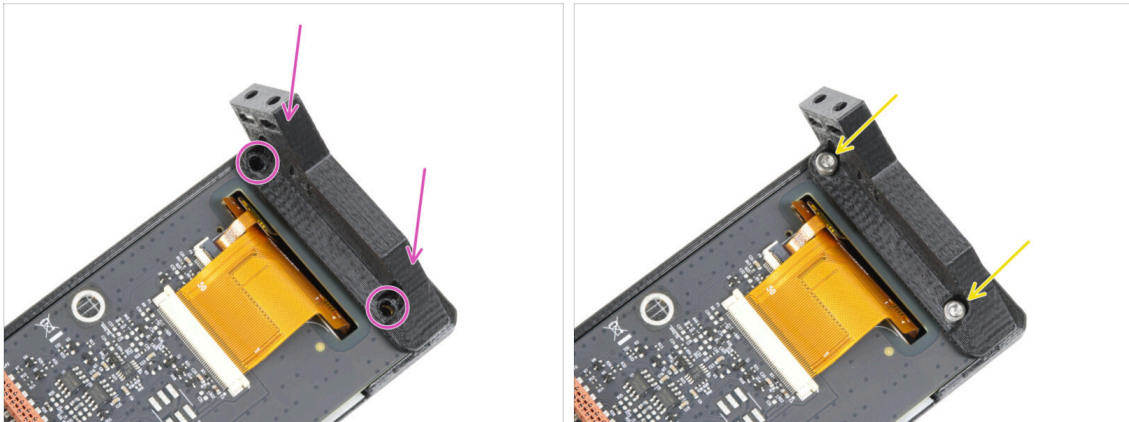
- ◆ Place the xLCD-support-right onto the USB-connector-side of the xLCD board. Notice there is a small hook that goes around the circuit board.
- ◆ Line up the hole in the plastic part with the hole in the xLCD board.
- ◆ Insert the xLCD with the xLCD-support-right still hooked on, into the xLCD-cover. Note the recess for the xLCD-support-right in the xLCD-cover. The support must perfectly fit into the recess.
- ❗ Make sure the hook on the xLCD-support-right holds onto the xLCD now. Otherwise, you won't be able to attach it later.

STEP 7 Installing the PE Faston



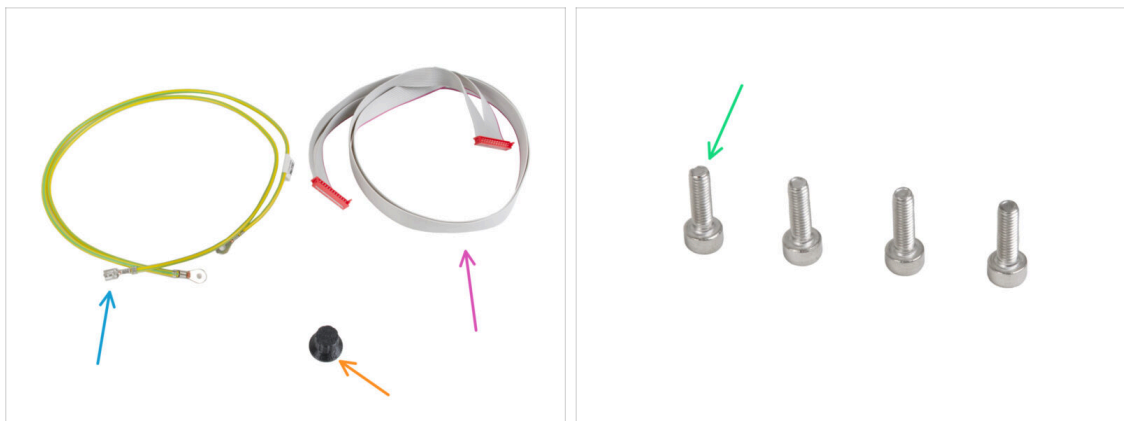
- Secure the xLCD-support-right and the xLCD board with the M3x8 screw.
- Attach the PE Faston on the top left hole in the xLCD.
- Orient PE Faston according to the picture. The bent part must point to the right - to the triangle symbol.
- Maintain the position and secure the PE Faston with the M3x8 screw.

STEP 8 Assembling the xLCD-support-left



- Attach the xLCD-support-left on the xLCD board and align it with two holes in the board.
- Secure both parts together with two M3x8 screws.

STEP 9 xLCD cables: parts preparation



For the following steps, please prepare:

PE cable 460/420 mm (1x)

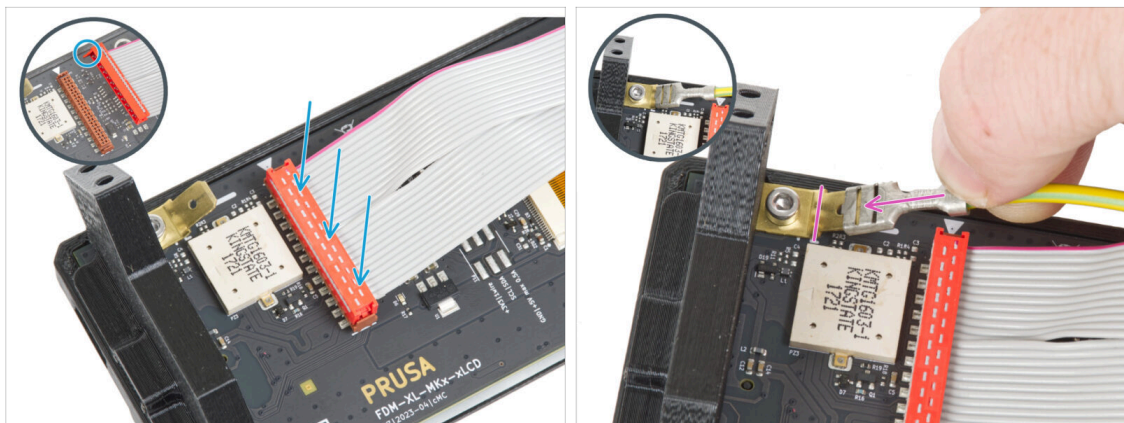
i The xLCD package might display an image of the PE cable that has round connectors on each end, instead of a cable with a faston connector on one end. This will be fixed on new labels soon.

xLCD cable (1x)

xLCD-knob(1x)

M3x10 screw (4x)

STEP 10 Connecting the PE cable



Connect the xLCD cable to the xLCD board. Note the safety latch on the xLCD cable connector. It must be plugged into the side of the xLCD slot marked with the triangle symbol on the board.

! Make sure the xLCD cable is connected in the same orientation as seen in the picture. Otherwise, your display won't work

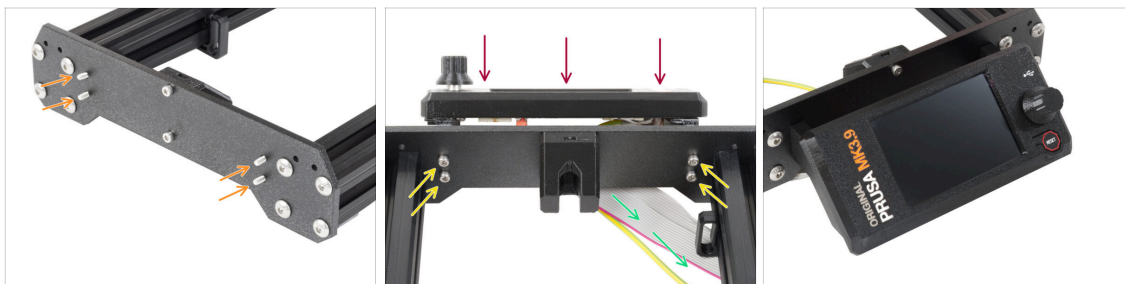
Take the end of the PE cable with square connector. Slide the connector onto the PE Faston all the way down.

STEP 11 Attaching the knob



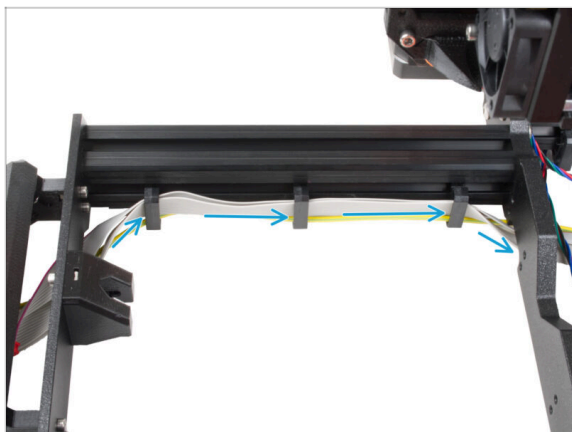
- Attach and push the xLCD-knob onto the xLCD encoder pin.
 - i Note that there is a flat part on the encoder shaft. There is a geometry on the inside of the knob that should align with the flat part to seat the knob properly.

STEP 12 Attaching the xLCD assembly



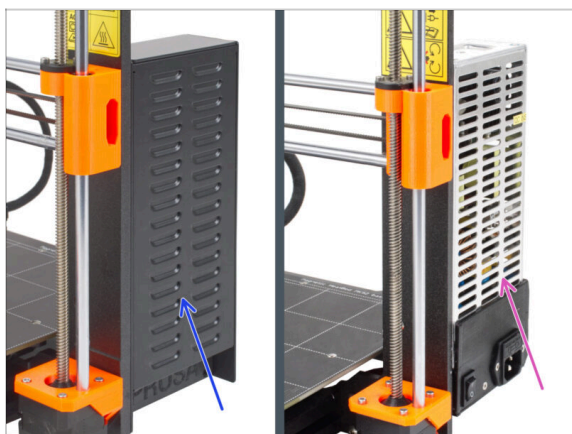
- There are four holes in the front plate of the printer's frame. Insert four M3x10 screws through each of them from the inner side.
- Attach the xLCD assembly onto the front plate. The screws should fit into the corresponding openings in the xLCD assembly.
- Guide the xLCD and PE cables under the front plate to the frame.
- Tighten up all four screws.

STEP 13 Guiding the xLCD cable



- Guide both cables through the cable clips on the inside of the frame.

STEP 14 Black vs Silver PSU



⚠ The following instructions vary depending on the type of your PSU (power supply unit)!

● **Select the appropriate instructions for your PSU before proceeding:**

- **Black PSU** - go to [Connecting the PSU \(Black PSU\): parts preparation](#) and follow the instructions.
- **Silver PSU** - go to [PE cable \(Silver PSU\): parts preparation](#) and follow the instructions.

STEP 15 Connecting the PSU (Black PSU): parts preparation



i The following steps are intended for the **black PSU** only.

For the following steps, please prepare:

PSU-cover (1x) *you can retain the old one*

M3x10 screw (2x)

xBuddy power cable (2x)

Power panic cable (1x)

i The **latest versions of the Power panic cable have two wires** - black and white. However, the procedure is the same for both versions.

Zip tie (4x)

STEP 16 Connecting the PSU (Black PSU): PE cable



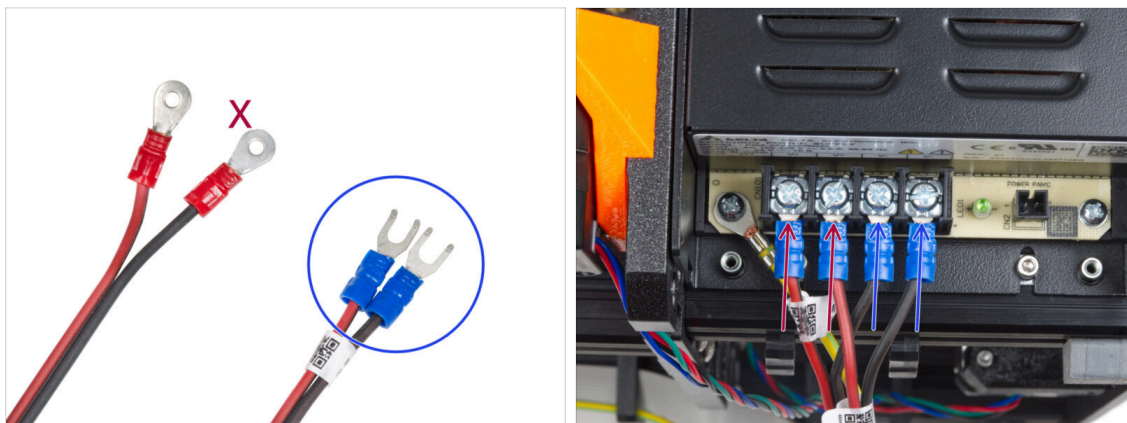
Place the printer so that you have easy access to the bottom side of the PSU.

Remove the left screw on the PSU circuit board. Note there is a washer on the screw. Do not throw the screw away, you will need it later.

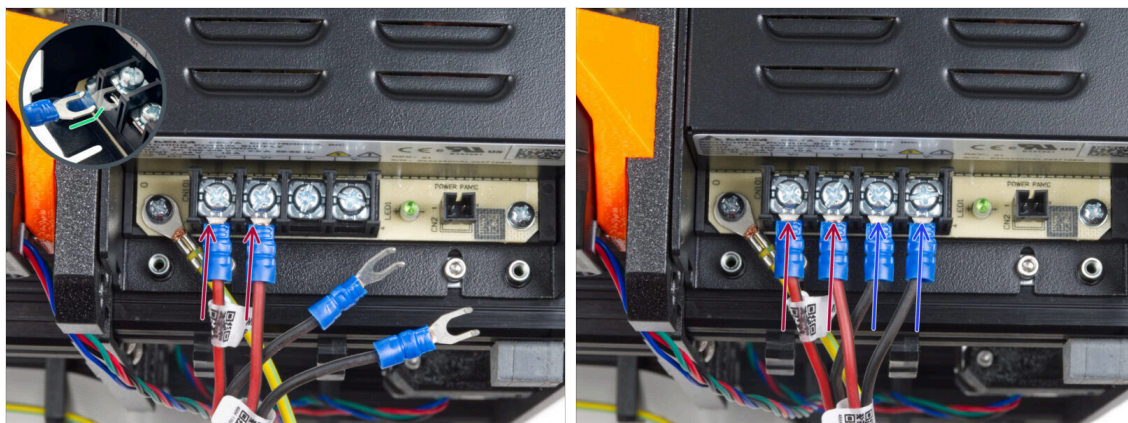
Place the single end of the PE (not the forked end) cable into the same place you have removed the screw. Secure the cable by re-using the screw together with the washer.

! **Note the correct orientation of the PE cable connector.**

Guide the PE cable so that it does not interfere with the threaded column under the PE connector.

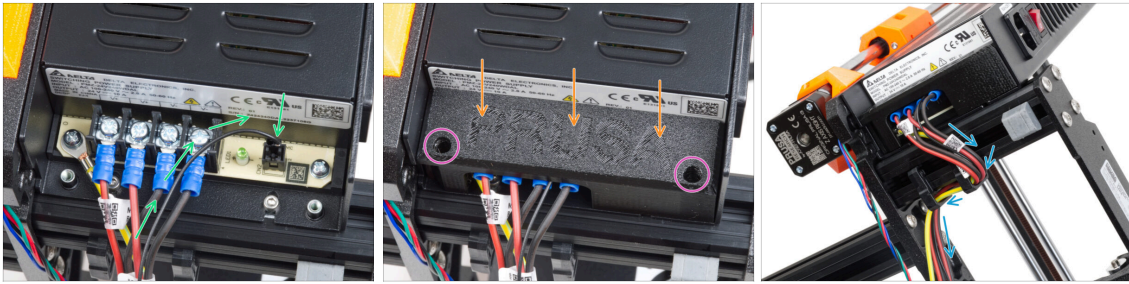
STEP 17 Power cables info (Black PSU)

- ❗ In the following steps, we will be connecting the power cables one by one. The terminal screws are installed on the PSU already. Loosen them but **don't remove them completely** so they don't get mixed up with the other type of screws used on the xBuddy board side of the cable. Each of the two power cables has two leads. One has a prevailing **red color = positive / +**. One has a prevailing **black color = negative / -**.
- 🔵 Note that the power cables have different connectors on each end. For now, prepare the U-shaped connectors (crimping tube color may vary).
- ⬛ **Note that the polarity of the terminals on the PSU is:**
- 🔴 Positive (V+)
 - 🔴 Positive (V+)
 - ⬛ Negative (V-)
 - ⬛ Negative (V-)
- ❗ The red cable (positive) may have a black stripe on it. Similarly, the black cable (negative) can have a red stripe on it.
- ⚠ **Do not connect any cables yet, wait until you have prompted.**

STEP 18 Connecting the PSU (Black PSU)

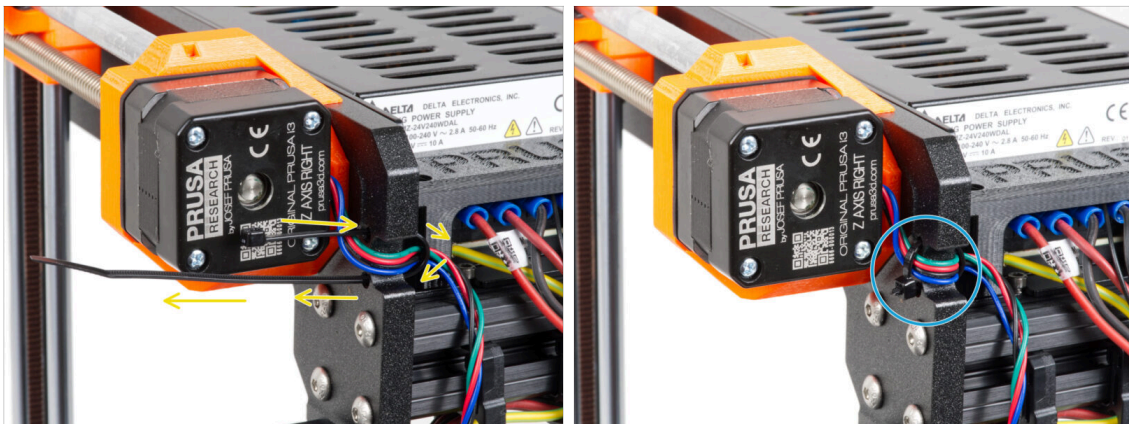
- Take two **RED** wires and slide the fork connectors all the way into the first two (positive) terminals from the left on the bottom of the PSU. Make sure the steel washer is above the "fork" connector.
 - Point the bent part of the fork upwards.
- Tighten the terminal screw firmly.
- ⓘ Keep in mind some parts are made out of plastic. When tightening each of the terminal screws, proceed carefully.
- Take the **BLACK** wires and slide them all the way into the last two (negative) terminals. Make sure the steel washer is above the "fork" connector.
- Tighten the terminal screw firmly.
- ⚠ **Check all the connections again!** The red wire is in the first slot and black in the third. Make sure that cables are tightened properly. Otherwise, there is a risk of a damage to the printer and its surroundings!

STEP 19 Connecting the power panic (Black PSU)



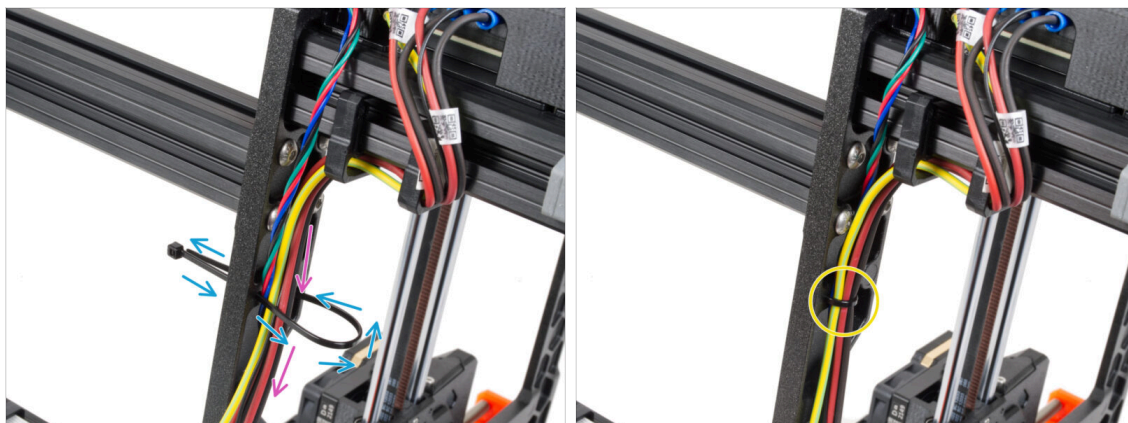
- ◆ Connect the power panic cable into the PSU. Use the side with the black connector at the end.
- ⚠ **Check all the connections again!** The red wire is in the second slot and black in the fourth. Make sure that all the cables are properly tightened. Otherwise, there is a risk of damage to the printer and its surroundings.
- ◆ Place the psu cover over the power terminals. Make sure the "PRUSA" logo is facing upwards.
- ◆ Attach the cover by using the two M3x10 screws through the marked openings. Note the openings are quite deep.
- ⚠ **Make sure the cover is seated properly and no cable is being pinched underneath.**
- ◆ Take a look from the bottom of the PSU and guide all the PSU cables through the cable clips according to the picture.

STEP 20 Guiding the Z motor right cable (Black PSU)



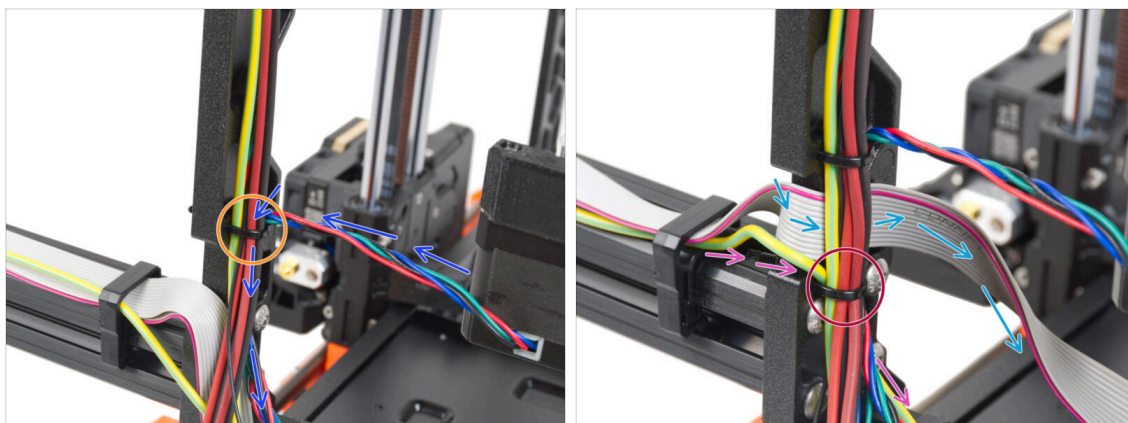
- ◆ Slide the zip tie through the circular holes in the frame to create a loop on both sides of the frame so that the cable goes through both the loops.
- ◆ Start tightening the zip tie so it is snug and holds the wires on both sides. Be careful not to over-tighten the zip tie as it could damage the wires. Cut off the remaining part of the zip tie very carefully.

STEP 21 Guiding the power cable bundle (Black PSU)



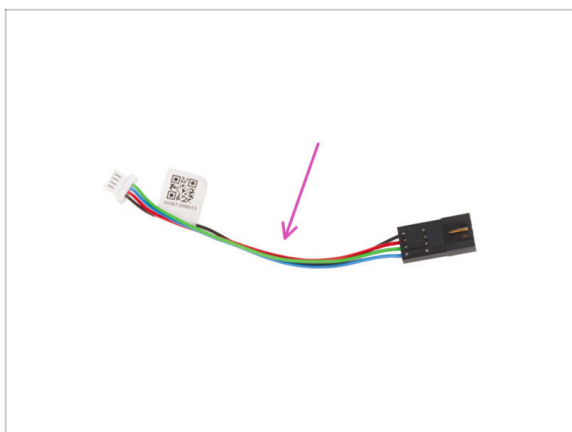
- ◆ Continue downwards and using another zip tie create the next loop.
- ◆ Guide the Z-axis cable and all cables from the PSU through the zip tie.
- ◆ Place the PE and power cables at the bottom of the bundle.
- ◆ Push the cable gently in the zip tie and tighten it so it is snug and holding the wires. Be careful not to over tighten the tie as it can cut the wires. Cut the remaining part.

STEP 22 Guiding the power cables (Black PSU)



- ◆ Continue guiding the cables toward the xBuddy. Include the Y motor cable into the bundle.
- ◆ Secure it with another zip tie to the frame.
- ◆ Carefully guide and fold the xLCD cable under the cable bundle. **Do not include the xLCD cable in the cable bundle.** Leave it free for now.
- ◆ Guide the PE cable from the xLCD through the cutout in the frame and include it in the cable bundle.
- ◆ Secure the cable bundle with the zip tie.

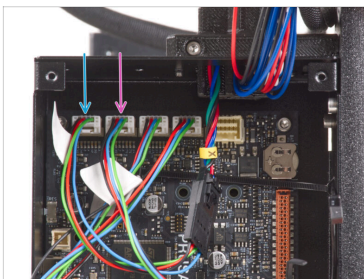
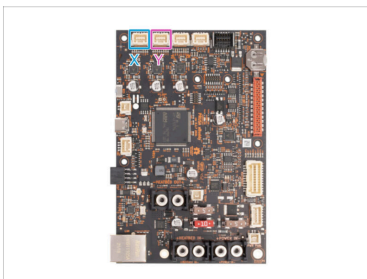
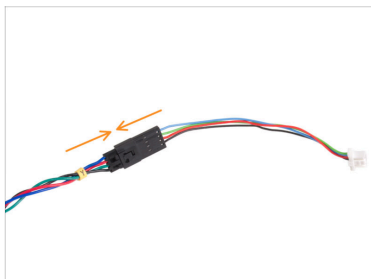
STEP 23 Y motor cable adapter (Black PSU): parts preparation



For the following steps, please prepare:

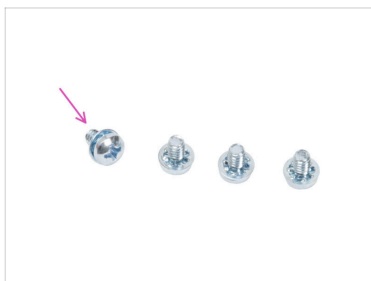
- Motor cable adapter (1x)

STEP 24 Connecting the X and Y motor cables (Black PSU)



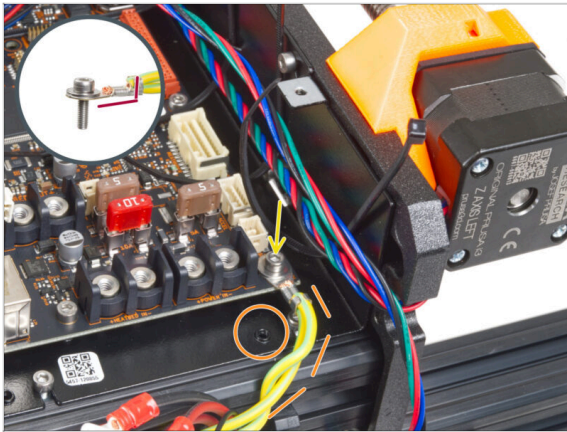
- Plug the Y motor cable into the motor cable adapter.
- Connect the X motor cable to the first slot from the left on the top of the xBuddy.
- Connect the Y motor cable to the second slot from the left on the top of the xBuddy.

STEP 25 Connecting the PSU cable (Black PSU): parts preparation



For the following steps, please prepare:

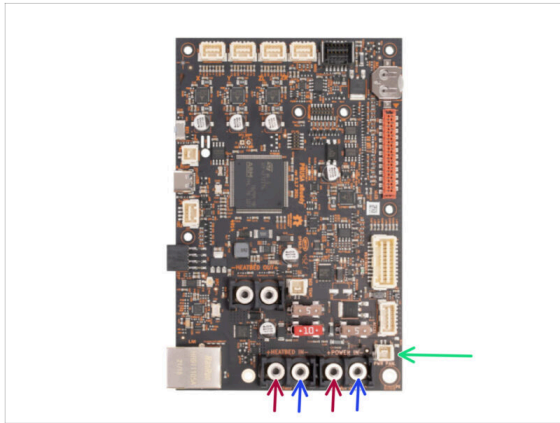
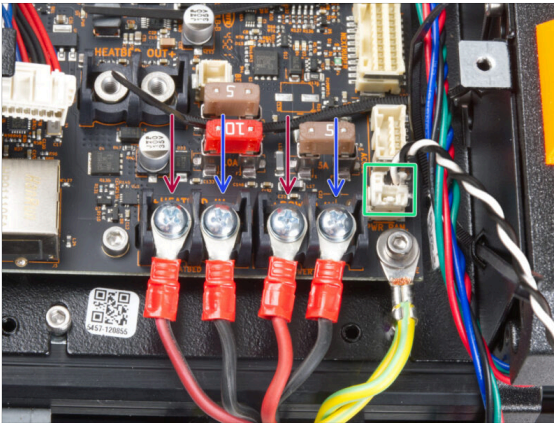
- Power terminal screw 6-32 (4x)
- M3x6 screw (1x)
- M3w washer (1x)
- Zip tie (3x)

STEP 26 Connecting the PSU cables (Black PSU): PE cable

- Attach the PE cable connector to the right lower screw hole in the xBuddy box. Secure the cable with the M3w washer and the M3x6 screw. Tighten the screw firmly.

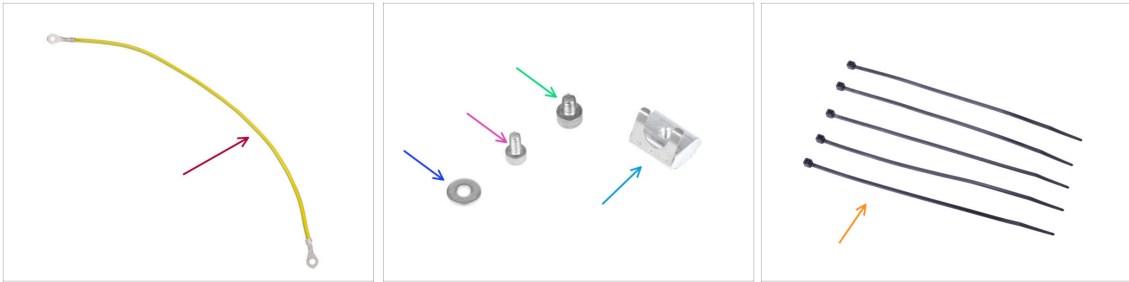
⚠ Note the correct orientation of the PE connector.

- Guide the PE cable so that it does not interfere with the threaded hole under the xBuddy board.

STEP 27 Connecting the PSU cables (Black PSU)

- Connect the PSU cables into the xBuddy board in this order (starting from the left with the first pair of the PSU cables):
 - Red power cable (positive)
 - Black power cable (negative)
 - Red power cable (positive)
 - Black power cable (negative)
- Secure all power cable connectors with the terminal **screws**. **Tighten the screws firmly.**
- Connect the power panic cable to the white connector on the bottom of the xBuddy board.
- ⚠ Verify the correct placement of the cables comparing it to the picture. This is crucial! Incorrect wiring may cause damage to your printer!**
- The following instructions are for the silver PSU. Go to [Securing the PSU cables](#)

STEP 28 PSU - PE cable (Silver PSU): parts preparation

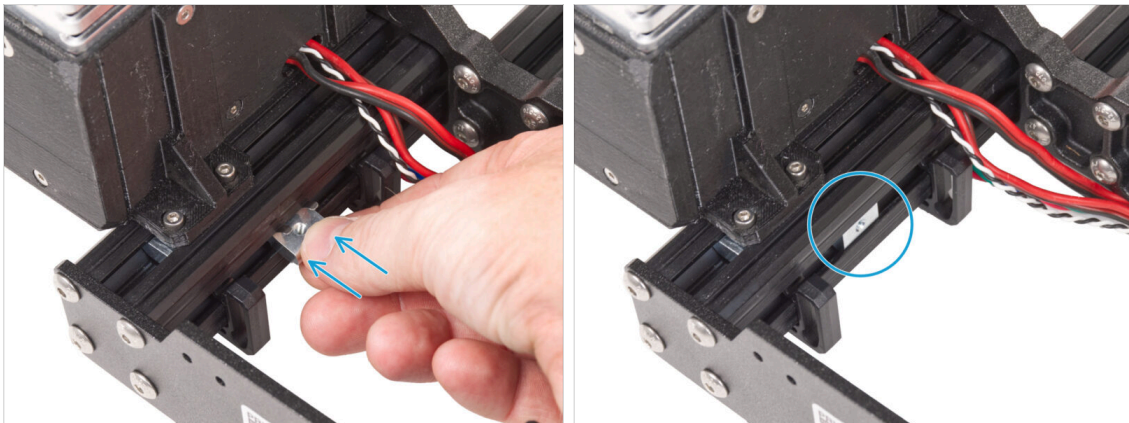


i The following steps are intended for the **silver PSU** only.

For the following steps, please prepare:

- PE cable extension (1x)
- M3w washer (1x)
- M3x6 screw (1x)
- M4x5 screw (1x)
- M3nEs nut (1x)
- Zip tie (5x)

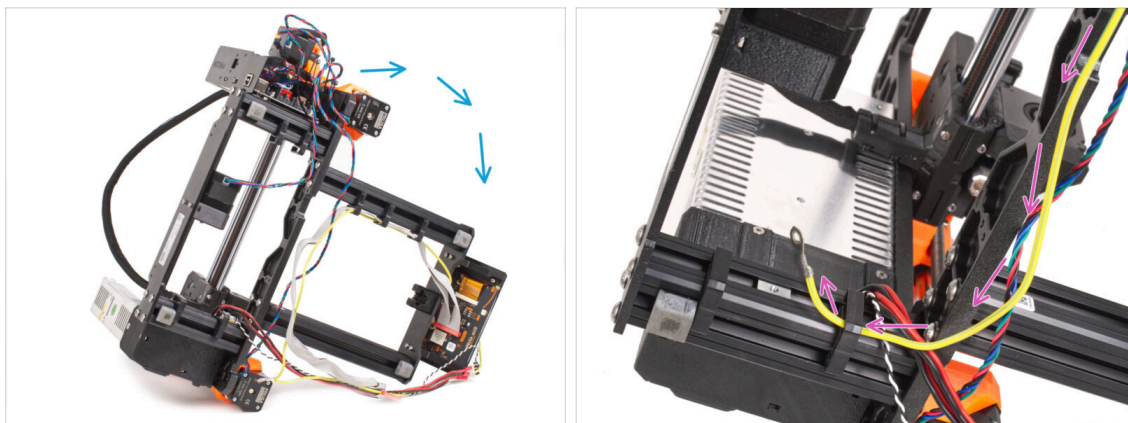
STEP 29 Inserting M3nEs nut (Silver PSU)



- From the inner PSU side of the short extrusion, insert the M3nEs nut between two cable clips.

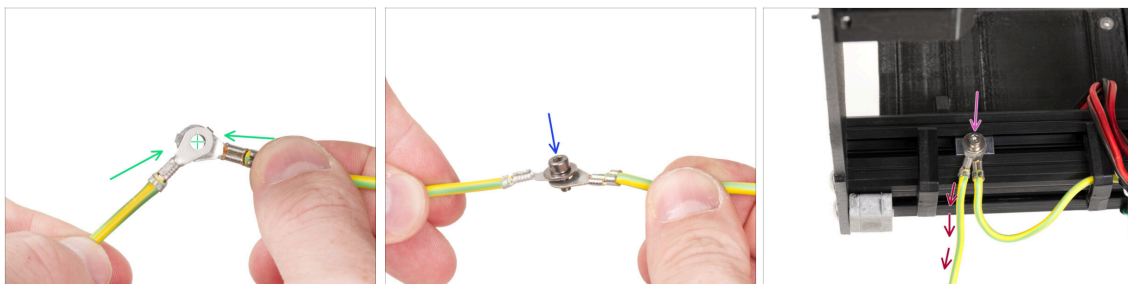
i The exact position of the nut doesn't matter.

STEP 30 Guiding the PE cable (Silver PSU)



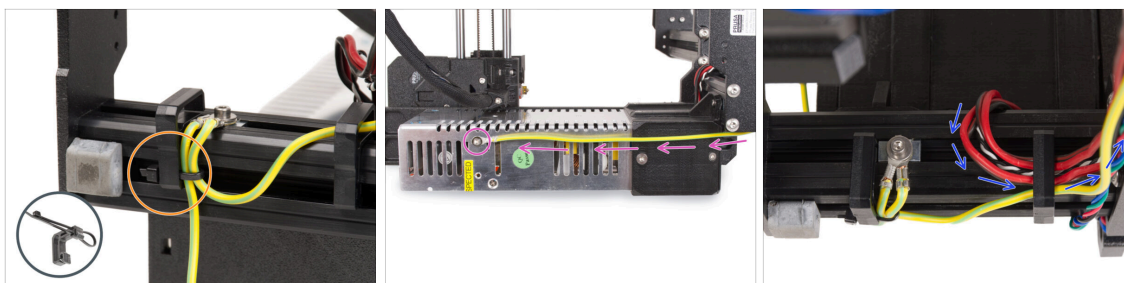
- Carefully turn the printer on the PSU side.
- Take the single end of the PE (not the forked end) cable that is already installed on the printer. Guide the cable through the right cable clip.

STEP 31 Connecting the PE cables (Silver PSU)



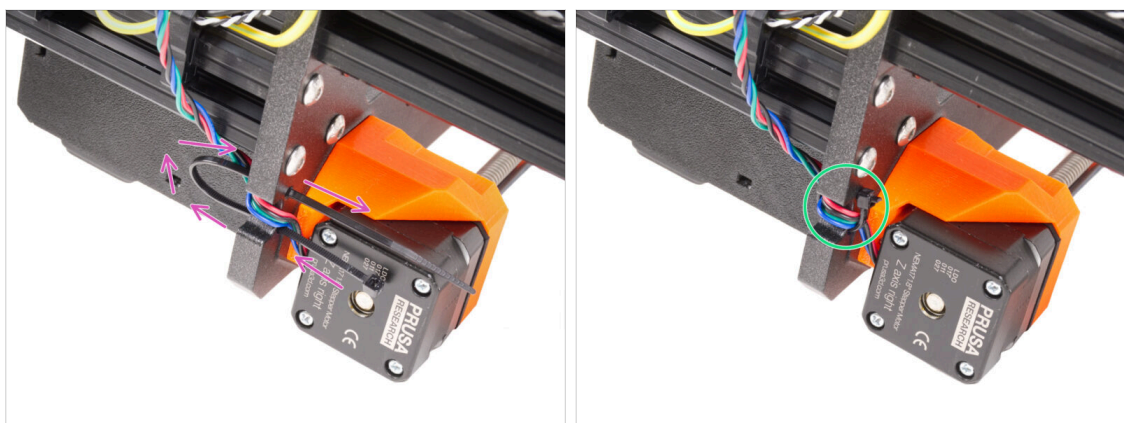
- Take the free end of the PE cable guiding from the printer and line up the connector with on of the connector of the extended PE cable.
- Push the M3x6 screw **and the M3w washer** through the both connectors.
- Attach the joint of cables to the M3nEs nut in the extrusion profile and secure it by fully tightening the M3x6 screw.
- The free extended PE cable must be in the left position and lead freely outside the printer.

STEP 32 Connecting the extended PE cable (Silver PSU)

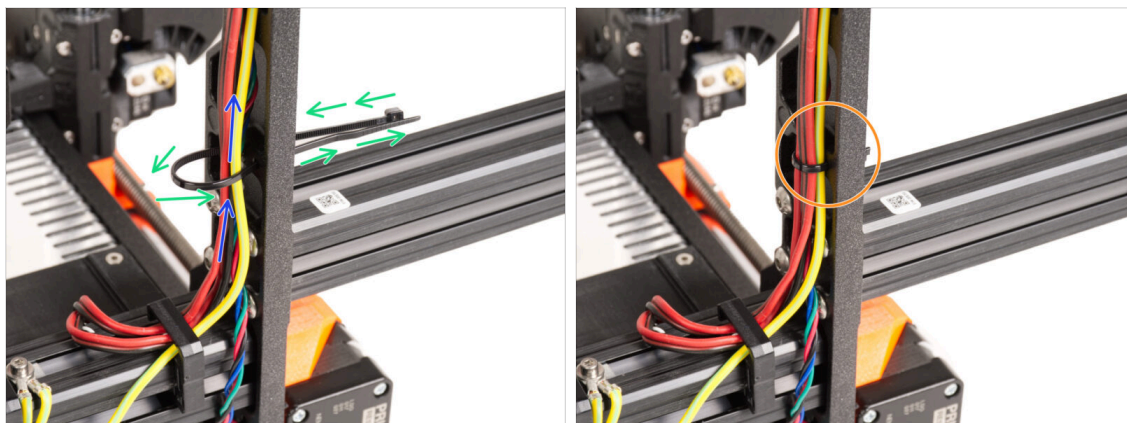


- ◆ Merge both PE cables and attach them with the zip tie to the left cable clip.
- ◆ Note two threaded screw holes in the silver power supply unit (PSU). Secure the extended ground connector to the "**upper**" hole using the M4x5 screw.
- ◆ Guide all PSU cables through the right cable clip.

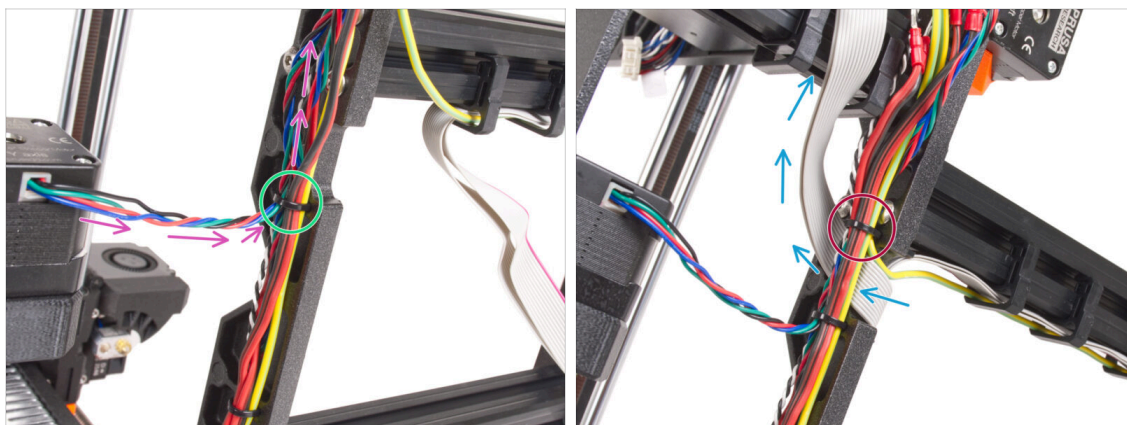
STEP 33 Guiding the Z motor right cable (Silver PSU)



- ◆ Slide the zip tie through the circular holes in the frame to create a loop on both sides of the frame so that the cable goes through both the loops.
- ◆ Start tightening the zip tie so it is snug and holds the wires on both sides. Be careful not to over-tighten the zip tie as it could damage the wires. Cut off the remaining part of the zip tie very carefully.

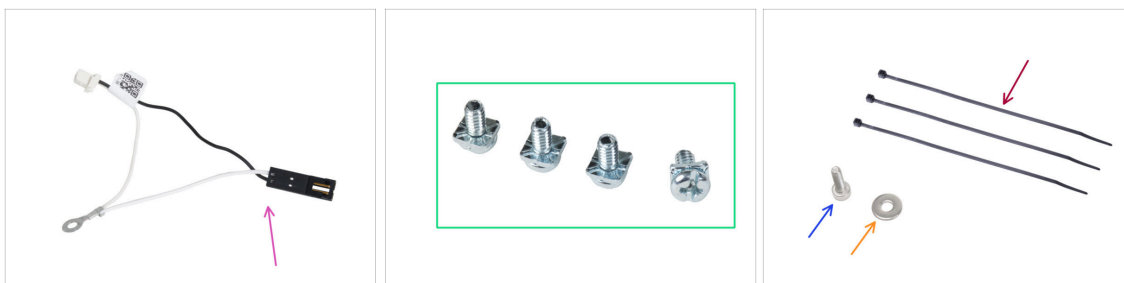
STEP 34 Guiding the power cable bundle (Silver PSU)

- Continue upwards and using another zip tie create the next loop.
- Guide the Z-axis cable and all cables from the PSU through the zip tie.
- ⬛ Place the PE and power cables at the bottom of the bundle.
- Push the cable gently in the zip tie and tighten it so it is snug and holding the wires. Be careful not to over tighten the tie as it can cut the wires. Cut the remaining part.

STEP 35 Guiding the power cables (Silver PSU)

- Continue guiding the cables toward the xBuddy. Include the Y motor cable into the bundle.
- Secure it with another zip tie to the frame.
- Carefully guide and fold the xLCD cable under the cable bundle. **Do not include the xLCD cable in the cable bundle.** Leave it free for now.
- ⬛ Guide the PE cable from the xLCD through the cutout in the frame and include it in the cable bundle.
- Secure the cable bundle with the zip tie.

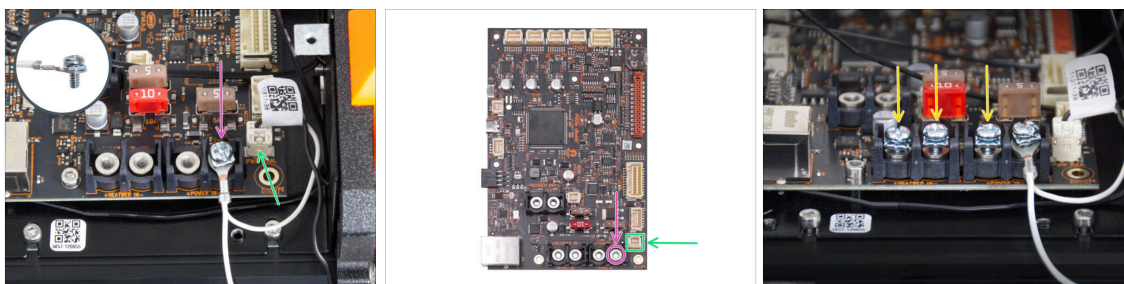
STEP 36 Power panic extended cable (Silver PSU): parts preparation



For the following steps, please prepare:

- Power panic extended cable (1x)
- 3/32 PT screw (4x)
- Zip tie (3x)
- M3x6 screw (1x)
- M3w washer (1x)

STEP 37 Extending the power panic cable (Silver PSU)



- Using the 3/32 PT screw, attach the power panic extended cable connector to the last (right) power terminal slot. **Do not completely tighten the terminal screw!** A few turns are enough for now, we will fully tighten the screw later.

i The cable must be free to move.

- Connect the white connector of the power panic extended cable to the slot labeled PWR PAN. on the xBuddy board.

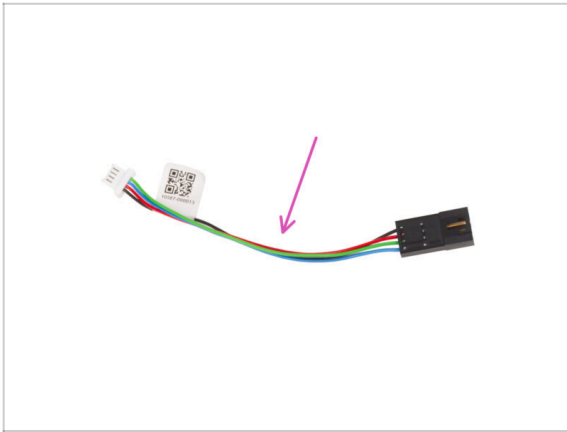
- Leave the black connector of the power panic extended cable free for now.



Note that most of the following steps are taken with a black PSU and without power panic extended cable. However, specific instructions will be provided if there are differences for the silver PSU.

- Pre-screw three 3/32 PT screws into the terminals on the xBuddy board. **Do not tighten the screws completely**, 3-5 turns will be sufficient.

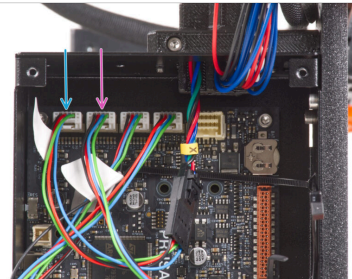
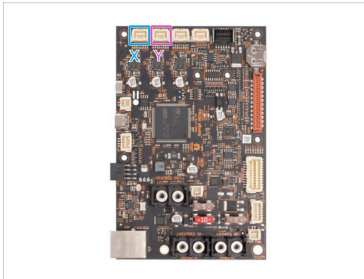
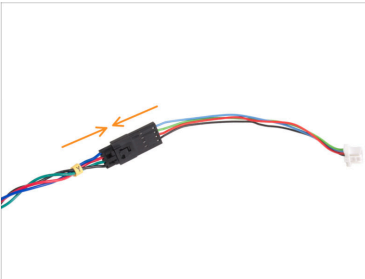
STEP 38 Y motor cable adapter (Silver PSU): parts preparation



For the following steps, please prepare:

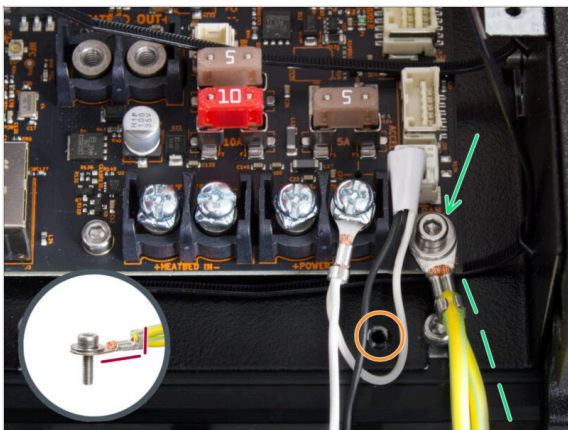
- Motor cable adapter (1x)

STEP 39 Connecting the X and Y motor cables (Silver PSU)



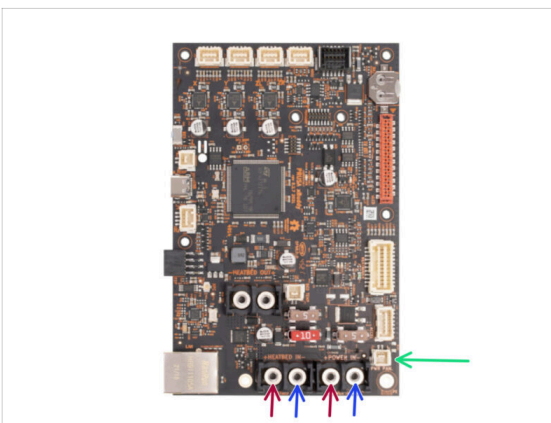
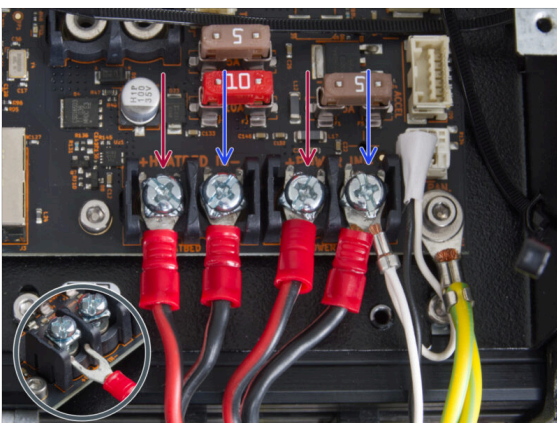
- Plug the Y motor cable into the motor cable adapter.
- Connect the X motor cable to the first slot from the left on the top of the xBuddy.
- Connect the Y motor cable to the second slot from the left on the top of the xBuddy.

STEP 40 Connecting the PE cable (Silver PSU)



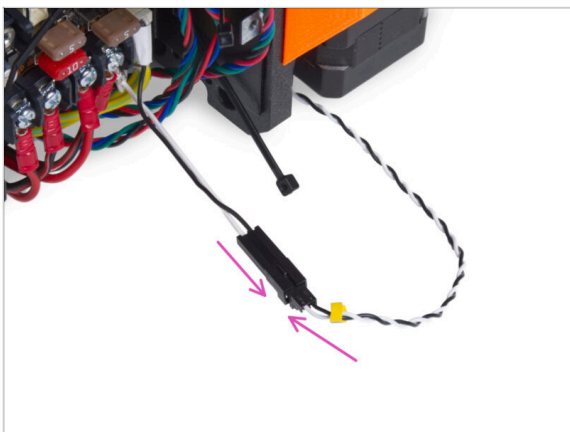
- Attach the PE cable connector to the right lower screw hole in the xBuddy box. Secure the cable with the M3w washer and the M3x6 screw. Tighten the screw firmly.
- ⚠ Note the correct orientation of the PE connector.
- Guide the PE cable so that it does not interfere with the threaded hole under the xBuddy board.

STEP 41 Connecting the PSU cables (Silver PSU)



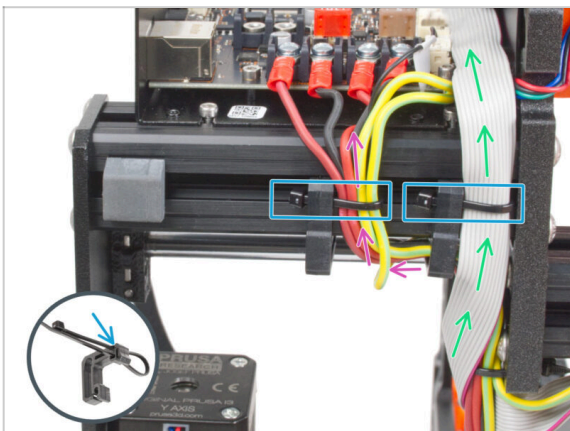
- ⬢ Plug the power cables under the pre-screwed terminals screws on the xBuddy board in this order (starting from the left with the first pair of the PSU cables). :
 - Red power cable (positive)
 - Black power cable (negative)
 - Red power cable (positive)
 - Black power cable (negative) - connect together with the extended power panic cable. The extended power panic cable must be underneath.
- ⬢ Secure all power cable connectors with the terminal screws. **Tighten the screws firmly.**
- ⚠ **Verify the correct placement of the cables comparing it to the picture. This is crucial! Incorrect wiring may cause damage to your printer!**

STEP 42 Connecting the power panic cable (Silver PSU)



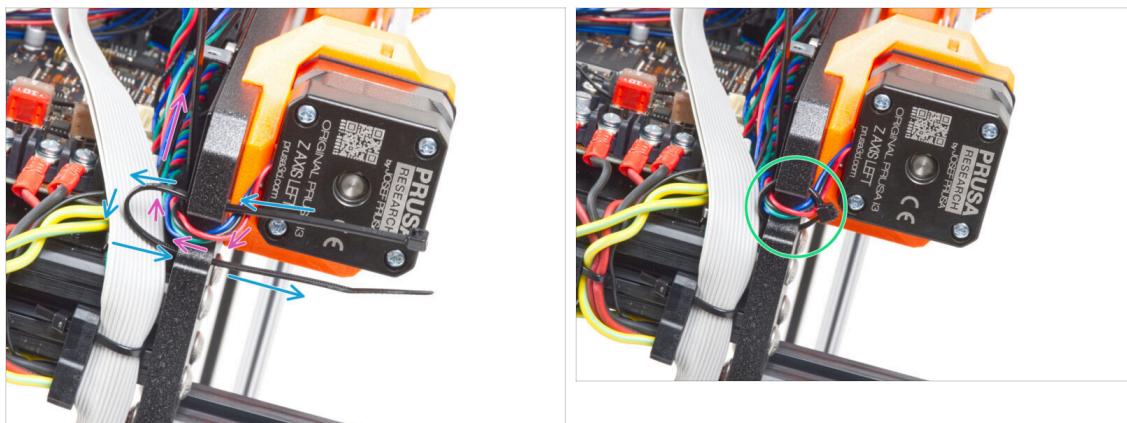
- ◆ Plug the power panic guiding from the PSU into the power panic extended cable.

STEP 43 Securing the PSU cables



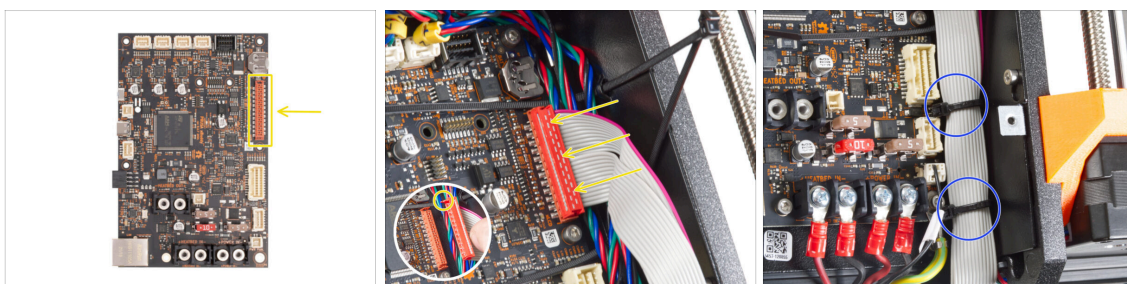
- ◆ **Divide the cable bundle into two paths:**
 - ◆ Guide the cables from the PE cables, PSU cables and Power Panic cable around the left cable clip from the right side
 - ◆ Guide the xLCD cable and motor cables in between the right cable clip and the frame
- ◆ Secure all cable paths with the zip tie to the cable clip. See the detail showing how to push a zip tie through the cable clip.

STEP 44 Guiding the Z motor left cable



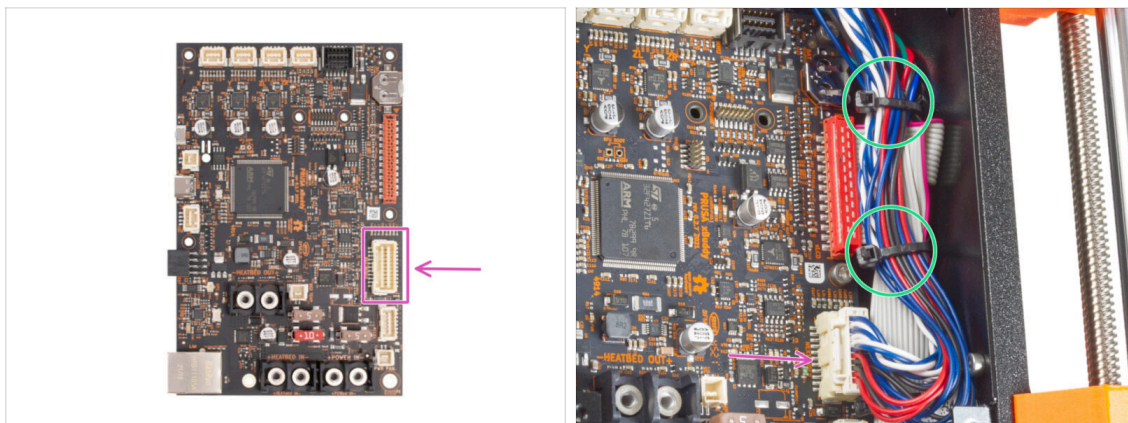
- ◆ Push the zip tie through the frame under the Z motor left.
 - ◆ Guide the Z motor left cable through the cutout in the frame to the xBuddy box.
 - ◆ Carefully tighten the zip tie. Cut off the excess of the zip tie.
- ⚠ **Do not overtighten the zip tie, it may fatally damage the cable.**

STEP 45 Connecting the xLCD cables



- ◆ Connect the xLCD to the slot on the right side of the xBuddy. Note the safety latch on the xLCD cable connector. The latch must fit into the upper side of the connector.
- ⚠ **Make sure that all the cable guiding over the zip ties in the xBuddy box, not under the zip ties.**
- ◆ Arrange the xLCD cable like in the picture. The xLCD must covering the cable bundle. Tighten the cable bundle with the first two zip ties in the bottom of the xBuddy box. **Do not overtighten the zip ties!**

STEP 46 Connecting the extruder main cable



- ◆ Connect the extruder main cable to the slot in the right side of the xBuddy.
- ◆ Arrange the cable according to the picture. Tighten the cable bundle (extruder main cable and the motor cables) with the two upper zip ties. **Do not overtighten the zip ties!**

STEP 47 Time for energy delivery!



- ◆ It was almost like rocket science, but you did it! Take six gummy bears.
- ⓘ **Did you know that** some gummy bear manufacturers offer sugar-free versions of the candy, which are sweetened with artificial sweeteners like maltitol or stevia.

STEP 48 Almost there!

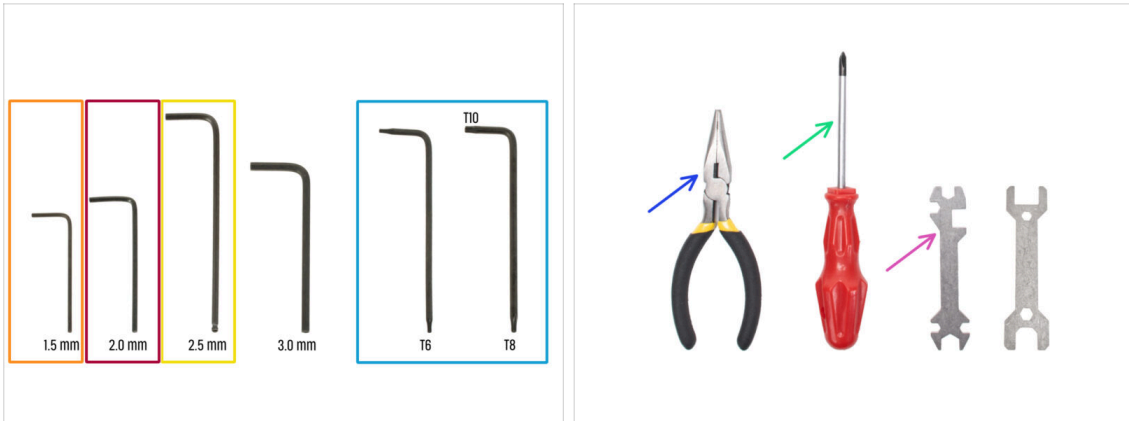


- Wasn't as hard, right? You are almost there!
- Just compare the xLCD assembly and the cable management to the pictures.
- Let's go the next chapter: **7. Y-carriage & Heatbed assembly**

7. Y-carriage & Heatbed assembly



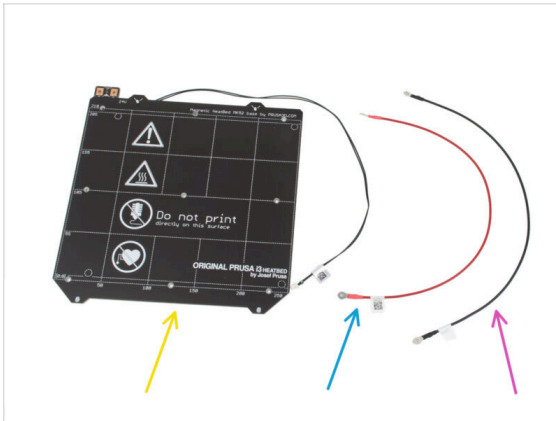
STEP 1 Tools necessary for this chapter



● **For this chapter, please prepare:**

- 1.5mm Allen key
- 2.0 mm Allen key
- 2.5mm Allen key
- Torx T8/10 key
- Needle-nose pliers
- Phillips screwdriver PH2
- Universal wrench

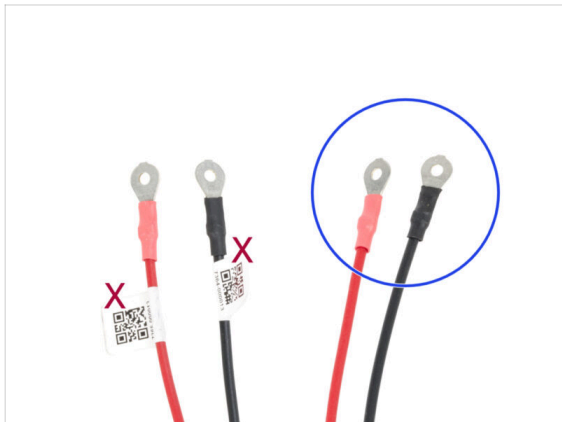
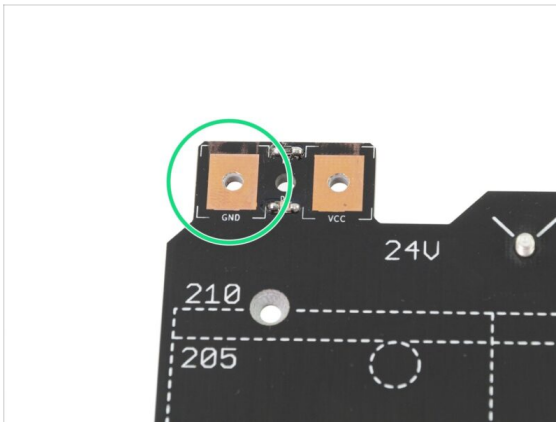
STEP 2 Heatbed cable assembly: parts preparation



For the following step please prepare:

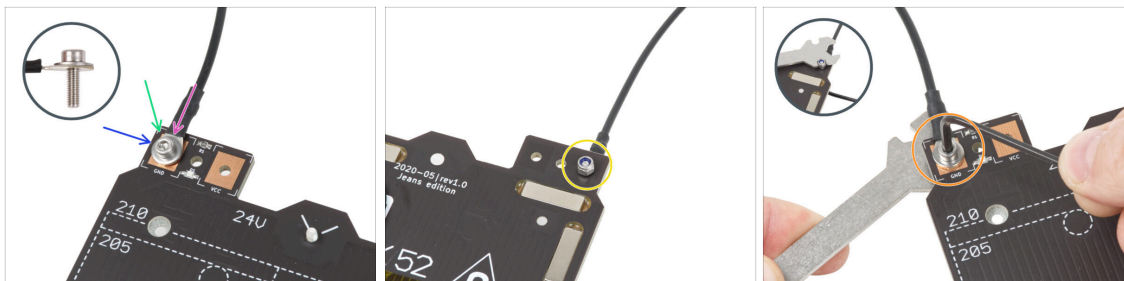
- Heatbed MK52 24V (1x)
- Heatbed cable red (1x)
- Heatbed cable black (1x)
- M3x10 screw (2x)
- M3w washer (2x)
- M3nN nut (2x)

STEP 3 Heatbed cable assembly (part 1)



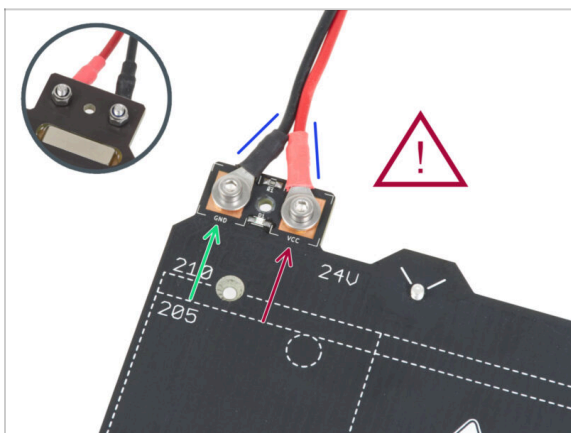
- IT IS IMPORTANT** to connect the power cable correctly. Before you start the assembly have a look at the pins. The one on the left with "GND" sign must be connected to the **BLACK WIRE**.
- Take both Heatbed cables. Note the label on each cable. For the following steps, prepare the ends of the cables **without the label**.

STEP 4 Heatbed cable assembly (part 2)



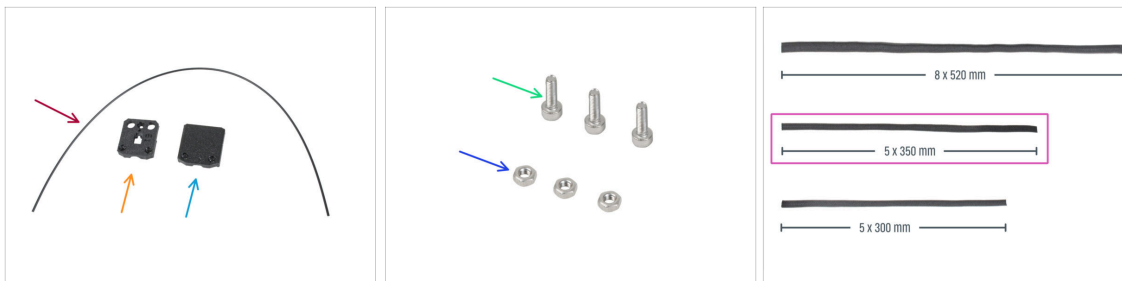
- ✿ Place the black wire above the pin with "GND" sign. **Use the end of the cable that is not labeled with QR code.** The QR code must be at the other end.
- 🔵 Place the M3w washer above the round cable connector.
- 🟢 Press the M3x10 screw through all parts.
- ⬛ Hold the screw and carefully turn the heatbed upside down.
- 🟡 Attach the M3nN nut onto the M3x10 screw and tighten it slightly.
- 🟠 Turn the heatbed back around. Using the universal wrench and the Allen key, tighten up the screw. We will adjust the cable position later on, **therefore do not tighten the screw too firmly yet.**

STEP 5 Heatbed cable assembly (part 3)



- ⬛ Repeat this procedure for the second (Red / + / VCC) wire. **Use the end of the cable that is not labeled with QR code.** The QR code must be at the other end.
- ⚠ Before proceeding further, please check again that:
 - 🟢 **BLACK** wire must be connected to the "GND"
 - 🔴 **RED** wire must be connected to the "VCC"
- 🔵 The cable cover, which will be applied later requires the connectors to be slightly inclined towards each other. Press them gently, but leave a gap between them.
- ⚠ **Now, tighten both screws firmly** using the Allen key and the wrench. Maintain the position of the connectors while tightening.

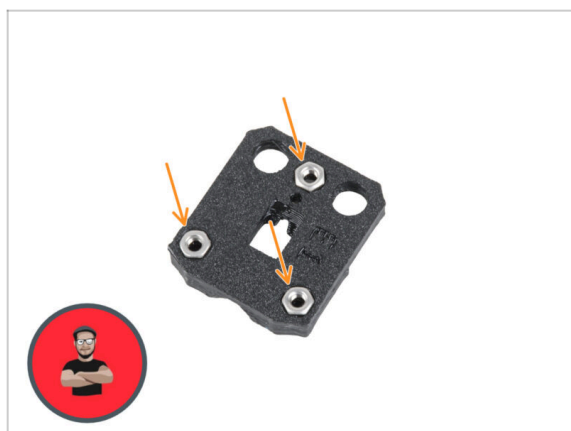
STEP 6 Covering the heatbed cables: parts preparation



For the following steps, please prepare:

- Nylon 2x380 mm (1x)
- heatbed-cable-cover-bottom
- heatbed-cable-cover-top
- M3x10 screw (3x)
- M3n nut (3x)
- Textile sleeve 5x350 (1x)

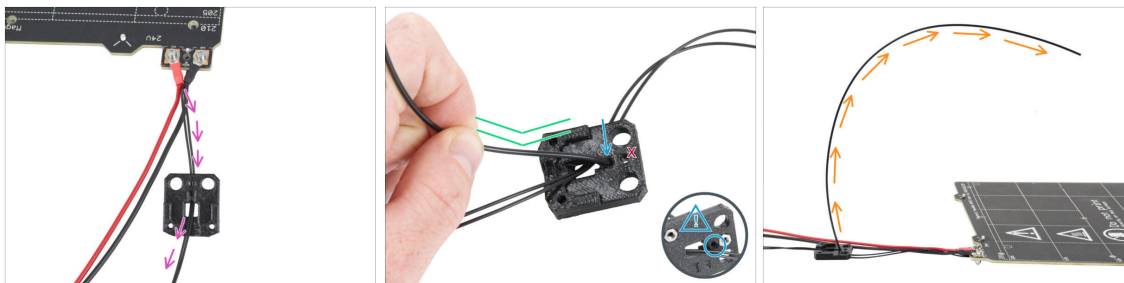
STEP 7 Assembling the heatbed-cable-cover-bottom



- Insert three M3n nuts into the shaped openings in the heatbed-cable-cover-bottom.

i Use the screw pulling technique.

STEP 8 Assembling the heatbed-cable-cover: nylon filament



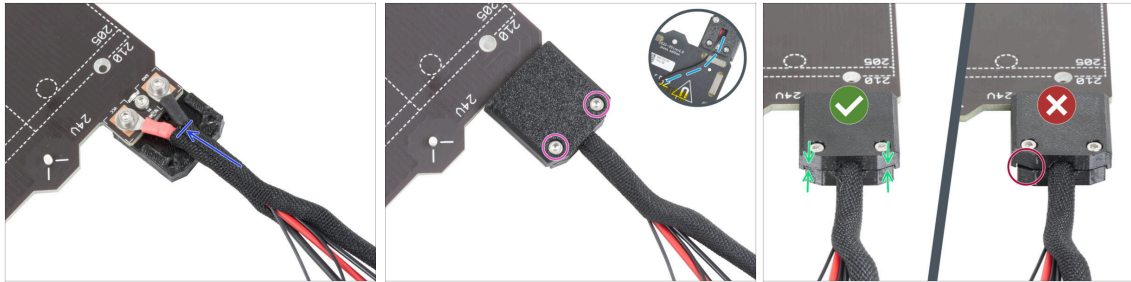
- ✦ Place the heatbed-cable-cover-bottom like in the picture. Push the heatbed thermistor cable through the heatbed-cable-cover-bottom.
- ✦ Insert the nylon filament into the hole in the heatbed-cable-cover-bottom. Don't let the nylon filament stick out too much on the other side. It should not protrude more than 2 millimeters.
- ⚠ When inserting the nylon filament, **ensure that the filament does not damage the thermistor cables under the printed part.**
- ✦ After inserting the nylon, bend the filament slightly in the same direction as shown.
- ✦ Orient the curve of the filament as shown in the third picture.

STEP 9 Assembling the heatbed-cable-cover-bottom



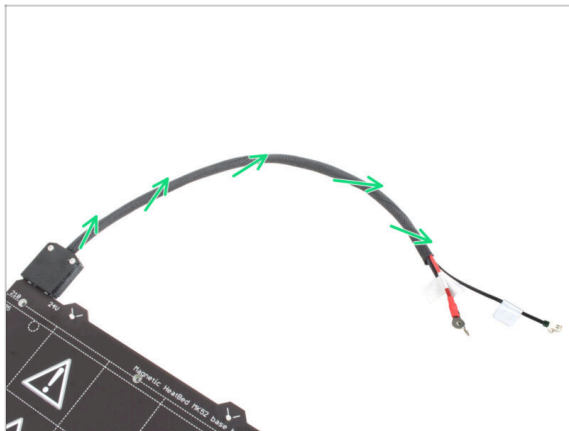
- ✦ Slide the cable-cover-bottom under the heatbed cable connectors (M3nN nuts). See the correct orientation in the picture.
- ✦ Secure the cover with the M3x10 screw from the top. Tighten the screw firmly.
- ⚠ **Make sure the nylon filament is still bent upward as in the previous step.**

STEP 10 Assembling the heatbed-cable-cover-top



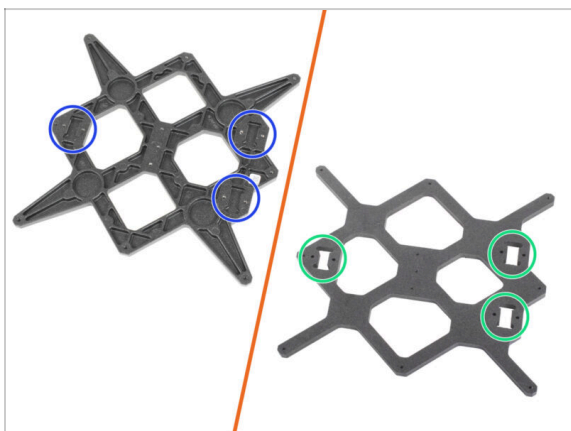
- Wrap the end of the cable bundle together with the nylon filament in the textile sleeve. Slide the sleeve as far towards the heatbed as possible.
- Attach the heatbed-cable-cover-top onto the junction and secure it with two M3x10 screws.
- On the bottom side, leave a slack on the thermistor cable for one finger to be pushed through.
- Make sure there is no big gap between both covers.




STEP 11 Wrapping the textile sleeve



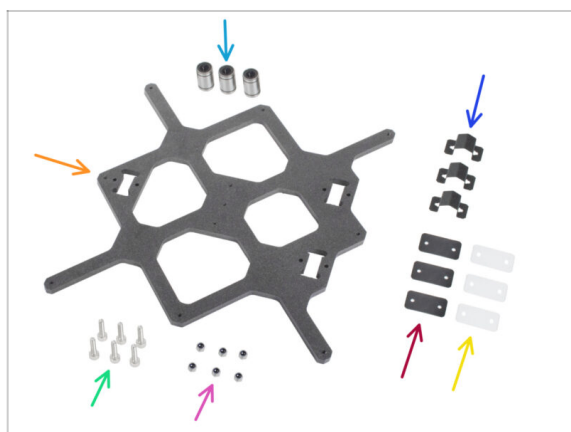
- Finish wrapping the cable bundle in the textile sleeve. And twist the sleeve, **not the cables**.








STEP 12 Y-carriage variations



-  The Y-carriage has two variations, depending on which MK3 printer model you have. Each variant has a different assembly procedure. **According to the picture distinguish your variation and follow the appropriate instructions:**
-  **NEW version:** there are **three pockets (recesses)** for bearings in the Y-carriage. If you have this variation of the part, go to step [Y-carriage: parts preparation \(new\)](#).
-  **OLD version:** there are **three cutouts** for bearings in the Y-carriage. If you have this variation of the part, go to step [Y-carriage: parts preparation \(old\)](#).

STEP 13 Y-carriage (old): parts preparation



-  LM8UU bearing (3x)
-  Y-carriage (1x)
-  Bearing clip (3x)
-  Rubber bearing pad 31x16x0.5 mm (3x)
-  M3x12 screw (6x)
-  Plastic bearing pad 31x16x1 mm (3x)
-  M3nN nut (6x)

STEP 14 Y-carriage (old): parts preparation (lubricating)



For the following steps, please prepare:

- Prusa lubricant applicator (1x)
- Prusa lubricant (1x) for LM8UU bearings
- Several paper towels to wipe oil and grease from the bearing surface.

⚠ Each bearing must be lubricated before mounting on the printer. Follow these instructions carefully.

STEP 15 Lubricating the bearing (old)



i Use any piece of fabric as a pad to protect your working surface from grease.

⚠ Make sure the bearing is clean inside.

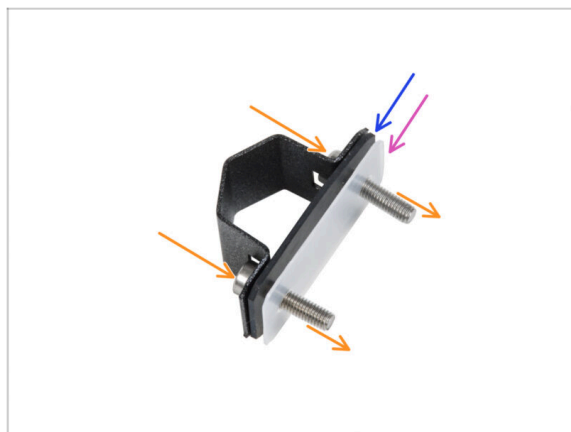
- Wipe the preservative oil off the bearing surface with a paper towel.
- It is necessary to lubricate all 4 rows of balls inside the bearing.
- Open the lubricant and pierce the hole in the tube with the tip in the cap.
- Screw the tube into the applicator.
- Carefully slide the entire bearing onto the applicator.

STEP 16 Lubricating the bearing (old)

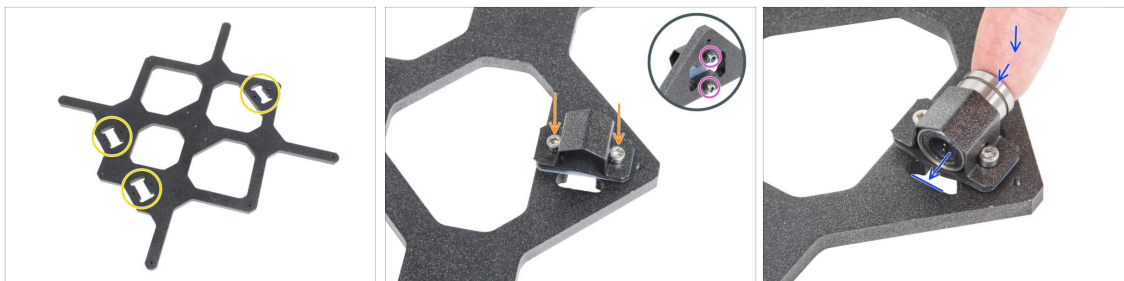


- Turn the tube and applicator counterclockwise until you feel a slight resistance. This means that the holes in the applicator are aligned with the ball rows.
- Gently press the tube to push the lubricant into the ball rows of the bearing.
- Look at the front of the bearing. When the applicator pushes the lubricant out (around the black gasket), stop pressing the tube. Hold the bearing with the other hand during the lubricating.
- ⚠ **The grease must be spread evenly over all four ball rows inside the bearing. There must not be too much grease, or too little. Take a closer look at the last picture.**
- Wipe off excess grease on the outside of the bearing with a paper towel.
- Use this procedure for all three bearings.
- The bearings may leave excess grease on the smooth rods after their installation. Wipe off any residue with a paper towel.

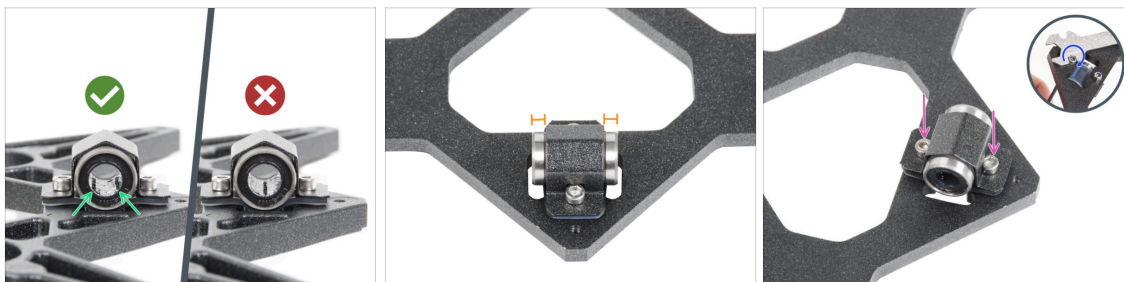
STEP 17 Assembling the bearing clips (old)



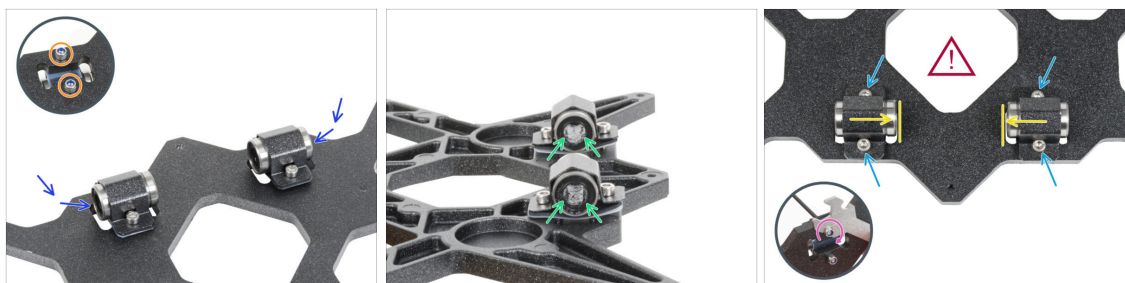
- Push two M3x12 screws through the bearing clip.
- Insert the rubber bearing pad on the screws.
- Insert the plastic bearing pad on the screws.
- Repeat the same for the remaining two bearing clips.
- ⚠ **The order of the pads is crucial. Check the order on all three bearing clips.**

STEP 18 Installing the bearing on the Y-carriage (old)

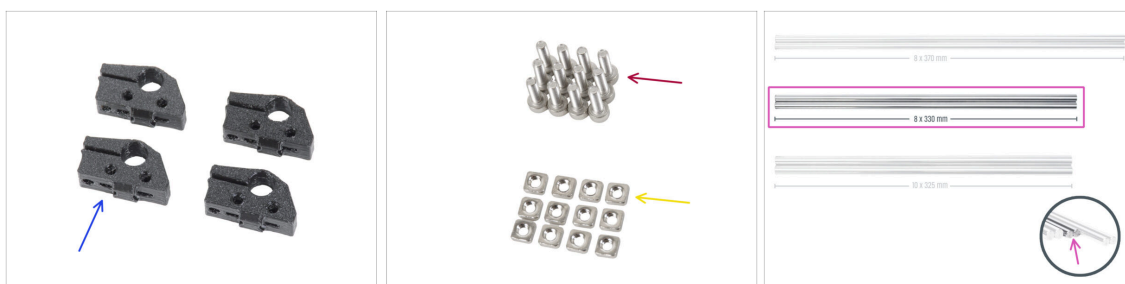
- Note the three cutouts for bearings in the Y-carriage.
 - Start with the side with the one pocket. Attach the bearing clip on the cutout.
 - From the opposite side, secure each screw with the M3nN nut. **Do not tighten the nuts**, 1-2 turns are enough for now.
 - Insert the bearing into the bearing clip.
- ❗ If the bearing cannot be inserted easily, you have probably tightened the M3nN nuts too much, loosen them.

STEP 19 Aligning the bearing (old)

- **The correct bearing orientation:** When placing bearings onto the Y-carriage, **make sure that they are oriented as shown in the picture**. The tracks (rows of balls) have to be on the sides.
- Align the bearing so that it is centered on the bearing clip. Approximately the same piece of bearing should be visible on each side.
- Maintain the bearing position and slightly tighten both screws. Just barely to maintain its position and orientation. We will tighten the screws firmly later on.
- Using the 2.5mm Allen key and the universal wrench, slightly tighten the M3nN nuts. **Do not tighten it completely**, just secure the bearing orientation and position. We will completely tighten it later.

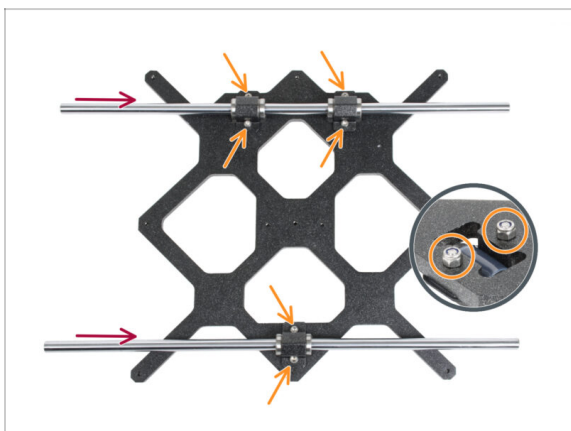
STEP 20 Installing the bearings on the Y-carriage (old)

- Attach two bearing clips on the remaining two bearing pockets and push two bearings inside.
- From the opposite side, secure each screw with the M3nN nut. **Do not tighten the nuts**, 1-2 turns are enough for now.
- Orient both bearings so that the two rows of bearing balls have to be on the sides.
- Unlike the previous bearing, position the bearings as close to the center of the Y-carriage as possible. **Beware, the bearings must not touch the edge of the pocket!**
- ⚠ **Correct bearing alignment is CRUCIAL.** Proceed carefully and make sure that **both bearings are as close to the center of the Y-carriage as possible and do not touch any pocket edge.**
- **Maintain the bearing's position** and slightly tighten the screws. Just barely to maintain the position and orientation of the bearings. We will tighten the screws firmly later on.
- Using the 2.5mm Allen key and the universal wrench, slightly tighten the M3nN nuts. **Do not tighten it completely**, just secure the bearing orientation and position. We will completely tighten it later.

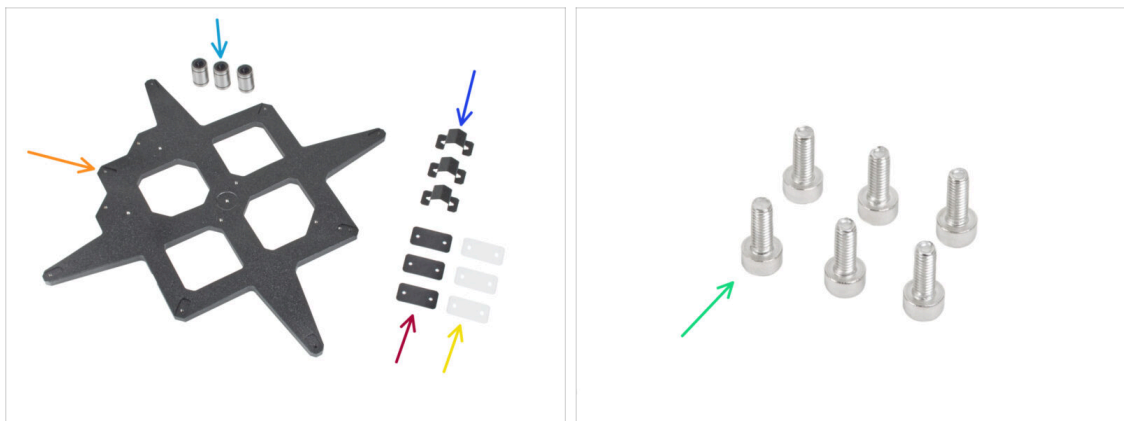
STEP 21 Y-axis: smooth rods holders (old)

■ **For the following steps, please prepare:**

- Y-rod-holder (4x)
- M3x10 screw (12x)
- M3nS nut (12x)
- Smooth rod 8x330 (2x)

STEP 22 Inserting smooth rods into Y-carriage (old)

- ⚠ **NOW, PLEASE BE VERY CAREFUL!** Gently insert the rod straight into the bearings, do not apply too much force and do not tilt the rod!
- ⓘ In case you manage to push out some balls from the bearings by accident, please count the balls. Without one or two balls, the bearing will continue to work. If there are more of them, please consider ordering new bearings.
- 🔧 Carefully tighten the screws fully into the nuts on the underside. Make sure you tighten the screws **EQUALLY** and **FIRMLY**. Each screw must come all the way through the nut, or at least its tip must be aligned with the top surface of the nut.
- ⚠ After the final tightening, the **movement of the smooth rods must be gentle**. If the smooth rod moves stiffly, loosen the screws and repeat the procedure.
- 🛠 Now, please go to step **Preparing Y-rod-holder**.

STEP 23 Y-carriage: parts preparation (new)

● For the following steps, please prepare:

- LM8UU bearing (3x)
- Y-carriage (1x)
- Bearing clip (3x)
- Rubber bearing pad 31x16x0.5 mm (3x)
- Plastic bearing pad 31x16x1 mm (3x)
- M3x8 screw (6x)

STEP 24 Y-carriage (new): parts preparation (lubricating)


● For the following steps, please prepare:

- Prusa lubricant applicator (1x)
- Prusa lubricant (1x) for LM8UU bearings
- Several paper towels to wipe oil and grease from the bearing surface.








Each bearing must be lubricated before mounting on the printer. Follow these instructions carefully.




STEP 25 Lubricating the bearing (new)


 Use any piece of fabric as a pad to protect your working surface from grease.



 **Make sure the bearing is clean inside.**


-  Wipe the preservative oil off the bearing surface with a paper towel.
-  It is necessary to lubricate all 4 rows of balls inside the bearing.
-  Open the lubricant and pierce the hole in the tube with the tip in the cap.
-  Screw the tube into the applicator.
-  Carefully slide the entire bearing onto the applicator.

STEP 26 Lubricating the bearing (new)

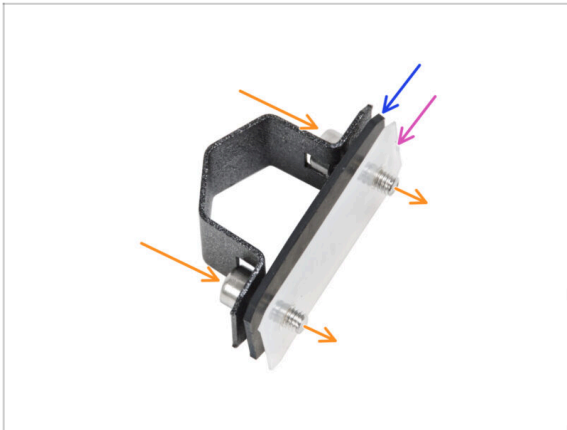
-  Turn the tube and applicator counterclockwise until you feel a slight resistance. This means that the holes in the applicator are aligned with the ball rows.
-  Gently press the tube to push the lubricant into the ball rows of the bearing.
-  Look at the front of the bearing. When the applicator pushes the lubricant out (around the black gasket), stop pressing the tube. Hold the bearing with the other hand during the lubricating.

 **The grease must be spread evenly over all four ball rows inside the bearing. There must not be too much grease, or too little. Take a closer look at the last picture.**

-  Wipe off excess grease on the outside of the bearing with a paper towel.
-  Use this procedure for all three bearings.

 The bearings may leave excess grease on the smooth rods after their installation. Wipe off any residue with a paper towel.

STEP 27 Assembling the bearing clips (new)



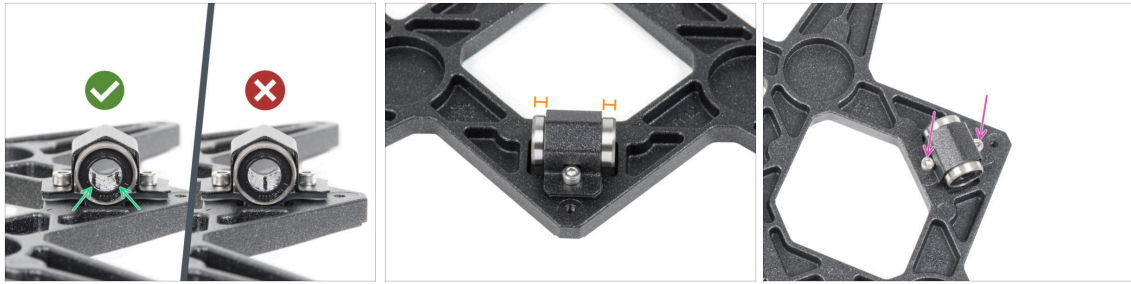
- ✦ Push two M3x8 screws through the bearing clip.
- ✦ Insert the rubber bearing pad on the screws.
- ✦ Insert the plastic bearing pad on the screws.
- ✦ Repeat the same for the remaining two bearing clips.

⚠ **The order of the pads is crucial.**
Check the order on all three bearing clips.

STEP 28 Installing the bearing on the Y-carriage (new)



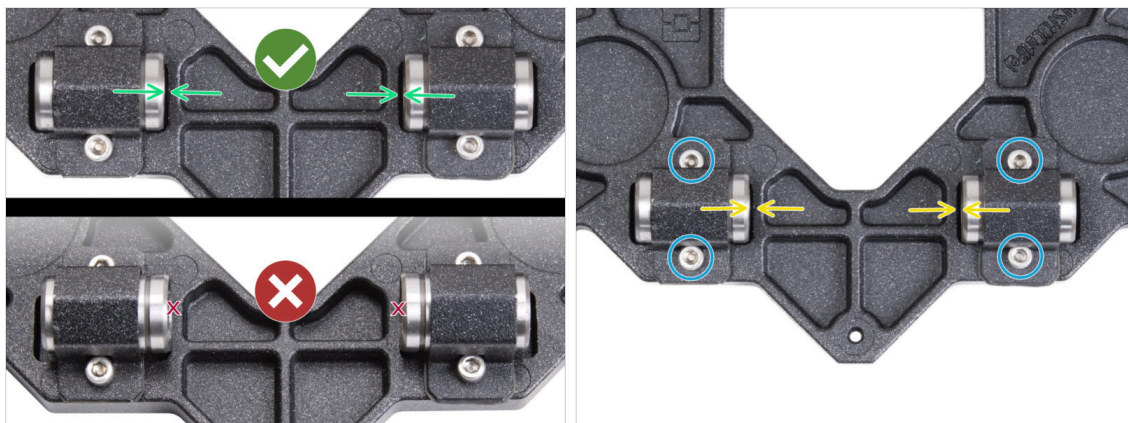
- ✦ Note the three pockets for bearings in the Y-carriage.
- ✦ Start with the side with the one pocket. Attach the bearing clip on the cutout.
- ✦ Insert the bearing into the bearing clip.

STEP 29 Aligning the bearing (new)

- **The correct bearing orientation:** When placing bearings onto the Y-carriage, **make sure that they are oriented as shown in the picture.** The tracks (rows of balls) have to be on the sides.
- Align the bearing so that it is centered on the bearing clip. Approximately the same piece of bearing should be visible on each side.
- Maintain the bearing position and slightly tighten both screws. Just barely to maintain its position and orientation. We will tighten the screws firmly later on.

STEP 30 Installing the bearings on the Y-carriage (new)

- Attach two bearing clips on the remaining two bearing pockets and push two bearings inside.
- Orient both bearings so that the two rows of bearing balls have to be on the sides.

STEP 31 Positioning of the bearings (new)

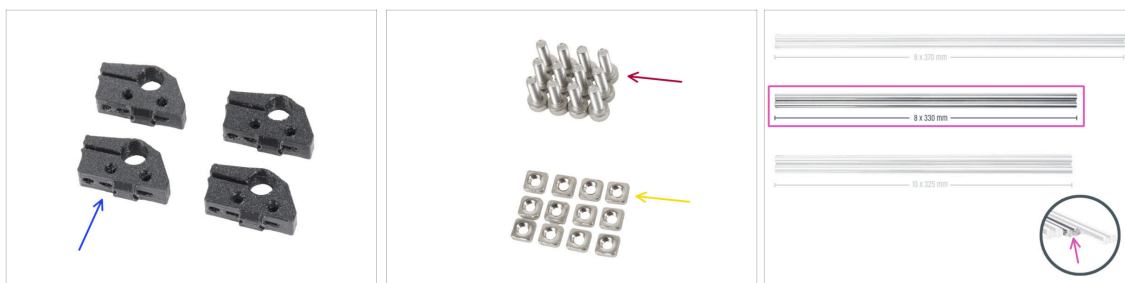
⚠ **Correct bearing alignment is CRUCIAL.** Proceed carefully and make sure that **both bearings** are as close to the center of the Y-carriage as possible and **do not touch any pocket edge**.

🟢 Unlike the previous single-bearing, position the bearings as close to the center of the Y-carriage as possible. **Beware, the bearings must not touch the edge of the pocket!**

⚠ **Incorrect positioning: the bearings must not touch or overlap the edges of the pocket** as shown in the bottom of the first picture.

🔵 **Maintain the bearing's position** and slightly tighten the screws. Just barely to maintain the position and orientation of the bearings. We will tighten the screws firmly later on.

🟡 After securing the clips double-check the correct position of the bearings so that they do not touch the edges of the pockets.

STEP 32 Y-axis (new): smooth rods holders

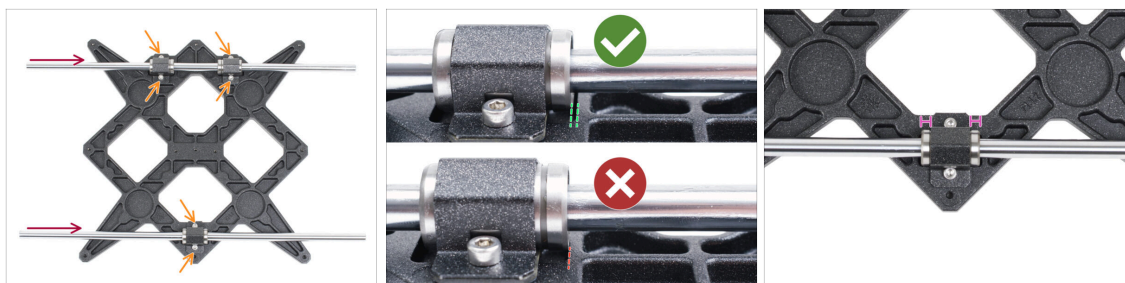
⬛ **For the following steps, please prepare:**

🔵 Y-rod-holder (4x)

🔴 M3x10 screw (12x)

🟡 M3nS nut (12x)

🟡 Smooth rod 8x330 (2x)

STEP 33 Inserting smooth rods into Y-carriage (new)

- Using a paper towel, wipe the transport oil from the surface of the smooth rods.
- ⚠ **NOW, PLEASE BE VERY CAREFUL!** Gently insert the rod straight into the bearings, do not apply too much force and do not tilt the rod!
- ⓘ In case you manage to push out some balls from the bearings by accident, please count the balls. Without one or two balls, the bearing will continue to work. If there are more of them, please consider ordering new bearings.
- Tighten the screws on each bearing clip.
- ⚠ After the final tightening, the **movement of the smooth rods must be gentle**. If the smooth rod moves stiffly, loosen the screws and repeat the procedure.
- After tightening all the screws securing the bearing clips, make a **final check of the correct position of the bearings**:
 - ⚠ **Two-bearing side:** the bearing must be positioned closer to the center of the Y-carriage. It must not touch or extend over the edge of the pocket.
 - **Single-bearing side:** the bearing must be in the center of the pocket.

STEP 34 Preparing Y-rod-holder

- Take one Y-rod-holder and insert two M3nS nuts.
- Make sure you've pressed the nuts all the way in. You can use pliers, **BUT** be careful, you can damage the printed part.
- ⓘ In case you can't press the nuts in, don't use excessive force. First, check if there isn't any obstacle in the nut trap.
- Insert one M3nS nut from the side of the Y-rod-holder.
- Ensure and adjust the alignment of each nut with the 2mm Allen key.
- Repeat for the remaining Y-rod-holders.

STEP 35 Mounting the Y-rod-holder parts



- Push one of the Y-rod-holders onto the rod. Align the front surface of the plastic part with the flat surface of the rod.
- Check the correct position of the Y-rod-holders. The screw hole must be facing up and towards the center of the Y-carriage (see the picture).
- Repeat for the remaining Y-rod-holders.

STEP 36 Installing the Y-carriage



- Take the Y-carriage including smooth rods with rod holders and place them in YZ-frame. Make sure, that **two bearings are on the left side** (see the picture, there are two pairs of the screw holes on the left and one pair on the right).
- Secure each Y-rod-holders and fix them with M3x10 screws on the front plate (the one with the longer extrusions). Tighten both screws equally, but not completely. We will tighten them fully later on.
- Insert the M3x10 screw into the hole in each front holder and tighten them.
- Secure the second pair of the Y-rod-holder with two M3x10 screws. Tighten both screws equally, but not completely. We will tighten them fully later on.
- Insert the M3x10 screw into the hole in each rear holder and tighten it.
- ⓘ In case the M3nS nuts keep falling out, please flip the frame upside down. Tighten both printed parts and then return the frame to the original position.

STEP 37 Aligning the smooth rods



⚠ IMPORTANT: proper alignment of the smooth rods is crucial to reduce noise and overall friction.

- ➡ Move the Y-carriage back and forth across the entire length of the smooth rods to align them.
- ➡ Then move the carriage to the front plate and tighten all screws in the front-Y-holders.
- ➡ Move the Y-carriage to the rear plate and tighten all screws in the back-Y-holders.

STEP 38 Assembling the Y belt: parts preparation



⬛ For the following steps, please prepare:

⚠ The printed parts are not the same, take a closer look and compare both parts with each other.

- ➡ Y-belt-tensioner (1x) *with an oval hole*
- ➡ Y-belt-holder (1x) *with a hexagonal hole*
- ➡ M3x40 screw (1x)
- ➡ M3x10 screw (4x)
- ➡ M3nN nut (1x)
- ➡ GT2-20 pulley (1x)
- ➡ Pin H8 2.9x20 (1x)
- ➡ Y belt (1x)

STEP 39 Assembling the Y belt



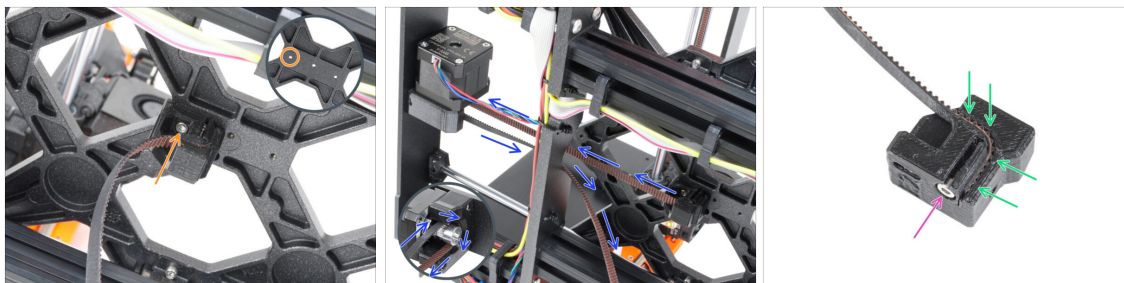
- Insert the M3nN nut all the way into the Y-belt-holder.
 - i Use the screw pulling technique. Attach the M3nN nut on the tip of the M3x40 screw (a few turns are enough). **Do not tighten the screw**, pull the nut all the way into the Y-belt-holder. Don't forget to remove the M3x40 screw from the part and keep it aside for later use.

STEP 40 Assembling the Y belt



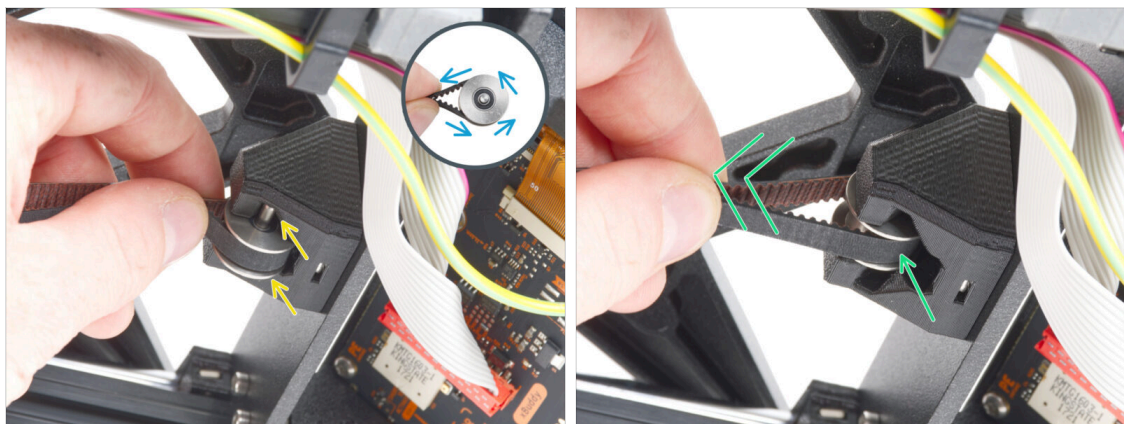
- Lean the printer onto the right side (the one with the PSU) to gain access to the bottom.
- Push the pin into the pulley and center it.
- Take one of the Y belt ends and push it into the Y-belt-holder. Note the orientation of the belt (teeth).
- Secure it by inserting and tightening the M3x10 screw.

STEP 41 Assembling the Y belt holder



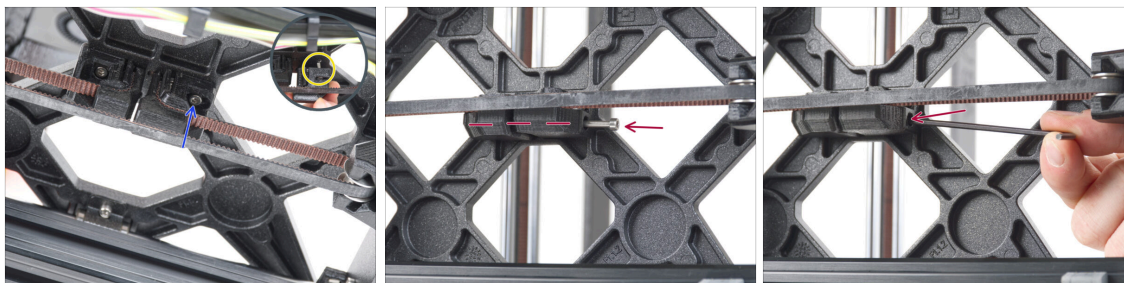
- ✦ Using the M3x10 screw, fix the Y-belt-holder to the Y-carriage. Use the left (rear) hole in the center part.
- ✦ Guide the Y-axis belt around the Y-axis motor pulley. Make sure the belt is inside the frame, not under!
- ✦ Take the free end of the Y belt guiding from the pulley and push it into the groove in the Y-belt-tensioner.
- ✦ Secure it with the M3x10 screw.

STEP 42 Assembling the Y belt tensioner



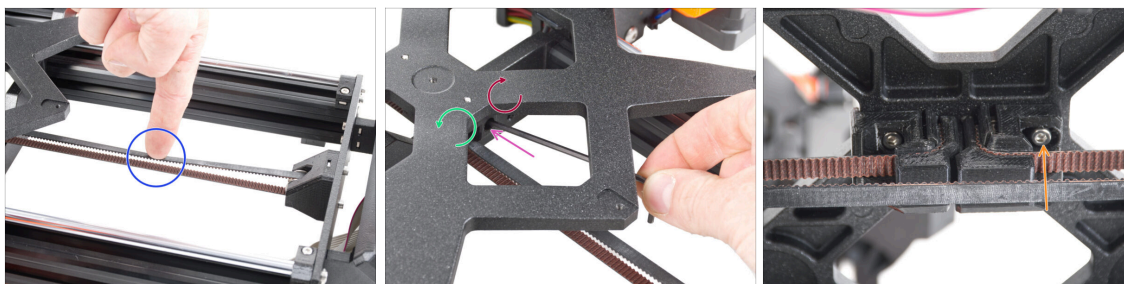
- ✦ Take the free end of the belt and guide it around the GT2-20 pulley.
- ✦ Insert the belt with the pulley into the Y-belt-idler on the rear of the front plate.
- ✦ Push the pulley all the way inside the printed part and lightly pull on the belt to lock the pulley in place.

STEP 43 Assembling the Y belt tensioner



- Insert the M3x10 screw into the Y-belt-tensioner and try if the screw reaches the threaded hole in the Y-carriage when tensioning the belt.
 - i If the screw does not reach the hole, it is necessary to remove the Y-belt-holder (the one already installed) and reposition the belt by one tooth in both printed parts - one tooth in each printed part will be vacant.
- Attach the Y-belt-tensioner to the right (front) hole in the Y-carriage and secure it with the M3x10 screw. **Do not overtighten the screw.** We will adjust the exact position later on.
- Insert the M3x40 screw into the Y-belt-tensioner and tighten it until the screw reaches the nut in the second part.

STEP 44 Tensioning the Y belt



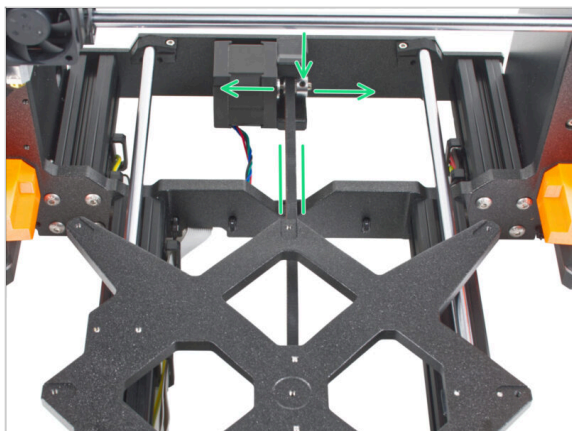
- Move the Y-carriage all the way to the back. Using a finger on your left hand, push the belt down. A medium force should be needed to squish the belt until both the parts touch. Don't try to overstretch the belt as you might damage the printer.
- You can change the belt tension by adjusting the long M3x40 screw on the bottom of the Y-carriage.
 - **Tighten the screw** to bring the parts closer together and **increase the tension**.
 - **Release the screw** to move the parts apart to **decrease the tension**.
- After you set the correct belt tension, tighten up the M3x10 screw on the bottom to fix the Y-belt-tensioner in place.

STEP 45 Belt tension check



- i** This step is recommended, but optional. If you don't have a phone at your disposal, continue to the next step. You can do this check later on.
- To verify or fine-tune the X or Y-axis belt tension on your printer, visit prusa.io/belt-tuner and open up the webpage on your mobile device. Or using your phone, scan the QR code in the picture.
- Watch the instructional video on prusa.io/belt-tuner-video and fine-tune your Y belt tension, if required.
- i** The belt tuner app was tested on multiple phones and should work across all most common phone manufacturers. However, in some rare cases it might not work as expected. Please state your brand and model in the comments below the step.

STEP 46 Aligning the Y belt



- Make sure that both the top and bottom parts of the belt are parallel (directly above each other).
- If not, adjust the belt position. Release both screws on the pulley and slightly move with it, until you reach the best position.
- Tighten both screws on the pulley.
- i** Note: If you need to readjust the belt position, don't forget to check the belt tension once again.

STEP 47 Installing the Expansion joints: parts preparation

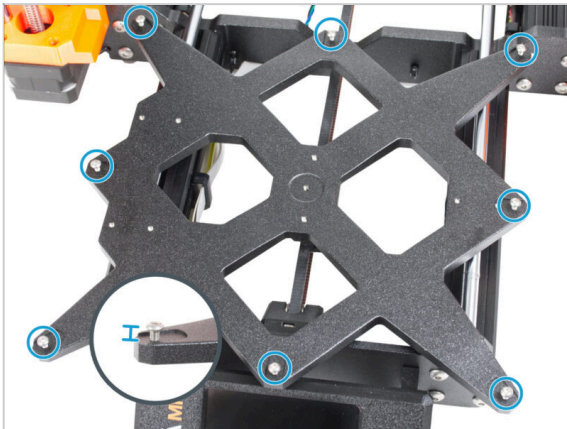


■ For the following steps, please prepare:

■ Expansion joint (8x)

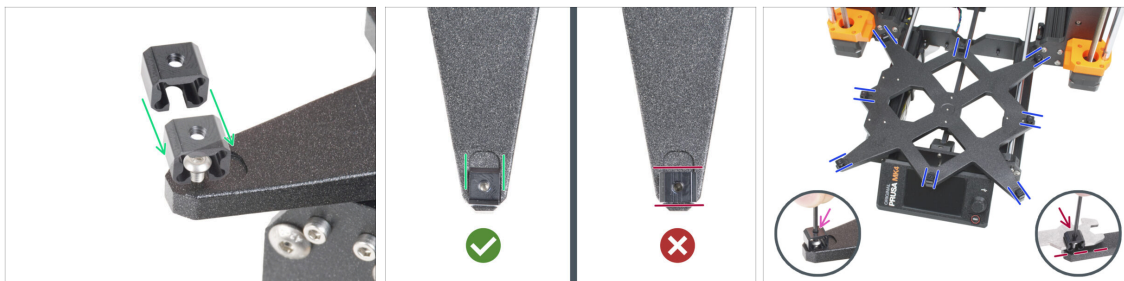
■ M3x6r screw (8x)

STEP 48 Preparing the expansion joints



■ Install eight M3x6r screws in the outer holes on the Y-carriage. **Do not tighten them completely.** A few turns are enough for now.

STEP 49 Installing the Expansion joints



⚠ The installation of the expansion joints needs to be done carefully. It is crucial for the correct functionality of the printer. Carefully read the instructions:

➡ Slide the expansion joint from the side on the M3x6r screw.

⚠ Make sure the expansion joints are correctly oriented. There is a recess with approximately the same shape as the expansion joint. The joint must fit into the recess. **See the second picture.**

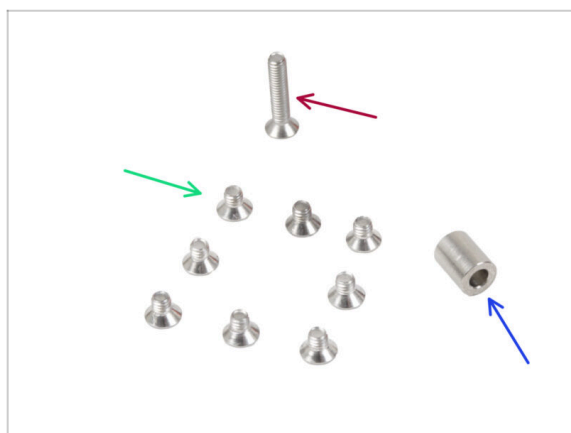
i Some of the Y-carriages don't have the recesses, depending on the version of the printer model. **Position the expansion joints according to the picture.**

➡ Maintain the position and tighten the M3x6r screw using the 2.0mm Allen key.

➡ Proceed the same for the rest of the expansion joints.

⚠ OLD Y-CARRIAGE: On the old Y-carriage without the recesses, maintain the correct position and orientation of the expansion joint using the universal wrench while tightening.

STEP 50 Attaching the heatbed: parts preparation



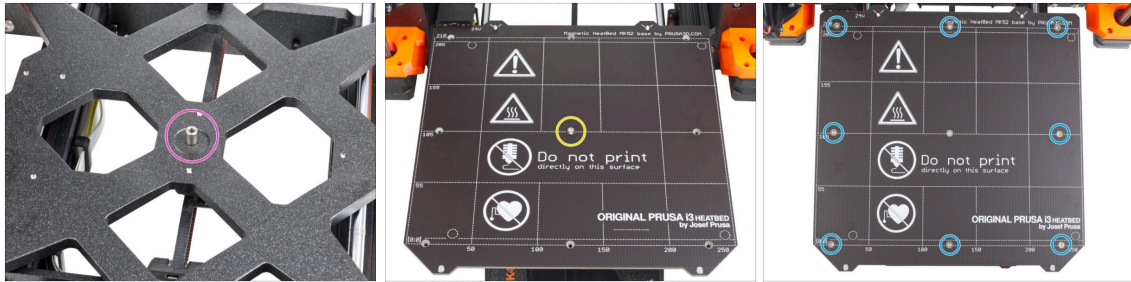
⬢ **For the following steps, please prepare:**

➡ M3x4bT screw (8x)

➡ M3x14bT screw (1x)

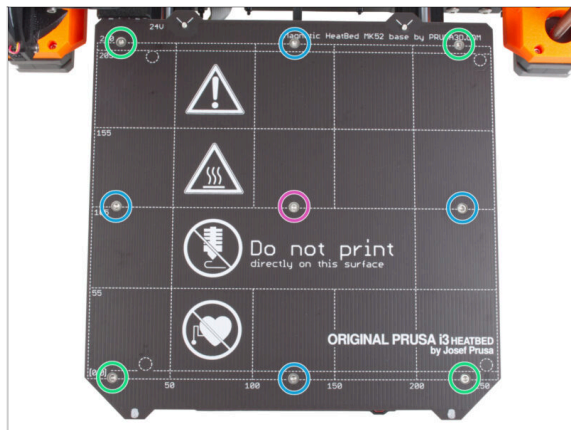
➡ Spacer 3.1x6x8 mm (1x)

STEP 51 Attaching the heatbed



- ◆ Place the spacer onto the Y-carriage and align it with the hole in the center.
- ◆ Put the heatbed on the Y-carriage and secure it by the M3x14bT. **Do not fully tighten the screw yet.**
- ◆ Insert the M3x4bT screws into the remaining holes in the heatbed. **Do not fully tighten the screws yet.**

STEP 52 Tightening the heatbed

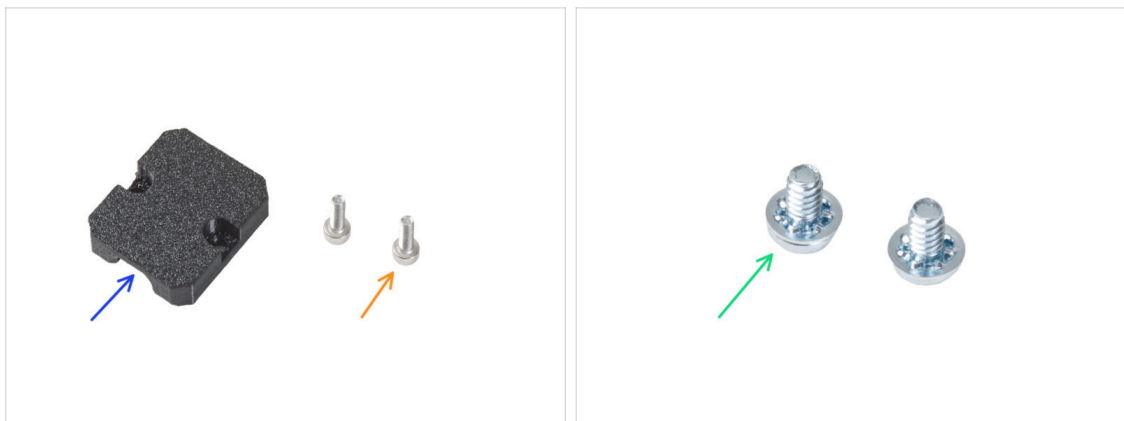


- ◆ After all screws are in place, tighten them in the following sequence:

- ◆ Center screw
- ◆ First four screws (edges)
- ◆ Last four screws (corners)

⚠ **Tighten the screws gently, but firmly.**

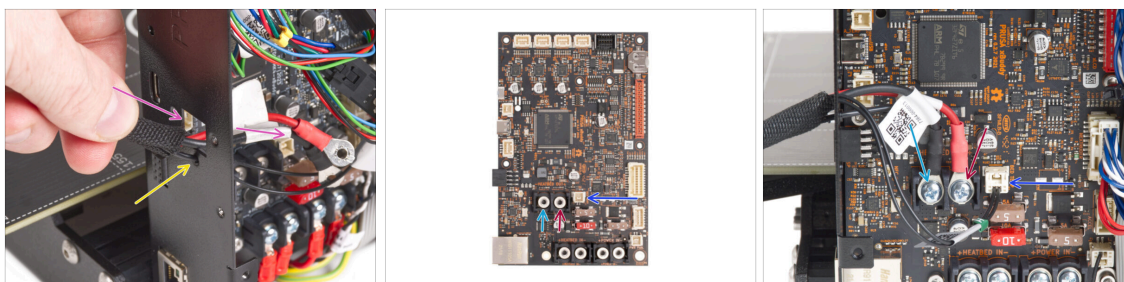
STEP 53 Guiding the heatbed cables: parts preparation



For the following steps, please prepare:

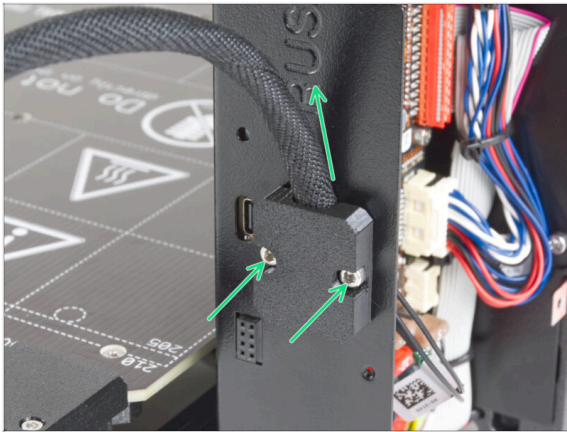
- Heatbed-cable-holder (1x)
- M3x6 screw (2x)
- Power terminal screw 6/32" (2x)

STEP 54 Guiding the heatbed cables



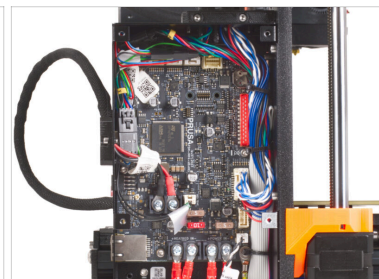
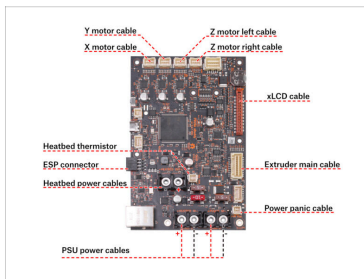
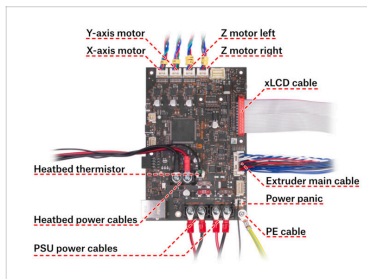
- Push the heatbed cables and heatbed thermistor cable through the square opening on the back of the xBuddy Box.
- Push the filament through the circle hole right below the square opening.
- Place the **black** heatbed cable on the **left** terminal and secure it with the terminal screw.
- Place the **red** heatbed cable on the **right** terminal and secure it with the terminal screw.
- Connect the heatbed thermistor cable to the xBuddy board.

STEP 55 Covering the heatbed cables



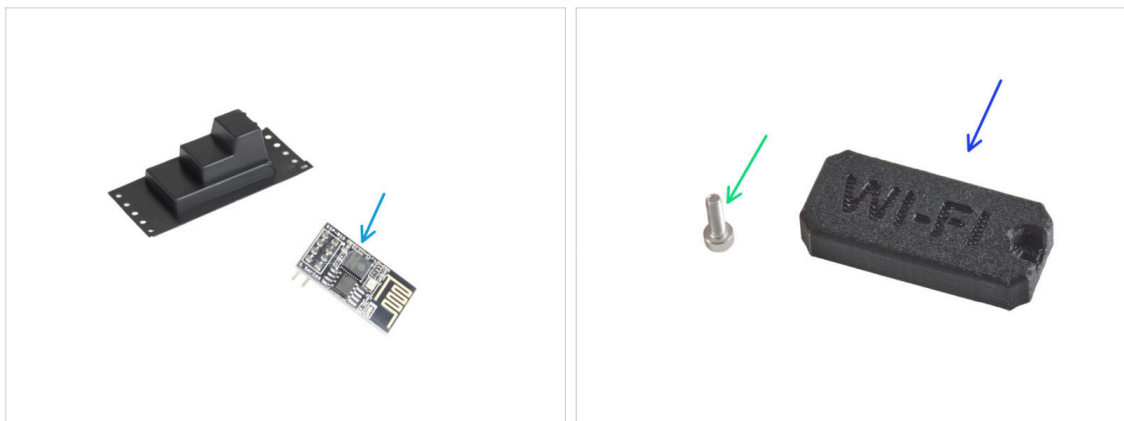
- Attach the heatbed-cable-holder to the xBuddy box. The cable bundle must be pointing up. Secure it by tightening both M3x6 screws firmly.

STEP 56 Verify all connections once more!



- Check your electronics connection with the first picture.
- Before covering the electronics, check and compare your wiring.**
- Compare your cable management with the third picture. Guide the cables along the inside of the box and maintain clearance above the electronics board for better cooling.
- Make sure that all connectors are fully inserted and PSU cables properly tightened. Otherwise, there is a risk of damage to the printer!**

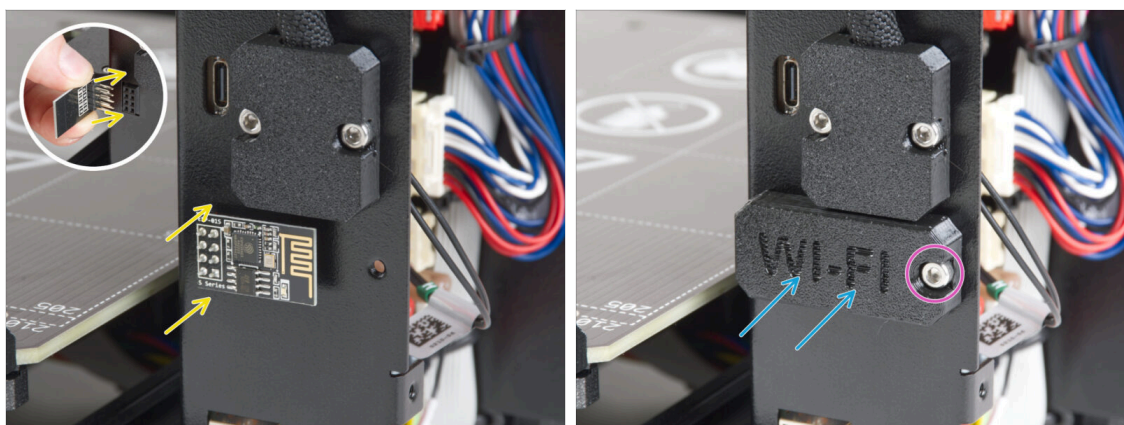
STEP 57 Installing the ESP module: parts preparation



● For the following steps, please prepare:

- ESP-01S Wi-Fi module (1x) *packed in black plastic packaging*
- M3x6 screw (1x)
- Wifi-cover (1x)

STEP 58 Installing the ESP module



⚠ **Be very careful** when handling and connecting the ESP module to **avoid bending and damaging the pins.**

- **Grasp the ESP Wi-Fi module by the edges of the board** and plug its pins in the eight-hole slot in the xBuddyBox. Make sure the part is correctly oriented.
- Cover the ESP module with the wifi-cover.
- Secure it with the M3x6 screw.

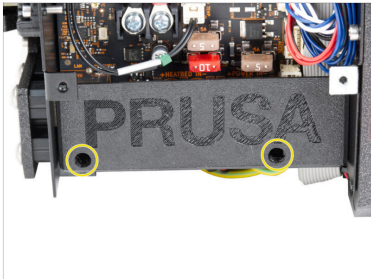
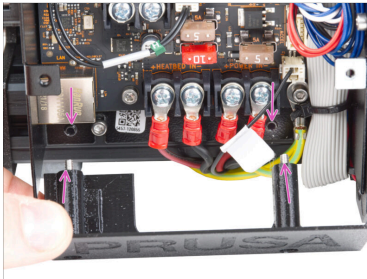
STEP 59 Covering the xBuddy box: parts preparation



For the following steps, please prepare:

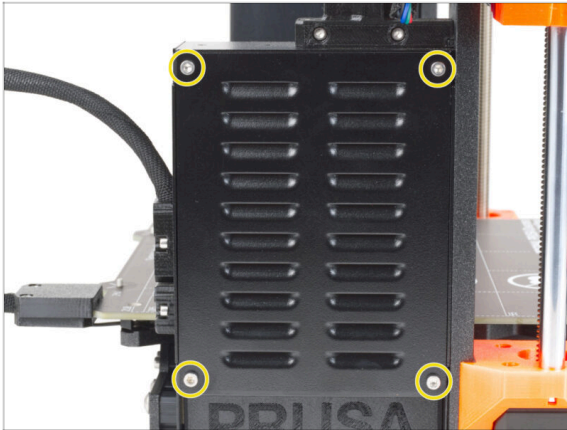
- xBuddybox-cover (1x)
- M3x6 screw (4x)
- El-box-cover (1x)
- M3x10 screw (2x)

STEP 60 Covering the xBuddy box



- Push two M3x10 screws through the el-box-cover.
- Attach the cover to the xBuddy Box. There are two threaded holes in the xBuddy box. Make sure there is no cable in the way for the screws and the cover.
- Secure the el-box-cover by tightening both M3x10 screws to the xBuddy box.

STEP 61 Covering the xBuddy box



- Align the xBuddy box cover with the xBuddy box and secure it with four M3x6 screws.

STEP 62 Assembling the double spool holder (part 1)



- For the following steps, please prepare:
- Centre part (1x)
- Side arm (2x)

STEP 63 Assembling the double spool holder (part 2)

⚠ Don't use excessive force during the assembly, or you might damage the spool holder locking system.

- 🟡 Place all three parts in front of you. Note both "arms" are identical. Make sure the C shaped part, which will snap on the printer's frame is facing towards you.
- 🟢 Take the "arm" on the right side, insert it gently in the main part and start to rotate clockwise (away from you). It should take about half the turn to lock the part in place.
- 🟠 Take the "arm" on the left side, insert it gently in the main part and start to rotate anticlockwise (towards you). It should take about half the turn to lock the part in place.
- 📄 **i** The assembly requires a very small force (torque). If you experience issues, check first the locking mechanism for obstacles.

STEP 64 Assembling the Filament guide: parts preparation

⬛ **For the following steps, please prepare:**

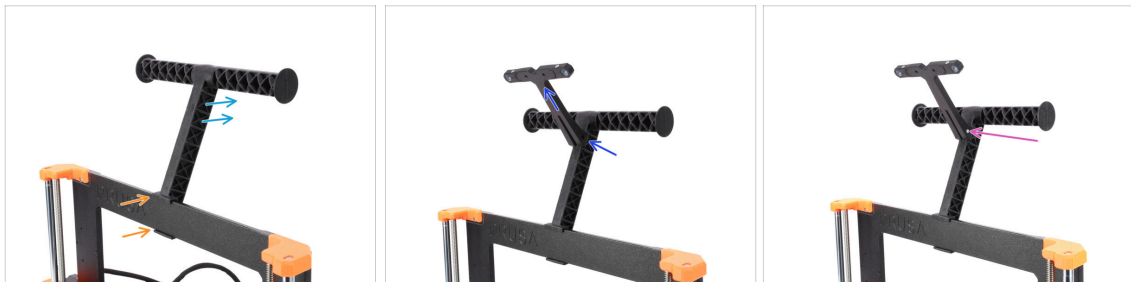
- 🟠 Filament-guide (1x)
- 🟡 Filament guide PTFE tube (2x)
- 🟢 M3n nut (3x)
- 🟡 M3x18 screw (1x)
- 🟡 M3x10 screw (2x)

STEP 65 Filament guide assembly (part 1)



- Insert two M3n nuts into the marked openings.
- Use the longer M3x18 screw as a handle for inserting the nut.
- Insert the two PTFE tubes into the marked openings.
- Fix the tubes in place with two M3x10 screws from the other side.
- Insert the third M3n nut into the opening on the side.

STEP 66 Filament guide assembly (part 2)



- Attach the spoolholder onto the **middle** of the printer's frame.
- Make sure the spool holder is inclined towards the back of the printer.
- Attach the filament guide onto the spool holder.

It should click in inbetween the top two ribs, pointing upwards, as seen in the photo.

- Fix the guide in place using M3x18 screw.

STEP 67 Haribo time!



- ◆ Eat another five gummy bears.
- ⓘ **Did you know that** the bright colors of gummy bears are achieved through the use of food coloring, which adds to their visual appeal.

STEP 68 That's it



- ◆ That was tough. But you made it!
- ◆ Let's move to the last chapter: **8. Preflight check**

8. Preflight check



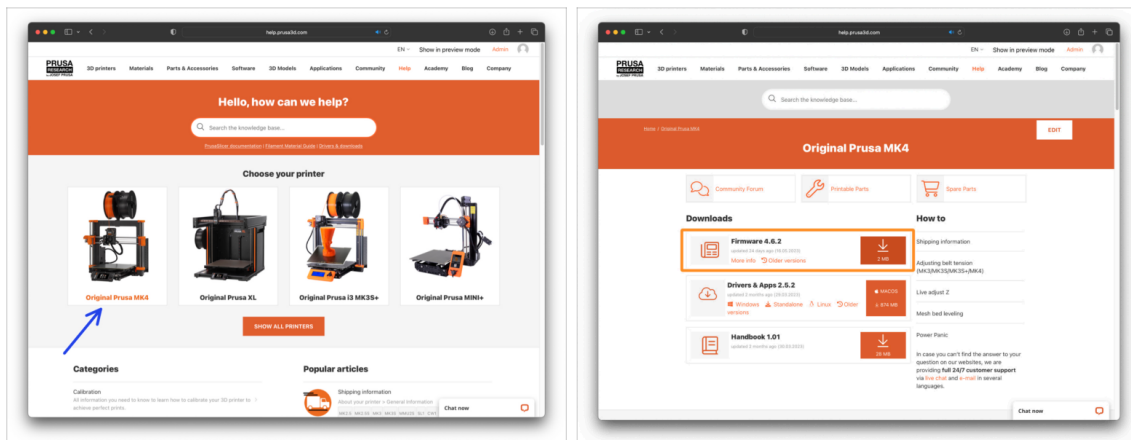
STEP 1 Attaching the print sheet



- i** Note: In the following steps, you will see MK4 logos on the display. This is because these steps are the same as the ones in the MK4 assembly instructions, which we have reused. You don't need to be concerned about discrepancies.
- ⚠** **Make sure there is nothing on the heatbed.** The heatbed must be clean. Any dirt can damage the surface of both the heatbed and the print sheet.
- 🟡** **Attach the sheet by first aligning the rear cutout with the locking pins on the back of the heated bed** (marked in orange in the picture above). Hold the sheet by the front two corners and slowly lay it down onto the heated bed - **watch your fingers!**

 - 🛡** Keep the **print sheet** clean for optimum performance.
 - 🛡** #1 cause of prints detaching from the print surface is a greasy print sheet. **Use IPA (Isopropyl alcohol) to degrease it** if you have touched its surface before.
- i** We are using a print sheet with a smooth surface. However, the same procedure applies to other variants.

STEP 2 Firmware update (part 1)



- ❗ All shipped kit units have the latest firmware version. However, it is recommended to check and possibly upgrade the firmware version.
- 🔗 Visit the help.prusa3d.com page.
- 🔗 Navigate to the Original Prusa MK3.9 page.
- 🔗 Save the firmware file (*.bbf*) onto the *bundled USB drive*.
- ❗ MK3.9 is compatible with firmware release 5.0.0 or higher.

STEP 3 Firmware update (part 2)



- 🔗 Insert the USB drive with the latest firmware file into the printer.
- 🔗 Connect the power cable and connect the printer into a wall outlet.
- 🔗 Turn the printer on using the switch on the back.
- 🔗 If the "New firmware available" screen appears, hit **FLASH** by pressing the rotary knob to upgrade to the latest firmware.
- 🔗 If no such message appears, the printer is running the latest firmware already. Proceed to the next step.

STEP 4 Wizard - Selftest start



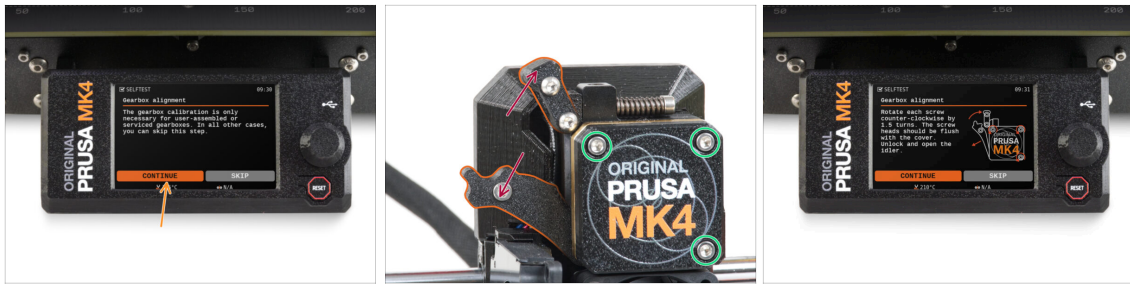
- ◆ After the printer starts up, the setup wizard will show up - requiring a self-test. Select **CONTINUE** to start.
- i The wizard will test all important components of the printer. The whole process takes a few minutes. Some parts of the wizard require direct user interaction. Follow the instruction on the screen.
- ⚠ **NOTE:** While testing the axes, make sure that there is nothing in the printer obstructing the axes movement.
- ⚠ **WARNING:** Do not touch the printer during the self-test unless prompted! Some parts of the printer may be **HOT** and moving at high speed.
- ◆ The wizard starts with the fan check, Z-axis alignment and the X&Y axis test; all fully automatic.

STEP 5 Wizard - Loadcell Test



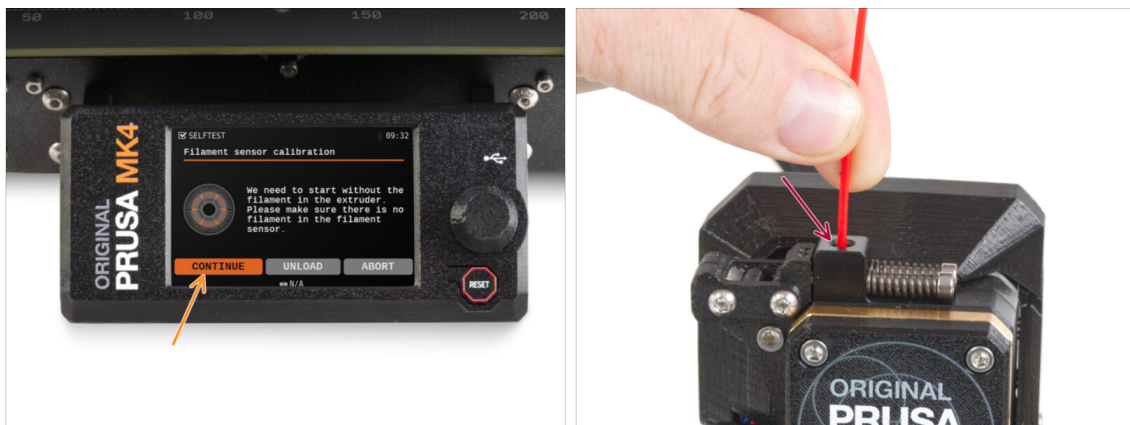
- ◆ The next step of the wizard will prompt you to touch the nozzle to test and calibrate the Loadcell. During this procedure, the parts of the printer are not heated up so that you can touch them. Click **Continue**.
- ◆ Do not touch the nozzle yet, wait until prompted by the **Tap nozzle NOW** message.
- ◆ Tap the nozzle from below. In case the Loadcell does not detect the touch, you will be prompted to repeat the step. Otherwise, you will see **Loadcell test passed OK** when it succeeds.

STEP 6 Wizard - Gearbox Alignment



- Once you get to the Gearbox Alignment part, select **Continue** and follow the on-screen instructions.
- Undo the idler lock (swivel), then open the idler door.
- Loosen the three screws on the front of the gearbox by 1.5 turns.
- i** The printer will go through the automatic gearbox alignment. This process can't be seen from the outside.
- Once prompted, tighten the three screws in the pattern indicated on the screen.

STEP 7 Wizard - Filament Sensor Calibration



- During the filament sensor calibration, you will need to use a short piece of filament. Prepare the filament and select **Continue**. There should be no filament inside the extruder before the start of the calibration process.
- i** There should be no filament inside the extruder before the calibration process starts.
- Once prompted to, insert the filament end into the opening on top of the extruder.
- Remove the filament after the calibration finishes.

STEP 8 Wizard complete



- ◆ **The printer is now fully calibrated.** Follow this guide to the end to load a filament in and start a test print.
- ◆ Once the Wizard finishes, the details screen will show up. **Click the knob** to continue.

STEP 9 Reward yourself!



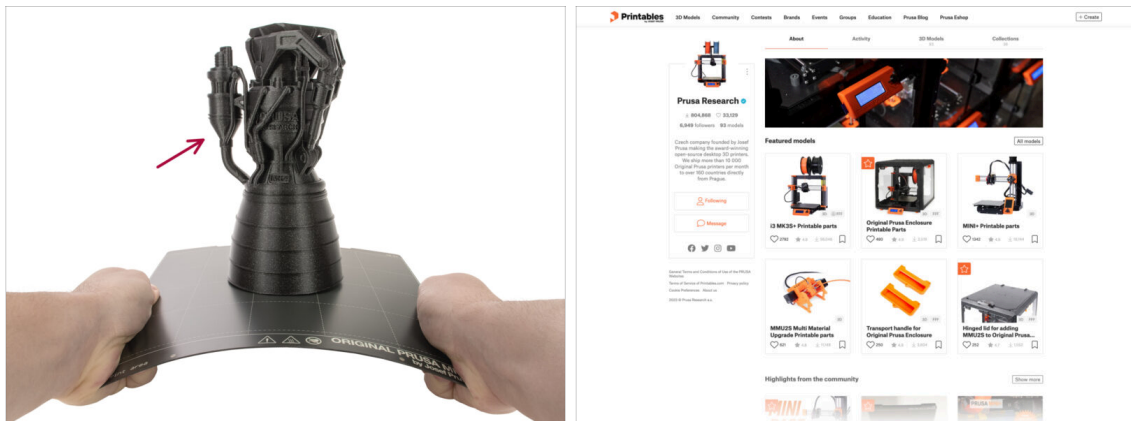
- ◆ It looks like you have successfully assembled and connected everything. No doubt ;). **Congratulations!** You deserve a big reward for that. Eat all the remaining gummy bears... and don't forget to share with those who supported you during the assembly.
- ① **Did you know that** Haribo gummy bears are one of the most important parts of the Original Prusa printers assembly instructions.

STEP 10 Loading a filament



- Add a spool or a sample of your favourite filament onto either side of the spool holder.
 - Guide the filament end through the filament guide into the extruder. Using the filament guide prevents filament tangling.
 - Once a filament is detected, the printer will load it automatically. It is important to select the correct type of filament you are using on the screen. We recommend using **PLA** material for the first test print.
 - The printer will purge some of the material through the nozzle. Confirm its color is clear by selecting **YES** on the screen and remove the leftover plastic from below the nozzle.
- ⚠ Proceed carefully, the nozzle is now very **HOT!** Do not touch it with your bare hands!

STEP 11 Printable 3D models



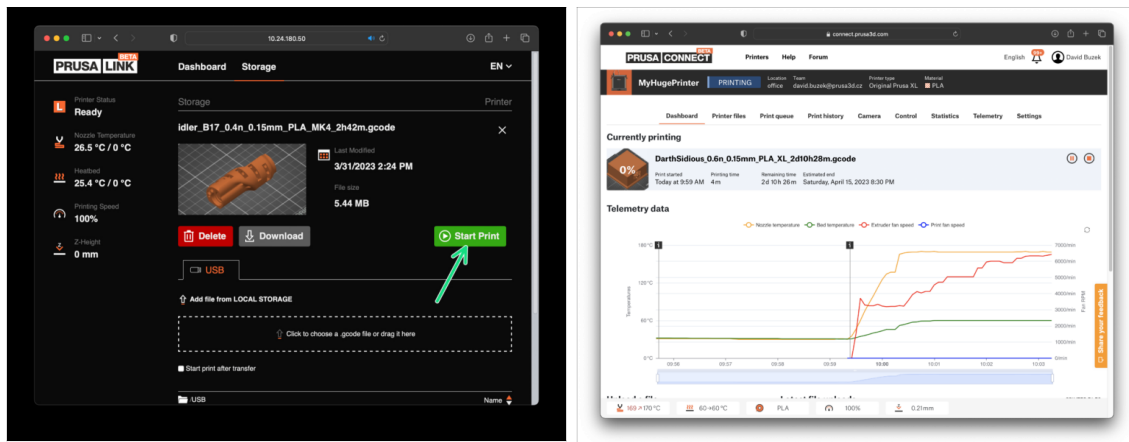
- **The printer is now ready to print!**
- You can start by printing some of our test objects from the bundled USB drive.
- The sample objects are also available on the official **Prusa Research Printables profile**

STEP 12 PrusaSlicer for MK3.9



- Ready to print your own models?
- Visit help.prusa3d.com once again. Download and install the latest **Drivers & Apps** package onto your computer. This package includes the **PrusaSlicer** app.
- Open the **PrusaSlicer** app. If you're running it for the first time, Configuration Wizard will show up. Visit the Prusa FFF tab in the Wizard, select **Original Prusa MK3.9** in the **0.4mm nozzle** version (the default nozzle size) and hit **Finish** to start using the MK3.9 printer profile.
- Make sure the Original Prusa MK3.9 is selected in the Printer menu on the right, when slicing for the MK3.9.
- **Import a model** of your choice into PrusaSlicer, adjust the settings if needed, hit **Slice** and export the G-code file onto the USB drive to print it on your MK3.9.

STEP 13 PrusaLink and Prusa Connect



- Did you know you can print and control the printer over the local network with **PrusaLink** or from anywhere in the world using **Prusa Connect**?
- ⚠ First, read the article about PrusaLink and Prusa Connect to get general information about these services.
- To start using these services, visit prusa.io/wifimk4 to set up Wi-Fi or connect your printer to a network using the wired Ethernet connection.

STEP 14 Quick guide for your first prints

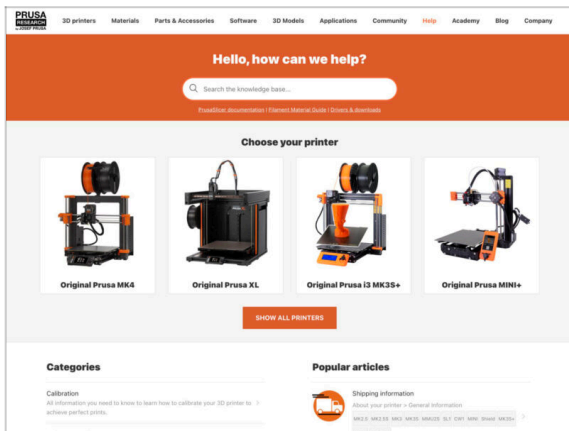


Please read the **3D Printing Handbook** dedicated to your printer and follow the instructions to set up and use the printer properly. The latest version is always available at help.prusa3d.com



Read the **Disclaimer and Safety instructions** chapters.

STEP 15 Prusa knowledge base

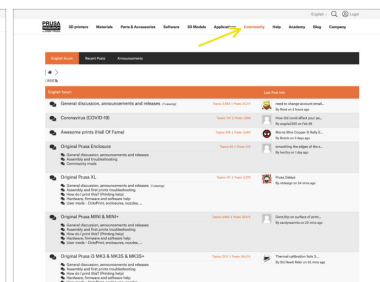
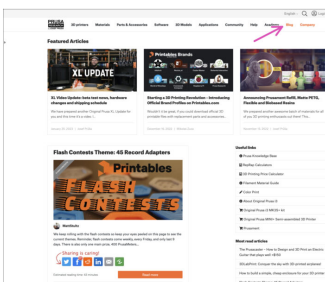
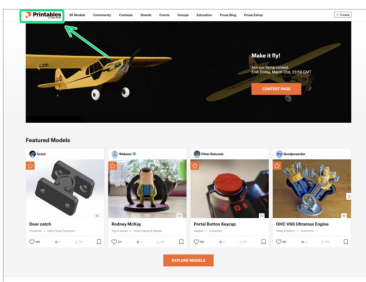


If you encounter any problems at all, don't forget you can always check out our knowledge base at help.prusa3d.com



We're adding new topics every day!

STEP 16 Join Printables!



Don't forget to join the biggest Prusa community! Download the latest models in STL or G-code tailored for your printer. Register at [Printables.com](https://printables.com)



Looking for inspiration on new projects? Check our blog for weekly updates.

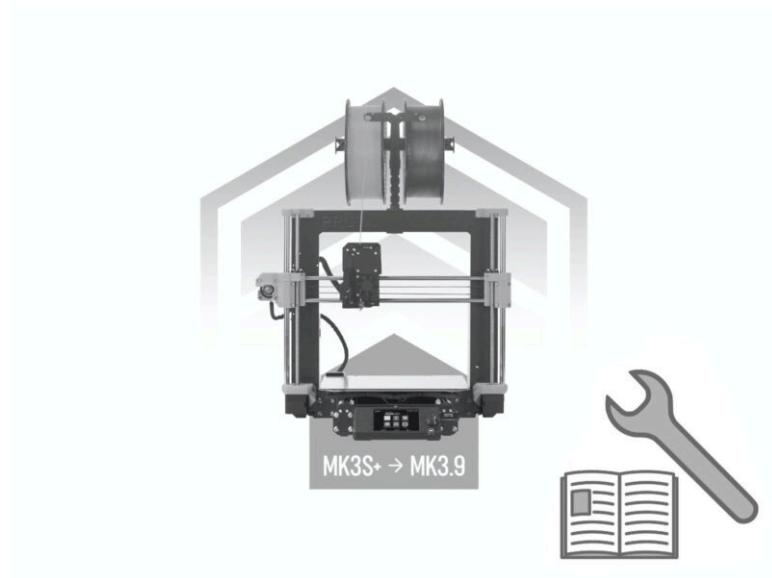


If you need help with the build, check out our forum with a great community :-)

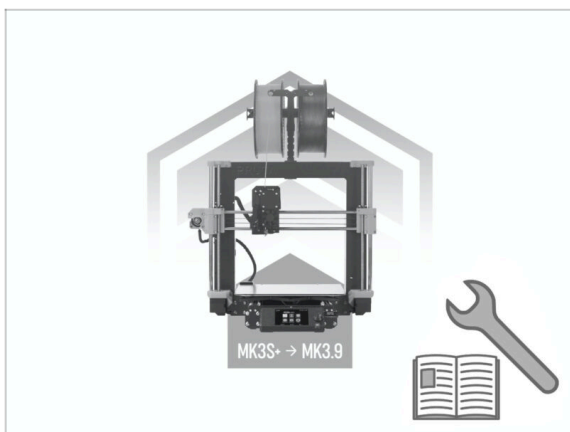


All Prusa services share one user account.

Manual changelog MK3.9 upgrade



STEP 1 Version history



- **Versions of the MK3.9 manual:**
- 09/2023 - Initial version 1.0

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[illegible]

This image shows a full page of blank, lined paper. It features approximately 20 evenly spaced horizontal grey lines across the entire width of the page, providing a guide for writing. The background is a clean, solid white color. There are no margins, text, or other markings present.

