



# LMP 331

## Screw-In Transmitter with piezoresistive Stainless Steel Sensor

- ▶ flush diaphragm
- ▶ hydrostatic level measurement of clean, thin fluid media
- ▶ nominal pressure ranges from 0 ... 40 mbar up to 0 ... 40 bar (0 ... 0.4 mWC up to 0 ... 400 mWC)

The screw-in transmitters LMP 331 are suited for continuous level measurement of liquids in open tanks. They are used preferably for level measurement in clean, thin fluid media.

By the liquid column above the submerged transmitter a pressure is generated that is transmitted via a stainless steel diaphragm and inert oil filling onto the semiconductor sensor element. An amplifier circuit supplies the sensor and transforms the temperature compensated sensor output, which is proportional to the liquid level, into standard current and voltage output signals. The diaphragm is flush with a G3/4" pressure port; an O-ring behind the thread provides sealing of the transmitter.

A variety of standard output signals as well as mechanical and electrical connections make the LMP 331 covering a wide field of applications. Additional it is possible to use the screw-in transmitter LMP 331 in explosive area (zone 0).

Preferred areas of use are:

- ▶ tank level measurement of neutral media
- ▶ water and sewage treatment plants

- ▶ small thermal effect
- ▶ excellent linearity
- ▶ good long term stability
- ▶ option Ex-version (only for 4 ... 20 mA / 2-wire) TÜV 03 ATEX 2006 X
- ▶ accuracy: 0.175 / 0.125 / 0.05% FSO BFSL (0.35 / 0.25 / 0.1% FSO IEC 60770)
- ▶ customer specific versions: - special pressure ranges

Characteristics



**LMP 331**  
Stainless Steel Screw-In Transmitter

# LMP 331

Stainless Steel Screw-In Transmitter

Technical Data

Input pressure range																
Nominal pressure gauge [bar]	0.04	0.06	0.1	0.16	0.25	0.4	0.6	1	1.6	2.5	4	6	10	16	25	40
Level [mWC]	0.4	0.6	1	1.6	2.5	4	6	10	16	25	40	60	100	160	250	400
Permissible overpressure [bar]	0.2	0.2	0.5	0.5	1	1	3	3	6	6	20	20	20	60	60	100

Output signal / Supply	
Standard	2-wire: 4 ... 20 mA / $V_s = 12 \dots 36 V_{DC}$ Ex-protection: $V_s = 14 \dots 28 V_{DC}$
Optional	3-wire: 0 ... 20 mA / $V_s = 14 \dots 36 V_{DC}$ 0 ... 10 V / $V_s = 14 \dots 36 V_{DC}$

Performance			
Accuracy	standard: nominal pressure > 0.4 bar	IEC 60770 <sup>1</sup>	BFSL
	nominal pressure ≤ 0.4 bar	≤ ± 0.35 % FSO	≤ ± 0.175 % FSO
	option 1: nominal pressure > 0.4 bar	≤ ± 0.50 % FSO	≤ ± 0.250 % FSO
	option 2: nominal pressure ≥ 0.16 bar	≤ ± 0.25 % FSO	≤ ± 0.125 % FSO
Permissible load	current 2-wire: $R_{max} = [(V_s - V_{smin}) / 0.02] \Omega$	≤ ± 0.10 % FSO	≤ ± 0.050 % FSO
	current 3-wire: $R_{max} = 500 \Omega$ voltage 3-wire: $R_{min} = 10 k\Omega$		
Influence effects	Supply: 0.05 % FSO / 10 V	Load: 0.05 % FSO / kΩ	
Long term stability	≤ ± 0.1 % FSO / year		
Response time <sup>2</sup>	< 5 msec.		

Thermal errors (Offset and Span - standard)					
Nominal pressure gauge $P_N$ [bar]	≤ 0.1	≤ 0.25	≤ 0.4	≤ 1	> 1
Tolerance band [% FSO]	≤ ± 2	≤ ± 1.5	≤ ± 1	≤ ± 1	≤ ± 0.75
TC, average [% FSO / 10 K]	± 0.3	± 0.2	± 0.14	± 0.1	± 0.07
in compensated range [°C]	0 ... 50			0 ... 70	

Thermal errors (Offset and Span - optional for -20 ... 50 °C)					
Nominal pressure gauge $P_N$ [bar]	≤ 0.25	≤ 0.4	≤ 1.0	> 1.0	
Tolerance band [% FSO]	≤ ± 2.0	≤ ± 1.5	≤ ± 1.0	≤ ± 0.75	
TC, average [% FSO / 10 K]	± 0.3	± 0.2	± 0.1	± 0.07	
in compensated range [°C]	-20 ... 50				

Electrical protection	
Short-circuit protection	permanent
Reverse polarity protection	no damage, but also no function
Electromagnetic compatibility	emission and immunity according to EN 61326
Option Ex-protection only with 4 ... 20 mA / 2-wire DX13-LMP 331	zone 0 <sup>3</sup> : II 1 G EEx ia IIC T4 zone 20: II 1 D T 85°C safety technical maximum values: $V_i = 28 V$ , $I_i = 93 mA$ , $P_i = 660 mW$ ; $C_i \leq 1 nF$ , $L_i \leq 10 \mu H$

Permissible temperatures	
Medium	-25 ... 125 °C
Electronics / environment	-25 ... 85 °C      Ex-protection: application in zone 0: -20 ... 60 °C application in zone 1 or higher: -25 ... 70 °C
Storage	-40 ... 100 °C

<sup>1</sup> accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability)

<sup>2</sup> with optional accuracy 0.1 % FSO the response time is 200 msec

<sup>3</sup> approved for atmospheric pressure from 0.8 bar up to 1.1 bar

# LMP 331

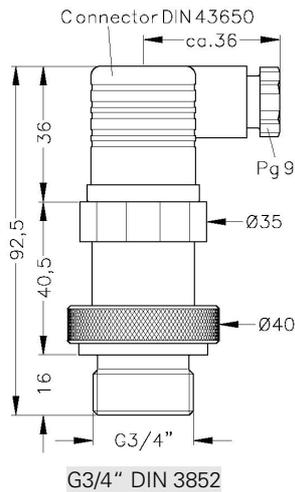
Stainless Steel Screw-In Transmitter

Technical Data

## Mechanical stability

Vibration	10 g RMS (20 ... 2000 Hz)
Shock	100 g / 11 msec

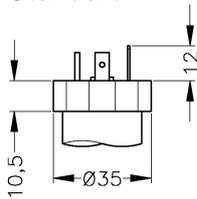
## Mechanical connection



- ⇒ Total length of devices with Ex-protection increases by 16 mm!
- ⇒ Total length of devices with accuracy 0.1 % FSO IEC 60770 increases by 42.5 mm! (standard and Ex-protection)

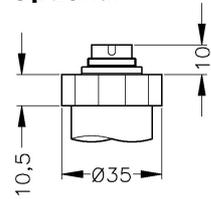
## Electrical connection

### Standard

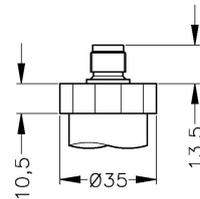


DIN 43650 (IP 65)

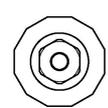
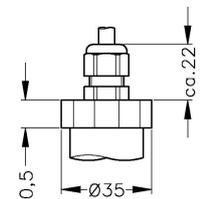
### Optional



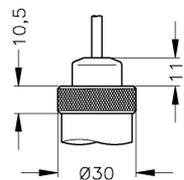
Binder Series 723 (IP 67)



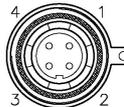
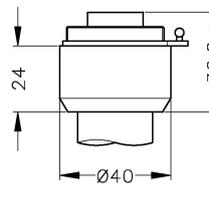
M12x1 4-pin (IP 67)



Cable gland (IP 67)<sup>4,5</sup>



Cable outlet (IP 68)<sup>4</sup>



Buccaneer (IP 68)<sup>6</sup>

<sup>4</sup> different cable types and lengths available

<sup>5</sup> standard: 2m PVC cable (without ventilation tube), optionally cable with ventilation tube

<sup>6</sup> cable with ventilation tube required

# LMP 331

## Stainless Steel Screw-In Transmitter

## Technical Data

### Materials

Pressure port	stainless steel 1.4571 (316Ti) / others on request
Housing	stainless steel 1.4301 (304)
Seals (media wetted)	FKM / EPDM / others on request
Diaphragm	stainless steel 1.4435 (316L)
Media wetted parts	pressure port, seals, diaphragm

### Miscellaneous

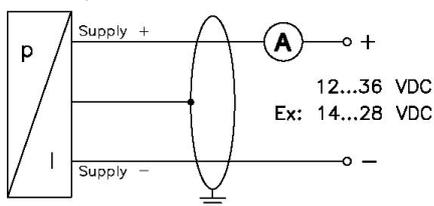
Cable capacitance <sup>7</sup>	cable without air tube: signal line/shield: 160 pF/m cable with air tube: signal line/shield: 150 pF/m	signal line/signal line: 120 pF/m signal line/signal line: 100 pF/m
Cable inductance <sup>7</sup>	cable without air tube: signal line/shield: 0.65 µH/m cable with air tube: signal line/shield: 1.0 µH/m	signal line/signal line: 0.65 µH/m signal line/signal line: 1.0 µH/m
Current consumption	signal output current: max. 25 mA signal output voltage: max. 7 mA	
Weight	approx. 200 g	
Installation position	any <sup>8</sup>	
Operational life	> 100 x 10 <sup>6</sup> cycles	

### Pin configuration

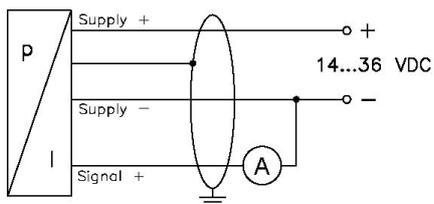
Electrical connection		DIN 43650	Binder 723 (5-pin)	M12x1 (4-pin)	Buccaneer (4-pin)	Cable colours <sup>7</sup> (DIN 47100)
2-wire-system	Supply +	1	3	1	1	white
	Supply -	2	4	2	2	brown
	Ground	ground pin	5	4	4	yellow / green (shield)
3-wire-system	Supply +	1	3	1	1	white
	Supply -	2	4	2	2	brown
	Signal +	3	1	3	3	green
	Ground	ground pin	5	4	4	yellow / green (shield)

### Wiring diagrams

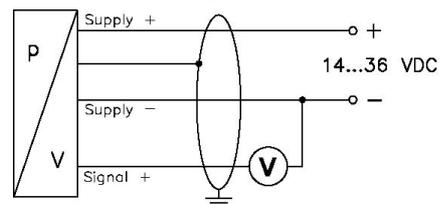
2-wire-system (current)



3-wire-system (current)



3-wire-system (voltage)



<sup>7</sup> if the electrical connection is a mounted cable by factory

<sup>8</sup> Pressure transmitters are calibrated in a vertical position with the pressure connection down. If this position is changed on installation there can be slight deviation in the zero point for pressure ranges  $P_N \leq 1$  bar.

Ordering code LMP 331

**LMP 331**

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<b>Pressure</b>																				
	in bar			4	3	0														
	in mWC			4	3	1														
<b>Input</b>																				
	[mWC]	[bar]																		
	0,4	0,04		0	4	0	0													
	0,6	0,06		0	6	0	0													
	1	0,10		1	0	0	0													
	1,6	0,16		1	6	0	0													
	2,5	0,25		2	5	0	0													
	4	0,40		4	0	0	0													
	6	0,60		6	0	0	0													
	10	1,0		1	0	0	1													
	16	1,6		1	6	0	1													
	25	2,5		2	5	0	1													
	40	4,0		4	0	0	1													
	60	6,0		6	0	0	1													
	100	10		1	0	0	2													
	160	16		1	6	0	2													
	250	25		2	5	0	2													
	400	40		4	0	0	2													
	customer			9	9	9	9													
<b>Pressure port</b>																				
	Stainless steel 1.4571 (316Ti)						1													
	customer						9													
<b>Diaphragm</b>																				
	Stainless steel 1.4435 (316L)						1													
	customer						9													
<b>Output</b>																				
	4 ... 20 mA / 2-wire																			
	0 ... 20 mA / 3-wire																			
	0 ... 10 V / 3-wire																			
	Intrinsic safety 4 ... 20 mA / 2-wire																			
	customer																			
<b>Seals</b>																				
	FKM																			
	EPDM																			
	customer																			
<b>Electrical connection</b>																				
	Male and female plug DIN 43650																			
	Binder series 723 (5-pin)																			
	Cable gland incl. Cable <sup>1,2</sup>																			
	Cable outlet <sup>1</sup>																			
	Male plug Buccaneer IP68 <sup>3</sup>																			
	M12x1 (4-pin)																			
	customer																			
<b>Accuracy</b>																				
	standard for P <sub>N</sub> > 0,4 bar	0,35 %																		
	standard for P <sub>N</sub> ≤ 0,4 bar	0,5 %																		
	option for P <sub>N</sub> > 0,4 bar	0,25 %																		
	option for P <sub>N</sub> ≥ 0,16 bar	0,1 %																		
	customer																			
<b>Special version</b>																				
	standard																			
	special compensation -20 ... 50 °C																			
	customer																			

<sup>1</sup> different cable types and lengths deliverable  
<sup>2</sup> standard: 2 m PVC cable without ventilation tube  
<sup>3</sup> for gauge pressure cable with ventilation tube required

