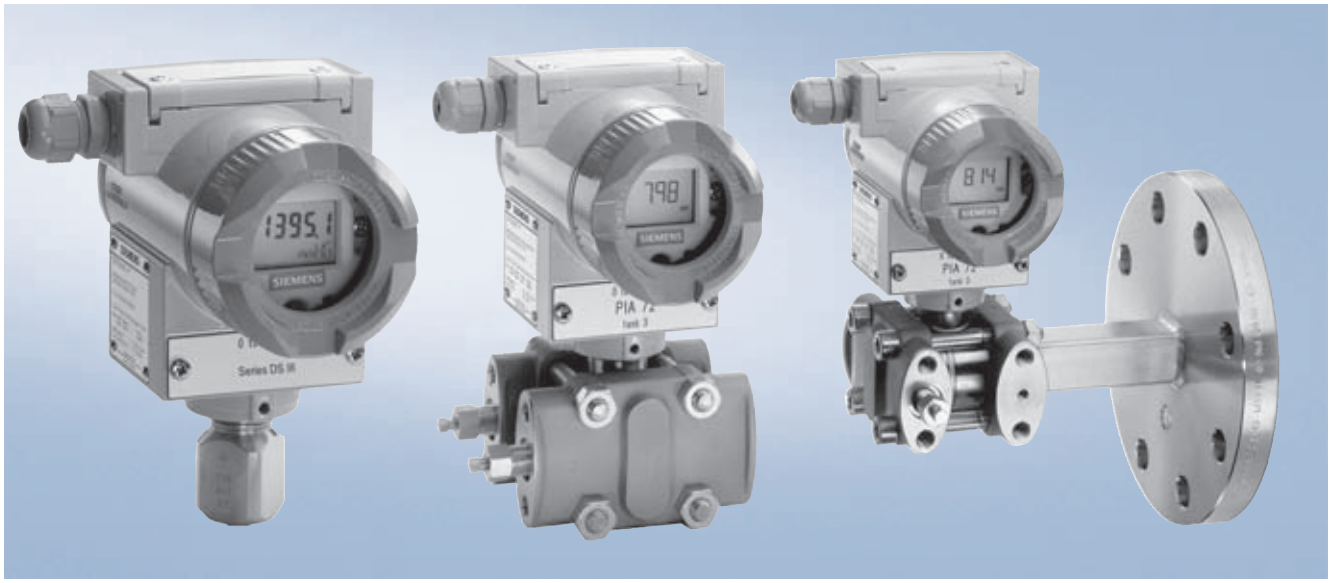
DS III FF series (Foundation Fieldbus)

Overview



SITRANS P pressure transmitters of the DS III FF series are digital pressure transmitters featuring extensive user-friendliness and high accuracy. Parameterization is performed using input keys or through the Foundation Fieldbus Interface.

Extensive functionality enables the pressure transmitter to be precisely adapted to the plant's requirements. Operation is very simple in spite of the numerous setting options.

Transmitters with type of protection "Intrinsic safety" and "Explosion-proof" (planned) may be installed within potentially explosive atmospheres (zone 1) or in zone 0. The transmitters are provided with an EC type examination certificate and comply with the corresponding 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.

Various versions of the DS III FF pressure transmitters are available for measuring:

- Pressure
- Absolute pressure
- For differential pressure transmitters
- Level
- Volume
- Volume flow
- Mass flow

Benefits

- High quality and long life
- High reliability even under extreme chemical and mechanical loads
- For aggressive and non-aggressive gases, vapors and liquids
- Extensive diagnosis and simulation functions
- Separate replacement of measuring cell and electronics without recalibration
- Minimum conformity error
- Small long-term drift
- Wetted parts made of high-grade materials (stainless steel, Hastelloy, gold, Monel, tantalum)
- Choice of several nominal measuring ranges
- High measuring accuracy
- Parameterization using input keys and Foundation Fieldbus

Application

SITRANS P pressure transmitters, DS III FF series, can be used in industrial areas with extreme chemical and mechanical loads. Electromagnetic compatibility in the range 10 kHz to 1 GHz makes the DS III FF pressure transmitters suitable for locations with high electromagnetic emissions.

Transmitters with type of protection "Intrinsic safety" and "Explosion-proof" (planned) may be installed within potentially explosive atmospheres (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 of the CENELEC.

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.

Pressure transmitters for pressure

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

Measured spans: 0.01 ... 400 bar (0.145 ... 5802 psi)

Pressure transmitters for absolute pressure

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

Measured spans: 8.3 mbar ... 100 bar (0.12 ... 1450 psi)

There are two series:

- Pressure series
- Differential pressure series

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)

Nominal measuring ranges: 1 mbar ... 30 bar
(0.0145 ... 435 psi)

Pressure transmitters for level

Measured variable: Level of aggressive and non-aggressive liquids in open and closed vessels.

Nominal measuring ranges: 25 mbar ... 5 bar (0.363 ... 72.5 psi)

Nominal diameter of the mounting flange:

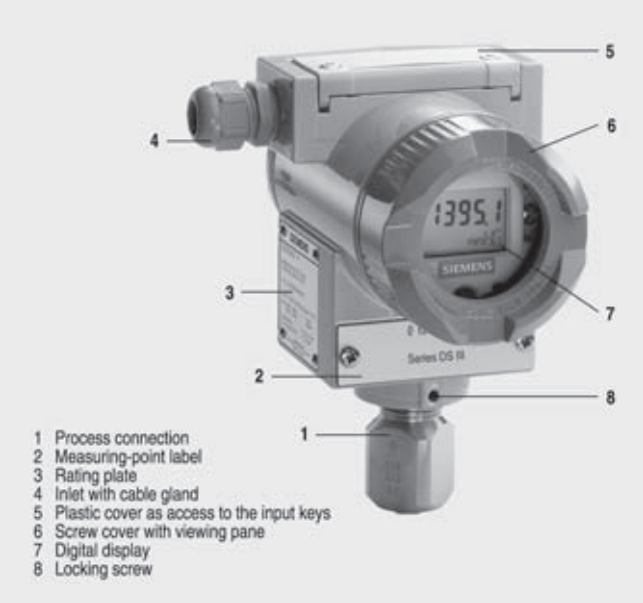
- DN 80 or DN 100
- 3 inch or 4 inch

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

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

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

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 (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.

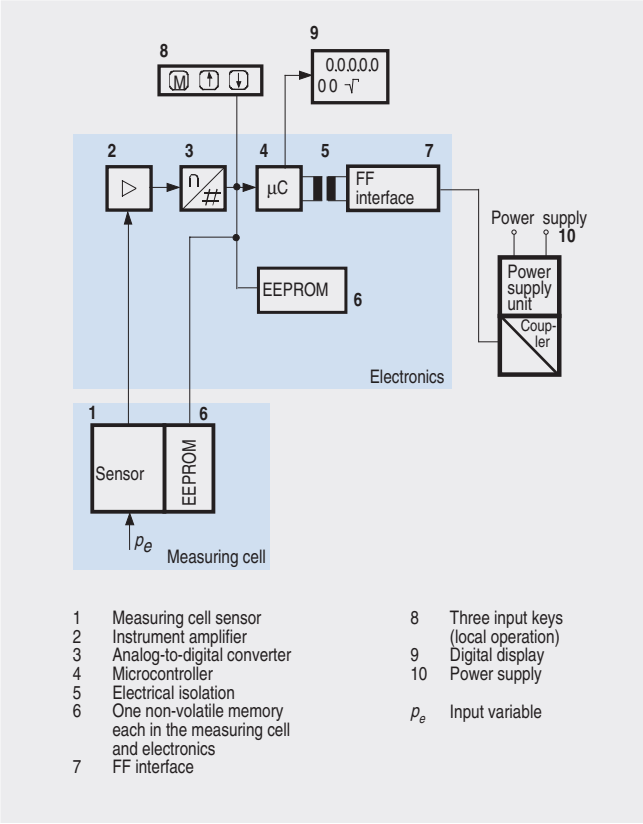
The housing is made of die-cast aluminium or stainless steel precision casting. A round cover is screwed on at the front and rear of the housing. The front cover (6) can be fitted with a viewing pane so that the measured values can be read directly on the digital display. The inlet (4) for the electrical 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 (8). As the result of this modular design, the measuring cell and the electronics can be replaced separately from each other. The set parameter data are retained.

At the top of the housing is a plastic cover (5), under which the input keys can be found.

Function

Mode of operation of the electronics



Function diagram of the electronics

The bridge output voltage created by the sensor (1, Figure "Function diagram of the electronics") is amplified by the instrument 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.

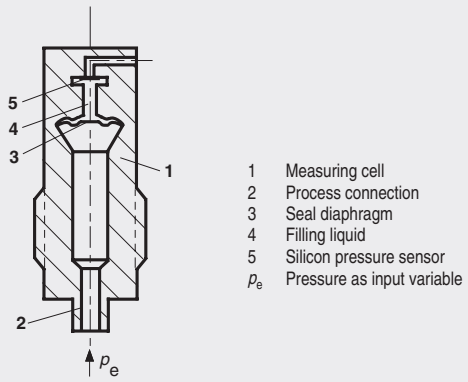
Using the three input keys (8) you can parameterize the pressure transmitter directly at the point of measurement. The input keys can also be used to control the view of the results, the error messages and the operating modes on the digital display (9).

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.

DS III FF series (Foundation Fieldbus)

Mode of operation of the measuring cells

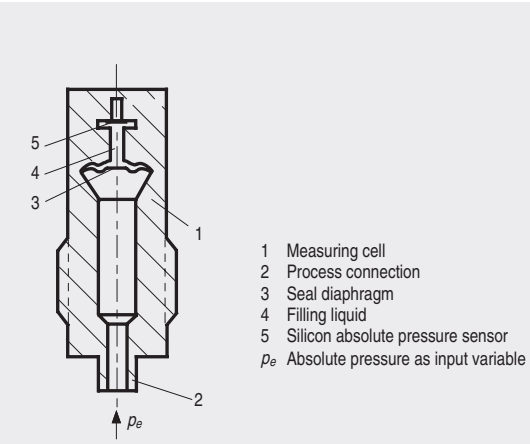
Measuring cell for pressure



Measuring cell for pressure, functional diagram

Measuring cell for absolute pressure from pressure series

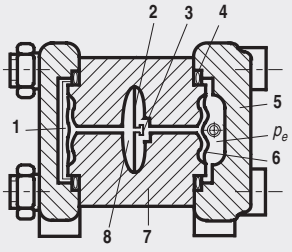
The pressure p_e is applied through the process connection (2, Figure "Measuring cell for pressure, functional diagram) to the measuring cell (1). This pressure is subsequently transmitted further through the seal diaphragm (3) and the filling liquid (4) to the silicon pressure sensor (5) whose measuring diaphragm is then flexed. 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 input pressure.



Measuring cell for absolute pressure from the pressure series, functional diagram

The absolute pressure p_e is transmitted through the seal diaphragm (3, Figure "Measuring cell for absolute pressure from pressure series, functional diagram") and the filling liquid (4) to the silicon absolute pressure sensor (5) 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 input pressure.

Measuring cell for absolute pressure from differential pressure series



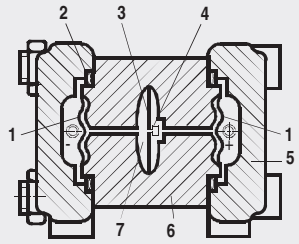
Measuring cell for absolute pressure from differential pressure series, functional diagram

The input pressure p_e is transmitted through the seal diaphragm (6, Figure "Measuring cell for absolute pressure from differential pressure series, functional diagram") and the filling liquid (8) to the silicon pressure sensor (3).

The difference in pressure between the input pressure p_e and the reference vacuum (1) on the low-pressure side of the measuring cell flexes the measuring diaphragm. 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.

An overload diaphragm is installed to provide protection from overloads. If the measuring limits are exceeded, the overload diaphragm (2) is flexed until the seal diaphragm rests on the body of the measuring cell (7), thus protecting the silicon pressure sensor from overloads.

Measuring cell for differential pressure and flow



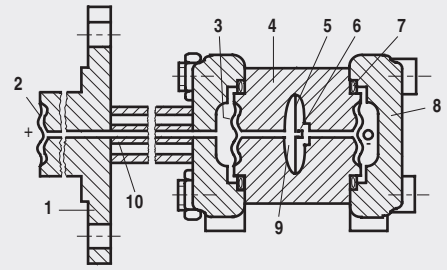
Measuring cell for differential pressure and flow, functional diagram

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

The measuring diaphragm is flexed by the applied differential pressure. 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.

An overload diaphragm is installed to provide protection from overloads. If the measuring limits are exceeded, the overload diaphragm (2) is flexed until the seal diaphragm rests on the body of the measuring cell (7), thus protecting the silicon pressure sensor from overloads.

Measuring cell for level



1	Flange with tube	6	Silicon pressure sensor
2	Seal diaphragm on mounting flange	7	O-ring
3	Seal diaphragm	8	Process flange
4	Body of measuring cell	9	Filling liquid
5	Overload diaphragm	10	Capillary with filling liquid of mounting flange

Measuring cell for level, functional diagram

The input pressure (hydrostatic pressure) acts hydraulically on the measuring cell through the seal diaphragm on the mounting flange (2, Figure "Measuring cell for level, functional diagram"). This differential pressure is subsequently transmitted further through the measuring cell (3) and the filling liquid (9) to the silicon pressure sensor (6) 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 differential pressure.

An overload diaphragm is installed to provide protection from overloads. If the measuring limits are exceeded, the overload diaphragm (2) is flexed until the seal diaphragm rests on the body of the measuring cell (7), thus protecting the silicon pressure sensor from overloads.

Parameterization

Depending on the version, there are different possibilities for parameterizing the pressure transmitter and for setting or scanning the parameters.

Parameterization using the input keys (local operation)

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

Parameterization through Foundation Fieldbus Interface

Fully digital communication through Foundation Fieldbus is particularly user-friendly. Through the Foundation Fieldbus the DS III FF 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

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

Diagnostic functions

- 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, hPa, kPa, Pa, bar, mbar, torr, atm, psi, g/cm^2, kg/cm^2, mm$H_2$0, mm$H_2$0 (4 °C), in$H_2$0, in$H_2$0 (4 °C), ft$H_2$0, mmHg, inHg
Level (height data)	m, cm, mm, ft, in, yd
Volume	m^3, dm^3, hl, yd^3, ft^3, in^3, US gallon, Imp. gallon, bushel, barrel, barrel liquid
Volume flow	m^3/s, m^3/min, m^3/h, m^3/d, l/s, l/min, l/h, l/ d, Ml/d, ft^3/s, ft^3/min, ft^3/h, ft^3/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	%

DS III FF series for pressure

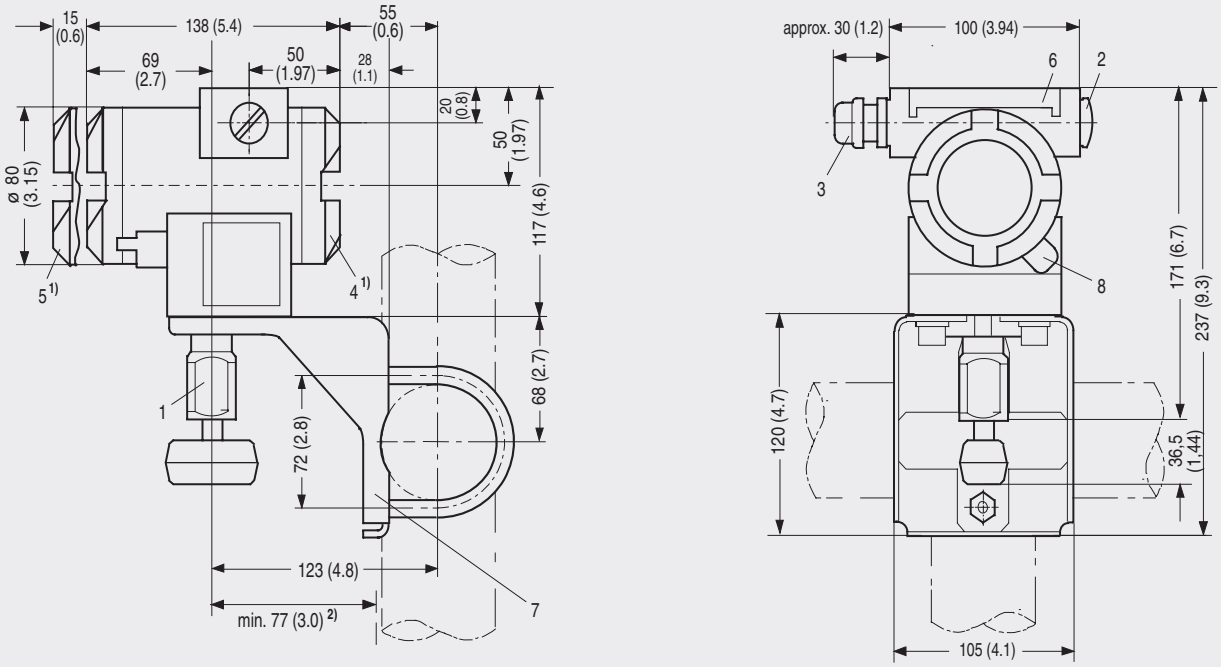
Technical specifications

SITRANS P pressure transmitters, DS III FF series, for pressure

Input	
Measured variable	Pressure
Nominal measuring range	Max. working pressure
• 1 bar (14.5 psi)	6 bar (87 psi)
• 4 bar (58 psi)	10 bar (145 psi)
• 16 bar (232 psi)	32 bar (464 psi)
• 63 bar (913 psi)	100 bar (1450 psi)
• 160 bar (2320 psi)	250 bar (3626 psi)
• 400 bar (5802 psi)	500 bar (7252 psi)
Lower measuring limit	
• Measuring cell with silicone oil filling	30 mark (0.435 psi) absolute
Upper measuring limit	100% of nominal measuring range (max. 160 bar (2320 psi) with oxygen measurement and inert filling liquid)
Output	Digital Foundation Fieldbus signal
Physical bus	IEC 61158-2
Measuring accuracy	
Reference conditions	Increasing characteristic, start-of-scale value 0 bar, stainless steel seal diaphragm, silicone oil filling, room temperature (25 °C (77 °F))
Error in measurement (including hysteresis and repeatability)	
- Linear characteristic	≤ 0.075%
Influence of ambient temperature	
• With -10 ... +60 °C (14 ... 140 °F)	≤ 0.3%
• With -40 ... -10 °C and +60 °C ... +85 °C (-40 ... +14 and 140 ... 185 °F)	≤ 0.25% / 10 K (≤ 0.25% / 18 °F)
Rated conditions	
Degree of protection (to EN 60529)	IP65
Process temperature	
• Measuring cell with silicone oil filling	-40 ... +100 °C (-40 ... +212 °F)
• Measuring cell with inert filling liquid	-20 ... +100 °C (-4 ... +212 °F)
Design	
Weight (without options)	≈ 1.5 kg (≈ 3.3 lb)
Wetted parts materials	
• Connection shank	Stainless steel, mat. No. 1.4404/316L or Hastelloy C4, mat. No. 2.4610
• Seal diaphragm	Stainless steel, mat. No. 1.4404/316L or Hastelloy C276, mat. No. 2.4819
Measuring cell filling	Silicone oil or inert filling liquid (max. 160 bar (2320 psi) with oxygen measurement)
Process connection	Connection shank G½A to DIN EN 837, female thread ½ -14 NPT or oval flange (PN 160 (MWP 2320)) to DIN 19213 with mounting thread M10 or $^{7}/_{16}$-20 UNF to EN 61518

Power supply U_H	Supplied through bus
Separate 24 V power supply necessary	No
Bus voltage	
• Not Ex	9 ... 32 V
• With intrinsically-safe operation	9 ... 24 V
Current consumption	
• Basic current (max.)	12.5 mA
Certificates and approvals	
Classification according to pressure equipment directive (DRGL 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 99 ATEX 2122
- Identification	Ex II 1/2 G EEx ia/ib IIB/IIC T6
- 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 a certified intrinsically-safe circuit with maximum values: • FISCO supply unit: U_o = 17.5 V, I_o = 380 mA, P_o = 5.32 W • Linear barrier: U_o = 24 V, I_o = 250 mA, P_o = 1.2 W
- Effective internal inductance/capacitance	L_i = 7 µH, C_i = 1.1 nF
• Explosion-proof "d"	Planned
• Type of protection "n" (zone 2)	Planned
• Explosion protection to FM	Planned
• Explosion protection to CSA	Planned

Dimensional drawings



1 Process connection:
- ½-14 NPT,
- connection shank G½A or
- oval flange

2 Blanking plug

3 Electrical connection:
- screwed gland M20x1,5 3) or
- screwed gland ½-14 NPT

4 Terminal side

5 Electronics side (long er overall length for cover with window)

6 Safety cover over keys

7 Mounting bracket (option)

8 Screw cover safety bracket (only for explosion-proof cover, not shown in the drawing)

1) Allow approx. 20 mm (0.79 inch) thread length in addition

2) Minimum distance to permit rotation

3) Not for type of protection "FM + CSA".

SITRANS P pressure transmitters, DS III FF series for pressure, dimensional drawing, dimensions in mm (inch)

DS III FF series for pressure

2

Selection and Ordering data		Order No.
SITRANS P pressure transmitter for pressure		7MF4035-
DS III FF series		■■■■■-■■■■
Measuring cell filling	**Measuring cell cleaning**	
Silicone oil	Standard	1
Inert liquid [1]	Grease-free	3
Rated measuring range		
1 bar	(14.5 psi)	B
4 bar	(58 psi)	C
16 bar	(232 psi)	D
63 bar	(914 psi)	E
160 bar	(2320 psi)	F
400 bar	(5802 psi)	G
Wetted parts materials		
Seal diaphragm	Process connection	
Stainless steel	Stainless steel	A
Hastelloy	Stainless steel	B
Hastelloy	Hastelloy	C
Version as diaphragm seal		Y0
Process connection		
• Connection shank G½B to EN 837-1		0
• Female thread ½-14 NPT		1
• Oval flange made of stainless steel, max. span 160 bar (2320 psi)		
- Mounting thread $^{7}/_{16}$-20 UNF to EN 61518		2
- Mounting thread M10 to DIN 19213		3
Non-wetted parts materials		
• Housing made of die-cast aluminium		0
• Housing stainless steel precision casting		3
Design		
• Standard design		1
• International version, English label inscriptions, documentation in 5 languages on CD		2
Explosion protection		
• without		A
• with CENELEC, Type of protection:		
- "Intrinsic safety (EEx ia)"		B
- "Explosion-proof (EEx d)" [2] (planned)		D
- "Intrinsic safety and explosion-proof enclosure (EEx ia + EEx d)" [3] (planned)		P
- "n (zone 2)" (planned)		E
• with FM + CSA, Type of protection:		
- "Intrinsic safety and explosion-proof (is + xp)" [1] (planned)		NC
Electrical connection / cable inlet		
• Screwed gland M20x1.5		B
• Screwed gland ½-14 NPT		C
Display		
• without (digital display hidden)		1
• with visible digital indicator		6
• with customer-specific digital indicator (setting as specified, Order code "Y21" required)		7

The device is delivered together with brief instructions (Leporello) and a CD-ROM containing detailed documentation.

1) For oxygen application, add Order code E10.
2) Without cable gland, with blanking plug
3) 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
Rating plate inscription (instead of German)	
• English	B11
• French	B12
• Spanish	B13
• Italian	B14
English rating plate Pressure units in inH_2O or psi	B21
Manufacturer's test certificate M to DIN 55.350, Part 18 and to ISO 8402	C11
Acceptance test certificate B to EN 10 204-3.1B	C12
Factory certificate to EN 10.204-2.2	C14
Acid gas version to NACE (only together with seal diaphragm made of Hastelloy)	D07
Type of protection IP68 (not together with nominal measuring range ≤ 63 bar (≤ 914 psi))	D12
Digital indicator along side the input keys (only together with the devices 7MF4035-....0-.A.6 or -.A.7-Z, Y21)	D27
Use on zone 1D / 2D (only together with type of protection "Intrinsic safety (EEx ia)"	E01
Use at zone 0 (only together with type of protection "Intrinsic safety (EEx ia)"	E02
Oxygen application (max. 160 bar (2320 psi) with oxygen measurement and inert liquid)	E10

Additional data	
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
Setting of pressure indicator in pressure units specify in plain text (standard setting: mA): Y21: mbar, bar, kPa, MPa, psi, ... Note: The following pressure units can be selected: bar, mbar, mm $H_2O^{*)}$, in$H_2O^{*)}$, ft$H_2O^{*)}$, mmHG, inHG, psi, Pa, kPa, MPa, g/cm^2, kg/cm^2, mA, Torr, ATM or % *) Reference temperature 20 °C	Y21

Only the settings for "Y21" can be made in the factory.

Ordering example
Item line: 7MF4034-1EA00-1AA7-Z
B line: A01 + Y21
C line: Y21: ... mbar

Technical specifications

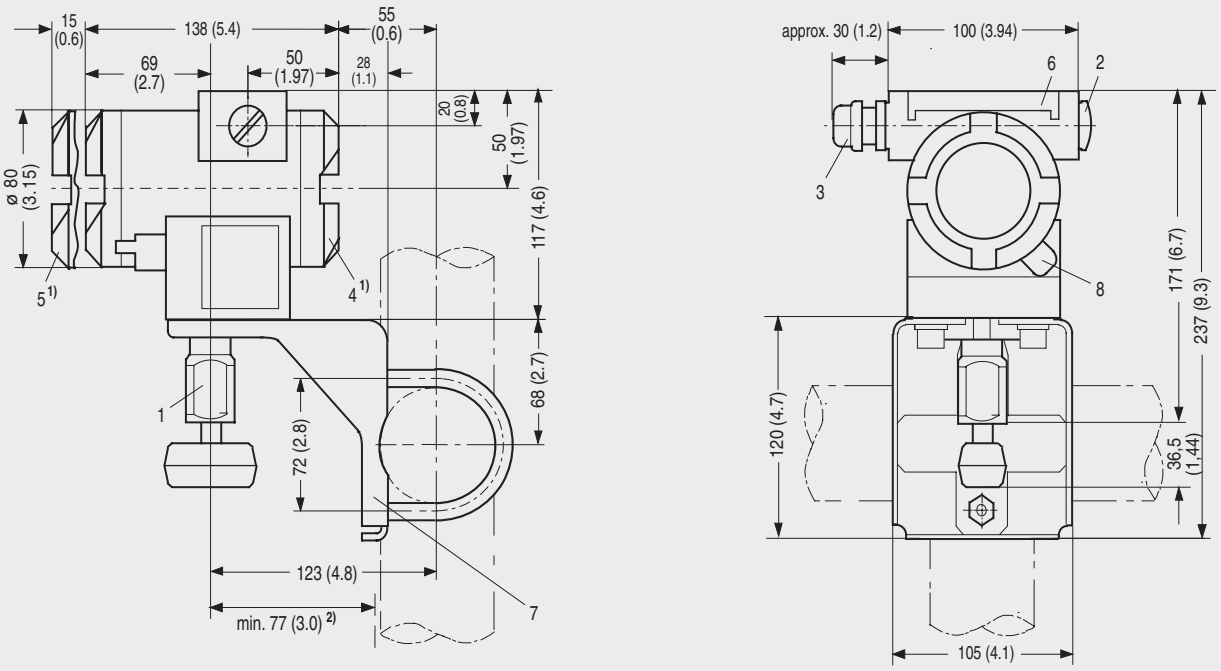
SITRANS P pressure transmitters, DS III FF series for absolute pressure, from the pressure series

Input	
Measured variable	Absolute pressure
Nominal measuring range	Max. working pressure
• 250 mbar (3.6 psi)	6 bar (87 psi)
• 1300 mbar (18.9 psi)	10 bar (145 psi)
• 5 bar (72.5 psi)	30 bar (435 psi)
• 30 bar (435 psi)	100 bar (1450 psi)
Lower measuring limit	
• Measuring cell with silicone oil filling	0 mbar absolute
Upper measuring limit	100% of nominal measuring range (max. 160 bar (2320 psi) with oxygen measurement and inert filling liquid)
Output	Digital Foundation Fieldbus signal
Physical bus	IEC 61158-2
Measuring accuracy	
Reference conditions	Increasing characteristic Start-of-scale value 0 bar Stainless steel seal diaphragm Silicone oil filling Room temperature (25 °C (77 °F))
Error in measurement (including hysteresis and repeatability)	
- Linear characteristic	≤ 0.075%
Influence of ambient temperature	
• With -10 ... +60 °C (14 ... 140 °F)	≤ 0.3%
• With -40 ... -10 °C and +60 °C ... +85 °C (-40 ... +14 and 140 ... 185 °F)	≤ 0.25% / 10 K (≤ 0.25% / 18 °F)
Rated conditions	
Degree of protection (to EN 60529)	IP65
Process temperature	
• Measuring cell with silicone oil filling	-40 ... +100 °C (-40 ... +212 °F)
Design	
Weight (without options)	≈ 1.5 kg (≈ 3.3 lb)
Wetted parts materials	
• Connection shank	Stainless steel, mat. No. 1.4404/316L or Hastelloy C4, mat. No. 2.4610
• Seal diaphragm	Stainless steel, mat. No. 1.4404/316L or Hastelloy C276, mat. No. 2.4819
Measuring cell filling	Silicone oil or inert filling liquid (max. 160 bar (2320 psi) with oxygen measurement)
Process connection	Connection shank G½A to DIN EN 837, female thread ½ -14 NPT or oval flange (PN 160 (MWP 2320)) to DIN 19,213 with mounting thread M10 or $^{7}/_{16}$-20 UNF to EN 61518

Power supply U_H	Supplied through bus
Separate 24 V power supply necessary	No
Bus voltage	
• Not Ex	9 ... 32 V
• With intrinsically-safe operation	9 ... 24 V
Current consumption	
• Basic current (max.)	12.5 mA
Certificates and approvals	
Classification according to pressure equipment directive (DRGL 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 99 ATEX 2122
- Identification	Ex II 1/2 G EEx ia/ib IIB/IIC T6
- 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 a certified intrinsically-safe circuit with maximum values: • FISCO supply unit: U_o = 17.5 V, I_o = 380 mA, P_o = 5.32 W • Linear barrier: U_o = 24 V, I_o = 250 mA, P_o = 1.2 W
- Effective internal inductance/capacitance	L_i = 7 µH, C_i = 1.1 nF
• Explosion-proof "d"	Planned
• Type of protection "n" (zone 2)	Planned
• Explosion protection to FM	Planned
• Explosion protection to CSA	Planned

DS III FF series for absolute pressure (from pressure series)

Dimensional drawings



1 Process connection:
- ½-14 NPT,
- connection shank G½A or
- oval flange

2 Blanking plug

3 Electrical connection:
- screwed gland M20x1,5 3) or
- screwed gland ½-14 NPT

4 Terminal side

5 Electronics side (long er overall length for cover with window)

6 Safety cover over keys

7 Mounting bracket (option)

8 Screw cover safety bracket (only for explosion-proof cover, not shown in the drawing)

1) Allow approx. 20 mm (0.79 inch) thread length in addition

2) Minimum distance to permit rotation

3) Not for type of protection "FM + CSA".

SITRANS P pressure transmitters, DS III FF series for absolute pressure, from the pressure series, dimensional drawing, dimensions in mm (inch)

DS III FF series for absolute pressure (from pressure series)

Selection and Ordering data			Order No.
SITRANS P pressure transmitters for absolute pressure from the pressure series			7MF4235-
DS III FF series			■■■■-■■■■
Measuring cell filling	**Measuring cell cleaning**		
Silicone oil	Standard		1
Inert liquid [1]	Grease-free		3
Rated measuring range			
250 mbar	(3.63 psi)	E)	D
1300 mbar	(18.9 psi)	E)	F
5 bar	(72.5 psi)	E)	G
30 bar	(435 psi)		H
Wetted parts materials			
Seal diaphragm	Process connection		
Stainless steel	Stainless steel		A
Hastelloy	Stainless steel	E)	B
Hastelloy	Hastelloy	E)	C
Version as diaphragm seal [2]			Y 0
Process connection			
• Connection shank G½B to EN 837-1			0
• Female thread ½-14 NPT			1
• Oval flange made of stainless steel, max. span 160 bar (2320 psi)			
- Mounting thread $^{7}/_{16}$-20 UNF to EN 61518			2
- Mounting thread M10 to DIN 19213			3
Non-wetted parts materials			
• Housing made of die-cast aluminium			0
• Housing stainless steel precision casting			3
Design			
• Standard design			1
• International version, English label inscriptions, documentation in 5 languages on CD			2
Explosion protection			
• without			A
• with CENELEC, Type of protection:			
- "Intrinsic safety (EEx ia)"			B
- "Explosion-proof (EEx d)" [3] (planned)			D
- "Intrinsic safety and explosion-proof enclosure (EEx ia + EEx d)" [4] (planned)			P
- "n (zone 2)" (planned)			E
• with FM + CSA, Type of protection:			
- "Intrinsic safety and explosion-proof (is + xp)" [3] (planned)			N C
Electrical connection / cable inlet			
• Screwed gland M20x1.5			B
• Screwed gland ½-14 NPT			C
Display			
• without (digital display hidden)			1
• with visible digital indicator			6
• with customer-specific digital indicator (setting as specified, Order code "Y21" required)			7

The device is delivered together with brief instructions (Leporello) and a CD-ROM containing detailed documentation.

1) For oxygen application, add Order code E10.
2) Version 7MF4235-1DY... only up to max. span 200 mbar (2.9 psi)
3) Without cable gland, with blanking plug
4) With enclosed cable gland EEx ia and blanking plug
E) Combinations of the versions marked with E) are subject to the export regulations AL: 2B230, ECCN: N

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**
Rating plate inscription (instead of German)	
• English	**B11**
• French	**B12**
• Spanish	**B13**
• Italian	**B14**
English rating plate Pressure units in inH_2O or psi	**B21**
Manufacturer's test certificate M to DIN 55350, Part 18 and to ISO 8402	**C11**
Acceptance test certificate B to EN 10204-3.1B	**C12**
Factory certificate to EN 10204-2.2	**C14**
Acid gas version to NACE (only together with seal diaphragm made of Hastelloy)	**D07**
Type of protection IP68	**D12**
Digital indicator along side the input keys (only together with the devices 7MF4235-...0-.A.6 or -.A.7-Z, Y21)	**D27**
Use on zone 1D / 2D (only together with type of protection "Intrinsic safety (EEx ia)"	**E01**
Use at zone 0 (only together with type of protection "Intrinsic safety (EEx ia)"	**E02**
Oxygen application (max. 160 bar (2320 psi) with oxygen measurement and inert liquid)	**E10**
Additional data	
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**
Setting of pressure indicator in pressure units specify in plain text (standard setting: mA): Y21: mbar, bar, kPa, MPa, psi, ... Note: The following pressure units can be selected: bar, mbar, mm $H_2O^{*)}$, $inH_2O^{*)}$, $ftH_2O^{*)}$, mmHG, inHG, psi, Pa, kPa, MPa, g/cm^2, kg/cm^2, mA, Torr, ATM or % *) Reference temperature 20 °C	**Y21**

Only the settings for "Y21" can be made in the factory

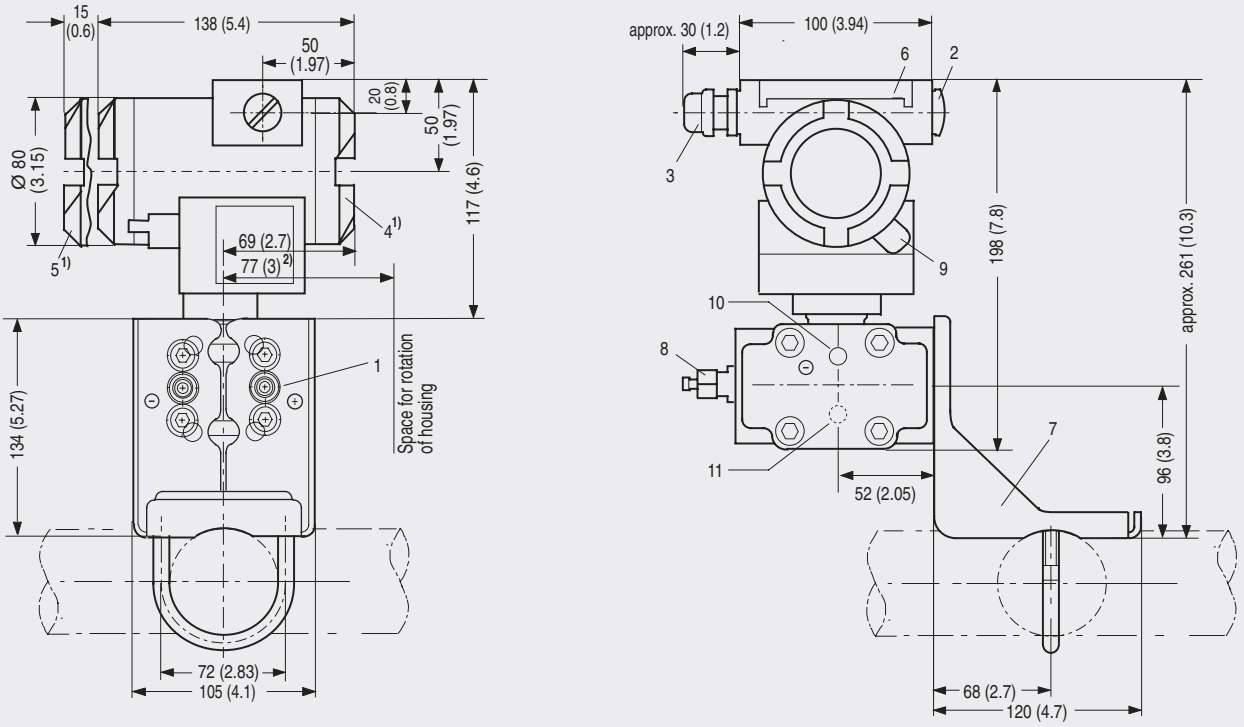
DS III FF series for absolute pressure (from differential pressure series)

Technical specifications

SITRANS P pressure transmitters, DS III FF series for absolute pressure, from the differential pressure series

Mode of operation and system design	
Measuring principle	Piezo-resistive
Input	
Measured variable	Absolute pressure
Nominal measuring range	Max. working pressure
• 250 mbar (3.6 psi)	32 bar (464 psi)
• 1300 mbar (18.9 psi)	32 bar (464 psi)
• 5 bar (72.5 psi)	32 bar (464 psi)
• 30 bar (435 psi)	160 bar (2320 psi)
• 100 bar (1450 psi)	160 bar (2320 psi) with pressure cover screws M10 and $^{7}/_{16}$-20 UNF
Lower measuring limit	
• Measuring cell with silicone oil filling	0 mbar absolute
Upper measuring limit	100% of nominal measuring range (max. 160 bar (2320 psi) with oxygen measurement and inert filling liquid)
Output	Digital Foundation Fieldbus signal
Physical bus	IEC 61158-2
Measuring accuracy	
Reference conditions	Increasing characteristic Start-of-scale value 0 bar Stainless steel seal diaphragm Silicone oil filling Room temperature (25 °C (77 °F))
Error in measurement (including hysteresis and repeatability)	
- Linear characteristic	≤ 0.075%
Influence of ambient temperature	
• With -10 ... +60 °C (14 ... 140 °F)	≤ 0.3%
• With -40 ... -10 °C and +60 °C ... +85 °C (-40 ... +14 and 140 ... 185 °F)	≤ 0.25% / 10 K (≤ 0.25% / 18 °F)
Rated conditions	
Degree of protection (to EN 60529)	IP65
Process temperature	
- Measuring cell with silicone oil filling	-40 ... +100 °C (-40 ... +212 °F)
Design	
Weight (without options)	≈ 4.5 kg (≈ 9.9 lb)
Wetted parts materials	
- Seal diaphragm	Stainless steel, mat. No. 1.4404/316L, Hastelloy C276, mat. No. 2.4819, Monel, mat. No. 2.4360, tantalum or gold
Measuring cell filling	Silicone oil or inert filling liquid (max. 160 bar (2320 psi) with oxygen measurement)
Process connection	Female thread $^{1}/_{4}$-18 NPT and flange connection to DIN 19213 with mounting thread M10 or $^{7}/_{16}$-20 UNF to EN 61518
Power supply	Supplied through bus
Separate 24 V power supply necessary	No
Bus voltage	
• Not Ex	9 ... 32 V
• With intrinsically-safe operation	9 ... 24 V
Current consumption	
• Basic current (max.)	12.5 mA
Certificates and approvals	
Classification according to pressure equipment directive (DRGL 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 99 ATEX 2122
- Identification	Ex II 1/2 G EEx ia/ib IIB/IIC T6
- 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 a certified intrinsically-safe circuit with maximum values: • FISCO supply unit: U_o = 17.5 V, I_o = 380 mA, P_o = 5.32 W • Linear barrier: U_o = 24 V, I_o = 250 mA, P_o = 1.2 W
- Effective internal inductance/capacitance	L_i = 7 µH, C_i = 1.1 nF
• Explosion-proof "d"	Planned
• Type of protection "n" (zone 2)	Planned
• Explosion protection to FM	Planned
• Explosion protection to CSA	Planned

Dimensional drawings



1 Process connection ¼-18 NPT (EN 61518)
2 Blanking plug
3 Electrical connection
- screwed gland M20x1,5 3) or
- screwed gland ½-14 NPT
4 Terminal side
5 Electronics side, digital display (longer overall length for cover with window)
6 Protective cover over keyes
7 Mounting bracket (option)
8 Sealing screw with valve (option)
9 Screw cover safety bracket (only for explosion-proof enclosure, not shown in the drawing)
10 Lateral venting for liquid measurement
11 Lateral venting for gas measurement (suffix H02)

1) Allow approx. 20 mm (0.79 inch) thread length in addition
2) 92 mm (3.62 inch) for minimum distance to permit rotation with indicator
3) Not with type of protection "FM + CSA"

SITRANS P pressure transmitters, DS III FF series for absolute pressure, from the differential pressure series, dimensional drawing, dimensions in mm (inch)

DS III FF series for absolute pressure (from differential pressure series)

2

Selection and Ordering data			Order No.
SITRANS P pressure transmitters for absolute pressure from the series Differential pressure			7MF4335-
DS III FF series			■■■■-■■■■
Measuring cell filling	**Measuring cell cleaning**		
Silicone oil	Standard		1
Inert liquid [1]	Grease-free		3
Rated measuring range			
250 mbar	(3.63 psi)	E)	D
1300 mbar	(18.9 psi)	E)	F
5 bar	(72.5 psi)	E)	G
30 bar	(435 psi)		H
100 bar	(1450 psi)		K E
Wetted parts materials			
Seal diaphragm	Parts of measuring cell		
Stainless steel	Stainless steel		A
Hastelloy	Stainless steel	E)	B
Hastelloy	Hastelloy	E)	C
Tantalum	Tantalum		E
Monel	Monel	E)	H
Gold	Gold		L
Version as diaphragm seal [2]			Y
Process connection			
Female thread ¼-18 NPT with flange connection			
• Sealing screw opposite process connection			
- Mounting thread M10 to DIN 19 213			0
- Mounting thread $^{7}/_{16}$-20 UNF to EN 61518			2
• Vent on side of process flange [3]			
- Mounting thread M10 to DIN 19 213			4
- Mounting thread $^{7}/_{16}$-20 UNF to EN 61518			6
Non-wetted parts materials			
Process flange screws	Electronics housing		
Stainless steel	Die-cast aluminium		2
Stainless steel	Stainless steel precision casting		3
Design			
• Standard design			1
• International version, English label inscriptions, documentation in 5 languages on CD			2
Explosion protection			
• without			A
• with CENELEC, Type of protection:			
- "Intrinsic safety (EEx ia)"			B
- "Explosion-proof (EEx d)" [4] (planned)			D
- "Intrinsic safety and explosion-proof enclosure (EEx ia + EEx d)" [5] (planned)			P
- "n (zone 2)" (planned)			E
• with FM + CSA, Type of protection:			
- "Intrinsic safety and explosion-proof (is + xp)" [4] (planned)			N C
Electrical connection / cable inlet			
• Screwed gland M20x1.5			B
• Screwed gland ½-14 NPT			C
Display			
• without (digital display hidden)			1
• with visible digital indicator			6
• with customer-specific digital indicator (setting as specified, Order code "Y21" required)			7

Included in delivery of the device:
- Brief instructions (Leporello)
- CD-ROM with detailed documentation
- Sealing plug(s) or sealing screw(s) for the process flanges(s)

1) For oxygen application, add Order code E10.
2) Version 7MF4335-1DY... only up to max. span 200 mbar (2.9 psi)
3) Not for nominal measuring range 100 bar (1450 psi).
4) Without cable gland, with blanking plug
5) With enclosed cable gland EEx ia and blanking plug

E) Combinations of the versions marked with E) are subject to the export regulations AL: 2B230, ECCN: N.

DS III FF series for absolute pressure (from differential pressure series)

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**
O-rings for process flanges (instead of FPM (Viton))	
• PTFE (Teflon)	**A20**
• FEP (with silicone core, approved for food)	**A21**
• FFPM (Kalrez, compound 4079)	**A22**
• NBR (Buna N)	**A23**
Sealing screws ¼-18 NPT, with valve in material of process flanges	**A40**
Rating plate inscription (instead of German)	
• English	**B11**
• French	**B12**
• Spanish	**B13**
• Italian	**B14**
English rating plate Pressure units in inH_2O or psi	**B21**
Manufacturer's test certificate M to DIN 55350, Part 18 and to ISO 8402	**C11**
Acceptance test certificate B to EN 10204-3.1B	**C12**
Factory certificate to EN 10204-2.2	**C14**
Acid gas version to NACE (only together with seal diaphragm made of Hastelloy and process flange screws made of stainless steel)	**D07**
Type of protection IP68	**D12**
Digital indicator along side the input keys (only together with the devices 7MF4335-...0.2-.A.6 or -.A.7-Z, Y21)	**D27**
Use on zone 1D / 2D (only together with type of protection "Intrinsic safety (EEx ia)"	**E01**
Use at zone 0 (only together with type of protection "Intrinsic safety (EEx ia)"	**E02**
Oxygen application (max. 160 bar (2320 psi) with oxygen measurement and inert liquid)	**E10**
Interchanging of process connection side	**H01**
Vent on side for gas measurements	**H02**
Process flange	
• Hastelloy	**K01**
• Monel	**K02**
• Stainless steel with PVDF insert max. PN 10 (MWP 145 psi) max. temperature of medium 90 °C (194 °F)	**K04**

Further designs	Order code
Please add "-Z" to Order No. and specify Order code.	
Additional data	
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**
Setting of pressure indicator in pressure units specify in plain text Y21: mbar, bar, kPa, MPa, psi, ... Note: The following pressure units can be selected: bar, mbar, mm H_2O*), inH_2O*), ftH_2O*), mmHG, inHG, psi, Pa, kPa, MPa, g/cm^2, kg/cm^2, mA, Torr, ATM or % *) Reference temperature 20 °C	**Y21**

Only the settings for "Y21" can be made in the factory.

DS III FF series for differential pressure and flow

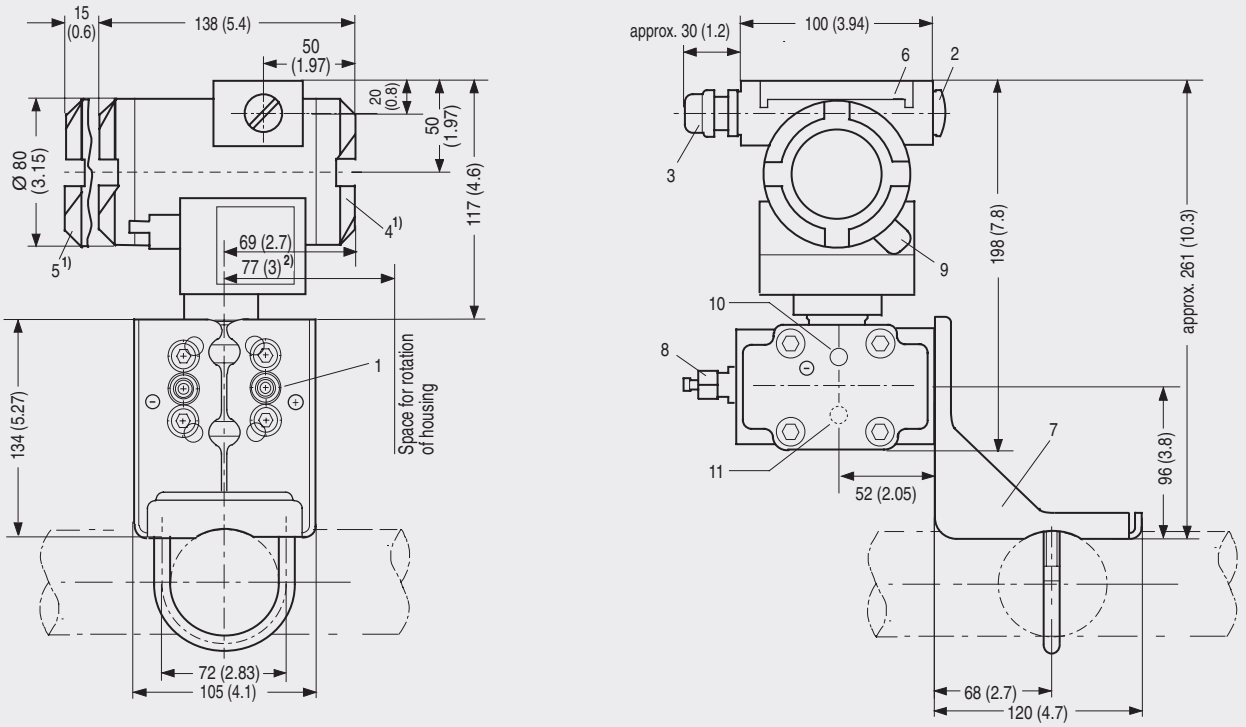
Technical specifications

SITRANS P pressure transmitters, DS III FF series, for differential pressure and flow

Input	
Measured variable	Differential pressure and flow
Nominal measuring range	Max. working pressure
• PN 32 (MWP 464 psi)	
- 20 mbar (0.29 psi)	32 bar (464 psi)
• PN 160 (MWP 2320 psi)	
- 60 mbar (0.87 psi)	160 bar (2320 psi)
- 250 mbar (3.63 psi)	160 bar (2320 psi)
- 600 mbar (8.7 psi)	160 bar (2320 psi)
- 1600 mbar (23.3 psi)	160 bar (2320 psi)
- 5 bar (72.5 psi)	160 bar (2320 psi)
- 30 bar (435 psi)	160 bar (2320 psi)
• PN 400 (MWP 6092 psi)	
- 250 mbar (3.63 psi)	420 bar (6092 psi)
- 600 mbar (8.7 psi)	420 bar (6092 psi)
- 1600 mbar (23.3 psi)	420 bar (6092 psi)
- 5 bar (72.5 psi)	420 bar (6092 psi)
- 30 bar (435 psi)	420 bar (6092 psi)
Lower measuring limit	
• Measuring cell with silicone oil filling	-100% of nominal measuring range (-33% with nominal measuring range 30 bar (435 psi)) or 30 mbar (0.435 psi) absolute
Upper measuring limit	100% of nominal measuring range (max. 160 bar (2320 psi) with oxygen measurement and inert filling liquid)
Output	Digital Foundation Fieldbus signal
Physical bus	IEC 61158-2
Measuring accuracy	
Reference conditions	Increasing characteristic Start-of-scale value 0 bar Stainless steel seal diaphragm Silicone oil filling Room temperature (25 °C (77 °F))
Error in measurement (including hysteresis and repeatability)	
- Linear characteristic	≤ 0.075%
- Square-root characteristic, flow > 50 %	≤ 0.1%
- Square-root characteristic, flow 25 ... 50 %	≤ 0.2%
Influence of ambient temperature	
• With -10 ... +60 °C (14 ... 140 °F)	≤ 0.3% (Twice the value with 20-mbar (0.29 psi) nominal measuring range)
• With -40 ... -10 °C and +60 °C ... +85 °C (-40 ... +14 and 140 ... 185 °F)	≤ 0.25% / 10 K (≤ 0.25% / 18 °F) (Twice the value with 20 mbar (0.29 psi) nominal measuring range)
Rated conditions	
Degree of protection (to EN 60529)	IP65
Process temperature	
• Measuring cell with silicone oil filling	-40 ... +100 °C (-40 ... +212 °F)

Design	
Weight (without options)	≈ 4.5 kg (≈ 9.9 lb)
Wetted parts materials	
• Seal diaphragm	Stainless steel, mat. No. 1.4404/316L, Hastelloy C276, mat. No. 2.4819, Monel, mat. No. 2.4360, tantalum or gold
Measuring cell filling	Silicone oil or inert filling liquid (max. 160 bar (2320 psi) with oxygen measurement)
Process connection	Female thread $^1/_4$-18 NPT and flange connection to DIN 19213 with mounting thread M10 or $^7/_{16}$-20 UNF to EN 61518
Power supply U_H	Supplied through bus
Separate 24 V power supply necessary	No
Bus voltage	
• Not Ex	9 ... 32 V
• With intrinsically-safe operation	9 ... 24 V
Current consumption	
• Basic current (max.)	12.5 mA
Certificates and approvals	
Classification according to pressure equipment directive (DRGL 97/23/EC)	
- PN 32/160 (MWP 464/2320)	For gases of fluid group 1 and liquids of fluid group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice)
- PN 420 (MWP 6092)	For gases of fluid group 1 and liquids of fluid group 1; complies with basic safety requirements of article 3, paragraph 1 (appendix 1); assigned to category III, conformity evaluation module H by the TÜV Nord
Explosion protection	
• Intrinsic safety "i"	PTB 99 ATEX 2122
- Identification	Ex II 1/2 G EEx ia/ib IIB/IIC T6
- 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 a certified intrinsically-safe circuit with maximum values: • FISCO supply unit: U_o = 17.5 V, I_o = 380 mA, P_o = 5.32 W • Linear barrier: U_o = 24 V, I_o = 250 mA, P_o = 1.2 W
- Effective internal inductance/capacitance	L_i = 7 µH, C_i = 1.1 nF
• Explosion-proof "d"	Planned
• Type of protection "n" (zone 2)	Planned
• Explosion protection to FM	Planned
• Explosion protection to CSA	Planned

Dimensional drawings

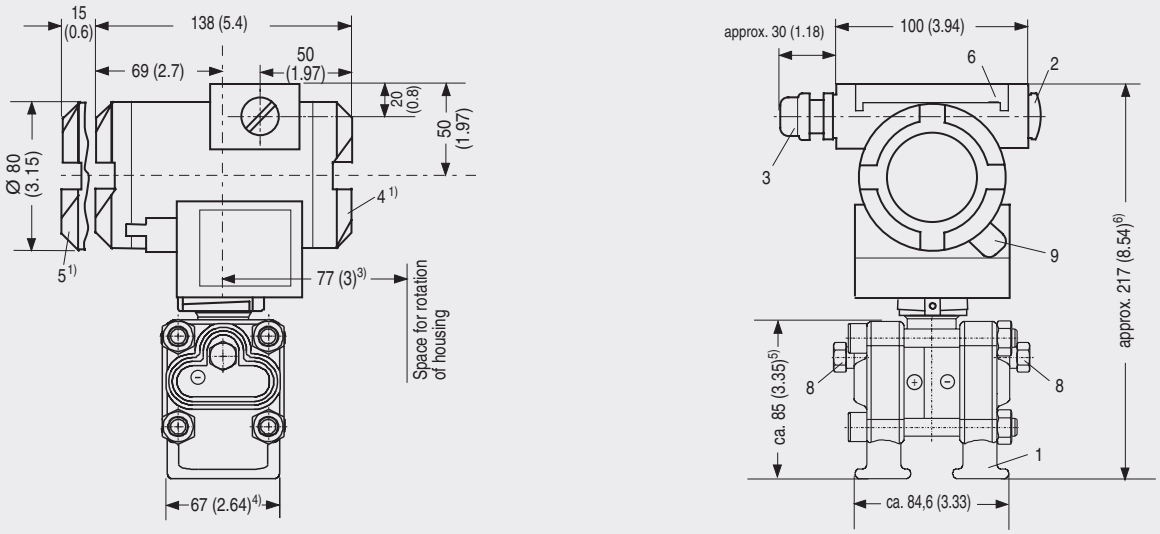


1 Process connection ¼-18 NPT (EN 61518)
2 Blanking plug
3 Electrical connection
- screwed gland M20x1,5 3) or
- screwed gland ½-14 NPT
4 Terminal side
5 Electronics side, digital display (longer overall length for cover with window)
6 Protective cover over keyes
7 Mounting bracket (option)
8 Sealing screw with valve (option)
9 Screw cover safety bracket (only for explosion-proof enclosure, not shown in the drawing)
10 Lateral venting for liquid measurement
11 Lateral venting for gas measurement (suffix H02)

1) Allow approx. 20 mm (0.79 inch) thread length in addition
2) 92 mm (3.62 inch) for minimum distance to permit rotation with indicator
3) Not with type of protection "FM + CSA"

SITRANS P pressure transmitters, DS III FF series for differential pressure and flow, dimensional drawing, dimensions in mm (inch)

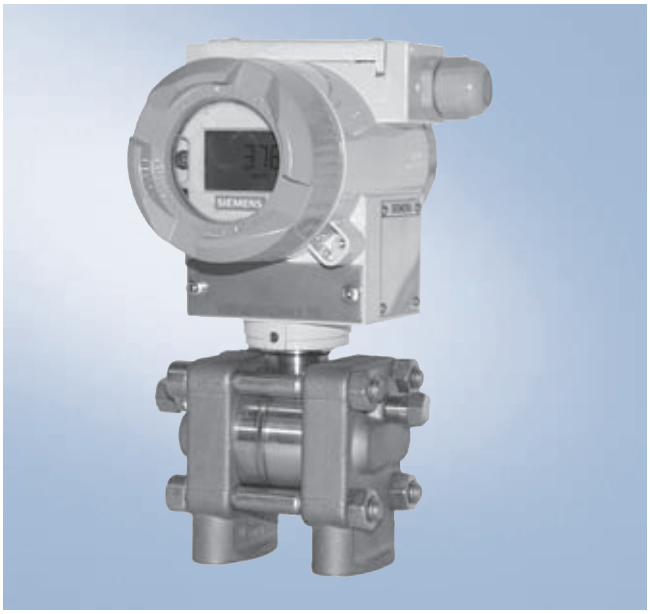
DS III FF series for differential pressure and flow



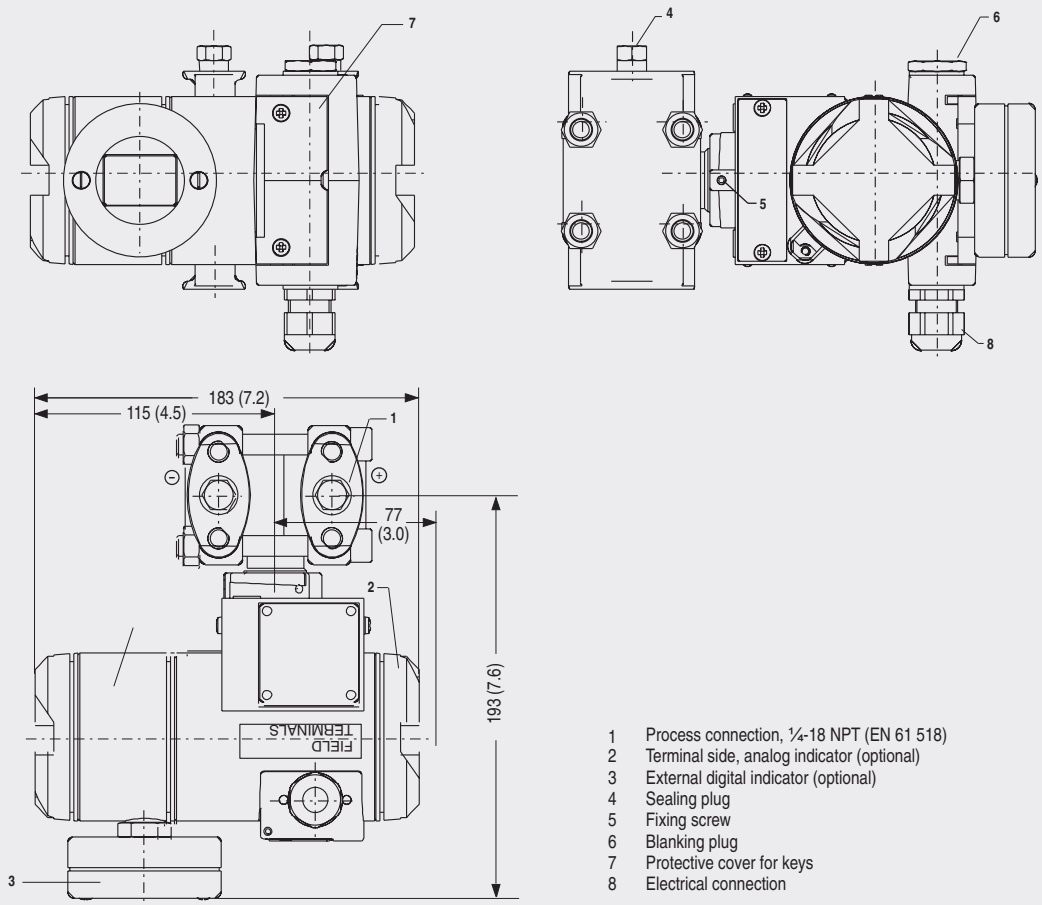
1 Process connection: ¼-18 NPT (EN 61518)
2 Blanking plug
3 Electrical connection:
- screwed gland M20x1,5 3) or
- screwed gland ½-14 NPT
4 Terminal side
5 Electronics side, digital display (longer overall length for cover with window)
6 Safety cover over keys
7 Mounting bracket (option)
8 Sealing screw with valve (option)
9 Screw cover safety bracket (only for explosion-proof enclosure, not shown in the drawing)

1) Allow approx. 20 mm (0.79 inch) thread length in addition
2) Not for type of protection "FM + CSA [is + xp]"
3) 92 mm (3.6 inch) minimum distance to permit rotation with indicator
4) 74 mm (2.9 inch) for PN ≥ 420 (MWP ≥ 6092 psi)
5) 91 mm (3.6 inch) for PN ≥ 420 (MWP ≥ 6092 psi)
6) 219 mm (8.62 inch) for PN ≥ 420 (MWP ≥ 6092 psi)

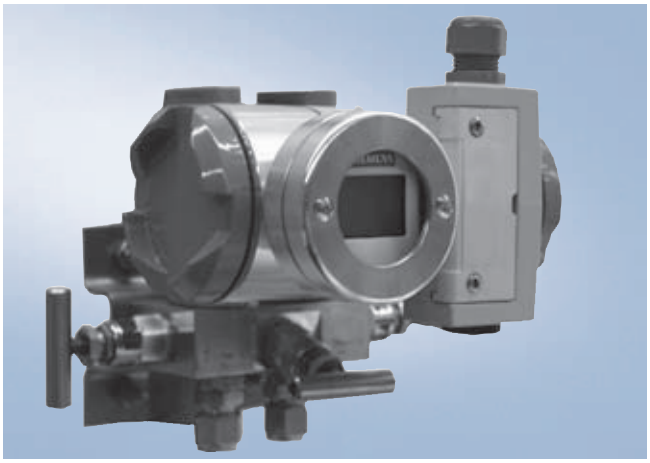
SITRANS P pressure transmitters, DS III FF series for differential pressure and flow, with process covers for vertical differential pressure lines, dimensional drawing, dimensions in mm (inch)



SITRANS P pressure transmitters, DS III FF series for differential pressure and flow, with process covers for vertical differential pressure lines



SITRANS P pressure transmitters, DS III FF series for differential pressure and flow, with digital indicator beside control keys, dimensional drawing, dimensions in mm (inch)



SITRANS P pressure transmitters, DS III FF series for differential pressure and flow, with digital indicator beside control keys

DS III FF series for differential pressure and flow

Selection and Ordering data		Order No.
SITRANS P pressure transmitters for differential pressure and flow		7MF4435-
DS III FF series, PN 32 / 160 (MWP 464 / 2320 psi)		■■■■■-■■■■
Measuring cell filling	**Measuring cell cleaning**	
Silicone oil	Standard	1
Inert liquid [1]	Grease-free	3
Rated measuring range		
PN 32 (MWP 464 psi)		
20 mbar [2]	(0.29 psi)	B
PN 160 (MWP 2320 psi)		
60 mbar	(0.87 psi)	C
250 mbar	(3.63 psi)	D
600 mbar	(8.70 psi)	E
1600 mbar	(23.2 psi)	F
5000 mbar	(72.5 psi)	G
30 bar	(435 psi)	H
Wetted parts materials		
(stainless steel process flanges)		
Seal diaphragm	Parts of measuring cell	
Stainless steel	Stainless steel	A
Hastelloy	Stainless steel	B
Hastelloy	Hastelloy	C
Tantalum [3]	Tantalum	E
Monel [3]	Monel	H
Gold [3]	Gold	L
Version as diaphragm seal		Y
Process connection		
Female thread ¼-18 NPT with flange connection		
• Sealing screw opposite process connection		
- Mounting thread M10 to DIN 19 213		0
- Mounting thread $^{7}/_{16}$-20 UNF to EN 61518		2
• Venting on side of process flanges		
- Mounting thread M10 to DIN 19 213		4
- Mounting thread $^{7}/_{16}$-20 UNF to EN 61518		6
Non-wetted parts materials		
Process flange screws	Electronics housing	
Stainless steel	Die-cast aluminium	2
Stainless steel	Stainless steel precision casting	3
Design		
• Standard design		1
• International version, English label inscriptions, documentation in 5 languages on CD		2
Explosion protection		
• without		A
• with CENELEC, Type of protection:		
- "Intrinsic safety (EEx ia)"		B
- "Explosion-proof (EEx d)" [4] (planned)		D
- "Intrinsic safety and explosion-proof enclosure (EEx ia + EEx d)" [5] (planned)		P
- "n (zone 2)" (planned)		E
• with FM + CSA, Type of protection:		
- "Intrinsic safety and explosion-proof (is + xp)" [4] (planned)		N C
Electrical connection / cable inlet		
• Screwed gland M20x1.5		B
• Screwed gland ½-14 NPT		C

Selection and Ordering data	Order No.
SITRANS P pressure transmitters for differential pressure and flow	7MF4435-
DS III FF series, PN 32 / 160 (MWP 464 / 2320 psi)	■■■■■-■■■■
Display	
• without (digital display hidden)	1
• with visible digital indicator	6
• with customer-specific digital indicator (setting as specified, Order code "Y21" required)	7

Included in delivery of the device:
- Brief instructions (Leporello)
- CD-ROM with detailed documentation
- Sealing plug(s) or sealing screw(s) for the process flanges(s)

1) For oxygen application, add Order code E10
2) Not suitable for connection of remote seal
3) Only together with max. spans 250, 1600, 5000 and 30000 mbar (3.63, 23.2, 72.5 and 435 psi).
4) Without cable gland, with blanking plug
5) 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**
O-rings for process flanges (instead of FPM (Viton))	
• PTFE (Teflon)	**A20**
• FEP (with silicone core, approved for food)	**A21**
• FFPM (Kalrez, compound 4079)	**A22**
• NBR (Buna N)	**A23**
Sealing screws ¼-18 NPT, with valve in material of process flanges	**A40**
Rating plate inscription (instead of German)	
• English	**B11**
• French	**B12**
• Spanish	**B13**
• Italian	**B14**
English rating plate Pressure units in inH_2O or psi	**B21**
Manufacturer's test certificate M to DIN 55350, Part 18 and to ISO 8402	**C11**
Acceptance test certificate B to EN 10204-3.1B	**C12**
Factory certificate to EN 10204-2.2	**C14**
Acid gas version to NACE (only together with seal diaphragm made of Hastelloy and process flange screws made of stainless steel)	**D07**
Type of protection IP68	**D12**
Digital indicator along side the input keys (only together with the devices 7MF4435-....0-.A.6 or -.A.7-Z, Y21)	**D27**
Use on zone 1D / 2D (only together with type of protection "Intrinsic safety (EEx ia)"	**E01**
Use at zone 0 (only together with type of protection "Intrinsic safety (EEx ia)"	**E02**
Oxygen application (max. 160 bar (2320 psi) with oxygen measurement and inert liquid)	**E10**
Interchanging of process connection side	**H01**
Vent on side for gas measurements	**H02**
Stainless steel process flanges for vertical differential pressure lines (not together with K01, K02 and K04) 1)	**H03**
Process flange	
• Hastelloy	**K01**
• Monel	**K02**
• Stainless steel with PVDF insert max. PN 10 (MWP 145 psi) max. temperature of medium 90 °C (194 °F)	**K04**

Further designs	Order code
Please add "-Z" to Order No. and specify Order code.	
Additional data	
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**
Setting of pressure indicator in pressure units specify in plain text Y21: mbar, bar, kPa, MPa, psi, ... Note: The following pressure units can be selected: bar, mbar, mm H_2O*), inH_2O*), ftH_2O*), mmHG, inHG, psi, Pa, kPa, MPa, g/cm^2, kg/cm^2, mA, Torr, ATM or % *) Reference temperature 20 °C	**Y21**

Only the settings for "Y21" can be made in the factory

1) Not suitable for connection of remote seal

2

DS III FF series for differential pressure and flow

Selection and Ordering data		Order No.
SITRANS P pressure transmitters for differential pressure and flow		7MF4535-
DS III FF series, PN 420 (MWP 6092 psi)		1 ■■■■-■■■■
Rated measuring range		
250 mbar	(3.63 psi)	D
600 mbar	(8.70 psi)	E
1600 mbar	(23.2 psi)	F
5 bar	(72.5 psi)	G
30 bar	(435 psi)	H
Wetted parts materials		
(stainless steel process flanges)		
Seal diaphragm	Parts of measuring cell	
Stainless steel	Stainless steel	A
Hastelloy	Stainless steel	B
Gold [1]	Gold	L
Process connection		
Female thread ¼-18 NPT with flange connection to DIN 19 213		
• Sealing screw opposite process connection		
- Mounting thread M12 to DIN 19 213		1
- Mounting thread $^7/_{16}$-20 UNF to EN 61518		3
• Venting on side of process flanges		
- Mounting thread M12 to DIN 19 213		5
- Mounting thread $^7/_{16}$-20 UNF to EN 61518		7
Non-wetted parts materials		
Process flange screws	Electronics housing	
Stainless steel	Die-cast aluminium	2
Stainless steel	Stainless steel precision casting	3
Design		
• Standard design		1
• International version, English label inscriptions, documentation in 5 languages on CD		2
Explosion protection		
• without		A
• with CENELEC, Type of protection:		
- "Intrinsic safety (EEx ia)"		B
- "Explosion-proof (EEx d)" [2] (planned)		D
- "Intrinsic safety and explosion-proof enclosure (EEx ia + EEx d)" [3] (planned)		P
- "n (zone 2)" (planned)		E
• with FM + CSA, Type of protection:		
- "Intrinsic safety and explosion-proof (is + xp)" [2] (planned), max. PN 360		N C
Electrical connection / cable inlet		
• Screwed gland M20x1.5		B
• Screwed gland ½-14 NPT		C
Display		
• without (digital display hidden)		1
• with visible digital indicator		6
• with customer-specific digital indicator (setting as specified, Order code "Y21" required)		7

Included in delivery of the device:
- Brief instructions (Leporello)
- CD-ROM with detailed documentation
- Sealing plug(s) or sealing screw(s) for the process flanges(s)

1) Not together with max. span 600 mbar
2) Without cable gland, with blanking plug
3) 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
O-rings for process flanges (instead of FPM (Viton))	
• PTFE (Teflon)	A20
• FEP (with silicone core, approved for food)	A21
• FFPM (Kalrez, compound 4079)	A22
• NBR (Buna N)	A23
Sealing screws ¼-18 NPT, with valve in material of process flanges	A40
Rating plate inscription (instead of German)	
• English	B11
• French	B12
• Spanish	B13
• Italian	B14
English rating plate Pressure units in inH_2O or psi	B21
Manufacturer's test certificate M to DIN 55.350, Part 18 and to ISO 8402	C11
Acceptance test certificate B to EN 10 204-3.1B	C12
Factory certificate to EN 10.204-2.2	C14
Acid gas version to NACE (only together with seal diaphragm made of Hastelloy and process flange screws made of stainless steel)	D07
Type of protection IP68	D12
Digital indicator along side the input keys (only together with the devices 7MF4535-...0.2-.A.6 or -.A.7-Z, Y21)	D27
Use on zone 1D / 2D (only together with type of protection "Intrinsic safety (EEx ia)"	E01
Use at zone 0 (only together with type of protection "Intrinsic safety (EEx ia)"	E02
Interchanging of process connection side	H01
Stainless steel process flanges for vertical differential pressure lines	H03

Additional data	
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
Setting of pressure indicator in pressure units specify in plain text (standard setting: mA): Y21: mbar, bar, kPa, MPa, psi, ... Note: The following pressure units can be selected: bar, mbar, mm $H_2O^{*)}$, in$H_2O^{*)}$, ft$H_2O^{*)}$, mmHG, inHG, psi, Pa, kPa, MPa, g/cm^2, kg/cm^2, mA, Torr, ATM or % *) Reference temperature 20 °C	Y21

Only the settings for "Y21" can be made in the factory.

Technical specifications

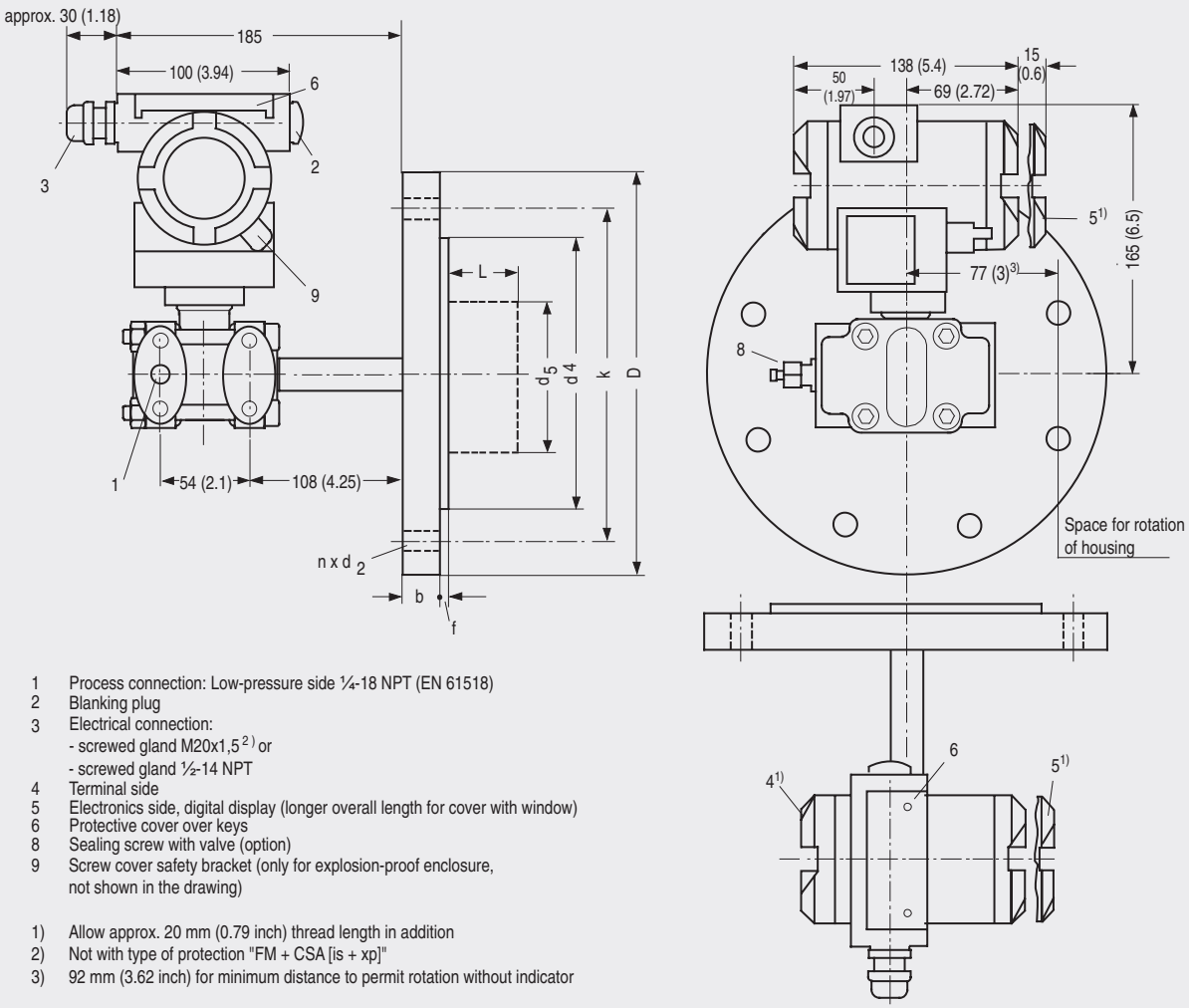
SITRANS P pressure transmitters, DS III FF series for level

Input	
Measured variable	Level
Nominal measuring range	Max. working pressure
• 250 mbar (3.63 psi)	See "Mounting flange"
• 600 mbar (8.7 psi)	
• 1600 mbar (23.2 psi)	
• 5000 mbar (72.5 psi)	
Lower measuring limit	
• Measuring cell with silicone oil filling	-100% of max. span or 30 mbar (0.435 psi) absolute, depending on mounting flange
Upper measuring limit	100% of max. span
Output	Digital Foundation Fieldbus signal
Physical bus	IEC 61158-2
Measuring accuracy	
Reference conditions	Increasing characteristic Start-of-scale value 0 bar Stainless steel seal diaphragm Mounting flange without tube Silicone oil filling Room temperature (25 °C (77 °F))
Error in measurement (including hysteresis and repeatability)	
- Linear characteristic	≤ 0.15%
Influence of ambient temperature	
• With -10 ... +60 °C (14 ... 140 °F)	
- 250-mbar (3.63 psi) measuring cell	≤ 0.7%
- 600-mbar (8.7 psi) measuring cell	≤ 0.5%
- 1,600 and 5,000 mbar (23.2 and 72.5 psi) measuring cells	≤ 0.45%
• With -40 ... -10 °C and +60 °C ... +85 °C (-40 ... +14 and 140 ... 185 °F)	
- 250-mbar (3.63 psi) measuring cell	≤ 0.4% / 10 K (≤ 0.4% / 18 °F)
- 600-mbar (8.7 psi) measuring cell	≤ 0.3% / 10 K (≤ 0.4% / 18 °F)
- 1,600 and 5,000 mbar (23.2 and 72.5 psi) measuring cells	≤ 0.27% / 10 K (≤ 0.4% / 18 °F)
Rated conditions	
Degree of protection (to EN 60529)	IP65
Temperature of medium	
• Measuring cell with silicone oil filling	
- High-pressure side	• p_{abs} ≥ 1bar: -40 ... +175 °C (-40 ... +347 °F) • p_{abs} < 1bar:-40 ... +80 °C (-40 ... +176 °F)
- Low-pressure side	-40 ... +100 °C (-40 ... +212 °F)
Design	
Weight	
• To DIN (pressure transmitter with mounting flange, without tube)	≈ 11 ... 13 kg (24.2 ... 28.7 lb)
• To ASME (pressure transmitter with mounting flange, without tube)	≈ 11 ... 18 kg (24.2 ... 39.2 lb)
Wetted parts materials	
High-pressure side:	
• Seal diaphragm of mounting flange	Stainless steel 316L, Monel 400, mat. No. 2.4360, Hastelloy B2, mat. No. 2.4617, Hastelloy C276, mat. No. 2.4819, Hastelloy C4, mat. No. 2.4610, tantalum, PTFE, ECTFE
Measuring cell filling	Silicone oil
Process connection	
• High-pressure side	Flange to DIN and ANSI
• Low-pressure side	Female thread ¼-18 NPT and flange connection to DIN 19213 with mounting thread M10 or $^{7}/_{16}$-20 UNF to EN 61518
Power supply U_H	Supplied through bus
Separate 24 V power supply necessary	No
Bus voltage	
• Not Ex	9 ... 32 V
• With intrinsically-safe operation	9 ... 24 V
Current consumption	
• Basic current (max.)	12.5 mA
Certificates and approvals	
Classification according to pressure equipment directive (DRGL 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 99 ATEX 2122
- Identification	Ex II 1/2 G EEx ia/ib IIB/IIC T6
- 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 a certified intrinsically-safe circuit with maximum values: • FISCO supply unit: U_o = 17.5 V, I_o = 380 mA, P_o = 5.32 W • Linear barrier: U_o = 24 V, I_o = 250 mA, P_o = 1.2 W
- Effective internal inductance/capacitance	L_i = 7 µH, C_i = 1.1 nF
• Explosion-proof "d"	Planned
• Type of protection "n" (zone 2)	Planned
• Explosion protection to FM	Planned
• Explosion protection to CSA	Planned

Mounting flange

Nom. diam.	Nom. press.
• To EN 1092-1	
- DN 80	PN 40
- DN 100	PN 16 PN 40
• To ASME B16.5	
- 3 inch	Class 150 Class 300
- 4 inch	Class 150 Class 300

Dimensional drawings



1 Process connection: Low-pressure side ¼-18 NPT (EN 61518)
2 Blanking plug
3 Electrical connection:
- screwed gland M20x1,5 2) or
- screwed gland ½-14 NPT
4 Terminal side
5 Electronics side, digital display (longer overall length for cover with window)
6 Protective cover over keys
8 Sealing screw with valve (option)
9 Screw cover safety bracket (only for explosion-proof enclosure, not shown in the drawing)

1) Allow approx. 20 mm (0.79 inch) thread length in addition
2) Not with type of protection "FM + CSA [is + xp]"
3) 92 mm (3.62 inch) for minimum distance to permit rotation without indicator

SITRANS P pressure transmitters, DS III FF series for level, including mounting flange, dimensional drawing, dimensions in mm (inch)

Connection to EN 1092-1

Nom. diam.	Nom. press.	b	D	d	d_2	d_4	d_5	d_M	f	k	n	L
		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
DN 80	PN 40	24	200	90	18	138	76	72 1)	2	160	8	0, 50, 100, 150 or 200
DN 100	PN 40	20	220	115	18	158	94	89	2	180	8	
	PN 40	24	235	115	22	162	94	89	2	190	8	

Connection to ASME B16.5

Nom. diam.	Nom. press.	b	D	d_2	d_4	d_5	d_M	f	k	n	L
	lb/sq.in.	inch (mm)	inch (mm)	inch (mm)	inch (mm)	inch (mm)	inch (mm)	inch (mm)	inch (mm)		inch (mm)
3 inch	150	0.94 (23.8)	7.5 (190.5)	0.75 (19.0)	5 (127)	3 (76)	2.81 1) (72)	0.06 (1.6)	6 (152.4)	4	0, 2, 3.94, 5.94 or 7.87 (0, 50, 100, 150 or 200)
	300	1.12 (28.6)	8.25 (209.5)	0.87 (22.2)	5 (127)	3 (76)	2.81 1) (72)	0.06 (1.6)	6.69 (168.3)	8	
4 inch	150	0.94 (23.8)	9 (228.5)	0.75 (19.0)	6,19 (157.2)	3.69 (94)	3.5 (89)	0.06 (1.6)	7.5 (190.5)	8	
	300	1.25 (31.7)	10 (254)	0.87 (22.2)	6,19 (157.2)	3.69 (94)	3.5 (89)	0.06 (1.6)	7.88 (200)	8	

d: Internal diameter of gasket to DIN 2690
d_M: Effective diaphragm diameter

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

Selection and Ordering data		Order No.
SITRANS P pressure transmitters for level		7MF4635-
DS III FF series		1 ■ Y ■■ - ■■■■
Rated measuring range		
250 mbar	(3.63 psi)	D
600 mbar	(8.70 psi)	E
1600 mbar	(23.2 psi)	F
5 bar	(72.5 psi)	G
Process connection of low-pressure side		
Female thread ¼-18 NPT with flange connection		
• Mounting thread M10 to DIN 19 213		0
• Mounting thread $^{7}/_{16}$-20 UNF to EN 61518		2
Non-wetted parts materials		
Process flange screws	Electronics housing	
Stainless steel	Die-cast aluminium	2
Stainless steel	Stainless steel precision casting	3
Design		
• Standard design		1
• International version, English label inscriptions, documentation in 5 languages on CD		2
Explosion protection		
• without		A
• with CENELEC, Type of protection:		
- "Intrinsic safety (EEx ia)"		B
- "Explosion-proof (EEx d)" [1] (planned)		D
- "Intrinsic safety and explosion-proof enclosure (EEx ia + EEx d)" [2] (planned)		P
- "n (zone 2)" (planned)		E
• with FM + CSA, Type of protection:		
- "Intrinsic safety and explosion-proof (is + xp)" [1] (planned)		N C
Electrical connection / cable inlet		
• Screwed gland M20x1.5		B
• Screwed gland ½-14 NPT		C
Display		
• without (digital display hidden)		1
• with visible digital indicator		6
• with customer-specific digital indicator (setting as specified, Order code "Y21" required)		7

Ordering information:
1st order item: Pressure transmitter 7MF4635-...
2nd order item: Mounting flange 7MF4912-...

Example of ordering:

Item line 1:	7MF4635-1EY22-1AB1
Item line 2:	7MF4912-3GE01

Included in delivery of the device:
- Brief instructions (Leporello)
- CD-ROM with detailed documentation
- Sealing plug(s) or sealing screw(s) for the process flanges(s)

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.	
O-rings for process flanges on low-pressure side (instead of FPM (Viton))	
• PTFE (Teflon)	A20
• FEP (with silicone core, approved for food)	A21
• FFPM (Kalrez, compound 4079)	A22
• NBR (Buna N)	A23
Sealing screws ¼-18 NPT, with valve in material of process flanges	A40
Rating plate inscription (instead of German)	
• English	B11
• French	B12
• Spanish	B13
• Italian	B14
English rating plate Pressure units in inH_2O or psi	B21
Manufacturer's test certificate M to DIN 55350, Part 18 and to ISO 8402	C11
Acceptance test certificate B to EN 10204-3.1B	C12
Factory certificate to EN 10204-2.2	C14
Type of protection IP68	D12
Use on zone 1D / 2D (only together with type of protection "Intrinsic safety (EEx ia)"	E01
Use at zone 0 (only together with type of protection "Intrinsic safety (EEx ia)"	E02
Interchanging of process connection side	H01
Additional data	
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
Setting of pressure indicator in pressure units specify in plain text (standard setting: mA): Y21: mbar, bar, kPa, MPa, psi, ... Note: The following pressure units can be selected: bar, mbar, mm $H_2O^{*)}$, $inH_2O^{*)}$, $ftH_2O^{*)}$, mmHG, inHG, psi, Pa, kPa, MPa, g/cm^2, kg/cm^2, mA, Torr, ATM or % *) Reference temperature 20 °C	Y21

Only the settings for "Y21" can be made in the factory.

2

DS III FF series for level

Selection and Ordering data		Order No.						
Mounting flange		7	M	F	4	9	1	2 -
Directly fitted to pressure transmitter SITRANS P (converter part) for level, for DS III FF series		3	■	■	■	■	-	■ ■ ■
Connection to EN 1092-1								
Nom. diam.	**Nom. press.**							
DN 80	PN 40		D					
DN 100	PN 16		G					
	PN 40		H					
Connection to ASME B16.5								
Nom. diam.	**Nom. press.**							
7.62 cm	Class 150		Q					
	Class 300		R					
4 inch	Class 150		T					
	Class 300		U					
Other version Add Order code and plain text: Nominal diameter: ...; Nominal pressure: ...			Z				J	1 Y
Wetted parts materials								
• Stainless steel 316L [1]				A				
- Coated with PFA				D				
- Coated with PTFE				E	0			
- Coated with ECTFE				F				
• Monel 400, mat. No. 2.4360				G				
• Hastelloy B2, mat. No. 2.4617				H				
• Hastelloy C276, mat. No. 2.4819				J				
• Hastelloy C4, mat. No. 2.4610				U				
• Tantalum				K				
Other version Add Order code and plain text: Wetted parts materials: ... Sealing face, see "Technical data"				Z			K	1 Y
Tube length								
• without					0			
• 50 mm	(1.97 inch)				1			
• 100 mm	(3.94 inch)				2			
• 150 mm	(5.90 inch)				3			
• 200 mm	(7.87 inch)				4			
Other version: Add Order code and plain text: Tube length: ...					9		L	1 Y
Filling liquid								
• Silicone oil M5						1		
• Silicone oil M50						2		
• High-temperature oil						3		
• Halocarbon oil (for O_2 measurements)						4		
• Vegetable oil						5		
• Glycerin / water [2]						6		
Other version Add Order code and plain text: Filling liquid: ...						9	M	1 Y

1) For vacuum on request
2) Not suitable for use in low-pressure range

Further designs	Order code
Please add "-Z" to Order No. and specify Order code.	
Spark arrestor for mounting on zone 0 (including documentation)	A01
Manufacturer's test certificate M to DIN 55350, Part 18 and to ISO 8402	C11
Acceptance test certificate B to EN 10204-3.1B	C12
Vacuum-proof design (for use in low-pressure range)	V04
Calculation of span of associated pressure transmitter (enclose filled-in questionnaire with order) Note: Suffix "Y01" required with pressure transmitter	Y05