

## T 9510 EN

### Media 7 Differential Pressure Meter with remote data transmission



#### Application

Microprocessor-controlled transmitter with dp-cell for measuring and indicating the differential pressure, pressure or measured variables derived from them.

The Media 7 is suitable for liquids, gases and vapors, in particular for cryogenic gases, such as argon, oxygen and nitrogen.

The operating modes are adjustable as required:

- **Filling level measurement** (with operating pressure) in stationary pressure vessels and transportation vehicles
- **Differential pressure measurement** between flow and return flow pipe as well as pressure drop measurement across valves and filters

#### Special features

- Microprocessor-controlled transmitter with digital interface
- Modular design: easy to install or exchange optional additional functions by inserting option modules (four slots in the device)
- Cabled data transmission or optional remote data transmission over the integrated GSM module
- Measuring ranges between 0 to 160 mbar and 0 to 3600 mbar
- Pressure rating PN 60
- Internal absolute pressure sensor
- Modular power supply unit with standby power supply (SPS)
- 4" backlit graphics display
- Certification for Zone 0 (flammable gases and liquids)
- Configuration and programming using the TROVIS-VIEW software
- Capacitive keys facilitate operation
- Start-up wizard
- Volume and mass measurements in any type of vessel using a calculation or a freely programmable characteristic
- Zero and span adjustment activated by key without influencing each other



Fig. 1: Media 7 with integrated GSM module

## Versions

### – Two-wire version

#### – Type 5007-1-000x...

To operate the two-wire version, a transmitter supply voltage for the 4 to 20 mA current loop is required ( $U_b = 12$  to 36 V DC for the version without explosion protection).

#### – Type 5007-1-1xx0....

To operate the two-wire version, a transmitter supply voltage for the 4 to 20 mA current loop is required ( $U_b = 12$  to 28 V DC for the version with explosion protection).

The current loop must be supplied only by a supply unit which has an equivalent or higher explosion protection approval. Its electrical connection data must be lower or identical to those in the explosion protection certificate of the Type 5007-1-1xx0.. device.

### – 24 V version · Type 5007-xxx1...

The 24 V version has a wider ambient temperature range. Due to a more powerful input signal, it has additional functions, such as an illuminated display and remote data transmission through the use of a retrofittable GSM module.

### – 230 V version · Type 5007-1-xxx2...

Due to a more powerful input signal, the 230 V version has additional functions, such as an illuminated display and remote data transmission through the use of a retrofittable GSM module.

## Design and principle of operation

The differential pressure meter is a microprocessor-controlled transmitter with dp-cell for measuring, indicating and transmitting the differential pressure, pressure or measured variables derived from them in stationary pressure vessels and in transportation vehicles. The device is suitable for cryogenic gases, liquids, gases and vapors. Measuring ranges between 0 to 100 mbar and 0 to 3600 mbar, nominal pressure PN 60.

The device mainly consists of a dp-cell (1), housing with transmitter and a display (6).

The differential pressure  $\Delta p = p_1 - p_2$  is converted into an electric signal in the dp-cell by a sensor and processed in the microcontroller (2) which controls the LCD and D/A converter of the two-wire version.

Four capacitive keys (4) are used to operate the differential pressure meter and allow users to navigate within the menu on the display.

### Measurement tasks

The differential pressure of liquids, vapors and gases are measured by the integrated dp-cell in the Media 7 device. The measured differential pressure is used for various possible applications.

#### – Differential pressure measurement

Two absolute pressures  $p_1$  and  $p_2$  are compared for the differential pressure measurement. This allows, for example the filters to be monitored by measuring the upstream and downstream pressures at the filter.

#### – Liquid level measurement

The tank content (function of hydrostatic pressure, tank geometry and liquid density of the stored gas) is displayed proportionally and the operating pressure is indicated in the selected unit on the display.

### Power supply unit with standby power supply (SPS)

The power supply units include a battery compartment for a 1.5 V battery (not included in the scope of delivery) which provides standby power supply upon power failure. The interchangeable power supply boards allow the supply of 4 to 20 mA, 24 to 36 V (DC) or 100 to 230 V (AC) to be simply adapted to the local conditions.

## Block diagrams

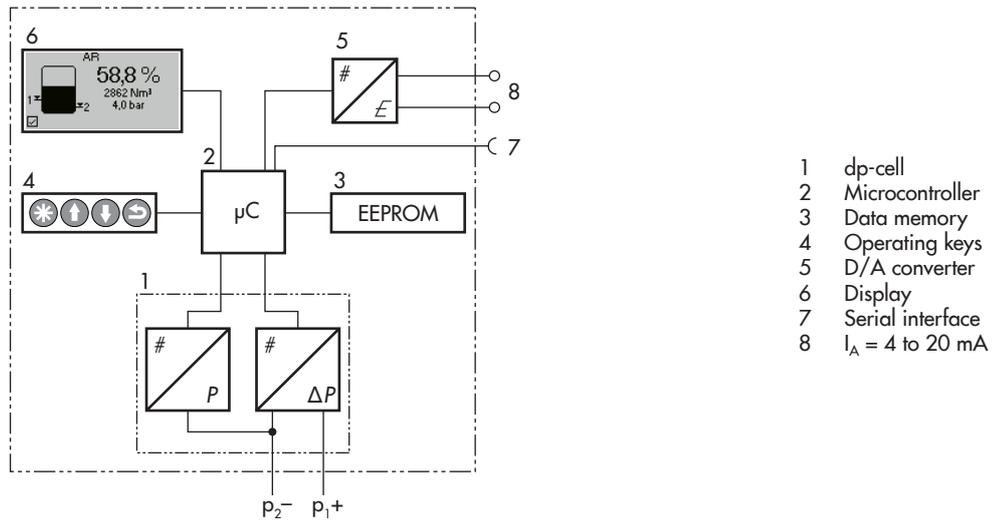


Fig. 2: Two-wire version

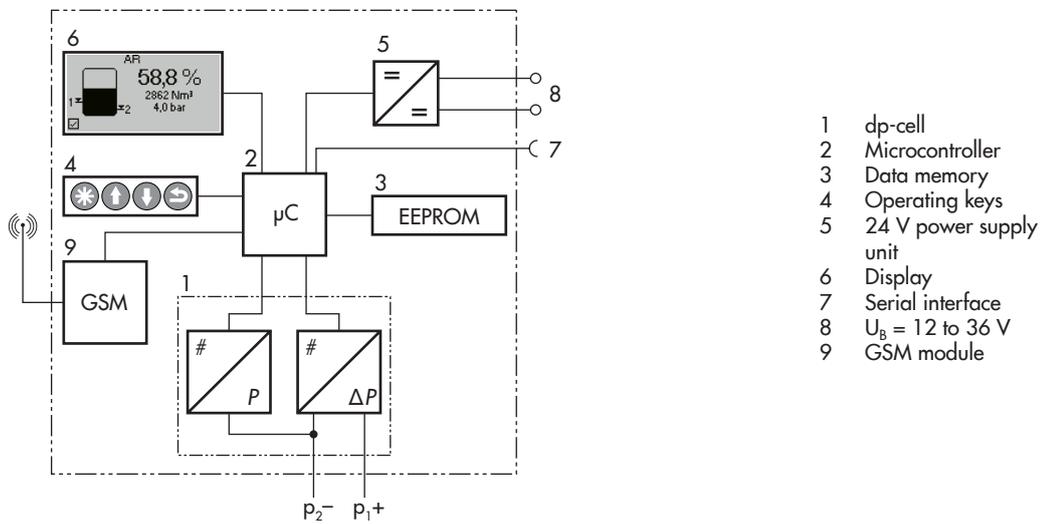


Fig. 3: 24 V version

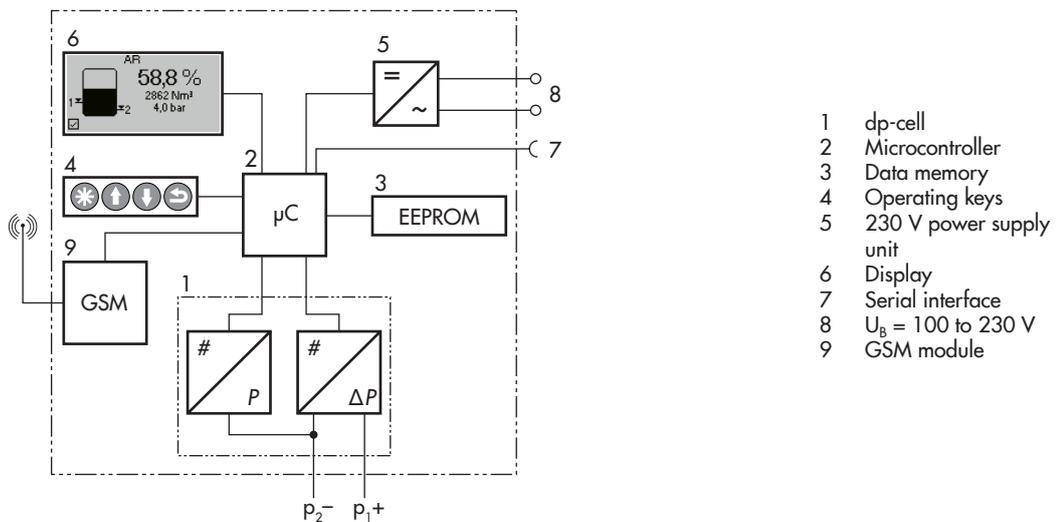


Fig. 4: 230 V version

### Optional additional functions

The modular design of the Media 7 Differential Pressure Meter allows it to be tailored to meet specific requirements. Additional functions are available through the use of option modules. A GSM module is also available for the 24 V and 230 V versions of the Media 7 device.

#### – AO: Analog output

The **AO: Analog output** option module issues an internal measuring signal (4 to 20 mA) representing the tank pressure or, depending on the operating mode, the filling level or differential pressure. The analog output parameters can be configured.

#### – AI: Analog input

The **AI: Analog input** option module accepts 4 to 20 mA signals from filling level or pressure sensors of external equipment with their own power supply. This module works passively and has galvanically isolated inputs.

#### – AIA: Analog input active

The **AIA: Analog input active** option module accepts 4 to 20 mA signals from filling level or pressure sensors of external equipment. This module works actively and has a 12 V output to power external equipment that do not have their own power supply.

#### – GSM module

A GSM module is available for the 24 V and 230 V versions of the Media 7 device. The GSM module establishes connection to the SAM TANK MANAGEMENT web interface over a mobile network. It ensures a secure data exchange, polling of states as well as monitoring and operation of the Media 7 (see Fig. 5).

**Accessories** (see page 11 for recommended accessories)

#### – Valve block

Three valves are combined in the valve block for Media 7. The valve block is bolted onto the bottom of the Media 7 dp-cell. It offers the following advantages:

- Mounting of an operating pressure gauge
- The connected measuring lines can be bypassed. This allows a zero calibration to be performed regardless of the current filling level of the tank.

Details on the valve block: see accessories for the Media Series ▶ T 9555

#### – Further accessories

A list of available accessories for the Media Series can be found in the Data Sheet ▶ T 9555.

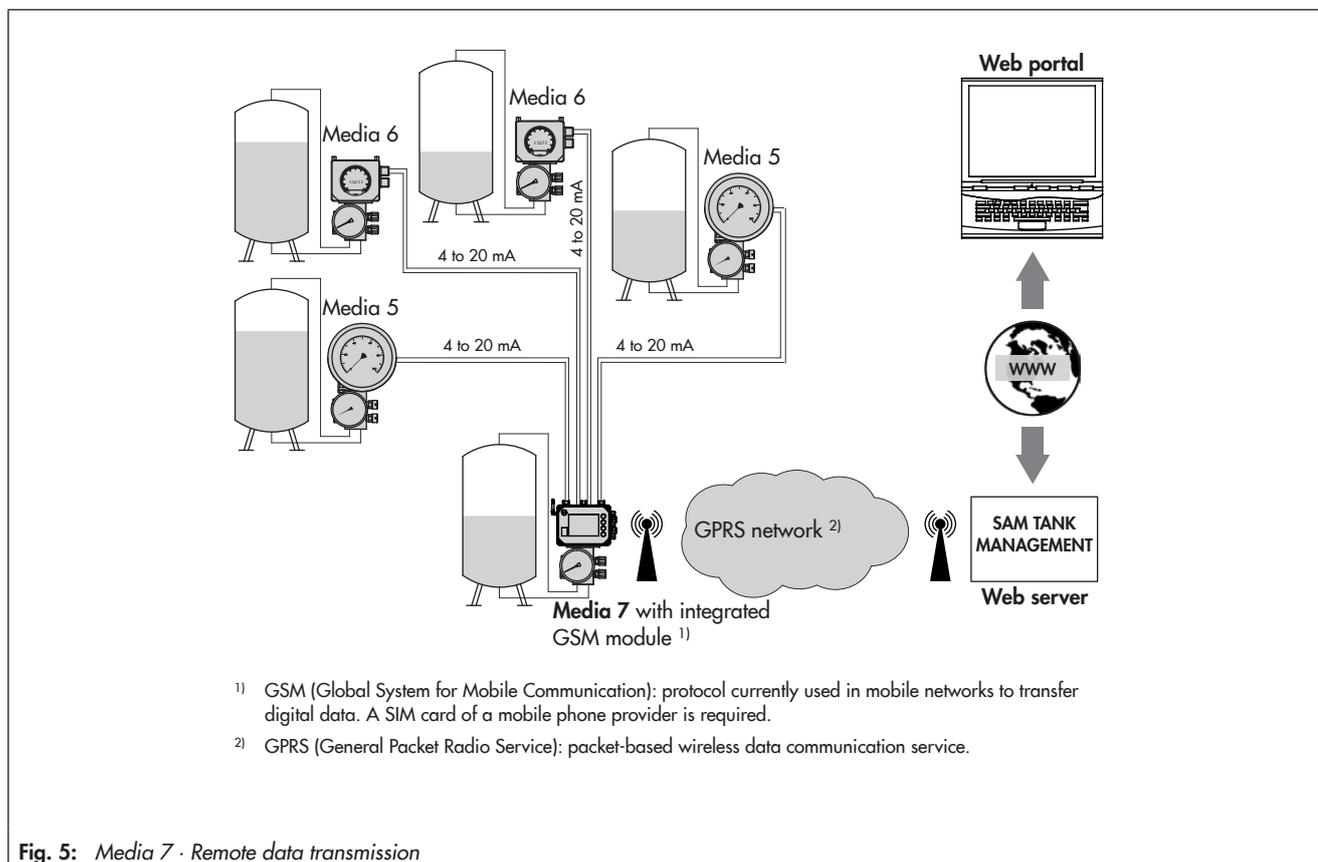


Fig. 5: Media 7 · Remote data transmission

## Technical data

**Table 1: General technical data**

<b>Media 7 Differential Pressure Meter</b> (All pressure in bar (gauge); all errors and deviations are specified in % of the adjusted measuring span)				
Mounting orientation	Upright with display facing sideways			
Principle of operation	The differential pressure at the diaphragm is converted into an electric signal by the AMR system.			
Pressure rating	PN 60, overloadable on one side up to 60 bar Oxygen: PN 50, overloadable on one side within the adjusted system pressure			
Characteristic	Differential pressure proportional to the tank geometry			
Deviation from terminal-based linearity	<±1.6 % (including hysteresis)			
Sensitivity	≤0.25 % or <±0.5 % depending on measuring span selected			
Effect of static pressure	<0.03 %/1 bar			
<b>Display</b>				
Display	LCD 128 x 64 (90 x 40 mm)			
Storage temperature	-40 to approx. +80 °C			
Operating temperature	Two-wire version: -20 to approx. +70 °C <sup>1)</sup> 24 V version: -40 to +70 °C 230 V version: -20 to approx. +70 °C <sup>1)</sup>			
Measuring range in mbar	0 to 160	0 to 600	0 to 1600 <sup>2)</sup>	0 to 3600 <sup>2)</sup>
Adjustable measuring span in mbar				
Class ±1 %	-	≤630 to ≥150	≤1700 <sup>2)</sup> to ≥320	≤3800 <sup>2)</sup> to ≥720
Class ±1.6 %	≤170 to ≥60	≤150 to ≥120	-	-
Effect of ambient temperature in the range from -20 to +70 °C				
On zero in %/10 K	<±0.4	<±0.1	<±0.1	<±0.1
On span in %/10 K	<±0.4	<±0.1	<±0.1	<±0.1
<b>Internal absolute pressure sensor</b>				
Measuring range	0 to 60 bar			
Deviation from terminal-based linearity	<±1.6 %			
Effect of ambient temperature	≤0.018 % (within the range from -20 to +70 °C)			
<b>Environmental influences</b>				
Storage according to EN 60721-3-1 (long-term storage)	1K5 (air temperature -40 to +80 °C); 1M3 (The following restriction applies to GSM module: air temperatures -30 to +75 °C)			
Transportation according to EN 60721-3-2	2K4 (air temperature -40 to +40 °C in ventilated enclosures, up to +70 °C in unventilated enclosures), 2M1 (The following restriction applies to GSM module for low air temperatures down to -30 °C)			
Operation according to EN 60721-3-4 (stationary use at non-weather-protected locations)	4K4 (with restrictions: air temperature -40 to +55 °C, temperature inside the housing must not exceed +70 °C when exposed to direct sunlight); 4M4 - The display and GSM module are heated at low air temperatures (24 V version). - The restrictions for the oxygen testing additionally apply to versions for oxygen service: 50 bar/+60 °C. - Observe the limits in the test certificate for explosion-protected versions.			
<b>Mechanical vibration</b>				
Vibrations (sinusoidal) according to IEC 60068-2-6	2 to 9 Hz; 3.5 mm amplitude 9 to 200 Hz; 10 m/s <sup>2</sup> acceleration 200 to 500 Hz; 15 m/s <sup>2</sup> acceleration			
Random and guidance vibration according to IEC 60068-2-64	1.0 m <sup>2</sup> /s <sup>3</sup> ; 10 to 200 Hz 0.3 m <sup>2</sup> /s <sup>3</sup> ; 200 to 2000 Hz			
Shocks according to IEC 60068-2-27	Acceleration 100 m/s <sup>2</sup> ; duration 11 ms			
<b>Requirements</b>				
EMC	Devices with a CE marking fulfill the requirements of the Directive 2014/30/EU. Compliance with EN 61000-6-2, EN 61000-6-3, EN 61326-1 and NAMUR Recommendation NE 21 <sup>3)</sup> .			
Degree of protection	IP 67 according to IEC 60529 (VDE 470 Part 1, 2014-09)			
<b>Explosion protection</b>				
Type of protection	ATEX/IECEX: Ex ia IIB T4 Gb Devices with a CE marking fulfill the requirements of the Directive 2014/34/EU.			
<b>Oxygen service</b>				
Gaseous oxygen (process medium)	Operating temperature from -40 to +60 °C at max. 50 bar operating pressure (applies to parts inside and on the device which are included in the oxygen testing)			

Electrical connections	
Cable glands	M16 x 1.5 (max. 5)
Terminals	0.2 to 2.5 mm <sup>2</sup> wire cross-section
Spring-cage terminals (option modules)	0.13 to 1.5 mm <sup>2</sup> wire cross-section
Communication	
Local	SAMSON SSP interface and serial interface adapter, TROVIS-VIEW
Remote data transmission	GSM module
Weight	
Device without valve block	Approx. 3300 g
Device with valve block (without pressure gauge)	Approx. 5200 g

<sup>1)</sup> Impaired operation and readability may arise outside the temperature range. Measurement is not influenced in the range between -40 and +70 °C.

<sup>2)</sup> A class accuracy of 0.6 % can be expected in these measuring ranges with measuring spans ≤100 % to ≥75 % of the nominal range.

<sup>3)</sup> Differential pressure meters with the following article codes meet requirements of the NE 21 Recommendation: 5007-1-xxx0xxxx00xxxxxxx, 5007-1-xxx1xxx00xxxxxxx

**Table 2: Power supply**

Optional power supply					
Two-wire version	5007-1-0000	5007-1-1100	5007-1-1110	5007-1-1200	5007-1-1210
Explosion protection	No explosion protection	ATEX Ex ia	IECEX Ex ia	ATEX Ex ia	IECEX Ex ia
Output	4 to 20 mA				
Permissible load $R_B$ in $\Omega$	$R_B = (U_B - 12 \text{ V})/0.020 \text{ A}$				
Output circuit	–	Intrinsically safe according to EN/IEC 60079-11			
Power supply $U_B$ for two-wire transmitter	12 to 36 V DC	12 to 28 V DC (only in conjunction with an intrinsically safe circuit)			
24 V version		5007-1-0001			
Input voltage	24 to 36 V DC				
Output voltage	12 V DC				
Power	24 W				
Version	Reverse polarity protection				
230 V version		5007-1-0002			
Input voltage	100 to 230 V/50 Hz · 100 to 110 V/60 Hz				
Output voltage	14 V DC				
Power	Max. 10 W				

**Table 3: Optional additional functions**

AO: Analog output	
Version	Two-wire system, galvanic isolation, reverse polarity protection, reversible direction of action
Power supply	10 to 30 V DC
Output signal	4 to 20 mA
Operating range	3.8 to 20.5 mA (according to NAMUR Recommendation NE 43)
Error indication	3.4 or 21.6 mA
No-load current	1.36 mA
Static destruction limit	38 V DC · 30 V AC
Suitability	For Media 7: two-wire, 24 V and 230 V versions
AI: Analog input	
Version	4 to 20 mA current input, externally powered, galvanically isolated, reverse polarity protection
Load impedance	≤5.0 V external (corresponding to ≤200 $\Omega$ at 20 mA)
Measuring range	0.1 to 21.6 mA
Accuracy	≤0.5 %
Resolution	20 $\mu$ A
Effect of temperature	0.1 %/10 K
Static destruction limit	38 V DC · 30 V AC
Suitability	For Media 7: 24 V version with GSM module and 230 V version with GSM

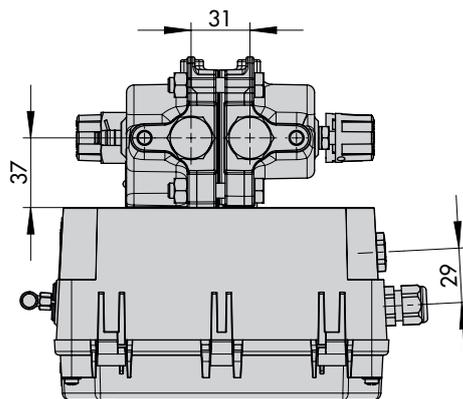
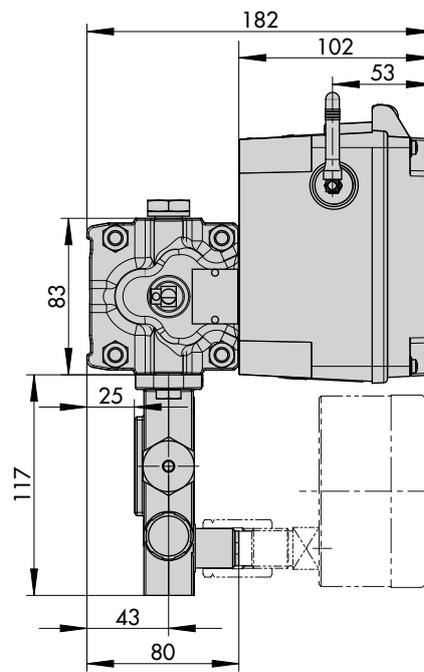
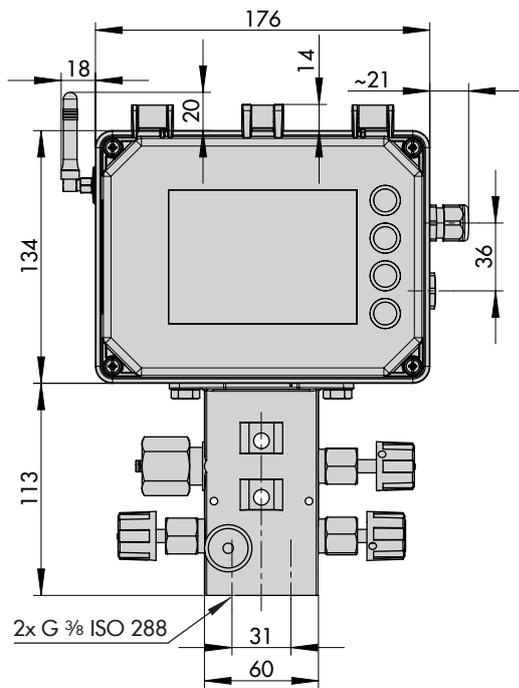
<b>AIA: Analog input active</b>	
Version	4 to 20 mA current input, internally powered, reverse polarity protection
Load impedance	≤1 V internal (corresponds to ≤50 Ω at 20 mA)
Output voltage at the terminal	≥12 VDC to power external two-wire devices
Measuring range	0.1 to 21.6 mA
Accuracy	≤0.5 %
Resolution	20 μA
Effect of temperature	0.1 %/10 K
Static destruction limit	38 V DC - 30 V AC
Suitability	For Media 7: 24 V version with GSM module and 230 V version with GSM
<b>GSM module for remote data transmission</b>	
GSM frequency	E-GSM 850/900/1800/1900 MHz
Power output	Class 4 (2 W) with 850/900 MHz; Class 1 (1 W) with 1800/1900 MHz
Antenna connection	SMA connector in housing wall
Right-angle antenna	Type 2J010: SMA R/A male
Color	Black
Rating	25 W
Impedance	50 Ω
Polarization	Vertical
Frequency	GSM (900 MHz), AMPS (824-894 MHz), ISM (868 MHz), DCS (1800 MHz), PCS (1900 MHz), 3G (UMTS 2.1 GHz)
SIM card	M2M Industrial Plug in High Temperature, operating temperature: -40 to +105 °C; Provider: Telefonica Germany GmbH
Operating temperature	-40 to +70 °C (with active heating control)
Storage temperature	-30 to +75 °C
Web interface	SAM TANK MANAGEMENT
Suitability	For Media 7: 24 V and 230 V versions

**Table 4: Materials**

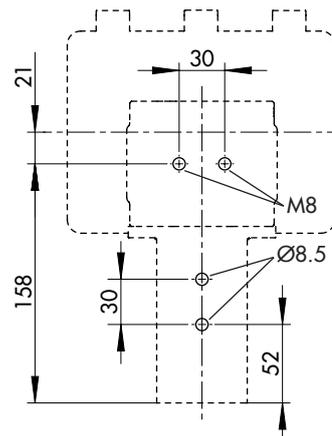
<b>dp-cell</b>	
dp-cell housing, high-pressure and low-pressure chambers	Brass CW617N-H070 (according to DIN EN 12420)
Elastomers	Standard cryogenic gases, oxygen, flammable gases of Group I: ECO 60 Shore A; Further versions: FPM/FKM, EPDM, NBR
Springs and diaphragm plate	Corrosion-resistant steel
Screw fitting of process connections	Corrosion-resistant steel A2-70 and A4-70
Screw plugs	Brass CW608N-R380
<b>Electronics housing and indicating unit</b>	
Housing	UV-stabilized polycarbonate
Screws (housing)	Corrosion-resistant high-grade steel
Cover (transparent)	UV-stabilized polycarbonate
Screw fastenings (cover)	Corrosion-resistant high-grade steel
Cable glands	Polyamide with NBR seal

**Table 5: Summary of explosion protection approvals**

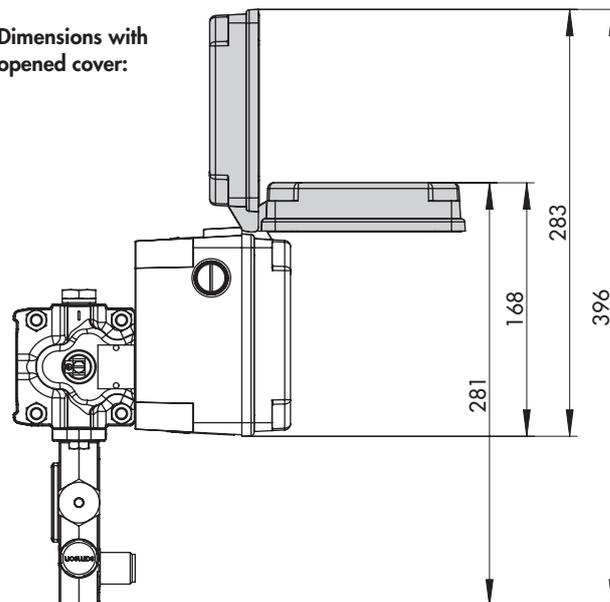
	<b>Certification</b>			<b>Type of protection/comments</b>
Type 5007-1	 EU type examination certificate	Number	KIWA 17ATEX0041X	II 2 G Ex ia IIB T4 Gb
		Date	2018-06-01	
	 EU type examination certificate	Number	KIWA 17ATEX0041X	II 1/2 G Ex ia IIB T4 Ga/Gb
		Date	2018-06-01	
-111	<b>IECEX</b>	Number	IECEX KIWA 17.0020X	Ex ia IIB T4 Gb
-121	<b>IECEX</b>	Number	IECEX KIWA 17.0020X	Ex ia IIB T4 Ga/Gb
		Date	2018-06-01	



Drill pattern for wall/panel mounting:



Dimensions with opened cover:



**Table 6:** Article code/order number

Media 7	5007-1-	x	x	x	x	x	x	x	x	x	x	0	x	x	x	x	x	x	x
With 4" LCD																			
Explosion protection																			
Without	0	0	0																
<b>ATEX:</b> II 2G Ex ia IIB T4 Gb	1	1	0																
<b>IECEX:</b> Ex ia IIB T4 Gb	1	1	1																
<b>ATEX:</b> II 1/2G Ex ia IIB T4 Ga/Gb	1	2	0																
<b>IECEX:</b> Ex ia IIB T4 Ga/Gb	1	2	1																
Energy supply																			
Two-wire				0															
Power supply unit, 24 to 36 V DC				1															
Power supply unit, 100 to 230 V AC				2															
Option module slot 1																			
Without				0															
AO: Analog output				5															
AI: Analog input				4															
AIA: Analog input active				6															
Option module slot 2																			
Without				0															
AO: Analog output				5															
AI: Analog input				4															
AIA: Analog input active				6															
Option module slot 3																			
Without				0															
AO: Analog output				5															
AI: Analog input				4															
AIA: Analog input active				6															
Option module slot 4																			
Without				0															
AO: Analog output				5															
AI: Analog input				4															
AIA: Analog input active				6															
GSM module with antenna																			
Without										0									
GSM module with antenna (including SIM card) <sup>1)</sup>										2									
dp-cell material																			
Brass												0							
Measuring range																			
160 mbar													0	2					
600 mbar													0	5					
1600 mbar													0	7					
3600 mbar													0	9					

<sup>1)</sup> The version with GSM module requires the connection to the SAM TANK MANAGEMENT web portal as well as a service agreement. Monthly fees are incurred in this case.

<b>Media 7</b>		<b>5007-1- x x x x x x x x x x 0 x x x x x x x x</b>									
Diaphragm											
ECO: -40 to +80 °C, REACH compliant		0									
Version											
Version for cryogenic gases according to DIN EN ISO 23208, packed in plastic bags, free of oil and grease according to company standard WN 1.34-2 Sheets 1 and 1.1		1	1								
Version for oxygen according to DIN EN ISO 23208, packed in plastic bags, free of oil and grease according to company standard WN 1.34-2 Sheets 1 and 1.1		1	2								
Pressure rating											
50 bar, version for oxygen service, without valve block										1	
60 bar, without valve block										2	
50 bar, with valve block PN 50										3	
Pressure sensor											
Without											1
With, non-flammable gases (Ex Zone 0)											2

## Accessories

We recommend the following accessories (see Fig. 6) for use with the Media 7 device:

Item	Accessories	Ordering specifications
1	Valve block	Valve block: [yes/no]
2	Pressure gauges	Pressure gauge: [yes/no] + measuring range specifications (e.g. 25 bar)
3	Screw plugs	Screw plugs: [yes/no]
4	Screw fittings for process connections	Screw fittings for process connections: [yes/no] + pipe diameter specification [6/8/10/12 mm]

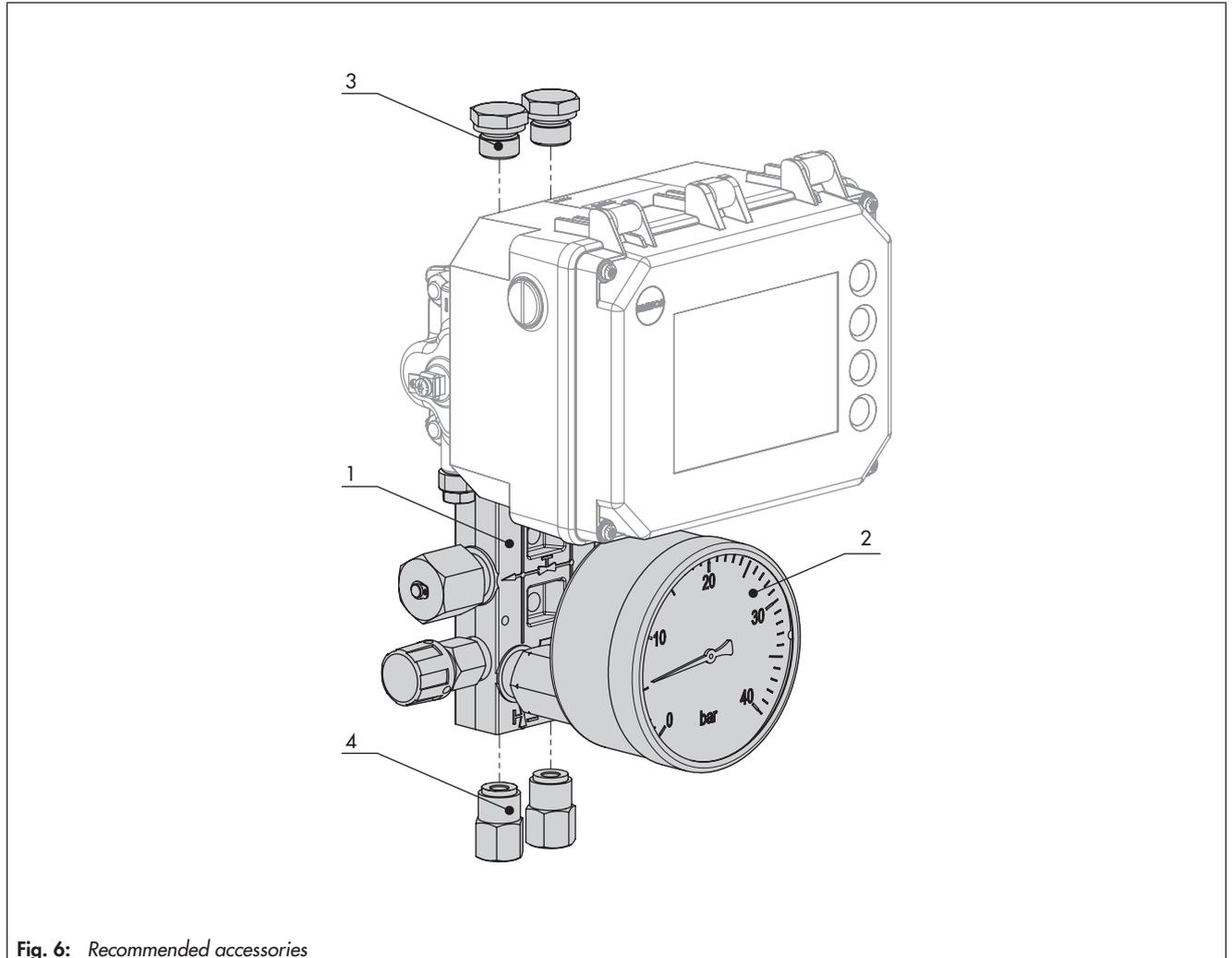


Fig. 6: Recommended accessories

### Tip

We recommend to protect the differential pressure meter with a sun shield (material no. 100112667) for mounting positions in which the differential pressure meter is exposed to direct sunlight.

Details and other accessories are listed in the Information Sheet ► T 9555.

### Ordering text

#### Media 7 Differential Pressure Meter

Order number from Table 6: Type 5007-1-...

Special version ...

### Data logging

Data need to be made available about the tank characteristics and the stored gas for the factory settings of the display reading and the 4 to 20 mA two-wire signal to ensure that they are proportional to the tank content.

You can enter these data in the Specification Sheet

▶ T 9510-9.

### Certificates and approvals

- CE compliance
- Explosion protection approval according to ATEX/IECEX
- Oxygen service, test report No. 2017/R211 based on DIN EN ISO 7291