



# **DMP 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
- Turn-Down 1:10
- processing of the sensor signal using digital electronics
- process connections suitable for hygienic application
- vacuum resistant

## **Optional versions**

- communication interface for adjustment of offset, span and damping
- IS-version (on request)

The precision pressure transmitter DMP 331Pi demonstrates the further development of welltried industrial pressure transmitter DMP 331P.

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

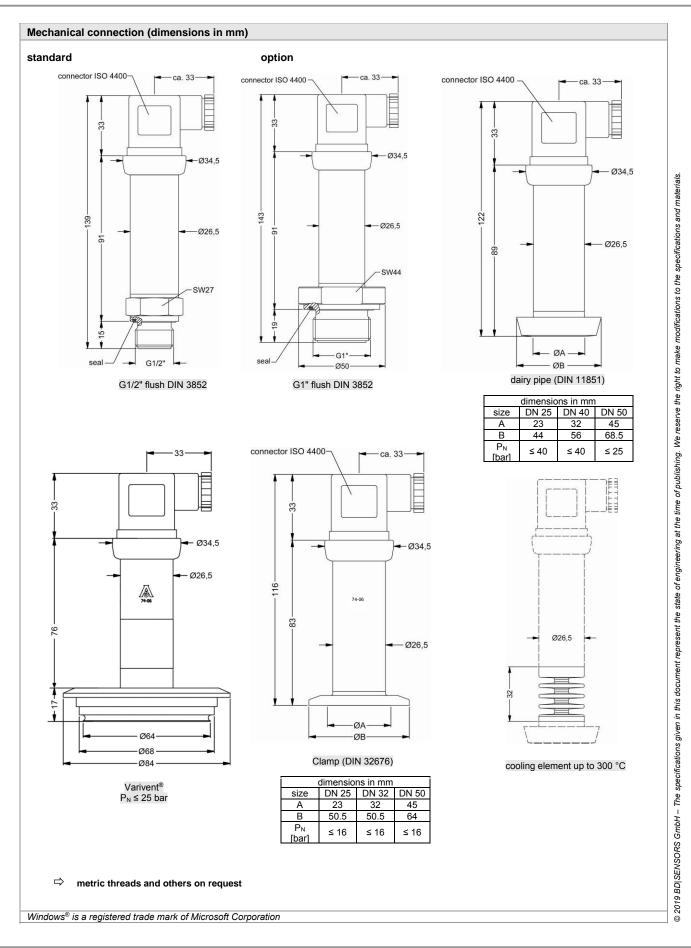


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Pressure ranges <sup>1</sup>					1			1				
Nominal pressure		0.4	1	2	4	10	20	40				
auge / absolute 2	[bar]	-				-	-	-				
Overpressure	[bar]	2	5	10	20	40	80	105				
Burst pressure ≥	[bar]	3 D > 1 hor: ur	7.5	15 m rociotonoo	25	50	120	210				
/acuum resistance On customer request we	adjust the	$P_N \ge 1$ bar: ur				< 1 bar: on requert						
absolute pressure permis			e lum-down-pos	ssibility by solit	are on the requir	ed pressure range						
/acuum 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	5	15	25		50				
Output signal / Suppl			•	•								
Standard	у	2 wiro: 1	20 mA / \	/ - 12 36	\/							
Option IS-version			2-wire: $4 \dots 20 \text{ mA}$ / $V_s = 12 \dots 36 V_{DC}$ 2-wire: $4 \dots 20 \text{ mA}$ / $V_s = 14 \dots 28 V_{DC}$									
Options			20 mA with c									
optiono				/ <sub>s</sub> = 14 36								
		0	10 V with con									
only possible with el. con	nnection Bi	nder series 723 (	7-pin)									
Performance												
Accuracy 4		IEC 60770: ≤	± 0.1 % FSO									
performance after turn-	-down		5									
- TD ≤ 1:5 - TD > 1:5		no change of		vina formula	(for nominal pr	essure ranges ≤	0 40 har coo	note 5).				
- 10 - 1.0		$\leq \pm [0.1 + 0.0]$			(ior nominal pre	soure rangeo ≥	0.70 Dai 300	note 0).				
		with turn-dow	n = nominal p	ressure range	e / adjusted ran	ge						
		e.g. with a tur	n-down of 1:1	0 following a	ccuracy is calcu	lated:						
		≤ ± (0.1 + 0.0	15 x 10) % FS	SO i.e. accura	acy is ≤ ± 0.25	% FSO						
Permissible load		current 2-wire				Itage 3-wire: Rn						
nfluence effects		supply: 0.05				ad: 0.05 % FSO	/ kΩ					
Long term stability			-down) % FS(	O / year at re	ference condition	ons						
Response time		< 5 msec										
							6)					
$\frac{1}{2}$ accuracy according to IE $\frac{1}{2}$ except nominal pressure $\leq \pm (0.1 + 0.02 \times turn-dow$	ranges ≤ ( wn) % FSC	electronic dan limit point adjust 0.40 bar; for thes 0 e.g. turn-down	pping: $0 \dots 100$ ment (non-linea e calculation of of 1:3: $\leq \pm (0.1 + 1)$	0 sec arity, hysteresis accuracy is as ⊦ 0.02 x 3 ) % F	offset: 0 90 , repeatability) follows: SO i.e. accuracy	% FSO t is≤±0.16 % FSC	urn down of s	epan: max. 1:10				
<sup>4</sup> accuracy according to IE <sup>5</sup> except nominal pressure ≤ ± (0.1 + 0.02 x turn-dow <sup>5</sup> software, interface, and c	ranges ≤ ( wn) % FSC cable have	electronic dan limit point adjust 0.40 bar; for thes 0 e.g. turn-down to be ordered se	nping: $0 \dots 100$ ment (non-linea e calculation of of 1:3: $\leq \pm (0.1 + 1)$ parately (softwa	0 sec arity, hysteresis accuracy is as ⊦ 0.02 x 3 ) % F are appropriate	offset: 0 90 , repeatability) follows: SO i.e. accuracy	% FSO t is≤±0.16 % FSC	urn down of s					
<sup>4</sup> accuracy according to IE <sup>5</sup> except nominal pressure ≤ ± (0.1 + 0.02 x turn-dow <sup>6</sup> software, interface, and of <b>Thermal effects</b> <sup>7</sup> (Offs Tolerance band	ranges ≤ 0 wn) % FSC cable have <b>set and S</b> [% FSO]	electronic dan limit point adjust 0.40 bar; for thes 0 e.g. turn-down to be ordered se <b>Span) / Permis</b> $\leq \pm (0.35 \text{ x turn})$	nping: 0 100 ment (non-linea e calculation of of 1:3: $\leq \pm (0.1 + 1)$ parately (softwas <b>sible temper</b> m-down)	0 sec arity, hysteresis accuracy is as ← 0.02 x 3 ) % F are appropriate atures in compe	offset: 0 90 , repeatability) follows: SO i.e. accuracy for Windows® 95 nsated range	% FSO t is ≤ ± 0.16 % FSC , 98, 2000, NT Ver 0 80 °C	urn down of s					
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<sup>4</sup> accuracy according to IE <sup>6</sup> except nominal pressure ≤ ± (0.1 + 0.02 × turn-dov <sup>8</sup> software, interface, and o <b>Thermal effects</b> <sup>7</sup> (Offs Tolerance band [ TC, average [% FSC	ranges ≤ ( wn) % FSC cable have <b>set and S</b> [% FSO] O / 10 K]	electronic dan limit point adjust 2.40 bar; for these b e.g. turn-down to be ordered se <b>Span) / Permis</b> $\leq \pm (0.35 \text{ x turt})$ $\leq \pm (0.035 \text{ x turt})$ medium:	$\begin{array}{l} \text{nping: } 0 \dots 100\\ ment (non-lineare calculation ofof 1:3: \leq \pm (0.1 +parately (softwasible tempern-down)urn-down)$	0 sec prity, hysteresis accuracy is as 6 .0.2 x 3 ) % F are appropriate atures in compe in compe -40 12 -10 12	offset: 0 90 , repeatability) follows: SO i.e. accuracy for Windows® 95 insated range nsated range 5 °C for filling fl 5 °C for filling fl	% FSO t is ≤ ± 0.16 % FSC , 98, 2000, NT Ver 0 80 °C 0 80 °C	urn down of s ) sion 4.0 or high					
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<sup>4</sup> accuracy according to IE <sup>6</sup> except nominal pressure         ≤ ± (0.1 + 0.02 × turn-dov         © software, interface, and of         Thermal effects <sup>7</sup> (Offs         Tolerance band         TC, average       [% FSC         Permissible temperature         Permissible temperature         for cooling element 300° <sup>7</sup> an optional cooling elemed <sup>8</sup> max. temperature of the is <sup>9</sup> also for Pabs ≤ 1 bar         Electrical protection         Reverse polarity protect         Electromagnetic compa         Filling fluids         Standard         Options         Mechanical stability         Vibration (DIN EN 6006         Shock (DIN EN 6006         Materials         Pressure port         Housing	ranges ≤ ( wn) % FSC cable have set and S [% FSO] D / 10 K] res <sup>8</sup> e medium C ent can infl medium fo ction atibility 58-2-6) 58-2-27)	electronic dan limit point adjust 2.40 bar; for thess be: g. turn-down it to be ordered se <b>Span) / Permis</b> $\leq \pm (0.35 \times turn- \leq \pm (0.035 \times turn- ) (0.035 \times turn- $	nping: 0 100 ment (non-linea e calculation of of 1:3: $\leq \pm$ (0.1 + parately (softwa sible temper n-down) urn-down urn-d	0 sec arity, hysteresis accuracy is as 6 .0.2 x 3 ) % F are appropriate atures in compe -40 12 -10 12 -25 8 -40 10 ove oil ove and span depel ar: 150 °C for 6 action ording to EN mg to 21CFR <sup>-</sup> gory Code: H 00 Hz); oth L) L) L) ); cable glamore ording to game	offset: 0 90 , repeatability) follows: SO i.e. accuracy for Windows® 95 msated range msated range 5 °C for filling fl 5 °C for filling fl 5 °C for filling fl 5 °C o °C erpressure: -40 erpressure: -40 erpressure: -40 fl (1) 61326 178.3570 1; NSF Registr ers except G 1/2 ers except G 1/2 ers except G 1/2 d M12x1.5, brain r medium temp	% FSO t <i>is</i> ≤ ± 0.16 % FSC , 98, 2000, NT Ver 0 80 °C 0 80 °C 0 300 °C 250 °C on position and filli max. environmenta ation No.: 14150 2": 10 g RMS (2 2": 100 g / 1 ms ss, nickel plated eratures ≤ 200 °	urn down of s sion 4.0 or high ible oil vacuum: -40 vacuum: -10 ing conditions. il temperature of 00) other 5 2000 Hz ec others (clamping ran C)	ner, and XP)				
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<sup>4</sup> accuracy according to IE <sup>5</sup> except nominal pressure $\leq \pm (0.1 + 0.02 \times turn-dow\leq software, interface, and ofThermal effects 7 (OffsTolerance band [TC, average [% FSCPermissible temperaturefor cooling element 300°7 an optional cooling element2^{\circ} also for Pabs \leq 1 barElectrical protectionShort-circuit protectionReverse polarity protectElectromagnetic compaFilling fluidsStandardOptionsMechanical stabilityVibration (DIN EN 6006Shock (DIN EN 6006MaterialsPressure portHousingOption compact field hoSeals (O-ring)$	ranges ≤ ( wn) % FSC cable have set and S [% FSO] D / 10 K] res <sup>8</sup> e medium C ent can infl medium fo ction atibility 58-2-6) 58-2-27)	electronic dan limit point adjust 2.40 bar; for thess be e.g. turn-down it to be ordered se <b>span) / Permis</b> ≤ ± (0.35 x turning storage: filling fluid silling filling fluid	nping: 0 100 ment (non-lineae e calculation of of 1:3: $\leq \pm$ (0.1 + parately (softwa sible temper n-down) urn-down) nvironment: cone oil d compatible fects for offset a fects for offset a fects for offset a fects for offset a fects for offset a l t also no fun immunity acc observed t also no fun immunity acc observed MS (25 20 / 1 msec; 1.4435 (316 I 1.4404 (316 I 1.4301 (304 FKM (recc pipe, Varivent	0 sec arity, hysteresis accuracy is as 6 .0.2 x 3 ) % F are appropriate atures in compe in compe -40 12 -10 12 -25 8 -40 10 ove oil ove and span depelar: 150 °C for 6 action ording to 21CFR <sup>•</sup> gory Code: H 00 Hz); oth L) L) ); cable glan- ommended fo ®: without	offset: 0 90 , repeatability) follows: SO i.e. accuracy for Windows® 95 insated range 0 nsated range 0 5 °C for filling fl 5 °C for filling fl 5 °C for filling fl 5 °C or erpressure: -40 erpressure: -40 erpressure: -40 15 °C 178.3570 17	% FSO t <i>is</i> ≤ ± 0.16 % FSC , 98, 2000, NT Ver 0 80 °C 0 80 °C 0 300 °C 250 °C on position and filli max. environmenta ation No.: 14150 2": 10 g RMS (2 2": 100 g / 1 ms ss, nickel plated eratures ≤ 200 °	urn down of s sion 4.0 or high ible oil vacuum: -40 vacuum: -10 ing conditions. il temperature of 00) other 5 2000 Hz ec others (clamping ran C)	ner, and XP)				
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Explosion protection (on req	uest for 4 20 mA / 2-wire)								
Approvals DX19-DMP 331Pi	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 T85°C Da								
Safety technical maximum values	$U_i = 28 \text{ V}, I_i = 93 \text{ mA}, P_i = 660 \text{ mW}, C_i \approx 0 \text{ nF}, L_i \approx 0 \mu\text{H},$ the supply connections have an inner capacity of max. 27 nF to the housing								
Ambient temperature range	in zone 0: $-20 \dots 60 \degree C$ with $p_{atm} 0.8$ bar up to 1.1 bar in zone 1 or higher: $-20 \dots 65 \degree C$								
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								
Miscellaneous	cable inductance. Signal								
Current consumption	signal output current: max 2	5 mA	signal output vo	ltage: max 7 mA					
Weight	signal output current: max. 25 mA signal output voltage: max. 7 mA approx. 200 g								
Installation position	any <sup>10</sup>								
Operational life	any <sup>10</sup> 100 million load cycles								
CE-conformity	EMC Directive: 2014/30/EU								
ATEX Directive	2014/34/EU								
<sup>10</sup> Pressure transmitters are calibrat slight deviations in the zero point		essure connection down. If	this position is chan	iged on installation th	nere can be				
Wiring diagrams									
		Quint contant	(						
2-wire-system (current)		3-wire-system							
			$ \rightarrow $	Vs					
	Vs	supply	-	• - •					
supply -	——o —		+V						
└───────┴── Pin configuration		e.shar	Ť						
	Binder 7	23 Binder 723	M12x1/ metal	compact	cable colours				
Electrical connections	ISO 4400 (5-pin)		(4-pin)	field housing	(IEC 60757)				
Supply +	1 3	3	1	IN +	WH (white)				
Supply –	2 4	1	2	IN –	BN (brown)				
Signal + (only for 3-wire)	3 1	6	3	OUT +	GN (green)				
shield	ground pin 🕀 5	2	4	ŧ	GNYE (green-yellow)				
Communication interface <sup>11</sup> RxD TxD GND		4 5 7			-				
<sup>11</sup> may not be connected directly wit	h the PC (the suitable adapter is a	,	-	-	-				
Electrical connections (dimen	isions in mm)								
standard	options			M12x1	r				
		1 1			12				
		Y	<u> </u>	<u> </u>	<b></b> _				
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		6		2-	1				
		2	6	( ( @	a))				
ISO 4400 Binder series 723 5-pin Binder series 723 7-pin M12x1 4-pin									
ISO 4400 (IP 65)	Binder series 723 5-pir (IP 67)		ries 723 7-pin P 67)		1 4-pin 967)				
	44				-				
	Ø 49,5								
			15	1 1					
	84		₽	<u>+</u>	<u> </u>				
		M12x1,5	÷						
		2	₩ 4						
		2	-Ø35-	10 <sup>5</sup>					
	compact field housing	cable outlet	with PVC cable	cable outle	t, cable with				
	- 02	cable outlet	-ø35	cable outle					
<sup>12</sup> standard: 2 m PVC cable (withou	compact field housing (IP 67) t ventilation tube, permissible temp	e,5 cable outlet (IF	with PVC cable $267$ ) <sup>12</sup>	cable outle	t, cable with				
<sup>12</sup> standard: 2 m PVC cable (withou <sup>13</sup> different cable types and lengths	compact field housing (IP 67) t ventilation tube, permissible temp	e,5 cable outlet (IF	with PVC cable $267$ ) <sup>12</sup>	cable outle	t, cable with				



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DMP331Pi\_E\_010919



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	Orderi	ing code [	DMP	331	Pi					
DMP 331Pi			-		]-[]	- 🗌 -	<u>-</u> [			
Pressure gauge	5 0 0									
absolute <sup>1</sup> nput [bar] 0.4 <sup>1</sup>	5 0 1 4 0 0 0									
1.0 2.0	1 0 0 1 2 0 0 1									
4.0 10	4 0 0 1 1 0 0 2									
20 40 -0.40 0.40	2 0 0 2 4 0 0 2 S 4 0 0									
-1 1 -1 2	S 1 0 2 V 2 0 2									
-1 4 -1 10	S 1 0 2 S 1 0 2 V 2 0 2 V 4 0 2 V 1 0 3 9 9 9 9									
Customer	9 9 9 9								_	consult
4 20 mA / 2-wire intrinsic safety 4 20 mA / 2-wire 0 10 V / 3-wire		1 E 3								consult
Accuracy	_	9							_	consult
0.1 % FSO customer		1 9								consult
Electrical connection male and female plug ISO 4400 male plug Binder series 702 (5 pip)		1	0 0							
male plug Binder series 723 (5-pin) male plug Binder series 723 (7-pin) <sup>2</sup> cable outlet with PVC cable (IP67) <sup>3</sup>		2 A T	0 0 0 0 A 0							
cable outlet, cable with ventilation tube (IP68) <sup>4</sup>		T	R 0							
male plug M12x1 (4-pin) / metal compact field housing		M 8	1 0 5 0							
stainless steel 1.4301 (304) <sup>5</sup> customer			99							consult
Mechanical connection G1/2" with flush welded diaphragm (DIN 3852) <sup>6</sup>			_	Z 0 (	0					
G1" with flush welded diaphragm (DIN 3852)				Z 3	1					
Clamp DN 25 / 1" (DIN 32676) / 3A Clamp DN 32 / 1 1/2" (DIN 32676) / 3A				C 6 2	2					
Clamp DN 50 / 2" (DIN 32676) / 3A Clamp 3/4" (DIN 32676) / 3A dairy pipe DN 25 (DIN 11851) <sup>5</sup>				C 6 3 C 6 9 M 7 3	9					
dairy pipe DN 23 (DIN 11851) <sup>5</sup> dairy pipe DN 50 (DIN 11851) <sup>5</sup>					5					
Varivent <sup>®</sup> DN 40/50 / 3A customer				P 4 9 9 9	1					consult
Diaphragm stainless steel 1.4435 (316L)					1					
Hastelloy <sup>®</sup> C-276 (2.4819) tantalum customer					H T 9					consult consult
Seals	-	-			9	0			-	Consult
or inch thread - standard: FKM or inch thread - option: FFKM						1 7				
customer Filling Fluids silicone oil						9	4			consult
food compatible oil (FDA) / 3A customer							1 2 9			consult
Special version standard								1 1 1		
RS-232 interface <sup>7</sup> with cooling element up to 300 °C								1 2 1 2 1 1		
RS-232 interface and cooling element up to 300 °C 7								2 2 1		
customer								9 9 9		consult
absolut pressure possible from 1 bar cable socket is included in delivery										
standard: 2 m PVC cable without ventilation tube (permiss cable with ventilation tube (code TR0 = PVC cable), differe	ent cable types and lengths av	ailable		alact						consult consult consult consult consult
The cup nut has to be mounted by production of pressure The cup nut has to be ordered as separate position. possible only for $P_N \ge 1$ bar	uansmitter with electrical conr	rection rield nousing a	nu mecha	uncai coni	iection da	ary pipe.				
RS-232 interface only possible with el. connection Binder : Software, Interface and cable for DMP 331 Pi with option F		rately								
Ordering code: CIS-G; Software appropriate for Windows										

**BD SENSORS GmbH** 

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