



*Perfect Fit Shutter CNC Machine Technical Manual
2023 Edition.*

Documentation for Beverley Blinds PF Shutter CNC Machine.

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Overview:

“Fed up of being reliant on a third party for the drilling of your stiles, damaged deliveries and made wrong?”

“Take control of your production using our cost effective CNC drilling machine !

Our machine is custom built for drilling the holes in the stiles.

We are using a heavy duty, fiercely reliable rack and pinion system - So no need to adjust belt tensions anymore!”

This Guide is intended as a workshop manual for basic set up and function. For in depth specifications please refer to the manufacturers specifications or via contacting a support technician.

Thank You.



Safe Working Procedure:

Description Of Work: Using a CNC Machine.

Hazards:

- Exposed moving parts with the potential to cause harm through entanglement.
- Impact and cutting.
- Exposure to projectiles
- Exposure to sharp objects.
- Electrocution. (Frayed/Damaged Cables).
- Manual Handling

Personal Protective Equipment (PPE) Required:



Eye Protection



Protective Clothing

Safe Work Procedure Checklist:

1: Pre-Operation/Task

- Ensure Task is clearly understood (Ensuring correct size job is being run for the correct frame size.)
- Ensure Operator wears appropriate PPE.
- Ensure all appropriate safety guards are in place
- Check that the frame pieces are securely positioned in the holders.
- Remove all tools from around the machine and a quick check that there is nothing that could interfere physically with the machine's operation.
- Ensure the work area stays clean.
- Identify the ON/OFF Isolator Switch and the Emergency Stop button.
- Ensure the machine is homed correctly.

2: Operation/Task

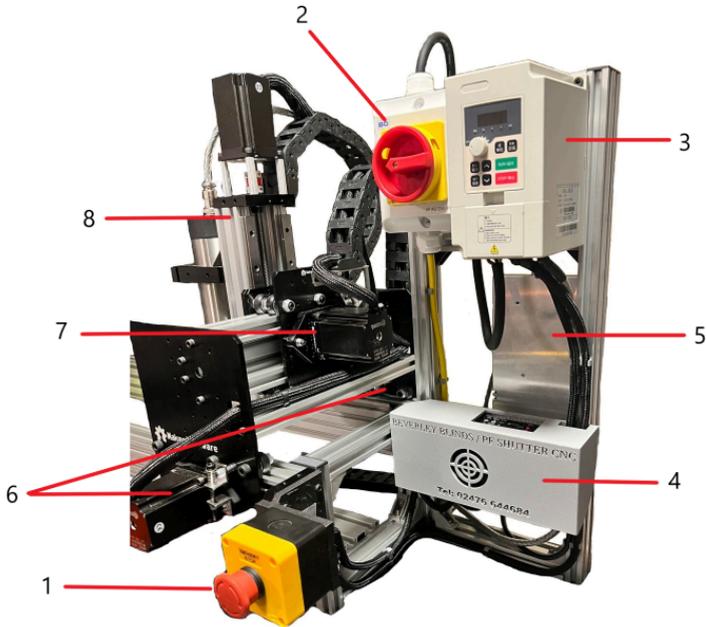
- Never leave the machine running unattended.
- Never for any reason try to physically interact with any part of the machine while it is running - If you need to adjust or interact with any part of the machine, or if something has went wrong:
 - Hit the E-stop. Wait for the machine to come to a full stop. If the machine does not stop when the e-stop is pushed in, use the E-stop through the software. Switch off the controller and then switch off the machine completely by the isolator switch before attempting to engage with any part of the machine.
- Avoid letting the swarf build up too much around the machine and the rails.

3: Post-Operation/Task:

- Switch off the CNC machine to clean away any waste material and before removing the job from the holders.



Machine Part Locations:



1: E-stop

- 1a) On Position/Running = Pulled out
- 1b) Off Position/Emergency Stop= Pushed In

2: Rotary Isolator Switch

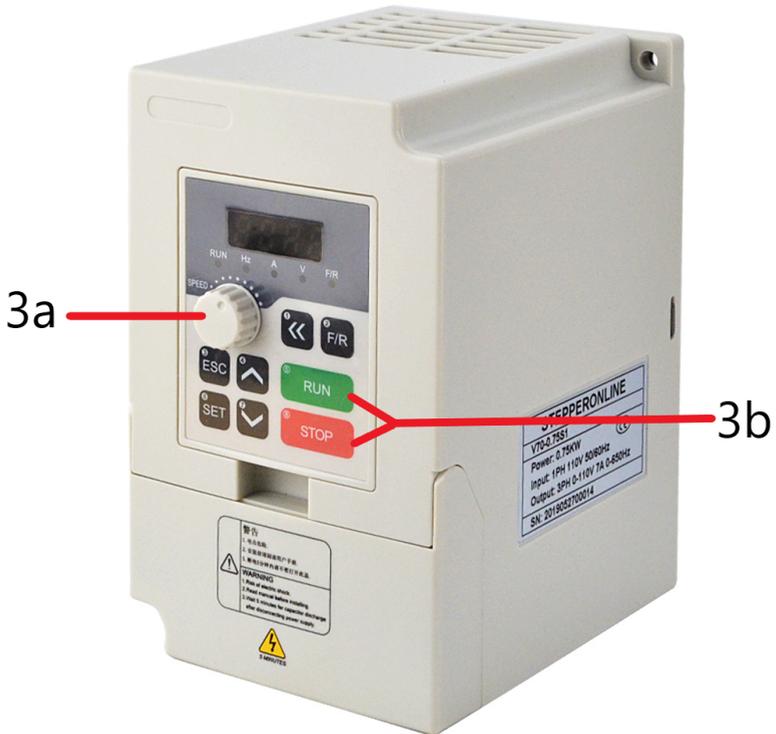
- 2a) On Position = Arrow Pointed Up (Hole Marked On)
- 2b) Off Position = Arrow Pointed Left (Hole Marked Off)



3: VFD

3a) Speed Control

3b) Off and On Control



4: Micro Controller

- 4a) Power On/Off
- 4b) Reset Button
- 4c) USB-C Connector

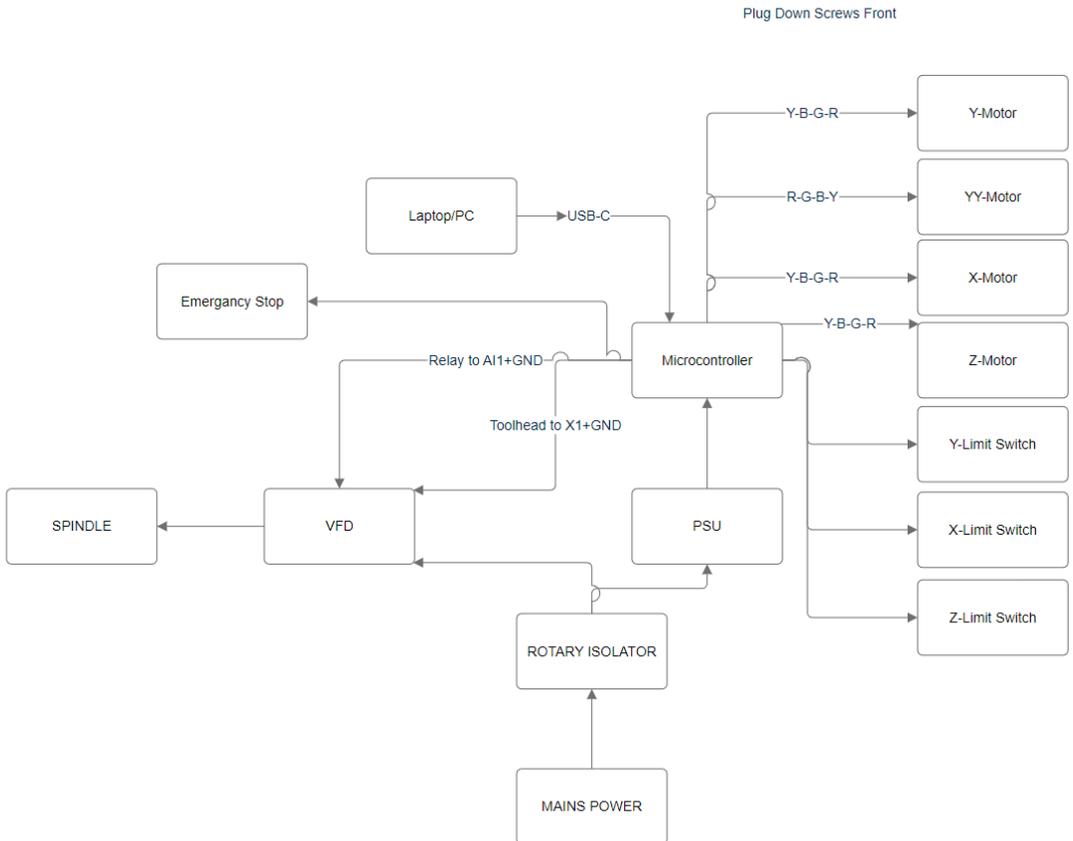


- 5: Power Unit
- 6: Y-Assembly
- 7: X- Assembly



8: Z-Assembly

Wiring Diagram:



First Time Setup/User Manual:

Work Area Setup:

- Arrange a workspace with dimensions of at least 3000mm x 500mm.
- Ensure the surface is solid and level to support the machine's weight. Uneven surfaces can affect the machine's performance.

Inspect Cables:

- Check for any loose, unplugged, or damaged cables. If any issues are found, do not power on the machine and contact a technician.

Software Installation:

- Set up your computer near the CNC machine.
- Download the CNC3D-Commander software and necessary drivers for the Microcontroller from the Beverley Blinds website:
<https://www.beverleyblinds.co.uk/cnc-drill-machine.php>.
These are also available on the USB stick provided with the machine.

Initial Machine Setup:

- Ensure the E-Stop is engaged (1b).
- Set the rotary isolator to the off/left position (2b).
- Ensure the microcontroller is off (4a).

Connecting the Machine:

- Connect the microcontroller to your computer using a USB cable.
- Power on the machine by plugging it into a mains socket.



- Turn the Rotary Isolator to the on position (2a) and switch on the Microcontroller (4a).

Machine Connection:

- The machine should remain stationary after being connected. If it moves, press the E-Stop (1b), turn off the rotary isolator (2b), and contact a technician.

Software Configuration:

- Open CNC3D Commander on your computer.
- In the top left, select your COM port from the drop-down menu next to "COM", then press "Connect".
- Go to the "Profiles" Tab and then press "Import" then navigate to the USB Stick and upload the profile which should be named by your company name. Then when it has been imported you should see this profile in the list of choices - click it and then press "send to machine".
- DO NOT Change any settings, click any buttons other than specified by this guide the settings are perfectly calibrated to your specific machine and changes could require a technician call out to reset and re-calibrate the machine

Machine Homing:

- Ensure the workspace is clear.
- Press the reset button on the microcontroller (4b). You may hear motor noises.
- In CNC3D, press the "Emergency Stop" button, then "Unlock".
- Press "Home Machine Button". The Z-Axis should move upwards. If it moves downwards, press the E-Stop, reset the microcontroller, and start again. Contact a technician if the issue persists.
- The machine will automatically adjust and home the X and Y axes.
- If the motors exceed their limits, indicated by a loud knocking sound, immediately press the E-Stop and restart the process.

Setting Zero Position:



- Click “Go to Zero (XY)” in CNC3D. Avoid pressing “ZERO JOB” as it requires a full reset.

Job Preparation:

- Go to “Run Job” in CNC3D, click “Load Job”, and select the correct .tap file.
- Monitor the machine for correct depth, rates, and speeds. Adjust spindle speed using the VFD Speed Control knob (3a) as needed. The recommended speed is 800 rpm.

Tool Setup:

- Turn off the machine when setting up jobs or installing the drill bit.
- Install the drill bit into the collet until fully inserted by pushing the drill bit all the way into the collet
- Use the 13mm and 17mm spanners from the toolkit to tighten the collet securely.
- Whenever we take the drill bit out it is best practice to re-do the Z-offset. A advanced tutorial for this can be found here:
<https://www.beverleyblinds.co.uk/cnc-instructions.html>

Post-Job and Maintenance:

- Use the recommended air compressed line to blow away any swarf after each job to keep the work area clear.
- Always press the reset button (4b) on the microcontroller when turning on the machine after any time it has been switched off.
- For new jobs, upload the job file as done previously and adjust spindle speed if required but approximately 800rpm is typically correct.
- It is advised that regularly you check the offset positions and re-calibrate them using the video mentioned earlier to ensure the machines accuracy.

Troubleshooting:

- In case of unusual machine behaviour, stop the machine using the E-Stop.



- Unlock the machine, press Reset (4b), and use the controller to move the machine away from hazards before re-homing.
- Checking the offset position may sort many issues.
- If "Zero Job" has been pressed then repeat the entirety of the first time set up. Make sure that no drill bits or stiles are in the machine while doing this reset.
- For any other issues contact a technician.

CNC Machine Step Calibration Tutorial

Purpose: This guide will help you accurately calibrate the steps per mm on your CNC machine for precise operation.

Steps for Calibration:

- **Home Position:**
 - Begin by homing the machine. This is the absolute starting position for all calibration procedures.
- **Access Measurement Settings:**
 - Navigate to the Measurements page. Here, you'll find settings for X, Y, Z steps per mm.
- **Z-Axis Setting:**
 - Keep the Z-axis value at 200.000mm as standard.
- **Y-Axis Calibration:**
 - The Y-axis steps should be between 31.900 and 32.000, as calibrated.
- **Initial Measurement:**
 - Measure exactly 2000mm from the edge of the Y-axis plates and mark this point with a pencil. Accuracy in this step is crucial for the overall precision of the machine.



- **Move the Machine:**
 - Use the Y-axis controls to move the machine to the 2000mm mark.
 - Important: Press the movement button only once and avoid stopping the machine mid-motion.
- **Handling Interruptions:**
 - If an emergency stop is needed, restart and rehome the machine before continuing.
- **Check the Alignment:**
 - Observe where the machine aligns with the pencil mark.
 - Adjust the Y-axis steps per mm:
 - If the mark is undershot, increase the value.
 - If it's overshoot, decrease the value.
- **Making Adjustments:**
 - Keep the first two digits of the Y-axis value constant.
 - Use the following key for adjustments (e.g., 31.995=AB.CDE):
 - A = Large change (avoid changing; may damage the machine)
 - B = Large change (approximately 50mm)
 - C = Approximately 1cm change
 - D = Approximately 1mm change
 - E = 0.06-0.08mm change
- **Incremental Adjustments:**
 - Aim for accuracy within 1mm.
 - Start around 31.900.
 - Run the machine up to the pencil mark and observe the position.
 - Move back by 2000mm to the starting point.

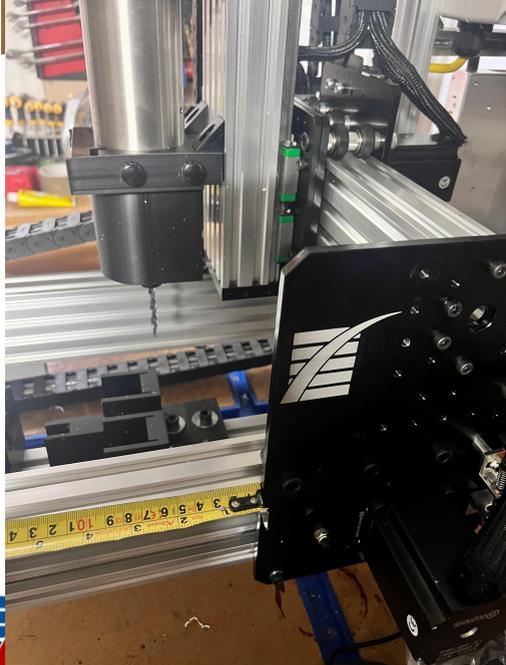
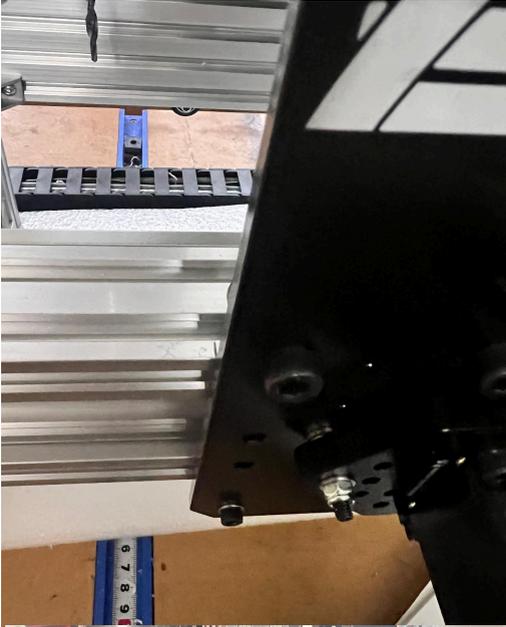


- Update the steps per mm accordingly.
- **Repeat Process:**
 - Run the machine up to the pencil mark again.
 - Continue this process until the calibration is perfect.
- **Documentation:**
 - Record the final value for future reference.
- **Maintenance Reminder:**
 - Be aware that movement and settling of machine components can change this value over time.
 - It is recommended to recalibrate when visual deviations are noticed or during regular service intervals.
- **Tips:**

When gauging the current position of the machine in relation to the Y-axis plate by eye, try and line up the edges of both of the Y plates and see where the pencil line sits in relation to this.

 - Less is more, the smaller you can increase or decrease measurements will allow you to be more accurate and not overshoot the measurement.





Tips and Tricks:

- When placing the Stile into the holders you may tap the back of it into place, this does not require a lot of force- hitting the stile with excessive force means you risk not only potentially damaging the stile but also moving the mounting block out of position which means the drilling position will be off and require a recalibration of the Offset position.
- Most problems can be solved by doing a reset, by simply stopping the machine, pressing the Reset (4b) button then unlocking through CNC3D and then rehoming the drill.
- Resetting with (4b) resets the machine position back to 0 on all axis, this means that sometimes if you have reset the machine when the z axis is down then the machine may have some issues when trying to home as it is trying to run over its soft-limits. What you must do is attempt to home, allow it to alarm, then reset again and try homing once more.
- When troubleshooting for any reason it is advised that you remove the drill bit, it is better to take the extra time to remove it than risk snapping the drill bit or damaging parts of the machine like the holders while doing these processes.

Warnings:

Do not...

- Put any part of your body anywhere near any moving parts while the machine is moving.
- Put your hands on the frame which holds the electrical components. The machine sits almost flush with the electrical housing frame as you can see during homing, these motors have the ability to run at incredibly fast speeds and can move from one side of the machine to the other in seconds with a huge amount of force - Do not risk entrapping yourself, if there is some kind of emergency then **Hit the machine E-stop and wait for the**



machine to come to a halt. Press the E-stop in the CNC3D software then turn off the isolator and remove the power and USB cable before attempting to handle any part of the machine.

- Use the machine without the proper PPE recommended.

Other:

- If the machine has been stopped via the E-Stop or Alarmed for any reason you **MUST** press the reset (4b) button on the microcontroller every time before re-homing the machine. Not doing so can cause unpredictable behaviours of the CNC Machine.

Glossary:

CNC Machine: Computer Numerical Control machine, a device used for precisely cutting, carving, drilling, or milling materials based on instructions from a computer program.

E-Stop (Emergency Stop): A safety mechanism designed to immediately halt the machine's operations in emergency situations.

Rotary Isolator Switch: A switch used to completely disconnect the machine from its power source for safety and maintenance.

VFD (Variable Frequency Drive): A type of motor controller that drives an electric motor by varying the frequency and voltage of its power supply.

Microcontroller: A compact integrated circuit designed to govern a specific operation in an embedded system, such as controlling the movements of a CNC machine.

USB-C Connector: A type of USB connector used for connecting various electronic devices, including microcontrollers.

Y-Assembly: Part of the CNC machine responsible for movement along the Y-axis.



X-Assembly: Part of the CNC machine responsible for movement along the X-axis.

Z-Assembly: Part of the CNC machine responsible for movement along the Z-axis (usually up and down).

Swarf: Metal shavings or filings produced by the machining operation of the CNC machine.

PPE (Personal Protective Equipment): Safety equipment such as eye protection and protective clothing required while operating the machine.

CNC3D-Commander Software: The specific software used to operate and control the CNC machine.

Toolholder Collet: A device used to hold the drill bit or cutting tool in place during the machine's operation.

Homing Process: The procedure of returning the CNC machine to its home position or point of origin.

Limit Switch: A switch that is used to limit the motion of the machine to prevent it from moving beyond a predetermined point.

Frame Holder: A component that holds and secures the frame or material being worked on by the CNC machine.

Spindle Speed Control: A control mechanism on the VFD for adjusting the speed of the spindle (the part of the machine that holds and rotates the drill bit or cutting tool).

Reset Button: A button on the microcontroller used to restart or reset the machine's programming or operation.

COM Port: A communication port on a computer used for connecting peripheral devices like the microcontroller of a CNC machine.



Feed Rate: The speed at which the cutter is moved through the material, impacting the quality and speed of the cutting process.

Tool Path: The programmed route the tool follows to create the desired shape in the material.

Spindle: The part of the CNC machine that holds and rotates the cutting tool.

Backlash: The amount of play in the machine's components, which can affect precision and accuracy.

Workpiece: The material (like metal, plastic, or wood) that is being machined.

Clamping System: The method or device used to secure the workpiece to the machine bed or table.

Thank You

Video Tutorials can be found on:

<https://www.beverleyblinds.co.uk/cnc-instructions.html>

For any technical support please contact John @ Beverley Blinds

Tel: (02476) 644684

