

Analytical Instrumentation

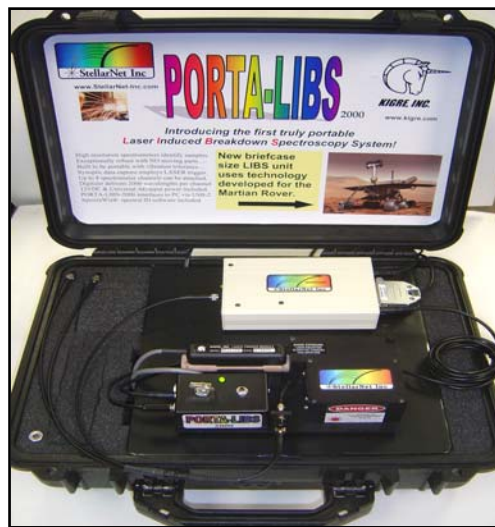
Surf the New Wave in Portable Fiber Optic Spectrometry

PORTA-LIBS-2000 Instrument for Laser Induced Breakdown Spectroscopy

The PORTA-LIBS-2000 is the first truly portable low cost analyzer that can be used for real-time qualitative measurements of trace elements. It can be used for dedicated applications in the field or just about anywhere. Portable high resolution EPP2000 spectrometers are integrated with a high intensity pulsed laser, and sample chamber, to permit UV-VIS-NIR spectral analysis of unknown samples. The portable instrument case is just 18 x 14 x 7 inches and operates via 12 volt adapter or battery. Detection requirements determine the number of required spectrometer channels. Up to 8 high resolution spectrometers can be attached via USB-2 computer interface with 0.1 or 0.2nm resolution.

Laser Induced Breakdown Spectroscopy or **LIBS** has become the common acronym for element detection via laser induced plasma. This permits real-time qualitative identification of trace elements in solids, gases, and liquids via optical detection of elemental emission spectra. Using this technique, little or no sample preparation is required and calibration-free quantitative analysis has been reported without matrix effects.

The SpectraWiz software provides element identification via spectral database for qualitative measurements. Samples can be quickly measured and saved to log-file. Options allow customization of spectral search algorithms. Custom compound element libraries can be created or searched.



PORTA-LIBS-2000 can be useful for a variety of applications. Here's just a few:

- Industrial materials analysis
- Prospecting & Mining
- Environmental monitoring
- Homeland security measures
- Military chemical and biological agents
- Forensics analysis
- Pharmaceutical R&D
- Engine Oil analysis
- Gemology and Counterfeit detection

Specifications	PORTA-LIBS-2000-LSR1	\$19,995
Spectrometer channels: Expandable to 8	Case Dimensions:	7 x 14 x 18 inches
Spectrometer ranges: 190-1000nm wavelengths	Data transfer speed:	480 Mbits per second
Optical resolution: HR=0.1nm or SR=0.2nm	Power consumption:	350 mA @ 12 VDC
Detector type: 2048 pixel CCD array	Computer Interface:	USB-2 port
Laser type: Pulsed Nd-YAG @1.06um	Laser power:	2x consecutive 25mJ,4ns pulse
Laser model & rep rate: Kigre MK-367, 1 Hertz	Power to sample:	6 MegaWatts
Laser lifetime: > 300,000 shots	Plasma chamber:	2 x 2 x 3 inches
SR wavelength range: 200nm =200-400/400-600	Operating systems:	Win9x/XP/Vista/Win7
HR wavelength range: 100nm =200-300/300-400	Software included:	SpectraWiz Spectral-ID
Additional channel: SR=\$3000 HR=\$3500	Customizable software:	LabView,Excel+VBA,Delphi
Example configurations:		
LSR1 \$19,995	1 channel, 200nm range	LHR2 \$23,995
LSR2 \$22,995	2 channel, 400nm range	LHR3 \$27,495
LSR3 \$25,995	3 channel, 600nm range	LHR4 \$30,995
LSR4 \$28,995	4 channel, 800nm range	LHR5 \$34,495
LSR5 \$31,995	5 channel, 1000nm range	LHR6 \$37,995
		6 channels, 600nm range



PORTA-LIBS-2000 High Resolution Spectrometers for Plasma Emissions

The PORTA-LIBS-2000 spectrometers are miniature fiber optic instruments for UV, VIS, and NIR measurements in 190-1000nm spectral ranges. Each unit contains a high speed integrated digitizer with a 4K word spectral scan memory to provide instantaneous spectral capture from the highly sensitive 2048 element CCD detectors. Various models provide a choice of grating range and slit resolution to fit detection requirements. Fiber optic cables deliver the spectral signal from the sample chamber and use standard SMA 905 connections.

The spectrometer optics are exceptionally robust in a vibration tolerant modular design that has no moving parts. The detachable optics assembly and control electronics are protected inside a rugged metal enclosure, suitable for portable applications.



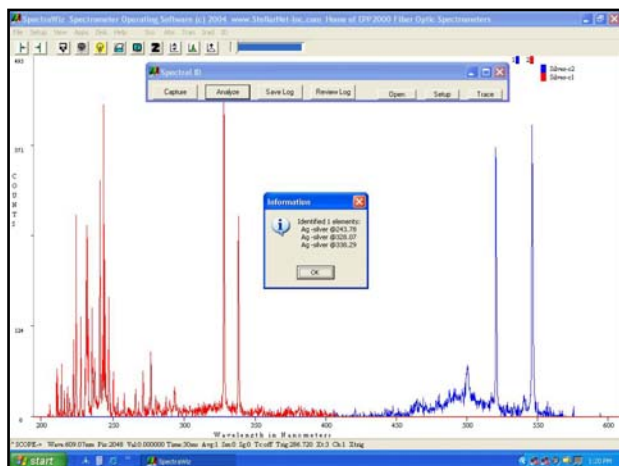
Several units may be daisy-chained via USB-2 hub allowing for expandable configurations. The LHR high resolution spectrometers have double the resolution (0.1nm) over LSR standard models (0.2nm) with the same grating. The LSR models on the other hand have twice the wavelength range of the LHR allowing for a smaller number of channels when application requirements permit. Most elements have plasma emission spectra in the 200-500nm UV-VIS range, leaving just a few in the 500-925nm VIS-NIR range.

BLUE-Wave LSR Model	Wavelength Range in nm	Grating g/mm	Slit-14 nm res.
UV2	200-400	2400	0.20
VIS4	400-600	2400	0.20
VIS4b	600-800	2400	0.20
NIR3b	800-1000	1800	0.20

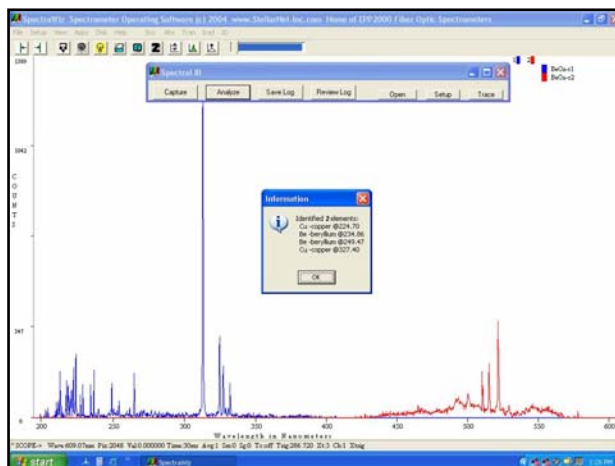
Each PORTA-LIBS-2000 spectrometer includes fiber optic cable interface to sample chamber and high speed USB-2 computer interface with hub when needed. Additional cables are provided for battery operation and laser synchronization.

EPP2000 LHR model	Wavelength Range in nm	Grating g/mm	Slit-7 nm res.
UV3	200-300	1800	0.10
UV3b	300-400	1800	0.10
VIS3	400-500	1800	0.10
VIS3b	500-600	1800	0.10
VIS3c	600-700	1800	0.10
NIR3	700-800	1800	0.10
NIR2	800-925	1200	0.10

Spectrometer optics include CCD detector upgrade for UV, order sorting filters, and slit. Optical alignment of each channel allows for 5nm of overlap outside of specified range. SpectraWiz software integrates all optical channels into single spectral graph for elemental analysis and display.



PORTA-LIBS spectral ID of 99.998% Silver



Spectral ID of 1.9% Beryllium + 98.1% Copper



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