

LMK 382H

Stainless Steel Probe with HART®-communication

Ceramic Sensor

accuracy according to IEC 60770:
0.1 % FSO



Nominal pressure

from 0 ... 60 cmH₂O up to 0 ... 200 mH₂O

Output signals

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

Special characteristics

- ▶ diameter 39.5 mm
- ▶ HART® communication
(setting of offset, span and damping)
- ▶ permissible temperatures up to 85 °C
- ▶ high overpressure resistance
- ▶ high long-term stability

Optional versions

- ▶ IS-version
Ex ia = intrinsically safe for gas and dust
- ▶ mounting with stainless steel pipe
- ▶ flange version
- ▶ diaphragm 99.9 % Al₂O₃
- ▶ accessories e.g. transmitter and mounting
flanges and terminal clamp

The stainless steel probe LMK 382H has been designed for continuous level measurement in sewage, polluted and higher viscosity fluids.

Basic element is a robust and high overpressure capable capacitive ceramic sensor e.g. for low levels.

Preferred areas of use are



Water

ground water level measurement
rain spillway basins



Sewage

waste water treatment
water recycling



Fuel and oil

level monitoring in open tanks
with low filling heights
fuel storage
tank farms
biogas plants



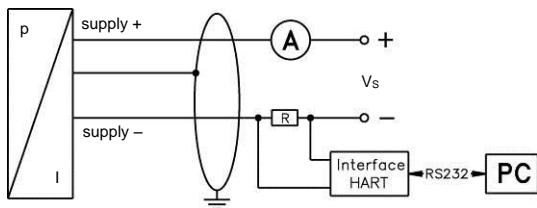
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|--|--|--|------------------------|-----|----|----|---|--------------------------|-----|
| Pressure ranges ¹ | | | | | | | | | |
| Nominal pressure | [bar] | 0.06 | 0.16 | 0.4 | 1 | 2 | 5 | 10 | 20 |
| Level | [mH ₂ O] | 0.6 | 1.6 | 4 | 10 | 20 | 50 | 100 | 200 |
| Overpressure | [bar] | 2 | 4 | 6 | 8 | 15 | 25 | 35 | 45 |
| Max. ambient pressure (housing): 40 bar | | | | | | | | | |
| ¹ on customer request we adjust the devices by software on the required pressure ranges, within the turn-down possibility (starting at 0.02 bar). | | | | | | | | | |
| Output signal / Supply | | | | | | | | | |
| Standard | 2-wire: 4 ... 20 mA / V _S = 12 ... 36 V _{DC} with HART® communication | | | | | | V _{S rated} = 24 V _{DC} | | |
| Option IS-version | 2-wire: 4 ... 20 mA / V _S = 14 ... 28 V _{DC} with HART® communication | | | | | | V _{S rated} = 24 V _{DC} | | |
| Performance | | | | | | | | | |
| Accuracy ² | p _N ≥ 160 mbar | TD ≤ 1:5 ≤ ± 0.2 % FSO TD > 1:5 ≤ ± [0.2 + 0.03 x TD] % FSO | | | | | | TD _{max} = 1:10 | |
| | p _N < 160 mbar | ≤ ± [0.2 + 0.1 x TD] % FSO | | | | | | TD _{max} = 1:3 | |
| | p _N ≥ 1 bar | TD ≤ 1:5 ≤ ± 0.1 % FSO TD > 1:5 ≤ ± [0.1 + 0.02 x TD] % FSO | | | | | | TD _{max} = 1:10 | |
| Permissible load | R _{max} = [(V _S - V _{S min}) / 0.02 A] Ω load at HART®-communication: R _{min} = 250 Ω | | | | | | | | |
| Long term stability | ≤ ± (0.1 x turn-down) % FSO / year at reference conditions | | | | | | | | |
| Influence effects | supply: 0.05 % FSO / 10 V permissible load: 0.05 % FSO / kΩ | | | | | | | | |
| Turn-on time | 850 msec | | | | | | | | |
| Mean response time | 140 msec without consideration of electronic damping | | | | | | mean measuring rate 7/sec | | |
| Max. response time | 380 msec | | | | | | | | |
| Adjustability | configuration of following parameters possible (interface / software necessary ³): - electronic damping: 0 ... 100 sec - offset: 0 ... 80 % FSO - turn down of span: max. 1:10 | | | | | | | | |
| ² accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability) | | | | | | | | | |
| ³ software, interface, and cable have to be ordered separately (software appropriate for Windows® 95, 98, 2000, NT Version 4.0 or higher, and XP) | | | | | | | | | |
| Thermal effects (offset and span) | | | | | | | | | |
| Tolerance band | ≤ ± 1 % FSO | | | | | | | | |
| in compensated range | -20 ... 80 °C | | | | | | | | |
| Permissible temperatures | | | | | | | | | |
| Permissible temperatures | medium / electronics / environment / storage: -25 ... 85 °C | | | | | | | | |
| Electrical protection ⁴ | | | | | | | | | |
| Short-circuit protection | permanent | | | | | | | | |
| Reverse polarity protection | no damage, but also no function | | | | | | | | |
| Electromagnetic compatibility | emission and immunity according to EN 61326 | | | | | | | | |
| ⁴ 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: DIN EN 60068-2-6) | | | | | | | | |
| Electrical connection | | | | | | | | | |
| Cable outlet with sheath material ⁵ | PVC (-5 ... 70 °C) | grey | Ø 7.4 mm | | | | | | |
| | PUR (-25 ... 70 °C) | black | Ø 7.4 mm | | | | | | |
| | FEP ⁶ (-25 ... 70 °C) | black | Ø 7.4 mm | | | | | | |
| | TPE-U (-25 ... 85 °C) | blue | Ø 7.4 mm | | | | | | |
| Bending radius | static installation: | | 10-fold cable diameter | | | | | | |
| | dynamic application: | | 20-fold cable diameter | | | | | | |
| ⁵ shielded cable with integrated ventilation tube for atmospheric pressure reference | | | | | | | | | |
| ⁶ do not use freely suspended probes with an FEP cable if effects due to highly charging processes are expected | | | | | | | | | |
| Materials | | | | | | | | | |
| Housing | stainless steel 1.4404 (316 L) | | | | | | | | |
| Seals | FKM, FFKM, EPDM, others on request | | | | | | | | |
| Diaphragm | standard: ceramics Al ₂ O ₃ 96 % option: ceramics Al ₂ O ₃ 99.9 % | | | | | | | | |
| Protection cap | POM-C | | | | | | | | |
| Cable sheath | PVC, PUR, FEP, TPE-U, others on request | | | | | | | | |
| Explosion protection | | | | | | | | | |
| Approval DX15A-LMK 382H | IBExU 10 ATEX 1186 X zone 0 ⁷ : II 1G Ex ia IIB T4 Ga zone 20: II 1D Ex ia IIIC T85 °C Da | | | | | | | | |
| Safety technical maximum values | U _i = 28 V, I _i = 93 mA, P _i = 660 mW, C _i = 13.2 nF, L _i = 0 µH, the supply connections have an inner capacity of max. 27 nF opposite the enclosure | | | | | | | | |
| Permissible media temperature | in zone 0: -10 ... 60 °C with p _{atm} 0.8 bar up to 1.1 bar zone 1 or higher: -25 ... 70 °C | | | | | | | | |
| 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: 1 µH/m | | | | | | | | |
| ⁷ for optional stainless steel pipe following designation is valid: "II 1G Ex ia IIC T4" (zone 0) | | | | | | | | | |

Miscellaneous

| | |
|------------------------------------|---|
| Option cable protection for probes | prepared for mounting with stainless steel pipe; available as compact product (standard: stainless steel pipe with a total length up to 2 m possible; other lengths on request) |
| Ingress protection | IP 68 |
| Current consumption | max. 21 mA |
| Weight | approx. 400 g (without cable) |
| CE-conformity | EMC Directive: 2014/30/EU |
| ATEX Directive | 2014/34/EU |

Wiring diagram

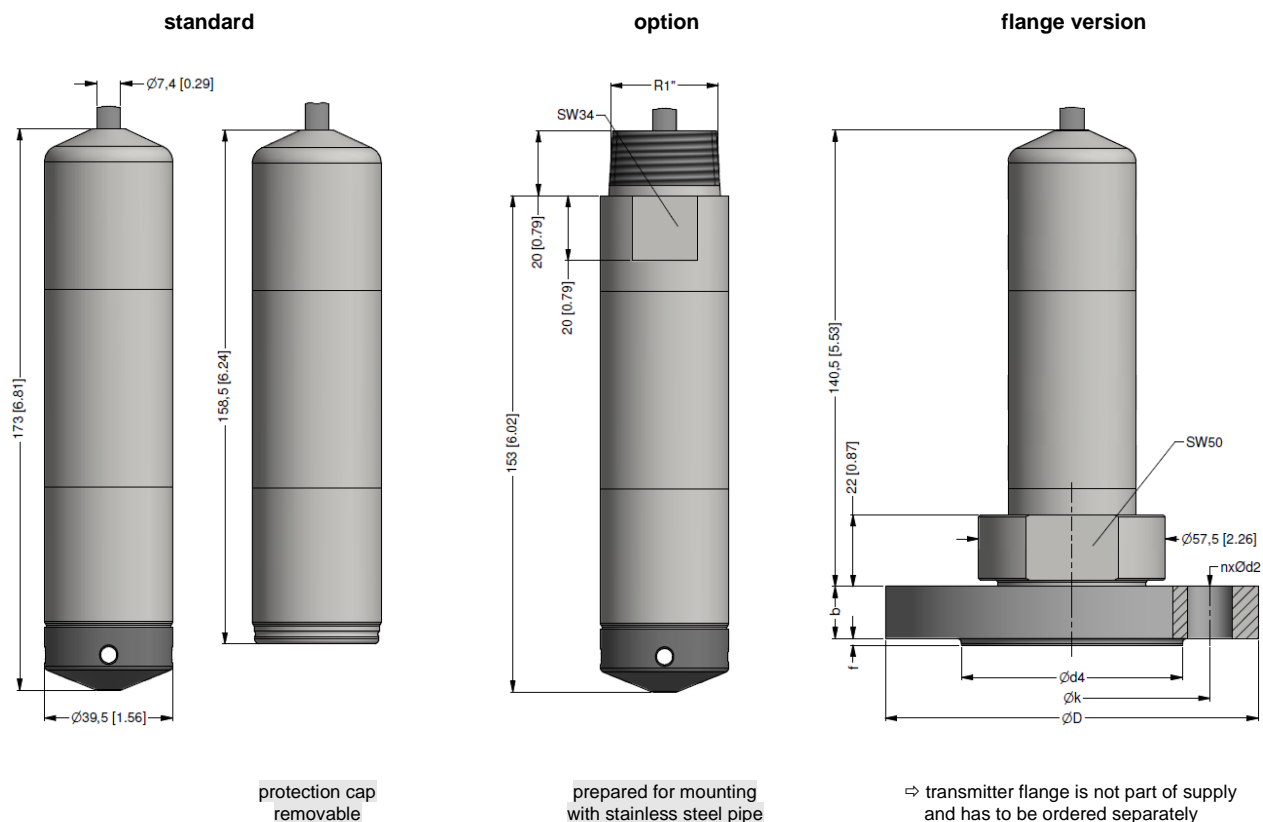
2-wire-system (current) HART®



Pin configuration

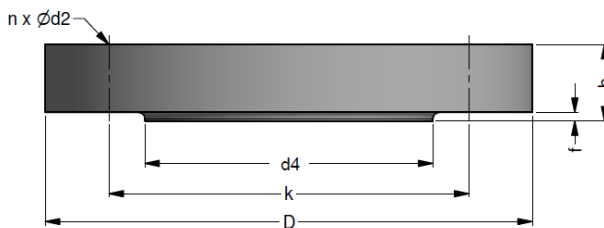
| | |
|-----------------------|---------------------------|
| Electrical connection | cable colours (IEC 60757) |
| Supply + | WH (white) |
| Supply - | BN (brown) |
| Shield | GYNE (green-yellow) |

Dimensions (mm / in)



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Transmitter flange for flange version



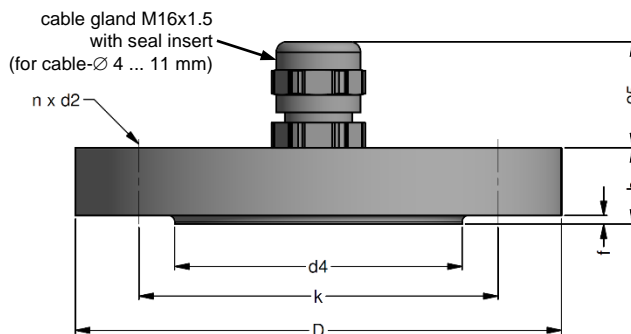
| dimensions in mm | | | |
|------------------|-------------|-------------|-------------|
| size | DN25 / PN40 | DN50 / PN40 | DN80 / PN16 |
| b | 18 | 20 | 20 |
| D | 115 | 165 | 200 |
| d2 | 14 | 18 | 18 |
| d4 | 68 | 102 | 138 |
| f | 2 | 3 | 3 |
| k | 85 | 125 | 160 |
| n | 4 | 4 | 8 |

Technical data

| | |
|-----------------|--------------------------------------|
| Suitable for | LMK 382, LMK 382H, LMK 458, LMK 458H |
| Flange material | stainless steel 1.4404 (316L) |
| Hole pattern | according to DIN 2507 |

| Ordering type | Ordering code | Weight |
|--------------------------------|---------------|--------|
| Transmitter flange DN25 / PN40 | ZSF2540 | 1.2 kg |
| Transmitter flange DN50 / PN40 | ZSF5040 | 2.6 kg |
| Transmitter flange DN80 / PN16 | ZSF8016 | 4.1 kg |

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 Ø 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 | |

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Ordering code LMK 382H

LMK 382H

| | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| □ | □ | □ | - | □ | □ | □ | □ | - | □ | - | □ | - | □ | - | □ | - | □ | □ | □ | - | □ | □ | □ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| Pressure | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------|--|----------------------|---|---|---|---|---|---|---|---|---|---|---|---|--|--|---|---|---|--|--|---------|--|
| | | in bar | 5 | 6 | 5 | | | | | | | | | | | | | | | | | | |
| | | in mH ₂ O | 5 | 6 | 6 | | | | | | | | | | | | | | | | | | |
| Input | [mH ₂ O] | [bar] | | | | | | | | | | | | | | | | | | | | | |
| | 0.6 | 0.06 | | | | 0 | 6 | 0 | 0 | | | | | | | | | | | | | | |
| | 1.6 | 0.16 | | | | 1 | 6 | 0 | 0 | | | | | | | | | | | | | | |
| | 4.0 | 0.40 | | | | 4 | 0 | 0 | 0 | | | | | | | | | | | | | | |
| | 10 | 1.0 | | | | 1 | 0 | 0 | 1 | | | | | | | | | | | | | | |
| | 20 | 2.0 | | | | 2 | 0 | 0 | 1 | | | | | | | | | | | | | | |
| | 50 | 5.0 | | | | 5 | 0 | 0 | 1 | | | | | | | | | | | | | | |
| | 100 | 10 | | | | 1 | 0 | 0 | 2 | | | | | | | | | | | | | | |
| | 200 | 20 | | | | 2 | 0 | 0 | 2 | | | | | | | | | | | | | | |
| | customer | | | | | 9 | 9 | 9 | 9 | | | | | | | | | | | | | consult | |
| Housing | | | | | | | | | | | | | | | | | | | | | | | |
| | stainless steel 1.4404 (316L) | | | | | | | | | 1 | | | | | | | | | | | | | |
| | customer | | | | | | | | | 9 | | | | | | | | | | | | consult | |
| Diaphragm | | | | | | | | | | | | | | | | | | | | | | | |
| | ceramics Al ₂ O ₃ 96 % | | | | | | | | | 2 | | | | | | | | | | | | | |
| | ceramics Al ₂ O ₃ 99.9 % | | | | | | | | | C | | | | | | | | | | | | | |
| | customer | | | | | | | | | 9 | | | | | | | | | | | | consult | |
| Output | | | | | | | | | | | | | | | | | | | | | | | |
| | HART [®] -communication | | | | | | | | | | H | | | | | | | | | | | | |
| | 4 ... 20 mA / 2-wire | | | | | | | | | | | | | | | | | | | | | | |
| | HART [®] -communication | | | | | | | | | | I | | | | | | | | | | | | |
| | intrinsic safety 4 ... 20 mA / 2-wire | | | | | | | | | | | | | | | | | | | | | | |
| | customer | | | | | | | | | 9 | | | | | | | | | | | | consult | |
| Seals | | | | | | | | | | | | | | | | | | | | | | | |
| | FKM | | | | | | | | | | 1 | | | | | | | | | | | | |
| | EPDM | | | | | | | | | | 3 | | | | | | | | | | | | |
| | FFKM | | | | | | | | | | 7 | | | | | | | | | | | | |
| | customer | | | | | | | | | | 9 | | | | | | | | | | | consult | |
| Electrical connection | | | | | | | | | | | | | | | | | | | | | | | |
| | PVC-cable (grey, Ø 7.4 mm) ¹ | | | | | | | | | | 1 | | | | | | | | | | | | |
| | PUR-cable (black, Ø 7.4 mm) ¹ | | | | | | | | | | 2 | | | | | | | | | | | | |
| | FEP-cable (black, Ø 7.4 mm) ¹ | | | | | | | | | | 3 | | | | | | | | | | | | |
| | TPE-U-cable (blue, Ø 7.4 mm) ¹ | | | | | | | | | | 4 | | | | | | | | | | | | |
| | customer | | | | | | | | | | 9 | | | | | | | | | | | consult | |
| Accuracy | | | | | | | | | | | | | | | | | | | | | | | |
| p _N ≥ 1 bar: | 0.1 % FSO | | | | | | | | | | 1 | | | | | | | | | | | | |
| p _N < 1 bar: | 0.2 % FSO | | | | | | | | | | B | | | | | | | | | | | | |
| | customer | | | | | | | | | | 9 | | | | | | | | | | | consult | |
| Cable length | | | | | | | | | | | | | | | | | | | | | | | |
| | in m | | | | | | | | | | | 9 | 9 | 9 | | | | | | | | | |
| Special version | | | | | | | | | | | | | | | | | | | | | | | |
| | standard | | | | | | | | | | | | | | | | 0 | 0 | 0 | | | | |
| | prepared for mounting | | | | | | | | | | | | | | | | 5 | 0 | 2 | | | | |
| | with stainless steel pipe ² | | | | | | | | | | | | | | | | | | | | | | |
| | flange version ³ | | | | | | | | | | | | | | | | 5 | 1 | 0 | | | | |
| | customer | | | | | | | | | | | | | | | | 9 | 9 | 9 | | | consult | |

¹ shielded cable with integrated ventilation tube for atmospheric pressure reference

² stainless steel pipe is not part of the supply

³ mounting accessories are not part of supply and have to be ordered separately

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