

# Gas density monitor With integrated transmitter Model GDM-100-TI



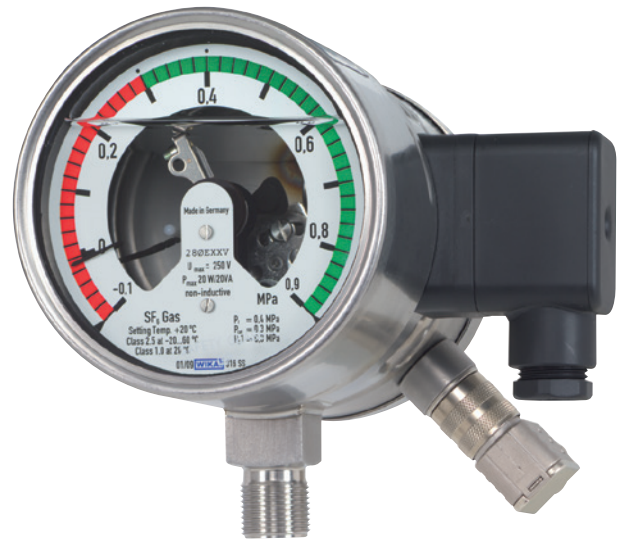
for further approvals see  
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## Applications

- Gas density monitoring of closed SF<sub>6</sub> tanks
- For indoor and outdoor installation in SF<sub>6</sub> gas-insulated switchgear

## Special features

- On-site display with switch contact
- Remote readout (output 4 ... 20 mA, 2-wire), measuring ranges from 0 ... 10 g/litre to 0 ... 80 g/litre
- High electromagnetic compatibility (EMC)
- Hermetically sealed, therefore no influence from atmospheric pressure fluctuation and differences in mounting heights



**Gas density monitor with integrated transmitter,  
model GDM-100-TI**

## Description

The model GDM-100-TI features a model GD-10 analogue transmitter integrated into the rear of the case. Through this, the functions of switching and transmission are combined in just one gas density monitor. The combination of a gas density monitor and transmitter in one instrument enables the parallel operation of both instruments with only one process connection, provides additional safety through redundancy and simplifies the installation tasks on the electrical equipment.

The transmitter is electrically compensated in accordance with the non-linear behaviour of SF<sub>6</sub> gas according to the virial equation. This achieves the highest accuracy for the gas density.

The transmitter records the pressure and temperature of the SF<sub>6</sub> gas in the gas tank. The current gas density is ascertained from both measurement parameters by means of an electronic evaluation system. Thermally induced pressure changes are dynamically compensated and do not affect the output signal. The transmitter generates a density-proportional, standardised signal of 4 ... 20 mA.

Recalibration of the zero point is not necessary due to the high long-term stability of the transmitter. The measuring cell ensures a high long-term sealing and is hermetically sealed to prevent leaks and remain independent of atmospheric pressure fluctuations and variations in the mounting height.

# Gas density monitor

## Nominal size in mm

100

## Calibration pressure PE

To customer specification

## Accuracy specifications

- $\pm 1$  % at an ambient temperature of 20 °C [68 °F]
- $\pm 2.5$  % at ambient temperature -20 ... +60 °C and with calibration pressure in accordance with reference isochore (reference diagram KALI-Chemie AG, Hanover, prepared by Dr. Döring 1979)

## Scale range

Vacuum and overpressure range with measuring span of 1.6 ... 25 bar (at an ambient temperature of 20 °C [68 °F] and gaseous phase)

## Permissible ambient temperature

Operation: -20 ... +60 °C [-4 ... +140 °F], gaseous phase  
Storage: -40 ... +60 °C [-58 ... +140 °F]

## Process connection

G ½ B per EN 837, lower mount  
Stainless steel, spanner flats 22 mm  
Other connections and connection locations on request.

## Pressure element

Stainless steel, welded  
Gas-tight: Leak rate  $\leq 1 \cdot 10^{-8}$  mbar · l / s  
Test method: Helium mass spectrometry

## Movement

Stainless steel  
Bimetal link (temperature compensation)

## Dial

Aluminium  
Red, yellow, green area as specified in the order

## Pointer

Aluminium, black

## Case

### Selectable versions

Option 1	Stainless steel, with gas filling
Option 2	Stainless steel, with filling liquid

Gas-tight: Leak rate  $\leq 1 \cdot 10^{-5}$  mbar · l / s

## Window

### Selectable versions

Option 1	Laminated safety glass
Option 2	Clear non-splintering plastic

## Ring

Bayonet ring, stainless steel, secured by means of 3 welding spots

## Permissible air humidity

$\leq 90$  % r. h. (non-condensing)

## Ingress protection

IP65 per IEC/EN 60529

## Weight

Case with gas filling: approx. 1.2 kg  
Case with fill fluid: approx. 1.6 kg

## High-voltage test 100 %

2 kV, 50 Hz, 1 s (wiring against case)

# Switch contacts

## Electrical connection

### Selectable versions

Option 1	Cable socket with compression fitting M20 x 1.5 Wire cross-section max. 2.5 mm <sup>2</sup>
Option 2	Plug-in cable box

## Number of switch contacts

### Selectable versions

Option 1	1 magnetic snap-action contact
Option 2	2 magnetic snap-action contacts
Option 3	3 magnetic snap-action contacts
Option 4	4 magnetic snap-action contacts

## Switching directions

### Selectable versions

Option 1	Falling pressure
Option 2	Rising pressure

## Switching functions

### Selectable versions

Option 1	Normally open
Option 2	Normally closed
Option 3	Change-over contact (max. 2 switch points)

## Circuits

### Selectable versions

Option 1	Galvanically connected (not for change-over contact)
Option 2	Galvanically isolated

### Switching accuracy

Switch point = calibration pressure  $P_E$ : see accuracy specifications

Switch point  $\neq$  calibration pressure  $P_E$ : Parallel to the reference isochore of the calibration pressure

### Max. switching voltage

AC 250 V

### Switching power

Case with gas filling: 30 W / 50 VA, max. 1 A

Case with fill fluid: 20 W / 20 VA, max. 1 A

### Switch point setting

#### Selectable versions

Option 1	Secured switch points, not adjustable
Option 2	Adjustable switch points

### Material of switch contacts

80 % Ag / 20 % Ni, gold-plated

Further information on magnetic snap-action contacts in data sheet AC 08.01

# Gas density sensor

## Measuring ranges

Density							
Density range	g/litre	10	16	25	40	60	80
(Pressure range based on 20 °C)	(bar abs.)	(1.64)	(2.59)	(3.97)	(6.16)	(8.87)	(11.33)
Overload safety	bar abs.	14	14	14	29	29	67
Burst pressure sensor element	bar abs.	17	17	17	35	35	80

### Intended medium

Pure SF<sub>6</sub> gas

### Measuring principle

Piezo-resistive

### Output signal

4 ... 20 mA, 2-wire

### Permissible max. load R<sub>A</sub>

$R_A \leq (U_B - 10 \text{ V}) / 0.02 \text{ A}$  with R<sub>A</sub> in Ohms and U<sub>B</sub> in Volts

### Power supply U<sub>B</sub>

DC 10 ... 30 V

### Accuracy specifications

■ Point of optimal density:

- 40 °C: 3 % of span
- 20 °C: 1 % of span
- 60 °C: 2.3 % of span

■ Start and end of the measuring range:

- 40 °C: 4 % of span
- 20 °C: 2 % of span
- 60 °C: 3.3 % of span

### Stability per year

≤ 0.3 % of span (at reference conditions)

### Electromagnetic compatibility (EMC) to IEC 61000-4

IEC 61000-4-2 (ESD): test level 4 (8 kV)

IEC 61000-4-3 (Field): test level 3 (10 V/m)

IEC 61000-4-4 (Burst): test level X (±2 kV)

IEC 61000-4-5 (Surge): test level 2 (±1 kV)

IEC 61000-4-6 (Conducted RFI): test level 3 (10 V)

### High-voltage strength

DC 750 V (electrical connections against case)

### Permissible ambient temperature

Operation: -40 ... +60 °C [-40 ... +140 °F], gaseous phase

Storage: -40 ... +80 °C [-40 ... +176 °F]

### Electrical connection

With built-in transmitter: Cable outlet, IP68

With built-in transmitter: Angular connector (2-pin), IP67

### Electrical safety

Protection against reverse polarity and overvoltage

### Materials

Wetted parts: Stainless steel

Case, terminal enclosure: Stainless steel

### Internal pressure transmission medium

Synthetic oil

