Data Sheet
Ultrafast Laser Spectrum Analyzers (LSA)

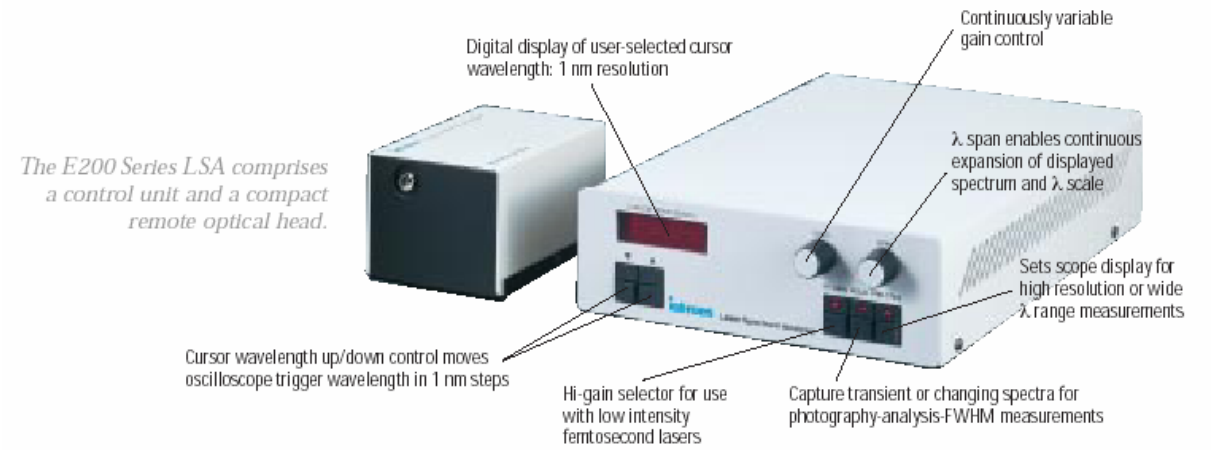
The tool to tune, modelock and optimize your ultrafast laser correctly

The Rees E200 Series Laser Spectrum Analyzer (LSA) from Heraeus Noblelight can now give you the answers by enabling you to continuously monitor the spectral output from wavelength tuneable, mode-locked pico/femto second lasers… on your own laboratory oscilloscope!

It's Fast The E200 Series LSA comprises a compact remote optical head and a control unit which links to any standard laboratory oscilloscope to provide a real time display of the laser spectrum. A scale comprising pulses at 0.2, 1.0 and 10 nm intervals, with a superimposed user selectable cursor pulse is also provided for accurate determination of the Center Wavelength (CWL) and the Full Width Half Maximum (FWHM) of the Laser Spectrum.

It's Easy to Use
Simply line up the spectrum peak with the LSA cursor pulse and read the laser's CWL from the controller's digital display. Measurement of the laser's FWHM is just as easy: Simply freeze the display using the "HOLD" switch and count the number of ë scale pulses between FWHM points on the spectrum display. The normally tedious task of checking to see if your laser is properly modelocked, free of Continuous Wave (CW) breakthrough, and optically tuned to produce a train of wellformed, broadband pulses is now quickly and easily carried out by using the Rees LSA.

It's for You
The compact optical head can be fitted in the smallest of spaces in your existing optical setup and the real time spectrum display makes interfacing to your optics quick and easy. Within minutes of unpacking the system you can be analyzing and tuning your laser spectrum, leaving you more time to get on with the real business of using your laser with the knowledge that it is operating to your specification.



The E200 Series LSA comprises a control unit and a compact remote optical head.

Model Options

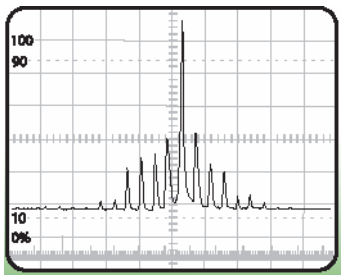
E201 A visible optimized system offering 0.3 nm FWHM optical resolution. Primarily designed to operate over the 350-1000 nm wavelength range; may also be used up to 1100 nm depending on the power level being monitored. Suitable for use with a wide range of femto/picosecond laser systems such as: • Ti:Sapphire • Pr: YLF • AlGaInP Semiconductor Laser Diodes • Cr:LiSaF Diode Pumped Laser • Dye Laser Systems.

E202 A near infrared system with an optical resolution of 0.4 nm FWHM. Optimized for use over the 1000-1650 nm wavelength range; may also be used in the 750-1000 nm range (normally covered by the E201 LSA) if a reduced sensitivity is acceptable. Due to its infrared capability, this system is particularly suitable for use with: • Fiber Soliton • Color Center • OPO • Semiconductor DFB • ER: Yb Fiber.

Quickly and easily tune your ultrafast laser…

From this…

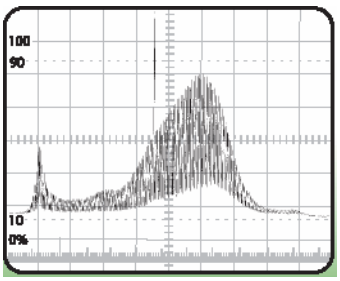
Spectrum and λ scale displayed over over
800 - 925 nm range; cursor at 820 nm.



to this…

Spectrum and λ scale displayed over

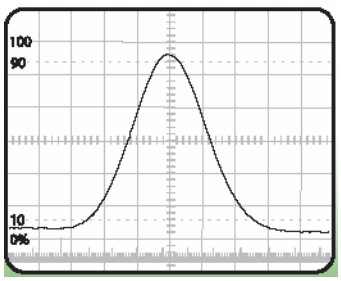
770 - 990 nm range; cursor at 790 nm.



and, finally, to this!

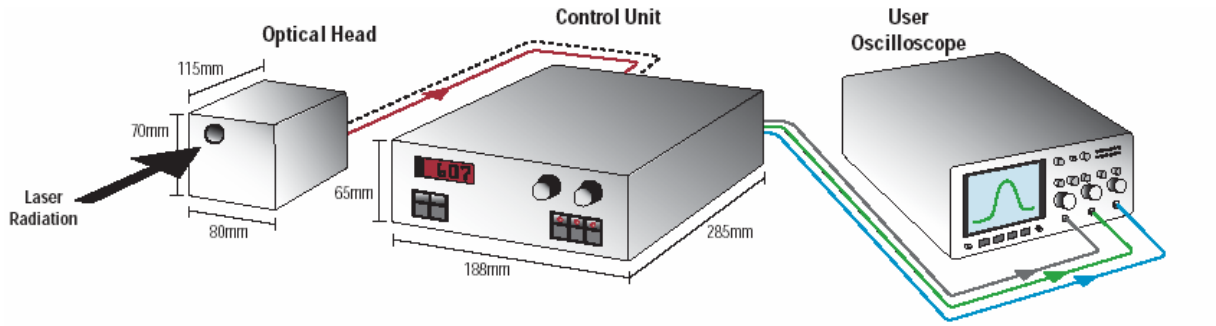
Spectrum and λ scale displayed

800 - 930 nm range; cursor at 820 nm



The high spectral resolution provided by the LSA enables fine laser mode structure, as seen above on the left and middle, to be investigated. This plot shows interference structure in the spectrum of a diode pumped, self-mode locked Cr:LiSaF Laser system.

Having successfully optimized the laser spectrum, you can now quickly and easily measure its CWL and FWHM by using the cursor pulse and the displayed wavelength scale. Measurement of FWHM is particularly useful, as it can be directly related to the time duration of the laser pulses. A good example of this is shown in the plot above on the right which was obtained from a self mode-locked Cr:LiSaF diode pumped laser. The measured spectral FWHM of 30 nm corresponds to a train of laser pulses having a temporal FWHM of approximately 28 femtoseconds.



Optical Heads

Mounting Facilities	1/4 x 20 UNC and M6 bench rod mounting holes	1/4 x 20 UNC and M6 bench rod mounting holes
Input Coupling	FC connector or direct coupling	FC connector or direct coupling
Spectral Scan Rate	18.0 scans/second	18.0 scans/second
Wavelength Range	350-1000 nm (optimized)	1000-1650 nm (optimized)
Wavelength Range	1000-1100 nm (reduced sensitivity)	750-1000 nm (reduced sensitivity)
Wavelength Resolution	0,3 nm FWHM, ±10%	0,4 nm FWHM, ±10%
Wavelength Accuracy	±0,5 nm over the entire range	±0,5 nm over the entire range
Input Power Level Requirements* (350-1000 nm)	10µW (min) --> 2mW (max)	
Input Power Level Requirements* (1000-1650 nm)		10µW (min) --> 2mW (max)
Input Power Level Requirements* (1000-1100 nm)	100µW (min) --> 2mW (max)	
Input Power Level Requirements* (750-1000 nm)		100µW (min) --> 2mW (max)

*Theoretical values for "picosecond lasers" calculated assuming a 2mm dia. uniform collimated input beam. Input power requirements for "femtosecond lasers" depends on the natural FWHM of the laser spectrum, but typically will be around 10X higher tan specified above. In bouth cases, higher sensitivity (lower input power levels) are achievable by use of suitable external focusing optics or a higher input power density.

Note: Controllers and Optical Heads are supplied as factory calibrated matched pairs.

Controller

Power Requirements	Factory preset to 90-132 or 180-264V, 50/60 Hz
Controls	**Signal Gain:** Fixed and continously variable sensitivity controls **Corsor Wavelength Up/Down:** Moves oscilloscope trigger wavelength in 1 nm steps **Display Hold:** Enables storag/repeat display of spectrum on standard (non storage) oscilloscope **Span:** Enables continuous expansion/compresion of displayed spectrum and λ scale
Calibration	Rear panel controls provide fine λ calibration adjustment
Outputs	**Trigger, signal** and **λ Scale** BNC outputs for connection to user's oscilloscope, λ scale comprises pulses at 0.2, 1.0 and 10 nm intervals throughout spectrum range with superimposed cursor pulse positioned by Up/Down controls
Display	Digital display of user-selected cusor wavelength 1 nm resolution
Minimum Oscilloscope Requirement	Standard laboratory oscilloscope with 2 display channels and Ext trigger input, recommended > 20 MHz BW
Trigger Output Rate to Oscilloscope	36 Hz
Operating Conditions	Normal laboratory use (10°-40°C operating temp.)

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