Gas Density Monitor (GDM) with Integrated Gas Density Transmitter
Model 233.52.100 TI

Applications
- Gas density monitoring of closed SF₆ tanks
- For indoor and outdoor installation in SF₆-gas-isolated switching units

Special Features
- Modified bourdon tube pressure gauge with integrated Gas Density Transmitter inside the case
- Local readout with alarm contacts
- Remote readout (output 4 ... 20 mA, 2-wire system), measuring ranges from 0 ... 10 g/liter to 0 ... 80 g/liter
- High EMI performance, CE-conformity
- Hermetically sealed, therefore no influence by atmospheric pressure fluctuation and differences in altitude

Description - Gas Density Transmitter
Model 233.52.100 TI features a Gas Density Transmitter integrated into the back of the case. It functions fully as a standard GD-10 Gas Density Transmitter, however, the combination allows for both instruments to obtain a density reading through a single connection to the tank.

The gas density transmitter is electrically compensated following the non-linear behavior of SF₆-gas according to the virial equation. This provides the highest accuracy and best temperature compensation possible since SF₆ is a real gas functioning according to real gas law equations. Only a gas density transmitter can take this into account.

The gas density transmitter picks up the pressure and temperature of the SF₆-gas contained in the device (tank). The current gas density is ascertained from both variables by means of an electronic evaluation system. Thermal induced pressure changes are dynamically compensated and do not affect the output signal. The gas density transmitter generates a density proportional, standardized signal of 4 ... 20 mA.

Recalibration of the zero signal is not necessary due to the high long-term stability of the gas density transmitter. The hermetically-sealed measuring cell guarantees high long-term leak tightness. It is welded closed to prevent leaks and remain independent of atmospheric pressure fluctuations and variations of the mounting height.

The EMI properties of the transmitter are tested according to IEC 61000-4-2 thru IEC 61000-4-6 and guarantee a safe pick-up of the signal which is especially suited to conditions prevailing in high-voltage switching units.
**Description - Gas Density Monitor**

**Nominal size**
100 mm dial size with transmitter integrated into special deeper case

**Accuracy (relating to the measuring span)**
Accuracy of ± 1% at +20 °C/68 °F (± 0.37%/10 °K must be added as the temperature deviates from +20 °C/68 °F)
- Reference diagram KALI-Chemie AG
- Calibration pressure is used as reference isochore

**Scale ranges**
All standard ranges and +/- ranges with a measuring span of min. 1.6 bar und max. 25 bar (SF6 gas pressure at +20 °C)

**Calibration pressure PE**
As ordering specifications

**Permissible temperatures**
Ambient: -20 ... +60 °C (gas phase)
Storage: -50 ... +60 °C

**Alarm contacts / Contact rating**
- Max. 3 magnetic snap-action contacts, to make or break, with galvanic isolation, switching points non-adjustable and secured
- Contact rating: 20 W / 20 VA, max. 1 A
- Material of contacts: 80 % Ag / 20 % Ni, 10 μm gold-plated

**Switching accuracy in temperature range -20 ... +60 °C**
If switching point is equal PE: as measuring span,
If switching point is not equal PE: Moved parallel to calibration pressure

**High-voltage test**
2 kV, 50 Hz, 1 s (wiring versus case)

**Electrical connection**
Cable box with cable gland M20 x 1.5
Connection cross-section max. 2.5 mm²

**Pressure connection**
Stainless steel,
Lower mount (LM) only, spigot Ø 6 x 5, similar to EN 837,
G ½ B (male), 22 mm flats

**Pressure element**
Stainless steel, welded
Gas tight: leakage rate ≤ 1 · 10⁻⁸ mbar · l / s
Test method: spectrometry of helium mass

**Options - Gas Density Monitor**
- 3 magnetic snap-action contacts, without galvanic isolation, switching points are adjustable
- Acrylic glass window
- Pressure connection through flanges
- Pluggable cable box

**Movement**
Stainless steel
Bimetal link (temperature compensation)

**Dial**
Aluminium, red-green-yellow section as ordering specifications

**Pointer**
Aluminium, black

**Case**
Stainless steel with silicone oil or dry nitrogen filling
Gas tight: leakage rate ≤ 1 · 10⁻⁸ mbar · l / s

**Window**
Laminated safety glass

**Bezel ring**
Cam ring (bayonet type), stainless steel secured with 3 welding spots

**Ingress protection**
IP 65 per EN 60 529 / IEC 529

**Weight**
approx. 1.2 kg
Dimensions in mm

Standard version

<table>
<thead>
<tr>
<th>Kind of contact</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double contact without separate circuits</td>
<td>821</td>
<td>30</td>
<td>55</td>
</tr>
<tr>
<td>Double contact with separate circuits without adjustable arms</td>
<td>825</td>
<td>30</td>
<td>55</td>
</tr>
<tr>
<td>Double contact with separate circuits with adjustable arms</td>
<td>821</td>
<td>54</td>
<td>65</td>
</tr>
<tr>
<td>Single contact without separate circuits without adjustable arms</td>
<td>821</td>
<td>56</td>
<td>65</td>
</tr>
<tr>
<td>Single contact with separate circuits without adjustable arms</td>
<td>825</td>
<td>56</td>
<td>65</td>
</tr>
<tr>
<td>Single contact with separate circuits with adjustable arms</td>
<td>825</td>
<td>103</td>
<td>80</td>
</tr>
</tbody>
</table>
### Specifications for Gas Density Transmitter

**Designed for Sensing principle**

<table>
<thead>
<tr>
<th>Density ranges (Pressure ranges)</th>
<th>g/Litre bar\textsubscript{abs.} at 20 °C</th>
<th>10</th>
<th>16</th>
<th>25</th>
<th>40</th>
<th>60</th>
<th>80</th>
<th>11.33</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over pressure safety bar\textsubscript{abs.}</td>
<td>14</td>
<td>14</td>
<td>14</td>
<td>29</td>
<td>29</td>
<td>67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burst pressure of sensor bar\textsubscript{abs.}</td>
<td>17</td>
<td>17</td>
<td>17</td>
<td>35</td>
<td>35</td>
<td>80</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Pressure reference**

- **Materials**
  - Wetted parts: stainless steel
  - Case / terminal case: stainless steel
  - Internal transmitting fluid: synthetic oil

**Power supply U\textsubscript{B}**

- DC V
- $10 < U\textsubscript{B} \leq 30$
- $4 \ldots 20$ mA, 2-wire, $R\textsubscript{L} \leq (U\textsubscript{B}-10$ V) / 0.02 A with $R\textsubscript{L}$ in Ohm and $U\textsubscript{B}$ in Volt

**Accuracy**

- % of span
- -40 °C.: 3% / 20 °C.: 1% / 60 °C.: 2.3% (optimal accuracy point)
- -40 °C.: 4% / 20 °C.: 2% / 60 °C.: 3.3% (beginning and end of measuring range)
- ≤ 0.3 (at reference conditions)

**Nominal temperature**

| °C (°F) | -40 ... +60 (-40 ... +140) [gas phase!]
|--------|----------------------------------|

**Working temperature range**

| °C (°F) | -40 ... +80 (-40 ... +176) [gas phase!]
|--------|----------------------------------|

**Storage temperature**

<table>
<thead>
<tr>
<th>°C (°F)</th>
<th>-40 ... +80 (-40 ... +176)</th>
</tr>
</thead>
</table>

**CE - conformity**

- EN 61326
- 750 (wiring versus case)
- 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 (+/- 4 kV)
- IEC 61000-4-5 (Surge): test level 2 (+/- 1 kV)
- IEC 61000-4-6 (Conducted RFI): test level 3 (10 V)

**Cable gland and Ingress protection per EN 60529 / IEC 529**

- 2-pin plug, IP 67 [L-junction box brass, nickel-plated, IP 67]
- 2-pin plug with flying lead 1.5 m; IP 68

**Wiring protection**

- Protected against reverse polarity and overvoltage

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Items in curved brackets \{\} are optional extras for additional price.