

# IMPRESS

## SENSORS & SYSTEMS

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Pressure - Temperature - Level - Flow - Analytical - Control - Indication - Data logging



The submersible transmitters LMK 358 and LMK 358 H have been designed for continuous level measurement. Basic element is a capacitive ceramic sensor. Use in more viscous media such as slurries is possible - removing the protective cap makes the transmitter flush.

On basis on a mechanically robust and highly overloadable capacitive ceramic sensor the transmitters are among others suited for the measurement of low filling heights with good long term stability. In order to facilitate stock-keeping and maintenance the transmitter head is plugged to the cable assembly with a connector and can be changed easily. On type LMK 358 H thermal errors and non-linearity of the sensor are actively compensated by the microprocessor electronics. Then a D/A converter creates the standard output signal 4 ... 20 mA which is overlaid with a signal according to HART® protocol. Thus measurement specific parameters (offset, span, and damping) can be adjusted individually. The submersible transmitters LMK 358 and LMK 358 H are 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

## LMK 358 LMK 358 H

### Separable Stainless Steel Submersible Transmitter with Ceramic Sensor

- ▶ Diameter: 39.5 mm
- ▶ H-version: HART® communication
- ▶ nominal pressure ranges from 0 ... 40 cmWC up to 0 ... 100 mWC (0 ... 40 mbar up to 0 ... 10 bar)

Characteristics	<ul style="list-style-type: none"><li>▶ good long term stability</li><li>▶ <b>accuracy LMK 358:</b> 0.175% / 0.125% FSO BFSL (0.35% / 0.25% FSO IEC 60770)</li><li>▶ <b>accuracy LMK 358 H:</b> 0.1% FSO BFSL (0.2% FSO IEC 60770)</li><li>▶ <b>LMK 358 H:</b> <b>HART® communication</b> (adjustment of offset, span, and damping)</li><li>▶ <b>option Ex version</b> (only for 4 ... 20 mA / 2-wire) <b>LMK 358: IBE<sub>x</sub>U 05 ATEX 1070 X</b> <b>LMK 358 H: FTZ<sub>U</sub> 06 ATEX 0018 X</b></li><li>▶ optional:<ul style="list-style-type: none"><li>- cable protection with corrugated pipe</li><li>- diaphragm in Al<sub>2</sub>O<sub>3</sub> 99.9 %</li><li>- customer versions on request</li></ul></li></ul>	LMK 358 / 358 H Stainless Steel Level Transmitter
	  	

Visit the website: [www.impress-sensors.co.uk](http://www.impress-sensors.co.uk)

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# LMK 358 / 358 H

Stainless Steel Level Transmitter

Technical Data

Input pressure range <sup>1</sup>													
<b>LMK 358</b>													
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
<b>LMK 358 H</b>													
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		
<b>LMK 358</b>		
2-wire	4 ... 20 mA / $V_s = 9 \dots 36 V_{DC}$	Ex-protection: $V_s = 12 \dots 28 V_{DC}$
<b>LMK 358 H</b>		
2-wire	4 ... 20 mA / $V_s = 12 \dots 36 V_{DC}$ with modulated HART <sup>®</sup> signal	Ex-protection: $V_s = 12 \dots 28 V_{DC}$ with modulated HART <sup>®</sup> signal

Performance		
<b>LMK 358</b>		
Accuracy	IEC 60770 <sup>2</sup> 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	$R_{max} = [(V_s - V_{smin}) / 0.02] \Omega$	
Influence effects	supply: 0.05 % FSO / 10 V	load: 0.05 % FSO / k $\Omega$
Long term stability	$\leq \pm 0.1 \% \text{ FSO} / \text{year}$	
Response time	200 ms	measuring rate 5/s
<b>LMK 358 H</b>		
Accuracy	IEC 60770 <sup>2</sup> : $\leq \pm 0.2 \% \text{ FSO}$ relating to nominal range BFSL: $\leq \pm 0.1 \% \text{ FSO}$ relating to nominal range	
Permissible load	$R_{max} = [(V_s - V_{smin}) / 0.02] \Omega$	load during HART <sup>®</sup> communication: $R_{min} = 250 \Omega$
Influence effects	supply: 0.05 % FSO / 10 V	load: 0.05 % FSO / k $\Omega$
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 <sup>3</sup> ): - electronic damping: 0 ... 100 s - offset: 0 ... 67 % FSO - turn down of span: max. 1:3	

Thermal effects	
<b>LMK 358</b>	
Thermal error for offset and span in compensated range	$\leq \pm 0.1 \% \text{ FSO} / 10 \text{ K}$ 0 ... 70 °C
<b>LMK 358 H</b>	
Tolerance band	$\leq \pm (0.2 \times \text{nominal range} / \text{adjusted range}) \% \text{ FSO}$
TC, average in compensated range	$\pm (0.02 \times \text{nominal range} / \text{adjusted range}) \% \text{ FSO} / 10 \text{ K}$ 0 ... 70 °C

<sup>1</sup> version with Al<sub>2</sub>O<sub>3</sub> 99.9% possible for pressure ranges from 0.1 bar up to 1 bar

<sup>2</sup> accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability)

<sup>3</sup> software, interface, and cable have to be ordered separately (software appropriate for Windows<sup>®</sup> 95, 98, 2000, NT Version 4.0 or higher, and XP)

# LMK 358 / 358 H

Stainless Steel Level Transmitter

Technical Data

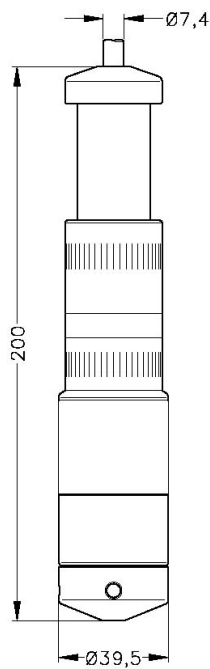
## Electrical protection <sup>4</sup>

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 358 DX15-LMK 358 H	LMK 358 (IBExU05 ATEX 1070 X) LMK 358 H (FTZÜ 06 ATEX 0018 X) Zone 0 <sup>5,6</sup> : II 1 G EEx ia IIB T4 safety technical maximum values: $U_i = 28 \text{ V}$ , $I_i = 93 \text{ mA}$ , $P_i = 660 \text{ mW}$ , $C_i = 27 \text{ nF}$ , $L_i = 5 \text{ } \mu\text{H}$

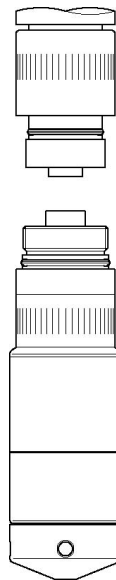
## Permissible temperatures

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	

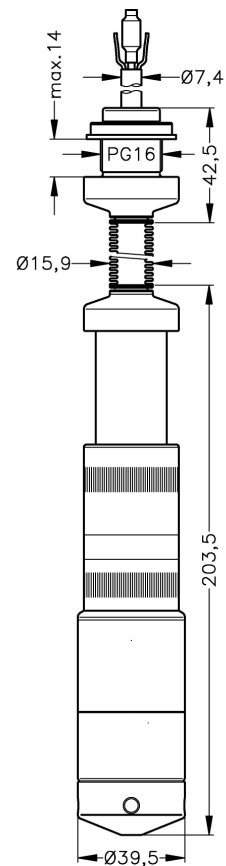
## Dimensions



LMK 358



Transmitter head and cable assembly separable



optionally with corrugated pipe

⇒ Total length of LMK 358 H increases by 71 mm.

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

<sup>5</sup> approved for atmospheric pressure from 0.8 bar up to 1.1 bar

<sup>6</sup> for option corrugated pipe following designation is valid: "II 1 G EEx ia IIC T4" (zone 0)

# LMK 358 / 358 H

Stainless Steel Level Transmitter

Technical Data

## Electrical connection

Cable with sheath material <sup>7</sup>	PVC grey PUR black FEP black
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## Materials

Housing	stainless steel 1.4571 (316Ti)
Seals	FKM, EPDM; others on request
Diaphragm	Standard: ceramics Al <sub>2</sub> O <sub>3</sub> 96 % Option: ceramics Al <sub>2</sub> O <sub>3</sub> 99.9 % (possible for pressure ranges from 0.1 bar up to 1 bar)
Cable sheath	PVC / PUR / FEP

## Miscellaneous

Cable capacitance	signal line/shield: 150 pF/m	signal line/signal line: 100 pF/m
Cable inductance	signal line/shield: 1.0 µH/m	signal line/signal line: 1.0 µH/m
Current consumption	max. 21 mA	
Weight	approx. 650 g (without cable)	
Ingress protection	IP 68	

## Mounting accessories (not part of delivery)

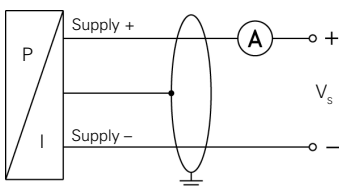
Screw fitting made of stainless steel 1.4571 (316Ti)  
 Mounting flange for transmitter fixing made of stainless steel 1.4571 (316Ti):  
 DN25 / PN40 (Ø115, 18 thick, 4 drill holes Ø14 at Ø85)  
 DN50 / PN16 (Ø165, 18 thick, 4 drill holes Ø18 at Ø125)  
 DN80 / PN16 (Ø200, 20 thick, 8 drill holes Ø18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

## Pin configuration

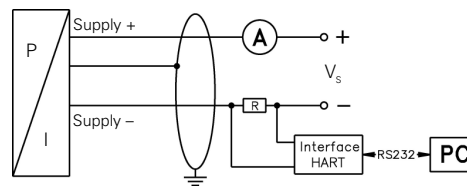
Electrical connection		Binder Series 723 <sup>8</sup> (5-pin)	cable colours (DIN 47100)
2-wire- system	Supply +	3	white
	Supply -	1	brown
	Ground	5	yellow / green (shield)

## Wiring diagrams

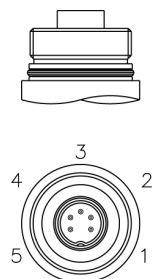
2-wire-system (current)



2-wire-system (current) HART<sup>®</sup>



connector <sup>8</sup>



<sup>7</sup> cable with integrated air tube for atmospheric pressure reference

<sup>8</sup> in separated version

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Windows<sup>®</sup> is a registered trade mark of Microsoft Corporation