

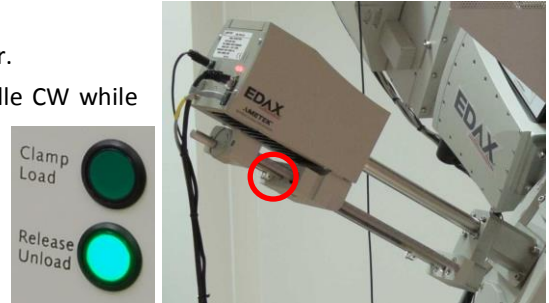
This guide contains only the most common workflow. It by no means supersedes the training or user manual<sup>A</sup>

## VERIOS 460L

### Quick guide – general

#### Starting the Session

1. Check that gas valves are open. Pressure on gauges should be  $\geq 4$  bar.
2. Check EDS detector position; if not fully withdrawn, turn the handle CW while supporting the slide's back end and cables until the EDS is fully out.
3. Switch the central monitor on (the right one will activate synchronously).
4. Log in to the user interface.








#### Loading the sample

5. Push the “**Unload/Release**” button on the LoadLock. Wait until it stops flashing → shuttle is unloaded. **IMPORTANT:** Do **NOT** push  button in the UI!
6. Open the LoadLock and push the “**Unload/Release**” button once again to unclamp the shuttle.
7. Take out the shuttle. Close the lid immediately to prevent ingress of any dirt.
8. Put your samples on stubs<sup>B</sup> into appropriate shuttle positions. Only combine samples of approximately the **same height** in one batch. Secure each stub by setscrews – **tighten gently** just by fingers.
9. **Check the overall height of the stubs + samples + shuttle** by a height gauge. It must be lower than the bottom surface of the gauge “nose”. **Do not load** if your specimens overstep the limit.
10. Put the shuttle into the LoadLock. The three garnet balls shall match the grooves in the transfer fork. Check the correct shuttle position by looking from both sides.
11. Push the “**Clamp/Load**” button on the LoadLock. Keep the lid open until the button stops flashing!
12. Close the lid and push the “**Clamp/Load**” button again. Wait until the button stops flashing → shuttle loaded.



#### Setting up the microscope



13. Acquire Navigation picture Nav Cam by <Ctrl + Shift + Z>.
14. Select the position of your **tallest sample** by double clicking the left mouse button in the NavCam quadrant (bottom-left one).
15. Select the IR camera quadrant (the bottom right one) and press <F6> to un-pause the quadrant (if needed).
16. Raise/lower the stage to a **4 mm** working distance  (approach the 4 mm marker by the sample top surface).
17. Set up beam parameters (HV, beam current) in the Beam Control panel  (typical starting condition 5kV, 50 pA).
18. Set up suitable dwell time for beam scanning (100 ns recommended).
19. Select the quadrant for imaging (upper left with **ETD** detector recommended).
20. Start the beam by  button and press <F6> to un-pause the quadrant.
21. Go to Direct adjustments  →  and press  - center the spot by respective 2D slider.<sup>C</sup>
22. Change magnification (usually decrease) by the MUI<sup>D</sup> knob or by <+>/<-> keys on the keyboard.
23. Adjust brightness and contrast – auto C/B <F9> or MUI knobs.
24. Focus the image by pushing the right mouse button and moving the mouse left or right . Change magnification intermittently to see sample features with enough detail to focus on.

<sup>A</sup> Help and documentation - <F1> or  icons. Manual in PDF available also in Documents section of CEITEC Nano website.





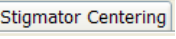
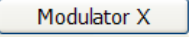
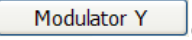



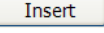
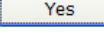
<sup>B</sup> In case your sample is particulate/powdery, you are obliged to do your sample fixation in room A1.08 inside a fume cupboard!

<sup>C</sup> If you do not see the spot, increase contrast.






<sup>D</sup> MUI = Manual User Interface – panel with manual knobs of the most frequent functions

25. Link working distance WD and Z coordinate by clicking an icon  (turns into ).

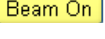

### Tuning the image and observing the sample

26. Check image resolution and dwell time – usually 1536 x 1024 and 100 – 300 ns work fine<sup>E</sup>.
27. Improve **focus** in the reduced area ( or <F7>).
28. Set **stigmator** XY - MUI knobs or the 2D slider in Beam control panel .
29. Adjust **lens alignment** (at magnification greater than 60 k X) – start alignment tool by pressing , suppress image shift by moving the alignment cross inside the view field. Repeat step 26 + 28 (lens alignment influences stigmators).
30. If you see an image shift during step 28, do **stigmator centering**: open direct adjustments  → , start   consecutively and use relevant 2D slider to suppress the shift.
31. Repeat steps 27 + 28 – stigmator centering settings influence the stigmator effect set previously.
32. Find your region of interest on the sample, and repeat steps 27 + 28 as needed. Assess the resolution of your image. If not sufficient, then switch to **immersion mode**<sup>F</sup>  → . **IMPORTANT: When your sample is particulate/powdery AND magnetic OR magnetizable, DO NOT switch to immersion mode!**
33. Go through steps 21 - 24 and 27 - 30. Immersion mode activation affects all alignment items.
34. Select detectors as needed in one or more quadrants. In the case of work with CBS, pay extreme attention to lowering the stage so no sample or piece of stage hardware protrudes above the 4 mm marker. After activating the selected quadrant, go to Detectors  panel →  → confirm  only if the above conditions are met!

### Taking the image



35. Check image acquisition presets in  → Preferences →  → , set dwell time, resolution and filters.
36. Set image area (HFW) as needed. Click <F2> or  icon to acquire image in active quadrant or <Shift + F2> or <Shift> +  to acquire multiple images.
37. Save the images to your personal folder in *D:\Shared data\Users\...* on the Support PC.

### Finishing the session

38. Retract the CBS detector if used. Set tilt to 0 °.
39. Switch off the beam by  button.
40. Go through steps 5 - 7<sup>G</sup>.
41. Unmount your samples from the shuttle and stubs. Put the used stubs into the appropriate container for cleaning by CEITEC Nano staff.
42. Go through steps 10 - 12 with the empty shuttle. Wait until the shuttle is loaded.
43. Always copy your data from the shared data folder onto your folder on the network storage (X:\Users\...). **NO USB sticks allowed!**<sup>H</sup>
44. Log off by  → Log off user.
45. Switch the central monitor off (the right one will switch off synchronously).
46. Adjust your reservation in the booking system and inform other users about your changes, if needed.
47. Clean up the workplace.

<sup>E</sup> If you see ongoing changes in contrast (dark/bright areas change their size, image shifts), then you highly likely see charging artefacts. Lower the beam current and/or lower HV and/or decrease dwell time and/or set „scan interlacing“ to 2 – 8. You may need to work in Beam deceleration (BD) mode.

<sup>F</sup> Immersion mode uses strong magnetic field that floods your sample. Pay attention to allowed types of samples!

<sup>G</sup> You can unload the shuttle also on Navigation  panel → 

<sup>H</sup> If you cannot/do not want to reach your data on the network drive, use your cloud services via web browser on the support PC.