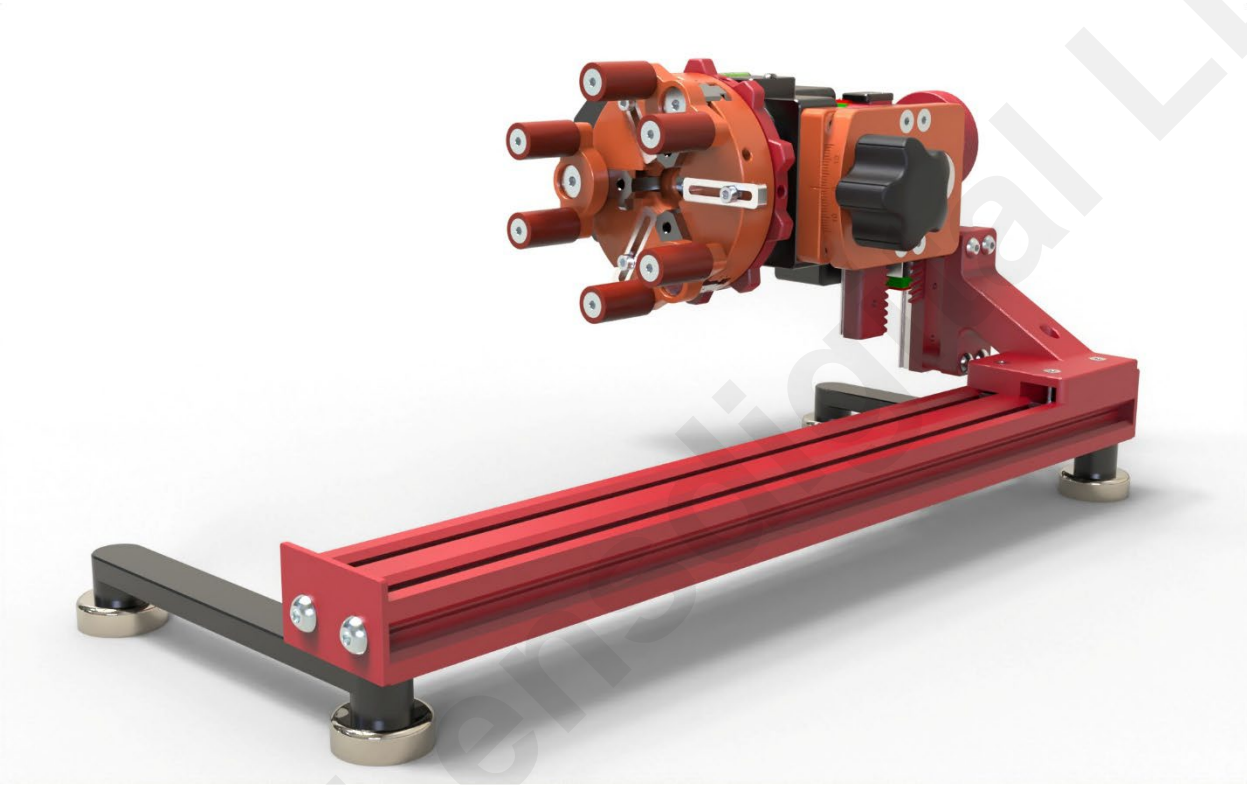
PIBURN GRIP LITE

User Manual



Updated: August 22, 2025 (get the latest version at: http://piburn.info/manual)

Note: PiBurn Grip Lite is a chuck-style rotary attachment for laser cutters engravers that allows you to engrave cylindrical objects. It's same as Grip 2, but without back support system and on the shorter rail.

It's meant to replace your Y-Axis temporarily and will work with most Ruida-type controllers.

Note: Due to constant improvements to the design, your PiBurn Grip might look slightly different from the one pictured in this guide.

Contents

PiBurn Grip Lite vs. PiBurn Roller vs. PiBurn Grip 2

PiBurn “Roller” is a roller-style rotary attachment that relies on the friction of the drive wheels to keep objects rotating.

PiBurn “Grip” is a chuck-style rotary that holds engraving objects using a set of “jaws.”

PiBurn Grip Lite is essentially same Chuck style rotary as Grip 2, however it doesn’t have back support wheels/lift and also uses a more compact main rail (330mm).

Main Diagram

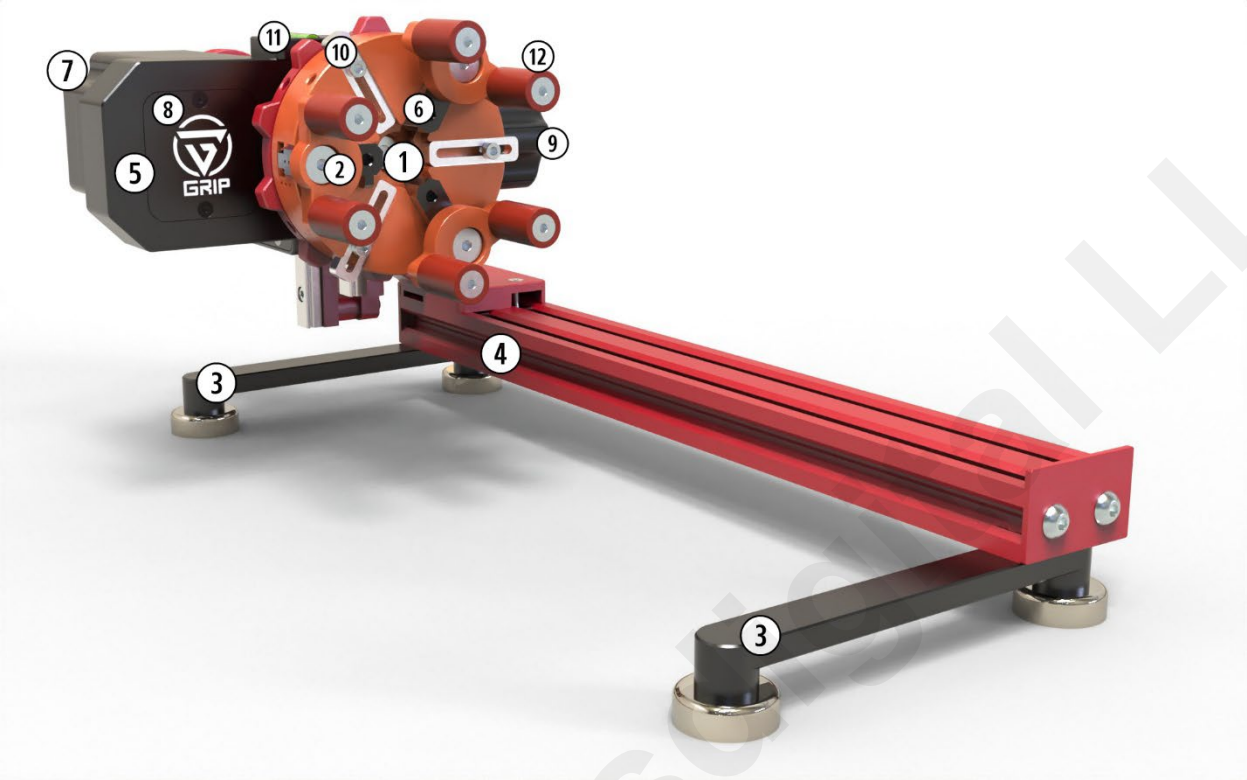


Figure 1. Front View Diagram

1. Grip Head
2. Hexa-Jaw
3. Magnetic Feet
4. Main Rail
5. Gear Housing
6. Base Jaw
7. Motor
8. Gear Access Door
9. Tilt Adjustment Knob
10. Cup Stoppers
11. Level Indicator
12. Finger Jaw

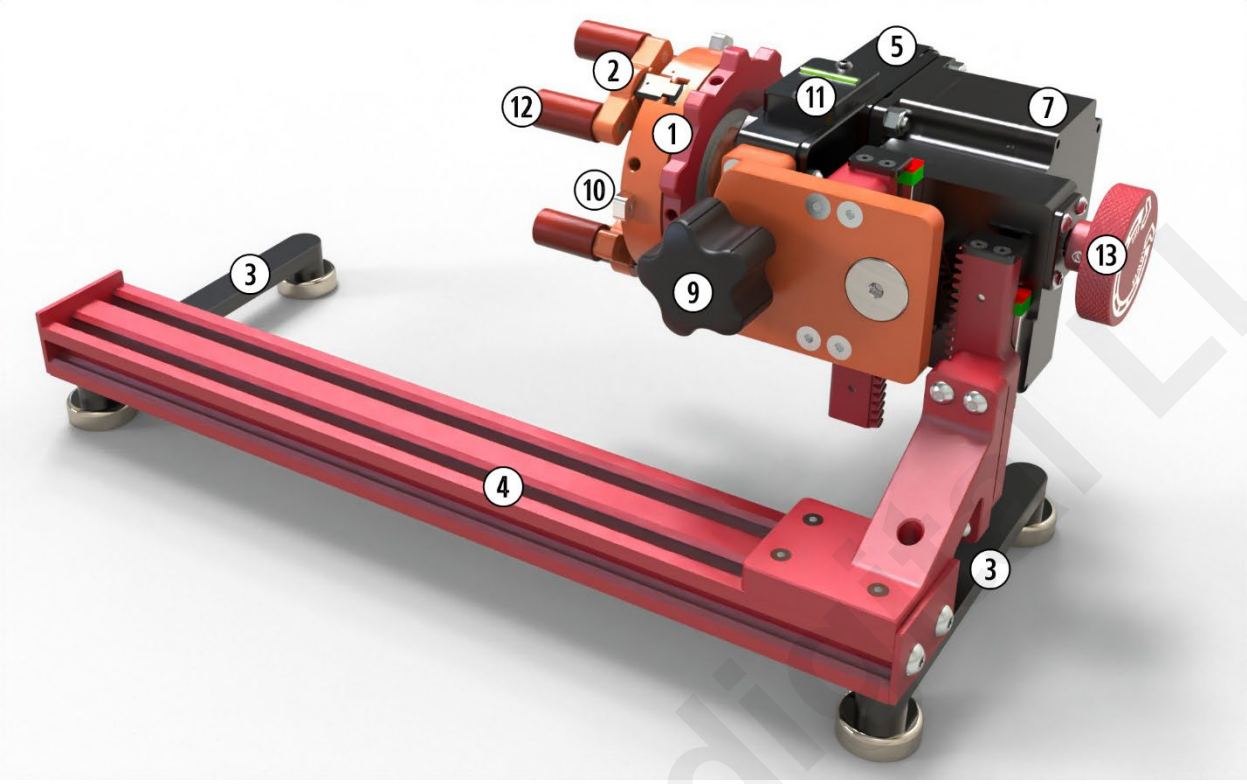


Figure 2. Back View

1. Grip Head
2. Hexa-Jaw
3. Magnetic Feet
4. Main Rail
5. Gear Housing
7. Motor
9. Tilt Adjustment Knob
8. Gear Access Door
10. Cup Stoppers
11. Level Indicator
12. Finger Jaw
13. Grip Head Lift Hand Wheel

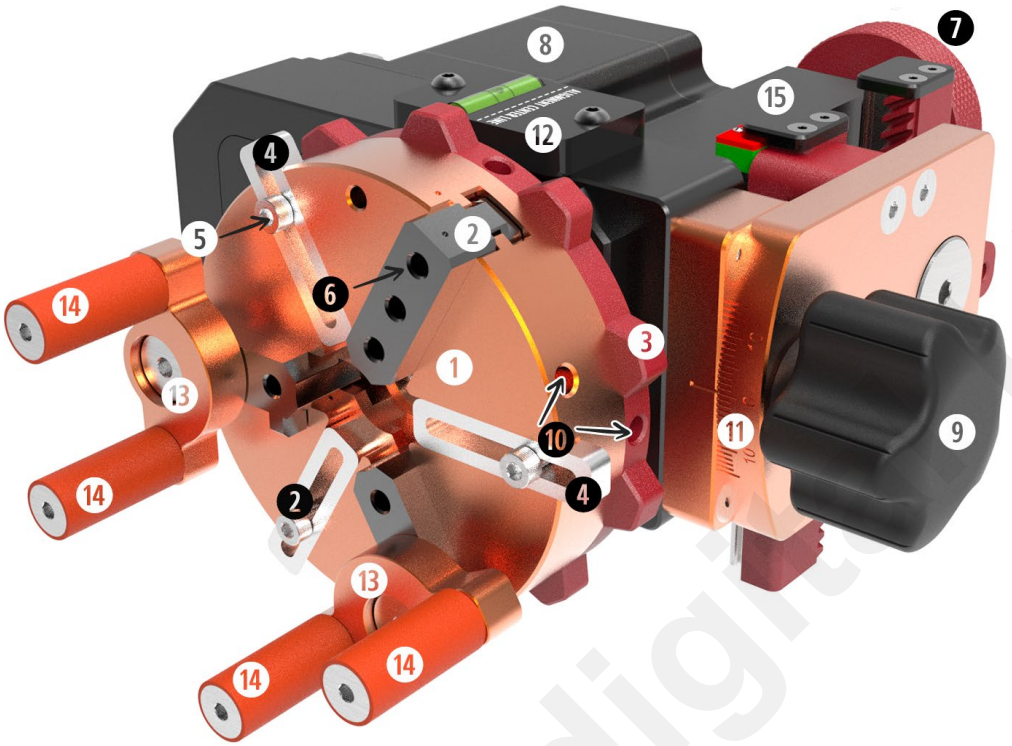


Figure 3. Main Grip Diagram

1. Grip Housing
2. Base Jaws
3. Scroll Wheel
4. Cup Stoppers
5. Cup Stopper Screw
6. Jaw Mounting holes (3)
7. Lift Mechanism Hand Wheel
8. Motor
9. Tilt Adjustment Knob
10. Lever Holes
11. Tilt Angle Degree Scale
12. Bubble Level Indicator and Center Line
13. Hexa-Jaws
14. Finger Jaws
15. Gearbox

Dimensions:

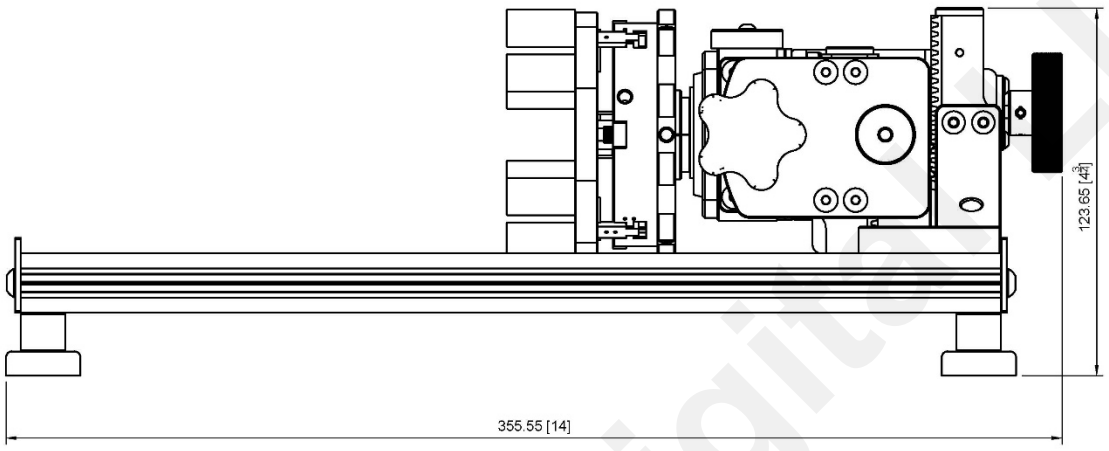


Figure 4. Dimensions

Chapter 1: Connecting to Laser (Hardware Setup)

NOTE: Different laser machines have different ways of connecting rotary attachments. Some (i.e., Boss Lasers made after 2020, Aeon Mira/Nova, Thunder laser) have dedicated rotary port and either a manual switch or automatic relay to enable it. In machines that don't have a dedicated rotary port (i.e., Boss Laser made before 2020, OMTech, and other generic), you will usually unplug your Y-axis motor and plug in the rotary instead.

Whenever possible, follow your laser manufacturer's instructions for connecting the rotary! This procedure will mostly be the same for ALL rotaries, including PiBurn Grip, except for actual steps per rotation settings, which will be different.

For Machines without a dedicated Rotary Port:

1. Locate the Y-Axis plug. This is where your Y-motor is plugged in. Usually, it's located in the "work chamber" and easily accessible once you lift the main machine cover. On Boss Laser machines plug is located toward the back

Figure 5. Y-Axis Connector

2. Lower your bed so PiBurn can easily fit under the laser nozzle
3. We also recommend that you move your laser head to the top right corner (or whenever your normal homing position is) via control panel arrows and save position (i.e. "**Origin**" button on the control panel) before turning the machine off. It's safer this way because the laser head tends to move very fast to the position it was in last before the machine was powered down. It can injure or surprise you when it does that.
4. Finally, power down the machine.

For Machines with Dedicated Rotary Port:

1. Power on your laser and let it auto home.

2. Place the rotary in the desired position, lower the table if needed and align the gantry over the rotary.
3. Locate the Rotary port (note on some machines (i.e., Aeon Mira). You might have to lower the z table to gain access to this port and plug in the Rotary
4. If your laser machine has a Rotary switch, switch it to the rotary position.

Install PiBurn Grip Lite inside the machine.

(See note for Thunder Laser)

1. When physically placing the PiBurn Grip insider laser, you have three options:
   a. Place it on top of the Honeycomb Table
   b. Place it on the “knife blades.”
   c. Place it directly on the laser floor
   You can place PiBurn Grip directly on the honeycomb table if you have enough headroom space. PiBurn has Magnetic Feet, so using a honeycomb made from ferrous metal (i.e., NOT aluminum) is best. If you desire to place PiBurn Grip directly on top of your knife blades, we recommend placing it on something large and flat (like an acrylic or plywood sheet) so feet don’t slide off the blades.
2. When engraving larger objects, and if your laser machine allows, you can remove knife blades and place the rotary directly on the laser bed. This is the recommended setup for Aeon Laser machines.
3. If your laser bed has sloping walls (i.e., Boss Laser or some OMTech machines), you can attach optional magnetic slope adapter brackets (sold separately). Then, you can place rotary on those adapters like on any flat surface.
4. Plug in your rotary as described above.
5. Carefully arrange wire, PiBurn Grip, and supporting platform so it doesn’t interfere with the laser bed going up or down. We don’t want the wire to get pinched between moving parts.
6. Turn on your machine (if it wasn’t already).

Homing Machine with Rotary Attachment

When you turn on your laser, it must perform a “homing” sequence to know its start position. This usually involves moving the gantry and laser head into the top right (or left on some machines) corner until it reaches the end-stop limit switch. Then, the laser will move a little away from the limit switch and back. Upon completion of the homing sequence, the laser head and gantry will want to move rapidly to the last known position where it was when you turned off the laser.

In many laser machines, when you plug in the rotary, you disable the Y gantry motor, so it won’t be able to reach the limit switch. In cases like that, you must move the gantry by hand to simulate a typical homing sequence. But sometimes you can’t move the gantry because its motor is still under power. In that case, you should only plug in the rotary after the machine finishes homing sequence.

To home gantry by hand, push the whole gantry back to trigger the Y-axis limit switch.

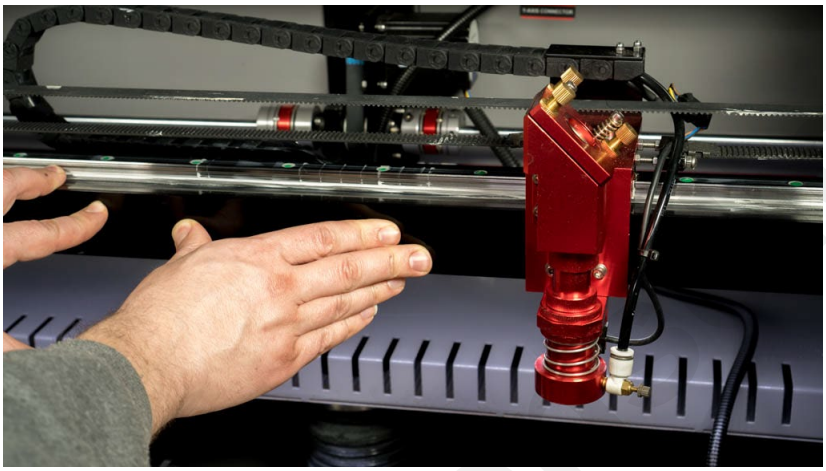


Figure 6.Pushing Gantry

- You’ll notice that the Grip body on the Piburn will start rotating in the opposite direction after you reach the limit switch. That’s because the laser wants to move the gantry back a little.
- Pull the gantry towards yourself just a bit so it disengages the limit switch and finally pushes it all the way back again.

At this point, you manually finished performing the initialization process that the machine usually does automatically when the Y-axis is plugged in, and it should all be set to continue with the software setup part.

Note for Thunder Laser Owners (might apply to other lasers as well):

You will not be able to move your gantry by hand because the Y motor is always powered on. Thus, it would be best to position the gantry using the arrow keys above the rotary before turning it on or plugging it in.

Chapter 3: Connecting to Laser (Software Setup)

You must input two settings to configure your PiBurn Grip with a laser machine correctly.

The first setting is **Object diameter**. This is the **actual diameter** of the object you will be engraving. You'll have to measure your tumbler, cup, or bottle and write down this number.
Note that this differs from the diameter setting for a Roller-type rotary!

The second setting is "**Steps Per Rotation** (a.k.a. **Circle Pulse**"). This number tells your laser machine how many pulses/steps it needs to send to the rotary's motor for a full 360-degree rotation. In practical terms, it controls how far your engraving object is rotated. If you set this number incorrectly, your engravings will squish or elongate. This number depends on how your laser engraver was set up at the factory.

Known "Steps Per Rotation" Values:

Laser Machine/Model	Steps per Rotation
Boss Laser LS1420/1416	9,000* or 12,000
Boss Laser LS1630 and above	18,750
AEON Laser (before June 2023) **AEON Laser (after June 2023)**	37,500 48,000
Thunder	30,000
OMTech	7,500 * or 18,750
AP Laser	18,750

*Most common steps setting
For all others, it must be determined by looking at Stepper Driver DIP switches, as described below. **DO NOT CHANGE THE DIP SWITCH POSITION**! Only note them.

Find Out Steps per rotation for Unlisted/Unknown machine

WARNING!

Your machine must be completely powered off, unplugged, and discharged because you must go inside the electronics compartment to inspect some switch settings visually.

1. Open the door that leads you to the internal electronics compartment. On the Boss 1630 series, it's located in the back of the machine.

Figure 7. Door to electronics

2. Locate Stepper Motor Driver that controls your Y motor. Stepper Driver looks similar one in the picture below.

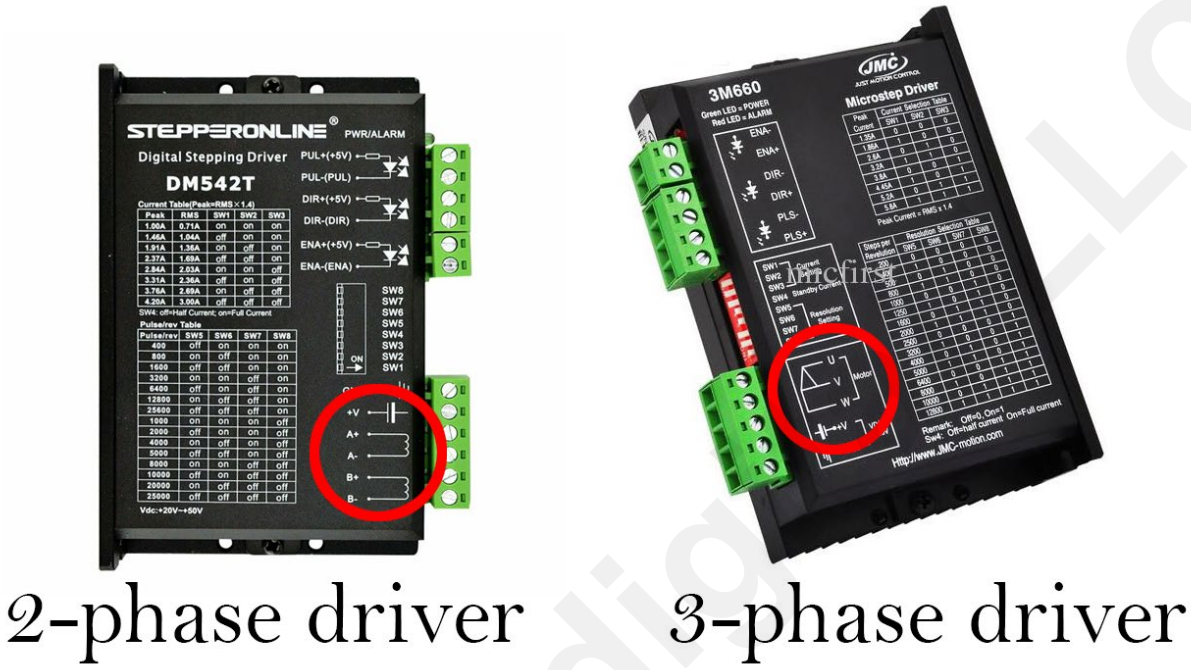


Figure 8. Stepper Driver type

3. There will be 2 or 3 of them inside your machine. One is for the X motor, one is for the Y motor, and one is for the Z axis (if your machine is equipped with a motorized table). Y and X drivers should be identical to each other.

Here's what it looks like inside the Boss Laser LS-1630 machine (notice drivers are labeled):

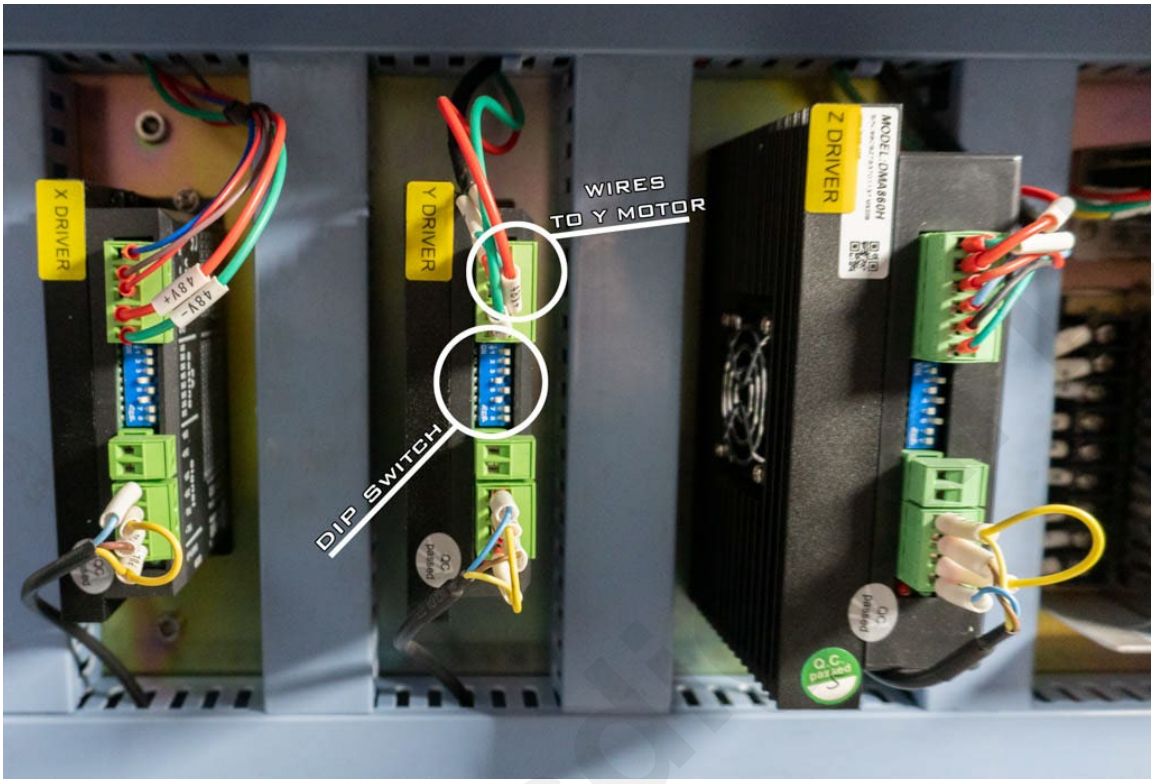


Figure 9. Stepper Drivers inside Boss Laser

4. If yours are not labeled, try tracing wires from the plug where your motor was plugged in (and where we now connected the PiBurn rotary).
5. Write down (or take a photo) of:
    a. **Make** and **Model Number** of your **Stepper Driver**
    b. Position of **"DIP" switches**. These are tiny switches on the back of the motor driver that can be flipped up or down. There are about 6-8 of them. Please refer to *F*igure 8. Stepper Drivers inside Boss Laser
6. Find out how many "**Pulse/Rev**" (Pulses per Revolution) is your Y driver set to.
   The position of **DIP switches** determines the "**Pulse/Rev**" setting.
   Many stepper drivers will have a "**Pulse/Rev**" table printed on them (see *Figure 9. Close* look at stepper driver). If yours doesn't, search online and download your stepper driver model manual. In the manual, find the "**Pulse/Rev**" table.

Let's look at the example below:

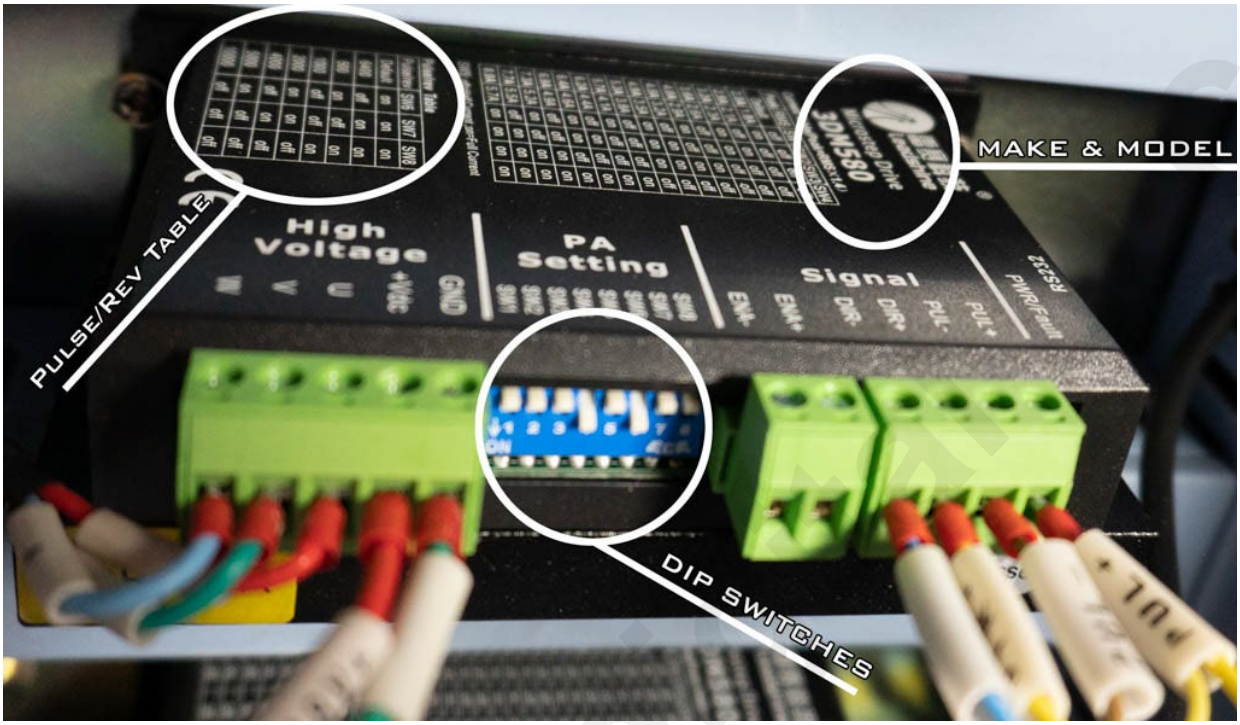


Figure 10. A close look at the stepper driver

There are 8 **DIP switches** on this driver, SW1 - SW8. Switches 4 (SW4) and 6 (SW6) are turned on (flipped down), while the rest are off (flipped up).
This driver has **Pulse/Rev** Table printed on it, so we don't need to know its manufacturer and model (no need to look at the manual).
The table refers only to SW6, SW7, and SW8 positions. In our case, **SW6** is **ON**, and **SW7** and **SW8** are **OFF**. That's the one you need to know for the next step.

7. To find the "**Steps Per Rotation**" setting, take the "**Pulse/Rev**" value (from the previous step) and **multiply by 3.75x** (that's the gear ratio of PiBurn Grip if you are curious). Note that for Thunder Lasers, the gear ratio is **3x**
   For example, if your **Pulse/Rev** = **5000**, your **Steps Per Rotation** will be: 5000*3.75= **18,750**

Chapter 4: Configuring Software

Now that we know the Diameter and Steps Per Rotation values let's use LightBurn to configure your laser to use PiBurn.

Note: Boss Laser HP Series machines cannot be configured via Lightburn. See the instructions at the end of this chapter.

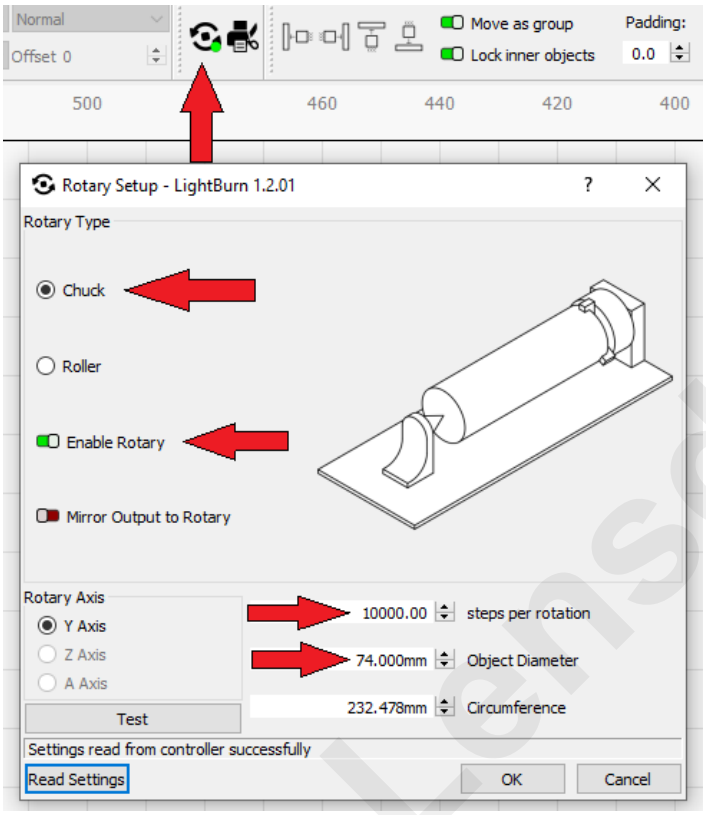


Figure 11. Lightburn Rotary Configuration

IMPORTANT: Unlike the "Roller" type rotary, the "Chuck" type rotary's Diameter setting is the ACTUAL diameter of the object you are engraving! It will be different for every tumbler, cup, bottle, etc.!

1. Following "Connecting PiBurn" instructions to position and plug in the rotary inside the laser machine, ensure the laser is on, the rotary is plugged in, and any required rotary switches are turned on.
2. In Lightburn, click on Rotary Icon or go to the Laser Tools menu and choose Rotary Setup (Ctrl+Shift+R on Windows)
3. Change Rotary Type to "Chuck."
4. Click the "Enable Rotary" switch to make it green.
5. Rotary Axes should be set to "Y-axis" (for Thunder, it will be "A Axis")
6. Change "Steps Per Rotation" to a value you determined from the previous chapter

7. Set “Object Diameter” to the diameter of your engraving object

Alternatively, these settings can be changed via Edit -> Machine Settings and then under Rotary Parameters. Your machine settings can be saved to a configuration file, which is very convenient when switching between flat and rotary work and between different diameter objects without actually remembering any numbers! Some laser manufacturers will include settings files on a USB drive.

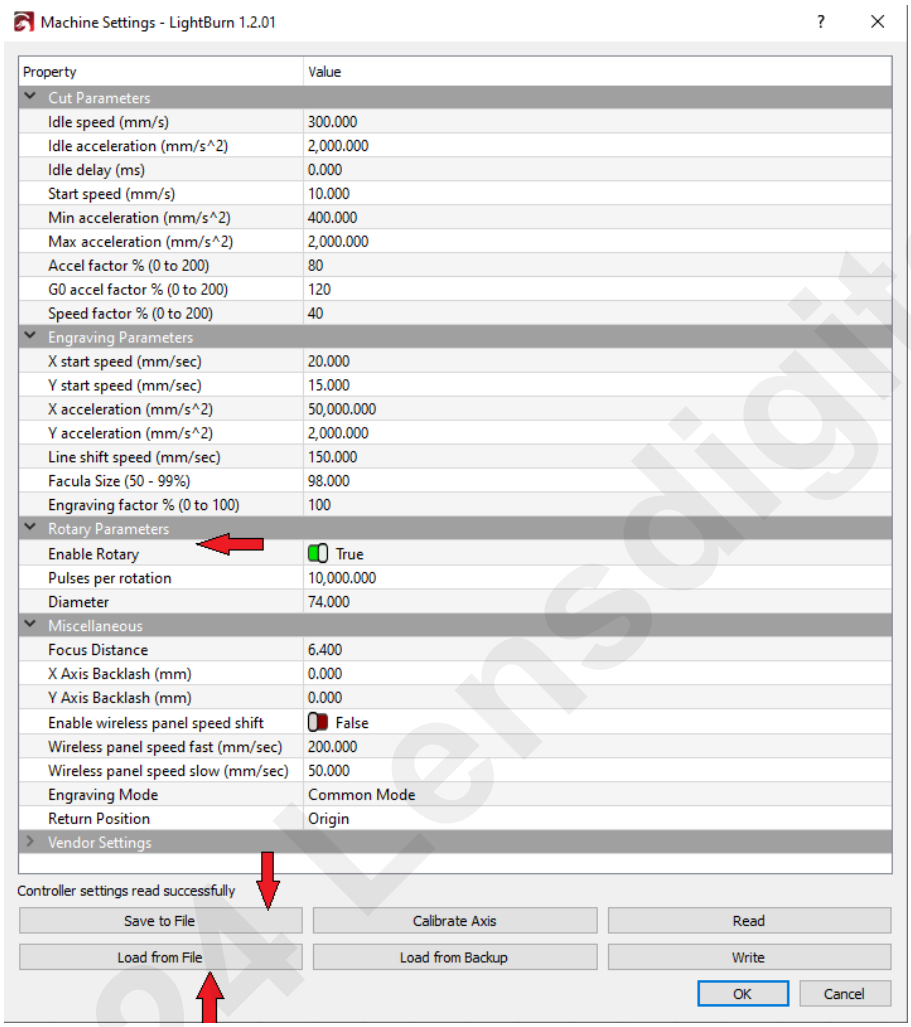


Figure 12. Machine Settings

Boss HP machine setup

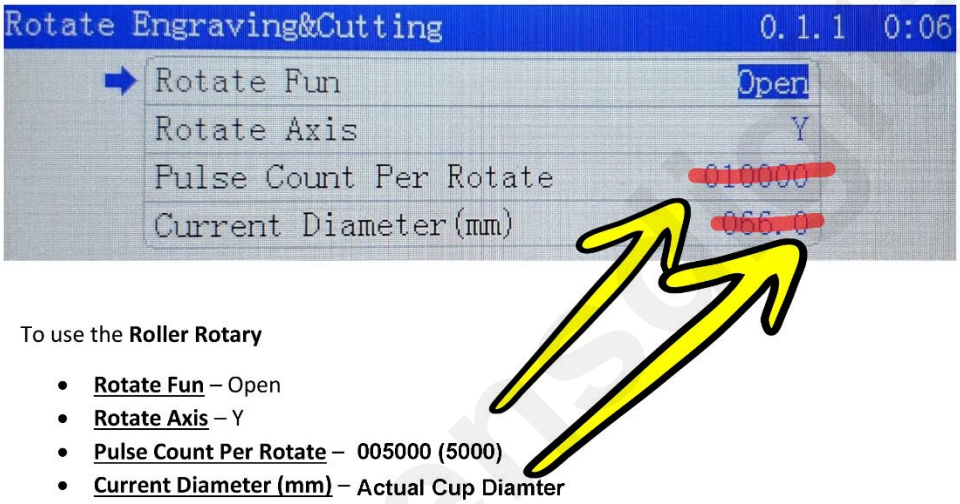
These lasers use a different controller. Lightburn is unable to change rotary settings on it, so it has to be done from the laser's control panel:

Setting up in LaserCAD (HP Machines)

On the AWC Control Panel, press the **Menu button**, then go to:

7. Common Parameter Settings > Press Enter > 4. Rotate Engraving&Cutting > Press Enter

The following picture shows that **four parameters** that need to be adjusted



To use the **Roller Rotary**

- **Rotate Fun** – Open
- **Rotate Axis** – Y
- **Pulse Count Per Rotate** – **005000 (5000)**
- **Current Diameter (mm)** – **Actual Cup Diamter**

✎ **NOTE: You will need to RESET the machine (Turning off/on the machine or pressing the RESET button) after you've made changes!**

To go back to the worktable, change the **Rotate Fun to "Close,"** then press the **Enter button**. Then RESET the machine to save changes to the machine.

Figure 13. Boss HP laser config

Chapter 5: Basic Operations

Adjusting Height and Tilt

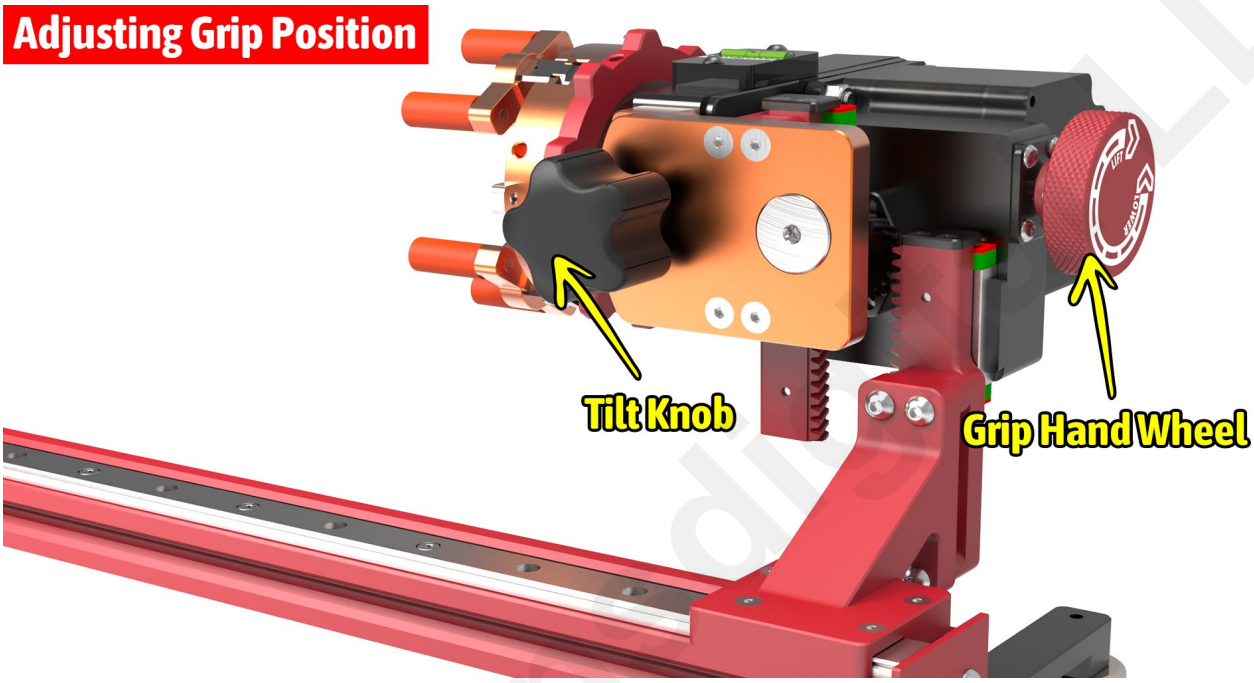


Figure 14. Adjusting Height

PiBurn Grip head unit can be raised or lowered by turning the Grip Hand Wheel on the back of the Grip body. For tapered objects, you can easily adjust tilt by loosening up Tilt Knob and rotating grip up or down until the desired angle is achieved.

Note: The grip can be tilted by + or - 15 degrees, which is sufficient for most objects. Use degree indicator scale shown in the picture below to adjust the tilt to the exact angle.

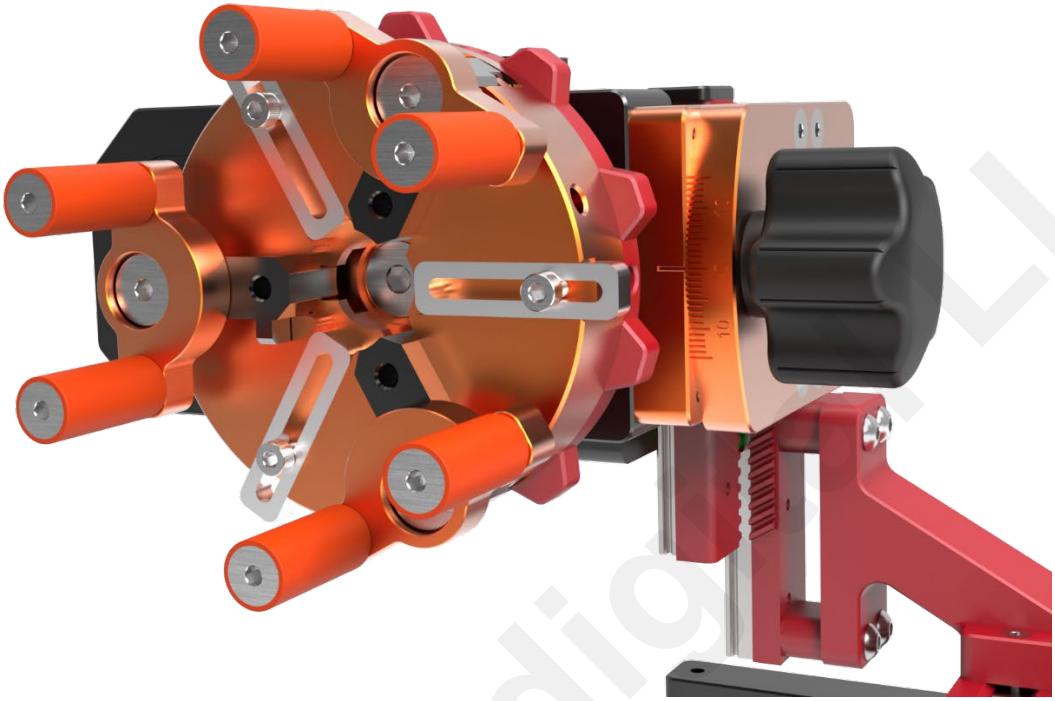


Figure 15. Degree Indicator

Using Grip Jaws

Your PiBurn Grip Lite will come with several sets of “jaws” to hold round objects. There are so many combinations that can be used that we can’t list them all, but we’ll describe the most common setups. Feel free to find your new way of using these!

Base Jaws

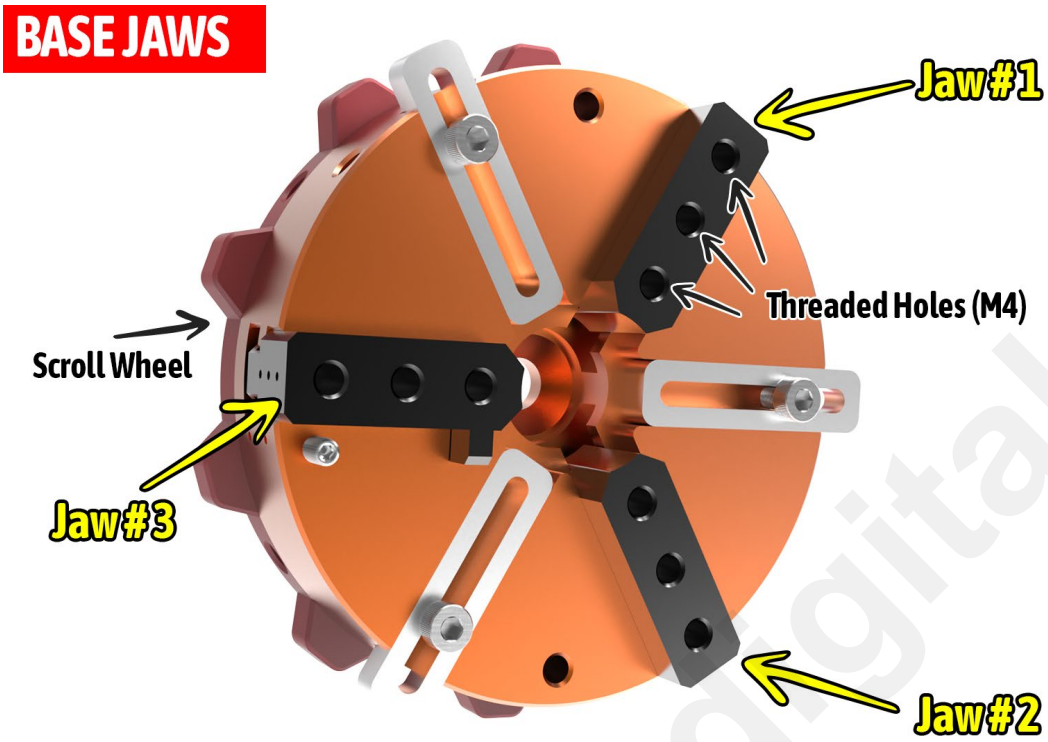


Figure 16. Base Jaws

These jaws are used as attachment points for all other (external) jaws on the grip. Each has three threaded M4 holes used for external jaw attachments. You will choose which holes to use based on the diameter of your engraving object.

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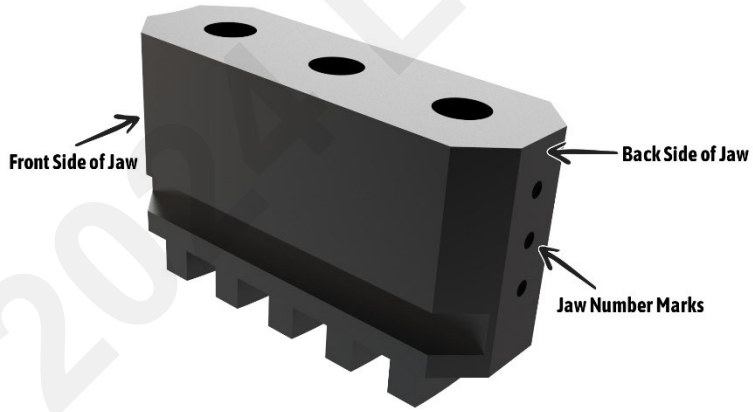

Figure 17. Base jaw closeup

Finger Jaws

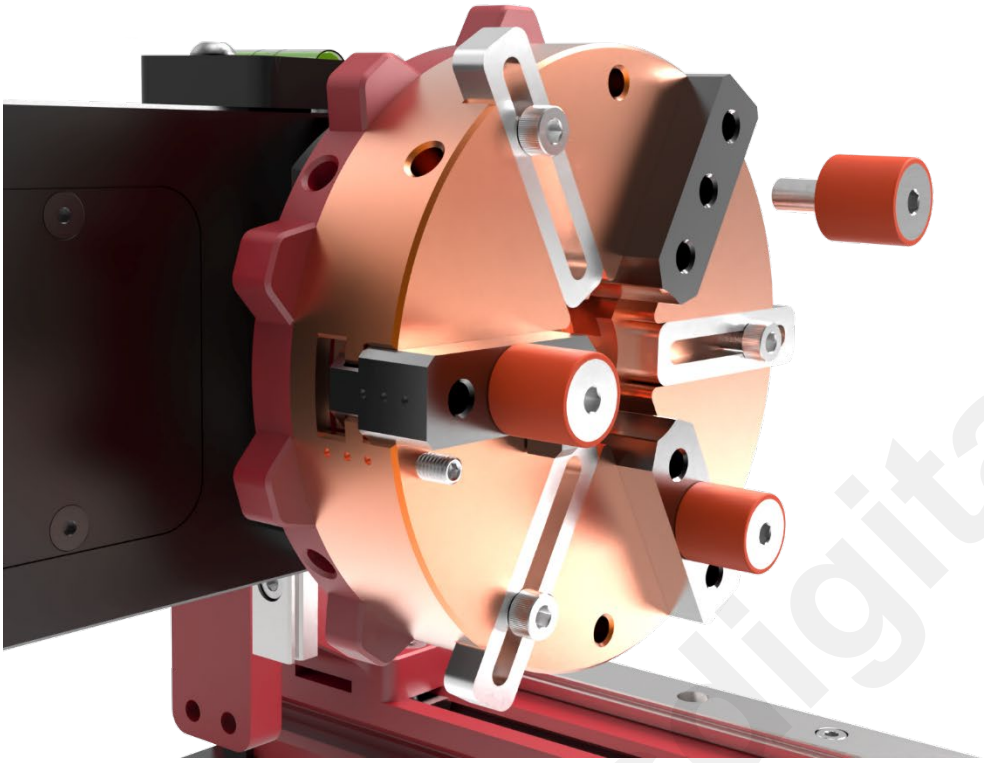

Figure 18. Finger Jaws (short)

Finger jaws have silicone sleeves that provide excellent grip on most objects and are gentle on glass. They can be used for most of the objects you will be engraving; in most cases, you will use them to hold round objects from the inside. These jaws can be used on the outside for objects that are not hollow inside, like baseball bats.

Finger jaws come in two lengths: Regular and Short.

Regular finger jaws are great for straight objects and can better hold heavier objects like glass beer mugs.

Short Finger Jaws are great for tapered objects and tumblers with an inner ridge that will prevent regular finger jaws from engaging. Great examples are 20 and 30-oz tumblers such as Polar Camel and Yeti.

Finger jaws screw into one of 3 holes in the base jaws. These jaws do not require any tools to install.

Use the middle hole to attach these for the most versatility whenever possible.

Hexa-Jaws

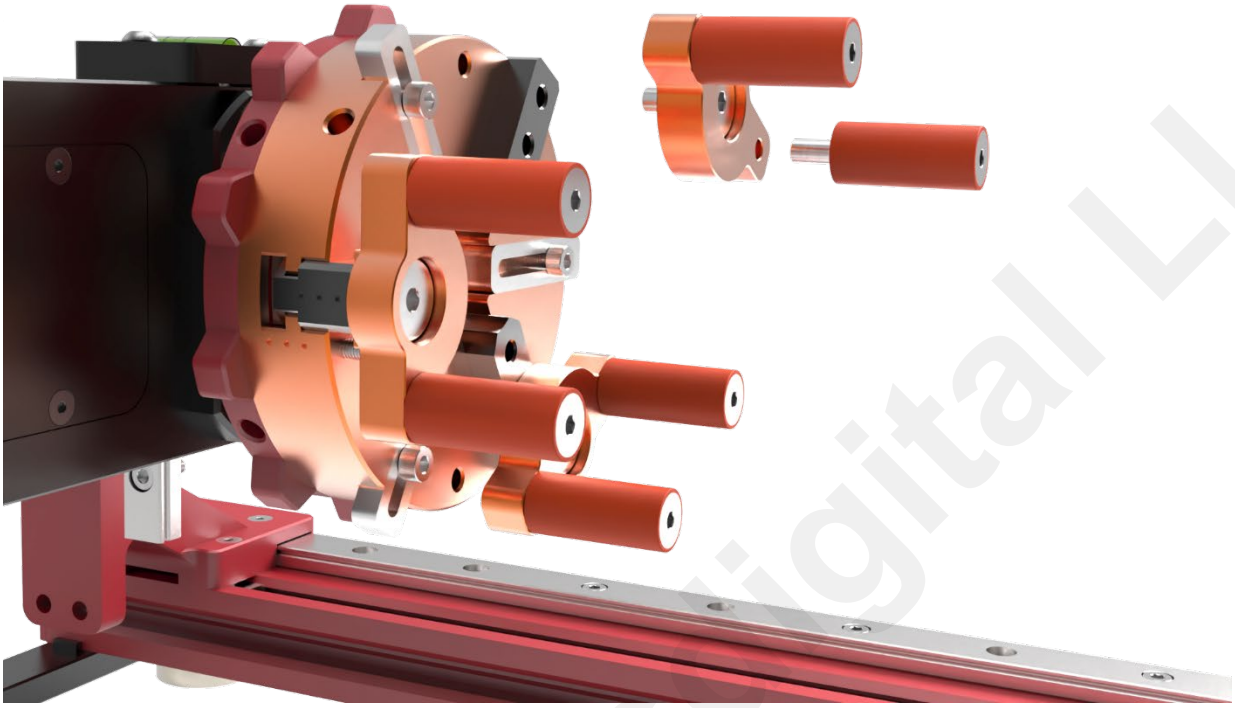

Figure 19. Hexa-Jaws

Our patent-pending Hex-Jaws or “jaw doubler system” allows converting three standard jaws into six. This triples the finger jaws' holding power and makes it easier and faster to secure objects for engraving. With the Hexa-jaw system, you won’t need back wheel support for most objects unless they are very long or heavy.

Grip 2 comes standard with 3 Hexa-Jaws and 6 Normal Finger Jaws that can be used with either hexa-jaws (default out-of-box configuration) or 3 of them can be screwed into base jaws. If you wish to use short fingers with hexa-jaws, you will need to purchase another set of these short-finger jaws at our online store.

For the strongest holding power (for heavy objects), we recommend installing hexa-jaws into the outermost hole on the base jaws and using/extending cup stoppers.

Hexa-jaws can be installed into the last two (outer) holes on the base jaws. However, they can’t be used with the innermost hole. Please note that one side of these jaws has a protruding round edge. These act as stoppers when securing objects from outside. Normally, this edge should be on the inside; however, in some rare cases, like with some very round stemless glasses, you’ll want to flip these on the outside and use

them as stoppers, as seen in this photo:

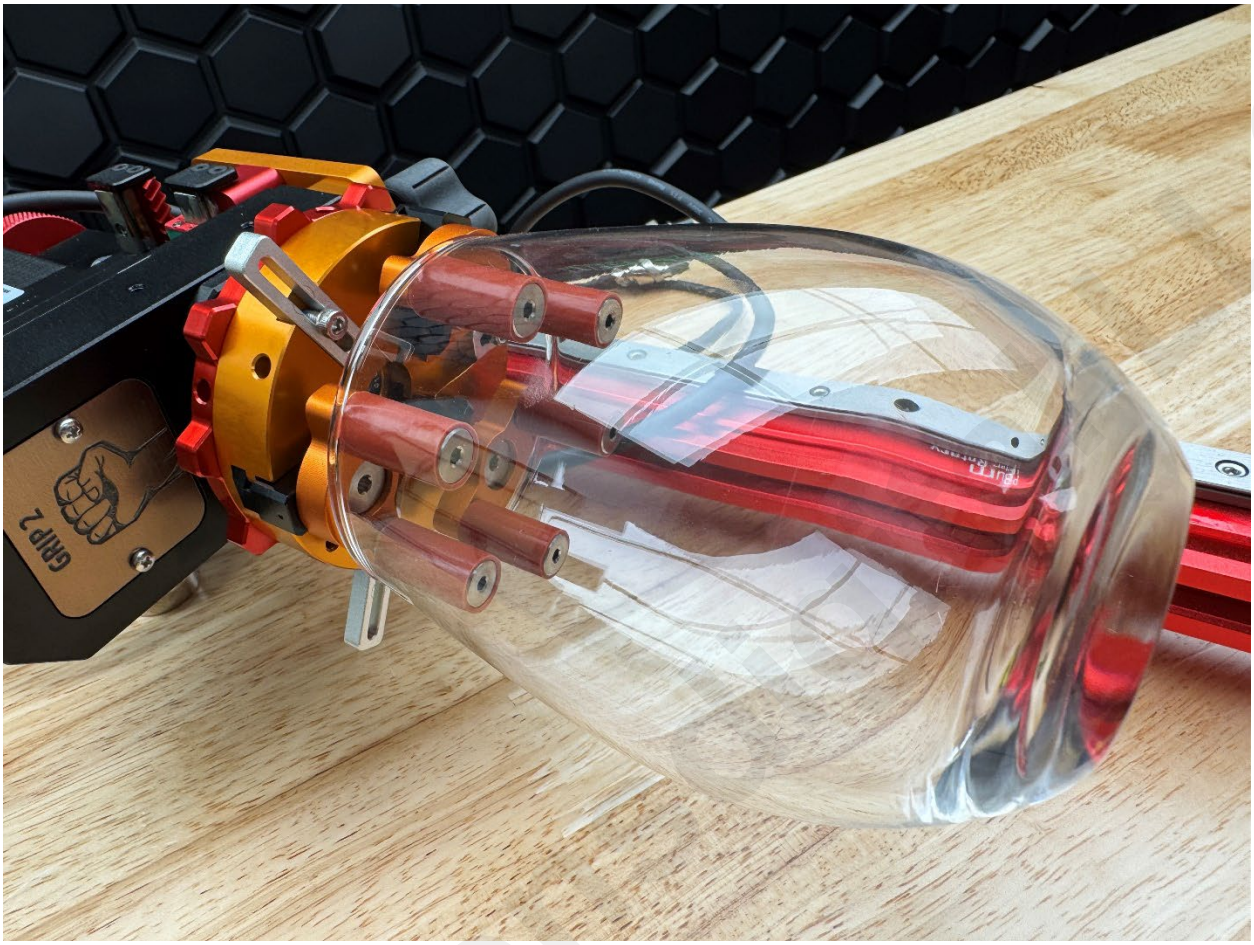

Figure 20. Flipping Jaw stops to hold the stemless glass

Hexa-Jaws can be installed/removed using a 2.5mm Hex Screwdriver.

Metal “L” jaws

Figure 21. Metal jaws

These jaws resemble “classic” chuck jaws you might have seen on other chucks. We designed these with a few things in mind. In most cases, you will want to use them on the outside. The length of the part that grabs the tumbler is designed to fit just over the stainless “ring” portion of the tumbler, so you can still engrave most of the powder-coated surface. The thickness of these is also made so most laser heads can pass over them and avoid collision because the laser head will need to move a little past the engraving area due to the inertia.

We tested these on 20 and 30-oz tumblers, and they work great! But they will hold many other objects! You can also flip them around to hold very small objects like pens.

Use 3 included M4x16mm counter-sink screws to install these on the base jaws. You only need to use one holes out of 3.

Use a 2.5mm Hex Wrench or Screwdriver for these.

Optional Extended Jaws

Figure 22. Extended jaws

These are special jaws never seen before on a rotary chuck! Also known as “dog bowl jaws,” they significantly increase the grip jaws’ reach to hold bowls and other large objects. Take a closer look at these. You will see a set of holes on both ends. Some of these have threads of them; **some are not threaded. You will attach these extended jaws to base jaws thru unthreaded holes. Use** included M4x16mm countersink

screws (oner per jaw is sufficient) to attach them on the base jaws. Now you can install your finger jaws into one of the threaded holes on the opposite end. Use a hole that works best for your object.

You can also install either L-Jaws or Hexa-Jaws on the extended bases!

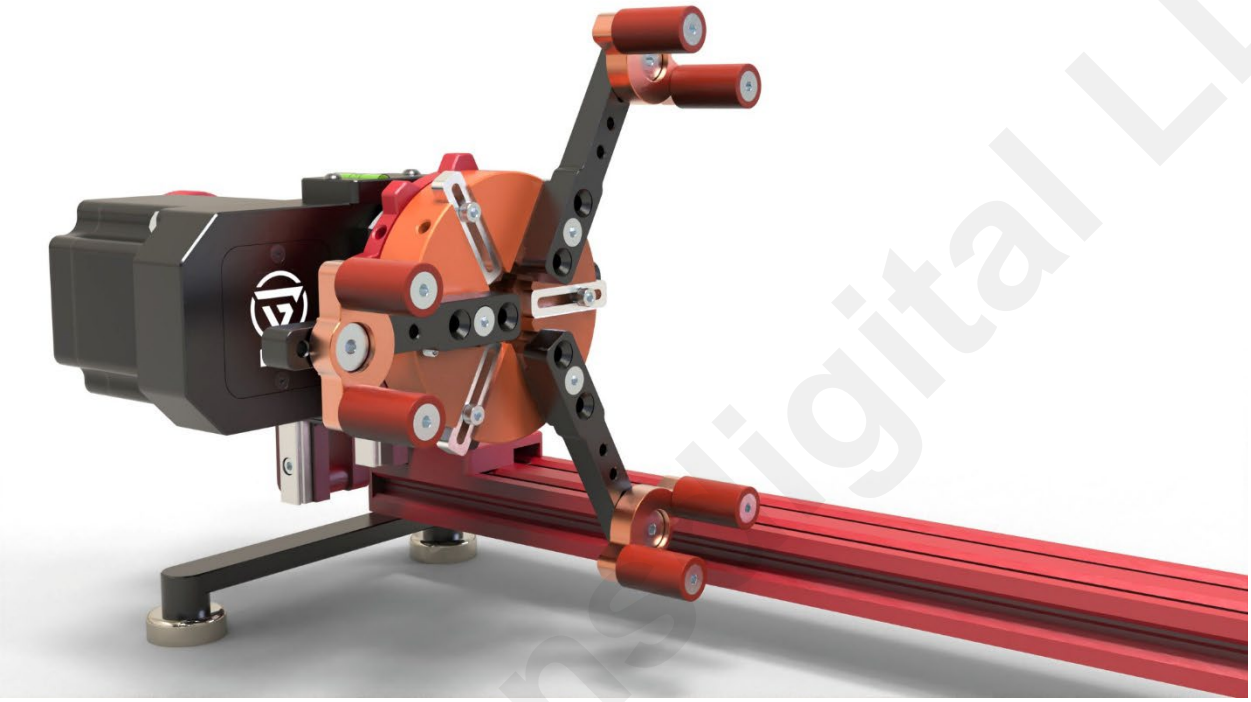

Figure 23. Extended Jaws with Hexa-Jaws

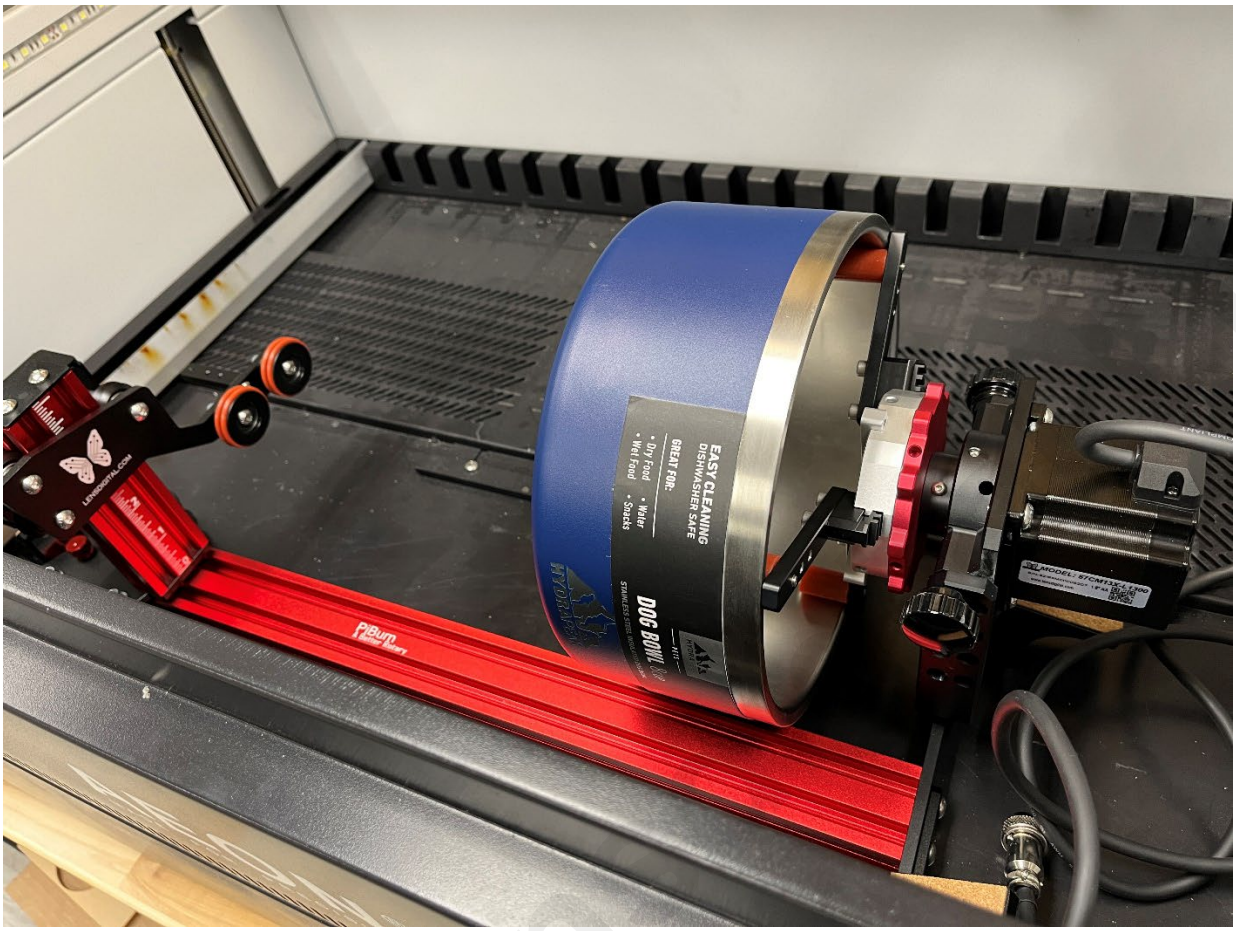

Figure 24. Dog Bowl in Extended Jaws (back support NOT included)

Using Adjustable Cup Stoppers

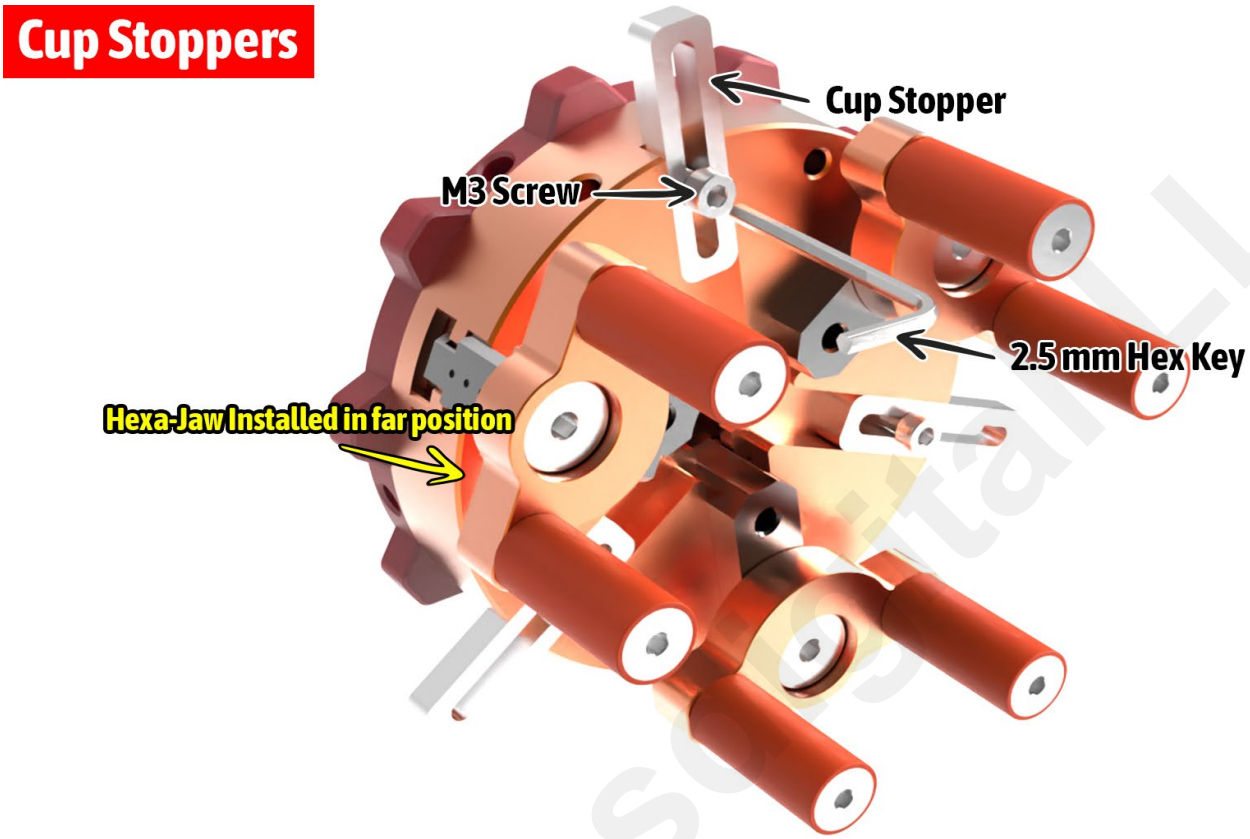

Figure 25. Cup Stoppers

When you install Hexa-Jaws or “finger” jaws in the outermost hole of the base jaws (i.e., when setting up for larger diameter tumblers), there won’t be enough of the edge of the base jaw to stop the tumbler from moving past them. It will be virtually impossible to align the tumbler to be parallel to the grip’s face. In this case, you can extend adjustable cup stoppers. You can move each stopper out of its slot by loosening up an M3 screw with a 2.5mm Allen wrench or hex screwdriver. Extend these so that the edge of the cup or tumbler can make complete contact with each of the three stoppers, and tighten the back M3 screw.

When not needed, retract all three stopper arms so the laser head won't collide with them. IMPORTANT: Don't retract them too far, or they will block Base jaws from moving all the way to the center.

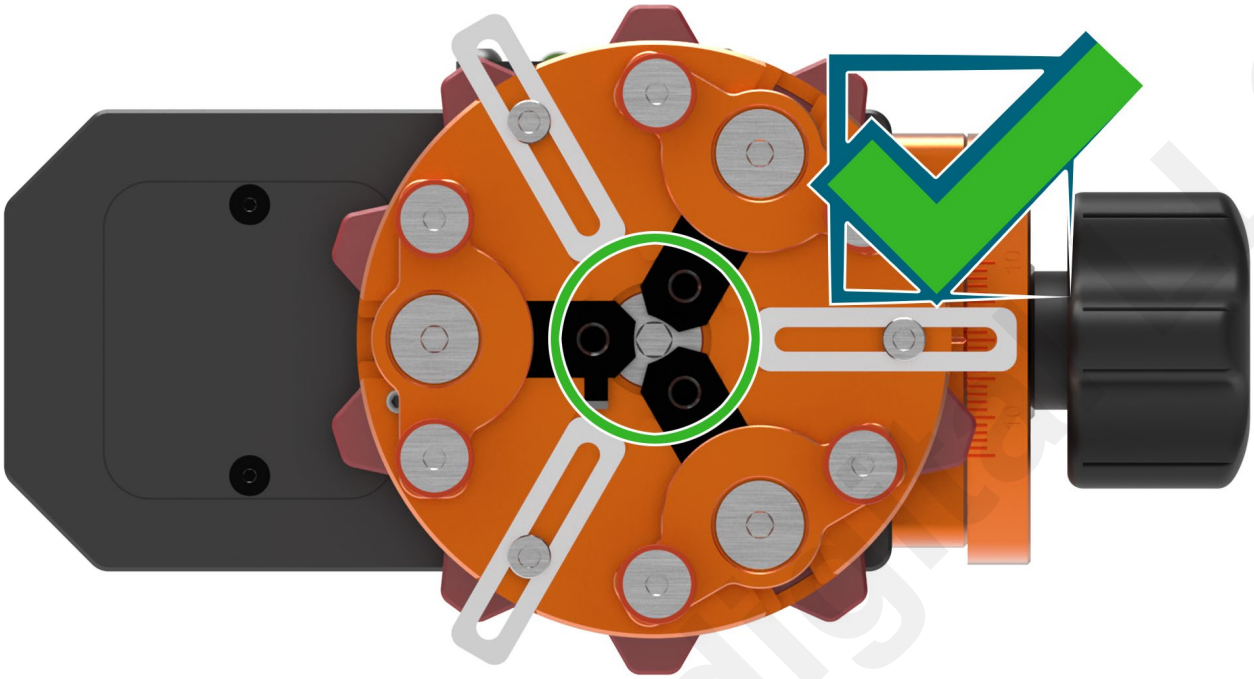

Figure 26. Stoppers Position

Using Levers

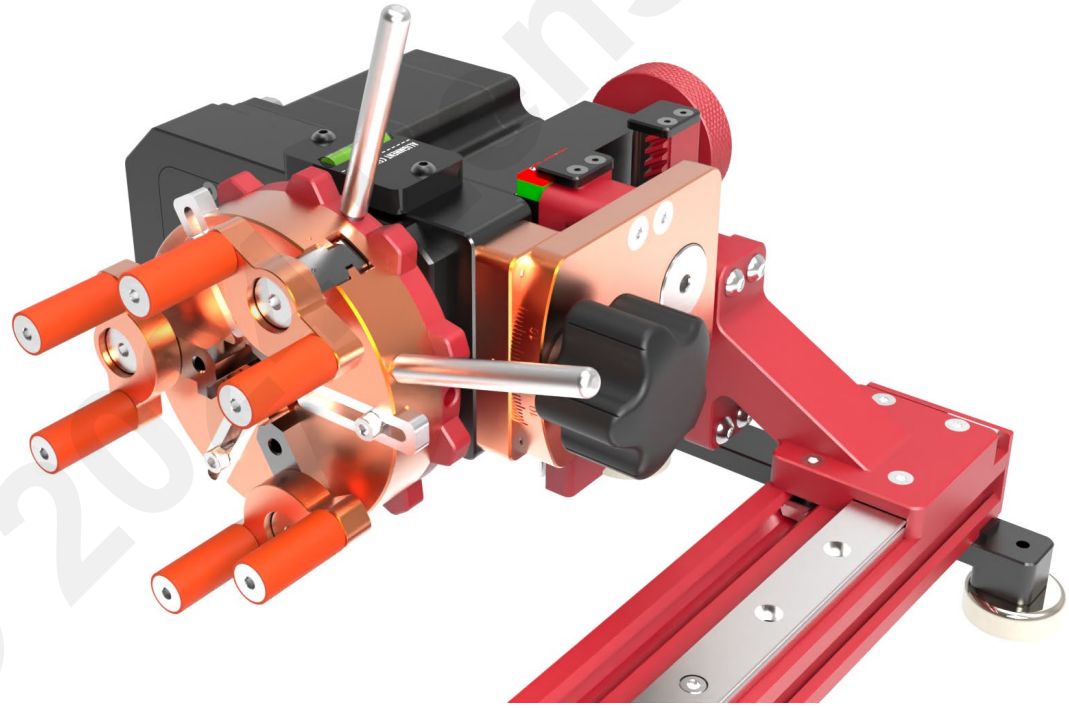

Figure 27. Levers

You can secure most objects by hand. However, in some cases where you might need extra tightening, you can use included Levers. Insert one into the hole on the grip body and the second one in the hole on the scroll wheel. Please do not use excessive force.

Securing Object in Jaws

Decide which jaw set and position will work best for your object. Also, decide if you want to secure your object from inside or outside. Whenever possible, secure it from the inside. Rotate the scroll wheel until the jaws are close to touching your cup or tumbler.

When securing an object from the inside, you spread your jaws apart and turn the scroll wheel counterclockwise. To release the object, spin the wheel clockwise.

When securing an object from the outside, you move the jaws toward the center and turn the scroll wheel clockwise. To release an object, spin the wheel counterclockwise.

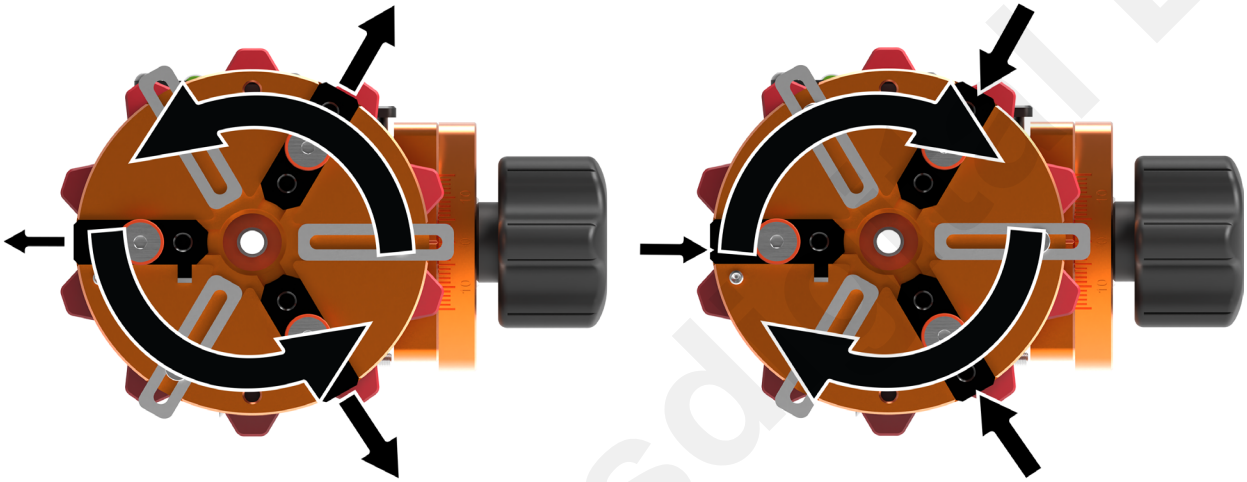

Figure 28. Clamping

If you want to secure your object (i.e., cup or tumbler from inside), look at the object's inner diameter and see the best jaw position. When using finger jaws in the middle hole position, insert your cup or tumbler on the grip and extend the jaws until your object's edge evenly touches the surface of all three base jaws. If your finger jaws are installed in the last outer hole, extend stoppers and insert your object until its edge touches all three stoppers. Now start turning the scroll wheel away from you (counterclockwise) while firmly holding the cup or tumbler to the grip's base jaws (or stopper arms). You want the grip's silver housing to be stationary while turning the scroll wheel.

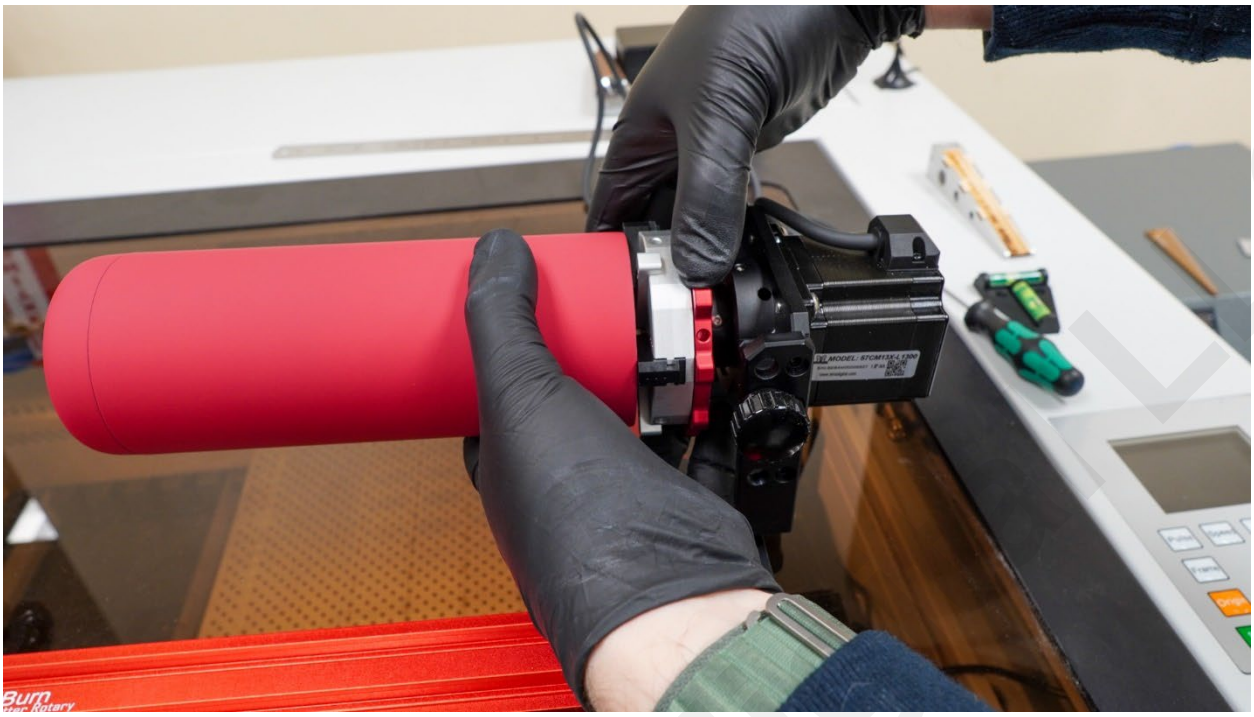

Figure 29. Securing Cup

This might take some practice; either hold it with the tips of fingers of your left hand or use your fingers on your right hand to turn both grip housing and scroll wheels in opposite directions. For example, push on the scroll wheel's protrusion with your thumb and pull the edge of the base jaw or stopper arm with your index finger in the opposite direction. Try it a few times, and you'll quickly find the best way to do this as your fingers develop "muscle memory." Levers might also help you accomplish the same task more naturally.

Chapter 6: Switching to Galvo Mount

If you purchased the optional Galvo Mount, you could easily move your grip from the lift assembly into the Galvo Mount by removing four M4x16mm Screws, as shown in the picture below (hold the grip head before removing the last screws so the grip won't fall)

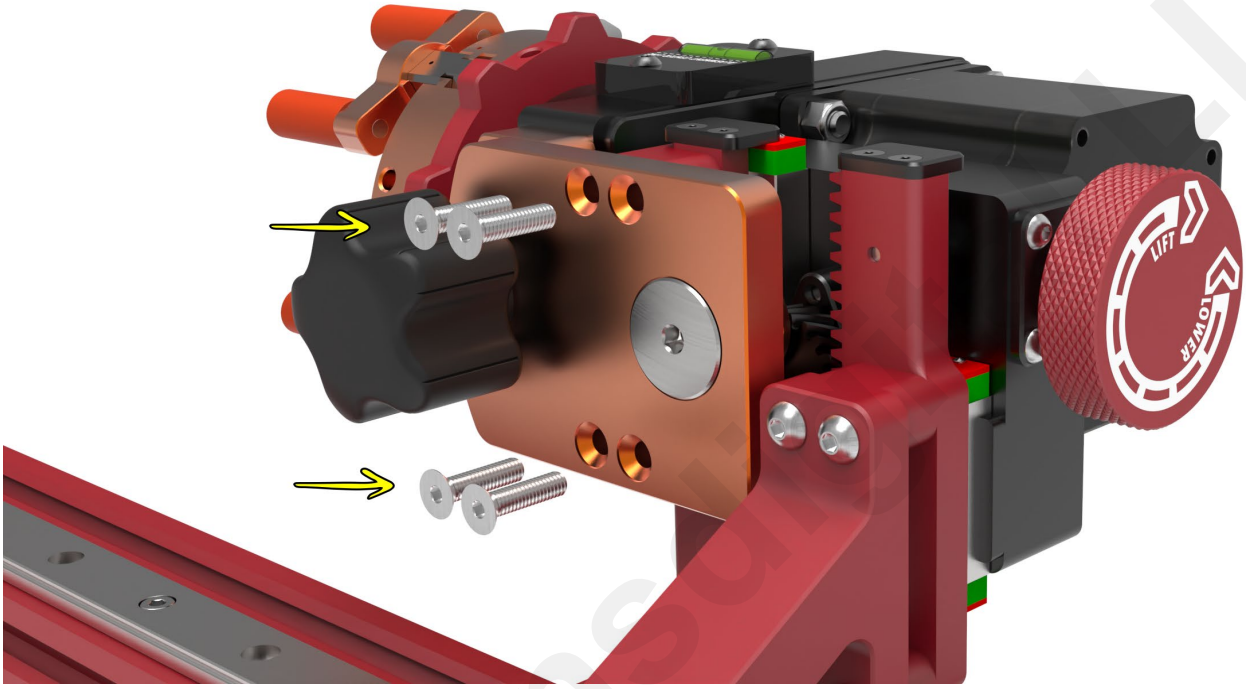

Figure 30. Removing Grip Assembly

Next, insert the grip into the galvo bracket as shown below and secure it with previously removed Screws.

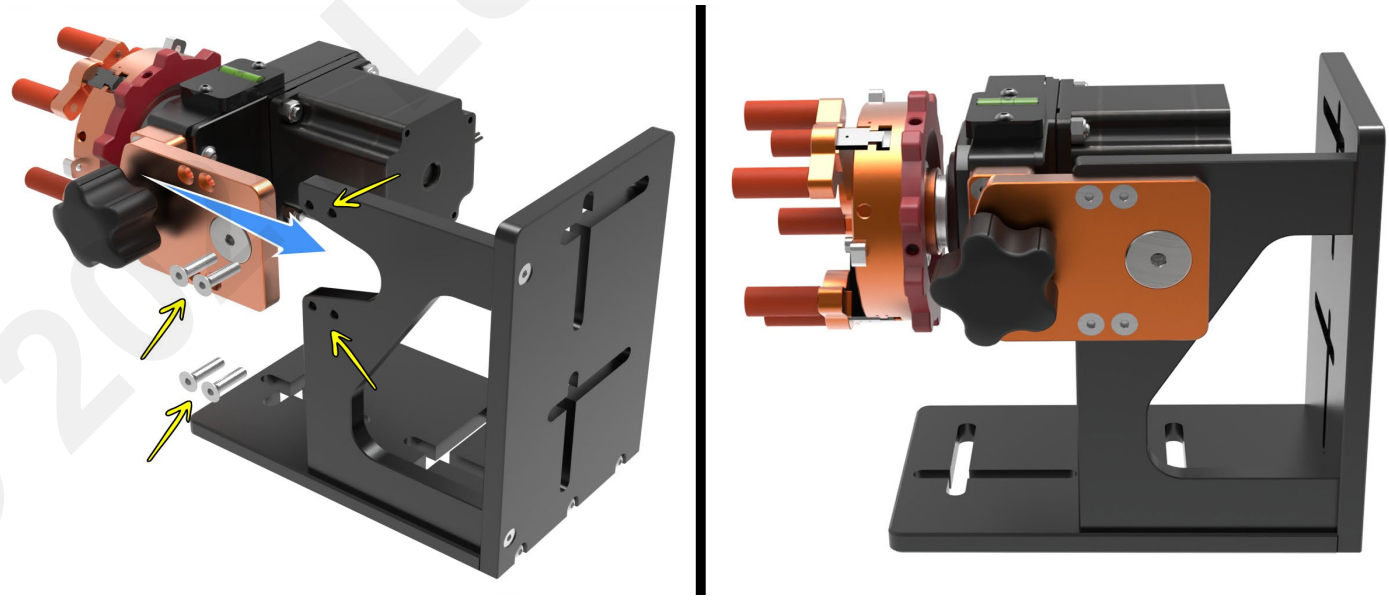

Figure 31. Attach to Galvo Bracket

Attach the Bracket to your Galvo Laser's "breadboard" using two included M6 Thumbscrews.

To switch to the "turret" configuration, flip the bracket 90 degrees.

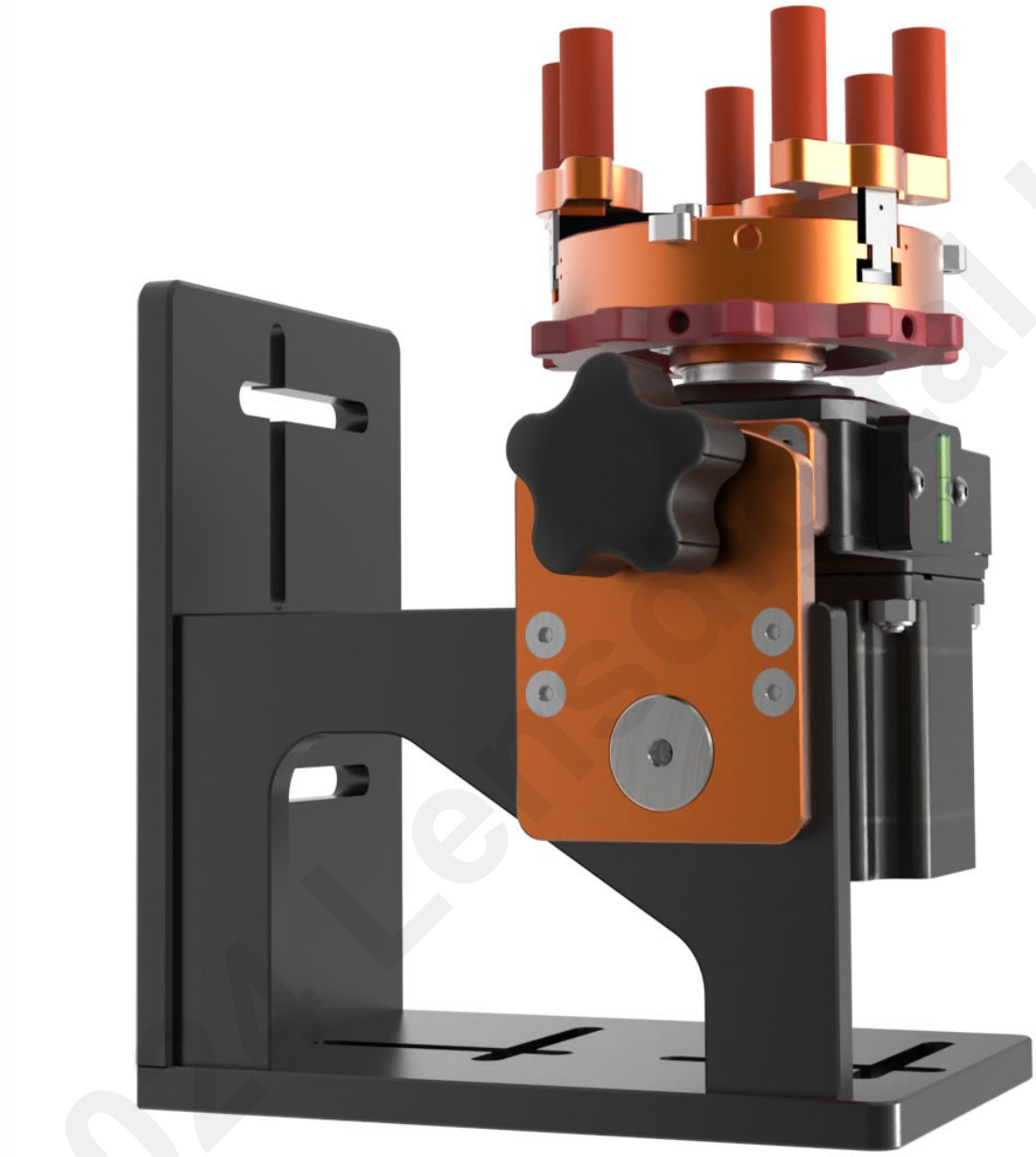

Figure 32. Turret Configuration

Chapter 7: Maintenance and Alignment

This maintenance is needed to keep PiBurn in top shape.

Scroll Wheel

The Scroll Wheel inside Grip's head can accumulate dust and particles. If it's hard to turn the scroll wheel, use some compressed air to blow out debris. You can also spray some WD-40 on the red scroll wheels (extend your jaws first so you can access it, and it will help with smooth movement.

Chapter 7: Getting Help

The best place to get a quick answer to your question is on our Official Support Facebook page, “PiBurn Labs.”

https://www.facebook.com/groups/996618140714203

To reach us, please open a helpdesk ticket by going to our website and either clicking on the Green "Help" icon on the bottom right corner of the page or clicking on the Contact Us link located on top of the web page (it's nested inside "About Us" menu). Please remember to specify your order number.