

LMK 382 LMK 382 H

Stainless Steel Submersible Transmitter with Ceramic Sensor

- ▶ Diameter: 39.5 mm
- ▶ hydrostatic level measurement in sewage water and contaminated media
- ▶ nominal pressure ranges from 0 ... 40 cmWC up to 0 ... 100 mWC (0 ... 40 mbar up to 0 ... 10 bar)

The submersible transmitter LMK 382 and LMK 382 H have been designed for continuous level measurement in sewage water and contaminated media.

On basis on a mechanically robust and highly over loadable capacitive ceramic sensor the transmitters are among others suited for the measurement of low filling heights with good long term stability. Usage in more viscous media such as slurries is possible – removing the protective cap makes the transmitter flush.

In addition to the several cable materials (PVC, PUR and FEP) the customer has the possibility to consider different versions of cable protection. The submersible transmitter is suited for explosive area (zone 0).

Preferred areas of use are:

- ▶ level monitoring in open tanks with low filling heights
- ▶ depth or level measurement in wells and open waters
- ▶ ground water level measurement
- ▶ sewage and water treatment plants
- ▶ chemical and pharmaceutical industries

- ▶ small thermal effect
- ▶ excellent linearity
- ▶ good long term stability
- ▶ **accuracy LMK 382:**
0.175 % / 0.125 % FSO BFSL
(0.35 % / 0.25 % FSO IEC 60770)
- ▶ **accuracy LMK 382 H:**
0.1 % FSO BFSL
(0.2 % FSO IEC 60770)
- ▶ **LMK 382 H:**
HART® communication
(configuration of offset, span and damping)
- ▶ **option Ex version**
(only for 4 ... 20 mA / 2-wire)
LMK 382: IBExU 05 ATEX 1070 X
LMK 382 H: FTZÜ 06 ATEX 0018 X
- ▶ optional:
 - cable protection
 - diaphragm in Al₂O₃ 99.9 %
 - customer versions on request

Characteristics

LMK 382 / 382 H
Stainless Steel Level Transmitter



| Input pressure range ¹ | | | | | | | | | | | | | |
|---|------|------|------|------|------|-----|-----|----|-----|-----|----|----|-----|
| LMK 382 | | | | | | | | | | | | | |
| Nominal pressure gauge [bar] | 0.04 | 0.06 | 0.1 | 0.16 | 0.25 | 0.4 | 0.6 | 1 | 1.6 | 2.5 | 4 | 6 | 10 |
| Level [mWC] | 0.4 | 0.6 | 1 | 1.6 | 2.5 | 4 | 6 | 10 | 16 | 25 | 40 | 60 | 100 |
| Permissible overpressure [bar] | 2 | 2 | 4 | 4 | 6 | 6 | 8 | 8 | 15 | 25 | 25 | 35 | 35 |
| LMK 382 H | | | | | | | | | | | | | |
| Nominal pressure gauge [bar] | 0.06 | | 0.16 | | 0.4 | | 1 | | 2 | | 5 | | 10 |
| Level [mWC] | 0.6 | | 1.6 | | 4 | | 10 | | 20 | | 50 | | 100 |
| Permissible overpressure [bar] | 2 | | 4 | | 6 | | 8 | | 15 | | 25 | | 35 |
| 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 | | |
|------------------------|---|--|
| LMK 382 | | |
| 2-wire | 4 ... 20 mA / $V_s = 9 \dots 36 V_{DC}$ | Ex-protection: $V_s = 12 \dots 28 V_{DC}$ |
| LMK 382 H | | |
| 2-wire | 4 ... 20 mA / $V_s = 12 \dots 36 V_{DC}$ with modulated HART [®] signal | Ex-protection: $V_s = 12 \dots 28 V_{DC}$ with modulated HART [®] signal |

| Performance | | |
|---------------------|--|--|
| LMK 382 | | |
| Accuracy | IEC 60770 ² standard: $\leq \pm 0.35 \% \text{ FSO}$ option: $\leq \pm 0.25 \% \text{ FSO}$ | BFSL standard: $\leq \pm 0.175 \% \text{ FSO}$ option: $\leq \pm 0.125 \% \text{ FSO}$ |
| Permissible load | $R_{\max} = [(V_s - V_{s \min}) / 0.02] \Omega$ | |
| Influence effects | supply: 0.05 % FSO / 10 V | load: 0.05 % FSO / k Ω |
| Long term stability | $\leq \pm 0.1 \% \text{ FSO} / \text{year}$ | |
| Response time | < 200 msec | |
| LMK 382 H | | |
| Accuracy | turn-down $\leq 1:3$ IEC 60770 ² : $\leq \pm 0.2 \% \text{ FSO}$ turn-down $> 1:3$ $\leq \pm [0.2 + 0.015 \times (\text{nominal range} / \text{adjusted range})] \% \text{ FSO}$ | BFSL: $\leq \pm 0.1 \% \text{ FSO}$ |
| Permissible load | $R_{\max} = [(V_s - V_{s \min}) / 0.02] \Omega$ | load during HART [®] communication: $R_{\min} = 250 \Omega$ |
| Influence effects | supply: 0.05 % FSO / 10 V | load: 0.05 % FSO / k Ω |
| Long term stability | $\leq \pm (0.1 \times \text{nominal range} / \text{adjusted range}) \% \text{ FSO} / \text{year}$ | |
| Response time | 200 ms – without consideration of electronic damping | measuring rate 5/s |
| Adjustability | configuration of following parameters possible (interface / software necessary ³): - electronic damping: 0 ... 100 s - offset: 0 ... 80 % FSO - turn down of span: max. 1:5 | |

| Thermal effects | |
|--|---|
| LMK 382 | |
| Thermal error for offset and span in compensated range | $\leq \pm 0.1 \% \text{ FSO} / 10 \text{ K}$ 0 ... 70 °C |
| LMK 382 H | |
| Tolerance band | $\leq \pm (0.1 \times \text{nominal range} / \text{adjusted range}) \% \text{ FSO}$ |
| TC, average in compensated range | $\pm (0.01 \times \text{nominal range} / \text{adjusted range}) \% \text{ FSO} / 10 \text{ K}$ 0 ... 70 °C |

| Permissible temperatures | |
|--------------------------|--|
| Medium | -10 ... 70 °C Ex-protection: application in zone 0: -10 ... 60 °C application in zone 1 or higher: -10 ... 70 °C |
| Storage | -25 ... 70 °C |

¹ version with Al₂O₃ 99.9% possible for pressure ranges from 0.1 bar up to 1 bar

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)

LMK 382 / 382H

Stainless Steel Level Transmitter

Technical Data

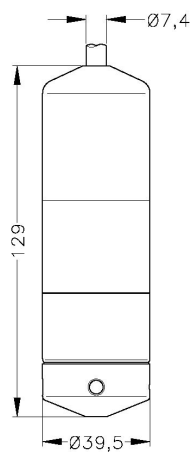
Electrical protection ⁴

| | |
|---|--|
| Reverse polarity protection | no damage, but also no function |
| Electromagnetic compatibility | emission and immunity according to EN 61326 |
| Option Ex-protection only with 4 ... 20 mA / 2-wire | LMK 382 (IBExU05 ATEX 1070 X) LMK 382 H (FTZÚ 06 ATEX 0018 X) |
| DX14-LMK 382 | Zone 0 ^{5,6} : II 1 G EEx ia IIB T4 |
| DX15-LMK 382 H | safety technical maximum values: $U_i = 28 \text{ V}$, $I_i = 93 \text{ mA}$, $P_i = 660 \text{ mW}$, $C_i = 27 \text{ nF}$, $L_i = 5 \text{ }\mu\text{H}$ |

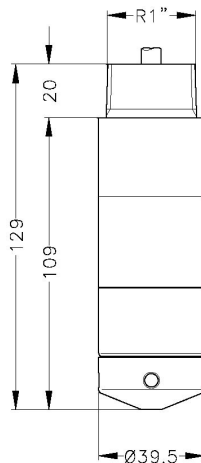
Electrical connection

| | |
|---|------------------------------------|
| Cable with sheath material ⁷ | PVC grey PUR black FEP black |
|---|------------------------------------|

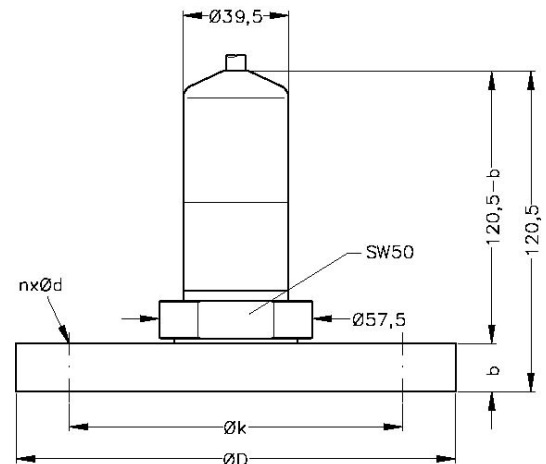
Dimensions



LMK 382
Standard



LMK 382 with thread R1"
for stainless steel pipe



LMK 382
Flange version

⇒ Total length of LMK 382 H increases by 71 mm.

| Dimensions | DN25 / PN40 | DN50 / PN16 | DN80 / PN16 |
|------------|----------------|----------------|----------------|
| D | 115 | 165 | 200 |
| b | 18 | 18 | 20 |
| k | 85 | 125 | 160 |
| n | 4 | 4 | 8 |
| d | 14 | 18 | 18 |

⁴ additional external overvoltage protection unit in terminal box KL 1 or KL 2 with atmospheric pressure reference available as accessory

⁵ approved for atmospheric pressure from 0.8 bar up to 1.1 bar

⁶ for option stainless steel pipe following designation is valid: "II 1 G EEx ia IIC T4" (zone 0)

⁷ cable with integrated air tube for atmospheric pressure reference

Materials

| | |
|--------------|--|
| Housing | stainless steel 1.4571 (316Ti) |
| Seals | FKM / EPDM / others on request |
| Diaphragm | Standard: ceramics Al_2O_3 96 % Option: ceramics Al_2O_3 99.9 % (possible for pressure ranges from 0.1 bar up to 1 bar) |
| Cable sheath | PVC / PUR / FEP |

Miscellaneous

| | |
|--------------------------------|--|
| 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 μ H/m |
| Current consumption | max. 21 mA |
| Weight | approx. 400 g (without cable) |
| Ingress protection | IP 68 |

Mounting accessories (not included in delivery)

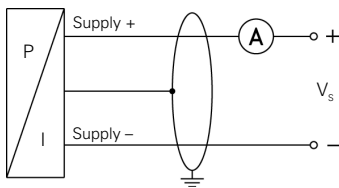
| |
|---|
| Transmitter flange , stainless steel 1.4571 (316Ti): DN25 / PN40 (\varnothing 115, 18 thick, 4 drill holes \varnothing 14 at \varnothing 85) DN50 / PN16 (\varnothing 165, 18 thick, 4 drill holes \varnothing 18 at \varnothing 125) DN80 / PN16 (\varnothing 200, 20 thick, 8 drill holes \varnothing 18 at \varnothing 160) |
| Mounting flange for transmitter fixing, stainless steel 1.4571 (316Ti): DN25 / PN40 (\varnothing 115, 18 thick, 4 drill holes \varnothing 14 at \varnothing 85) DN50 / PN16 (\varnothing 165, 18 thick, 4 drill holes \varnothing 18 at \varnothing 125) DN80 / PN16 (\varnothing 200, 20 thick, 8 drill holes \varnothing 18 at \varnothing 160) |
| Screw fitting, stainless steel 1.4571 (316 Ti) |
| Terminal clamp, stainless steel 1.4301 (304) or steel, zinc plated |

Pin configuration

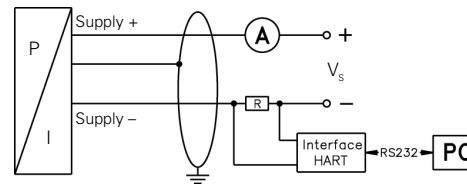
| | |
|-----------------------|--|
| Electrical connection | cable colours (DIN 47100) |
| 2-wire-system | Supply + white Supply - brown Ground yellow / green (shield) |

Wiring diagram

2-wire-system (current)



2-wire-system (current) HART®



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Ordering code LMK 382H

LMK 382H



| | | | | | | | | | | | | | | | | | | | |
|------------------------------|--|-------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|--|
| Pressure | | | | | | | | | | | | | | | | | | | |
| | in bar | 5 | 6 | 5 | | | | | | | | | | | | | | | |
| | in mWC | 5 | 6 | 6 | | | | | | | | | | | | | | | |
| Input | [mWC] | [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 | | | | | | | | | | | |
| | customer | | | | 9 | 9 | 9 | | | | | | | | | | | | |
| Housing | | | | | | | | | | | | | | | | | | | |
| | Stainless steel 1.4571 (316Ti) | | | | | | | | 1 | | | | | | | | | | |
| | customer | | | | | | | | 9 | | | | | | | | | | |
| Diaphragm | | | | | | | | | | | | | | | | | | | |
| | Ceramics Al ₂ O ₃ 96% | | | | | | | | | 2 | | | | | | | | | |
| | Ceramics Al ₂ O ₃ 99,9% ¹ | | | | | | | | | C | | | | | | | | | |
| | customer | | | | | | | | | 9 | | | | | | | | | |
| Output | | | | | | | | | | | | | | | | | | | |
| | HART [®] -communication | | | | | | | | | | H | | | | | | | | |
| | 4 ... 20 mA / 2-wire | | | | | | | | | | | | | | | | | | |
| | HART [®] -communication | | | | | | | | | | I | | | | | | | | |
| | Intrinsic safety 4 ... 20 mA / 2-wire | | | | | | | | | | | | | | | | | | |
| | customer | | | | | | | | | | 9 | | | | | | | | |
| Seals | | | | | | | | | | | | | | | | | | | |
| | FKM | | | | | | | | | | 1 | | | | | | | | |
| | EPDM | | | | | | | | | | 3 | | | | | | | | |
| | customer | | | | | | | | | | 9 | | | | | | | | |
| Electrical connection | | | | | | | | | | | | | | | | | | | |
| | PVC-cable ² | | | | | | | | | | | 1 | | | | | | | |
| | PUR-cable ² | | | | | | | | | | | 2 | | | | | | | |
| | FEP-cable ² | | | | | | | | | | | 3 | | | | | | | |
| | customer | | | | | | | | | | | 9 | | | | | | | |
| Accuracy | | | | | | | | | | | | | | | | | | | |
| | 0,2 % | | | | | | | | | | | | B | | | | | | |
| | customer | | | | | | | | | | | | 9 | | | | | | |
| Cable length | | | | | | | | | | | | | | | | | | | |
| | in m | | | | | | | | | | | | | 9 | 9 | 9 | | | |
| Special version | | | | | | | | | | | | | | | | | | | |
| | standard | | | | | | | | | | | | | | 0 | 0 | 0 | | |
| | prepared for mounting with st. steel pipe ³ | | | | | | | | | | | | | | 5 | 0 | 2 | | |
| | flange version | | | | | | | | | | | | | | 5 | 1 | 0 | | |
| | customer | | | | | | | | | | | | | | 9 | 9 | 9 | | |

¹ ceramics Al₂O₃ 99.9% only possible with pressure ranges from 0,16 bar up to 1 bar
² cable with integrated air tube for atmospheric pressure reference
³ stainless steel pipe is not part of the supply

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