## Full range, portable, fiber optic spectroradiometers for remote sensing

**RS-3500/RS-5400 Remote Sensing Bundle Include:**

- RS-3500 and RS-5400 compact, portable spectroradiometers
- Ergonomically designed pistol grip with industry-standard Picatinny rail for mounting accessories, for example, a laser sight
- AC universal power supply
- DARWin SP Data Acquisition software
- Pelican case
- Padded backpack
- 5x5 inch reflectance standard (99%) with aluminum case, cover and tripod mount
- 1.5 meter metal clad fiber optic with SMA-905 input connector (includes thumbscrew release mount)
- RS-3500 includes an ALGIZ 8X handheld tablet running Windows 10, with a Bluetooth connection to DARWin SP and GPS—optional with RS-5400 bundle
- NIST-traceable radiance calibration of 25 degree FOV fiber optic cable
- Rechargeable battery and universal AC charger (2 of each)
- Battery power cable

### RS-3500 Spectroradiometer Specifications

<table>
<thead>
<tr>
<th>Spectral Range</th>
<th>350 - 2500nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spectral Resolution</td>
<td>2.8nm @ 700nm, 8nm @ 1500nm, 6nm @ 2100nm</td>
</tr>
<tr>
<td>Data output</td>
<td>in 1nm increments</td>
</tr>
<tr>
<td>Data output</td>
<td>2151 channels reported</td>
</tr>
<tr>
<td>Si Detectors</td>
<td>512 element Si photodiode array (350 - 1000nm)</td>
</tr>
<tr>
<td>InGaAs Detectors</td>
<td>512 element InGaAs photodiode array (1000 - 1900nm)</td>
</tr>
<tr>
<td>FOV Options</td>
<td>SMA-905 fiber end mount lenses: 1, 2, 3, 4, 5, 8 and 10° field of view, irradiance diffuser</td>
</tr>
<tr>
<td>Noise Equivalence Radiance (1.5 meter fiber optic)</td>
<td>0.8x10⁻⁹ W/cm²/nm/sr @ 700nm, 0.5x10⁻⁹ W/cm²/nm/sr @ 700nm, 1.2x10⁻⁹ W/cm²/nm/sr @ 1400nm, 0.2x10⁻⁹ W/cm²/nm/sr @ 1400nm, 1.8x10⁻⁹ W/cm²/nm/sr @ 2100nm, 2.5x10⁻⁹ W/cm²/nm/sr @ 2100nm</td>
</tr>
<tr>
<td>Minimum Scan Speed</td>
<td>100 milliseconds</td>
</tr>
<tr>
<td>Wavelength Reproducibility</td>
<td>±0.1nm</td>
</tr>
<tr>
<td>Communications interface</td>
<td>USB or Class I Bluetooth - laptop compatible</td>
</tr>
<tr>
<td>Size</td>
<td>8.5 x 12 x 3.5 inches (21.59 x 30.48 x 8.89 cm)</td>
</tr>
<tr>
<td>Batteries</td>
<td>External Li-ion battery and universal power charger (2 of each included)</td>
</tr>
<tr>
<td>Weight</td>
<td>7.3 lbs (3.31 kg)</td>
</tr>
</tbody>
</table>

### RS-5400 Spectroradiometer Specifications

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<thead>
<tr>
<th>Spectral Range</th>
<th>350 - 2500nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spectral Resolution</td>
<td>2.5nm @ 700nm, 5.5nm @ 1500nm, 5.8nm @ 2100nm</td>
</tr>
<tr>
<td>Data output</td>
<td>in 1nm increments</td>
</tr>
<tr>
<td>Data output</td>
<td>2151 channels reported</td>
</tr>
<tr>
<td>Si Detectors</td>
<td>1024 element UV-enhanced Si photodiode array (350 - 1000nm)</td>
</tr>
<tr>
<td>InGaAs Detectors</td>
<td>1024 element InGaAs photodiode array (1000 - 1900nm)</td>
</tr>
<tr>
<td>FOV Options</td>
<td>SMA-905 fiber end mount lenses: 1, 2, 3, 4, 5, 8 and 10° field of view, irradiance diffuser</td>
</tr>
<tr>
<td>Noise Equivalence Radiance (1.5 meter fiber optic)</td>
<td>0.5x10⁻⁹ W/cm²/nm/sr @ 700nm, 0.2x10⁻⁹ W/cm²/nm/sr @ 700nm, 5.0x10⁻¹⁰ W/cm²/nm/sr @ 1400nm, 2.5x10⁻¹⁰ W/cm²/nm/sr @ 1400nm, 2.0x10⁻⁹ W/cm²/nm/sr @ 2100nm, 2.5x10⁻⁹ W/cm²/nm/sr @ 2100nm</td>
</tr>
<tr>
<td>Minimum Scan Speed</td>
<td>100 milliseconds</td>
</tr>
<tr>
<td>Wavelength Reproducibility</td>
<td>±0.1nm</td>
</tr>
<tr>
<td>Communications interface</td>
<td>USB or Class I Bluetooth - laptop compatible</td>
</tr>
<tr>
<td>Size</td>
<td>12.4 x 8.7 x 4.4 inches (31.5 x 22.9 x 38.7 cm)</td>
</tr>
<tr>
<td>Batteries</td>
<td>External Li-ion battery and universal power charger (2 of each included)</td>
</tr>
<tr>
<td>Weight</td>
<td>11 lbs (4.99kg)</td>
</tr>
</tbody>
</table>

**Bundle Include:**

- RS-3500 and RS-5400 compact, portable spectroradiometers
- Ergonomically designed pistol grip with industry-standard Picatinny rail for mounting accessories, for example, a laser sight
- AC universal power supply
- DARWin SP Data Acquisition software
- Pelican case
- Padded backpack
- 5x5 inch reflectance standard (99%) with aluminum case, cover and tripod mount
- 1.5 meter metal clad fiber optic with SMA-905 input connector (includes thumbscrew release mount)
- RS-3500 includes an ALGIZ 8X handheld tablet running Windows 10, with a Bluetooth connection to DARWin SP and GPS—optional with RS-5400 bundle
- NIST-traceable radiance calibration of 25 degree FOV fiber optic cable
- Rechargeable battery and universal AC charger (2 of each)
- Battery power cable

**RS-3500 and RS-5400 Remote Sensing Bundles**

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Field Remote Sensing Systems to Match Your Application

SPECTRAL EVOLUTION’s RS-3500 and RS-5400 spectroradiometer bundles are used in the field for a wide range of remote sensing applications, including:

- Ground truthing—confirming, disputes, or interpreting hyperspectral or multi-spectral data
- Environmental research
- Agricultural analysis
- Ecosystem change
- Forestry research, including canopy studies
- Glacial change and climate studies
- Atmospheric research
- Calibration transfer and satellite sensor validation
- Water body studies
- Plant species identification
- Urban development
- Crop health, including photosynthesis efficiency
- Irrigation assessment
- Soil analysis, including topsoil fertility and erosion risks
- Soil degradation, mapping, and monitoring
- Geological remote sensing, including surveying, mineral identification, and geomorphology

The RS-5400 provides high resolution/high sensitivity performance for remote sensing application with the following spectral resolution:

- 2.5nm @ 700nm
- 5.5nm @ 1500nm
- 8nm @ 2100nm

RS-3500 and RS-5400 bundles include an ALGIZ EK handheld tablet running Windows 10 and connecting to DARWin SP and GPS using Bluetooth communications. Both the RS-3500 and RS-5400 bundles offer many different styles of contact probes and fiber holders such as a pistol grip with unique low reflectance and impact resistant thermoplastic handle, pushbutton trigger for data collection, and industry-standard Pictacnny rail for mounting accessories such as laser sights. A sample contact probe with built in light source is also available.

For reflection and transmittance measurements of leaves and needles, we offer an RT sphere.

The RS-3500 and RS-5400 Spectroradiometer Bundles Advantages

The full range RS-3500 bundle was used to measure soil samples to detect trace amounts of hydrocarbons in soil. The green scan represents a topical sample with prominent water absorption features at 1400nm and 1900nm. The light blue scan represents a sample of the same soil with trace amounts of hydrocarbons with features around 1700nm and 2300nm (circled in yellow).

A Field Instruments to Fit Your Research

The RS-3500 and RS-6400 Spectroradiometer Bundles

Our RS-3500 and RS-5400 bundles feature the spectroradiometers with NIST-traceable calibration for spectral radiance or irradiance measurements (depending on your optics choice) so you can get to work immediately. They are ideal for reflectance measurements in applications like vegetation studies, climate research, and soil analysis.

USGS Library & Vegetation Indices

Access to the USGS spectral library for vegetation and nineteen vegetation indices is provided by pull-down menu in DARWin SP Data Acquisition software. Vegetation indices include:

- NDVI (Normalized Difference Vegetation Index)
- SR (Simple Ratio Vegetation Index)
- SAVI (Soil Adjusted Vegetation Index)
- ARVI (Atmospherically Resistant Vegetation Index)
- EVI (Enhanced Vegetation Index)
- IPVI (Infrared Percentage Vegetation Index)
- PRI (Photochemical Reflectance Index)
- WBI (Water Band Index)
- PAR (Photosynthetically Active Radiation)
- GRVI (Green Ratio Vegetation Index)

The RS-3500 and RS-6400 spectroradiometers cover the UV/VIS/NIR spectra using three photodiode arrays with no moving parts. This makes them supremely reliable in the field. The RS-3500 bundle and RS-5400 bundle can collect spectra in as little as 100 milliseconds.

The exclusive DARWin SP Data Acquisition software included with each unit allows for full featured instrument control and data handling and is compatible with a wide range of 3rd party analytical software. DARWin allows the user to display single or multiple plot spectra. In the display on the left, the RS-3500 was used to identify and classify different clay mixtures in soils in different test pits. The measurements were taken with a contact probe by scanning the pit sidewalls.

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Our leaf clip bundle is specifically designed for leaf reflectance measurements. It features a single-handed leaf clip with an integrated light source and data scan trigger. An integral swing reflectance panel provides easy reference measurements. Dispos-able peel and stick white reference standards are available.