ADOS®
est. 1900

INSTRUMENTATION AND CONTROL

PRODUCTION PROGRAM

measuring instruments for monitoring operational performance

■ Gas Analysis ■ Gas Warning ■ Environmental Protection

ADOS GmbH
Instrumentation and Control

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since 1997
DIN EN ISO 9001
ID: 01 100 71011

Company

1900
Formation of the ADOS Feuerungstechnische Gesellschaft GmbH in Aachen as the first factory worldwide to be established for chemical gas analysis on the basis of the Patent of Max Arndt for automatic tests on flue gases.
The company was formed by Aachener Industrialists, all with equal shares.

1926
Acceptance of the company shares by the banker Leo Ruetgers as manager and Mrs. Elisabeth Lang née Houben.

1945
After the complete destruction in the Second World War, the manager Leo Ruetgers took over all the company's shares.

He commenced with the rebuilding and once more started the production after he was granted approval by the authority of the British occupying forces.

1950
The company name was changed to ADOS GmbH. The program was extended to include the heat technology sector with volumetric measurement equipment (gas, vapour, water) and heat quantity measurement equipment for boiler house control.

1958
Grad. Eng. Herbert Ruetgers started in the company.

1973
Gas analysis was changed from wet-chemical to electric gas test equipment. The company and management was taken over by Grad. Eng. Herbert Ruetgers.

1990
Grad. Eng. Michael Ruetgers started in the company.

1997
Grad. Eng. Michael Ruetgers was invited to join the management as a junior partner.

2000
The company celebrated its Centenary Jubilee.

2005
Extension of the production possibilities by using new gas transmitters.

2012
First ATEX and SIL 1 gastransmitter GTR 210 EX is certified by DEKRA.

2015
GTR 210 MED is certified for marine applications.

2016
First ATEX and SIL 1 central unit FlexADOS 914/LON is certified by TUEV (Technical Control Board).

A test instrument hanging in an universal joint (to compensate the strong wave motion on board of a ship), when measuring carbon dioxide.

Triple test instrument (Triplex) for monitoring the CO, H_2 and CO_2 content of the ambient air. Used in the chemical industry.

The first automatic flue gas monitor "ADOS" from 1900: Driven by updraught in the chimney, the unit takes a sample of flue gas 10-times per hour, automatically analyses the sample and records the content of carbon dioxide. This forms a measure for the most economic use of fuel by the personnel responsible (boilermen). The standard is around 15% carbon dioxide content in the furnace gases.

In 1898, Max Arndt was awarded the "Elliot Cresson" gold medal in recognition of his patent "Econometer" automatic selfacting flue tester). The medal was awarded by the "Franklin Institute of the State of Pennsylvania, USA".

Content

Physical Gas Analysis

Heat Reaction (VQ)

Measurement principle: Measuring the combustion heat at a fixed catalyst
Measuring ranges: from a few ppm to Vol% ranges
Measuring components: CO, CH_4, NH_3, C_6H_6, CnHm and/or all combustible gases
Types of equipment: KM 2000 CnHm EM, GTR 210, GTR 196, LCTR 903, LCTR 404 LON®

Chemisorption at semiconductors (TGS)

Measurement principle: When combustible or reducing gases are absorbed by the surface of the sensor, the concentration of the test gas is determined by the change in conductivity.
Measuring ranges: ppm ranges up to 100% LEL
Measuring components: CH_4 LPG, H_2 and many others
Types of equipment: GTR 210, GTR 196, LCTR 903, LCTR 404 LON®

Thermal Conductivity (GOW)

Measurement principle: Measuring the different thermal conductivity between test gas and reference gas
Measuring ranges: 0 - 2 Vol % … 0 - 100 Vol %
Measuring components: CO_2, H_2, He and many others
Types of equipment: GTR 210, GTR 196

Electrochemical Reaction (TOX)

Measurement principle: Measuring the electron flow produced by chemical reaction
Measuring ranges: from a few ppm up to Vol% ranges
Measuring components: CO, O_2, H_2S, SO_2, Cl_2, HCl, NH_3, NO, NO_2 and many others
Types of equipment: TOX 592, TOX 914 LON®, GTR 210, GTR 196

Infrared Analysis (IR)

Measurement principle: Non-dispersive infrared analysis
Measuring ranges: from 0-3.000 ppm to 0-100 Vol %
Measuring components: CO_2, CO, LPG, CH_4, CnHm and many others
Types of equipment: GTR 210, GTR 196, LCTR 903

Photoionisation: (PID)

Measurement principle: ultra-violet measurement
Measuring ranges: 0-200 ppm…0-2000 ppm
Measuring components: e.g. C_7H_8, C_8H_{10}, $CHCL_3$, PH_3 and others
Types of equipment: GTR 210, GTR 196

Gas Measurement and Gas Warning Sensors

Measurement principle: Chemisorption at semiconductors, Heat reaction, Thermal conductivity, Electrochemical reaction, Infrared analysis, ultra-violet measurement
Measuring ranges:
Chemisorption at semiconductors: ppm ranges to 100 % LEL
Heat reaction: 0-5 Vol% to 0-100 Vol %
Thermal conductivity: from 0-2 Vol% to 0-100 Vol %
Electro-chemical reaction: from ppm ranges to Vol % ranges
Infrared analysis: from 0-3.000 ppm to 0-100 Vol %
Photoionisation: 0-200 ppm…0-2000 ppm
Measuring components: O_2, H_2, CO_2, CO, CH_4, hydrogen chloride, helium, neon, propane, toluene, xylene and many others

TYPES OF EQUIPMENT:

GW 399: multi-channel gas detector system comprising central control units and remote sensors with 4-20 mA current interface (e.g. GTR 210, GTR 196, TOX 592, LCTR 903) functional testing for the explosion protection parts GW 399/GTR 196 Ex

MWS 906: multi-channel gas warning system for 16 two-line or three-line sensors and max. 48 relays for alarms for the activation of further warning and control units (e.g. warning banners and signal horns)

MWS 906 CP: multi-channel gas warning system for 16 two-line or three-line sensors up to 2 alarm levels, each with 6 relays (five alarm thresholds for each level, independently adjustable)

MWS 903: Multi-channel gas warning unit for a total of 8 gas sensors and 12 floating change-over contacts (e.g. GTR 210, GTR 196, TOX 592, LCTR 903)

MWS 897: Multi-channel gas warning unit for a total of 6 gas sensors and 3 floating change-over contacts (e.g. GTR 210, GTR 196, TOX 592, LCTR 903)

FlexADOS 914: Multi-Channel Gas Detector System for 12 two- or three-wire detectors and max. 14 floating contacts

FlexADOS 914 LON®: Test, Control and Warning Unit for the techniques of gas-sensorics; Connection of up to 60 LON-Bus sensors is possible

GTR 210 Comfort: Single-Channel Gas Warning System with integrated gas sensor.

Gas Analysis

Bio Gas Analysis

Multi Channel Gas Analyser for Fermentation

Measurement principle: Electrochemical reaction, infrared analysis, paramagnetic measurement
Measuring ranges: CO_2: 0-50 Vol%;
CH_4: 0-100 Vol%;
O_2: 0 - 21 Vol% (electrochemical);
O_2: 0-5 Vol % … 0-25 Vol % (paramagnetic);
H_2: 0-2 Vol%; H_2S: 0-50 ppm … 0-5.000 ppm;
further ranges on request
Measuring components: CH_4, CO_2, O_2 (optionally continuous);
H_2S, H_2 (only discontinuous)
Types of equipment: Biogas 401, Biogas 905

Infrared Gas Analysis System for Composting

Measurement principle: Non-dispersive infrared analysis
Measuring ranges: from 0 - 3.000 ppm to 0 - 100 Vol %
Measuring components: CO_2
Types of equipment: ITR 504

Flue Gas Analysis

Measurement principle: Electrochemical reaction, thermal conductivity
Measuring ranges: CO: 0 - 100 ppm; CO_2: 0 - 20 Vol %; O_2: 0 - 25 Vol %
Measuring components: CO, CO_2, O_2
Types of equipment: Flue Gas Analyser RG 399

Accessories for Gas Analysis


Alarm horns


Warning banners


Alarm horn Ex-version


Rotating mirror lamp (also available as Ex-version)


Warning flasher (also available as Ex-version)


Room probes


Mains Stand-by supply unit


Test gas bottle


Pressure reducer

Special equipment for specific tasks and measurement problems on demand.

Gas Analysis

pH Measurement

pH-Measured Value Transducer:	Flow-through fitting, electrode, impedance transformer, coaxial electrode connection cable, buffer solutions. Measuring transducer: ADOS GTR 210 pH or GTR 196 pH
	Evaluation unit for 8 pH sensors and 8 gas sensors: MWS 906 Sensor, compact
Accessories:	Balance lines, thimbles, stop flanges, protective sleeves, weiding collars, reference junction thermostats, compensating terminals

Ion-selective measurement

ISE-measuring element:	Flange for horizontal pipeline construction with DN50, PN16;
	Built-in flange for open and pressureless containers
Measuring transducer:	ISE NH_3
Evaluation unit:	MWS 906 for 8 ISE-NH_3 probes and 8 gas sensors

Software and Ancillaries

Software:	data collection and visualisation with the software "Log & View" for MWS 903
Buffer amplifier:	0-20 mA –> 0-20 mA
	others on request

Scope of Services and Solutions

- Consultation and Technical Planning
  – design and development of innovative components and systems in measuring and control engineering
- Installation and Commissioning
  – planning the start-up and initiation phases
  – system control and adjustment
  – instruction and training
  – documentation
- Technical Services
  – repairs
  – single inspections
  – maintenance and calibration
  – fault remedies
  – system components and spare parts service
  – system analysis
- trans-european service – supplemented by our worldwide network of agencies abroad
- coverage of various price and quality levels
- all queries are immediately processed

- stationary and portable gas measurement systems
- highly-sensitive sensors measure a vast number of dangerous substances, even in very small concentrations and can thus give warnings of potential dangers
- sophisticated equipment for special requirements as well as universal applications
- extensive production program – “low budget” or “high end equipment”
- system components for completion of a gas warning system
- solutions for sampled gas conditioning and extraction

Fields of Application

VENTILATION ENGINEERING

Fields of Application: Underground car parks in housing estates and office blocks, road traffic tunnels (CO, NOX), monitoring the CO_2 content in conference rooms, monitoring fine dust filter systems for any breakthrough

Customers: Cactus Howald (Luxembourg), Parc du Canal (Luxembourg)

BREWERIES + CHAMPAGNE PRODUCERS

Fields of Application: CO_2- and O_2 measurements

Customers: Bitburger (Germany), Brau-Union (Austria), Cölner Hofbräu P. Josef Früh KG (Germany), Hasseröder Brauerei (Germany)

MOTOR VEHICLE INDUSTRY

Fields of Application: Paint shops – monitoring organic solvents (toluene), motor and brake test beds (CO, NOX, SO_2, CnHm, H_2), emission measurements

Customers: Audi (Germany), BMW (Germany), FEV Motorentechnik (Germany, China), Ford (Germany, USA), Haden (Great Britain), Opel (Germany), Toyota (France), Visteon (France), Volkswagen (Germany)

AGRICULTURE

Fields of Application: Measurement systems for biogas

Customers: C.E.A. (Italy), Shandong Minghe Poultry Biogas Plant (China), Biomasse-Heizkraftwerk Hünenberg (Switzerland), Hühnerhof Terhorst (Germany), Biogas Technology BV (Netherlands), Rainborrow Farm Poundbury (GB), Wyke Farms (GB), Rhön Energiesysteme (Germany), TS-Umweltanlagenbau (Germany)

WORKPLACE PRODUCTION

Fields of Application: MWC-monitoring – controlling the workplace concentration limits; explosion protection

Customers: Hutchinson (Germany, France), Mapa in Liancourt (France), Procter & Gamble (world-wide)

Fields of Application

ACTIVATED CARBON FILTER

Fields of Application: Monitoring the breakthrough of solvents (Process control + Emission monitoring)

Customers: Beiersdorf (Germany), Prinovis (Germany, Great Britain)

LIQUID GAS STORES

Fields of Application: LPG (butane + propane)

Customers: Linde (Austria), Praxair (Spain)

SEWAGE PLANTS

Fields of Application: H_2S, CO_2, CH_4, O_2, H_2

Customers: Minden (Germany),
Heidelberg (Germany)

COLD-STORAGE DEPOTS

Fields of Application: Leakage monitoring of NH_3, CO_2 and Freon

Customers: Amberger Kühltechnik (Germany), GfKK (Germany),
Johnson Controls (Germany)

LABORATORIES

Fields of Application: foodstuffs, pharmacy, mineral oil

Customers: RWTH-Aachen (Germany), Grünenthal (Germany),
Bode Chemie (Germany), Vetter Pharma (Germany),
Lindt & Sprüngli (Germany), Uni Mainz (Germany), Uni Münster (Germany)

Evaluation units and analyzers

- FlexADOS 914 LON®
- GW 399
- FlexADOS 914
- MWS 906
- MWS 906 CP
- MWS 903
- MWS 897
- Biogas 401
- Biogas 905
- KM 2000 CnHm
- RG 399

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Instrumentation and Control

MEASURING, CONTROL AND WARNING UNIT FOR SENSORS

FlexADOS 914 LON®

VDI 2053 SIL1

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MEASURING, CONTROL AND WARNING UNIT FOR SENSORS

FlexADOS 914 LON®

Suitability

The FlexADOS 914 LON® is a measuring, control and warning unit for gas sensors. It continuously monitors the ambient air and provides an early warning of harmful, explosive and non-flammable gases and vapours. Together with the TOX 914 LON® gas transmitters, FlexADOS 914 LON® fulfils VDI guideline 2053 from December 2014 and also EN 50271:2011.

Areas of application

- Garages and tunnels
- Chemicals industry
- Paint and varnish manufacturing
- Liquid gas storage facilities
- Laboratories
- Refrigerated warehouses (ammonia monitoring)
- Refineries
- Measurement of oxygen concentration
- Gas-powered boilers
- Wastewater treatment plants
- and much more

Features

- Up to 60 digital LON®bus sensors are evaluated (TOX 914 LON®, LCTR 404 LON®)
- Graphic LCD display to show actual values, mean values and faults in plain text
- Indicator for operation, malfunction, maintenance, power failure
- Simple menu-guided setting of the device parameters using 6-part keyboard
- Five alarm thresholds per sensor, independently adjustable from 10 to 90% of the measuring range
- Averaging from 1 to 60 minutes possible, 2 levels (fan areas) can be displayed
- Maximum of 14 potential-free changeover contacts to control further warning and control facilities
- Potential-free changeover contact for malfunction, maintenance and power failure
- Plastic wall housing (IP 54)
- High operating reliability
- Low power consumption
- Simple assembly
- Uninterrupted electricity supply possible

Information exchange

Optional data interfaces for building management systems (BMS):

- LONWorks
- Modbus RTU
- Profibus
- BacNet
- ModBus TCP
- TCP/IP (Webserver)

Measuring ranges

Gas types can be adjusted as desired, Examples:	CO carbon monoxide NO_2 nitrogen dioxide NO nitrogen monoxide CH_4 methane
physical unit adjustable as desired, Examples:	%UEG %LEL ppm VOL%

Accessories

Horn, warning light, blinker lamp, recorder, emergency power unit UPS 2000-24V, gas cooler, gas inlet, and much more. Additional accessories are offered on request depending on the measuring task.

Technical data

Sensors digital LON®	60 sensors in a four-wire system
Power supply	100-240V 50/60Hz, optional 24Vdc
max. power consumption	60VA
Operating conditions	-25°C...+45°C 80kPa...120kPa 0%...95% rel. humidity non-condensing
Protection class due to housing (DIN EN 60529)	IP 54
Dimensions (WxHxD)	300 x 230 x 120 mm
Displays	Graphic LCD display 128x64 px Background red/green/yellow LED power, malfunction, power failure, maintenance
digital inputs	3
analogue outputs	2 x power output 4...20mA max. burden 400 ohm
digital outputs	2 alarm levels with max 17 relays per 1 relay Malfunction, power failure, maintenance 14 alarm relays Potential-free change-over contacts Switching capacity max 250V/8A Expansion possibility up to a total of 6 alarm levels
other interfaces	USB LONWorks (option) Universal fieldbus (option)
Weight	2.7 kg
Service life Buffer battery clock Service life parameter memory	 > 10 years > 20 years
Storage conditions	max. 1 year -25°C...+45°C 80kPa...120kPa 0%...95% rel. humidity non-condensing
certified according to	VDI2053:2014 EN50545:2012 EN50271:2011 EN50270:2010

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MULTI-CHANNEL GAS WARNING SYSTEM

GW 399

Compact

Standard

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since 1997
DIN EN ISO 9001
ID: 01 100 71011

MULTI-CHANNEL GAS WARNING SYSTEM GW 399

ADOS® est. 1900

Application

The multi-channel gas warning system GW 399 continunosly monitors the ambient air and provides an early warning of hazardous, explosive and non-combustible gases and vapours.

Fields of Application

- Monitoring of heating systems
- Garages and tunnels
- Liquid gas storage rooms
- Laboratories
- Cold-storage houses
- Plastic processing plants
- Chemical industries
- Paint manufacturing plants
- Concentration measurement of O_2
- and many more

Features

- Use of various types of measurement sensor
- Direct warning status recognition, via different colors of the LC-Display background illumination
- Menu-aided operation, via 2 keys
- Three alarm thresholds individually adjustable from 5–100 % of the test range
- Three floating alarm outputs for driving additional warning and control systems
- Floating relay contacts
- Serial output RS 232 or RS 485
- LON®-Interface
- 4–20 mA current output
- Different housings are available e.g. 19" rack, panel mounting, wall-mounted housing
- Up to 10 units per rack
- 1 control unit configurable as master, for supervision of central alarms and communication control systems
- High degree of reliability
- Low current consumption
- Possibility of uninteruptible power supply

Measurable gases

Gas	Formula
Acetylene	C_2H_2
Alcohol	e.g. C_2H_6O
Ammonia	NH_3
Butane	C_4H_{10}
Carbon dioxyde	CO_2
Carbon monoxide	CO
Carbon tetrachloride	CCl_4
Chloroform	$CHCl_3$
Ether	$C_4H_{10}O$
Helium	He
Hydrogen	H_2
Hydrogen chloride	HCl
Methane	CH_4
Neon	Ne
Oxygen	O_2
Petrol	
Propane	C_3H_8
Toluene	C_7H_8
Xylene	C_8H_{10}

Accessories

Signal horn, Warning light, Warning banner, Ventilation control, Test meters, Plotter.
Additional accessories are available, depending on the system ordered.

Technical Data

Details as for control unit	
Sensors:	Semiconductor sensor Heat reaction sensor Thermal conductivity sensor Chemical sensor Infrared sensor
Sensors input:	1 two-wire sensor (e.g. TOX 592) or 1 three-wire sensor (e.g. GTR 196)
Sensor supply:	20 V DC / 200 mA
Ranges:	Adaptable by software
Accuracy:	< 2 %, f.s.d.
Ambient temperature:	-10 °C to +40 °C
Temperature effects:	< 2 % for a ±20 °C change
Installation:	Panel-mounting or wall-mounting
Output signals:	Current output 4–20 mA RS 232 or RS 485 interface LON®-Interface 3 Alarm relays, 1 Fault relay
Relay rating:	230 V, 450 VA other voltages on request
Voltage supply:	230 V 50 Hz
Options:	115 V 60 Hz; 24 V DC; 12 V DC
Power consumption:	8 VA

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MULTI-CHANNEL GAS SENSOR SYSTEM

FlexADOS 914

Ex SIL1

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MULTI-CHANNEL GAS SENSOR SYSTEM

Flex ADOS 914

ADOS® est. 1900

Suitability

The multi-channel gas detector system FlexADOS 914 continuously monitors the ambient air and provides an early warning of harmful, explosive and non-flammable gases and vapours. Together with the GTR 210 gas transmitter family, FlexADOS 914 fulfils EN 50271:2011, achieves safety integrity level SIL1 and can be used for primary explosion protection.

Areas of application

- Explosion protection chemicals industry
- Paint and varnish manufacturing
- Liquid gas storage facilities
- Laboratories
- Refrigerated warehouses (ammonia monitoring)
- Refineries
- Measurement of oxygen concentration
- Gas-powered boilers
- Wastewater treatment plants
- and much more

Features

- Up to 12 analogue 4...20mA sensors are evaluated (GTR 210, LCTR 903, TOX 592)
- Graphic LCD display to show actual values, mean values and faults in plain text
- Indicator for operation, malfunction, maintenance, power failure
- Simple menu-guided setting of the device parameters using 6-part keyboard
- Three alarm thresholds per sensor, independently adjustable from 10 to 90% of the measuring range
- Averaging from 1 to 60 minutes possible
- Maximum of 14 potential-free changeover contacts to control further warning and control facilities
- Potential-free changeover contact for malfunction, maintenance and power failure
- Plastic wall housing (IP 54)
- High operating reliability
- Low power consumption
- Simple assembly
- Uninterrupted electricity supply possible

Information exchange

Optional data interfaces for building management systems (BMS):

- LONWorks
- Modbus RTU
- Profibus
- BacNet
- ModBus TCP
- TCP/IP (Webserver)

Measuring ranges

Gas types can be adjusted as desired, Examples:	CH_4 methane H_2 hydrogen H_2S hydrogen sulphide CO_2 carbon dioxide
physical unit adjustable as desired, Examples:	%UEG %LEL ppm VOL%

Accessories

Horn, warning light, blinker lamp, recorder, emergency power unit UPS 2000-24V, gas cooler, gas inlet, and much more. Additional accessories are offered on request depending on the measuring task.

Technical data

Sensors analogue 4...20mA	12 sensors in a 2- or 3-wire system
Power supply	100-240V 50/60Hz, optional 24Vdc
max. power consumption	60VA
Operating conditions	-25°C...+45°C 80kPa...120kPa 0%...95% rel. humidity non-condensing
Protection class due to housing (DIN EN 60529)	IP 54
Dimensions (WxHxD)	300 x 230 x 120 mm
Displays	Graphic LCD display 128x64 px Background red/green/yellow LED power, malfunction, power failure, maintenance
digital inputs	3
analogue outputs	2 x power output 4...20mA max. burden 400 ohm
digital outputs	17 relays per 1 relay Malfunction, power failure, maintenance 14 alarm relays Potential-free change-over contacts Switching capacity max 250V/8A
other interfaces	USB LONWorks (option) Universal fieldbus (option)
Weight	2.7 kg
Service life Buffer battery clock Service life Parameter memory	 > 10 years > 20 years
Storage conditions	max. 1 year -25°C...+45°C 80kPa...120kPa 0%...95% rel. humidity non-condensing
Conformity EC type-examination according to	EN60079-29-1:2008 EN50104:2011 EN45544-1,-2,-3:2000 EN50271:2011 EN50270:2010
EX marking	Ⓔx II (2) G

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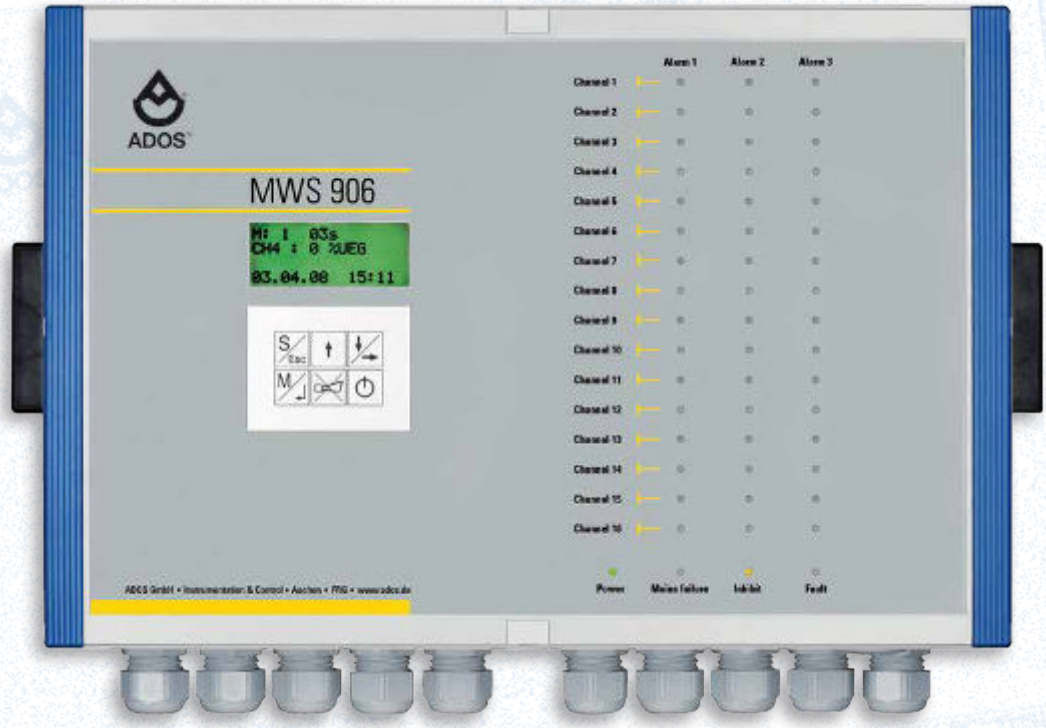
MULTI-CHANNEL GAS WARNING UNIT

MWS 906



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MULTI-CHANNEL GAS WARNING UNIT MWS 906

ADOS® est. 1900

Application

The multi-channel gas warning unit MWS 906 continuously monitors the ambient air and issues an early warning of gases and vapours that are dangerous to health, or when there is a danger of explosion, for non-combustible gases and vapours.

Fields of Application

Monitoring of:

- Heating systems
- Garages and tunnels
- Liquid gas storage plants
- Laboratories
- Cold-storage depots
- Plastic processing workshops
- Chemical industries
- Paint varnish manufacturers
- Concentration measurement of O_2
- and many more

Features

- 6-section keyboard and backlit 4-line LC-display for displaying actual values, half-hourly average values and fault messages in cleartext
- Ready for operation, fault and gas warning indicators
- Menu-assisted adjustment of equipment parameters via 6-section keyboard
- Three alarm thresholds for each sensor, independently adjustable from 5-100% of the measurement range, half-hourly average values, possibility for 24 h time-weighed averages (TLV)
- A maximum of 48 floating outputs for driving additional warning and control devices
- Floating change-over contact for faults, sirens and warning banners
- Serial output RS 232, for connecting a printer or PC
- 4–20 mA current interface as output signal
- Plastic, wall-mounting housing (IP 54)
- High degree of service reliability
- Low power consumption
- Easy installation
- Un-interruptible power supply (UPS) can be used

Examples of measurable gases

Gas	Formula
Acetylene	C_2H_2
Ether	$C_4H_{10}O$
Alcohol	e.g. C_2H_6O
Ammonia	NH_3
Petrol	
Butane	C_4H_{10}
Hydrogen chloride	HCl
Helium	He
Carbon dioxide	CO_2
Carbon monoxide	CO
Methane (natural gas)	CH_4
Neon	Ne
Propane	C_3H_8
Oxygen	O_2
Toluene	C_7H_8
Hydrogen	H_2
Xylene	C_8H_{10}

Accessories

Signal horn, warning lights, warning banner, plotter, stand-by power supply unit UPS 2000–24 V.
Further accessories will be available, according to the proposed measurement tasks.

Technical Data

Sensor inputs:	16 two- or three-line sensors (e.g. ADOS GTR 196) with current interface 4–20mA
Sensor supply:	24 V= / 2 A
Measurement ranges:	CH_4 0–100 % LEL LPG 0–100 % LEL H_2 0–100 % LEL NH_3 0–1000 ppm CO_2 0–4 Vol % CO 0–300 ppm NO_2 0–30 ppm O_2 0–25 Vol % further ranges on request
Digital inputs:	1 input for cancelling the horn (siren)
Digital outputs:	max. 48 relays for alarms 1 fault relay 1 service relay 1 horn relay 1 warning banner relay All outputs are floating change-over contacts rated at max. 250 V/4 A
Standard output signals:	Analog output 4–20 mA Serial interface RS 232
Voltage supply:	230 V / 50 Hz 115 V / 60 Hz (optional) 24 V / DC
Power consumption:	max. 60 VA
Ambient temperature:	-10 °C to +45°C
Dimensions (WxHxD):	390 x 270 x 160 mm
Weight:	approx. 5 kg
Protection type:	IP 54 to DIN 40050

ADOS GmbH
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MULTI-CHANNEL GAS WARNING UNIT

MWS 906 CP

standard

portable

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MULTI-CHANNEL GAS WARNING UNIT

MWS 906 CP

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Application

The multi-channel gas warning equipment MWS 906 CP continuously monitors the ambient air and issues an early warning of gases and vapours that are dangerous to health, or when there is a danger of explosion, for non-combustible gases and vapours.
In conjunction with the ADOS TOX 592 CO gas measurement sensor, the MWS 906 CP satisfies all requirements of the VDI-guideline 2053.

Fields of Application

Monitoring of:

- Heating systems
- Garages and tunnels
- Liquid gas storage plants
- Laboratories
- Cold-storage depots
- Plastic processing workshops
- Chemical industries
- Paint varnish manufacturers
- Concentration measurement of O_2
- and many more

Features

- 6-section keyboard and backlit 4-line LC-display for displaying actual values, half-hourly average values and fault messages in cleartext
- Ready for operation, fault and gas warning indicators
- Menu-assisted adjustment of equipment parameters via 6-section keyboard
- Two monitoring areas (Levels)
- Five alarm thresholds for each sensor, independently adjustable from 5-100% of the measurement range, also possible: half-hourly average values
- 8 floating outputs for driving additional warning and control devices
- Floating change-over contact for sirens and warning banners for each level
- Serial output RS 232, for connecting a printer or PC
- 4–20 mA current interface as output signal
- Plastic, wall-mounting housing (IP 54)
- High degree of service reliability
- Low power consumption
- Easy installation
- Un-interruptible power supply (UPS) can be used

Examples of measurable gases

Gas	Formula
Carbon monoxide	CO
Nitrogen dioxide	NO_2
Petrol	
Methane	CH_4
LPG	C_3H_8 C_4H_{10}
Hydrogen	H_2

Accessories

Signal horn, warning lights, warning banner, plotter, stand-by power supply unit UPS 2000 24 V.

Further accessories will be available, according to the proposed measurement tasks.

Technical Data

Sensor inputs:	16 two- or three-line sensors (e.g. ADOS GTR 196) with current interface 4–20mA
Sensor supply:	24 V= / 1 A
Measurement ranges:	CO 0–300 ppm NO_2 0–30 ppm Petrol 0–100 % LEL CH_4 0–100 % LEL LPG 0–100 % LEL H_2 0–100 % LEL other ranges by request
Digital inputs:	1 input for cancelling the horn (siren)
Digital outputs:	upto 2 alarm levels, each with 6 relays, of which, for each level: 3 average values 1 instantaneous value 1 horn 1 warning banner 1 fault relay 1 service relay All outputs have floating change-over contacts rated at max. 250 V / 4 A
Standard output signals:	Analog output 2x 4–20 mA 1 serial interface RS 232
Voltage supply:	230 V / 50 Hz 115 V / 60 Hz (optional) 24 V= (optional)
Power consumption:	max. 30 VA
Ambient temperature:	-10 °C to +45°C
Dimensions (WxHxD):	360 x 270 x 160 mm
Weight:	approx. 4 kg
Protection type:	IP 54 to DIN 40050
Accumulator operating time:	>10 h for a real “mains fault” display
with UPS 2000-24V/4 Ah:	>1 h optional, retaining all equipment functions
Test certificate:	German Technical Inspectorate approval, according to VDI 2053 in conjunction with ADOS TOX 592 CO

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MULTI-CHANNEL GAS WARNING SYSTEM

MWS 903

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MULTI-CHANNEL GAS WARNING SYSTEM MWS 903

Application

The **multi-channel gas warning equipment MWS 903** continuously monitors the surrounding air and provides an early warning of dangerous, explosive and non-combustible gases and vapours. Possibility to connect up to 8 gas transmitters to the unit.

Fields of Application

Monitoring of:

- Heating systems
- Garages
- Liquid gas storage rooms
- Laboratories
- Cold-storage houses
- Plastic processing plants
- Chemical industries
- Paint manufacturing plants
- Concentration measurement of O_2
- and many more

Features

- 6-section keybord and illuminated 4-line LC-Display for indicating actual values, half-hourly average values and fault messages, all clear text encoded
- Ready, Fault and Gas warning display
- Menu-assisted settings for the equipment parameters, via 6-section keybord
- Two alarm thresholds for each sensor, independently adjustable from 5 to 100% of the measurement range; facility for forming half-hourly average value
- A maximum of 12 floating alarm outputs for controlling extra warning and control devices
- Floating change-over contacts for fault, siren and warning banners
- Serial interface output RS 232 for connecting a printer or PC
- 4 – 20 mA current interface
- Plastic, wall-mounted housing
- High operational reliability
- Low current consumption
- Easy installation
- USP unit available

Example of measurable gases

Gas	Formula
Acetylene	C_2H_2
Alcohol	e.g. C_2H_6O
Ammonia	NH_3
Butane	C_4H_{10}
Carbon dioxide	CO_2
Carbon monoxide	CO
Carbon tetrachloride	CCl_4
Chloroform	$CHCl_3$
Ether	$C_4H_{10}O$
Helium	He
Hydrogen	H_2
Hydrogen chloride	HCl
Methane (natural gas)	CH_4
Neon	Ne
Oxygen	O_2
Petroleum spirit	
Propane	C_3H_8
Toluene	C_7H_8
Xylene	C_8H_{10}

Accessories

Signal horn (siren), warning light, warning banner, test meters, plotter, stand-by power supply UPS 2000 24 V. Additional accessories will be offered, according to the system required. An early warning of dangerous, explosive and non-combustible gases and vapours.

Technical Data

Sensor inputs:	8 two- or three-wire sensors (e.g. LCTR 903) with current interface, 4 – 20 mA
Sensor supply:	24 V= / 200 mA
Ranges:	CO 0–300 ppm NO_2 0–30 ppm CH_4 0–100 % LEL CO_2 0–10 Vol % other ranges on request
Ambient temperature:	-10 °C to +40 °C
Digital inputs:	1 input for siren cancel
Digital outputs:	max. 12 alarms 1 fault relay 1 siren relay 1 warning banner relay All outputs have floating change-over contacts, max. rating 250 V / 4 A
Standard output signals:	Analog output 4 – 20 mA serial interface RS 232
Mains connection:	230 V / 50 Hz 115 V / 60 Hz (optional) 24 V= (optional)
Dimensions (WxHxD):	240 x 160 x 90 mm
Weight:	approx. 2 kg
Protection:	IP 54, to DIN 40050

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MULTI-CHANNEL GAS WARNING UNIT

MWS 897

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MULTI-CHANNEL GAS WARNING UNIT MWS 897

Application

The multi-channel gas warning unit MWS 897 continuously monitors the ambient air and provides an early warning of hazardous, explosive and non-combustible gases and vapours.

Fields of Application

Monitoring of:

- Heating systems
- Garages and tunnels
- Liquid gas storage rooms
- Laboratories
- Cold-storage houses
- Plastic processing plants
- Chemical industries
- Paint manufacturing plants
- Concentration measurement of O_2
- and many more

Features

- Use of various types of measurement sensor
- Ready, fault and gas warning indicators
- Menu-aided operation, via 2 keys
- Integrated buzzer, gas half-hourly average value
- Three alarm thresholds individually adjustable from 0 –100 % of test range
- Three floating alarm outputs for driving additional warning and control systems
- Floating fault contact
- Serial output RS 232, for connecting a printer or a PC
- High degree of reliability
- Low current consumption
- Plastic, wall-mounting housing
- Easy installation
- Straightforward operation

Measurable gases

Gas	Formula
Acetylene	C_2H_2
Alcohol	e.g. C_2H_6O
Ammonia	NH_3
Butane	C_4H_{10}
Carbon dioxyde	CO_2
Carbon monoxide	CO
Carbon tetrachloride	CCl_4
Chloroform	$CHCl_3$
Ether	$C_4H_{10}O$
Helium	He
Hydrogen	H_2
Hydrogen chloride	HCl
Methane	CH_4
Neon	Ne
Oxygen	O_2
Petroleum spirit	
Propane	C_3H_8
Toluene	C_7H_8
Xylene	C_8H_{10}

Accessories

Signal horn, warning light, warning banner, ventilation control, test meters, plotter.
Additional accessories are available, depending on the system ordered.

Technical Data

Sensors:	Semiconductor sensor Heat reaction sensor Thermal conductivity sensor Fuel cell Infrared cell
Sensor inputs:	6 two-wire sensors (e.g. TOX 592) or 3 three-wire sensors (e.g. GTR 196) or 2 three-wire sensor + 4 two-wire sensors
Sensor supply:	19 V≈ / 200 mA
Ranges:	CO 0–300 ppm NO_2 0–30 ppm CH_4 0–100 % LEL CO_2 0–10 Vol % further ranges on request
Accuracy:	<3 %, f.s.d.
Ambient temperature:	-10 °C to +40 °C
Temperature effects:	<3 % for ± 20 °C change
Setting time (t_{90}):	< 60 s
Installation:	Wall-mounting
Protection class:	IP 54
Output signal:	Voltage output, 1–5 V RS 232 interface 3 alarm relays, 1 fault relay
Relay rating:	230 V, 450 VA other voltages on request
Voltage supply:	230 V, 50 Hz 115 V, 60 Hz (optional) 24 V= (optional)
Consumption:	14 VA
Dimensions (W x H x D):	225 x 180 x 105 mm
Weight:	approx. 1,5 kg

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MULTI-CHANNEL GAS ANALYSER

Biogas 401

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MULTI-CHANNEL GAS ANALYSER

Biogas 401

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Application

The **Biogas Analyser 401** monitors either continuously or intermittently, the gas components contained in the Biogas (process control) and optionally, monitors the surrounding air to provide an early warning of dangerous, explosive and non-combustible gases and vapours.

Fields of Application

- Monitoring of biogas, landfill gas or digester gas
- Warning of explosive gas mixtures
- Warning of gases that endanger health
- Warning of non-combustible gases

Features

- Use of various measurement sensors
- Direct indication of a warning state on an LC-display with colored background lighting
- Menu-assisted operation via 2 keys
- 3 alarm levels, independently adjustable from 5–100 % of the selected test range
- 3 floating alarm outputs for driving external warning and control equipment
- Floating contact connections for fault and mains failure
- Serial interface output RS 232 or RS 485
- 4–20 mA current interface
- Various types of housing available, e.g. 19" rack system, wall-mounting cabinet
- Up to 6 measurement channels per unit
- 1 card as Master for the control of the biogas measuring time and interval
- Extreme service reliability
- Low energy consumption
- Peltier cooling element with condensation pump
- Flow-through adjustement
- Gas components – filter system and conditioning
- Water sensor for the detection of condensate break-through
- Modular construction
- Monitoring of more than one measuring point possible

Measurable gases

Gas	Formula
Methane	CH_4
Hydrogen sulphide	H_2S
Carbon dioxide	CO_2
Oxygen	O_2
Hydrogen	H_2

Accessories

External peltier gas cooler, Signal horn, warning light, warning banner.

Other accessories will be offered,
according to the measurement tasks required.

Technical Data

Details apply, per control unit	
Sensors:	Electrochemical sensors Infrared sensors
Sensor input:	2-wire sensors (TOX 592) or 3-wire sensors (GTR 196) for warning of explosive gas mixtures
Sensor supply:	24 V DC / 200 mA max.
Test ranges:	CO_2: 0-50 Vol.% CH_4: 0-100 Vol.% O_2: 0 - 21 Vol.% (optionally continuous) H_2: 0-2 Vol. % H_2S: 0-50 ppm ... 0-5.000 ppm (only discontinuous) other ranges by request
Accuracy:	< ±3 %, f.s.d.
Ambient temperature:	+5 °C to +45 °C
Temperature effects:	< 5 % for a ±20 °C change
Installation:	Wall-mounting
Output signals:	Current output 4–20 mA; RS 232 or RS 485 interface; for each measurement channel: 3 alarm relays 1 fault relay
Relay rating:	230 V, 450 VA
Voltage supply: optional:	230 V / 50 Hz 115 V / 60 Hz
Power consumption:	100 VA
Dimensions (W x H x D):	600 x 478 x 480 mm (9 HU)
Weight:	approx. 60 kg

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MULTI-CHANNEL GAS ANALYSER

Biogas 905

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MULTI-CHANNEL GAS ANALYSER

Biogas 905

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Application

The **Biogas Analyser 905** monitors either continuously or intermittently, the gas components contained in the Biogas (process control) and optionally, monitors the surrounding air to provide an early warning of dangerous, explosive and non-combustible gases and vapours.

Fields of Application

- Monitoring of biogas, landfill gas or digester gas
- Warning of explosive gas mixtures
- Warning of gases that endanger health
- Warning of non-combustible gases

Features

- Up to 5 sensors for Biogas measurements
- Up to 3 sensors for room monitoring
- Time-controlled measurements in intermittent mode
- 4-line display, each line with 16 characters
- Menu-assisted operation via 6 keys
- 16 freely configurable alarms (max. 3 per measurement point or sensor)
- Adjustable alarm threshold, from 5–100 % of the measurement range
- A minimum of 5 floating alarm contacts for optional assignment
- Floating service and fault contact
- 5 analog outputs, 4–20 mA
- 5 digital inputs for control functions (initiating a measurement, selection of a measurement point)
- Double measurement change-over switch in the standard housing (optional); extras by request
- Serial output RS 232
- Manual flow-through adjustment
- Gas components-filter system and conditioning
- Condensate collector for external installation
- High degree of operational reliability
- Low power consumption
- Water sensor for the detection of condensate break-through
- Monitoring of more than one measuring point possible

Measurable gases

Gas	Formula
Methane	CH_4
Hydrogen sulphide	H_2S
Carbon dioxide	CO_2
Oxygen	O_2
Hydrogen	H_2

Accessories

Signal horn, warning light, warning banner, plotter.

Other accessories will be offered, according to the measurement tasks required.

Technical Data

Details apply, per control unit	
Sensors:	Electrochemical sensors Infrared sensors
Sensor input:	2-wire sensors or 3-wire sensors for warning of explosive gas mixtures
Sensor supply:	24 V DC / 200 mA max.
Test ranges:	CO_2: 0 - 50 Vol.% CH_4: 0-100 Vol.% O_2: 0 - 21 Vol.% (optionally continuous) H_2: 0 - 0,2 ... 2 Vol. % H_2S: 0 - 50 ppm ... 0 - 5.000 ppm (only discontinuous) other ranges by request
Accuracy:	< ±3 %, f.s.d.
Ambient temperature:	+5 °C to +45 °C
Temperature effects:	< 5 % for a ±20 °C change
Installation:	Wall-mounting
Output signals:	Current output 4–20 mA RS 232 interface a minimum of 5 floating alarm contacts for optional assignment; 1 fault relay 1 service relay
Relay rating:	230 V, 500 VA
Voltage supply: optional:	230 V / 50 Hz 115 V / 60 Hz
Power consumption:	100 VA
Dimensions (W x H x D):	600 x 500 x 400 mm (9 HU)
Weight:	approx. 35 kg

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HYDROCARBON ANALYSER

KM 2000 CnHm EM

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since 1997
DIN EN ISO 9001
ID: 01 100 71011

HYDROCARBON ANALYSER KM 2000 CnHm EM

Application

The modular constructed ADOS KM 2000 CnHm EM equipment incorporates a microcontroller-aided measurement device for measuring solvents.
All combustible gaseous CnHm compounds can be measured with the exeption of chlorinated and sulphur-sublimed hydrocarbons.
The thermocouples used for measurements, in conjunction with applying the principle of heat reaction, offer the following advantages:

- High degree of sensitivity
- Good accuracy
- Negligible drift of zero point
- Over-range signals have no effect

Fields of Application

Supervision of industrial processes

- KM 2000 CnHm EM:
  Measuring the emission of hydrocarbons, according to the German clean-air regulations
- KM 2000 CnHm:
  Measuring solvent saturation
  Measuring the concentration of solvents

Room air (ventilation) monitoring

A warning is issued at a very low concentration of poisonous gas thus preventing any danger to health.

Measurement Principle and Functioning

Gas measurement system

The sampled gas is drawn in by a pump through a feed pipe (heated if required), to the reaction chamber, via a Compensating filter, Flow regulator and Flow-through meter. The gas is warmed to a constant temperature by means of the heater coil and jacket and finally burned in a solid-matter catalytic converter. The difference in temperature before and after combustion, is used as the measurement signal that is prepared and evaluated by the microcontroller-aided analyser.

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HYDROCARBON ANALYSER

KM 2000 CnHm EM

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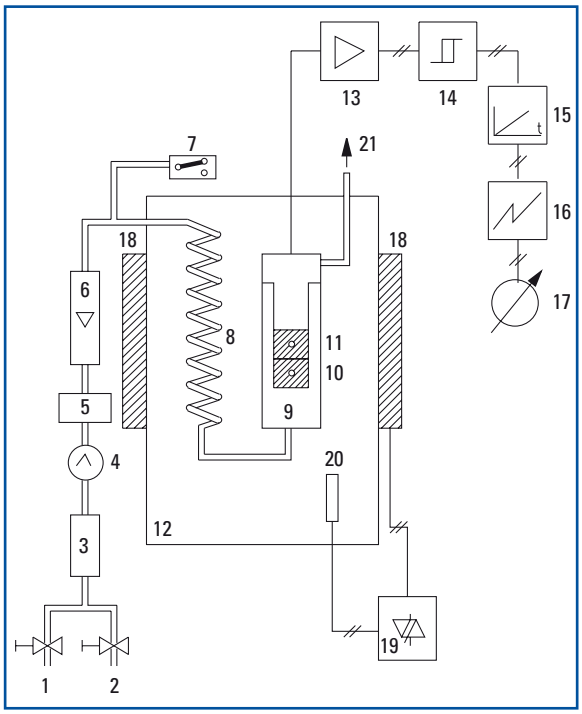

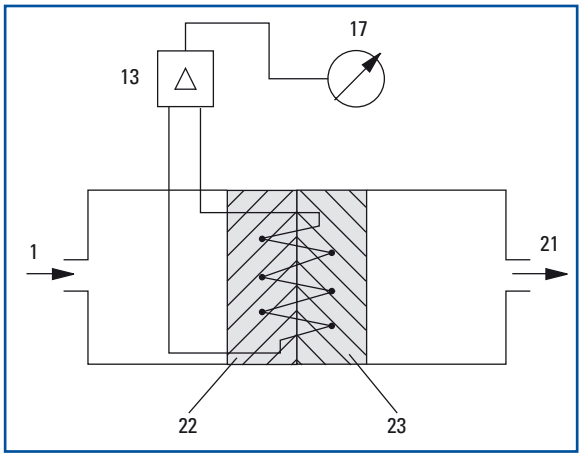

Gas Flow Schematic

1 = Sampled gas intake
2 = Test gas intake
3 = Prefilter or compensating filter
4 = Sampled gas pump
5 = Flow regulator
6 = Flow-through meter
7 = Flow monitor
8 = Heating coil
9 = Catalyst chamber
10 = Reference measuring point
11 = Measuring point
12 = Reaction chamber
13 = Measuring amplifier
14 = Limit monitor 1–4
15 = Measured value integration
16 = Continuous-line recorder
17 = Concentration indicator
18 = Heater
19 = Temperature control
20 = Resistance-thermometer
21 = Gas outlet
22 = Inert mass
23 = Catalytic converter

Analyser

The analyser functions on the principle of heat reaction. The difference in temperatures at the reference measuring point and the measuring point, is a directly-dependent variable of the component part of combustible substances in the gas.
The reference measuring point is subjected to the heated non-burned gas mixture, whilst the second probe of the thermocouple pile measures the temperature of the burned gas.
A load-independent current of 0–(4)–20 mA is available for connecting to electrical test meters, plotters and limit value monitors. An RS 232 interface is incorporated for data communication.
The inclusion of a measured value integration provides the facility of forming the average value of measured quantities, continuously or over a prescribed period of time.

Equipment construction

The hydrocarbon measuring system ADOS KM 2000 CnHm EM consists of the following 19" rack units:

- Reaction chamber with sensor and electronics
- Gas suction system with or without constant heating for the feed pipes, with sampled gas pump, flow-through meter, flow regulator, flow monitor and filter
- Microcontroller-aided evaluation unit in 19"-system with application specific standard plug-in Euro-cards
- The housing

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HYDROCARBON ANALYSER KM 2000 CnHm EM

Technical data

Measurement principle:	Measuring the heat of combustion in a catalytic converter
Measuring ranges:	0–50 mg/m³ TOC up to 0–1600 mg/m³ TOC
Minimum detection limit:	1 mg/m³ TOC
Cross sensitivity: (50 mg/m³ measuring range)	
concentration:	max. deviation:
200 mg/m³ SO_2	-10 %
30 mg/m³ NO_2	-2,5 %
300 mg/m³ CO	+108 %
300 mg/m³ NO	+7 %
Output signals:	Current interface 0–(4)–20 mA max. load 400 ohm; RS 232
Response time (t_{90}):	< 200 sec. (sampling pipe approx. 11 m; dead time 10 sec.)
Accuracy:	< 2 % full-scale error
Permissible ambient temperature:	+5 °C to +40 °C
Temperature dependency:	< 5 % full-scale error
Sampled gas flow:	125 l/h (±10 l/h)
Preheating time:	approx. 120 min.
Maintenance interval:	4 weeks with auto-calibration 1 week without auto-calibration
Mains supply:	230 V / 50 Hz; 115 V / 60 Hz; 600 VA
Dimensions (W x H x D):	600 x 478 x 500 mm
Weight:	approx. 43 kg
Test certificate:	TÜV approval according to the clean-air regulations („TA-Luft"). TÜV-report: 936/21 200 245

Accessories

- CnHm EM sampling probes heated or unheated
- Mounting flanges for removal of heated extraction pipes
- Heated extraction pipes
- Test gas bottles with pressure reducer
- Polution control computer according to the clean-air regulation
- Continuous-line recorder
- Air purging system
- Compensation of CO cross sensitivity
- Automatic calibration system

Note: tested and approved according to the guidelines of the Clean Air Act in 2002, meets the requirements of QAL 1 according to DIN EN14181: 2004

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FLUE GAS ANALYSER

RG 399

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FLUE GAS ANALYSER

RG 399

ADOS est. 1900

Application

The **flue gas analyser RG 399** is suitable for supervising exhaust and process gases that contain traces of corrosive gas and /or dust.

The gas preparation before analysing, is achieved by way of a double-filter that is self-regenerating.

Fields of Application

- Supervision of flue gases
- Supervision of boiler installations
- Supervision of process and exhaust gases
- and many more

Features

- Various types of measurement sensor can be used
- Long service life of the measurement sensors is ensured by including a pre-cleaning of the test gas to remove any corrosive components
- Gas conditioning specific to the application by the use of various types of filter medium
- Automatic regeneration of the filter used
- Suction system, thus hot test gases can be monitored
- Integrated flow control
- Direct recognition of the warning status by way of a coloured LC-Display
- Menu-assisted operation via two keys
- Three alarm levels, independently adjustable from 5–100% of the measurement range
- Three floating alarm outputs for controlling external warning and control devices
- Floating fault contact
- Serial output RS 232 or RS 485
- 4–20 mA current interface
- Various designs of housing are available, for example, 19" rack system, wall-mounting housing
- High standard of service reliability
- Low current consumption
- Un-interruptible power supply (UPS) is available

Measurable gases

Gas	Formula
Carbon dioxide	CO_2
Carbon monoxide	CO
Methane (natrual gas)	CH_4
Oxygen	O_2
Hydrogen	H_2

Accessories

Gas extraction with protective cover, test gas connection with fine dust filter, gas extraction pipe, special extraction probe, installation connection pieces, condensate collector with mounting plate, sampled gas cooler with single or double cooling system.

Further accessories can be offered on request, according to the intended measurement task.

Technical Data

Detail applies to one control unit

Sensors:	Heat reaction sensor Heat conductivity sensor Chemical measurement cell Infrared sensor
Sensor input:	1 two-wire or three-wire sensor
Sensor supply:	20 V= / 200 mA
Measurement range:	CO: 0 -100 ppm CO_2: 0 - 20 Vol% O_2: 0 - 25 Vol%
Measurement accuracy:	< 2 % or < 5 % f.s.d. (dependent on measurement principle)
Ambient temperature:	-10 °C to +40 °C
Influence of temperature:	< 2 % at ±20 °C change in temperature
Installation:	Panel or wall mounting
Output signals:	Current output 4–20 mA Interface RS 232 or RS 485 3 alarm relays 1 fault relay
Relay switch rating:	230 V, 450 VA other voltages by request
Mains voltage supply: Optional:	230 V / 50Hz 115 V / 60 Hz
Power consumption:	300 VA
Dimensions (W x H x D):	710 x 600 x 380 mm
Weight:	approx. 45 kg

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Gas sensors and transmitters

- GTR 210 Comfort
- GTR 210
- GTR 210 MED
- GTR 210 Ex V4A Protection housing
- GTR 196
- TOX 592/TOX 914 LON®
- LCTR 903/LCTR 404 LON®
- Tunnel Application protection
- Filter-Guard 206

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GASTRANSMITTER

GTR 210

Ex SIL1

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GASTRANSMITTER GTR 210

Application

The gas transmitter ADOS GTR 210 is suitable for continuous measurement of gases in normal areas and areas where there are risks of explosion.

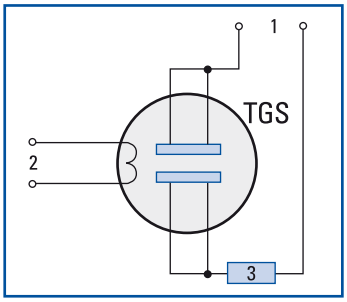
By employing 6 different types of sensor, noxious, explosive and non-combustible gases and vapours can be measured.

Display of the measured gas concentration and the adjustable alarm thresholds, are shown on a multi-colour graphic display. The keyboard input is by way of a touchpad.

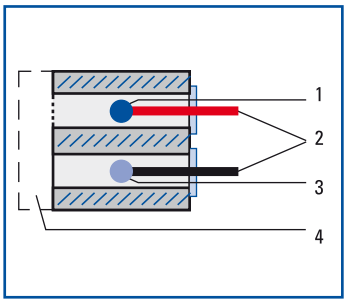
A current signal is generated that is proportional to the measured concentration of gas, which is transmitted to an evaluation unit placed in a safe area, away from any dangers of explosion.

The type test of the explosion-protected gas transmitter, is completed by the DEKRA.

ATEX test certificate: DEKRA 11 ATEX 0257 X
IECEx test certificate: IECEx DEK 11.0090 X
Type of protection: Ex d e ia mb IIC T4 Gb
SIL 1 & functional test:
ATEX Certificate –> BVS 12 ATEX G 001 X



1 = Circuit voltage
2 = Heating voltage
3 = Load resistor



1 = Catalyzer pellistor
2 = Electric connections
3 = Inert pellistor
4 = Diffusion filter

Fields of Application

- Chemical industry
- Manufacture of paints and varnishes
- Plastic processing plants
- Sewage works
- Gas-fired boiler systems
- Liquid gas storage houses
- Laboratories
- Oxygen concentration measurement
- Refineries
- Cold-storage houses (Ammonia monitoring)
- Paint spraying booths
- and many more

New: Advanced field of application: marine (option MED)
The gas transmitter product family GTR 210 with the option MED fulfills the requirements of the Marine Equipment Directive 96/98/EC and its annual updated addendum 2013/52EU. The conformity with the above mentioned regulation has been certified by the ship safety division of the German Government Safety Organisation for Transport and Transport Economies. The compliance with international IEC standards and the durability against saltwater was verified. The gastransmitter GTR 210 can now be installed under deck as well as on deck (weather zone) under harsh conditions. The field of application extends to:

- gas tankers
- container ships
- offshore platforms
- applications in aggressive environments

The TGS sensor

The TGS sensor contains a semiconductor sensor, which is constructed on SnO_2-sintered N-substrate.

When combustible or reducing gases are absorbed by the surface of the sensor, the concentration of the test gas is determined by the change in conductivity.

The VQ sensor

The head of the VQ sensor functions on the principle of heat reaction. When combustible or reducing gases or vapours come in contact with the measuring element, they are subjected to catalytic combustion, which causes a rise in temperature; this rise causes a change in the resistance of the measuring element which is used as a measure of the component of gas being tested.
The inert element is for compensating the temperature and conductivity of the test gas.

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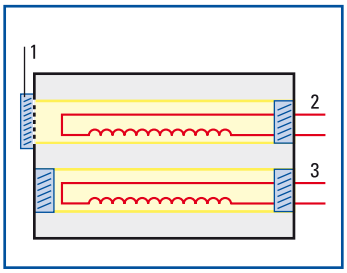
The GOW sensor

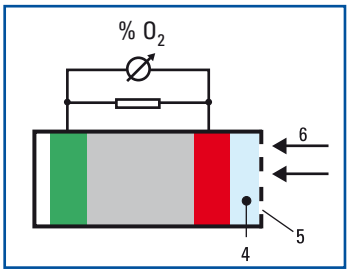
The GOW sensor functions on the principle of thermal conductivity. Two rhenium-tungsten resistors are used as a measuring element, where the comparison element is subjected to normal ambient air and the measuring element is subjected to the test gas. Any change in the concentration of gas at the measurement element, causes a change in temperature, which is due to the variation of conductivity.
The resultant change in resistance is a direct measure of the gas concentration.



1 = Diffusion filter
2 = Test resistor
3 = Comparison resistor

The TOX sensor

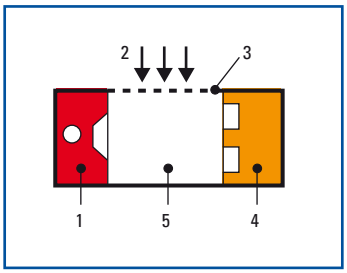
The TOX sensor is a measurement system with electro-chemical cell, where the sampled gas is measured by diffusion. In the case of oxygen measurement the oxygen content is in an electrolyte, thus producing a small flow of current (electro-chemical process).
At a constant air pressure, this current is directly proportional to the oxygen concentration in the sampled air.



1 = Anode
2 = Electrolyte
3 = Cathode
4 = Diffusion path
5 = Diffusion filter
6 = Test gas

The IR sensor

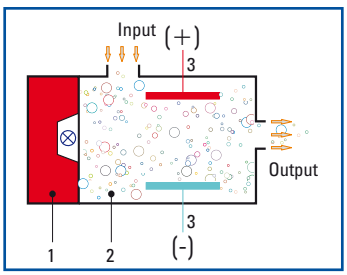
The test gas flows through a measurement chamber that incorporates an IR radiating source and a two-channel infrared detector. The intensity of the infrared radiation is reduced as it passes through the gas molecules. The concentration of the gas can then be calculated by the magnitude of the reduction in intensity.
Since only absorption of the wavelength specific to the gas under test in relation to the wavelength not absorbed by a test gas is considered, interference due to dust, ageing etc., is almost compensated.



1 = Infrared-radiating source
2 = Test gas
3 = Diffusion filter
4 = Infrared-detector
5 = Measurement chamber

The PID sensor

The sampled gas flows through a measurement chamber, that incorporates a UV radiating source and a pair of electrodes with opposing polarity. The gas molecules to be detected are ionized by the UV radiation.
The resulting positively charged molecules and the electrons are attracted to the relevant electrode. The current generated is a measure of the gas concentration.
Using the PID measuring head, volatile organic compounds (VOC) can be measured, the ionisation potential of which is less than the energy in the UV radiating source (10,6 eV), e.g. aromatic hydrocarbons like toluol (C_7H_8) and xylene (C_8H_{10}) as well as chlorinated hydrocarbons like trichloroethylene ($CHCl_3$). The detection of toxic gases like phosphine (PH_3) is also possible.



1 = UV radiating source
2 = Test gas
3 = Capacitive charge measurement

The output signal of each sensor is connected to the central unit via a multicore cable for further processing. All sensors are plug-in types and thus are easily replaceable.

GASTRANSMITTER GTR 210

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Technical data – sensors

Type Measurement method	TGS Semiconductor	VQ Heat reduction	GOW Thermal conductivity	TOX Electro-chemical reaction	IR Infrared	PID Photo-Ionisation
Measurement range	ppm ranges to 100 % LEL	ppm ranges to 100 % LEL	from 0–5 Vol % to 0–100 Vol %	ppm ranges tp 0–100 Vol %	0-100 % LEL CH_4, C_3H_8, C_2H_2 0-100 Vol % CH_4 0–1, 2, 3, 4, 5 Vol % CO_2	0–200 ppm to 0–2.000 ppm
Percentage error of f.s.d.	± 5 %	± 5 %	± 5 %	± 3 %	± 3 %	± 5 %
Temperature effect	5 %	2 %	2 %	2 %	2 %	2 %
Response time (t_{90})	approx. 60 s	approx. 60 s	approx. 45 s	approx. 60 s	approx. 45 s	approx. 120 s
Pressure effect	1 %	1 %	1 %	1 %	1 %	1 %
Mounting position	optional ± 90° from the vertical mounting position	optional ± 90° from the vertical mounting position	optional ± 90° from the vertical mounting position	optional ± 90° from the vertical mounting position	optional ± 90° from the vertical mounting posi-tion	optional ± 90° from the vertical mounting position
Application	Poisonous, combustible and explosive gases in the LEL region	Poisonous, combustible and explosive gases in the LEL region	gases exhibiting sub-stantial differences in thermal conductivity, compared to air	O_2, CO, NH_3, NO_2, SO_2, H_2S and others	CH_4 (Vol %; LEL) Propane (LEL), CO_2 (Vol %)	e.g. C_7H_8, C_8H_{10} $CHCl_3$, PH_3
Versions available	industrial (Al), industrial (VA)- and Ex-version	industrial (Al), industrial (VA)- and Ex-version	industrial (Al), industrial (VA)- and Ex-version	industrial (Al), industrial (VA)- and Ex-version	industrial (Al), industrial (VA)- and Ex-version	industrial (Al), industrial (VA)- and Ex-version
Expected lifetime of the sensor	unlimited, when used for gases not causing catalytic poisoning	unlimited, when used for gases not causing catalytic poisoning	unlimited, when used with gases that do not attack aluminium, rhenium-tungsten or gold	12 months to 5 years depending on the measuring cell	approx. 5 years	12 months
Dimensions (W x H x D)	150 x 175 x 105 mm	150 x 175 x 105 mm	150 x 175 x 105 mm	150 x 175 x 105 mm 150 x 200 x 105 mm (O_2)	150 x 175 x 105 mm	150 x 175 x 105 mm

Technical data – gas transmitter

Type	GTR 210 Ex-Version	GTR 210 Standard	GTR 210 Comfort
Supply voltage	24 V DC +10% / -25%	24 V DC +10% / -25%	230 V AC, 50 Hz 115 V AC, 60 Hz (optional)
Power consumption:	4 W	4 W	10 VA
Interface	3-wire techniques 4 – 20 mA	3-wire techniques 4 – 20 mA	1 current output 4-20 mA 4 potential-free changeover contact for alarm/failure 1 digital input for cancelling alarms
Equipment group / category	II 2G	II (2) G	II (2) G
Ignition protection	Ex d e ia mb IIC T4 Gb	none Ex	none Ex
Type of protection	**ATEX Certificate:** DEKRA 11 ATEX0257 X **IECEx Cert:** IECEx DEK 11.0090 X		
SIL 1 & functional test	**ATEX Certificate:** BVS 12 ATEX G 001 X	**ATEX Certificate:** BVS 12 ATEX G 001 X	**ATEX Certificate:** BVS 12 ATEX G 001 X
Option MED / Marine Equipment	0736/15 Directive 2013/52/EU Approval 213.053	0736/15 Directive 2013/52/EU Approval 213.053	0736/15 Directive 2013/52/EU Approval 213.053
Temperature range	-25 °C to +60 °C	-25 °C to +60 °C	-25 °C to +60 °C
Protection class	IP 66	IP 54 or IP 66	IP 54 or IP 66
Weight	2,3 kg	1,8 kg	2,0 kg

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ADOS®

PROTECTION-HOUSING V4A
FOR GASTRANSMITTER GTR 210

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since 1997
DIN EN ISO 9001
ID: 01 100 71011

PROTECTION-HOUSING V4A FOR GASTRANSMITTER GTR 210

Fields of Application

Harsh environments like onshore- and offshore-platforms, gas- and oil-pipe-lines are characterized by a high degree of background pollution. Aggressive substances like oil, salt, solvents but also corrosive gases like hydrogen sulphid constitude a big corrosive stress on the electrical environment. The V4A-housing provides an enhanced protection against the exposure of these solvents to the gastransmitter. Also available with special ATEX-connector for maintenance easement.

Technical data

Compatible ADOS gas transmitters:	ADOS GTR 210 EX (TGS, VQ, GOW, TOX, IR, PID)
Housing material:	V4A stainless steel
ATEX:	EX II 2 G (for applications up to ATEX-zone 1)
Option Low temperature -40 °C:	ATEX certified heating 230 V 50 VA
Protection degree:	corresponds to IP 65
Dimensions (W x H x D):	260 x 340 x140 mm
Weight (including gas transmitters):	approx. 6 kg

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GASTRANSMITTER

GTR 196

since 1997
DIN EN ISO 9001
ID: 01 100 71011

GASTRANSMITTER GTR 196

Application

The gas transmitter ADOS GTR 196 is suitable for continuous measurement of gases in normal areas and areas where there are risks of explosion.

By employing 5 different types of sensor, noxious, explosive and non-combustible gases and vapours can be measured.

A current signal is generated that is proportional to the measured concentration of gas, which is transmitted to an evaluation unit placed in a safe area, away from any dangers of explosion.

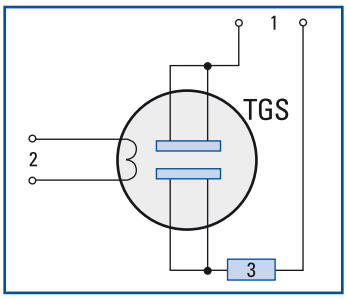
The type test of the explosion-protected gas transmitter, is completed by the KEMA.

KEMA test certificate: KEMA 03 ATEX 2403 X

Degree of protection: II 2 G Ex demb [ia] IIC T6

Fields of Application

- Chemical industry
- Manufacture of paints and varnishes
- Plastic processing plants
- Sewage works
- Gas-fired boiler systems
- Liquid gas storage houses
- Laboratories
- Oxygen concentration measurement
- Refineries
- Cold-storage houses (Ammonia monitoring)
- Paint spraying booths
- and many more

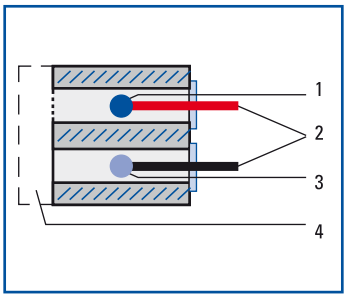


1 = Circuit voltage
2 = Heating voltage
3 = Load resistor

The TGS sensor

The TGS sensor contains a semiconductor sensor, which is constructed on SnO_2-sintered N-substrate.

When combustible or reducing gases are absorbed by the surface of the sensor, the concentration of the test gas is determined by the change in conductivity.



1 = Catalyzer pellistor
2 = Electric connections
3 = Inert pellistor
4 = Diffusion filter

The VQ sensor

The head of the VQ sensor functions on the principle of heat reaction. When combustible or reducing gases or vapours come in contact with the measuring element, they are subjected to catalytic combustion, which causes a rise in temperature; this rise causes a change in the resistance of the measuring element which is used as a measure of the component of gas being tested.
The inert element is for compensating the temperature and conductivity of the test gas.

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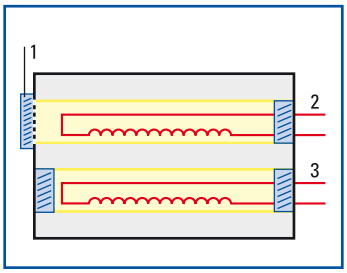
The GOW sensor

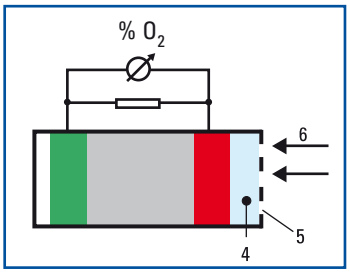
The GOW sensor functions on the principle of thermal conductivity. Two rhenium-tungsten resistors are used as a measuring element, where the comparison element is subjected to normal ambient air and the measuring element is subjected to the test gas. Any change in the concentration of gas at the measurement element, causes a change in temperature, which is due to the variation of conductivity.
The resultant change in resistance is a direct measure of the gas concentration.



1 = Diffusion filter
2 = Test resistor
3 = Comparsion resistor

The TOX sensor

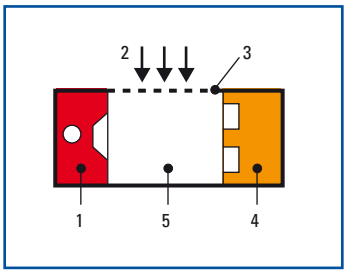
The TOX sensor is a measurement system with electro-chemical cell, where the sampled gas is measured by diffusion. In the case of oxygen measurement the oxygen content is in an electrolyte, thus producing a small flow of current (electro-chemical process).
At a constant air pressure, this current is directly proportional to the oxygen concentration in the sampled air.



1 = Anode
2 = Electrolyte
3 = Cathode
4 = Diffusion path
5 = Diffusion filter
6 = Test gas

The IR sensor

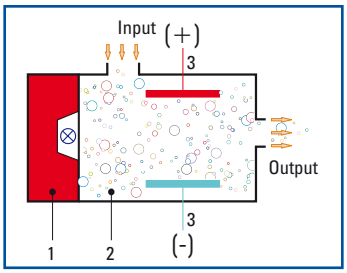
The test gas flows through a measurement chamber that incorporates an IR radiating source and a two-channel infrared detector. The intensitiy of the infrared radiation is reduced as it passes through the gas molecules.The concentration of the gas can then be calculated by the magnitude of the reduction in intensity.
Since only absorption of the wavelength specific to the gas under test in relation to the wavelength not absorbed by a test gas is considered, interference due to dust, ageing etc., is almost compensated.



1 = Infrared-radiating source
2 = Test gas
3 = Diffusion filter
4 = Infrared-detector
5 = Measurement chamber

The PID sensor

The sampled gas flows through a measurement chamber, that incorporates a UV radiating source and a pair of electrodes with opposing polarity. The gas molecules to be detected are ionized by the UV radiation.
The resulting positively charged molecules and the electrons are attracted to the relevant electrode. The current generated is a measure of the gas concentration.
Using the PID measuring head, volatile organic compounds (VOC) can be measured, the ionisation potential of which is less than the energy in the UV radiating source (10,6 eV), e.g. aromatic hydrocarbons like toluol (C_7H_8) and xylene (C_8H_{10}) as well as chlorinated hydrocarbons like trichloroethylene ($CHCl_3$). The detection of toxic gases like phosphine (PH_3) is also possible.



1 = UV radiating source
2 = Test gas
3 = Capacitive charge measurement

The output signal of each sensor is connected to the central unit via a multicore cable for further processing. All sensors are plug-in types and thus are easily replaceable.

GASTRANSMITTER GTR 196

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Technical Data

Type Measurement method	TGS Semiconductor	VQ Heat reduction	GOW Thermal conductivity	TOX Electro-chemical cell	IR Infrared	PID Photo-Ionisation
Measurement range	ppm ranges to 100 % LEL	ppm ranges to 100 % LEL	from 0–5 Vol % to 0–100 Vol %	ppm ranges to 0–100 Vol %	0-100 % LEL CH_4, C_3H_8, C_2H_2 0-100 Vol % CH_4 0–1, 2, 3, 4, 5 Vol % CO_2	0 – 200 ppm to 0 – 2.000 ppm
Percentage error of f.s.d.	± 5 %	± 5 %	± 5 %	± 3 %	± 3 %	± 5 %
Temperature range	-20 °C to +45 °C	-20 °C to +45 °C	-20 °C to +45 °C	-20 °C to +45 °C	-20 °C to +45 °C	-20 °C to +45 °C
Temperature effect	5 %	2 %	2 %	2 %	2 %	2 %
Response time (t_{90})	approx. 60 sec.	approx. 60 sec.	approx. 40 sec.	approx. 60 sec.	approx. 45 sec.	approx. 120 sec.
Pressure effect	1 %	1 %	1 %	1 %	1 %	1 %
Mounting position	optional ± 90° from the vertical mounting position	optional ± 90° from the vertical mounting position	optional ± 90° from the vertical mounting position	optional ± 90° from the vertical mounting position	optional ± 90° from t he vertical mounting position	optional ± 90° from the vertical mounting position
Application	Poisonous, combustible and explosive gases in the LEL region	Poisonous, combustible and explosive gases in the LEL region	Gases exhibiting substantial diffe-rences in thermal conductivity, compared to air	O_2, CO, NH_3, NO_2, SO_2, H_2S and others	CH_4 (Vol %; LEL) Propane (LEL) CO_2 (Vol %)	e.g. C_7H_8, C_8H_{10} $CHCl_3$, PH_3
Versions available	Industrial (Al), industrial (VA)- and Ex-version	Industrial (Al), industrial (VA)- and Ex-version	Industrial (Al), industrial (VA)- and Ex-version	Industrial (Al), industrial (VA)- and Ex-version	Industrial (Al), industrial (VA)- and Ex-version	Industrial (Al), industrial (VA)- and Ex-version
Service life of the sensor	Unlimited, when used for gases not causing catalytic poisoning	Unlimited, when used for gases not causing catalytic poisoning	Unlimited, when used whith gases that do not attack aluminium, rhenium-tungsten or gold	12 months to 5 years depending on the measuring cell	approx. 5 years	12 months
Supply voltage	15 V–30 V	15 V–30 V	15 V–30 V	15 V–30 V	15 V–30 V	15 V–30 V
Interface	3-wire techniques 4–20 mA or LON© 4-wire tech-niques, galvanically isolated, data transfer 78 kB/s	3-wire techniques 4–20 mA or LON© 4-wire tech-niques, galvanically isolated, data transfer 78 kB/s	3-wire techniques 4–20 mA or LON© 4-wire tech-niques, galvanically isolated, data transfer 78 kB/s	3-wire techniques 4–20 mA or LON© 4-wire tech-niques, galvanically isolated, data transfer 78 kB/s	3-wire techniques 4–20 mA or LON© 4-wire techniques, galvanically isolated, data transfer 78 kB/s	3-wire techniques 4–20 mA or LON© 4-wire tech-niques, galvanically isolated, data transfer 78 kB/s
Protection Ex-version	II 2 G Ex demb [ia] IIC T6 KEMA 03 ATEX 2403 X	II 2 G Ex demb [ia] IIC T6 KEMA 03 ATEX 2403 X	II 2 G Ex demb [ia] IIC T6 KEMA 03 ATEX 2403 X	II 2 G Ex demb [ia] IIC T6 KEMA 03 ATEX 2403 X	II 2 G Ex demb [ia] IIC T6 KEMA 03 ATEX 2403 X	II 2 G Ex demb [ia] IIC T6 KEMA 03 ATEX 2403 X
Protection class	IP 54	IP 54	IP 54	IP 54	IP 54	IP 54
Dimensions (W x H x D)	100 x 180 x 80 mm	100 x 180 x 80 mm	100 x 180 x 80 mm	100 x 180 x 80 mm 100 x 200 x 80 mm (O_2)	100 x 180 x 80 mm	100 x 180 x 80 mm
Weight	1,1 kg	1,1 kg	1,1 kg	1,1 kg	1,1 kg	1,1 kg

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SENSOR FOR MEASURING THE CONCENTRATION OF TOXIC GASES

TOX 592

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SENSOR FOR MEASURING THE CONCENTRATION OF TOXIC GASES

TOX 592

ADOS® est. 1900

Application

The ADOS TOX 592 gas sensor is suitable for continuous measurement of a concentration of toxic gas in air, over the range of 0 – 20 ppm to 0 – 5000 ppm.

Fields of Application

- In garages for measuring, control and warning, in conjunction with the MWS 906 CP tested to VDI 2053 standards
- For monitoring at working places, to control the maximum concentration value e.g. in laboratories or motor test stands
- In private and collective shelters for monitoring the external or internal air

Function Example, CO-sensor

The ADOS TOX 592 CO gas sensor uses a method of measurement where the air to be measured is diffused in a chemical measuring cell.

The (H+)-ions and the electrons released, are consumed at the electrode in a cathode reaction.

The flow of current between anode and cathode, generated by this process, is directly proportional to the CO-concentration in the measured air.

The sensor current is amplified and applied via a 4-20 mA field-bus to an evaluation unit, e.g. MWS 906 CP, where the measured variable is processed and indicated in ppm CO, together with any control and warning functions which may be necessary.

Gases and Measuring Ranges

Gas	Formula	Measuring Range
Carbon monoxide	CO	0 – 300 ppm
Ammonia	NH_3	0 – 200 ppm
Nitrogen dioxide	NO_2	0 – 30 ppm
Sulphur dioxide	SO_2	0 – 50 ppm
Hydrogen sulphide	H_2S	0 – 20 ppm

Other gases and measuring ranges on request.

Reaction

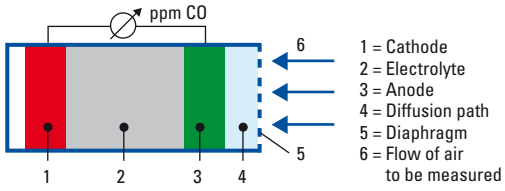
Reaction at the anode:

$CO + H_2O \Rightarrow CO_2 + 2H^+ + 2e^-$

Reaction at the cathode:

$\frac{1}{2} O_2 + 2H^+ + 2e^- \Rightarrow H_2O$

Sensor Measurement Principle



Technical data

Measuring principle:	Electro-chemical reaction
Measurable substance:	Carbon monoxide
Measuring ranges:	0–150 ppm, 0–300 ppm, other ranges on request
Zero error:	< 10 ppm CO
Reading instability:	< 3 ppm CO
Accuracy:	± 3% of f.s.d.
Zero drift:	< 2% per year
Repeatability:	< 2% per year
Linearity:	< 2% of f.s.d.
Response time (t_{90}):	< 60 sec.
Cross sensitivity:	< 2% with integrated filter
Interface:	two-wire current interface 4–20 mA or LON® four-wire techniques, data transmission 78 kbps
Supply voltage:	15 V – 30 V dependent on maximum load: 100 Ohm – 500 Ohm
Ambient temperature:	-10 °C to +40 °C, with sensor temperature compensation
Humidity range:	10 – 99 %, non-condensing
Serviceable life of cell:	approx. 2 years
Protection class:	IP 54
Sensor dimensions:	diameter 80 mm, height 80 mm
Weight:	600 g
Test certificate:	To german standards, according to VDI 2053 in conjunction with MWS 906 CP

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Instrumentation and Control

GAS TRANSMITTER FOR MEASURING THE CONCENTRATION OF TOXIC GASES

TOX 914 LON®

ADOS GmbH
Instrumentation and Control
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www.ados.de

since 1997
DIN EN ISO 9001
ID: 01 100 71011

GAS TRANSMITTER FOR MEASURING THE CONCENTRATION OF TOXIC GASES

TOX 914 LON®

ADOS® est. 1900

Application

The gas measurement sensor ADOS TOX 914 LON® is suitable for the continuous measurement of the concentration of toxic gas in air.

Fields of Application

- In garages for measurement, control and warning purposes, the TOX 914 LON®, in conjunction with the FlexADOS 914 LON® fulfils the VDI guideline 2053 from December 2014 and also EN 50271:2011
- For ambient air monitoring of occupational exposure limit values (German: AGW value) e.g. in laboratories or motor test stands
- In private and collective shelters to monitor external or internal air

Function Example, CO-sensor

The ADOS TOX 914 LON® CO gas measurement sensor uses a method where the air to be measured is diffused into a chemical measuring cell. The H+ ions and electrons released at the electrode are consumed in a cathode reaction.

The low of current between anode and cathode generated during this process is directly proportional to the CO concentration in the measured air.

The sensor current is amplified and applied via the LON® field bus of an evaluation unit e.g. FlexADOS 914 LON®, where the measured variable is processed and displayed in ppm CO together with any possibly necessary control and warning functions.

Example of measurable gases

Gas	Formula	Measuring Range
Carbon monoxide	CO	0 – 300 ppm
Ammonia	NH_3	0 – 250 ppm
Nitrogen dioxide	NO_2	0 – 30 ppm
Sulphur dioxide	SO_2	0 – 50 ppm
Hydrogen sulphide	H_2S	0 – 20 ppm

Other gases and measuring ranges on request.

Technical data

Measuring principle:	Electro-chemical reaction
Measurable substance:	Carbon monoxide
Measuring range:	0 – 150 ppm, 0 – 300 ppm, other measuring ranges upon request
Zero point error:	< 3 ppm CO
Measurement value error:	± 3% of the measurement range end value
Long-term drift:	< 5% (1 year)
Repeatability:	< 2% of the measurement range end value
Temperature drift:	< 10 ppm
Adjustable time (t_{90}):	< 60 seconds
Interface:	LON® four-wire technology, galvanically isolated, Data transmission 78 kbps
Supply voltage:	24 V DC +10% / -25%
Ambient temperature:	- 20 °C to + 50 °C, Sensor in the range temperature-compensated
Humidity:	10% – 90% r. h., non-condensing
Protection class:	IP 54 acc. to EN 60529
Measuring head dimensions:	Diameter 80 mm, Height 80 mm
Weight:	400 g
Test certificate:	VDI2053:2014 EN50545:2012 EN50271:2011 in conjunction with FlexADOS 914 LON®

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Instrumentation and Control

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LOWCOST GASTRANSMITTER

LCTR 903

ADOS GmbH
Instrumentation and Control
P.O. Box 500 444 · 52088 Aachen · FRG
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LOWCOST GASTRANSMITTER LCTR 903

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Application

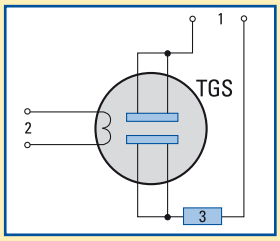
The gas transmitter ADOS LCTR 903 is suitable for the detection of combustible gases, for example hydrogen, methane (natural gas) or propane / butane (LPG) in air in the LEL region.

Fields of Application

- Gas fired boiler systems
- Gas distribution station
- Gas transfer station
- Battery-charging station

The TGS sensor

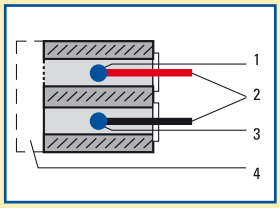
The TGS sensor contains a semiconductor sensor, which is constructed on SnO_2-sintered N-substrate. When combustible or reducing gases are absorbed by the surface of the sensor, the concentration of the test gas is determined by the change in conductivity.



1 = Circuit voltage
2 = Heating voltage
3 = Load resistor

The VQ sensor

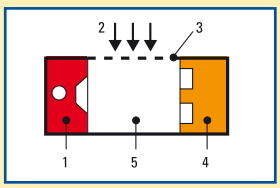
The head of the VQ sensor functions on the principle of heat reaction. When combustible or reducing gases or vapours come in contact with the measuring element, they are subjected to catalytic combustion, which causes a rise in temperature. This rise causes a change in the resistance of the measuring element which is used as a measure of the component of gas being tested. The inert element is for compensating the temperature and conductivity of the test gas.



1 = Catalyzer pellistor
2 = Electric connections
3 = Inert pellistor
4 = Diffusion filter

The IR sensor

The test gas flows through a measurement chamber that incorporates an IR radiating source and a two-channel infrared detector. The intensity of the infrared radiation is reduced as it passes through the gas molecules. The concentration of the gas can then be calculated by the magnitude of the reduction in intensity. Since only absorption of the wavelength (A) specific to the gas under test in relation to the wavelength (B) not absorbed by a test gas is considered, interference due to dust, ageing etc., is almost fully compensated.



1 = Infrared-radiation source
2 = Test gas
3 = Diffusion filter
4 = Infrared-detector
5 = Measurement chamber

Technical Data

Type	TGS	VQ	IR
Measurement method:	Semiconductor	Heat reduction	Infrared
Measurement range:	ppm ranges to 0–100 % LEL	ppm ranges to 0–100 % LEL	0–100 % LEL CH_4, C_3H_8, C_2H_2 0–100 Vol % CH_4 0–1, 2, 3, 4, 5 Vol % CO_2
Percentage error of f.s.d.:	±5 %	±5 %	±3 %
Linearity:	<15 % of f.s.d.	<3 % of f.s.d.	<3 % of f.s.d.
Temperature range:	-20 °C to +45 °C	-20 °C to +45 °C	-20 °C to +45 °C
Temperature effect:	5 %	2 %	8 %
Response time (t_{90}):	approx. 20 sec.	approx. 20 sec.	< 30 sec.
Pressure effect:	1 %	1 %	1 %
Mounting position:	optional	optional	optional
Application:	Poisonous, combustible and explosive gases in the LEL region	Poisonous, combustible and explosive gases in the LEL region	Poisonous, combustible and explosive gases in the LEL region
Expected operation time for sensor:	> 2 years	> 2 years	approx. 5 years
Supply voltage:	15 V – 30 V	15 V – 30 V	15 V – 30 V
Interface:	4–20 mA three-wire or LON® four-wire techniques (LCTR 404), galvanically isolated, data transmission 78 kbps	4–20 mA three-wire or LON® four-wire techniques (LCTR 404), galvanically isolated, data transmission 78 kbps	4–20 mA three-wire or LON® four-wire techniques (LCTR 404), galvanically isolated, data transmission 78 kbps
Protection class:	IP 54	IP 54	IP 54
Dimensions: (diameter x height)	80 x 80 mm	80 x 80 mm	80x80 mm
Weight:	500 g	500 g	500 g

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EMC AND WATER PROTECTION HOUSING V2A FOR UP TO 4 ADOS GAS TRANSMITTERS

- Tunnel Application -

ADOS GmbH
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www.ados.de

since 1997
DIN EN ISO 9001
ID: 01 100 71011

- Tunnel Application -

EMC AND WATER PROTECTION HOUSING V2A FOR UP TO 4 ADOS GAS TRANSMITTERS

Fields of Application

Tunnel installations are characterized by a high degree of EMC disturbance (by tunnel radio) and by the occurence of water (during tunnel cleaning). The EMC and Water Protection Housing V2A provides an enhanced protection in order to increase the EMC resistance as well as a reliable protection again water intrusion into the gas transmitters. All gas transmitters, that are usually installed to monitor tunnel atmospheres (CO, NO, NO_2, LEL), can be used along with the EMC and Water Protection Housing V2A.

Version A – up to 2 gas transmitters

Compatible ADOS gas transmitters:	ADOS 592 TOX and LCTR 903 (TGS, VQ, IR) including polyamide-adapter and EMC interference filter CSEF
Number of ADOS gas transmitters:	up to 2 units
Housing material:	V2A stainless steel
Protection degree:	corresponds to IP 65
Dimensions (W x H x D):	260 x 240 x 160 mm
Weight (including gas transmitters):	approx. 3,6 kg

Version B – up to 4 gas transmitters

Compatible ADOS gas transmitters:	ADOS 592 TOX and LCTR 903 (TGS, VQ, IR) including polyamide-adapter and EMC interference filter CSEF
Number of ADOS gas transmitters:	up to 4 units
Housing material:	V2A stainless steel
Protection degree:	corresponds to IP 65
Dimensions (W x H x D):	560 x 320 x 200 mm
Weight (including gas transmitters):	approx. 10,4 kg

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DUST FILTER MONITORING

Filter-Guard 206

ADOS GmbH
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DUST FILTER MONITORING

Filter-Guard 206

Application

Filter-Guard 206 continuously monitors the clean air side of any fine dust filter installations.
A warning is initiated when a sudden increase in dust concentration is present, i.e. due to breakdown in the filter casing or bag.

Fields of Application

- Monitoring filter systems
- Vibrating and jet filter systems
- Air extraction installations in wood and plastic processing plants
- Air conditioning units with dust filter systems
- Paint and varnish production
- Ambient air monitoring at workplaces
- and many more

Features

- Suitable for various types of dust
- 4–20 mA standard output signal
- LON® interface (optional)
- Low current consumption
- Robust aluminium housing
- Straightforward installation
- Easy exchange of the sensor elements

Detectable Types of Dusts

Dry dusts:

- Wood dust
- Household dust
- Colouring pigments
- Plastic dust
- Flour dust
- Metallic dust
- Mineral dust
- and many more

Evaluation Units

Multi-channel installations:

MWS 897
MWS 903
GW 399
Multitronik MC 602

Accessories

Signal horns, warning lamps, warning banners, air control accessories, metering units, plotters, data-logger.
Further accessories can be supplied on request, according to the proposed measurement tasks.

Technical Data

Measurement principle:	optical light dispersion
Fields of application:	filtermonitoring for dry, not sticking, not lumping, not hygroscopic substances
Measurement ranges:	0–100 % dust approx. measurement range: total dust 0,1 – 20 mg/m³ 0,1 – 50 mg/m³ 0,1 – 100 mg/m³ dependant on the kind of dust at the measuring point
Medium humidity:	dry
Measurement accuracy:	pure warning function, no metering unit
Ambient temperature:	-10 °C to +50 °C
Response time (t_{90}):	< 10 s
Installation:	flexible flange for output air channel construction (flat and round channels)
Protection class:	IP 54
Output signals:	analog output, 4 (0)–20 mA RS 485/LON®
Voltage supply:	24 V=
Power consumption:	3 VA
Dimensions (D x L):	50 x 300 mm or 50 x 600 mm (long version)
Weight:	approx. 0,95 kg
Trademark right:	EU-patent

ADOS GmbH
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Software

- Log & View Software

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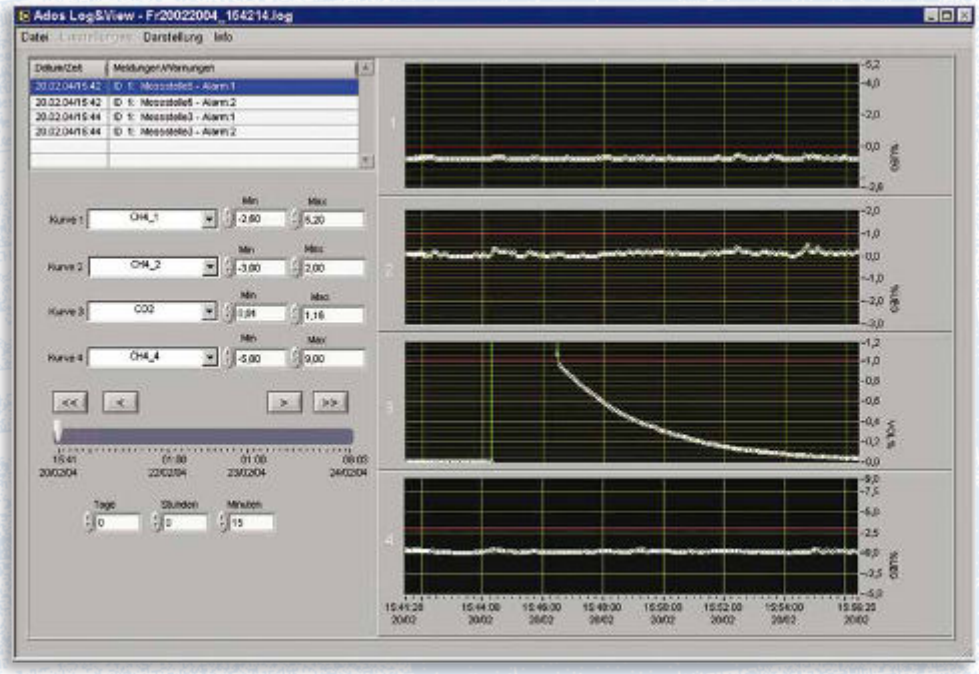
Instrumentation and Control

DATA LOGGING SOFTWARE

Log & View



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since 1997
DIN EN ISO 9001
ID: 01 100 71011

DATA LOGGING SOFTWARE

Log & View

ADOS® est. 1900

Application

ADOS Log & View is suitable for recording, observation and printing, the measured values and events that occur with ADOS gas warning and monitoring equipment MWS 903.

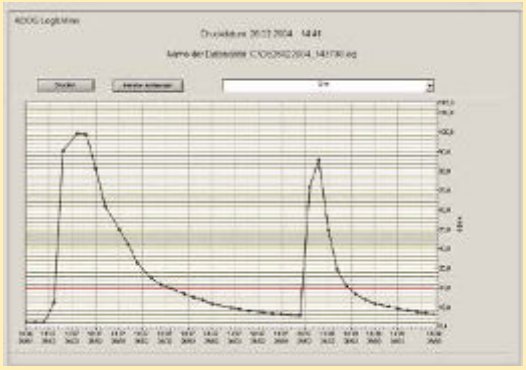
System Requirements

Interfaces:	1 or more, RS232 or USB-RS 232
Operating system:	Windows 98, 2000, XP, 7
RAM:	64 MB minimum
Processor:	PII-266 MHz or higher
Display:	1024 x 768 pixels (min.)
Harddisk:	at least 5 MB free

Functions

- On-line recording or call-up of more than 1000 measured values (1 sensor) saved in memory
- Starting a measurement from the PC
- Reading and setting the equipment time
- Reading and setting the interval time
- Export of data in the .csv format
- Save, export and print of equipment messages including alarm messages
- Data logging of upto 99 devices
- Printout of charts
- Scaling on chart axes can be set manually or fully automatic scaling can be applied
- Languages available: English, German and French
- Readout of equipment parameters
- Straightforward, easy handling of data, irrespective of the quantity of data
- Recognition of connection errors or equipment failure

Chart Printout



Read-out of Equipment Parameters

ADOS GmbH
Instrumentation
and Control

Accessory

- Gas Warning Systems accessory
- KM 2000 CnHm accessory

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Instrumentation and Control

GAS WARNING SYSTEMS

Accessories

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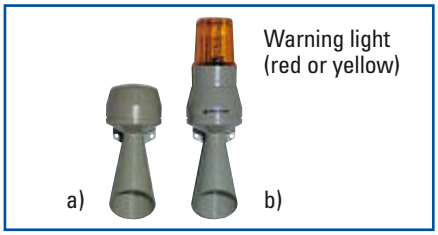


Alarm horn (small version)

Technical data:

Housing:	Shock-proof thermoplastic (ABS), light gray
Protection class:	IP 33 (DIN 40050 / IEC 529)
Sound level:	approx. 92 dB (A), 1 m
Dimension (WxHxD):	a) 70 x 170 x 78 mm; b) 70 x 256 x 78 mm
Weight:	approx. 0,2 kg
Mains supply:	230 V / 50 Hz or 115 V / 60 Hz, 12 V=, 24 V=
Power consumption:	2 W
Option:	with integrated warning light

Alarm horn (large version)

Alarm signal for damp rooms and external installation

Technical data:

Housing:	Shock-proof thermoplastic (ABS), light gray
Protection class:	IP 55 / IP 66 DIN 40050 or IEC 529
Sound level:	approx. 110 dB (A), 1 m
Dimension (WxHxD):	148 x 356 x 152 mm
Weight:	1,1 kg
Mains supply:	230 V / 50 Hz or 115 V / 60 Hz, 12 V=, 24 V=
Power consumption:	20 W

Alarm horn (ex version)

Alarm signal for explosion and firedamp endangered factories

Technical data:

Housing:	PC / ABS
Protection class:	IP 55 (DIN 40050 / IEC 529)
Sound level:	approx. 110 dB (A), 1 m
Dimension (WxHxD):	148 x 356 x 152 mm
Weight:	approx. 1,25 kg
Mains supply:	230 V / 50 Hz or 115 V / 60 Hz, 12 V=, 24 V=
Power consumption:	approx. 22 W

Rotating mirror lamp

Motor-driven rotating lamp for optical warning of inadmissibly high levels of gas concentration.

Technical data:

Housing:	Plastic base, transparent yellow glass guard
Protection class:	IP 56; Optional mounting position
Mirror revs.:	160 r.p.m., continuous operation
Dimension:	Ø 152 mm x 216 mm
Mains supply:	230 V / 50 Hz or 115 V / 60 Hz, 12 V=, 24 V=
Power consumption:	40 / 45 W

Warning flasher

Pulsating lamp (flashlight) for optical warning of inadmissibly high levels of gas concentration

Technical data:

Housing:	Plastic base, transparent yellow glass guard
Protection class:	IP 54; Optional mounting position
Dimension:	Ø 108 mm x 133 mm
Mains supply:	230 V / 50 Hz or 115 V / 60 Hz, 12 V=, 24 V=
Power consumption:	5 W

a) CO-ALARM GASALARM

b) DANGER - POISON GASES SWITCH OFF MOTOR

c) DANGER – POISON GASES
Vacate the garage immediately
Switch off motor when stationary

d) DANGER – POISON GASES
Switch off motor

e) DANGER – POISON GASES
Vacate the garage immediately
Switch off motor when stationary

f)

Side view of the LED CO warning banner

Warning banner

Optical warning for inadmissibly high levels of gas concentration. Double-side black lettering on a yellow background. Other lettering available on request.

Technical data:

a) Version single (3 x 15 W); Mains supply = 230 V / 50 Hz
Dimension (WxHxD): IP 30 = 230 x 75 x 76 mm
IP 54 = 368 x 148 x 112 mm
IP 65 = 310 x 155 x 100 mm
also as LED-version (24 V)

b) Version single (3 x 15 W)
or version with integrated emergency supply voltage (comprising accumulator, charger unit with discharge protection and flasher relay);
Mains supply: 230 V / 50 Hz;
Dimension (WxHxD): 1000 x 205 x 100 mm (2 lines)

c) The same like number b)
Dimension (WxHxD): 1300 x 260 x 100 mm (3 lines)

d) LED-CO warning banner with stand-by voltage supply "Danger – poison gases/Switch off motor"– without figure
Appropriated fo pendant or wall mounting.
Fitted with: flashing device, discharge protection with power reclosing lockout and switch-over electronics together with a maintenance free NimH-battery for 4,8 V; with double-sided black lettering on a yellow background. Flashing at least 1 hour in case of alarm, with 1 m connection cable.
Mains supply: 90 V AC – 264 V AC, 2 W; protection class IP30;
Dimension (WxHxD) = 1000 x 205 x 25 mm

e) LED-CO warning banner (3 lines) – without figure the same like number d) "Danger – poison gases/Vacate the garage immediately/ Switch off motor when stationary"
Dimension (WxHxD) = 1300 x 260 x 25 mm

f) LED-CO warning banner the same like number d) – with pictograms – equivalent to:
"Leave the garage immediately. Switch off motor when stationary". Flashing at least 1 hour in case of alarm, with 1 m connection cable.
Mains supply: 90 V AC – 264 V AC, 2 W; protection class IP30;
Dimension (WxHxD) = 1000 x 205 x 25 mm

All versions conform to garage regulations.

Mains Stand-by supply unit USV

The unit provides all supplies for the warning systems (banners, alarm horns), in the case of a normal type of failure in the mains supply. The unit contains a maintenance-free battery, an inverter, a charger unit and mains supply monitoring.

Technical data:

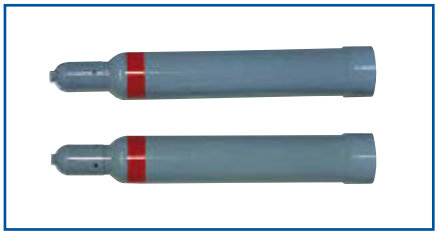
version A: 230 V / 50 Hz, 500 VA: 440 x 550 x 85 mm (WxHxD)
version B: 230 V / 50 Hz, 1000 VA: 440 x 265 x 405 mm (WxHxD)
version C: 230 V / 50 Hz, 2000 VA: 440 x 440 x 650 mm (WxHxD)
version D: 230 V / 50 Hz, 6000 VA: 440 x 440 x 680 mm (WxHxD)

Stand-by power supply UPS 2000

For uninterrupted operation of the ADOS units:
LON®-Center 2000, MWS 903, MWS 906 and GWA 2000.
Compact housing with NiMH batteries, with on/off switch.
Permanent discharge device and exhaustive discharge protection.

Technical data:

Voltage:	230 V / 50 Hz or 115 V / 60 Hz (optional)
Power consumption:	18 VA
Protection class:	IP 54
Dimension (WxHxD):	240 x 160 x 90 mm
Weight:	2 kg



Test gas bottle

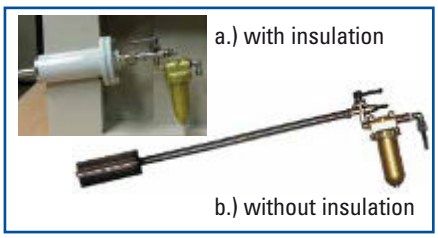
- zero-point-gas: synthetic air
- N-Butane in synthetic air (calibration gas)
- for non-aggressive gases
- for hydrogen sulphide (in stainless steel)

content: 10 l
filling pressure: min. 100 bar

Pressure reducer

Pressure reducer for connection to test gas bottles

Inlet pressure:	max. 200 bar
Output pressure:	0,1 bar – 3 bar
Material:	Brass



Sampled gas extraction

Carborundum filter with protective cap,
gas sampling pipe with isolating valve and test gas valve

Versions:	V 4 A material (1.4571)
	a) with insulation
	b) without insulation

Mounting stub

Mounting stub with single flange for mounting the gas extraction pipe.
Versions:
- material V4A (1.4571)
- material St 37
- with single flange DN 50 / PN 6, 150 mm long

Heated extraction pipe

Technical Data:

Length:	1 m … 100 m
Operation temperature:	65 °C … 120 °C
Nominal width:	4 … 8
Nominal voltage:	230 V=
Outer diameter:	42 mm
End caps:	with pull relief and bend protection in PA 6 or silicone
Outer protection:	polyamide 6 ring-spendle tube, flame retardant, halogen-free
Temperatures:	-40 °C … +150 °C, temporary >150 °C
Optional accessory:	temperature controller

Room probes

Gas extraction system – housing of shock-proof plastic;
Exchangeable filter material.

Technical Data:

Dimension:	Ø 80 x 32 mm; Ø 150 x 32 mm
Version:	Lateral connection – with hose connector or cutting ring couplings

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Instrumentation and Control

ACCESSORIES FOR HYDROCARBON MEASUREMENT

KM 2000 CnHm EM Accessories

ADOS GmbH
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a.) with insulation

b.) without insulation

Sampled gas extraction

Carborundum filter with protective cap,
gas sampling pipe with isolating valve and test gas valve
Versions:
- V 4 A material (1.4571)
a) with insulation
b) without insulation

Mounting stubs

Mounting stubs with single flange for mounting the gas extraction pipe.
Versions:
- material V4A (1.4571)
- material St 37
- with single flange DN 50 / PN 6, 150 mm long

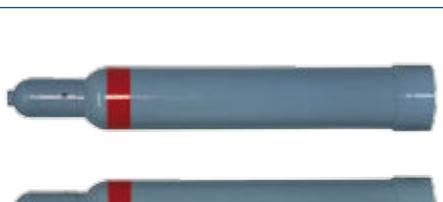
Respirable dust filter with filter cartridge

Double sided cutting ring screw connection for gas pipe breaker R 1/4" or 8 mm cutting ring connection

Heated extraction pipe

Technical Data:

Length:	1 m … 100 m
Operation temperature:	65 °C … 120 °C
Nominal width:	4 … 8
Nominal voltage:	230 V=
Outer diameter:	42 mm
End caps:	with pull relief and bend protection in PA 6 or silicone
Outer protection:	polyamide 6 ring-spendle tube, flame retardant, halogen-free
Temperatures:	-40 °C … +150 °C, temporary >150 °C
Optional accessory:	temperature controller



Test gas bottle

- zero-point-gas: synthetic air
- N-Butane in synthetic air (calibration gas)
- for non-aggressive gases
- for hydrogen sulphide (in stainless steel)

content: 10 l
filling pressure: min. 100 bar

Pressure reducer

Pressure reducer for connection to the test gas bottles.

Technical Data:
Inlet pressure: max. 200 bar
Output pressure: 0,1 bar - 3 bar
Material: Brass

Test adapter

- for ITR 498 sensor
- for GTR 210 sensor
- for GTR 196 sensor
- for TOX 592 sensor

Explosion vent

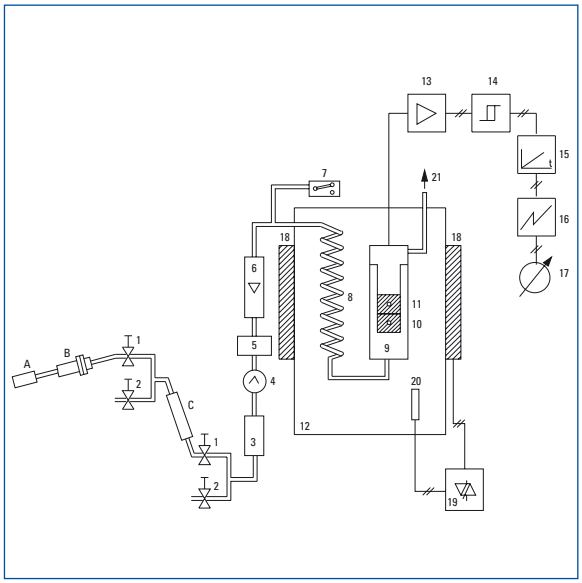
Explosion vent for inserts in gas measuring pipes

Type Wt,
BAM approved ("BAM" = Federal Institute for Material Testing)

Condensate collector

Condensate collector with mounting sheet

175 x 260 x 125 mm (WxHxD)



Gasflow schematic

A) Sampled gas suction
B) Mounting stubs with single flange
C) Heated gas suction pipe
1) Sampled gas input
2) Test gas input
3) Pre-filter or balance filter
4) Sampled gas pump
5) Flow regulator
6) Flow-through meter
7) Flow monitor
8) Heating element
9) Catalyser chamber
10) Comparison measurement
11) Measurement point
12) Reaction chamber
13) Measurement amplifier
14) Limit value monitor 1–4
15) Measured value integrator
16) Line plotter
17) Concentration indicator
18) Heating element sleeve
19) Temperature controller
20) Resistance thermometer
21) Gas output

ADOS GmbH
Instrumentation
and Control

ADOS®
est. 1900

Certificate

- ISO 9001 Certificate
- Certificate ATEX 94/9/EC
- GTR 210 IECEx Certificate IP66 60˚C
- GTR 210 IECEx Certificate IP54 55˚C
- GTR 210 IECEx Certificate SIL1 & functional test IP66 60 °C
- GTR 210 IECEx Certificate SIL1 & functional test IP54 55 °C
- GTR 210 Certificate Marine
- EC type-examination DEKRA GTR 210 Ex IP66 60˚C
- EC type-examination DEKRA GTR 210 Ex IP54 55˚C
- FlexADOS 914 + FlexADOS 914 LON® Certificate SIL 1
- FlexADOS 914 + FlexADOS 914 LON®
- Examination Certificate GTR 196
- Certificate Function Check GW 399/GTR 196

Certificate

Standard **ISO 9001:2008**

Certificate Registr. No. 01 100 71011

Certificate Holder:

ADOS GmbH
Trierer Str. 23-25
D - 52078 Aachen

ADOS®
seit 1909

Scope: development, production, installation, service and sales of instrumentation and control

Proof has been furnished by means of an audit that the requirements of ISO 9001:2008 are met.

Validity: The certificate is valid from 2015-05-30 until 2018-05-29.
First certification 1997

2015-05-08

TÜV Rheinland Cert GmbH
Am Grauen Stein · 51105 Köln

www.tuv.com

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Deutsche
Akkreditierungsstelle
D-ZM-16031-01-00

TÜVRheinland®
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Certificate

Quality Assurance Notification

Directive 94/9/EC

Certificate Registr. No. **01 220 71011**

The Certification Body for Explosion Protection
of TÜV Rheinland Industrie Service GmbH
Reported under no. 0035
certifies:

Certificate Holder: **Ados GmbH**
Trierer Str. 23-25
D - 52078 Aachen

ADOS®
seit 1900

Scope: Production, final equipment inspection and testing of the gastransmitters type GTR 196 and GTR 210

Types of protection: d, e, i, m

An audit was performed, Report No. 71011. Proof has been furnished that the requirements according to Directive 94/9/EC Annex VII / IV are fulfilled.

The due date for all future audits is 31-May

Validity: The certificate is valid from 2015-06-01 until 2018-05-31
First certification 2002

Wuppertal, 08.05.2015

TÜV Rheinland Industrie Service GmbH
Am Grauen Stein, D-51105 Cologne
Dipl.-Ing. Andreas Maschke

www.tuv.com

TÜVRheinland®
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IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.:	IECEx DEK 11.0090X issue No.:1	Certificate history: Issue No. 1 (2013-9-11) Issue No. 0 (2012-5-21)
Status:	Current	
Date of Issue:	2013-09-11	Page 1 of 4

Applicant:

ADOS GmbH
Trierer Strasse 23-25
D-52078
Aachen
Germany

Electrical Apparatus: **Gastransmitter GTR 210 Ex**
Optional accessory:

Type of Protection: **Ex d e ia mb**

Marking: Ex d e ia mb IIC T4 Gb

Approved for issue on behalf of the IECEx Certification Body: M. Erdhuizen

Position: Certification Manager

Signature: (for printed version)

Date: 2013-09-11

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body
3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website.

Certificate issued by:

DEKRA Certification B.V.
Meander 1051,
6825 MJ Arnhem
The Netherlands

DEKRA

IECEx Certificate of Conformity

Certificate No.: IECEx DEK 11.0090X

Date of Issue: **2013-09-11** Issue No.: **1**

Manufacturer: **ADOS GmbH**
Trierer Strasse 23-25
D-52078
Aachen
Germany

Additional Manufacturing location (s):

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended.

STANDARDS:
The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:

IEC 60079-0 : 2011 Edition: 6.0	Explosive atmospheres - Part 0: General requirements
IEC 60079-1 : 2007-04 Edition: 6	Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"
IEC 60079-11 : 2011 Edition: 6.0	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"
IEC 60079-18 : 2009 Edition: 3	Explosive atmospheres Part 18: Equipment protection by encapsulation "m"
IEC 60079-7 : 2006-07 Edition: 4	Explosive atmospheres - Part 7: Equipment protection by increased safety "e"

*This Certificate **does not** indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.*

TEST & ASSESSMENT REPORTS:
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in

Test Report:
NL/DEK/ExTR11.0106/01 NL/DEK/ExTR11.0106/02

Quality Assessment Report:

DE/TUR/QAR11.0007/01

IECEx Certificate of Conformity

Certificate No.: IECEx DEK 11.0090X

Date of Issue: **2013-09-11** Issue No.: **1**

Schedule

EQUIPMENT:
Equipment and systems covered by this certificate are as follows:

Description
The gas transmitter Type GTR 210 Ex is used for measuring combustible gases and vapours in air and under atmospheric conditions. The measurement values and status of the gas transmitter can be read on the display. A sensor head in type of protection flameproof enclosure "d" is incorporated in the measuring instrument housing in types of protection encapsulation "mb, increased safety "e" and intrinsic safety "ia". The sensor head incorporates a breathing device of sintered metal.
The transmitter enclosure provides a degree of protection IP 66 as per IEC 60529.
Ambient temperature range -25 °C to +60 °C.

Electrical data
Power supply: 24 VDC, 200 mA,
Output signal : 4 - 20 mA,
Sensor : 9,7 W max.

CONDITIONS OF CERTIFICATION: YES as shown below:

Maximum allowed prospective short circuit current of the supply: 1500 A

IECEx Certificate of Conformity

Certificate No.: IECEx DEK 11.0090X

Date of Issue: **2013-09-11** Issue No.: **1**

DETAILS OF CERTIFICATE CHANGES (for issues 1 and above):

- Increase of upper ambient temperature
- Addition of Ingress protection IP 66

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.:	IECEx DEK 11.0090X	issue No.:0	Certificate history:
Status:	**Current**		
Date of Issue:	**2012-05-21**	Page 1 of 3	

Applicant: **ADOS GmbH**
Trierer Strasse 23-25
D-52078
Aachen
Germany

Electrical Apparatus: **Gastransmitter GTR 210**
Optional accessory:

Type of Protection: **Ex d e ia mb**

Marking: Ex d e ia mb IIC T4 Gb

Approved for issue on behalf of the IECEx Certification Body: M. Erdhuizen

Position: Certification Manager

Signature:
(for printed version)

Date: 2012-05-21

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website.

Certificate issued by:

DEKRA Certification B.V.
Utrechtseweg 310
6812 AR Arnhem
The Netherlands

All testing, inspection, auditing and certification activities of the former KEMA Quality are an integral part of the DEKRA Certification Group.

IECEx Certificate of Conformity

Certificate No.: IECEx DEK 11.0090X

Date of Issue: **2012-05-21** Issue No.: **0**

Manufacturer: **ADOS GmbH**
Aachen
Germany

Manufacturing location(s):

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex produ covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended.

STANDARDS:
The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identi documents, was found to comply with the following standards:

IEC 60079-0 : 2007-10 Edition: 5	Explosive atmospheres - Part 0:Equipment - General requirements
IEC 60079-1 : 2007-04 Edition: 6	Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"
IEC 60079-11 : 2006 Edition: 5	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"
IEC 60079-18 : 2009 Edition: 3	Explosive atmospheres Part 18: Equipment protection by encapsulation "m"
IEC 60079-7 : 2006-07 Edition: 4	Explosive atmospheres - Part 7: Equipment protection by increased safety "e"

*This Certificate **does not** indicate compliance with electrical safety and performance requirements other than thos expressly included in the Standards listed above.*

TEST & ASSESSMENT REPORTS:
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in

Test Report:
NL/DEK/ExTR11.0106/00

Quality Assessment Report:

DE/TUR/QAR11.0007/00

IECEx Certificate of Conformity

Certificate No.: IECEx DEK 11.0090X

Date of Issue: **2012-05-21** Issue No.: **0**

Schedule

EQUIPMENT:
Equipment and systems covered by this certificate are as follows:

Description
The gas transmitter Type GTR 210 is used for measuring combustible gases and vapours in air ai under atmospheric conditions. The measurement values and status of the gas transmitter can be read on the display. A sensor head in type of protection flameproof enclosure "d" is incorporated i the measuring instrument housing in types of protection encapsulation "mb, increased safety "e" a intrinsic safety "ia". The sensor head incorporates a breathing device of sintered metal.
Ambient temperature range -25 °C to +55 °C.

Electrical data
Power supply: 24 VDC, 200 mA,
Output signal : 4 - 20 mA,
Sensor : 9,7 W max.

CONDITIONS OF CERTIFICATION: YES as shown below:

Maximum allowed prospective short circuit current of the supply: 1500 A

Translation

(1) 1. Supplement to the EC-Type Examination Certificate

(2) Equipment and protective systems intended for use in potentially explosive atmospheres - Directive 94/9/EC

(3) No. of EC-Type Examination Certificate: **BVS 12 ATEX G 001 X**

(4) Equipment: **Gas Transmitter type GTR 210**

(5) Manufacturer: **ADOS GmbH**

(6) Address: **52078 Aachen, Germany**

(7) The design and construction of this equipment and any acceptable variation thereto are specified in the appendix to this supplement.

(8) The certification body of DEKRA EXAM GmbH, notified body no. 0158 in accordance with Article 9 of the Directive 94/9/EC of the European Parliament and the Council of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive. The examination and test results are recorded in the test report PFG-no. 41300212P NI.

(9) The Essential Health and Safety Requirements with respect to the measuring function for explosion protection are assured by application of:

EN 60079-29-1:2007
EN 50271:2010

This EC-type examination certificate covers for the variant IP54 the measuring function for alkanes from methane to nonane in the measuring range 0 - 100 % LEL.
This EC-type examination certificate covers for the variant IP66 the measuring function for alkanes from methane to hexane in the measuring range 0 - 100 % LEL.
This EC-type examination certificate covers equipment with software version 1.12.

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the appendix to this certificate.

(11) This supplement to the EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to Directive 94/9/EC.
Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

DEKRA EXAM GmbH Dinnendahlstrasse 9 44809 Bochum Phone +49.234.3696-105 Fax +49.234.3696-110 zs-exam@dekra.com

(12) The marking of the equipment shall include the following:

⟨Ex⟩ **II 2 G Ex d e ia mb IIC T4 Gb**

Type GTR 210 Ex

⟨Ex⟩ **II (2) G**

Types
GTR 210 Standard
GTR 210 Comfort

DEKRA EXAM GmbH
Bochum, dated 15. October 2013

Signed: Müller

Certification body

Signed: Kiesewetter

Special services unit

DEKRA EXAM GmbH Dinnendahlstrasse 9 44809 Bochum Phone +49.234.3696-105 Fax +49.234.3696-110 zs-exam@dekra.com

(13) Appendix to

(14) **1. Supplement to the EC-Type Examination Certificate**
BVS 12 ATEX G 001 X

(15) 15.1 Subject and type

Gas transmitter type GTR 210 with versions GTR 210 Ex, GTR 210 Standard and GTR 210 Comfort, variants IP54 and IP66

15.2 Description

This supplement to the EC-type examination certificate concerns modifications of the software and the variant IP66. The variant certified previously will be denoted as variant IP54 in the future.
The gas detection apparatus GTR 210 is a fixed device for the measurement of flammable gases. The measurement is done with a catalytic combustion sensor. The versions GTR 210 Standard and GTR 210 Comfort are not suitable for operation in potentially explosive atmospheres.
A 3-wire 4-20 mA interface serves as power supply and for transmission of the measured value for the versions GTR 210 Ex and GTR 210 Standard.
The version GTR 210 Comfort is mains powered with 230 V AC. In addition, a 4-20 mA current output and four galvanic isolated change-over contacts for signalling faults and there alarms are available.

15.3 Parameters

- See EC-type examination certificate DEKRA 11ATEX0257 X
- Ambient temperature ranges:
  - Variant IP54: -25 °C to +55 °C
  - Variant IP66: -25 °C to +60 °C

(16) Test and assessment report

PFG-no. 41300212P NI as of 15/10/2013
- EC-type examination certificate DEKRA 11ATEX0257 X as of 15/05/2013

(17) Special conditions for safe use

- see EC-type examination certificate DEKRA 11ATEX0257 X
- At air velocities greater than 4 m/s, measured values in gas can be increased exceeding the tolerances of EN 60079-29-1.
- If vibrations cannot be excluded, the (nc)-contacts of the alarm relays of the GTR 210 Comfort shall not be used for safety-relevant purposes.
- If the indication "Sensor overcharged" is observed zero and span of the equipment has to be calibrated before further use. The calibration should be checked regularly (e.g. every day) until no significant deviations are observed anymore.
- The time of response t_{90} for propane is about 8 s higher than required by EN 60079-29-1 for the variant IP66. This has to be taken into account in the settings of the alarm set points.

We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

DEKRA EXAM GmbH
44809 Bochum, 15. October 2013
PFG-Kie/Ne

Certification body

Special services unit

DEKRA EXAM GmbH Dinnendahlstrasse 9 44809 Bochum Phone +49.234.3696-105 Fax +49.234.3696-110 zs-exam@dekra.com

Translation

(1) EC-Type Examination Certificate

(2) Equipment and protective systems intended for use in potentially explosive atmospheres - Dirèctive 94/9/EC

(3) No. of EC-Type Examination Certificate: **BVS 12 ATEX G 001 X**

(4) Equipment: **Gas Transmitter type GTR 210**

(5) Manufacturer: **ADOS GmbH**

(6) Address: **52078 Aachen, Germany**

(7) The design and construction of this equipment and any acceptable variation thereto are specified in the appendix to this supplement.

(8) The certification body of DEKRA EXAM GmbH, notified body no. 0158 in accordance with Article 9 of the Directive 94/9/EC of the European Parliament and the Council of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive. The examination and test results are recorded in the test report PFG-no. 41300212P.

(9) The Essential Health and Safety Requirements with respect to the measuring function for explosion protection are assured by application of:

EN 60079-29-1:2007
EN 50271:2010

This EC-type examination certificate covers the measuring function for alkanes from methane to nonane in the measuring range 0 - 100 % LEL.
This EC-type examination certificate covers equipment with software version 1.09.

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the appendix to this certificate.

(11) This supplement to the EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to Directive 94/9/EC.
Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment shall include the following:

II 2 G Ex d e ia mb IIC T4 Gb

Type GTR 210 Ex

II (2) G

Types
GTR 210 Standard
GTR 210 Comfort

DEKRA EXAM GmbH
Bochum, dated 6. December 2012

Signed: Müller

Certification body

Signed: Kiesewetter

Special services unit

DEKRA EXAM GmbH Dinnendahlstrasse 9 44809 Bochum Phone +49.234.3696-105 Fax +49.234.3696-110 zs-exam@dekra.com

(13) Appendix to

(14) **EC-Type Examination Certificate**
BVS 12 ATEX G 001 X

(15) 15.1 Subject and type

Gas Detector type GTR 210 with versions GTR 210 Ex, GTR 210 Standard and GTR 210 Comfort

15.2 Description

The gas detection apparatus GTR 210 is a fixed device for the measurement of flammable gases. The measurement is done with a catalytic combustion sensor. The versions GTR 210 Standard and GTR 210 Comfort are not suitable for operation in potentially explosive atmospheres.
A 3-wire 4-20 mA interface serves as power supply and for transmission of the measured value for the versions GTR 210 Ex and GTR 210 Standard.
The version GTR 210 Comfort is mains powered with 230 V AC. In addition, a 4-20 mA current output and four galvanic isolated change-over contacts for signalling faults and there alarms are available.

15.3 Parameters

See EC-type examination certificate DEKRA 11ATEX0257 X

(16) Test and assessment report

PFG-no. 41300212P as of 06/12/2012
- EC-type examination certificate DEKRA 11ATEX0257 X as of 13/04/2012

(17) Special conditions for safe use

- see EC-type examination certificate DEKRA 11ATEX0257 X
- At air velocities greater than 4 m/s, measured values in gas can be increased exceeding the tolerances of EN 60079-29-1.
- If vibrations cannot be excluded, the (nc)-contacts of the alarm relays of the GTR 210 Comfort shall not be used for safety-relevant purposes.
- If the indication "Sensor overcharged" is observed zero and span of the equipment has to be calibrated before further use. The calibration should be checked regularly (e.g. every day) until no significant deviations are observed anymore.

We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

DEKRA EXAM GmbH
44809 Bochum, 6. December 2012
PFG-Kie/Ne

Certification body

Special services unit

DEKRA EXAM GmbH Dinnendahlstrasse 9 44809 Bochum Phone +49.234.3696-105 Fax +49.234.3696-110 zs-exam@dekra.com

European notified body
Identification number 0736

DGUV Test
Prüf- und Zertifizierungsstelle
BG Verkehr
Dienststelle Schiffssicherheit

EC-Type Examination (Module B) Certificate

Certificate No. **213.053**

Name and address of the manufacturer:	ADOS GmbH Trierer Straße 23-25 52078 Aachen (Germany)
Date of issue:	**15.04.2015**
Annex A.1 Item No & Item designation:	**A.1/3.54 – Fixed oxygen analysis and gas detection equipment**
Product designation:	Gas detection equipment (type 3)
Product Type:	**GTR 210 EX MED / GTR 210 Standard MED / GTR 210 Comfort MED**
Intended purpose:	Gas analysis detection equipment complying with SOLAS 74/88 Chapter II-2/4 and VI/3, as amended, IMO Resolution MSC.98(73)-(FSS-Code) 15.
Testing based on (Specific standard):	IEC 60092-504 (2001) incl. IEC 60092-504 corrigendum 1 (2011) IEC 60533 (1999) Type 3: explosiv gas atmospheres - EN 50104 (2010)*, IEC 60079-0 (2011), EN 60079-29-1 (2007) Type 4*: safe area - EN 50104 (2010)* (*) = not applicable
Remarks:	see overleaf

The type tested was found to be in compliance with the Fire Protection requirements of Marine Equipment Directive (MED) 96/98/EC as amended by Directive 2013/52/EU subject to any conditions in the schedule (part of this certificate).

This certificate may only be used in connection with module(s) **D, E or F** of this directive.

Expiry date: **14.04.2020**

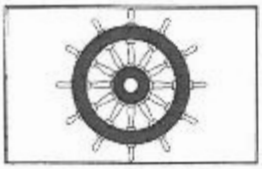
Signature (Niehus)

Installed equipment stays approved beyond the validity date until it is revoked!

Note 1: This certificate will not be valid if the manufacturer makes any changes or modifications to the approved equipment, which have not been notified to, and agreed with the notified body named on this certificate.

Note 2: Should the specified regulations or standards be amended during the validity of this certificate, the product(s) is/are to be re-approved prior to it/they being placed on board vessels to which the amended regulations or standards apply.

Note 3: The Mark of Conformity may only be affixed to the above type approved equipment and a Manufacturer's Declaration of Conformity issued when the production-control phase module (D, E or F) of ANNEX B of the Directive is fully complied with and controlled by a written inspection agreement with a notified body.



xxxx/yy

Note 4: "Wheelmark" Format

YY Last two digits of year mark affixed.

XXXX Notified Body number undertaking surveillance module

Postal address
BG Verkehr
Dienststelle Schiffssicherheit
Ottenser Hauptstraße 54
22765 Hamburg

Office
Brandstwiete1
20457 Hamburg

Tel: 0 40/3 61 37-0
Fax 0 40/3 61 37 2 04
In any case, the German original shall prevail

Technical data / approved drawings and additional conditions and remarks:

1.
This EC-Type Examination Certificate is based on following documents:
- EMC test report no. 2175818.0501-EMC of the "DEKRA Certifcation B.V.", 6825 MJ Arnhem (NL), dated 25.02.2015
- Environmental test report no. 2175818.0502-EMC of the "DEKRA Certifcation B.V.", 6825 MJ Arnhem (NL), dated 25.02.2015
- EC- Type Examination Certificate no. DEKRA 11ATEX0257 X - version no. 2 of the "DEKRA Certifcation B.V.", 6825 MJ Arnhem (NL), dated 15.05.2013
- EC- Type Examination Certificate no. BVS 12 ATEX G 001 X der "DEKRA EXAM GmbH", 44809 Bochum (D), dated 06.12.2012
- 1. Supplement to EC- Type Examination Certificate no. BVS 12 ATEX G 001 X of the "DEKRA EXAM GmbH", 44809 Bochum (D), dated 15.10.2013
- Statement of the company ADOS GmbH (Mr. Rütgers), dated 26.02.2015.

2.
The terms of the Test Certificates / EC- Type Examination Certificates are part of this EC-Type Examination Certificate.

3.
The equipment **"GTR 210 EX MED / GTR 210 Standard MED / GTR 210 Comfort MED"** is certified only for use as fixed gas detection equipment (Type 3).

4.
The function of the oxygen analyzing is excluded and therefore not a part of the EC type examination certificate

5.
Alteration in design and construction have to be approved by the BG Verkehr, Dienststelle Schiffssicherheit.

5.
The equipment shall be marked in accordance with article 11 of the Council Directive 96/98 EC of 20 December 1996 on Marine Equipment as amended.

6.
This EC-Type Examination Certificate may only reproduced in full.

DNV·GL

Certificate No:
MEDE0000015

QS - CERTIFICATE OF ASSESSMENT - EC (MODULE E)

Application of: Directive 2014/90/EU of 23 July 2014 on marine equipment (MED). This Certificate is issued by DNV GL SE based on the notification of the Federal Maritime and Hydrographic Agency of Germany.

This is to certify:

That the Quality System for the products

with type designation(s) as specified in the Appendix to this Certificate

Issued to

Ados GmbH

Aachen Nordrhein-Westfalen, Germany

is found to comply with the applicable requirements.
The quality system has been assessed with respect to the procedure of conformity assessment described in Annex II, Module E in the directive 2014/90/EU and regulation (EU) 2017/306.

This Certificate is valid until **2022-07-17**.

Issued at **Hamburg** on **2017-07-18**

DNV GL local station:
Essen

Approval Engineer:
Dariusz Lesniewski

Notified Body
No.: **0098**

for **DNV GL SE**

Sven Dudszus
Head of Notified Body

0098/yyyy

0098: Notified Body number undertaking quality surveillance
yyyy: The year in which the mark is affixed

The product liability rests with the manufacturer or his representative in accordance with Directive 2014/90/EU.
This certificate authorizes the manufacturer in conjunction with the valid EC Type Examination (Module B) Certificate(s) of the equipment listed before to affix the Mark of Conformity (wheelmark) to the product described herein.
This certificate loses its validity if the manufacturer makes any changes to the approved quality system, which have not been notified to, and agreed with the notified body named on this certificate. This certificate remains valid unless suspended, withdrawn, recalled or cancelled.
The Manufacturer has to apply for periodical audits to verify the maintenance and application of the quality system every 12 months.

Job Id: **344.1-007107-1**
Certificate No: **MEDE0000015**

APPENDIX

Item no. MED/3.54 Fixed oxygen analysis and gas detection equipment

Type designation	EC Type-Examination Certificate No.	Expiry date	Notified Body No.	USCG approval number
Gas Transmitter GTR 210 EX MED / GTR 210 Standard MED / GTR 210 Comfort MED[1]	213.053	2020-04-14	0736	N/A

Places of production

1.Ados GmbH, Trierer Str. 23-25, Aachen, Germany

CERTIFICATE

(1) EC-Type Examination

(2) **Equipment and protective systems intended for use in potentially explosive atmospheres - Directive 94/9/EC**

(3) EC-Type Examination Certificate Number: **DEKRA 11ATEX0257 X** Issue Number: **2**

(4) Equipment: **Gas Transmitter Type GTR 210 Ex**

(5) Manufacturer: **ADOS GmbH**

(6) Address: **Trierer Strasse 23-25, D-52078 Aachen, Germany**

(7) This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) DEKRA Certification B.V., notified body number 0344 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the directive.

The examination and test results are recorded in confidential test report number NL/DEK/ExTR11.0106/**.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 60079-0 : 2012	**EN 60079-1 : 2007**	**EN 60079-7 : 2007**
EN 60079-11 : 2012	**EN 60079-18 : 2009**	

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment according to the Directive 94/9/EC. Further requirements of the directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment shall include the following:

II 2 G Ex d e ia mb IIC T4 Gb

This certificate is issued on 15 May 2013 and, as far as applicable, shall be revised before the date of cessation of presumption of conformity of (one of) the standards mentioned above as communicated in the Official Journal of the European Union.

DEKRA Certification B.V.

M. Erdhuizen
Certification Manager

DEKRA Certification B.V. Utrechtseweg 310, 6812 AR Arnhem P.O. Box 5185, 6802 ED Arnhem The Netherlands
T +31 88 96 83000 F +31 88 96 83100 www.dekra-certification.com Registered Arnhem 09085396

(13) # SCHEDULE

(14) **to EC-Type Examination Certificate DEKRA 11ATEX0257 X** Issue No. **2**

(15) **Description**

The gas transmitter Type GTR 210 Ex is used for measuring combustible gases and vapours in air and under atmospheric conditions. The measurement values and status of the gas transmitter can be read on the display.
A sensor head in type of protection flameproof enclosure "d" is incorporated in the measuring instrument housing in types of protection encapsulation "mb, increased safety "e" and intrinsic safety "ia". The sensor head incorporates a breathing device of sintered metal.

The transmitter enclosure provides a degree of protection IP 66 as per EN 60529.

Ambient temperature range -25 °C to +60 °C.

Electrical data

Power supply	:	24 VDC, 200 mA
Output signal	:	4 - 20 mA
Sensor	:	9,7 W max.

Installation instructions

The instructions provided with the equipment shall be followed in detail to assure safe operation.

(16) **Test Report**

No. NL/DEK/ExTR11.0106/**.

(17) **Special conditions for safe use**

Maximum allowed prospective short circuit current of the supply: 1500 A

(18) **Essential Health and Safety Requirements**

Covered by the standards listed at (9).

(19) **Test documentation**

As listed in Test Report No. NL/DEK/ExTR11.0106/**.

CERTIFICATE

(1) EC-Type Examination

(2) **Equipment and protective systems intended for use in potentially explosive atmospheres - Directive 94/9/EC**

(3) EC-Type Examination Certificate Number: **DEKRA 11ATEX0257 X** Issue Number: 1

(4) Equipment: **Gas Transmitter Type GTR 210**

(5) Manufacturer: **ADOS GmbH**

(6) Address: **Trierer Strasse 23-25, D-52078 Aachen, Germany**

(7) This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) DEKRA Certification B.V., notified body number 0344 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the directive.

The examination and test results are recorded in confidential test report number 214051100.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 60079-0 : 2009 **EN 60079-1 : 2007** **EN 60079-7 : 2007**
EN 60079-11 : 2007 **EN 60079-18 : 2009**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment according to the Directive 94/9/EC. Further requirements of the directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment shall include the following:

II 2 G Ex d e ia mb IIC T4 Gb

This certificate is issued on April 13, 2012 and, as far as applicable, shall be revised before the date of cessation of presumption of conformity of (one of) the standards mentioned above as communicated in the Official Journal of the European Union.

DEKRA Certification B.V.

M. Erdhuizen
Certification Manager

PRODUCTS RvA C 001

All testing, inspection, auditing and certification activities of the former KEMA Quality are an integral part of the DEKRA Certification Group

DEKRA Certification B.V. Utrechtseweg 310, 6812 AR Arnhem P.O. Box 5185, 6802 ED Arnhem The Netherlands
T +31 26 3 56 20 00 F +31 26 3 52 58 00 www.dekra-certification.com Registered Arnhem 09085396

(13) **SCHEDULE**

(14) **to EC-Type Examination Certificate DEKRA 11ATEX0257** Issue No. **1**

(15) **Description**

The gas transmitter Type GTR 210 is used for measuring combustible gases and vapours in air and under atmospheric conditions. The measurement values and status of the gas transmitter can be read on the display.

A sensor head in type of protection flameproof enclosure "d" is incorporated in the measuring instrument housing in types of protection encapsulation "mb, increased safety "e" and intrinsic safety "ia". The sensor head incorporates a breathing device of sintered metal.

Ambient temperature range -25 °C to +55 °C.

Electrical data

Power supply	:	24 VDC, 200 mA
Output signal	:	4 - 20 mA
Sensor	:	9,7 W max.

Installation instructions

The installation instructions provided with the equipment shall be followed in detail to assure safe operation.

(16) **Test Report**

No. 214051100.

(17) **Special conditions for safe use**

Maximum allowed prospective short circuit current of the supply: 1500 A

(18) **Essential Health and Safety Requirements**

Covered by the standards listed at (9).

(19) **Test documentation**

As listed in Test Report No. 214051100.

Certificate

Zertifikat Nr. S 488 2015 C2

Manufacturer / Contractor:	**ADOS GmbH Mess- und Regeltechnik Trierer Straße 23-25 D-52078 Aachen**
Product:	**FlexADOS 914: O_2, toxic and flammable gas measurements. LON® System: Electrical Apparatus for the detection and measurement of carbon-monoxide in car parks and tunnels.**
Type:	**FlexADOS 914 FlexADOS 914 LON® with Detector ADOS TOX 914 LON®**
Type of use:	**Detection and measurement of gases**
Test requirements:	**FlexADOS 914: DIN EN 50104:2011, DIN EN 45544-1:2015, LON® System: DIN EN 50545-1:04.2012 / VDI 2053:12.2014**
	TÜVRheinland® CERTIFIED Type Approved Regular Production Surveillance www.tuv.com ID 0000050968
Test result:	**The tested specimen meets the test requirements. Restrictions see remark in the report no.: S 488 2015 T1.**

This certificate is valid until February 2021

Cologne, 12.02.2016

Test Centre for Energy Appliances

Dipl.-Ing. W. Rückwart

TÜV Rheinland Energie und Umwelt GmbH, Am Grauen Stein, D-51105 Köln

www.tuv.com

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Certificate

Nr./No.: 968/FSP 1092.00/16

Prüfgegenstand **Product tested**	Gaswarnzentrale und CO-Gastransmitter Gas warning center and CO gas transmitter	**Zertifikats-inhaber** **Certificate holder**	ADOS GmbH Trierer Str. 23-25 52078 Aachen Germany
Typbezeichnung **Type designation**	FLexADOS914 (SIL 1), FLexADOS914LON (SIL 1), TOX914LON		
Prüfgrundlagen **Codes and standards**	EN 50271:2010		
Bestimmungsgemäße Verwendung **Intended application**	Gaswarnzentralen zur Überwachung von verschiedenen Gaskonzentrationen erfüllen die Anforderungen entspr. SIL 1 der EN 50271. CO-Gastransmitter zur Messung von Kohlenmonoxidkonzentrationen erfüllt die Anforderungen der EN 50271 ohne SIL 1 Betrachtung. Gas warning centres for monitoring of various gas concentrations meet the requirements acc. to SIL 1 of EN 50271. CO gas transmitter for measuring carbon monoxide concentrations meets the requirements of EN 50271 without SIL 1 consideration.		
Besondere Bedingungen **Specific requirements**	Die Hinweise in der zugehörigen Betriebsanleitung sind zu beachten. The instructions of the associated Operating Manuals shall be considered.		

Gültig bis / Valid until 2021-02-05

Der Ausstellung dieses Zertifikates liegt eine Prüfung zugrunde, deren Ergebnisse im Bericht Nr. 968/FSP 1092.03/16 vom 05.02.2016 dokumentiert sind.
Dieses Zertifikat ist nur gültig für Erzeugnisse, die mit dem Prüfgegenstand übereinstimmen. Es wird ungültig bei jeglicher Änderung der Prüfgrundlagen für den angegebenen Verwendungszweck.
The issue of this certificate is based upon an examination, whose results are documented in Report No. 968/FSP 1092.03/16 dated 2016-02-05.
This certificate is valid only for products which are identical with the product tested. It becomes invalid at any change of the codes and standards forming the basis of testing for the intended application.

Köln, 2016-02-05

TÜV Rheinland Industrie Service GmbH
Bereich Automation
Funktionale Sicherheit
Am Grauen Stein, 51105 Köln
Certification Body Safety & Security for Automation & Grid

Dr.-Ing. Thorsten Gantevoort

www.fs-products.com
www.tuv.com

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TÜV Rheinland Industrie Service GmbH, Am Grauen Stein, 51105 Köln / Germany
Tel.: +49 221 806-1790, Fax: +49 221 806-1539, E-Mail: industrie-service@de.tuv.com

CERTIFICATE

ELECTROMAGNETIC COMPATIBILITY

Applicant	:	**ADOS GmbH Mess – und Regeltechnik**
Contact person	:	**Mr A. Winkens**
Address	:	**Trierer Str. 23-25**
Postal code, Place	:	**52078 Aachen**
Country	:	**Germany**
Electrical apparatus	:	**Gas transmitter and gas warning systems**
Trademark	:	**ADOS**
Type designation	:	**TOX 914 LON, FlexADOS 914 and FlexADOS 914 LON**

Environment : **Industrial process environments (type 2)**

EN 50270:2006	Electromagnetic compatibility – Electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen, from which:
EN 61000-6-4:2007 +A1:2011	Generic emission standard for industrial environments
EN 61000-3-2:2006 +A1:2009,+A2:2009	Limits for harmonic current emissions
EN 61000-3-3:2013	Limitation of voltage fluctuations and flicker
EN 61000-6-2:2005	Generic immunity standard for industrial environments
EN 61000-4-2:2009	Electrostatic discharge (ESD) immunity
EN 61000-4-3:2006 +A1:2008, +A2:2010	Radiated Electro-Magnetic field immunity
EN 61000-4-4:2012	Electrical fast transient (EFT) immunity
EN 61000-4-5:2006	Surge transient immunity
EN 61000-4-6:2014	Conducted Radio-Frequency disturbances immunity
EN 61000-4-8:2010	Power frequency magnetic field immunity
EN 61000-4-11:2004	Immunity to voltage dips and short interrupts

The undersigned declares that the described products meet the essential requirements of the **EMC Directive 2004/108/EC**, based on a non-recurrent examination. The results are recorded in our test report with reference 2177152.0501-EMC.

DEKRA Certification B.V.
(Notified Body EMC)
Arnhem, 11 February 2015

R. Hartsuiker
Certification Manager EMC

Certificate nr. **2177152.0551-EMC**

DEKRA Certification B.V. Meander 1051, 6825 MJ Arnhem P.O. Box 5185, 6802 ED Arnhem, The Netherlands
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(1) EU-TYPE EXAMINATION CERTIFICATE

(2) Equipment and Protective Systems intended for use in Potentially Explosive Atmosphere - **Directive 2014/34/EU**

(3) EU-Type Examination Certificate Number

TÜV 15 ATEX 7801 X Issue: 02

(4) Equipment: **Central gas warning unit type FlexADOS 914**

(5) Manufacturer: **ADOS GmbH**
(6) Address: **Trierer Str. 23-25**
52078 Aachen, Germany

(7) This product and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) The TÜV Rheinland Zertifizierungsstelle für Explosionsschutz of TÜV Rheinland Industrie Service GmbH, Notified Body No. 0035 in accordance with Article 21 of the Council Directive 2014/34/EU of 26th February 2014, certifies this product which has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmosphere, given in Annex II to the Directive.

The examination and test results are recorded in the confidential report 557 / Ex 7801.02 / 15 and 968 / FSP 1092.00 / 16.

(9) Compliance with the Essential Health and Safety Requirements, with the exception of those listed in the schedule of this certificate, has been assessed by reference to:

EN 60079-0:2012+A11:2013 **EN 60079-29-1:2007** **EN 50104:2010**
EN 50271:2010

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EU-Type Examination Certificate relates only to the design and specification for construction of the equipment or protective system. It does not cover the process for actual manufacture or supply of the equipment or protective system, for which further requirements of the directive are applicable.

(12) The marking of the equipment shall include the following:

II (2) G

TÜV Rheinland Zertifizierungsstelle für Explosionsschutz Cologne, 2017-05-05

Dipl.-Ing. Klauspeter Gräff

This EU-Type Examination Certificate without signature and stamp shall not be valid.
This EU-Type Examination Certificate may be circulated only without alteration. Extracts or alterations are subject to approval by the TÜV Rheinland Industrie Service GmbH | TÜV Rheinland Group Am Grauen Stein 51105 Köln
Tel. +49 (0) 221 806-0 Fax. + 49 (0) 221 806 114

(13) Annex

(14) # EU Type Examination Certificate

TÜV 15 ATEX 7801 X Issue: 02

(15) Description of equipment

15.1 Equipment and type:

Gas detection system type FlexADOS 914 in the variant with up to 12 analogues 4...20 mA sensors.

15.2 General product information

The gas detection system type FlexADOS 914 is a safety-related, parameterisable control unit which has to be used with separately tested and certified gas measurement equipment; e.g. GTR 210 EX (BVS 12 ATEX G 001 X). Within the enclosure, which is intended for wall mounting, the electronic and connection facilities are situated; as well as display and keyboard at the front of the enclosure.
Up to 12 analogue 4...20 mA sensors can be evaluated by and connected to the gas detection system via two-wire- or three-wire-technique. 5 alarm thresholds per sensor can be individually set. Limits can be assigned to either actual or average value (adjustable to 1 up to 60 minutes). Maximum 14 potential-free changeover contacts can be freely allocatec to external warning or control devices. One potential-free changeover contact available for failure, power failure or service each.

15.3 Details of Change

Additional Listing of the software version V1.01 according the test report 968/FSP1092.03/16.

Technical Data

Power supply	100-240V AC 50/60Hz, optional 24V DC
max. power consumption	60 VA
Operating conditions	-25°C...+45°C 80kPa...120kPa 0%...95% relative humidity non-condensing
Protection class housing (DIN EN 60529)	IP 54
Dimensions (W x H x D)	300 x 230 x 120 mm
Displays	Graphic LCD display 128x64 pixel Background red / green / yellow LEDs for power, faults, mains failure, maintenance
Digital Inputs	3
Analogue outputs	2 x current outputs 4 - 20mA max. load 400 Ohm
Digital outputs	17 relays 1 relay each for faults, mains failure, maintenance and 14 alarm relays Potential-free changeover contact Switching capacity 250V AC / 4A
Other interfaces	USB, LONWorks (option) Universal FieldBus (option)
Weight	2,7 kg
Expected lifetime buffer battery clock Expected lifetime parameter memory	> 10 years > 20 years
Storage conditions	max. 1 year -25°C...+45°C 80kPa...120kPa 0%–95% relative humidity non-condensing
Software version	V1.01

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(16) Test-Report No. 557 / Ex 7801.02 / 15 and 968/FSP 1092.00/16

The central gas warning unit type FlexADOS 914 was tested as an independent control unit for use with external gas monitoring devices.

(17) Special Conditions for safe use

Observe the information in the associated operating instructions.

(18) Basic Safety and Health Requirements

Covered by afore mentioned standard

TÜV Rheinland Zertifizierungsstelle für Explosionsschutz

Cologne, 2017-05-05

Dipl.-Ing. Klauspeter Graffi

CERTIFICATE

(1) EC-Type Examination

(2) **Equipment and protective systems intended for use in potentially explosive atmospheres - Directive 94/9/EC**

(3) EC-Type Examination Certificate Number: **KEMA 03ATEX2403 X** Issue Number: **3**

(4) Equipment: **Gas Transmitter Type GTR 196**

(5) Manufacturer: **ADOS GmbH**

(6) Address: **Trierer Strasse 23-25, D-52078 Aachen, Germany**

(7) This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) DEKRA Certification B.V., notified body number 0344 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the directive.

The examination and test results are recorded in confidential test report number 203163500, issue 4.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 60079-0 : 2006 **EN 60079-1 : 2007** **EN 60079-7 : 2007**
EN 60079-11 : 2007 **EN 60079-18 : 2004**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment according to the Directive 94/9/EC. Further requirements of the directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment shall include the following:

II 2 G Ex d e mb [ia] IIC T6

This certificate is issued on 20 October 2015 and, as far as applicable, shall be revised before the date of cessation of presumption of conformity of (one of) the standards mentioned above as communicated in the Official Journal of the European Union.

DEKRA Certification B.V.

R. Schuller
Certification Manager

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(13) # SCHEDULE

(14) **to EC-Type Examination Certificate KEMA 04ATEX2403 X** Issue No. **3**

(15) **Description**

The gas transmitter Type GTR 196 is used for measuring combustible gases and vapours in air and under atmospheric conditions. The measurement signal is available at test sockets that are accessible, together with other adjustment devices, behind a movable front plate.

A sensor head in type of protection flameproof enclosure “d” is incorporated in the measuring instrument housing in types of protection encapsulation “mb and increased safety “e”. The adjustment devices behind the front plate are in type of protection intrinsic safety “ia”.

Ambient temperature range -20 ˚C to +45 ˚C.

The sensor head incorporates a breathing device of sintered metal.

Electrical data

Power supply	:	12 - 30 Vdc, 200 mA Um = 250 Vac
Output signal	:	4 - 20 mA Um = 250 Vac
Sensor	:	30 V, 6 W max.

Test socket circuit: in type of protection intrinsic safety Ex ia IIC, only for connection to a certified intrinsically safe circuit, with the following maximum values: U_o = 38,3 V; I_o = 4,2 mA; P_o = 40 mW; C_o = 35 nF; L_o = 50 mH.

Installation instructions

The instructions provided with the equipment shall be followed in detail to assure safe operation.

Routine tests

Each gas transmitter shall be tested in accordance with EN 60079-7, clause 7.1, with a test voltage of 500 V during 1 minute.

Each gas transmitter shall be tested in accordance with EN 60079-18, clause 9:
- 9.1 Visual inspection
- 9.2 Dielectric strength test

(16) **Test Report**

No. 203163500, issue 4.

(17) **Special conditions for safe use**

The front plate may only be opened temporarily for the connection of a certified measuring instrument to the test sockets and/or for adjustments.

Maximum allowed prospective short circuit current of the supply: 1500 A

(13) # SCHEDULE

(14) **to EC-Type Examination Certificate KEMA 04ATEX2403 X** Issue No. **3**

(18) **Essential Health and Safety Requirements**

Covered by the standards listed at (9).

(19) **Test documentation**

As listed in Test Report No. 203163500, issue 4.

KEMA

50251616-KPS/TCM 04-2022 **04-02-02**

Test report on the ADOS gas sensoric GW 399/GTR 196 for the measurement of oxygen, hydrogen as well as CnHm (methane, propane, butane, xylene, ethanol, nonane), ammonia and hydrogen sulphide.

KEMA POWER GENERATION & SUSTAINABLES

SUMMARY

At the request of the ADOS GmbH the KEMA Netherlands B.V. company carried out a function check of the gas sensoric GW 399/GTR 196 in accordance with the following performance requirements and test procedures:

- EN 50104 Electric equipment for the detection and measurement of oxygen
- EN 61779-1 and EN 61779-4: Electric equipment for the detection and measurement of combustible gases
- EN 45544-1 and EN 45544-2: Electric equipment for direct detection and direct measurement of the concentration of toxic gases and vapours.

The measurement principle of the sensors is based on electro-chemical reaction (TOX measurement head) for measuring oxygen content; for toxic gases and vapours and combustible gases, the principles of heat reaction are used (VQ measurement head).

For oxygen measurements, the sensor is suitable for the measurement of oxygen-deficiency, oxygen enrichment as well as oxygen-inertion.
For toxic gases and vapours, the sensor is suitable for the measurement of ammonia and hydrogen sulphide. For combustible gases, the sensor is suitable for the measurement of hydrogen, methane, propane, butane, xylene, ethanol and nonane.

Accordingly, the sensor (GTR 196) was tested for the components listed below, in the corresponding measurement ranges:

Table 1: Test Gases and Measurement Ranges for ADOS Gas Sensoric GW 399 / GTR196

Application		Measurement range	Standard test gas	Analyser measuring range
O_2	Enrichment	0 to 21 % V/V	10 % V/V	0 to 25 % V/V
O_2	Inertion	21 to 25 % V/V	23 % V/V	0 to 25 % V/V
O_2	Deficiency	0 to 21 % V/V	10 % V/V	0 to 25 % V/V
CH_4			2.5 % V/V	0 to 4.4 % V/V
H_2S			100.3 ppm(v)	0 to 200 ppm(v)
NH_3			2.8 % V/V	0 to 3.0 % V/V

It can be deduced from all the test results, that the performance of the ADOS gas sensoric GW 399/GTR 196 conforms to the recommendations specified in the performance requirements of EN 50104, EN 61779-4 and EN 45544-2.

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est. 1900

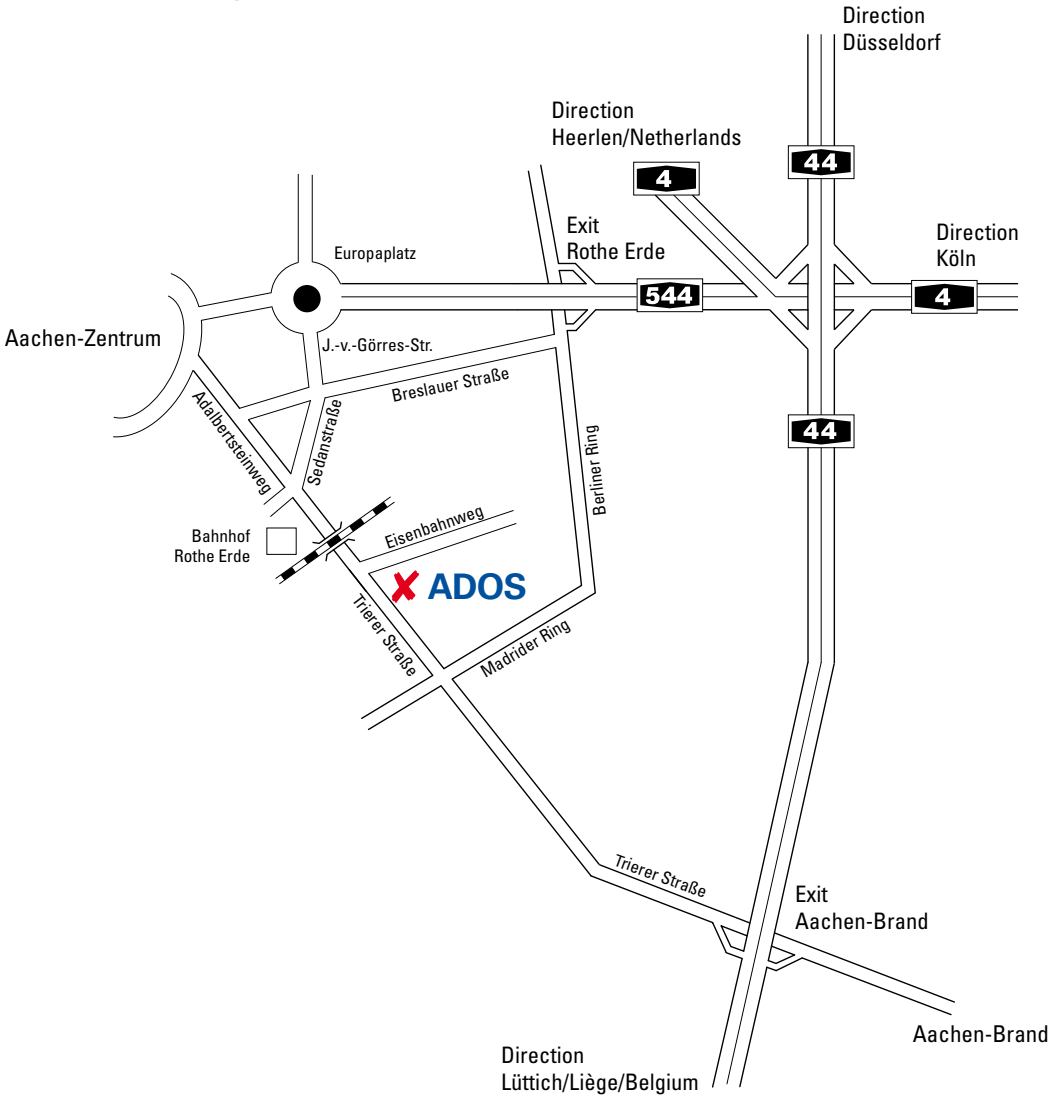
Location Plan

ROUTE MAP

Approaching on the A4:
- From the Motorway Interchange Aachen, follow the A 544 in the direction of Aachen-Europaplatz
- Leave the motorway at the exit marked "Rothe Erde"
- At the traffic lights, turn left on to the Berliner Ring (Highway)
- Follow the road via the Madrider Ring to the Trierer Strasse (approx. 2 km)
- Turn right at the crossing on to the Trierer Strasse
- After about 500 m, we are located on the right hand side (before the petrol station)

Approaching on the A44
- From the Motorway Interchange Aachen, follow the A 544 in the direction of Aachen-Brand
- Leave the A 44 at the exit marked "Aachen-Brand"
- At the traffic lights, turn left on to the Trierer Strasse
- Follow the Trierer Strasse for about 2 km (gradual downhill)
- We are located on the right hand side, just before the railway bridge

We look forward to your visit!



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