

Vibracon LVL-M2C

Level limit switch for use in all liquids
With high corrosion-resistant coating
Suitable for use in explosion hazardous areas



Application

The Vibracon is a level limit switch for use in all liquids

- with a temperature between -50 °C (243 K) and $+120\text{ °C}$ (393 K)
- with a pressure up to 40 bar
- with a viscosity up to $10000\text{ mm}^2/\text{s}$
- for densities 0.5 g/cm^3 or 0.7 g/cm^3 (other settings on request)
- foam detection on request

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

The coating of all sensor wetted parts (process connections, extension pipe and vibration fork) is made of synthetic material to ensure it can be used for highly aggressive liquids.

Instruments with protection EEx ia and EEx d are available for use in explosion hazardous areas.

Features

- Use in safety systems requiring functional safety to SIL2 in accordance with IEC 61508/IEC 61511-1
- Corrosion-resistant coating: ideally suited to the process
- Large number of process connections to choose from:
 - flanges of various standards
 - universal use
- Wide variety of electronics, e. g. NAMUR, relay, thyristor, PFM signal output: the right connection for every process control system
- No calibration: quick, low-cost start-up
- No mechanically moving parts: no maintenance, no wear, long operating life
- Monitoring of fork for damage: guaranteed function
- PROFIBUS PA protocol: commissioning and maintenance
- FDA approved material

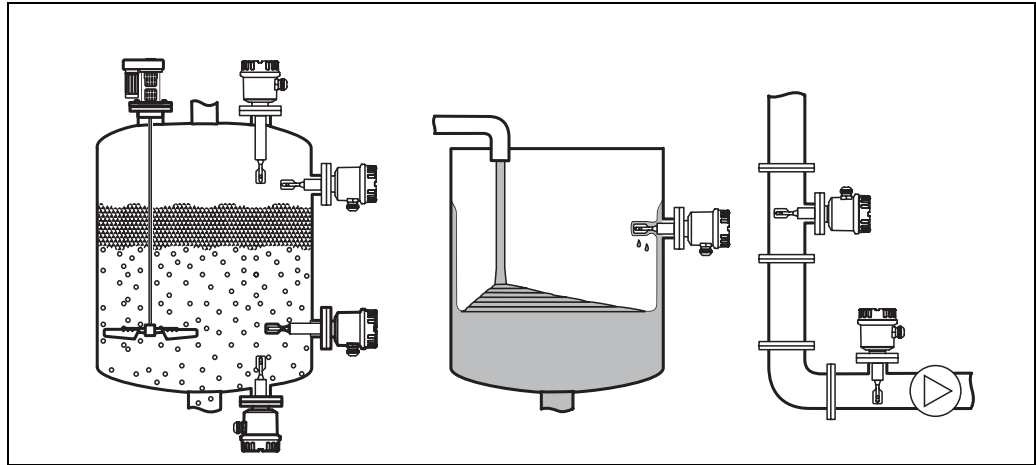
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Application

Level limit detection

Maximum or minimum detection in tanks or pipes containing all kinds of liquids, also in hazardous areas. Particularly suited to very aggressive liquids thanks to high degree of corrosion protection.



Function and system design

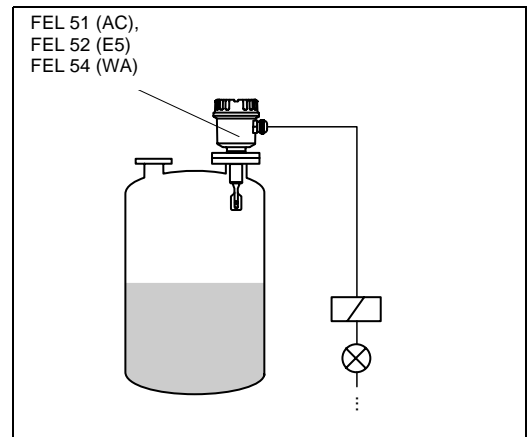
Measuring principle

The sensor's fork vibrates at its intrinsic frequency. This frequency is reduced when covered with liquid. The change in frequency then activates a limit switch.

Modularity

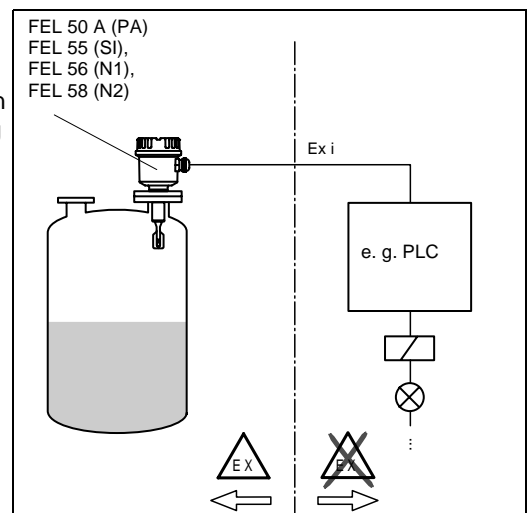
Level limit switch

Vibracon LVL-M2C with electronic versions
FEL 51 (AC), FEL 52 (E5), FEL 54 (WA)



Level sensor

Vibracon LVL-M2C with electronic versions
FEL 55 (SI), FEL 56 (N1), FEL 58 (N2)
for connecting to a separate switching unit or an
isolating amplifier FEL 50 A (PA) for connecting
to PROFIBUS PA segment



Electronic versions for level limit switches	<p>FEL 51 (AC): two-wire AC version, switch the load directly into the power supply circuit via the thyristor</p> <p>FEL 52 (E5): three-wire DC version, switch the load via the transistor (PNP) and separate connection</p> <p>FEL 54 (WA): universal current version with relay output, switch the loads via two floating change-over contacts</p>
Electronic versions for level sensor	<p>FEL 55 (SI): for separate switching unit, signal transmission 16 mA/8 mA along two-wire cabling</p> <p>FEL 56 (N1): for separate switching unit, signal transmission L-H edge 0.6 mA ... 1.0 mA/2.2 mA ... 2.8 mA to IEC 60947-5-6 (NAMUR) along two-wire cabling</p> <p>FEL 58 (N2): for separate switching unit, signal transmission H-L edge 2.2 mA ... 3.5 mA/0.6 mA ... 1.0 mA to IEC 60947-5-6 (NAMUR) along two-wire cabling checking of connecting cabling and other devices by pressing a key on the electronic insert</p> <p>FEL 50 A (PA): for connecting to PROFIBUS PA, cyclic and acyclic data exchange acc. to PROFIBUS PA Profile 3.0, discrete input</p>
Galvanic isolation	<p>FEL 51 (AC), FEL 52 (E5), FEL 50 A (PA): between sensor and power supply</p> <p>FEL 54 (WA): between sensor and power supply and load</p> <p>FEL 55 (SI), FEL 56 (N1), FEL 58 (N2): see switching unit connected</p>
Design	<p>Vibracon LVL-M2C: mit flange and extension pipe, with the same coating</p>

Input

Measured variable	Level (limit value)
Measuring range (detection range)	Depends on mounting point and the pipe extension, standard 3000 mmm (115 in)
Product density	Adjustment on the electronic insert > 0.5 g/cm ³ or > 0.7 g/cm ³ (other on request)

Electronic insert FEL 51 (AC)

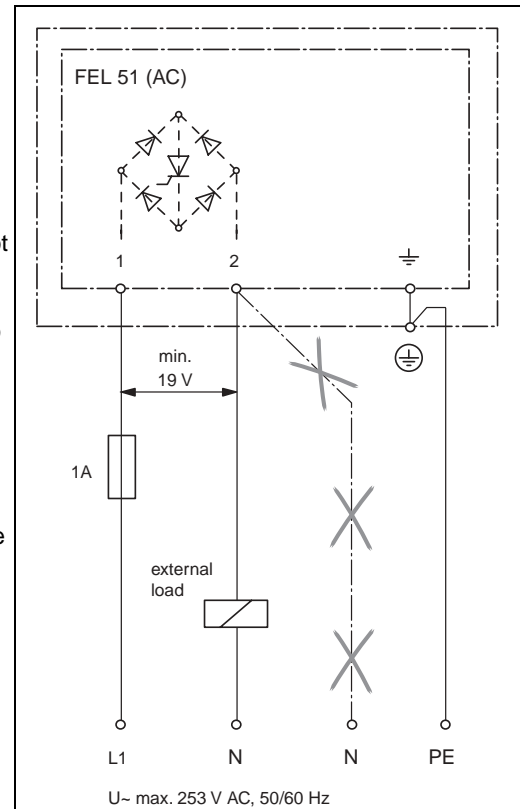
Electrical connection

Two-wire AC connection

Always connect in series with a load!

Check the following:

- the residual current in blocked state (up to 3.8 mA)
- that for low voltage
 - The voltage drop across the load is such that the minimum terminal voltage at the electronic insert (19 V) when blocked is not undershot.
 - The voltage drop across the electronics when switched through is observed (up to 12 V).
- that a relay cannot de-energise with holding power below 3.8 mA
If this is the case, a resistor should be connected parallel to the relay. (RC module available on request).
- When selecting the relay, pay attention to the holding power/rated power (see connectable load).



Output signal

I_L = load current (switched through)

$< 3.8 \text{ mA}$ = residual current (blocked)



= lit



= unlit

Safety connection	Level	Output signal	LEDs green red
Max.		$1 \xrightarrow{I_L} 2$	
		$1 \xrightarrow{< 3.8 \text{ mA}} 2$	
Min.		$1 \xrightarrow{I_L} 2$	
		$1 \xrightarrow{< 3.8 \text{ mA}} 2$	

Signal on alarm

Output signal on power failure or in the event of damaged sensor: $< 3.8 \text{ mA}$

Connectable load

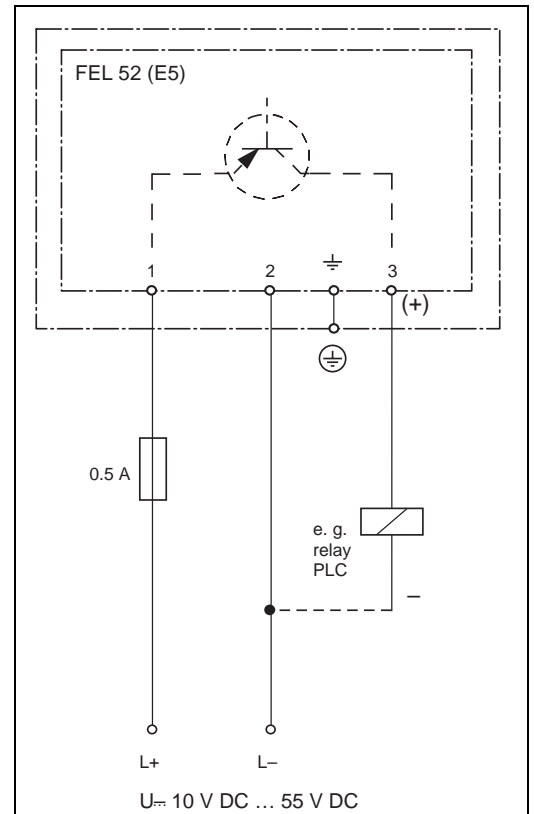
- Permitted for relay with a holding power/rated power $> 2.5 \text{ VA}$ for 253 V (10 mA), min. 0.5 VA for 24 V (20 mA)
- Relays with a lower holding power/rated power can be operated by means of an RC module connected in parallel (option).
- Load switched directly into the power supply circuit via the thyristor
 - transient (40 ms) max. 1.5 A, max. 375 VA at 253 V or max. 36 VA at 24 V (not short-circuit proof)
 - continuous max. 89 VA at 253 V, max. 8.4 VA at 24 V
- Voltage drop across FEL 51(AC) max. 12 V
- Residual current with blocked thyristor max. 3.8 mA
- Overvoltage protection FEL 51 (AC): overvoltage category III

Electronic insert FEL 52 (E5)

Electrical connection

Three-wire DC connection

- preferably used with programmable logic controllers (PLC), DI module as per EN 61131-2.
- positive signal at switching output of the electronics (PNP)
- Output blocked on reaching limit.



Output signal

I_L = load current (switched through)

$< 100 \mu A$ = residual current (blocked)

= lit

= unlit

Safety connection	Level	Output signal	LEDs green red
Max.		$L+ \xrightarrow{I_L} +$ 1 → 3	
		$1 < 100 \mu A \rightarrow 3$	
Min.		$L+ \xrightarrow{I_L} +$ 1 → 3	
		$1 < 100 \mu A \rightarrow 3$	

Signal on alarm

Output signal on power failure or in the event of damaged sensor: $< 100 \mu A$

Connectable load

Load switched via the transistor and separate PNP connection.
 max. 55 V (pulsed overload and short-circuit protection),
 continuous max. 350 mA,
 max. 0.5 μF at 55 V, max. 1.0 μF at 24 V,
 Residual voltage < 3 V (with transistor switched through),
 Residual current $< 100 \mu A$ (with transistor blocked)

Power supply

10 V DC ... 55 V DC
 Ripple max. 1.7 V, 0 Hz ... 400 Hz
 Current consumption max. 15 mA
 Power consumption max. 0.83 W
 Reverse polarity protection
 Overvoltage protection FEL 52 (E5): overvoltage category III

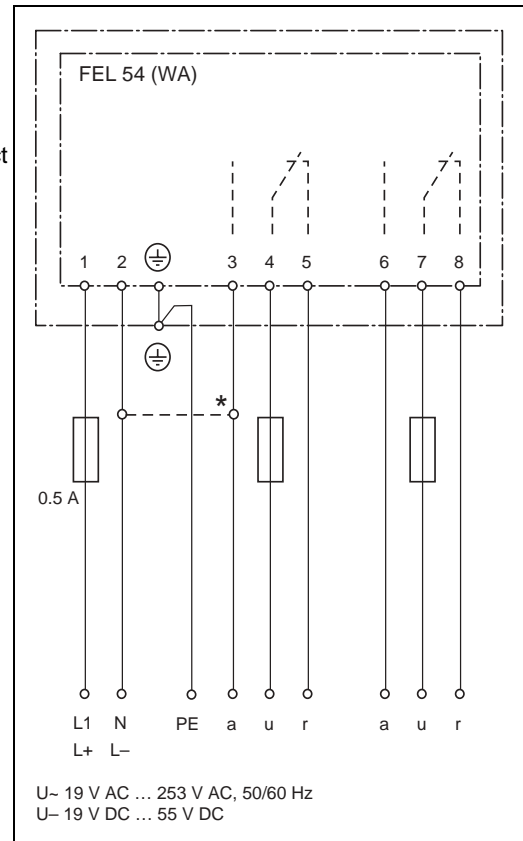
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Electronic insert FEL 54 (WA)

Electrical connection

Universal current connection with relay output

- Power supply:
Please note the different voltage ranges for AC and DC.
- Output:
When connecting an instrument with high inductance, provide a spark arrester to protect the relay contact.
A fine-wire fuse (depending on the load connected) protects the relay contact on short-circuiting.
Both relay contacts switch simultaneously.
- * When jumpered, the relay output works with NPN logic.



Output signal

- = relay energised
- = relay de-energised
- = lit
- = unlit

Safety connection	Level	Output signal	LEDs green red
Max.		 3 4 5 6 7 8	
		 3 4 5 6 7 8	
Min.		 3 4 5 6 7 8	
		 3 4 5 6 7 8	

Signal on alarm

Output signal on power failure or in the event of damaged sensor: relay de-energised

Connectable load

Loads switched via 2 floating change-over contacts.
I~ max. 6 A, U~ max. 253 V,
P~ max.1500 VA, cos φ = 1, P~ max. 750 VA, cos φ > 0.7,
I- max. 6 A to 30 V, I- max. 0.2 A to 125 V,
When connecting a low-voltage circuit with double isolation according to IEC 1010 the following applies: total of voltages of relay output and power supply max. 300 V.

Power supply

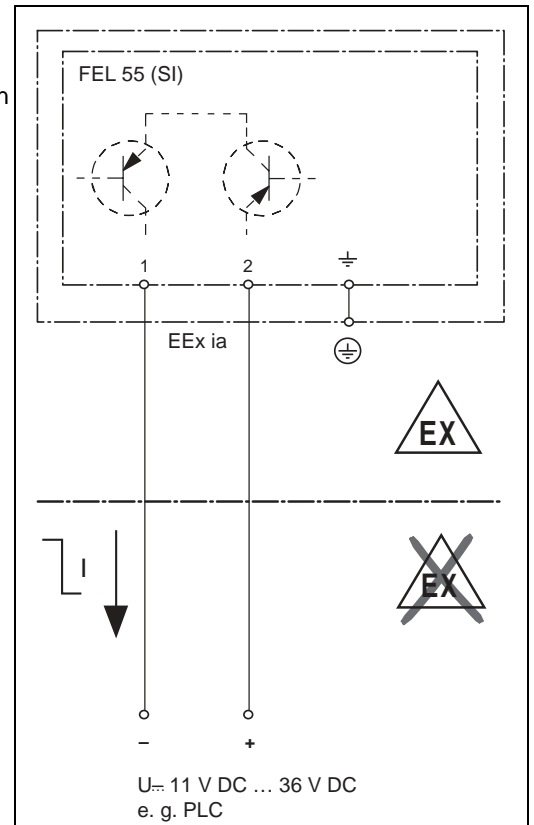
19 V AC ... 253 V AC voltage, 50/60 Hz or 19 V DC ... 55 V DC voltage
Power consumption max. 1.3 W
Reverse polarity protection
Overvoltage protection FEL 54 (WA): overvoltage category III

Electronic insert FEL 55 (SI)

Electrical connection

Two-wire connection for separate switching unit

- for connecting to programmable logic controllers (PLC) for example, AI module 4 mA ... 20 mA to EN 61131-2
- Output signal jump from high to low current on limit. **(H-L edge)**



Output signal

~ 16 mA = 16 mA ± 5 %

~ 8 mA = 8 mA ± 6 %



= lit



= unlit

Safety connection	Level	Output signal	LEDs green red
Max.		$\frac{+}{2} \xrightarrow{\sim 16 \text{ mA}} 1$	
		$\frac{+}{2} \xrightarrow{\sim 8 \text{ mA}} 1$	
Min.		$\frac{+}{2} \xrightarrow{\sim 16 \text{ mA}} 1$	
		$\frac{+}{2} \xrightarrow{\sim 8 \text{ mA}} 1$	

Signal on alarm

Output signal on power failure or in the event of damaged sensor: < 3.6 mA

Connectable load

$R = (U - 11 \text{ V}) : 16.8 \text{ mA}$

U = connection voltage 11 V DC ... 36 V DC

Overvoltage protection FEL 55 (SI): overvoltage category III

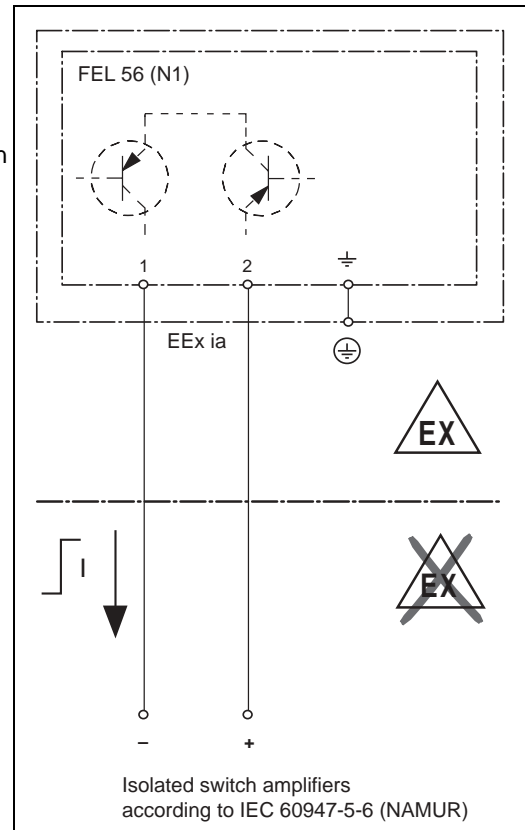
Electronic insert FEL 56 (N1)

Electrical connection




Two-wire connection for separate switching unit













- for connecting to isolating amplifiers acc. to NAMUR (IEC 60947-5-6), e. g. isolating amplifier KFD2-SR2-Ex1.W or remote process interface KSD-BI-Ex2 from Pepperl+Fuchs
- Output signal jump from low to high current on limit. **(L-H edge)**

Connecting to multiplexer:
set clock time to min. 2 s.



Output signal

-  = lit
-  = flashes
-  = unlit

Safety connection	Level	Output signal	LEDs green red
Max.		+ 0.6 mA ... 2 1.0 mA → 1	 
		+ 2.2 mA ... 2 2.8 mA → 1	 
Min.		+ 0.6 mA ... 2 1.0 mA → 1	 
		+ 2.2 mA ... 2 2.8 mA → 1	 

Signal on alarm

Output signal in the event of damaged sensor: > 2.2 mA

Connectable load

See technical data of isolating amplifier connected according to IEC 60947-5-6 (NAMUR).

Electronic insert FEL 58 (N2)

Electrical connection

Two-wire connection for separate switching unit

- for connecting to isolating amplifiers acc. to NAMUR (IEC 60947-5-6), e. g. Isolating amplifier KFD2-SR2-Ex1.W or remote process interface KSD-BI-Ex2 from Pepperl+Fuchs
- Output signal jump from high to low current on limit. **(H-L edge)**

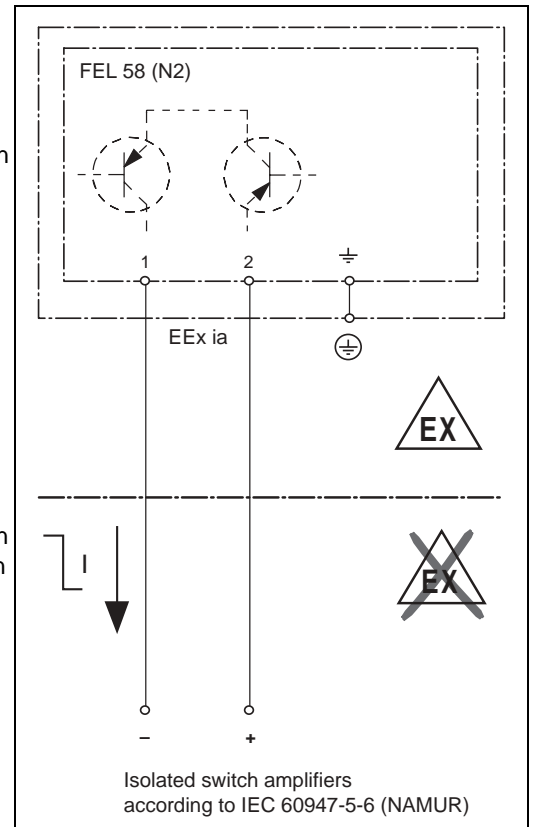
Additional function:

Test key on the electronic insert
Pressing the key breaks the connection to the isolating amplifier.

Connecting to multiplexer:
set clock time to min. 2 s.

Note

For Ex d applications, the additional function can only be used if the housing is not exposed to an explosive atmosphere.



Output signal

- = lit
- = flashes
- = unlit

Safety connection	Level	Output signal	LEDs green yellow
Max.		+ 2.2 mA ... - 3.5 mA → 1	
		+ 0.6 mA ... - 1.0 mA → 1	
Min.		+ 2.2 mA ... - 3.5 mA → 1	
		+ 0.6 mA ... - 1.0 mA → 1	

Signal on alarm

Output signal in the event of damaged sensor: < 1.0 mA

Connectable load

See technical data of isolating amplifier connected according to IEC 60947-5-6 (NAMUR), connection also to isolating amplifiers which have special safety circuits (I > 3.0 mA).

Electronic insert FEL 50 A (PA)

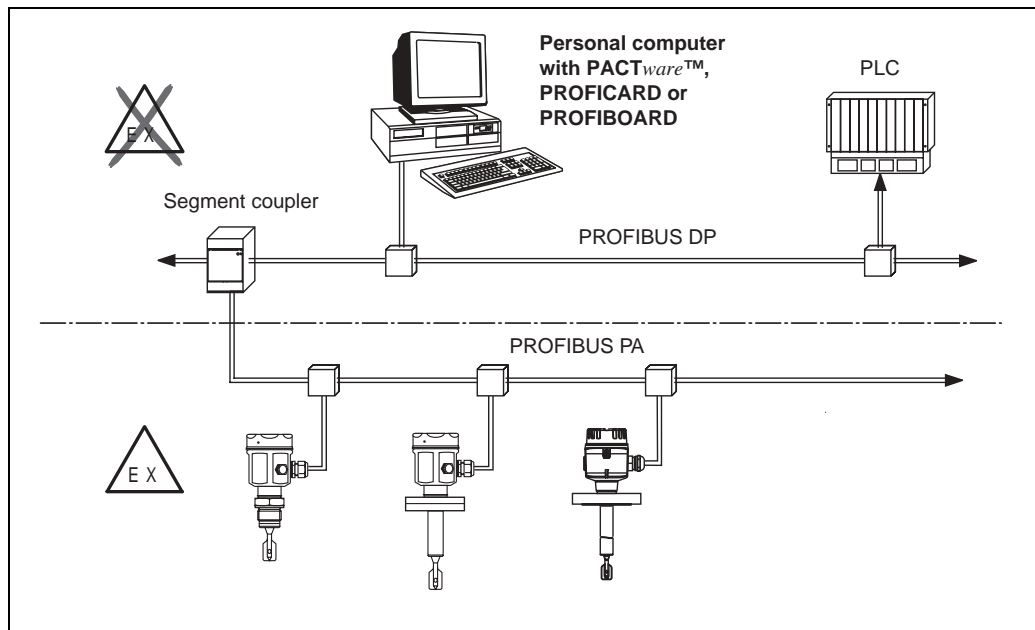
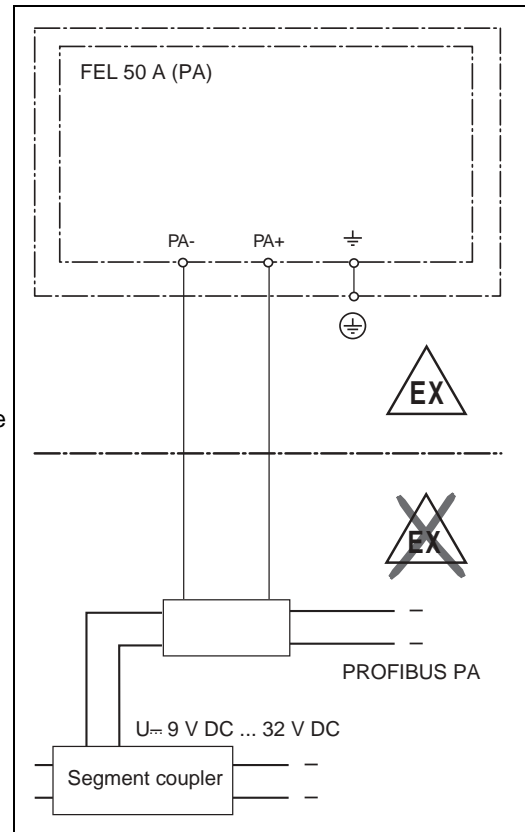
Electrical connection

Two-wire connection for power supply and data transfer



for connecting to PROFIBUS PA

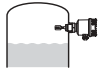


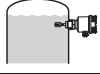


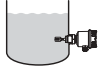


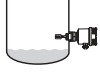


Additional functions:

- Digital communication enables the representation, reading and editing of the following parameters: fork frequency, switch-on frequency, switch-off frequency, switch-on time and switch-off time, status, measured value, density switch.
- Matrix locking possible.
- Switch to WHG mode possible (WHG approval).
- For a detailed description see BA 1410.
- You can also visit www.profibus.com for more information.



Output signal

 = lit
 = unlit

Safety connection	Level	LEDs		FEL 50 A (PA)
		green	yellow	
not inverted				OUT_D = 0 PA bus signal
				OUT_D = 1 PA bus signal
inverted				OUT_D = 1 PA bus signal
				OUT_D = 0 PA bus signal

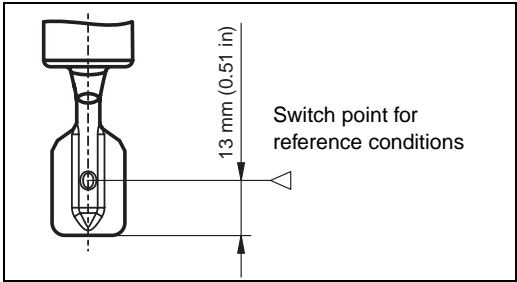
Signal on alarm

Failure information can be opened using the following interfaces:
yellow LED flashing, status code, diagnostic code

Connection and function

Connecting cables	<ul style="list-style-type: none"> • Electronic inserts: cross-section max. 2.5 mm², strand in ferrule to DIN 46228 • Protective earth in housing: cross-section max. 2.5 mm² • External equipotential bonding connection on housing: cross-section max. 4 mm²
Fail-safe mode	<p>Switch-over for minimum/maximum residual current safety on electronic insert</p> <p>Max. = maximum safety: The output switches to the power fail response when the fork is covered, for use with overflow protection for example.</p> <p>Min. = minimum safety: The output switches to the power fail response when the fork is exposed, for use with dry running protection for example.</p>
Switching time	<p>when fork is covered: approx. 0.5 s</p> <p>when fork is exposed: approx. 1.0 s (other switching times on request)</p> <p>additionally configurable for PROFIBUS PA: 0.5 s ... 60 s</p>
Switch-on behaviour	<p>when switching on the power supply the output assumes the alarm signal after max. 3 s it assumes the correct switching mode</p>

Performance characteristics

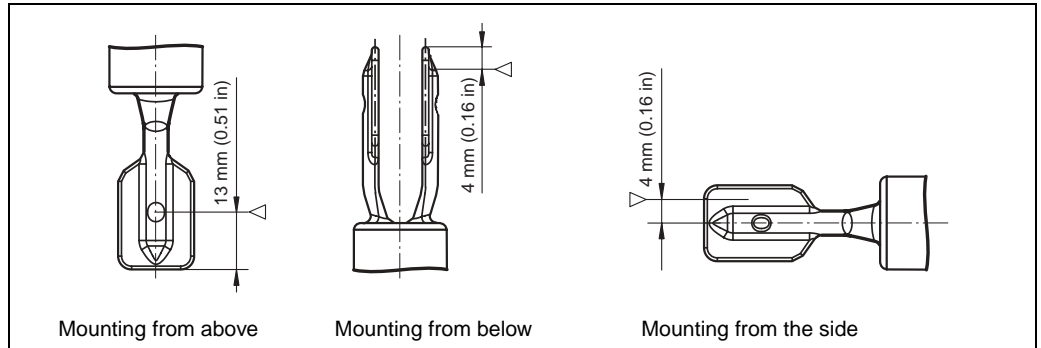
Reference operating conditions	<p>Ambient temperature: 23 °C (296 K)</p> <p>Medium temperature: 23 °C (296 K)</p> <p>Product density: 1 g/cm³ (water)</p> <p>Viscosity: 1 mm²/s</p> <p>Medium pressure p_e: 0 bar</p> <p>Sensor mounting: vertical from above</p> <p>Density switch: to > 0.7</p>	
Maximum measured error	specified by mounting position: max. ±1mm (0.04 in)	
Repeatability	0.1 mm (0.004 in)	
Hysteresis	approx. 2 mm (0.08 in)	
Influence of medium temperature	max. +1.4 mm ... -2.8 mm (+0.05 in ... -0.11 in) (-40 °C ... +120 °C (233 K ... 393 K))	
Influence of product density	max. +4.8 mm ... -3.5 mm (+0.19 in ... -0.14 in) (0.5 g/cm ³ ... 1.5 g/cm ³)	
Influence of medium pressure	max. 0 mm ... -2.0 mm (0 in ... -0.079 in) (0 bar ... 40 bar)	

Operating conditions

Installation

Installation instructions

Switch point \triangleright on the sensor depend on the mounting position, with reference to water, density 1 g/cm³, 23 °C (296 K), p_e 0 bar.



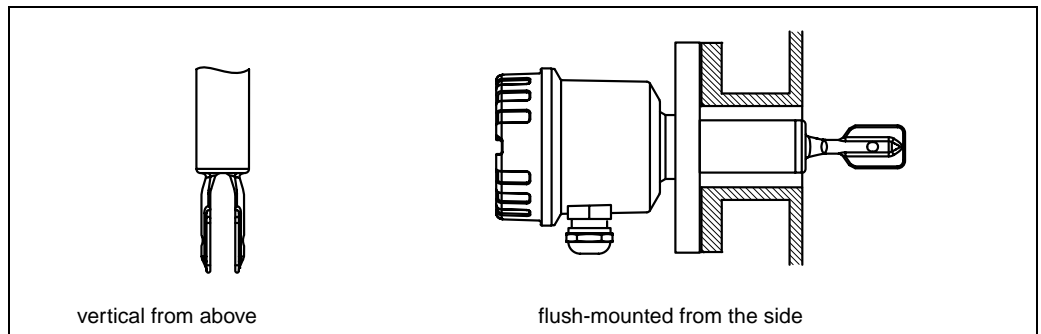
Note

The switchpoints of the Vibracon LVL-M2C are at other positions to those of the previous version LVL2.

Examples of mounting with regard to the viscosity ν of the liquid and the amount of build-up:

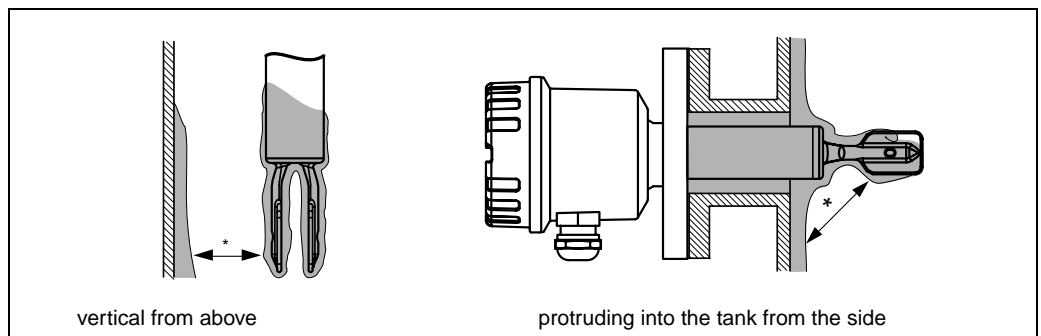
Optimum mounting, without problem even with high viscosity:

Position the fork so that the narrow edge of the tines is vertical. This ensures that the liquid can run off easily.



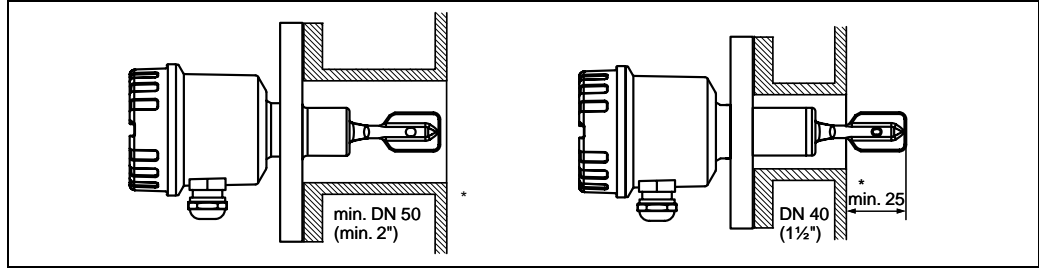
with build-up on the tank walls:

* Ensure that there is sufficient distance between the build-up expected on the tank wall and the fork.



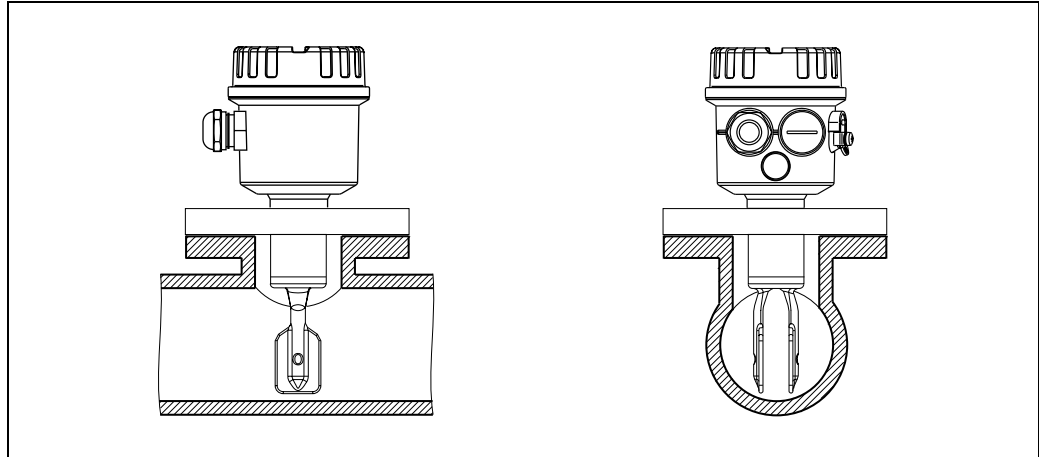
Mounting positions with low viscosity (up to 2000 mm²/s):

* deburr the nozzle surfaces

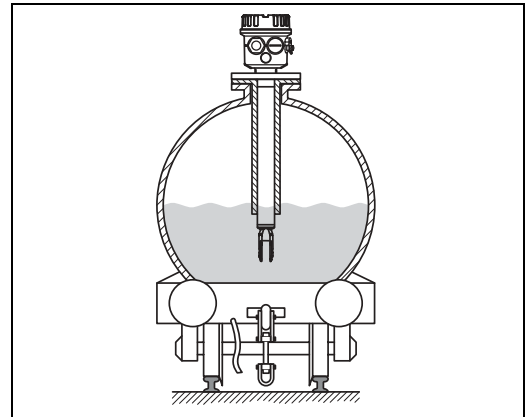


Mounting in piping from 2"

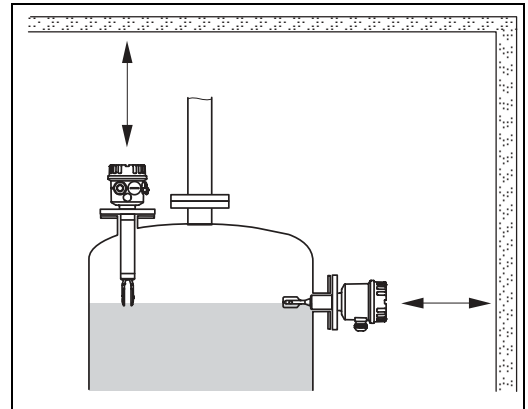
Fluid velocities up to 5 m/s for viscosity 1 mm²/s and density 1 g/cm³
(Check the function for other operating conditions.)



Support the Vibracon LVL-M2C
in the event of severe dynamic loads!



Ensure adequate space outside the tank for
mounting, electrical connection and
configuration!



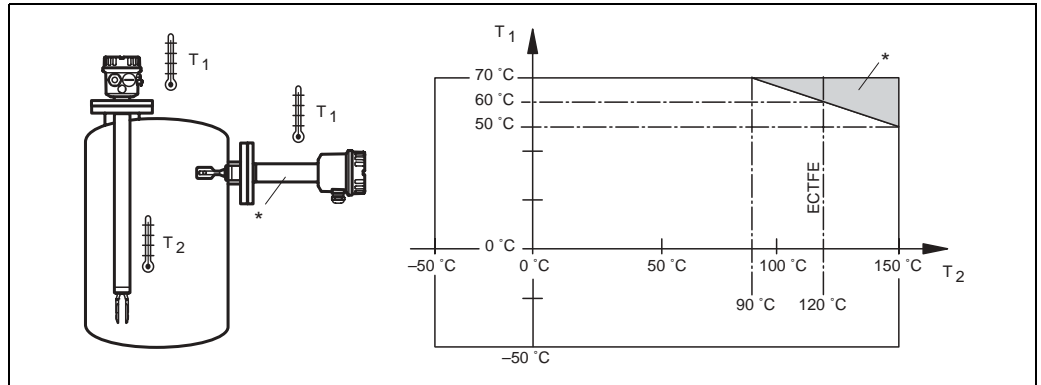
Orientation

LVL-M2C with short pipe (up to approx. 500 mm (19.7 in)) – any position,
LVL-M2C with long pipe – vertical

Environment

Ambient temperature range

Permitted ambient temperature T_1 at the housing depending on the medium temperature T_2 in the tank:



* additional temperature range for devices with a temperature spacer or pressure-tight bushing
The temperature difference between the process and ambient side ($T_2 - T_1$) of the flange may not exceed max. 60 °C (333 K). For this reason, the flange may have to be included in the tank insulation if necessary.

Ambient temperature limits

-50 °C ... +70 °C (223 K ... 343 K) (function with restricted data)

Storage temperature

-50 °C ... +80 °C (223 K ... 353 K)

Climate class

Climate protection to IEC 68, part 2-38, fig. 2a

Degree of protection

Polyester, steel and aluminium housings: IP66/IP67 to EN 60529

Vibration resistance

to IEC 68, part 2-6 (10 Hz ... 55 Hz, 0.15 mm, 100 cycles)

Electromagnetic compatibility

Interference emission to EN 61326, Electrical Equipment Class B

Interference immunity to EN 61326, annex A (Industrial) and NAMUR recommendation NE 21 (EMC)

If the fork tines are joined together on account of build-up, the useful signal is attenuated to such an extent that the original EMC values can no longer be completely observed (EN 61000-4-3 electromagnetic fields, EN 61000-4-6 HF coupling).

Medium conditions

Medium temperature range

-50 °C ... +120 °C (223 K ... 393 K), for exceptions see process connections

Thermal shock

max. 120 °C/s (120 K/s)

Medium pressure

$p_e = -1$ bar ... +40 bar over the entire temperature range, for exceptions see process connections

Test pressure

max. 100 bar (1.5 times the medium pressure p_e), no function during test pressure
burst pressure of diaphragm 200 bar

Pressure shock

max. 20 bar/s

State of aggregation

liquid

Density

min. 0.5 g/cm³
other density settings on request

Viscosity

max. 10000 mm²/s

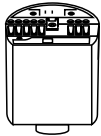
Solids content

max. Ø5 mm (0.2 in)

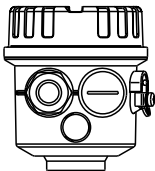
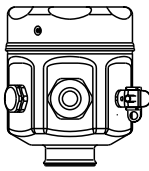
Mechanical construction

Design

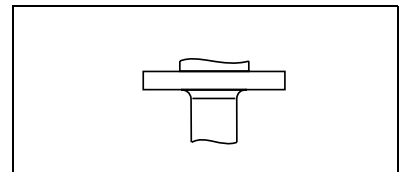
Summary of all electrical and mechanical versions
Plug-in electronic inserts to mount in the housing

	FEL 51 (AC):	Two-wire AC connection
	FEL 52 (E5):	Three-wire DC connection PNP
	FEL 54 (WA):	Universal current connection, 2 relay outputs
	FEL 55 (SI):	Output 16 mA/8 mA for separate switching unit
	FEL 56 (N1):	Output 0.6 mA ... 1.0 mA/2.2 mA ... 2.8 mA for separate switching unit (NAMUR)
	FEL 58 (N2):	Output 2.2 mA ... 3.5 mA/0.6 mA ... 1.0 mA for separate switching unit (NAMUR)
FEL 50 A (PA):	Digital communication PROFIBUS PA	

Housing

		
Polyester (PBT)	Stainless steel (1.4435 (AISI 316L))	Aluminium (also for EEx d), coated

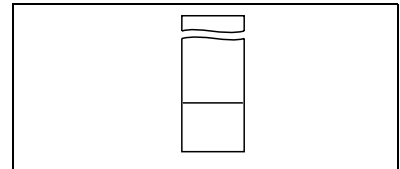
Process connections



Flanges to DIN, ANSI, JIS
 from DN 25/1"

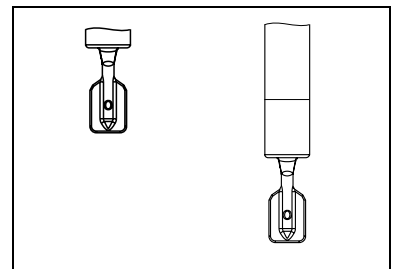
Bushings

Temperature spacer and pressure-tight bushing



Sensors

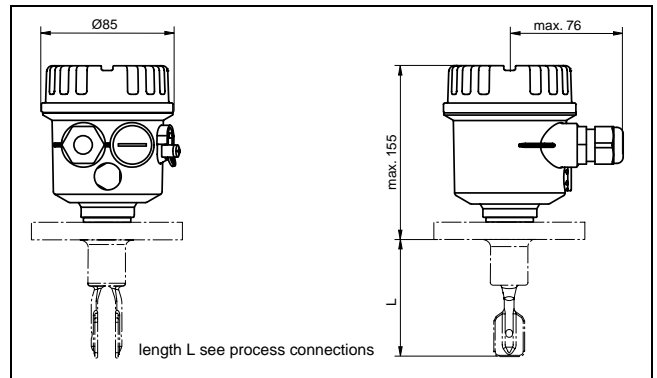
Compact or with extension pipe up to 3 m (10 ft)



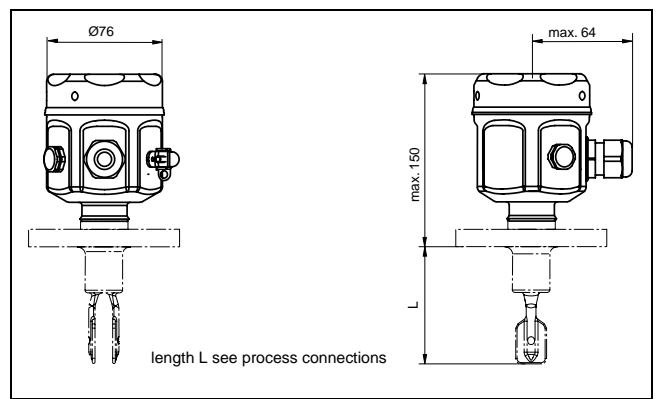
Dimensions

Housing and sensor LVL-M2C

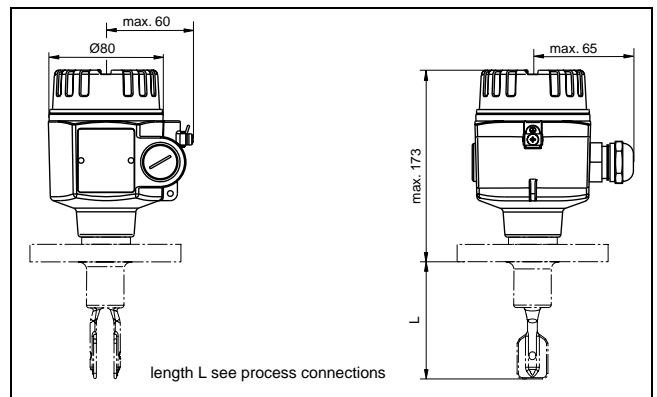
Polyester housing P*



Stainless steel housing E*



Aluminium housing A*



Note

The switchpoints of the Vibracon LVL-M2C are at other positions to those of the previous version LVL2.

Bushings: temperature spacer, pressure-tight bushing

additional length L 140 mm (5.5 in)

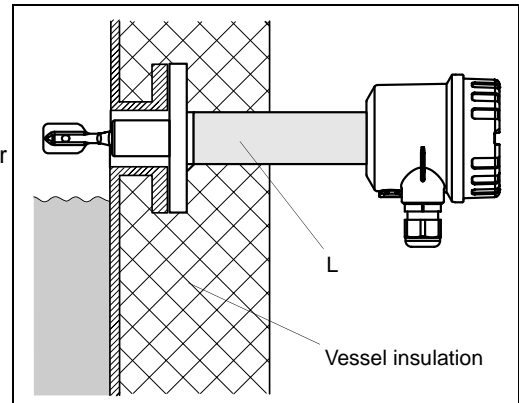
Temperature spacer

Provides sealed insulation for the vessel and normal ambient temperatures for the housing.

Pressure-tight bushing

Protects the housing from pressures up to 40 bar if the sensor is damaged.

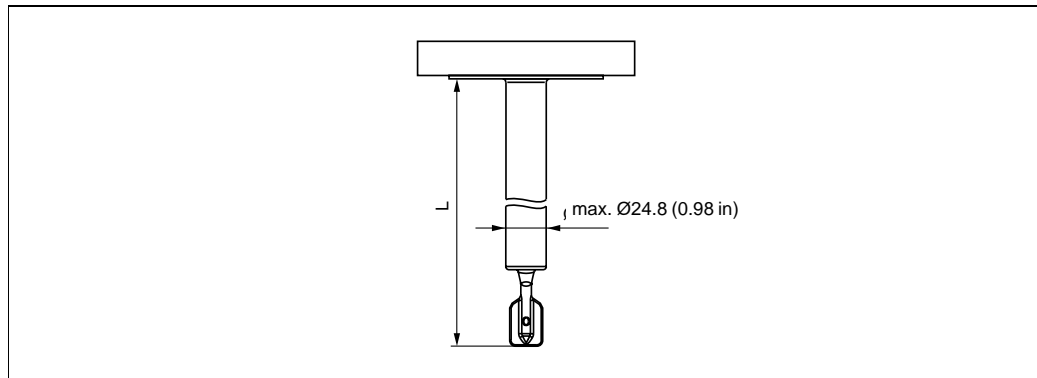
Provides sealed insulation for the vessel and normal ambient temperatures for the housing.



Process connections

Process connection		Dimensions	Accessories	Pressure/temperature
Flanges ANSI B 16.5 (RF) EN 1092-1 (DIN 2527 B) JIS B 2238 (RF)	A** H** J**		seal according to design installed on site in conformity with FDA*	see nominal pressure of flange, however max. 40 bar max. 150 °C (423 K)
* FDA approved materials according to 21 CFR part 177.1550/2600				

Sensor length L for LVL-M2C, depending on process connection



Extension tube: any length L 148 mm ... 3000 mm (6 in ... 115 in)

Note



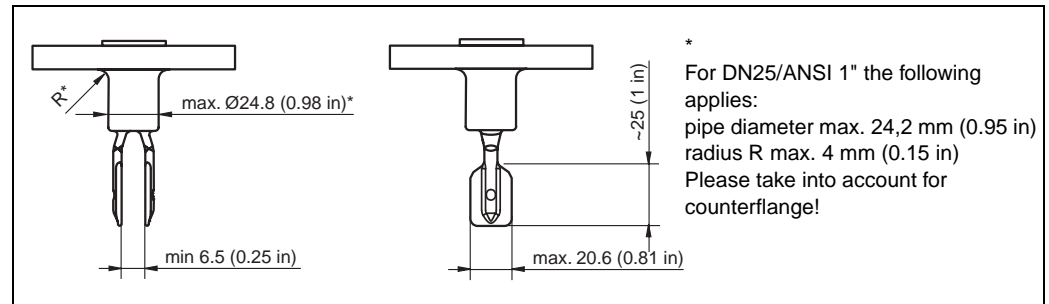
The switchpoints of the Vibracon LVL-M2C are at other positions to those of the previous version LVL2.

Extension tube: special length "L II" with vertical mounting from above the same switchpoint as for the Vibracon LVL2

"L II" depends on process connection: 115 mm (4.5 in)

Vibration fork

width 17.5 mm (0.7 in), fork width 10 mm (0.4 in), max. length 40.7 mm (1.6 in)

**Weights**

800 g, basic weight: compact sensor with electronic insert and polyester housing, additional weight is dependent on extension tube, housing and process connection

Additional weight

- Process connection:
 - A3H 1000 g, A5H 1500 g, A6H 2400 g, A6I 3200 g, A8H 4900 g
 - H35 1400 g, H65 2400 g, H71 1600 g, H75 3200 g, H95 5900 g, HA3 5600 g
 - J1H 1700 g
- Length, spacer, bushings:
 - BK* 900 g/m
 - CK* 2300 g/100 in
 - DKA 100 g, DKB 700 g, DKC 800 g

Material

- Wetted parts:
 - process connections and extension tube: 1.4435 (AISI 316L) with ECTFE coating
 - vibration fork: 1.4435 (AISI 316L) with ECTFE coating
- Housings:
 - Polyester housing: PBT-FR with PBT-FR cover or with PA12 cover with sight glass, cover seal: EPDM
 - Stainless steel housing: AISI 316L, cover seal: silicone
 - Aluminium housing: EN-AC-AISi10Mg, plastic-coated, cover seal: EPDM
- Cable gland: polyamide or brass, nickel-plated
- Temperature spacer: AISI 316L (1.4435)
- Pressure-tight bushing: AISI 316L (1.4435)

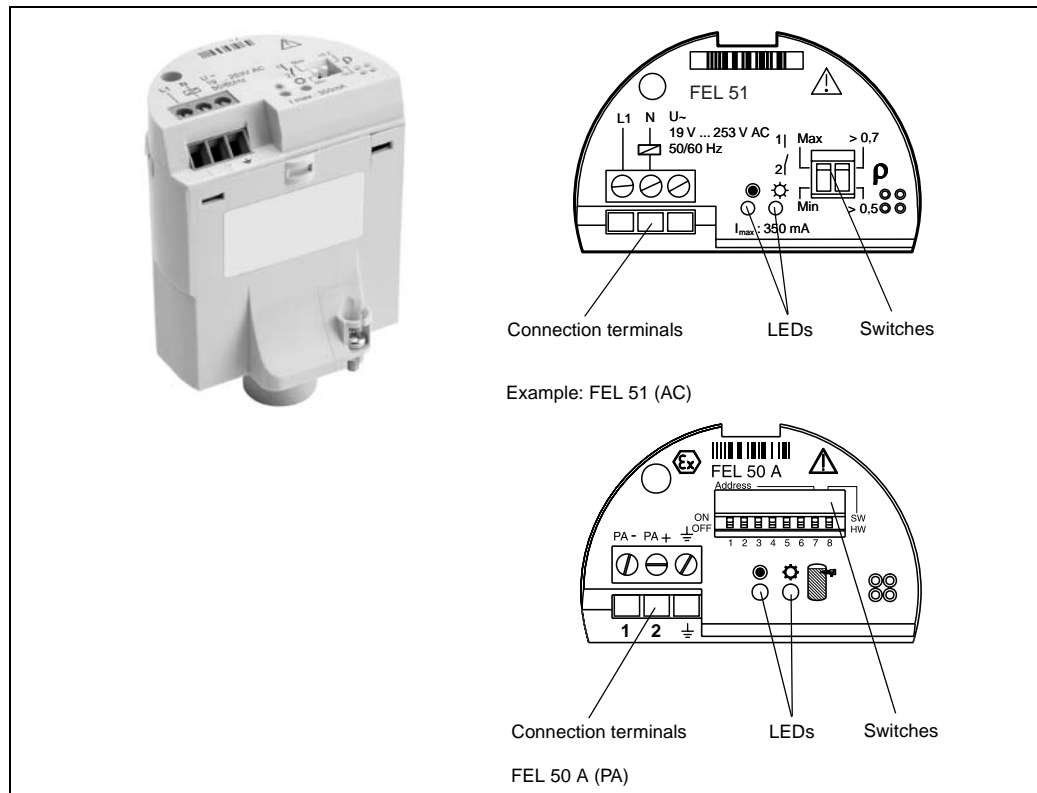
Surface quality $R_a < 3.2 \mu\text{m}/80$ grit: length, spacer, bushings B**, C**, D****Process connection**

Flanges to EN/DIN from DN25, for standards see process connections, to ANSI B 16.5 from 1", to JIS B 2238 (RF) from DN 50

Indication and operation

Overview indication and operation

Electronic inserts



Indicating elements

Electronic inserts

- Electronic insert FEL 50 A (PA):
 - green LED to display standby, pulsing to display communication
 - yellow LED to display switching state, flashing on corrosion damage to sensor or for defective electronics
- Electronic inserts FEL 51 (AC), FEL 52 (E5), FEL 54 (WA), FEL 55 (SI):
 - green standby LED
 - red LED for switch state indication is flashing in case of corrosion failure on the sensor or in case of electronic error
- Electronic insert FEL 56 (N1):
 - green standby LED flashes
 - red LED for switch state indication is flashing in case of corrosion failure on the sensor or in case of electronic error
- Electronic insert FEL 58 (N2):
 - green standby LED flashes quickly, LED is slowly flashing in case of corrosion failure on the sensor or in case of electronic error
 - yellow LED for switch state indication

Operating elements

Electronic inserts

- Electronic insert FEL 50 A (PA): 8 switches for device address setting
- Electronic inserts FEL 51 (AC), FEL 52 (E5), FEL 54 (WA), FEL 55 (SI), FEL 56 (N1): two switches for fail-safe mode and density change
- Electronic insert FEL 58 (N2): two switches for fail-safe mode and density change and one test button interrupts lead

Operating concept

On-site configuration

Certificates and approvals

Combination of housings and electronic inserts

Based on the various certificates, permissible combinations of housings and electronic inserts are given in the following table.

	Certificate, applications	Housings	Electronic inserts
NA	without any special certificate (for non-hazardous area)	P1, P2, P3, P4, P5 E1, E2, E3, E4, E5 A1, A2, A3, A4, A5	FEL 51 (AC), FEL 52 (E5) FEL 54 (WA), FEL 55 (SI) FEL 56 (N1), FEL 58 (N2) FEL 50 A (PA)
WH	Overspill protection WHG	P1, P2, P3, P4, P5 E1, E2, E3, E4, E5 A1, A2, A3, A4, A5	FEL 51 (AC), FEL 52 (E5) FEL 54 (WA), FEL 55 (SI) FEL 56 (N1), FEL 58 (N2) FEL 50 A (PA)
EB	⊗ II 1/2G EEx ia IIC T6, WHG	P1, P2, P3, P4, P5 E1, E2, E3, E4, E5 A1, A2, A3, A4, A5	FEL 55 (SI), FEL 56 (N1) FEL 58 (N2), FEL 50 A (PA)
	⊗ II 1/2 D, T80°C	E1, E2, E3, E4, E5 A1, A2, A3, A4, A5	FEL 51 (AC), FEL 52 (E5), FEL 55 (SI), FEL 56 (N1), FEL 58 (N2), FEL 50 A (PA)
EC	⊗ II 1/2G EEx d IIC T6, WHG	A1, A2, A3, A4, A5	FEL 51 (AC), FEL 52 (E5) FEL 54 (WA), FEL 55 (SI) FEL 56 (N1), FEL 58 (N2) FEL 50 A (PA)
EF	⊗ ATEX II 1/2G EEx ia IIB T6, WHG	P1, P2, P3, P4, P5 E1, E2, E3, E4, E5 A1, A2, A3, A4, A5	FEL 55 (SI), FEL 56 (N1), FEL 58 (N2), FEL 50 A (PA)
EG	⊗ ATEX II 1/2G EEx d IIB T6, WHG	A1, A2, A3, A4, A5	FEL 51 (AC), FEL 52 (E5) FEL 54 (WA), FEL 55 (SI) FEL 56 (N1), FEL 58 (N2) FEL 50 A (PA)
EI	⊗ ATEX II 1/2G EEx ia IIC* T6, WHG	P1, P2, P3, P4, P5 E1, E2, E3, E4, E5 A1, A2, A3, A4, A5	FEL 55 (SI), FEL 56 (N1), FEL 58 (N2), FEL 50 A (PA)
EK	⊗ ATEX II 1/2G EEx d IIC* T6, WHG	A1, A2, A3, A4, A5	FEL 51 (AC), FEL 52 (E5) FEL 54 (WA), FEL 55 (SI) FEL 56 (N1), FEL 58 (N2) FEL 50 A (PA)
FI	FM, IS, CI I, II, III, Div1, Group A–G	A2, E2, P2	FEL 55 (SI), FEL 56 (N1), FEL 58 (N2)
FN	FM, NI, CI I, Div2, Group A–D	A2, E2 P2	FEL 51 (AC), FEL 52 (E5) FEL 54 (WA), FEL 55 (SI) FEL 56 (N1), FEL 58 (N2) FEL 51 (AC), FEL 52 (E5) FEL 55 (SI), FEL 56 (N1), FEL 58 (N2)
FX	FM, XP, CI I, II, III, Div1, Group A–G	A2	FEL 51 (AC), FEL 52 (E5) FEL 54 (WA), FEL 55 (SI) FEL 56 (N1), FEL 58 (N2)
CG	CSA, General Purpose	A2, E2 P2	FEL 51 (AC), FEL 52 (E5) FEL 54 (WA), FEL 55 (SI) FEL 56 (N1), FEL 58 (N2) FEL 51 (AC), FEL 52 (E5) FEL 55 (SI), FEL 56 (N1), FEL 58 (N2)
CI	CSA, IS, CI I, II, III, Div1, Group A–G	A2, E2, P2	FEL 55 (SI), FEL 56 (N1) FEL 58 (N2)
CX	CSA, XP, CI I, II, III, Div1, Group A–G	A2	FEL 51 (AC), FEL 52 (E5) FEL 54 (WA), FEL 55 (SI) FEL 56 (N1), FEL 58 (N2)

* with note: "Avoid electrostatic charge!"

Ordering information

Product structure



Specification of length without unit

Certificates

- NA** for non-hazardous areas
- WH** WHG overspill protection
- EB** II 1/2G EEx ia IIC T6, WHG
- EC** II 1/2G EEx d IIC T6, WHG
- EF** II 1/2 G EEx ia IIB T6, WHG
- EG** II 1/2 G EEx d IIB T6, WHG
- EI** II 1/2 G EEx ia IIC T6, WHG
- EK** II 1/2 G EEx d IIC T6, WHG
- FI** FM, IS, Cl I, II, III, Div1, Group A-G
- FN** FM, NI, Cl I, Div2, Group A-D
- FX** FM, XP, Cl I, II, III, Div1,, Group A-G
- CG** CSA, General Purpose
- CI** CSA, IS, Cl I, II, III, Div1, Group A-G
- CX** CSA, XP, Cl I, II, III, Div1, Group A-G

Optional equipment

- NA** without optional equipment
- TD** special version

Electronic insert

- PA** FEL 50 A, PROFIBUS PA
- AC** FEL 51, contactless 2-wire switch, 19 V ... 253 V AC
- E5** FEL 52, PNP 3-wire, 10 V ... 55 V DC
- WA** FEL 54, potential-free change-over contact, DPDT, 19 V ... 253 V AC, 19 V ... 55 V DC
- SI** FEL 55, 8/16 mA, 11 V ... 36 V DC
- N1** FEL 56, NAMUR, L-H edge
- N2** FEL 58, NAMUR with push button, H-L edge

Housing, cable entry

- A1** aluminium housing, IP66, cable gland M20
- A2** aluminium housing, Nema 4x, ¼ NPT
- A3** aluminium housing, IP66, entry G½A
- A4** aluminium housing, IP66, plug connector M12 x 1
- A5** aluminium housing, IP66, PA plug connector M12 x 1
- E1** 1.4301-housing, IP66, cable gland M20
- E2** 1.4301-housing, Nema 4x, ½ NPT
- E3** 1.4301-housing, IP66, entry G½A
- E4** 1.4301-housing, IP66, plug connector M12 x 1
- E5** 1.4301-housing, IP66, PA plug connector M12 x 1
- P1** polyester housing, IP66, cable gland M20
- P2** polyester housing, Nema 4x, ½ NPT
- P3** polyester housing, IP66, entry G½A
- P4** polyester housing, IP66, plug connector M12 x 1
- P5** polyester housing, IP66, PA plug connector M12 x 1

Temperature spacer, pressure-tight bushing

- A** without option
- B** temperature spacer
- C** pressure-tight bushing
- Y** special version

Length, material extension tube

- BK** mm L, 1.4435/316L, ECTFE
- CK** in L, 1.4435/316L, ECTFE
- DK** special length L II, 1.4435/316L, ECTFE, switch point = Vibracon compact

Process connection and material

- A3H** ANSI 1", 150 lbs RF, 1.4435/316L, ECTFE
- A5H** ANSI 1½", 150 lbs RF, 1.4435/316L, ECTFE
- A6H** ANSI 2", 150 lbs RF, 1.4435/316L, ECTFE
- A6I** ANSI 2", 300 lbs RF, 1.4435/316L, ECTFE
- A8H** ANSI 3", 150lbs RF, 1.4435/316L, ECTFE
- H35** DN25 PN40 Form B, 1.4435/316L, ECTFE
- H65** DN40 PN40 Form B, 1.4435/316L, ECTFE
- H71** DN50 PN6 Form B, 1.4435/316L, ECTFE
- H75** DN50 PN40 Form B, 1.4435/316L, ECTFE
- H95** DN80 PN40 Form B, 1.4435/316L, ECTFE
- HA3** DN100 PN16 Form B, 1.4435/316L, ECTFE
- J1H** JIS RF 10 K 50, 1.4435/316L, ECTFE
- XXX** special version

Design

- M2** extended design (148 mm/6 in ... 3,000 mm/115 in)

Supplementary documentation

- Operating manual KA 1620
- Operating manual BA 1410 (electronic insert FEL 50 A (PA))
- Safety information SI 0310-C (KEMA 01 ATEX 2117)
- Safety information SI 0630-C (KEMA 01 ATEX 1089)
- Safety information SI 0640-B (KEMA 01 ATEX 1147 X)
- Safety information SI 1130-C (KEMA 01 ATEX 1148 X)
- Safety information SI 1140-B (KEMA 01 ATEX 2118 X)
- Safety information SI 1540-A (KEMA 01 ATEX 1089), PROFIBUS PA version
- Safety information SI 1580-B (KEMA 01 ATEX 1148 X), PROFIBUS PA version
- Safety information SI 1820-A
- Safety information ZE 2330 (Z-65.11-306)




Directive conformity

Directive conformity 89/336/EC (EMC)

- Emitted interference to EN 61326, class B equipment
- Interference immunity to EN 61326, annex A (industrial sector) and NAMUR EMC recommendation (NE 21)

Directive 94/9/EC (ATEX)

Approval

KEMA 01 ATEX 2117,  II 1/2 G EEx d IIC/IIB T3 ... T6KEMA 01 ATEX 2118,  II 1/2 G EEx d IIC T3 ... T6KEMA 01 ATEX 1089,  II 1/2 G (1/2 D T80°C)
EEx ia/ib IIC/IIB T3 ... T6KEMA 01 ATEX 1147 X,  II 1 G EEx ia IIC/IIB T3 ... T6KEMA 01 ATEX 1148 X,  II 1/2 G EEx ia/ib IIC T3 ... T6 II 3 G EEx nA/nC II T6

Directive 73/23/EC (Low Voltage Directive) EN 61010-1

Standards

EN 61326, EN 61010-1,
EN 50014, EN 50020,
EN 50284, IEC 60079-14
EN 61326, EN 61010-1,
EN 50014, EN 50020,
EN 50284, IEC 60079-14
EN 61326, EN 61010-1,
EN 50014, EN 50020,
EN 50284
EN 61326-1, EN 50081-1,
EN 50082-1, EN 61010-1,
EN 50014, EN 50020,
EN 50284
EN 61326-1, EN 50081-1,
EN 50082-1, EN 61010-1,
EN 50014, EN 50020,
EN 50284
EN 61326-1, EN 61010-1,
EN 50021, EN 50281-1-1

**Supplementary
informations**

EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. For information see www.pepperl-fuchs.com.

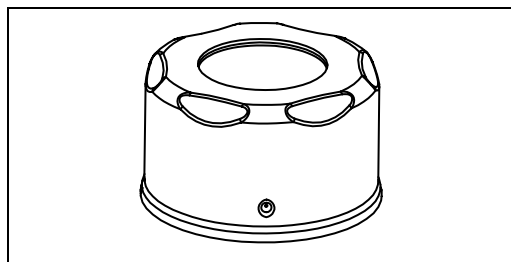
Accessories

Cover with sight glass

Model number:
LVL-Z108 (with glass sight glass)
LVL-Z109 (with PC sight glass (not for CSA,
General Purpose))

for stainless steel housing E*

Material: 1.4435 (AISI 316L)
Weight: 160 g

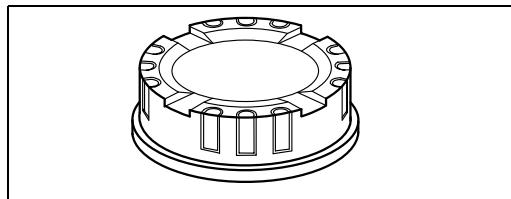


Transparent cover

Model number: LVL-Z110

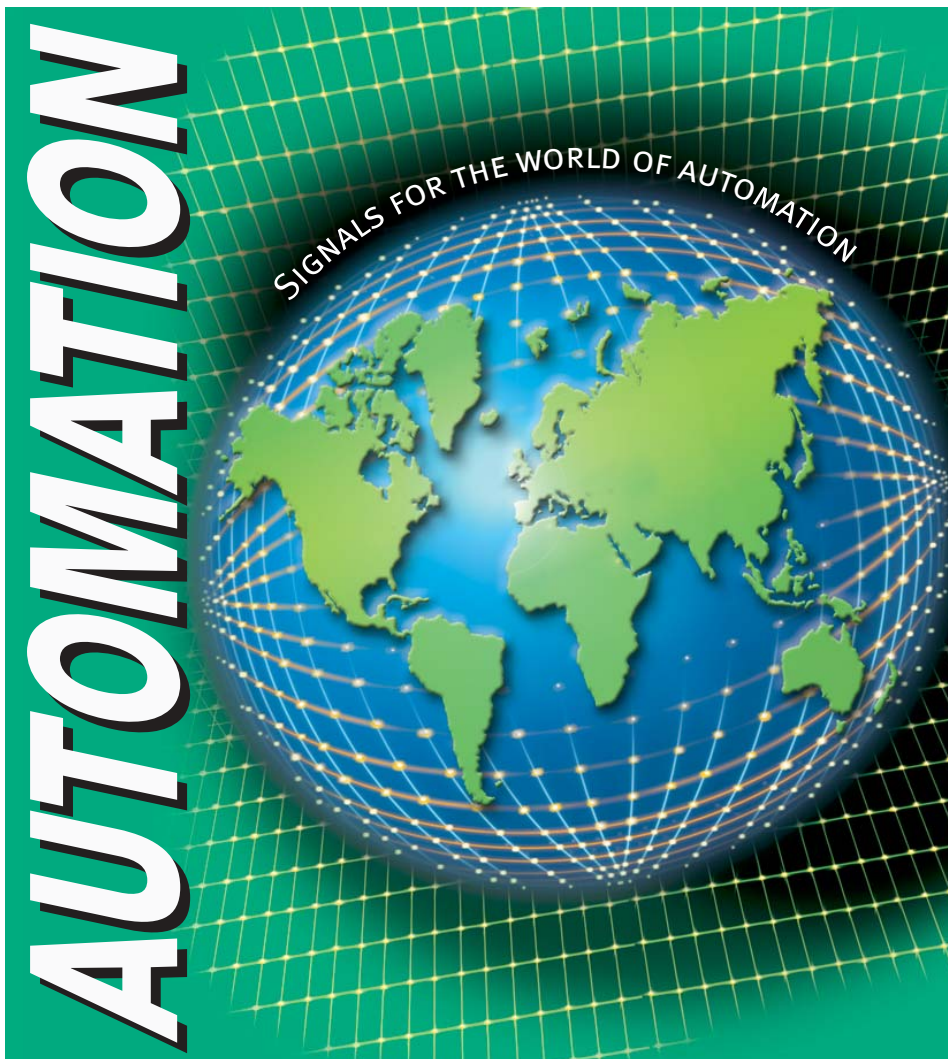
for polyester housing P*

Material: PA 12
Weight: 40 g



With regard to the supply of products, the current issue of the following document is applicable: The General Terms of Delivery for Products and Services of the Electrical Industry, published by the Central Association of the "Elektrotechnik und Elektroindustrie (ZVEI) e.V." including the supplementary clause: "Erweiterter Eigentumsvorbehalt".

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