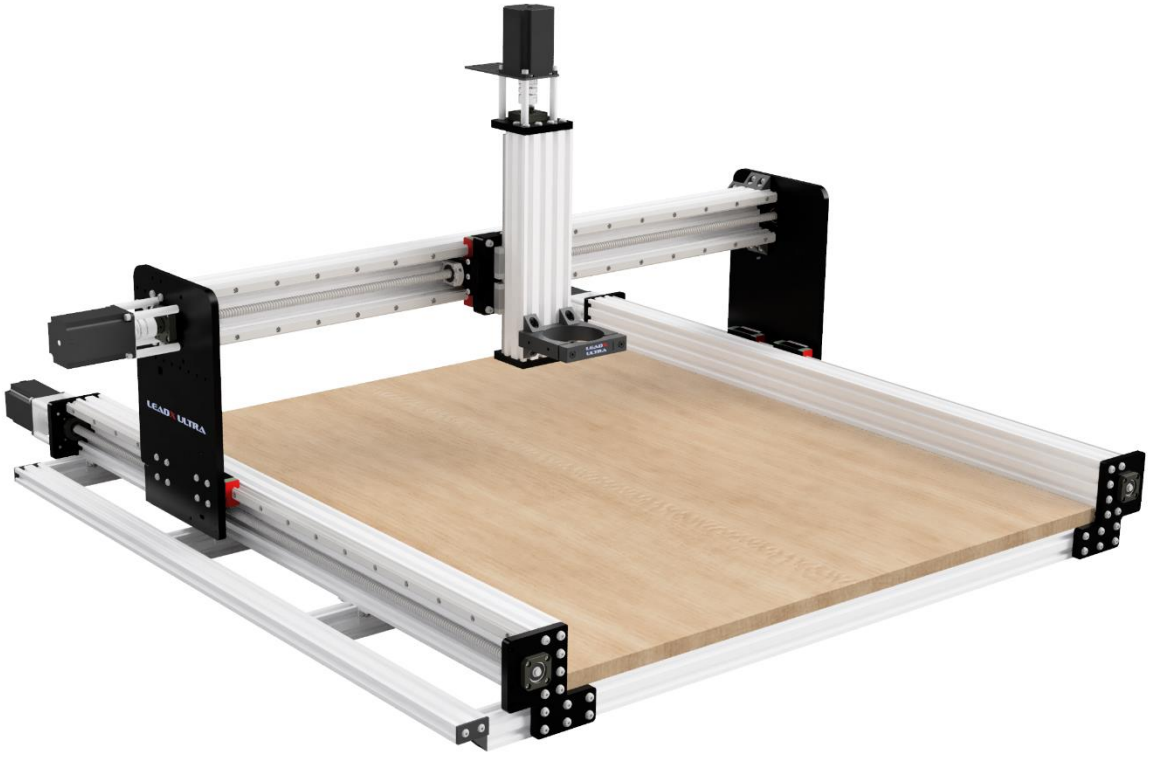
NENO LEADX Serie

NENO LEADX Ultra

Assembly instructions, operating instructions and safety V1.2



Index

General

About the NENO LEADX Ultra

Congratulations on purchasing your NENO LEADX Ultra basic kit!

The NENO LEADX Ultra is a CNC milling machine of the latest generation.

After the success of our simple but stable LEADX Pro, we were increasingly confronted with inquiries about more complex and stable milling machines.

The LEADX Ultra is based on the same aluminium profiles as the LEADX Pro, but dispenses with the roller system and the trapezoidal threaded spindles and uses high-precision linear guides and ball screws.

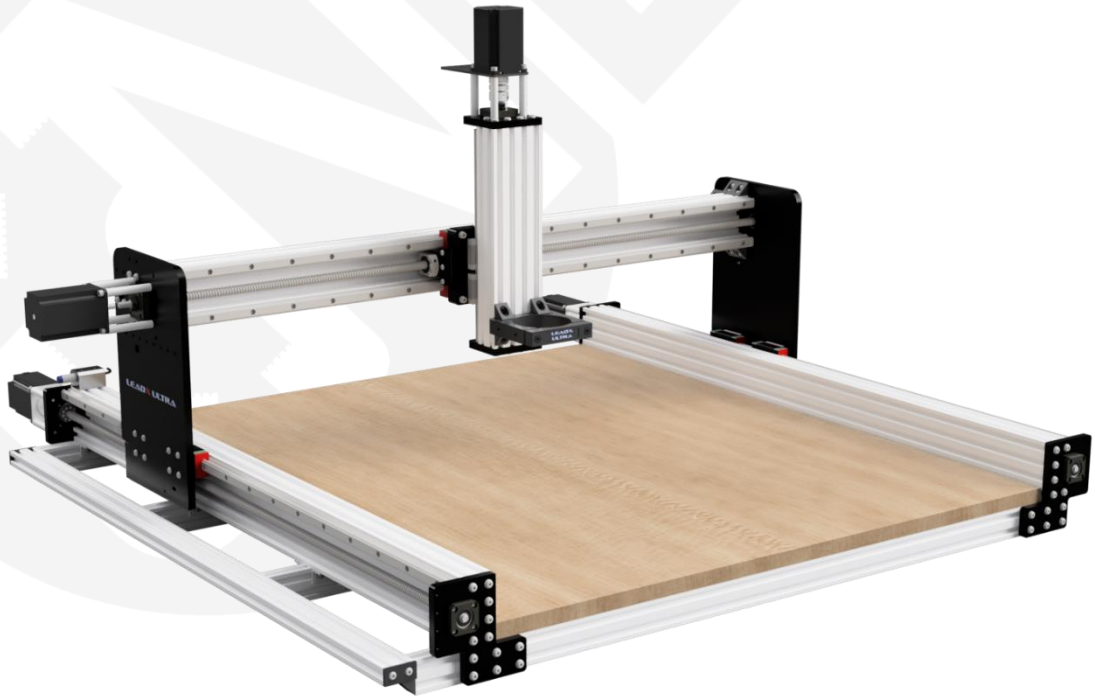
In order to stand out from the competition on the market, the LEADX Ultra uses massive HGR15 linear guides that can absorb 3x as many forces as the usual MGN15 linear guides.

The LEADX Ultra uses high-precision rolled ball screws with a diameter of 12mm in precision class C7 on all axes.

For this purpose, all aluminium profiles used are made in Europe.

We wish You a lot of fun with the assembly!

We are here for You. Write to us if you don't know what to do: **Support@nenocnc.ch**



Limitation

The information and notes in this manual have been compiled taking into account the applicable standards, regulations as well as the applicable case law and the current state of the art.

No liability is assumed for improper assembly, wiring, commissioning, use or maintenance.

The manufacturer NENO-CNC is also not liable in the following cases:

1. Failure to follow the instructions
2. Incorrect assembly
3. Inappropriate use
4. Arbitrary intervention and modification of the components
5. Technical conversions of any kind
6. Use of third-party accessories or non-approved spare parts

The actual scope of delivery may deviate from the explanations and illustrations described here in the event of special designs, the use of additional ordering options, introductory promotions, or due to the latest technical changes. The obligations agreed in the delivery contract, the general terms and conditions as well as the terms of delivery of the manufacturer NENO-CNC and the legal regulations valid at the time of conclusion of the contract apply. Furthermore, the statutory warranty provisions apply.

Read these assembly instructions and the operating and safety instructions carefully and make sure several times in each step of the instructions that you have not made any mistakes during assembly.

Safety

Responsibility of the operator

The operator of the NENO LEADX Ultra is responsible for the following points:

1. The safety instructions have been read and understood.
2. The construction was carried out completely according to instructions.
3. The CNC milling machine has been properly tested before each operation and is only put into operation in perfect condition.
4. The CNC milling machine is only used with accessories approved by the manufacturer.
5. Possible precautions (hearing protection, safety goggles, distance to the spindle, etc.) have been properly taken before commissioning.
6. Minors have reached the age of 14 before use and a basic technical understanding is available.
7. The CNC milling machine must be operated and stored out of the reach of children.
8. Safety devices such as the emergency stop switch must always be freely accessible.
9. If you want to make adjustments to the machine, the associated controller or various system-guided tools, unplug the power as a precaution.
10. The owner of the machine must ensure that all persons working with the CNC milling machine have read and understood the safety instructions.
11. The owner, as well as anyone present while actively working with the machine, must wear protective clothing as described in this manual.

Personal protective device

Please always ensure that basic personal protection measures are observed at every company and for bystanders.

12. Safety goggles (protection of the eyes from flying chips and broken milling cutter)
13. Hearing protection (protection of the ears from loud background noise)
14. Protective gloves (protection of hands from heat and cuts when handling milling cutters)
15. Tight-fitting work clothes (protection against accidental entanglement of clothing in spindles or guides)
16. Secure shoulder-length or even longer scalp hair with a hairnet or cap so that it cannot get into the linear guides and/or the rotating milling tools.
17. Protective mask (protection against carcinogenic fumes and milling dusts)

Safety

Ambient conditions

Carry out the construction and operation of the milling machine only on a solid, flat surface. It should stand securely and not be able to slip.

Make sure there is enough space around the machine so that you can work comfortably and the machine can fully extend its travels. Also keep a safe distance from other machines.

Never touch system-guided tools or moving components during operation. Moving parts (e.g. Y-bridge gantry) can suddenly and unexpectedly change direction. Depending on the operating regulations, a barrier or covering of moving parts may be necessary.

Keep your workspace clean and well lit. Keep children and others away or at a minimum distance while using the milling machine. There is a massively increased risk of injury.

Residual risk

Even if all precautions are observed, there is always a certain degree of residual risk for persons or property.

It must always be ensured that the machine is operated with caution and caution.

For your own safety, please always ensure that you are not unfocused or under the influence of various means that could affect your mental activity.

Required tools

We recommend a set of tools needed to assemble the NENO LEADX Ultra. Of course, You can also use complementary tools.

1. Allen key set
2. Wrench or Ratchet Set
3. Various screwdrivers
4. Possibly M5 thread cutter for recutting
5. Square ruler
6. Linear guides alignment tool (included)
7. Retaining ring pliers
8. Grease gun for linear drives and ball screws
9. Grease to grease gun

Notes on assembly

10. This guide is a generalization. Photos and graphics refer to the 1000 x 1000mm version of the NENO LEADX Ultra. The manual also works without problems with the other two machine sizes offered.

11. At each step, first place all components listed in the respective BOM in front of you to get an overview.

12. In each case, it is specified whether an assembly must be built 2x. Also whether it is built identically or mirrored, is highlighted in the instructions.

13. For the accuracy of the machine, it is particularly important to measure each angle with a stop angle to guarantee 100% perpendicularity before screws are fully tightened.

14. If an M5 thread has been forgotten, please cut it with an M5 thread cutter.

15. If you have a dial gauge, please run all linear guides with it to guarantee a completely flat and rectangular machine.

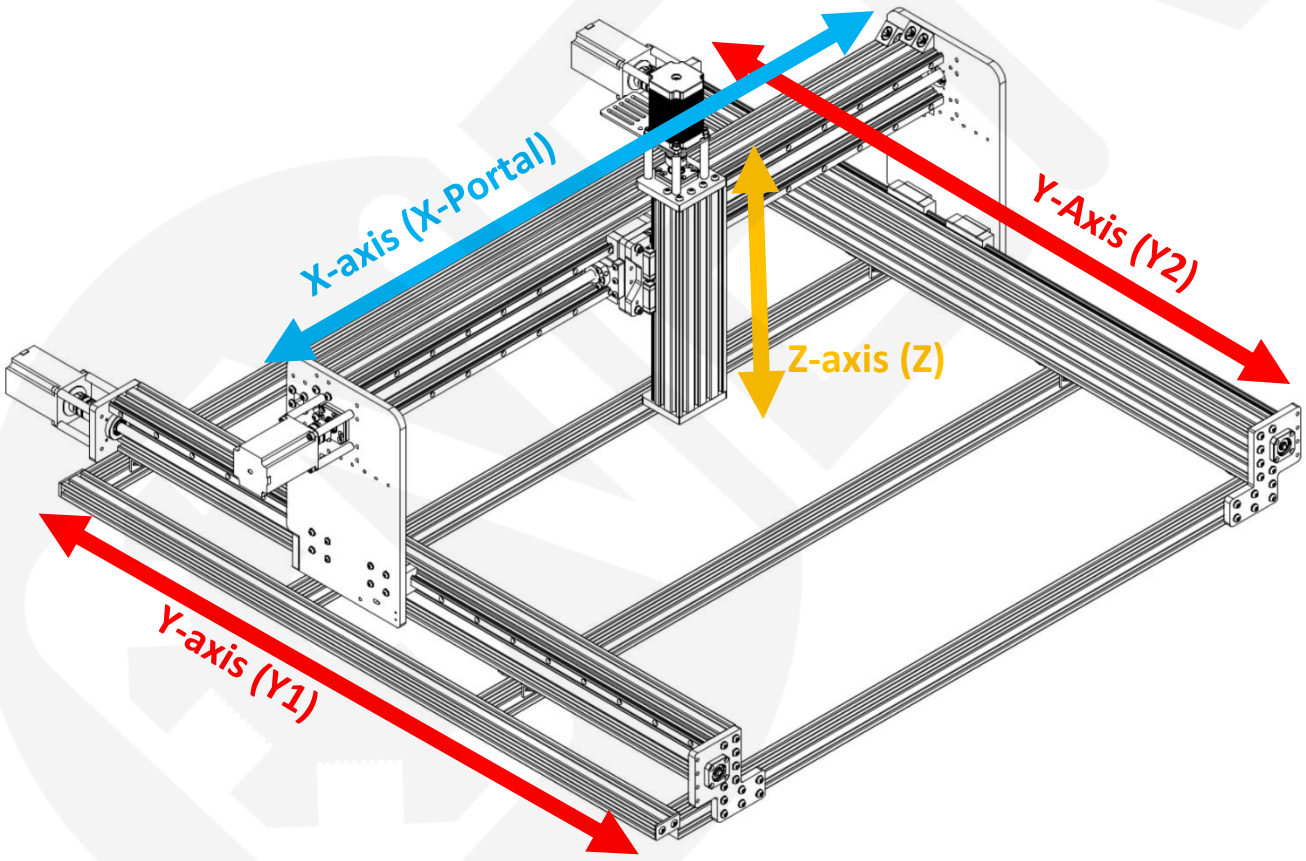
16. The connection of ball screw to fixed bearing is often ground to very minimal tolerances. If the ball screw cannot be inserted into the fixed bearing with light pressure, take a sandpaper with a fine grain size and carefully grind some material from the contact surface. Then remove any residue.

17. The ball screw can be too short or too long after fixing in the fixed bearing to attach the snap ring in the loose bearing. The ball bearing, which is located in the loose bearing, can be easily moved in the loose bearing by 1-2mm in both directions using a nut from a socket wrench set and a rubber hammer.

1.0 Explanation of the basics

1.0.1 Machine axes

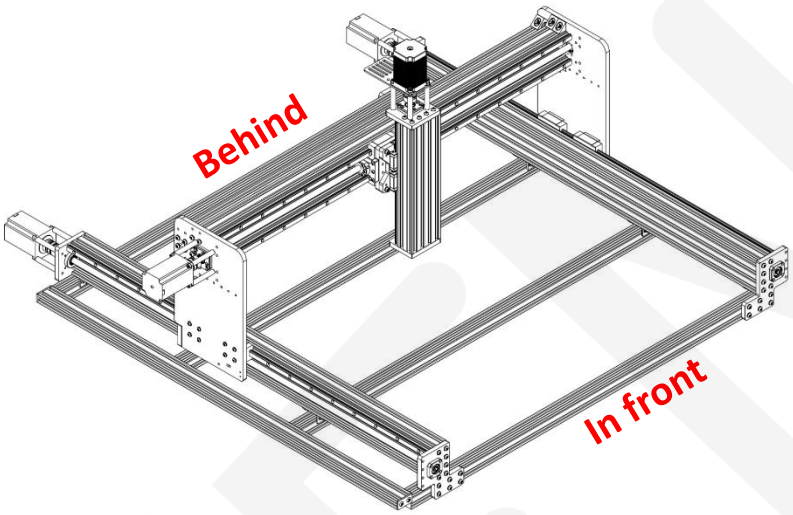
Before we start, we start with the basic structure of a milling machine for reasons of understanding. On the picture we can see the different axes that a classic portal milling machine has. The X-Portal runs on the two Y-axes. The Z-axis runs on the X-Portal. Please memorize these basics, as this basic understanding can be very helpful during assembly.



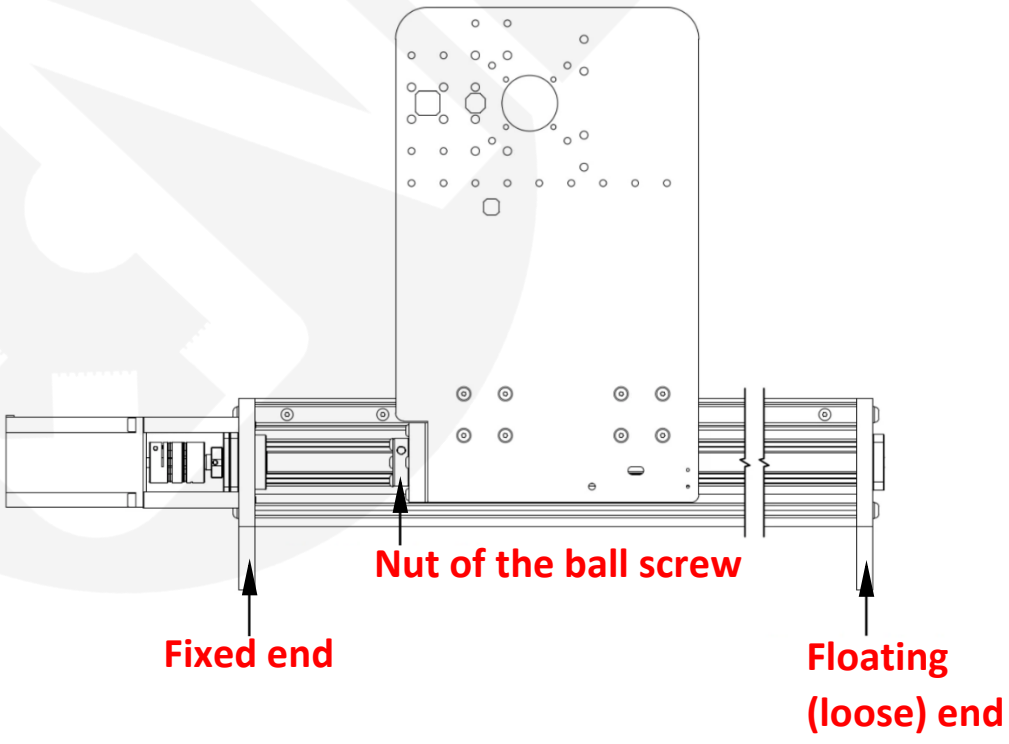
1.0.2 Guidance

For better orientation, it is important to know how the CNC milling machine is aligned.

1. **Front**: The Z-axis is mounted on this side.
2. **Rear**: The stepper motors of the Y-axes are installed on this side.



3. The **nut of the ball screw** is attached to the movable portal plate. The ball screw is fixed via fixed and loose bearings.
4. The **fixed bearing** is mounted at the rear of the Y-axis towards the stepper motor.
5. The floating bearing is mounted at the front.



1.1 Cleaning before assembly

It is recommended to degrease guide rails and block carriages before assembly. The grease, which is located on the guide rails and block carriages when preserved, is called bearing grease. This grease is intended to prevent rusting of the guides during storage and shipping. This fat can be removed by alcohol-based cleaners, e.g. isopropanol.

Attention: Never remove the plastic brackets from the block carriages to avoid losing the ball bearings. During installation, the block carriages are pushed directly from the plastic brackets onto the guide rails.

1.1.1 Cleaning procedure

1. Fill a small bowl with the cleaning solution.
2. Place the block carriages in so that they are completely covered and let it linger for 10 minutes.
3. Move the block carriages back and forth on the plastic brackets.
4. Remove the block trolleys from the cleaning solution and let them dry for at least an hour.
5. Screw the grease nipples onto the block carriages.
6. Take household paper, wet it with the cleaning solution and degrease the guide rails as well.

Perform this cleaning procedure right before assembly. Do not leave any of the cleaned parts for more than a few hours, otherwise rust may occur. After each work step, the greasing of the respective axis is discussed.

If you do not want to assemble the entire machine in one day, grease the mentioned parts before assembly to prevent corrosion.

2.0 Y-axis

It is recommended to read and understand all steps between 2.1 and 2.7 before starting assembly.

The t-slot nuts must be inserted into the channel of the aluminium profile for later steps, and if they are missing, the steps must be dismantled again.

2.1 C-beam and HGR rail

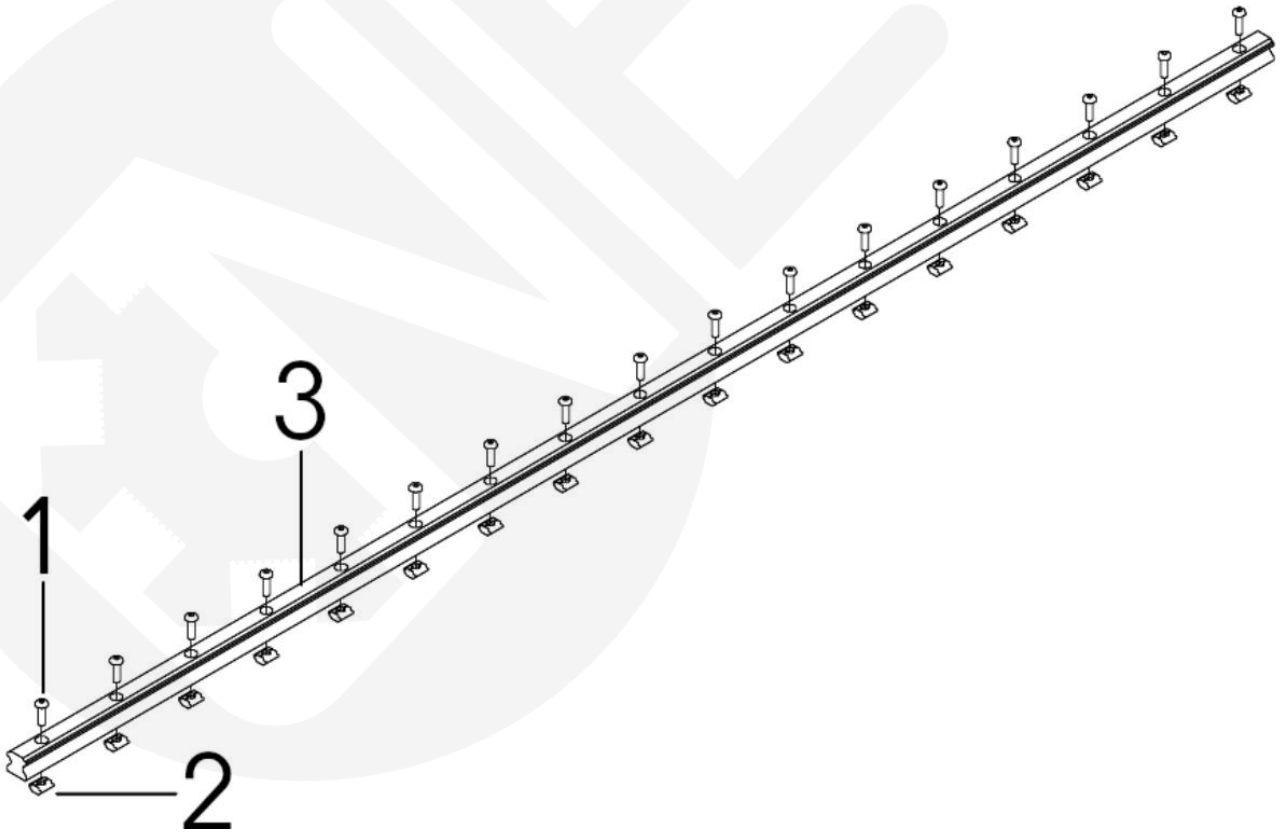
Find the C-Beam profile and the HGR rails used for your Y-axis. If your machine size differs from X to Y, e.g. if you purchased a size of 1000 mm x 1500 mm, the second length, which in this example is 1500 mm, is the Y-axis.

2.1.1 HGR rail preparation

Article Nr.	Description	Number of screws for Y-axis length	
		1000MM	1500MM
1	M4 x 14mm cylinder head bolt with hexagon socket	17	26
2	M4 sliding T-nut	17	26
3	HGR 15 rail	1	1

Insert the M4 x 14mm cylinder head screw through the HGR rail and screw the M4 sliding nut to the other end. Half a turn on a screw is sufficient. These are tightened later.

Please note that the number of M4 x 14mm cylinder head bolts and the M4 sliding nut depends on the machine size.

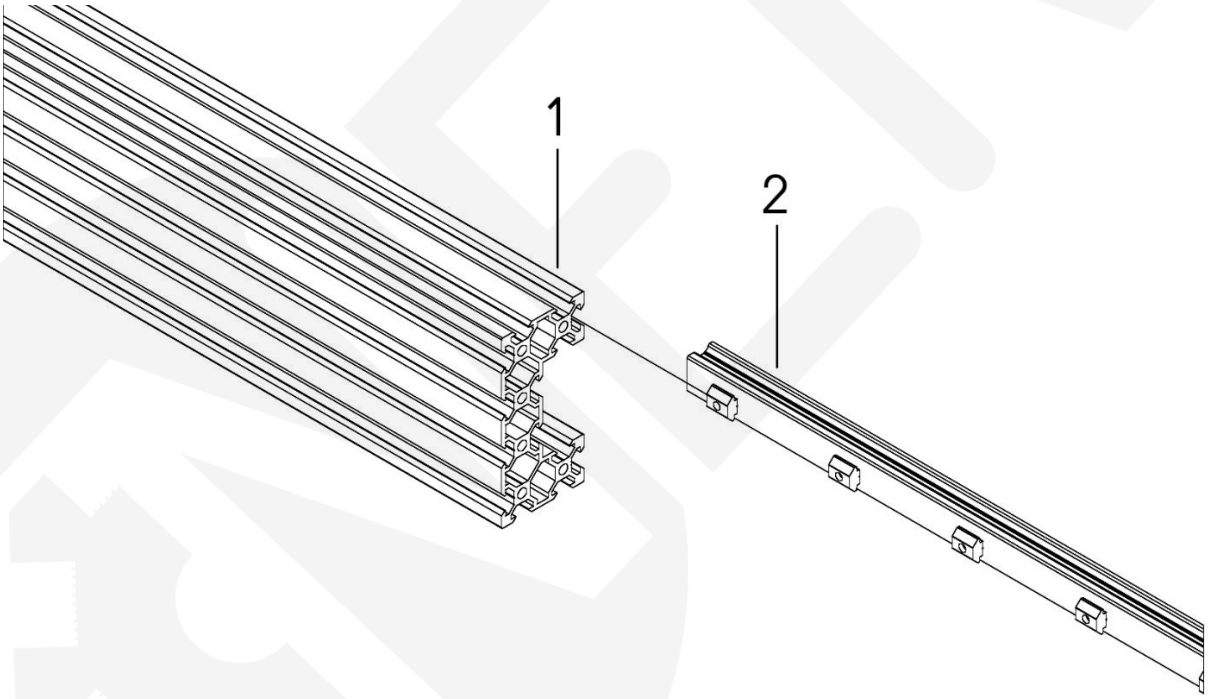


2.1.2 Attaching the HGR rail to the C-beam

Article Nr.	Description	Quantity
1	C-Beam Profile	1
2	HGR 15 rail	1

Slide the HGR 15 rail assembly into the upper channel of the C-Beam profile as shown in the drawing.

Inserting the HGR 15 rails and M4 t-nuts can be difficult. Let another person help you keep the rail straight while pushing the t-nuts into the C-beam.



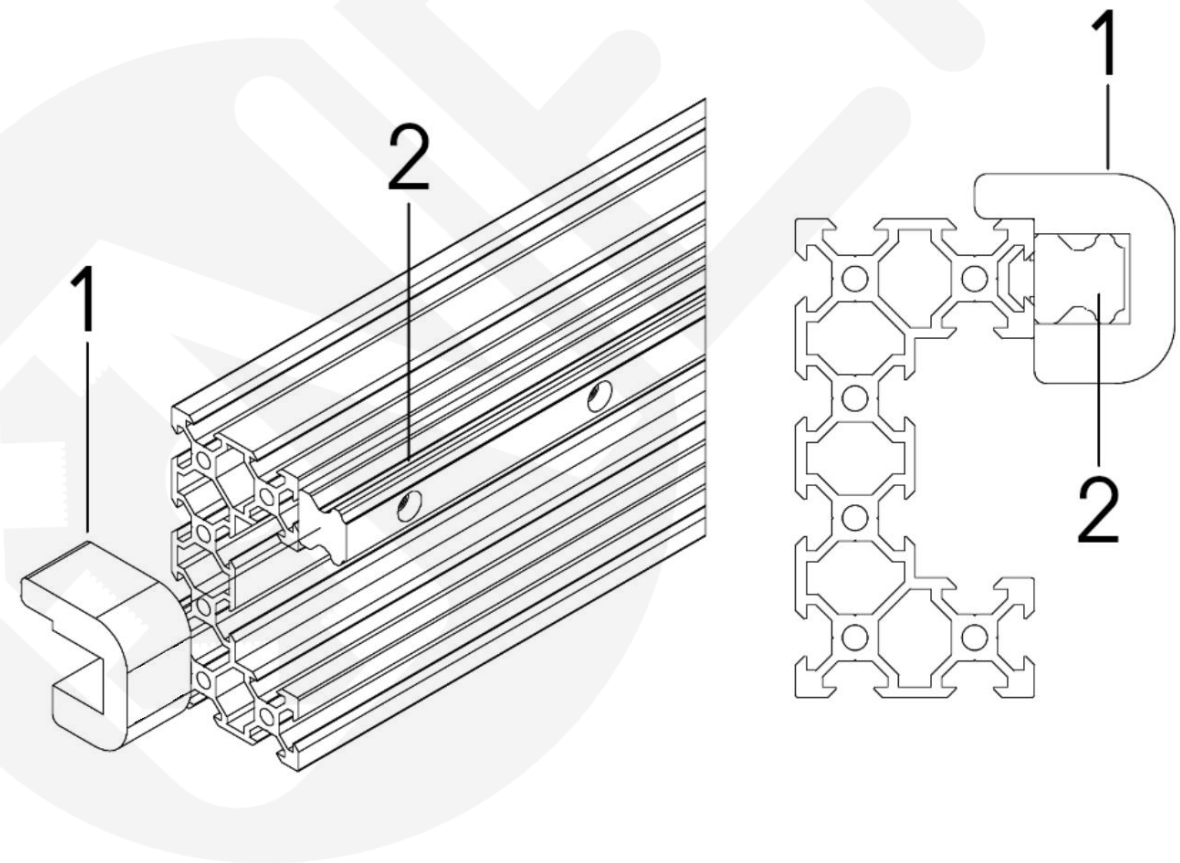
2.1.3 Alignment tool

Article Nr.	Description	Quantity
1	Alignment tool	1
2	HGR 15 rail	1

Slide the alignment tool onto the HGR 15 rail and bring it close to the end of the rail. Tighten the M4 x 14 mm screw pre-assembled in chapter 2.1.1 n.

Repeat the process by moving the alignment tool and tightening all M4 x 14mm hexagon socket bolts one by one.

When tightening the M4 x 14 mm hexagon socket screws, pay attention to the amount of torque. Tightening too hard can damage the screw head or Allen wrench.



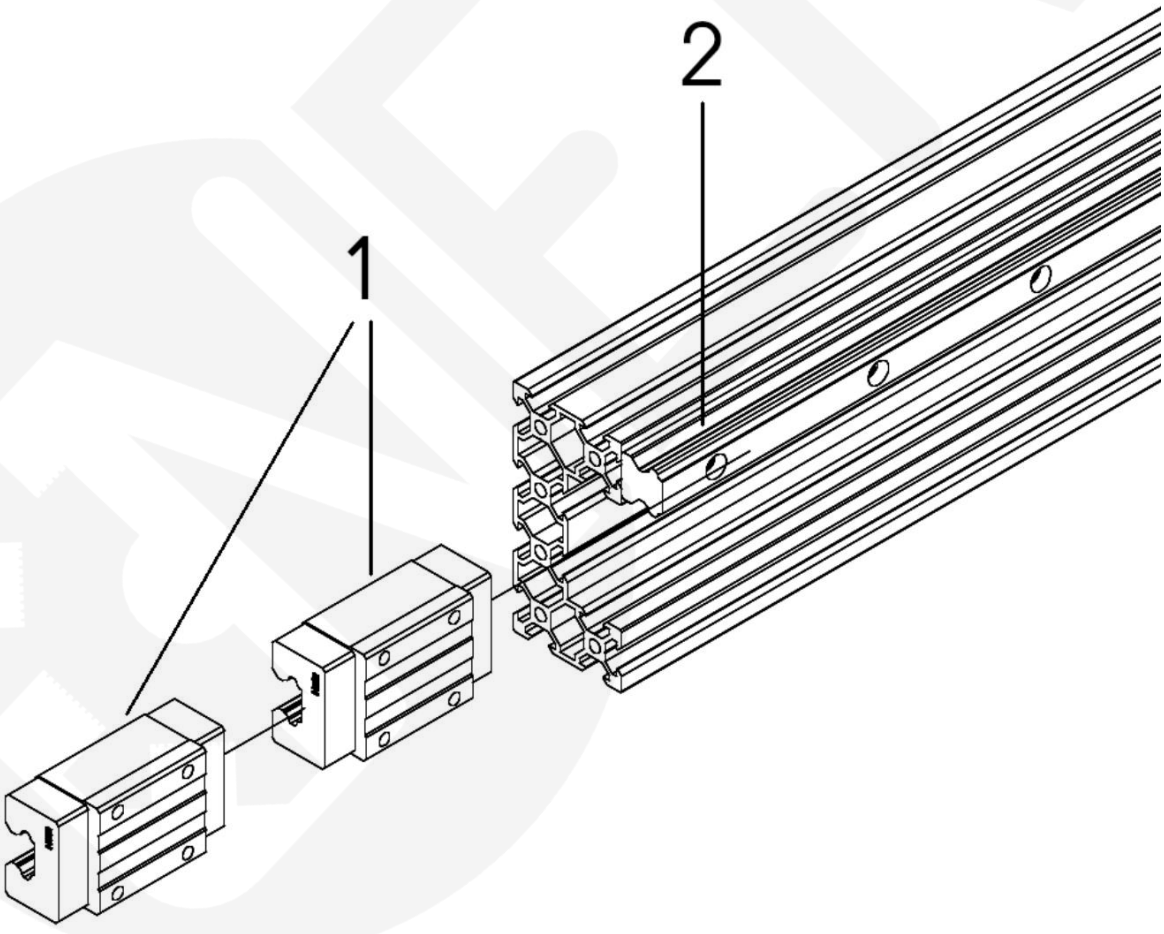
2.1.4 HGH storage blocks

Article Nr.	Description	Quantity
1	HGH 15 bearing blocks	2
2	HGR 15 rail	1

Slide the 2x HGH 15 bearing blocks onto the HGR 15 rail.

To avoid the loss of bearing balls, store the supplied plastic holder on the bearing block. When mounting the bearing block on the rail, use the rail to push the plastic bracket out of the block so that the steel balls are preloaded and in contact with a rail at all times.

Although this is not shown on the drawing, it is best if the grease nipple faces outwards to facilitate access during maintenance.

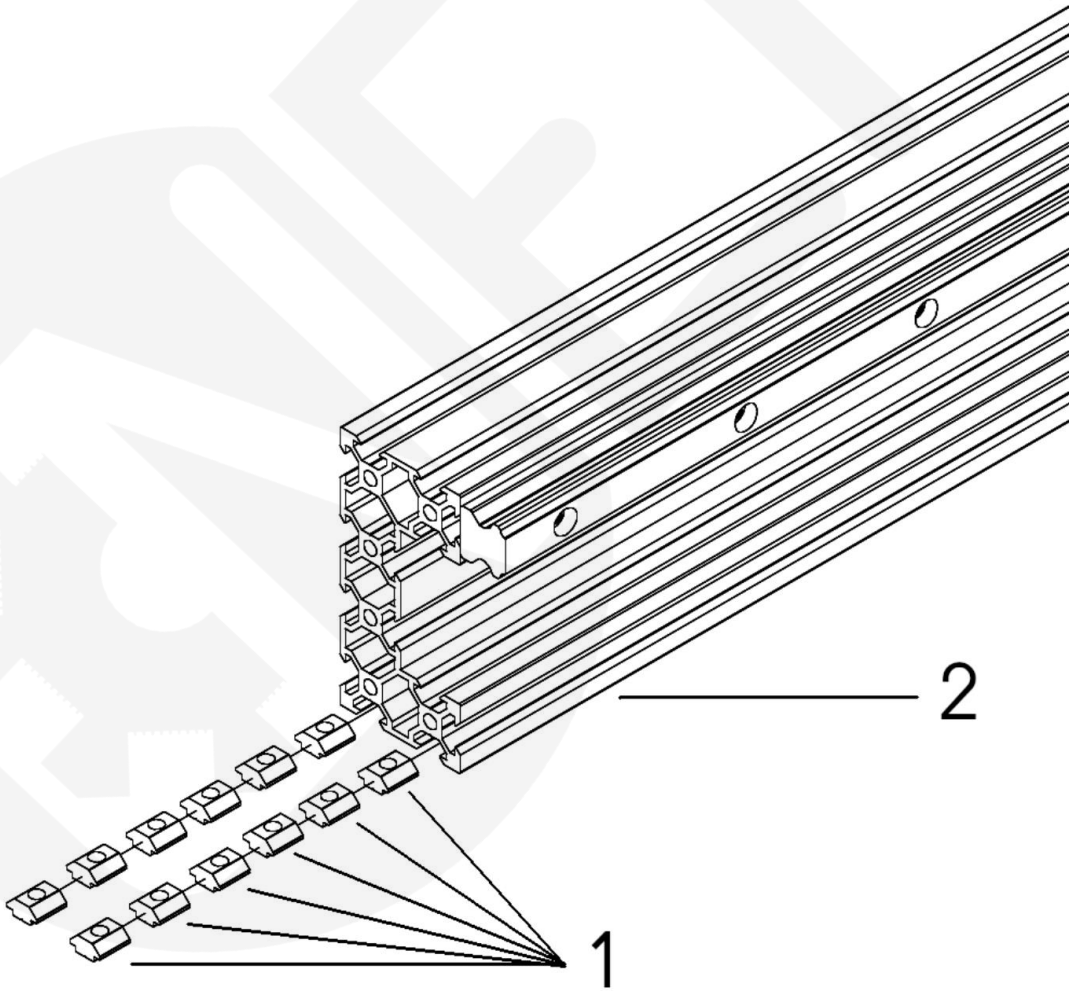


2.1.5 Insertion of T-nuts

Article Nr.	Description	Number of screws for Y-axis length	
		1000MM	1500MM
1	M5 sliding T-nut	12	20
2	C-Beam Profile	1	1

Slide M5 T-nuts into the two lower channels on the 40 mm front side of the C-beam profile, as shown.

Please note that the number of M5 sliding slot stones depends on the machine size taken from the table above.



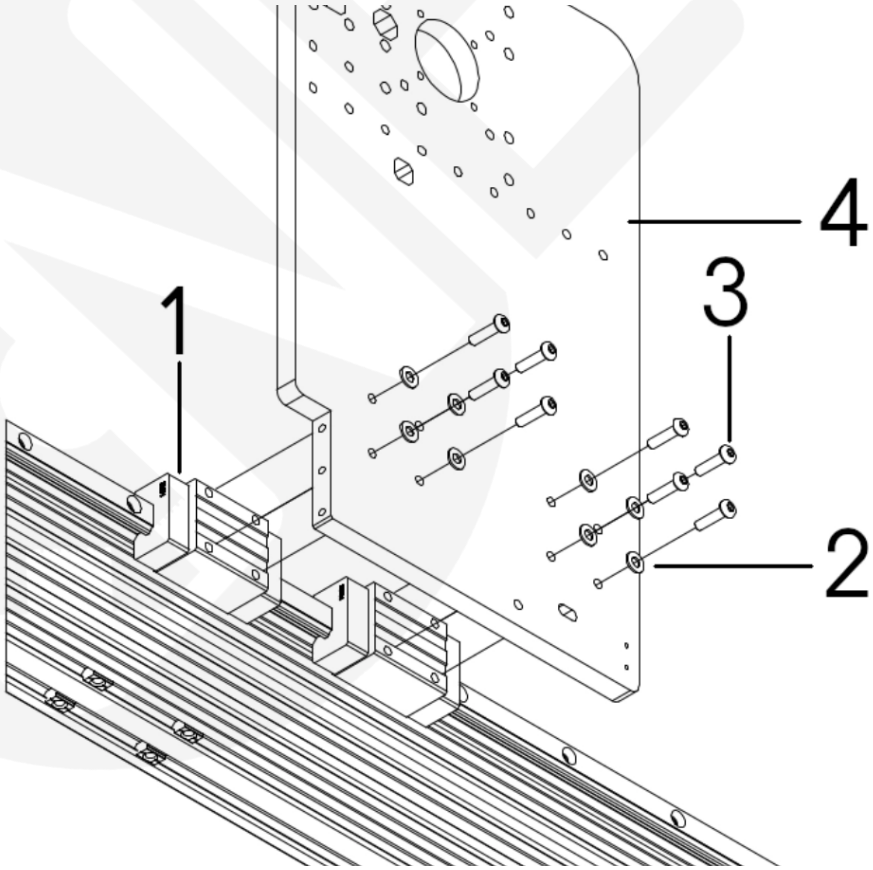
2.2 Y-plate

2.2.1 Y-plate and bearing block

Article Nr.	Description	Quantity
1	HGH 15 bearing blocks	2
2	Precision washer M4	16
3	M4 x 16mm screw with flat head	16
4	Y-plate left	1

Insert the M4x 16mm flat head bolts through the M4 precision washer and Y-plate on the left and screw them onto the HGH bearing blocks as shown in the figure.

When attaching the screws to each bearing, start with the screw in the upper left corner and tighten this screw by one turn. Now tighten the screw at the bottom left by one turn. Continue like this, always crosswise, until all screws are fixed.



2.3 Ball screw

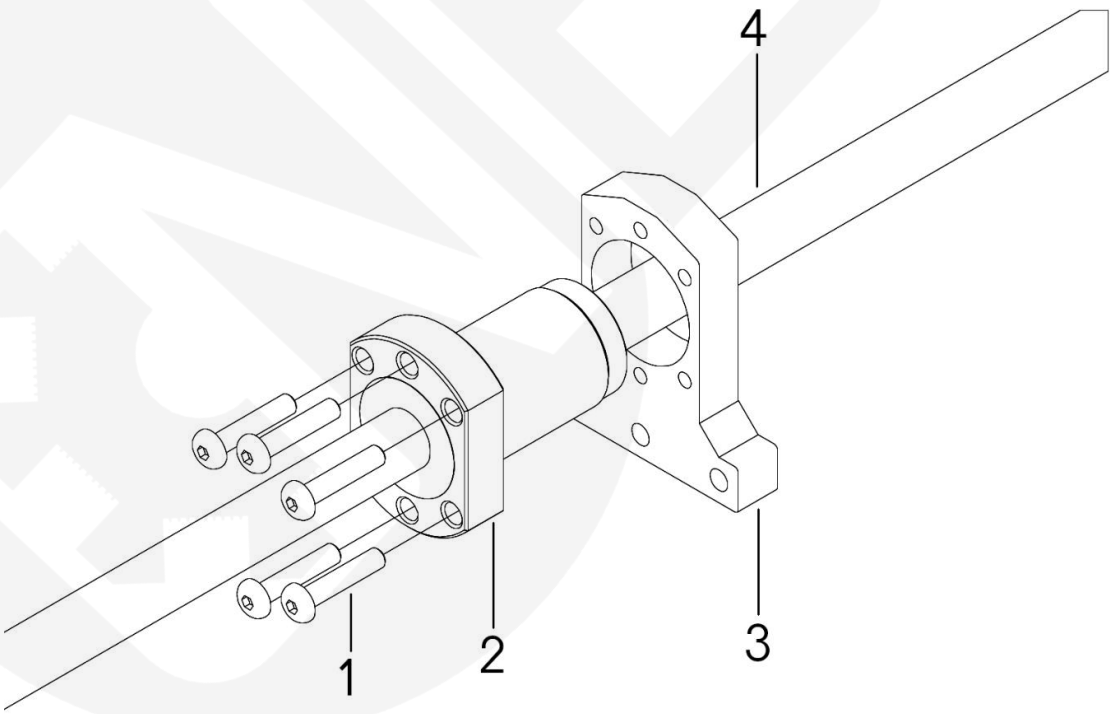
2.3.1 Ball nut and ball nut plate

Article Nr.	Description	Quantity
1	M4 x 20mm screw with flat head	6
2	Ballscrew-nut	1
3	Ball-nut adapter plate	1
4	Ball screw 1210	1

Place the ball nut adapter plate on the ball screw.

Attach the ball nut adapter bar to the ball screw nut with 6x M4 x 20mm flat head screws.

Under no circumstances remove the ball screw nut from the ball screw. The ball nut ball bearing mechanism is held only by the ball screw. If you remove the ball nut from the ball screw, the bearings will fall out and void the warranty.

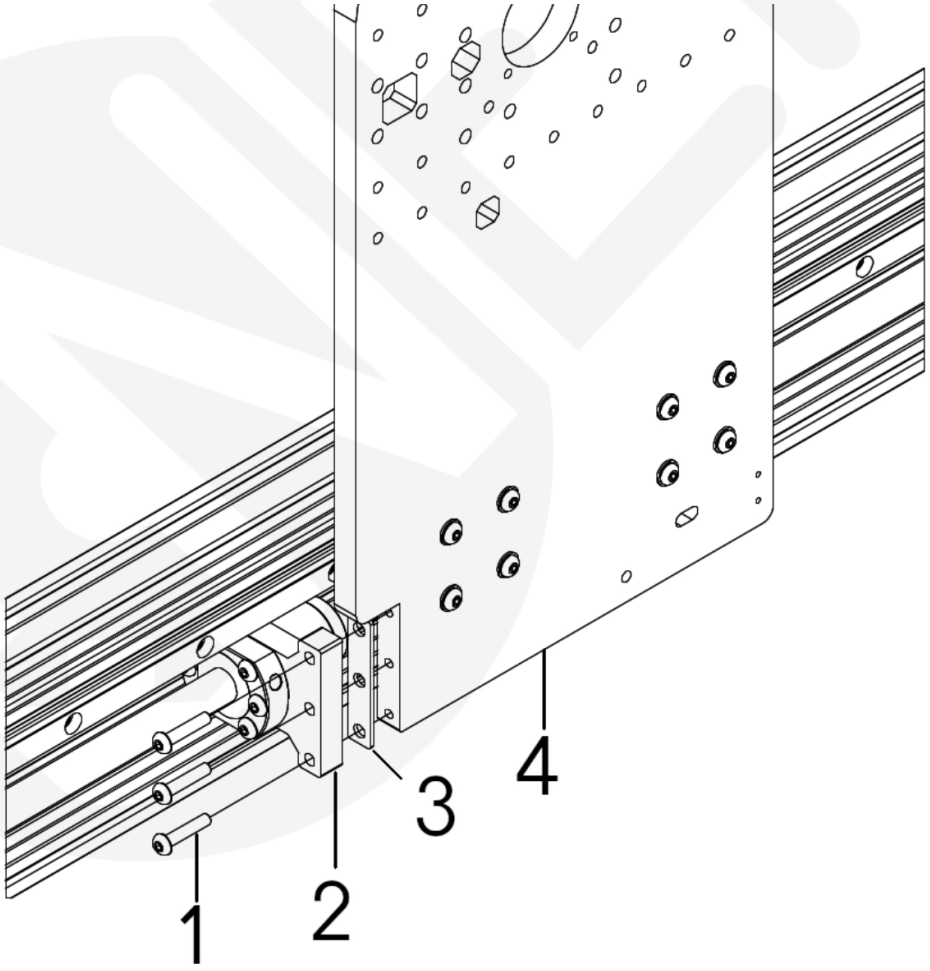


2.3.2 Ball nut plate and Y-plate

Article Nr.	Description	Quantity
1	M4 x 20mm screw with flat head	3
2	Ball nut adapter latte	1
3	Gasket 50 x 10mm	1
4	Y-plate left	1

Tighten the ball nut adapter plate on the left Y-plate with 3 x M4x 20 mm lens screws. Insert the gasket 50x10mm between the ball nut plate/bracket and the Y-plate on the left. Tighten the screws completely and then twist them out by 2 turns.

Do not leave the M4x 20mm lens window screws fully tightened. The final tightening takes place in the chapter "Aligning".



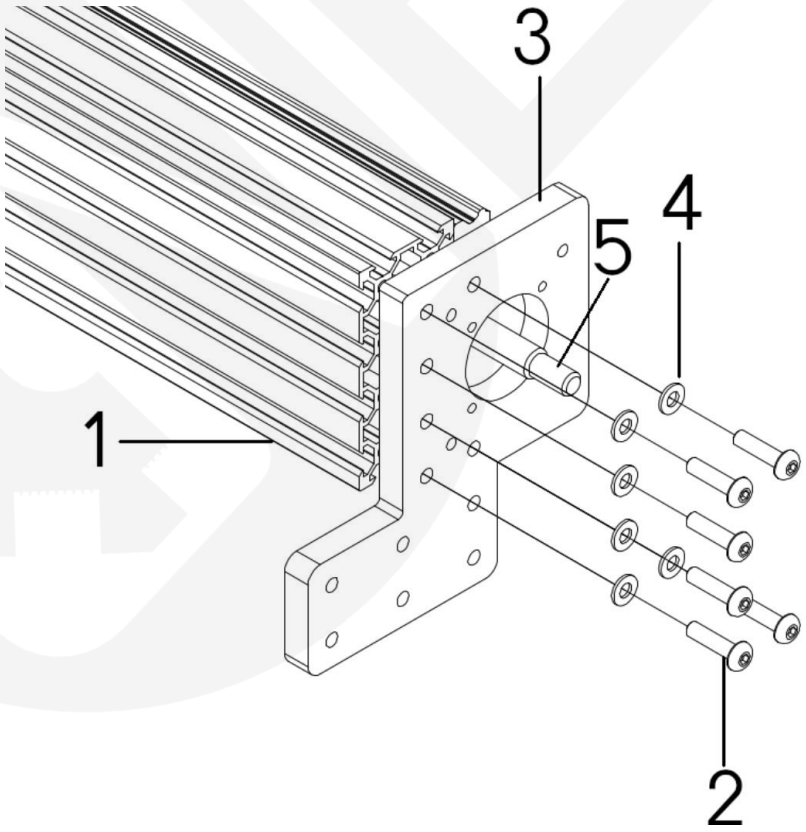
2.4 End plates

2.4.1 End plate (fixed end)

Article Nr.	Description	Quantity
1	C-Beam	1
2	M5 x 20mm flat head screw	6
3	Y-End Plate - Fixed End	1
4	Precision washer 10x5x1	6
5	Ball screw 1210	1

Insert 6x M5 x 20mm hexagon socket screws through the precision washer 10x5x1. Attach the Y-End Plate - Fixed End to the C-Beam with the screws.

Align the C-beam with the Y-end plate - fixed end at right angles . As a result, your drive system will have fewer parts that need to be aligned in chapter 2.6.



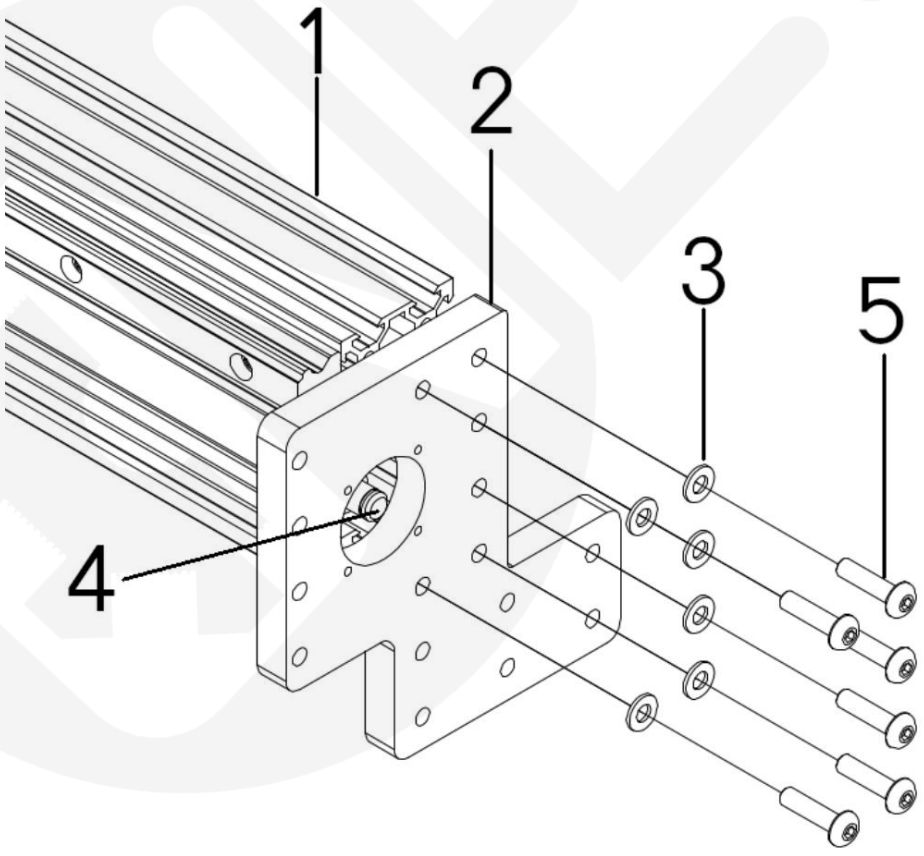
2.4.2 End plate (loose end)

Article Nr.	Description	Quantity
1	C-Beam	1
2	Y-end plate - loose end	1
3	Precision washer 10x5x1	6
4	Ball screw 1210	1
5	M5 x 20mm flat head screw	6

Insert 6x M5 x 20mm hexagon socket screws through the precision disc 10x5x1.

Attach the Y-end plate - floating end to the C-beam as shown.

Align the C-beam with the Y-end plate - loose end at right angles. As a result, your drive system will have fewer parts that need to be aligned in chapter 2.6.



2.5 FK and FF camps

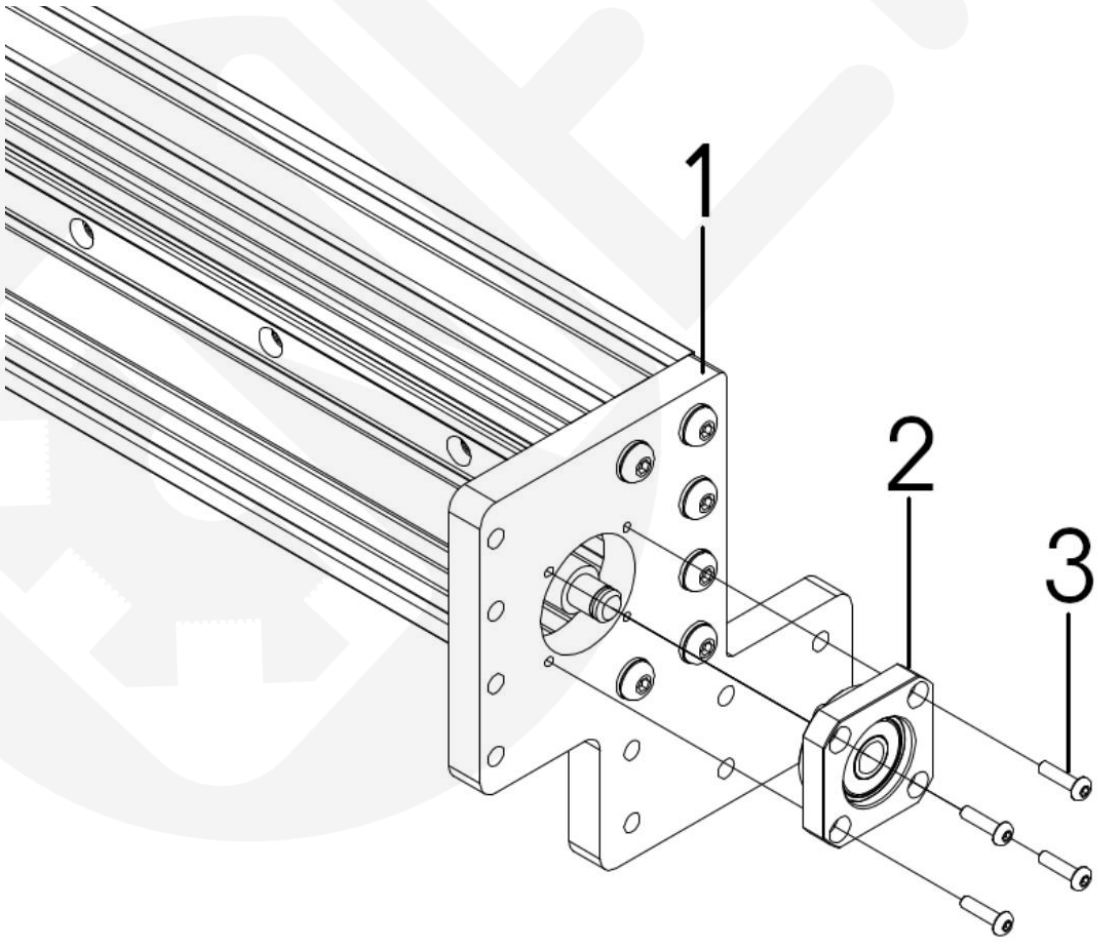
2.5.1 FF bearings (loose bearings)

Article Nr.	Description	Quantity
1	Y-end plate - loose end	1
2	FF bearing block (loose bearing)	1
3	M3 x 12 mm flat head screw	4

Pass the FF bearing block (loose bearing) through the ball screw.

Attach the FF bearing block to the Y-end plate with 4x M3 x 12mm flat head screws.

When tightening the screws, tighten all screws completely, then loosen them by 2 turns. This part is fully tightened in chapter 2.7.



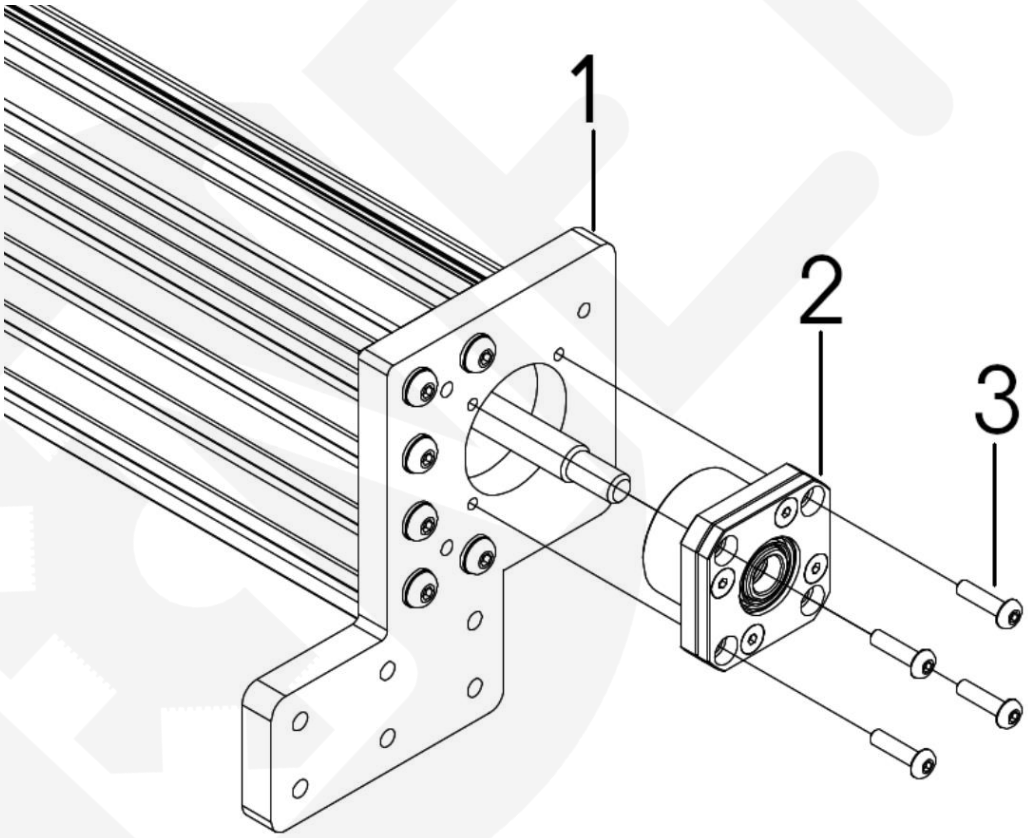
2.5.2 FK warehouse (fixed bearings)

Article Nr.	Description	Quantity
1	Y-End Plate - Fixed End	1
2	FK bearing block (fixed bearing)	1
3	M4 x 16 mm flat head screw	4

Pass the FK bearing block (fixed bearing) through the ball screw.

Attach the FK bearing block to the Y-end plate with 4x M4 x 16mm flat head screws.

When tightening the screws, tighten all screws completely, then loosen them by 2 turns. This part is fully tightened in chapter 2.7.



2.5.3 Locking nut and diaphragm coupling

Article Nr.	Description	Quantity
1	FK storage block (fixed bearing)	1
2	FK locking nut	1

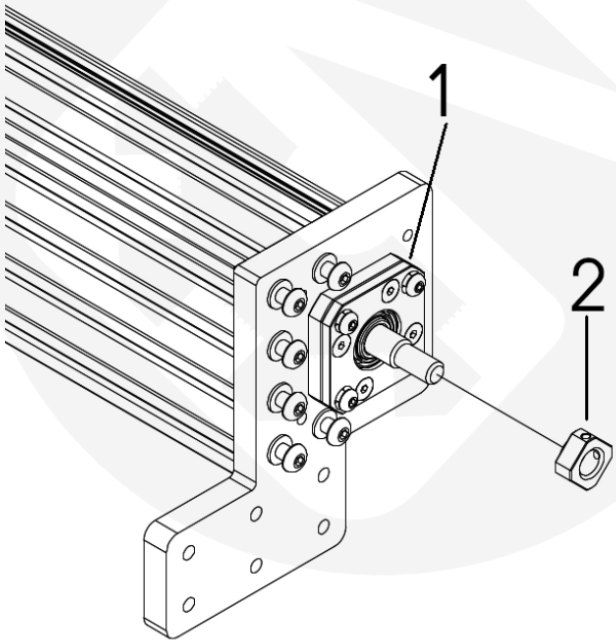
Manually screw the FK lock nut onto the end of the ball screw, which is located at the fixed end.

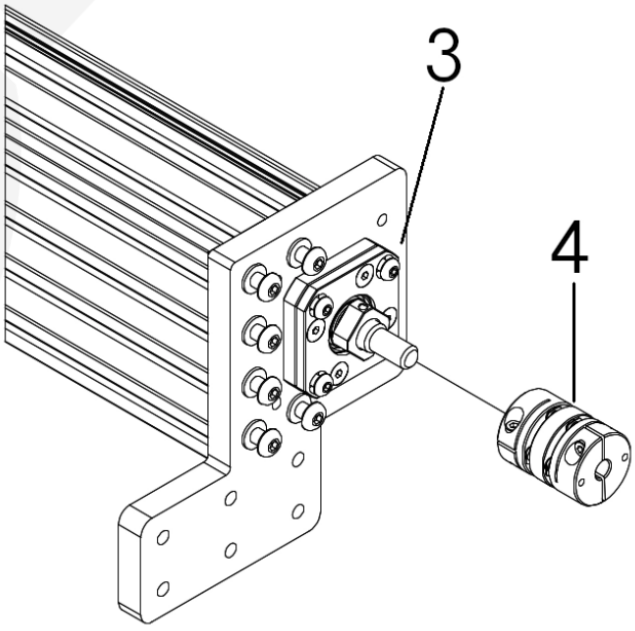
Tighten the grub screw on the FK lock nut to secure the FK lock nut.

Article Nr.	Description	Quantity
3	FK storage block (fixed bearing)	1
4	Diaphragm coupling	1

Place the diaphragm coupling on the fixed end of the ball screw. Tighten the grub screw on the diaphragm coupling to secure it to the ball screw.

Screws are very sensitive to tightening torque. Avoid tightening them too tightly, otherwise you could destroy the screw head.





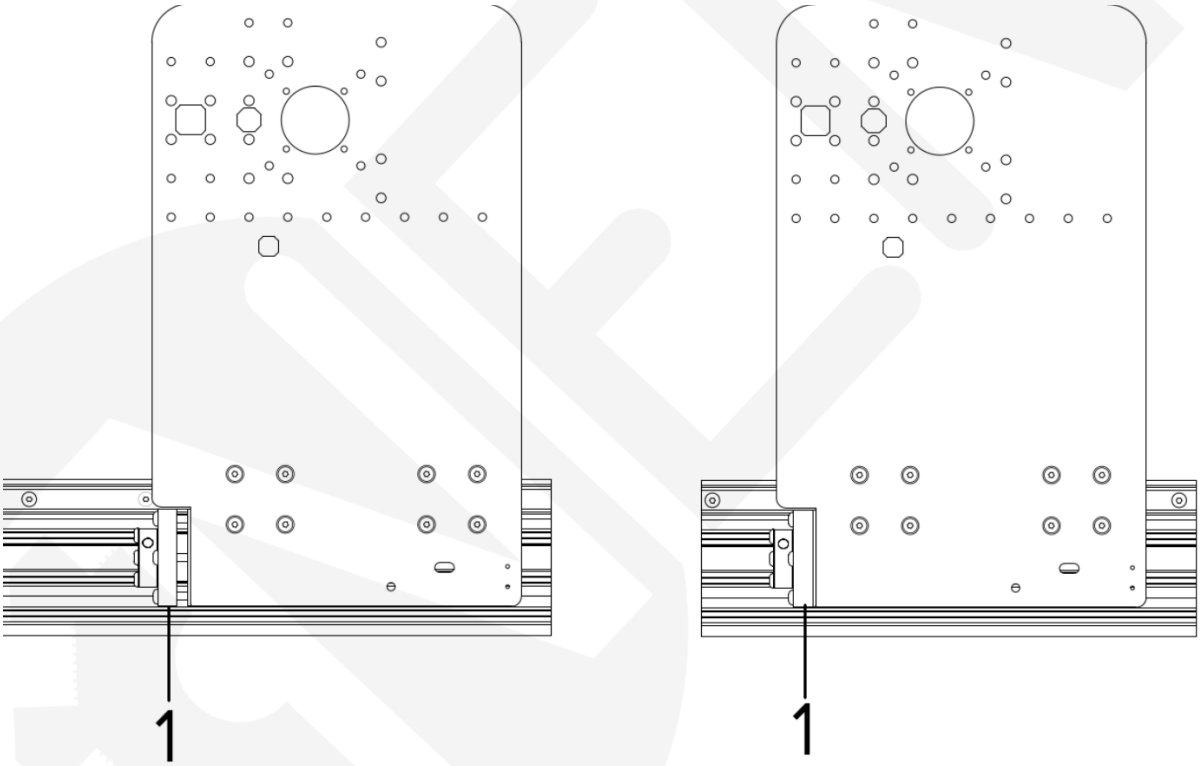
2.6 Aligning

2.6.1 Tightening the ball nut adapter plate

Article Nr.	Description	Quantity
1	Ball nut y-assembly	1

Tighten the screws on the ball nut plate/bracket as shown in the figure.

Avoid tightening too tightly. The seal has a minimum of flexibility to compensate for misalignment of the system. Tightening too much means your system is less flexible to adapt to a misalignment.

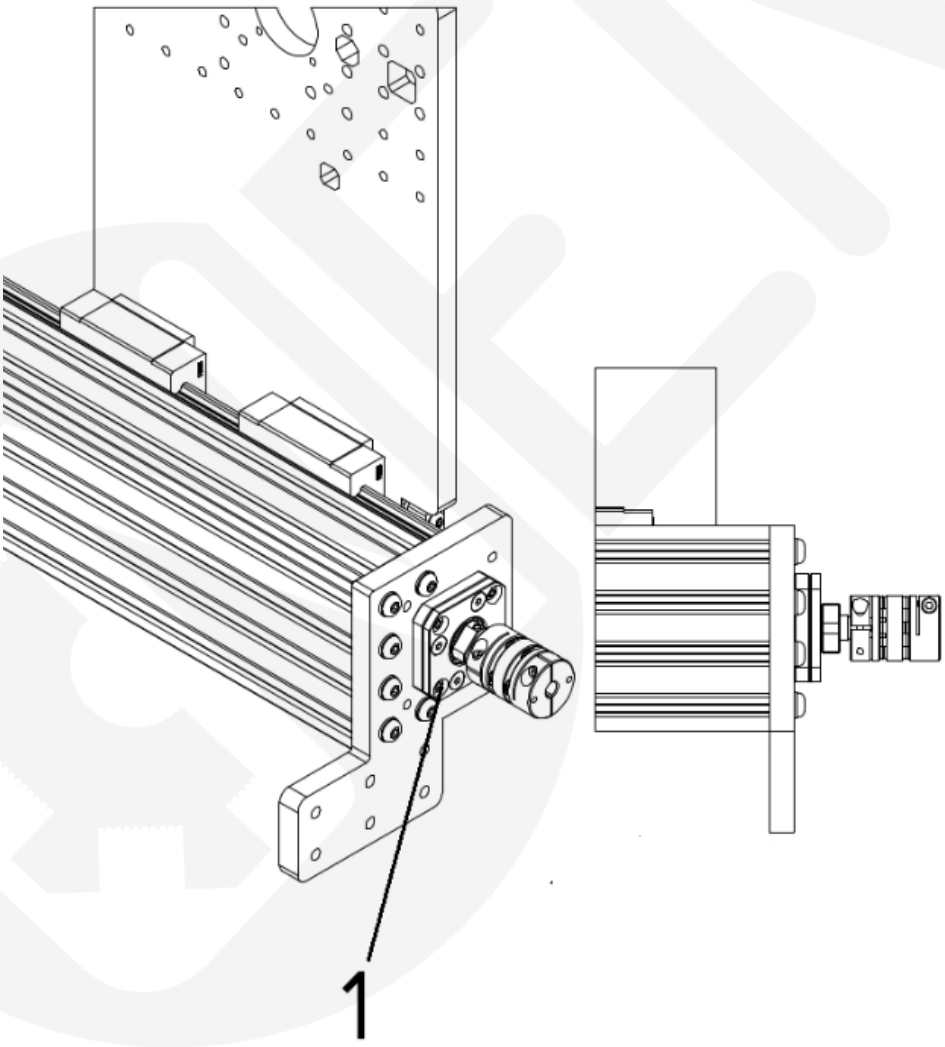


2.6.2 Fixed bearings

Article Nr.	Description	Quantity
1	M4 x 16mm screw with flat head (pre-assembled)	4

Slide the Y-plate to the left toward the fixed end of the actuator, as shown in the figure below.

Bring the Y-plate as close as possible to the fixed storage and then tighten the 4x M4x 16mm lens screws.

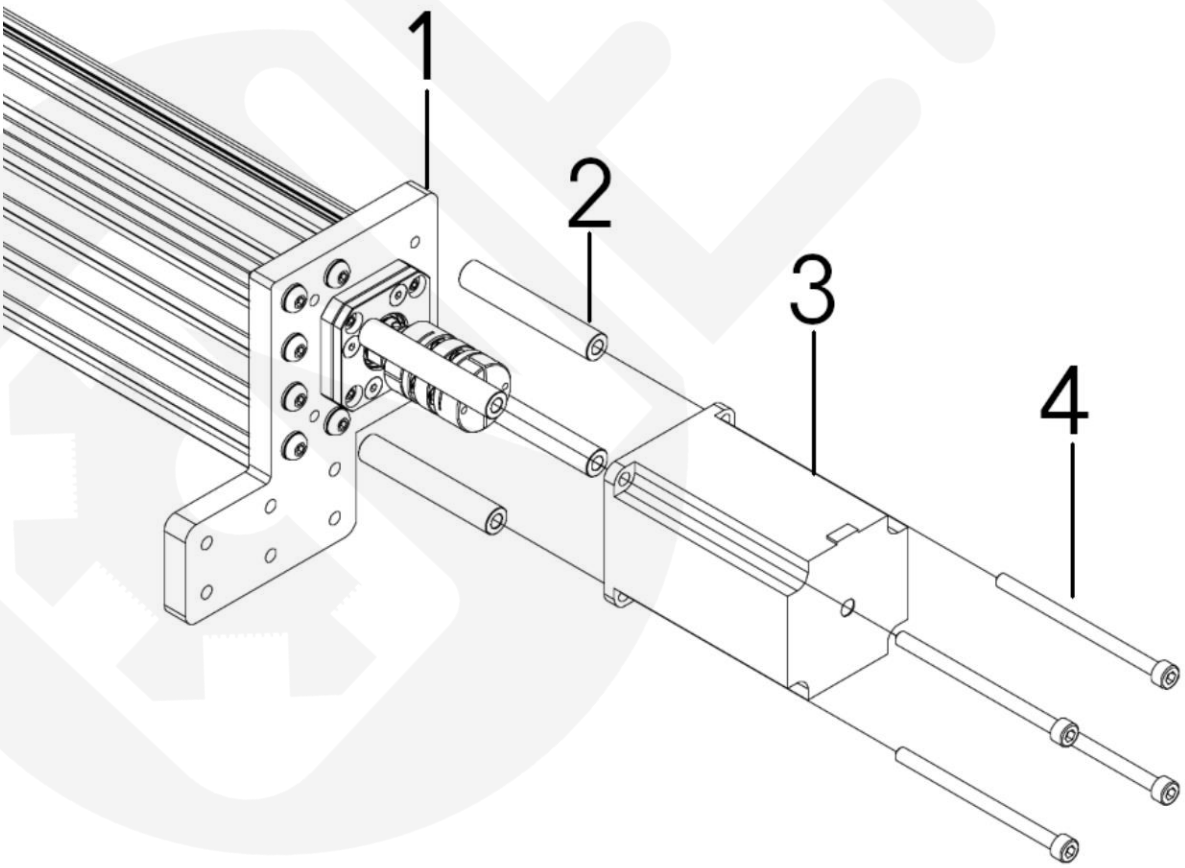


2.6.3 Stepper motor

Article Nr.	Description	Quantity
1	Y-End Plate - Fixed End	1
2	Precision spacers - 60mm	4
3	Stepper motor	1
4	M5 x 75mm cylinder head bolt	4

First, insert the M5 x 75 mm cylinder head bolts through the mounting holes of the stepper motor and also through the 60 mm precision spacers, and then attach them to the Y-end plate - fixed end after aligning the motor shaft inside the diaphragm coupling.

Do not tighten the grub screw on the diaphragm coupling yet.

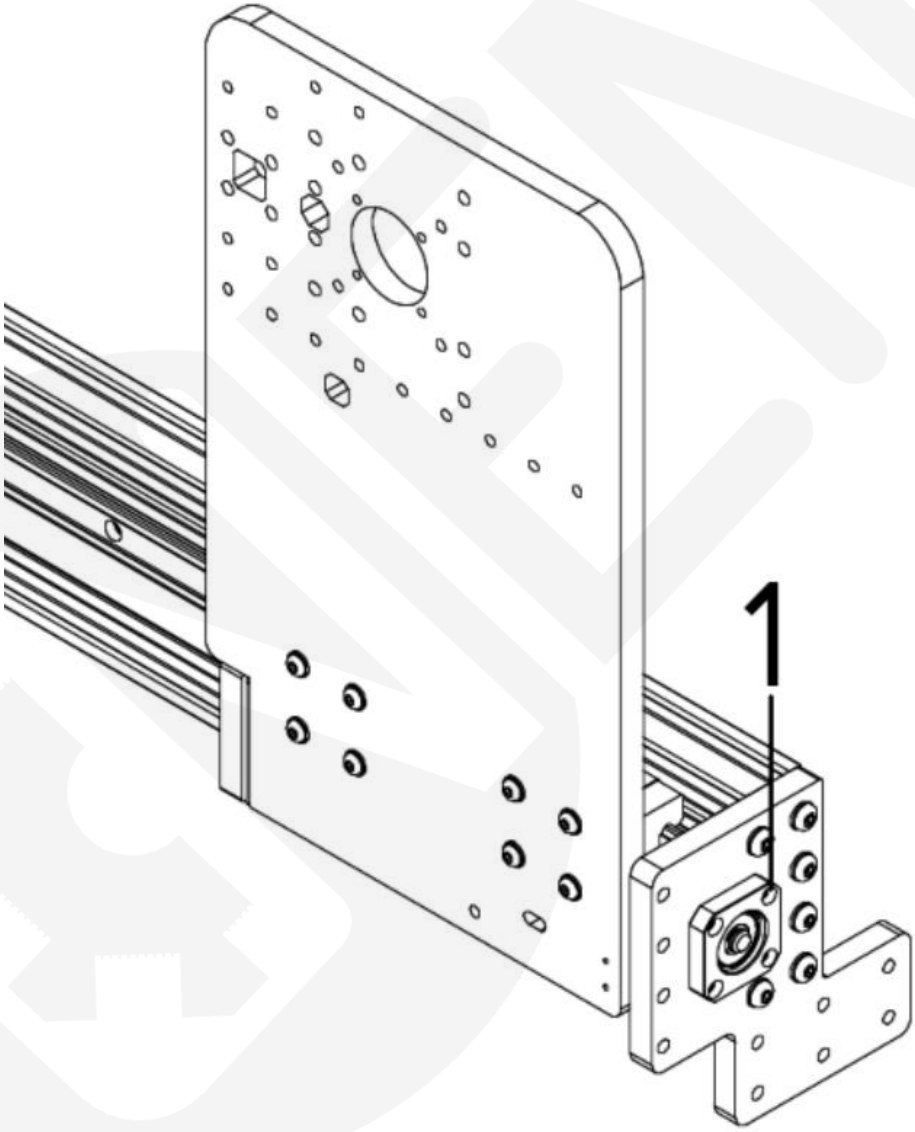


2.6.4 Loose bearing

Article Nr.	Description	Quantity
1	M3 x 12 mm flat head screw (pre-assembled)	4

Slide the Y-plate to the right toward the loose end of the actuator as shown.

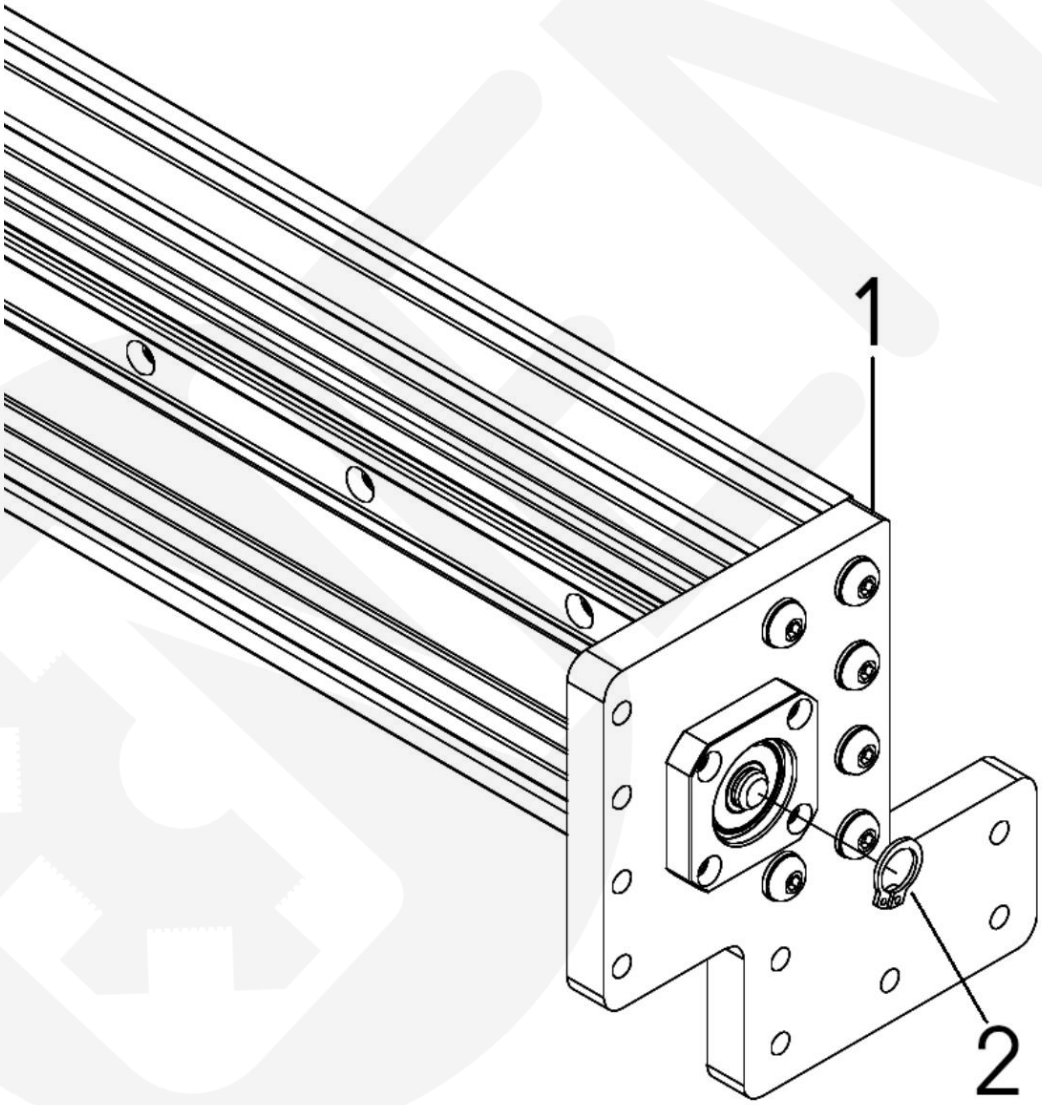
Bring the Y-plate as close as possible to the loose bearing, then tighten the 4x M3x12 mm lens screws.



2.6.5 Retaining ring

Article Nr.	Description	Quantity
1	Y-End Plate - Fixed End	1
2	Retaining ring	1

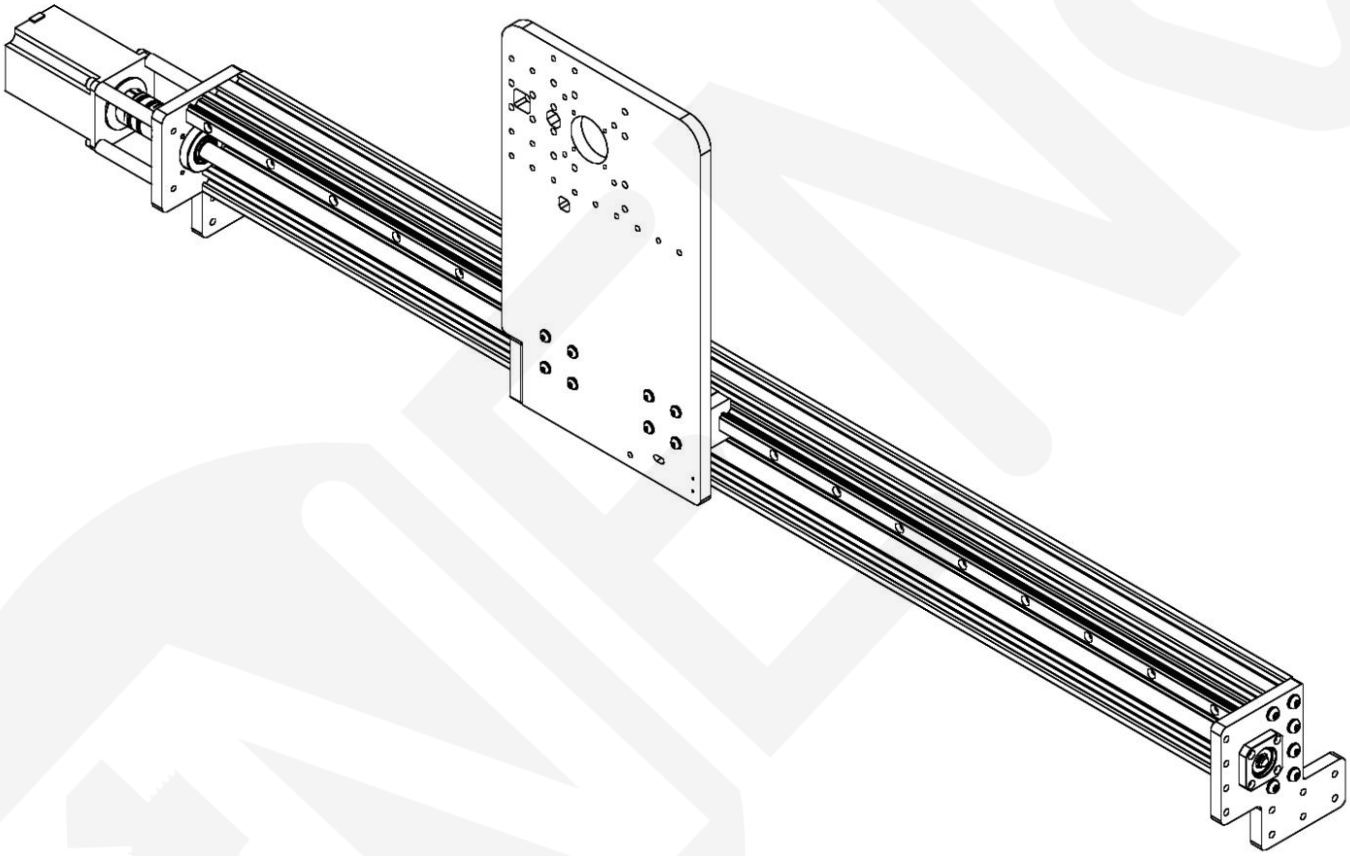
Place the retaining ring on the loose end of the ball screw with a retaining ring pliers as shown.



2.7 Axis complete

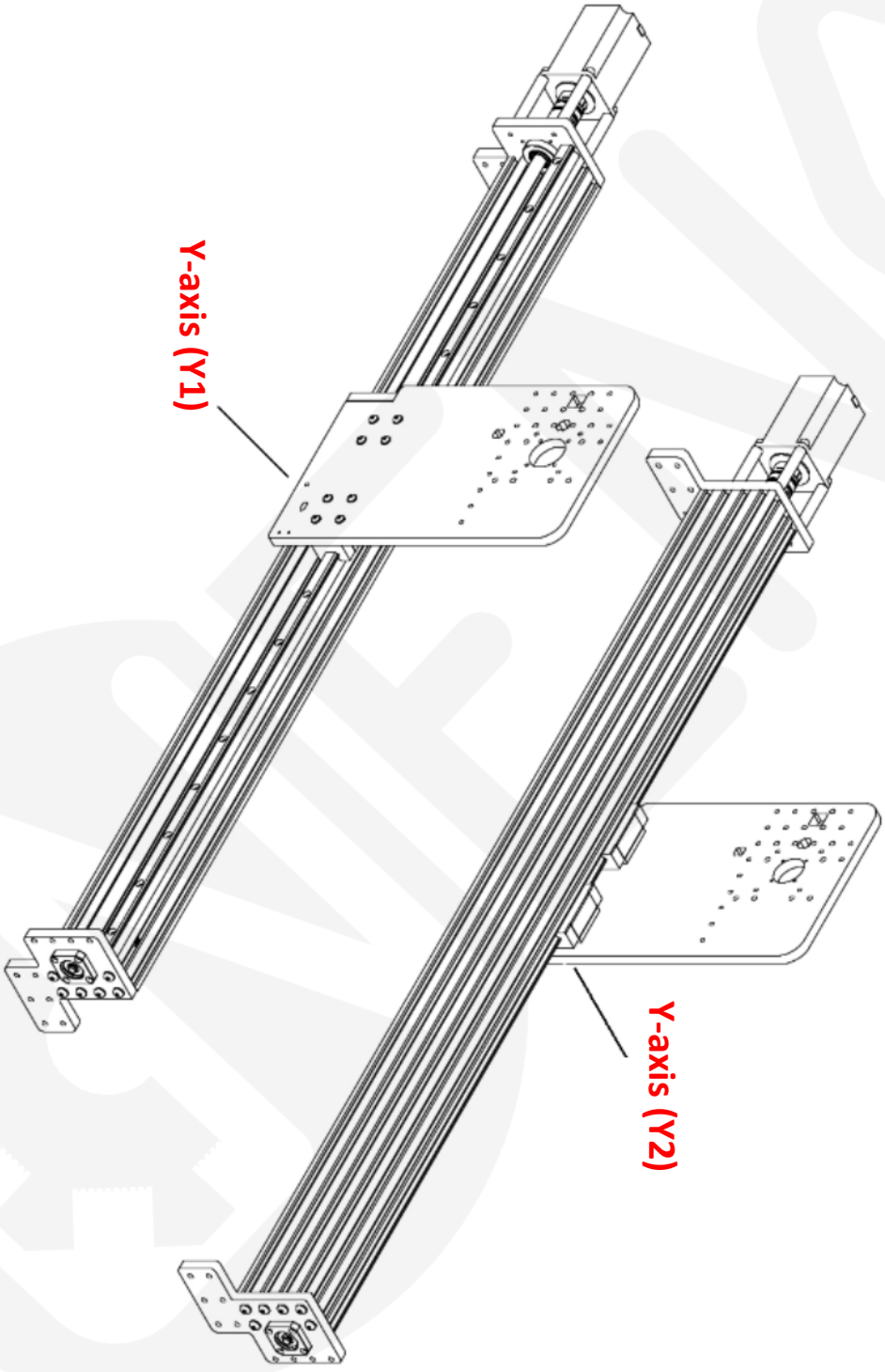
2.7.1 Completed Y-axis

Repeat this chapter to assemble the other Y-axis. You should have two Y-axes that are exactly mirrored to each other.



2x (mirrored)

2.7.2 Completed Y1 and Y2 axes



2.8 Lubrication of the Y1 and Y2 axes

2.8.1 HGH bearing blocks

Place the axles on the side and locate the grease nipple an the HGH bearing blocks. As we have already recommended, the grease nipples should be directed outwards. Connect the grease gun to the grease nipple and press the grease in. The grease should emerge from the bearing. Repeat this procedure for all HGH storage blocks.

2.8.2 Ball screw

Place the axles on their side and find the grease nipple on the ball nut. Attach the grease gun to the grease nipple and press in the grease. Some grease will come out of the back of the ball screw wiper seal.

Move the axes back and forth several times by hand. This lubricates the rail and circulates the grease on all bearings and ball screws, ensuring uniform lubrication.

3.0 Substructure

It is recommended to read all chapters 3.1-3.5 before starting the assembly.

3.1 T-nuts

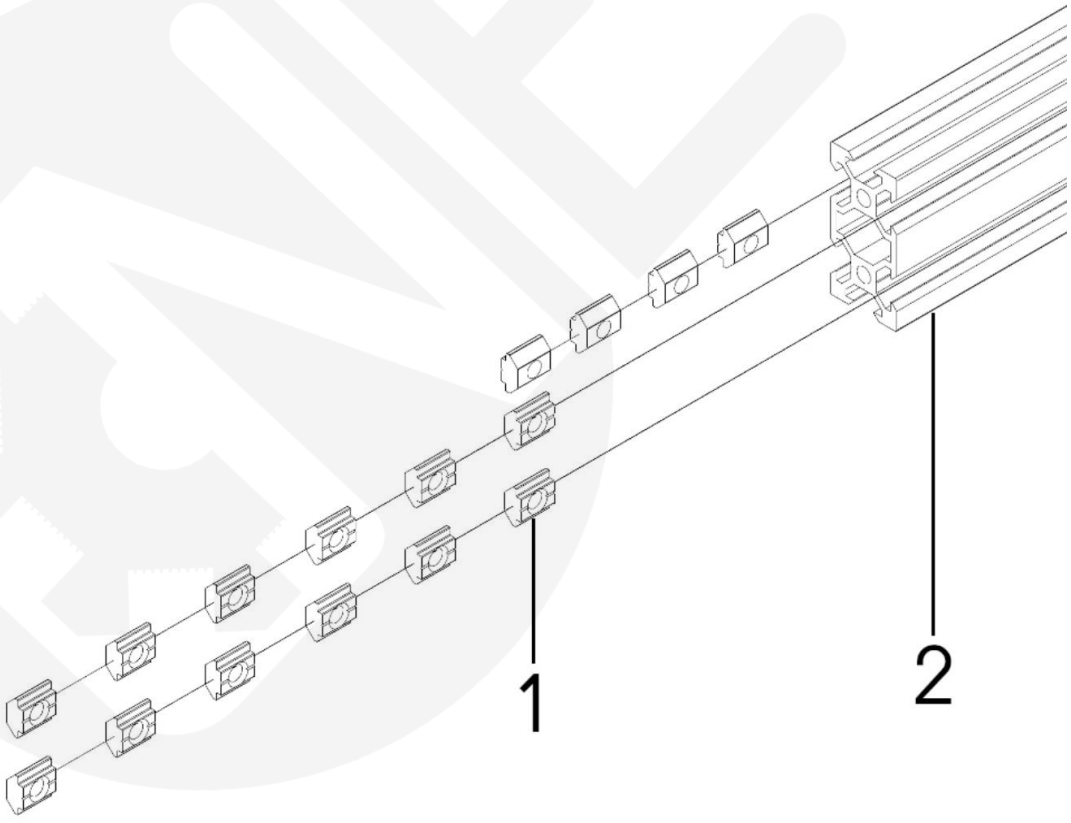
3.1.1 Insertion of T-nuts - front and rear profile

Article Nr.	Description	Quantity
1	M5 sliding T-nut	16
2	2040 Profile	1

2x

Slide the M5 sliding T-nuts into the 2040 profile as shown. 6 in each channel of one side on the wide side. 4 in the upper channel of the other side.

Repeat the process for a seconds 2040 profile.



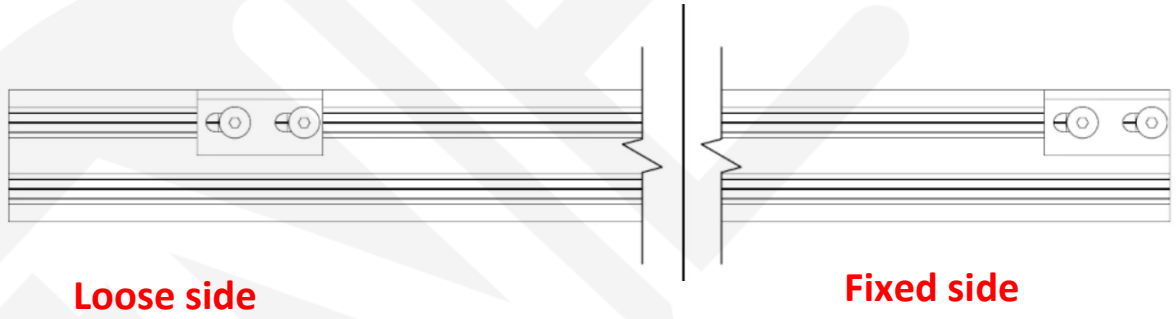
3.1.2 Mounting brackets - front and rear profile

Article Nr.	Description	Quantity
1	2040 Profile	1
2	M5 sliding T nut	2
3	L2 angle bracket	1
4	M5 x 8mm flat head screw	2

2x

On the side where we inserted 4x M5 slot stones in the previous step, attach the L2 bracket with 2x M5 x 8mm flat head screws. Note that the holes in the L2 bracket are in different positions. The holes closer to the outer edge of the bracket are the side that attaches to the profile.
Do not fully tighten the M5 x 8mm head bolts on the loose side. The position of the brackets on the loose side is later determined by the length of the X-axis platform.

Repeat the assembly on the same surface of the 2040 profile, but on the opposite side, as shown below.



As in the figure above, the brackets on the fixed side are mounted and tightened flush with the end of the 2040 profiles. after you built the 2040 profile with 2 brackets, repeat the Mirror Inverted operation to build the second 2040 profile.

Leave these profiles aside, we will use them soon.
Check the illustration in chapter 3.1.5, you should now have the two outer profiles.

3.1.3 Insertion of T-nuts - middle sections

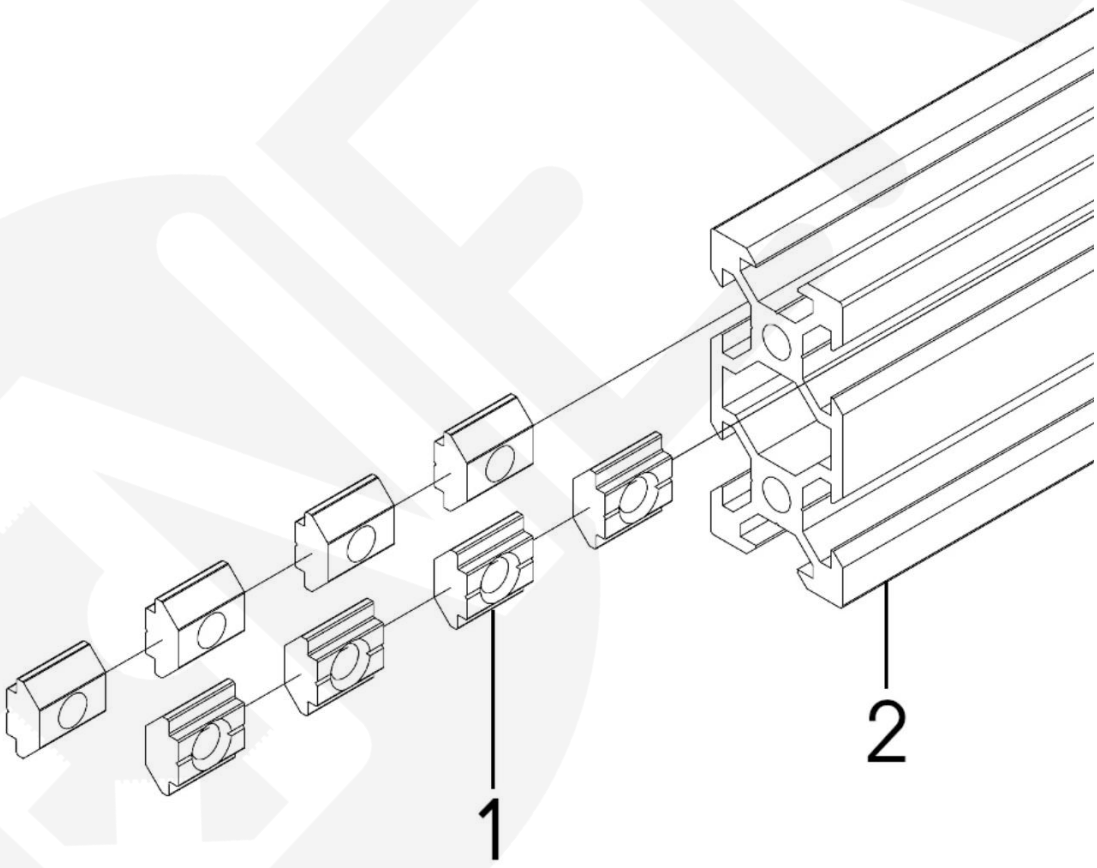
Article Nr.	Description	Quantity
1	M5 sliding T nut	8
2	2040 Profile	1

2x/
3x

Slide 4x M5 sliding T-nuts into each side of the upper channels of the wide side, as shown. The number of middle parts depends on the size of the machine you have.

For machines up to 1000×1000 you have 2 middle section profiles

For the machines 1000×1500 and 1500×15000 you have 3 middle profiles.



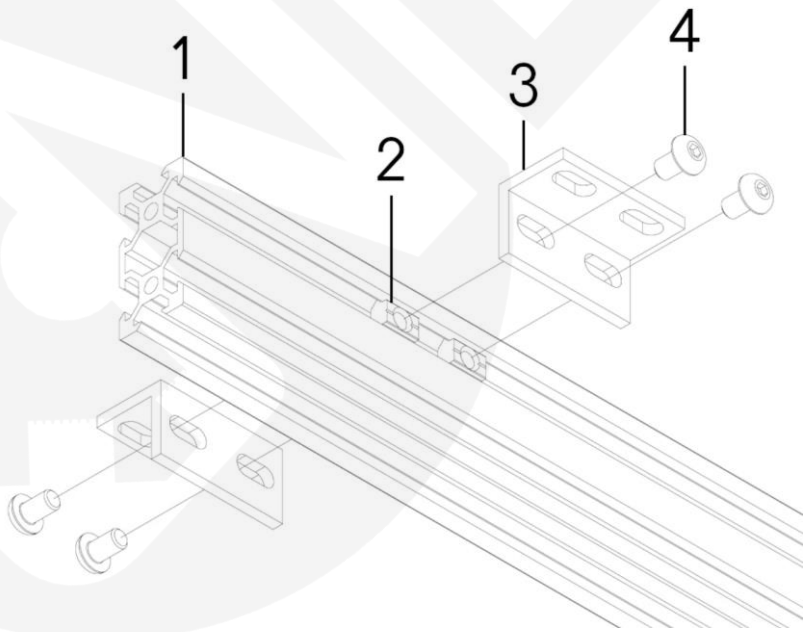
3.1.4 Mounting brackets - middle sections

Article Nr.	Description	Quantity
1	2040 Profile	1
2	M5 sliding T nut	2
3	L2 angle bracket	1
4	M5 x 8mm flat head screw	2

2x/
3x

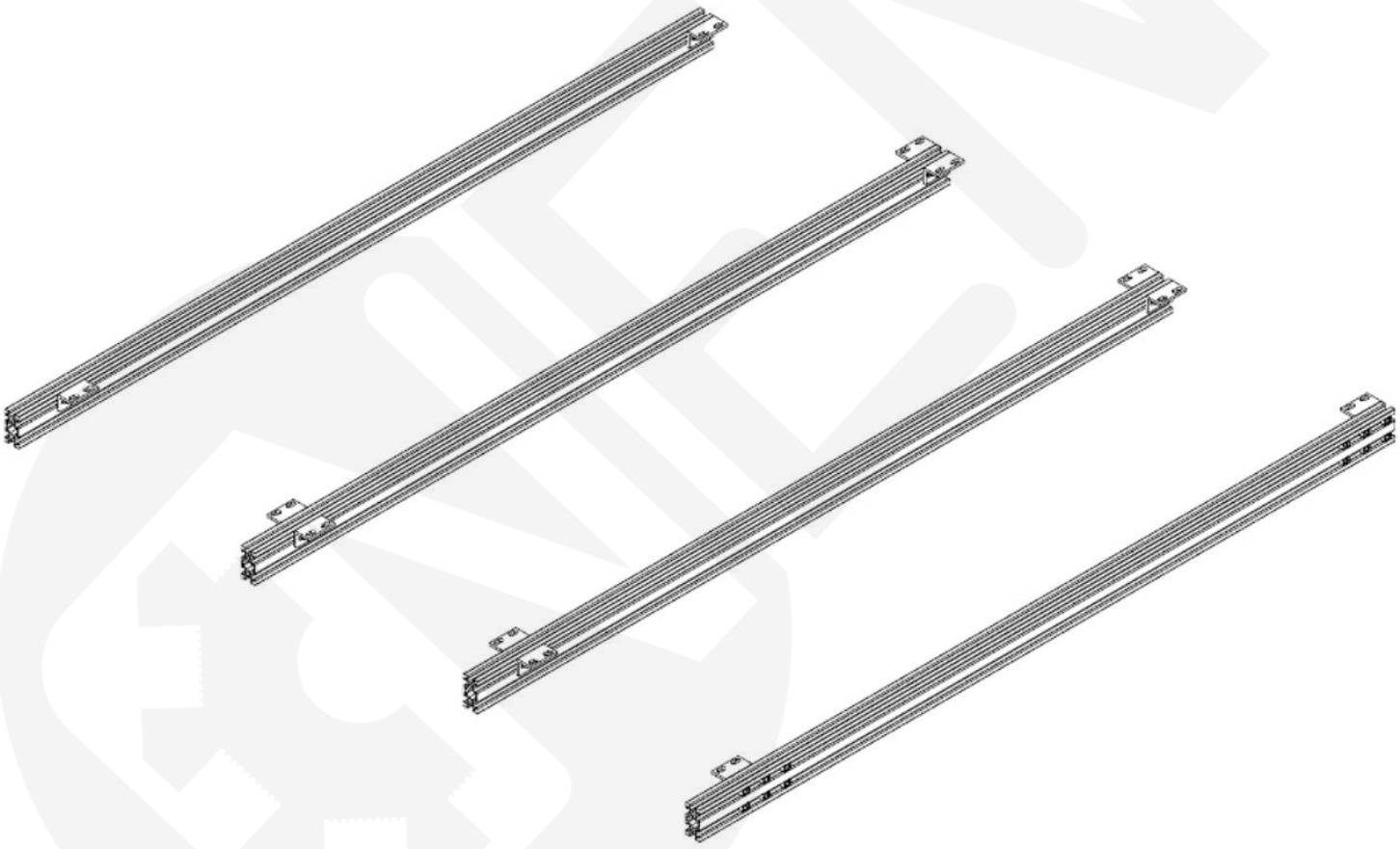
On the side where we used 4x M5 T-nuts in the previous step, attach the L2 brackets with 2x M5 x 8 flat head bolts on each side of the 2040 profile. Note that the holes in the L2 bracket are in different positions. The holes closer to the outer edge of the bracket is the side that attaches to the profile. Repeat the process on the opposite side of the 2040 profile.
Do not fully tighten the M5x8mm head screws on the sliding side. The position of the brackets on the sliding side is later determined by the length of the X-axis platform. Once you have built 1x 2040 profiles with 4 brackets, repeat the process for the other middle profiles according to the instructions below:

1. Machines with a size of 1000×1000 have 2x 2040 profiles in the middle.
2. Machines with a size of 1000×1500 and more have 3x 2040 profiles in the middle.



3.1.5 Preparation of the substructure completed.

Note that the fixed side is on the right; these brackets are all flush with the end of the profile and fully tightened. The brackets on the left side are still movable and will later be positioned and tightened according to the X-axis mounting.

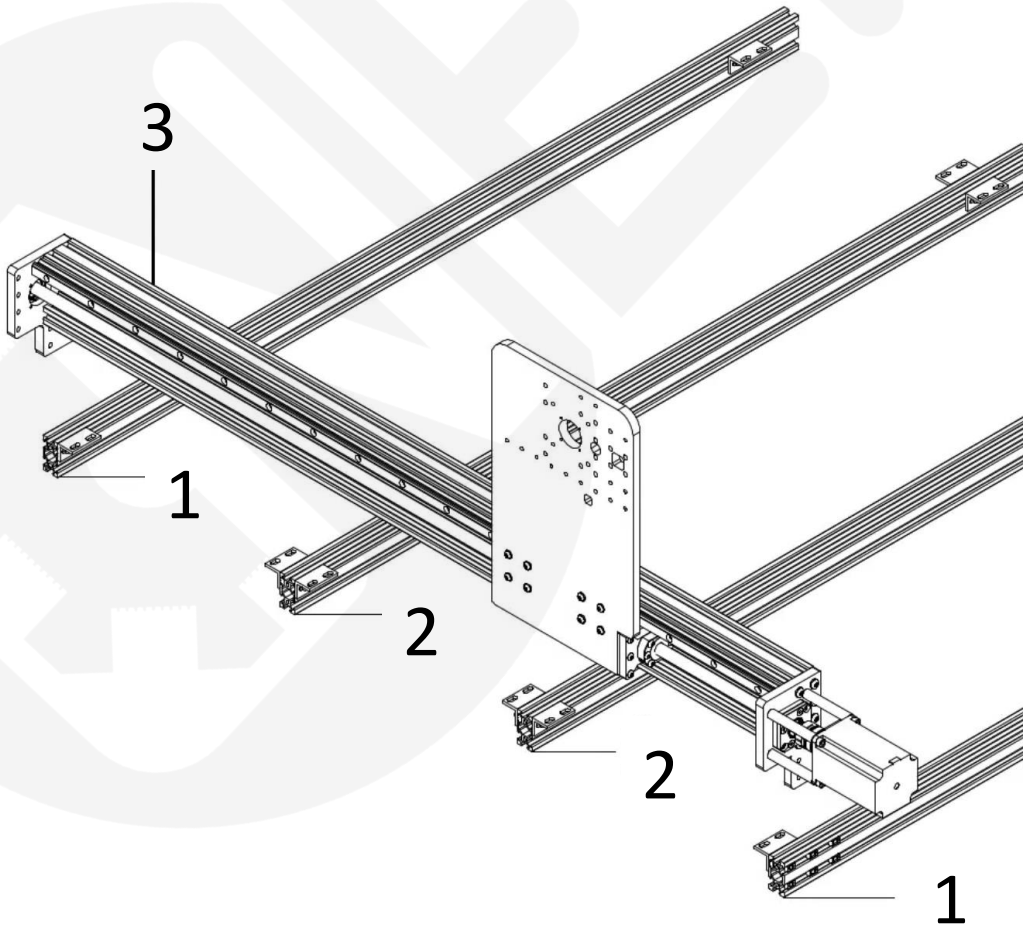


3.2 Substructure fixed side

3.2.1 - Attach the Y2 axle to the reference side.

Article Nr.	Description	Number of screws for Y-axis length	
		1000MM	1500MM
1	2040 profiles - front and back	2	2
2	2040 profiles - middle sections	2	3
3	Y 2-axis	1	1

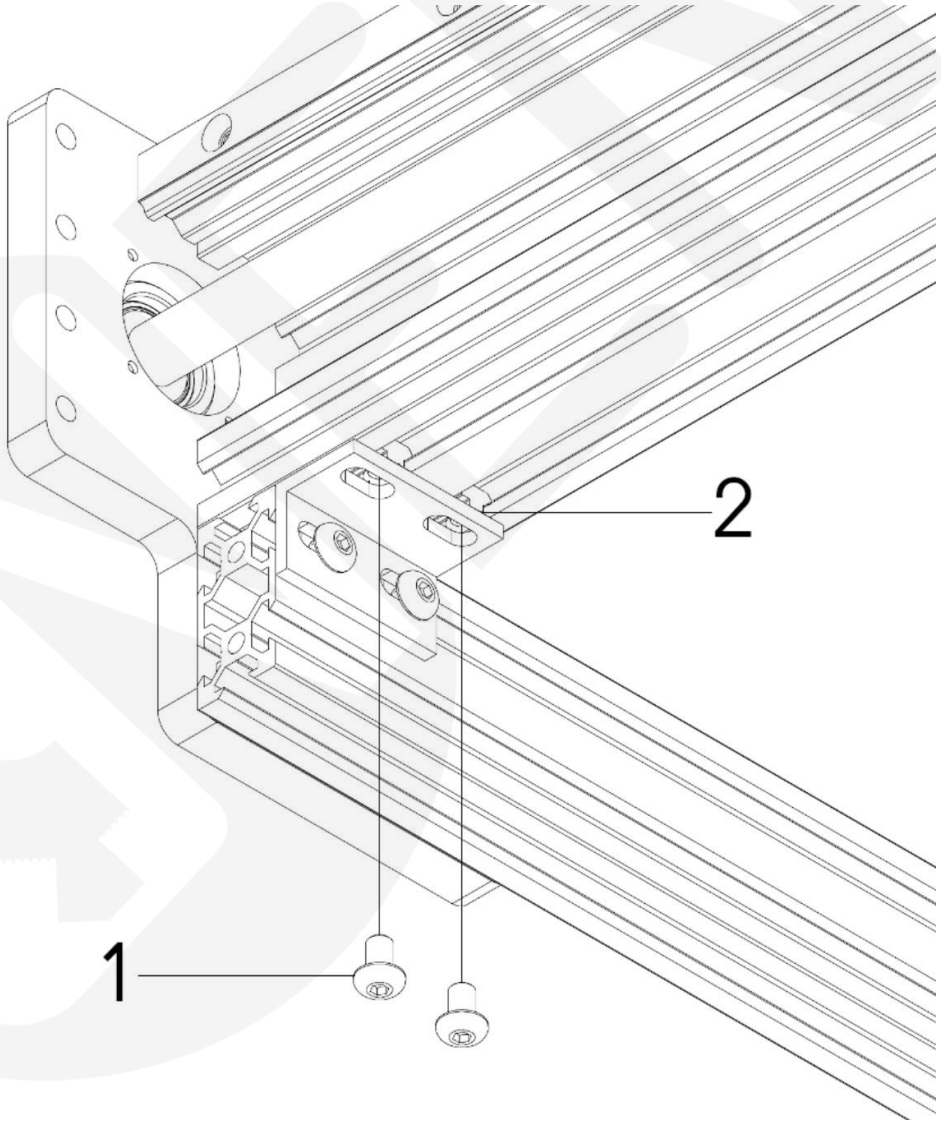
Position the Y2 axis on the fixed side of your substructure, as shown in the figure below.



3.2.2 - Attachment of the front (loose end)

Article Nr.	Description	Quantity
1	M5 x 8mm flat head screw	2
2	L2 angle bracket	1

Slide the sliding nut previously inserted into the lower channels of the C-beam of the Y2 axis towards the loose end, then use it to attach the M5 x 8mm flat head screws that secure the L2 brackets. Make sure that the C-beam of the Y2 axis is mounted flush with the bracket and thus with the end of the 2040 profile. The fixed side must be the reference for the entire machine.



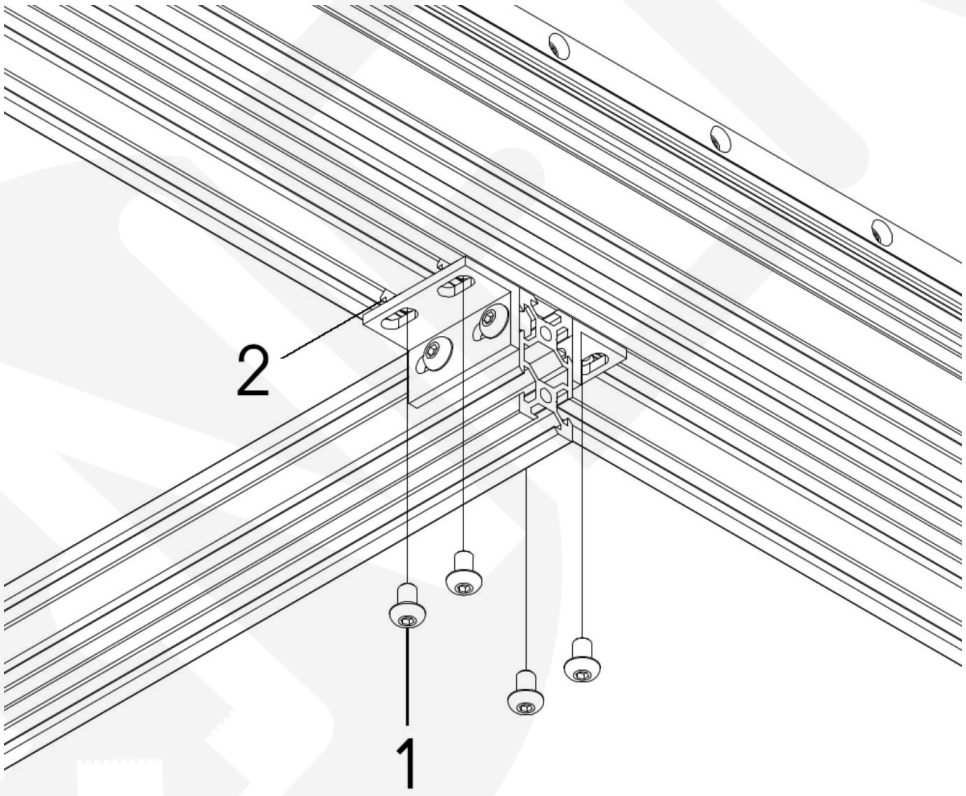
3.2.3 - Attachment of the middle sections to the Y2 axis.

Article Nr.	Description	Quantity
1	M5 x 8mm flat head screw	2
2	L2 angle bracket	1

2x/
3x

Slide the previously inserted T-nuts of the C-beam of the Y2 axis to the correct places and attach the L2 angle brackets of the middle sections with the M5 x 8 mm lens screws.

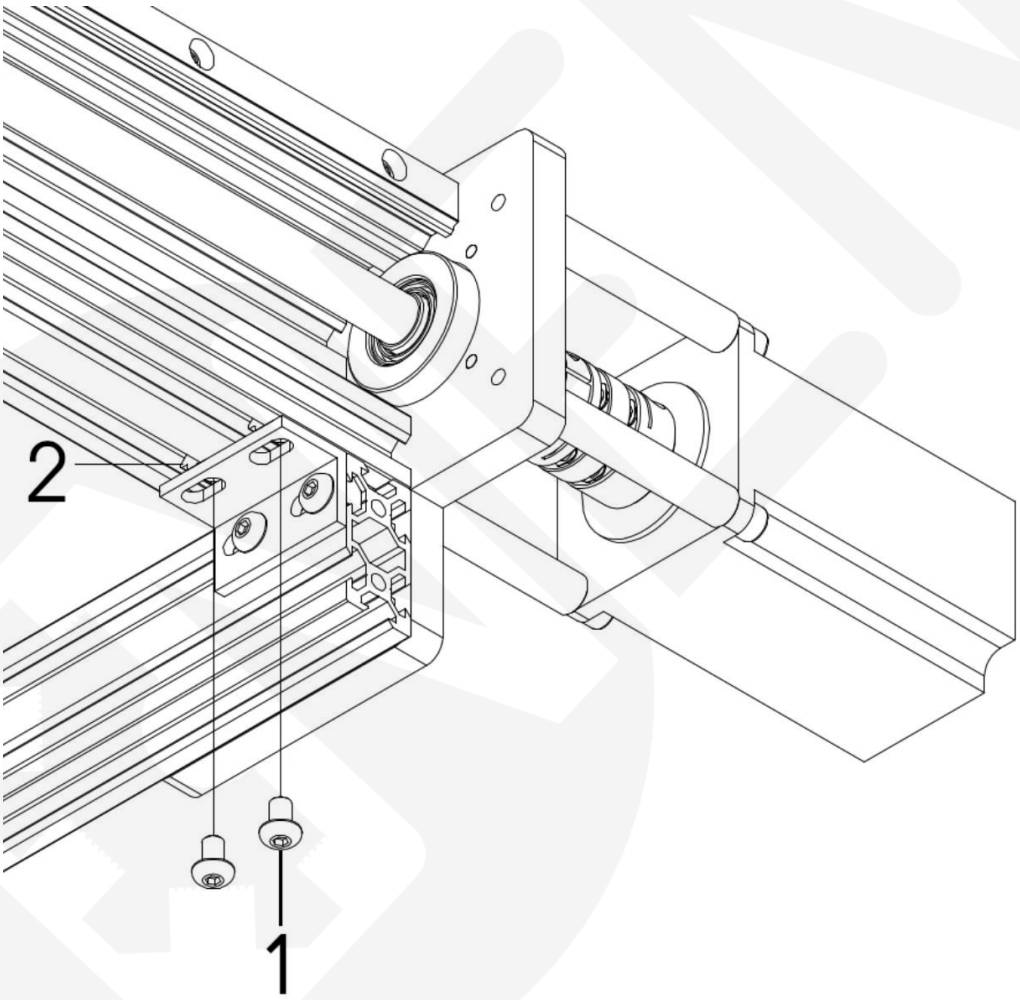
Repeat the previous step for all middle sections that you want to attach to the fixed side. The distances between the individual sections should always be the same.
Make sure that the Y2 axis is flush with the bracket and thus with the end of the 2040 profile. The fixed side must be the reference for the entire machine.



3.2.4 - Attachment of the back (fixed end)

Article Nr.	Description	Quantity
1	M5 x 8mm flat head screw	1
2	L2 angle bracket	2

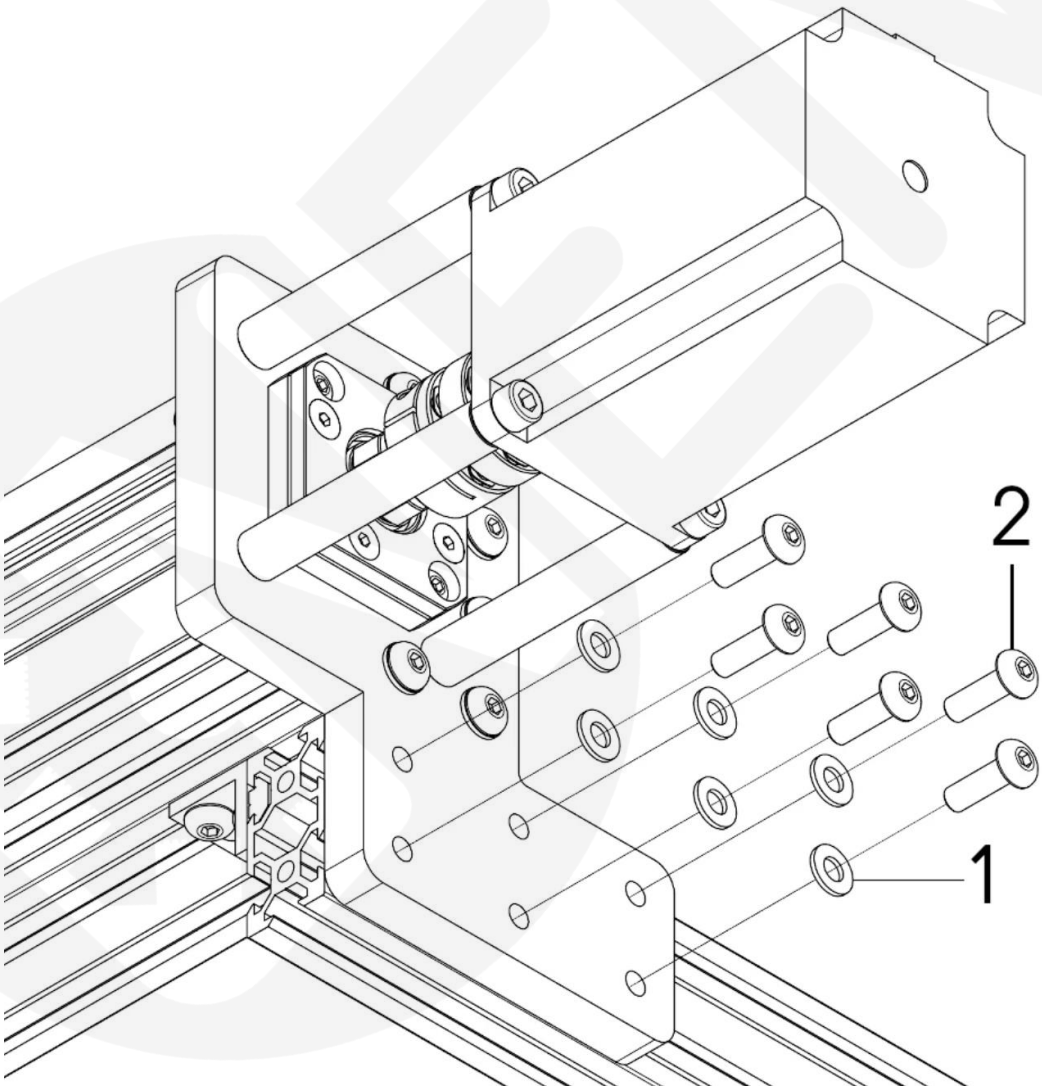
Slide the T-nut previously inserted into the lower channels of the Y-axis C-beam towards the fixed end, then use it to fasten the profile using the M5 x 8mm flat head screws.



3.2.5 - Attachment of the rear profile to the Y-end plate (fixed end)

Article Nr.	Description	Quantity
1	Precision washer 10x5x1	6
2	M5 x 16mm flat head screw	6

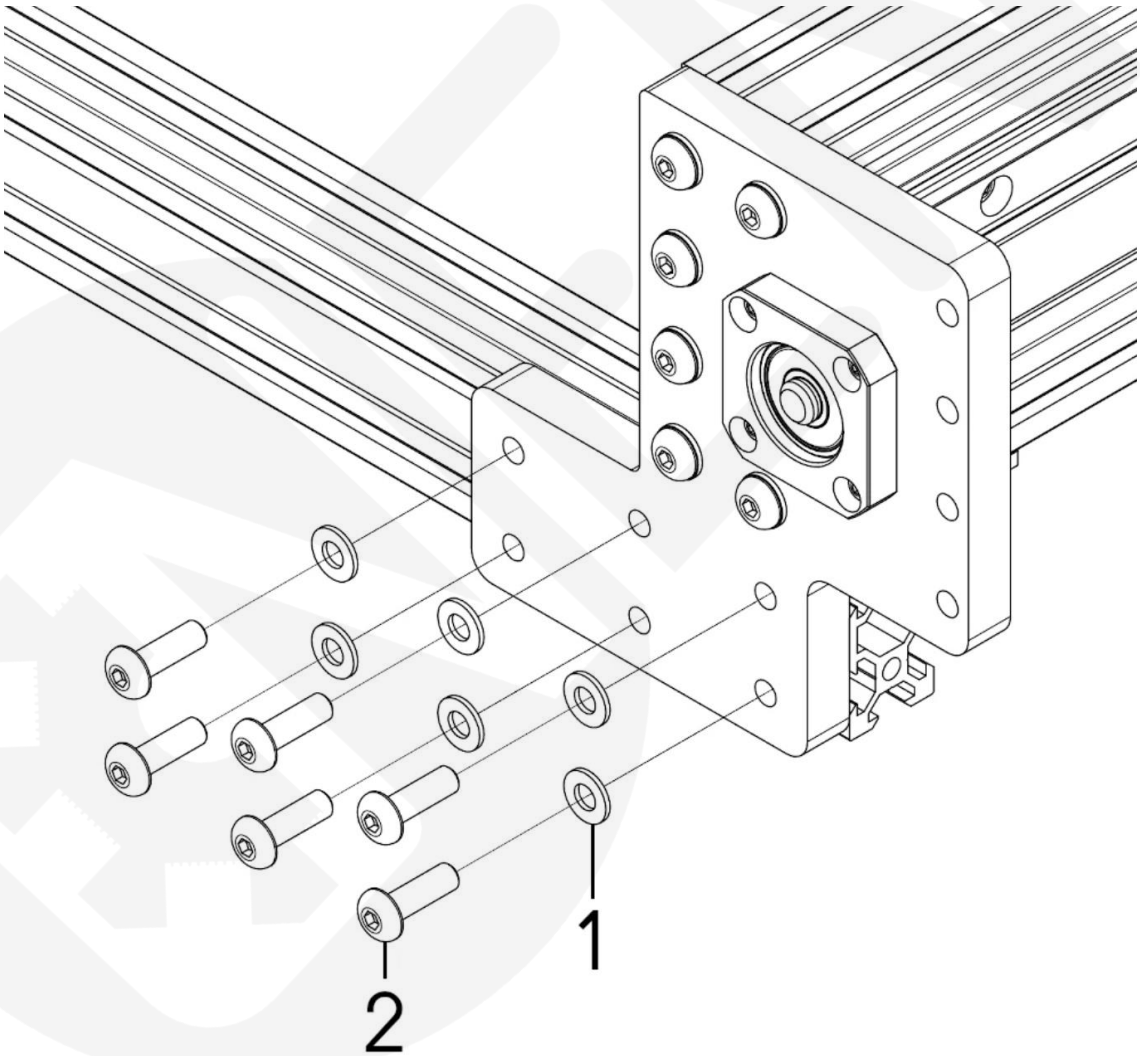
Use the T-nuts inserted into the 2040 profile in chapter 3.1.1 to attach the Y-end plate - firmly to the 2040 profile (rear).



3.2.6 - Attachment of the front to the Y-end plate (loose end)

Article Nr.	Description	Quantity
1	Precision washer 10x5x1	6
2	M5 x 16mm flat head screw	6

Use the T-nuts inserted into the 2040 profile in chapter 3.1.1 to attach the Y-end plate – loose end to the 2040 profile (front). Note that there is a precision washer between each screw and the plate.

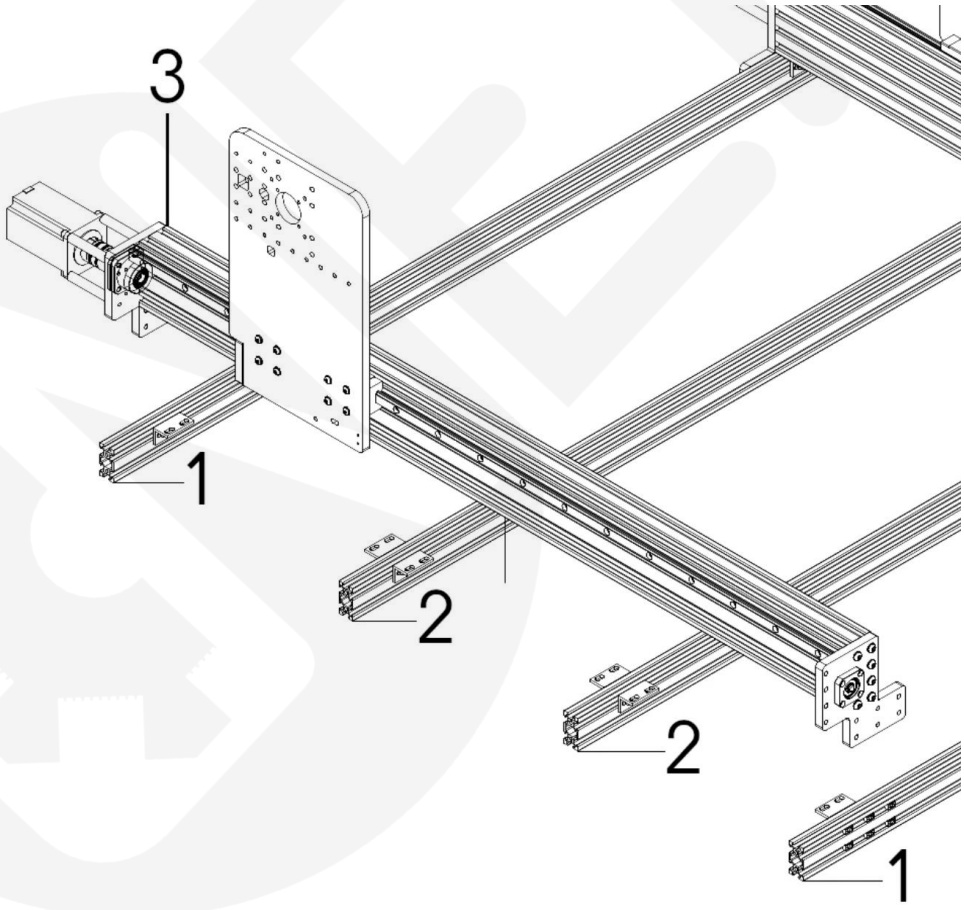


3.3 Substructure – loose side

3.3.1 - Place the second Y-axis on the sliding side.

Article Nr.	Description	QUANTITY FOR MACHINE Y-AXIS LENGTH	
		1000MM	1500MM
1	2040 profiles - front and back	2	2
2	2040 Profile - middle sections	2	3
3	Y 1-axis	1	1

Position the y-axis on the sliding side of the substructure, as shown in the figure below.

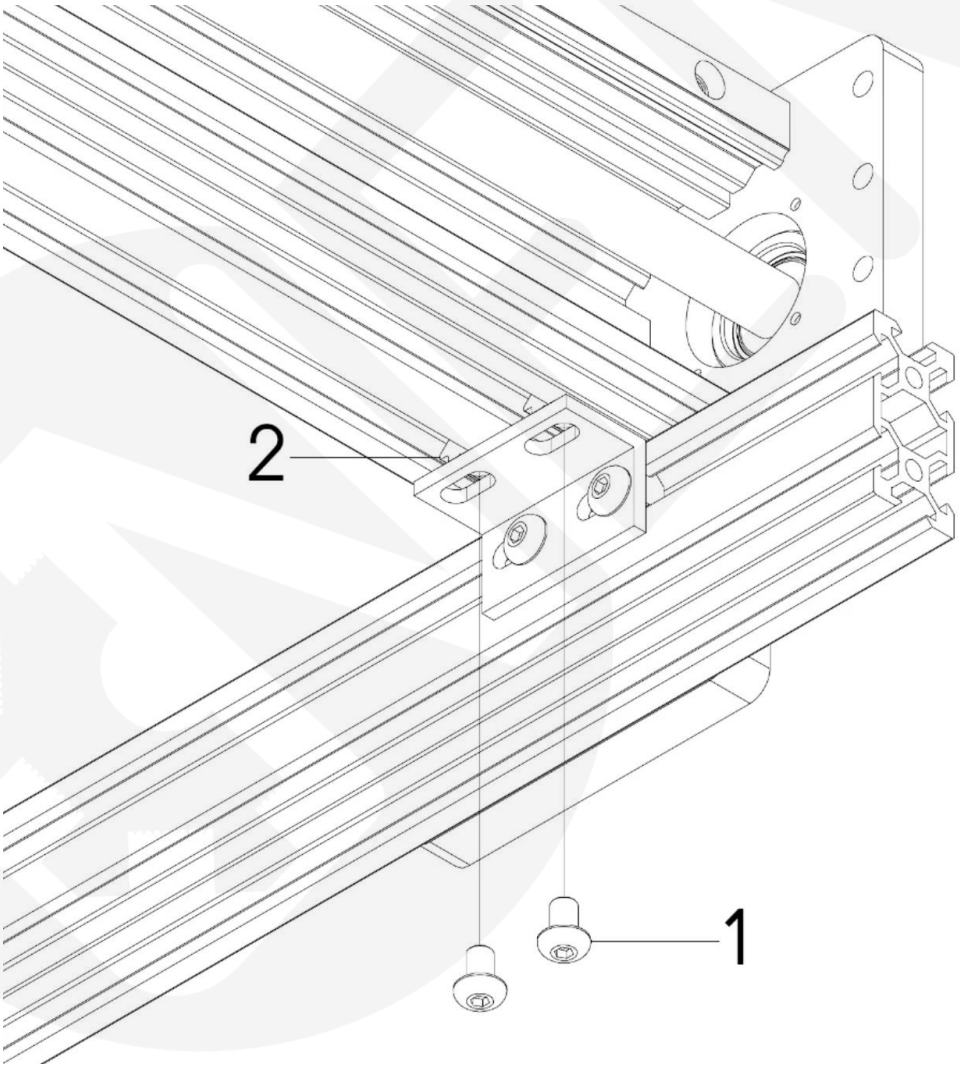


3.3.2 - Attachment of the front (loose end)

Article Nr.	Description	Quantity
1	M5 x 8mm flat head screw	2
2	L2 angle bracket	1

Slide the T-nuts previously inserted into the lower channels of the C-beam of the Y1 axis towards the loose end, then use it to attach the M5 x 8mm flat head screws that secure the L2 angle bracket.

You can tighten the angle bracket on the C-beam. However, leave the other side of the angle on the 2040 profile still movable, this will be tightened later.



3.3.3 - Attachment of the middle sections to the Y-axis.

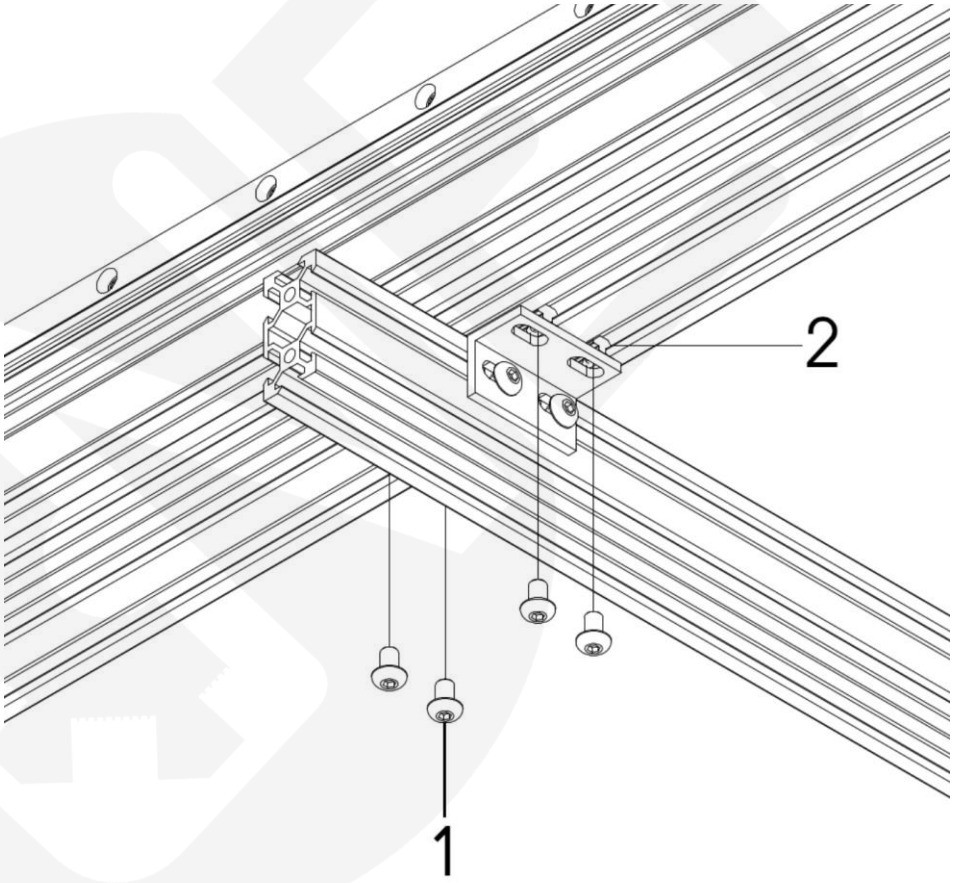
Article Nr.	Description	Quantity
1	M5 x 8mm flat head screw	2
2	L2 angle bracket	1

2x/
3x

Slide the previously inserted T-nuts of the C-beam of the Y1 axis to the correct locations and attach the L2 angle brackets of the middle sections with the M5 x 8 mm flat head screws.

Repeat the previous step for all middle sections that you want to attach to the sliding side. The distances between the individual sections should always be the same and match those of the reference side.

You can tighten the angle brackets on the C-beam. However, leave the other side of the angle on the 2040 profile still movable, this will be tightened later.

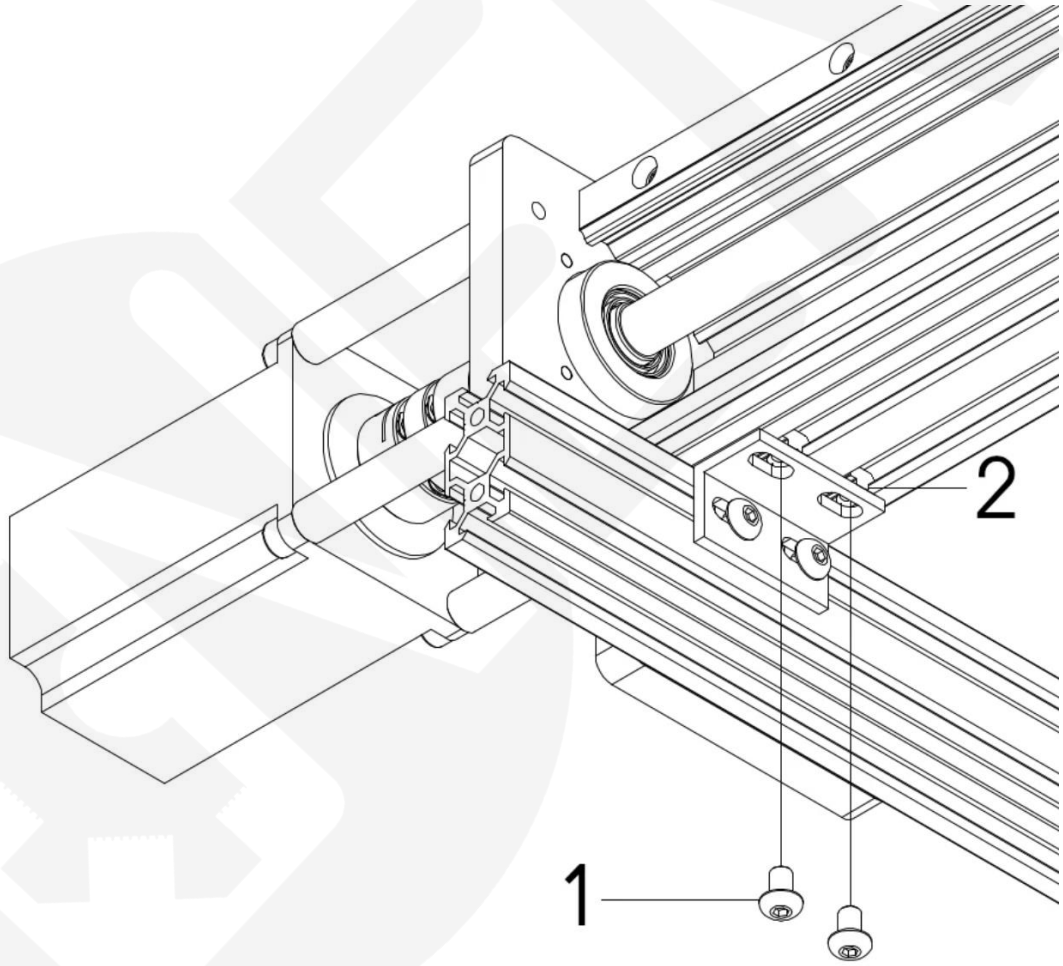


3.3.4 - Attachment of the back (fixed end)

Article Nr.	Description	Quantity
1	M5 x 8mm flat head screw	2
2	L2 angle bracket	1

Slide the T-nuts previously inserted into the lower channels of the Y-axis C-beam towards the fixed end, then use it to fasten the profile using the M5 x 8mm flat head screws.

You can tighten the angle brackets on the C-beam. However, leave the other side of the angle on the 2040 profile still movable, this will be tightened later.

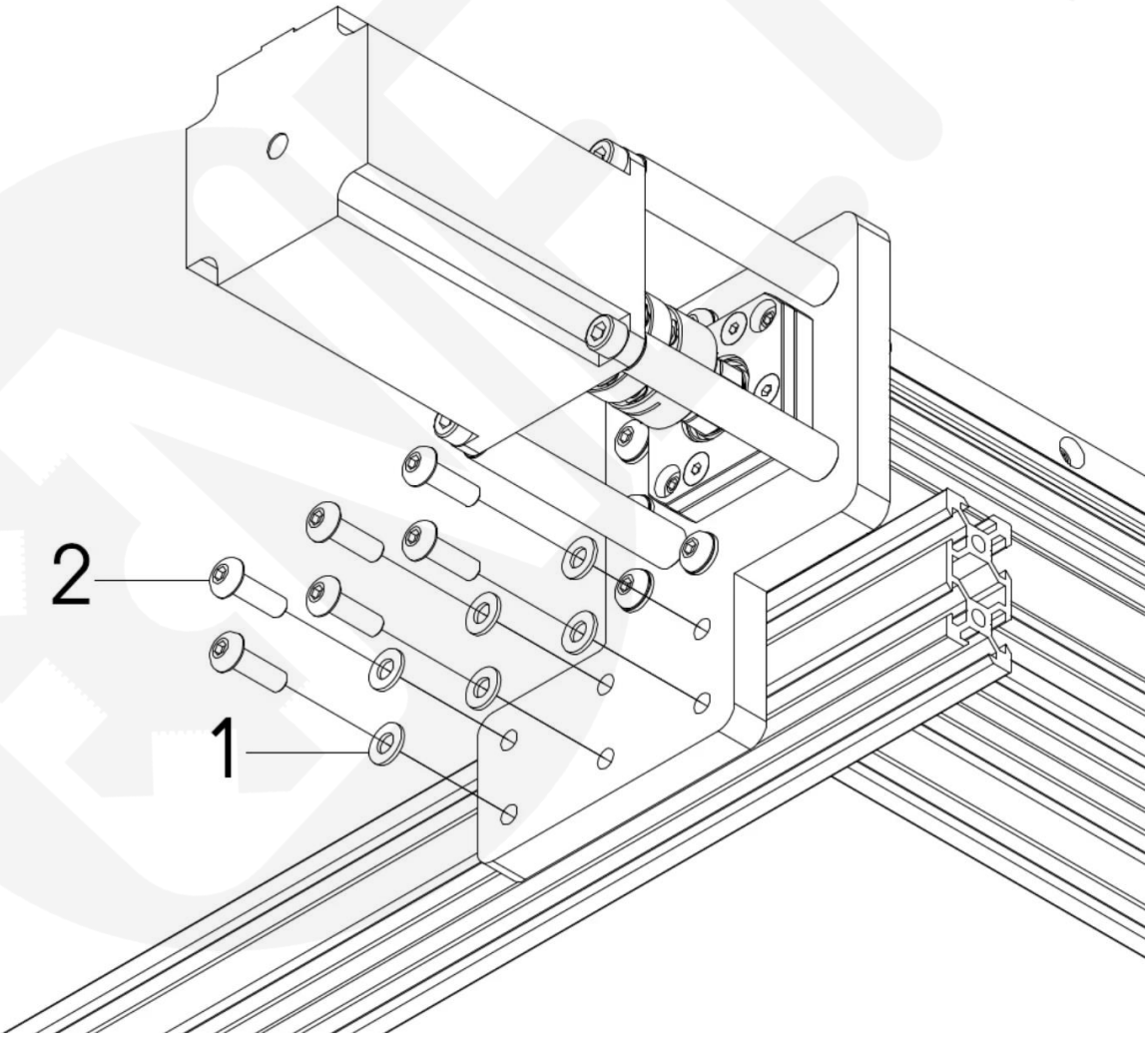


3.3.5 - Attachment of the rear profile to the Y-end plate (fixed end)

Article Nr.	Description	Quantity
1	Precision washer 10x5x1	6
2	M5 x 16mm flat head screw	6

Use the T-nuts inserted into the 2040 profile in chapter 3.1.1 to attach the Y-end plate – fixed end to the 2040 profile (rear).

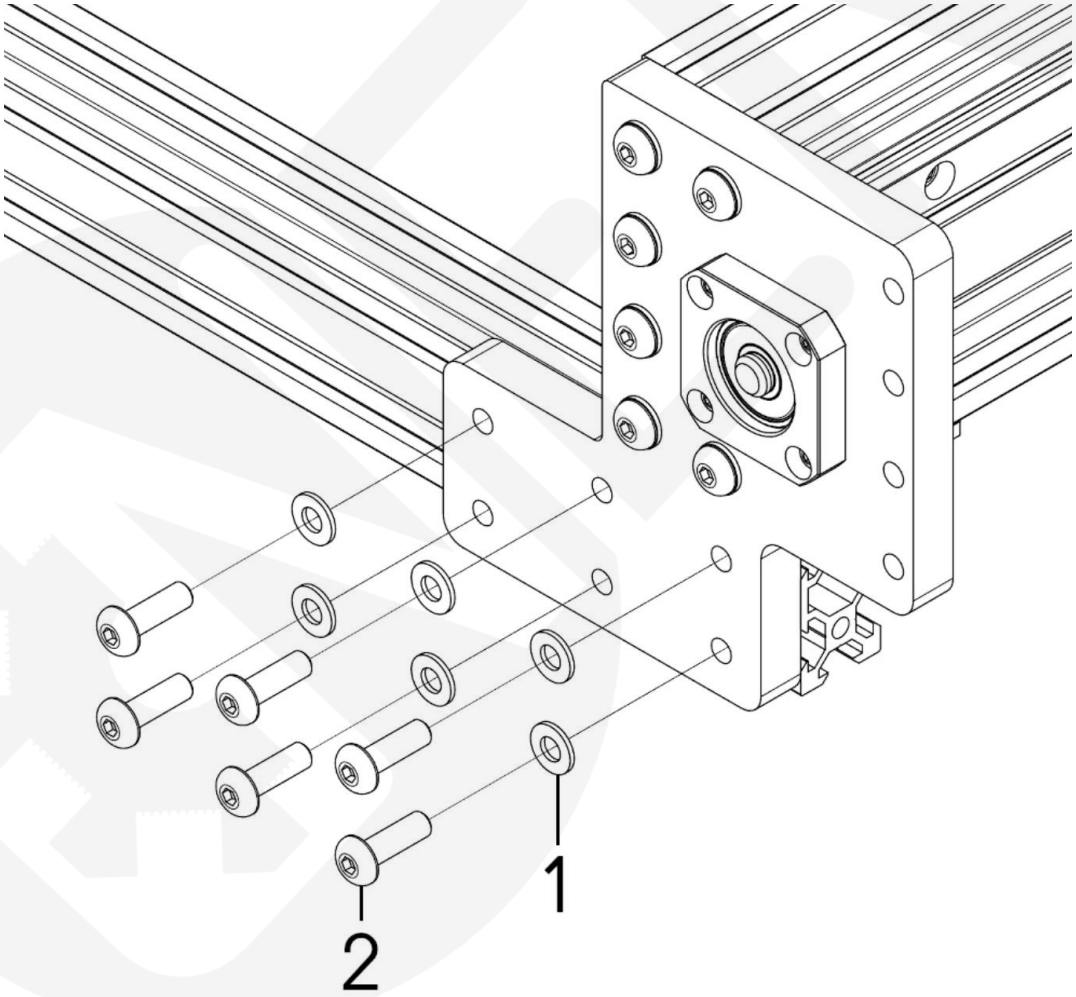
Since the final position of the X-axis is not known before the X-axis is incorporated into the construction, do not fully tighten the M5 x 16 mm flat head screws.



3.3.6 - Attachment of the front to the Y-end plate (loose end)

Article Nr.	Description	Quantity
1	Precision washer 10x5x1	6
2	M5 x 16mm flat head screw	6

Use the T-nuts inserted into the 2040 profile in chapter 3.1.1 to attach the Y-end plate – loose end to the 2040 profile (front). Note that there is a precision washer between each screw and the plate. Since the final position of the X-axis is not yet known before the X-axis is installed in the construction, do not fully tighten the M5 x 16 mm flat head screws .

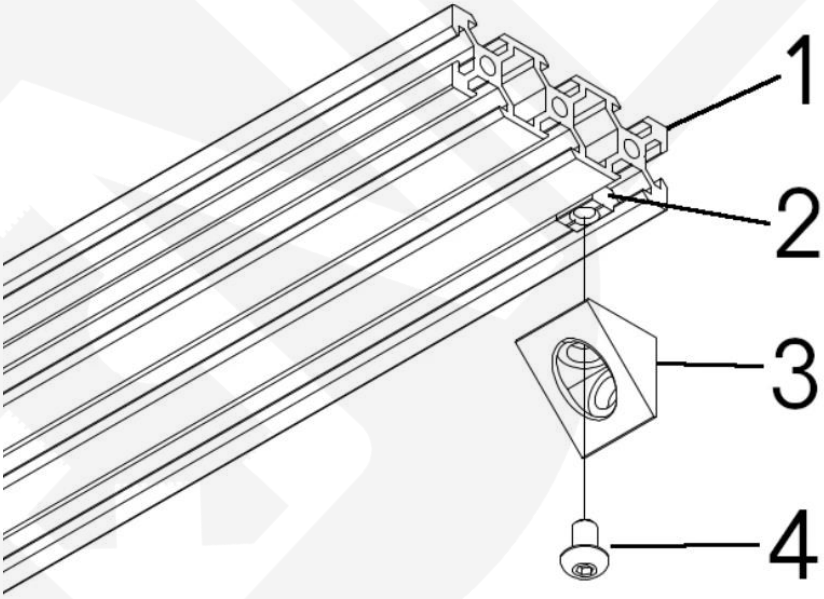


3.4 - Drag chain support

3.4.1 - Attachment of the profile

Article Nr.	Description	Quantity
1	2060 Profile	1
2	M5 sliding T nut	1
3	90-degree angle bracket	1
4	M5 x 8mm flat head screw	1

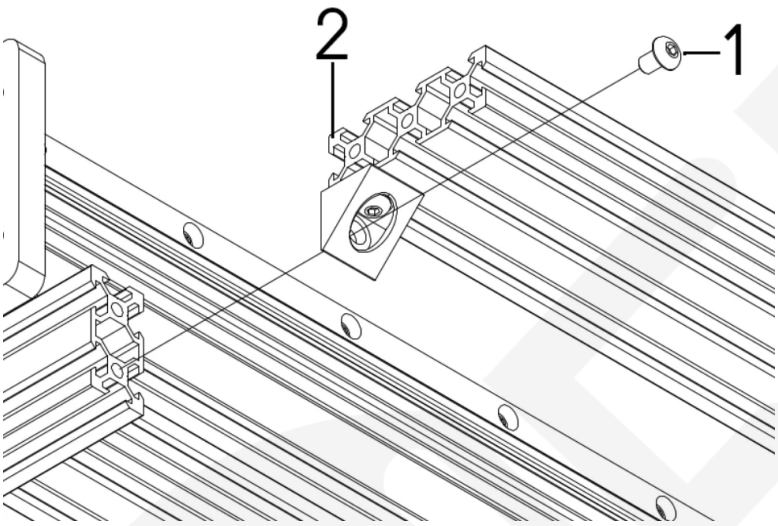
Slide an M5 sT-nut into the channel of the 2060 profile, then use an M5 x 8mm flat head screw to attach the 90-degree angle bracket to the 2060 profile. Repeat the previous step to attach another 90-degree bracket to the other end.

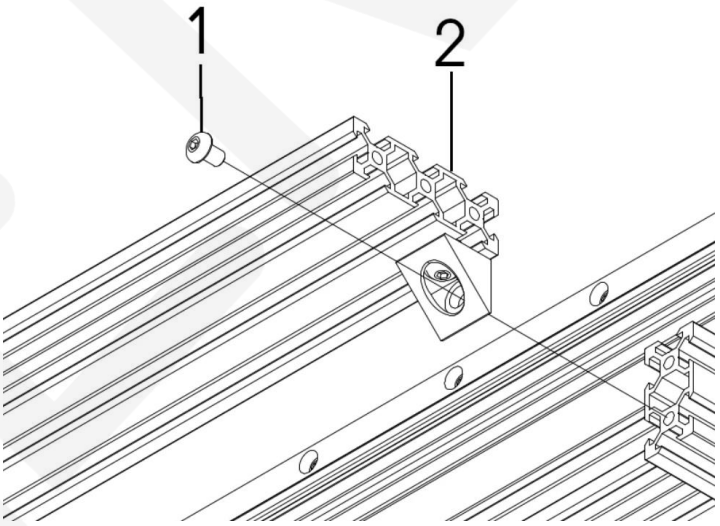


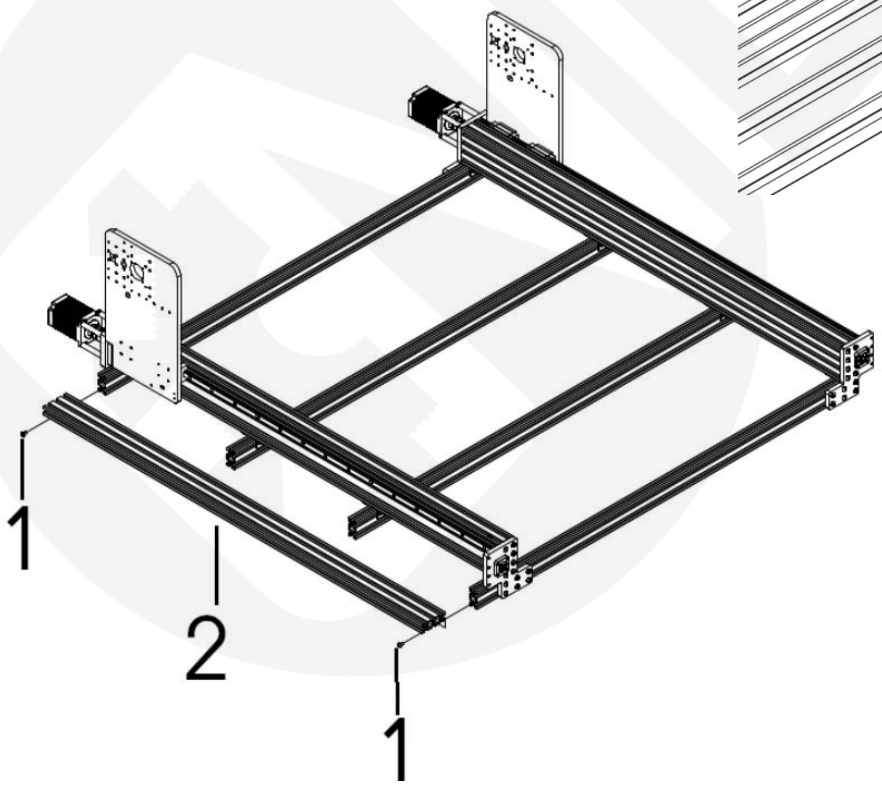
3.4.2 - Attachment to the substructure

Article Nr.	Description	Quantity
1	M5 x 8mm flat head screw	2
2	2060 Profile	1

Pass the M5 x 8 mm flat head screw through the brackets applied in the previous step, then attach the 2060 profile to the base at both ends as shown.



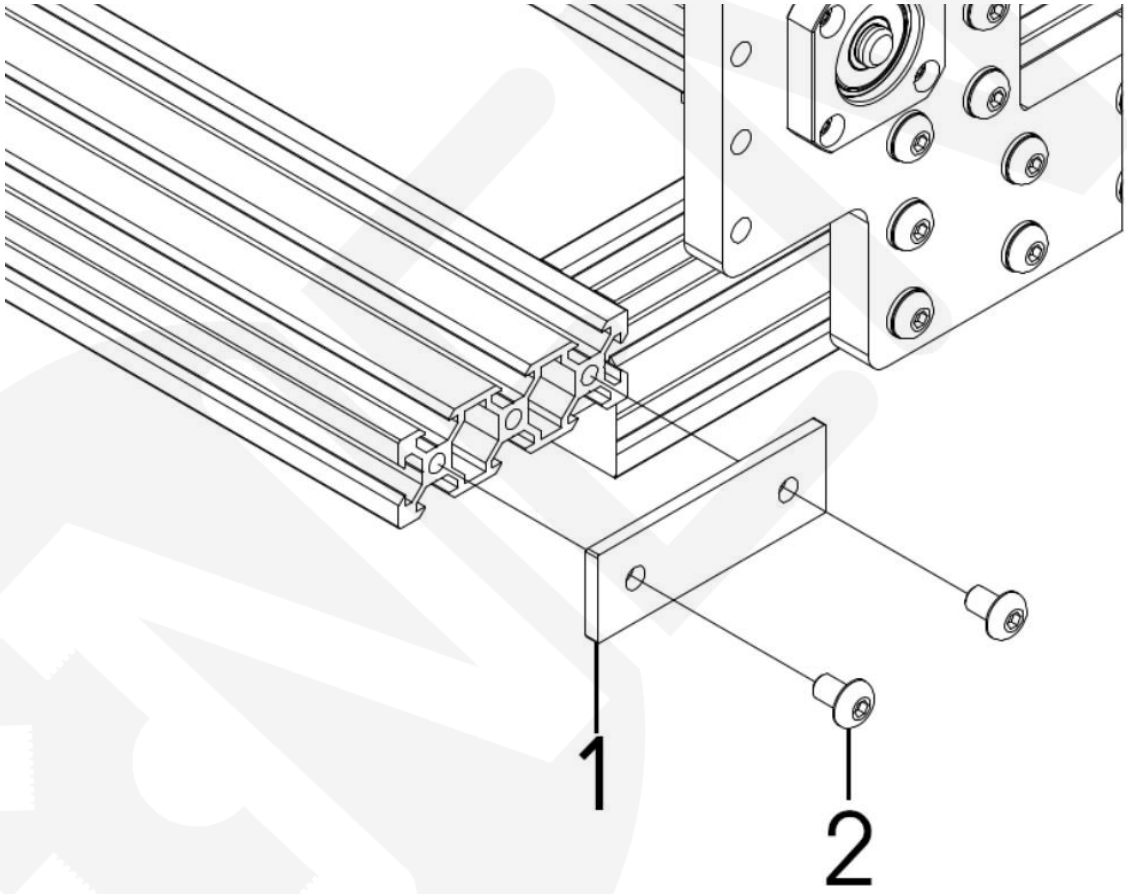




3.4.3 - End caps

Article Nr.	Description	Quantity
1	End cap - 2060	1
2	M5 x 8mm flat head screw	2

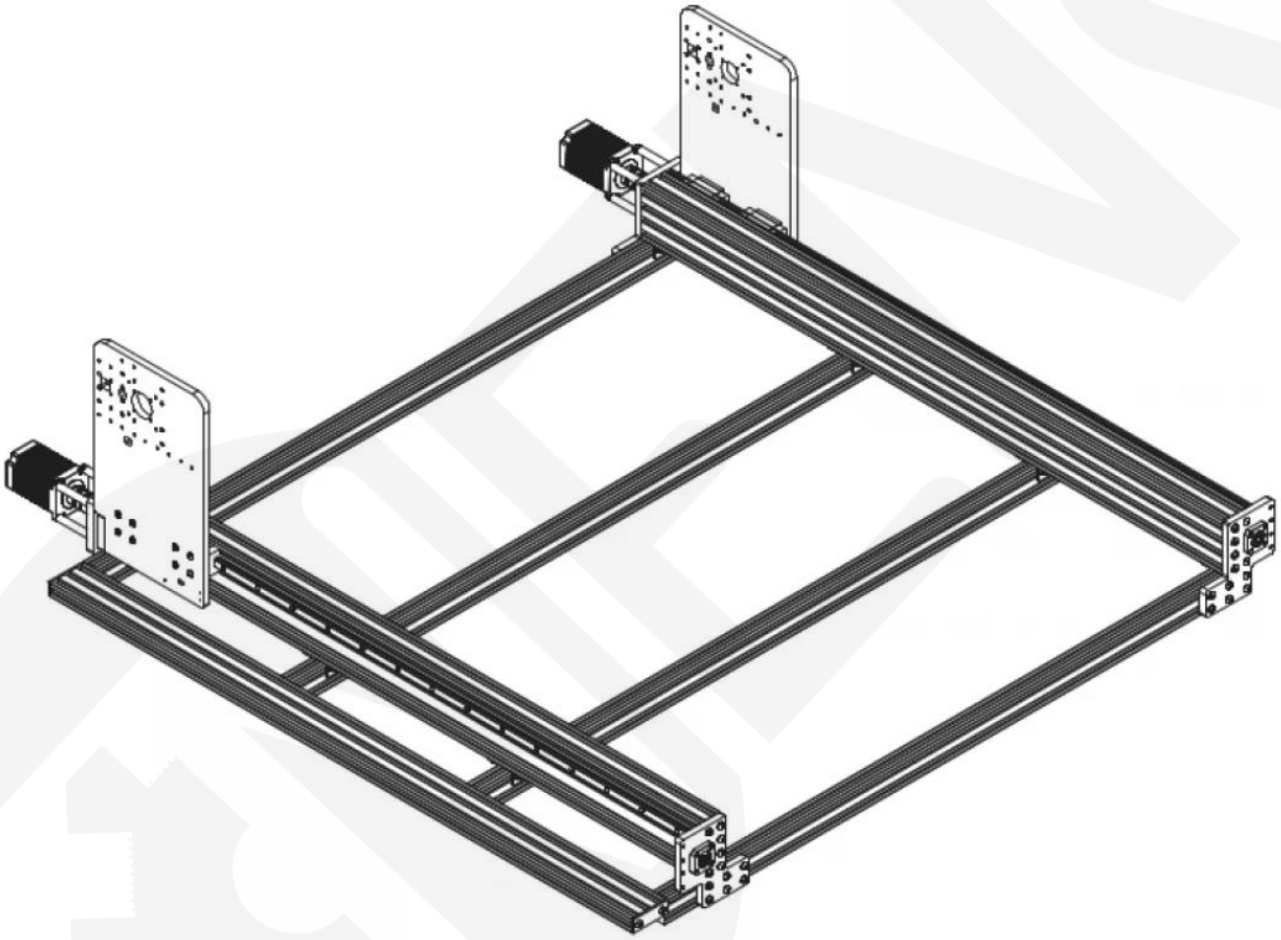
Finally, attach the endcap - 2060 to the end of the substructure profile as shown in the figure below.



3.5 Substructure complete

Please check your previous setup using the graphic below.

The Pictured Right Side (Y2) should be fixed and perpendicular and the Left Side (Y1) should be movable on the X-axis to fit the X-Portal exactly.



4.0 X-axis

4.1 C-beam and HGR rail

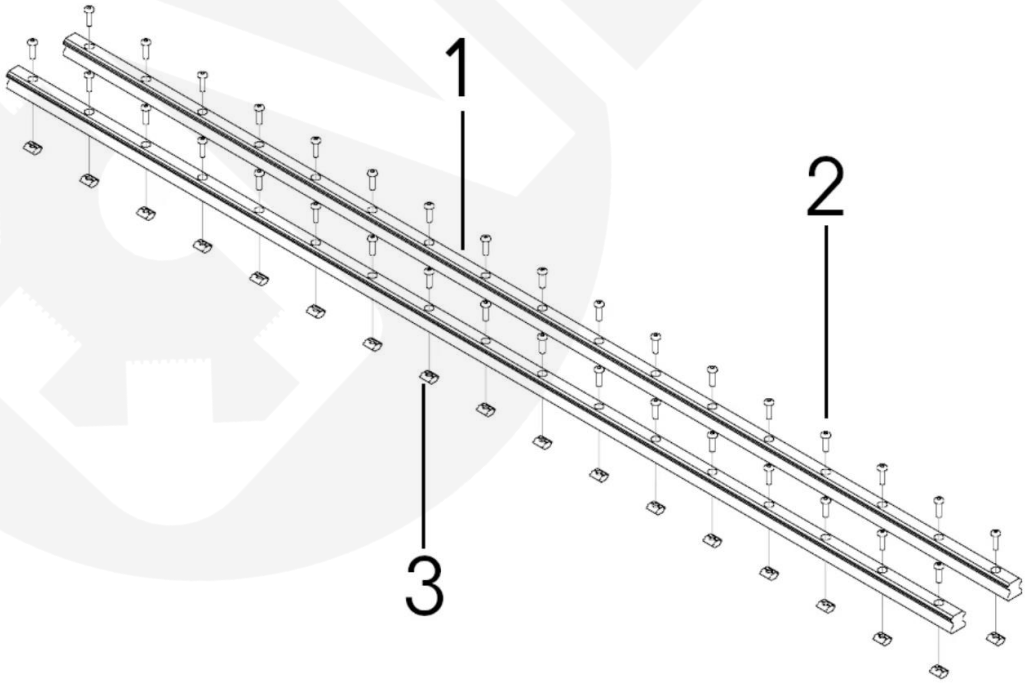
4.1.1 HGR rail preparation

Article Nr.	Description	NUMBER FOR MACHINE X-AXIS LENGTH	
		1000MM	1500MM
1	HGR 15 rail	2	2
2	M4 x 14mm cylinder head bolt with hexagon socket	34	52
3	M4 sliding T-nut	2	2

Insert the M4 x 14mm cylinder screw through the HGR rail and screw the M4 T-nut to the other end. Half a turn on a screw is sufficient. We will tighten them later.

Repeat this process for both HGR 15 rails of the X-axis.

Please note that the number of M4 x 14mm cylinder head bolts and M4 T-nuts depends on the machine size you have.

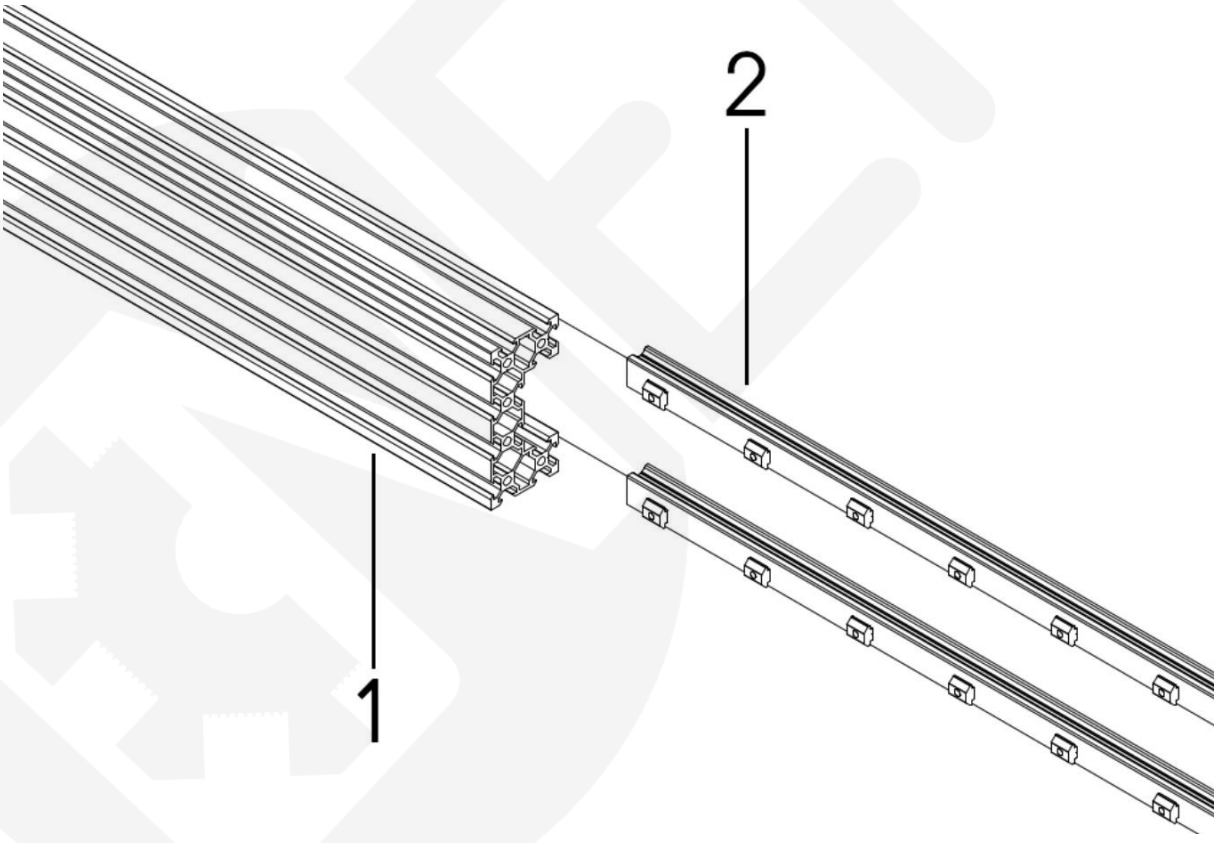


4.1.2 Attaching the HGR rails to the C-Beam profile

Article Nr.	Description	Quantity
1	C-Beam Profile	1
2	HGR 15 rail	2

Slide both HGR 15 rail assemblies into the C-Beam as shown.

Inserting the HGR 15 rails and M4 T-nuts can be difficult. Let another person help you keep the rail straight while you slide the slot stones into the C-beam.



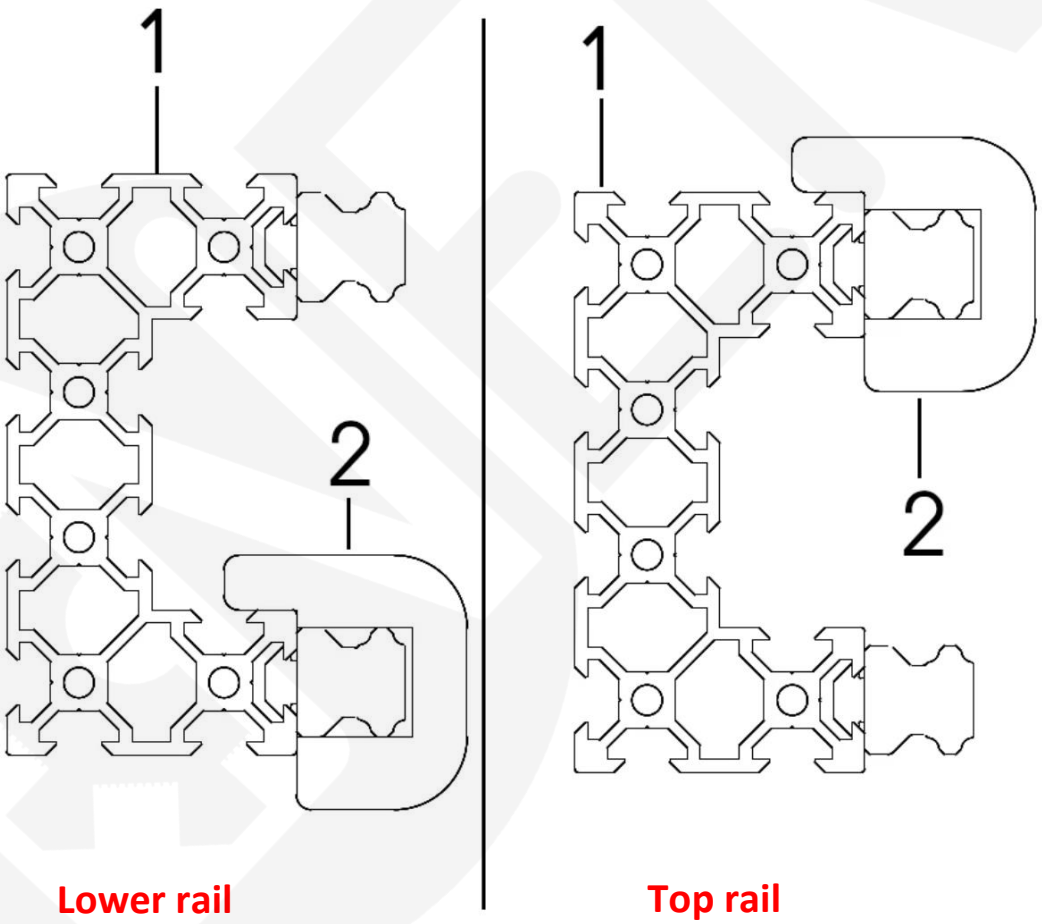
4.1.3 Alignment Tool

Article No.	Description	Quantity
1	C-Beam Profile	1
2	Alignment tool	1

Slide the alignment tool onto the HGR 15 rail and bring it close to the end of the rail. Tighten the M4 x 14 mm hexagon socket screw pre-assembled in chapter 4.1.1.

Repeat the process by moving the alignment tool and tightening all M4 x 14mm hexagon socket bolts one by one.

When tightening the M4 x 14 mm hexagon socket bolts, pay attention to the amount of torque. Tightening too hard can damage the screw head or Allen wrench.



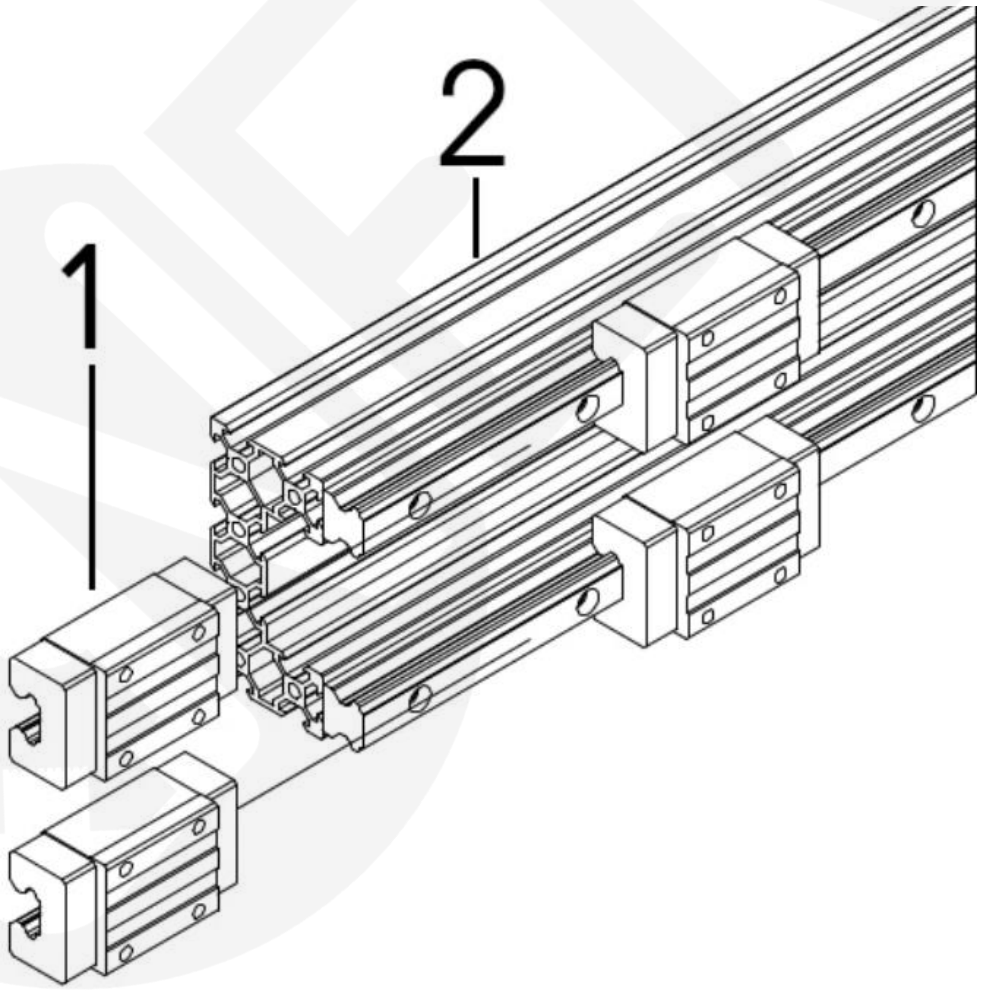
4.1.4 HGH storage blocks

Article Nr.	Description	Quantity
1	HGH 15 bearing blocks	4
2	C-Beam with 2x HGR 15 rails	1

Slide the 2x HGH 15 bearing blocks onto the two HGR 15 rails.

To avoid the loss of balls, store the supplied plastic holder on the bearing block. When mounting the bearing block on the rail, use the rail to push the plastic bracket out of the block so that the steel balls are preloaded and in contact with a rail at all times.

Although this is not shown on the drawing, it is best if the grease nipple faces outwards to facilitate access during maintenance.

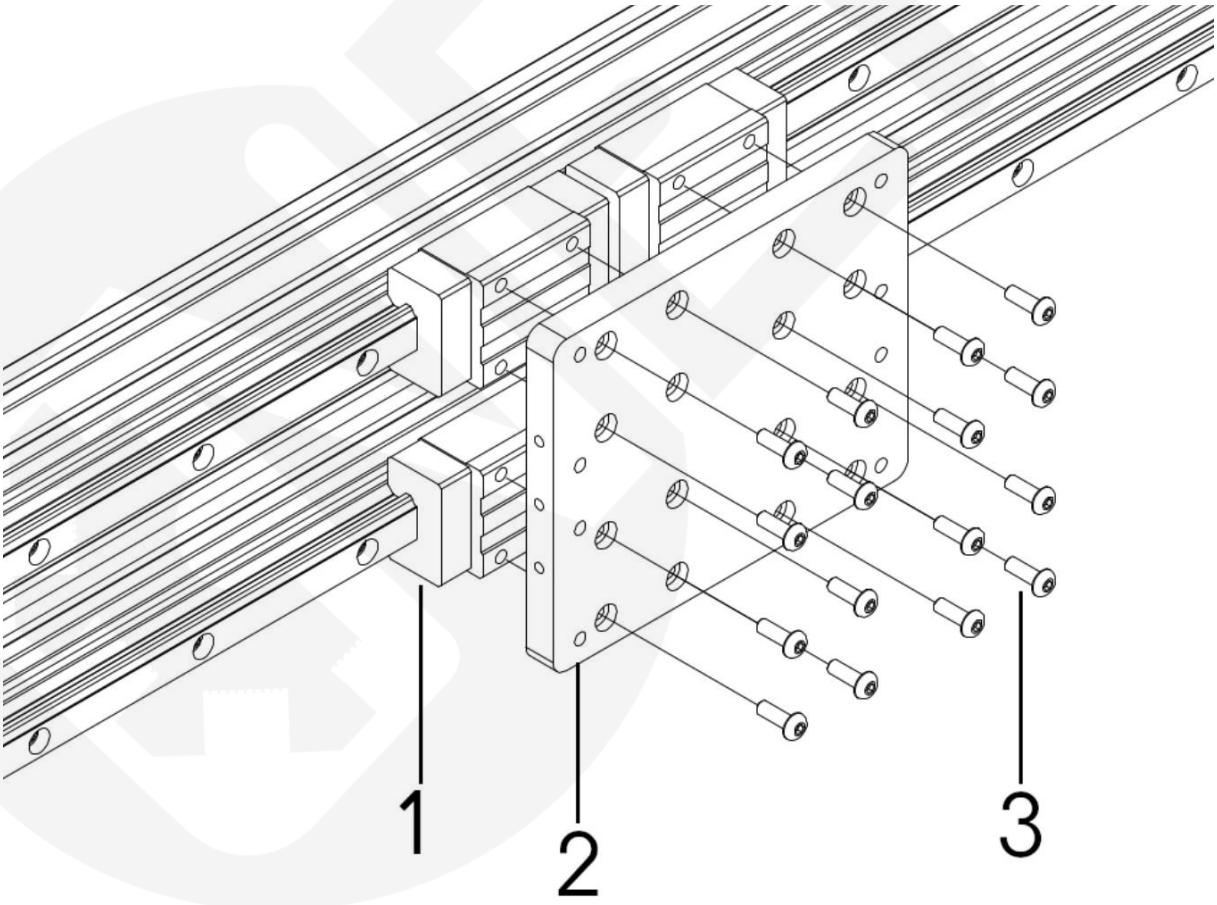


4.1.5 X-plate and HGH slide

Article Nr.	Description	Quantity
1	HGH 15 bearing blocks	4
2	X Plate	1
3	M4 x 12 mm flat head screw	16

Attach the X-plate to the 4x HGH 15 bearing blocks with M4 x 12mm flat head screws as shown in the figure.

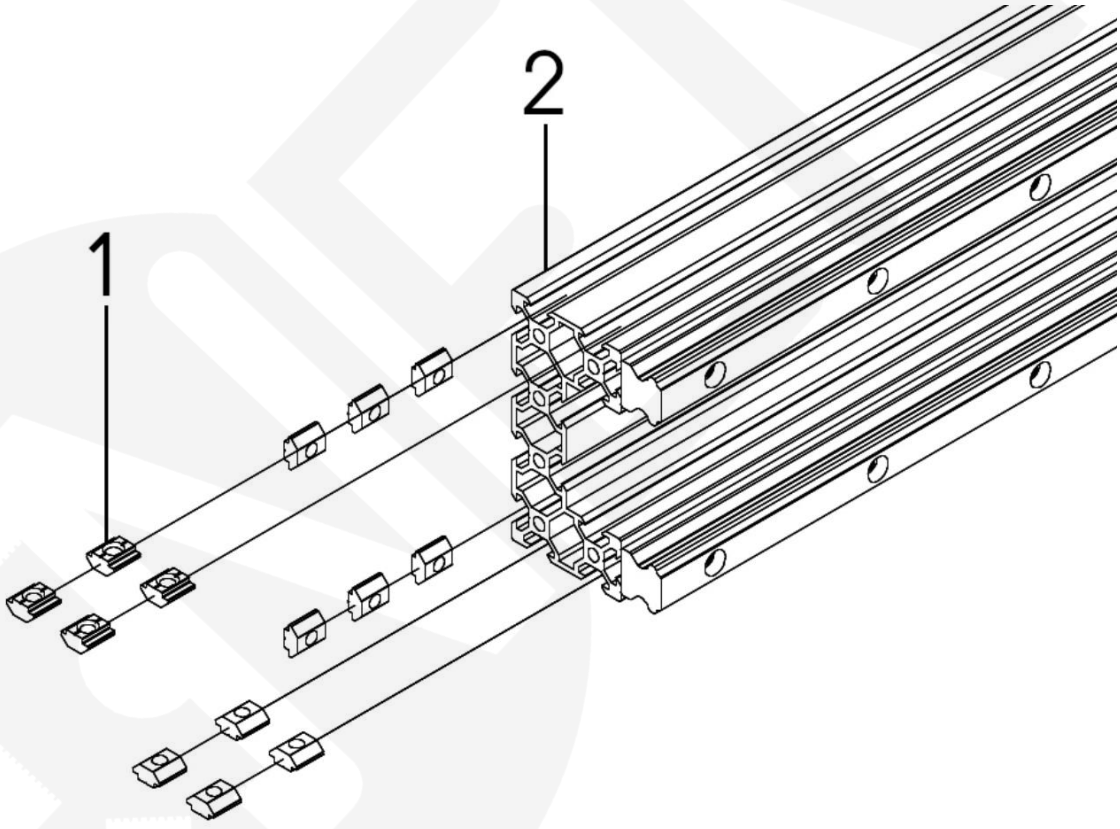
When attaching the screws to each bearing block, start with the screw in the upper left corner and tighten this screw by one turn. Now tighten the screw at the bottom left by one turn. Continue like this, always crosswise, until all screws are fixed.



4.1.6 Insertion of slot stones in the C-beam profile

Article Nr.	Description	Quantity
1	M5 sliding T nut	14
2	C-Beam Profile	1

Slide 4x M5 T-nuts into the upper and lower channels of the C-Beam profile (2x M5 sliding slot stones into each channel). Insert 6x M5 T-nuts into the back of the C-beam. 3x M5 T-nuts for the upper channel and 3x for the lower channel.



4.1.7 Inserting T-nuts into the 4040 Profile

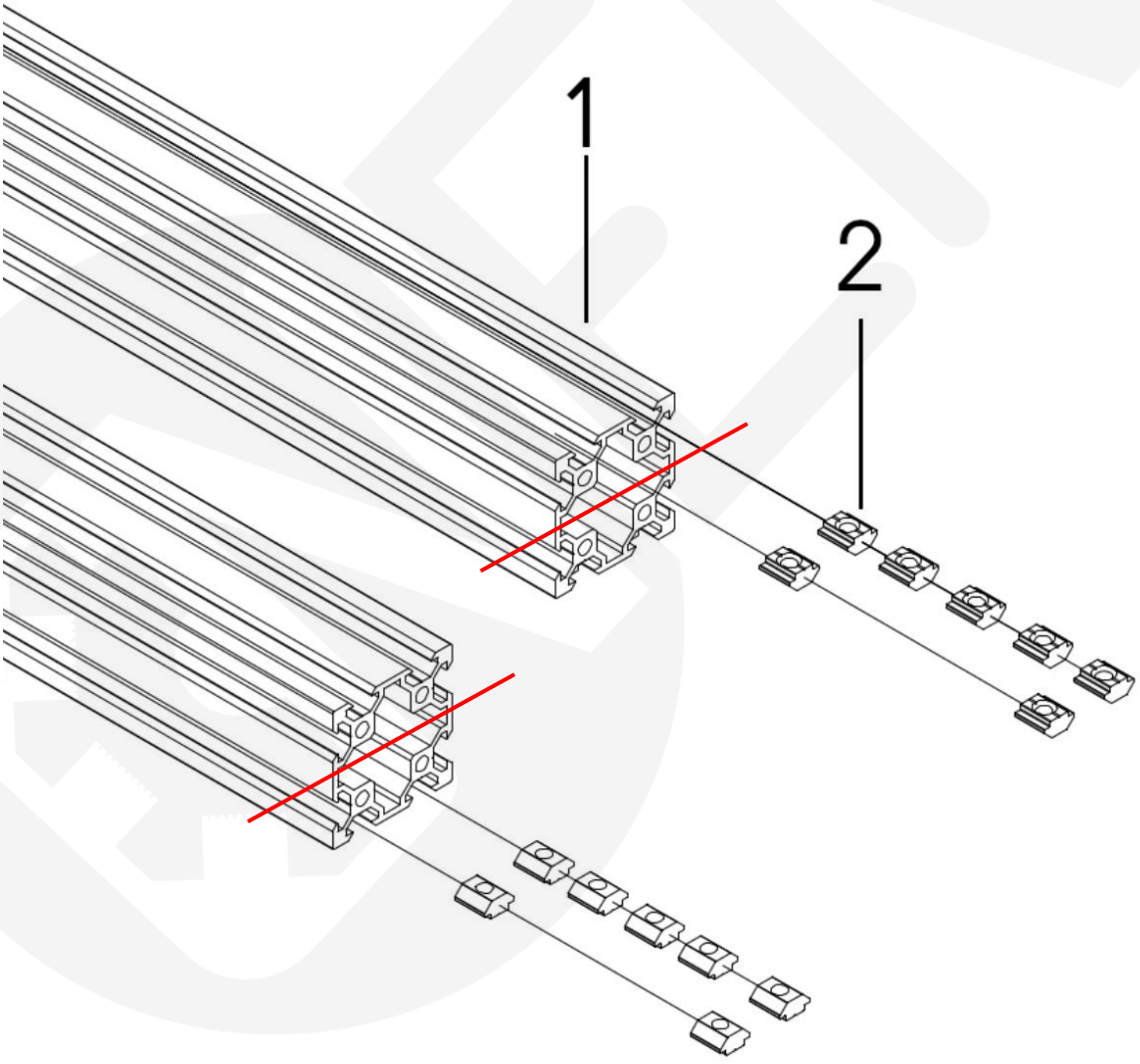
Article Nr.	Description	Quantity
1	2040 Profile	2
2	M5 sliding T nut	14

Attention: Picture shows a 4040 profile. However, this machine uses 2x 2040 profiles. The red line indicates the contact point of the two 2040 profiles.

Insert 7x M5 sliding T nut on the top of the top 2040 profiles as shown.

Insert 7x M5 sliding T nut on the bottom of the bottom 2040 profiles as shown.

The image shows the left and right sides of the same 2040 profiles.



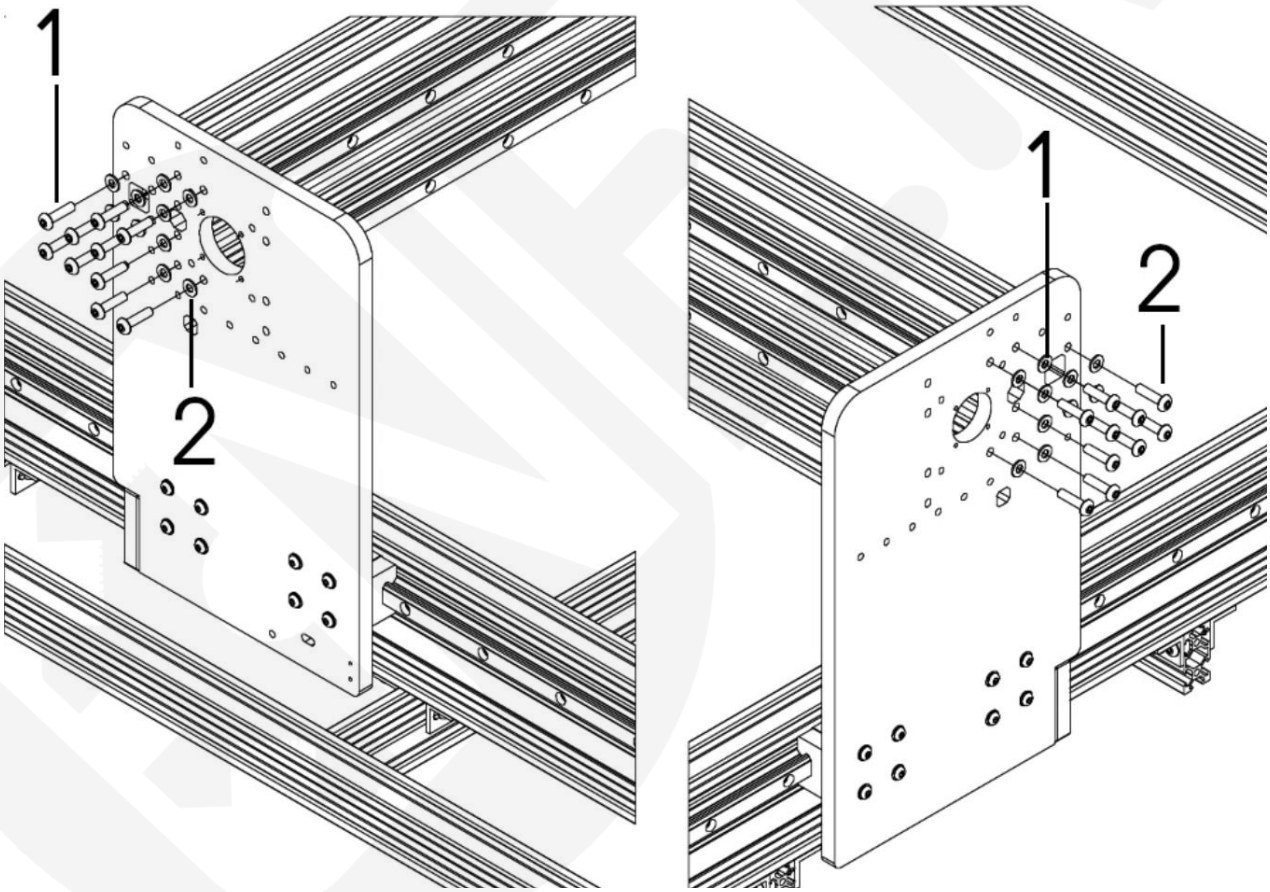
4.2 Extruded profiles and Y-plates

4.2.1 C-beam and 4040 on the Y-plates

Article Nr.	Description	Quantity
1	M5 x 20mm flat head screw	20
2	Precision washer 10x5x1	20

Insert 10x M5 x 20mm hexagon socket screws through the 10x5x1 precision washer, then attach the C-beam and two 2040 profiles to the Y-plate (left side) as shown.

Repeat the procedure on the opposite side.

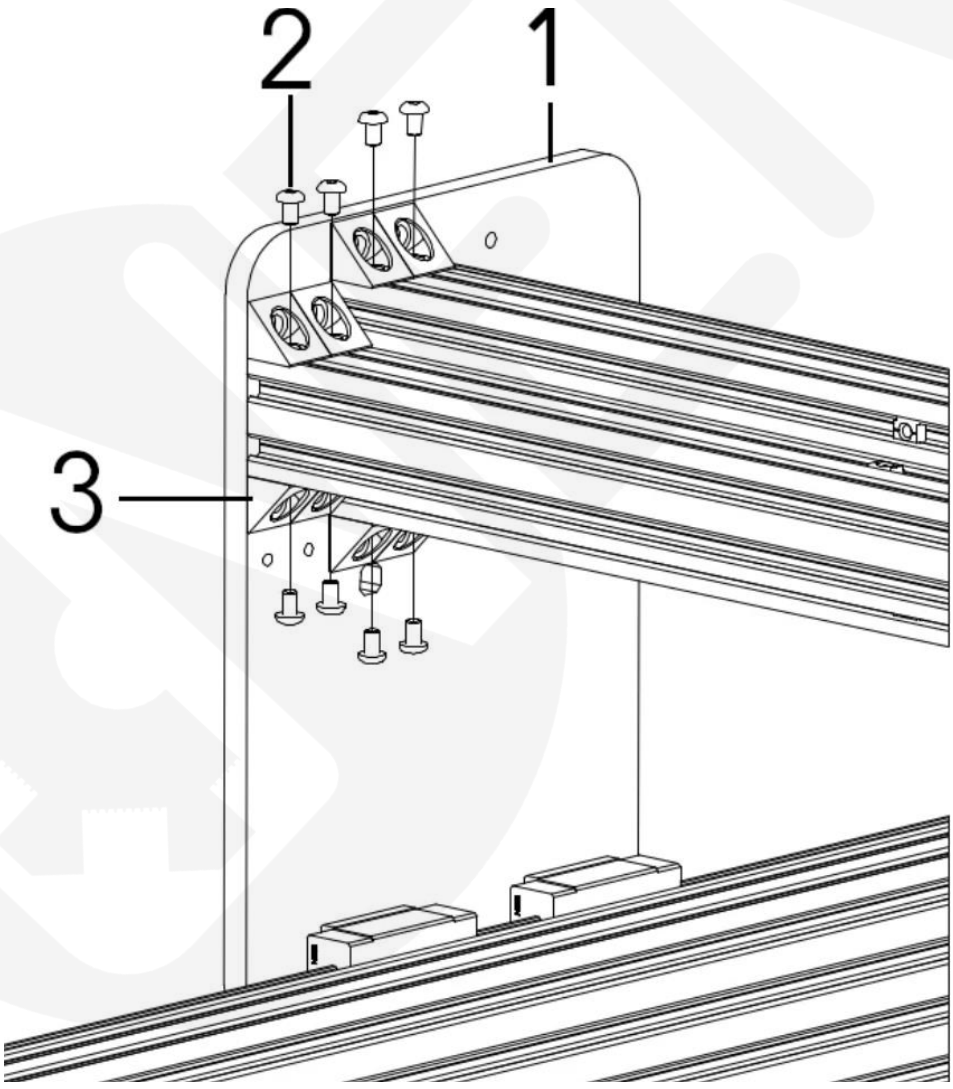


4.2.2 Angle brackets at the Y-plate

Article Nr.	Description	Quantity
1	Y-plate right	1
2	M5 x 8mm flathead screw	8
3	Angle bracket 90 degrees	8

Slide the M5 T-nuts inserted in previous chapters to the correct location, then use 8x M5 x 8mm flat head screws to attach the angle brackets to the C-beam and the two 2040 profiles as shown.

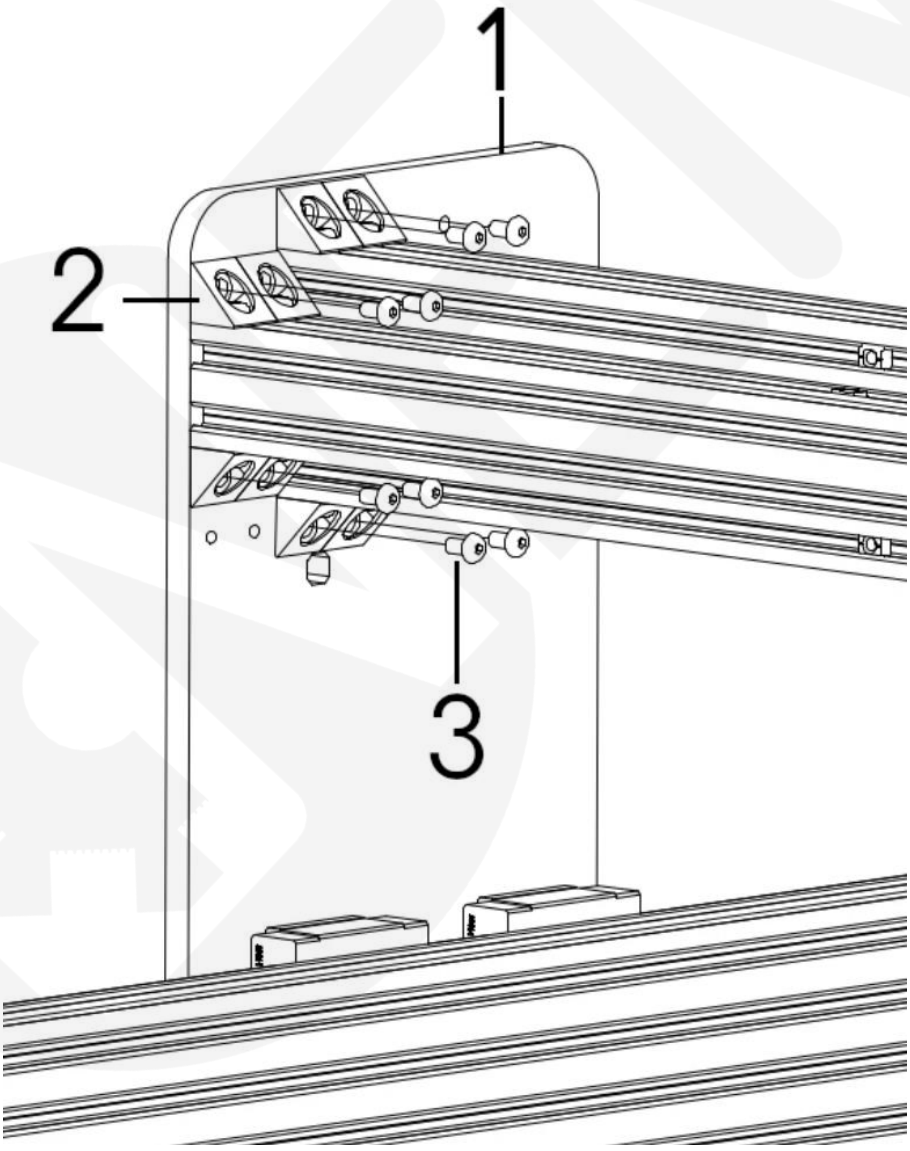
Repeat the procedure on the opposite side.



Article Nr.	Description	Quantity
1	Y-plate right	1
2	Angle bracket 90 degrees	8
3	M5 x 10mm flat head screw	8

Attach the brackets to the Y-plate with 8x M5 x 8mm screws as shown.

Repeat the procedure on the opposite side.

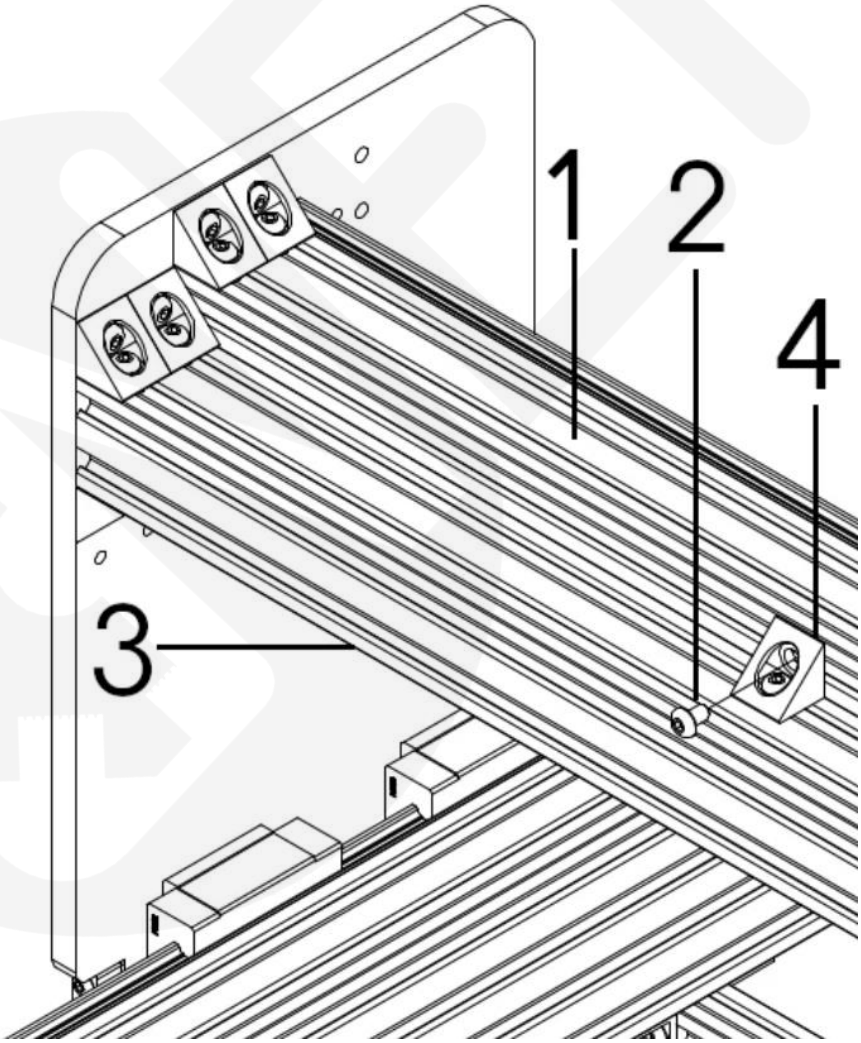


4.2.3 C-beam and 4040 angles

Article Nr.	Description	Quantity
1	C-Beam Profile	1
2	M5 x 8mm flat head screw	1
3	2040 Profile	1
4	Angle bracket 90 degrees	1

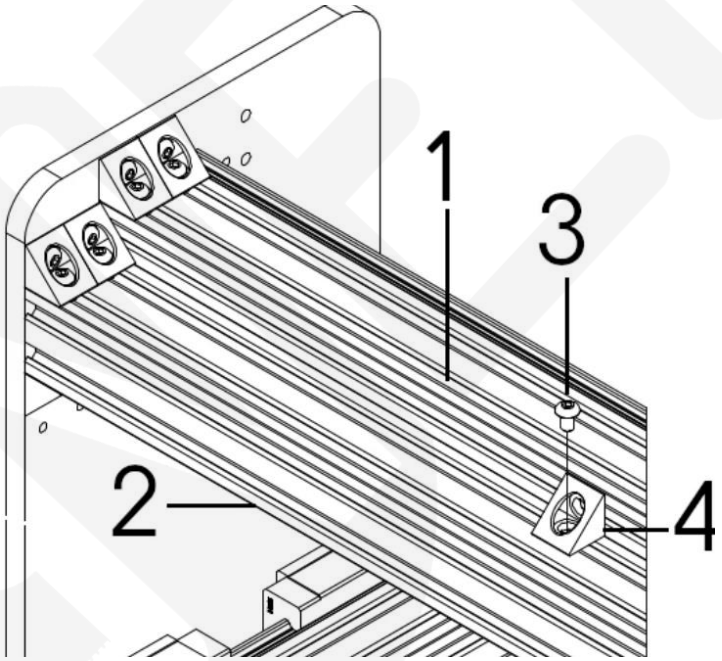
The M5 T-nuts should be positioned at 1/3 of the length of the profile.

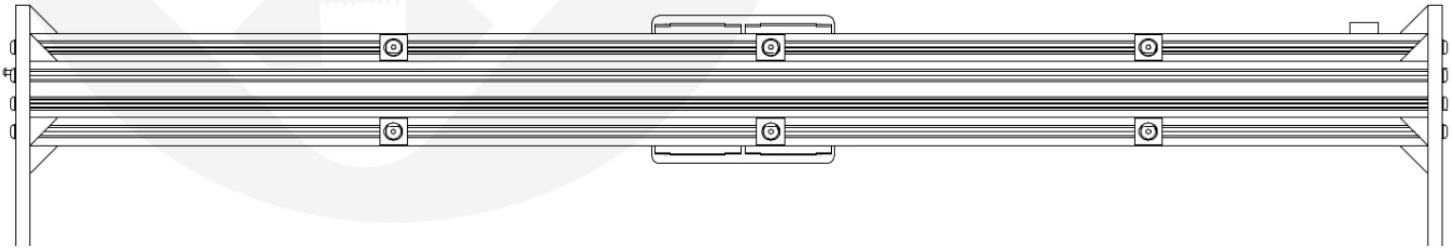
Attach the 90-degree angle brackets to the back of the C-beam profile with an M5x 8mm flat head screw.



Article Nr.	Description	Quantity
1	C-Beam Profile	1
2	2040 Profile	1
3	M5 x 8mm flat head screw	1
4	Angle 90 bracket degrees	1

Attach the angle bracket 90 degrees with an M5x 8 mm flat head screw on top of the 2040 profiles. Repeat the steps you just performed, using the screenshot below to find out where you want to position all brackets. At the end of these steps, the C-Beam and the 2040 profiles are connected by 6 brackets, 3 at the top and 3 at the bottom.





4.3 Ball screw

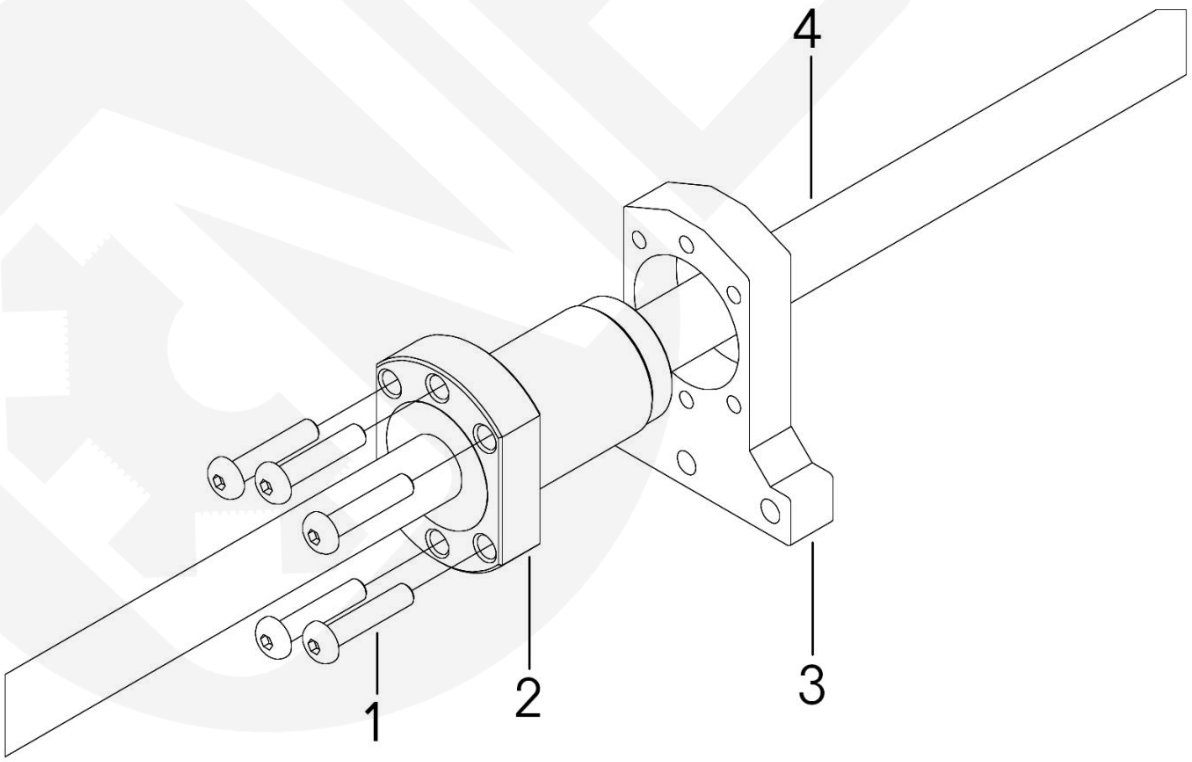
4.3.1 Ball nut and ball nut plate

Article Nr.	Description	Quantity
1	M4 x 20mm screw with flat head	6
2	Ballscrew-nut	1
3	Ball nut adapter plate	1
4	Ballscrew 1210	1

Place the ball nut adapter plate on the ball screw.

Attach the ball nut adapter plate to the ball screw nut with 6x M4 x 20mm flat head screws.

Under no circumstances remove the ball screw nut from the ball screw. The ball nut ball bearing mechanism is held only by the ball screw. If you remove the ball nut from the ball screw, the bearings will fall out and void the warranty.

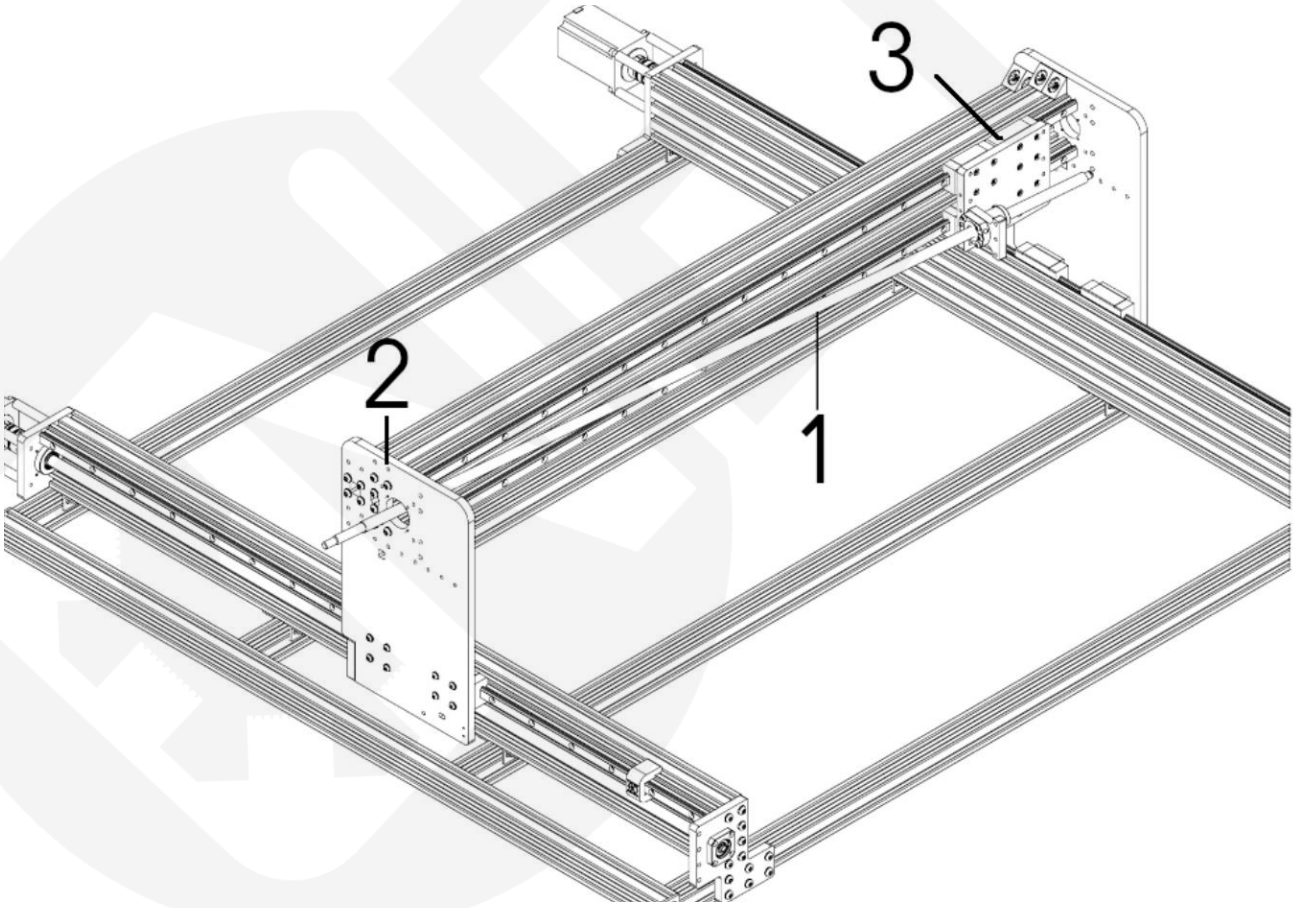


4.3.2 Insertion of the ballscrew into the X-axis

Article Nr.	Description	Quantity
1	Ball screw 1210	1
2	Y-plate left	1
3	X-axis and X-plate	1

Move the X-axis plate as far away as possible from the Y-plate on the left.

Pass the ball screw through the hole in the Y-plate on the left.

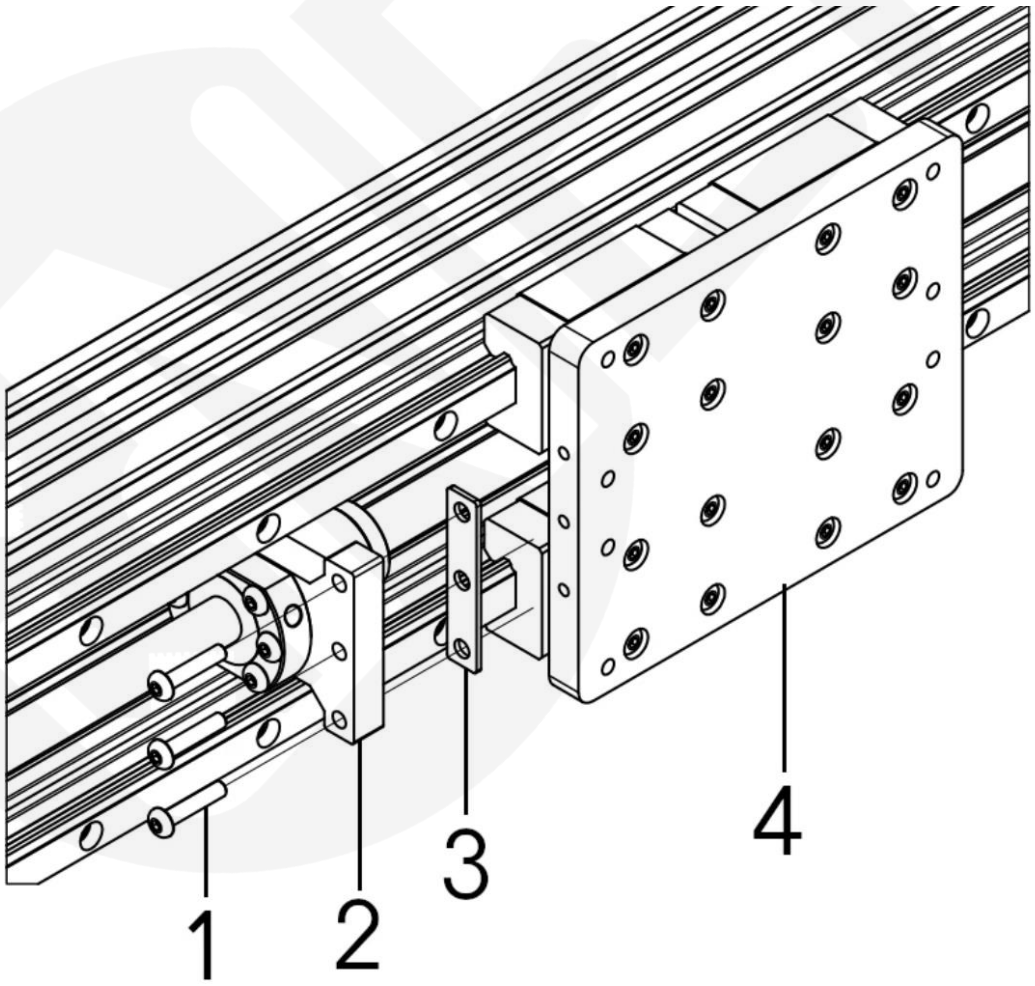


4.3.3 Ball nut plate and X-plate

Article Nr.	Description	Quantity
1	M4 x 20mm screw with flat head	3
2	Ball nut adapter plate	1
3	Gasket 50x10mm	1
4	X-axis plate	1

Tighten the ball nut adapter plate on the X-axis plate with 3 x M4x 20 mm flat head screws. Insert the gasket 50x10mm between the ball nut plate/bracket and the X-axis plate. Tighten the screws completely and then twist them out by 2 turns.

Do not leave the M4x 20mm lens screws fully tightened. The final tightening takes place in the chapter "Aligning".



4.4 FK and FF camps

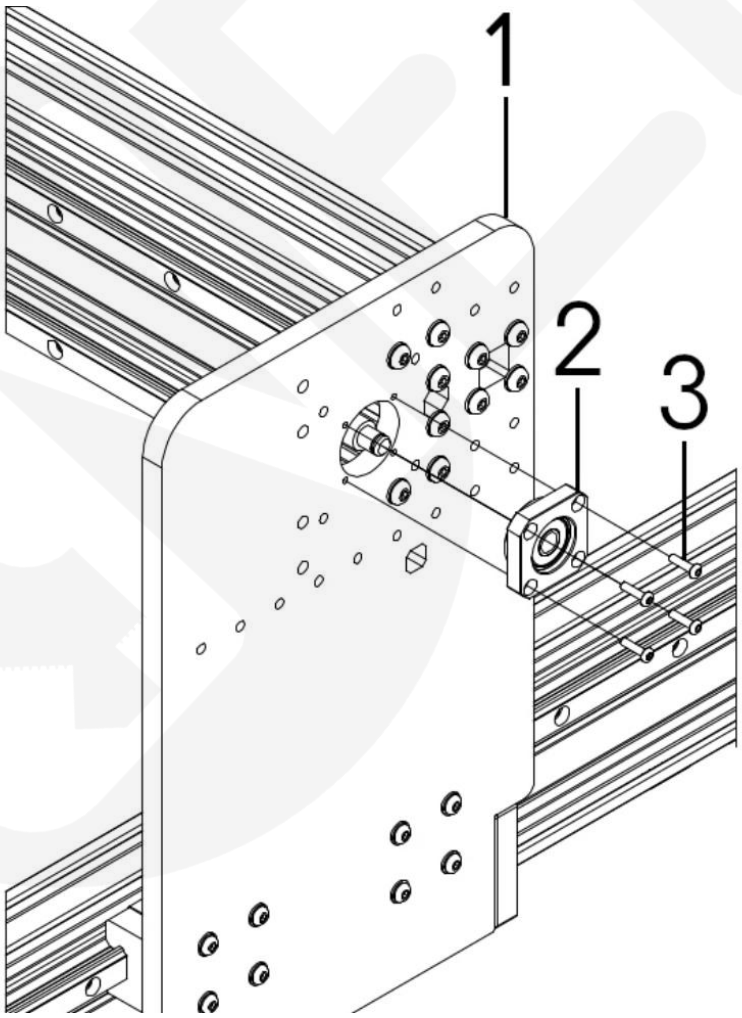
4.4.1 FF bearings (loose bearings)

Article Nr.	Description	Quantity
1	Y-plate right	1
2	FF bearings (loose bearings)	1
3	M3 x 12 mm flat head screw	4

Pass the FF bearing block (loose bearing) through the ball screw.

Attach the FF bearing block with 4x M3 x 12mm flat head screws to the Y-plate on the right.

When tightening the screws, tighten all screws completely, then loosen them by 2 turns. This part is described in Chapter 4. 5 Aligning.



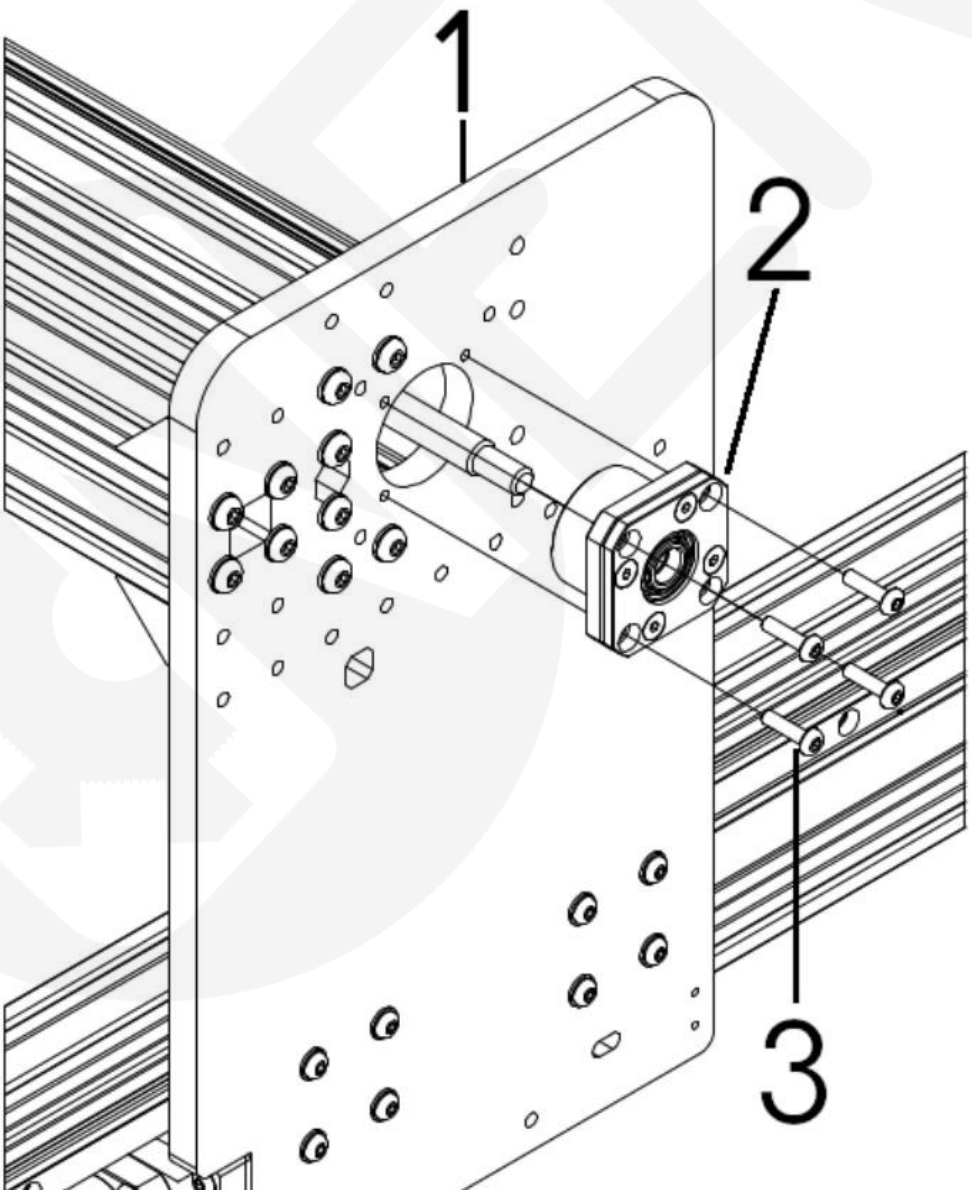
4.4.2 FK storage (fixed bearings)

Article Nr.	Description	Quantity
1	Y-plate left	1
2	FK warehouse (fixed bearings)	1
3	M4 x 16mm screw with flat head	4

Pass the FK bearing block (fixed bearing) through the ball screw.

Attach the FK bearing block with 4x M4 x 16mm flat head screws to the Y-plate on the left.

When tightening the screws, tighten all screws completely, then loosen them by 2 turns. This part is described in Chapter 4. 5 Aligning.



4.4.3 Locking nut and diaphragm coupling

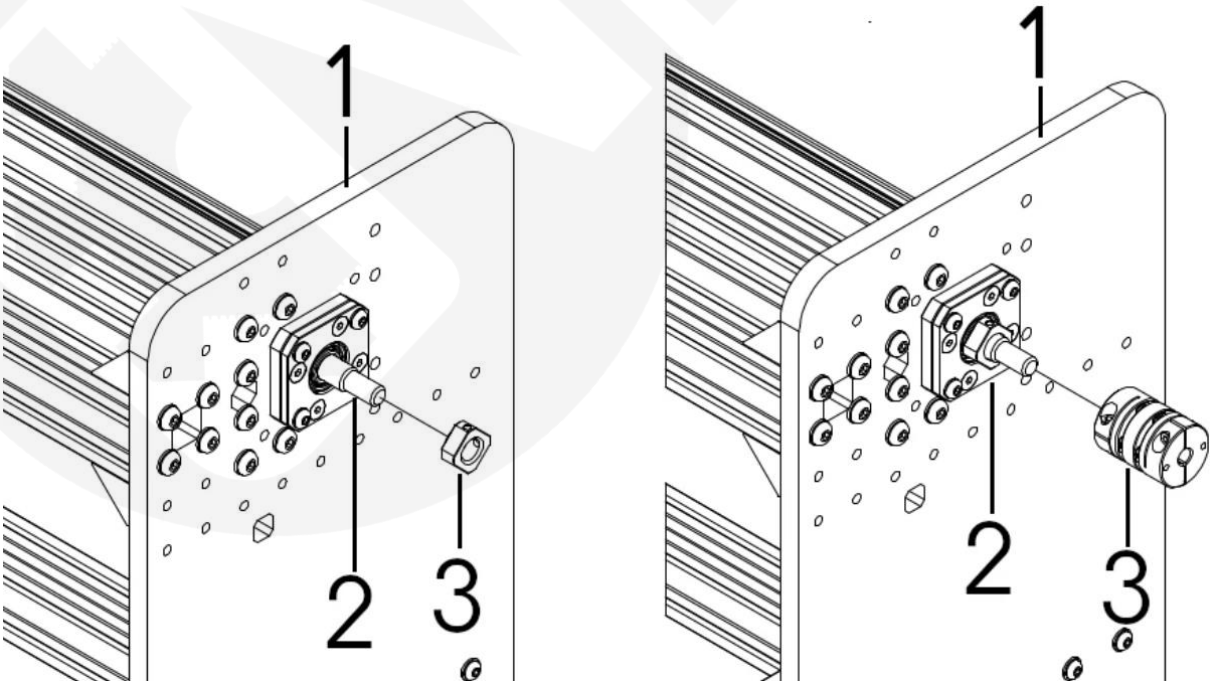
Article Nr.	Description	Quantity
1	Y-plate left	1
2	Ball screw 1210	1
3	FK locking nut	1

Manually screw the FK lock nut onto the end of the ball screw, which is located at the fixed end.

Tighten the grub screw on the FK lock nut to secure the FK lock nut.

Article Nr.	Description	Quantity
1	Y-plate left	1
2	Ball screw 1210	1
3	Diaphragm coupling	1

Place the diaphragm coupling on the fixed end of the ball screw. Tighten the grub screw on the diaphragm coupling to secure it to the ball screw.



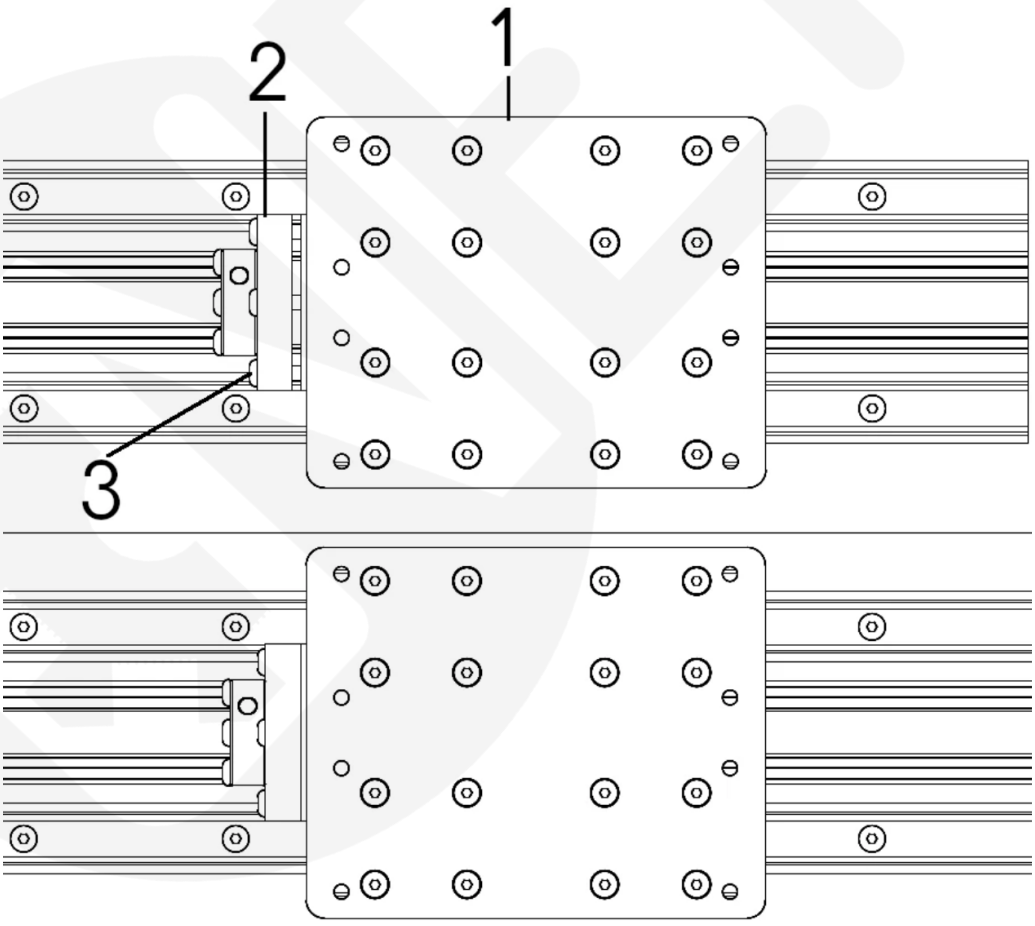
4.5 Aligning

4.5.1 Tightening the ball nut adapterplate

Article Nr.	Description	Quantity
1	X-axis plate	1
2	Ball nut adapter plate	1
3	M4 x 20mm screw with flat head	3

Tighten the screws on the ball nut plate/bracket as shown in the figure.

Avoid tightening too tightly. The seal has a minimum of flexibility to compensate for misalignment of the system. Tightening too much means your system is less flexible to adapt to a misalignment.

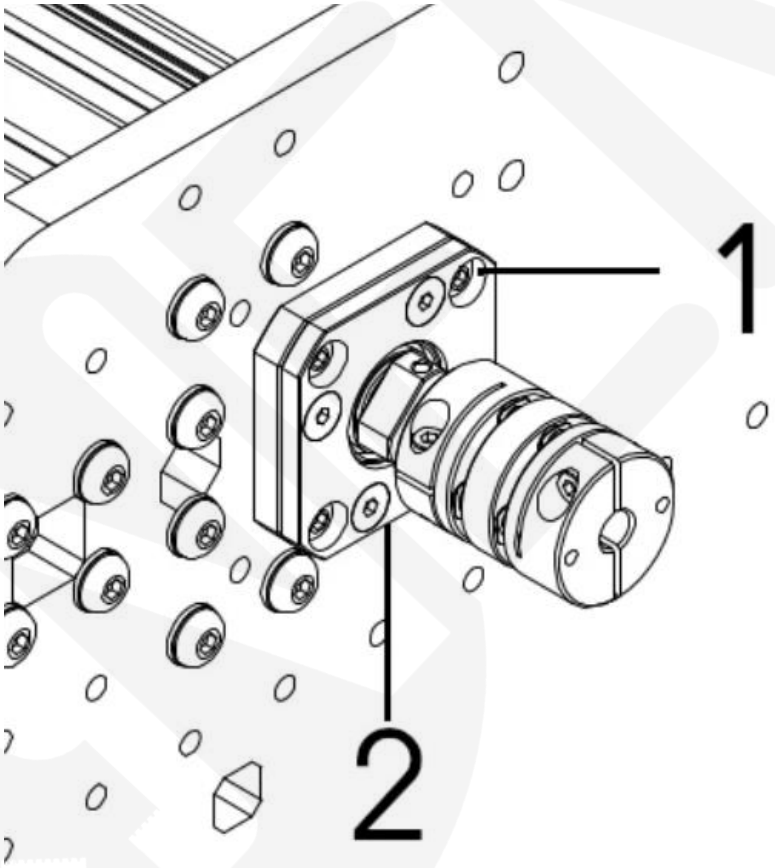


4.5.2 Fixed bearings

Article Nr.	Description	Quantity
1	M4 x 16mm screw (pre-assembled)	4
2	FK warehouse (fixed bearings)	1

Slide the X-plate to the left toward the fixed end of the actuator, as shown in the figure below.

Bring the X-plate as close as possible to the fixed storage and then tighten the 4x M4x 16mm lens screws.

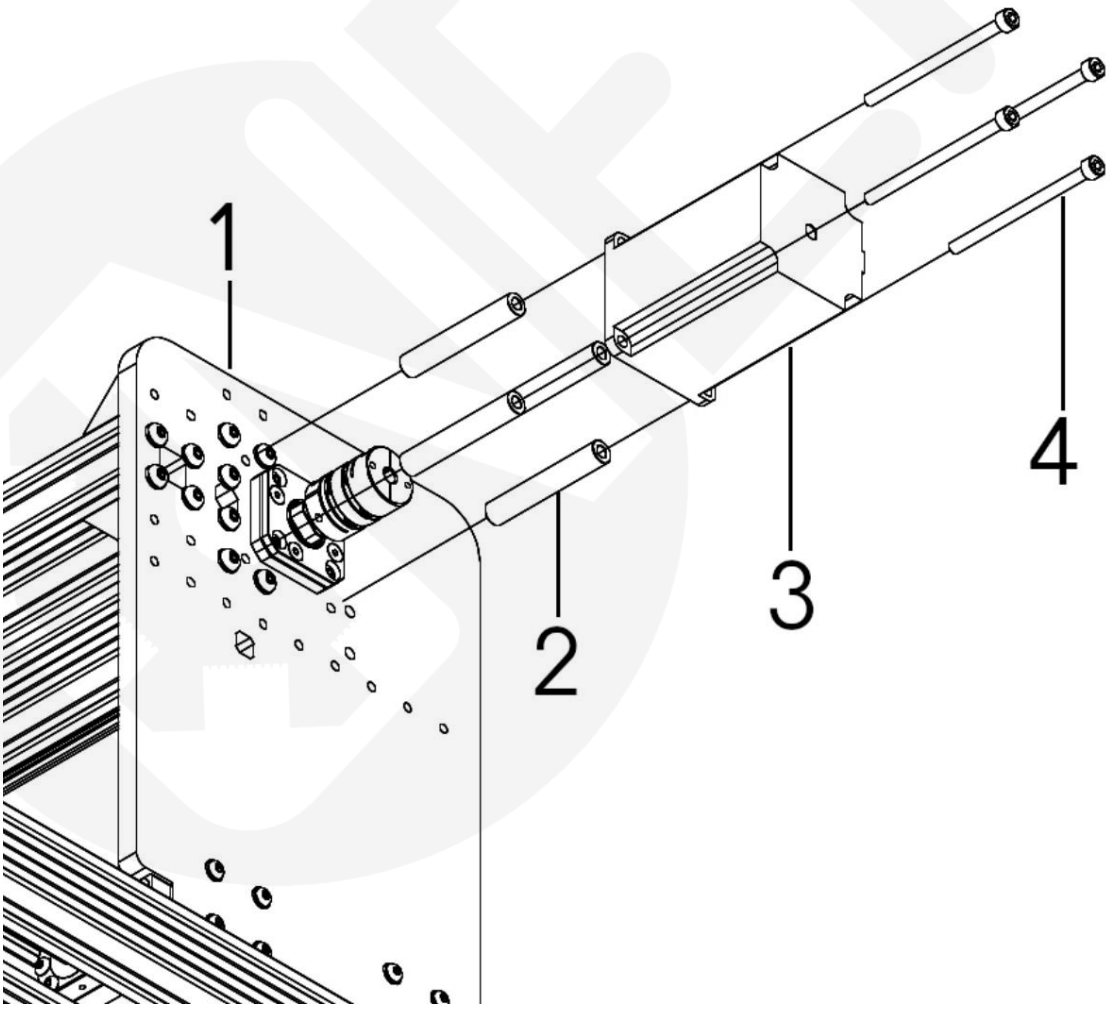


4.5.3 Stepper motor

Article Nr.	Description	Quantity
1	Y-plate - left	1
2	Precision spacers - 60mm	4
3	Stepper motor	1
4	M5 x 75mm cylinder head bolt	4

First insert the M5 x 75 mm cylinder head bolts through the mounting holes of the stepper motor and also through the 60 mm precision spacers and then attach them to the Y-plate - left after aligning the motor shaft inside the diaphragm coupling.

Do not tighten the grub screw on the diaphragm coupling yet.

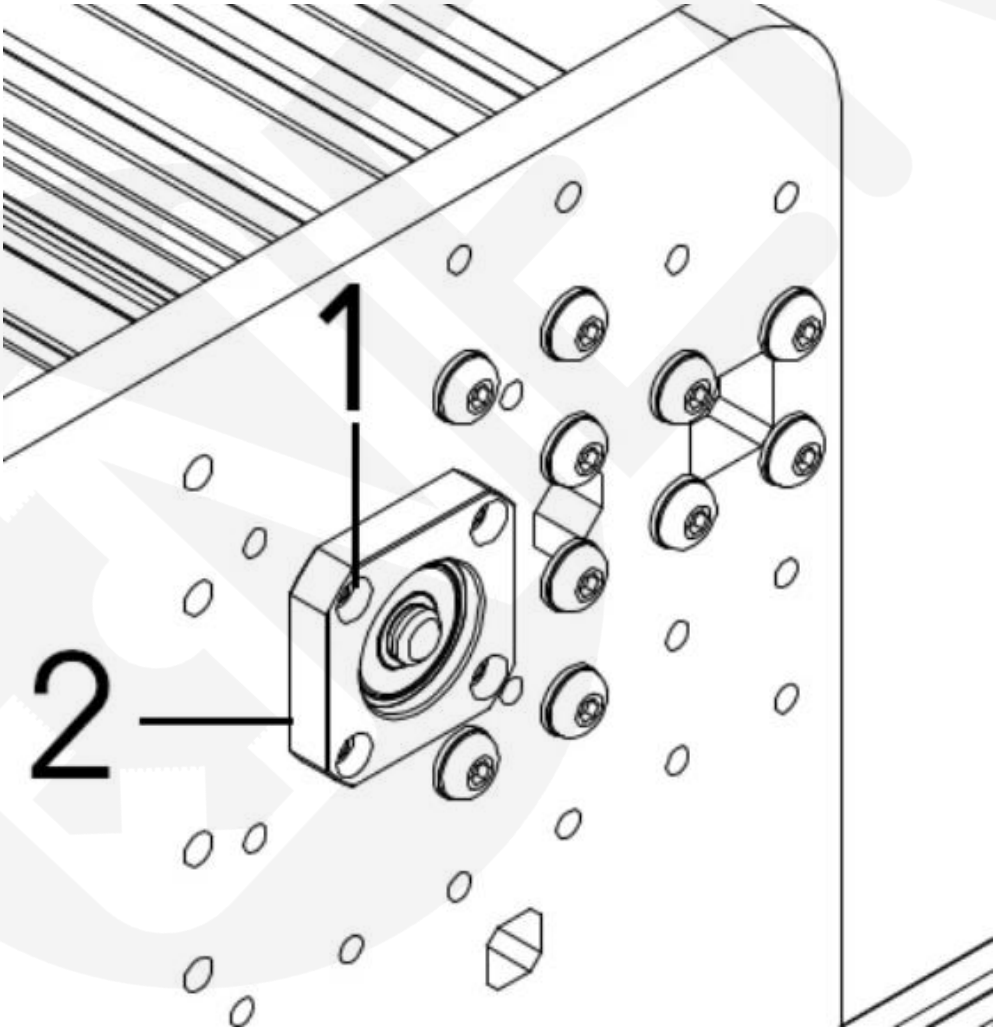


4.5.4 Loose bearing

Article Nr.	Description	Quantity
1	M3 x 12 mm flat head screw (pre-assembled)	4
2	FF bearings (loose bearings)	1

Slide the X-plate to the right toward the loose end of the actuator as shown.

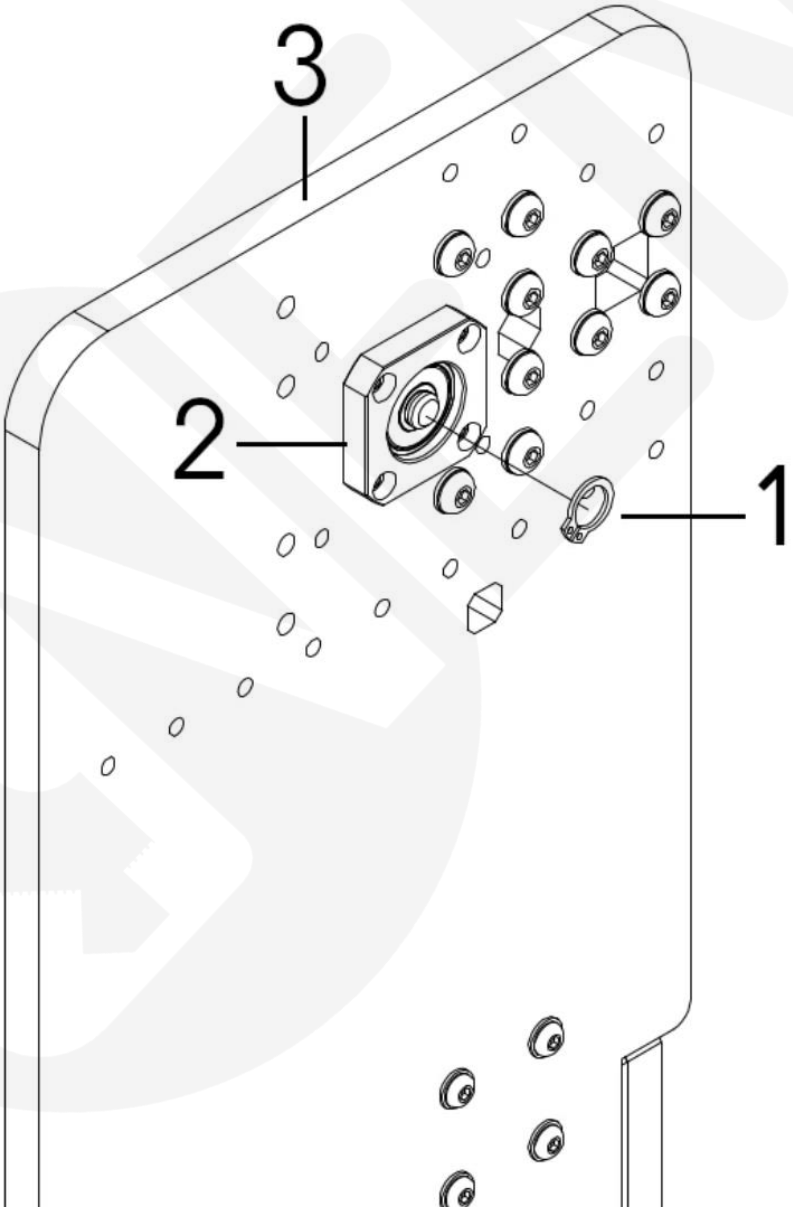
Bring the X-plate as close as possible to the loose bearing, then tighten the 4x M3x12 mm flat head screws.



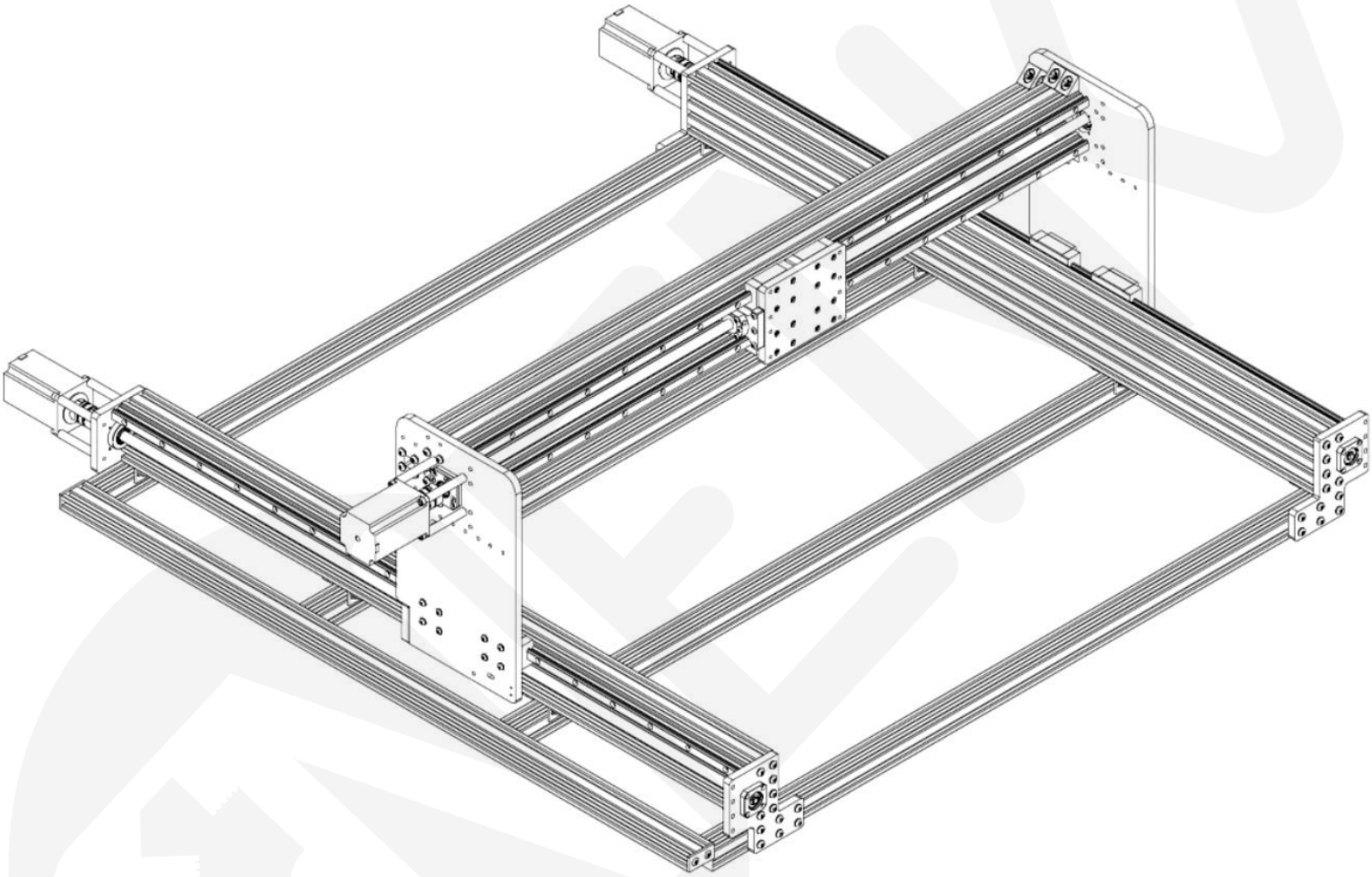
4.5.5 Retaining ring

Article Nr.	Description	Quantity
1	C-Clip Retaining Ring	1
2	FF bearings (loose bearings)	1
3	Y-plate right	1

Place the retaining ring on the loose end of the ball screw with a retaining ring plier as shown.



4.6 X-axis complete



4.7 Lubrication of the X-axis

4.7.1 HGH bearing blocks

Place the axle on its side and locate the grease nipple on the HGH bearing blocks. As we have already recommended, the grease nipples should be directed outwards. Connect the grease gun to the grease nipple and press the grease in. The grease should emerge from the bearing. Repeat this procedure for all HGH storage blocks.

4.7.2 Ball screw

Place the axle on its side and locate the grease nipple on the ball nut. Attach the grease gun to the grease nipple and press in the grease. Some grease will come out of the back of the ball screw wiper seal.

Move the axes back and forth several times by hand. This lubricates the rail and circulates the grease on all bearings and ball screws, ensuring uniform lubrication.

5.0 Z-axis

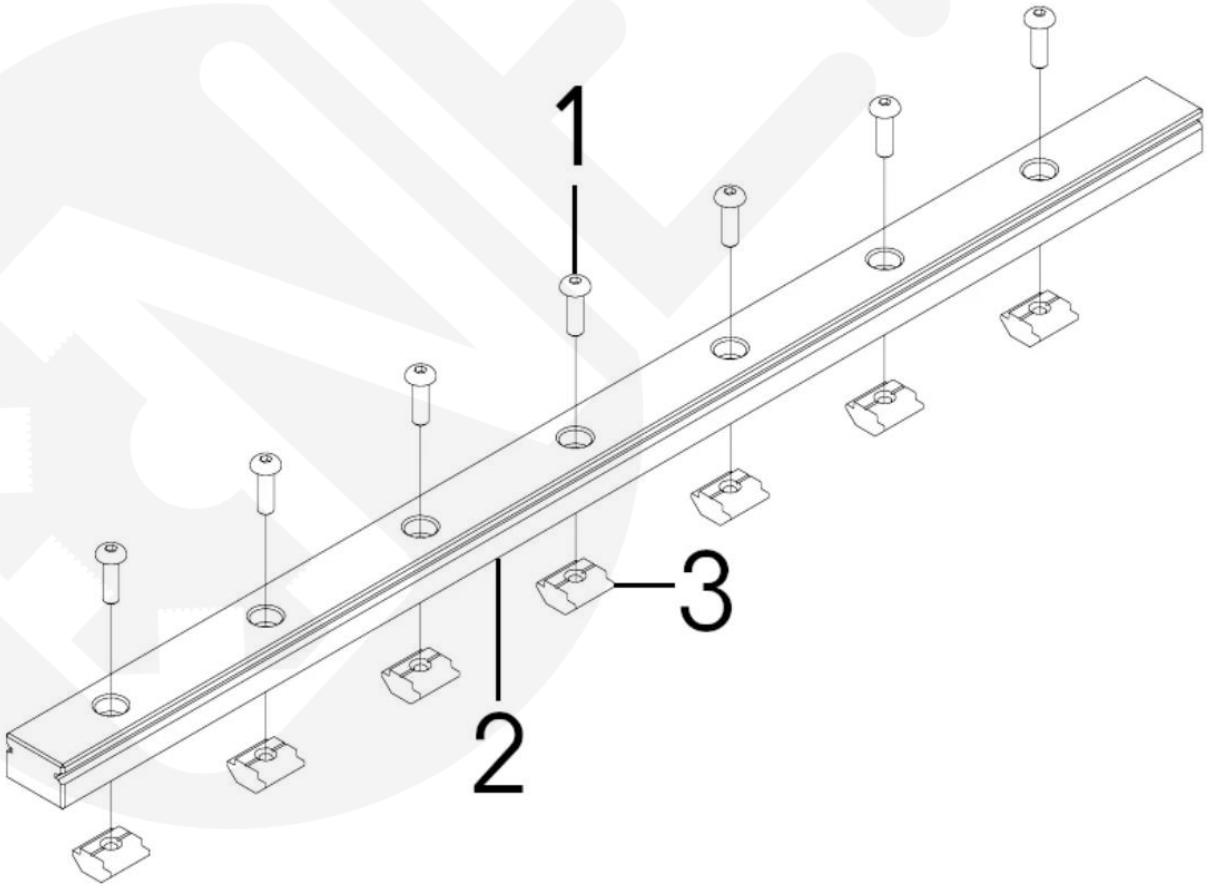
5.1 C-beam and MGN rails

5.1.1 MGN rail preparation

Article Nr.	Description	Quantity
1	M3 x 10mm screw with flat head	8
2	MGN15 rail	1
3	M3 Sliding T-nut	8

Insert the M3 x 10mm flat head screw through the MGN rail and screw the M3 T-nuts to the other end. Half a turn on a screw is sufficient. We will tighten them later.

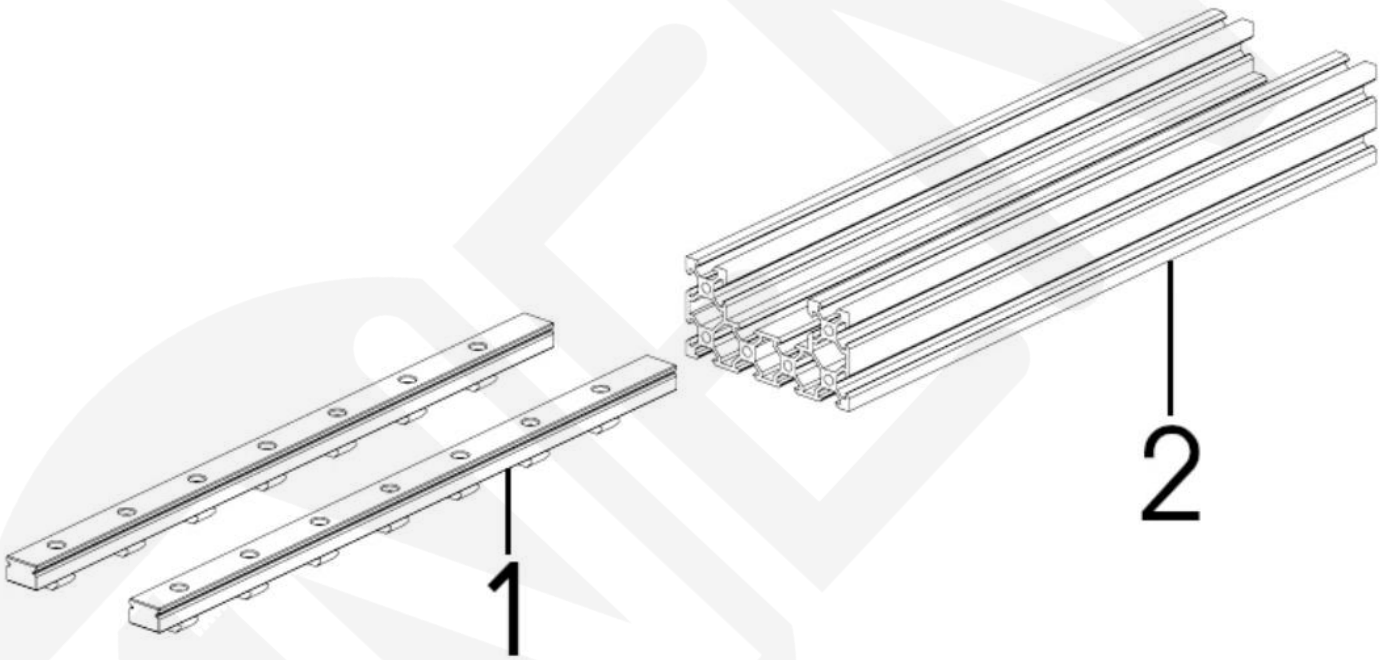
Repeat this process for both MGN 15 rails of the Z-axis.



5.1.2 Attaching the MGN rail to the C-Beam

Article Nr.	Description	Quantity
1	MGN 15 rail	2
2	C-Beam Profile	1

Slide both MGN 15 rail assemblies into the C-Beam as shown.



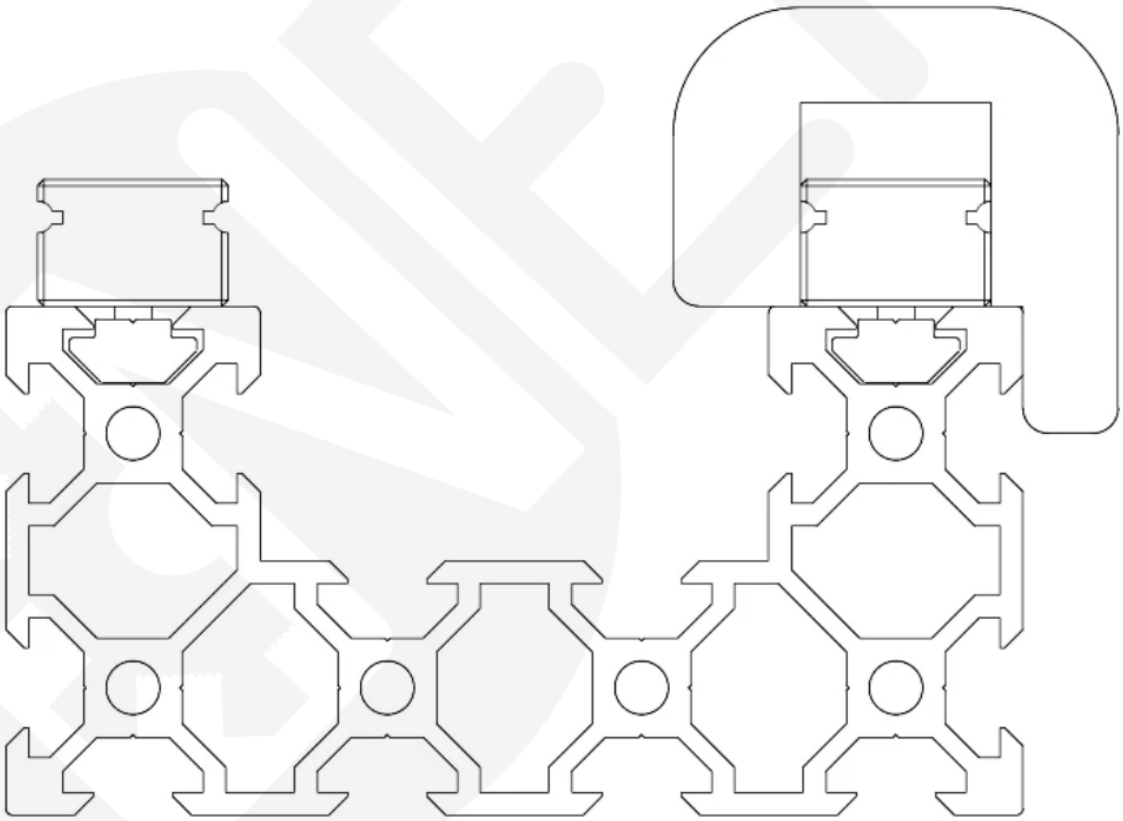
5.1.3 Alignment Tool

Article Nr.	Description	Quantity
1	C-Beam Profile	1
2	Alignment tool	1

Slide the alignment tool onto the MGN 15 rail and bring it close to the end of the rail. Tighten the M3 x 10 mm hexagon socket screw pre-assembled in Chapter 5.1.1.

Repeat the process by moving the alignment tool and tightening all M3 x 10 mm hexagon socket bolts one by one.

When tightening the M3 x 10 mm hexagon socket bolts, pay attention to the amount of torque. Tightening too hard can damage the screw head or Allen wrench.

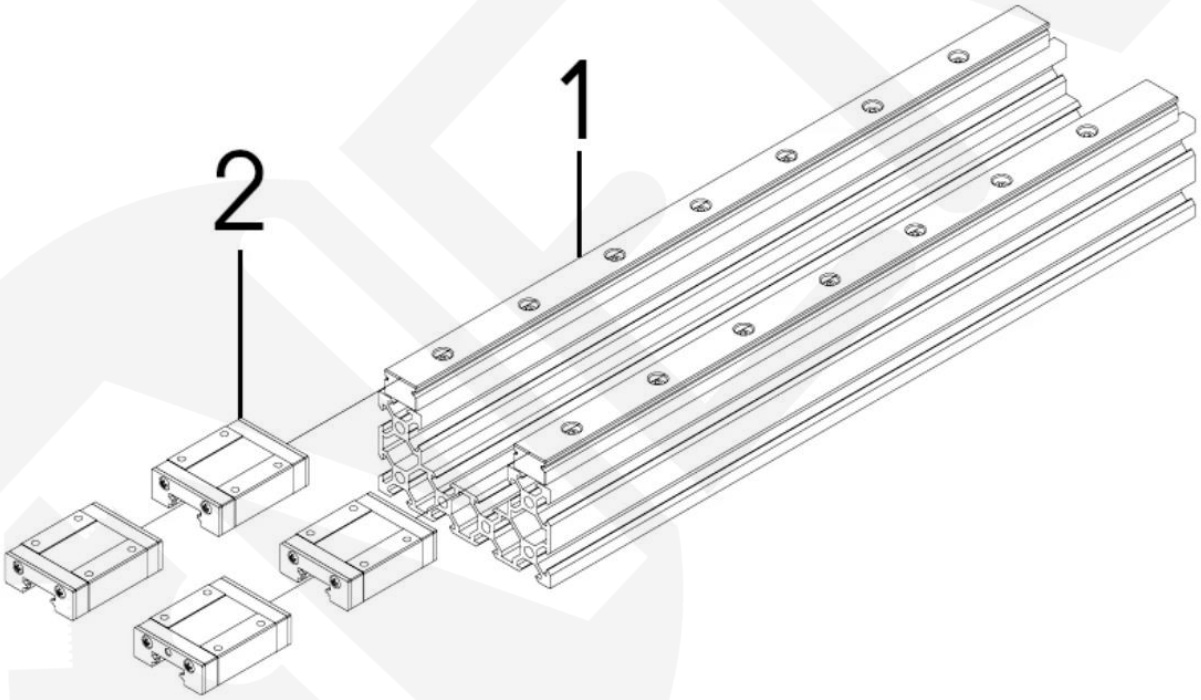


5.1.4 MGN 15 Bulkheads

Article Nr.	Description	Quantity
1	MGN 15 rail	2
2	MGN 15 storage blocks	4

Push 2x MGN 15 bearing blocks onto the two MGN-15 rails.

To avoid the loss of balls, store the supplied plastic holder on the bearing block. When mounting the bearing block on the rail, use the rail to push the plastic bracket out of the block so that the steel balls are preloaded and in contact with a rail at all times.

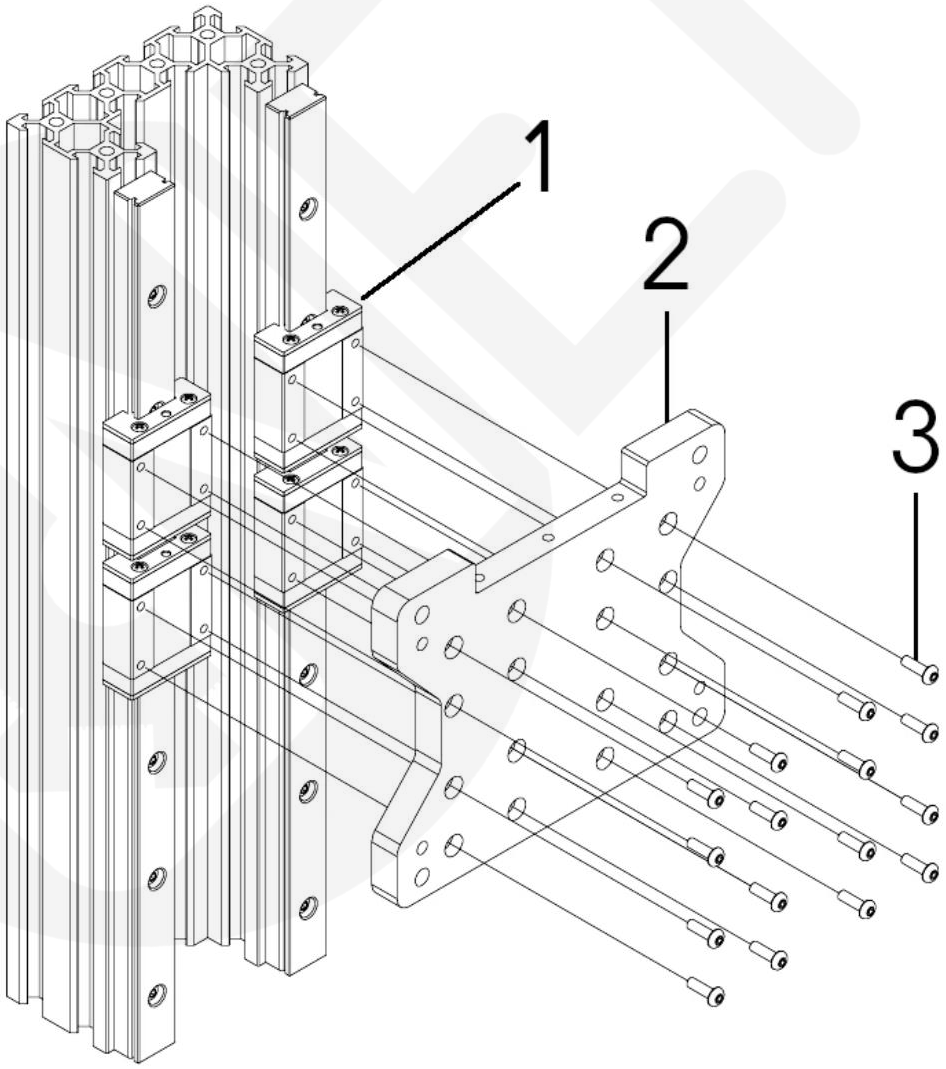


5.2 Z-plate

Article Nr.	Description	Quantity
1	MGN 15 storage blocks	4
2	Z-plate	1
3	M3 x 10mm screw with flat head	16

Attach the Z-plate to the 4x MGN 15 bearing blocks with M3 x 10mm flat head screws as shown in the figure.

When attaching the screws to each bearing, start with the screw in the upper left corner and tighten this screw by one turn. Now tighten the screw at the bottom left by one turn. Continue like this, always crosswise, until all screws are fixed.



5.3 Ball screw

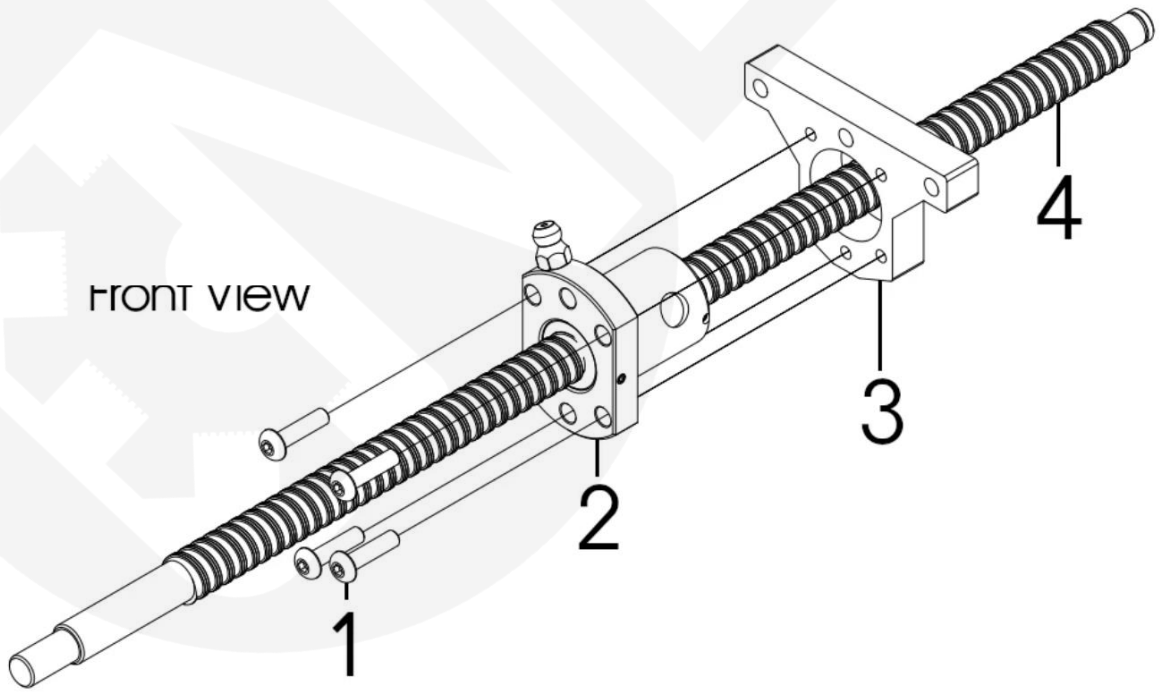
5.3.1 Ball nut and spherical nut plate

Article No.	Description	Quantity
1	M4 x 16mm screw with flat head	5
2	Ballscrew-nut	1
3	Ball nut adapter plate	1
4	Ballscrew 1210	1

Place the ball nut adapter plate on the ball screw.

Attach the ball nut adapter bar to the ball screw nut with 5x M4 x 16mm flat head screws.

Under no circumstances remove the ball screw nut from the ball screw. The ball nut ball bearing mechanism is held only by the ball screw. If you remove the ball nut from the ball screw, the bearings will fall out and void the warranty.



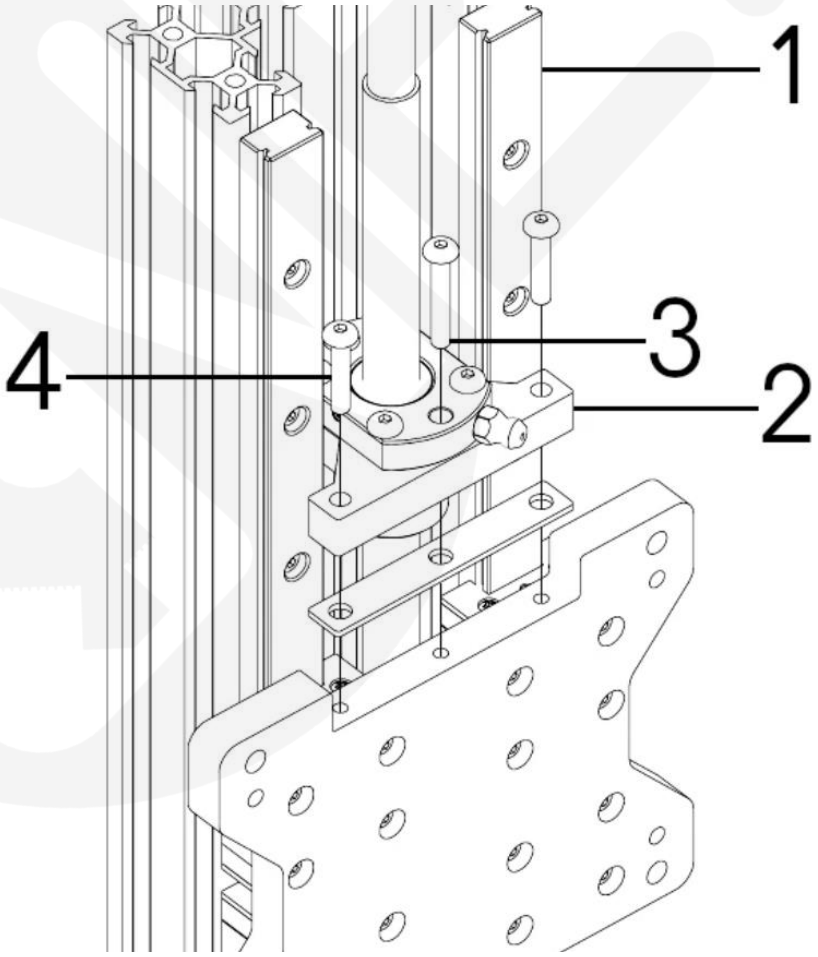
5.3.2 Ball nut plate and Z-plate

Article Nr.	Description	Quantity
1	C-Beam Profile	1
2	Ball nut adapter plate	1
3	M4 x 25mm screw with flat head	1
4	M4 x 20mm screw with flat head	2

Tighten the ball nut adapter plate on the Z-axis plate with 2 x M4x 20-mm and 1 x M4 x 25mm flat head screw. Insert the gasket 50x10mm between the ball nut plate/bracket and the Z-axis plate. Tighten the screws completely and then twist them out by 2 turns.

Do not leave the lens head screws fully tightened. The final tightening takes place in the chapter "Aligning".

The longer M4 x 25 mm head screw is inserted into the middle hole.

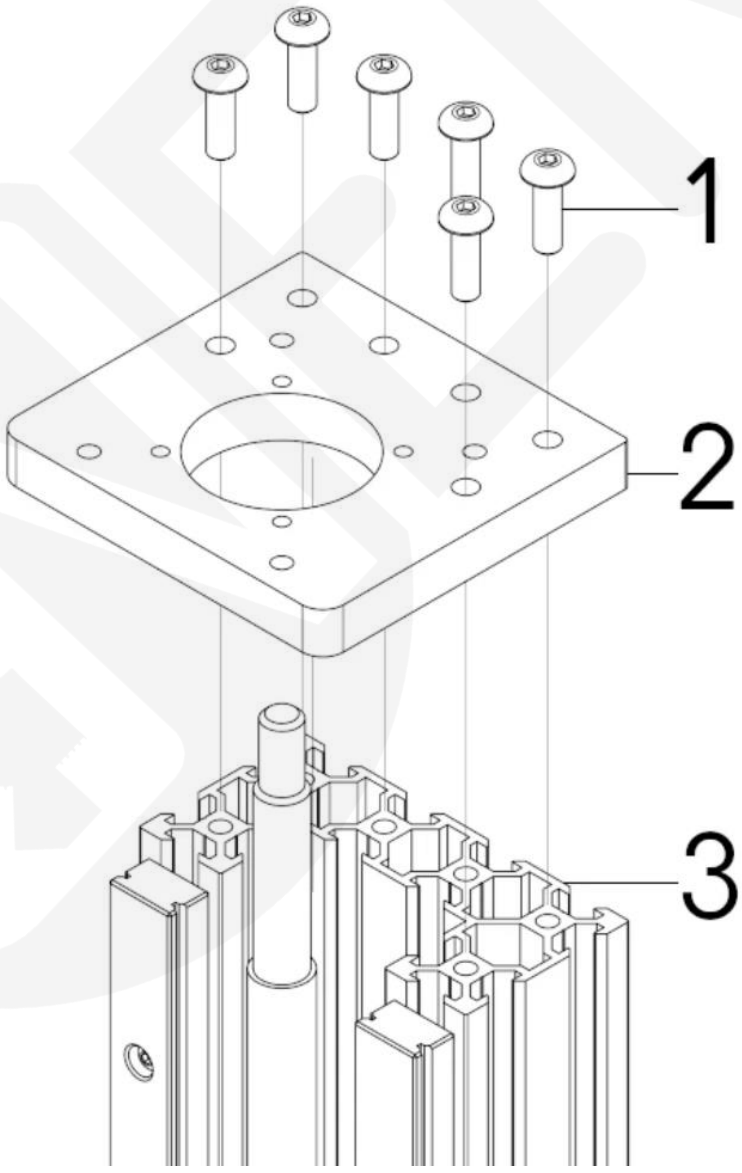


5.4 End plates

5.4.1 End plate (fixed end)

Article Nr.	Description	Quantity
1	M5 x 16mm flat head screw	6
2	Z Top Plate	1
3	C-Beam Profile	1

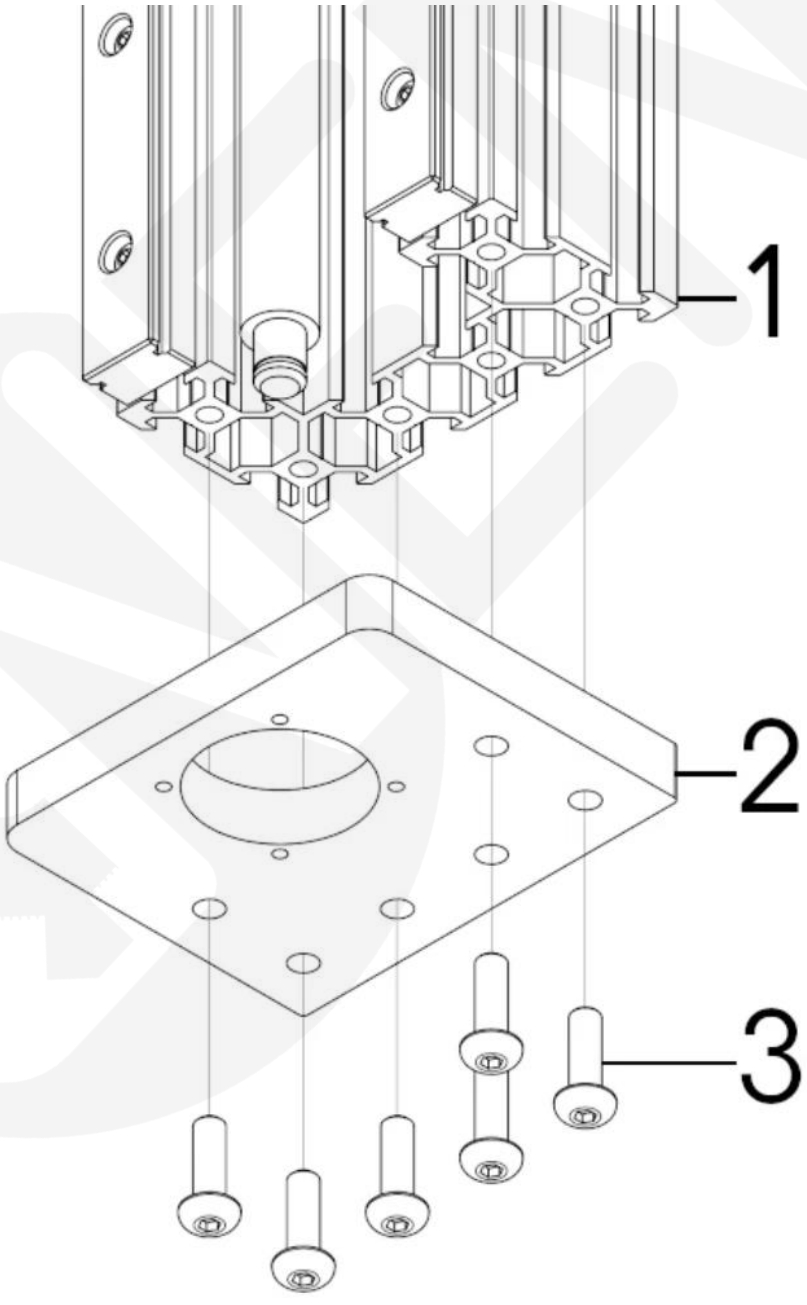
Attach the Z-top plate to the C-beam profile with 6x M5 x 16mm flat head screws.



5.4.2 End plate (loose end)

Article Nr.	Description	Quantity
1	C-Beam Profile	1
2	Z-base plate	1
3	M5 x 16mm flathead screw	6

Attach the Z-base plate with 6x M5 x 16 mm flat head screws to the C-beam profile.



5.5 FK and FF bearings

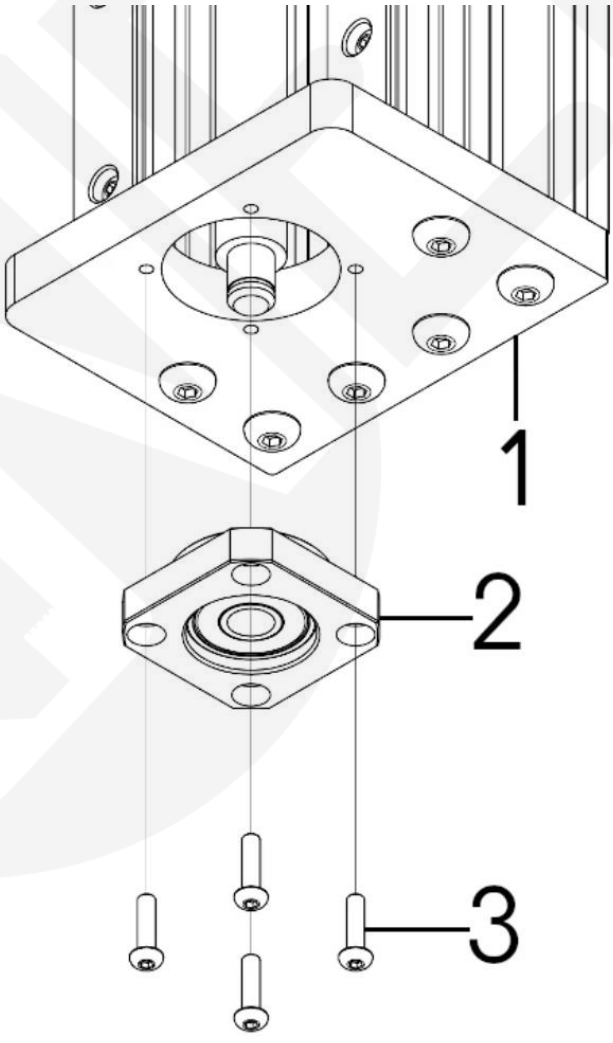
5.5.1 FF bearing (loose)

Article Nr.	Description	Quantity
1	Z-base plate	1
2	FF bearings (loose bearings)	1
3	M3 x 12 mm flat head screw	4

Pass the FF bearing block (loose bearing) through the ball screw.

Attach the FF bearing block to the Z-base plate with 4x M3 x 12mm flat head screws.

When tightening the screws, tighten all screws completely, then loosen them by 2 turns. This part is described in Chapter 5.6 Aligning.



5.5.2 FK bearing (fixed)

Article Nr.	Description	Quantity
1	FK locking nut	1
2	M4 x 16mm screw with flat head	4
3	FK storage block (fixed bearing)	1
3	Z Top Plate	1

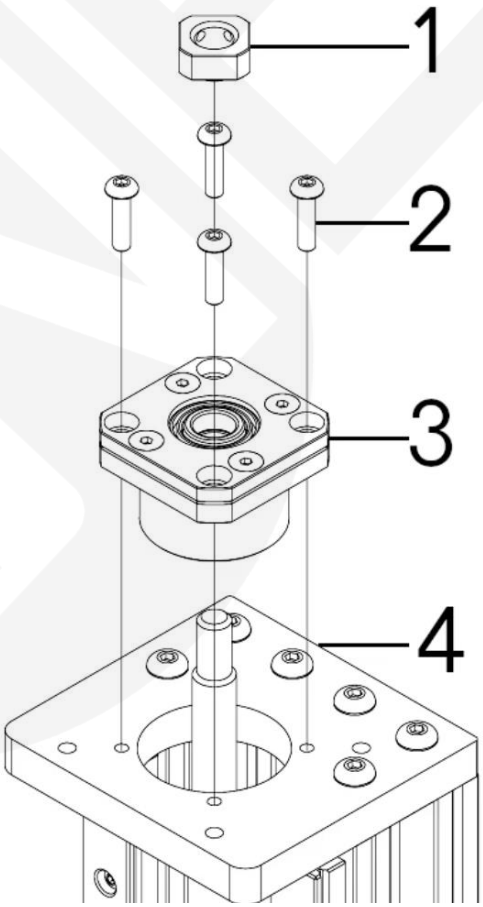
Pass the FK bearing block (fixed bearing) through the ball screw.

Attach the FK bearing block with 4x M4 x 16mm flat head screws to the Y-plate on the left.

When tightening the screws, tighten all screws completely, then loosen them by 2 turns. This part is described in Chapter 5. 6 Aligning

Manually screw the FK lock nut onto the end of the ball screw, which is located at the fixed end.

Tighten the grub screw on the FK lock nut to secure the FK lock nut.



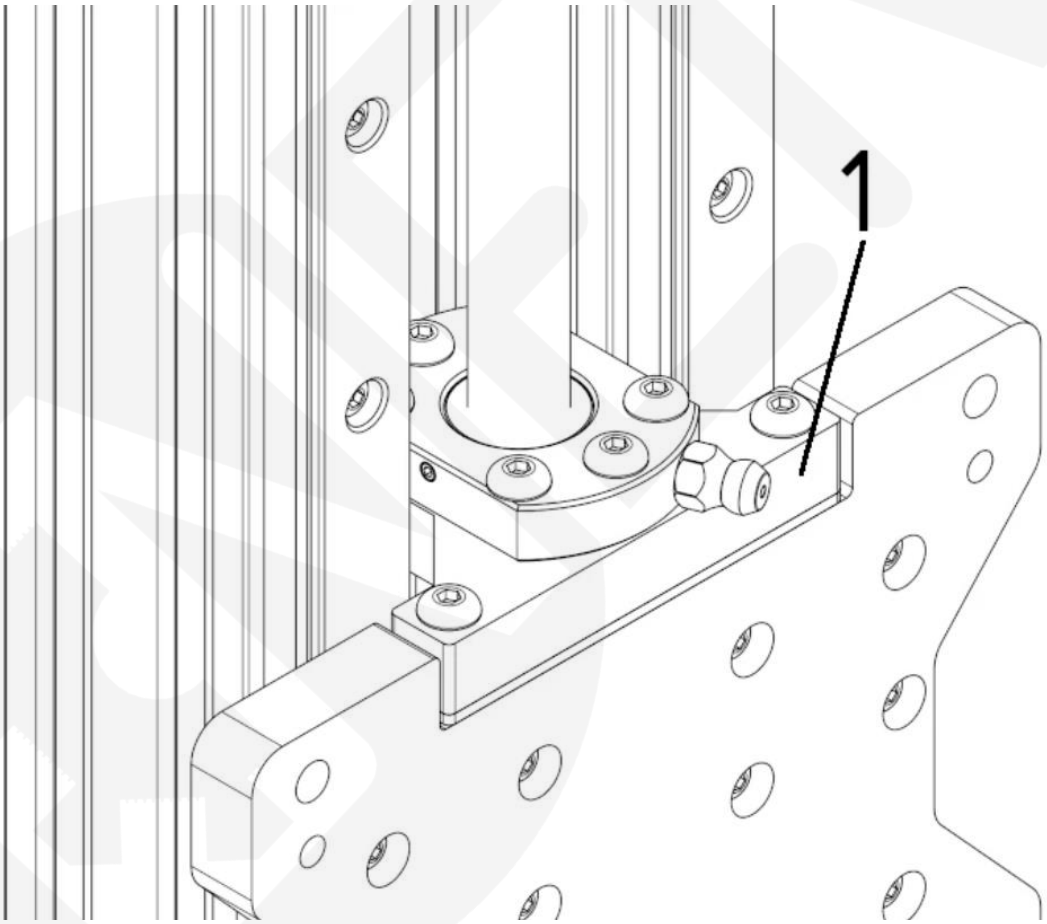
5.6 Aligning

5.6.1 Tightening the ball nut adapter-plate

Article Nr.	Description	Quantity
1	Ball nut adapter plate	1

Tighten the screws on the ball nut plate/bracket as shown in the figure.

Avoid tightening too tightly. The seal has a minimum of flexibility to compensate for misalignment of the system. Tightening too much means your system is less flexible to adapt to a misalignment.

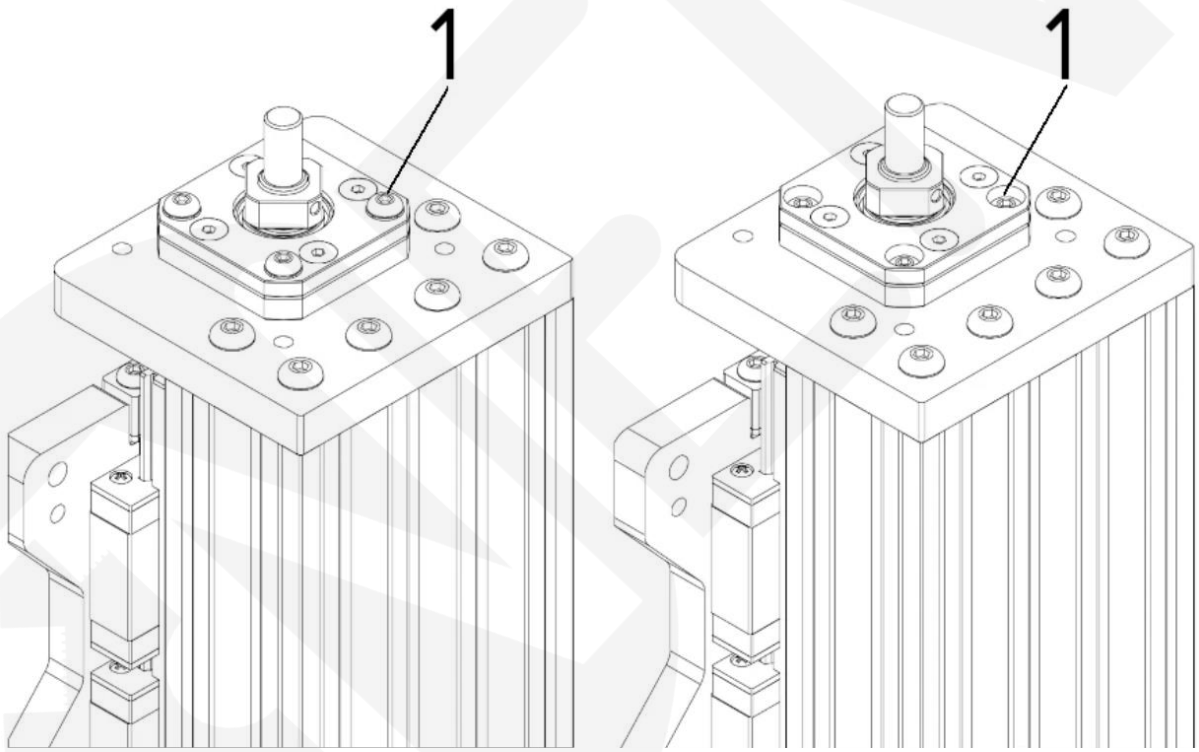


5.6.2 Fixed bearing

Article Nr.	Description	Quantity
1	M4 x 16mm screw with flat head (pre-assembled)	4

Slide the Z-plate upwards toward the fixed end of the actuator, as shown in the figure below.

Bring the Z-plate as close as possible to the fixed bearing and then tighten the 4x M4x 16mm flat head screws.



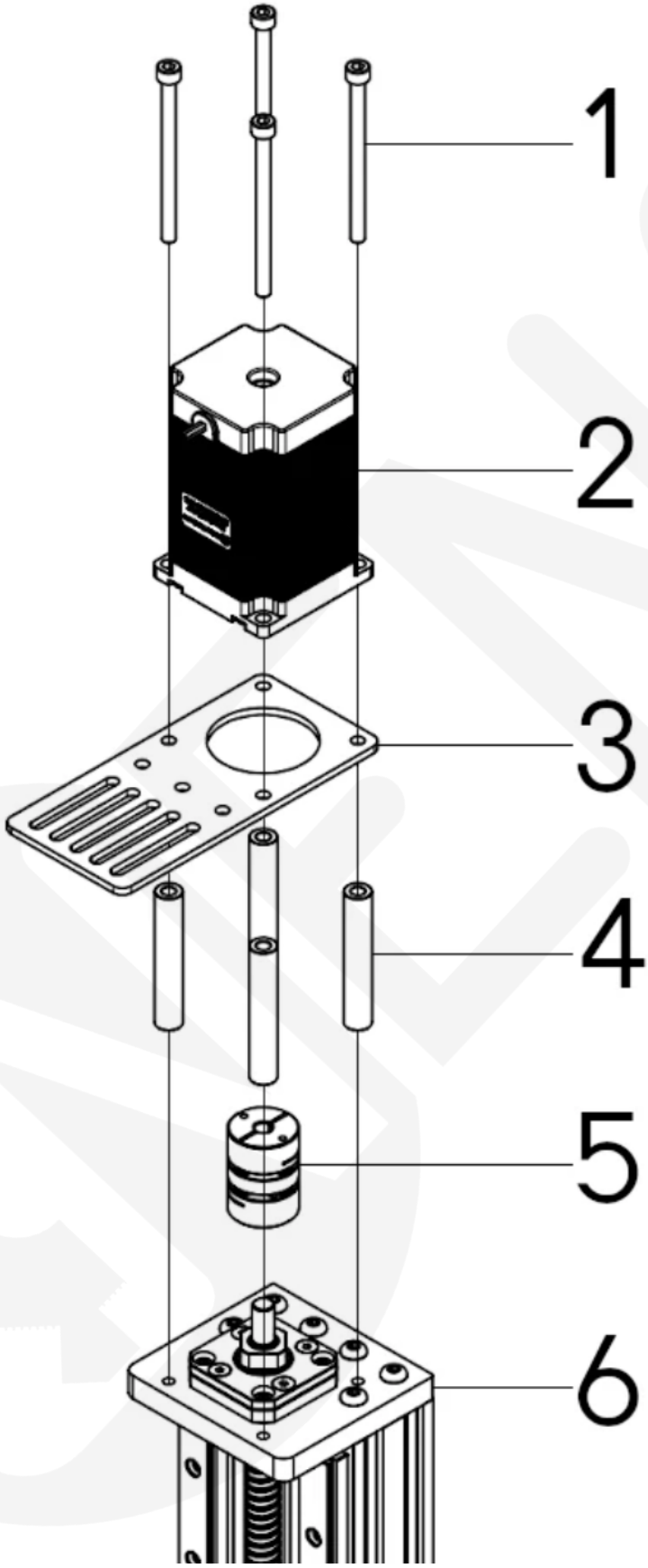
5.6.3 Stepper motor

Article Nr.	Description	Quantity
1	M5 x 70mm cylinder head bolt	4
2	Stepper motor	1
3	Chain mounting plate NEMA23	1
4	Aluminium spacer 57mm	4
5	Diaphragm coupling	1
6	Z Top Plate	1

Place the diaphragm coupling on the fixed end of the ball screw. Tighten the grub screw on the diaphragm coupling to secure it to the ball screw.

First, insert the M5 x 70 mm cylinder head bolts through the mounting holes of the stepper motor, the chain mounting plate and also through the 67 mm spacer and then attach them to the Z-plate at the top after aligning the motor shaft inside the diaphragm coupling.

Do not tighten the grub screw on the diaphragm coupling yet.

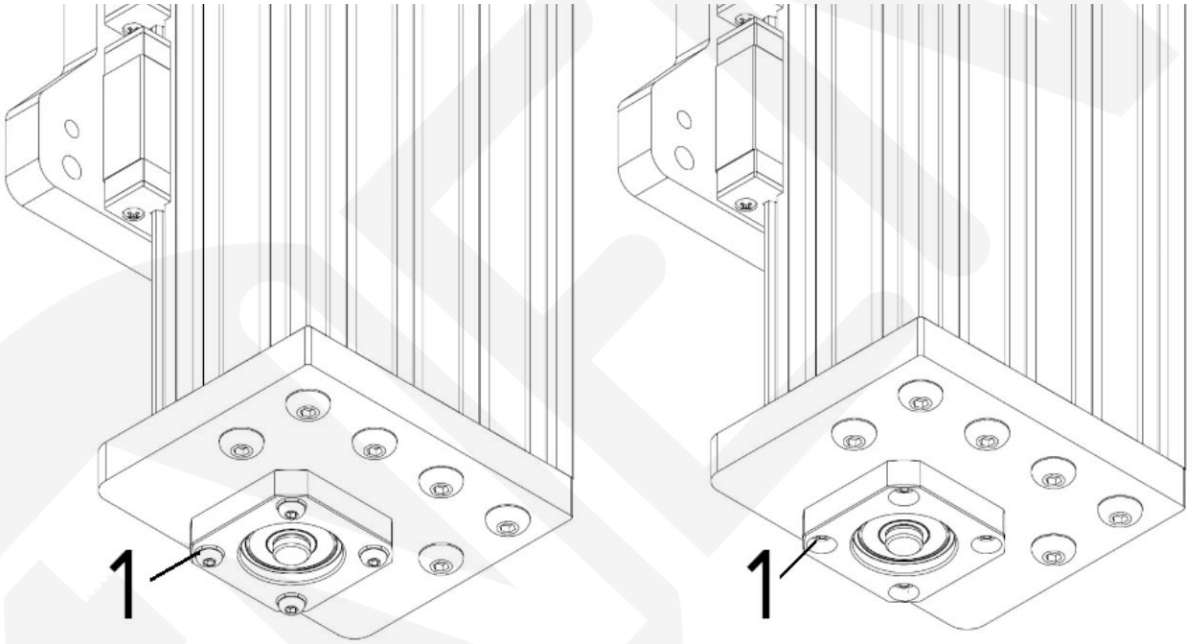

1
2
3
4
5
6

5.6.4 Loose bearing

Article Nr.	Description	Quantity
1	M3 x 12 mm flat head screw (pre-assembled)	4

Slide the Z-plate down towards the loose end of the actuator as shown.

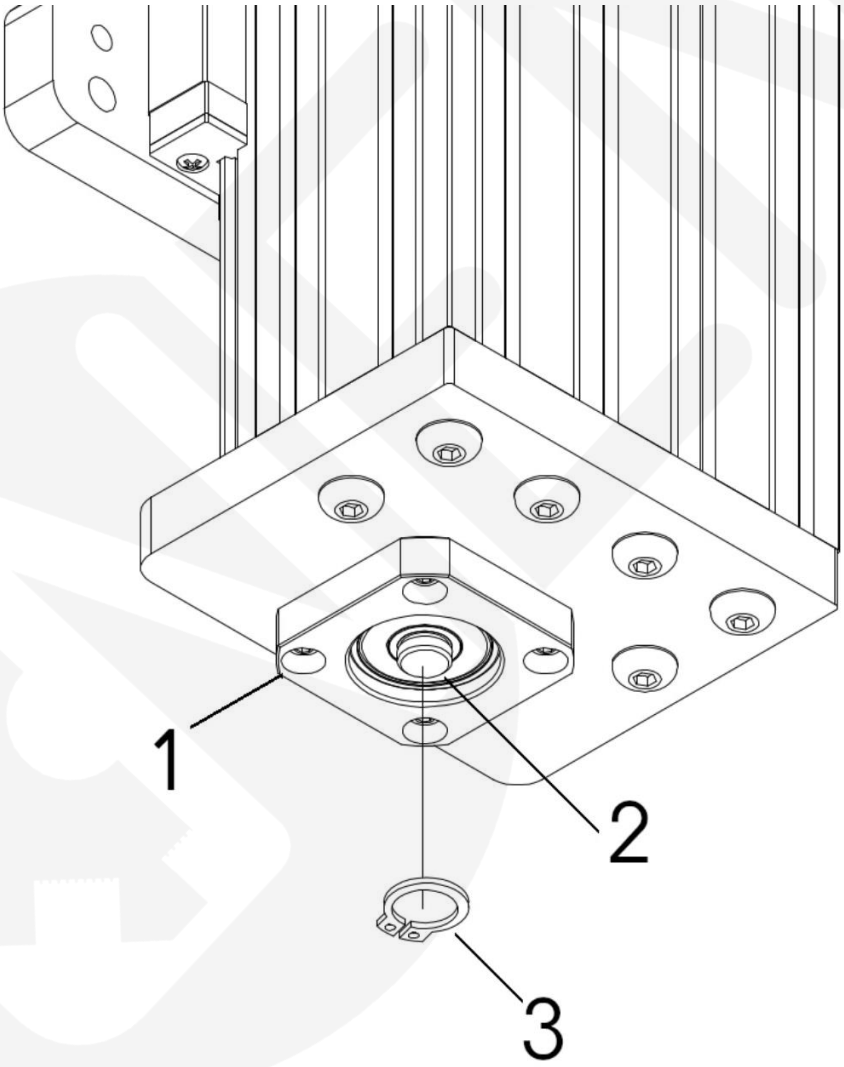
Bring the Z-plate as close as possible to the loose bearing and then tighten the 4x M3x12 mm flat head screws.



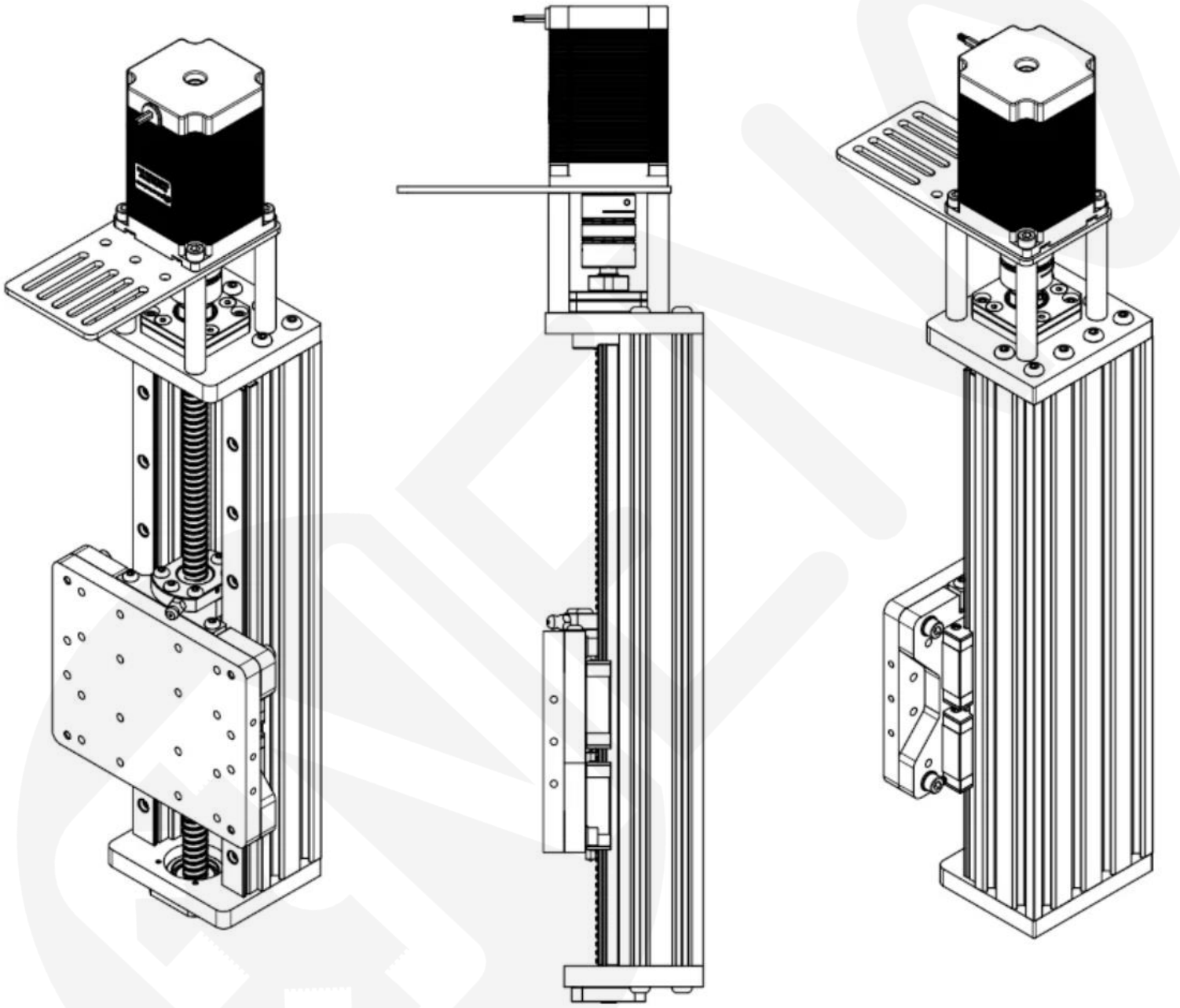
5.6.5 Retaining ring

Article Nr.	Description	Quantity
1	FF bearings (loose bearings)	1
2	Ball screw 1204	1
3	C-Clip Retaining Ring	1

Place the retaining ring on the loose end of the ball screw with a retaining ring plier as shown.



5.7 Z-axis complete



5.8 Lubrication of the Z-axis

5.8.1 MGN warehouse

Apply lithium grease directly to the MGN 15 rails.

For continuous care, please read the chapter: 8 Care and maintenance

5.8.2 Ball screw

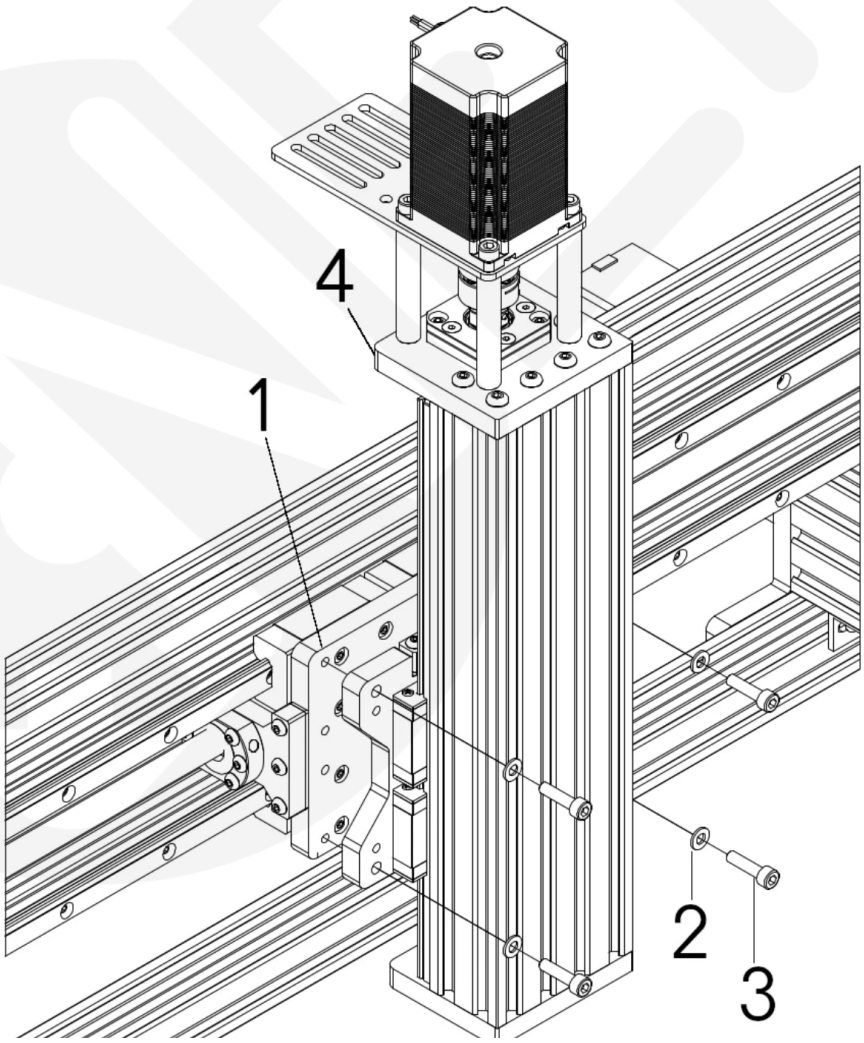
Place the axle on its side and locate the grease nipple on the ball nut. Attach the grease gun to the grease nipple and press in the grease. Some grease will come out of the back of the ball screw wiper seal.

Move the axes back and forth several times by hand. This lubricates the rail and circulates the grease on all bearings and ball screws, ensuring uniform lubrication.

5.9 Joining X and Z axes together

Article Nr.	Description	Quantity
1	X-Portal	1
2	Precision washer 10x5x1	4
3	M5 x 20mm cylinder head bolt	4
4	Z-axis	1

First, pass the M5 x 20 mm cylinder screw through the precision washer 10x5x1 and then attach the Z-axis plate to the X-axis plate.



6.0 Final work

6.1 Description

At this point of the structure, the lateral distance of the substructure is defined by the X-axis. In the next construction phases, we will start to tighten the L2 angle brackets and Y-end plates presented in chapter 3.0. The length of the profile of the x-axis specifies the position of the sliding side of the substructure. The following steps will help you ensure the parallelism of the Y-axis and the perpendicularity of your machine. At each step, we recommend placing one side of a "Right Angle" on the profiles of the substructure before tightening, while the other side of your "Right Angle" faces the C-Beam profiles of the Y-axis. This ensures perpendicularity between the axes.

6.2 Squaring the machine

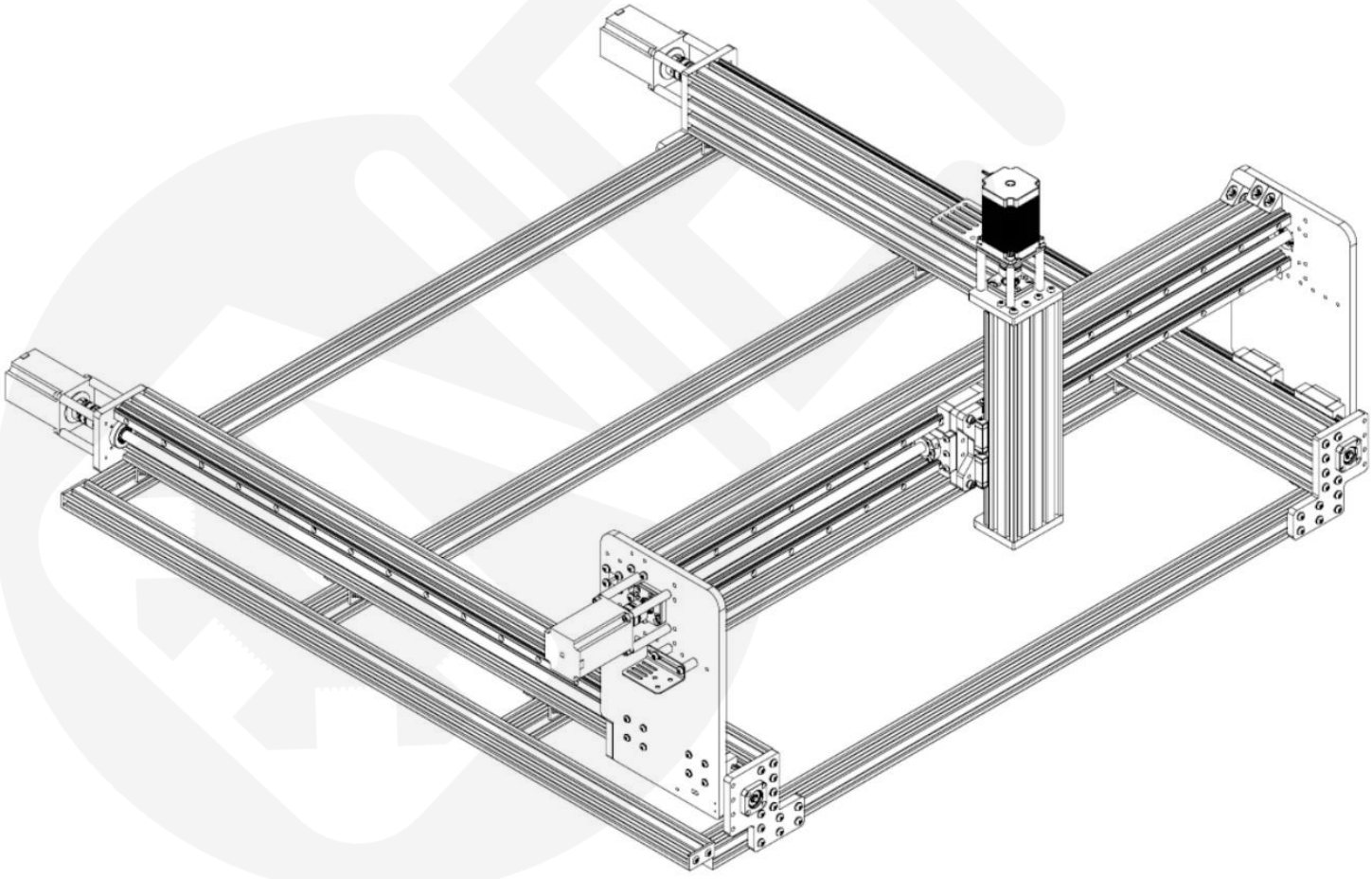
6.2.1 - Front

Make sure that all parts connected to the base brackets can move on the loose side. The loose side must be able to align itself when we take the next steps.

Move the y-axis to the front of the machine as shown in the figure. Make sure you move the Y-axis as close as possible to the front of the machine.

Place one side of a "right angle" on the profile of the substructure while the other side of the contra-angle handpiece rests against the C-beam of the Y-axis, and then tighten the screws that secure the Y-end plate to the front of the machine. Tighten the screws that secure the L2 angle brackets to the front 2040 profile.

Be sure to use a reliable "right angle" for this operation. Using an inferior tool will later negatively affect the results of your LEADX Ultra CNC milling machine.

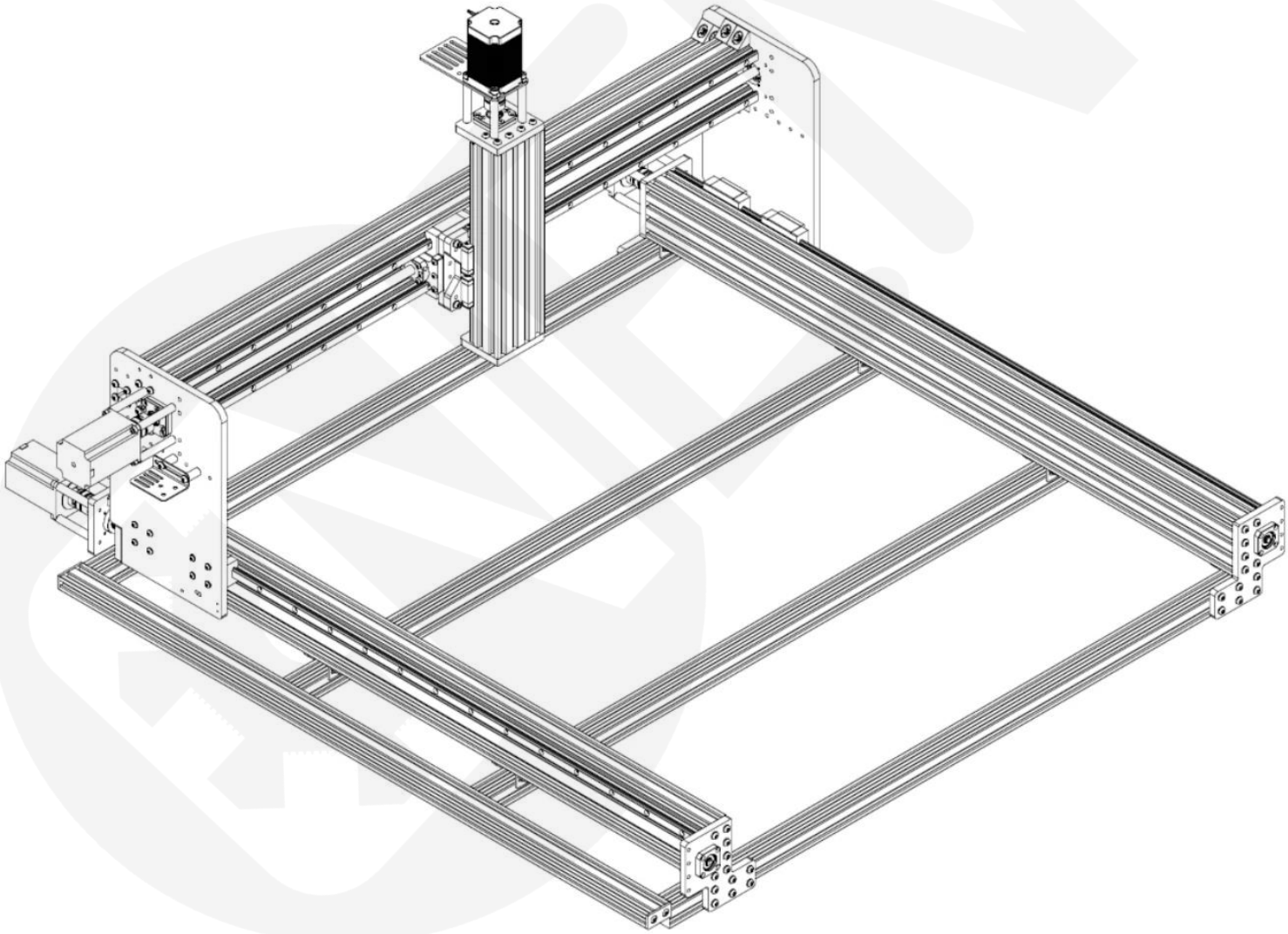


6.2.2 - Back

Make sure that all parts connected to the base brackets can move on the loose side. The loose side must be able to align itself when we take the next steps.

Move the y-axis to the back of the machine as shown in the figure. Make sure you move the Y-axis as close as possible to the rear of the machine.

Place one side of a "right angle" on the profile of the substructure while the other side of the contra-angle handpiece rests against the C-beam of the Y-axis, and then tighten the screws that secure the Y-end plate to the back of the machine. Tighten the screws that secure the L2 angle brackets to the rear 2040 profile.



6.2.3 Middle sections

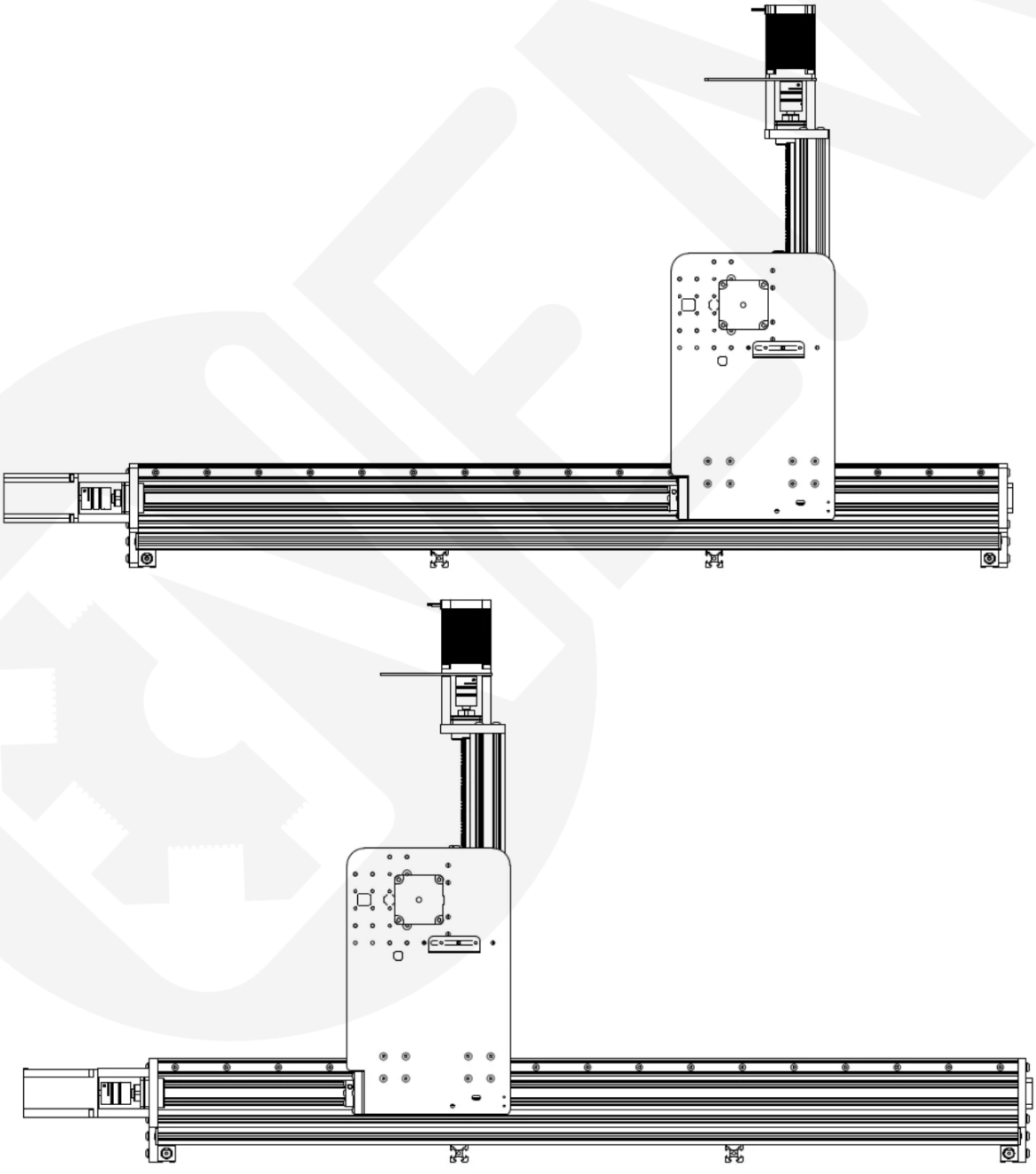
Make sure that all parts connected to the base brackets can move on the loose side. The loose side must be able to align itself when we take the next steps.

Move the y-axis toward the first center profile, as shown in the figure.

Tighten the screws that secure the L2 angle brackets to the first 2040 medium profile.

Move the y-axis toward the second center profile, as shown in the second figure.

Repeat the steps by tightening the L2 angle brackets until all middle sections of the substructure are tightened.

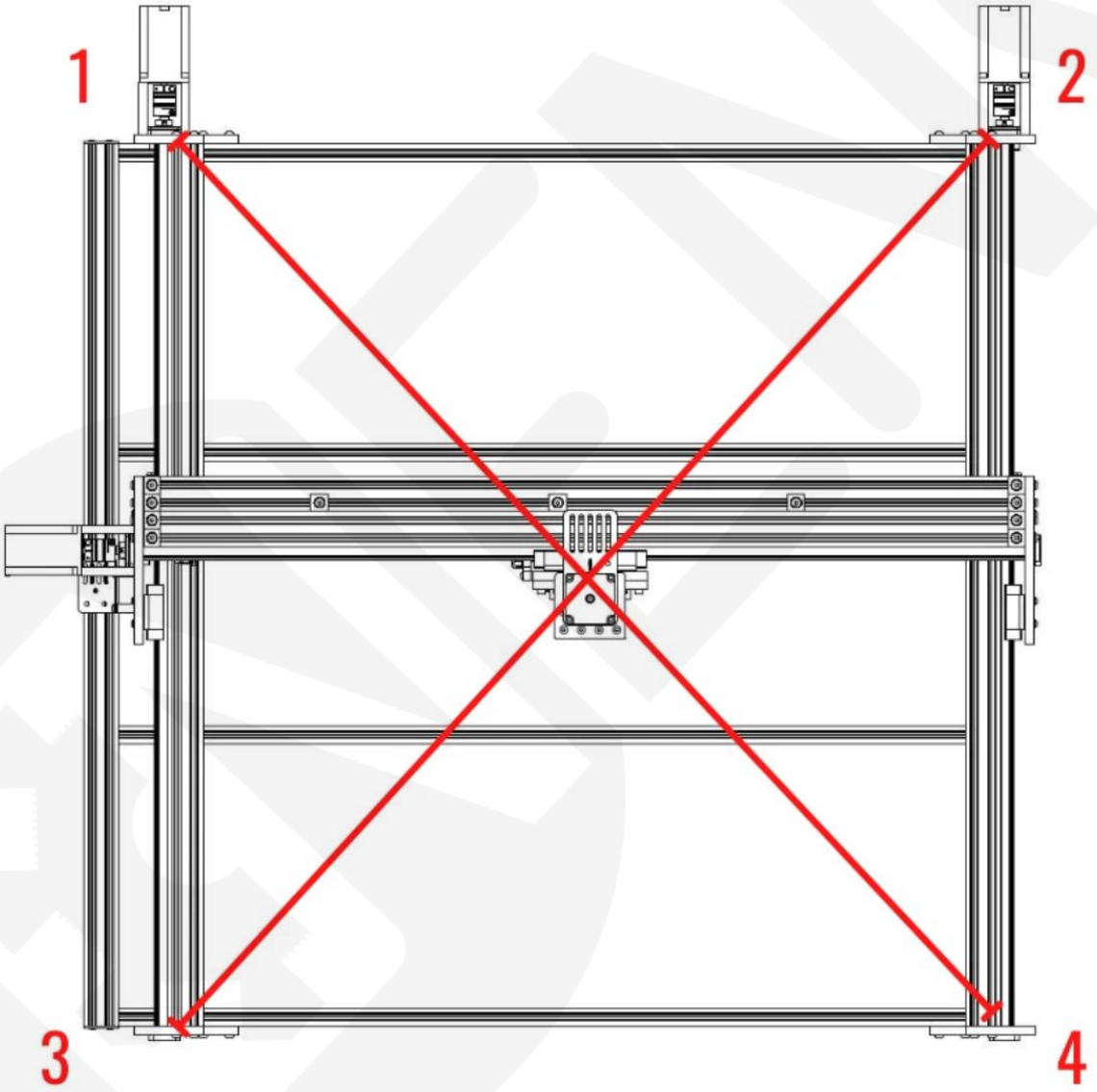


6.3 Carrying out the measurements

Measure the distance between **1** and **4** and compare it to the distance between **2** and **3.**

The distance determined by the above measurements should be very similar. Good results are between 1 mm and 2 mm. If you got a good result by measuring the diagonals, you have squared your machine. However, if you notice a larger deviation, we recommend that you repeat Chapter 6.2.

Also tighten all grub screws of the motor couplers at this point.



7 Care and maintenance

To avoid downtime, we recommend preventive maintenance of your LEADX Ultra CNC milling machine. It is best to keep it clean and well lubricated at all times. We recommend performing three types of maintenance for these machines: preventive maintenance, usage-based maintenance, and condition-based maintenance. While we can guide you with preventive maintenance, usage-based and condition-based maintenance are at the discretion of the user.

7.1 Preventive maintenance

Daily care

1. If you have a water-cooled spindle: Check if the water is circulating. In the case of a water-cooled spindle, we also recommend the purchase of a flow indicator to facilitate the control.

Weekly

2. Use an air compressor and a small brush to clean all areas where dust has accumulated.

Monthly

3. Clean rails and ball screws with a microfiber cloth impregnated with an alcohol-containing detergent.
4. Lubricate the ball screws with a grease gun.
5. Lubricate HRG and MGN rails with a grease gun.

Quarterly

6. If you have a water-cooled spindle: Replace the water.
7. Check the limit switches and the tight fit of all screws.

Annual

8. Check for signs of "play" on the bearings and ball screw nuts.

8.0 spoilboard

Now the spoilboard is manufactured and assembled. It is best to use 16mm MDF. The size should be as follows, but feel free to measure again to get a perfectly fitting spoilboard-plate.

1. LEADX Ultra 1000x1000mm spoilboard plate: 1000x850mm
2. LEADX Ultra 1000x1500mm spoilboard plate: 1500x850mm
3. LEADX Ultra 1500x1500mm spoilboard plate: 1500x1350mm

Now drill holes along the leading and trailing edges that lead exactly into the profile. Now take the supplied screws and insert them into the holes you just drilled. The screws should have about 5mm thread visible under the plate, lower the holes until this is exactly right. Now screw hammer head slot stones to the threads and screw the sacrificial plate to the basic structure.