

STOP!

**BEFORE USING,
READ
THE
INSTRUCTIONS!**

Really, It's important

NQALHA

Not Quite A Lathe Handwork Assistant

Personal Safety

Glassworking is inherently dangerous

You can be seriously injured or killed by hot glass and glassworking torches. Before using the NQALHA, you must be experienced in dealing safely with hot glass and glassworking torches. If you are new to glasswork, you must start by learning how to safely perform the basics by hand. It's highly recommended to take lessons from a competent teacher. If a teacher isn't available, there are books and videos available from many sources that demonstrate safe glassworking techniques.

Once you are familiar with safe hand work, you can transition to using the NQALHA.

**YOU MUST TAKE FULL RESPONSIBILITY FOR YOUR SAFETY WHEN USING THE NQALHA!
YOU MUST RELEASE MPM&E AND MIKE PETERSON FROM ALL LIABILITY ASSOCIATED WITH
USE OF THE NQALHA!**

**IF YOU DON'T AGREE TO THESE CONDITIONS, YOU MUST RETURN THE NQALHA FOR A
REFUND!**

You must be aware of these safety related issues before using the NQALHA.

Electromagnetic locks

The locking mechanism is based on electromagnets. If power is lost, they will release and the NQALHA will no longer hold position. If an object is held in the rollers, and power is lost, the object will fall.

This behavior can be mitigated by the use of an Uninterruptable Power Supply, available at most electronic/computer stores for very low cost. A UPS is not provided with the NQALHA, but the APC Back UPS 6, model number BE425M, at www.apc.com, approximately \$50, is a good choice.

Rapid rotation

The NQALHA is capable of rapid rotation. This can be a desirable feature for some types of glasswork when the glassworker has the skill to manage centrifugal force. It can also cause a piece of hot glass to rotate dangerously fast, possibly causing hot glass to fly toward the glassworker.

The NQALHA starts at a safe rotation speed. It's necessary to rotate the thumbwheel speed control to enable high speed motion. When rotation is stopped and restarted, rotation resumes at a safe speed.

Workpiece holding

The workpiece is held by a lever operated clamp mechanism. Whenever a workpiece is loaded and clamped in place, the glassworker must verify that the workpiece is securely fastened before starting work.

Balance and Tipping

The steel base is an effective counterweight, but it does NOT balance the NQALHA in all extreme arm positions and for all workpiece weights. In these extreme positions, the NQALHA can tip over.

Before using the NQALHA, carefully move the head through the full range of motion needed for the work being done. If you see signs of tipping, use a clamp, counterweight or screw to secure the NQALHA to the workbench.

The ball bearings on the horizontal arm allow free motion when the magnets are released. If the work surface is not level, and power is removed. The arm can possibly swing into an unbalanced position and the NQALHA can tip over.

The twist axis

The twist axis is inherently problematic. It's unbalanced because of the weight of the motors. When working with a lightweight workpiece, the head can rotate quickly when the twist magnet is released. If the user is expecting this, they can prepare by strongly gripping the handle and preparing to take control. If the user is unprepared, it can be surprising.

To avoid breaking the NQALHA

Wiring

Even though the wire routing was carefully designed, and the wires are protected by flexible steel conduit and mesh, the wiring can still be damaged by abuse. Before using the NQALHA, look at all of the conduits and wires as the head is moved and understand where they move and how they flex. If anything looks like it's being pinched, stretched or excessively flexed, contact MPM&E for assistance. Also, be aware of anything on your bench that might snag or break the wires.

While working, be careful to keep the conduit out of the direct torch flame. In testing, the wiring proved to be durable and able to withstand radiant heat, but it cannot withstand the full heat of a glassworking torch for more than a very short time.

Don't break the clamp

NEVER tighten the clamp when there is no workpiece inserted and the clamp is at the bottom of its travel. Doing this will damage the clamp. The clamp lever motion should feel smooth and light. If it feels tight, don't force it. Contact MPM&E for assistance.

Be extra careful and observant

If anything appears dangerous or unexpected, immediately stop using the NQALHA and contact MPM&E for assistance.

Operation

The NQALHA has several controls. On the wood handle, at the bottom left, is a lever used to release the magnetic locks. To the right of the wood handle is an aluminum piece with two buttons and a thumbwheel. The button facing the glassworker is the front button, the other one is the back button. Below the front button is a thumbwheel. A footpedal is also provided, connected by a cable and 1/4 inch plug. Before using the NQALHA, hold the handle, press the lever, move the head through its range of motion and use all of the controls until you are comfortable that you understand their function.

Electromagnetic locks

The NQALHA is locked into position by electromagnets. The locking is not strong, the glassworker can overpower it at any time, but it locks securely enough for most normal glasswork.

The NQALHA has three independent sets of locking electromagnets: horizontal, vertical and twist. They can be controlled separately or in combination.

Rotation

The NQALHA can rotate the workpiece in three different ways:

Continuous Rotation

Once started, the workpiece rotates continuously until stopped.

No control action is necessary to maintain rotation.

This is useful when using the NQALHA as a one-sided lathe.

Intermittent Rotation

Rotation occurs when the footpedal is pressed and stops when the footpedal is released.

This is useful for operations like striping or placing dots.

Manual Control

The thumbwheel can be used to precisely rotate the workpiece to the desired angular position.

This is useful when the NQALHA is being used as an adjustable work holding platform.

The Combo UI Configuration

This configuration uses combinations of controls.

The toggle switch is not used in this configuration.

It can be selected by holding the front button down when power is applied.

The lever controls the horizontal and vertical magnets

When the lever is pressed, the horizontal and vertical magnets are released.

The twist axis remains locked.

If the lever is pressed and held, and then the footpedal is pressed, all magnets are released.

When the lever is released, the magnets are locked.

If the footpedal is released while the lever is held, the twist magnet is locked.

The front button is the on/off button that starts and stops continuous rotation

The back button reverses direction

When continuous rotation is active:

The thumbwheel controls continuous rotation speed

Moving your thumb toward the heat shield increases speed.

Moving your thumb toward the handle decreases speed.

The footpedal reverses continuous rotation direction

If the lever is not pressed, the footpedal reverses rotation direction.

When continuous rotation is stopped:

The thumbwheel controls position

This allows manual control of angular position.

The footpedal controls intermittent rotation

If the lever is not pressed:

Pressing the footpedal starts rotation.

Releasing the footpedal stops rotation.

The thumbwheel controls speed

When intermittent rotation is active, the thumbwheel controls speed.

The Toggle UI Configuration

This configuration has all of the functions of the combo configuration, but uses the toggle switch to select rotation or positioning mode. It can be selected by holding the back button down when power is applied.

Modes of Operation

The NQALHA has two modes of operation: Rotation and Positioning. They are selected by the toggle switch, located on the aluminum box at the left side of the handle. When the switch is up, Rotation mode is selected. When the switch is down, Positioning mode is selected.

Rotation Mode

The front button is the on/off button that starts and stops continuous rotation

The lever controls the horizontal and vertical magnets

When the lever is pressed, the horizontal and vertical magnets are released.

The twist axis remains locked.

The footpedal has two functions

The functions depend on the state of the lever.

When the lever is pressed and held, the pedal controls the twist magnet.

When the lever is not pressed, the pedal reverses rotation direction.

The thumbwheel controls rotation speed

Moving your thumb toward the heat shield increases speed while moving your thumb toward the handle decreases speed.

When rotation is stopped

The motors are free to rotate by hand. Since they are stepper motors, there is a bit of resistance even when they are turned off.

Positioning Mode

The footpedal has two functions

The functions depend on the state of the lever.

When the lever is pressed and held, the pedal controls the twist magnet.

When the lever is not pressed, the pedal starts and stops intermittent rotation.

The thumbwheel controls intermittent rotation speed

Moving your thumb toward the heat shield increases speed.

Moving your thumb toward the handle decreases speed.

Pressing the back button reverses direction

Manual control

When the pedal is not pressed, the thumbwheel controls position.

The Old Standard Configuration

All NQALHAs from Version 1 to Version 3 have a variant of this UI configuration. For those who like this configuration, it can be selected when power is applied, by holding the front and back buttons.

The back button enables twist magnet control

Initially, the lever controls the horizontal and vertical axis magnets with the twist axis magnet locked. When the back button is pressed and released, the lever controls all axis magnets. When the back button is pressed again, the twist axis control is disabled.

Modes of Operation

The NQALHA has two modes of operation: Rotation and Positioning. They are selected by the toggle switch, located on the aluminum box at the left side of the handle. When the switch is up, Rotation mode is selected. When the switch is down, Positioning mode is selected. Each mode maintains its own values for speed and direction. When the mode is changed, speed and direction resume at the values selected before the mode was changed.

Rotation Mode

The front button is the on/off button that starts and stops continuous rotation

The footpedal controls pause and reverse

When the pedal is pressed, rotation is paused. When it's released, rotation resumes in the reversed direction. The pedal can be pressed and released quickly to reverse without pausing.

The thumbwheel controls rotation speed

Moving your thumb toward the heat shield increases speed.
Moving your thumb toward the handle decreases speed.

When rotation is stopped

The motors are free to rotate by hand. Since they are stepper motors, there is a bit of resistance even when they are de-energized.

Positioning Mode

Positioning Mode is selected when the toggle switch is down.

The footpedal controls intermittent rotation

Pressing the footpedal starts intermittent rotation, releasing the pedal stops it.
When the pedal is released, the motors lock in place.

The thumbwheel controls rotation speed

Moving your thumb toward the heat shield increases speed.
Moving your thumb toward the handle decreases speed.

Pressing the front button reverses direction

Choosing a UI configuration

The manual control function works well, but has one possibly annoying behavior. For some reason, configuring the stepper driver to provide smooth operation at very low speeds results in an audible buzz. Also, in the Combo UI configuration, if rotation is stopped, manual function is automatically activated. This results in the motors being powered and buzzing constantly when not being used.

If you are using the NQALHA strictly as a single sided lathe, the Toggle UI or Old Standard UI are the best choice.

If you are using the NQALHA as a workholding platform, manual control is a great addition. If you don't mind flipping the toggle switch and want the motors to be turned off and quiet when not in use, the Toggle UI is the best choice.

If you want the most efficient operation, using the fewest control inputs to access all functions, the Combo UI is the best choice. This is the config I use.

Changing UI Configuration

Combo UI Configuration Power on with Front Button pressed

Toggle UI Configuration Power on with Back Button pressed

Old Standard Power on with Front and Back Button pressed

UI Configurations can be selected by powering off the NQALHA. Be careful to have control of the head when removing power. Using the chart above, press a button and hold it while restoring power. The new configuration will remain selected even if power is removed.

In early releases, there were many more User Interface configurations. Some were good, some useless. Early on, I just threw in everything I could think of. After many hours of use, I have refined the interface. The Old Standard is still available for anyone who prefers the old behavior.

User Interface Evolution

When I first designed the user interface, it was trivially simple and had few options. As I used it and got reports from testers, it evolved. Several UI configurations were tried. Most of them were never used, but they were included in the software to allow users to have a choice. Even though most of them were never used, maintaining them increased the complexity of the software and made debugging harder. Most users never changed the UI configuration and stuck with the Old Standard UI.

Now, after many hours of use, I have made some changes. They are motivated by two factors: the problems associated with the twist axis and the desire to reduce the number of control inputs necessary to efficiently do the work.

The twist axis is inherently problematic. It's unbalanced because of the weight of the motors. When working with a lightweight workpiece, the head can rotate quickly when the twist magnet is released. If the user is expecting this, they can prepare by strongly gripping the handle and preparing to take control. If the user is unprepared, it can be surprising, possibly in a bad way.

In the Old Standard UI Configuration, the rear button enabled or disabled the twist magnet function. This is troublesome because there is no visible indication that the magnet is enabled. The only ways to know if the magnet is enabled or disabled are to remember pushing the button or try using the lever. The new configuration consistently uses the footpedal to release the twist magnet.

When using the NQALHA as an adjustable workholding platform, it's useful to be able to manually position the workpiece at any angle using the thumbwheel. I worked to implement this function for a long time. It was tricky and required a change to the motor controller wiring on the PCB, but I finally got it to work.

In the Old Standard UI Configuration, every control had exactly one function and combinations weren't used. As a result, it was more beginner friendly. The new configuration uses combinations that may seem confusing at first, but after a bit of practice, the new functions make the unit work more predictably and efficiently.

After releasing a few units with the new Standard UI Configuration, a customer asked a question. This caused me to rethink the design again. The new Standard UI Configuration was a good step in the right direction, but I could go farther. I thought about it for a while and did some experiments and determined that it was possible to eliminate modes and unify all operations. Version 3.2 now supports the even newer, Combo UI Configuration.

Shutdown

The NQALHA does not have a power switch. To turn off the magnets and motors, press and hold the front button and back button for several seconds. After shutdown, pressing the lever resumes normal operation.

Drift and lock collars

Even though the drive rollers are manufactured to very tight tolerances, they aren't perfect. Neither are the o-rings, the clamp or the workpiece. As a result, the workpiece will drift slowly along its axis when rotating.

For short duration use, like flaring a tube, drift will not be a problem. For longer duration work, drift can be managed using multiple strategies:

Mark the workpiece to allow you to see the drift. As it drifts, reverse rotation to reverse the drift
Push a marker on the workpiece, and locate it between the two right side drive rollers.

Use a lock collar. Three custom lock collars, 10, 12 and 25.4mm are included. MPM&E sells other sizes of custom made plastic lock collars. They work well, but many other options are available. Lock collars are a common, off the shelf item at industrial suppliers (In the industrial world, they're called Shaft Collars). Some are even available at local hardware stores. The best source is www.ruland.com/shaft-collars.html
I have found that lock collars are almost never needed and I rarely use them.

Springs

The NQALHA comes with two sets of springs, regular and strong. This allows for 3 combinations of spring force, depending on workpiece weight and user preference.

Don't get discouraged

Like learning to play a new musical instrument, the NQALHA takes time to learn. Many experienced glassworkers struggle the first time they use it. Think of it like a guitar player learning to play the saxophone. If you find that your handwork technique doesn't translate to the NQALHA, experiment with alternate techniques. The NQALHA master technique has not been invented yet. All of the users are refining and inventing techniques as they gain experience. Many of the users have speculated that the NQALHA could change how glass is worked.

Maintenance

Now that NQALHAs have been out in the field for many years, I have observed that very little maintenance is required and I have had almost no requests for repairs. They seem to just work reliably for years. It's highly recommended to have a set of ball-end T-handle hex drivers. Periodically, check all screws to make sure they are tight. Pay particular attention to the screws at the pivot points. Also, check the flex conduit to make sure it is flexing smoothly with no kinks or breaks.

The silicone o-rings are standard, off the shelf parts. If they are damaged, they can be easily replaced.

Warranty, Support and Parts

The NQALHA has a "lifetime" warranty, my lifetime, I'm 72. As long as I'm able, I'll do whatever I reasonably can to support users of the NQALHA. I love glass. I love art. I look forward to working closely with artists as they make amazing creations with my invention.

Any part that's defective in design or fabrication will be replaced for free. As the design evolves, upgrades will be available, either free or at a low cost, depending on the details.

If you damage or destroy anything, parts will be available at a reasonable cost.

Since the NQALHA is large and heavy, and shipping is expensive and potentially damaging, most maintenance and repair should be done on-site. The NQALHA is a modular design. All complex parts can be replaced at the module level.

The buyer needs to have a set of basic hand tools (hex drivers, wrenches, wire cutters, etc.) and the ability to work with screws, cable ties and connectors.

This is not a product from a faceless corporation. It's a tool for artists, handmade by an artist. All comments, good or bad, are welcome and valuable. Please send feedback or requests for assistance to support@nqalha.com

Please save the shipping box and packing material in case the NQALHA needs to be returned to MPM&E.

Training Videos

Training and demo videos are available on my YouTube channel.

<https://www.youtube.com/c/MikePetersonManufacturingandEngineering>

They are also linked from my website, nqalha.com

Instructions Version History

3/16/2026 Added Combo UI configuration

2/6/2026 Added New Standard UI config. Added manual control function

5/19/2023 Small changes to positioning and pedal twist mode behavior

11/8/2022 Removed MpExperimental documentation since it was deactivated. Added more detail for Pedal Twist mode

9/16/2021 Added MpExperimental documentation and changed shutdown sequence

11/30/2019 Minor operation refinements

9/10/2019 Fixed some small errors

5/22/2019 Added new software functions

1/31/2019 Added new software functions

7/8/2018 Added warranty info

7/3/2018 Added Positioning Mode and renamed Continuous Rotation Mode to Rotation Mode

6/14/2018 Initial release

NQALHA Version History

Version 3.2

- Added Combo UI Configuration

Version 3.1

- Changed controller design to better support very low speeds

- Added manual control function

- Added combination functions to some controls

- Changed Standard UI configuration

- Switched to acrylic controller insulator

Version 3.0

- Added vert arm magnet overtravel stop

- Switched to laser etched serial number plate

- Functionally equivalent to V2.7 and 2.8

Version 2.9

- Added twist magnet overtravel stop

- Minor dimensional changes and process improvements

- Functionally equivalent to V2.7 and 2.8

Version 2.8

- Minor dimensional changes and process improvements

- Functionally equivalent to V2.7

Version 2.7

- Changed magnet mounts to leaf spring

- Removed unused functions and cleaned up firmware

Version 2.6

- Added Right Hand version
- Changed to cold rolled steel for better surface finish
- Improved travel lock
- Changed drive wheel manufacturing process for better accuracy

Version 2.5

- Added precision ground main shafts
- New software modes

Version 2.4

- Added stronger clamp bar

Version 2.3

- New heatsink design

Version 2.2

- Added hinged magnet rings on twist axis

Version 2.1

- Improved twist axis axle
- Added hinged magnet rings on vertical axis

Version 2.0

- Stronger, one piece handle
- Ball bearings on the horizontal arm to increase smoothness of motion
- Additional control mode that locks twist axis while allowing vertical motion
- New software with many improved functions
- Hard stops on horizontal motion to prevent over-rotation
- Metal mesh covering on magnet wires to protect against heat
- Switched to Nickel-chrome plating

Version 1.0

- Initial release