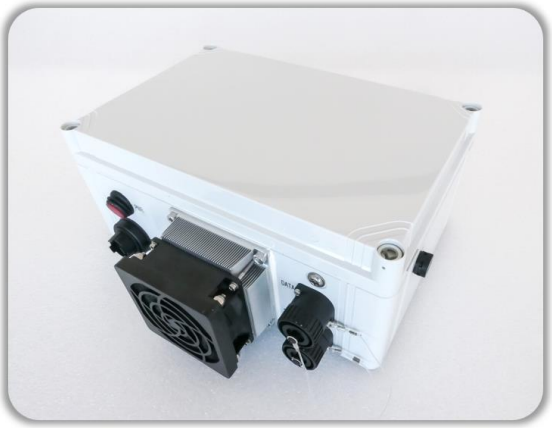
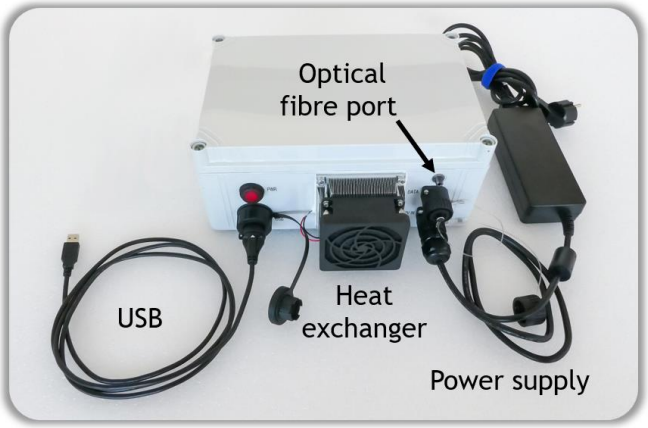
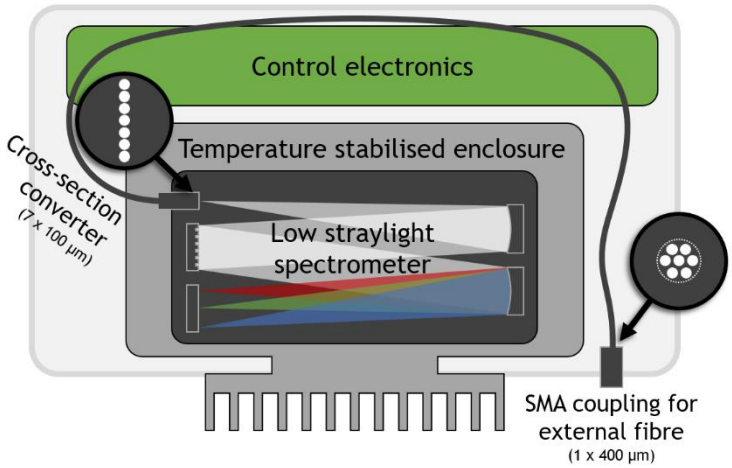
# Specbox Mini v.250

## 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 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** | • Colour filters and optimised optical bench design minimise spectrometer straylight<br>• Low noise detectors<br>• Spectrometer characterization included: wavelength calibration, offset, dark current, detector non-linearity function<br>• Very stable spectrometer properties due to high temperature stability<br>• Fine slit function sampling to minimize shift induced residuals e.g. in DOAS applications<br>• Internal cross-section converter for optimal light throughput and performance stability<br>• Various configurations on request (spectral range and resolution, fibre configuration)<br>• Available with regular CMOS or backthinned CCD-detector (for high UV sensitivity) |
| **Simple setup & operation** | • Simple instrument setup and start up<br>• Low maintenance<br>• Low power consumption (< 25W) and flexible power supply (12V/DC) → Operation via power adapter, car cigarette lighter, batteries or other DC sources<br>• Software for easy control and measurement routine implementation available<br>• Optical connection via optical fibre (FSMA connector)<br>• Compact and rugged for mobile applications even in harsh environments<br>• Control via single USB port |
| **Long lifetime** | • Rugged IP64<br>• Designed for long term operation<br>• Internal humidity monitoring to avoid water condensation, easily replaceable desiccant |

## TYPICAL SPECIFICATIONS

| | | |
|---|---|---|
| **Spectral range**[1] | 300 to 460 nm wavelength | |
| **Resolution**[1] | < 0.7 nm (FWHM) | |
| **Colour filter**[1] | BG3 | |
| **Noise** | < $3 \cdot 10^{-4}$ at $10^3$ scans<br>(≈ 60 s integration time) | |
| **Spectral sampling** | > 6 points over slit function FWHM | |
| **Quantum efficiency**[2] | UV: >50%, Vis: ~80% | |
| **F-number** | f/4 | |
| **Optical fibre configuration** [1] | Material: | Fused silica glass |
| | Internal: | Cross section converter (circle to slit), 7 x 100 µm |
| | External:[3] | Mono-fibre, 1 x 400 µm, connection via SMA port |
| **Operation temperature** | -10°C to 40°C | |
| **Spectrometer temp./stability** | Temperature: 20°C (adjustable)<br>Stability better than +/-0.03°C | |
| **Wavelength calibration** | Highly stable in-house calibration<br>(typ. spectral shifts < 0.01 nm) | |

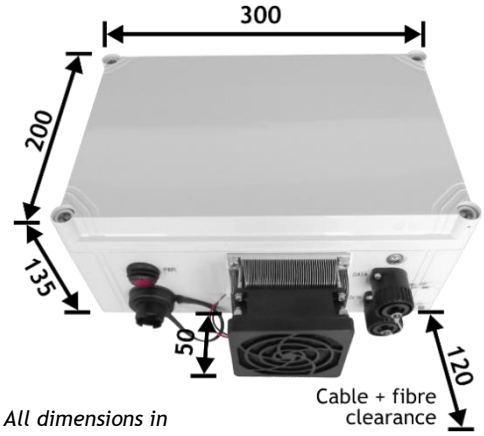
| | | |
|---|---|---|
| **Further characterisation** | Dark current, offset, detector non-linearity | |
| **Measurement software** | MS-DOAS included, enables independent control of individual components and implementation of measurement routines. | |
| **Power consumption** | Typ. < 25W (max. 90 W), 12 V | |
| **Size (WxDxH):** | 30 x 13.2 x 20 $cm^3$ (box only) | |
| **Weight** | 5 kg | |
| **Start-up time** | < 10 s, temp. stable after ~10 min | |
| **Mechanical stability** | Robust Polyethylene enclosure. IP 64 design, except of heat exchanger fan. Internal desiccant avoids water condensation on optics. | |
| **Additional Sensors** | Temp.: | 1°C accuracy |
| | Pressure: | 0.5% accuracy |
| | Humidity: | ± 3% accuracy in relative humidity |

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

## OPTIONAL COMPONENTS & CONFIGURATIONS

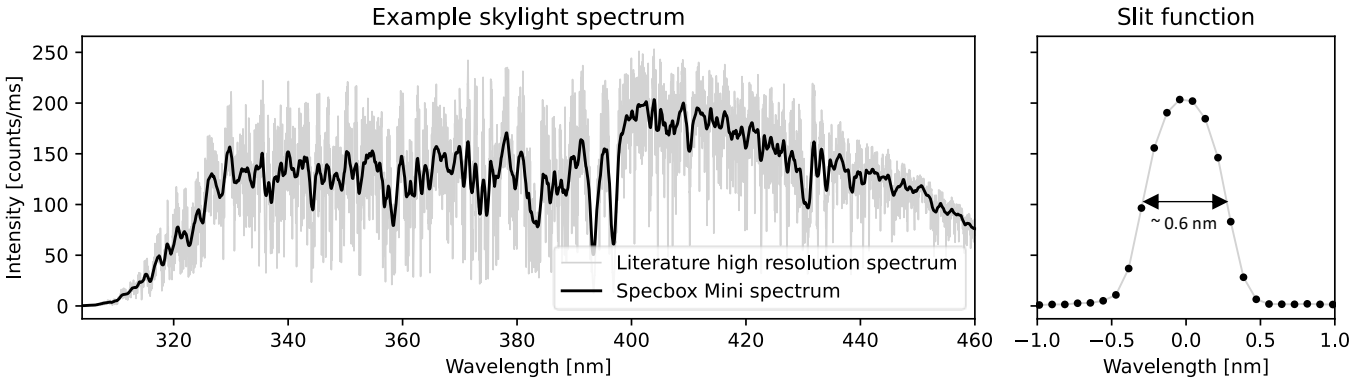
- Custom configuration ensures best compatibility with your measurement setup and requirements.
- Mobile LiPo battery in a Peli case (50 Ah, 13.6 V)
- Airyx SkySpec telescope unit
- Fibre and cable extensions up to 20 m
- Spare parts and maintenance sets
- Online installation and support service
- Spectral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

## DIMENSIONS



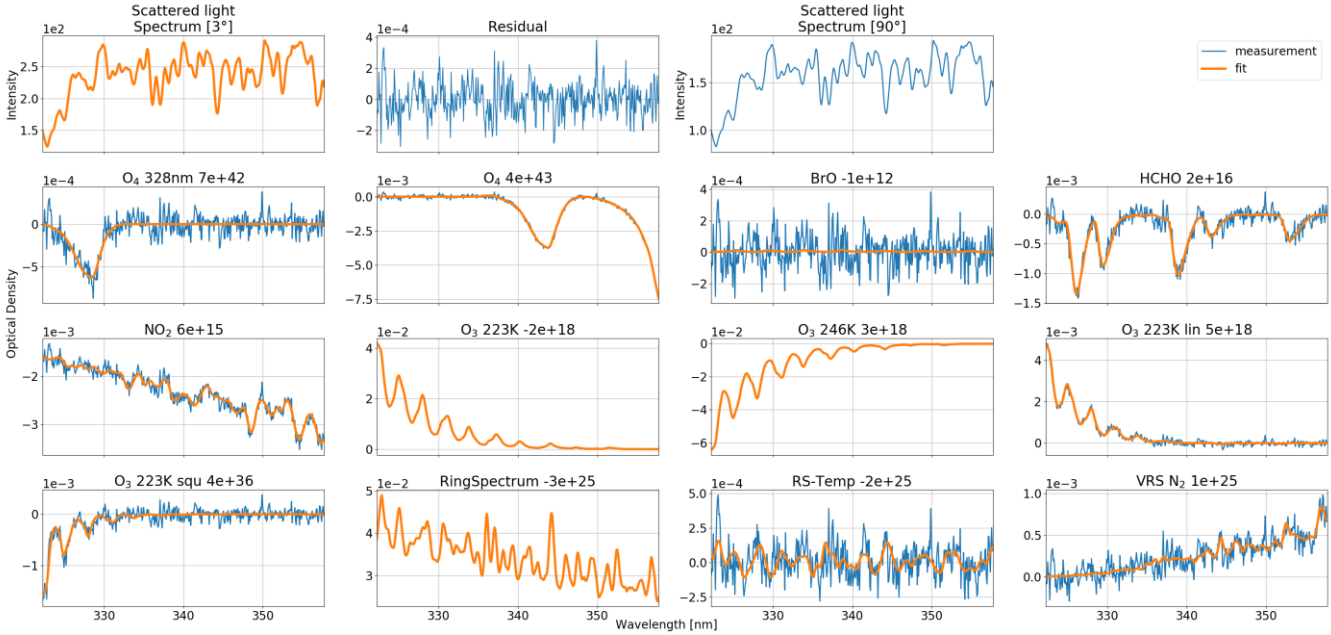

*All dimensions in*

## 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.*