Benchtop PRO Stepper Assembly Instructions

v2024Q4.1

Getting Started

READ THE FOLLOWING BEFORE ASSEMBLING YOUR BENCHTOP PRO CNC MACHINE KIT

1. The machine assembly is broken down into 8 main sections, visible in the PDF bookmarks tab.
2. Section 10 includes links for install & setup of spindles, software, VFDs, and other accessories.
3. It is helpful to look through each section prior to beginning its assembly.
4. Most sections begin with an image of the fully assembled component. If needed, refer to this as a reference while completing individual assembly steps.
5. Each section will identify the parts and tools needed for those assembly steps, as well as which box contains those parts. Identification of fasteners is easier if they are kept in their respective fastener bags.
6. Assembling the larger components, such as the base, is made easier with two people. Though not required, this can make the process more efficient.
7. Listed below are three types of notes you will see throughout the assembly instructions:

Section Note

Section Notes can be used to denote when the section is configuration specific.
(ex: NEMA 23 vs NEMA 34 electronics)

Assembly Note

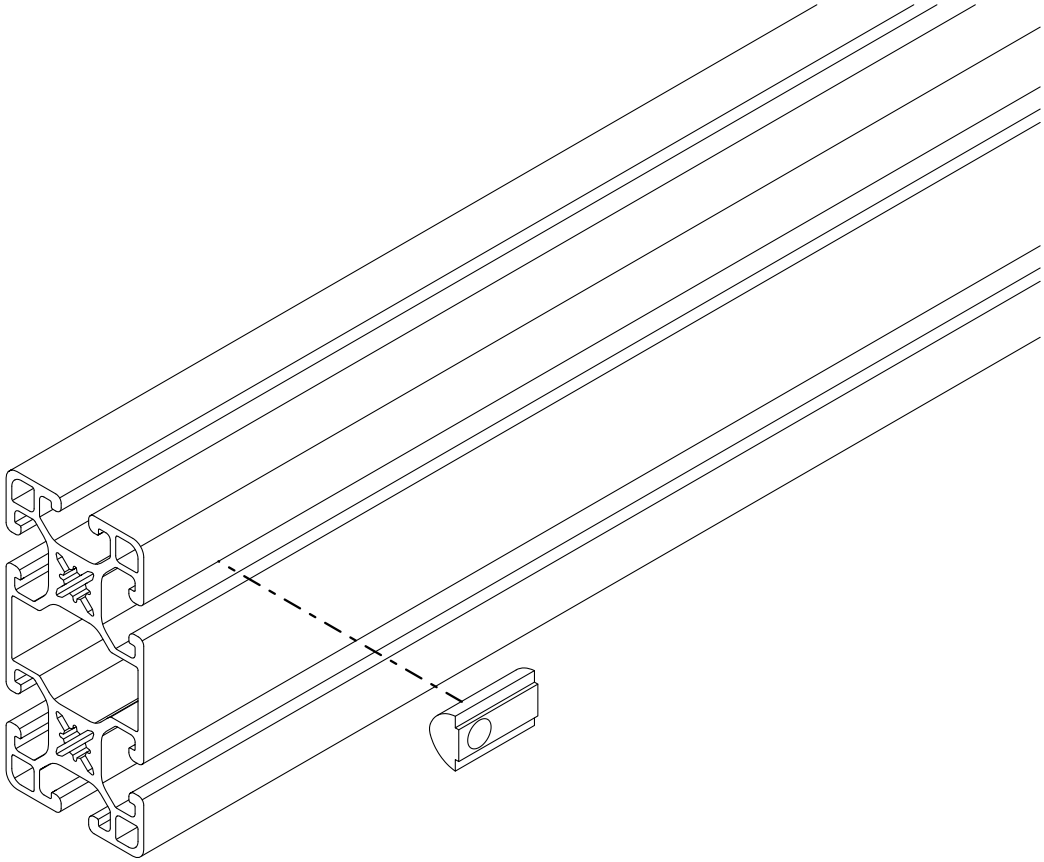
Assembly Notes are used to call attention to certain parts of the assembly step. Pay attention to these as they provide important information for a successful machine build.

Machine Configuration Options

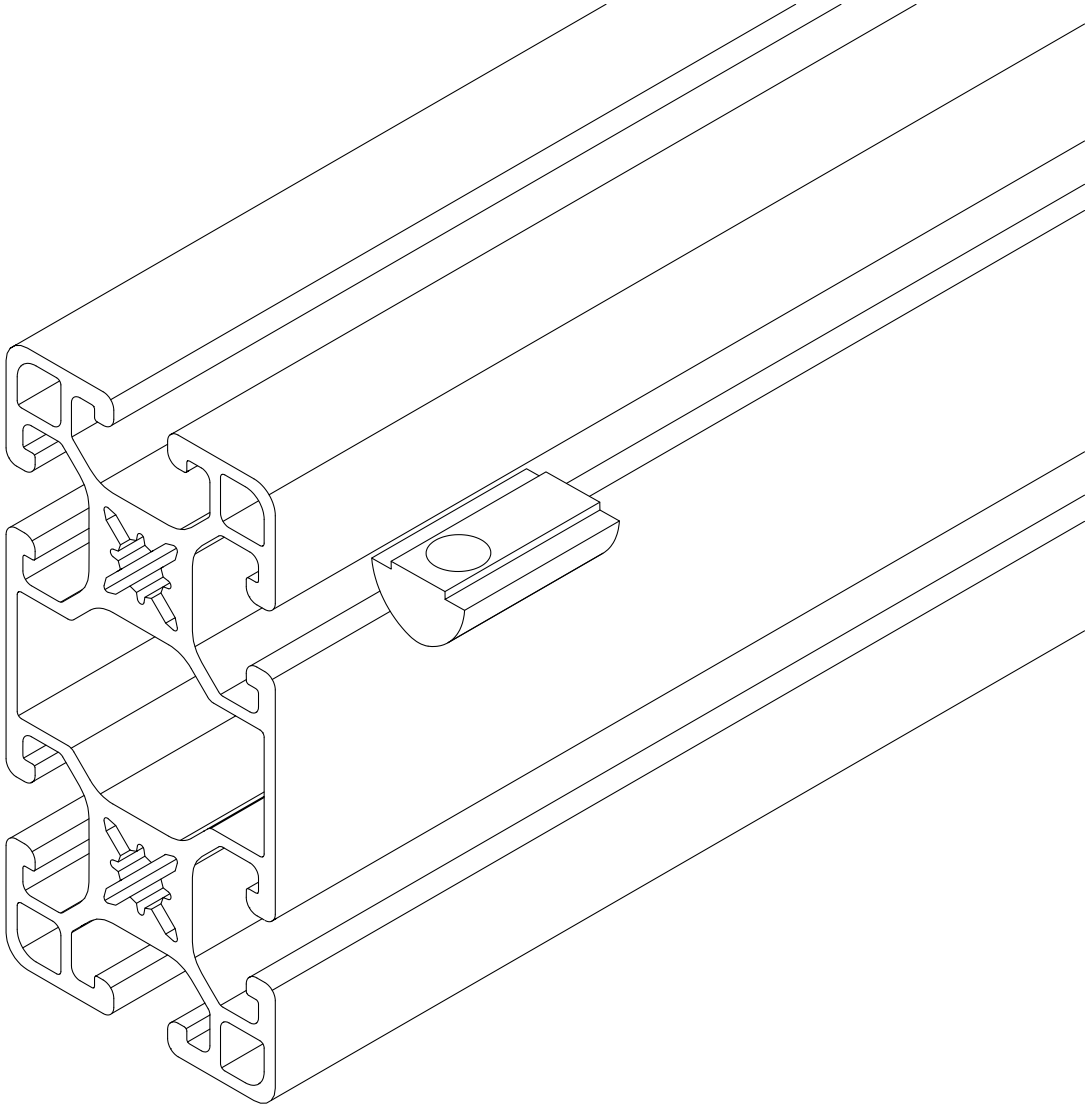
These will denote specific steps to follow if you purchased the different optional sizes of the machine.

8. Throughout the assembly of your machine, you will use Roll-in T-Nuts. Review the instructions on the following pages for proper use of this component.

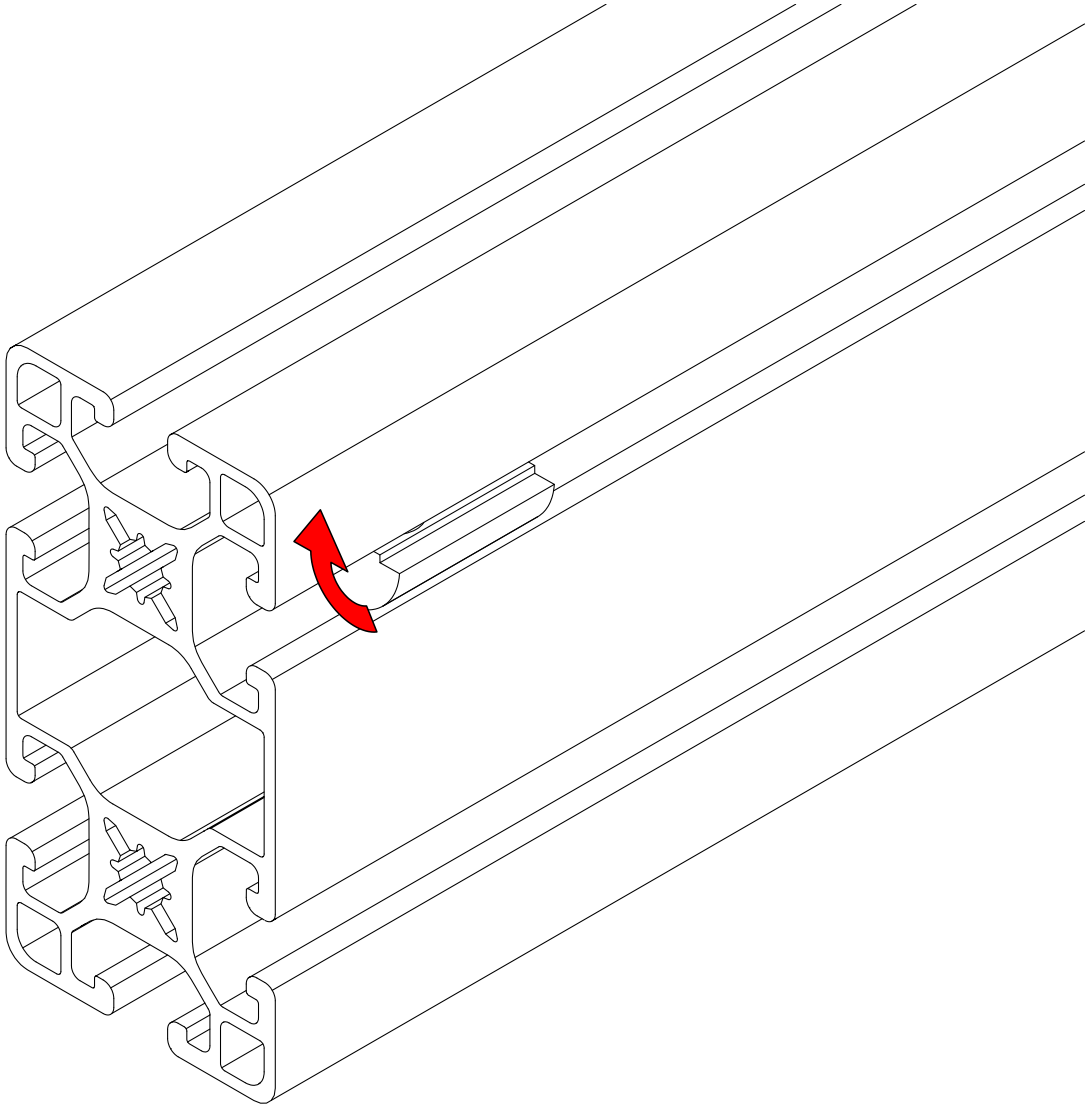
Roll-in T-Nuts



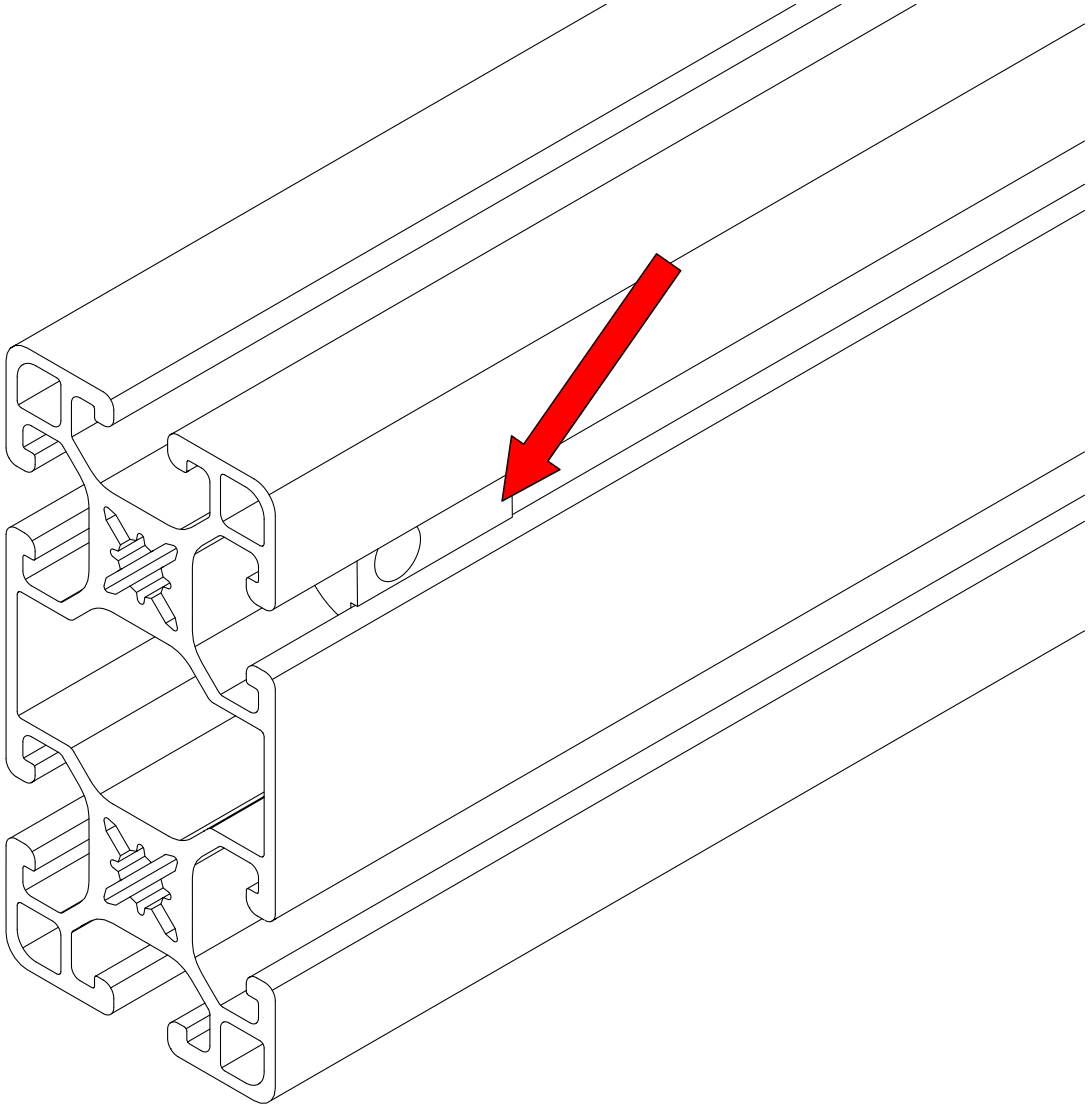
- Assembly steps will depict Roll-in T-Nut installation as shown above.



- To install in the appropriate extrusion slot, position the T-Nut as indicated.



- Insert the T-Nut into the extrusion slot and rotate 90°.



- When properly installed, the indicated face of the T-Nut will be parallel with the face of the extrusion.

Assembly Note

A small allen wrench can be inserted into the hole of the T-Nut and subsequently used to rotate it the full 90°.

Tools List

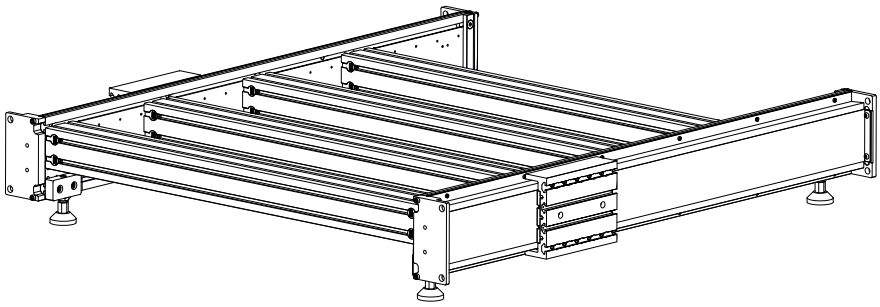
Required tools for assembly of your machine:

- Metric Ball-End Allen Wrenches:
  - 2.5mm, 3mm, 4mm, 5mm, 6mm
- Adjustable Wrench
- Standard (Flat Tip) Screwdriver
- Tape Measure

Additional recommended tools and supplies:

- 6mm Hex Ball-end Power Bit and Drill/Impact Driver
- Metric Combination Wrenches:
  - 14mm, 17mm
- Metric Tape Measure

Section 1: Table Assembly



Parts and Tools Required

The following parts and tools will be used in Section 1

2' x 2' Parts List

QTY	Part/Description	Packaged In
3	8080 Crossmember Extrusion, 641mm (25-1/4")	Linear Extrusion Bundle
1	CRP840-00-650 - PRO Linear Ballscrew Table Axis	Table Axis Left
1	CRP840-00-650 - PRO Linear Ballscrew Table Axis	Table Axis Right
1	CRP910-00-24-FAST: - (24) 40 Series Anchor Fastener - (24) M8 x 30mm Socket Head Cap Screw - (12) M8 Slide-in T-Nut	CRP900-00-2424-HW
4	CRP913-00: - (1) M12 Leveling Foot 50mm (Total QTY: 4) - (1) M12 BTP Leveling Foot End Plate (Total QTY: 4) - (2) M8 x 30mm Socket Head Cap Screw (Total QTY: 8) - (2) M8 Roll In T-Nut (Total QTY: 8)	CRP900-00-2424-HW

2' x 3' Parts List

QTY	Part/Description	Packaged In
4	8080 Crossmember Extrusion, 641mm (25-1/4")	Linear Extrusion Bundle
1	CRP840-00-950 - PRO Linear Ballscrew Table Axis	Table Axis Left
1	CRP840-00-950 - PRO Linear Ballscrew Table Axis	Table Axis Right
1	CRP910-00-36-FAST: - (32) 40 Series Anchor Fastener - (32) M8 x 30mm Socket Head Cap Screw - (16) M8 Slide-in T-Nut	CRP900-00-2436-HW
4	CRP913-00: - (1) M12 Leveling Foot 50mm (Total QTY: 4) - (1) M12 BTP Leveling Foot End Plate (Total QTY: 4) - (2) M8 x 30mm Socket Head Cap Screw (Total QTY: 8) - (2) M8 Roll In T-Nut (Total QTY: 8)	CRP900-00-2436-HW

3' x 2' Parts List

QTY	Part/Description	Packaged In
3	8080 Crossmember Extrusion, 961mm (37-7/8")	Linear Extrusion Bundle
1	CRP840-00-650 - PRO Linear Ballscrew Table Axis	Table Axis Left
1	CRP840-00-650 - PRO Linear Ballscrew Table Axis	Table Axis Right
1	CRP910-00-24-FAST: - (24) 40 Series Anchor Fastener - (24) M8 x 30mm Socket Head Cap Screw - (12) M8 Slide-in T-Nut	CRP900-00-3624-HW
4	CRP913-00: - (1) M12 Leveling Foot 50mm (Total QTY: 4) - (1) M12 BTP Leveling Foot End Plate (Total QTY: 4) - (2) M8 x 30mm Socket Head Cap Screw (Total QTY: 8) - (2) M8 Roll In T-Nut (Total QTY: 8)	CRP900-00-3624-HW

3' x 3' Parts List

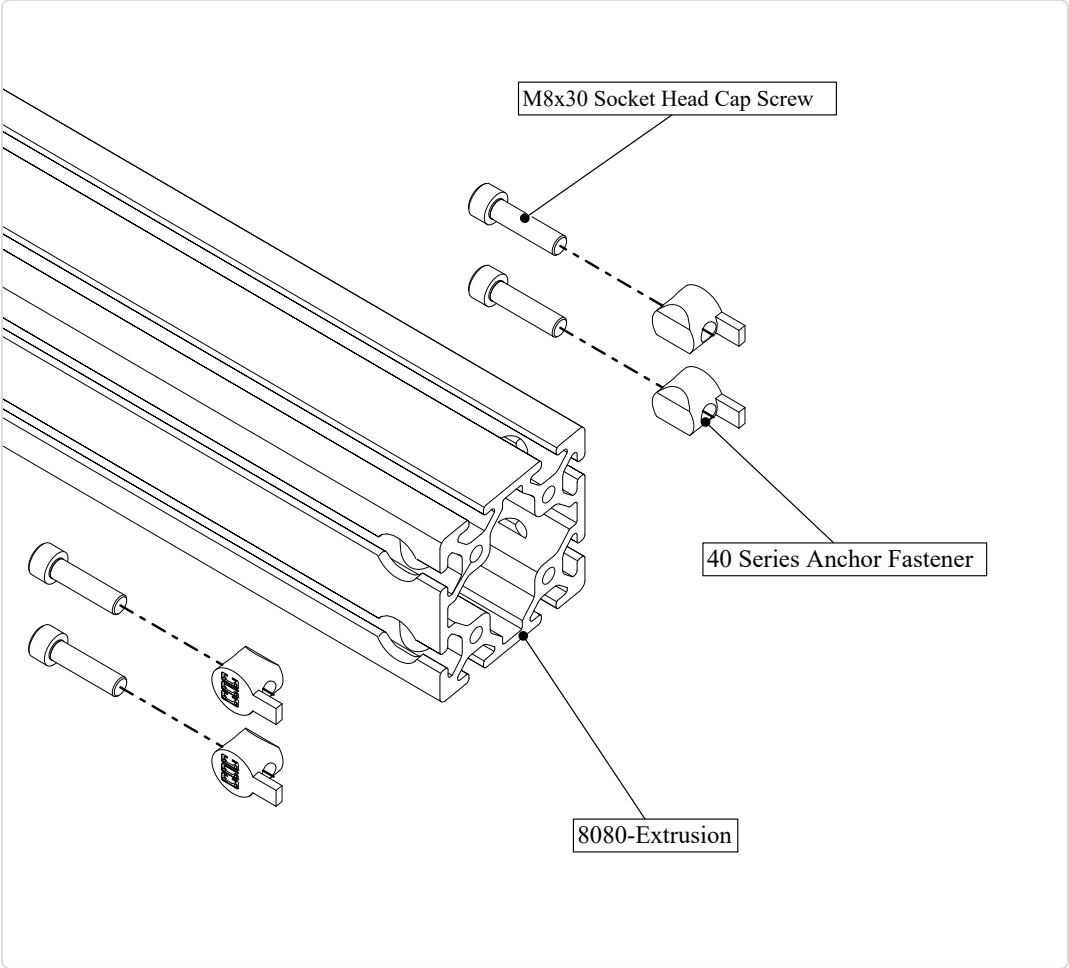
QTY	Part/Description	Packaged In
4	8080 Crossmember Extrusion, 961mm (37-7/8")	Linear Extrusion Bundle
1	CRP840-00-950 - PRO Linear Ballscrew Table Axis	Table Axis Left
1	CRP840-00-950 - PRO Linear Ballscrew Table Axis	Table Axis Right
1	CRP910-00-36-FAST: - (32) 40 Series Anchor Fastener - (32) M8 x 30mm Socket Head Cap Screw - (16) M8 Slide-in T-Nut	CRP900-00-3636-HW
4	CRP913-00: - (1) M12 Leveling Foot 50mm (Total QTY: 4) - (1) M12 BTP Leveling Foot End Plate (Total QTY: 4) - (2) M8 x 30mm Socket Head Cap Screw (Total QTY: 8) - (2) M8 Roll In T-Nut (Total QTY: 8)	CRP900-00-3636-HW

Required Tools:

- 6mm Ball-End Allen Wrench
- Adjustable Wrench

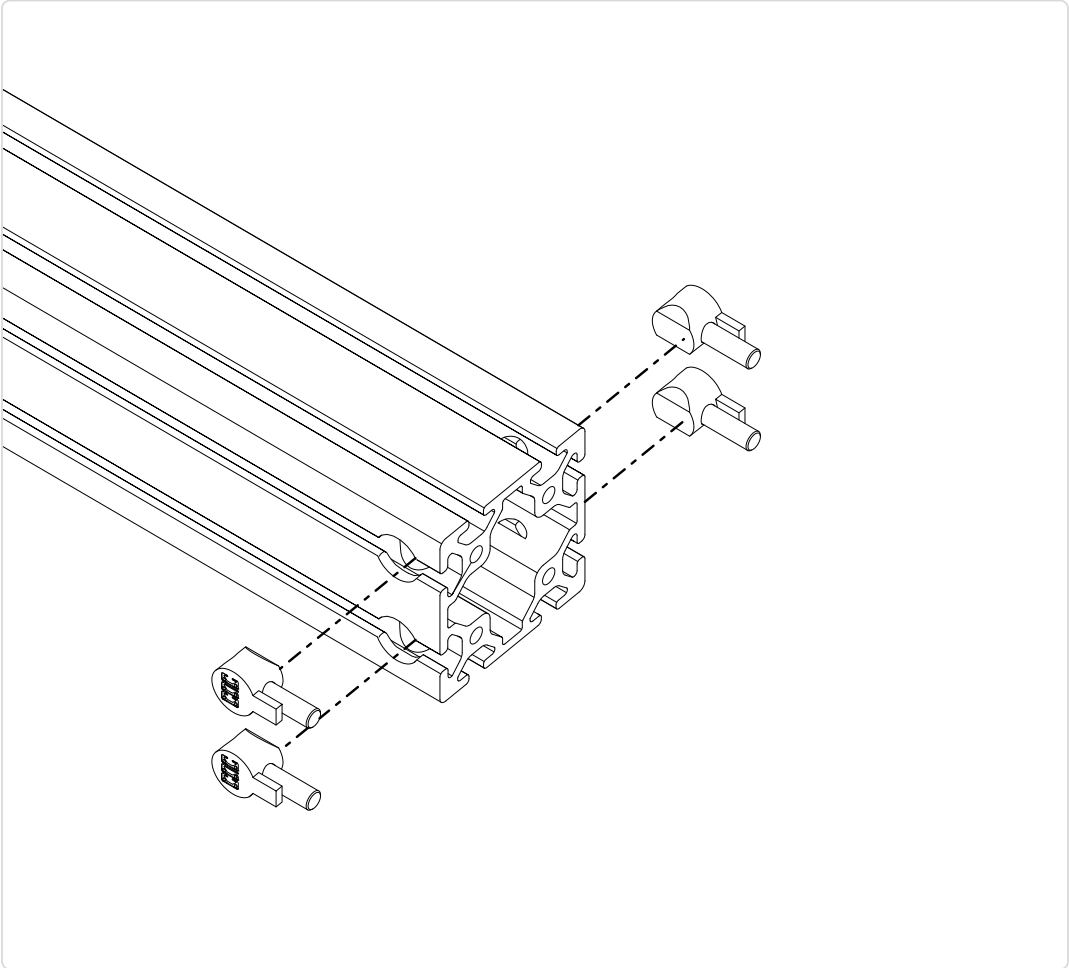
1.1 Table Base Assembly

1.1.1



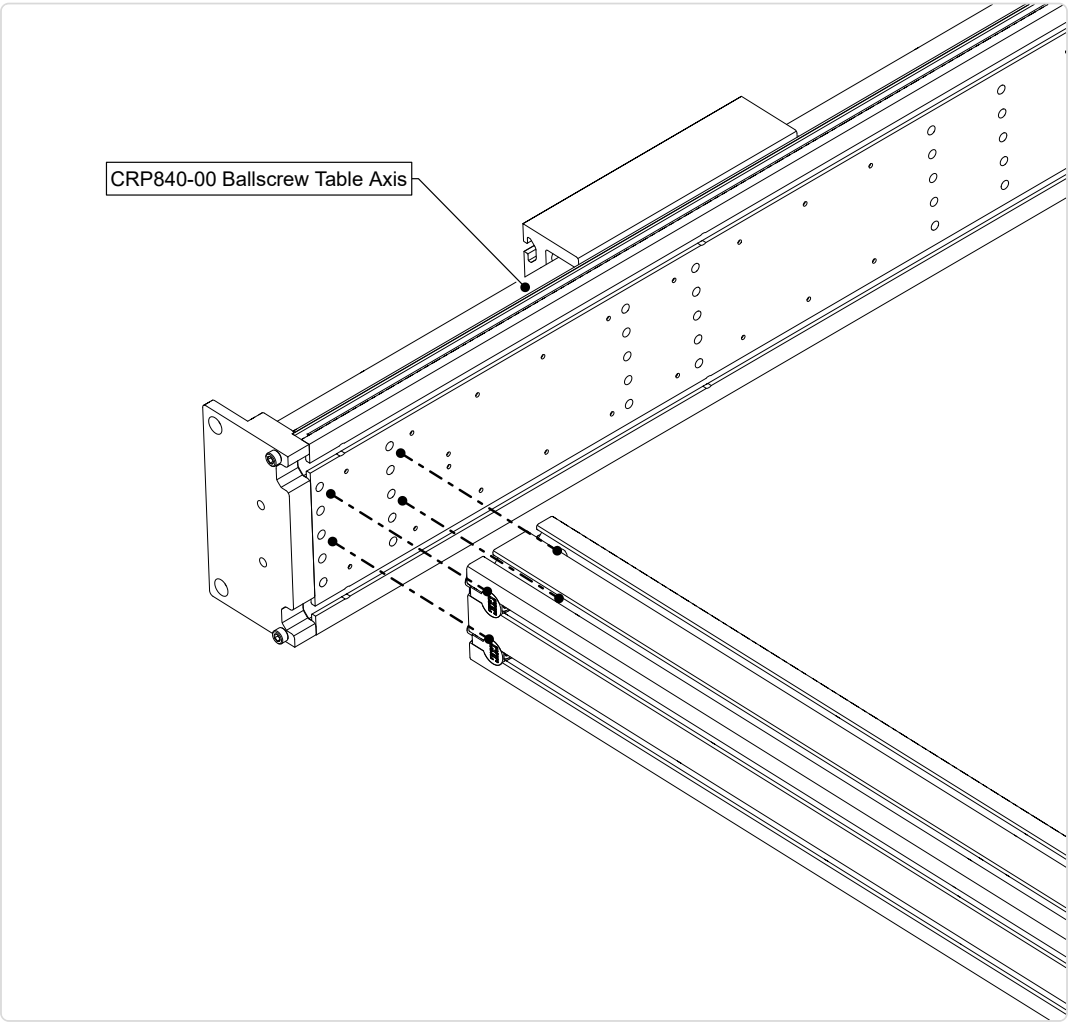
- Insert socket head cap screws into anchor fasteners as indicated.

1.1.2



- Slide the anchor fasteners and screws into the extrusion counterbores.

1.1.3



- Thread the screws into the left table ballscrew axis as indicated.

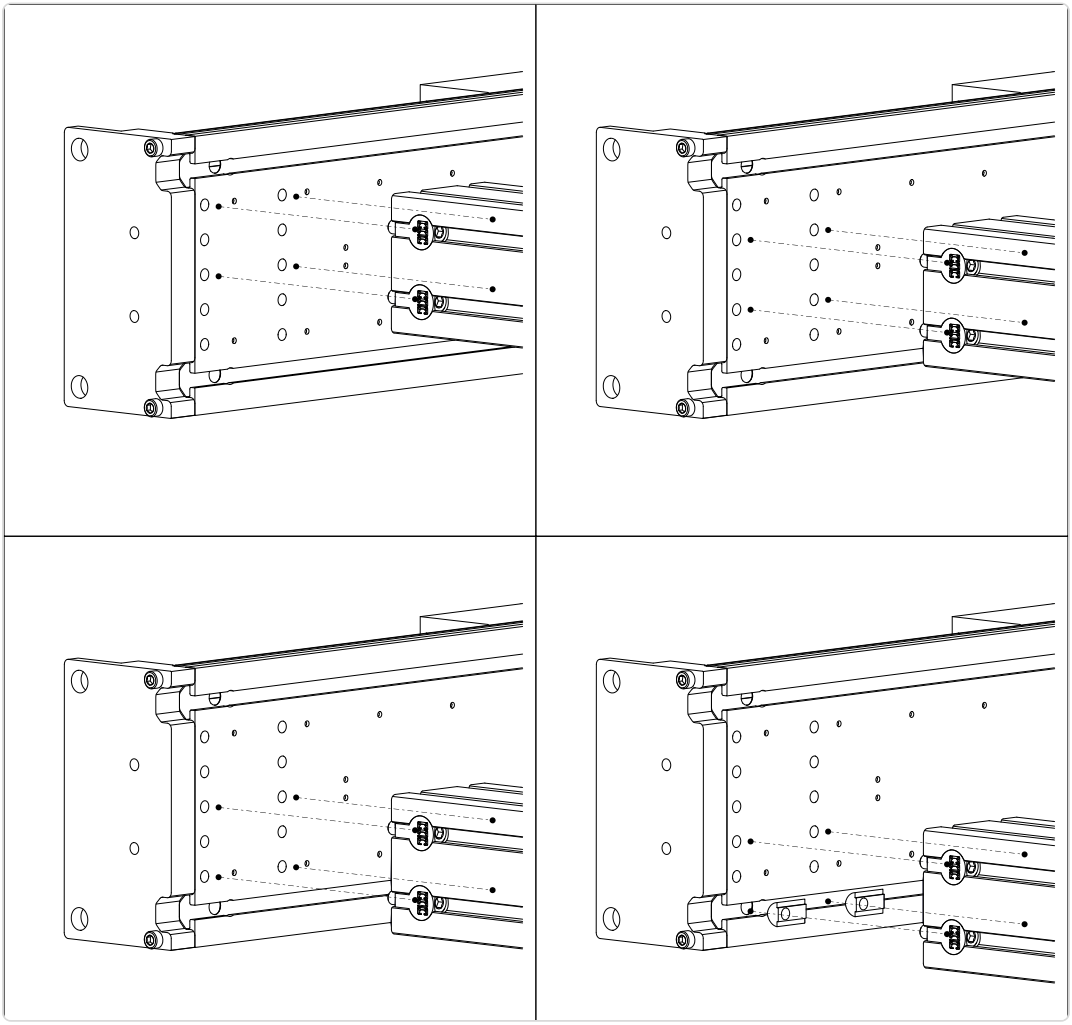
Assembly Note

If crossmember extrusion has engraved arrows, orient arrows on all crossmembers pointing **up**.

1.1.4

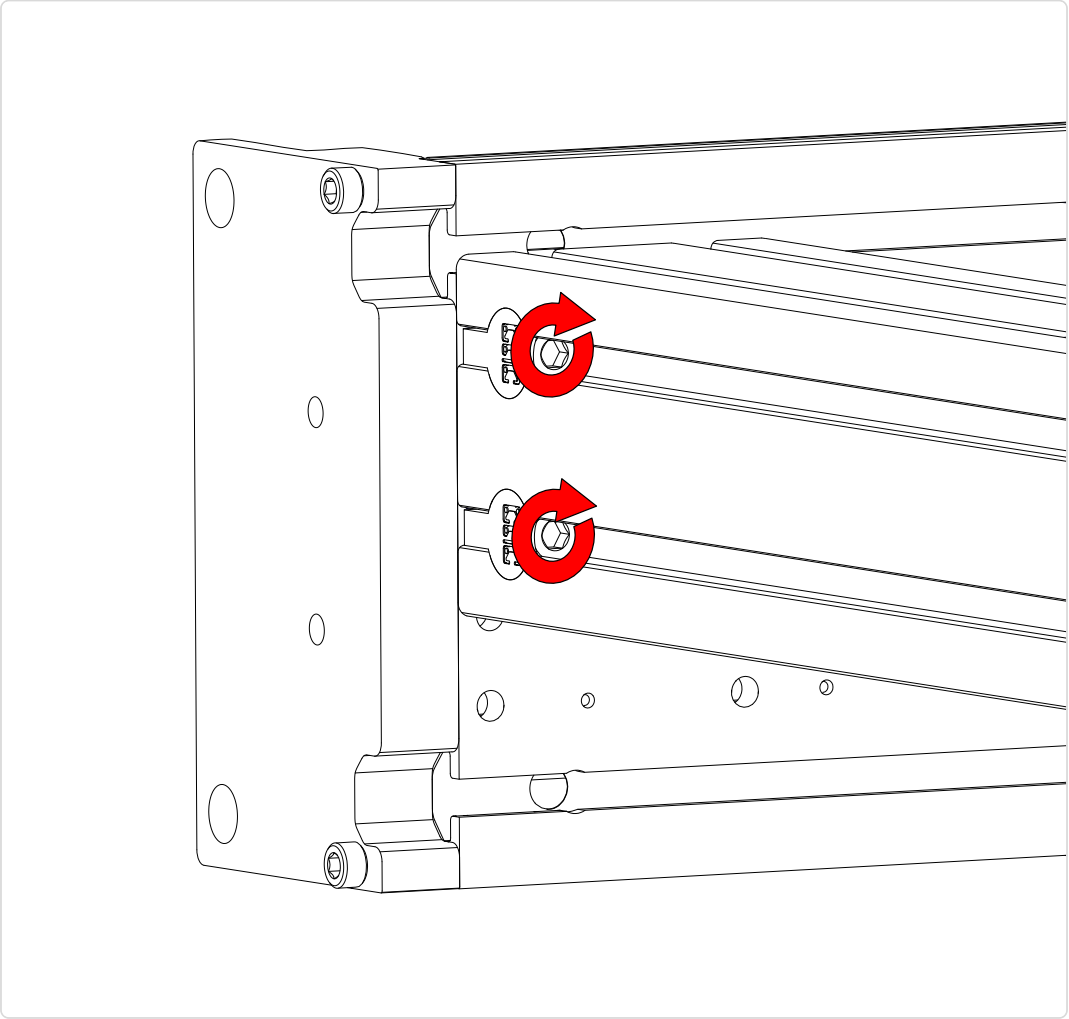
Assembly Note

The table crossmembers may be installed at multiple heights to accommodate various fixtures, such as a vise or spoilboard. For general use, we recommend the middle location, shown in the upper right window. Images in the assembly instructions show the crossmembers in their highest location.



- Alternately, you can use the provided slide-in t-nuts to lower the crossmember extrusion.

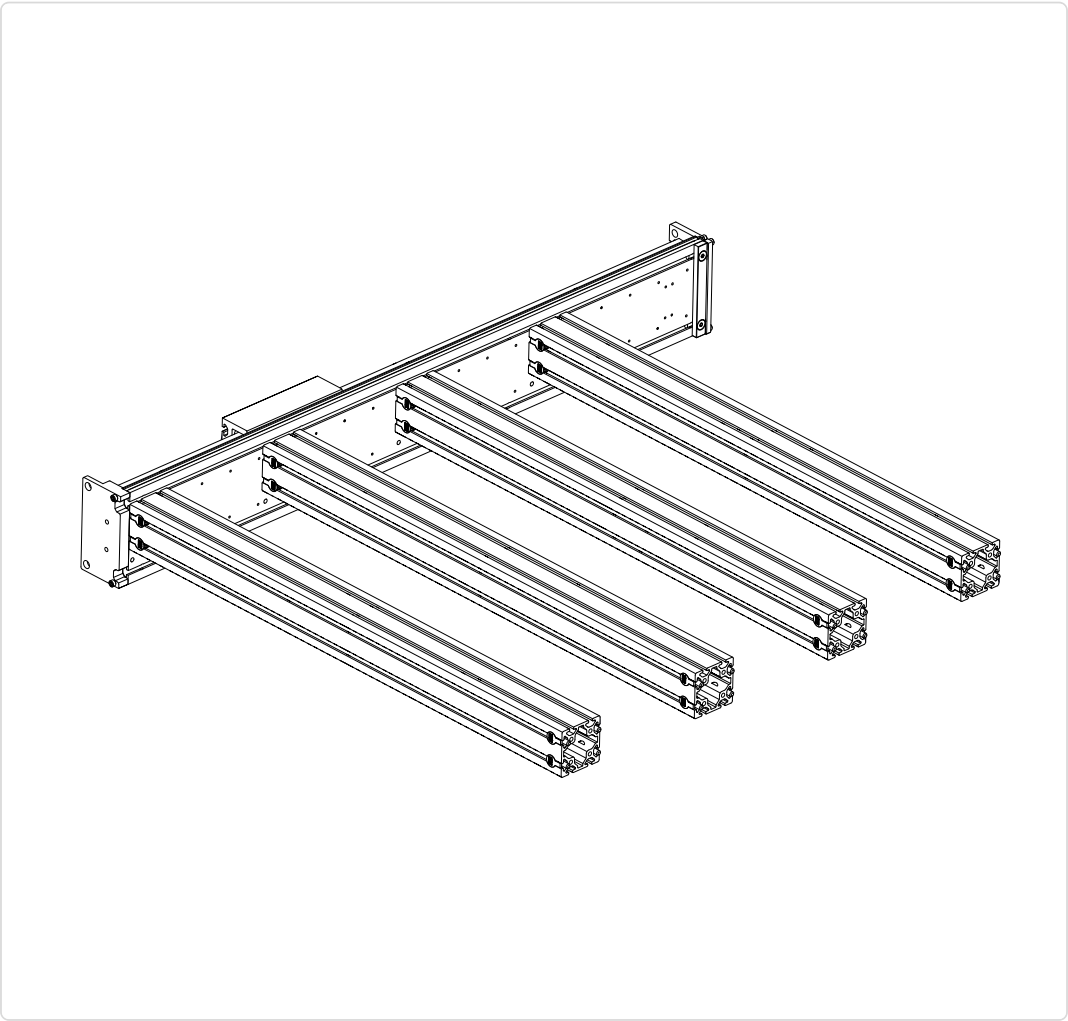
1.1.5



- Tighten the indicated fasteners

> **Assembly Note**
>
> Be sure to tighten all four crossmember fasteners.

1.1.6



- Repeat the previous steps to install the remaining crossmembers.

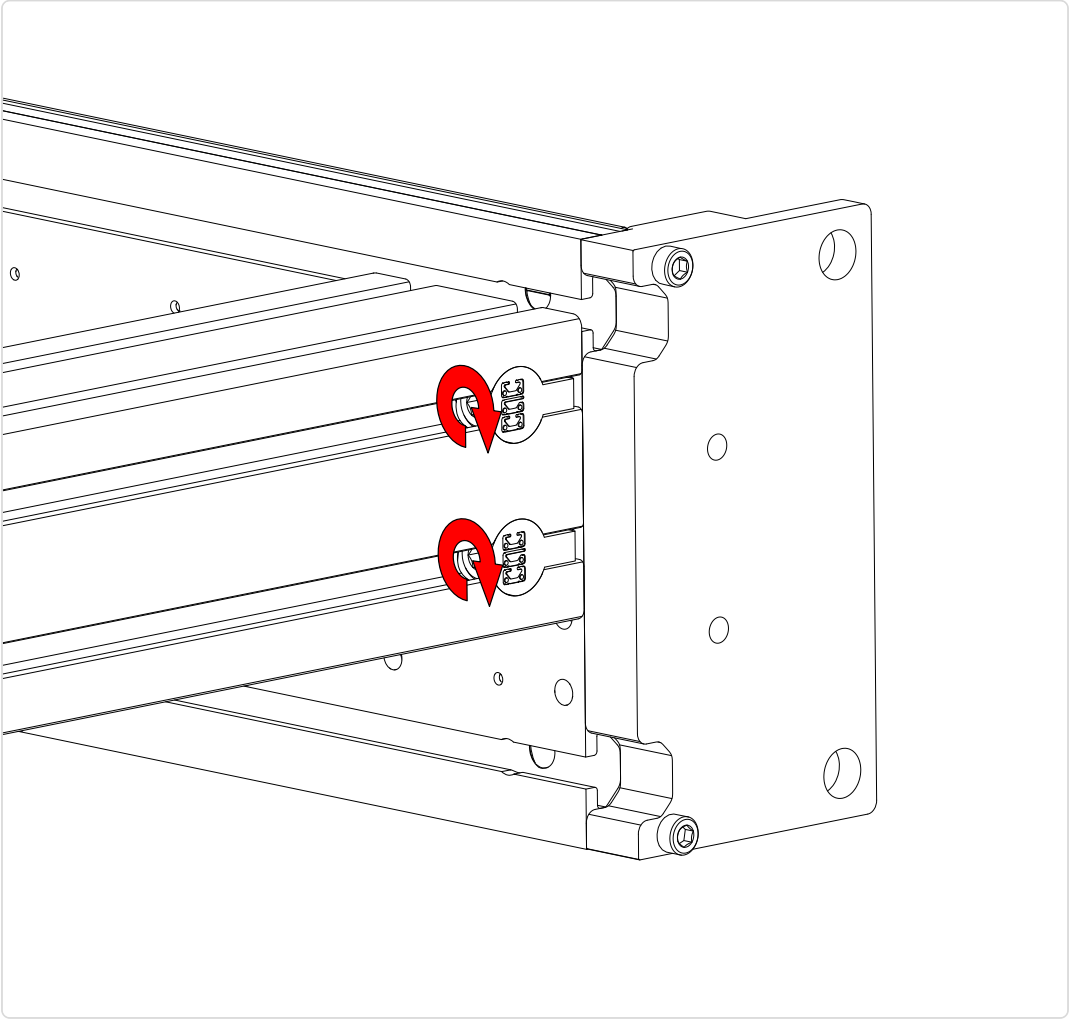
Machine Configuration Options

2' x 2' (2424) and 3' x 2' (3624) machines only require three crossmembers.

1.1.7

- Add anchor fasteners and screws to the other side of the extrusion and attach the right table ballscrew axis.

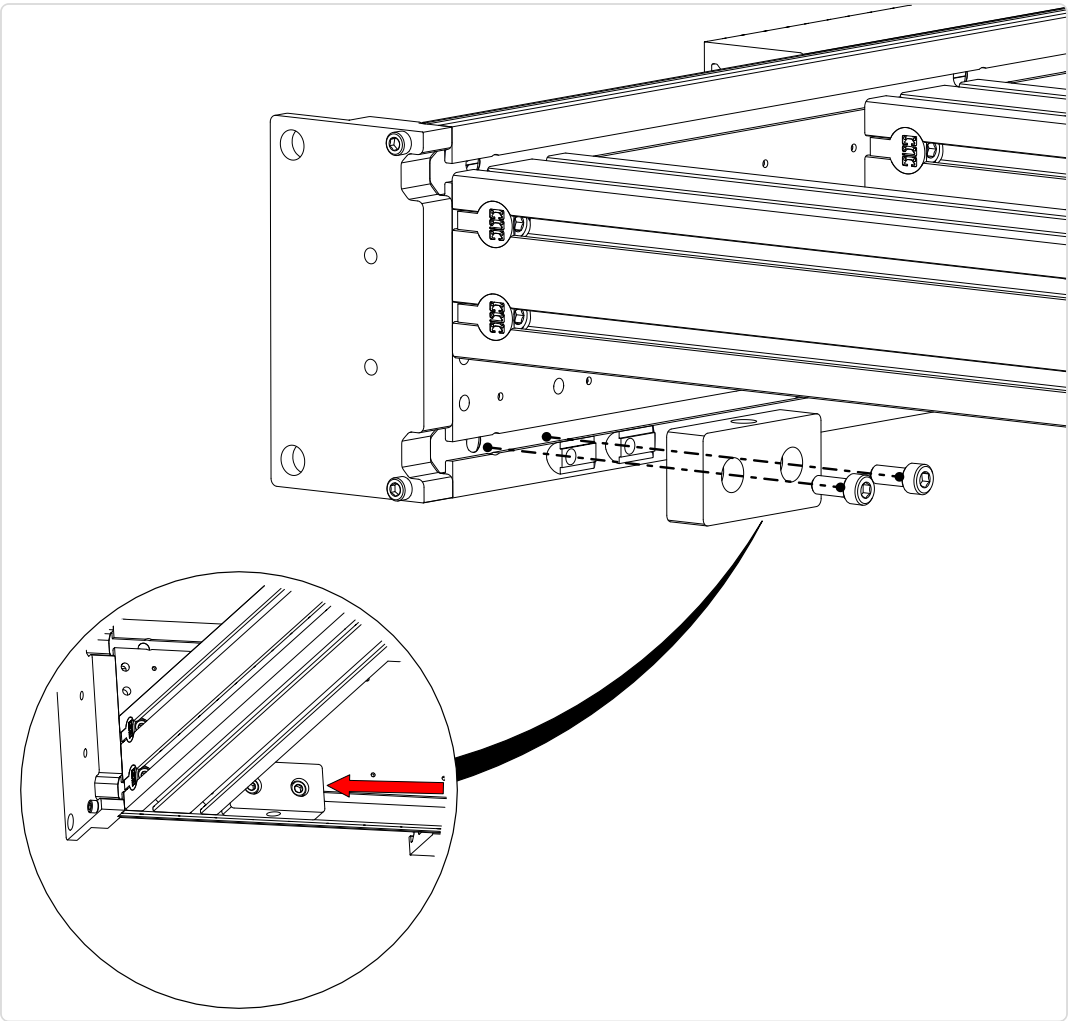
1.1.8



- Tighten all remaining crossmember anchor screws.

1.2 Leveling Feet Assembly

1.2.1

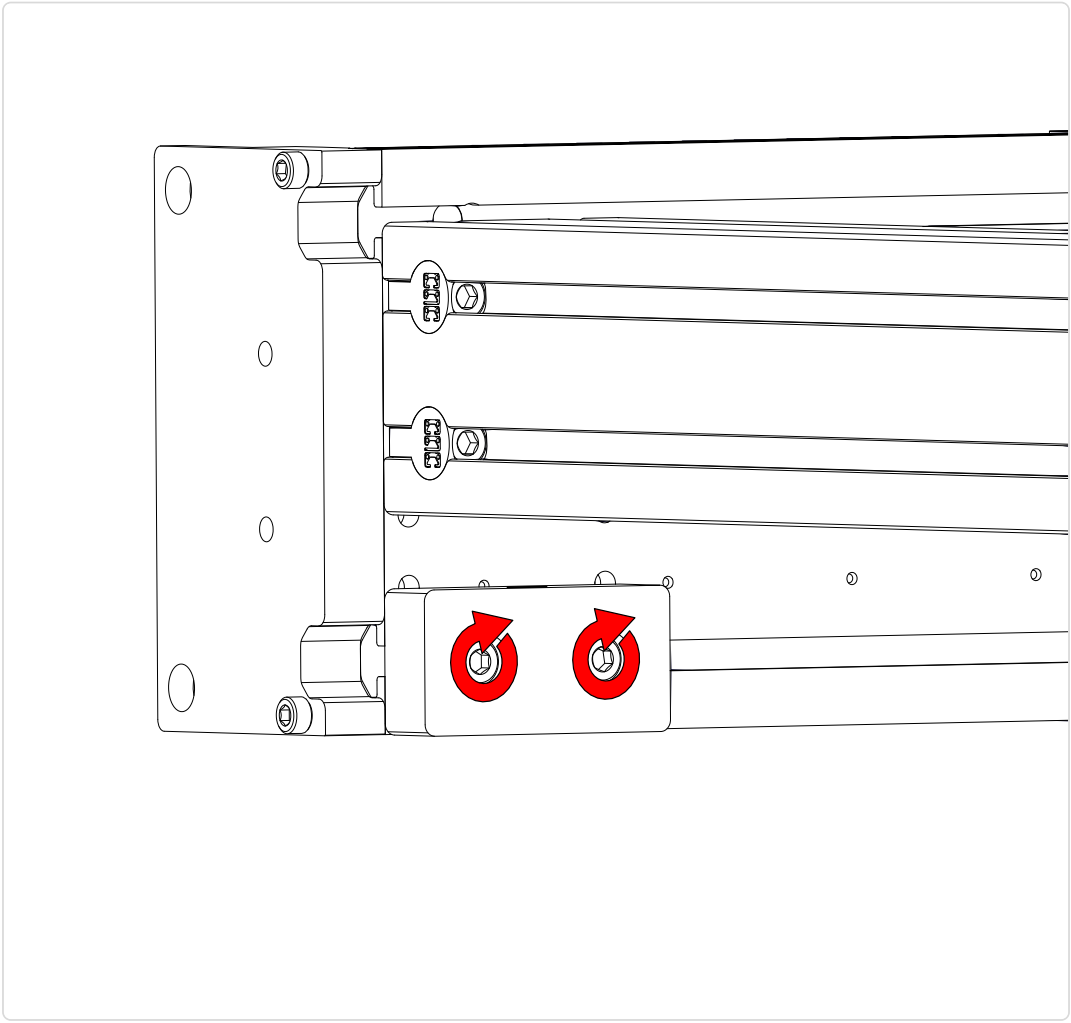


- Attach a foot plate to a ballscrew axis as indicated.

Assembly Note

If you assembled the crossmembers in the lowered configuration, locate the block to the side of the crossmember rather than under it.

1.2.2

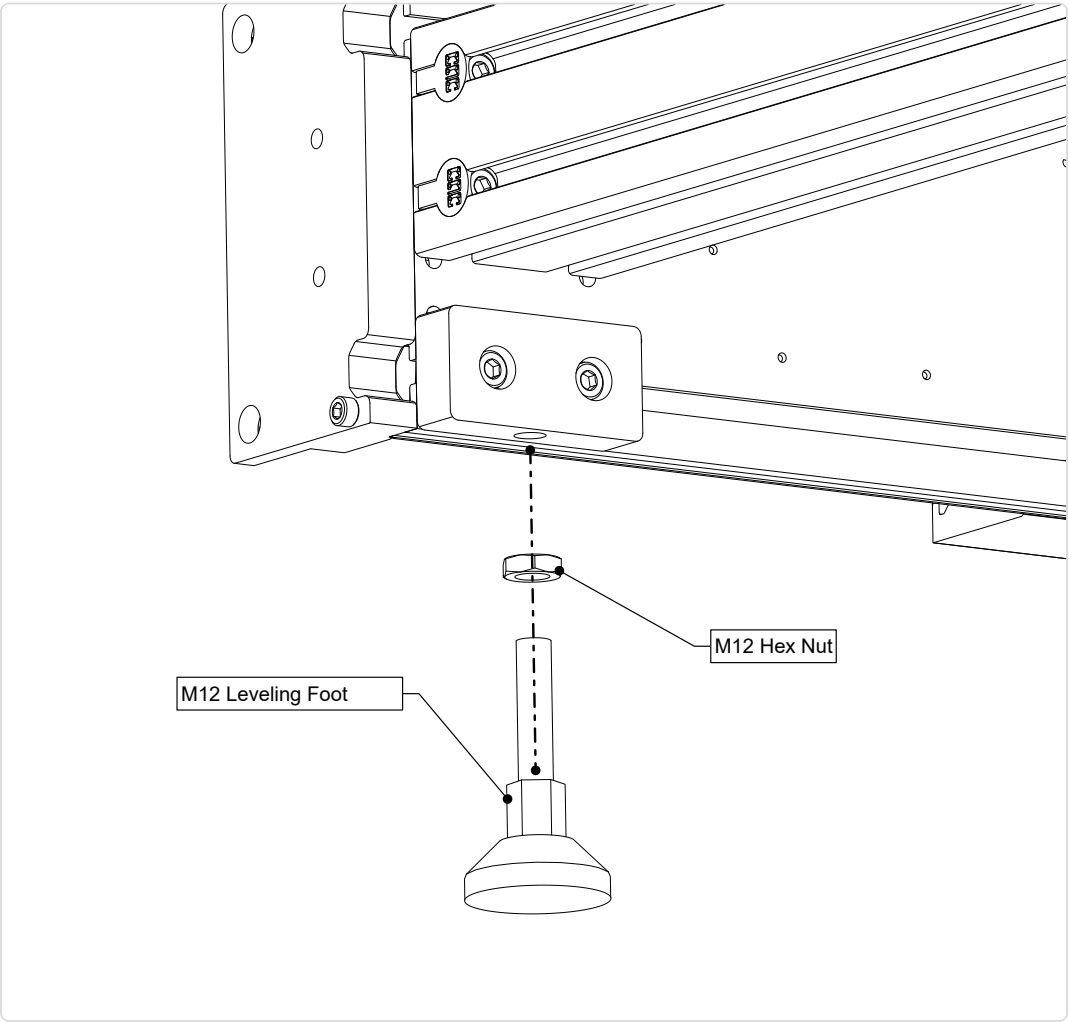


- Bias the foot plate towards the crossmember, ensuring it is flush with the bottom of the extrusion.
- Tighten the indicated fasteners.

Assembly Note

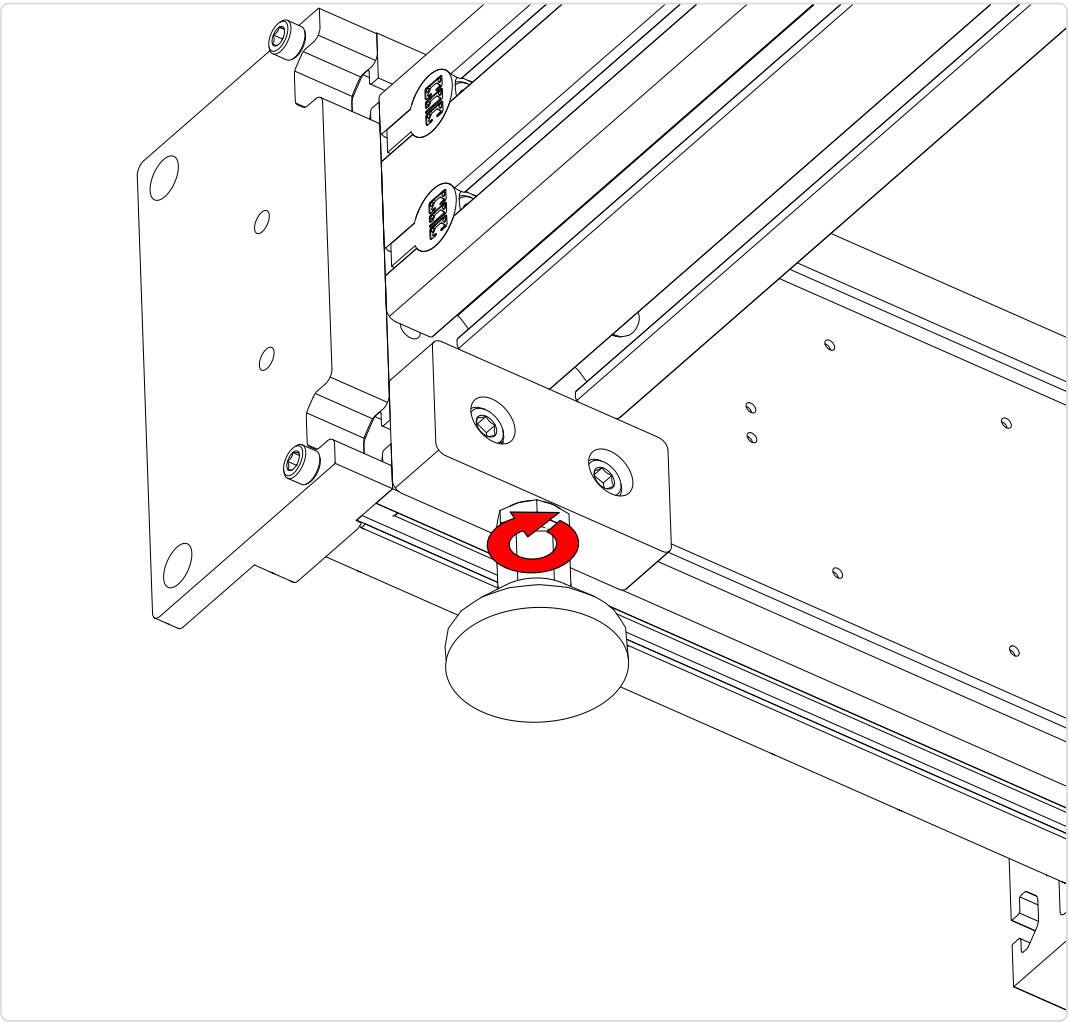
If your crossmembers are not in the default configuration, do not attempt to bring the foot plate flush with the extrusion.

1.2.3



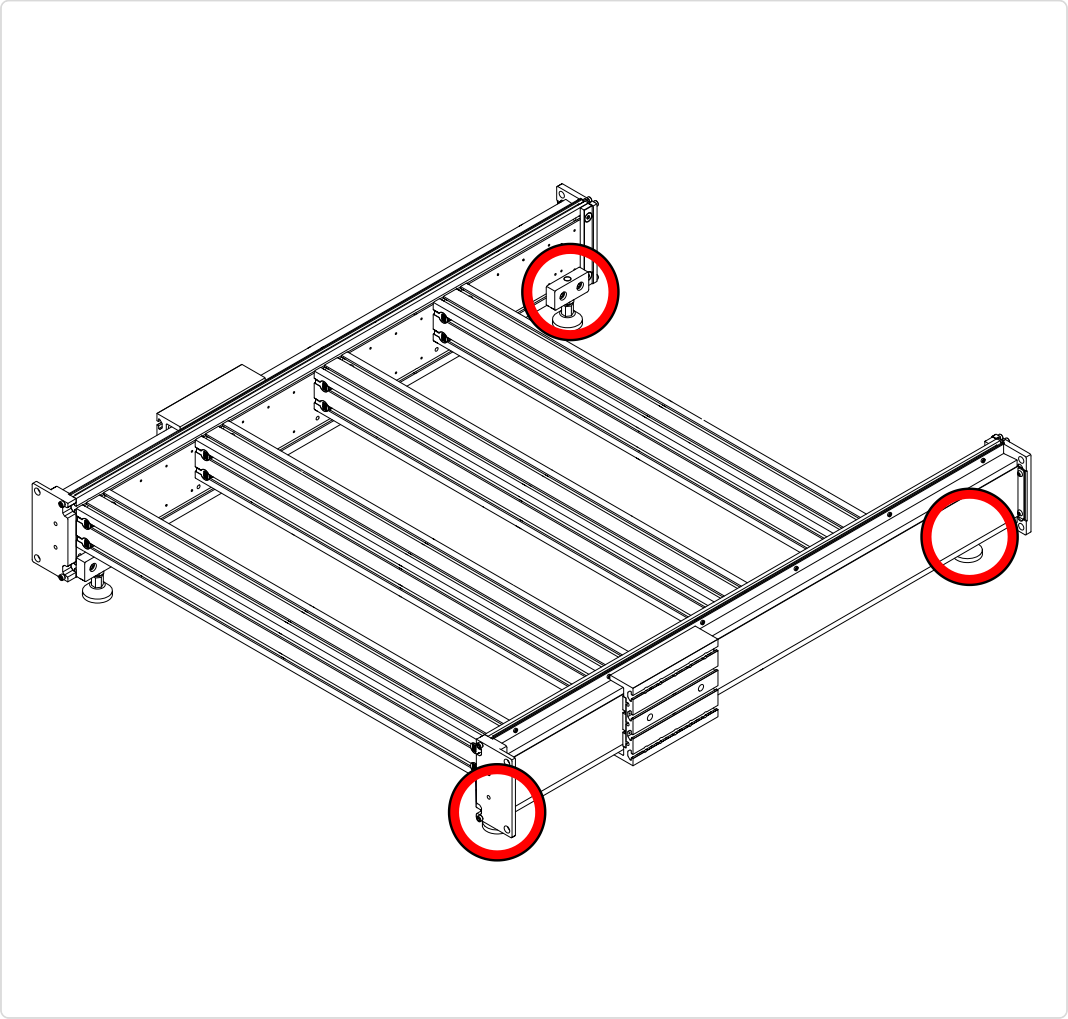
- Install the lock nut onto the leveling foot and thread the leveling foot into the foot plate.

1.2.4



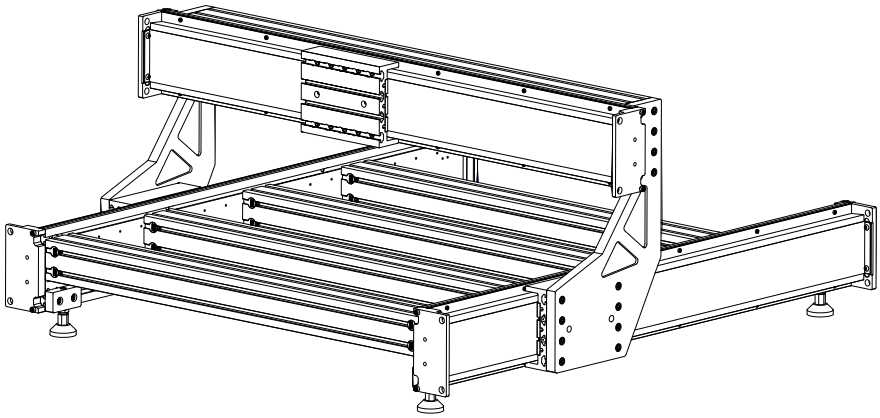
- Tighten the lock nut.

1.2.5



- Repeat this process to install the remaining leveling feet at the indicated locations.

Section 2: Gantry Installation



Parts and Tools Required

The following parts and tools will be used in Section 2

Parts List - 2' Wide Machines

QTY	Part/Description	Packaged In
1	8016 Gantry Extrusion, 800mm (31-1/2)	Linear Extrusion Bundle
1	CRP840-00-650 - PRO Linear Ballscrew Axis, Gantry	Benchtop Gantry Axis
1	CRP920-01-L - Gantry Riser, Left	CRP900-00-XXXX-HW
1	CRP920-01-R - Gantry Riser, Right	CRP900-00-XXXX-HW
1	CRP920-00-FAST: - (16) M8 x 25mm Socket Head Cap Screw - (16) M8 Slide-in T-Nut	CRP900-00-XXXX-HW
1	CRP930-00-FAST: - (16) M8 x 25mm Flat Head Screw - (16) M8 x 25mm Socket Head Cap Screw - (16) M8 Slide-in T-Nut	CRP900-00-XXXX-HW

Parts List - 3' Wide Machines

QTY	Part/Description	Packaged In
1	8016 Gantry Extrusion, 1120mm (44-1/16")	Linear Extrusion Bundle
1	CRP840-00-950 - PRO Linear Ballscrew Axis, Gantry	Benchtop Gantry Axis
1	CRP920-01-L - Gantry Riser, Left	CRP900-00-3636-HW
1	CRP920-01-R - Gantry Riser, Right	CRP900-00-3636-HW
1	CRP920-00-FAST: - (16) M8 x 25mm Socket Head Cap Screw - (16) M8 Slide-in T-Nut	CRP900-00-3636-HW
1	CRP930-00-36-FAST: - (22) M8 x 25mm Flat Head Screw - (16) M8 x 25mm Socket Head Cap Screw - (22) M8 Slide-in T-Nut	CRP900-00-3636-HW

Required Tools:

-3mm Allen Wrench

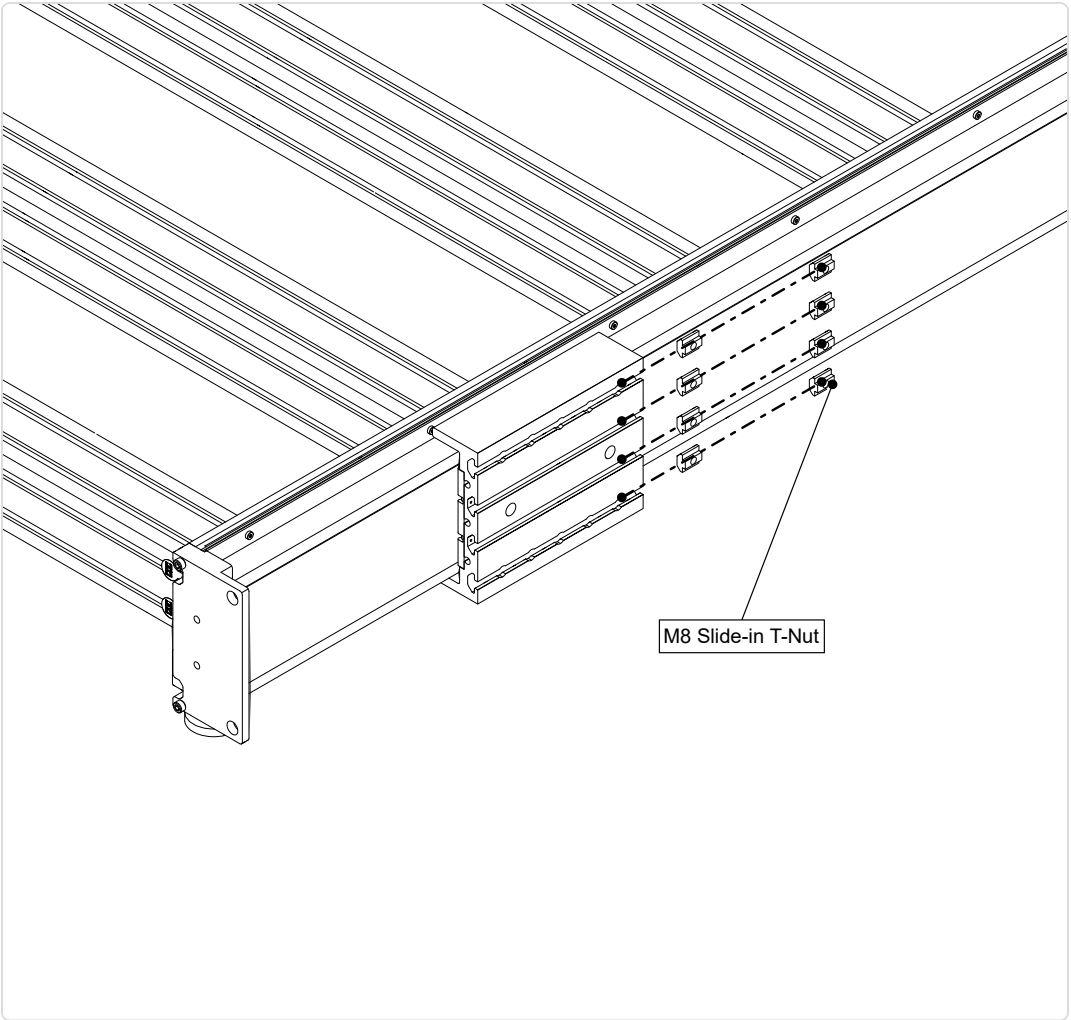
-5mm Allen Wrench

-6mm Allen Wrench

-Tape Measure

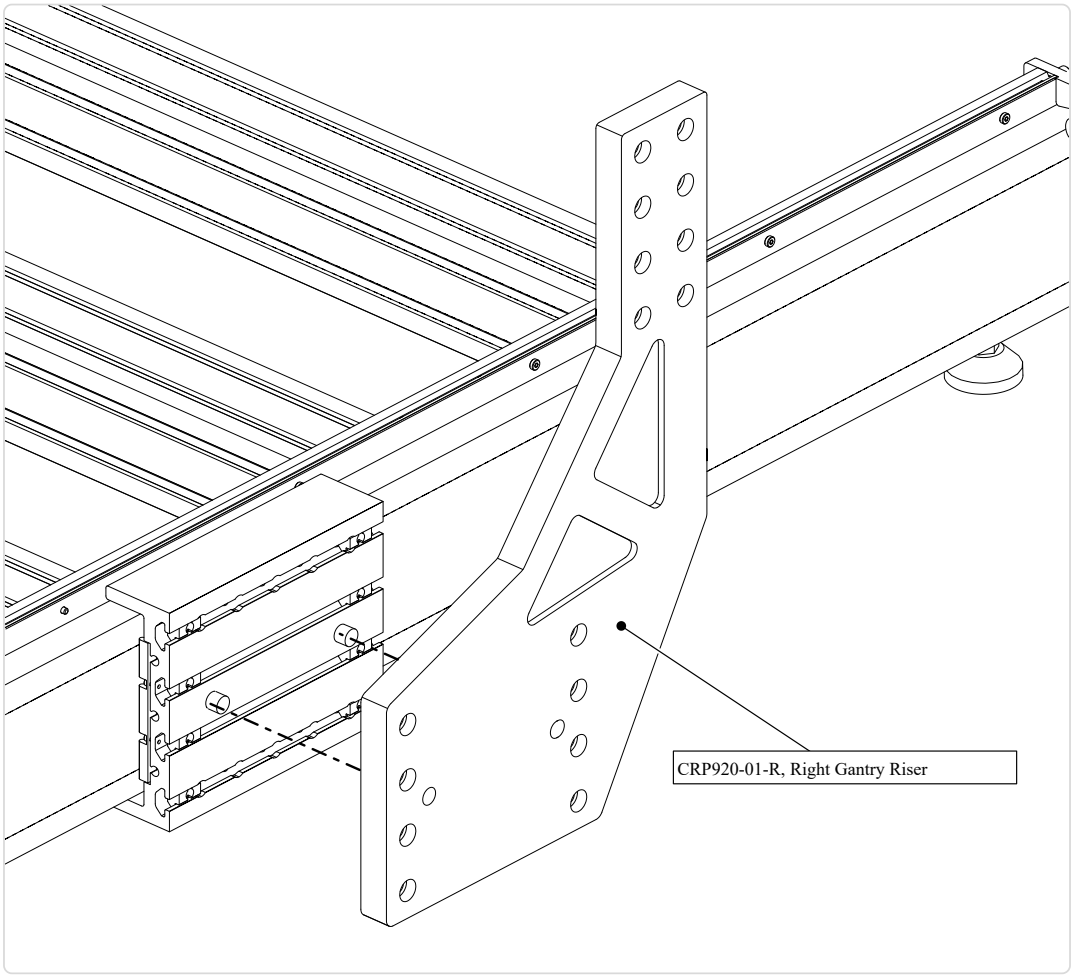
2.1 Gantry Riser Assembly

2.1.1



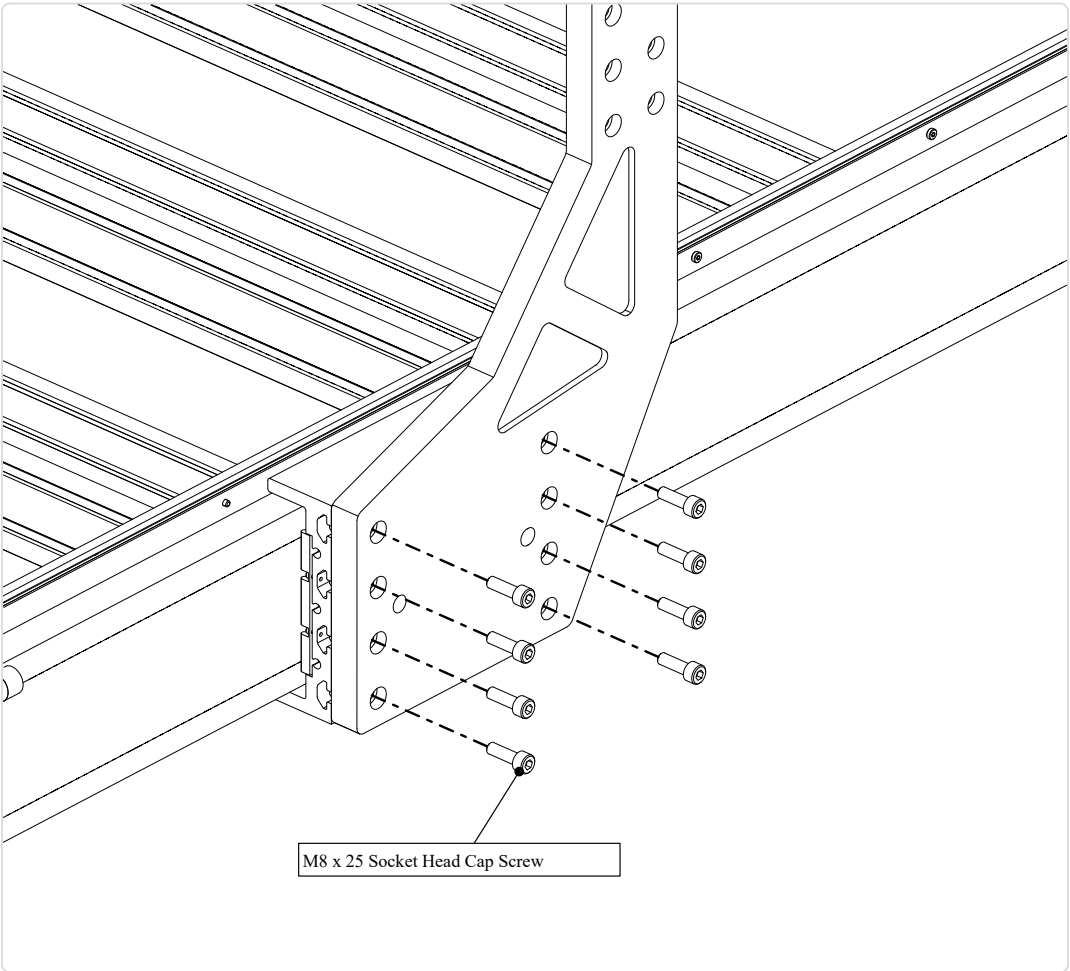
- Slide slide-in T-Nuts onto the right table axis as indicated.

2.1.2



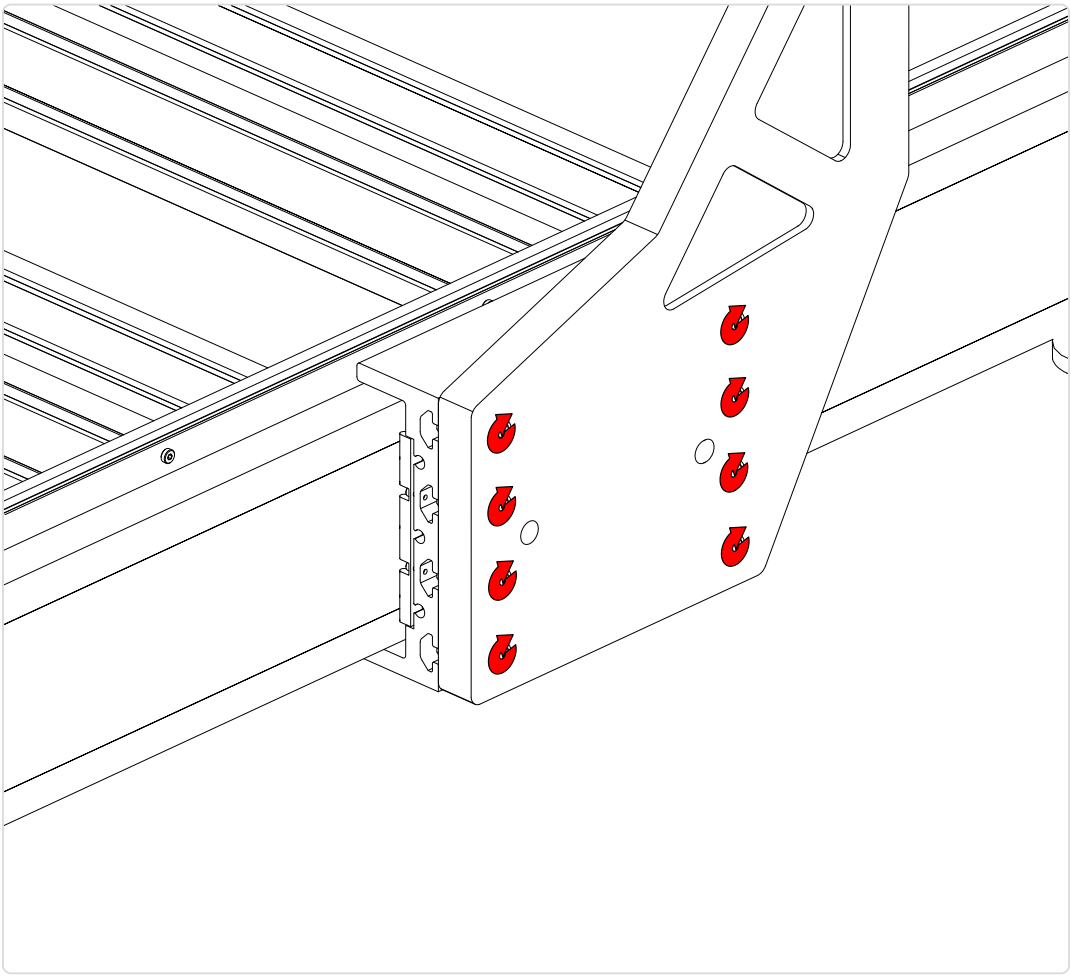
- Attach the right gantry riser to the extrusion.

2.1.3



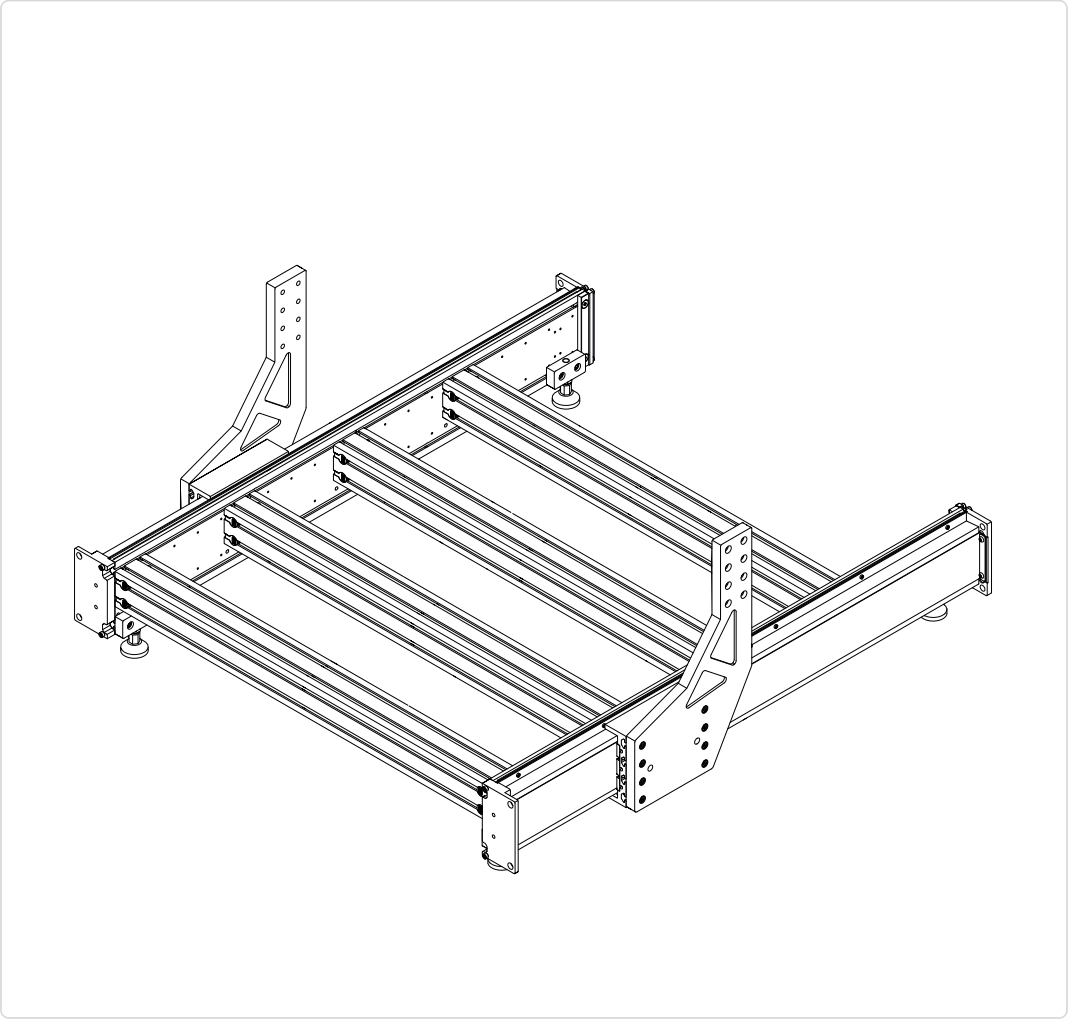
- Thread socket head cap screws into the T-Nuts.

2.1.4



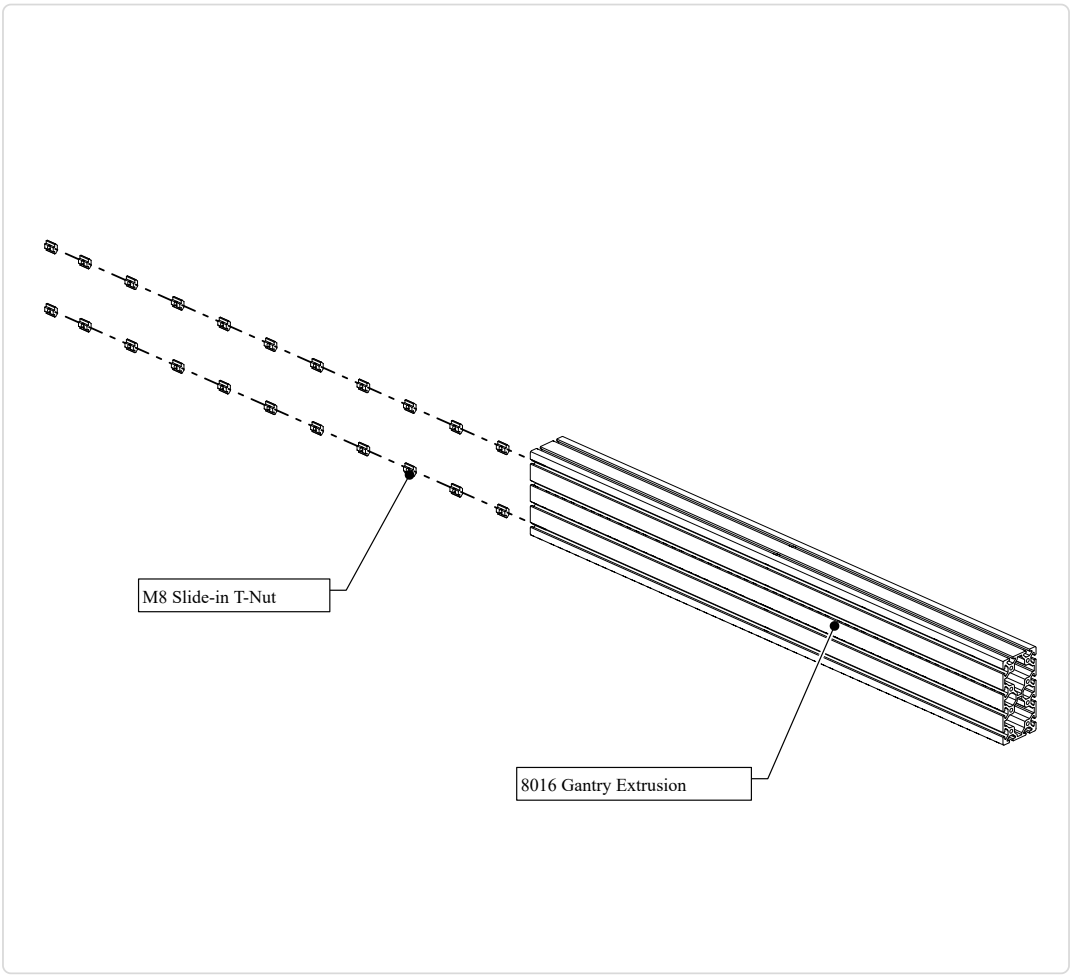
- Tighten the indicated bolts.

2.1.5



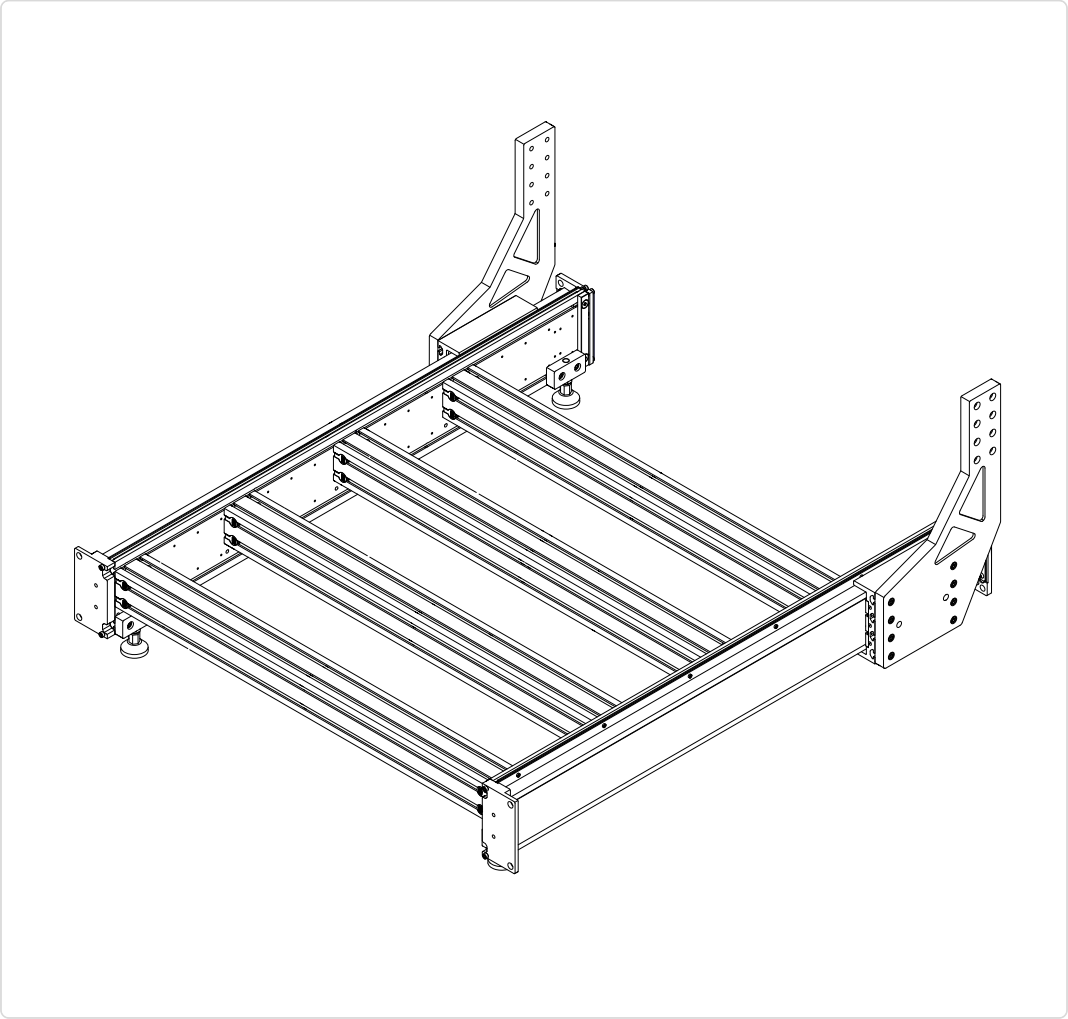
- Repeat the previous steps to attach the second gantry riser to the left table axis.

2.1.6



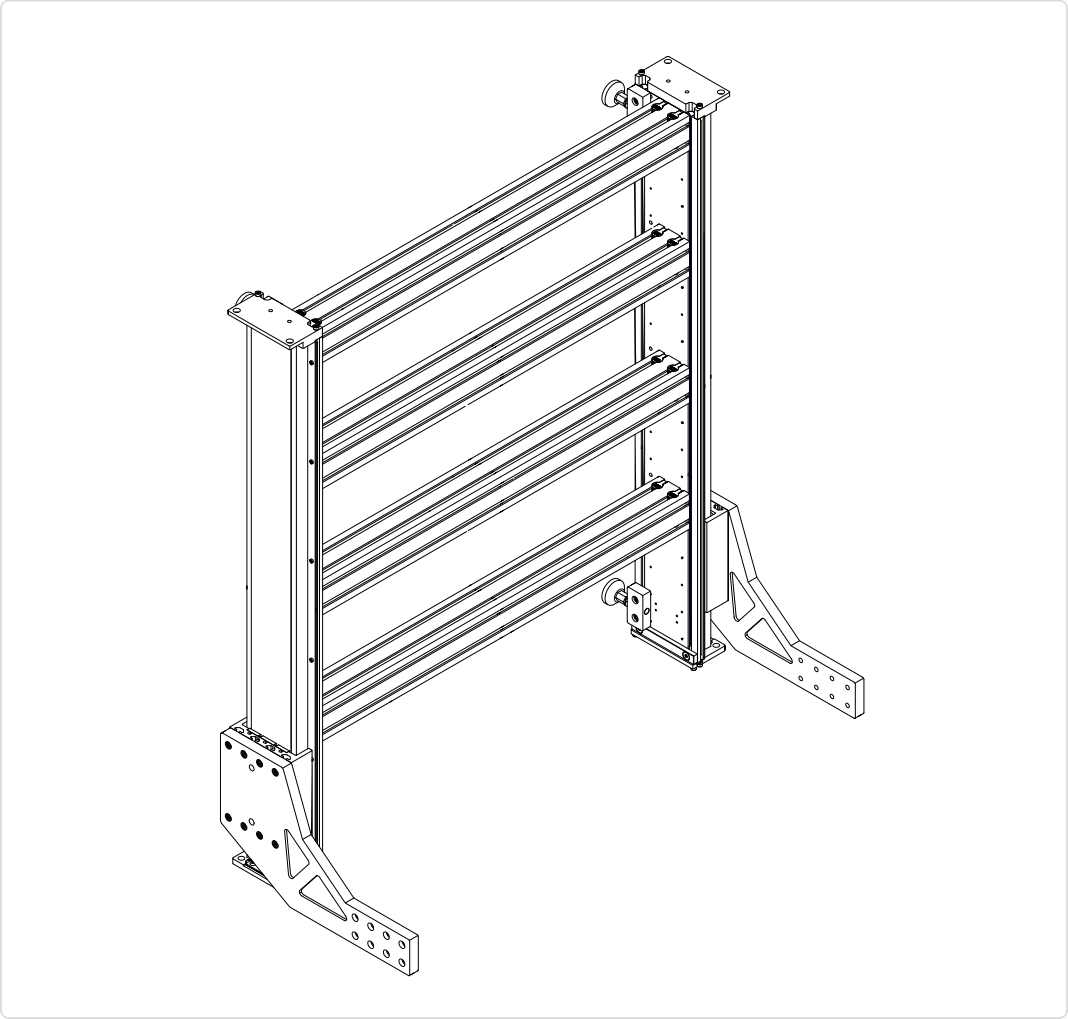
- Slide t-nuts into gantry extrusion.

2.1.7



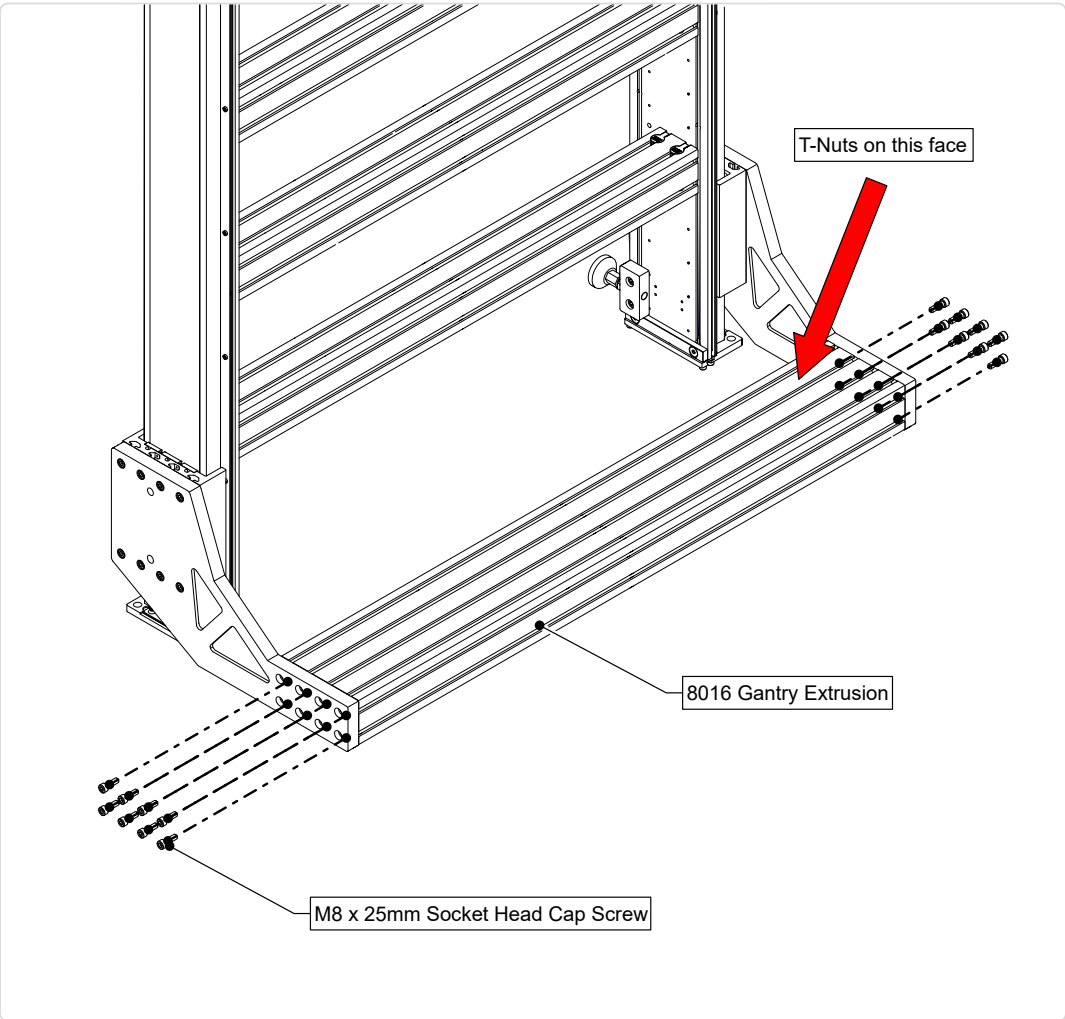
- Slide the risers to the back of the machine.

2.1.8



- Turn the machine onto its back.

2.1.9

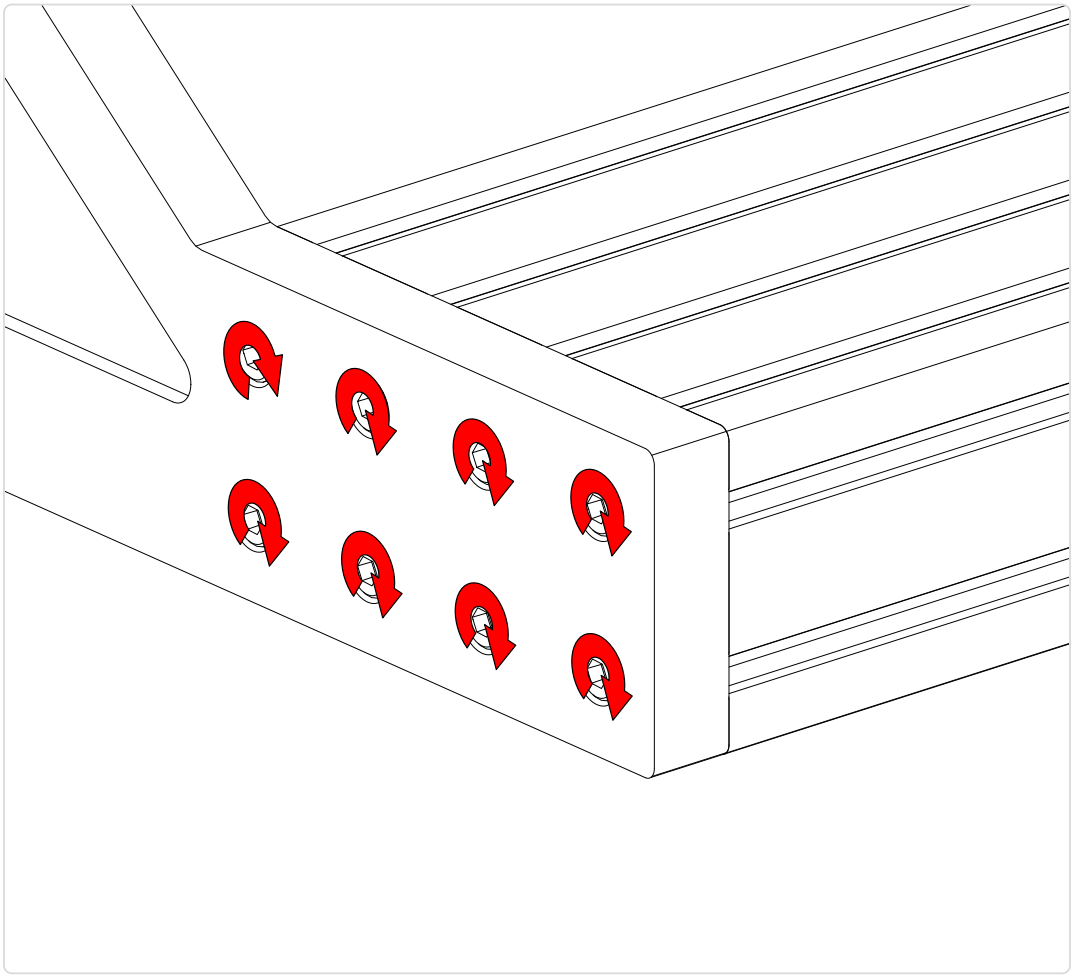


- Attach gantry extrusion to the risers with the M8 x 25mm fasteners.

Assembly Note

Orient gantry extrusion with the previously installed t-nuts on the indicated face.

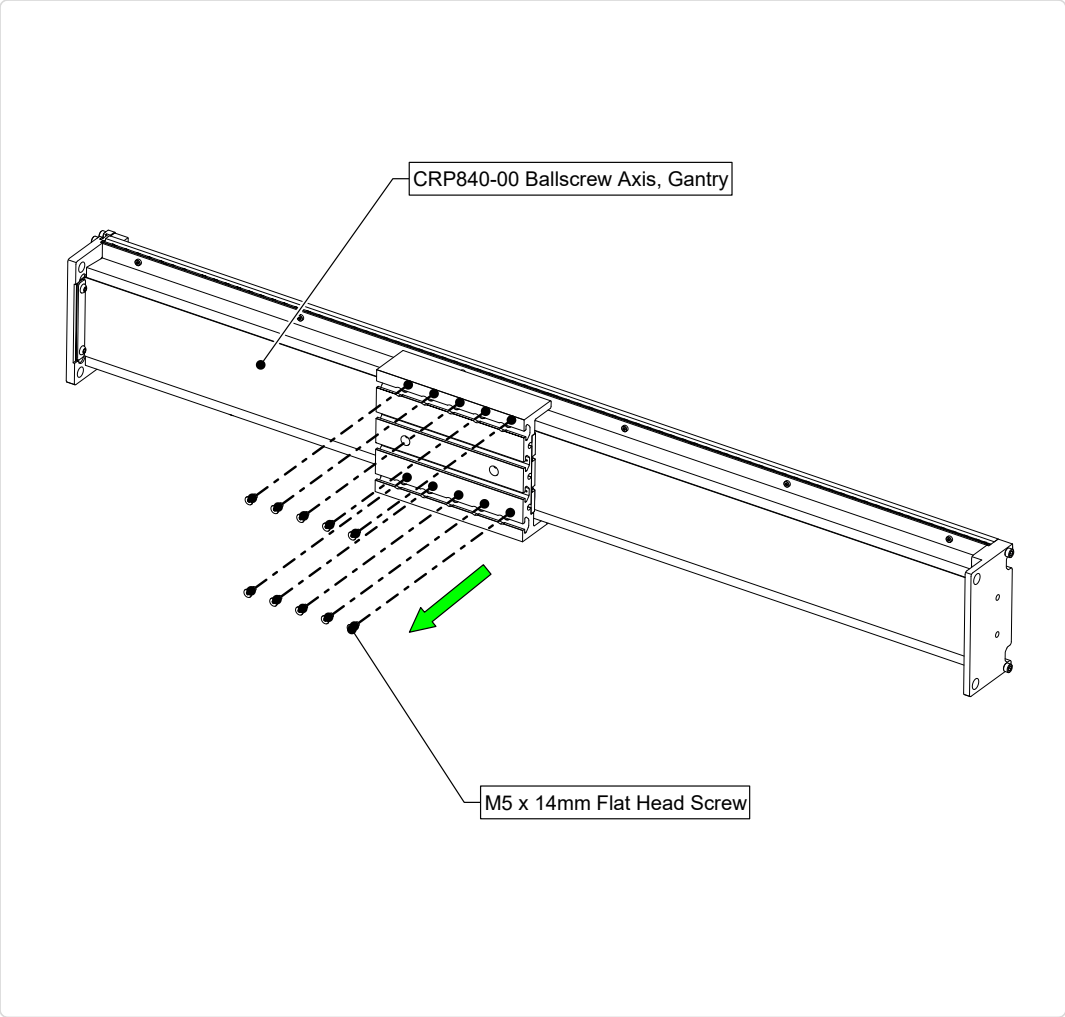
2.1.10



- Tighten the indicated bolts.

2.2 Gantry Axis Installation

2.2.1

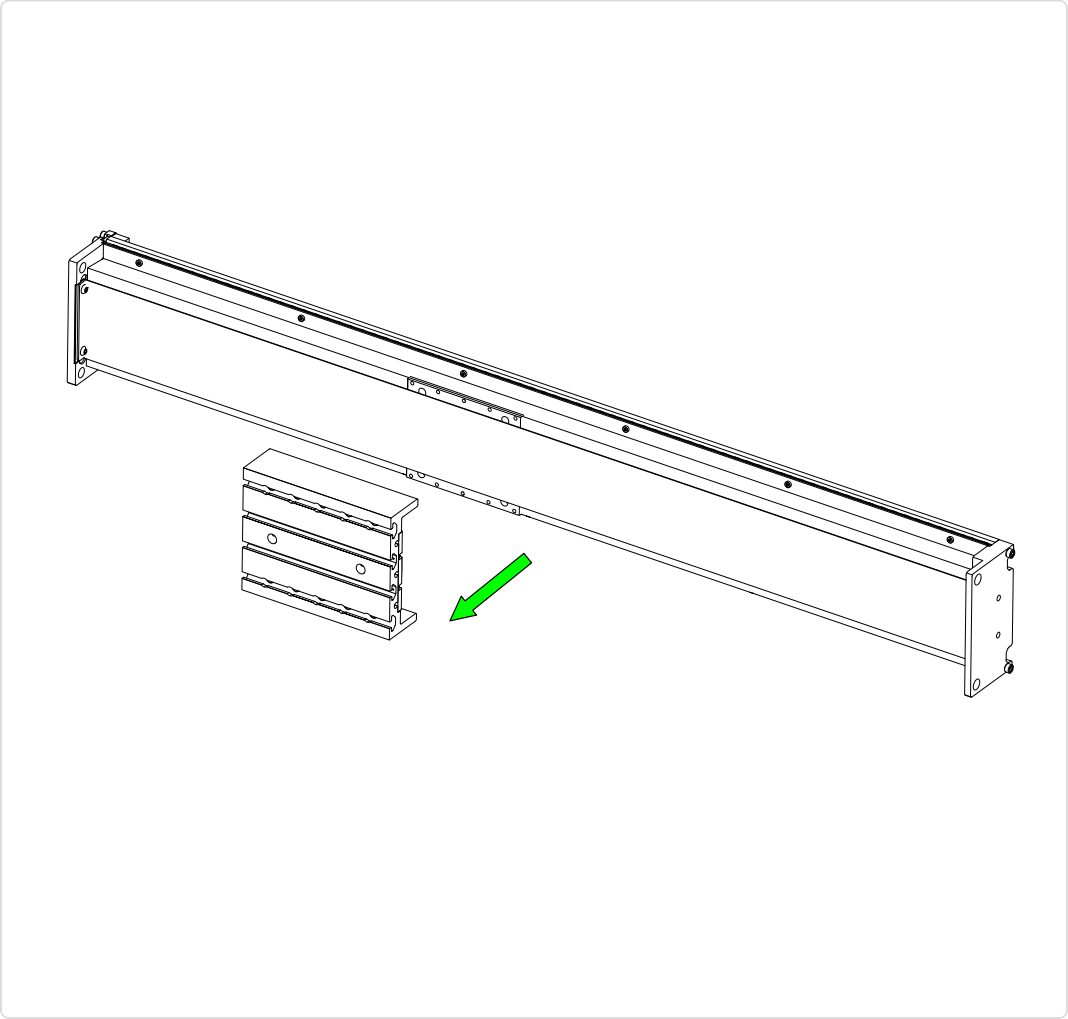


- Remove the indicated screws holding the moving plate to the gantry ballscrew axis.

Assembly Note

Place these screws aside, you will be reinstalling the moving plate in a future step.

2.2.2

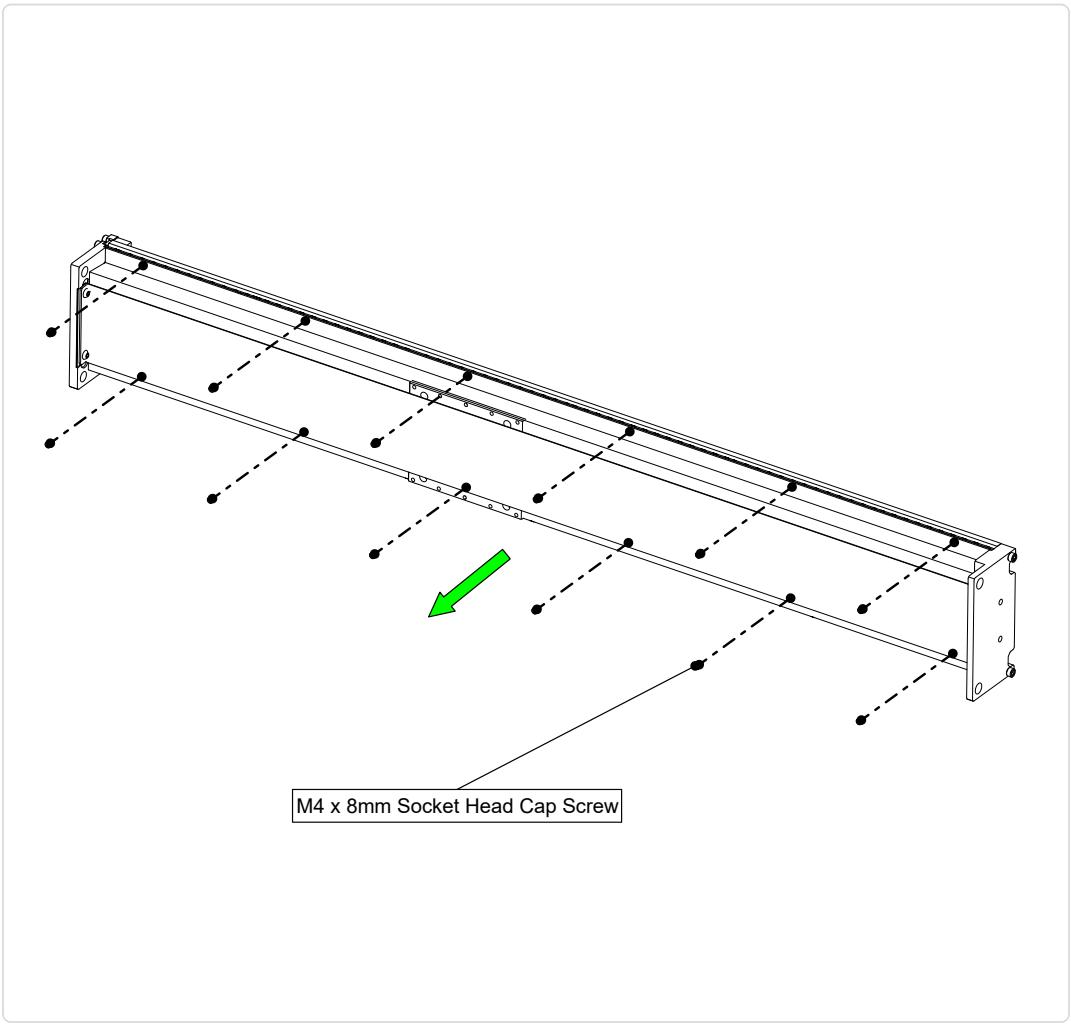


- Remove the moving plate and set aside.

Assembly Note

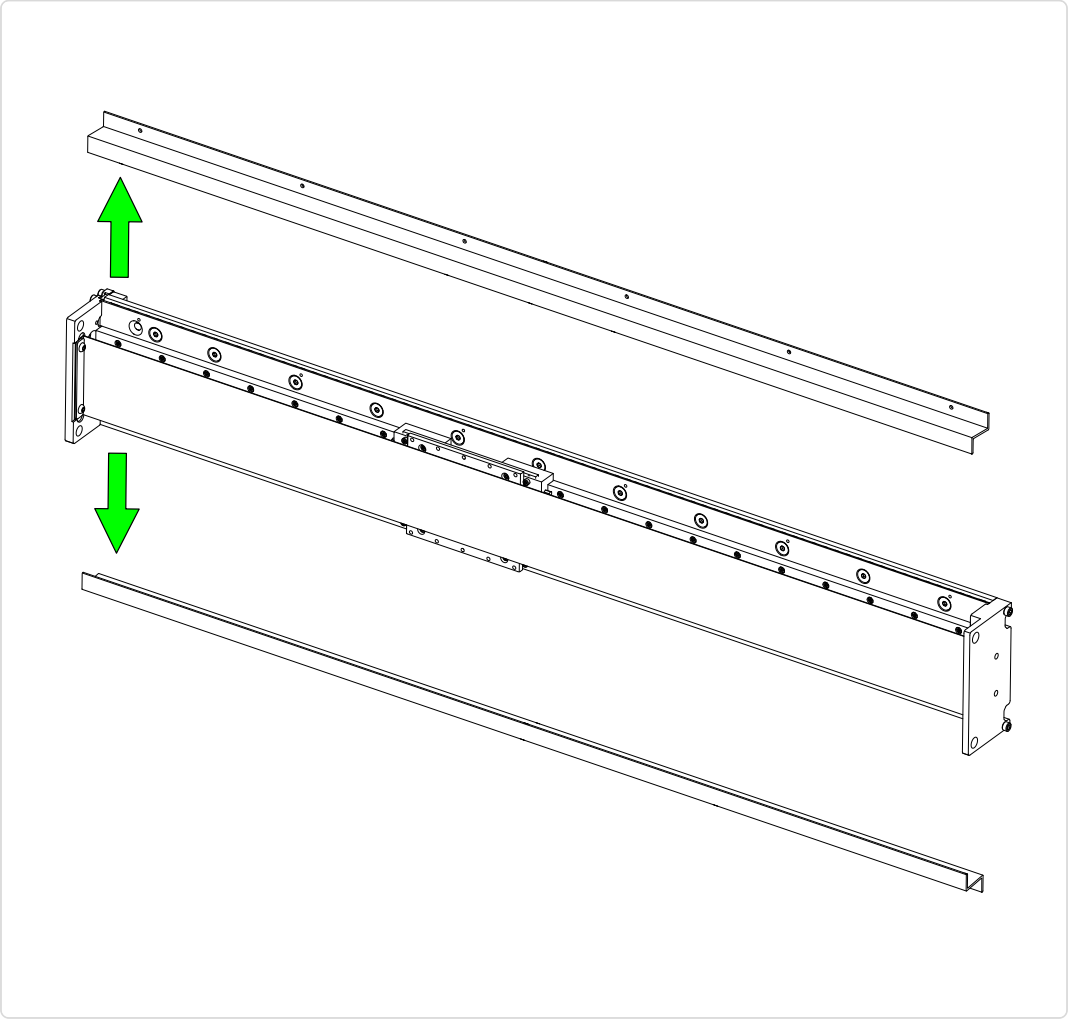
Some force may be required to remove the moving plate from the gantry ballscrew axis.

2.2.3



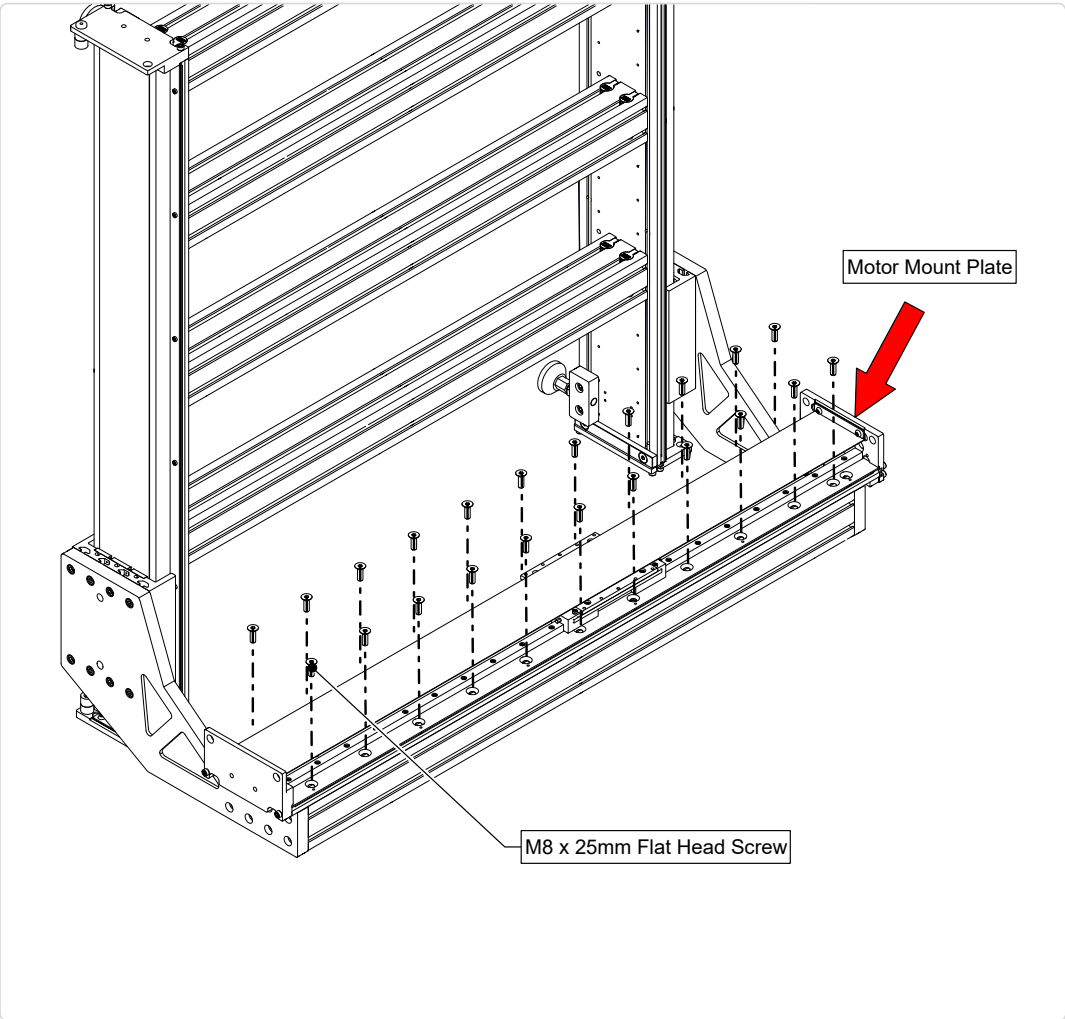
- Remove the metal dust cover screws from the gantry axis and set them aside.

2.2.4



- Remove the metal dust covers from the gantry axis.

2.2.5

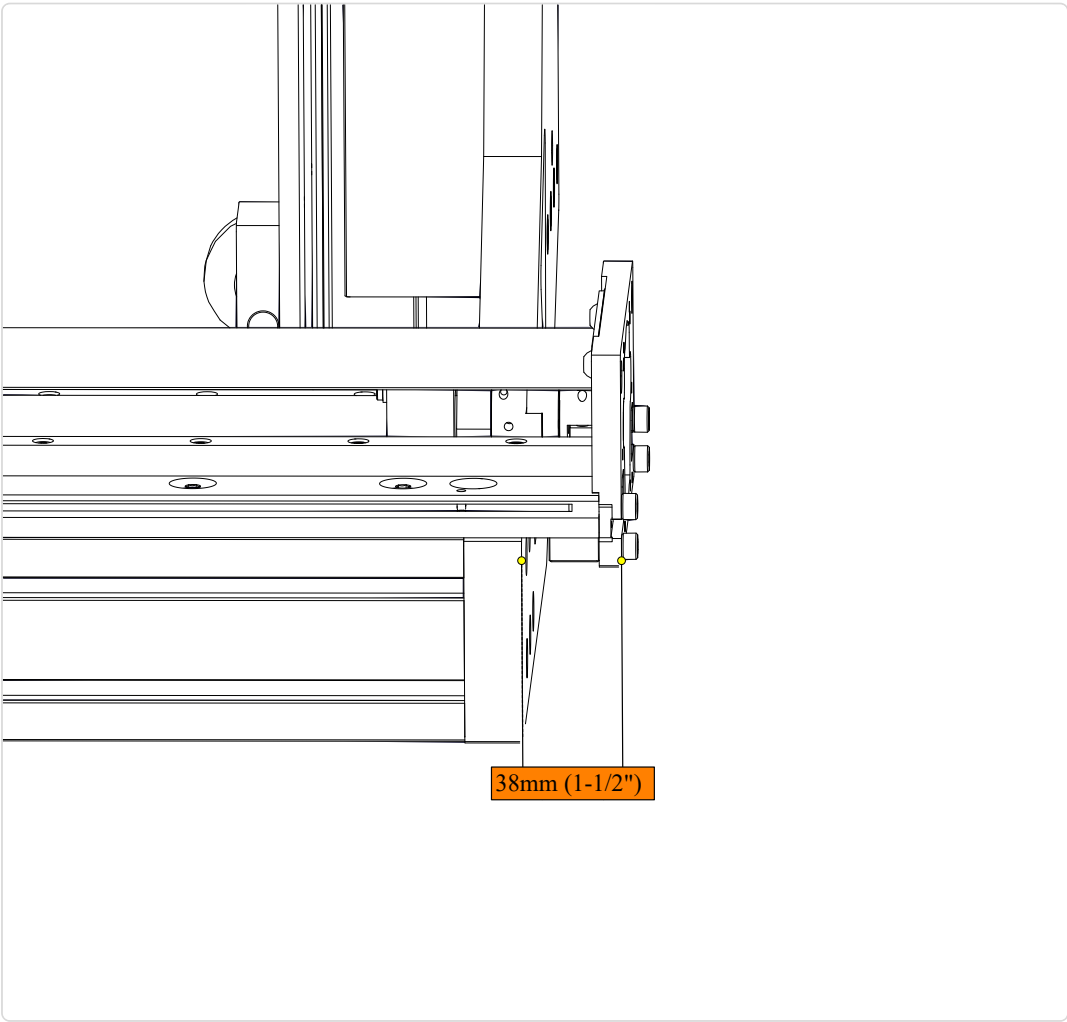


- Attach the gantry ballscrew axis to the gantry extrusion oriented with the motor mount plate on the indicated side.

Assembly Note

For all gantry sizes, the two countersunk holes closest to the motor mount plate do not receive fasteners.

2.2.6

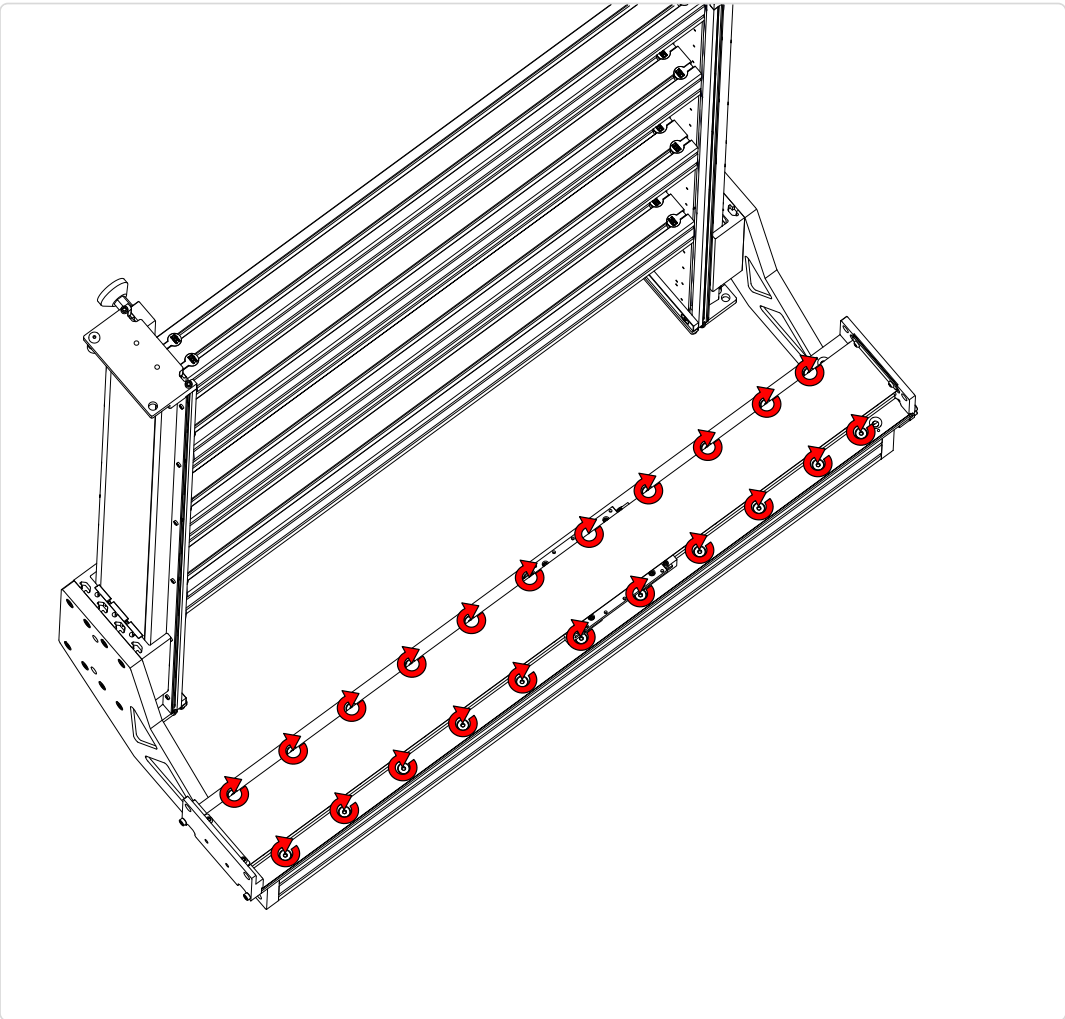


- Position the axis so the motor mount plate is 38mm (1-1/2") from the riser.

Machine Configuration Options

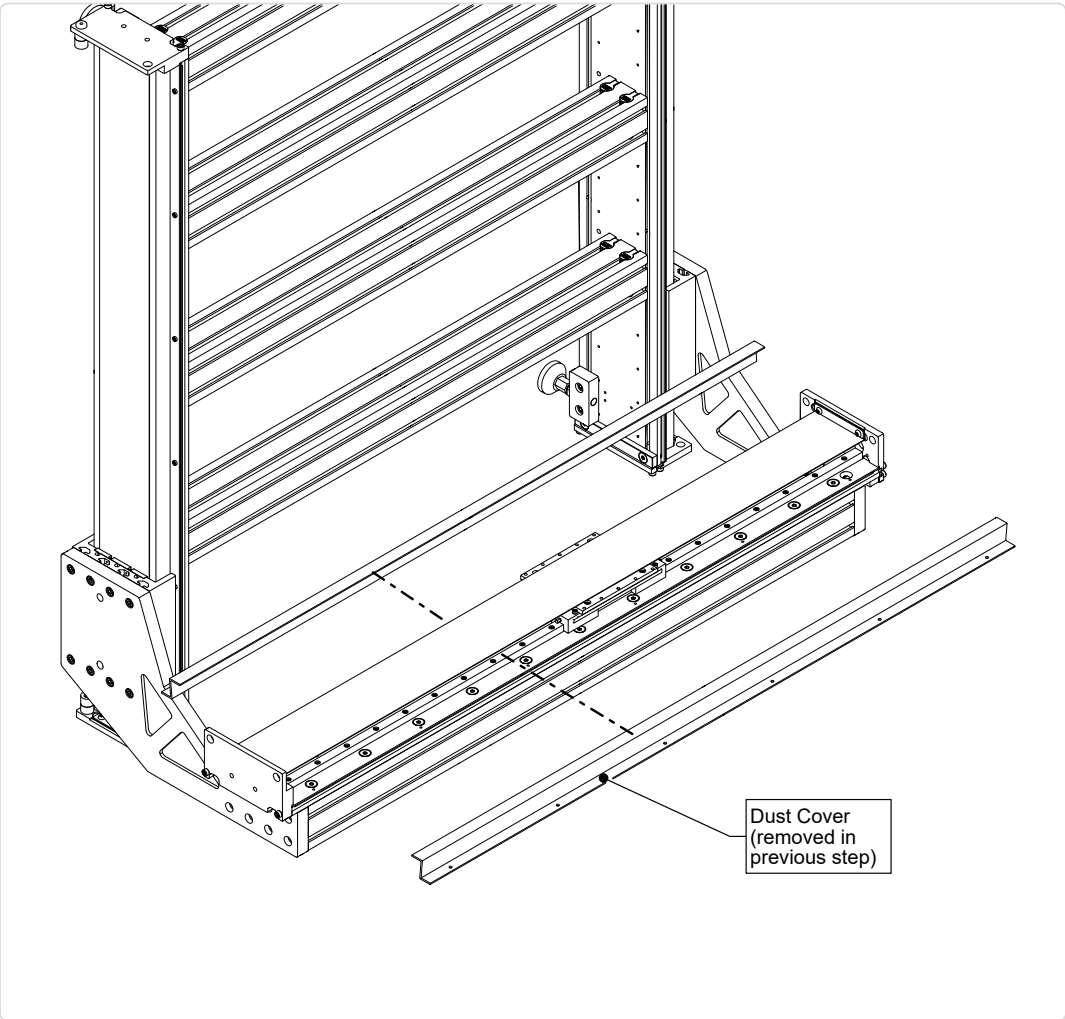
For 24" gantries, position the plate 46mm (1-13/16") from the riser

2.2.7



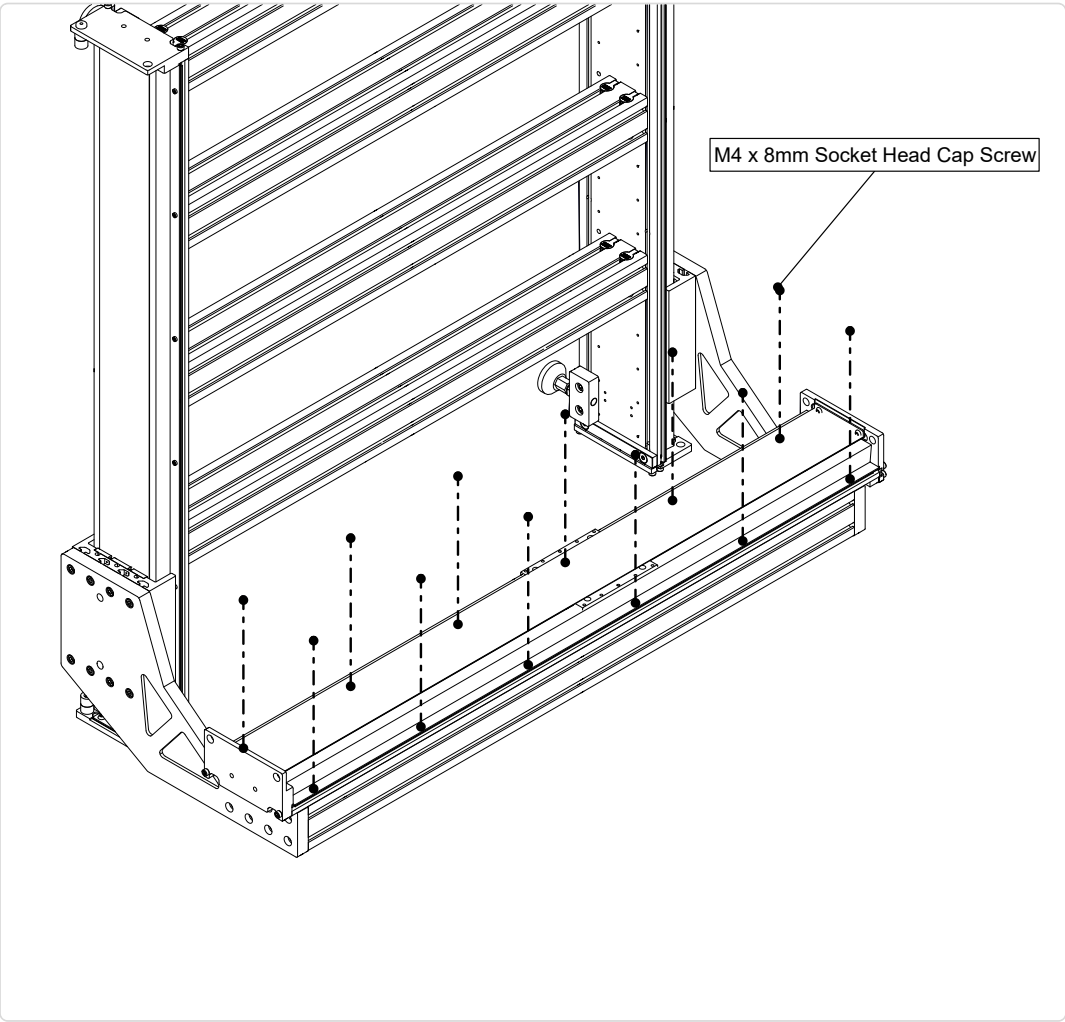
- Tighten the gantry axis bolts.

2.2.8



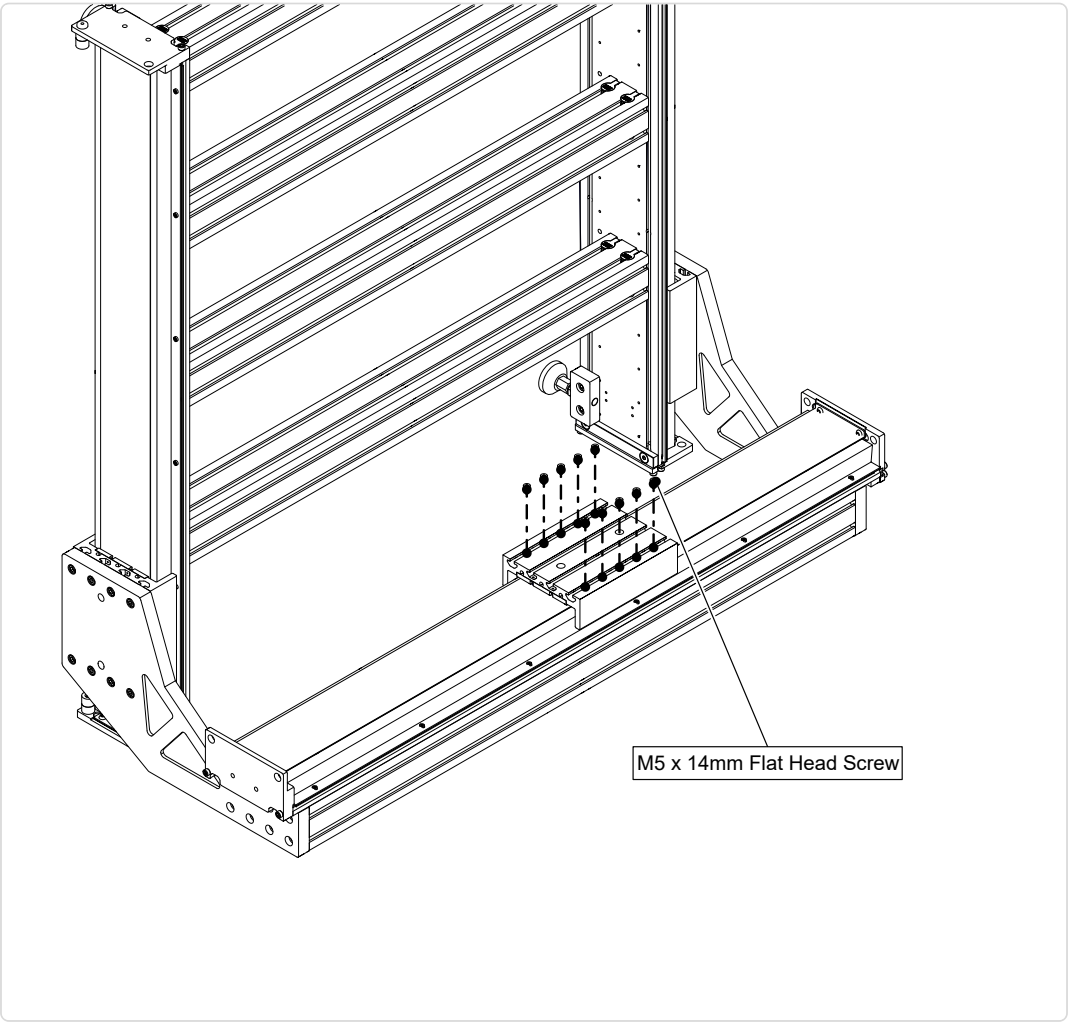
- Slide the metal dust covers back on the gantry axis as indicated.

2.2.9



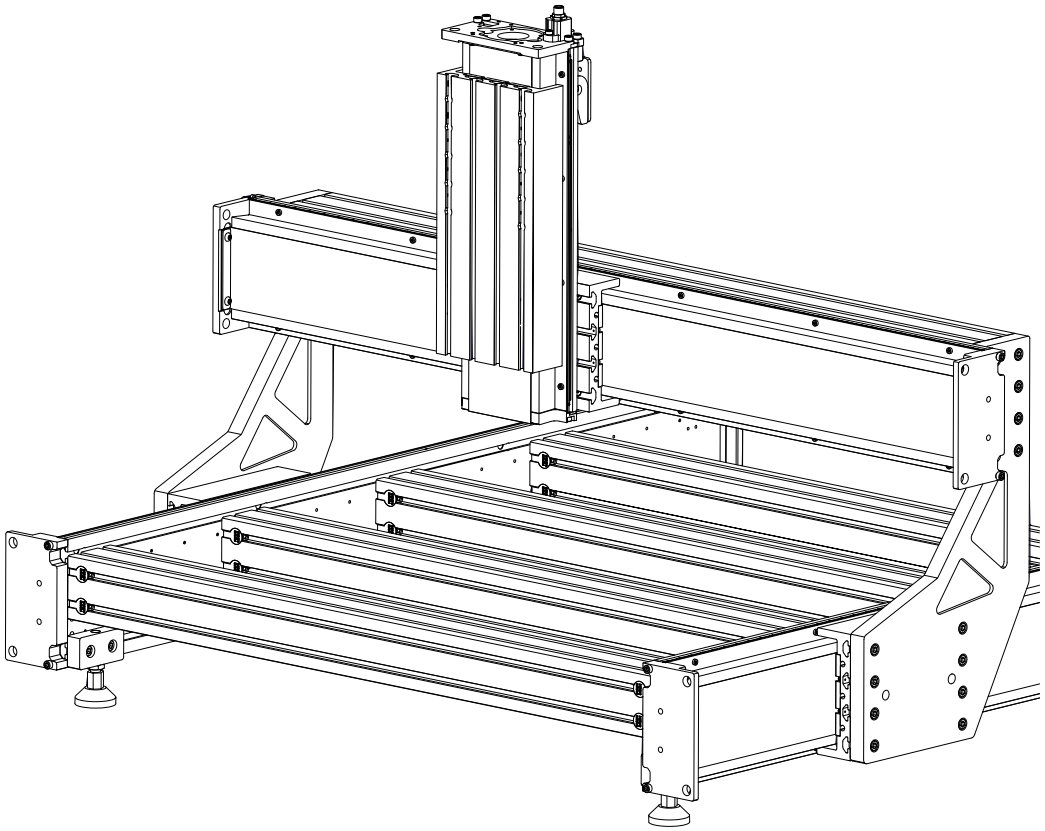
- Attach the metal dust covers using the screws removed in previous steps.

2.2.10



- Attach the moving plate to the gantry axis using the screws removed in previous steps.

Section 3: Z-Axis Installation



Parts and Tools Required

The following parts and tools will be used in Section 3

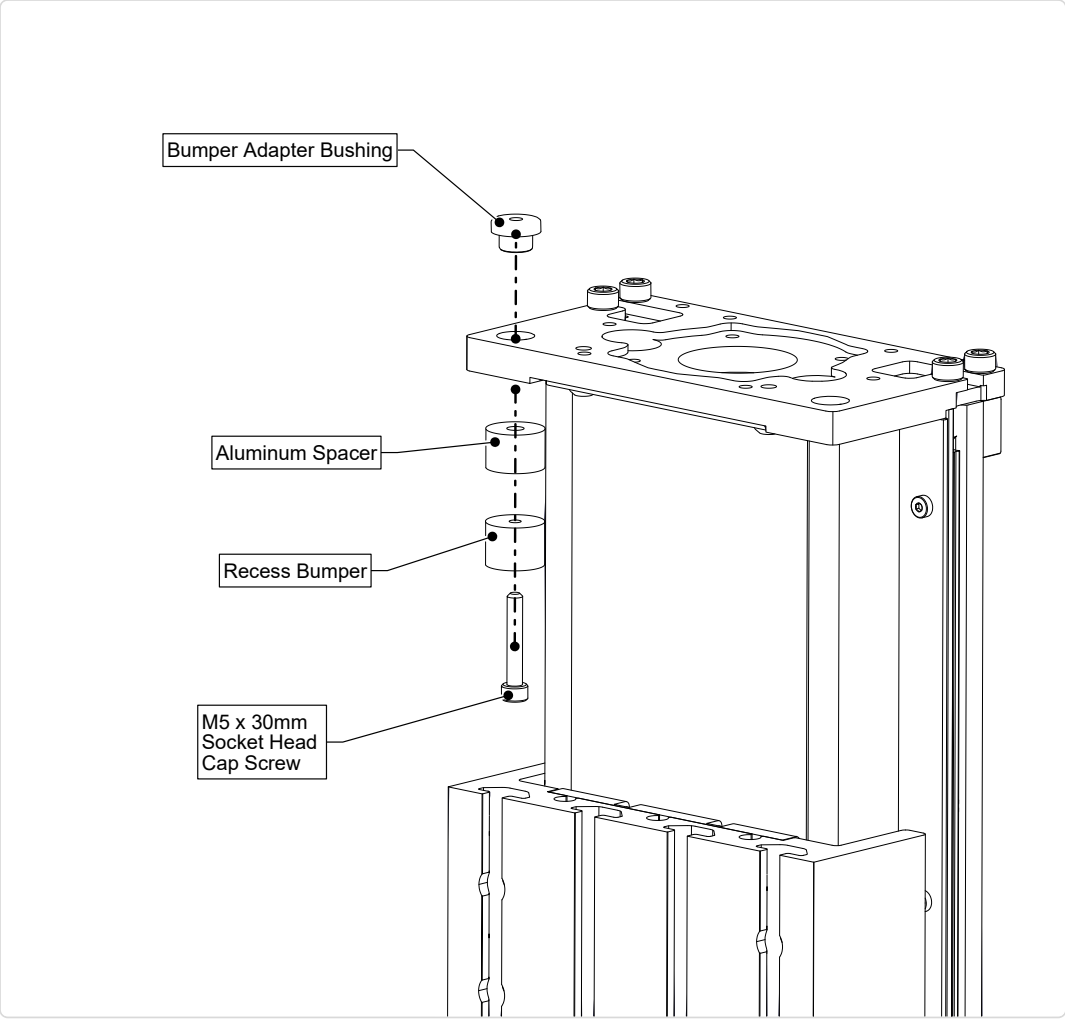
QTY	Part/Description	Packaged In
1	CRP840-00-200 - PRO Linear Ballscrew Axis	Z Axis
1	CRP940-00-FAST: - (8) M8 x 25mm Flat Head Screw - (8) M8 Slide-in T-Nut	CRP900-00-HW-XXXX
1	Motor & Bumper Hardware: - (1) Bumper Adapter Bushing - (1) Aluminum Spacer - (1) Recess Bumper - (1) M5 x 30mm Socket Head Cap Screw	CRP900-00-HW-XXXX

Required Tools:

- 3mm Allen Wrench
- 4mm Allen Wrench
- 5mm Allen Wrench

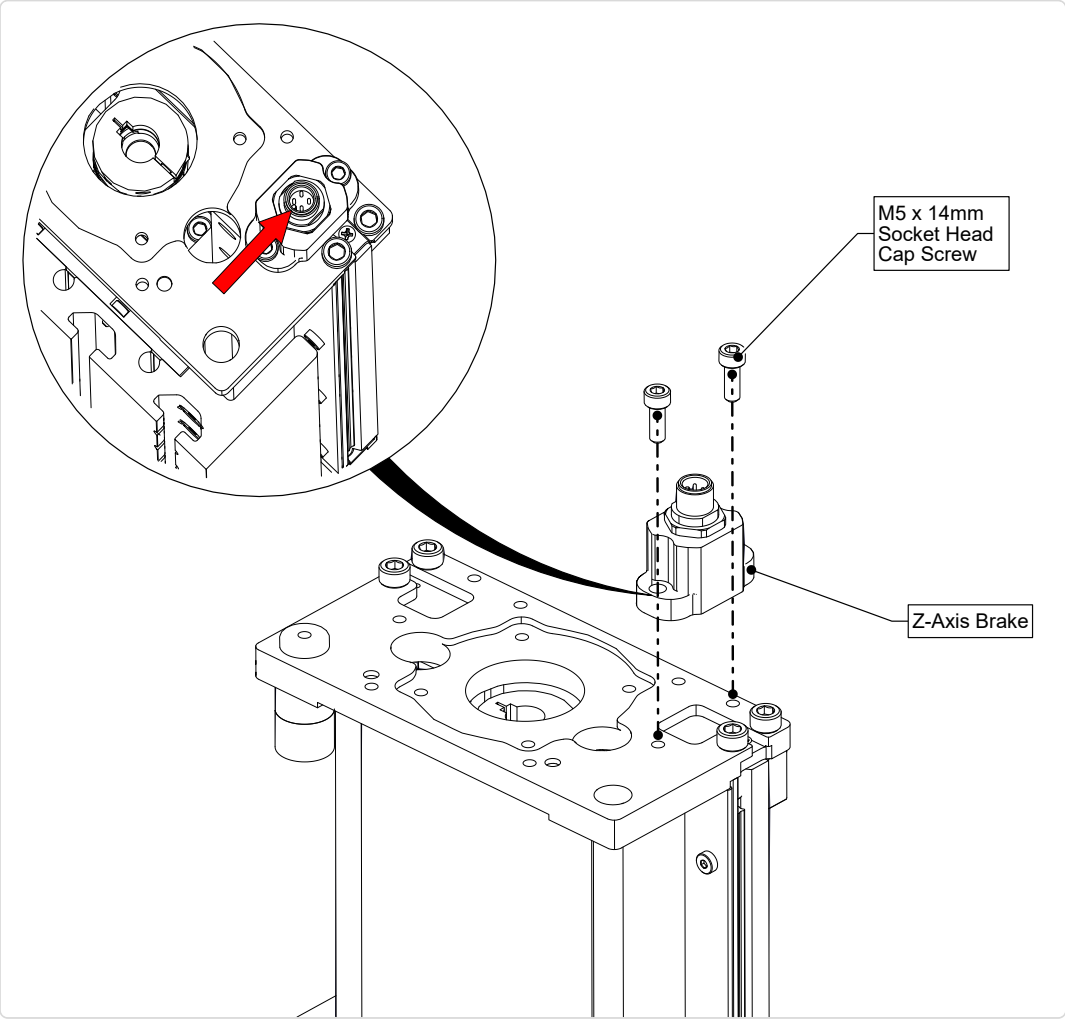
3.1 Z-Axis Installation

3.1.1



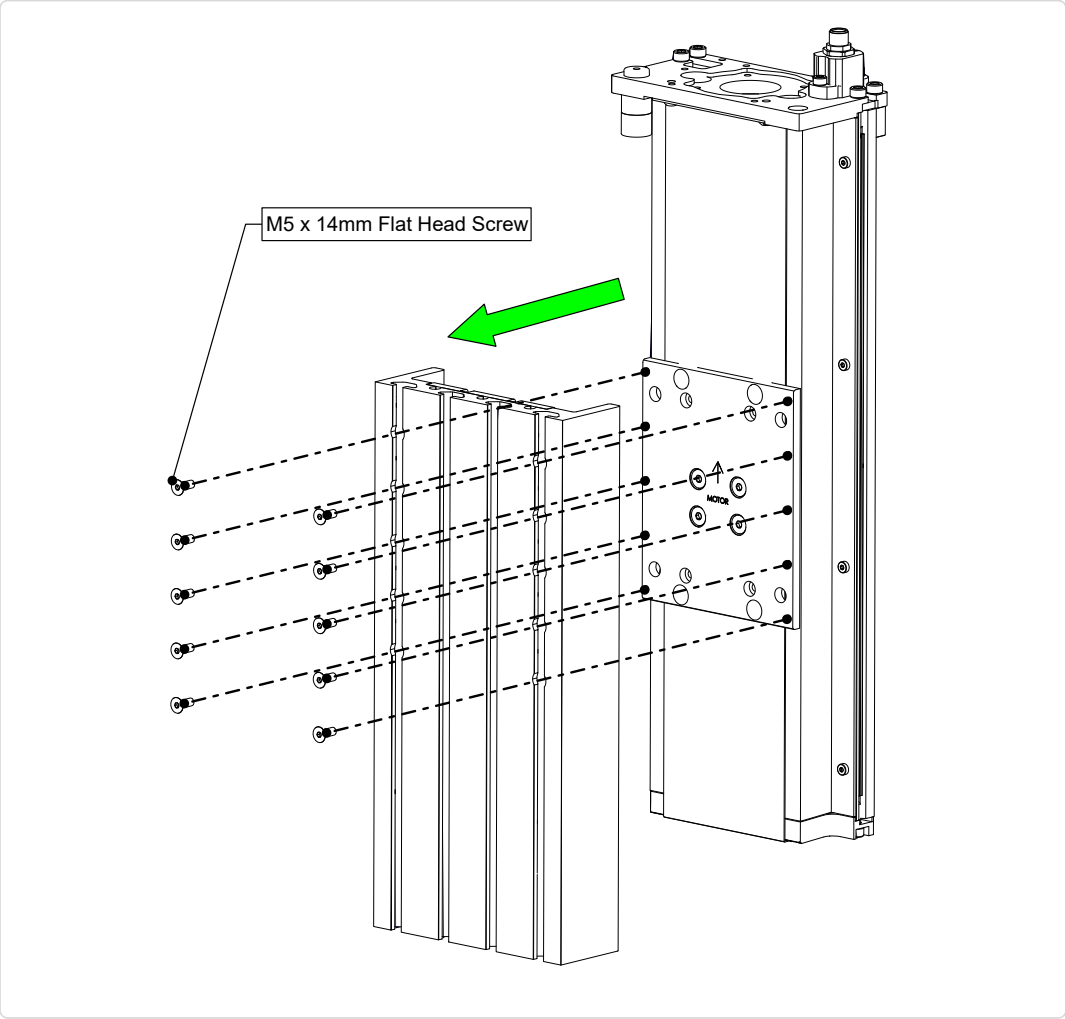
- Attach the Z axis bumper to the motor mount plate.

3.1.2



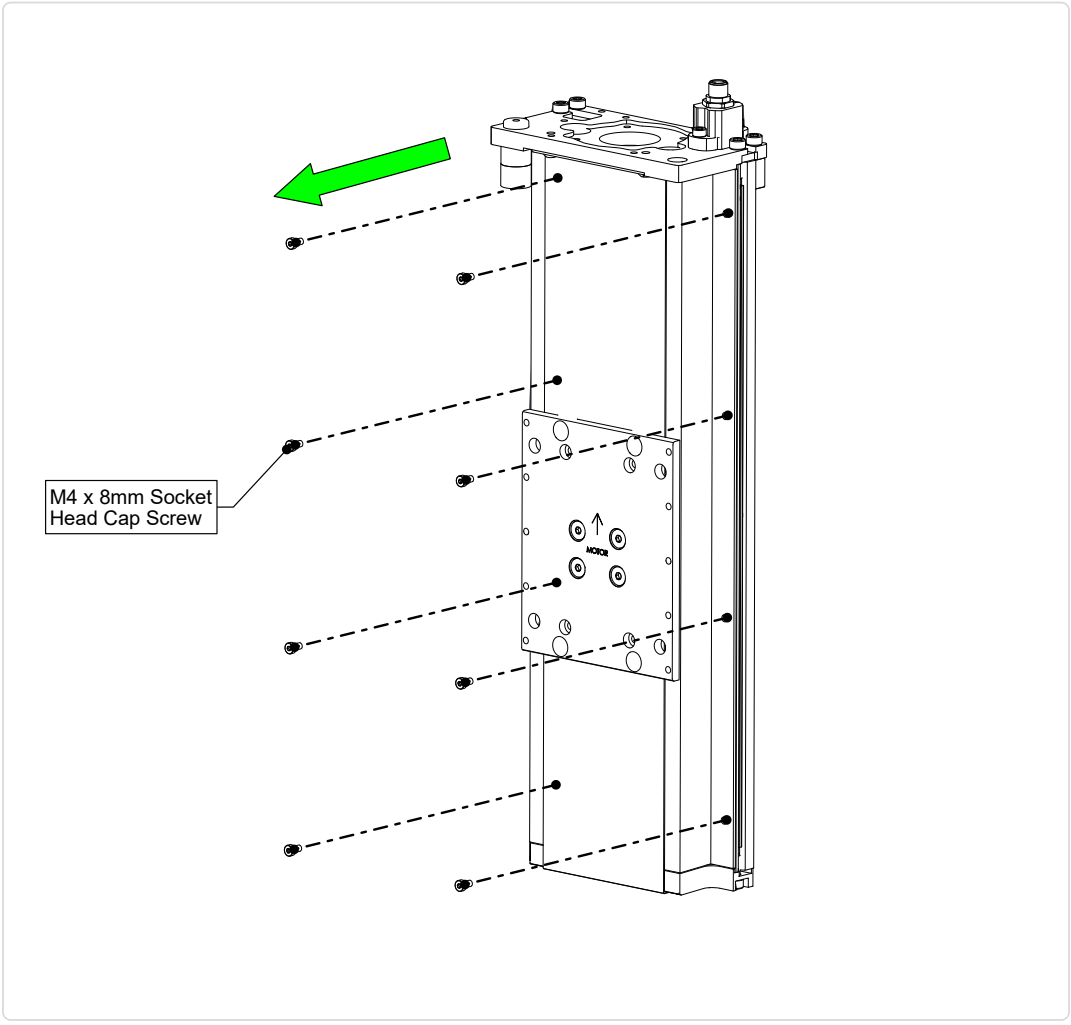
- Attach the Z axis Brake Connector to the motor mount plate.
- Orient the brake connector with the alignment tab (inset image) toward the front of the Z axis.
- Do not overtighten the screws.

3.1.3



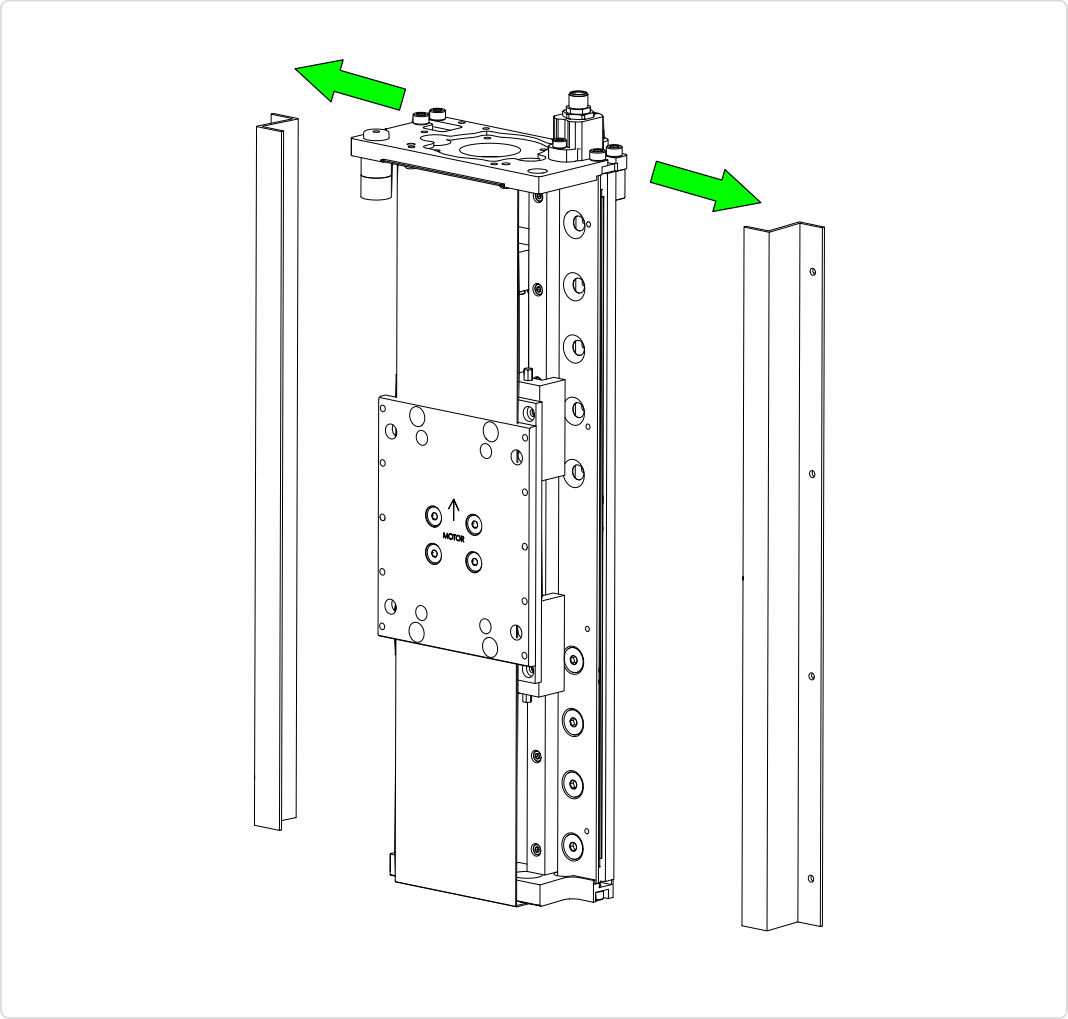
- Remove the moving plate from the Z axis.

3.1.4



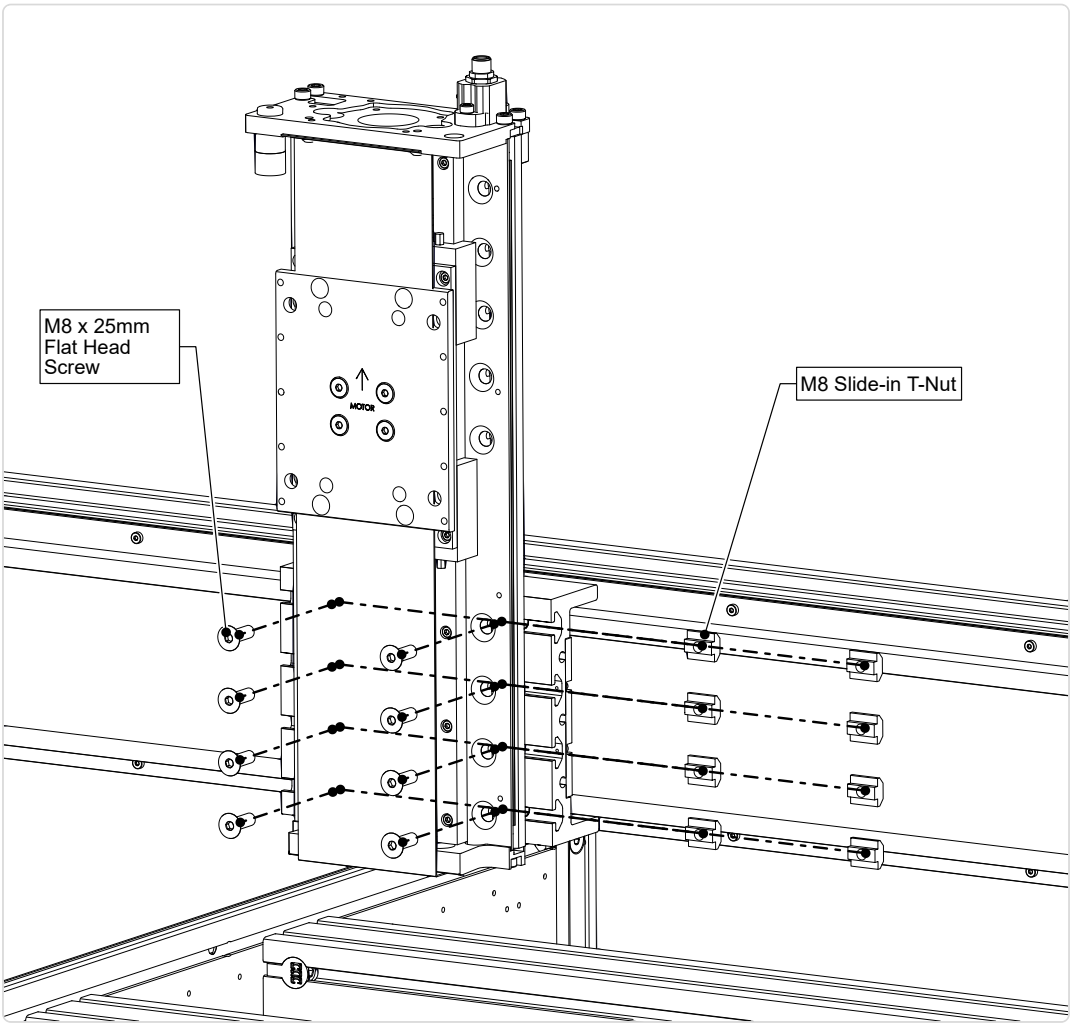
- Remove the metal dust cover screws from the Z axis and set them aside.

3.1.5



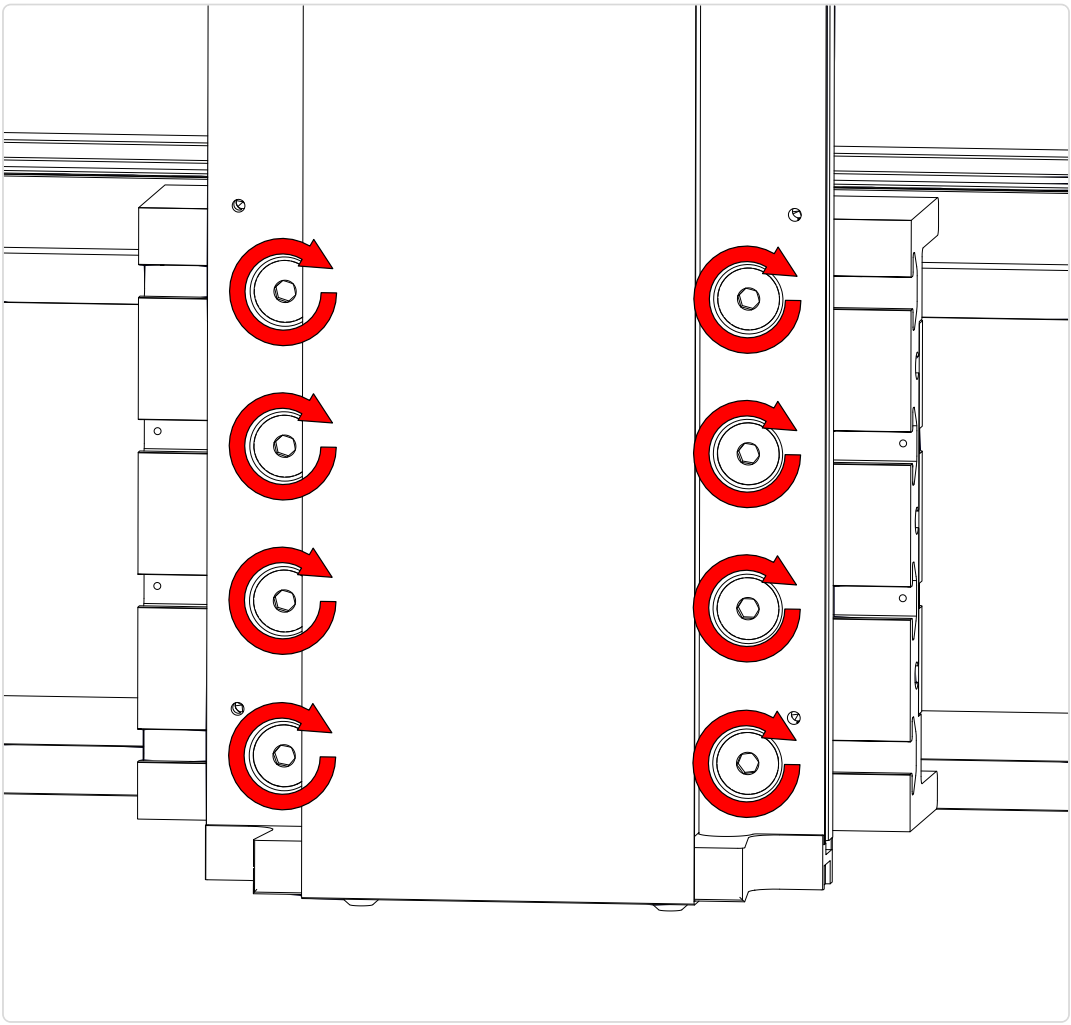
- Remove the metal dust covers from the Z-Axis.

3.1.6



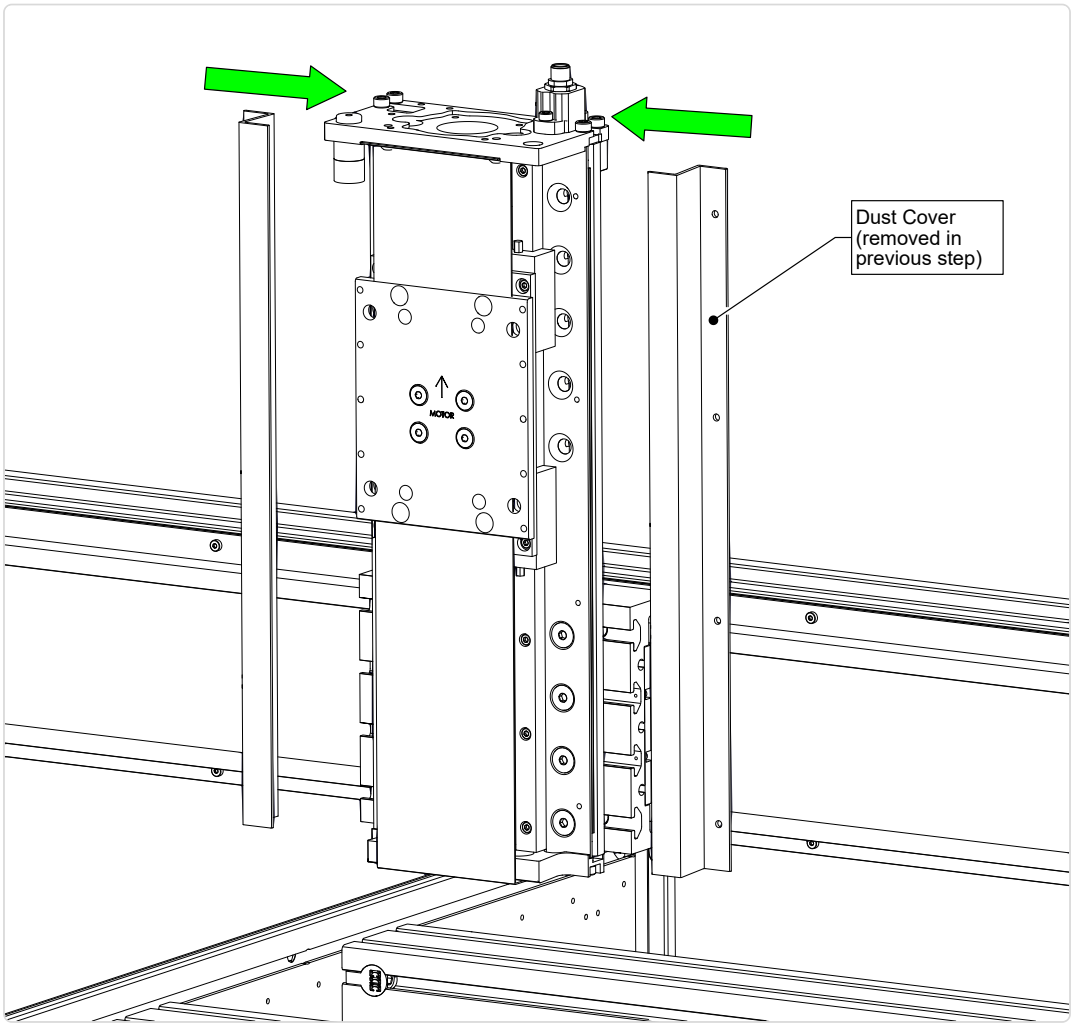
- Slide the M8 T-Nuts into the gantry plate and install the Z-axis to the gantry.

3.1.7



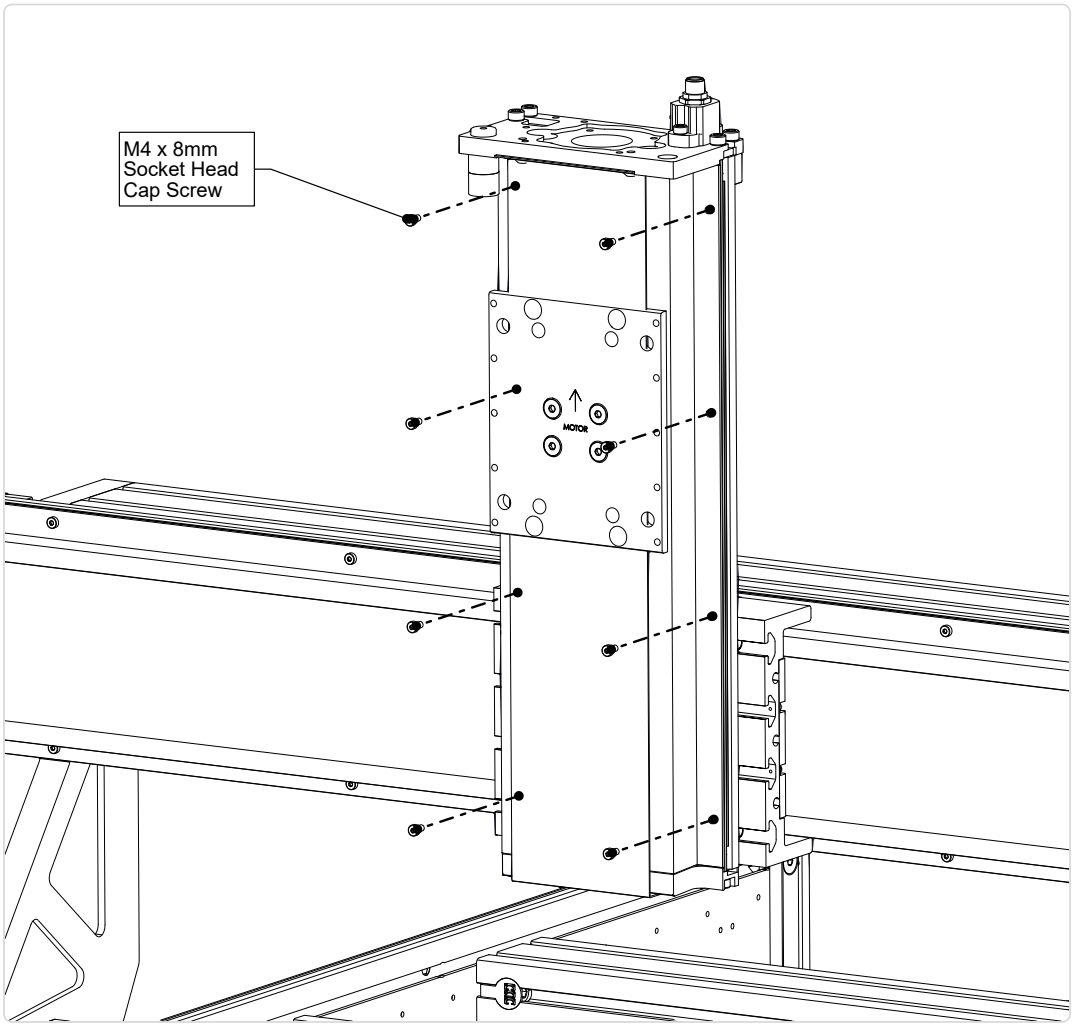
- Tighten the indicated bolts.

3.1.8



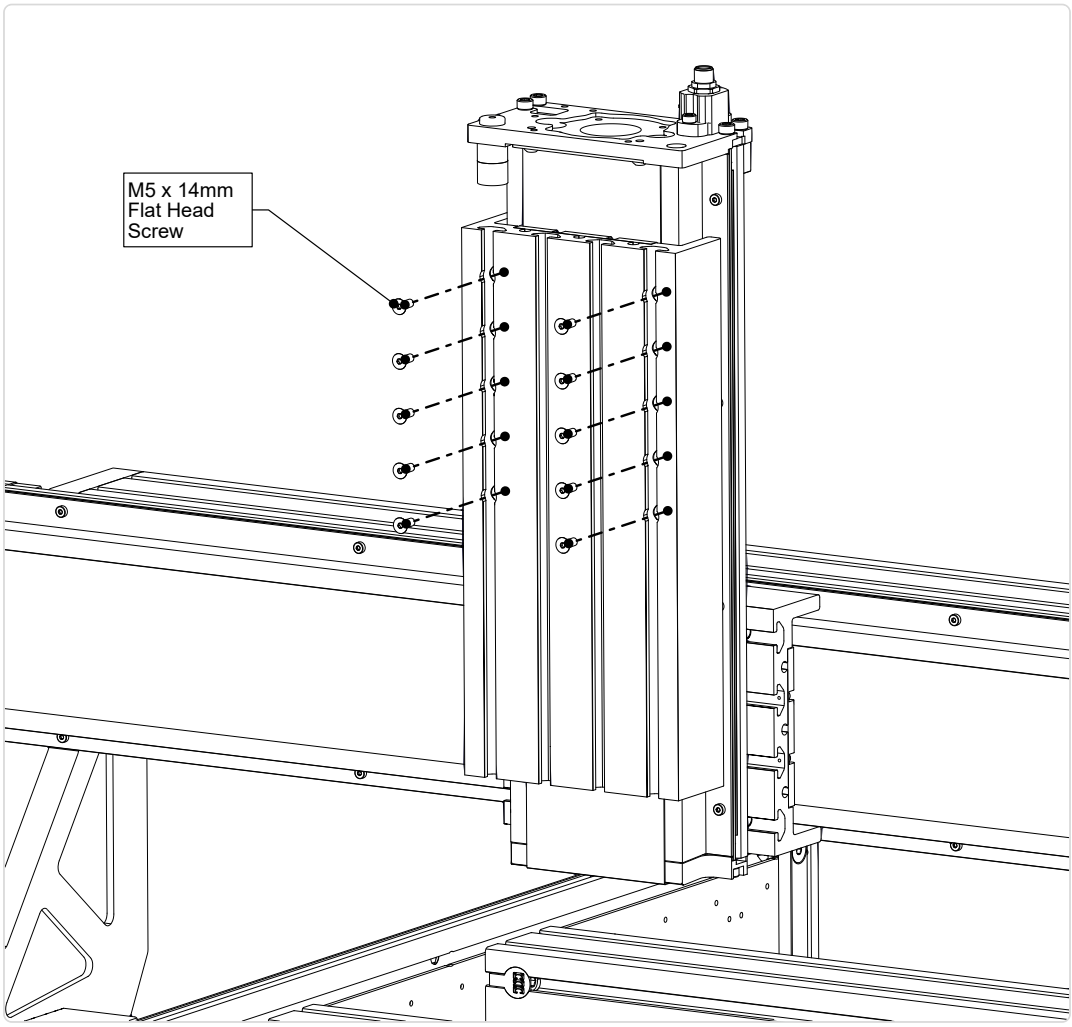
- Slide the metal dust covers back on the Z axis as indicated.

3.1.9



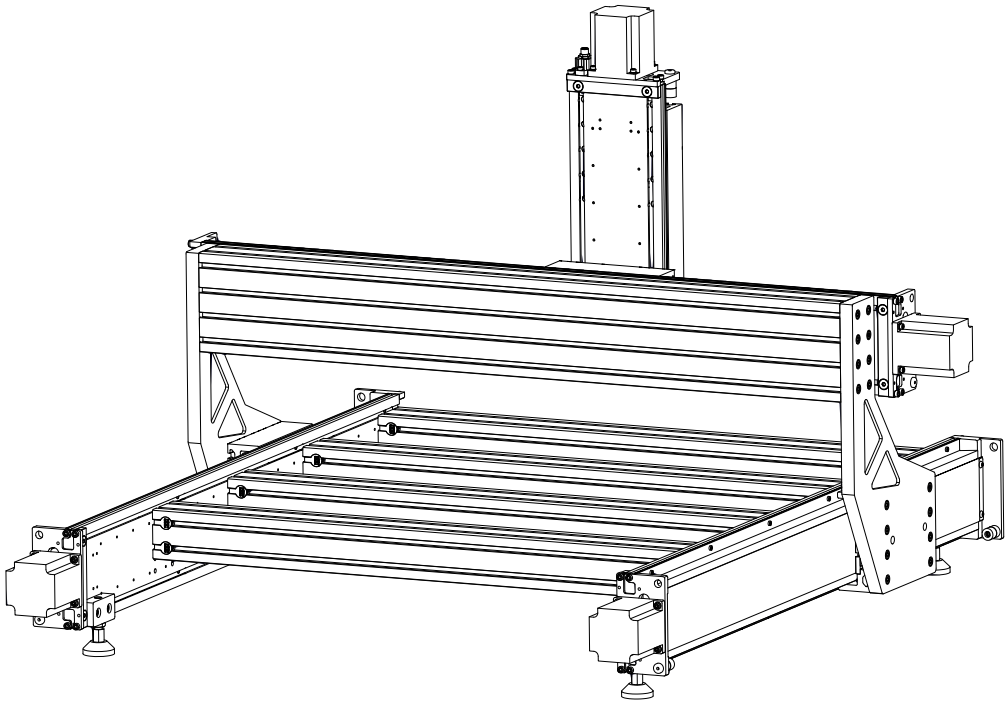
- Attach the metal dust covers using the screws removed in previous steps.

3.1.10



- Attach the moving plate to the Z axis using the screws removed in previous steps.

Section 4: Motor Installation



4.1 NEMA 23 Electronics

Section Note

Skip to **Section 4.2** if you are using a NEMA 34 electronics package.

Parts and Tools Required

The following parts and tools will be used in Section 4.1

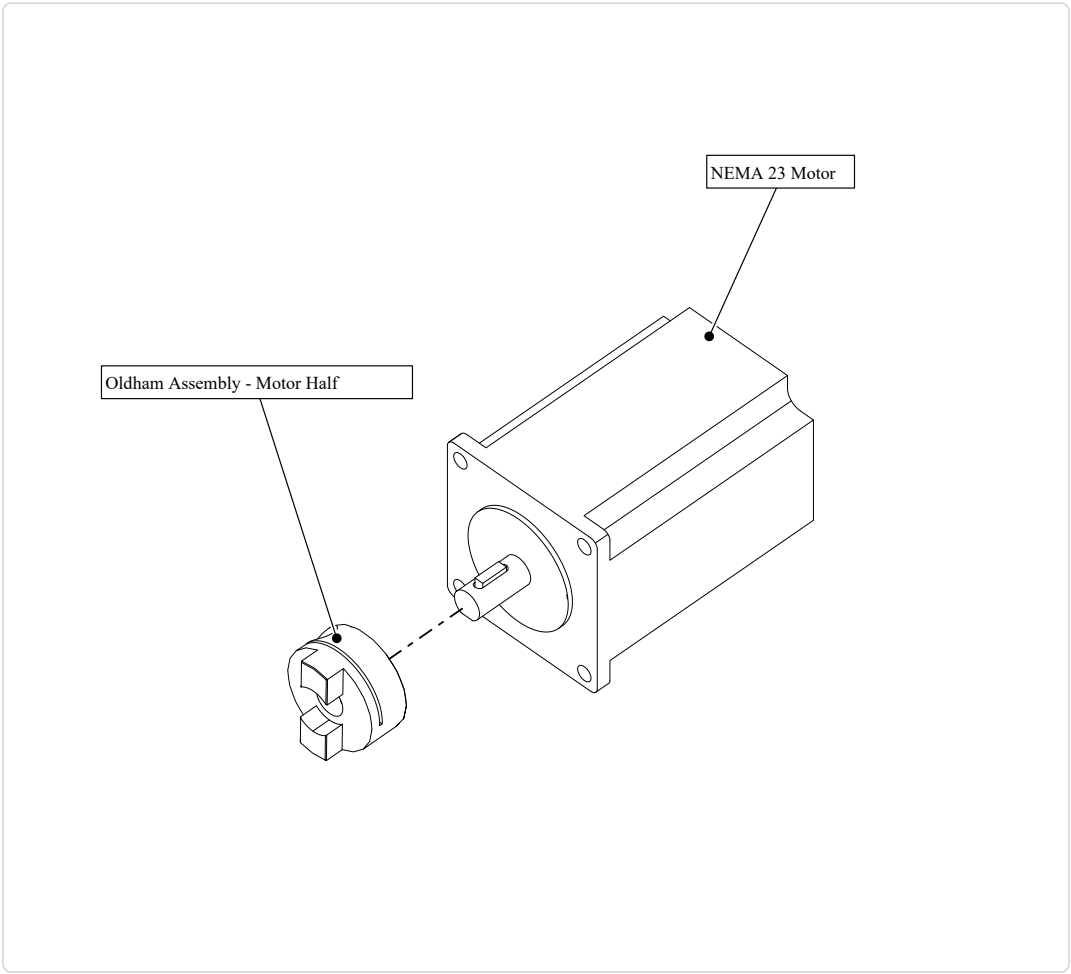
QTY	Part/Description	Packaged In
4	NEMA 23 Stepper Motor	Electronics
1	CRP900-00-MOTOR-HW-375: - (4) Oldham Assembly - Motor Side - (16) M5 x 12mm Socket Head Cap Screw	CRP900-00-XXXX-HW

Required Tools:

- 4mm Allen Wrench
- 3mm Allen Wrench
- Tape Measure

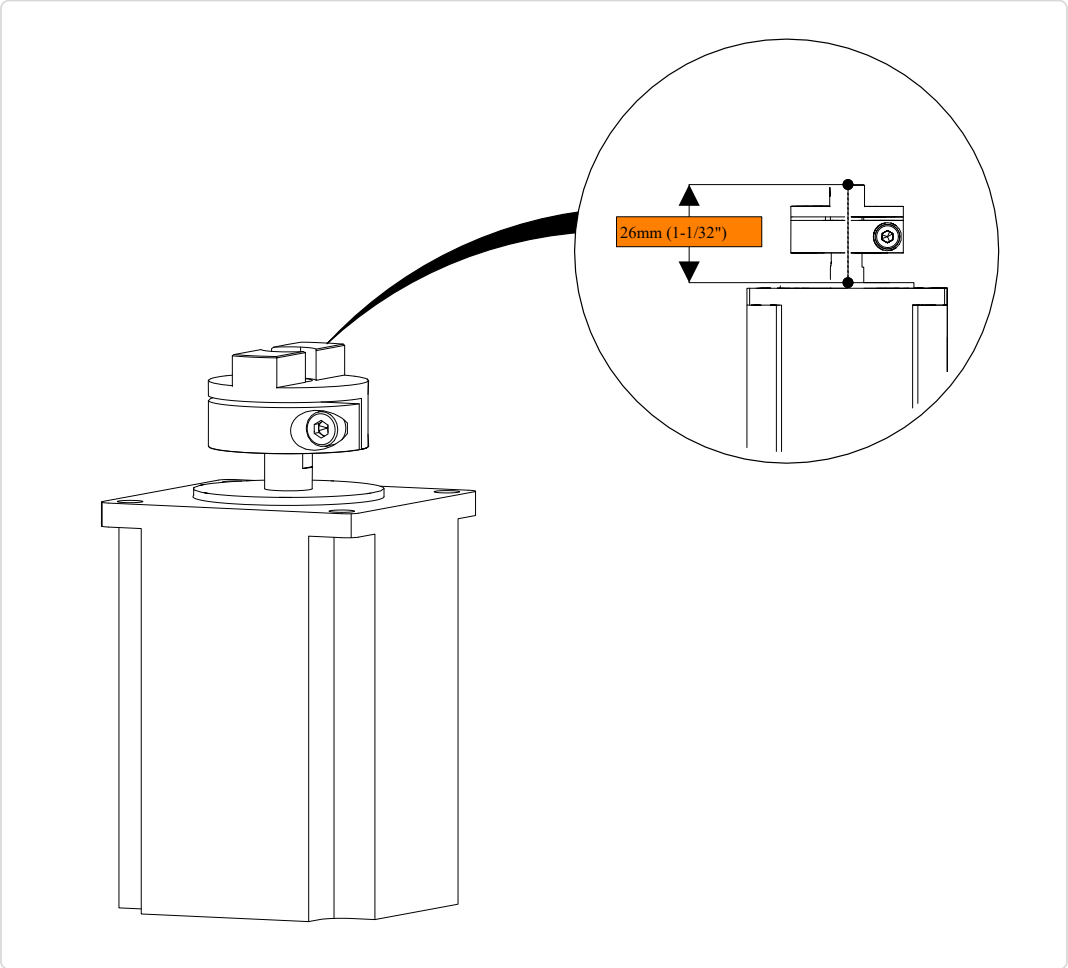
N23 Motor Installation

4.1.1



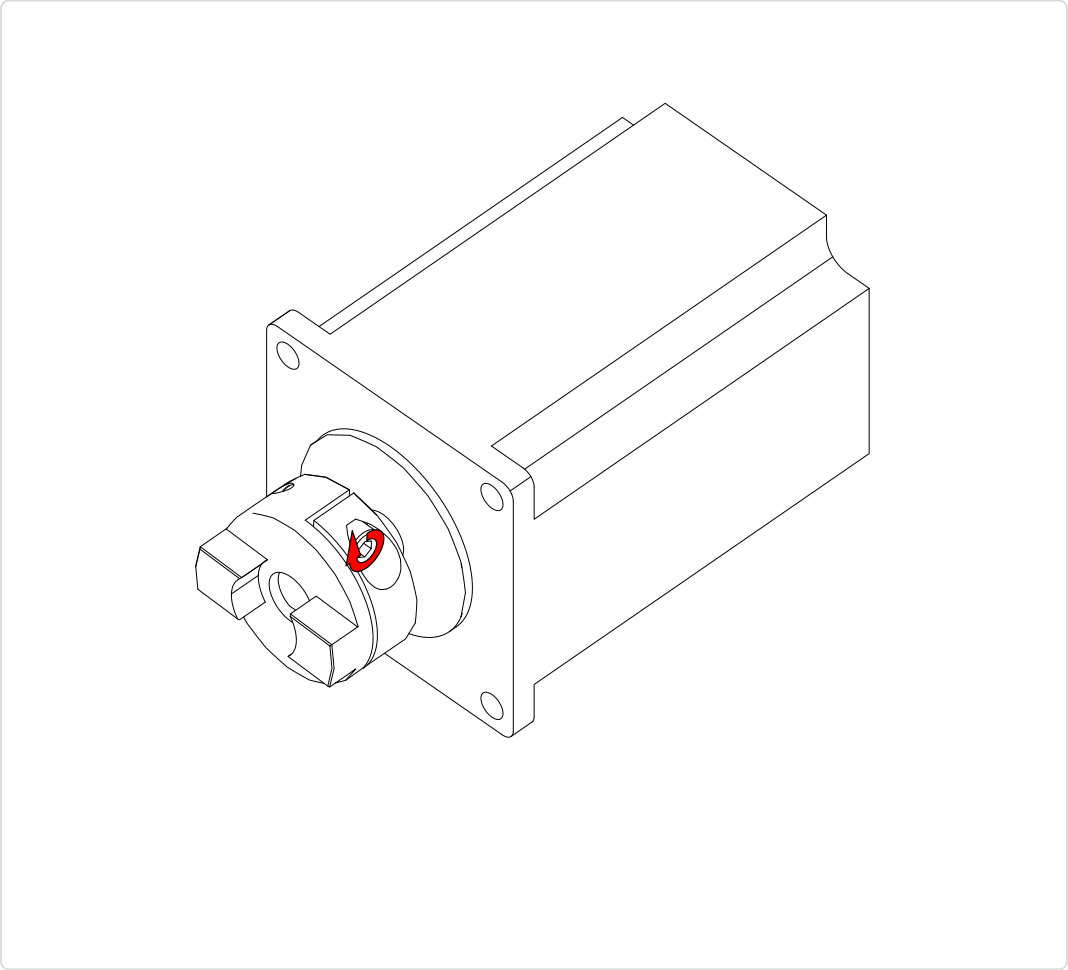
- Slide the motor side of the oldham coupler onto the motor as indicated.

4.1.2



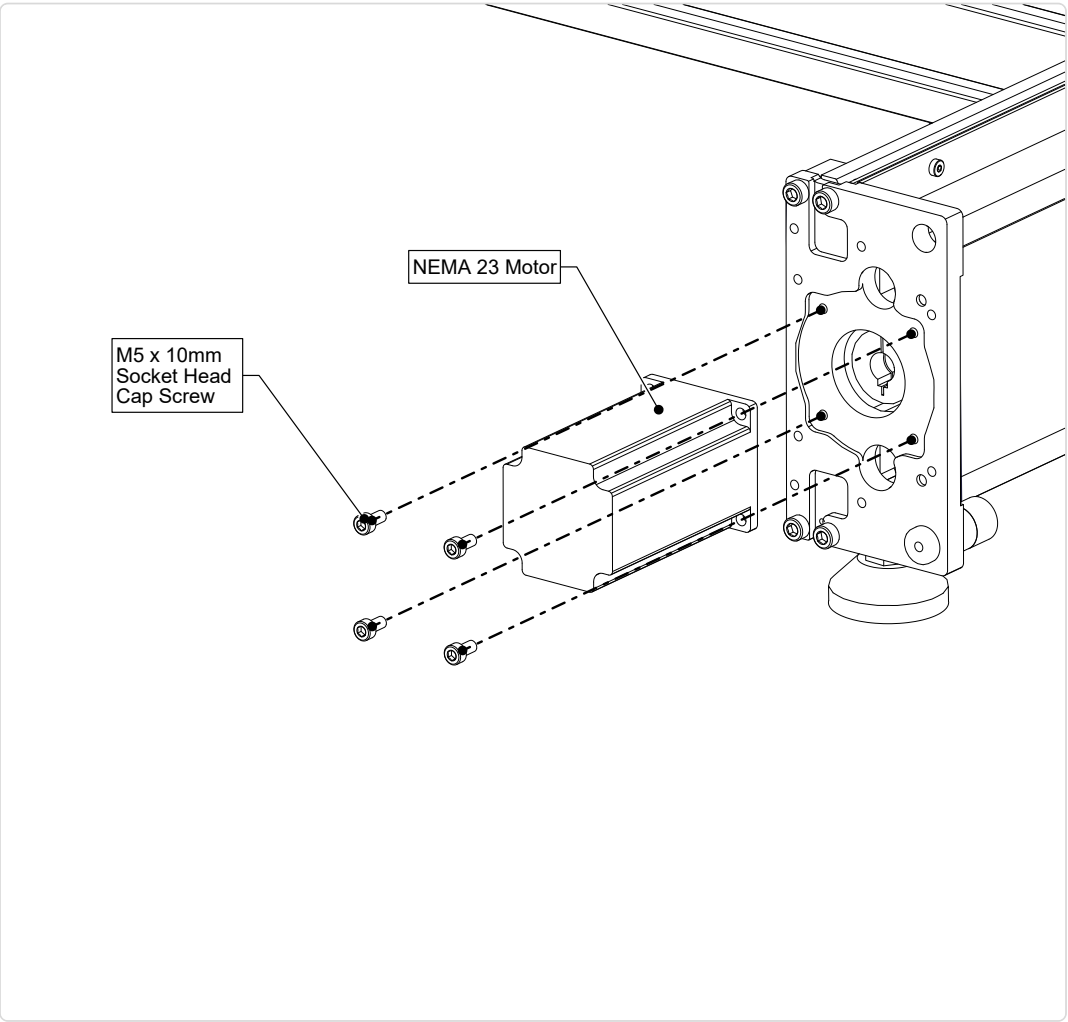
- Position the end of the coupler 26mm (1-1/32") from the motor flat.

4.1.3



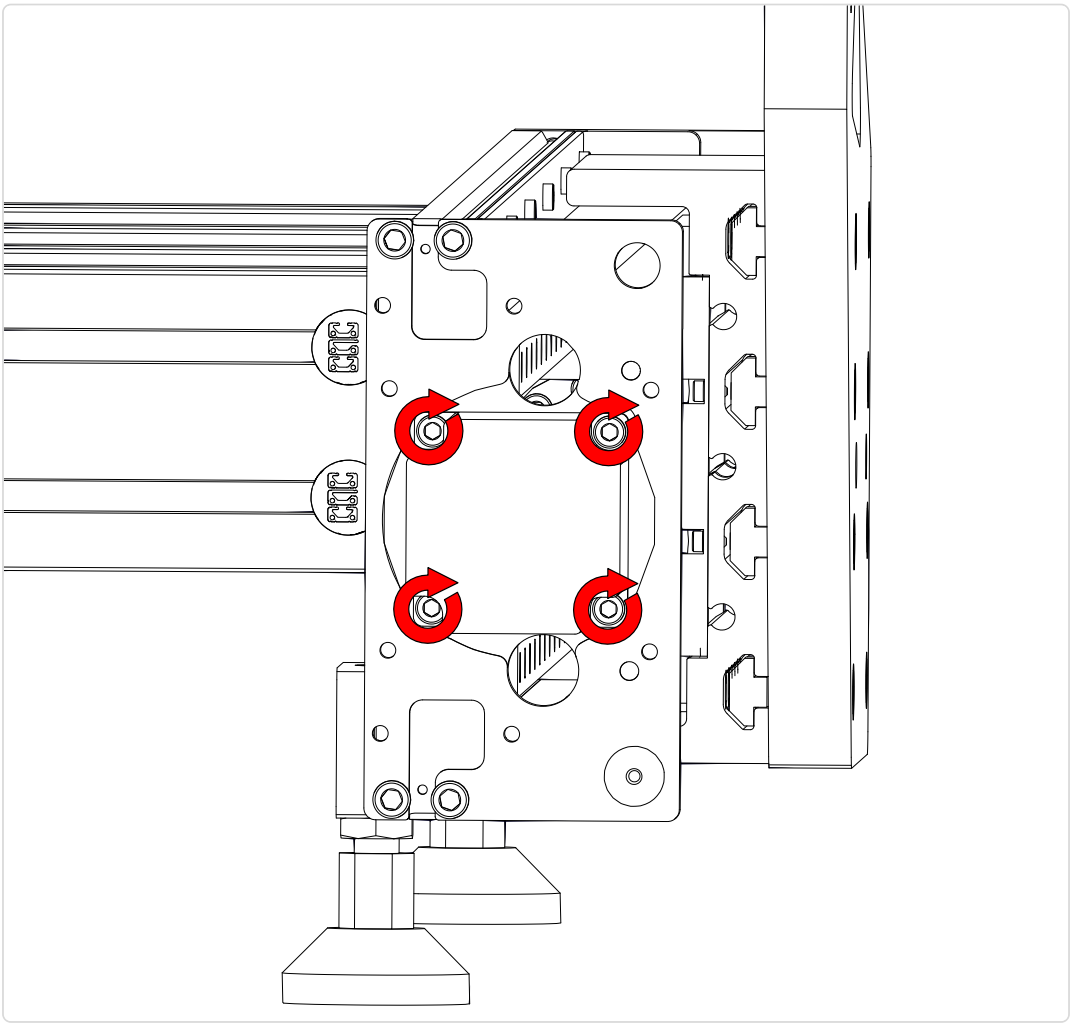
- Tighten the clamp bolt as indicated.

4.1.4



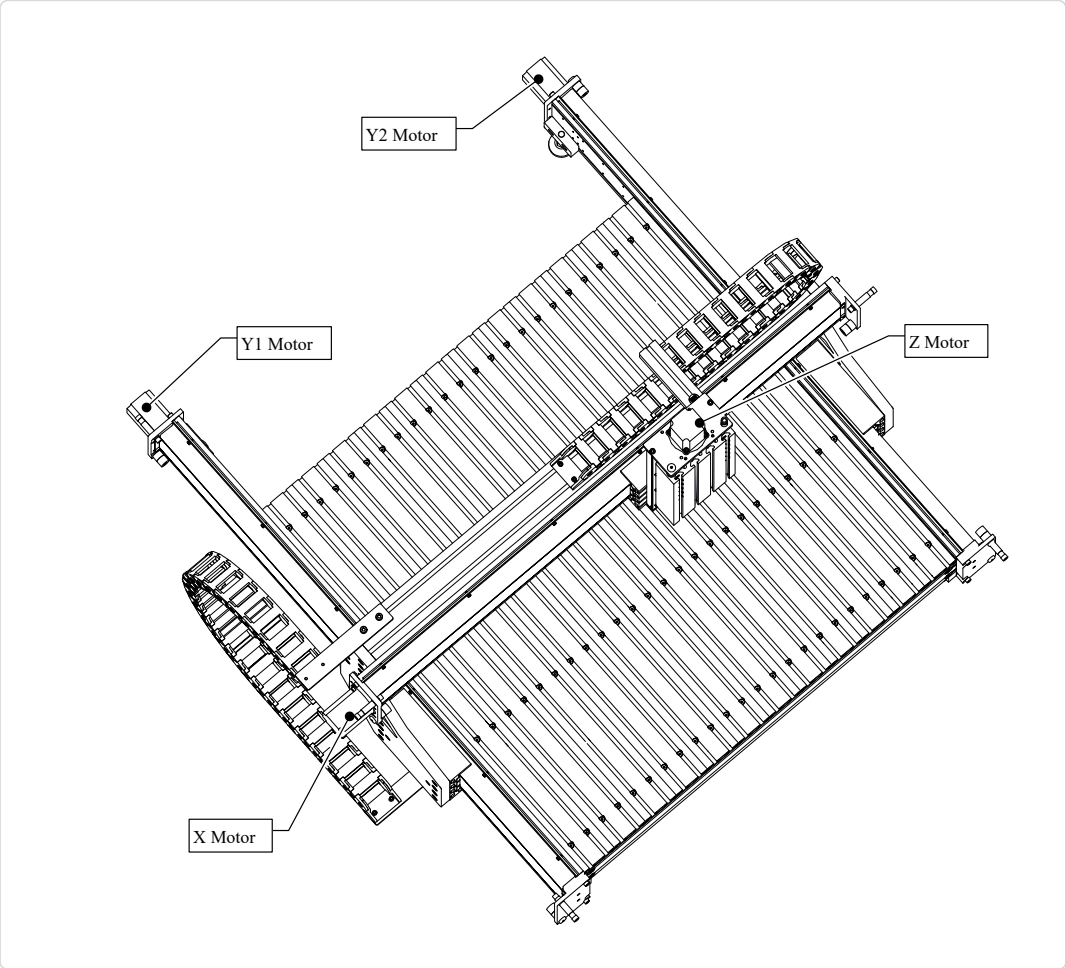
- Attach the motor to one of the table axes as indicated.

4.1.5



- Tighten the indicated fasteners.

4.1.6



- Install motors on the remaining axes.

4.2 NEMA 34 Electronics

Section Note

Skip this section if you are using a NEMA 23 electronics package.

Parts and Tools Required

The following parts and tools will be used in Section 4.2

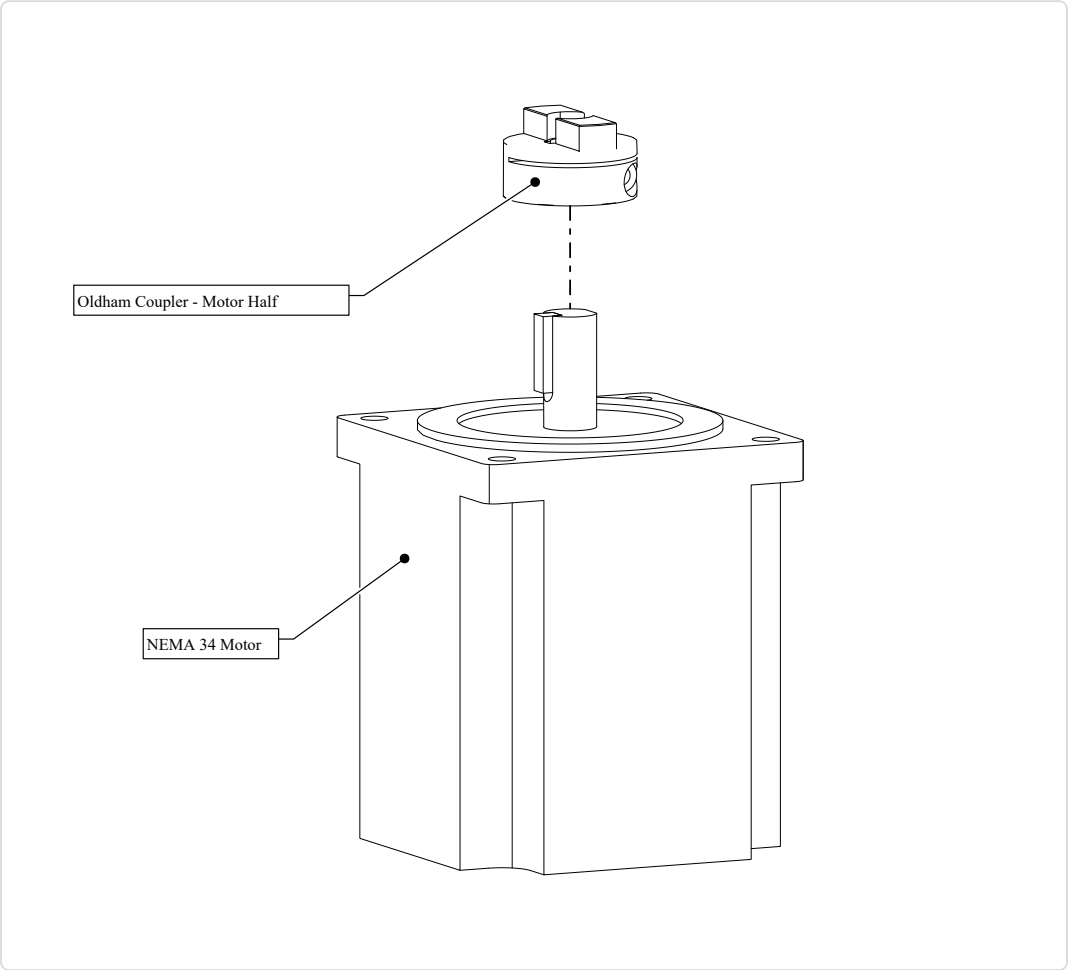
QTY	Part/Description	Packaged In
4	NEMA 34 Stepper Motor	Motors
1	CRP900-00-MOTOR-HW-500: - (4) Oldham Assembly - Motor Side - (16) M6 x 16mm Socket Head Cap Screw	CRP900-00-XXXX-HW

Required Tools:

- 3mm Allen Wrench
- 5mm Allen Wrench
- Tape Measure

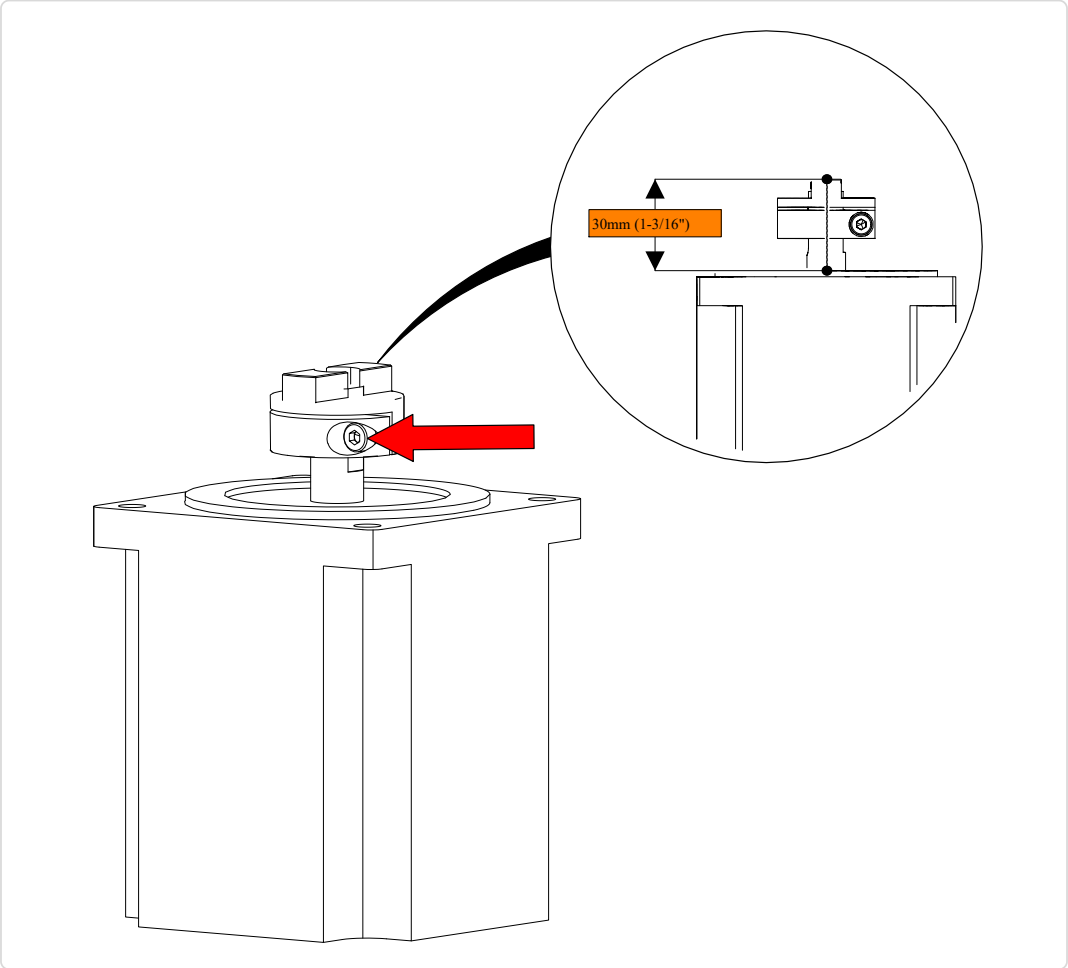
N34 Motor Installation

4.2.1



- Slide the motor side of the oldham coupler onto the motor as indicated.

4.2.2

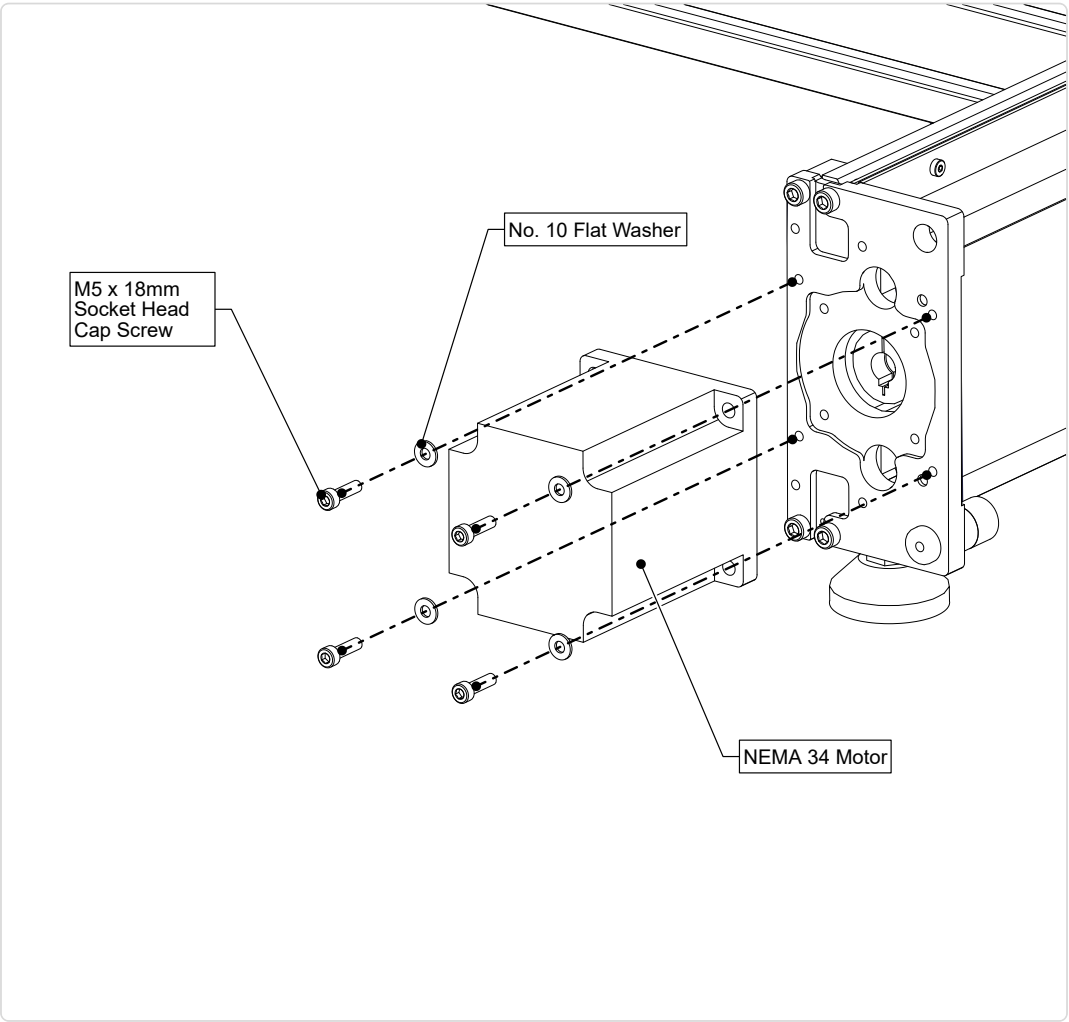


- Position the end of the coupler 30mm (1-3/16") from the motor flat.
- Then tighten the clamping screw on the oldham coupler.

Assembly Note

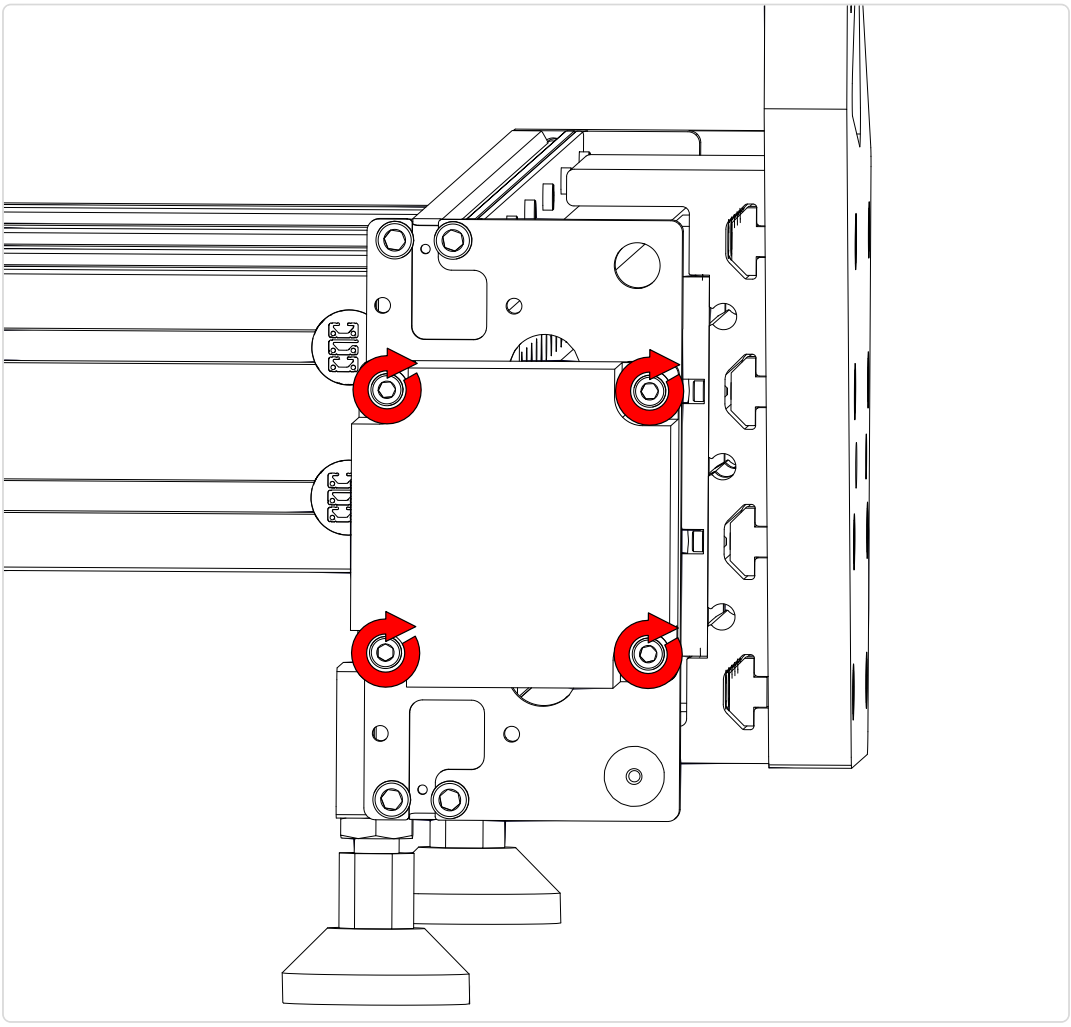
The dimension shown is measured from the boss on the motor to the top of the oldham coupler.

4.2.3



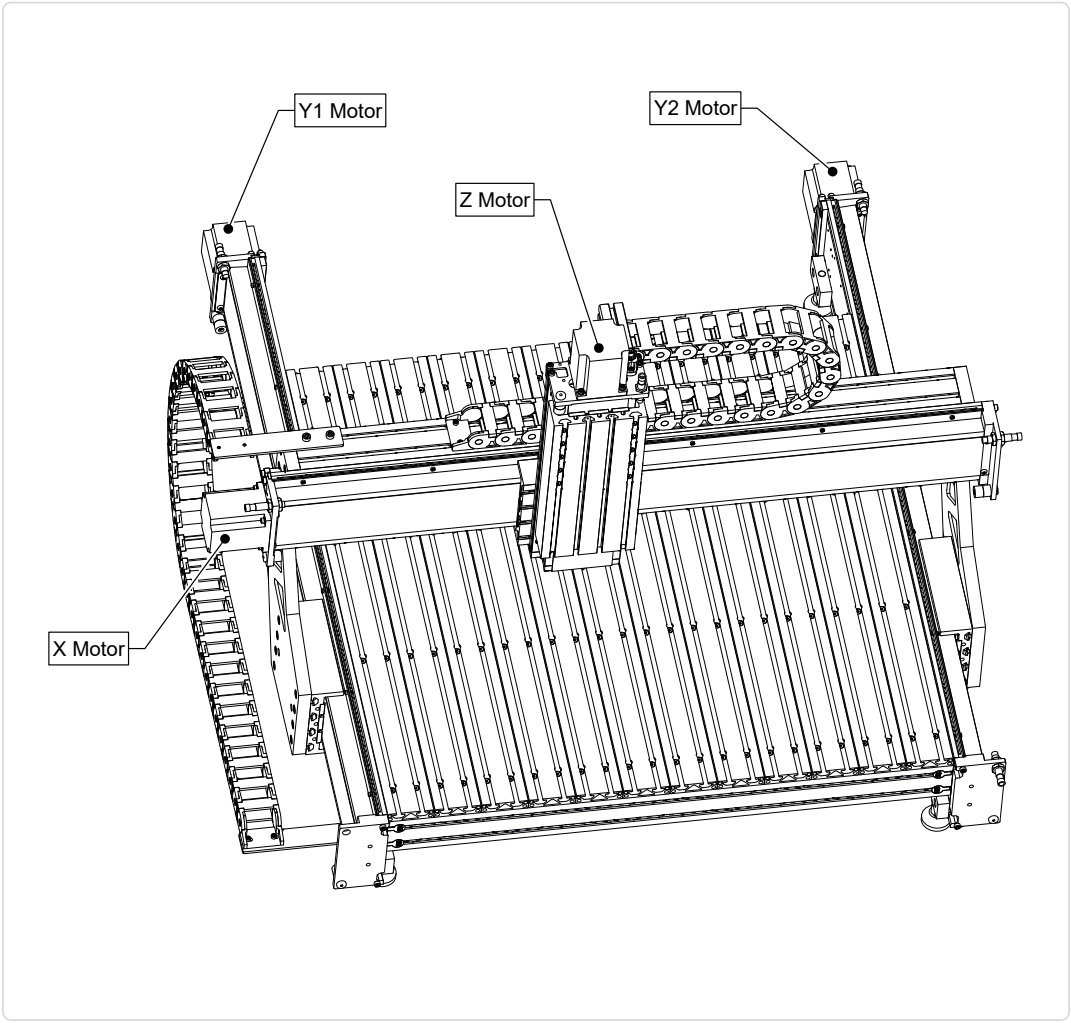
- Attach the motor to one of the table axes as indicated.

4.2.4



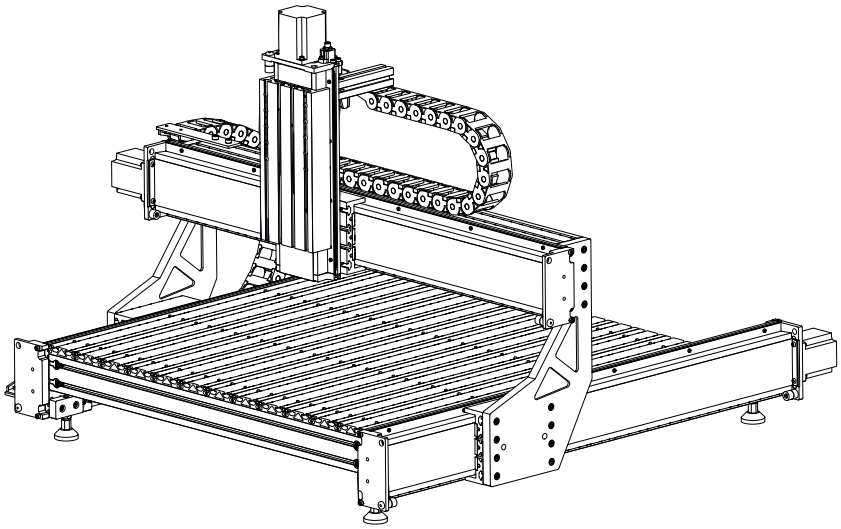
- Tighten the indicated fasteners.

4.2.5



- Install motors on the remaining axes.

Section 5: Cable Track Installation



Section Note

Your components may appear slightly different than the images. The assembly and installation procedure are the same.

Parts and Tools Required

The following parts and tools will be used in Section 5

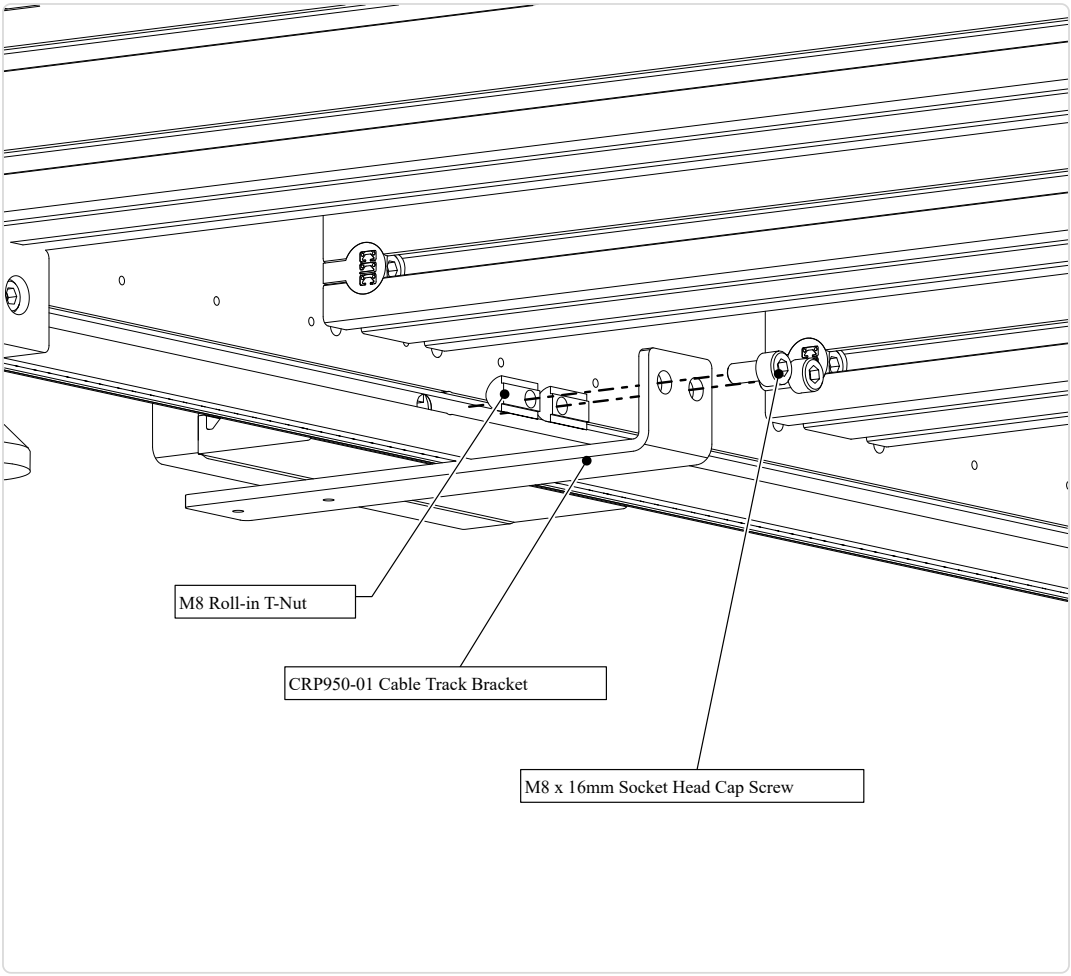
QTY	Part/Description	Packaged In
1	CRP950-01 Cable Track Bracket	CRP950-00-XX
1	CRP950-02 Cable Track Bracket	CRP950-00-XX
1	CRP950-03 4040 Cable Track Extrusion	CRP950-00-XX
2	50mm Cable Track Section	CRP950-00-XX
1	CRP950-00-FAST: - (6) M8 Roll-in T-Nut - (4) M8 x 16mm Socket Head Cap Screw - (4) M5 x 12mm Socket Head Cap Screw - (2) M8 x 30mm Socket Head Cap Screw - (2) 40 Series Anchor Fasteners - (4) M5 x 16mm Socket Head Cap Screw - (4) M5 Roll-in T-Nut	CRP950-00-XX

Required Tools:

- 6mm Allen Wrench
- 4mm Allen Wrench
- Flat Head Screwdriver
- Tape Measure

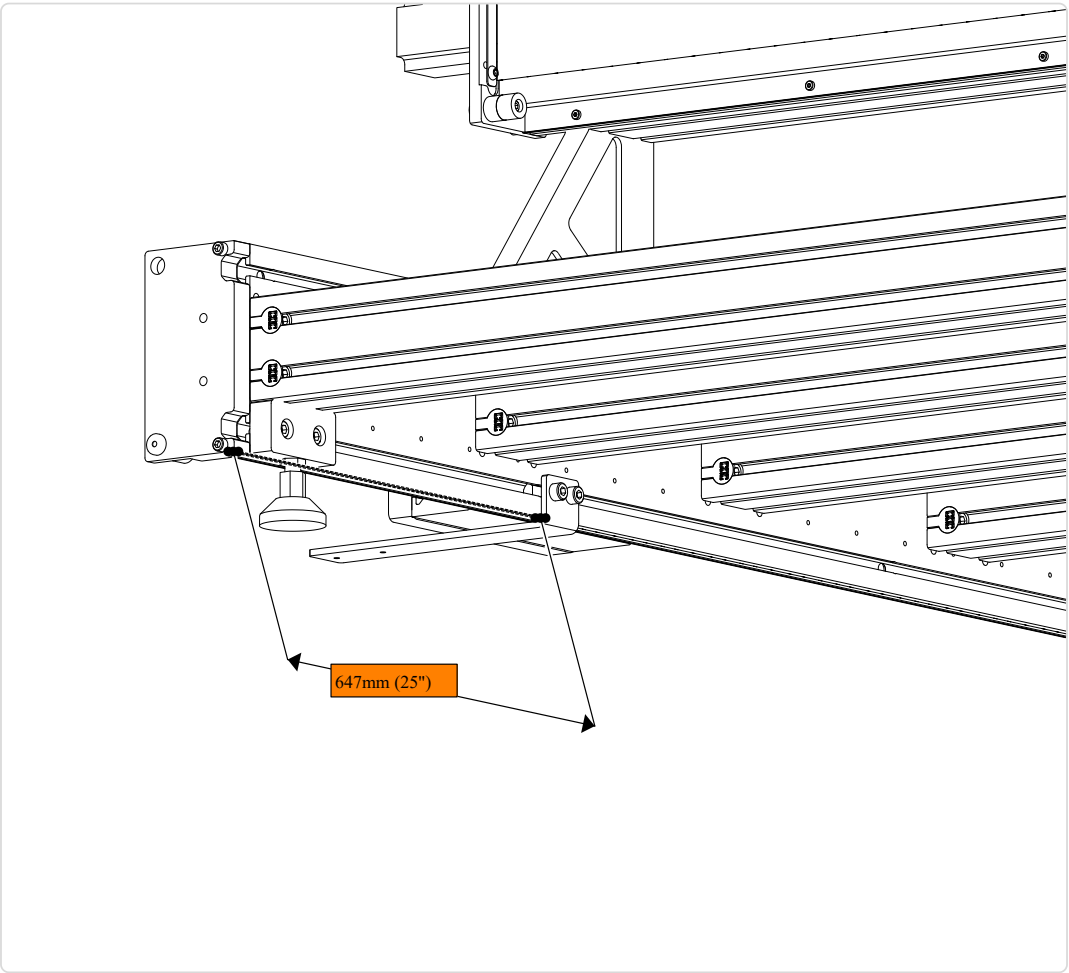
5.1 Table Cable Track Installation

5.1.1



- Install the lower cable track bracket onto the bottom of the base of the machine.

5.1.2

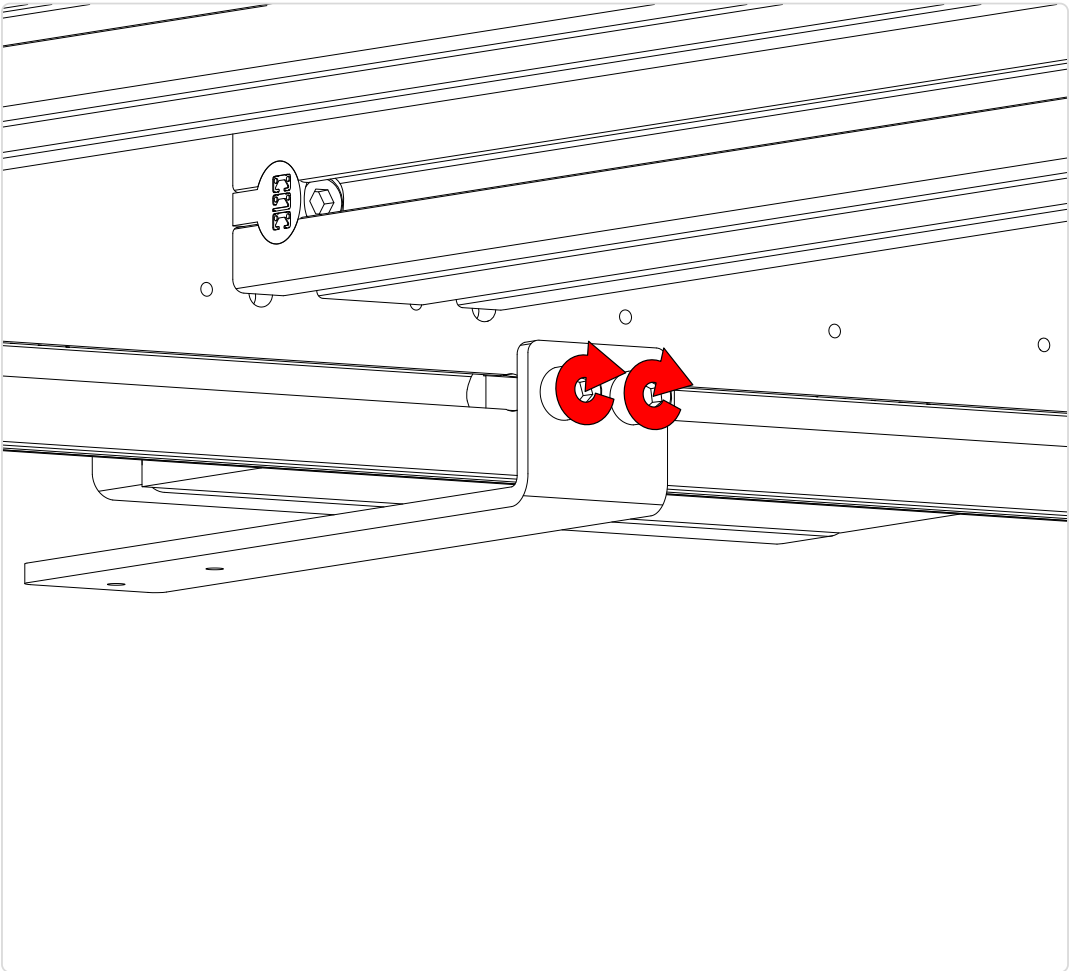


- Place the bracket 647mm (25") from the front of the machine.

Machine Configuration Option

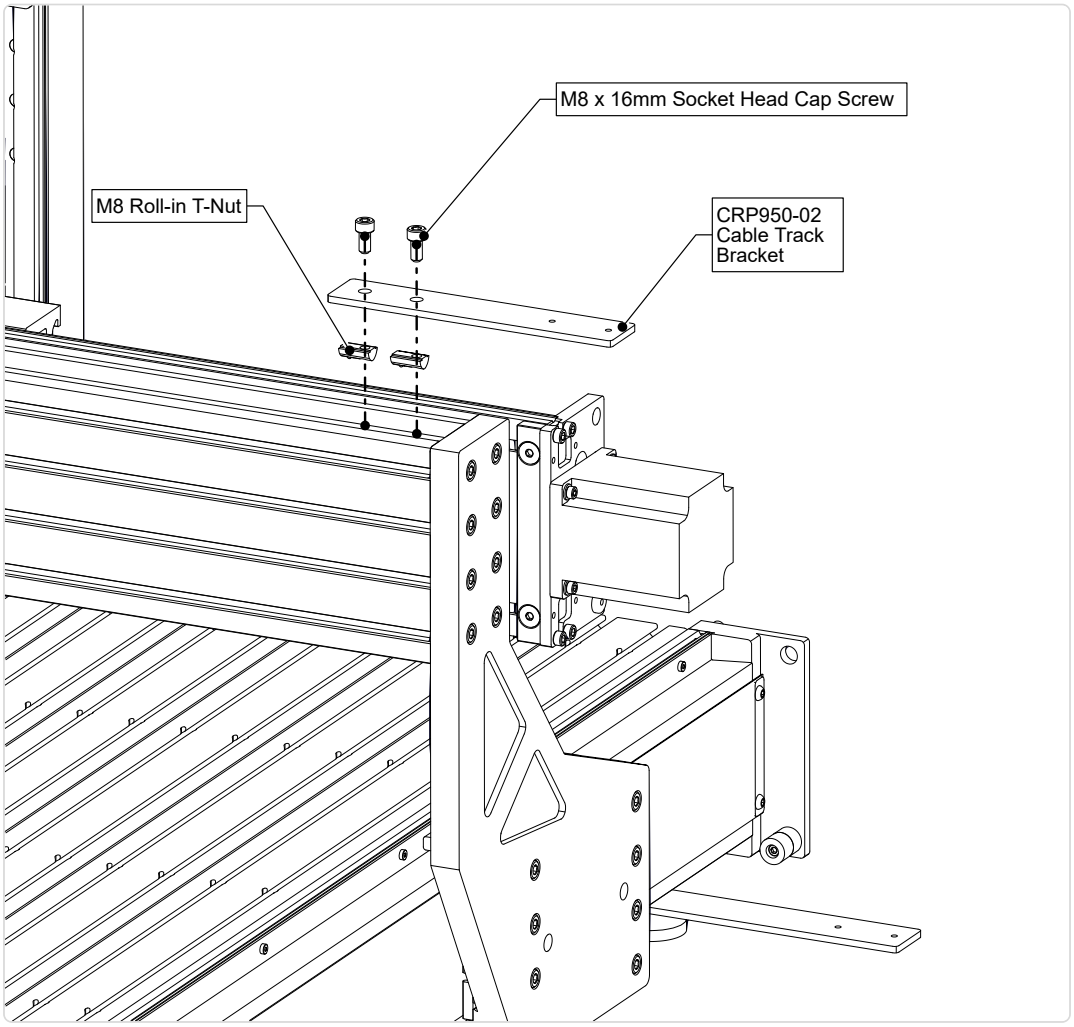
For 2' length machines, position the bracket 380mm (15") from the front of the machine.

5.1.3



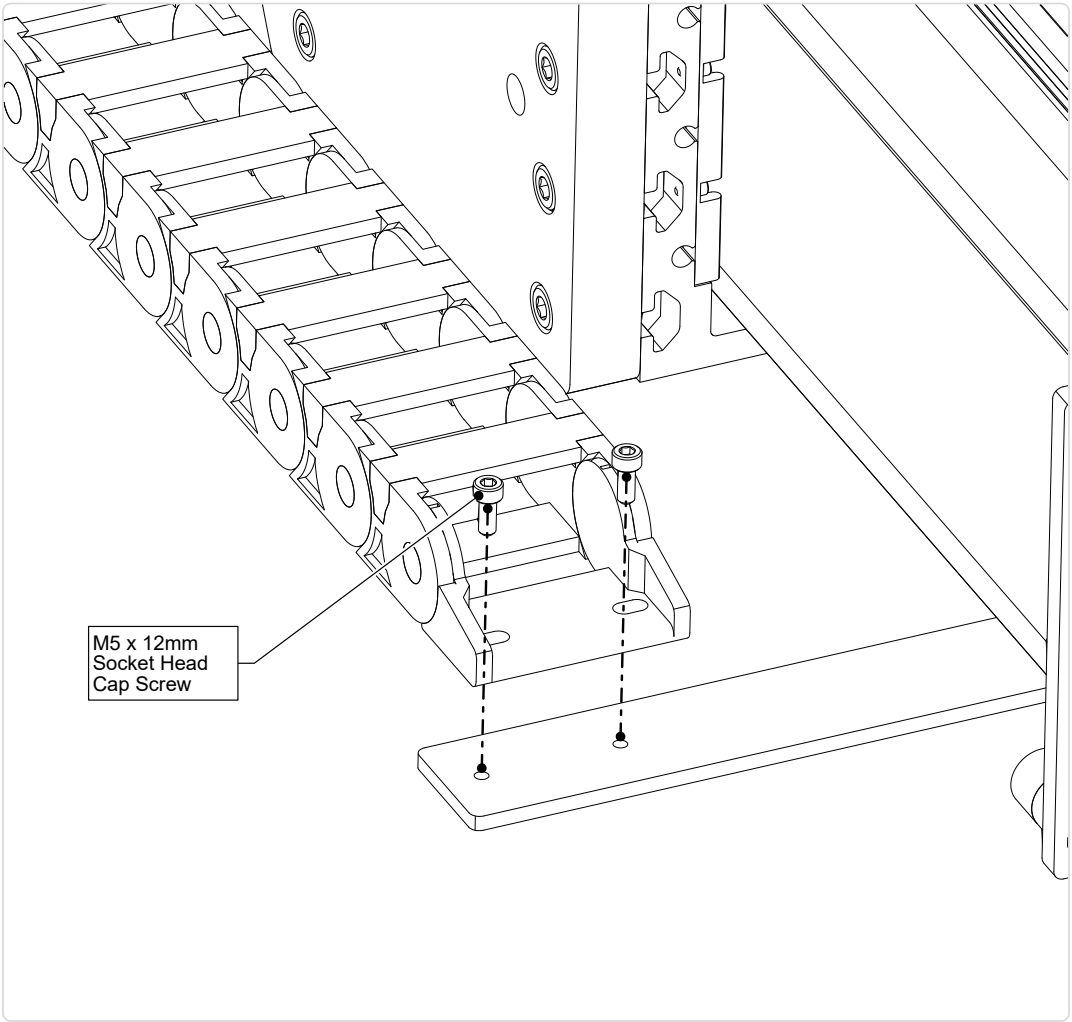
- Tighten the indicated fasteners.

5.1.4



- Install the upper cable track bracket.

5.1.5

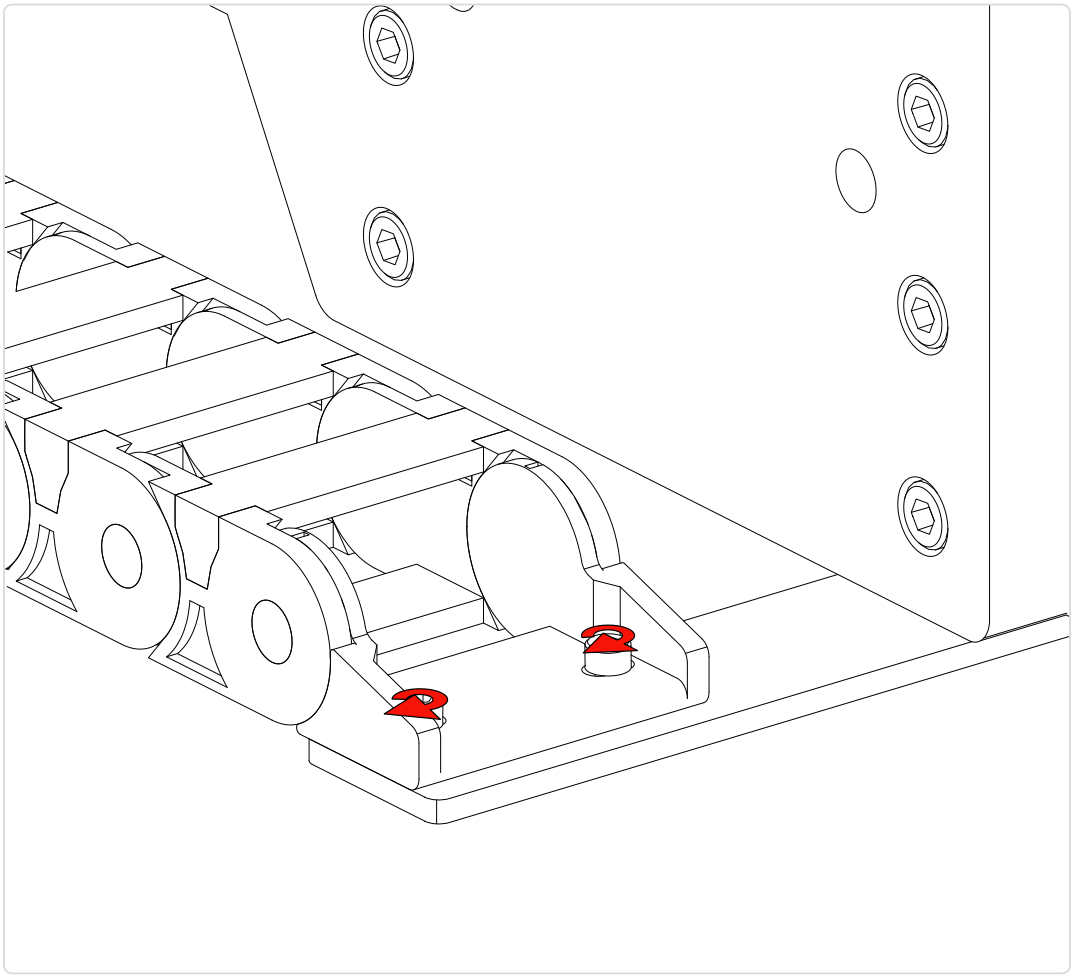


- Attach the fixed end of the cable track to the bracket as indicated.

Assembly Note

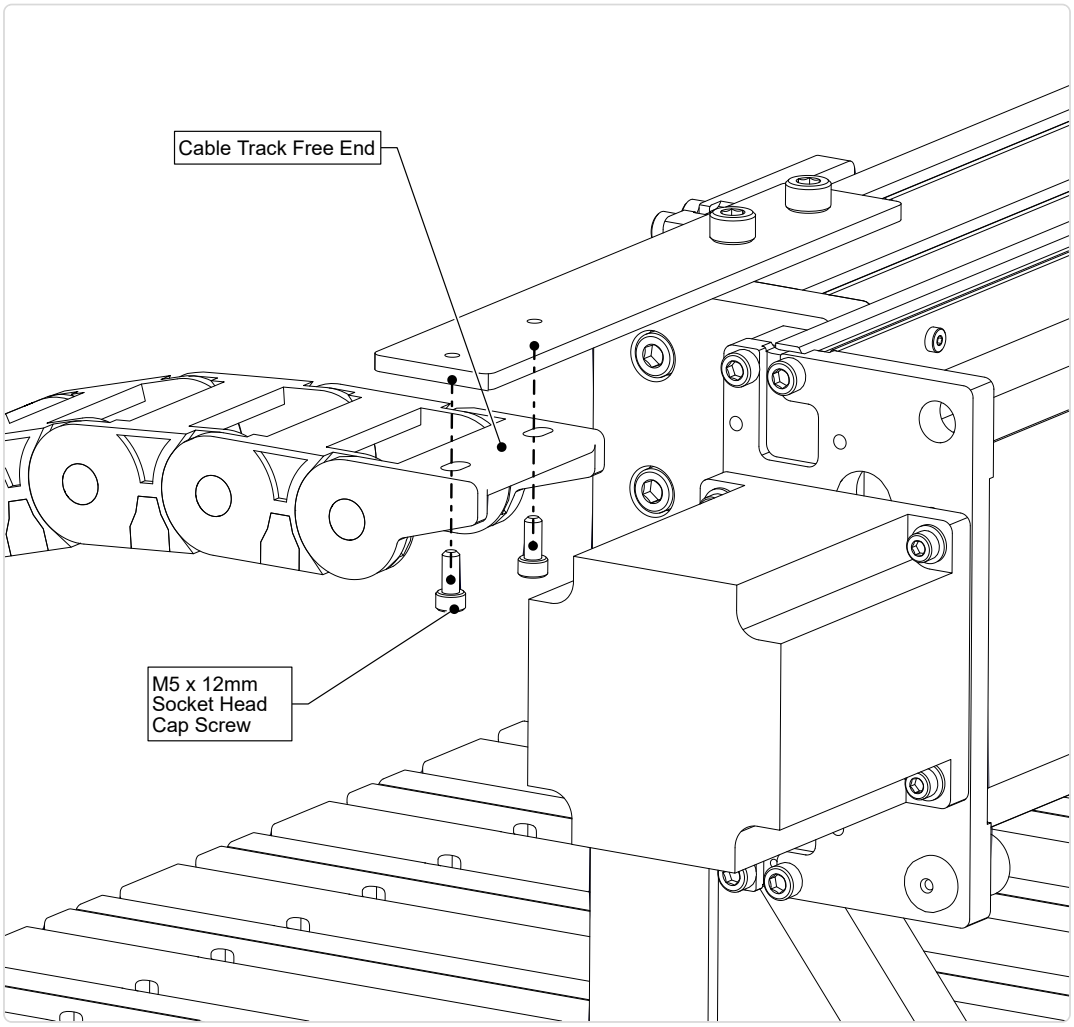
The fixed end of the cable track is the one which does not rotate independently.

5.1.6



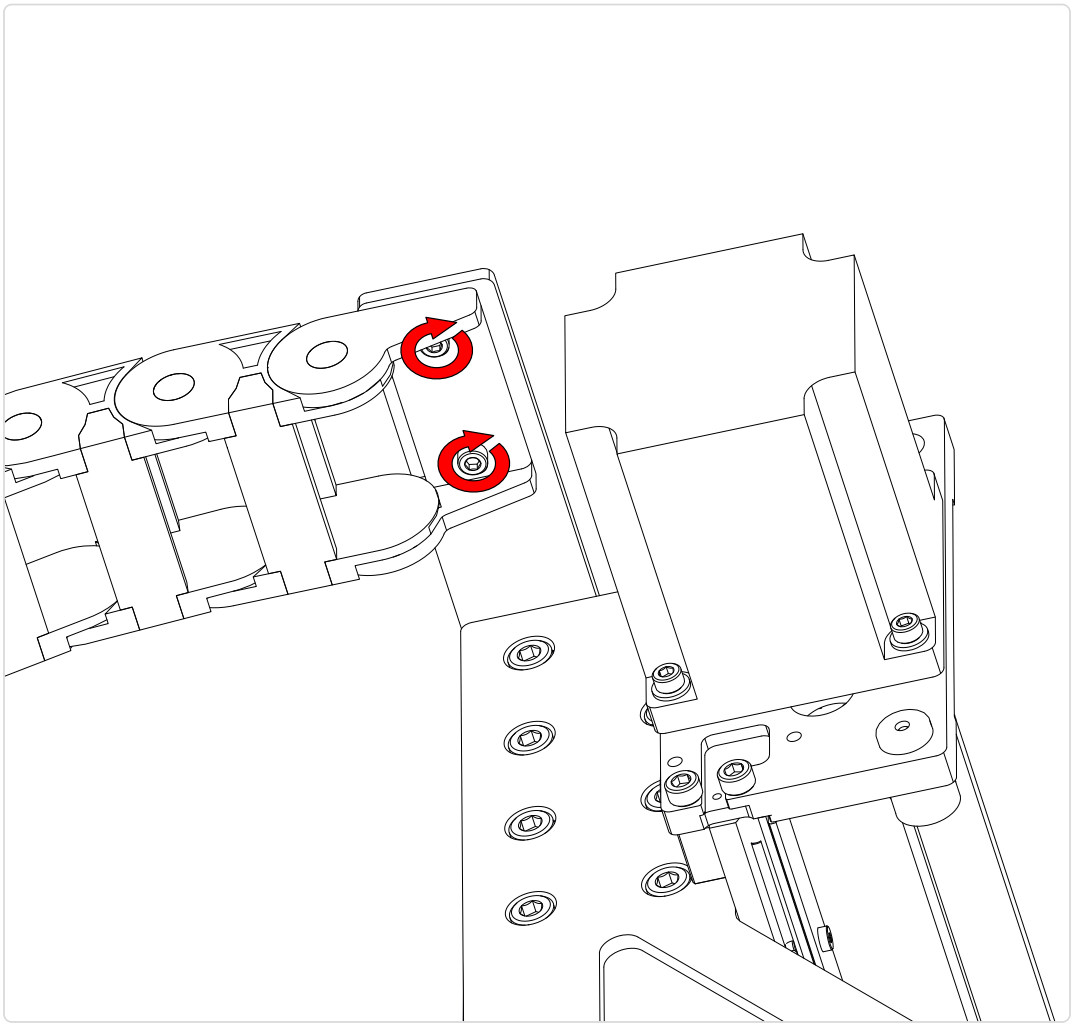
- Tighten the fixed end to the lower bracket.

5.1.7



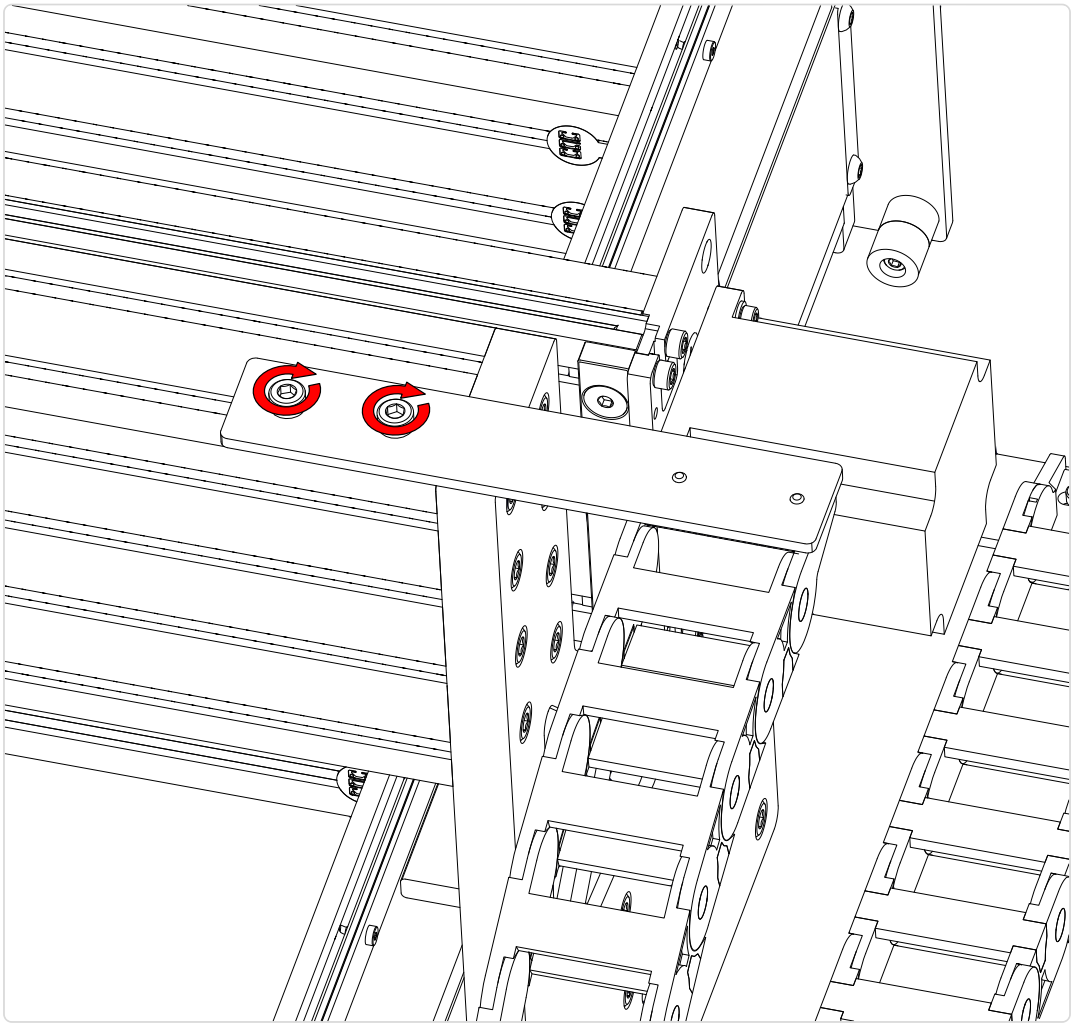
- Attach the other end to the upper bracket.

5.1.8



- Tighten the end to the upper bracket.

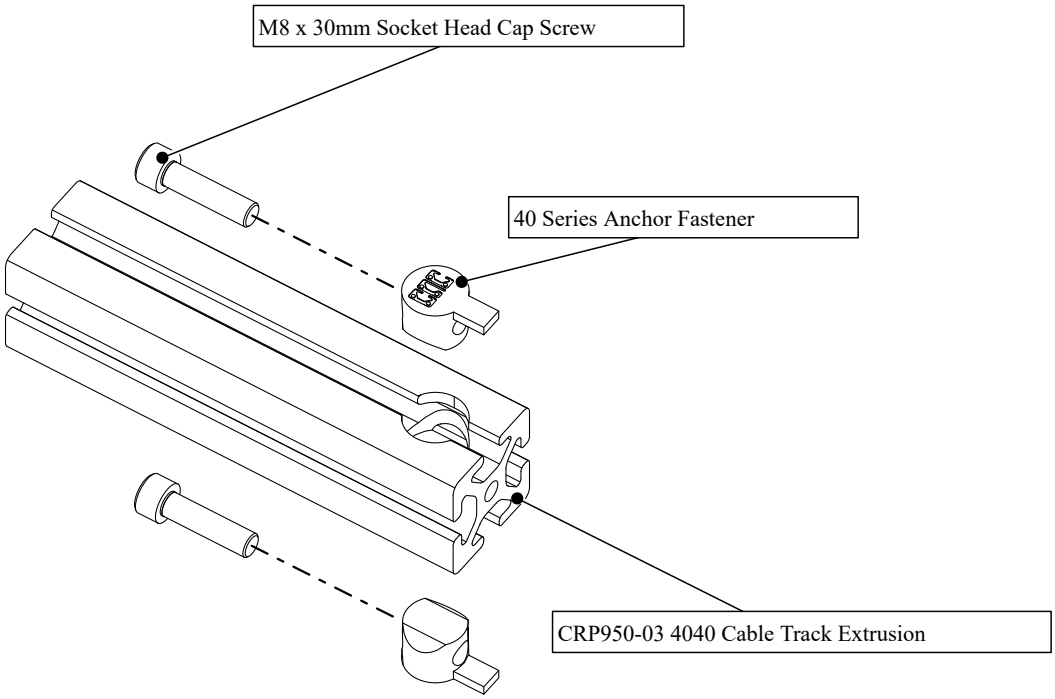
5.1.9



- Tighten upper bracket to the gantry extrusion.

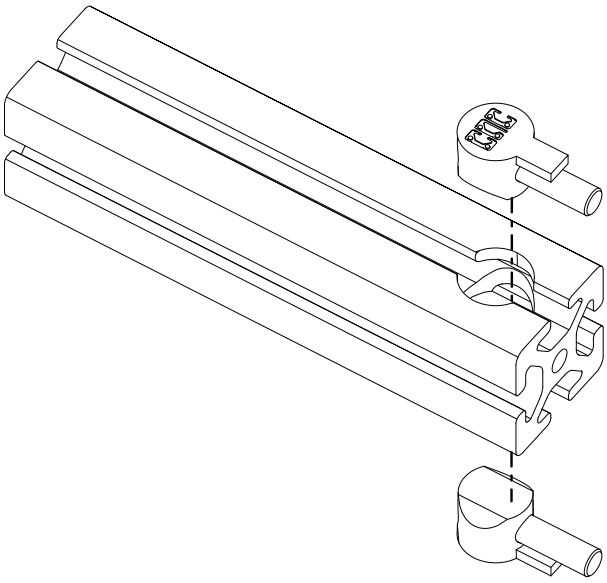
5.2 Gantry Cable Track Installation

5.2.1



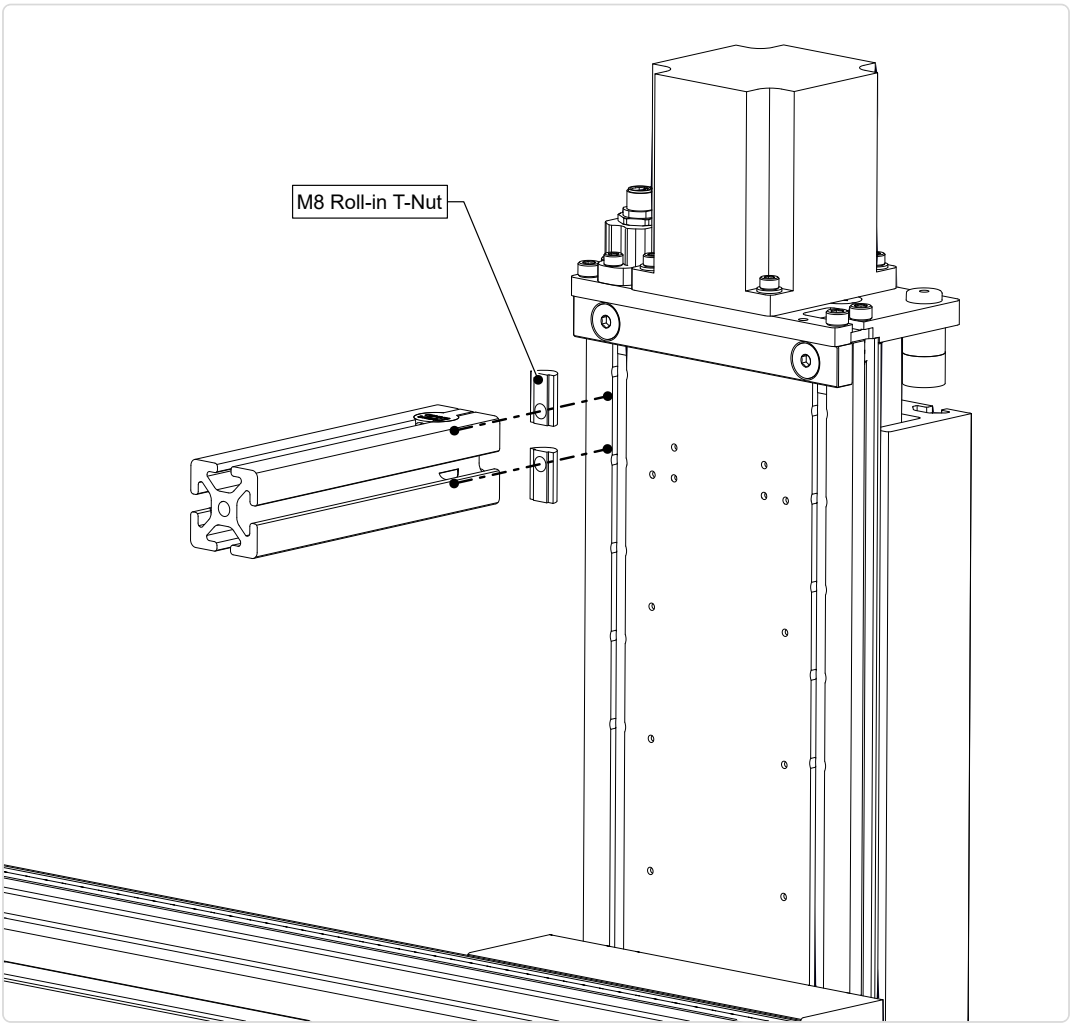
- Insert the M8 x 30mm bolts into the provided anchors and place the anchors in the bracket extrusion provided.

5.2.2



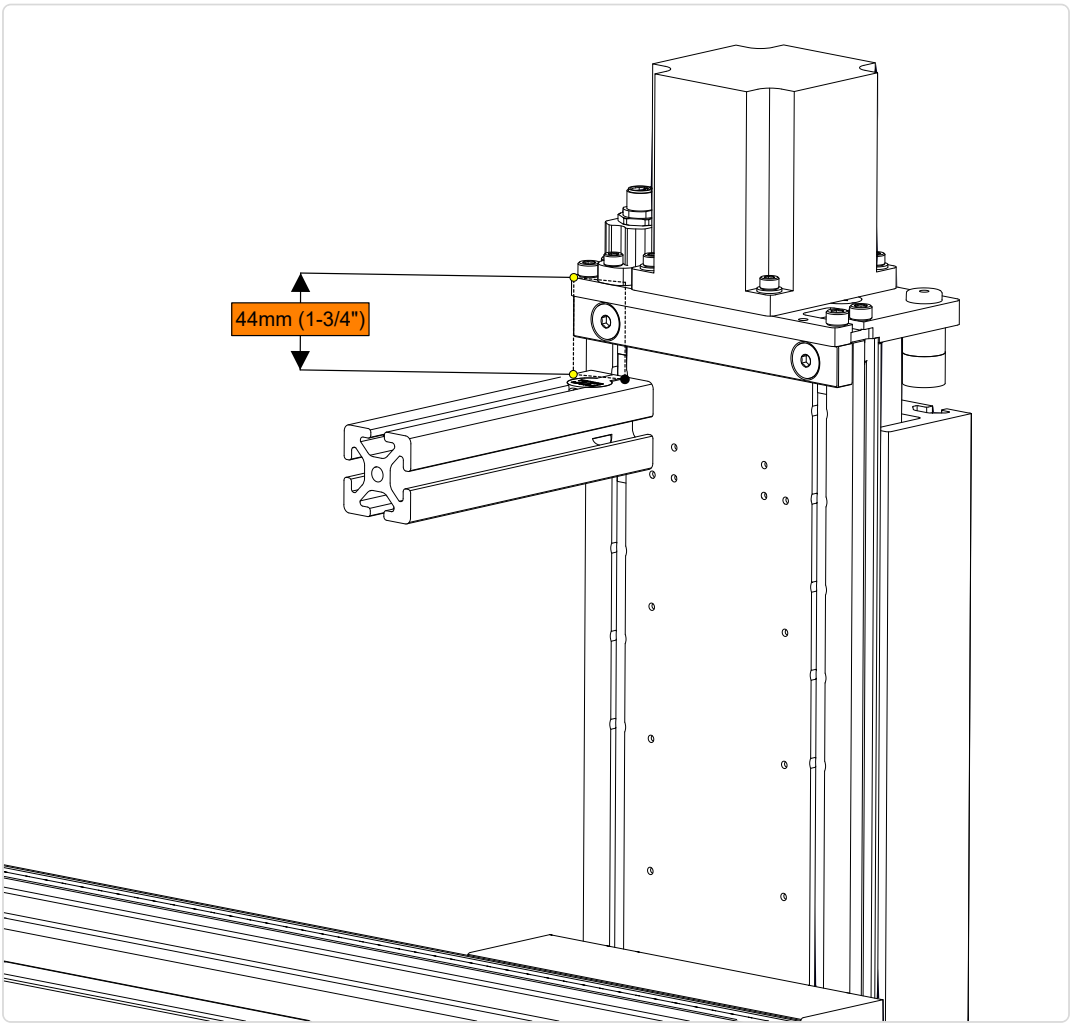
- Slide the anchors into the cable track extrusion as indicated.

5.2.3



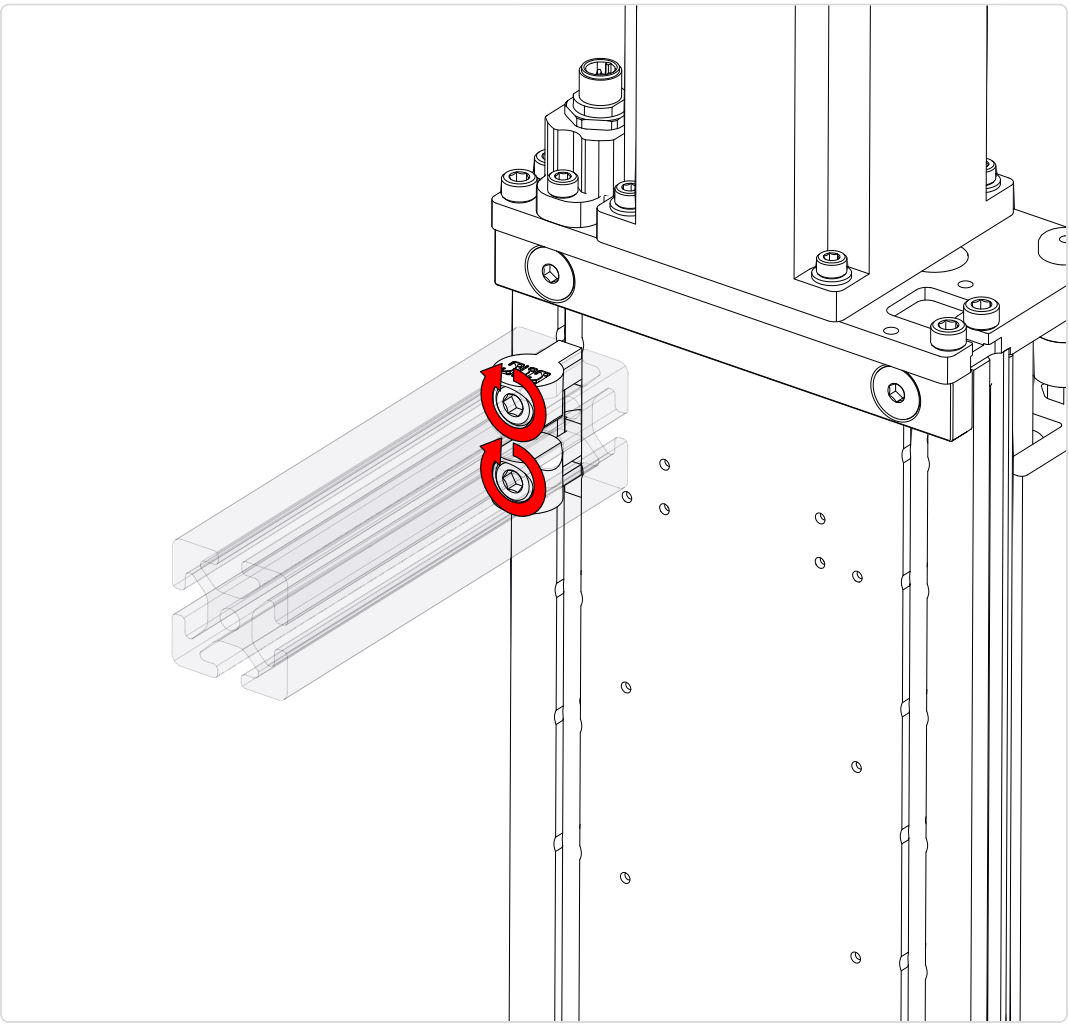
- Attach the cable track extrusion to the Z axis indicated.

5.2.4



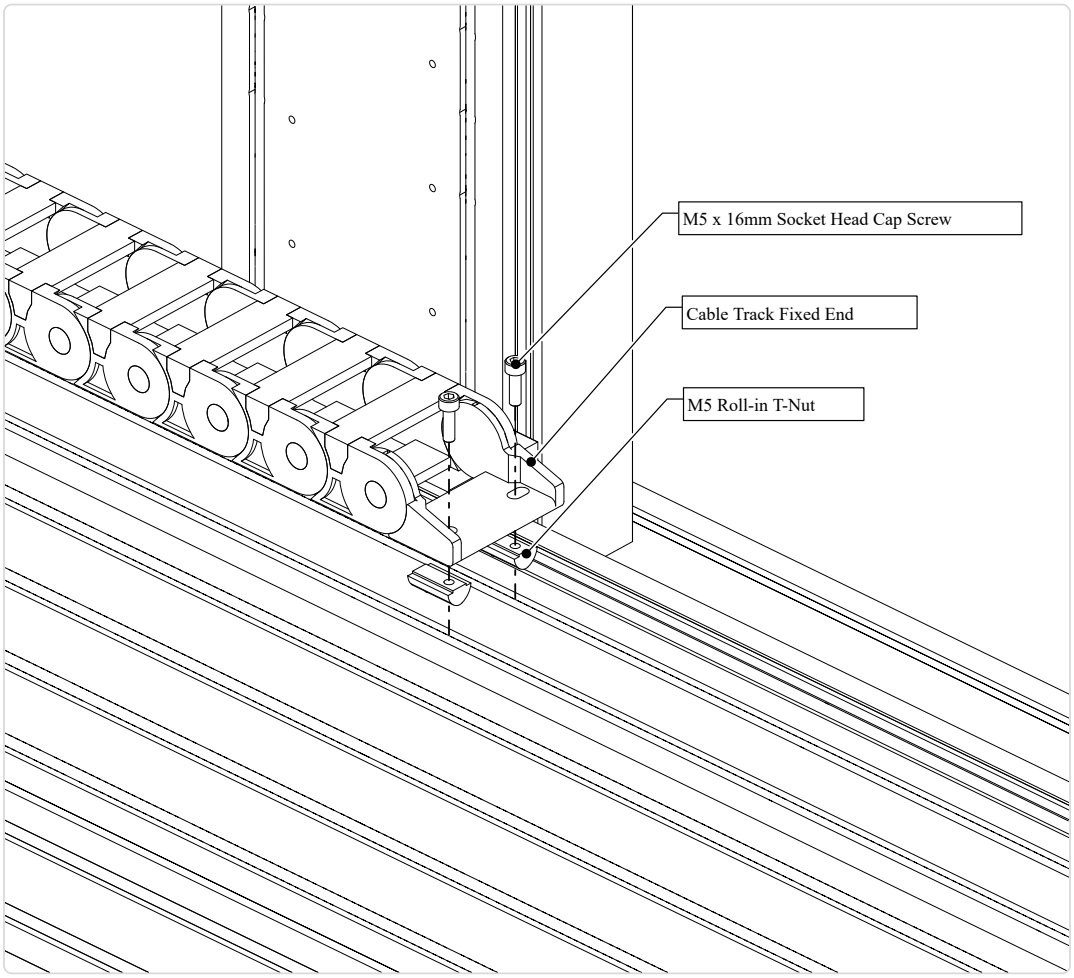
- Position the bracket extrusion approximately 44mm (1-3/4") from the top of the Z axis.

5.2.5



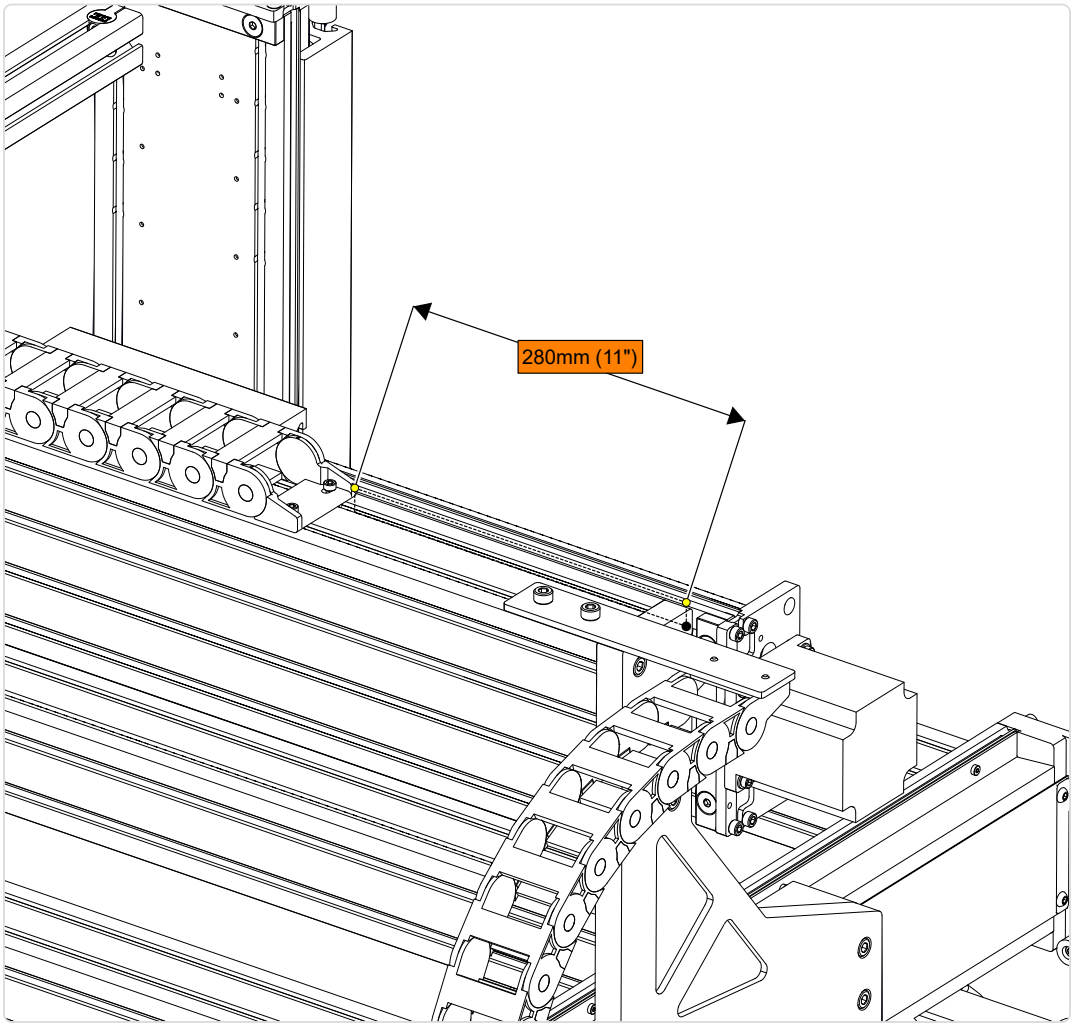
- Tighten the cable track extrusion fasteners as indicated.

5.2.6



- Install the fixed end of a length of cable track to the gantry extrusion.

5.2.7

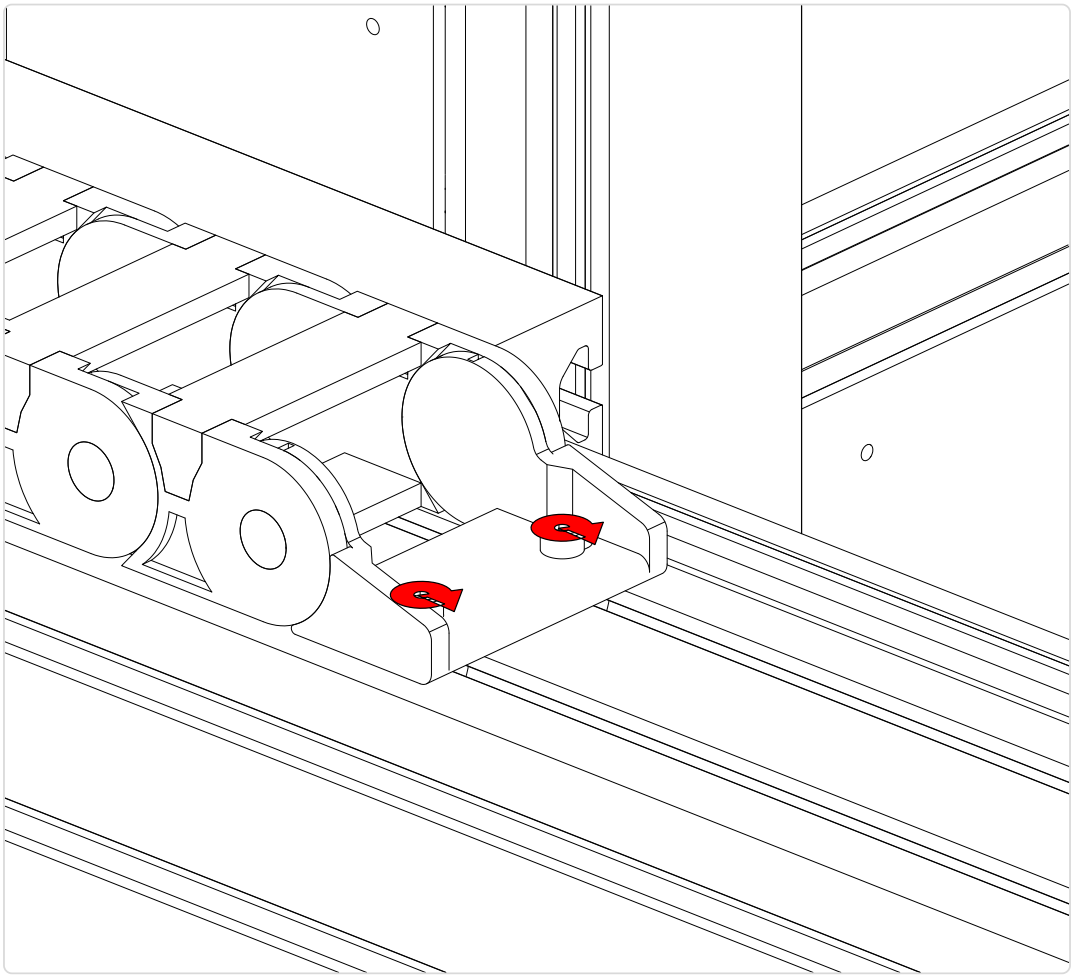


- Position the cable track approximately 280mm (11") from the riser plate.

Machine Configuration Option

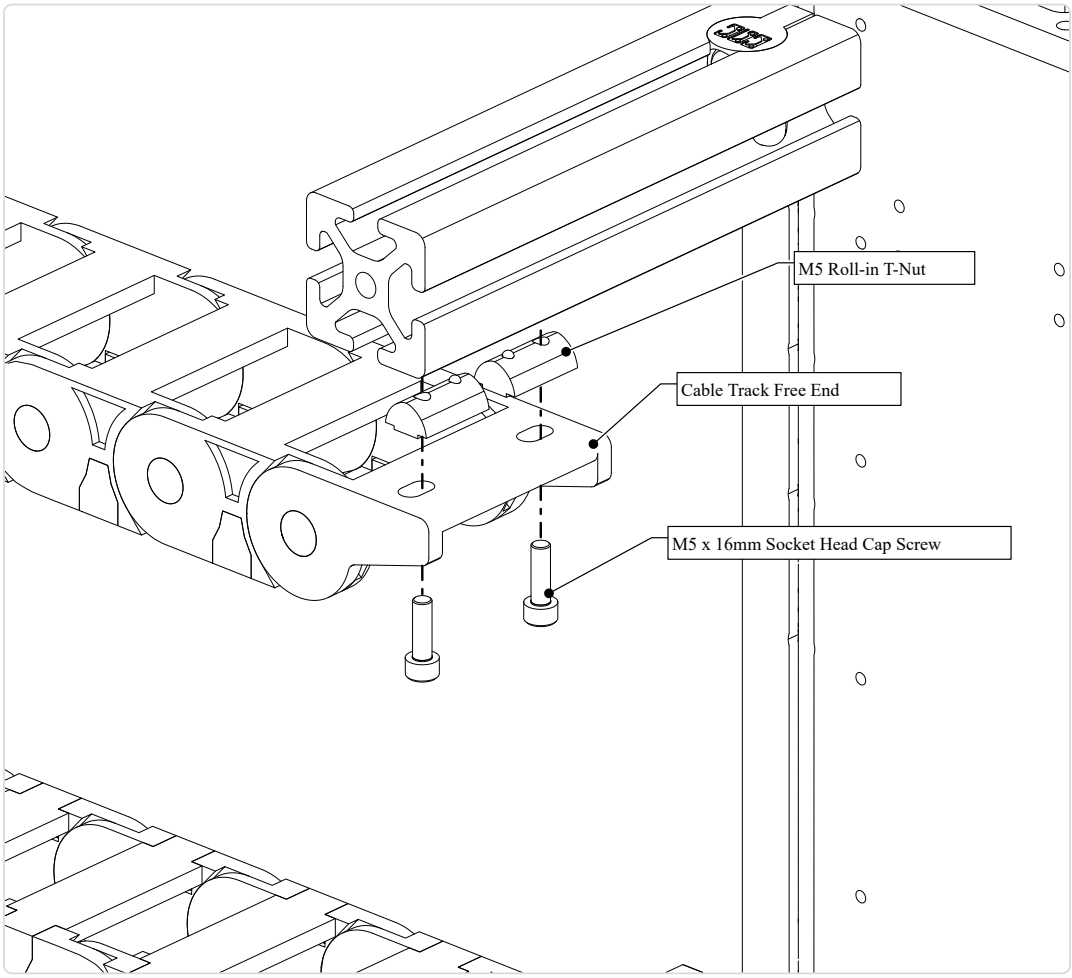
For the 3' width machines, position the cable track approximately 530mm (21") from the end of the riser plate.

5.2.8



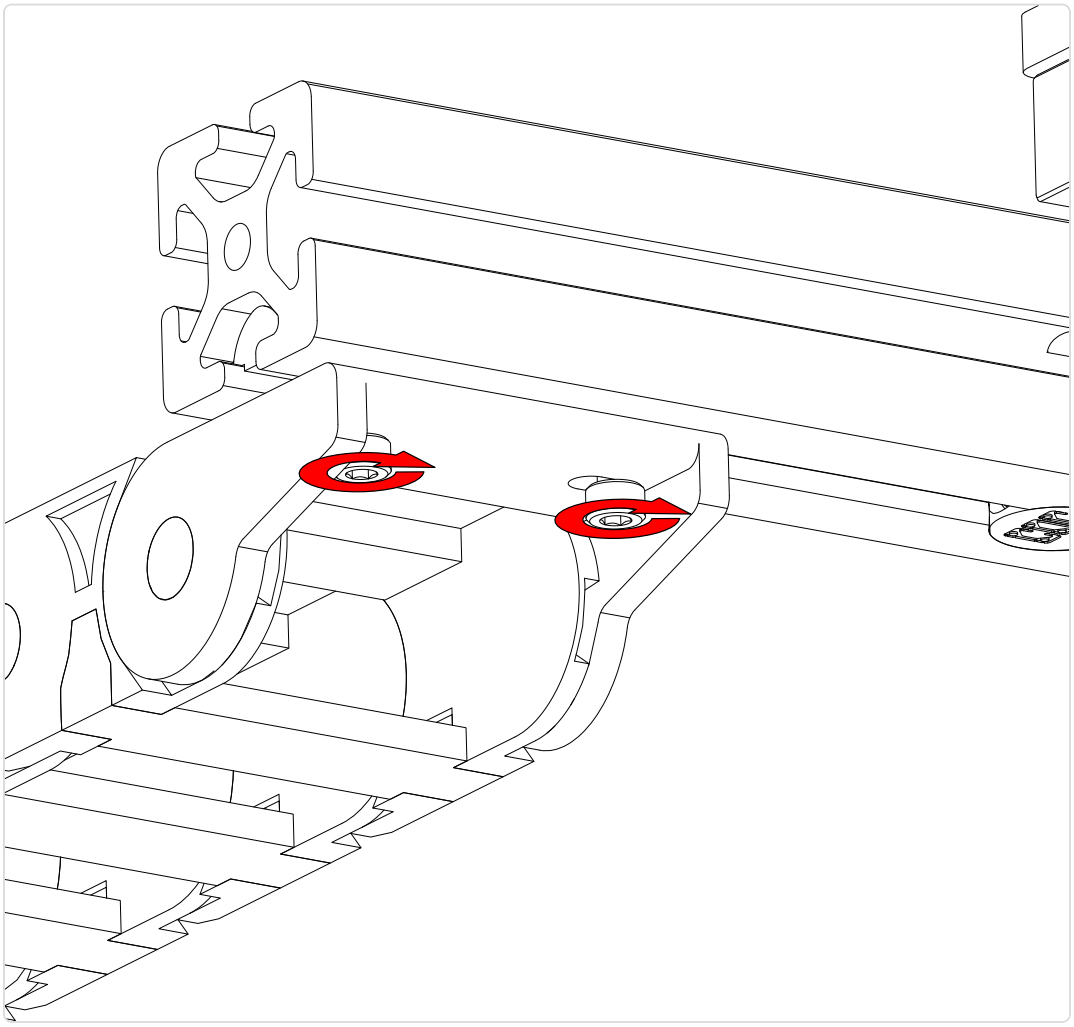
- Tighten the fixed end in place.

5.2.9



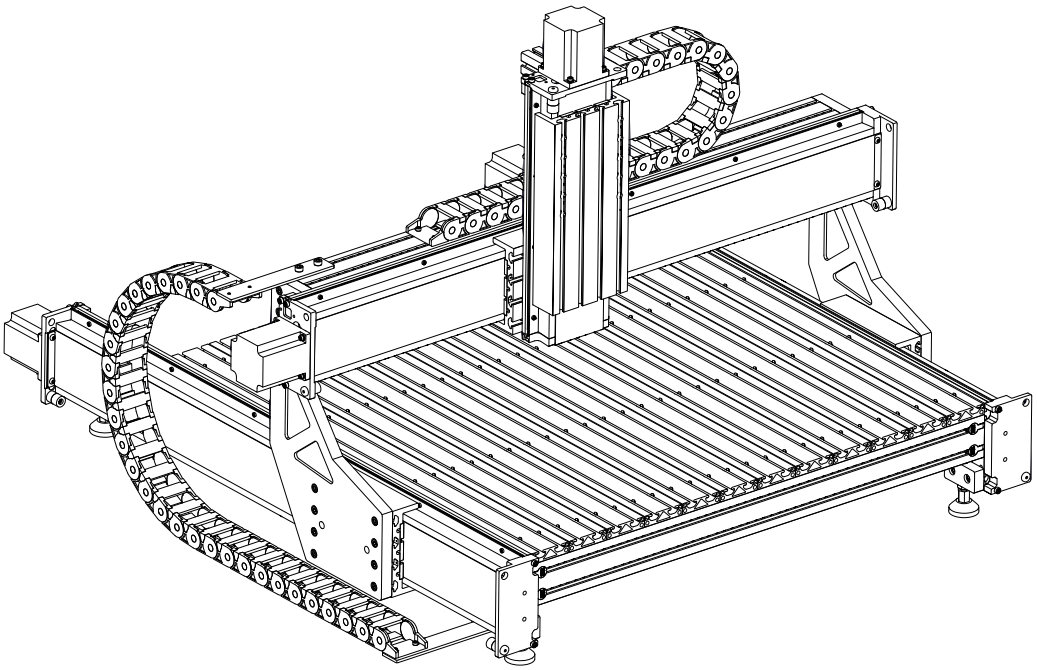
- Install the free end onto the extrusion bracket.

5.2.10



- Tighten the free end in place.

Section 6: Tabletop Extrusion Installation



Section Note

Your components may appear slightly different than the images. The assembly and installation procedure are the same.

Parts and Tools Required

The following parts and tools will be used in Section 6

2' x 2' Parts List

QTY	Part/Description	Packaged In
8	8020-720-CS6 T-Slot Machine Table Extrusion	CRP8020-720-CS6-BT-2424
1	CRP8020-720-CS6-BT-2424-FAST: - (48) M5 x 16mm Flat Head Screw - (48) M5 Roll-in T-Nut	CRP8020-720-CS6-BT-2424

2' x 3' Parts List

QTY	Part/Description	Packaged In
8	8020-960-CS8 T-Slot Machine Table Extrusion	CRP8020-960-CS8-BT-2436
1	CRP8020-960-CS8-BT-2436-FAST: - (64) M5 x 16mm Flat Head Screw - (64) M5 Roll-in T-Nut	CRP8020-960-CS8-BT-2436

3' x 2' Parts List

QTY	Part/Description	Packaged In
12	8020-720-CS8 T-Slot Machine Table Extrusion	CRP8020-720-CS6-BT-3624
1	CRP8020-720-CS6-BT-3624-FAST: - (72) M5 x 16mm Flat Head Screw - (72) M5 Roll-in T-Nut	CRP8020-720-CS6-BT-3624

3' x 3' Parts List

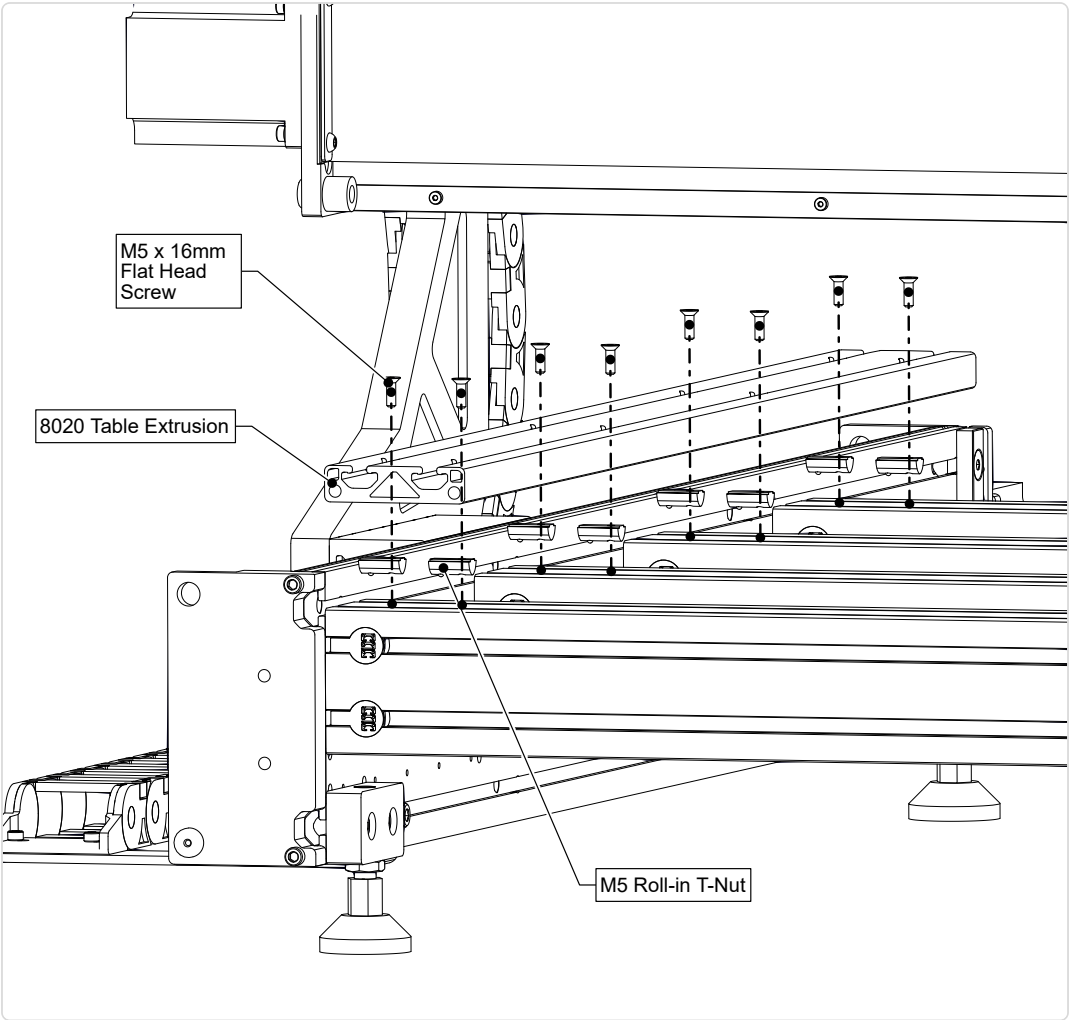
QTY	Part/Description	Packaged In
12	8020-960-CS8 T-Slot Machine Table Extrusion	CRP8020-960-CS8-BT-3636
1	CRP8020-960-CS8-BT-3636-FAST: - (96) M5 x 16mm Flat Head Screw - (96) M5 Roll-in T-Nut	CRP8020-960-CS8-BT-3636

Required Tools:

- 3mm Allen Wrench

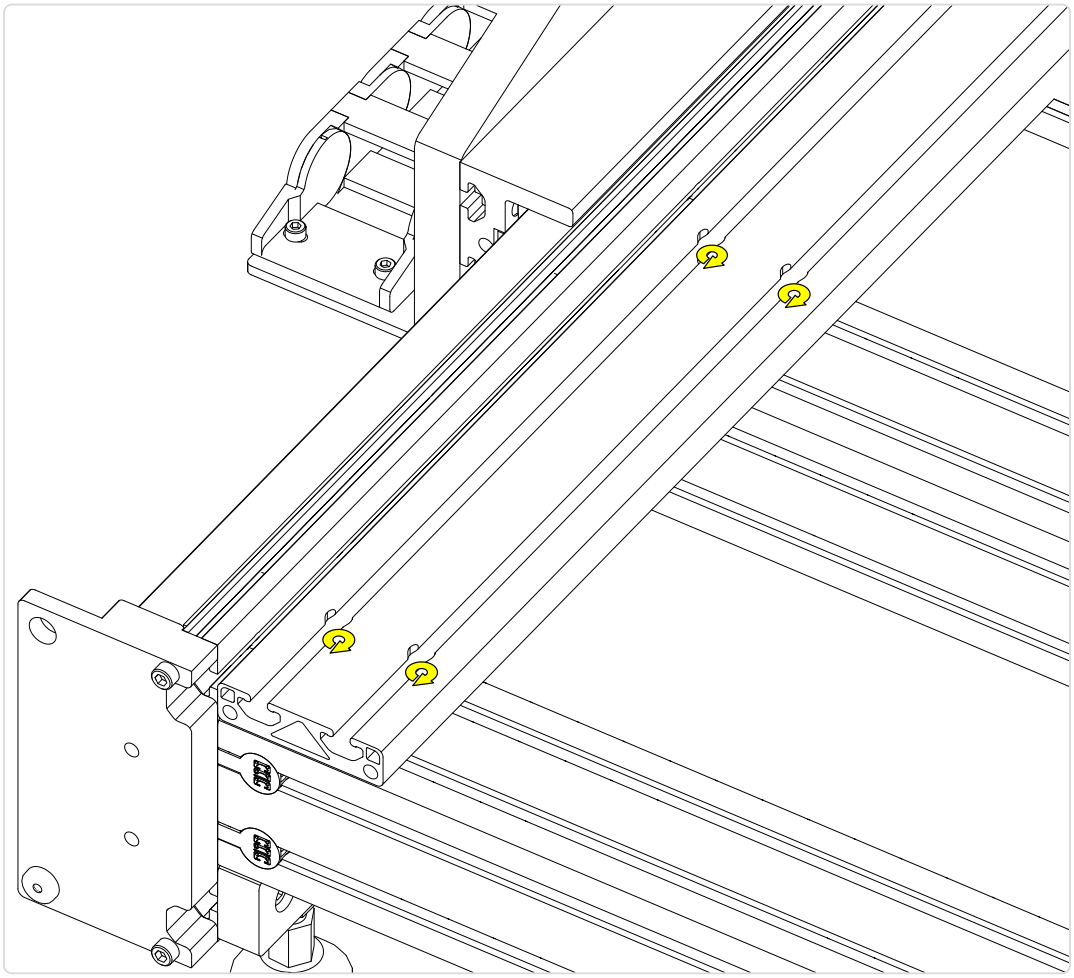
6.1 Tabletop Installation

6.1.1



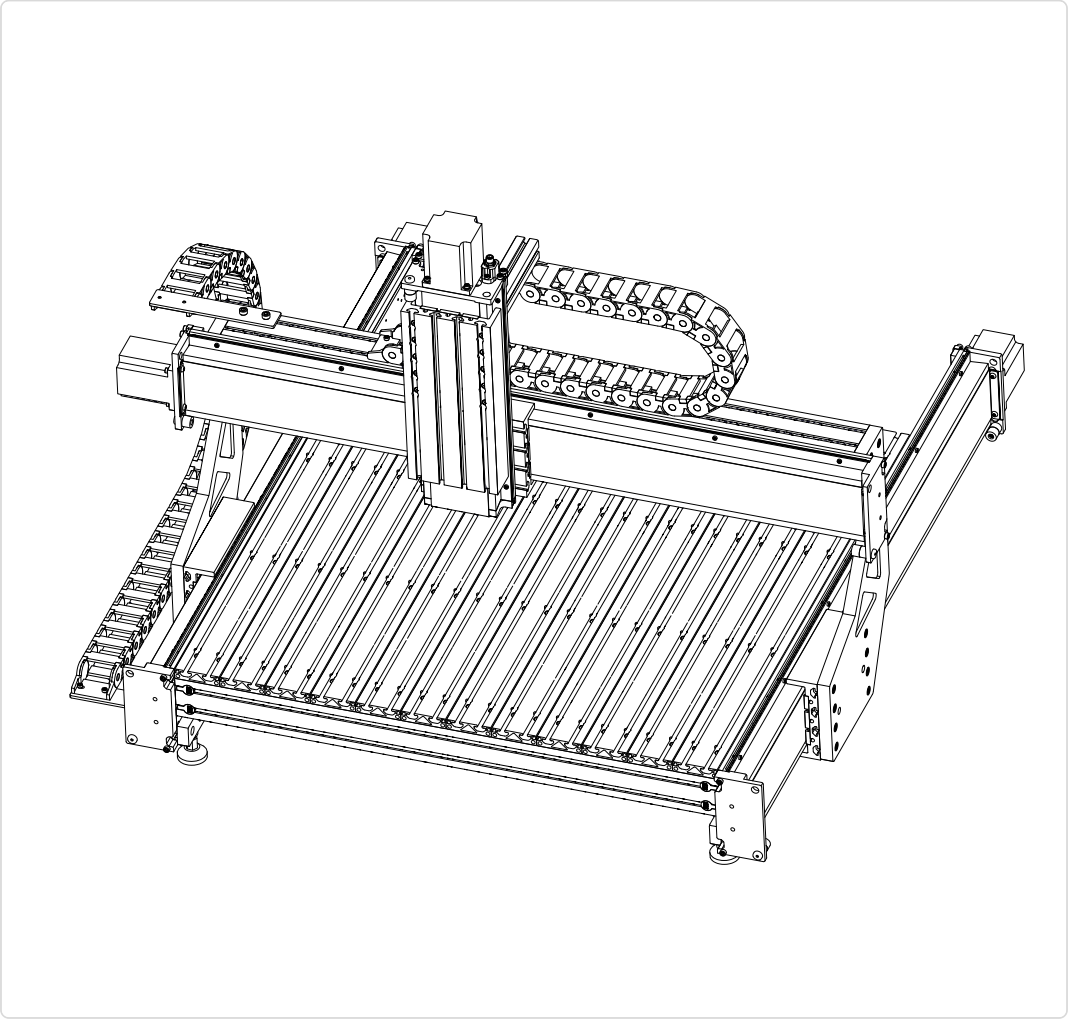
- Attach a piece of tabletop extrusion to the machine crossmembers as indicated.

6.1.2



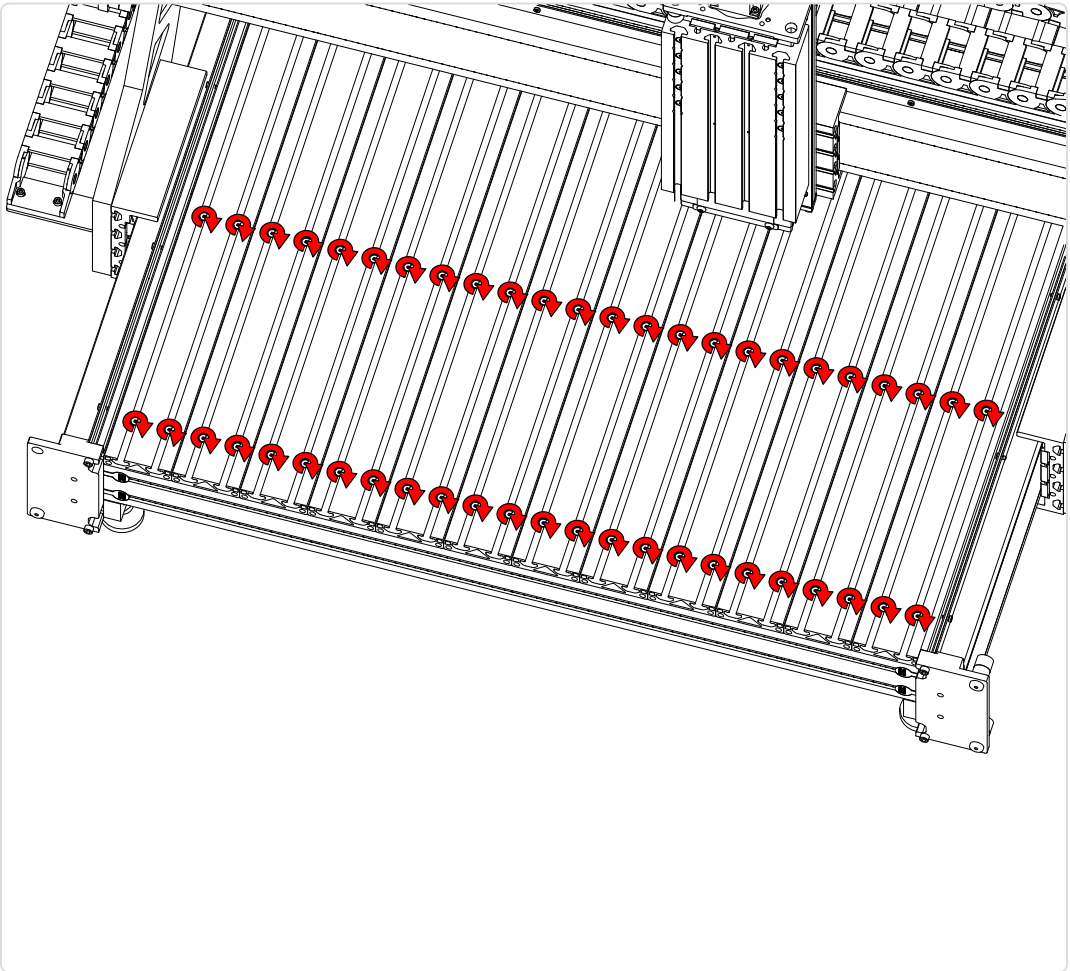
- Partially tighten the tabletop extrusion fasteners.

6.1.3



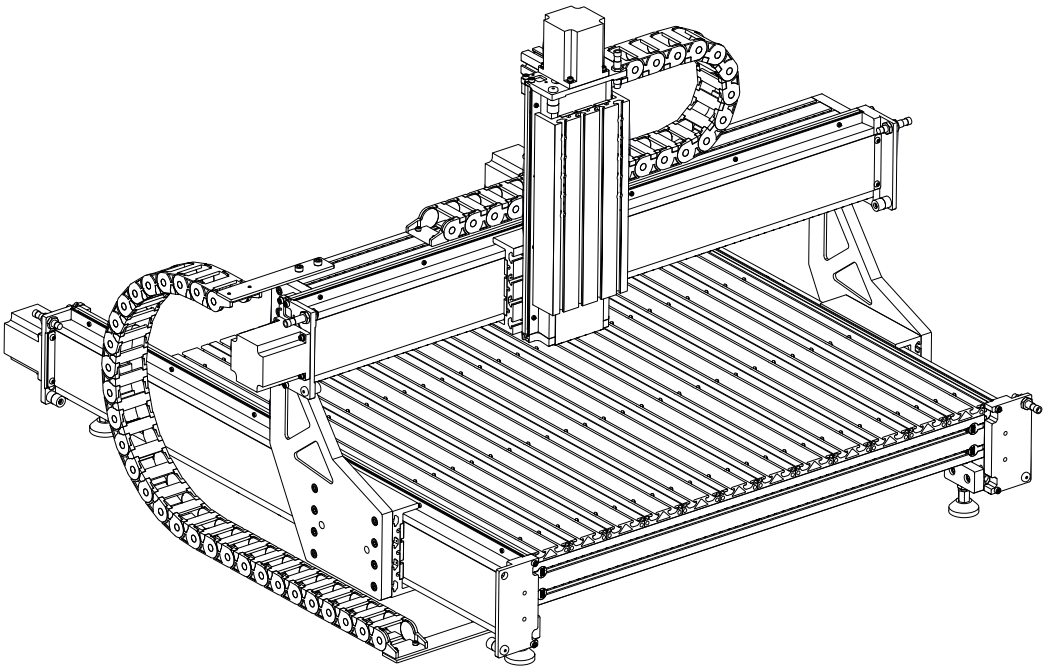
- Repeat the previous steps to install the remaining tabletop extrusion pieces.

6.1.4



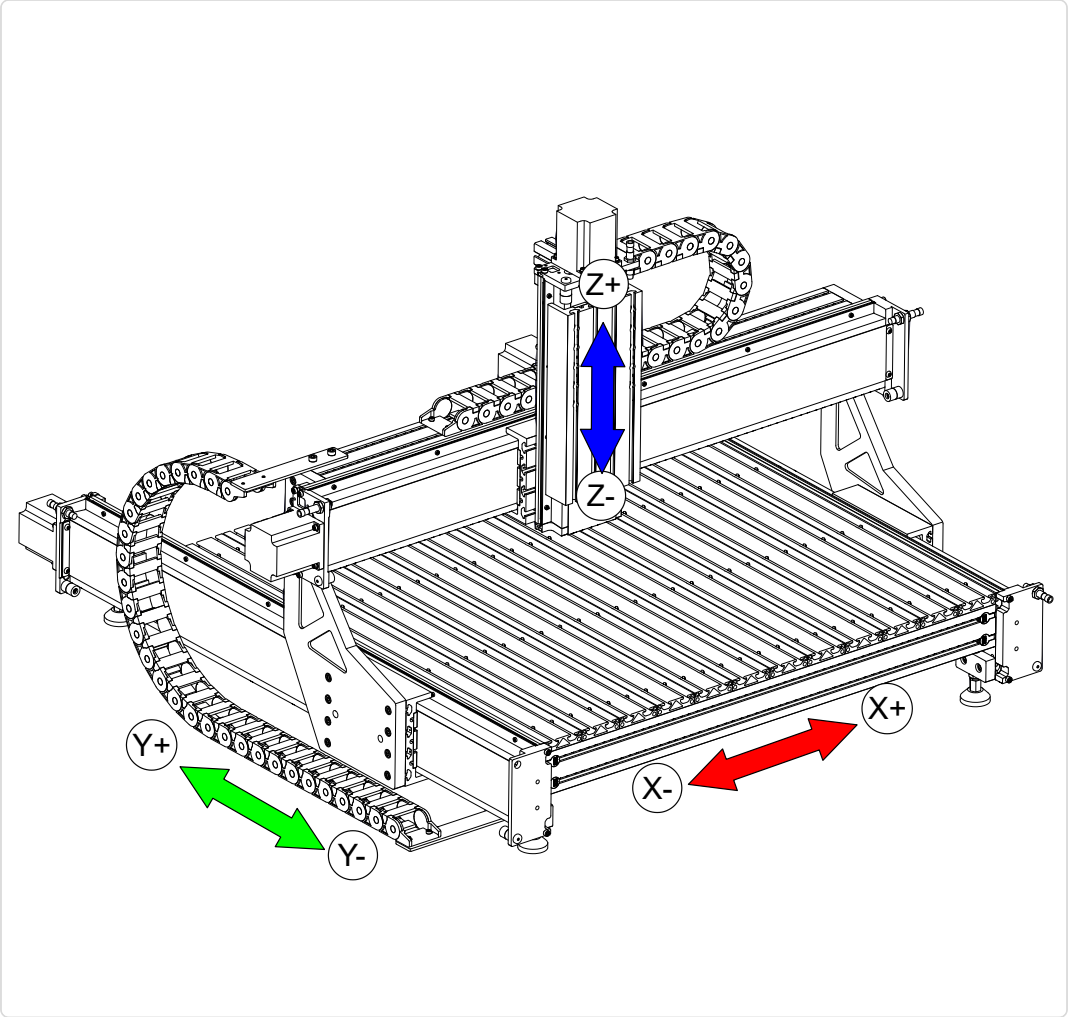
- Fully tighten the tabletop extrusion fasteners.

Section 7: Motor and Sensor Connections



7.1 Motor and Sensor Locations

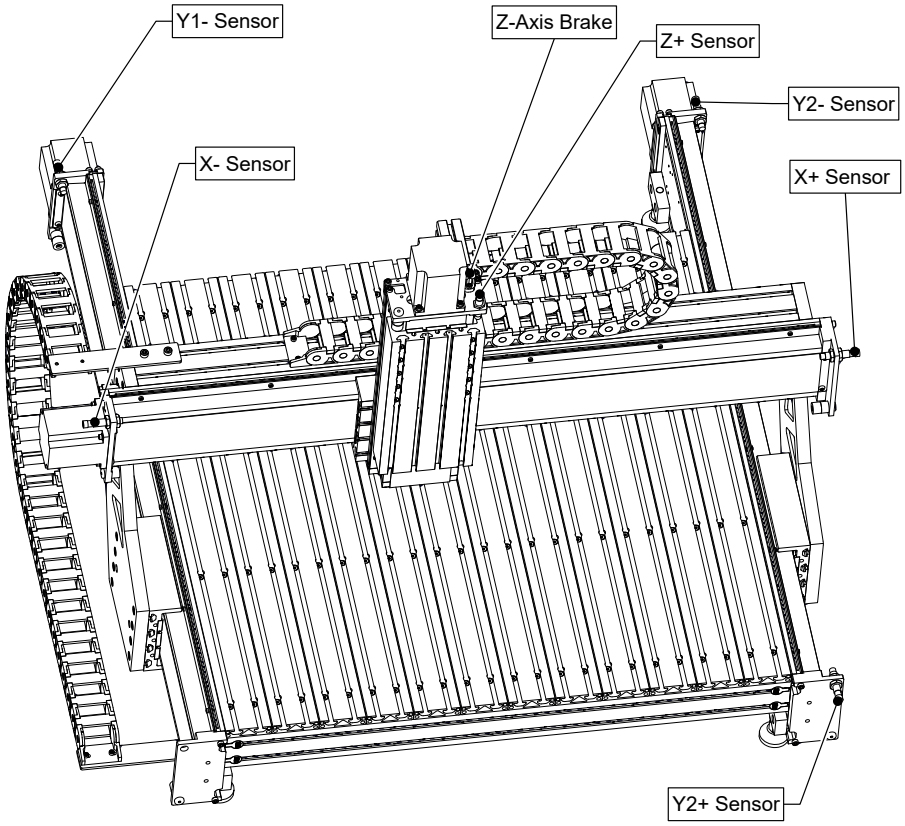
7.1.1



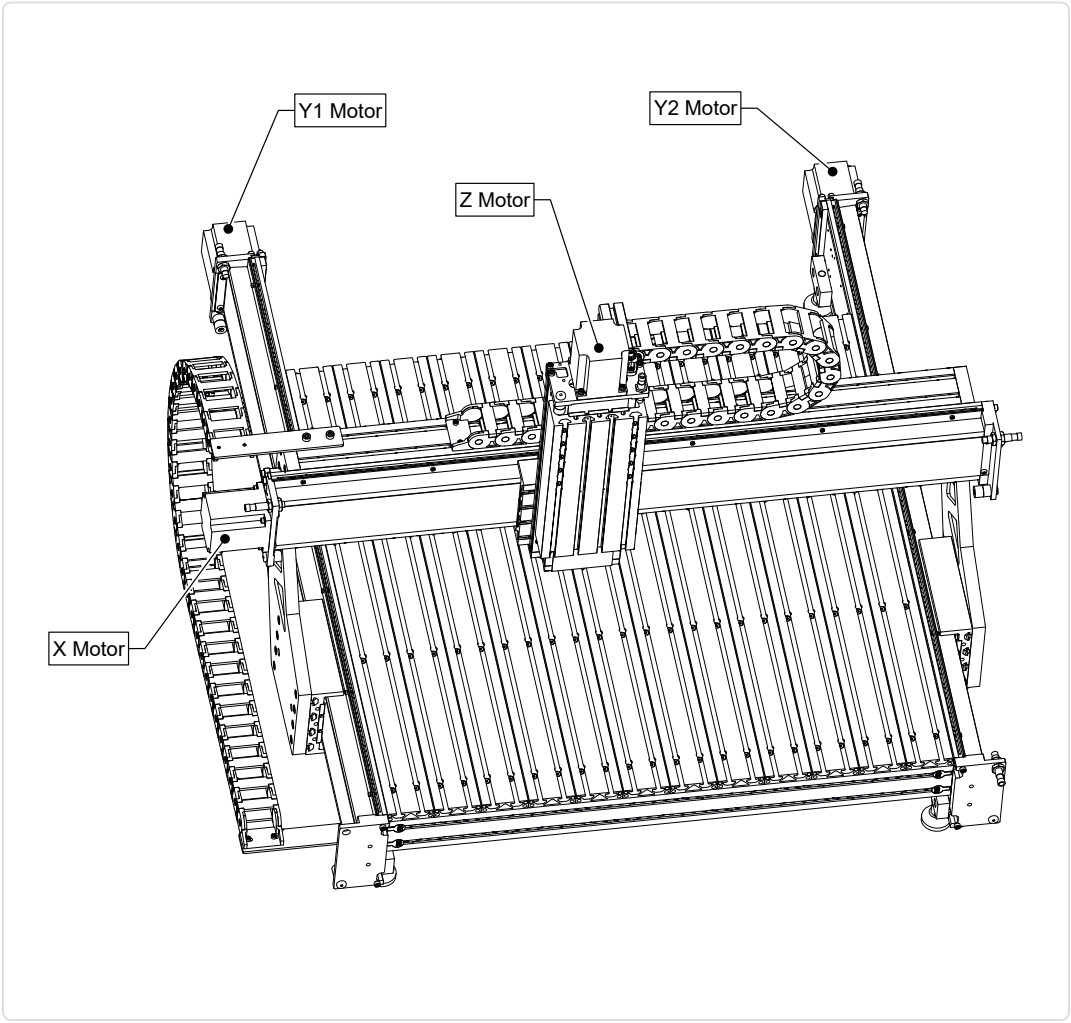
7.1.2

Assembly Note

The Y-axis sensor locations are opposite of the machine coordinate system (Shown in **7.1.1**). This is necessary for the machine to home properly and does not affect the actual machine coordinate system. Ensure that your sensors are plugged into the controller ports labeled in the drawing.

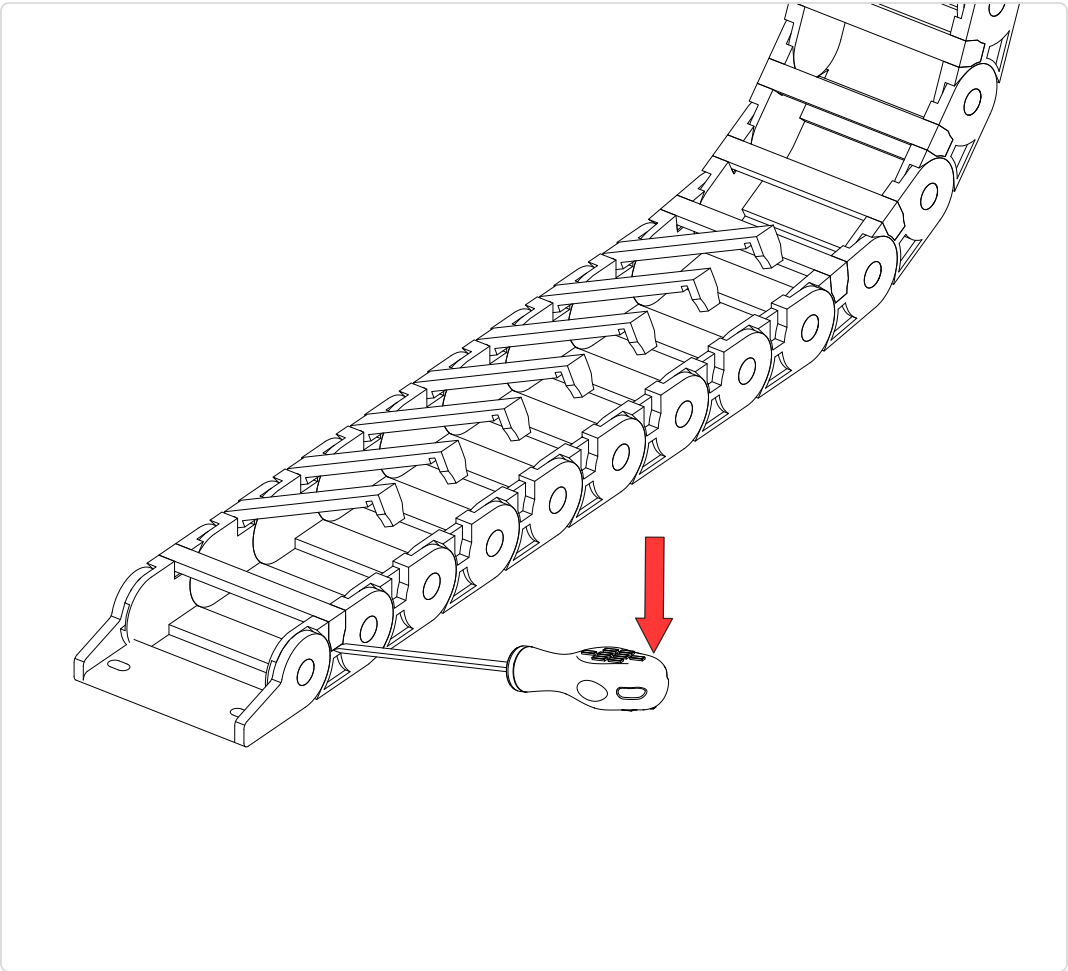


7.1.3



7.2 Cable Routing

7.2.1



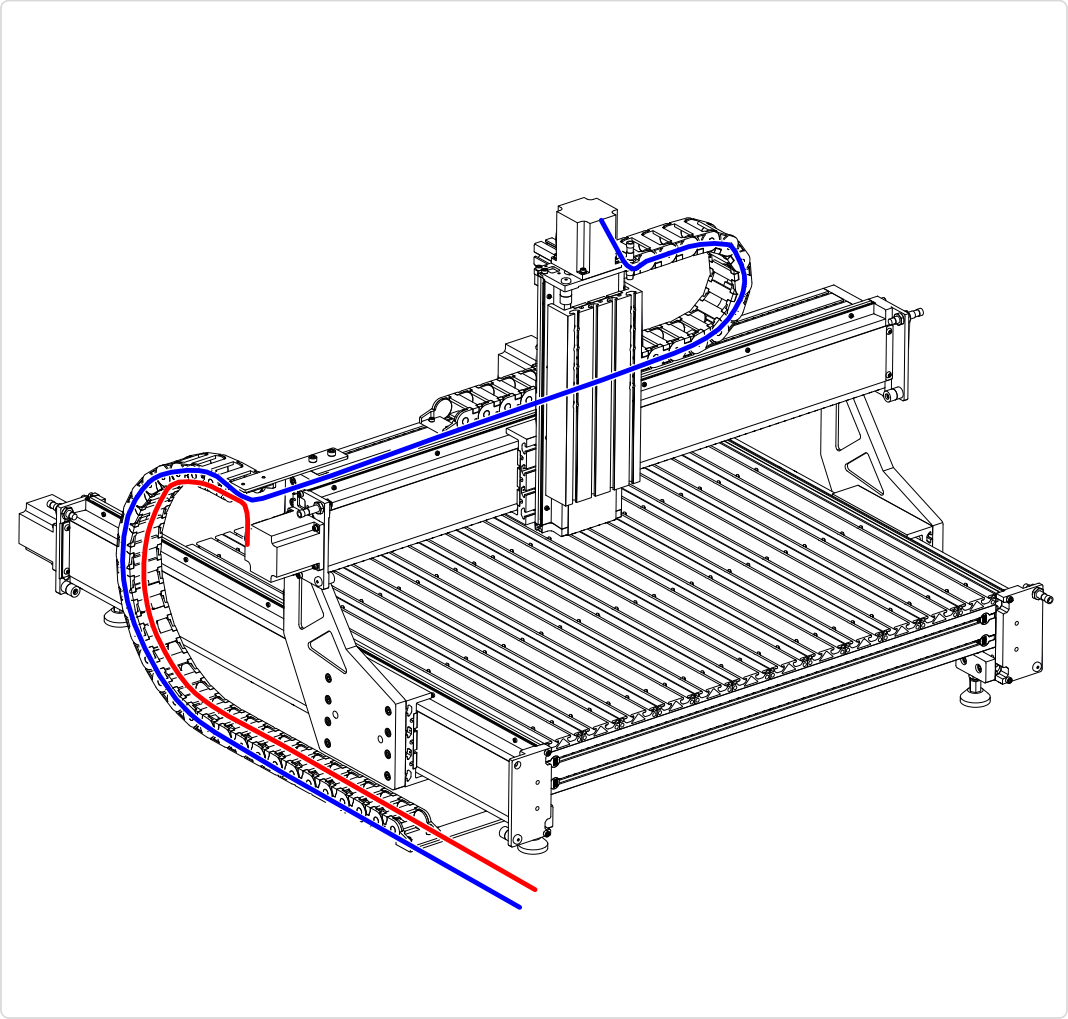
- To route cables through the cable track, use a screwdriver to lift open the individual cable track sections as indicated.

7.2.2

Cable Routing Paths

Motor/Sensor	Cable Routing Path
Y1- Switch	Directly to control box
Y2- Switch	Directly to control box
Y2+ Switch	Directly to control box
Y1 Motor	Directly to control box
Y2 Motor	Directly to control box
X- Switch	Through table cable track
X+ Switch	Across gantry and through table cable track
X Motor	Through table cable track
Z Motor	Through table cable track and gantry cable track
Z+ Switch	Through table cable track and gantry cable track
Z Axis Brake	Through table cable track and gantry cable track

7.2.3

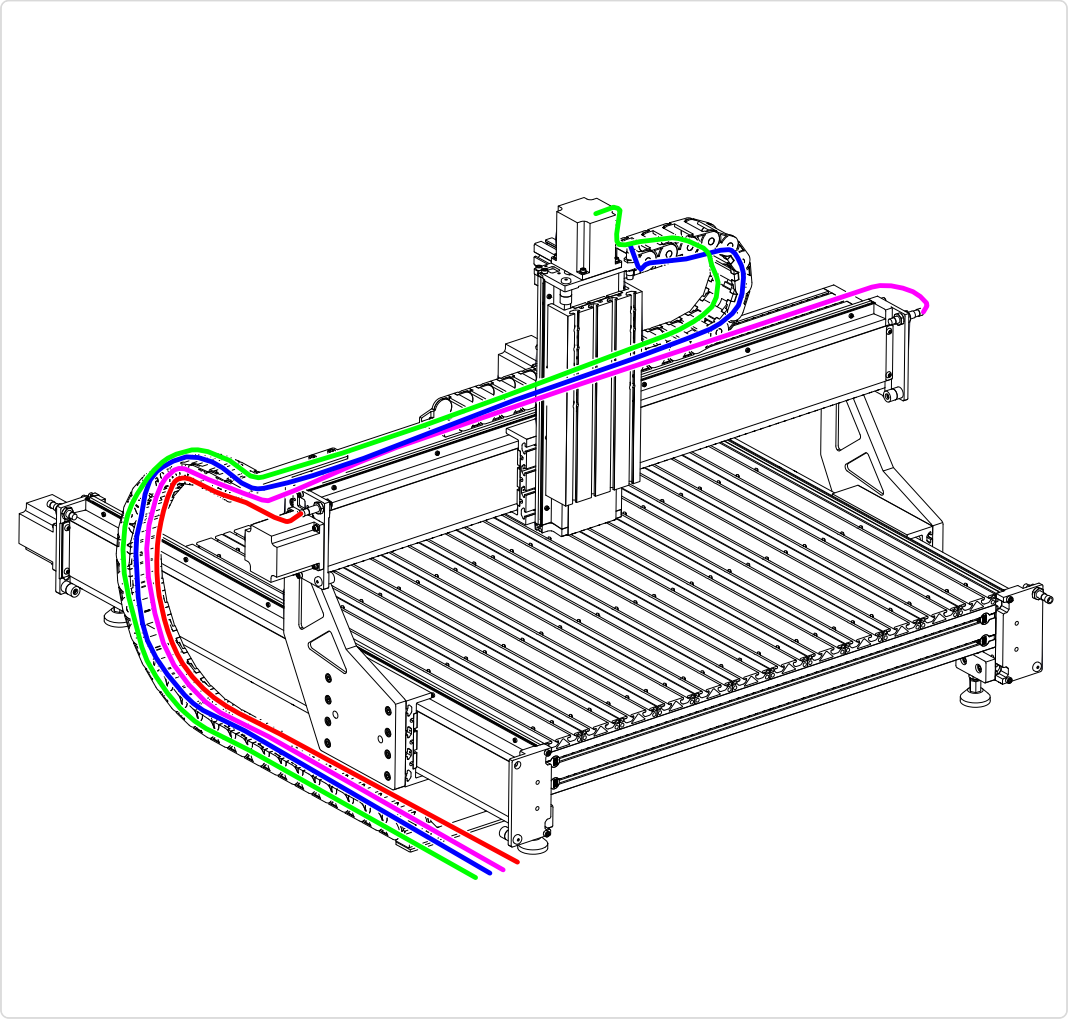


- Route the indicated motor cables as shown. The remaining two motor cables can be routed directly to your control box without going through cable track.

Cables

Axis	Color	Cable
X Motor	Red	12'
Z Motor	Blue	20'

7.2.4



- Route the indicated sensor cables as shown (see table on next page). The remaining three sensor cables can be routed directly to your control box without going through cable track.

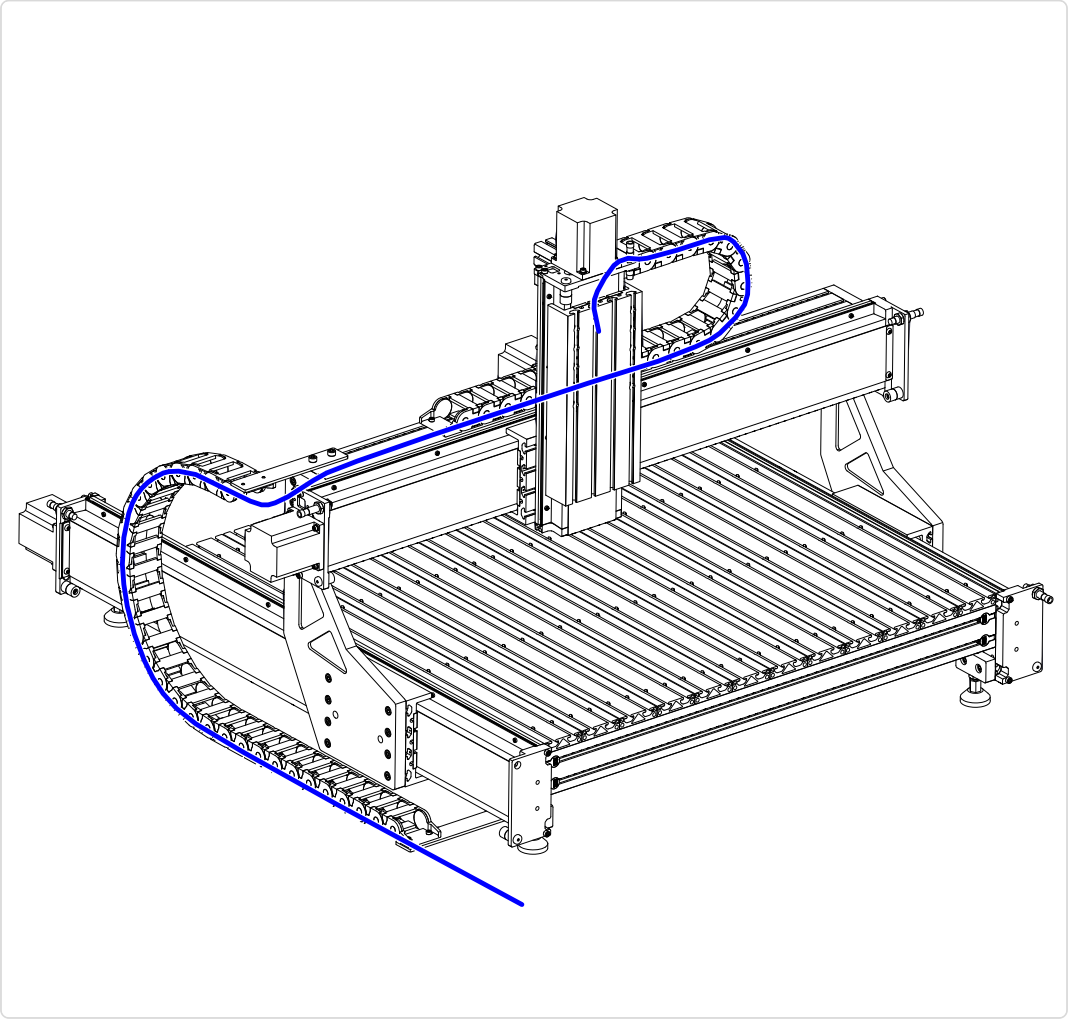
Assembly Note

The X+ sensor cable is routed on top of the gantry, but not inside the gantry cable track.

Cables

Axis	Color	Cable
X- Sensor	Red	12'
X+ Sensor	Pink	20'
Z Sensor	Blue	20'
Z Brake	Green	20'

7.2.5



Accessory Routing

Connection	Color	Component	Routing Path
Spindle	Blue	M23 Spindle Cable	Through table cable track and gantry cable track
Router	Blue	Router Power Cable	Through table cable track and gantry cable track
Laser	Blue	See **Instructions**	Through table cable track and gantry cable track

Assembly Note

Ensure any components routed to the Z-axis moving plate have enough slack for the entire range of motion.

7.3 Sensor and Bumper Installation

Parts and Tools Required

The following parts and tools will be used in Section 7.3

QTY	Part/Description	Packaged In
1	Proximity Sensor Kit: - (6) Cylindrical Proximity Sensors - Proximity Cables	Electronics
1	Motor & Bumper Hardware: - (6) Bumper Adapter Bushing - (5) Aluminum Spacer - (6) Recess Bumper - (5) M5 x 30mm Socket Head Cap Screw - (1) M5 x 20mm Socket Head Cap Screw	CRP900-00-HW-XXXX

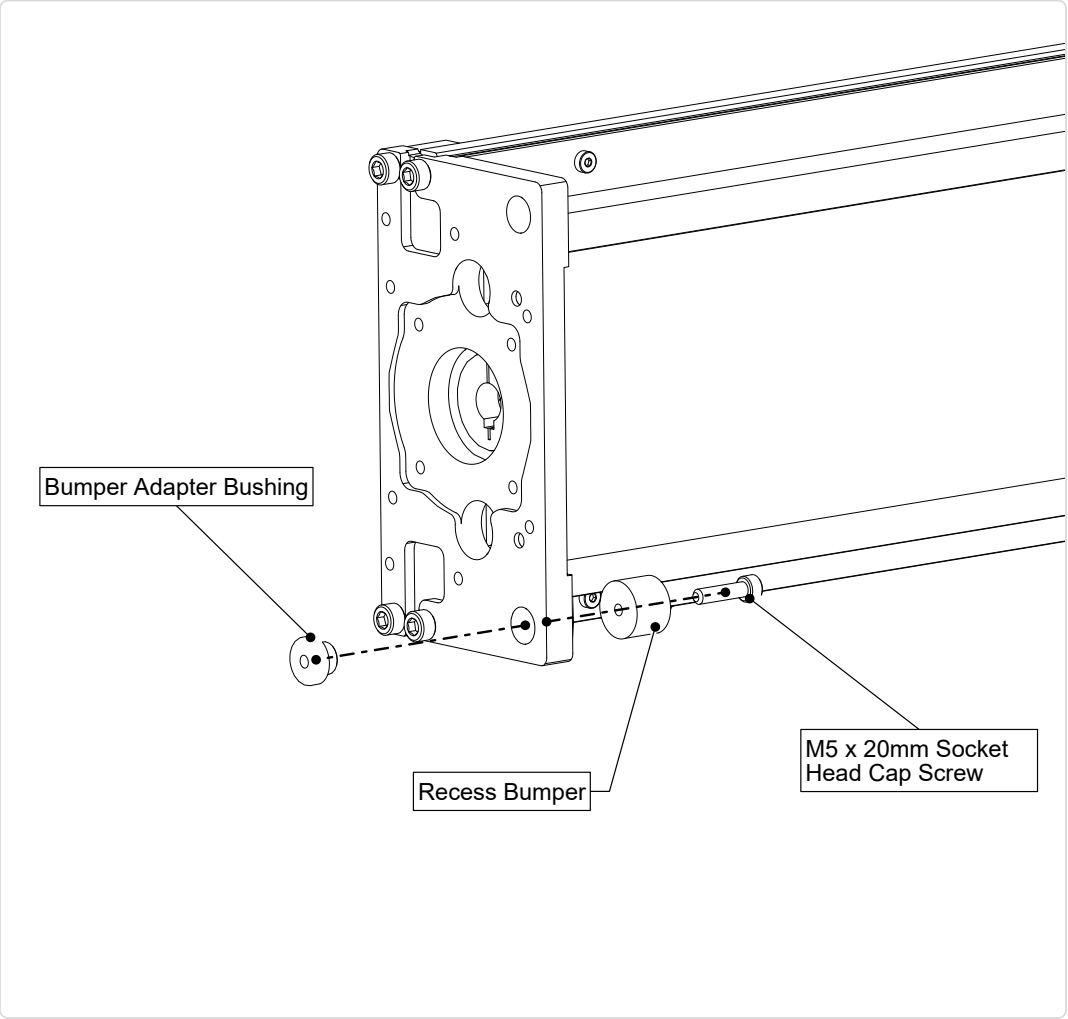
Required Tools:

- 4mm Allen Wrench
- Adjustable Wrench
- Tape Measure

Recommended Additional Tools:

- 17mm Combination Wrench

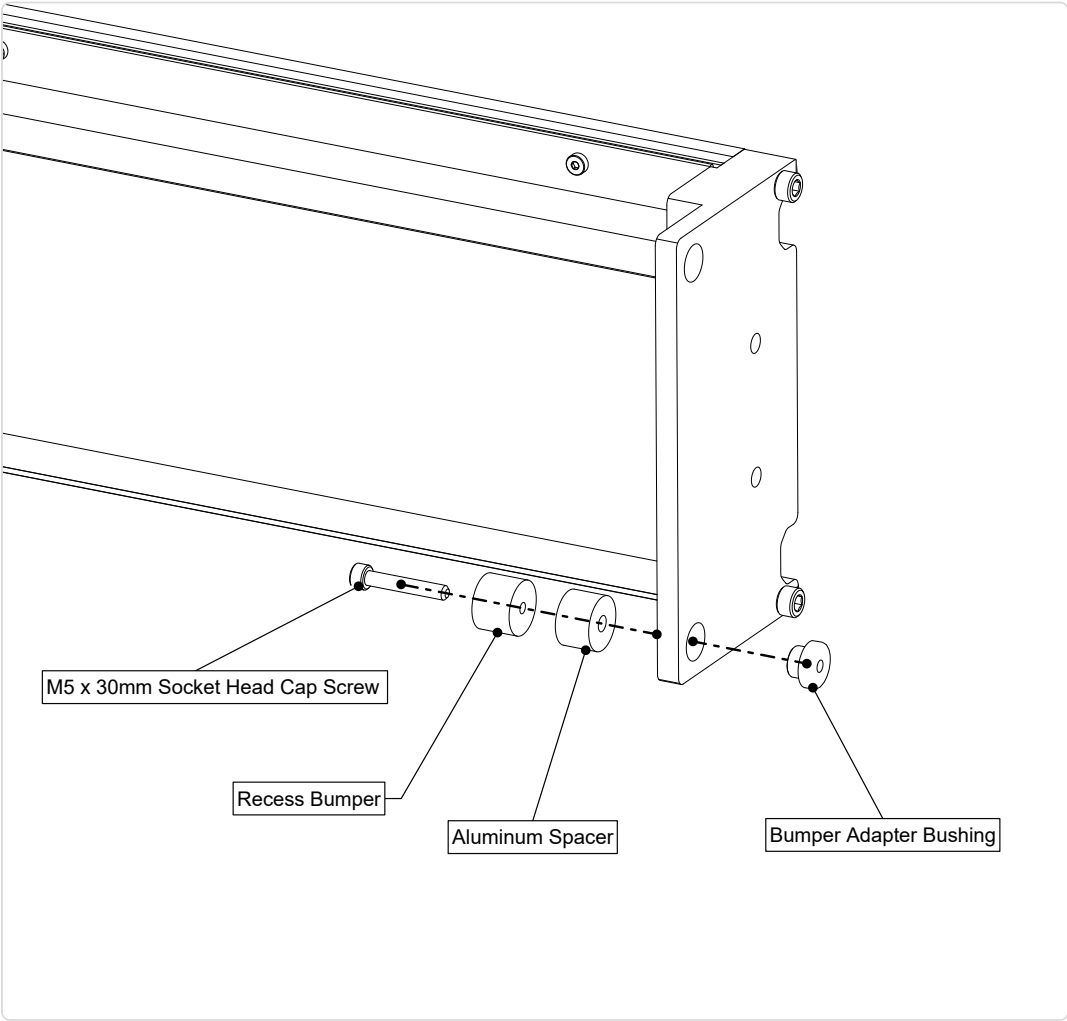
7.3.1



Components removed for clarity

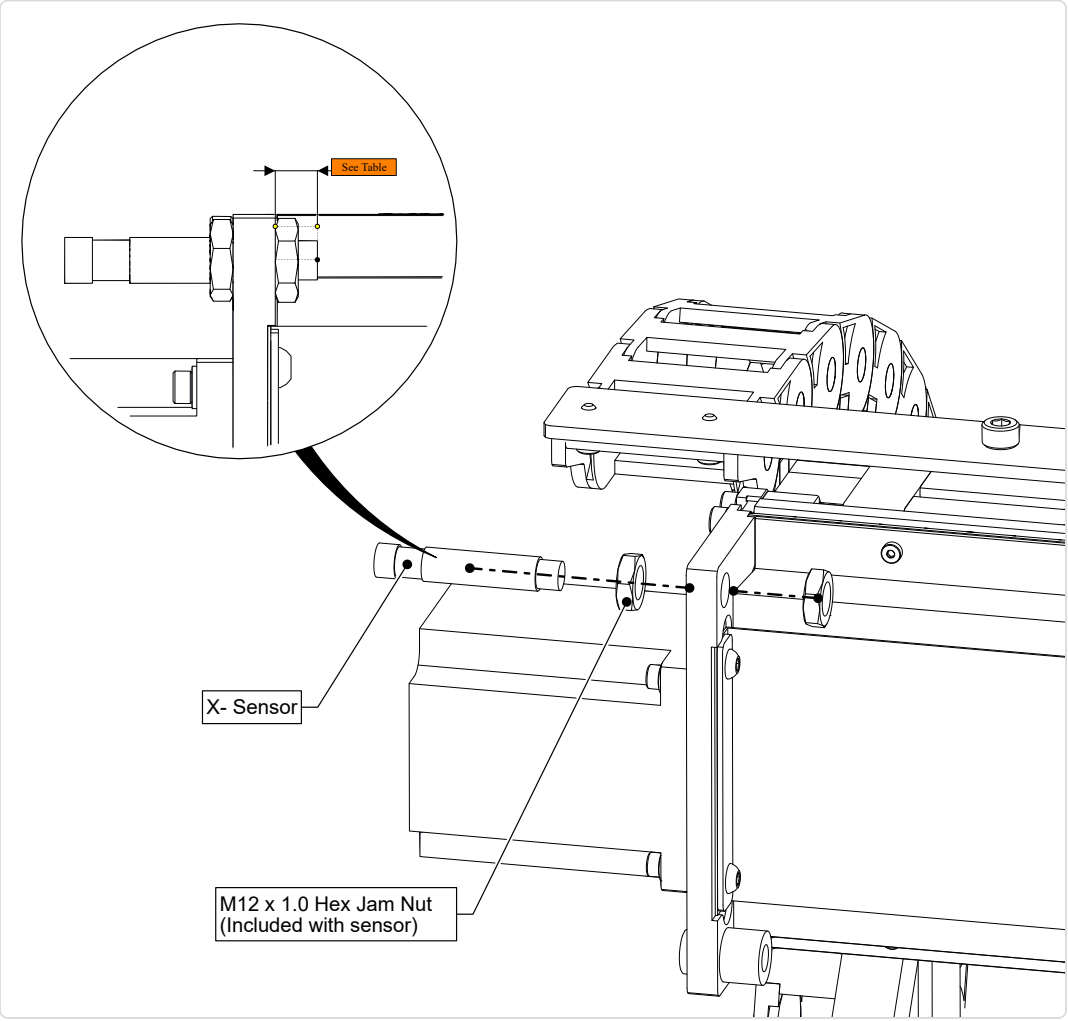
- On the motor end of the X-axis (Gantry), install a Recess Bumper with a Bumper Adapter Bushing and the shorter M5 x 20mm Socket Head Cap Screw.
- Do not install an Aluminum Spacer at this location.

7.3.2



- Install five more bumpers in the bottom hole at each remaining end of the table and gantry axes.
- Include an Aluminum Spacer and use a longer M5 x 30mm Socket Head Cap Screw at these remaining locations.

7.3.3



- Install sensors into the remaining axis end plate holes as indicated at each sensor location (see step 7.1.2).
- Adjust the jam nuts so that the face of the sensor is distanced from the inside face of the motor mount plate according to the table below.

Sensor	Distance
X- Sensor	11mm (7/16")
X+ Sensor	22mm (7/8")
Y1- Sensor	22mm (7/8")
Y2- Sensor	22mm (7/8")
Y2+ Sensor	22mm (7/8")
Z+ Sensor	22mm (7/8")

Section 8: Tool Height Setter

Parts and Tools Required

The following parts and tools will be used in Section 8

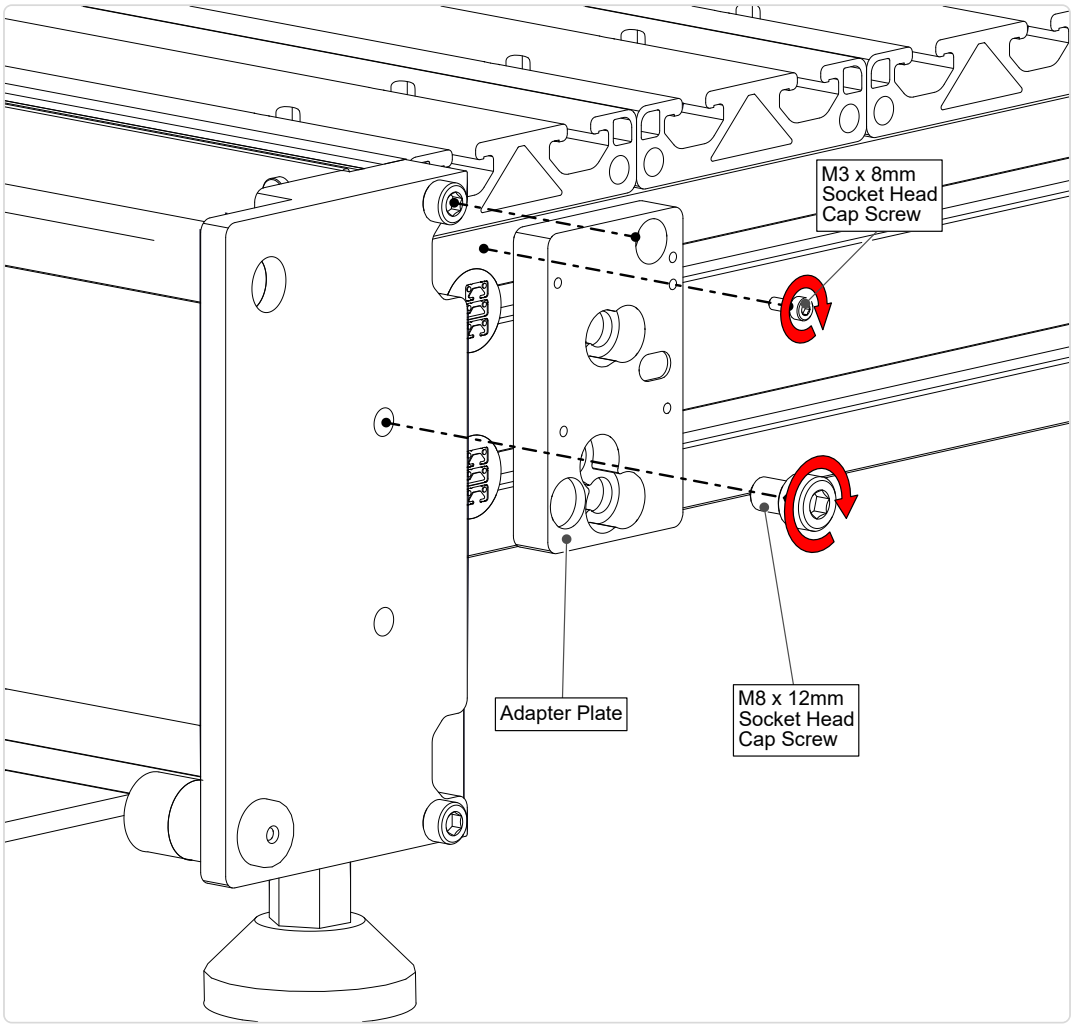
QTY	Part/Description	Packaged In
1	Fixed Tool Height Setter Kit: - (1) Tool Height Setter Assembly - (1) Tool Height Setter Cover -- Part of Tool Setter Assembly - (2) M3 x 8mm Socket Head Cap Screw -- Part of Tool Setter Assembly	
1	Tool Height Setter Hardware: - (1) Adapter Plate - (1) M8 x 12mm Socket Head Cap Screw - (5) M3 x 8mm Socket Head Cap Screw - (1) Tramming Cam	

Required Tools:

- 2.5mm Allen Wrench
- 3mm Allen Wrench
- 6mm Allen Wrench

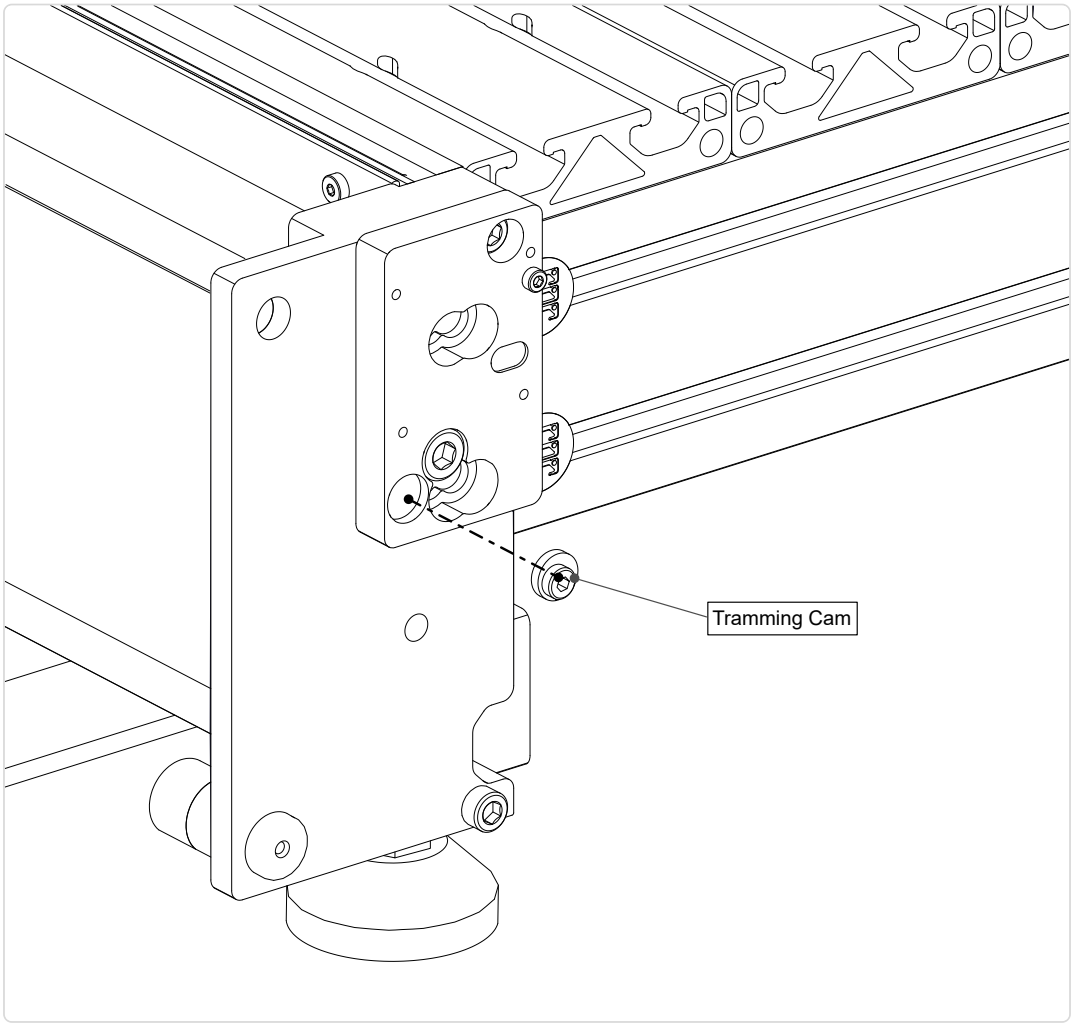
8.1 - Install Tool Height Setter

8.1.1



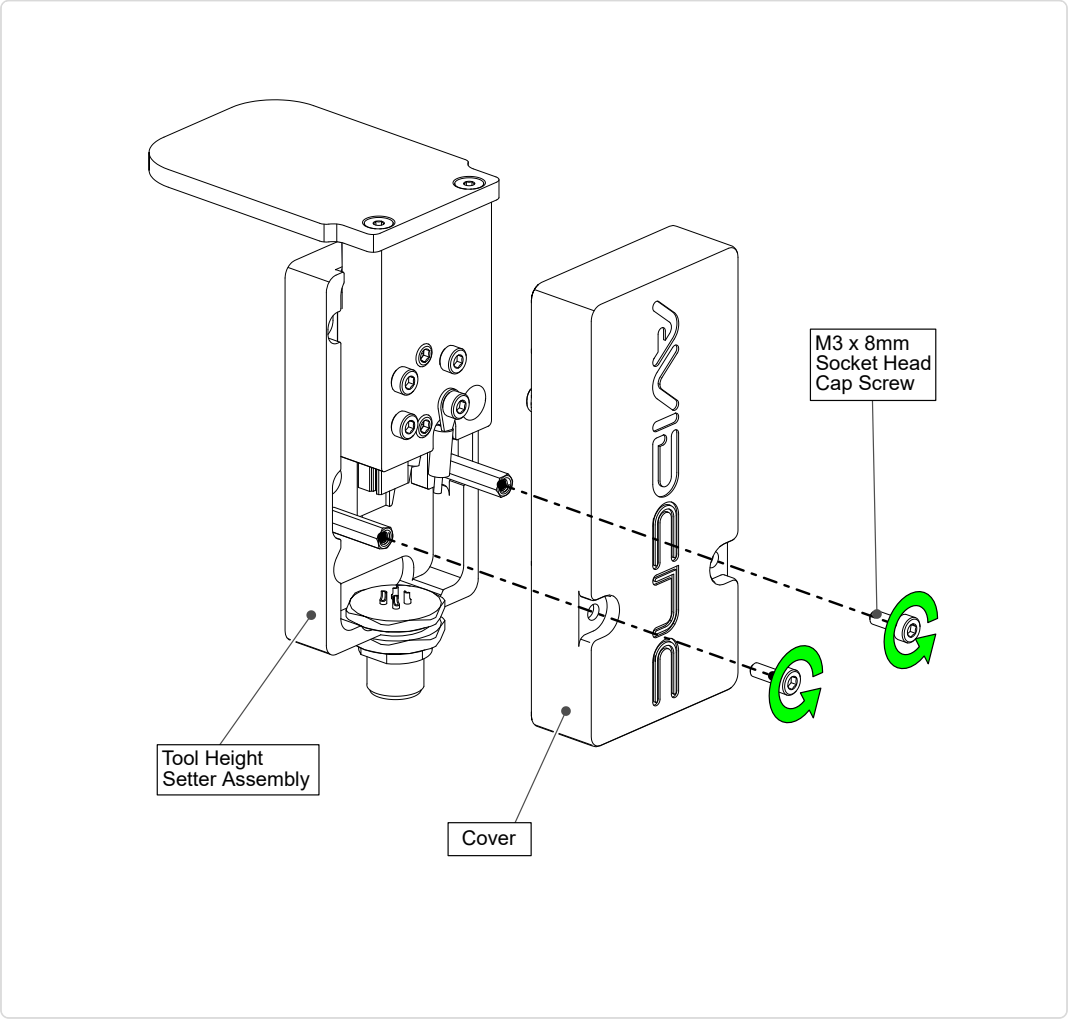
- Attach the Adapter Plate to the end of the benchtop table axis.
- Remove the M6 screw holding the top of the axis end plate in place and use that to connect the base plate to the axis.

8.1.2



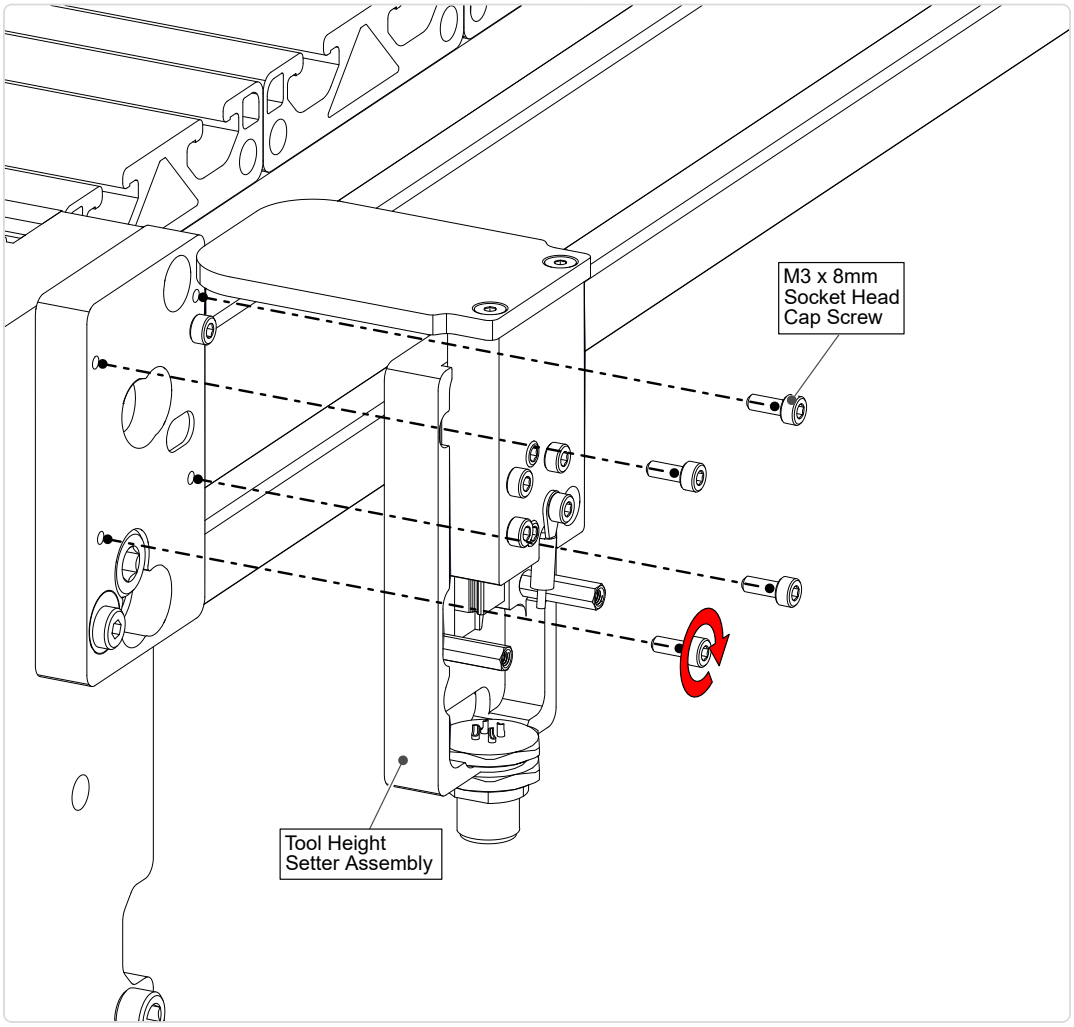
- Insert the Tramming Cam into the pocket on the Adapter Plate.

8.1.3



- Remove the Cover from the Tool Height Setter Assembly.

8.1.4



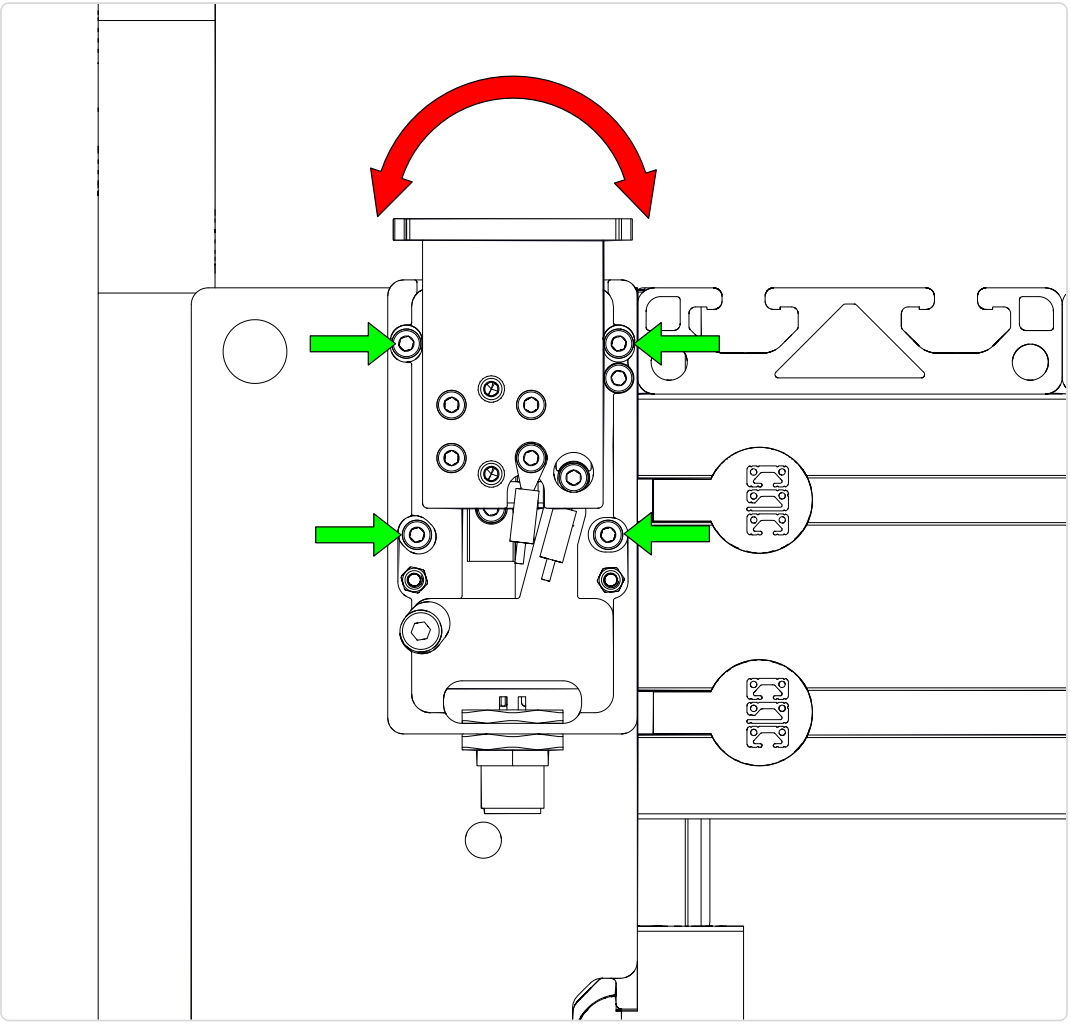
- Attach the Tool Height Setter Assembly to the Adapter Plate.

8.2 - Tool Height Setter Tramming

Section Note

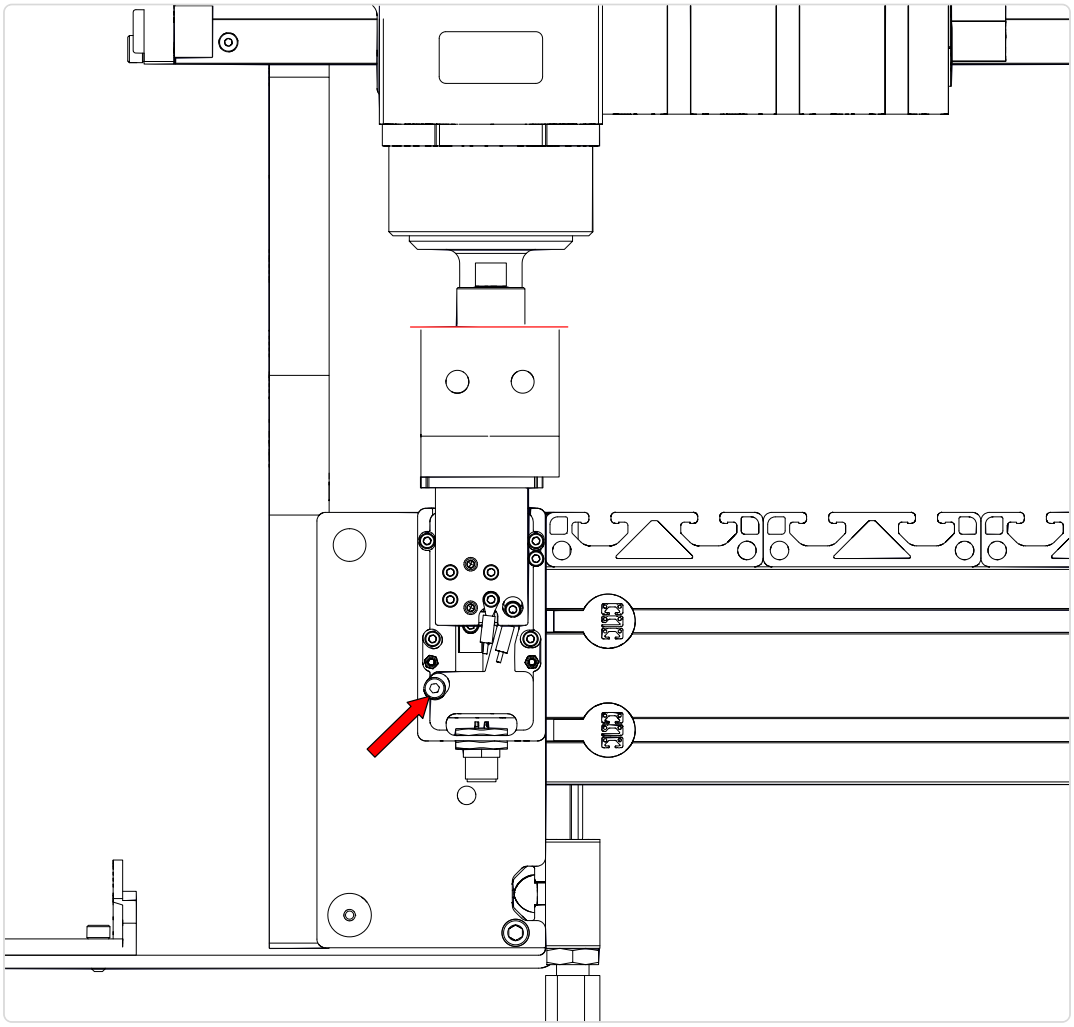
Prior to tramming the Tool Height Setter, ensure that your machine table has been squared and leveled, and your spindle has been trammed.

8.2.1



- Loosen the four indicated screws to tram the Tool Height Setter in the x-axis direction.

8.2.2

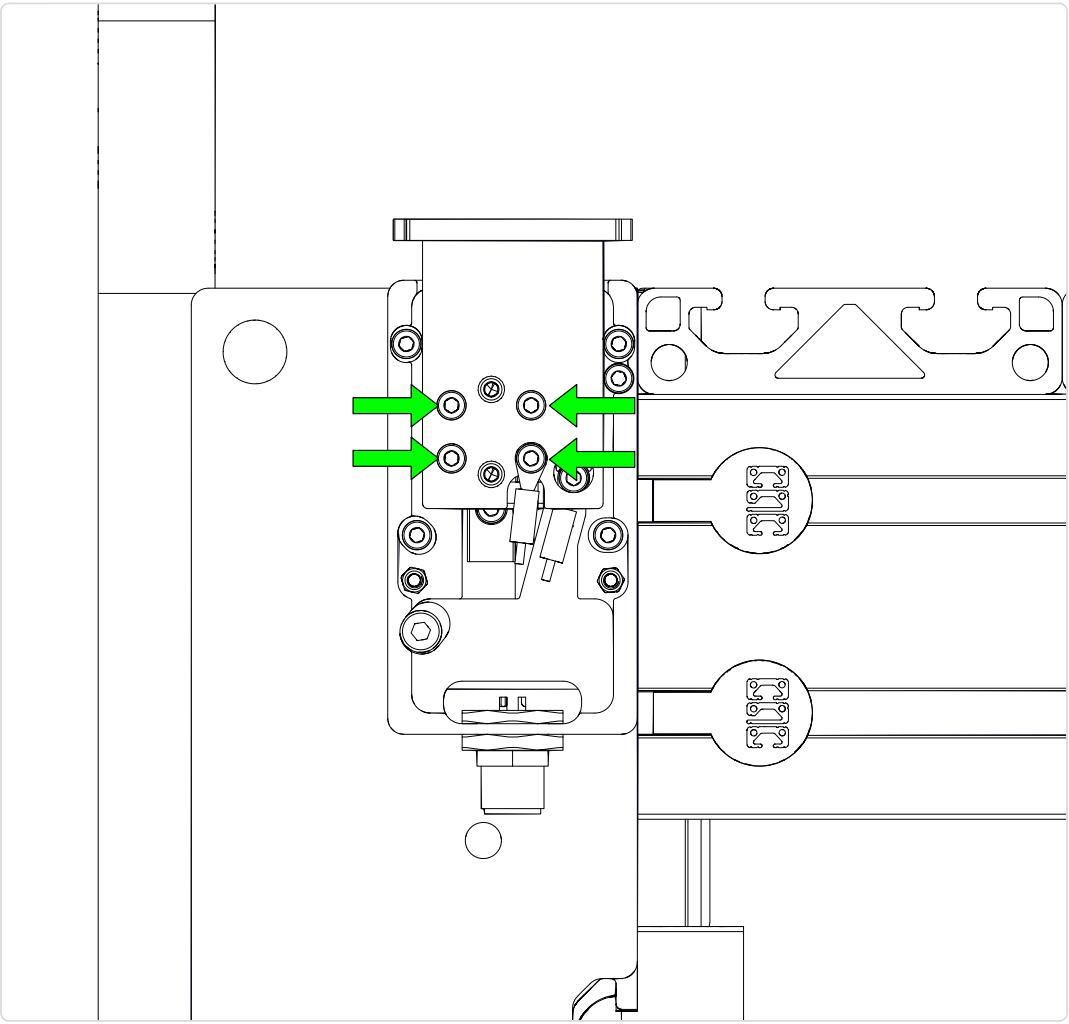


- Set a reference block on top of the Tool Setter to extend the height of the touch surface. The block needs to have two parallel surfaces approximately 2" apart.
- Remove the collet from the spindle.
- Slowly jog the spindle nose down to the reference block.
- Rotate the Tramming Cam until the touch surface of the Tool Height Setter is parallel to the spindle nose.
- Retighten the four screws previously loosened to lock the position.

8.2.3

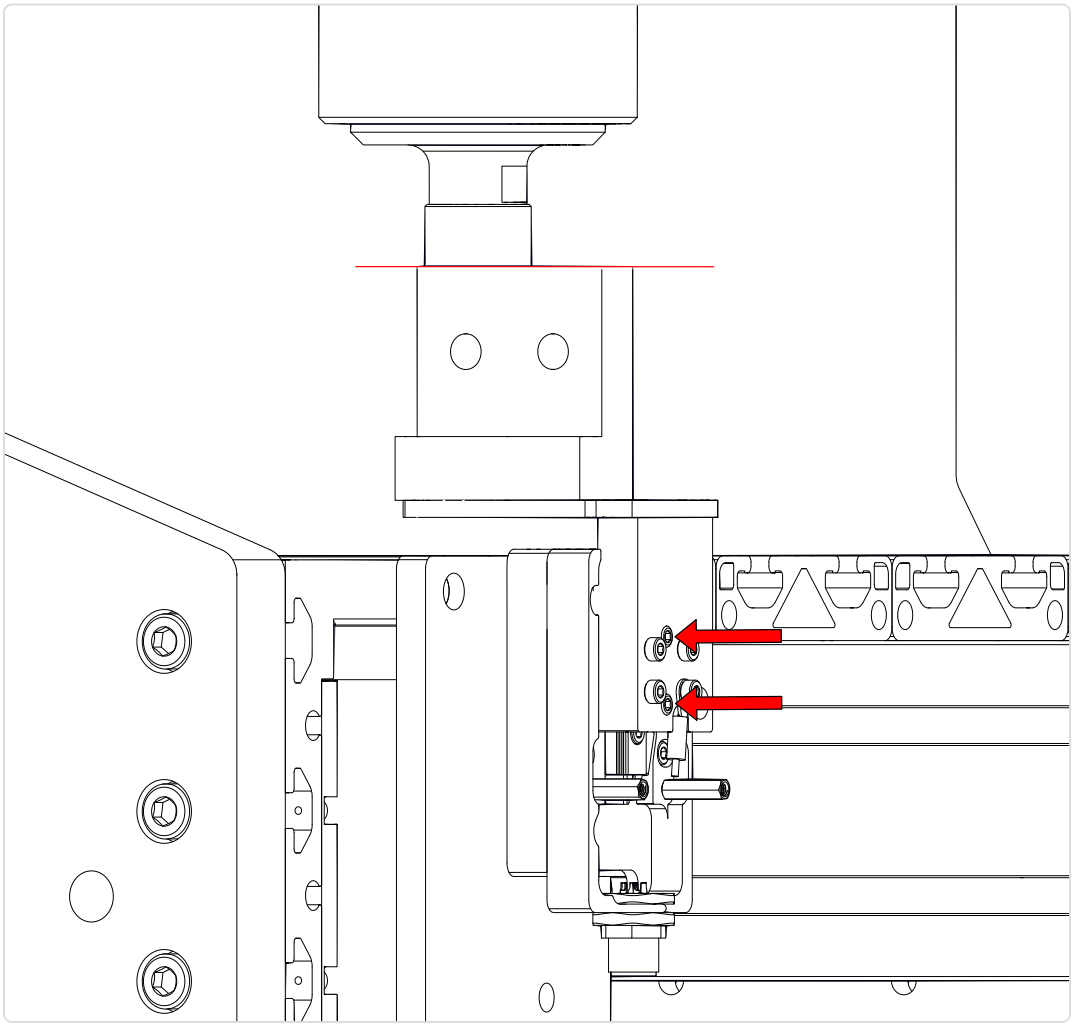
Section Note

It is likely that your Tool Height Setter will not need tramming in this orientation. Only tram this direction if it is not parallel to your work surface.



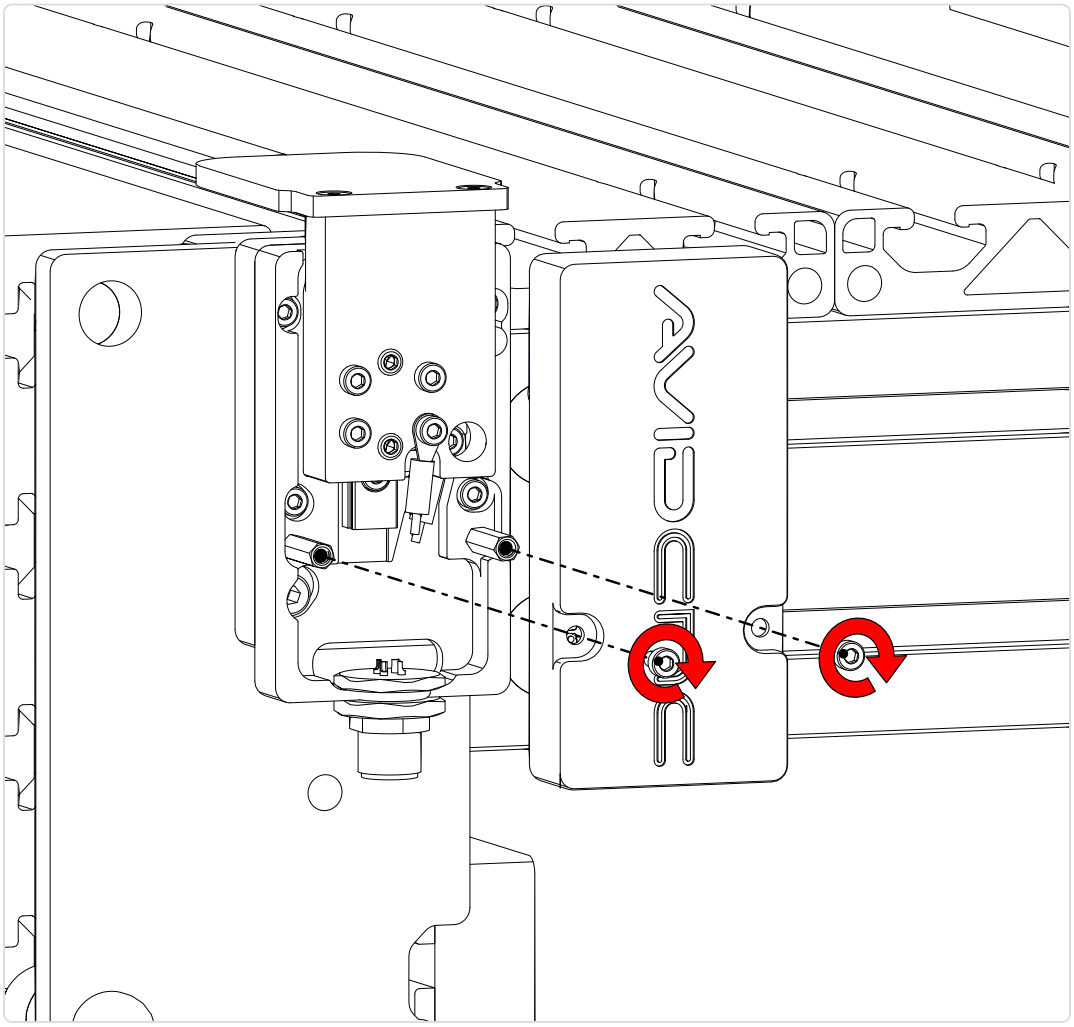
- Loosen the screws noted to tram the Tool Height Setter in the y-axis direction.

8.2.4



- To move the tip of the plate UP, tighten the upper set screw. To move the tip of the plate DOWN, tighten the lower set screw. Only adjust one set screw so that only one set screw is tight against the bearing block.
- Retighten the four screws previously loosened to lock the position.

8.2.5



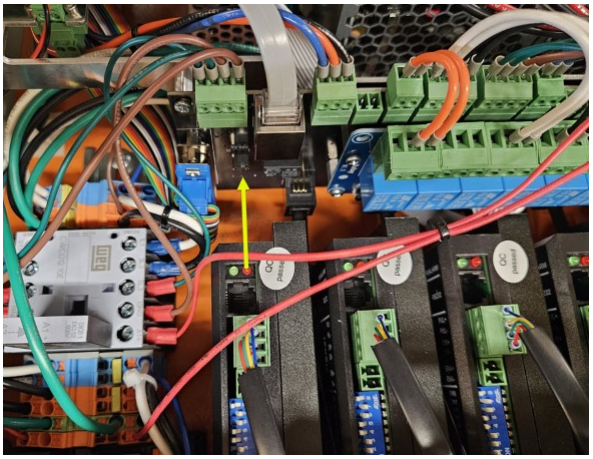
- Replace the cover and two removed screws.
- Your Tool Height Setter is now installed and trammed.

Section 9: Control Box Connections

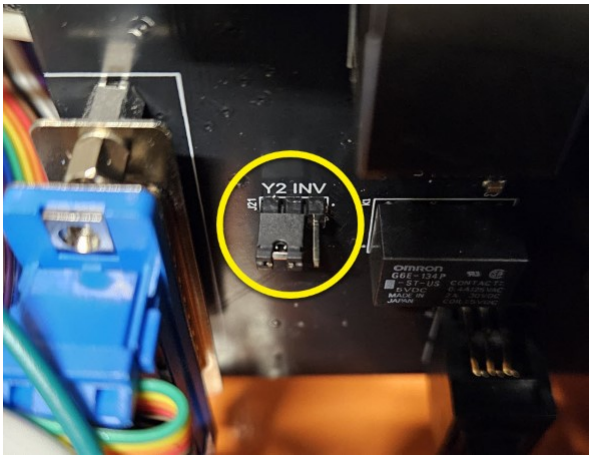
Assembly Note - Motor Direction

Prior to connecting your EX controller to your Benchtop PRO Machine, you will need to ensure a jumper on your interconnect card is correctly set so that the Y axis motors turn in the same direction.

- Locate the jumper on the card near the middle of your controller, as shown in the first image.
- Verify that the jumper in is the position shown, covering the two pins nearest the "J21" label.



Enlarge



Enlarge

Parts List

The following parts will be used in Section 9

QTY	Part/Description	Packaged In
1	EX Controller: - (1) Emergency Stop Cable, 20' - (1) Emergency Stop Switch - (1) C13 Power Cable - (1) Ethernet Cable, 10' - (1) M12 Sensor Cable, 12'	EX Controller Kit
1	M12 Splitter	Electronics Proximity Sensor Kit

9.1 NEMA 23 Electronics

Section Note

Skip to **Section 9.2** if you are using a NEMA 34 electronics package.

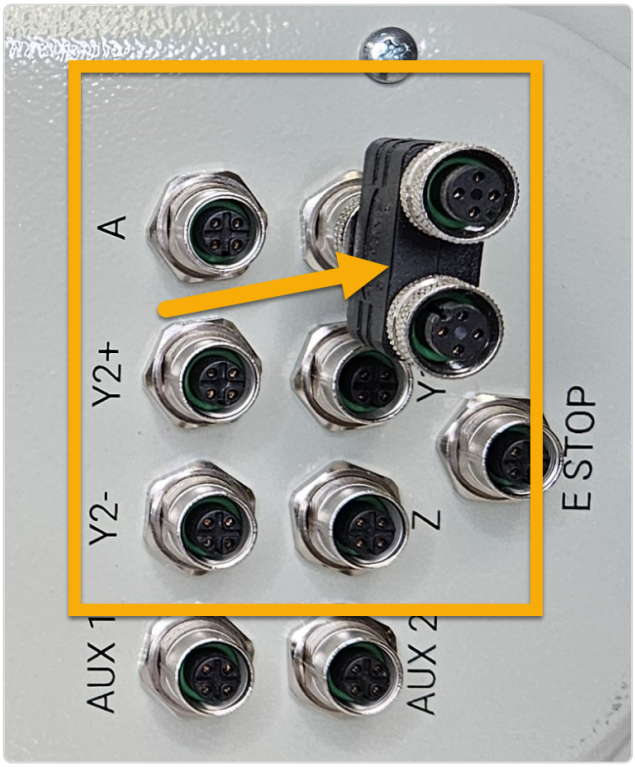
9.1.1

- Connect each motor cable to the appropriate motor port.

Assembly Note

The A motor port is used for either a CNC Rotary Axis, or the U axis (second Z axis) on a dual-use machine.

9.1.2



- Install the M12 splitter in the port labeled "X" on your controller.

9.1.3

- Connect each sensor cable to the appropriate sensor port.
- The X- and X+ sensor cables will plug into the splitter installed in the previous step.

9.1.4

- Connect the Emergency Stop Cable, 20' to the E Stop port.
- Connect the other end of this cable to the Emergency Stop Switch .

9.1.5 - Spindle / Router Applications

- Connect the Tool Height Setter to the Aux 2 port.
- Connect the optional Auto Z and Corner Finding Touch Plate to the Aux 1 port.

9.1.6 - Plasma Applications

- Connect the existing Ohmic Protection Box sensor cable to the Aux 5 port.

9.1.7 - Spindle / Plasma Applications

- Connect the existing SP/THC Cable to the SP/THC port.
- Depending on your current cutting method, this cable will be connected to either the Plug and Play Spindle / VFD Control Box, or your Hypertherm plasma power unit.

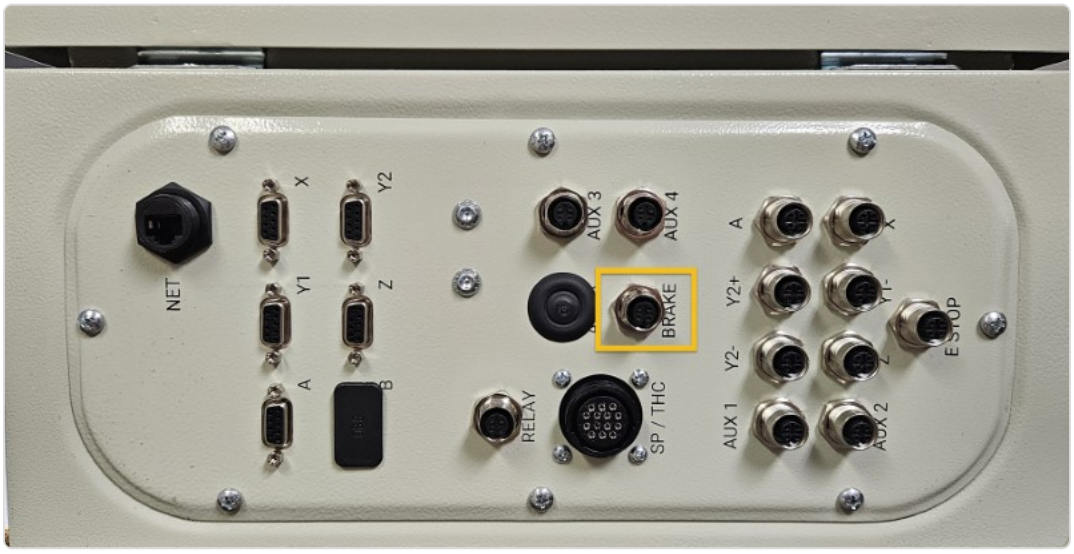
9.1.8

- Connect the Ethernet Cable, 10' to the NET port.
- Connect the other end of the Ethernet cable to your control PC.

Ethernet Cable

Please ensure you're using the Ethernet cable included with the kit. The provided cable is shielded to reduce unwanted signal interference.

9.1.9



- Connect the Z-axis brake cable to the Brake port.

9.2 NEMA 34 Electronics

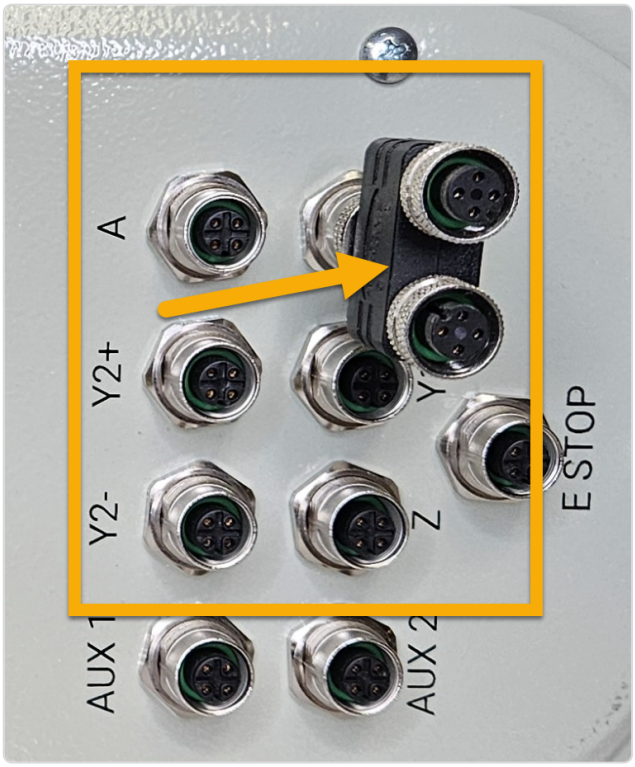
9.2.1

- Connect each motor cable to the appropriate motor port.

Assembly Note

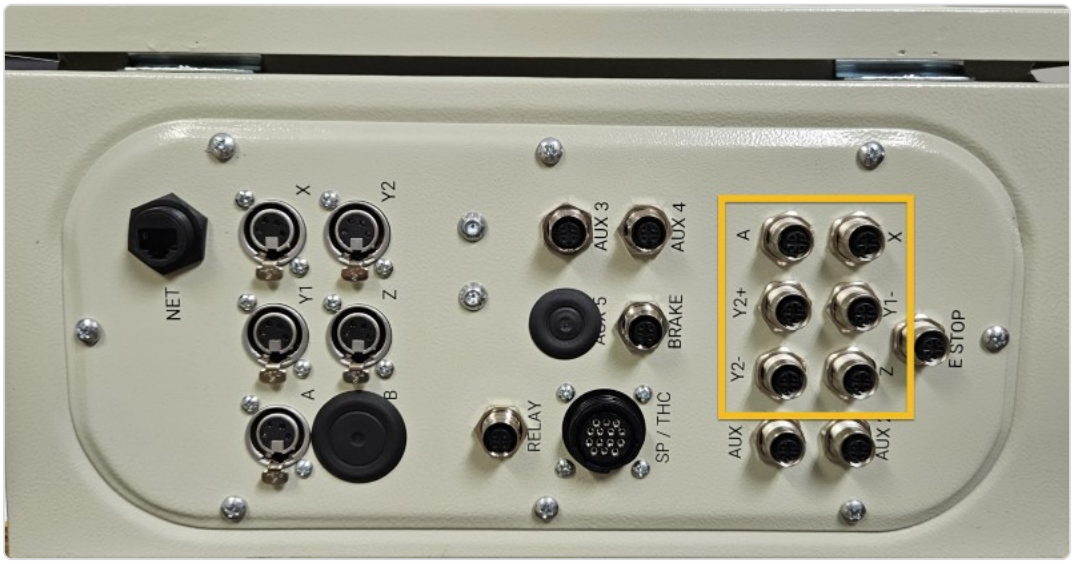
The A motor port is used for either a CNC Rotary Axis, or the U axis (second Z axis) on a dual-use machine.

9.2.2



- Install the M12 splitter in the port labeled "X" on your controller.

9.2.3



- Connect each sensor cable to the appropriate sensor port.
- The X- and X+ sensor cables will plug into the splitter installed in the previous step.

9.2.4

- Connect the Emergency Stop Cable, 20' to the E Stop port.
- Connect the other end of this cable to the Emergency Stop Switch .

9.2.5 - Spindle / Router Applications

- Connect the Tool Height Setter to the Aux 2 port.
- Connect the optional Auto Z and Corner Finding Touch Plate to the Aux 1 port.

9.2.6 - Plasma Applications

- Connect the existing Ohmic Protection Box sensor cable to the Aux 5 port.

9.2.7 - Spindle / Plasma Applications

- Connect the existing SP/THC Cable to the SP/THC port.
- Depending on your current cutting method, this cable will be connected to either the Plug and Play Spindle / VFD Control Box, or your Hypertherm plasma power unit.

9.2.8

- Connect the Ethernet Cable, 10' to the NET port.
- Connect the other end of the Ethernet cable to your control PC.

Ethernet Cable

Please ensure you're using the Ethernet cable included with the kit. The provided cable is shielded to reduce unwanted signal interference.

9.2.9

- Connect the Z-axis brake cable to the Brake port.

Section 10: Machine Setup

Post-Assembly Machine Setup Instructions

- **Spindle & Router Mount Installation**
  (https://www.avidcnc.com/support/instructions/accessories/spindles/mountInstallation)
  Installation instructions for spindle and router mounts (including tramming adapter).
- **Plug & Play Spindle / VFD Setup** (https://www.avidcnc.com/support/instructions/accessories/spindles/setup)
  Setup guides for spindle / VFD systems. This includes our Plug & Play systems and DIY installations.
- **CNC12 Software Setup & Usage Guide** (https://www.avidcnc.com/support/instructions/software/)
  Guides for installation, setup, and usage of CNC12 controller software.
- **Dust Collection** (https://www.avidcnc.com/support/instructions/machineSetup/dustCollection)
  Information about dust collection solutions for your machine.
- **Auto Z & Corner Finding Touch Plate** [Video] (https://youtu.be/NzIdFVuaGQc)
  Use of our touch plate with CNC12 and your machine.
- **Machine Gantry Squaring** [Video] (https://youtu.be/qz6VrsEq_Xc)
  How to square both our stepper and servo driven CNC machines.
- **Tool Height Setter** [Video] (https://youtu.be/6G4Ljdou3qo)
  How to use the fixed tool height setter to improve your workflow.
- **Wireless CNC Control Pendant** [Video] (https://youtu.be/bbHBYR_2vqQ)
  Features and functions of the wireless control pendant.
- **Rotary Axis** (https://www.avidcnc.com/support/instructions/rotary/assembly/)
  Assembly and installation instructions for the Avid CNC rotary axis.
- **Laser Kit** (https://www.avidcnc.com/support/instructions/laser/laserAssembly/)
  Assembly instructions for the Avid CNC laser kit.