USER MANUAL

Genmitsu CNC Router 3018-PROVer

V1.2 Jun 2020

Contents

Welcome

Thank you for purchasing the Genmitsu 3018-PROVer CNC Router from SainSmart.

Included in your package will be a Micro SD card. On the Micro SD Card, you will find:

- Assembly instruction videos
- PDF version of this manual
- Windows USB Driver
- GrblControl/Candle software for Windows
- Sample files
- Offline Controller control files

These files can also be downloaded from SainSmart Online Resource Center
https://docs.sainsmart.com/3018-prover

Before attempting to assembly the 3018 PROVer, please watch the assembly video on the Micro SD card. This will help you and avoid mistakes.

For technical support, please email us at ***support@sainsmart.com***.

Help and support is also available from our Facebook group.
(SainSmart Genmitsu CNC Users Group)

Scan QR code
to join the group

Disclaimer

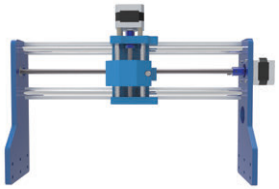
Before operating your Desktop CNC Machine, please read the manual. Failure to do so may lead to personal injury, poor results, or damage to the CNC Machine. Anyone who operates the Desktop CNC machine should know and understand the contents of this manual.
SainSmart cannot control the conditions in which you assemble your Genmitsu CNC machine or verify if it was done properly.
We do not assume responsibility and expressly disclaim liability for loss, injuries, damage, or expense arising out of, or in any way connected with the assembly, handling, storage, use, or disposal of the product.
The information in this manual is provided without any warranty, expressed or implied, regarding its correctness.

Please be careful when using your CNC machine. This machine is an electrical device with moving parts and dangerous areas.

- Genmitsu CNC Machines are for Indoor Use Only.
- You must be 18 years or older to operate this machine, unless supervised by a knowledgeable adult familiar with the machine.
- Wear the proper Personal Protection Equipment (Safety Glasses etc.).
- Always place the CNC Machine on a stable surface.
- The SainSmart Genmitsu CNC Machine is supplied with Switchable Power Supply 230 VAC or 110VAC. Never use a different power supply; it may cause malfunctions or damage to the machine.
- Ensure the Emergency stop button is easily accessible at all times.
- Never disassemble the Power Supply or Electrical Components. This will VOID the warranty.
- DO NOT TOUCH the machine spindle, or place any body part near the working area when the machine is operating. Serious Injury may occur.
- DO NOT leave children unsupervised with the CNC Machine even when it’s not operating. Injury may occur.
- DO NOT leave the machine unattended while it's operating.
- Ensure your CNC Machine is in a well-ventilated area. Some Materials may discharge smoke or fumes during operation.

Part 1 - Unboxing

Please make sure all the following parts are included. If you are missing any part or have any questions, please email us at ***support@sainsmart.com.***



1 X-Axis/Z-Axis Gantry

2 Y-Axis Base Assembly

3 Spindle with ER11 tail

4 ER11 1/8" Collet

5 (2) Acrylic Baffle

6 Offline Controller

7 Main Control Board

8 USB A-to-B Cable

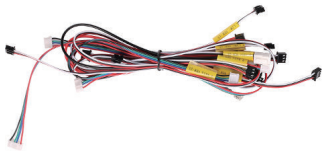
9 Power Supply

10 Power Adapter Cable - US

11 Power Adapter Cable - EU

12 (4) Limit Switch

13 Offline Controller Cable



14 Limit Switch Cable X LIM+, 15cm
15 Limit Switch Cable X LIM-, 53cm
16 Limit Switch Cable Y LIM+, 30cm
17 Limit Switch Cable Y LIM-, 60cm
18 Limit Switch Cable Z LIM+, 34cm
19 Limit Switch Cable Z LIM-, 40cm

20 Stepper Motor Cable, X-Axis, 17cm
21 Stepper Motor Cable, Y-Axis, 52cm
22 Stepper Motor Cable, Z-Axis, 28cm

23 Spindle Cable, 35cm

24 Emergency Stop Button with Cable

25 Work Clamp Set

26 Z-Probe Kit

27 (10) 20-degree V Bit

28 Allen Wrench Set,
2mm, 2.5mm, 3mm, 4mm, 5mm

29 (2) Wrench

30 Screwdriver

31 Spacer Template Tool

32 (30) Cable Tie

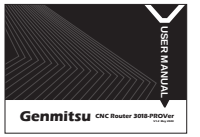
33 (10) Cable Holder

34 Sealing Strip, Y-Axis, 27cm
35 Sealing Strip, X-Axis, 34cm

36 Cable Protector

37 MicroSD Card

38 MicroSD Card Reader



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40 (4) Rubber Foot

41 (8) M5 10mm Bolt
42 (12) M5 14mm Bolt
43 (2) M6 16mm Bolt

44 (2) M3 20mm Screw
45 (16) M3 5mm Screw
46 (4) M3 8mm Screw

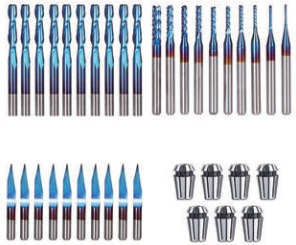
47 (4) M3 20mm T-Slot Nut
48 (8) M5 20mm T-Slot Nut

49 (2) ABS Spacer

Optional Accessories (Not Included)

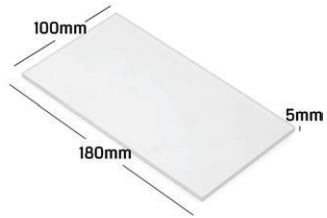
Consider following optional upgrades or accessories to make your CNC experience better!
You can find them on ***www.sainsmart.com***.
Save 10% with discount code **PROVER10**

5.5W Laser Module



CNC Router Bits Essential Kit

Resin Board for CNC Engraving, 2-Pack



Acrylic Sheet for CNC, 180 x 100 x 5mm, 4-Pcs

Scan QR codes to learn more

Part 2 - Mechanical installation

2.1 Preparing your base assembly

What you will need

43 (2) M6 16mm Bolt

28 Allen Wrench Set, 5mm

2 Y-Axis Base Assembly

Step 1: Flip the Y-Axis Base Assembly upside down and remove the cable ties from the bearing mount.
Step 2: Align the Aluminum Build Plate center slot with the blue Y-Axis lead screw mount as shown in the picture.
Step 3: Tighten (2) M6 16mm screws to secure the lead screw mount.

2.2 Installing limit switches & cable holders to Y-Axis

What you will need

45 (10) M3 5mm Screw

33 (6) Cable Holder

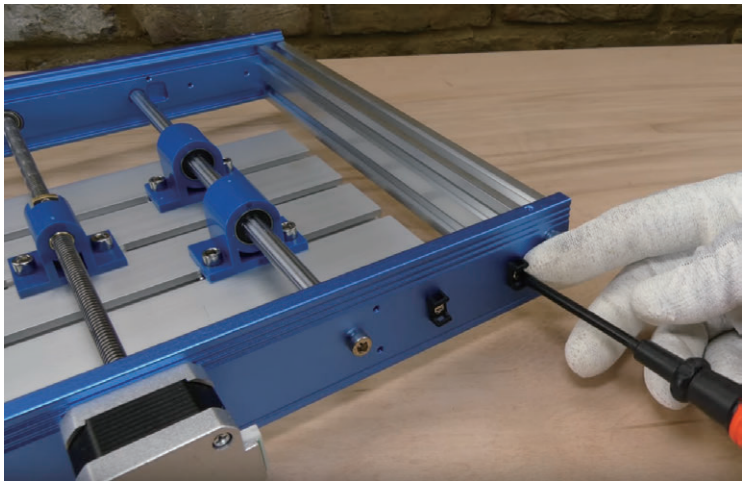
12 (2) Limit Switch

30 Screwdriver

2 Y-Axis Base Assembly

Step 1: Locate the Limit switch mount indents on the inner side of the frame. One on each side as shown below.

Step 2: Install cable wire holders in the pre-drilled holes next to the limit switches, using the 3mm screws. Install two cable holders on each side, facing inside the frame. Install two on the outside of the frame in the back (the stepper motor side).



Step 3: Install one limit switch on each side by tightening the 3mm screws.

2.3 Installing Rubber feet to Y-Axis Base Assembly

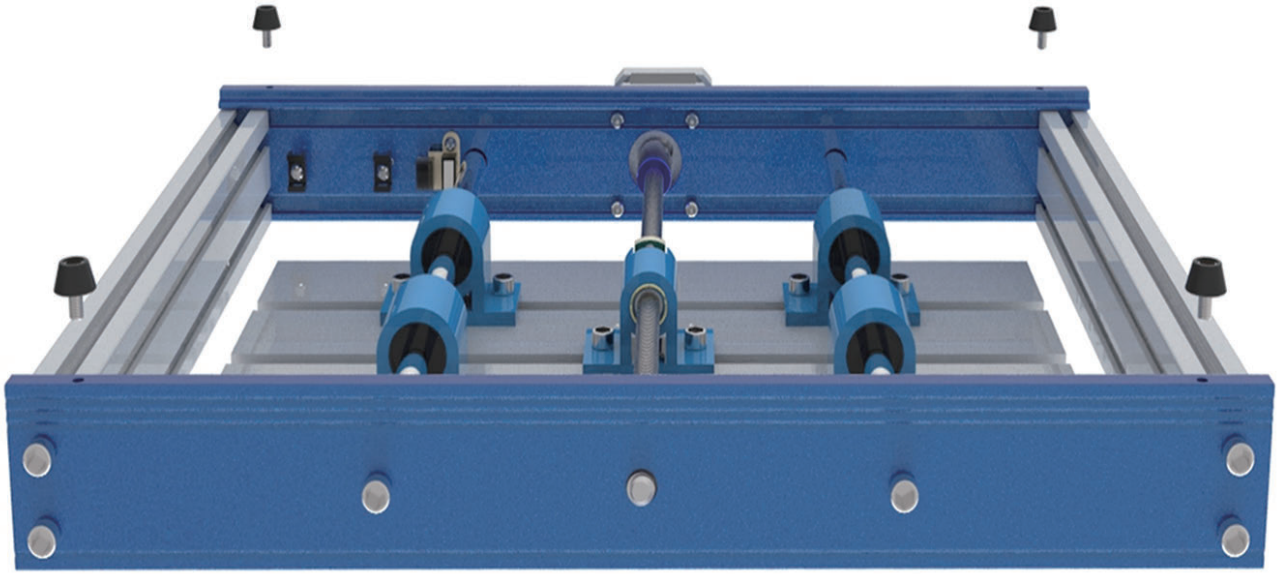
What you will need

40 (4) Rubber Foot

28 Allen Wrench Set, 3mm

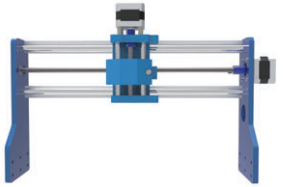
2 Y-Axis Base Assembly

Step 1: Locate the 4 pre-drilled holes and install the rubber feet on each corner using the Allen wrench



2.4 Installing Limit Switches to X-Axis/Z-Axis Gantry

What you will need



1 X-Axis/Z-Axis Gantry

12 (2) Limit Switch

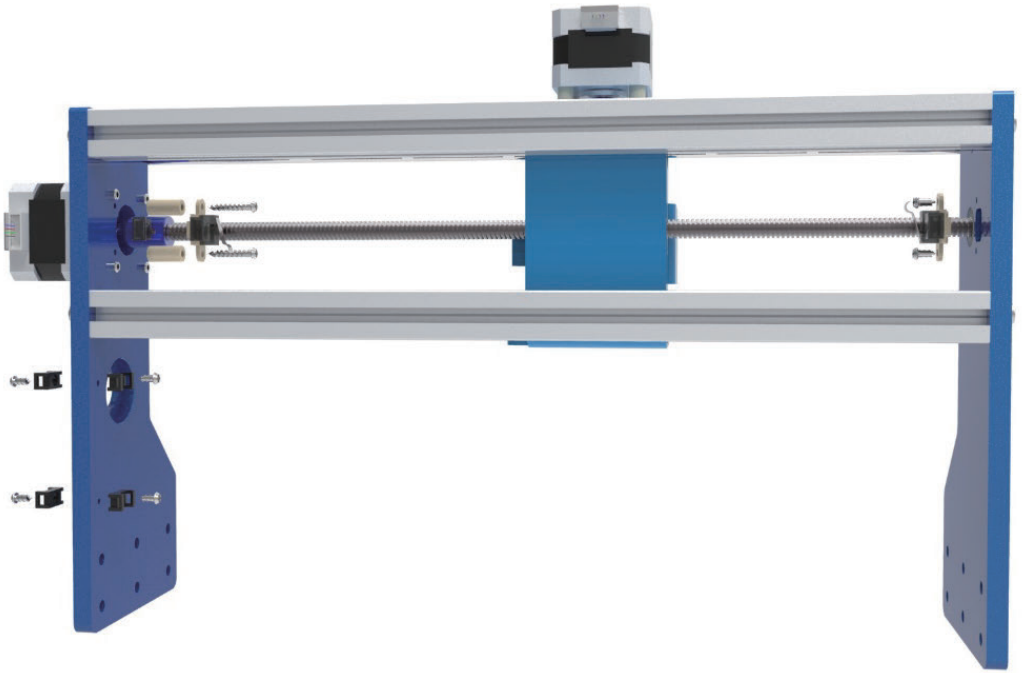
33 (3) Cable Holder

49 (2) ABS Spacer

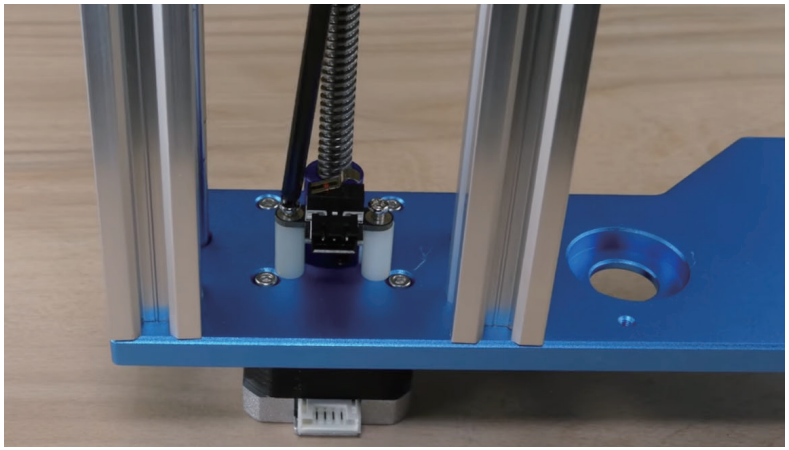
30 Screwdriver

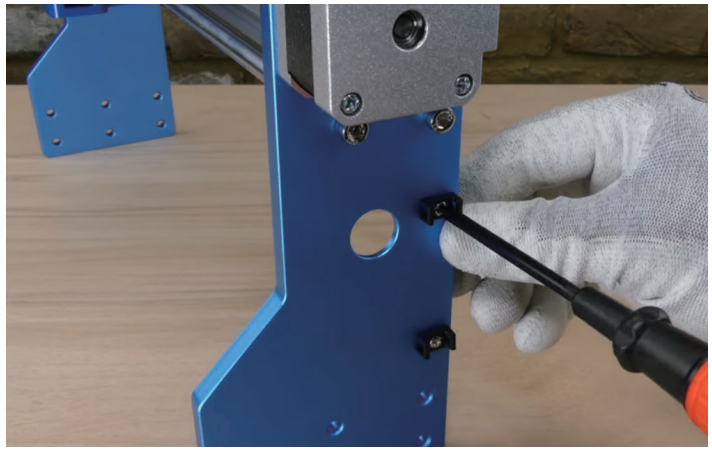
45 (6) M3 5mm Screw

44 (2) M3 20mm Screw

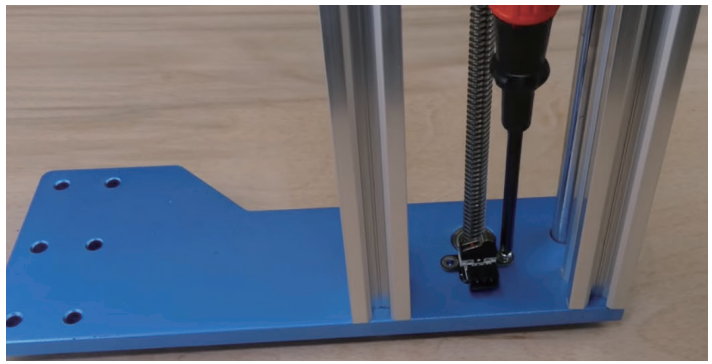


Step 1: The first limit switch to install is on the stepper motor side. You will need the two white ABS spacers and the longer 20mm M3 screws for this step. Locate the two pre-drilled holes on the inside of the gantry next to the lead screw, as shown in the picture below. Using (2) M3 20mm screws to secure the limit switch followed by the spacers into the frame.
(Tip: You may rotate the lead screw to move the motor away when installing the limit switches.)
Step 2: Install four cable holders on the same side of the gantry. Two on the inside and two on the outside.





Step 3: Now install the remaining Limit switch on the opposite side, using the 5mm M3 screws. You don't need a spacer for this limit switch.



2.5 Install T-Slot Tension Nuts

What you will need

31 Spacer Template Tool

2 Y-Axis Base Assembly

Step 1: Position the Y-Axis base assembly so that the step motor is facing your right hand side.

Step 2: Insert (6) Tension T-Slot Nuts on each side. Position near the back of the machine (Stepper Motor Side).

Step 3: Insert the Acrylic Spacer Template into the slot and space out the T-slot nuts as shown in the picture.

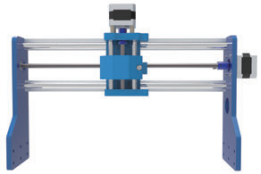
2.6 Install Y-Axis Base to X / Z Axis Gantry

What you will need

42 (12) M5 14mm Bolt

31 Spacer Template Tool

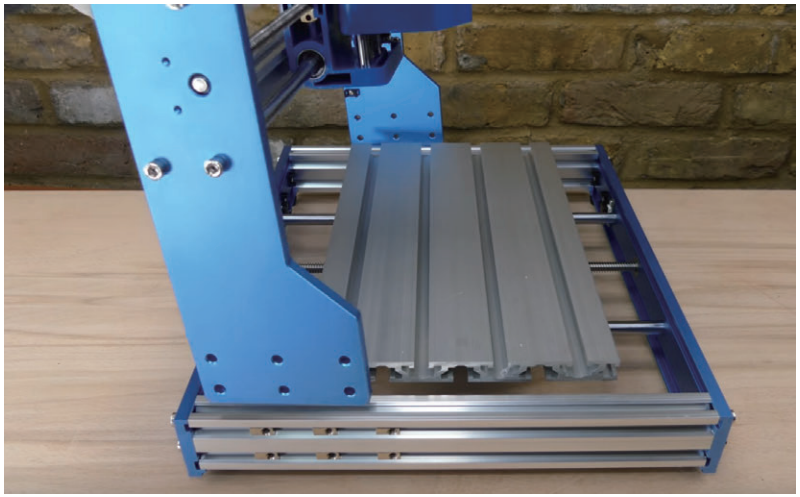
28 Allen Wrench Set, 4mm

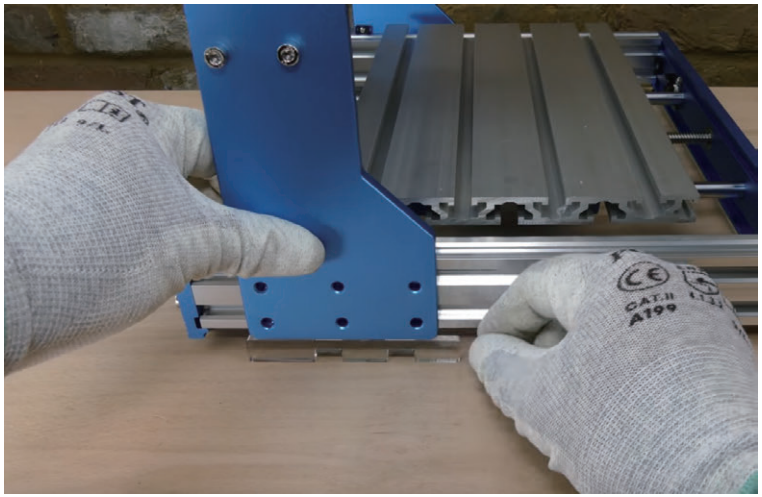


1 X-Axis/Z-Axis Gantry

2 Y-Axis Base Assembly

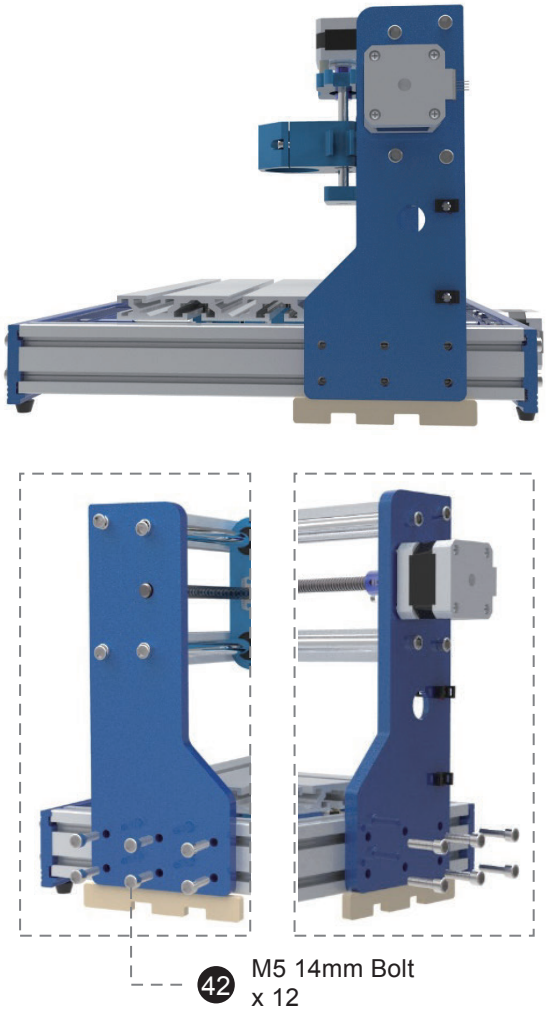
Step 1: Set the X-Axis / Z Axis Gantry over your Y-Axis Base Assembly as shown below.
Step 2: Place the Acrylic Spacer template underneath the gantry to prop a side up at a time.
See through the six pre-drilled holes on the side of the gantry to make sure they align with the nuts positioned in 2.5.





Step 3: Install (6) M5 14mm screws into the T-Slot nuts. Keep the screws loose until you finish the other side.

Step 4: Repeat the process on the opposite side. Now you can tighten all 12 M5 screws.



2.7 Install the Spindle

What you will need

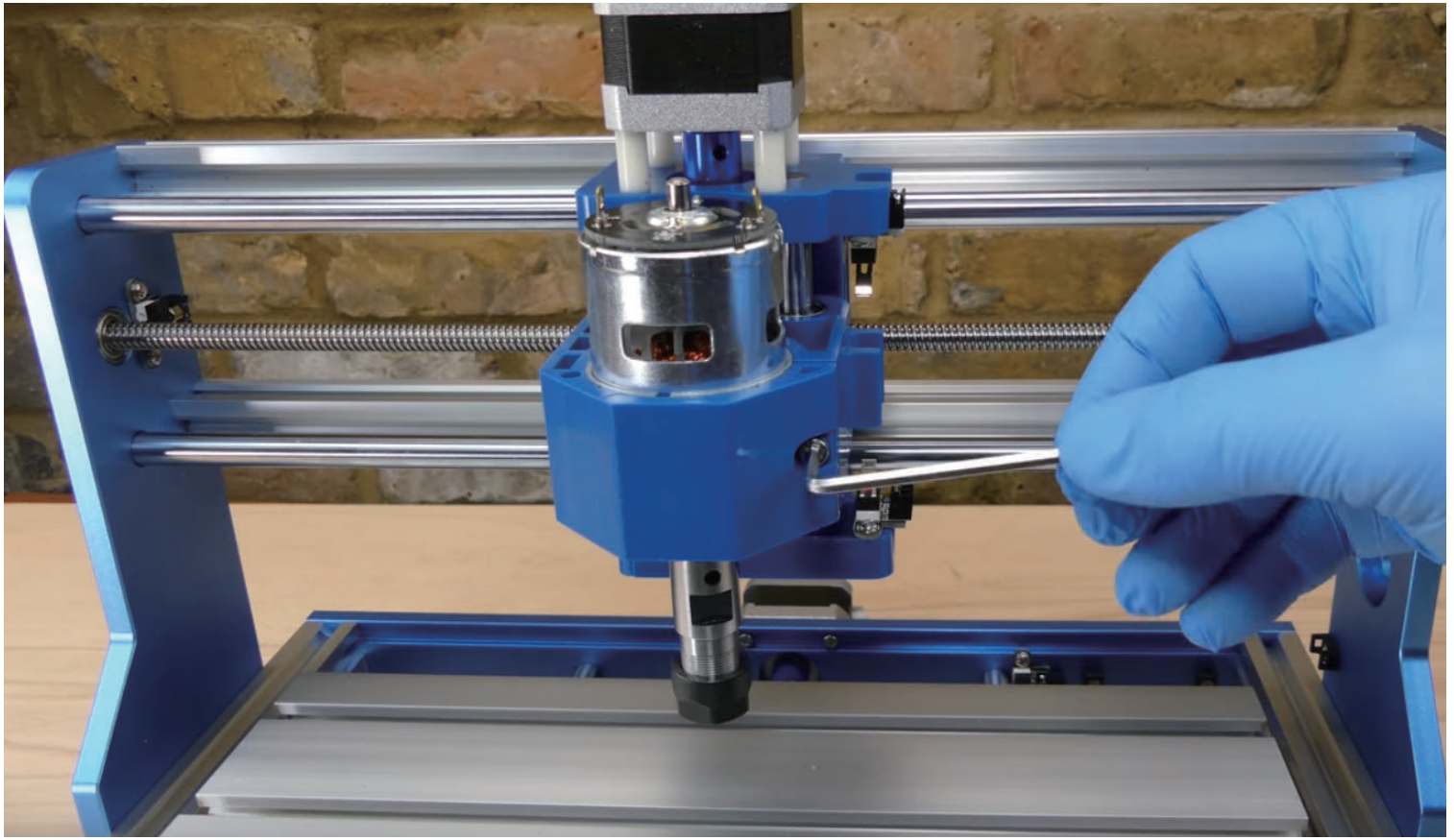
3 Spindle with ER11 tail

4 ER11 1/8" Collet

28 Allen Wrench Set, 3mm

Step 1: Unscrew the black collet collar from the spindle and insert the collet. Make sure the collet is locked in place by pushing it. Then screw the the collet collar back to the spindle.

Step 2: Loosen the Spindle Mount Hex Screw
Step 3: Slide the spindle into the mount until the external sleeve of the spindle is fully inserted.
Step 4: Tighten the Hex screw to secure the Spindle. Do not over tighten the screw, as it can damage the mount.



2.8 Install the Acrylic Baffles

What you will need

41 (8) M5 10mm Bolt

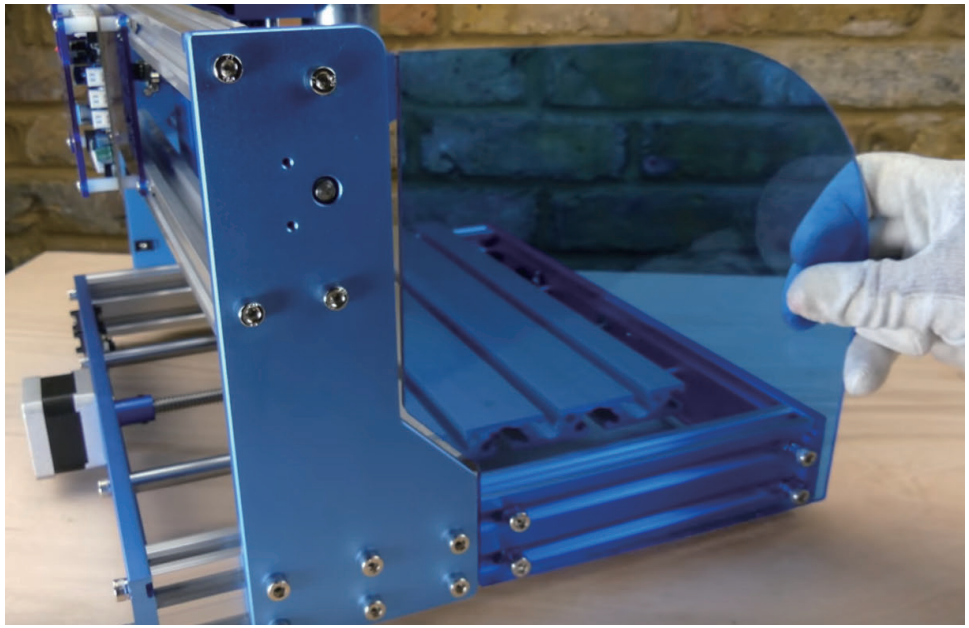
48 (8) M5 20mm T-Slot Nut

28 Allen Wrench Set, 3mm

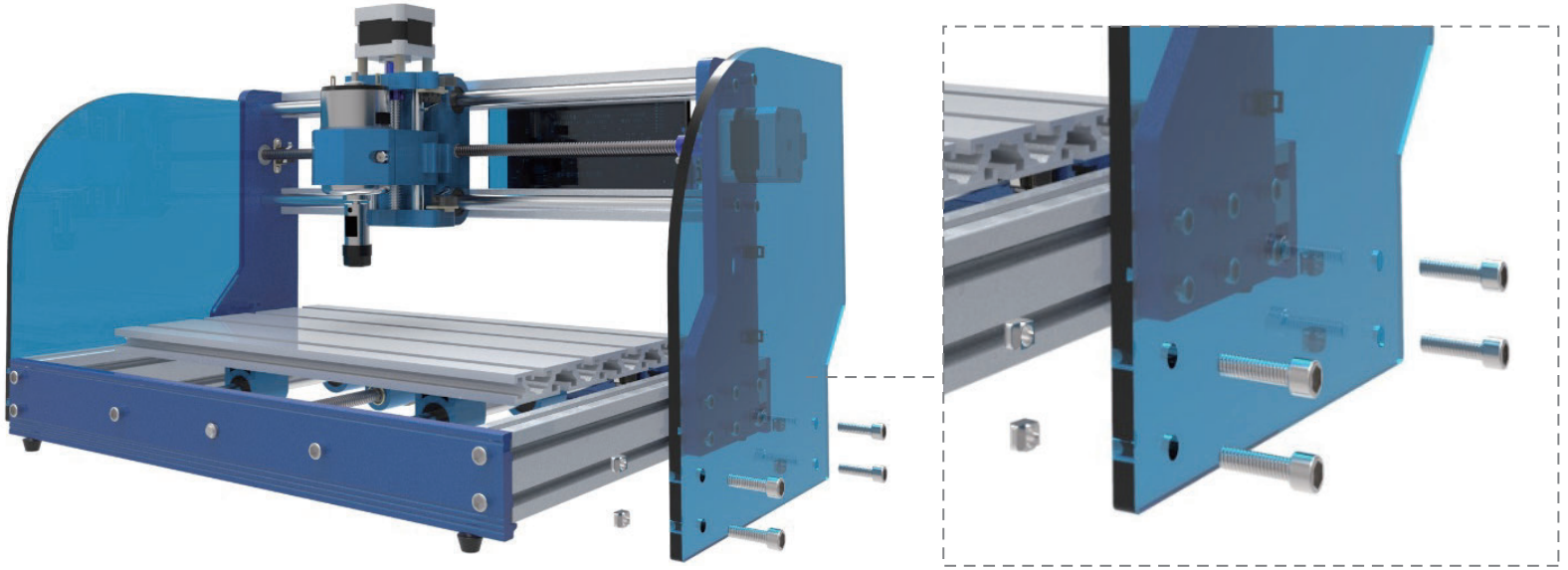
5 (2) Acrylic Baffle

You want to identify the left baffle and the right baffle first, by placing the baffle along side the frame to fit the shape. Peel off the protective paper from the baffles.

Step 1: Insert the M5 bolts from the outside of the baffle (For example, for the left-side baffle, the M5 bolt should insert from the left side). Then put the T-Slot nut onto the bolt from the other side using your hand. One turn only. Keep them loose for now. Orient the T-Slot nuts horizontally.
Step 2: Place T-Slot nuts into the side of the machine so that the baffle is aligned with the edge of the frame.

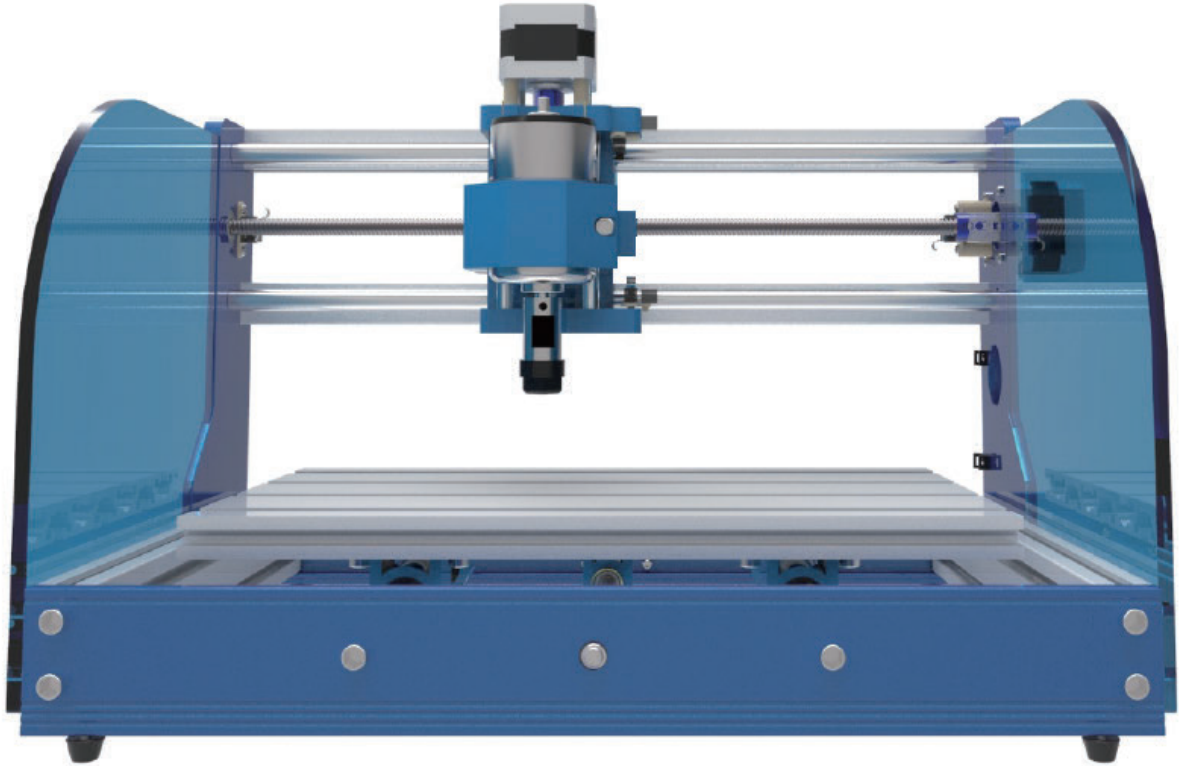


Step 3: Now tighten the M5 bolts to secure the baffle. Repeat the steps to install the other side.



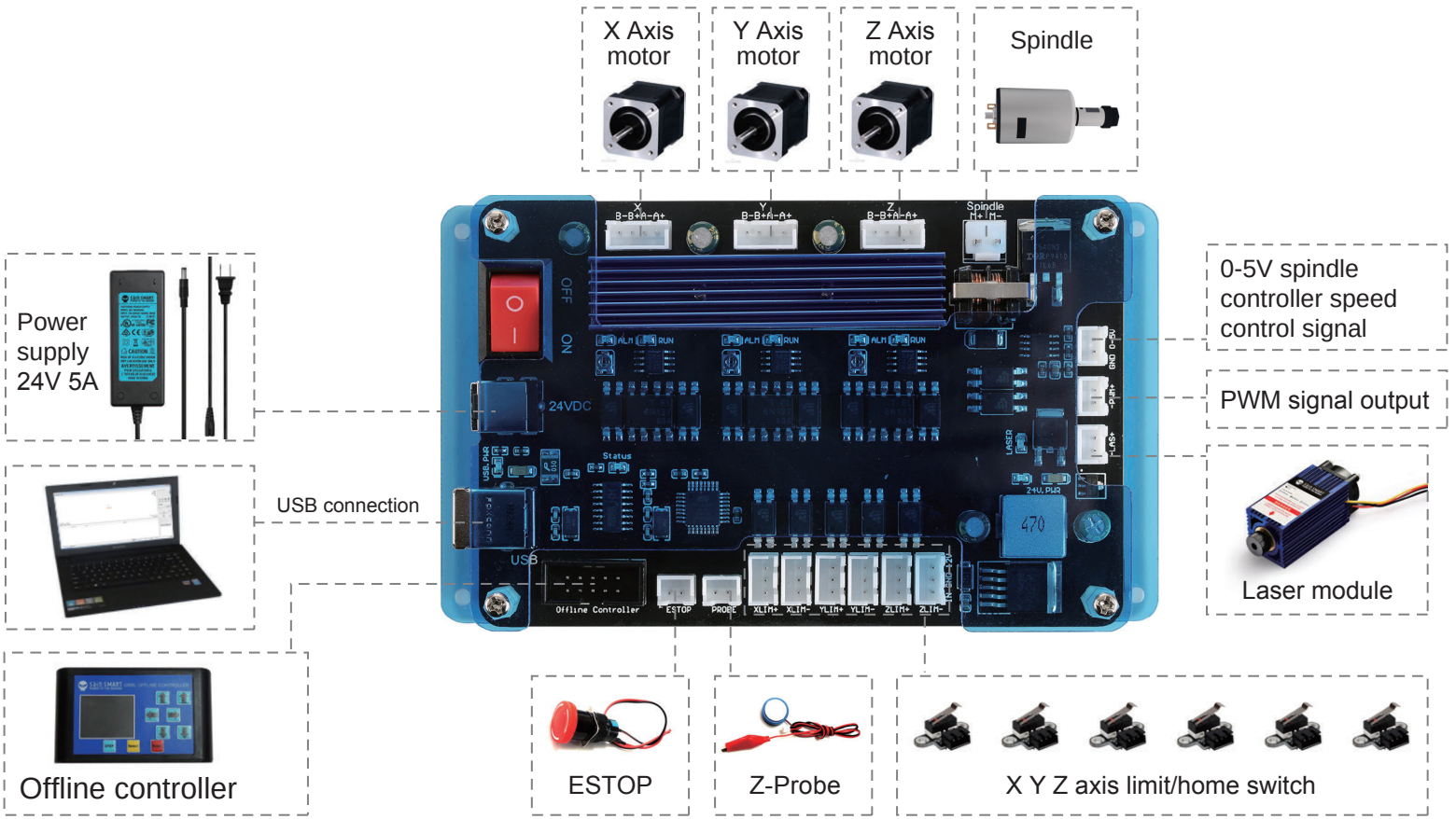
Congratulations! Now your machine frame is fully assembled!

Now let's move onto wiring!



Part 3 - Wiring

PCB Board Diagram



PCB Label Description

Mark	Description	Mark	Description
USB	USB interface	**-LAS+**	Laser module interface
24VDC	24V power interface	**-PWM+**	PWM signal output interface
ON	Power ON	**GND 0-5V**	0-5V spindle controller speed control signal
OFF	Power OFF	**Spindle**	Spindle motor interface
Offline controller	Offline controller (Note: Only connect to our offline controller)	**X**	X Axis motor interface
		Y	Y Axis motor interface
ESTOP	Emergency stop switch interface	**Z**	Z Axis motor interface
Z-Probe	Z Zero Tool interface	**USB.PWR**	USB power indicator LED
XLIM+	X limit switch +	**24V.PWR**	24V power indicator LED
XLIM-	X limit switch -	**Status**	Communication LED
YLIM+	Y limit switch +	**SPINDLE**	Spindle working indicator LED
YLIM-	Y limit switch -	**LASER**	Laser working indicator LED
ZLIM+	Z limit switch +	**ALM**	Stepper motor driver circuit alarm indicator LED
ZLIM-	Z limit switch -	**RUN**	Stepper motor driver circuit working indicator LED

Cable Management

Please refer to the video for cable management options.

3.1 Install the Main Control Board

What you will need

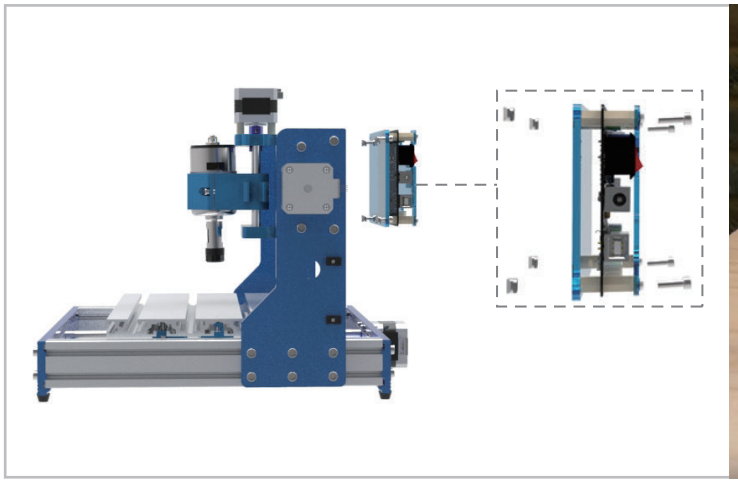
46 (4) M3 8mm Screw

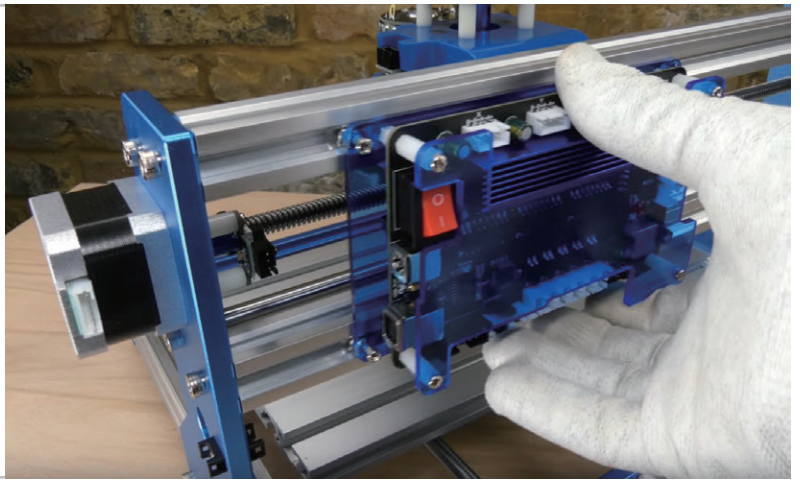
47 (4) M3 20mm T-Slot Nut

7 Main Control Board

Step 1: Locate the four pre-drilled holes in the corners on the control board. Put on the M3 T-Slot nuts trough the holes into M4 8mm bolts. One turn only. Keep the nut loose and in horizontal position so that they can be inserted into the beams in step 2.

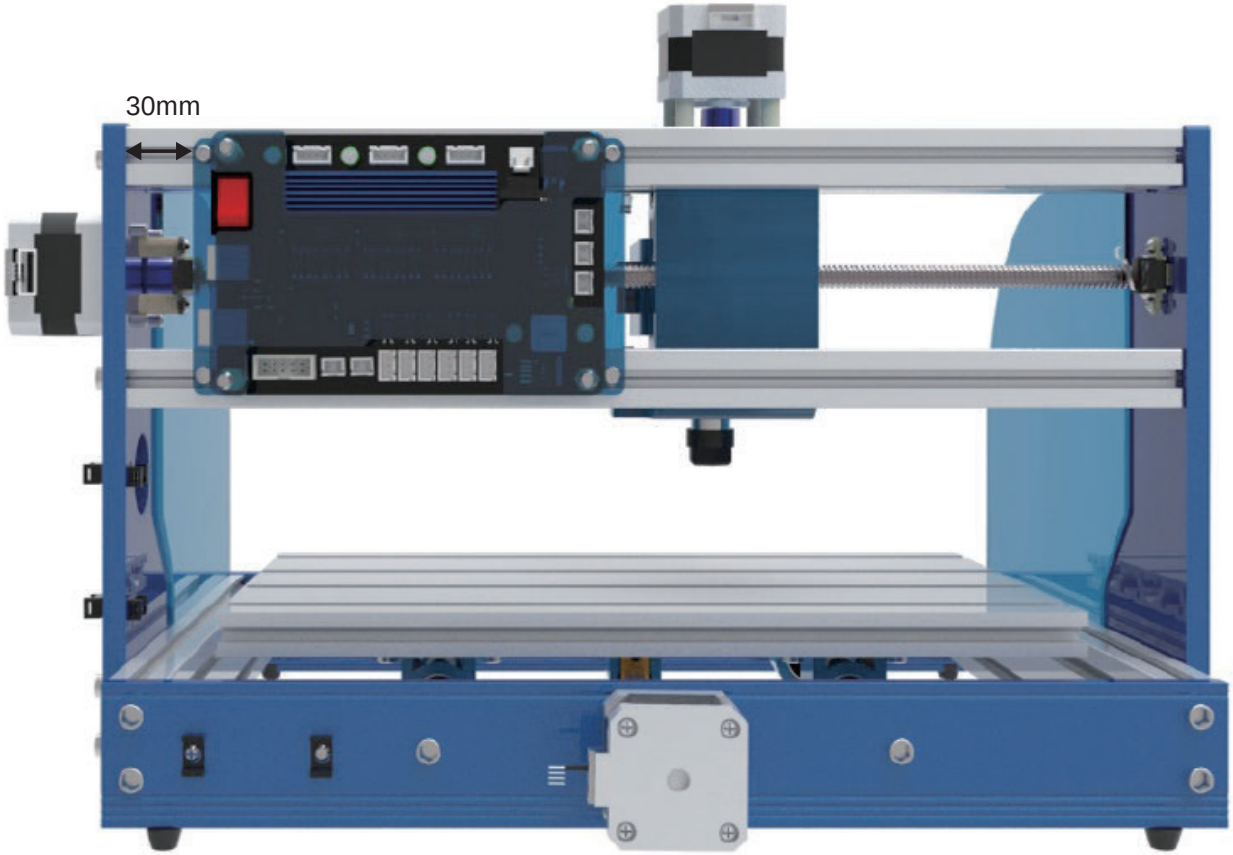
Step 2: Position the frame so that the back of the machine is facing you. Install the board by inserting (4) M3 20mm T-Slot nuts onto the top and bottom beams on the frame, like shown in the figure below.





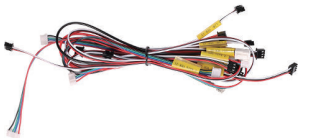
Step 3: Slide the board horizontally to leave about 30mm of space between the board and the left edge of the machine as shown below.

Step 4: Now you can tighten all (4) 8mm bolts so the T-Slot nuts lock the board into the frame.



3.2 Connecting X-Axis Limit Switches

What you will need

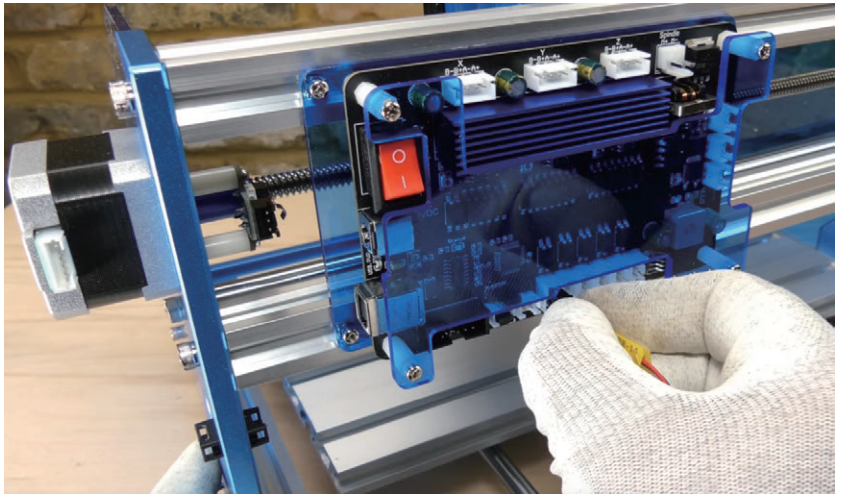


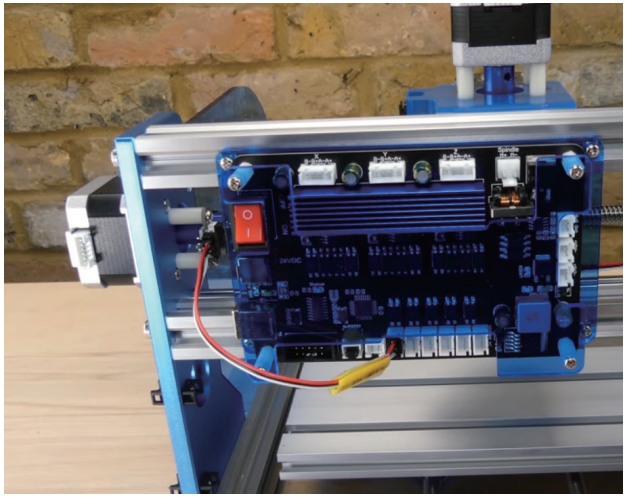
14 Limit Switch Cable X LIM+, 15cm
15 Limit Switch Cable X LIM-, 53cm
(Limit switch cables have black plugs on both ends)

35 Sealing Strip, X-Axis, 34cm

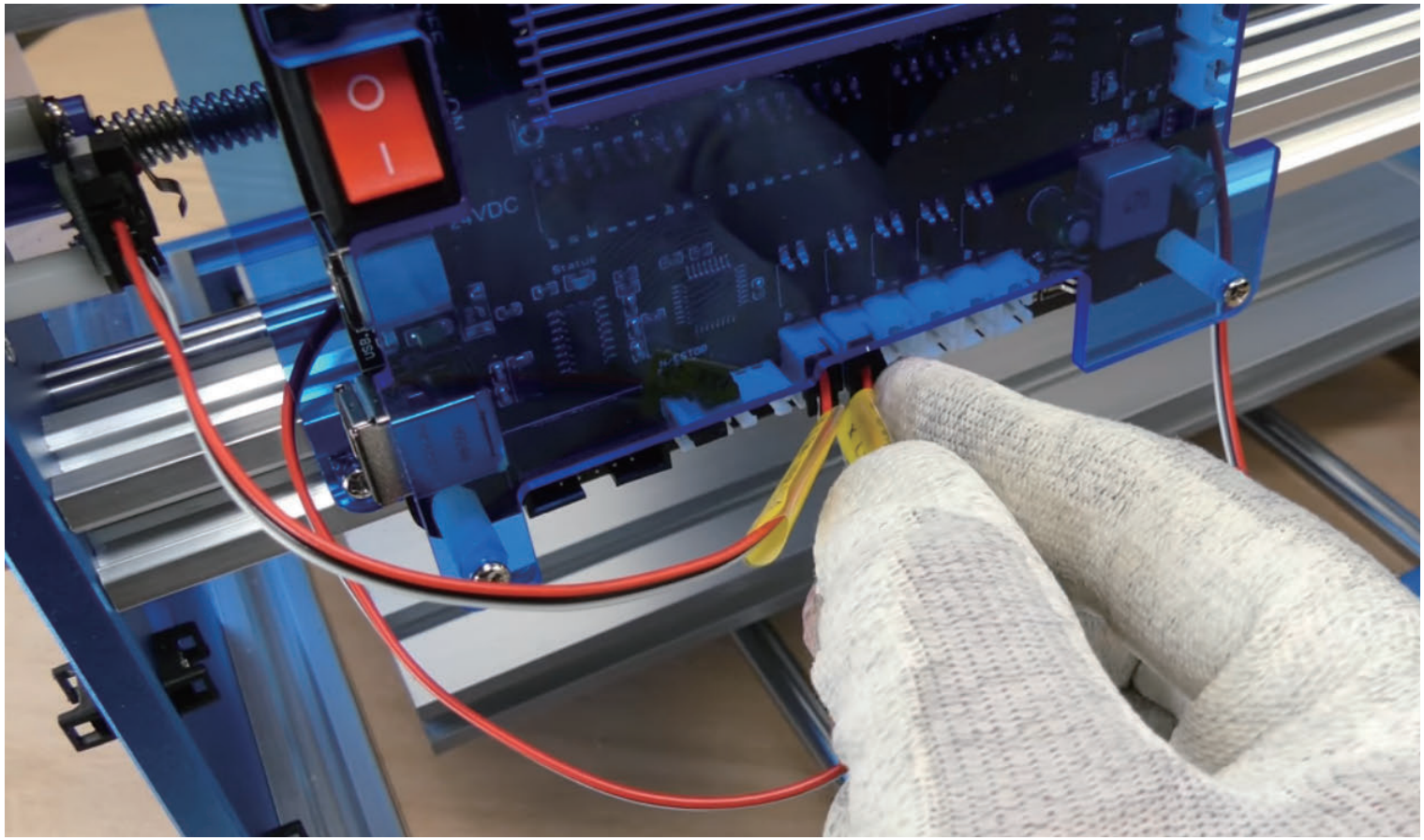
Position the machine so that the main control board is facing you.

Step 1: Connect one end of the Limit Switch Cable X-LIM (+) (+ is near the stepper motor) to the X+ limit switch near the stepper motor, and connect the other end to the socket marked X-LIM (+) to the main control board (There are six white sockets toward the bottom of the board).

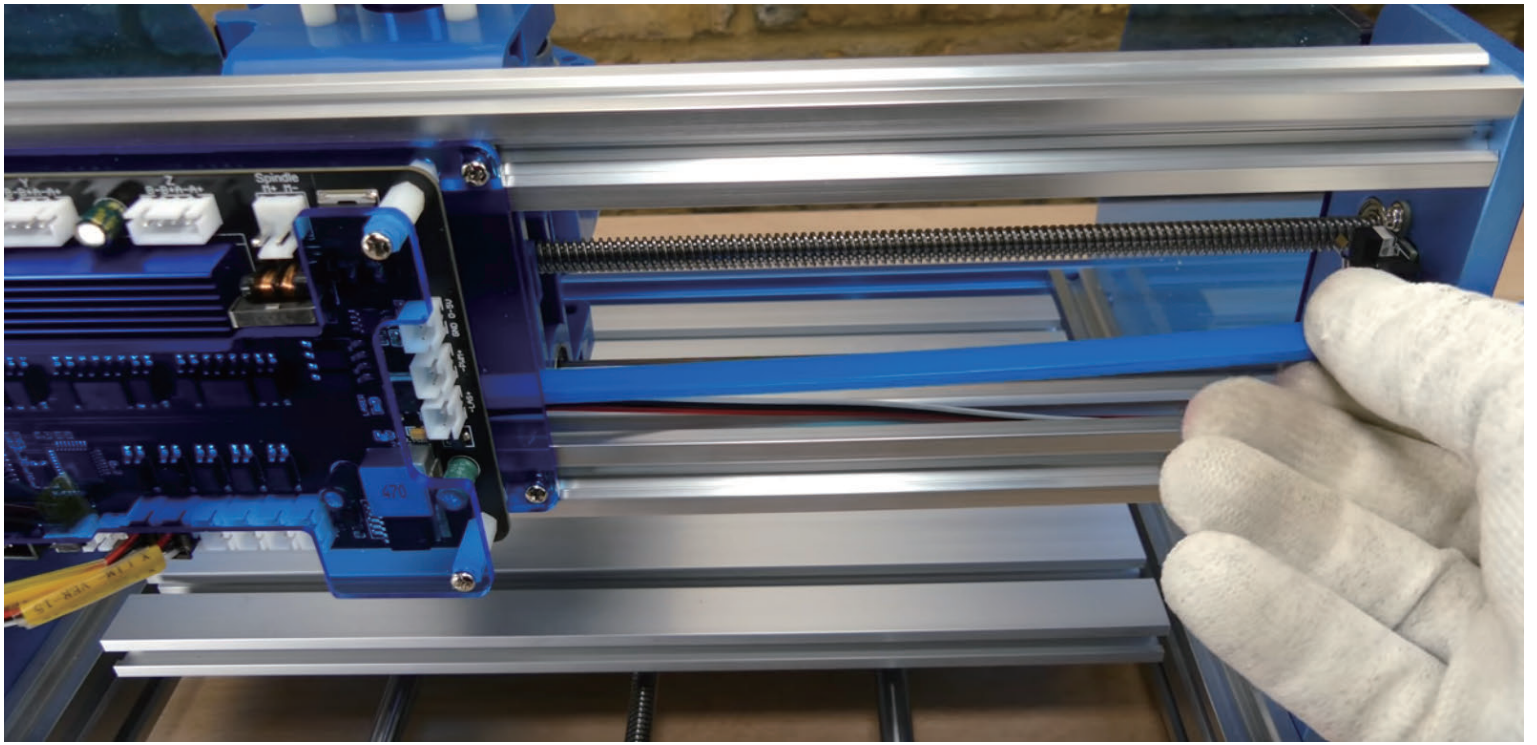




Step 2: Connect Limit Switch Cable X-LIM (-) to the X- limit switch on the right side. Run the cable behind the control board, along the top channel of the bottom beam, then loop around the control board. Plug the other end of the cable to the control board X-LIM(-) socket.

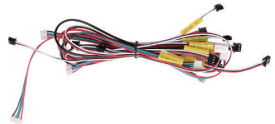


Step 3: Press the sealing strip (flat side out) over the cable into the top channel of the bottom beam.



3.3 Connecting Y-Axis Limit Switches

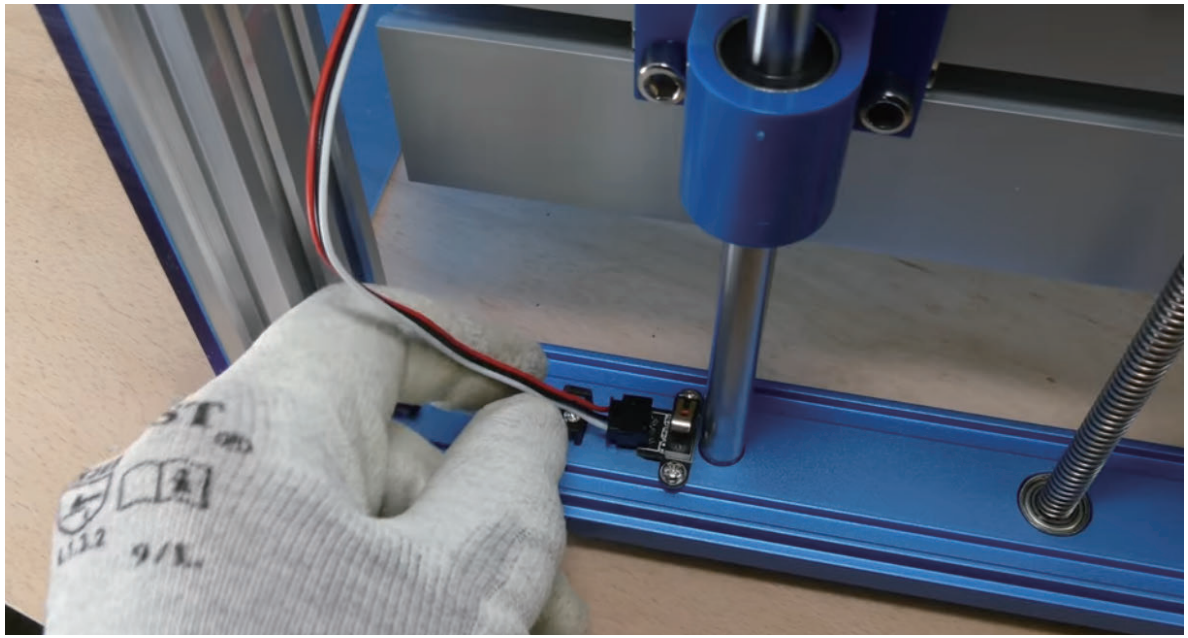
What you will need



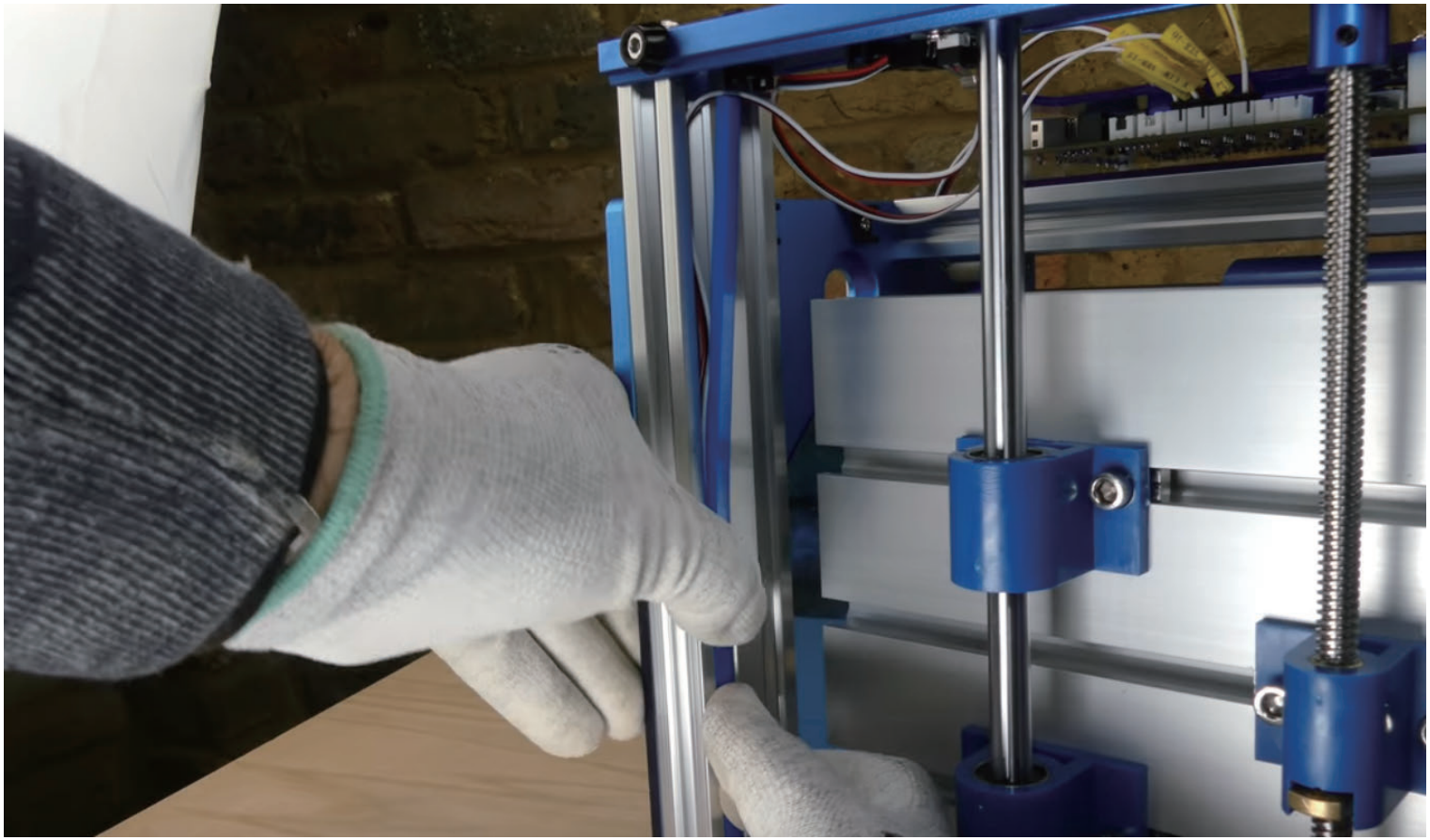
34 Sealing Strip, Y-Axis, 27cm

16 Limit Switch Cable Y LIM+, 30cm
17 Limit Switch Cable Y LIM-, 60cm

Step 1: Connect one end of the Limit Switch Cable Y-LIM (+) to the Y+ limit switch (the one on the step motor side)
Step 2: Connect one end of the Limit Switch Cable Y-LIM (-) to the Y- limit switch

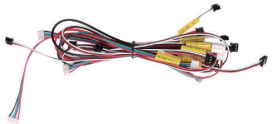


Step 3: Connect both cables to the corresponding sockets on the control board
Step 4: Press the sealing strip (flat side out) over the Y- limit switch cable into the side beam.



3.4 Connecting Z-Axis Limit Switches

What you will need

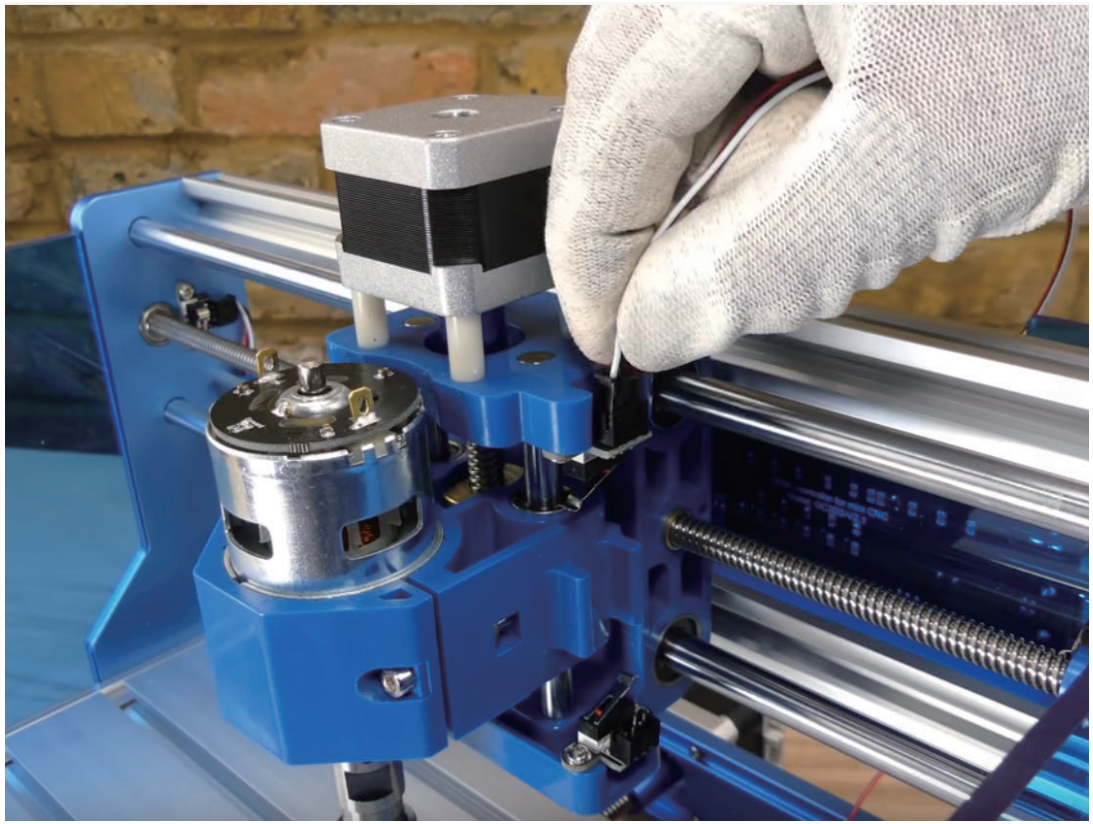


18 Limit Switch Cable Z LIM-, 34cm

19 Limit Switch Cable Z LIM-, 40cm

Step 1: Insert the short Limit Switch Cable Z-LIM (+) into Z+ limit switch (on top, near the stepper motor). Connect the other end to main control board.

Step 2: Insert the long Limit Switch Cable Z-LIM (-) into Z- limit switch (toward the spindle holder). Connect the other end to main control board.



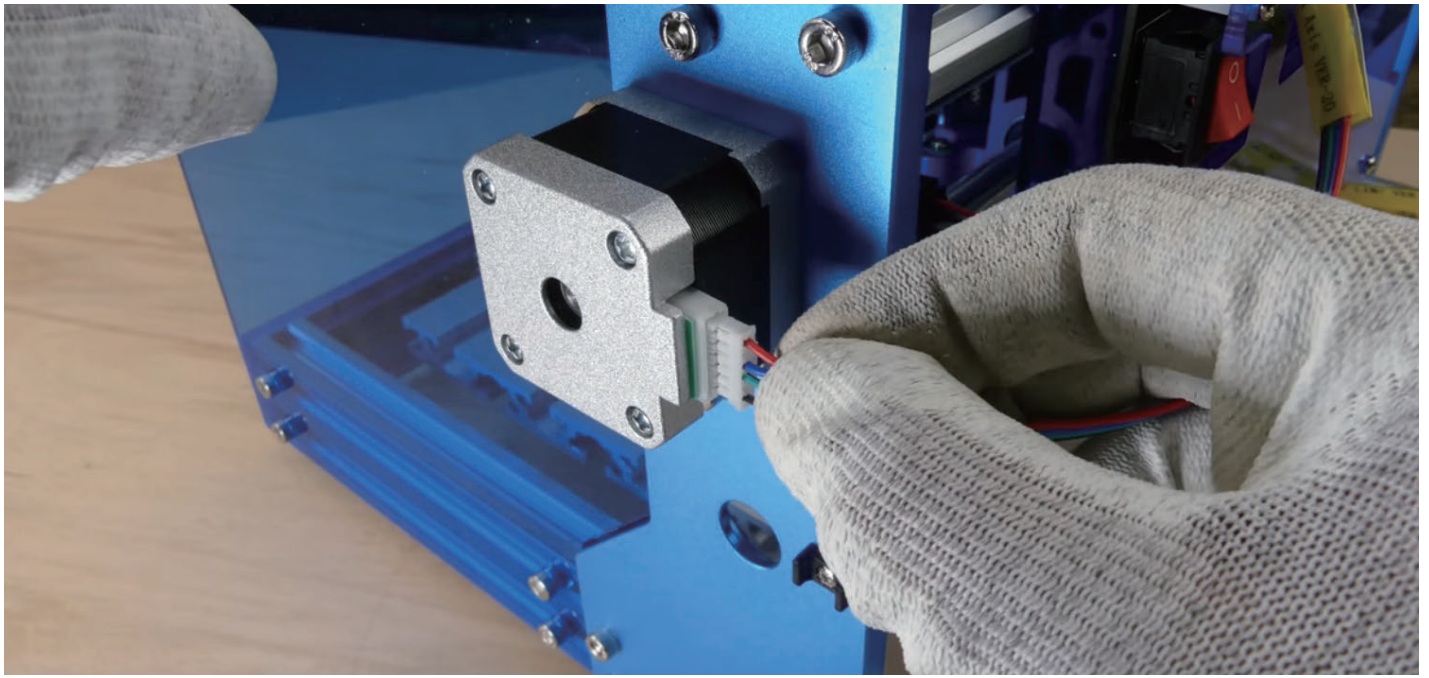
3.5 Connecting the Stepper Motor cables

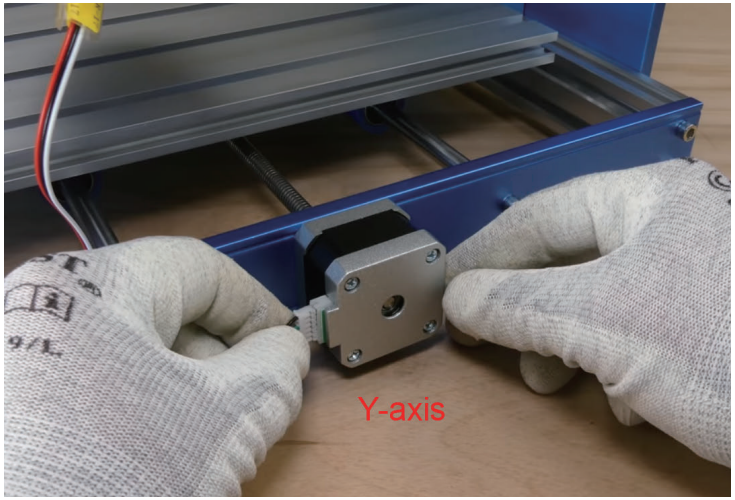
What you will need

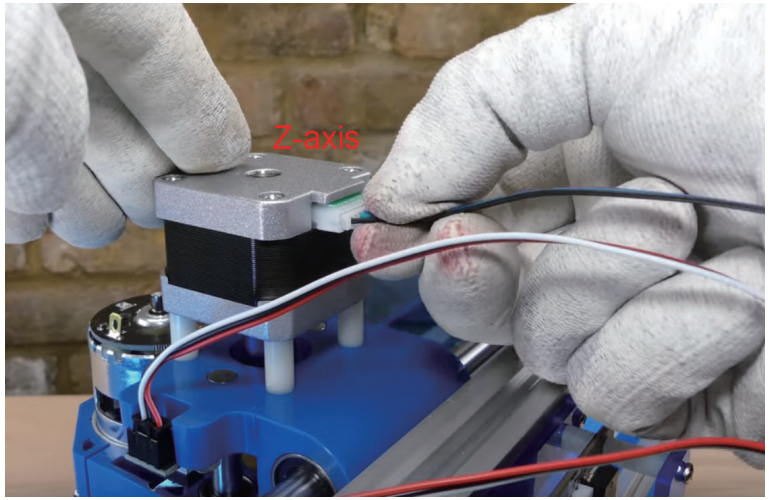
20 Stepper Motor Cable, X-Axis, 17cm
21 Stepper Motor Cable, Y-Axis, 52cm
22 Stepper Motor Cable, Z-Axis, 28cm

(Stepper Motor Cables are cables with white plugs on both ends)

Step 1: Locate all three stepper motors. X-Axis stepper motor is on the side of the machine. Y-Axis stepper motor is on the bottom of the machine in the back. Z-Axis stepper motor is on top of the machine. As shown in the photos below.







Step 2: Connect each stepper motor with the labeled cable to the main control board. Note that the end of 4-pin plug goes to the main board.

3.6 Connecting the Spindle cables

What you will need

23 Spindle Cable, 35cm

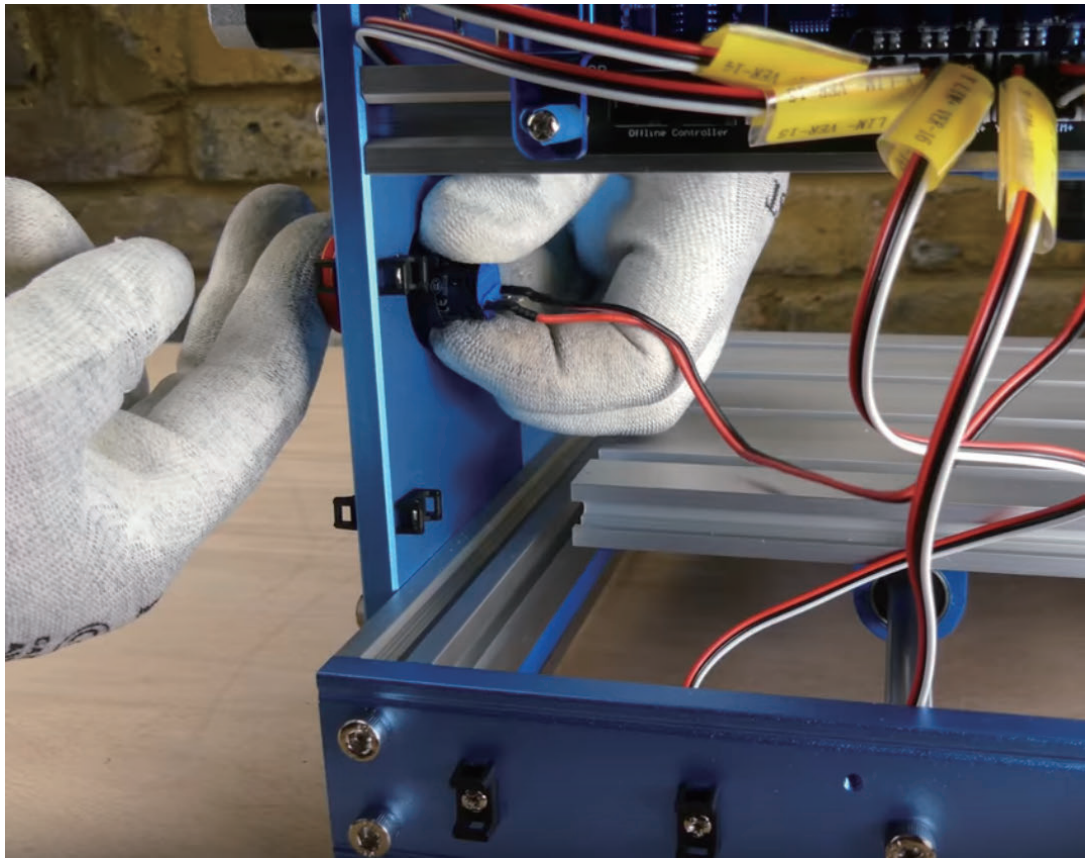
Step 1: Connect spindle cable to the top of the spindle, RED to M+ and BLACK to M-.
Step 2: Connect the other end of the spindle cable to the main control board.

3.7 Install the Emergency Stop button

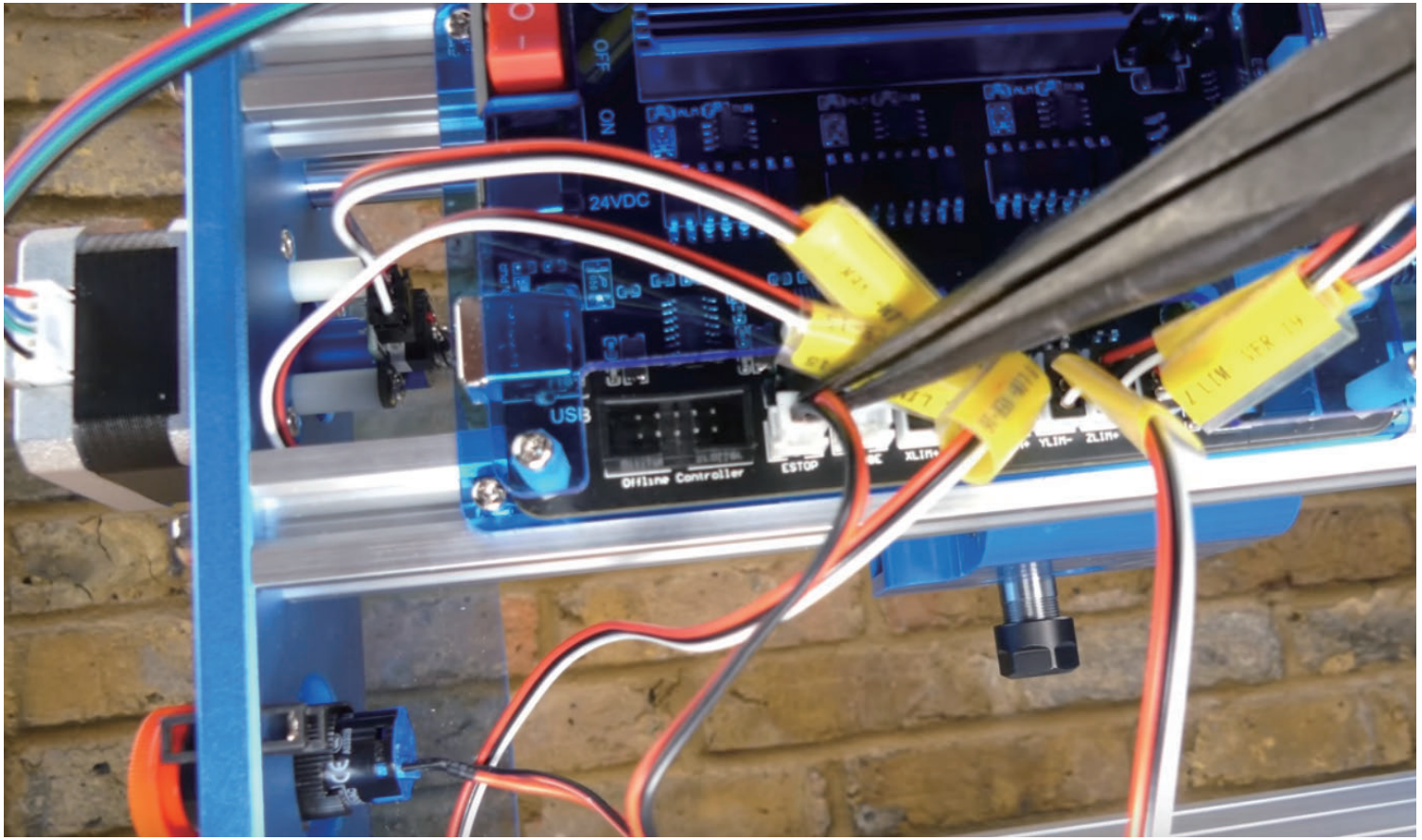
What you will need

24 Emergency Stop Button with Cable

Step 1: Remove black plastic nut and the square lock washer on th back side of the button.
Step 2: Insert Emergency button into the pre-cut hole underneath the X-Axis Stepper Motor. See Picture A.
Step 3: From the other side of the metal plate(inside), Install the square lock washer (with pointy corners facing the metal plate) then black plastic nut back onto the Emergency button and tighten down.

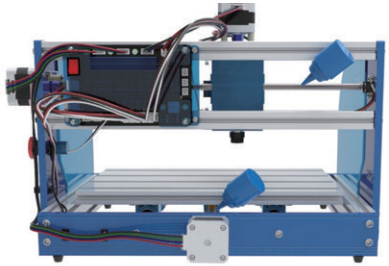


Step 4: Connect the cable to the main control board. See position show below.



Usage: *Pushing the button will trigger emergency stop. The button will stay engaged once pushed. The button can only released when twisted clockwise. This prevents double pushing the button from releasing the trigger.*

Final Checks

Lubricate the axes	Lubricate the Threaded rods on all the axes, It is suggested to use a 'Dry' PTFE based lubricant or similar (Not included) to help stop any dust sticking to the rods. **Note:** Part of the normal maintenance is to periodically clean the threaded rods and re-lubricate as needed.	
Check Cable routing	The bed and anything which will be mounted on it will be able to move fully from front to back without snagging on any cables. The cables connecting the Z Axis and spindle motor will move freely and not restrict the movement of the Z and X axes. Access to the Motherboard 24V power supply and the USB Cable connection are not obstructed.	
Emergency stop button	This is a normally closed switch. Make sure before powering on the Emergency Stop button is released by turning the button in the direction of the arrows and letting it spring out.	
Vref	This controls the current going to the stepper motors. This has been pre-set for the PROVer and no adjustment is necessary or advised.	

A Brief Glossary

Glossary	
Bed	The aluminum base with slots to allow stock to be clamped to it. Moved by the Y axis.
Stock	Whatever material you secure to the bed and cut or engrave.
G-Code	Geometric Code, the language of the commands that the router understands, ca be used for specific commands or combined into a file (normally .nc) of instructions to make something.
Stepper Motor	A motor which turns in single steps or fractions of one (microsteps) These are used to drive the motion of the axes as they can accurately move the axis by a very small amount at a time.
ER11 Collet	The tool holder on the Spindle motor is an ER11 type. The Collet is the compressible part that surrounds the bit and is compressed, holding the bit, by tightening the nut at the bottom of the ER11.
Homing Cycle	The process by which the router moves the spindle round looking for the limit switches to be activated on all the axes so that it has a defined ‘Home’ position.
Origin	The coordinates of the starting position for a particular job, each G-Code file operates in reference to an origin which is often but not always the left/front/top (X/Y/Z) of the material to be cut.
Jogging	A Jog command tells the machine to move on a single axis, normally used to either position the spindle to the start position for a job or just to move it out of the way.

Part 4 - Software Setup

Please visit SainSmart Online Resource Center installing drivers and software for your CNC.

https://docs.sainsmart.com/3018-prover

The driver and software can also be found on the included Micro SD card.

Part 5 - Using Offline Controller

https://docs.sainsmart.com/3018-prover-offline

Part 6 - Troubleshooting

Hopefully everything works as expected, but if not:

Symptom	Check
Candle shows a Serial port error message in the Console window	The USB cable is inserted correctly. The USB Driver has been installed correctly. The correct COM Port and a baud rate of 115200 are set in Candle. The Offline Controller is not connected.
Candle can communicate with the router but nothing moves.	Ensure the On/Off switch on the motherboard is ON. Verify the 24V external power supply is connected correctly.
Router is totally unresponsive to Candle	The Emergency Stop Button is in the Out position.
An Axis does not move	The Stepper motor wiring is correct.
The wrong Axis moves	The Stepper motors are connected to the correct motherboard ports.
Limit switch does not work	The cable connections for the limit switch.
Spindle motor does not turn	The cable connections for the spindle motor.
Spindle motor turns but the LED does not light	The Spindle motor cable Red wire is connected to M+ on the spindle motor and the Black wire to the M-.
Limit switch LED stays on	The spindle is not too close to the edge of the axis.
Homing Cycle fails	Limit switch connections and cabling.
Z-Probe fails	The bit is conductive and clean. The Z-Probe connection to the motherboard is correct.
After running a Z-Probe the tip of the bit is not level with the top of the bed	Adjust the Z-Probe base height in the Z-Probe code accordingly

We would like to extend sincere gratitude to techydiy and Graham Bland for contributing to this manual.

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