

HighFinesse
The Standard of Accuracy

HighFinesse Tutorial

Setting up the HighFinesse LWA-1k

Tutorial · Setting up the HighFinesse LWA-1k · 8-2023

This document provides general information only and may be subject to change at any time without prior notice.

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

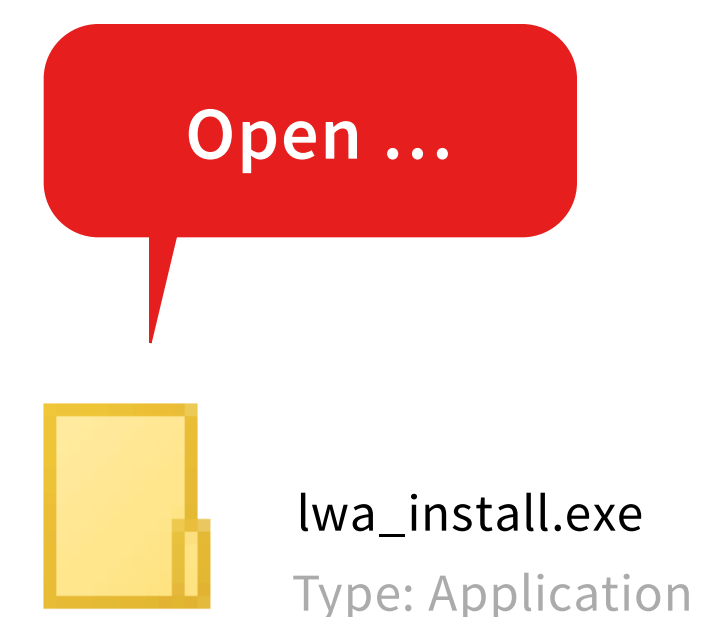
<https://www.highfinesse.com/en/linewidthanalyzer/linewidthanalyzer-further-information/product-brochure-linewidthanalyzer.pdf>

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

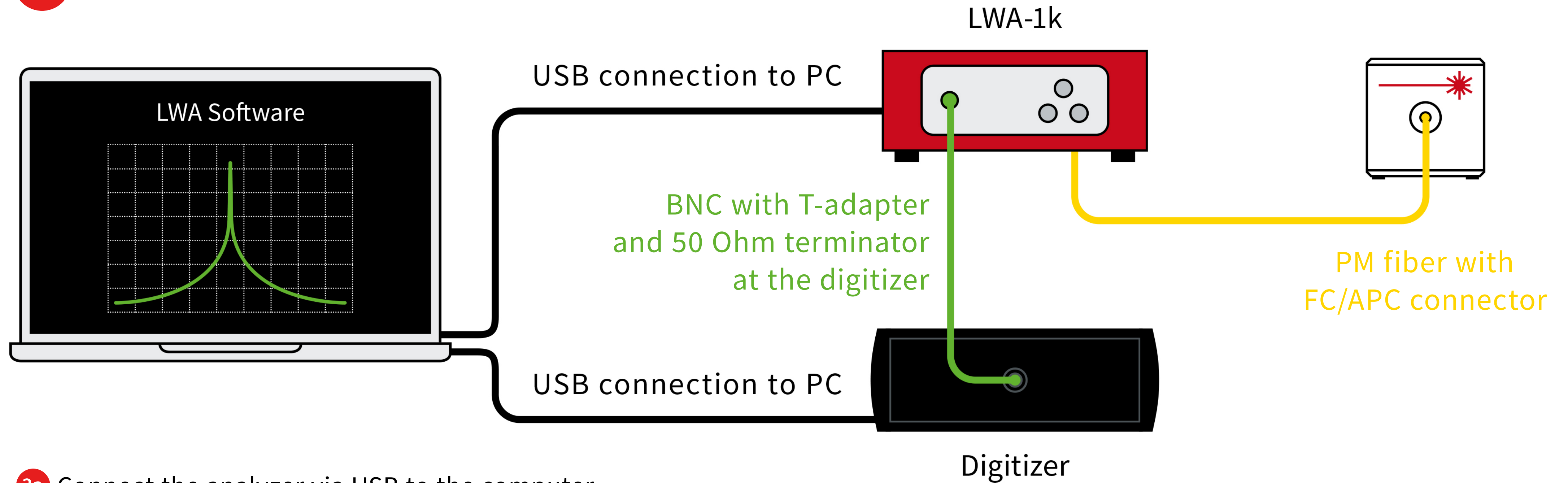


We recommend the following specs for the computer:

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

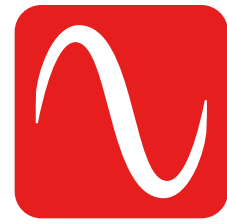


3

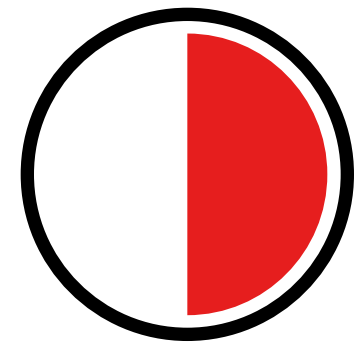


- 3a Connect the analyzer via USB to the computer.
- 3b Connect the digitizer via USB to the same computer.
- 3c Connect the analyzer output to the digitizer input using the BNC cable (with T-adaptor with 50 Ohm termination at the digitizer).
- 3d Connect the laser via a PM fiber with FC/APC connector.

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HighFinesse
Linewidth Analyzer
Control



30 sec.

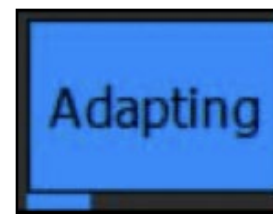
Turn on the Analyzer and start the LWA Software.

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

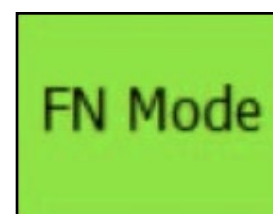
5



Autostart: the instrument is warming up and initializing.



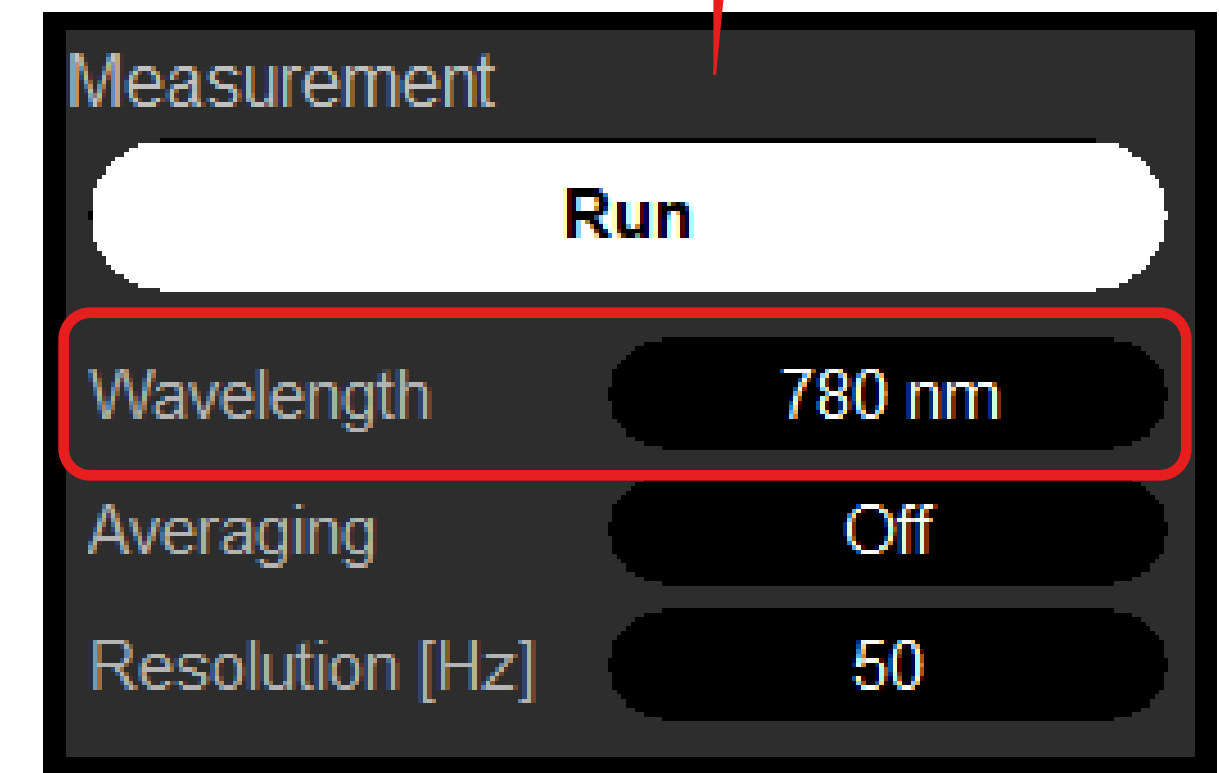
Adapting: the instrument is adjusting to the laser.



FN Mode: the instrument is attuned to the laser and the frequency deviations can be measured.

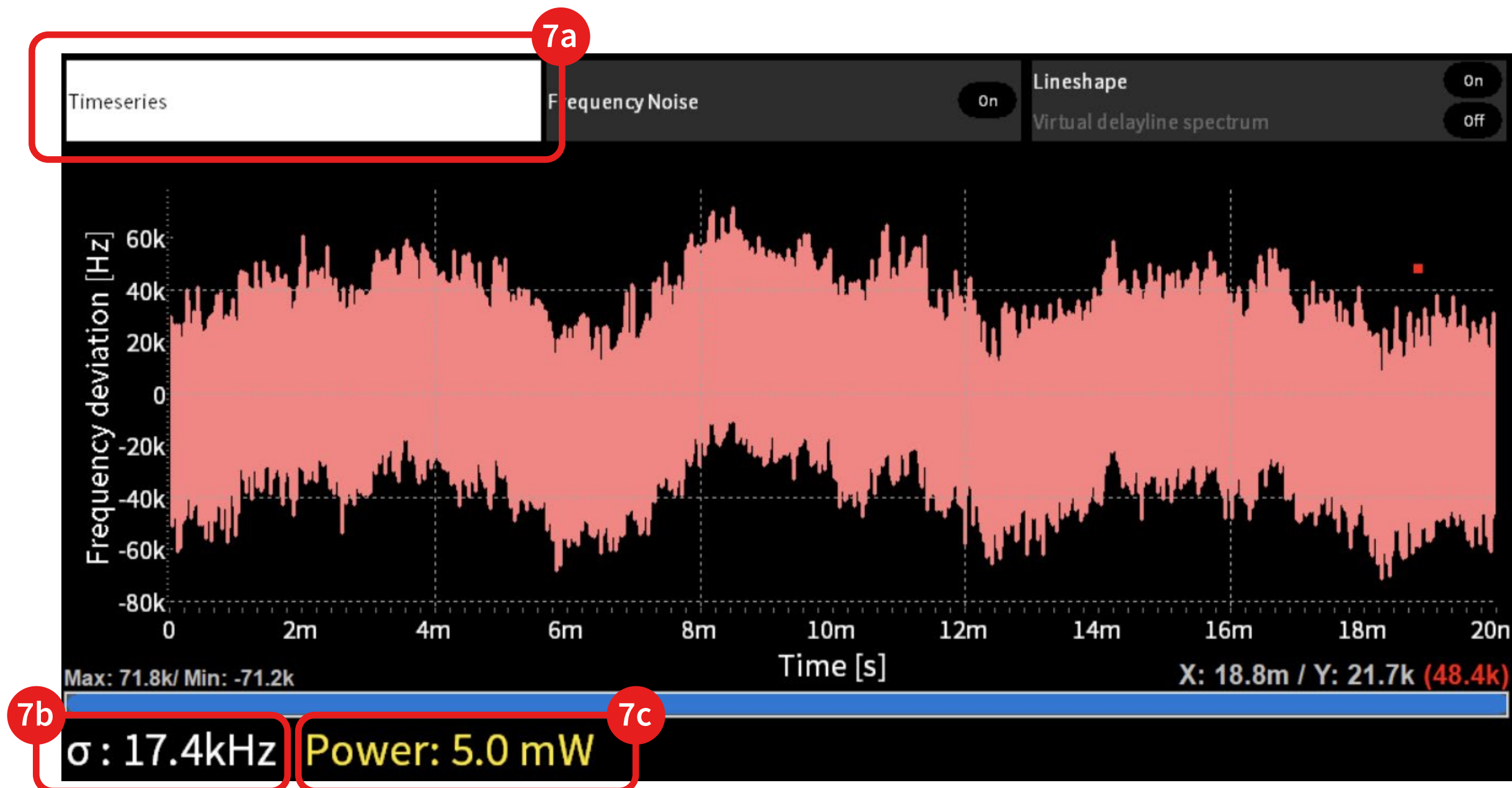
6

Enter the wavelength and click to run ...



Enter the wavelength and start the Measurement by clicking on “Run”.

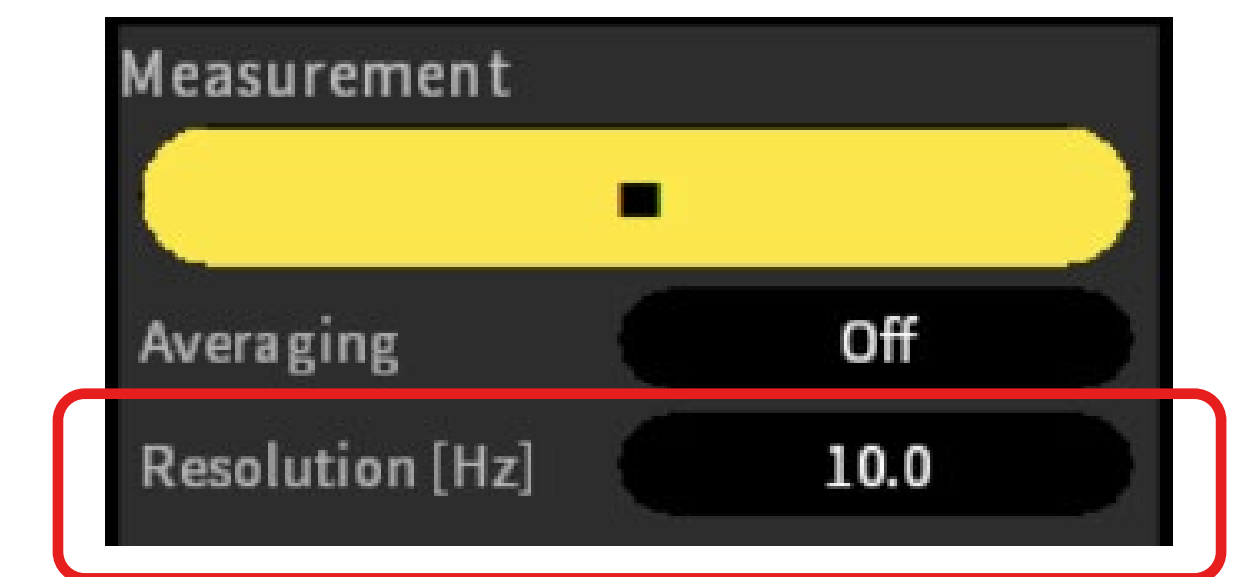
7



Click to the “Timeseries” frame **7a** to display the fundamental data measured by the instrument: The frequency deviations are displayed as a function of time.

The indicator **7b** shows the standard deviation of the observed frequency deviations. This should not be mistaken by the linewidth. The indicator **7c** shows an estimation of the laser power.

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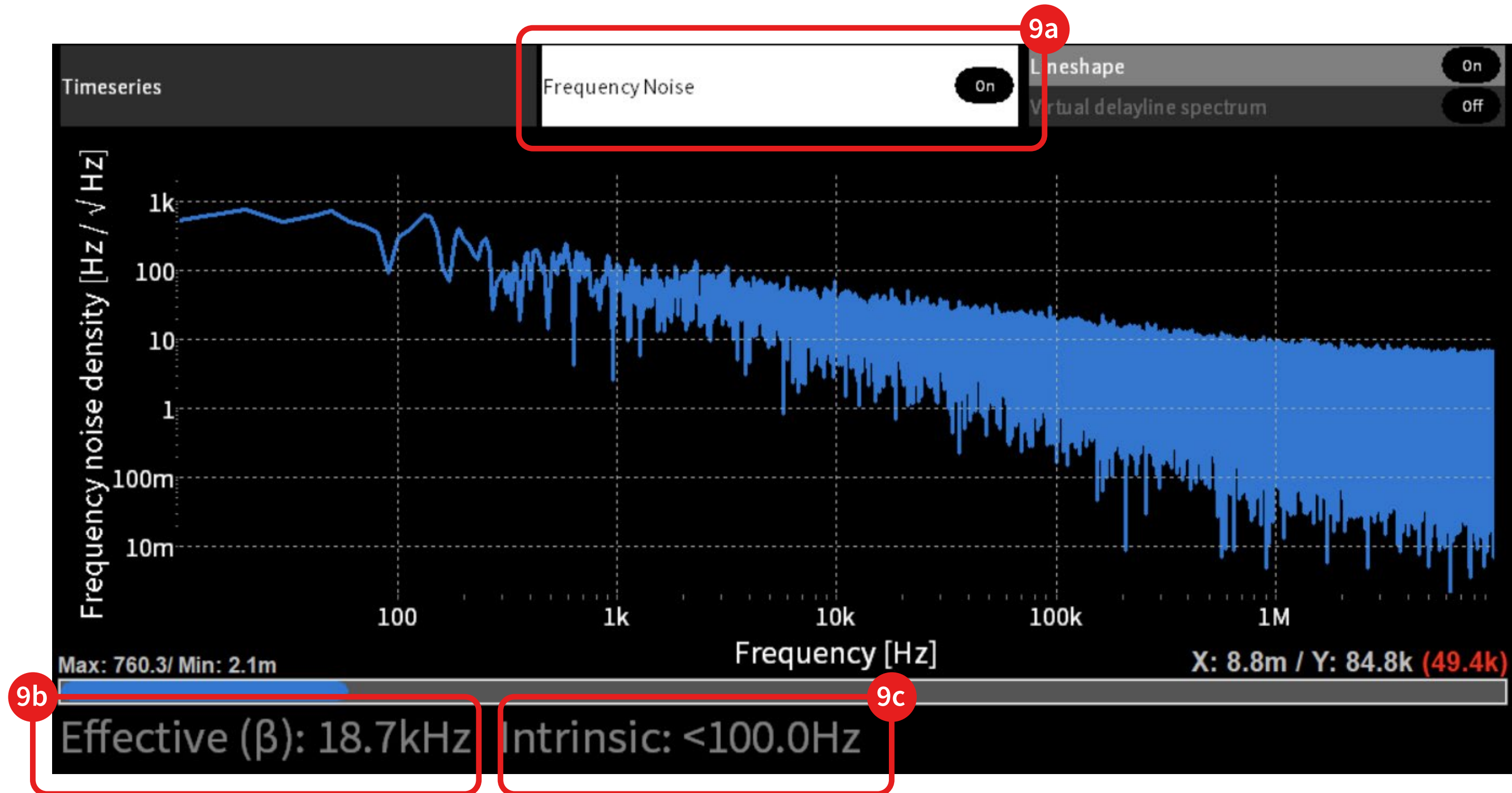


Adjust the Resolution [Hz]/measurement time.

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.

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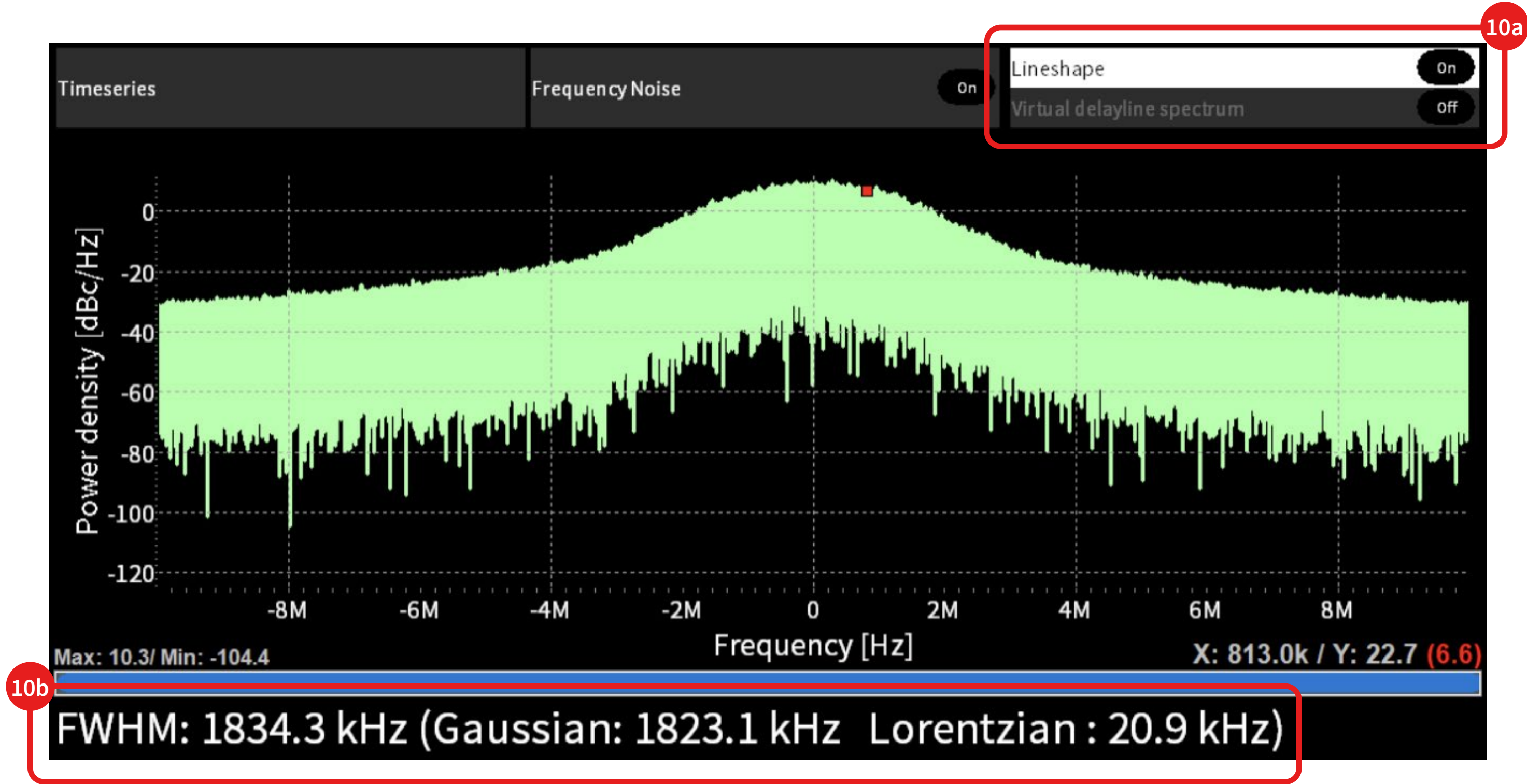
Move to the “Frequency Noise” frame **9a** to display the frequency noise density as a function of the perturbation frequency.



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

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

10

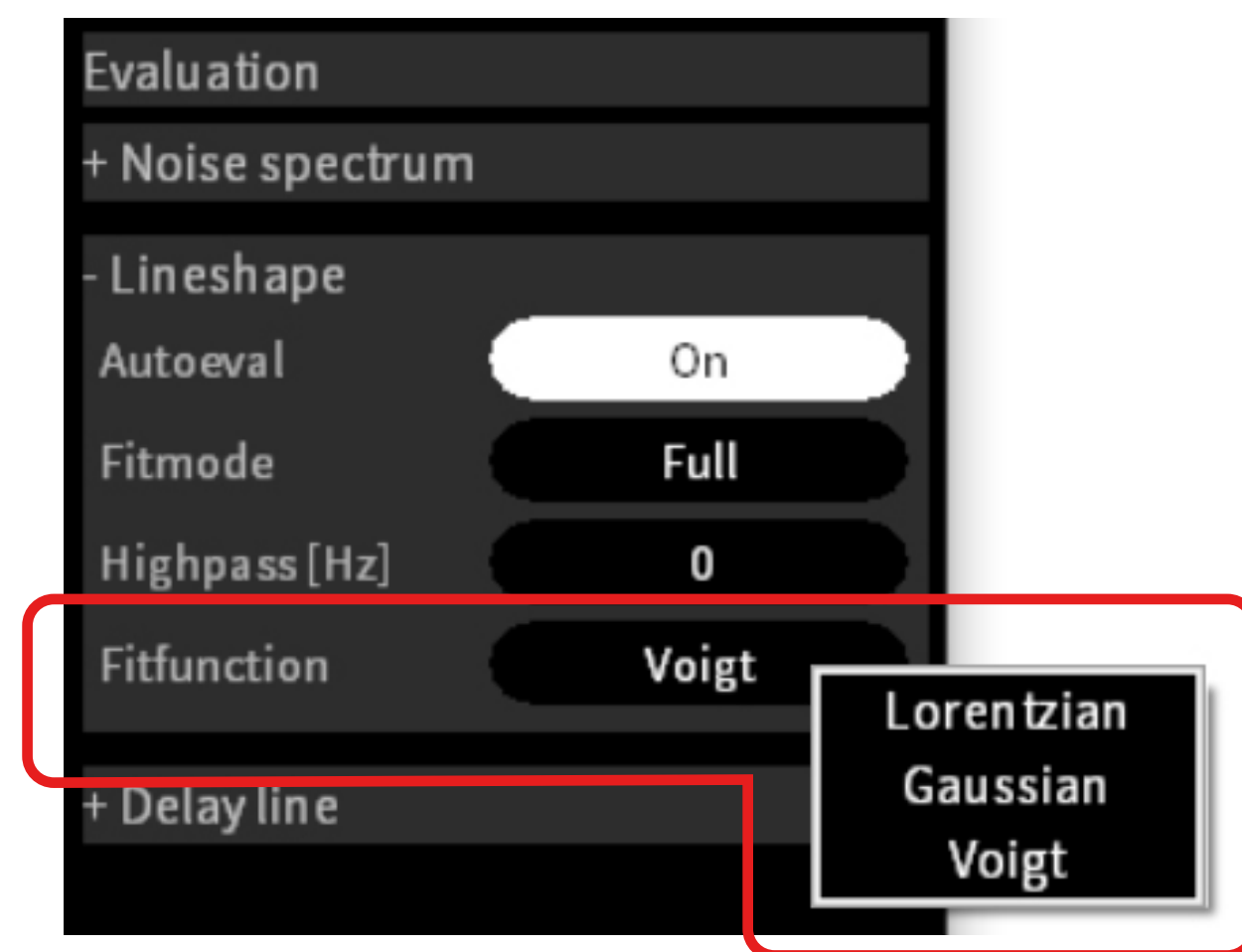


Move to the “Lineshape” frame **10a** to display the lineshape.

A Voigt model is fitted to the lineshape yielding the Gaussian and Lorentzian linewidth **10b**.

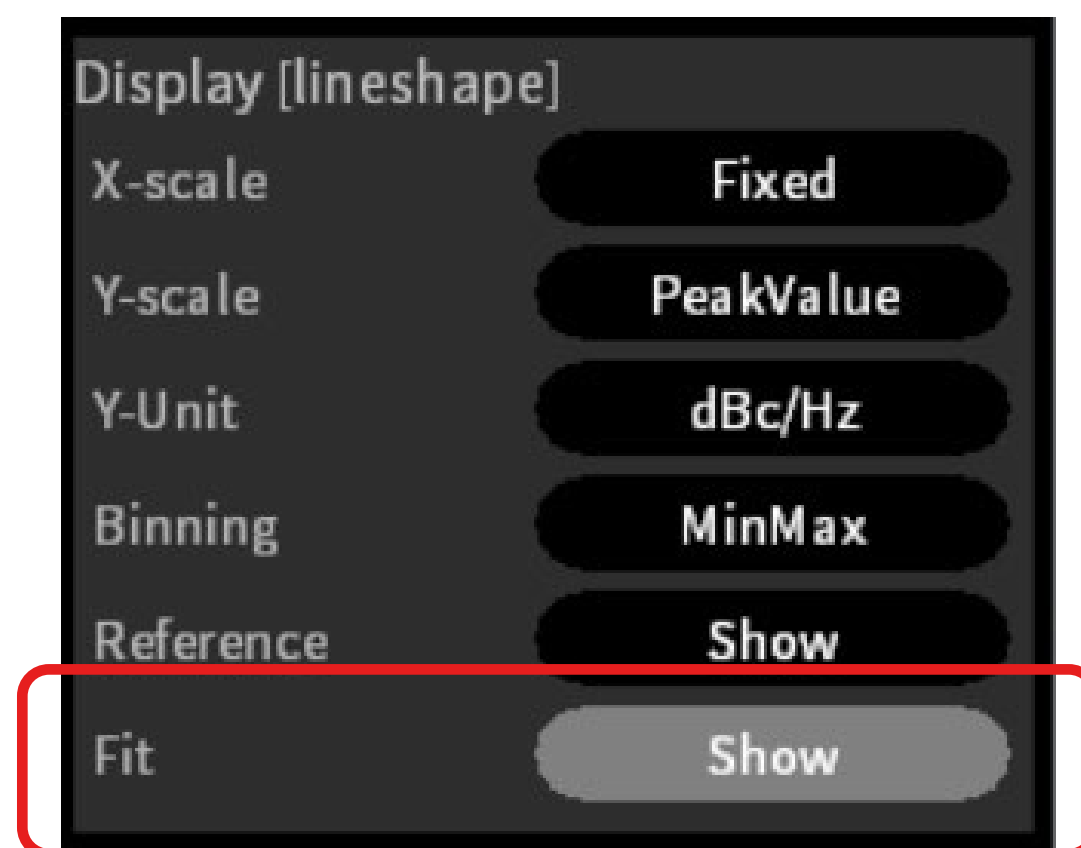


11



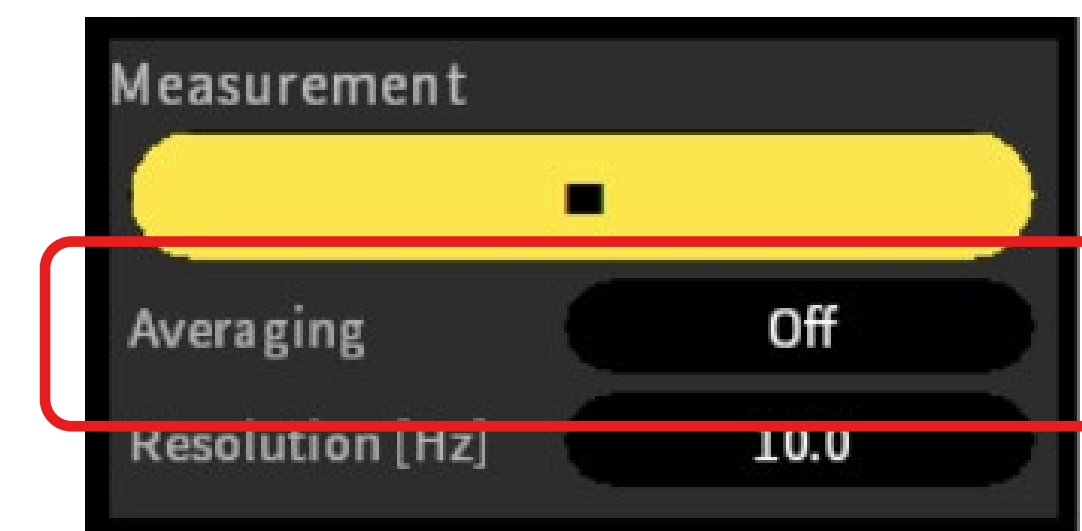
The model used in the fit can be changed in the Evaluation [Lineshape] settings.

12

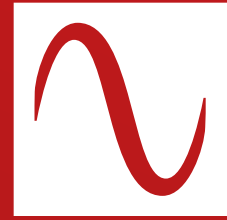


In the Display [Lineshape] settings the resulting fit can be shown.

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Enable averaging to obtain the overall lineshape average over multiple measurements.



HighFinesse
The Standard of Accuracy



HighFinesse GmbH
Wöhrdstraße 4
72072 Tübingen, Germany



T + 49 (0) 7071 - 53 918 0



F + 49 (0) 7071 - 53 918 99



M info@highfinesse.com



Additional information
and distributors:



www.highfinesse.com