

## 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 measuring 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.

#### Measuring 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"))

#### Measuring 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)

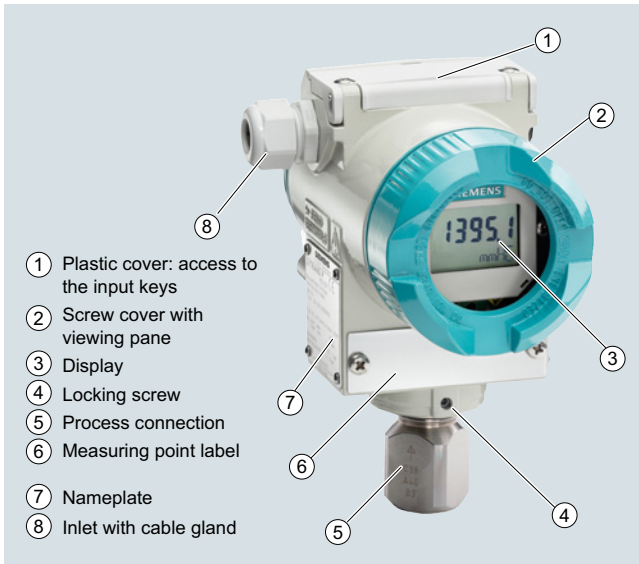
## Pressure Measurement

Pressure transmitters  
for applications with advanced requirements (Advanced)  
SITRANS P410

### Technical description

1

#### 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 enclosure. 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).

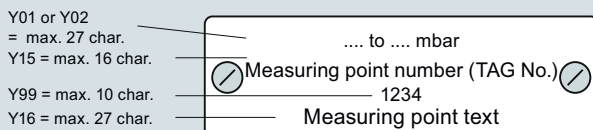
The approval label is located on the opposite side.

The enclosure 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 enclosure. 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 enclosure.

The electrical connections for the power supply and screen are accessible by unscrewing the rear cover. The bottom part of the enclosure 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.

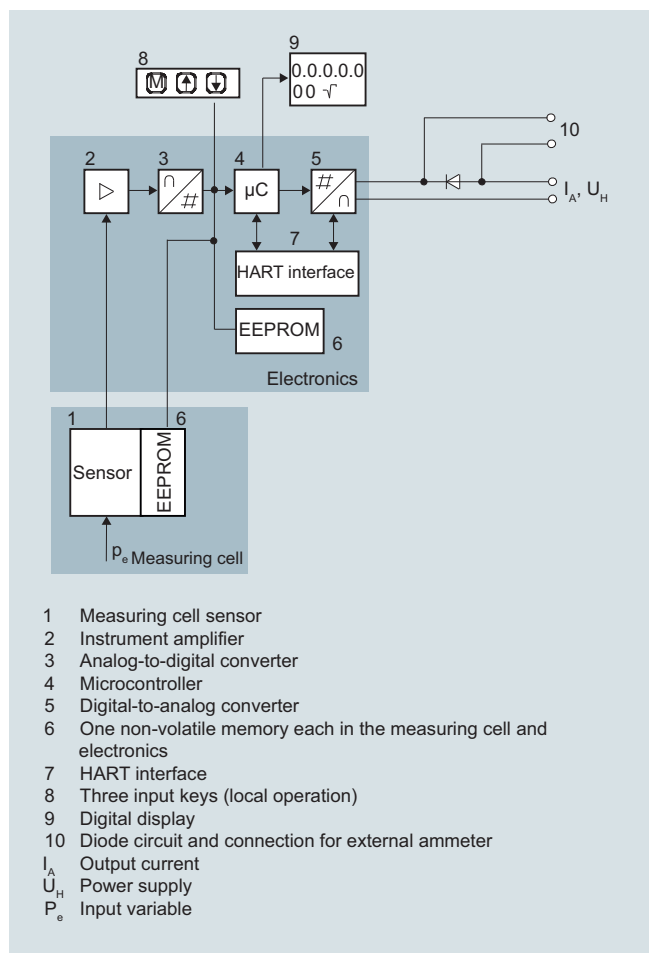
At the top of the enclosure is a plastic cover (1), which hides the input keys.

#### Example for an attached measuring point label



## Function

## Operation of electronics with HART communication



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.

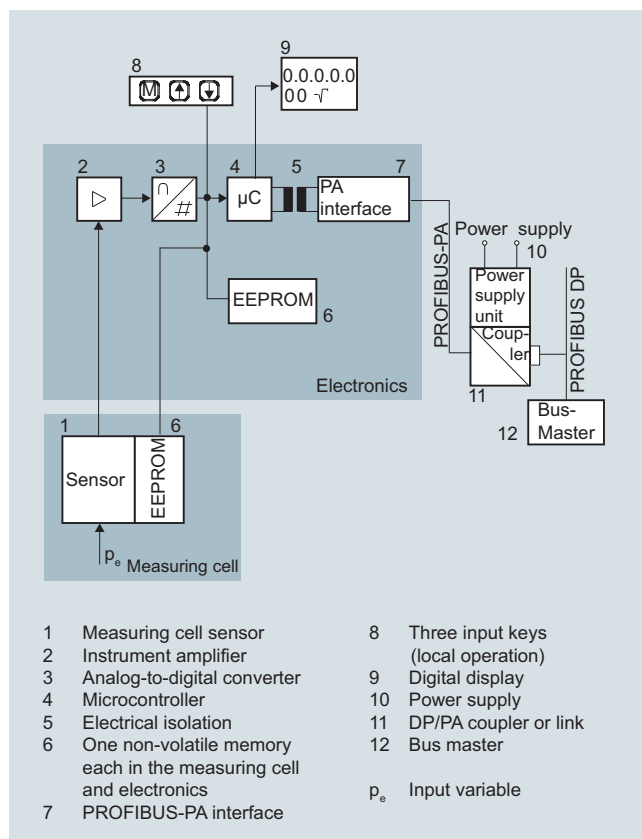
The data specific to the measuring cell, the electronics data, and the parameter data are stored in the two non-volatile memories (6). The one memory is coupled to the measuring cell, the other to the electronics. As the result of this modular design, the electronics and the measuring cell can be replaced 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 measuring spans  $\leq 63$  bar measure the input pressure compared to atmosphere, transmitters with measuring spans  $\geq 160$  bar compared to vacuum.

## Operation of electronics with PROFIBUS PA communication



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 the 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).

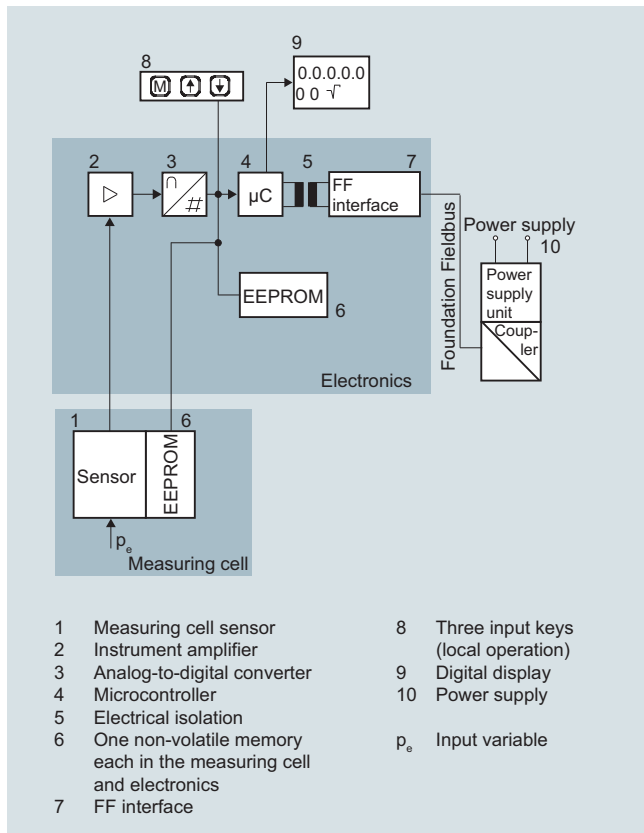
The results with status values and diagnostic values are transferred by cyclic data transmission on the PROFIBUS PA. Parameterization data and error messages are transferred by acyclic data transmission. Special software such as SIMATIC PDM is required for this.

## Pressure Measurement

Pressure transmitters  
for applications with advanced requirements (Advanced)  
SITRANS P410

### Technical description

#### Operation of electronics with FOUNDATION Fieldbus communication



Function diagram of electronics

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).

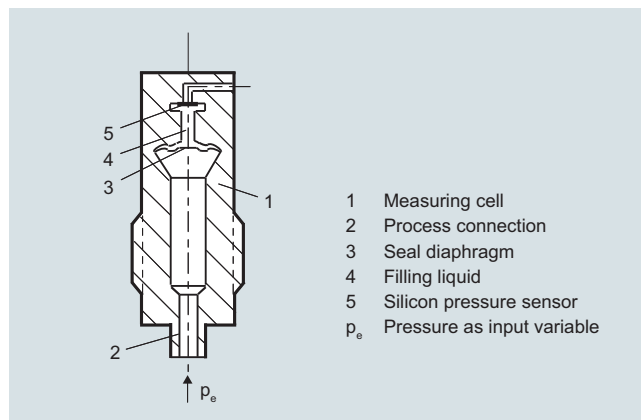
The data specific to the measuring cell, the electronics data, and the parameter data are stored in the two non-volatile memories (6). The one memory is coupled to the measuring cell, the other to the electronics. As the result of this modular design, the electronics and the measuring cell can be replaced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

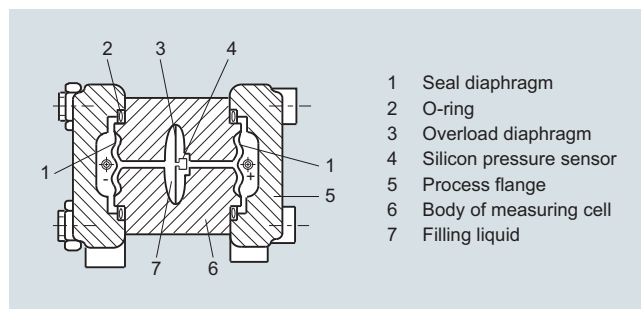
##### Measuring cell for gauge pressure



Measuring cell for gauge pressure, function diagram

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



Measuring cell for differential pressure and flow, function diagram

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.

**Parameterization SITRANS P410**

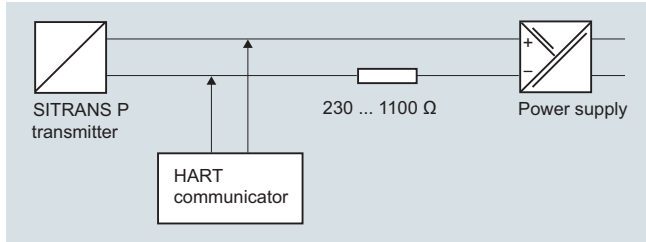
Depending on the version, there are a range of options for parameterizing the pressure transmitter and for setting or scanning the parameters.

Parameterization using the input buttons (local operation)

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

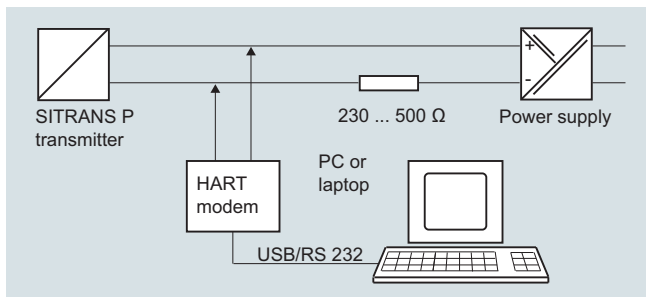
Parameterization using HART

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
Lower range value	x	x
Upper range value	x	x
Electrical damping	x	x
Lower range value without application of a pressure ("Blind setting")	x	x
Upper range 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

1) Cancel apart from write protection  
2) 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

# Pressure Measurement

Pressure transmitters  
for applications with advanced requirements (Advanced)  
SITRANS P410

1

## Technical description

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	%

## Technical specifications

### SITRANS P410 for gauge pressure

Input		Gauge pressure			
		HART	PROFIBUS PA/ FOUNDATION Fieldbus		
		Measuring span	Nominal measuring range	Max. operating pressure MAWP (PS)	Max. perm. test pressure
Measured variable		0.01 ... 1 bar 1 ... 100 kPa 0.15 ... 14.5 psi	1 bar 100 kPa 14.5 psi	4 bar 400 kPa 58 psi	6 bar 600 kPa 87 psi
Measuring span (infinitely adjustable) or nominal measuring range, max. operating pressure (in accordance with 97/23/EC Pressure Equipment Directive) and max. test pressure (pursuant to DIN 16086)		0.04 ... 4 bar 4 ... 400 kPa 0.58 ... 58 psi	4 bar 400 kPa 58 psi	7 bar 0.7 MPa 102 psi	10 bar 1 MPa 145 psi
		0.16 ... 16 bar 16 ... 1600 kPa 2.3 ... 232 psi	16 bar 1600 kPa 232 psi	21 bar 2.1 MPa 305 psi	32 bar 3.2 MPa 464 psi
		0.63 ... 63 bar 63 ... 6300 kPa 9.1 ... 914 psi	63 bar 6300 kPa 914 psi	67 bar 6.7 MPa 972 psi	100 bar 10 MPa 1450 psi
		1.6 ... 160 bar 0.16 ... 16 MPa 23 ... 2321 psi	160 bar 16 MPa 2321 psi	167 bar 16.7 MPa 2422 psi	250 bar 2.5 MPa 3626 psi
Lower measuring limit		30 mbar a/3 kPa a/0.44 psi a			
• Measuring cell with silicone oil filling		100 % of max. measuring span			
Upper measuring limit					
Output		HART	PROFIBUS PA/FOUNDATION Fieldbus		
Output signal		4 ... 20 mA	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)			

# Pressure Measurement

Pressure transmitters

for applications with advanced requirements (Advanced)

SITRANS P410

for gauge pressure

1

## SITRANS P410 for gauge pressure

### Measuring accuracy

Reference conditions

Acc. to IEC 60770-1

- Increasing characteristic
- Lower range 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)

$r = \text{max. measuring span/set measuring span or nominal measuring range}$

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

$r \leq 5$  :  $\leq 0.04$  %  
 $5 < r \leq 100$  :  $\leq (0.004 \cdot r + 0.045)$  %

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

$\leq (0.05 \cdot r + 0.1)$  %  
 $\leq (0.025 \cdot r + 0.125)$  %

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

$\leq (0.25 \cdot r)$  % in 5 years  
 $\leq (0.125 \cdot r)$  % in 5 years

Effect of mounting position

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

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

<b>SITRANS P410 for gauge pressure</b>		
<b>Operating conditions</b>		
Degree of protection	IP66 (optional IP66/IP68)	
<ul style="list-style-type: none"> <li>• according to EN 60529</li> <li>• according to NEMA 250</li> </ul>	Type 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>	-40 ... +100 °C (-40 ... +212 °F) -20 ... +100 °C (-4 ... +212 °F) -20 ... +60 °C (-4 ... +140 °F)	
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>	-40 ... +85 °C (-40 ... +185 °F) -30 ... +85 °C (-22 ... +185 °F) -50 ... +85 °C (-58 ... +185 °F)  Relative humidity 0 ... 100 % Condensation permissible, suitable for use in the tropics  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>	Stainless steel, mat. no. 1.4404/316L or Hastelloy C4, mat. no. 2.4602 Stainless steel, mat. no. 1.4404/316L Stainless steel, mat. no. 1.4404/316L or Hastelloy C276, mat. no. 2.4819	
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 IEC 61518/DIN EN 61518)	
Material of mounting bracket		
<ul style="list-style-type: none"> <li>• Steel</li> <li>• Stainless steel 304</li> <li>• Stainless steel 316L</li> </ul>	Sheet-steel, Mat. No. 1.0330, chrome-plated Sheet stainless steel, mat. no. 1.4301 (SS 304) Sheet stainless steel, mat. no. 1.4404 (SS 316L)	
<b>Power supply <math>U_H</math></b>		
Terminal voltage on transmitter	<b>HART</b> 10.5 ... 45 V DC 10.5 ... 30 V DC in intrinsically-safe mode	<b>PROFIBUS PA/ FOUNDATION Fieldbus</b> -
Power supply		Supplied through bus
Separate supply voltage	-	No
Bus voltage		
<ul style="list-style-type: none"> <li>• Not Ex</li> <li>• With intrinsically-safe operation</li> </ul>	- -	9 ... 32 V 9 ... 24 V
Current consumption		
<ul style="list-style-type: none"> <li>• Basic current (max.)</li> <li>• Start-up current ≤ basic current</li> <li>• Max. current in event of fault</li> </ul>	- - -	12.5 mA Yes 15.5 mA
Fault disconnection electronics (FDE) available	-	Yes

# Pressure Measurement

Pressure transmitters  
for applications with advanced requirements (Advanced)  
SITRANS P410

## for gauge pressure

1

### 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"	PTB 13 ATEX 2007 X	
- Marking	Ex II 1/2 G Ex ia/ib IIC T4/T5/T6 Ga/Gb	
- Permissible ambient temperature	-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 peak values: $U_i = 30 \text{ V}$ , $I_i = 100 \text{ mA}$ , $P_i = 750 \text{ mW}$ ; $R_i = 300 \Omega$	FISCO supply unit: $U_o = 17.5 \text{ V}$ , $I_o = 380 \text{ mA}$ , $P_o = 5.32 \text{ W}$ Linear barrier: $U_o = 24 \text{ V}$ , $I_o = 174 \text{ mA}$ , $P_o = 1 \text{ W}$
- Effective internal inductance/capacitance	$L_i = 0.4 \text{ mH}$ , $C_i = 6 \text{ nF}$	$L_i = 7 \mu\text{H}$ , $C_i = 1.1 \text{ nF}$
• Explosion-proof "d"	PTB 99 ATEX 1160	
- Marking	Ex II 1/2 G Ex d IIC T4/T6 Ga/Gb	
- Permissible ambient temperature	-40 ... +85 °C (-40 ... +185 °F) temperature class T4; -40 ... +60 °C (-40 ... +140 °F) temperature class T6	
- Connection	To circuits with values: $U_H = 10.5 \dots 45 \text{ V DC}$	To circuits with values: $U_H = 9 \dots 32 \text{ V DC}$
• Dust explosion protection for zone 20 (pending)	PTB 01 ATEX 2055	
- Marking	Ex II 1 D Ex ta IIIC T120°C Da Ex II 1/2 D Ex ta/tb IIIC T120°C Da/Db	
- Permissible ambient temperature	-40 ... +85 °C (-40 ... +185 °F)	
- Max. surface temperature	120 °C (248 °F)	
- Connection	To certified intrinsically-safe circuits with peak values: $U_i = 30 \text{ V}$ , $I_i = 100 \text{ mA}$ , $P_i = 750 \text{ mW}$ , $R_i = 300 \Omega$	FISCO supply unit: $U_o = 17.5 \text{ V}$ , $I_o = 380 \text{ mA}$ , $P_o = 5.32 \text{ W}$ Linear barrier: $U_o = 24 \text{ V}$ , $I_o = 250 \text{ mA}$ , $P_o = 1 \text{ W}$
- Effective internal inductance/capacitance	$L_i = 0.4 \text{ mH}$ , $C_i = 6 \text{ nF}$	$L_i = 7 \mu\text{H}$ , $C_i = 1.1 \text{ nF}$
• Dust explosion protection for zone 21/22 (pending)	PTB 01 ATEX 2055	
- Marking	Ex II 2 D Ex tb IIIC T120°C Db	
- Connection	To circuits with values: $U_H = 10.5 \dots 45 \text{ V DC}$ ; $P_{\max} = 1.2 \text{ W}$	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	
- Marking	Ex II 2/3 G Ex nA IIC T4/T5/T6 Gb/Gc Ex II 2/3 G Ex ic IIC T4/T5/T6 Gb/Gc	
- Connection (Ex nA)	$U_m = 45 \text{ V}$	$U_m = 32 \text{ V}$
- Connections (Ex ic)	To circuits with values: $U_i = 45 \text{ V}$	FISCO supply unit ic: $U_o = 17.5 \text{ V}$ , $I_o = 570 \text{ mA}$ Linear barrier: $U_o = 32 \text{ V}$ , $I_o = 132 \text{ mA}$ , $P_o = 1 \text{ W}$
- Effective internal inductance/capacitance	$L_i = 0.4 \text{ mH}$ , $C_i = 6 \text{ nF}$	$L_i = 7 \mu\text{H}$ , $C_i = 1.1 \text{ nF}$
• Explosion protection acc. to FM (pending)	Certificate of Compliance 3008490	
- Identification (XP/DIP) or (IS); (NI)	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	
• Explosion protection to CSA (pending)	Certificate of Compliance 1153651	
- Identification (XP/DIP) or (IS)	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	

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

# Pressure Measurement

Pressure transmitters

for applications with advanced requirements (Advanced)

SITRANS P410

for gauge pressure

1

Selection and Ordering data	Article No.	Order code
<b>Pressure transmitter for gauge pressure, SITRANS P410 with HART</b>	<b>7MF4033-</b>	<b>-Z C41</b>
<a href="#">Click on the Article No. for the online configuration in the PIA Life Cycle Portal.</a>		
<b>Measuring cell filling</b> <b>Measuring cell cleaning</b> Silicone oil                      normal	1	
<b>Measuring span (min. ... max.)</b> 0.01 ... 1 bar    (0.15 ... 14.5 psi) 0.04 ... 4 bar    (0.58 ... 58 psi) 0.16 ... 16 bar    (2.32 ... 232 psi) 0.63 ... 63 bar    (9.14 ... 914 psi) 1.6 ... 160 bar    (23.2 ... 2320 psi)	B C D E F	
<b>Wetted parts materials</b> Seal diaphragm                  Process connection Stainless steel                    Stainless steel Hastelloy                          Stainless steel Hastelloy                          Hastelloy Version for diaphragm seals in conjunction with process connector "female thread ½-14 NPT" <b>(recommended version)</b> <sup>1) 2) 3) 4)</sup> Version for diaphragm seals in conjunction with process connector "G½B connection shank" <sup>1) 2) 3) 4)</sup>	A B C Y 1 Y 0	
<b>Process connection</b> <ul style="list-style-type: none"> <li>• Connection shank G½B to EN 837-1</li> <li>• Female thread ½-14 NPT</li> <li>• Stainless steel oval flange with process connection (Oval flange has no female thread)               <ul style="list-style-type: none"> <li>- Mounting thread 7/16-20 UNF to IEC 61518/DIN EN 61518</li> <li>- Mounting thread M10 to DIN 19213</li> <li>- Mounting thread M12 to DIN 19213</li> </ul> </li> <li>• Male thread M20 x 1.5</li> <li>• Male thread ½ -14 NPT</li> </ul>	0 1 2 3 4 5 6	
<b>Non-wetted parts materials</b> <ul style="list-style-type: none"> <li>• Enclosure made of die-cast aluminium</li> <li>• Enclosure stainless steel precision casting<sup>5)</sup></li> </ul>	0 3	
<b>Version</b> <ul style="list-style-type: none"> <li>• Standard version, German plate inscription, setting for pressure unit: bar</li> <li>• International version, English plate inscription, setting for pressure unit: bar</li> <li>• Chinese version, English plate inscription, setting for pressure unit: Pascal</li> </ul> All versions include DVD with compact operating instructions in various EU languages.	1 2 3	
<b>Explosion protection</b> <ul style="list-style-type: none"> <li>• None</li> <li>• With ATEX, Type of protection:               <ul style="list-style-type: none"> <li>- "Intrinsic safety (Ex ia)"</li> <li>- "Explosion-proof (Ex d)"<sup>6)</sup></li> <li>- "Intrinsic safety and flameproof enclosure" (Ex ia + Ex d)<sup>7)</sup></li> <li>- "Ex nA/ic (Zone 2)"<sup>8)</sup></li> <li>- "Intrinsic safety, explosion-proof enclosure and dust explosion protection (Ex ia + Ex d + Zone 1D/2D)"<sup>7)9)</sup></li> </ul> </li> <li>• FM + CSA intrinsic safe (is) (pending)<sup>10)</sup></li> <li>• FM + CSA (is + ep) + Ex ia + Ex d (ATEX) + Zone 1D/2D<sup>7)9)10)</sup></li> <li>• With FM + CSA, Type of protection:               <ul style="list-style-type: none"> <li>- "Intrinsic Safe and Explosion Proof (is + xp)"<sup>6)10)</sup></li> </ul> </li> </ul>	A B D P E R S NC	
<b>Electrical connection / cable entry</b> <ul style="list-style-type: none"> <li>• Screwed gland M20 x1 .5</li> <li>• Screwed gland ½-14 NPT</li> <li>• Device plug Han 7D (plastic enclosure) incl. mating connector<sup>11)</sup></li> <li>• Device plugs M12 (stainless steel)<sup>11)12)</sup></li> </ul>	B C D F	

# Pressure Measurement



## Pressure transmitters

### for applications with advanced requirements (Advanced)

#### SITRANS P410

for gauge pressure

1

Selection and Ordering data	Article No.	Order code
<b>Pressure transmitter for gauge pressure, SITRANS P410 with HART</b>	<b>7MF4033-</b>  <b>-</b>  <b>-Z C41</b>	
<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".

A quick-start guide is included in the scope of delivery of the device.

- 1) When the manufacture'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 inspection 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 "device plug Han 7D".
- 6) Without cable gland, with blanking plug
- 7) With enclosed cable gland Ex ia and blanking plug
- 8) Configurations with device plugs Han and M12 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

# Pressure Measurement

Pressure transmitters

for applications with advanced requirements (Advanced)

SITRANS P410

for gauge pressure

1

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
<a href="#">↗</a> 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>			
1 bar	(14.5 psi)		
4 bar	(58 psi)		
16 bar	(232 psi)		
63 bar	(914 psi)		
160 bar	(2320 psi)		
<b>Wetted parts materials</b>			
Seal diaphragm	Process connection		
Stainless steel	Stainless steel		
Hastelloy	Stainless steel		
Hastelloy	Hastelloy		
Version for diaphragm seals in conjunction with process connector "female thread ½-14 NPT" <b>(recommended version)</b> <sup>1) 2) 3) 4)</sup>			
Version for diaphragm seals in conjunction with process connector "G½B connection shank" <sup>1) 2) 3) 4)</sup>			
<b>Process connection</b>			
<ul style="list-style-type: none"> <li>• Connection shank G½B to EN 837-1</li> <li>• Female thread ½-14 NPT</li> <li>• Stainless steel oval flange with process connection (Oval flange has no female thread) <sup>5)</sup> <ul style="list-style-type: none"> <li>- Mounting thread 7/16-20 UNF to IEC 61518/DIN EN 61518</li> <li>- Mounting thread M10 to DIN 19213</li> <li>- Mounting thread M12 to DIN 19213</li> </ul> </li> <li>• Male thread M20 x 1.5</li> <li>• Male thread ½ -14 NPT</li> </ul>			
<b>Non-wetted parts materials</b>			
<ul style="list-style-type: none"> <li>• Enclosure made of die-cast aluminium</li> <li>• Enclosure stainless steel precision casting</li> </ul>			
<b>Version</b>			
<ul style="list-style-type: none"> <li>• Standard version, German label inscription, setting of pressure unit: bar</li> <li>• International version, English label inscription, setting of pressure unit: psi</li> <li>• Chinese version, English label inscription, setting of pressure unit: kPa</li> </ul> All versions include DVD with compact operating instructions in various EU languages.			
<b>Explosion protection</b>			
<ul style="list-style-type: none"> <li>• None</li> <li>• With ATEX, Type of protection:               <ul style="list-style-type: none"> <li>- "Intrinsic safety (Ex ia)"</li> <li>- "Explosion-proof (Ex d)"<sup>6)</sup></li> <li>- "Intrinsic safety and flameproof enclosure" (Ex ia + Ex d)<sup>7)</sup></li> <li>- "Ex nA/ic (Zone 2)"<sup>8)</sup></li> <li>- "Intrinsic safety, explosion-proof enclosure and dust explosion protection (Ex ia + Ex d + Zone 1D/2D)"<sup>7) 9)</sup></li> </ul> </li> <li>• FM + CSA intrinsic safe (is)<sup>10)</sup></li> <li>• FM + CSA (is + ep) + Ex ia + Ex d (ATEX) + Zone 1D/2D<sup>7)9)10)</sup></li> <li>• With FM + CSA, Type of protection:               <ul style="list-style-type: none"> <li>- "Intrinsic Safe and Explosion Proof (is + xp)"<sup>6)10)</sup></li> </ul> </li> </ul>			
<b>Electrical connection/cable entry</b>			
<ul style="list-style-type: none"> <li>• Screwed gland M20 x 1.5</li> <li>• Screwed gland ½-14 NPT</li> <li>• Device plugs M12 (stainless steel)<sup>11) 12)</sup></li> </ul>			

# Pressure Measurement

## Pressure transmitters

### for applications with advanced requirements (Advanced)

#### SITRANS P410

for gauge pressure

1

Selection and Ordering data	Article No.	Order code
<b>Pressure transmitter for gauge pressure</b>		
<b>SITRANS P410 with PROFIBUS PA (PA)</b>	<b>7MF4034-</b>	<b>-Z C41</b>
<b>SITRANS P410 with FOUNDATION Fieldbus (FF)</b>	<b>7MF4035-</b>	<b>-Z C41</b>
<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

A quick-start guide is included in the scope of delivery of the device.

- 1) When the manufacture'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 inspection 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. measuring span 160 bar (2320 psi)  
7/16-20 UNF and M12 fastening thread: Max. measuring 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 device plugs Han and M12 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.



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)

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

2) Preset values can only be changed over SIMATIC PDM.

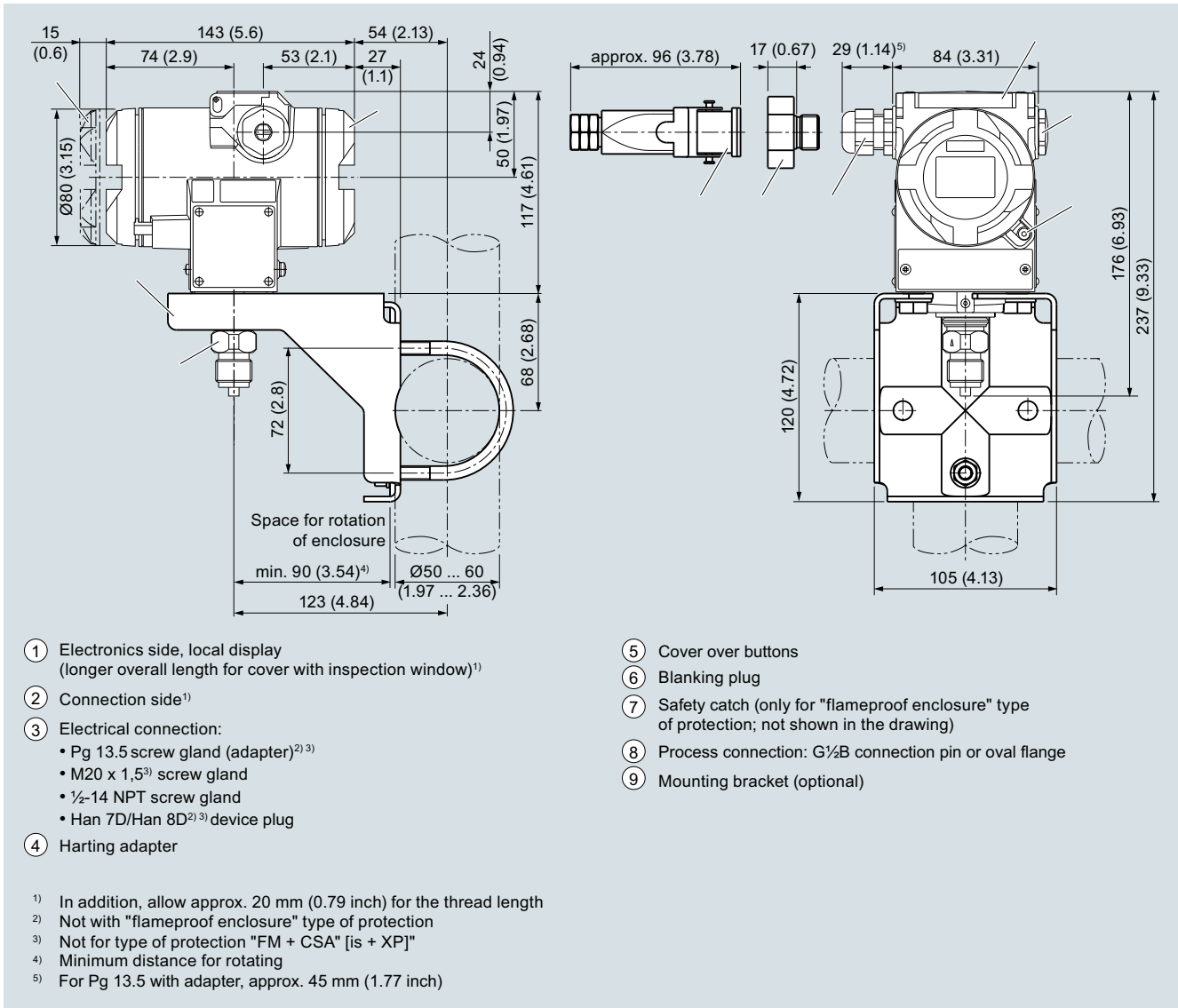
# Pressure Measurement

Pressure transmitters  
for applications with advanced requirements (Advanced)  
SITRANS P410

for gauge pressure

1

## Dimensional drawings



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

**Technical specifications****SITRANS P410 for differential pressure and flow**

<b>Input</b>		<b>Differential pressure and flow</b>	
Measured variable		Differential pressure and flow	
Measuring span (infinitely adjustable) or nominal measuring range and maximum operating pressure (pursuant to 2014/68/EU Pressure Equipment Directive)		<b>HART</b>	<b>PROFIBUS PA/ FOUNDATION Fieldbus</b>
		Measuring 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
		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
		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		-100 % of max. measuring span (-33 % with measuring cell 30 bar/3 MPa/435 psi) or 30 mbar a/3 kPa a/0.44 psi a	
<ul style="list-style-type: none"> <li>Measuring cell with silicone oil filling</li> </ul>			
Upper measuring limit		100 % of max. measuring span	
Lower range value		Between the measuring limits (fully adjustable)	
<b>Output</b>		<b>HART</b>	<b>PROFIBUS PA/ FOUNDATION Fieldbus</b>
Output signal		4 ... 20 mA	Digital PROFIBUS PA and FOUNDATION Fieldbus signal
<ul style="list-style-type: none"> <li>Lower limit (infinitely adjustable)</li> <li>Upper limit (infinitely adjustable)</li> </ul>		3.55 mA, factory preset to 3.84 mA 23 mA, factory preset to 20.5 mA or optionally set to 22.0 mA	- -
Load		$R_B \leq (U_H - 10.5 \text{ V})/0.023 \text{ A}$ in $\Omega$ $U_H$ : Power supply in V	-
<ul style="list-style-type: none"> <li>Without HART</li> <li>With HART</li> </ul>		$R_B = 230 \dots 500 \Omega$ (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)	

# Pressure Measurement

Pressure transmitters

for applications with advanced requirements (Advanced)

SITRANS P410

for differential pressure and flow

1

## SITRANS P410 for differential pressure and flow

### Measuring accuracy

Reference conditions	Acc. to IEC 60770-1
	<ul style="list-style-type: none"> <li>Increasing characteristic</li> <li>Lower range value 0 bar/kPa/psi</li> <li>Stainless steel seal diaphragm</li> <li>Silicone oil filling</li> <li>Room temperature 25 °C (77 °F)</li> </ul>
Measuring span ratio $r$ (spread, Turn-Down)	$r = \text{max. measuring span/set measuring span or nominal measuring range}$
Error in measurement at limit setting incl. hysteresis and reproducibility	
<ul style="list-style-type: none"> <li>Linear characteristic</li> </ul>	
<ul style="list-style-type: none"> <li>- 250 mbar/25 kPa/3.63 psi</li> <li>600 mbar/60 kPa/8.7 psi</li> <li>1600 mbar/160 kPa/23.21 psi</li> <li>5 bar/500 kPa/72.5 psi</li> <li>30 bar/3 MPa/435 psi</li> </ul>	$r \leq 5 :$ $\leq 0.04 \%$ $5 < r \leq 100 :$ $\leq (0.004 \cdot r + 0.045) \%$
<ul style="list-style-type: none"> <li>Square-rooted characteristic (flow &gt; 50 %)</li> </ul>	
<ul style="list-style-type: none"> <li>- 250 mbar/25 kPa/3.63 psi</li> <li>600 mbar/60 kPa/8.7 psi</li> <li>1600 mbar/160 kPa/23.21 psi</li> <li>5 bar/500 kPa/72.5 psi</li> <li>30 bar/3 MPa/435 psi</li> </ul>	$r \leq 5 :$ $\leq 0.04 \%$ $5 < r \leq 100 :$ $\leq (0.004 \cdot r + 0.045) \%$
<ul style="list-style-type: none"> <li>Square-rooted characteristic (flow &gt; 25 ... 50 %)</li> </ul>	
<ul style="list-style-type: none"> <li>- 250 mbar/25 kPa/3.63 psi</li> <li>600 mbar/60 kPa/8.7 psi</li> <li>1600 mbar/160 kPa/23.21 psi</li> <li>5 bar/500 kPa/72.5 psi</li> <li>30 bar/3 MPa/435 psi</li> </ul>	$r \leq 5 :$ $\leq 0.08 \%$ $5 < r \leq 100 :$ $\leq (0.008 \cdot r + 0.09) \%$
Influence of ambient temperature (in percent per 28 °C (50 °F))	
<ul style="list-style-type: none"> <li>250 mbar/25 kPa/3.63 psi</li> <li>600 mbar/60 kPa/8.7 psi</li> <li>1600 mbar/160 kPa/23.21 psi</li> <li>5 bar/500 kPa/72.5 psi</li> <li>30 bar/3 MPa/435 psi</li> </ul>	$\leq (0.025 \cdot r + 0.125) \%$
Influence of static pressure	
<ul style="list-style-type: none"> <li>on the lower range value</li> </ul>	
<ul style="list-style-type: none"> <li>- 250 mbar/25 kPa/3.63 psi</li> <li>600 mbar/60 kPa/8.7 psi</li> <li>1600 mbar/160 kPa/23.21 psi</li> </ul>	$\leq (0.1 \cdot r) \%$ per 70 bar (zero offset is possible with position error adjustment)
<ul style="list-style-type: none"> <li>- 5 bar/500 kPa/72.5 psi</li> <li>30 bar/3 MPa/435 psi</li> </ul>	$\leq (0.2 \cdot r) \%$ per 70 bar (zero offset is possible with position error adjustment)
<ul style="list-style-type: none"> <li>on the measuring span</li> </ul>	
<ul style="list-style-type: none"> <li>- 250 mbar/25 kPa/3.63 psi</li> <li>600 mbar/60 kPa/8.7 psi</li> <li>1600 mbar/160 kPa/23.21 psi</li> <li>5 bar/500 kPa/72.5 psi</li> <li>30 bar/3 MPa/435 psi</li> </ul>	$\leq 0.14 \%$ per 70 bar
Long-term stability (temperature change $\pm 30$ °C ( $\pm 54$ °F))	Static pressure max. 70 bar/7 MPa/1015 psi
<ul style="list-style-type: none"> <li>250 mbar/25 kPa/3.63 psi</li> <li>600 mbar/60 kPa/8.7 psi</li> <li>1600 mbar/160 kPa/23.21 psi</li> <li>5 bar/500 kPa/72.5 psi</li> </ul>	$\leq (0.125 \cdot r) \%$ in 5 years
<ul style="list-style-type: none"> <li>30 bar/3 MPa/435 psi</li> </ul>	$\leq (0.25 \cdot r) \%$ in 5 years
Effect of mounting position (in pressure per change in angle)	$\leq 0.7$ mbar/0.07 kPa/0.028 inH <sub>2</sub> O per 10° inclination (zero offset 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

**SITRANS P410 for differential pressure and flow****Operating conditions**

Degree of protection	IP66 (optional IP66/IP68)
<ul style="list-style-type: none"> <li>• according to EN 60529</li> <li>• according to NEMA 250</li> </ul>	Type 4X
Temperature of medium	
<ul style="list-style-type: none"> <li>• Measuring cell with silicone oil filling</li> </ul>	-40 ... +100 °C (-40 ... +212 °F) -20 ... +100 °C (-4 ... +212 °F) with 30 bar measuring cell
<ul style="list-style-type: none"> <li>• In conjunction with dust explosion protection</li> </ul>	-20 ... +60 °C (-4 ... +140 °F)
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> </ul>	-40 ... +85 °C (-40 ... +185 °F) -30 ... +85 °C (-22 ... +185 °F) -50 ... +85 °C (-58 ... +185 °F)
<ul style="list-style-type: none"> <li>• Electromagnetic Compatibility <ul style="list-style-type: none"> <li>- Emitted interference and interference immunity</li> </ul> </li> </ul>	Relative humidity 0 ... 100 % Condensation permissible, suitable for use in the tropics  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-AISI12 or stainless steel precision casting, mat. no. 1.4408
Wetted parts materials	
<ul style="list-style-type: none"> <li>• Seal diaphragm</li> <li>• Process flanges and sealing screw</li> <li>• O-Ring</li> </ul>	Stainless steel, mat. no. 1.4404/316L or Hastelloy C276, mat. no. 2.4819 Stainless steel, mat. no. 1.4408, Hastelloy C4, mat. no. 2.4602 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/DIN EN 61518
Material of mounting bracket	
<ul style="list-style-type: none"> <li>• Steel</li> <li>• Stainless steel 304</li> <li>• Stainless steel 316L</li> </ul>	Sheet-steel, Mat. No. 1.0330, chrome-plated Sheet stainless steel, mat. no. 1.4301 (SS 304) Sheet stainless steel, mat. no. 1.4404 (SS 316L)

**Power supply  $U_H$** 

	<b>HART</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		Supplied through bus
Separate supply voltage	-	No
Bus voltage		
<ul style="list-style-type: none"> <li>• Not Ex</li> </ul>	-	9 ... 32 V
<ul style="list-style-type: none"> <li>• With intrinsically-safe operation</li> </ul>	-	9 ... 24 V
Current consumption		
<ul style="list-style-type: none"> <li>• Basic current (max.)</li> <li>• Start-up current ≤ basic current</li> <li>• Max. current in event of fault</li> </ul>	- - -	12.5 mA Yes 15.5 mA
Fault disconnection electronics (FDE) available	-	Yes

# Pressure Measurement

Pressure transmitters

for applications with advanced requirements (Advanced)

SITRANS P410

for differential pressure and flow

1

## 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/ib 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

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 99 ATEX 1160

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

-40 ... +85 °C (-40 ... +185 °F) temperature class T4;  
-40 ... +60 °C (-40 ... +140 °F) temperature class T6

To 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 Gb/Gc  
Ex II 2/3 G Ex ic IIC T4/T5/T6 Gb/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:  
 $U_o = 24 \text{ V}$ ,  $I_o = 250 \text{ mA}$ ,  $P_o = 1.2 \text{ W}$

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

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

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

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

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

# Pressure Measurement

Pressure transmitters

for applications with advanced requirements (Advanced)

SITRANS P410

for differential pressure and flow

1

## Selection and Ordering data

Article No.

Order Code

**SITRANS P410 with HART pressure transmitters for differential pressure and flow, PN 160 (MAWP 2320 psi)**

7MF4433-

-Z C41

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

### Measuring cell filling

Silicone oil

### Measuring cell cleaning

normal

### Measuring span (min. ... max.)

2.5 ... 250 mbar (1.004 ... 100.4 inH<sub>2</sub>O)6 ... 600 mbar (2.409 ... 240.9 inH<sub>2</sub>O)16 ... 1600 mbar (6.424 ... 642.4 inH<sub>2</sub>O)50 ... 5000 mbar (20.08 ... 2008 inH<sub>2</sub>O)

0.3 ... 30 bar (4.35 ... 435 psi)

### Wetted parts materials

(stainless steel process flanges)

Seal diaphragm Parts of measuring cell

Stainless steel Stainless steel

Hastelloy Stainless steel

Hastelloy Hastelloy

Version for diaphragm seal<sup>1) 2) 3) 4)</sup>

### Process connection

Female thread 1/4-18 NPT with flange connection

- Sealing screw opposite process connection

- Mounting thread 7/16-20 UNF to IEC 61518/DIN EN 61518

- Mounting thread M10 to DIN 19213 (only for replacement requirement)

- Vent on side of process flange<sup>5)</sup>

- Mounting thread 7/16-20 UNF to IEC 61518/DIN EN 61518

- Mounting thread M10 to DIN 19213 (only for replacement requirement)

### Non-wetted parts materials

process flange screws Electronics enclosure

Stainless steel Die-cast aluminum

Stainless steel Stainless steel precision casting<sup>6)</sup>

### Version

- Standard version, German plate inscription, setting for pressure unit: bar

- International version, English plate inscription, setting for pressure unit: bar

- Chinese version, English plate inscription, setting for pressure unit: Pascal

All versions include DVD with compact operating instructions in various EU languages.

### Explosion protection

- None

- With ATEX, Type of protection:

- "Intrinsic safety (Ex ia)"

- "Explosion-proof (Ex d)"<sup>7)</sup>

- "Intrinsic safety and flameproof enclosure" (Ex ia + Ex d)<sup>8)</sup>

- "Ex nA/ic (Zone 2)"<sup>9)</sup>

- "Intrinsic safety, explosion-proof enclosure and dust explosion protection (Ex ia+ Ex d + Zone 1D/2D)"<sup>8)10)</sup>

- FM + CSA intrinsic safe (is) (pending)<sup>11)</sup>

- FM + CSA (is + ep) + Ex ia + Ex d (ATEX) + Zone 1D/2D<sup>8)10)11)</sup>

- With FM + CSA, Type of protection:

- "Intrinsic Safe and Explosion Proof (is + xp)"<sup>7)11)</sup>

1

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# Pressure Measurement


## Pressure 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>	<b>7MF4433-</b>  <b>-Z C41</b>	
<b>Electrical connection/cable entry</b>		<b>B</b>
• Screwed gland M20 x 1.5		<b>C</b>
• Screwed gland ½-14 NPT		<b>D</b>
• Device plug Han 7D (plastic enclosure) incl. mating connector <sup>12)13)</sup>		<b>F</b>
• Device plugs M12 (stainless steel) <sup>14)15)</sup>		
<b>Display</b>		<b>0</b>
• Without display		<b>1</b>
• Without visible display (display concealed, setting: mA)		<b>6</b>
• With visible display (setting: mA)		<b>7</b>
• with customer-specific display (setting as specified, Order code "Y21" or "Y22" required)		

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

Included in delivery of the device:

- Quick-start guide
- Sealing plug(s) or sealing screw(s) for the process flanges(s)

- 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 inspection 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 7MF443.-.Y.-..... and 7MF4900-1...-B
- The standard measuring cell filling for configurations with remote seals (Y) is silicone oil.
- Not suitable for connection of remote seal. Position of the top vent valve in the process flange (see dimensional drawing).
- Not in conjunction with Electrical connection "device plug Han 7D".
- Without cable gland, with blanking plug
- With enclosed cable gland Ex ia and blanking plug
- Configurations with device plugs Han and M12 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

Pressure 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
<a href="#">Click on the Article No. for the online configuration in the PIA Life Cycle Portal.</a>			
<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)			
600 mbar (240.9 inH <sub>2</sub> O)			
1600 mbar (642.4 inH <sub>2</sub> O)			
5 bar (2008 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		
Hastelloy	Stainless steel		
Hastelloy	Hastelloy		
Version as diaphragm seal 1) 2) 3) 4)			
<b>Process connection</b>			
Female thread 1/4-18 NPT with flange connection			
<ul style="list-style-type: none"> <li>Sealing screw opposite process connection               <ul style="list-style-type: none"> <li>Mounting thread 7/16-20 UNF to IEC 61518/DIN EN 61518</li> <li>Mounting thread M10 to DIN 19213 (only for replacement requirement)</li> </ul> </li> <li>Venting on side of process flanges 5)               <ul style="list-style-type: none"> <li>Mounting thread 7/16-20 UNF to IEC 61518/DIN EN 61518</li> <li>Mounting thread M10 to DIN 19213 (only for replacement requirement)</li> </ul> </li> </ul>			
<b>Non-wetted parts materials</b>			
process flange screws	Electronics enclosure		
Stainless steel	Die-cast aluminum		
Stainless steel	Stainless steel precision casting		
<b>Version</b>			
<ul style="list-style-type: none"> <li>Standard version, German plate inscription, setting for pressure unit: bar</li> <li>International version, English plate inscription, setting for pressure unit: bar</li> <li>Chinese version, English plate inscription, setting for pressure unit: Pascal</li> </ul> All versions include DVD with compact operating instructions in various EU languages.			
<b>Explosion protection</b>			
<ul style="list-style-type: none"> <li>None</li> <li>With ATEX, Type of protection:               <ul style="list-style-type: none"> <li>"Intrinsic safety (Ex ia)"</li> <li>"Explosion-proof (Ex d)"<sup>6)</sup></li> <li>"Intrinsic safety and flameproof enclosure" (Ex ia + Ex d)<sup>7)</sup></li> <li>"Ex nA/ic (Zone 2)"<sup>8)</sup></li> <li>"Intrinsic safety, explosion-proof enclosure and dust explosion protection (Ex ia + Ex d + Zone 1D/2D)<sup>7) 9)</sup> (not for DS III FF)</li> </ul> </li> <li>FM + CSA intrinsic safe (is) (pending)<sup>10)</sup></li> <li>FM + CSA (is + ep) + Ex ia + Ex d (ATEX) + Zone 1D/2D<sup>7)9)10)</sup></li> <li>With FM + CSA, Type of protection:               <ul style="list-style-type: none"> <li>"Intrinsic Safe and Explosion Proof (is + xp)<sup>8)10)</sup></li> </ul> </li> </ul>			
<b>Electrical connection/cable entry</b>			
<ul style="list-style-type: none"> <li>Screwed gland M20 x 1.5</li> <li>Screwed gland 1/2-14 NPT</li> <li>Device plugs M12 (stainless steel)<sup>11) 12)</sup></li> </ul>			

# Pressure Measurement

## Pressure transmitters

### for applications with advanced requirements (Advanced)

#### SITRANS P410

for differential pressure and flow

1

**Selection and Ordering data**

Article No.

Order code

**Pressure transmitters for differential pressure and flow PN 160 (MAWP 2320 psi)****SITRANS P410 with PROFIBUS PA (PA)**

7MF4434- - - - -Z C41

**SITRANS P410 with FOUNDATION Fieldbus (FF)**

7MF4435- - - - -Z C41

**Display**

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

0  
1  
6  
7

Included in delivery of the device:

- Quick-start guide
- Sealing plug(s) or sealing screw(s) for the process flanges(s)

- 1) When the manufacture'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 inspection 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 7MF443-...Y... and 7MF4900-1...-B
- 4) The standard measuring cell filling for configurations with remote seals (Y) is silicone oil.
- 5) Not suitable for connection of remote seal. Position of the top vent valve in the process flange (see dimensional drawing).
- 6) Without cable gland, with blanking plug.
- 7) With enclosed cable gland Ex ia and blanking plug.
- 8) Configurations with device plugs Han and M12 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, E or F.
- 12) M12 delivered without cable socket

# Pressure Measurement

Pressure transmitters

for applications with advanced requirements (Advanced)

SITRANS P410

for differential pressure and flow

1

Selection and Ordering data	Order code				Selection and Ordering data	Order code			
<i>Further designs</i> Add "-Z" to Article No. and specify Order code.		HART	PA	FF	<i>Further designs</i> Add "-Z" to Article No. and specify Order code.		HART	PA	FF
<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 the upper saturation limit of the 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 ½-14 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<sup>4)</sup></b> (only together with type of protection "Intrinsic safety" (transmitter 7MF4...-.....-B.. Ex ia) and IP66)	E01	✓	✓	✓
• FFBM (Kalrez, 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>5)</sup>	✓	✓	✓
<b>Device plugs<sup>1)</sup></b>					<b>Explosion protection "Explosion-proof" to NEPSI (China)</b> (only for transmitter 7MF4...-.....-D..)	E56 <sup>5)</sup>	✓	✓	✓
• Han 7D (metal)	A30	✓			<b>Explosion-proof "Zone 2" to NEPSI (China)</b> (only for transmitter 7MF4...-.....-E..)	E57 <sup>5)</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>5)</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>5)</sup>	✓	✓	✓
• Han 8D (metal)	A33	✓			<b>Ex-protection Ex ia according to EAC Ex (Russia)</b>	E80	✓	✓	✓
<b>Sealing screws (2 units)</b> ¼-18 NPT, with vent valve in mat. of process flanges	A40	✓	✓	✓	<b>Ex-protection Ex d according to EAC Ex (Russia)</b>	E81	✓	✓	✓
<b>Cable sockets for device plugs M12 (metal (CuZn))</b>	A50	✓	✓	✓	<b>Ex-protection Ex nA/ic (Zone 2) according to EAC Ex (Russia)</b>	E82	✓	✓	✓
<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	✓	✓	✓
• English	B11	✓	✓	✓	<b>Two coats of lacquer on enclosure 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>6)</sup> )	H03	✓	✓	✓
<b>English rating plate</b> Pressure units in inH <sub>2</sub> O and/or psi	B21	✓	✓	✓					
<b>Quality test certificate, 5-point factory calibration (IEC 60770-2)<sup>2)</sup></b>	C11	✓	✓	✓					
<b>Inspection certificate<sup>3)</sup> to EN 10204-3.1</b>	C12	✓	✓	✓					
<b>Factory certificate to EN 10204-2.2</b>	C14	✓	✓	✓					
<b>Inspection certificate (EN 10204-3.1)</b> PMI test of parts in contact with medium	C15	✓	✓	✓					
<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>PED for Russia with initial calibration mark</b>	C99	✓	✓	✓					

# Pressure Measurement

## Pressure transmitters

### for applications with advanced requirements (Advanced)

#### SITRANS P410

for differential pressure and flow

1

Selection and Ordering data	Order code			
<b>Further designs</b> Add "-Z" to Article No. and specify Order code.		HART	PA	FF
<b>Transient protector 6 kV (lightning protection)</b>	J01	✓	✓	✓
<b>Chambered graphite gasket for process flange</b>	J02	✓	✓	✓
<b>Chambered PTFE graphite gasket</b>	J03	✓	✓	✓
<b>EPDM O-rings for process flange with approval (WRC/WRAS)</b>	J05	✓	✓	✓
<b>Vent valve or blanking plug of process flange welded-in (orientation: on right when viewing the display)<sup>7)</sup></b>	J08	✓	✓	✓
<b>Vent valve or blanking plug of process flange welded-in (orientation: on left when viewing the display)<sup>7)</sup></b>	J09	✓	✓	✓
<b>Marine approvals</b>				
• Det Norske Veritas Germanischer Lloyd (DNV-GL)	S10	✓	✓	✓
• Lloyds Register (LR)	S11	✓	✓	✓
• French marine classification society Bureau Veritas (BV)	S12	✓	✓	✓
• American Bureau of Shipping (ABS)	S14	✓	✓	✓
• Russian Maritime Register (RMR)	S16	✓	✓	✓
• Korean Register of Shipping (KR)	S17	✓	✓	✓
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 1/253).				
✓ = available				
1) Device plug Han IP65				
2) When the manufacture'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.				
3) If the inspection certificate 3.1 is ordered for the transmitter with mounted diaphragm seals this certificate must also be ordered with the respective remote seals.				
4) Option does not contain gas explosion protection; only dust explosion protection: Use in or at Zone 1D/2D				
5) When the additional ex option is selected, the ATEX marking on the device is omitted. Only the Ex option selected via the Z option is marked.				
6) Not suitable for connection of remote seal.				
7) Blanking plug is standard configuration. Order option A40 if a vent valve is required instead of a blanking plug.				

Selection and Ordering data	Order code			
<b>Additional data</b> Please add "-Z" to Article No. and specify Order code(s) and plain text.		HART	PA	FF
<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 • in the case of square rooted characteristic (max. 5 characters): Y02: ... up to ... mbar, bar, kPa, MPa, psi	Y01 Y02	✓ ✓	✓ <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 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 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	✓	✓	✓
<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	✓		
<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

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

2) Preset values can only be changed over SIMATIC PDM.

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

# Pressure Measurement

Pressure 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 P DS III with HART pressure transmitters for differential pressure and flow, PN 420 (MAWP 6092 psi)</b>		7MF4533-	-Z C41
<a href="#">Click on the Article No. for the online configuration in the PIA Life Cycle Portal.</a>			
<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 <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			
- Mounting thread 7/16-20 UNF to IEC 61518/DIN EN 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/DIN EN 61518		7	
- Mounting thread M12 to DIN 19213 (only for replacement requirement)		5	
<b>Non-wetted parts materials</b>			
process flange screws	Electronics enclosure		
Stainless steel	Die-cast aluminum	2	
Stainless steel	Stainless steel precision casting <sup>5)</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 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>			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>			S
• With FM + CSA, Type of protection:			
- "Intrinsic safety and explosion-proof (is + xp) <sup>6)10)</sup> , max PN 360			NC
<b>Electrical connection/cable entry</b>			
• Screwed gland M20x1.5			B
• Screwed gland 1/2-14 NPT			C
• Device plug Han 7D (plastic enclosure) incl. mating connector <sup>11) 12)</sup>			D
• Device plugs M12 (stainless steel) <sup>13)14)</sup>			F

# Pressure Measurement

## Pressure 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 P DS III with HART pressure transmitters for differential pressure and flow, PN 420 (MAWP 6092 psi)</b>	<b>7MF4533-</b>  <b>-</b>  <b>-Z C41</b>	
<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".

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

- 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 inspection 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 7MF453-...Y.-... and 7MF4900-1...-B
- 4) The standard measuring cell filling for configurations with remote seals (Y) is silicone oil.
- 5) Not in conjunction with Electrical connection "device plug Han 7D".
- 6) Without cable gland, with blanking plug
- 7) With enclosed cable gland Ex ia and blanking plug
- 8) Configurations with device plugs Han and M12 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) Permissible only for crimp-contact of conductor cross-section 1 mm<sup>2</sup>
- 13) Only in connection with Ex approval A, B, E or F.
- 14) M12 delivered without cable socket.

# Pressure Measurement

Pressure transmitters

for applications with advanced requirements (Advanced)

SITRANS P410

for differential pressure and flow

1

## Selection and Ordering data

Article No.

Order Code

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

**SITRANS P410 with PROFIBUS PA (PA)**

7MF4534- - - -Z C41

**SITRANS P410 with FOUNDATION Fieldbus (FF)**

7MF4535- - - -Z C41

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

### Measuring cell filling

Silicone oil

### Measuring cell cleaning

normal

### Nominal measuring range

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)

### Wetted parts materials

(stainless steel process flanges)

Seal diaphragm	Parts of measuring cell
----------------	-------------------------

Stainless steel	Stainless steel
-----------------	-----------------

Hastelloy	Stainless steel
-----------	-----------------

Version for diaphragm seal	<sup>1)</sup> <sup>2)</sup> <sup>3)</sup> <sup>4)</sup>
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### Process connection

Female thread 1/4-18 NPT with flange connection

- Sealing screw opposite process connection
  - Mounting thread 7/16-20 UNF to IEC 61518/DIN EN 61518
  - 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).
  - Mounting thread 7/16-20 UNF to IEC 61518/DIN EN 61518
  - Mounting thread M12 to DIN 19213 (only for replacement requirement)

### Non-wetted parts materials

Process flange screws	Electronics enclosure
-----------------------	-----------------------

Stainless steel	Die-cast aluminum
-----------------	-------------------

Stainless steel	Stainless steel precision casting
-----------------	-----------------------------------

### Version

- Standard version, German plate inscription, setting for pressure unit: bar
  - International version, English plate inscription, setting for pressure unit: bar
  - Chinese version, English plate inscription, setting for pressure unit: Pascal
- All versions include DVD with compact operating instructions in various EU languages.

### Explosion protection

- None
- With ATEX, Type of protection:
  - "Intrinsic safety (Ex ia)"
  - "Explosion-proof (Ex d)<sup>4)</sup>"
  - "Intrinsic safety and flameproof enclosure" (Ex ia + Ex d)<sup>6)</sup>
  - "Ex nA/ic (Zone 2)"<sup>7)</sup>
  - "Intrinsic safety, explosion-proof enclosure and dust explosion protection (Ex ia + Ex d + Zone 1D/2D)<sup>6)8)</sup>"
- FM + CSA intrinsic safe (is) (pending)<sup>9)</sup>
- FM + CSA (is + ep) + Ex ia + Ex d (ATEX) + Zone 1D/2D<sup>6)7)9)</sup>
- With FM + CSA, Type of protection:
  - "Intrinsic safety and explosion-proof (is + xp)<sup>6)9)</sup>, max PN 360

### Electrical connection/cable entry

- Screwed gland M20 x 1.5
- Screwed gland 1/2-14 NPT
- Device plugs M12 (stainless steel)<sup>10) 11)</sup>

1

E  
F  
G  
HA  
B  
Y3  
17  
52  
31  
2  
3A  
B  
D  
P  
E  
R  
F  
S  
NCB  
C  
F

# Pressure Measurement















## Pressure 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 420 (MAWP 6092 psi)</b>		
<b>SITRANS P410 with PROFIBUS PA (PA)</b>	<b>7MF4534-</b>              	

# Pressure Measurement

Pressure transmitters  
for applications with advanced requirements (Advanced)  
SITRANS P410

for differential pressure and flow

1

Selection and Ordering data	Order code			Selection and Ordering data	Order code		
<i>Further designs</i>	HART	PA	FF	<i>Further designs</i>	HART	PA	FF
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<sup>2)</sup></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>Ex prot. "Explosion-proof" to NEPSI (China)</b> (only for transmitter 7MF4...-.....-D..)	E56 <sup>3)</sup>	✓	✓
<b>O-rings for process flanges</b> (instead of FPM (Viton))				<b>Explosion-proof "Zone 2" to NEPSI (China)</b> (only for transmitter 7MF4...-.....-E..)	E57 <sup>3)</sup>	✓	✓
• PTFE (Teflon)	A20	✓	✓	<b>Ex protection „Ex ia", „Ex d" and „Zone 2" to NEPSI (China)</b> (only for transmitter 7MF4...-.....-R..)	E58 <sup>3)</sup>	✓	✓
• FEP (with silicone core, approved for food)	A21	✓	✓	<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>	✓	✓
• FPM (Kalrez, for measured medium temperatures -15 ... 100 °C (5 ... 212 °F))	A22	✓	✓	<b>Ex-protection Ex ia according to EAC Ex (Russia)</b>	E80	✓	✓
• NBR (Buna N)	A23	✓	✓	<b>Ex-protection Ex d according to EAC Ex (Russia)</b>	E81	✓	✓
<b>Device plugs<sup>1)</sup></b>				<b>Ex-protection Ex nA/ic (Zone 2) according to EAC Ex (Russia)</b>	E82	✓	✓
• Han 7D (metal)	A30	✓		<b>Ex-protection Ex ia + Ex d + Zone 1D/2D according to EAC Ex (Russia)</b>	E83	✓	✓
• Han 8D (instead of Han 7D)	A31	✓		<b>Two coats of lacquer on enclosure and cover (PU on epoxy)</b>	G10	✓	✓
• Angled	A32	✓		<b>Interchanging of process connection side</b>	H01	✓	✓
• Han 8D (metal)	A33	✓		<b>Vent on side for gas measurements</b>	H02	✓	✓
<b>Sealing screws (2 units)</b> ¼-18 NPT, with vent valve in mat. of process flanges	A40	✓	✓	<b>Stainless steel process flanges for vertical differential pressure lines</b>	H03	✓	✓
<b>Cable sockets for device plugs M12 (metal (CuZn))</b>	A50	✓	✓	<b>Transient protector 6 kV (lightning protection)</b>	J01	✓	✓
<b>Rating plate inscription</b> (instead of German)				<b>Chambered graphite gasket for process flange</b>	J02	✓	✓
• English	B11	✓	✓	<b>Chambered PTFE graphite gasket</b>	J03	✓	✓
• French	B12	✓	✓	<b>EPDM O-rings for process flange with approval (WRC/WRAS)</b>	J05	✓	✓
• Spanish	B13	✓	✓	<b>Vent valve or blanking plug of process flange welded-in (orientation: on right when viewing the display)<sup>4)</sup></b>	J08	✓	✓
• Italian	B14	✓	✓	<b>Vent valve or blanking plug of process flange welded-in (orientation: on left when viewing the display)<sup>4)</sup></b>	J09	✓	✓
<b>English rating plate</b> Pressure units in inH <sub>2</sub> O and/or psi	B21	✓	✓	<b>Marine approvals</b>			
<b>Quality test certificate, 5-point factory calibration (IEC 60770-2)</b>	C11	✓	✓	• Det Norske Veritas Germanischer Lloyd (DNV-GL)	S10	✓	✓
<b>Inspection certificate</b> Acc. to EN 10204-3.1	C12	✓	✓	• Lloyds Register (LR)	S11	✓	✓
<b>Factory certificate</b> Acc. to EN 10204-2.2	C14	✓	✓	• French marine classification society Bureau Veritas (BV)	S12	✓	✓
<b>Functional safety (SIL2) (pending)</b> Devices suitable for use according to IEC 61508 and IEC 61511. Includes SIL conformity declaration	C20	✓		• American Bureau of Shipping (ABS)	S14	✓	✓
<b>Functional safety (SIL2/3)</b> Devices suitable for use according to IEC 61508 and IEC 61511. Includes SIL conformity declaration	C23	✓		• Russian Maritime Register (RMR)	S16	✓	✓
<b>Increased measuring accuracy</b> (mandatory specification for SITRANS P410)	C41	✓	✓	• Korean Register of Shipping (KR)	S17	✓	✓
<b>PED for Russia with initial calibration mark</b>	C99	✓	✓	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 1/253).			
<b>Setting of the upper saturation limit of the output signal to 22.0 mA</b>	D05	✓					
<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	✓	✓				
<b>Degree of protection IP66/IP68</b> (only for M20 x 1.5 and ½-14 NPT)	D12	✓	✓				
<b>Capri cable gland 4F CrNi and clamping device (848699 + 810634) included</b>	D59	✓	✓				
<b>TAG plate empty (no inscription)</b>	D61	✓	✓				

1) Device plug Han IP65

2) Option does not contain gas explosion protection; only dust explosion protection: Use in or at Zone 1D/2D.

3) When the additional ex option is selected, the ATEX marking on the device is omitted. Only the Ex option selected via the Z option is marked.

4) Blanking plug is standard configuration. Order option A40 if a vent valve is required instead of a blanking plug.

Selection and Ordering data	Order code		
Additional data	HART	PA	FF
Please add <b>"-Z"</b> 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 • in the case of square rooted characteristic (max. 5 characters): Y02: ... up to ... mbar, bar, kPa, MPa, psi	Y01 Y02	✓ ✓	✓ <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 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

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

2) Preset values can only be changed over SIMATIC PDM.

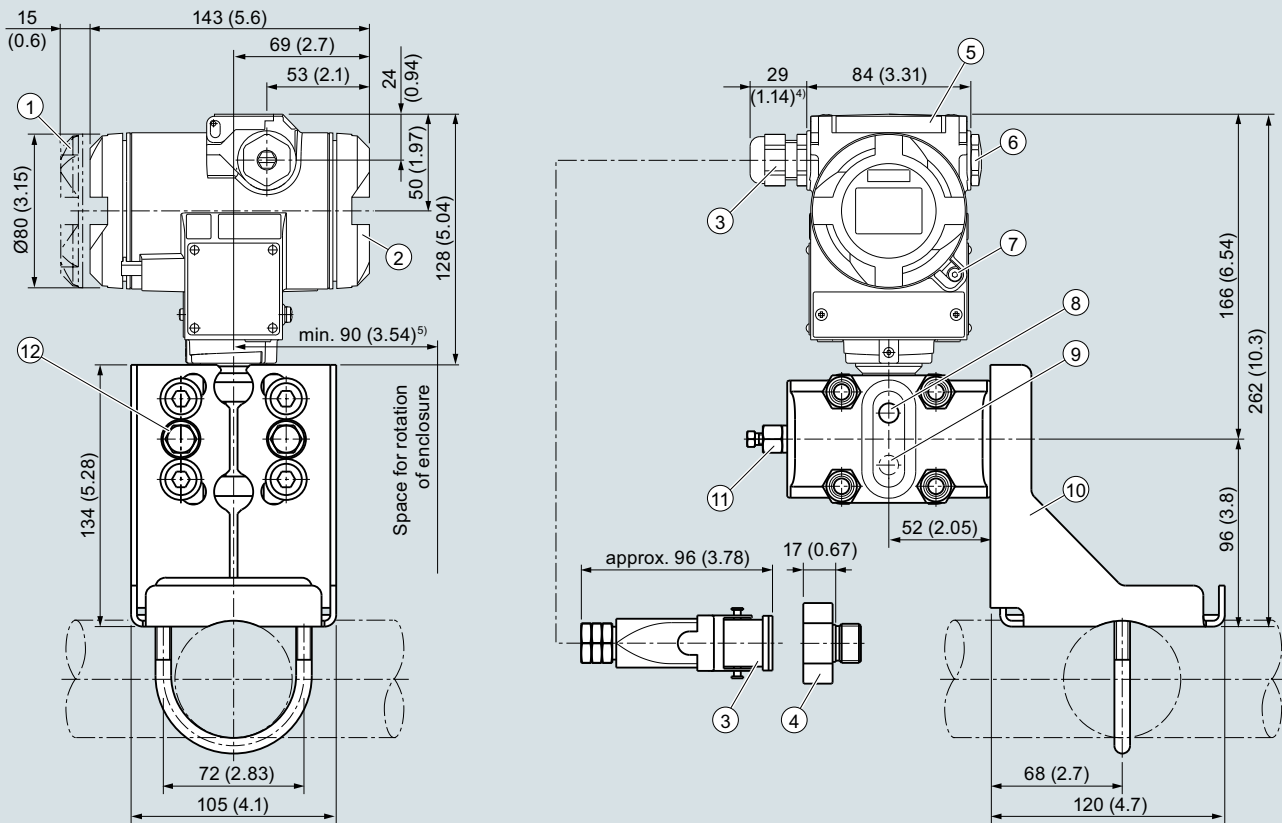
# Pressure Measurement

Pressure transmitters  
for applications with advanced requirements (Advanced)  
SITRANS P410

for differential pressure and flow

1

## Dimensional drawings

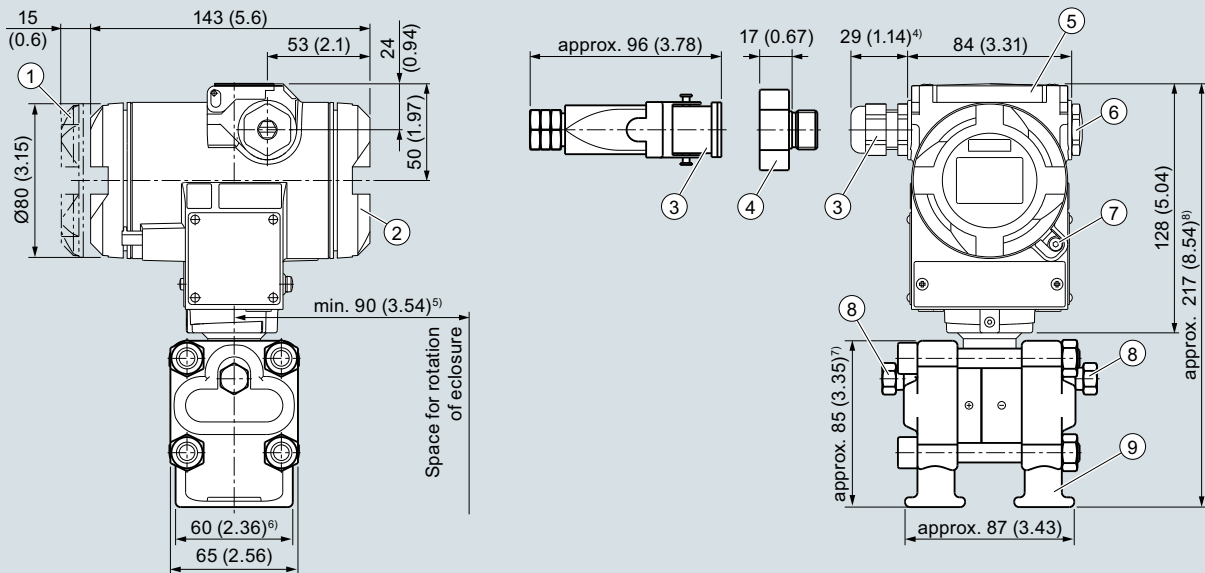


- ① Electronics side, local display  
(longer overall length for cover with inspection window)<sup>1)</sup>
- ② Connection side<sup>1)</sup>
- ③ Electrical connection:
  - Pg 13.5 screw gland (adapter)<sup>2) 3)</sup>
  - M20 x 1,5 screw gland
  - ½-14 NPT screw gland
  - Han 7D/Han 8D<sup>2) 3)</sup> device plug
- ④ Harting adapter
- ⑤ Cover over buttons

- ⑥ Blanking plug
- ⑦ Safety catch (only for "flameproof enclosure" type of protection; not shown in the drawing)
- ⑧ Lateral ventilation for liquid measurement (Standard)
- ⑨ Lateral ventilation for gas measurement (order option H02)
- ⑩ Mounting bracket (optional)
- ⑪ Sealing plug with valve (optional)
- ⑫ Process connection: ¼-18 NPT (IEC 61518)

- <sup>1)</sup> In addition, allow approx. 20 mm (0.79 inch) for the thread length
- <sup>2)</sup> Not with "flameproof enclosure" type of protection
- <sup>3)</sup> Not for type of protection "FM + CSA" [is + XP]"
- <sup>4)</sup> For Pg 13.5 with adapter, approx. 45 mm (1.77 inch)
- <sup>5)</sup> 92 mm (3.62 inch) minimum distance for rotating with indicator

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



- ① Electronics side, local display (longer overall length for cover with inspection window)<sup>1)</sup>
- ② Connection side<sup>1)</sup>
- ③ Electrical connection:
  - Pg 13.5 screw gland (adapter)<sup>2)</sup>
  - M20 x 1,5 screw gland
  - ½-14 NPT screw gland
  - Han 7D/Han 8D<sup>2)</sup> device plug
- ④ Harting adapter

- ⑤ Cover over buttons
- ⑥ Blanking plug
- ⑦ Safety catch (only for "flameproof enclosure" type of protection; not shown in the drawing)
- ⑧ Sealing plug with valve (optional)
- ⑨ Process connection: ¼-18 NPT (IEC 61518)

- <sup>1)</sup> In addition, allow approx. 20 mm (0.79 inch) for the thread length
- <sup>2)</sup> Not with "flameproof enclosure" type of protection
- <sup>3)</sup> Not for type of protection "FM + CSA" [is + XPJ]"
- <sup>4)</sup> For Pg 13.5 with adapter, approx. 45 mm (1.77 inch)
- <sup>5)</sup> 92 mm (3.62 inch) minimum distance for rotating with indicator
- <sup>6)</sup> 74 mm (2.9 inch) for PN ≥ 420 (MAWP ≥ 6092 psi)
- <sup>7)</sup> 91 mm (3.6 inch) for PN ≥ 420 (MAWP ≥ 6092 psi)
- <sup>8)</sup> 219 mm (8.6 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

# Pressure Measurement

Pressure transmitters

for applications with advanced requirements (Advanced)

SITRANS P410

## Accessories/Spare parts

1

Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
<i>Accessories/Spare parts</i>			
<b>Mounting bracket and fastening parts</b> for pressure transmitters SITRANS P410 with HART, P410 with PROFIBUS PA and P410 with FOUNDATION Fieldbus (7MF403-.....-..C.) <ul style="list-style-type: none"> <li>made of steel</li> <li>made of stainless steel 304/1.4301</li> <li>made of stainless steel 316L/1.4404</li> </ul>	<b>7MF4997-1AB</b> <b>7MF4997-1AH</b> <b>7MF4997-1AP</b>	<b>Mounting screws</b> For measuring point label, grounding and connection terminals or for display (50 units)	<b>7MF4997-1CD</b>
<b>Mounting bracket and fastening parts</b> for pressure transmitters SITRANS P410 with HART, P410 with PROFIBUS PA and P10with FOUNDATION Fieldbus (7MF403-.....-..A., ..B., ..D. and ..F.) <ul style="list-style-type: none"> <li>made of steel</li> <li>made of stainless steel 304/1.4301</li> <li>made of stainless steel 316L/1.4404</li> </ul>	<b>7MF4997-1AC</b> <b>7MF4997-1AJ</b> <b>7MF4997-1AQ</b>	<b>Sealing screws</b> (1 set = 2 units) for process flange <ul style="list-style-type: none"> <li>made of stainless steel</li> <li>made of Hastelloy</li> </ul>	<b>7MF4997-1CG</b> <b>7MF4997-1CH</b>
<b>Mounting and fastening brackets</b> For differential pressure transmitters with flange thread M10 SITRANS P410 with HART, P410 with PROFIBUS PA and P410 with FOUNDATION Fieldbus (7MF443-....) <ul style="list-style-type: none"> <li>made of steel</li> <li>made of stainless steel 304/1.4301</li> <li>made of stainless steel 316L/1.4404</li> </ul>	<b>7MF4997-1AD</b> <b>7MF4997-1AK</b> <b>7MF4997-1AR</b>	<b>Sealing screws with vent valve</b> Complete (1 set = 2 units) <ul style="list-style-type: none"> <li>made of stainless steel</li> <li>made of Hastelloy</li> </ul>	<b>7MF4997-1CP</b> <b>7MF4997-1CQ</b>
<b>Mounting and fastening brackets</b> For differential pressure transmitters with flange thread M12 SITRANS P410 with HART, P410 with PROFIBUS PA and P410 with FOUNDATION Fieldbus (7MF453-....) <ul style="list-style-type: none"> <li>made of steel</li> <li>made of stainless steel 304/1.4301</li> <li>made of stainless steel 316L/1.4404</li> </ul>	<b>7MF4997-1AE</b> <b>7MF4997-1AL</b> <b>7MF4997-1AS</b>	<b>Connection board</b> <ul style="list-style-type: none"> <li>for SITRANS P410</li> <li>for SITRANS P410 with PROFIBUS PA and P410 with FOUNDATION Fieldbus</li> </ul>	<b>7MF4997-1DN</b> <b>7MF4997-1DP</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-....) <ul style="list-style-type: none"> <li>made of steel</li> <li>made of stainless steel 304/1.4301</li> <li>made of stainless steel 316L/1.4404</li> </ul>	<b>7MF4997-1AF</b> <b>7MF4997-1AM</b> <b>7MF4997-1AT</b>	<b>O-rings for process flanges made of:</b> <ul style="list-style-type: none"> <li>FPM (Viton)</li> <li>PTFE (Teflon)</li> <li>FEP (with silicone core, approved for food)</li> <li>FFPM (Kalrez)</li> <li>NBR (Buna N)</li> </ul>	<b>7MF4997-2DA</b> <b>7MF4997-2DB</b> <b>7MF4997-2DC</b> <b>7MF4997-2DD</b> <b>7MF4997-2DE</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 <ul style="list-style-type: none"> <li>without window</li> <li>with window</li> </ul>	<b>7MF4997-1BB</b> <b>7MF4997-1BE</b>	<b>Sealing ring</b> for process connection	see "Fittings"
<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 <ul style="list-style-type: none"> <li>without window</li> <li>with window</li> </ul>	<b>7MF4997-1BC</b> <b>7MF4997-1BF</b> <b>7MF4997-1BR</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> <ul style="list-style-type: none"> <li>without inscription (5 units)</li> <li>Printed (1 unit) Data according to Y01 or Y02, Y15, Y16 and Y99 (see "Pressure transmitters")</li> </ul>	<b>7MF4997-1CA</b> <b>7MF4997-1CB-Z</b> <b>Y..: .....</b>		

Selection and Ordering data	Article No.
<p><b>Documentation</b></p> <p>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></p> <p>Compact operating instructions SITRANS P DS III/P410</p> <ul style="list-style-type: none"> <li>English, German, Spanish, French, Italian, Dutch</li> </ul>	<b>A5E03434626</b>
<p><b>Certificates (order only via SAP)</b> instead of Internet download</p> <ul style="list-style-type: none"> <li>hard copy (to order)</li> <li>on DVD (to order)</li> </ul>	<b>A5E03252406</b> <b>A5E03252407</b>
<p><b>HART modem</b> with USB interface</p>	<b>7MF4997-1DB</b>

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

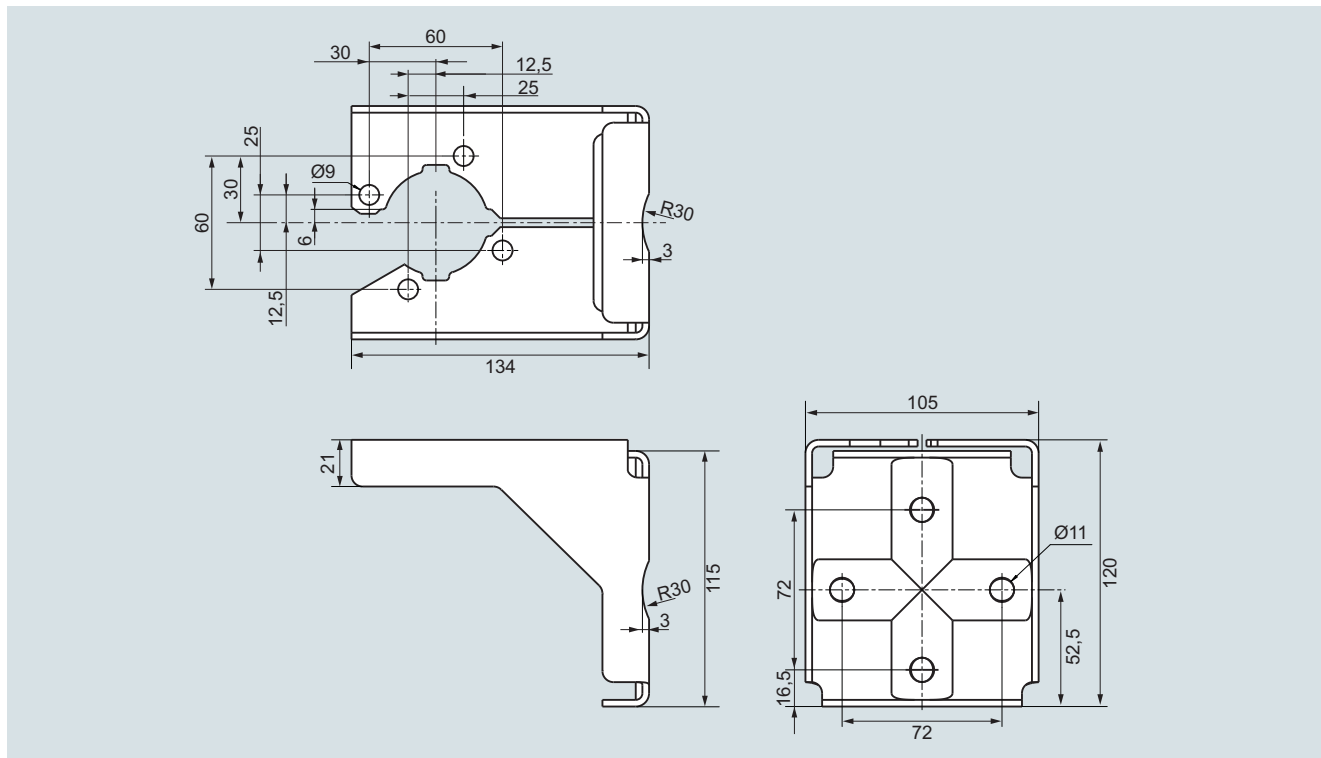
## Pressure Measurement

Pressure transmitters  
for applications with advanced requirements (Advanced)  
SITRANS P410

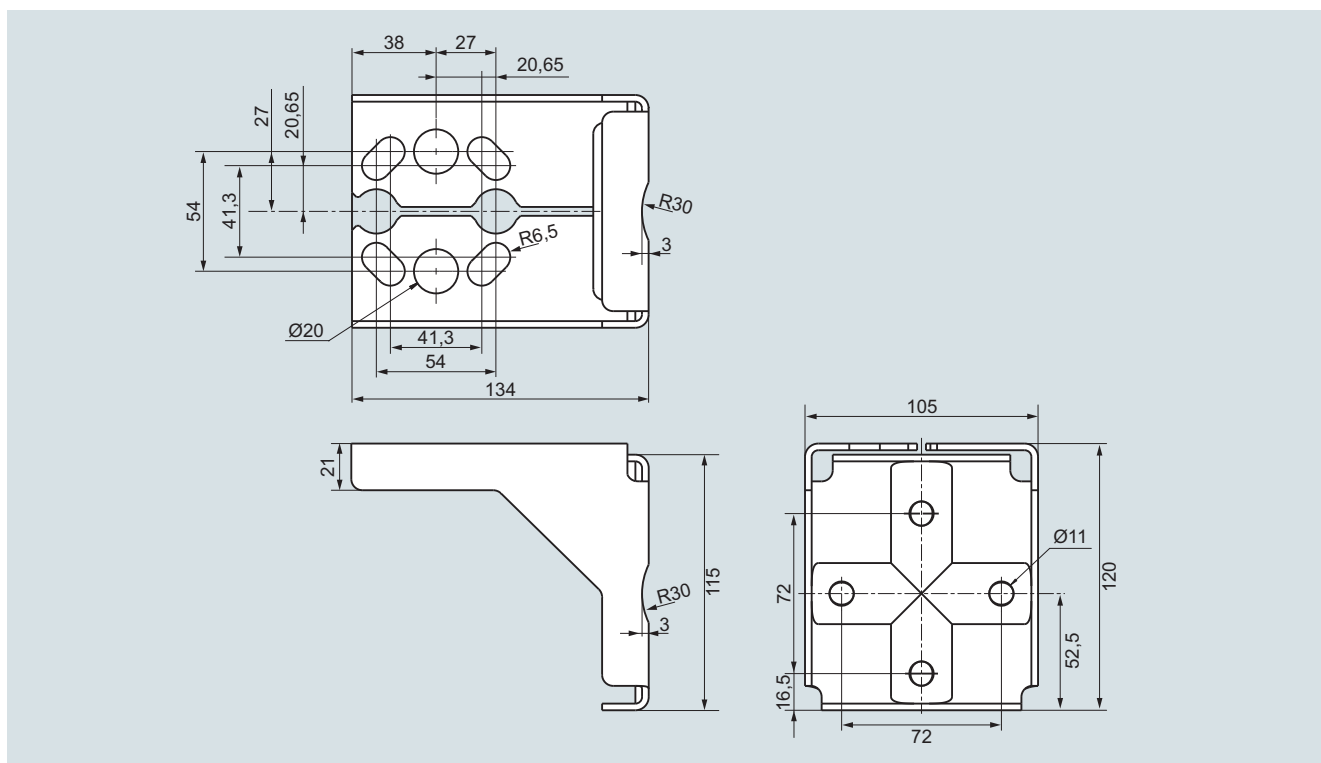
### Accessories/Spare parts

1

### 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)