

LMK 458H

Probe with HART[®]-communication for Marine and Offshore

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

- ▶ shipping approvals acc. to:
Lloyd's Register (LR), Germanischer
Lloyd (GL), Det Norske Veritas (DNV)
China Classification Society (CCS)
- ▶ diameter 39.5 mm
- ▶ HART[®] communication (setting of
offset, span and damping)
- ▶ high overpressure resistance
- ▶ high long-term stability



Optional versions

- ▶ IS-version zone 0
- ▶ diaphragm Al₂O₃ 99.9 %
- ▶ different housing materials
(stainless steel, CuNiFe)
- ▶ screw-in and flange version
- ▶ accessories e. g. assembling and
probe flange, mounting clamp

The hydrostatic probe LMK 458H has been developed for measuring level in service and storage tanks and is as a consequence certificated for shipbuilding and offshore applications.

A permissible operating temperature of up to 85°C and the possibility to use the device in intrinsic safe areas enable to measure the pressure of various fluids under extreme conditions. The basis for the LMK 458H is a capacitive ceramic sensor element, which offers a high overload resistance and medium compatibility.

Preferred areas of use are

-  Water
Drinking water abstraction
Desalinization plant
-  Shipbuilding / Offshore
Ballast tanks
Draught monitoring
Level measurement in ballast and
storage tanks



| Pressure ranges | | | | | | | | | | |
|--|---|----------|--|-----------------------------|---------------------------------------|-----------------------------------|---|--------------------------|-----|--|
| Nominal pressure ¹ | [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 | |
| 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 _{max} = 1:10 | | |
| | P _N < 160 mbar | TD > 1:5 | | ≤ ± [0.2 + 0.03 x TD] % FSO | | | | TD _{max} = 1:3 | | |
| | P _N ≥ 1 bar | TD ≤ 1:5 | | ≤ ± 0.1 % FSO | | | | TD _{max} = 1:10 | | |
| | | TD > 1:5 | | ≤ ± [0.1 + 0.02 x TD] % FSO | | | | | | |
| 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) / Permissible temperatures | | | | | | | | | | |
| Tolerance band | ≤ ± [0.2 x turn-down] % FSO | | | | | | | | | |
| TC, average | ≤ ± [0.02 x turn-down] % FSO / 10 K | | | | | | | | | |
| in compensated range | -20 ... 80 °C | | | | | | | | | |
| Permissible temperatures | medium: -25 ... 85 °C | | electronics / environment: -25 ... 85 °C | | | | 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 - Germanischer Lloyd (GL) - Det Norske Veritas (DNV) | | | | | | | | | |
| ⁴ additional external overvoltage protection unit in terminal box KL 1 or KL 2 with atmospheric pressure reference available | | | | | | | | | | |
| Mechanical stability | | | | | | | | | | |
| Vibration | 4 g (according to GL: curve 2 / according to DNV: Class B / basis: DIN EN 60068-2-6) | | | | | | | | | |
| Electrical connection | | | | | | | | | | |
| Cable | shielded cable with integrated air tube for atmospheric reference (for nominal pressure ranges absolute, the air tube is closed) | | | | | | | | | |
| Materials (media wetted) | | | | | | | | | | |
| Housing | standard: stainless steel 1.4404 (316L) | | option: CuNi10Fe1Mn (resistant against sea water) | | | | others on request | | | |
| Cable sheath | TPE -U (flame-resistant, halogen free, increased resistance against oil and gasoline, resistant against salt, sea water, heavy oil) | | | | | | | | | |
| Seals | FKM; FFKM; EPDM others on request | | | | | | | | | |
| Diaphragm | standard: ceramics Al ₂ O ₃ 96 % option: ceramics Al ₂ O ₃ 99.9 % | | | | | | | | | |
| Nose cone | POM | | | | | | | | | |
| Miscellaneous | | | | | | | | | | |
| Cable protection | stainless steel pipe for probe in stainless steel: 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 | min. 650 g (without cable) | | | | | | | | | |
| CE-conformity | EMC Directive: 2004/108/EC | | | | | | | | | |
| Category of the environment | | | | | | | | | | |
| Lloyd's Register (LR) | EMV1, EMV2, EMV3, EMV4 | | | | number of certificate: 13/20056 | | | | | |
| Germanischer Lloyd (GL) | D, EMC 1 | | | | number of certificate: 19 777 - 11 HH | | | | | |
| Det Norske Veritas (DNV) | temperature: D | | humidity: B | | vibration: B | | number of certificate: A-12144 | | | |
| | electromagnetic compatibility: B | | | | | | | | | |

LMK 458H

Hydrostatic Probe

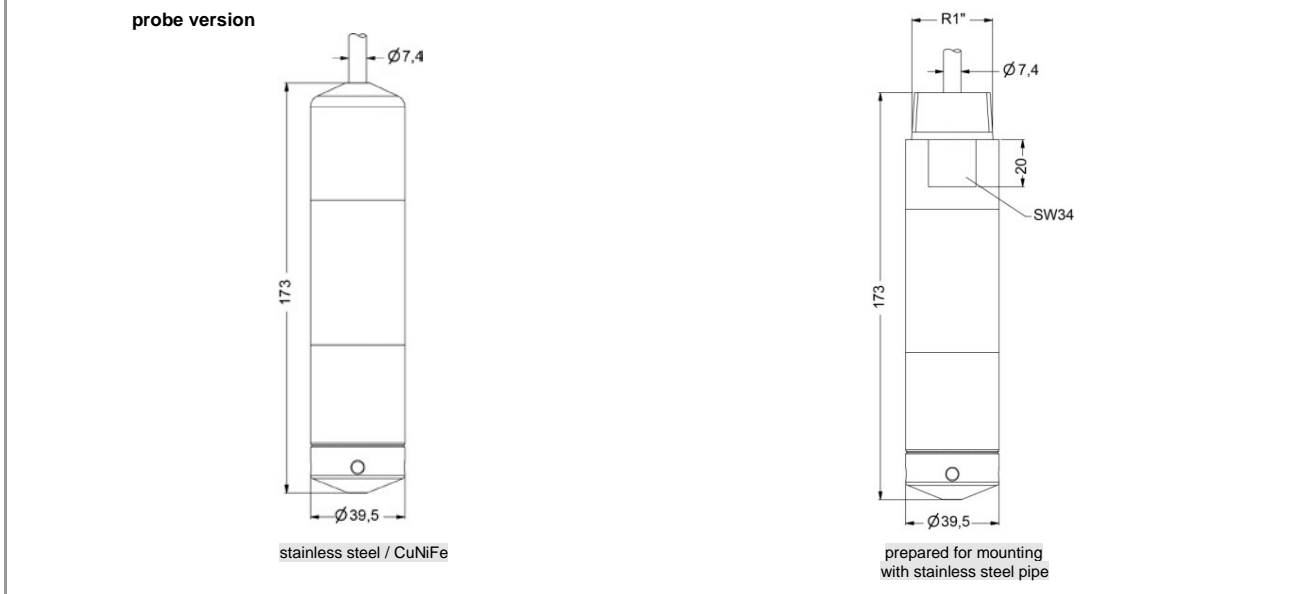
Technical Data

| IS-protection | |
|--|--|
| Approval DX15A-LMK 458H | IBExU 10 ATEX 1186 X zone 0 ⁵ : II 1G Ex ia IIB T4 zone 20: II 1D Ex iaD 20 T85°C |
| Safety technical maximum values | $U_i = 28 \text{ V}$, $I_i = 93 \text{ mA}$, $P_i = 660 \text{ mW}$, $C_i = 105 \text{ nF}$; $L_i = 5 \text{ } \mu\text{H}$; the supply connections have an inner capacity of max. 140 nF opposite the enclosure |
| Permissible temperatures for environment | in zone 0: $-20 \dots 60 \text{ }^\circ\text{C}$ with p_{atm} 0.8 bar up to 1.1 bar zone 1 and higher: $-25 \dots 70 \text{ }^\circ\text{C}$ |
| 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 $\mu\text{H}/\text{m}$ |

⁵ for optional stainless steel pipe the following designation is valid: "II 1G Ex ia IIC T4" (zone 0)

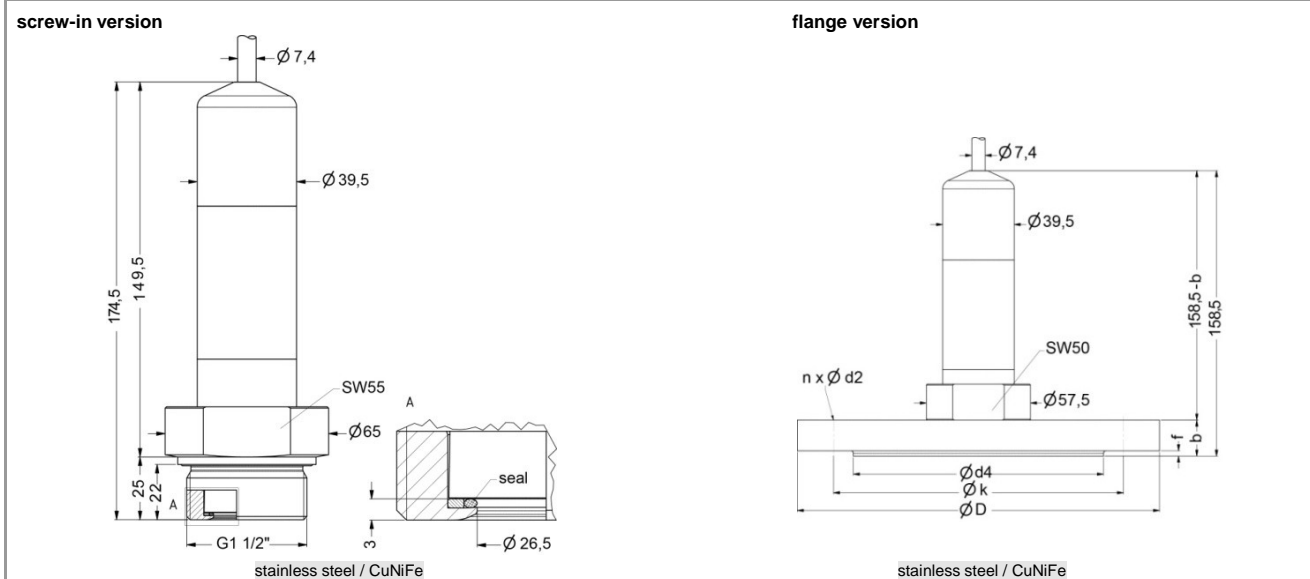
| Wiring diagrams | Pin configuration | |
|--------------------------------------|------------------------------------|---------------------------|
| <p>2-wire-system (current) HART®</p> | Electrical connection | cable colours (DIN 47100) |
| | Supply V_{S+} Supply V_{S-} | wh (white) bn (brown) |
| | Shield | ye/gn (yellow / green) |

Dimensions (in mm)



HART® is a registered trade mark of HART Communication Foundation;
Windows® is a registered trade mark of Microsoft Corporation

Dimensions (in mm)



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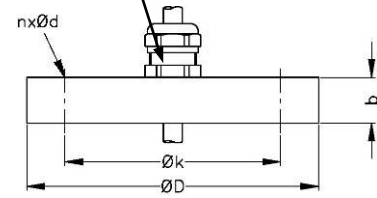
LMK 458H

Hydrostatic Probe

Accessories

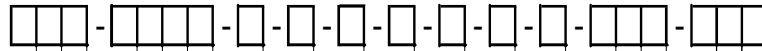
| Transmitter flange for flange version | | |
|---|---|----------------------|
| Technical data | | |
| Suitable for | LMK 382, LMK 382H, LMK 458, LMK 458H | |
| Flange material | stainless steel 1.4404 (316L) | |
| Hole pattern | according to DIN 2507 | |
| Version | Size (in mm) | Weight |
| DN25 / PN40 | D = 115, k = 85, d4 = 68, b = 18, f = 2, n = 4, d2 = 14 | 1.2 kg |
| DN50 / PN40 | D = 165, k = 125, d4 = 102, b = 20, f = 3, n = 4, d2 = 18 | 2.6 kg |
| DN80 / PN16 | D = 200, k = 160, d4 = 138, b = 20, f = 3, n = 8, d2 = 18 | 4.1 kg |
| Ordering type | | Ordering code |
| Transmitter flange DN25 / PN40 | | ZSF2540 |
| Transmitter flange DN50 / PN40 | | ZSF5040 |
| Transmitter flange DN80 / PN16 | | ZSF8016 |
| Mounting flange with cable gland | | |
| 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; plastic | |
| Seal insert | material: TPE (ingress protection IP 68) | |
| Hole pattern | according to DIN 2507 | |
| Version | Size (in mm) | Weight |
| DN25 / PN40 | D = 115, k = 85, b = 18, n = 4, d = 14 | 1.4 kg |
| DN50 / PN40 | D = 165, k = 125, b = 20, n = 4, d = 18 | 3.2 kg |
| DN80 / PN16 | D = 200, k = 160, b = 20, n = 8, d = 18 | 4.8 kg |
| Ordering type | | Ordering code |
| DN25 / PN40 with cable gland brass, nickel plated | | ZMF2540 |
| DN50 / PN40 with cable gland brass, nickel plated | | ZMF5040 |
| DN80 / PN16 with cable gland brass, nickel plated | | ZMF8016 |

cable gland M16x1.5 with seal insert (for cable- \varnothing 4 ... 11 mm)



Ordering code LMK 458H

LMK 458H



| | | | | | | | | | | |
|------------------------------|--|-------|---|---|---|---|--|--|---|---------|
| Pressure | | | | | | | | | | |
| | in bar, gauge | | 7 | 6 | E | | | | | |
| | in bar, sealed gauge ¹ | | 7 | 6 | G | | | | | consult |
| | in bar, absolute ¹ | | 7 | 6 | H | | | | | |
| | in mH ₂ O | | 7 | 6 | F | | | | | |
| Input | | | | | | | | | | |
| | [mH ₂ O] | [bar] | | | | | | | | |
| | 0.60 | 0.06 | 0 | 6 | 0 | 0 | | | | |
| | 1.60 | 0.16 | 1 | 6 | 0 | 0 | | | | |
| | 4.00 | 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 | |
| | Copper-Nickel-alloy (CuNi10Fe1Mn) | | | | | | | | K | |
| | customer | | | | | | | | 9 | consult |
| Design | | | | | | | | | | |
| | Submersible transmitter ² | | | | | | | | 1 | |
| | Flange transmitter ² | | | | | | | | 3 | |
| | Screw-in transmitter ² | | | | | | | | 5 | |
| 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 | | | | | | | | | | |
| | TPE-U-cable ³ | | | | | | | | 4 | |
| | customer | | | | | | | | 9 | |
| Accuracy | | | | | | | | | | |
| | 0.1 % ⁵ | | | | | | | | 1 | |
| | customer | | | | | | | | 9 | consult |
| Cable length | | | | | | | | | | |
| | in m | | | | | | | | 9 | 9 |
| Special version | | | | | | | | | | |
| | standard | | | | | | | | 0 | 0 |
| | prepared for mounting with st. steel pipe ^{2,4} | | | | | | | | 5 | 0 |
| | customer | | | | | | | | 9 | 9 |
| | | | | | | | | | | consult |

¹ nominal pressure ranges sealed gauge and absolute from 1 bar

² mounting accessories are not part of supply and have to be ordered separately

³ shielded cable with integrated air tube for atmospheric reference

⁴ stainless steel pipe is not part of the supply

⁵ only possible for P_N ≥ 1 bar

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