GfG Instrumentation

Worldwide Manufacturer of Gas Detection Solutions

ZD 21

Operations Manual



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For your safety

As any piece of complex equipment, the GfG transmitter ZD21 will do the job 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 them. This manual must be carefully read by all individuals who have or will have the responsibility for using and servicing this product. The warranties made by GfG with respect to the product are voided, if the adjustment of functions or parameters is changed without GfG permission. 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 statements regarding GfG warranties and conditions of sale and delivery.

General description

A fixed gas monitoring system consists of the transmitter (MWG) and a controller (GMA), which are connected by means of cable. The transmitter converts the unit for the gas concentration into an electrical signal and transmits it over the cable to the controller.

Fixed Gas Detection System

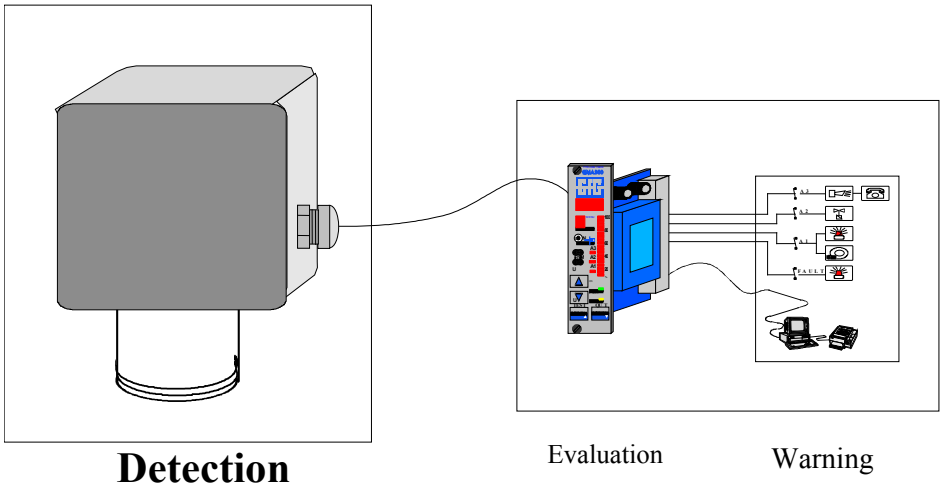


Fig. 1

The ZD21 is an "intelligent" transmitter. The comprehensive electronics allows easy operation and maintenance and also increases the operational safety and accuracy. The ZD21 is characterized by the following features:

- Easy calibration at site.
- Compensation of temperature effects.
- Long sensor life.

Detection principle

The ZD21 contains an amperometric oxygen sensor, which is based on an electrochemical oxygen pump cell made from zirconia. Once a voltage is connected to the cell, oxygen ions are pumped from the cathode to the anode. Since the cathode is covered by a gas diffusion barrier, increasing voltage results in a saturation current, which is the measure for the oxygen concentration in the ambient air. Using this principle of detection yields good selectivity and results in long-term stability of the sensor.

Operational notes

Before shipment, the ZD21 passes a function and display test, being calibrated with suitable test gases. **This does not, however, overrule the obligation to arrange for another function test after putting the transmitter in operation.**

Design

The design of the ZD21 is shown in fig. 2. The sensor is mounted in the sensor support (pos. 5). The 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 supplied to the controller by means of cable.

ZD21 – Design

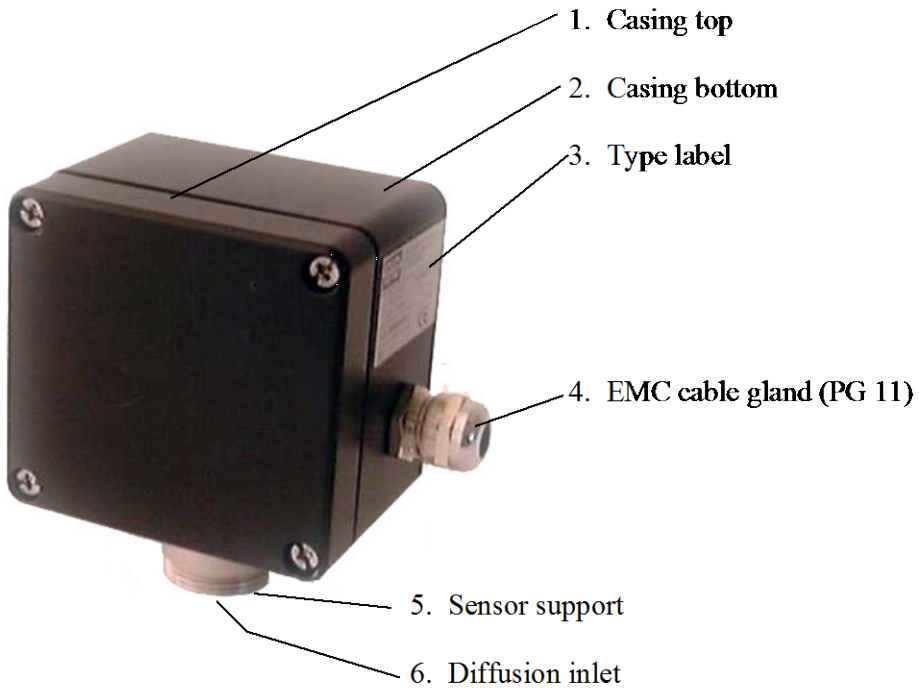


Fig. 2

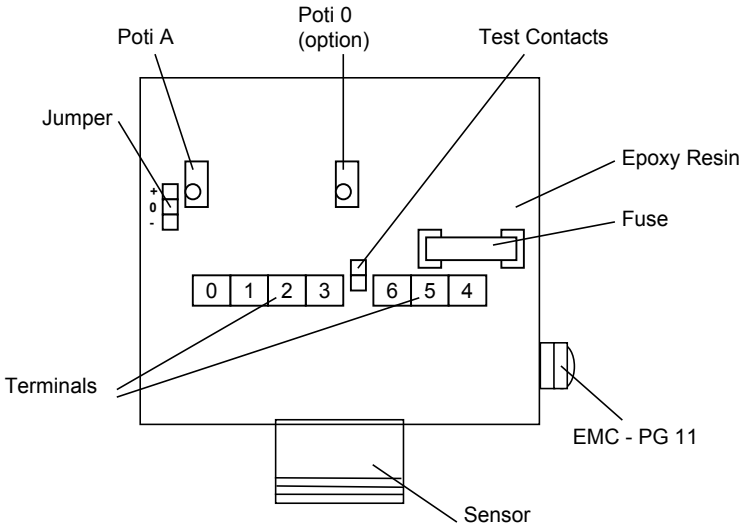


Fig. 3 / Schematic

Mounting Position

It is essential to exactly know the ambient conditions, which have to be taken into consideration before deciding on the mounting position. To achieve representative measurement results, take care of

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

Install the ZD21 at a place where the gases pass the sensor even in case of bad ventilation. If necessary, use a smoke cartridge to check.

Furthermore, take the following into consideration as well:

- **Ambient temperature,**
- **Rain water, hose water, dripping water, condensation** and
- **Dust** in the atmosphere.

The ZD21 is to a great extent protected against the entering of water and dust (IP 54). Special accessories are available to provide additional protection for very difficult conditions. Please contact GfG for detailed information.

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

When deciding on the position for the transmitter, make sure that it is always accessible for service and maintenance. It is recommended to mount the ZD21 with the sensor facing down to the floor. A different mounting position, however, does not affect the sensor accuracy.

Mounting

For connecting the ZD21 refer to the connection diagram (also refer to the terminal diagram of your GMA controller). For mounting the transmitter remove the four lock screws and lift the casing top off. Fix the casing by means of two screws through the relevant borings. The printed circuit board with electronic components inside the casing is potted in epoxy resin.



The ZD 21 comes equipped with a protective cap on the sensor. Do not remove this cap until immediately prior to applying power to the transmitter.

The protective cap must be reinstalled whenever power is not applied to the ZD 21.



In order for the ZD 21 to properly detect O_2, the protective cap must be removed.

Once the ZD 21 is properly installed and under power it has a heater that helps to keep the sensor clear from most contaminates in the environment.



If maintenance is being performed in the area, the protective cap must be used.

Failure to follow these instructions may cause damage to the sensor and will void the warranty.



The ZD21 is not certified for use in hazardous areas

Installation of Electrical Connections

Procurement of cable and electrical connections must be done by a specialist only, obeying the applicable regulations. A shielded 3-core cable has to be used (e.g. LIYCY 3 x 1.5 mm^2). The cross section of the cable depends on the cable length. For short distances (max. 200 m) it may be sufficient to use 0.75 mm^2 instead of 1.5 mm^2.

Note: Shielding is effected over the EMC cable screwing.

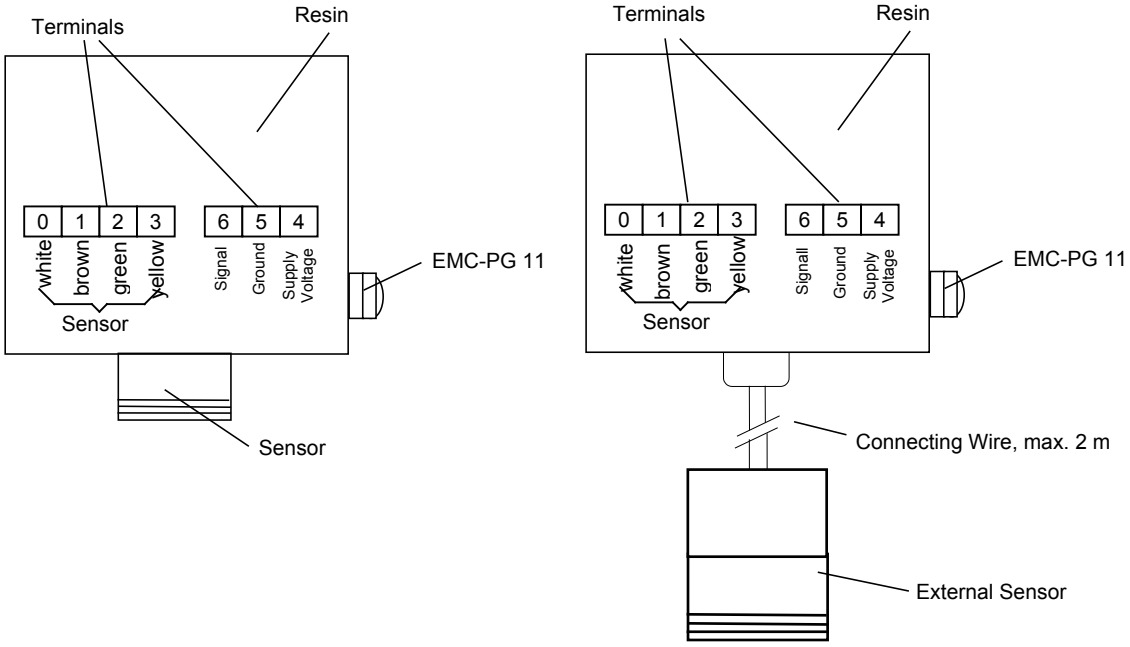


Fig. 4

The supply voltage for the transmitter (terminal 4) is 10…32 V DC.

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

Putting into Operation

Once the ZD21 is installed, a skilled person can put it into operation. Before shipment, the ZD21 has been calibrated and tested after a specific warm-up time for several days. When connecting to a controller (power supply), allow approx. 15 - 30 minutes to warm-up the transmitter before checking the sensitivity. **In case you replace the sensor, adjust the jumper of the transmitter according to the specification on the new sensor.**

Check of Electrical Zero point

The ZD21 is calibrated and tested before shipment. Certain deviations, however, are possible due to transport, mounting and ambient conditions.

Inside the ZD21 there are two test contacts (fig. 3) to check the electrical output signal. The voltage at the test contacts can be measured by means of a multimeter.

After the warm-up time of approx. 30 minutes, the signal must be approx. 200mV for zero gas *. This corresponds to an output current of 0.2 mA (0.2 .. 1 mA interface) respectively 4 mA (4 .. 20 mA interface).

In case of deviation you can correct the value by turning potentiometer **O**.

Alternatively, for example when using a GMA controller, you can check the zero point signal at the controller. After the warm-up time of approx. 30 minutes, you can read the zero point voltage at the controller resp. check with a voltmeter (please read the operation manual of your GMA controller).

Check of Sensitivity

To check the sensitivity of the ZD21 fix a calibration adapter to the diffusion inlet of the transmitter. Then select a suitable test gas, taking into consideration, which gas has been used for initial calibration of the transmitter. You can see this information and the basic adjustment from the test report.

Use a multimeter to check the output signal by measuring the voltage at the test contacts. The voltage is proportional to the output current. 200mV correspond to an output current of 0.2 mA (0.2 .. 1 mA interface) resp. 4 mA (4 .. 20 mA interface). 1000mV correspond to an output current of 1 mA (0.2 .. 1 mA interface) resp. 20 mA (4 .. 20 mA interface).

In case of deviation you can correct the value by turning potentiometer **A**.

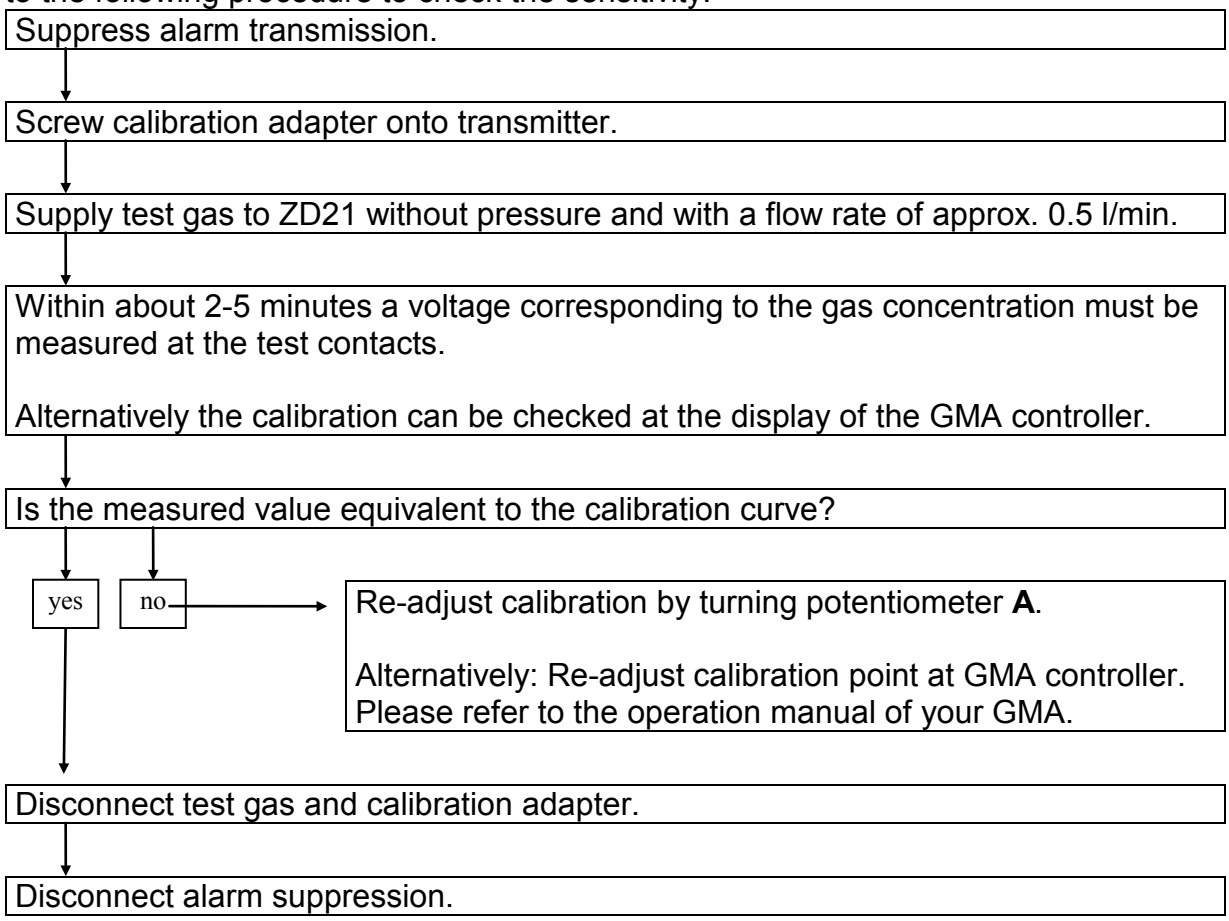
Alternatively, for example when using a GMA controller, you can check the transmitter signal at the GMA. After the warm-up time of approx. 30 minutes you can read the signal voltage at the controller or check it with a voltmeter (please read the operation manual of your GMA). Should you notice a deviation, you can correct it at the GMA.

* 100 Vol.-% N_2

For measurement accuracy it is important to set the calibration point for the second alarm threshold accurately.

When using dry test gas a slower response time of the sensor has to be taken into account.

Adhere to the following procedure to check the sensitivity:



Service

According to the German "Regulation for Explosion Protection", "UVV-Gase" and DIN 31051, service stands for maintenance, inspection and repair of gas warning equipment. Regulation T023 of "BG Chemie" describes the relating measures, among others requesting a regular function check.
This function check means:

- Check with alarm gas concentration
- Check of zero point and sensitivity (calibration)
- Check of response time
- Check of gas sampling and gas processing system (if any)
- Check of alarm signal activation
- Check of failure alarm

The check must be done by an expert, who has to report the result in written form. Generally the function check intervals should not exceed 16 weeks. The function check shall be done before putting the system into operation, and it should be repeated at least once a year.

Service Address

For additional questions on the product or in case of failure and problems please contact:

GfG Instrumentation, Inc.
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Suite 20
Ann Arbor, Mi. 48108
Phone: 734-769-0573
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Web: www.gfg-inc.com

Maintenance and Inspection

With maintenance and inspection the proper and planned status of the gas detection system is controlled. The ZD21 does not require special maintenance, nevertheless a few points should be obeyed.
Depending on the ambient conditions, gas detection systems may show a different behaviour. Therefore, it is important to perform a visual check every day, particularly during the first few days after putting into operation.

- Check of pump assembly and gas processing system (if any).
- Check of gas supply for soiling (for correct measurement the gas supply to the sensor must not be blocked).
- Sensors are subject to ageing and exhausting processes. Depending on their type and on their exposure to gas they are more or less used. 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 persons.

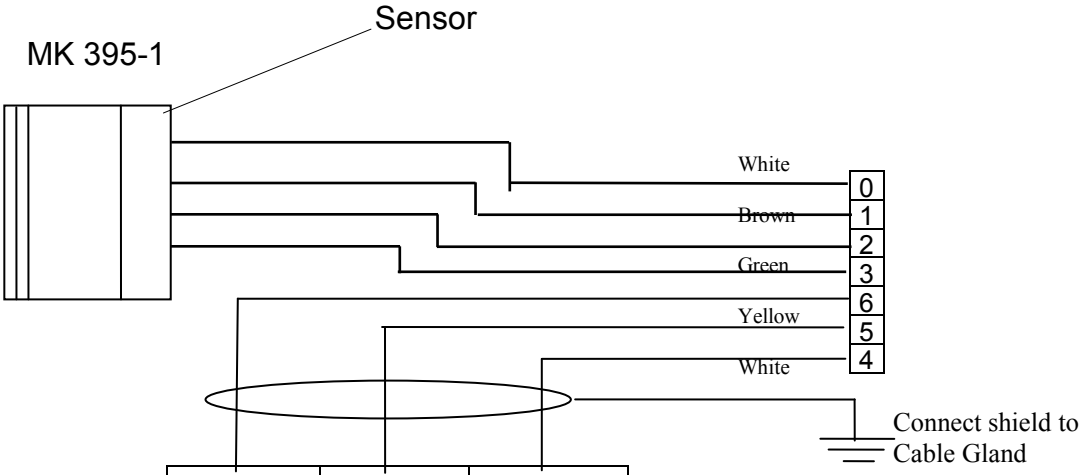
Trouble Shooting

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 Defective electronics Cable cut	Replace fuse Replace pc board Check connection

Accessories

	Part No.
Calibration Adapter	2000209

Connection Diagram ZD21

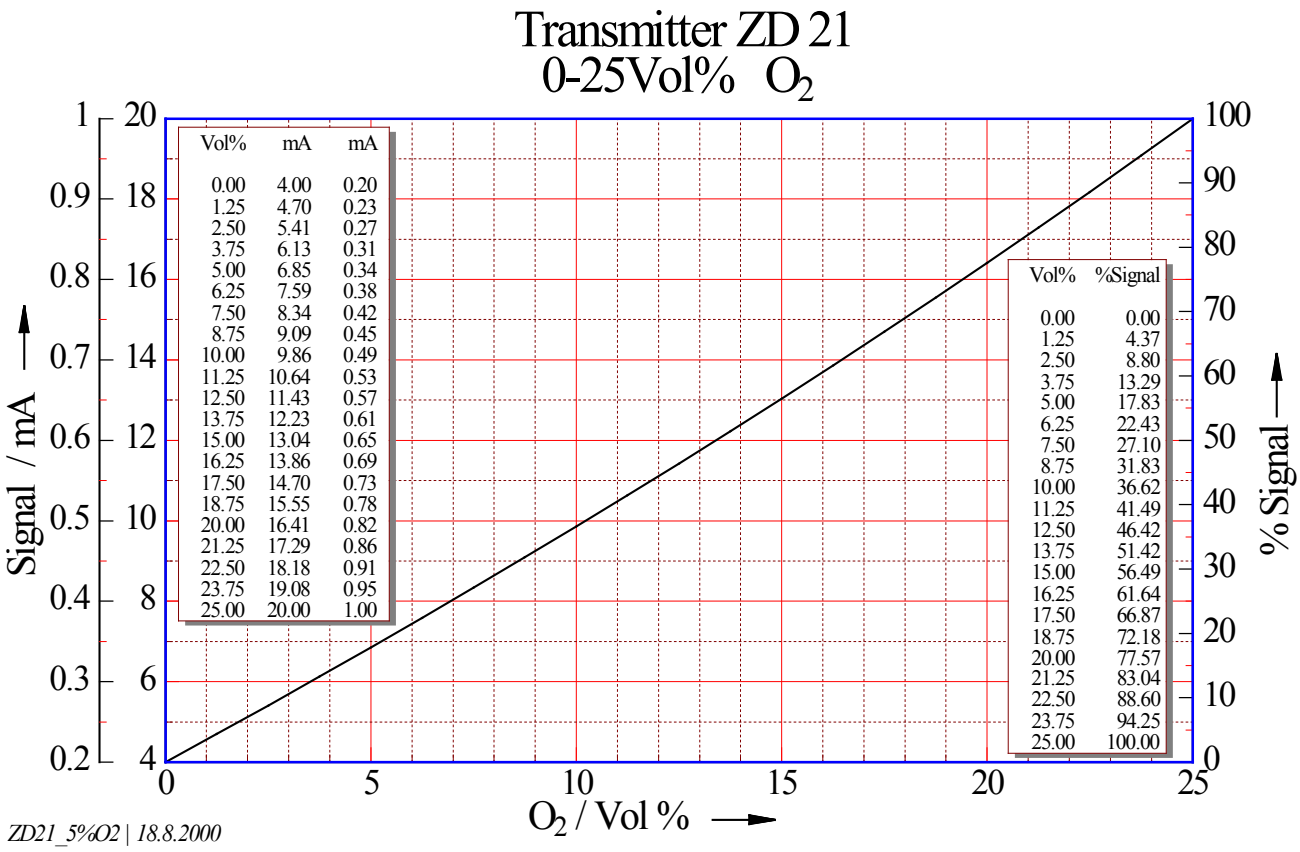


	4-20 mA	GND	20V / 24V	
GMA300	2	1	5	
GMA011	2	1	5	
GMA100	2	1	5	with motherboard from 1997 (blue)
GMA100	2	0	3	with motherboard until 1996 (no color)
GMA101	2	1	5	
GMA41	30	29	28	
GMA81 (A)	3	2	1	

Technical Data

Transmitter ZD21	
Type:	ZD21
Sensor Type:	MK 395-1
Gas:	Oxygen, O_2
Standard range:	25 Vol.-%
Gas Supply:	Diffusion
Detection Principle:	Zirconia (ZD)
Supply Voltage:	10 ... 32 V DC
Output Current:	0.2 ... 1mA (4kΩ) or 4 ...20mA (200Ω)
Response Time t_A:	< 2 s
Typical Sensor Life:	> 5 years
Climate Conditions	
Temperature:	-25 ... +50 °C
Humidity:	0 … 99 % r. h., non condensing
Pressure:	920 ... 1100 hPa
Casing	
Material:	Aluminum
Protection:	IP 54
Cable Gland:	PG 11 screwing, for cable size up to 3 x 1.5 mm^2
Transmitter Cable:	3 core shielded cable e.g. LiYCY 3 x 1.5 mm^2
Dimensions:	100 x 100 x 57 mm (WxHxD)
Weight:	approx. 370 g

Characteristic Curve



Vol%	mA	mA
0.00	4.00	0.20
1.25	4.70	0.23
2.50	5.41	0.27
3.75	6.13	0.31
5.00	6.85	0.34
6.25	7.59	0.38
7.50	8.34	0.42
8.75	9.09	0.45
10.00	9.86	0.49
11.25	10.64	0.53
12.50	11.43	0.57
13.75	12.23	0.61
15.00	13.04	0.65
16.25	13.86	0.69
17.50	14.70	0.73
18.75	15.55	0.78
20.00	16.41	0.82
21.25	17.29	0.86
22.50	18.18	0.91
23.75	19.08	0.95
25.00	20.00	1.00

Vol%	%Signal
0.00	0.00
1.25	4.37
2.50	8.80
3.75	13.29
5.00	17.83
6.25	22.43
7.50	27.10
8.75	31.83
10.00	36.62
11.25	41.49
12.50	46.42
13.75	51.42
15.00	56.49
16.25	61.64
17.50	66.87
18.75	72.18
20.00	77.57
21.25	83.04
22.50	88.60
23.75	94.25
25.00	100.00

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prices, and/or technical information without notification.

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