

Modular Pressure Transmitter PF

Range of applications

- Pressure measurement in pipes and vessels
- High Temperature applications up to 177 °C (350 °F) permanent

Application Examples

- Sanitary pressure monitoring for breweries, dairies and food & beverage production

Hygienic Design / Process Connection

- Front-flush, hygienic and easy sterilizable installation by sleeve EMZ-352 or build-in system EHG-.../1"
- Conforming to 3-A Sanitary Standard 74-05 with Tri-Clamp DIRECTadapt
- EHEDG compliant hygienic design with CLEANadapt process connection
- CIP-/ SIP-cleaning up to 177 °C / 350 °F
- Product contacting materials compliant to FDA
- Sensor and product contact surfaces made of stainless steel
- Version with fixed Tri-Clamp adaptor
- Additional process connections in combination with CLEANadapt: diary flange (DIN 11851), Varivent, APV, DRD et al.

Features

- Unique design and fully modular components
- Components may be economically purchased and individually integrated
- Lower inventory cost for critical sensors
- Modules may be stocked and interchanged to meet any need
- Extremely durable at continuous temperatures up to 177 °C / 350 °F
- Easy to operate, adjustments without additional tools
- Self diagnostics ensure that sensor is performing optimally
- Available with absolute and relative measuring cell (vacuum proof)
- Developed to excel in the harshest environments
- Air tight sealing eliminates internal condensation (patent pending)

Options / Accessories

- Wide offering of standard pressure ranges
- Customer specified ranges available
- Waterproof prefabricated cable for M12 connector

Measuring Principle of the Pressure Sensor

This unit utilizes an internal piezoelectric transducer to convert the process measurement into a corresponding mV signal. The mV signal then passes through custom linearization and conditioning circuitry. The resulting signal is an industry standard 4...20 mA. This mA signal is factory set over the specified range of the unit.

With relative pressure sensors, the back of the diaphragm is vented, i.e. this sensor measures the gauge pressure and/or vacuum relative to the atmospheric pressure. With an absolute pressure sensor the measurement is relative to a perfect theoretical vacuum. I.e. the signal will vary with the ambient atmospheric air pressure.

Authorizations



Pressure sensor PF

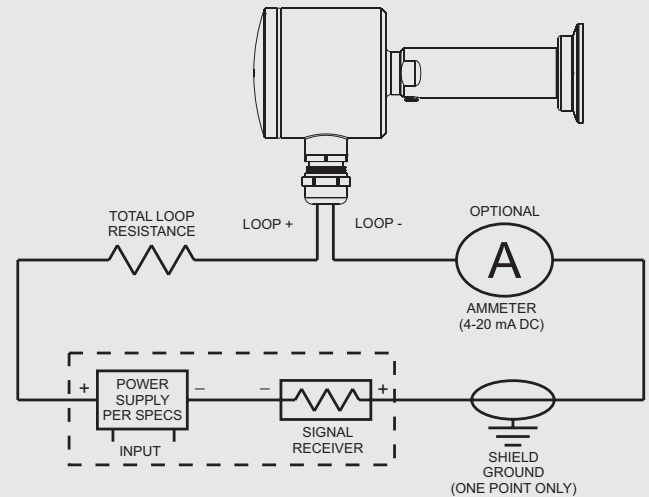
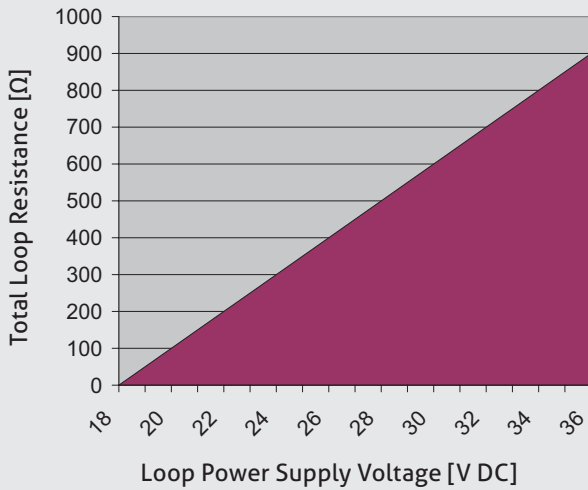


Pressure sensor PF



Specification		
Measuring range URL [bar]	Relative	0...2 / 3 / 4 / 6 / 7 / 10 / 20 / 35 / 70 -1...1 / 2.5 / 3 / 4 / 7
Measuring range URL [psi]	Absolute	0...2 / 3 / 4 / 6 / 7 / 10 / 20 / 35
	Relative	0...30 / 50 / 60 / 99 / 100 / 150 / 160 / 200 / 300 / 500 / 1000 30 mmHg/0, 30 mmHg/0...15 / 30 / 60 / 100 / 200
	Absolute	0...30 / 50 / 60 / 100 / 150 / 160 / 200 / 300 / 500
Turndown	max. 10:1	of upper range value (see also measurement accuracy)
Overpressure strength	Factor	1.5 x nominal pressure of measuring element up to 35 bar/500 psi 1.1 x nominal pressure of measuring element 70 bar / 1000 psi
Measurement accuracy	Turndown to 5:1	≤ 0.10 % in calibrated measuring range
	Turndown over 5:1	≤ 0.15 % in calibrated measuring range
	Repeatability	0.05 %
	Long-term stability	0.2 % URL every 2 years
Temperature effect	Process	< 12.5 mbar / 10 °C (0.1 psi / 10 °F) typical
	Ambient	< 12.5 mbar / 10 °C (0.1 psi / 10 °F) typical
Temperature range	Process	-18...177 °C (0...350 °F) at ambient temp. up to 60 °C (140 °F) -18...165 °C (0...330 °F) at ambient temp. up to 71 °C (160 °F)
	Ambient	0...71 °C (32...169 °F)
Response time		< 0.1 seconds
Sample rate		< 0.05 seconds
Materials	Connection head	Stainless steel, AISI 304 (1.4301), $R_a \leq 0.8 \mu\text{m}$ (32 microinch)
	Metal cover	Stainless steel, AISI 304 (1.4301), $R_a \leq 0.8 \mu\text{m}$ (32 microinch)
	Plastic cover	Polycarbonate
	Threaded connector	Stainless steel, AISI 304 (1.4301), $R_a \leq 0.8 \mu\text{m}$ (32 microinch)
	Wetted parts	Stainless steel, AISI 316L, $R_a \leq 0.64 \mu\text{m}$ (25 microinch)
	Diaphragm	Stainless steel, AISI 316L, $R_a \leq 0.64 \mu\text{m}$ (25 microinch)
	Diaphragm seal/oil filling	Medical white oil / mineral oil / paraffin oil FDA approval number 21CFR172.878, 21CFR178.3620, 21CFR573.680 Neobee M20 (optional)
Process connection		G1" hygienic, CPM fitting, IDF 38 mm / 51 mm (female), Tri-Clamp 3/4" ...2"
Electric connection	Cable gland	M16x1.5
	Plug-in connection	M12 plug, 5-pin, 1.4305 (option)
Protection class		IP 67 (with cable fitting) / NEMA 4X IP 69 K (with plug-in connection)
Auxiliary voltage		18...36 V DC
Output	Current loop	analog 4...20 mA
Burden		see separate graph on page 3
Tightening torque	For assembly all PFS components	27 Nm (20 ft-lbs)
Weight		approx. 780 g

Burden



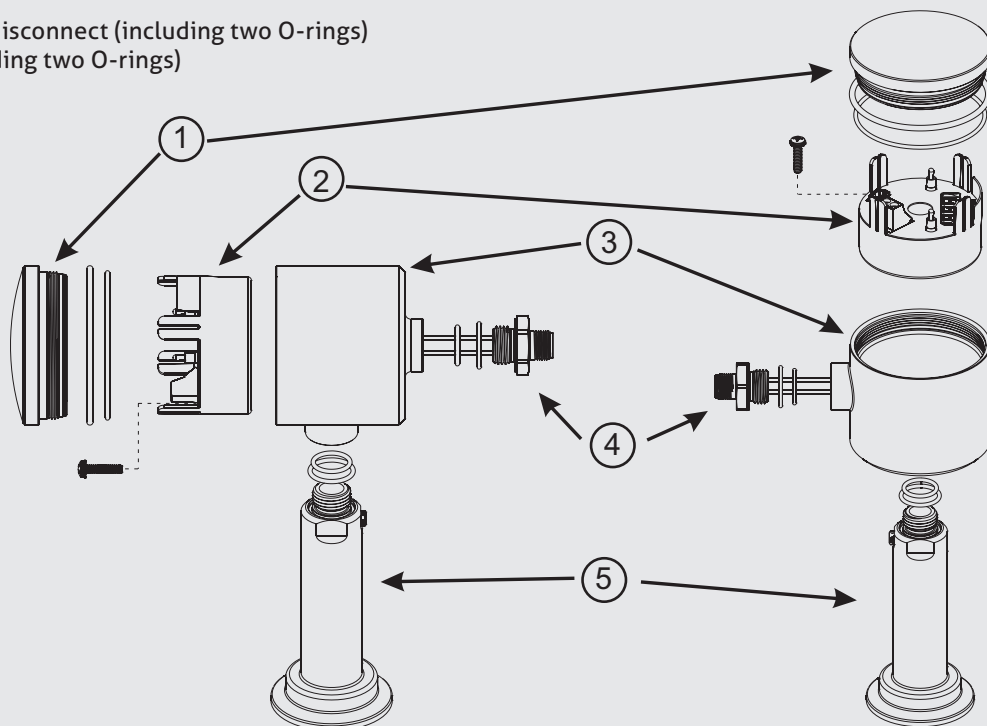
Conditions for a measuring point according to 3-A Sanitary Standard 74-05



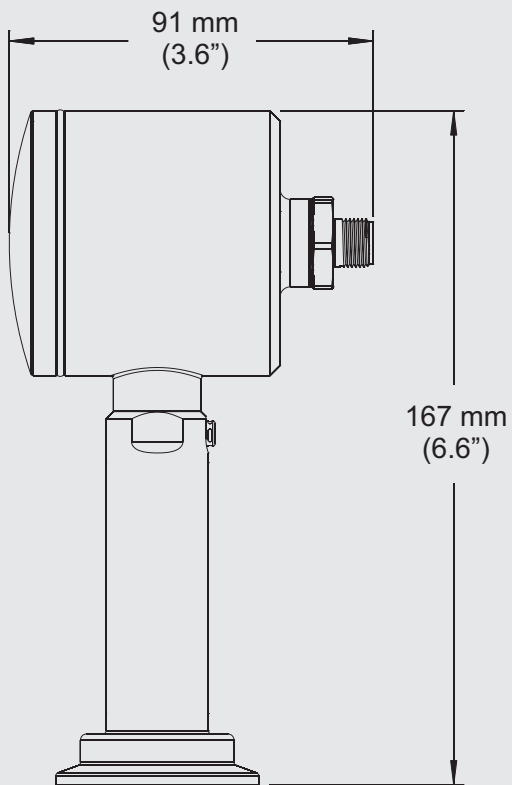
- The PF sensors with Tri-Clamp fitting conforming to the 3-A Sanitary Standard.
- The sensors are designed for CIP-/ SIP-cleaning. Maximum 177 °C / 120 minutes.
- Only with 3-A conforming Tri-Clamp connection.
- Mounting position, self draining and the position of the leakage hole must be in accordance to current 3-A Sanitary Standard.

Exploded view of functional components

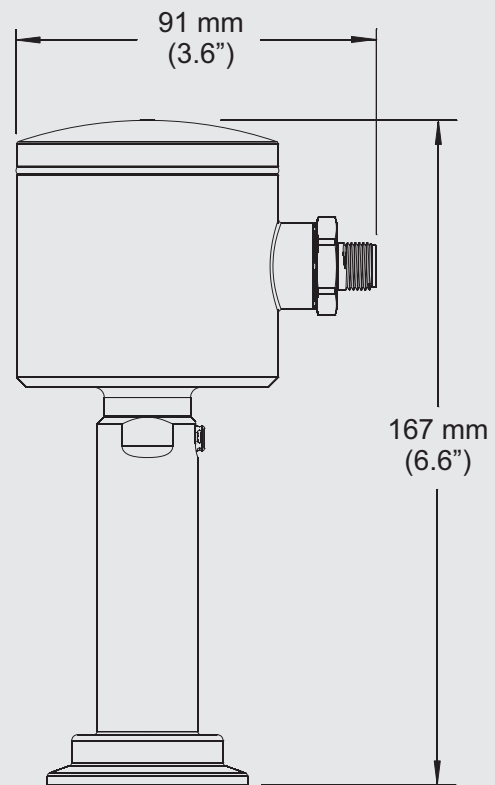
- 1: Cap (including two O-rings)
- 2: Puck
- 3: Enclosure
- 4: M12 Quick disconnect (including two O-rings)
- 5: Stem (including two O-rings)



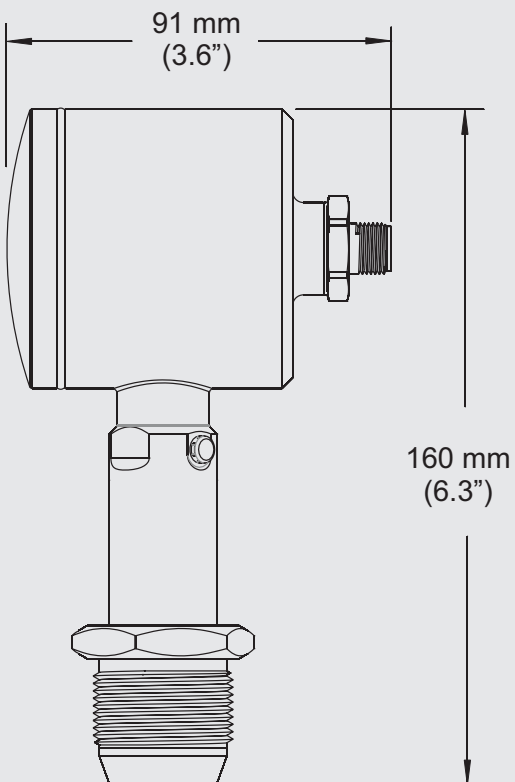
Dimensional drawing horizontal orientation



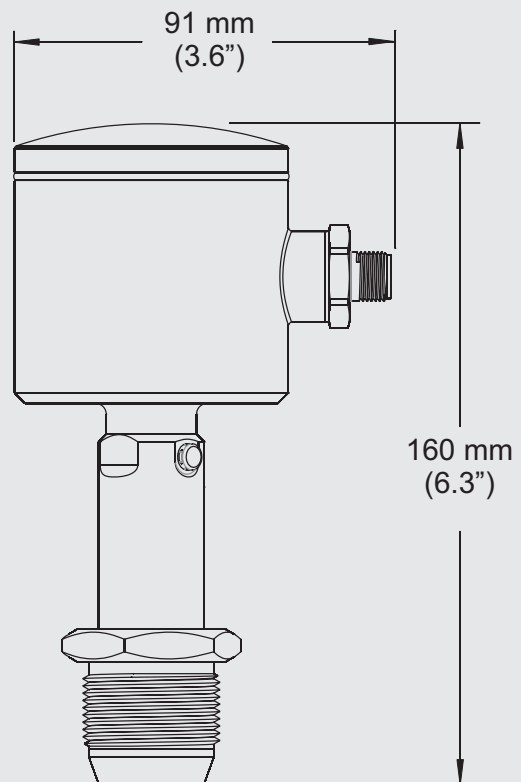
Dimensional drawing vertical orientation



Dimensional drawing CLEANadapt horizontal orientation



Dimensional drawing CLEANadapt vertical orientation

**Mechanical Connection / Installation**

Pay attention to the maximum tightening torque of 20 Nm if using Negele CLEANadapt system!

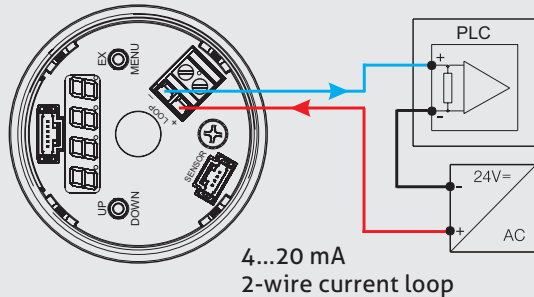




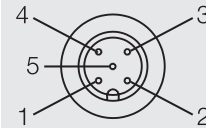
Conventional Usage

- Not suitable for applications in explosive areas.
- Not suitable for applications in security-relevant equipments (SIL).

Electrical connection with cable gland



Electrical connection with M12-plug



Configuration M12-plug

- 1: + supply +24 V DC
- 2: - output 4...20 mA
- 3: not connected
- 4: not connected
- 5: not connected

Maintenance Error Codes

Error Code	Category	Customer Action
No visible code, 3.8 mA output	Communication	Check Stem ribbon cable connection to puck, power cycle
E100	Incompatible Range	1. Reset Error 2. Reconfigure puck to a range compatible with the stem 3. power cycle
E101	Incompatible Range/ range changed	1. Reset Error 2. Reconfigure puck to a range compatible with the stem 3. power cycle
E300	Stem Data Corruption	Replace Stem
E301	Stem Data Corruption	Replace Stem
E302	Stem Data Corruption	Replace Stem
E304	Stem Data Corruption	Replace Stem
E405	Puck Data Corruption	Replace Puck
E406	Puck Data Corruption	Replace Puck
E407	Puck Data Corruption	Replace Puck
E500	Communication	Check Stem ribbon cable connection to puck, power cycle
E501	Stem Data Corruption	Replace Stem
E502	Stem Data Corruption	Replace Stem
E503	Stem Data Corruption	Replace Stem
E504	Stem Data Corruption	Replace Stem
E505	Insufficient loop voltage	Check if loop voltage is at least 18 V, provide correct voltage then power cycle
E600	Puck Data Corruption	Replace Puck
E602	Stem Configuration Error	Reset Error and power cycle and if error is persistent replace Stem
E603	Stem Configuration Error	Reset Error and power cycle and if error is persistent replace Stem
E700	Internal System Failure	Reset Error and power cycle and if error is persistent replace puck
E701	Internal System Failure	Reset Error and power cycle and if error is persistent replace puck
E702	Internal System Failure	Reset Error and power cycle and if error is persistent replace puck

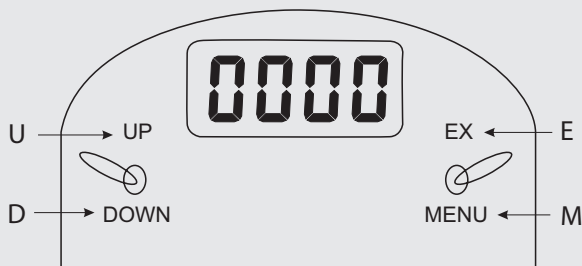


Modular sensor principle

The "MPF" pressure sensor has a modular design. It can be purchased in separate components and assembled as required by the customer. It is also available as a fully assembled sensor. In both cases, the user can check or change the following settings.

The components and sensors are delivered according to the specifications (ranges and units) stated on the type label. These values can be checked and changed by the user in the following menu. This is accomplished using two operating buttons (with a total of 4 actuation possibilities) and a 4-digit segment display.

View of electronics with open cover



Explanation of symbols used in menu structure

E	Tip on button "E" for short time
E_L	Hold button "E" for minimum 2 seconds
M	Tip on button "M" for short time
M_L	Hold button "M" for minimum 2 seconds
U	Tip on button "U" for short time
U_L	Hold button "U" for minimum 2 seconds
D	Tip on button "D" for short time
D_L	Hold button "D" for minimum 2 seconds

Configuration submenu "damping output" call up see page 7

Damping	Delay [ms]
0	100
1	1000
2	2000
3	3000
4	4000
5	5000
6	6000
7	7000
8	8000
9	9000
10	10000

Starting sequence

Power on device		LED-test all segments and points lighted
		Revision number is displayed
		Pressure unit e. g. BAR or PSI for relative version
		Upper range value e. g. 12.0 BAR
		Self-test, display differs acc. to „Display VALUE“
	Basic menu / RUN MODE	

Display of submenu/settings				
Mode / Basic menu	LED Indicator	Button/switch	Submenu operating level	Setting
		Select: U or D	Select: U or D	
RUN MODE	Display actual current or pressure value or error code if an error occurred			<ul style="list-style-type: none"> · Clear error · One touch zero (zero adjustment) · Display pressure or current value
	120.1	D _L	8.8.8.8	Clear error
	M	D _L + M _L	0000	"One Touch Zero"
		U	120.1	Display pressure value for 2 seconds (PVAL) if display "current" (CVAL) is selected.
		D	120.1	
SENSOR CONFIG MODE	CONF	E _L + U _L		
Display VALUE	M		PVAL	Toggle display CVAL / PVAL Actual current value (mA) CVAL Actual pressure value BAR / PSI PVAL
Units			PSI 9	Toggle unit PSI 9 PSI relative / BAR 9 BAR relative PSI A PSI absolute / BAR A BAR absolute
Output			4 20	Assignment of current value at output to measuring range 4...20 -> 4 mA = measuring range min 20 mA = max measuring range 20...4 -> 20 mA = measuring range min 4 mA = max measuring range
PRESSURE RANGE LRV: Lower range value		E	LrU	Display of present setting e.g. "50" Change value, at SET changing is not possible (vacuum range).
PRESSURE RANGE URV: Upper range value		E	UrU	Display of present setting e.g. "50" Change value, use U or D to set desired value. At SET the units BAR / PSI were changed.
Output Damping		E	dIP9	Display of present setting e.g. "0...10" Change value, see table on page 6.
Factory configuration reset		E	FrES	Display "n0" Change to "YES" -> Reset to factory setting
CALIBRATION MODE	CAL			

Cleaning / Maintenance 

- In case of using pressure washers, don't point nozzle directly to electrical connections!

Reshipment 

- Sensors shall be clean and must not be contaminated with dangerous media! Note the advice for cleaning!
- Use suitable transport packaging only to avoid damage of the equipment!

Advice to Conformity 

- Applicable guidelines:
Electromagnetic compatibility 2004/108/EC
- The accordance with applicable EC-guidelines is confirmed with CE-labeling of the device.
- You have to guarantee the compliance of all guidelines applicable for the entire equipment.

Transport / Storage 

- No outdoor storage
- Dry and dust free
- Not exposed to corrosive media
- Protected against solar radiation
- Avoiding mechanical shock and vibration
- Storage temperature -55...+90 °C
- Relative humidity max. 95 %

Standards and Guidelines 

- You have to comply with applicable regulations and directives.

Disposal 

- This instrument is not subject to the WEEE directive 2002/96/EC and the respective national laws.
- Pass the instrument directly on to a specialised recycling company and do not use the municipal collecting points.

Possible presettings of the measurement range

Order number PSI		Suitable for sensor type (see Order number)		Order number BAR		Suitable for sensor type (see Order number)	
		A (absolute)	C (relative)			A (absolute)	C (relative)
025	30Hg/0		x	251	-1...1		x
028	30Hg/0/15		x	286	-1...2.5		x
029	30Hg/0/30		x	217	-1...3		x
031	30Hg/0/60		x	056	-1...4		x
032	30Hg/0/100		x	304	-1...7		x
314	30Hg/0/200		x	057	0...2	x	x
066	0...30	x		235	0...3	x	x
068	0...50	x	x	192	0...4	x	x
069	0...60	x	x	060	0...6	x	x
070	0...99	x	x	309	0...7	x	x
071	0...100	x	x	061	0...10	x	x
073	0...150	x	x	065	0...20	x	x
074	0...160	x	x	224	0...35	x	x
075	0...200	x	x	206	0...70		x
077	0...300	x	x				
081	0...500	x	x				
084	0...1000	x	x				
000	(Field calibration)						
999	(Factory setting acc. to customer specifications)						

Order code of fully assembled sensor

PF (Modular pressure sensor, food)

S1 (Sensor neck, food and beverages)

Maximum upper range value

966 (30 psi / 2 bar)

971 (100 psi / 7 bar)

981 (500 psi / 35 bar)

984 (1000 psi / 70 bar)

Sensor type

A (Absolute)

C (Relative, vacuum-proof)

Process connection

160 (Flexible thread G1", hygienic CLEANadapt)

182 (Fixed thread G1" hygienic CLEANadapt)

059 (1.5" NPT)

002 (3/4" Tri-Clamp)

003 (1" Tri-Clamp)

004 (1.5" Tri-Clamp)

005 (2" Tri-Clamp)

123 (CPM fitting)

129 (IDF 38 mm female)

131 (IDF 51 mm female)

Actuating fill

1 (Medical-grade white oil/FDA-approved)

5 (Neobee M20)

Material membrane

A (Stainless steel 316L)

00 (Fixed character)

Certificates

A (No certificate)

B (3.1 Material and 2.1 Certificate)

Enclosure

E2A (SS head with measuring electronics and plastic cover)

E3A (SS head with measuring electronics and stainless steel cover)

Unit of measure

P (PSI)

B (BAR)

Measuring range

XXX (See measuring range table, page 8)

0 (Fixed character)

Electrical connection

A (M12 connector)

C (Cable fitting M16 x 1.5)

Enclosure orientation

1 (Vertical)

2 (Horizontal)

Certificates

A (No certificate)

B (3.1 Material and 2.1 Certificate)

C (3.1 Material and accuracy)

D (2.1 Certificate)

64 (Fixed character)



PF S1 966 C 160 1 A 00 A E2A P 068 0 A 1 A 64

Order number of measuring electronics without stainless steel enclosure

E1A (Measuring electronics without stainless steel enclosure)

Unit of measure

- P** (PSI)
- B** (BAR)
- 0** (Field calibrated)

Measuring range

- 000** (without preset of measuring range)
- XXX** (See measuring range table, page 8)

0 (Fixed character)

Electrical connection

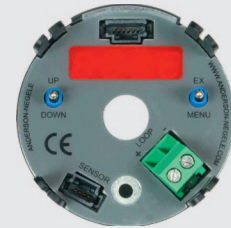
0 (Measuring electronics only)

Enclosure orientation

0 (Measuring electronics only)

Certificates

- A** (No certificate)
- D** (2.1 Certificate)
- 64** (Fixed character)



E1A P 066 0 0 0 A 64

Order number of measuring electronics with stainless steel enclosure

E2A (Measuring electronics with stainless steel enclosure and plastic cover)

E3A (Measuring electronics with stainless steel enclosure and stainless steel cover)

Unit of measure

- P** (PSI)
- B** (BAR)

Measuring range

- 000** (without preset of measuring range)
- XXX** (See measuring range table, page 8)

0 (Fixed character)

Electrical connection

- A** (M12 connector)
- C** (Cable fitting M16 x 1.5)

Enclosure orientation

- 1** (Vertical)
- 2** (Horizontal)

Certificates

- A** (No certificate)
- D** (2.1 Certificate)
- 64** (Fixed character)



E2A P 066 0 A 1 A 64

Order code of sensor neck

S1 (Sensor neck, food and beverages)

Maximum measuring range end value

- 966 (30 psi / 2 bar)
- 971 (100 psi / 7 bar)
- 981 (500 psi / 35 bar)
- 984 (1000 psi / 70 bar)

Sensor type

- A (Absolute)
- C (Relative, vacuum-proof)

Process connection

- 160 (Flexible thread G1", hygienic CLEANadapt)
- 182 (Fixed thread G1" hygienic CLEANadapt)
- 059 (1.5" NPT)
- 002 (3/4" Tri-Clamp)
- 003 (1" Tri-Clamp)
- 004 (1.5" Tri-Clamp)
- 005 (2" Tri-Clamp)
- 123 (CPM fitting)
- 129 (IDF 38 mm female)
- 131 (IDF 51 mm female)

Actuating fill

- 1 (Medical white oil / mineral oil)
- 5 (Neobee M20)

Material membrane

- A (Stainless steel 316L)
- 00 (Fixed character)

Certificates

- A (No certificate)
- B (3.1 Material and 2.1 Certificate)



S1 966 A 160 1 A 00 A

Order number of individual components		
Figure	Part	Order number
	Electronics	See order number of measuring electronics without a stainless steel housing on page 10
	Wire cover	56741B0064
	Enclosure w/o cap	56327S0064
	Stainless steel cap with seal	5632900001
	Plastic cap with seal	5632800001
	M12 connector	SP56726A0002
	Cable gland M16x1.5	SP5633100000
	O-ring kit (6 rings for complete sensor)	563300001