LMK 487

Probe for Marine and Offshore 22 mm

Ceramic Sensor

accuracy according to IEC 60770:
0.25 % FSO

Nominal pressure

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

Output signals

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

Special characteristics

- diameter 22 mm
- LR-certificate (Lloyd´s Register)
- DNV▪GL Approval (Det Norske Veritas ▪ Germanischer Lloyd)
- diaphragm 99.9 % Al_2O_3
- high long-term stability

Optional versions

- housing material titanium
- IS-version
  Ex ia = intrinsically safe for gas and dust
- temperature element Pt 100
- different kinds of elastomer

The hydrostatic probe LMK 487 has been developed for measuring levels in various tank applications for shipbuilding and offshore. In comparison to the hydrostatic probe LMK 458 the external diameter amounts to only 22 mm by which the installation in 1" pipes can be carried out easily.

Beside the housing materials stainless steel and titanium, different elastomer materials are available by which an optimum adaptation to the application can be ensured.

Preferred areas of use

Water
drinking water abstraction
desalinization plant

Shipbuilding / Offshore
ballast tanks
monitoring of a ship's position and draught
level measurement in ballast and storage tanks

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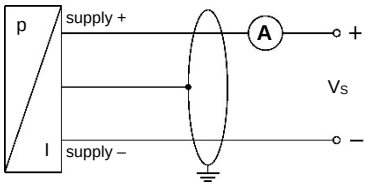
Input pressure range												
Nominal pressure gauge	[bar]	0.1	0.16	0.25	0.4	0.6	1	1.6	2.5	4	6	10
Level	[mH_2O]	1	1.6	2.5	4	6	10	16	25	40	60	100
Overpressure	[bar]	3	4	5	5	7	7	12	20	20	20	20
Burst pressure ≥	[bar]	4	6	8	8	9	9	18	25	25	30	30
Permissible vacuum	[bar]	-0.2	-0.3	-0.5				-1				
Max. ambient 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 Pt 100-temperature element		
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]	nominal pressure ≥ 0.4 bar: ≤ ± 0.25 % FSO	nominal pressure < 0.4 bar ≤ ± 0.35 % 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 temperatures		
Permissible temperatures	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 - DNV▪GL (Det Norske Veritas ▪ Germanischer Lloyd)	
[2] additional external overvoltage protection unit in terminal box KL 1 or KL 2 with atmospheric pressure reference available on request		
Mechanical stability		
Vibration	4 g (according to DNV▪GL: Class B, curve 2 / basis: IEC 60068-2-6)	
Electrical connection		
Cable with sheath material [3]	TPE-U (-25 …125 °C) blue Ø 7.4 mm TPE-U [4] (-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] only in combination with IS version (explosion protection) and temperature element Pt100*		
Materials (media wetted)		
Housing	standard: stainless steel 1.4404 (316 L) option: titanium (resistant against sea water)	others on request
Seals (O-rings)	standard: FKM options: EPDM; FFKM (min. permissible temperature from -15 °C)	others on request
Diaphragm	ceramics Al_2O_3 99.9%	
Protection cap	POM-C	
Cable sheath	TPE-U (flame-resistant, halogen free, increased resistance against oil and gasoline, resistant against salt, sea water, heavy oil)	
Category of the environment		
Lloyd´s Register (LR)	number of certificate: 18/20068	ENV1, ENV2, ENV3, ENV4
Det Norske Veritas/ Germanischer Lloyd (DNV GL)	number of certificate: TAA00000RM temperature: D humidity: B vibration: B EMC: B	enclosure: D
Explosion protection		
Approval DX14B-LMK 487	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 as well as signal line/signal line: 160 pF/m cable inductance: signal line/shield as well as signal line/signal line: 1 µH/m	

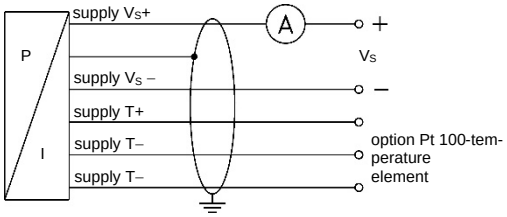
Miscellaneous	
Current consumption	max. 22 mA
Weight	approx. 180 g (without cable)
Ingress protection	IP 68
CE-conformity	EMC Directive: 2014/30/EU
ATEX Directive	2014/34/EU
Pin configuration	
Electrical connection	cable colours (IEC 60757)
Supply + Supply – Option Pt 100 temperature element: Supply T+ Supply T– Supply T–	WH (white) BN (brown) YE (yellow) GY (grey) PK (pink)
Shield	GNYE (green-yellow)

Wiring diagrams

2-wire-system (current)

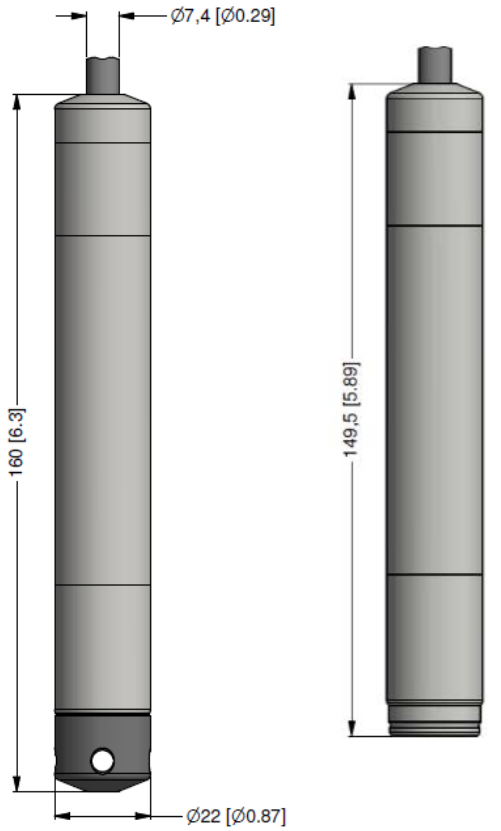


2-wire-system (pressure) / 3-wire-system (temperature)



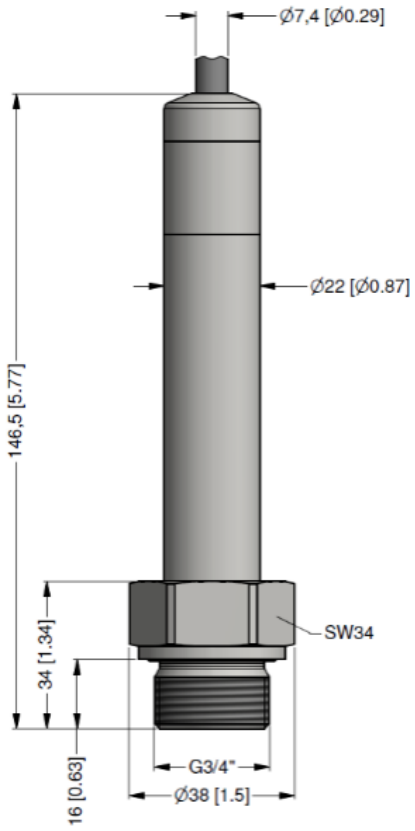
Dimensions (mm / in)

standard



protection cap removable

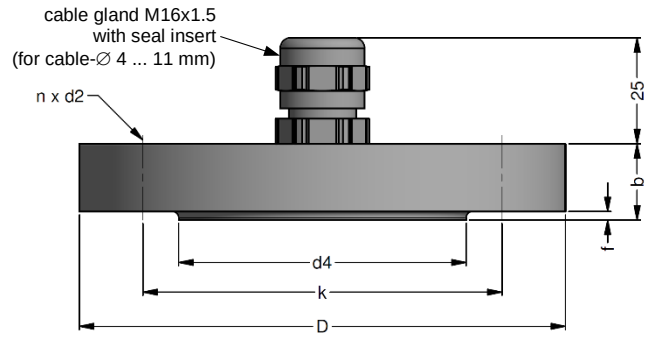
screw-in version in stainless steel 1.4404 (316 L)



G3/4" flush

⇨ **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

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BD|SENSORS pressure measurement

BD|SENSORS
pressure measurement

Ordering code LMK 487

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Pressure		Code	
gauge in bar		3 6 5	
gauge in mH_2O		3 6 6	

Input	[mH_2O]	[bar]	Code	
	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	Code	
stainless steel 1.4404 (316L)	1	
titanium	T	
customer	9	consult

Design	Code	
probe	1	
screw-in version G3/4" flush [1]	B	

Diaphragm	Code	
ceramics Al_2O_3 99,9 %	C	
customer	9	consult

Output	Code	
4 … 20 mA / 2-wire	1	
intrinsic safety 4 … 20 mA / 2-wire	E	
customer	9	consult

Seals	Code	
FKM	1	
EPDM	3	
FFKM [2]	7	
customer	9	consult

Electrical connection	Code	
TPE-U-cable (blue, Ø 7.4 mm) [3]	4	
TPE-U-cable (red, Ø 9.0 mm) [3,4]	42	

Accuracy		Code	
standard for p_N < 0,4 bar	0.35 % FSO	3	
standard for p_N ≥ 0,4 bar	0.25 % FSO	2	
	customer	9	consult

Cable length	Code	
in m	9 9 9	

Special version	Code	
standard	0 0 0	
with temperature sensor Pt 100	0 1 3	
customer	9 9 9	consult

[1] only in combination with housing in stainless steel 1.4404 (316L)
[2] min. permissible temperature from -15 °C
[3] shielded cable with integrated ventilation tube for atmospheric pressure reference
[4] only in combination with IS version (explosion protection) and temperature element Pt 100

28.04.2022

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