GfG Instrumentation

## Transmitter

# CS 21

# Operation Manual


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**Content**

## For your Safety

As with any piece of complex equipment, the GfG CS21 transmitter will do the job it is designed to do only if it is used and serviced in accordance with the manufacturer's instructions. Please protect yourself and your employees by following the instructions in this manual. All individuals who have or will have the responsibility for using and servicing this product must carefully read this manual. The warranties made by GfG with respect to the product are voided if functions or parameters are changed without the permission of GfG. They are also voided if the product is not used and serviced in accordance with the instructions in this manual. Failures or false alarms caused by interfering gases or electrical signals are not part of the warranty obligation. The above does not alter any statements by GfG regarding warranties, conditions of sale and/or delivery.

## General Description

A fixed gas monitoring system consists of a transmitter and a control module, which are connected by means of a transmitter cable. The transmitter converts the gas concentration into an electrical signal, which is sent to the control module for evaluation.

**Fixed Gas Monitoring System**

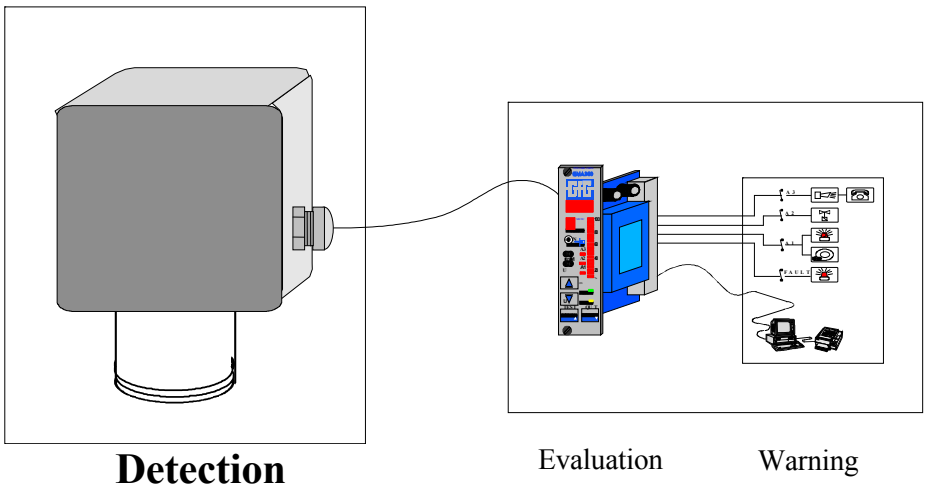



**Fig. 1**

The CS21 is an "intelligent" transmitter. Its comprehensive electronic circuitry allows easy handling and servicing and increases the measurement reliability and accuracy. The CS21 is characterized by following features:

- Easy calibration at site.
- Long sensor life.

## Detection Principle

The CS21 is operated on the chemosorption principle. The basic element is a sensor, which is different depending on the application and the gas to be monitored. As long as there is no gas in the ambient air, the internal resistance of the sensor is rather high. As soon as gas is adsorbed at the sensor surface, the internal resistance is reduced. The change in resistance is the measure for the gas concentration and is converted to a standardized current signal (0.2 .. 1 mA or 4 .. 20 mA) by the integrated electronic circuit. The chemosorption principle has proven long-term stability.

## Operation

The CS21 passes function and performance tests before shipment and is calibrated with suitable test gases. **This does not preempt the user's obligation to perform a function test after putting the transmitter in operation.**

## Design

The design of the CS21 is shown in Fig. 2. The sensor is mounted in the sensor support (pos. 5). Gas enters the sensor chamber through the diffusion inlet (pos. 6). The casing (pos. 2) includes a resin encapsulated p.c. board with electronic components. The electronics convert the measurement signal into the output of 0.2 .. 1 mA or 4 .. 20 mA, which is transferred to the controller by a cable.

**CS21 – Design**

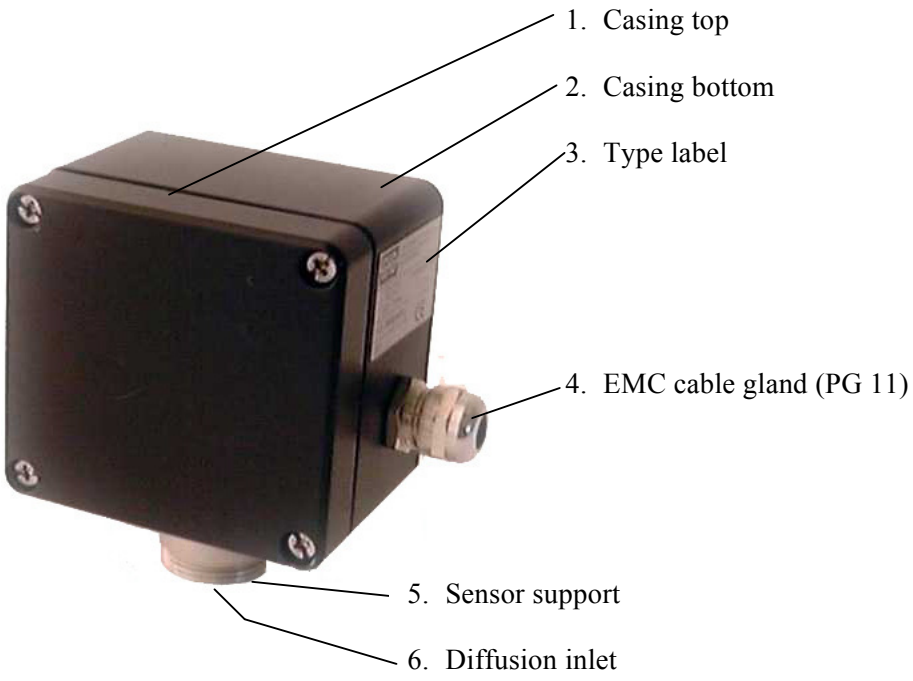



**Fig. 2**

**CS21 Schematic**

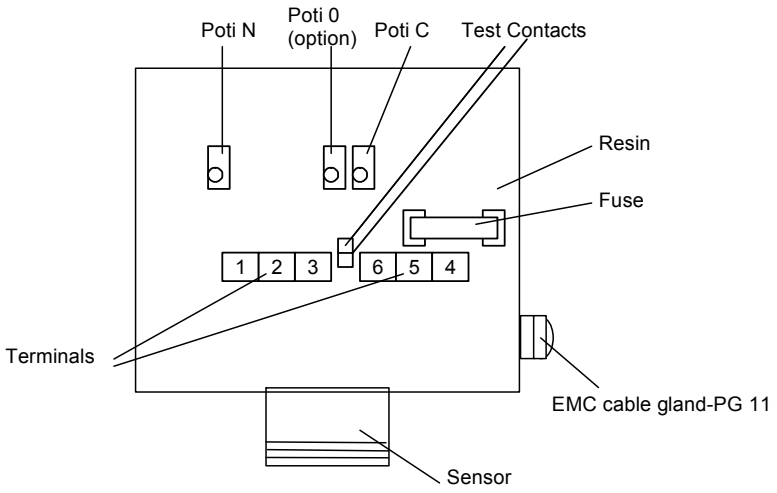



**Fig. 3**

## Mounting

It is essential to ambient conditions before deciding on the mounting position. To achieve representative measurement results, check the:

- the **room ventilation and**
- the **gas density,**
- the **danger highlights**.

Install the CS21 in a place where the gases will pass the sensor even in case of bad ventilation. If necessary, use a smoke cartridge to check air flow.

Take the following into consideration as well:

- **Ambient temperature,**
- **Rain, hose water, dripping water, condensate and**
- **Dust in the atmosphere**
- **Other possible contaminants**

The CS21 is to protected to a great extent against water and dust (IP 54). Special accessories are available to provide additional protection for very harsh conditions. Please contact GfG for detailed information.

The warranty may be voided, if the transmitter is exposed to ambient conditions that were unknown to GfG during planning, production or delivery.

When deciding on the transmitter position, make sure it is always accessible for service and maintenance. Mounting the CS 21 with the sensor facing the floor is recommended. A different mounting position, however, does not affect the sensor accuracy.

For connecting the CS 21 refer to the connection diagram (also refer to the terminal diagram of your GMA controller). To mount the transmitter, remove the four lock screws and lift the casing top off. Attach the casing by putting two screws through the appropriate borings. The optional potentiometer **N** is factory-set and **MUST NOT** be turned.

**The CS21 is not certified for use in hazardous areas.**

## Electrical Connections

An electrician following the applicable regulations should install cable and electrical connections. A shielded 18/3 cable should be used (Belden #8770 or equivalent) for distances less than 500 yards.

**Connections**

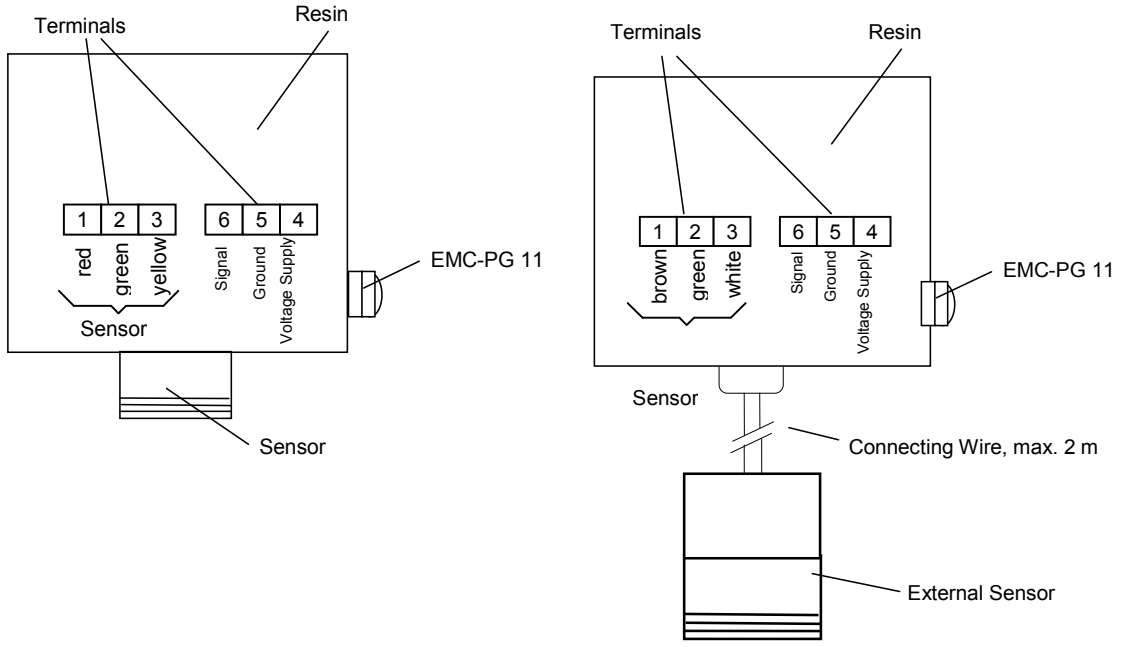
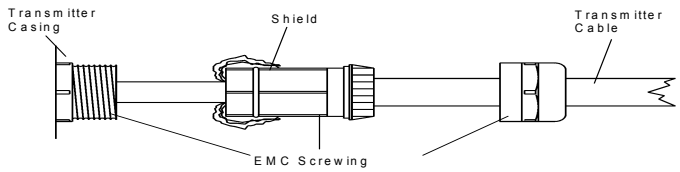



**Fig. 4**

The supply voltage for the transmitter (terminal 4) is 10 .. 30 V DC.

Once the installation is completed, close the casing top and fix it with the screws.

Note: Shielding is done over the EMC cable screwing.




The shield is to be connected to the transmitter casing by means of the cable screwing. Fix the shield as shown in above sketch.

**Fig. 5**

## Start-up

Once the CS 21 is installed, the user can put it into operation. Before shipment, the CS 21 is calibrated and tested after a specific warm-up time. When connecting the transmitter to a controller (power supply) you should allow approximately 60 minutes to warm-up the chemosorption sensor before checking the sensitivity. Should you notice that a re-calibration is required, allow an extended warm up period of about 4 hours.

The CS 21 is calibrated and tested before shipment. Certain deviations, however, are possible due to transport, mounting, and ambient conditions. Inside the CS 21 there are two test contacts to check the electrical output signal (fig. 3). The voltage at the test contacts can be measured with a voltmeter.
Warm-up time is approximately 60 minutes.

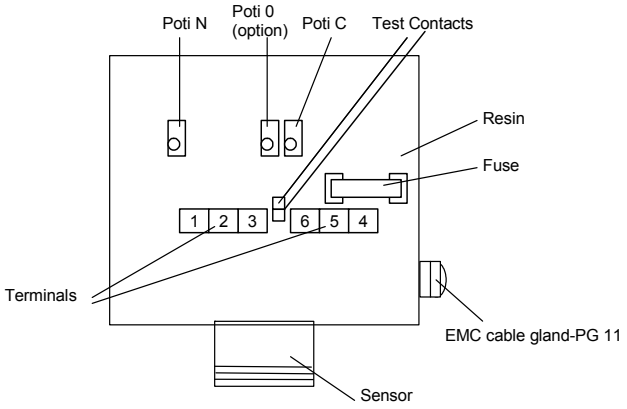
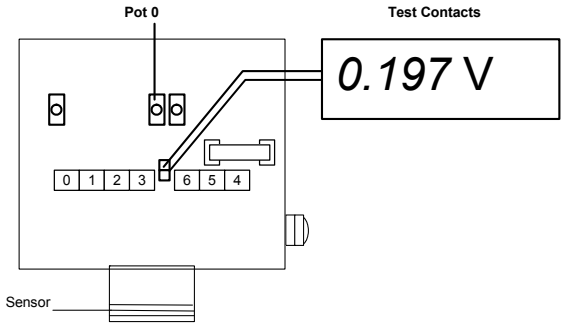



**Figure 3**

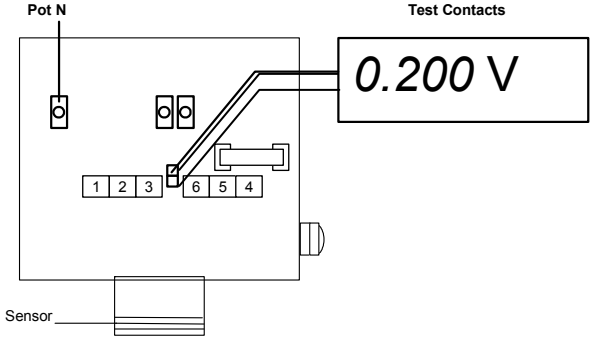
## Check of Electrical Zero Point

1) Use a multimeter to check the output signal by measuring the voltage at the test contacts.
2) The reading should be approximately 0.197 V.
3) If there is a deviation from this range it is possible to adjust the value by turning pot **0**.

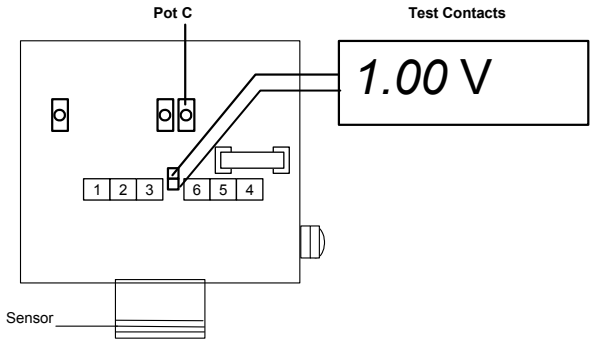



## Check Dead Band (Should not be adjusted without GfG Authorization)

Contact GfG for instructions.
Engineered Fixed Systems 734-761-5987



## Check Sensitivity (Calibration) / Bump Test




1) Use a multimeter to check the output signal by measuring the voltage at the test contacts.
2) Attach the calibration adapter to the diffusion inlet of the transmitter. Moisten and wring out the humidifier sponge, install the sponge in the humidifier and attach to the calibration adapter.
3) Select a suitable test gas, taking into consideration which gas has been used for initial calibration (found on the test report). Gas concentration should be at least 20% above the second alarm threshold (for bump testing).
4) The reading should be in the 10% range for 4 .. 20 mA interface.
5) In case of a deviation you can correct the value by turning potentiometer **C**.

When using a GMA controller, signal checks and adjustments should be done at the GMA (please refer to the GMA manual).

Do not use a test gas with a balance of nitrogen

You must use an inline humidifier, and a ½ l/min. valve with test gas.

For measurement accuracy it is important to use the end range gas to calibrate the CS 21.

Adhere to the following procedure for checking the sensitivity:

Suppress alarm transmission.

Put calibration adapter on transmitter.

Supply test gas to CS21 without pressure and with a flow rate of approx. 0.5 l/min.

Within about 2-5 minutes a voltage corresponding to the gas concentration can be measured at the test contacts.
Alternatively the calibration can be checked at the GMA controller.

Is the measured value equivalent to the calibration curve?

yes / no — Re-adjust calibration by turning potentiometer **C**.
Alternatively: Re-adjust calibration point at GMA controller. Please refer to the operation manual of your GMA controller.

Disconnect test gas and calibration adapter.

Disconnect alarm suppression.

## Service

Service includes maintenance, inspection, and repair of gas warning equipment and function tests of the equipment.

A function test checks the:
- Zero point and sensitivity (calibration)
- Alarm with gas concentration
- Response time
- Gas sampling and gas processing system (if any)
- Alarm signal activation
- Failure alarm

The function check should be done before putting the system into operation, and it should be repeated at least once a year.
For service, please contact:

Phone: (734) 761-5987
Fax: (734) 769-1888
E-mail: info@gfg-inc.com
Website: www.gfg-inc.com

## Maintenance and Inspection

With maintenance and inspection you can ensure the proper working status of the gas detection system. The CS 21 does not require special maintenance. Depending on the ambient conditions, gas detection systems may change their behavior. Therefore, it is important to perform a visual check every day, particularly during the first few days after starting up the device:
- Check gas processing system and filters (if any).
- Check gas supply for blockage (for correct measurement the gas supply to the sensor must not be blocked).
- Sensors are subject to ageing and exhausting. Depending on their type and on their exposure to gas they can be used up. A sensitivity check can only be done with a suitable test gas after certain periods of time. The sensitivity calibration is an expert calibration and is usually performed by GfG service or by authorized technicians.

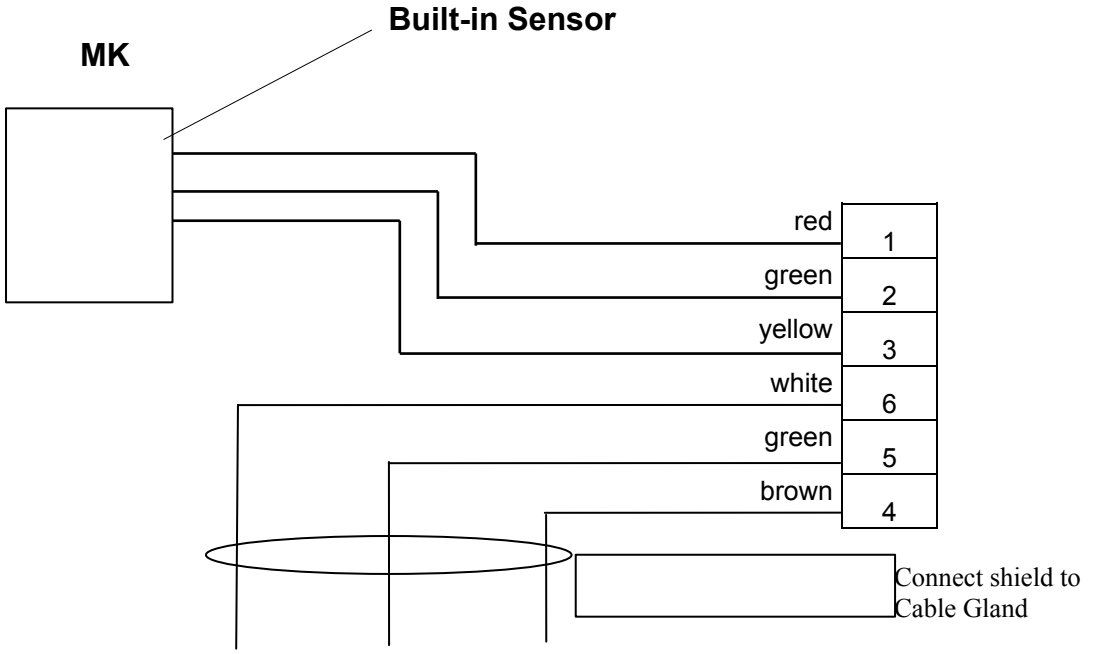
## Trouble Shooting

| Failure | Reason | Solution |
|---|---|---|
| Zero point cannot be adjusted | Faulty sensor | Replace sensor |
| Full scale value cannot be set | Faulty sensor | Replace sensor |
| Output current has fallen to 0 mA | Defective fuse<br>Faulty sensor<br>Cable cut | Replace fuse<br>Replace sensor<br>Re-fix connection |

## Accessories

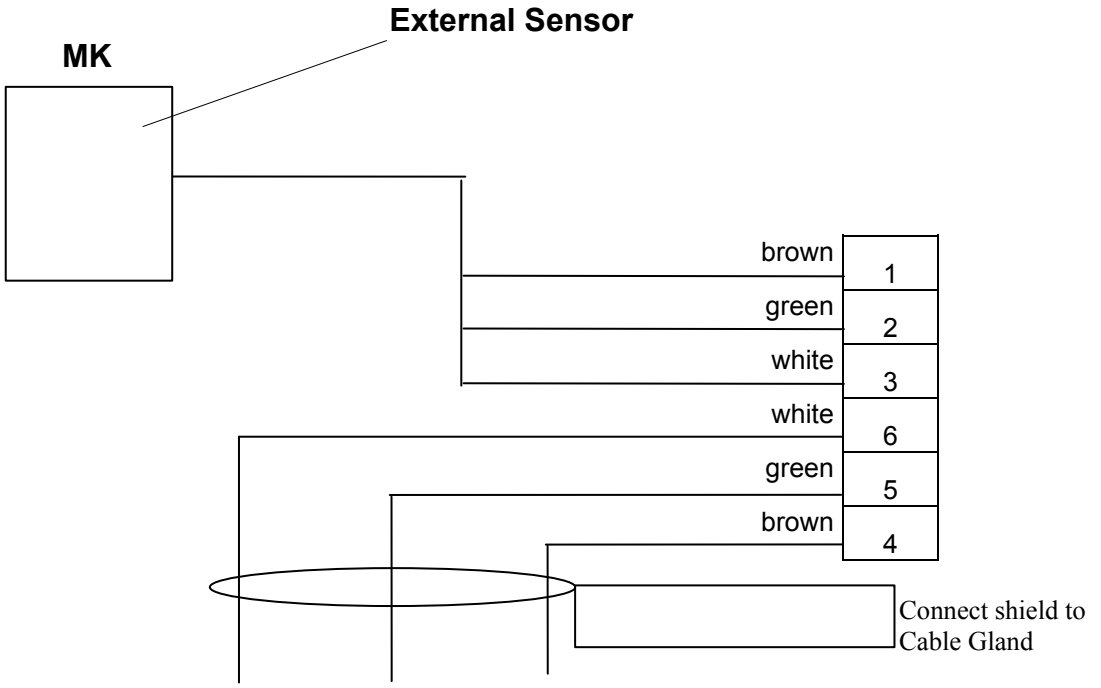
| | Part No. |
|---|---|
| Screw-on calibration adapter | 2000209 |

## Connection Diagram CS21 / Built-in Sensor




| | Signal | GND | 20V / 24V | |
|---|---|---|---|---|
| GMA 300 | 2 | 1 | 5 | |
| GMA 011 | 2 | 1 | 5 | |
| GMA 100 | 2 | 1 | 5 | Motherboard from 1997 (blue) |
| GMA 100 | 2 | 0 | 3 | Motherboard until 1996 (no color) |
| GMA101 | 2 | 1 | 5 | |
| GMA41 | 30 | 29 | 28 | |
| GMA81 (A) | 3 | 2 | 1 | |

## Connection Diagram CS21 / External Sensor

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| GMA81 (A) | 3 | 2 | 1 | |

## Technical Data

| | |
|---|---|
| **Transmitter CS21** | |
| Type: | CS21 |
| Sensor Type (MK): | See test report |
| Gas: | See test report |
| Range: | See test report |
| Gas Supply: | Diffusion |
| Detection Principle: | Chemosorption (CS) |
| Supply Voltage: | 10 .. 30 V DC |
| Output Current: | 0.2 .. 1mA (4kΩ) or 4 ..20mA (200Ω) |
| Response Time $t_A$: | < 14 s (depending on gas) |
| Typical Sensor Life: | > 5 years |
| Climate Conditions | |
| Operational Temperature: | - 30 .. + 55 °C |
| Humidity: | 20 .. 96 % r. h., non condensing |
| Atm. Pressure: | 920 .. 1100 hPa |
| Casing | |
| Material: | Aluminum |
| Protection: | IP 54 |
| Cable Gland: | PG 11 screwing, max. cross section 3 x 1.5 $mm^2$ |
| Transmitter Cable: | Shielded cable - #18/3 shielded or Belden 8770 equal |
| Dimensions: | 100 x 100 x 57 mm (WxHxD) |
| Weight: | approx. 370 g |

GfG Instrumentation

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