

This quick guide obtains information how to operate the EVAPORATOR. Most of known issues and solutions are mentioned here. In case you need more detailed instructions, contact the instrument guarantor.

EVAPORATOR – Deposition

Deposition setup

1. Set the **pocket DISTANCE** using M-ET2 - go to: Motor M-MT2 “SP Pos” in range 0-170 mm (e.g. set 0 mm for the slowest but the most homogeneous deposition over 8” wafer – **standard value is 50 mm**).
2. Select the **material** (pocket) for deposition using the **EBG-21 hand panel** – go to MENU/Set pocket using joysticks or change it directly from **EBG-21G on screen menu** “SP Pocket” and choose the number of the pocket. The actual pocket and material are visible under “Act_Pocket” and “Material” respectively.



Known issue: “Error 26: Pocket jammed” appears on EBG-21 hand panel after several seconds. The instrument must be opened - please call the instrument guarantor.

3. In the **THICKNESS-THC-21** menu select the deposited material and tooling factor - go to “Settings...” and select the material from drop down menu, set the “Global Tooling [%]” and press OK (e.g. 55 - 60 % for 50 mm distance).

Note: The tooling factor changes with the material and pocket distance. Your own research on the tooling factor is therefore needed.

4. Set the **sample rotation** (e.g. 5 rpm/min) – right click on the SUBSTRATE scheme/Process and select “SUBSTRATE CONT ROT +5rpm.prc”.
5. Set the **sample tilt** (2 ÷ -45°) - go to Motor M-MR2 and select the desired value.

Deposition

Attention: Always keep all window shutters closed when depositing!!!

6. Set **High Voltage** (HV) depending on deposited material (6 – 10 kV) using the **EBG-21 hand panel** – go to MENU/Set Data/High Voltage using joysticks and press MENU button when finished - **standard value is 8 kV**.

Attention: High HV may cause spitting out the material from the pocket!!! 8 kV is enough for most of the materials. Set 9 kV or more if you really know what you are doing (e.g. 10 kV for Au and Al). Check the labbook for process information from other users.

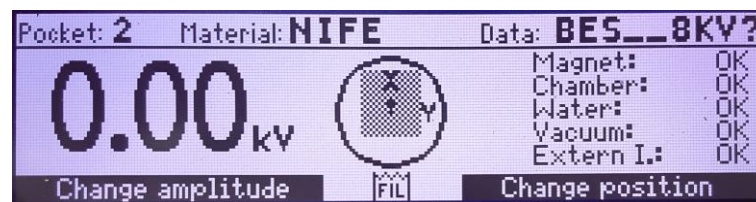
7. Set a low **Emission Current** (about 20-60% of deposition current which depends on material and HV, e.g. 45 mA for Ti at 8kV and 250 mA for Al and Au at 10 kV - check the labbook for further process information from other users) – go to **GENERATOR EBG-21G menu** and set the Setpoint[mA] to desired value with “Ramp[mA/s]” about 2-5 mA/s depending on material and press “Set SP”.

Note: The manual emission current adjustment can be also done using the right knob on EBG-21 Hand panel but it is not recommended.

8. **SWITCH ON** the HV – press “On” button at **GENERATOR EBG-21G on screen menu** and wait until the desired current is reached. If there is no problem, “HV_on” and “Emission” fields will change their status to green.

Known issue: “Error 6: High voltage minimum” appears on EBG-21 hand panel after several seconds. Check in the right rack of the instrument if the EBG-21 source is switched on. If it is switched on and the problem persists the instrument must be opened - please call the instrument guarantor.

9. **ADJUST** the **e-beam** position and the spot size (wobbling) by checking the melting process via the glass window in the main chamber – stay at the low emission current as mentioned in point 7. For adjusting, use the joysticks on **EBG-21 hand panel**. The left joystick changes the e-beam position and the right one changes the spot size.



Attention: Do not focus the beam into a small spot!!! This may cause spitting out the material from the pocket! The smallest spot should have about 8 × 8 mm.

Note: Do not forget to **close all window shutters** before continuing! The pocket window shutter should be opened for a small time period for beam adjustment only!

10. **OPEN** the thickness Sensor **THC-21** shutter – right click on THC-21 scheme/Process and select “THC-21 SHUTTER OPEN.prc”. If everything was set correctly during the e-beam setup, it shouldn’t show any deposition rate.
 11. **SET** the **Emission Current** to 100% of selected value with ramp parameters from point 7 and wait until the deposition rate increases up to some suitable value about ~1-10 Å/s depending on deposited material.
 12. Simultaneously **RESET** the THC-21 thickness meter in THICKNESS-THC-21 menu and **OPEN** the SUBSTRATE shutter – right click on substrate scheme/Process and select “SUBSTRATE SHUTTER OPEN.prc”.
- Note:** For experienced users it is highly recommended to use some predefined procedure instead of the steps 12 to 17 to continue and finish the deposition process automatically.
13. Wait until the desired thickness in angstroms is shown at thickness meter plot.
 14. **CLOSE** the SUBSTRATE shutter – right click on SUBSTRATE scheme/Process and select “SUBSTRATE SHUTTER CLOSE.prc”.
 15. **CLOSE** the thickness Sensor **THC-21** shutter – right click on THC-21 scheme/Process and select “THC-21 SHUTTER CLOSE.prc”.
 16. After the deposition, **RAMP** the **Emission Current** slowly down – go to EBG-21G menu and set the Setpoint[mA] to 0 mA with "Ramp[mA/s]" about 2-5 mA/s depending on material and press "Set SP".
 17. Wait until the HV source is switched off.

Sample heating

Sample heating is not available at the moment. Instruction will be added after heating element installation.