BD SENSORS®

DMP 331i RS 485
DMP 333i RS 485
LMP 331i RS 485

Precision pressure transmitter / screw-in transmitter with digital signal RS 485

Stainless steel sensor

Accuracy according to EN IEC 62828-2:
0.1 % span

Nominal pressure

from 0 ... 400 mbar up to 0 ... 600 bar

Output signal

digital signal RS 485

Digital signal

HART©

Modbus RTU

Product characteristics

- thermal error in compensated range
  -20 ... 80 °C: 0.2 % span
  TC 0.02 % span / 10K

Optional version

- other pressure ranges on request

The precision pressure transmitter DMP 331i RS 485 and DMP 333i RS 485 together with screw-in transmitter LMP 331i RS 485 demonstrate further development of our industrial pressure transmitters of DMP, LMP series. Transmitters can handle both protocols HART© and Modbus RTU simultaneously.

The signal processing of sensors signal is done by digital electronics with 24-bit analog digital converter. Consequently it is possible to conduct an active compensation and the transmitters with excellent measurements and exceptionally attractive price to offeron the market

Preffered areas of use are DMP 331i/ DMP 333i RS 485

- laboratory techniques
- energy production (gas consumption and thermal energy measurement)

Preferred areas of use are LMP 331i RS 485

- environmental engineering (water / sewage / recycling)
- chemical / petrochemical industry

CE

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Pressure ranges DMP 331i [1]							
Nominal pressure gauge / absolute [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] On cusotomer request we adjust the device within the turn-down-possibility by software on the required pressure range.							

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

Pressure ranges DMP 333i [1]					
Nominal pressure gauge / absolute [bar]	60	100	200	400	600
Overpressure [bar]	210	210	600	1050	1250
Burst pressure [bar]	420	420	1000	1250	1250
[1] On cusotomer request we adjust the device within the turn-down-possibility by software on the required pressure range.					

Pressure ranges LMP 331i [1]							
Nominal pressure gauge / absolute [bar]	0,4	1	2	4	10	20	40
Level gauge [mH2O]	4	10	20	40	100	200	400
Overpressure [bar]	2	5	10	20	40	80	105
Burst pressure [bar]	3	7,5	15	25	50	120	210
[1] On cusotomer request we adjust the device within the turn-down-possibility by software on the required pressure range.							

Output signal / Supply	
Output signal RS 485	Digital output (communication RS 485 / HART© protocol) 1D Digital output (communication RS 485 / ModBus RTU protocol) 2D
Supply	Standard 3,3 … 36 V_{DC}, option 3 … 5 V_{DC}
Performance	
Accuracy	IEC 62828-2 Pressure … ≤ ± 0,1 % of span Temperature … ± 2 °C
Long term stability	≤ 0,1 % span / year
Measurement speed	80/s
Thermal effects (Offset and Span) / Permissible temperatures	
Tolerance band [% span]	≤ ± 0,2 in compensated range -20 ... 80 °C
TC, average [% span / 10 K]	± 0,02 in compensated range -20 ... 80 °C
Permissible temperatures	medium: -25 ... 125 °C electronics / environment: -25 ... 85 °C storage: -40 ... 100 °C
Electrical protection	
Short-circuit protection	permanent
Reverse polarity protection	no damage, but also no fuction
Electromagnetic compatibility	emission and immunity according to EN 61326
Materials	
Pressure port	stainless steel 1.4404 (316 L)
Housing	stainless steel 1.4404 (316 L)
Seals	DMP 331i / LMP 331i: FKM DMP 333i: NBR option: welded version [3]; other on request
Diaphragm	stainless steel 1.4435 (316L)
Media wetted parts	pressure port, seal, diaphragm
[3] welded version only with pressure ports according to EN 837; welded version not available with pressure ranges > 60 bar	
Mechanical stability	
Vibration	10 g RMS (20 ... 2000 Hz)
Shock	100 g / 11 ms
Transmission baud rate	
HART©	1200 Bd 4800 Bd 19200 Bd 2400 Bd 9600 Bd 38400 Bd
ModbusRTU	1200 Bd 4800 Bd 19200 Bd 2400 Bd 9600 Bd 38400 Bd
** Unless otherwise specified by the customer, the communication is set as follows after delivery by the manufacturer: 8 dat. bit, 1 stop bit, 9600 Bd, even parity, address 1*	
Miscellaneous	
Current consumption	Power supply 3,3 … 36 V: 3,2 mA Power supply 3 … 5 V: 6 mA
Weight	approx. 200 g
Installation position	any [4]
Operational life	100 million load cycles
CE-conformity	EMC Directive: 2014/30/EU Pressure Equipment Directive: 2014/68/EU (module A)[5]
ATEX Directive	2014/34/EU

[4] 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 $P_N \leq 1$ bar.
[5] This directive is only valid for devices with maximum permissible overpressure > 200 bar

Map of Input registers MODBUS (read only, function #4 – Read input registers)

Address	Register	Description	Data type	Example	
0x0000	SerialNr	Serial Number	UInt32	0x0012	123456
0x0001				0xd687	
0x0002	CalDate	Date of last calibration	Date	0x07de	2014
0x0003				0x051b	27.5.
0x0004	PressUpperRange	Upper range of pressure channel	Float, IEEE754	0x4120	10,0
0x0005				0x0000	
0x0006	PressLowerRange	Lower range of pressure channel	Float, IEEE754	0x0000	0,0
0x0007				0x0000	
0x0008	Pressure	Actual pressure	Float, IEEE754	0x3f9e	1,2345
0x0009				0x0419	
0x000A	MaxPress	Maximal Pressure	Float, IEEE754	0x3f00	1,5
0x000B				0x0000	
0x000C	MinPress	Minimal Pressure	Float, IEEE754	0x3f00	0,5
0x000D				0x0000	
0x000E	TempUpperRange	Upper range of temperature channel	Float, IEEE754	0x42a0	80,0
0x000F				0x0000	
0x0010	TempLowerRange	Lower range of temperature channel	Float, IEEE754	0xc1a0	-20,0
0x0011				0x0000	
0x0012	Temperature	Actual temperature	Float, IEEE754	0x41a0	20,0
0x0013				0x0000	
0x0014	MaxTemp	Maximal temperature	Float, IEEE754	0x4270	60,0
0x0015				0x0000	
0x0016	MinTemp	Minimal temperature	Float, IEEE754	0x4170	15,0
0x0017				0x0000	

Map of Holding registers MODBUS (read and write, function #3 - Read Holding Registers , fce #6 - Write Single Register)

Address	Register	Description	Data type	Example	
0x0000	PressUnitsCode	Unit of pressure channel	Uint16	0x0006	bar
0x0001	TempUnitsCode	Unit of temperature channel	Uint16	0x0000	°C
0x0002	DeviceAddress	Device address (1…247)	Uint16	0x0001	1
0x0003	Baudrate	Baud rate	Uint16	0x0005	9600
0x0004	Parity	Parity	Uint16	0x0000	PA_none
0x0005	PressZero	Value for zeroing the pressure	Float, IEEE754	0,0001	bar
0x0007	TempZero	Value for zerioing the temperature	Float, IEEE754	0,1	°C
0x0010	PressDamping	Pressure damping	Float, IEEE754	0,1	s
0x0012	ClearMinMaxValues	Resetting of maximum and minimum values	Unit16	0x0000	Writing 0x0000 will reset all max. and min. values
0x0014	DecPointPosPressure	Decimal point position for pressure register dPpres (0x0019)	Uint16	0x0002	2
0x0015	DecPointPosTemper	Decimal point position for temperature register dpTemper (0x001A)	Uint16	0x0001	1
0x0019	PressureInt	Current measured pressure integer *)	Sint16	0x04D2	Read 1234 value 12,34
0x001A	TemperatureInt	Current measured temperature *)	Sint16	0x07D0	Read 214 value 21,4

When resetting the pressure channel, the value in the selected pressure unit is written (according to the setting in reg. 0). The permissible limit for pressure zeroing is ± 10% span.
When resetting the temperature channel, the value in ° C is written. The permissible limit for temperature reset is ± 10 ° C.

Pressure unit enumeration MODBUS													
Code (Unit16)	0x0003	0x0004	0x0005	0x0006	0x0007	0x0008	0x0009	0x000A	0x000B	0x000C	0x000D	0x000E	0x000F
Unit	mmH2O @4**	mmHG @0***	psi	bar	mbar	g/cm^2	kg/cm^2	Pa	kPa	torr	atm	mH2O @4**	MPa
*to obtain the current value, the current value must be divided by 10 by dp (dpPres or dpTemper)													
**millimeter of water column (4 °C)													
***millimeter of Hg column (0 °C)													

Temperature unit enumeration MODBUS			
Code (Uint16)	0x0000	0x0001	0x0002
Unit	°C	°K	°F

Baud rate enumeration MODBUS						
Code (Uint16)	0x0002	0x0003	0x0004	0x0005	0x0006	0x0007
Baud rate [Bd]	1200	2400	4800	9600	19200	38400

Parity enumeration MODBUS			
Code (Uint16)	0x0000	0x0001	0x0002
Parity	Žádná (None)	Lichá (Odd)	Sudá (Even)

It is necessary to make device reset (Power supply off and on) after changing Address, Baud rate or Parity (command #6).
If reset is not performed, device uses old communication parameters.

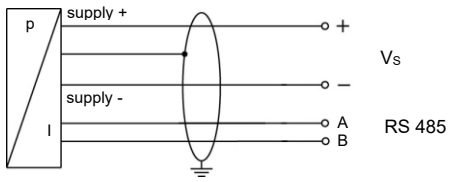
When working with registers that are longer than 16 bits, it is necessary to read and write these registers at once, otherwise a response with the error code "Illegal data address" is returned.

Following commands are implemented in HART protocol:	
Command #0	Read Unique Identifier
Command #1	Read Primary Variable
Command #2	Read Loop Current and Percent of Range
Command #3 Command #3 gives back 4 variables	Read Dynamic Variables and Loop Current - Primary Variable: Pressure [units below pt. 2] - Secondary Variable: PT1000 temperature unit is given by Modbus hold. register #1 (via HART only the primary variable unit can be set) - Tertiary Variable: Conductivity [mS/cm] (Temperature compensated value) - QuaternaryVariable: Conductivity [mS/cm]
Command #6	Write Polling Address
Command #7	Read Polling Address
Command #11	Read Unique Identifier Associated with Tag
Command #12	Read Message
Command #13	Read Tag, Descriptor, Date
Command #14	Read Primary Variable Transducer Information
Command #15	Read Device Information
Command #16	Read Final Assembly number
Command #17	Write Message
Command #18	Write Tag, Descriptor, Date
Command #19	Write Final Assembly Number
Command #34	Write Primary Variable Damping Value
Command #35	Write Primary Variable Range Values
Command #43	Set Primary Variable Zero
Command #44	Write Primary Variable Units
HART protocol is described in the HART standard.	

The following units of measured quantities are implemented in the HART protocol:	
HART pressure units	
Unit	Code (h)
mmH2O@4°C	0xEF
mmHg@0°C	0x05
psi	0x06
bar	0x07
mbar	0x08
g/cm2	0x09
kg/cm2	0x0A
Pa	0x0B
kPa	0x0C
torr	0x0D
atm	0x0E
mH2O@4°C	0xAB
MPa	0xED

HART temperature units	
Unit	Code (h)
Degree °C	0x20
Degree °F	0x21
Degree °K	0x23

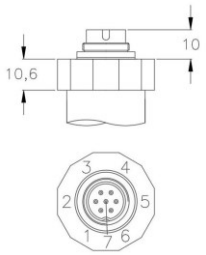
Wiring diagrams



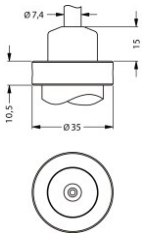
Pin configuration

Electrical connections		Binder 723 (7-pin)	cable colours (DIN 47100)
	supply + supply –	3 1	wh (white) bn (brown)
	shield	2	gn/ye (green / yellow)
Communication interface	A B	4 5	ye (yellow) pk (pink)

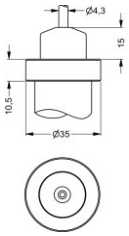
Electrical connections (dimensions in mm / inch)



Binder serie 723 7-pin
(IP 67)



cable outlet
(IP 67) [6]

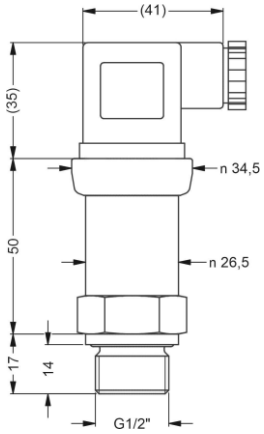


cable gland
(IP 67) [7]

[6] *different cable types and lengths available, permissible temperature depends on kind of cable*
[7] *standard: 2 m PVC cable (without ventilation tube, permissible temperature: -5 ... 70 °C)*

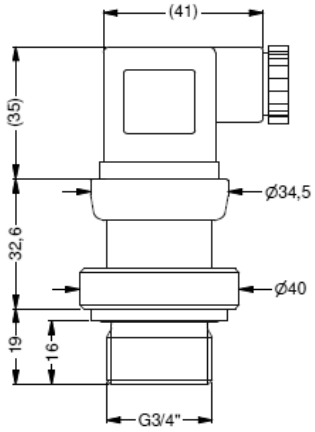
Mechanical connection (dimensions in mm/ inch)

standard **DMP 331i / DMP 333i**



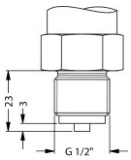
G1/2" DIN 3852

LMP 331i

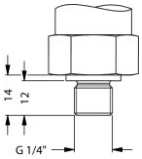


G3/4" DIN 3852

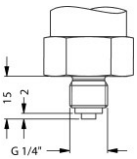
options for DMP 331i and DMP 333i



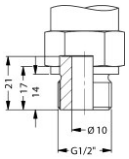
G1/2" EN 837



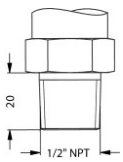
G1/4" DIN 3852



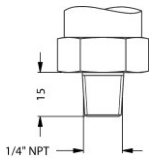
G1/4" EN 837



G1/2" open port



1/2" NPT



1/4" NPT

⇨ **metric threads and others on request**

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BD SENSORS® pressure measurement

ORD. Code DMP 331i RS485

15.05.2024

DMP 331i RS485

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Pressure	
Gauge	1 1 0
Absolute	1 1 1
Input [bar]	
0 … 0,4[1]	4 0 0 0
0 … 1 [1]	1 0 0 1
0 … 2[1]	2 0 0 1
0 … 4[1]	4 0 0 1
0 … 10[1]	1 0 0 2
0 … 20[1]	2 0 0 2
0 … 40[1]	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
Customer - underpressure	X X X X
Output	
Digital output (communication RS 485 / HART protocol)	1D
Digital output (communication RS 485 / ModBus RTU protocol)	2D
Customer	9
Accuracy	
0,1 %	1
0,2 % (P_N < 0,1 bar)	B
Customer	9
Electrical connection	
Connector Binder 723 7-pin (IP 67)	A 0 0
Customer	9 9 9
Mechanical connection	
G 1/2" DIN 3852	1 0 0
G 1/2" EN 837	2 0 0
G 1/4" DIN 3852	3 0 0
G 1/4" EN 837	4 0 0
M 20 x 1,5 DIN 3852	5 0 0
M 12 x 1 DIN 3852	6 0 0
M 10 x 1 DIN 3852	7 0 0
M 20 x 1,5 EN 837	8 0 0
G 1/2" DIN 3852 flush [2]	F 0 0
M 20 x 1,5 DIN 3852 flush	F 0 4
Jiná	9 9 9
Seals	
Viton (FKM)	1
Without sealing - welded (only with EN 837-1/-3) [2,3]	2
EPDM	3
Customer	9
Special version	
Interface RS 485, power supply 8 … 15 V DC	1 4 1
Interface RS 485, power supply 10 … 36 V DC	1 4 2
Interface RS 485, power supply 3,3...5 V DC	1 4 3
Customer	9 9 9
Additional informations for communication "1D" RS 485 / HART protocol and for "2D" RS 485 / ModBus RTU protocol parity	
Even	2
Odd	1
No parity	0

Baud rate			
4800 Bd	0		
9600 Bd (standard)	1		
19200 Bd	2		
38400 Bd	3		
1200 Bd	4		
2400 Bd	5		
Temperature compensation			
0 … 70 °C (standard)		1	
-20 …+80 °C		3	
Software for set up on site			
Communication module ADAPT-6 (RS 232 / USB for DMP 331i, DMP 333i) + software			
Software for DMP 331i, 333i / update code 503498			

0,-…without additional charge
On request...in accordance with the producer

Surcharges for calibration are not subject to any discounts. Subject to change.
This document contains the specification for ordering the product; detailed technical parameters of the product and its possible variants are giv
BD SENSORS reserves the right to change sensor specifications without further notice.

1 pressure ranges ≤ 60 bar
2 only possible for DMP 331i and P_N ≤ 40 bar
3 welded version only with pressure ports according to EN 837

ORD. Code DMP 333i RS485

15.05.2024

DMP 333i RS485

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Pressure	
Relative [1]	1 3 0
Gauge	1 3 1
Input [bar]	
0 … 60	6 0 0 2
0 … 100[2]	1 0 0 3
0 … 200[2]	2 0 0 3
0 … 400[2]	4 0 0 3
0 … 600[2]	6 0 0 3
Customer	9 9 9 9
Output	
Digital output (communication RS 485 / HART protocol)	1D
Digital output (communication RS 485 / ModBus RTU protocol)	2D
Customer	9
Accuracy	
0,1 %	1
Customer	9
Electrical connection	
Connector Binder 723 7-pin (IP 67)	A 0 0
Customer	9 9 9
Mechanical connection	
G 1/2" DIN 3852	1 0 0
G 1/2" EN 837	2 0 0
G 1/4" DIN 3852	3 0 0
G 1/4" EN 837	4 0 0
M 20 x 1,5 DIN 3852	5 0 0
M 12 x 1 DIN 3852	6 0 0
M 10 x 1 DIN 3852	7 0 0
M 20 x 1,5 EN 837	8 0 0
Customer	9 9 9
Seals	
Viton (FKM)	1
EPDM (P_N < 160 bar)	3
NBR (standard)	5
Customer	9
Special version	
Interface RS 485, power supply 8 … 15 V DC	1 4 1
Interface RS 485, power supply 10 … 36 V DC	1 4 2
Interface RS 485, power supply 3,3...5 V DC	1 4 3
Customer	9 9 9
Additional informations for communication "1D" RS 485 / HART protocol and for "2D" RS 485 / ModBus RTU protocol	
Parity	
Even	2
Odd	1
No parity	0
Baud rate	
4800 Bd	0
9600 Bd (standard)	1
19200 Bd	2
38400 Bd	3
1200 Bd	4
2400 Bd	5
Temperature compensation	
0 … 70 °C (standard)	1
-20 …+80 °C	3

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1 measurement starts with ambient pressure
2 pressure ranges > 60 bar

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BD SENSORS®
tlakoměrná technika

ORD.Code LMP 331i RS 485

15.05.2024

LMP 331i RS 485 ☐☐☐ - ☐☐☐☐ - ☐ - ☐ - ☐☐ - ☐ - ☐☐☐ - ☐☐☐ - ☐ - ☐☐☐ - ☐ - ☐ - ☐

Pressure	
in bar	4 3 0
in m H_2O	4 3 1
Input [mH_2O] [bar]	
0 … 0,4	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
Customer - underpressure	X X X X
Housing material	
Stainless steel 1.4404 (316 L)	1
Diaphragm material	
Stainless steel 1.4435 (316 L)	1
Output	
Digital output (communication RS 485 / HART protocol)	1D
Digital output (communication RS 485 / ModBus RTU protocol)	2D
Customer	9
Accuracy	
0,1 %	1
0,2 % (P_N < 0,1 bar)	B
Customer	9
Electrical connection	
Connector Binder 723 7-pin (IP 67)	A 0 0
Customer	9 9 9
Mechanical connection	
G 3/4" DIN 3852	K 0 0
Customer	9 9 9
Seals	
Viton (FKM)	1
Without sealing - welded (only with EN 837-1/-3)	2
EPDM	3
Customer	9
Special version	
Interface RS 485, powe Interface RS 485, power supply 8 … 15 V DC	1 4 1
Interface RS 485, powe Interface RS 485, power supply 10 … 36 V DC	1 4 2
Interface RS 485, powe Interface RS 485, power supply 3,3...5 V DC	1 4 3
Customer	9 9 9
Additional informations for communication "1D" RS 485 / HART protocol and for "2D" RS 485 / ModBus RTU protocol parity	
Even	2
Odd	1
No parity	0
Baud rate	
4800 Bd	0
9600 Bd (standard)	1
19200 Bd	2
38400 Bd	3
1200 Bd	4
2400 Bd	5
Temperature compensation	
0 … 70 °C (standard)	1
-20 …+80 °C	3

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Surcharges for calibration are not subject to any discounts. Subject to change.

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