

# LMP 307i RS 485



## Stainless Steel Probe Precision

Stainless Steel Sensor

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

### Nominal pressure

from 0 ... 0,6 mH<sub>2</sub>O up to 0 ... 250 mH<sub>2</sub>O

### Output signals

digital output RS 485 Modbus RTU  
digital output RS 485 HART<sup>®</sup>

### Communication protocol

HART<sup>®</sup>  
Modbus RTU

### Special characteristics

- ▶ diameter 27 mm
- ▶ small thermal effect
- ▶ excellent accuracy
- ▶ excellent long term stability

### Optional versions

- ▶ cable protection via corrugated pipe
- ▶ mounting accessories as cable gland and terminal clamp in stainless steel
- ▶ different kinds of cables
- ▶ different kinds of seal materials

The precision stainless steel probe LMP 307i RS 485 is designed for continuous fill level and level measurement of water and liquid mediums.

Housing material is 1.4044; the sensor diaphragm is made of 1.4435. Standard sealing material is FKM; other materials are available on request.

Transmitter can handle both protocols HART<sup>®</sup> and Modbus RTU simultaneously.

The LMP 307i RS 485 features high accuracy of 0.1 % span and a very small thermal error. Basic element is a high quality stainless steel sensor with a digital electronics with microprocessor and 24-bit analog/digital converter. Thus it's possible to compensate the sensor specific errors as non-linearity and thermal errors actively resulting in a level transmitter with excellent measuring properties at an unusual competitive price.

### Preferred areas of use are

#### Water / filtrated Sewage

- environmental engineering: water supply, sewage treatment



- depth or level measurement in wells
- ground water level measurement
- level measurement in open tanks



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Technical Data

<b>Input pressure range</b>																	
Nominal pressure gauge	[bar]	0.06	0.1	0.16	0.25	0.4	0.6	1	1.6	2.5	4	6	10	16	25		
Level	[mH <sub>2</sub> O]	0.6	1	1.6	2.5	4	6	10	16	25	40	60	100	160	250		
Permissible overpressure	[bar]	0.2	0.5	0.5	1	1	3	3	6	6	20	20	20	60	60		
<b>Output signal / Supply</b>																	
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 <sub>DC</sub> , option 3 ... 5 V <sub>DC</sub>															
<b>Performance</b>																	
Accuracy <sup>1</sup>		≤ ± 0.1 % span															
Long term stability		≤ ± 0.1 % span / year															
Measurement speed		80/s															
<sup>1</sup> accuracy according to EN IEC 62828-2– limit point adjustment (non-linearity, hysteresis, repeatability; temperature range -10 ... 50 °C including thermal effects)																	
<b>Thermal effects (Offset and Span)</b>																	
Tolerance band	[% span]	≤ ± 0.2 in compensated range -20 ... 80 °C															
TC	[% span / 10 K]	± 0.02 in compensated range -20 ... 80 °C															
Permissible temperatures		Medium/ electronics/ environment/ storage: -20 ... 80 °C *															
*If the cable is intended for use in a smaller temperature range, the use of the probe is limited by this range.																	
<b>Electrical protection <sup>2</sup></b>																	
Insulation resistance		> 100 MΩ															
Short-circuit protection		permanent															
Reverse polarity protection		no damage, but also no function															
Electromagnetic compatibility		emission and immunity according to EN 61326															
<sup>2</sup> additional external overvoltage protection unit in terminal box KL 1 or KL 2 with atmospheric pressure reference available on request																	
<b>Electrical connection</b>																	
Cable with sheath material <sup>3</sup>		PVC (-5 ... 70 °C)	grey (-25 ... 70 °C in fixed condition)													Ø 7,4 mm	
		PUR (-25 ... 80 °C)	black (with drinking water certificate)													Ø 7,4 mm	
		FEP <sup>4</sup> (-25 ... 75 °C)	black													Ø 7,4 mm	
		others on request															
<sup>3</sup> cable with integrated air tube for atmospheric pressure reference																	
<sup>4</sup> do not use freely suspended probes with an FEP cable if effects due to highly charging processes are expected																	
<b>Materials (media wetted)</b>																	
Housing		stainless steel 1.4404 (316L)															
Diaphragm		stainless steel 1.4435 (316L)															
Seals		FKM, others on request															
Protection cap		POM															
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: 1µH/m															
<b>Miscellaneous</b>																	
Current consumption		Power supply 3,3 ... 36 V: 3,2 mA Power supply 3 ... 5 V: 6 mA															
Weight		approx. 200 g (without cable)															
Ingress protection		IP 68															
CE-conformity		EMC Directive: 2004/108/EC															
Baud rate		HART®				ModbusRTU											
		1200 Bd	4800 Bd	19200 Bd	1200 Bd	4800 Bd	19200 Bd										
		2400 Bd	9600 Bd	38400 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																	
<b>Mechanical stability</b>																	
Vibration		10 g RMS (20 ... 2000 Hz)															
Shock		100 g / 11 ms															

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 zeroing 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.

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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 <sup>2</sup>	kg/cm <sup>2</sup>	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	Read Dynamic Variables and Loop Current
Command #3 gives back 4 variables	<ul style="list-style-type: none"> <li>- Primary Variable: Pressure [units below pt. 2]</li> <li>- Secondary Variable: PT1000 temperature unit is given by Modbus hold. register #1 (via HART only the primary variable unit can be set)</li> <li>- Tertiary Variable: Conductivity [mS/cm] (Temperature compensated value)</li> <li>- Quaternary Variable: Conductivity [mS/cm]</li> </ul>
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.	

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Technical Data

The following units of measured quantities are implemented in the HART protocol:

## HART pressure units

Unit	Code (h)
mmH <sub>2</sub> O@4°C	0xEF
mmHg@0°C	0x05
psi	0x06
bar	0x07
mbar	0x08
g/cm <sup>2</sup>	0x09
kg/cm <sup>2</sup>	0x0A
Pa	0x0B
kPa	0x0C
torr	0x0D
atm	0x0E
mH <sub>2</sub> O@4°C	0xAB
MPa	0xED

## HART temperature units

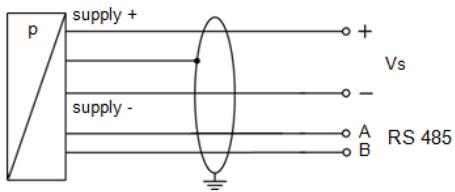
Unit	Code (h)
Degree °C	0x20
Degree °F	0x21
Degree °K	0x23

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Technical Data

## Wiring diagram / connector

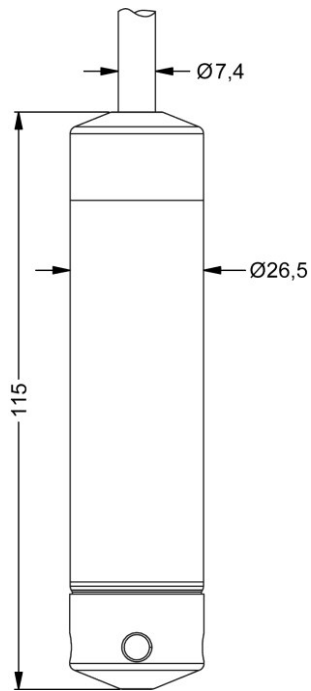


## Pin configuration

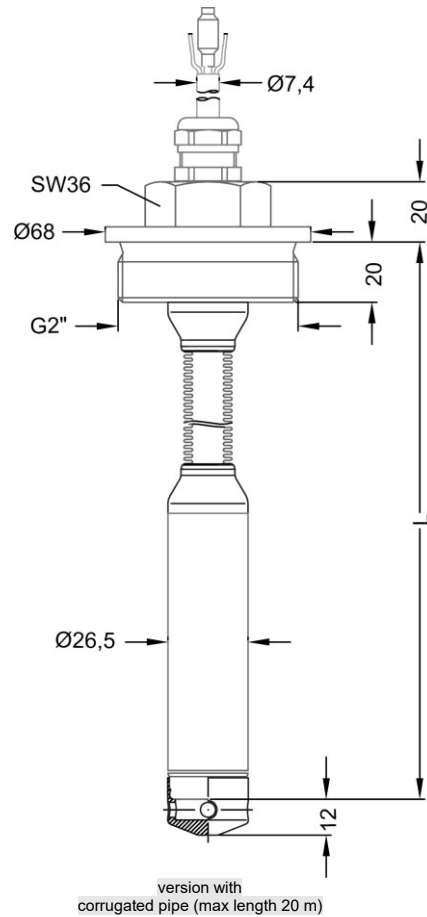
Electrical connection		cable colours (DIN 47100)
	Supply +	wh (white)
	Supply -	bn (brown)
	Shield	gn/ye (green / yellow)
Communication protocol	A	ye (yellow)
	B	pk (pink)

## Dimensions (in mm)

### standard



### option



## Accessories

Mounting flange with cable gland		
<b>Technical data</b>		
Suitable for	all probes	
Flange material	stainless steel 1.4404 (316L)	
Material of cable gland	standard: brass, nickel plated on request: stainless steel 1.4305 (303); plastic	
Seal insert	material: TPE (ingress protection IP 68)	
Hole pattern	according to DIN 2507	
<b>Version</b>	<b>Size (in mm)</b>	<b>Weight</b>
DN25 / PN40	D = 115, k = 85, b = 18, n = 4, d = 14	1.4 kg
DN50 / PN40	D = 165, k = 125, b = 20, n = 4, d = 18	3.2 kg
DN80 / PN16	D = 200, k = 160, b = 20, n = 8, d = 18	4.8 kg
<b>Ordering type</b>		<b>Ordering code</b>
DN25 / PN40 with cable gland brass, nickel plated		ZMF2540
DN50 / PN40 with cable gland brass, nickel plated		ZMF5040
DN80 / PN16 with cable gland brass, nickel plated		ZMF8016
<b>Terminal clamp</b>		
<b>Technical data</b>		
Suitable for	all probes with cable $\varnothing$ 5.5 ... 10.5 mm	
Material	standard: steel, zinc plated optionally: stainless steel 1.4301 (304)	
Weight	approx. 160 g	
<b>Ordering type</b>		<b>Ordering code</b>
Terminal clamp, steel, zinc plated		1003440
Terminal clamp, stainless steel 1.4301 (304)		1000278
<b>Display program</b>		
<b>CIT 200</b> Process display with LED display		
<b>CIT 250</b> Process display with LED display and contacts		
<b>CIT 300</b> Process display with LED display, contacts and analogue output		
<b>CIT 350</b> Process display with LED display, bargraph, contacts and analogue output		
<b>CIT 400</b> Process display with LED display, contacts, analogue output and Ex-approval		
<b>CIT 600</b> Multichannel process display with graphics-capable LC display		
<b>CIT 650</b> Multichannel process display with graphics-capable LC display and datalogger		
<b>CIT 700</b> Multichannel process display with graphics-capable TFT monitor, touchscreen and contacts		
<b>PA 440</b> Field display with 4-digit LC display		
<p>For further information please contact our sales department or visit our homepage: <a href="http://www.bdsensors.com">http://www.bdsensors.com</a></p>		

## Ordering code LMP 307i RS485

05.06.2024

LMP 307i RS485

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<b>Pressure</b>																								
in bar		4	5	0																				
in m H <sub>2</sub> O		4	5	1																				
<b>[mH<sub>2</sub>O]</b>	<b>[bar]</b>																							
0 ... 4	0 ... 0,4				4	0	0	0																
0 ... 10	0 ... 1				1	0	0	1																
0 ... 20	0 ... 2				2	0	0	1																
0 ... 40	0 ... 4				4	0	0	1																
0 ... 100	0 ... 10				1	0	0	2																
0 ... 200	0 ... 20				2	0	0	2																
Customer					9	9	9	9																
<b>Housing material</b>																								
Stainless steel 1.4404 (316L)									1															
<b>Diaphragm material</b>																								
Stainless steel 1.4435 (316 L)									1															
<b>Output signal</b>																								
Digital output (communication RS 485 / HART protocol)										1	D													
Digital output (communication RS 485 / ModBus RTU protocol)										2	D													
Customer										9	9													
<b>Seals</b>																								
Viton (FKM)											1													
Customer											9													
<b>Accuracy</b>																								
0,1 %												1												
Customer												9												
<b>Electrical connection</b>																								
PVC - cable (grey, Ø 7,4 mm, price for 1 m) <sup>1</sup>													1											
PUR - cable (black, Ø 7,4 mm, price for 1 m) <sup>1</sup>														2										
FEP - cable with PTFE sheath (black, Ø 7,4 mm, price for 1 m) <sup>1</sup>															3									
TPE-U - cable, up to 125 °C (blue, Ø 7.4 mm, price for 1 m) <sup>1</sup>																4								
Customer																9								
<b>Cable length</b>																								
in m																9	9	9						
<b>Special version</b>																								
RS 485 interface, supply 8...15 V DC																			1	4	1			
RS 485 interface, supply 10...36 V DC																				1	4	2		
RS 485 interface, supply 3,3...5 V DC																					1	4	3	
Customer																						9	9	9
<b>Additional information for "1D" RS 485 / HART and for "2D" RS 485 / ModBus RTU</b>																								
<b>Parity</b>																								
Even																					2			
Odd																						1		
No Parity																						0		
<b>Baud Rate</b>																								
4800 Bd																						0		
9600 Bd (standard)																						1		
19200 Bd																						2		
38400 Bd																						3		
1200 Bd																						4		
2400 Bd																						5		
<b>Temperature compensation</b>																								
0 ... 70 °C (standard)																						1		
-20 ... 80 °C (PUR and TPE-U cable)																						3		
-20 ... 70 °C (PVC and FEP cable)																						4		
<b>Accessories for submersible transmitter</b>																								
Terminal clamp - zinc plated																							1003440	
Terminal clamp - Stainless Steel 1.4301																							1000278	
Mounting screw PG16 - plastic																							5002200	

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 given in the data sheet.

BD SENSORS reserves the right to change sensor specifications without further notice.



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The company BD SENSORS s.r.o. is certified by TÜV SÜD Czech according to the standard ISO 9001.



1 shielded cable with integrated ventilation tube for atmospheric pressure reference



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