FIELD-PORTABLE UV-VIS-NIR SPECTRORADIOMETERS

REMOTE SENSING SERIES

- Rugged & Reliable
- Compact & Portable
- Unparalledled Accuracy
- High Spectral Resolution

High-Resolution Field Portable UV-Vis-NIR Spectroradiometers For Remote Sensing

Spectral Evolution is the leading manufacturer of field-portable and laboratory UV-Vis-NIR spectroradiometers and spectrometers for remote sensing applications including geological remote sensing, ground-truthing, spectral remote sensing, environmental and climate research, crop and soil research, vegetative studies, forestry and canopy studies, radiometric calibration transfer, upwelling and downwelling measurement and more. Our UV-Vis-NIR spectroradiometers provide the best combination of high resolution and high sensitivity resulting in the most precise field portable instruments available on the market.

Spectral Evolution UV-Vis-NIR spectroradiometers provide:

- Fast, full-spectrum UV-Vis-NIR measurements – 350-2500nm with just one scan
- Superior reliability in the field with 100% diode array optics with no moving parts
- Wireless interface
- High-capacity Lithium-ion rechargeable batteries for field use
- Lightweight and rugged
- Standalone operation – internal memory holds 1000 scans (PSR+)
- Rugged handheld tablet for field use running DARWin LT on Windows with digital camera, and GPS
- Field switchable optics for varying target sizes and measurement modes

All Spectral Evolution UV-Vis-NIR spectroradiometers include our exclusive DARWin SP Data Acquisition and Analysis software for one-touch, full range spectroscopic analysis of samples. DARWin SP automatically saves data as ASCII files for use with 3rd party software without post-processing.

Remote Sensing Series Technical Specifications

Model	NATURASPEC			NATURASPEC PLUS			NATURASPEC ULTRA			PSR-1100f	RS-3500			PSR+		
																
	• Best signal to noise compromise in a field instrument • High resolution & sensitivity • Better data quality of any field spectrometer • The new standard for remote sensing			Same specifications as the NaturaSpec but with added compatibility with the Sensaprobe: • Built-in inclinometer • Built-in camera for real-time targeting • Distance sensor • GPS Coordinates			• The highest spectral resolution of any field spectroradiometer • Enables field validation and calibration of even the highest resolution hyperspectral cameras and satellites by bringing lab quality hyperspectral data into the field. • The optimum instrument to build high-resolution libraries and to push the limits of spectral analysis			• Smallest and lightest portable instrument • Spectral range is ideal for vegetation and water analysis • Internal memory – no need for external PC to operate • Tripod mountable • Compatible with all fore optics and accessories	• Tried and true full-range model • Standard spectral resolution • Lightweight and portable for field research • Compatible with all fore optics and accessories			• Lightest, most portable full-range instrument • Internal memory & onboard controls - no need for external PC to operate • Option for direct attach lens or fiber optic • Tripod mountable • Compatible with all fore optics and accessories		
Spectral Range	350-2500nm			350-2500nm			350-2500nm			320-1100nm	350-2500nm			350-2500nm		
Spectral Resolution	2.7nm @ 700nm	5.5nm @ 1500nm	5.8nm @ 2100nm	2.7nm @ 700nm	5.5nm @ 1500nm	5.8nm @ 2100nm	1.5nm @ 700nm	3nm @ 1500nm	3.8nm @ 2100nm	3.0nm @ 600nm	2.8nm @ 700nm	8nm @ 1500nm	6nm @ 2100nm	2.8nm @ 700nm	8nm @ 1500nm	6nm @ 2100nm
Spectral Sampling Bandwidth (nm)	Data output in 1nm increments; 2151 channels reported			Data output in 1nm increments; 2151 channels reported			Data output in 1nm increments; 2151 channels reported			Data output in 1nm increments; 781 channels reported	Data output in 1nm increments; 2151 channels reported			Data output in 1nm increments; 2151 channels reported		
Detectors	1024-element UV-enhanced Si Array 512-element TE-cooled InGaAs Array 512-element extended TE-cooled InGaAs Array			1024-element UV-enhanced Si Array 512-element TE-cooled InGaAs Array 512-element extended TE-cooled InGaAs Array			1024-element UV-enhanced Si Array 512-element TE-cooled InGaAs Array 512-element extended TE-cooled InGaAs Array			512-element Si Array	512-element Si Array Two 256-element TE-cooled InGaAs Arrays			512-element Si Array Two 256-element TE-cooled InGaAs Arrays		
Calibration	Spectral and radiometric calibration for radiance/irradiance measurements using NIST traceable sources.															
Noise Equivalence Radiance W/cm²/nm/sr (1.2m fiber optic)	$0.3x10^{-9}$ @ 400nm	$0.1x10^{-9}$ @ 1500nm	$2.5x10^{-9}$ @ 2100nm	$0.3x10^{-9}$ @ 400nm	$0.1x10^{-9}$ @ 1500nm	$2.5x10^{-9}$ @ 2100nm	$0.4x10^{-9}$ @ 400nm	$0.2x10^{-9}$ @ 1500nm	$4.0x10^{-9}$ @ 2100nm	$0.8x10^{-9}$ @ 700nm	$0.8x10^{-9}$ @ 400nm	$1.2x10^{-9}$ @ 1500nm	$1.8x10^{-9}$ @ 2100nm	$0.5x10^{-9}$ @ 400nm	$0.8x10^{-9}$ @ 1500nm	$1.0x10^{-9}$ @ 2100nm
Software Included	DARWin™ Data Acquisition			DARWin™ Data Acquisition			DARWin™ Data Acquisition			DARWin™ Data Acquisition	DARWin™ Data Acquisition			DARWin™ Data Acquisition		
Power (volts|watts)	7.4v | 28w			12v | 28w			12v | 33w			7.5v | 2.5w	7.5v | 22.5w			7.5v | 22.5w		
Dimensions (millimeters | inches)	314.9 x 220.9 x 111.7 (mm) 12.4 x 8.7 x 4.4 (in)			317.5 x 226.1 x 86.4 (mm) 12.5 x 8.9 x 3.4 (in))			314.9 x 220.9 x 111.7 (mm) 12.4 x 8.7 x 4.4 (in)			177.8 x 82.5 x 147.3 (mm) 7 x 3.3 x 5.8 (in)	215.9 x 304.8 x 88.9 (mm) 8.5 x 12 x 3.5 (in)			215.9 x 292.1 x 82.5 (mm) 8.5 x 11.5 x 3.3 (in)		
Weight (kilograms | pounds)	5.5kg | 12lbs			4.5kg | 9.9lbs (without internal battery) 5kg | 11lbs (with internal battery)			5.5kg | 12lbs			1.8kg | 4lbs	3.3kg | 7.3lbs			3.5kg | 7.6lbs		
Interface	USB, Wireless Connection			USB, Wireless Connection			USB, Wireless Connection			USB, Wireless Connection	USB, Wireless Connection			USB, Wireless Connection		
Minimum Scan Speed	100ms			100ms			100ms			100ms	100ms			100ms		
Wavelength Reproducibility	0.1nm			0.1nm			0.1nm			0.1nm	0.1nm			0.1nm		
Wavelength Accuracy (nm)	±0.5Bandwidth			±0.5Bandwidth			±0.5Bandwidth			±0.5Bandwidth	±0.5Bandwidth			±0.5Bandwidth		
Automatic Data	Data Optimization | One Touch Operation | Automatic Exposure | Detector Integration | Dark Current Correction															
Input	1.5 m fiber optic (25° field of view); optional fore optics and optional longer fiber optic cables available			1.5 m fiber optic (25° field of view); optional fore optics and optional longer fiber optic cables available			1.5 m fiber optic (25° field of view); optional fore optics and optional longer fiber optic cables available			1m fiber optic (25° field of view); optional fore optics and optional longer fiber optic cables available	1.5 m fiber optic (25° field of view); optional fore optics and optional longer fiber optic cables available			4° lens as standard optic; optional fore optics and fiber optic cables available		
Operational temperature range (°C)	0 to 40 degrees															
Maximum Radiance	VNIR 2x Solar | SWIR 10x Solar															

Created with consideration for field research and built for the environment.

Academia:
Motivate your students. For your research, our Remote Sensing Series of instruments provides the best and most precise radiance and reflectance data. We have the most versatile and precise spectroradiometers in the world, which allow us to build predictive models from the spectral data.

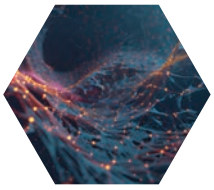
Ground Truthing, Sensor Calibration & Imagery Analysis:
With different resolutions that match or exceed a range of hyperspectral sensors, our Remote Sensing Series spectroradiometers offer the fastest field measurements, making it perfect for sensor calibration, image analysis, and ground truthing.

Environmental Research:
Our Remote Sensing Series of instruments are an essential tool for environmental condition monitoring. They can evaluate a wide range of environmental resources to give comprehensive information about status and composition. They can also be used for remote sensing, air and water quality monitoring, vegetation and soil research, and other activities that show the health of an ecosystem.

Precision Agriculture:
By monitoring environmental and plant physiological conditions, our Remote Sensing Series gives users the power to assess the chemical and physical characteristics of agricultural products, allowing them to identify and initiate targeted mitigation actions early in the growth cycle. This increases yields and lowers production risks.

Art Conservation:
To address issues of attribution, age dating, and conservation, our Remote Sensing Series of instruments are portable, ensuring that artwork remains in place during examination. It also examines significant works of art and historical documents nondestructively, allowing all materials to be noted by their spectral characteristics.

Defense & Intelligence:
Target materials such as flora, camouflage netting, and terrain visible in remotely sensed overflight imagery can be recognized by using our Remote Sensing Spectroradiometers. Spectral Evolution's instrument wavelength range enables the instruments to detect the surrounding landscape, soil, and flora; this helps remote sensing overflight missions in their search for military structures.



Material Composition & Quality Control:
Material composition can be measured with the help of predictive models made with our Remote Sensing Series spectroradiometers. Chemometric models and spectral libraries can be developed and used to automatically identify sample properties and composition for a wide variety of applications in material research, pharmaceutical, and food science.

DARWin™ Aquisition Software

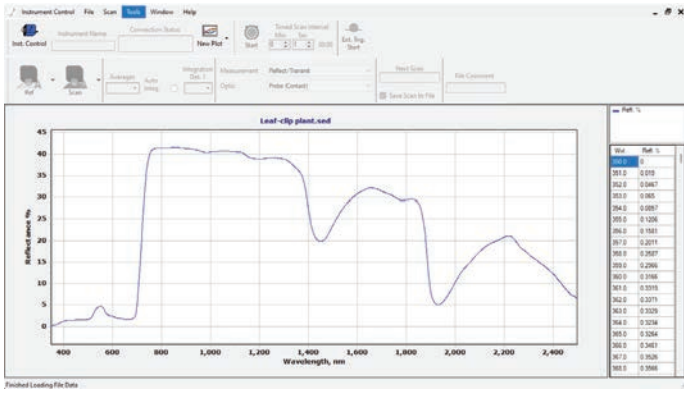
Every Spectral Evolution spectroradiometer includes the exclusive DARWin software – a full-featured, menu-driven program for easy data acquisition and analysis of multiple UV-VIS-NIR spectra.

DARWin comes equipped with features specifically for field measurements.

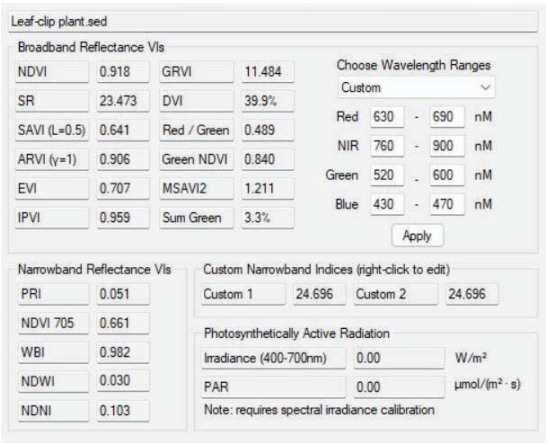
- One-touch operation
- Easy, intuitive menus for fast, effortless operation
- Ability to adjust parameters such as integration time, number of average scans, fore optics selection
- Spectra can be automatically collected at user adjustable intervals from 1 second to 1 hour
- Saves scans as ASCII files for use with third-party software without pre-processing
- Ability to trigger scan from either the software or accessory
- Instrument status displayed after each scan (voltage, temperature, scan title, etc.)
- Specialty pulldown menus to automatically calculate broadband and narrowband vegetative indices
- User-modified index with simple on-screen menu-driven instructions
- Ability to display data as reflectance, transmittance, absorbance, or radiance/irradiance
- Compatible with Windows
- DARWin LT is a simplified version of the software that can be run on a rugged field tablet

EZ-ID™ Spectral Matching Software

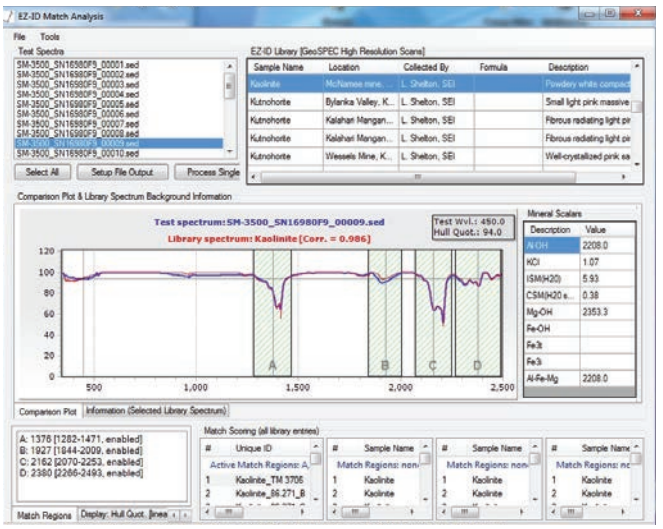
- Add-on module to DARWin
- Build your own custom spectral libraries
- Instantly compare acquired data to reference libraries for instant identification and classification
- Available with up to 3 spectral libraries for minerals, matching to more than 1000 known samples



DARWin interface showing a vegetation scan



Vegetation indices screen



EZ-ID module

Fast, Rugged, Reliable Spectroradiometers

Superior Detectors

We use state-of-the-art TE-cooled photodiode arrays that integrate the complete light signal simultaneously, resulting in faster scan times and more accurate data. With no moving parts, you can count on a rugged and reliable performance in the field.

First-Rate Fiber Optic Cables

Our fiber optic cables bring the complete signal straight to the detectors with a uniform field of view for the best signal-to-noise ratio. With a Spectral Evolution instrument, you don't need to worry about data loss due to loose connections or fiber optic coupling; our fibers are precisely aligned with a keyed entrance, making it quick and easy to replace right in the field without loss of calibration.

Outstanding Optimization

With our DARWin software, manual optimization is a thing of the past. DARWin performs auto-optimization before each and every scan, including auto-integration, auto-exposure, and auto-dark current. This process maximizes signal-to-noise and ensures repeatable and accurate measurements.

Essential Accessories

All of our spectrometers have SMA connectors to quickly and easily connect to a variety of accessories, including contact probes, leaf clips, R/T spheres, field of view lenses, cosine diffusers, and more for radiance, irradiance, reflectance, and transmittance measurements.

ILM-550

- Illuminates large spot size for standoff measurements
- Aluminum reflector for bright, uniform illumination across the entire spectral range
- Includes two 50-watt tungsten-halogen bulbs for diffuse or spot illumination mode - additional bulb options available
- Mount on lab benches, optical tables, or tripod for repeatable data collection

R/T Sphere

- Measures absorbance, reflectance, and transmittance
- Small size and lightweight for use in the lab or field
- Use with included stand or mount on tripod
- Choose a High or Low intensity light setting to scan a variety of samples

Rugged Handheld Tablet

- Real-time, wireless instrument control
- Instantly view scans & match to vegetative, geological, and soil libraries in situ with DARWin and EZ-ID
- 7" capacitive touchscreen – 1280×800 resolution – sunlight readable display
- Built-in GPS, camera, and microphone to collect & organize essential field data

Leaf Clip

- Comfortable handle with push-button external triggering allows for singlehanded operation
- Integrated 3mm spot size light source & reflectance standard
- Unique light source design minimizes heat to the sample to prevent damage.

Pistol Grip

- Ergonomic handle with trigger holds fiber optic in place for precise standoff measurements
- Picatinny rail to mount optional scopes & laser sights for enhanced targeting accuracy
- Tripod mountable

Field of View Lenses

- Lenses provide flexibility for varying target sizes
- Direct attach lenses available for PSR+: 4°, 8°, 14°
- SMA fiber mount lenses available: 1°, 2°, 3°, 4°, 5°, 8°, and 10°

Benchtop Probe w/Compactor

- Ideal for hands-free measurement of loose samples such as soil, crushed stone, or powders
- Optional compactor for consistent sample preparation
- SMA-905 fiber optic connection
- Built-in 5-watt tungsten-halogen bulb and durable sapphire window

Contact Probes

- Ergonomic design with external trigger for quick contact measurements
- Built-in 5-watt illumination for great signal to noise across the full spectral range
- Available in 10mm or 3mm spot sizes for flexible targeting
- Scratch-resistant sapphire window

Diffusers

- Ideal for irradiance measurements
- Compact alternative to an integrating sphere
- Inline and right-angle options available
- Reflective diffuser

ILM-660

- Our highest-intensity light source
- Includes two 20-watt tungsten-halogen bulbs for maximum illumination
- Ideal for dark samples like solid rock or loose mineral/soil

The Pinnacle of Field Spectroscopy!

Bringing lab quality data to field measurements.

Every instrument and accessory built and sold by Spectral Evolution is subject to rigorous quality testing. Each component is meticulously designed, assembled, and calibrated at our facility in Haverhill, MA to ensure the maximum performance and reliability.

We value your time.

By using only photodiode arrays and fixed grating systems, we increase the system's sensitivity and reliability resulting in the highest data quality. There are no moving parts to drift or malfunction during your mission-critical work. We constantly look for ways to make our instruments and software the easiest to use with one-touch autoexposure, auto-dark shutter, auto-ranging controls, and easy software pulldown menus.

We value your mobility.

Without sacrificing ruggedness, our systems are small and lightweight. Portable units are powered with high-capacity lithium-ion batteries and are wireless compatible, so there are no extra cords or cables to restrict your work. Operating our system only requires a small laptop or tablet to keep your travel load as light as possible.

SPECTRAL EVOLUTION

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