



IMP 331Pi

Precision Pressure Transmitter

pressure ports and process connections with flush welded stainless steel diaphragm

accuracy according to IEC 60770:
0,1 % FSO

Nominal pressure

from 0 ... 400 mbar up to 0 ... 40 bar

Output signals

2-wire: 4 ... 20 mA
3-wire: 0 ... 10 V
others on request

Product characteristics

- ▶ excellent temperature response
0.04 % FSO / 10K
- ▶ processing of the sensor signal using digital electronics
- ▶ process connections suitable for hygienic application
- ▶ vacuum resistant

Optional versions

- ▶ IS-version
Ex ia = intrinsically safe for gases and dusts
- ▶ communication interface for adjustment of offset, span and damping

The precision pressure transmitter IMP 331P demonstrates the further development of well-tried industrial pressure transmitter IMP 331.

The signal from the specially designed piezoresistive stainless steel sensor is processed by the newly developed digital electronic system, performing thus an active compensation of sensor-specific deviations such as hysteresis, thermal errors and non-linearity.

The temperature range of -40 ... 125 °C can be extended by the integration of a cooling element up to 300 °C.

Preferred areas of use are



Laboratory techniques



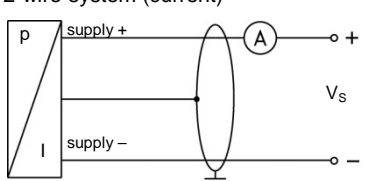
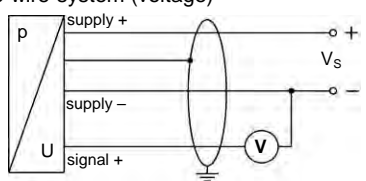
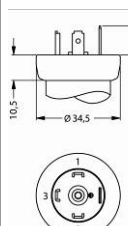
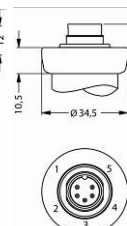

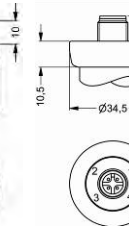
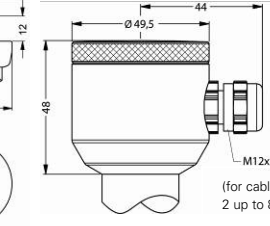
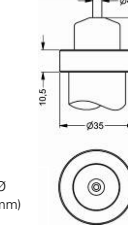

Food and beverage



Pharmaceutical industry

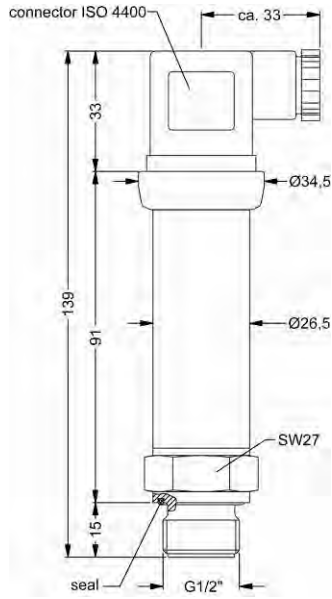


Pressure ranges ¹								
Nominal pressure gauge / absolute ²	[bar]	0.4	1	2	4	10	20	40
Overpressure	[bar]	2	5	10	20	40	80	105
Burst pressure ≥	[bar]	3	7,5	15	25	50	120	210
Vacuum resistance		P _N ≥ 1 bar: unlimited vacuum resistance P _N < 1 bar: on request						
¹ On customer request we adjust the device within the turn-down-possibility by software on the required pressure range.								
² absolut pressure permissible from 1 bar								
Vacuum ranges								
Nominal pressure	[bar]	-0.4 ... 0.4	-1 ... 1	-1 ... 2	-1 ... 4	-1 ... 10		
Overpressure	[bar]	2	5	10	20	40		
Burst pressure ≥	[bar]	3	7.5	15	25	50		
Output signal / Supply								
Standard		2-wire: 4 ... 20 mA / V _S = 12 ... 36 V _{DC}						
Option IS-protection		2-wire: 4 ... 20 mA / V _S = 14 ... 28 V _{DC}						
Options		2-wire: 4 ... 20 mA with communication interface ³ 3-wire: 0 ... 10 V / V _S = 14 ... 30 V _{DC} 0 ... 10 V with communication interface ³						
³ only possible with el. connection Binder series 723 (7-pin)								
Performance								
Accuracy ⁴		IEC 60770: ≤ ± 0.1 % FSO						
performance after turn-down		no change of accuracy ⁵ for calculation use the following formula (for nominal pressure ranges ≤ 0.40 bar see note 5): ≤ ± [0.1 + 0.015 x turn-down] % FSO with turn-down = nominal pressure range / adjusted range e.g. with a turn-down of 1:10 following accuracy is calculated: ≤ ± (0.1 + 0.015 x 10) % FSO i.e. accuracy is ≤ ± 0.25 % FSO						
Permissible load		current 2-wire: R _{max} = [(V _S - V _S min) / 0.02 A] Ω voltage 3-wire: R _{min} = 10 kΩ						
Influence effects		supply: 0.05 % FSO / 10 V load: 0.05 % FSO / kΩ						
Long term stability		≤ ± (0.1 x turn-down) % FSO / year						
Response time		< 5 msec						
Adjustability		configuration of following parameters possible (interface / software necessary ⁶): - electronic damping: 0 ... 100 sec - offset: 0 ... 90 % FSO - turn down of span: max. 1:10						
⁴ accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability)								
⁵ except nominal pressure ranges ≤ 0.40 bar; for these calculation of accuracy is as follows: ≤ ± (0.1 + 0.02 x turn-down) % FSO e.g. turn-down of 1:3: ≤ ± (0.1 + 0.02 x 3) % FSO i.e. accuracy is ≤ ± 0.16 % FSO								
⁶ software, interface, and cable have to be ordered separately (software appropriate for Windows [®] 95, 98, 2000, NT Version 4.0 or higher, and XP)								
Thermal effects ⁷ (Offset and Span) / Permissible temperatures								
Tolerance band	[% FSO]	≤ ± (0.35 x turn-down)		in compensated range -20 ... 80 °C				
TC, average	[% FSO / 10 K]	≤ ± (0.035 x turn-down)		in compensated range -20 ... 80 °C				
Permissible temperatures ⁸		medium: -40 ... 125 °C for filling fluid silicon oil -10 ... 125 °C for filling fluid food compatible oil electronics / environment: -25 ... 85 °C storage: -40 ... 100 °C						
Permissible temperature medium for cooling element 300°C		filling fluid silicon oil		overpressure: -40 ... 300 °C		vacuum: -40 ... 150 °C ⁹		
		filling fluid food compatible oil		overpressure: -10 ... 250 °C		vacuum: -10 ... 150 °C ⁹		
⁷ an optional cooling element can influence thermal effects for offset and span depending on installation position and filling conditions.								
⁸ max. temperature of the medium for nominal pressure gauge > 0 bar: 150 °C for 60 minutes with a max. environmental temperature of 50 °C								
⁹ also for P _{abs} ≤ 1 bar								
Electrical protection								
Short-circuit protection		permanent						
Reverse polarity protection		no damage, but also no function						
Electromagnetic compatibility		emission and immunity according to EN 61326						
Filling fluids								
Standard		silicon oil						
Options		food compatible oil with FDA approval (Mobil DTE FM 32; Category Code: H1; NSF Registration No.: 130662) others on request						
Mechanical stability								
Vibration (DIN EN 60068-2-6)		G 1/2": 20 g RMS (25 ... 2000 Hz);			others except G 1/2": 10 g RMS (25 ... 2000 Hz)			
Shock (DIN EN 60068-2-27)		G 1/2": 500 g / 1 msec;			others except G 1/2": 100 g / 1 msec			

Materials						
Pressure port	stainless steel 1.4404 (316 L) others on request					
Housing	stainless steel 1.4404 (316 L)					
Option compact field housing	stainless steel 1.4305 (303), cable gland brass, nickel plated others on request					
Seals (O-ring)	standard: FKM (recommended for medium temperatures $\leq 200\text{ }^{\circ}\text{C}$) option: FFKM (recommended for medium temperatures $> 200\text{ }^{\circ}\text{C}$) others on request clamp and dairy pipe: without					
Diaphragm	standard: stainless steel 1.4435 (316L) option: Hastelloy [®] C-276 (2.4819) and Tantalum on request					
Media wetted parts	pressure port, diaphragm					
Explosion protection (only for 4 ... 20 mA / 2-wire)						
Approvals DX 19-IMP 331 P	IBExU 10 ATEX 1068 X / IECEx IBE 12.0027X zone 0: II 1G Ex ia IIC T4 Ga zone 20: II 1D Ex ia IIIC T 85°C Da					
Safety technical maximum values	$U_i = 28\text{ V}$, $I_i = 93\text{ mA}$, $P_i = 660\text{ mW}$, $C_i \approx 0\text{ nF}$, $L_i \approx 0\text{ }\mu\text{H}$, the supply connections have an inner capacity of max. 27 nF to the housing					
Ambient temperature range	in zone 0: $-20 \dots 60\text{ }^{\circ}\text{C}$ with p_{atm} 0.8 bar up to 1.1 bar in zone 1 or higher: $-20 \dots 70\text{ }^{\circ}\text{C}$					
Connecting cables (by factory)	cable capacitance: signal line/shield also signal line/signal line: 160 pF/m cable inductance: signal line/shield also signal line/signal line: 1 $\mu\text{H}/\text{m}$					
Miscellaneous						
Current consumption	signal output current: max. 25 mA signal output voltage: max. 7 mA					
Weight	approx. 200 g					
Installation position	any ¹⁰					
Operational life	$> 100 \times 10^6$ pressure cycles					
CE-conformity	EMC Directive: 2004/108/EC					
¹⁰ Pressure transmitters are calibrated in a vertical position with the pressure connection down. If this position is changed on installation there can be slight deviations in the zero point for pressure ranges $P_N \leq 1\text{ bar}$.						
Wiring diagrams						
<p>2-wire-system (current)</p> 	<p>3-wire-system (voltage)</p> 					
Pin configuration						
Electrical connections	ISO 4400	Binder 723 (5-pin)	Binder 723 (7-pin)	M12x1/ metal (4-pin)	field housing	cable colours (DIN 47100)
Supply +	1	3	3	3	IN +	wh (white)
Supply -	2	4	1	1	IN -	bn (brown)
Signal + (only for 3-wire)	3	1	6	-	OUT +	gr (green)
shield	ground pin	5	2	4	$\text{---}\text{---}\text{---}$	ye/gn yellow / green
Communication interface ¹¹	RxD	-	4	-	-	-
	TxD	-	5	-	-	-
	GND	-	7	-	-	-
¹¹ may not be connected directly with the PC (the suitable adapter is available as accessory)						
Electrical connections (dimensions in mm)						
standard	option					
						
ISO 4400 (IP 65)	Binder 723 5-pin (IP 67)	Binder 723 7-pin (IP 67)	M12x1 4-pin (IP 67)	field housing (IP 67)	cable outlet ¹² PVC cable (IP 67)	cable outlet ¹³ , with ventilation tube (IP 68)
¹² standard: 2 m PVC cable (without ventilation tube, permissible temperature: $-5 \dots 70\text{ }^{\circ}\text{C}$)						
¹³ different cable types and lengths available, permissible temperature depends on kind of cable						

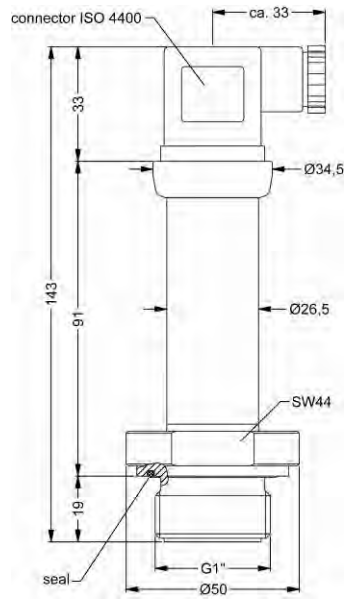
Mechanical connection (dimensions in mm)

standard

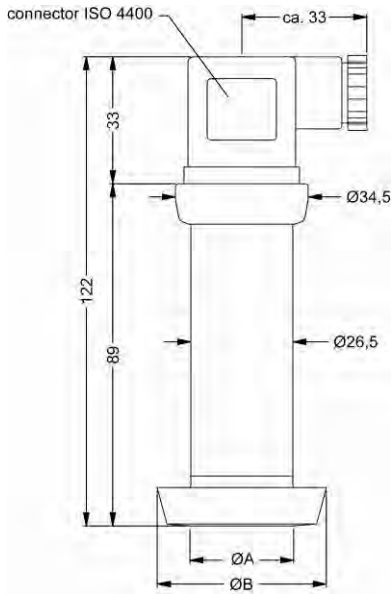


G1/2" flush DIN 3852

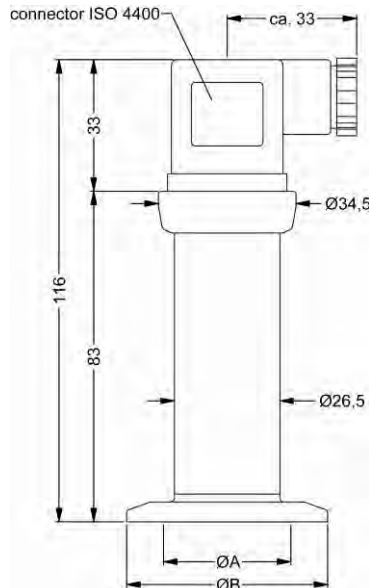
option



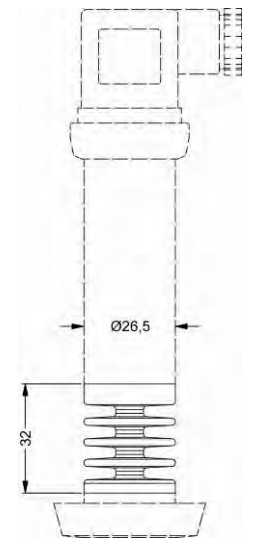
G1" flush DIN 3852



dairy pipe (DIN 11851)



Clamp (DIN 32676)



cooling element up to 300 °C

dimensions in mm			
size	DN 25	DN 40	DN 50
A	23	32	45
B	44	56	68.5
P _N [bar]	≤ 40	≤ 40	≤ 25

dimensions in mm			
size	DN 25	DN 32	DN 50
A	23	32	45
B	50.5	50.5	64
P _N [bar]	≤ 16	≤ 16	≤ 16

⇒ metric threads and others on request

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