MultiGas ULTRAVIOLET NDUV/UVRAS

- **NON-DISPERSIVE ULTRAVIOLET SENSOR /RESONANCE SPECTROSCOPY (NDIR/UVRAS)**, **SENSORS**
  - SO2 NOX NO2 NO

Overview

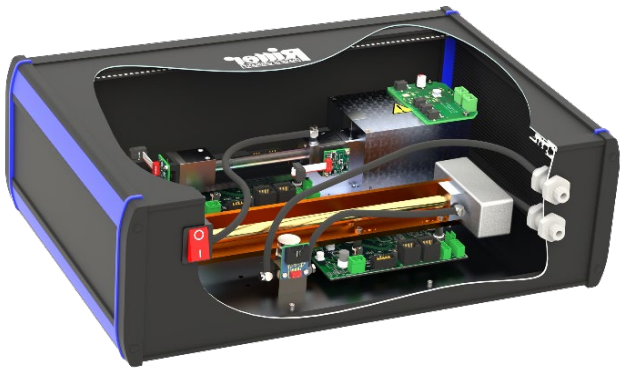
For the detection of NO an EDL (electrodeless gas discharge lamp) is used. In the EDL, N2 and O2 are converted to NO and produce a selective UV radiation. With this radiation, a cross-sensitivity-free NO measurement is made possible. This method is called UV resonance absorption spectroscopy (UVRAS). A combination of both the UVRAS and NDUV technology allows the simultaneous gas analysis of NO, NO2 and SO2 in the lower ppm range which is particularly important in flue gas analysis (Continuous Emission Monitoring, CEM).

Applications

- Automotive test equipment
- Portable Gas Analysis (PEMS)
- Exhaust gas monitoring (CEM)
- Laboratory area
- Industrial gas analysis
- Continuous Emission Monitoring (CEM)Automotive exhaust gas analysis

Characteristics and Benefits

- Group of detectable gases: SO2 NO2 NO
- Temperature controlled up to 55 °C
- Fast response time < 3 seconds
- Durable EDL (> 16000 h)
- Flow-independent measurement 0-2 L/min
- No influence of gas humidity



General Features	
Measurement technology	UV resonance absorption spectroscopy (UVRAS)
Detectable gases:	SO2 NO2 NO
Number of simultaneously detectable gases:	max. 3 per sensor unit
Measurement ranges:	See Table of Measurement Ranges
Flow rate range:	5 ~ 300 ltr/h For higher flow rates the sensor can be operated in bypass
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Max. gas inlet pressure:	300 mbar
Pressure loss (without additional optional sensors):	10 @ 100 / 35 @ 200 / 70 @ 300 (mbar @ ltr/h)
Temperature compensation:	Yes
Data acquisition software:	Yes
Lifetime of UV radiation source:	LED > 20 000 h (NO2, SO2) EDL > 8 000 h (NO)
Measurement cuvette:	Stainless steel with silicone coating inside
Cuvette sealing:	Viton O-ring
Internal tubing:	FKM / Viton (fluorinated rubber)
Casing:	High-quality table-top casing type 2, aluminium
Dimensions: (W x H x L):	464 x 189 x 305 mm
Weight:	approx. 6.5+ kg
Gas connections:	PVDF screw-type tube connection for tube Ø 4 mm, Ø 6 mm

Measuring response	
Linearity error:	< ± 1% F.S.
Repeatability:	± 0.5% F.S.
Long term stability zero:	< 3 ppm / 24 h
Long term stability span:	< ± 1 % F.S. / month
Temperature influence of zero point	< 1% F.S. / 10K
Temperature influence of span:	< 2% F.S. / 10K
Cross sensitivity:	500 ppm NO2 < 2 ppm 100 ppm SO2 < 2 ppm 100 ppm N2O < 10 ppm 20 °C D.P. H2O < 10 ppm
Pressure influence:	< 1.5% / 10hPa of reading
Warm-up time:	1 min (initial), < 60 min for full specification
Response time (t):	1.5 ~ 15 sec
Sampling frequency by software:	≤ 10 Hz
Detection limit:	See table of measurement ranges
Resolution:	0.5 x detection limit

Electrical features	
Power Supply:	24 VDC incl. power plug 100 ~ 240 VAC 50/60 Hz: 24 VDC
Supply current (peak):	1.5 A
Power consumption:	36 W
Interface:	USB (standard), RS232 / CANbus / CANopen (options) incl. data transmission cable 1 m
Analogue voltage output (option):	0 – 2 V / 0 – 5 V / 0 – 10 V

Climatic conditions	
Operating temperature:	+5 ~ +40 °C
Storage temperature:	–20 ~ +60 °C
Operating pressure:	800 ~ 1200 hPa (mbar)
Ambient humidity:	0 ~ 95% rel. humidity **Condensing inside of sensor must be prevented!**

List of standard measurement ranges *1 (and detection limits *2)

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	Standard Measuring Ranges with respective Detection Limits (% of F.S. *3)															
	100 Vol.%	50 Vol.%	30 Vol.%	20 Vol.%	10 Vol.%	5 Vol.%	1 Vol.%	5,000 ppm	2,000 ppm	1,000 ppm	500 ppm	300 ppm	100 ppm	50 ppm	10 ppm	1 ppm
SO_2					✓ (< 0.1%)	✓ (< 0.1%)	✓ (< 0.1%)	✓ (< 0.1%)	✓ (< 0.1%)	✓ (< 0.1%)	✓ (< 0.1%)	✓ (< 0.1%)	✓ (< 0.5%)	✓ (< 0.5%)	✓ (< 0.5%)	
NO_2								✓ (< 0.1%)	✓ (< 0.1%)	✓ (< 0.1%)	✓ (< 0.2%)	✓ (< 0.2%)	✓ (< 0.5%)	✓ (< 0.5%)	✓ (< 0.5%)	
NO								✓ (< 0.1%)	✓ (< 0.1%)	✓ (< 0.1%)	✓ (< 0.2%)	✓ (< 0.2%)				

*1 A standard measurement range is defined by ✓ / *2 (= 3 σ) in Percent of Full Scale / *3 F.S. = Full Scale / *4 Calibration with Propane

Infrared module NDIR Ultraviolet module NDUV

Definition of Detection Limit

The Detection Limit is the smallest measurement value which can be obtained with a specific uncertainty. This uncertainty includes the resolution, noise and stability of the gas sensor for a specific gas and specific measurement range. For evaluation of the detection limit value, several single measurements are taken at the identical measurement conditions. With the obtained single measurement results the standard deviation “Sigma” (σ) is calculated. The values given in the table equal the triple amount of Sigma.

Recalibrations

The following recalibration intervals are recommended for UV sensors:

- Zero-point:
  - Concentrations < 300 ppm: Every 48 hours with inert gas, e.g. Nitrogen
  - Concentrations ≥ 300 ppm: Every 24 hours with inert gas, e.g. Nitrogen

The recalibration of the zero point is described in the software manual.

- Endpoint (full scale): Every 3 months with suitable calibration gas