

HighFinesse  
The Standard of Accuracy

HighFinesse Tutorial

# Setting up the HighFinesse LWA-1k

## How to ...

### ... set up the HighFinesse LWA-1k

This tutorial does not replace reading the linewidth analyzer (LWA) user manual.





Make sure that your laser input fulfills the following requirements:

- a) The **laser must be cw**.
- b) The **laser must not be scanned during the measurement**.
- c) **Provide 0.5 to 10 mW in a PM Fiber with FC/APC connector**.  
Ideally provide 5 to 10 mW for the best performance of the instrument.
- d) The **laser must not exceed the maximum linewidth of 20 MHz at 100 ms observation time**.
- e) In case the **laser is sensitive to back reflection** the **use of an isolator with 55 dB between laser and LWA** is recommended.

LWA products brochure

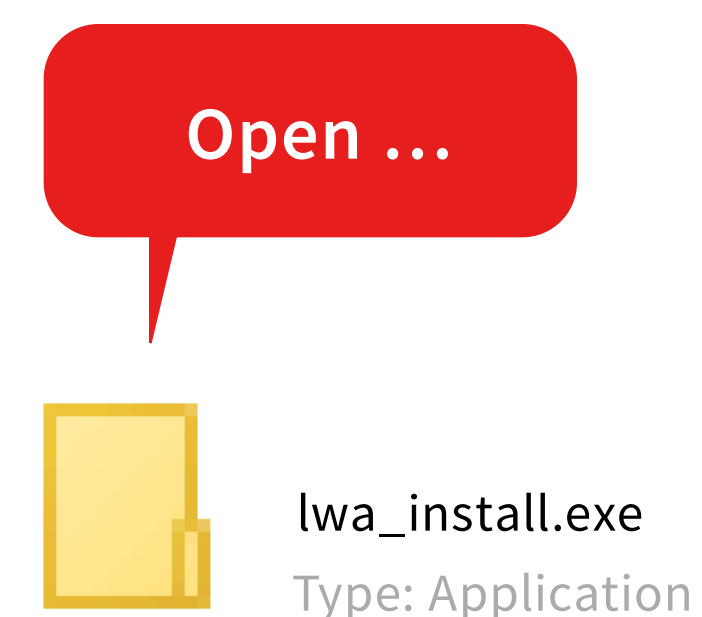
<https://www.highfinesse.com/en/linewidthanalyzer/linewidthanalyzer-further-information/product-brochure-linewidthanalyzer.pdf>

1

 bin	24.08.2022 09:38	Dateiordner
 drivers	24.08.2022 09:38	Dateiordner
 Control Measurement.pdf	04.07.2022 10:08	PDF Document
 lwa_install.exe	04.07.2022 17:25	Anwendung

Install the Software that is located on the USB Flash Drive by clicking on lwa\_install.exe.

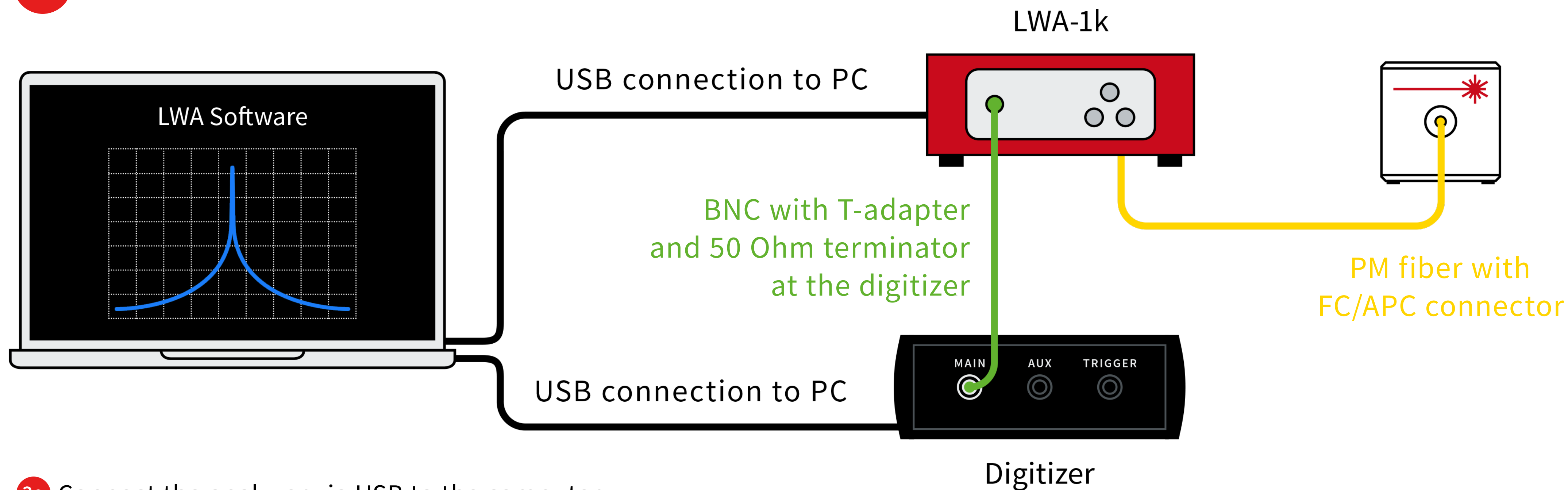
2



We recommend the following specs for the computer:

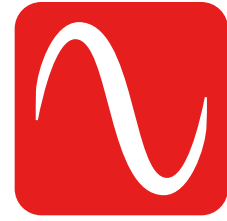
- Windows 10, 64 bit or higher
- Intel® Core™ i5 equivalent or better
- Memory 16 GB or better
- At least 2 USB 3.0

3

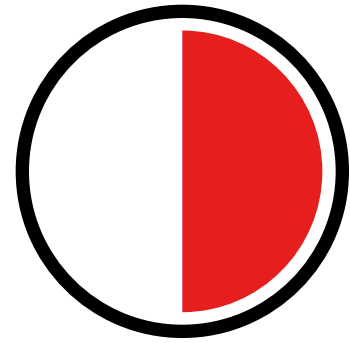


- 3a Connect the analyzer via USB to the computer.
- 3b Connect the digitizer via USB to the same computer.
- 3c Connect the analyzer output to the digitizer input using the BNC cable (with T-adapter with 50 Ohm termination at the digitizer).
- 3d Connect the laser via a PM fiber with FC/APC connector.

4



HighFinesse  
Linewidth Analyzer  
Control

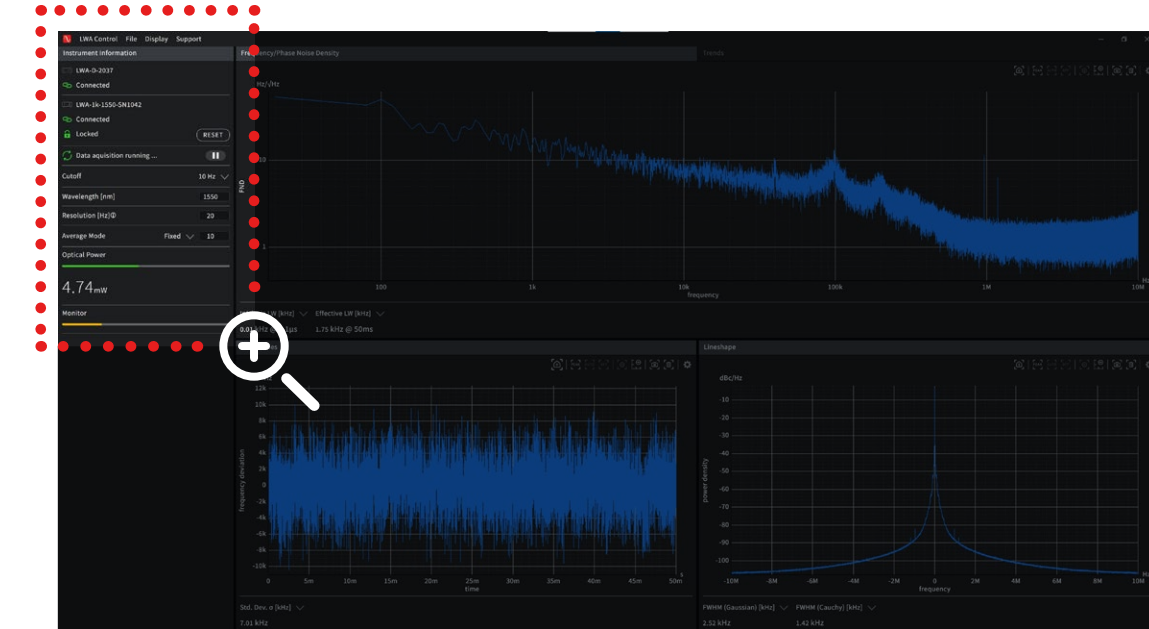
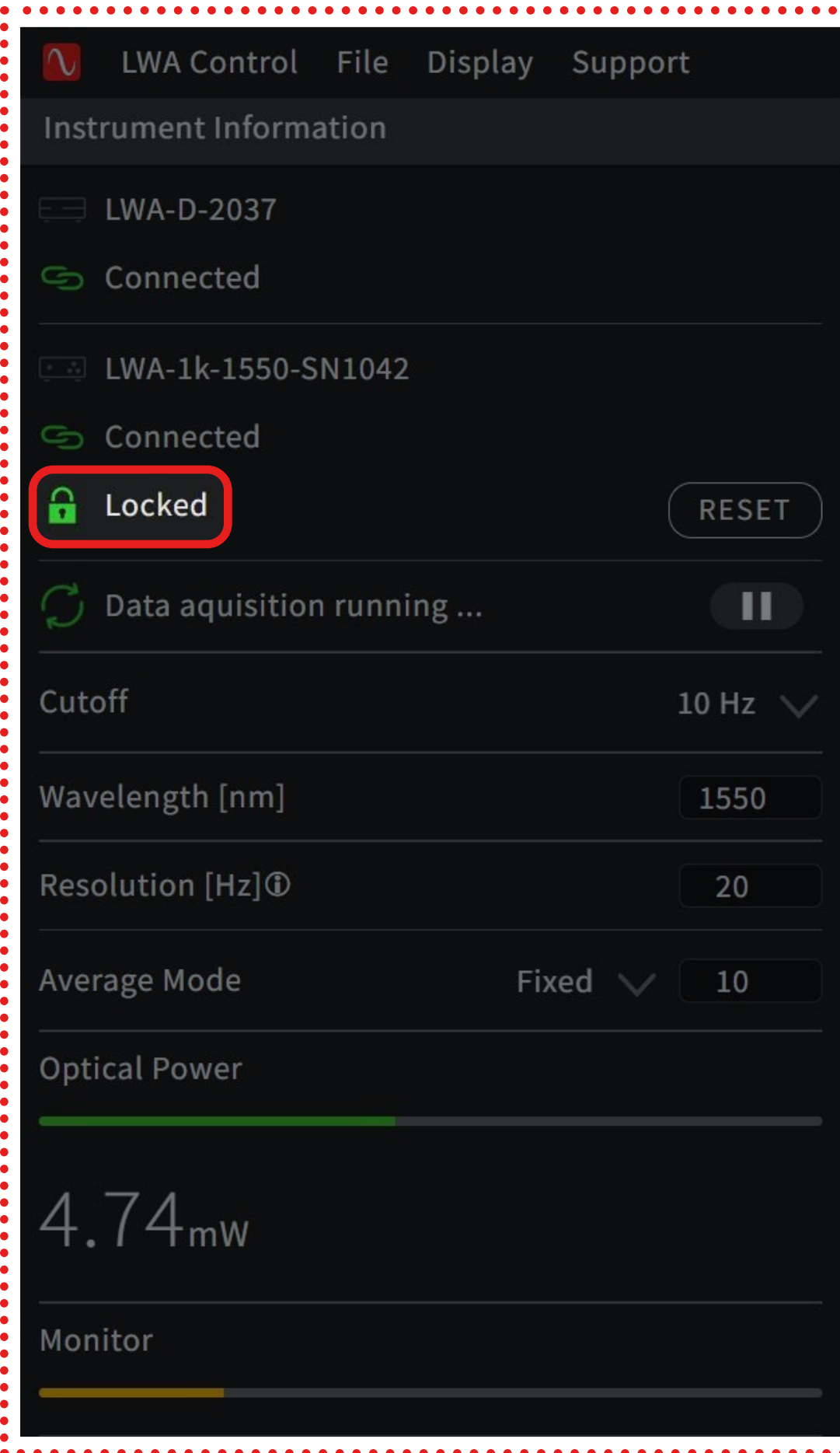


30 sec.

Turn on the Analyzer and start the LWA Software.

Wait for the LWA to adapt to the **laser**. This can take up to 10 minutes but **typically** takes 30 seconds.

5



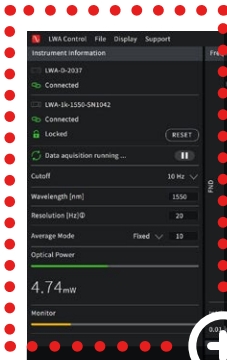
In the software the device information displays the current state of the Analyzer in its initialization procedure.

Wait for this indicator to turn to **“Locked”** before valid measurements can be obtained.

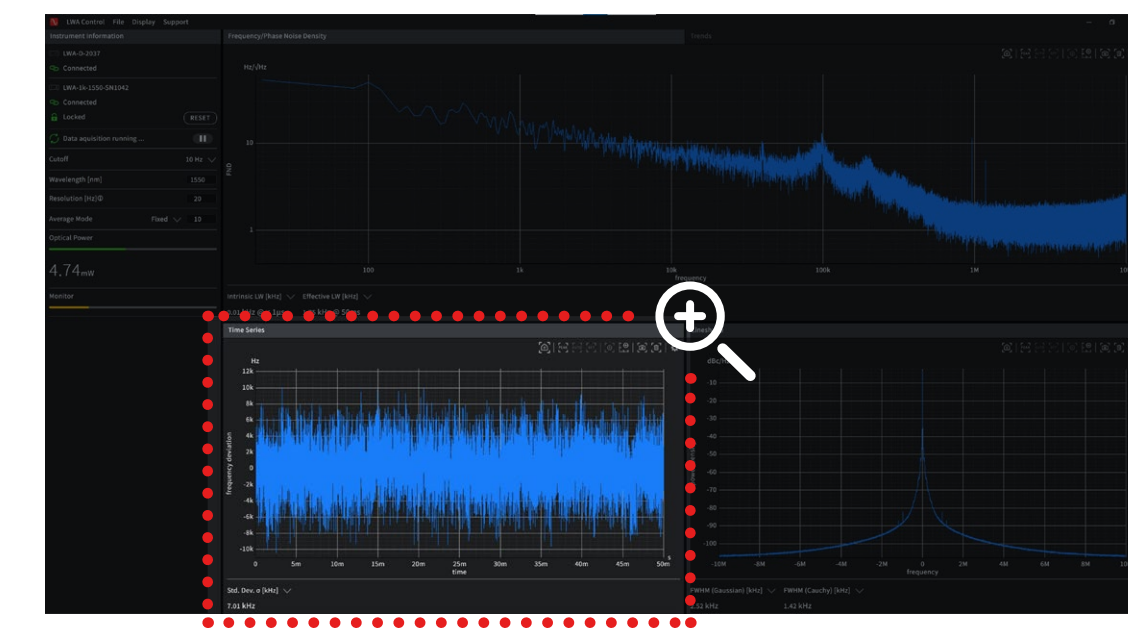
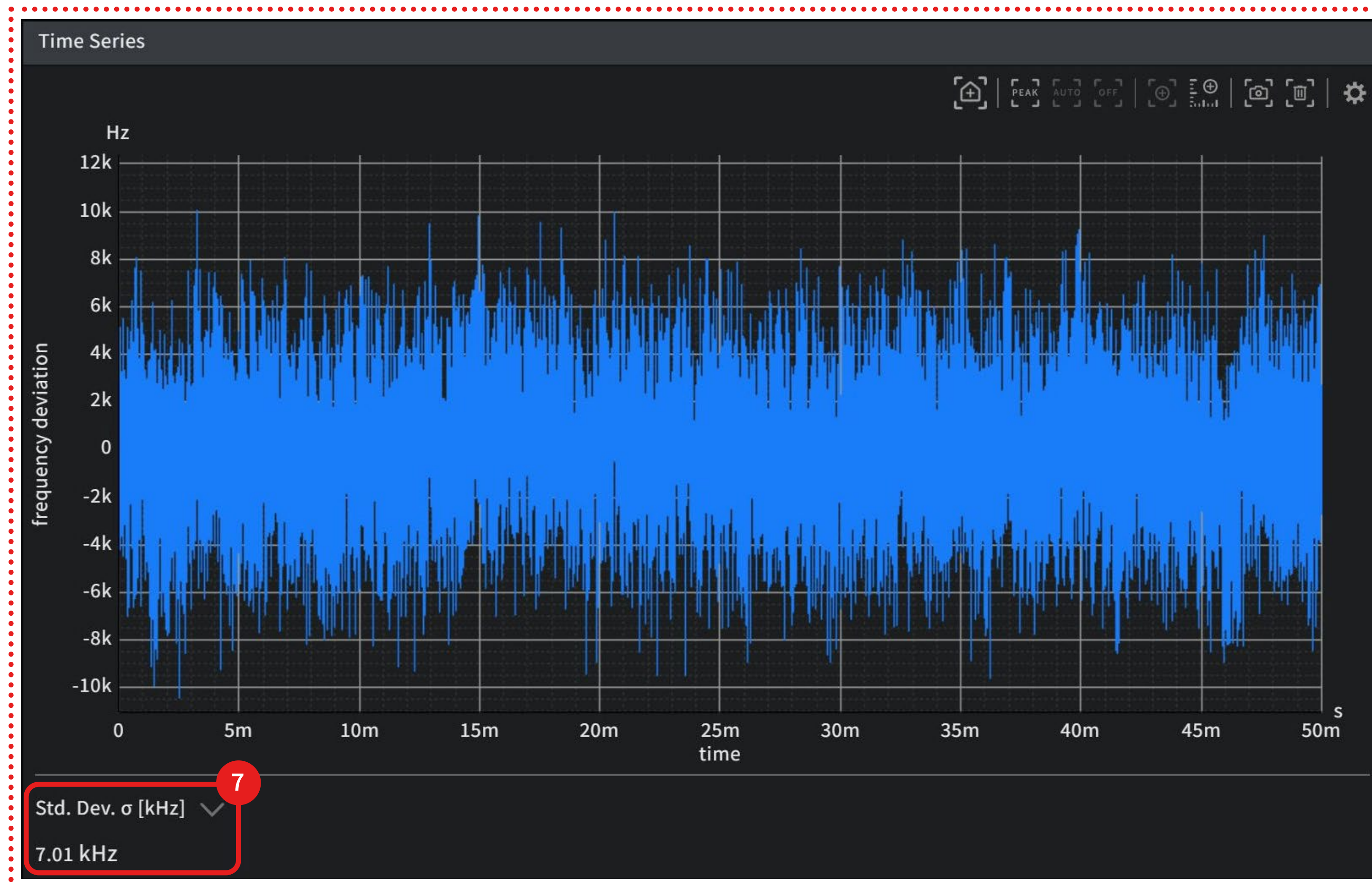
If **“Failed”** is displayed or **“Stabilizing”** for more than 20 minutes refer to the troubleshooting section in the manual.



6



7

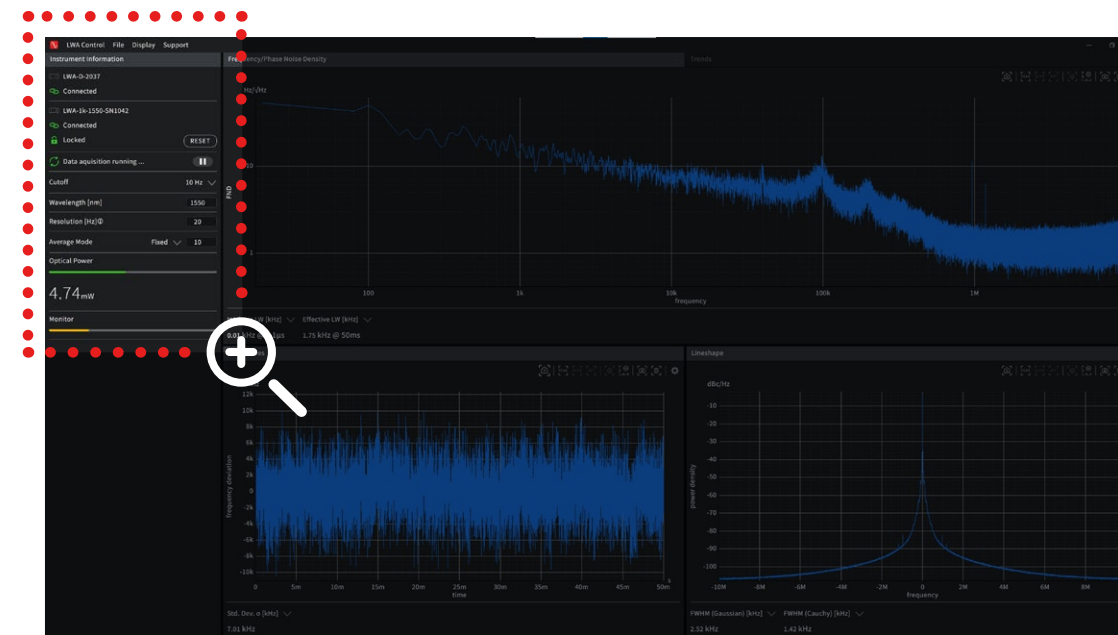


In the “Time Series” window the fundamental data measured is displayed by the instrument: The frequency deviations are displayed as a function of time.

The indicator 7 shows the standard deviation of the observed frequency deviations. This should not be mistaken by the linewidth.



8

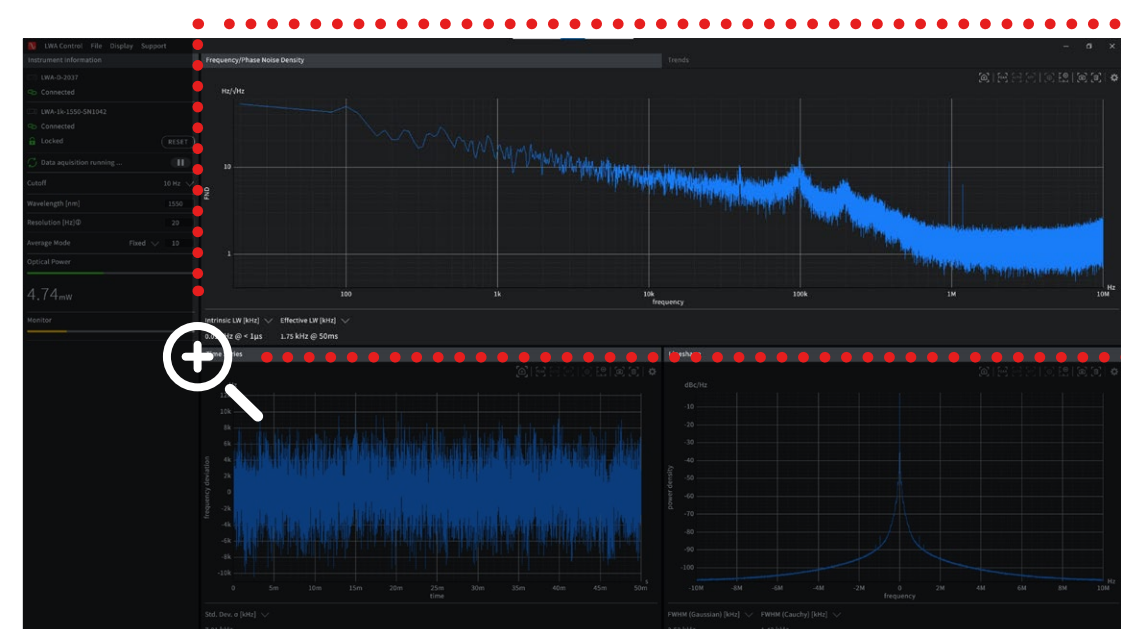
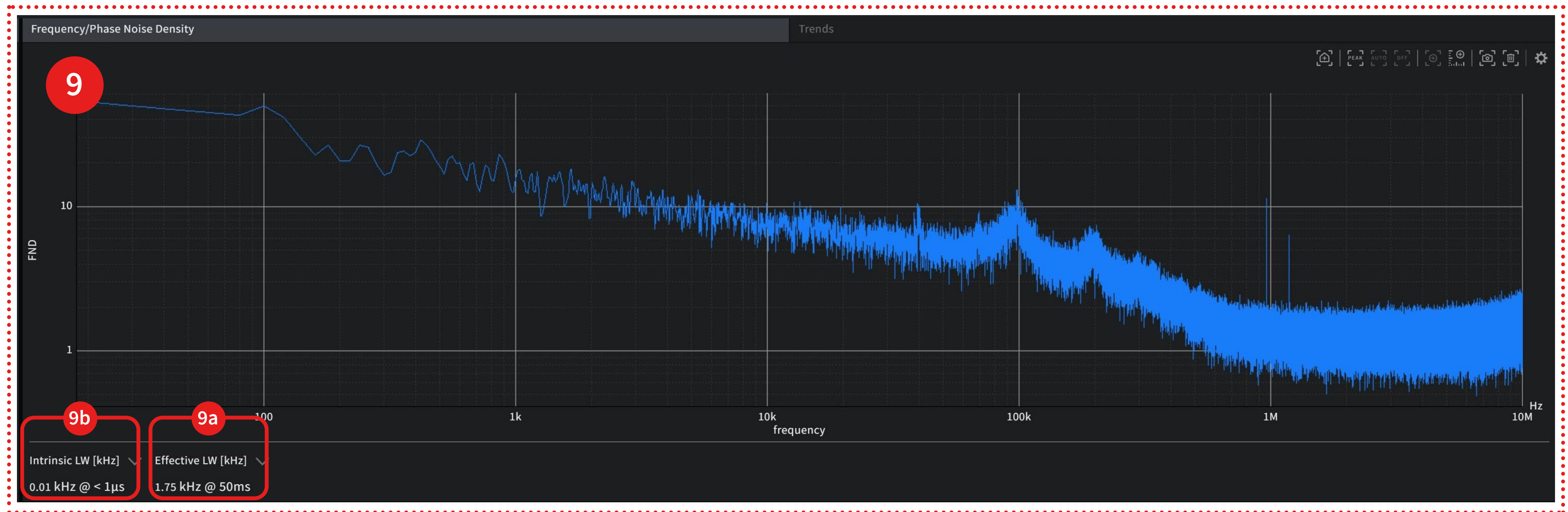


Adjust the Resolution [Hz]/measurement time.

10 Hz corresponds to the maximum measurement time of 100 ms.

This will both affect the measurement time and resolution in the frequency noise density spectrum.





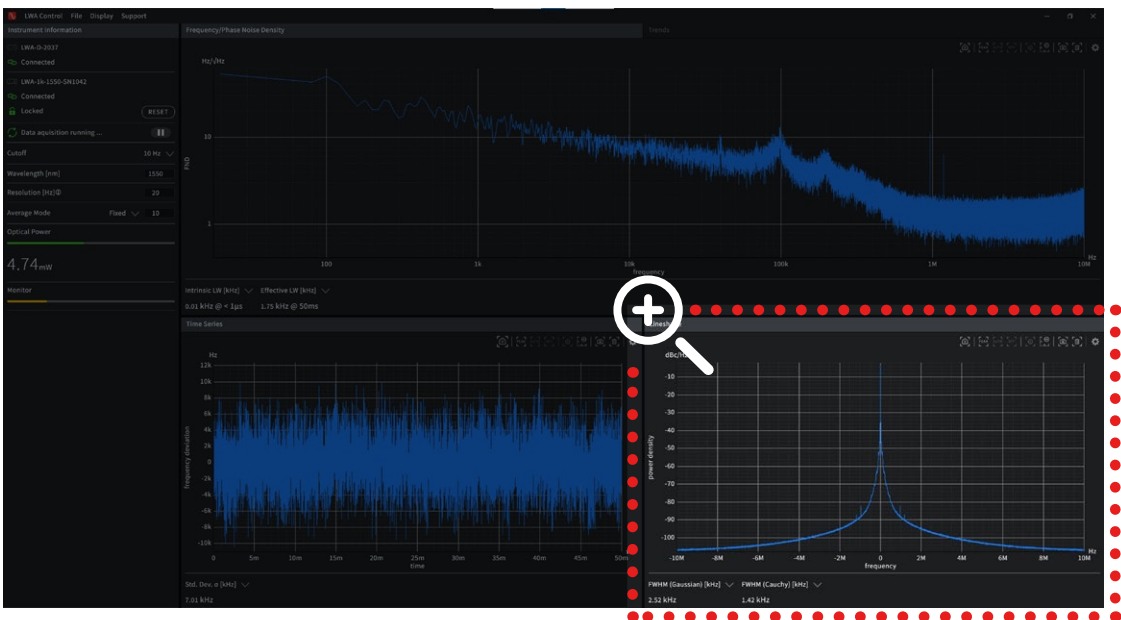
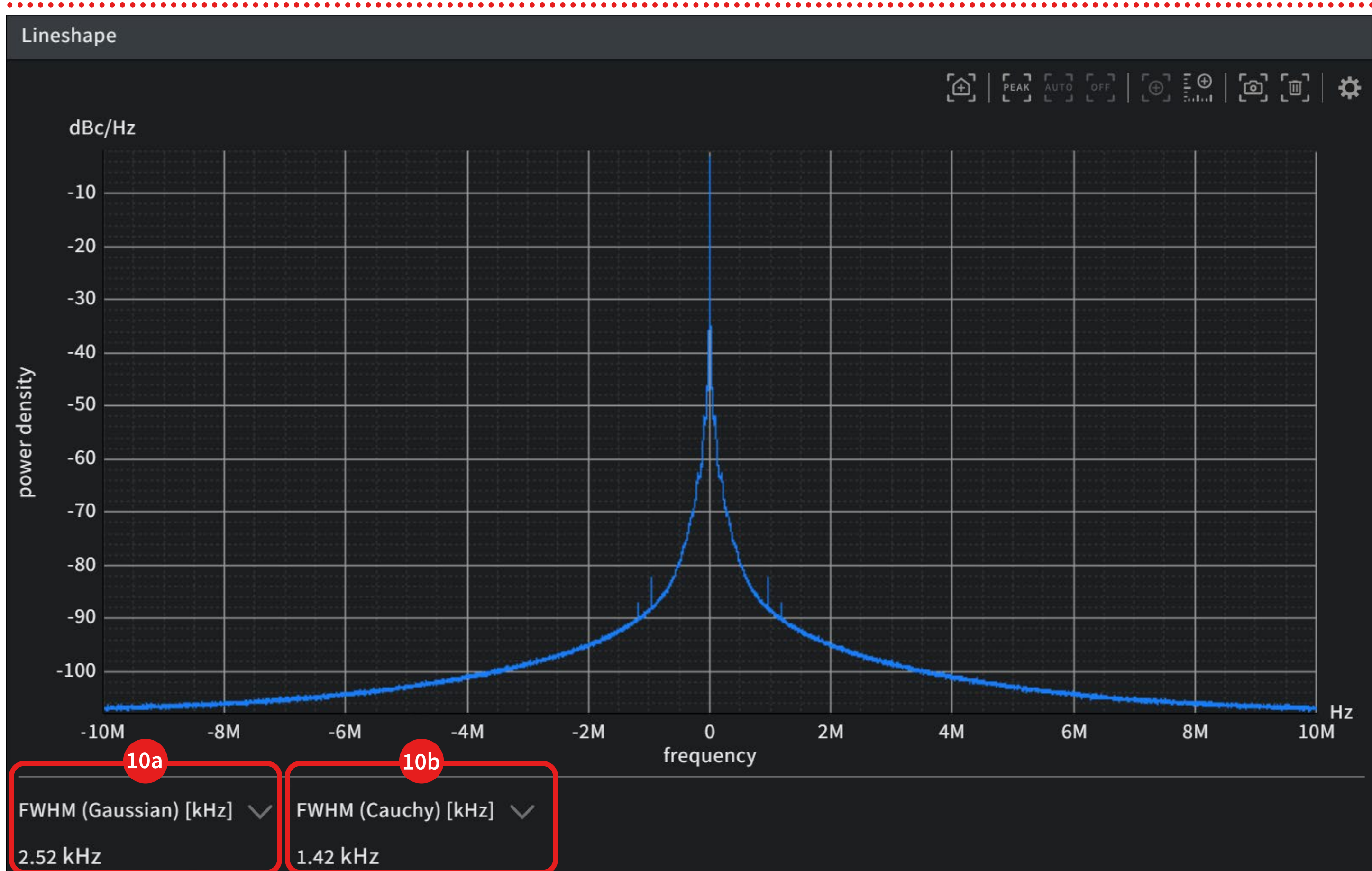
In the “Frequency/Phase Noise Density” window the frequency noise density is displayed.

The effective linewidth displayed in the lower left corner **9a** gives you the linewidth over the measurement time as specified in “Resolution/measurement time”.

The intrinsic linewidth **9b** is derived from the noise between 1 and 10 MHz and corresponds to an observation time of 1 µs.



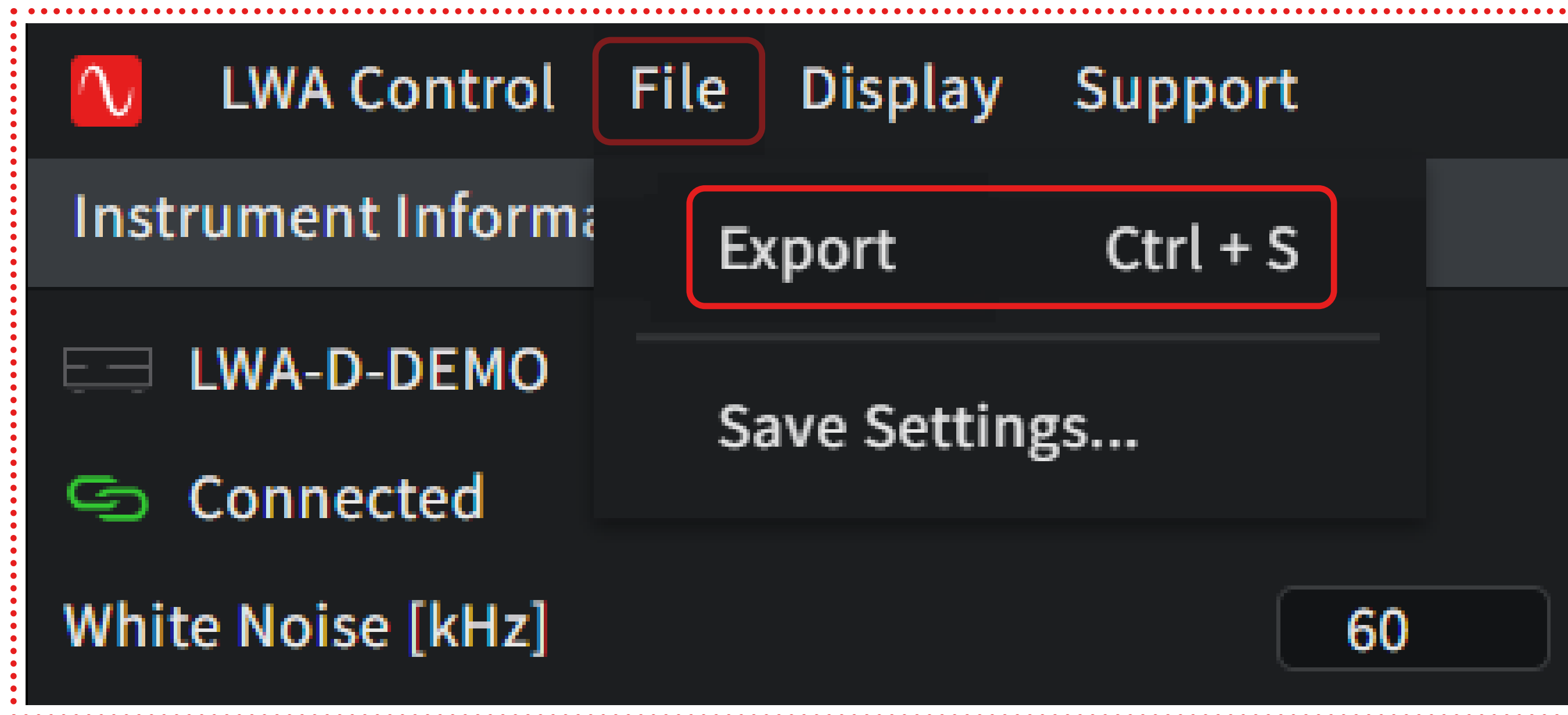
10



In the “**Lineshape**” window the **laser lineshape** is displayed.

The fullwidth half maximum is displayed assuming a pure **10a** Gaussian or **10b** Cauchy/Lorentzian lineshape.

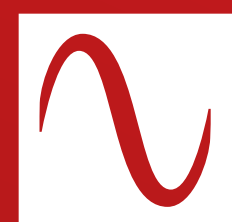
11



Click to “File – Export” to export data as .csv or .npz.

For post analysis in Python see examples in the software installation path.





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