

SITRANS P

Transmitters for differential pressure and flow

Introduction



HK series



DS series with PROFIBUS-PA

Fig. 1/16 SITRANS P transmitters for differential pressure and flow, with built-in analog indicator or digital display

Application

The transmitter measures

- the differential pressure,
- low pressures above or below atmospheric pressure,
- the flow $q \sim \sqrt{\Delta p}$ (in conjunction with a primary differential pressure device)

of gases, vapors and liquids. Different spans are possible depending on the version.

The output signal is a load-independent direct current of 4 to 20 mA or a digital bus signal where a linear characteristic (proportional to the differential pressure) or a square-rooted characteristic (proportional to the flow) can be selected.

Transmitters conforming to the type of protection "Intrinsic safety" and "Explosion-proof" may be installed within potentially explosive atmospheres (zone 1). The conformity certificate corresponds to the European standard (CENELEC), the American standard (FM) or the Canadian standard (CSA).

The transmitters can be equipped with various designs of remote seals for special applications such as the measurement of highly viscous substances.

Adjustable spans

Series	Span in bar
	1 to 30,000
HK	
DS	
DS (PA)	Measuring cells from 20 mbar to 30 bar

Types of protection and conformity certificates

Series	Type of protection		Conformity certificate	
	Intrinsic safety	Explosion-proof	CENELEC	FM/CSA
HK	●		●	
DS	●	●	●	●
DS (PA)	●	●	●	○

● = Exists

○ = In planning

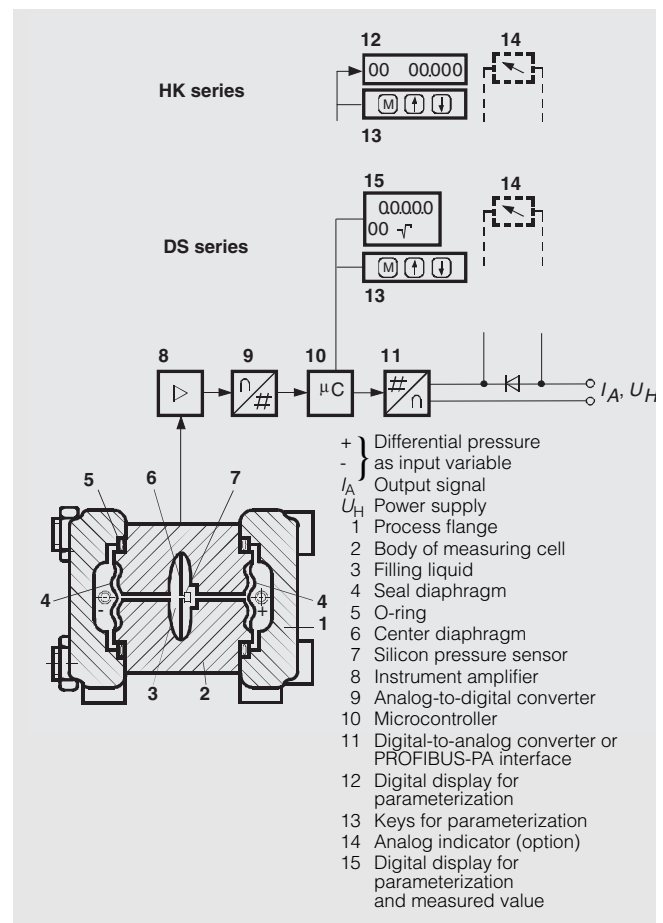


Fig. 1/17 Functional diagram

Mode of operation

The differential pressure is applied via the seal diaphragm (4, Fig. 1/17) and the filling liquid (3) to the silicon pressure sensor (7). If the measuring limits are exceeded, the overload diaphragm (6) is flexed until one of the seal diaphragms (4) rests on the measuring self body (2), thus protecting the silicon pressure sensor (7) from overloading.

The measuring diaphragm is flexed by the applied differential pressure. The resistance of four piezo-resistors fitted in the diaphragm in a bridge circuit thus changes. This change in resistance results in a bridge output voltage proportional to the differential pressure. This voltage is amplified and converted into a digital signal by means of an analog-to-digital converter (9). This signal is evaluated by a microcontroller (10), and its linearity and temperature response corrected. The signal processed in this manner is converted in a digital-to-analog converter (11) into an output current of 4 to 20 mA, or via the PROFIBUS-PA interface into a digital bus signal.

The data specific to the measuring cell as well as the data for parameterization of the transmitter are stored in a non-volatile EEPROM.

Parameterization

Depending on the version, there are different possibilities for parameterizing the transmitter and for setting or scanning the parameters.

Parameterization using the input keys (local operation)

The input keys can be used to simply set the most important parameters without any additional equipment.

Parameterization using HART communicator

When parameterizing with the HART communicator, the connection is made directly to the two-wire system (Fig. 1/18). When parameterizing with a laptop or PC, the connection is made via a HART modem (Fig. 1/19).

The signals required for communication according to the HART protocol 5.x are superimposed on the output current according to frequency shift keying (FSK).

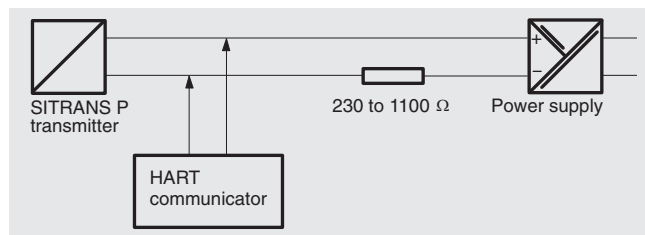


Fig. 1/18 Communication between HART communicator and transmitter

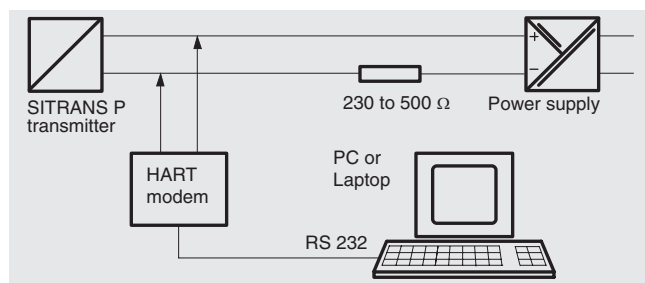


Fig. 1/19 Communication between PC or laptop and transmitter

Elements for parameterization of transmitter

Parameterization using	HK	DS
3 external keys	●	●
Built-in digital display	●	●
Laptop, PC		●
HART communicator		●
PROFIBUS-PA interface		●

Adjustable parameters which can also be displayed

	HK	DS
Start-of-scale and full-scale values with application of a pressure	●	●
Start-of-scale and full-scale values without application of a pressure ("Blind setting")	●	●
Characteristic (linear or square-rooted)	●	●
Application point of square-rooted characteristic	●	●
Damping	●	●
Current transmitter function	●	●
Zero adjustment	●	●
Output signal in event of fault	●	●
Disabling of keys for operation	●	●
Measured-value display in % or mA	●	●
Measured-value display of physical unit		●
Measuring-point number (abbreviation, max. 16 characters)		●
Measuring-point description (max. 27 characters)		●
Message		●
Range limits		●
Transmitter version (e.g. material)		●
Slave pointer (only PROFIBUS-PA)		●
Further displays and parameters		●

● Possible

Parameterization via PROFIBUS-PA interface

SITRANS P transmitters with a PROFIBUS-PA interface (Fig. 1/20) are parameterized, starting from a master, using signals transmitted via PROFIBUS-DP and converted by a SIMATIC DP/PA coupler with power supply into a signal for PROFIBUS-PA. A bus terminator is required for cable lengths > 2 m.

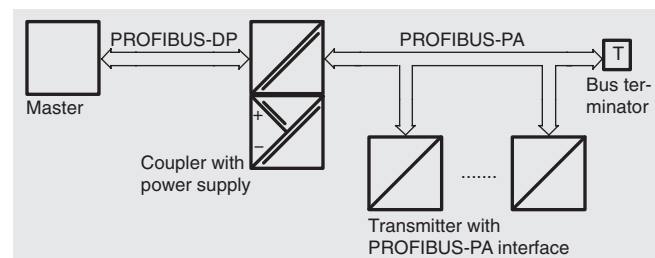


Fig. 1/20 Communication via PROFIBUS-PA interface

SITRANS P

Transmitters for differential pressure and flow

Technical data

Technical data

	HK 7MF4420, MF4520	DS 7MF4432, 7MF4532	DS with PROFIBUS-PA 7MF4432, 7MF4532
Application		See page 1/28	
Mode of operation		See page 1/29	
Measuring principle		Piezo-resistive	
Input			
Measured variable		Differential pressure and flow	
Measuring range			
• Span (continuously adjustable)			
- Nominal pressure PN 32	1 mbar to 20 mbar	1 mbar to 20 mbar	20-mbar measuring cell
- Nominal pressure PN 160	6 mbar to 30 bar	1 mbar to 30 bar	Measuring cells from 60 mbar to 30 bar
- Nominal pressure PN 420	25 mbar to 30 bar	2.5 mbar to 30 bar	Measuring cells from 250 mbar to 30 bar
• Lower measuring limit			
- Measuring cell with silicone oil filling		30 mbar (absolute)	
- Measuring cell with inert filling liquid			
For process temp. $-20\text{ °C} < \vartheta \leq 60\text{ °C}$		30 mbar (absolute)	
For process temp. $+60\text{ °C} < \vartheta \leq 100\text{ °C}$ (max. $+85\text{ °C}$ for 30-bar measuring cell)		30 mbar + 20 mbar · ($\vartheta - 60$) (absolute)	
• Upper measuring limit	100 % of max. span	100 % of max. span	–
• Start-of-scale (continuously adjustable)	Between the measuring limits	Between the measuring limits	–
Output			
Output signal	4 to 20 mA	4 to 20 mA	Digital bus signal
• Lower limit	3.84 mA	3.84 mA	Digital status signal
• Upper limit	22 mA	20.5 or 22 mA	Digital status signal
• Electric damping			
- Adjustable time constant		0 to 100 s	
• Current transmitter	Adjustable to 3.6, 4.0, 12.0, 20.0 or 22.8 mA	Adjustable from 3.6 to 22.8 mA	–
Signal on alarm	3.6 or 22.8 mA	3.6 or 22.8 mA	Digital status signal
Load			
• Without HART communication	$R_B \leq (U_H - 11\text{ V})/0.023\text{ A}$ in Ω , U_H : power supply in V	$R_B \leq (U_H - 11\text{ V})/0.023\text{ A}$ in Ω , U_H : power supply in V	–
• With HART communication	–	$R_B = 230$ to $500/1100\ \Omega$	–
Characteristic	Linear rising, linear falling or square-rooted (start of square-rooting adjustable between 5 % and 15 % of max. flow, linear below this value)	Linear rising, linear falling or square-rooted (start of square-rooting adjustable between 5 % and 15 % of max. flow, either linear or constant 4 mA below this value)	–
Accuracy			
Reference conditions	Increasing characteristic, start-of-scale value 0 bar, stainless steel seal diaphragm, silicone oil filling and limit point setting. $r = \text{max. span/set span}$		
Error in measurement (including hysteresis and repeatability)			
• Linear characteristic	$\leq 0.1\ %$	$\leq 0.1\ %$ at $r \leq 10$ $\leq 0.2\ %$ at $10 < r \leq 30$ $(0.005 \cdot r + 0.05)\ %$ at $30 < r \leq 100$	$\leq 0.1\ %$
• Square-root characteristic			
- Flow $> 50\ %$	$\leq 0.1\ %$	$\leq 0.1\ %$ at $r \leq 10$ $\leq 0.2\ %$ at $10 < r \leq 30$	–
- Flow 25 to 50 %	$\leq 0.2\ %$	$\leq 0.2\ %$ at $r \leq 10$ $\leq 0.4\ %$ at $10 < r \leq 30$	–
• Repeatability		Included in error in measurement	
• Hysteresis		Included in error in measurement	
Response time (T_{63} , without electric damping)		Approx. 0.2 s Approx. 0.3 s with 20-mbar and 60-mbar measuring cells	
Long-term drift	$\leq 0.1\ % / 12$ months with max. span	$\leq 0.1\ % / 12$ months with max. span	$\leq 0.1\ % / 12$ months
Ambient temperature effect (twice the value with 20-mbar measuring cell)			
• At -10 to $+60\text{ °C}$	$\leq (0.1 \cdot r + 0.2)\ %$	$\leq (0.1 \cdot r + 0.2)\ %$	$\leq 0.3\ %$
• At -40 to -10 °C and at $+60$ to $+85\text{ °C}$	$\leq (0.1 \cdot r + 0.15)\ % / 10\text{ K}$	$\leq (0.1 \cdot r + 0.15)\ % / 10\text{ K}$	$\leq 0.25\ % / 10\text{ K}$

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	HK 7MF4420, MF4520	DS 7MF4432, 7MF4532	DS with PROFIBUS-PA 7MF4432, 7MF4532
Accuracy (continued)			
Influence of static pressure			
• On start-of-scale value	≤ 0.15 % per 100 bar at max. span; with 20-mbar cell per 32 bar		
• On span	≤ 0.2 % per 100 bar; with 20-mbar cell per 32 bar		
Influence of mounting position			
	≤ 0.7 mbar per 10° inclination		
Influence of power supply			
	≤ 0.005 % per 1 V change in voltage		
Rated operating conditions			
Installation conditions			
• Installation instructions	Any mounting position		
Ambient conditions			
• Ambient temperature (observe temperature class in potentially explosive atmospheres)			
- Measuring cell with silicone oil filling			
Span ≤ 5 bar	-40 to +85 °C		
Span 30 bar	-20 to +85 °C		
- Measuring cell with inert filling liquid	-20 to +85 °C		
- Digital display	–	-20 to +85 °C	-20 to +85 °C
• Ambient temperature limits			
	See ambient temperature		
• Storage temperature	-50 to +85 °C		
• Climate class			
- Condensation	Permissible		
• Degree of protection (to EN 60 529)			
	IP 65		
• Electromagnetic compatibility			
- Emitted interference	To EN 50 081-1		
- Noise immunity	To EN 50 082-2 and NAMUR NE 21		
Medium conditions			
• Process temperature			
- Measuring cell with silicone oil filling			
Span ≤ 5 bar	-40 to +100 °C		
Span 30 bar	-40 to + 85 °C		
- Measuring cell with inert filling liquid			
Span ≤ 5 bar	-20 to +100 °C		
Span 30 bar	-20 to +85 °C		
• Process temperature limits			
	See process temperature		
• Process pressure limits			
	Nominal pressure (PN)		
Design			
Weight (without options)	Approx. 4 kg	Approx. 4 kg	Approx. 4.2 kg
Dimensions	See Fig. 1/21	See Fig. 1/22	See Fig. 1/22
Material			
• Wetted parts materials			
- Seal diaphragm	Stainless steel, mat. No. 1.4404, Hastelloy C276, mat. No. 2.4819, tantalum, Monel, mat. No. 2.4360 or gold		
- Process flanges and sealing screw	Stainless steel, mat. No. 1.4408, Hastelloy C4, mat. No. 2.4610 or Monel, mat. No. 2.4360		
- Measuring cell parts	Stainless steel, mat. No. 1.4401		
- O-ring	FPM, PTFE, FEP, FFFPM or NBR as option		
• Non-wetted parts materials			
- Electronics housing	Die-cast aluminium, low in copper, GD-ALSi 12, polyester-based lacquer, stainless steel rating plate	Die-cast aluminium, low in copper, GD-ALSi 12, or stainless steel precision casting, polyester-based lacquer, stainless steel rating plate	Die-cast aluminium, low in copper, GD-ALSi 12, or stainless steel precision casting, polyester-based lacquer, stainless steel rating plate
- Process flange screws	Steel, galvanized and yellow-passivized, or stainless steel		
- Mounting bracket (option)	Steel, galvanized and yellow-passivized, or stainless steel		
Measuring cell filling			
	Inert filling liquid (PN ≤ 160 bar) or silicone oil		
Process connection			
	Female thread ¼ - 18 NPT and flange connection to DIN 19 213 with mounting thread M10 (PN ≤ 160 bar), M12 (PN 420) or 7/16 - 20 UNF		
Electrical connection			
	Screw terminals, cable inlet via screwed gland Pg 13.5 (adapter), M20 x 1.5 or ½ - 14 NPT, or Han 7D/Han 8U plug	Screw terminals, cable inlet via screwed gland Pg 13.5 (adapter), M20 x 1.5 or ½ - 14 NPT, or Han 7D/Han 8U plug	Screw terminals, cable inlet via screwed gland M20 x 1.5 or ½ - 14 NPT

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	HK 7MF4420, MF4520	DS 7MF4432, 7MF4532	DS with PROFIBUS-PA 7MF4432, 7MF4532
Displays and controls			
Input keys	3 for local programming directly on transmitter		
Analog indicator (option)	Linear scale 0 to 100 % or customer-specific scale	Linear scale 0 to 100 % or customer-specific scale	–
Digital display	–	Yes	Yes
Power supply			
Terminal voltage on transmitter	DC 11 to 45 V DC 11 to 30 V in intrinsically-safe mode	DC 11 to 45 V DC 11 to 30 V in intrinsically-safe mode	Provided via bus DC 9 to 32 V DC 9 to 23 V in intrinsically-safe mode
Ripple	–	$U_{pp} \leq 0.2 \text{ V}$ (47 to 125 Hz)	–
Noise	–	$U_{rms} \leq 1.2 \text{ V}$ (0.5 to 10 kHz)	–
Certificates and approvals			
CENELEC		To DIN EN 50 014, DIN 50 018 and DIN EN 50 020	
• Intrinsic safety	EEx ia IIC T4 or T5 or T6	EEx ia IIC T4 or T5 or T6	EEx ib IIC T4
- Conformity certificate	PTB No. Ex-92.C.2146	PTB No. Ex-94.C.2090	PTB No. Ex-97.C.2178
- Max. ambient temperature	+85 °C temp. class T4 +75 °C temp. class T5 +60 °C temp. class T6	+85 °C temp. class T4 +75 °C temp. class T5 +60 °C temp. class T6	+80 °C temp. class T4
- Connection to certified intrinsically-safe circuits with maximum values	$U_o = 30 \text{ V}$ $I_k = 100 \text{ mA}$ $P = 750 \text{ mW}$	$U_o = 30 \text{ V}$ $I_k = 100 \text{ mA}$ $P = 750 \text{ mW}$	$U_o = 17.5 \text{ V}$ $I_k = 128 \text{ mA}$ $P = 1.8 \text{ W}$
- Effective internal inductance	$L_i \leq 0.6 \text{ mH}$	$L_i \leq 0.6 \text{ mH}$	$L_i \leq 7.2 \mu\text{H}$
- Effective internal capacitance	$C_i \leq 6 \text{ nF}$	$C_i \leq 8 \text{ nF}$	$C_i \leq 0.6 \text{ nF}$
• Explosion-proof	–	EEx d IIC T5 and T6	EEx d IIC T5 and T6
- Conformity certificate	–	PTB No. Ex-94.C.1021	PTB No. Ex-94.C.1021
- Max. ambient temperature	–	+85 °C temp. class T5 +75 °C temp. class T6	+85 °C temp. class T5 +75 °C temp. class T6
TÜV		To DIN VDE 0165/02.91, Section 6.3	
• Ex-approved zone 2n	Ex n V II T4		
- Registration number	08/220/1092/6	08/220/1092/6	TÜV 97 ATEX 1247
FMRC (Factory Mutual Research Corp.)			
• Intrinsic safety and explosion-proof	–	2Y9A7.AX (3610, 3615)	–
• Explosion-proof	–	For class I, division 1, groups A, B, C and D	For class I, division 1, groups A, B, C and D
• Dust-ignition proof	–	For class II, division 1, groups E, F and G, indoor and outdoor (NEMA 4X) hazardous (classified) locations	For class II, division 1, groups E, F and G, indoor and outdoor (NEMA 4X) hazardous (classified) locations
• Intrinsically safe	–	With entity, for use in class I, division 1, group A, B, C, D, E, F and G, indoor and outdoor (NEMA 4X) hazardous (classified) locations	–
• Entity parameters	–	$V_{max} = 30 \text{ V}$ $I_{max} = 100 \text{ mA}$ $L_i = 0.6 \text{ mH}$ $C_i = 8 \text{ nF}$	–
CSA (Certificate of Compliance)	–	No. LR 104225-1 Class 2258 02 and Class 2258 03	–

SITRANS P

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Technical data

Technical data

	DS 7MF4432, 7MF4532	DS with PROFIBUS-PA 7MF4432, 7MF4532
Communication		
Load when connecting a		
• HART communicator	230 to 1100 Ω	–
• HART modem	230 to 500 Ω	–
Cable	2-wire screened: ≤ 3.0 km Multi-core screened: ≤ 1.5 km	–
Protocol	HART, version 5.x	Layers 1 and 2 according to PROFIBUS-PA Intrinsically-safe to IEC 1158-2 Slave function Layer 7 (protocol layer) according to PROFIBUS-DP functions (all data acyclic, measured value and status cyclic in addition)
PC/laptop requirements	IBM-compatible, main memory > 32 Mbyte, hard disk > 70 Mbyte, RS 232 interface, VGA graphics	–
Software for PC/laptop	WINDOWS 95/NT 4.0 and SIMATIC PDM	–
Device and remote control functions	–	More than 100 parameters according to PROFIBUS-PA profile
Device profile taking into account previous HART functions for	–	Measuring-point designation Device organization Device type Device materials Hardware and firmware versions Sensor data Adjustment points Type and materials of process connection Sensor temperature Limit monitoring Slave pointer functions Alarm signalling Status information Filter time Measured value in selectable dimension
Device address	–	1 when delivered
Current consumption of device	–	Approx. 18 mA
Electronic current limiting	–	$I_{\max} \leq 27 \text{ mA}$ in event of fault, output twice
Measured-value resolution	–	3×10^{-5} referred to full-scale value

SITRANS P

Transmitters for differential pressure and flow

7MF4420, HK series

Ordering data

SITRANS P transmitter for differential pressure and flow, HK series

PN 32 and PN 160, two-wire system, including Instruction Manual (in same language as rating plate; see "Further designs"), 2 sealing screws (same material as process flange)

Meas. cell filling Measuring cell cleaning

Silicone oil	Normal
Inert filling liquid	Grease-free

Nominal pressure PN 32
Span 1 to 20 mbar¹⁾

Nominal pressure PN 160
Span

6	to	60	mbar
25	to	250	mbar
60	to	600	mbar
160	to	1,600	mbar
500	to	5,000	mbar
3,000	to	30,000	mbar

Wetted parts materials

(Process flanges made of stainless steel)

Seal diaphragm Parts of meas. cell

Stainless steel	Stainless steel
Hastelloy	Stainless steel
Hastelloy	Hastelloy
Tantalum ²⁾	Tantalum
Monel ²⁾	Monel
Gold ²⁾	Gold

Version for remote seal

Process connection

Female thread ¼ - 18 NPT and flange connection to DIN 19213

- With mounting thread M10
- With mounting thread 7/16 - 20 UNF

Non-wetted parts materials

Process flange	Electronics housing screws
Steel	Die-cast aluminium
Stainless steel	Die-cast aluminium

Explosion protection

- Without explosion protection
- With explosion protection (CENELEC)
Type of protection: "Intrinsic safety" (EEx ia)
- Use in zone 2n (TÜV)

Electrical connection/cable inlet

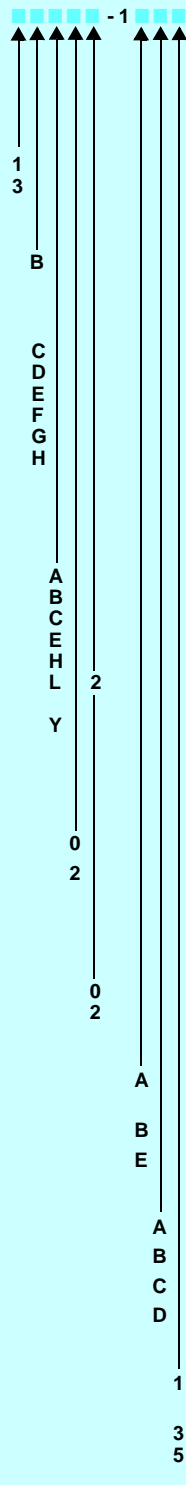
- Screwed gland Pg 13.5 (adapter)
- Screwed gland M20 x 1.5
- Screwed gland ½ - 14 NPT
- Han 7D plug

Indicator

- Without
- Housing cover with analog indicator
- Scale 0 to 100 %, linear divisions
- Scale as specified
(Order code Y20 required)

Order No.

7MF4420-



Ordering data

Further designs

Please add "Z" to Order No. and specify Order code(s).

Transmitter with mounting bracket made of	A01
• Steel	A02
• Stainless steel	
Instead of FPM (Viton), process flange O-ring made of:	
• PTFE (Teflon)	A20
• FEP (with silicone core, approved for food)	A21
• FFKM (Kalrez)	A22
• NBR (Buna N)	A23
Han 7D plug (metal, gray)	A30
Han 8U plug (instead of Han 7D)	A31
Sealing screw (¼ - 18 NPT) with valve in material of process flange	A40
Rating plate inscription (instead of German)	
• English	B11
• French	B12
• Spanish	B13
• Italian	B14
Manufacturer's test certificate M to DIN 55 350, Part 18 4.2.2 and to ISO 9001	C11
Acceptance test certificate B to DIN 50 049/EN 204-3.1B	C12
Factory certificate to DIN 50 049-2.2/EN 10 204-2.2	C14
Acid gas version to NACE (only together with seal diaphragm made of Hastelloy and process flange screws made of stainless steel)	D07
Use	
• In zone 10/11 (basic unit EEx ia)	E01
• In zone 0 (basic unit EEx ia)	E02
Approval to AD/TRD	E06
Over-filling safety device for flammable and non-flammable liquids (max. PN 32) (basic unit EEx ia)	E08
Oxygen application (max. 190 bar with oxygen measurement and inert filling liquid)	E10
Interchanging of process connection side (high-pressure side: left, low-pressure side: right)	H01
Process flange made of:	
• Hastelloy	K01
• Monel	K02
See page 1/54 for four-wire system	

Additional information

Please add "Z" to Order No. and specify Order code(s) and plain text.

Measuring range to be set, specify in plain text: Y01: ... to ... mbar, bar, kPa, MPa Measuring range to be set for level measurements without remote seals: the measuring range (Δp) must be calculated. Therefore enclose the filled-in "Questionnaire for hydrostatic level measurements" with the order (see page 1/82)	Y01
Plain text with square-rooted characteristic: Y02: ... to ... mbar, bar, kPa, MPa	Y02
Measuring-point number/identification (max. 16 characters), specify in plain text: Y15:	Y15
Measuring-point text (max. 27 characters), specify in plain text: Y16:	Y16
Customer-specific scale for analog indicator, specify in plain text: Y20: ... to ... mbar, bar, kPa, MPa	Y20

Only the settings for "Y01" and "Y02" can be made in the factory.

See page 1/35 for **example for ordering**.

Power supply units: see page 2/50

¹⁾ Not suitable for connection of remote seal.

²⁾ Only together with max. span 250, 1,600, 5,000 and 30,000 mbar.

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7MF4520, HK series

Ordering data

SITRANS P transmitter for differential pressure and flow, HK series

PN 420, two-wire system, including Instruction Manual (in same language as rating plate; see "Further designs"), 2 sealing screws (same material as process flange), measuring cell filling: silicone oil, measuring cell cleaning: normal

Nominal pressure PN 420

Span

25	to	250 mbar
60	to	600 mbar
160	to	1,600 mbar
500	to	5,000 mbar
3,000	to	30,000 mbar

Wetted parts materials

(Process flanges made of stainless steel)

Seal diaphragm	Parts of meas. cell
Stainless steel	Stainless steel
Hastelloy	Stainless steel
Gold ¹⁾	Gold

Process connection

Female thread 1/4 - 18 NPT and flange connection to DIN 19213

- With mounting thread M12
- With mounting thread 7/16 - 20 UNF

Non-wetted parts materials

Process flange screws	Electronics housing screws
Steel	Die-cast aluminium
Stainless steel	Die-cast aluminium (≤ PN 315)

Explosion protection

- Without explosion protection
- With explosion protection (CENELEC)
Type of protection: "Intrinsic safety" (EEx ia)
- Use in zone 2n (TÜV)

Electrical connection/cable inlet

- Screwed gland Pg 13.5 (adapter)
- Screwed gland M20 x 1.5
- Screwed gland 1/2 - 14 NPT
- Han 7D plug

Indicator

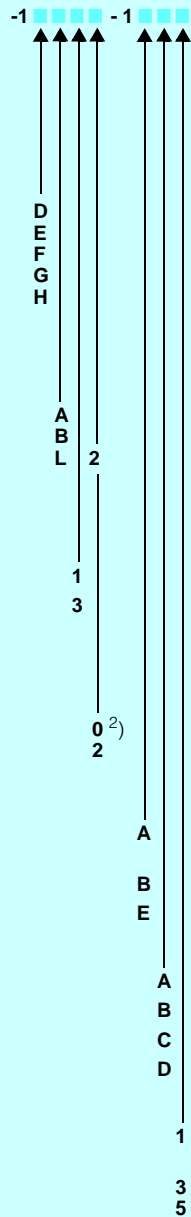
- Without
- Housing cover with analog indicator
 - Scale 0 to 100 %, linear divisions
 - Scale as specified (Order code Y20 required)

Example for ordering

Item line: 7MF4520-1DA10-1AA1-Z
 B line: A01 + B11 + C14 + Y01 + Y15
 C line: Y01: 50 to 150 mbar
 C line: Y15: PIC 1758

Order No.

7MF4520-



Ordering data

Further designs

Please add "Z" to Order No. and specify Order code(s).

Further designs	Order code
Transmitter with mounting bracket made of	
• Steel	A01
• Stainless steel	A02
Instead of FPM (Viton), process flange O-ring made of:	
• PTFE (Teflon)	A20
• FEP (with silicone core, approved for food)	A21
• FFPM (Kalrez)	A22
• NBR (Buna N)	A23
Han 7D plug (metal, gray)	A30
Han 8U plug (instead of Han 7D)	A31
Sealing screw (1/4 - 18 NPT) with valve in material of process flange	A40
Rating plate inscription (instead of German)	
• English	B11
• French	B12
• Spanish	B13
• Italian	B14
Manufacturer's test certificate M to DIN 55 350, Part 18 and to ISO 9001	C11
Acceptance test certificate B to DIN 50 049/EN 204-3.1B	C12
Factory certificate to DIN 50 049-2.2/EN 10 204-2.2	C14
Acid gas version to NACE (only together with seal diaphragm made of Hastelloy and process flange screws made of stainless steel (max. PN 315))	D07
Process flange screws made of stainless steel for PN 420	D09
Use	
• In zone 10/11 (basic unit EEx ia)	E01
• In zone 0 (basic unit EEx ia)	E02
Interchanging of process connection side (high-pressure side: left, low-pressure side: right)	H01
See page 1/54 for four-wire system	

Additional information

Please add "Z" to Order No. and specify Order code(s) and plain text.

Additional information	Order code
Measuring range to be set, specify in plain text: Y01: ... to ... mbar, bar, kPa, MPa	Y01
Measuring range to be set for level measurements without remote seals: the measuring range (Δp) must be calculated. Therefore enclose the filled-in "Questionnaire for hydrostatic level measurements" with the order (see page 1/82)	
Plain text with square-rooted characteristic: Y02: ... to ... mbar, bar, kPa, MPa	Y02
Measuring-point number/identification (max. 16 characters), specify in plain text: Y15:	Y15
Measuring-point text (max. 27 characters), specify in plain text: Y16:	Y16
Customer-specific scale for analog indicator, specify in plain text: Y20: ... to ... mbar, bar, kPa, MPa	Y20

Only the settings for "Y01" and "D05" can be made in the factory.

Power supply units: see page 2/50.

¹⁾ Only together with max. span 250, 1,600, 5,000 and 30,000 mbar and max. PN 315.

²⁾ Not together with Order code "D09".

SITRANS P

Transmitters for differential pressure and flow

7MF4432, DS series

Ordering data

SITRANS P transmitter for differential pressure and flow, DS series

PN 32 and PN 160, two-wire system, Smart version, including Instruction Manual (in same language as rating plate; see "Further designs"), 2 sealing screws (same material as process flange))

Measuring cell filling Meas. cell cleaning

Silicone oil	Normal
Inert filling liquid	Grease-free

Nominal pressure PN 32
Span 1 to 20 mbar¹⁾

Nominal pressure PN 160
Span

1	to	60 mbar
2.5	to	250 mbar
6	to	600 mbar
16	to	1,600 mbar
50	to	5,000 mbar
300	to	30,000 mbar

Wetted parts materials

(Process flanges made of stainless steel)
Seal diaphragm Parts of meas. cell

Stainless steel	Stainless steel
Hastelloy	Stainless steel
Hastelloy	Hastelloy
Tantalum ²⁾	Tantalum
Monel ²⁾	Monel
Gold ²⁾ ³⁾	Gold

Version for remote seal

Process connection

Female thread ¼ - 18 NPT and flange connection to DIN 19213 with

- Sealing screw opposite process connection
 - Mounting thread M10
 - Mounting thread 7/16 - 20 UNF
- Sealing screw on side of process flanges
 - Mounting thread M10
 - Mounting thread 7/16 - 20 UNF

Non-wetted parts materials

Process flange	Electronics housing	
screws		
Steel	Die-cast aluminium	0
Stainless steel	Die-cast aluminium	2
Stainless steel	Stain. steel precision casting	3

Explosion protection

- Without explosion protection
- With explosion protection (CENELEC)
 - Type of protection: "Intrinsic safety" (EEx ia)
 - "Explosion-proof" (EEx d)⁴⁾
 - "Intrinsic safety and explosion-proof" (EEx ia and EEx d)⁴⁾
- Use in zone 2n (TÜV)
- With explosion protection (FM + CSA)
 - Intrinsic safety and expl.-proof (is + xp)⁴⁾

Electrical connection/cable inlet

- Screwed gland Pg 13.5 (adapter)⁵⁾
- Screwed gland M20 x 1.5
- Screwed gland ½ - 14 NPT
- Han 7D plug⁵⁾

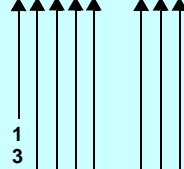
Indicator

- Basic version with housing cover without window (built-in digital display hidden) 1
- Housing cover with analog indicator
 - Scale 0 to 100 %, linear divisions
 - Scale as specified (Order code Y20 required) 3 5
- Housing cover with window (built-in digital display visible) 6

Order No.

7MF4432-

■ ■ ■ ■ ■ - 1 ■ ■ ■ ■ ■



Ordering data

Further designs

Please add "Z" to Order No. and specify Order code(s).

Transmitter with mounting bracket made of

- Steel **A01**
- Stainless steel **A02**

Instead of FPM (Viton), process flange O-ring made of:

- PTFE (Teflon) **A20**
- FEP (with silicone core, approved for food) **A21**
- FFPM (Kalrez) **A22**
- NBR (Buna N) **A23**

Han 7D plug (metal, gray) **A30**
Han 8U plug (instead of Han 7D) **A31**

Sealing screw (¼ - 18 NPT) with valve in mat. of process flange **A40**

Rating plate inscription (instead of German)

- English **B11**
- French **B12**
- Spanish **B13**
- Italian **B14**

Manufact. test cert. M to DIN 55 350, Part 18 and to ISO 9001 **C11**
Acceptance test certificate B to DIN 50 049/EN 204-3.1B **C12**
Factory certificate to DIN 50 049-2.2/EN 10 204-2.2 **C14**

Setting of upper limit of output signal to 22.0 mA **D05**

Acid gas vers. to NACE (only together with seal diaphragm made of Hastelloy and process flange screws made of stainless steel) **D07**

IP 68 (not together with Han 7D, Han 8U or Pg 13.5 plug) **D12**

Use in zone 0 (basic unit EEx ia) **E02**

Over-filling safety device for flammable and non-flammable liquids (max. PN 32) (basic unit EEx ia) **E08**

Oxygen application (max. 190 bar with oxygen measurement and inert filling liquid) **E10**

Interchanging of process connection side (high-pressure side: left, low-pressure side: right) **H01**

Vent on side for gas measurements **H02**

Stainless steel process flanges for vertical differential pressure lines (not together with suffixes K01 and K02) **H03**

Process flange made of:

- Hastelloy **K01**
- Monel **K02**

See page 1/54 for four-wire system

Additional information

Please add "Z" to Order No. and specify Order code(s) and plain text.

Measuring range to be set, plain text with lin. characteristic: **Y01: ... to ... mbar, bar, kPa, MPa** **Y01**

Measuring range to be set for level measurements without remote seals: the measuring range (Δp) must be calculated. Therefore enclose the filled-in "Questionnaire for hydrostatic level measurements" with the order (see page 1/82)
Plain text with square-rooted characteristic: **Y02: ... to ... mbar, bar, kPa, MPa** **Y02**

Measuring-point number/identification (max. 16 characters), specify in plain text: **Y15:** **Y15**

Meas.-point text (max. 27 characters), specify in plain text: **Y16:** **Y16**

Customer-specific scale for analog indicator, specify in plain text: **Y20: ... to ... mbar, bar, kPa, MPa** **Y20**

Only the settings for "Y01", "Y02" and "D05" can be made in the factory.

Available ex stock: 7MF4432-1 A02-1BB1-Z B11

¹⁾ Not suitable for connection of remote seal.
²⁾ Only together with max. span 250, 1,600, 5,000 and 30,000 mbar.
³⁾ Only together with process flange screws made of stainless steel.
⁴⁾ Without cable gland.
⁵⁾ Not together with type of protection "Explosion-proof".

See page 1/35 for [example for ordering](#).

Power supply units: see page 2/50.

SITRANS P Transmitters for differential pressure and flow

7MF4532, DS series

Ordering data	Order No.	Ordering data	Order code
SITRANS P transmitter for differential pressure and flow, DS series PN 420, two-wire system, Smart version, including Instruction Manual (in same language as rating plate; see "Further designs"), 2 sealing screws (same material as process flange), measuring cell filling: silicone oil, measuring cell cleaning: normal Nominal pressure PN 420 Span 2.5 to 250 mbar 6 to 600 mbar 16 to 1,600 mbar 50 to 5,000 mbar 300 to 30,000 mbar Wetted parts materials (Process flanges made of stainless steel) Seal diaphragm Parts of meas. cell Stainless steel Stainless steel Hastelloy Stainless steel Gold ¹⁾ Stainless steel Process connection Female thread 1/4 - 18 NPT and flange connection to DIN 19213 with • Sealing screw opposite process connection - Mounting thread M12 - Mounting thread 7/16 - 20 UNF Non-wetted parts materials Process flange Electronics housing screws Steel Die-cast aluminium Stainl. steel (≤ PN 315) Die-cast aluminium Stainl. steel (≤ PN 315) Stain. steel prec. cast. Explosion protection • Without explosion protection • With explosion protection (CENELEC) Type of protection: - "Intrinsic safety" (EEx ia) - "Explosion-proof" (EEx d) ³⁾ - "Intrinsic safety and explosion-proof" (EEx ia and EEx d) ³⁾ • Use in zone 2n (TÜV) • With explosion protection (FM + CSA) Intrin. safety and explosion-proof (is + xp) ³⁾ Electrical connection/cable inlet • Screwed gland Pg 13.5 (adapter) ⁴⁾ • Screwed gland M20 x 1.5 • Screwed gland 1/2 - 14 NPT • Han 7D plug ⁴⁾ Indicator • Basic version with housing cover without window (built-in digital display hidden) • Housing cover with analog indicator - Scale 0 to 100 %, linear divisions - Scale as specified (Order code Y20 required) • Housing cover with window (built-in digital display visible)	7MF4532- -1 -1 D E F G H A B L 1 3 0 ²⁾ 2 3 A B D P E N C A B C D 1 3 5 6	Further designs Please add "Z" to Order No. and specify Order code(s). Transmitter with mounting bracket made of • Steel • Stainless steel Instead of FPM (Viton), process flange O-ring made of: • PTFE (Teflon) • FEP (with silicone core, approved for food) • FFPM (Kalrez) • NBR (Buna N) Han 7D plug (metal, gray) Han 8U plug (instead of Han 7D) Sealing screw (1/4 - 18 NPT) with valve in material of process flange Rating plate inscription (instead of German) • English • French • Spanish • Italian Manufacturer's test certificate M to DIN 55 350, Part 18 and to ISO 9001 Acceptance test certificate B to DIN 50 049/EN 204-3.1B Factory certificate to DIN 50 049-2.2/EN 10 204-2.2 Setting of upper limit of output signal to 22.0 mA Acid gas version to NACE (only together with seal diaphragm made of Hastelloy and process flange screws made of stainless steel) (max. PN 315) Process flange screws made of stainless steel for PN 420 IP 68 (not together with Han 7D, Han 8U or Pg 13.5 plug) Use in zone 0 (basic unit EEx ia) Interchanging of process connection side (high-pressure side: left, low-pressure side: right) Vent on side for gas measurements Stainless steel process flanges for vertical differential pressure lines See page 1/54 for four-wire system Additional information Please add "Z" to Order No. and specify Order code(s) and plain text. Measuring range to be set, plain text with lin. characteristic: Y01: ... to ... mbar, bar, kPa, MPa Measuring range to be set for level measurements without remote seals: the measuring range (Δp) must be calculated. Therefore enclose the filled-in "Questionnaire for hydrostatic level measurements" with the order (see page 1/82) Plain text with square-rooted characteristic: Y02: ... to ... mbar, bar, kPa, MPa Measuring-point number/identification (max. 16 characters), specify in plain text: Y15: Measuring-point text (max. 27 characters), specify in plain text: Y16: Customer-specific scale for analog indicator, specify in plain text: Y20: ... to ... mbar, bar, kPa, MPa	A01 A02 A20 A21 A22 A23 A30 A31 A40 B11 B12 B13 B14 C11 C12 C14 D05 D07 D09 D12 E02 H01 H02 H03 Y01 Y02 Y15 Y16 Y20

Only the settings for "Y01", "Y02" and "D05" can be made in the factory.

See page 1/35 for [example for ordering](#).

Power supply units: see page 2/50.

1) Only together with max. span 250, 1,600, 5,000 and 30,000 mbar, max. PN 315 and process flange screws made of stainless steel.
 2) Not together with Order code "D09".
 3) Without cable gland.
 4) Not together with type of protection "Explosion-proof".

SITRANS P

Transmitters for differential pressure and flow

7MF4432, DS series with PROFIBUS-PA

Ordering data

SITRANS P transmitter for differential pressure and flow, DS series with PROFIBUS-PA

PN 32 and PN 160, two-wire system, including Instruction Manual (in same language as rating plate; see "Further designs"), 2 sealing screws (same material as process flange)

Measuring cell filling	Meas. cell cleaning
Silicone oil	Normal
Inert filling liquid	Grease-free

Nominal pressure PN 32
Span up to 20 mbar¹⁾

Nominal pressure PN 160
Span

- Up to 60 mbar
- Up to 250 mbar
- Up to 600 mbar
- Up to 1,600 mbar
- Up to 5,000 mbar
- Up to 30,000 mbar

Wetted parts materials

(Process flanges made of stainless steel)

Seal diaphragm Parts of meas. cell

Stainless steel	Stainless steel
Hastelloy	Stainless steel
Hastelloy	Hastelloy
Tantalum ²⁾	Tantalum
Monel ²⁾	Monel
Gold ²⁾³⁾	Gold
Version for remote seal	

Process connection

Female thread 1/4 - 18 NPT and

flange connection to DIN 19 213 with

- Sealing screw opposite process connection
 - Mounting thread M10
 - Mounting thread 7/16 - 20 UNF
- Sealing screw on side of process flanges
 - Mounting thread M10
 - Mounting thread 7/16 - 20 UNF

Non-wetted parts materials

Process flange Electronics housing screws

Steel	Die-cast aluminium
Stainless steel	Die-cast aluminium
Stainless steel	Stain. steel precision casting

Explosion protection

- Without explosion protection
- With explosion protection
 - Type of protection: "Explosion-proof" (EEx d)⁴⁾
 - Use in zone 2n (TÜV)
 - With explosion protection (FM) Explosion-proof (xp)⁴⁾
 - With explosion protection EEx ib

Electrical connection/cable inlet

- Screwed gland M20 x 1.5
- Screwed gland 1/2 - 14 NPT

Indicator

- Basic version with housing cover without window (built-in digital display hidden)
- Housing cover with window (built-in digital display visible)

Order No.

7MF4432-

1 3 B C D E F G H A B C E H L Y 0 2 4 6 A D E G C Q B C 1 6

1 3

B

C D E F G H

A B C E H L Y

0

2

4

6

0

2

3

A

D

E

G

C

Q

B

C

1

6

Ordering data

Further designs

Please add "Z" to Order No. and specify Order code(s).

Transmitter with mounting bracket made of

- Steel
- Stainless steel

A01
A02

Instead of FPM (Viton), process flange O-ring made of:

- PTFE (Teflon)
- FEP (with silicone core, approved for food)
- FFPM (Kalrez)
- NBR (Buna N)

A20
A21
A22
A23

Sealing screw (1/4 - 18 NPT) with valve in material of process flange

A40

Rating plate inscription (instead of German)

- English

B11

Manufacturer's test certificate M to DIN 55 350, Part 18 and to ISO 9001

Acceptance test certificate B to DIN 50 049/EN 204-3.1B

Factory certificate to DIN 50 049-2.2/EN 10 204-2.2

C11
C12
C14

Acid gas version to NACE (only together with seal diaphragm made of Hastelloy and process flange screws made of stainless steel)

D07

IP 68

D12

Oxygen application (max. 190 bar with oxygen measurement and inert filling liquid)

E10

Interchanging of process connection side (high-pressure side: left, low-pressure side: right)

H01

Vent on side for gas measurements

H02

Process flange made of:

- Hastelloy
- Monel

K01
K02

Additional information

Please add "Z" to Order No. and specify Order code(s) and plain text.

Measuring-point number/identification (max. 16 characters), specify in plain text:

Y15:

Y15

Measuring-point text (max. 27 characters), specify in plain text:

Y16:

Y16

See page 1/35 for [example for ordering](#).

1) Not suitable for connection of remote seal.

2) Only together with max. span 250, 1,600, 5,000 and 30,000 mbar.

3) Only together with process flange screws made of stainless steel.

4) Without cable gland.

SITRANS P Transmitters for differential pressure and flow

7MF4532, DS series with PROFIBUS-PA

Ordering data	Order No.	Ordering data	Order code																																																								
<p>SITRANS P transmitter for differential pressure and flow, DS series with PROFIBUS-PA</p> <p>PN 420, two-wire system, including Instruction Manual (in same language as rating plate; see "Further designs"), 2 sealing screws (same material as process flange), measuring cell filling: silicone oil, measuring cell cleaning: normal</p> <p>Nominal pressure PN 420 Span Up to 60 mbar Up to 600 mbar Up to 1,600 mbar Up to 5,000 mbar Up to 30,000 mbar</p> <p>Wetted parts materials (Process flanges made of stainless steel) Seal diaphragm Parts of meas. cell</p> <table border="0"> <tr> <td>Stainless steel</td> <td>Stainless steel</td> </tr> <tr> <td>Hastelloy</td> <td>Stainless steel</td> </tr> <tr> <td>Gold¹⁾</td> <td>Stainless steel</td> </tr> </table> <p>Process connection Female thread 1/4 - 18 NPT and flange connection to DIN 19 213 with</p> <ul style="list-style-type: none"> Sealing screw opposite process connection <ul style="list-style-type: none"> Mounting thread M12 Mounting thread 7/16 - 20 UNF <p>Non-wetted parts materials</p> <table border="0"> <tr> <td>Process flange</td> <td>Electronics housing screws</td> </tr> <tr> <td>Steel</td> <td>Die-cast aluminium</td> </tr> <tr> <td>Stainl. steel (≤ PN 315)</td> <td>Die-cast aluminium</td> </tr> <tr> <td>Stainl. steel (≤ PN 315)</td> <td>Stain. steel prec. cast.</td> </tr> </table> <p>Explosion protection</p> <ul style="list-style-type: none"> Without explosion protection With explosion protection <ul style="list-style-type: none"> Type of protection: "Explosion-proof" (EEx d)³⁾ Use in zone 2n (TÜV) With explosion protection (FM) Explosion-proof (xp)³⁾ With explosion protection EEx ib <p>Electrical connection/cable inlet</p> <ul style="list-style-type: none"> Screwed gland M20 x 1.5 Screwed gland 1/2 - 14 NPT <p>Indicator</p> <ul style="list-style-type: none"> Basic version with housing cover without window (built-in digital display hidden) Housing cover with window (built-in digital display visible) 	Stainless steel	Stainless steel	Hastelloy	Stainless steel	Gold ¹⁾	Stainless steel	Process flange	Electronics housing screws	Steel	Die-cast aluminium	Stainl. steel (≤ PN 315)	Die-cast aluminium	Stainl. steel (≤ PN 315)	Stain. steel prec. cast.	<p>7MF4532-</p> <p>-1 ■■■■ -1 ■■■■ -Z P01</p> <p>↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑</p> <p>D E F G H</p> <p>A B L</p> <p>1 3</p> <p>0²⁾ 2 3</p> <p>A D E G C Q</p> <p>B C</p> <p>1 6</p>	<p>Further designs</p> <p>Please add "Z" to Order No. and specify Order code(s).</p> <table border="0"> <tr> <td>Transmitter with mounting bracket made of</td> <td></td> </tr> <tr> <td>• Steel</td> <td>A01</td> </tr> <tr> <td>• Stainless steel</td> <td>A02</td> </tr> <tr> <td>Instead of FPM (Viton), process flange O-ring made of:</td> <td></td> </tr> <tr> <td>• PTFE (Teflon)</td> <td>A20</td> </tr> <tr> <td>• FEP (with silicone core, approved for food)</td> <td>A21</td> </tr> <tr> <td>• FFPM (Kalrez)</td> <td>A22</td> </tr> <tr> <td>• NBR (Buna N)</td> <td>A23</td> </tr> <tr> <td>Sealing screw (1/4 - 18 NPT) with valve in material of process flange</td> <td>A40</td> </tr> <tr> <td>Rating plate inscription (instead of German)</td> <td></td> </tr> <tr> <td>• English</td> <td>B11</td> </tr> <tr> <td>Manufacturer's test certificate M to DIN 55 350, Part 18 and to ISO 9001</td> <td>C11</td> </tr> <tr> <td>Acceptance test certificate B to DIN 50 049/EN 10 204-3.1B</td> <td>C12</td> </tr> <tr> <td>Factory certificate to DIN 50 049-2.2/EN 10 204-2.2</td> <td>C14</td> </tr> <tr> <td>Acid gas version to NACE (only together with seal diaphragm made of Hastelloy and process flange screws made of stainless steel) (max. PN 315)</td> <td>D07</td> </tr> <tr> <td>Process flange screws made of stainless steel for PN 420</td> <td>D09</td> </tr> <tr> <td>IP 68</td> <td>D12</td> </tr> <tr> <td>Interchanging of process connection side (high-pressure side: left, low-pressure side: right)</td> <td>H01</td> </tr> <tr> <td>Vent on side for gas measurements</td> <td>H02</td> </tr> </table> <p>Additional information</p> <p>Please add "Z" to Order No. and specify Order code(s) and plain text.</p> <table border="0"> <tr> <td>Measuring-point number/identification (max. 16 characters), specify in plain text: Y15:</td> <td>Y15</td> </tr> <tr> <td>Measuring-point text (max. 27 characters), specify in plain text: Y16:</td> <td>Y16</td> </tr> </table>	Transmitter with mounting bracket made of		• Steel	A01	• Stainless steel	A02	Instead of FPM (Viton), process flange O-ring made of:		• PTFE (Teflon)	A20	• FEP (with silicone core, approved for food)	A21	• FFPM (Kalrez)	A22	• NBR (Buna N)	A23	Sealing screw (1/4 - 18 NPT) with valve in material of process flange	A40	Rating plate inscription (instead of German)		• English	B11	Manufacturer's test certificate M to DIN 55 350, Part 18 and to ISO 9001	C11	Acceptance test certificate B to DIN 50 049/EN 10 204-3.1B	C12	Factory certificate to DIN 50 049-2.2/EN 10 204-2.2	C14	Acid gas version to NACE (only together with seal diaphragm made of Hastelloy and process flange screws made of stainless steel) (max. PN 315)	D07	Process flange screws made of stainless steel for PN 420	D09	IP 68	D12	Interchanging of process connection side (high-pressure side: left, low-pressure side: right)	H01	Vent on side for gas measurements	H02	Measuring-point number/identification (max. 16 characters), specify in plain text: Y15:	Y15	Measuring-point text (max. 27 characters), specify in plain text: Y16:	Y16	
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Factory certificate to DIN 50 049-2.2/EN 10 204-2.2	C14																																																										
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¹⁾ Only together with max. span 250, 1,600, 5,000 and 30,000 mbar, max. PN 315 and process flange screws made of stainless steel.

²⁾ Not together with Order code "D09"

³⁾ Without cable gland.

SITRANS P

Transmitters for differential pressure and flow

Dimensional drawings

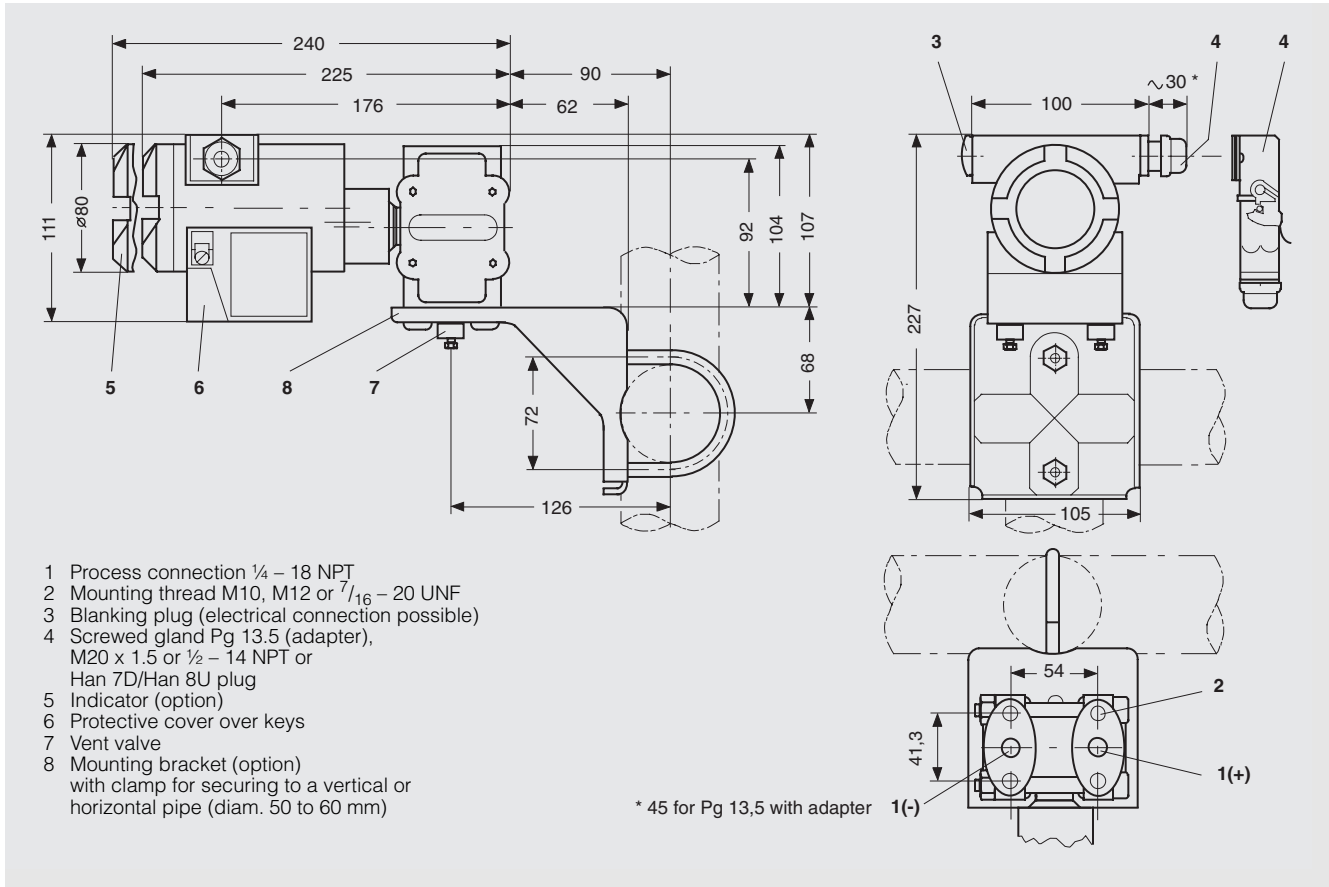


Fig. 1/21 Dimensions of HK series

SITRANS P Transmitters for differential pressure and flow

Dimensional drawings

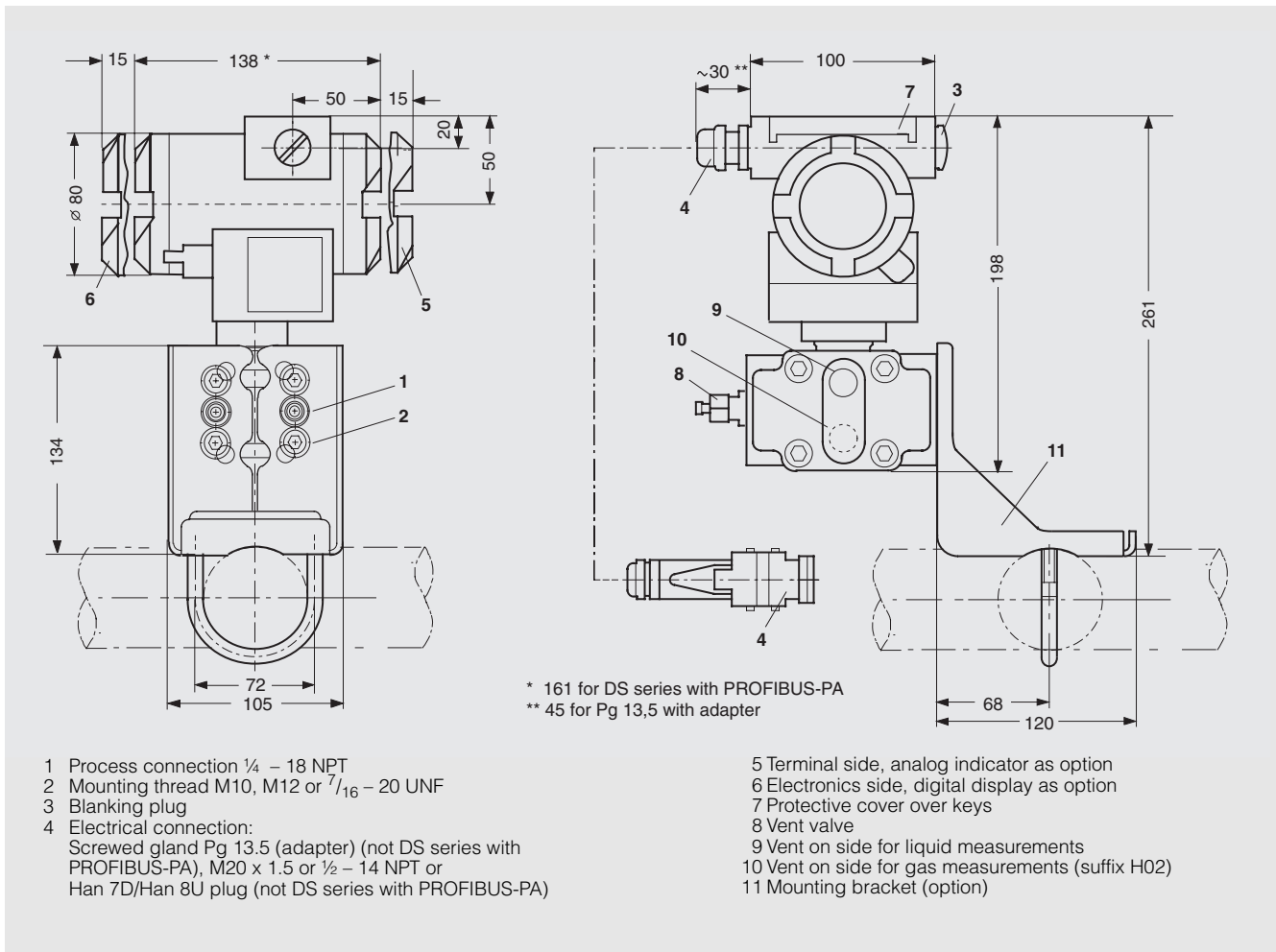


Fig. 1/22 Dimensions of DS series and DS series with PROFIBUS-PA