LMK 458

Probe For Marine And Offshore

Ceramic Sensor

accuracy according to IEC 60770:
standard: 0.25 % FSO
option: 0.1 % FSO

Nominal pressure

from 0 ... 40 cmH_2O up to 0 ... 200 mH_2O

Output signals

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

Special characteristics

- diameter 39.5 mm
- permissible temperatures up to 125 °C
- high overpressure resistance
- high long-term stability

Optional versions

- diaphragm Al_2O_3 99.9 %
- different housing materials (stainless steel, CuNiFe)
- IS-version zone 0
- screw-in and flange version
- accessories e.g. assembling and probe flange, mounting clamp

The hydrostatic probe LMK 458 has been developed for measuring level in service and storage tanks and is as a consequence of the certification by Germanischer Lloyd predestined for shipbuilding and offshore applications.

A permissible operating temperature of up to 125 °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 458 is a capacitive ceramic sensor element designed by BD|SENSORS, which offers a high overload resistance and medium compatibility.

Preferred areas of use are

Water
drinking water abstraction
desalinization plant

Shipbuilding / Offshore
ballast tanks
monitoring of a ship´s position and draught
level measurement in ballast and storage tanks

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Pressure ranges																
Nominal pressure [1]	[bar]	0.04	0.06	0.1	0.16	0.25	0.4	0.6	1	1.6	2.5	4	6	10	16	20
Level	[mH_2O]	0.4	0.6	1	1.6	2.5	4	6	10	16	25	40	60	100	160	200
Overpressure	[bar]	2	2	4	4	6	6	8	8	15	25	25	35	35	45	45
Permissible vacuum	[bar]	-0.2		-0.3		-0.5				-1						
[1] available in gauge, sealed gauge and absolute; nominal pressure ranges sealed gauge and absolute from 1 bar																

Output signal / Supply	
Standard	2-wire: 4 ... 20 mA / V_S = 9 ... 32 V_{DC} $V_{S\ rated}$ = 24 V_{DC}
Option IS-version	2-wire: 4 ... 20 mA / V_S = 14 ... 28 V_{DC} $V_{S\ rated}$ = 24 V_{DC}

Performance		
Accuracy [2]	standard: ≤ ± 0.25 % FSO	option: for P_N ≥ 0.6 bar [3]: ≤ ± 0.1 % FSO
Permissible load	R_{max} = [(V_S – $V_{S\ min}$) / 0.02 A] Ω	
Long term stability	≤ ± 0.1 % FSO / year	
Influence effects	supply: 0.05 % FSO / 10 V	permissible load: 0.05 % FSO / kΩ
Turn-on time	700 msec	
Mean response time	< 200 msec	mean measuring rate 5/sec
Max. response time	380 msec	
[2] accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability)		
[3] Under the influence of disturbance burst according to EN 61000-4-4 (2004) +2 kV accuracy decreased to ≤ ± 0.25 % FSO.		

Thermal effects / Permissible temperatures	
Thermal error	≤ ± 0.1 % FSO / 10 K in compensated range -20 … 80 °C
Permissible temperatures	medium / electronics / environment: -25 ... 125 °C (depending on cable sheath / seal) storage: -40 ... 125 °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 outlet	shielded cable with integrated air tube for atmospheric reference (for nominal pressure ranges sealed gauge and absolute, the air tube is plugged)

Materials	
Housing	standard: stainless steel 1.4404 (316L) option: CuNi10Fe1Mn (resistant against sea water) others on request
Seals (media wetted)	standard: FKM options: EPDM, FFKM (min. permissible temperature from -15 °C) others on request
Diaphragm	standard: ceramics Al_2O_3 96 % option: ceramics Al_2O_3 99.9 %
Cable sheath	standard: TPE (-25 ... 125 °C) dark blue (resistant against sea water, halogen free) option: FEP (-25 ... 70 °C) black (resistant against sea water) PUR (-25 ... 70 °C) black others on request

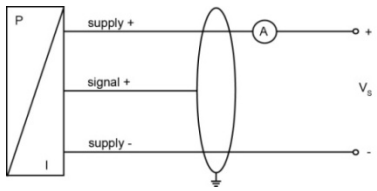
Miscellaneous	
Optionally cable protection	stainless steel pipe for probe in stainless steel: available as compact product (standard: stainless steel pipe with a total length up to 2 m possible; other lengths on request)
Ingress protection	IP 68
Current consumption	max. 21 mA
Weight	min. 650 g (without cable)
CE-conformity	EMC Directive: 2004/108/EC

Option Pt 100 temperature element [5]	
Temperature range	-25 ... 125 °C
Connection temperature element	3-wire
Resistance	100 Ω at 0 °C
Temperature coefficient	3850 ppm/K
Supply I_S	0.3 ... 1.0 mA $_{DC}$

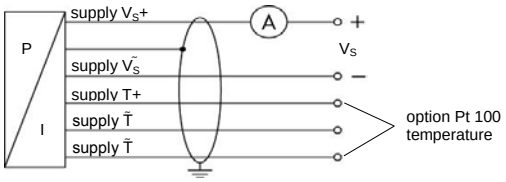
IS-protection	
Approval DX14A-LMK 458	zone 0: II 1G Ex ia IIB T4
Safety technical maximum values	U_i = 28 V, I_i = 93 mA, P_i = 660 mW, C_i = 105 nF; L_i = 5 µH; the supply connections have an inner capacity of max. 140 nF opposite the enclosure
Permissible temperatures for environment	in zone 0 [6]: -20 ... 60 °C with p_{atm} 0.8 bar up to 1.1 bar zone 1 and higher: -25 ... 70 °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 µH/m
[5] only for 4...20mA, cable lenght max. 5m	
[6] for optional stainless steel pipe the following designation is valid: "II 1 G Ex ia IIC T4" (zone 0)	

Wiring diagrams

2-wire-system (current)



2-wire-system (current) with Pt 100

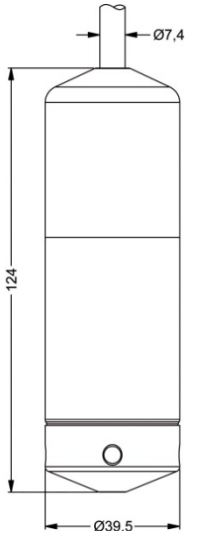


Pin configuration

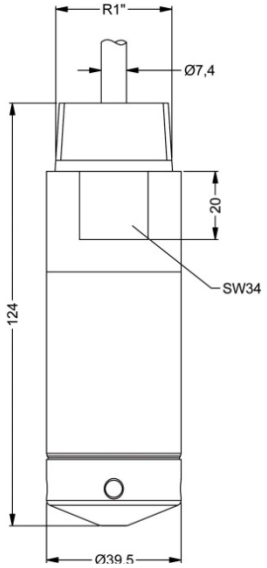
Electrical connection	cable colours (DIN 47100)
Supply V_S+	wh (white)
Supply V_S–	bn (brown)
Option Pt 100 temperature element:	
Supply T+ (with Pt 100)	ye (yellow)
Supply T– (with Pt 100)	gy (grey)
Supply T– (with Pt 100)	pk (pink)
Shield	gn/ye (green / yellow)

Dimensions (in mm)

probe versions

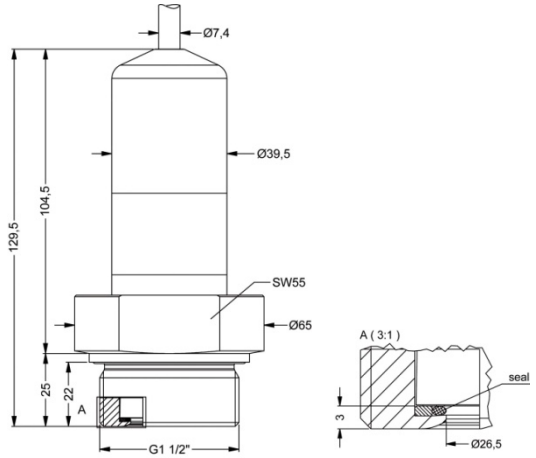


stainless steel / CuNiFe



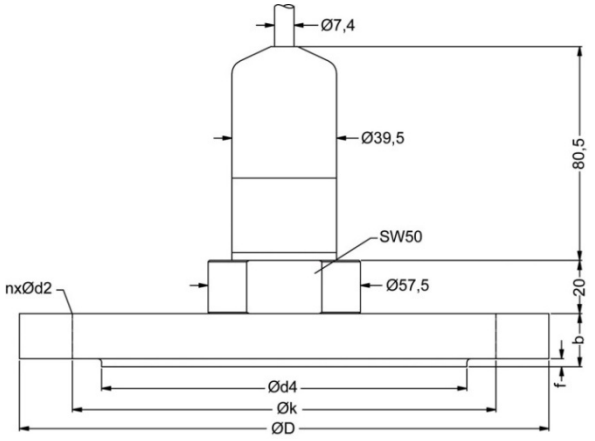
prepared for mounting
with stainless steel pipe
stainless steel / CuNiFe

screw-in version



stainless steel / CuNiFe

flange version

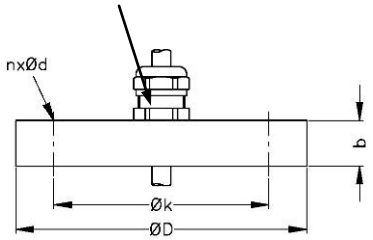


stainless steel / CuNiFe

Probe flange for flange version	
Technical Data	
Suitable for	LMK 382, LMK 382H, LMK 458
Flange material	stainless steel 1.4404 (316L)
Hole pattern	according to DIN 2507
Version	**Size (in mm)**
DN25 / PN40	D = 115, k = 85, d4 = 68, b = 18, f = 2, n = 4, d2 = 14
DN50 / PN40	D = 165, k = 125, d4 = 102, b = 20, f = 3, n = 4, d2 = 18
DN80 / PN16	D = 200, k = 160, d4 = 138, b = 20, f = 3, n = 8, d2 = 18
Ordering type	
Probe flange DN25 / PN40	ZSF2540
Probe flange DN50 / PN40	ZSF5040
Probe flange DN80 / PN16	ZSF8016

Assembling 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 (303); plastic
Seal insert	material: TPE (ingress protection IP 68)
Hole pattern	according to DIN 2507
Version	**Size (in mm)**
DN25 / PN40	D = 115, k = 85, b = 18, n = 4, d = 14
DN50 / PN40	D = 165, k = 125, b = 20, n = 4, d = 18
DN80 / PN16	D = 200, k = 160, b = 20, n = 8, d = 18
Ordering type	
Assembling Flange DN25 / PN40	ZMF2540
Assembling Flange DN50 / PN40	ZMF5040
Assembling Flange DN80 / PN16	ZMF8016

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



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Ordering code LMK 458

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	[mH2O]	[bar]	Code	
Pressure				
in bar, gauge			7 6 5	
in bar, absolute [1]			7 6 8	
in bar, sealed gauge			7 6 7	consult
in mH_2O			7 6 6	
Input	**[mH_2O]**	**[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	
	160	16	1 6 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				
Probe			1	
Flange version [2]			3	
Screw-in version			5	
Diaphragm				
Ceramics Al_2O_3 96%			2	
Ceramics Al_2O_3 99.9%			C	
customer			9	consult
Output				
4 … 20 mA / 2-wire			1	
Intrinsic safety 4 … 20 mA / 2-wire			E	
customer			9	consult
Seals				
FKM			1	
EPDM			3	
FFKM [3]			7	
customer			9	consult
Electrical connection				
PUR-cable			2	
FEP-cable			3	
TPE-cable			4	
customer			9	consult
Accuracy				
standard		0.25 %	2	
option für P_N ≥0.6 bar:		0.1 %	1	
customer			9	consult
Cable length				
in m			9 9 9	
Special version				
standard			0 0 0	
with temperature sensor Pt 100			0 1 3	
prepared for mounting with st. steel pipe [4]			5 0 2	
customer			9 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] min. permissible temperature from -15°C
[4] stainless steel pipe is not part of the supply

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