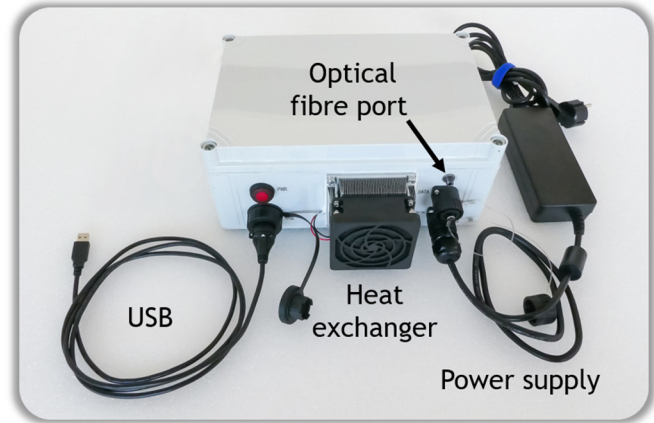
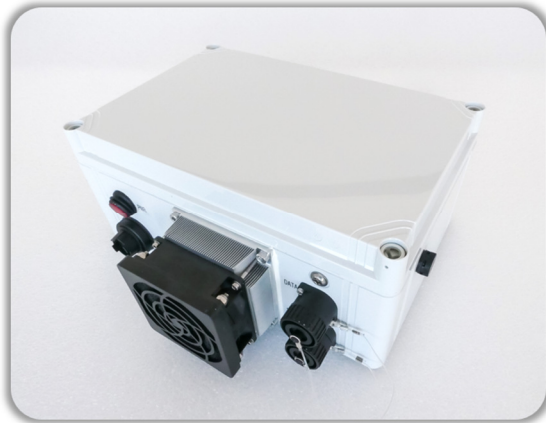
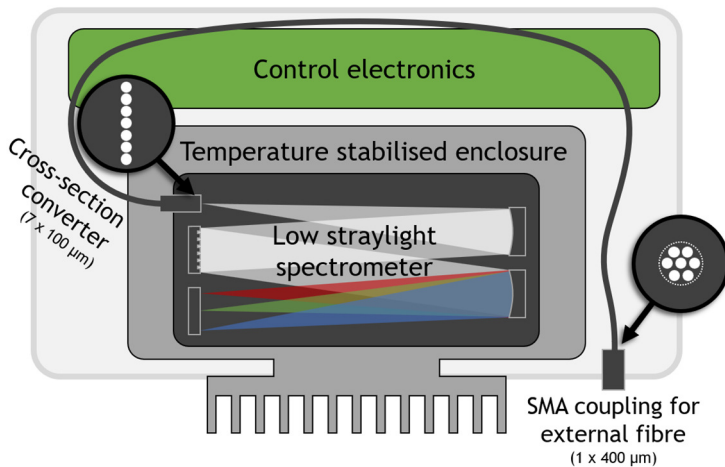


Specbox Mini v1.0

CALIBRATED AND STABILIZED HIGH-RESOLUTION UV/VIS SPECTROMETER



- UV/Vis/IR grating spectrometer in compact and rugged enclosure
- Optimised for UV/Vis-DOAS remote detection of atmospheric gases and aerosols
- Full characterisation included (dark spectra, calibration, detector non-linearity)
- Very stable properties due to active temperature stabilisation



- Low noise and high precision
- High spectral resolution ($< 1 \text{ nm}$)
- Optical connection via quartz fibre
- For permanent as well as mobile applications
- Highly configurable to meet your specific requirements
- Control via USB

EXAMPLE APPLICATIONS

- Environmental passive remote sensing:
 - Detection of trace gases (NO_2 , O_3 , SO_2 , HCHO , H_2O , HONO , IO , BrO , Glyoxal, ...) and aerosols e.g. using the DOAS method
 - Measurements of surface reflection properties.
- Material science
- Biomedical spectroscopy

ADVANTAGES

BENEFITS	INNOVATION
High measurement accuracy	<ul style="list-style-type: none"> • Colour filters and optimised optical bench design minimise spectrometer straylight • Low noise detectors • Spectrometer characterization included: wavelength calibration, offset, dark current, detector non-linearity function • Very stable spectrometer properties due to high temperature stability • Fine slit function sampling to minimize shift induced residuals e.g. in DOAS applications • Internal cross-section converter for optimal light throughput and performance stability • Various configurations on request (spectral range and resolution, fibre configuration) • Available with regular CMOS or backthinned CCD-detector (for high UV sensitivity)
Simple setup & operation	<ul style="list-style-type: none"> • Simple instrument setup and start up • Low maintenance • Low power consumption (< 25W) and flexible power supply (12V/DC) → Operation via power adapter, car cigarette lighter, batteries or other DC sources • Software for easy control and measurement routine implementation available • Optical connection via optical fibre (FSMA connector) • Compact and rugged for mobile applications even in harsh environments • Control via single USB port
Long lifetime	<ul style="list-style-type: none"> • Rugged IP64 • Designed for long term operation • Internal humidity monitoring to avoid water condensation, easily replaceable desiccant

TYPICAL SPECIFICATIONS

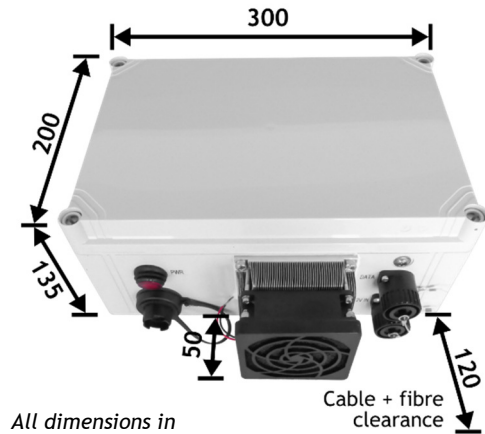
Spectral range¹	300 to 460 nm wavelength	Further characterisation	Dark current, offset, detector non-linearity
Resolution¹	< 0.7 nm (FWHM)	Measurement software	MS-DOAS included, enables independent control of individual components and implementation of measurement routines.
Colour filter¹	BG3	Power consumption	Typ. < 25W (max. 90 W), 12 V
Noise	< $3 \cdot 10^{-4}$ at 10^3 scans (\approx 60 s integration time)	Size (WxDxH):	30 x 13.2 x 20 cm ³ (box only)
Spectral sampling	> 5 points over slit function FWHM	Weight	5 kg
Quantum efficiency²	UV: >50%, Vis: -80%	Start-up time	< 10 s, temp. stable after ~10 min
F-number	f/4	Mechanical stability	Robust Polyethylene enclosure. IP 64 design, except of heat exchanger fan. Internal desiccant avoids water condensation on optics.
Optical fibre configuration¹	Material: Fused silica glass Internal: Cross section converter (circle to slit), 7 x 100 μ m External: ³ Mono-fibre, 1 x 400 μ m, connection via SMA port	Additional Sensors	Temp.: 1 °C accuracy Pressure: 0.5% accuracy Humidity: \pm 3% accuracy in relative humidity
Operation temperature	-10 °C to 40 °C		
Spectrometer temp./stability	Temperature: 20 °C (adjustable) Stability better than +/-0.03 °C		
Wavelength calibration	Highly stable in-house calibration (typ. spectral shifts < 0.01 nm)		

¹ Custom configuration possible ² Other detectors available on request ³ Not included, available on request

OPTIONAL COMPONENTS & CONFIGURATIONS

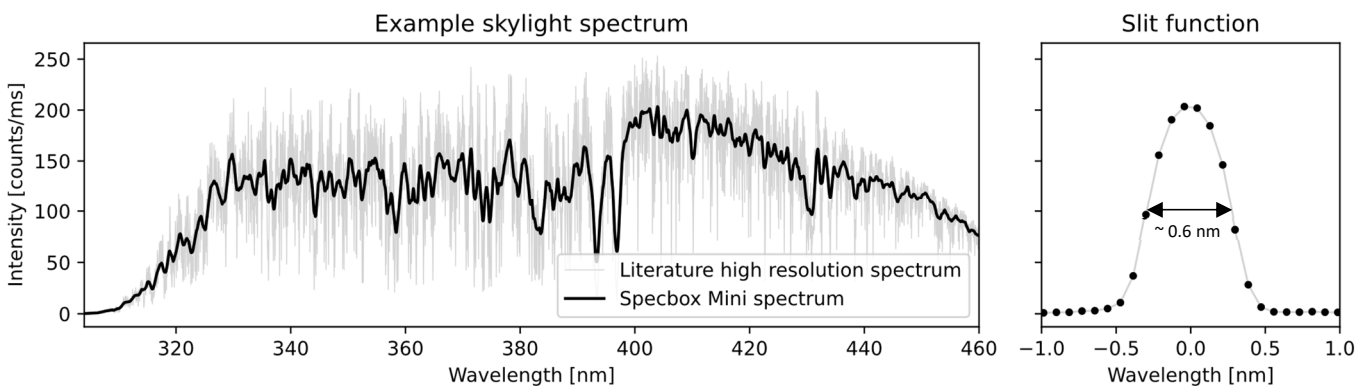
- Custom configuration ensures best compatibility with your measurement setup and requirements.
- Mobile LiPo battery in a Peli case (50 Ah, 13.6 V)
- Airyx SkySpec telescope unit
- Fibre and cable extensions up to 20 m
- Spare parts and maintenance sets
- Online installation and support service
- Spectral data DOAS analysis package

DIMENSIONS



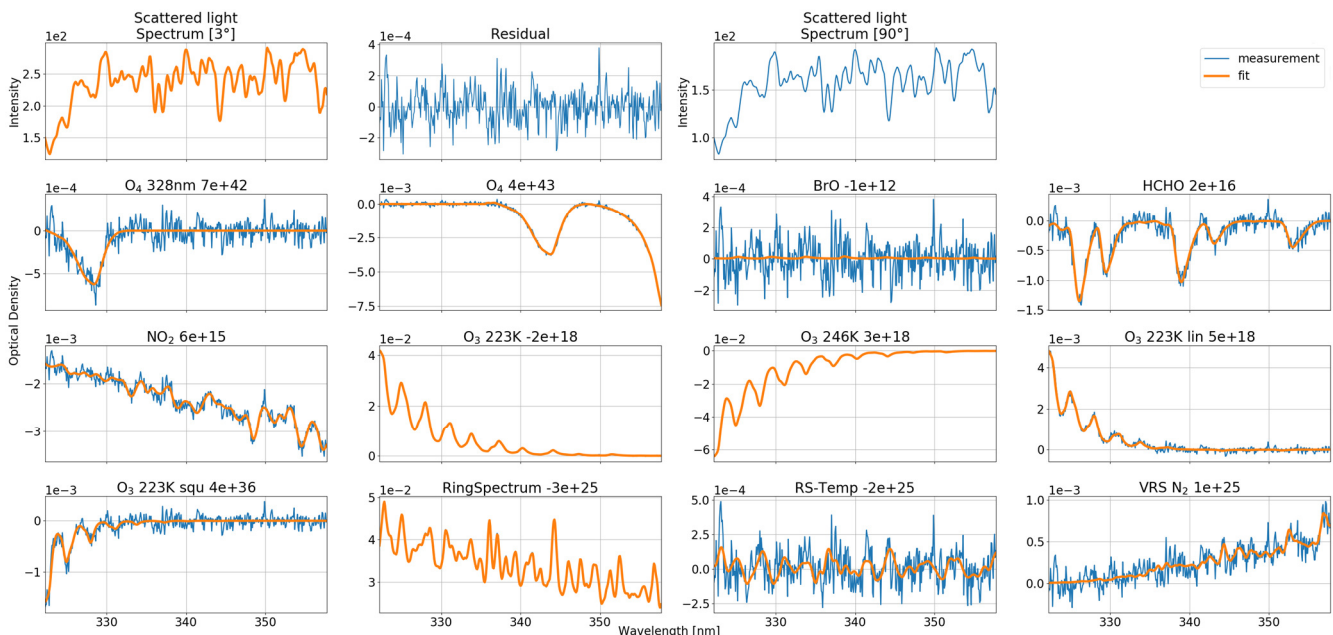
All dimensions in

EXAMPLE SPECTRUM



EXAMPLE DOAS FIT

Optimized for trace gas detection with DOAS, the Specbox-Mini is designed to achieve exceptional precision in narrow-band optical density. The high spectral quality can best be demonstrated on DOAS fit results. The residual magnitude indicates a precision of few 10^{-4} . Its near-statistical nature indicates that it can even be further improved by extending the exposure times.



Example fit of the optical density between two UV skylight spectra, 4 minute exposure time.