

## Operating Instructions

### Gas Transmitter with Current Interface



Issue: 04/2014

**Contents**

	Page
1. Function	1
2. Construction	1
3. Commissioning	2
4. Commissioning of LON <sup>®</sup> design	3
5. Calibration	4
6. Maintenance	5
7. Technical Data	11

## **1. Function**

The gas transmitter GTR 196 is an universal gas measurement sensor, which is manufactured as a standard model or an explosion-protected version.

The explosions-protected version has been tested by the KEMA and conforms to the protection standards, Ex II 2 G Ex demb [ia] IIC T6.

In this design the gas transmitter GTR 196 complies with the following standards:

- EN 60079-00:2006 electrical equipment for explosive areas  
Part 00: general requirements
- EN 60079-01:2007 Potentially explosive atmosphere-  
Part 01: protection of the equipment using pressure-resistant enclosure "d"
- EN 60079-07:2007 Part 07: protection of the equipment via raised safety "e"
- EN 60079-11:2007 Part 11: protection of the equipment via intrinsic safety "i"
- EN 60079-18:2006 Part 18: construction, checking and marking of the electrical equipment with the type of protection encapsulation "m"
- EN 50104 electrical equipment for the detection and measurement of oxygene
- EN 61779-1, EN 61779-4 electrical equipment for the detection and measurement of combustible gases
- EN 45544-1, EN 45544-2 electrical equipment for the direct detection and direct concentration measurement of toxic gases and vapours.

The explosion-proof version is not available with LON-interface.

For detecting various gases, chemical test cells, sensors functioning on the principle of heat reaction and thermal conductivity, semiconductor and infrared sensors.

The signal from the sensor is amplified and fed to the evaluation electronics outside the Ex-area, using 3-wire techniques, via a 4-20 mA interface. The evaluation electronics processes the measured values and displays the concentration value and in addition, supervises all control and warning functions.

The gas transmitter GTR 196 is designed for the stationary gas detection. The installation should be in a clean, weather-protected and as possible vibration-free location.

Under no circumstances the normal version is allowed to be installed in an area that is classified as an EX-zone (zone 0, zone 1, zone 2).

Sensor elements of the type TGS or VQ can be poisoned by materials that contain silicon, sulphur and halogen as well as by metals like lead. Therefore the gas transmitter is not allowed to be used at the presence of these sensor poisons.

## **2. Construction**

A sensor consists of two-section housing, where the lower section contains the sensor element, together with the wall fixing points and connections for the test signal cable.

The upper section of the sensor, has a moveable front label, behind which are openings for adjusting the zero reference point and the measurement range, as well as test sockets. This provides easy access for calibration, without the need of opening the complete housing.

### 3. Commissioning

Test signal cable, fixed to the evaluation electronics

- e.g. 3 x 0.25 mm<sup>2</sup> for cable lengths up to 500 m  
 3 x 0.50 mm<sup>2</sup> for cable lengths up to 1 km  
 3 x 0.80 mm<sup>2</sup> for cable lengths up to 2 km  
 3 x 1.50 mm<sup>2</sup> for cable lengths up to 5 km

The lengths given, include forward and return lengths.

Screened measurement cables are preferred (3 x 0.5 mm<sup>2</sup>). In multi-core cables in one sheath (16 x 0.5 mm<sup>2</sup>), two cores must be available for the 24V supply voltage.

During commissioning, the system must be isolated from all voltage supplies.

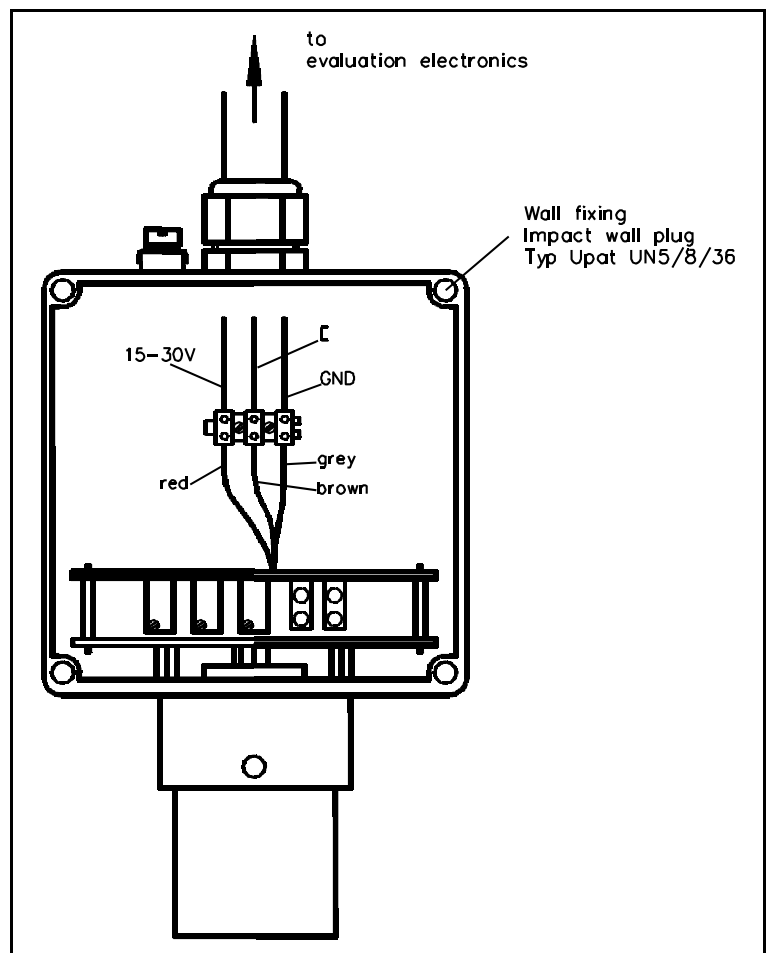
It is essential that the sequences given below are followed when connecting or disconnecting the GTR 196 to the evaluation system.

#### Connection:

1. GND (grey)
2. I (brown)
3. 15-30V (red)

#### Disconnection:

1. 15-30V (red)
2. I (brown)
3. GND (grey)



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#### Caution !

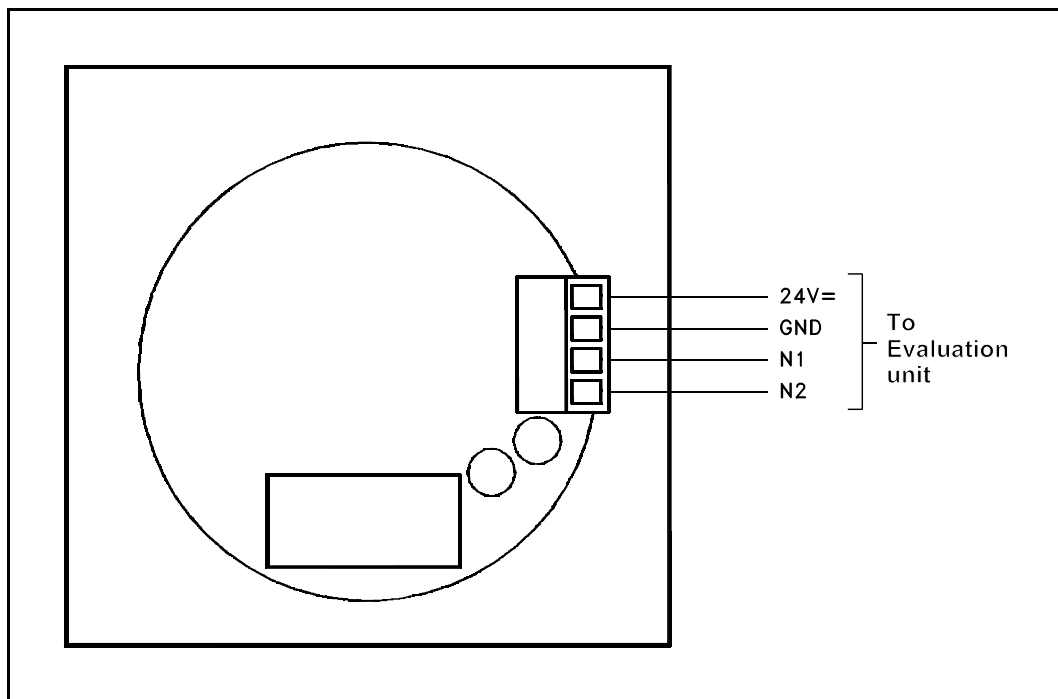
- When the sequences above are not followed exactly, the GTR 196 will be seriously damaged. Subsequent repair is not possible to an encapsulated unit (Ex-version).
- Using the explosion-proof version of the GTR 196, a cable fitting with EC-Type Examination Certificate and marking:  $\text{Ex}$  II 2G Ex e II has to be used. The cable fitting is contained within the scope of delivery.
- The terminal clamps have to be operated using a torque of 0,4 Nm

#### **4. Commissioning of LON<sup>®</sup> design**

The electronics are connected via a 4-wire measuring signal line (ST (Y) 2 x 2 x 0,8 mm<sup>2</sup> shielded) with the LON<sup>®</sup> -bus. Two wires provide the power supply, whereas the other ones are for the connection of the LON<sup>®</sup> -bus.

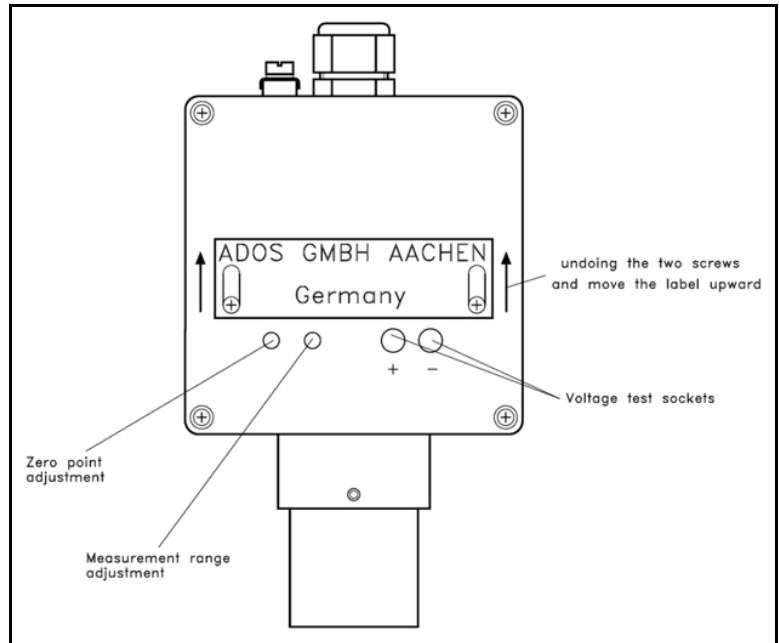
The sensors are installed one after another in a parallel way at one wiring string. Each single sensor can be identified using the appropriate ADOS hard- and software. The signal cable can be looped through the sensors or via branch lines from the central line to the sensors.

The shielding may only be connected with the grounding of the evaluation unit.  
A shielding is only effective in case of an one-way connection!



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**5. Calibration**



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The test instrument must be switched on at least two hours before commencing the with calibration of the gas sensors.

Reference gas is allways referring to the second gas component.

- e.g. H<sub>2</sub>S in air                      Referent gas (synthetic) air
- e.g. H<sub>2</sub> in N<sub>2</sub>                         Referent gas N<sub>2</sub>

A suitable test gas adapter must be used for applying the test gas to the measurement cell. This adapter must not cause any build-up of pressure in the calibration gas connection to the measurement cell, which would result in incorrect calibration.

The sequence given here, should be followed:  
Loosen the manufacturer's label and slide upwards, to give access to the calibration opening.

**NOTE**

The adjustment opening on the ADOS GTR 196 below the manufacturer's label, may be briefly opened for the purposes of test and calibration. After use, the label must be replaced and fixed in position to ensure safety within the housing.

In a potentially explosive area, any test equipment connected to the sockets must not exceed the loading values stated in the KEMA test report.

**C<sub>0</sub> = 35 nF;    L<sub>0</sub> = 50 mH**

**All voltages must be switched off, before opening the cover of the housing.**

Connect a voltmeter to the test sockets.

4 mA Sensor output signal corresponds to 0.204 V = 0 ppm H<sub>2</sub>S

20 mA Sensor output signal corresponds to 1.02 V = 50 ppm H<sub>2</sub>S

Example:      Test gas 45 ppm H<sub>2</sub>S  
 = {(1.02V - 0.204V) : 50 ppm x 45 ppm} + 0.204V = 0.938V

The test gas flow-through should be adjusted to 40 l/h.

Zero reference point adjustment:

1. Apply the reference gas via the test gas adapter connection, to the sensor
2. When the output signal of the sensor shows no further change, adjust the zero point potentiometer to 4mA (= 204mV) sensor output signal.

Measurement range adjustment:

1. Apply the test gas in synthetic air, via the test gas adapter connection, to the sensor.
2. When the output signal of the sensor shows no further change, adjust the measurement range potentiometer to match the sensor output signal to the range.

Replace the manufacturer's label and fix in its original position.

The calibration of the sensor should take place at least each six months.

## **6. Maintenance**

The following maintenance work is based on twice yearly checks which may only be completed by suitability qualified personnel.

The system operator has the opportunity to take out a maintenance contract with the manufacturer, ADOS GmbH, whereby an efficient service is ensured by the company's own customer service.

For reason of safety, the measurement sensor should be checked every 12 months by a specialist engineer.

Maintenance work can be divided into checking the transmitter ADOS GTR 196 and checking the evaluation electronics.

The calibration checks described in section 5 above, with reference and calibration gases, must be completed on all available sensors, since over a period of time, the sensors age and may lose their sensitivity.

### **NOTE**

**The adjustment opening on the ADOS GTR 196 below the manufacturer's label, may be briefly opened for the purposes of test and calibration. After use, the label must be replaced and fixed in position to ensure safety within the housing.**

**In a potentially explosive area, any test equipment connected to the sockets must not exceed the loading values stated in the KEMA test report.**

**$C_o = 35 \text{ nF}; \quad L_o = 50 \text{ mH}$**

**All voltages must be switched off, before opening the cover of the housing.**

After establishing that the sensitivity is insufficient, old gas sensors must be replaced by new sensors and re-calibrated.

After removing the safety screws, the pressure-proof housing can be unscrewed.

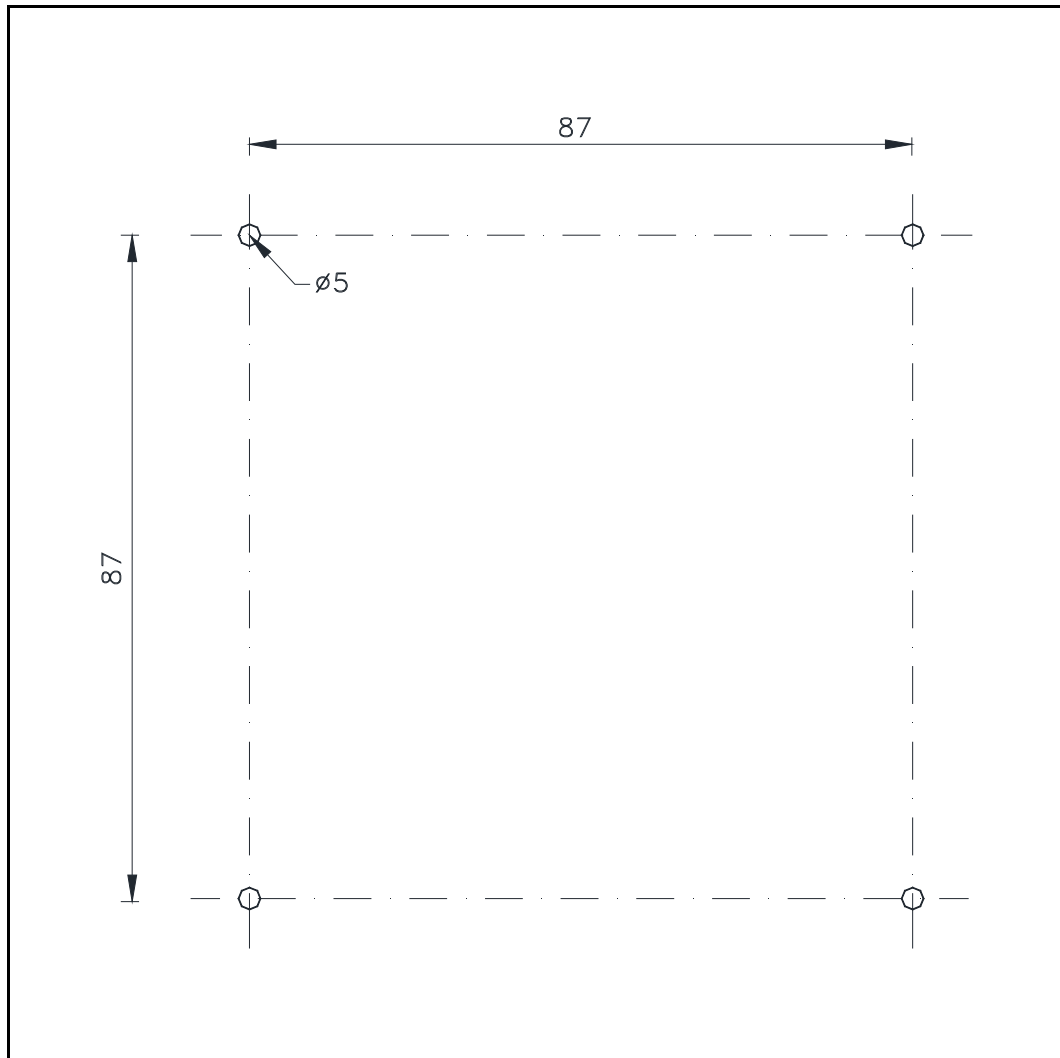
The removable front section contains a sinter-metal, which must be replaced by a new front section if there is an accumulation of dirt.

A clean sinter-metal is essential for the exact measurement and retention of the sensor reaction time,  $t_{90}$ .

### **NOTE**

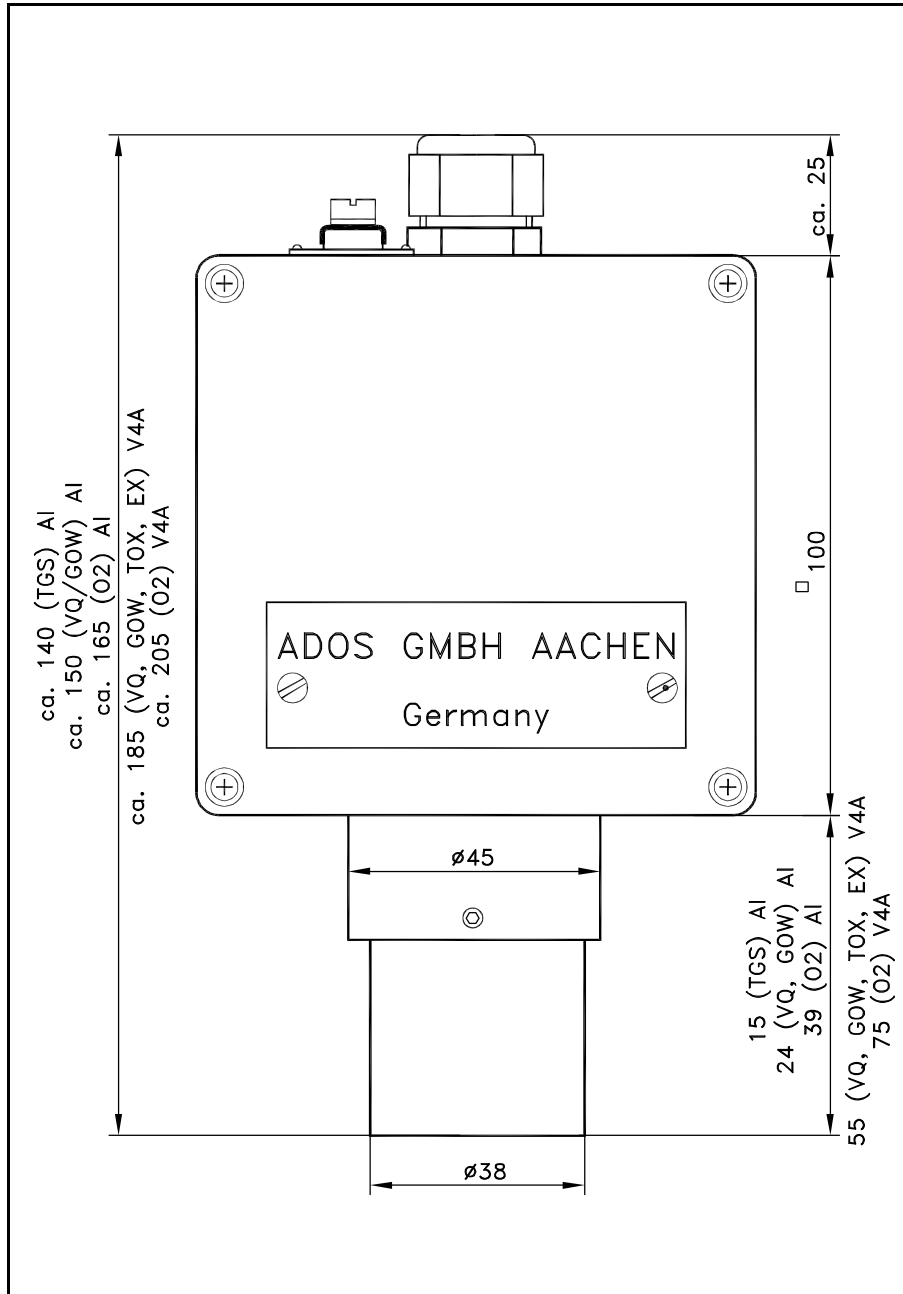
**In an Ex-area, replacing the capsule or the gas sensor may only be made when all supplies have been switched off and the sensor has been allowed to cool for at least 30 minutes.**

**Drilling Measurements**

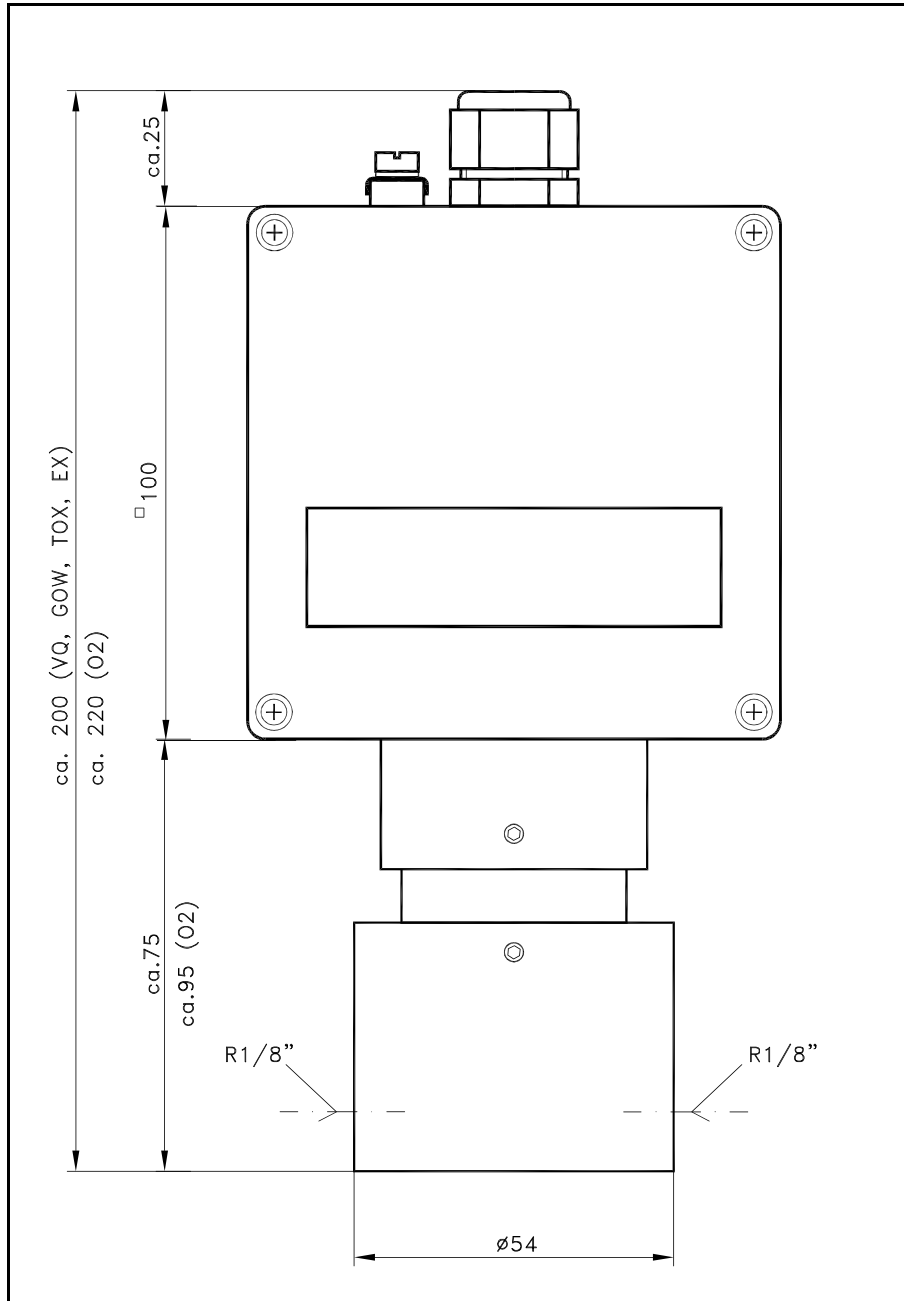


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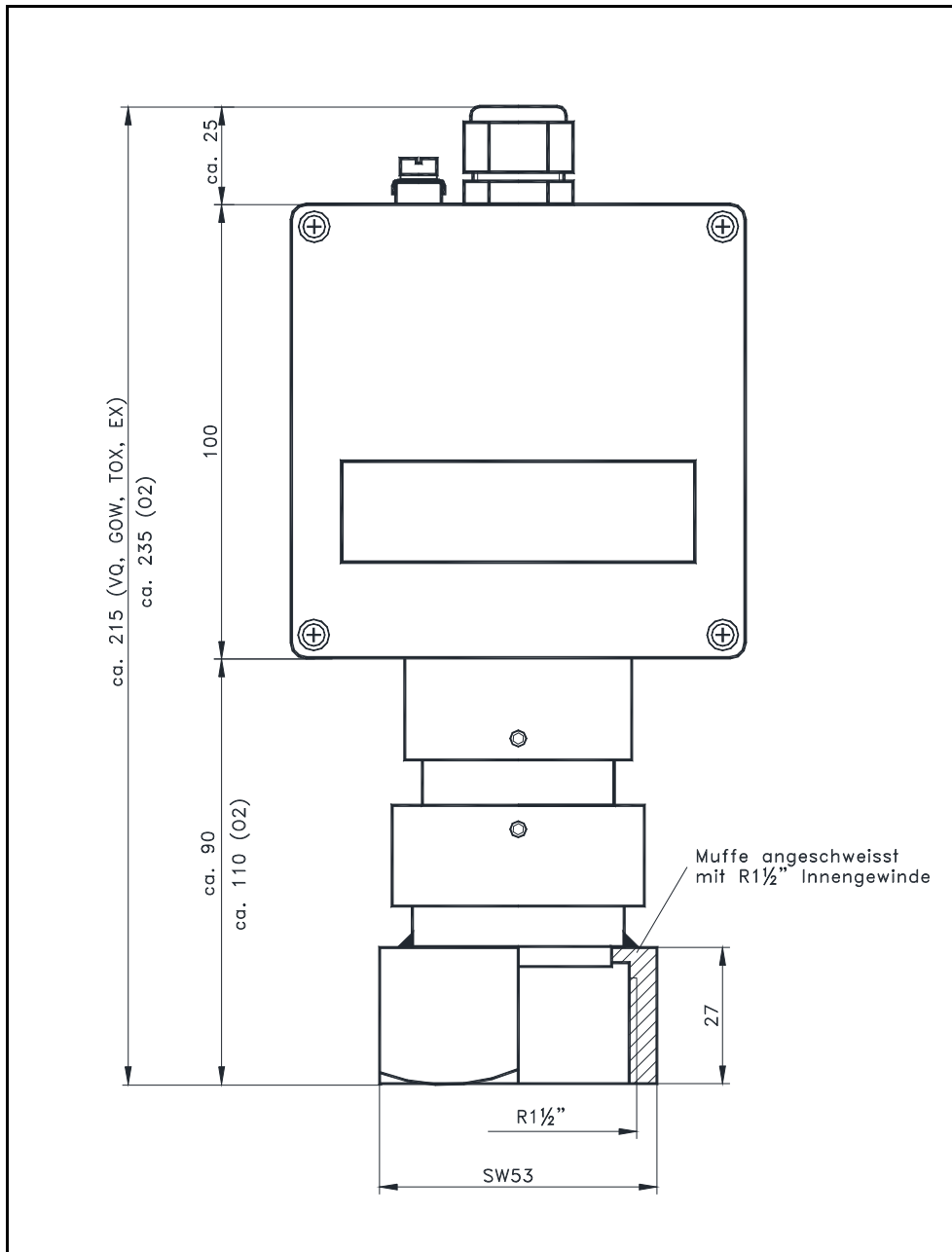




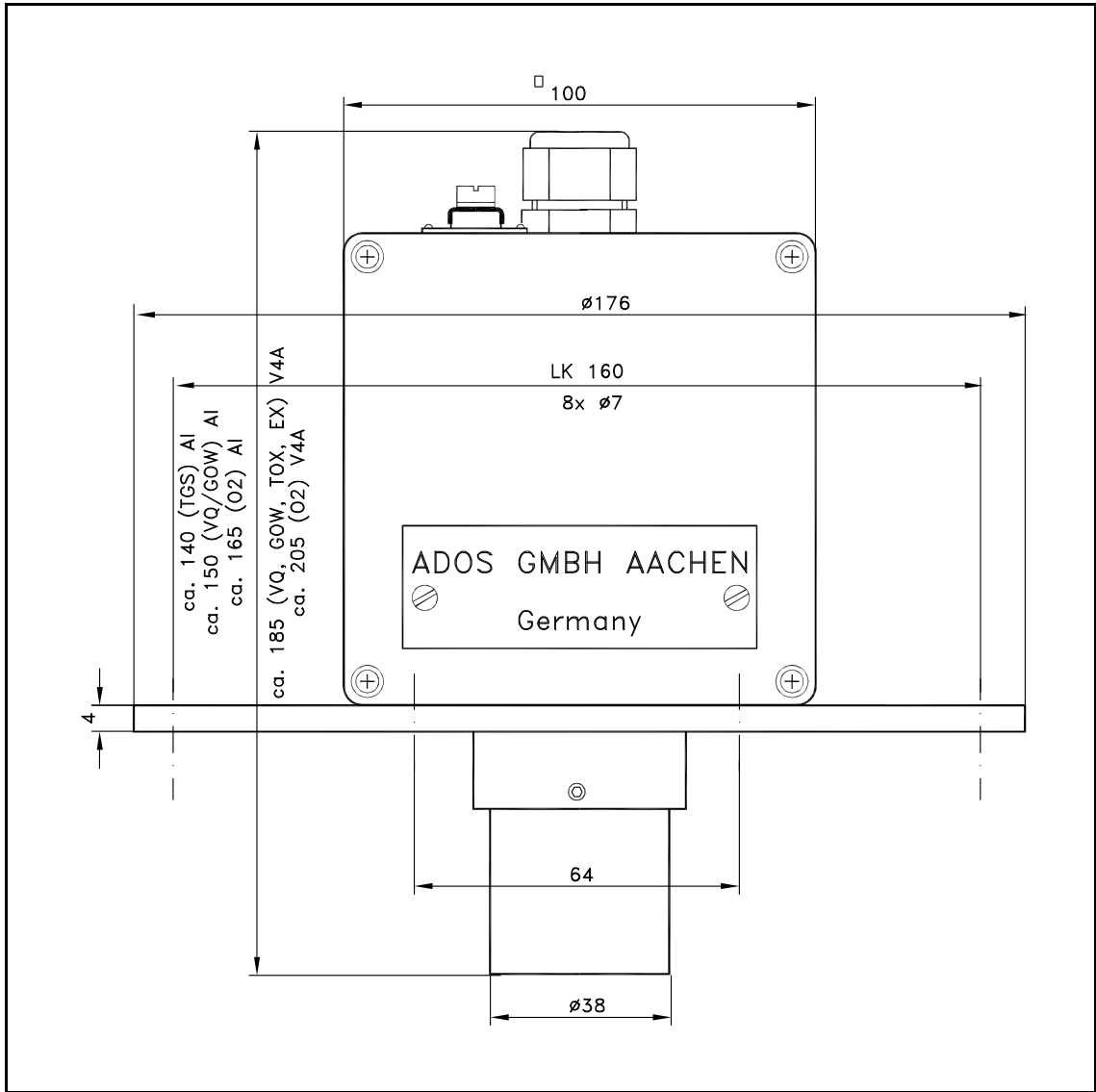
Dimension: GTR 196 (880-5252)



Dimensions: GTR 196 with flow adapter (880-5982/a)



Dimension: GTR 196with sensor brush R1 1/2" F (880-5982/1)



Dimension: GTR 196 with flange (880-5252/a)

**7. Technical Data**

<b>Type</b>	<b>TGS</b>	<b>VQ</b>	<b>GOW</b>
Meas. method	Semiconductor	Heat reaction	Therm. conductivity
Measurement range	ppm-ranges to 100 % LEL	ppm-range to 100 % LEL	from 0 - 5 Vol% to 0 -100 Vol%
Percentage error of f.s.d	±5%	±5%	±3%
Temperature range	-20°C to + 45°C	-20°C to + 45°C	-20°C to + 45°C
Temp. effect	5%	2%	2%
Settling time (t <sub>90</sub> )	approx. 20s	approx. 20s	approx. 40s
Effects of pressure (atm.)	1%	1%	1%
Install. position	Optional	Optional	Optional
Application	Poisonous, combustible and explosive gases in LEL range	Poisonous, combustible and explosive gases in LEL range	Gases with a significant thermal conductivity difference to air
Versions	Standard, Industrial and Ex-models	Standard, Industrial and Ex-models	Standard, Industrial an Ex-models
Durability of the sensor	No restrictions on gases that do not contaminate catalysers	No restrictions on gases that do not contaminate catalysers	No restrictions on gases that do not attack Aluminium, Rhenium-tungsten or Gold
Supply voltage	15 - 30 VDC	15 - 30 VDC	15 - 30 VDC
Interface	3-wire techniques 4-20 mA or LON <sup>®</sup> four-wire techniques, galvanically isolated, data transmission 78 kbps	3-wire techniques 4-20 mA or LON <sup>®</sup> four-wire techniques, galvanically isolated, data transmission 78 kbps	3-wire techniques 4-20 mA or LON <sup>®</sup> four-wire techniques, galvanically isolated, data transmission 78 kbps
Protection Ex-model	Ex II 2 G Ex demb [ia] IIC T6 KEMA 03 ATEX 2403 X	EX II 2 G Ex demb [ia] IIC T6 KEMA 03 ATEX 2403 X	Ex II 2 G Ex demb [ia] IIC T6 KEMA 03 ATEX 2403 X
Housing	IP 54	IP 54	IP 54
Dimensions (WxHxD) / mm	100 x 180 x 80	100 x 180 x 80	100 x 180 x 80
Weight	1.1 kg	1.1 kg	1.1 kg

Type	TOX	IR
Meas. method	electro-chemical reaction	Infrared
Measurement range	ppm-ranges to 0 -100 Vol%	0-100 % LEL CH <sub>4</sub> , C <sub>3</sub> H <sub>8</sub> 0-100 Vol. % CH <sub>4</sub> 0-1, 2, 3, 4, 5 Vol. % CO <sub>2</sub>
Percentage error of f.s.d	±3%	± 3 %
Temperature range	-20°C to + 45°C	-20°C to + 45°C
Temp. effect	2%	approx. 8 %
Settling time (t <sub>90</sub> )	< 60s	< 30s
Effects of pressure (atm.)	1%	1%
Install. position	Optional	Optional
Application	O <sub>2</sub> , CO, NH <sub>3</sub> , NO <sub>2</sub> , SO <sub>2</sub> , H <sub>2</sub> S a.o.	CH <sub>4</sub> (Vol. %; LEL) Propane (LEL) CO <sub>2</sub> (Vol. %)
Versions	Standard, Industrial and Ex-models	Industrial and Ex- models
Durability of the sensor	12 months to 5 years depending on the measuring cell	approx. 5 years
Supply voltage	15 - 30 VDC	15 - 30 VDC
Interface	3-wire techniques 4-20 mA or LON <sup>®</sup> four-wire techniques, galvanically isolated, data transmission 78 kbps	3-wire techniques 4-20 mA or LON <sup>®</sup> four-wire techniques, galvanically isolated, data transmission 78 kbps
Protection Ex-model	Ex II 2 G Ex demb [ia] IIC T6 KEMA 03 ATEX 2403 X	Ex II 2 G Ex demb [ia] IIC T6 KEMA 03 ATEX 2403 X
Housing	IP 54	IP 54
Dimensions (WxHxD) / mm	100 x 180 x 80	100 x 180 x 80
Weight	1.1 kg	1.1 kg