

Dektak 150 Stylus Surface Profiler Operation Manual

Note: To abort a Dektak 150 operation, press the **Esc** or **A** key on the keyboard.
The stylus is very expensive, take caution when you load and unload your samples.




START UP

1. Double-click the “Dektak” icon to start the Dektak 150 software.

SAMPLE LOADING

1. Open the enclosure.
2. Verify that the tower is raised.
3. Position the sample in the center of the stage right below the stylus.

DEFINING SCAN LOCATION and LENGTH

1. Select **Profiler > Tower Down** or click  icon.
2. Use the **Illumination Adjustment** icons  to adjust the illumination to view the sample.
3. From stage control panel, click arrows to move sample and find desired area.
4. Initiate Stage Tracking (left-click in the camera view pane) for fine sample positioning. The image should now track the motion of the mouse.
5. With the stylus reticle properly positioned on the sample, click the mouse button a second time to deactivate Stage Tracking. This is your starting point.
6. Select **Edit > Define Scan Location/Length**. The **Location/Length for Routine #: 1 of 1** dialog box appears. The **X**, **Y**, and **T** fields display the current X-Y stage position.
7. Click the **Enter** button in the **Current Location** section to assign the coordinates to the scan routine. This is the scan start point.
8. Under the **Current Length** in the **Location/Length for Routine #: 1 of 1** dialog box, click **Track** button. Then roll the mouse until the stylus reticle is at the end of the scan. Click **Enter** button. The start location and length are determined. **Note** that it is also possible to edit the value with the keyboard.
9. Click the close box at the upper right corner to close the dialog box.
10. Select **Window > Scan Routines** from the system menu bar or click the **Switch to Scan Routines Window** icon  to display the **Scan Routines** window
11. Click any of the underlined items in the **Scan Parameters** section of the window to open the **ScanParameters** dialog box.

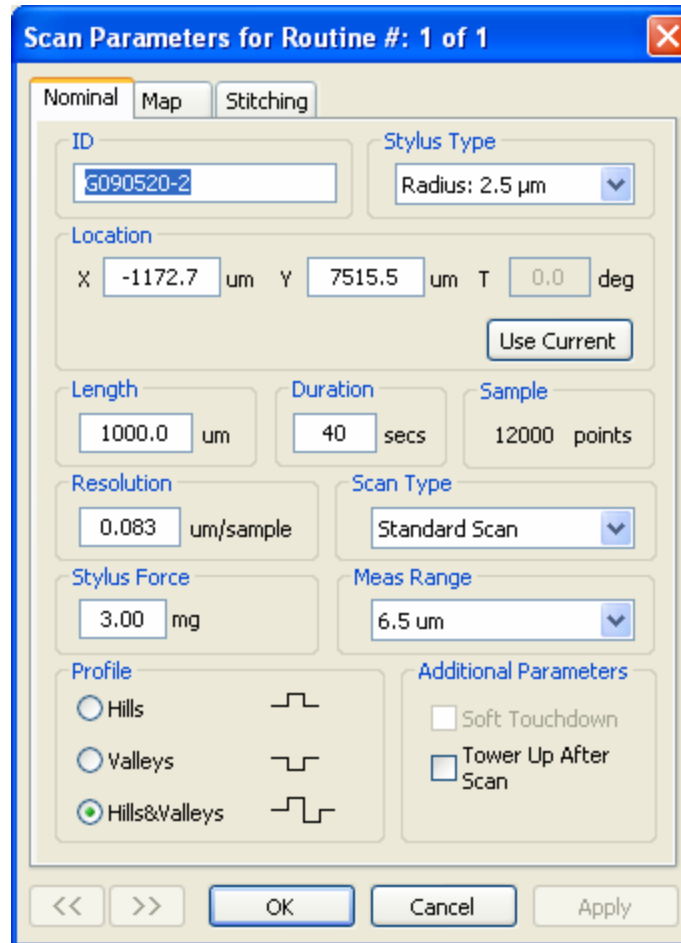


Figure 1: Scan Parameters Dialog Box

12. If desired, adjust the scan parameters in the dialog box, such as scan **ID**, **Duration**, horizontal **Resolution**, **Stylus Force**, **Measurement Range**, and **Tower Up After Scan**.
13. Click **Apply** and then click **OK** to accept your entries and close the dialog box.

SCAN PARAMETERS

All of the scan parameters are user selectable and can be accessed from the **Scan Routines** window.

Scan ID

This parameter allows you to assign a fifteen-digit scan identification file name or number.

Stylus Type

The **Stylus Type** parameter allows you to specify which stylus type is used in your system.

Scan Location

This parameter displays the X and Y location in μm for this particular scan routine.

Scan Length

Scan lengths from 50 μm to 55,000 μm (50 mm) are possible using the standard Dektak 150 system.

Scan Duration/Speed

The **Duration** setting displays the amount of time it takes to complete a given scan. Scan duration, in conjunction with scan length, determines the horizontal resolution of a scan. Therefore, scan speed is directly related to the resolution.

Scan Resolution

The **Resolution** parameter displays the horizontal resolution for the scan length and scan speed (duration) entered into the scan routine. The scan resolution is expressed in $\mu\text{m}/\text{sample}$, indicating the horizontal distance between data points. Data points are the points along the scan path at which data samples are taken. The more data points taken during a given scan length, the shorter the distance between data samples. Therefore, a scan routine with the lowest number of μm per sample provides the best possible horizontal resolution.

The Dektak 150 provides horizontal resolution with a maximum 60,000 data points available per scan. Scan length and scan duration determine the horizontal resolution of the Dektak 150. The profiler maintains a constant sampling rate of 300 data points per second. By slowing scan speed, you can process more samples with a given scan length over a longer period of time. Scan duration may be set anywhere from 3 to 200 seconds.

Scan Type

Only **Standard Scan** and **Map Scan** can be selected.

Stylus Force

You can set the stylus force from 1mg to 15 mg force.

Measurement Range



The available vertical resolution depends upon the **Measurement Range** selected. When measuring extremely fine geometries, the 65 kÅ range provides a vertical bit resolution of 1 Å. For general applications, the 10 Å vertical resolution of the 655 kÅ range is usually adequate. When measuring thick films or very rough or curved samples, select the 5240 kÅ range with 80 Å resolution.

Profile

The **Profile** setting scales the measurement range according to the profile selected. Three different profiles are available for a variety of sample surface characteristics.

- **Valleys:** Provides 90% of the measurement range below the zero horizontal grid line. Used primarily for measuring etch depths.
- **Hills and Valleys:** Provides 50% of the measurement range above the zero horizontal grid line and 50 percent below. Used in most applications, especially if the surface characteristics of the sample are not well known, or if the sample is out of level.
- **Hills:** Provides 90% of the measurement range above the horizontal grid line. Used primarily for measuring step heights.

DATA COLLECTION

1. Click **Window > Sample positioning** from system menu bar or click **Sample Positioning Window** icon .
2. To run a scan routine, click **Run > Scan** from the system menu or click the **Run Currently Active Scan Routine** icon .

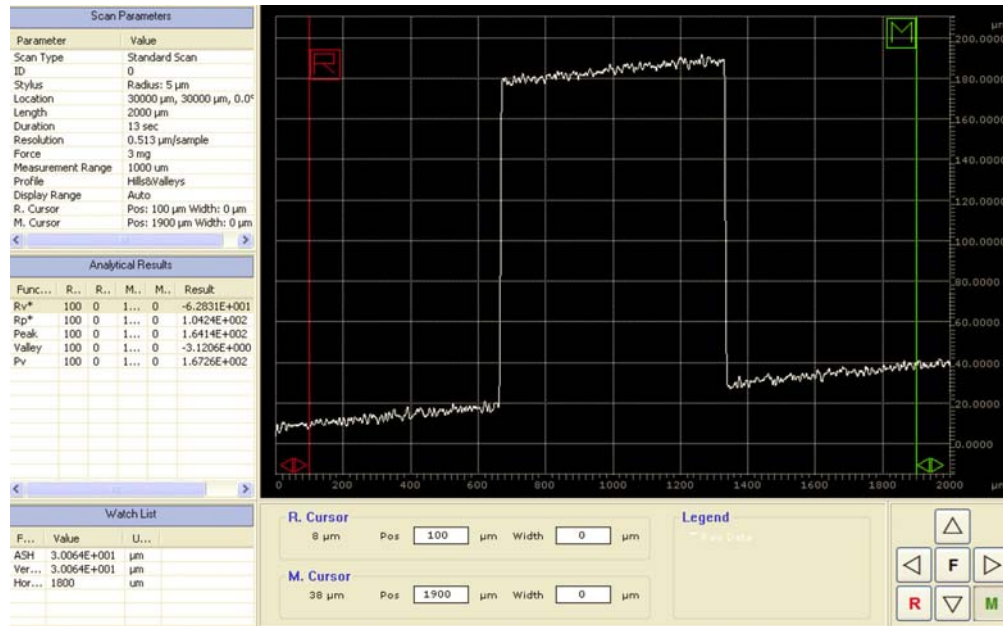



Figure 2 Data Plot Window after Scan Completion

The reference (**R**) cursor and measurement (**M**) cursor define the portion of the profile trace for leveling or performing analytical functions. You can adjust the bandwidth at each cursor to average the data points within the cursor's bandwidth. This is useful for leveling and average step height measurements.

SOFTWARE LEVEL and STEP HEIGHT

1. Position the **R** and **M** cursors along the baseline of the step and adjust the bandwidth.
2. Click the **Level** icon  or press **F7**, or select **Plot > Level** from the system menu bar. The profile trace replots and levels with the R and M cursor intercepts at zero.
3. Measure the step height with **R** and **M** cursors.


SAVING THE DATA PLOT

1. Click **File > Save as** to save the original data in **C/user-data/your folder**.
2. Click **File > Export** to save as CSV format.
3. Right click on the data plot, select **Save as Image** if you want the graphic format.

SHUT DOWN

1. Click **Window > Sample positioning** from system menu bar or click **Sample**

Positioning Window icon .

2. Select **Tower up** from **Profiler** menu bar or click **Tower Up** icon .
3. After the tower is raised, remove your sample carefully.
4. Select **File > Exit** from the Dektak menu bar to exit the Dektak software.