HighFinesse
The Standard of Accuracy

Ångstrom

Wavelength Meter

Sensitive and compact, with a large spectral range for high speed measurements of pulsed and continuous lasers

The HighFinesse/Ångstrom wavelength meters are the unsurpassed high-end instruments for wavelength measurement of pulsed and continuous laser sources. They deliver the superb absolute and relative accuracy required by cutting-edge scientific research, as well as industrial and medical applications. The unmatched precision of the WS8 series and all of our other wavelength meters is achieved by using non-moving Fizeau interferometers in a unique geometric configuration.

pulsed / cw
Pulsed and Continuous Laser Sources

192 nm / 2600 nm
Measurement Range

down to 2 / MHz
Absolute Accuracy

up to 76 / kHz
Measurement Speed

The standard wavelength meters are connected to the PC via a USB interface and are ready for use as soon as the software delivered with the instrument is installed. The wavelength meters are also availabe as rack or standalone instruments with Ethernet connection facilitating the system integration.

API
Remote Network Access & Software Integration

Remote Access via WebApp

A compact, thermally insulated housing holds the optical elements as well as the electronics. To allow even higher stability and precision, temperature and pressure effects are compensated. The design enables the integration of additional options, allowing customized solutions to specific applications even years after purchase.

No-moving Part Fizeau Technology

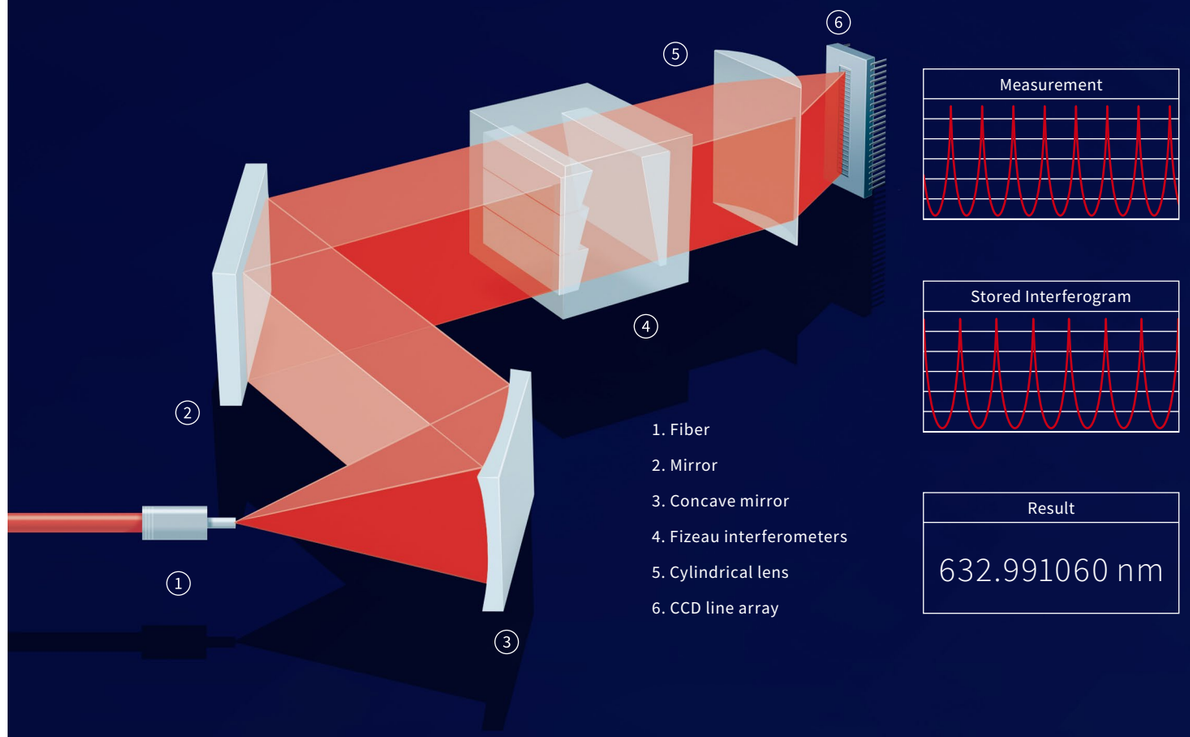
Seamless Integration and Customization

Automatic Temperature Corrections

Thermally Insulated Housing

With an absolute accuracy of 2 MHz and a measurement resolution of 100 kHz the next generation WS8-2 is the ultimate solution for frequency monitoring and stabilization tasks. Together with the photonic crystal switch technology, which is only offered by HighFinesse, it enables the quasi-simultaneous measurement of up to 8 channels over a broad wavelength range. Despite its unmatched accuracy the next generation WS8-2 is a versatile, compact and reliable tool not only for quantum physics laboratories and applications such as quantum computing and atomic clocks.

The optical unit consists of Fizeau-based interferometers which are read out by photodiode arrays. We achieve remarkable high accuracy and stability by using exclusive, non-moving optics.



The light is coupled into the instrument via a fiber and then collimated by a mirror, before entering the solid-state Fizeau-interferometers. The interference pattern is imaged by a cylindrical lens onto CCD photodiode arrays. This recorded pattern is transferred to your computer via a USB connection (Standard Series) or a Camera link connection or ethernet (WF Series) which allows data acquisition rates of up to 76 kHz.

The software fits and compares the pattern to a previously recorded calibration to calculate the wavelength. One significant advantage of our Fizeau-based wavelength meters, compared with other available instruments, is the absence of mechanical moving parts. This ensures the high reliability of accuracies up to 2 MHz (absolute) and ensures the outstanding robustness HighFinesse wavelength meters are noted for. The design enables the precise measurement of not only continuous lasers, but also pulsed laser sources, which broadens the application range even further.

Another key benefit is the simplicity of our wavelength meters. Simply connect the USB cable and run the program supplied. That’s all it takes!

Astronomy

In astronomy artificial guidestars created by laser radiation are successfully used to correct atmospheric distortion of light drastically improving the image quality of telescopes. Not only the Very Large Telescope in Chile uses a customized HighFinesse Wavelength Meter in its guidestar systems to stabilize the laser to keep the emission from sodium atoms at the maximum and in this way make the systems reliable and efficient.

The flexible design of our wavelength meters allows the integration of additional optical components and software modules. Please reach out to us if you need a customized solution for your specific application requirement.

The VLT in Chile with the guidestar system.

Picture courtesy: ESO/Y. Beletsky

Quantum Computers

Researchers and companies working on quantum computing rely on the excellent accuracy of HighFinesse wavemeters. In trapped ion quantum computers, the tasks laser cooling, state preparation, manipulation, and read out require wavelength meter for accurate laser wavelength measurements. Laser stabilization is a key task and can be carried out conveniently by using the PID option. HighFinesse is a partner in the following front-running reasearch projects on quantum computers

MUNIQC-atom [1]: This project aims on developing a quantum computer based on neutral atoms for solving problems in quantum chemistry and material sciences.

https://muniqc-atoms.munich-quantum-valley.de/about

Rymax One [1]: The HighFinesse wavelength meter helps to fulfill the mission to build a quantumcomputer to solve the today's real-world problems.

https://rymax.one/

Secure quantum communication

The QR.X project [1] aims at developing quantum repeaters for secure quantum communication. Current fiber-based technology is limited to distances roughly below 100 km. HighFinesse wavelength meters assist partners from a strong team of different German universities in their research to overcome these limitations.

https://www.forschung-it-sicherheit-kommunikationssysteme.de/projekte/qr.x

1) HighFinesse is proud to participate in the project founded by the German BMBF (Federal Ministry of Education and Research)

Picture courtesy: DLR, CC-BY 3.0

Demanding field applications

The robustness of the HighFinesse Fizeau-technology enables the use of wavelength meters in harsh environments: The German Aerospace Center (DLR) uses a HighFinesse wavelength meter in a plane.

Tolerating the demanding conditions (vibrations, pressure gradients) the wavemeter provides the researchers with accurate wavelength measurements for their research on the atmosphere.

Tools for high end laser diagnostics

Laser manufacturers use our wavelength meters as tools in R&D, production, quality control, and service as reliable and accurate instruments. Thanks to the HighFinesse non-moving-part technology the wavelength meters are very robust and insensitive to shocks and vibrations. The compact size facilitates the use for field engineers. For seamless system integration the wavelength meters can be obtained as rack and standalone instruments. The well documented dynamic link library-based API enables full control of the instrument from external software and makes integration in software systems straightforward.

Atomic clocks

opticlock

As effective laser cooling is a key technology in atomic clocks and relies on accurate laser wavelength diagnostic our high-end wavemeters are used in the frontrunning Opticlock project [1]. The aim of this project is to develop an easy-to-use optical clock for reliable operation in environments outside scientific laboratories. This project relies on the high accuracy and robustness of the HighFinesse WS8 wavemeter.

https://www.opticlock.de/en/info

Singlemode fiber switches are needed to provide homogeneous light input for measurements with our high-end instruments WS6-200, WS7 and WS8 to ensure the excellent accuracy.

The ranges of single mode fibers are limited to a few 100 nm which makes quasi-simultaneous measurements of lasers separated by more than that impossible. Our photonic-crystal-fiber (PCF) switches solve this problem. Using endlessly single mode PCF allows us to produce a switch that offers single mode operation for all wavelengths. The PCF switch enables to switch between light-sources at any wavelength within the instrument's measurement range and maintain the full accuracy.

Combining the PCF switch with other options such as PID control opens new possibilities. Sold exclusively with all WS6-200, WS7 and WS8 instruments except for the UV-II range the PCF switches are available in two-channel, four-channel, and eight-channel configurations.

Product Overview WS Series

		Unit	WS5	WS6-600	WS6-200	WS7-60	WS7-30	WS8-10 NEW PRODUCT	WS8-2 NEW PRODUCT
Measurement range	UV-II (192 – 800 nm)		■	■	■	■	▢	▢	▢
	UV-I (248 – 1180 nm)		■	■	■	■	■	■	▢
	Standard (330 – 1180 nm)		■	■	■	■	■	■	■
	VIS / IR-I (330 – 1750 nm) [15]		■	■	■	▢	▢	▢	▢
	IR-I (630 – 1750 nm)		▢	▢	▢	■ [18]	■	■	▢
	VIS / IR-II (500 – 2250 nm) [15]		■	■	■	▢	▢	▢	▢
	IR-II (1000 – 2250 nm)		▢	▢	▢	■	■ [17]	▢	▢
Absolute accuracy [1]	192 – 330 nm [2]	pm	3	0.6	0.3	0.2	0.1	0.1 [19]	–
	330 – 375 nm		3000	900	300	100	50	20 [3]	10 [4]
	375 – 800 nm		3000	600	200	60	30	10 [3]	2 [4]
	800 – 1180 nm		2000	500	150	50	25	8 [3]	2 [4]
	1180 – 2250 nm	MHz	2000	400	120	40	20	8 [20]	–
Quick coupling accuracy (with 50 µm multi mode fiber)			3000	600	600	150	100	100	100
Wavelength deviation sensitivity/Measurement resolution [5]			500	20	4	2	1	0.2	0.1
Linewidth option [10]	Estimation accuracy [6]		2000	500	400	200	200	100	100
Measurement speed		Hz	950, on request IR-I and IR-II: 1500	950, on request IR-I and IR-II: 1500	500, Vis/IR-I: 950, on request IR-I and IR-II: 1500	500	500	1000	1000
Minimum required input energy and power [8]	Standard (VIS)	µJ (or µW)	0.02 – 15	0.02 – 15	0.02 – 15	0.02 – 15	0.08 – 60	0.08 – 60	0.08 – 60
	UV-I		0.02 – 10	0.02 – 10	0.02 – 10	0.02 – 10	0.08 – 40	–	–
	UV-II		0.02 – 200	0.02 – 200	0.02 – 200	0.04 – 400	–	–	–
	IR-I		2 – 200	2 – 200	2 – 200	2 – 200	8 – 800	8 – 800	–
	IR-II [9]		2 – 80	2 – 80	2 – 80	2 – 80	8 – 800	–	–
FSR of the Fizeau interferometers (Fine/wide mode) [10]		GHz	100	16/100 [11]	16/100 [12]	8/32	4/32	2/20	2/20
Calibration [16]			Built-in calibration			Built-in calibration [13]	Stabilized HeNe laser or any other well known laser source Δν < 5 MHz	SLR-780 or any other well known laser source Δν < 2 MHz	SLR-780 or any other well known laser source Δν < 1 MHz
Recommended calibration period			≤ 1 month			≤ 14 days	≤ 10 hours	≤ 1 hour	≤ 2 minutes
Warm-up time			No warm-up time under constant ambient conditions [14]					> 30 minutes	
Dimensions L × W × H		mm	360 × 120 × 120	360 × 120 × 120	360 × 200 × 120	360 × 200 × 120	360 × 200 × 120	360×200×120 | 340×252×106	360×200×120 | 340×252×106
Weight		kg	2.8	2.8	5.5 [16]	5.9	6.1	6.4	6.4
Interface			USB 2.0 connection					USB 3.0	USB 3.0
Power supply			UV-II, UV-I, Standard,Vis/IR-I: < 2.5 W, WS8 all ranges: < 4.5 W IR-I: < 10 W, external power supply included IR-II: < 30 W, external power supply included						

1) According to 3σ criterion, but never better than 20 % of the laser linewidth.
2) With multi mode fiber.
3) ± 200 nm around calibration wavelength; outside of this range the accuracy as WS7-30.
4) ± 2 nm around calibration wavelength; outside of this range the accuracy as WS8-10; note 3 also applies.
5) Standard deviation within 1 minute. WS6-200 and higher models require singlemode or photonic crystal fibers to reach this resolution.
6) Not better than 20 % of the linewidth.
7) Depending on PC hardware and settings. Ultra-fast models up to 76 kHz available.
8) The CW power interpretation in [µW] compares to an exposure of 1s (generally the energy needs to be divided by the exposure time to obtain the required power).
9) µJ interpretation for pulsed lasers. CW signals need more power in [µW] since the exposure is limited at IR-II instruments.
10) Each instrument in each mode can measure lasers with a linewidth up to 30 % of the correspondig FSR. This option is not available for next generation wavemeters.
11) For IR instruments: 32/32.
12) For IR-I and IR-II instruments: 16/16.
13) IR-I and IR-II instruments: external calibration source needed, e. g. LFR-1532.
14) IR-II: > 30 min. warm-up, or until ambient equilibrium.
15) These instruments have a decreased power sensitivity by a factor of 4, compared to the Standard and IR ranges in the required input fields, respectively.
16) External source required for UV-II, IR-I, and IR-II Instruments. Our recommendation: SL04 or LFR-1532.
17) Photonic crystal switches can be used up to 2000 nm. Please contact HighFinesse if you want to measure over 2000 nm.
18) Measurement range WS7-60 IR-I: 520 – 1750 nm
19) Range is limited from 248 to 330 nm.
20) Range is limited up to 1750 nm.

Wavelength Meter Overview 3-2025

Scan or browse to **www.highfinesse.com/en/specs.html** to download more specs and brochures for our products.

Upgrade options expand the capabilities of our wavelength meters to match individual requirements of cutting-edge research and measurements. Among these powerful options are the HighFinesse multichannel fiber switches allowing for quasi-simultaneous measurement of up to 8 channels and the PID option for full wavelength control of up to 8 lasers.

Upgrade Option -Compatibility Overview

Wavemeters	L Linewidth Estimation	TTL External Trigger	D Spectrometer	CAL Calibration Source	PID Laser Control	MC Multichannel Switch	MCLC Multichannel Laser Control
WS8 all ranges	▢	■ (included)	▢	■	■	■ (included)	■
WS7-30 all ranges, WS7-60 UV-II, IR-I, IR-II	■	■	▢	■	■	■	■
WS7-60 Std and UV-I, WS6-200 all ranges	■	■	▢	■ (included)	■	■	■
WS6-600 and WS5 Std	■	■	■ [1]	■ (included)	■	■	▢
WS6-600 and WS5 UV-I , UV-II, VIS/IR-I, and VIS/IR-II	■	■	▢	■ (included)	■	■	▢

MC

The combination of our wavelength meters with one of the quickest fiber switches available allows up to eight channels to be measured quasi-simultaneously. Exposure time and other parameters can be defined independently for each light source. The table below gives an overview of the HighFinesse multi-channel switches which are available with 2, 4, and 8 input channels. Single mode fiber switches are needed to provide homogeneous light input for measurements with our high-end instruments WS6-200, WS7 and WS8 to ensure the excellent accuracy. The range of single mode fibers are limited to a few 100 nm which makes quasi-simultaneous measurements of lasers separated by more than that impossible.

Our photonic-crystal-fiber switches solve this problem and offer single mode operation for all wavelengths.

For the WS5 and WS6-600 Multimode fiber switches can be used which offer a broad wavelength range. Are you also interested in PID-laser control? If yes please also take a look at the MCLC Option.

Switches	Range	Compatible with the Wavemeter	Recommended for the Wavemeter
Photonic crystal fiber switch	370 – 2000 nm	WS8, WS7-30, WS7-60 and WS6-200 execpt for UV-II range [2]	WS8, WS7-30, WS7-60 and WS6-200 execpt for UV-II range
Single Mode 405	370 – 650 nm	WS7-30, WS7-60, WS6-200 WS6-600 and WS5 with L Option	WS7-30, WS7-60, WS6-200 WS6-600 and WS5 with L Option
Single Mode 630	600 – 850 nm		
Single Mode 780	750 – 1020 nm		
Single Mode 980	950 – 1300 nm		
Single Mode 1300	1250 – 2000 nm		
Multi Mode	200 – 2000 nm	WS7-30, WS7-60, WS6-200, WS6-600 and WS5	WS6-600 and WS5

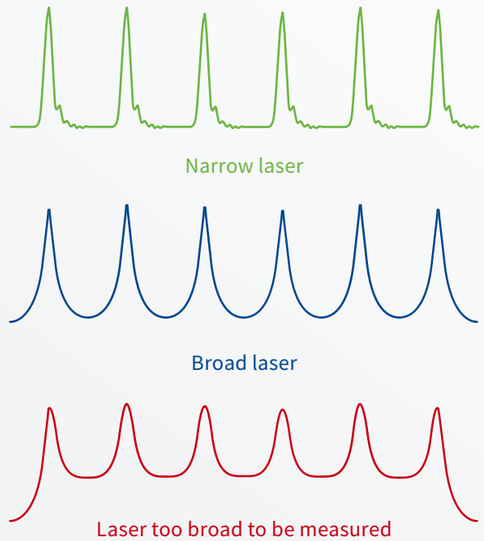
1) Only available at the time of the purchase of the wavemeter. No upgrade later on possible. 2) Old wavemeters with model numbers WS7-30, WS7-60 and WS6-200 might not be compatible with the photonic crystal fiber switch. Please check the compatibility by sending the serial number of the wavemeter to the HighFinesse support team.

Linewidth Option

L

The linewidth estimation of a singlemode laser source is performed by a special algorithm which eliminates the interferometer's instrument response function. The algorithm enables the estimation of the linewidth with an accuracy better than the tenth of the instrument's FSR.

Qualitative interpretation of the wavemeter interferogram



The maximum linewidth that can be measured depends on the free spectral range (see specifications on page 8) of the interferometers used in the wavemeter. As a rule of thumb, the maximum linewidth is given by 30 % FSR.

Example: For a WS6-200 in the fine mode the maximum linewidth is 30 % × 16 GHz = 4,8 GHz. The use of single mode fibers is recommended for this option.

If you are interested in linewidth and noise characterization of narrow linewidth lasers below 100 MHz you might be interested in our linewidth analyzers (LWA).

Please see our brochure on linewidth analyzers

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

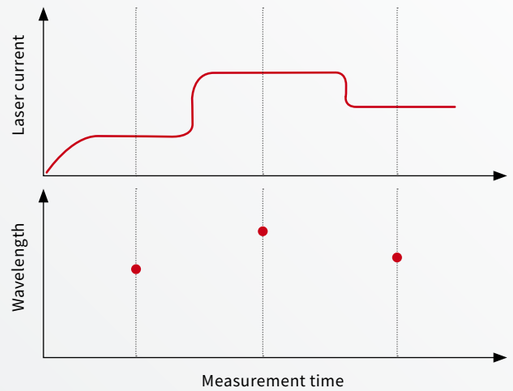
TTL Option

TTL

All wavelength meters detect and measure pulsed signals automatically. Additionally, this option allows the user to trigger pulsed measurements externally. The TTL option guarantees synchronization between pulsed excitation and measurement. It provides low-noise signals without parasitic parts when measuring pulsed signals with low duty cycles.

This option includes a BNC adapter cable. The required standard TTL trigger pulses with a length >400 ns can be provided by a delay generator or similar equipment. The option includes two additional software modes. Mode 1 allows to work at the maximum measurement rate while the end of the exposure is defined by the rising edge of the trigger. Mode 2 allows to adjust the exposure time in the software while the beginning of the exposure is defined by the rising edge of the trigger pulse. This option is ideal to synchronize the wavelength measurements with other measurement tasks in your lab or assign the wavelength measurements to certain events. A typical application is illustrated in the sketch below. A current of a laser diode is changed.

Illustration of a typical application: laser diode testing



As soon as the laser current becomes stable the Wavemeter is triggered such that the wavelength measurement can be assigned to a certain stable current. In this way the laser wavelength dependence on laser current but also on other parameters can be screened efficiently.

Please note, if the option MC is ordered together with the TTL option, the TTL mode can only be used if the switch is set fixed to one input channel.

PID

With the PID option it is possible to stabilize the frequency of a laser connected to the wavelength meter using a software based proportional-integral-derivative controller (PID controller). Unlike analog PID electronics, the PID option provides software based signal processing, allowing the laser to be stabilized to a specific user defined frequency or regulated with an arbitrary pattern.

This makes it extremely useful in experiments where the laser frequency has to be actively regulated or varied to fit changing experimental conditions, such as laser cooling, atomic detection, trapping and spectroscopy. Combined with the MC option the wavelength meter can be used to stabilize multiple lasers simultaneously. The regulation speed and quality and absolute accuracy match the measurement speed, relative accuracy and absolute accuracy of the wavelength meter respectively. The measurement speed is not affected by the regulation.

The achievable resolution and loop capture range depends on the laser system that you would like to control. The table (page 11) gives a summary of the achievable loop capture range and resolution using a HighFinesse WS8 wavelength meter with PID option and a TOPTICA DL Pro with a typical sensitivity of 1 V/pm.

Are you also interested in a multi-channel switch? If yes please also take a look at the MCLC Option.

Watch how accurately the wavelength of multiple lasers can be controlled by a HighFinesse Wavelength Meter with PID option.

https://www.youtube.com/watch?v=3Tf1iwzCEP8

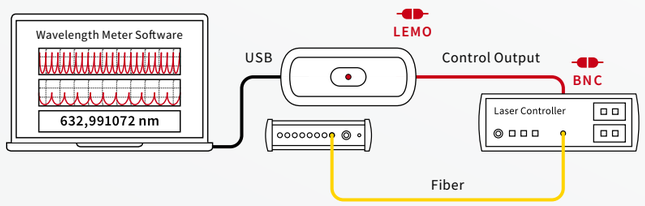
Analog wavelength control

General

- If no internal calibration source available, one channel is reserved for the external source.
- Control input at the laser required (Lemo-BNC Adapters or PCIe card-BNC adapters included)
- Possible methods for providing feedback to the laser: piezo, current, temperature ...

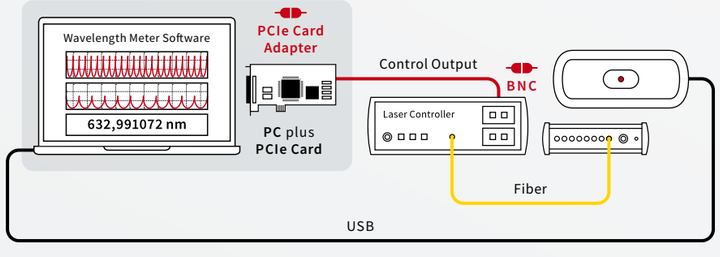
Control of up to 2 lasers (PID1, PID2)

- Output directly from the wavelength meter (± 4 V, 16 bit)



Control of up to 8 lasers (PID4, PID8) [1]

- PCIe (× 1) slot in the measurement PC required (control outputs ±10 V, 16 bit)
- Required impedance at the control input of the laser: > 10 kOhm



1) Supported by Next Generation wavelength meters on Windows computers only.

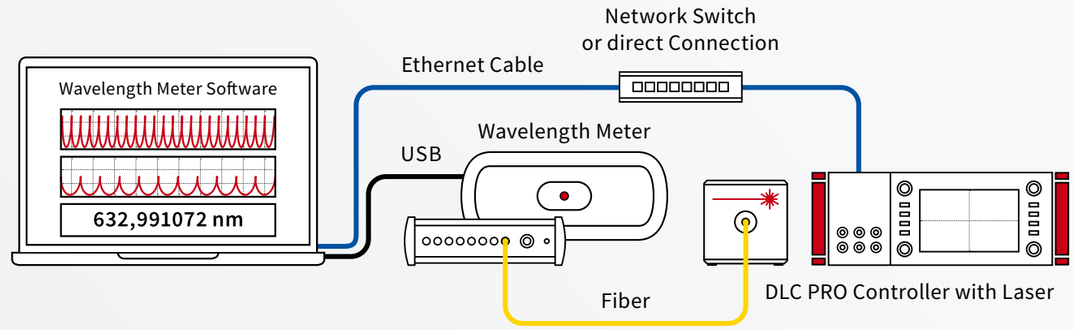
Digital wavelength control

Control of 1, 2, 4 or up to 8 TOPTICA Lasers (up to 2 lasers for each DLC pro)

- Use of the digital interface of the TOPTICA-Laser Controller DLC Pro for control of the laser wavelength
- DLC pro Laser Controller required
- One DLC Pro allows to control two lasers
- compatible with the following TOPTICA-products: DL pro, DFB pro, CTL [2] and other procuts based on these systems

Advantages:

- DAC-electronics of the DLC pro can be used
- better digitalization limit: 24bit resolution (provided by DLC Pro)
- less ground loops



Option	Output type		Loop capture range (CR) and resolution (RES) [3]	
Analog 1 and 2 channels ○ ○ ○	WLM output: **± 4 V, 16 bit**	steps: **122 µV**	RES ~ 12 10^{-21} m (theoretical) ... 120 pm	CR = ± 2^{15} × RES
Analog 4 and 8 channels ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	PCIe output: **± 10 V, 16 bit** MCLC output type: **± 10 V, 16 bit**	Steps: **300 µV**	RES ~ 30 10^{-21} m (theoretical) ... 300 pm	CR = ± 2^{15} × RES
Digital PID 1, 2, 4 or 8 channels ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	DLC Pro controller output: **0–140 V, 24 bit**	Steps: **8 µV**	RES ~ 67 10^{-24} m (theoretical) ... 670 fm	CR = ± 2^{23} × RES

2) CTL not supported by Next Generation wavelength meters.

3) For lasers with a sensitivity between 1V/µm –9.99 V/fm. Theoretical, mind the mode-hope free scanning range of the laser and wavemeter measurement resolution.

NEW OPTION

Multichannel Laser Control

MCLC

The MCLC option combines the capabilities of the photonic crystal switch and PID option in one instrument. It can be ordered with 4 or 8 channels.

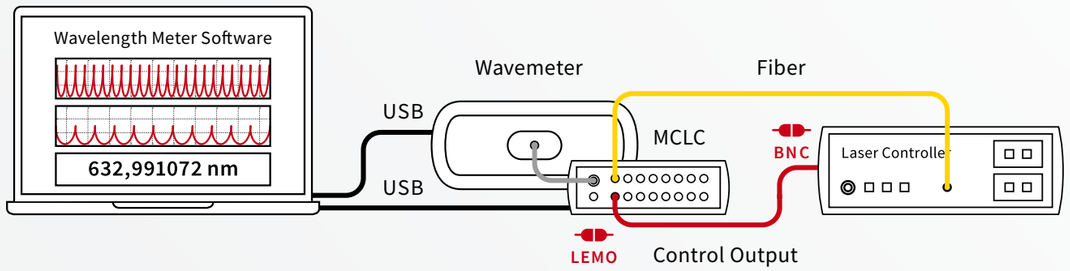
MCLC = MC + PID

This solution for 4 or 8 channel PID is compact and circumvents the need for a computer with a free PCIe slot such that it is possible to monitor and control up to 8 lasers using the HighFinesse wavemeter connected to a laptop as the 4 or 8 analogue outputs with maximum ± 10 V are located at the MCLC instrument. At the same time the MCLC guarantees for the same excellent feedback rate and precision the HighFinesse PID option is known for.

Adapters to connect from the MCLC to the laser from Lemo 00 to BNC are included in the scope of delivery.

Analog Wavelength Control with the MCLC

- Laser Control and Multichannel switch in one compact instrument
- Output directly from the MCLC (± 10 V, 16 bit)
- Required impedance at the control input of the laser: > 10 kOhm



UPCOMING NEW PRODUCT

Next Generation

With the next generation, you can benefit from very recent progress and improvements in software and hardware development already today.

These make the instrument more powerful and versatile:

Enabling high-speed measurements (twice the measurement rate of the standard WS series)

Compatibility with Ubuntu 22.04 and more Linux distributions

down to 100 kHz Resolution

Enabling better measurement resolution

“Next Generation” is available for …		WS8-10	WS8-2
Measurement range	UV-I (248 – 1180 nm)	■	▢
	Std (330 – 1180 nm)	■	■
	IR-I (630 – 1750 nm)	■	▢
Absolute accuracy [1]	330 – 375 nm	20 MHz [3]	10 MHz [4]
	375 – 800 nm	10 MHz [3]	2 MHz [4]
	800 – 1750 nm	8 MHz [3]	2 MHz [4]
Quick coupling accuracy (with multi mode fiber)		100 MHz	100 MHz
Wavelength deviation sensitivity/ Measurement resolution [5]	330 – 1180 nm	200 kHz	100 kHz
	1180 – 1750 nm	150 kHz	–
Measurement speed		1000 Hz	1000 Hz
Minimum required input energy and power [8]		0.08 – 60 µJ or µW	0.08 – 60 µJ or µW
FSR of the Fizeau interferometers (Fine/wide mode) [10]		2/20 GHz	2/20 GHz
Calibration [16]		SLR-780 or any other well known laser source Δν < 2 MHz	SLR-780 or any other well known laser source Δν < 1 MHz
Recommended calibration period		≤ 1 hour	≤ 2 minutes
Warm-up time		> 30 minutes	
Dimensions L × W × H		340 × 252 × 106 mm	
Weight		6.4 kg	
Interface		USB 3.0	

Footnotes: see table page 6/7

The next generation wavelength meters are compatible with all options except for the linewidth option.

All WS Series (tabletop) HighFinesse wavelength meters are connected with USB to a computer running the easy-to-use and powerful HighFinesse wavelength meter software.

They can be controlled with external software via the dynamic link library-based API enabling easy integration in complex measurement processes. The HighFinesse network solution enables control of the wavemeters via the network from computers (with Windows, Linux or MAC operation system) in the same network as the computer running the wavelength meter software. For even more convenient integration HighFinesse provides you with the WR Series (19” Rack). The specifications concerning the absolute accuracy, measurement resolution, speed and range correspond to the WS Series. [1]

Ranges	WR6-600, WR6-200	WR7-60	WR7-30	WR8-10	WR8-2
UV-II (192 – 800 nm)	■	■	▢	▢	▢
UV-I (248 – 1180 nm)	■	■	■	■	▢
Std (330 – 1180 nm)	■	■	■	■	■
Vis/IR-I (330 – 1750 nm)	■	▢	▢	▢	▢
IR-I (630 – 1750 nm) [2]	▢	■	■	■	▢
IR-II and Vis/IR-II	▢	▢	▢	▢	▢

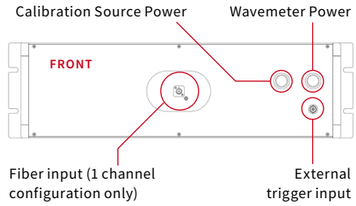
Options	WR6-600	WR6-200, 7-60, 7-30, 8-10 and 8-2	WR Next Generation Series
MC Multichannel Switch	▢	Photonic crystal switch in external 1 HU rack only [4]	Photonic crystal switch in external 1 HU rack only [4]
Analog PID	With external PCIe card	With external PCIe card	With external PCIe card [3]
Digital PID	■	■	■
TTL (External Trigger)	■ (included)	■ (included)	■ (included)
L (Linewidth)	■	■	▢

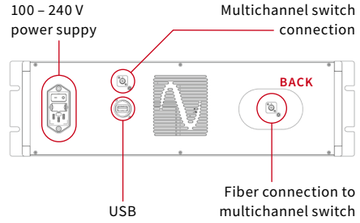
Calibration Sources	WR6-600, 6-200 and WS7-60 Std, UV-I	WR6-200, 7-60, 7-30, Std	WR8-10 and 8-2 Series
	Included	Optionally, integrated in the same rack or in an external rack, wavelength: 632, 780 (external rack only) and 1532 nm	Optionally in an external 19” 3 HU rack, wavelength 780 and 1532 nm

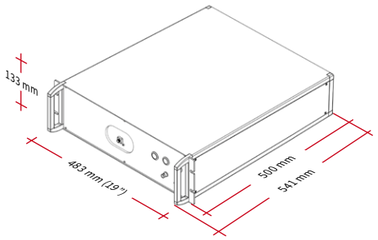
1) If not stated otherwise in the individual specification sheet. 2) For WS7-60 extended range down to 520 nm. 3) Windows only 4) Included for WR8-10 and WR8-2

HighFinesse WR Series

Our standard configuration for Rack wavelength meters of the WR Series is shown above. The WR Series wavelength meter will come in 19”standard rack cases with 3 HU readily mountable in a standard rack system. The wavelength meter can be equipped with options such as Photonic crystal switch (external 1 HU Rack), PID Laser Control. As a standard the TTL external trigger option is included. The Rack wavelength meter is connected via USB to an external computer.







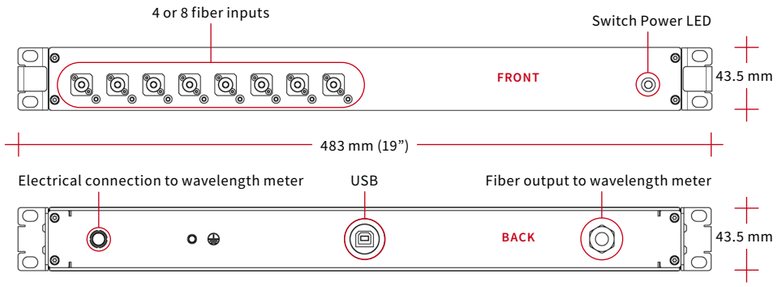
External Calibration Sources for Rack Systems

Our 19” rack calibration sources are highly accurate, reliable, plug and play and ready to be mounted in a 19” Rack system.

Calibration Source	Reference	Wavelength	Accuracy
Rack HeNe	self-stabilized	632 nm	± 5 MHz
Rack SLR-780	Rb	780 nm	± 0.5 MHz
Rack SLR-1532	Acetylene	532 nm	± 2 MHz

Photonic Crystal Switch Rack

To multiply the measurement capabilities of the WR Series we are offering a multichannel switch in a 19” Rack with 1 HU. The switch provides endlessly-singlemode output as it is needed to benefit from the excellent accuracy of the wavelength meter.



OEM and customization

There are always cases when custom solutions are necessary, for example if instruments are subject to extreme conditions. We are always happy to work with you on the perfect solution for instance improving the protection against environmental influences and increased shock resistance.

The HighFinesse WF Series features ultra high measurement rates – for monitoring ultrafast wavelength dynamics. Readout rates can be up to 24 kHz in the 380 – 1064 nm and even up to 76 kHz in the 980 – 1650 nm wavelength range. Fast swept laser sources can be precisely characterized with these wavelength meters.

The fastest commercially available wavelength meters.

Product Overview WF6 Series

	WF6-600 VIS	WF6-200 VIS	WF6-200 IR-I	WF6-600 IR-II
Measurement range (QE > 60%)	380 – 1064 nm	530 – 1064 nm	980 – 1650 nm	1400 – 2600 nm
Absolute accuracy	600 MHz	200 MHz	200 MHz	600 MHz
Quick coupling accuracy	600 MHz	600 MHz	600 MHz	Singlemode fibers only
Wavelength deviation sensitivity	20 MHz	8 MHz	4 MHz	40 MHz
Exposure Times [1]	3 – 3300 µs	3 – 3300 µs	6 – 9500 µs	12 – 90 µs
Measurement Rate	300 – 24000 Hz	300 – 24000 Hz	100 – 76000 Hz	100 – 32000 Hz
Live Calculation Speed [2]	24000 Hz	24000 Hz	28000 Hz	20000 Hz
Live Calculation Latency [2]	≥ 33.6 – 0.7 ms	≥ 33.6 – 0.7 ms	≥ 100.3 – 0.4 ms	10 ms – 150 µs
Minimum required input energy and power	100 µW @ 3 µs / 0.29 nJ @ 532 nm	100 µW @ 3 µs / 0.29 nJ @ 532 nm	1 mW @ 6 µs / 6 nJ @ 1532 nm	100 µW @ 24µs / 2.4 nJ @ 1532nm and 100 µW @ 24 µs / 2.4 nJ @ 2327 nm
Fizeau interferometers (FSR)	16 GHz / 100 GHz	16 GHz	16 GHz	16 GHz
Calibration	Stabilized HeNe laser or any other well known laser source		A well known laser source (e.g. LFR-1532)	
	Δν < 150 MHz	Δν < 40 MHz	Δν < 40 MHz	Δν < 40 MHz
Recommended calibration period	1 month			
Warm-up time	30 min			
Dimensions	432 × 144 × 144 mm			436 × 342 × 133 mm
Weight	3.5 kg			3.5 kg
Interface	USB 2.0 and GbE	USB 2.0 and GbE	USB 2.0 and Camera Link	GbE
Power supply	External 12 V	External 12 V	External 12 V	100 – 240 V, 50 – 60 Hz

1) Depends on gain mode. 2) Depends on PC and measurement rate.

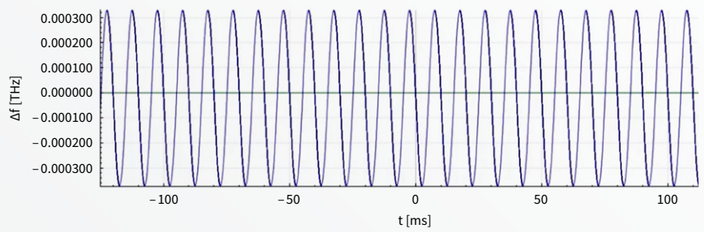
The »FAST wavelength meter« can be externally triggered for synchronizing the wavelength measurements with other processes. As a special software feature an oscilloscope mode is included facilitating the analysis of fast wavelength dynamics.

Oscilloscope mode

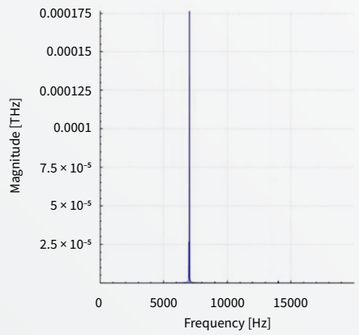
The Oscilloscope Mode displays frequency dynamics like an oscilloscope. The frequencies can be displayed relative to a reference or as an absolute value.

The Oscilloscope Mode includes various analysis features such as the automatic calculation of an amplitude spectrum and a histogram analysis of the frequency deviations.

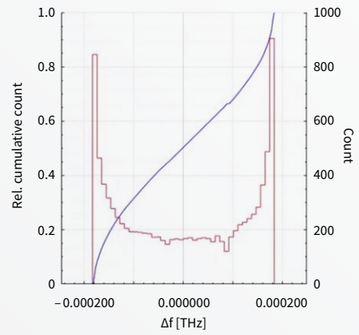
Frequency Deviations displayed in an oscilloscope style



Amplitude Spectrum



Histogram



NEW PRODUCT

The WF7 IR-II reaches the next accuracy level of wavelength characterization at ultra-high measurement rates. At the same time the carefully designed optics of the wavelength meter are very sensitive making it the ideal tool for studying fast wavelength dynamics, even of very weak light sources.

Though being an order of magnitude more accurate than the WF6 series the WF7 IR-II still offers ultra-high measurement rates such that all rapid wavelength changes can be detected.

Synchronisation of the wavelength measurement with additional measurement task can be done easily as the wavelength meter accepts standard TTL signals.

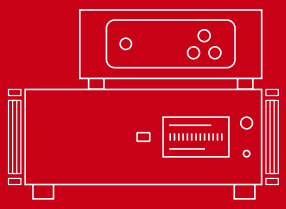
Technical Specification

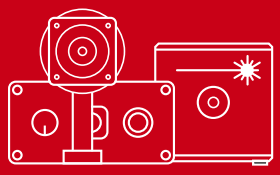
Measurement range (QE > 60%)	1400 – 2600 nm
Absolute accuracy	60 MHz
Quick coupling accuracy	200MHz
Wavelength deviation sensitivity	10 MHz
Exposure Times [1]	26 – 20000 µs
Measurement Rate (continuous/short time)	up to 20000 Hz/up to 38 kHz
Live Calculation Speed [2]	5 kHz
Live Calculation Latency [2]	10 ms – 150 µs
Minimum required input energy and power	4 nJ corresponding to 0.15 mW @ 26 µs exposure time
Fizeau interferometers (FSR)	8 GHz /16 GHz
Calibration	A well known laser source (e.g. LFR-1532) Δv < 10 MHz
Recommended calibration period	1 day
Warm-up time	30 min
Dimensions	436 × 342 × 133 mm
Weight	3.5 kg
Interface	GbE
Power supply	100 – 240 V, 50 – 60 Hz

1) Depends on gain mode. 2) Depends on PC and measurement rate.

HighFinesse

The Standard of Accuracy





Spectrometer

The grating based HighFinesse/Ångstrom Laser Spectrum Analyzers offer the capability for a very accurate simultaneous measurement of both the center wavelength and the linewidth of a laser source with a compact and versatile instrument.

The product series covers the ranges from 192 nm to 2250 nm. The grating based technology allows the analysis of laser sources over a large linewidth range. Utilizing the principle of non-moving parts just like the well-known HighFinesse WS-series wavemeters, the LSA offers the time-tested robustness and ability to measure both pulsed and cw lasers.

Linewidth Analyzer

HighFinesse Linewidth Analyzers (LWA) are specialized high-end instruments for measuring and analyzing the spectral shape of various laser sources. Through the use of two measurement modes, the LWA instruments can analyze both very narrow laser lines down to 350 Hz as well as broader spectra up to 100 MHz. They feature an extremely high resolution and accuracy in determining the linewidth of the respective laser source and its spectral lineshape. The LWAs are ideal for optimizing the stability of laser setups.

Calibration Sources

HighFinesse offers a variety of frequency stabilized, narrow linewidth laser sources for the calibration of all wavelength meters and applications down to ± 0.5 MHz absolute accuracy. These are user friendly, plug and play devices that can be connected to the wavelength meter. Different technologies, accuracies and wavelengths are available to suit your application.

HighFinesse stabilized frequency references yield extremely accurate frequency stabilizations, ideal for calibration of our wavelength meters in the visible and infrared wavelength regimes.

HighFinesse GmbH
Neckarsulmer Straße 5
72072 Tübingen, Germany

+ 49 (0) 7071 - 53 918 0
info@highfinesse.com
www.highfinesse.com

Find further information on products, data sheets and distributors on our website