

BUILD
YOUR INDIVIDUAL
CONFIGURATION WITH UP TO

6 IN 1

4 GAS SENSORS PLUS GAS
PRESSURE AND HUMIDITY
SENSORS IN A SINGLE
HIGH-QUALITY
TABLETOP CASING



Simultaneous Gas Analysis with RITTER »MultiGas« Sensors

The Gas Analysis Solution by RITTER with multiple Sensors
for up to 4 different Gases plus Pressure and Humidity

It is a considerable advantage to conveniently use several high-sensitivity sensors in just one tabletop casing

Modular sensor design

In order to adapt gas analyses as flexibly as possible to individual measurement tasks, the single components were designed modularly. This resulted in a modular system in which the various photometric components such as detectors, emitters, measuring sample cell, etc. can be assembled user-specifically.

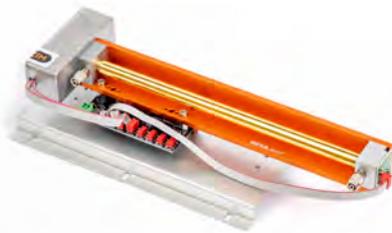
With this sophisticated sensor design, customer-specific applications can be realized without needing a completely new development. The modularity makes replacement and maintenance considerably easier when servicing is required. In contrast to this design, common completely glued gas sensors can only be replaced as a complete unit thus generating high follow-up costs (total cost of ownership) in case of maintenance.

RITTER »MultiGas« takes basic IR & UV technologies to a whole new level of gas analysis experience, according to the latest scientific findings. And optionally, the various gas measurement modules can also be equipped with sensors for oxygen, pressure and humidity measurements.



Photo shows optional display for indication of gas concentrations, temperature, pressure and humidity

RITTER »MultiGas« Infrared Modules NDIR (non-dispersive IR sensor)



CO₂ CO N₂O C_nH_m CH₄ CF₄ SF₆ H₂O

The RITTER »MultiGas« Infrared Modules NDIR have 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 (IR-LED) and thermal micro-radiators which were adapted to the requirements of gas detection. In the spectral range from 2 µm to 12 µm, carbon dioxide, carbon monoxide, hydrocarbons, water vapor and sulfur hexafluoride can be safely detected down to the ppm range with this innovative sensor platform.

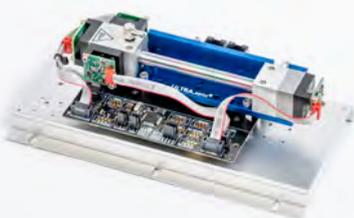
Applications

- › Biogas research
- › Environmental and process measuring technology
- › Elemental analysis
- › TOC-analyzers
- › Industrial gas analysis
- › Natural gas analysis

Features & Benefits

- › Measurement accuracy ±2 % of span (full scale)
- › Operating temperature: 5-45 °C
- › Operating pressure: 800-1200 mbar (hPa) abs.
- › Warm-up time: 2 min
- › Response time (t₉₀): ≈ 3 sec
- › Interface: USB, on request RS232
- › Sensor cuvette: Aluminum, gold plated for sensor length ≥ 100 mm
- › Incl. temperature compensation
- › Incl. data acquisition software

RITTER »MultiGas« Ultraviolet Modules NDUV (non-dispersive UV sensor)



O₂ Cl₂ SO₂ NO₂

The RITTER »MultiGas« Ultraviolet Modules NDUV have 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, sulfur dioxide and halogens can be used with this novel sensor platform, partly detected reliably in the ppb range.

Applications

- › Biogas research
- › Environmental measuring technology
- › Elemental analysis
- › Industrial gas analysis
- › Process measuring technology

Features & Benefits

- › Measurement accuracy ±2 % of span (full scale)
- › Operating temperature: 5-45 °C
- › Operating pressure: 800-1200 mbar (hPa) abs.
- › Warm-up time: 1 min
- › Response time (t₉₀): ≈ 1-2 sec depending on gas
- › Interface: USB, on request RS232

Analyse simultaneously up to 3 different gases plus oxygen, pressure and humidity



Configuration choices for RITTER »MultiGas« Modules

Module types (no. of gases in group)		IR Gas Group	UV Gas Group	Options / Additional Sensors ^{*2}
mono (1) + options	IR	CO ₂ CO N ₂ O C _n H _m CH ₄ CF ₄ SF ₆ H ₂ O		O ₂ P H
	UV		O ₃ Cl ₂ H ₂ S SO ₂ NO ₂ NO	O ₂ P H
duo (2) + options	IR	CO ₂ CO N ₂ O C _n H _m CH ₄ CF ₄ SF ₆ H ₂ O		O ₂ P H
	UV		O ₃ Cl ₂ SO ₂ NO ₂ NO	O ₂ P H
duo combi (1+1)^{*1} + options	IR + UV	CO ₂ CO N ₂ O C _n H _m CH ₄ CF ₄ SF ₆ H ₂ O	O ₃ Cl ₂ H ₂ S SO ₂ NO ₂ NO	O ₂ P H
trio (3) + options	IR	CO ₂ CO N ₂ O C _n H _m CH ₄ CF ₄ SF ₆ H ₂ O		O ₂ P H
	UV / UVRAS		SO ₂ NO ₂ NO	O ₂ P H
trio combi (1+2)^{*1} + options	IR + UV	CO ₂ CO N ₂ O C _n H _m CH ₄ CF ₄ SF ₆ H ₂ O	O ₃ Cl ₂ SO ₂ NO ₂	O ₂ P H

^{*1} Not all combinations possible / ^{*2} P = pressure, H = humidity

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
CO ₂	✓ (< 0,1%)	✓ (< 0,1%)		✓ (< 0,1%)	✓ (< 0,1%)	✓ (< 0,1%)	✓ (< 0,1%)	✓ (< 0,1%)	✓ (< 0,1%)	✓ (< 0,1%)	✓ (< 0,1%)		✓ (< 0,3%)	✓ (< 0,3%)		
CO	✓ (< 0,2%)	✓ (< 0,2%)	✓ (< 0,2%)		✓ (< 0,2%)	✓ (< 0,2%)	✓ (< 0,2%)	✓ (< 0,2%)	✓ (< 0,3%)	✓ (< 0,5%)	✓ (< 0,5%)					
N ₂ O	✓ (< 0,1%)	✓ (< 0,1%)	✓ (< 0,1%)	✓					✓ (< 0,1%)	✓ (< 0,1%)	✓ (< 0,1%)	✓ (< 0,1%)	✓ (< 0,3%)			
C _n H _m ^{*4}	✓ (< 0,1%)	✓ (< 0,1%)	✓ (< 0,1%)	✓	✓ (< 0,2%)	✓ (< 0,2%)	✓ (< 0,2%)	✓ (< 0,2%)	✓ (< 0,5%)	✓ (< 0,5%)						
CH ₄	✓ (< 0,1%)	✓ (< 0,1%)	✓ (< 0,1%)	✓	✓ (< 0,1%)	✓ (< 0,1%)	✓ (< 0,1%)	✓ (< 0,1%)	✓ (< 0,3%)	✓ (< 0,5%)						
CF ₄	✓ (< 0,2%)	✓ (< 0,2%)	✓ (< 0,2%)													
SF ₆	✓ (< 0,1%)	✓ (< 0,1%)	✓ (< 0,1%)					✓ (< 0,2%)		✓ (< 0,5%)			✓ (< 0,3%)	✓ (< 0,3%)		
H ₂ O						✓	✓	✓								
O ₂								✓ (< 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%)			
H ₂ S							✓ (< 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%)	✓ (< 0,1%)	✓ (< 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

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.

RITTER »MultiGas« Combined Modules NDIR + NDUV

CO₂ CO N₂O C_nH_m CH₄ CF_x SF₆ H₂O
O₃ Cl₂ H₂S SO₂ NO₂ NO

RITTER »MultiGas« Modules can also be a combination of both NDIR sensors and NDUV sensors on a common board. With this unit, up to 3 gas components can be measured simultaneously. The basic electronics can supply IR and UV radiation sources with different frequencies for 0 Hz (DC) to 100 Hz (AC). This system is an ideal tool for detecting multi-component gas at low ppm levels.



Please note: For technical and chemical reasons, not every combination of gases/measuring ranges can be analyzed/measured in a single or combined RITTER »MultiGas« module. As this is a rather complex topic, please do not hesitate to contact one of our gas experts first.

RITTER »MultiGas« Ultraviolet Module NDUV / UVRAS

SO₂ NO₂ NO

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 selective UV radiation. With this radiation a cross sensitivity free NO measurement is made possible. This method is called UV resonance spectroscopy (UVRAS).

A combination of both technologies (UVRAS & NDUV) allows simultaneous gas analysis of NO, NO₂ and SO₂ in the lower ppm range, which is particularly important in flue gas analysis (CEM, Continuous Emission Monitoring).

Features & Benefits

- › Measurement accuracy ±2 % of span (full scale)
- › Simultaneous NO_x and SO₂ analysis
- › 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
- › No NO_x converter required
- › In »Thermobox« as standard for stable measurement conditions

Applications

- › Exhaust gas monitoring (CEM, Continuous Emission Monitoring)
- › Laboratory area
- › Biogas research
- › Industrial gas analysis
- › Engine test benches
- › Portable gas analysis (PEMS, Portable Emission Monitoring System)



RITTER »MultiGas« Ultraviolet Module NDUV / H2S

H₂S SO₂

The H₂S sensor works according to the principle of non-dispersive UV absorption (NDUV). The measuring wavelength used is in the lower nanometer range, which enables interference-free measurements with water vapor and hydrocarbons. This makes the sensor ideal for use in biogas measurements, as accompanying gases such as NH₃, CO₂, CH₄ and H₂O do not affect the accuracy of the measurements.

Features & Benefits

- › High dynamic range
- › Fast response time
- › Applicable for continuous measurements
- › Different Interfaces (RS232, CANbus)

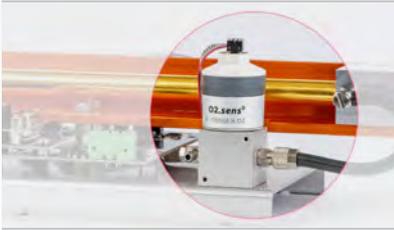
Applications

- › Biogas Monitoring
- › Industrial gas analyzer
- › Environmental monitoring
- › Process control
- › Leakage detection
- › Renewable Gas Monitoring



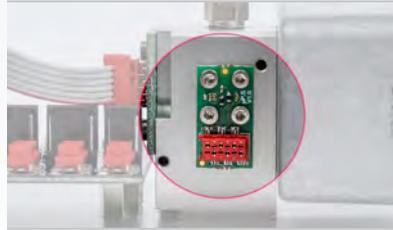
In contrast to photometric NDUV sensors the **lifetime of electrochemical sensors for measurement of H₂S** is limited. Please note that lifetime data for such sensors are given for air and not for measurement of H₂S. For H₂S concentrations > 200 ppm the lifetime is reduced, for concentrations > 1000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

RITTER »MultiGas« Options, built-in as supplement in tabletop casing



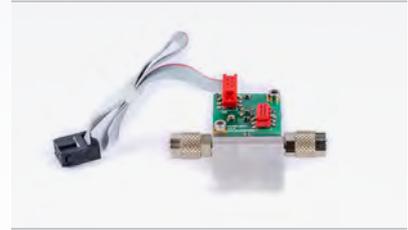
Oxygen sensor

- › Electrochemical sensor
- › Measurement range: 0-100 %
- › Measurement accuracy ± 2 % of span (full scale)
- › Resolution: < 0.5 % of span (full scale)
- › Response time (t90): ≈ 15 sec; automotive version ≈ 5 sec
- › Lifetime: approx. 5 years
- › Incl. temperature compensation
- › Operating temperature: 5-45°C
- › Operating pressure: 800-1200 mbar (hPa) abs.
- › Indication of measured values by provided Software



Pressure sensor

- › Pressure compensation of measured gas concentrations
- › Measuring range: 800-1,200 mbar abs.
- › Measurement accuracy ± 1 % of span (full scale)
- › Resolution: 1 mbar
- › Response time (t90): 1 s
- › Incl. temperature compensation
- › Operating temperature: 5-45°C
- › Operating pressure: 800-1200 mbar (hPa) abs.
- › Indication of measured values by provided Software



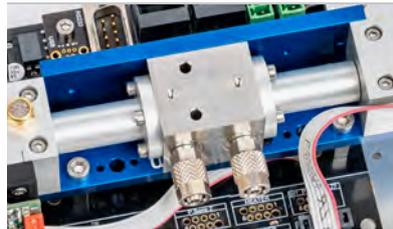
Humidity sensor

- › Polymer humidity sensor
- › Measuring range: 0-100 % RH
- › Measurement accuracy ± 2 % RH of span (full scale)
- › Resolution: ± 1 % RH
- › Response time (t90): 12 s
- › Incl. temperature compensation
- › Indicated values: relative humidity in % RH
- › Operating temperature: 5-45°C
- › Operating pressure: 800-1200 mbar (hPa) abs.
- › Indication of measured values by provided Software



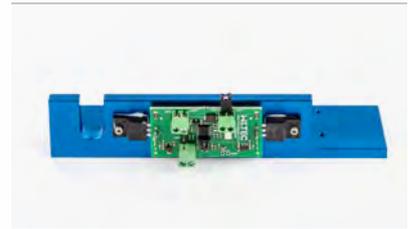
Analog Output

- › Analog Voltage Output for max. 4 separate gas concentrations
- › Alternatively 0-2 V / 0-5 V / 0-10 V
- › 16 bit resolution,
- › 1 sec update rate



PEEK Cuvette

- › For corrosive gases (e.g. Chlorine)
- › O-ring seal
- › Pressure-resistant



Heating and thermostating of sensor module

- › To avoid condensation inside the sensor
- › For constant measurement results
- › Thermal insulation of casing interior
- › Thermostating at 50°C (standard), lower thermostat temperature possible on request

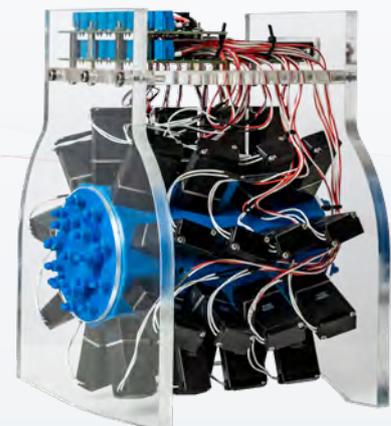
IN PREPARATION

With »MultiGas« and »MultiPlex« to more measurement efficiency and cost reduction

The RITTER Multiplexer for Gas Analysis

In addition to the advantage of the RITTER »MultiGas« Sensor system by analysing up to four different gases (plus gas pressure and humidity), the RITTER Multiplexer for Gas Analysis allows the measurement of gas concentrations from up to **18 gas sources (e.g. fermenters)** with **one gas sensor only**.

All contents are subject to alteration without prior notice. Patent(s) pending.
Please check our website for latest product updates at: <https://www.ritter.de/en/products/multigas-sensors/>
Most components can be customized to match individual requirements. Do not hesitate to contact us directly!



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