Gas density monitor
With Modbus® output
Model GDM-100-TI-D

Applications
- Gas density monitoring in closed SF₆ gas tanks
- Remote monitoring of the SF₆ condition

Special features
- Ideally suited for Smart Grid or modernisation projects
- On-site display with switch contacts and Modbus® output
- Modbus® delivers measured values for pressure, temperature and gas density
- Compact design with only one process connection
- Precision sensors enable high-accuracy gas density determination

Description
Gas density is a crucial operating parameter for high-voltage switchgear. If the required gas density is not present, safe operation of the plant cannot be guaranteed.

The gas density measuring instruments from WIKA warn reliably against dangerously low gas quantities, even under extreme environmental conditions. If the gas density drops as a result of a leakage, the switch contacts will switch. In addition to the traditional gas density monitor, with the model GDM-100-TI-D with Modbus® output, high-precision sensors and evaluation electronics are incorporated.

Numerous fields of application
The GDM-100-TI-D only requires one connection to the measuring point to determine the pressure, temperature and gas density.

Via the on-site display, the pressure related to 20 °C can be read directly on the instrument. With the integrated switch contacts, simple switching tasks can be realised quickly and without complication. The integrated Modbus® sensors enable remote monitoring of the plant.

Remote monitoring with Modbus®
The measured data for pressure, temperature and gas density are transmitted using the standardised Modbus® RTU protocol. The advantages of this digital fieldbus are reduced cabling costs and very detailed measured data.

The GDM-100-TI-D delivers continuous data packets to a local controller or a central control system with SCADA. There, the data packets can be saved and evaluated. The data storage enables trend analysis to be carried out, so that critical SF₆ conditions can be predicted and rectified in time. An optimisation of the maintenance strategy from time-based (TBM) to condition-based (CBM) is possible through the use of the GDM-100-TI-D.

TBM = Time Based Maintenance
CBM = Condition Based Maintenance
Gas density monitor

Nominal size
100

Calibration pressure $P_E$
To customer specification

Accuracy specifications
- $\pm 1\%$ at ambient temperature $+20\, ^\circ C$
- $\pm 2.5\%$ at ambient temperature $-20\ldots+60\, ^\circ C$ and with calibration pressure in accordance with reference isochor (reference diagram KALI-Chemie AG, Hannover, prepared by Dr. Döring 1979)

Scale range
Vacuum and overpressure range with measuring span of $1.6 \ldots 16\, \text{bar}$ (with an ambient temperature of $20\, ^\circ C$ and gaseous phase)

Permissible ambient temperature
Operation: $-20 \ldots +60\, ^\circ C$ (-4 ... +140 °F)
Storage: $-40 \ldots +60\, ^\circ C$ (-40 ... +140 °F)

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

Pressure element
Stainless steel, welded
Gas-tight: leak rate $\leq 1 \cdot 10^{-8}\, \text{mbar} \cdot \text{l} / \text{s}$
Test method: helium mass spectrometry

Movement
Stainless steel
Bimetal link (temperature compensation)

Dial
Aluminium
The scale range is subdivided into red, yellow and green ranges

Pointer
Aluminium, black

Case
Stainless steel, with gas filling
Gas-tight: leak rate $\leq 1 \cdot 10^{-9}\, \text{mbar} \cdot \text{l} / \text{s}$
Test method: helium mass spectrometry

Window

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

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

Ingress protection
IP65 per IEC/EN 60529

Weight
approx. 1.4 kg

High-voltage test 100 %
2 kV, 50 Hz, 1s

Switch contacts

Number of switch contacts

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Switching directions

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Switching functions

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Circuits

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Switching accuracy in temperature range $-20 \ldots +60\, ^\circ C$
Switch point = calibration pressure $P_E$: As measuring span
Switch point $\neq$ calibration pressure $P_E$: Shifted parallel to calibration pressure

Switch points
Not adjustable and secured against adjustment.

Max. switching voltage
AC 250 V

Switching power
30 W / 50 VA, max. 1 A

Material of switch contacts
80 % Ag / 20 % Ni, gold-plated

Further information on magnetic snap-action contacts in data sheet AC 08.01
Sensor system with Modbus® output

Measuring ranges
Density: 0 ... 60 g/litre (8.87 bar abs. at 20 °C)
Temperature: -40 ... +80 °C
Pressure: 0 ... 16 bar abs.
Overload safety: up to 30 bar abs.
Pressure reference: Absolute

Accuracy specifications
Specifications only valid for clean gaseous SF₆ gas
Density: ±0.60 %, ±0.35 g/litre (-40 ... +80 °C)
Temperature: ±1 K
Pressure: ±0.20 %, ±32 mbar (-40 ... < 0 °C)
±0.06 %, ±10 mbar (0 ... 80 °C)

Long-term stability at reference conditions
Temperature: ≤ ±0.10 % of span/year
Pressure: ≤ ±0.05 % of span/year

Refresh rate
Density: 20 ms
Temperature: 20 ms
Pressure: 20 ms

Voltage supply $U_B$
DC 17 ... 30 V

Power consumption
max. 0.5 W

Electrical connection
Connection cross-section max. 2.5 mm²
Modbus® RTU via RS-485 interface
For the configuration of the cable socket, see product label.

Functionality Modbus®
Mixture ratio of SF₆ to N₂ or CF₄ (default 100% SF₆ gas)
Customer-specific name of measuring point
Measured values with alternative units can be retrieved directly in the Modbus® registers.
- Density: g/litre, kg/m³
- Temperature: °C, °F, K
- Pressure: mbar, Pa, kPa, MPa, psi, N/cm², bar (at 20 °C)

Electrical safety
Protected against reverse polarity

High-voltage test 100 %
1 kV DC, 5s

Approvals

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<td>EN 61326 emission (group 1, class B) and interference immunity (industrial application)</td>
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Country
- European Union
- Eurasian Economic Community

Approvals and certificates, see website

EMC tests
- Interference immunity per IEC 61000-4-3:
  30 V/m (80 MHz ... 2.7 GHz)
- Burst per IEC 61000-4-4:
  4 kV
- Impulse voltages per IEC 61000-4-5:
  2 kV conductor to ground, 1 kV conductor to conductor
- ESD per IEC 61000-4-2:
  8 kV/15 kV, contact/air
- High-frequency fields per IEC 61000-4-6:
  10 V
**Dimensions in mm**

![Diagram](image)

**Accessories**

**Modbus® startup kit (Order number 14075896)**

Consisting of:
- Power supply unit for transmitter
- Connection cable
- Interface converter (RS-485 to USB)
- USB cable type A to type B
- Modbus® tool software on USB stick

**Ordering information**

Model / Permissible ambient temperature / Window / Number of switch contacts / Switching direction / Switching function / Circuit type / Accessories