

SITRANS™ P DSIII Pressure Transmitters

All versions of the SITRANS P transmitter, DS III series, are smart two-wire transmitters. The output signal is a load-independent direct current of 4 to 20 mA proportional to the input pressure, with HART® communications.

These transmitters are rated intrinsically safe and explosion-proof by FM, CSA, CENELEC and others.

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

The transmitters can be programmed locally using three magnetic push-buttons, or externally via HART.

TRANSMITTER FOR GAGE PRESSURE

Spans range from 0.15 psi to 5800 psi. This type of transmitter measures the gage pressure of corrosive and non-corrosive gases, vapors and liquids.

TRANSMITTER FOR ABSOLUTE PRESSURE

Spans range from 3.3" H₂Oa to 2325 psia. This type of transmitter measures the absolute pressure of corrosive and non-corrosive gases, vapors and liquids.

Two series are available:

- "Pressure" construction
- "Differential" construction

The "Differential pressure" series has a higher process pressure limit.

TRANSMITTER FOR DIFFERENTIAL PRESSURE AND FLOW

Spans range from 0.4" H₂O to 435 psi. This type of transmitter is used to measure:

- the differential pressure
- a small positive or negative pressure
- the flow $Q \propto \sqrt{DP}$ (together with a square-law primary element)



SIEMENS

There are two series of DP transmitters which offer static pressure ratings of 2325 psi or 6090 psi.

TRANSMITTER FOR LEVEL

Spans range between 10" H₂O and 2000" H₂O. This type of transmitter with mounting flange measures the level of corrosive and non-corrosive

liquids in open or closed containers. The nominal mounting flange diameter is 3 or 4 inches.

In the case of level measurements in open containers, the low-pressure connection of the measuring cell remains open (measurement with respect to atmosphere), while for

measurements in closed containers, this connection must be connected to the container in order to compensate the static pressure.

The wetted parts are constructed from a variety of materials depending on the degree of corrosion resistance required.

MOUNTING DIMENSIONS

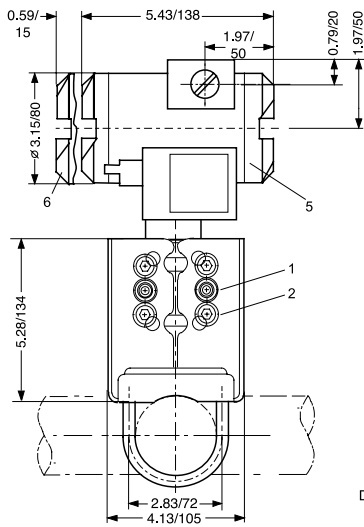


Fig. 1 Dimensions, Differential Construction, Diff., Flow and Absolute Models

- 1 Process connection of low-pressure side 1/4 - 18 NPT
- 2 Mounting thread M10, M12, or 7/16 -20 UNF
- 3 Connection side
- 4 Electronics side, digital display
- 5 Sealing screw
- 6 Blanking plug (only for Pg 13,5 and Han 7D)
- 7 Protective cover over keyboard
- 8 Electrical connection: Screwed gland Pg 13,5 1,2 M20 x 1.5² or 1/2 -14 NPT or Han 7D^{1,2} plug

This Figure is for Models 7MF4433 and FM4533 with HO3 option.

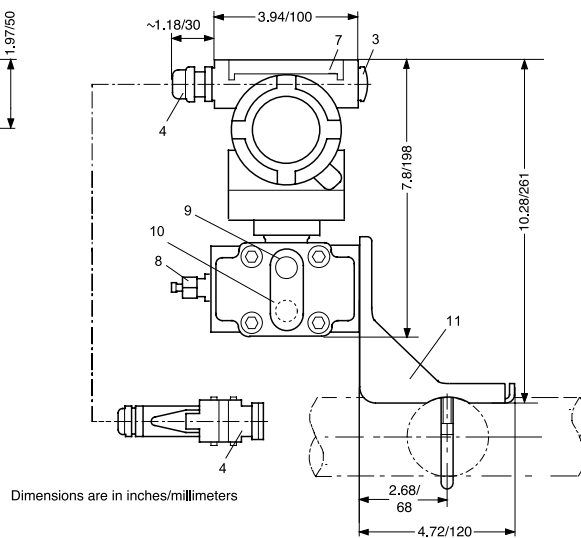
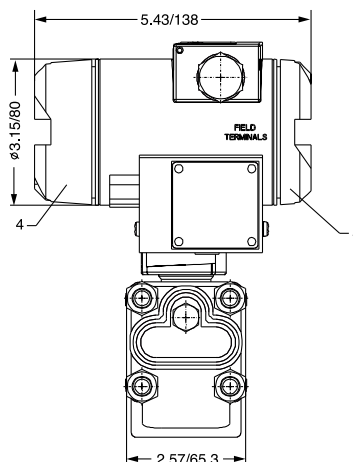
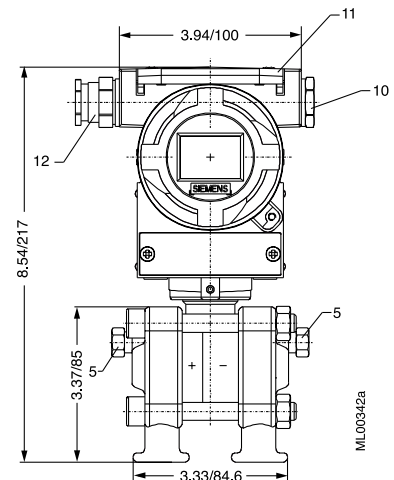
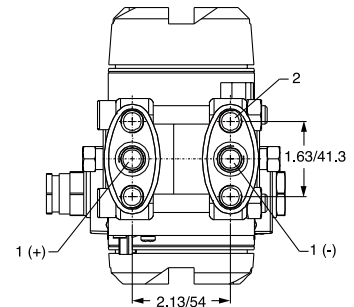


Fig. 2 Dimensions, Differential Pressure and Flow Models with HO3 Option



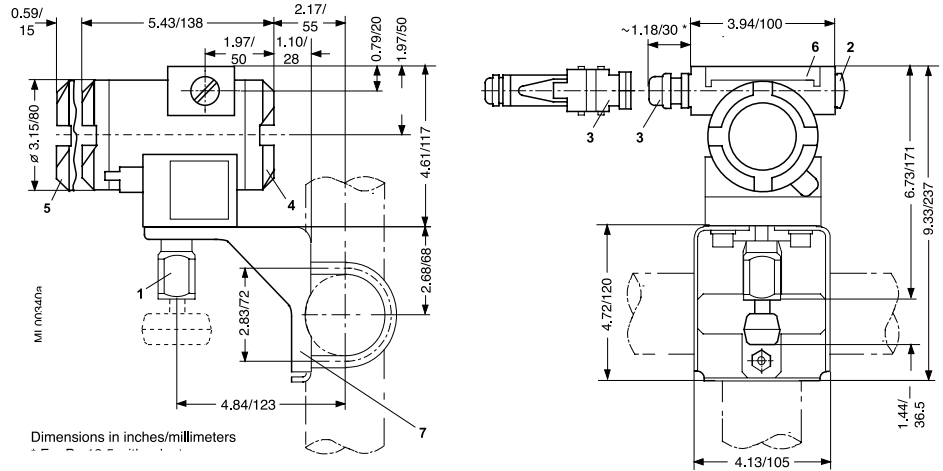
- 1 Process connection of low-pressure side 1/4 - 18 NPT, for absolute pressure (+) side
- 2 Mounting thread M10, M12, or 7/16 -20 UNF
- 3 Dummy plug
- 4 Electrical connection: Screwed gland Pg 13,5 (adapter) M20 x 1.5 or 1/2 -14 NPT or Han 7D/Han 8 U plug
- 5 Connector side
- 6 Electronics side, digital display (greater length for cover with window)
- 7 Protective cover over keys
- 8 Sealing screw
- 9 Side vent for measuring liquid
- 10 Side vent for measuring gas (supplement HO2)
- 11 Mounting bracket (option)

This Figure is for Models 7MF4333 and 7MF4333, and FM4533.



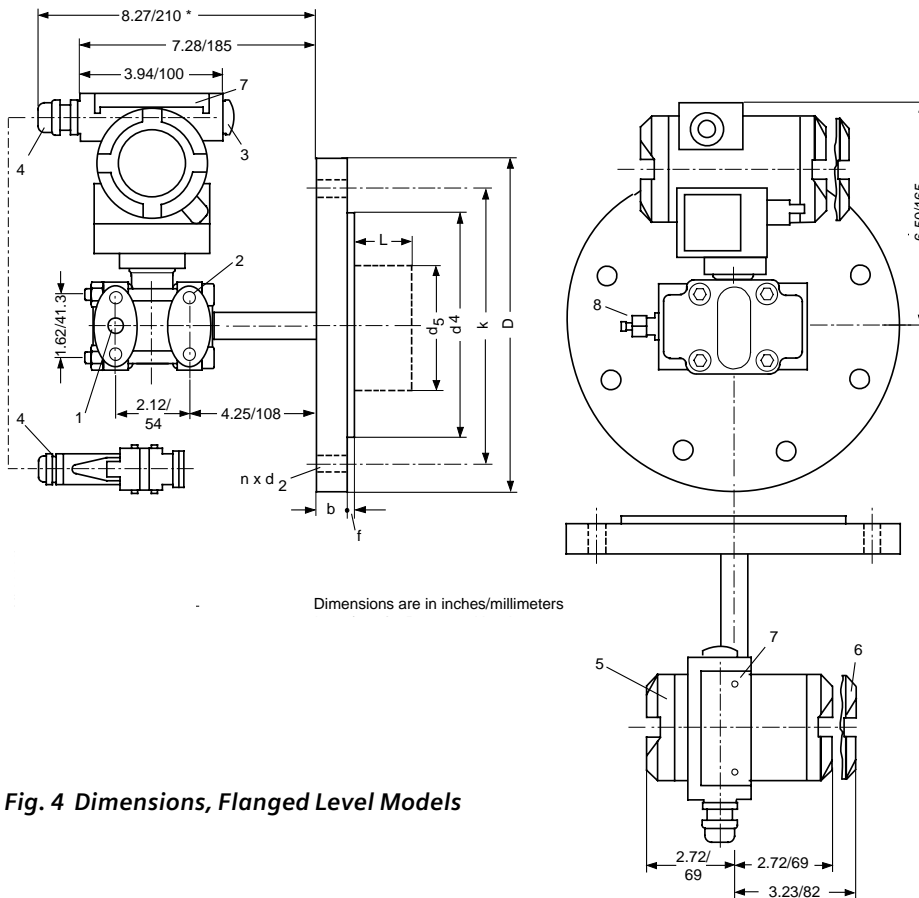
MOUNTING DIMENSIONS

- 1) Plus approx. 20 mm thread length to permit unscrewing.
- 1 Process connection 1/2 - 14NPT, connection shank G1/2A or oval flange
- 2 Blanking plug
- 3 Electrical connection:
Screwed gland Pg 13,5 (adapter)
Screwed gland M20 x 1.5 or
Screwed gland 1/2 - 14 NPT or
Han 7D/Han 8 U plug
- 4 Connector side
- 5 Electronics side, digital display (greater length for cover with window)
- 6 Protective cover over keys
- 7 Mounting bracket (option)



This Figure is for Models 7MF4033 and 7MF4233.

Fig. 3 Dimensions, Gauge Construction, Pressure and Absolute Models



- 1 Process connection of low-pressure side 1/4 - 18 NPT
- 2 Mounting thread M10, M12, or 7/16 - 20 UNF
- 3 Blanking plug
- 4 Electrical connection:
Screwed gland Pg 13,5 (with adapter)
M20 x 1.5 or 1/2 - 14 NPT or Han 7D/Han 8 U plug
- 5 Connector side
- 6 Electronics side, digital display (greater length for cover with window)
- 7 Protective cover over keys
- 8 Sealing screw with valve

This Figure is for Models 7MF4633 and 7MF4333, and FM4912.

Fig. 4 Dimensions, Flanged Level Models

SPECIFICATIONS

SITRANS P, DS III series, for	Pressure 7MF4033	Pressure trans- mitter series 7MF4233	Absolute pressure Differential pressure trans- mitter series 7MF4333	Differential pressure and flow 7MF4433/ 7MF4533	Level 7MF4633
Input					
Measured variable	Pressure		Absolute pressure	Differential pressure and flow	Level
Measuring range					
• Span (continuously adjustable)	0.15 psi to 5800 psi in 6 ranges	3.3" H ₂ O (abs.) to 435 psi (abs.) in 4 ranges	3.3" H ₂ O (abs.) to 2325 psi (abs.) in 5 ranges	0.4" to 8" H ₂ O (1 range) 0.4" H ₂ O to 435 psi (6 ranges) 1" H ₂ O to 435 psi (5 ranges)	10" to 2000" H ₂ O
- Max static pressure 470 psi					
- Max static pressure 2325 psi					
- Max static pressure 6090 psi					
• Lower measuring limit					
- Measuring cell with silicone oil filling	-14.5 psi		0" H ₂ O (absolute)	-100% of max. span or 12" H ₂ O (absolute)	-100% of max. span or 12" H ₂ O (abs.) depending on mounting flange
- Measuring cell with inert filling liquid					
For process temperature					
-20°C (-4°F) < ϑ < 60°C (140°F)			12" H ₂ O		
For process temperature					
+60°C (140°F) < ϑ < 100°C (212°F)					
(max. +85°C (185°F) for 435 psi measuring cell)			12" H ₂ O (abs.) + 8" H ₂ O (abs.) · (ϑ - 60°C)°C (or -76°F)°F		
• Upper measuring limit			100% of max. span (max. 2325 psi with oxygen measurement and inert filling liquid)		100% of max. span
• Zero (continuously adjustable)			Between the measuring limits		
Output					
Output signal			4 to 20 mA		
• Lower limit (continuously adjustable)			3.55 mA, factory-set to 3.84 mA		
• Upper limit (continuously adjustable)			23.0 mA, factory-set to 20.5 mA or optional 22.0 mA		
• Ripple (without HART communication)			/ pp ≤ 0.5% of max. output current		
• Electric damping					
- Adjustable time constant (T ₆₃)			0 to 100 s in steps of 0.1 s, factory-set to 0.1 s		
• Current transmitter			Adjustable from 3.55 to 23 mA		
• Signal on alarm			Adjustable from 3.55 to 23 mA		
Load					
• Without HART communication			$R_B \leq (UH - 10.5 V) / 0.023 A$ in Ω , UH: power supply in V		
• With HART communication			$R_B = 230$ to 500 Ω (HART modem) / 230 to 1100 Ω (HART communicator)		
Characteristic			Linear rising or falling or square-rooted		
Accuracy					
Reference conditions			Positive going, zero-based, stainless steel process diaphragm (with level: mounting flange without tube), silicone oil fill and room temperature (25 ½C) $r = \text{max. span/set span} = \text{span ratio}$		
Error in measurement with fixed-point setting (including hysteresis and repeatability)					
- Linear characteristic					
r - 10			≤ 0.1 %		≤ 0.15 %
10 < r ≤ 30			≤ 0.2 %		≤ 0.3 %
30 < r ≤ 100	≤ (0.005 · r + 0.05 %)			≤ (0.005 · r + 0.05 %)	≤ (0.0075 · r + 0.075 %)
- Square-root characteristic					
Flow > 50 %				≤ 0.1 % at r ≤ 10 ≤ 0.2 % at 10 < r ≤ 30	
Flow 25 to 50 %				≤ 0.2 % at r ≤ 10 ≤ 0.4 % at 10 < r ≤ 30	
• Repeatability			Included in error in measurement		
• Hysteresis			Included in error in measurement		

SPECIFICATIONS

SITRANS P, DS III series, for	Pressure 7MF4033	Absolute pressure Pressure trans- mitter series 7MF4233	Differential pressure trans- mitter series 7MF4333	Differential pressure and flow 7MF4433/ 7MF4533	Level 7MF4633
Response time (T_{63} , without electric damping)	Approx. 0.2 s	Approx. 0.2 s		Approx. 0.2 s, approx. 0.3 s with 8" H ₂ O and 24" H ₂ O measuring cells	Approx. 0.2 s
Long-term drift per 12 months - 8" H ₂ O measuring cell	$\leq (0.1 \cdot r)\%$	$\leq (0.2 \cdot r)\%$		$\leq (0.2 \cdot r)\%$	$\leq (0.1 \cdot r)\%$
Ambient temperature effect	$\leq (0.1 \cdot r + 0.2)\%$ ¹⁾				
• At -10 to +60°C (14 to 140°F)					
- 100" H ₂ O measuring cell					$\leq (0.5 \cdot r + 0.2)\%$ ²⁾
- 240" H ₂ O measuring cell					$\leq (0.3 \cdot r + 0.2)\%$ ²⁾
- 640" H ₂ O and 2000" H ₂ O measuring cells					$\leq (0.25 \cdot r + 0.2)\%$ ²⁾
• At -40 to -10°C (-40 to 14°F) and +60 to +85°C (140 to 185°F)	$\leq (0.1 \cdot r + 0.15)\% / 10\text{ C}^1)$				
- 100" H ₂ O measuring cell					$\leq (0.25 \cdot r +$ $0.15)\%$ ³⁾ / 10 K
- 240" H ₂ O measuring cell					$\leq (0.15 \cdot r +$ $0.15)\%$ ³⁾ / 10 K
- 640" H ₂ O and 2000" H ₂ O measuring cells					$\leq (0.12 \cdot r +$ $0.15)\%$ ³⁾ / 10 K
Influence of static pressure					
• On zero					$\leq (0.15 \cdot r)\%$ per 1450 psi
- 8" H ₂ O measuring cell					$\leq (0.15 \cdot r)\%$ per 465 psi
- 100" H ₂ O measuring cell					$\leq (0.3 \cdot r)\%$ per nominal pres. (PN)
- 240" H ₂ O measuring cell					$\leq (0.15 \cdot r)\%$ per nominal pres. (PN)
- 640" H ₂ O and 2000" H ₂ O meas. cell					$\leq (0.1 \cdot r)\%$ per nominal pres. (PN)
• On span					$\leq 0.2\%$ per 1450 psi
- 8" H ₂ O measuring cell					$\leq 0.2\%$ per 465 psi
Influence of mounting position	$\leq 0.02\%$ H ₂ O per 10° inclination	$\leq 0.28\%$ H ₂ O per 10° inclination			Dependent on filling liquid in mounting flange
Influence of power supply	0.005% per 1 V change in voltage				
Rated operating conditions					
Installation conditions					
• Installation instructions	Process connection pointing vertically downwards	Any mounting position			Defined by flange
Ambient conditions					
• Ambient temperature (observe temperature class in potentially explosive atmospheres)					
- Measuring cell with silicone oil filling	-40 to +85°C (-40 to 185°F)				
- 30-bar measuring cell	-20 to +85°C (-4 to 185°F)				
- Measuring cell with inert filling liquid	-20 to +85°C (-4 to 185°F)				
- Digital display	-30 to +8°C (-22 to 185°F)				
• Ambient temperature limits	See ambient temperature				
• Storage temperature	-50 to +85°C (-58 to 185°F)				
• 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				

¹⁾ Twice the value with 8" measuring cell. ²⁾ 0.4 instead of 0.2 for $10 < r \leq 30$. ³⁾ Twice the value for $10 < r \leq 30$.

SPECIFICATIONS

SITRANS P, DS III series, for	Pressure 7MF4033	Absolute pressure Pressure trans- mitter series 7MF4233	Differential pressure trans- mitter series 7MF4333	Differential pressure and flow 7MF4433/ 7MF4533	Level 7MF4633
Medium conditions					
• Process temperature					
- Measuring cell with silicone oil filling		-40 to +100°C (-40 to 212°F)			High-press. side: see mounting flange Low-press. side: -40 to +100°C (-40 to 212°F)
435 psi measuring cell			-40 to +85°C (-40 to 185°F) (-20 to +85°C (-4 to 185°F) for 7MF4533)		
- Measuring cell with inert filling liquid		-20 to +100°C (-4 to 212°F)			
435 psi measuring cell			-20 to +85°C (-4 to 185°F)		
• Process temperature limits		See process temperature			
• Process pressure limits	See page 3			Nominal pressure (PN)	
Design					
Weight (without options)	Approx. 3.3 lbs		Approx. 9.9 lbs		
• To DIN (transmitter with mounting flange, without extension)					Approx. 24.2 lbs to 28.6 lbs
• To ANSI (transmitter with mounting flange, without extension)					Approx. 24.2 lbs to 28.6 lbs
Dimensions	See Fig. 12	See Fig. 13	See Fig. 14	See Fig. 15	
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				
- Process diaphragm	Stainless steel, mat. No. 1.4404 or Hastelloy C276, mat. No. 2.4819		Stainless steel, mat. No. 1.4404, Hastelloy C276, mat. No. 2.4819, Monel, mat. No. 2.4360, tantalum 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		
- O-ring			FPM (Viton) or as option: PTFE, FEP, FEPM and NBR		
- High-pressure side Process diaphragm of mounting flange					Stainl. st., mat. No. 1.4571, Monel 400, mat. No. 2.4360, Hastelloy B2, mat. No. 2.4617, Hastelloy C276, mat. No. 2.4819, Hastelloy C4, mat. No. 2.4610, tantalum, PTFE, ECTFE
Sealing face					Smooth to DIN 2526 form D or ANSI B16.5 RF for stainl. steel, mat. No. 1.4571, DIN 2526 form E or ANSI B16.5 RFSF for other materials
- Sealing material in the process flanges for standard applications					Viton
for vacuum application of mounting flange					Copper
- Low-pressure side					
Process diaphragm					Stainless steel, mat. No. 1.4404
Process flanges and sealing screw					Stainless steel, mat. No. 1.4408
Connection shank					Stainless steel, mat. No.
- O-ring					FPM (Viton)

SPECIFICATIONS

SITRANS P, DS III series, for	Pressure 7MF4033	Absolute pressure Pressure trans- mitter series 7MF4233	Differential pressure trans- mitter series 7MF4333	Differential pressure and flow 7MF4433/ 7MF4533	Level 7MF4633
• Non-wetted parts materials - Electronics housing	Die-cast aluminium, low in copper, GD-ALSi 12, or stainless steel precision casting, polyester-based "epoxy", stainless steel rating plate				
- Process flange screws - Mounting bracket (option)	Steel, galvanized and yellow-passivated, or stainless steel				
Measuring cell filling • Filling liquid of mounting flange	Silicone oil or inert filling liquid (max. 2325 psi with oxygen measurement)				Silicone oil Silicone oil or other material
Process connection	Female thread 1/2 - 14 NPT, connection shank G 1/2A to DIN 16 288, or oval flange (PN 160) with mounting thread M10 or 7/16-20 UNF		Female thread 1/4 - 18 NPT and flange connection to DIN 19 213 with mounting thread M10 (M12 for PN 420) or 7/16-20 UNF		
• High-pressure side					Flange to DIN and ANSI
• Low-pressure side					Female thread 1/4 - 18 NPT and flange connection to DIN 19 213 with mounting thread M10 or 7/16-20 UNF
Electrical connection	Screw terminals, cable inlet via 1/2 - 14 NPT, or screwed gland Pg 13.5 (adapter), M20 x 1.5, or Han 7D/Han 8U plug				
Displays and controls					
Input keys	3 for local programming directly on transmitter				
Digital display	Built-in, cover with window (option)				
Power supply (U_H)					
Terminal voltage on transmitter	DC 10.5 to 45 V and DC 10.5 to 30 V in intrinsically-safe mode				
Ripple	$U_{pp} \leq 0.2 \text{ V}$ (47 to 125 Hz)				
Noise	$U_{rms} \leq 1.2 \text{ mV}$ (0.5 to 10 kHz)				
Certificates and approvals	Exclusively decisive are the data in the official EU prototype test certificate and the respectively valid supplements				
CENELEC	To DIN EN 50 014: 1997, EN 50 020: 1994 and EN 50 284: 1999				
• Intrinsic safety - EU prototype test certificate - Max. ambient temperature	Ex II 1/2 G EEx ia/ib IIC/IIB T6 PTB 99 ATEX 2122 +85°C (185°F) temperature class T4 +70°C (158°F) temperature class T5 +60°C (140°F) temperature class T6 $U_i = 30 \text{ V}$, $I_i = 100 \text{ mA}$, $P_i = 750 \text{ mW}$, $R_i = 300 \Omega$ $L_i = 0.25 \text{ mH}$ $C_i = 6 \text{ nF}$				
- Connection to certified intrinsically-safe circuits with maximum values - Effective internal inductance - Effective internal capacitance					
• Explosion-proof - Conformity certificate - Max. ambient temperature	Ex II 1/2 G EEx d IIC T4 / T6 PTB 99 ATEX 1160 +85°C (185°F) temperature class T4 +60°C (140°F) temperature class T6				
• Ex-approved zone 2 - Registration number	planned				
FMRC (Factory Mutual Research Corp.)	3008490 (3610, 3615)				
• Intrinsic safety and explosion-proof • Explosion-proof • Dust-ignition proof • Intrinsically safe	For class I, division, 1, groups A, B, C and D For class II, div. 1, groups E, F and G, indoor and outdoor (NEMA 4X) hazardous (classified) locations With entity, for use in class I, div. 1, group A, B, C, D, E, F and G, indoor and outdoor (NEMA 4X) hazardous (classified) locations				
- Entity parameters CSA (Certificate of Compliance)	$V_{max} = 30 \text{ V}$; $I_{max} = 100 \text{ mA}$; $L_i = 0.4 \text{ mH}$; $C_i = 5 \text{ nF}$ No. 1153651 (LR104225); Class 2258 02 and Class 2258 03				
Communication					
Load when connecting a • HART communicator • HART modem	230 to 1100 Ω 230 to 500 Ω				
Cable	2-wire screened: - 3.0 km, multi-core screened: $\leq 1.5 \text{ km}$				
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 / 98 / NT 4.0 and SIMATIC PDM				

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