ASSEMBLY INSTRUCTIONS FOR THE MILLRIGHT CNC POWER ROUTE PLUS.

Version 1.08

For additional resources, see *www.millrightcnc.com/resources*

Be sure to check the resources page for the most updated assembly instructions.
Contact support@millrightcnc.com if you have questions.

We have a big online community. Be sure to join in the discussion.
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MillRight CNC Forum at www.millrightcnc.proboards.com

Important safety rules for operating your MillRight CNC machine:

Never place your hands near a spinning end mill or bit.
Always wear eye and ear protection while operating your machine.
Always run a dust collector or wear a mask while performing a milling operation.
Do not leave the machine unattended while running a milling operation.
Do not operate your machine while under the influence of alcohol or drugs.
Secure long hair and loose clothing so it is not caught in spinning mechanisms.
Ensure work pieces are properly secured before running a milling operation.
Keep a fire extinguisher nearby.
Visually inspect wires prior to power up to prevent short circuits.

We recommend using a blue thread locker on any fastener not secured with a lock washer or lock nut.

Mounting Y rails to Y Extrusion

Parts

835 Extrusion (2)

Linear Rail with 2 Bearings (2)

Y Motor Mount (2)

Hardware

M5x16 Button Cap (28)

Large T Nut (28)

5/16 x 3/4 Button Cap (8)

Tools

3mm Hex Key

3/16 Hex Key

Place M5x16 button cap screws into the linear rail holes for the Y. Spin a “slide in” T nut onto each screw. Do not tighten the T nuts all the way against the rail as you will need to leave space to slide the nuts into the extrusion.

Note that some of the rails will not yet have the bearings installed. If not, they can be installed by putting the bearing up to the rail and pushing it on. Each bearing (if not pre-installed on the rail) has a plastic ball bearing retainer. As you align the bearing to the rail and slide it on, the plastic retainer will push out.

Slide the nuts into the 835mm long extrusion. Snug up a couple of the M5x16 button cap screws to hold the rails in place. You should not tighten these fully at this time.

Be careful not to slide the bearings off the rails.

Mount the Y motor mount plates onto one end of the 835mm long extrusion as shown below, using 5/16x3/4” button cap screws. Take note of the orientation shown below. The below picture shows the left Y extrusion on the left and the right Y extrusion on the right. Notice the position and orientation of the rails and motor mounts.

Bed Frame

Parts

760mm Extrusion (3)

Y End Plate (2)

Hardware

Inside Corner Joiner (12)

M5x20 Machine Screws (8)

Drop-In T Nut (8)

Tools

Phillips Screwdriver

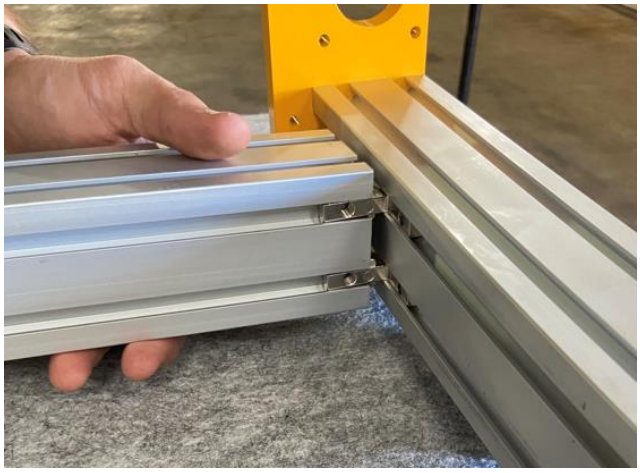
3mm Hex Key

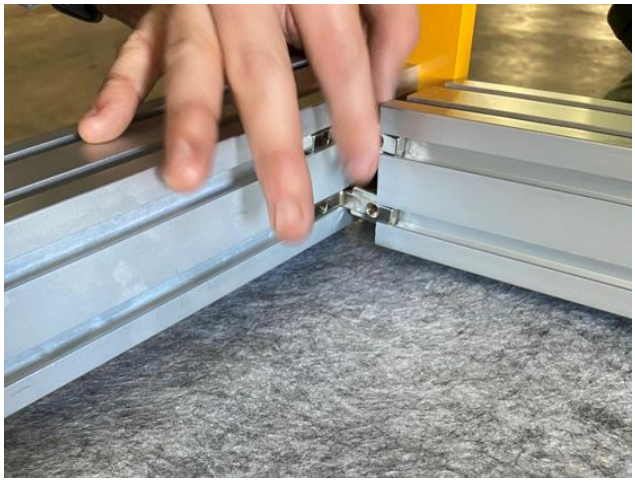
3/16 Hex Key

Square or Straight Edge

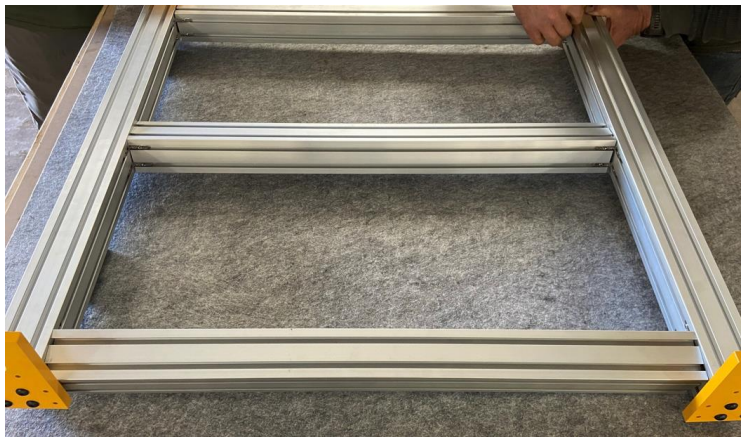
Turn the 835mm extrusion upside down and insert the inside corner joiners into the opposite end of the extrusion. Take note of the position of the inside corner joiners. They point the same direction as the overhang of the Y motor mount.

Slide one of the 760mm extrusions onto the inside corner joiner. Then slide the other end on.





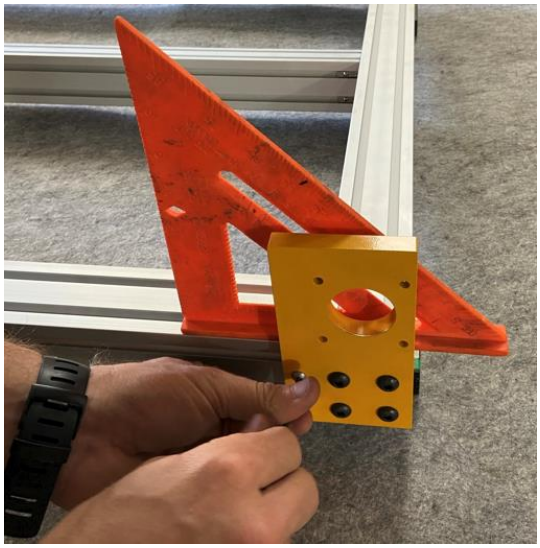
Continue to slide the 760mm crossmember extrusions onto the inside corner joiners. There are 3 crossmembers: front, middle, and rear. It is easiest to position all three in place on one of the Y extrusions, snug them into place on that side with the set screws on the joiners, then slide the other Y extrusion on.



Once all three crossmembers are roughly in place, install the Y End Plate (looks about the same as the Y motor mount, but without the opening for the motor) using 5/16x3/4” button cap screws, secured into the pre-tapped holes on the Y extrusions.

Place drop-in T nuts near the end plates and motor mounts. Push the nuts to line up with the holes. Secure them with M5x20 machine screws. You can use a straight edge to make sure that the crossmembers and Y rails are on the same plane.

Start to secure the crossmembers with the set screws on the inside joiners. Be certain that the distance between the front and middle crossmember is AT LEAST 13 inches. If it is not AT LEAST 13 inches (13.25” to be safe), the control box will not fit under the table once built.



Use a square to make sure the crossmembers are perpendicular to the Y extrusions. Flip the assembly back over.

Be careful not to let the bearings slide off the end of the rails as you flip this over. Make final adjustments to the squareness and flushness of the crossmembers.

It can help to push the Y extrusions together to get the crossmembers more flush with the Y rails. You may need to loosen and retighten the set screws on the inside corner joiners to achieve squareness.

Your lower frame assembly should look like the below picture.

Aluminum Bed

Parts

Aluminum T Plate Section (3)

Table Joining Angle (3)

Hardware

M5x8 Machine Screw (27)

M5x12 Machine Screw (15)

Small T Nut (27)

Large Drop-In T Nut (15)

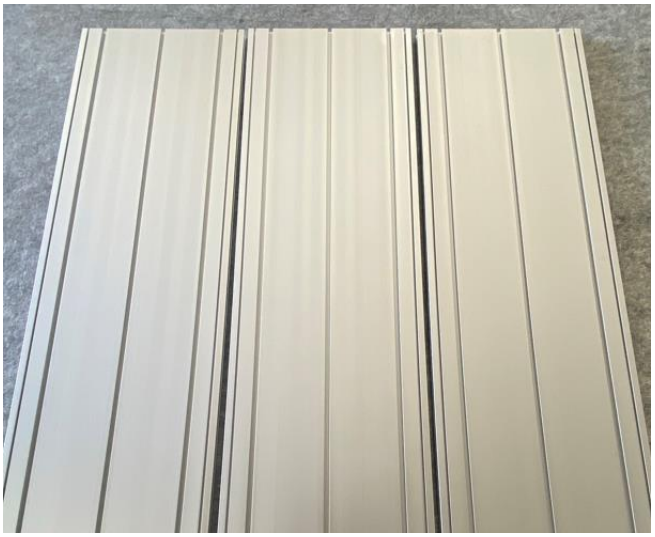
Tools

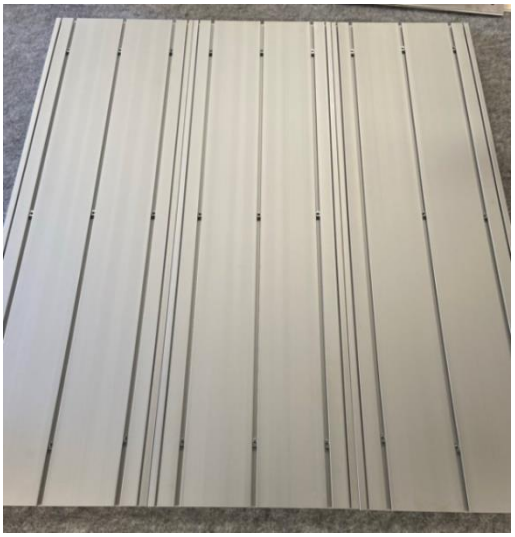
Philips Screwdriver

Square or Straight Edge

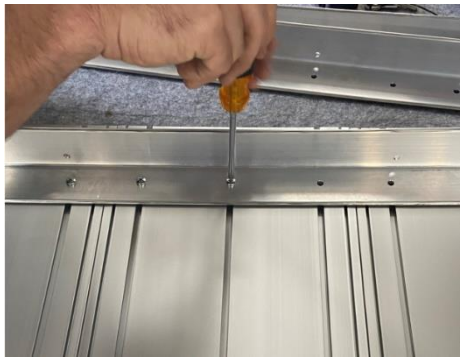
Wood Blocks

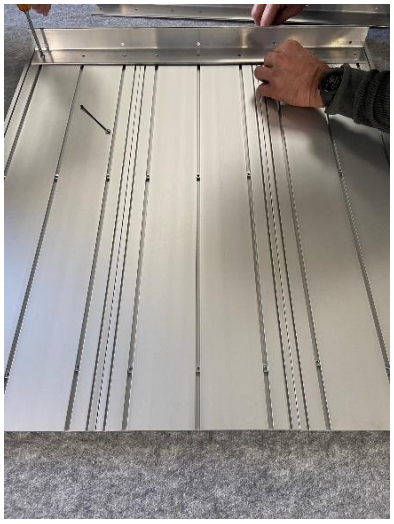
Position the three T Plates on the table with the smaller slots facing upward. Slide (3) rows of (9), so (27 total) small slide in T nuts into the positions shown in the picture on the right. They are small, so please look closely at the bottom right picture. The position is just approximate for now.





Place the first piece of table joining angle as shown below and install M5x8 machine screws through the angle, into the slide in T nuts. Do not tighten the screws yet. Leave it so you can push the angle forward and backwards.





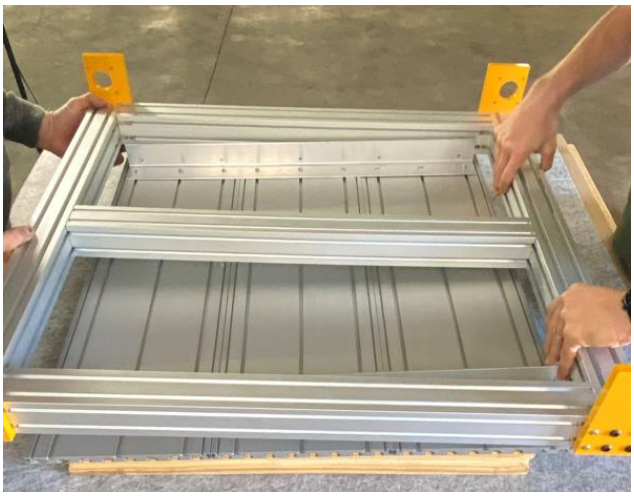
Install the second piece of angle near the middle. Once again, leave it loose so it can be slide back and forth.

Install the final piece of table joining angle. Note the differing orientation of the flange.

Place blocks of wood, or some other object to raise the height of the bed under the T plate 2 to 3 inches.

The next step will be installing the lower frame assembly onto the bed. If the bed is not raised off the table surface, the bearing rails and bearings on the lower frame assembly will prevent you from being able to align the table joining angle to the frame's crossmembers.

Flip the lower frame assembly that you previously set aside back over (being sure to prevent the bearings from sliding off) and lay it onto the bed. You may need to push the angle forward or back so the frame assembly can lay properly.



Use a straight edge to align the T Plate edges to the front crossmember.

Place Large Drop in T nuts into the frame crossmembers in locations that correspond to holes in the corner joining angle (5 per angle).

Slide the angle to the crossmember and fully tighten it with M5x12 machine screws. Do this for all positions, then fully tighten the M5x8 machine screws that hold the table joining angle to the T Plate.

STOP.

REMEMBER THAT THERE MUST BE AT LEAST 13 INCHES (PERFERABLY 13.25”) OF SPACE BETWEEN THE FRONT AND MIDDLE CROSSMEMBERS OR THE CONTROL BOX WILL NOT FIT UNDER THE TABLE AND IT WILL BE VERY DIFFICULT TO CORRECT THIS LATER.

X/Y Ball Screw

Parts

X/Y Fixed Ball Screw Support (3)

X/Y Floating Ball Screw Support (3)

16mm Ball Screw (3)

XY Ballscrew Preload Nut (3)

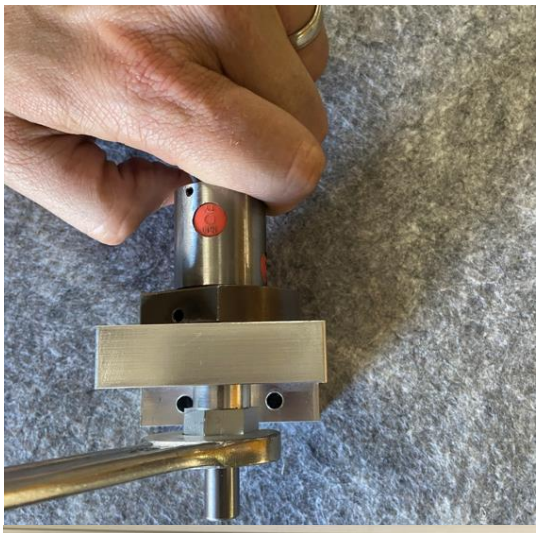
Tools

19mm or 3/4 Wrench

Wood Block

Mallet or Deadblow Hammer

WARNING: Do NOT spin the ballnut all the way off the ballscrew. If you do, the ball bearings will fall out and the ball screw will have to be replaced.



Slide the X/Y Fixed Ball Screw Support onto the end of the ball screw that is threaded. Spin the ball nut against the bearing of the fixed side support, then install the preload nut onto the threads on the end. Hold the ball nut or ball screw support as you tighten the preload nut with a 19mm or ¾” wrench. Do this for all three of the long ball screws now.

Note that the fit between the ball screw shank and the bearing is very tight. You may need to knock it into position with a mallet or hammer and block of wood.

Place the Floating Side Ball Screw Support on the opposite edge with the “ledge” facing away from the screw. Do this for all three of the long ball screws at this time.

Y Motors and Drive System

Parts

6.35x10 Coupler (2)

B1450 Motor (2)

Ball Screw Assembly (2)

Ball Nut Housing (2)

Hardware

M4x25 Machine Screw (8)

M4 Nylock Nut (8)

M5x16 Button Cap (8)

M5x25 Machine Screw (8)

Large Drop-In T Nut (8)

Tools

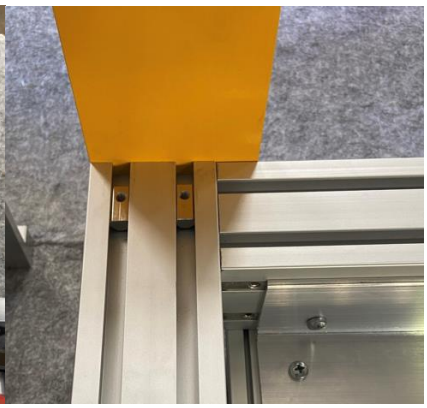
Philips Screw Driver

3mm Hey Key

2.5mm Hex Key

Install the 6.35x10 couplers onto the B motors with 1450mm wire length. Leave about 6mm (about ¼" inch) from the end of the coupler to the face of the motor. Tigthen the tensioning screw on the coupler fully to secure it to the shaft of the motor. **If you do not do this adequately, you will have slippage and binding during operation**. Install the B1450 motors into the Y motor mounts using M4x25 machine screws and M4 Nylock nuts. Note the position of the wire that exits the motor in the picture above.

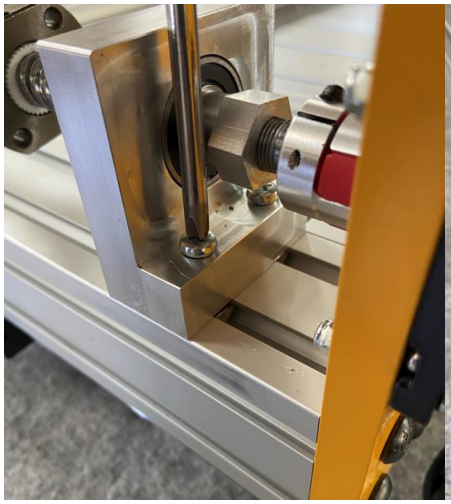
Place large drop in T nuts into the Y cross member as shown below. Two are near the Y Motor Mount. Two are near the Y End Plate.



Place the ball screw assembly onto the Y rails. Push the shaft of the ball screw into the coupler.

Tighten the screw down to secure the coupler to the ball screw shaft.

Tighten the Fixed and Floating Ball Screw Supports to the Y rail using M5x25 machine screws. These secure into the Large Drop in T Nuts you placed earlier. Do this for both Y ball screws.



Install the Y ballnut housings onto the ballnuts using M5x16 button cap screws. The larger holes will face to the OUTBOUND side of the machine on both sides. Study the picture closely. It should look like this on both sides.

Flip the lower frame assembly back over, so it is in its “right side up” position. Remember not to let the bearings fly off the ends. Make sure your Y Ballnut Housings are in the configuration shown.

X Rails

Parts

888mm Extrusion (2)

Ball Screw Assembly

Hardware

M5x16 Button Cap (28)

M5x25 Button Cap (4)

Large T Nut (28)

Drop-in T Nut (4)

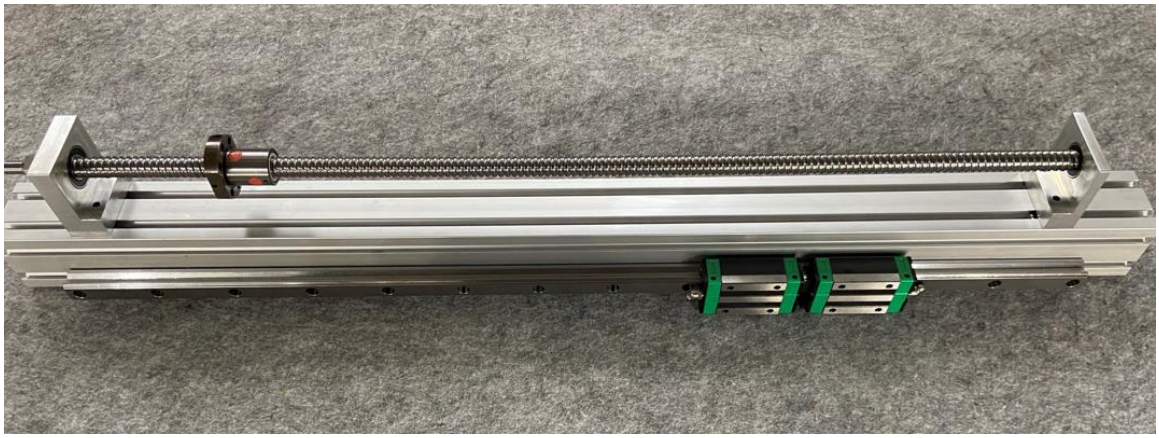
Tools

3mm Hex Key

Just as you did with the other linear rails on the Y axis, place M5x16 button cap screws into the holes of the linear rails and spin Large Slide-in T Nuts onto the threads a couple of turns. Slide one linear rail onto each onto the 888mm extrusions. Tighten a couple of screws down to hold them in place about 1.75” (45mm) from the edge.

Note the position of the linear rail on this extrusion. Place the remaining 16mm ball screw assembly onto the rail.

Secure the ball screw assembly in place with (4) M5x25 button cap screws and (4) drop in T nuts. This is your “lower” gantry rail. The drop in T nuts (shown in picture above) will be situated underneath the ball screw supports. You screw the M5x20 into these. The edge of the fixed side bracket should be about 1.75” from the edge of the extrusion.



Gantry

Parts

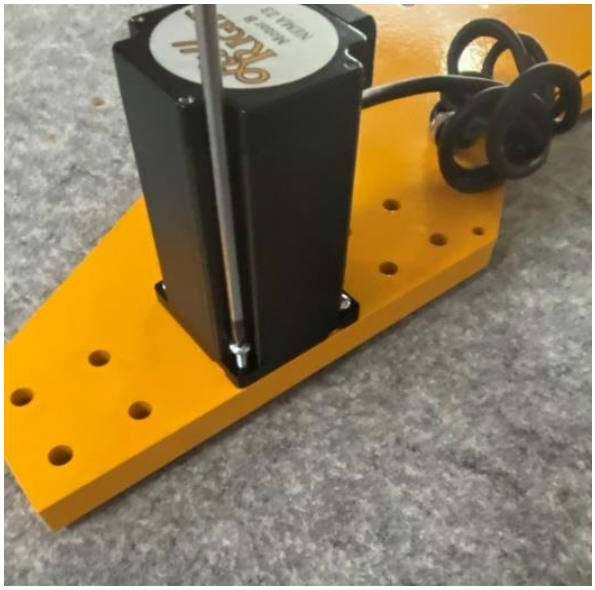
6.35x10 Coupler

B Motor

Left Gantry End Plate

Right Gantry End Plate

Y Bearing Plate (2)



Hardware

M4x12 Machine Screws (4)

M4x20 Machine Screw (4)

M5x12 Button Cap (8)

5/16 x 3/4 Button Cap (20)

Drop-in T Nut (8)

Tools

3mm Hex Key

3/16 Hex Key

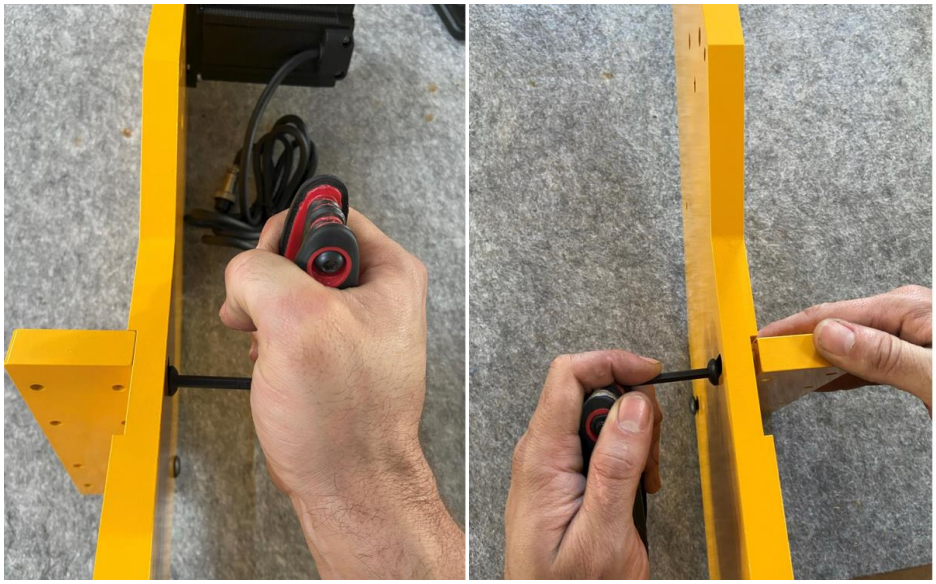
Philips Screwdriver

Install the remaining 6.35x10 coupler onto the shaft of the **B motor with the longer wire (2670mm)**, with the coupler about ¼" (6mm) from the face of the motor. Tighten the tensioning screw fully on the motor shaft.

If you do not do this adequately, you will have slippage and binding during operation.

Install the motor onto the Motor Side Gantry End Plate with (4) M4x12 machine screws. Note the orientation of the wire protruding from the motor.

Install the Y Bearing Plate onto both Gantry End Plates using 5/16"x3/4" Button Cap Screws. They go into the pocketed side.



Install the Gantry End Plates onto the 888mm extrusions using 5/16”x1” button cap screws. Study the picture to the right closely so that you get the proper orientation of the top and bottom rails. Do NOT fully tighten either Gantry End Plate until both are installed and aligned.

You may need to tigthen the screws in sequence to snug the plate up, as there won’t be much free fitment in the end plate holes.

Place 4 drop in T nuts into the bottom slots of the bottom 888mm extrusion and install the side gussets with M5x12 Button Cap Screws. Then secure the Side Gussets to the Gantry End Plates with M4x20 Machine Screws.

Do this for both sides.

X Plate

Parts

X Plate

Z Rail with 2 Bearings (2)

X Ball Nut Housing

Hardware

M5x16 Button Cap (16)

M5x20 Button Cap (8)

M5x16 Machine Screw (4)

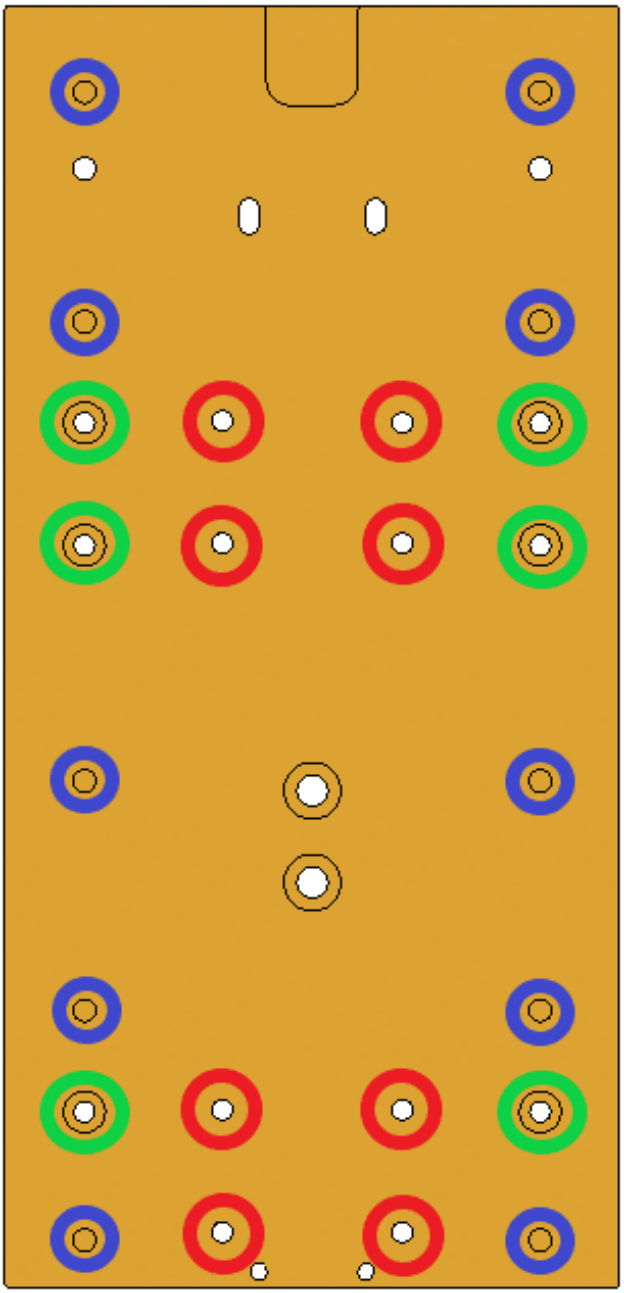
5/16 x 3/4 Button Cap (2)

Tools

Philips Screw Driver

3mm Hex Key

3/16 Hex Key



Place the X plate onto the X linear bearings in the orientation shown above. The “U” shaped pocket is at the top and should face you. The X Plate secures to the top two bearings with all four holes, while the bottom two bearings are secured to the X plate with only 3 holes. Use M5x16 button cap screws in the holes indicated with green and M5x20 button cap screws in the holes indicated in red.

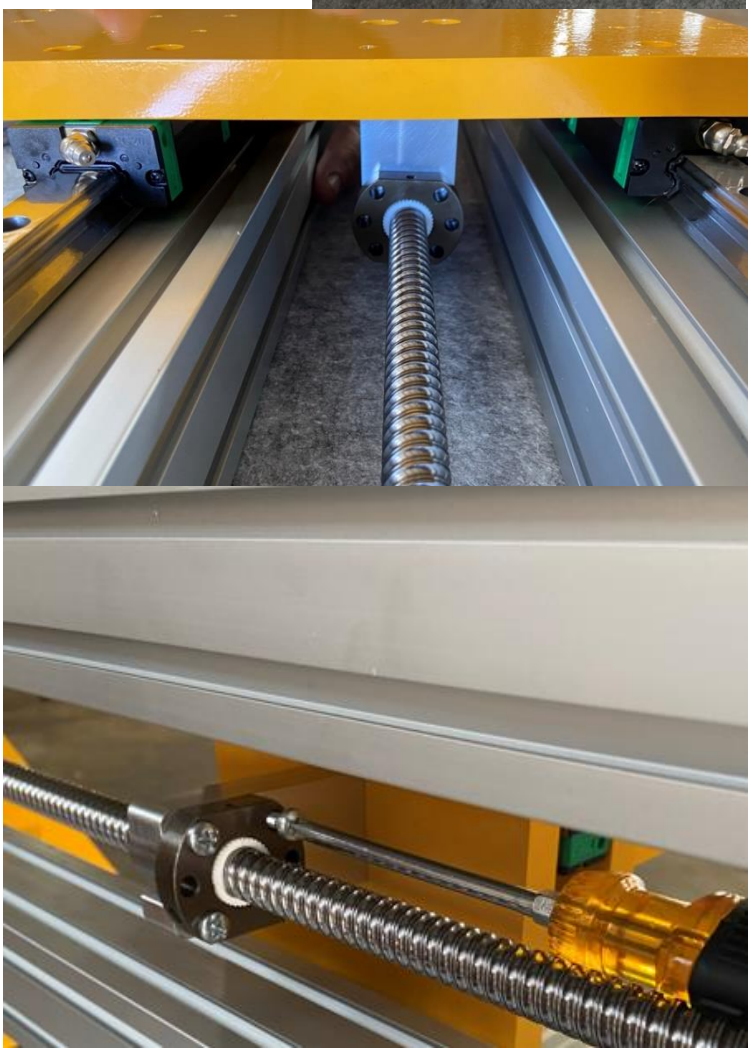
Place the Z Bearing Rails onto the X Plate. Some of the rails will have the bearings pre-installed. Others will not. Refer to page 2 for installation information if needed. Secure the Z Bearing Rails into place using M5x16 Button Cap Screws in the locations indicated by the **blue** circles above. Note that one of the holes in each rail will not receive a screw.

Spin the X ballnut to the left or slide the X plate to the right.

Install the X Ballnut housing onto the X plate using 5/16x3/4” button cap screws in the two larger pocketed holes towards the center of the X plate.

Note that the X ballnut housing only has tapped holes to secure to the ballnut housing on one side. Make sure you install it onto the X plate with these holes facing towards the Motor Side Gantry End Plate.

Slide the X plate to the left to insert the ball nut into the housing. Secure the ballnut to the housing using M5x16 machine screws.



Z Drive Assembly

Parts

12mm Ball Screw

Z Fixed Ball Screw Support

Z Floating Ball Screw Support

Ball Nut Housing

Z Axis Preload Nut

Hardware

M4x12 Machine Screw (4)

M4x20 Machine Screw (2)

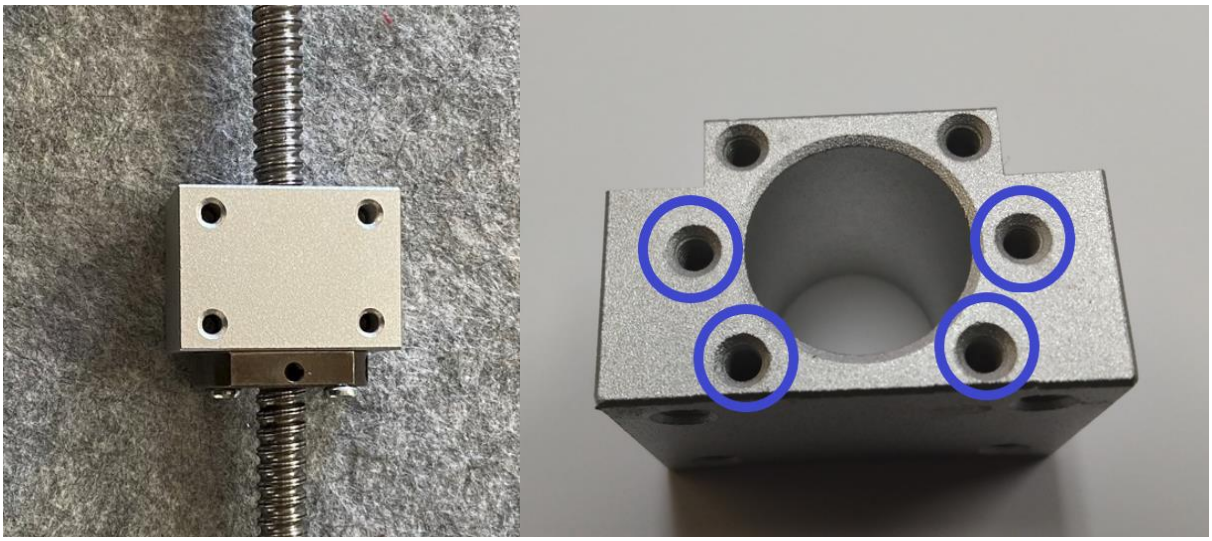
M5x25 Machine Screw (2)

Tools

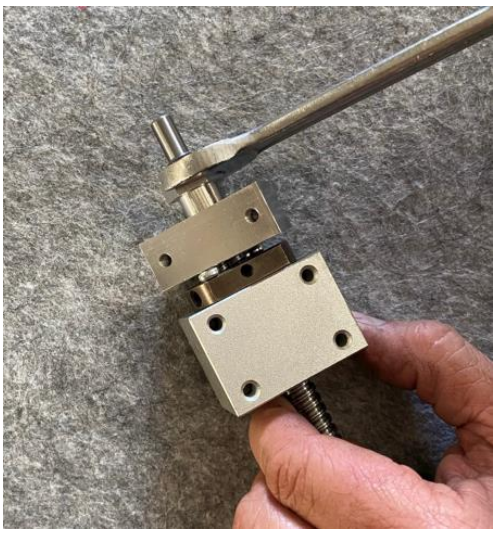
19mm or 3/4 Wrench

Philips Screw Driver

Slide the Z Ballnut Housing onto the ball screw and secure it with M4x12 machine screws, using the four holes indicated below.

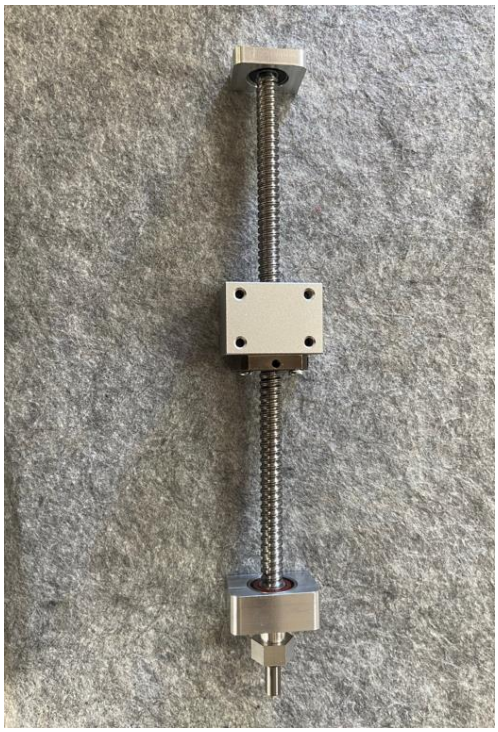


Slide the Z Fixed Ball Screw Support onto the threaded side of the Z Ball Screw. Seat it fully down, whacking with a mallet if necessary. Then spin the ballnut to the Fixed Side Ball Screw Support. Hold the assembly with your hand and tigthen the Z Preload Nut down with a 19mm or ¾” wrench.



Slide the Z Floating Side Ballscrew Support onto the opposite end of the ball screw.

Your Z Ballscrew Assembly should now look like the picture to the right.



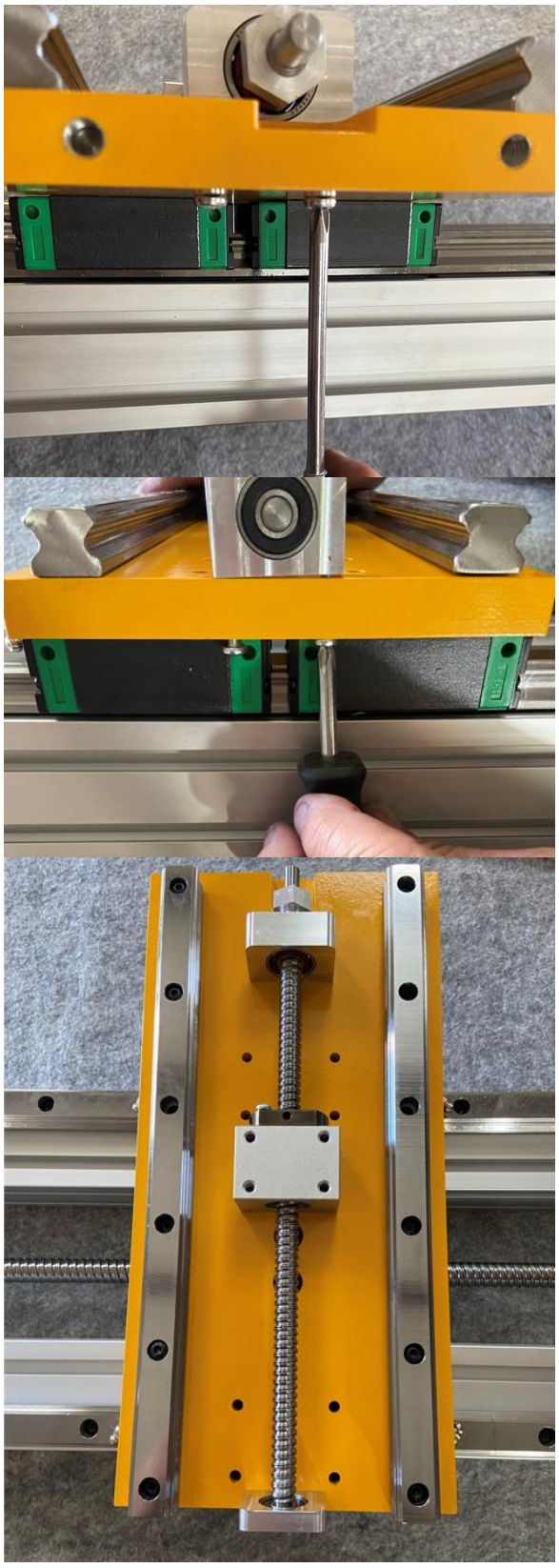
Place the Z Ball Screw Assembly onto the X Plate as shown.

THE THREADS ON THE BALLNUT HOUSING MUST BE FACING AWAY FROM THE X PLATE. IF THEY DON'T FACE AWAY, YOU WON'T BE ABLE TO FASTEN IT TO THE Z PLATE IN THE STEPS THAT FOLLOW.

Secure the Fixed Side Ballscrew Support to the X Plate with M5x25 machine screws.

Secure the Floating Side Support at the Bottom of the X Plate with M4x20 machine Screws.

The ball screw should be installed as show here.



You'll now tighten the X rails down fully. Turn X the ball screw by hand to one end. Begin tightening all the hardware for the rails. Turn the screw some more and tighten the next set of screws until all the screws on the X Bearing Rails are tightened fully.

Z Plate

Parts

Z Plate

Router Mount

Hardware

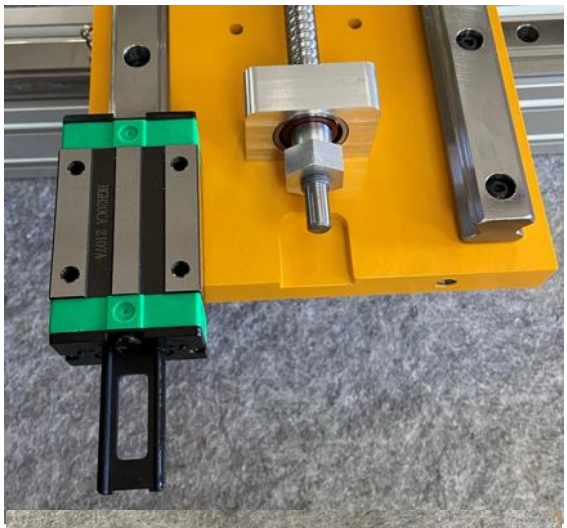
5/16 x 1 Button Cap (4)

M5x20 Button Cap (18)

Tools

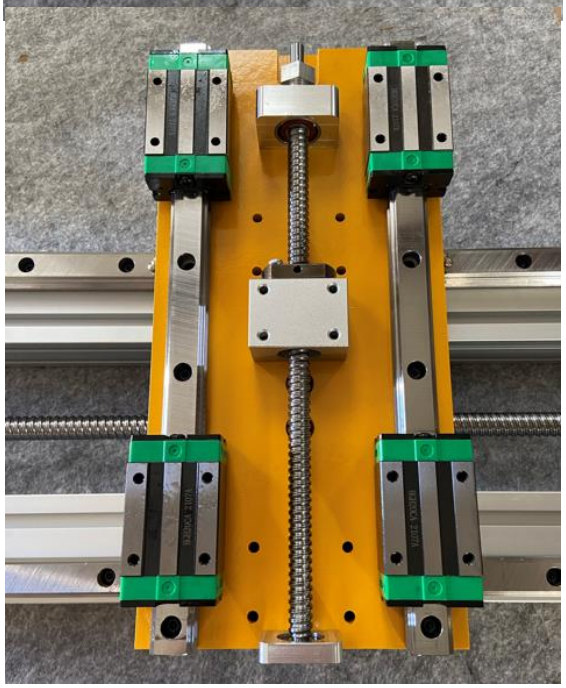
3mm Hex Key

3/16 Hex Key

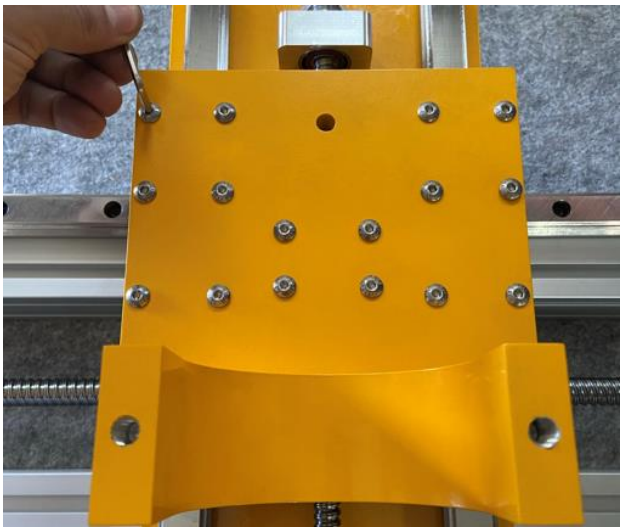


Install the router mount onto the Z Plate with 5/16”x1 button cap screws. Make sure the router mount is straight with the edge of the Z plate.

If not already factory installed, slide the bearing blocks onto the Z rails as shown below. Each bearing (if not pre-installed on the rail) has a plastic ball bearing retainer. As you align the bearing to the rail and slide it on, the plastic retainer will push out.



Place the Z Plate on top of the bearings. Line the bearings up as appropriate, and secure the plate to the bearings using M5x20 button cap screws. Note that the router mount will block one of the holes in each of the bottom bearings. This is expected.



Slide the Z Plate to line up its four holes with the threaded holes in the Z Ballnut Housing. Secure the Z plate to the housing with M5x20 button cap screws as well.

Combine Gantry to Bed Frame

Parts

Gantry

Bed and Frame

Hardware

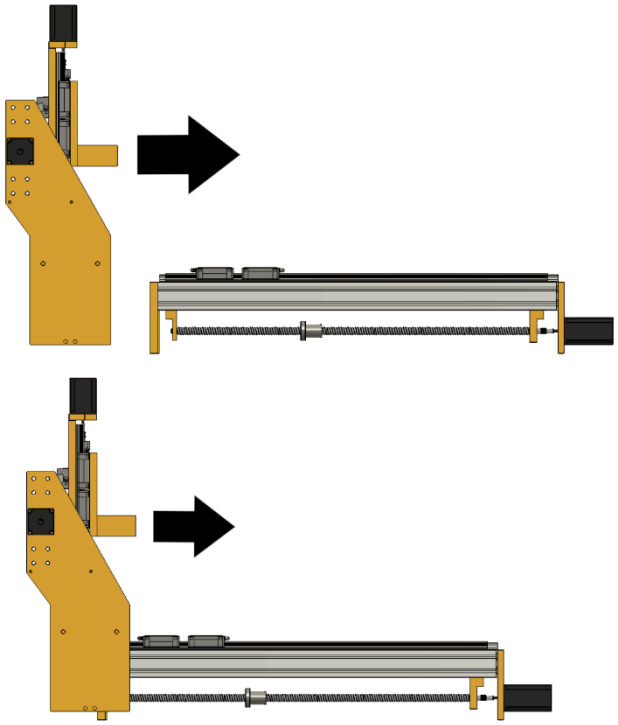
M5x20 Button Cap (16)

5/16 x 1 Button Cap (4)

Tools

3mm Hex Key or Hex Bit Socket

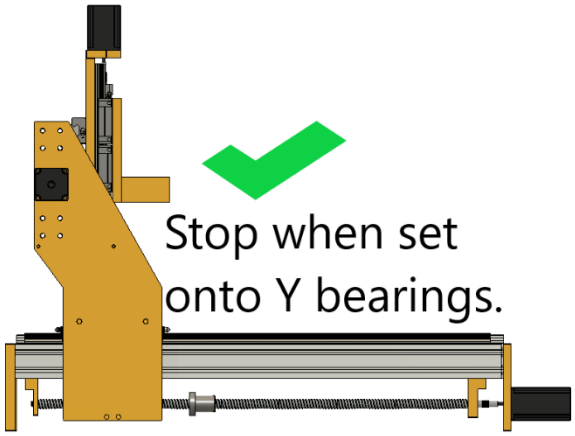
3/16 Hex Key



The gantry must now be set onto the lower frame. You can NOT set the gantry down onto the Y Bearings from the top. You must place the gantry onto the Y bearings from the back end. Use a helper with this step. Slide the Y bearings near the back of the machine so that you will not have to move the gantry as far when mating it to the lower frame.

See the diagrams above and below to better understand this procedure.

Secure the Y Bearing Plates to the Y bearings using M5x20 screws. You may have to tap the bearings to get them aligned with the holes. A hex bit socket is much preferred to a hex key at this step.



Slide the gantry all the way to the front, then the back, to make sure everything slides smoothly.

Turn the ball screw to align the Y Ballnut Housings with the corresponding holes in the Gantry End Plates.

If there is a large gap between the Y Ballnut housings and the Gantry End plate, you may need to loosen the 5/16” button cap screws on the X extrusions. You may also need to tap an end plate (in the same direction the X extrusion runs) with a rubber mallet if one end plate is significantly closer to the ballnut housing that the other.

When the distance is similar on both sides, slide the gantry towards the front (taking care not to slide it all the way off the rails), and start tightening the Y bearings down. Continue to push the gantry back, tightening screws as you go.

Slide the gantry back to line the bottom holes with the Y ball nut housings and secure them with 5/16x1” button cap screws.

Do this for both sides.

Drag Chains

Parts

Drag Chain (2)

Drag Chain Bracket

Hardware

M5x12 Button Cap (2)

M5x16 Button Cap (2)

M5 Washer (3)

M5 Nylock (2)

Large Drop-In T Nut (2)

Tools

3mm Hex Key

Needle Nose Pliers

Place one cable chain onto the X Drag Chain Bracket using (2) M5x16 button cap screws, (2) M5 washers, and (2) M5 nylock nuts. Notice the direction that the drag chain must bend as it comes off the bracket.

Place a Drop-in T Nut into the extrusion and secure it with an M5x12 button cap as show below.

Place a Drop-in T Nut into the top gantry extrusion as shown in the picture to the right and install the end of the other drag chain into place using an M5 washer and M5x12 button cap screw.

Z Motor Assembly, Further Drag Chain Connection, Router Installation

Parts

6.35x8 Coupler

Z Motor Mount

X Drag Chain Bracket

Router Mount Cap

Hardware

M4x8 Machine Screw (4)

M5x12 Button Cap (1)

M5 Nylock (1)

M5 Washer (1)

5/16 x 3/4 Button Cap (4)

Tools

3mm Hex Key

2.5mm Hex Key

3/16 Hex Key

Phillips Screwdriver

Install the 6.35 to 8mm coupler onto the Z axis motor's shaft, then install the motor to the Z axis motor mount as shown below using M4x8 machine screws. The coupler's top tensioning screw should be accessible once the motor is installed onto the mounting plate. Notice the orientation of the wire on the motor relative to the motor mount.

Install this assembly onto the top of the X Plate by sliding the coupler onto the top of the Z ball screw. Place the X Drag Chain Mounting Bracket onto the Z Motor Mount and secure it to the top of the X Plate with a 5/16x1" button cap screw. Then install another 5/16"x1" button cap in the other mounting hole.

Curl the drag chain around and secure it with an M5x12 button cap, M5 Washer, and M5 nylock nut. Only one of the screw holes will be used.

Tighten the coupler tensioning screws, making sure both the top and bottom screws are tight. **Failure to tension these adequately will cause slippage during operation.**

Install the router into the mount using the Router Mount Cap and (2) 5/16x1” button cap screws at about the position shown in the picture. The position of the router in the mount can be adjusted later to your preference.

Put the router cord on the router.

Homing Switches

Parts

- Short Roller Switch (2)
- Long Roller Switch (1)
- Homing Spacer (3)
- L Bracket (3)

Hardware

- M3x16 Machine Screw (6)
- M3 Nylock (6)
- M5x8 Machine Screw (1)
- M5x30 Bolt (1)
- M5x50 Bolt (1)
- Drop-In T Nut (2)

Tools

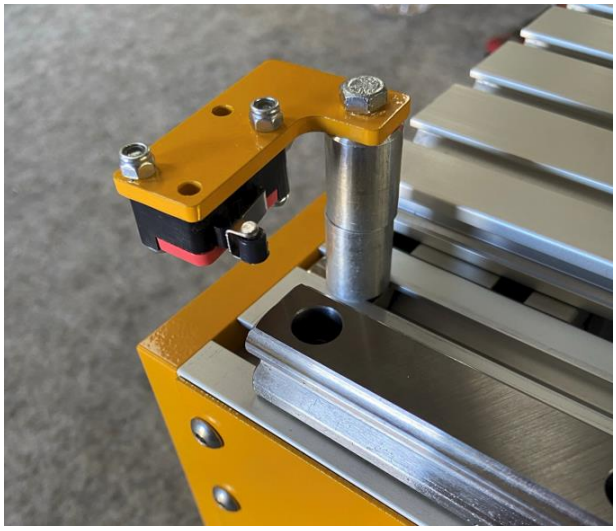
Phillips Screwdriver

Needle Nose Pliers

See the picture on page 29. Mount a short roller switch to a homing L bracket in the orientation shown using (2) M3x16 machine screws and (2) M3 nylock nuts. Install it onto the hole in the Z motor mount as shown in that picture with an M5x8 machine screw. Take note of the downward angle of the bracket. If it is not angled sufficiently downward, the homing switch will not be engaged by the Z axis plate during a homing cycle.

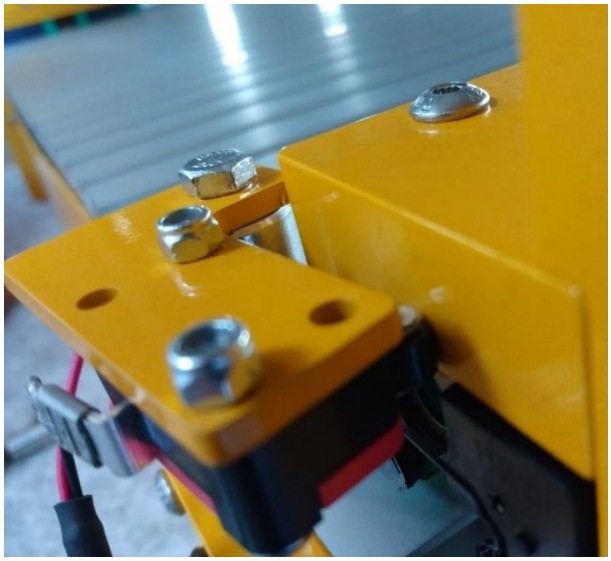
Connect the Z axis homing wire onto the leads shown. The black wire goes onto the terminal on the side of the switch. The red wire goes onto the bottom terminal closest to that.

Install the LONG roller switch for the X axis onto a bracket in the configuration shown in the top right picture of this page using (2) M3x16 machine screws and (2) M3 nylock nuts. Place the X homing wires onto the switch before mounting it, so you have better access to the terminals. Just as with the Z switch, the black wire goes onto the terminal on the side of the switch and the red wire goes onto the bottom terminal closest to that.Place a drop-in T nut into the bottom gantry extrusion in the position shown and secure the bracket with an M5x30 hex bolt (1) and homing spacer. This is located near the Motor Side Gantry End Plate.



Install a short roller switch onto the remaining L bracket using (2) M3x16 machine screws and (2) M3 nylock nuts in the exact orientation shown in the middle picture of this page. Place a drop in T nut at the back left of the machine and secure the bracket with an M5x50 hex bolt and (2) homing spacers. Place the Y axis homing wires onto this homing switch just as you did before.

Notice in the picture to the right how the homing switch engages against the Y Bearing Plate. The angle and orientation are important, otherwise the Y Bearing Plate may hit the switch bracket before engaging the switch.



Cable Routing and Control Box Placement

Run your wires through the drag chains according to the below table:

Drag Chain	Cables to include in Drag Chain
X Drag Chain	Router cable, Z motor wire, Z homing switch wire
Y Drag Chain	Z motor wire, Z homing switch wire, X motor wire, X homing switch wire

The drag chain can be snapped open and the links can even by separated to make it easier to install the wires.

The router cable will not make it all the way through the Y drag chain, so it is best to leave it out. The Y motors and Y switch will route under the machine as described in the subsequent instructions. They are not installed in the drag chains.

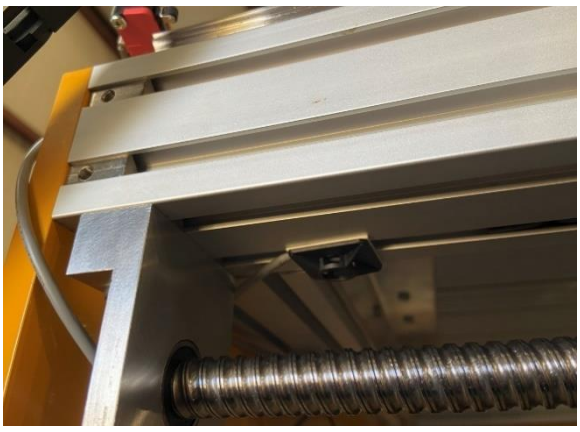
Before proceeding further, make sure you have the machine in its final desired location. Moving the machine after the below connections and cable routing is complete will require that you repeat these steps.

Lift the machine and put the corners on blocks so you can better access the underside to route cables and place the box.

Slide the box under the table of the machine, positioning it so the back of the control box (the one with most of the connection ports faces to the left side of the machine).

The Y motors will snake around the Y motor mounts and go under the machine. Bundle the excess with cable ties to prevent the wires becoming entangled in the moving mechanisms.

Run the Y axis homing switch wire as shown below. This is a view of the back left of the machine, aiming up. Push the cable into the interior channel of the Y extrusion and retain it in black with an adhesive zip tie anchor from the wire management bag. Place a second zip tie anchor about eight inches from the front of the machine and turn the wire towards the box, then plug in the switch.



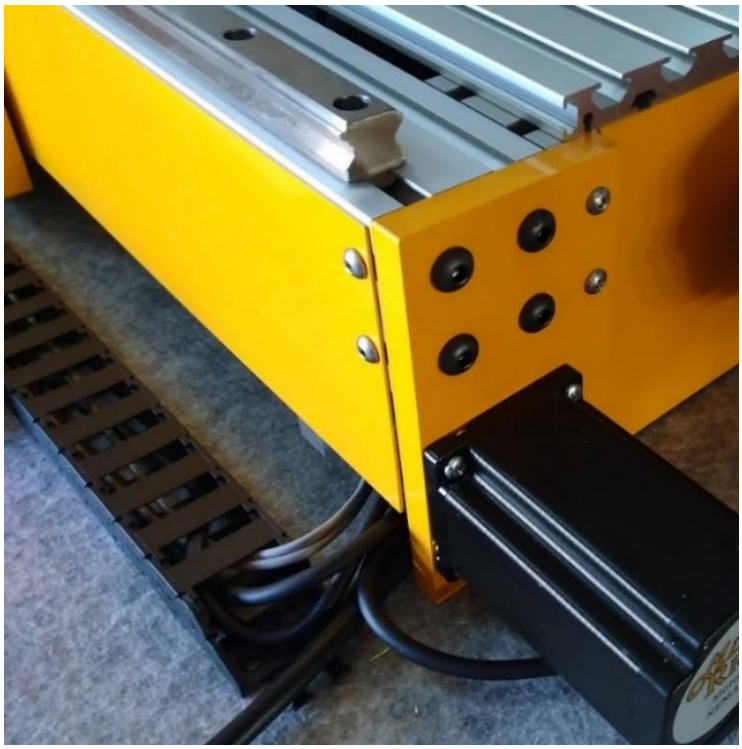
Plug in the rest of the wires into the appropriate connectors at the back of the box.

The pause and resume buttons plug into the front of the box. This is a cable with blue, red, green, and black wires with connectors on the other end.

Plug the USB cable into the control box. Use a zip tie anchor and a zip tie to secure the wires coming from the Y drag chain, the left Y motor, the USB cable, and the box power cord on the left Y motor mount. Do this in such a way that the cables will not be rubbed by the coupler as it turns.

See the picture of what it will look like with the side skirt installed (a later step) and the machine taken off the blocks.

Secure the end of the Y drag chain to your table using a wood screw, metal screw, or whatever is appropriate for your table type (screw not provided). In this position, the cables will not be snagged by the Gantry End Plate or the spinning coupler.

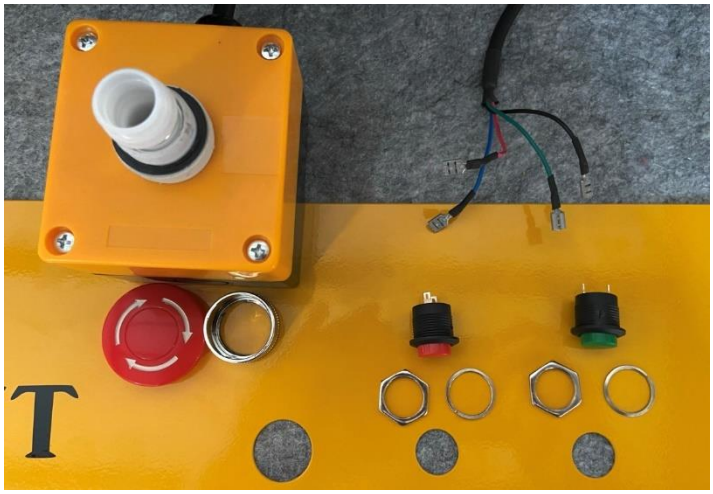


Installing Skirts and Front Panel

(Request earlier version of instructions for machines shipped before 1/1/22 as the front panel is different for earlier machines)

Parts

- Front Panel (1)
- Rear Panel (1)
- Side Skirt (2)
- E stop box (1), connected to control box
- Red Button (1)
- Green Button (1)



Hardware

- M5x8 Button Cap Screws (16)
- Drop-In T Nut (16)

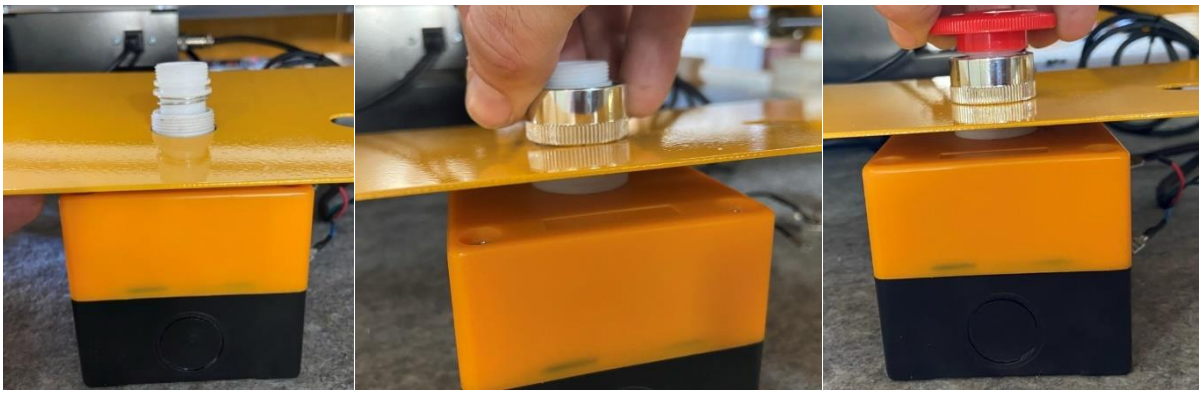
Tools

3mm Hex Key

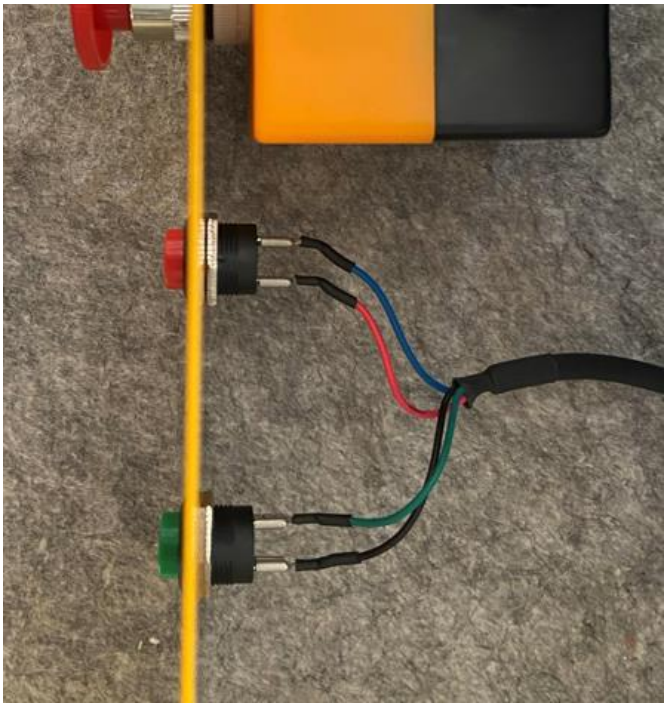
Take the machine off the blocks. Use a helper to make sure you set the machine down without snagging the USB cable as it enters the box, or any of the other connections.

Gather the front panel (the one with the MillRight logo). Unscrew the red button from the E-Stop, along with the chrome ring. Hold the white connector at the base of the E-stop box so as not to spin it loose.

Put the E-stop through the largest hole om the panel. The E-Stop box will be on the back of the panel, and the white plunger will protrude from the front. Screw the chrome ring back onto the white plunger, then screw the red button back onto the switch.



Install the red (pause) and green (resume) button into the holes in the panel. Put the red and blue wires on the terminals of the red switch. Put the green and black wires onto the terminal of the green switch. These wires can go on either terminal of their respective switch, so long as red and blue go to the red switch and green and black go to the green switch.



There is an additional hole to the right of the green button (when viewed for the front) for the 4th axis connector. This allows you to unplug the 4th axis assembly when not needed. **If you do not have a 4th axis, put the panel plug into the hole instead.**

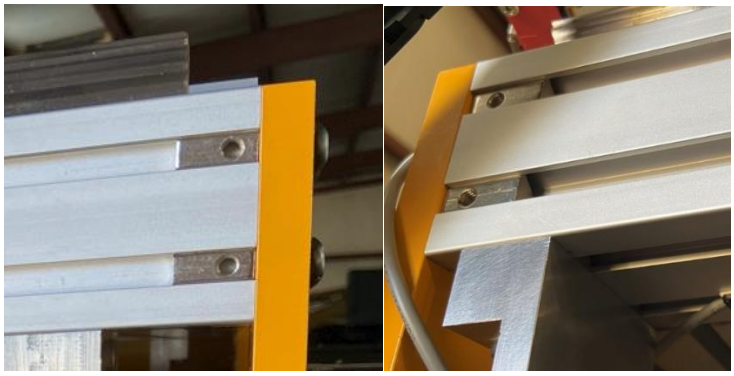
Position the front panel at the front crossmember. Place (4) drop in T nuts into the front crossmember in a place that corresponds to the holes in the front panel.

Secure the front panel with (4) M5x8 button cap screws.

Note that it may be prudent to wait to install the side skirts and rear skirt until *after* you start the machine and begin moving it around. These panels protect you from pinch points at the table level of the machine, but any adjustments that need to be made to the system will require these panels to be removed. **They should remain installed during normal operation.**

Place (4) drop in T nuts into the rear frame in locations that correspond to the holes in the rear panel. Secure the rear panel using (4) M5x8 button cap screws.

Each side skirt also installs with (4) drop in T nuts and (4) M5x8 button cap screws. Take careful note of how the thread holes in the drop in T nuts MUST face the outer ends of the machine. In other words, the T nuts need to be installed so that the hole is closest to the yellow plates at each end.



Slide the side skirts between the Gantry End Plates and the Y extrusions to get them into position. Secure them with M5x8 button cap screw.

Congratulations on the build of the Power Route Plus!

4th Axis Assembly Instruction

(Only applies to customers with Optional 4th Axis)

V-Wheels, Slider Plate, Tail Stock

Hardware

(8) 625-2RS bearings

(4) Small V Wheels

(4) M5 Washers

(2) Small Eccentric Spacers

(2) 6.35mm Fixed Spacers

(2) M5x30 Machine Screw

(2) M5 Nylock Nuts

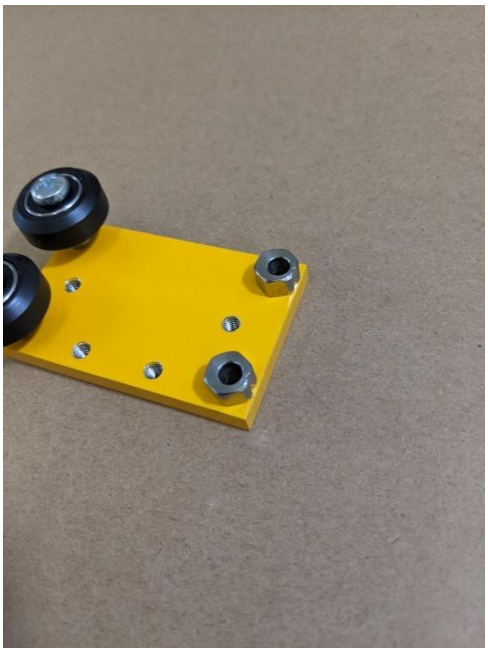
(2) M5x25 Machine Screw

(4) M5x10 Machine Screws

Press on bearing into a v wheel. Turn the wheel over, place a M5 washer into the wheel on the bearing, and press another bearing into the wheel. Do not forget the M5 washer. Repeat the process with the other 3 wheels.

Locate the tail stock slider plate. Place a v wheel on a M5x25 machine screw, followed by a standard spacer. Screw it into the treaded hole on the corner of the tail stock slider plate. Repeat the process with a second v wheel.

Insert an eccentric spacer into the larger hole opposite of the v wheels you installed earlier. Make sure the notch on the eccentric spacer is facing away from the installed v wheels. Place a v wheel on a M5x30 machine screw. Place the screw through the eccentric spacer and secure with a M5 nylock. Repeat the process with the last v wheel.



Flip the tail stock slider plate over with the wheels down. Locate the tail stock with live center and place it on the tail stock slider plate with the live center positioned as pictured right. Secure the tail stock with two M5x10 machine screws. Leave loose.

Install two M5x10 machine screws into the last two threaded holes. These will be used to lock the slider plate on the base plate extrusion. Leave the screws loose. Place to the side.

Chuck Assembly

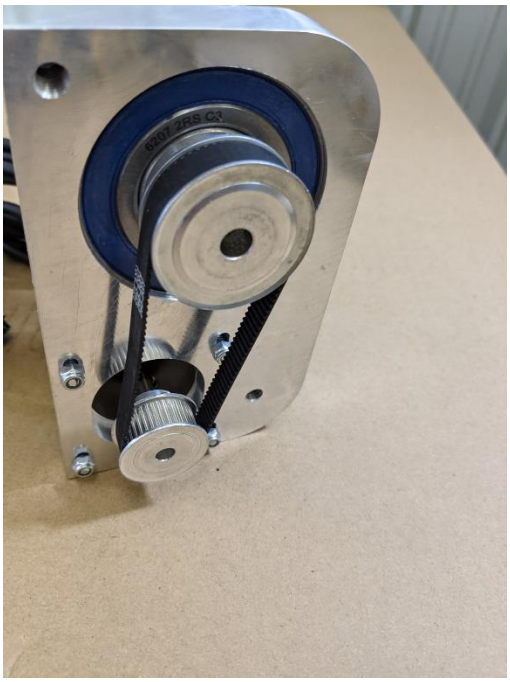
Hardware

(4) M4x20 Machine Screws

(4) M4 Nylock

Place the motor in the opening on the chuck assembly. The motor wire should be facing away from the chuck. The motor shaft should be on the same side as the chuck shaft. Put a M4x20 machine screw through a hole at the corner of the motor, through the chuck assembly plate, and secure with a M4 nylock nut. Leave the screws loose. Place the large gear on the chuck shaft and the small gear on the motor shaft. Leave room to reach the grub screws on the gears. There are two grub screws on each gear. Tighten the screws.

Place the belt on the gears smooth side out. Flip the chuck assembly motor side down to tighten the belt between the gears. Tighten the motor screws.



Base Plate

Hardware

(2) Small T nuts

(4) M5x10 Socket Flat Cap

Place a M5x10 socket flat cap in one hole of the middle set of holes at the end of the base plate. Place the screw in the side with the recessed opening. Lightly thread a t nut onto the screw. Repeat the process with the next set of inner screw holes using the hole in line with the first.

Line up the nuts with the slot on the extrusion and slide it onto the base plate. Tighten the screws.

Slide the tail stock onto the extrusion. Using a 10mm wrench, turn the eccentric spacers until they are snug.

Slide the tail stock forward and center it with the chuck. Tighten the screws to secure the tail stock in place.

Turn the chuck assembly on its side to allow access to the mounting holes. Line up the holes at the end of the base plate with the holes on the underside of the chuck assembly. Use 2 M5x10 socket flat caps to attach the chuck assembly to the base plate.

For tips on start-up and to learn more about operating the machine, check out the Operating and Troubleshooting Guide at https://millrightcnc.com/wp-content/uploads/2021/08/Operating-and-Troubleshooting-Guide-version-1p00.pdf

Also see www.millrightcnc.com/resources for more information

Have questions or comments? Contact support@millrightcnc.com