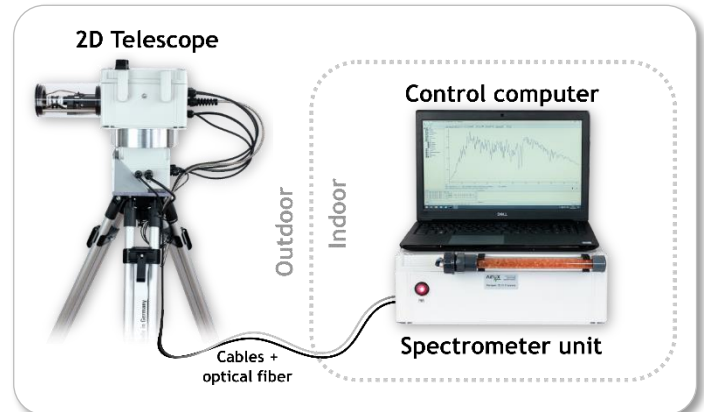


SkySpec 2D Instrument v.250

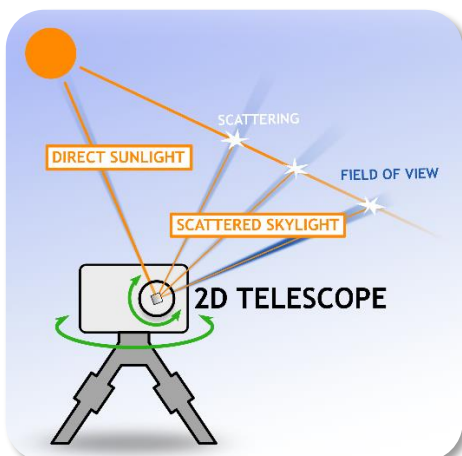
TELESCOPE-SPECTROMETER SYSTEM FOR PASSIVE REMOTE SENSING



- Telescope-spectrometer system for direct-sun and scattered skylight spectrum acquisition
- Optimized for UV/Vis-aerosol and trace gas remote sensing with the DOAS method
- Other applications are possible
- Detectable gases: NO₂, HCHO, SO₂, O₄, O₃, H₂O, HONO, Glyoxal, BrO, IO, ...
- Modular and customizable to meet your specific requirements
- Software packages for spectral analysis, post-processing and data visualization available

TELESCOPE:

- Two motorized axes → automatic pointing to anywhere in the sky hemisphere
- Automatic correction of telescope viewing elevation via integrated inclination sensor
- Narrow field of view
- Rugged and weather-proof design with minimum outside moving parts
- Integrable wide angle cameras for monitoring purposes



SPECTROMETER:

- Grating spectrometer in compact and rugged enclosure
- Characterized and calibrated
- Active temperature stabilization
- Low straylight design
- Sub-nm spectral resolution
- High spectral sampling
- Homogenized slit illumination
- Available with backthinned CCD detector to maximize UV sensitivity

For measurement principle, example applications and data, see SkySpec overview datasheet!

HIGHLIGHTS

Measurement accuracy

- Individual in-house spectrometer fine adjustment to optimize spectral properties
- Spectrometer characterization included: wavelength calibration, offset and dark current spectra, detector non-linearity function
- Active spectrometer temperature stabilization ensures stable properties
- High spectral sampling prevents quantization errors
- Low noise and high precision in narrow-band optical density
- Color filters and optical bench design minimize spectrometer stray-light
- Cross-section converting fiber bundle for maximum light throughput and homogeneous spectrometer illumination
- Real-time correction of telescope elevation via inclination sensor, ideal for measurements on moving platforms (ships, cars) or in changing environments
- Prism deflector and optical fiber setup prevent polarization induced biases
- Small vertical field of view ($< 0.3^\circ$) optimized for vertical profiling applications
- Optional motorized diffusor attenuates and homogenizes the incoming radiation during direct-sun observations
- Optional integrated mercury lamp for spectrometer calibration monitoring

Setup, lifetime & maintenance

- Quartz glass tube design minimizes outside moving parts for:
 - ▶ long lifetime even under harsh environmental conditions
 - ▶ simple cleaning
- Integrated telescope heating (activates at $< 5^\circ\text{C}$) prevents:
 - ▶ freezing of mechanical components
 - ▶ water condensation, snow and ice on quartz cylinder and other optics
- Weather proof and UV resistant IP64 housings
- 12V/DC power supply with low consumption, ideal for mobile operation via battery or car-cigarette-lighter
- Easily adaptable measurement routines
- Fast instrument power-up
- Various mounting options (tripod, rail and mast adapters available)
- Switching between direct-sun and scattered skylight observations within seconds

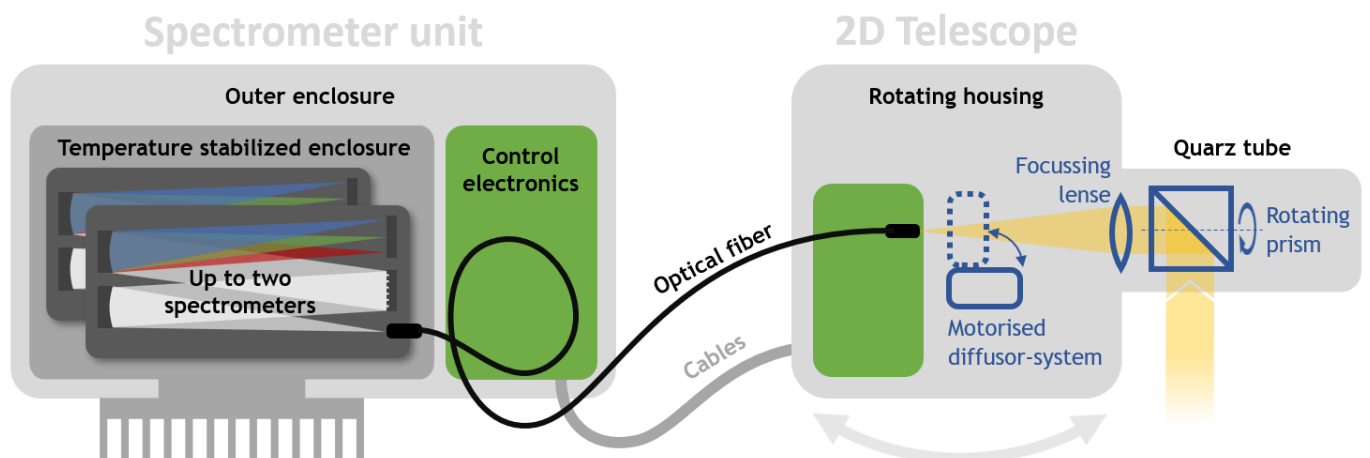
Customization

- Individual spectrometer configurations to best meet your spectral requirements
 - Various optical fiber configurations
 - Different fiber and cable lengths available
 - Integrable opto-mechanical components for direct-sun observations and calibration monitoring purposes
 - Stand-alone operation of separate spectrometer and telescope units for integration in arbitrary spectroscopic measurement system
-

TYPICAL SPECIFICATIONS

Spectrometer specifications (typical) ^{*1,*2}	Config.	Range [nm]	FWHM [nm]	Filter	Mechanical stability Robust for harsh environmental conditions, water proof (IP 64)										
	UV-I	300-408	< 0.5	BG3											
	Vis	408-553	< 0.6	BG40											
	UV-II ^{*3}	300-460	< 0.7	BG3											
Noise	< 3 · 10 ⁻⁴ at 10 ³ scans (≈60s integration time)					Additional Sensors Temperature: 1 °C accuracy, ambient, telescope, spectrometers, electronics Pressure: 0.5 % accuracy, ambient Humidity: ± 3 % accuracy in relative humidity, Spectrometer and telescope unit									
Spectral sampling	> 5 points over slit function FWHM														
Quantum efficiency	UV: > 50 % with back-thinned detectors Vis: up to 80 %														
Spectrometer temp./stability	Temperature: 20 °C (adjustable) Stability better than +/-0.03 °C					Measurement software Included, customizable measurement routine (angles, time resolution)									
Wavelength calibration	Highly stable in-house calibration (typ. shifts < 0.01 nm), optionally: built-in mercury-lamp or manual calibration														
Operation temperature range	Spectrometer unit: -10 °C to 40 °C Telescope: -30 °C to 50 °C					Start-up time < 2 min									
Elevation range and accuracy	-10° to 190°, automatic correction with < 0.1° accuracy (1σ)					Data communication USB 2.0									
Azimuth range and accuracy	-5° to 185°, ± 2° (360° virtually available due to > 180° elevation range)					Power consumption Typ. < 30 W (max. 100 W), 12 V									
Field of view FWHM, vertical x horizontal	Scattered light: < 0.3° x 1° Direct Sun ^{*4} : ≈ 10° x 10°					<table border="1"> <tbody> <tr> <td>Weight</td> <td>Spectrometer unit</td> <td>≈ 8 kg</td> </tr> <tr> <td></td> <td>Telescope unit</td> <td>≈ 7 kg</td> </tr> <tr> <td></td> <td>Full setup (incl. Laptop, fibres, cables)</td> <td>≈ 20 kg</td> </tr> </tbody> </table>	Weight	Spectrometer unit	≈ 8 kg		Telescope unit	≈ 7 kg		Full setup (incl. Laptop, fibres, cables)	≈ 20 kg
Weight	Spectrometer unit	≈ 8 kg													
	Telescope unit	≈ 7 kg													
	Full setup (incl. Laptop, fibres, cables)	≈ 20 kg													
	Size		<table border="1"> <tbody> <tr> <td>Spectrometer box (WxDxH)</td> <td>Box: 40 x 35 x 13.2 cm³</td> </tr> <tr> <td>Telescope unit (WxDxH)</td> <td>Box: 20 x 20 x 29 cm³ Tube (LxD): 16 cm x 8 cm</td> </tr> </tbody> </table>			Spectrometer box (WxDxH)	Box: 40 x 35 x 13.2 cm ³	Telescope unit (WxDxH)	Box: 20 x 20 x 29 cm ³ Tube (LxD): 16 cm x 8 cm						
Spectrometer box (WxDxH)	Box: 40 x 35 x 13.2 cm ³														
Telescope unit (WxDxH)	Box: 20 x 20 x 29 cm ³ Tube (LxD): 16 cm x 8 cm														
Telescope mounting options Wall mount, tripod or mast															

^{*1} Spectrometers equipped with color filters to reduce stray light, ^{*2} Custom specifications are possible, ^{*3} Replaces UV-I, max 2 spectrometers, ^{*4} FOV widened due to diffusor system

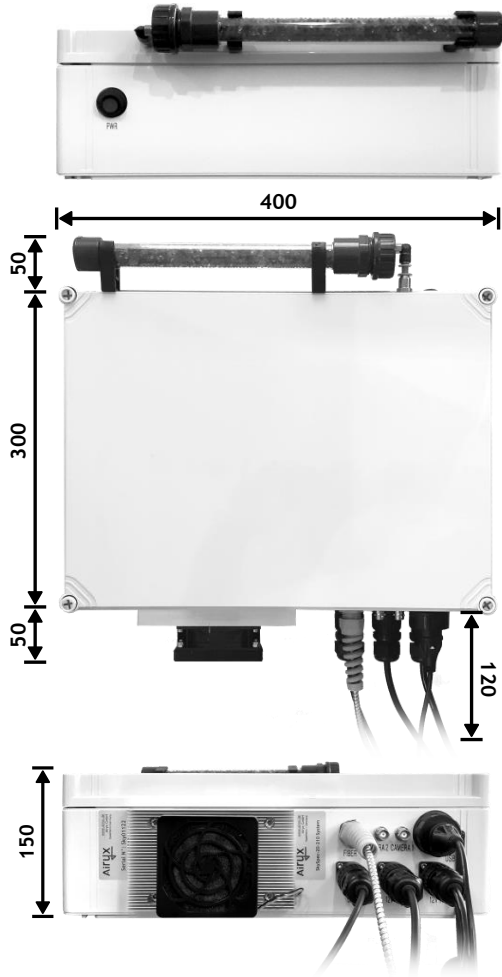


OPTIONAL COMPONENTS & CONFIGURATIONS

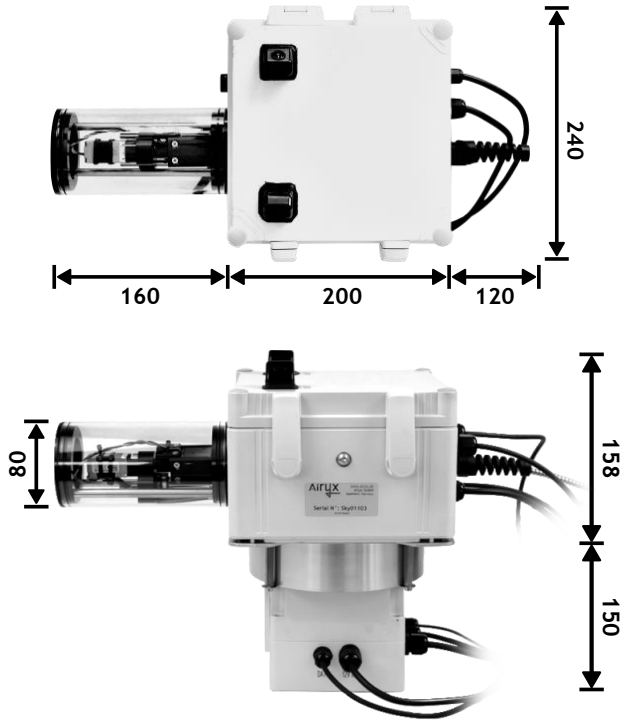
- Custom spectrometer configuration and systems with only one spectrometer
- Integrated, wide FOV camera (2 cameras cover 0° to 180° elevation) to monitor measurement conditions
- Integrated mercury (HG) wavelength calibration lamp system
- Integrated diffusor system for homogenisation of direct Sun light
- Fibre and cable length of 15 m or 20 m
- Azimuth motor heating (for low temperature operation)
- Tripod and various mounting adapters (rails, masts, ...)
- Spare parts and maintenance set
- Pre-configured measurement PC (notebook/desktop)
- Spectral data analysis and imaging software packages
- Online installation and support service

DIMENSIONS

SPECTROMETER BOX:



TELESCOPE UNIT:



All dimensions in mm