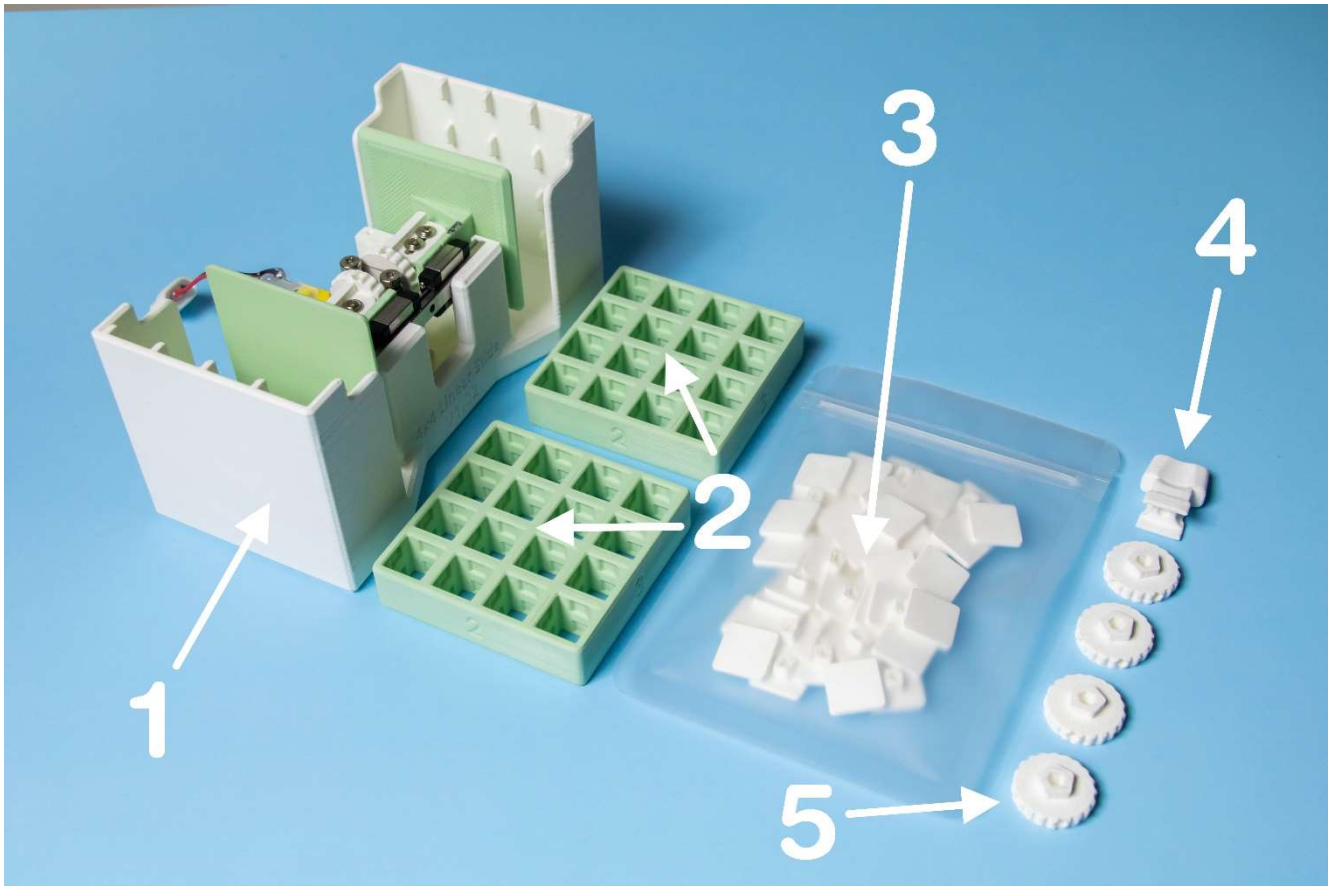
User Instructions

Switch Break-in Machine 4×4 LS v1.0

Feng Studio

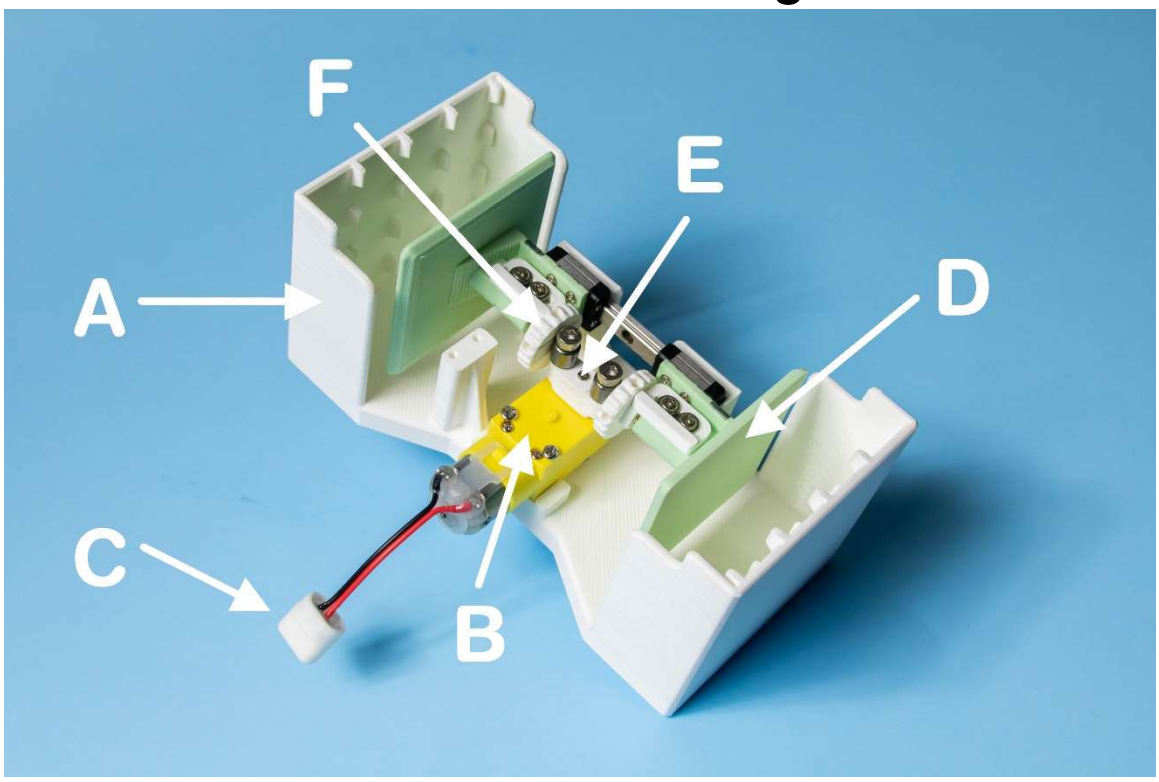
Below are the user instructions for assembling and operating this product. Some variations are to be expected between the provided images and the product on hand.

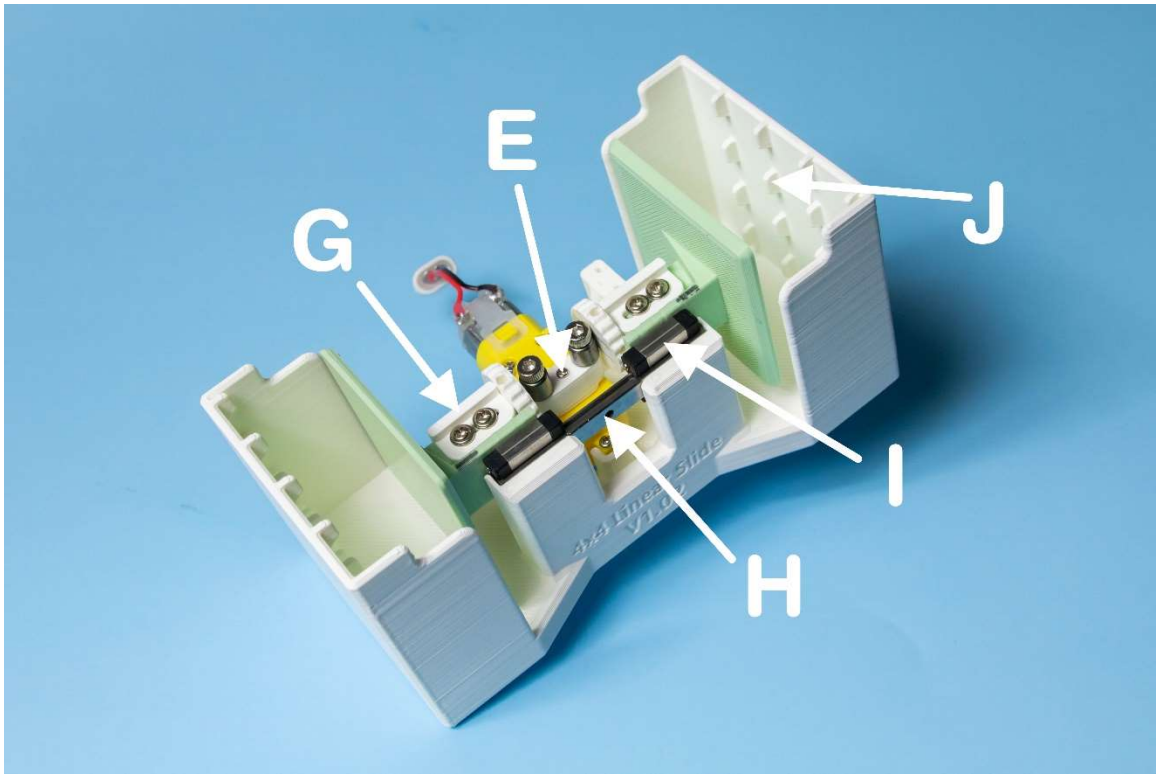
Section 1: Parts List



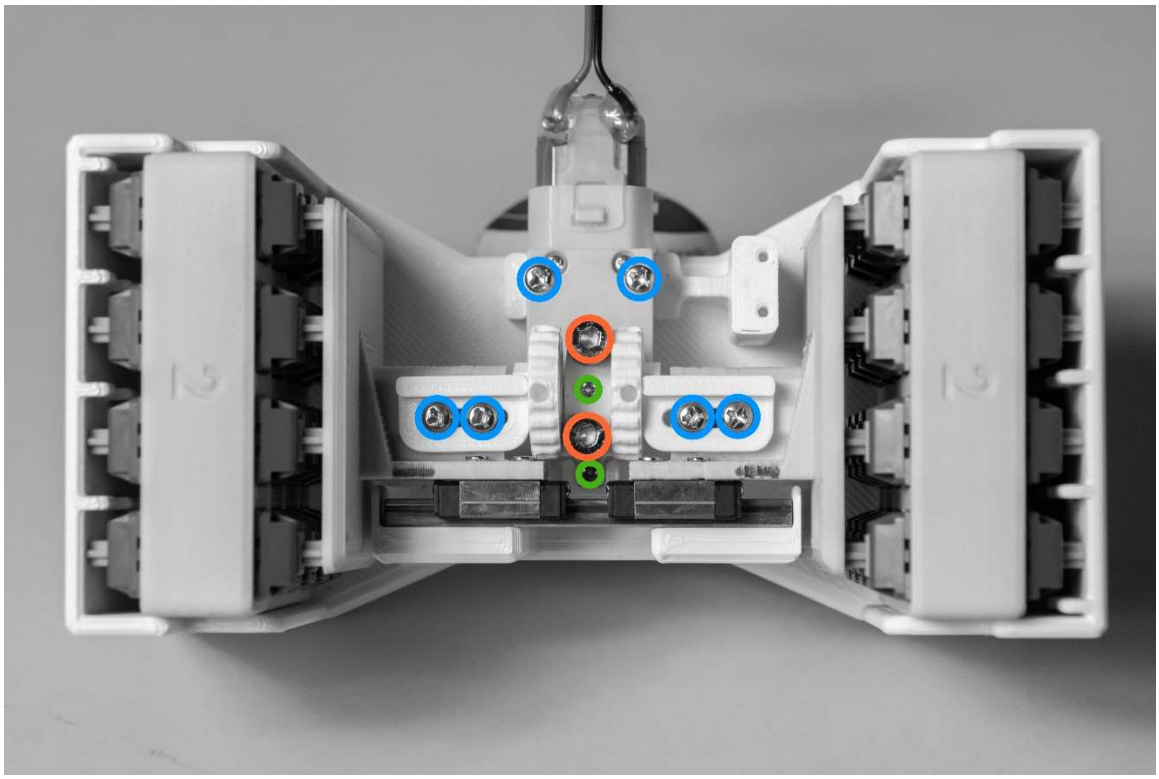
1 - Pre-assembled main body	2 – Plates * 2
3 – Keycaps * ~35	4 – Wheel wrench
5 – Spare circular buffer pieces * 2	

Section 2: Parts Diagram





A: Main body	B: Gear box
C: Female USB type-c port	D: Pusher
E: Wheel	F: Circular buffer piece
G: Buffer lock	H: Slider
I : Slider block	J: Off-center nibs



Blue: PH2

Green: PH1

Orange: H3.0

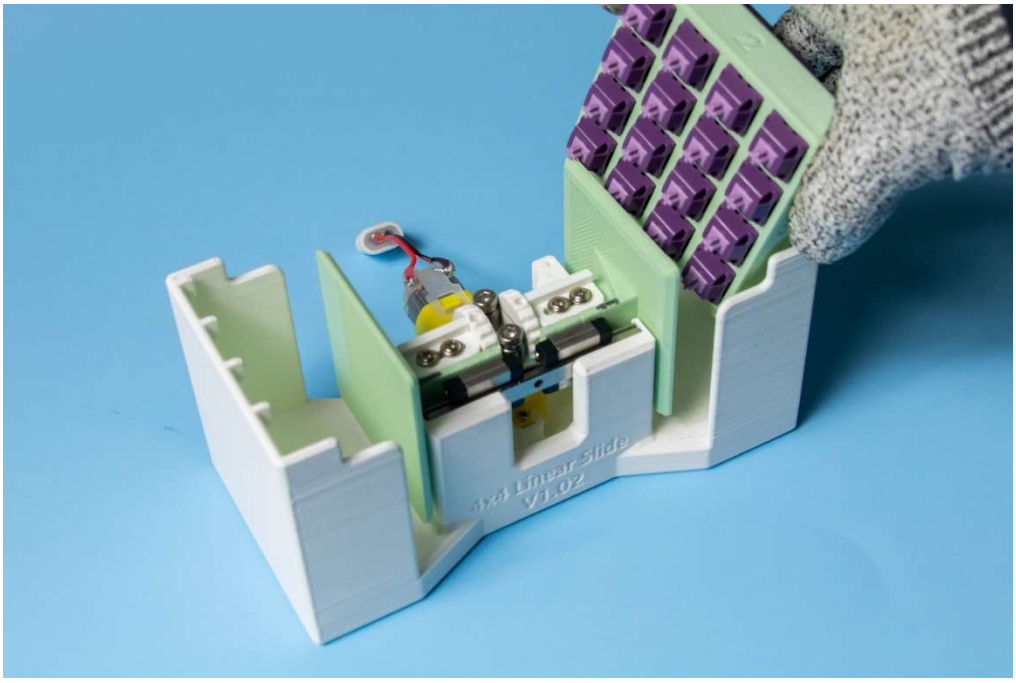
In addition to using the correct sized screwdriver, please also avoid overtightening the screws. They only need to be tight enough to hold down the components securely. Overtightening can cause issues or permanent damage to the device. I will not be responsible for damages caused by overtightened screws.

Some of the pictures used in this document are reused from the V1 version of the 4x4 machine.

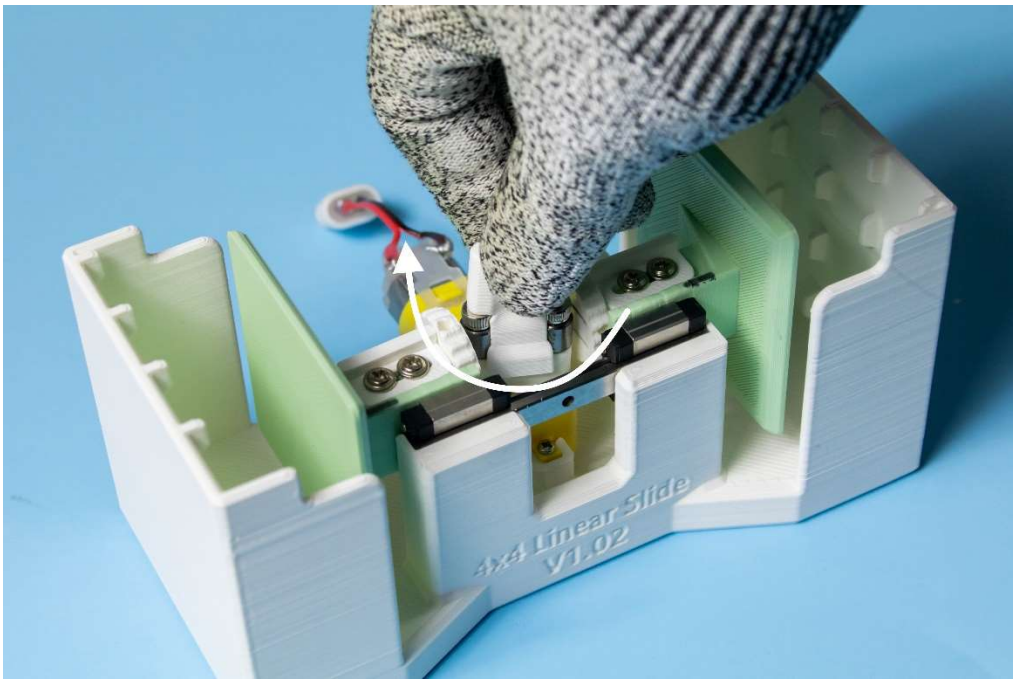
Do not try to remove the slider blocks from the slider “for fun”, this will cause irreversible damage.

Read through the entire document before using the device

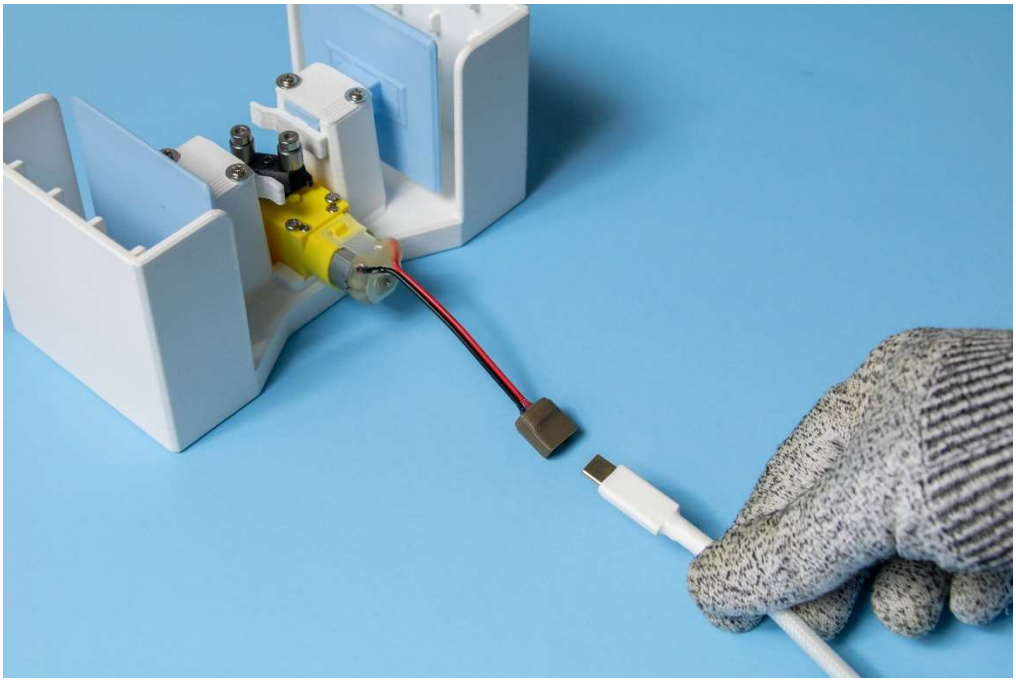
Section 3: General Operation (applies for both mode A and B)



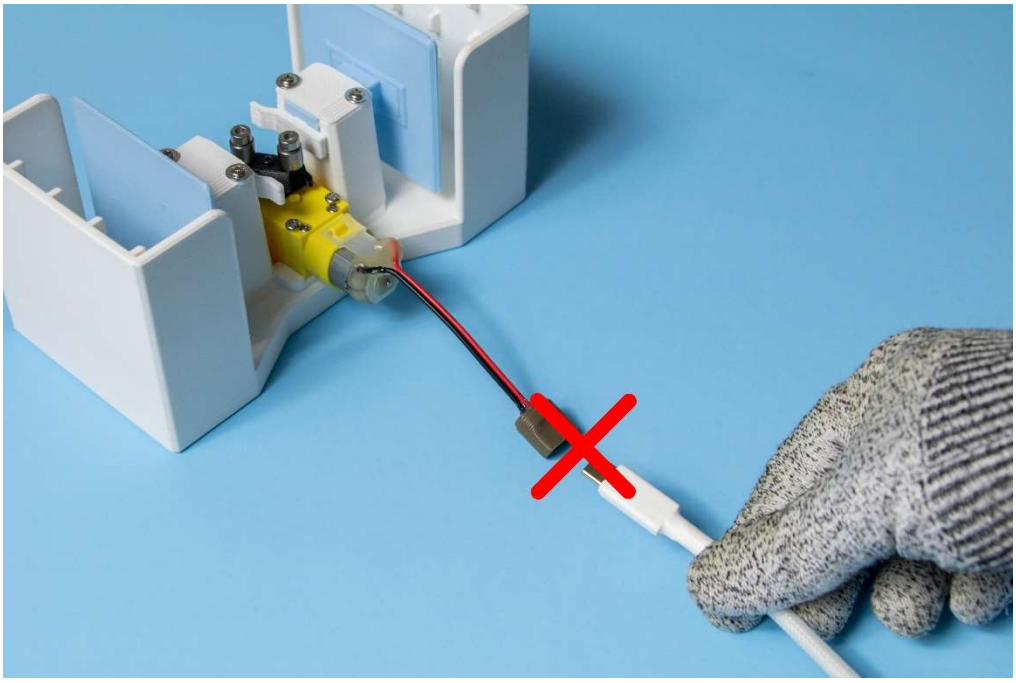
The switch plate is inserted through the top of the machine. The product will function with 1 or 2 plates, but operation with 2 plates is highly recommended (also make sure the 2 plates have the same amount of switches).



The wheel can be rotated with the wrench. Rotate the wheel SLOWLY and ONLY WHEN NEEDED to avoid breaking the gears. If the wheel can't be rotated in one direction, try the other. If both directions don't work, turn the machine on/off briefly and try again.

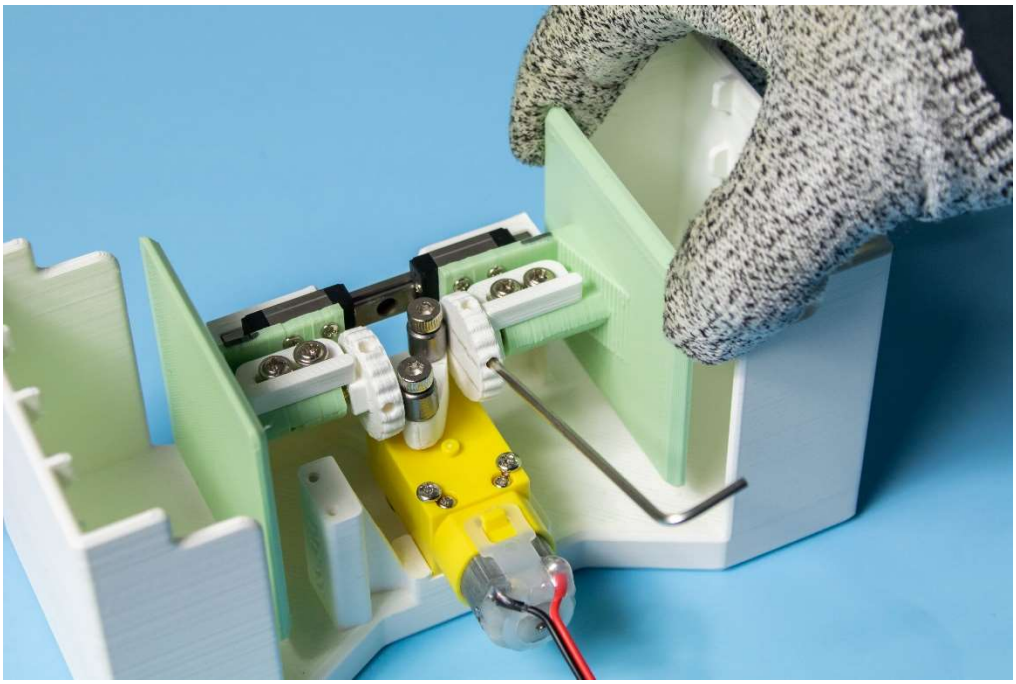


A standard 5V USB wall plug is recommended, along with any USB type-c cable. Simply plug or unplug the cable into the connector to turn the machine on or off. The user can also choose to use power banks or computer USB ports to provide power.



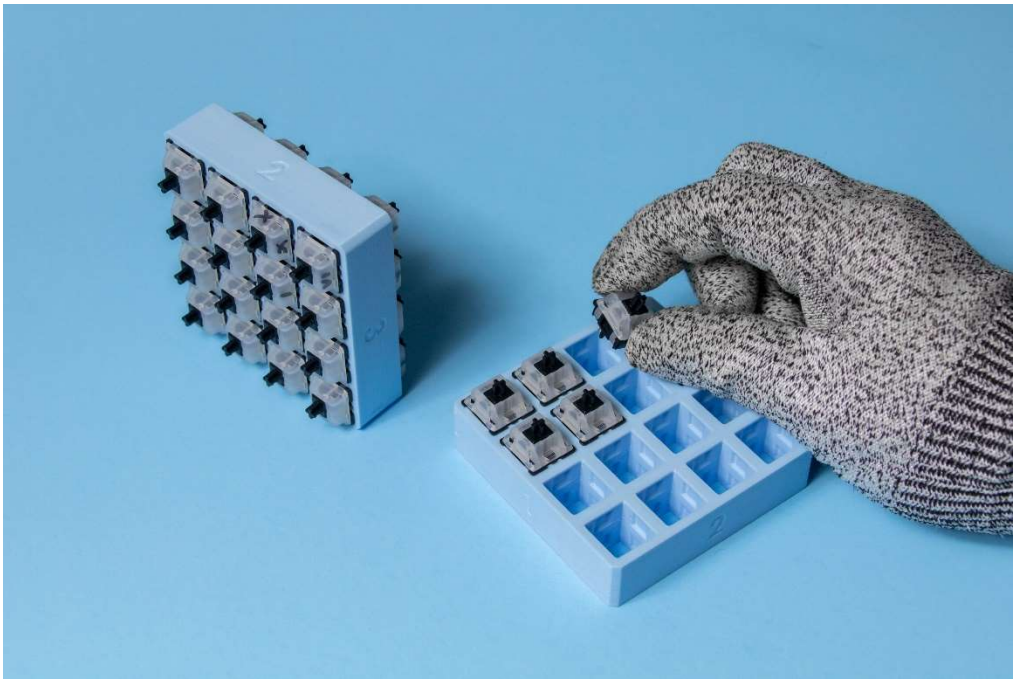
Check for wear on the bearing assembly and the bearing-pusher buffer piece periodically. Any wear on the plastic will be very obvious. Black residue from the lubricant on the wheel or buffer piece is normal, wipe it off from the wheel if it bothers you but I do not suggest wiping the lube off from the buffer piece. The machine do not need to be shut down periodically to prevent overheating.

Make sure to space out the switches evenly if you are not planning on filling the entire plate. If you are filling the entire plates with switches, ~70g max bottom out switches is recommended.

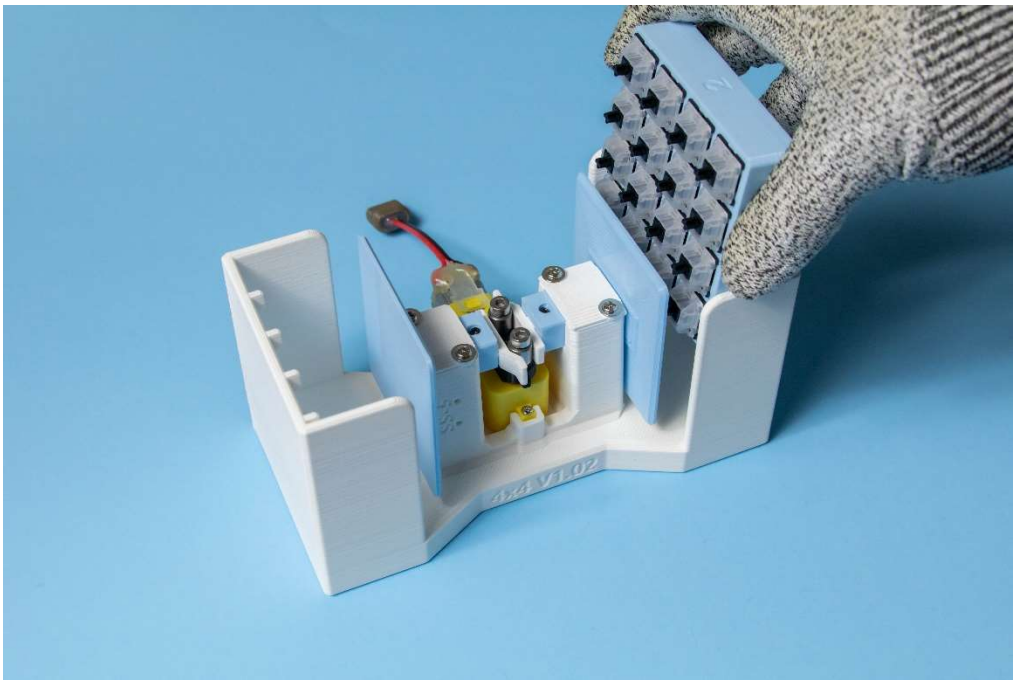


When adjusting the circular buffer or the buffer lock screws, make sure to support the pusher with your hands like shown. Since the slider is installed on the side, applying too much force downwards might cause the slider blocks to detach.

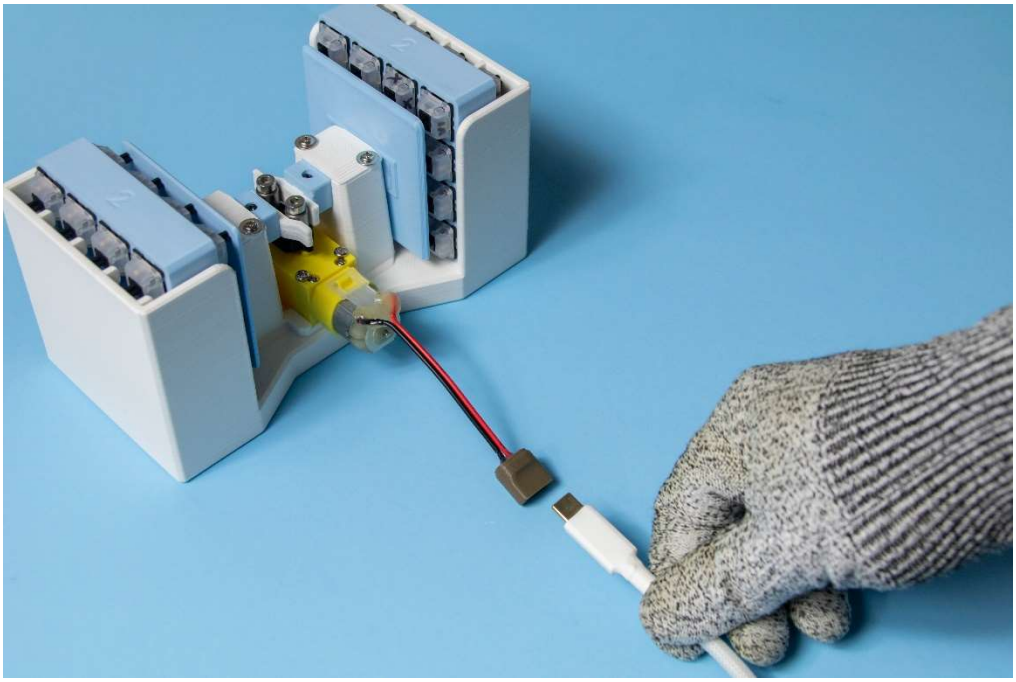
Section 4: Mode A – Centered Actuations



Step 1: Install switches into both sides of the switch plates (32 max on each).

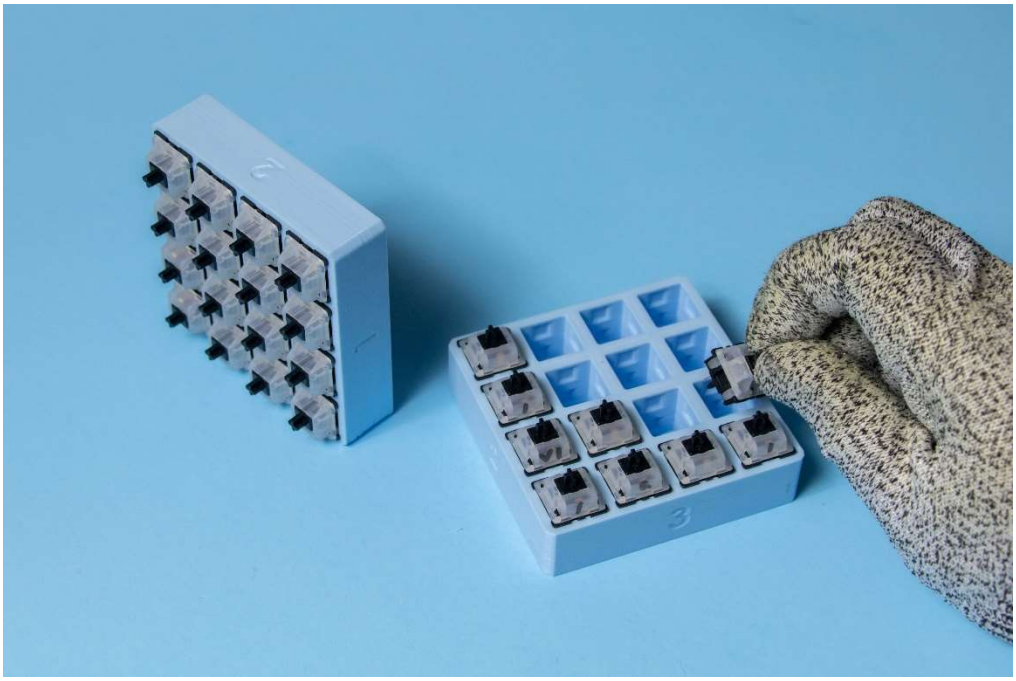


Step 2: Insert switch plates in any orientation. Switch plate orientation does not affect break-in process in Mode A.



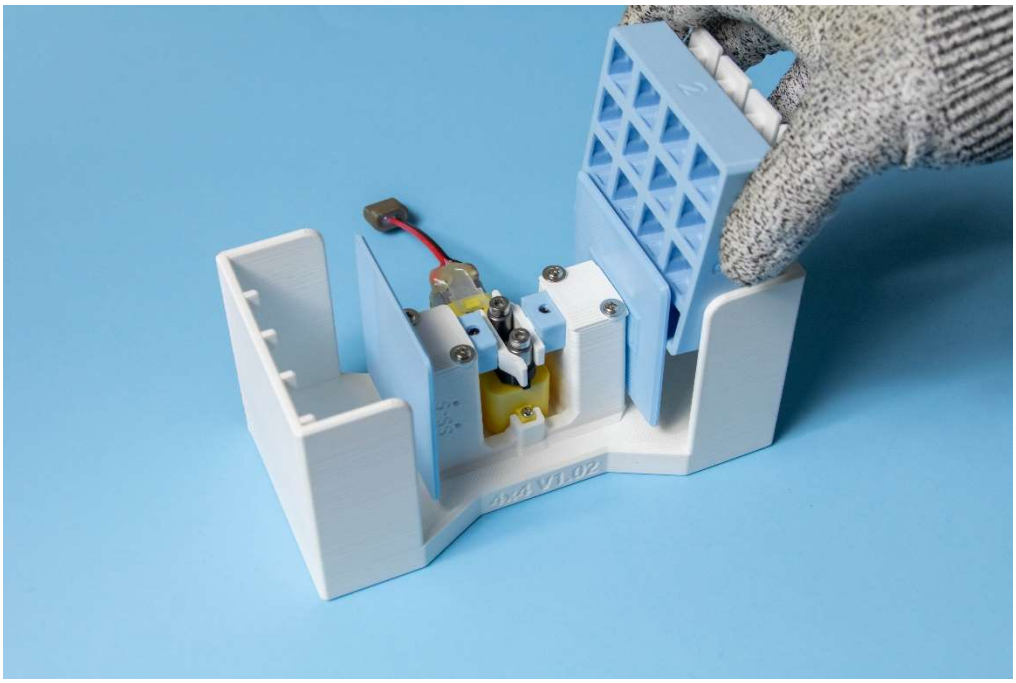
Step 3: Simply plug in the machine to start. To achieve consistency, it is recommended to break in switches by amount of time (min, hrs, etc).

Section 5: Mode B – Off-center Actuations



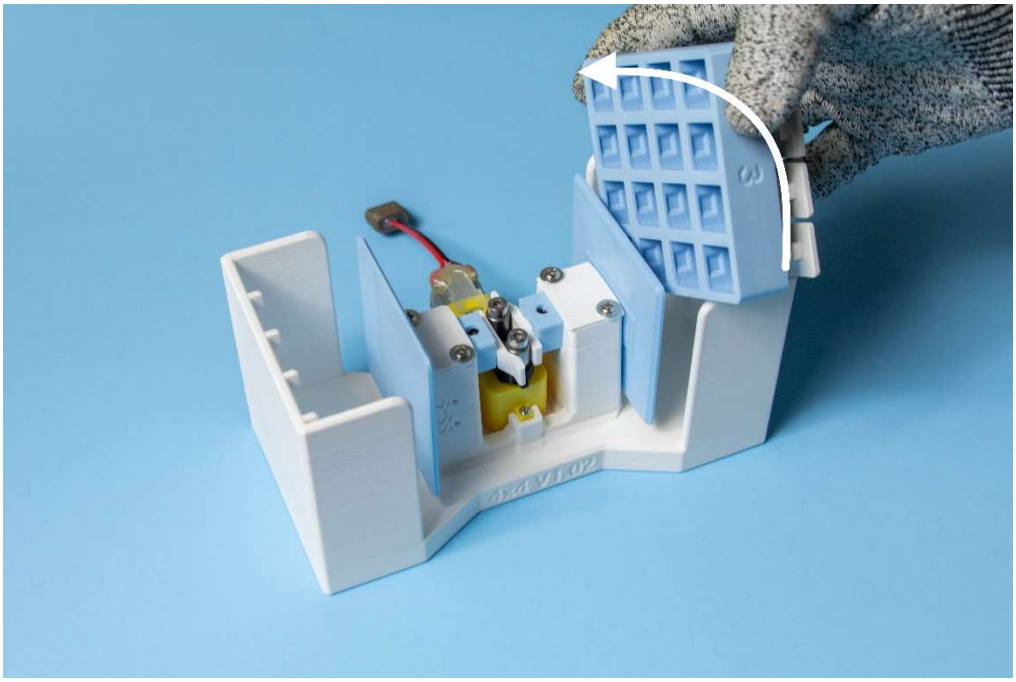
Step 1: Insert switches into only one side of the switch plate (16 max on each).

Step 2: Insert keycaps onto all switches.



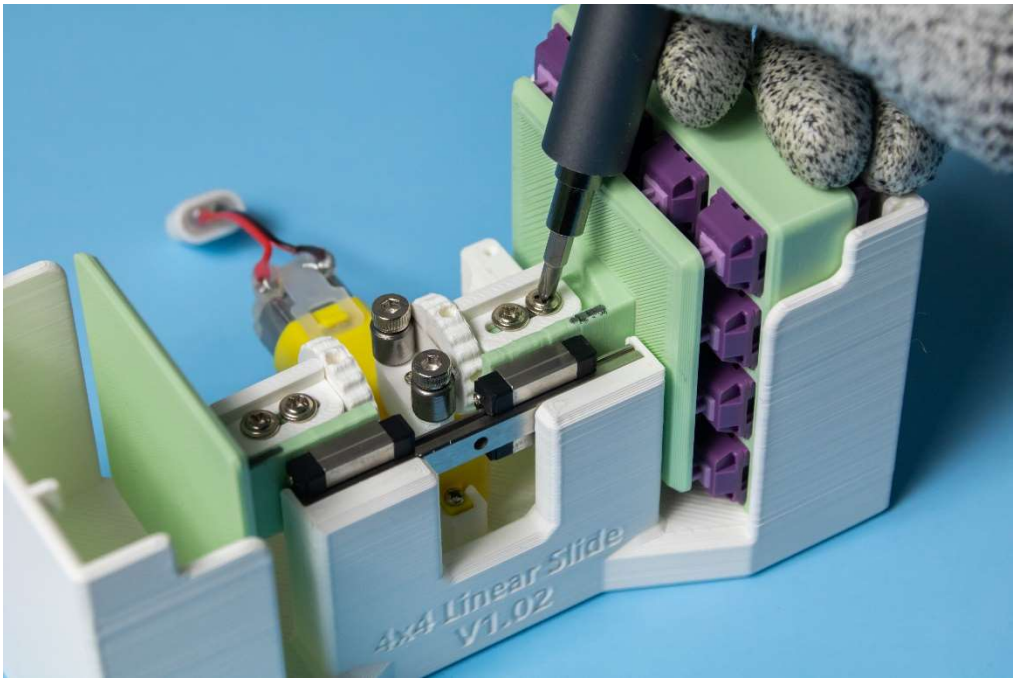
Step 3: Insert switch plates with the keycaps facing away from the pusher, the off-center nibs should line up with the edge of the keycaps.

At this point, the user's machine should look like the image above. Once turned on, the nibs will apply a force to the side of the keycaps, resulting in more friction towards the side.

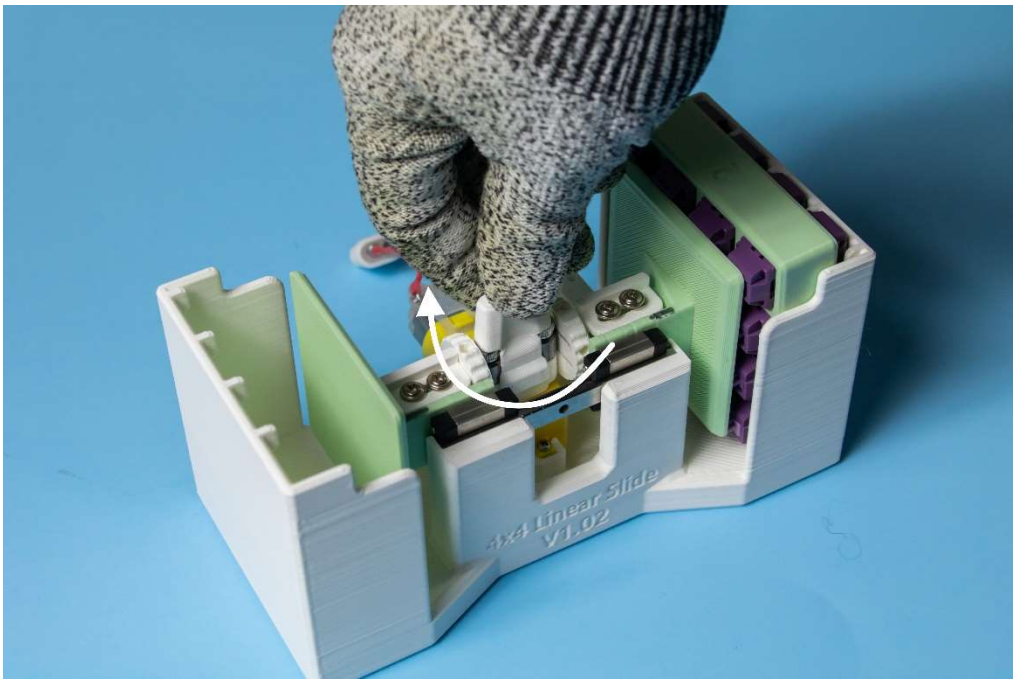


Step 4: Turn on the machine, the pusher will break in only one side of the switch. In order to break in the other three sides, rotate the switch plate 90 degrees after one side is finished. Please take notes on which side(s) has been broken in. 4 sides are labeled with numbers. For consistent results, break in each side for the same amounts of time.

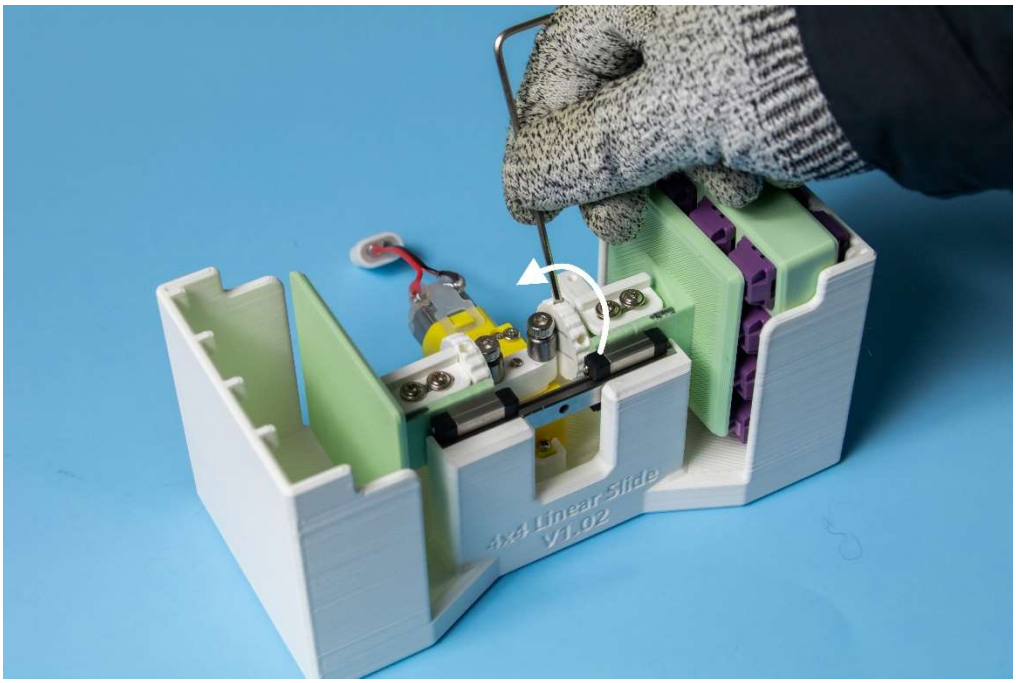
Section 6: Adjusting the Travel Distance



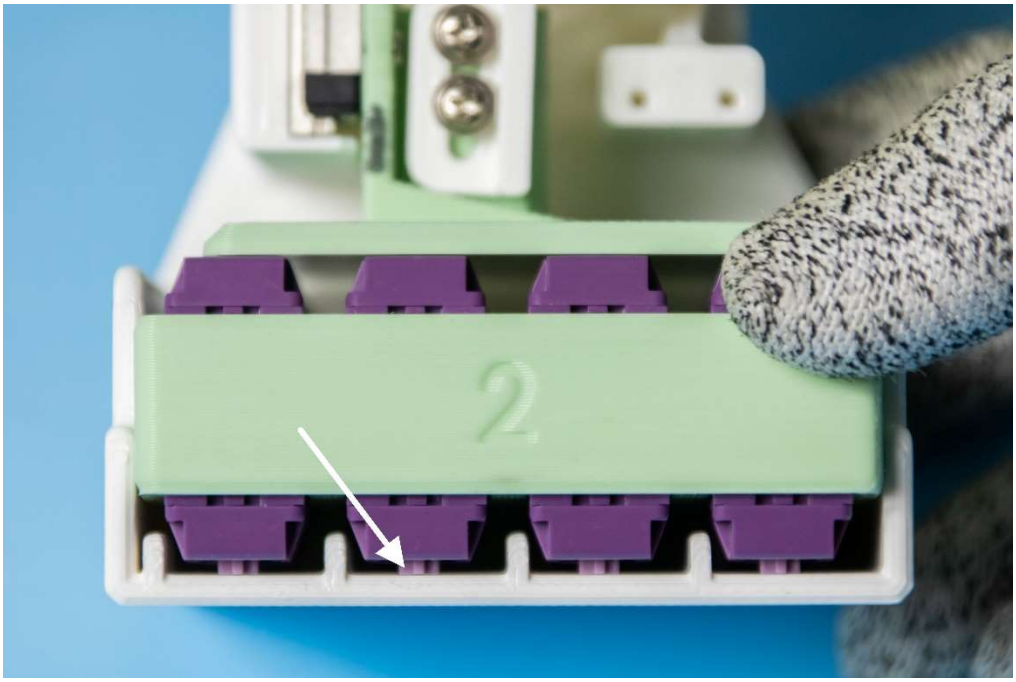
Step 1: Unscrew the 2 screws holding down the buffer lock. These do not need to be unscrewed completely, only loosened to allow the buffer to spin. Note that the machine is adjusted for 4mm switches out of the box, unless you are using long pole switches, you do not need to adjust the travel distance.



Step 2: Rotate the wheel as shown so that the switches are in the bottomed-out position. If you cannot bottom out the switches, that means you need to lower the travel distance, skip to step 3 to do this.

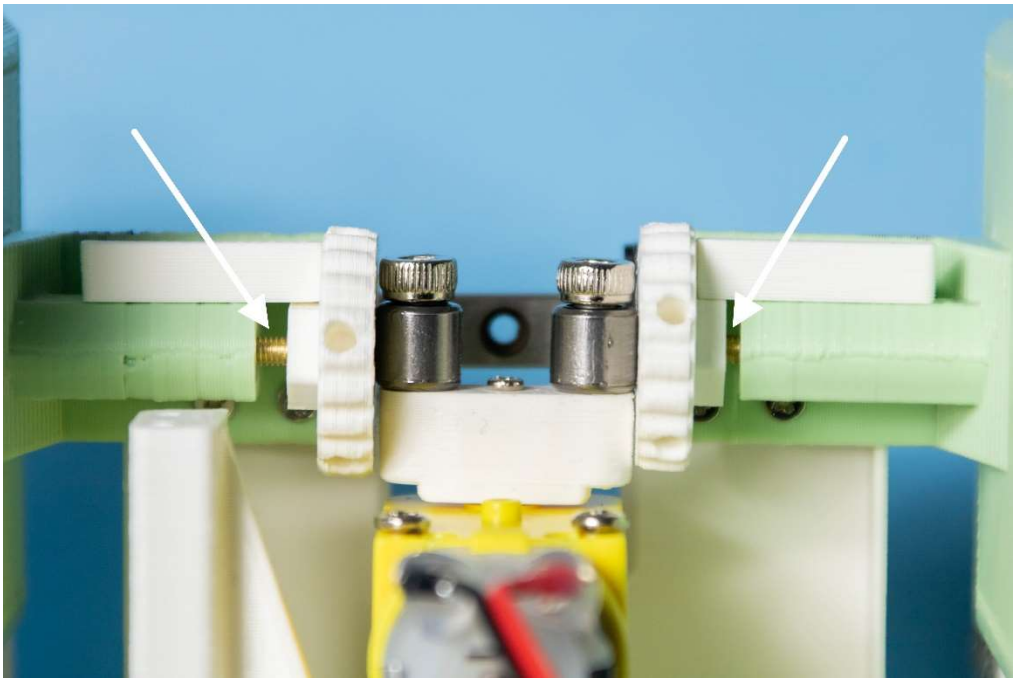


Step 3: Spin the buffer piece by hand to adjust the travel distance. You can also use a tool to do so like shown. Hold down the switches and rotate the buffer until it touches the bearing in the middle (leave some room, see step 4). Make sure to orient 1 of the holes directly towards the sky when you finish, if this is not done, the buffer lock will not be able to hold down the buffer properly. I suggest putting in both switch plates with switches while doing this step.

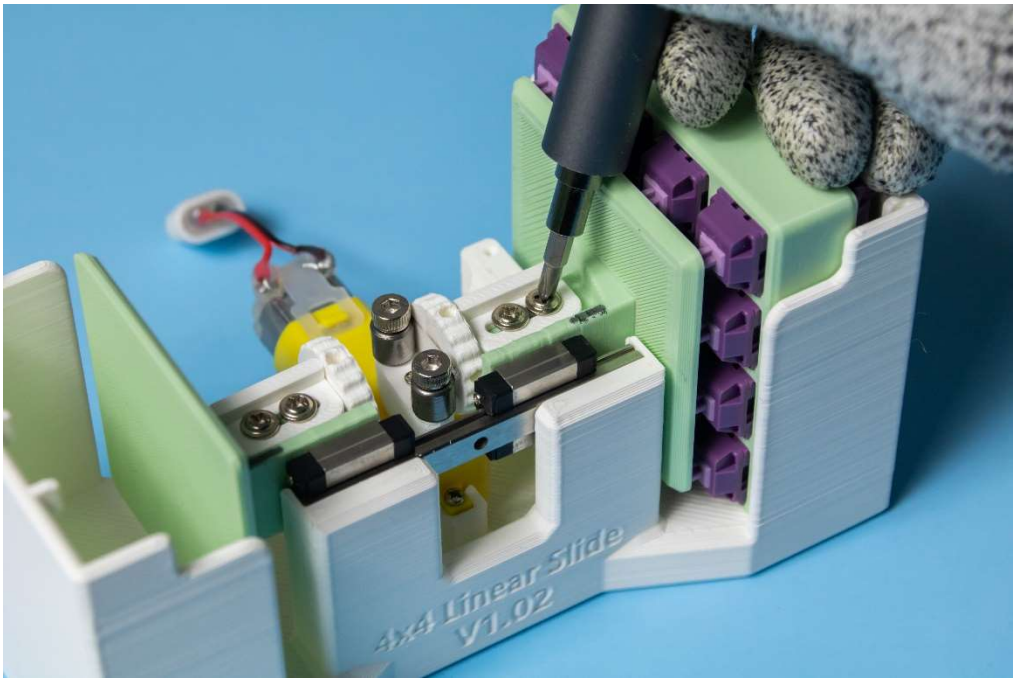


Step 4: VERY IMPORTANT!!! Check the switches, they do not need to be bottomed out completely. It is suggested for you to leave a small gap as shown to avoid overloading the motor. This does not impact

break-in performance in my testing. Please fill in both sides of the plate while performing section 6, instead of filling only 1 side and adding keycaps.



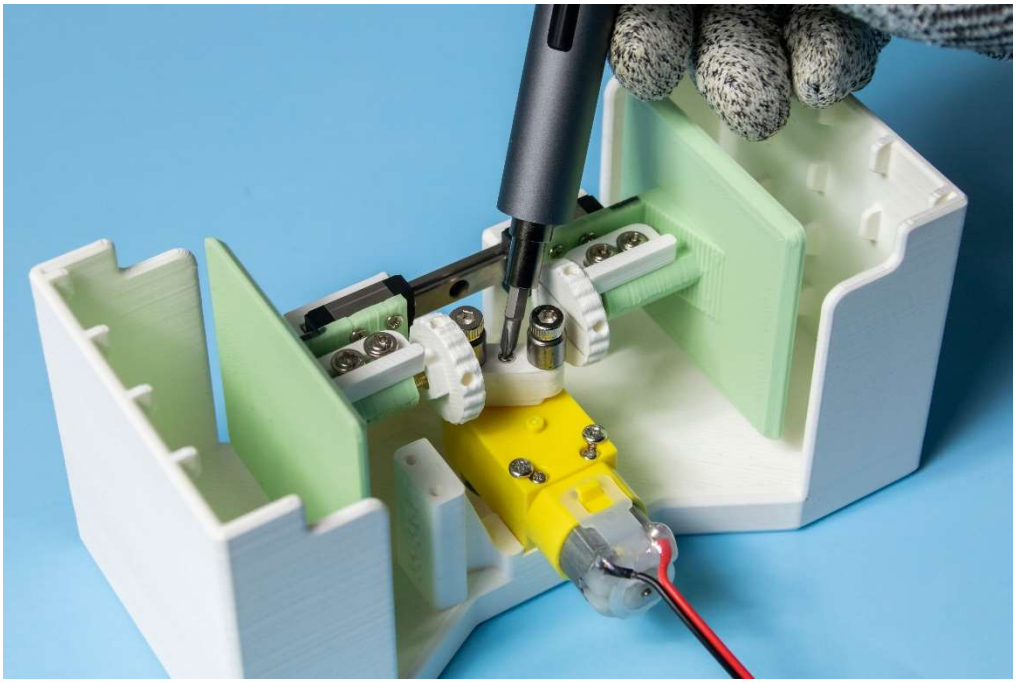
Step 5: VERY IMPORTANT!!! Check the buffer screws. The amount of exposed screw on both sides should be about the same. In the situation shown in the picture, one would want to screw in the left screw in further, and unscrew the right one to make them equal.



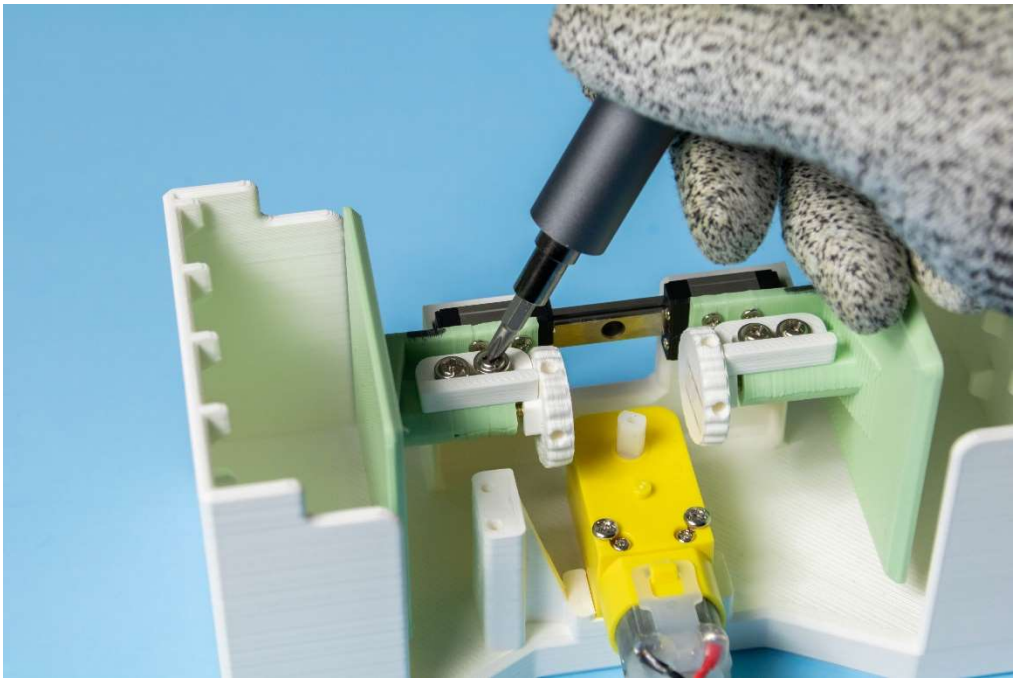
Step 6: Move the buffer lock towards the buffer so that the two pieces are touching. Again, make sure one of the side holes on the buffer is facing directly up. Tighten the 2 buffer lock screws.

Section 7: Replacing the buffer piece

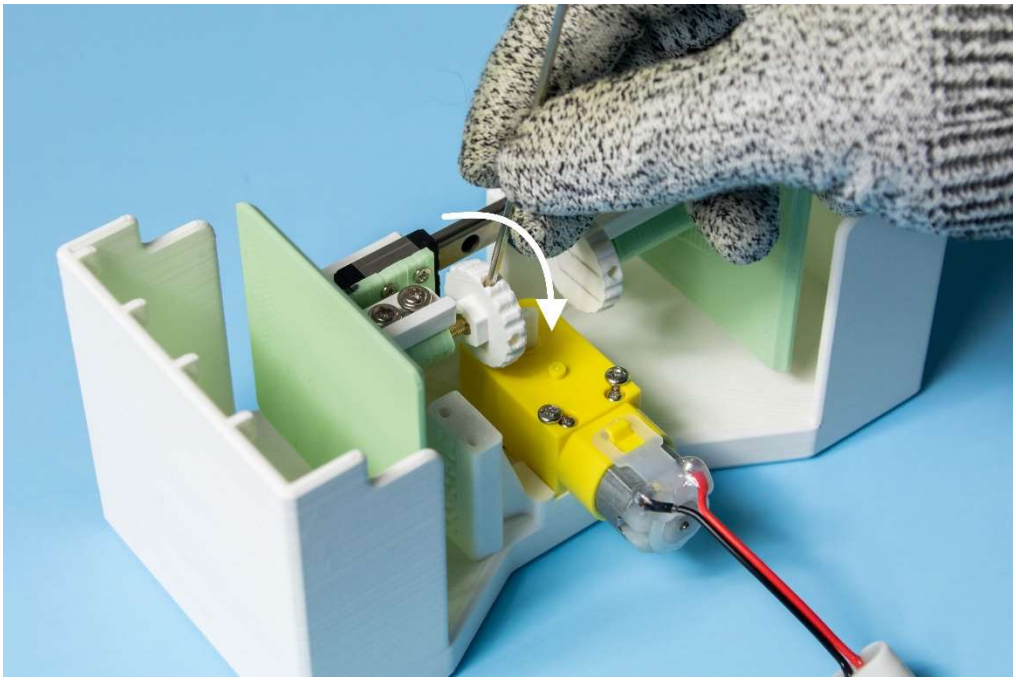
When to replace the buffer? Wear on the buffer will decrease the travel distance of the pushers, when this happens, sometimes one can compensate by adjusting the travel distance following section 6. Use your judgement, the pictured piece was used for ~400 hours and is still usable.



Step 1: Unscrew the wheel screw and remove the wheel. If more space is needed, one can also remove the yellow gear box.



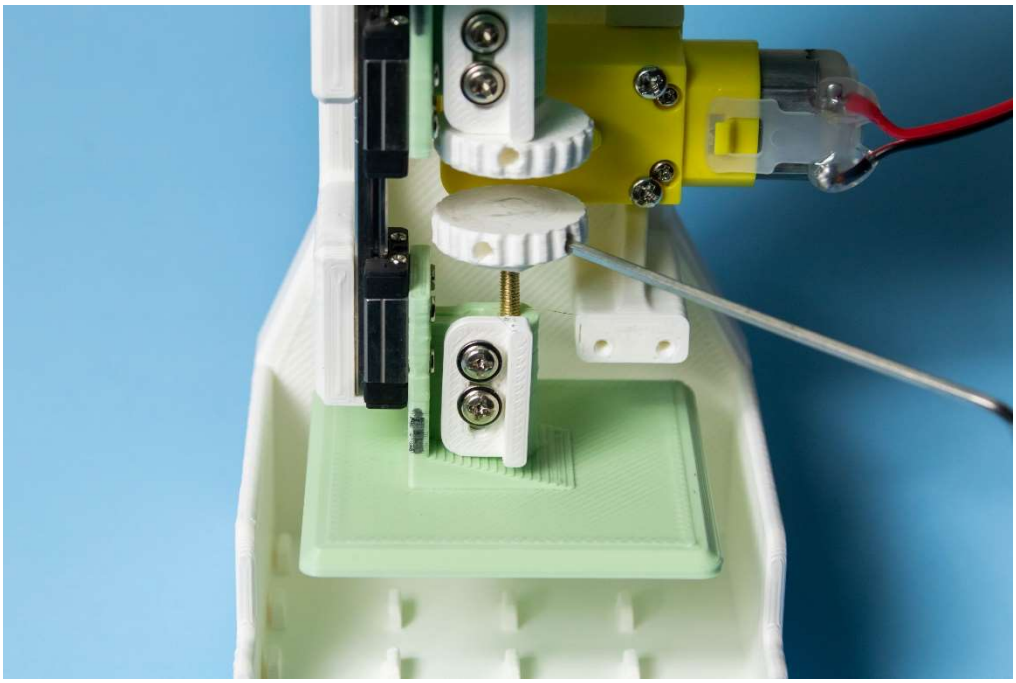
Step 2: Loosen the buffer lock screws slightly so that the buffer can spin. These screws do not need to be completely removed.



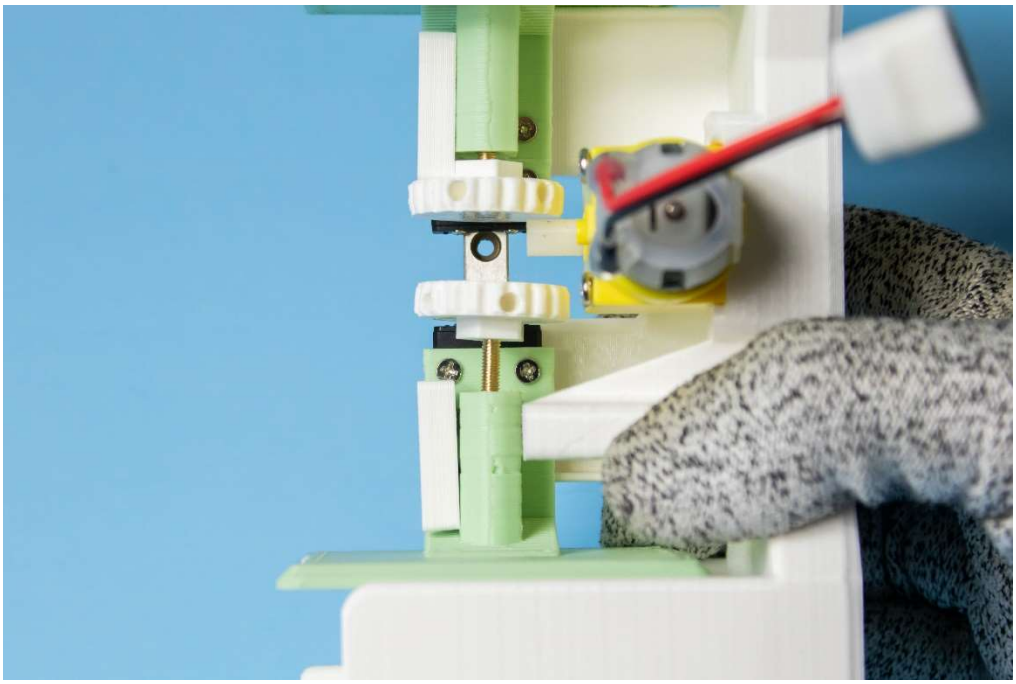
Step 2: Unscrew the buffer pieces completely, the beginning portion might need to be done with a tool. When approaching the end of removal, switch to your hand to make sure the screw is not being removed at an angle. Putting too much sideward pressure on the screw during removal will enlarge the screw hole.

Step 3: The wrench has a threaded hole on the end, screw the buffer piece into the hole, then use the wrench as a handle to pull the screw straight outwards. The screw is held in only by friction. If this is difficult, one can simply destroy the buffer to access the screw. Do not pull on the threads of the screw with tools to avoid destroying the threading.

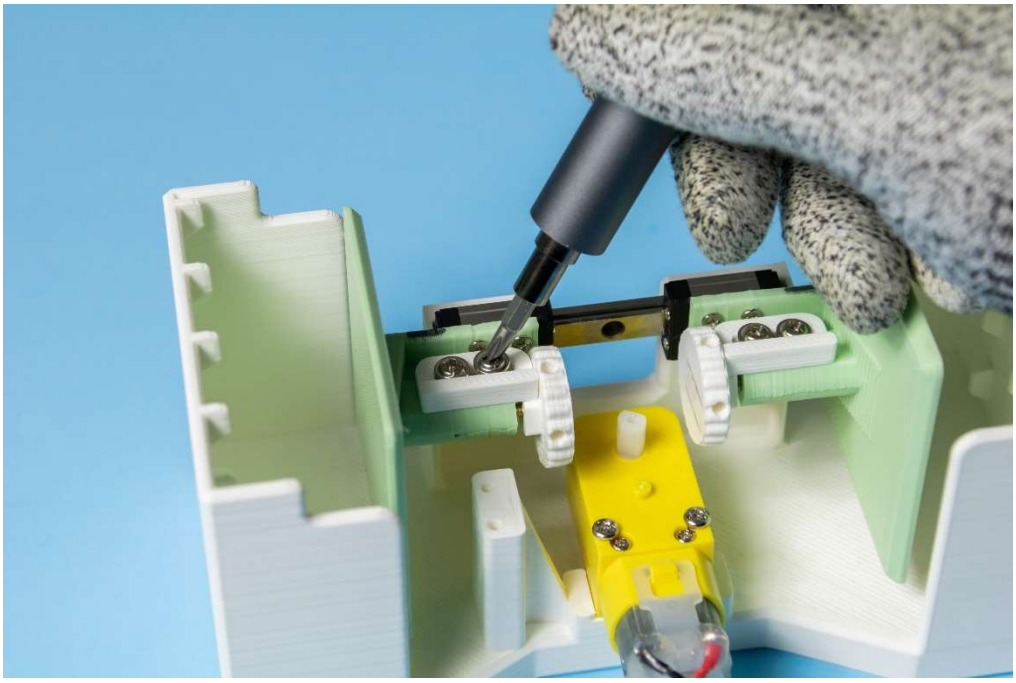
Step 4: Use the screw extracted from the last step and insert it into a new buffer piece. If this is difficult, press the end of the screw into a hard surface and press the buffer piece into that surface. Make sure the screw is inserted straight.



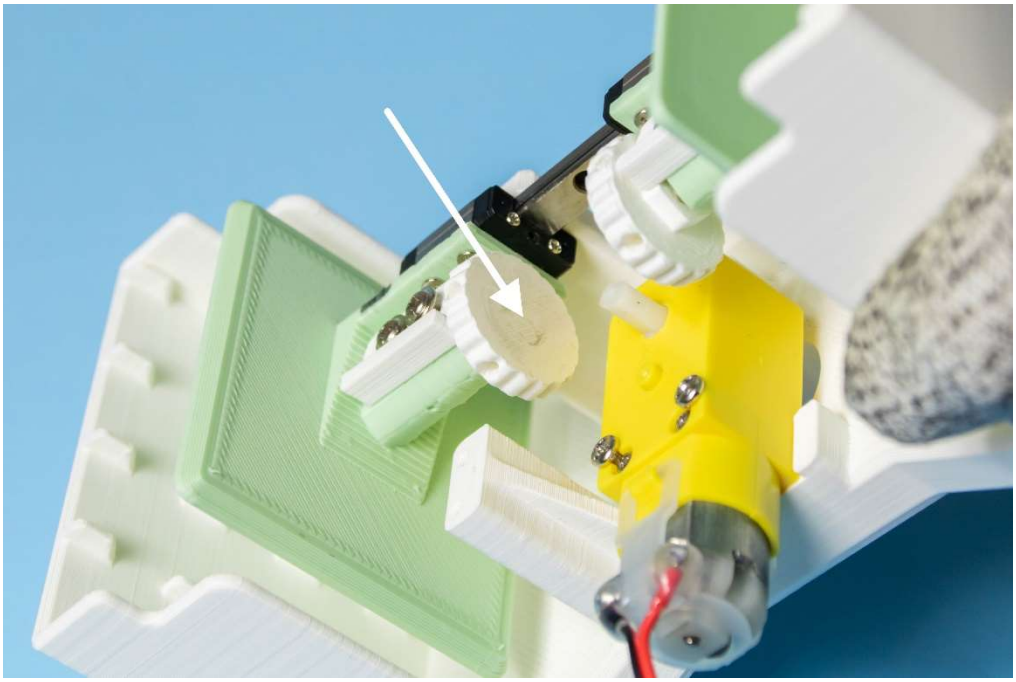
Step 5: Screw the buffer back in, when starting this process (first 2mm of insertion), make sure to do so by hand instead of with a tool so that the buffer can be inserted completely straight. I suggest orienting the machine as shown in the picture to be able to insert the buffer accurately.



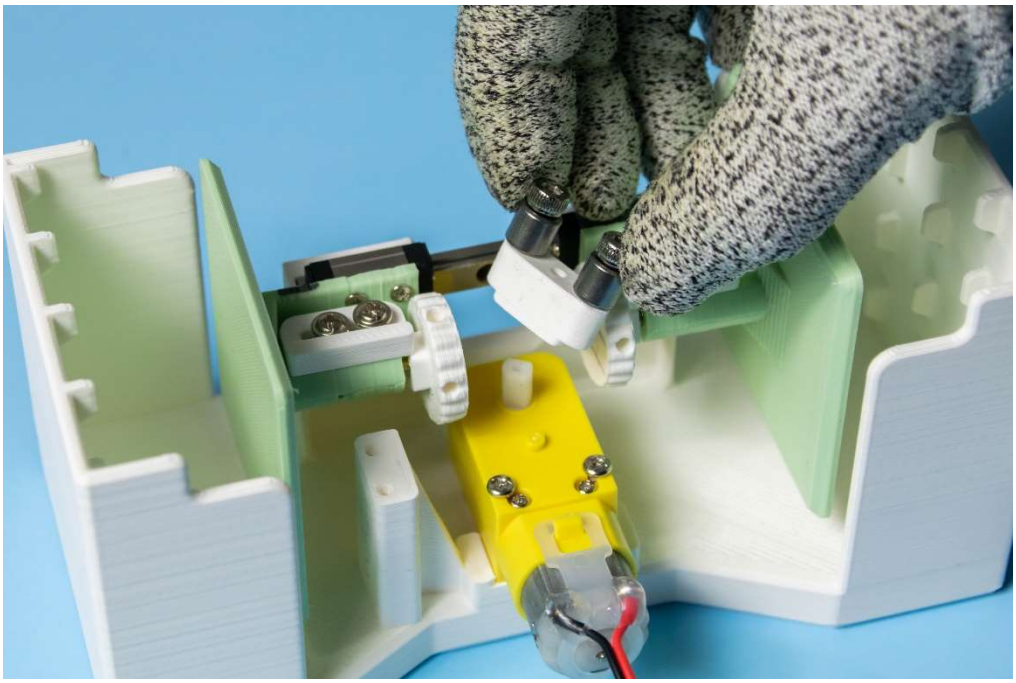
Make sure to complete step 5 slowly, damaged caused by an unaligned screw is irreversible. Adjust the buffer to a desired location by following section 6.



Step 6: Move the buffer lock forward until it touches the circular buffer, then tighten the buffer lock screws, make sure one of the buffer side holes is facing up (More about this in step 3 of section 6).



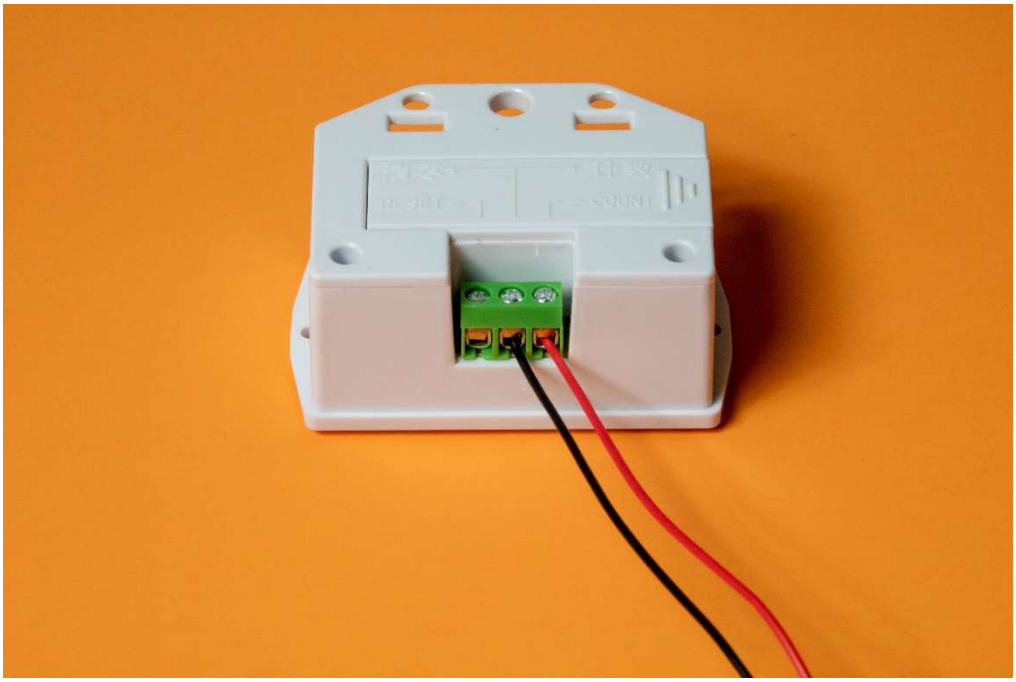
Step 7: Apply any type of grease to the new buffer piece, where the bearing comes in contact with the buffer.



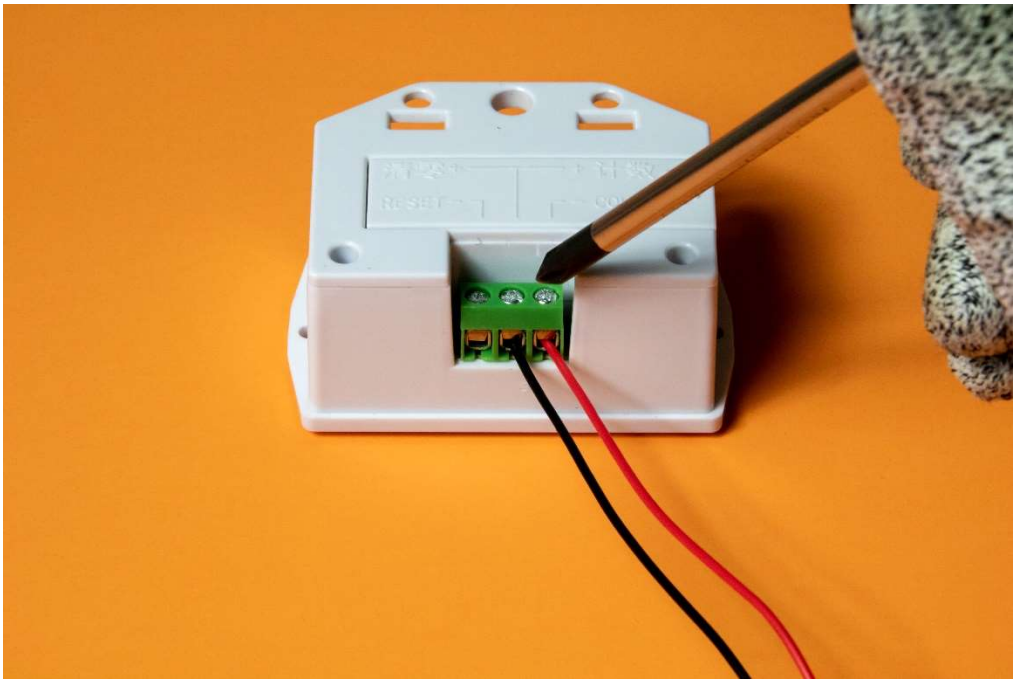
Step 8: Reattach the wheel and put the screw back on.

Section 8: Actuation Counter

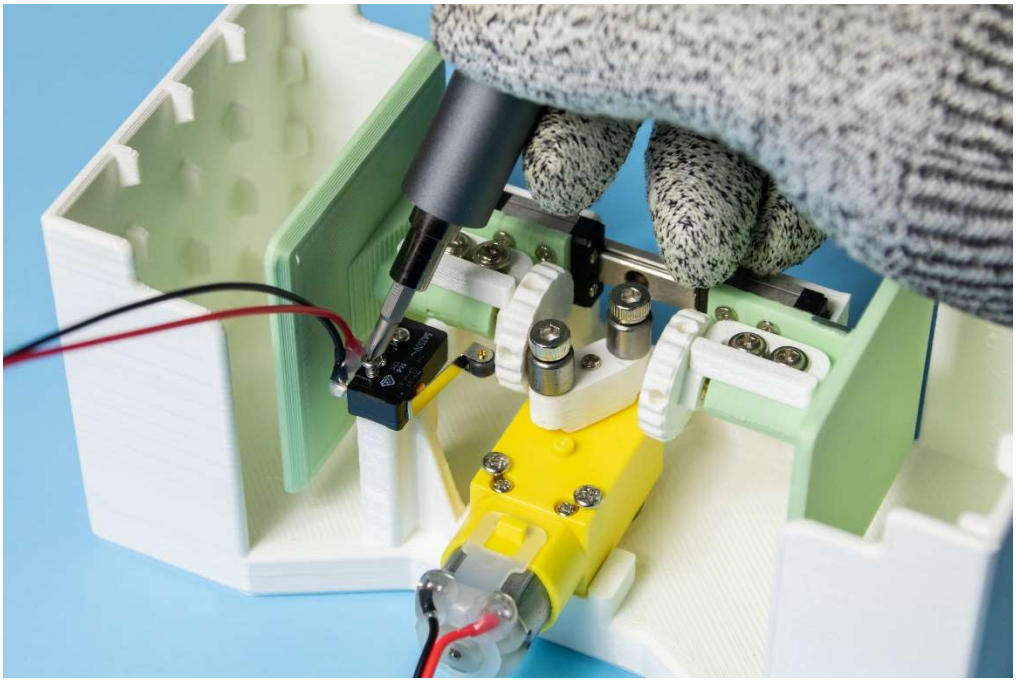
Step 1: Flip the counter so the back side is facing up.



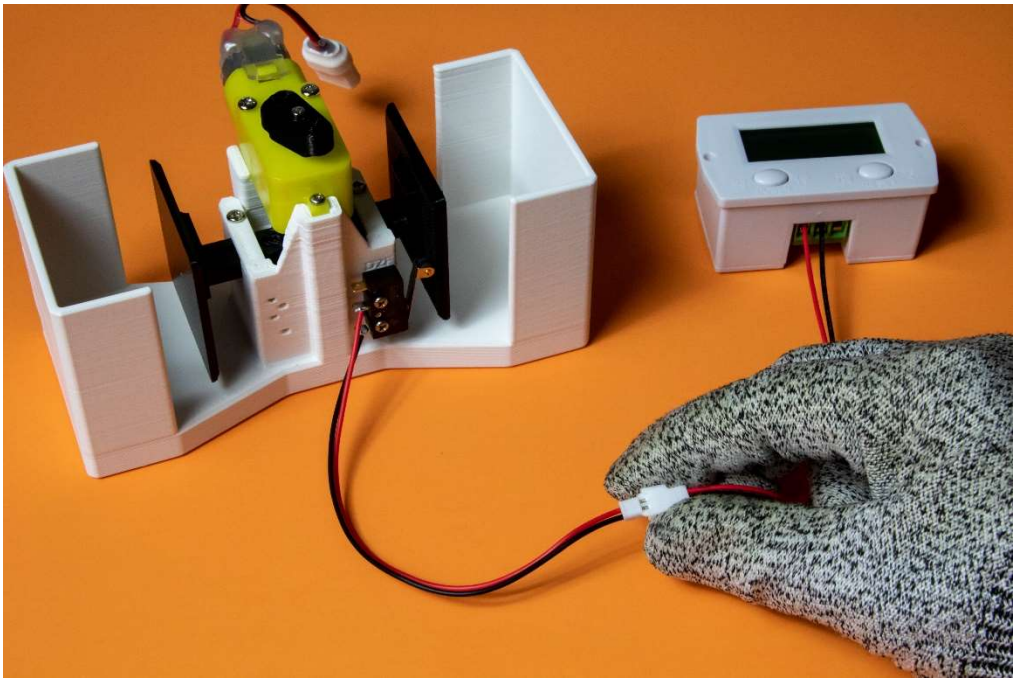
Step 2: Insert the 2 wires into the right and middle slots, the order of the wires does not matter. Make sure the screws are loose if you are unable to insert the wires.



Step 3: Tighten the two screws and make sure the wires are secure.



Step 4: Hold the switch onto the main body of the machine so that the holes line up and that the wheel is facing towards the buffer piece. Screw in the two screws.



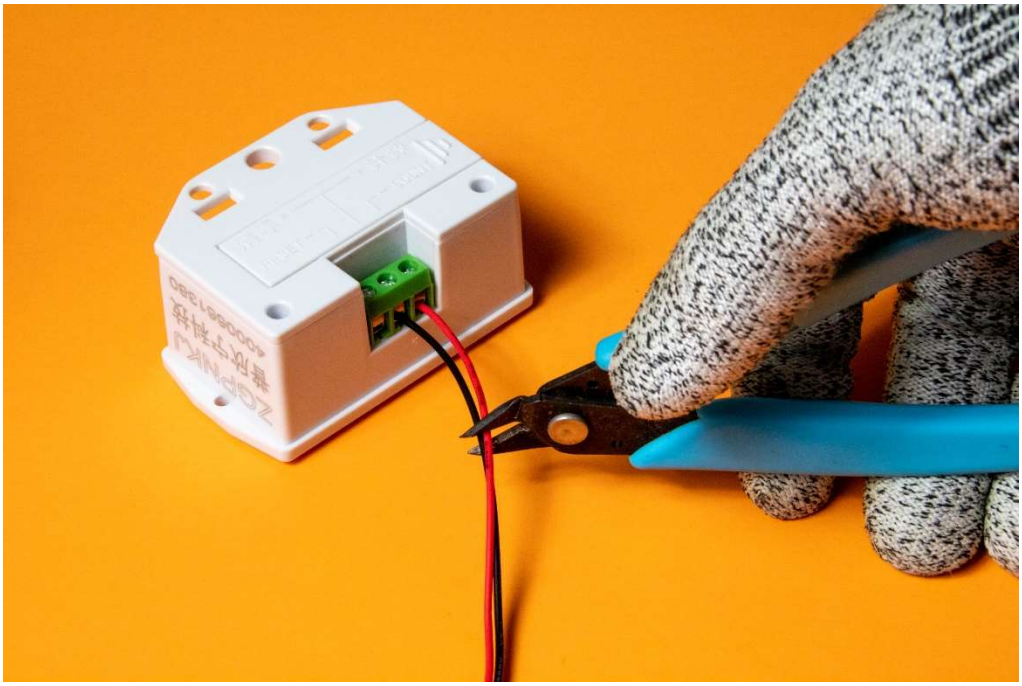
Step 5: Connect the two wires with the white connector, the pins only go in one way.

Step 6: Remove the battery compartment cover.

Step 7: Insert a AA battery (1.5v) and put the cover back in place.

Step 8: Long press the POWER button (left) to turn on/off the counter. The current count will be saved when the counter is shut off.

Step 9: Long press the RESET button to reset the counter, the counter resets itself after the count reaches 1,000,000.



Step 10 (OPTIONAL): Cut the wire if you feel the wire is too long, please note this process is not reversible unless you choose to solder on another section.

Changelog

V1.1