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MK II series

Overview

SITRANS P pressure transmitters, MK II series, with built-in analog indicator

SITRANS P pressure transmitters, MK II series, measure the pressure of aggressive and non-aggressive gases, vapors and liquids.

They are precise and robust pressure transmitters of compact design.

These pressure transmitters are available in numerous versions and with a wide range of accessories.

Benefits

- Robust and compact design
- High measuring accuracy
- Conformity error ≤ 0.25%
- Wetted parts made of stainless steel 1.4404/316L
- Measuring range 0.23 ... 160 bar (3.34 ... 2320 psi)
- Ex protection to ATEX and FM/CSA

Application

SITRANS P pressure transmitters, MK II series, are used mainly in the following branches:

- Chemical industry
- Petrochemical industry
- Power engineering
- Pharmaceutical industry

Transmitters with the type of protection "Intrinsic safety" may be installed within potentially explosive atmospheres (zone 1). The conformity certificate corresponds to the European standard (ATEX).

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

Design

SITRANS P pressure transmitters, MK II series, 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 (3, Figure "Front view") with the Order No. is located on the side of the housing. The specified number together with the ordering information provide details on the optional design details and on the possible measuring range (physical properties of built-in sensor element).

The approval label is located on the opposite side.

The housing is made of die-cast aluminium or stainless steel precision casting. A round cover (5) is screwed on at the front and rear of the housing. The pressure transmitter can be optionally equipped with an analog indicator (6). The inlet (4) for the electrical connection is located either on the left or right side. The unused opening on the opposite side is sealed by a blanking plug. The protective earth connection is located on the rear of the housing.

The electrical connections for the power supply and screen are accessible by unscrewing the rear cover. The bottom part of the housing contains the measuring cell with process connection (1). The measuring cell is protected from rotating by a locking screw.

Function

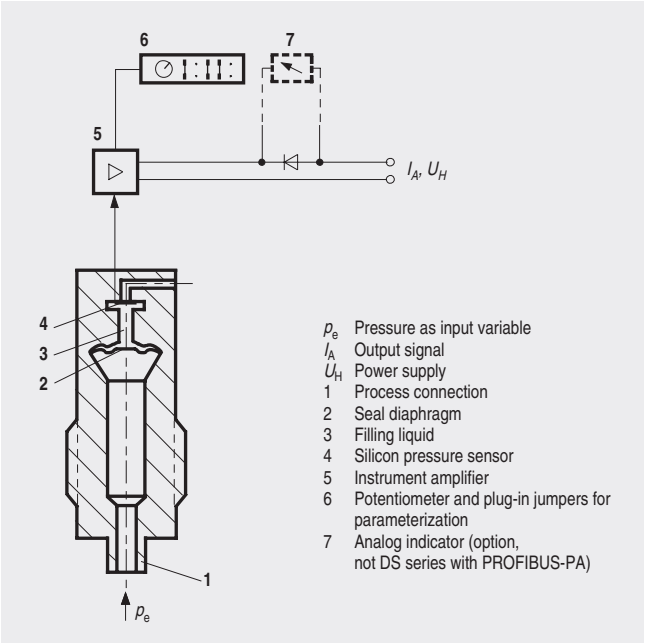
Mode of operation

The pressure is applied through the seal diaphragm (2, Figure "Functional diagram") and the filling liquid (3) to the silicon pressure sensor (4) whose measuring diaphragm is then flexed. The resistance of the four piezo-resistors fitted in the diaphragm in a bridge circuit thus changes.

This change in resistance results in a bridge output voltage proportional to the absolute pressure, which is amplified in the instrument amplifier and converted directly into an output current 4 to 20 mA.

The pressure transmitters with spans ≤ 63 bar (≤ 914 psi) measure the input pressure compared to atmospheric

The pressure transmitters with span 160 bar (2320 psi) measure the input pressure compared to vacuum



SITRANS P pressure transmitters, MK II series, functional diagram

Parameterization

The transmitter parameters are set using potentiometers and plug-in jumpers (6, Figure "Functional diagram").

The following parameters can be set and displayed:

- Start-of-scale and full-scale values with application of a pressure
- Damping

Technical specifications

SITRANS P pressure transmitters, MK II series

Mode of operation	
Measuring principle	Piezo-resistive
Input	
Measured variable	Pressure
Measured range	
Measured span	Maximum working pressure
0.23 ... 1 bar (3.34 ... 14.5 psi)	6 bar (87 psi)
0.89 ... 4 bar (12.9 ... 58 psi)	10 bar (145 psi)
3.55 ... 16 bar (51.5 ... 232 psi)	32 bar (464 psi)
14.0 ... 63 bar (203 ... 914 psi)	100 bar (1450 psi)
35.6 ... 160 bar (516 ... 2320 psi)	250 bar (3626 psi)
• Lower measuring limit	
- Measuring cell with silicone oil filling	30 mbar (0.435 psi) absolute
• Upper measuring limit	100% of max. span
• Start-of-scale (cont. adjustable)	+20 ... -13% of max. span
Output	
Output signal	4 ... 20 mA
Voltage measurement	Linear rising

Measuring accuracy	
Reference conditions	Increasing characteristic Start-of-scale value 0 bar Stainless steel seal diaphragm Silicone oil filling Limit setting r: Span ratio (r = max. span / set span)
Error in measurement (including hysteresis and repeatability)	≤ 0,25%
Long-term drift	≤ 0.2% in 12 months with max. span
Influence of ambient temperature	
Temperature range:	
• -10 ... +60 °C (14 ... 140 °F)	≤ (0.6·r + 0.6)% With 1 bar (14.5 psi) cell: ≤ (1.2·r + 0.6)%
• -40 ... -10 °C (-40 ... +14 °F) and 60 ... 85 °C (140 ... 185 °F)	≤ (0.2·r + 0.15)% / 10 K (≤ (0.2·r + 0.15)% / 18 °F)
Rated conditions	
Degree of protection (to EN 60529)	IP65
Process temperature	-30 ... +100 °C (-22 ... +212 °F)
Design	
Weight (without options)	≈ 1.5 kg (≈ 3.3 lb)
Wetted parts materials	
• Connection shank	Stainless steel, mat. No. 1.4404/316L
• Seal diaphr.	Stainless steel, mat. No. 1.4404/316L
Measuring cell filling	Silicone oil
Process connection	Connection shank G½A to DIN EN 837-1, female thread ½ -14 NPT
Electrical connection	Screw terminals, cable inlet through screwed gland Pg 13.5 (adapter), M20x 1.5 or ½-14 NPT, or Han 7D / Han 8U plug
Power supply U_H	
Terminal voltage on pressure transmitter	10.5 ... 45 V DC 10.5 ... 30 V DC in intrinsically-safe mode
Certificate and approvals	
Classification according to pressure equipment directive (DGRL 97/23/EC):	For gases of fluid group 1 and liquids of fluid group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice)
Explosion protection	
• Intrinsic safety "i"	PTB 98 ATEX 2003
- Identification	Ex II 1/2 G EEx ia/ib IIC T4
- Perm. ambient temperature	-30 ... +80 °C (-22 ... +176 °F)
- Connection	To certified intrinsically-safe circuits with maximum values: U_i = 30 V, I_i = 100 mA, P_i = 750 mW
- Effective internal inductance/capacitance	L_i = 0.75 mH, C_i = 21 nF
• Explosion-proof "d"	PTB 99 ATEX 1160
- Identification	Ex II 1/2 G EEx d IIC T4/T6
- Permissible ambient temperature	-30 ... +85 °C (-22 ... +185 °F) temperature class T4; -30 ... +60 °C (-22 ... +140 °F) temperature class T6
- Connection	To circuits with values: U_H = 10.5 ... 45 V DC

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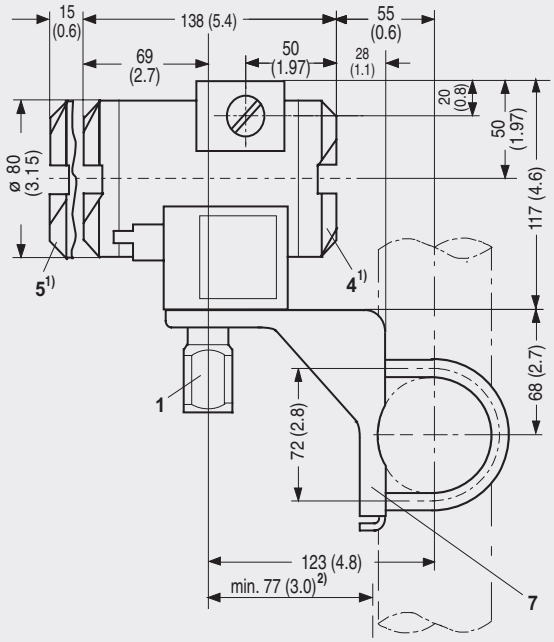
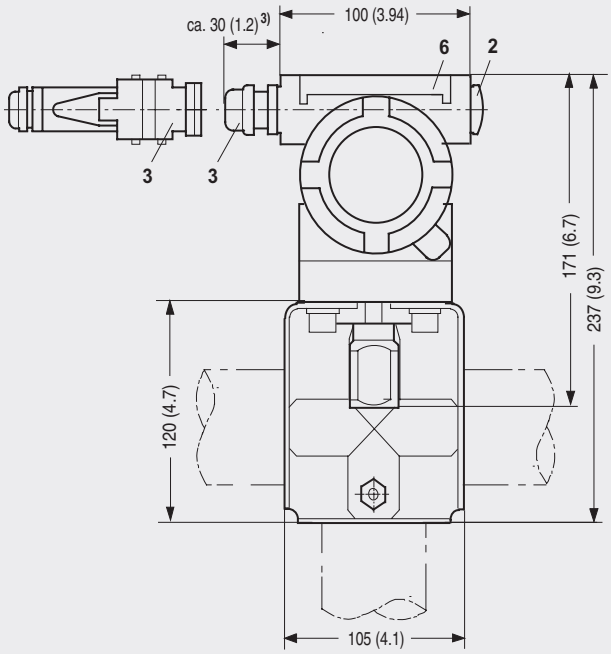
• Explosion protection to FM	Certificate of Compliance 3008490
- Identification (XP/DIP) or (IS); (NI)	CL I, DIV 1, GP ABCD T4; CL II, DIV 1, GP EFG; CL III; CL I, ZN 0/1 AEx ia IIC T4; CL I, DIV 2, GP ABCD T4; CL II, DIV 2, GP FG; CL III
• Explosion protection to CSA	Certificate of Compliance 2000.1153651
- Identification (XP/DIP) or (IS)	CL I, DIV 1, GP ABCD T4; CL II, DIV 1, GP EFG; CL III; Ex ia IIC T4; CL I, DIV 2, GP ABCD T4; CL II, DIV 2, GP FG; CL III

Dimensional drawings





1 Process connection:
- ½-14 NPT or
- connection shank G½A

2 Blanking plug

3 Electrical connection:
- screwed gland Pg 13,5 (adapter) 4),
- screwed gland M20x1,5 4),
- screwed gland ½-14 NPT or
- Han 7D / Han 8U plug 4)

4 Terminal side, analog indicator as option

5 Electronics side

6 Protective cover over keys

7 Mounting bracket (option)

1) Allow approx. 20 mm (0.79 inch) thread length to permit unscrewing

2) Minimum distance for rotation

3) 45 mm (1.8 inch) for Pg 13,5 with adapter

4) Not with type of protection "FM + CSA [is + xp]"

SITRANS P pressure transmitters, MK II series, dimensional drawing, dimensions in mm (inch)

Selection and Ordering data		Order No.
SITRANS P pressure transmitter for pressure MK II series		7MF4010-
2-wire system, Instruction Manual (in same language as rating plate; see "Further designs")		-1
Measuring cell filling	**Measuring cell cleaning**	
Silicone oil	Standard	1
Measured span		
0.23 ... 1 bar	(3.34 ... 14.5 psi)	B
0.89 ... 4 bar	(12.9 ... 58 psi)	C
3.55 ... 16 bar	(51.5 ... 232 psi)	D
14.0 ... 63 bar	(203 ... 914 psi)	E
35.6 ... 160 bar	(516 ... 2320 psi)	F
Wetted parts materials		
Seal diaphragm	Connection shank	
Stainless steel	Stainless steel	A
Version for diaphragm seal		Y0
Process connection		
• Connection shank G½B to EN 837-1		0
• Female thread ½-14 NPT		1
Non-wetted parts materials		
Housing made of die-cast aluminium		0
Explosion protection		
• without		A
• with ATEX, Type of protection:		
- "Intrinsic safety (EEx ia)"		B
- "Explosion-proof (EEx d)" [1]		D
- "Intrinsic safety and explosion-proof enclosure (EEx ia + EEx d)" [2]		P
- "Intrinsic safety, explosion-proof enclosure and dust explosion protection (EEx ia + EEx d + zone 1D/2D)" [2]		R
• with FM + CSA, Type of protection:		
- "Intrinsic safety and explosion-proof (is + xp)" [1]		NC
Electrical connection / cable inlet		
• Screwed gland Pg 13.5 (adapter)		A
• Screwed gland M20x1.5		B
• Screwed gland ½-14 NPT		C
• Han 7D plug (plastic housing) incl. mating connector		D
Display		
• without		1
• Housing cover with analog indicator, scale 0 ... 100%, linear divisions		3

Power supply units see "SITRANS I power supply units and input isolators".

Included in delivery of the device:
- Brief instructions (Leporello)
- CD-ROM with detailed documentation

1) Without cable gland, with blanking plug
2) With enclosed cable gland EEx ia and blanking plug

Further designs	Order code
Please add "-Z" to Order No. and specify Order code.	
Pressure transmitter with mounting bracket made of:	
• Steel	**A01**
• Stainless steel	**A02**
Plug	
• Han 7D (metal, gray)	**A30**
• Han 8U (instead of Han 7D)	**A31**
Rating plate inscription (instead of German)	
• English	**B11**
• French	**B12**
• Spanish	**B13**
• Italian	**B14**
English rating plate Pressure units in H_2O or psi	**B21**
Manufacturer's test certificate M (calibration certificate) to DIN 55350, Part 18 4.2.2 and to ISO 9001	**C11**
Factory certificate to DIN 50049-2.2/EN 10204-2.2	**C14**
use at zone 0 (only together with type of protection "Intrinsic safety (EEx ia)"	**E02**
Additional data	
Measuring range to be set specify in plain text: Y01: ... to ... mbar, bar, kPa, MPa, psi	**Y01**
Measuring point number/identification max. 16 characters, specify in plain text: Y15:	**Y15**
Measuring point text max. 27 characters, specify in plain text: Y16:	**Y16**

Only the settings for "Y01" can be made in the factory

Ordering example

Item line:	7MF4010-1EA00-1AA5-Z
B line:	A01 + Y01 + Y20
C line:	Y01: 10 ... 20 bar (145 ... 290 psi)
C line:	Y20: 10 ... 20 bar (145 ... 290 psi)