SkySpec **1D Instrument** v.260
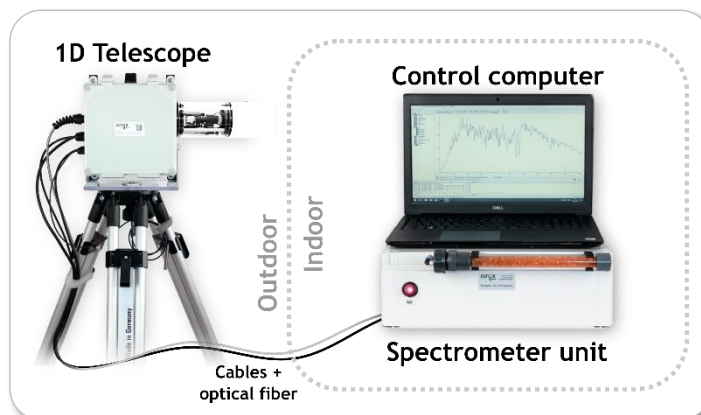
TELESCOPE-SPECTROMETER SYSTEM FOR PASSIVE REMOTE SENSING

- Telescope-spectrometer system for scattered skylight spectrum acquisition
- Optimized for UV/Vis-aerosol and trace gas remote sensing with the DOAS method
- Other applications are possible
- Detectable gases: NO_2, HCHO, SO_2, O_4, O_3, H_2O, HONO, Glyoxal, BrO, IO, ...
- Modular and customizable to meet your specific requirements
- Software packages for spectral analysis, post-processing and data visualization available

TELESCOPE:

- Motorized viewing elevation axis, fixed azimuth
- Automatic correction of telescope viewing elevation via integrated inclination sensor
- Narrow field of view
- Rugged and weather-proof design with no outside moving parts
- Integrable wide angle cameras for monitoring purposes
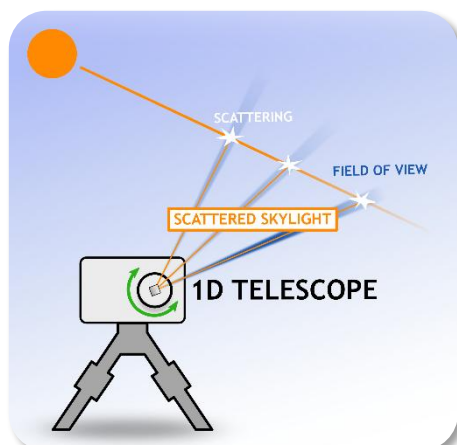
SPECTROMETER:

- 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°) optimized for vertical profiling applications
- Optional integrated mercury lamp and shutter for spectrometer calibration monitoring

Setup, lifetime & maintenance

- Quartz glass tube design avoids outside moving parts for:
  - ▶ long lifetime even under harsh environmental conditions
  - ▶ simple cleaning
- Integrated telescope heating (activates at < 5°C) prevents:
  - ▶ water condensation, snow and ice on quartz cylinder and other optics
  - ▶ freezing of mechanical components
- 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)

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 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
	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)
Spectral sampling	> 6 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
Wavelength calibration	Highly stable in-house calibration (typ. shifts < 0.01 nm), optionally: build in mercury-lamp or manual calibration
Operation temperature range	Spectrometer unit: -10˚C to 40˚C Telescope: -30˚C to 50˚C
Elevation range and accuracy	-10˚ to 190˚, 0.1˚ resolution, automatic correction with < 0.2˚ accuracy (1σ)
Field of view FWHM, vertical x horizontal	< 0.3˚ x 1˚
Telescope mounting options	Wall mount, tripod or mast

Telescope optic		focal length (internal): 75 mm clear aperture: 22.5 mm
Mechanical stability		Robust for harsh environmental conditions, water proof (IP 64)
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
Measurement software		Included, customizable measurement routine (angles, time resolution)
Start-up time		< 2 min
Data communication		USB 2.0
Power consumption		Typ. < 30 W (max. 100 W), 12 V
Weight	Spectrometer unit	≈ 8 kg
	Telescope unit	≈ 4 kg
	Full setup (incl. Laptop, fibres, cables)	≈ 17 kg
Size	Spectrometer unit (WxDxH)	Box: 40 x 35 x 13 cm^3
	Telescope unit (WxDxH)	Box: 32 x 23 x 13 cm^3 Tube (LxD): 12.3 cm x 8 cm

[1] Spectrometers are equipped with color filters to reduce stray light, [2] Custom specifications with different wavelength ranges are possible, [3] Replace UV-I, max. 2 spectrometers.
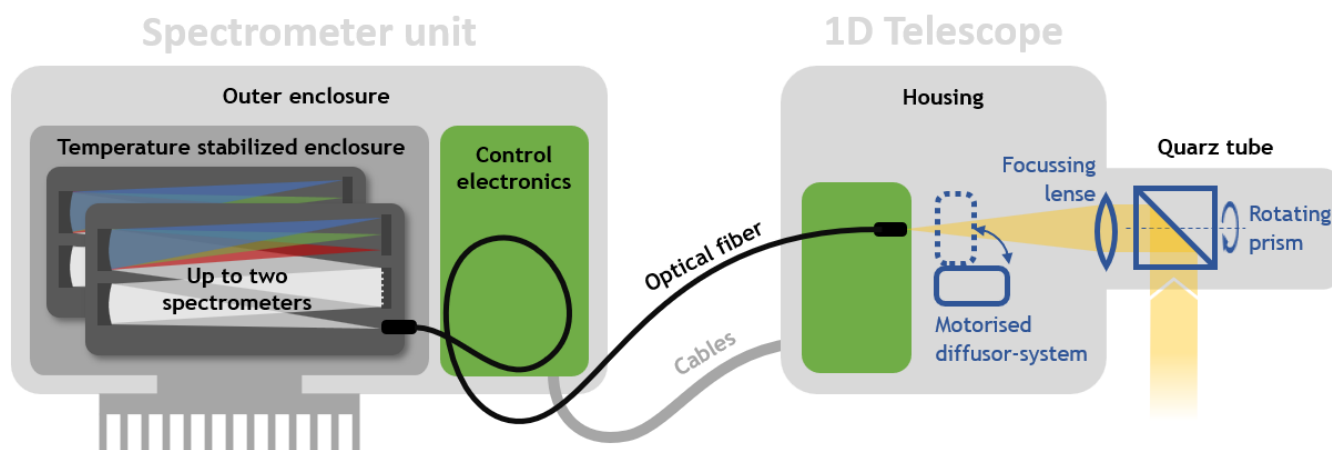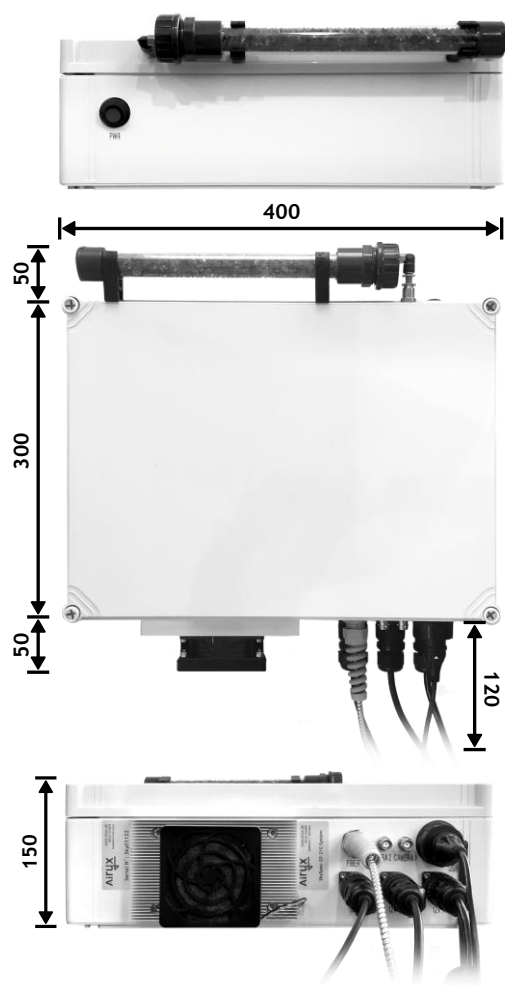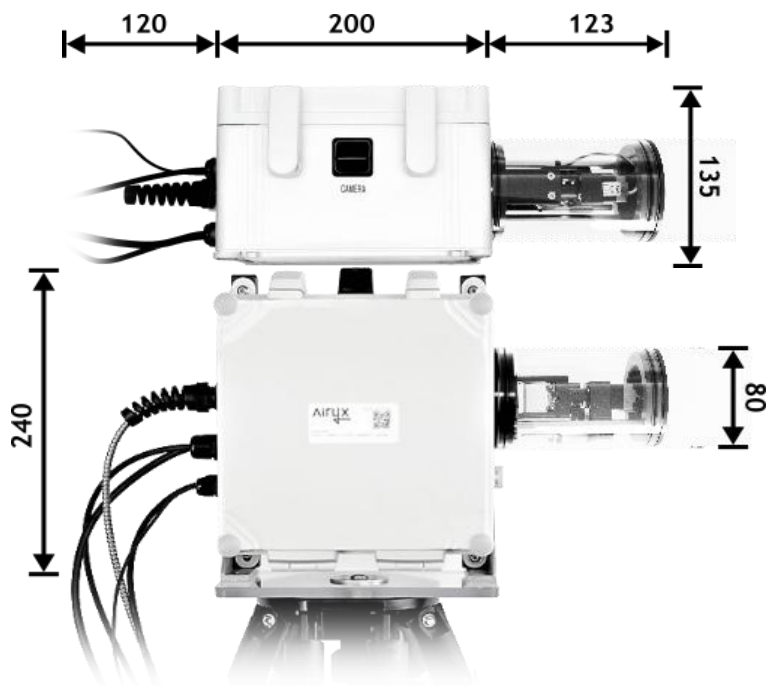

OPTIONAL COMPONENTS & CONFIGURATIONS

- Custom spectrometer configuration and systems with only one spectrometer
- Integrated, wide FOV camera (2 cameras cover 0˚ to 180˚ elevation) to monitor measurement conditions; various mounting options/directions.
- Integrated mercury (HG) wavelength calibration lamp system
- Fibre and cable length of 15 m or 20 m

- Tripod and various mounting adapters (rails, masts, …)
- Spare parts and maintenance set
- Pre-configured measurement PC (notebook/desktop)
- Spectral evaluation software packages
- Online installation and support service

DIMENSIONS

SPECTROMETER BOX:

400

50

300

50

120

150

TELESCOPE UNIT:

120   200   123

135

240

80

All dimensions in mm