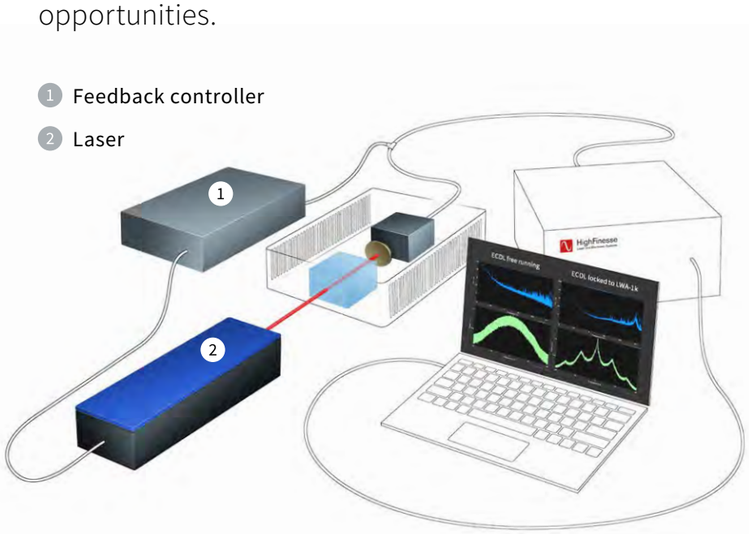
Due to the design of the LWAs, the output voltage can be directly used as an error signal for a feedback controller allowing to reduce the frequency noise of the test laser.

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.

1 Feedback controller

2 Laser



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

	Unit	LWA-1k 780			LWA-10k VIS			LWA-1k 1550			LWA-10k NIR			LWA-100k NIR		
		min	typ	max	min	typ	max	min	typ	max	min	typ	max	min	typ	max
Wavelength range	nm	760	780	1064	450	780	1064	1530	1550	1625	1064	1550	1625	1064	1550	1625
Input power range (@typical wavelength)	mW	1	10	15	0.5	5	8	0.5	5	8	0.5	5	8	0.5	5	8
Required input power stability	%	±5														
Laser type		Laser type CW, single mode														
Input type		PM-FC/APC			FC/APC			PM-FC/APC			FC/APC			FC/APC		
Maximum frequency stroke (@ f > 10Hz)	MHz	30			40			30			40			100		

Frequency Noise Specification

	Unit	LWA-1k 780						LWA-10k VIS						LWA-1k 1550					
Hz		10	100	1k	10k	100k	>1M	10	100	1k	10k	100k	>1M	10	100	1k	10k	100k	>1M
Noise floor @typ.input power and wavelength	Hz/√Hz	200	75	30	30	25	15	500	150	60	60	50	30	80	40	15	10	8	5
Frequency noise bandwidth	Hz	10 – 10 M																	
Minimum measurable intrinsic linewidth (lorentzian linewidth)	Hz	< 3 k						< 12 k						< 350					
Effective linewidth range (optical linewidth) [β-separation method]	Hz	< 10 k – 20 M						< 20 k – 30 M						< 1 k – 20 M					
Relative intensity noise limit (lorentzian linewidth)	dB/Hz	– 150						–						– 150					
Dynamic range	dB	60																	

	Unit	LWA-10k NIR						LWA-100k NIR					
Hz		10	100	1k	10k	100k	>1M	10	100	1k	10k	100k	>1M
Noise floor @typ.input power and wavelength	Hz/√Hz	200	100	30	20	15	10	1k	200	60	50	40	25
Frequency noise bandwidth	Hz	10 – 10 M											
Minimum measurable intrinsic linewidth (lorentzian linewidth)	Hz	< 2 k						< 10 k					
Effective linewidth range (optical linewidth) [β-separation method]	Hz	< 5 k – 30 M						< 15 k – 100 M					
Relative intensity noise limit (lorentzian linewidth)	dB/Hz	–						–					
Dynamic range	dB												

Lineshape Specifications

	Unit	LWA-1k 780	LWA-10k VIS	LWA-1k 1550	LWA-10k NIR	LWA-100k NIR
Effective linewidth range (optical linewidth) [curve fitting method]	Hz	< 10 k – 10 M	< 20 k – 10 M	< 1 k – 10 M	< 5 k – 10 M	< 15 k – 10 M
Dynamic range	dB	60				

Miscellaneous

	Unit	LWA-1k 780	LWA-10k VIS	LWA-1k 1550	LWA-10k NIR	LWA-100k NIR
Interface		USB 2.0 Type B	Ethernet	USB 2.0 Type B	Ethernet	Ethernet
Analog Output		BNC ± 7.5 (50 Ω) ± 15 (high impedance) V, single ended				
Cutoff (highpass filter)	Hz	10, 1k, 10k, 100k	10	10, 1k, 10k, 100k	10	10
Dimensions	mm	220 × 334 × 96	440 × 340 × 155 mm	220 × 334 × 96	440 × 340 × 155 mm	440 × 340 × 155 mm
Weight	kg	8.0	12	8.0	12	12

Digitizer Module

	Unit	
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

Linewidth Analyzer · 11-2021 · This document provides general information only and may be subject to change at any time without prior notice.

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).