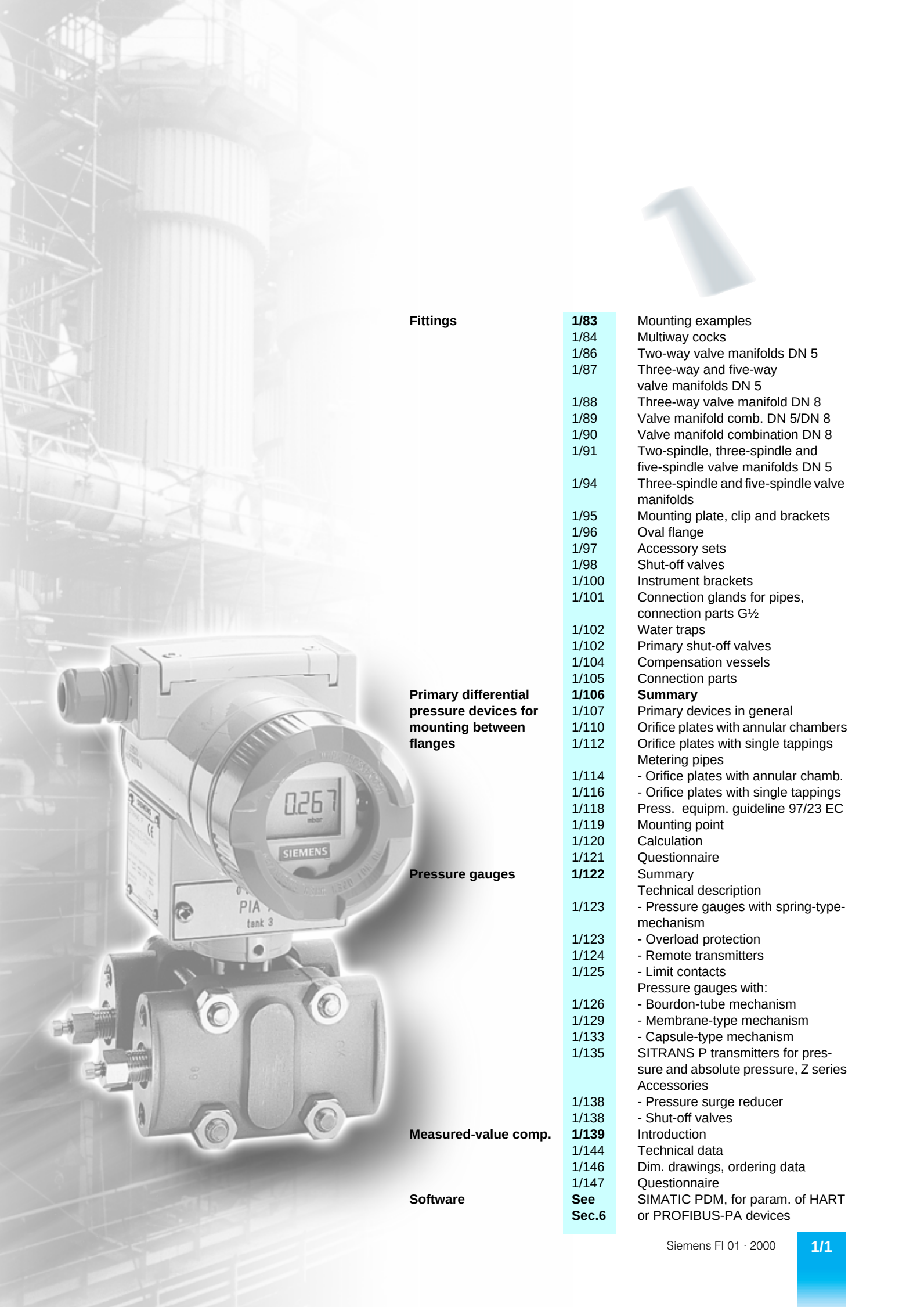
SITRANS P

Measuring Instruments for Pressure, Absolute Pressure, Differential Pressure, Flow, Level



Introduction

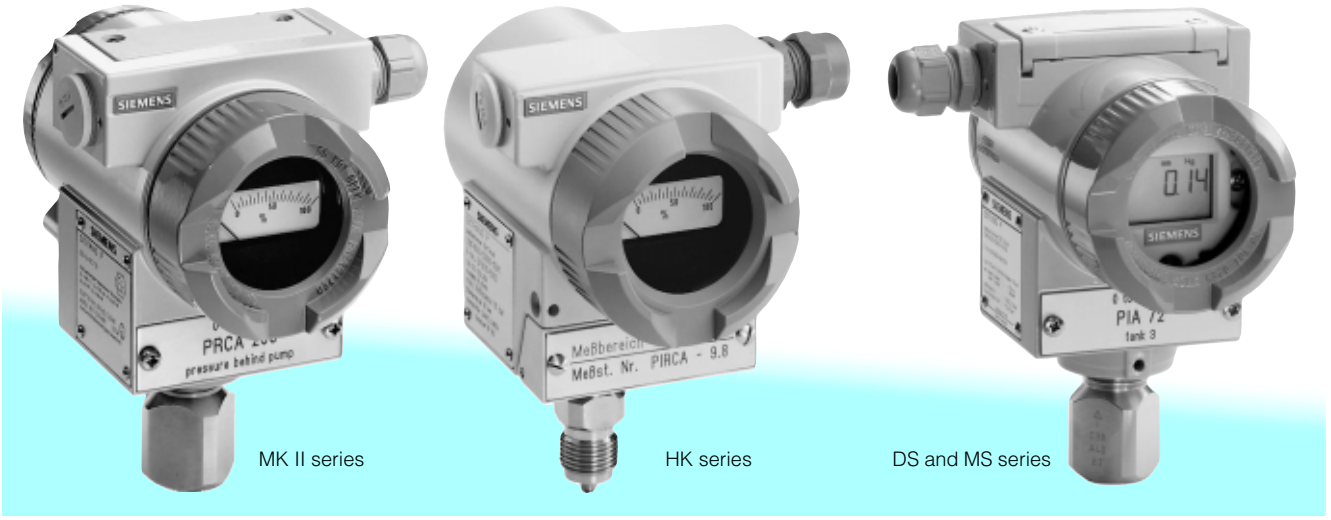


Fig. 1/1 SITRANS P transmitters for pressure with built-in analog indicator or digital display

Application

The transmitter measures the pressure of corrosive and non-corrosive 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 linearly proportional to the input pressure, or a digital bus signal. 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

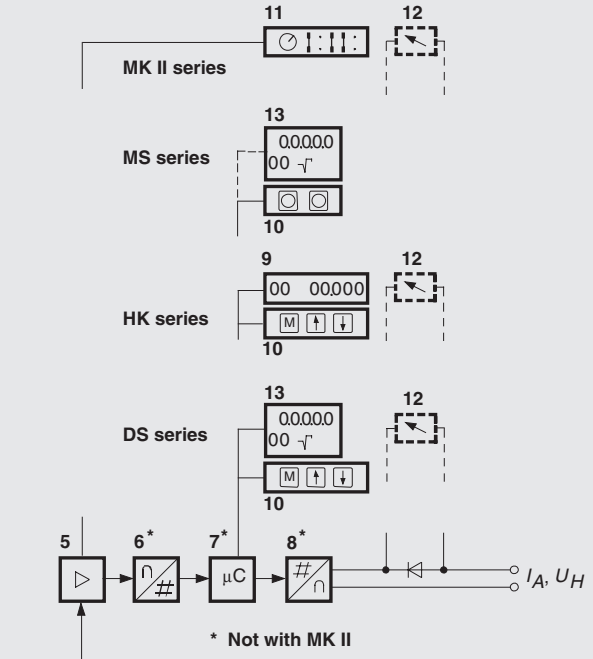
Series	Span in bar						
	0.01	0.03	0.1	0.23	to	160	400
MK II							
MS							
HK							
DS							
DS (PA)	Measuring cells from 1 bar to 400 bar						

Process pressure limits

Span	Upper process pressure limit
Up to 1 bar	6 bar
Up to 4 bar	10 bar
Up to 16 bar	32 bar
Up to 63 bar	100 bar
Up to 160 bar	250 bar
Up to 400 bar	600 bar

Types of protection and conformity certificates

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



p_e Pressure as input variable
I_A Output signal
U_H Power supply
1 Process connection
2 Seal diaphragm
3 Filling liquid
4 Silicon pressure sensor
5 Instrument amplifier
6 Analog-to-digital converter (not MK II)
7 Microcontroller (not MK II)
8 Digital-to-analog converter or PROFIBUS-PA interface (not MK II)
9 Digital display for parameterization
10 Keys for parameterization
11 Potentiometer and plug-in jumpers for parameterization
12 Analog indicator (option, not DS series with PROFIBUS-PA)
13 Digital display for parameterization and measured value (option with MS)

Fig. 1/2 Functional diagram

● Exists o In planning

Mode of operation

The pressure is applied via the seal diaphragm (2, Fig. 1/2) and the filling liquid (3) to the silicon pressure sensor (4) whose measuring diaphragm is then flexed. 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 input pressure. This voltage is amplified and converted into a digital signal by means of an analog-to-digital converter (6). This signal is evaluated by a microcontroller (7), and its linearity and temperature response corrected. The signal processed in this manner is converted in a digital-to-analog converter (8) into an output current of 4 to 20 mA, or via the PROFIBUS-PA interface into a digital bus signal.

Note: With the MK II series, the signal from the instrument amplifier (5) is converted directly into the output current of 4 to 20 mA.

The data specific to the measuring cell as well as the data for parameterization of the transmitter are stored in a non-volatile EEPROM (not MK II series).

Transmitters with spans ≤ 63 bar measure the input pressure compared to atmospheric, transmitters with spans of 160 bar and 400 bar compared to a vacuum.

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. 1/3). When parameterizing with a laptop or PC, the connection is made via a HART modem (Fig. 1/4).
The signals required for communication according to the HART protocol 5.x are superimposed on the output current according to frequency shift keying (FSK).

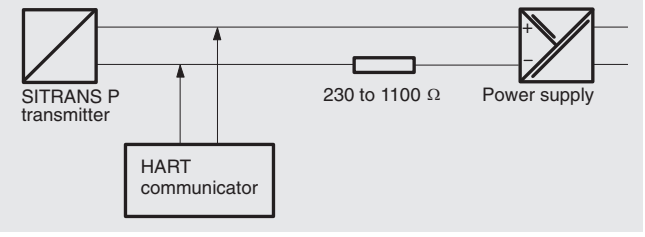


Fig. 1/3 Communication between HART communicator and transmitter

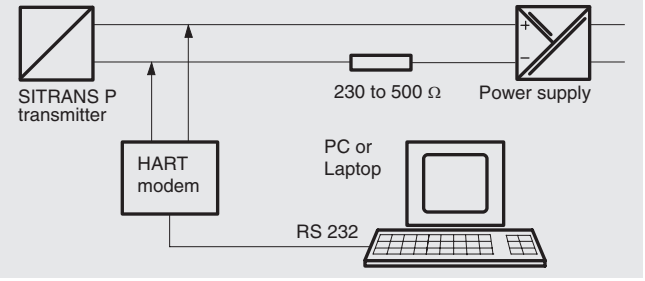


Fig. 1/4 Communication between PC or laptop and transmitter

Elements for parameterization of transmitter

Parameterization using	MK II	MS	HK	DS
2 external keys		●		
3 external keys			●	●
Potentiometer and jumpers	●			
Built-in digital display		●	●	●
Laptop, PC		●		●
HART communicator		●		●
PROFIBUS-PA interface				●

Adjustable parameters which can also be displayed

	MK II	MS	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")		●	●	●
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. 1/5) 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.

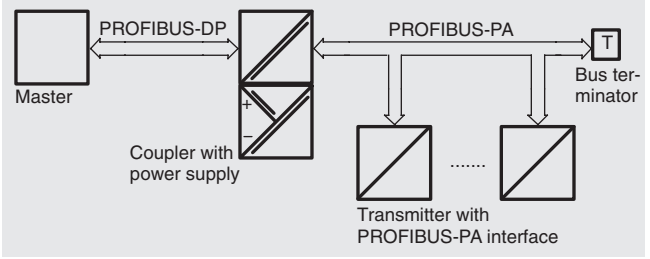


Fig. 1/5 Communication via PROFIBUS-PA interface

Technical data

Technical data

	MK II 7MF4010	MS 7MF4013	HK 7MF4020
Application		See page 1/2	
Mode of operation		See page 1/3	
Measuring principle		Piezo-resistive	
Input			
Measured variable		Pressure	
Measuring range			
• Span (continuously adjustable)	0.23 to 160 bar	0.03 to 400 bar	0.1 to 400 bar
• Lower measuring limit			
- Measuring cell with silicone oil filling		30 mbar (absolute)	
- Measuring cell with inert filling liquid			
For process temp. -20 °C < $\vartheta \leq$ 60 °C	–	–	30 mbar (absolute)
For process temp. +60 °C < $\vartheta \leq$ 100 °C	–	–	30 mbar + 20 mbar · (ϑ - 60) (absolute)
• Upper measuring limit		100 % of max. span	
• Start-of-scale (continuously adjustable)	Between + 20 % and -13 % of max. span	Between the measuring limits	Between the measuring limits
Output			
Output signal		4 to 20 mA	
• Lower limit		3.84 mA	
• Upper limit	22 mA	20.5 mA	22 mA
• Electric damping			
- Adjustable time constant	Approx. 0/3 s (selectable using plug-in jumpers)	0 to 100 s	0 to 100 s
• Current transmitter	–	Adjustable from 3.55 to 23 mA	Adjustable to 3.6, 4.0, 12.0, 20.0 or 22.8 mA
Signal on alarm	≥ 22.8 mA	22.8 mA	3.6 or 22.8 mA
Load			
• Without HART communication	$R_B \leq (U_H - 11\ V)/0.023\ A$ in Ω, U_H : power supply in V	$R_B \leq (U_H - 10.5\ V)/0.023\ A$ in Ω, U_H : power supply in V	$R_B \leq (U_H - 11\ V)/0.023\ A$ in Ω, U_H : power supply in V
• With HART communication	–	R_B = 230 to 500/1100 Ω	–
Characteristic		Linear	
Accuracy			
Reference conditions	Increasing characteristic, start-of-scale value 0 bar, stainless steel seal diaphragm, silicone oil filling and limit point setting, r = max. span/set span		
Error in measurement (including hysteresis and repeatability)	≤ 0.25 %	≤ 0.25 % at r ≤ 10 ≤ 0.5 % at 10 < r ≤ 30	≤ 0.1 %
• Repeatability		Included in error in measurement	
• Hysteresis		Included in error in measurement	
Response time (T_{63}, without electric damping)	Approx. 0.3 s	Approx. 0.1 s	Approx. 0.2 s
Long-term drift	≤ 0.2 % / 12 months with max. span	≤ 0.1 % / 12 months with max. span	≤ 0.1 % / 12 months with max. span
Ambient temperature effect			
• At -10 to +60 °C	≤ (0.6 · r + 0.6) %; with 1 bar cell: ≤ (1.2 · r + 0.6) %	≤ (0.2 · r + 0.4) %	≤ (0.1 · r + 0.2) %
• At -40 to -10 °C and +60 to +85 °C	≤ (0.2 · r + 0.15) % / 10 K	≤ (0.3 · r + 0.35) % / 10 K	≤ (0.1 · r + 0.15) % / 10 K
Influence of mounting position	≤ 0.1 mbar per 10° inclination	≤ 0.05 mbar per 10° inclination	≤ 0.05 mbar per 10° inclination
Influence of power supply	≤ 0.01 % per 1 V change in voltage	≤ 0.005 % per 1 V change in voltage	≤ 0.005 % per 1 V change in voltage

Technical data

	MK II 7MF4010	MS 7MF4013	HK 7MF4020
Rated operating conditions			
Installation conditions			
• Installation instructions	Process connection pointing vertically downwards		
Ambient conditions			
• Ambient temperature (observe temperature class in potentially explosive atmospheres)			
- Measuring cell with silicone oil filling	-30 to +85 °C	-40 to +85 °C	-40 to +85 °C
- Measuring cell with inert filling liquid	–	–	-20 to +85 °C
- Digital display	–	-30 to +85 °C	–
• Ambient temperature limits	See ambient temperature		
• Storage temperature	-50 to +85 °C	-40 to +85 °C	-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	-30 to +100 °C	-40 to +100 °C	-40 to +100 °C
- Measuring cell with inert filling liquid	–	–	-20 to +100 °C
• Process temperature limits	See process temperature		
• Process pressure limits	See page 1/2		
Design			
Weight (without options)		Approx. 1.5 kg	
Dimensions	See Fig. 1/7	See Fig. 1/7	See Fig. 1/6
Material			
• Wetted parts materials			
- Connection shank	Stainless steel, mat. No. 1.4401	Stainless steel, mat. No. 1.4401	Stainless steel, mat. No. 1.4401 or Hastelloy C4, mat. No. 2.4610
- Oval flange	–	–	–
- Seal diaphragm	Stainless steel, mat. No. 1.4404	Stainless steel, mat. No. 1.4404	Stainless steel, mat. No. 1.4404 or Hastelloy C276, mat. No. 2.4819
• Non-wetted parts materials			
- Electronics housing	Die-cast aluminium, low in copper, GD-ALSi 12, polyester-based lacquer, stainless steel rating plate		
- Mounting bracket (option)	Steel, galvanized and yellow-passivized, or stainless steel		
Measuring cell filling	Silicone oil	Silicone oil	Silicone oil or inert filling liquid
Process connection	Connection shank G½A to DIN 16 288, female thread ½ - 14 NPT		
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		
Displays and controls			
Input keys	None	2 for local programming directly on transmitter	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	–	Option	–
Power supply			
Terminal voltage on transmitter	DC 11 to 35 V DC 11 to 30 V in intrinsically-safe mode	DC 10.5 to 45 V DC 10.5 to 30 V in intrinsically-safe mode	DC 11 to 45 V DC 11 to 30 V in intrinsically-safe mode
Ripple	–	$U_{pp} \leq 0.2$ V (47 to 125 Hz)	–
Noise	–	$U_{rms} \leq 1.2$ mV (0.5 to 10 kHz)	–

Technical data

	MK II 7MF4010	MS 7MF4013	HK 7MF4020
Certificates and approvals			
CENELEC	To DIN EN 50 014, DIN 50 018 and DIN EN 50 020		
• Intrinsic safety	ⓔ II 1/2 G EEx ia IIC T4	ⓔ II 1/2 G EEx ia IIC T6	EEx ia IIC T4 or T5 or T6
- Conformity certificate	PTB 98 ATEX 2003	PTB 99 ATEX 2122	PTB No. Ex-92.C.2146
- Max. ambient temperature	+80 °C temp. class T4	+80 °C temp. class T4 +70 °C temp. class T5 +60 °C temp. class T6	+80 °C temp. class T4 +75 °C temp. class T5 +60 °C temp. class T6
- Connection to certified intrinsically-safe circuits with maximum values		U_o = 30 V I_k = 100 mA P = 750 mW	
- Effective internal inductance	$L_i \leq 0.75$ mH	$L_i \leq 1$ mH	$L_i \leq 0.6$ mH
- Effective internal capacitance	$C_i \leq 21$ nF	$C_i \leq 6$ nF	$C_i \leq 6$ nF
• Explosion-proof	–	–	–
- Conformity certificate	–	–	–
- Max. ambient temperature	–	–	–
TÜV	–		To DIN VDE 0165/02.91, Section 6.3
• Ex-approved zone 2n	–	In planning	Ex n V II T4
- Registration number	–	–	08/220/1092/6
FMRC (Factory Mutual Research Corp.)		–	
• Intrinsic safety and explosion-proof	–	–	–
• Explosion-proof	–	–	–
• Dust-ignition proof	–	–	–
• Intrinsically safe	–	–	–
• Entity parameters	–	–	–
CSA (Certificate of Compliance)	–	–	–
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	–
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	–

Technical data

	DS 7MF4032	DS with PROFIBUS-PA 7MF4032
Application	See page 1/2	
Mode of operation	See page 1/3	
Measuring principle	Piezo-resistive	
Input		
Measured variable	Pressure	
Measuring range		
• Span (continuously adjustable)	0.01 to 400 bar	Measuring cells from 1 to 400 bar
• Lower measuring limit		
- Measuring cell with silicone oil filling	30 mbar (absolute)	
- Measuring cell with inert filling liquid		
For process temp. -20 °C < $\vartheta \leq$ 60 °C	30 mbar (absolute)	
For process temp. +60 °C < $\vartheta \leq$ 100 °C	30 mbar + 20 mbar · (ϑ - 60) (absolute)	
• Upper measuring limit	100 % of max. span	–
• Start-of-scale (continuously adjustable)	Between the measuring limits	–
Output		
Output signal	4 to 20 mA	Digital bus signal
• Lower limit	3.84 mA	Digital status signal
• Upper limit	20.5 or 22 mA	Digital status signal
• Electric damping		
- Adjustable time constant	0 to 100 s	0 to 100 s
• Current transmitter	Adjustable from 3.6 to 22.8 mA	–
Signal on alarm	3.6 or 22.8 mA	Digital status signal
Load		–
• Without HART communication	$R_B \leq (U_H - 11\ V)/0.023\ A$ in Ω, U_H: power supply in V	–
• With HART communication	R_B = 230 to 500/1100 Ω	–
Characteristic	linear	
Accuracy	Increasing characteristic, start-of-scale value 0 bar, stainless steel seal diaphragm, silicone oil filling and limit point setting, r = max. span/set span	
Reference conditions		
Error in measurement (including hysteresis and repeatability)	≤ 0.1 % at r ≤ 10, ≤ 0.2 % at 10 < r ≤ 30, (0.005 · r + 0.5) % at 30 < r ≤ 100	≤ 0.1 %
• Repeatability	Included in error in measurement	
• Hysteresis	Included in error in measurement	
Response time (T_{63}, without electric damping)	Approx. 0.2 s	
Long-term drift	≤ 0.1 % / 12 months with max. span	≤ 0.1 % / 12 months
Ambient temperature effect		
• At -10 to +60 °C	≤ (0.1 · r + 0.2) %	0.3 %
• At -40 to -10 °C and +60 to +85 °C	≤ (0.1 · r + 0.15) % / 10 K	0.25 % / 10 K
Influence of mounting position	≤ 0.05 mbar per 10° inclination	
Influence of power supply	≤ 0.005 % per 1 V change in voltage	
Rated operating conditions		
Installation conditions		
• Installation instructions	Process connection pointing vertically downwards	
Ambient conditions		
• Ambient temperature (observe temperature class in potentially explosive atmospheres)		
- Measuring cell with silicone oil filling	-40 to +85 °C	
- Measuring cell with inert filling liquid	-20 to +85 °C	
- Digital display	-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	

Technical data

	DS 7MF4032	DS with PROFIBUS-PA 7MF4032
Rated operating conditions (continued)		
Medium conditions		
• Process temperature		
- Measuring cell with silicone oil filling	-40 to +100 °C	
- Measuring cell with inert filling liquid	-20 to +100 °C	
• Process temperature limits	See process temperature	
• Process pressure limits	See page 1/2	
Design		
Weight (without options)	Approx. 1.5 kg	Approx. 1.7 kg
Dimensions	See Fig. 1/7	
Material		
• Wetted parts materials		
- Connection shank	Stainless steel, mat. No. 1.4401 or Hastelloy C4, mat. No. 2.4610	
- Oval flange	Stainless steel, mat. No. 1.4401	
- Seal diaphragm	Stainless steel, mat. No. 1.4404 or Hastelloy C276, mat. No. 2.4819	
• Non-wetted parts materials		
- Electronics housing	Die-cast aluminium, low in copper, GD-ALSi 12, or stainless steel precision casting, polyester-based lacquer, stainless steel rating plate	
- Mounting bracket (option)	Steel, galvanized and yellow-passivized, or stainless steel	
Measuring cell filling	Silicone oil or inert filling liquid	
Process connection	Connection shank G½A to DIN 16 288, female thread ½ - 14 NPT or oval flange	
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 M20 x 1.5 or ½ - 14 NPT
Displays and controls		
Input keys	3 for local programming directly on transmitter	
Analog indicator (option)	Linear scale 0 to 100 % or customer-specific scale	–
Digital display	Built-in, cover with window: option	
Power supply		
Terminal voltage on transmitter	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	$U_{pp} \leq 0.2$ V (47 to 125 Hz)	–
Noise	$U_{rms} \leq 1.2$ 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 ib IIC T4
- Conformity certificate	PTB No. Ex-94.C.2090	PTB Ex-97.D.2178
- Max. ambient temperature	+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 V I_k = 100 mA P = 750 mW	U_o = 17.5 V I_k = 128 mA P = 1.8 W
- Effective internal inductance	$L_i \leq 0.6$ mH	$L_i \leq 7.2$ µH
- Effective internal capacitance	$C_i \leq 8$ nF	$C_i \leq 0.6$ nF
• Explosion-proof	EEx d IIC T5 and T6	
- Conformity certificate	PBT No. Ex-94.C.1021	
- Max. ambient temperature	+85 °C temp. class T5 +75 °C temp. class T6	

Technical data

	DS 7MF4032	DS with PROFIBUS-PA 7MF4032
Certificates and approvals (continued)		
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	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	
• Dust-ignition proof	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, groups A, B, C, D, E, F and G, indoor and outdoor (NEMA 4X) hazardous (classified) locations	–
• Entity parameters	V_{max} = 30 V I_{max} = 100 mA L_i = 0.6 mH C_i = 8 nF	–
CSA (Certificate of Compliance)	No. LR 104225-1 Class 2258 02 and Class 2258 03	–
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} ≤ 27 mA in event of fault, output twice
Measured-value resolution	–	3 x 10^{-5} referred to full-scale value

Ordering date
7MF4010, MK II series

Ordering data	Order No.
SITRANS P transmitter for pressure, MK II series	7MF4010- 1- ■■■■ - 1 ■■■
Two-wire system, Instruction Manual (in same language as rating plate; see "Further designs"), measuring cell filling: silicone oil, measuring cell cleaning: normal	
Span	
0.23 to 1 bar	B
0.89 to 4 bar	C
3.55 to 16 bar	D
14.0 to 63 bar	E
35.6 to 160 bar	F
Wetted parts materials	
Seal diaphragm / Connection shank	
Stainless steel / Stainless steel	A
Version for remote seal	Y 0
Process connection	
• Connection shank G½A	0
• Female thread ½ - 14 NPT	1
Non-wetted parts materials	
Housing made of die-cast aluminium	0
Explosion protection	
• Without explosion protection	A
• With explosion protection (CENELEC) Type of protection: "Intrinsic safety" (EEx ia)	B
Electrical connection/cable inlet	
• Screwed gland Pg 13.5 (adapter)	A
• Screwed gland M20 x 1.5	B
• Screwed gland ½- 14 NPT	C
• Han 7D plug	D
Indicator	
• Without	1
• Housing cover with analog indicator	
- Scale 0 to 100 %, linear divisions	3
- Scale as specified (Order code Y20 required)	5

Ordering data	Order code
Further designs	
Please add **"Z"** to Order No. and specify Order code(s).	
Transmitter with mounting bracket made of	
• Steel	**A01**
• Stainless steel	**A02**
Han 7D plug (metal, gray)	**A30**
Han 8U plug (instead of Han 7D)	**A31**
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**
Factory certificate to DIN 50 049-2.2/EN 10 204-2.2	**C14**
Use in zone 0 (basic device EEx ia)	**E02**
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**	**Y01**
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 setting for "Y01" can be made in the factory.

See page 1/12 for **example for ordering**.

Power supply units: see page 2/50.

Ordering data

Order No.

SITRANS P transmitter for pressure, MS series

Two-wire system,
Smart version,
measuring cell filling: silicone oil,
measuring cell filling: normal

7MF4013- 1 ■■■■ - 1 ■■■

Span

0.03	to	1 bar	B
0.13	to	4 bar	C
0.53	to	16 bar	D
2.10	to	63 bar	E
5.33	to	160 bar	F
13.33	to	400 bar	G

Wetted parts materials

Seal diaphragm	Parts of measuring cell	
Stainless steel	Stainless steel	A

Version for remote seal

Y	0

Process connection

• Connection shank G½A	0
• Female thread ½ - 14 NPT	1

Non-wetted parts materials

Housing made of die-cast aluminium	0

Explosion protection

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

Electrical connection/cable inlet

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

Indicator

• Without	1
• Housing cover with window and digital display	6

Scope of delivery: Transmitter as ordered (Instruction Manual is extra ordering item (see accessories on page 1/56)).

Ordering data

Order code

Further designs

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

Transmitter with mounting bracket made of	
• Steel	**A01**
• Stainless steel	**A02**
Han 7D plug (metal, gray)	**A30**
Han 8U plug (instead of Han 7D)	**A31**
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 10 204-3.1B	**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**
Use in zone 0 (basic device EEx ia)	**E02**

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**	**Y01**
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**

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

See page 1/12 for **example for ordering**.

Power supply units: see page 2/50.

7MF4020, HK series

Ordering data — Order No.

SITRANS P transmitter for pressure, HK series

Two-wire system, Instruction Manual (in same language as rating plate; see "Further designs")

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

Span

0.1	to	1 bar
0.4	to	4 bar
1.6	to	16 bar
6.3	to	63 bar
16	to	160 bar
40	to	400 bar

Wetted parts materials

Seal diaphragm	Parts of meas. cell
Stainless steel	Stainless steel
Hastelloy	Stainless steel
Hastelloy	Hastelloy

Version for remote seal

Process connection

- Connection shank G½A
- Female thread ½ - 14 NPT

Non-wetted parts materials

- Housing made of 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)

7MF4020- ■■■■■ **-1** ■■■

1								
3								
	B							
	C							
	D							
	E							
	F							
	G							
		A						
		B						
		C						
		Y	0					
			0					
			1					
				0				
					A			
						B		
						E		
							A	
							B	
							C	
							D	
								1
								3
								5

Ordering data — Order code

Further designs

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

Transm. with mounting bracket made of	
• Steel	**A01**
• Stainless steel	**A02**
Han 7D plug (metal, gray)	**A30**
Han 8U plug (instead of Han 7D)	**A31**
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 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)	**D07**
Use	
• In zone 10/11 (basic unit EEx ia)	**E01**
• In zone 0 (basic unit EEx ia)	**E02**
Oxygen application (max. 190 bar for oxygen measurement and inert filling liquid)	**E10**
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	**Y01**
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 setting for "Y01" can be made in the factory.

Power supply units: see page 2/50.

Example for ordering:

Item line:	7MF4020-1EA00-1AA5-Z
B line:	A01 + Y01 + Y20
C line:	Y01: 10 to 20 bar
C line:	Y20: 10 to 20 bar

Ordering data

Order No.

SITRANS P transmitter for pressure, DS series

Two-wire system, Smart version; incl. Instruction Manual (in same language as rating plate; see "Further designs")

7MF4032- ■■■■■ -1 ■■■

Meas. cell filling	Meas. cell cleaning	
Silicone oil	Normal	1
Inert liquid	Grease-free	3

Span

0.01 to	1 bar	B
0.04 to	4 bar	C
0.16 to	16 bar	D
0.63 to	63 bar	E
1.6 to	160 bar	F
4.0 to	400 bar	G

Wetted parts materials

Seal diaphragm	Parts of meas. cell	
Stainless steel	Stainless steel	A
Hastelloy	Stainless steel	B
Hastelloy	Hastelloy	C
Version for remote seal		Y 0

Process connection

• Connection shank G½A	0
• Female thread ½ - 14 NPT	1
• Oval flange and connection shank made of stainless steel, max. span 160 bar	
- Mounting thread $^{7}/_{16}$ - 20 UNF	2
- Mounting thread M10	3

Non-wetted parts materials

• Housing made of die-cast aluminium	0
• Housing: stainl. steel precision casting	3

Explosion protection

• Without explosion protection	A
- With explosion protection (CENELEC) Type of protection: "Intrinsic safety" (EEx ia)	B
- "Explosion-proof" (EEx d) [1]	D
- "Intrinsic safety + explosion-proof" (EEx ia and EEx d) [1]	P
• Use in zone 2n (TÜV)	E
• With explosion protection (FM + CSA) Intrinsic safety and explosion-proof (is + xp) [1]	N C

Electrical connection/cable inlet

• Screwed gland Pg 13.5 (adapter) [2]	A
• Screwed gland M20 x 1.5	B
• Screwed gland ½ - 14 NPT	C
• Han 7D plug [2]	D

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	3
- Scale as specified (Order code Y20 required)	5
• Housing cover with window (built-in digital display visible)	6

Ordering data

Order code

Further designs

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

Transm. with mounting bracket made of	
• Steel	**A01**
• Stainless steel	**A02**
Han 7D plug (metal, gray)	**A30**
Han 8U plug (instead of Han 7D)	**A31**
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 10 204-3.1B	**C12**
Factory certificate to DIN 50 049-2.2/ EN 10 204-2.2	**C14**
Setting of upper limit of output signal to 22 mA	**D05**
Acid gas version to NACE (only together with seal diaphragm made of Hastelloy)	**D07**
IP 68 (not together with Han 7D, Han 8U or Pg 13.5 plug and max. span ≤ 63 bar)	**D12**
Use in zone 0 (basic device EEx ia)	**E02**
Oxygen application (max. 190 bar with oxygen measurement and inert filling liquid)	**E10**
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**	**Y01**
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.

See page 1/12 for **example for ordering**
Power supply units: see page 2/50.

Available ex stock: 7MF4032-1■A00-1BB1-Z B11.

[1] Without cable gland.
[2] Not together with type of protection "Explosion-proof".

7MF4032, DS series with PROFIBUS-PA

Ordering data

Order No.

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

Two-wire system, Instruction Manual (in same language as rating plate; see "Further designs")

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

Span

Up to 1 bar	B
Up to 4 bar	C
Up to 16 bar	D
Up to 63 bar	E
Up to 160 bar	F
Up to 400 bar	G

Wetted parts materials

Seal diaphragm	Parts of meas. cell	
Stainless steel	Stainless steel	A
Hastelloy	Stainless steel	B
Hastelloy	Hastelloy	C
Version for remote seal		Y 0

Process connection

• Connection shank G½A	0
• Female thread ½ - 14 NPT	1
• Oval flange and connection shank made of stainless steel, max. span 160 bar - Mounting thread $^{7}/_{16}$ - 20 UNF - Mounting thread M10	2 3

Non-wetted parts materials

• Housing made of die-cast aluminium	0
• Housing: stainl. steel precision casting	3

Explosion protection

• Without explosion protection	A
• With explosion protection (CENELEC) Type of protection: "Explosion-proof" (EEx d) [1]	D
• Use in zone 2n (TÜV)	E
• With explosion protection (FM) explosion-proof (xp) [1]	G C
• With explosion protection (EEx ib)	Q

Electrical connection/ cable inlet

• Screwed gland M20 x 1.5	B
• Screwed gland ½ - 14 NPT	C

Indicator

• Basic version with housing cover without window (built-in digital display hidden)	1
• Housing cover with window (built-in digital display visible)	6

7MF4032- ■■■■■ **-1** ■■■ **-Z P01**

1 3

Ordering data

Order code

Further designs

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

Transm. with mounting bracket made of	
• Steel	**A01**
• Stainless steel	**A02**
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)	**D07**
IP 68 (not for max. span ≤ 63 bar)	**D12**
Oxygen application (max. 190 bar with oxygen measurement and inert filling liquid)	**E10**

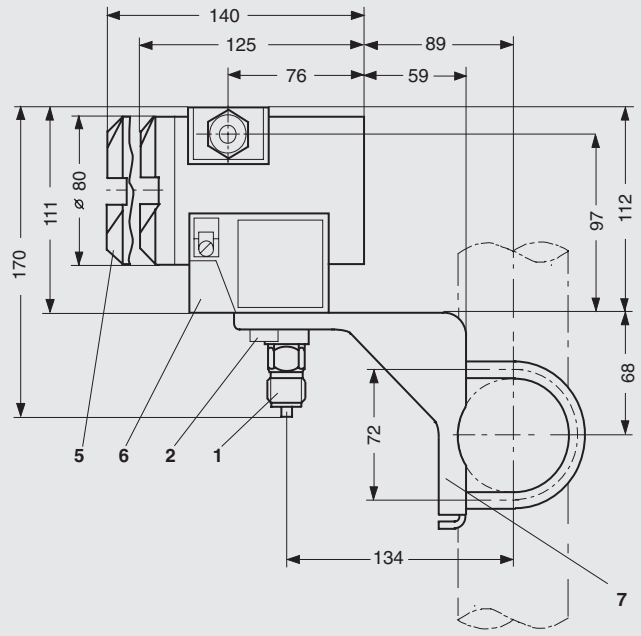
Additional information

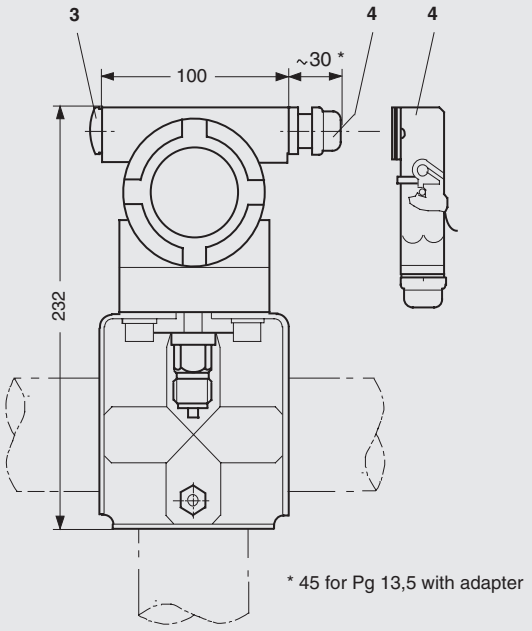
Please add **"Z"** to Order No. and specify Order code(s) and plain text.

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 1/12 for **example for ordering**

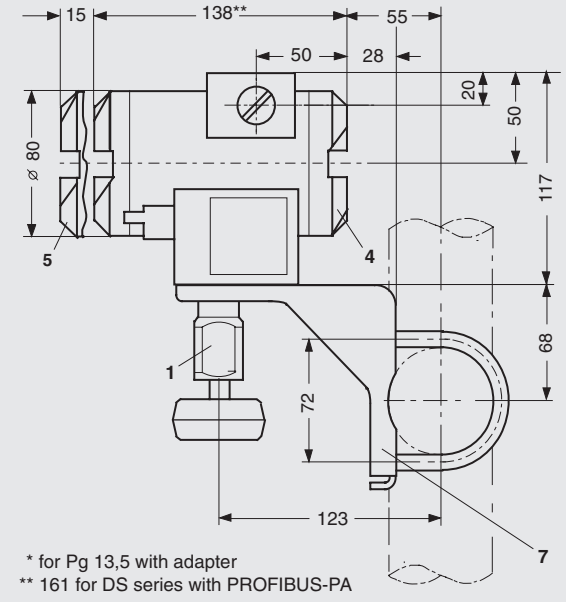
[1]) Without cable gland

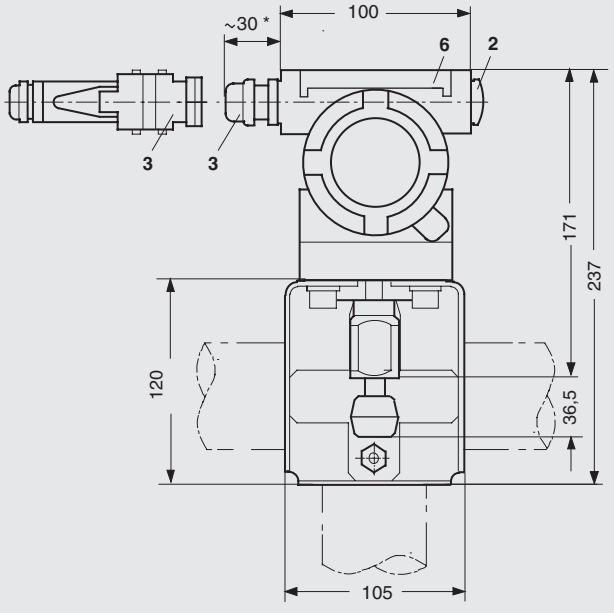




1 Process connection, G½A or ½ - 14 NPT
2 Mounting with M8 screws
3 Blanking plug
4 Screwed gland Pg 13.5 (adapter), M20 x 1.5 or ½ – 14 NPT, or Han 7D/Han 8U plug
5 Indicator (option)
6 Protective cover over keys
7 Mounting bracket (option) with clamp for securing to a vertical or horizontal pipe

Fig. 1/6 Dimensions of HK series





1 Process connection, ½ – 14 NPT, connection shank G½A or oval flange
2 Blanking plug
3 Electrical connection:
screwed gland Pg 13.5 (adapter)
(not DS series with PROFIBUS-PA),
screwed gland M20 x 1.5 or
screwed gland ½ - 14 NPT or
Han 7D/Han 8 U plug (not DS series with PROFIBUS-PA)
4 Terminal side, analog indicator as option
5 Electronics side, digital display
6 Protective cover over keys (no function with MS)
7 Mounting bracket (option)

Fig. 1/7 Dimensions of MK II, MS, DS and DS series with PROFIBUS-PA