

## Transmitter

# For density, temperature, pressure and moisture of insulation gases Model GDHT-20, with Modbus® output

WIKA data sheet SP 60.14

### Applications

- Permanent monitoring of the relevant gas condition parameters in closed tanks
- For internal and external SF<sub>6</sub>-insulated and alternative gas-insulated equipment

### Special features

- High-accuracy sensor technology
- Modbus® output protocol via RS-485 interface
- Ingress protection IP65
- Very good long-term stability and EMC characteristics
- Compact dimensions



Transmitter, model GDHT-20

### Description

The model GDHT-20 transmitter is a multi-sensor system with digital output for the measurands of pressure, temperature and humidity. Based on these measured values, the condition-related data can be determined.

#### Permanent monitoring

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

The GDHT-20 transmitter calculates the current gas density from the pressure and temperature using a complex virial equation in the transmitter's powerful microprocessor. Changes in pressure resulting from thermal effects will be compensated by this and will not affect the output value.

In addition, the GDHT-20 transmitter delivers humidity or dew point information, which enables monitoring within the terms of the Cigré directives and IEC standards.

#### Modbus® fieldbus

The RS-485 interface communicates using the Modbus® RTU protocol. The instrument's output parameters and their units can be configured and read according to requirements. The GDHT-20 transmitter can be freely configured in percentage values by the user for any defined gas mixture consisting of SF<sub>6</sub>, N<sub>2</sub>, CF<sub>4</sub>, O<sub>2</sub>, CO<sub>2</sub>, 3M™ Novec™ 4710, He and Ar. The calculation of gas density is based on the partial pressure method of the individual gas components. The humidity values can be output for SF<sub>6</sub> gas and N<sub>2</sub>.

#### Signal stability

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

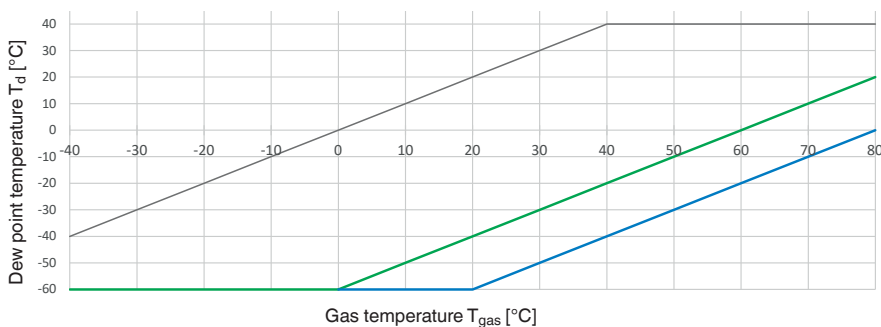
# Specifications

Accuracy specifications		
<b>Accuracy</b>	Specifications only valid for pure, gaseous SF <sub>6</sub>	
Dew point	→ See graphic below the table	
	Span $T_{\text{gas}} - T_d < 60 \text{ K}$	Measured value deviation $< \pm 2 \text{ K}$
	Span $T_{\text{gas}} - T_d < 80 \text{ K}$	Measured value deviation $< \pm 3 \text{ K}$
Density	$\pm 0.6 \%$ , $\pm 0.35 \text{ g/litre}$ (-40 ... 80 °C [-40 ... +176 °F])	
Temperature	$\pm 1 \text{ K}$	
Pressure	-40 ... < 0 °C [-40 ... +32 °F]	$\pm 0.2 \%$ , $\pm 32 \text{ mbar}$
	0 ... 80 °C [32 ... 176 °F]	$\pm 0.06 \%$ , $\pm 10 \text{ mbar}$
Long-term drift per IEC 61298-2		
Temperature	$\leq \pm 0.1 \%$ of span/year	
Pressure	$\leq \pm 0.05 \%$ of span/year	
Dew point	$\leq \pm 0.5 \%$ of span/year	

## Dew point accuracy

Measured value deviation  $< \pm 2 \text{ K}$  for span  $T_{\text{gas}} - T_d < 60 \text{ K}$

Measured value deviation  $< \pm 3 \text{ K}$  for span  $T_{\text{gas}} - T_d < 80 \text{ K}$



- Upper limit (Measuring deviation  $< \pm 2 \text{ K}$ )
- Lower limit (Measuring deviation  $< \pm 2 \text{ K}$ )
- Lower limit (Measuring deviation  $< \pm 3 \text{ K}$ )

## Examples:

- If the gas temperature is +30 °C and the dew point is -20 °C, an accuracy of  $< \pm 2 \text{ K}$  is achieved (since  $T_{\text{gas}} - T_d < 60 \text{ K}$ ).
- If the gas temperature is +40 °C and the dew point is -30 °C, the accuracy of  $< \pm 3 \text{ K}$  is achieved (since  $T_{\text{gas}} - T_d < 80 \text{ K}$ ).

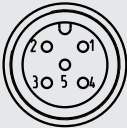
Measuring range	
<b>Dew point at atmospheric pressure</b>	-60 ... +40 °C [-76 ... +104 °F] Td
<b>Density</b>	0 ... 60 g/litre (8.87 bar abs. SF <sub>6</sub> gas at 20 °C [68 °F])
<b>Temperature</b>	-40 ... +80 °C [-40 ... +176 °F]
<b>Pressure at 20 °C [68 °F]</b>	0 ... 8.87 bar abs. SF <sub>6</sub> gas
<b>Pressure</b>	0 ... 16 bar abs.
<b>Burst pressure</b>	52 bar abs.
<b>Overload limit</b>	Up to 30 bar abs.
<b>Pressure reference</b>	Absolute

Process connection	
<b>Process connection</b>	<ul style="list-style-type: none"> <li>■ G 1 B, male thread, stainless steel</li> <li>■ DN 20, female thread</li> <li>■ G ½ B, male thread</li> <li>■ Malmkvist®</li> <li>■ Flange D40</li> <li>■ Via measuring chamber (see page 5)</li> <li>■ DN 8, female thread</li> </ul>
	Other connections on request

Output signal	
<b>Signal type</b>	Modbus® output
<b>Retrievable measured values</b>	Measured values with alternative units can be retrieved directly in the Modbus® registers.
Density	<ul style="list-style-type: none"> <li>■ g/litre</li> <li>■ kg/m<sup>3</sup></li> </ul>
Temperature	<ul style="list-style-type: none"> <li>■ °C</li> <li>■ °F</li> <li>■ K</li> </ul>
Absolute pressure	<ul style="list-style-type: none"> <li>■ mbar</li> <li>■ Pa</li> <li>■ kPa</li> <li>■ MPa</li> <li>■ psi</li> <li>■ N/cm<sup>2</sup></li> <li>■ bar</li> </ul>
Humidity	<ul style="list-style-type: none"> <li>■ ppm<sub>v</sub></li> <li>■ ppm<sub>w</sub></li> </ul>
Dew point	<ul style="list-style-type: none"> <li>■ °C at tank pressure</li> <li>■ °C at atmospheric pressure</li> </ul>
Frost point	<ul style="list-style-type: none"> <li>■ °C at tank pressure</li> <li>■ °C at atmospheric pressure</li> </ul>
Relative humidity	<ul style="list-style-type: none"> <li>■ %</li> </ul>
Absolute pressure at 20 °C [68 °F]	<ul style="list-style-type: none"> <li>■ bar</li> <li>■ MPa</li> </ul>
Gauge pressure at 20 °C [68 °F] (based on 1,013 mbar)	<ul style="list-style-type: none"> <li>■ bar</li> <li>■ MPa</li> </ul>
<b>Alternative gases</b>	Gas mixtures and components can be freely configured and combined from the gases SF <sub>6</sub> , N <sub>2</sub> , CF <sub>4</sub> , O <sub>2</sub> , CO <sub>2</sub> , 3M™ Novec™ 4710, He and Ar via Modbus®. The calculation is based on the physical principle of the partial pressure method.
Voltage supply	
Supply voltage U <sub>B+</sub>	DC 17 ... 30 V
Power consumption	Max. 0.5 W (max. 3 W during the heating phase of the humidity sensor)
Refresh rate	
Density	20 ms
Temperature	20 ms
Pressure	20 ms
Dew point	<ul style="list-style-type: none"> <li>■ 2 s (typical)</li> <li>■ Auto-adjustment cycle, every 30 min., adjustable</li> </ul>

Electrical connection	
<b>Connection type</b>	<ul style="list-style-type: none"> <li>■ Circular connector M12 x 1 (5-pin)</li> <li>■ Modbus® RTU via RS-485 interface</li> </ul>
<b>Ingress protection</b>	IP65, only when plugged in and using mating connectors with the corresponding ingress protection
<b>Electrical safety</b>	Protected against reverse polarity, protected against overvoltage

## Pin assignment

Circular connector M12 x 1 (5-pin)			
	1	-	-
	2	U <sub>B</sub> <sup>+</sup>	Supply voltage
	3	U <sub>B</sub> <sup>-</sup>	Ground
	4	A	Signal RS-485
	5	B	Signal RS-485

Material	
Material (in contact with the environment)	
Case	Stainless steel

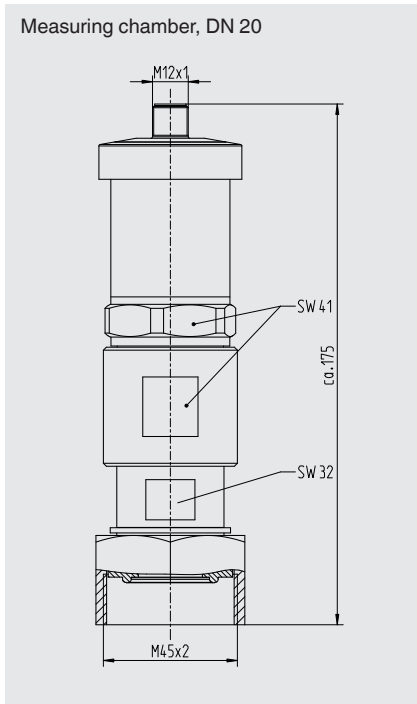
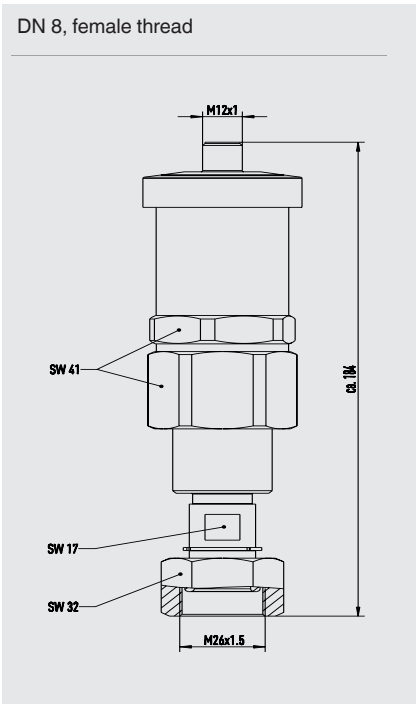
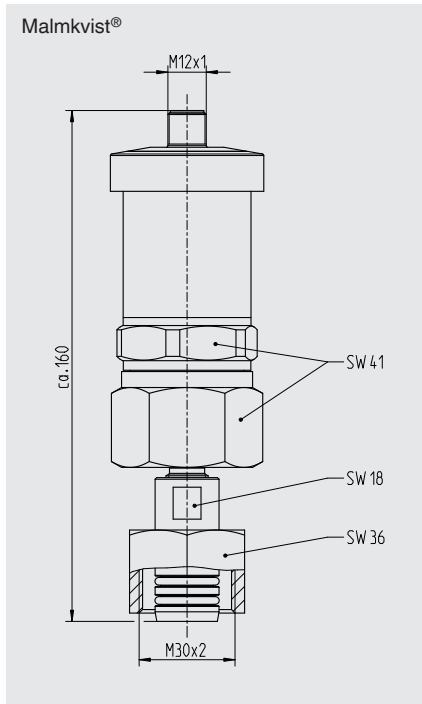
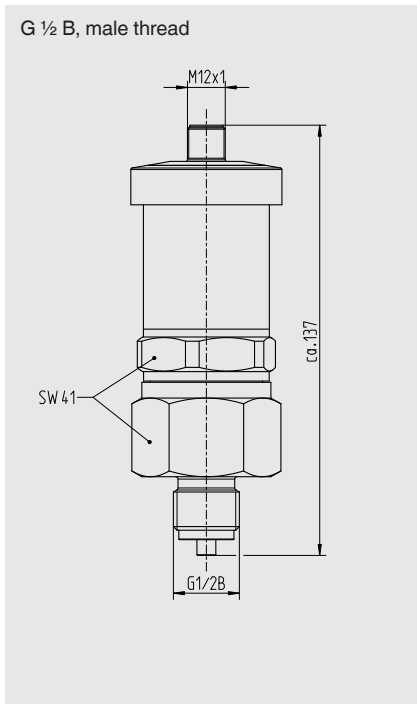
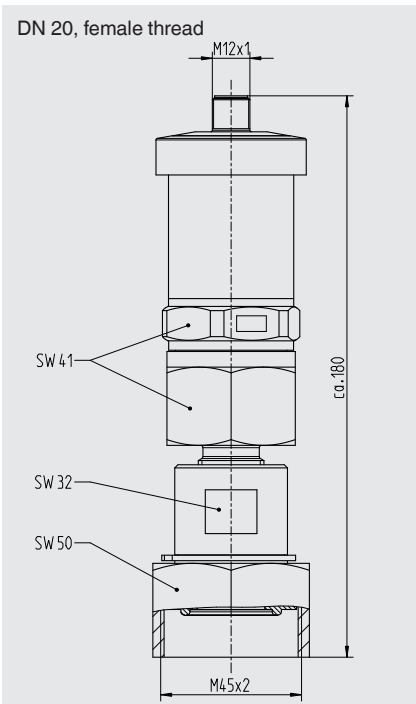
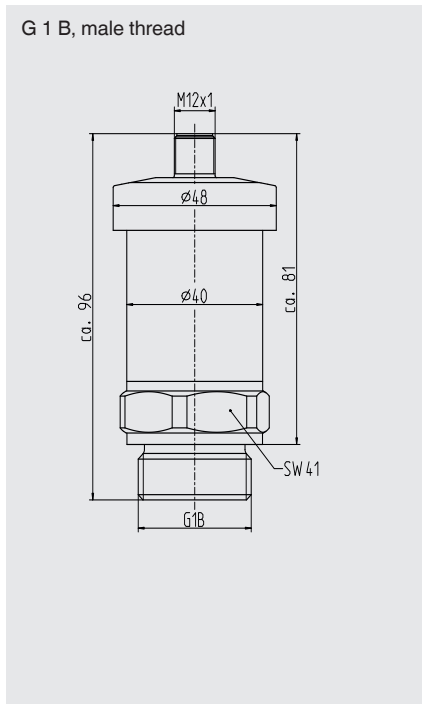
Operating conditions	
Ambient temperature range	-40 ... +80 °C [-40 ... +176 °F]
Permissible air humidity	≤ 90 % r. h. (non-condensing)
Dimensions	
Diameter	48 mm [1.89 in]
Height	96 mm [3.78 in]
Weight	approx. 0.4 kg [0.88 lbs]
EMC tests	
Immunity per IEC 61000-4-3	30 V/m (80 MHz ... 6 GHz)
Burst per IEC 61000-4-4	4 kV
Surge immunity 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
Conducted HF signals in accordance with IEC 61000-4-6	10 V (0.15 kHz ... 80 MHz)

## Approvals

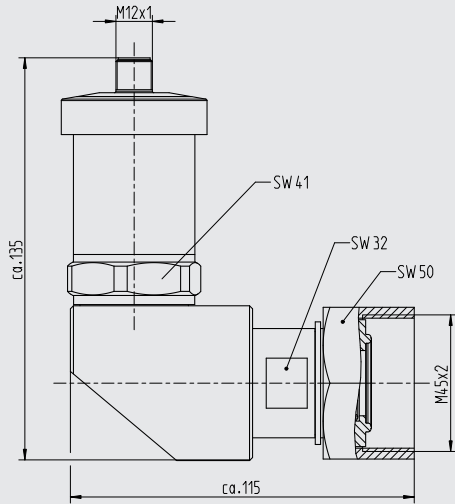
Logo	Description	Country
CE	<b>EU declaration of conformity</b>	European Union
	EMC directive, EN 61326 emission (group 1, class B) and immunity (industrial application)	
	RoHS directive	

→ For approvals and certificates, see website

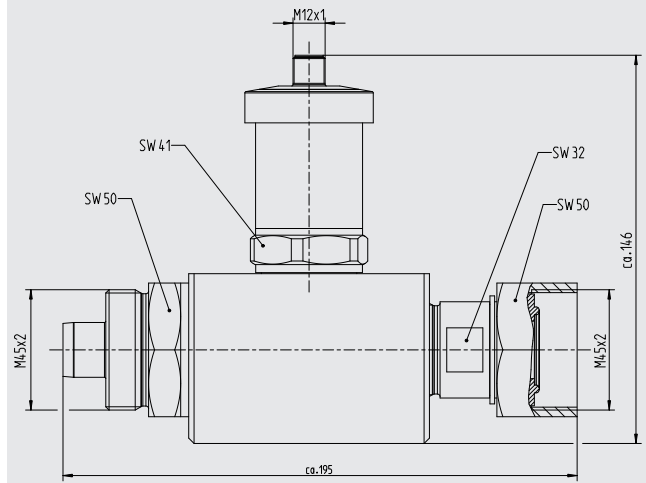
# Dimensions in mm



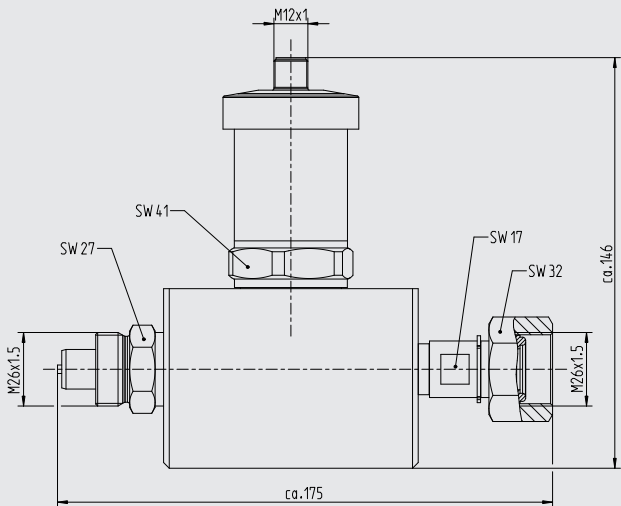
Measuring chamber, DN 20, 90° angled



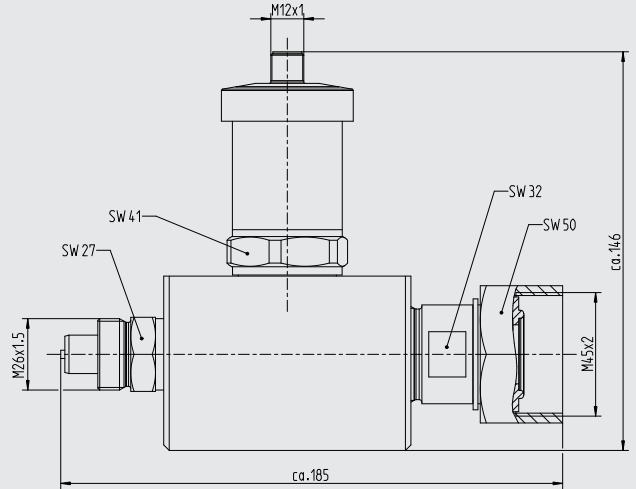
Measuring chamber, DN 20 male thread / DN 20 female thread



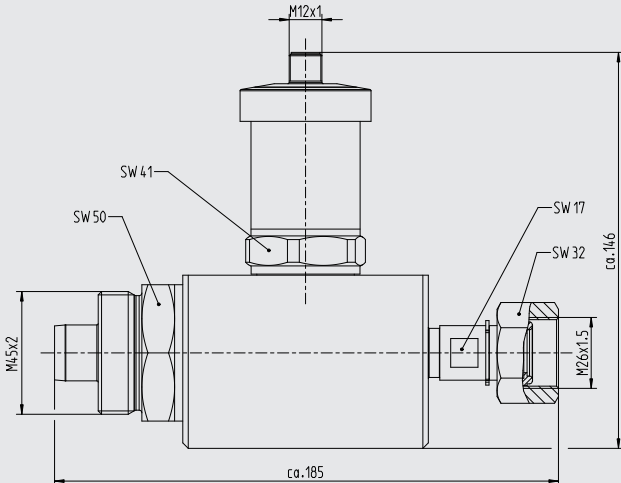
Measuring chamber, DN 8 male thread / DN 8 female thread



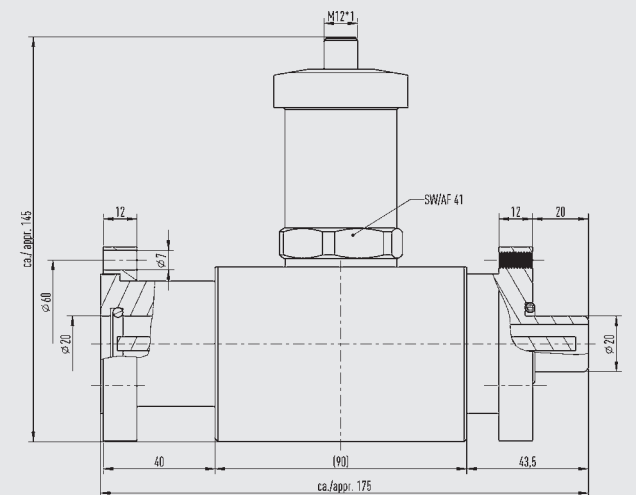
Measuring chamber, DN 8 male thread / DN 20 female thread



Measuring chamber, DN 20 male thread / DN 8 female thread



Measuring chamber, flange D70, female / flange D70, male



## Accessories and spare parts

Designation	Order number
<b>Modbus® startup kit for measured value recording and configuration, consisting of:</b> <ul style="list-style-type: none"> <li>■ Power supply unit for transmitter</li> <li>■ Cable with M12 x 1 connector</li> <li>■ Interface converter (RS-485 to USB)</li> <li>■ USB cable type A to type B</li> <li>■ Modbus® tool software</li> </ul>	14075896
<b>WIKAsoft-GD for configuration and testing of the sensor</b>	Free download from: <a href="http://www.wika.com/download">www.wika.com/download</a>

Sealing	Order number
<b>Sealing for G 1 B male thread process connection (included in the standard scope of delivery)</b>	14046738

Shielded cable, M12 x 1, AWG20	Order number
Length 1 m	14430138
Length 2 m	14430140
Length 3 m	14430141
Length 4 m	14430142
Length 5 m	14297684
Length 6 m	14430143
Length 7 m	14430144
Length 8 m	14430145
Length 9 m	14430148
Length 10 m	14297685
Length 15 m	14430149
Length 20 m	14430150
Length 25 m	14430151
Length 30 m	14430152
Length 50 m	14430153

### Ordering information

Model / Permissible ambient temperature / Process connection / Accessories

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