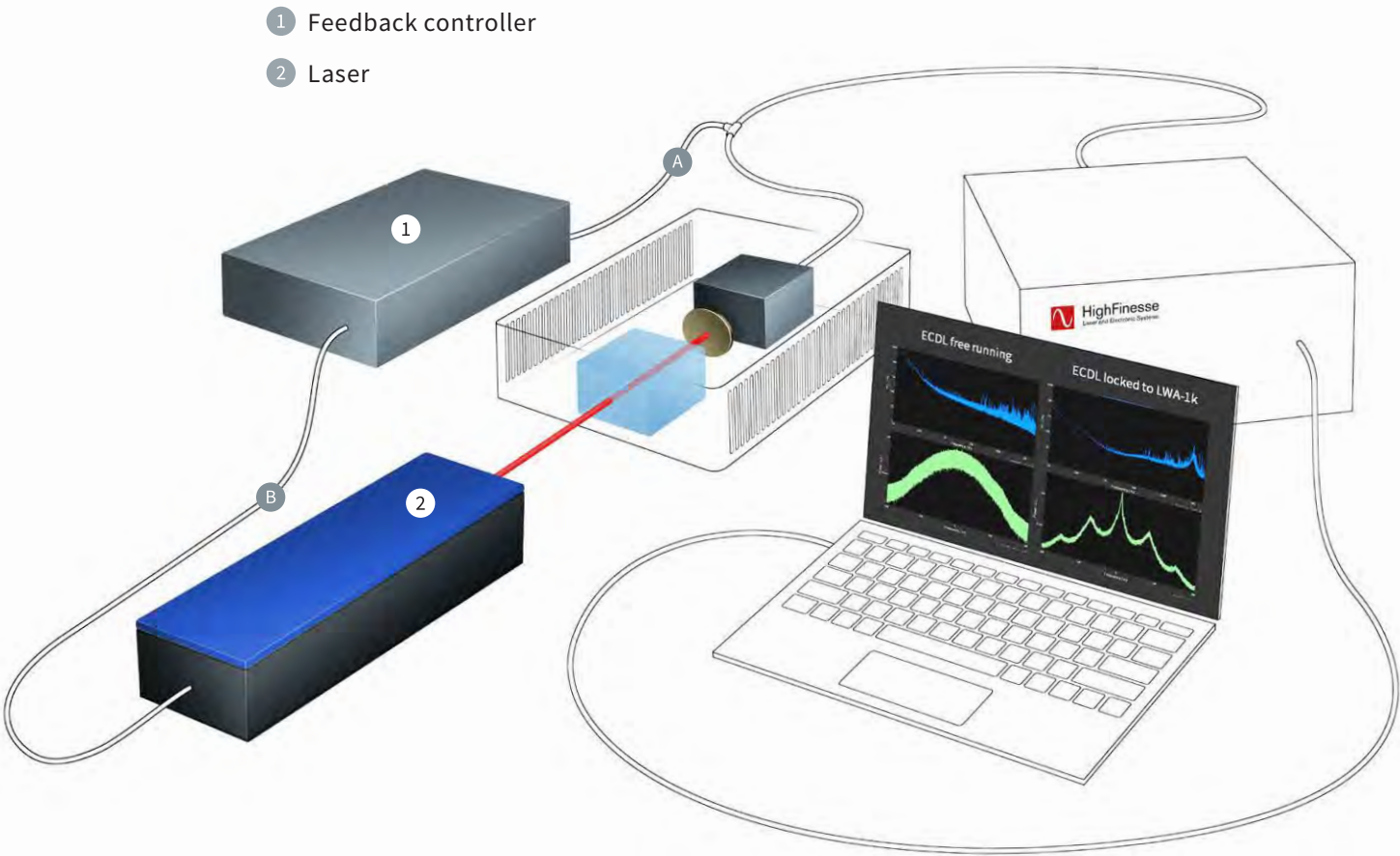


Feedback Controller

Due to the design of the LWA-1k, the output voltage can be directly used as an error signal for a feedback controller allowing to reduce the frequency noise of the test laser.

Depending on the used feedback controller and the laser system the optical linewidth can be reduced by more than two orders of magnitude offering a vast amount of new opportunities.



Active laser noise reduction

- Connect the Analyzer output signal **A** as input signal to a fast feedback controller.
- Connect the feedback controller to the laser’s fast DC modulation input (e.g. laser diode current). **B**
- Adjust the feedback to minimize the output signal of the Analyzer (e.g. PID parameters, gain)

Typical application

- Laser module quality control
- Laser design optimization
- Metrology and quantum technology
- Linewidth control for spectroscopy
- Modulation surveillance

Technical Data

Analyzer Unit

Unit	LWA-1k 780			LWA-1k 1550		
	min.	typ.	max.	min.	typ.	max.
Wavelength Range	760	780	1064	1530	1550	1625
Input Power Range	1	10	15	0.5	5	8
Input Power Stability	± 5					
Laser Type	CW, single-mode					
Input type	PM-FC/APC					

Frequency Noise Specification

	Hz	10	100	1 k	10 k	>100k	10	100	1 k	10 k	>100k
Noise floor @ typ. input power/wavelength	Hz/√Hz	500	100	30	30	<25	100	50	20	15	5
Frequency noise bandwidth	Hz	10 – 10 M									
Frequency noise density range	Hz/√Hz	50 – 10 M					10 – 10 M				
Intrinsic linewidth range (Lorentzian Linewidth)	Hz	<8 k					<350				
Effective linewidth range (optical Linewidth) [β-separation method]	Hz	<10 k – 20 M					<1 k – 20 M				
Relative intensity noise limit	dB/Hz	–150									
Dynamic range	dB	60									

Lineshape Specifications

Effective linewidth range (optical Linewidth) [curve fitting method]	Hz	< 10 k – 10 M		< 1 k – 10 M	
Dynamic range	dB	60			

Miscellaneous

Interface	USB 2.0 Type B										
Analog Output / error signal	BNC ± 7.5 (50 Ω) ± 15 (high impedance) V, single ended										
Cutoff (highpass filter)	Hz	10, 1 k, 10 k, 100 k									
Dimensions	mm	220 × 334 × 96									
Weight	kg	8.0									

Digitizer Module

Sample rate	Sa/s	62.5M (max.)
Resolution	bits	16
Acquisition time (time series)	s	1 m – 100 m
Evaluation time ¹⁾	s	10 m – 1 (typ.)
Communication		USB 3.0 Type B
Dimensions	mm	210 × 200 × 74
Weight	kg	2.0

Software

Operating system		Microsoft® Windows® 10, 64 Bit
CPU (minimum)		Intel® Core™ i5 or equivalent
Memory (minimum)	GB	8
Graphical evaluation options		Frequency noise density spectrum, lineshape spectrum, intrinsic (Lorentzian) linewidth, effective (optical) linewidth

1) Effective linewidth: Combination of intrinsic linewidth and additional broadening mechanisms (thermal, electronical and acoustic noise). Determination by β-separation method (noise density spectrum) or curve fitting procedure (lineshape spectrum).