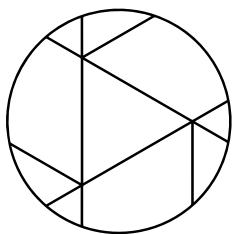


MILL ONE

Assembly Manual



SIENCI LABS

DESKTOP CNC MILLING

Manual Illustrated by Gontarz Design Studio

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.

Machine Disclaimer

The product user takes on all the associated liability pertaining to the operation and performance of the Mill One. The listed “Safety Warnings and Guidelines” outline the necessary precautions that should be taken any time the machine is operated. Sienci Labs will not be held responsible for any damages to property or injury incurred on the operator or bystanders. Sienci Labs will not be held responsible for 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 this website and other forms of media, Sienci Labs will not be held liable for inaccuracies, errors, or inconsistencies in website content, the content of files linked to by this website, references made to external websites herein, and/or 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 product users. 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.

LIST OF PARTS



M3-N
6x



M3-8
12x



M3-15
6x



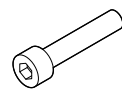
M5-N
10x



M5-NE
6x



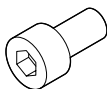
M5-W
12x



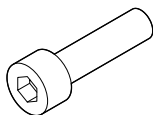
M5-25
16x



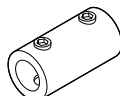
M8-N
26x



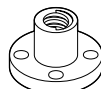
M8-15
12x



M8-25
26x



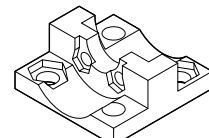
SC
3x



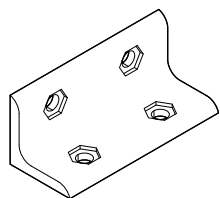
A-N
3x



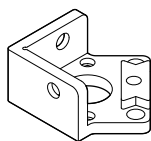
VB
12x



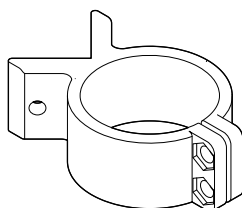
P-NH
3x



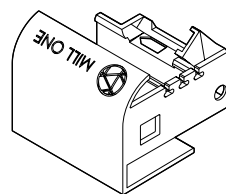
P-FB
4x



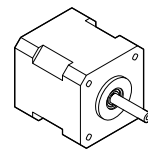
P-AM
5x



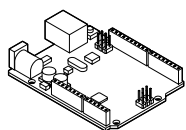
P-RM
1x



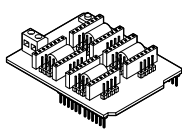
P-EH
1x



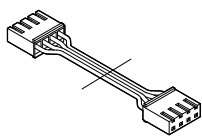
SM
3x



E-ARD
1x



E-CNC
1x



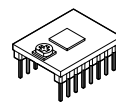
E-C
3x



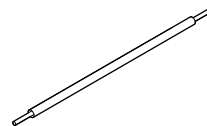
E-HJ
6x



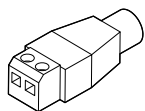
E-SDH
3x



E-SDC
3x



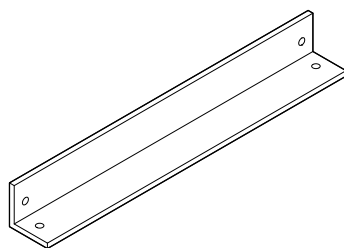
E-W
2x



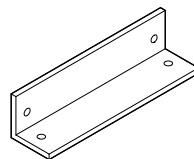
E-J
1x



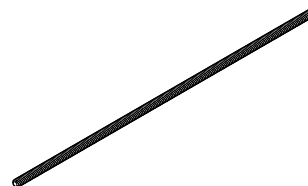
P-PH
1x



AR-400
2x



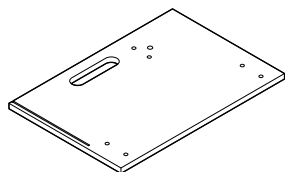
AR-200
1x



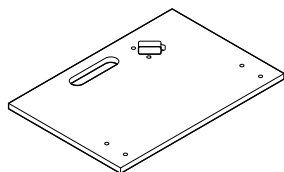
LS-400
2x



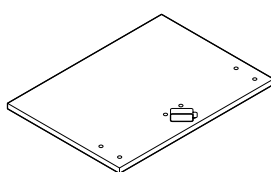
LS-200
1x



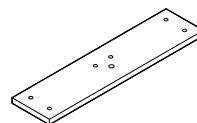
F-L
1x



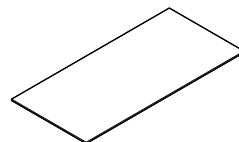
F-R
1x



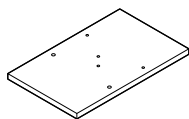
F-B
1x



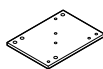
F-F
1x



F-AC
1x



G-Y
1x



G-XZ
1x

Tools:



Phillips



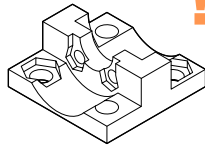
10mm
Wrench



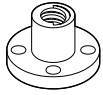
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STEP 1

Lead Screw Nut Holding Assembly



P-NH
3x



A-N
3x



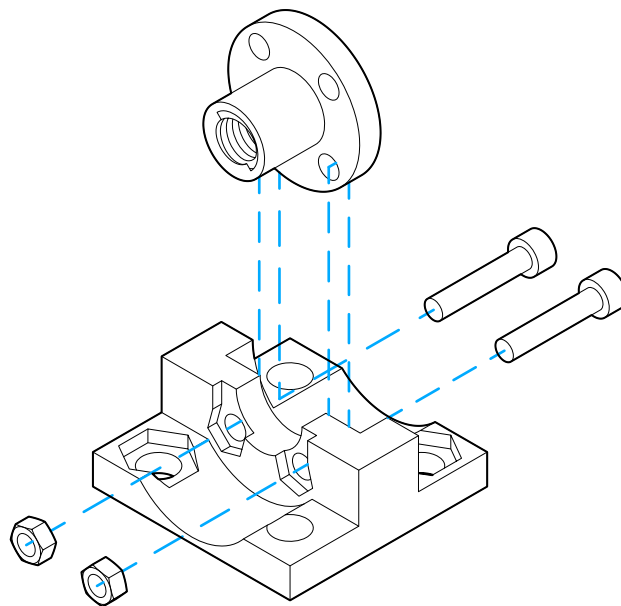
M3-15
6x



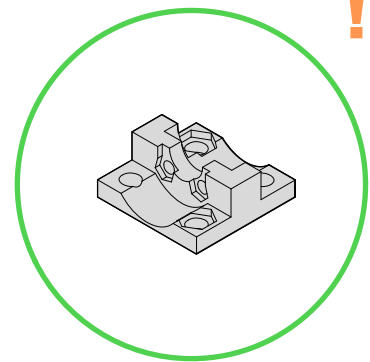
M3-N
6x



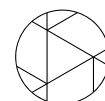
2.5
Allen



3x



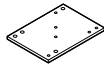
! Take note that one of the three plastic nut holders (P-NH) is a different colour and is not the same as the one depicted. It's still assembled the same way but is specially used for Step 2.



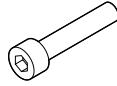
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STEP 2

XZ Gantry Assembly



G-XZ
1x



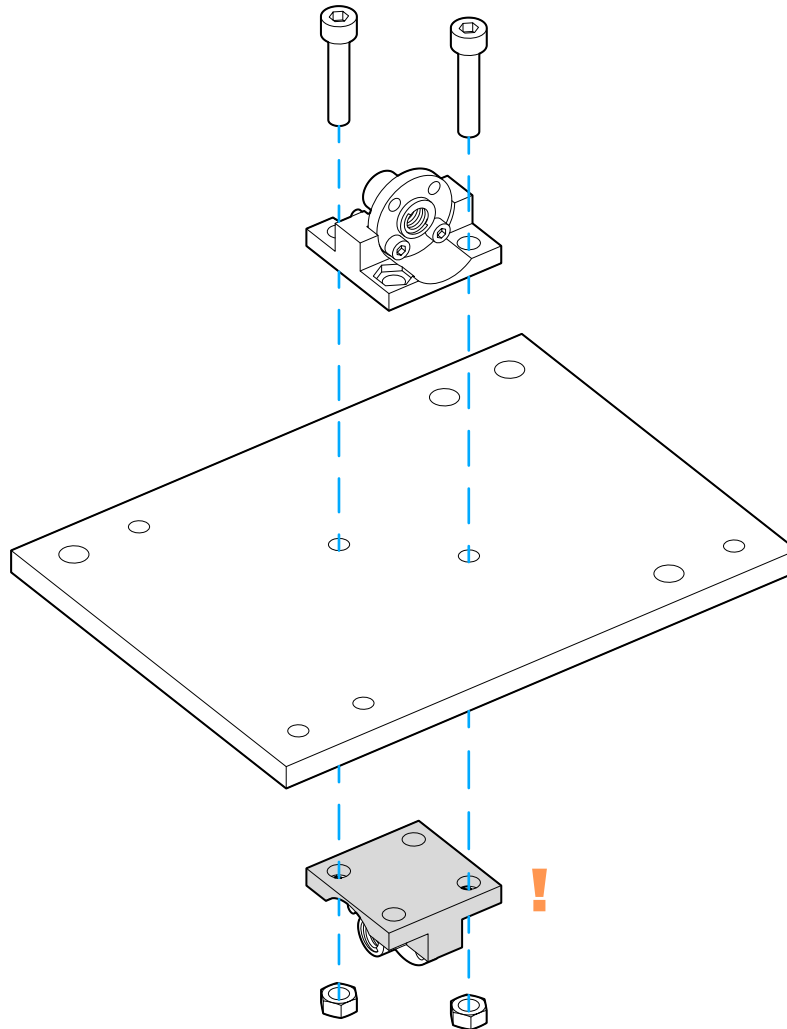
M5-25
2x



M5-N
2x



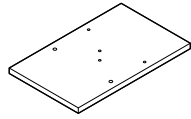
4
Allen



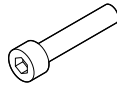
! This is the mirrored lead screw nut assembly.
Check that the M5 nuts are properly fitting into
the nut traps.

STEP 3

Y Gantry Assembly



G-Y
1x



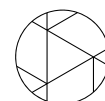
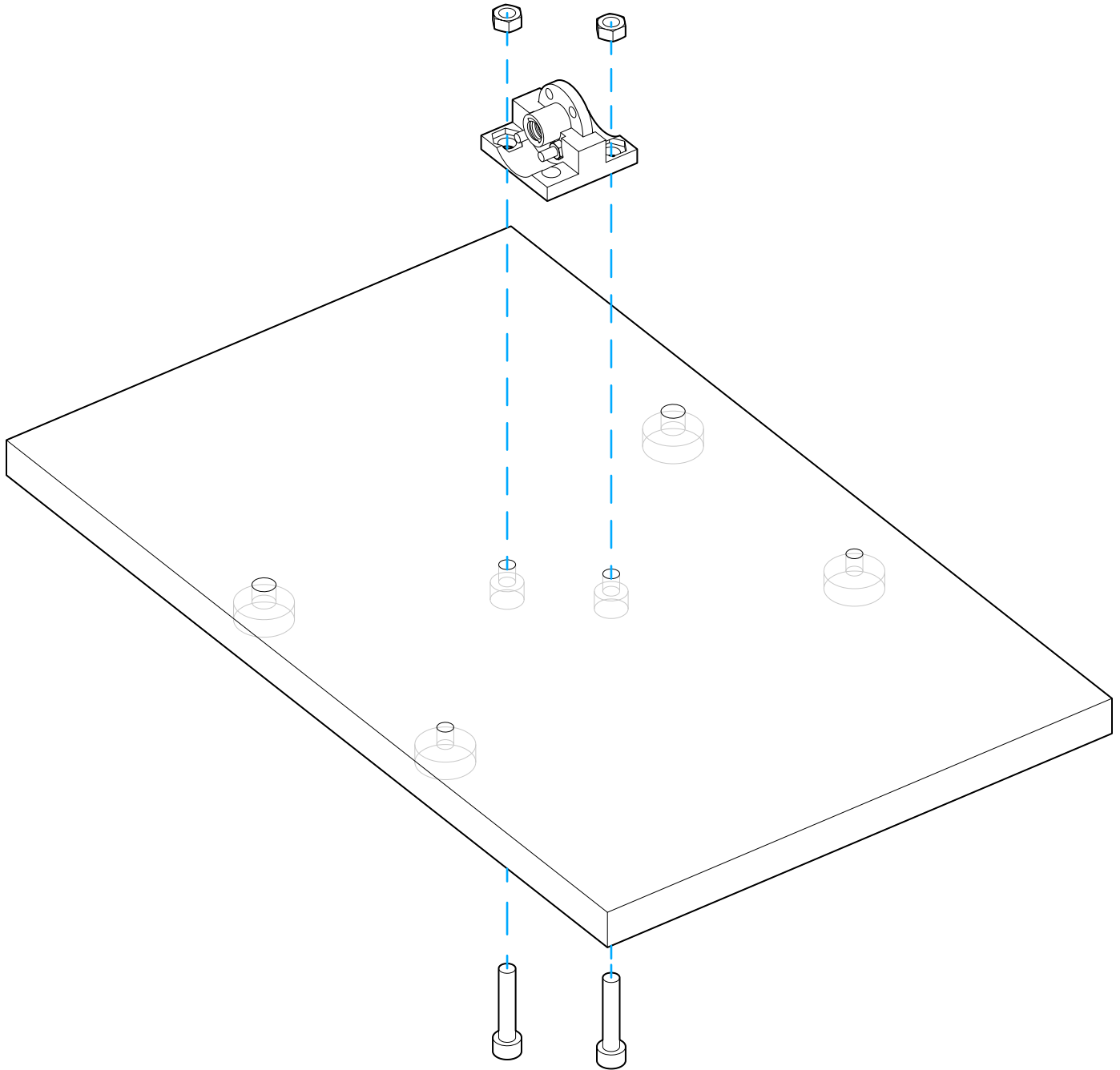
M5-25
2x



M5-N
2x



4
Allen



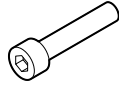
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STEP 4

XZ Gantry Assembly



VB
4x



M5-25
4x



M5-W
4x



M5-N
2x



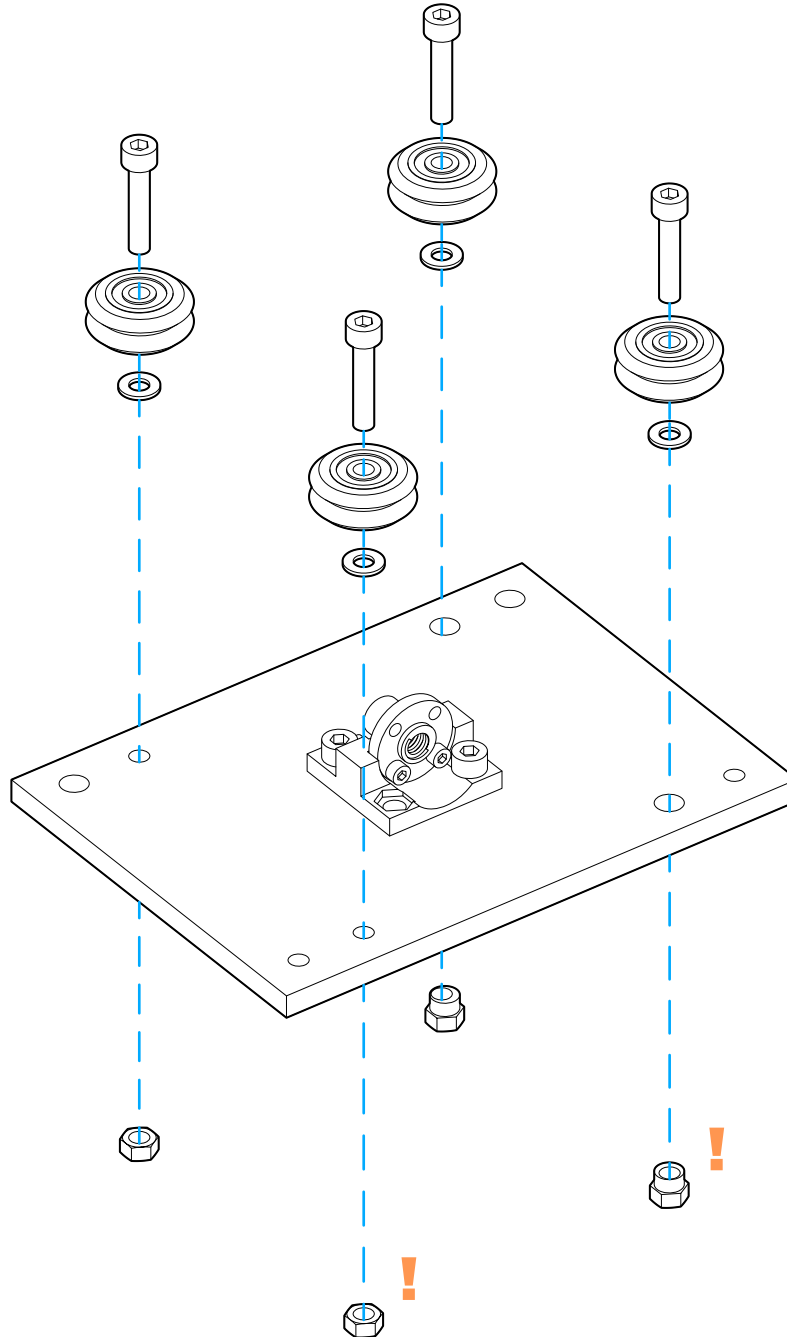
M5-NE
2x



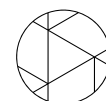
4
Allen



10mm
Wrench



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



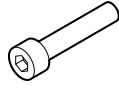
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STEP 5

XZ Gantry Assembly



VB
4x



M5-25
4x



M5-W
4x



M5-N
2x



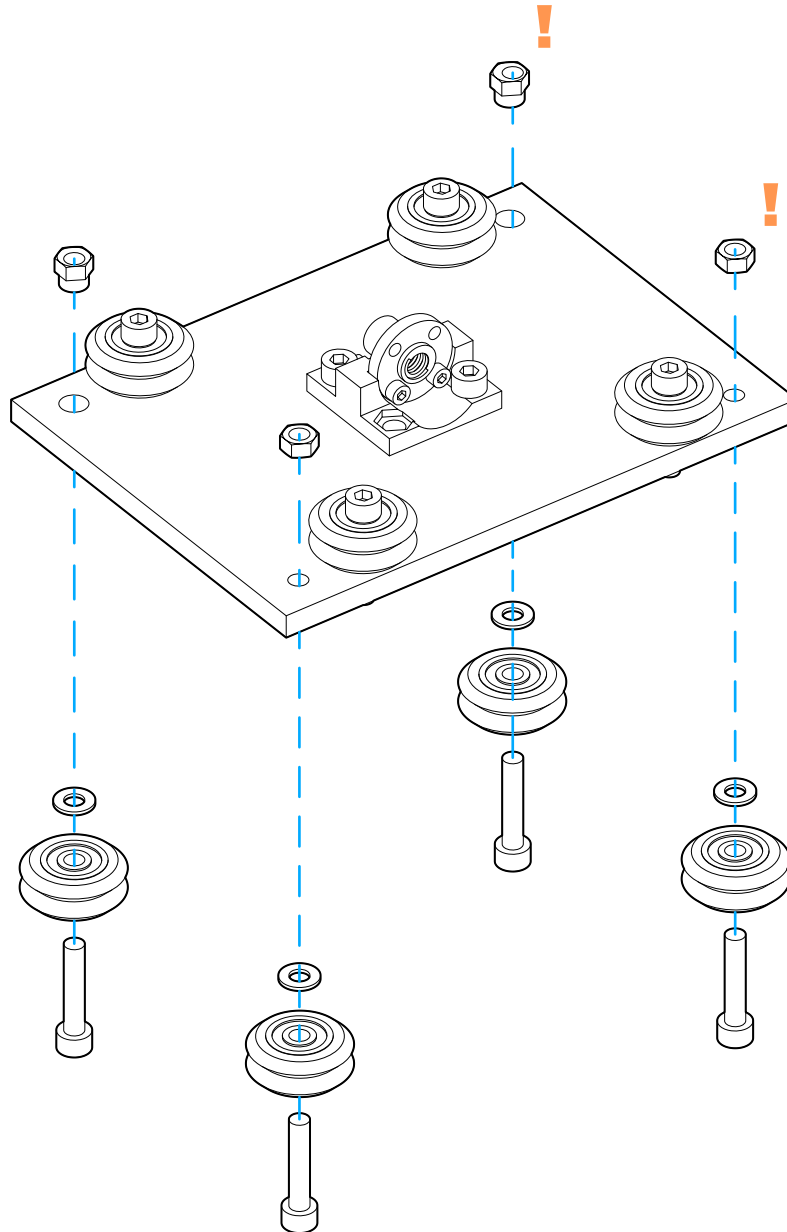
M5-NE
2x



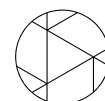
4
Allen



10mm
Wrench



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



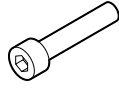
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STEP 6

Y Gantry Assembly



VB
4x



M5-25
4x



M5-W
4x



M5-N
2x



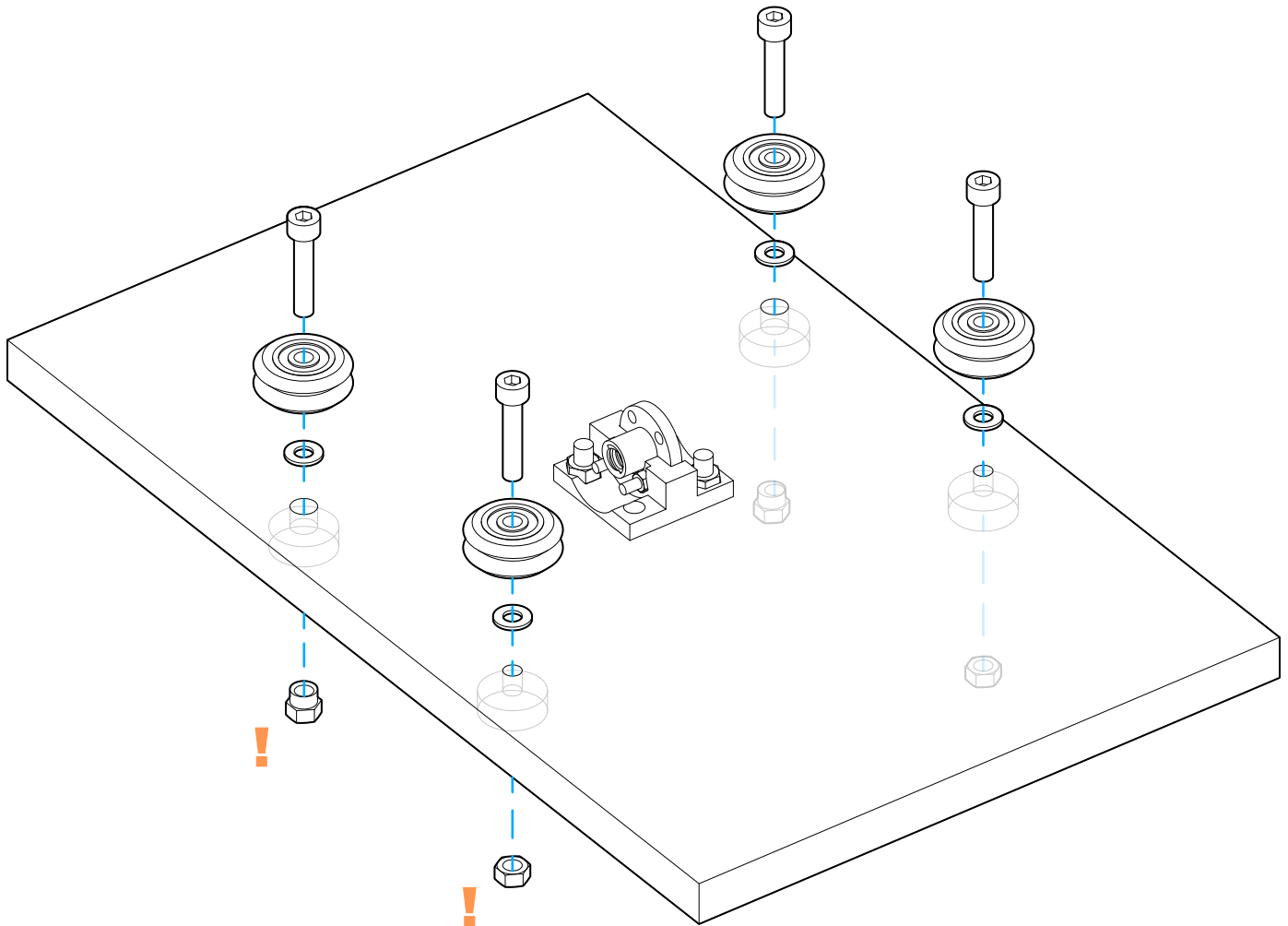
M5-NE
2x



4
Allen



10mm
Wrench



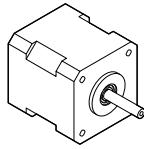
! Match the eccentric nuts (M5-NE) to the larger holes, and the regular nuts (M5-N) to the smaller holes



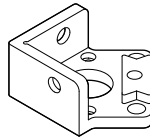
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STEP 7

Mounting the
Motors to the
Rails



SM
3x



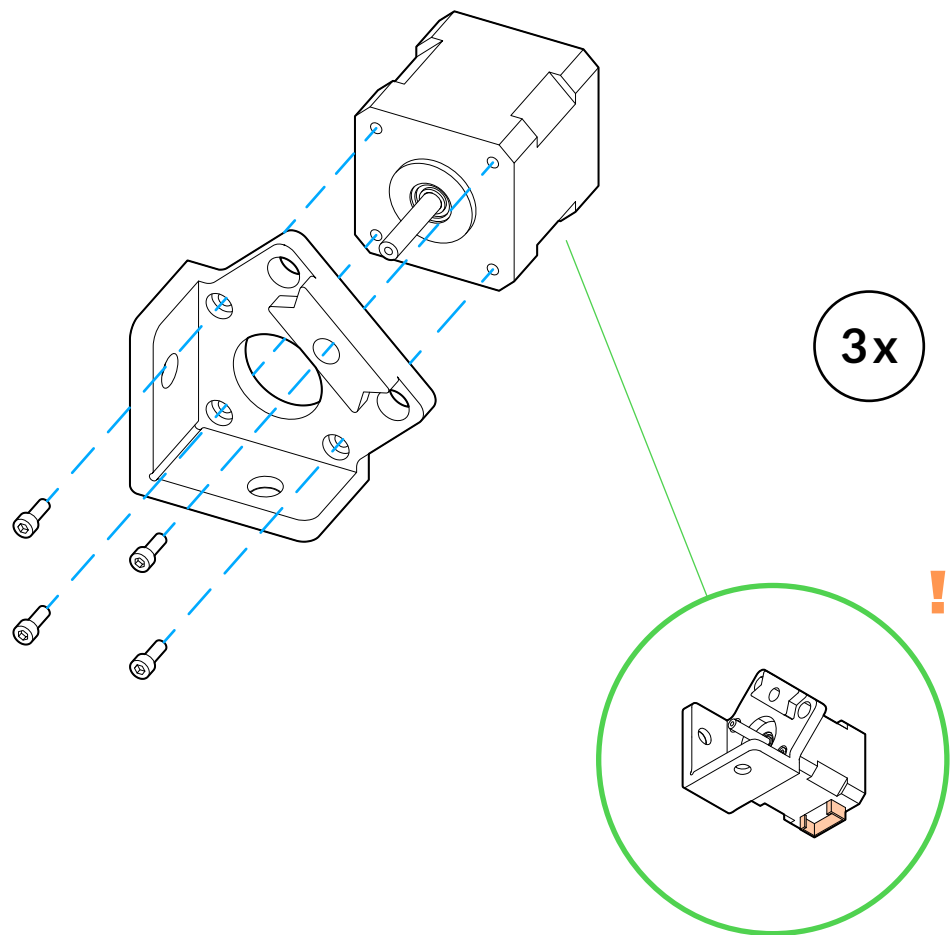
P-AM
3x



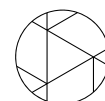
M3-8
12x



2.5
Allen



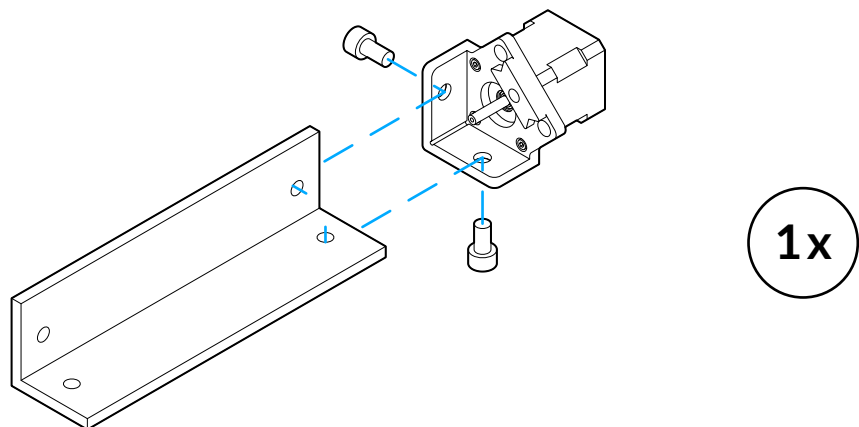
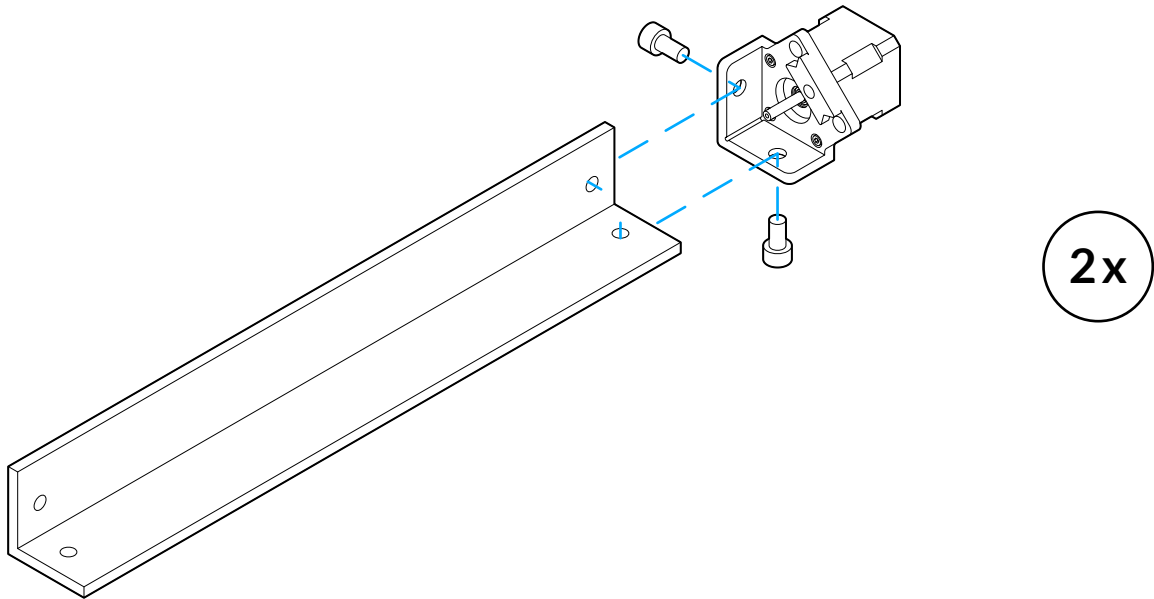
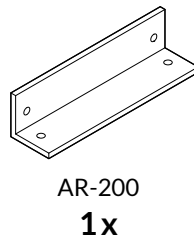
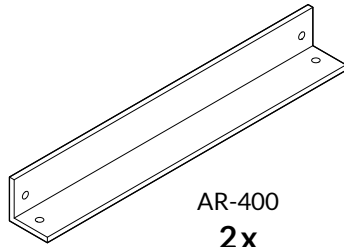
! Make sure that the motor connector is facing downwards



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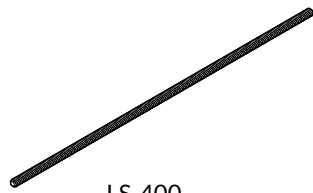
STEP 8

Mounting the
Motors to the
Rails

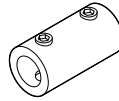


STEP 9

Attaching
X-Lead Screw
to XZ Gantry



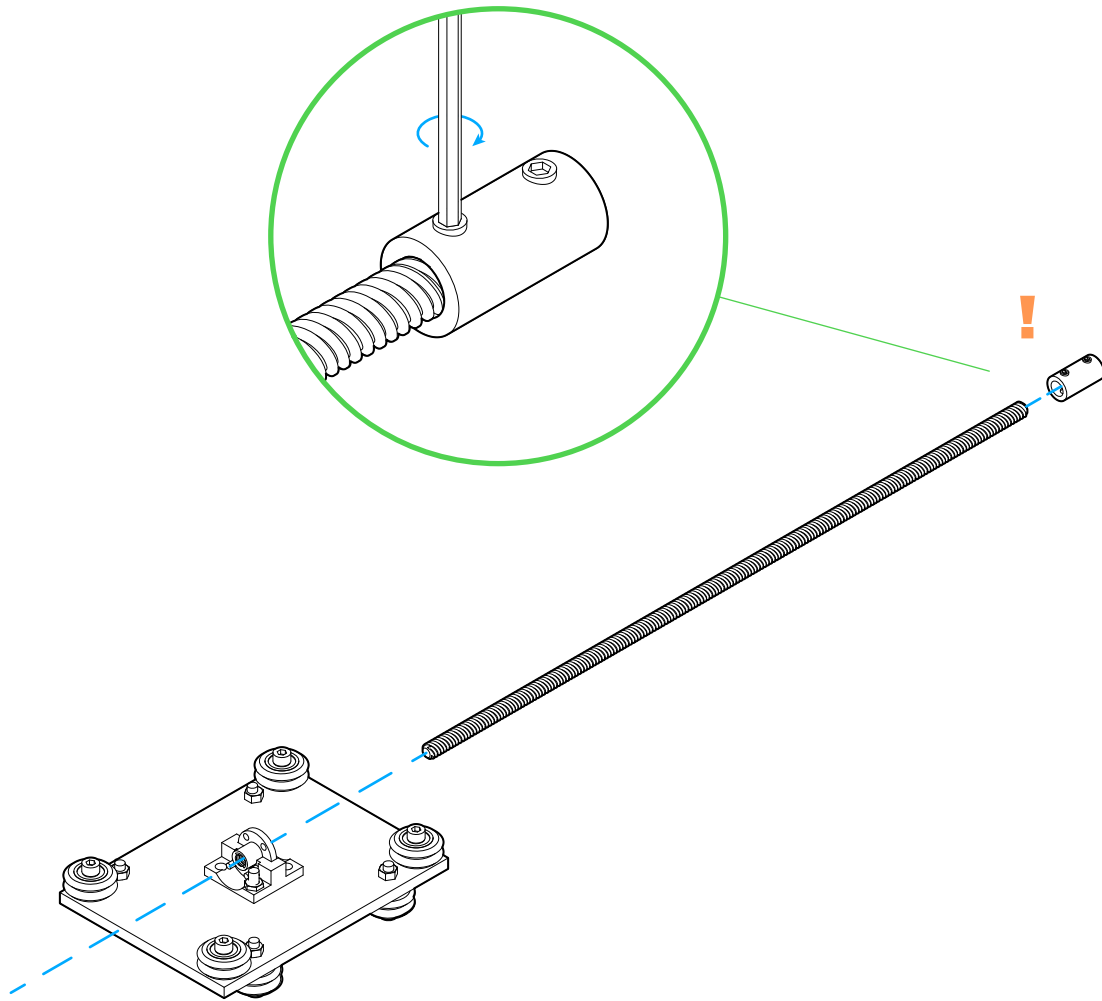
LS-400
1x



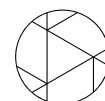
SC
1x



2
Allen



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

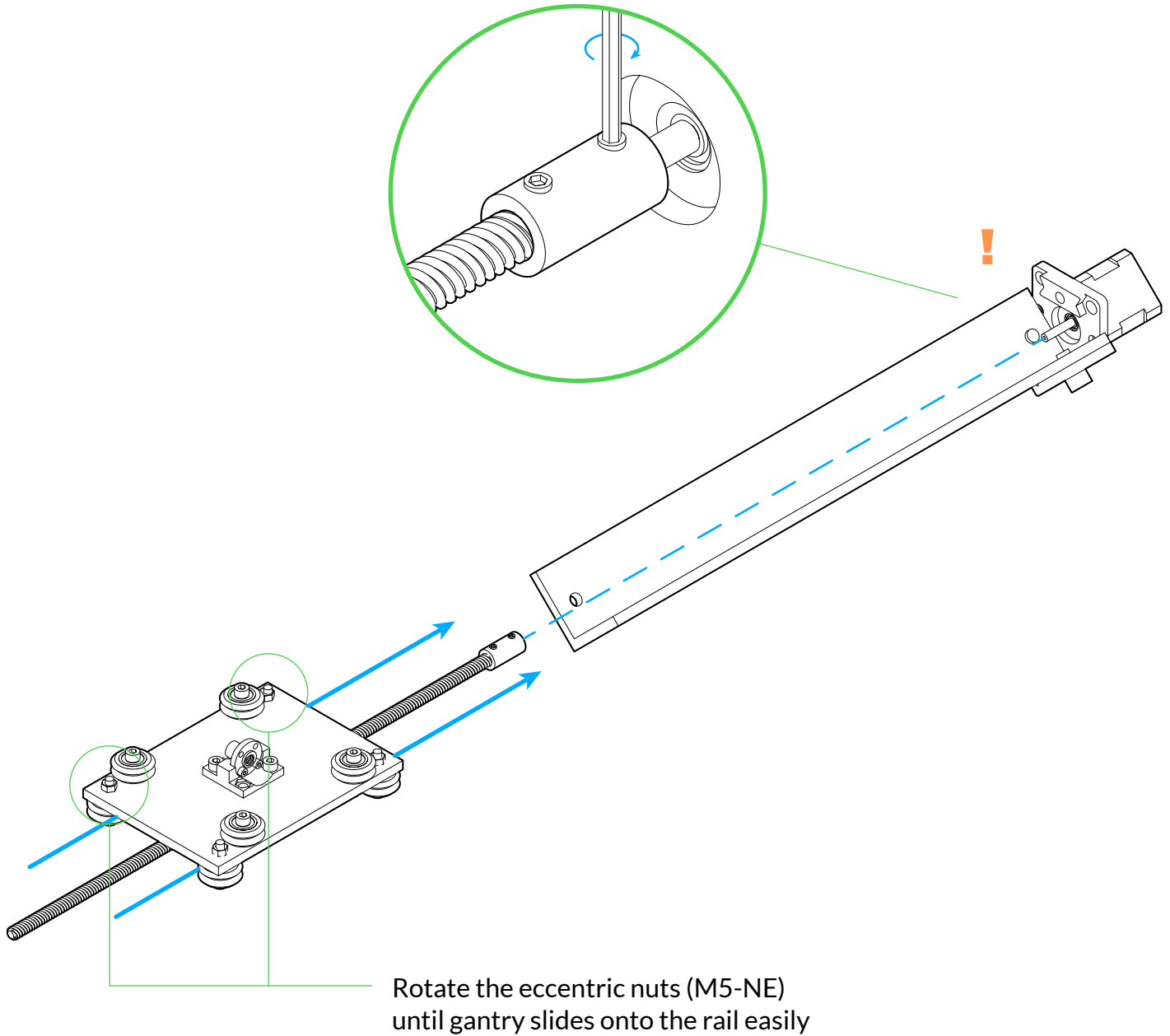


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STEP 10

Attaching the
X-Rail to the XZ
Gantry

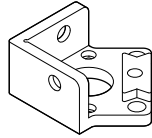
2
Allen
10mm
Wrench



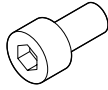
! Make sure to push coupler all the way onto
motor shaft before tightening

STEP 11

Attaching the
X-Rail to the XZ
Gantry



P-AM
1x



M8-15
2x

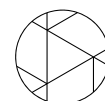
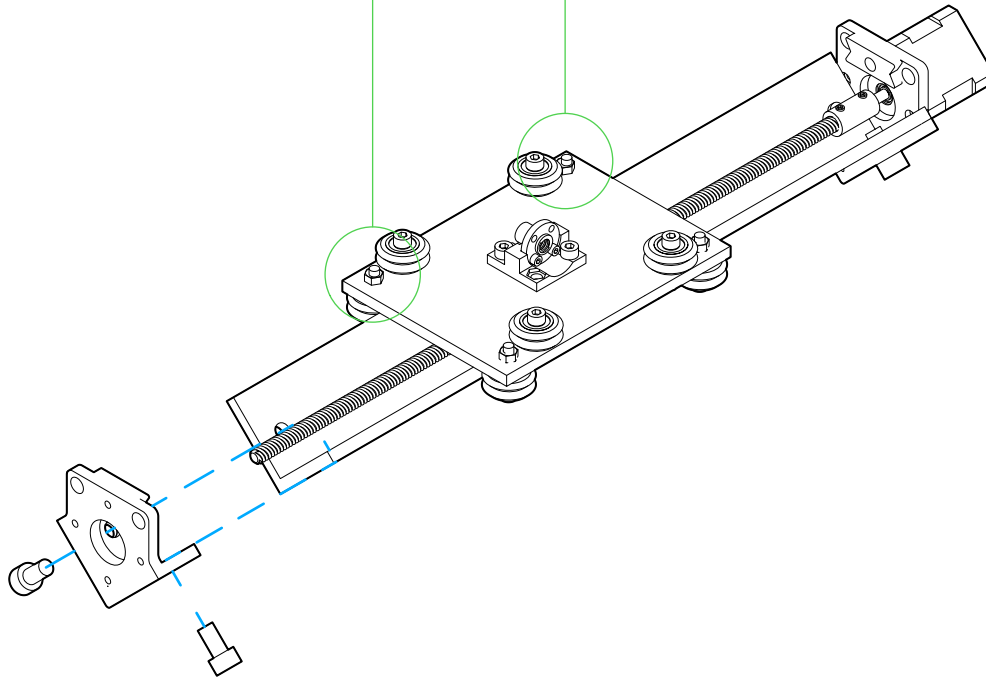


6
Allen



10mm
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.



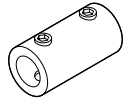
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STEP 12

Attaching
Z-Lead Screw
to XZ Gantry



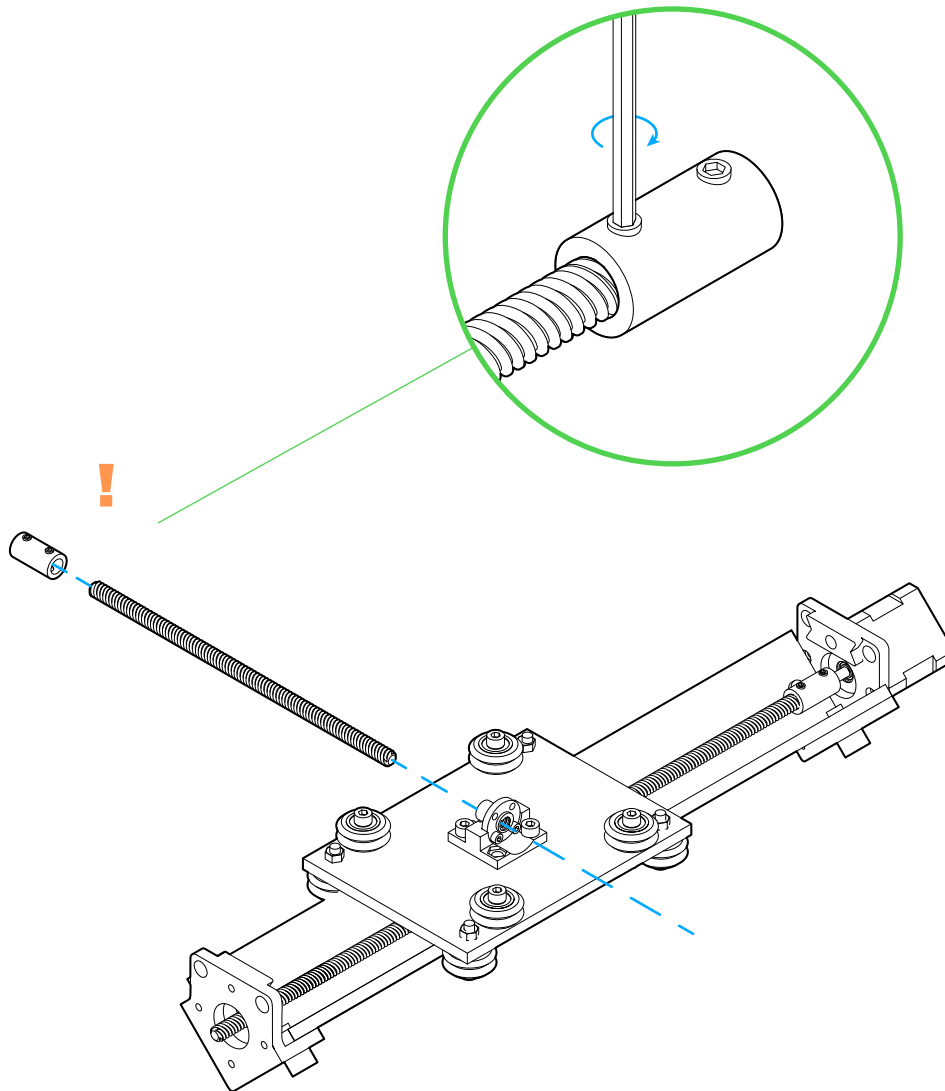
LS-200
1x



SC
1x



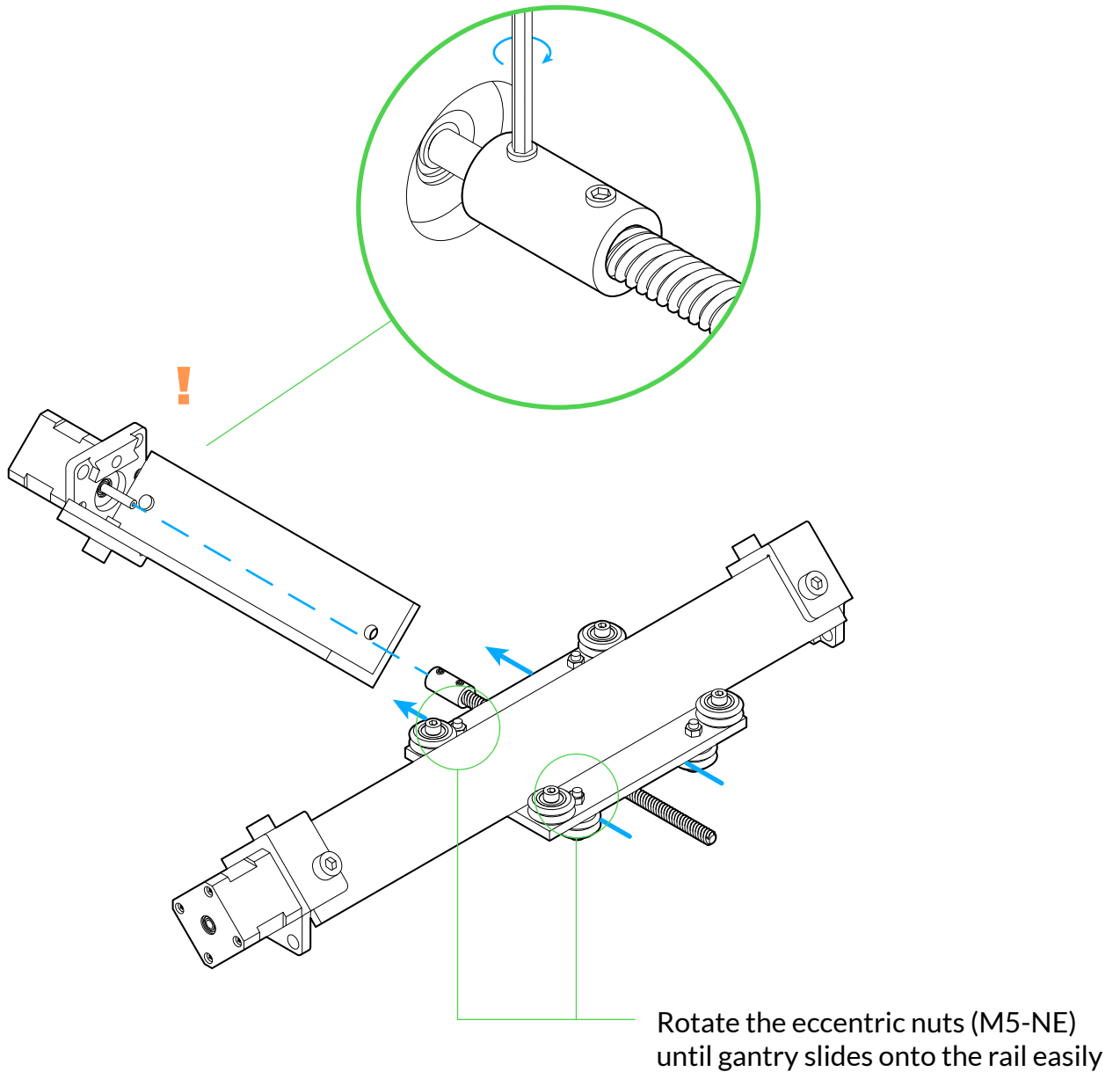
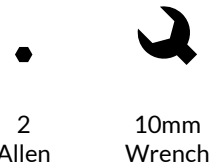
2
Allen



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

STEP 13

Attaching the
Z-Rail to the XZ
Gantry



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

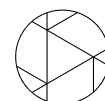
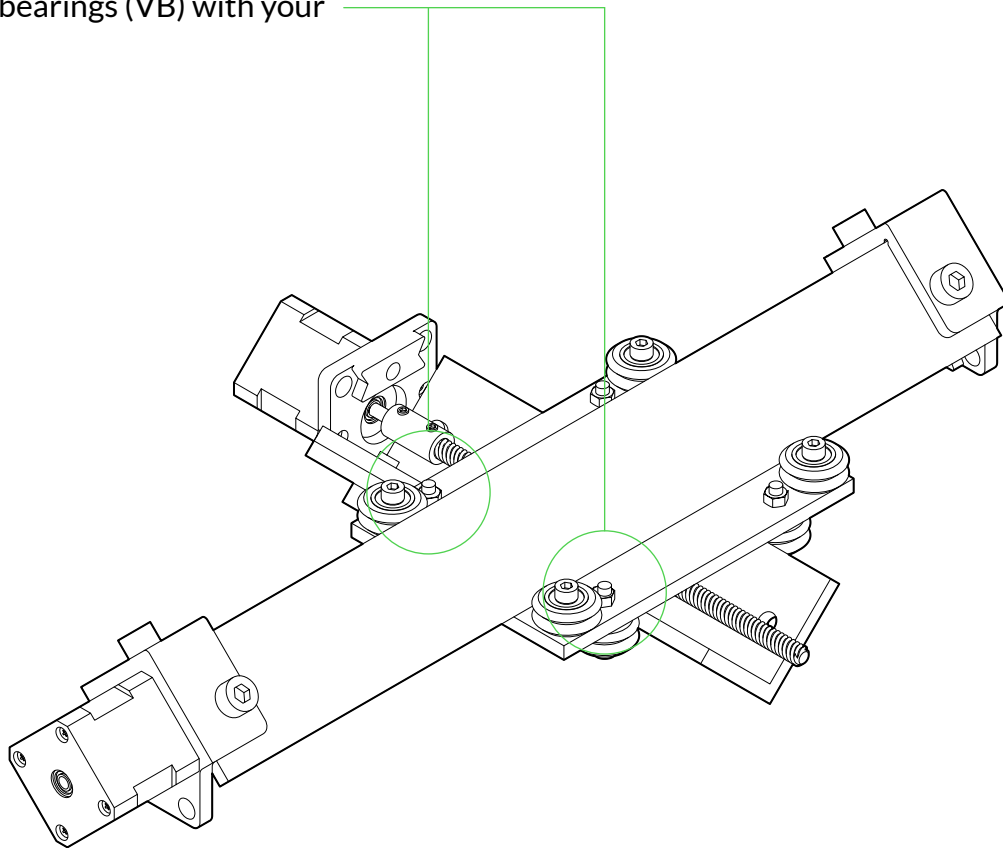
STEP 14

Calibrating the
V Groove
Bearings on
the XZ Gantry



10mm
Wrench

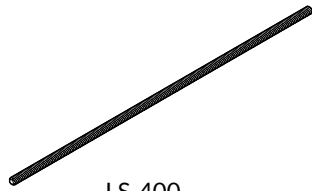
Rotate the eccentric nuts (M5-NE) to
tighten the grip of the wheels on the rail.
Tighten until you can no longer rotate
the V Groove bearings (VB) with your
fingers.



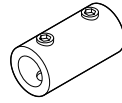
SIENCI LABS
DESKTOP CNC MILLING

STEP 15

Attaching Lead
Screw to Y
Gantry



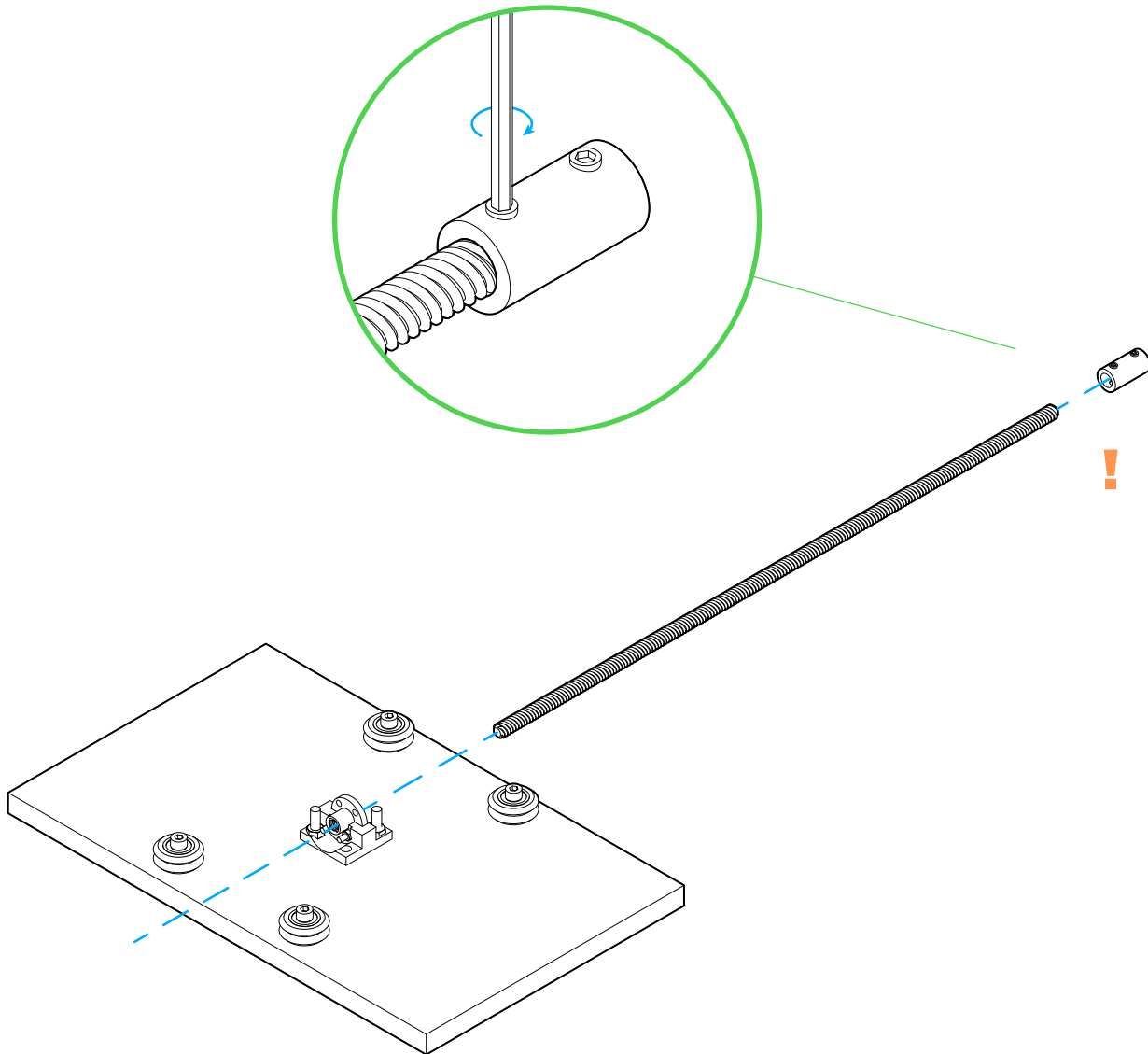
LS-400
1x



SC
1x



2
Allen



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

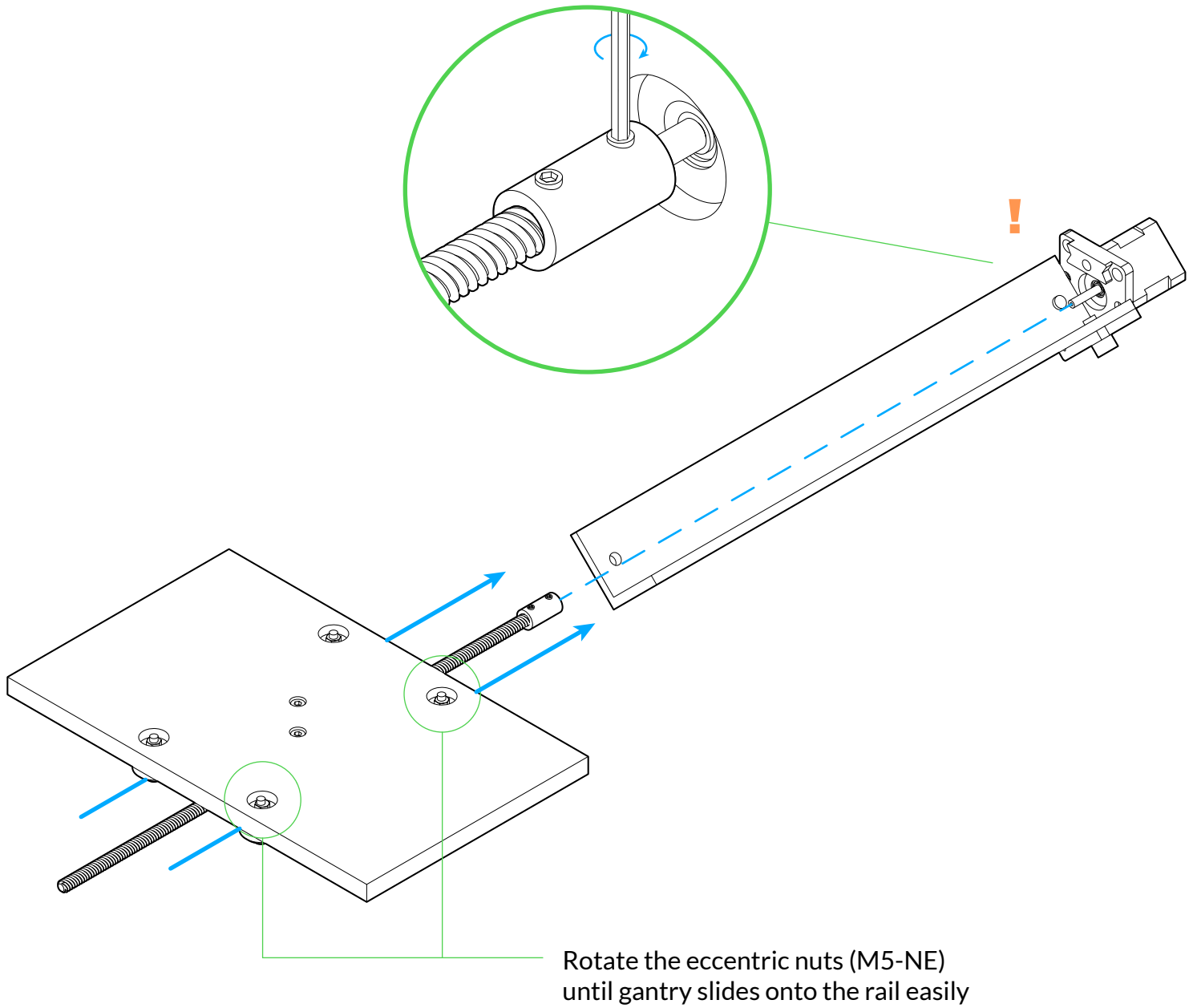


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STEP 16

Attaching the
Y-Rail to the Y
Gantry

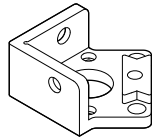
2
Allen
10mm
Wrench



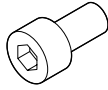
! Make sure to push coupler all the way onto
motor shaft before tightening

STEP 17

Attaching the
Y-Rail to the Y
Gantry



P-AM
1x



M8-15
2x

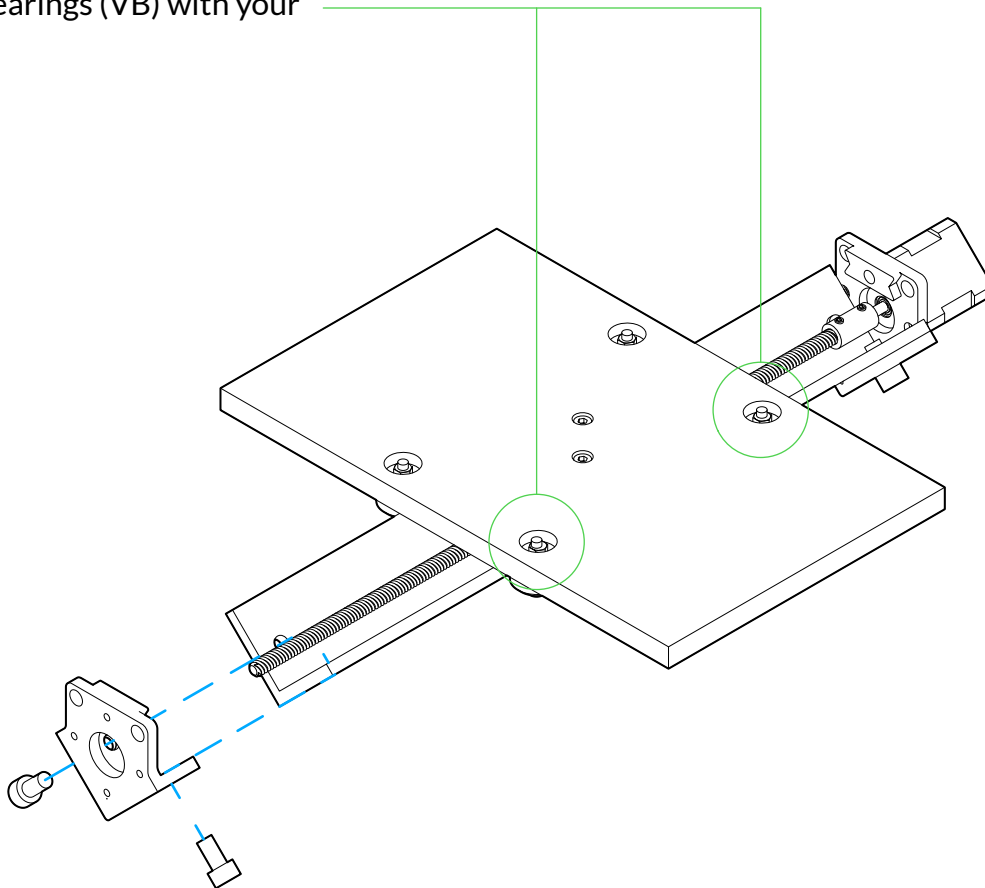


6
Allen



10mm
Wrench

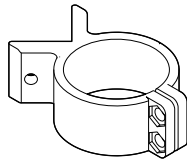
Rotate the eccentric nuts (M5-NE) to
tighten the grip of the wheels on the rail.
Tighten until you can no longer rotate
the V Groove bearings (VB) with your
fingers.



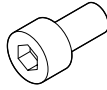
SIENCI LABS
DESKTOP CNC MILLING

STEP 18

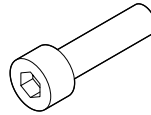
Attaching the
Router Mount



P-RM
1x



M8-15
2x



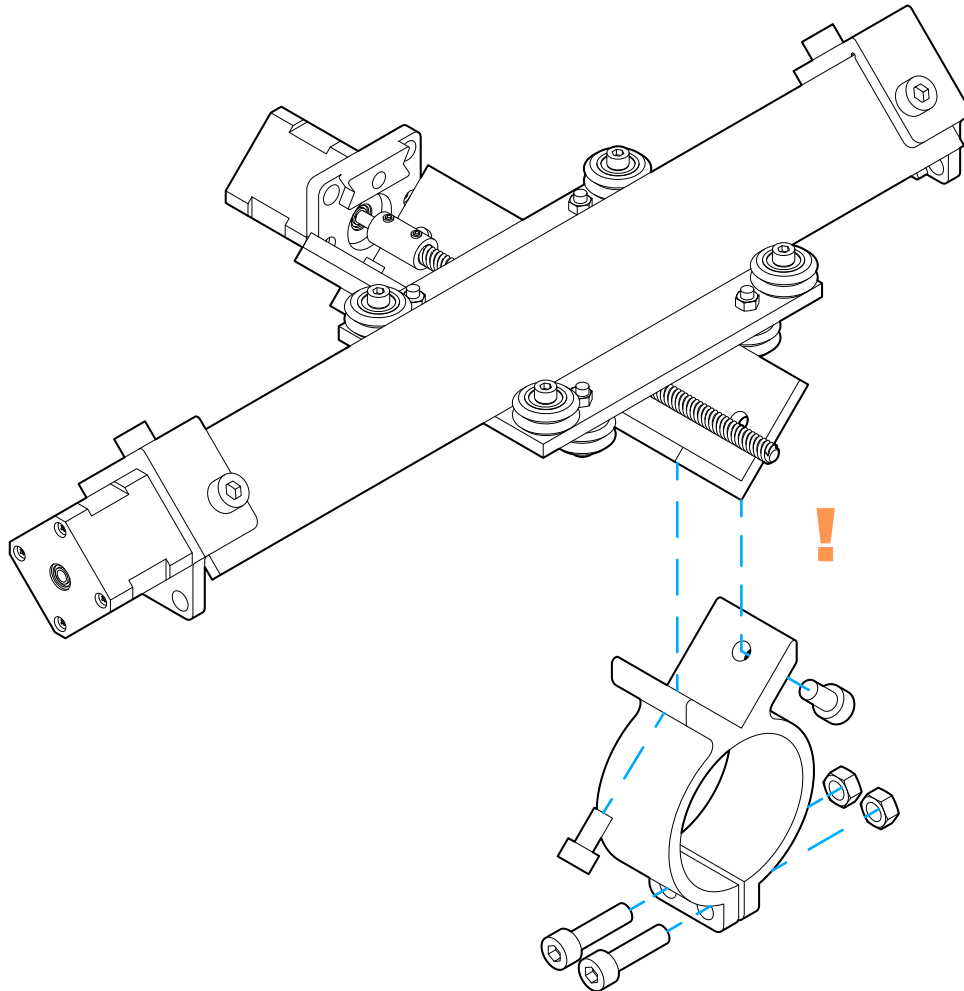
M8-25
2x



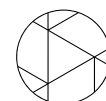
M8-N
2x



6
Allen



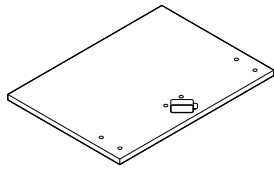
! The bottom of the mount (P-RM) should be the side that is more flush with the bottom of the aluminum rail (AR-200)



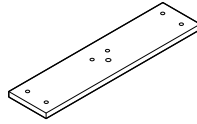
SIENCI LABS
DESKTOP CNC MILLING

STEP 19

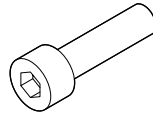
Attaching Y
Gantry to
Frame



F-B
1x



F-F
1x



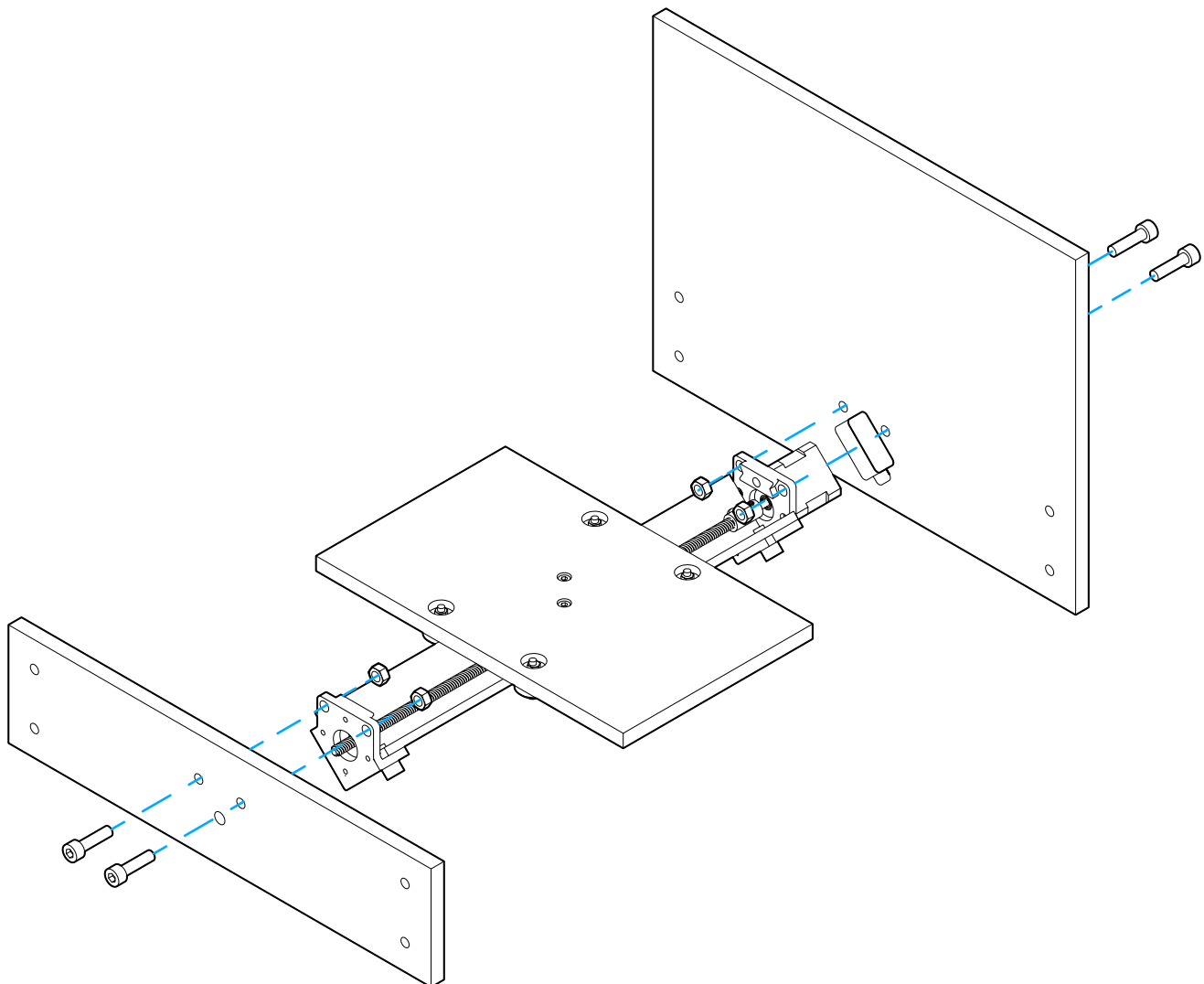
M8-25
4x



M8-N
4x



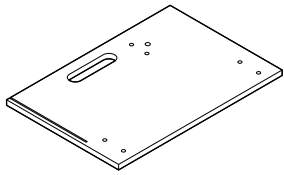
6
Allen



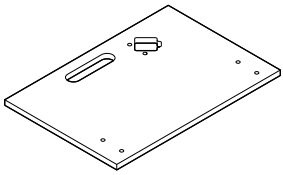
SIENCI LABS
DESKTOP CNC MILLING

STEP 20

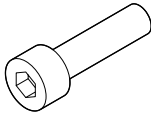
Attaching XZ
Gantry to
Frame



F-L
1x



F-R
1x



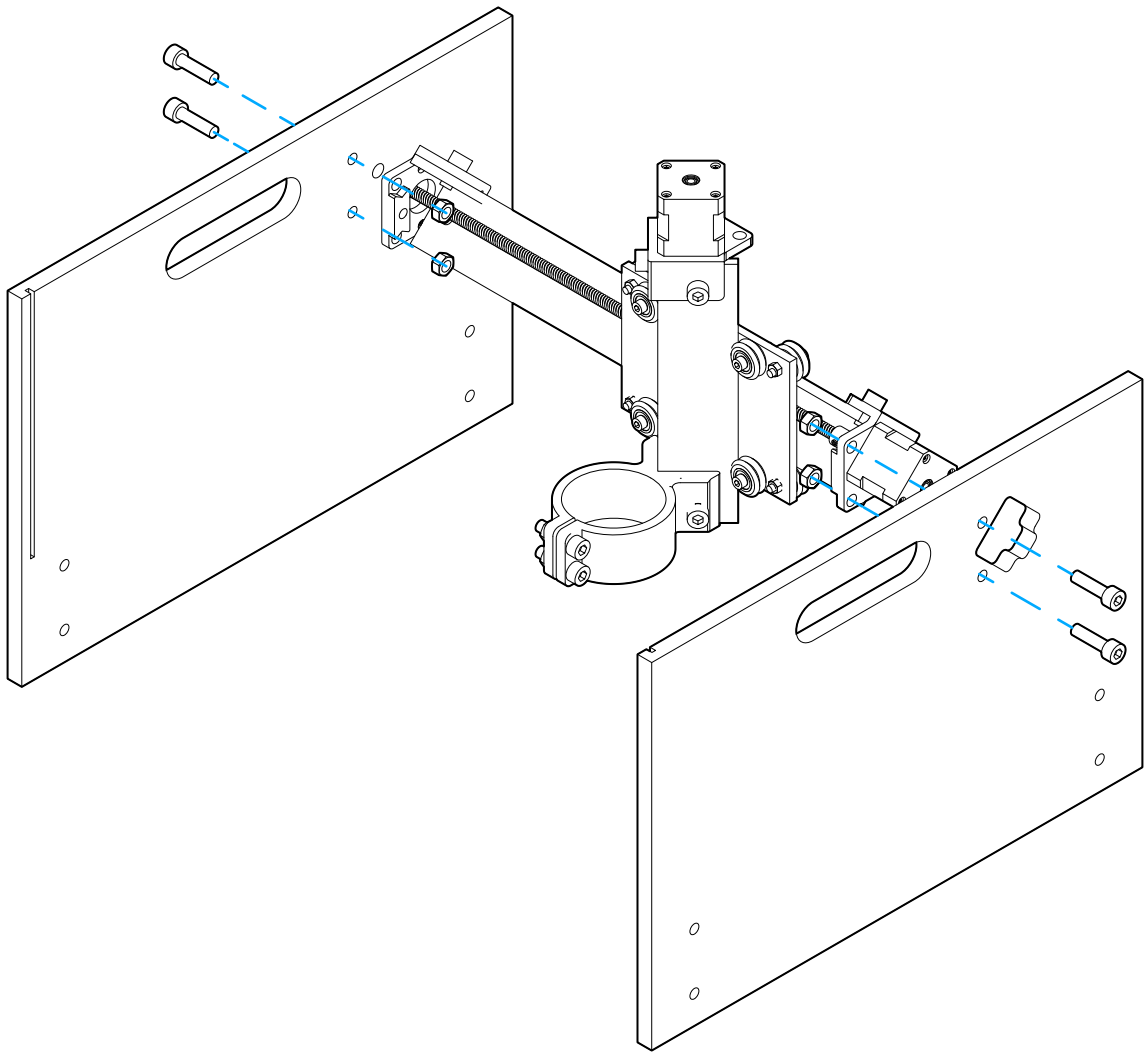
M8-25
4x



M8-N
4x

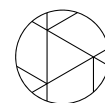
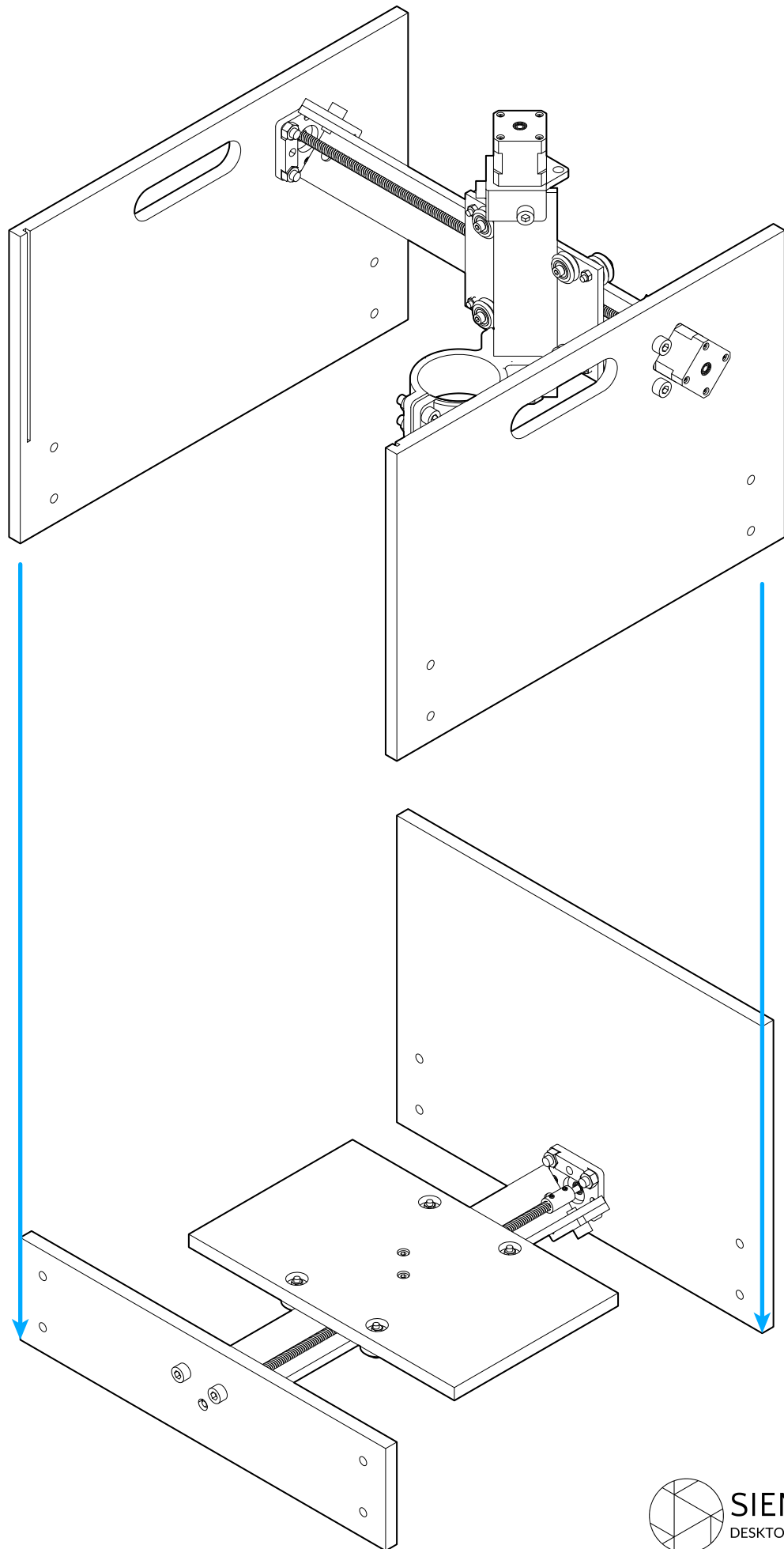


6
Allen



STEP 21

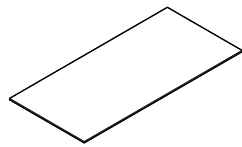
Attaching the
Assemblies



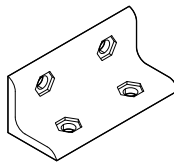
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DESKTOP CNC MILLING

STEP 22

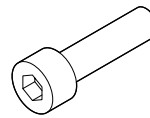
Attaching
Frame Brackets
and Acrylic
Shield



F-AC
1x



P-FB
4x



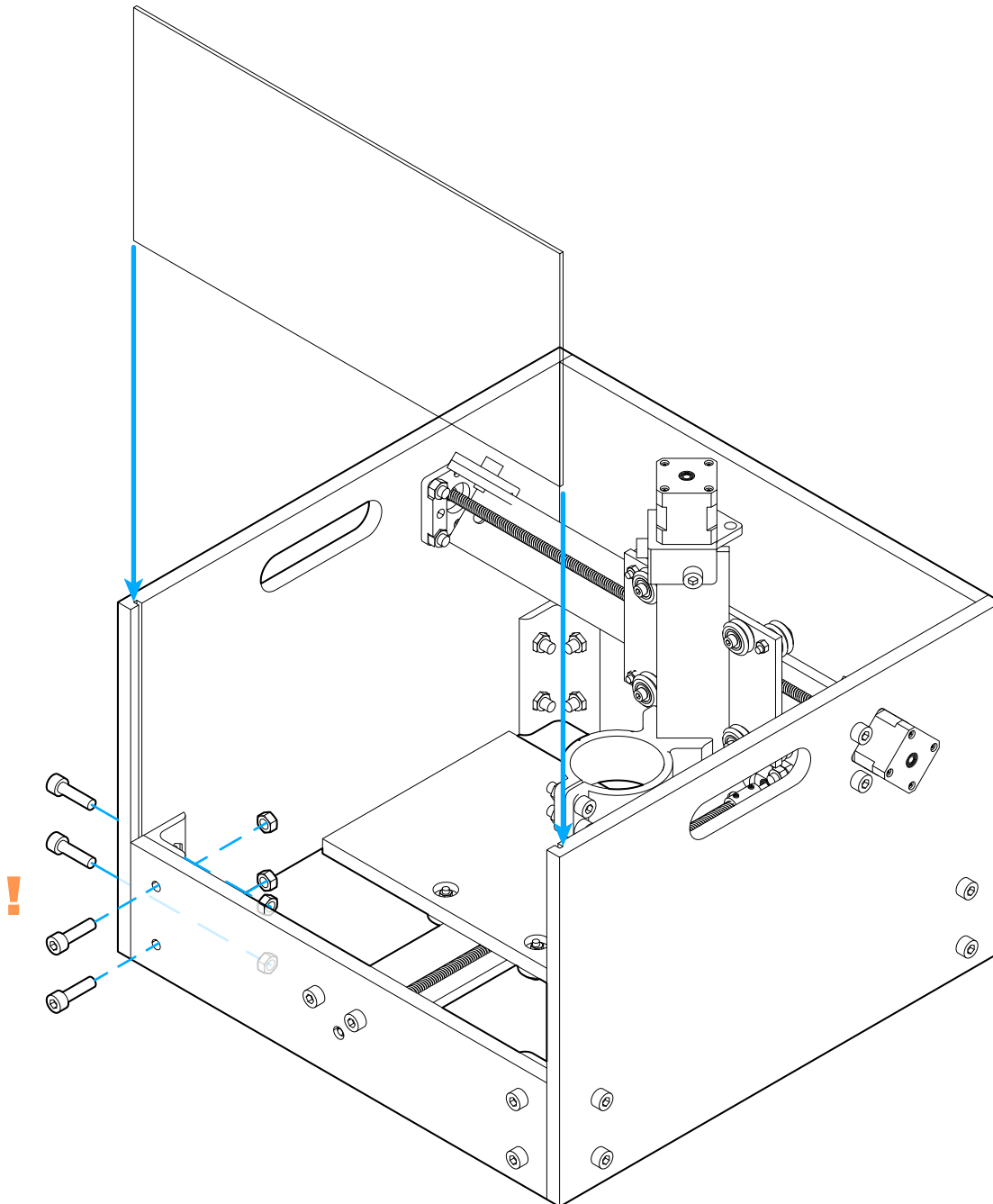
M8-25
16x



M8-N
16x



6
Allen



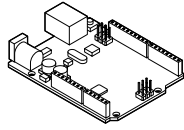
! Twist on nuts and bolts on all corners loosely,
then tighten on a flat surface



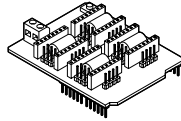
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DESKTOP CNC MILLING

STEP 23

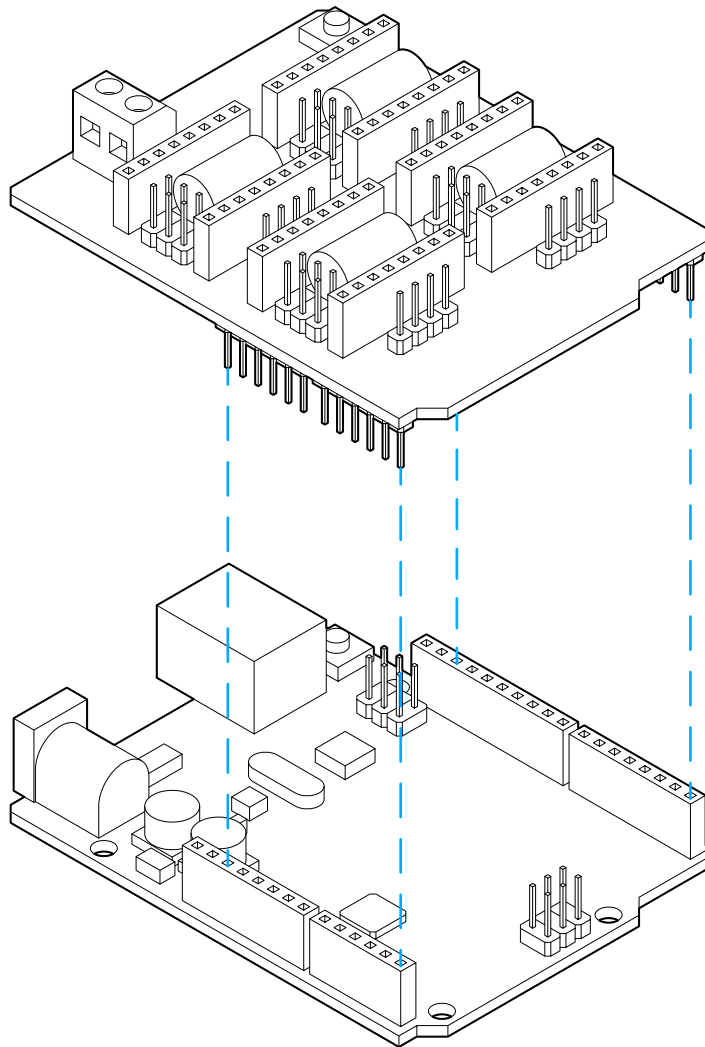
Combining the
Arduino and
CNC Shield



E-ARD
1x



E-CNC
1x

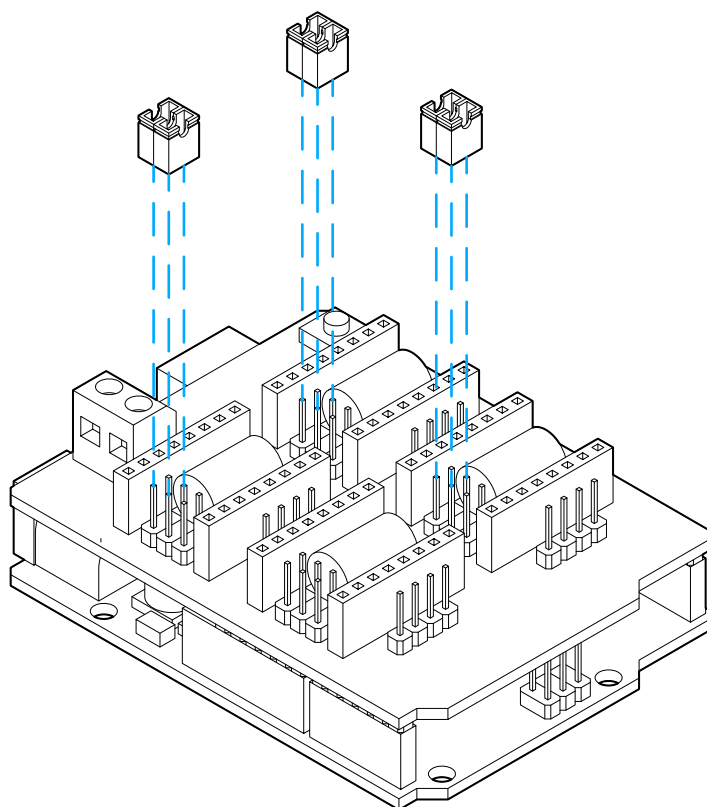


STEP 24

Attaching the
Header
Jumpers

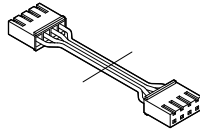


E-HJ
6x

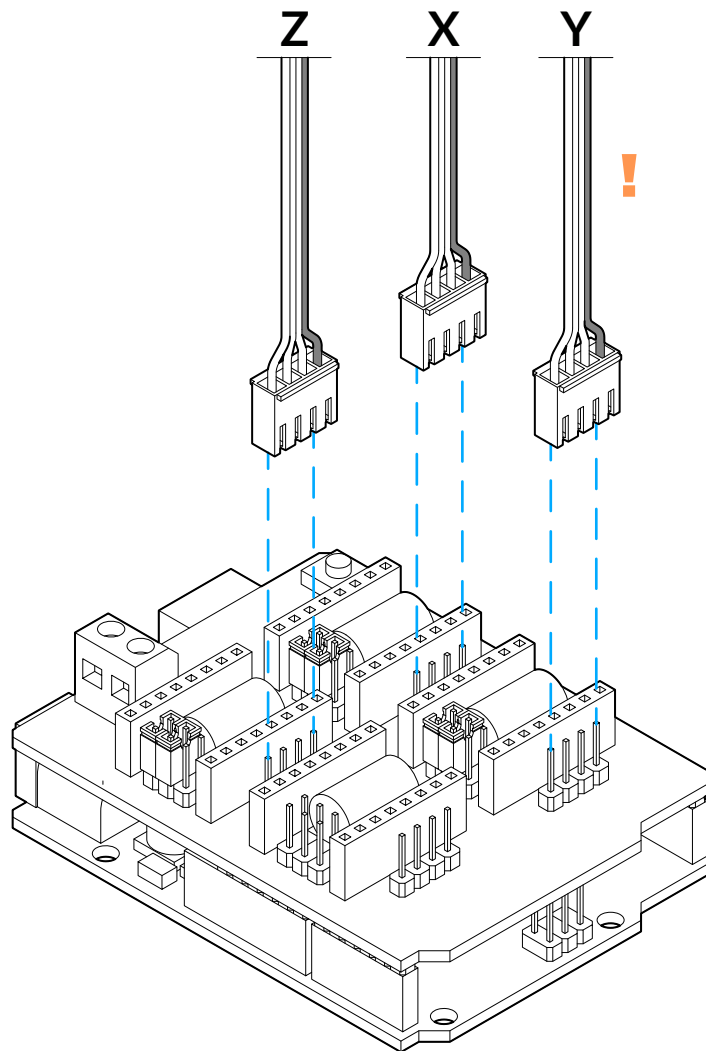


STEP 25

Attaching
Motor Cables



E-C
3x



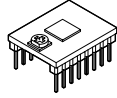
! Make sure the black wire is oriented as depicted

STEP 26

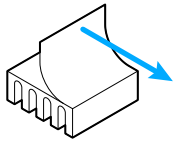
Attaching
Stepper Driver
Chips



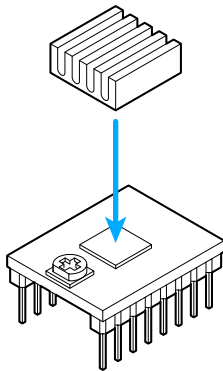
E-SDH
3x



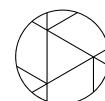
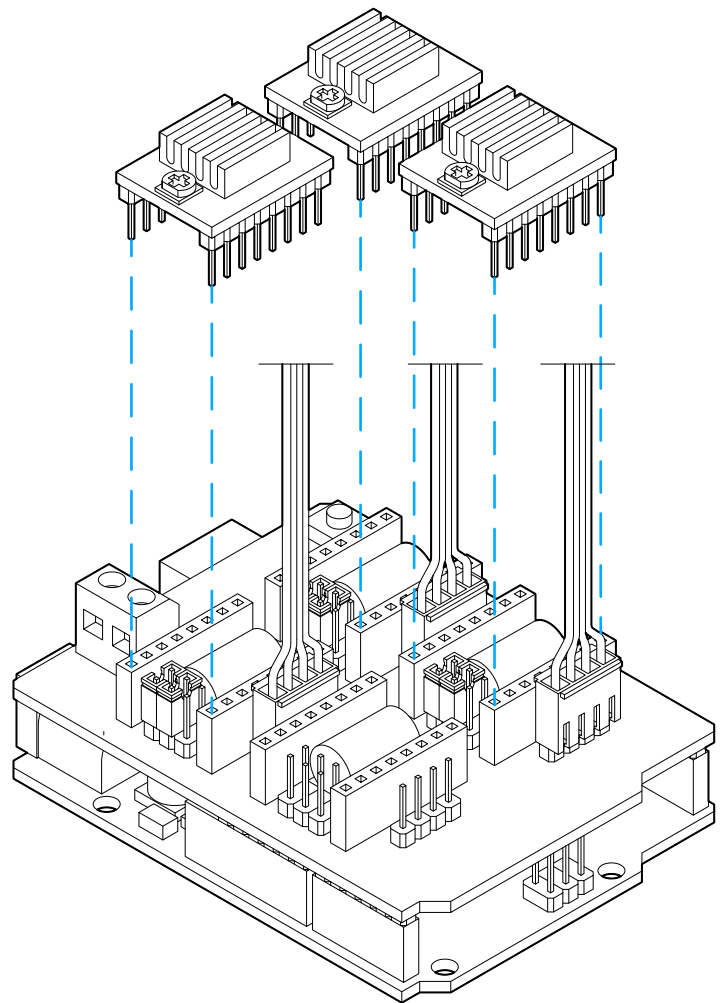
E-SDC
3x



3x



3x



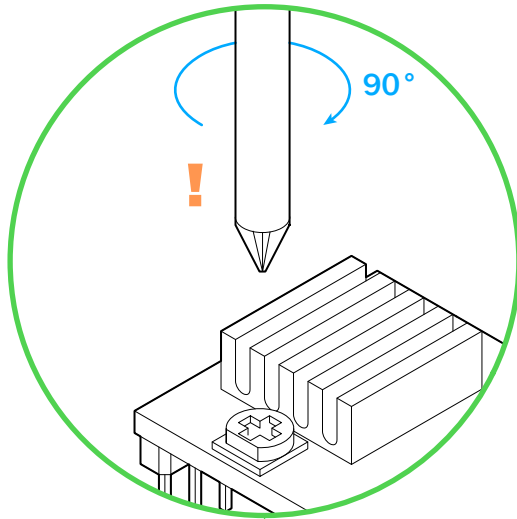
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STEP 27

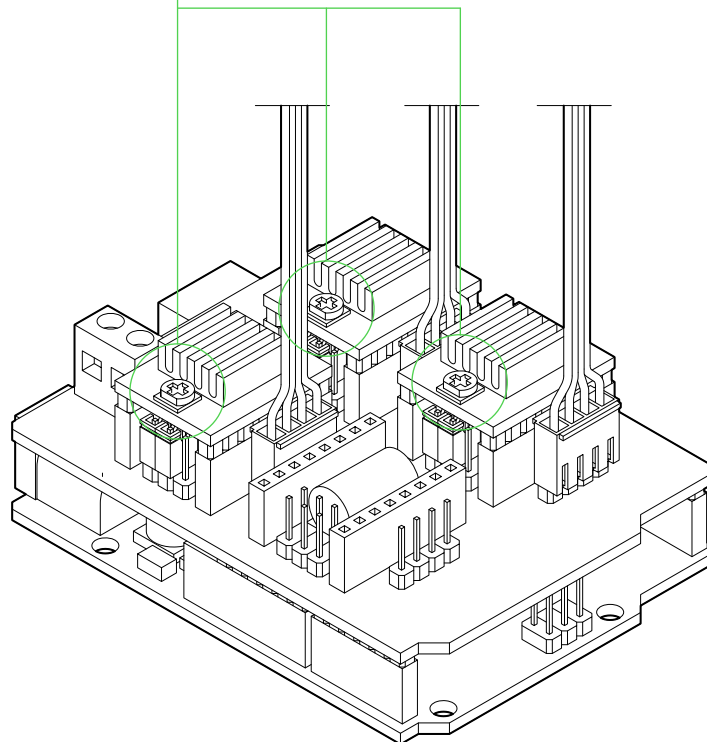
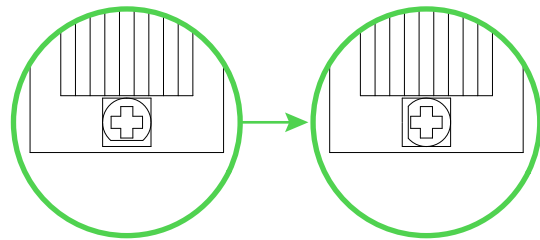
Tuning the Stepper Motor Drivers



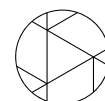
Phillips



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.



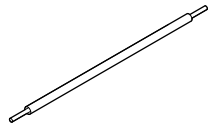
! Stepper driver potentiometers should never be turned while the board is powered up



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STEP 28

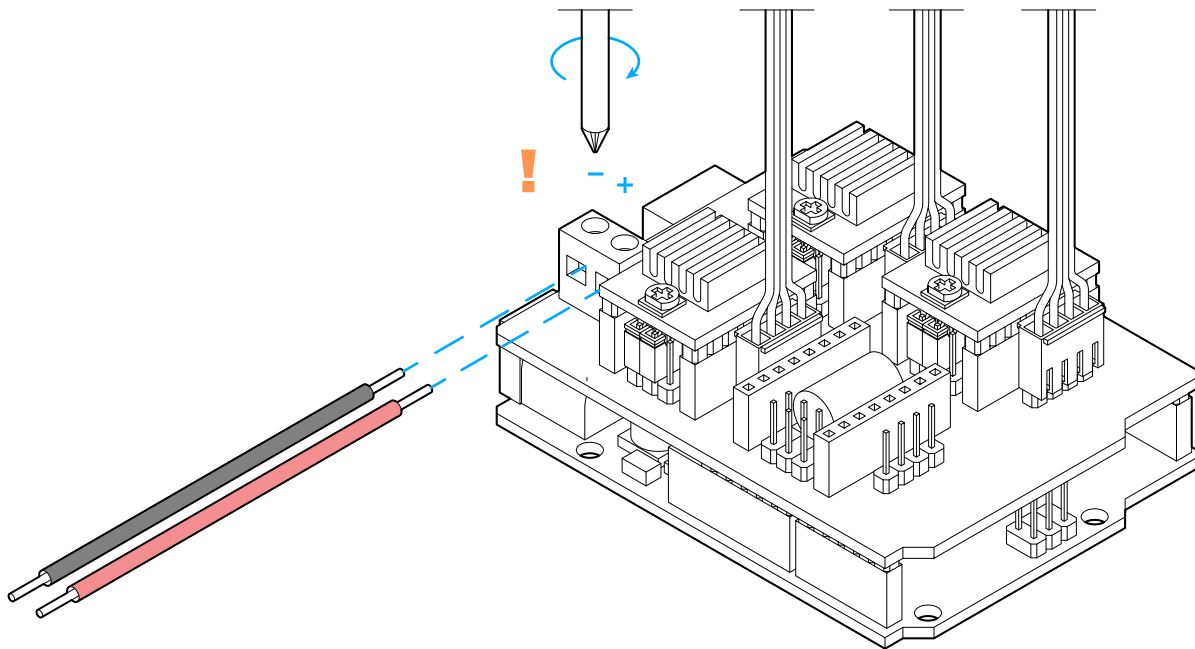
Attaching
Wires to the
DC Power
Socket



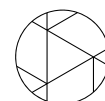
E-W
2x



Phillips



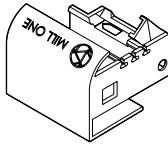
! Ensure polarity is correct to avoid damage to electronics



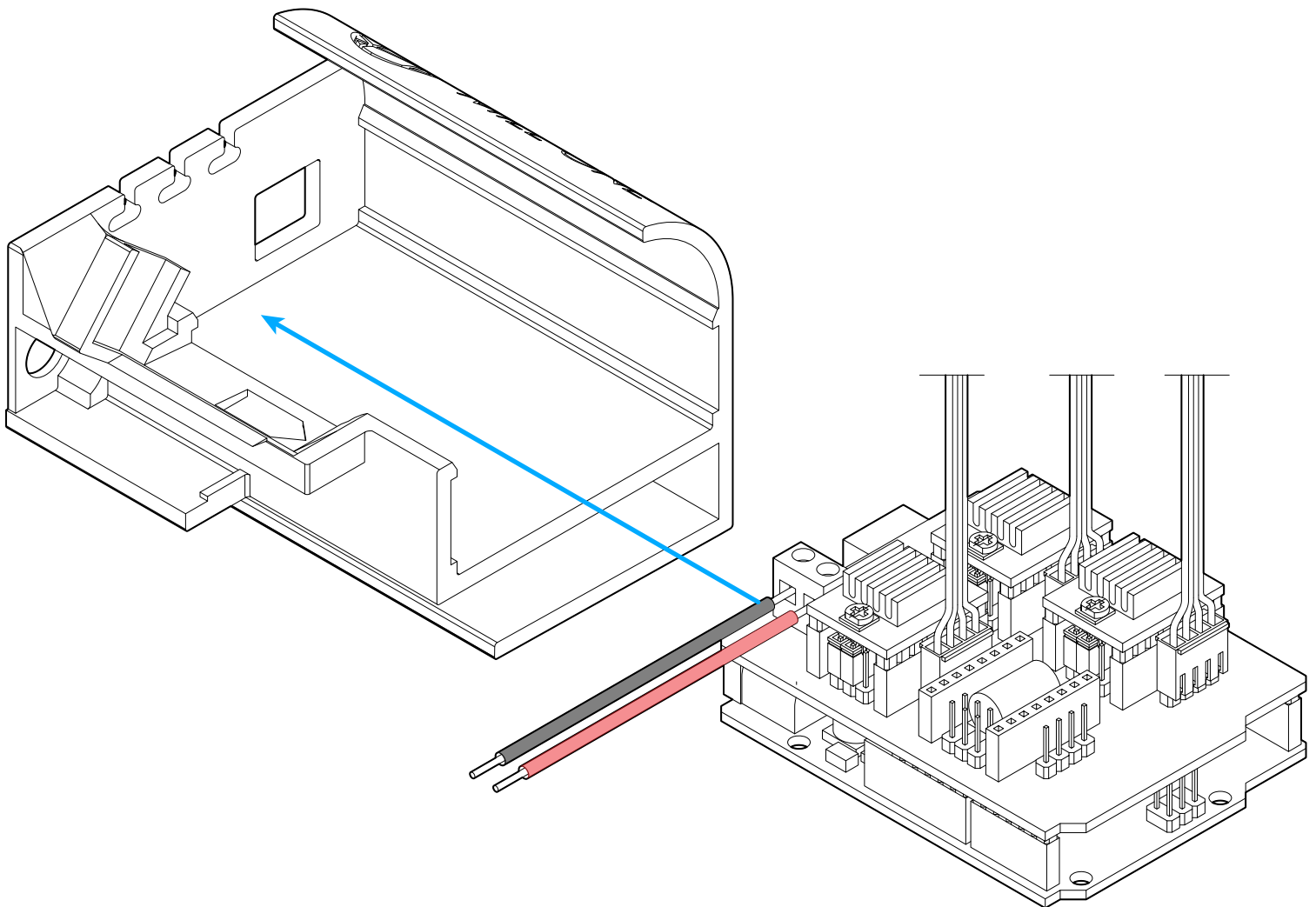
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STEP 29

Placing Boards
into Electronics
Holder

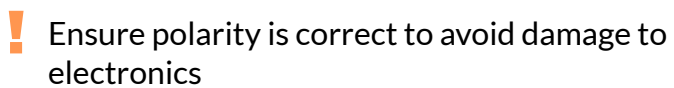


P-EH
1x



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Feeding Wires Through Slots + Attaching DC Jack

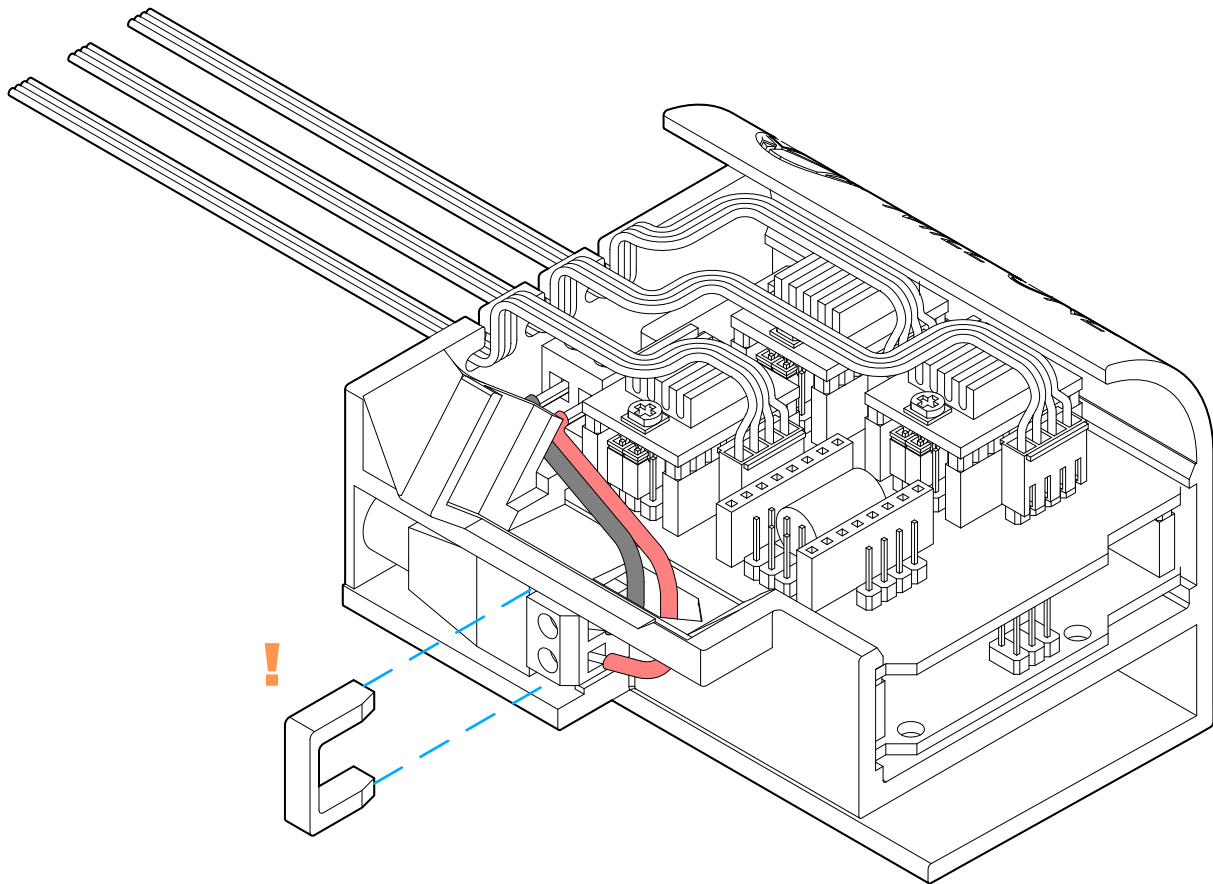


STEP 31

Securing the
DC Jack



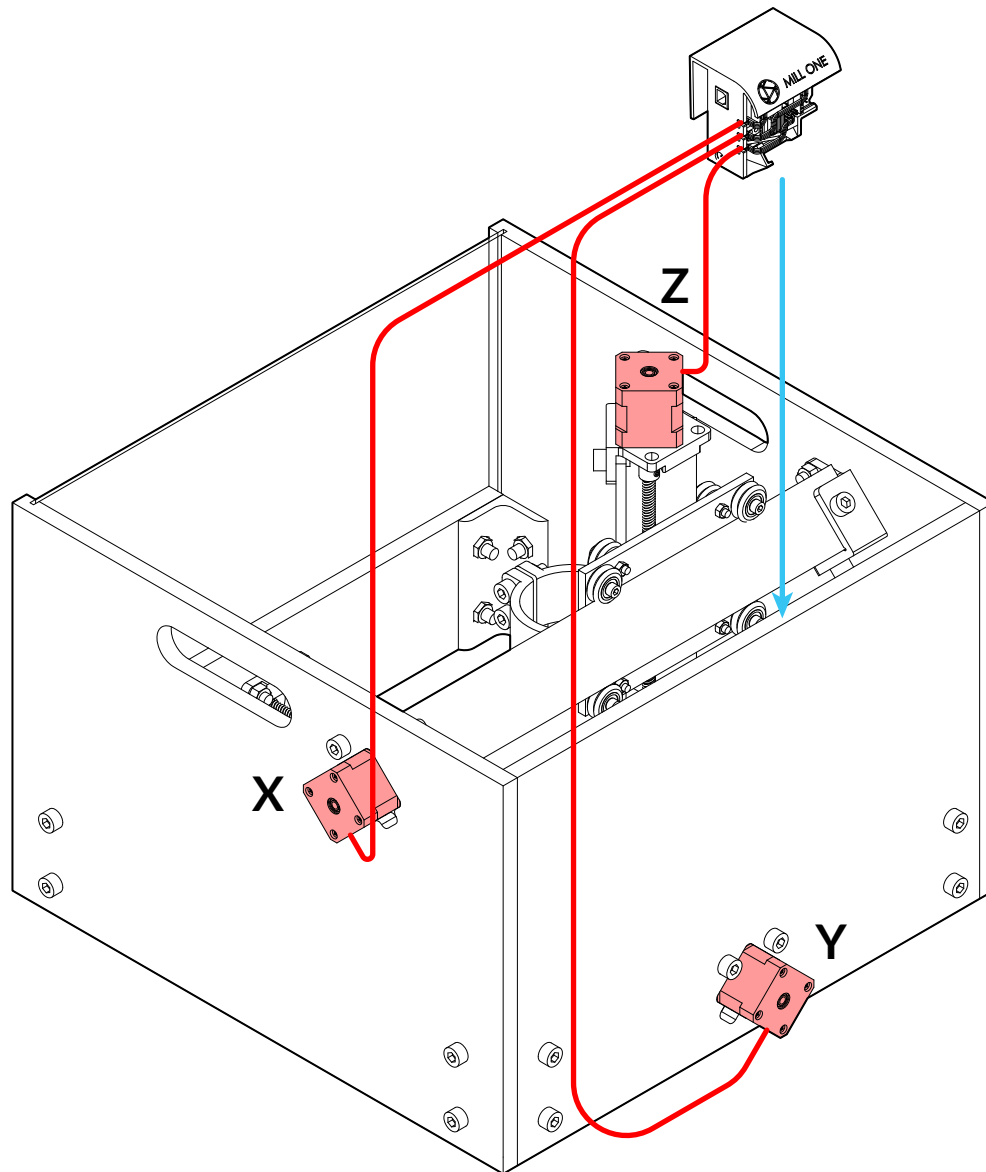
P-PH
1x



! Some machines may not need this step as the DC
Jack (E-J) should fit snugly

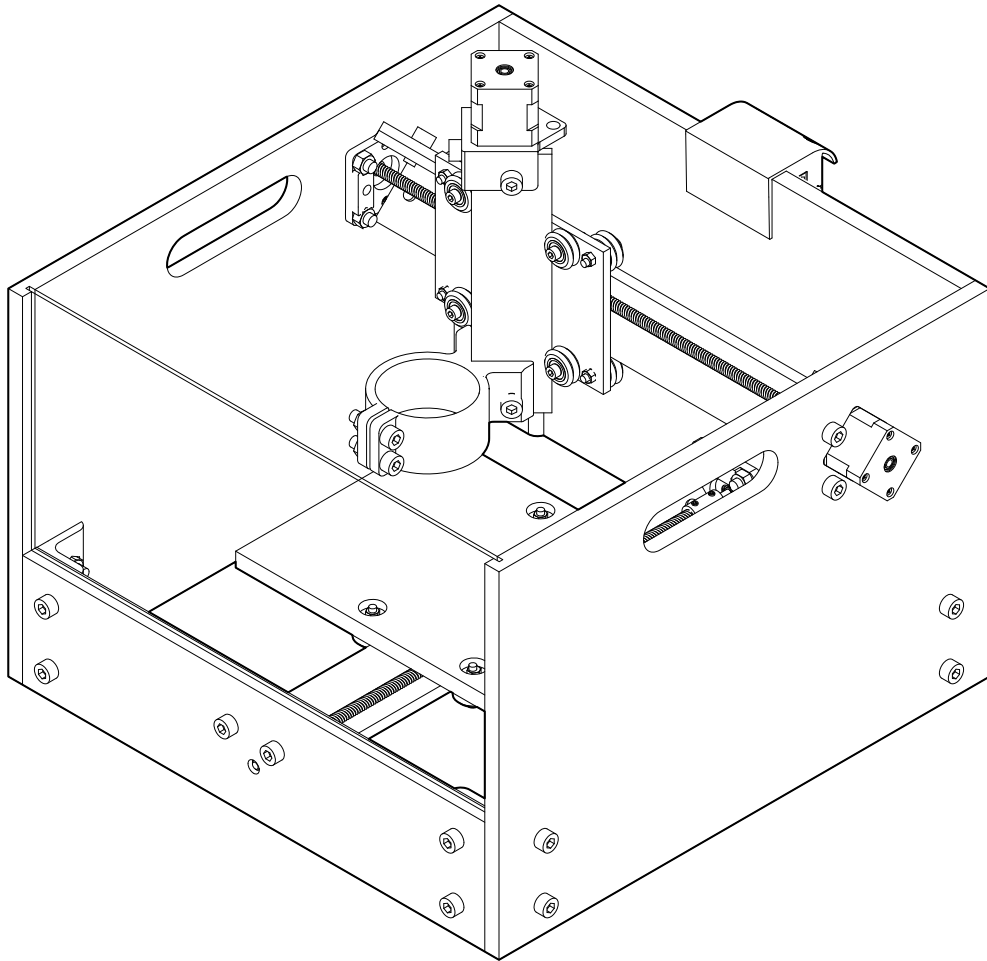
STEP 32

Attaching
Electronics to
Motors

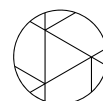


STEP 33

Assembled
Mill One

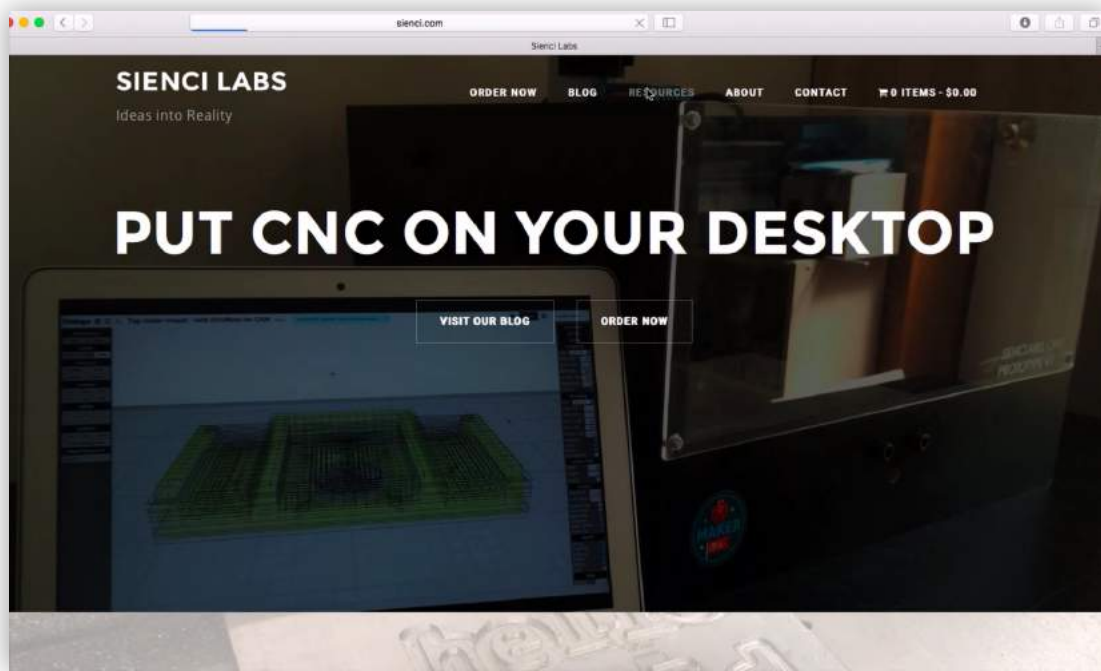


Your Mill One is now fully assembled. Don't plug in your power brick yet, simply connect the USB cable to your computer and continue onto the next steps.

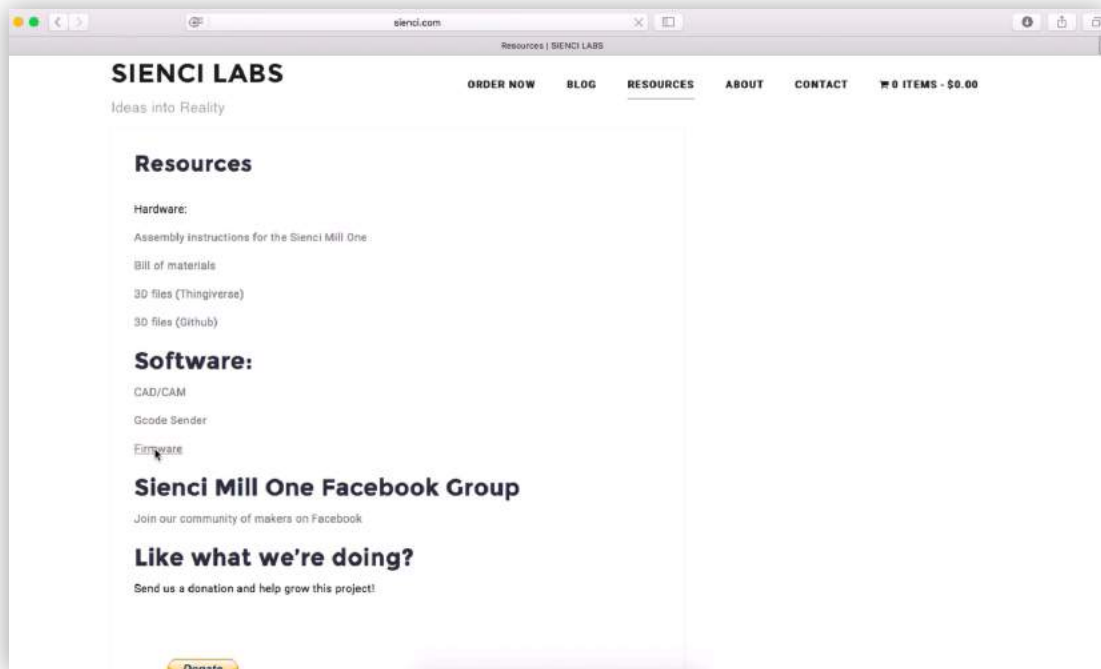


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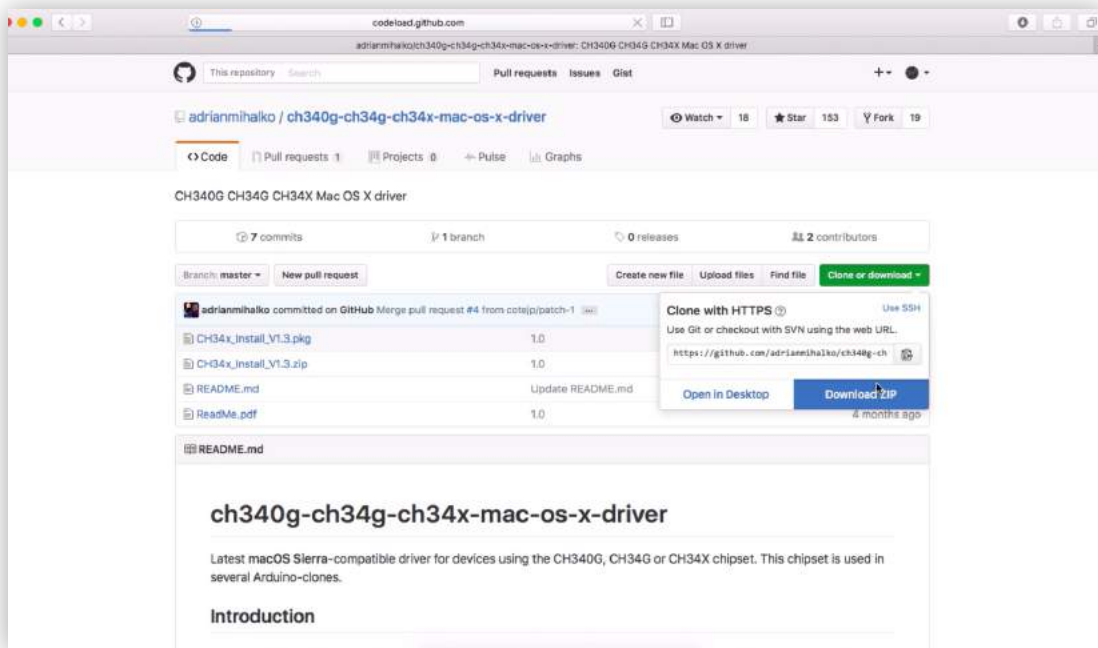
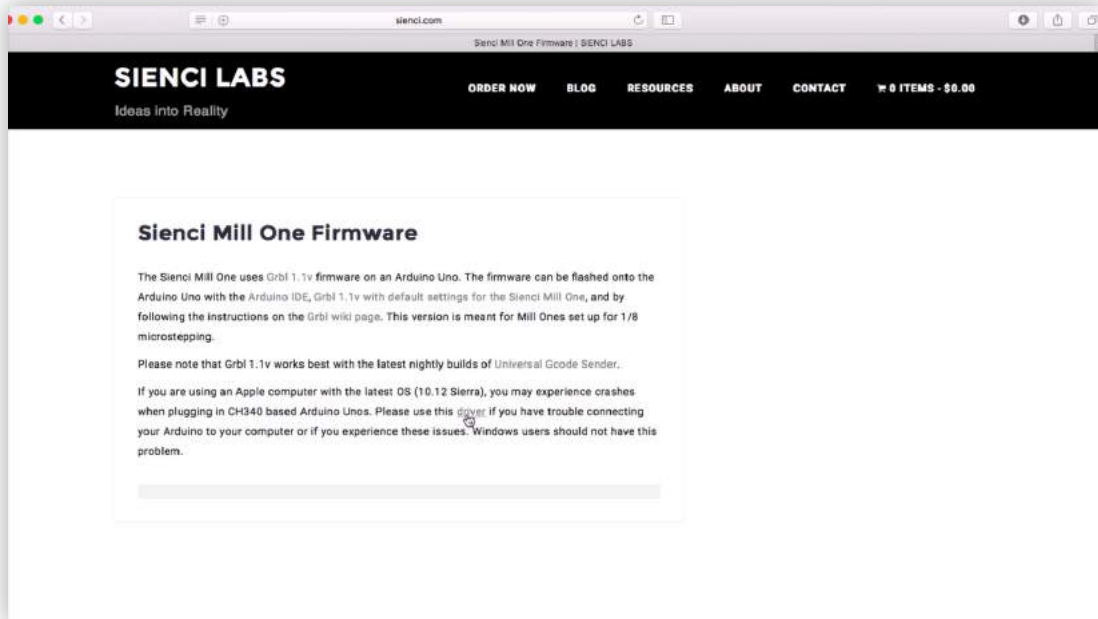
INSTALLING FIRMWARE



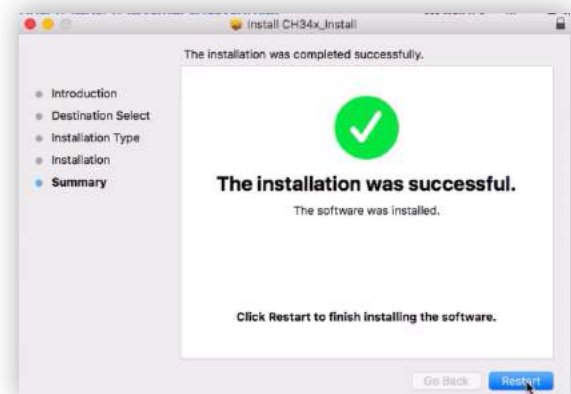
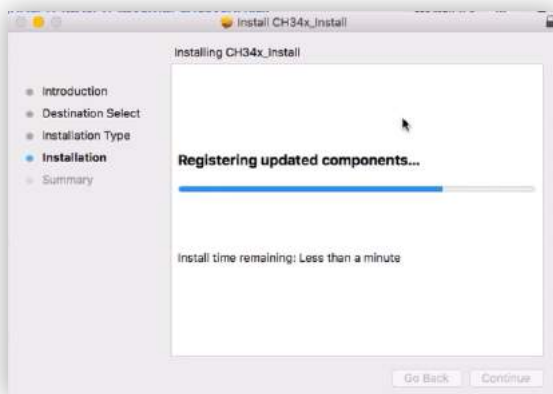
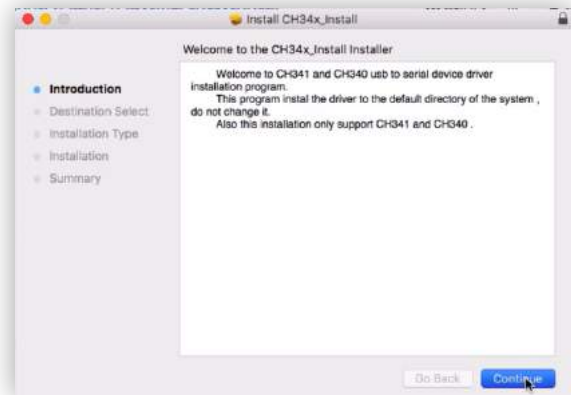
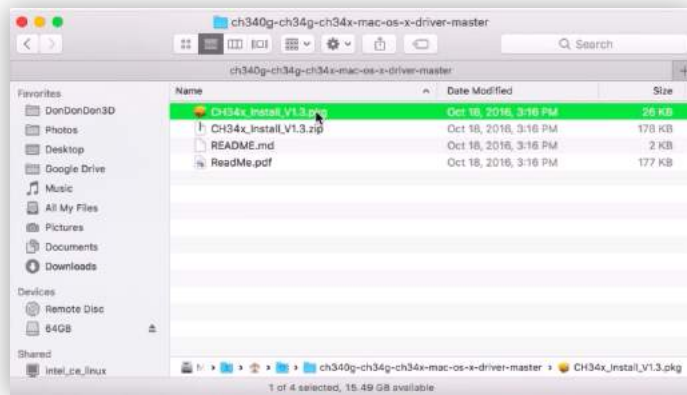
Open your favourite web browser and navigate to the Resources tab of our website.



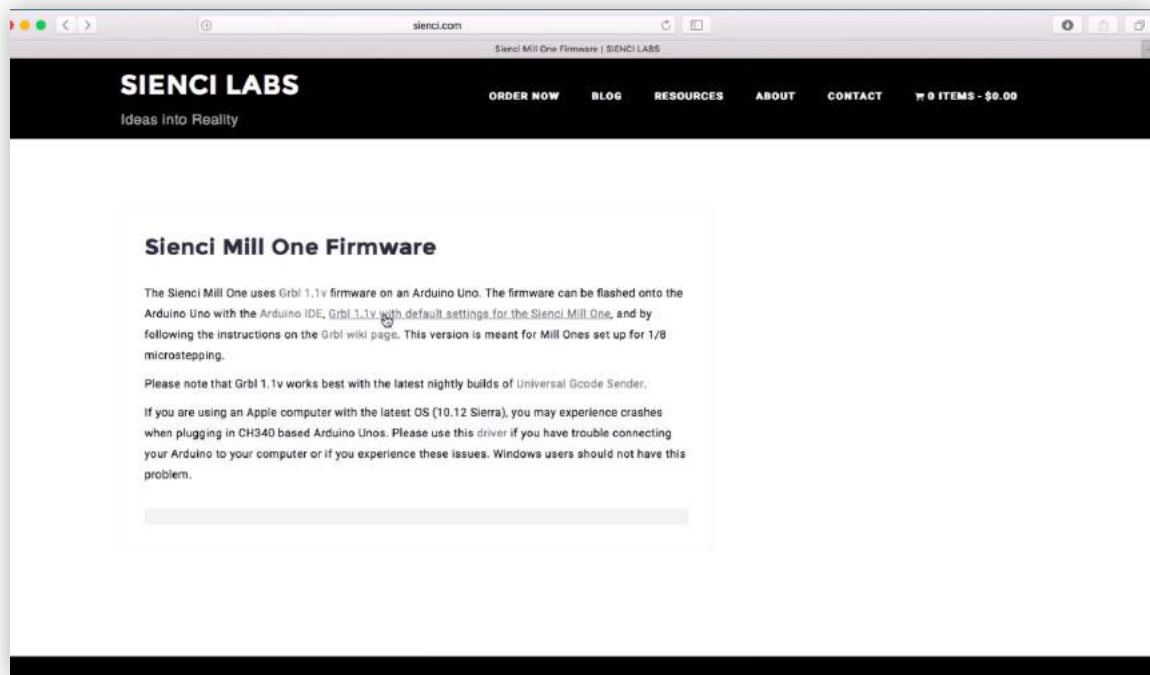
On the Resources page, under the Software heading, you should notice a link to the Firmware.



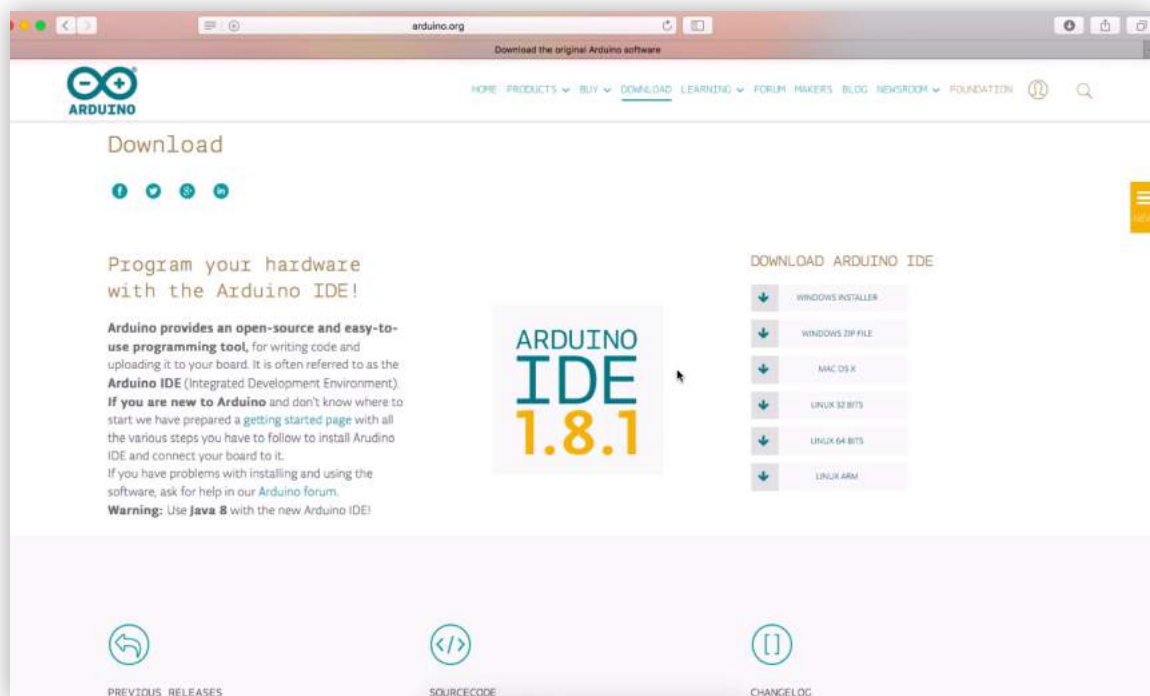
If you're using an apple product, your first step will be to download the driver linked on the page. This will ensure that plugging in your Arduino doesn't cause any issues.



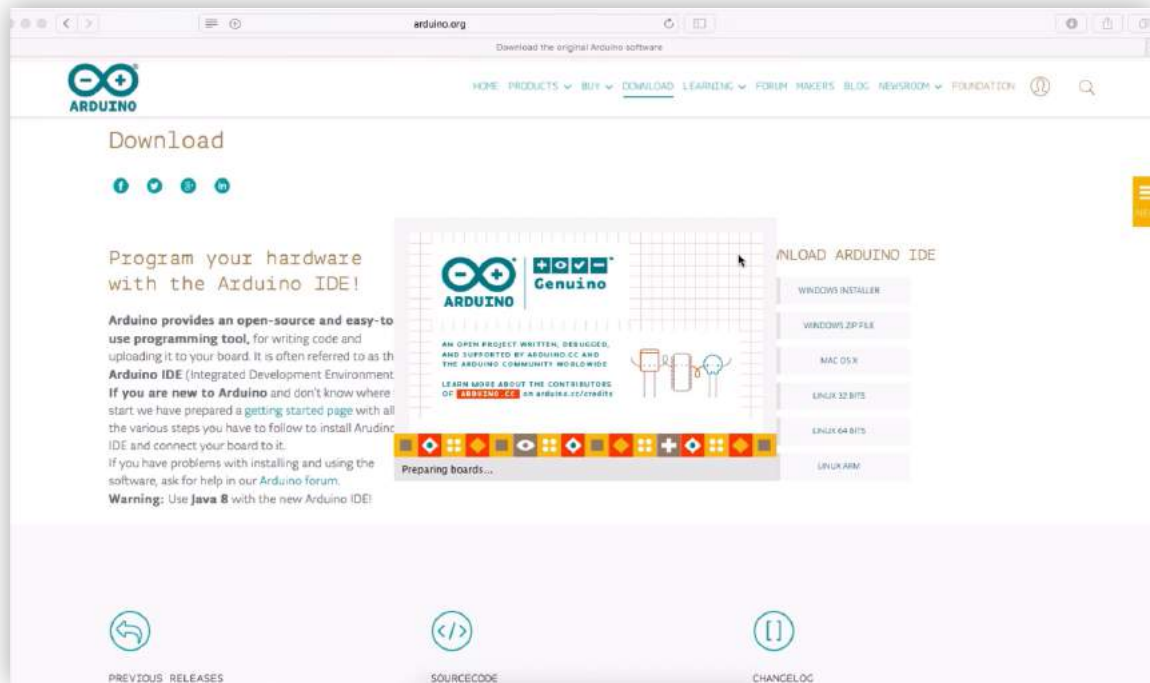
Once you run the package in the downloaded folder, the driver will install. You will be prompted to restart your computer, once the restart has completed, you should return to the Firmware page of our website



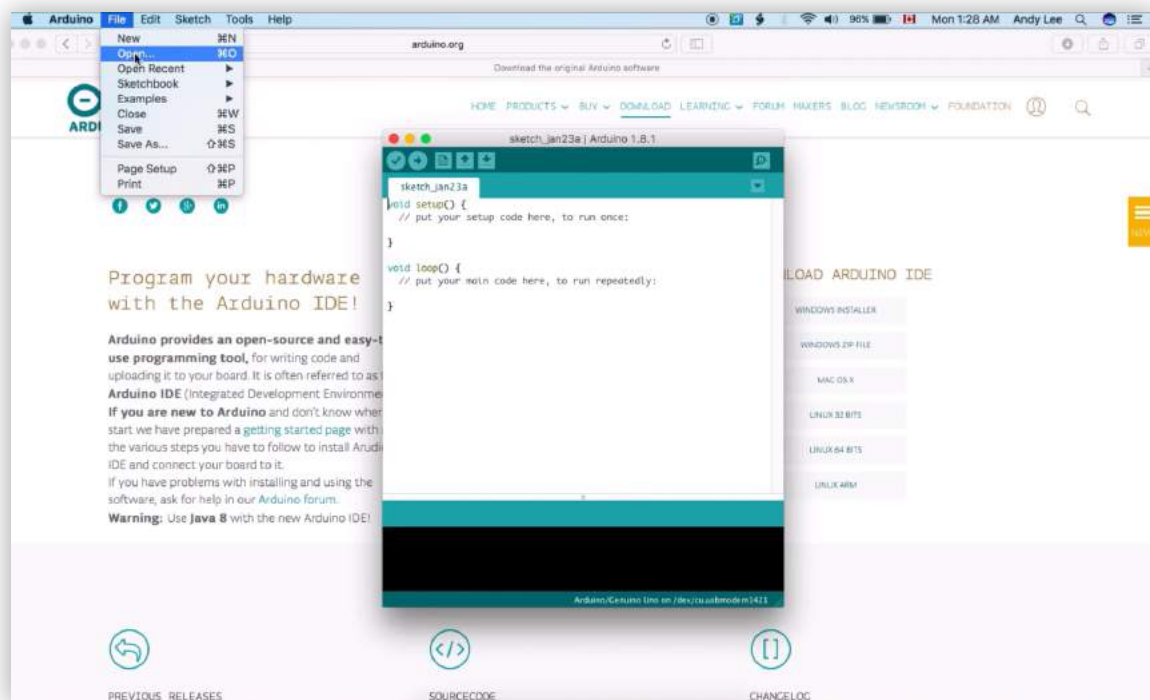
Back on the Firmware page, you'll want to click to download the "Grbl 1.1v with default settings for the Sienci Mill One" firmware.



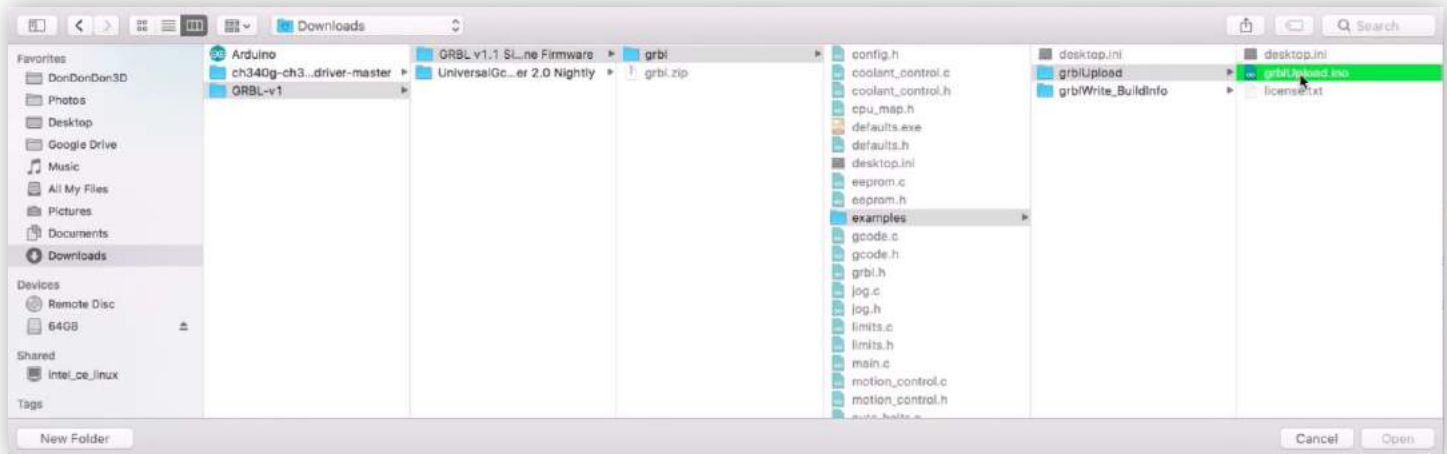
You'll also want to download the latest Arduino IDE onto your computer; select your operating system to download the appropriate package.



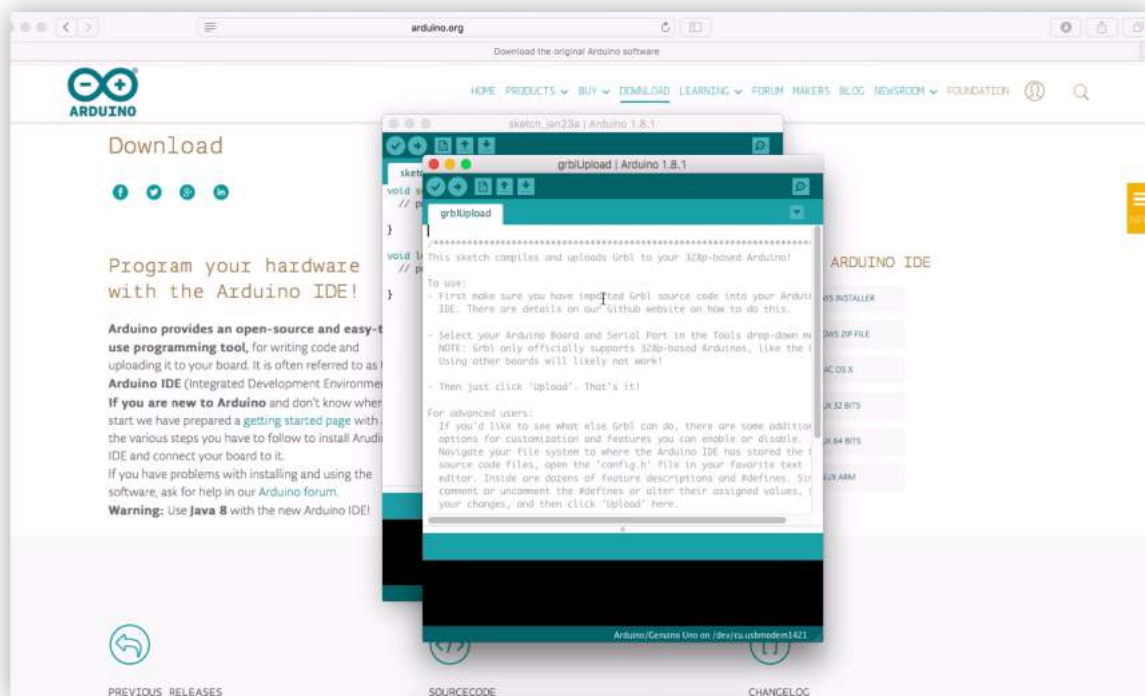
Open the Arduino IDE once it's installed



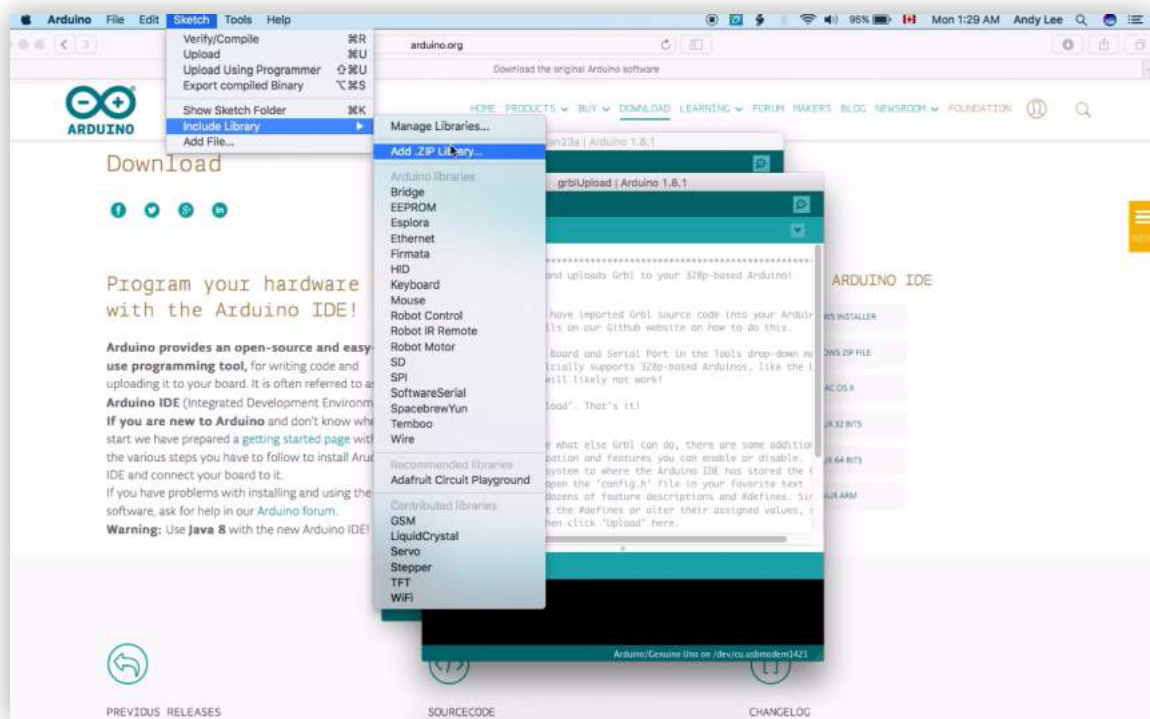
Once open, navigate to File-> Open



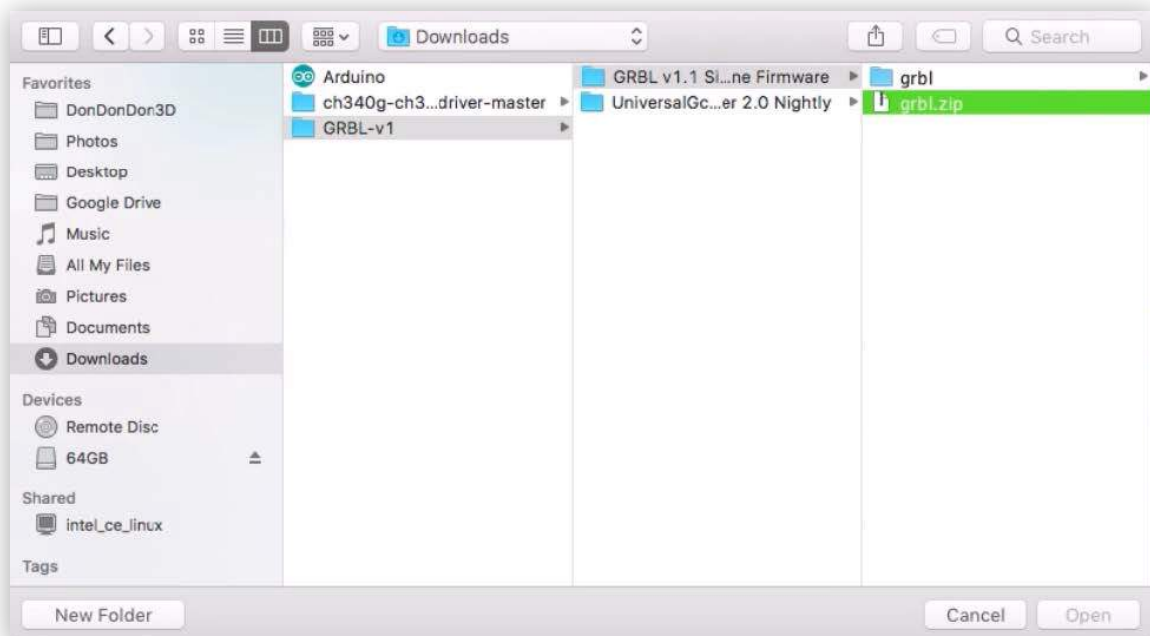
You should find a folder for the GRBL download in your downloads folder. Navigate through the folders until you find grblUpload.ino, double-click it to open it.



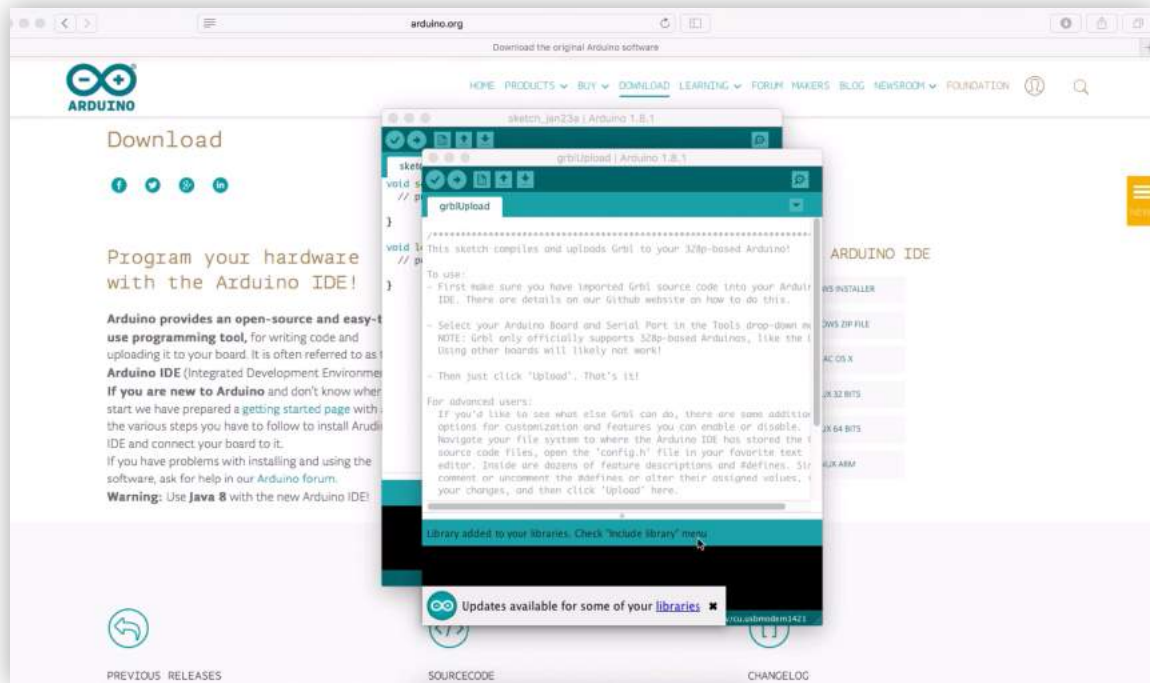
This is the code that needs to be uploaded to the Arduino.



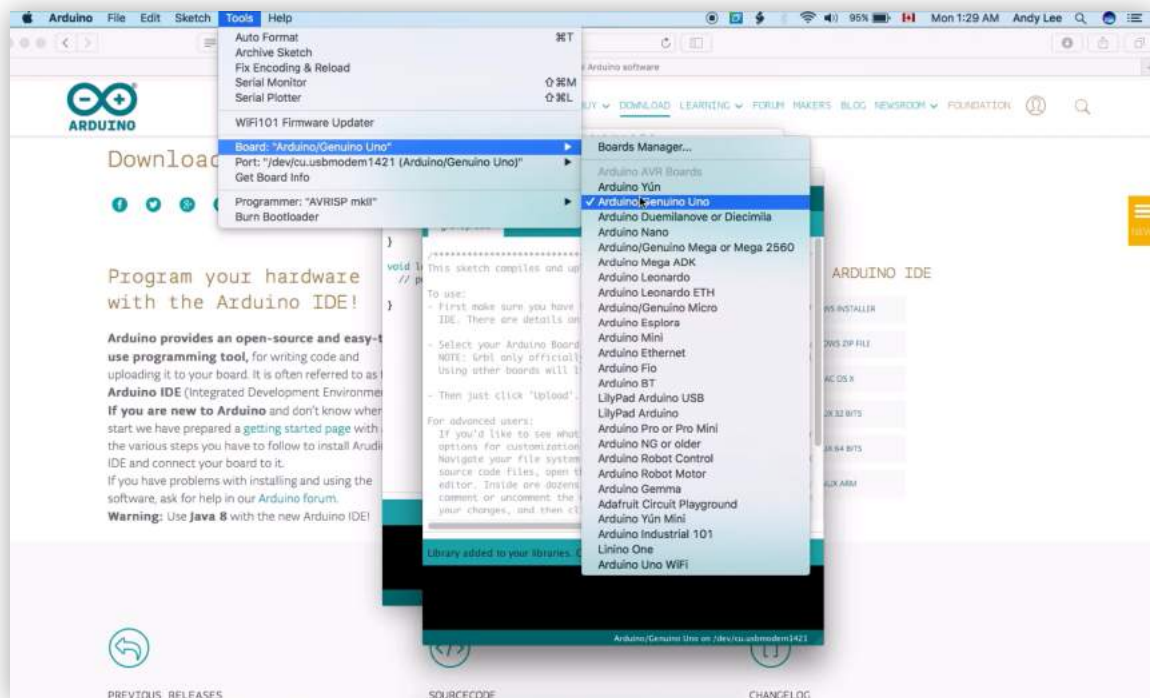
The last step to prepare for uploading the code is to include the Grbl library. Go to Sketch-> Install Library-> Add .zip Library then navigate back to your downloads folder.



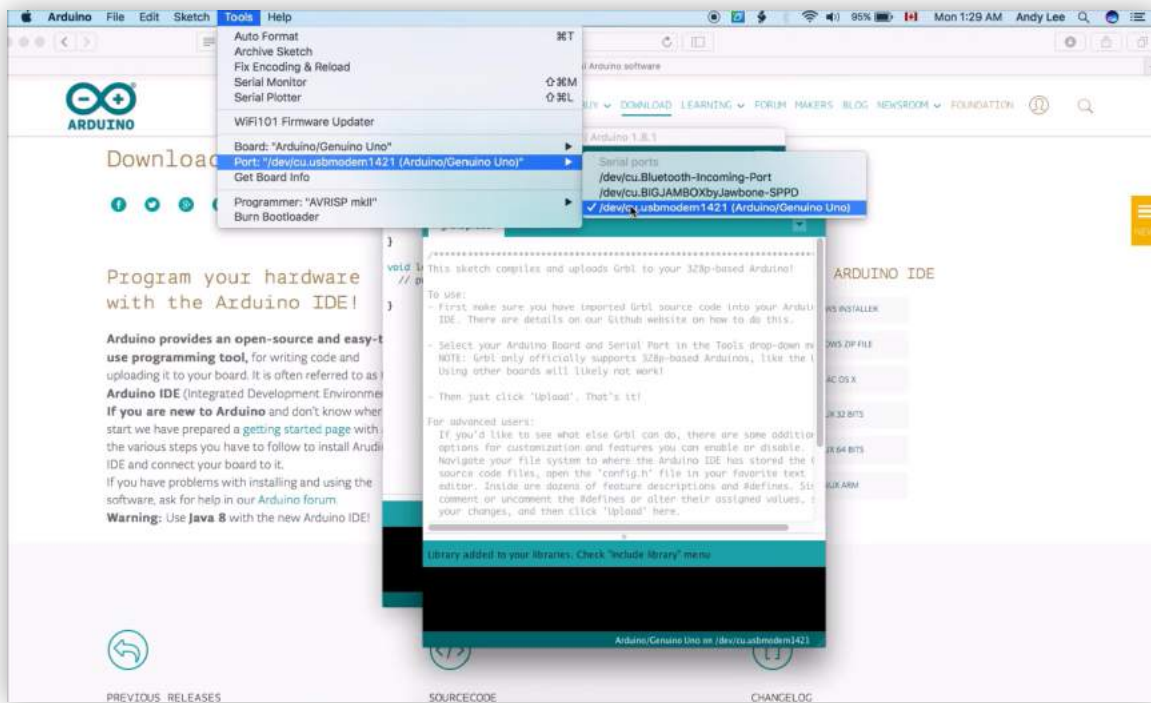
Once again, open the Grbl folder then navigate through and double-click on the grbl.zip file.



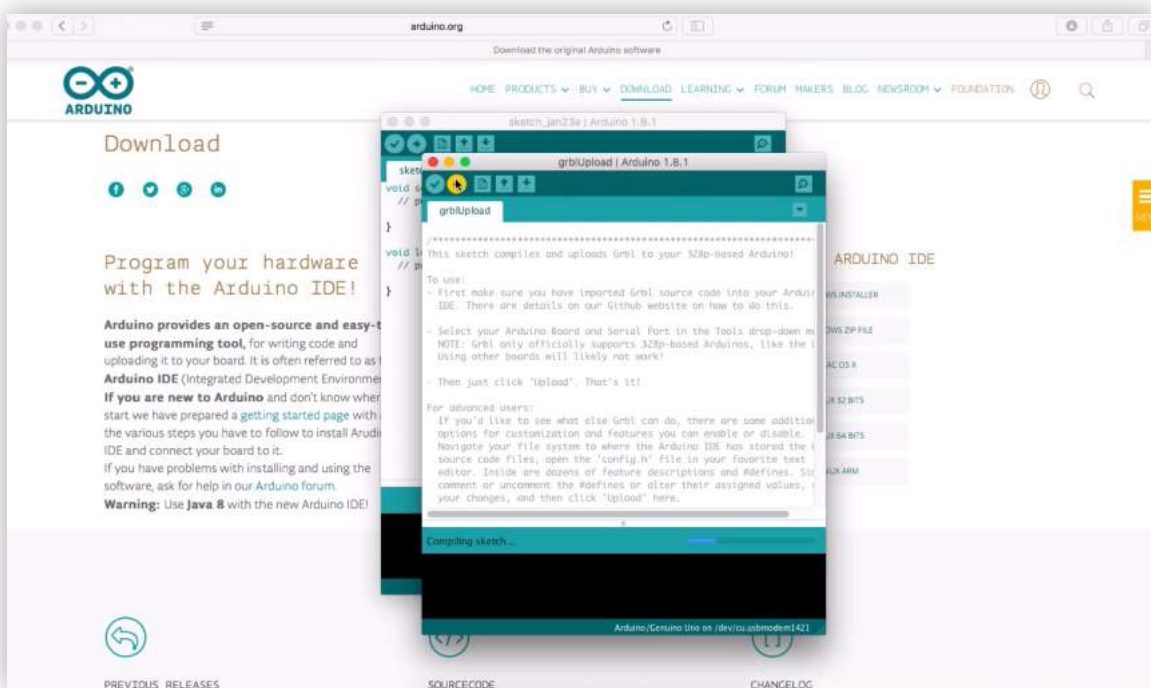
The Arduino IDE should confirm that the Library was added and you will now be able to upload the code to the Arduino.



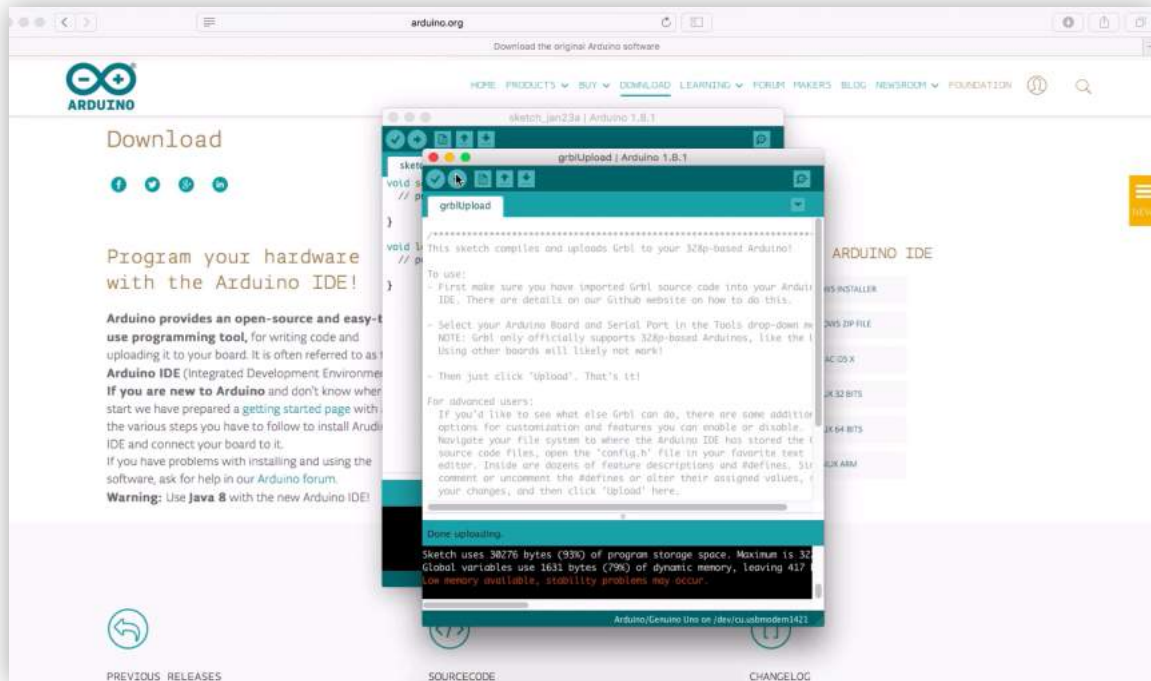
Check in the Tools tab that you've selected your board to be the Arduino Uno.



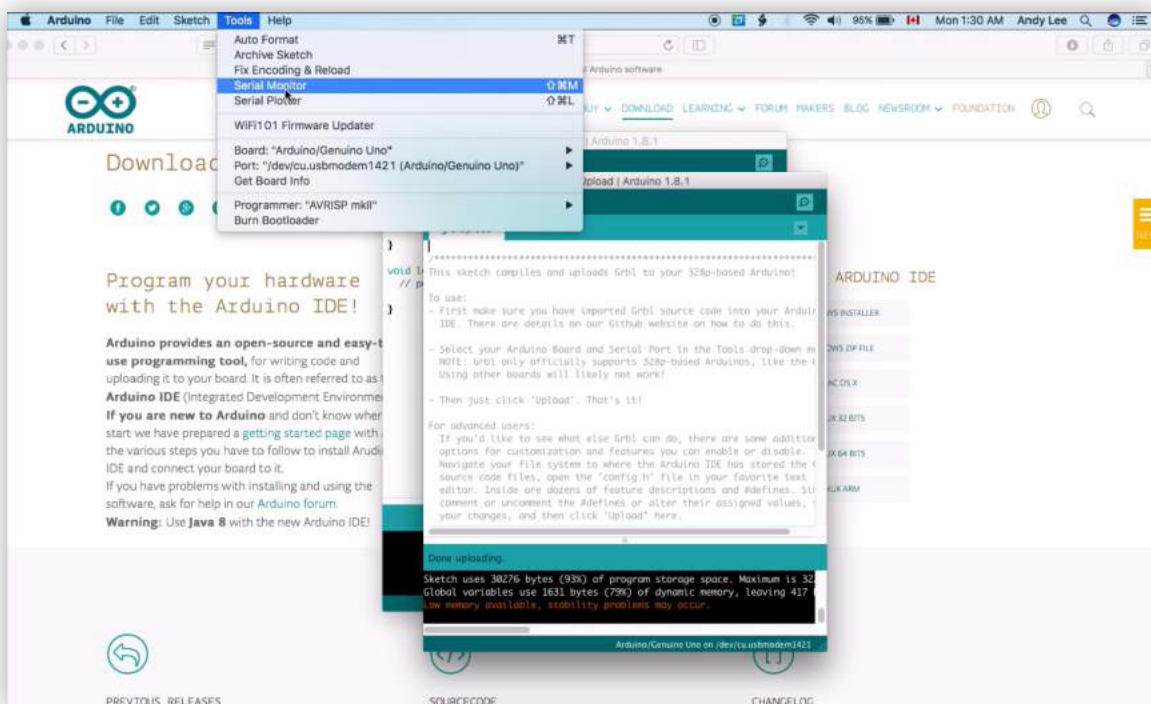
Also check that the proper port is selected.



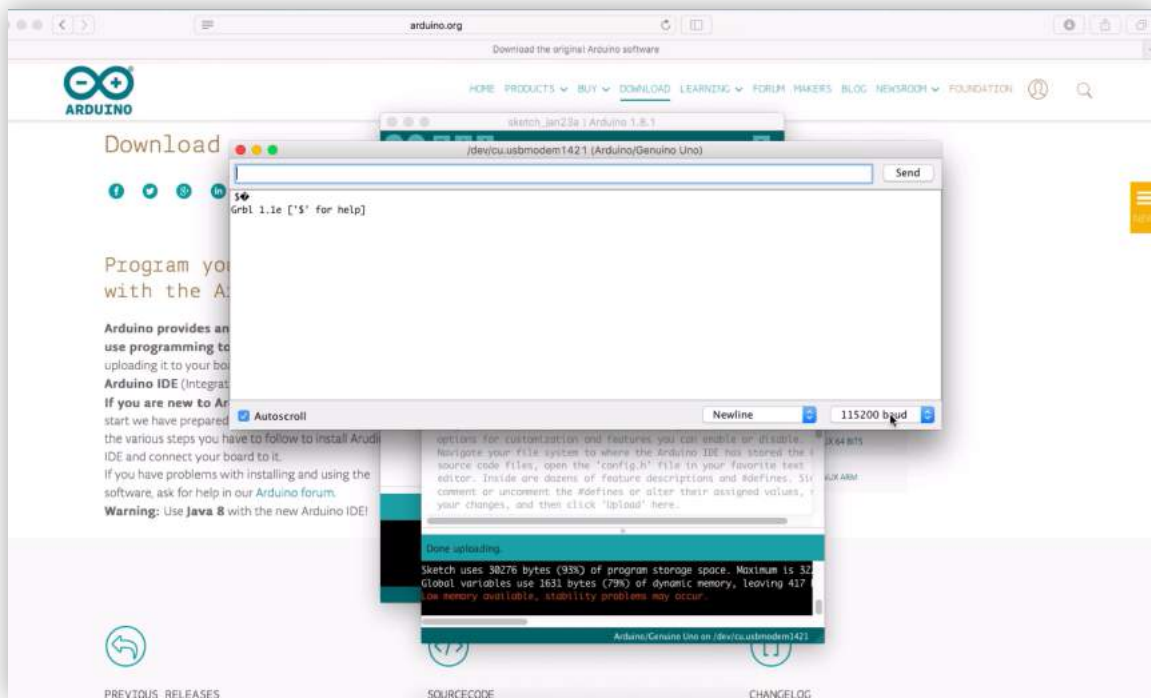
Then click Upload on the IDE to upload the code.



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.