LMK 387

Stainless Steel Probe

Ceramic Sensor

accuracy according to IEC 60770:
standard: 0.35 % FSO
option: 0.25 % FSO

Nominal pressure

from 0 ... 1 mH_2O up to 0 ... 100 mH_2O

Output signal

2-wire: 4 ... 20 mA
others on request

Special characteristics

- diameter 22 mm
- diaphragm ceramics 99.9% Al_2O_3
- good long-term stability
- especially for waste water

Optional versions

- housing material titanium
- IS-version
  Ex ia = intrinsically safe for gas and dust
- drinking water certificate according to DVGW and KTW
- temperature element Pt 100
- mounting with stainless steel tube
- different kinds of cables
  and elastomers

The stainless steel probe LMK 387 was developed for level and gauge measurement in waste water, sludge or water courses. The mechanical robustness of the flush ceramic diaphragm facilitates an easy disassembly and cleaning of the probe in case of service.

Compared to the level probe LMK 382 the outer diameter is only 22 mm, whereby the installation or retrofitting can be easily carried out in 1 "pipes or in confined installation conditions. An IS-version (zone 0) is also available.

Preferred areas of use

Water
groundwater and level monitoring

Sewage
waste water treatment
water recycling

Fuel and oil
tank battery
biogas plants

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Input pressure range												
Nominal pressure gauge	[bar]	0.1	0.16	0.25	0.4	0.6	1	1.6	2.5	4	6	10
Level	[mH_2O]	1	1.6	2.5	4	6	10	16	25	40	60	100
Overpressure	[bar]	3	4	5	5	7	7	12	20	20	20	20
Burst pressure ≥	[bar]	4	6	8	8	9	9	18	25	25	30	30
Permissible vacuum	[bar]	-0.2	-0.3	-0.5				-1				
Max. ambient pressure (housing): 40 bar												

Output signal / Supply		
Standard	2-wire: 4 ... 20 mA / V_S = 12 ... 36 V_{DC}	
Option IS-version	2-wire: 4 ... 20 mA / V_S = 14 ... 28 V_{DC}	
Option temperature element Pt 100		
Temperature range	-25 … 125 °C	max. voltage 10 V_{DC}, in intrinsically safe circuit 30 V_{DC} max. current 2 mA, in intrinsically safe circuit 54 mA max. power 10 mW, in intrinsically safe circuit 405 mW
Connectivity technology	3-wire	
Resistance	100 Ω at 0 °C	
Temperature coefficient	3850 ppm/K	
Supply I_S	0.3 … 1.0 mA $_{DC}$	
Performance		
Accuracy [1]	standard: ≤ ± 0.35 % FSO	option: ≤ ± 0.25 % FSO
Permissible load	R_{max} = [(V_S – $V_{S\,min}$) / 0.02 A] Ω	
Influence effects	supply: 0.05 % FSO / 10 V	load: 0.05 % FSO / kΩ
Long term stability	≤ ± 0.1 % FSO / year	
Turn-on time	450 msec	
Mean response time	≤ 70 msec	
Measuring rate	80 Hz	
[1] accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability)		
Thermal effects (offset and span)		
Tolerance band	≤ ± 1 % FSO	
in compensated range	-20 … 80 °C	
Permissible temperature		
Medium / storage	-25 ... 85 °C	
Electrical protection [2]		
Short-circuit protection	permanent	
Reverse polarity protection	no damage, but also no function	
Electromagnetic compatibility	emission and immunity according to EN 61326	
[2] additional external overvoltage protection unit in terminal box KL 1 or KL 2 with atmospheric pressure reference available on request		
Electrical connection		
Cable with sheath material [3]	PUR (-25 … 70 °C) black Ø 7.4 mm FEP [4] (-25 … 70 °C) black Ø 7.4 mm TPE-U (-25 … 125 °C) blue Ø 7.4 mm (without / with drinking water certificate) TPE-U [5] (-25 … 125 °C) red Ø 9.0 mm	
Bending radius	static installation: 10-fold cable diameter dynamic application: 20-fold cable diameter	
[3] shielded cable with integrated ventilation tube for atmospheric pressure reference (for nominal pressure ranges absolute, the ventilation tube is closed) *[4] do not use freely suspended probes with an FEP cable if effects due to highly charging processes are expected* *[5] only in combination with IS-version (explosion protection) and temperature element Pt 100*		
Materials (media wetted)		
Housing	standard: stainless steel 1.4404 (316 L) option: titanium others on request	
Seals (O-rings)	standard: FKM option: EPDM (without / with drinking water certificate) FFKM (min. permissible temperature from -15 °C) others on request	
Diaphragm	ceramics Al_2O_3 99.9%	
Protection cap	POM-C	
Cable sheath	PUR, FEP, TPE-U	
Explosion protection		
Approval DX14B-LMK 387	IBExU 15 ATEX 1066 X / IECEx IBE 18.0019X zone 0: II 1G Ex ia IIB T4 Ga zone 20: II 1D Ex ia IIIC T135 °C Da	
Safety technical maximum values (pressure)	U_i = 28 V, I_i = 93 mA, P_i = 660 mW, C_i = 49.2 nF, L_i = 0 µH; the supply connections have an inner capacity of max. 100 nF opposite the enclosure	
Safety technical maximum values (temperature)	U_i = 30 V, I_i = 54 mA, P_i = 405 mW, C_i = 0 nF, L_i = 0 µH (temperature element Pt 100)	
Permissible temperatures for environment	in zone 0: -20 ... 60 °C with p_{atm} 0.8 bar up to 1.1 bar zone 1 and higher: -25 ... 65 °C	
Connecting cables (by factory)	cable capacity: signal line/shield also signal line/signal line: 160 pF/m cable inductance: signal line/shield also signal line/signal line: 1 µH/m	

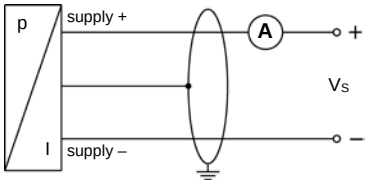
Miscellaneous	
Drinking water certificate [6]	according to DVGW W 270 and UBA KTW (with order the indication "with drinking water certificate" is necessary)
Option cable protection	prepared for mounting with stainless steel pipe
Current consumption	max. 22 mA
Weight	approx. 180 g (without cable)
Ingress protection	IP 68
CE-conformity	EMC Directive: 2014/30/EU
ATEX Directive	2014/34/EU

[6] only possible with EPDM seal in combination with TPE-U cable; not possible with IS-version (explosion protection) or housing material titanium

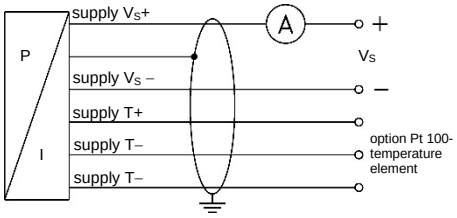
Pin configuration	
Electrical connection	cable colours (IEC 60757)
Supply V_S +	WH (white)
Supply V_S –	BN (brown)
Supply T+ (with Pt 100)	YE (yellow)
Supply T– (with Pt 100)	GY (grey)
Supply T– (with Pt 100)	PK (pink)
Shield	GNYE (green-yellow)

Wiring diagrams

2-wire-system (current)

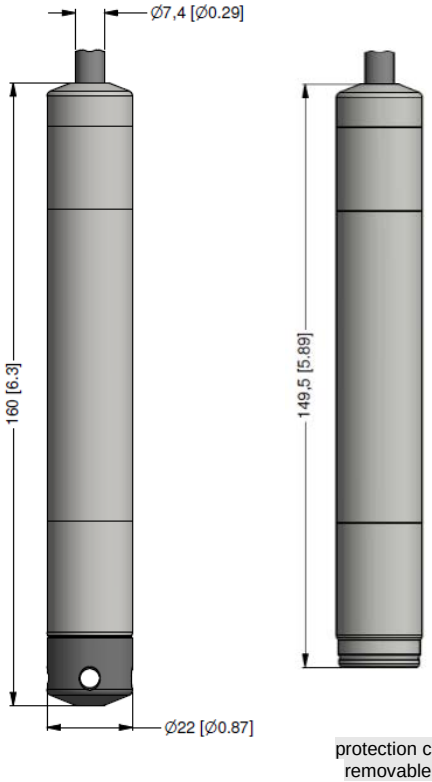


2-wire-system current (pressure) / 3-wire-system (temperature Pt 100)

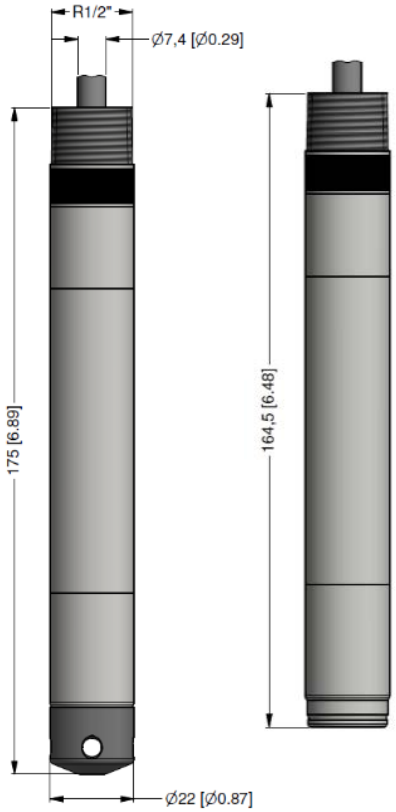


Dimensions (mm / in)

probes



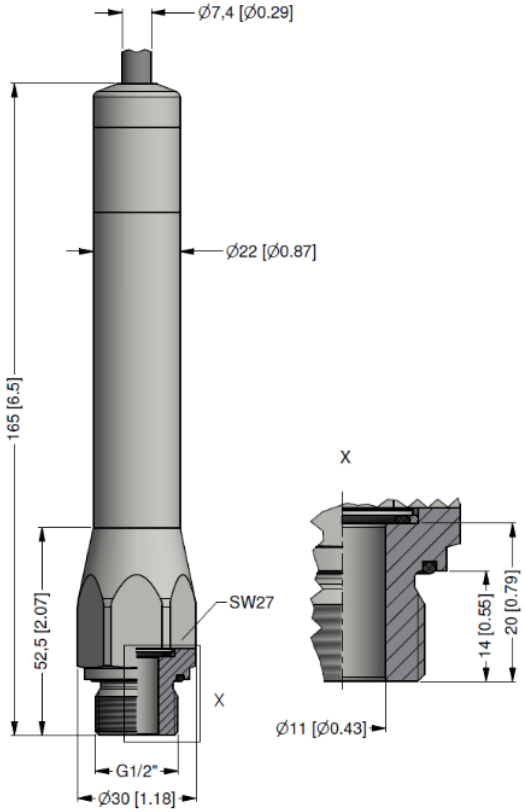
**optionally with thread R1/2"
for mounting with stainless steel tube**



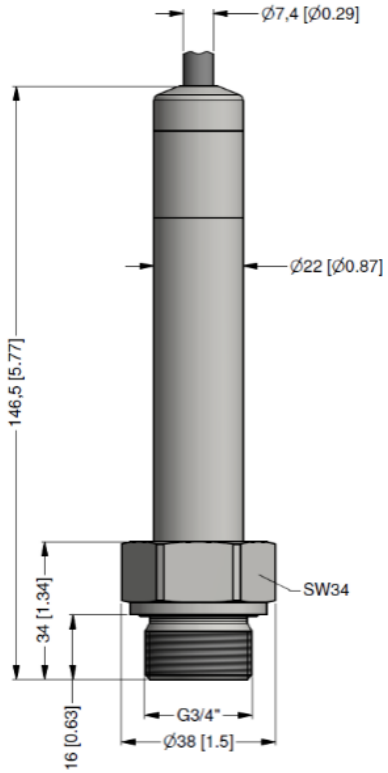
⇨ **cable diameter Ø9 mm for TPE-U cable (red), drawings for option with Pt 100 on request**

Dimensions (mm / in)

screw-in versions in stainless steel 1.4404 (316 L)



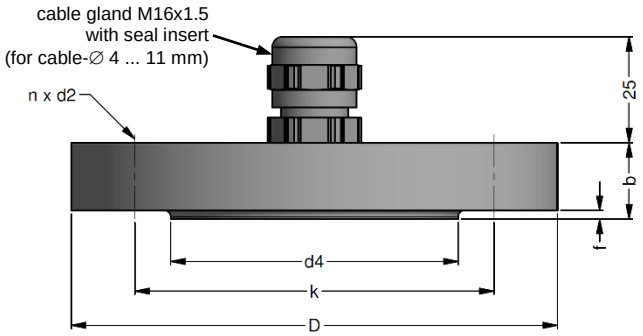
G1/2" open



G3/4"

⇨ **cable diameter Ø9 mm for TPE-U cable (red), drawings for option with Pt 100 on request**

Mounting flange with cable gland



dimensions in mm			
size	DN25 / PN40	DN50 / PN40	DN80 / PN16
b	18	20	20
D	115	165	200
d2	14	18	18
d4	68	102	138
f	2	3	3
k	85	125	160
n	4	4	8

Technical data		
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	

Ordering type	**Ordering code**	**Weight**
DN25 / PN40 with cable gland brass, nickel plated	ZMF2540	1.4 kg
DN50 / PN40 with cable gland brass, nickel plated	ZMF5040	3.2 kg
DN80 / PN16 with cable gland brass, nickel plated	ZMF8016	4.8 kg

Terminal clamp

Technical data		
Suitable for	all probes with cable ∅ 5.5 ... 10.5 mm	
Material of housing	standard: steel, zinc plated	optionally: stainless steel 1.4301 (304)
Material of clamping jaws and positioning clips	PA (fibre-glass reinforced)	
Dimensions (mm)	174 x 45 x 32	
Hook diameter	20 mm	

Ordering type	**Ordering code**	**Weight**
Terminal clamp, steel, zinc plated	Z100528	approx. 160 g
Terminal clamp, stainless steel 1.4301 (304)	Z100527	

Display program

CIT 200 Process display with LED display

CIT 250 Process display with LED display and contacts

CIT 300 Process display with LED display, contacts and analogue output

CIT 350 Process display with LED display, bargraph, contacts and analogue output

CIT 400 Process display with LED display, contacts, analogue output and Ex-approval

CIT 600 Multichannel process display with graphics-capable LC display

CIT 650 Multichannel process display with graphics-capable LC display and datalogger

CIT 700 / CIT 750 Multichannel process display with graphics-capable TFT monitor, touchscreen and contacts

PA 440 Field display with 4-digit LC display

For further information please contact our sales department or visit our homepage: http://www.bdsensors.de

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BD|SENSORS pressure measurement

Ordering code LMK 387

LMK 387 ☐☐☐-☐☐☐☐-☐-☐-☐-☐-☐-☐-☐-☐☐☐-☐☐☐

Pressure			
	gauge in bar	3 6 0	
	absolute in bar	3 6 3	consult
	gauge in mH_2O	3 6 1	
Input [mH_2O]	[bar]		
1.0	0.10	1 0 0 0	
1.6	0.16	1 6 0 0	
2.5	0.25	2 5 0 0	
4.0	0.40	4 0 0 0	
6.0	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	
	customer	9 9 9 9	consult
Housing			
	stainless steel 1.4404 (316L)	1	
	titanium	T	
	customer	9	consult
Design			
	probe	1	
	screw-in version G1/2" open [1]	A	
	screw-in version G3/4" flush [1]	B	
Diaphragm			
	ceramics Al_2O_3 99.9 %	C	
	customer	9	consult
Output			
	4 … 20 mA / 2-wire	1	
	intrinsic safety 4 … 20 mA / 2-wire	E	
	customer	9	consult
Seals			
	FKM	1	
	EPDM	3	
DVGW / KTW:	EPDM [2]	3T	
	FFKM [3]	7	
	customer	9	consult
Electrical connection			
	PUR-cable (black, Ø 7.4 mm) [4]	2	
	FEP-cable (black, Ø 7.4 mm) [4]	3	
	TPE-U-cable (blue, Ø 7.4 mm) [4]	4	
	TPE-U-cable (red, Ø 9.0 mm) [4,5]	42	
DVGW / KTW:	TPE-U-cable (blue, Ø 7.4 mm) [2,4]	F	
	customer	9	consult
Accuracy			
standard	0.35 % FSO	3	
option	0.25 % FSO	2	
	customer	9	consult
Cable length			
	in m	9 9 9	
Special version			
	standard	0 0 0	
	with temperature sensor Pt 100	0 1 3	
	prepared for mounting with stainless steel pipe [6]	5 0 2	
	customer	9 9 9	consult

[1] only in combination with housing in stainless steel 1.4404 (316L)

[2] drinking water certification only possible with EPDM seal (code 3T) in combination with TPE-U cable (code F); not possible with IS-protection (explosion protection) or housing material titanium

[3] min. permissible temperature from -15 °C

[4] shielded cable with integrated air tube for atmospheric pressure reference

[5] only in combination with IS version (explosion protection) and temperature element Pt 100

[6] stainless steel pipe is not part of the supply

29.04.2022