BD|SENSORS
pressure measurement

x|act i

Precision Pressure Transmitter for Food Industry, Pharmacy and Biotechnology with SIL2 (optionally)

Stainless Steel Sensor

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
others on request

Special characteristics

- turn-down 1:10
- hygienic version
- flush welded diaphragm
- several process connections (G1" cone, Clamp, dairy pipe, etc.)
- integrated display and operating module

Optional versions

- explosion protection intrinsic safety (ia)
- SIL2 -version according to IEC 61508 / IEC 61511
- HART®-communication
- cooling element for media temperatures up to 300 °C

The precise pressure transmitter x|act i has been especially designed for the food industry, pharmacy and biotechnology and measures vacuum, gauge and absolute pressure of gases, steam, and fluids up to 40 bar.

Several process connections e.g. thread or hygienic versions like Varivent®, dairy pipe and Clamp with a flush welded diaphragm are available, which can be combined with a cooling element for media temperatures up to 300 °C. The robust stainless steel globe housing has a high ingress protection IP 67 and all characteristics for a residue-free and antibacterial cleaning.

Preferred areas of use are

- Food industry
- Pharmacy

Material and test certificates

- Inspection certificate 3.1 according to EN 10204
- Test report 2.2 according to EN 10204

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Pressure ranges [1]								
Nominal pressure gauge / abs. [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

[1] higher pressure ranges on request; on demand we adjust the devices within the turn-down-possibility by software on the required pressure ranges
[2] absolute pressure possible from 1 bar

Vacuum ranges						
Nominal pressure gauge	[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			
2-wire: 4 ... 20 mA	standard:	analogue signal	V_S = 12 … 30 V_{DC}
	options:	intrinsic safety (ia)	V_S = 12 … 28 V_{DC}
		intrinsic safety (ia) with HART®-communication	V_S = 12 … 28 V_{DC}
		SIL2	V_S = 12 … 30 V_{DC}
		SIL2 / intrinsic safety (ia)	V_S = 12 … 28 V_{DC}
		SIL2 / intrinsic safety (ia) with HART® communication	V_S = 12 … 28 V_{DC}
Current consumption	max. 25 mA		
Performance			
Accuracy [3] performance after turn-down (TD) - TD ≤ 1:5 - TD > 1:5	≤ ± 0.1 % FSO no change of accuracy the accuracy is calculated as follows: ≤ 0.1 + 0.015 x (turn-down - 5) % FSO e.g. turn-down 9: ≤ 0.1 + 0.015 x (9 - 5) % FSO = 0.16 % FSO		
Permissible load	$R_{max} = [(V_S – V_{S\,min}) / 0.02\ A]\ \Omega$	load during HART® communication: R_{min} = 250 Ω	
Influence effects	supply: 0.05 % FSO / 10 V	permissible load: 0.05 % FSO / kΩ	
Long term stability	≤ ± (0.1 x turn-down) % FSO / year at reference conditions		
Response time	100 msec – without consideration of electronic damping	measuring rate 10/sec	
Adjustability	electronic damping: 0 … 100 sec	offset: 0 ... 90 % FSO	turn-down of span: max. 1:10

[3] accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability)

Thermal effects (offset and span)	
Tolerance band [4, 5]	≤ ± 0.2 % FSO x turn-down
in compensated range	-20 … 85 °C

[4] an optional cooling element can influence thermal effects for offset and span depending on installation position and filling conditions
[5] for flange-, Varivent-, DRD-version: tolerance band offset ≤ ± 1.6 % FSO / tolerance band span ≤ ± 0.6 % FSO

Permissible temperatures		
Filling fluid	silicone oil	food compatible oil
Medium [6]	-40 ... 125 °C	-10 ... 125 °C
Medium with cooling element [7]	overpressure: -40 ... 300 °C vacuum: -40 ... 150 °C	overpressure: -10 ... 250 °C vacuum: -10 ... 150 °C
Electronics / environment	-20 ... 70 °C	
Storage	-30 ... 80 °C	

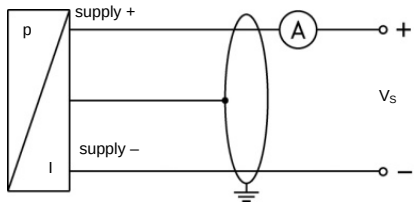
[6] for vacuum ranges and absolute pressure the max. medium temperature is 70 °C; max. temperature of the medium for nominal pressure gauge > 0 bar: 150 °C for 60 minutes with a max. environmental temperature of 50 °C (without cooling element).
[7] max. temperature depends on the used sealing material, type of seal and installation

Electrical protection	
Short-circuit protection	permanent
Reverse polarity protection	no damage, but also no function
Electromagnetic compatibility	emission and immunity according to EN 61326
Mechanical stability	
Vibration	5 g RMS (25 ... 2000 Hz) according to DIN EN 60068-2-6
Shock	100 g / 11 msec according to DIN EN 60068-2-27
Filling fluids	
Standard	silicone oil
Options	food compatible oil according to 21CFR178.3570 (Mobil SHC Cibus 32; Category Code: H1; NSF Registration No.: 141500) Halocarbon and others on request
Materials	
Pressure port	stainless steel 1.4435 (316 L)
Housing	stainless steel 1.4301 (304)
Viewing glass	laminated safety glass
Seals (media wetted)	none, not included in the scope of delivery
Diaphragm	standard: stainless steel 1.4435 (316 L) options: Hastelloy® C-276 (2.4819); tantalum (possible from 1 bar on) on request
Media wetted parts	pressure port, diaphragm, seals (if existing)

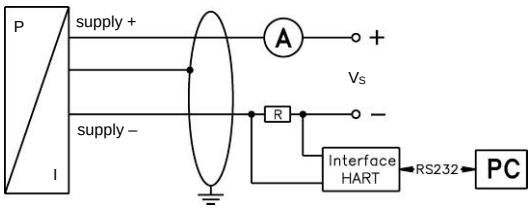
Explosion protection	
Approvals AX12-x|act i AX2 - x|act i (with SIL2)	IBExU 05 ATEX 1106 X (with SIL2: IBExU 05 ATEX1105 X) zone 0: II 1G Ex ia IIC T4 Ga zone 20: II 1D Ex ia IIIC T85 °C Da
Safety technical maximum values	U_i = 28 V, I_i = 98 mA, P_i = 680 mW, C_i = 0 nF, L_i = 0 µH, the supply connections have an inner capacity of max. 27 nF to the housing
Permissible temperatures for environment	in zone 0: -20 ... 60 °C with p_{atm} 0.8 bar up to 1.1 bar in zone 1 or higher: -40 ... 70 °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 µH/m
Option	
SIL2-version	according to IEC 61508 / IEC 61511
Miscellaneous	
EHEDG certificate Type EL Class I	EHEDG conformity is only ensured in combination with an approved seal. This is e.g. for - Clamp (C61, C62, C63): T-ring-seal from Combifit International B.V. - Varivent® (P41): EPDM-O-ring which is FDA-listed - dairy pipe (M73, M75, M76): ASEPTO-STAR k-flex upgrade seal by Kieselmann GmbH
Display	LC display, visible range 32.5 x 22.5 mm; 5-digit 7-segment main display, digit height 8 mm, range of indication ±9999; 8-digit 14-segment additional display, digit height 5 mm; 52-segement bargraph; accuracy 0.1% ± 1 digit
Ingress protection	IP 67
Installation position	any (standard calibration in a vertical position with the pressure port connection down; differing installation position for $p_N \leq 2$ bar have to be specified in the order)
Surface roughness	pressure port $R_a < 0.8$ µm (media wetted parts) diaphragm $R_a < 0.15$ µm weld seam $R_a < 0.8$ µm
Weight	min. 400 g (depending on mechanical connection)
Operational life	100 million load cycles
CE-conformity	EMC Directive: 2014/30/EU
ATEX Directive	2014/34/EU

Wiring diagrams

2-wire-system (current)

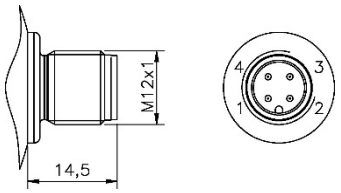


2-wire-system (current) HART® - communication

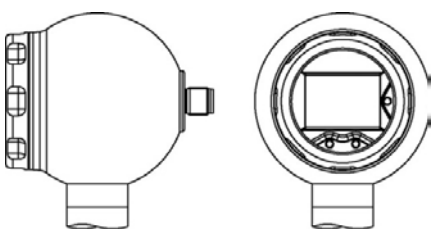


Pin configuration / electrical connection (dimensions in mm)

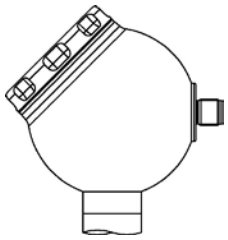
Electrical connections	M12x1 (4-pin), metal
Supply +	1
Supply –	3
Shield	plug housing



Designs [8]



side display

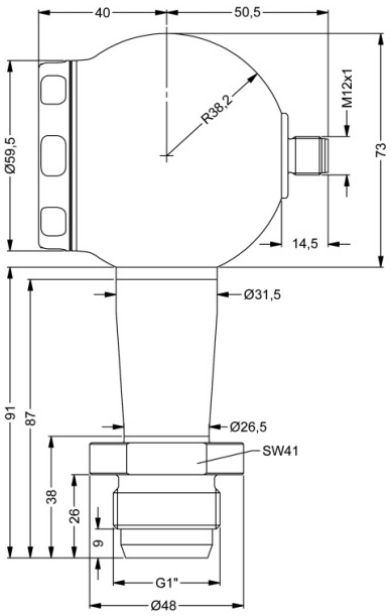


45° display

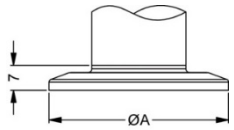
[8] *all designs in combination with G1" cone in horizontal rotatable housing as standard; other mech. connections in rotatable housing on request*

Dimensions (in mm)

G1" cone

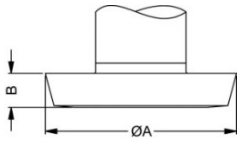


Clamp (DIN 32676)



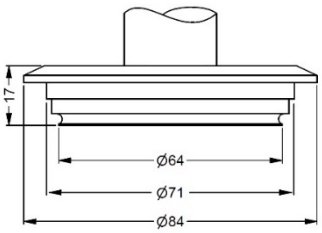
dimensions in mm				
size	3/4"	DN 25	DN 32	DN 50
A	25	50.5	50.5	64
p_N [bar]	≥ 4 ≤ 8	≥ 0,25 ≤ 16	≤ 16	≤ 16

dairy pipe [9] (DIN 11851)



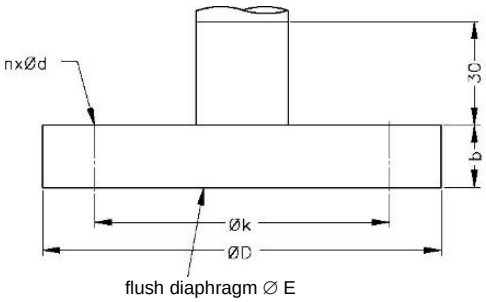
dimensions in mm			
size	DN 25	DN 40	DN 50
A	44	56	68,5
B	10	10	11
p_N [bar]	≥ 0.25 ≤ 40	≥ 0.25 ≤ 40	≥ 0.25 ≤ 25

Varivent®



DN40/50
p_N ≤ 25 bar

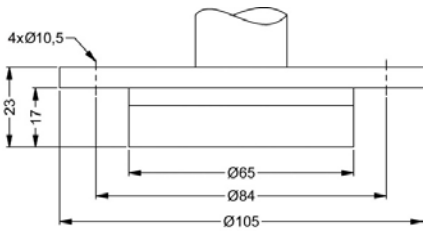
flange (DIN 2501)



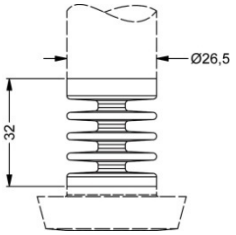
flush diaphragm ∅ E

dimensions in mm			
size	DN 25	DN 50	DN 80
D	115	165	200
E	30	89	89
k	85	125	160
b	18	20	20
n	4	4	8
d	14	18	18
p_N [bar]	≤ 40	≤ 40	≤ 16

DRD [9] (for p_N ≤ 25 bar)



cooling element up to 300 °C [7]



[7] *max. temperature depends on the used sealing material, type of seal and installation*
[9] *cup nut resp. mounting flange is included in the delivery (already pre-assembled)*

HART® is a registered trademark of HART Communication Foundation; Hastelloy® is a trademark of Haynes International Inc.; Varivent® is a trademark of GEA Tuchenhagen GmbH; Windows® is a registered trademark of Microsoft Corporation

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Pressure			
	gauge	5 1 1	
	absolute [1]	5 1 2	
Input	[bar] ⚠		
	0 ... 0.4 [1]	4 0 0 0	
	0 ... 1	1 0 0 1	
	0 ... 2	2 0 0 1	
	0 ... 4	4 0 0 1	
	0 ... 10	1 0 0 2	
	0 … 20	2 0 0 2	
	0 ... 40	4 0 0 2	
	-0.4 … 0.4	S 4 0 0	
	-1 … 1	S 1 0 2	
	-1 ... 2	V 2 0 2	
	-1 … 4	V 4 0 2	
	-1 … 10	V 1 0 3	
	customer	9 9 9 9	consult
Design			
	side display	K H	
	45° display	K 4	
Output			
	4 … 20 mA / 2-wire	1	
	intrinsic safety (ia) 4 … 20 mA / 2-wire	E	
	intrinsic safety (ia) 4 … 20 mA / 2-wire with HART®-communication	I	
SIL2:	4 … 20 mA / 2-wire	1S	
SIL2:	intrinsic safety (ia) 4 … 20 mA / 2-wire	ES	
SIL2:	intrinsic safety (ia) 4 … 20 mA / 2-wire with HART®-communication	IS	
	customer	9	consult
Accuracy			
	0.1 % FSO	1	
Electrical connection			
	male plug M12x1 (4-pin), metal	M 1 0	
	customer	9 9 9	consult
Mechanical connection			
	G1" cone	K S 1	
	Clamp DN 25 / 1" (DIN 32676) / 3A (0,25 bar ≤ p_N ≤ 16 bar)	C 6 1	
	Clamp DN 32 / 1 1/2" (DIN 32676) / 3A (p_N ≤ 16 bar)	C 6 2	
	Clamp DN 50 / 2" (DIN 32676) / 3A (p_N ≤ 16 bar)	C 6 3	
	Clamp 3/4" (DIN 32676) / 3A (4 bar ≤ p_N ≤ 8 bar)	C 6 9	
	diary pipe DN 25 DIN 11851 (p_N ≤ 40 bar) [2]	M 7 3	
	diary pipe DN 40 DIN 11851 (p_N ≤ 40 bar) [2]	M 7 5	
	diary pipe DN 50 DIN 11851 (p_N ≤ 25 bar) [2]	M 7 6	
	Varivent® DN 40/50 / 3A (p_N ≤ 25 bar)	P 4 1	
	flange DN 25 DIN 2501 (p_N ≤ 40 bar)	F 2 0	
	flange DN 50 DIN 2501 (p_N ≤ 40 bar)	F 2 3	
	flange DN 80 DIN 2501 (p_N ≤ 16 bar)	F 1 4	
	DRD Ø 65 mm (p_N ≤ 25 bar) [2]	D R D	
Diaphragm			
	stainless steel 1.4435 (316L)	1	
	Hastelloy® C-276 (2.4819)	H	consult
	tantalum [3]	T	consult
Seal			
	without	0	
Filling fluids			
	silicone oil	1	
	food compatible oil (FDA) / 3A	2	
	Halocarbon	C	consult
	customer	9	consult
Special version			
	standard	0 0 0	
	with cooling element up to 300°C / 3A	2 0 0	
	customer	9 9 9	consult

⚠ **if setting range shall be different from nominal range please specify in your order**

[1] absolute pressure possible from 1 bar

[2] cup nut resp. mounting flange is included in the delivery (already pre-assembled)

[3] tantalum diaphragm possible with nominal pressure ranges from 1 bar

HART® is a registered trade mark of HART Communication Foundation; Hastelloy® is a brand name of Haynes International Inc.

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