SensorsONE
Measurement Instrumentation Products

LMK 331

Screw-In Transmitter

Ceramic Sensor

accuracy according to IEC 60770:
0.5 % FSO

Nominal pressure

from 0 ... 400 mbar up to 0 ... 60 bar

Output signals

2-wire: 4 ... 20 mA
3-wire: 0 … 20 mA / 0 … 10 V
others on request

Special characteristics

- pressure port G 3/4" flush
  for pasty and impurity media
- pressure port PVDF
  for aggressive media

Optional versions

- IS-version
  (only for 4 … 20mA / 2-wire):
  Ex ia = intrinsically safe for
  gases and dusts
- SIL 2 application according to
  IEC 61508 / IEC 61511
- customer specific versions

The screw-in transmitter LMK 331 has been especially designed for level and process measurement and is suitable for pressure measurement of liquids, oils and gases. Usage in more viscous or polluted media is possible because of the semi-flush pressure sensor.

For the usage in aggressive media we recommended the version with PVDF pressure port. Additional features like e.g. an intrinsically safe version or a functionally safe version (SIL 2) complete the range of possibilities.

Preferred areas of use are

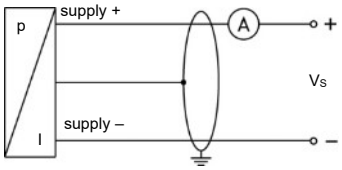
- Plant and machine engineering
- Energy industry
- Environmental engineering
  (water – sewage – recycling)
- Medical technology

Input pressure range													
Nominal pressure gauge	[bar]	0.4	0.6	1	1.6	2.5	4	6	10	16	25	40 [1]	60 [1]
Level	[mH_2O]	4	6	10	16	25	40	60	100	160	250	400	600
Overpressure	[bar]	1	2	2	4	4	10	20	20	40	40	100	200
Burst pressure	[bar]	2	4	4	5	7,5	12	25	30	50	50	120	250
Vacuum resistance	[bar]	$p_N \geq 1$ bar: unlimited vacuum resistance $p_N < 1$ bar: on request											
[1] only possible with stainless steel pressure port													

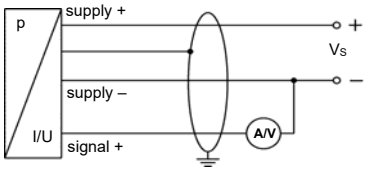
Output signal / Supply		
Standard	2-wire: 4 ... 20 mA / V_S = 8 ... 32 V_{DC}	SIL-version: V_S = 14 … 28 V_{DC}
Option IS-version [2]	2-wire: 4 ... 20 mA / V_S = 10 ... 28 V_{DC}	SIL-version: V_S = 14 … 28 V_{DC}
Options 3-wire	3-wire: 0 ... 20 mA / V_S = 14 ... 30 V_{DC} 0 ... 10 V / V_S = 14 ... 30 V_{DC}	
[2] IS-version not possible with plastic pressure port		
Performance		
Accuracy [3]	≤ ± 0.5 % FSO	
Permissible load	current 2-wire: $R_{max} = [(V_S - V_{S\,min}) / 0.02\ A]\ \Omega$ current 3-wire: R_{max} = 500 Ω voltage 3-wire: R_{min} = 10 kΩ	
Influence effects	supply: 0.05 % FSO / 10 V load: 0.05 % FSO / kΩ	
Response time	2-wire: ≤ 10 msec 3-wire: ≤ 3 msec	
Long term stability	≤ ± 0,3 % FSO / year at reference conditions	
[3] accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability)		
Thermal effects (Offset and Span) / Permissible Temperatures		
Thermal error	≤ ± 0.2 % FSO / 10 K	
in compensated range	0 ... 85 °C	
Permissible temperatures [4]	medium: -40 ... 125 °C	electronics / environment: -40 ... 85 °C storage: -40 ... 100 °C
[4] for pressure port in PVDF the medium temperature is -30 … 60 °C		
Electrical protection		
Short-circuit protection	permanent	
Reverse polarity protection	no damage, but also no function	
Electromagnetic compatibility	emission and immunity according to EN 61326	
Mechanical stability		
Vibration	10 g RMS (25 ... 2000 Hz)	according to DIN EN 60068-2-6
Shock	500 g / 1 msec	according to DIN EN 60068-2-27
Materials		
Pressure port / housing	standard: options for p_N ≤ 25 bar:	pressure port: stainless steel 1.4404 (316L) / PVDF; housing: stainless steel 1.4404 (316L) / PVDF
Option compact field housing	stainless steel 1.4301 (304); cable gland M12x1.5, brass, nickel plated (clamping range 2 … 8 mm)	
Seals	standard: FKM options: EPDM	others on request
Diaphragm	ceramics Al_2O_3 96 %	
Media wetted parts	pressure port, seals, diaphragm	
Explosion protection (only for 4 ... 20 mA / 2-wire)		
Approval DX19-LMK 331 only for stainless steel pressure port	IBExU 10 ATEX 1068 X / IECEx IBE 12.0027X zone 0: II 1G Ex ia IIC T4 Ga zone 20: II 1D Ex ia IIIC T135 °C Da	
Safety technical maximum values	U_i = 28 V, I_i = 93 mA, P_i = 660 mW, $C_i \approx 0$ nF, $L_i \approx 0$ µH, the supply connections have an inner capacity of max. 27 nF to the housing	
Permissible temperatures for environment	in Zone 0: -20 ... 60 °C with p_{atm} 0.8 bar up to 1.1 bar in Zone 1 or higher: -40/-20 ... 70 °C	
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	
Miscellaneous		
Option SIL 2 version [5]	according to IEC 61508 / IEC 61511	
Current consumption	signal output current: max. 25 mA	signal output voltage: max. 7 mA
Weight	approx. 150 g	
Installation position	any	
Operational life	100 million load cycles	
CE-conformity	EMC Directive: 2014/30/EU	
ATEX Directive	2014/34/EU	
[5] only for 4...20mA / 2-wire		

Wiring diagrams

2-wire-system (current)



3-wire-system (current / voltage)

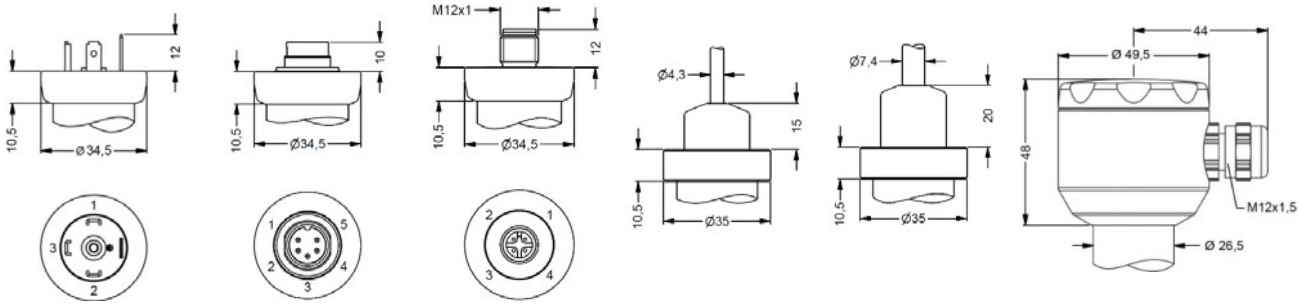


Pin configuration

Electrical connection	ISO 4400	Binder 723 (5-pin)	M12x1 / metal (4-pin)	compact field housing	cable colour (IEC 60757)
Supply +	1	3	1	IN +	WH (white)
Supply –	2	4	2	IN –	BN (brown)
Signal + (only for 3-wire)	3	1	3	OUT +	GN (green)
Shield	ground pin ⏚	5	4	⏚	GNYE (green-yellow)

Electrical connections (dimensions in mm)

standard **options**



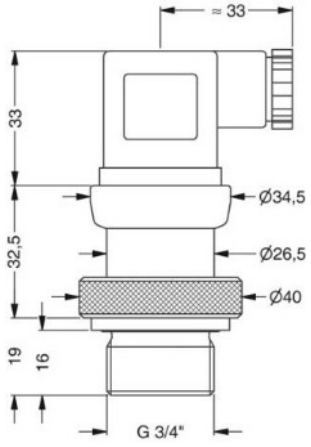
ISO 4400 (IP 65) | Binder Series 723 5-pin (IP 67) | M12x1, 4-pin (IP 67) | cable outlet with PVC cable (IP 67) [6] | cable outlet, cable with ventilation tube (IP 68) [7] | compact field housing (IP 67)

⇨ **universal field housing stainless steel 1.4404 with cable gland M20x1.5 (ordering code 880) and other versions on request**

[6] standard: 2 m PVC-cable without ventilation tube (permissible temperature: -5 ... 70°C)
[7] different cable types and length available, permissible temperature depends on kind of cable

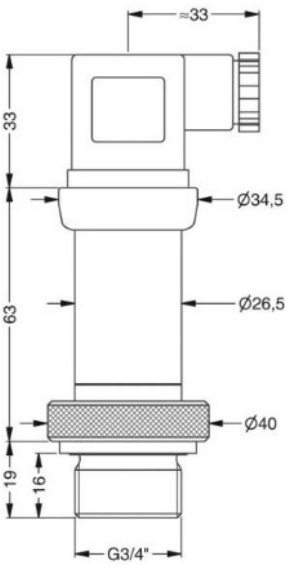
Mechanical connection (dimensions in mm)

standard



G3/4" flush (DIN 3852) with ISO 4400

standard for SIL- and SIL-Ex-version



G3/4" flush (DIN 3852) with ISO 4400

Ordering code LMK 331

LMK 331 □□□-□□□□-□-□-□□□-□□□-□-□-□-□□□

Pressure			
	gauge in bar	460	
	gauge in mH_2O	461	
Input	**[mH_2O]**	**[bar]**	
	4	0.4	4000
	6	0.6	6000
	10	1.0	1001
	16	1.6	1601
	25	2.5	2501
	40	4.0	4001
	60	6.0	6001
	100	10	1002
	160	16	1602
	250	25	2502
	400	40 [1]	4002
	600	60 [1]	6002
	customer		9999 consult
Analogue output			
	4 … 20 mA / 2-wire		1
	0 … 20 mA / 3-wire		2
	0 … 10 V / 3-wire		3
	intrinsic safety 4 … 20 mA / 2-wire [2]		E
	SIL2 4 … 20 mA / 2-wire		1S
	SIL2 with intrinsic safety 4 … 20 mA / 2-wire [2]		ES
	customer		9 consult
Accuracy			
	0.5 % FSO		5
	customer		9 consult
Electrical connection			
	male and female plug ISO 4400		100
	male plug Binder series 723 (5-pin)		200
	cable outlet with PVC cable (IP67) [3]		TA0
	cable outlet, cable with ventilation tube (IP68) [4]		TR0
	male plug M12x1 (4-pin) / metal		M10
	compact field housing stainless steel 1.4301 (304)		850
	customer		999 consult
Mechanical connection			
	G3/4" DIN 3852 with flush sensor		K00
	customer		999 consult
Seals			
	FKM		1
	EPDM		3
	customer		9 consult
Pressure port			
	stainless steel 1.4404 (316L)		1
option for $p_N \leq 25$ bar:	PVDF [5]		B
	customer		9 consult
Diaphragm			
	ceramics Al_2O_3 96 %		2
	customer		9 consult
Special version			
	standard		000
	customer		999 consult

[1] only possible for pressure port of stainless steel

[2] intrinsic safety not possible with plastic pressure port

[3] standard: 2 m PVC cable without ventilation tube (permissible temperature: -5 ... 70 °C); others on request

[4] code TR0 = PVC cable, cable with ventilation tube available in different types and lengths

[5] permissible medium temperature: -30 … 60 °C