MultiGas Ultraviolet Module NDUV

NON-DISPERSIVE ULTRAVIOLET SENSOR (NDUV) SENSORS

O3 CL2 CLO2 CS2 SO2 H2S NOX NO2 NO

Featuring high-performance light-emitting diodes (UV-LED) and gas discharge lamps (EDL)

Overview

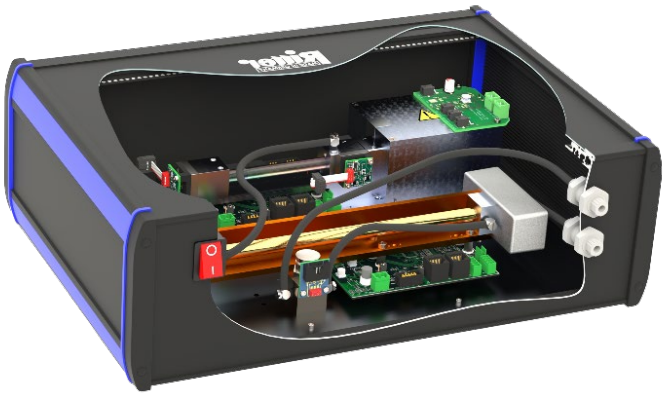
The RITTER MultiGas Sensors NDUV Module (non-dispersive UV sensor) has also been specially developed for use in high quality gas analysis. In the design phase special emphasis was placed on high stability and a low detection limit. These goals could be fully achieved by using high-performance light-emitting diodes (UV-LED) and gas discharge lamps (EDL) which were adapted to the requirements of gas detection technology. In the spectral range from 200 nm to 405 nm, nitrogen oxides, aromatic hydrocarbons, ketones, ozone, sulphur dioxide and halogens can be used with this novel sensor platform, partly detected reliably in the ppb range.

The various photometric components such as detectors, emitters, measuring sample cell, etc. will be assembled user-specifically in a high-quality tabletop casing by RITTER.

Applications

- Biogas research
- Environmental and process measuring technology.

- Elemental analysis
- TOC-analysers
- Industrial gas analysis
- Natural gas analysis



Characteristics and Benefits

- Group of detectable gases: O3 CL2 H2S SO2 NO2
- Measurement technology: Innovative NDUV-Sensor (non-dispersive ultraviolet sensor)
- Measurement accuracy ±2% of Full Scale (F.S.)
- No cross-sensitivity to H2
- Operating temperature: 5 – 45 °C
- Operating pressure: 800 – 1200 mbar (hPa) abs.
- Flow rate range: 1 ltr/day – 100 ltr/h
- Warm-up time: 1 min
- Response time (t90): ≈ 1-2 sec depending on gas
- In tabletop casing, overall dimensions W x H x L 171 x 85 x 246 mm, weight approx. 1,9 kg
- Gas connection: PVDF screw-type tube connection for tube Øi 4 mm, Øa 6 mm
- Power supply: 24 VDC (incl. power plug 100 – 240 VAC / 24 VDC)

In contrast to photometric NDUV sensors the lifetime of electrochemical sensors for measurement of H2S is limited. Please note that lifetime data for such sensors are given for air and not for measurement of H2S. For H2S concentrations > 200 ppm the lifetime is reduced, for concentrations > 1000 ppm critical. While the measurement performance of UV-LED is constant, EC sensors are becoming »deaf«.

General Features	
Measurement technology:	Innovative NDUV Sensor (non-dispersive ultraviolet sensor)
Detectable gases:	O3 CL2 H2S SO2 NO2
Number of simultaneously detectable gases:	max. 2
Measurement ranges:	See below
Flow rate range:	1 ltr/d ~ 300 ltr/h – For higher flow rates the sensor can be operated in bypass
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:	> 8 000 h
Measurement cuvette:	Stainless steel with silicone coating inside
Cuvette sealing:	Viton O-ring
Casing:	High-quality table-top casing, 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 Øi 4mm, Øo 6 mm

Measuring response	
Linearity error:	< ± 1% F.S.
Repeatability:	± 0.5% F.S.
Long term stability zero N2:	< ± 1% F.S. / 24h
Long term stability span:	< ± 2% F.S. / month
Temperature influence of zero point	< 1% F.S. / 10K
Temperature influence of span:	< 2% F.S. / 10K
Cross sensitivity:	< 2% F.S.
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 below
Resolution:	0.5 x detection limit

Electrical features	
Power Supply:	24 VDC incl. power plug 100 ~ 240 VAC /24 VDC
Supply current (peak)	<0.4 A
Average power consumption:	< 7.5 W
Interface:	USB (standard), RS232 (option) – incl. data transmission cable 1 m
Analogue voltage output (option):	0 – 2 V / 0 – 5 V / 0 – 10 V

Climatic conditions	
Operating temperature:	+25 ~ +45 °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)

	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
O_3								✓ (< 0.1%)	✓ (< 0.1%)	✓ (< 0.1%)	✓ (< 0.2%)		✓ (< 0.5%)	✓ (< 0.5%)	✓ (< 0.5%)	✓
CL_2	✓		✓ (< 0.1%)	✓	✓ (< 0.1%)	✓ (< 0.1%)	✓ (< 0.1%)	✓ (< 0.1%)	✓ (< 0.1%)	✓ (< 0.1%)	✓ (< 0.2%)	✓	✓ (< 0.5%)			
SO_2					✓ (< 0.1%)	✓ (< 0.1%)	✓ (< 0.1%)	✓ (< 0.1%)	✓ (< 0.1%)	✓ (< 0.1%)	✓ (< 0.1%)	✓ (< 0.1%)	✓ (< 0.5%)	✓ (< 0.5%)	✓ (< 0.5%)	
H_2S							✓ (< 0.1%)	✓ (< 0.1%)	✓ (< 0.1%)	✓ (< 0.1%)	✓ (< 0.2%)	✓	✓ (< 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