HighFinesse

The Standard of Accuracy

HighFinesse Tutorial

Setting up the HighFinesse LWA-10k and LWA-100k

How to …

… set up the HighFinesse LWA-10k and LWA-100k

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.

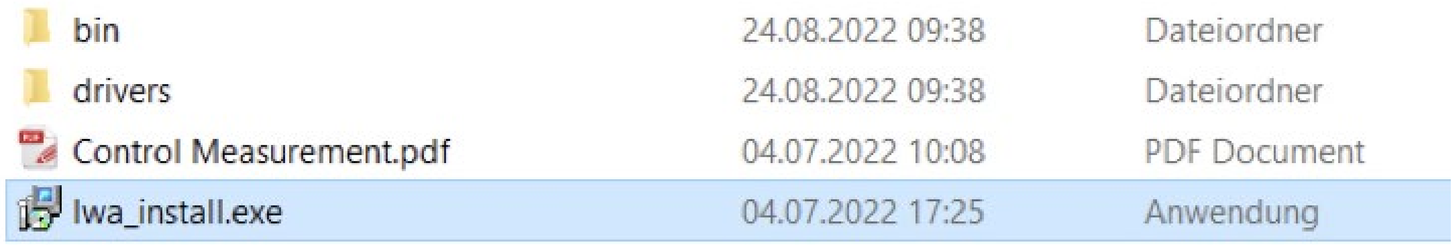
d) The **laser must not exceed the maximum linewidth specified for the LWA-10k - 30 MHz @ 100 ms and LWA-100k - 100 MHz @ 100 ms.**

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

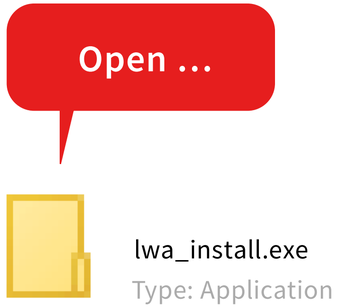
https://www.highfinesse.com
/en
/linewidthanalyzer
/linewidthanalyzer-further-information
/product-brochure-linewidthanalyzer.pdf

1



Install the Software that is located on the USB Flash Drive by clicking on lwa_install.exe.

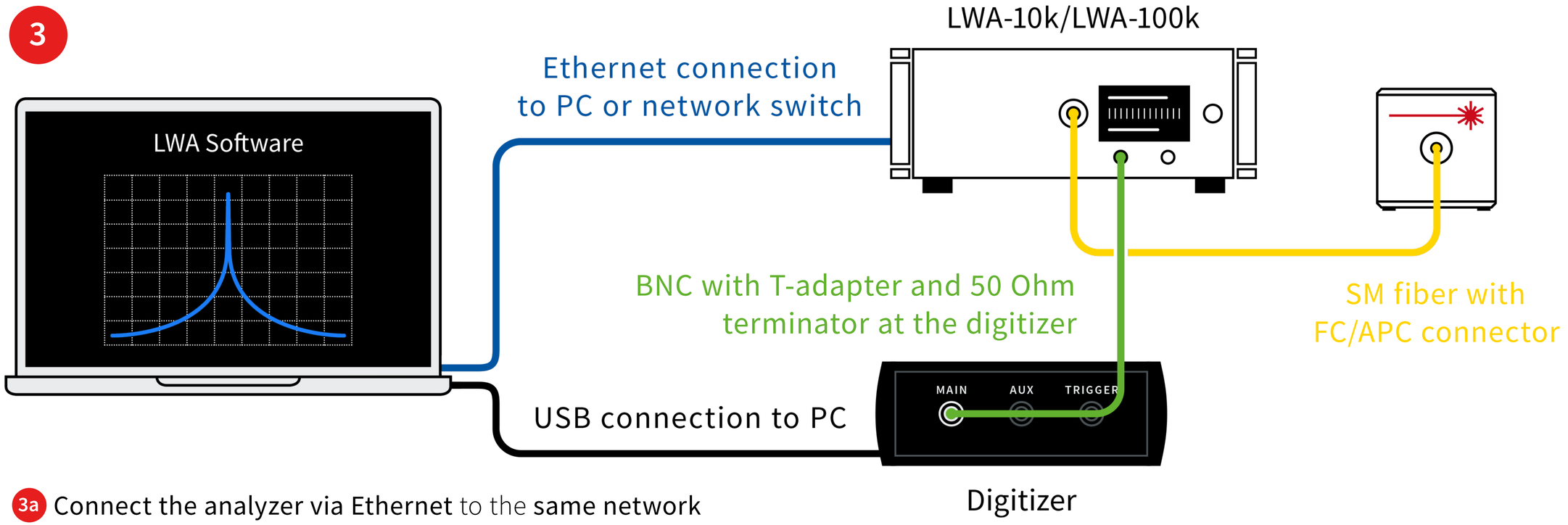
2



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 1 Ethernet and 1 USB 3.0 Port

3



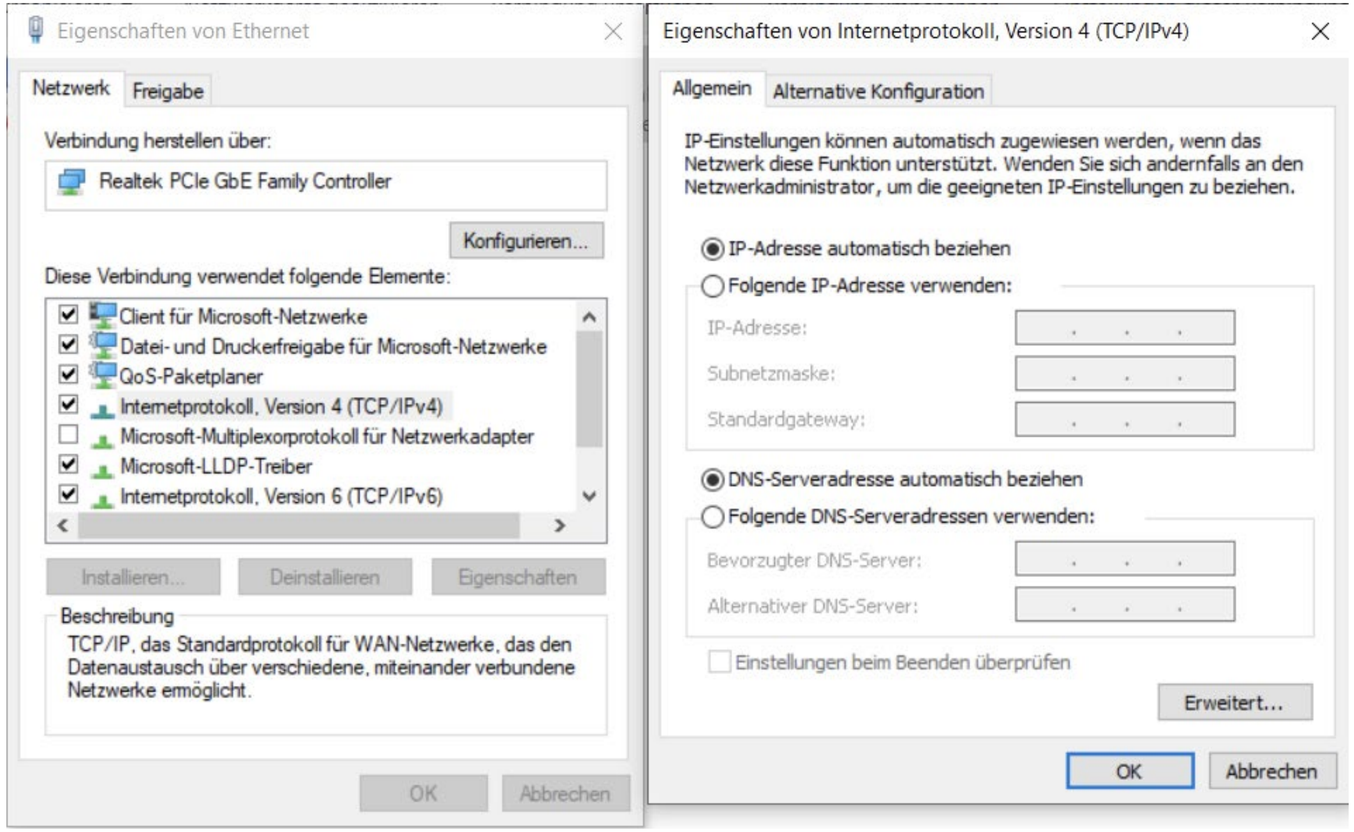
3a Connect the analyzer via Ethernet to the same network as the computer running the Software.

3b Connect the digitizer via USB to the same computer running the software.

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 an SM fiber with FC/APC connector.

4



In case you would like to **directly connect the instrument to the computer using an Ethernet cable** make sure the **TCP/IP protocol of the network adapter is set to automatic.**

5

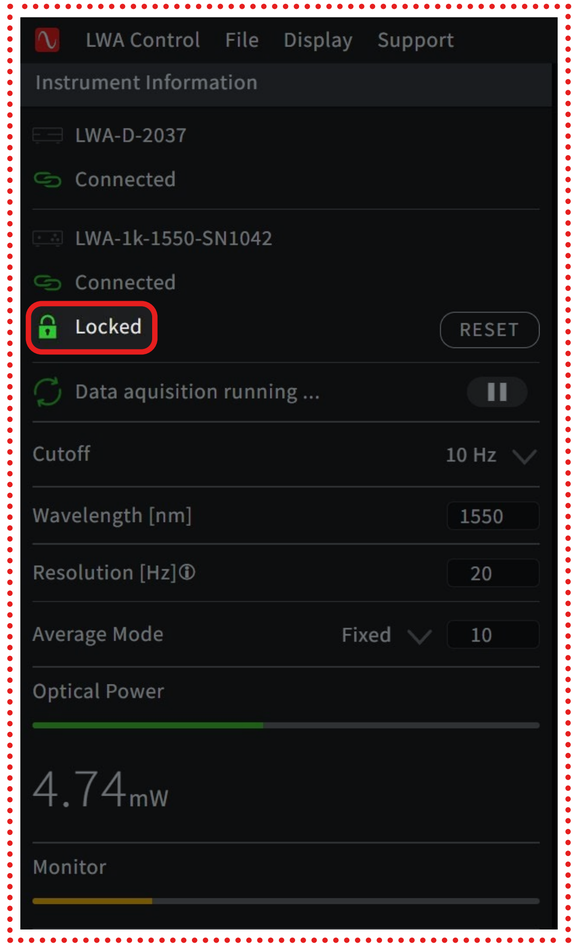
HighFinesse
Linewidth Analyzer
Control

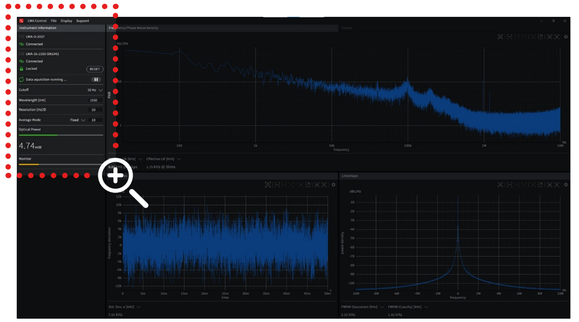
30 sec.

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.**

6



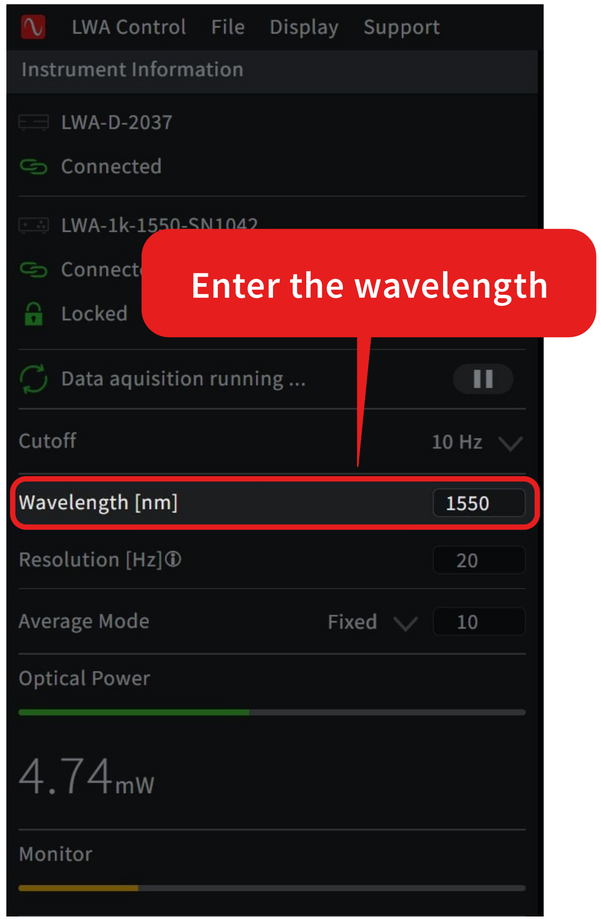


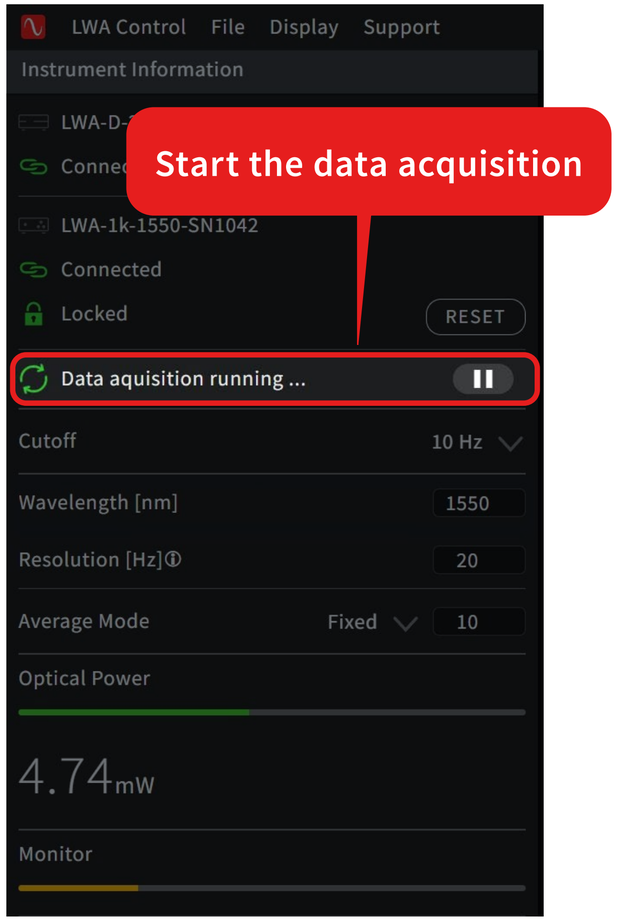
In the software the device information displays the current state of the Analyzer in its initialization procedure.

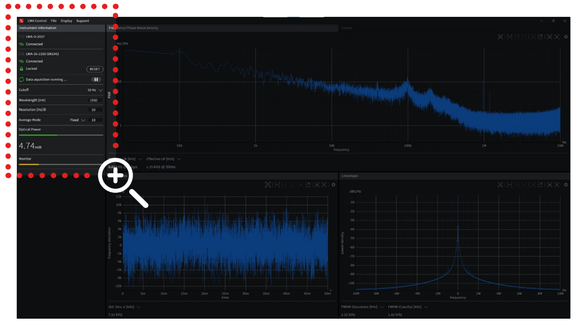
Wait for this indicator to turn to **“Locked”** before valid measurements can be obtained.

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

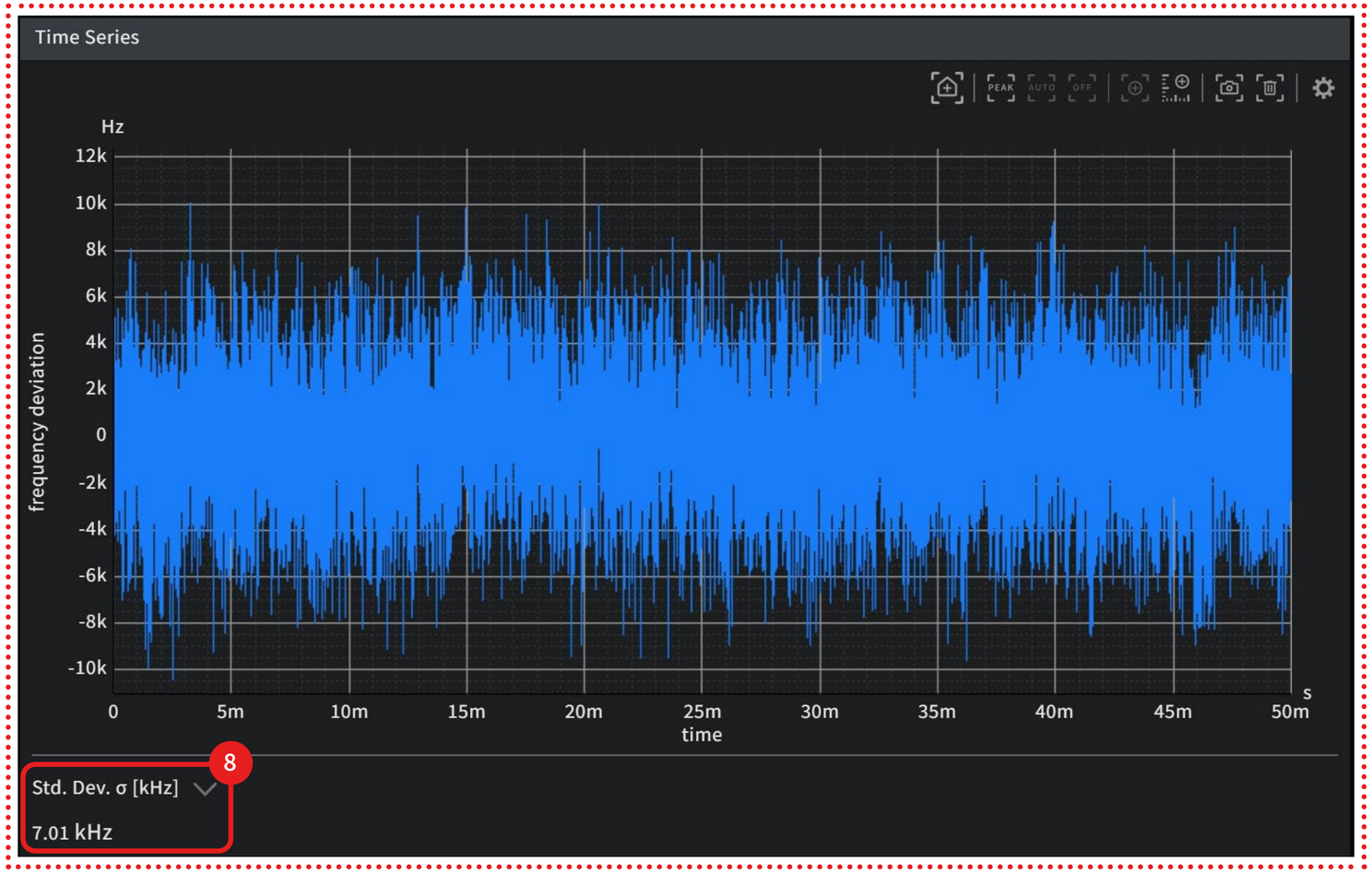
7

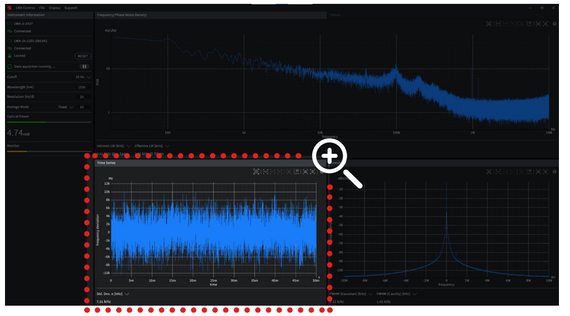

LWA Control
File
Display
Support
Instrument Information
LWA-D-2037
Connected
LWA-1k-1550-SN1042
Connect
Locked
Enter the wavelength
Data aquisition running ...
Cutoff
10 Hz
Wavelength [nm]
1550
Resolution [Hz]
20
Average Mode
Fixed
10
Optical Power
4.74mW
Monitor


LWA Control
File
Display
Support
Instrument Information
LWA-D-
Connec
Start the data acquisition
LWA-1k-1550-SN1042
Connected
Locked
RESET
Data aquisition running ...
Cutoff
10 Hz
Wavelength [nm]
1550
Resolution [Hz]
20
Average Mode
Fixed
10
Optical Power
4.74mW
Monitor



8

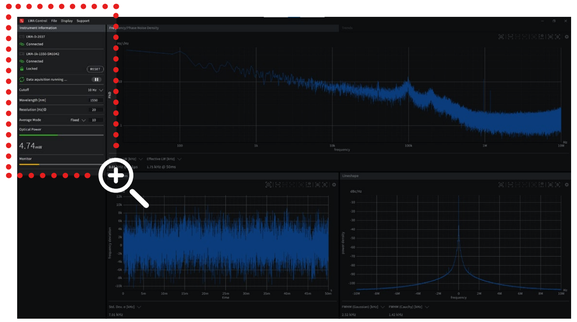




In the **“Time Series”** window the **fundamental data measured** is displayed by the instrument: The frequency deviations are **displayed as a function of time.**

The **indicator** 8 **shows the standard deviation** of the observed frequency deviations. This should not be mistaken by the linewidth.

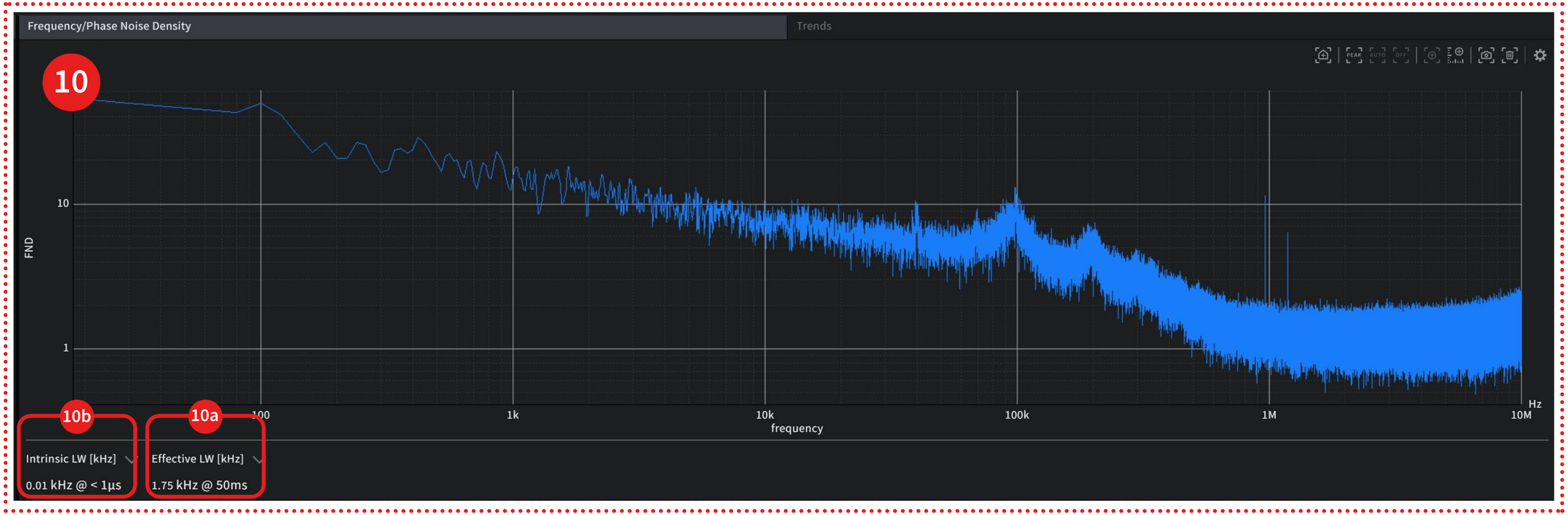
9

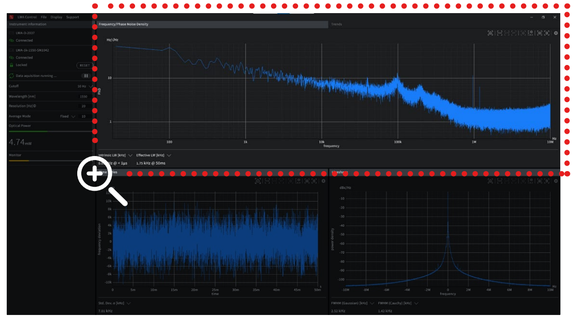


Adjust the Resolution [Hz]/measurement time.

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.



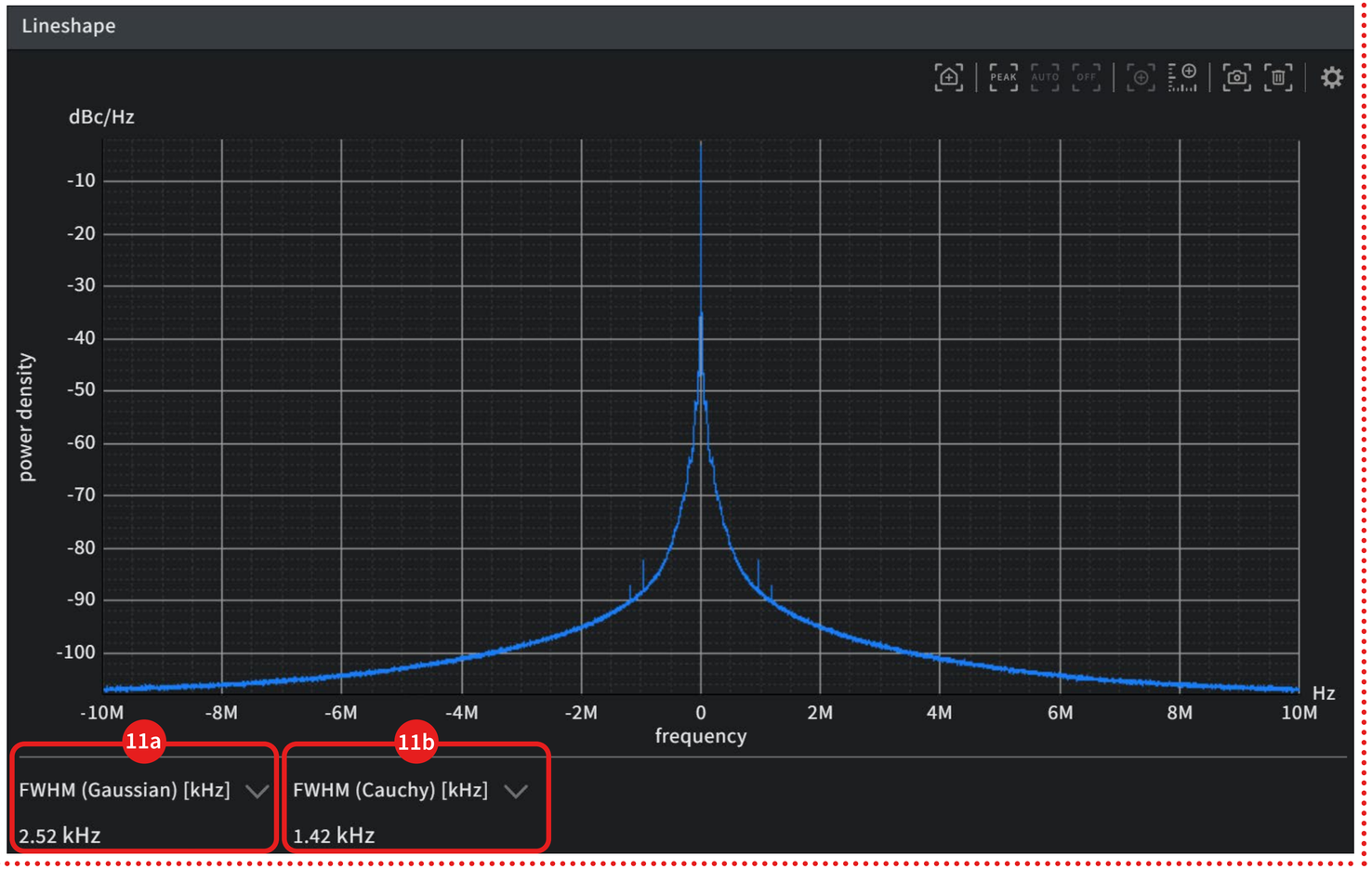


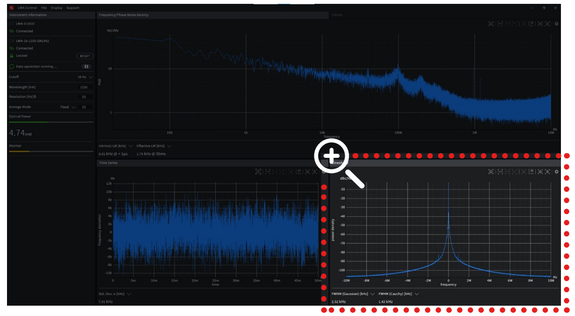
In the **“Frequency/Phase Noise Density” window the frequency noise density** is displayed.

The effective linewidth displayed in the lower left corner 10a gives you the linewidth over the measurement time as specified in **“Resolution/measurement time”.**

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

11

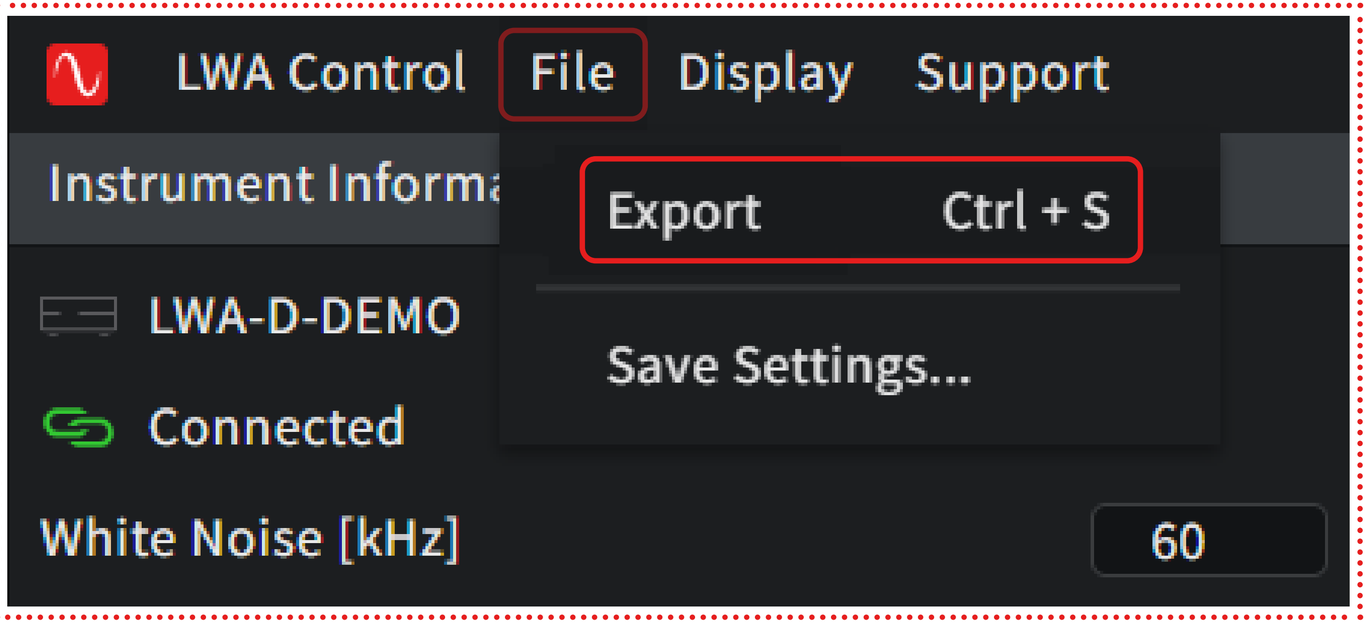


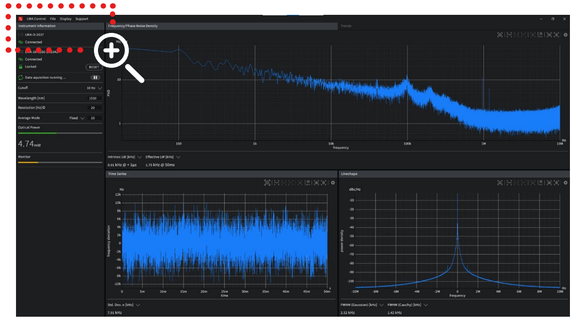


In the “**Lineshape**” window the **laser lineshape** is displayed.

The fullwidth half maximum is displayed assuming a pure 11a Gaussian or 11b Cauchy/Lorentzian lineshape.

12





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

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

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