

# Wavelength Meter WS8-10 Series



HighFinesse  
The Standard of Accuracy



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## Available Measurement Ranges

WS8-10 Standard (VIS)	330 – 1180 nm
WS8-10 UV-I	248 – 1180 nm
WS8-10 IR-I	630 – 1750 nm

## Absolute (and Other) Accuracies<sup>1)</sup>

192 – 330 nm (with multi mode fiber)	0.1 pm
330 – 375 nm	20 MHz <sup>2)</sup>
375 – 800 nm	10 MHz <sup>2)</sup>
800 – 1750 nm	8 MHz <sup>2)</sup>
Quick coupling accuracy (with multi mode fiber)	100 MHz
Wavelength deviation sensitivity/Measurement resolution <sup>3)</sup>	0.4 MHz
Linewidth estimation accuracy <sup>4) 5)</sup>	100 MHz

## Measurement Speed

500 Hz
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## Required Minimum Input Energy and Power<sup>6)</sup>

Standard (VIS)	0.08 – 60 $\mu$ J or $\mu$ W
UV-I	0.08 – 60 $\mu$ J or $\mu$ W
IR-I	8 – 800 $\mu$ J or $\mu$ W

1) According to  $3\sigma$  criterion, but never better than 20 % of the laser linewidth.

2)  $\pm 200$  nm around calibration wavelength; outside of this range the accuracy as WS7-30.

3) Standard deviation. WS8-10 requires photonic crystal (endlessly singlemode) fibers to reach this resolution.

4) Not better than 20 % of the linewidth.

5) Each instrument in each mode can measure lasers with a linewidth up to 30 % of the corresponding FSR.

6) The CW power interpretation in [ $\mu$ W] compares to an exposure of 1s (generally the energy needs to be divided by the exposure time to obtain the required power).



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## FSR of the Fizeau Interferometers (Fine/Wide Mode)

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2 GHz/20 GHz<sup>5)</sup>

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## Calibration

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SLR-780, Iodine stabilized HeNe, or any other well known laser source  $\Delta\nu < 2$  MHz

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Recommended calibration period  $\leq 1$  hour

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## Warm-up Time

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> 30 min. warm-up, or until ambient equilibrium

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## Dimensions L × W × H

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360 × 200 × 120 mm

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## Weight

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6.4 kg

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## Interface

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High-speed USB 2.0 connection

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## Power Supply

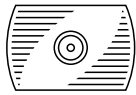
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Power consumption < 2.3 W, power provided directly via USB cable

WS8-10 IR-I: external power supply included

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5) Each instrument in each mode can measure lasers with a linewidth up to 30 % of the corresponding FSR.



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## Included Options

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### Photonic Crystal Multichannel Switch (MC)

In order to measure the frequencies of more than just one laser at a time, an opto-mechanical switch is used. The combination of our high-speed wavelength meters with one of the quickest fiber switches available allows up to eight channels to be measured almost simultaneously. Exposure time and other parameters can be defined independently for each light source.

The WS8-10 series features the use of an endlessly singlemode switch based on photonic crystal technology. This allows to measure any laser wavelength on all switch input channels within all measurement ranges of the WS8-10.

The TTL mode can only be used if the switch is set fixed to one input channel.

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## Options

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### External Trigger (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.

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.

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### Laser Control (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.

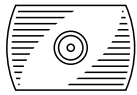
Combined with the MC option the wavelength meter can be used to stabilize multiple lasers simultaneously. The regulation speed, quality and absolute accuracy match the measurement speed, relative accuracy and absolute accuracy of the wavelength meter respectively. The measurement speed is not affected by the regulation.

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### 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. 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  $\pm 10$  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.

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## Options

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### Linewidth Estimation (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 FSR.

The linewidth option can also be used for measuring the linewidth of multimode lasers or lasers with sidebands. In this case, the longitudinal mode splitting needs to be less than the instruments spectral resolution and the calculated result is the FWHM of the envelope function of the multiline spectrum. Any instrument can be upgraded with the L-option.

Singlemode fibers are required.

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### External Calibration (CAL)

Standard HighFinesse wavelength meters up to an absolute accuracy of 60 MHz feature autocalibration via an integrated calibration source. This guarantees the accuracy and stability of measurements with our wavelength meters. For the higher accuracies we offer a variety of frequency stabilized, narrow linewidth, laser sources with up to  $\pm 0.5$  MHz frequency stability for different applications.

For further information see our product description here: <https://www.highfinesse.de/cal>

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## Typical Applications

The WS8-10 is a high-end solution for wavelength monitoring and control with an absolute accuracy of 10 MHz and a wavelength deviation sensitivity of 0.4 MHz. It perfectly combines with the singlemode multichannel option for selected wavelength intervals or the photonic crystal fiber technology enabling multichannel operation in the spectral range of the wavelength meter. The 10 MHz presumes, that the instrument is supported by one of our calibration sources.

## Further Information

For further technical information, application examples, diagrams and for customization of the WS8-10 Series please contact:

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