

Gas density sensor with wireless transmission

For gas density, temperature and pressure of insulating gases

Model GD-20-W

WIKA data sheet SP 60.78

Applications

- Permanent monitoring of the relevant gas condition parameters in closed tanks
- For indoor and outdoor SF₆-insulated equipment
- Density measurement of alternative gases in electrical equipment or in the laboratory
- General pressure and temperature measurement of non-corrosive media, e.g. transformer oil, in power transmission applications

Special feature

- High-accuracy sensor technology
- Wireless LoRaWAN® output signal
- Long battery life
- Good long-term stability and EMC characteristics
- Compact design

Description

Permanent monitoring

In order to prevent system failures in switchgear and network outages, the permanent monitoring of the gas density is essential.

The model GD-20-W calculates the current gas density from the pressure and temperature using a complex virial equation in the gas density sensor's powerful microprocessor. Pressure changes resulting from temperature effects will be compensated by this and will not affect the output value.

Signal stability

Due to its high long-term stability, the sensor is maintenance-free and requires no calibration. Due to the hermetically sealed weld seam and a measuring cell design without sealing elements, the permanent sealing of the measuring cell is ensured.

LoRaWAN® output signal

This gas density sensor requires no external power supply due to an integrated, easily replaceable battery. By means of the integrated antenna, the sensor reliably transmits the measured values based on the LoRaWAN® protocol even over long distances.

Integrated alarm function

The independent sensor enables a variety of alarm settings, including alarms at low densities or high temperatures. By setting the measuring frequency higher than the transmission frequency, the sensor can immediately send a warning when a threshold value is reached and does not need to wait for the next scheduled transmission.

If no threshold value warning is triggered, only the last measured values are transmitted in the next transmission period to save energy and bandwidth.



Gas density sensor, model GD-20-W

Configurator



Specifications

Compensated pressure range in bar abs. [psi] at 20 °C [68 °F] (g/l SF ₆)	Temperature in °C [°F]	Accuracy ¹⁾ Standard	Accuracy ¹⁾ Enhanced	Operating temperature in °C [°F] ²⁾	Output parameter	Output signal
■ 0 ... 2 [0 ... 29.00] (12.28)	-40 ... 0 [-40 ... +32]	±2.00 %	±1.5 %	-40 ... +80 [-40 ... +176]	■ Density ■ Compensated absolute pressure at 20 °C [68 °F] ■ Compensated gauge pressure at 20 °C [68 °F] based on 1,013 mbar [14.69 psi] ■ Absolute pressure ■ Temperature ■ Battery status in percent	LoRaWAN®
■ 0 ... 3 [0 ... 43.51] (18.65)	0 ... 15 [32 ... 59]	±1.25 %	±1.00 %			
■ 0 ... 6 [0 ... 87.02] (38.87)	15 ... 50 [59 ... 122]	±1.25 %	±0.60 %			
■ 0 ... 8 [0 ... 116.03] (53.4)	>50 [122]	±1.25 %	±1.00 %			
■ 0 ... 10 [0 ... 145.03] (68.96)	<15 [59]	±1.25 %	±1.00 %			
■ 0 ... 12 [0 ... 174.04] (85.79)	15 ... 50 [59 ... 122]	±1.25 %	±0.60 %			
■ 0 ... 16 [0 ... 232.06] (124.64)	>50 [122]	±1.25 %	±1.00 %			

1) Specifications apply to measurement of the compensated pressure under reference conditions and position. Accuracy determined for pure SF₆

2) At temperatures below -35 °C [-31 °F] voltage drops may occur that can lead to signal interruption. The sensor will start to perform normally again when temperatures rise above -35 °C [-31 °F].

Accuracy specifications	
Accuracy of pressure measurement	±0.2 % at 20 °C [68 °F]
Temperature error	±0.8 K
Compensated pressure range at 20 °C [68 °F] (g/l SF ₆)	0 ... 16 bar abs. (124.65 g/l SF ₆)
Long-term stability at reference conditions	±0.1 % per year for the density signal
Reference conditions	Per IEC 61298-1

Measuring ranges and overpressure safety		
Compensated pressure range in bar abs. [psi abs.] at 20 °C [68 °F] (g/l SF ₆)	Overload safety in bar abs. [psi abs.]	Burst pressure in bar abs. [psi abs.]
0 ... 2 [0 ... 29.00] (12.28)	6.2 [89.92]	10 [145.03]
0 ... 3 [0 ... 43.51] (18.65)	14.5 [210.30]	24 [348.09]
0 ... 6 [0 ... 87.02] (38.87)	14.5 [210.30]	24 [348.09]
0 ... 8 [0 ... 116.03] (53.4)	31 [449.61]	52 [754.19]
0 ... 10 [0 ... 145.03] (68.96)	31 [449.61]	52 [754.19]
0 ... 12 [0 ... 174.04] (85.79)	31 [449.61]	52 [754.19]
0 ... 16 [0 ... 232.06] (124.64)	62 [899.23]	103 [1,493.89]

Process connections	
Standard	Thread size
EN 837	■ G ¼ B ■ G ½ B
B7505	■ G ⅝ B JIS ■ G ½ B JIS
ANSI/ASME B1.20.1	¼ NPT
	→ Other connections on request

Voltage supply and performance data		
Voltage supply	Via battery pack, DC 3.6 V (WIKA order number: 14833168), replaceable without tools	
Power consumption	Max. 0.28 W	
	Between each measurement the sensor is automatically switched off to save energy.	
Nominal capacity	2.4 Ah at nominal voltage	
Total current consumption	Max. 55 mA	
Battery life	Depending on transmission and measuring frequency, up to 12 years	
Transmission frequency	Standard	Sending: every 240 minutes Measuring: every 60 minutes
	Minimum	Every 10 minutes
	Maximum	All 7 days

Radio standard	
LoRaWAN® protocol	
Specification	LoRaWAN® 868 MHz EU LoRaWAN® 865-867 MHz India
Version	1.0.3
Functions	■ Registration ■ Configuration ■ Sending measured values ■ Alarm management ■ Battery status
Frequency range	863 ... 870 MHz
Range in free field	Typically 10 km [6 mi] → Depending on the ambient conditions, such as topography and building structures.
Antenna	PCB antenna, internal
Channel spacing	200 kHz
Bandwidth	125 kHz
Max. transmission power	14 dBm

Operating conditions	
Medium temperature range	(-40) -35 ... +80 °C [(-40) -31 ... +176 °F] ¹⁾
Ambient temperature range	(-40) -35 ... +80 °C [(-40) 31 ... +176 °F] ¹⁾
Storage temperature range	-40 ... +80 °C [-40 ... +176 °F]
Relative humidity	≤ 90 % relative humidity
Condensation	Non-condensing
Shock resistance	
Single shock loads	150g in all axes and directions, 6 ms
Continuous shock	100g in all axes and directions, 60,000 shocks

Operating conditions	
Vibration resistance	20g, 30 ... 2,000 Hz in all axes
Ingress protection per IEC/EN 60529	IP65 and IP67

1) At temperatures below -35 °C [-31 °F] voltage drops may occur that can lead to signal interruption. The sensor will start to perform normally again when temperatures rise above -35 °C [-31 °F].

Suitable for the following gases ¹⁾

Name in accordance with IUPAC ²⁾ nomenclature	Abbreviation	Description (CAS no.)
Sulphur hexafluoride	SF ₆	2551-62-4
Nitrogen	N ₂	7727-37-9
Tetrafluoromethane	CF ₄	75-73-0
Oxygen ³⁾	O ₂	7782-44-7
Carbon dioxide	CO ₂	124-38-9
2,3,3,3-Tetrafluoro-2-(trifluoromethyl) propanenitrile	C4-FN (fluoronitrile)	42532-60-5
Helium	He	7440-59-7
Argon	Ar	7440-37-1

1) Gas mixtures and components can be individually configured and combined ex-works. Liquid gases can only be measured in the gaseous phase.

2) International Union of Pure and Applied Chemistry

3) The oxygen measuring range is limited to <30 volume percent.

Case	
Material	Stainless steel, upper body made of plastic

Alarms	
Alarms	Various alarms can be set → see “special documentation”, LoRaWAN® communications protocol for model GD-20-W (item number 14705379)

EMC tests	
ESD per IEC 61000-4-2	6 kV contact discharge, 8 kV indirect discharge
Immunity against electromagnetic fields (EMF) per IEC 61000-4-3	■ 10 V/m (at 80 MHz to 1 GHz) ■ 3 V/m (at >1 GHz to 2,7 GHz)
Immunity against magnetic fields (50/60 Hz) per EN 61000-4-8	■ 100 A/m (continuous) ■ 1 kA/m for 1 s

The instrument complies with the limit values for the following EMC environments:

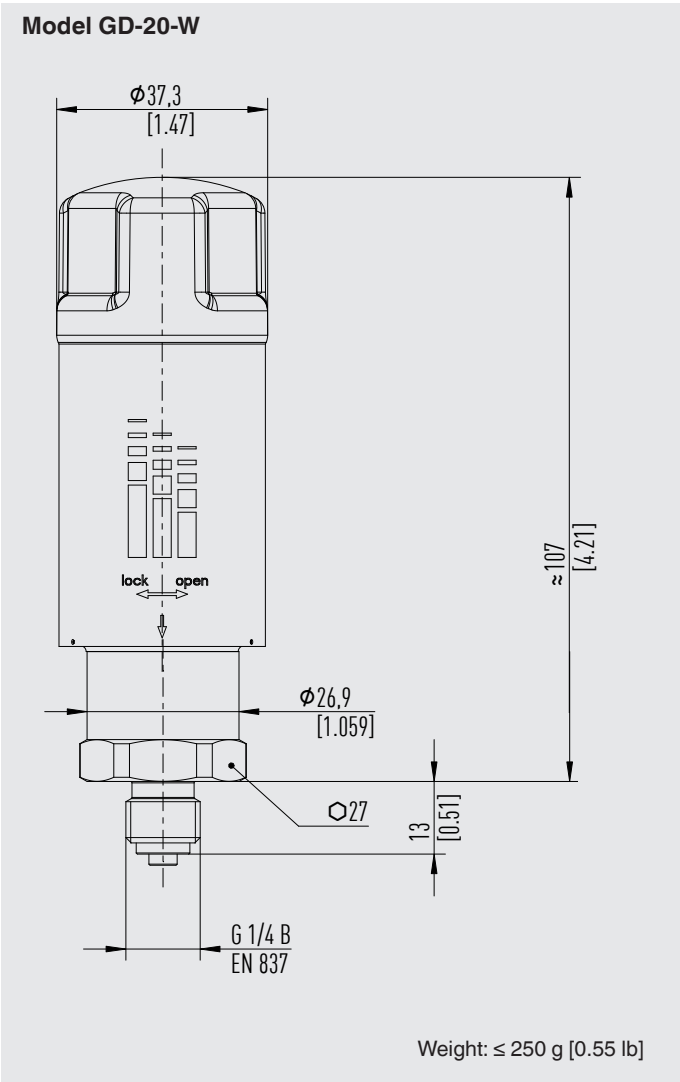
EMC environments	
EN 61326-1, EN 61326-2-3 and CISPR 11	Emission (group 1, class B) and immunity (industrial environment)
EN 61000-6-5	Suitable for use in switchgear (10.3) and power plants (10.2).

Approvals

Logo	Description	Country
CE	EU declaration of conformity	European Union
	Radio equipment directive	
	RoHS directive	

→ For approvals and certificates, see website

Dimensions in mm [in]



Accessories and spare parts

Model	Description	Ordner number
	Battery pack	14833168
-	Outdoor cover	64477629
-	Case cover	14739139
-	O-RING 30 x 1.5 ISO3601 EPDM 70 black Minimum order quantity 100 x	14428614

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Ordering information

Model / Measuring chamber / Process connection / Options

Configurator



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