

## Pressure Measurement

Transmitters for applications with advanced requirements (Advanced)

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### SITRANS P410 - Technical description

#### Overview



SITRANS P410 pressure transmitters are digital pressure transmitters with a high level of operating convenience. Technically, they are based on the SITRANS P DS III but offer an increased measuring accuracy of 0.04%. This means the SITRANS P 410 is perfectly suited for measuring tasks with increased accuracy requirements. The parameterization is performed using input buttons or via HART or via PROFIBUS PA or FOUNDATION Fieldbus interface.

The comprehensive functionality makes for precise adjustment of the pressure transmitter to the requirements of the plant. Operation is very simple, despite the variety of setting options.

Pressure transmitters with type of protection "Intrinsic safety" and "Explosion-proof" may be installed in hazardous areas (zone 1) or in zone 0. The transmitters are provided with an EC type examination certificate and comply with the respective harmonized European standards (ATEX).

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

SITRANS P410 pressure transmitters are available in various versions for measuring:

- Gauge pressure
- Differential pressure
- Volume flow
- Mass flow

#### Benefits

- High quality and service life
- For aggressive and non-aggressive gases, vapors and liquids
- Extensive diagnostics and simulation functions
- Minimal conformity error
- Good long-term stability
- Wetted parts made of high-grade materials (e.g., stainless steel, Hastelloy)
- Infinitely adjustable spans from 0.01 bar to 160 bar (0.15 psi to 2321 psi) for P410 with HART interface
- Nominal measuring ranges from 1 bar to 160 bar (14.5 psi to 2321 psi) for P410 with PROFIBUS PA and FOUNDATION Fieldbus interface
- High measuring accuracy
- Parameterization over input buttons and HART, PROFIBUS PA or FOUNDATION Fieldbus interface.

#### Application

SITRANS P410 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 the P410 suitable for locations with high electromagnetic emissions.

Pressure transmitters with type of protection "Flameproof enclosure" may be installed in hazardous areas (zone 1) or in zone 0. The pressure transmitters are provided with an EC type examination certificate and comply with the corresponding harmonized European standards (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".

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

The pressure transmitter can be operated locally over 3 input buttons or programmed externally over HART or over PROFIBUS PA or FOUNDATION Fieldbus interface.

#### Pressure transmitter for gauge pressure

Measured variable: Gauge pressure of aggressive and non-aggressive gases, vapors and liquids.

##### Span (infinitely adjustable)

for P410 with HART: 0.01 bar to 160 bar (0.15 psi to 2321 psi)

##### Nominal measuring range

for P410 with PROFIBUS PA and FOUNDATION Fieldbus: 1 bar to 160 bar (14.5 psi to 2321 psi)

#### 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 differential pressure device (see Chapter "Flow Meters"))

##### Span (infinitely adjustable)

for P410 with HART: 1 mbar ... 30 bar (0.0145 ... 435 psi)

##### Nominal measuring range

for P410 with PROFIBUS PA and FOUNDATION Fieldbus: 20 mbar ... 30 bar (0.29 ... 435 psi)

## Design



Front view

The transmitter consists of various components depending on the order. The possible versions are listed in the ordering information. The components described below are the same for all transmitters.

The rating plate (7, Figure "Front view") with the Article No. is located on the side of the housing. The specified number together with the ordering information provide details on the optional design details and on the possible measuring range (physical properties of built-in sensor element).

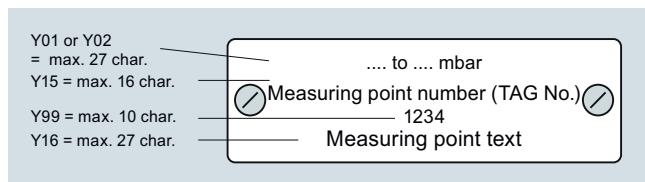
The approval label is located on the opposite side.

The housing is made of die-cast aluminium or stainless steel precision casting. A round cover (6) is screwed on at the front and rear of the housing. The front cover can be fitted with a viewing pane so that the measured values can be read directly on the display. The inlet (8) for the electrical connection is located either on the left or right side. The unused opening on the opposite side is sealed by a blanking plug. The protective earth connection is located on the rear of the housing.

The electrical connections for the power supply and screen are accessible by unscrewing the rear cover. The bottom part of the housing contains the measuring cell with process connection (5). The measuring cell is prevented from rotating by a locking screw (4). As the result of this modular design, the measuring cell and the electronics can be replaced separately from each other. The set parameter data are retained.

At the top of the housing is a plastic cover (1), which hides the input keys.

### Example for an attached measuring point label



# Pressure Measurement

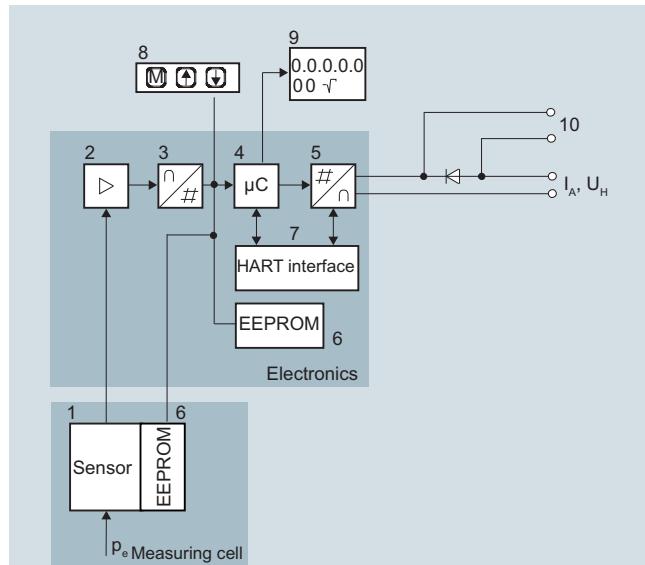
Transmitters for applications with advanced requirements (Advanced)

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## SITRANS P410 - Technical description

### Function

#### Operation of electronics with HART communication



- 1 Measuring cell sensor
- 2 Instrument amplifier
- 3 Analog-to-digital converter
- 4 Microcontroller
- 5 Digital-to-analog converter
- 6 One non-volatile memory each in the measuring cell and electronics
- 7 HART interface
- 8 Three input keys (local operation)
- 9 Digital display
- 10 Diode circuit and connection for external ammeter
- $I_A$  Output current
- $U_H$  Power supply
- $p_e$  Input variable

#### Function diagram of electronics

The bridge output voltage created by the sensor (1, Figure "Function diagram of the electronics") is amplified by the measuring amplifier (2) and digitized in the analog-to-digital converter (3). The digital information is evaluated in a microcontroller, its linearity and temperature response corrected, and converted in a digital-to-analog converter (5) into an output current of 4 to 20 mA.

The diode circuit (10) protects against incorrect polarity.

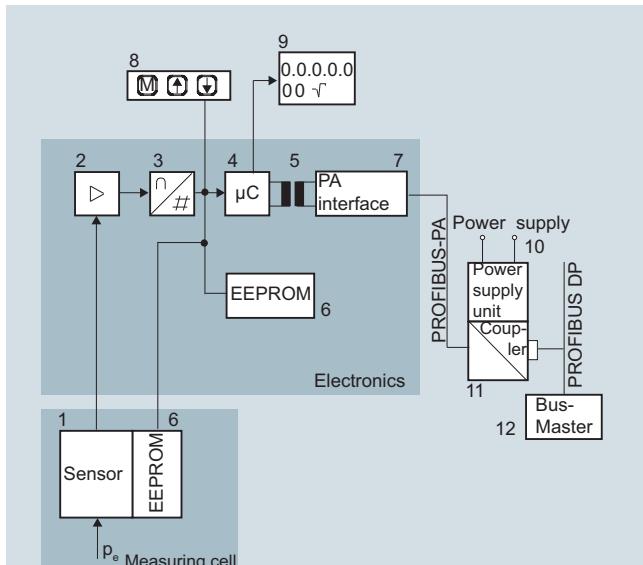
The data specific to the measuring cell, the electronics data, and the parameter data are stored in the two non-volatile memories (6). The one memory is coupled to the measuring cell, the other to the electronics. As the result of this modular design, the electronics and the measuring cell can be replaced separately from each other.

Using the 3 input keys (8) you can parameterize the pressure transmitter directly at the measuring point. The input buttons can also be used to control the view of the results, the error messages and the operating modes on the display (9).

The HART modem (7) permits parameterization using a protocol according to the HART specification.

The pressure transmitters with spans  $\leq$  63 bar measure the input pressure compared to atmosphere, transmitters with spans  $\geq$  160 bar compared to vacuum.

#### Operation of electronics with PROFIBUS PA communication



- 1 Measuring cell sensor
- 2 Instrument amplifier
- 3 Analog-to-digital converter
- 4 Microcontroller
- 5 Electrical isolation
- 6 One non-volatile memory each in the measuring cell and electronics
- 7 PROFIBUS-PA interface
- 8 Three input keys (local operation)
- 9 Digital display
- 10 Power supply
- 11 DP/PA coupler or link
- 12 Bus master
- $p_e$  Input variable

#### Function diagram of electronics

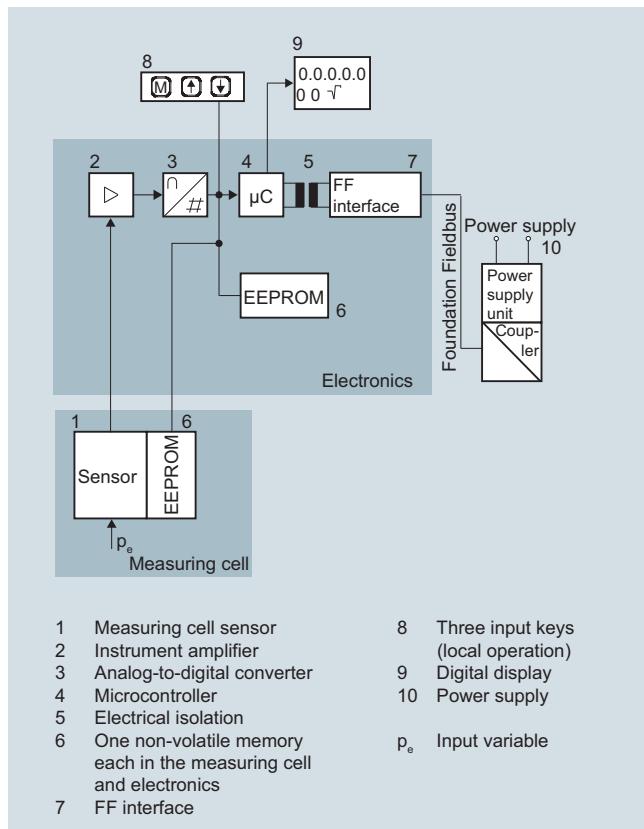
The bridge output voltage created by the sensor (1, Figure "Function diagram of the electronics") is amplified by the measuring amplifier (2) and digitized in the analog-to-digital converter (3). The digital information is evaluated in a microcontroller, its linearity and temperature response corrected, and provided on the PROFIBUS PA through an electrically isolated PA interface (7).

The data specific to the measuring cell, the electronics data, and the parameter data are stored in the two non-volatile memories (6). The one memory is coupled to the measuring cell, the other to the electronics. As the result of this modular design, the electronics and the measuring cell can be replaced separately from each other.

Using the three input buttons (8) you can parameterize the pressure transmitter directly at the measuring point. The input buttons can also be used to control the view of the results, the error messages and the operating modes on the display (9).

The results with status values and diagnostic values are transferred by cyclic data transmission on the PROFIBUS PA. Parameterization data and error messages are transferred by acyclic data transmission. Special software such as SIMATIC PDM is required for this.

### Operation of electronics with FOUNDATION Fieldbus communication



The bridge output voltage created by the sensor (1, Figure "Function diagram of electronics") is amplified by the measuring amplifier (2) and digitized in the analog-to-digital converter (3). The digital information is evaluated in the microcontroller, its linearity and temperature response corrected, and provided on the FOUNDATION Fieldbus through an electrically isolated FOUNDATION Fieldbus interface (7).

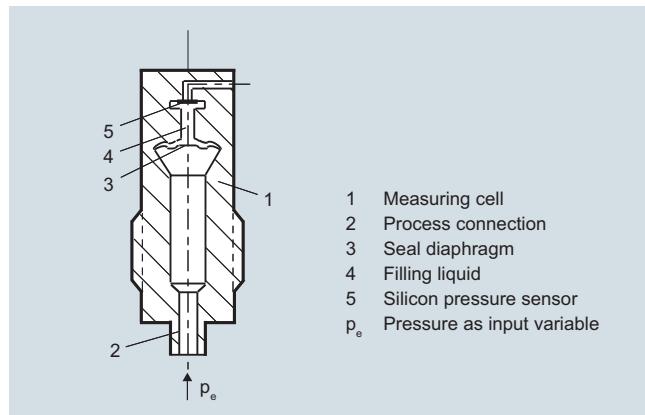
The data specific to the measuring cell, the electronics data, and the parameter data are stored in the two non-volatile memories (6). The one memory is coupled to the measuring cell, the other to the electronics. As the result of this modular design, the electronics and the measuring cell can be replaced separately from each other.

Using the three input buttons (8) you can parameterize the pressure transmitter directly at the measuring point. The input buttons can also be used to control the view of the results, the error messages and the operating modes on the display (9).

The results with status values and diagnostic values are transferred by cyclic data transmission on the FOUNDATION Fieldbus. Parameterization data and error messages are transferred by acyclic data transmission. Special software such as National Instruments Configurator is required for this.

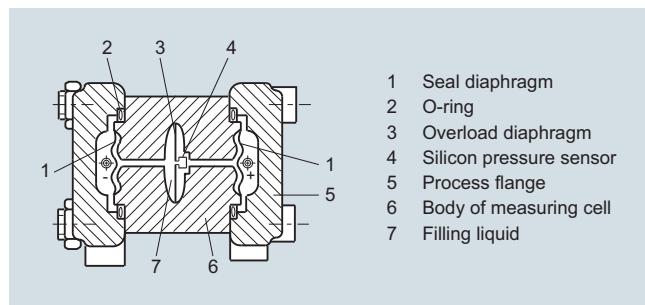
### Mode of operation of the measuring cells

#### Measuring cell for gauge pressure



The pressure  $p_e$  is applied through the process connection (2, Figure "Measuring cell for gauge pressure, function diagram") to the measuring cell (1). This pressure is subsequently transmitted further through the seal diaphragm (3) and the filling liquid (4) to the silicon pressure sensor (5) whose measuring diaphragm is then flexed. This changes the resistance of the four piezo-resistors fitted in the diaphragm in a bridge circuit. This change in resistance results in a bridge output voltage proportional to the differential pressure.

#### Measuring cell for differential pressure and flow



The differential pressure is transmitted through the seal diaphragms (1, Figure "Measuring cell for differential pressure and flow, function diagram") and the filling liquid (7) to the silicon pressure sensor (4).

The measuring diaphragm is flexed by the applied differential pressure. This changes the resistance of the four piezo-resistors fitted in the diaphragm in a bridge circuit. This change in resistance results in a bridge output voltage proportional to the differential pressure.

An overload diaphragm is installed to provide protection from overloads. If the measuring limits are exceeded, the overload diaphragm (3) is flexed until the seal diaphragm rests on the body of the measuring cell (6), thus protecting the silicon pressure sensor from overloads.

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## SITRANS P410 - Technical description

### Parameterization SITRANS P410

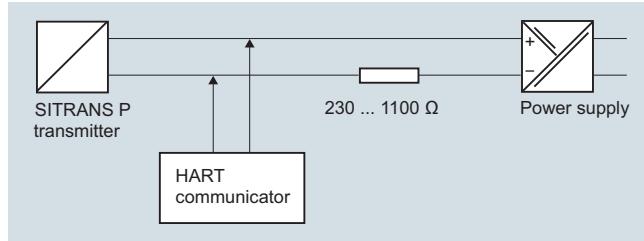
Depending on the version, there are a range of options for parameterizing the pressure transmitter and for setting or scanning the parameters.

#### Parameterization using the input buttons (local operation)

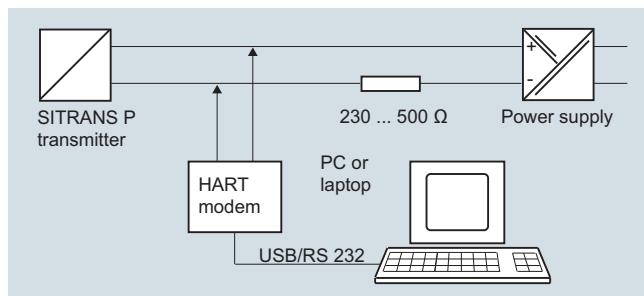
With the input buttons you can easily set the most important parameters without any additional equipment.

#### Parameterization using HART

Parameterization using HART is performed with a HART Communicator or a PC.



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

When parameterizing with a PC, the connection is made through a HART modem.

The signals needed for communication in conformity with the HART 5.x or 6.x protocols are superimposed on the output current using the Frequency Shift Keying (FSK) method.

#### Adjustable parameters, SITRANS P410 with HART

Parameters	Input keys (DS III HART)	HART communication
Start of scale	x	x
Full-scale value	x	x
Electrical damping	x	x
Start-of-scale value without application of a pressure ("Blind setting")	x	x
Full-scale value without application of a pressure ("Blind setting")	x	x
Zero adjustment	x	x
current transmitter	x	x
Fault current	x	x
Disabling of buttons, write protection	x	x <sup>1)</sup>
Type of dimension and actual dimension	x	x
Characteristic (linear / square-rooted)	x <sup>2)</sup>	x <sup>2)</sup>
Input of characteristic		x
Freely-programmable LCD		x
Diagnostic functions		x

<sup>1)</sup> Cancel apart from write protection

<sup>2)</sup> Only differential pressure

#### Diagnostic functions for SITRANS P410 with HART

- Zero correction display
- Event counter
- Limit transmitter
- Saturation alarm
- Slave pointer
- Simulation functions
- Maintenance timer

#### Available physical units of display for SITRANS P410 with HART

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

#### Parameterization through PROFIBUS PA interface

Fully digital communication through PROFIBUS PA, profile 3.0, is particularly user-friendly. Through the PROFIBUS the DS III with PROFIBUS PA is connected to a process control system, e. g. SIMATIC PSC 7. Communication is possible even in a potentially explosive environment.

For parameterization through PROFIBUS you need suitable software, e.g. SIMATIC PDM (Process Device Manager).

#### Parameterization through FOUNDATION Fieldbus interface

Fully digital communication through FOUNDATION Fieldbus is particularly user-friendly. Through the FOUNDATION Fieldbus the DS III with FOUNDATION Fieldbus is connected to a process control system. Communication is possible even in a potentially explosive environment.

For parameterization through the FOUNDATION Fieldbus you need suitable software, e.g. National Instruments Configurator.

#### Adjustable parameters for SITRANS P410 with PROFIBUS PA and FOUNDATION Fieldbus

Parameters	Input keys	PROFIBUS PA and FOUNDATION Fieldbus interface
Electrical damping	x	x
Zero adjustment (correction of position)	x	x
Buttons and/or function disabling	x	x
Source of measured-value display	x	x
Physical dimension of display	x	x
Position of decimal point	x	x
Bus address	x	x
Adjustment of characteristic	x	x
Input of characteristic		x
Freely-programmable LCD		x
Diagnostics functions		x

Diagnostic functions for SITRANS P410 with PROFIBUS PA and FOUNDATION Fieldbus

- Event counter
- Slave pointer
- Maintenance timer
- Simulation functions
- Display of zero correction
- Limit transmitter
- Saturation alarm

Physical dimensions available for the display

Physical variable	Physical dimensions
Pressure (setting can also be made in the factory)	MPa, kPa, Pa, bar, mbar, torr, atm, psi, g/cm <sup>2</sup> , kg/cm <sup>2</sup> , mmH <sub>2</sub> O, mmH <sub>2</sub> O (4 °C), inH <sub>2</sub> O, inH <sub>2</sub> O (4 °C), ftH <sub>2</sub> O (20 °C), mmHg, inHg
Level (height data)	m, cm, mm, ft, in, yd
Volume	m <sup>3</sup> , dm <sup>3</sup> , hl, yd <sup>3</sup> , ft <sup>3</sup> , in <sup>3</sup> , US gallon, Imp. gallon, bushel, barrel, barrel liquid
volume flow	m <sup>3</sup> /s, m <sup>3</sup> /min, m <sup>3</sup> /h, m <sup>3</sup> /d, l/s, l/min, l/h, l/d, Ml/d, ft <sup>3</sup> /s, ft <sup>3</sup> /min, ft <sup>3</sup> /h, ft <sup>3</sup> /d, US gallon/s, US gallon/min, US gallon/h, US gallon/d, bbl/s, bbl/min, bbl/h, bbl/d
Mass flow	g/s, g/min, g/h, g/d, kg/s, kg/min, kg/h, kg/d, t/s, t/min, t/h, t/d, lb/s, lb/min, lb/h, lb/d, STon/s, STon/min, STon/h, STon/d, LTon/s, LTon/min, LTon/h, LTon/d
Total mass flow	t, kg, g, lb, oz, LTon, STon
Temperature	K, °C, °F, °R
Miscellaneous	%

# Pressure Measurement

Transmitters for applications with advanced requirements (Advanced)

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## SITRANS P410 for gauge pressure

### Technical specifications

#### SITRANS P410 for gauge pressure

##### Input

Measured variable

Span (fully adjustable) or measuring range, max. operating pressure (in accordance with 2014/68/EU Pressure Equipment Directive) and max. test pressure (pursuant to DIN 16086)

Gauge pressure

HART	PROFIBUS PA/ FOUNDATION Fieldbus	Max. operating pres- sure MAWP (PS)	Max. perm. test pressure
Span	Nominal measuring range		
0.01 ... 1 bar	1 bar	4 bar	6 bar
1 ... 100 kPa	100 kPa	400 kPa	600 kPa
0.15 ... 14.5 psi	14.5 psi	58 psi	87 psi
0.04 ... 4 bar	4 bar	7 bar	10 bar
4 ... 400 kPa	400 kPa	0.7 MPa	1 MPa
0.58 ... 58 psi	58 psi	102 psi	145 psi
0.16 ... 16 bar	16 bar	21 bar	32 bar
16 ... 1600 kPa	1600 kPa	2.1 MPa	3.2 MPa
2.3 ... 232 psi	232 psi	305 psi	464 psi
0.63 ... 63 bar	63 bar	67 bar	100 bar
63 ... 6300 kPa	6300 kPa	6.7 MPa	10 MPa
9.1 ... 914 psi	914 psi	972 psi	1450 psi
1.6 ... 160 bar	160 bar	167 bar	250 bar
0.16 ... 16 MPa	16 MPa	16.7 MPa	2.5 MPa
23 ... 2321 psi	2321 psi	2422 psi	3626 psi

Lower measuring limit

• Measuring cell with silicone oil filling 30 mbar a/3 kPa a/0.44 psia

Upper measuring limit 100 % of max. span

##### Output

Output signal

- Lower limit (infinitely adjustable)
- Upper limit (infinitely adjustable)

Load

- Without HART
- With HART

Physical bus

Protection against polarity reversal

Electrical damping (step width 0.1 s)

##### HART

4 ... 20 mA

3.55 mA, factory preset to 3.84 mA

23 mA, factory preset to 20.5 mA or optionally set to 22.0 mA

$R_B \leq (U_H - 10.5 \text{ V})/0.023 \text{ A}$  in  $\Omega$ ,  
 $U_H$ : Power supply in V

$R_B = 230 \dots 500 \Omega$  (SIMATIC PDM) or  
 $R_B = 230 \dots 1100 \Omega$  (HART Communicator)

-

##### PROFIBUS PA/FOUNDATION Fieldbus

Digital PROFIBUS PA and FOUNDATION Fieldbus signal

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IEC 61158-2

Protected against short-circuit and polarity reversal. Each connection against the other with max. supply voltage.

Set to 2 s (0 ... 100 s)

**SITRANS P410 for gauge pressure****Measuring accuracy**

Reference conditions

Acc. to IEC 60770-1

- Increasing characteristic
- Start-of-scale value 0 bar/kPa/psi
- Stainless steel seal diaphragm
- Silicone oil filling
- Room temperature 25 °C (77 °F)

Measuring span ratio  $r$  (spread, Turn-Down) $r = \text{max. measuring span}/\text{set measuring span or nom. pressure range}$ 

Error in measurement at limit setting incl. hysteresis and reproducibility

- Linear characteristic

- 1 bar/100 kPa/14.5 psi
- 4 bar/400 kPa/58 psi
- 16 bar/1.6 MPa/232 psi
- 63 bar/6.3 MPa/914 psi
- 160 bar/16 MPa/2321 psi

$$\begin{array}{ll} r \leq 5 : & \leq 0.04 \% \\ 5 < r \leq 100 : & \leq (0.004 \cdot r + 0.045) \% \end{array}$$

Influence of ambient temperature  
(in percent per 28 °C (50 °F))

- 1 bar/100 kPa/14.5 psi
- 4 bar/400 kPa/58 psi
- 16 bar/1.6 MPa/232 psi
- 63 bar/6.3 MPa/914 psi
- 160 bar/16 MPa/2321 psi

$$\begin{array}{ll} & \leq (0.05 \cdot r + 0.1) \% \\ & \leq (0.025 \cdot r + 0.125) \% \end{array}$$

Long-term stability (temperature change  $\pm 30$  °C ( $\pm 54$  °F))

- 1 bar/100 kPa/14.5 psi
- 4 bar/400 kPa/58 psi
- 16 bar/1.6 MPa/232 psi
- 63 bar/6.3 MPa/914 psi
- 160 bar/16 MPa/2321 psi

$$\begin{array}{ll} & \leq (0.25 \cdot r) \% \text{ in 5 years} \\ & \leq (0.125 \cdot r) \% \text{ in 5 years} \end{array}$$

Effect of mounting position

$\leq 0.05 \text{ mbar}/0.005 \text{ kPa}/0.000725 \text{ psi}$  per 10° inclination  
(zero point correction is possible with position error compensation)

0.005 % per 1 V

Effect of auxiliary power supply  
(in percent per change in voltage) $3 \cdot 10^{-5}$  of nominal measuring range

Measuring value resolution for PROFIBUS PA and FOUNDATION Fieldbus

# Pressure Measurement

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## SITRANS P410 for gauge pressure

SITRANS P410 for gauge pressure		
<b>Rated conditions</b>		
Degree of protection (to EN 60529)	IP66 (optional IP66/IP68), NEMA 4X	
Temperature of medium	<ul style="list-style-type: none"> <li>Measuring cell with silicone oil filling</li> <li>Measuring cell with inert filling liquid</li> <li>In conjunction with dust explosion protection</li> </ul>	
Ambient conditions	<ul style="list-style-type: none"> <li>Ambient temperature <ul style="list-style-type: none"> <li>Transmitter</li> <li>Display readable</li> </ul> </li> <li>Storage temperature</li> <li>Climatic class <ul style="list-style-type: none"> <li>Condensation</li> </ul> </li> <li>Electromagnetic Compatibility <ul style="list-style-type: none"> <li>Emitted interference and interference immunity</li> </ul> </li> </ul>	
	<ul style="list-style-type: none"> <li>-40 ... +100 °C (-40 ... +212 °F)</li> <li>-20 ... +100 °C (-4 ... +212 °F)</li> <li>-20 ... +60 °C (-4 ... +140 °F)</li> </ul>	
	<ul style="list-style-type: none"> <li>-40 ... +85 °C (-40 ... +185 °F)</li> <li>-30 ... +85 °C (-22 ... +185 °F)</li> <li>-50 ... +85 °C (-58 ... +185 °F)</li> </ul>	
	<ul style="list-style-type: none"> <li>Relative humidity 0 ... 100 %</li> <li>Condensation permissible, suitable for use in the tropics</li> </ul>	
	Acc. to IEC 61326 and NAMUR NE 21	
<b>Design</b>		
Weight (without options)	Die-cast aluminum: ≈ 2.0 kg (≈ 4.4 lb) Stainless steel precision casting: ≈ 4.6 kg (≈ 10.1 lb)	
Enclosure material	Low-copper die-cast aluminum, GD-AISI 12 or stainless steel precision casting, mat. no. 1.4408	
Wetted parts materials	<ul style="list-style-type: none"> <li>Connection shank</li> <li>Oval flange</li> <li>Seal diaphragm</li> </ul>	
	<ul style="list-style-type: none"> <li>Stainless steel, mat. no. 1.4404/316L or Hastelloy C4, mat. no. 2.4602</li> <li>Stainless steel, mat. no. 1.4404/316L</li> <li>Stainless steel, mat. no. 1.4404/316L or Hastelloy C276, mat. no. 2.4819</li> </ul>	
Measuring cell filling	Silicone oil or inert filling liquid (maximum value with oxygen measurement pressure 100 bar (1450 psi) at 60 °C (140 °F))	
Process connection	Connection shank G $\frac{1}{2}$ B to DIN EN 837-1, female thread $\frac{1}{2}$ -14 NPT or oval flange (PN 160 (MAWP 2320 psi)) to DIN 19213 with mounting thread M10 or $\frac{7}{16}$ -20 UNF to EN 61518	
Material of mounting bracket		
Steel	Sheet-steel, Mat. No. 1.0330, chrome-plated	
Stainless steel	Sheet stainless steel, mat. no. 1.4301 (SS 304)	
<b>Power supply <math>U_H</math></b>		<b>PROFIBUS PA/ FOUNDATION Fieldbus</b>
Terminal voltage on transmitter	10.5 ... 45 V DC 10.5 ... 30 V DC in intrinsically-safe mode	-
Power supply		
Separate 24 V power supply necessary	-	
Bus voltage	<ul style="list-style-type: none"> <li>Not Ex</li> <li>With intrinsically-safe operation</li> </ul>	
	<ul style="list-style-type: none"> <li>-</li> <li>-</li> </ul>	
Current consumption	<ul style="list-style-type: none"> <li>Basic current (max.)</li> <li>Start-up current <math>\leq</math> basic current</li> <li>Max. current in event of fault</li> </ul>	
	<ul style="list-style-type: none"> <li>-</li> <li>-</li> <li>-</li> </ul>	
Fault disconnection electronics (FDE) available	<ul style="list-style-type: none"> <li>12.5 mA</li> <li>Yes</li> <li>15.5 mA</li> <li>Yes</li> </ul>	

## SITRANS P410 for gauge pressure

## Certificates and approvals

Classification according to PED 2014/68/EU

For gases of fluid group 1 and liquids of fluid group 1; complies with requirements of article 4, paragraph 3 (sound engineering practice)

Explosion protection

- Intrinsic safety "i"

- Marking

- Permissible ambient temperature

PTB 13 ATEX 2007 X

Ex II 1/2 G Ex ia/b IIC T4/T5/T6 Ga/Gb

-40 ... +85 °C (-40 ... +185 °F) temperature class T4;

-40 ... +70 °C (-40 ... +158 °F) temperature class T5;

-40 ... +60 °C (-40 ... +140 °F) temperature class T6

- Connection

To certified intrinsically-safe circuits with

FISCO supply unit:

 $U_o = 17.5 \text{ V}$ ,  $I_o = 380 \text{ mA}$ ,  $P_o = 5.32 \text{ W}$ 

peak values:

 $U_i = 30 \text{ V}$ ,  $I_i = 100 \text{ mA}$ , $P_i = 750 \text{ mW}$ ,  $R_i = 300 \Omega$ 

Linear barrier:

 $U_o = 24 \text{ V}$ ,  $I_o = 174 \text{ mA}$ ,  $P_o = 1 \text{ W}$  $L_i = 0.4 \text{ mH}$ ,  $C_i = 6 \text{ nF}$  $L_i = 7 \mu\text{H}$ ,  $C_i = 1.1 \text{ nF}$ 

- Effective internal inductance/capacitance

PTB 99 ATEX 1160

Ex II 1/2 G Ex d IIC T4/T6 Gb

-40 ... +85 °C (-40 ... +185 °F) temperature class T4;

-40 ... +60 °C (-40 ... +140 °F) temperature class T6

- Connection

To circuits with values:  $U_H = 10.5 \dots 45 \text{ V DC}$ To circuits with values:  $U_H = 9 \dots 32 \text{ V DC}$ 

- Dust explosion protection for zone 20 (pending)

PTB 01 ATEX 2055

Ex II 1 D Ex ta IIIC T120°C Da

Ex II 1/2 D Ex ta/tb IIIC T120°C Da/Db

-40 ... +85 °C (-40 ... +185 °F)

120 °C (248 °F)

- Marking

- Permissible ambient temperature

- Max. surface temperature

- Connection

To certified intrinsically-safe circuits with

FISCO supply unit:

 $U_o = 17.5 \text{ V}$ ,  $I_o = 380 \text{ mA}$ ,  $P_o = 5.32 \text{ W}$ 

peak values:

 $U_i = 30 \text{ V}$ ,  $I_i = 100 \text{ mA}$ , $P_i = 750 \text{ mW}$ ,  $R_i = 300 \Omega$ 

Linear barrier:

 $U_o = 24 \text{ V}$ ,  $I_o = 250 \text{ mA}$ ,  $P_o = 1 \text{ W}$  $L_i = 0.4 \text{ mH}$ ,  $C_i = 6 \text{ nF}$  $L_i = 7 \mu\text{H}$ ,  $C_i = 1.1 \text{ nF}$ 

- Dust explosion protection for zone 21/22 (pending)

PTB 01 ATEX 2055

Ex II 2 D Ex tb IIIC T120°C Db

To circuits with values:

 $U_H = 10.5 \dots 45 \text{ V DC}$ ;  $P_{\max} = 1.2 \text{ W}$ 

- Marking

- Connection

To circuits with values:  $U_H = 9 \dots 32 \text{ V DC}$ ;  $P_{\max} = 1 \text{ W}$ 

- Type of protection "n" (zone 2)

PTB 13 ATEX 2007 X

Ex II 2/3 G Ex nA II T4/T5/T6 Gc

Ex II 2/3 G Ex ic IIC T4/T5/T6 Gc

 $U_m = 32 \text{ V}$ 

- Marking

- Connection (Ex nA)

- Connections (Ex ic)

 $U_m = 45 \text{ V}$ 

FISCO supply unit ic:

 $U_o = 17.5 \text{ V}$ ,  $I_o = 570 \text{ mA}$ 

Linear barrier:

 $U_o = 32 \text{ V}$ ,  $I_o = 132 \text{ mA}$ ,  $P_o = 1 \text{ W}$ 

To circuits with values:

 $U_i = 45 \text{ V}$  $L_i = 7 \mu\text{H}$ ,  $C_i = 1.1 \text{ nF}$ 

- Effective internal inductance/capacitance

Certificate of Compliance 3008490

- Explosion protection acc. to FM (pending)

CL I, DIV 1, GP ABCD T4...T6; CL II, DIV 1, GP EFG; CL III; CL I, ZN 0/1 AEx ia IIC T4...T6; CL I, DIV 2, GP ABCD T4...T6; CL II, DIV 2, GP FG; CL III

- Identification (XP/DIP) or (IS); (NI)

Certificate of Compliance 1153651

- Explosion protection to CSA (pending)

CL I, DIV 1, GP ABCD T4...T6; CL II, DIV 1, GP EFG; CL III; Ex ia IIC T4...T6; CL I, DIV 2, GP ABCD T4...T6; CL II, DIV 2, GP FG; CL III

- Identification (XP/DIP) or (IS)

# Pressure Measurement

Transmitters for applications with advanced requirements (Advanced)

1

## SITRANS P410 for gauge pressure

<b>HART communication</b>		<b>FOUNDATION Fieldbus communication</b>
HART	230 ... 1100 $\Omega$	Function blocks
Protocol	HART Version 5.x	3 function blocks analog input, 1 function block PID
Software for computer	SIMATIC PDM	
<b>PROFIBUS PA communication</b>		
Simultaneous communication with master class 2 (max.)	4	
The address can be set using	Configuration tool or local operation (standard setting address 126)	
Cyclic data usage	5 (one measured value) or 10 (two measured values)	Yes, linearly rising or falling characteristic
• Output byte	0, 1, or 2 (register operating mode and reset function for metering)	0 ... 100 s
• Input byte		Output/input (can be locked within the device with a bridge)
Internal preprocessing		parameterizable (last good value, substitute value, incorrect value)
Device profile	PROFIBUS PA Profile for Process Control Devices Version 3.0, class B	parameterizable (last good value, substitute value, incorrect value)
Function blocks	2	Yes
• Analog input		Yes
- Adaptation to customer-specific process variables	Yes, linearly rising or falling characteristic	Standard FOUNDATION Fieldbus function block
- Electrical damping, adjustable	0 ... 100 s	1 resource block
- Simulation function	Input /Output	1 transducer block Pressure with calibration, 1 transducer block LCD
- Failure mode	parameterizable (last good value, substitute value, incorrect value)	
- Limit monitoring	Yes, one upper and lower warning limit and one alarm limit respectively	
- Register (totalizer)	Can be reset, preset, optional direction of counting, simulation function of register output	
- Failure mode	parameterizable (summation with last good value, continuous summation, summation with incorrect value)	
- Limit monitoring	One upper and lower warning limit and one alarm limit respectively	
• Physical block	1	
Transducer blocks	2	
• Pressure transducer block		
- Can be calibrated by applying two pressures	Yes	
- Monitoring of sensor limits	Yes	
- Specification of a container characteristic with	Max. 30 nodes	
- Square-rooted characteristic for flow measurement	Yes	
- Gradual volume suppression and implementation point of square-root extraction	Parameterizable	
- Simulation function for measured pressure value and sensor temperature	Constant value or over parameterizable ramp function	

## SITRANS P410 for gauge pressure

Selection and Ordering data		Article No.	Order code
<b>Pressure transmitter for gauge pressure, SITRANS P410 with HART</b>		7MF4033-	-Z C41
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.			
<b>Measuring cell filling</b>	<b>Measuring cell cleaning</b>		
Silicone oil	normal	1	
<b>Measuring span (min. ... max.)</b>		B	
0.01 ... 1 bar (0.15 ... 14.5 psi)		C	
0.04 ... 4 bar (0.58 ... 58 psi)		D	
0.16 ... 16 bar (2.32 ... 232 psi)		E	
0.63 ... 63 bar (9.14 ... 914 psi)		F	
1.6 ... 160 bar (23.2 ... 2320 psi)			
<b>Wetted parts materials</b>			
Seal diaphragm	Process connection	A	
Stainless steel	Stainless steel	B	
Hastelloy	Stainless steel	C	
Hastelloy	Hastelloy	Y	
Version as diaphragm seal <sup>1) 2) 3) 4)</sup>			
<b>Process connection</b>		0	
• Connection shank G1/2B to EN 837-1		1	
• Female thread 1/2-14 NPT		2	
• Stainless steel oval flange with process connection (Oval flange has no female thread)		3	
- Mounting thread 7/16-20 UNF to IEC 61518		4	
- Mounting thread M10 to DIN 19213		5	
- Mounting thread M12 to DIN 19213		6	
• Male thread M20 x 1.5		0	
• Male thread 1/2 -14 NPT		3	
<b>Non-wetted parts materials</b>			
• Housing made of die-cast aluminium		1	
• Housing stainless steel precision casting <sup>5)</sup>		2	
<b>Version</b>		3	
• Standard version, German plate inscription, setting for pressure unit: bar		A	
• International version, English plate inscription, setting for pressure unit: bar		B	
• Chinese version, English plate inscription, setting for pressure unit: Pascal		D	
All versions include DVD with documentation for SITRANS P in German, English, French, Italian and Spanish. Includes Compact operating instructions in various EU languages.		P	
<b>Explosion protection</b>		E	
• None		R	
• With ATEX, Type of protection:		F	
- "Intrinsic safety (Ex ia)" <sup>6)</sup>		S	
- "Explosion-proof (Ex d)" <sup>6)</sup>		NC	
- "Intrinsic safety and flameproof enclosure" (Ex ia + Ex d) <sup>7)</sup>		A	
- "Ex nA/ic (Zone 2)" <sup>8)</sup>		B	
- "Intrinsic safety, explosion-proof enclosure and dust explosion protection (Ex ia + Ex d + Zone 1D/2D)" <sup>7)9)</sup> (pending)		D	
• FM + CSA intrinsic safe (is) (pending) <sup>10)</sup>		P	
• FM + CSA (is + ep) + Ex ia + Ex d (ATEX) + Zone 1D/2D <sup>7)9)10)</sup> (pending)		E	
• With FM + CSA, Type of protection:		R	
- "Intrinsic Safe and Explosion Proof (is + xp)" <sup>6)10)</sup> (pending)		F	
<b>Electrical connection / cable entry</b>		S	
• Screwed gland M20 x 1 .5		NC	
• Screwed gland 1/2-14 NPT		A	
• Han 7D plug (plastic housing) incl. mating connector <sup>11)</sup>		B	
• M12 connectors (stainless steel) <sup>11)12)</sup>		C	
		D	
		F	

# Pressure Measurement

Transmitters for applications with advanced requirements (Advanced)

1

## SITRANS P410 for gauge pressure

### Selection and Ordering data

Pressure transmitter for gauge pressure, SITRANS P410 with HART

Article No.

Order code

7MF4033-  -Z C41

#### Display

- Without display
- Without visible display  
(display concealed, setting: mA)
- With visible display (setting: mA)
- with customer-specific display (setting as specified, Order code "Y21" or "Y22" required)

0

1

6

7

Power supply units see Chap. 7 "Supplementary Components".

Included in delivery of the device:

- Brief instructions (Leporello)
- DVD with detailed documentation

- 1) When the manufacturer's certificate (calibration certificate) has to be ordered for transmitters with diaphragm seals according to IEC 60770-2, it is recommended only to order this certificate exclusively with the diaphragm seals. The measuring accuracy of the total combination is certified here.
- 2) If the acceptance test certificate 3.1 is ordered for the transmitter with mounted diaphragm seals this certificate must also be ordered with the respective remote seals.
- 3) The diaphragm seal is to be specified with a separate order number and must be included with the transmitter order number, for example 7MF403-..Y..-.... and 7MF4900-1....B
- 4) The standard measuring cell filling of configurations with remote seals (Y) is silicone oil.
- 5) Not in conjunction with Electrical connection "Han7D plug".
- 6) Without cable gland, with blanking plug
- 7) With enclosed cable gland Ex ia and blanking plug
- 8) Configurations with HAN and M12 connectors are only available in Ex ic.
- 9) Only in connection with IP66.
- 10) Explosion protection acc. to FM/CSA: suitable for installations according to NEC 500/505.
- 11) Only in connection with Ex approval A, B or E.
- 12) M12 delivered without cable socket

## SITRANS P410 for gauge pressure

Selection and Ordering data	Article No.	Order code
<b>Pressure transmitter for gauge pressure</b>		
<b>SITRANS P410 with PROFIBUS PA (PA)</b>	7MF4034-	-Z C41
<b>SITRANS P410 with FOUNDATION Fieldbus (FF)</b>	7MF4035-	-Z C41
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
<b>Measuring cell filling</b>		
Measuring cell cleaning		
Silicone oil	1	
normal	B	
<b>Nominal measuring range</b>		
1 bar (14.5 psi)	C	
4 bar (58 psi)	D	
16 bar (232 psi)	E	
63 bar (914 psi)	F	
160 bar (2320 psi)		
<b>Wetted parts materials</b>		
Seal diaphragm	Process connection	
Stainless steel	Stainless steel	A
Hastelloy	Stainless steel	B
Hastelloy	Hastelloy	C
Version as diaphragm seal	1) 2) 3) 4)	Y
<b>Process connection</b>		
• Connection shank G $\frac{1}{2}$ B to EN 837-1	0	
• Female thread 1/2-14 NPT	1	
• Stainless steel oval flange with process connection (Oval flange has no female thread) <sup>5)</sup>		
- Mounting thread 7/16-20 UNF to IEC 61518	2	
- Mounting thread M10 to DIN 19213	3	
- Mounting thread M12 to DIN 19213	4	
• Male thread M20 x 1.5	5	
• Male thread 1/2 -14 NPT	6	
<b>Non-wetted parts materials</b>		
• Housing made of die-cast aluminium	0	
• Housing stainless steel precision casting	3	
<b>Version</b>		
• Standard version, German label inscription, setting of pressure unit: bar	1	
• International version, English label inscription, setting of pressure unit: psi	2	
• Chinese version, English label inscription, setting of pressure unit: kPa	3	
All versions incl. DVD with documentation for SITRANS P in German, English, French, Italian and Spanish.		
Incl. Compact operating instructions in various EU languages.		
<b>Explosion protection</b>		
• None	A	
• With ATEX, Type of protection:		
- "Intrinsic safety (Ex ia)"	B	
- "Explosion-proof (Ex d)" <sup>6)</sup>	D	
- "Intrinsic safety and flameproof enclosure" (Ex ia + Ex d) <sup>7)</sup>	P	
- "Ex nA/ic (Zone 2)" <sup>8)</sup>	E	
- "Intrinsic safety, explosion-proof enclosure and dust explosion protection (Ex ia + Ex d + Zone 1D/2D)" <sup>7)</sup> <sup>9)</sup> (not for P410 with FOUNDATION Fieldbus) (pending)	R	
• FM + CSA intrinsic safe (is) (pending) <sup>10)</sup>	F	
• FM + CSA (is + ep) + Ex ia + Ex d (ATEX) + Zone 1D/2D <sup>7)</sup> <sup>9)</sup> <sup>10)</sup> (pending)	S	
• With FM + CSA, Type of protection:		
- "Intrinsic Safe and Explosion Proof (is + xp)" <sup>6)</sup> <sup>10)</sup> (pending)	NC	
<b>Electrical connection/cable entry</b>		
• Screwed gland M20 x 1.5	B	
• Screwed gland 1/2-14 NPT	C	
• M12 connectors (stainless steel) <sup>11)</sup> <sup>12)</sup>	F	

# Pressure Measurement

Transmitters for applications with advanced requirements (Advanced)

1

## SITRANS P410 for gauge pressure

Selection and Ordering data	Article No.	Order code
<b>Pressure transmitter for gauge pressure</b>		
<b>SITRANS P410 with PROFIBUS PA (PA)</b>	7MF4034-	-Z C41
<b>SITRANS P410 with FOUNDATION Fieldbus (FF)</b>	7MF4035-	-Z C41
<b>Display</b>		
• Without display		0
• Without visible display (display concealed, setting: bar)		1
• With visible display (setting: bar)		6
• with customer-specific display (setting as specified, Order code "Y21" required)		7

Included in delivery of the device:

- Brief instructions (Leporello)
- DVD with detailed documentation

- 1) When the manufacturer's certificate (calibration certificate) has to be ordered for transmitters with diaphragm seals according to IEC 60770-2, it is recommended only to order this certificate exclusively with the diaphragm seals. The measuring accuracy of the total combination is certified here.
- 2) If the acceptance test certificate 3.1 is ordered for the transmitter with mounted diaphragm seals this certificate must also be ordered with the respective remote seals.
- 3) The diaphragm seal is to be specified with a separate order number and must be included with the transmitter order number, for example 7MF403-..Y..-.... and 7MF4900-1-..B
- 4) The standard measuring cell filling of configurations with remote seals (Y) is silicone oil.
- 5) M10 fastening thread: Max. span 160 bar (2320 psi)  
7/16-20 UNF and M12 fastening thread: Max. span 400 bar (5802 psi)
- 6) Without cable gland, with blanking plug.
- 7) With enclosed cable gland Ex ia and blanking plug.
- 8) Configurations with HAN and M12 connectors are only available in Ex ic.
- 9) Only in connection with IP66.
- 10) Explosion protection acc. to FM/CSA: suitable for installations according to NEC 500/505.
- 11) M12 delivered without cable socket.
- 12) Only in connection with Ex approval A, B, E or F.

## Pressure Measurement

Transmitters for applications with advanced requirements (Advanced)

## SITRANS P410 for gauge pressure

Selection and Ordering data		Order code			Selection and Ordering data		Order code		
		HART	PA	FF			HART	PA	FF
<b>Further designs</b> Add "Z" to Article No. and specify Order code.					<b>Further designs</b> Add "Z" to Article No. and specify Order code.				
<b>Pressure transmitter with mounting bracket (1x fixing angle, 2 x nut, 2 x U-washer or 1 x bracket, 2 x nut, 2 x U-washer) made of:</b>					<b>Use in or on zone 1D/2D</b> (only together with type of protection "Intrinsic safety" (transmitter 7MF4...-....-B.. Ex ia) and IP66)	E01	✓	✓	✓
• Steel	A01	✓	✓	✓	<b>Dual seal</b>	E24	✓	✓	✓
• Stainless steel 304	A02	✓	✓	✓	<b>Explosion-proof "Intrinsic safety" to NEPSI (China)</b> (only for transmitter 7MF4...-....-B..)	E55 <sup>3)</sup>	✓	✓	✓
• Stainless steel 316L	A03	✓	✓	✓	<b>Explosion protection "Explosion-proof" to NEPSI (China)</b> (only for transmitter 7MF4...-....-D..)	E56 <sup>3)</sup>	✓	✓	✓
<b>Plug</b>					<b>Ex protection "Zone 2" to NEPSI (China)</b> (only for transmitter 7MF4...-....-E..)	E57 <sup>3)</sup>	✓	✓	✓
• Han 7D (metal)	A30	✓			<b>Ex protection „Ex ia“, „Ex d“ and „Zone 2“ to NEPSI (China)</b> (only for transmitter 7MF4...-....-R..)	E58 <sup>3)</sup>	✓	✓	✓
• Han 8D (instead of Han 7D)	A31	✓			"Intrinsic safety" and "Explosion-proof" explosion protection acc. to Kosha (Korea) (pending)	E70 <sup>3)</sup>	✓	✓	✓
• Angled	A32	✓			(only for transmitter 7MF4...-....-[B, D]..-Z + E11)				
• Han 8D (metal)	A33	✓			<b>Ex-protection Ex ia according to EAC Ex (Russia)</b>	E80 <sup>4)</sup>	✓	✓	✓
<b>Cable sockets for M12 connectors (metal (CuZn))</b>	A50	✓	✓	✓	<b>Ex-protection Ex d according to EAC Ex (Russia)</b>	E81 <sup>4)</sup>	✓	✓	✓
<b>Rating plate inscription</b> (instead of German)					<b>Ex-protection Ex nA/ic (Zone 2) according to EAC Ex (Russia)</b>	E82 <sup>4)</sup>	✓	✓	✓
• English	B11	✓	✓	✓	<b>Ex-protection Ex ia + Ex d + Zone 1D/2D according to EAC Ex (Russia)</b>	E83 <sup>4)</sup>	✓	✓	✓
• French	B12	✓	✓	✓	<b>Two coats of lacquer on casing and cover (PU on epoxy)</b>	G10	✓	✓	✓
• Spanish	B13	✓	✓	✓	<b>Transient protector 6 kV (lightning protection)</b>	J01	✓	✓	✓
• Italian	B14	✓	✓	✓	<b>Oval flange NAM (ASTAVA)</b>	J06	✓	✓	✓
<b>English rating plate</b> Pressure units in inH <sub>2</sub> O and/or psi	B21	✓	✓	✓	Factor valve block mounting for SITRANS P410 is possible. Depending on the available P410 variants, please see the configuration options for SITRANS P DS III (page 1/193).				
<b>Quality Inspection Certificate (5-point characteristic curve test) according to IEC 60770-2<sup>1)</sup></b>	C11	✓	✓	✓					
<b>Inspection certificate<sup>2)</sup></b> Acc. to EN 10204-3.1	C12	✓	✓	✓	1) When the manufacturer's certificate (calibration certificate) has to be ordered for transmitters with diaphragm seals according to IEC 60770-2, it is recommended only to order this certificate exclusively with the diaphragm seals. The measuring accuracy of the <u>total</u> combination is certified here.				
<b>Factory certificate</b> Acc. to EN 10204-2.2	C14	✓	✓	✓	2) If the acceptance test certificate 3.1 is ordered for the transmitter with mounted diaphragm seals this certificate must also be ordered with the respective remote seals.				
<b>Functional safety (SIL2)</b> (pending) Devices suitable for use according to IEC 61508 and IEC 61511. Includes SIL conformity declaration	C20	✓			3) Option does not include ATEX approval, but instead includes only the country-specific approval.				
<b>Functional safety (SIL2/3)</b> Devices suitable for use according to IEC 61508 and IEC 61511. Includes SIL conformity declaration	C23	✓			4) Approval pending.				
<b>Increased measuring accuracy</b> (mandatory specification for SITRANS P410)	C41	✓	✓	✓					
<b>Device passport Russia</b>	C99	✓	✓	✓					
<b>Setting of upper limit of output signal to 22.0 mA</b>	D05	✓							
<b>Manufacturer's declaration acc. to NACE (MR 0103-2012 and MR 0175-2009)</b>	D07	✓	✓	✓					
<b>Degree of protection IP66/IP68</b> (only for M20x1.5 and 1½-14 NPT)	D12	✓	✓	✓					
<b>Supplied with oval flange</b> (1 item), PTFE packing and screws in thread of oval flange	D37	✓	✓	✓					
<b>Capri cable gland 4F CrNi and clamping device (848699 + 810634) included</b>	D59	✓	✓	✓					
<b>TAG plate empty (no inscription)</b>	D61	✓	✓	✓					

# Pressure Measurement

Transmitters for applications with advanced requirements (Advanced)

1

## SITRANS P410 for gauge pressure

Selection and Ordering data		Order code		
		HART	PA	FF
<b>Additional data</b> Please add "-Z" to Article No. and specify Order code(s) and plain text.				
<b>Measuring range to be set</b> Specify in plain text (max. 5 characters): Y01: ... up to ... mbar, bar, kPa, MPa, psi	Y01	✓	✓ <sup>1)</sup>	
<b>Stainless steel tag plate and entry in device variable (measuring point description)</b> Max. 16 characters, specify in plain text: Y15: .....	Y15	✓	✓	✓
<b>Measuring point text (entry in device variable)</b> Max. 27 characters, specify in plain text: Y16: .....	Y16	✓	✓	✓
<b>Entry of HART address (TAG)</b> Max. 8 characters, specify in plain text: Y17: .....	Y17	✓		
<b>Setting of pressure indication in pressure units</b> Specify in plain text (standard setting: bar): Y21: mbar, bar, kPa, MPa, psi, ... Note: The following pressure units can be selected: bar, mbar, mm H <sub>2</sub> O <sup>*)</sup> , inH <sub>2</sub> O <sup>*)</sup> , ftH <sub>2</sub> O <sup>*)</sup> , mmHG, inHG, psi, Pa, kPa, MPa, g/cm <sup>2</sup> , kg/cm <sup>2</sup> , Torr, ATM or % *) ref. temperature 20 °C	Y21	✓	✓	✓
<b>Setting of pressure indication in non-pressure units<sup>2)</sup></b> Specify in plain text: Y22: .... up to .... l/min, m <sup>3</sup> /h, m, USgpm, ... (specification of measuring range in pressure units "Y01" is essential, unit with max. 5 characters)	Y22 + Y01	✓		

✓ = available

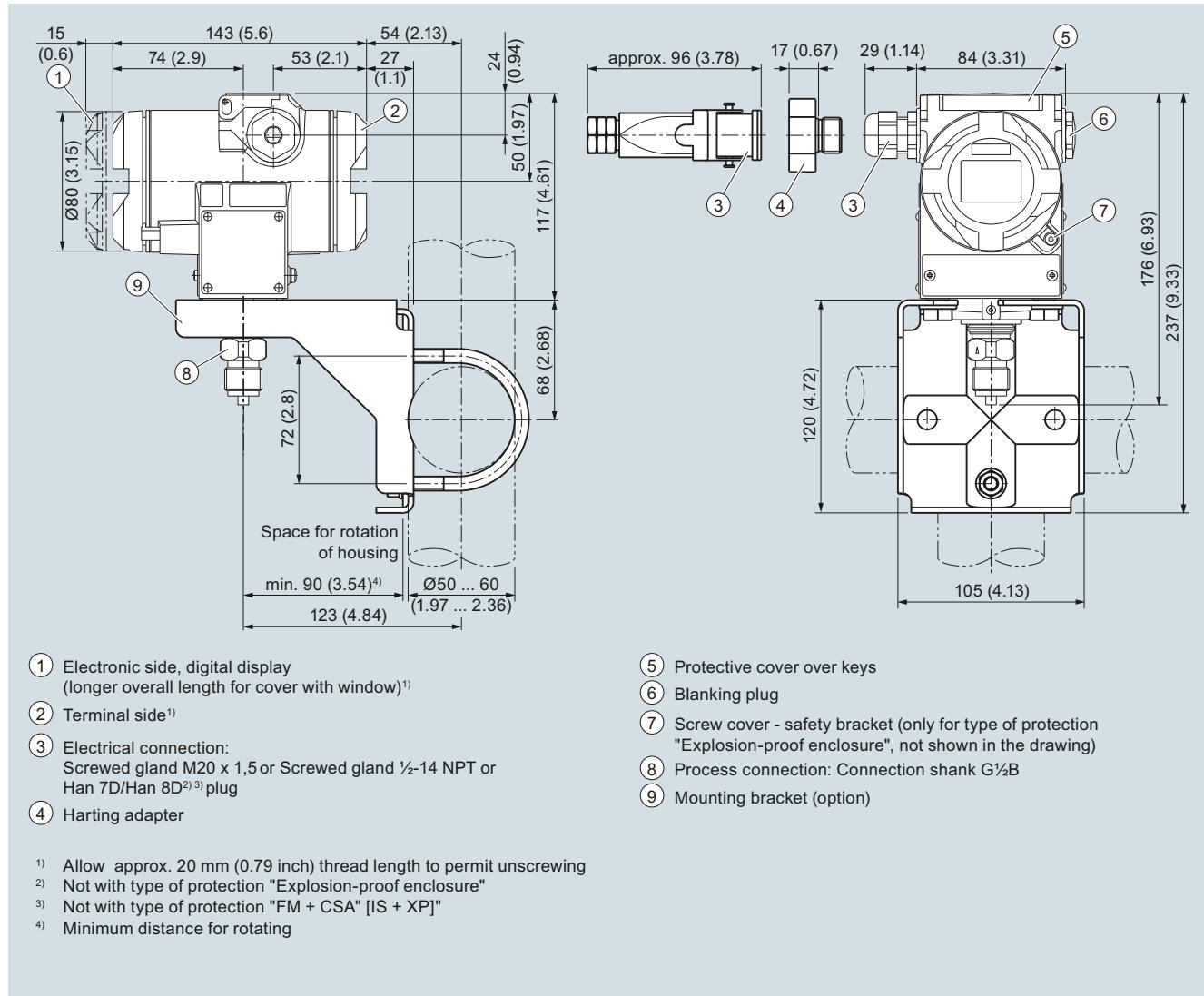
### Ordering example

Item line: 7MF4033-1EA00-1AA7-Z C41  
 B line: A01 + Y01 + Y21  
 C line: Y01: 10 ... 20 bar (145 ... 290 psi)  
 C line: Y21: bar (psi)

<sup>1)</sup> Measuring accuracies for PROFIBUS PA transmitters with Option Y01 are calculated in the same way as for HART devices.

<sup>2)</sup> Preset values can only be changed over SIMATIC PDM.

## Dimensional drawings



SITRANS P410 pressure transmitters for gauge pressure, dimensions in mm (inch)

# Pressure Measurement

Transmitters for applications with advanced requirements (Advanced)

1

## SITRANS P410 for differential pressure and flow

### Technical specifications

#### SITRANS P410 for differential pressure and flow

##### Input

Measured variable

Span (fully adjustable) or measuring range, max. operating pressure (in accordance with 2014/68/EU Pressure Equipment Directive)

Differential pressure and flow

HART	PROFIBUS PA/ FOUNDATION Fieldbus	
Span	Nominal measuring range	Max. operating pressure MAWP (PS)
2.5 ... 250 mbar 0.2 ... 25 kPa 1 ... 100 inH <sub>2</sub> O	250 mbar 25 kPa 100 inH <sub>2</sub> O	160 bar 16 MPa 2320 psi
6 ... 600 mbar 0.6 ... 60 kPa 2.4 ... 240 inH <sub>2</sub> O	600 mbar 60 kPa 240 inH <sub>2</sub> O	
16 ... 1600 mbar 1.6 ... 160 kPa 6.4 ... 642 inH <sub>2</sub> O	1600 mbar 160 kPa 642 inH <sub>2</sub> O	
50 ... 5000 mbar 5 ... 500 kPa 20 ... 2000 inH <sub>2</sub> O	5000 mbar 500 kPa 2000 inH <sub>2</sub> O	
0.3 ... 30 bar 0.03 ... 3 MPa 4.35 ... 435 psi	30 bar 3 MPa 435 psi	
6 ... 600 mbar 0.6 ... 60 kPa 2.4 ... 240 inH <sub>2</sub> O	600 mbar 60 kPa 240 inH <sub>2</sub> O	420 bar 42 MPa 6091 psi
16 ... 1600 mbar 1.6 ... 160 kPa 6.4 ... 642 inH <sub>2</sub> O	1600 mbar 160 kPa 642 inH <sub>2</sub> O	
50 ... 5000 mbar 5 ... 500 kPa 20 ... 2000 inH <sub>2</sub> O	5000 mbar 500 kPa 2000 inH <sub>2</sub> O	
0.3 ... 30 bar 0.03 ... 3 MPa 4.35 ... 435 psi	30 bar 3 MPa 435 psi	

Lower measuring limit

- Measuring cell with silicone oil filling

-100 % of max. span (-33 % with measuring cell 30 bar/3 MPa/435 psi) or 30 mbar a/3 kPa a/0.44 psi a

Upper measuring limit

100 % of max. span

Start of scale value

Between the measuring limits (fully adjustable)

##### Output

Output signal

##### HART

4 ... 20 mA

##### PROFIBUS PA/ FOUNDATION Fieldbus

Digital PROFIBUS PA and FOUNDATION Fieldbus signal

- Lower limit (infinitely adjustable)

3.55 mA, factory preset to 3.84 mA

-

- Upper limit (infinitely adjustable)

23 mA, factory preset to 20.5 mA or optionally set to 22.0 mA

-

Load

- Without HART

$R_B \leq (U_H - 10.5 \text{ V})/0.023 \text{ A}$  in  $\Omega$ ,  
 $U_H$ : Power supply in V

-

- With HART

$R_B = 230 \dots 500 \Omega$  (SIMATIC PDM) or  
 $R_B = 230 \dots 1100 \Omega$  (HART Communicator)

-

Physical bus

-

IEC 61158-2

Protection against polarity reversal

Protected against short-circuit and polarity reversal.  
Each connection against the other with max. supply voltage.

Electrical damping (step width 0.1 s)

Set to 2 s (0 ... 100 s)

## SITRANS P410 for differential pressure and flow

## Measuring accuracy

Reference conditions

Acc. to IEC 60770-1

- Increasing characteristic
- Start-of-scale value 0 bar/kPa/psi
- Stainless steel seal diaphragm
- Silicone oil filling
- Room temperature 25 °C (77 °F)

Measuring span ratio  $r$  (spread, Turn-Down) $r = \text{max. measuring span}/\text{set measuring span or nom. pressure range}$ Error in measurement at limit setting incl.  
hysteresis and reproducibility

## • Linear characteristic

- 250 mbar/25 kPa/3.63 psi
- 600 mbar/60 kPa/8.7 psi
- 1600 mbar/160 kPa/23.21 psi
- 5 bar/500 kpa/72.5 psi
- 30 bar/3 MPa/435 psi

$$\begin{array}{ll} r \leq 5 : & \leq 0.04 \% \\ 5 < r \leq 100 : & \leq (0.004 \cdot r + 0.045) \% \end{array}$$

## • Square-rooted characteristic (flow &gt; 50 %)

- 250 mbar/25 kPa/3.63 psi
- 600 mbar/60 kPa/8.7 psi
- 1600 mbar/160 kPa/23.21 psi
- 5 bar/500 kpa/72.5 psi
- 30 bar/3 MPa/435 psi

$$\begin{array}{ll} r \leq 5 : & \leq 0.04 \% \\ 5 < r \leq 100 : & \leq (0.004 \cdot r + 0.045) \% \end{array}$$

• Square-rooted characteristic  
(flow > 25 ... 50 %)

- 250 mbar/25 kPa/3.63 psi
- 600 mbar/60 kPa/8.7 psi
- 1600 mbar/160 kPa/23.21 psi
- 5 bar/500 kpa/72.5 psi
- 30 bar/3 MPa/435 psi

$$\begin{array}{ll} r \leq 5 : & \leq 0.08 \% \\ 5 < r \leq 100 : & \leq (0.008 \cdot r + 0.09) \% \end{array}$$

Influence of ambient temperature  
(in percent per 28 °C (50 °F))

- 250 mbar/25 kPa/3.63 psi
- 600 mbar/60 kPa/8.7 psi
- 1600 mbar/160 kPa/23.21 psi
- 5 bar/500 kpa/72.5 psi
- 30 bar/3 MPa/435 psi

$$\leq (0.025 \cdot r + 0.125) \%$$

Influence of static pressure

## • on the zero point (PKN)

- 250 mbar/25 kPa/3.63 psi
- 600 mbar/60 kPa/8.7 psi
- 1600 mbar/160 kPa/23.21 psi
- 5 bar/500 kpa/72.5 psi
- 30 bar/3 MPa/435 psi

$$\leq (0.1 \cdot r) \% \text{ per 70 bar}$$

(zero-point correction is possible with position error adjustment)

## • on the span (PKS)

- 250 mbar/25 kPa/3.63 psi
- 600 mbar/60 kPa/8.7 psi
- 1600 mbar/160 kPa/23.21 psi
- 5 bar/500 kpa/72.5 psi
- 30 bar/3 MPa/435 psi

$$\leq (0.2 \cdot r) \% \text{ per 70 bar}$$

(zero-point correction is possible with position error adjustment)

$$\leq 0.14 \% \text{ per 70 bar}$$

Long-term stability

(temperature change  $\pm 30$  °C ( $\pm 54$  °F))

Static pressure max. 70 bar/7 MPa/1015 psi

- 250 mbar/25 kPa/3.63 psi
- 600 mbar/60 kPa/8.7 psi
- 1600 mbar/160 kPa/23.21 psi
- 5 bar/500 kpa/72.5 psi

$$\leq (0.125 \cdot r) \% \text{ in 5 years}$$

- 30 bar/3 MPa/435 psi

$$\leq (0.25 \cdot r) \% \text{ in 5 years}$$

Effect of mounting position (in pressure per change in angle)

 $\leq 0.7 \text{ mbar}/0.07 \text{ kPa}/0.028 \text{ inH}_2\text{O}$  per 10° inclination  
(zero-point correction is possible with position error adjustment)Effect of auxiliary power supply  
(in percent per change in voltage)

0.005 % per 1 V

Measuring value resolution for PROFIBUS PA and  
FOUNDATION Fieldbus $3 \cdot 10^{-5}$  of nominal measuring range

# Pressure Measurement

Transmitters for applications with advanced requirements (Advanced)

1

## SITRANS P410 for differential pressure and flow

### SITRANS P410 for differential pressure and flow

#### Rated conditions

Degree of protection (to EN 60529)	IP66 (optional IP66/IP68), NEMA 4X
Temperature of medium	
• Measuring cell with silicone oil filling	-40 ... +100 °C (-40 ... +212 °F)
• In conjunction with dust explosion protection	-20 ... +100 °C (-4 ... +212 °F) with 30 bar measuring cell
Ambient conditions	-20 ... +60 °C (-4 ... +140 °F)
• Ambient temperature	
- Transmitter	-40 ... +85 °C (-40 ... +185 °F)
- Display readable	-30 ... +85 °C (-22 ... +185 °F)
• Storage temperature	-50 ... +85 °C (-58 ... +185 °F)
• Climatic class	
- Condensation	Relative humidity 0 ... 100 % Condensation permissible, suitable for use in the tropics
• Electromagnetic Compatibility	
- Emitted interference and interference immunity	Acc. to IEC 61326 and NAMUR NE 21

#### Design

Weight (without options)	Die-cast aluminum: ≈ 4.5 kg (≈ 9.9 lb) Stainless steel precision casting: ≈ 7.1 kg (≈ 15.6 lb)
Enclosure material	Low-copper die-cast aluminum, GD-AlSi12 or stainless steel precision casting, mat. no. 1.4408
Wetted parts materials	
• Seal diaphragm	Stainless steel, mat. no. 1.4404/316L or Hastelloy C276, mat. no. 2.4819
• Process flanges and sealing screw	Stainless steel, mat. no. 1.4408, Hastelloy C4, mat. no. 2.4602
• O-Ring	FPM (Viton) or optionally: PTFE, FEP, FEPM and NBR
Measuring cell filling	Silicone oil or inert filling liquid (maximum value with oxygen measurement pressure 100 bar (1450 psi) at 60 °C (140 °F))
Process connection	Female thread 1/4-18 NPT and flange connection with mounting thread M10 to DIN 19213 or 7/16-20 UNF to IEC 61518
Material of mounting bracket	
• Steel	Sheet-steel, Mat. No. 1.0330, chrome-plated
• Stainless steel	Sheet stainless steel, mat. no. 1.4301 (SS 304)

#### Power supply $U_H$

	HART	PROFIBUS PA/ FOUNDATION Fieldbus
Terminal voltage on transmitter	10.5 ... 45 V DC 10.5 ... 30 V DC in intrinsically-safe mode	-
Power supply	-	Supplied through bus
Separate 24 V power supply necessary	-	No
Bus voltage		
• Not Ex	-	9 ... 32 V
• With intrinsically-safe operation	-	9 ... 24 V
Current consumption		
• Basic current (max.)	-	12.5 mA
• Start-up current $\leq$ basic current	-	Yes
• Max. current in event of fault	-	15.5 mA
Fault disconnection electronics (FDE) available	-	Yes

## SITRANS P410 for differential pressure and flow

## Certificates and approvals

Classification according to PED 2014/68/EU

## Explosion protection

## • Intrinsic safety "i"

- Marking
- Permissible ambient temperature

- Connection

- Effective internal inductance/capacitance

## • Explosion-proof "d"

- Marking
- Permissible ambient temperature

- Connection

## • Dust explosion protection for zone 20 (pending)

- Marking

- Permissible ambient temperature

- Max. surface temperature

- Connection

- Effective internal inductance/capacitance

## • Dust explosion protection for zone 21/22 (pending)

- Marking

- Connection

## • Type of protection "n" (zone 2)

- Marking

- Connection (Ex nA)

- Connection (Ex ic)

- Effective internal inductance/capacitance

## • Explosion protection acc. to FM (pending)

- Identification (XP/DIP) or (IS); (NI)

## • Explosion protection to CSA (pending)

- Identification (XP/DIP) or (IS)

## HART

For gases of fluid group 1 and liquids of fluid group 1; complies with requirements of article 4, paragraph 3 (sound engineering practice)

PTB 13 ATEX 2007 X

Ex II 1/2 G Ex ia/b IIC T4/T5/T6 Ga/Gb

-40 ... +85 °C (-40 ... +185 °F) temperature class T4;  
-40 ... +70 °C (-40 ... +158 °F) temperature class T5;  
-40 ... +60 °C (-40 ... +140 °F) temperature class T6To certified intrinsically-safe circuits with peak values:  
 $U_i = 30 \text{ V}$ ,  $I_i = 100 \text{ mA}$ ,  $P_i = 750 \text{ mW}$   
 $R_i = 300 \Omega$  $L_i = 0.4 \text{ mH}$ ,  $C_i = 6 \text{ nF}$ 

PTB 99 ATEX 1160

Ex II 1/2 G Ex d IIC T4/T6 Gb

-40 ... +85 °C (-40 ... +185 °F) temperature class T4;  
-40 ... +60 °C (-40 ... +140 °F) temperature class T6To circuits with values:  $U_H = 10.5 \dots 45 \text{ V DC}$ 

PTB 01 ATEX 2055

Ex II 1 D Ex ta IIIC T120°C Da

Ex II 1/2 D Ex ta/tb IIIC T120°C Da/Db

-40 ... +85 °C (-40 ... +185 °F)

120 °C (248 °F)

To certified intrinsically-safe circuits with peak values:  
 $U_i = 30 \text{ V}$ ,  $I_i = 100 \text{ mA}$ ,  
 $P_i = 750 \text{ mW}$ ,  $R_i = 300 \Omega$  $L_i = 0.4 \text{ mH}$ ,  $C_i = 6 \text{ nF}$ 

PTB 01 ATEX 2055

Ex II 2 D Ex tb IIIC T120°C Db

To circuits with values:  $U_H = 10.5 \dots 45 \text{ V DC}$ ,  $P_{max} = 1.2 \text{ W}$ 

PTB 13 ATEX 2007 X

Ex II 2/3 G Ex nA IIC T4/T5/T6 Gc  
Ex II 2/3 G Ex ic IIC T4/T5/T6 Gc $U_m = 45 \text{ V}$ To circuits with values:  
 $U_i = 45 \text{ V}$  $L_i = 0.4 \text{ mH}$ ,  $C_i = 6 \text{ nF}$ 

Certificate of Compliance 3008490

CL I, DIV 1, GP ABCD T4...T6; CL II, DIV 1, GP EFG; CL III; CL I, ZN 0/1 AEx ia IIC T4...T6;

CL I, DIV 2, GP ABCD T4...T6; CL II, DIV 2, GP FG; CL III

Certificate of Compliance 1153651

CL I, DIV 1, GP ABCD T4...T6; CL II, DIV 1, GP EFG; CL III; Ex ia IIC T4...T6; CL I, DIV 2, GP ABCD T4...T6; CL II, DIV 2, GP FG; CL III

## PROFIBUS PA/FOUNDATION Fieldbus

FISCO supply unit:  
 $U_o = 17.5 \text{ V}$ ,  $I_o = 380 \text{ mA}$ ,  $P_o = 5.32 \text{ W}$ Linear barrier:  
 $U_o = 24 \text{ V}$ ,  $I_o = 250 \text{ mA}$ ,  $P_o = 1.2 \text{ W}$  $L_i = 7 \mu\text{H}$ ,  $C_i = 1.1 \text{ nF}$ FISCO supply unit:  
 $U_o = 17.5 \text{ V}$ ,  $I_o = 380 \text{ mA}$ ,  $P_o = 5.32 \text{ W}$ Linear barrier:  
 $U_o = 24 \text{ V}$ ,  $I_o = 250 \text{ mA}$ ,  $P_o = 1 \text{ W}$  $L_i = 7 \mu\text{H}$ ,  $C_i = 1.1 \text{ nF}$ To circuits with values:  $U_H = 9 \dots 32 \text{ V DC}$ ,  $P_{max} = 1 \text{ W}$  $U_m = 32 \text{ V}$ FISCO supply unit ic:  
 $U_o = 17.5 \text{ V}$ ,  $I_o = 570 \text{ mA}$ Linear barrier:  
 $U_o = 32 \text{ V}$ ,  $I_o = 132 \text{ mA}$ ,  $P_o = 1 \text{ W}$  $L_i = 7 \mu\text{H}$ ,  $C_i = 1.1 \text{ nF}$

# Pressure Measurement

Transmitters for applications with advanced requirements (Advanced)

1

## SITRANS P410 for differential pressure and flow

<b>HART communication</b>		<b>FOUNDATION Fieldbus communication</b>
HART	230 ... 1100 $\Omega$	Function blocks
Protocol	HART Version 5.x	<ul style="list-style-type: none"> <li>• Analog input           <ul style="list-style-type: none"> <li>- Adaptation to customer-specific process variables</li> <li>- Electrical damping, adjustable</li> <li>- Simulation function</li> <li>- Failure mode</li> <li>- Limit monitoring</li> </ul> </li> </ul>
Software for PC	SIMATIC PDM	<ul style="list-style-type: none"> <li>- Adaptation to customer-specific process variables</li> <li>- Electrical damping, adjustable</li> <li>- Simulation function</li> <li>- Failure mode</li> <li>- Limit monitoring</li> </ul>
<b>PROFIBUS PA communication</b>		<ul style="list-style-type: none"> <li>- Square-rooted characteristic for flow measurement</li> </ul>
Simultaneous communication with master class 2 (max.)	4	Yes
The address can be set using	Configuration tool or local operation (standard setting address 126)	Yes, linearly rising or falling characteristic
Cyclic data usage	5 (one measured value) or 10 (two measured values)	0 ... 100 s
<ul style="list-style-type: none"> <li>• Output byte</li> <li>• Input byte</li> </ul>	0, 1, or 2 (register operating mode and reset function for metering)	Output/input (can be locked within the device with a bridge)
Internal preprocessing	PROFIBUS PA Profile for Process Control Devices Version 3.0, class B	parameterizable (last good value, substitute value, incorrect value)
Device profile	2	Yes, one upper and lower warning limit and one alarm limit respectively
Function blocks		Yes
<ul style="list-style-type: none"> <li>• Analog input           <ul style="list-style-type: none"> <li>- Adaptation to customer-specific process variables</li> <li>- Electrical damping, adjustable</li> <li>- Simulation function</li> <li>- Failure mode</li> <li>- Limit monitoring</li> </ul> </li> <li>• Register (totalizer)           <ul style="list-style-type: none"> <li>- Failure mode</li> <li>- Limit monitoring</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• PID</li> <li>• Physical block</li> </ul>	Standard FOUNDATION Fieldbus function block
Transducer blocks		1 resource block
<ul style="list-style-type: none"> <li>• Physical block</li> </ul>		1 transducer block Pressure with calibration, 1 transducer block LCD
Transducer blocks		
<ul style="list-style-type: none"> <li>• Pressure transducer block           <ul style="list-style-type: none"> <li>- Can be calibrated by applying two pressures</li> <li>- Monitoring of sensor limits</li> <li>- Specification of a container characteristic with</li> <li>- Square-rooted characteristic for flow measurement</li> <li>- Gradual volume suppression and implementation point of square-root extraction</li> <li>- Simulation function for measured pressure value and sensor temperature</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Pressure transducer block           <ul style="list-style-type: none"> <li>- Can be calibrated by applying two pressures</li> <li>- Monitoring of sensor limits</li> <li>- Simulation function: Measured pressure value, sensor temperature and electronics temperature</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Yes</li> <li>Yes</li> <li>Constant value or over parameterizable ramp function</li> </ul>

## Pressure Measurement

Transmitters for applications with advanced requirements (Advanced)

## SITRANS P410 for differential pressure and flow

1

Selection and Ordering data		Article No.	Order Code
<b>SITRANS P410 with HART pressure transmitters for differential pressure and flow, PN 160 (MAWP 2320 psi)</b>		7MF4433-	-Z C41
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.			
<b>Measuring cell filling</b>	<b>Measuring cell cleaning</b>		
Silicone oil	normal	1	
<b>Measuring span (min. ... max.)</b>			
2.5 ... 250 mbar	(1.004 ... 100.4 inH <sub>2</sub> O)		D
6 ... 600 mbar	(2.409 ... 240.9 inH <sub>2</sub> O)		E
16 ... 1600 mbar	(6.424 ... 642.4 inH <sub>2</sub> O)		F
50 ... 5000 mbar	(20.08 ... 2008 inH <sub>2</sub> O)		G
0.3 ... 30 bar	(4.35 ... 435 psi)		H
<b>Wetted parts materials</b>			
(stainless steel process flanges)			
Seal diaphragm	Parts of measuring cell		
Stainless steel	Stainless steel	A	
Hastelloy	Stainless steel	B	
Hastelloy	Hastelloy	C	
Version for diaphragm seal <sup>1) 2) 3) 4)</sup>		Y	
<b>Process connection</b>			
Female thread 1/4-18 NPT with flange connection			
• Sealing screw opposite process connection		2	
- Mounting thread 7/16-20 UNF to IEC 61518		0	
- Mounting thread M10 to DIN 19213 (only for replacement requirement)			
• Vent on side of process flange <sup>5)</sup>		6	
- Mounting thread 7/16-20 UNF to IEC 61518		4	
- Mounting thread M10 to DIN 19213 (only for replacement requirement)			
<b>Non-wetted parts materials</b>			
process flange screws	Electronics housing		
Stainless steel	Die-cast aluminum	2	
Stainless steel	Stainless steel precision casting <sup>6)</sup>	3	
<b>Version</b>			
• Standard version, German plate inscription, setting for pressure unit: bar		1	
• International version, English plate inscription, setting for pressure unit: bar		2	
• Chinese version, English plate inscription, setting for pressure unit: Pascal		3	
All versions include DVD with documentation for SITRANS P in German, English, French, Italian and Spanish. Includes Compact operating instructions in various EU languages.			
<b>Explosion protection</b>			
• None		A	
• With ATEX, Type of protection:			
- "Intrinsic safety (Ex ia)"		B	
- "Explosion-proof (Ex d)" <sup>7)</sup>		D	
- "Intrinsic safety and flameproof enclosure" (Ex ia + Ex d) <sup>8)</sup>		P	
- "Ex nA/ic (Zone 2)" <sup>9)</sup>		E	
- "Intrinsic safety, explosion-proof enclosure and dust explosion protection (Ex ia+ Ex d + Zone 1D/2D)" <sup>8)10)</sup> (pending)		R	
• FM + CSA intrinsic safe (is) (pending) <sup>11)</sup>		F	
• FM + CSA (is + ep) + Ex ia + Ex d (ATEX) + Zone 1D/2D <sup>8)10)11)</sup> (pending)		S	
• With FM + CSA, Type of protection:			
- "Intrinsic Safe and Explosion Proof (is + xp)" <sup>7)11)</sup> (pending)		NC	

# Pressure Measurement

Transmitters for applications with advanced requirements (Advanced)

1

## SITRANS P410 for differential pressure and flow

Selection and Ordering data	Article No.	Order Code
<b>SITRANS P410 with HART pressure transmitters for differential pressure and flow, PN 160 (MAWP 2320 psi)</b>	<b>7MF4433-</b>	<b>-Z C41</b>
<b>Electrical connection/cable entry</b>		
• Screwed gland M20 x 1.5		B
• Screwed gland 1/2-14 NPT		C
• Han 7D plug (plastic housing) incl. mating connector <sup>12)</sup> <sup>13)</sup>		D
• M12 connectors (stainless steel) <sup>14)</sup> <sup>15)</sup>		F
<b>Display</b>		
• Without display		0
• Without visible display (display concealed, setting: mA)		1
• With visible display (setting: mA)		6
• with customer-specific display (setting as specified, Order code "Y21" or "Y22" required)		7
Power supply units see Chap. 7 "Supplementary Components".		
Included in delivery of the device:		
• Brief instructions (Leporello)		
• DVD with detailed documentation		
• Sealing plug(s) or sealing screw(s) for the process flanges(s)		

<sup>1)</sup> When the manufacturer's certificate (calibration certificate) has to be ordered for transmitters with diaphragm seals according to IEC 60770-2, it is recommended only to order this certificate exclusively with the diaphragm seals. The measuring accuracy of the total combination is certified here.

<sup>2)</sup> If the acceptance test certificate 3.1 is ordered for the transmitter with mounted diaphragm seals this certificate must also be ordered with the respective remote seals.

<sup>3)</sup> The diaphragm seal is to be specified with a separate order number and must be included with the transmitter order number, for example 7MF443-...Y-.... and 7MF4900-1-...-B

<sup>4)</sup> The standard measuring cell filling for configurations with remote seals (Y) is silicone oil.

<sup>5)</sup> Not suitable for connection of remote seal. Position of the top vent valve in the process flange (see dimensional drawing).

<sup>6)</sup> Not in conjunction with Electrical connection "Han7D plug".

<sup>7)</sup> Without cable gland, with blanking plug

<sup>8)</sup> With enclosed cable gland Ex ia and blanking plug

<sup>9)</sup> Configurations with HAN and M12 connectors are only available in Ex ic.

<sup>10)</sup> Only in connection with IP66.

<sup>11)</sup> Explosion protection acc. to FM/CSA: suitable for installations according to NEC 500/505.

<sup>12)</sup> Only in connection with Ex approval A, B or E.

<sup>13)</sup> Permissible only for crimp-contact of conductor cross-section 1 mm<sup>2</sup>

<sup>14)</sup> Only in connection with Ex approval A, B, E or F.

<sup>15)</sup> M12 delivered without cable socket.

## Pressure Measurement

Transmitters for applications with advanced requirements (Advanced)

## SITRANS P410 for differential pressure and flow

1

Selection and Ordering data	Article No.	Order code
<b>Pressure transmitters for differential pressure and flow PN 160 (MAWP 2320 psi)</b>		
<b>SITRANS P410 with PROFIBUS PA (PA)</b>	7MF4434-	-Z C41
<b>SITRANS P410 with FOUNDATION Fieldbus (FF)</b>	7MF4435-	-Z C41
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
<b>Measuring cell filling</b>	<b>Measuring cell cleaning</b>	
Silicone oil	normal	
<b>Nominal measuring range</b>		
250 mbar (100.4 inH <sub>2</sub> O)		1
600 mbar (240.9 inH <sub>2</sub> O)		D
1600 mbar (642.4 inH <sub>2</sub> O)		E
5 bar (2008 inH <sub>2</sub> O)		F
30 bar (435 psi)		G
		H
<b>Wetted parts materials</b>		
(stainless steel process flanges)		
Seal diaphragm	Parts of measuring cell	
Stainless steel	Stainless steel	A
Hastelloy	Stainless steel	B
Hastelloy	Hastelloy	C
Version as diaphragm seal	1) 2) 3) 4)	Y
<b>Process connection</b>		
Female thread 1/4-18 NPT with flange connection		
• Sealing screw opposite process connection		2
- Mounting thread 7/16-20 UNF to IEC 61518		0
- Mounting thread M10 to DIN 19213 (only for replacement requirement)		
• Venting on side of process flanges <sup>5)</sup>		6
- Mounting thread 7/16-20 UNF to IEC 61518		4
- Mounting thread M10 to DIN 19213 (only for replacement requirement)		
<b>Non-wetted parts materials</b>		
process flange screws	Electronics housing	
Stainless steel	Die-cast aluminum	2
Stainless steel	Stainless steel precision casting	3
<b>Version</b>		
• Standard version, German plate inscription, setting for pressure unit: bar		1
• International version, English plate inscription, setting for pressure unit: bar		2
• Chinese version, English plate inscription, setting for pressure unit: Pascal		3
All versions include DVD with documentation for SITRANS P in German, English, French, Italian and Spanish. Includes Compact operating instructions in various EU languages.		
<b>Explosion protection</b>		
• None		A
• With ATEX, Type of protection:		
- "Intrinsic safety (Ex ia)"		B
- "Explosion-proof (Ex d)" <sup>6)</sup>		D
- "Intrinsic safety and flameproof enclosure" (Ex ia + Ex d) <sup>7)</sup>		P
- "Ex nA(ic (Zone 2)" <sup>8)</sup>		E
- "Intrinsic safety, explosion-proof enclosure and dust explosion protection (Ex ia + Ex d + Zone 1D/2D)" <sup>7)</sup> <sup>9)</sup> (not for DS III FF) (pending)		R
• FM + CSA intrinsic safe (is) (pending) <sup>10)</sup>		F
• FM + CSA (is + ep) + Ex ia + Ex d (ATEX) + Zone 1D/2D <sup>7)</sup> <sup>9)</sup> <sup>10)</sup> (pending)		S
• With FM + CSA, Type of protection:		
- "Intrinsic Safe and Explosion Proof (is + xp)" <sup>8)</sup> <sup>10)</sup> (pending)		NC
<b>Electrical connection/cable entry</b>		
• Screwed gland M20 x 1.5		B
• Screwed gland 1/2-14 NPT		C
• M12 connectors (stainless steel) <sup>11)</sup> <sup>12)</sup>		F

## Pressure Measurement

Transmitters for applications with advanced requirements (Advanced)

1

### SITRANS P410 for differential pressure and flow

Selection and Ordering data	Article No.	Order code
<b>Pressure transmitters for differential pressure and flow PN 160 (MAWP 2320 psi)</b>		
<b>SITRANS P410 with PROFIBUS PA (PA)</b>	7MF4434-	-Z C41
<b>SITRANS P410 with FOUNDATION Fieldbus (FF)</b>	7MF4435-	-Z C41
<b>Display</b>		
• Without display		0
• Without visible display (display concealed, setting: bar)		1
• With visible display (setting: bar)		6
• With customer-specific display (setting as specified, Order code "Y21" required)		7

Included in delivery of the device:

- Brief instructions (Leporello)
- DVD with detailed documentation
- Sealing plug(s) or sealing screw(s) for the process flanges(s)

<sup>1)</sup> When the manufacturer's certificate (calibration certificate) has to be ordered for transmitters with diaphragm seals according to IEC 60770-2, it is recommended only to order this certificate exclusively with the diaphragm seals. The measuring accuracy of the total combination is certified here.

<sup>2)</sup> If the acceptance test certificate 3.1 is ordered for the transmitter with mounted diaphragm seals this certificate must also be ordered with the respective remote seals.

<sup>3)</sup> The diaphragm seal is to be specified with a separate order number and must be included with the transmitter order number, for example 7MF443-...Y-.... and 7MF4900-1-....B

<sup>4)</sup> The standard measuring cell filling for configurations with remote seals (Y) is silicone oil.

<sup>5)</sup> Not suitable for connection of remote seal. Position of the top vent valve in the process flange (see dimensional drawing).

<sup>6)</sup> Without cable gland, with blanking plug.

<sup>7)</sup> With enclosed cable gland Ex ia and blanking plug.

<sup>8)</sup> Configurations with HAN and M12 connectors are only available in Ex ic.

<sup>9)</sup> Only in connection with IP66.

<sup>10)</sup> Explosion protection acc. to FM/CSA: suitable for installations according to NEC 500/505.

<sup>11)</sup> Only in connection with Ex approval A, B, E or F.

<sup>12)</sup> M12 delivered without cable socket

## SITRANS P410 for differential pressure and flow

Selection and Ordering data		Order code			Selection and Ordering data		Order code		
		HART	PA	FF			HART	PA	FF
<b>Further designs</b> Add "Z" to Article No. and specify Order code.					<b>Further designs</b> Add "Z" to Article No. and specify Order code.				
<b>Pressure transmitter with mounting bracket (1x fixing angle, 2 x nut, 2 x U-washer or 1 x bracket, 2 x nut, 2 x U-washer) made of:</b>					<b>Setting of upper limit of output signal to 22.0 mA</b>	D05	✓		
• Steel	A01	✓	✓	✓	<b>Manufacturer's declaration acc. to NACE (MR 0103-2012 and MR 0175-2009)</b> (only together with seal diaphragm made of Hastelloy and stainless steel)	D07	✓	✓	✓
• Stainless steel 304	A02	✓	✓	✓	<b>Degree of protection IP66/IP68</b> (only for M20 x 1.5 and 1/2-14 NPT)	D12	✓	✓	✓
• Stainless steel 316L	A03	✓	✓	✓	<b>Supplied with oval flange set</b> (2 items), PTFE packings and screws in thread of process flanges	D37	✓	✓	✓
<b>O-rings for process flanges</b> (instead of FPM (Viton))					<b>Capri cable gland 4F CrNi and clamping device (848699 + 810634) included</b>	D59	✓	✓	✓
• PTFE (Teflon)	A20	✓	✓	✓	<b>TAG plate empty (no inscription)</b>	D61	✓	✓	✓
• FEP (with silicone core, approved for food)	A21	✓	✓	✓	<b>Use in or on zone 1D/2D</b> (only together with type of protection "Intrinsic safety" (transmitter 7MF4...-...-B.. Ex ia) and IP66)	E01	✓	✓	✓
• FFFM (Kalrez, compound 4079), for measured medium temperatures -15 ... 100 °C (5 ... 212 °F)	A22	✓	✓	✓	<b>Dual seal</b>	E24	✓	✓	✓
• NBR (Buna N)	A23	✓	✓	✓	<b>Explosion-proof "Intrinsic safety" to NEPSI (China)</b> (only for transmitter 7MF4...-...-B..)	E55 <sup>3)</sup>	✓	✓	✓
<b>Plug</b>					<b>Explosion protection "Explosion-proof" to NEPSI (China)</b> (only for transmitter 7MF4...-...-D..)	E56 <sup>3)</sup>	✓	✓	✓
• Han 7D (metal)	A30	✓			<b>Explosion-proof "Zone 2" to NEPSI (China)</b> (only for transmitter 7MF4...-...-E..)	E57 <sup>3)</sup>	✓	✓	✓
• Han 8D (instead of Han 7D)	A31	✓			<b>Ex protection „Ex ia“, „Ex d“ and „Zone 2“ to NEPSI (China)</b> (only for transmitter 7MF4...-...-R..)	E58 <sup>3)</sup>	✓	✓	✓
• Angled	A32	✓			<b>"Intrinsic safety" and "Explosion-proof" explosion protection acc. to Kosha (Korea)</b> (pending) (only for transmitter 7MF4...-...-[B, D]..-Z + E11)	E70 <sup>3)</sup>	✓	✓	✓
• Han 8D (metal)	A33	✓			<b>Ex-protection Ex ia according to EAC Ex (Russia)</b>	E80 <sup>4)</sup>	✓	✓	✓
<b>Sealing screws (2 units)</b> 1/4-18 NPT, with valve in mat. of process flanges	A40	✓	✓	✓	<b>Ex-protection Ex d according to EAC Ex (Russia)</b>	E81 <sup>4)</sup>	✓	✓	✓
<b>Cable sockets for M12 connectors (metal (CuZn))</b>	A50	✓	✓	✓	<b>Ex-protection Ex nA/ic (Zone 2) according to EAC Ex (Russia)</b>	E82 <sup>4)</sup>	✓	✓	✓
<b>Rating plate inscription</b> (instead of German)					<b>Ex-protection Ex ia + Ex d + Zone 1D/2D according to EAC Ex (Russia)</b>	E83 <sup>4)</sup>	✓	✓	✓
• English	B11	✓	✓	✓	<b>Two coats of lacquer on casing and cover (PU on epoxy)</b>	G10	✓	✓	✓
• French	B12	✓	✓	✓	<b>Interchanging of process connection side</b>	H01	✓	✓	✓
• Spanish	B13	✓	✓	✓	<b>Vent on side for gas measurements</b>	H02	✓	✓	✓
• Italian	B14	✓	✓	✓	<b>Stainless steel process flanges for vertical differential pressure lines</b> (not together with K01, K02 and K04) <sup>5)</sup>	H03	✓	✓	✓
<b>English rating plate</b> Pressure units in inH <sub>2</sub> O and/or psi	B21	✓	✓	✓					
<b>Quality Inspection Certificate (5-point characteristic curve test) according to IEC 60770-2<sup>1)</sup></b>	C11	✓	✓	✓					
<b>Inspection certificate<sup>2)</sup> to EN 10204-3.1</b>	C12	✓	✓	✓					
<b>Factory certificate</b> to EN 10204-2.2	C14	✓	✓	✓					
<b>Functional safety (SIL2) (pending)</b> Devices suitable for use according to IEC 61508 and IEC 61511. Includes SIL conformity declaration	C20	✓							
<b>Functional safety (SIL2/3)</b> Devices suitable for use according to IEC 61508 and IEC 61511. Includes SIL conformity declaration	C23	✓							
<b>Increased measuring accuracy</b> (mandatory specification for SITRANS P410)	C41	✓	✓	✓					
<b>Device passport Russia</b>	C99	✓	✓	✓					

# Pressure Measurement

Transmitters for applications with advanced requirements (Advanced)

1

## SITRANS P410 for differential pressure and flow

Selection and Ordering data		Order code			Selection and Ordering data		Order code		
		HART	PA	FF			HART	PA	FF
<b>Further designs</b> Add "-Z" to Article No. and specify Order code.					<b>Additional data</b> Please add "-Z" to Article No. and specify Order code(s) and plain text.				
<b>Transient protector 6 kV (lightning protection)</b>	J01	✓	✓	✓	<b>Measuring range to be set</b> Specify in plain text: • in the case of linear characteristic curve (max. 5 characters): Y01: ... up to ... mbar, bar, kPa, MPa, psi	Y01	✓	✓ <sup>1)</sup>	
<b>Chambered graphite gasket for process flange</b>	J02	✓	✓	✓	• in the case of square rooted characteristic (max. 5 characters): Y02: ... up to ... mbar, bar, kPa, MPa, psi	Y02	✓		
<b>Chambered PTFE graphite gasket</b>	J03	✓	✓	✓	<b>Stainless steel tag plate and entry in device variable (measuring point description)</b> Max. 16 characters, specify in plain text: Y15: .....	Y15	✓	✓	✓
<b>EPDM O-rings for process flange with approval (WRC/WRAS)</b>	J05	✓	✓	✓	<b>Measuring point text (entry in device variable)</b> Max. 27 char., specify in plain text: Y16: .....	Y16	✓	✓	✓
<b>Vent valve or blanking plug of process flange welded-in (orientation: on right when viewing the display)<sup>6)</sup></b>	J08	✓	✓	✓	<b>Entry of HART address (TAG)</b> Max. 8 char., specify in plain text: Y17: .....	Y17	✓		
<b>Vent valve or blanking plug of process flange welded-in (orientation: on left when viewing the display)<sup>6)</sup></b>	J09	✓	✓	✓	<b>Setting of pressure indicator in pressure units</b> Specify in plain text (standard setting: bar): Y21: mbar, bar, kPa, MPa, psi, ... Note: The following pressure units can be selected: bar, mbar, mm H <sub>2</sub> O <sup>*)</sup> , inH <sub>2</sub> O <sup>*)</sup> , ftH <sub>2</sub> O <sup>*)</sup> , mmHG, inHG, psi, Pa, kPa, MPa, g/cm <sup>2</sup> , kg/cm <sup>2</sup> , Torr, ATM or % *) ref. temperature 20 °C	Y21	✓	✓	✓
Factor valve block mounting for SITRANS P410 is possible. Depending on the available P410 variants, please see the configuration options for SITRANS P DS III (page 1/193).					<b>Setting of pressure indicator in non-pressure units<sup>2)</sup></b> Specify in plain text: Y22: .... up to .... l/min, m <sup>3</sup> /h, m, USgpm, ... (specification of measuring range in pressure units "Y01" or "Y02" is essential, unit with max. 5 characters)	Y22 <sup>3)</sup> + Y01 or Y02	✓		
✓ = available					<b>Preset bus address</b> possible between 1 and 126 Specify in plain text: Y25: .....	Y25	✓	✓	
<sup>1)</sup> When the manufacturer's certificate (calibration certificate) has to be ordered for transmitters with diaphragm seals according to IEC 60770-2, it is recommended only to order this certificate exclusively with the diaphragm seals. The measuring accuracy of the total combination is certified here.					<b>Damping adjustment in seconds (0 ... 100 s)</b> Only Y01, Y15, Y16, Y17, Y21, Y22, Y25 and D05 can be factory preset	Y30	✓	✓	✓
<sup>2)</sup> Measuring accuracies for PROFIBUS PA transmitters with Option Y01 are calculated in the same way as for HART devices.									
<sup>3)</sup> Preset values can only be changed over SIMATIC PDM.									
<sup>6)</sup> Not in conjunction with over-filling safety device for flammable and non-flammable liquids (Order code "E08")									

<sup>1)</sup> Measuring accuracies for PROFIBUS PA transmitters with Option Y01 are calculated in the same way as for HART devices.

<sup>2)</sup> Preset values can only be changed over SIMATIC PDM.

<sup>3)</sup> Not in conjunction with over-filling safety device for flammable and non-flammable liquids (Order code "E08")

## SITRANS P410 for differential pressure and flow

Selection and Ordering data		Article No.	Order code
<b>SITRANS P DS III with HART pressure transmitters for differential pressure and flow, PN 420 (MAWP 6092 psi)</b>		7MF4533-	-Z C41
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.			
<b>Measuring cell filling</b>	<b>Measuring cell cleaning</b>		
Silicone oil	normal	1	
<b>Measuring span (min. ... max.)</b>			
6 ... 600 mbar	(2.4 ... 240 inH <sub>2</sub> O)	E	
16 ... 1600 mbar	(6.4 ... 642 inH <sub>2</sub> O)	F	
50 ... 5000 mbar	(20 ... 2000 inH <sub>2</sub> O)	G	
0.3 ... 30 bar	(4.35 ... 435 psi)	H	
<b>Wetted parts materials</b>			
(stainless steel process flanges)			
Seal diaphragm	Parts of measuring cell		
Stainless steel	Stainless steel	A	
Hastelloy	Stainless steel	B	
Version for diaphragm seal 1) 2) 3) 4)		Y	
<b>Process connection</b>			
Female thread 1/4-18 NPT with flange connection			
• Sealing screw opposite process connection		3	
- Mounting thread 7/16-20 UNF to IEC 61518		1	
- Mounting thread M12 to DIN 19213 (only for replacement requirement)			
• Venting on side of process flanges, location of vent valve at top of process flanges (see dimensional drawing)		7	
- Mounting thread 7/16-20 UNF to IEC 61518		5	
- Mounting thread M12 to DIN 19213 (only for replacement requirement)			
<b>Non-wetted parts materials</b>			
process flange screws	Electronics housing	2	
Stainless steel	Die-cast aluminum	3	
Stainless steel	Stainless steel precision casting <sup>5)</sup>		
<b>Version</b>			
• Standard version, German plate inscription, setting for pressure unit: bar		1	
• International version, English plate inscription, setting for pressure unit: bar		2	
• Chinese version, English plate inscription, setting for pressure unit: Pascal		3	
All versions include DVD with documentation for SITRANS P in German, English, French, Italian and Spanish. Includes Compact operating instructions in various EU languages.			
<b>Explosion protection</b>			
• None		A	
• With ATEX, Type of protection:			
- "Intrinsic safety (Ex ia)"		B	
- "Explosion-proof (Ex d)" <sup>6)</sup>		D	
- "Intrinsic safety and flameproof enclosure" (Ex ia + Ex d) <sup>7)</sup>		P	
- "Ex nA/ic (Zone 2)" <sup>8)</sup>		E	
- "Intrinsic safety, explosion-proof enclosure and dust explosion protection (Ex ia+ Ex d + Zone 1D/2D)" <sup>7)9)</sup> (pending)		R	
• FM + CSA intrinsic safe (is) (pending) <sup>10)</sup>		F	
• FM + CSA (is + ep) + Ex ia + Ex d (ATEX) + Zone 1D/2D <sup>7)9)10)</sup> (pending)		S	
• With FM + CSA, Type of protection:			
- "Intrinsic safety and explosion-proof (is + xp)" <sup>6)10)</sup> , max PN 360 (pending)		NC	
<b>Electrical connection/cable entry</b>			
• Screwed gland M20x1.5		B	
• Screwed gland 1/2-14 NPT		C	
• Han 7D plug (plastic housing) incl. mating connector <sup>11) 12)</sup>		D	
• M12 connectors (stainless steel) <sup>13)14)</sup>		F	

## Pressure Measurement

Transmitters for applications with advanced requirements (Advanced)

1

### SITRANS P410 for differential pressure and flow

#### Selection and Ordering data

**SITRANS P DS III with HART pressure transmitters for differential pressure and flow, PN 420 (MAWP 6092 psi)**

Article No.

Order code

**7MF4533- [ ] -Z C41**

0  
1  
6  
7

#### Display

- Without display
- Without visible display (display concealed, setting: mA)
- With visible display (setting: mA)
- with customer-specific display (setting as specified, Order code "Y21" or "Y22" required)

Power supply units see Chap. 7 "Supplementary Components".

Scope of delivery: Pressure transmitter as ordered (Instruction Manual is extra ordering item)

- When the manufacturer's certificate (calibration certificate) has to be ordered for transmitters with diaphragm seals according to IEC 60770-2, it is recommended only to order this certificate exclusively with the diaphragm seals. The measuring accuracy of the total combination is certified here.
- If the acceptance test certificate 3.1 is ordered for the transmitter with mounted diaphragm seals this certificate must also be ordered with the respective remote seals.
- The diaphragm seal is to be specified with a separate order number and must be included with the transmitter order number, for example 7MF453-..Y..-.... and 7MF4900-1....-B
- The standard measuring cell filling for configurations with remote seals (Y) is silicone oil.
- Not in conjunction with Electrical connection "Han7D plug".
- Without cable gland, with blanking plug
- With enclosed cable gland Ex ia and blanking plug
- Configurations with HAN and M12 connectors are only available in Ex ic.
- Only in connection with IP66.
- Explosion protection acc. to FM/CSA: suitable for installations according to NEC 500/505.
- Only in connection with Ex approval A, B or E.
- Permissible only for crimp-contact of conductor cross-section 1 mm<sup>2</sup>
- Only in connection with Ex approval A, B, E or F.
- M12 delivered without cable socket.

## Pressure Measurement

## Transmitters for applications with advanced requirements (Advanced)

## SITRANS P410 for differential pressure and flow

Selection and Ordering data	Article No.	Order Code
<b>Pressure transmitters for differential pressure and flow, PN 420 (MAWP 6092 psi)</b>		
<b>SITRANS P410 with PROFIBUS PA (PA)</b>	7MF4534-	-Z C41
<b>SITRANS P410 with FOUNDATION Fieldbus (FF)</b>	7MF4535-	-Z C41
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
<b>Measuring cell filling</b>	<b>Measuring cell cleaning</b>	
Silicone oil	normal	
<b>Nominal measuring range</b>		
600 mbar	(240 inH <sub>2</sub> O)	
1600 mbar	(642 inH <sub>2</sub> O)	
5 bar	(2000 inH <sub>2</sub> O)	
30 bar	(435 psi)	
<b>Wetted parts materials</b>		
(stainless steel process flanges)		
Seal diaphragm	Parts of measuring cell	
Stainless steel	Stainless steel	A
Hastelloy	Stainless steel	B
Version for diaphragm seal 1) 2) 3) 4)		Y
<b>Process connection</b>		
Female thread 1/4-18 NPT with flange connection		
• Sealing screw opposite process connection		
- Mounting thread 7/16-20 UNF to IEC 61518	3	
- Mounting thread M12 to DIN 19213 (only for replacement requirement)	1	
• Venting on side of process flanges, location of vent valve at top of process flanges (see dimensional drawing).		
- Mounting thread 7/16-20 UNF to IEC 61518	7	
- Mounting thread M12 to DIN 19213 (only for replacement requirement)	5	
<b>Non-wetted parts materials</b>		
Process flange screws	Electronics housing	
Stainless steel	Die-cast aluminum	2
Stainless steel	Stainless steel precision casting	3
<b>Version</b>		
• Standard version, German plate inscription, setting for pressure unit: bar	1	
• International version, English plate inscription, setting for pressure unit: bar	2	
• Chinese version, English plate inscription, setting for pressure unit: Pascal	3	
All versions include DVD with documentation for SITRANS P in German, English, French, Italian and Spanish. Includes Compact operating instructions in various EU languages.		
<b>Explosion protection</b>		
• None		
• With ATEX, Type of protection:		
- "Intrinsic safety (Ex ia)"	A	
- "Explosion-proof (Ex d)" <sup>5)</sup>	B	
- "Intrinsic safety and flameproof enclosure" (Ex ia + Ex d) <sup>6)</sup>	D	
- "Ex nA/c (Zone 2)" <sup>7)</sup>	P	
- "Intrinsic safety, explosion-proof enclosure and dust explosion protection (Ex ia + Ex d + Zone 1D/2D)" <sup>6,8)</sup> (not for P410 with FOUNDATION Fieldbus) (pending)	E	
- "Intrinsic safety and explosion-proof (Ex ia + Ex d)" <sup>9)</sup> (pending)	R	
• FM + CSA intrinsic safe (is) (pending) <sup>9)</sup>	F	
• FM + CSA (is + ep) + Ex ia + Ex d (ATEX) + Zone 1D/2D <sup>6,7,9)</sup> (pending)	S	
• With FM + CSA, Type of protection:		
- "Intrinsic safety and explosion-proof (is + xp)" <sup>6,9)</sup> , max PN 360 (pending)	NC	
<b>Electrical connection/cable entry</b>		
• Screwed gland M20 x 1.5	B	
• Screwed gland 1/2-14 NPT	C	
• M12 connectors (stainless steel) 10) 11)	F	

# Pressure Measurement

Transmitters for applications with advanced requirements (Advanced)

1

## SITRANS P410 for differential pressure and flow

### Selection and Ordering data

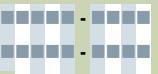
Pressure transmitters for differential pressure and flow, PN 420 (MAWP 6092 psi)

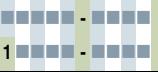
SITRANS P410 with PROFIBUS PA (PA)

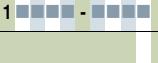
SITRANS P410 with FOUNDATION Fieldbus (FF)

Article No.

Order Code

7MF4534-  -Z C41

7MF4535-  -Z C41

1 

0

1

6

7

### Display

- Without (display hidden)
- Without visible display (display concealed, setting: bar)
- With visible display (setting: bar)
- With customer-specific display (setting as specified, Order code "Y21" required)

Included in delivery of the device:

• Brief instructions (Leporello)

• DVD with detailed documentation

• Sealing plug(s) or sealing screw(s) for the process flanges(s)

<sup>1)</sup> When the manufacturer's certificate (calibration certificate) has to be ordered for transmitters with diaphragm seals according to IEC 60770-2, it is recommended only to order this certificate exclusively with the diaphragm seals. The measuring accuracy of the total combination is certified here.

<sup>2)</sup> If the acceptance test certificate 3.1 is ordered for the transmitter with mounted diaphragm seals this certificate must also be ordered with the respective remote seals.

<sup>3)</sup> The diaphragm seal is to be specified with a separate order number and must be included with the transmitter order number, for example 7MF453-..Y..-.... and 7MF4900-1....-B

<sup>4)</sup> The standard measuring cell filling for configurations with remote seals (Y) is silicone oil.

<sup>5)</sup> Without cable gland, with blanking plug.

<sup>6)</sup> With enclosed cable gland Ex ia and blanking plug.

<sup>7)</sup> Configurations with HAN and M12 connectors are only available in Ex ic.

<sup>8)</sup> Only in connection with IP66.

<sup>9)</sup> Explosion protection acc. to FM/CSA: suitable for installations according to NEC 500/505.

<sup>10)</sup> Only in connection with Ex approval A, B, E or F.

<sup>11)</sup> M12 delivered without cable socket

## SITRANS P410 for differential pressure and flow

Selection and Ordering data		Order code			Selection and Ordering data		Order code		
		HART	PA	FF			HART	PA	FF
<b>Further designs</b>					<b>Further designs</b>				
Add "-Z" to Article No. and specify Order code.					Add "-Z" to Article No. and specify Order code.				
<b>Pressure transmitter with mounting bracket (1x fixing angle, 2 x nut, 2 x U-washer or 1 x bracket, 2 x nut, 2 x U-washer) made of:</b>					<b>Use in or on zone 1D/2D</b>		E01	✓	✓
• Steel	A01	✓	✓	✓	(only together with type of protection "Intrinsic safety" (transmitter 7MF4...-...-B.. Ex ia) and IP66)				✓
• Stainless steel 304	A02	✓	✓	✓		E24	✓	✓	✓
• Stainless steel 316L	A03	✓	✓	✓	<b>Explosion-proof "Intrinsic safety" to NEPSI (China)</b>	E55 <sup>1)</sup>	✓	✓	✓
<b>O-rings for process flanges</b> (instead of FPM (Viton))					(only for transmitter 7MF4...-...-B..)				
• PTFE (Teflon)	A20	✓	✓	✓	<b>Ex prot. "Explosion-proof" to NEPSI (China)</b>	E56 <sup>1)</sup>	✓	✓	✓
• FEP (with silicone core, approved for food)	A21	✓	✓	✓	(only for transmitter 7MF4...-...-D..)				
• FFFM (Kalrez, compound 4079), for measured medium temperatures -15 ... 100 °C (5 ... 212 °F)	A22	✓	✓	✓	<b>Explosion-proof "Zone 2" to NEPSI (China)</b>	E57 <sup>1)</sup>	✓	✓	✓
• NBR (Buna N)	A23	✓	✓	✓	(only for transmitter 7MF4...-...-E..)				
<b>Plug</b>					<b>Ex protection „Ex ia“, „Ex d“ and „Zone 2“ to NEPSI (China)</b>	E58 <sup>1)</sup>	✓	✓	✓
• Han 7D (metal)	A30	✓			(only for transmitter 7MF4...-...-R..)				
• Han 8D (instead of Han 7D)	A31	✓			<b>"Intrinsic safety" and "Explosion-proof" explosion protection acc. to Kosha (Korea) (pending)</b>	E70 <sup>1)</sup>	✓	✓	✓
• Angled	A32	✓			(only for transmitter 7MF4...-...-[B, D]..-Z + E11)				
• Han 8D (metal)	A33	✓			<b>Ex-protection Ex ia according to EAC Ex (Russia)</b>	E80 <sup>2)</sup>	✓	✓	✓
<b>Sealing screws (2 units)</b>	A40	✓	✓	✓	<b>Ex-protection Ex d according to EAC Ex (Russia)</b>	E81 <sup>2)</sup>	✓	✓	✓
1/4-18 NPT, with valve in mat. of process flanges					<b>Ex-protection Ex nA/ic (Zone 2) according to EAC Ex (Russia)</b>	E82 <sup>2)</sup>	✓	✓	✓
<b>Cable sockets for M12 connection (metal (CuZn))</b>	A50	✓	✓	✓	<b>Ex-protection Ex ia + Ex d + Zone 1D/2D according to EAC Ex (Russia)</b>	E83 <sup>2)</sup>	✓	✓	✓
<b>Rating plate inscription</b> (instead of German)					<b>Two coats of lacquer on casing and cover (PU on epoxy)</b>	G10	✓	✓	✓
• English	B11	✓	✓	✓	<b>Interchanging of process connection side</b>	H01	✓	✓	✓
• French	B12	✓	✓	✓	<b>Vent on side for gas measurements</b>	H02	✓	✓	✓
• Spanish	B13	✓	✓	✓	<b>Stainless steel process flanges for vertical differential pressure lines</b>	H03	✓	✓	✓
• Italian	B14	✓	✓	✓	<b>Transient protector 6 kV (lightning protection)</b>	J01	✓	✓	✓
<b>English rating plate</b>	B21	✓	✓	✓	<b>Chambered graphite gasket for process flange</b>	J02	✓	✓	✓
Pressure units in inH <sub>2</sub> O and/or psi					<b>Chambered PTFE graphite gasket</b>	J03	✓	✓	✓
<b>Quality Inspection Certificate (5-point characteristic curve test) according to IEC 60770-2</b>	C11	✓	✓	✓	<b>EPDM O-rings for process flange with approval (WRC/WRAS)</b>	J05	✓	✓	✓
<b>Inspection certificate</b>	C12	✓	✓	✓	<b>Vent valve or blanking plug of process flange welded-in (orientation: on right when viewing the display)<sup>3)</sup></b>	J08	✓	✓	✓
Acc. to EN 10204-3.1					<b>Vent valve or blanking plug of process flange welded-in (orientation: on left when viewing the display)<sup>3)</sup></b>	J09	✓	✓	✓
<b>Factory certificate</b>	C14	✓	✓	✓					
Acc. to EN 10204-2.2									
<b>Functional safety (SIL2) (pending)</b>	C20	✓							
Devices suitable for use according to IEC 61508 and IEC 61511. Includes SIL conformity declaration									
<b>Functional safety (SIL2/3)</b>	C23	✓							
Devices suitable for use according to IEC 61508 and IEC 61511. Includes SIL conformity declaration									
<b>Increased measuring accuracy</b> (mandatory specification for SITRANS P410)	C41	✓	✓	✓					
<b>Device passport Russia</b>	C99	✓	✓	✓					
<b>Setting of upper limit of output signal to 22.0 mA</b>	D05	✓							
<b>Manufacturer's declaration acc. to NACE (MR 0103-2012 and MR 0175-2009)</b>	D07	✓	✓	✓					
(only together with seal diaphragm made of Hastelloy and stainless steel)									
<b>Degree of protection IP66/IP68</b> (only for M20 x 1.5 and 1/2-14 NPT)	D12	✓	✓	✓					
<b>Capri cable gland 4F CrNi and clamping device (848699 + 810634) included</b>	D59	✓	✓	✓					
<b>TAG plate empty (no inscription)</b>	D61	✓	✓	✓					

Factor valve block mounting for SITRANS P410 is possible. Depending on the available P410 variants, please see the configuration options for SITRANS P DS III (page 1/193).

<sup>1)</sup> Option does not include ATEX approval, but instead includes only the country-specific approval.

<sup>2)</sup> Approval pending.

<sup>3)</sup> Blanking plug is standard configuration. Order option A40 if a vent valve is required instead of a blanking plug.

# Pressure Measurement

Transmitters for applications with advanced requirements (Advanced)

1

## SITRANS P410 for differential pressure and flow

Selection and Ordering data	Order code		
	HART	PA	FF
<b>Additional data</b> Please add "-Z" to Article No. and specify Order code(s) and plain text.			
<b>Measuring range to be set</b> Specify in plain text: • in the case of linear characteristic curve (max. 5 characters): Y01: ... up to ... mbar, bar, kPa, MPa, psi	Y01	✓	✓ <sup>1)</sup>
• in the case of square rooted characteristic (max. 5 characters): Y02: ... up to ... mbar, bar, kPa, MPa, psi	Y02	✓	
<b>Stainless steel tag plate and entry in device variable (measuring point description)</b> Max. 16 characters, specify in plain text: Y15: .....	Y15	✓	✓
<b>Measuring point text (entry in device variable)</b> Max. 27 char., specify in plain text: Y16: .....	Y16	✓	✓
<b>Entry of HART address (TAG)</b> Max. 8 char., specify in plain text: Y17: .....	Y17	✓	
<b>Setting of pressure indication in pressure units</b> Specify in plain text (standard setting: bar): Y21: mbar, bar, kPa, MPa, psi, ... Note: The following pressure units can be selected: bar, mbar, mm H <sub>2</sub> O <sup>1)</sup> , inH <sub>2</sub> O <sup>1)</sup> , ftH <sub>2</sub> O <sup>1)</sup> , mmHG, inHG, psi, Pa, kPa, MPa, g/cm <sup>2</sup> , kg/cm <sup>2</sup> , Torr, ATM or % *) ref. temperature 20 °C	Y21	✓	✓
<b>Setting of pressure indication in non-pressure units<sup>2)</sup></b> Specify in plain text: Y22: .... up to .... l/min, m <sup>3</sup> /h, m, USgpm, ... (specification of measuring range in pressure units "Y01" or "Y02" is essential, unit with max. 5 characters)	Y22 + Y01 or Y02	✓	
<b>Preset bus address</b> possible between 1 and 126 Specify in plain text: Y25: .....	Y25	✓	✓
<b>Damping adjustment in seconds (0 ... 100 s)</b>	Y30	✓	✓

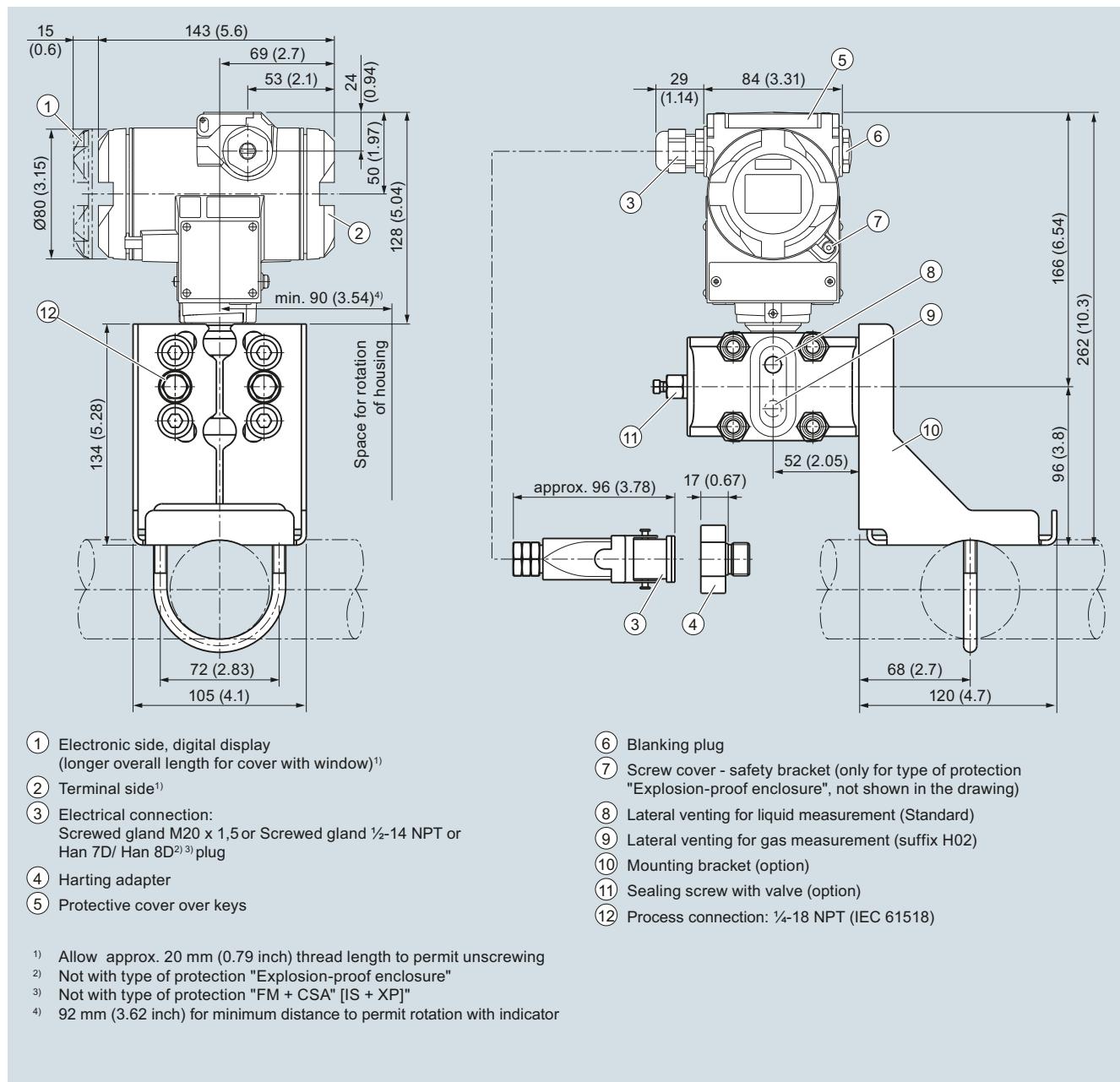
Only Y01, Y15, Y16, Y17, Y21, Y22, Y25 and D05 can be factory preset.

✓ = available

<sup>1)</sup> Measuring accuracies for PROFIBUS PA transmitters with Option Y01 are calculated in the same way as for HART devices.

<sup>2)</sup> Preset values can only be changed over SIMATIC PDM.

## Dimensional drawings



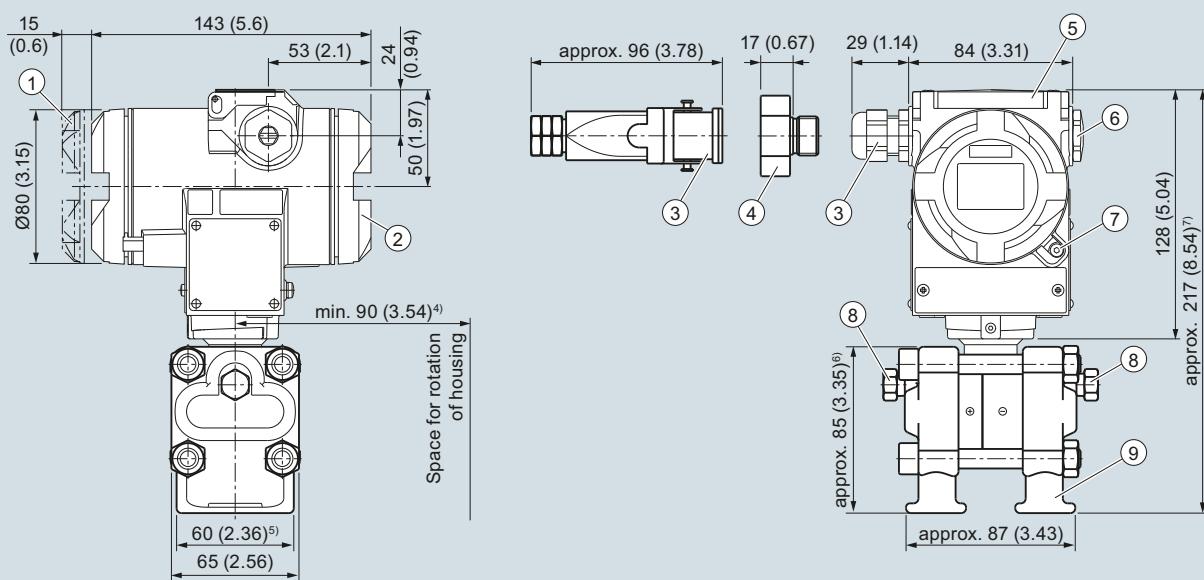
SITRANS P410 pressure transmitters for differential pressure and flow, dimensions in mm (inch)

# Pressure Measurement

Transmitters for applications with advanced requirements (Advanced)

1

## SITRANS P410 for differential pressure and flow



- ① Electronic side, digital display (longer overall length for cover with window)<sup>1)</sup>
- ② Terminal side<sup>1)</sup>
- ③ Electrical connection:  
Screwed gland M20 x 1,5 or Screwed gland 1/2-14 NPT or  
Han 7D/ Han 8D<sup>2)</sup> plug
- ④ Harting adapter
- ⑤ Protective cover over keys
- ⑥ Blanking plug
- ⑦ Screw cover - safety bracket (only for type of protection "Explosion-proof enclosure", not shown in the drawing)
- ⑧ Sealing screw with valve (option)
- ⑨ Process connection: 1/4-18 NPT (IEC 61518)

- 1) Allow approx. 20 mm (0.79 inch) thread length to permit unscrewing
- 2) Not with type of protection "Explosion-proof enclosure"
- 3) Not with type of protection "FM + CSA" [IS + XP]"
- 4) 92 mm (3.6 inch) for minimum distance to permit rotation with indicator
- 5) 74 mm (2.9 inch) for PN ≥ 420 (MAWP ≥ 6092 psi)
- 6) 91 mm (3.6 inch) for PN ≥ 420 (MAWP ≥ 6092 psi)
- 7) 219 mm (8.62 inch) for PN ≥ 420 (MAWP ≥ 6092 psi)

SITRANS P410 pressure transmitters for differential pressure and flow, with process covers for vertical differential pressure lines, optional "H03", dimensional drawing, dimensions in mm (inch)



SITRANS P410 pressure transmitters for differential pressure and flow, with process covers for vertical differential pressure lines

SITRANS P410 - Accessories/Spare parts

Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
<b>Accessories/Spare parts</b>		<b>Mounting screws</b>	
<b>Mounting bracket and fastening parts</b> for pressure transmitters		For measuring point label, grounding and connection terminals or for display (50 units)	<b>7MF4997-1CD</b>
SITRANS P410 with HART, P410 with PROFIBUS PA and P410 with FOUNDATION Fieldbus (7MF403-.....-C.)		<b>Sealing screws</b> (1 set = 2 units) for process flange	<b>7MF4997-1CG</b>
• made of steel	<b>7MF4997-1AB</b>	• made of stainless steel	<b>7MF4997-1CH</b>
• made of stainless steel 304/1.4301	<b>7MF4997-1AH</b>	• made of Hastelloy	
• made of stainless steel 316L/1.4404	<b>7MF4997-1AP</b>	<b>Sealing screws with vent valve</b> Complete (1 set = 2 units)	<b>7MF4997-1CP</b>
<b>Mounting bracket and fastening parts</b> for pressure transmitters		• made of stainless steel	<b>7MF4997-1CQ</b>
SITRANS P410 with HART, P410 with PROFIBUS PA and P10 with FOUNDATION Fieldbus (7MF403-.....-A., -B., ..D. and ..F.)		• made of Hastelloy	
• made of steel	<b>7MF4997-1AC</b>	<b>Connection board</b>	<b>7MF4997-1DN</b>
• made of stainless steel 304/1.4301	<b>7MF4997-1AJ</b>	• for SITRANS P410	<b>7MF4997-1DP</b>
• made of stainless steel 316L/1.4404	<b>7MF4997-1AQ</b>	• for SITRANS P410 with PROFIBUS PA and P410 with FOUNDATION Fieldbus	
<b>Mounting and fastening brackets</b> For differential pressure transmitters with flange thread M10		<b>O-rings for process flanges made of:</b>	
SITRANS P410 with HART, P410 with PROFIBUS PA and P410 with FOUNDATION Fieldbus (7MF443-....)		• FPM (Viton)	<b>7MF4997-2DA</b>
• made of steel	<b>7MF4997-1AD</b>	• PTFE (Teflon)	<b>7MF4997-2DB</b>
• made of stainless steel 304/1.4301	<b>7MF4997-1AK</b>	• FEP (with silicone core, approved for food)	<b>7MF4997-2DC</b>
• made of stainless steel 316L/1.4404	<b>7MF4997-1AR</b>	• FFFM (Kalrez, compound 4079)	<b>7MF4997-2DD</b>
<b>Mounting and fastening brackets</b> For differential pressure transmitters with flange thread M12		• NBR (Buna N)	<b>7MF4997-2DE</b>
SITRANS P410 with HART, P410 with PROFIBUS PA and P410 with FOUNDATION Fieldbus (7MF453-....)		<b>Sealing ring</b> for process connection	<b>see "Fittings"</b>
• made of steel	<b>7MF4997-1AE</b>		
• made of stainless steel 304/1.4301	<b>7MF4997-1AL</b>		
• made of stainless steel 316L/1.4404	<b>7MF4997-1AS</b>		
<b>Mounting and fastening brackets</b> For differential pressure transmitters with flange thread 7/16 -20 UNF			
SITRANS P410 with HART, P410 with PROFIBUS PA and P410 with FOUNDATION Fieldbus (7MF443-.... and 7MF453-....)			
• made of steel	<b>7MF4997-1AF</b>		
• made of stainless steel 304/1.4301	<b>7MF4997-1AM</b>		
• made of stainless steel 316L/1.4404	<b>7MF4997-1AT</b>		
<b>Cover</b>			
Made of die-cast aluminum, including gasket, for SITRANS P410 with HART, P410 with PROFIBUS PA and P410 with FOUNDATION Fieldbus.			
Compatible for Ex and non-Ex transmitters			
• without window	<b>7MF4997-1BB</b>		
• with window	<b>7MF4997-1BE</b>		
<b>Cover</b>			
Made of stainless steel, including gasket, or SITRANS P410 with HART, P410 with PROFIBUS PA and P410 with FOUNDATION Fieldbus.			
Compatible for Ex and non-Ex transmitters			
• without window	<b>7MF4997-1BC</b>		
• with window	<b>7MF4997-1BF</b>		
<b>Digital indicator</b>			
Including mounting material, for SITRANS P410 with HART, P410 with PROFIBUS PA and P410 with FOUNDATION Fieldbus			
<b>Measuring point label</b>			
• without inscription (5 units)	<b>7MF4997-1CA</b>		
• Printed (1 unit)	<b>7MF4997-1CB-Z</b>		
Data according to Y01 or Y02, Y15, Y16 and Y99 (see "Pressure transmitters")	Y..: .....		

# Pressure Measurement

Transmitters for applications with advanced requirements (Advanced)

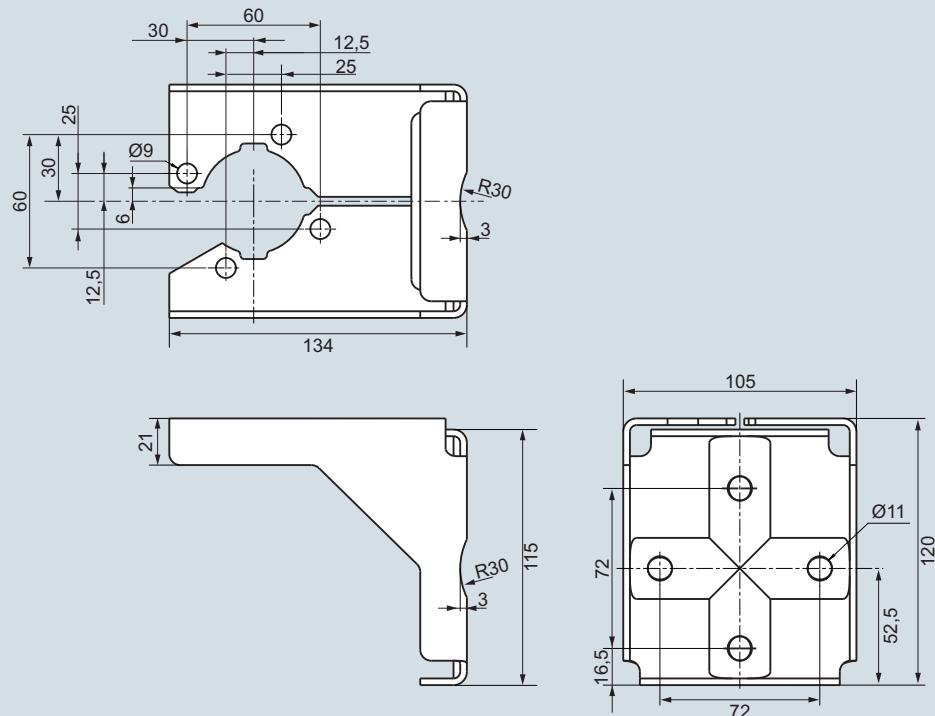
1

## SITRANS P410 - Accessories/Spare parts

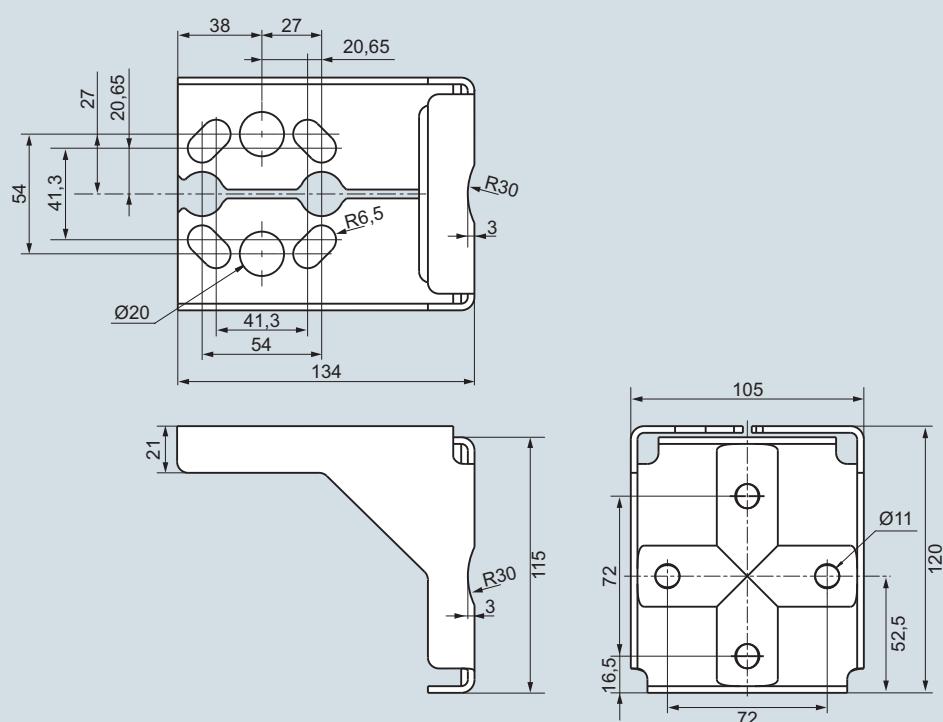
Selection and Ordering data	Article No.
<b>Documentation</b>	
The entire documentation is available for download free-of-charge in various languages at: <a href="http://www.siemens.com/processinstrumentation/documentation">http://www.siemens.com/processinstrumentation/documentation</a>	
Compact operating instructions SITRANS P DS III/P410	<b>A5E03434626</b>
• English, German, Spanish, French, Italian, Dutch	<b>A5E03434631</b>
• Estonian, Latvian, Lithuanian, Polish, Romanian, Croatian	<b>A5E03434645</b>
• Bulgarian, Czech, Finnish, Slovakian, Slovenian	<b>A5E03434656</b>
• Danish, Greek, Portuguese, Swedish, Hungarian	
The compact operating instructions are available on the DVD supplied with each transmitter.	
DVD with documentation	<b>A5E00090345</b>
The DVD contains detailed documentation for all device versions	
<b>Certificates (order only via SAP)</b>	
instead of Internet download	
• hard copy (to order)	<b>A5E03252406</b>
• on DVD (to order)	<b>A5E03252407</b>
<b>HART modem</b>	
with USB interface	<b>7MF4997-1DB</b>

Power supply units see Chap. 7 "Supplementary Components".

## Dimensional drawings



Mounting bracket for SITRANS P410 gauge pressure-transmitters, dimensions in mm  
mounting bracket material: Sheet-steel Mat. No. 1.0330, chrome-plated, or stainless steel Mat. No. 1.4301 (304)



Mounting bracket for SITRANS P410 differential pressure transmitter, dimensions in mm  
mounting bracket material: Sheet-steel Mat. No. 1.0330, chrome-plated, or stainless steel Mat. No. 1.4301 (304)