

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500 Technical description

Overview



SITRANS P500 pressure transmitters are digital pressure transmitters featuring extensive user-friendliness and which fulfil the most stringent demands of accuracy, long-term stability, speed and lots more.

Extensive functionality allows you to set the pressure transmitter specifically to your own requirements. Despite their many settings options, local set-up is easy. A multi-lingual menu with clear text instructions guides you through the process. There are also help texts available.

The innovative EDD with integrated QuickStart assistance is also quick and easy to configure by computer using the HART protocol.

Extensive diagnostic functions, e.g. min/max pointer for pressure and temperature, or limit value indicator, make sure you always have the process under control. You can also display additional process values such as temperature or static pressure. The simultaneous display of mass, resulting from a volume, is also easy.

The SITRANS P500 pressure transmitters can be configured to measure:

- Differential pressure
- Level
- Volume
- Mass
- Volume flow
- Mass flow

Benefits

- High measuring accuracy
- Very fast response time
- Extremely good long-term stability
- High reliability even under extreme chemical and mechanical loads
- For aggressive and non-aggressive gases, vapors and liquids
- Extensive diagnosis and simulation functions which can be used both on site as well as via HART.
- Optional separate replacement of measuring cell and electronics without recalibration.
- Extremely low conformity error values

- Infinitely adjustable spans of 1.25 to 1250 mbar (0.018 to 18 psi)
- Extremely good total performance and conformity error values with no loss of performance up to a turndown of 10 guaranteed.
- Additional integrated sensor for static pressure
- Parameterization via on-site control keys or HART
- Short process flanges enable space-saving installation.

Application

The SITRANS P500 pressure transmitters can be used in industrial areas with extreme chemical and mechanical loads. Electromagnetic compatibility in the range 10 kHz to 1 GHz makes them suitable for locations with high electromagnetic emissions.

Pressure transmitters with ratings "Intrinsic safety" and "Explosion-proof" may be installed within potentially explosive atmospheres (zone 1) or in zone 0. The pressure transmitter comes with a CE-declaration of conformity and fulfils the corresponding unified European directives (ATEX).

Pressure transmitters with the type of protection "Intrinsic safety" for use in zone 0 may be operated with power supply units of category "ia" and "ib".

With newly designed measuring cell, it is possible to work with process temperatures of -40 to 125 °C (-40 to +257 °F) without having to use a remote seal.

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

The pressure transmitter can be fully parameterized locally via the three operating keys and externally via HART.

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Pressure transmitters for differential pressure and flow

- Measured variables:
 - Differential pressure
 - Small positive or negative pressure
 - Flow $q \sim \sqrt{\Delta p}$ (together with a primary element (see Chapter "Flow Meters"))
- Span (freely adjustable)
for SITRANS P500 HART: 1.25 to 1250 mbar (0.5 to 502 inH₂O)

Pressure transmitters for level

- Measured variable: Level of aggressive and non-aggressive liquids in open and closed vessels.
- Span (freely adjustable)
for SITRANS P500: 1.25 to 1250 mbar (0.5 to 502 inH₂O)

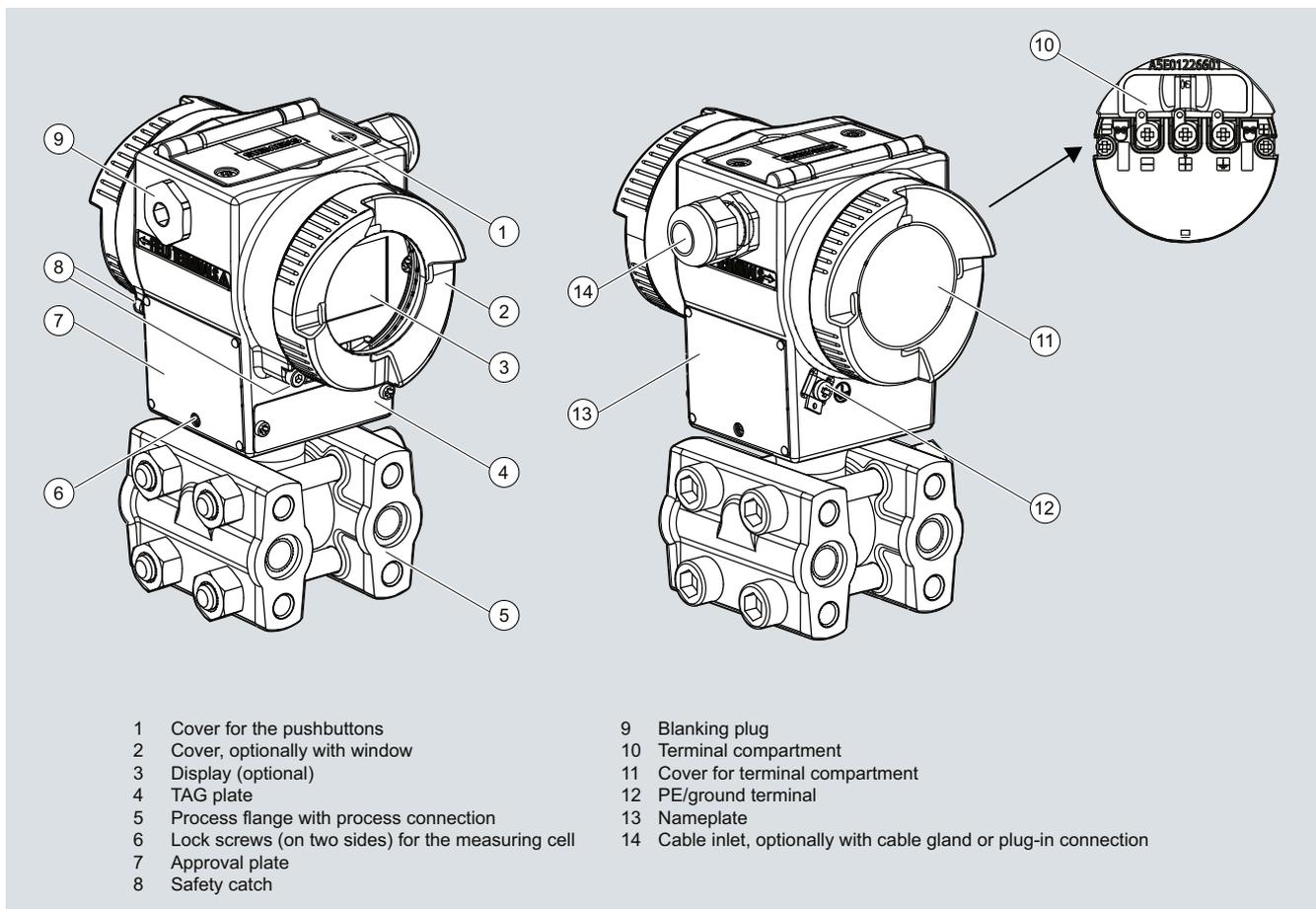
- Nominal diameter of the mounting flange
 - DN 50 / PN 40
 - DN 80 / PN 40
 - DN 100/ PN 16, PN 40
 - 2 inch/class 150, class 300
 - 3 inch/class 150, class 300
 - 4 inch/ class 150, class 300
 - customized special version

In the case of level measurements in open vessels, the low-pressure connection of the measuring cell remains open (measurement "compared to atmospheric").

In the case of measurements in closed vessels, the lower-pressure connection has to be connected to the vessel in order to compensate the static pressure.

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

Design



View of transmitter

- The electronics housing is made of coated die-cast aluminum.
- The casing has round screwed covers front and back.
- Depending on the design the front cover is fitted with an inspection window. You can read off the measured value directly from the optional display through the window.
- The inlet to the terminal compartment is located either on the left or right side. The unused opening in each case is sealed by a blanking plug.
- The PE/ground terminal is on the back of the housing.
- Access to the terminal compartment for auxiliary power and shielding by unscrewing the cover.
- Beneath the electronic housing is the measuring cell with its process flanges at which the process connections are available. The modular design of the pressure transmitter lets you replace the measuring cell, electronics and connection board as required.
- On the top of the housing you can see the screwed cover of the three local pushbuttons of the transmitter.

Pressure Measurement

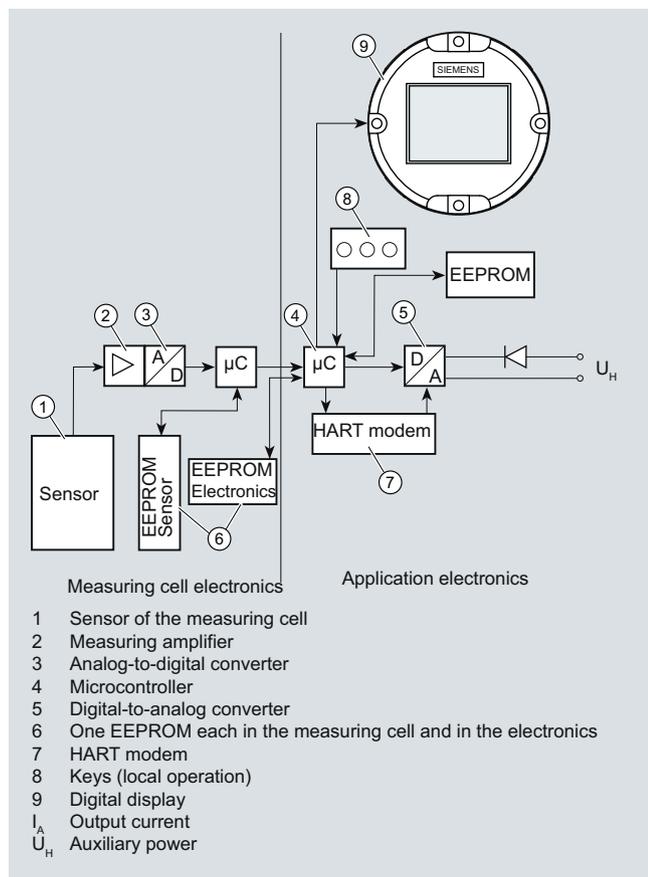
Transmitters for High Performance requirements

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Technical description

Function

Operation of electronics with HART communication



Function diagram of electronics

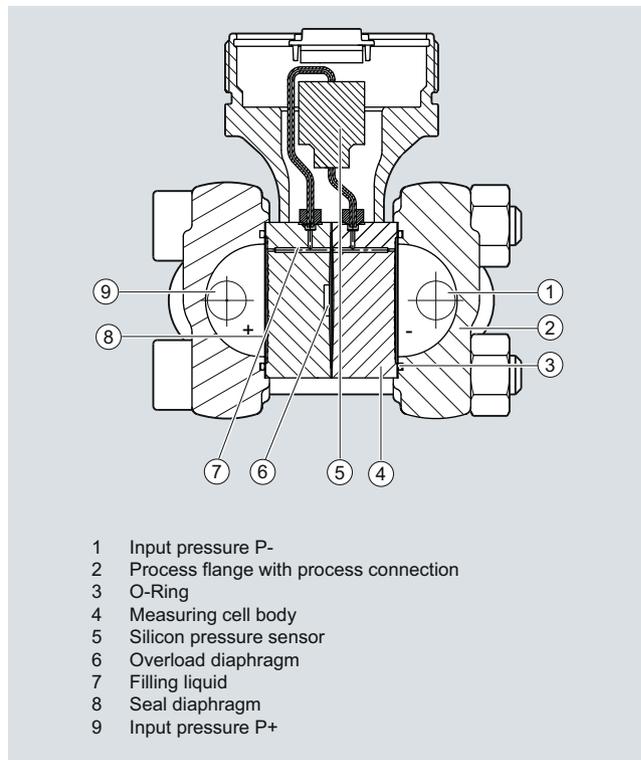
- The input pressure is converted into an electrical signal by the sensor.
- This signal is amplified by the measuring amplifier and digitalized in an analog-to-digital converter.
- The digital signal is analyzed in a microcontroller and corrected according to linearity and thermal characteristics.
- In a digital-to-analog converter it is then converted into the output current of 4 to 20 mA. When connected to supply lines, a diode circuit provides reverse polarity protection.
- The measuring cell-specific data, the electronic data and the parameterization data is held in two EEPROMs. One EEPROM is incorporated into the measuring cell electronics, the other is incorporated into the application electronics.

Operation

- The three local pushbuttons enable you both to navigate and carry out configuration and to visually track messages and process values, provided a display is available.
- If you have a device without a display, you can carry out zero adjustment using the three local pushbuttons. It is possible to retrofit a display at any time.
- You can also carry out settings by computer via a HART modem.

Mode of operation of the measuring cells

Measuring cell for differential pressure and flow



Measuring cell for differential pressure and flow, function diagram

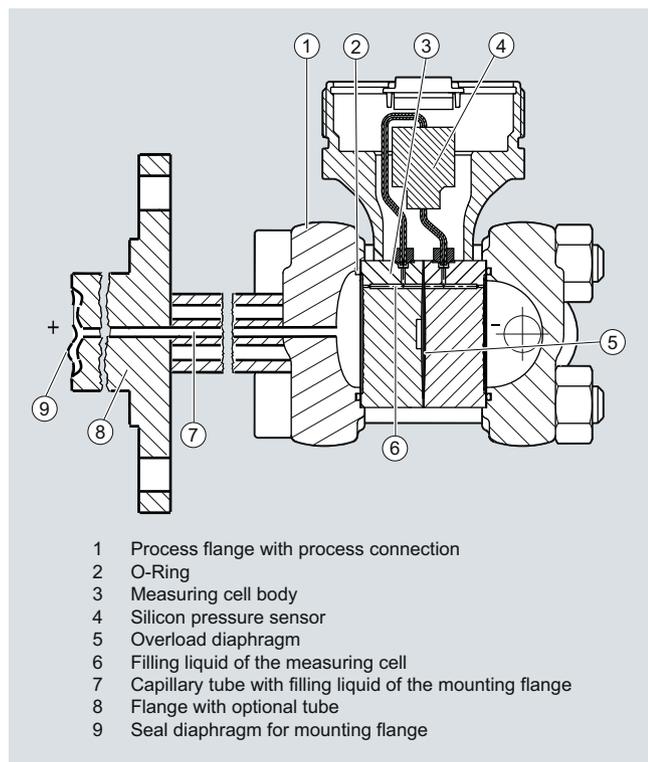
- The differential pressure is transmitted via the seal diaphragm and the filling liquid to the silicon pressure sensor.
- If the measuring limits are exceeded, the overload diaphragm flexes until it makes contact with the body of the measuring cell. This protects the sensor model from overload.
- The differential pressure causes the measuring diaphragm of the silicon pressure sensor to flex.
- The displacement changes the resistance value of the 4 piezo resistors in the measuring diaphragm in a bridge circuit.
- The change in the resistance causes a bridge output voltage proportional to the input pressure.

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Measuring cell for level



Measuring cell for level, function diagram

- The input pressure (hydrostatic pressure) acts hydraulically on the measuring cell via the seal diaphragm on the mounting flange.
- The differential pressure applied to the measuring cell is transmitted via the seal diaphragm and the filling liquid to the silicon pressure sensor.
- If the measuring limits are exceeded, the overload diaphragm flexes until it makes contact with the body of the measuring cell. This protects the silicon pressure sensor from overload.
- The differential pressure causes the measuring diaphragm of the silicon pressure sensor to flex.
- The displacement changes the resistance value of the 4 piezo resistors in the measuring diaphragm in a bridge circuit.
- The change in the resistance causes a differential pressure proportional to the input pressure.

Configuration of SITRANS P500 HART

Depending on the version, there are a range of options for configuring the pressure transmitter and for setting or reading the parameters.

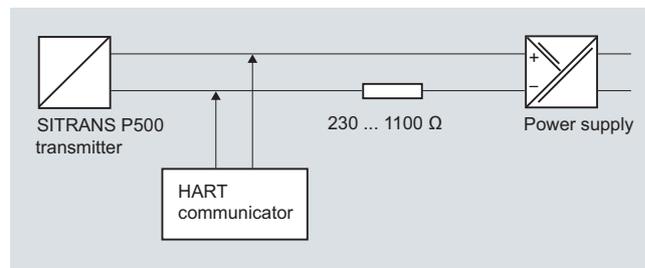
Configuration using the pushbuttons (local operation)

You can configure the transmitter in situ using the three keys provided a display is available. If you have no display, you can only carry out zero adjustment.

It is possible to retrofit a display. See accessories.

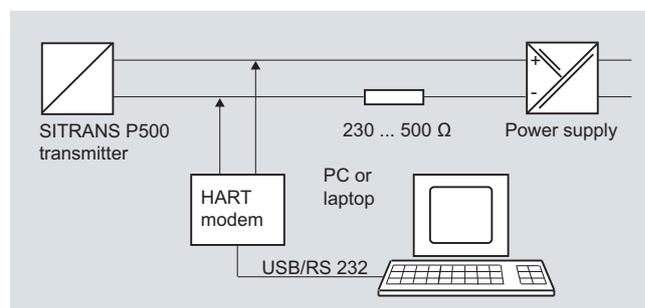
Configuration using HART

Parameterization using HART is carried out using a HART Communicator or a PC in conjunction with a HART modem.



Communication between a HART Communicator and a pressure transmitter

When parameterizing with the HART Communicator, the connection is made directly to the 2-wire cable.



HART communication between a PC communicator and a pressure transmitter

For configuring via PC a HART modem is used which connects the transmitter to the PC.

The signals needed for communication in conformity with the HART 6.0 protocols are superimposed on the output current using the Frequency Shift Keying (FSK) method.

The necessary device files are available for download on the Internet.

SITRANS P500 configuration options

The transmission offers you full configuring options both via HART as well as in situ provided the optional display is available.

For simple parameterizing we also offer the easy to understand QuickStart function with guided commissioning.

SITRANS P500 diagnostic functions

- Maintenance timer
- Min/Max pointer (both resetable and non-resetable)
 - Pressure (incl. time and temperature stamp)
 - Static pressure (incl. time and temperature stamp)
 - Sensor temperature (incl. time stamp)
 - Electronic temperature (incl. time stamp)
- Limit monitor block
- Diagnostic warning
- Diagnostic alarm
- Simulation functions
- Display of trends and histograms
- Operating hours meter

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Physical dimensions available for the SITRANS P500 HART display

Physical variable	Physical dimensions
Pressure (setting can also be made in the factory)	Pa, MPa, kPa, bar, mbar, torr, atm, psi, g/cm ² , kg/cm ² , mmH ₂ O (4 °C), inH ₂ O (4 °C), inH ₂ O (20 °C), mmH ₂ O, mmH ₂ O (4 °C), ftH ₂ O (20 °C), inHg, mmHg, hPA
Level	m, cm, mm, ft, in
Volume	m ³ , dm ³ , hl, yd ³ , ft ³ , in ³ , gallon, Imp. gallon, bushel, barrel, barrel liquid, l; Norm (standard) l; Norm (standard) m ³ , Norm (standard) feet ³
Mass	g, kg, t (metric), lb, Ston, Lton, oz
Volume flow	m ³ /d, m ³ /h, m ³ /s, l/min, l/s, ft ³ /d, ft ³ /min, ft ³ /s, US gallon/min, gallon/s, l/h, mil/d, gallon/d, gallon/h, milgallon/d, Imp.gallon/s, Imp.gallon/m, Imp.gallon/h, Imp.gallon/d, Norm (standard) m ³ /h, Norm (standard) l/h, Norm (standard) ft ³ /h, Norm (standard) ft ³ /m, barrel liquid/s, barrel liquid/m, barrel liquid/h
Mass flow	t/d, t/h, t/min, kg/d, kg/h, kg/min, kg/s, g/h, g/min, g/s, lb/d, lb/min, lb/s, LTon/d, LTon/h, STon/d, STon/h, STon/min
Temperature	K, °C, °F, °R
Miscellaneous	%, mA

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Design

Weight (without options)	Approx. 3.3 kg (7.3 lb)
Material of parts in contact with the medium	<ul style="list-style-type: none"> Seal diaphragm: Stainless steel, mat. no. 1.4404/316L Process connection and sealing screw: PN 160: stainless steel, mat.-No. 1.4404/316L O-Ring: Standard: Viton (FKM (FPM)) optional: NBR
Material of parts not in contact with media	
Electronics housing	<ul style="list-style-type: none"> Low copper die-cast aluminum AC-AISI12 (Fe) or AC-AISI 10 Mg (Fe) to DIN EN 1706 Lacquer on polyurethane base, optional epoxy-based primer Stainless steel name plates (mat. no. 1.4404/316L)
Process connection screws	Stainless steel, mat. no. 1.4404/316L
Mounting bracket	Steel or stainless steel mat. no. 1.4301
Measuring cell filling	Silicone oil
Process connection	¼-18 NPT female thread and flange connection with M10 to DIN 19213 or 7/16-20 UNF mounting thread to IEC 61518
Electrical connection	<ul style="list-style-type: none"> Screw terminals Cable entry via the following screwed glands: <ul style="list-style-type: none"> M20 x 1.5 ½-14 NPT Han 7D/Han 8D connector M12 plug
Displays and controls	
Pushbuttons	3 for local programming directly on transmitter
Display	<ul style="list-style-type: none"> With or without integrated display Cover with or without window

Auxiliary power supply

Terminal voltage on transmitter	<ul style="list-style-type: none"> DC 10.6 ... 44 V With intrinsically-safe operation DC 10.6 ... 30 V
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Certificates and approvals

Classification according to PED 97/23/EC	
<ul style="list-style-type: none"> PN 160 (MAWP 2320 psi) 	For gases of fluid group 1 and liquids of fluid group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice)
Explosion protection	
<u>Explosion protection for Europe (to ATEX)</u>	
<ul style="list-style-type: none"> Intrinsic safety "i" <ul style="list-style-type: none"> Marking: Ex II 1/2 G Ex ia/ib IIC T4 Permissible ambient temperature: -40 ... +85 °C (-40 ... +185 °F) Connection: To certified intrinsically-safe circuits with peak values: $U_i = 30\text{ V}$, $I_i = 100\text{ mA}$, $P_i = 750\text{ mW}$; $R_i = 300\ \Omega$ Effective internal inductance: $L_i = 400\ \mu\text{H}$ Effective inner capacitance: $C_i = 6\text{ nF}$ 	

<ul style="list-style-type: none"> Explosion-proof "d" <ul style="list-style-type: none"> Marking: Ex II 1/2 G Ex d IIC T4/T6 Permissible ambient temperature: -40 ... +85 °C (-40 ... +185 °F) temperature class T4; -40 ... +60 °C (-40 ... +140 °F) temperature class T6 Connection: To circuits with values: $U_m = \text{DC } 10.5 \dots 45\text{ V}$ Dust explosion protection for zone 20 <ul style="list-style-type: none"> Marking: Ex II 1 D Ex iaD 20 T 120 °C Permissible ambient temperature: -40 ... +85 °C (-40 ... +185 °F) Max. surface temperature: 120 °C (248 °F) Connection: To certified intrinsically-safe circuits with peak values: $U_i = 30\text{ V}$, $I_i = 100\text{ mA}$, $P_i = 750\text{ mW}$, $R_i = 300\ \Omega$; $L_i = 400\ \mu\text{H}$ Effective internal inductance: $L_i = 400\ \mu\text{H}$ Effective inner capacitance: $C_i = 6\text{ nF}$ Dust explosion protection for zone 21/22 <ul style="list-style-type: none"> Marking: Ex II 2 D Ex tD A21 IP68 T120 °C Ex ia D21 Connection: To circuits with values: $U_m = 10.5 \dots 45\text{ V DC}$; $P_{\text{max}} = 1.2\text{ W}$ Type of protection "n" (zone 2) <ul style="list-style-type: none"> Marking: Ex II 3 G Ex nA II T4/T6; Ex II 2/3 G Ex ib/nL IIC T4/T6; Ex II 2/3 G Ex ib/ic IIC T4/T6 "nA" connection: $U_m = 45\text{ V DC}$ "nL, ic" connection: $U_i = 45\text{ V}$ Effective internal inductance: $L_i = 400\ \mu\text{H}$ Effective inner capacitance: $C_i = 6\text{ nF}$ 	<p>BVS 09 ATEX E 027</p> <p>Ex II 1/2 G Ex d IIC T4/T6</p> <p>-40 ... +85 °C (-40 ... +185 °F) temperature class T4; -40 ... +60 °C (-40 ... +140 °F) temperature class T6</p> <p>To circuits with values: $U_m = \text{DC } 10.5 \dots 45\text{ V}$</p> <p>PTB 09 ATEX 2004 X</p> <p>Ex II 1 D Ex iaD 20 T 120 °C</p> <p>-40 ... +85 °C (-40 ... +185 °F)</p> <p>120 °C (248 °F)</p> <p>To certified intrinsically-safe circuits with peak values: $U_i = 30\text{ V}$, $I_i = 100\text{ mA}$, $P_i = 750\text{ mW}$, $R_i = 300\ \Omega$; $L_i = 400\ \mu\text{H}$</p> <p>$C_i = 6\text{ nF}$</p> <p>BVS 09 ATEX E 027</p> <p>Ex II 2 D Ex tD A21 IP68 T120 °C Ex ia D21</p> <p>To circuits with values: $U_m = 10.5 \dots 45\text{ V DC}$; $P_{\text{max}} = 1.2\text{ W}$</p> <p>PTB 09 ATEX 2004 X</p> <p>Ex II 3 G Ex nA II T4/T6; Ex II 2/3 G Ex ib/nL IIC T4/T6; Ex II 2/3 G Ex ib/ic IIC T4/T6</p> <p>$U_m = 45\text{ V DC}$</p> <p>$U_i = 45\text{ V}$</p> <p>$L_i = 400\ \mu\text{H}$</p> <p>$C_i = 6\text{ nF}$</p>
<u>Explosion protection for USA (to FM)</u>	
Certificate of Compliance	No. 3033013
<ul style="list-style-type: none"> Identification (XP/DIP) or (IS) <ul style="list-style-type: none"> XP CL I, DIV 1, GP ABCDEFG T4 / T6 DIP CL II, III, DIV1, GP EFG T4/T6 IS CL I, II, III, DIV1, GP ABCDEFG T4 CL I, Zone 0, AEx ia IIC T4 CL I, Zone 1, AEx ib IIC T4 Permissible Ambient Temperature: $T_a = \text{T4: } -40 \dots +85\text{ °C } (-40 \dots +185\text{ °F})$; $T_a = \text{T6: } -40 \dots +60\text{ °C } (-40 \dots +140\text{ °F})$ Entity parameters: According to "control drawing": A5E02189134N; $U_m = 30\text{ V}$, $I_m = 100\text{ mA}$, $P_i = 750\text{ mW}$, $L_i = 400\ \mu\text{H}$, $C_i = 6\text{ nF}$ Marking (NI/NO): NI CL I, DIV 2, GP ABCD T4/T6; NI CL I, Zone 2, GP IIC T4/T6; S CL II, III, GPFG T4/T6; NI CL I, DIV 2, GP ABCD T4/T6, NIFW; NI CL I, Zone 2, GP IIC T4/T6, NIFW; NI CLII, III, DIV 2, GP FG T4/T6, NIFW Permissible Ambient Temperature: $T_a = \text{T4: } -40 \dots +85\text{ °C } (-40 \dots +185\text{ °F})$; $T_a = \text{T6: } -40 \dots +60\text{ °C } (-40 \dots +140\text{ °F})$ (NI/S) parameters: According to "control drawing": A5E02189134N; $U_m = 45\text{ V}$, $L_i = 400\ \mu\text{H}$, $C_i = 6\text{ nF}$ 	

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<u>Explosion protection for Canada (to cCSAUS)</u>	
Certificate of Compliance	No. 2280963
• Marking (XP/DIP)	CL I, DIV 1, GP ABCD T4 /T6; CL II, DIV 1, GP EFG T4/T6
- Permissible ambient temperature	$T_a = T4: -40 \dots +85 \text{ °C} (-40 \dots +185 \text{ °F})$ $T_a = T6: -40 \dots +60 \text{ °C} (-40 \dots +140 \text{ °F})$
- Entity parameters	According to "control drawing": A5E02189134N $U_m = 45 \text{ V}$
• Marking (ia/ib)	CL I, Ex ia/Ex ib IIC, T4 CL II, III, Ex ia/Ex ib, GP EFG, T4 CL I, AEx ia/AEx ib IIC, T4 CL II, III, AEx ia/ AEx ib, GP EFG, T4
- Permissible ambient temperature	$T_a = T4: -40 \dots +85 \text{ °C} (-40 \dots +185 \text{ °F})$
- Entity parameters	$U_i = 30 \text{ V}, I_i = 100 \text{ mA}, P_i = 750 \text{ mW},$ $R_i = 300 \text{ } \Omega, L_i = 400 \text{ } \mu\text{H}, C_i = 6 \text{ nF}$
• Marking (NI/n)	CL I, DIV 2, GP ABCD T4/T6 CL II, III, DIV 2, GP FG T4/T6 Ex nA IIC T4/T6 AEx nA IIC T4/T6 Ex nL IIC T4/T6 AEx nL IIC T4/T6
- Permissible ambient temperature	$T_a = T4: -40 \dots +85 \text{ °C} (-40 \dots +185 \text{ °F})$ $T_a = T6: -40 \dots +60 \text{ °C} (-40 \dots +140 \text{ °F})$
- NI/nA parameters	According to "control drawing": A5E02189134N $U_m = 45 \text{ V}$
- nL parameters	According to "control drawing": A5E02189134N $U_i = 45 \text{ V}, I_i = 100 \text{ mA}, L_i = 400 \text{ } \mu\text{H},$ $C_i = 6 \text{ nF}$
<u>Explosion protection for China (acc. to NEPSI)</u>	
• Intrinsic safety "i"	GYJ111111X
- Marking	Ex ia/ib IIB/IIC T4
- Perm. ambient temperature	$40 \dots +85 \text{ °C} (-40 \dots +185 \text{ °F})$
- Connection	To certified intrinsically-safe circuits with maximum values: $U_i = 30 \text{ V}, I_i = 100 \text{ mA}, P_i = 750 \text{ mW}$
- Effective internal inductance	$L_i = 400 \text{ mH}$
- Effective inner capacitance	$C_i = 6 \text{ nF}$
• Explosion-proof "d"	GYJ111112
- Marking	Ex dia IIC T4/T6
- Permissible ambient temperature	$-40 \dots +85 \text{ °C} (-40 \dots +185 \text{ °F})$ temperature class T4; $-40 \dots +60 \text{ °C} (-40 \dots +140 \text{ °F})$ temperature class T6
- Connection	To circuits with values: $U_m = \text{DC } 10.5 \dots 45 \text{ V}$
• Dust explosion protection for zone 21/22	GYJ111112
- Marking	DIP A21 TA, T120 °C IP68 D21
- Connection	To circuits with values: $U_m = \text{DC } 10.5 \dots 45 \text{ V}$
• Type of protection "n" (zone 2)	GYJ111111X
- Marking	Ex nL IIB/IIC T4/T6 Ex nA II T4/T6
- Connection	$U_i = 45 \text{ V DC}$
- Effective internal inductance	$L_i = 400 \text{ mH}$
- Effective inner capacitance	$C_i = 6 \text{ nF}$

1) If the Type "D" measuring cell is used, the error should be increased by a factor of 5. This error can be reduced to 0 by a means of a zero adjustment.

2) The total performance includes the errors caused by temperature effects, static pressure effects and conformity error, including hysteresis and repeatability.

HART communication

Load with connection of

- HART communicator
- HART modem

$R_B = 230 \dots 1100 \text{ } \Omega$

$R_B = 230 \dots 500 \text{ } \Omega$

Cable

2 wire shielded: $\leq 3.0 \text{ km}$
(1.86 miles),
multiwire shielded: $\leq 1.5 \text{ km}$
(0.93 miles)

Protocol

HART Version 6.0

PC/laptop requirements

IBM compatible, RAM > 32 MByte,
hard disk > 70 MByte, depending
on modem type: RS 232-interface
or USB connection,
VGA graphics

Software for computer

SIMATIC PDM 6.0

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Selection and Ordering data

Order No.

**Pressure transmitters for differential pressure and flow,
SITRANS P500 HART, PN 160 (MAWP 2320 psi)**

D) 7MF54 - - - - 0

Enclosure

Die-cast aluminum, dual compartment

Thread for cable gland

M20x1.5

Die-cast aluminum, dual compartment

½-14 NPT

Output

4 ... 20 mA, HART

Measuring cell filling

Silicone oil

Measuring cell cleaning

normal

Measuring span

1.25 ... 250 mbar

(0.5 ... 100.4 inH₂O)

6.25 ... 1250 mbar

(2.5 ... 502 inH₂O)

Wetted parts materials

(stainless steel process flanges)

Seal diaphragm

Process connection

stainless steel

stainless steel

Hastelloy

stainless steel

Monel

stainless steel

Process connection

Female thread ¼-18 NPT

- Sealing screw opposite process connection
 - Mounting thread 7/16 - 20 UNF according to EN 61518
 - Mounting thread M10 to DIN 19213
- Vent on side of process flange¹⁾
 - Mounting thread 7/16 - 20 UNF according to EN 61518
 - Mounting thread M10 to DIN 19213

¹⁾ Not in conjunction with remote seals

D) Subject to export regulations AL: N, ECCN: EAR99H.

	0								
	1								
		3							
			1						
				D					
				E					
							A		
							B		
							C		
								0	
								1	
									4
									5

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Selection and Ordering data	Order code	Selection and Ordering data	Order code
Further designs Add "-Z" to Order No. and specify Order Code.		Further designs Add "-Z" to Order No. and specify Order Code.	
Attachments		Degree of protection approvals: Ex ia/ib (intrinsic safety)	
Mounting bracket made of steel	A01	Ex ia/ib protection (ATEX) (T4)	E00
Mounting bracket made of stainless steel	A02	Ex IS protection (FM) (T4)	E01
Display (Standard: no display, cover closed)		Ex IS protection (C _{CSA} US) (T4)	E02
With display and blanking cover	A10	Ex ia/ib protection (NEPSI) (T4)	E06
With display and glass cover	A11	Degree of protection approvals: Ex d (flameproof)	
Special casing / cover version		Ex d explosion-proof (ATEX)(T4/T6)	E20
Two coats of lacquer on casing, cover (PU on epoxy)	A20	Ex XP explosion-proof and DIP (FM)(T4/T6)	E21
Electrical connection and cable entry (Standard: no cable gland, only dust protection caps)		Ex XP explosion-proof and DIP (C _{CSA} US)(T4/T6)	E22
Cable gland made of plastic (IP66/68) ⁴⁾	A50	Ex d explosion-proof (NEPSI)(T4/T6)	E26
Cable glands made of metal (IP66/68)	A51	Degree of protection approvals: n/NI	
Cable glands made of stainless steel (IP66/68)	A52	Zone 2 (nA, nL, ic) (ATEX) (T4/T6)	E40
M12 connectors without cable socket (IP66/67) ⁴⁾	A60	Div2 NI, Div2 NI-field wiring (FM) (T4/T6)	E41
M12 connectors complete with cable socket (IP66/67) ⁴⁾	A61	Zone 2 (nA, nL), Div2 NI (C _{CSA} US) (T4/T6)	E42
Han 7D connectors, plastic, straight (with cable socket) (IP65) ⁴⁾	A71	Zone 2 (nA, nL) (NEPSI) (T4/T6)	E46
Han 7D connectors, plastic, angled (with cable socket) (IP65) ⁴⁾	A72	Degree of protection approvals: Dust Zone 20/21/22	
Han 7D connectors, metal enclosure, straight (with cable socket) (IP65) ⁴⁾	A73	Use in Zone 21/22 (Ex tD) (ATEX)	E60
Han 7D connectors, metal enclosure, angled (with cable socket) (IP65) ⁴⁾	A74	Use in Zone 20/21/22 (Ex iaD) (ATEX)	E61
Han 8D connectors, plastic, straight (with cable socket) (IP65) ⁴⁾ ⁸⁾	A75	Use in Zone 21/22 (Ex DIP) (NEPSI)	E66
Han 8D connectors, plastic, angled (with cable socket) (IP65) ⁴⁾ ⁸⁾	A76	Degree of protection approvals: Combinations	
Han 8D connectors, metal enclosure, straight (with cable socket) (IP65) ⁴⁾ ⁸⁾	A77	IS protection and XP and DIP (FM)	E71
Han 8D connectors, metal enclosure, angled (with cable socket) (IP65) ⁴⁾ ⁸⁾	A78	IS protection and XP and DIP (C _{CSA} US)	E72
PG 13.5 adapters ⁴⁾	A82	IS protection and XP and DIP (FM/C _{CSA} US)	E73
Language for labels, leporellos, menu language default ⁹⁾ (instead of English as standard)		Supplementary approvals/degree of protection	
German	B10	Dual Seal approval ⁵⁾	E85
French	B12	Special process connection versions (diff. pressure)	
Spanish	B13	Side vents for gas measurements ⁷⁾	L32
Italian	B14	Swap process connection: high-pressure side at front	L33
Chinese	B15	Process flanges, O-rings, special material	
Russian	B16	Standard: Viton (FKM (FPM))	
Japanese	B17	Process connection sealing rings made of PTFE (Teflon), virginal	L60
English with units psi/inH ₂ O/°F	B21	Process connection sealing rings made of PTFE (Teflon), glass fiber-reinforced	L61
Special version: Supplementary menu languages (Standard: English, German, French, Spanish, Italian)		Process connection sealing rings made of FPM (Kalrez)	L62
Asia language package (in addition: Chinese, Japanese, Russian)	B80	Process connection sealing rings made of NBR	L63
Certificates (available online for downloading) ¹⁾		Drain/Vent valve	
Quality inspection certificate (Five-step factory calibration) according to IEC 60770-2 ²⁾	C11	(1 set = 2 units)	
Acceptance test certificate according to EN 10204-3.1 ³⁾	C12	2 ventilation valves 1/4- 18 NPT, in material of process flanges)	L80
		Remote seals	
		Transmitters with connection of remote sea ⁶⁾	V00
		(For premounted valve manifolds see page 2/188)	

¹⁾ Enclosed in print or as CD: see page 2/186.

²⁾ When also ordering the quality inspection certificate (factory calibration) according to IEC 60770-2 for transmitters with mounted diaphragm seals: Order this certificate only together with the remote seals. The measuring accuracy of the total combination is certified here.

³⁾ When also ordering the acceptance test certificate according to EN 10204-3.1 for transmitters with mounted diaphragm seals: Order this certificate as well in addition to the respective remote seals.

⁴⁾ Not together with types of protection "Explosion-proof", "Ex nA" and "Intrinsic safety and explosion-proof"

⁵⁾ Only in conjunction with FM and/or C_{CSA}US

⁶⁾ Please select a remote seal separately. Also refer to the information under 2).

⁷⁾ Only in conjunction with process connection "Vent on side".

⁸⁾ The Han 8D plug is identical with the former Han 8U version.

⁹⁾ For option B15, B16 and B17 the menu language default is english. Otherwise the Option B80 (Asia language package) is necessary.

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500 for differential pressure and flow

Selection and Ordering data	Order code
Additional data Please add "-Z" to Order No. and specify Order code(s) and plain text.	
Measuring range to be set Specify in plain text:	
<ul style="list-style-type: none"> in the case of linear characteristic curve (max. 5 characters): Y01: ... up to ... mbar, bar, kPa, MPa, psi 	Y01
<ul style="list-style-type: none"> in the case of square rooted characteristic (max. 5 characters): Y02: ... up to ... mbar, bar, kPa, MPa, psi 	Y02
Measuring point number and measuring point identifier (only standard ASCII character set) Specify in plain text:	
Measuring point number (TAG No.), max. 16 characters Y15:	Y15
Measuring point text (max. 27 char.) Y16:	Y16
Entry of HART address (TAG), max. 32 characters Y17:	Y17
Setting of pressure indication in pressure units	Y21
Specify in plain text (standard setting: mbar) Y21: bar, kPa, MPa, psi, ... Note: The following pressure units are selectable: bar, mbar, mm H ₂ O*, in H ₂ O*, ftH ₂ O*, mmHG, inHG, psi, Pa, kPa, MPa, g/cm ² , kg/cm ² , Torr, ATM, % or mA *) Reference temperature 20 °C	
Setting of pressure indication in non-pressure units	Y22 + Y01 or Y02
Specify in plain text: Y22: ... up to ... l/min, m ³ /h, m, USgpm, ... (specification of measuring range in pressure units "Y01" is essential, unit with max. 5 characters)	
Customer-specific settings	
Damping setting (range: 0 ... 100 s) (Standard setting: 2 s)	Y30

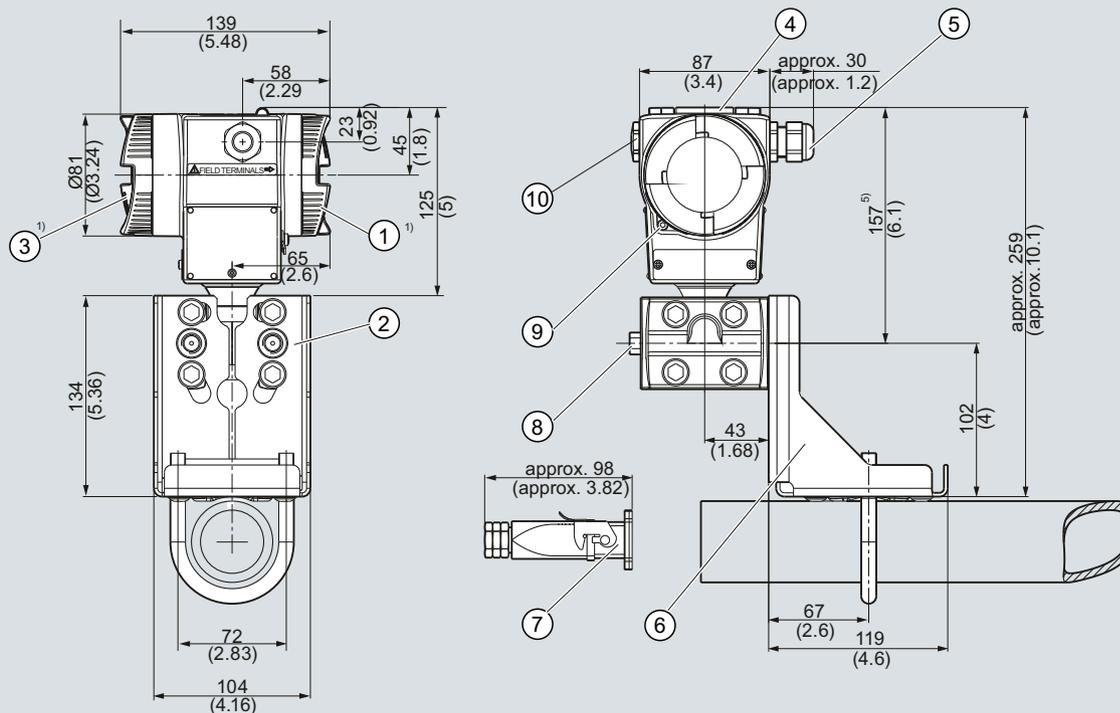
2

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500
for differential pressure and flow

Dimensional drawings



- 1 Terminal side
- 2 Process connection: ¼-18 NPT (EN61518)
- 3 Electronics side, digital display
- 4 Protective cover for the pushbuttons
- 5 Cable entry:
 - Screwed gland M20 x 1.5³⁾
 - Screwed gland ½-14 NPT
 - Han 7D/Han 8D connector²⁾³⁾
 - M12 connector
- 6 Mounting bracket (optional)

- 7 Electrical connection:
 - Han 7D/Han 8D connector/socket²⁾³⁾
 - 8 Vent valve (optional)
 - 9 Safety catch
 - 10 Blanking plug
- 1) Allow approx. 20 mm (0.79 inch) additional thread length
 - 2) Not with type of protection "Explosion-proof"
 - 3) Not with type of protection "FM + cCSA_{US} [IS + XP]"

SITRANS P pressure transmitter for differential pressure and flow, P500 series, measurements in mm (inch)

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500 for level

Technical specifications

Input			
Measured variable	Level		
Span (infinitely adjustable)	Span (min. ... max.)	Maximum operating pressure	
	1.25 ... 250 mbar (0.5 ... 100 inH ₂ O)	See "Mounting flange"	
	6.25 ... 1250 mbar (2.5 ... 500 inH ₂ O)		
Lower range limit			
• Measuring cell with silicone oil filling	-100 % of max. span or 30 mbar a (0.44 psia) vacuum resistance (available as an option)		
Upper range limit	100% of max. span		
Start of scale	Between measuring limits (freely adjustable)		
Output			
Output current signal	4 ... 20 mA		
• Lower current limit (freely adjustable)	3.55 mA, factory setting 3.8 mA		
• Upper current limit (freely adjustable)	23 mA, factory setting 20.5 mA		
• Ripple (without HART communication)	$I_{pp} \leq 0.4$ of max. output current		
• adjustable damping	0... 100 s in steps of 0.1 s, factory setting 2 s		
• current transmitter	3.55 ... 23 mA		
• Failure signal	adjustable within limits: • Lower: 3.55 ... 3.7 mA (factory setting 3.6 mA) • Upper: 21.0 ... 23 mA (factory setting 22.8 mA)		
Load			
• Without HART communication	$R_B \leq (U_H - 10.5 \text{ V})/0.023 \text{ A}$ in Ω , U_H : Power supply in V		
• With HART communication			
- HART Communicator	$R_B = 230 \dots 1100 \Omega$		
- HART modem	$R_B = 230 \dots 500 \Omega$		
Characteristic curve	Linearly rising or linearly falling and user-specific		
Measuring accuracy			
Reference conditions (in accordance with IEC 60770-1)	<ul style="list-style-type: none"> • Rising characteristic curve • Start of scale 0 bar • Stainless steel seal diaphragm • Measuring cell with silicone oil filling • Room temperature (25 °C (77 °F)) 		
Error in measurement at limit setting incl. hysteresis and reproducibility			
r: Span ratio (r = max. span / set span)			
• Linear characteristic			
- r ≤ 10	≤ 0.03 %		
- r > 10	≤ (0.003 · r) %		
Long-term stability	≤ 0.05 % per 5 years ≤ 0.08 % per 10 years		
Influence of ambient temperature per 28 °C ¹⁾	≤ (0.01 · r + 0.035) % / 28 °C		
		Influence of static pressure	
		• On the zero point (PKN) ²⁾	≤ (0.007 · r) % per 70 bar
		• on the span (PKS)	≤ 0.03 % per 70 bar
		Influence of power supply	≤ 0.005 %/1 V
		Rated conditions	
		Mounting position	Defined by flange
		Ambient conditions	
		• Ambient temperature (Note: Observe the temperature class in areas subject to explosion hazard.)	
		- total device	-40 ... +85 °C (-40 ... +185 °F)
		- Readable display	-20 ... +85 °C (-4 ... +185 °F)
		- Storage temperature	-50 ... +90 °C (-58 ... +194 °F)
		Climatic class	
		• Condensation	Relative humidity 0 ... 100 % (condensation permissible)
		Degree of protection to IEC 60529	IP66/IP68 and NEMA 4X (with corresponding cable gland)
		Electromagnetic Compatibility	
		• Emitted interference and interference immunity	Acc. to EN 61326 and NAMUR NE 21
		Permissible pressures	According to 97/23/EC pressure equipment directive
		Medium temperature of minus side	
		• Measuring cell with silicone oil filling	-40 ... +125 °C (-40 ... +257 °F)
		Design	
		Weight	
		• To EN (pressure transmitter with mounting flange, without tube)	approx. 9.8 ... 11.8 kg (21.6... 26.0 (lb)
		• To ASME (pressure transmitter with mounting flange, without tube)	approx. 9.8 ... 16.8 kg (21.6 ... 37.0 lb)
		Material of parts in contact with the medium	
		• High-pressure side	
		- Seal diaphragm of mounting flange	Stainless steel, mat. no. 1.4404/316L, Monel 400, W-Nr. 2.4360, Hastelloy B2, mat. no. 2.4617, Hastelloy C276, mat. no. 2.4819, Hastelloy C4, mat. no. 2.4610, Tantal, PTFE, ECTFE
		- Sealing face	Smooth to EN 1092-1, Form b1 and/or ASME B16.5 RF 125 ... 250 AA for stainless steel316L, EN1092-1 Form B2 and/or ASME B16.5 RFSF in the case of other materials
		• Sealing material in the process connections	
		- For standard applications	PTFE
		- For vacuum application of mounting flange	copper
		• Low-pressure side	
		- Seal diaphragm	Stainless steel, mat. no. 1.4404/316L
		- Process connection and sealing screw	• Stainless steel, mat. no. 1.4404/316L
		- O-Ring	Standard: Viton (FKM(FPM)) optional: NBR

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500
 for level

2

Material of parts not in contact with media		• Explosion-proof "d"	BVS 09 ATEX E 027
Electronics housing	<ul style="list-style-type: none"> • Low copper die-cast aluminum AC-AISI12 (Fe) or AC-AISI 10 Mg (Fe) to DIN EN 1706 • Lacquer on polyurethane base, optional epoxy-based primer • Stainless steel serial plate 	- Marking	Ex II 1/2 G Ex d IIC T4/T6
Process connection screws	Stainless steel	- Permissible ambient temperature	-40 ... +85 °C (-40 ... +185 °F) temperature class T4; -40 ... +60 °C (-40 ... +140 °F) temperature class T6
Measuring cell filling	Silicone oil	- Connection	To circuits with values: $U_m = DC 10.5 \dots 45 V$
• Liquid mounting flange	Silicone oil or other material	• Dust explosion protection for zone 20	PTB 09 ATEX 2004 X
Process connection		- Marking	Ex II 1 D Ex iaD 20 T 120 °C
• High-pressure side	Flange to EN and ASME	- Permissible ambient temperature	-40 ... +85 °C (-40 ... +185 °F)
• Low-pressure side	1/4-18 NPT female thread and flange connection with M10 to DIN 19213 or 7/16-20 UNF mounting thread to IEC 61518	- Max. surface temperature	120 °C (248 °F)
Electrical connection	<ul style="list-style-type: none"> • Screw terminals • Cable entry via the following screwed glands: <ul style="list-style-type: none"> - M20 x 1.5 - 1/2-14 NPT - Han 7D/Han 8D connector - M12 plug 	- Connection	To certified intrinsically-safe circuits with peak values: $U_i = 30 V, I_i = 100 mA, P_i = 750 mW, R_i = 300 \Omega$
Displays and controls		- Effective internal inductance:	$L_i = 400 \mu H$
Push buttons	3; for operation directly on the device	- Effective inner capacitance:	$C_i = 6 nF$
Display	<ul style="list-style-type: none"> • With or without integrated display • Cover with or without window 	• Dust explosion protection for zone 21/22	BVS 09 ATEX E 027
Auxiliary power supply		- Marking	Ex II 2 D Ex tD A21 IP68 T120 °C Ex ia D21
Terminal voltage on transmitter	<ul style="list-style-type: none"> • DC 10,6 ... 44 V • With intrinsically-safe operation DC 10.6 ... 30 V 	- Connection	To circuits with values: $U_H = 10.5 \dots 45 V DC; P_{max} = 1.2 W$
Certificates and approvals		• Type of protection "n" (zone 2)	PTB 09 ATEX 2004 X
Classification according to PED 97/23/EC		- Marking	Ex II 3 G Ex nA II T4/T6 Ex II 2/3 G Ex ib/nL IIC T4/T6 Ex II 2/3 G Ex ib/ic IIC T4/T6
• PN 160 (MAWP 2320 psi)	For gases of fluid group 1 and liquids of fluid group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice)	- "nA" connection	$U_m = 45 V DC$
Explosion protection		- "nL, ic" connection	$U_i = 45 V$
<u>Explosion protection for Europe (to ATEX)</u>		- Effective internal inductance	$L_i = 400 \mu H$
• Intrinsic safety "i"	PTB 09 ATEX 2004 X	- Effective inner capacitance	$C_i = 6 nF$
- Marking	Ex II 1/2 G Ex ia/ib IIC T4	<u>Explosion protection for USA</u> (to FM)	
- Permissible ambient temperature	-40 ... +85 °C (-40 ... +185 °F)	Certificate of Compliance	No. 3033013
- Connection	To certified intrinsically-safe circuits with peak values: $U_i = 30 V, I_i = 100 mA, P_i = 750 mW; R_i = 300 \Omega$	• Identification (XP/DIP) or (IS)	XP CL I, DIV 1, GP ABCDEFG T4 / T6 DIP CL II, III, DIV1, GP EFG T4/T6 IS CL I, II, III, DIV1, GP ABCDEFG T4 CL I, Zone 0, AEx ia IIC T4 CL I, Zone 1, AEX ib IIC T4
- Effective internal inductance:	$L_i = 400 \mu H$	- Permissible Ambient Temperature	$T_a = T4: -40 \dots +85 \text{ °C } (-40 \dots +185 \text{ °F})$ $T_a = T6: -40 \dots +60 \text{ °C } (-40 \dots +140 \text{ °F})$
- Effective inner capacitance:	$C_i = 6 nF$	- Entity parameters	According to "control drawing": A5E02189134N $U_m = 30 V, I_m = 100 mA, P_i = 750 mW, L_i = 400 \mu H, C_i = 6 nF$
		• Marking (NI/NO)	NI CL I, DIV 2, GP ABCD T4/T6 NI CL I, Zone 2, GP IIC T4/T6 S CL II, III, GPFG T4/T6 NI CL I, DIV 2, GP ABCD T4/T6, NIFW NI CL I, Zone 2, GP IIC T4/T6, NIFW NI CL II, III, DIV 2, GP FG T4/T6, NIFW
		- Permissible Ambient Temperature	$T_a = T4: -40 \dots +85 \text{ °C } (-40 \dots +185 \text{ °F})$ $T_a = T6: -40 \dots +60 \text{ °C } (-40 \dots +140 \text{ °F})$
		- (NI/S) parameters	According to "control drawing": A5E02189134N $U_m = 45 V, L_i = 400 \mu H, C_i = 6 nF$

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500 for level

Explosion protection for Canada

(to cCSAUS)

Certificate of Compliance	No. 2280963
• Marking (XP/DIP)	CL I, DIV 1, GP ABCD T4 /T6; CL II, DIV 1, GP EFG T4/T6
- Permissible Ambient Temperature	T _a = T4: -40 ... +85 °C (-40 ... +185 °F) T _a = T6: -40 ... +60 °C (-40 ... +140 °F)
- Entity parameters	According to "control drawing": A5E02189134N, U _m = 45 V
• Marking (ia/ib)	CL I, Ex ia/Ex ib IIC, T4 CL II, III, Ex ia/Ex ib, GP EFG, T4 CL I, AEx ia/AEx ib IIC, T4 CL II, III, AEx ia/ AEx ib, GP EFG, T4
- Permissible Ambient Temperature	T _a = T4: -40 ... +85 °C (-40 ... +185 °F)
- Entity parameters	U _i = 30 V, I _i = 100 mA, P _i = 750 mW, R _i = 300 Ω, L _i = 400 μH, C _i = 6 nF
• Marking (NI/n)	CL I, DIV2, GP ABCD T4/T6 CL II, III, DIV2, GP FG T4/T6 Ex nA IIC T4/T6 AEx nA IIC T4/T6 Ex nL IIC T4/T6 AEx nL IIC T4/T6
- Permissible Ambient Temperature	T _a = T4: -40 ... +85 °C (-40 ... +185 °F) T _a = T6: -40 ... +60 °C (-40 ... +140 °F)
- NI/nA parameters	According to "control drawing": A5E02189134N, U _m = 45 V
- nL parameters	According to "control drawing": A5E02189134N, U _i = 45 V, I _i = 100 mA, L _i = 400 μH, C _i = 6 nF

Explosion protection for China (acc. to NEPSI)

• Intrinsic safety "i"	GYJ111111X
- Marking	Ex ia/ib IIB/IIC T4
- Permissible ambient temperature	40 ... +85 °C (-40 ... +185 °F)
- Connection	To certified intrinsically-safe circuits with maximum values: U _i = 30 V I _i = 100 mA, P _i = 750 mW
- Effective internal inductance	L _i = 400 mH
- Effective inner capacitance	C _i = 6 nF
• Explosion-proof "d"	GYJ111112
- Marking	Ex dia IIC T4/T6
- Permissible ambient temperature	-40 ... +85 °C (-40 ... +185 °F) temperature class T4; -40 ... +60 °C (-40 ... +140 °F) temperature class T6
- Connection	To circuits with values: U _m = DC 10.5 ... 45 V
• Dust explosion protection for zone 21/22	GYJ111112
- Marking	DIP A21 TA,T120 °C IP68 D21
- Connection	To circuits with values: U _m = DC 10.5 ... 45 V
• Type of protection "n" (zone)	GYJ111111X
- Marking	Ex nL IIB/IIC T4/T6 Ex nA II T4/T6
- Connection	U _i = 45 V DC
- Effective internal inductance	L _i = 400 mH
- Effective inner capacitance	C _i = 6 nF

1) Only relevant for the pressure transmitter. The temperature error of the remote seal must be calculated separately.

2) If the Type "D" measuring cell is used, the error should be increased by a factor of 5. This error can be reduced to 0 by a means of a zero adjustment.

HART communication

Load with connection of	
• HART Communicator	R _B = 230 ... 1100 Ω
• HART modem	R _B = 230 ... 500 Ω
Cable	2 wire shielded: ≤ 3.0 km (1.86 miles), multiwire shielded: ≤ 1.5 km (0.93 miles)
Protocol	HART Version 6.0
PC/laptop requirements	IBM compatible, RAM > 32 MByte, hard disk > 70 MByte, depending on modem type: RS 232-interface or USB connection, VGA graphics
Software for computer	SIMATIC PDM 6.0

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500
 for level

2

Selection and Ordering data		Order No.	Order code
Pressure transmitters for level, SITRANS P500 HART		D) 7MF56	- - - - - 0 - - - - -
Enclosure	Thread for cable gland		
Die-cast aluminum, dual compartment	M20x1.5	0	
Die-cast aluminum, dual compartment	½-14 NPT	1	
Output			
4 ... 20 mA, HART		3	
Measuring cell filling	Measuring cell cleaning		
Silicone oil	normal	1	
Measuring span (min. ... max.)			
1.25 ... 250 mbar	(0.5 ... 100.4 inH ₂ O)		D
6.25 ... 1250 mbar	(2.5 ... 502 inH ₂ O)		E
Wetted parts of the low-pressure side (stainless steel process flanges)			
Seal diaphragm	Process connection		
stainless steel	stainless steel		A
Hastelloy	stainless steel		B
Monel	stainless steel		C
Process connection of low-pressure side			
Female thread ¼-18 NPT			
• Sealing screw opposite process connection			
- Mounting thread 7/16 - 20 UNF according to IEC 61518			0
- Mounting thread M10 to DIN 19213			1
• Vent on side of process flange			
- Mounting thread 7/16 - 20 UNF according to IEC 61518			4
- Mounting thread M10 to DIN 19213			5
Wetted parts materials (high-pressure side)			
Stainless steel/316L			0
Hastelloy C276			1
Monel			2
Tantalum			3
PFA coated on steel/316L			4
PTFE on stainless steel/316L (not in combination with an extension)			6 A
Other version			9 Y
Add order code and plain text:			N 1 Y
Material: ... ; Extension length: ...			
Process connection on high-pressure side: Extension length			
None			A
50 mm (1.97 inch)			B
100 mm (3.94 inch)			C
150 mm (5.90 inch)			D
200 mm (7.87 inch)			E
Other version: See option "9" for "Wetted parts materials"			
Process connection on high-pressure side: Nominal diameter/Nominal pressure			
DN 50, PN 40 ⁶⁾			B
DN 80, PN 40			D
DN 100, PN 16			G
DN 100, PN 40			H
2", class 150 ⁶⁾			L
2", class 300 ⁶⁾			M
3", class 150			Q
3", class 300			R
4", class 150			T
4", class 300			U
Other version, add			Z
Order Code and plain text:			Q 1 Y
Nominal diameter: ... ; Nominal pressure: ...			

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500 for level

2

Selection and Ordering data

Order No.

Order code

Pressure transmitters for level, SITRANS P500 HART

D) 7MF56 - - 0 - - - - -

Process connection on high-pressure side: Filling liquid

- Silicone oil M5
- Silicone oil M50
- High-temperature oil
- Halocarbon (for oxygen measurement)
- FDA compliant oil
- Glycerin/water
- Other version, add
- Order Code and plain text:
- Filling liquid: ...

	0	
	1	
	2	
	3	
	4	
	5	
	9	R 1 Y

D) Subject to export regulations AL: N, ECCN: EAR99H.

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500
 for level

2

Selection and Ordering data	Order code	Selection and Ordering data	Order code
Further designs Add "-Z" to Order No. and specify Order Code.		Further designs Add "-Z" to Order No. and specify Order Code.	
Display (Standard: no display, cover closed)		Degree of protection approvals: Ex d (flameproof)	
With display and blanking cover	A10	Ex d explosion-proof (ATEX)(T4/T6)	E20
With display and glass cover	A11	Ex XP explosion-proof and DIP (FM)(T4/T6)	E21
Special version: cover/casing		Ex XP explosion-proof and DIP (cCSA _{US})(T4/T6)	E22
Two coats of lacquer on casing, cover (PU on epoxy)	A20	Ex d explosion-proof (NEPSI)(T4/T6)	E26
Electrical connection and cable entry (Standard: no cable gland, only dust protection caps)		Degree of protection approvals: n/NI	
Cable gland made of plastic (IP66/68) ⁴⁾	A50	Zone 2 (nA, nL, ic) (ATEX) (T4/T6)	E40
Cable glands made of metal (IP66/68)	A51	Div2 NI, Div2 NI-field wiring (FM) (T4/T6)	E41
Cable glands made of stainless steel (IP66/68)	A52	Zone 2 (nA, nL), Div2 NI (cCSA _{US}) (T4/T6)	E42
M12 connectors without cable socket (IP66/67) ⁴⁾	A60	Zone 2 (nA, nL) (NEPSI) (T4/T6)	E46
M12 connectors, cable socket (IP66/67) ⁴⁾	A61	Degree of protection approvals: Zone 20/21/22	
Han 7D connectors, plastic, straight (with cable socket) (IP65) ⁴⁾	A71	Use in Zone 21/22 (Ex tD) (ATEX)	E60
Han 7D connectors, plastic, angled (with cable socket) (IP65) ⁴⁾	A72	Use in Zone 20/21/22 (Ex iaD) (ATEX)	E61
Han 7D connectors, metal enclosure, straight (with cable socket) (IP65) ⁴⁾	A73	Use in Zone (Ex DIP) (ATEX)	E66
Han 7D connectors, metal enclosure, angled (with cable socket) (IP65) ⁴⁾	A74	Degree of protection approvals: Combinations	
Han 8D connectors, plastic, straight (with cable socket) (IP65) ⁴⁾ ⁷⁾	A75	IS protection and XP and DIP (FM)	E71
Han 8D connectors, plastic, angled (with cable socket) (IP65) ⁴⁾ ⁷⁾	A76	IS protection and XP and DIP (cCSA _{US})	E72
Han 8D connectors, metal enclosure, straight (with cable socket) (IP65) ⁴⁾ ⁷⁾	A77	IS protection and XP and DIP (FM/cCSA _{US})	E73
Han 8D connectors, metal enclosure, angled (with cable socket) (IP65) ⁴⁾ ⁷⁾	A78	Supplementary approvals / degree of protection	
PG 13.5 adapters ⁴⁾	A82	Dual Seal approval ⁵⁾	E85
Language for labels, leprellos and menu language default⁶⁾ (instead of English as standard)		Special process connection versions (diff. pressure)	
German	B10	Swap process connection: high-pressure side at front	L33
French	B12	Process flanges, O-rings, special material	
Spanish	B13	Standard: Viton (FKM (FPM))	
Italian	B14	Process connection sealing rings made of PTFE (Teflon), virginal	L60
Chinese	B15	Process connection sealing rings made of PTFE (Teflon), glass fiber-reinforced	L61
Russian	B16	Process connection sealing rings made of FFPM (Kalrez)	L62
Japanese	B17	Process connection sealing rings made of NBR	L63
English with units: psi/inH ₂ O	B21	Drain/Vent valve (1 set = 2 units)	
Special version: Supplementary menu languages (Standard: English, German, French, Spanish, Italian)		2 ventilation valves 1/4- 18 NPT, in material of process flange)	L80
Asia language package (in addition: Chinese, Japanese, Russian)	B80	Vacuum-proof design	
Certificates (available online for downloading)¹⁾		Vacuum service	V04
Quality inspection certificate (Five-step factory calibration) according to IEC 60770-2 ²⁾	C11	Spark arrester	V05
Acceptance test certificate according to EN 10204-3.1 ³⁾	C12	For mounting on zone 0 (including documentation)	
Degree of protection approvals: Ex ia/ib (intrinsic safety)			
Ex ia/ib protection (ATEX) (T4)	E00		
Ex IS protection (FM) (T4)	E01		
Ex IS protection (cCSA _{US}) (T4)	E02		
Ex ia/ib protection (NEPSI) (T4)	E06		

1) Enclosed in print or as CD: see page 2/186.

2) When also ordering the quality inspection certificate (factory calibration) according to IEC 60770-2 for transmitters with mounted diaphragm seals: Order this certificate only together with the remote seals. The measuring accuracy of the total combination is certified here.

3) When also ordering the acceptance test certificate according to EN 10204-3.1 for transmitters with mounted diaphragm seals: Order this certificate as well in addition to the respective remote seals.

4) Not together with types of protection "Explosion-proof", "Ex nA" and "Intrinsic safety and explosion-proof"

5) Only in conjunction with FM and/or cCSA_{US}

6) Not recommended for Measuring span "D"

7) The Han 8D plug is identical with the former Han 8U version.

8) For option B15, B16 and B17 the menu language default is english. Otherwise the Option B80 (Asia language package) is necessary.

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500 for level

Selection and ordering data	Order code
<p>Additional data Please add "-Z" to Order No. and specify Order code(s) and plain text.</p>	
<p>Measuring range to be set Specify in plain text: Linear characteristic curve (max. 5 characters): Y01: ... up to ... mbar, kPa, MPa, psi</p>	Y01
<p>Measuring point number and measuring point identifier (only standard ASCII character set) Specify in plain text: Measuring point number (TAG No.), max. 16 characters Y15:</p>	Y15
<p>Measuring point text (max. 27 char.) Y16:</p>	Y16
<p>Entry of HART address (TAG), max. 32 characters Y17:</p>	Y17
<p>Setting of pressure indication in pressure units Specify in plain text (standard setting: mbar) Y21: bar, kPa, MPa, psi, ... Note: The following pressure units are selectable: bar, mbar, mm H₂O*, in H₂O*, ftH₂O*, mmHG, inHG, psi, Pa, kPa, MPa, g/cm², kg/cm², Torr, ATM, % or mA *) Reference temperature 20 °C</p>	Y21
<p>Setting of pressure indication in non-pressure units Specify in plain text: Y22: ... up to ... l/min, m³/h, m, USgpm, ... (specification of measuring range in pressure units "Y01" is essential, unit with max. 5 characters)</p>	Y22 + Y01
<p>Customer-specific settings Damping setting (range: 0 ... 100 s) (Standard setting: 2 s)</p>	Y30

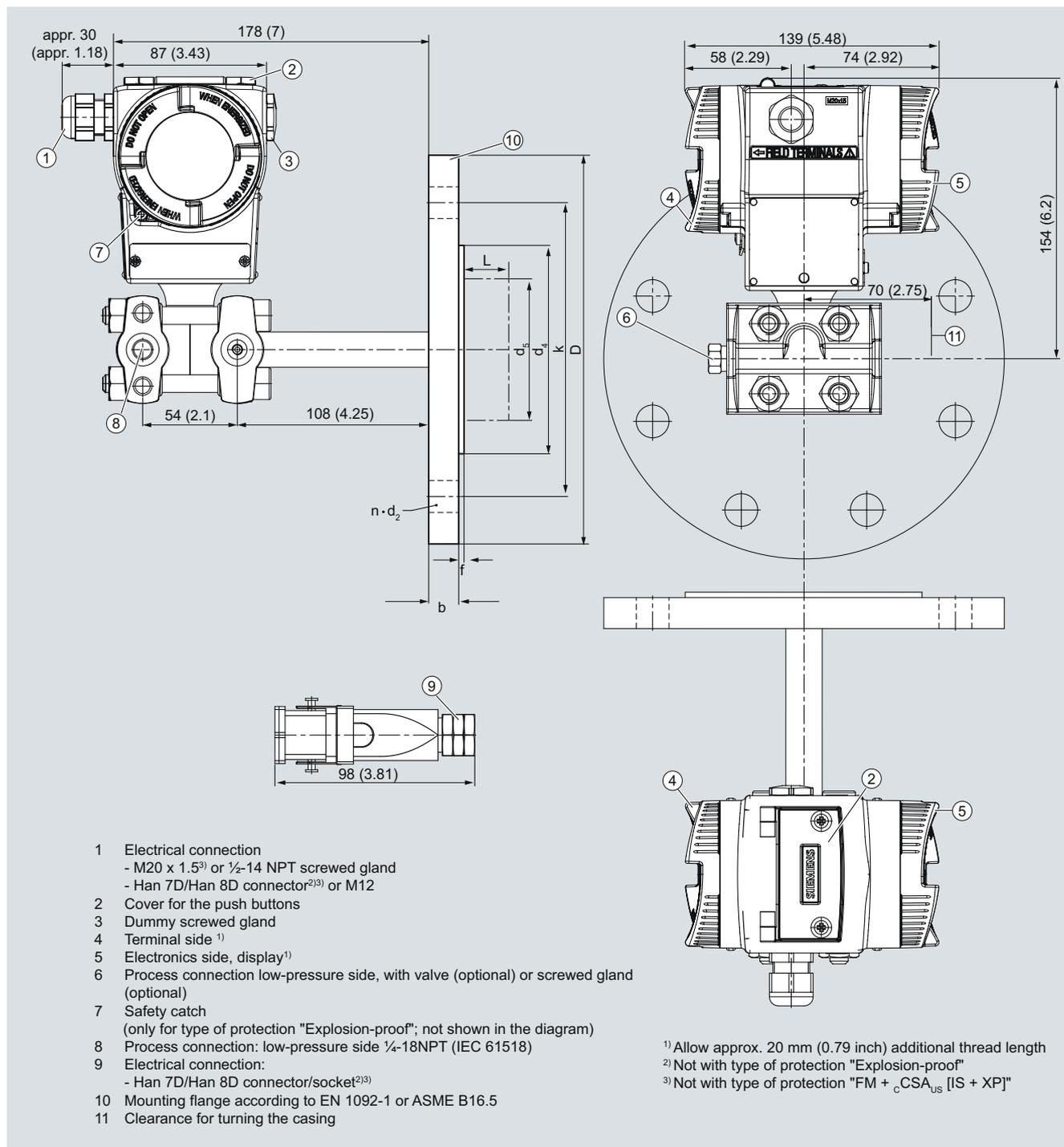
2

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500
for level

Dimensional drawings



SITRANS P pressure transmitter for filling level, P500 series, measurements in mm (inch)

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500 for level

Connection to EN 1092-1

Nominal diameter	Nominal pressure	b mm	D mm	d mm	d ₂ mm	d ₄ mm	d ₅ mm	d _M mm	f mm	k mm	n	L mm
DN50	PN 40	20	165	61	18	102	48.3	47 ²⁾	2	125	4	0, 50, 100, 150 or 200
DN 80	PN 40	24	200	90	18	138	76	72 ¹⁾	2	160	8	
DN 100	PN 16	20	220	115	18	158	94	89	2	180	8	
	PN 40	24	235	115	22	162	94	89	2	190	8	

Connection to ASME B16.5

Nominal diameter	Nominal pressure lb/sq.in.	b inch (mm)	D inch (mm)	d ₂ inch (mm)	d ₄ inch (mm)	d ₅ inch (mm)	d _M inch (mm)	f inch (mm)	k inch (mm)	n	L inch (mm)
2 inch	Class 150	0.77 (19.5)	5.91 (150)	0.75(19.0)	3.62(92)	1.9(48.3)	2.32(59.0)	0.079 (2.0)	4.75 (120.7)	4	0, 2, 3.94, 5.94 or 7.87 (0, 50, 100, 150 or 200)
	Class 300	0.89 (22.7)	6.49(165)	0.75(19.0)	3.62(92)	1.9(48.3)	2.32(59.0)	0.079 (2.0)	5.0 (127)	8	
3 inch	Class 150	0.96 (24.3)	7.5 (190.5)	0.75 (19.0)	5 (127)	3.0 (76)	2.83 ¹⁾ (72)	0.079 (2.0)	6 (152.4)	4	
	Class 300	1.14 (29.0)	8.27 (210)	0.87 (22.2)	5 (127)	3.0 (76)	2.83 ¹⁾ (72)	0.079 (2.0)	6.69 (168.3)	8	
4 inch	Class 150	0.96 (24.3)	9.06 (230)	0.75 (19.0)	6.19 (157.2)	3.69 (94)	3.5 (89)	0.079 (2.0)	7.5 (190.5)	8	
	Class 300	1.27 (32.2)	10.04 (255)	0.87 (22.2)	6.19 (157.2)	3.69 (94)	3.5 (89)	0.079 (2.0)	7.88 (200)	8	

Explanations of tables:

d: Internal diameter of gasket to DIN 2690

d_M: Effective diaphragm diameter

d₅: Diameter of extension

f: Milling edge

L: Extension length

¹⁾ 89 mm = 3½ inch with tube length L=0.

²⁾ 59 mm with tube length L=0.

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500 Supplementary electronics for 4-wire connection

Overview



SITRANS P pressure transmitter with supplementary electronics for 4-wire connection

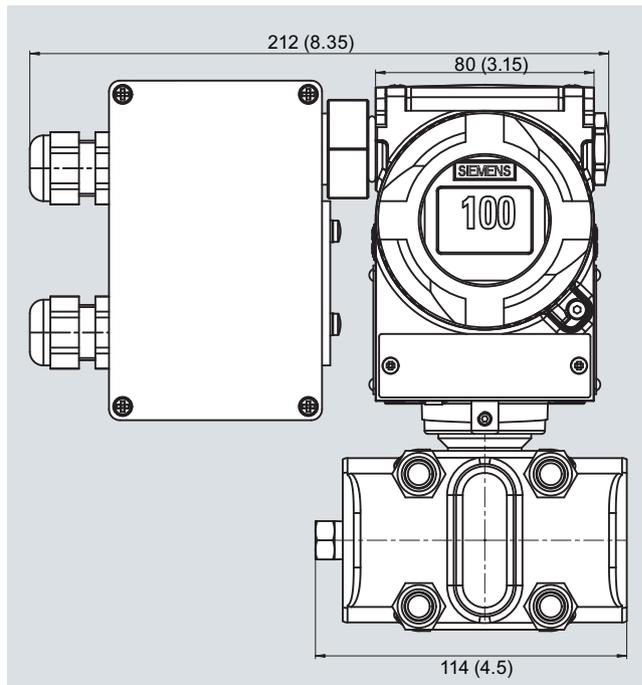
Direct connection of the supplementary electronics to a SITRANS P pressure transmitter from the P500 series produces a transmitter for four-wire connection.

The supplementary electronics cannot be attached to explosion-protected pressure transmitters. The supplementary electronics is fitted in a light metal housing which is mounted on the left side of the pressure transmitter.

Note on ordering:

The supplementary electronics has to be ordered through the **supplementary options** of the pressure transmitter in question.

Dimensional drawings

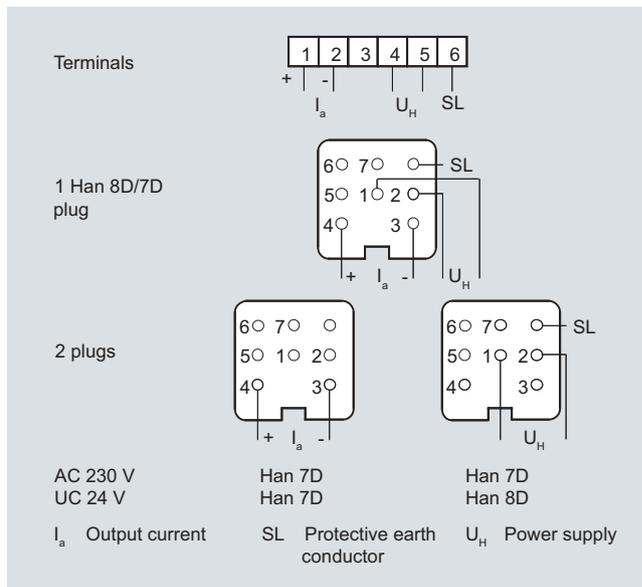


SITRANS P pressure transmitters with supplementary electronics for four-wire connection, dimension drawing, dimensions in mm (inch)

Technical specifications

Output	
Output signal	0 ... 20 mA or 4 ... 20 mA
Load	Max. 750 Ω
Voltage measurement	Linear (square-rooting in transmitter if necessary)
Electrical isolation	Between power supply and input/output
Measuring accuracy	
Conformity error (in addition to transmitter)	According to IEC 60770-1 ≤ 0.15 % of set span
Influence of ambient temperature	≤ 0.1 % per 10 K
Power supply effect	≤ 0.1 % per 10 % change in voltage or frequency
Load effect	≤ 0.1 % per 100 % change
Rated conditions	
Ambient temperature	-20 ... +80 °C (-4 ... +176 °F)
Storage temperature	-50 ... +85 °C (-58 ... +185 °F)
Degree of protection	IP54 to IEC 60529
Electromagnetic compatibility (EMC)	EN 50081, EN 50082
Structural design	
Dimensions (W x H x D) in mm (inch)	80 x 120 x 60 (3.15 x 4.72 x 2.36)
Electrical connection	Screw terminals (Pg 13.5 cable inlet) or Han 7D / Han 8D plug
Power supply	
Supply voltage	230 V AC (-10 ... +6 %, 47 ... 63 Hz, approx. 6 VA) or 24 V AC/DC (24 V AC ± 10 %, 47 ... 63 Hz, approx. 3 VA)
Permissible ripple (within the specified limits)	Approx. 2.5 V _{pp}

Schematics



Supplementary electronics for 4-wire connection, connection diagram (the HAN 8D connector is identical to the previous version of the HAN 8U)

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500 Supplementary electronics for 4-wire connection

Selection and Ordering data		Order code
Supplementary electronics for 4-wire connection		V
Order No. of the transmitter 7MF54..-.....-.... or 7MF56..-.....-.... add "-Z" and Order code.		
Power supply	Electrical connection	
24 V AC/DC	Terminals; 2 Pg screwed glands, to left	1
	2 Han 7D/Han 8U plugs incl. mating connector, to left	3
	1 Han 7D plug incl. mating connector, angled	5
	Terminals; 1 Pg screwed gland, downwards	6
	1 Han 8U plug incl. mating connector, downwards (observe arrangement of plug and differential pressure line)	9
230 V AC	Terminals; 2 Pg screwed glands, to left	7
	2 Han 7D plugs incl. mating connector, to left	8
Output current		
0 ... 20 mA		0
4 ... 20 mA		1
Accessories		Order No.
Instruction Manual German/English		A5E00322799

2

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500 - Accessories/Spare parts

2

Selection and ordering data		Order No.
Replacement measuring cells for differential pressure SITRANS P pressure transmitters for differential pressure and flow, P500 HART PN 160 series (MAWP 2320 psi)		D) 7MF5994 - 1
Measuring cell filling Silicone oil	Measuring cell cleaning normal	1
Measuring span (min. ... max.)		
1.25 ... 250 mbar	(0.5 ... 100.4 inH ₂ O)	D
6.25 ... 1250 mbar	(2.5 ... 502 inH ₂ O)	E
Wetted parts materials (stainless steel process flanges)		
Seal diaphragm	Parts of measuring cell	
stainless steel	stainless steel	A
Hastelloy	stainless steel	B
Monel	stainless steel	C
Process connection Female thread 1/4-18 NPT		
• Sealing screw opposite process connection		
- Mounting thread 7/16-20 UNF to IEC 61518		0
- Mounting thread M10 to DIN 19213		1
• Vent on side of process flange		
- Mounting thread 7/16-20 UNF to IEC 61518		4
- Mounting thread M10 to DIN 19213		5
Further designs		Order code
Add "-Z" to Order No. and specify Order Code.		
Acceptance test certificate		C12
Acc. to EN 10204-3.1		
Without process flanges		K00
Vent on side for gas measurements ¹⁾		L32
Process flanges, O-ring, special material Standard: Viton (FKM (FPM))		
Process connection sealing rings made of PTFE (Teflon), virginal		L60
Process connection sealing rings made of PTFE (Teflon), glass fiber-reinforced		L61
Process connection sealing rings made of FFPM (Kalrez)		L62
Process flanges, O-rings made of NBR		L63

¹⁾ Only in conjunction with process connection code 4 or 5.

D) Subject to export regulations AL: N, ECCN: EAR99H.

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500 - Accessories/Spare parts

Selection and Ordering data

	Order No.
Mounting brackets For differential pressure transmitters with flange thread M10 (7MF54...10 and 7MF54...50) <ul style="list-style-type: none"> made of steel made of stainless steel ▶ 	7MF5987-1AA 7MF5987-1AD
Mounting brackets for differential pressure transmitter with flange thread 7/16-20 UNE (7MF54...00 and 7MF54...40) <ul style="list-style-type: none"> made of steel made of stainless steel 	7MF5987-1AC 7MF5987-1AF
Cover Made of die-cast aluminum, including O-ring <ul style="list-style-type: none"> without window with window ▶ 	7MF5987-1BE 7MF5987-1BF
Digital indicator Including mounting material	7MF5987-1BR
TAG plate (incl. fastening material) without inscription (5 pcs.) C)	7MF5987-1CA
Printed (1 pc.) C) Data according to Y01 or Y02, Y15 and Y16 (see "SITRANS P transmitters")	7MF5987-1CB-Z Y... ..
Mounting screws For TAG plate, grounding and connection terminals and securing and locking screws (30 units) C)	7MF5987-1CC
Sealing plugs for process flange (1 set = 2 units) <ul style="list-style-type: none"> made of stainless steel made of Hastelloy 	7MF4997-1CG 7MF4997-1CH
Vent valve Complete (1 set = 2 units) <ul style="list-style-type: none"> made of stainless steel ▶ made of Hastelloy 	7MF4997-1CP 7MF4997-1CQ
Electronics module HART, intrinsically safe Ex ia for installation in transmitter casing (observe warranty conditions) C)	7MF5987-1DC
Connection board (incl. fastening material) HART, intrinsically safe Ex ia for installation in transmitter casing (observe warranty conditions)	7MF5987-1DM
O-rings for process flanges made of: <ul style="list-style-type: none"> Viton (FKM (FPM)) (10 pcs.) F) NBR (Buna N) (10 pcs.) F) 	7MF5987-2DA 7MF5987-2DE
Push buttons assembly (incl. fastening material) For replacement of operating keys for on-site operation of the transmitter	7MF5987-2AF
Sealing ring for <ul style="list-style-type: none"> Process connection NBR sealing ring for screw cover (10 pcs.) NBR sealing ring for interface measuring cell/housing (10 pcs.) F) 	See catalog FI01, "Fittings" 7MF4997-2EA 7MF5987-2EB

Selection and Ordering data

	Order No.
Operating Instructions¹⁾ German English French Italian Spanish	A5E02344527 A5E02344528 A5E02344529 A5E02344530 A5E02344531
Compact operating instructions¹⁾ English, German, Spanish, French, Italian, Dutch English, Estonian, Latvian, Lithuanian, Polish, Romanian English, Bulgarian, Czech, Finnish, Slovakian, Slovenian English, Danish, Greek, Portuguese, Swedish, Hungarian Russian	A5E02344532 A5E02307339 A5E02307340 A5E02307341 A5E02307338
Brief instructions (Leporello) German, English French, English Italian, English Spanish, English Chinese, English Russian, English	A5E02344536 A5E02344537 A5E02344538 A5E02344539 A5E02344540 A5E02556625
CD with documentation German, English, French, Spanish, Italian	A5E02344535
Service Instructions¹⁾ for replacement of electronics, measuring cell and terminal board <ul style="list-style-type: none"> german english 	A5E02822443 A5E02344534
HART modem <ul style="list-style-type: none"> with RS232 interface ▶D) with USB interface ▶D) 	7MF4997-1DA 7MF4997-1DB
Supplementary electronics for 4-wire connection	A5E00322799
Certificates (order only via SAP) additional to internet download <ul style="list-style-type: none"> hard copy (to order) on CD (to order) 	A5E03252406 A5E03252407

¹⁾ You can download these operating instructions free-of-charge from our Internet site at www.siemens.com/sitransp.

C) Subject to export regulations AL: N, ECCN: EAR99.

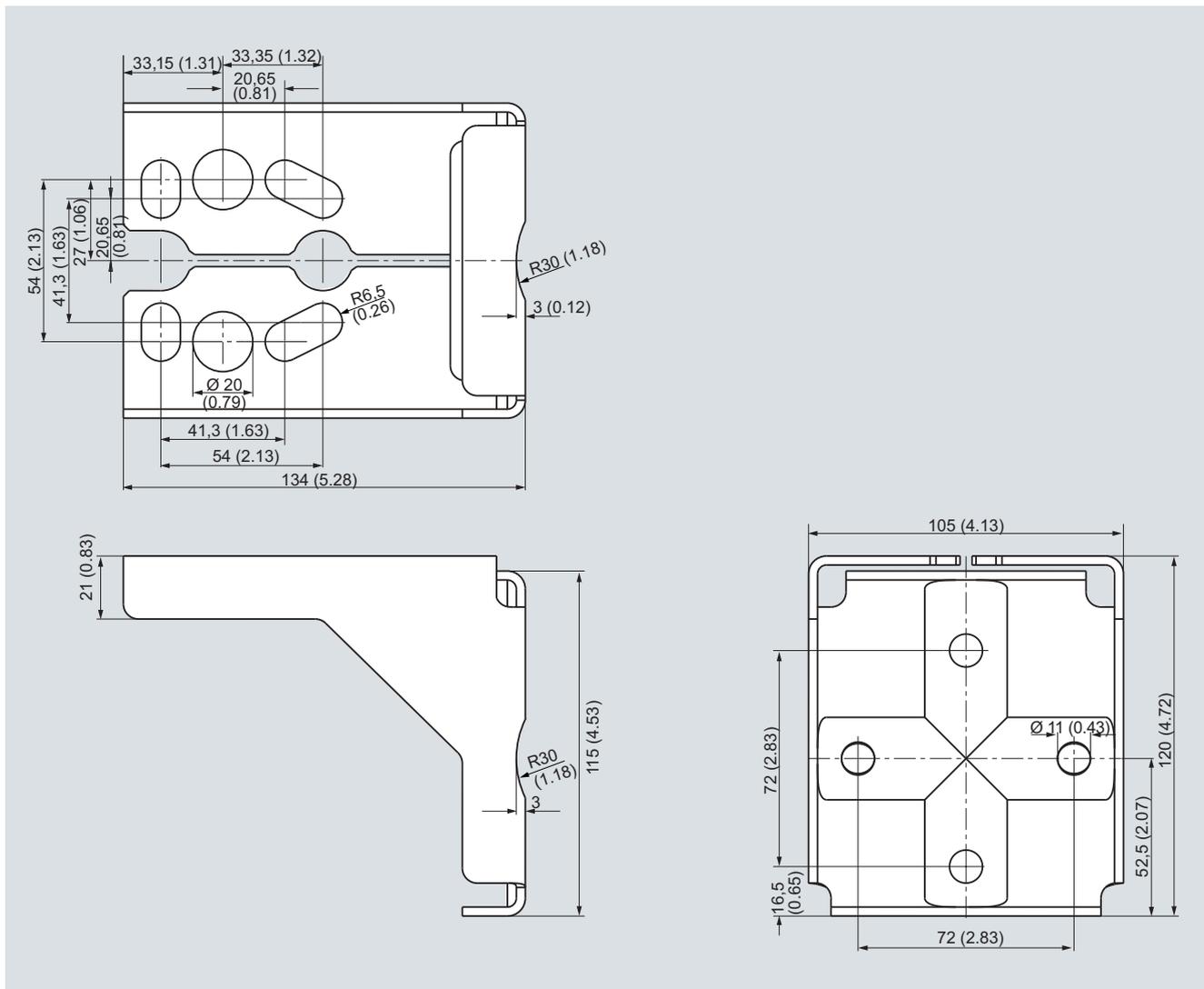
D) Subject to export regulations AL: N, ECCN: EAR99H.

F) Subject to export regulations AL: 91999, ECCN: N.

▶ Available ex stock.

For power supply units, see catalog FI01 "Supplementary Components".

Dimensional drawings



Mounting bracket for SITRANS P pressure transmitter, P500 series, measurements in mm (inch)

Mounting bracket material: Sheet-steel Mat. No. 1.0330, chrome-plated, or stainless steel Mat. No. 1.4301 (304)

Pressure Measurement

Transmitters for High Performance requirements

SITRANS P500 Factory-mounting of valve manifolds on transmitters

Overview

The SITRANS P500 transmitter can be delivered factory-fitted with the following manifolds:

- Valve manifolds 7MF9411-5BA: Three valve manifold for differential pressure transmitter
- Valve manifolds 7MF9411-5CA: Three valve manifold for differential pressure transmitter

Design

The 7MF9411-5BA and 7MF9411-5CA manifolds are sealed with PTFE sealing rings between the transmitter and the manifold.

Once installed, the complete unit is checked under pressure for leaks (compressed air 6 bar (2411 inH₂O)) and is certified leak-proof with a factory certificate to EN 10204 - 2.2.

All manifolds should preferably be secured with the respective mounting brackets. The transmitters are mounted on the manifold and not on the unit itself.

If you order a mounting bracket when choosing the option "Factory mounting of manifolds", you will receive a mounting bracket for the manifold instead of a bracket for mounting the transmitter.

If you order an acceptance test certificate 3.1 to EN10204 when choosing the option "Factory mounting of manifolds", a separate certificate is provided for the transmitters and the manifolds respectively.

Selection and ordering Data

Manifold 7MF9411-5BA on SITRANS P pressure transmitter P500 for differential pressure and flow



Add -Z to the Order No. of the transmitter and add order codes

Order Code

SITRANS P500 7MF54...-...

mounted with gaskets made of PTFE and screws made of

- chromized steel
- stainless steel

U01

U02

Delivery incl. high-pressure test certified by factory certificate to EN10204-2.2

Further designs:

Delivery includes mounting bracket and mounting clips made of

- steel
- stainless steel

A01

A02

(instead of the mounting bracket supplied with the transmitter)

Supplied acceptance test certificate to EN10204-3.1 for transmitters and mounted valve manifold

C12

Manifold 7MF9411-5CA on SITRANS P500 pressure transmitter for differential pressure and flow



Add -Z to the Order No. of the transmitter and add order codes

Order Code

SITRANS P500 7MF54...-...

mounted with gaskets made of PTFE and screws made of

- chromized steel
- stainless steel

U03

U04

Delivery incl. high-pressure test certified by factory certificate to EN10204-2.2

Further designs:

Delivery includes mounting bracket and mounting clips made of

- steel
- stainless steel

A01

A02

(instead of the mounting bracket supplied with the transmitter)

Supplied acceptance test certificate to EN10204-3.1 for transmitters and mounted valve manifold

C12

Pressure Measurement Transmitters for High Performance requirements

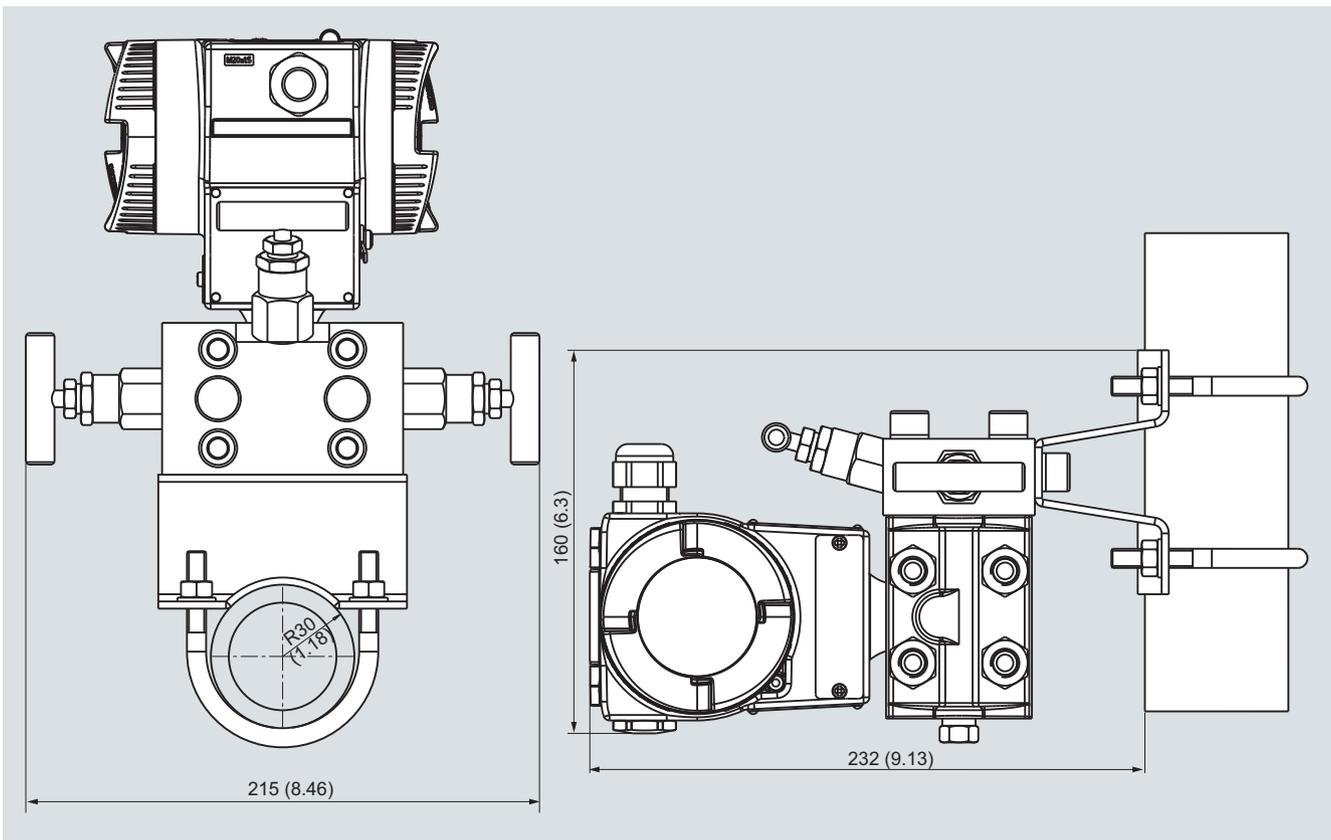
SITRANS P500 Factory-mounting
of valve manifolds on transmitters

2

Dimensional drawings



Manifold 7MF9411-5BA with attached SITRANS P500 pressure transmitter for differential pressure and flow (incl. mounting bracket)



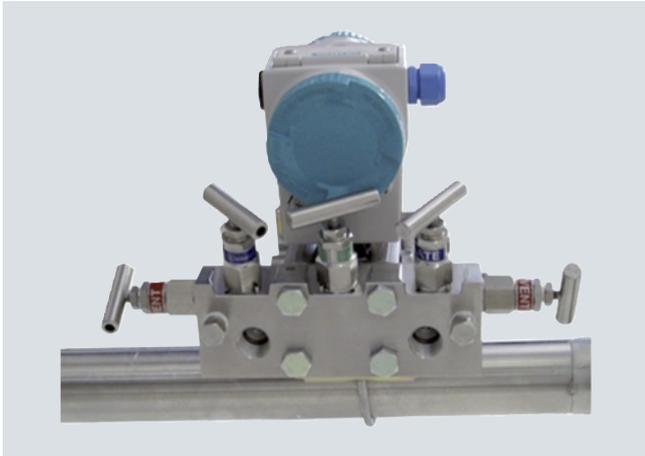
Manifold 7MF9411-5BA with attached SITRANS P500 pressure transmitter for differential pressure and flow, measurements in mm (inch)

Pressure Measurement

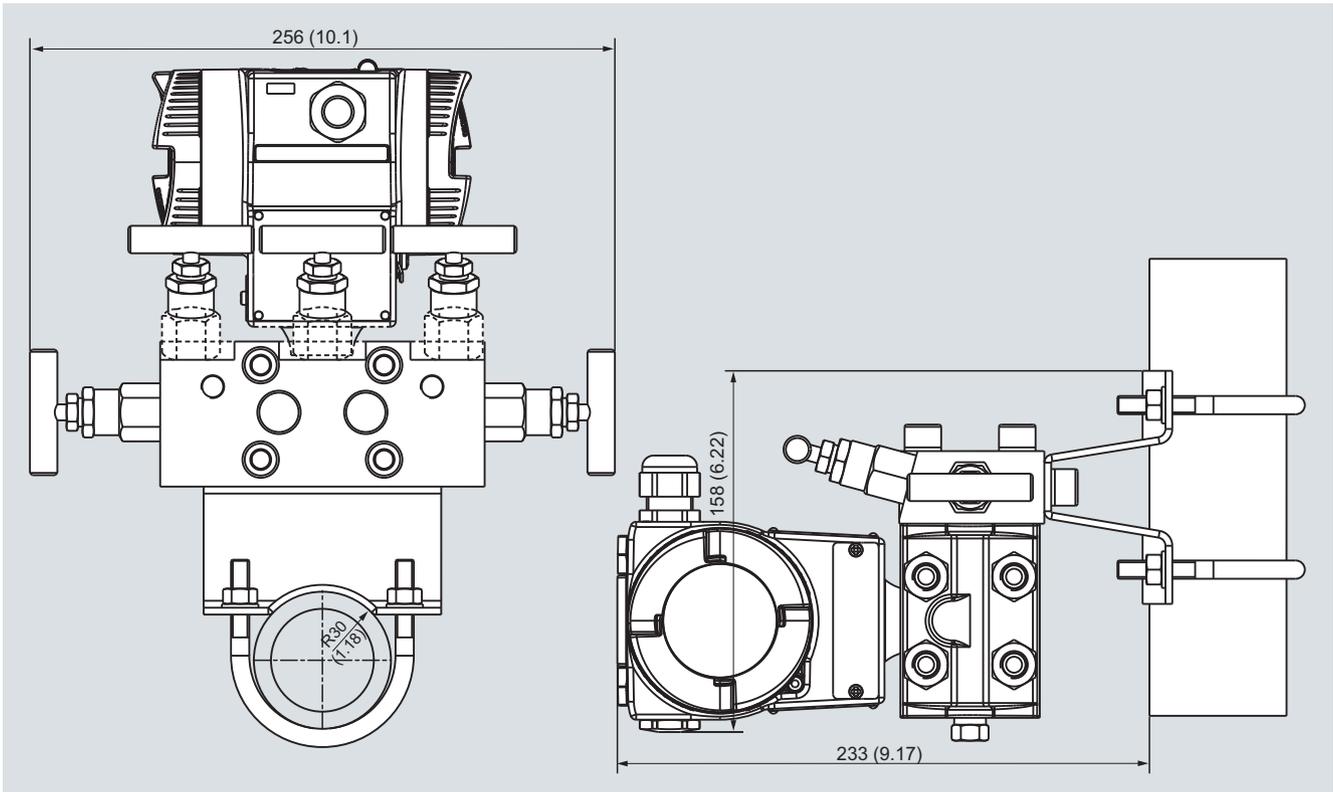
Transmitters for High Performance requirements

SITRANS P500 Factory-mounting of valve manifolds on transmitters

2



Manifold 7MF9411-5CA with attached SITRANS P500 pressure transmitter for differential pressure and flow (incl. mounting bracket)



Manifold 7MF9411-5CA with attached SITRANS P500 pressure transmitter for differential pressure and flow, measurements in mm (inch)