



Chapter 8.61

Keyence VHX-500F Digital Microscope**(keyence)****(584)(ver.04/2025)****1.0 Equipment Purpose**

- 1.1 The keyence VHX-500F digital microscope is a high resolution CCD camera based system with a high intensity halogen lamp and image processing capabilities that integrates observation.

2.0 Material Controls & Compatibility

- 2.1 No wet samples are allowed on the keyence stage.

3.0 Training Procedure & Applicable Documents**3.1 Member Qualify Tool**

- 3.1.1 This tool may requires enabling for use

- 3.1.2 There are no prerequisites for this tool

- 3.1.3 Timeline (estimated time to completion: 1 day)

- 3.1.3.1 Train and qualify with any qualified member. All qualified members are superusers on these tools.

3.2 VHX 600ESO User's Manual (office)**3.3 Quick Setup Guide (office)****4.0 Definitions & Process Terminology****4.1 Stage -- the stage may be adjusted in X, Y, and θ (rotation).**

- 4.1.1 As of Sept. 2023 - The stage Z axis (up/down) is completely stripped - all of the teeth have been sheared off. There are 2 coarse focusing mechanisms - the stage and the camera. The stage has permanently been locked in place, and removed the focusing knobs (under the stage) and set it so you will be able to focus the camera with the large black knobs on the back of the camera (remember, the smaller knobs are your fine focus).

- 4.1.2 Should you need to put on a larger item, contact us to assist with this.

4.2 Lens -- the system is equipped with a VH-Z100R bright field lens. Rotating the zoom ring on the lens changes the magnification from 100x to 1000x. A separate ring controls the aperture setting. The lens may be tilted to achieve angled images of samples.

4.3 CLEAR SHOT -- Used to freeze/pause the screen.

4.4 WHITE BALANCE -- Adjusts the white balance. Use a white technicloth to get true white color.

4.5 FRAME RATE -- switches between 15 and 28 fps. 15 fps yields better resolution and slower refresh rates, while 28 fps yields lower resolution and faster refresh rates.

- 4.6 ZOOM 2X -- this is a digital zoom, not an optical zoom
- 4.7 LIGHT CONTROL -- adjust the intensity of the halogen lamp
- 4.8 BRIGHTNESS/GAIN -- use this to adjust the shutter speed; typically set to the 10-o'clock position
- 4.9 ENHANCE -- This uses incident light from a single direction to enhance surface projections and depressions on the sample.
- 4.10 REC -- Use this to save an image
- 4.11 PAUSE -- toggle between freeze and live imaging
- 4.12 OPTIMIZE -- This creates four different images; normal, bump enhancement, image enhancement, and image sharpening.
- 4.13 CONTRAST -- use to optimize contrast settings
- 4.14 HALATION REMOVAL -- this can remove glare from highly reflective surfaces
- 4.15 S.C.F -- This is a shake correction function that removes noise caused by environmental vibrations.
- 4.16 DEPTH UP -- Instantaneously creates a depth composition image. This is useful when the sample has a large degree of topography when the entire image is not in focus.
- 4.17 3D DISPLAY -- This composes a 3D representation of the sample for further analysis/observation.

5.0 **Safety**

- 5.1 Be aware at all times where the lens is with respect to the stage or your sample. **Do not contact the objective lens with the sample or stage.**
- 5.2 Viewing the illumination light directly through the fiber optic port may cause eye injury.
- 5.3 The lamp is very hot and may cause burns even after being turned off.
- 5.4 No wet samples are allowed to be observed with this system. Do not attempt to put any sample with liquid on the stage.

6.0 **Process Data**

- 6.1 The tool is monitored by staff.. Data is found in the [Process Specification](#) section of the Nanolab Website.

7.0 **Available Processes, Gases, Process Notes**

- 7.1 Observing targets with universal zoom VH-Z100UR bright field roughly 100x - 1000x mag
- 7.2 Image optimization
- 7.3 Freezing, recording and measuring images
- 7.4 Video recording
- 7.5 Image enhancement
- 7.6 Halation removal
- 7.7 Shake correction function
- 7.8 Real time depth composition (multiple focal plane integration)
- 7.9 3-D profile measurement

8.0 Equipment Operation

- 8.1 Enable the system.
- 8.2 Turn on the computer by pressing the power button.
- 8.3 Turn the halogen lamp on by setting the light control knob on the touchpad console to the 12-o'clock position. Set the gain knob to the 10-o'clock position.
- 8.4 Perform white balance by focusing on a white card and pressing the white balance button on the touch pad.
- 8.5 Place sample on stage and perform observation.
- 8.6 When imaging your sample, many of the software functions require users to manually set the magnification setting that is being used on the lens. Be sure to that the proper lens magnification is set within the software (bottom right on computer screen) and that this corresponds to the magnification set on the lens of the microscope. This is especially important for length measurements on a sample.
- 8.7 Save all images under a personal folder. Make sure you scan your USB drive for viruses on terminal 3 or 4 before connecting your USB drive to the microscope computer. Be sure to copy all of your images onto the USB drive as the hard disk of the microscope will be periodically purged of saved files without notice.
- 8.8 When finished, turn the light control knob all the way down and turn off the system by right clicking and selecting Power Off.
- 8.9 Wait for the computer to shut down and then disable the system.

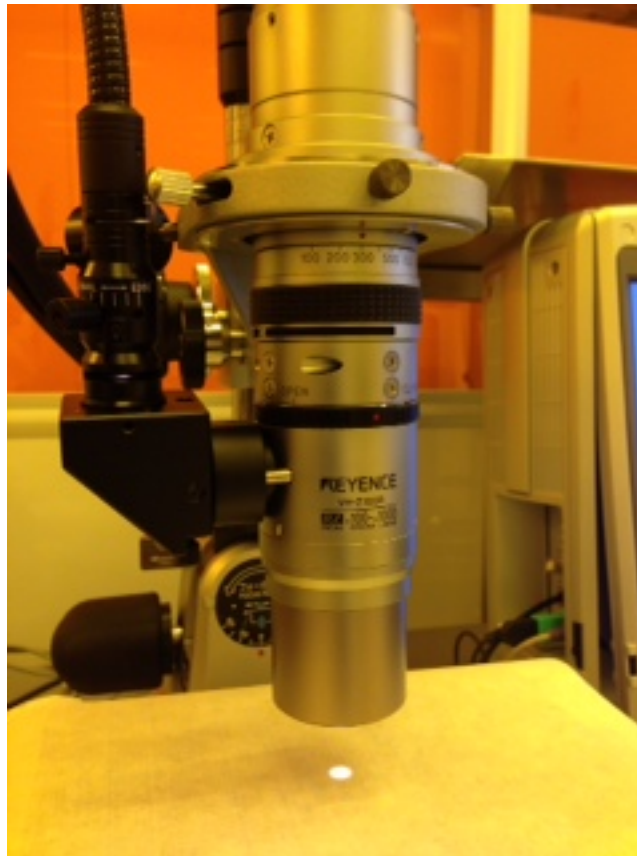
9.0 Troubleshooting Guidelines

- 9.1 The Function Guide (right most icon on the VHX Main Menu Bar) provides step-by-step tutorials for basic software tools and microscope operation. This is an easy to use guide that describes the basic features of the microscope.

10.0 Study Guide

- 10.1 No online test

11.0 Appendices



11.1 Magnification and aperture knobs are pictured in the figure above. Magnification is set to 300x in this image. Aperture should, generally, not be changed.



11.2 Control console is pictured. Definitions of the buttons are found in section 4.