MonoPrinter.com

MONO3-VZ2
First Print

Rev. 1.2

Microfluidics for all, Inc.
24 Denby Rd, Suite 120, Allston, MA 02134
Tel: +1-617-999-4977 Email: info@monoprinter.com
Web: http://www.monoprinter.com

Revision History

Rev. 1.0	10-23-2024	Initial draft based on VZ1 manual & FW 3.4Kv1
Rev. 1.1	04-09-2025	Minor revision (FW 3.4Kv4)
Rev. 1.2	05-15-2025	Service menu (FW 3.4Kv4)

Please read thoroughly and contact us if you have any further questions or suggestions at info@monoprinter.com

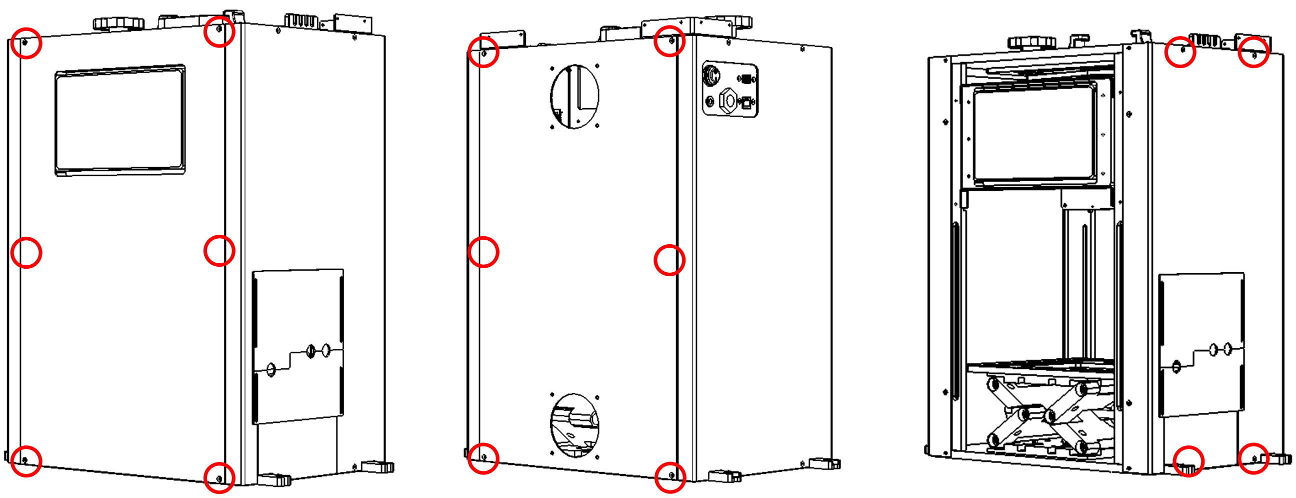
A. Assembly

1. Part list

- Printer main-frame
- Z-axis assembly
- Acrylic covers (rear + front)
- Visitech projector (LRS-WQ-DL) + Projection lens(es)
- Resin tank (Vat): Regular sized vat or small (56 x 35) sized vat
- Matching build platform
- USB microscope with a mount
- Alignment target

2. Remove the metal covers from the printer main frame

- The first step of the assembly is to remove all metal covers on 4 sides (***Fig. 1***)



Remove 12 x m3 flat screws on the front and back covers

Remove 8 x m3 flat screws on the left and right covers

Fig. 1. Removal of metal covers

CAUTION *The rear cover has a fan cable connected to the PCB board.* When you remove the rear cover, disconnect the fan connector from the PCB.

3. Install Z-axis and projector

- Once you remove all covers, install the Z-axis assembly (***Fig. 2-A***).
  CAUTION *The Z-axis is shipped with a bottom plate for linear rail protection. Remove the bottom plate before mounting it to the printer.* ***Be careful to avoid sliding down the build arm & linear carriages.*** *This will need the replacement of the linear rails. (**Fig. 2**)*
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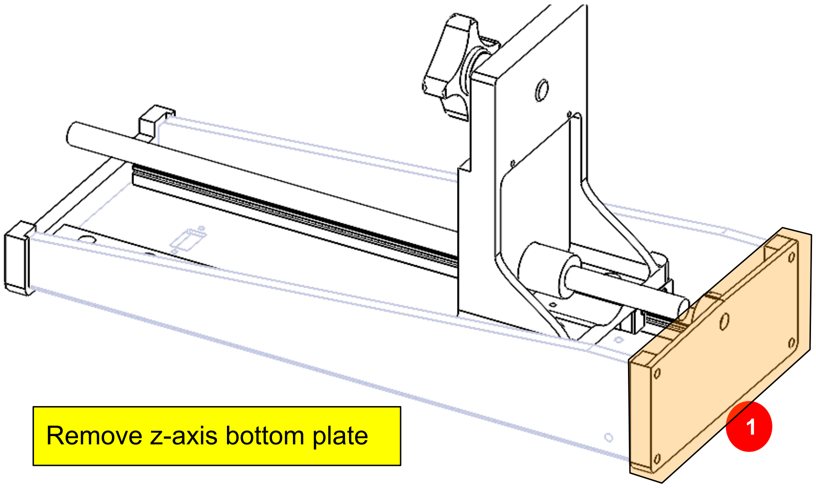

Fig. 2. Removal of the bottom plate from the z-axis assembly

- Align the lead screw of the Z-axis into the rod coupler (***Fig. 3, Step 1***), then tighten the m3 screw of the coupler.
- There are 8 x m4 screws to fix the Z-axis on the top plate (***Fig. 3, Step 2***).

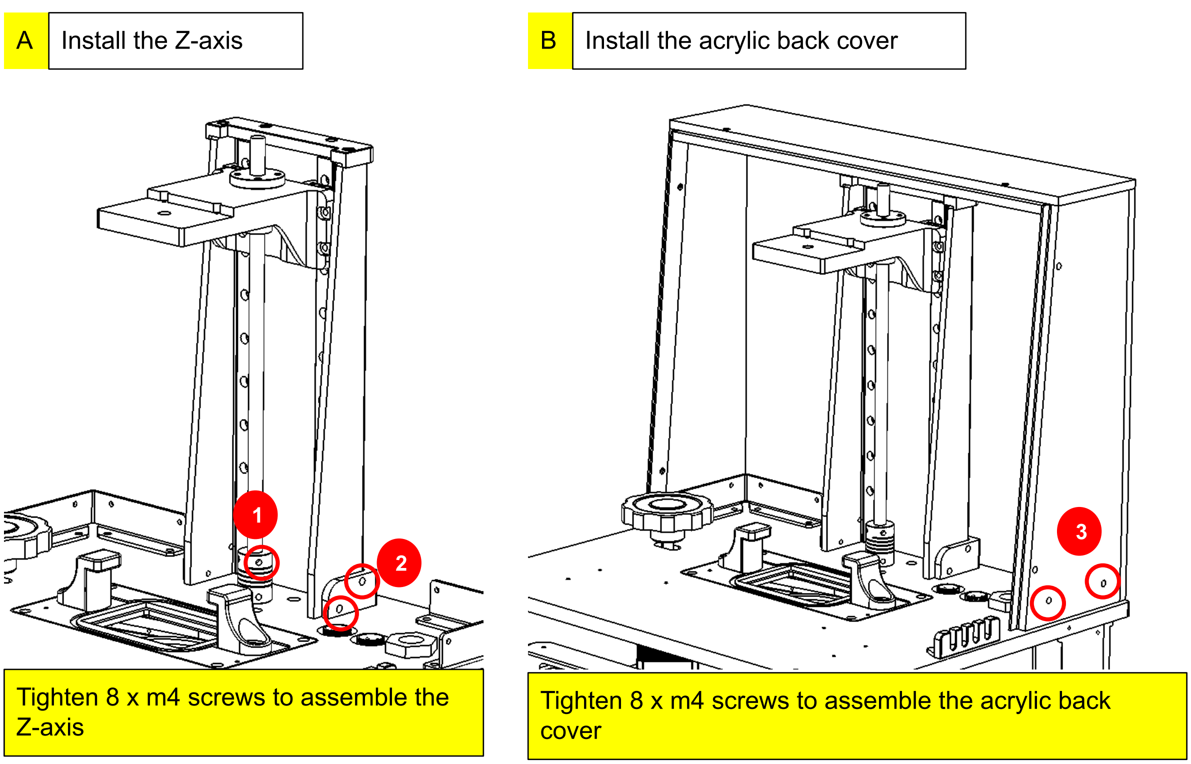

Fig. 3. Install procedure for the Z-axis and acrylic back cover

- The next step is to assemble the acrylic back cover (***Fig. 3-B***). Lock down its position using 8 x m4 screws.

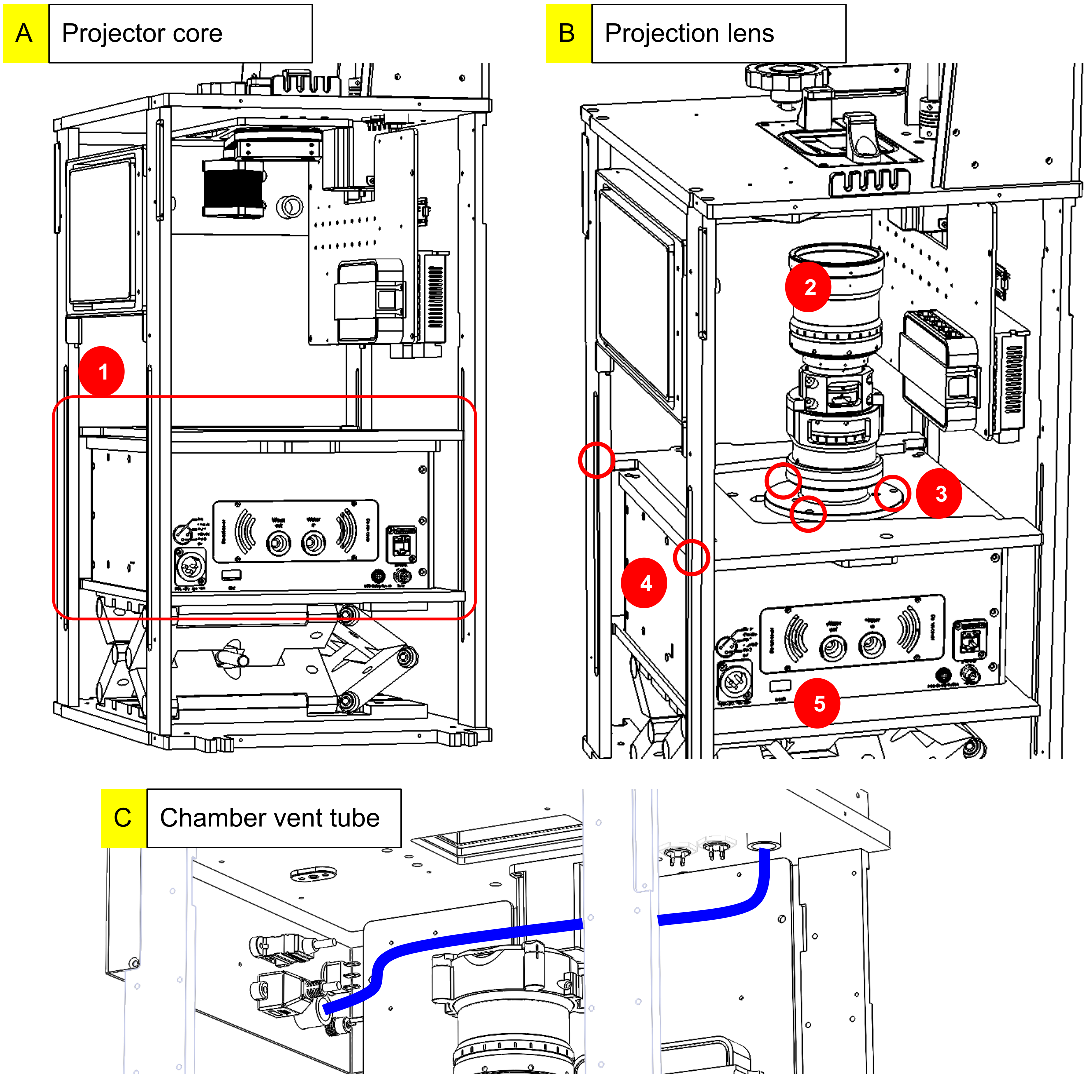

Fig. 4. Installation of the projector and lens

- Take out the projector and lenses from the package.
- Slide the projector into the printer.

  INFO The port side of the projector (HDMI, power, coolant hose, and ethernet) should be on the right side of the printer (***Fig. 4-A***)
- There is a shallow trench for the projector on top of the lab-jack. Place the projector on it and adjust its position (***Fig. 4-A, Step 1***).
- If the lens is shipped separately, place the projector lens (***Fig. 4-B, Step 2***) and lock down its position using ***3 x m5*** screws (***Fig. 4-B, Step 3***).
- Optional: You can lock down the projector position using 4 x m4 screws (***Fig. 4-B, Step 4***), but if you mount the system on an optical table, this might not be needed.
- If the vent tube is provided separately, connect it between the two tube connectors (***Fig. 4-C***).
- Lastly, connect cables and hoses for the projector (12V 600W power supply, two coolant hoses, ethernet cable, ***LED safety switch***, and HDMI cable) (***Fig. 5***).
- Two female connectors for the coolant hoses are included. Assemble them with the hose and connect it to the projector. ***Check if there is any water leak after connection.***

INFO Check if the HDMI cable is properly connected at its both ends. If it's loose, the projector won't be connected from the printer controller firmware.

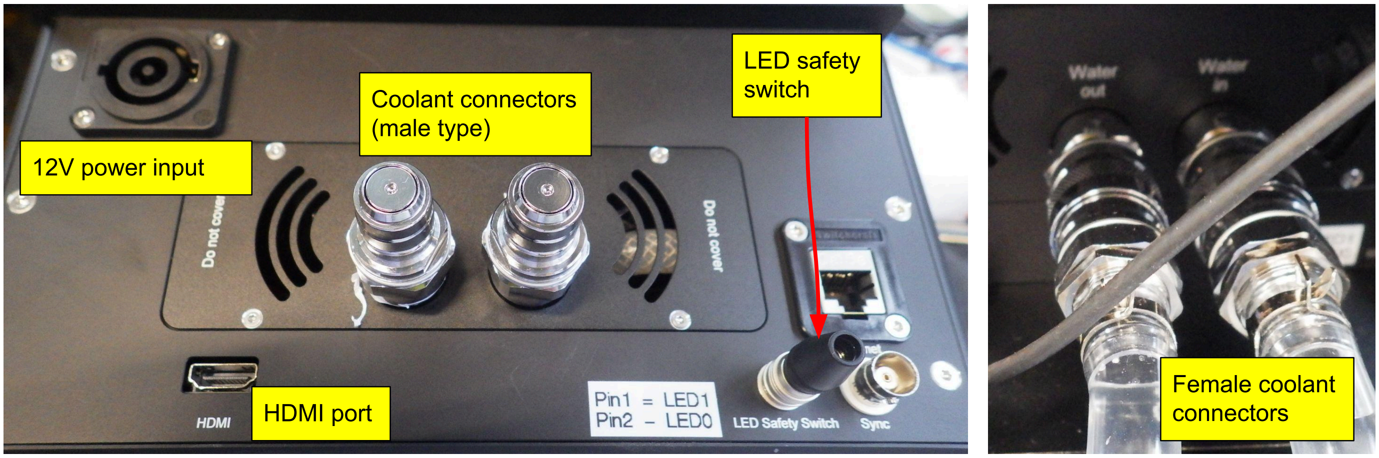

Fig. 5. Projector ports (LRS-WQ-DL)

B. First Print

4. Powering up and projector connection

- After you check all cables are connected properly, turn on the system with the following order:
  - Step 1: Turn on the chiller (***set temp: ambient minus 5℃***)
  - Step 2: Turn on the projector power (Meanwell 12V 600W)
  - Step 3: Turn on the printer (24V 5A)
- When the printer boots up successfully, you will see the main menu (***Fig. 6***)

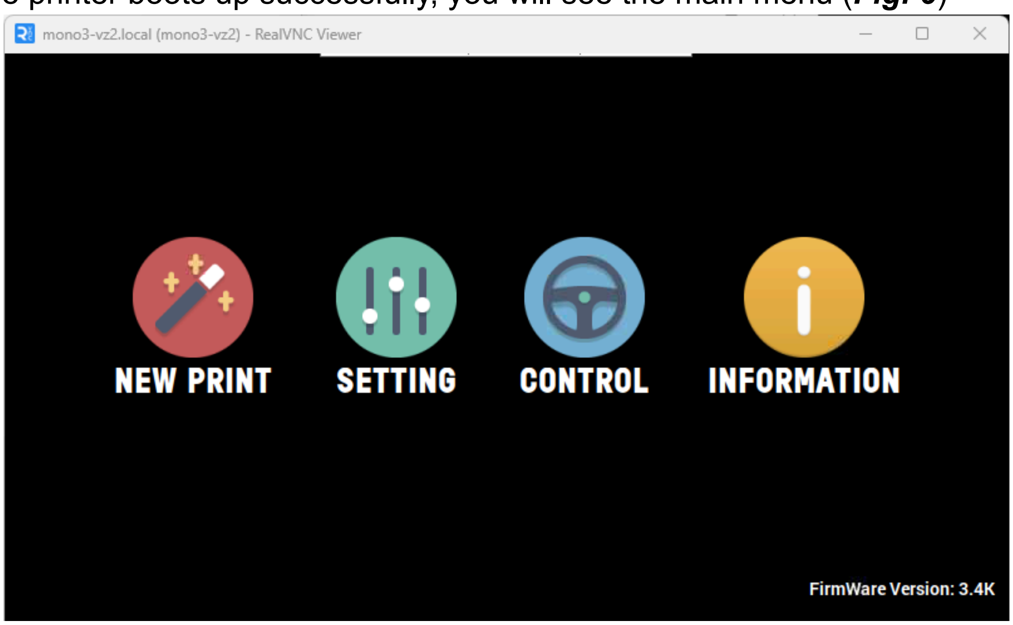

Fig. 6. Printer home screen

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- Check the Printer-Firmware manual for detailed information. The current firmware version is ***3.4K-v1***.
- You will need to manually connect the projector from the printer (***Fig. 7***).

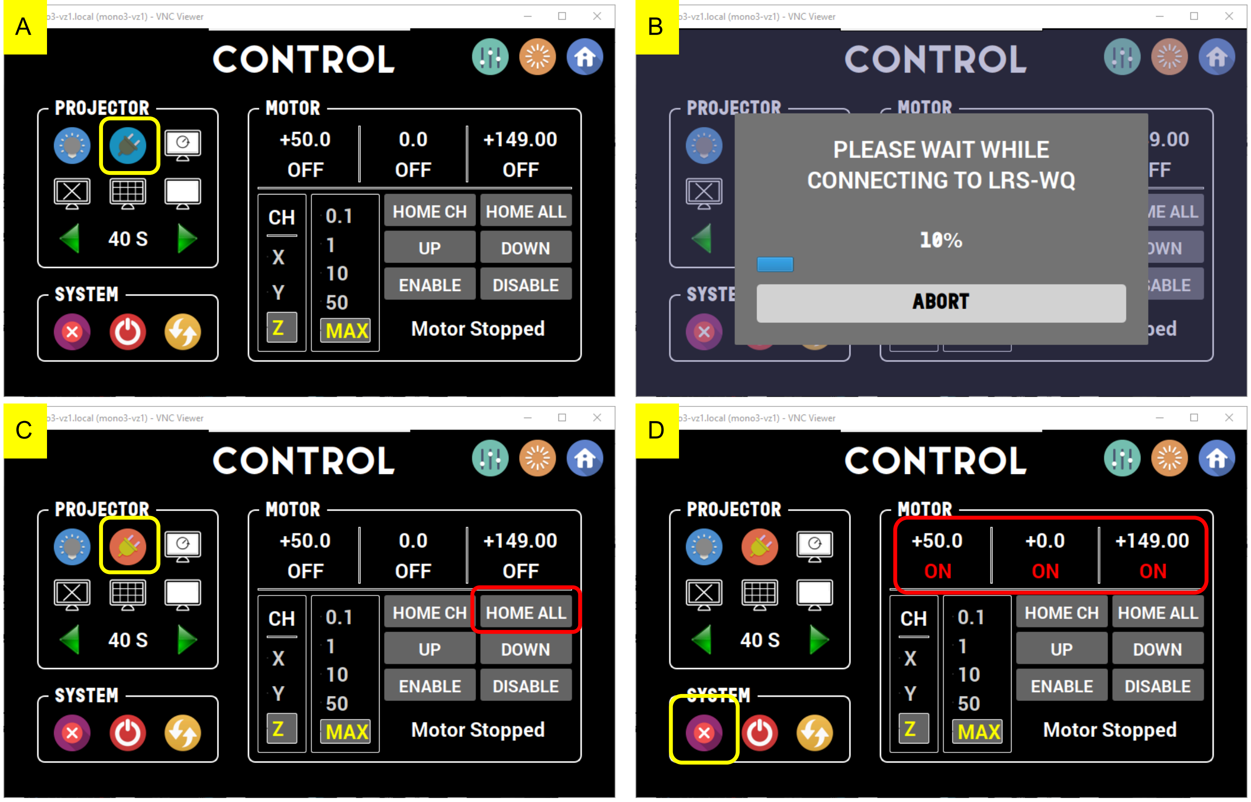

Fig. 7. Projector connection and motor homing

- Press the projector connection button (***Fig. 7-A***).
- It will show a progress window while trying to connect to the projector. Usually it will take about 10 seconds.

  INFO The projector needs 1-2 minutes to boot up. The firmware can connect after this period, so if you just turn on the projector, wait for 1-2 minutes to try to connect.

  INFO If you still can't connect the projector, check the HDMI cable or ethernet cable connection.
- If the projector is successfully connected, the connection button will be colored (***Fig. 7-C***).
- Then try to home all motors (***Fig. 7-C***) to have them enabled and homed (***Fig. 7-D***).
- Number of motors and its maximum distance is different according to the printer configuration.

5. Mount the build platform and resin tank (vat)

- Mount the build platform on the build arm and tighten the hand screw

  INFO The build platform has been calibrated in factory
- Mount the resin tank (vat) and rotate both vat clamps
- Pour resin with 3-4 mm depth.

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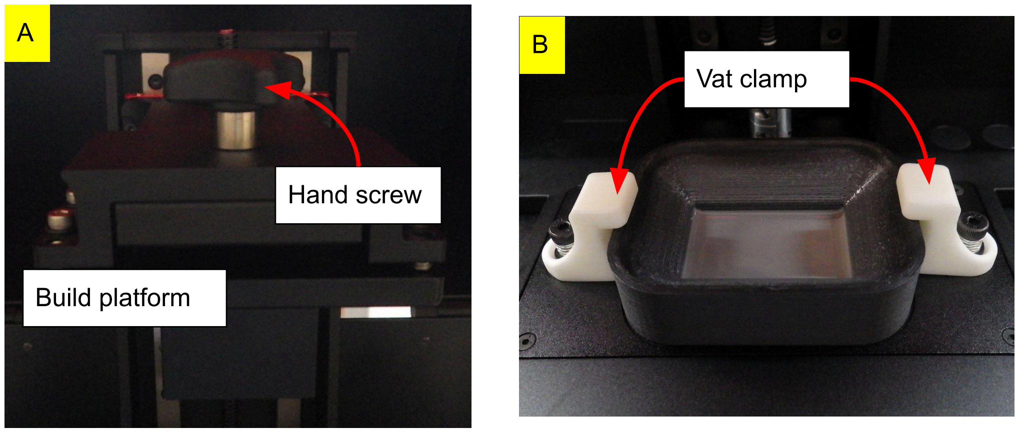


Fig. 8. Mounted build platform and resin tank (small sized version)

6. Printing process

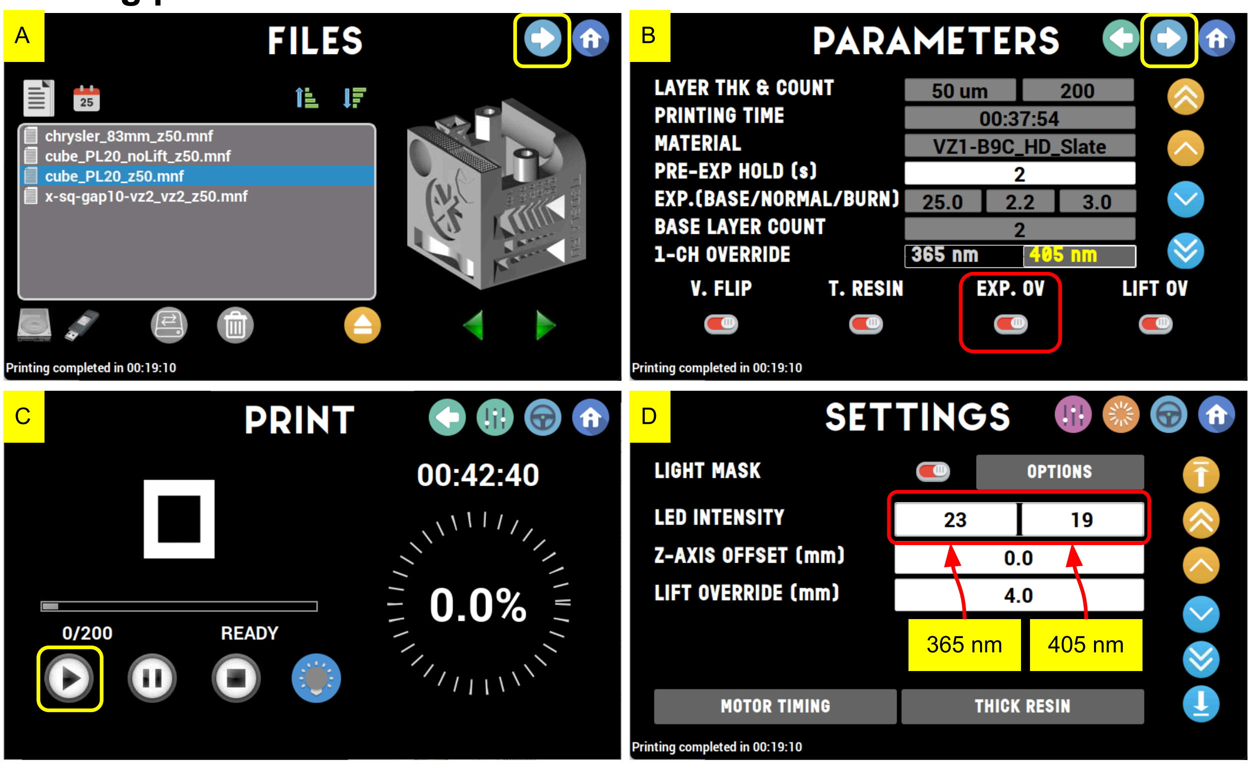


Fig. 9. Select a printing file and change exposure parameters

- ***Fig. 9*** shows a brief process of file selection and parameter changes.
- There are a couple of pre-uploaded files on the printer.
- Select one of them (***Fig. 9-A***) and press the next button (yellow box).
- On the parameters page, you can change the exposure parameters by turning on "EXP. OV" button (***Fig. 9-B***). ***This option is only available for 1-channel printing files. If the printing job uses both LEDs, this option won't be visible.***

INFO Burn-in exposure will affect the burn-in layers which should be pre-arranged on the PC slicer. This will perform additional exposure on the intersection between normal objects and supports to make the contact stronger.

- Press the next arrow button, then you will be directed to the PRINT page (***Fig. 9-C***).
- As for the LED intensity setting, you can change on the SETTINGS page. The first parameter is for 365 nm, and the latter for 405 nm (***Fig. 9-D***).

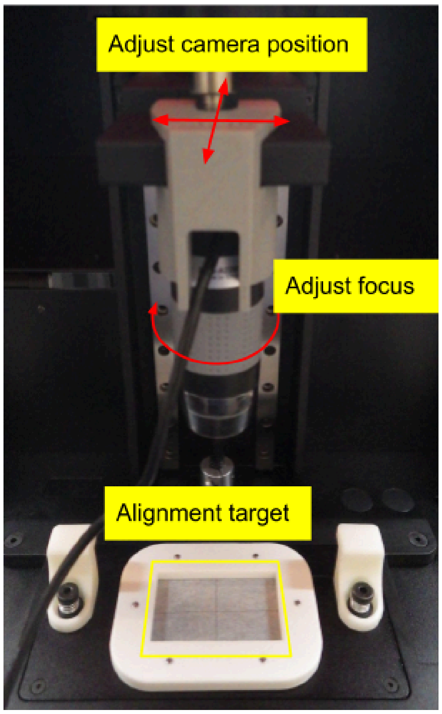
7. Post-processing

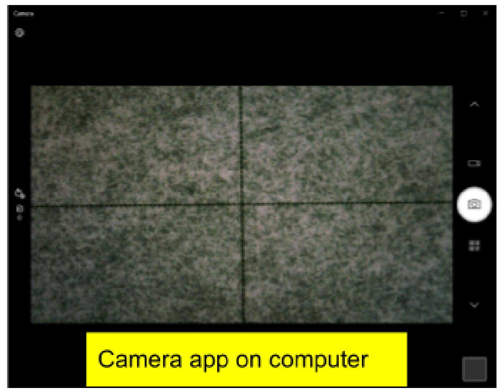
- General procedure can be found on below link
- https://www.matterhackers.com/articles/how-to-print-clean-and-post-process-sla-3d-prints
- Briefly you need to take 3 steps for regular commercial resins.
    - Detach the complete prints from a build plate.
    - Immerse the prints in an IPA bath for more than 5 mins. Manual agitation will be enough for some resins, however if you are using a wax based resin or thick resins, ultrasonic double bath will be helpful. In this case, 2-4 mins with the ultrasonic bath will clean the print surface.
    - After taking the prints from the IPA bath, remove excessive IPA of the print surface by air blow. The final step is curing with UV. A cheap nail curing station will be enough to cure small prints.

INFO The post-processing depends on the resin. If you're using custom resin, consult with a resin manufacturer for proper post process and cleaning.

C. Focus adjustment (if advised by a manufacturer)

8. Focus adjustment procedure





1. Remove the build platform and hand screw from the build arm
2. Install the USB microscope to the build arm
3. Plug the camera's USB to the computer
4. Launch a camera app on the computer
5. Place the alignment target
6. Adjust camera's position to roughly align the center
7. Adjust camera's focus

Fig. 10. USB microscope installation and set-up procedure

CAUTION *The printer is calibrated before shipping, so check the focus level before adjusting the projector height.*

- Mount a USB camera and connect it to the PC (***Fig. 10***).
- The camera vertical position is not critical, but the maximum height will give the largest field of view.
- Run camera app and set the resolution to the maximum (2 MP with included USB camera)

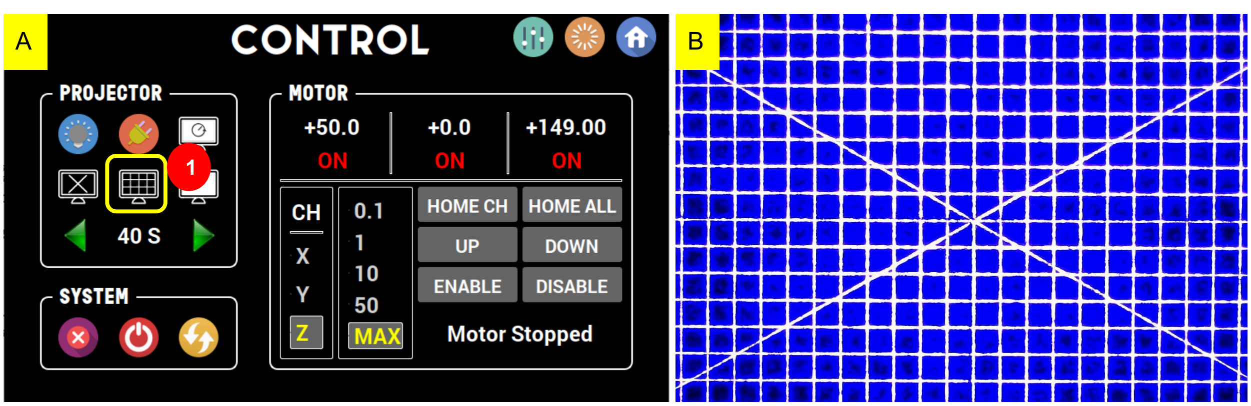


Fig. 11. Turn on grid projection to check the focus level

- Go to the Control page and turn on the grid projection (***Fig. 11-A, Step 1***).
- The grid projection will be turned off after time specified (ex. 40 sec) automatically.
- Once the grid projection is turned on, adjust the height of the lab-jack leading to change the distance of the lens to the build surface.

INFO Use a low LED intensity (<1-2 mW/cm2) to check the sharpness of the grid lines.

D. Right side cover installation

9. Right side cover

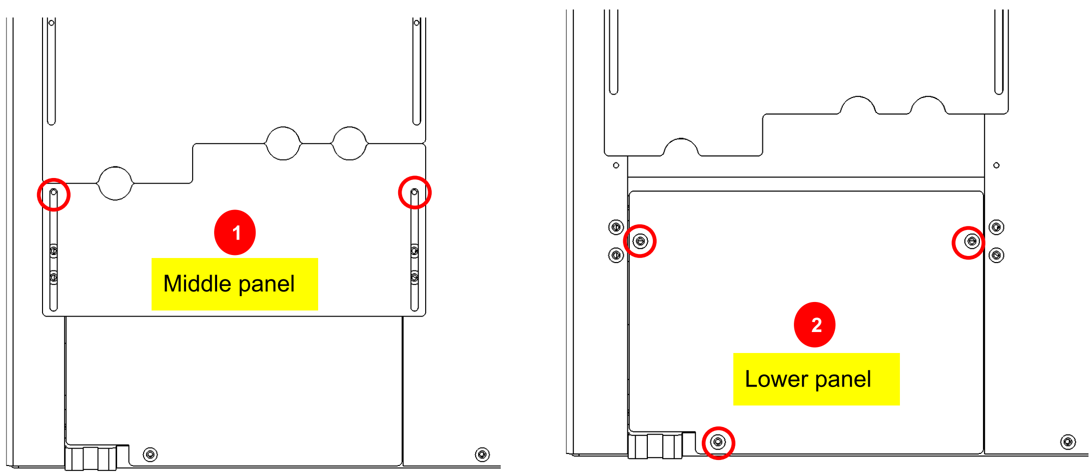


Fig. 12. Right side cover

- Before the installation of the right side cover, you need to remove the middle and lower panels from the cover.
- After the removal of both panels, you can install the right side cover with 12V power and coolant hoses installed.
- Adjust the heights of two panels (upper and middle) to match the projector's vertical position.

E. MonoWare Printer Setting

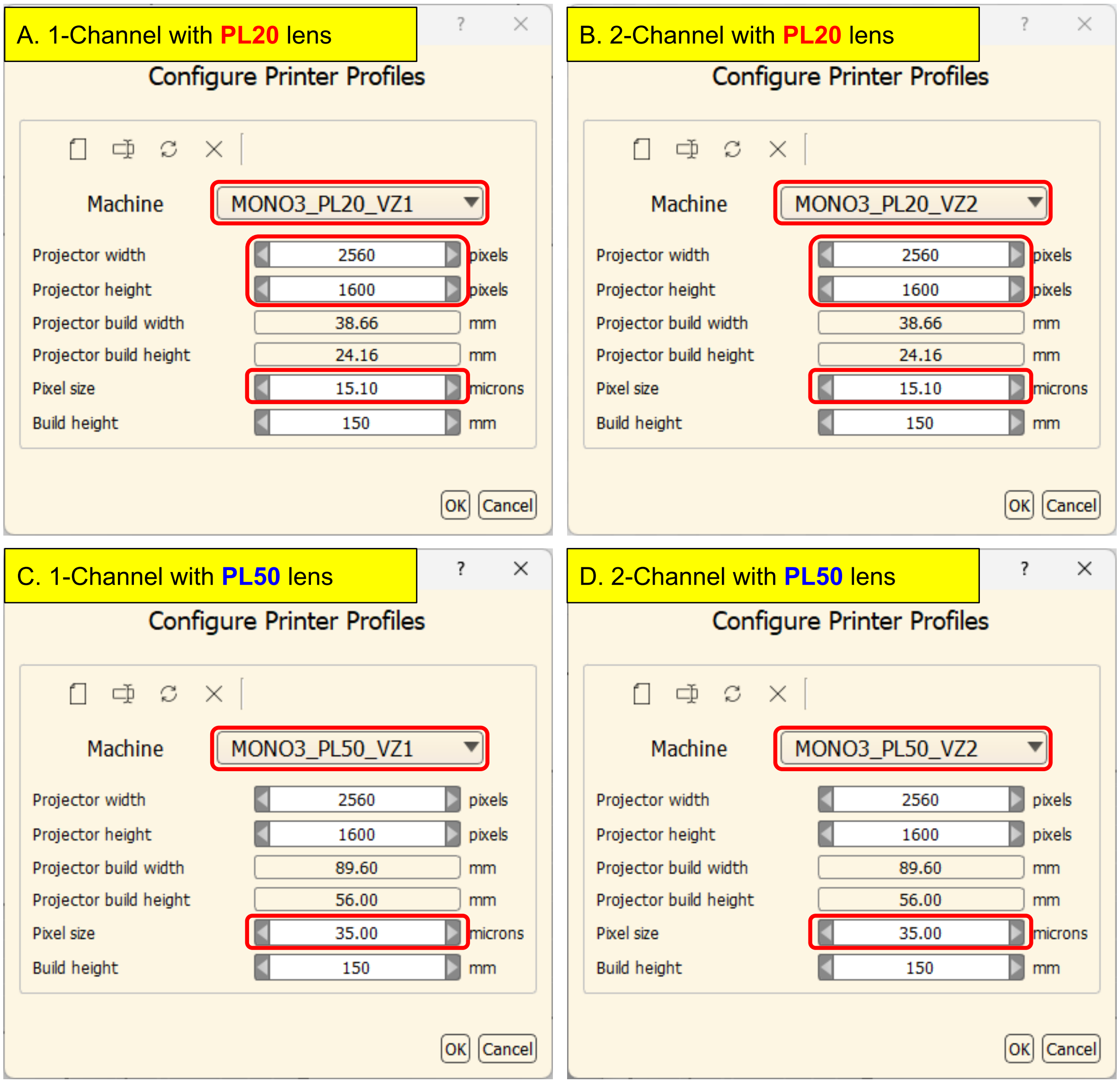


Fig. 13. Printer setting for Mono3_VZ1

- If this is the first time to use the MonoWare and/or there is no profile for VZ1 / VZ2, add the above profiles to the MonoWare.
- MONO3_VZ2 uses separate printer profiles for a ***single (VZ1)*** *and* ***dual (_VZ2)*** LED printing.

  CAUTION The machine name should be ***MONO3_PL20_VZ1 and MONO3_PL20_VZ2 or MONO3_PL50_VZ1 and MONO3_PL50_VZ2***.
- If you use a different lens, the pixel size should be updated accordingly. For example, if you use a 1x lens (PL10), the pixel size will be 7.56, and your printer name should be MONO3_PL10_VZ1.

F. PC Ethernet Setting for Visitech Web-Server

- For PC connection to the LRS-WQ Visitech projectors via ethernet cable, the ethernet setting should be as below.
    - IP: 192.168.0.225
    - Subnet: 255.255.255.0
    - Gateway: 192.168.0.1
    - DNS: 192.168.0.1
- This will make sure the ethernet of the laptop will be in the same DNS/gateway as the network switch inside the printer.
- If configured correctly, you can access the web-server (***192.168.0.10:8080***) as well as the VNC server of the raspberry pi (***mono3-vz2.local***) from the PC that is connected to the printer using an ethernet cable.

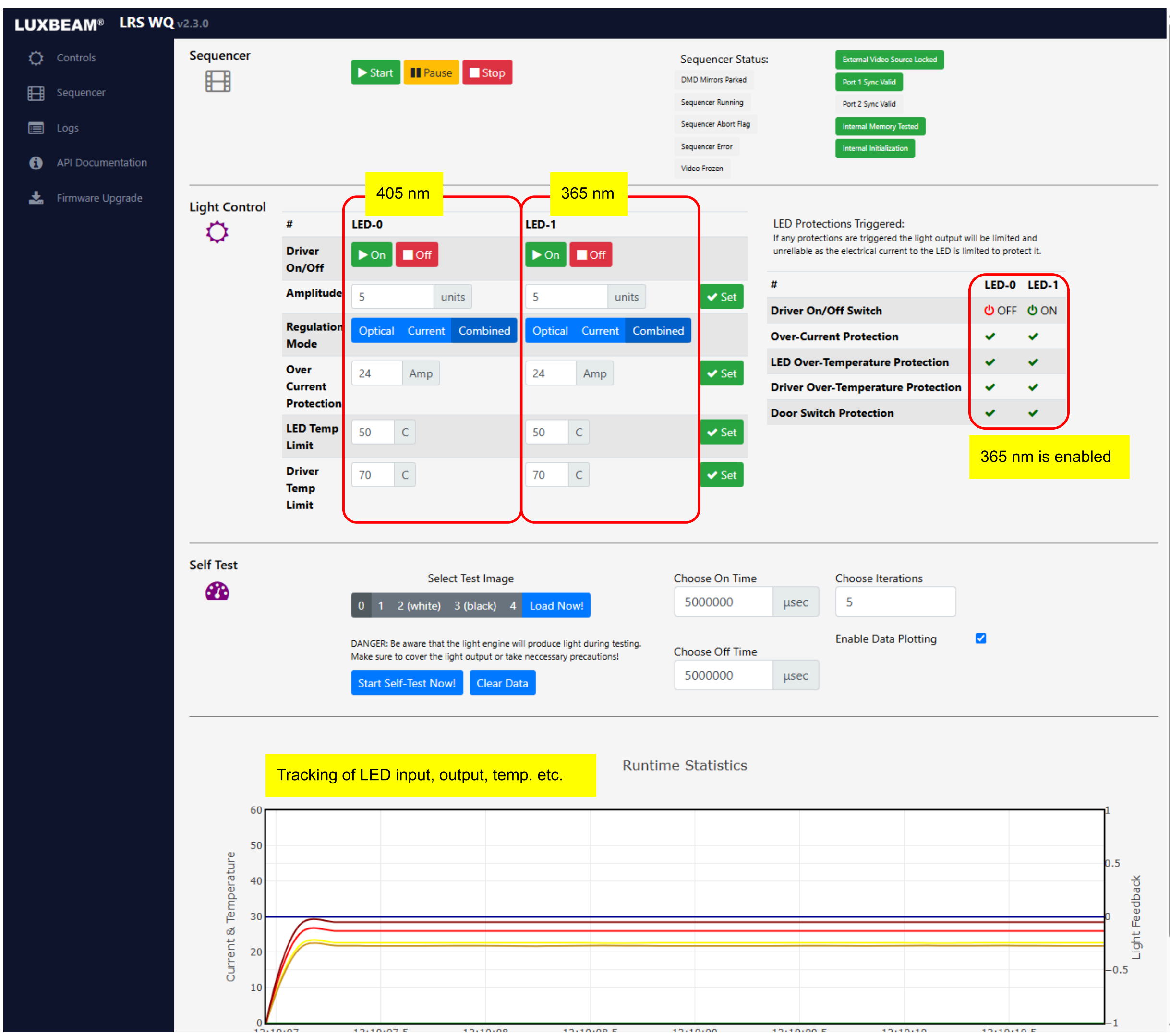
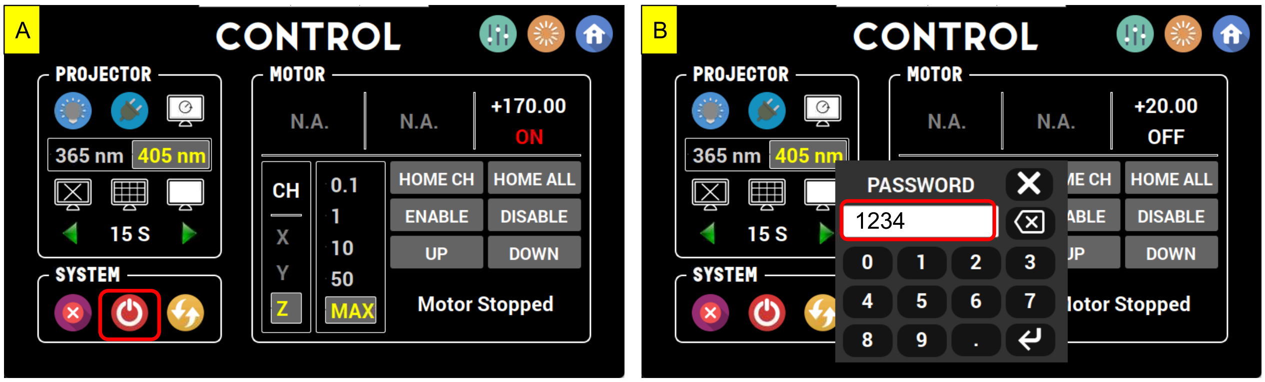
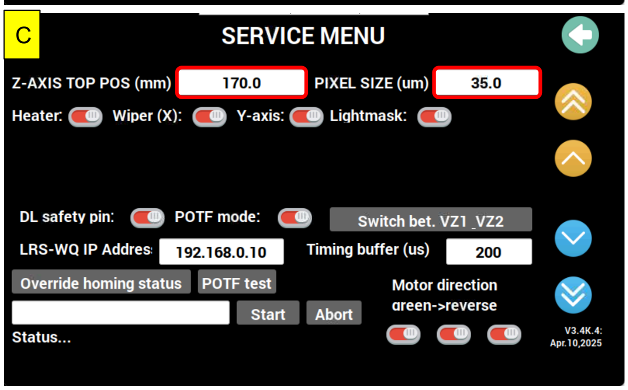


Fig. 14. LRS-WQ Visitech projector's web-server (192.168.0.10:8080)

- Please refer to Visitech's manuals for more information about the web-server operation and other remote control options.

G. SERVICE MENU





D

	PL20	PL50
Vat size	56 x 35 (small)	110 x 70
Build platform	43 x 25 (small)	94 x 60
Z-axis top position (mm)	149	170
Pixel size (um)	15.1	35.0

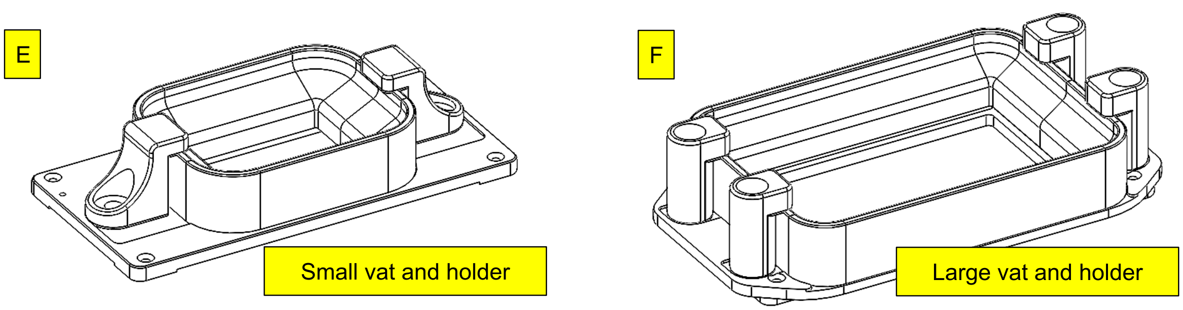


Fig. 15. Update service menu parameters & two different vats

- Moreover, if you use the new large vat (110 x 70) and platform (94 x 60) for PL50, the z-axis top position is also different (***Fig. 15-D***).
- The bottom surface levels of the small vat and large vat are different as well. ***The bottom level of the large vat is 4.5mm higher than the one of the small vat***. This means if you want to switch between the vats and platforms with the same projection lens, ***you have to be careful to calculate the Z-axis top position***.
  - PL20 + small vat/platform → Z-axis top position: 149.0 mm
  - PL20 + large vat/platform → Z-axis top position: 174.5 mm + projector height adj.

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- PL50 + small vat/platform → Z-axis top position: 149.0 mm
- PL50 + large vat/platform → Z-axis top position: 170.0 mm

- To update the z-axis top position, enter the service menu by pressing and holding the system shutdown button (***Fig. 15-A***).
- Enter password as shown in ***Fig. 15-B***.
- Then update the z-axis top position and pixel size (***Fig. 15-C***) as summarized in ***Fig. 15-D***.

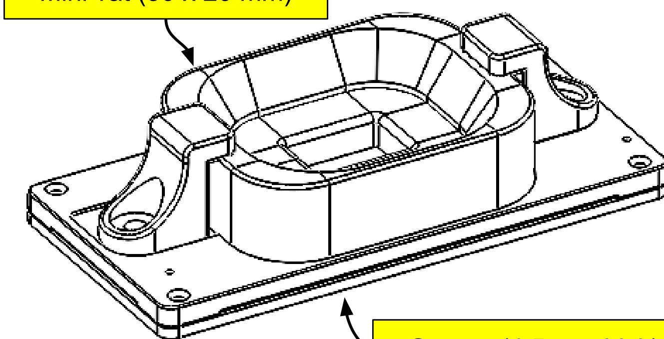

Fig. 16. 4.5mm thick spacer under the small vat holder (56 x 35)

- If you want to keep the projector position when you switch between the small vat and large vat holders, you can use the 4.5mm thick spacer as shown in ***Fig. 16***.
  INFO The projector vertical position needs to be adjusted for PL20 and PL50 lenses. The PL20 lens needs the projector vertical position higher by about 17.5mm. Hence, when you switch the projection lens, adjust the projector height using the labjack by monitoring a focus.
  CAUTION ***If you use a longer z-axis top position with PL20's small vat and platform, the vat holder glass can be damaged. Double check the z-axis position is correctly set for the installed projection lens.***

10. Closing remarks.

- If you have any issues during installation, contact us at info@monoprinter.com.

End of manual