# LMK 487

## Probe for Marine and Offshore 22 mm

Ceramic Sensor

accuracy according to IEC 61298-2:
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-approval
- 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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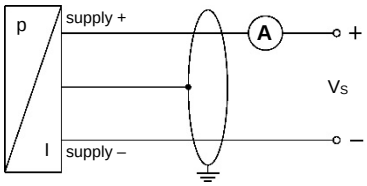
| **Input pressure range** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal pressure gauge | [bar] | 0.1 | 0.16 | 0.25 | 0.4 | 0.6 | 1 | 1.6 | 2.5 | 4 | 6 | 10 |
| Level | [$mH_2O$] | 1 | 1.6 | 2.5 | 4 | 6 | 10 | 16 | 25 | 40 | 60 | 100 |
| Overpressure | [bar] | 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 [1]** | | |
| Temperature range | -25 … 125 °C | max. voltage 10 $V_{DC}$, in intrinsically safe circuit 30 $V_{DC}$<br>max. current 2 mA, in intrinsically safe circuit 54 mA<br>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 $_{DC}$ | |
| *[1] not possible in combination with IS-version* | | |
| **Performance** | | |
| Accuracy [2] | nominal pressure ≥ 0.4 bar: ≤ ± 0.25 % FSO | nominal pressure < 0.4 bar ≤ ± 0.35 % FSO |
| Permissible load | $R_{max} = [(V_S – V_{S\,min}) / 0.02\ A]\ \Omega$ | |
| 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 | |
| *[2] accuracy according to IEC 61298-2 – 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 [3]** | | |
| Short-circuit protection | permanent | |
| Reverse polarity protection | no damage, but also no function | |
| Electromagnetic compatibility | emission and immunity according to<br>- EN 61326 - DNV | |
| *[3] 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: Class B, curve 2 / basis: IEC 60068-2-6) | |
| **Electrical connection** | | |
| Cable with sheath material [4] | TPE-U (-25 …125 °C) blue Ø 7.4 mm | |
| Bending radius | static installation: 10-fold cable diameter | dynamic application: 20-fold cable diameter |
| *[4] shielded cable with integrated ventilation tube for atmospheric pressure reference (for nominal pressure ranges absolute, the ventilation tube is closed)* | | |
| **Materials (media wetted)** | | |
| Housing | standard: stainless steel 1.4404 (316 L)<br>option: titanium (resistant against sea water) | others on request |
| Seals (O-rings) | standard: FKM<br>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 (DNV) | number of certificate: TAA00000RM<br>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<br>zone 0: II 1G Ex ia IIB T4 Ga<br>zone 20: II 1D Ex ia IIIC T135 °C Da | |
| Safety technical maximum values | $U_i$ = 28 V, $I_i$ = 93 mA, $P_i$ = 660 mW, $C_i$ = 49.2 nF, $L_i$ = 0 µH;<br>the supply connections have an inner capacity of max. 100 nF opposite the enclosure | |
| Permissible temperatures for environment | in zone 0: -20 ... 60 °C with $p_{atm}$ 0.8 bar up to 1.1 bar<br>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<br>cable inductance: signal line/shield as well as signal line/signal line: 1 µH/m | |

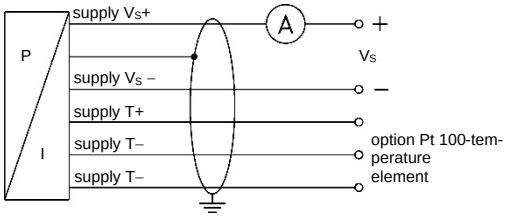
| **Miscellaneous** | |
|---|---|
| Current consumption | max. 22 mA |
| Weight | approx. 180 g (without cable) |
| Ingress protection | IP 68 |
| CE-conformity | EMC Directive: 2014/30/EU |
| ATEX Directive | 2014/34/EU |
| **Pin configuration** | |
| Electrical connection | cable colours (IEC 60757)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

**Wiring diagrams**

2-wire-system (current)

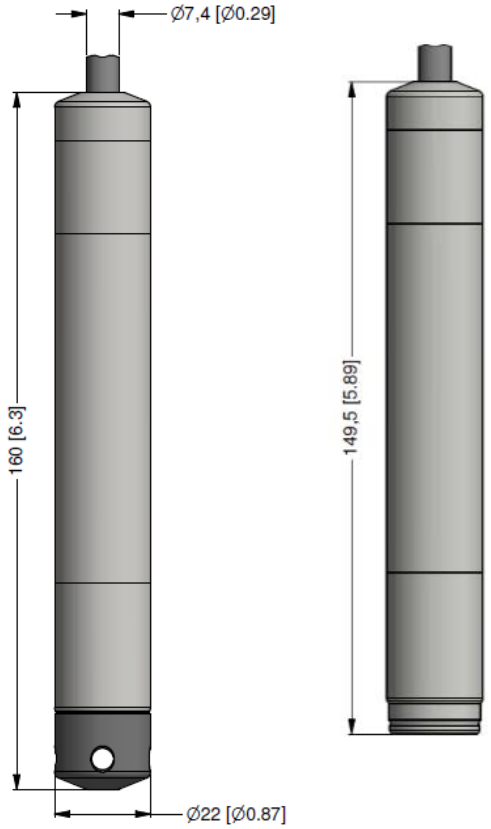



2-wire-system (pressure) / 3-wire-system (temperature)



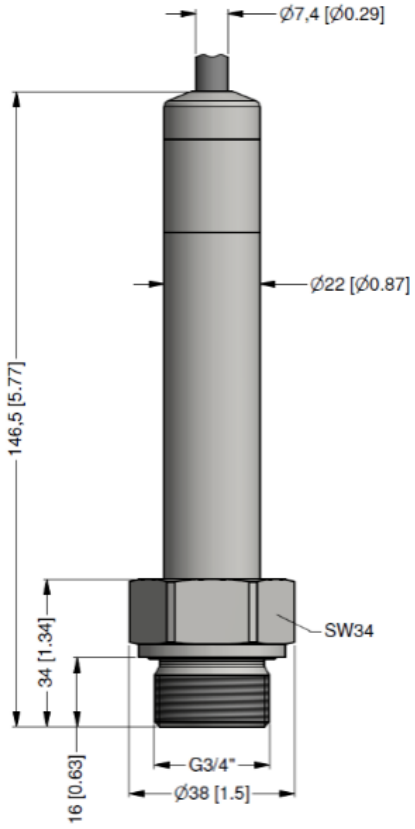

**Dimensions (mm / in)**

**standard**



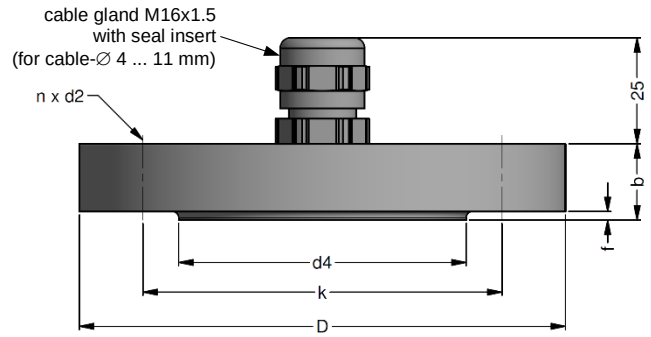

protection cap removable

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




G3/4" flush

## 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

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pressure measurement

# Ordering code LMK 487

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