

Датчики предельной вибрации LVL-M4-A

Технические характеристики

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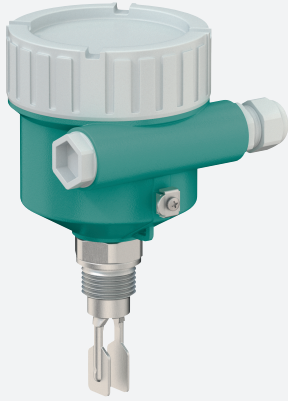
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Vibration Limit Switch Compact Version



Vibracon

LVL-M4-A

- Vibration limit switch for liquids
- Compact device
- Wide variety of electronic modules (e. g., relay, thyristor signal output): the right connection for every process control system
- No calibration: quick and low-cost start up
- No mechanically moving parts: maintenance-free, no wear, long operating life
- Operation via push buttons and DIP switches on the electronic insert
- Optional status and fault indication via LED module or via Bluetooth in the P+F Level app
- Up to SIL 3 acc. to IEC/EN 61508

CE  **SIL 3**   **Bluetooth®**

Function

The device is a vibration limit switch for use in all liquids.

- for temperatures from -50 °C to +150 °C
- for pressures up to 100 bar
- for viscosities up to 10000 mm²/s
- for densities up to 0.5 g/cm³ or 0.4 g/cm³ (other settings available on request)

The function is not affected by flow, turbulence, bubbles, foam, vibration, bulk solids content or build-up, the device is thus the ideal substitute for float switches.

The device is available with extension tube up to 6 m.

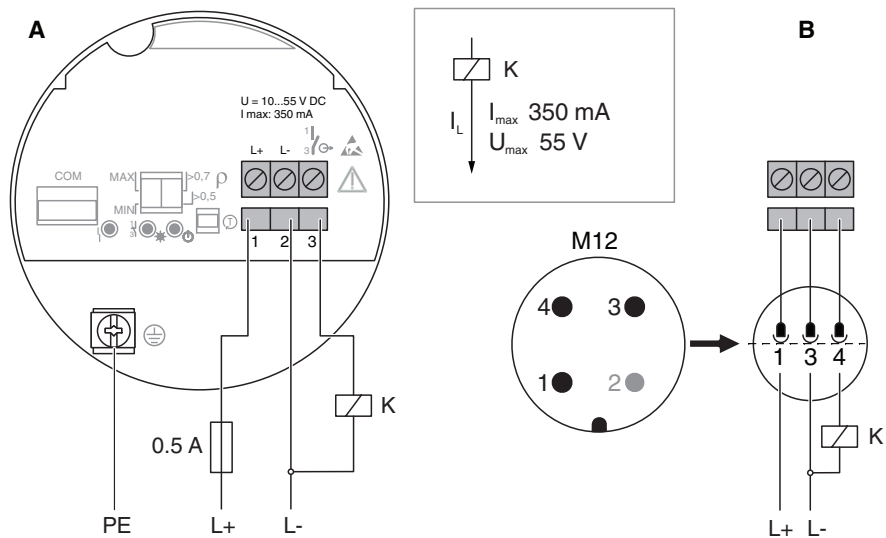
High corrosion-resistant Alloy C22 is available for the tuning fork and process connection for applications in very aggressive liquids.

Specific versions are suitable for use in explosion-hazardous areas.

The device is operated via push buttons and DIP switches on the electronic insert.

Status and faults of the device are optionally indicated via a LED module or via Bluetooth in the P+F Level app.

Connection

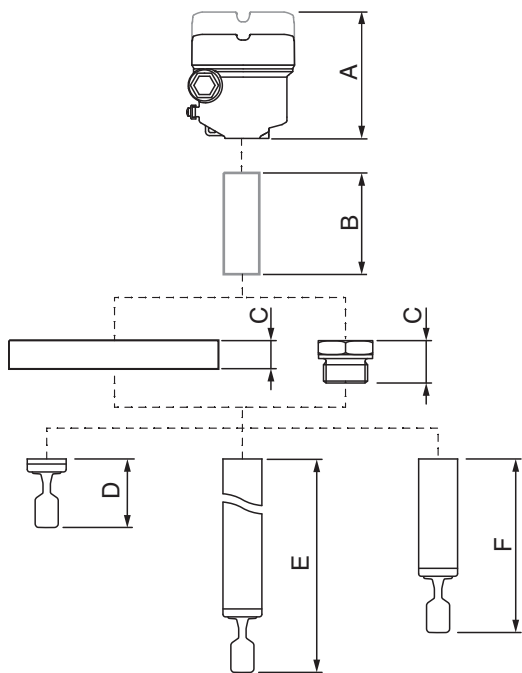


3-wire DC-PNP, electronic insert FEL62 (example)

- A Terminal assignment at electronic insert
- B Terminal assignment on M12 plug

For further connection versions see technical information (TI).

Assembly



The device is assembled from the following components:

- A Housing including cover
- B Temperature spacer, pressure tight feed through, optional
- C Process connection, flange or thread
- D Tuning fork
- E Tube extension
- F Short tube

For further information see technical information (TI).

Technical Data

General specifications		
Function principle		point level detection, maximum or minimum detection for liquids
Measuring method		The change in vibration frequency causes the device to switch.
Construction type		compact device
Series		Vibracon LVL-M4

Technical Data

Housing		single compartment, aluminum, coated single compartment, 316L, cast single compartment, plastic dual compartment, L-shape, aluminum, coated
Functional safety related parameters		
Safety Integrity Level (SIL)		SIL 3
Supply		
Rated voltage	U _r	electronic insert FEL61: 19 ... 253 V AC, 50/60 Hz electronic insert FEL62: 10 V DC ... 55 V DC electronic insert FEL64: 19 V AC ... 253 V AC50/60 Hz / 19 V DC ... 55 V DC electronic insert FEL64DC: 9 V DC ... 20 V DC electronic insert FEL68: switch amplifier acc. to IEC 60947-5-6 (NAMUR)
Current consumption		electronic insert FEL61: ≤ 3.8 mA electronic insert FEL62: ≤ 10 mA, without load
Power consumption		electronic insert FEL61: ≤ 2 VA electronic insert FEL62: ≤ 0.5 W electronic insert FEL64: ≤ 25 VA/< 1.3 W electronic insert FEL64DC: < 1.0 W electronic insert FEL68: acc. to IEC 60947-5-6 (NAMUR)
Interface		
Interface type		Bluetooth , optional
Detection range		max. 25 m
Configuration		commissioning, operation and maintenance via P+F Level app - can be activated/deactivated - password encryption
Communication		encrypted
Input		
Switching point		see section switch point
Measured variable		limit level (limit value)
Measurement range		depends on installation location and the tube extension maximum sensor length : 6 m
Output		
Output type		electronic insert FEL61: 2-wire with test button electronic insert FEL62: 3-wire PNP with test button electronic insert FEL64: relay DPDT with test button electronic insert FEL64DC: relay DPDT with contact and test button electronic insert FEL68: 2-wire NAMUR with test button
Switch behaviour		switch-over for minimum/maximum residual current safety on electronic insert MAX = maximum safety: The output switches to the power fail response when the fork is covered. for use with overspill protection for example MIN = minimum safety: The output switches to the power fail response when the fork is exposed. for use with dry running protection for example
Communication		connection for LED module VU120 and Bluetooth module VU121 , optional Bluetooth wireless technology , optional
Directive conformity		
Electromagnetic compatibility		
Directive 2014/30/EU		EN 61326
Low voltage		
Directive 2014/35/EU		EN 61010-1
Conformity		
Electromagnetic compatibility		NE 21
Degree of protection		IEC 60529 , NEMA 250
Shock resistance		IEC 60068-2-27
Vibration resistance		EN 60068-2-64
Climate class		IEC 60068-2-38 test Z/AD
Corrosion resistance		acc. to ISA-71.04, severity level G3
Input characteristics		
Medium density		adjustment on the electronic insert > 0,5 g/cm³ or > 0,7 g/cm³ (other on request)
Measurement accuracy		

Technical Data

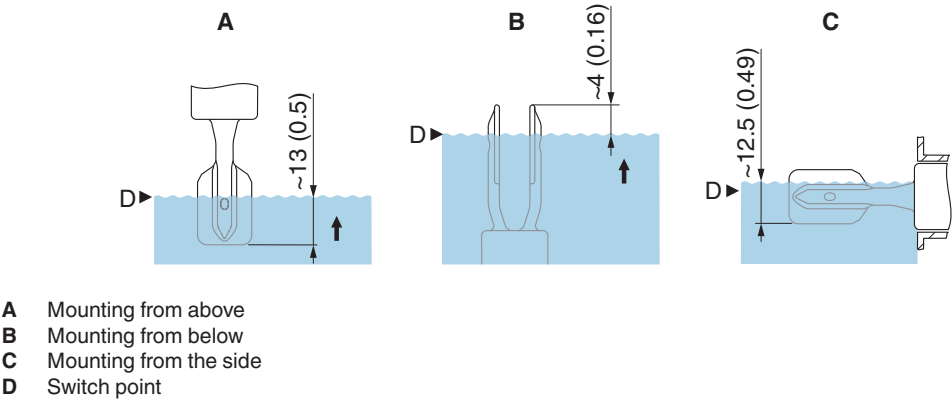
Reference operating conditions	ambient temperature: 23 °C (73 °F) process temperature: 23 °C (73 °F) density: 1 g/cm ³ (water) medium viscosity: 1 mPa·s process pressure: ambient pressure/unpressurized sensor installation: vertically from above density selection switch: > 0.7 g/cm ³ switch direction of sensor: uncovered to covered
Maximum measured error	max. ± 1 mm
Hysteresis	typ. 2.5 mm
Influence of medium density	see technical information (TI)
Influence of medium temperature	max. +1.4 ... -2.6 mm (-50 ... 150 °C (-58 ... 302 °F))
Influence of medium pressure	max. 0 ... 2.6 mm (-1 ... 64 bar)
Operating conditions	
Installation conditions	
Installation position	any position
Process conditions	
Medium temperature	-50 ... 150 °C (-58 ... 302 °F)
Medium pressure	p _e = 0 ... 100 bar (0 ... 1450.4 psi) over the entire temperature range , exceptions see process connections
Test pressure	PN = 64 bar (928 psi): test pressure = 1.5 x PN maximum 100 bar (1450 psi) depending on process connection selected PN = 100 bar (1450 psi): test pressure = 1.5 x PN maximum 150 bar (2175 psi) depending on process connection selected
Thermal shock resistance	≤ 120 K/s
State of aggregation	liquid
Density	min. 0.5 g/cm ³ , optional 0.4 g/cm ³
Viscosity	max. 10000 mm ² /s (max. 10000 cSt)
Ambient conditions	
Ambient temperature	-60 ... 70 °C (-76 ... 158 °F) For further information see technical information (TI).
Storage temperature	-40 ... 80 °C (-40 ... 176 °F)
Altitude	≤ 2000 m above MSL
Mechanical specifications	
Degree of protection	plug M12 : IP66/67, NEMA type 4X Others : IP66/68, NEMA type 4X/6P
Connection	gland M20 thread M20 , G1/2 , NPT1/2 , NPT3/4 plug M12
Material	see technical information (TI)
Surface quality	R _a < 3.2 µm/126 µinch
Mass	basic weight: 0.65 kg the basic weight comprises: - sensor (compact) - electronic insert - housing: single compartment, plastic with cover - process connection: thread, G3/4 in addition to the basic weight: - modules: 0,1 kg - housing: single compartment, aluminum, coated: 0.8 kg, single compartment, 316L: 1.21 kg, dual compartment, L-shaped, aluminum, coated: 1.22 kg - temperature spacer: 0.6 kg - pressure-tight feed through: 0.7 kg - pipe extension: 1000 mm: 0.9 kg, 100 inch: 2.3 kg - plastic protective cover: 0.2 kg For further information see technical information (TI).
Dimensions	housing: diameter max. 147 mm, height max. 163 mm temperature spacer, pressure-tight feed through: additional length 140 mm compact version: length depends on process connection short tube version: length 99 ... 118 mm, depends on process connection pipe extension: - length 117 ... 6000 mm, 316L - length 148 ... 3000 mm, Alloy C22 tuning fork: width 17.2 mm, fork width 10 mm, length 40 mm For further information see technical information (TI).

Technical Data

Process connection		cylindrical threads G3/4, G1 acc. to DIN ISO 228 G for installing in weld-in adapter cylindrical threads G3/4, G1 acc. to DIN ISO 228 G with flat seal conical threads NPT3/4, NPT1 acc. to ANSI B 1.20.3 conical threads R3/4, R1 acc. to EN 10226 flanges RF, RJF, FF from 1 inch acc. to ASME B16.5 flanges form A, B1, C, D, E from DN25 acc. to EN 1092-1 flanges RF from 10K 25A acc. to JIS B2220 Tri-Clamp from DN25 acc. to ISO 2852 For further information see technical information (TI).
Data for application in connection with hazardous areas		
EU-type examination certificate		see instruction manuals
International approvals		
CSA approval		see instruction manuals
IECEX approval		see instruction manuals
Indication and operation		
Display elements		Standard: without display LED module VU120, optional Bluetooth module VU121, optional
Control elements		switches on the electronic insert
Function test		via switches on the electronic insert test magnet , optional
Certificates and approvals		
Overspill protection		see approval (ZE)
General information		
Supplementary documentation		technical information (TI) manuals, brief instructions (BA, KA) instruction manuals Functional safety manuals (FY) Special documentation (SD)
Accessories		
Designation		see technical information (TI)

Mounting

Typical switch points, depending on the orientation of the device (water +23 °C (+73 °F))



Type Code

This overview does not mark options which are mutually exclusive.

L	V	L	-	M	4	-	(1)	(2)	(3)	(4)	-	(5)	(6)	(7)	(8)	(9)	(10)	-	(11)	(12)	.	L
LVL-M4		Device																				
LVL-M4		Limit switch for liquids																				
(1)		Type of probe																				
A		Compact version																				

Type Code

(1)	Type of probe
B	Short tube version
C	Tube extension
X	Special version

(2)	Process connection, sealing surface
A	Flange ASME B16.5, RF (Raised Face)
B	Flange ASME B16.5, FF (Flat Face)
C	Flange ASME B16.5, RJF (Ring Type Joint)
D	Thread ASME B1.20.3, NPT
E	Flange EN 1092-1, Form A
F	Flange EN 1092-1, Form B1
G	Flange EN 1092-1, Form C
H	Flange EN 1092-1, Form D
I	Flange EN 1092-1, Form E
J	Thread EN 10226, R
K	Flange HG/T20592, RF (Raised Face)
L	Flange HG/T20615, RF (Raised Face)
M	Flange HG/T20615, RJ (Ring Joint)
N	Thread ISO 228, G
P	Flange JIS B2220, RF (Raised Face)
T	Tri-Clamp ISO 2852
X	Special version

(3)	Process connection
ASME B16.5 flanges	
A31	NPS 1 inch, Cl.150, 316/316L
A41	NPS 1-1/4 inch, Cl.150, 316/316L
A42	NPS 1-1/4 inch, Cl.300, 316/316L
A51	NPS 1-1/2 inch, Cl.150, 316/316L
A52	NPS 1-1/2 inch, Cl.300, 316/316L
A61	NPS 2 inch, Cl.150, 316/316L
A62	NPS 2 inch, Cl.300, 316/316L
A6C	NPS 2 inch, Cl.150, Alloy C22 > 316/316L
A7C	NPS 3 inch, Cl.300, Alloy C22 > 316/316L
A81	NPS 3 inch, Cl.150, 316/316L
A82	NPS 3 inch, Cl.300, 316/316L
A91	NPS 4 inch, Cl.150, 316/316L
A92	NPS 4 inch, Cl.300, 316/316L
A95	NPS 2 inch, Cl.600, 316/316L
A97	NPS 3 inch, Cl.600, 316/316L
E35	1-1/2 inch, Cl.150, 316L
E45	2 inch, Cl.150, 316L
E55	3 inch, Cl.150, 316L
E65	1-1/2 inch, Cl.300, 316L
E75	2 inch, Cl.300, 316L
E85	3 inch, Cl.300, 316L
E95	2 inch, Cl.600, 316L
EN 1092-1 flanges	
C45	DN25 PN25/40, Alloy C22 > 316L
C71	DN50 PN6, Alloy C22 > 316L
C75	DN50 PN25/40, Alloy C22 > 316L
C95	DN80 PN25/40, Alloy C22 > 316L
CA3	DN100 PN10/16, Alloy C22 > 316L
D75	DN50 PN40, 316L
D95	DN80 PN40, 316L
F45	DN25 PN25/40, 316L
F51	DN32 PN6, 316L
F55	DN32 PN25/40, 316L
F61	DN40 PN6, 316L
F62	DN40 PN40, 316L
F65	DN40 PN25/40, 316L
F71	DN50 PN6, 316L
F75	DN50 PN25/40, 316L
F85	DN65 PN25/40, 316L
F93	DN80 PN10/16, 316L

Type Code

(3)	Process connection
F95	DN80 PN25/40, 316L
F99	DN50 PN100, 316L
FA3	DN100 PN10/16, 316L
FA5	DN100 PN25/40, 316L
JIS B2220 flanges	
J13	10K 25A, 316L
J16	10K 40A, 316L
J17	10K 50A, 316L
J19	10K 80A, 316L
J1A	10K 100A, 316L
J1C	10K 50A, Alloy C22 > 316L
ISO 228 threads, EN 10226 threads, ASME B1.20.3 threads	
G21	G3/4 inch, 316L, installation > accessory weld-in adapter
G2C	3/4 inch, Alloy C22
G31	1 inch, 316L
G3C	1 inch, Alloy C22
G3E	G1 inch, 316L, installation > accessory weld-in adapter
G41	3/4 inch, 316L
Tri-Clamp ISO 2852	
T51	DN25-38 (1 to 1-1/2 inch), 316L, DIN 32676 DN25/40
T61	DN40-51 (2 inch), 316L, DIN 32676 DN50
XXX	Special version

(4)	Sensor length, material
A	Compact version, Alloy C22
B	Compact version, 316L
C	Short tube version, Alloy C22
D	Short tube version, 316L
E	Tube extension, length L in mm, Alloy C22, Ra < 3.2 µm/126 µinch
F	Tube extension, length L in mm, 316L, Ra < 3.2 µm/126 µinch
G	Tube extension, length L in inch, Alloy C22, Ra < 3.2 µm/126 µinch
H	Tube extension, length L in inch, 316L, Ra < 3.2 µm/126 µinch
X	Special version

(5)	Housing, material
A	Single compartment, aluminum, coated
D	Dual compartment, L-shape, aluminum, coated
G	Single compartment, 316L, cast
P	Single compartment, plastic
X	Special version

(6)	Electrical connection
A	Gland M20, plastic, IP66/68, NEMA type 4X/6P
B	Gland M20, brass nickel plated, IP66/68, NEMA type 4X/6P
C	Gland M20, 316L, IP66/68, NEMA type 4X/6P
F	Thread M20, IP66/68, NEMA type 4X/6P
G	Thread G1/2, IP66/68, NEMA type 4X/6P
H	Thread NPT1/2, IP66/68, NEMA type 4X/6P
I	Thread NPT3/4, IP66/68, NEMA type 4X/6P
M	Plug M12, IP66/67, NEMA type 4X
X	Special version

(7)	Application, temperature
A	Process: max. 150 °C/302 °F, max. 64 bar
B	Process: max. 150 °C/302 °F, max. 100 bar
C	Process: max. 80 °C/176 °F, max. 25 bar
X	Special version

(8)	Surface refinement
A	Standard Ra < 3.2 µm/126 µinch
X	Special version

(9)	Electrical output
A	FEL61, 2-wire, 19 to 253 V AC with test button
B	FEL64DC, relay DPDT, 9 V DC to 20 V DC, cotact 253 V/6 A with test button
E	FEL62, 3-wire PNP, 10 V DC to 55 V DC with test button

Type Code

(9)	Electrical output
N	FEL64, relay DPDT, 19 V AC to 253 V AC/19 V DC to 55 V DC, contact 253 V/6 A with test button
M	FEL68, 2-wire NAMUR with test button
X	Special version

(10)	Display, operation
A	Without display, switch
B	LED module VU120 visible from the outside, switch
X	Special version

(11)	Approval
NA	Version for non-hazardous area
CC	CSA C/US Cl. I Div. 2 Gr.A-D
CG	CSA C/US General Purpose
CI	CSA C/US IS Cl. I, II, III Div. 1 Gr. A-G, Cl. I Zone 0, AEx/Ex ia IIC T6, (max. T4 if NAMUR with Bluetooth is used)
CD	CSA C/US XP Cl. I Div.1 Gr. A/B-D, Cl. II, III Div. 1 Gr. E-G, Cl. I Div. 2 Gr. A-D, Cl. I Zone 1, AEx/Ex d IIC T6
E2	ATEX/IEC II 1/2G, 2G Ex ia IIC T6 Ga/Gb (max. T4 if NAMUR with Bluetooth is used)
E3	ATEX/IEC II 1/2G, 2G Ex db IIC T6 Ga/Gb
E5	ATEX/IEC II 1/2G, 2G Ex ia IIC T6 Ga/Gb, II 1/2D, 2D Ex ia IIIC Da/Db (max. T4 if NAMUR with Bluetooth is used)
EA	ATEX/IEC II 1G Ex ia IIC T6 Ga (max. T4 if NAMUR with Bluetooth is used)
EC	ATEX/IEC II 1/2G, 2G Ex de IIC T6 Ga/Gb
EM	ATEX/IEC II 3G Ex ec IIC T6 Gc, II 3D Ex tc IIIC Dc
ES	ATEX/IEC II 1/2G, 2G Ex db IIC T6 Ga/Gb, II 1/2D, 2D Ex ta/tb IIIC Da/Db
UA	UK Ex ia IIC T6 Ga (max. T4 if NAMUR with Bluetooth is used)
UB	UK Ex ia IIC T6 Ga/Gb (max. T4 if NAMUR with Bluetooth is used)
UC	UK Ex db IIC T6 Ga/Gb
UD	UK Ex de IIC T6 Ga/Gb
UK	UK Ex ia IIC T6 Ga/Gb, UK Ex ia IIIC Da/Db (max. T4 if NAMUR with Bluetooth is used)
UL	UK Ex ec IIC T6 Gc, UK Ex tc IIIC Dc
UM	UK Ex db IIC T6 Ga/Gb, UK Ex ta/tb IIIC Da/Db
UR	Non-hazardous area and UK marking

Additional Options

(12)	Application package
HH	Verification and monitoring
LL	Prepared for verification and monitoring
XX	Special version

(12)	Service
D1	Presetting density > 0.4 g/cm ³
D2	Presetting density > 0.5 g/cm ³
P1	Product documentation on paper
S1	Cleaned from oil and grease (wetted parts)
S3	Adjustment switching delay according to specification
S7	PWIS free (paint-wetting impairment substances)
S8	Adjustment MIN safety circuit
XX	Special version

(12)	Test, certificate, declaration
DD	Pressure test, internal procedure, test report
N1	NACE MR0175/ISO 15156 (wetted parts), declaration
N2	NACE MR0103/ISO 17945 (wetted parts), declaration
N3	AD 2000 (wetted parts), declaration, excepting castings
S5	Inspection certificate 3.1, EN 10204 (material certificate wetted parts)
U1	Ambient temperature -50 °C/-58 °F
U2	Ambient temperature -60 °C/-76 °F
XX	Special version

(12)	Additional approval
SL	SIL Functional Safety
WH	WHG overfill protection, leakage

(12)	Sensor design
DF	Pressure tight feed through (second line of defense)
TD	Temperature spacer
XX	Special version

Type Code

(12)	Accessory mounted
BL	Bluetooth module VU121
VB	Bluetooth module VU121 for NAMUR output
XX	Special version

(12)	Accessory enclosed
ST	Test magnet
WP	Weather protection cover, plastic
WS	Weather protection cover, 316L
XX	Special version

(12)	Marking
S9	Tagging (TAG), see additional specification
XA	Tag plate, stainless steel
XB	Adhesive label
XC	Supplied label/plate

L	Sensor length, tube extension
Length	Option E, Alloy C22, length L in mm, 148 mm to 3000 mm
Length	Option F, 316L, length L in mm, 117 mm to 6000 mm
Length	Option G, Alloy C22, length L in inch, 5.83 inch to 118.11 inch
Length	Option H, 316L, length L in inch, 4.61 inch to 236.22 inch

По вопросам продаж и поддержки обращайтесь:

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