# TM4000 Operation Guide

The TM4000 tabletop SEM allows users to observe a specimen at high magnification (beyond the limits of optical microscopy) and capture 3D images of its structure with great focal depth.

## Parts of the TM4000



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#### **Start-up Procedure**

**CAUTION:** Ensure transportation fixing screws within main unit are removed before start-up!

- 1. Ensure extension board is switched on.
- Switch on power to TM4000 main unit (button on right-hand side);

Air will be pumped from the chamber automatically; EVAC LED will be flashing blue while evacuating.

When the chamber has reached vacuum, the EVAC LED will be solid blue.

3. Switch on PC. Open TM4000 software.





### **Specimen Preparation**

- 4. <Put on gloves> Mount specimen onto specimen stub using conductive double-sided tape.
- 5. Press EVAC/AIR button on main unit, AIR LED will flash white as air is introduced into the chamber.

Once AIR LED becomes solid white, wait another 5 seconds before opening specimen stage. Then use black handle to slowly pull stage door towards you.







- 6. Remove specimen holder from stage.
- Attach specimen stub to holder; Loosen locknut on holder to adjust height.



Set height using provided gauge so that distance between metal bar and specimen is  $\sim 1$  mm. Then tighten locknut to secure.

(Note: Plastic collar on gauge is for setting EDS analysis height - this is obsolete for our TM4000)

 Open stage door and insert specimen holder into place. Then close door gently and press EVAC/AIR button. Press gently against door for the first few seconds while pump starts evacuating chamber; blue EVAC LED will flash during this process.

Wait until EVAC LED is solid blue, indicating the process has been completed.





## **Sample Observation**



- 9. Choose appropriate Accelerating Voltage and Vacuum settings
  - a. Mode 1 = 5 kV vs. Mode 2 = 15 kV [Mode 3 relates to other detectors]
  - b. Vacuum = Standard (Medium) vs Chg-up Red. (Low)
    Rule of thumb: For biological samples, use low accelerating voltage and low vacuum to avoid charging. For metal samples, use high accelerating voltage and

Note: Our TM4000 only has a secondary electron (SE) detector.

10. Click "Start" to turn electron beam on.

standard vacuum.

- a. Use scroll wheel on mouse to adjust magnification.
- b. Click AUTO brightness and contrast and AUTO focus button on operation panel of software. It is best to focus on the sample at high magnification and zoom out.
- c. Use black knobs on main unit to move specimen stage in X and Y directions.
- 11. Use fast scan speed while moving stage and looking for features/Slow scan speed to preview, then click "SAVE" to capture image.(Quick save will also save the image on the screen but in lower resolution).

### End of observation:

12. Click "Stop" to turn electron beam off.

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- 13. Press EVAC/AIR button to let air into chamber. Wait for white AIR LED to stop flashing.
- 14. Open stage door using black handle.
  Exchange or remove sample leave empty specimen holder in chamber if finished for the day.
- 15. Press EVAC/AIR button to let air into chamber. Wait for blue EVAC LED to stop flashing.

#### **Shutdown Procedure**

NOTE: Always leave SEM in evacuated state before shutting down!

- 16. Exit TM4000 software.
- 17. Shutdown PC.
- 18. Switch off main unit (button on right side).
- 19. Switch off power to extension board.