

# Mill One V2 Assembly Manual

Throughout this policy the words "we", "us" and "our", or "Sienci Labs" will be used to refer to Sienci Labs Inc. herein and "Mill One" or "machine" will refer to Sienci Labs' Sienci Mill One product. Additionally, the words "you", "your", "user", and "operator" will refer to the original purchaser/customer, user, or viewer of any of the products or media provided by or through Sienci Labs.

## Machine Disclaimer

The listed "Safety Warnings and Guidelines" outline the necessary precautions that should be taken any time the machine is operated. By assembling our provided kit, the product user takes on all the associated liability pertaining to the operation and maintenance of the Mill One. Sienci Labs will not be held responsible for any damages to property or injury incurred on the operator or bystanders if any alterations are made to the design or assembly of our machine. Although care is taken to ensure the accuracy of information made available on our website ([www.Sienci.com](http://www.Sienci.com)) and other forms of media, Sienci Labs will not be held liable for any inaccuracies, errors, or inconsistencies in website content, the content of files linked to by our website, references made to external websites herein, and/or other information produced by Sienci Labs. The information which has been made available will not be applicable to all situations and is subject to change without notice so it should not substitute for the discretion of the user. Variability in machine accuracy and performance may occur due to improper machine assembly by the user, as such, Sienci Labs takes on no responsibility for variation between claimed machine specifications and the performance of the user's machine from improper assembly.

## Safety Warnings and Guidelines

1. Be sure to carefully follow provided machine assembly instructions before machine use to ensure operator safety.
2. All wires must be appropriately positioned before beginning the operation of this machine. Cutting a "live" wire may cause exposed metal parts of the routing/trimming tool to become electrified and shock the operator.
3. Ensure the machine is placed on a flat surface and in a well-ventilated space before operation.
4. Always wear eye protection during machine operation.
5. Always wear hearing protection during extended machine operation based on proximity to machine.
6. Materials may release chemicals that are toxic or unsafe to inhale when cut. Always check the Material Safety Data Sheet (MSDS) of the material in question before cutting. Always cover exposed skin and wear appropriate airway protection (e.g. dust mask/respirator) specific to the material used and its application.
7. Any workpiece must be appropriately secured before starting a cutting routine by clamps or other practical securing method. Holding the material by hand or employing any other unstable form of securing will lead to unsafe loss of machine control.
8. Cutting bits used for the Mill One should be used at the discretion of the user. Bits are sharp and can crack and break without notice so appropriate care should be taken by the user while manipulating and installing them. Carefully check bits for cracks or damage before operating the machine and replace any cracked or unfit bits immediately.
9. Carefully inspect any consumable material before use on the machine, any unforeseen inconsistency in material hardness or material quality may cause damage to the machine.
10. Keep away from all moving parts during machine operation.
11. Before beginning a cutting job, ensure the router/trimmer runs properly. Immediately disable the tool if visible vibration or wobble occurs. This might indicate a damaged tool or an improperly installed bit.
12. Make sure the bit is not contacting the workpiece before the router/trimmer tool is turned on.
13. Do not leave the machine running unattended, the machine should only be operated with the operator present.
14. Do not touch the cutting bit immediately after use. It may be hot and could burn the operator.
15. Use bits that are appropriate to the material and cutting speed used.

# LIST OF PARTS



M3-8  
24x



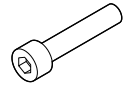
M5-N  
10x



M5-NE  
6x



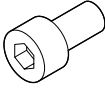
M5-W  
12x



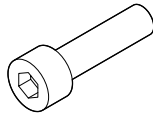
M5-25  
16x



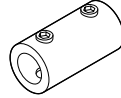
M8-N  
10x



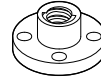
M8-15  
28x



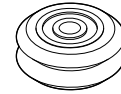
M8-25  
10x



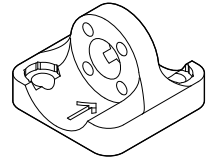
SC  
3x



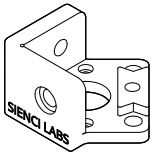
A-N  
3x



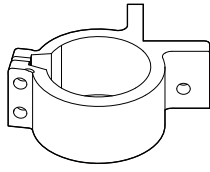
VW  
12x



P-NH  
3x



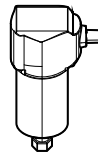
P-AM  
5x



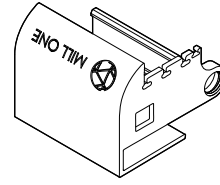
P-RM  
1x



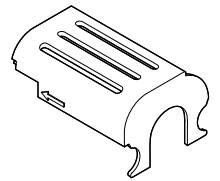
P-RB  
1x



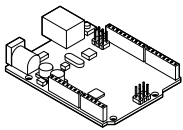
RO  
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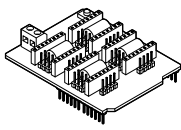
P-EH  
1x



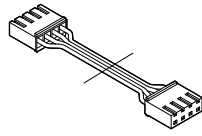
P-EC  
1x



E-ARD  
1x



E-CNC  
1x



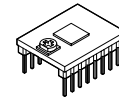
E-C  
3x



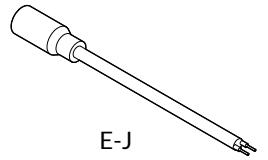
E-HJ  
6x



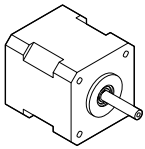
E-SDH  
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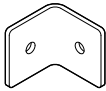
E-SDC  
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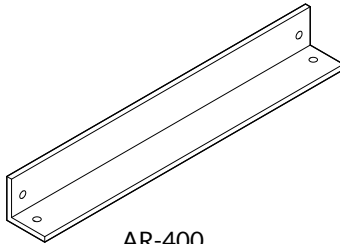
E-J  
1x



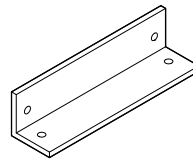
SM  
3x



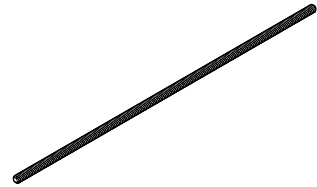
M-FB  
8x



AR-400  
2x



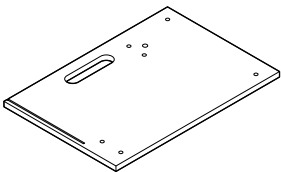
AR-200  
1x



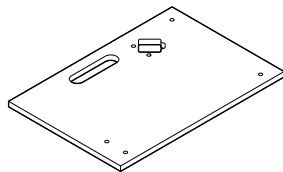
LS-400  
2x



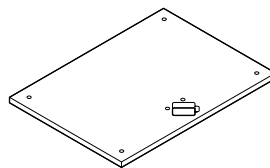
LS-200  
1x



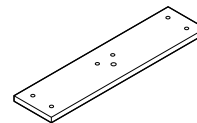
F-L  
1x



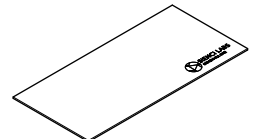
F-R  
1x



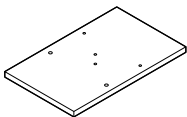
F-B  
1x



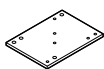
F-F  
1x



F-AC  
1x



G-Y  
1x



G-XZ  
1x

## Tools:



2



2.5



4



6



Phillips



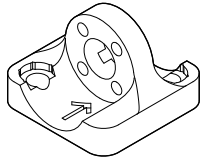
8mm  
Wrench



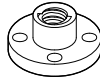
SIENCI LABS  
DESKTOP CNC MILLING

# STEP 1

Lead Screw  
Nut Holding  
Assembly



P-NH  
**3x**



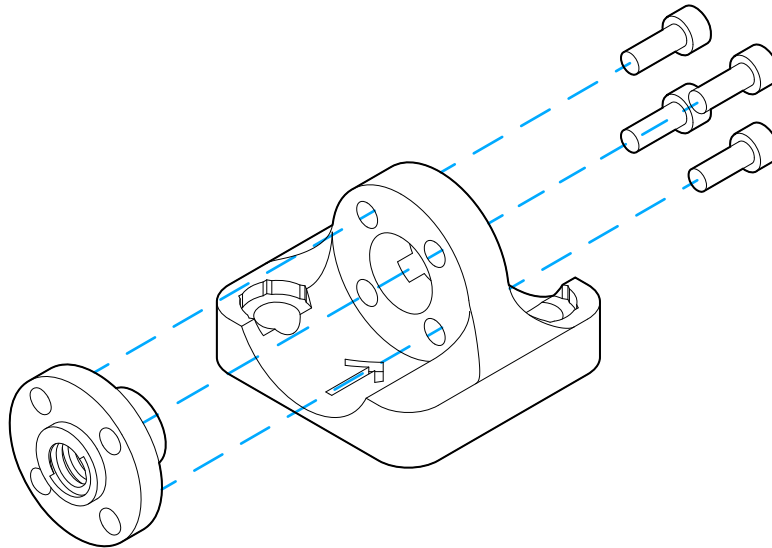
A-N  
**3x**



M3-8  
**12x**

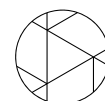


2.5  
Allen



**3x**

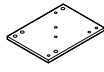
\*\*If you have purchased the anti-backlash nut kit for your Sienci Mill One, then the lead screw assembly above will be replaced by the anti-backlash nut assembly. Follow the instructions provided on the bag of the kit instead.



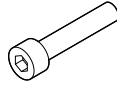
**SIENCI LABS**  
DESKTOP CNC MILLING

## STEP 2

XZ Gantry  
Assembly



G-XZ  
**1x**



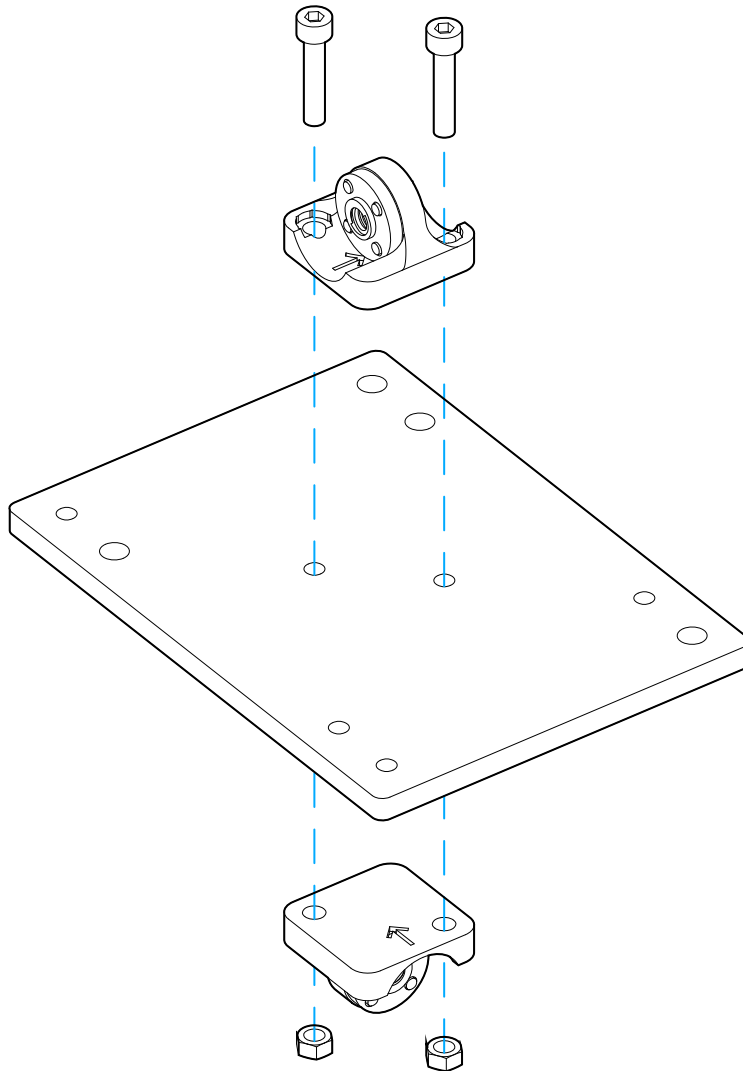
M5-25  
**2x**



M5-N  
**2x**

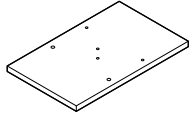


4  
Allen

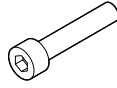


# STEP 3

Y Gantry  
Assembly



G-Y  
**1x**



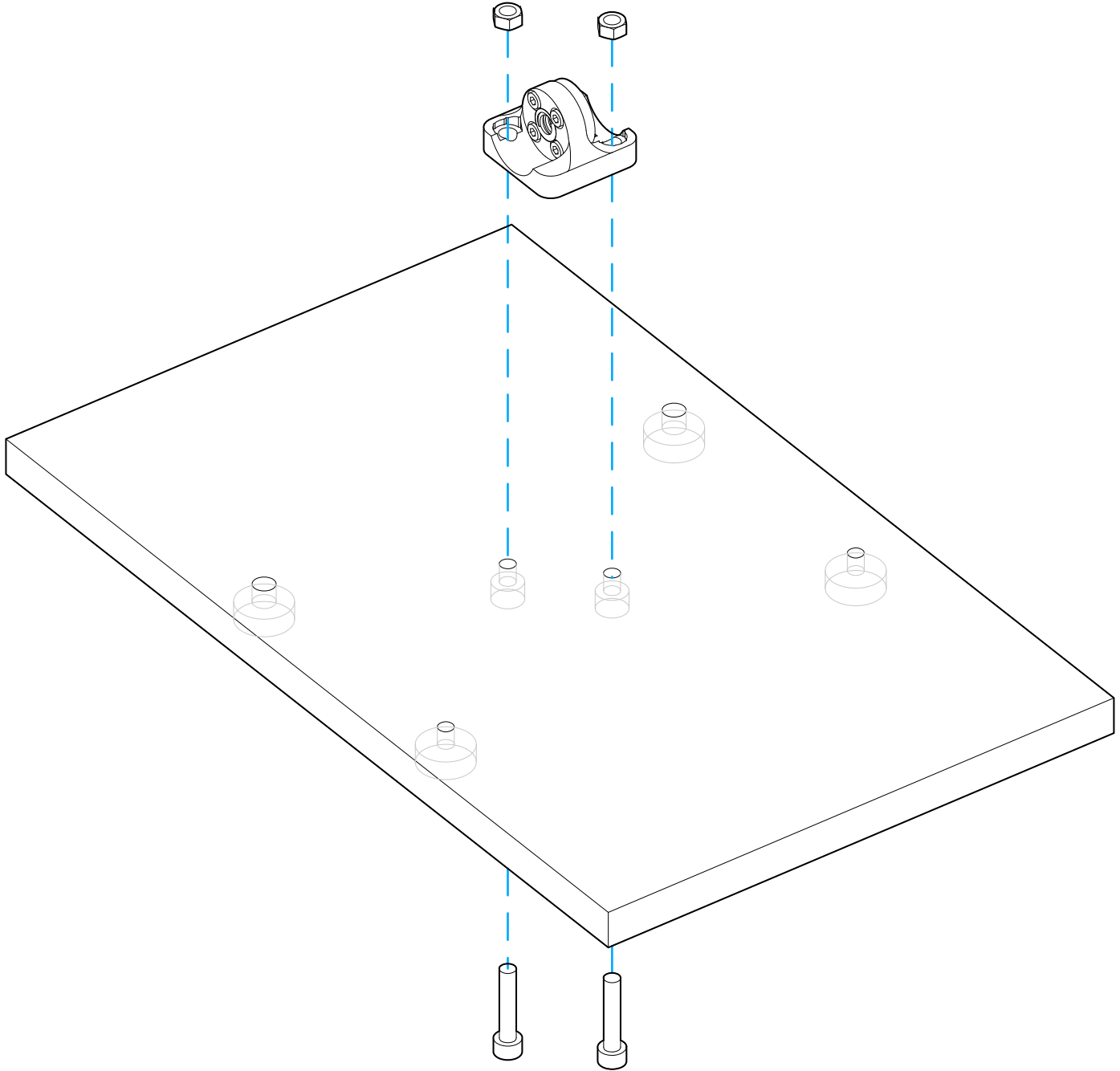
M5-25  
**2x**



M5-N  
**2x**



4  
Allen

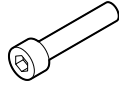


# STEP 4

## XZ Gantry Assembly



VB  
4x



M5-25  
4x



M5-W  
4x



M5-N  
2x



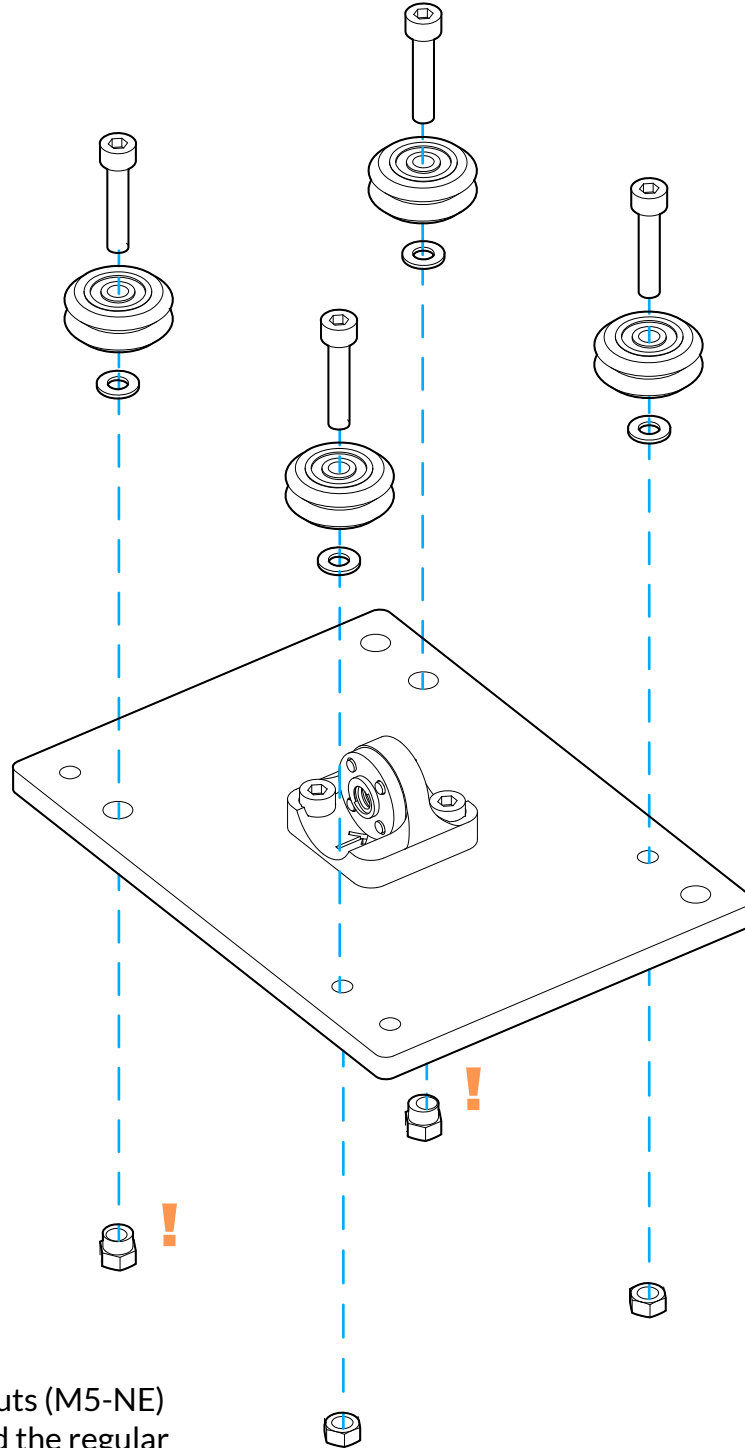
M5-NE  
2x



4  
Allen



8mm  
Wrench



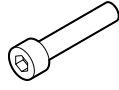
! Match the eccentric nuts (M5-NE) to the larger holes, and the regular nuts (M5-N) to the smaller holes

# STEP 5

## XZ Gantry Assembly



VB  
4x



M5-25  
4x



M5-W  
4x



M5-N  
2x



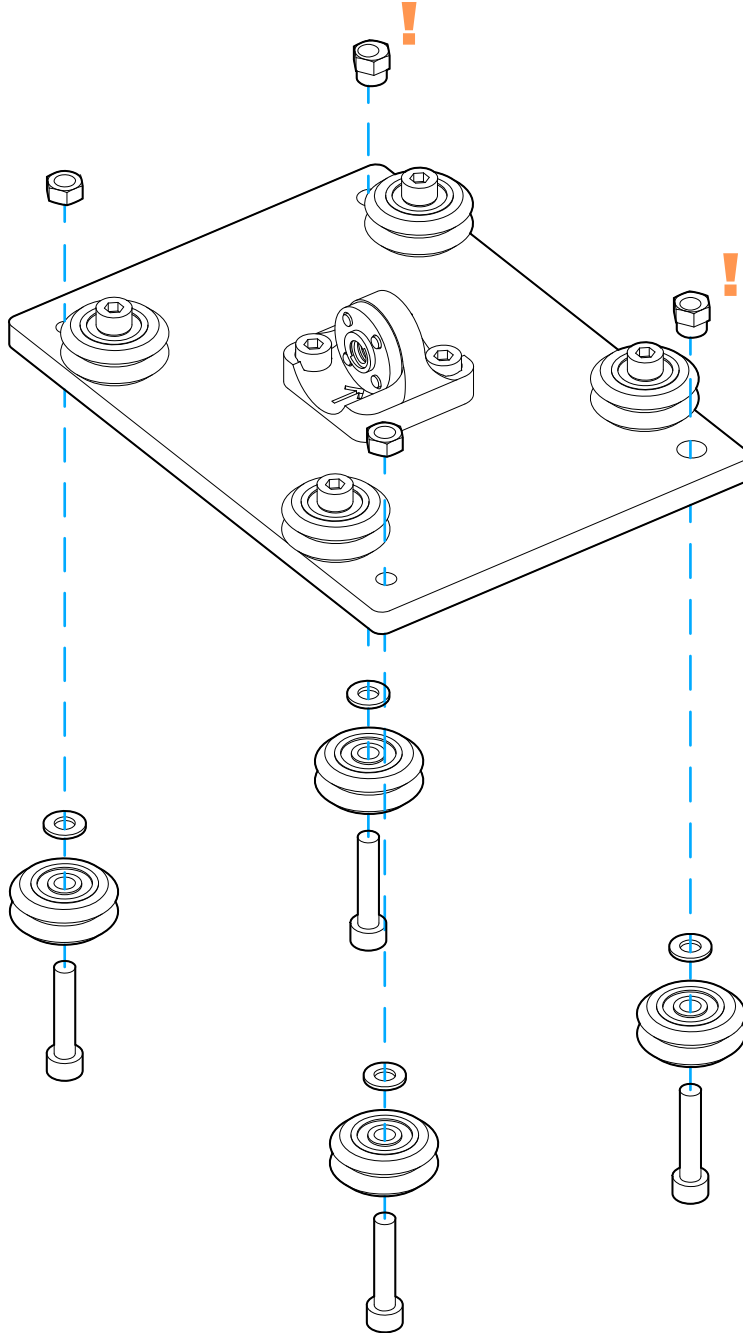
M5-NE  
2x



4  
Allen



8mm  
Wrench



! Match the eccentric nuts (M5-NE) to the larger holes, and the regular nuts (M5-N) to the smaller holes

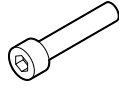


# STEP 6

## Y Gantry Assembly



VB  
4x



M5-25  
4x



M5-W  
4x



M5-N  
2x



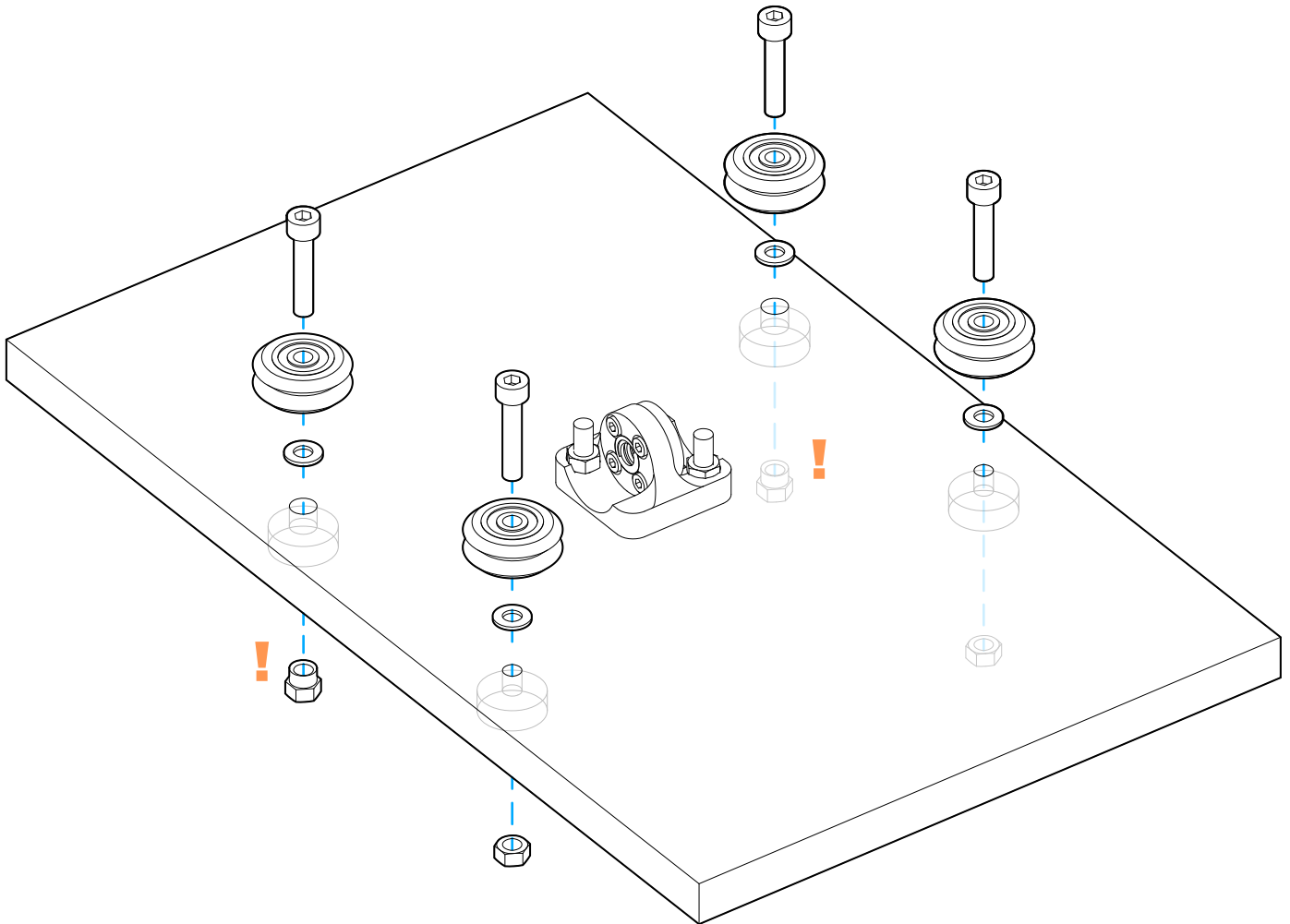
M5-NE  
2x



4  
Allen



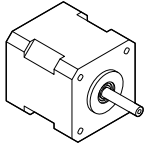
8mm  
Wrench



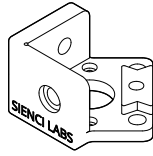
! Match the eccentric nuts (M5-NE) to the larger holes, and the regular nuts (M5-N) to the smaller holes

## STEP 7

Mounting the  
Motors to the  
Rails



SM  
3x



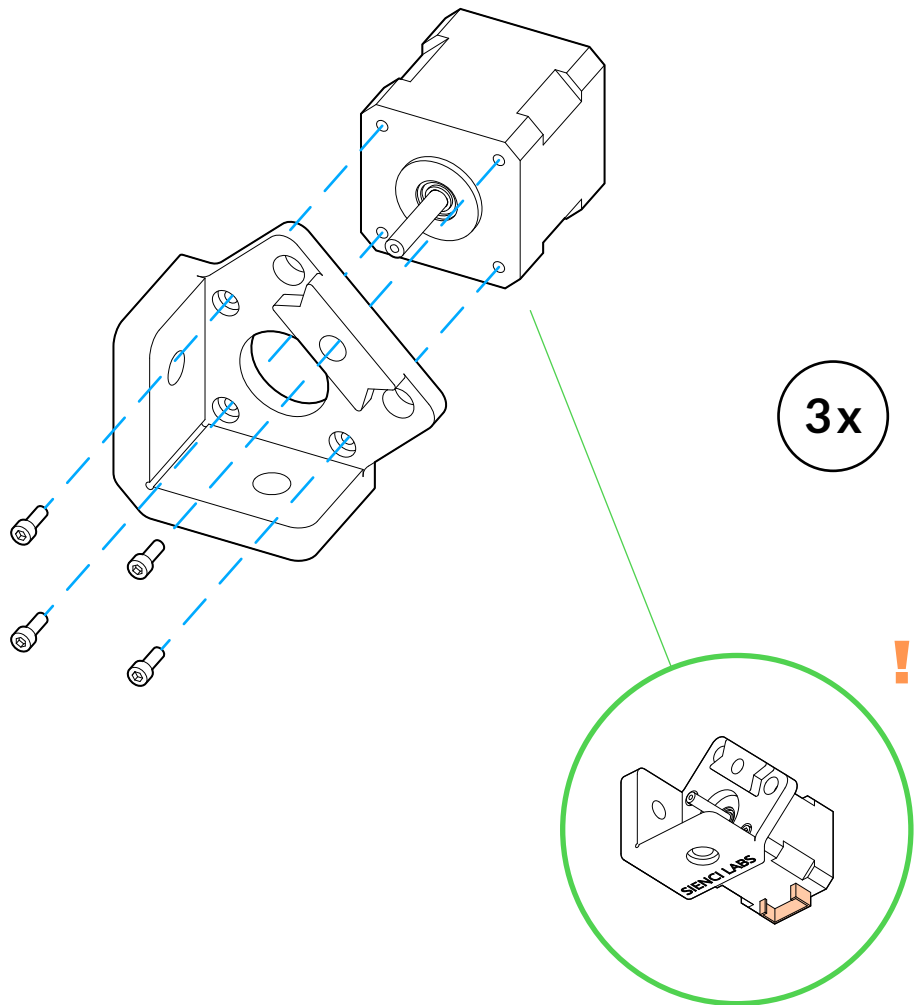
P-AM  
3x



M3-8  
12x



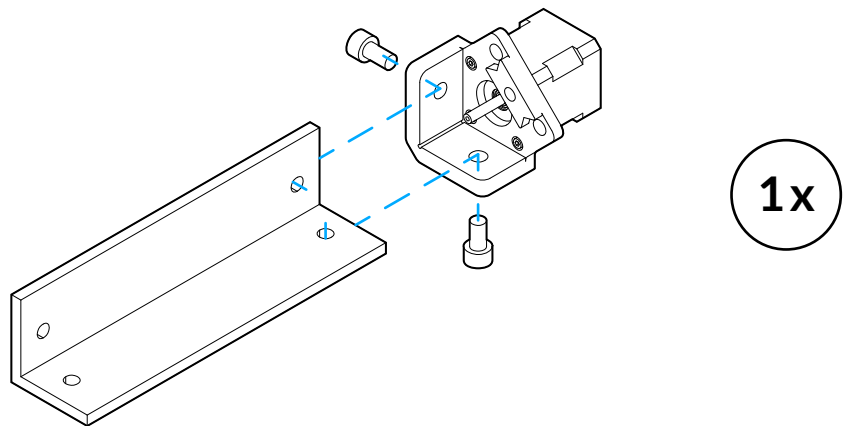
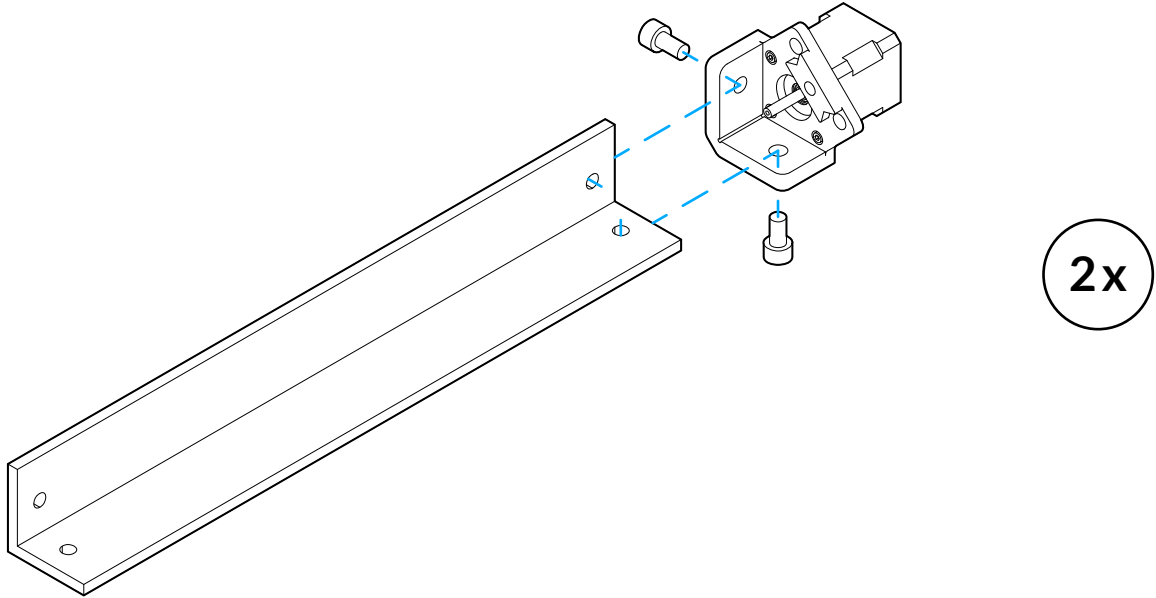
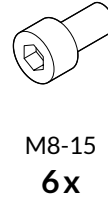
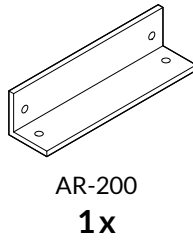
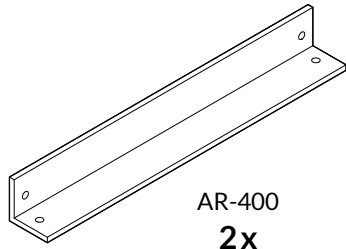
2.5  
Allen



! Make sure that the motor connector is facing downwards

# STEP 8

Mounting the  
Motors to the  
Rails

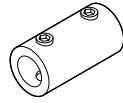


## STEP 9

Attaching  
Z-Lead Screw  
to XZ Gantry



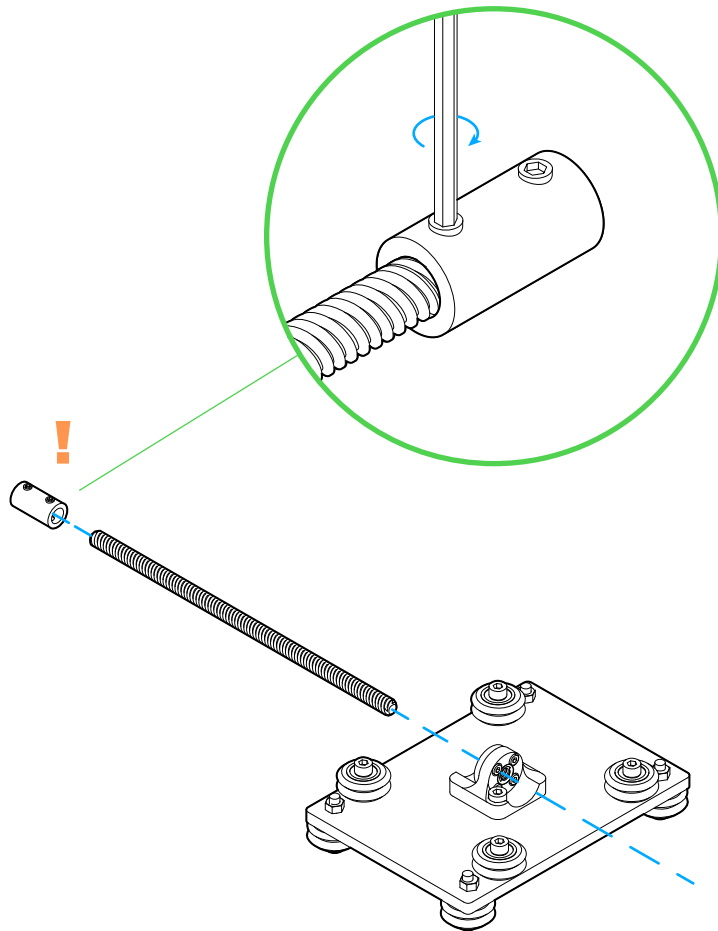
LS-200  
**1x**



SC  
**1x**



2  
Allen



**!** Make sure to push coupler all the way onto lead screw before tightening

## STEP 10

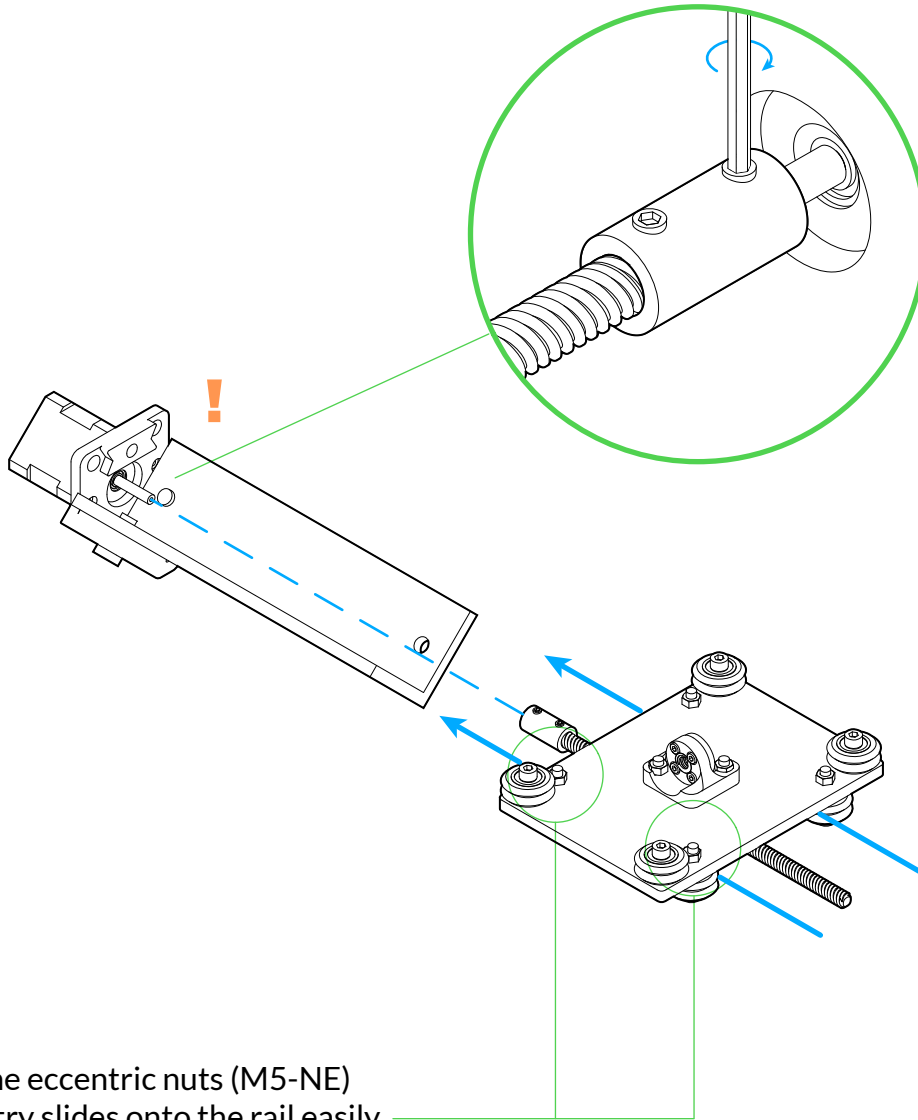
Attaching the  
Z-Rail to the XZ  
Gantry



2  
Allen



8mm  
Wrench



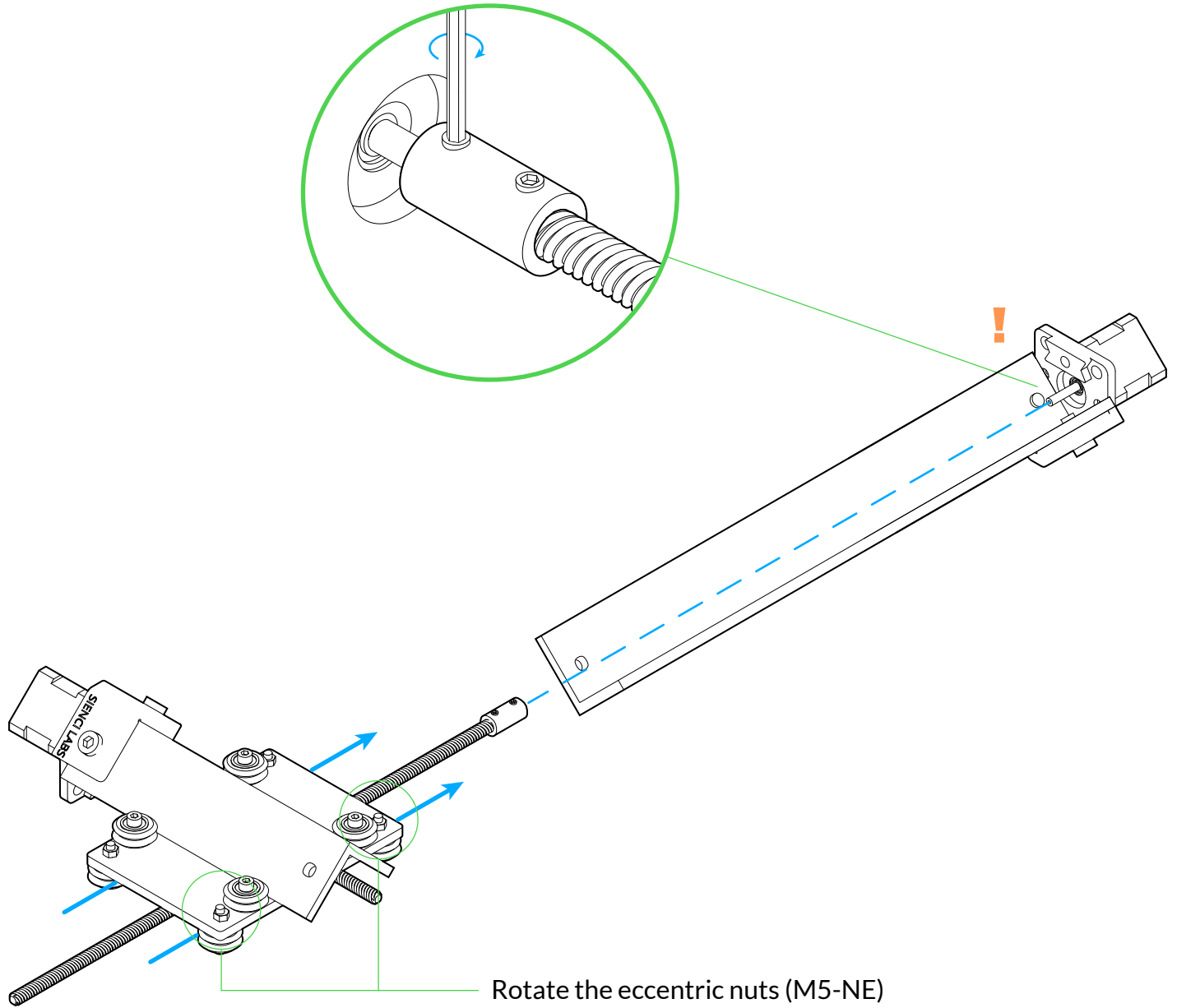
! Make sure to push coupler all the way onto  
motor shaft before tightening



## STEP 12

Attaching the  
X-Rail to the XZ  
Gantry

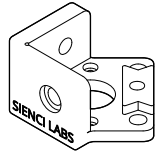
2  
Allen  
8mm  
Wrench



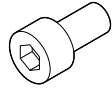
! Make sure to push coupler all the way onto  
motor shaft before tightening

## STEP 13

Attaching the  
Z-Rail to the XZ  
Gantry and  
Calibration



P-AM  
**1x**



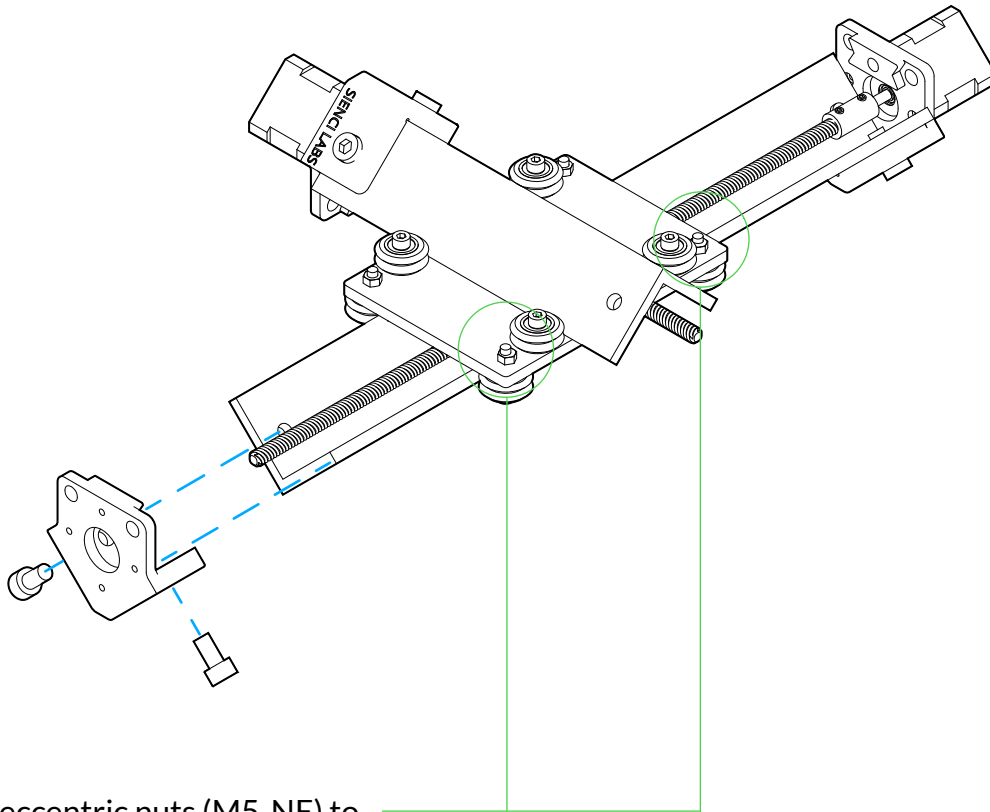
M8-15  
**2x**



6  
Allen



8mm  
Wrench

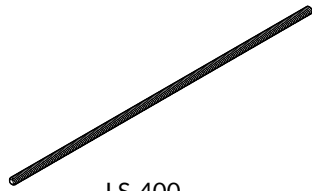


Rotate the eccentric nuts (M5-NE) to tighten the grip of the wheels on the rail. Tighten until you can no longer rotate the V Groove bearings (VB) with your fingers.

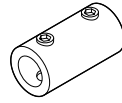


## STEP 15

Attaching Lead  
Screw to Y  
Gantry



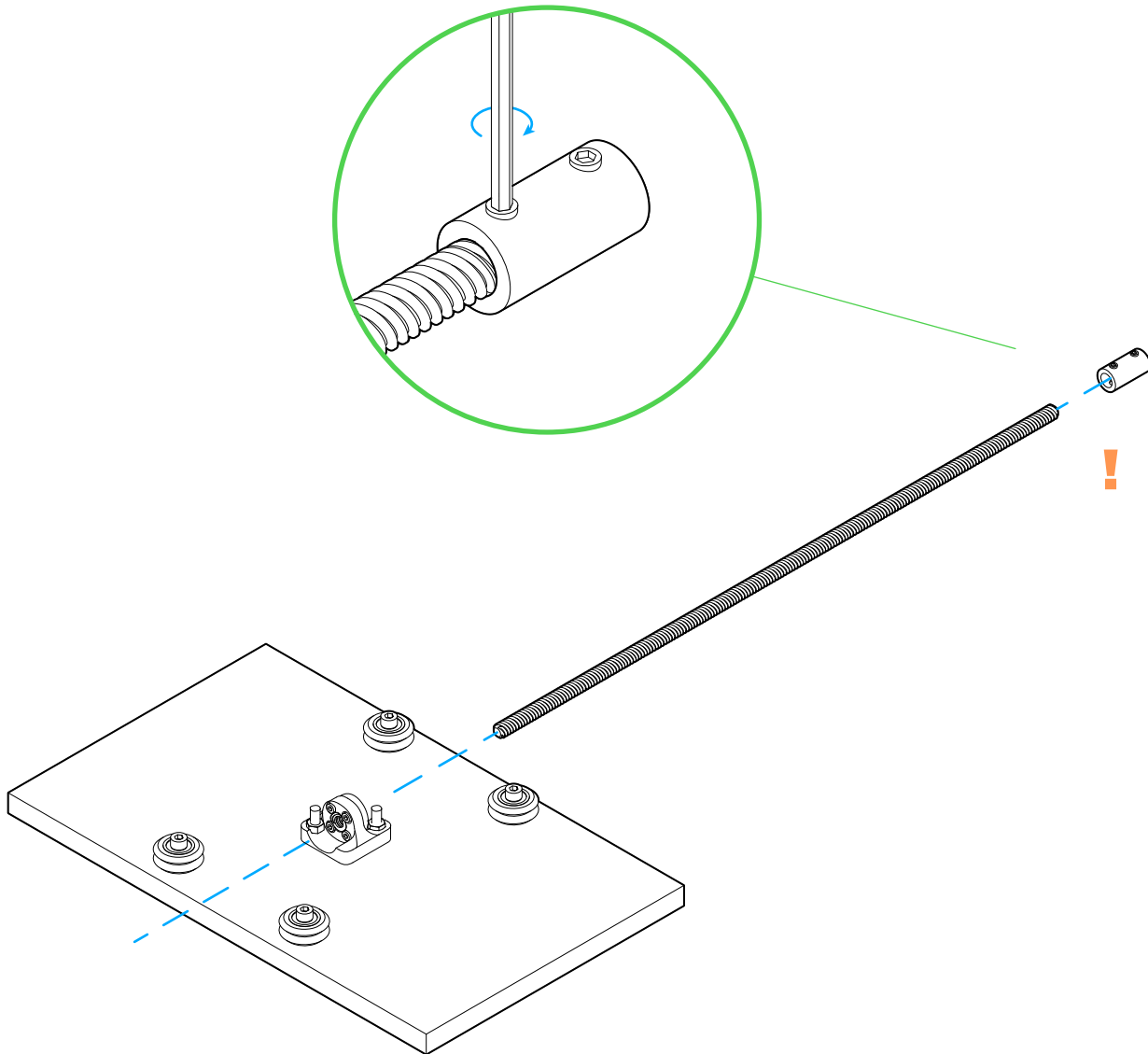
LS-400  
1x



SC  
1x



2  
Allen

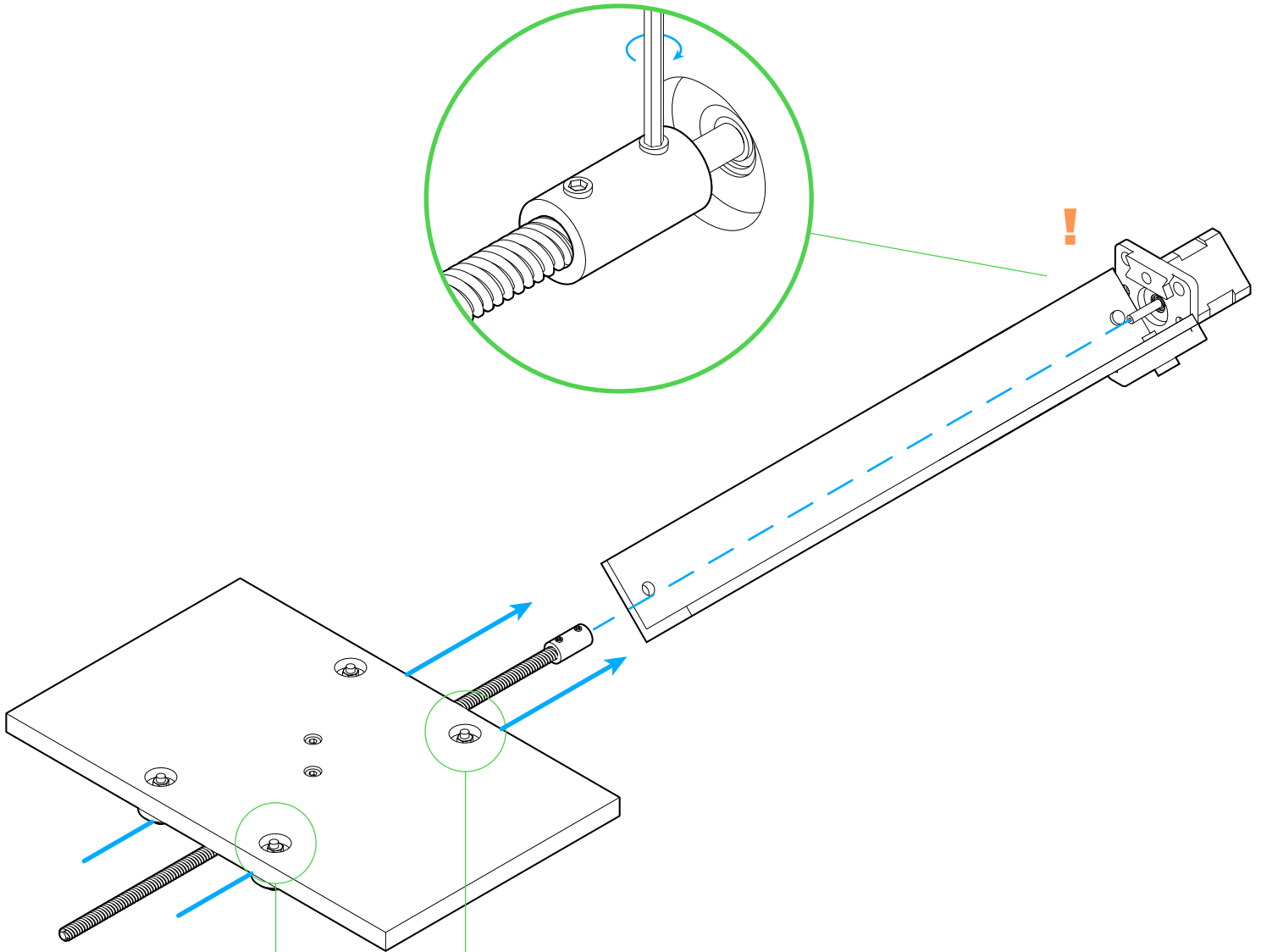


! Make sure to push coupler all the way onto lead screw before tightening

## STEP 15

Attaching the  
Y-Rail to the Y  
Gantry

2  
Allen  
8mm  
Wrench

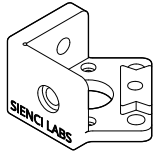


Rotate the eccentric nuts (M5-NE)  
until gantry slides onto the rail easily

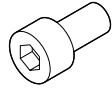
! Make sure to push coupler all the way onto  
motor shaft before tightening

## STEP 16

Attaching the  
Y-Rail to the Y  
Gantry



P-AM  
**1x**



M8-15  
**2x**

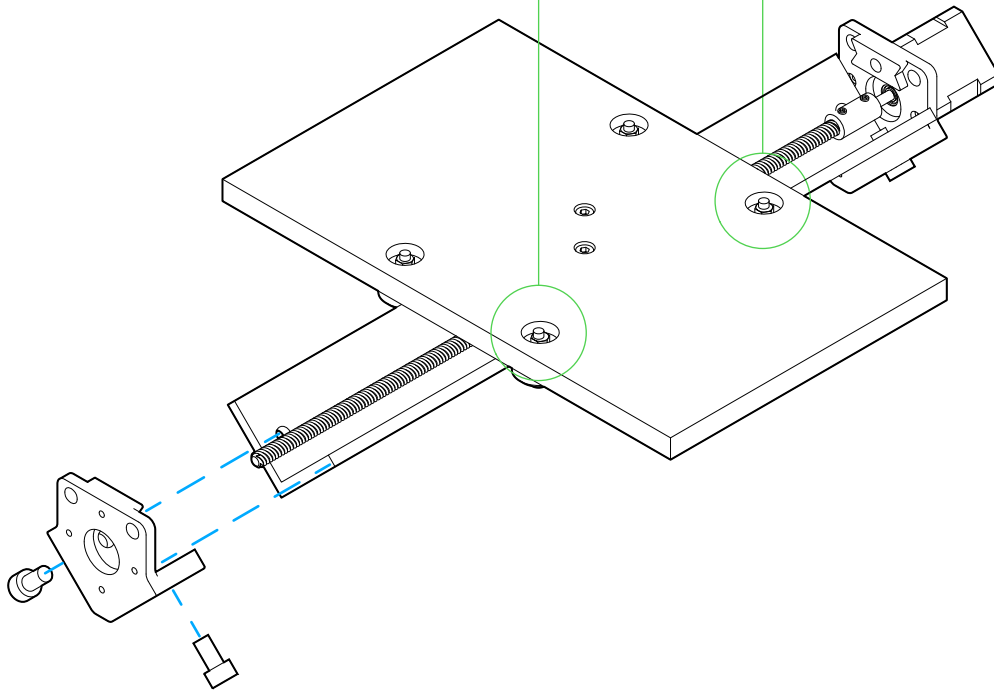


6  
Allen



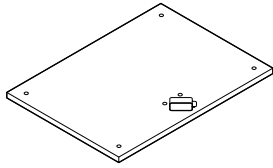
8mm  
Wrench

Rotate the eccentric nuts (M5-NE) to  
tighten the grip of the wheels on the rail.  
Tighten until you can no longer rotate  
the V Groove bearings (VB) with your  
fingers.

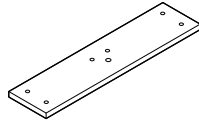


# STEP 17

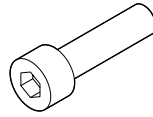
Attaching Y  
Gantry to  
Frame



F-B  
**1x**



F-F  
**1x**



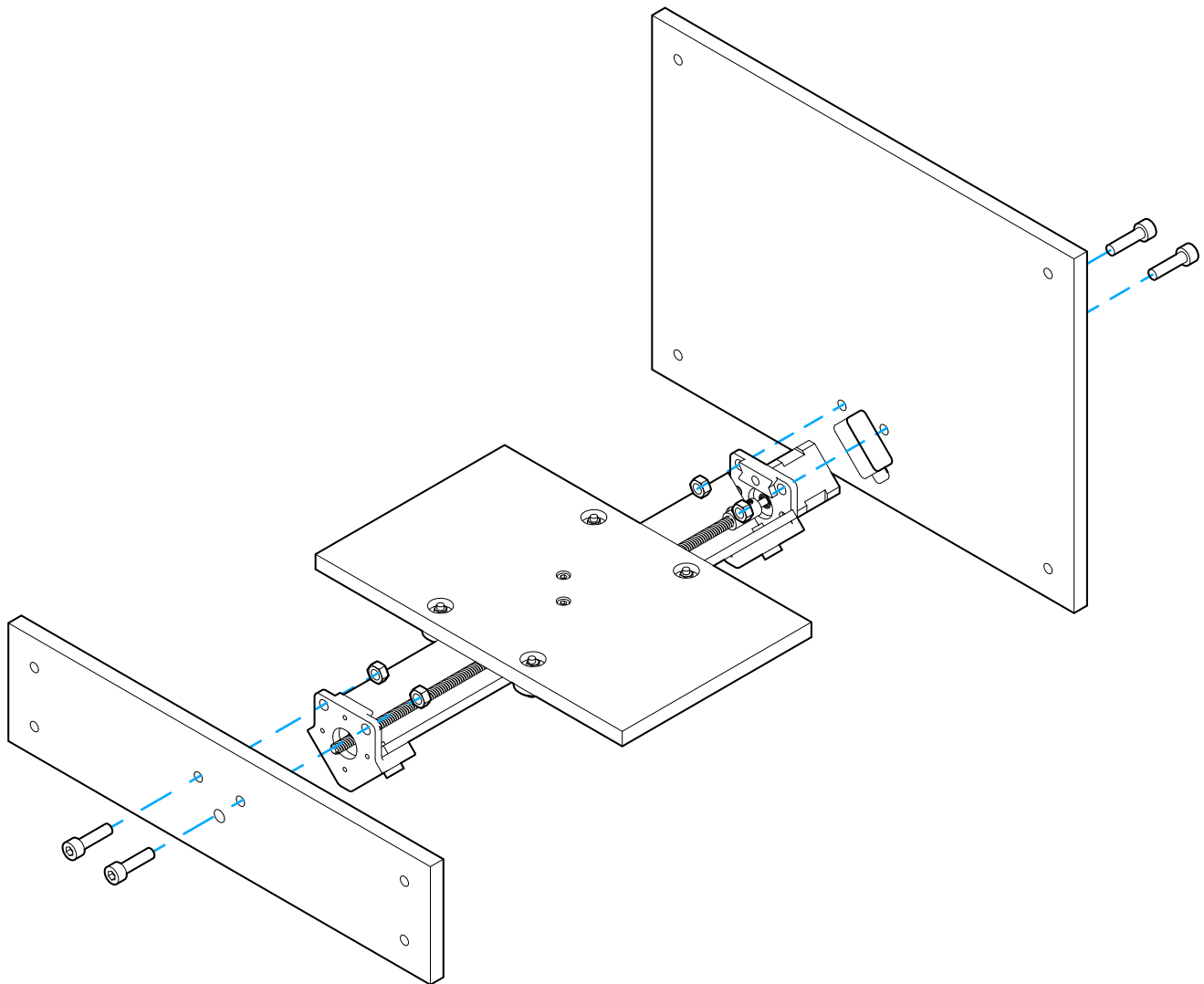
M8-25  
**4x**



M8-N  
**4x**

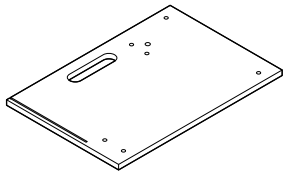


6  
Allen

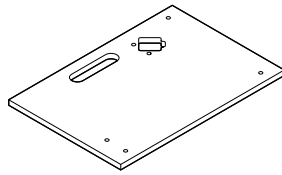


# STEP 18

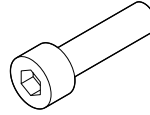
Attaching XZ  
Gantry to  
Frame



F-L  
**1x**



F-R  
**1x**



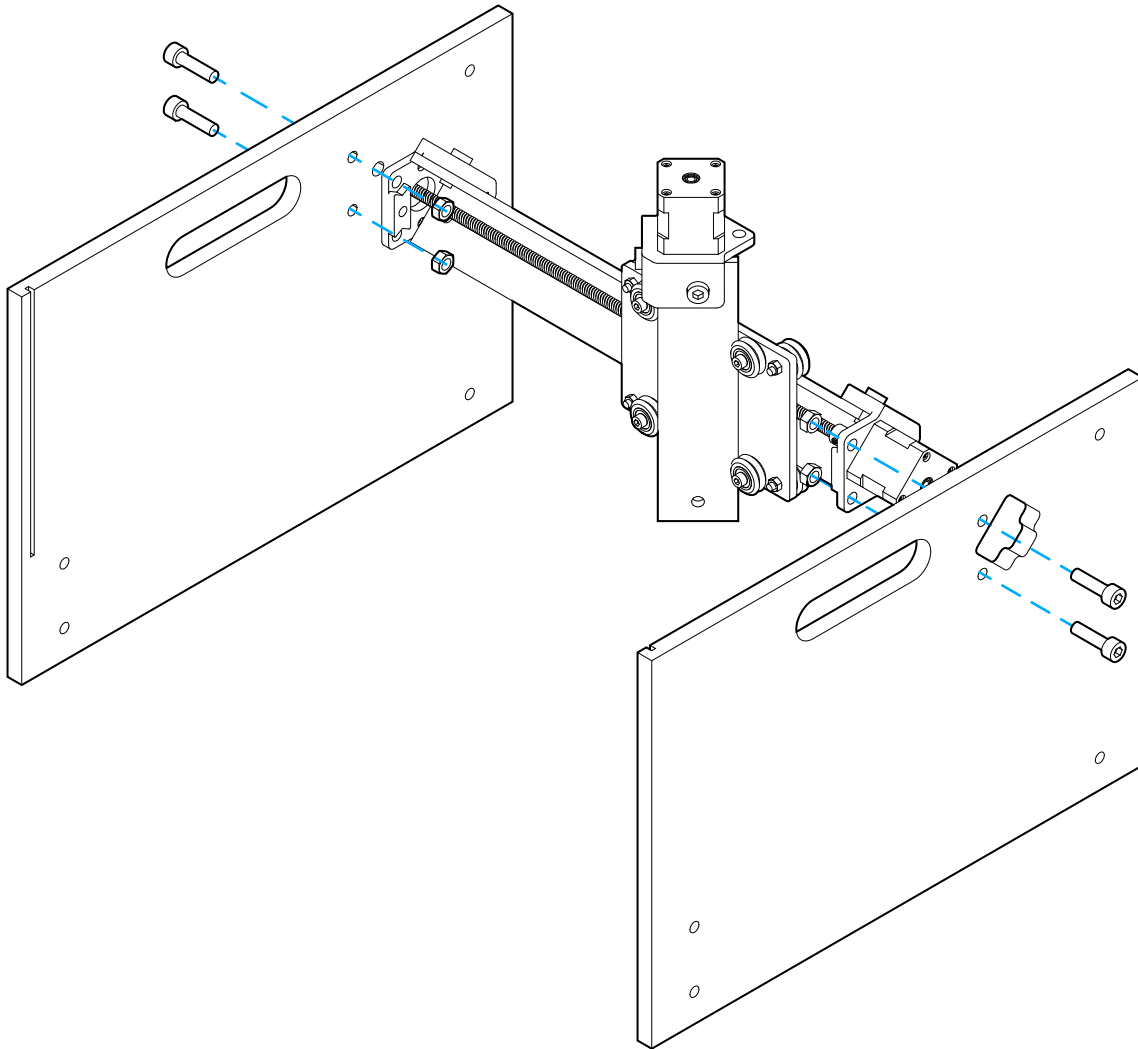
M8-25  
**4x**



M8-N  
**4x**

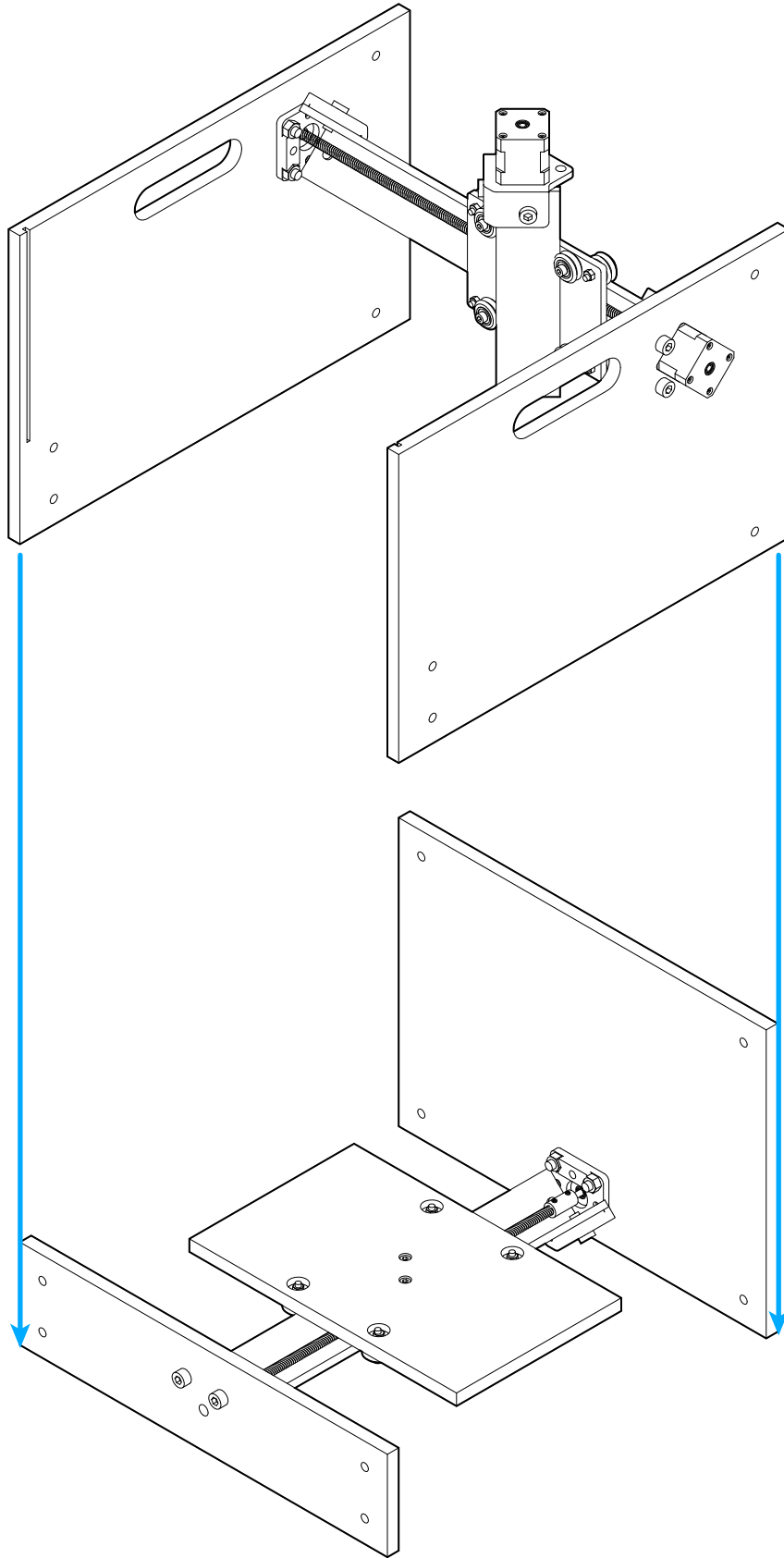


6  
Allen



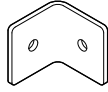
# STEP 19

Attaching the Assemblies

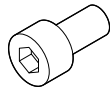


## STEP 20

Attaching  
Frame Brackets



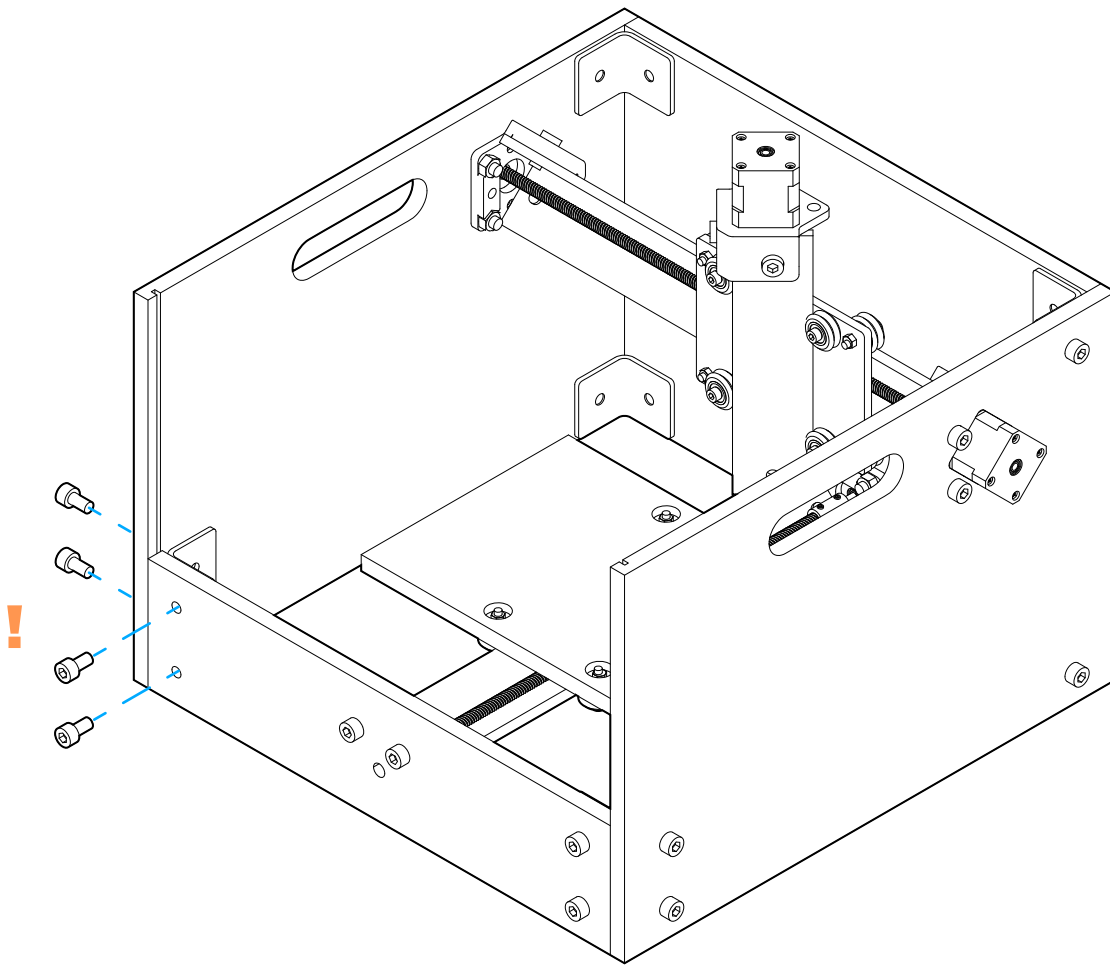
M-FB  
**8x**



M8-15  
**16x**



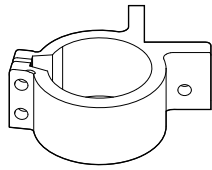
6  
Allen



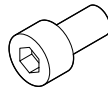
**!** Twist on bolts on all corners loosely,  
then tighten on a flat surface

# STEP 21

Attaching  
Router Mount



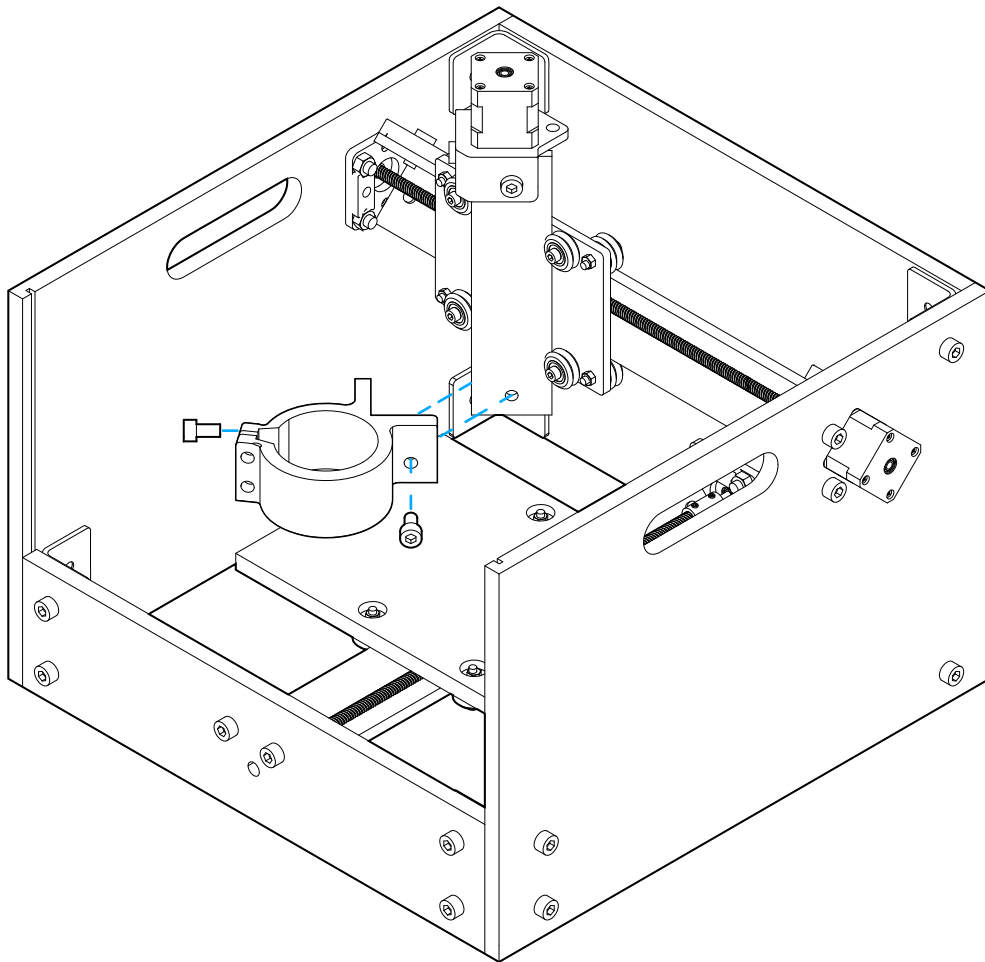
P-RM  
**1x**



M8-15  
**2x**



6  
Allen



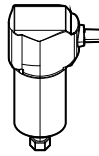


## STEP 22

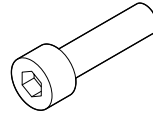
### Attaching Router



P-RB  
1x



RO  
1x



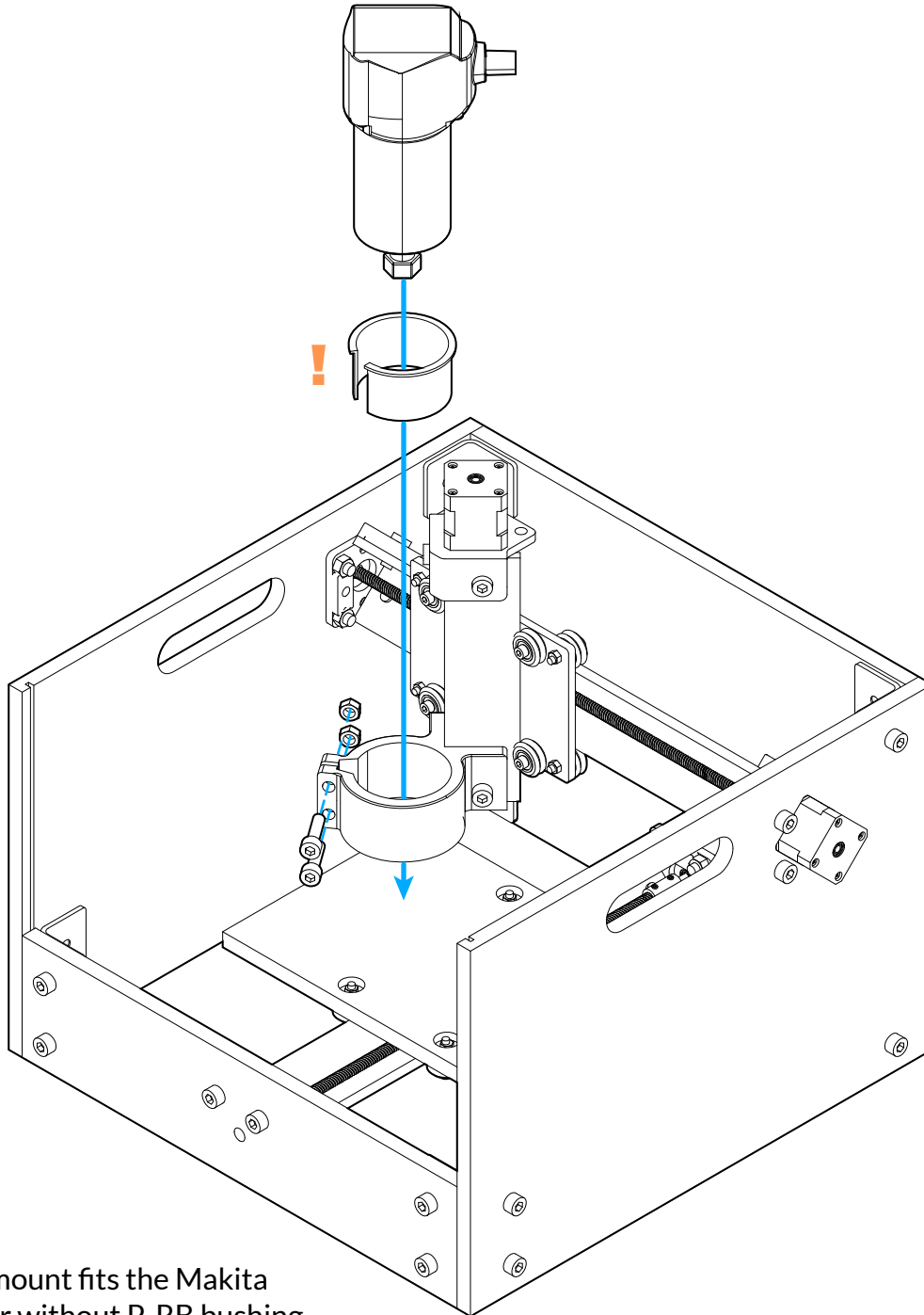
M8-25  
2x



M8-N  
2x



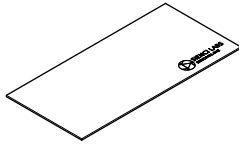
6  
Allen



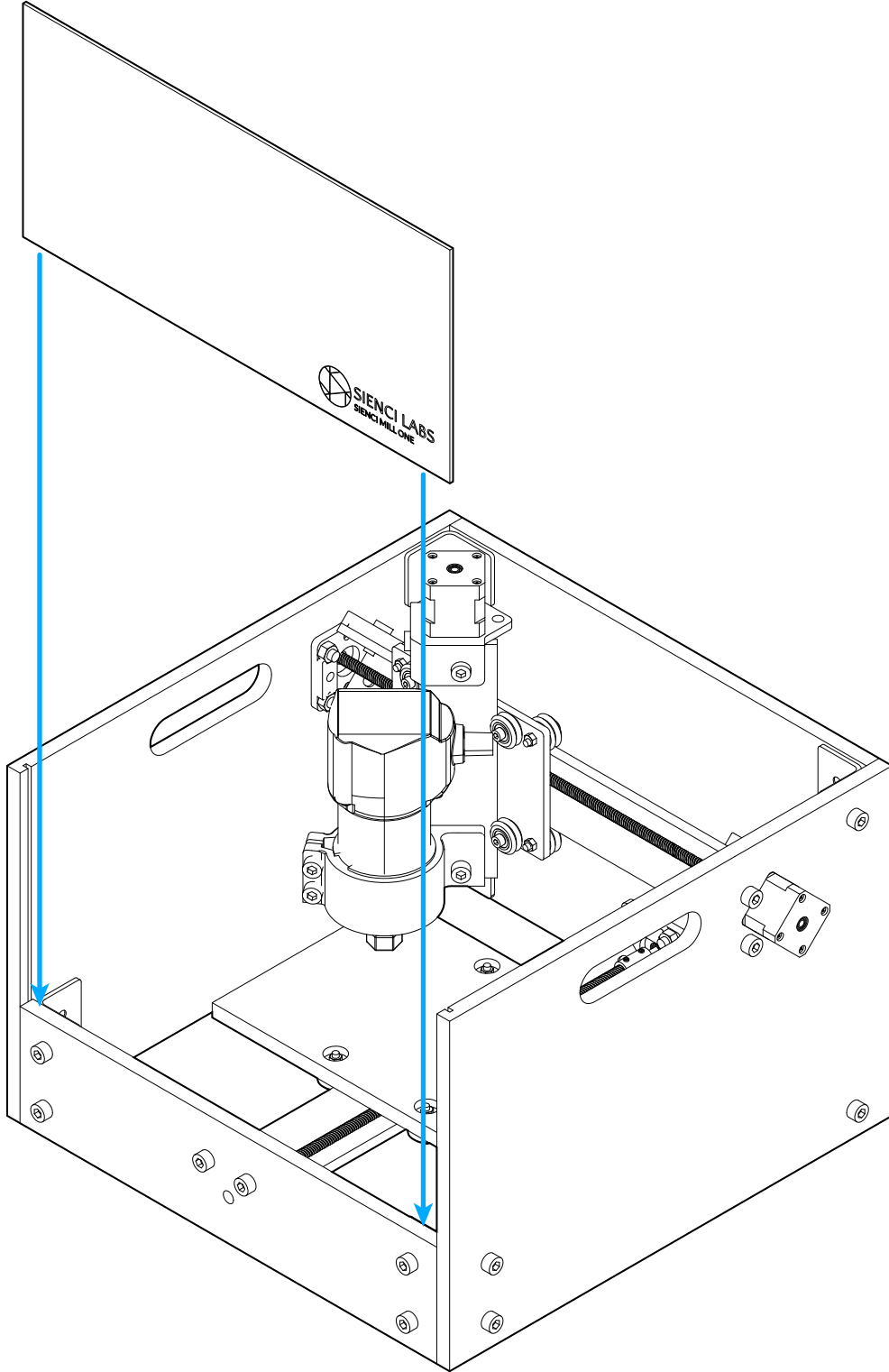
! P-RM router mount fits the Makita RT0701 router without P-RB bushing, bushing only required to mount Ridgid R24012 router

# STEP 23

Attaching  
Acrylic Shield

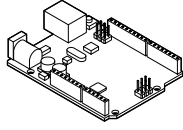


F-AC  
1x

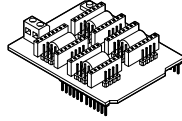


# STEP 24

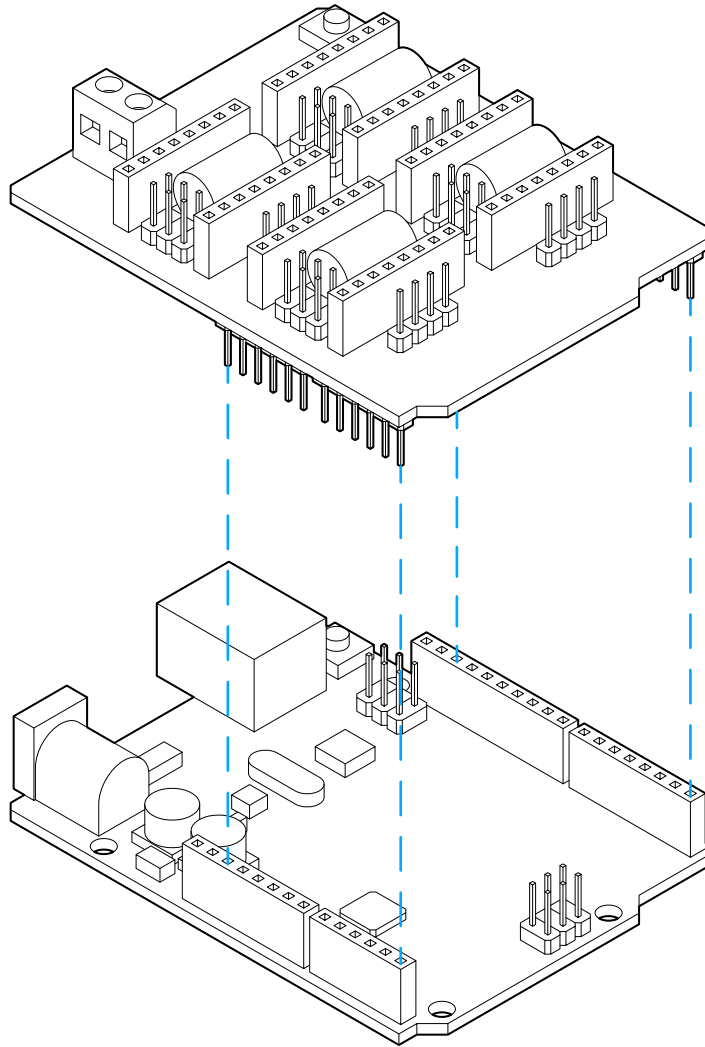
Combining the  
Arduino and  
CNC Shield



E-ARD  
**1x**



E-CNC  
**1x**

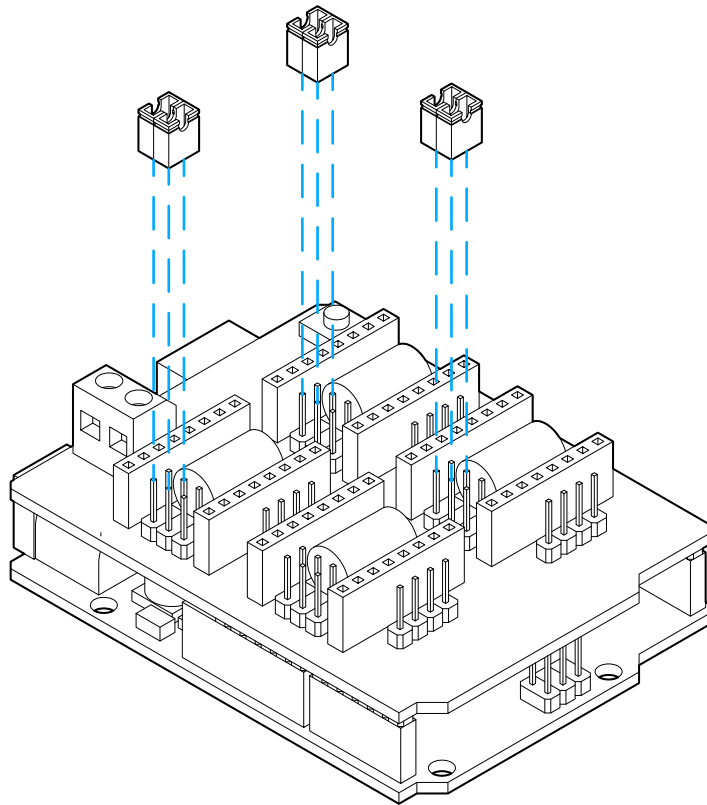


## STEP 25

Attaching the  
Header  
Jumpers

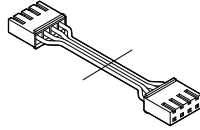


E-HJ  
**6x**

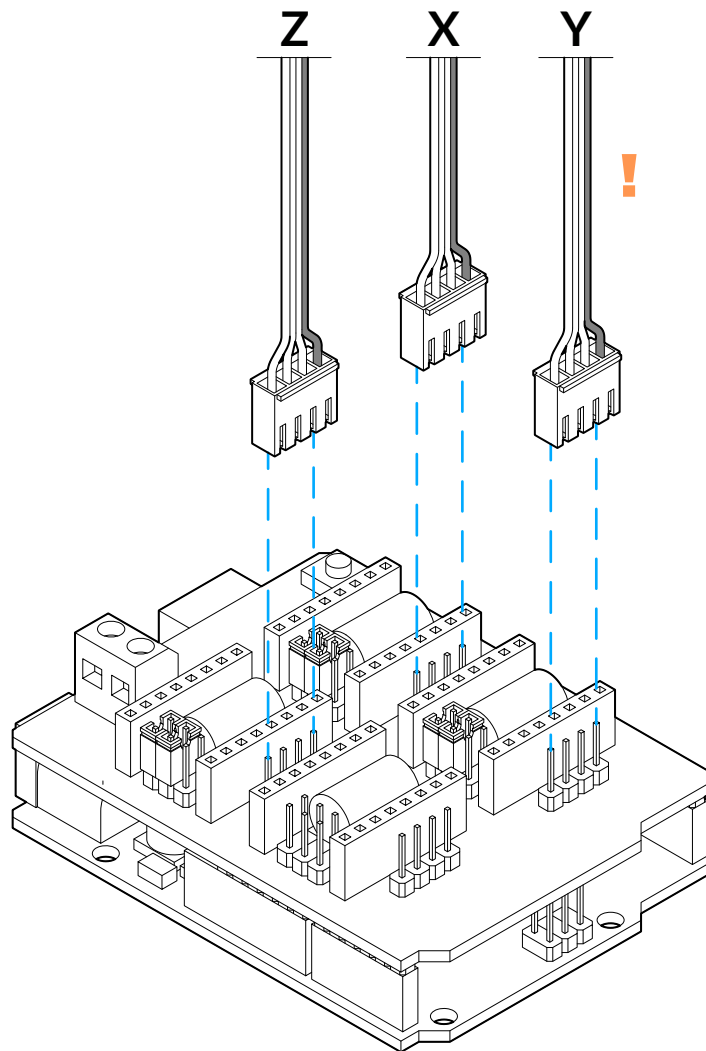


## STEP 26

Attaching  
Motor Cables



E-C  
3x



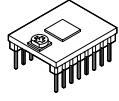
! Make sure the black wire is oriented as depicted

# STEP 27

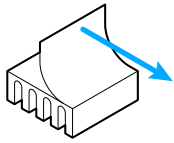
Attaching  
Stepper Driver  
Chips



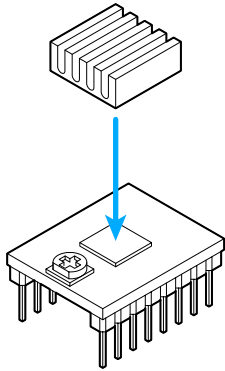
E-SDH  
3x



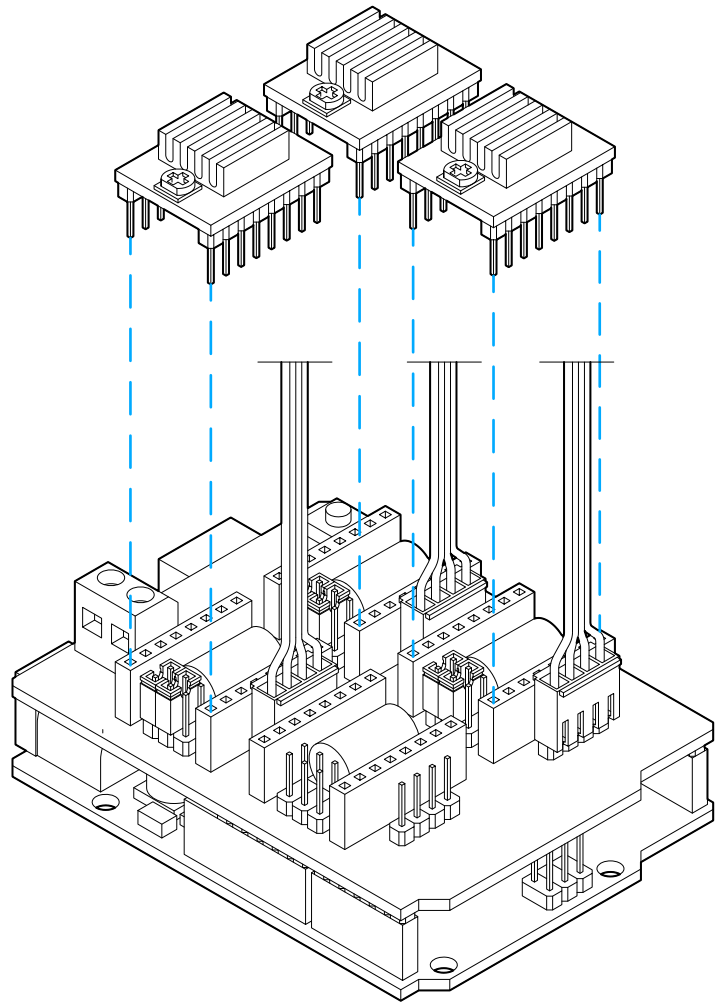
E-SDC  
3x



3x



3x

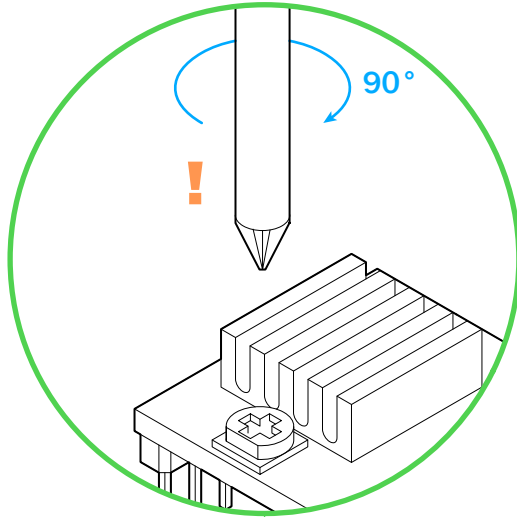


## STEP 28

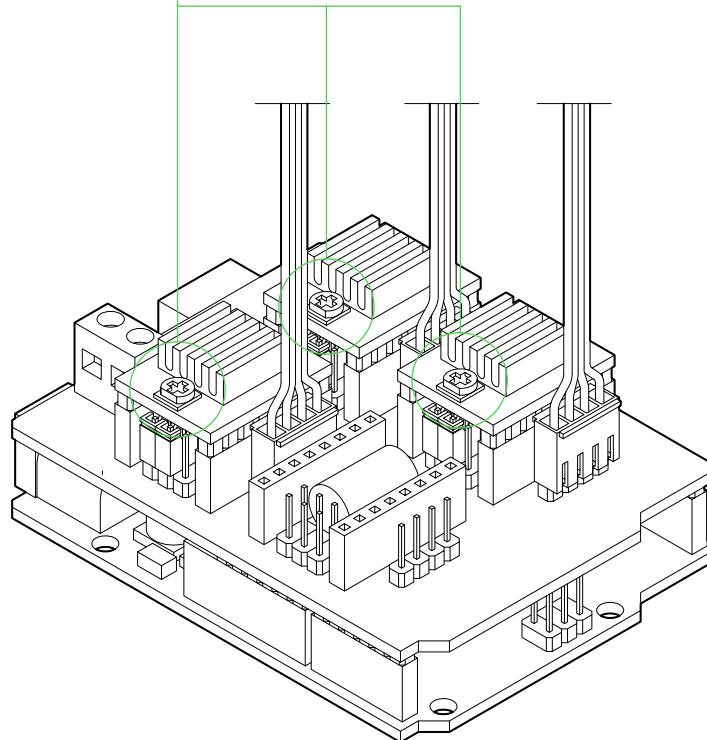
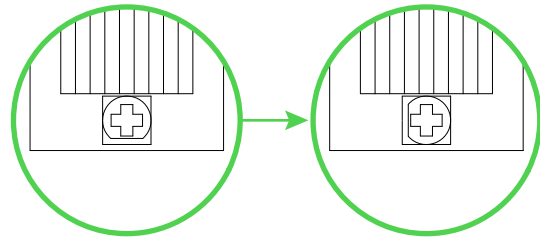
### Tuning the Stepper Motor Drivers



Phillips



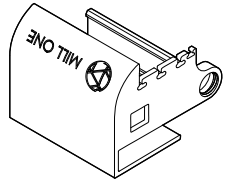
The stepper drivers should be tuned using the potentiometer on the front so that the flat edge on the dial faces to the left; this gives the stepper motors on the Mill One the right amount of power to run effectively. If further tuning is required, turning the flat either counterclockwise or clockwise will increase or decrease the motor power respectively.



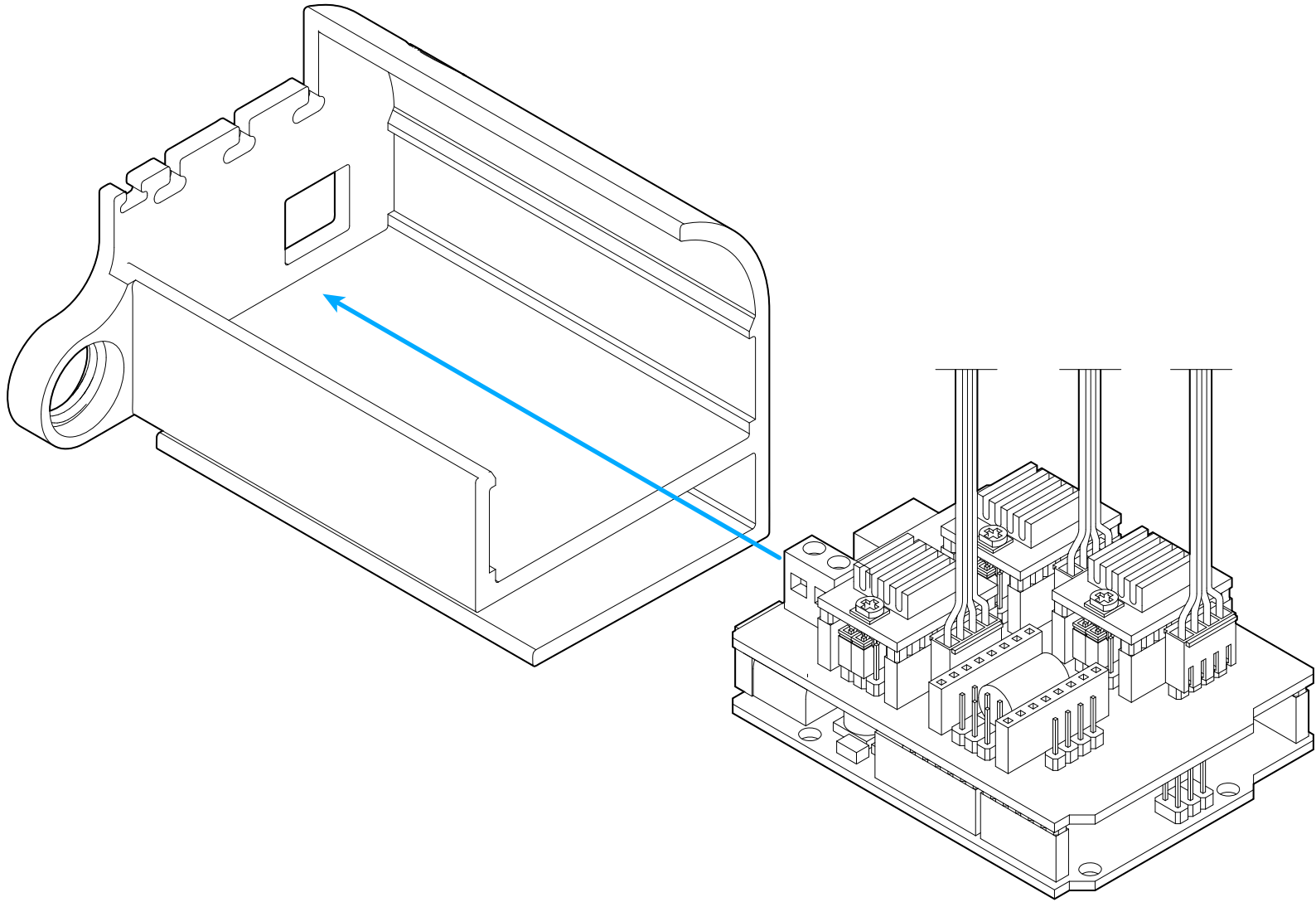
**!** Stepper driver potentiometers should never be turned while the board is powered up

## STEP 29

Placing Boards  
into Electronics  
Holder



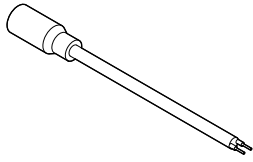
P-EH  
**1x**



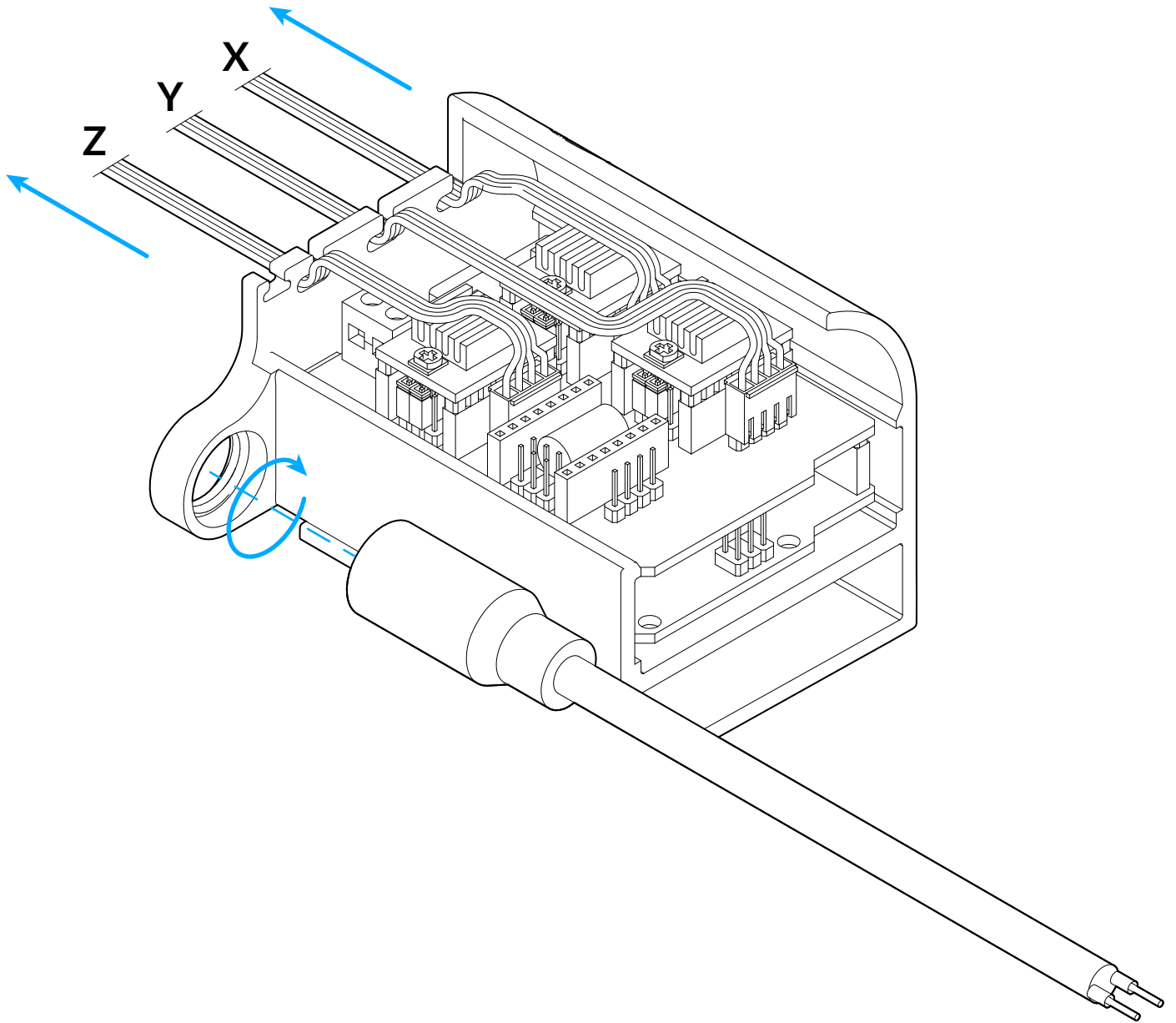


# STEP 30

Attaching  
DC Jack



E-J  
1x

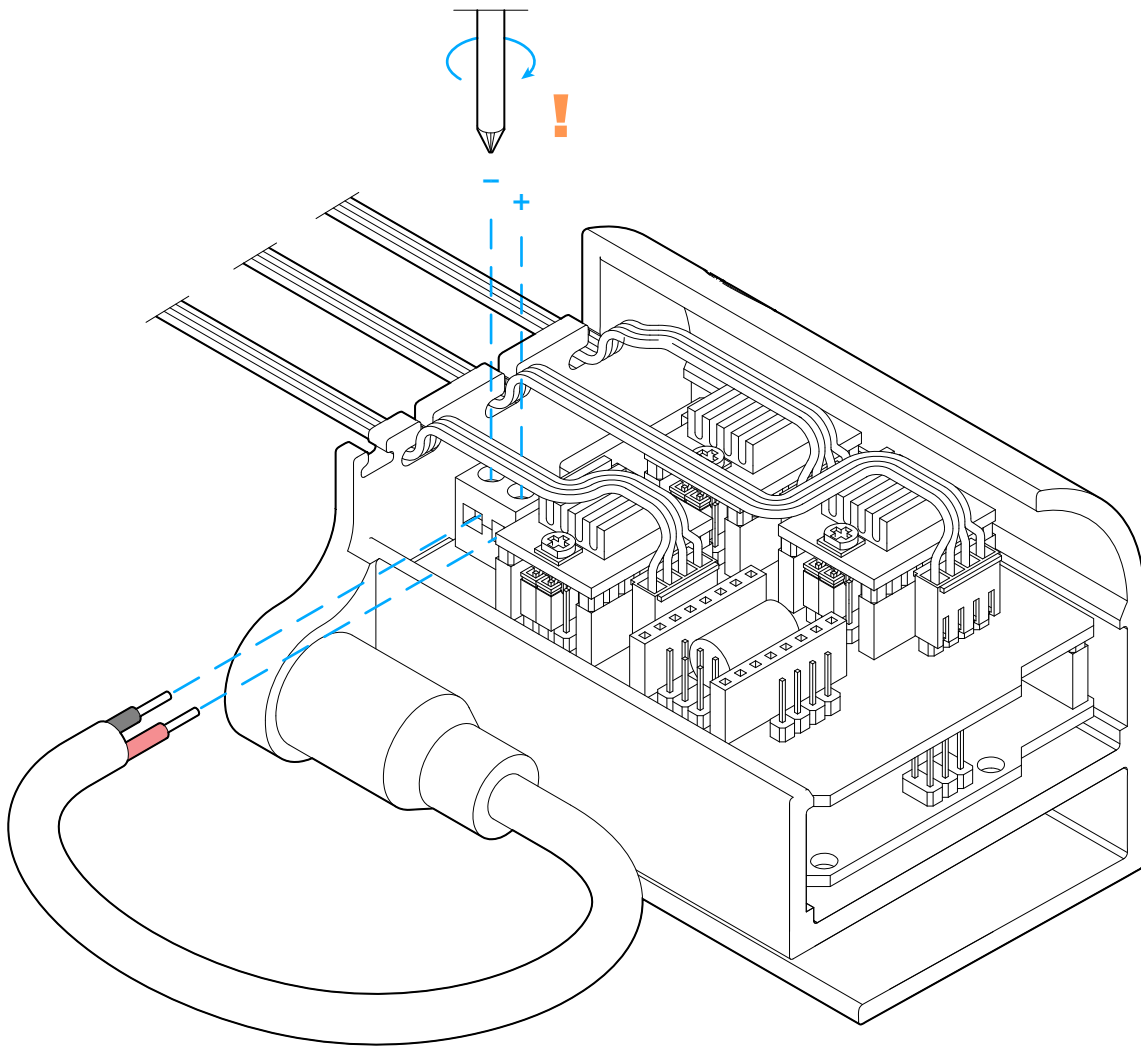


## STEP 31

Attaching  
DC Jack



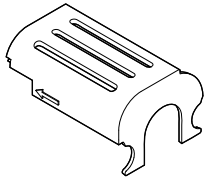
Phillips



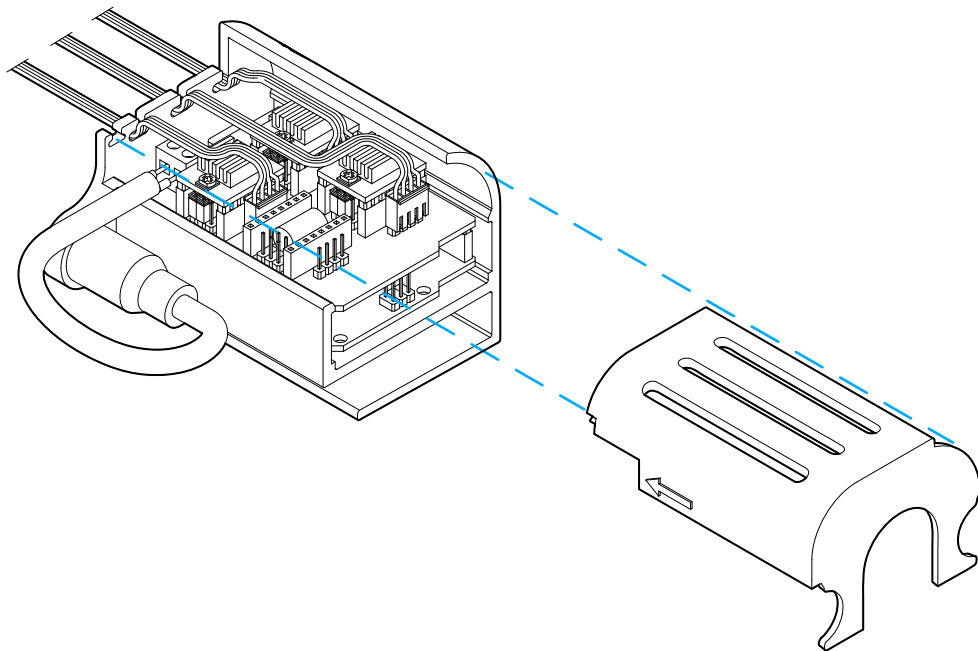
! Ensure polarity is correct to avoid damage to electronics

## STEP 32

Covering the  
Enclosure

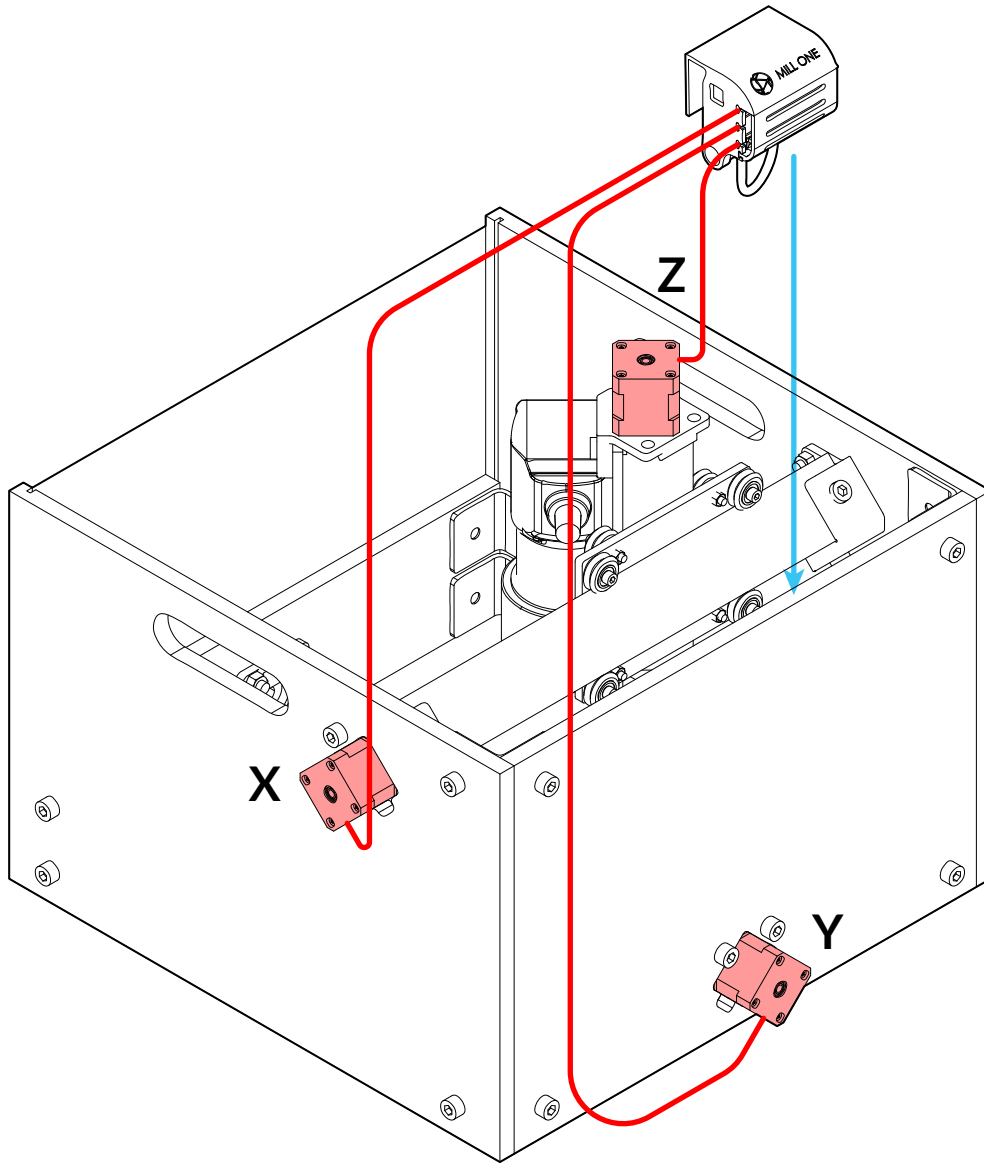


P-EC  
**1x**



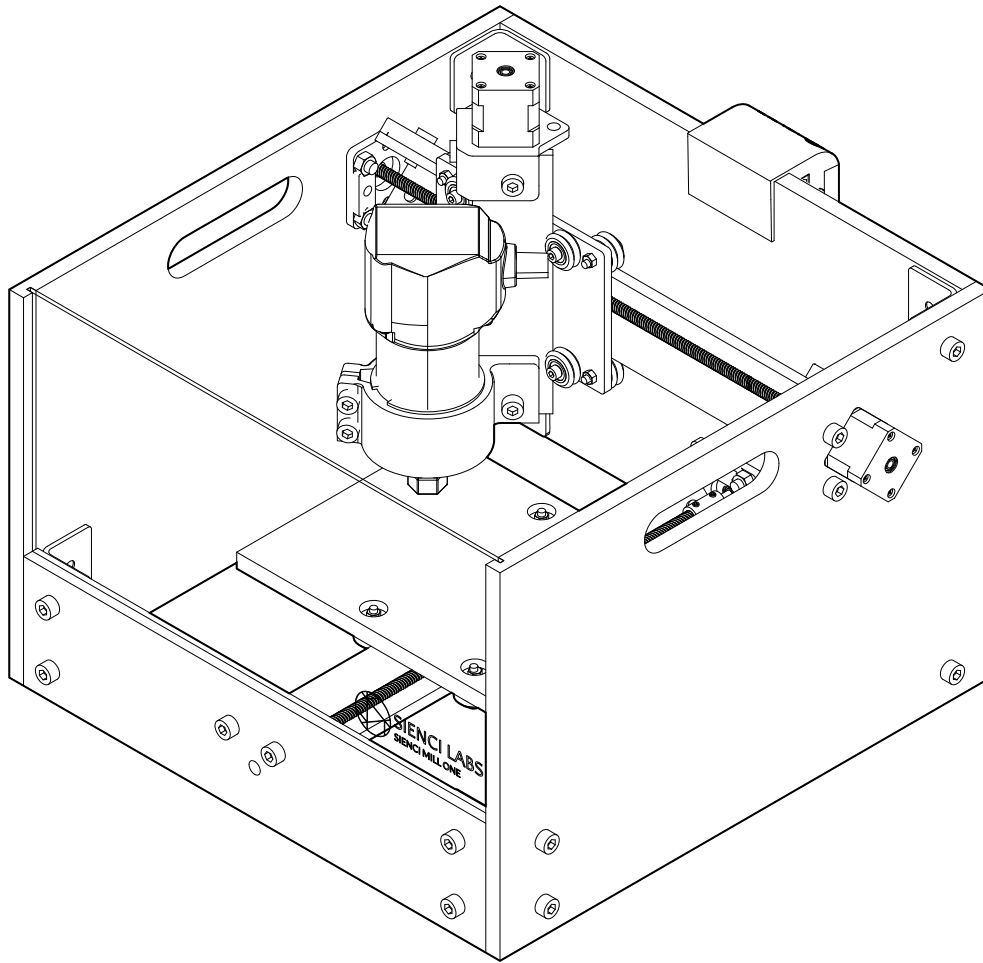
# STEP 33

Attaching  
Electronics to  
Motors



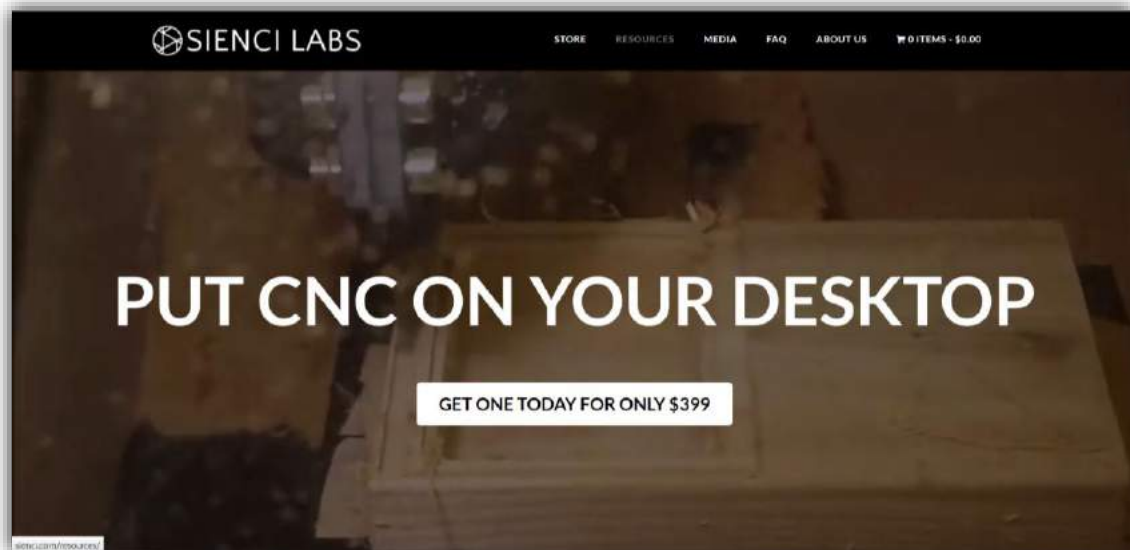
## STEP 34

Assembled  
Mill One

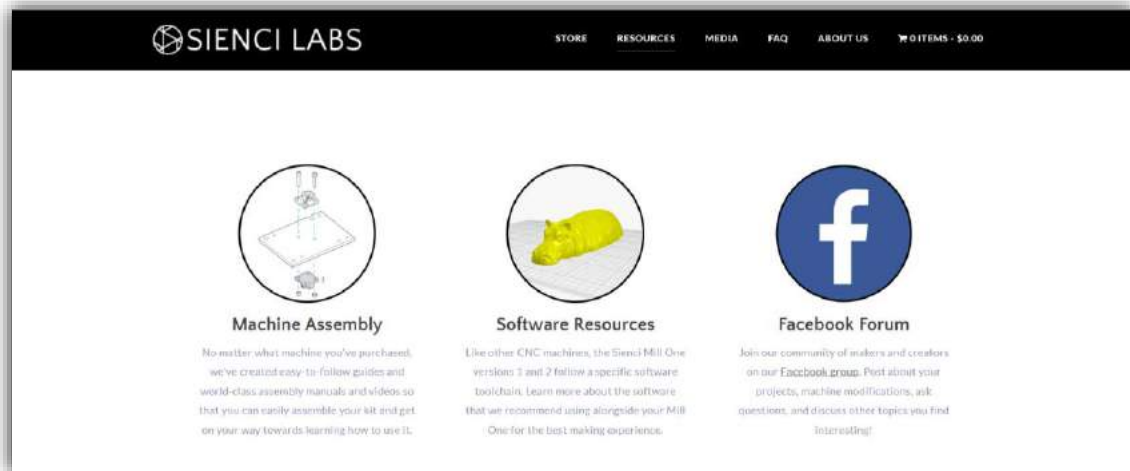


Your Mill One is now fully assembled. Don't plug in your power brick yet, simply connect the USB cable to your computer and continue onto the next steps.

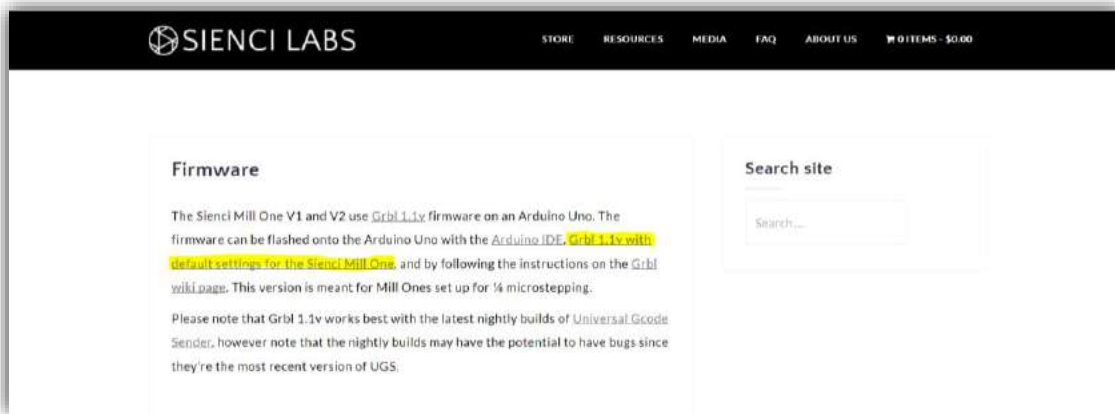
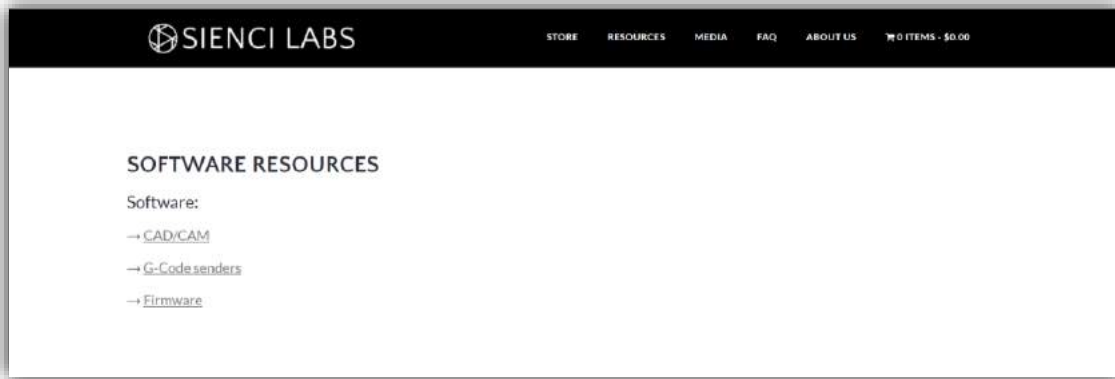
# INSTALLING FIRMWARE



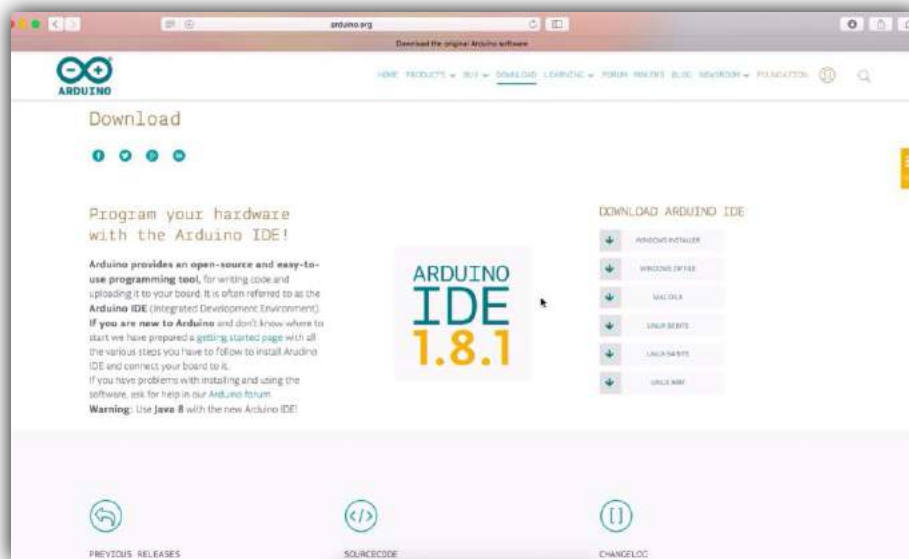
Open your favourite web browser and navigate to the Resources tab of our website.



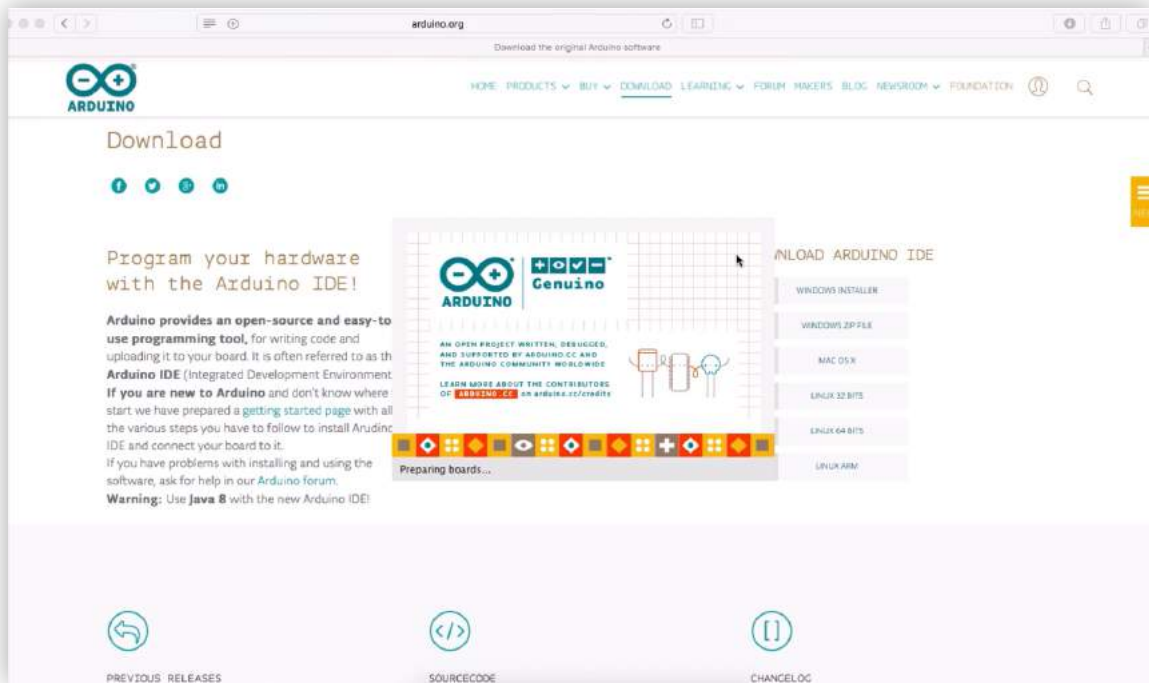
Once on the Resources page, click on the Software Resources heading, this will take you to the Software Resources page.



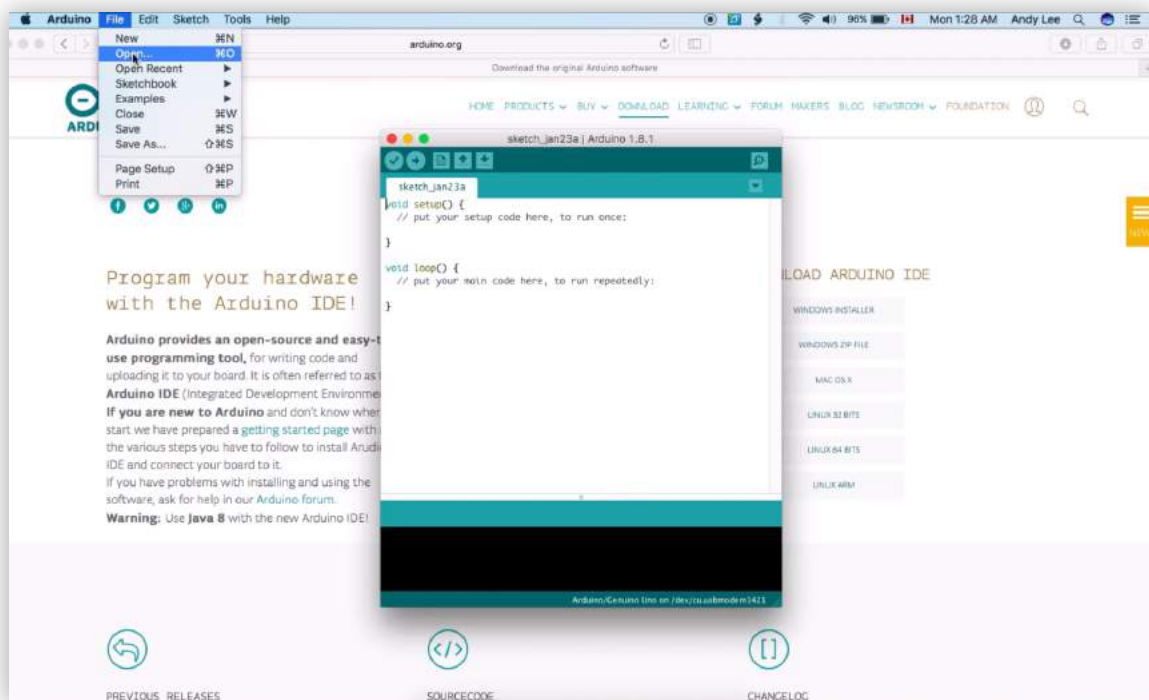
Under the Software heading, you should notice a link to the Firmware and on the Firmware page, you'll want to click to download the "Grbl 1.1v with default settings for the Sienci Mill One" firmware.



You'll also want to download the latest Arduino IDE onto your computer. Select your operating system to download the appropriate package.

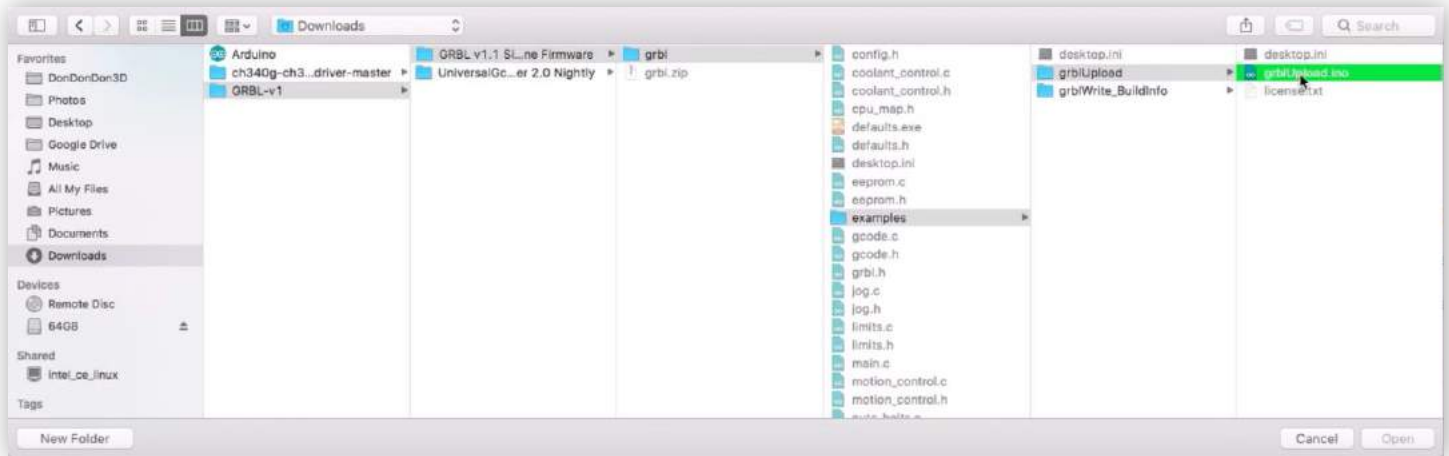


Open the Arduino IDE once it's installed

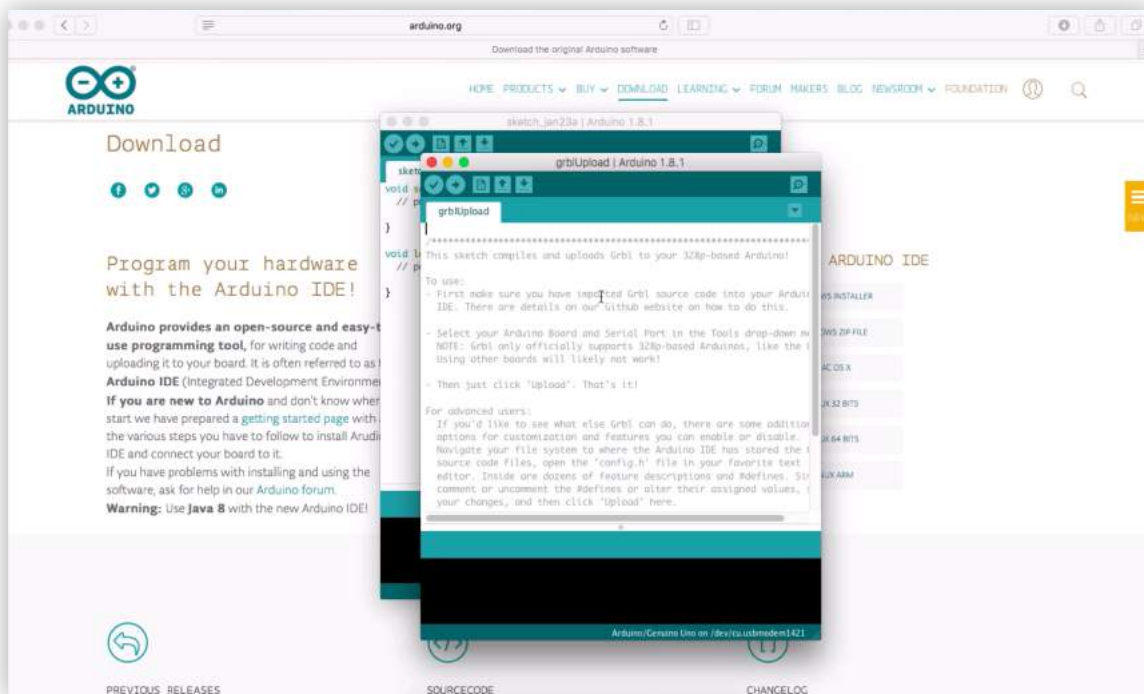


Once open, navigate to File-> Open

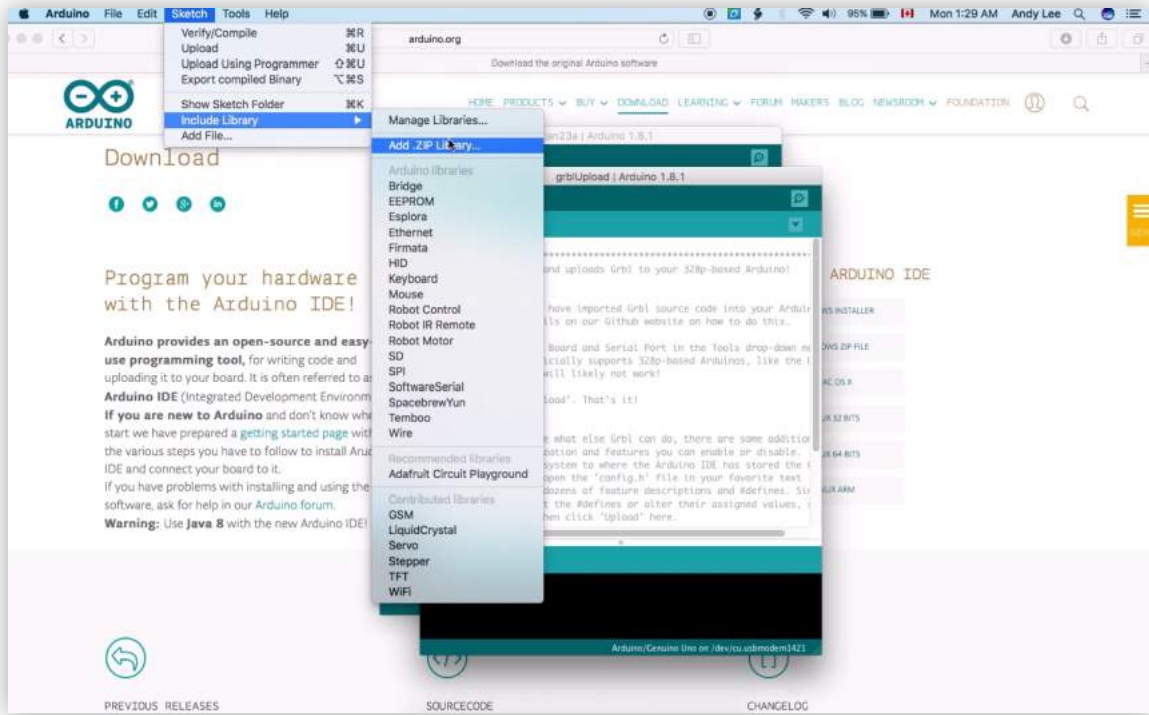




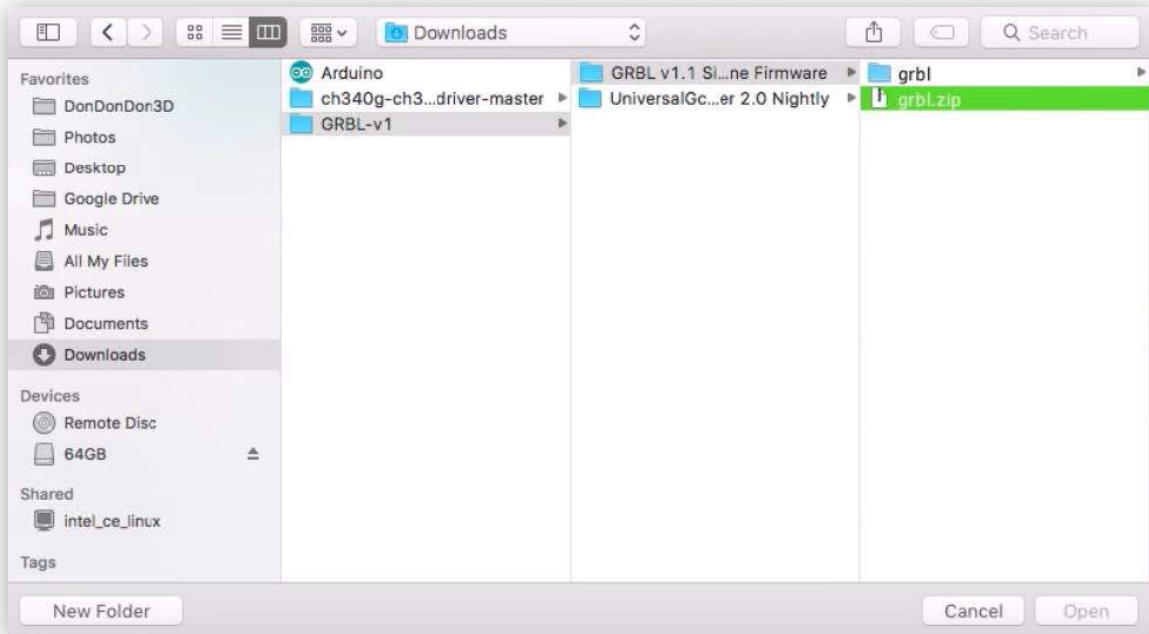
You should find a folder for the GRBL download in your downloads folder. Navigate through the folders until you find grblUpload.ino, double-click it to open it.



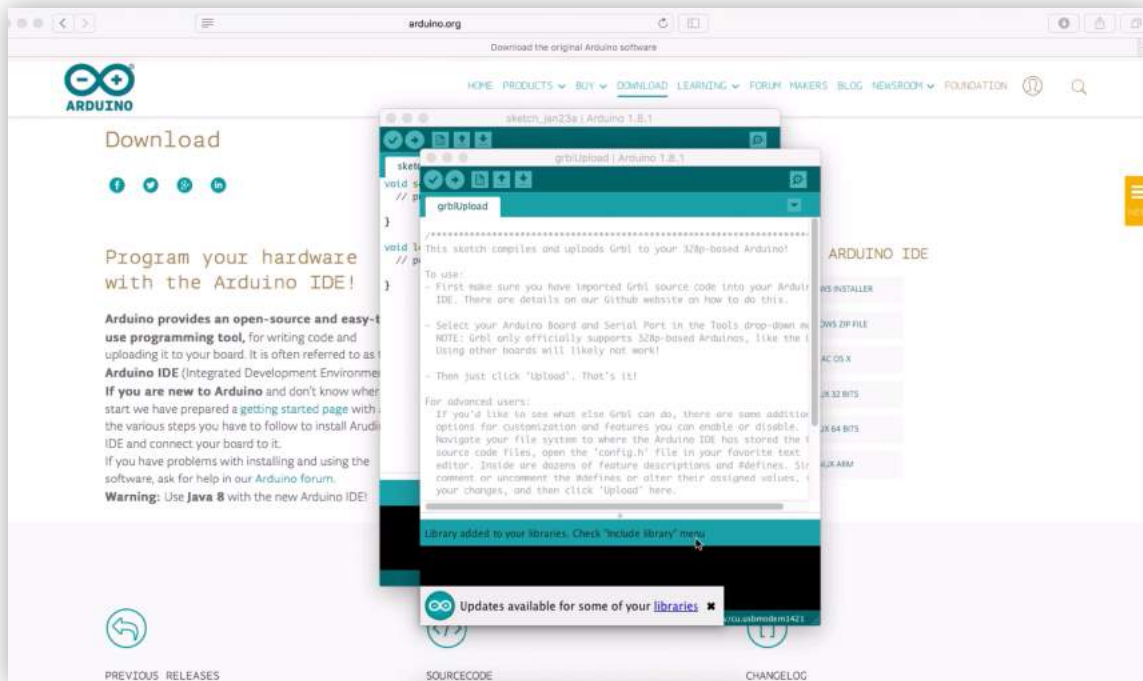
This is the code that needs to be uploaded to the Arduino.



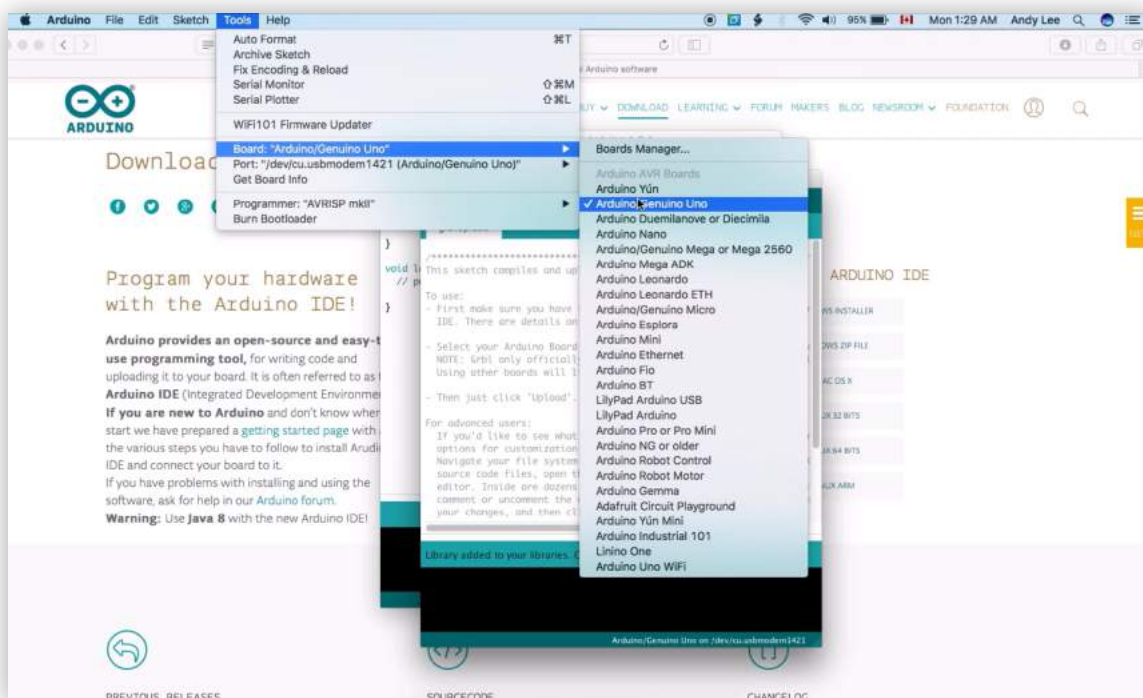
The last step to prepare for uploading the code is to include the Grbl library. Go to Sketch-> Install Library-> Add .zip Library then navigate back to your downloads folder.



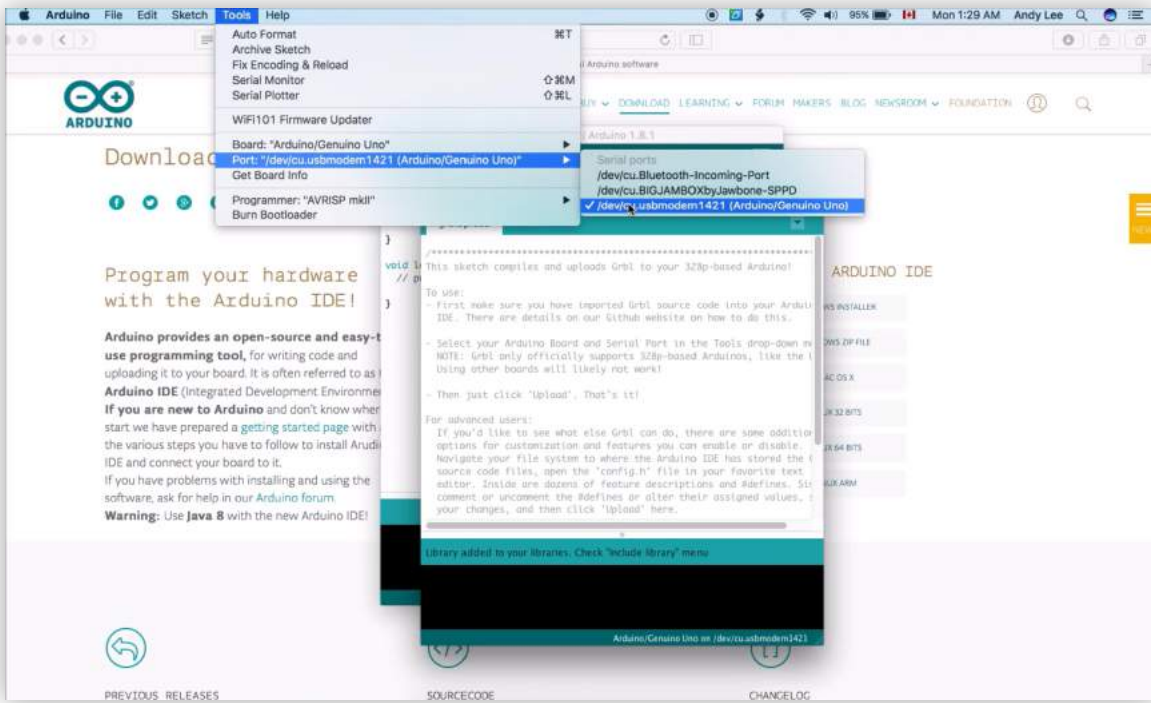
Once again, open the Grbl folder then navigate through and double-click on the grbl.zip file.



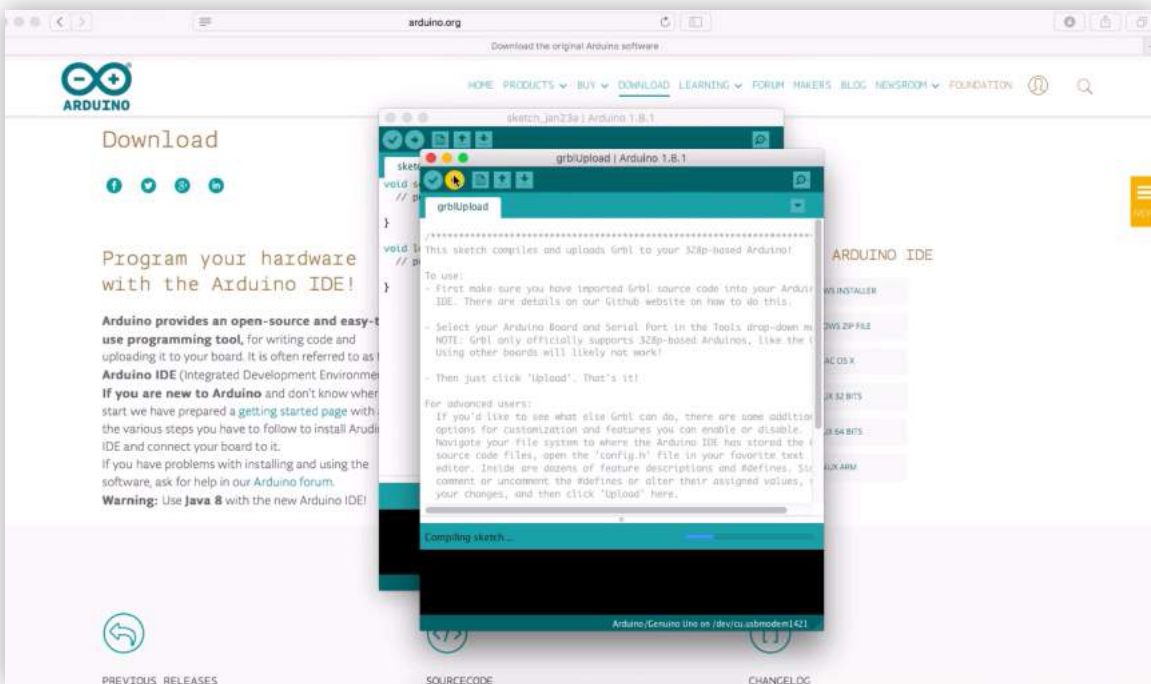
The Arduino IDE should confirm that the Library was added and you will now be able to upload the code to the Arduino.



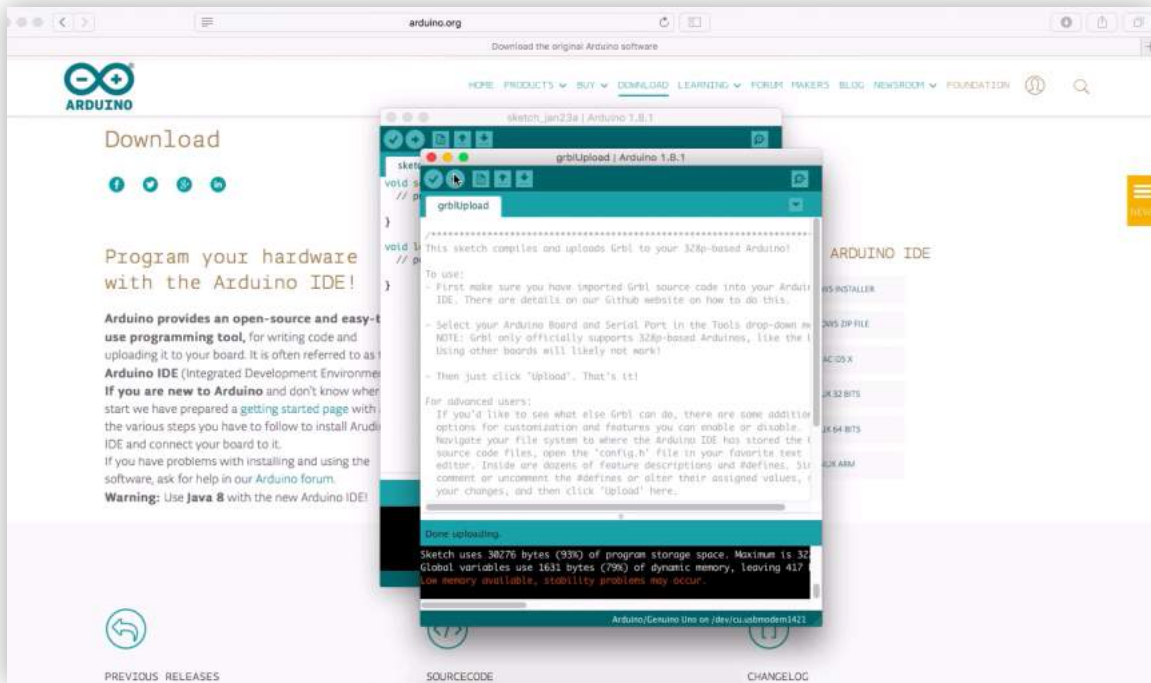
Check in the Tools tab that you've selected your board to be the Arduino Uno.



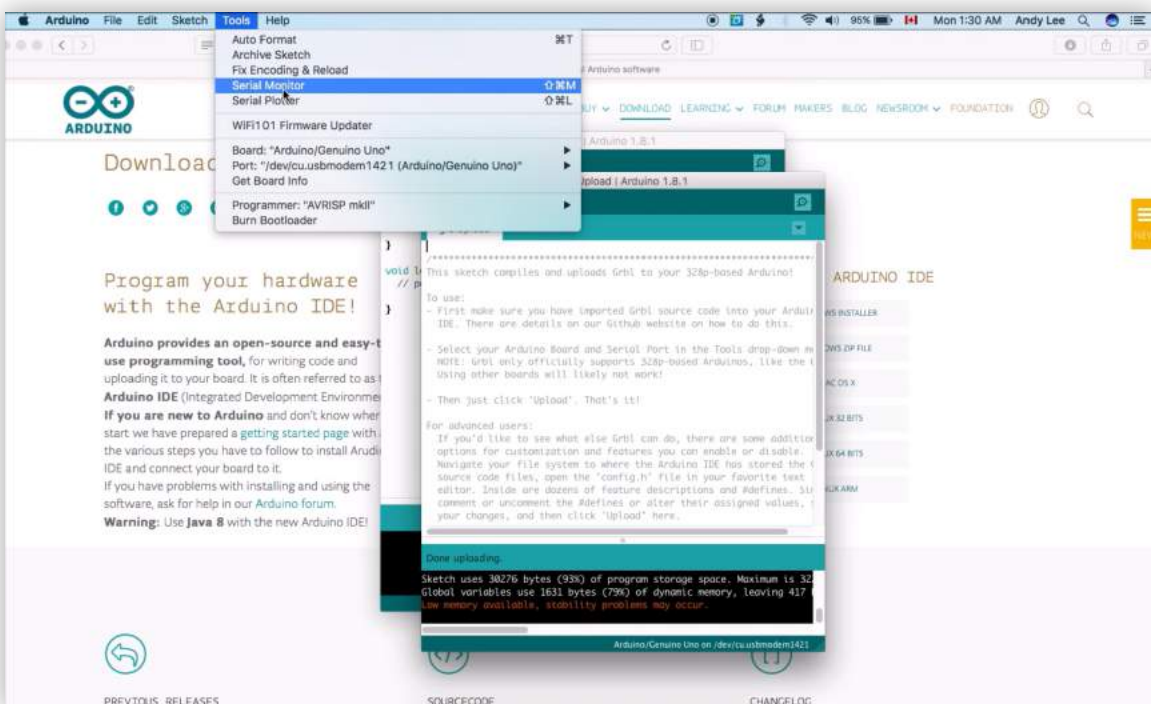
Also check that the proper port is selected.



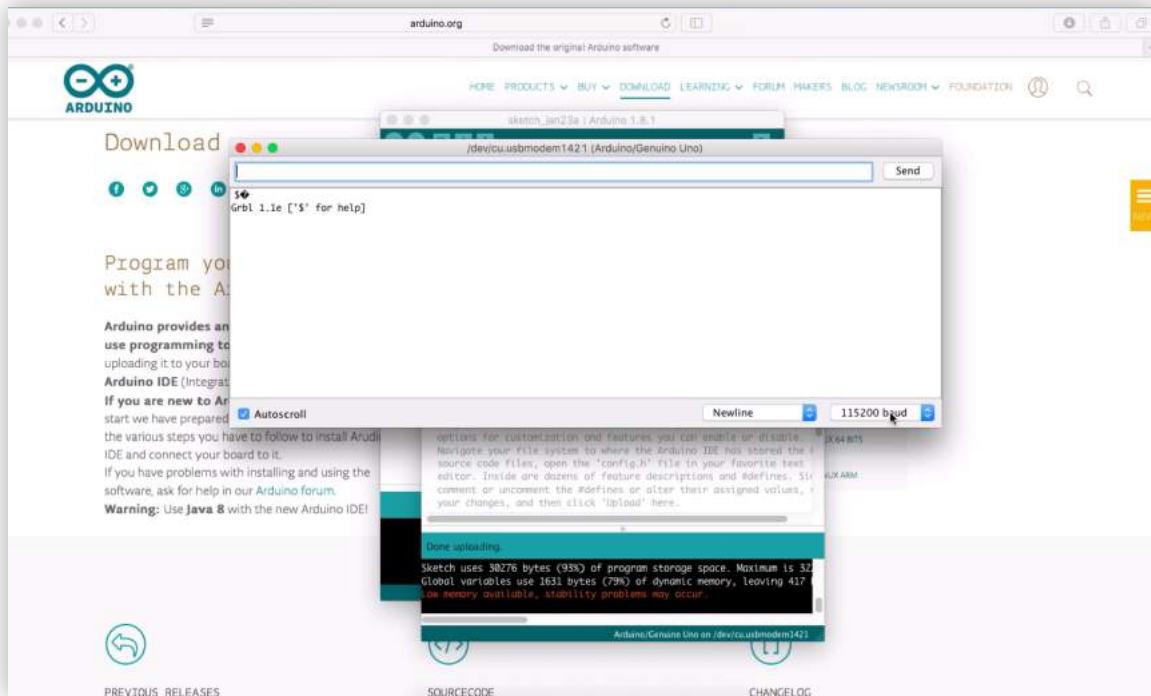
Then click Upload on the IDE to upload the code.



The IDE should confirm that the code is done uploading.



To confirm that the code was implemented correctly, go to Tools then open up the Serial Monitor.



Once you set your baud rate to 115200 you should see that the monitor shows the following message, this means that the firmware has been uploaded correctly.

## Congratulations!

Your Mill One should now be ready to go. In order to start using your machine you should start becoming comfortable with a CAM software as well as find a program which will send the g-code to your machine. For our software recommendations, you can navigate back to the Software heading on the Resources page of our website. For additional resources, be sure to check out our other hardware resources as well as request to join our user Facebook group where you can ask questions, find answers, and interact with the rest of the Sienci community.