

Wavelength Meter WS8-2



HighFinesse
Laser and Electronic Systems



Ångström

Available Measurement Range

WS8-2 Standard (VIS)	330 – 1180 nm
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Absolute (and Other) Accuracies¹⁾

330 – 420 nm	0.01 pm
420 – 1100 nm	2 MHz ²⁾
Quick coupling accuracy (with multi mode fiber)	100 MHz
Wavelength deviation sensitivity/Measurement resolution ³⁾	0.2 MHz ⁴⁾
Linewidth estimation accuracy ⁵⁾	100 MHz

Measurement Speed⁶⁾

500 Hz

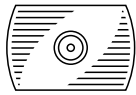
Required Input Energy and Power⁷⁾

Standard (VIS)	0.08 – 60 µJ or µW
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FSR of the Fizeau Interferometers (Fine/Wide Mode)

2 GHz/20 GHz (each instrument in each mode can measure lasers with a linewidth up to 30 % of the corresponding FSR)

- 1) According to 3σ criterion, but never better than 20 % of the laser linewidth.
- 2) 2 MHz: ± 2 nm around calibration wavelength; 10 MHz: ± 200 nm around calibration wavelength; outside of this range the accuracy is 30 MHz.
- 3) Standard deviation. WS8-2 requires photonic crystal (endlessly singlemode) fibers to reach this resolution.
- 4) 100 kHz for special ranges on request.
- 5) Not better than 20 % of the linewidth.
- 6) Depending on PC hardware and settings.
- 7) 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).



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Calibration

I2 stabilized HeNe or any well known laser source $\Delta\nu < 1$ MHz

Recommended calibration period ≤ 2 minutes

Warm-up Time

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

Dimensions L × W × H

360 × 200 × 120 mm

Weight

6.4 kg

Interface

High-speed USB 2.0 connection

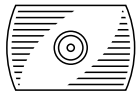
Power Supply

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

Options

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.



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Options

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.

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 WS8-2 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 WS8-2.

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.

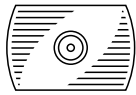
The linewidth option can also be used for measuring the linewidth of multimode lasers or lasers with sidebands. In this case, the longitudinal mode splitting needs to be less than the instruments spectral resolution and the calculated result is the FWHM of the envelope function of the multiline spectrum.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

Singlemode fibers are required.

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 ± 10 kHz 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 WS8-2 is the highest-end solution for wavelength monitoring and control with an absolute accuracy of 2 MHz and a wavelength deviation sensitivity of 0.2 MHz. It comes with the photonic crystal fiber technology enabling multichannel operation in the spectral range of the wavelength meter.

The 2 MHz accuracy presumes, that the instrument is supported by one of our calibration sources based on atomic spectroscopy (or an laser source provided with comparable accuracy).

Further Information

For further technical information, application examples, diagrams and for customization of the WS8-2 please contact:

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