

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.



Gas density sensor, model GD-20-W

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.

Specifications

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

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⁾ Option	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]	<ul style="list-style-type: none"> ■ 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].

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	<ul style="list-style-type: none"> ■ G ¼ B ■ G ½ B
B7505	<ul style="list-style-type: none"> ■ G ⅜ B JIS ■ G ½ B JIS
ANSI/ASME B1.20.1	¼ NPT
	→ Other connections on request

Radio standard	
LoRaWAN®	
Specification	<ul style="list-style-type: none"> ■ LoRaWAN® 868 MHz EU ■ LoRaWAN® 865-867 MHz India
Functions of the protocol	<ul style="list-style-type: none"> ■ 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
Version	1.0.3

Voltage supply and performance data	
Battery pack	Tadiran SL860+HLC1020+KAB+STAB (WIKA order number: 14615879), replaceable without tools
Voltage supply	DC 3.6 V
Battery life	Depending on transmission and measuring frequency, up to 12 years
Power consumption	Max. 0.28 W Between each measurement the sensor is automatically switched off to save energy.
Total current consumption	Max. 55 mA
Nominal capacity	2.4 Ah at nominal voltage
Transmission and measuring frequency	
Standard	Sending: every 240 minutes Measuring: every 60 minutes
Minimum	Every 10 minutes
Maximum	All 7 days

Material	
Case	
Upper body	Made of plastic
Lower body	Stainless steel

Operating conditions	
Medium temperature range	-35 ... +80 °C [-31 ... +176 °F] ¹⁾
Ambient temperature range	-35 ... +80 °C [-31 ... +176 °F] ¹⁾
Storage temperature range	-40 ... +80 °C [-40 ... +176 °F]
Relative humidity	≤ 90 % relative humidity
Consensation	Non-condensing
Shock resistance	
Single shock loads	150g in all axes and directions, 6 ms
Continuous shock	100g in all axes and directions, 10,000 shocks
Vibration resistance	20g, 30 ... 2,000 Hz in all axes
Ingress protection per IEC/EN 60529	IP65 and IP67
EMC	
ESD per IEC 61000-4-2	6 kV contact discharge, 8 kV indirect discharge
Immunity against electromagnetic fields (EMF) per IEC 61000-4-3	<div> <div>■ 10 V/m (at 80 MHz to 1 GHz)</div> <div>■ 3 V/m (at >1 GHz to 2.7 GHz)</div> </div>
Immunity against magnetic fields (50/60 Hz) per EN 61000-4-8	<div> <div>■ 100 A/m (continuous)</div> <div>■ 1 kA/m for 1 s</div> </div>

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].

Alarms	
Alarms	Various alarms can be set → See operating instructions for gas density sensor with wireless transmission, model GD-20-W (item number 14657927)

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.

Gas mixtures and components can be individually configured and combined ex-works. The calculation is based on the physical principle of the partial pressure method. The gas mixture cannot be changed subsequently.

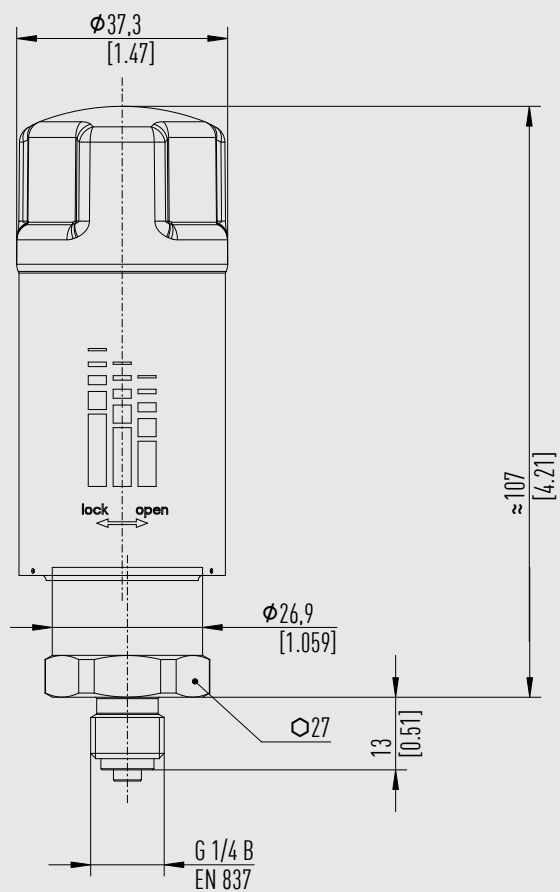
Approvals

Logo	Description	Country
CE	EU declaration of conformity	European Union
	EMC directive	
	EN 61326 emission (group 1, class B) and immunity (industrial application)	
	Radio Equipment Directive	
	RoHS directive	

→ For approvals and certificates, see website

Dimensions in mm [in]

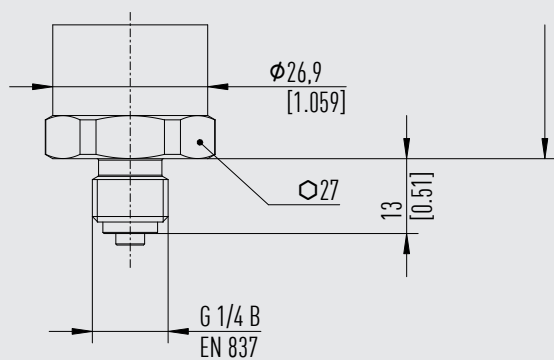
Model GD-20-W



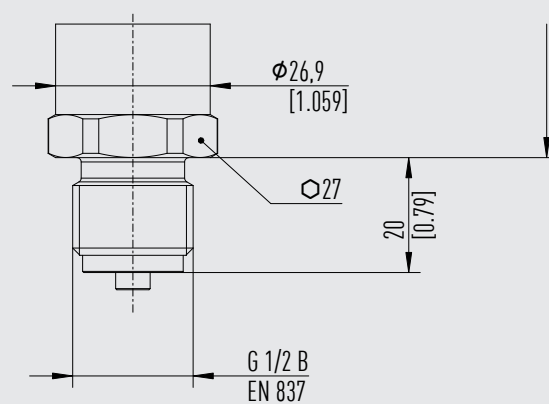
Weight: ≤ 250 g [0.55 lb]

Process connections

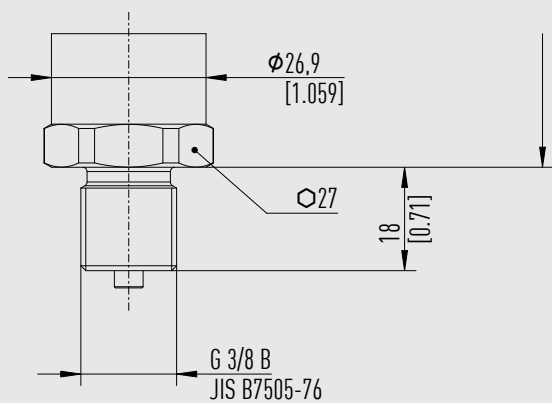
G 1/4 B



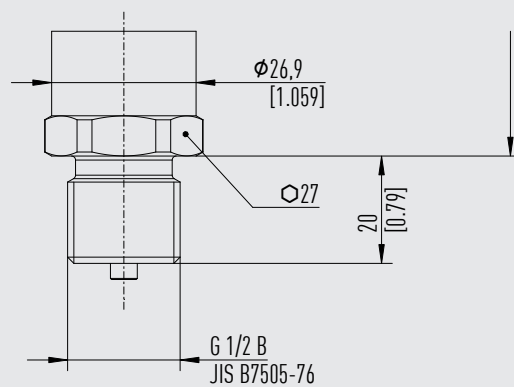
G 1/2 B



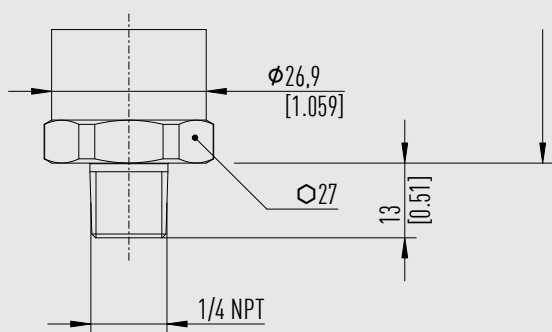
G 3/8 B JIS




G 1/2 B JIS




1/4 NPT



Accessories

Typ	Beschreibung	Bestellnummer
	Sun protector	14412373
-	LoRaWAN® gateway, preconfigured for WIKA network server	
	Gateway for indoor use	On request
	Gateway for outdoor use	On request

Spare parts

Typ	Beschreibung	Bestellnummer
	Battery pack Tadiran SL860+HLC1020+KAB+STAB	14615879
-	O-RING 30 x 1.5 ISO3601 EPDM 70 black Minimum order quantity 100 x	14428614

Ordering information

Model / Measuring chamber / Process connection / Options

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