

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 cmH₂O up to 0 ... 100 mH₂O (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 [mH ₂ O]	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 [mH ₂ O]	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 ... 36 V _{DC}	Ex-protection: V _s = 12 ... 28 V _{DC}
LMK 382 H		
2-wire	4 ... 20 mA / V _s = 12 ... 36 V _{DC} with modulated HART [®] signal	Ex-protection: V _s = 12 ... 28 V _{DC} with modulated HART [®] signal

Performance

LMK 382		
Accuracy	IEC 60770 ² standard: ≤ ± 0.35 % FSO option: ≤ ± 0.25 % FSO	BFSL standard: ≤ ± 0.175 % FSO option: ≤ ± 0.125 % FSO
Permissible load	R _{max} = [(V _s - V _{s min}) / 0.02] Ω	
Influence effects	supply: 0.05 % FSO / 10 V	load: 0.05 % FSO / kΩ
Long term stability	≤ ± 0.1 % FSO / year	
Response time	< 200 msec	
LMK 382 H		
Accuracy	turn-down ≤ 1:3 IEC 60770 ² : ≤ ± 0.2 % FSO turn-down > 1:3 ≤ ± [0.2 + 0.015 x turn-down] % FSO with turn-down = nominal pressure range / adjusted range	BFSL: ≤ ± 0.1 % FSO
Permissible load	R _{max} = [(V _s - V _{s min}) / 0.02] Ω	load during HART [®] communication: R _{min} = 250 Ω
Influence effects	supply: 0.05 % FSO / 10 V	load: 0.05 % FSO / kΩ
Long term stability	≤ ± (0.1 x turn-down) % FSO / 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	≤ ± 0.1 % FSO / 10 K 0 ... 70 °C
LMK 382 H	
Tolerance band	≤ ± (0.1 x turn-down) % FSO
TC, average in compensated range	± (0.01 x turn-down) % FSO / 10 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)

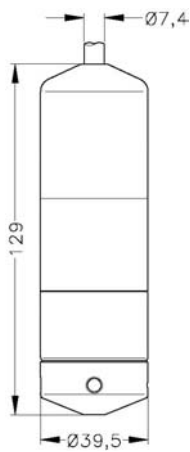
Electrical protection ⁴

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 DX14-LMK 382 DX15-LMK 382 H	LMK 382 (IBExU05 ATEX 1070 X) LMK 382 H (FTZÚ 06 ATEX 0018 X) Zone 0 ^{5,6} : II 1 G EEx ia IIB T4 safety technical maximum values: $U_i = 28 \text{ V}$, $I_i = 93 \text{ mA}$, $P_i = 660 \text{ mW}$, $C_i = 27 \text{ nF}$, $L_i = 5 \text{ }\mu\text{H}$

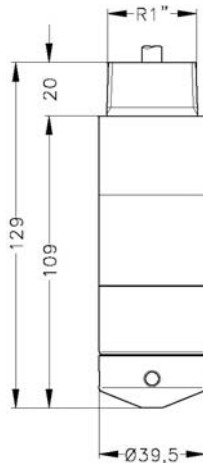
Electrical connection

Cable with sheath material ⁷	PVC grey PUR black FEP black
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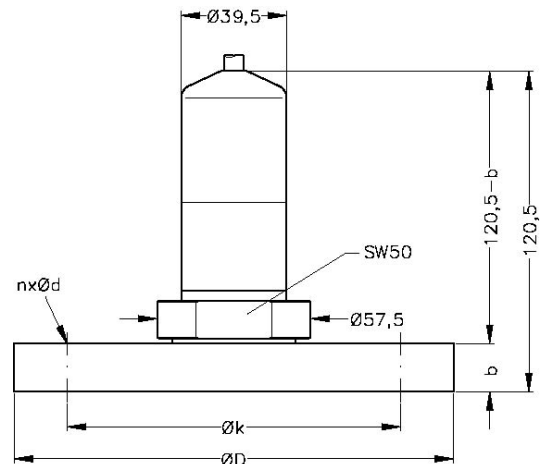
Dimensions (in mm)



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 ₂ O ₃ 96 % Option: ceramics Al ₂ O 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 µH/m
Current consumption	max. 21 mA
Weight	approx. 400 g (without cable)
Ingress protection	IP 68

Mounting accessories (not included in delivery)

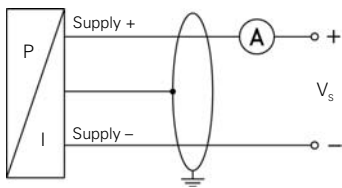
Transmitter flange , stainless steel 1.4571 (316Ti): DN25 / PN40 (Ø115, 18 thick, 4 drill holes Ø14 at Ø85) DN50 / PN16 (Ø165, 18 thick, 4 drill holes Ø18 at Ø125) DN80 / PN16 (Ø200, 20 thick, 8 drill holes Ø18 at Ø160)
Mounting flange for transmitter fixing, stainless steel 1.4571 (316Ti): DN25 / PN40 (Ø115, 18 thick, 4 drill holes Ø14 at Ø85) DN50 / PN16 (Ø165, 18 thick, 4 drill holes Ø18 at Ø125) DN80 / PN16 (Ø200, 20 thick, 8 drill holes Ø18 at Ø160)
Screw fitting, stainless steel 1.4571 (316 Ti)
Terminal clamp, stainless steel 1.4301 (304) or steel, zinc plated

Pin configuration

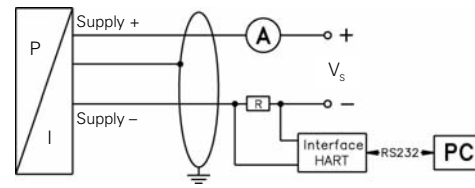
Electrical connection	cable colours (DIN 47100)
2-wire-system	Supply + white Supply - brown Ground yellow / green (shield)

Wiring diagram

2-wire-system (current)



2-wire-system (current) HART®

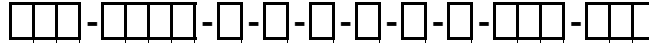


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Ordering code LMK 382

LMK 382



Pressure																				
	in bar	5	6	5																
	in mH ₂ O	5	6	6																
Input																				
	[mH ₂ O]																			
	[bar]																			
	0,40	0,04			0	4	0	0												
	0,60	0,06			0	6	0	0												
	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												on request
Housing																				
	Stainless steel 1.4571 (316Ti)							1												
	customer							9												on request
Diaphragm																				
	Ceramics Al ₂ O ₃ 96%							2												
	Ceramics Al ₂ O ₃ 99,9% ¹							C												
	customer							9												on request
Output																				
	4 ... 20 mA / 2-wire							1												
	Intrinsic safety 4 ... 20 mA / 2-wire							E												
	customer							9												on request
Seals																				
	FKM							1												
	EPDM							3												
	customer							9												on request
Electrical connection																				
	PVC-cable ²							1												
	PUR-cable ²							2												
	FEP-cable ²							3												
	customer							9												on request
Accuracy																				
	standard	0,35 %						3												
	option	0,25 %						2												
	customer							9												on request
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						on request

¹ diaphragm Al₂O₃ 99,9% possible for pressure ranges from 0.1 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