

## Vibracon LVL-M1, LVL-M1H Vibracon LVL-M2, LVL-M2H

**Level limit switch for all liquids.  
Suitable for use in hazardous areas, food  
and pharmaceuticals**



**LVL-M1:**  
compact design, ideal for mounting in pipes and for installation in areas difficult to access

**LVL-M2:**  
with extension pipe up to 3 m (115 in)  
(6 m (20 ft) on request)

**LVL-M1H, LVL-M2H:**  
with polished tuning fork and easy-to-clean process connections and housings for food and pharmaceutical applications

High corrosion-resistant Alloy C4 (2.4610) is available for the fork and process connections for applications in very aggressive liquids.

EEx ia and EEx d protection enable it to be used in hazardous areas.

### Features

- Use in safety systems requiring functional safety to SIL2 in accordance with IEC 61508/IEC 61511-1
- Large number of process connections to choose from: universal usage
- 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 quick and easy
- FDA approved materials

### Application

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

- for temperatures of -50 °C to +150 °C (223 K ... 423 K)
- for pressures up to 64 bar
- for viscosity up to 10000 mm<sup>2</sup>/s
- for densities 0.5 g/cm<sup>3</sup> or 0.7 g/cm<sup>3</sup> (other settings available on request)
- foam detection on request

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

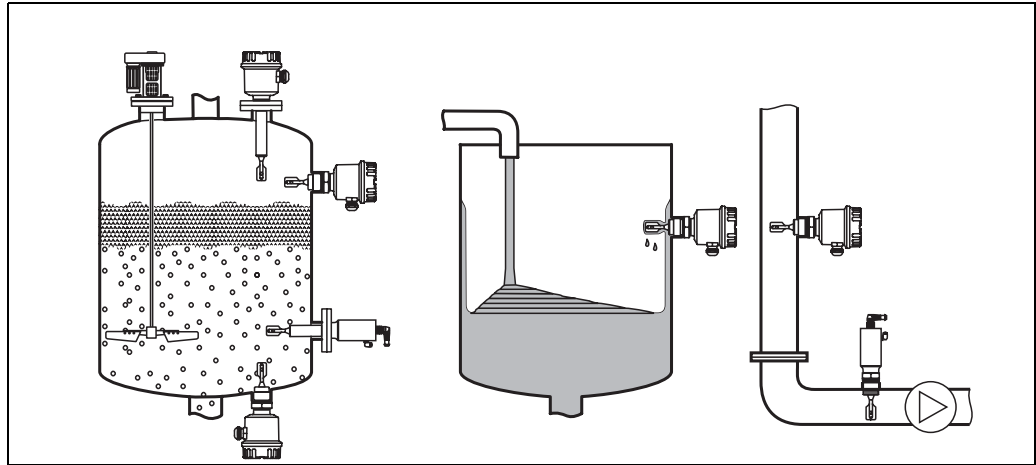
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## Application

### Level limit detection

Maximum or minimum detection in tanks or pipes containing all kinds of liquids, including use in hazardous areas, food and pharmaceuticals.



## Function and system design

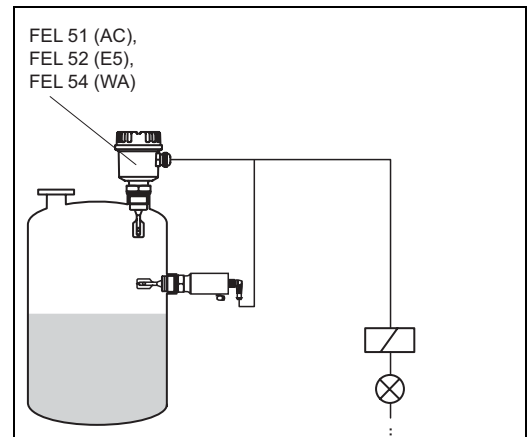
### Measuring principle

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

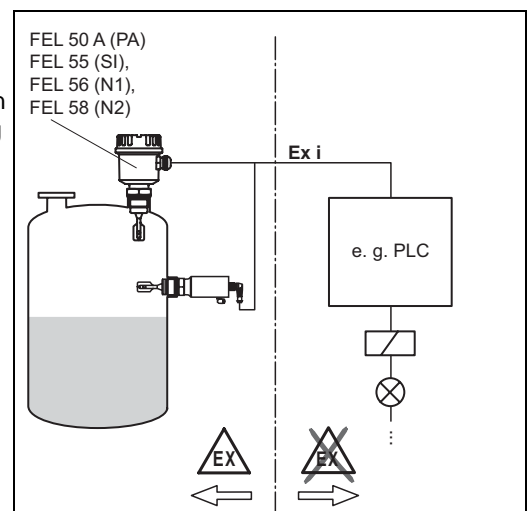
#### Level limit switch

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



#### Level sensor

Vibracon LVL-M\*\* 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



<b>Electronic versions for level limit switches</b>	<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>
<b>Electronic versions for level sensor</b>	<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>
<b>Galvanic isolation</b>	<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>
<b>Design</b>	<p>Vibracon LVL-M1: compact</p> <p>Vibracon LVL-M2: with extension pipe</p> <p>Vibracon LVL-M1H: compact, with polished tuning fork and hygienic process connections</p> <p>Vibracon LVL-M2H: with extension pipe, polished tuning fork and hygienic process connections</p>

## Input

<b>Measured variable</b>	Level (limit value)
<b>Measuring range (detection range)</b>	<p>Vibracon LVL-M1*: depends on mounting point.</p> <p>Vibracon LVL-M2*: depends on mounting point and the pipe extension, standard 3000 mm (115 in) (up to 6000 mm (20 ft) on request)</p>
<b>Product density</b>	Adjustment on the electronic insert > 0.5 g/cm <sup>3</sup> or > 0.7 g/cm <sup>3</sup> (other on request)

## Electronic insert FEL 51 (AC)

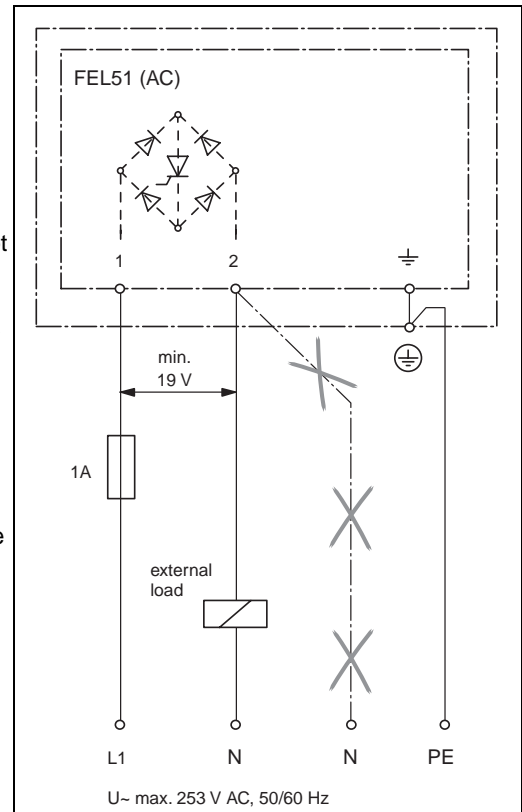
### Electrical connection

#### 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 FEL 51 (AC) in compact housing

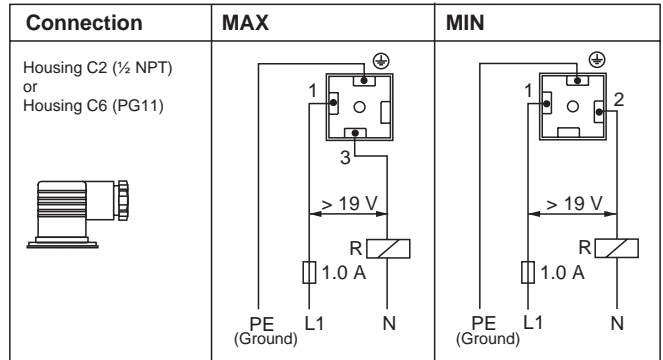
### Electrical connection

#### 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).



### Output signal

$I_L$  = load current (switched through)

< 3.8 mA = residual current (blocked)



= lit



= unlit

Safety connection	Level	Output signal	LEDs green red
Max.		1 $\xrightarrow{I_L}$ 3	
		1 $\xrightarrow{< 3.8 \text{ mA}}$ 3	
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 mA

### Connectable load

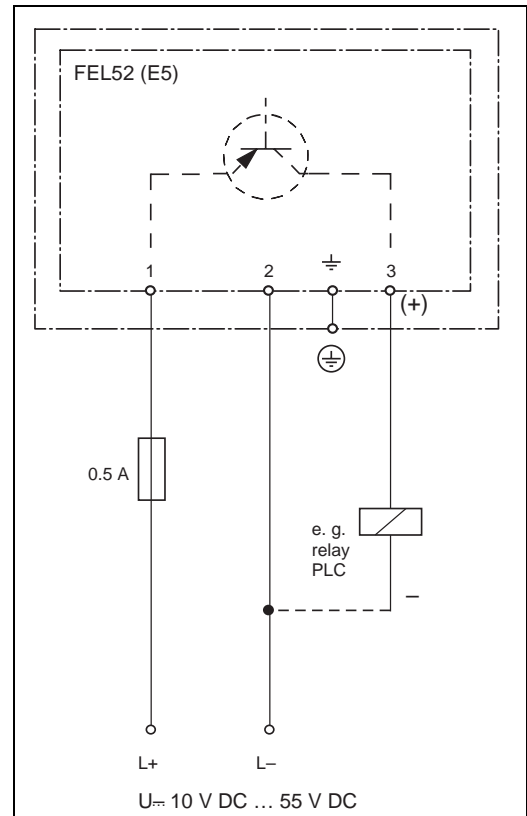
- Permitted for relay with a holding power/rated power > 2.5 VA for 253 V (10 mA), min. 0.5 VA for 24 V (20 mA)
- Relays with a lower holding power/rated power can be operated by means of an RC module connected in parallel (option).
- Load switched directly into the power supply circuit via the thyristor
  - transient (40 ms) max. 1.5 A, max. 375 VA at 253 V or max. 36 VA at 24 V (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.		$L+ \xrightarrow{I_L} 3$	
		$1 \xrightarrow{< 100 \mu A} 3$	
Min.		$L+ \xrightarrow{I_L} 3$	
		$1 \xrightarrow{< 100 \mu A} 3$	

### 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  $\mu F$  at 55 V, max. 1.0  $\mu F$  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

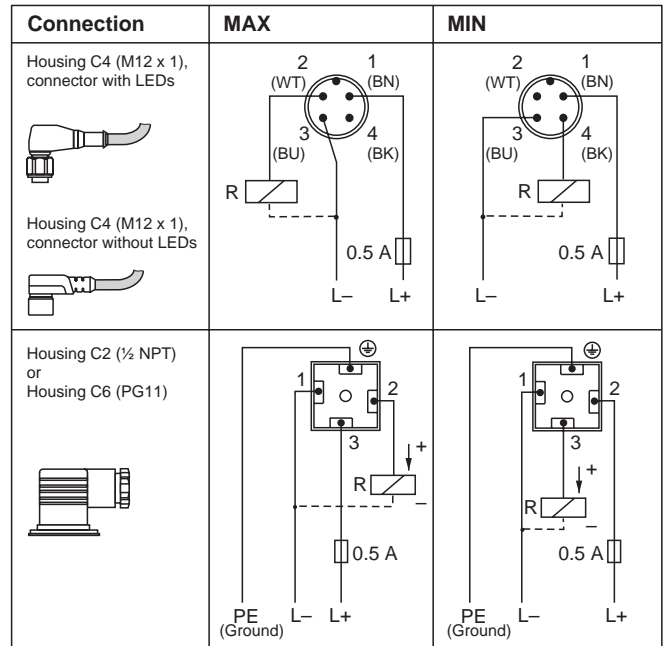


## Electronic FEL 52 (E5) in compact housing

### 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

#### with valve connector

$I_L$  = load current (switched through)

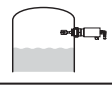

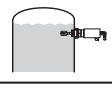

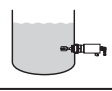

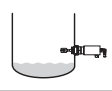

$< 100 \mu A$  = residual current (blocked)



= lit



= unlit

Safety connection	Level	Output signal	LEDs green red
Max.		$L+ \xrightarrow{I_L} 2$ $3 \xrightarrow{+}$	
		$L+ \xrightarrow{< 100 \mu A} 2$ $3 \xrightarrow{+}$	
Min.		$L+ \xrightarrow{I_L} 3$ $2 \xrightarrow{+}$	
		$L+ \xrightarrow{< 100 \mu A} 3$ $2 \xrightarrow{+}$	

with M12 x 1 connector (without LEDs)



$I_L$  = load current (switched through)  
 $< 100 \mu A$  = residual current (blocked)



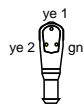
= lit



= unlit

Safety connection	Level	Output signal	LEDs
Max.		$L+ \xrightarrow{I_L} -$ 1 ————— 2	
		$L+ < 100 \mu A \xrightarrow{-} -$ 1 ————— 2	
Min.		$L+ \xrightarrow{I_L} -$ 1 ————— 4	
		$L+ < 100 \mu A \xrightarrow{-} -$ 1 ————— 4	

with M12 x 1 connector (with LEDs)



$I_L$  = load current (switched through)  
 $< 100 \mu A$  = residual current (blocked)



= lit



= unlit

Safety connection	Level	Output signal	LEDs
Max.		$L+ \xrightarrow{I_L} -$ 1 ————— 2	
		$L+ < 100 \mu A \xrightarrow{-} -$ 1 ————— 2	
Min.		$L+ \xrightarrow{I_L} -$ 1 ————— 4	
		$L+ < 100 \mu A \xrightarrow{-} -$ 1 ————— 4	

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  $\mu F$  at 55 V, max. 1.0  $\mu F$  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

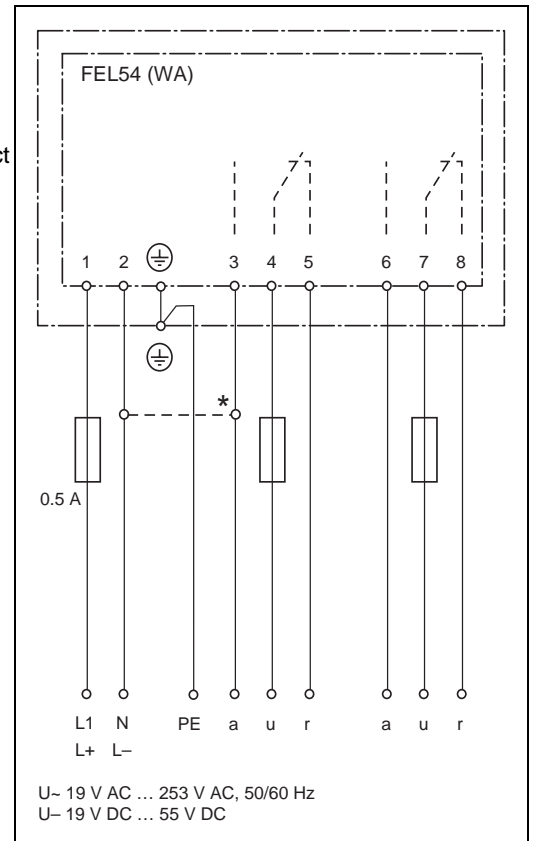
# Electronic insert FEL 54 (WA)

## 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	
		3 4 5	6 7 8	green	red
Max.					
Min.					

## 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

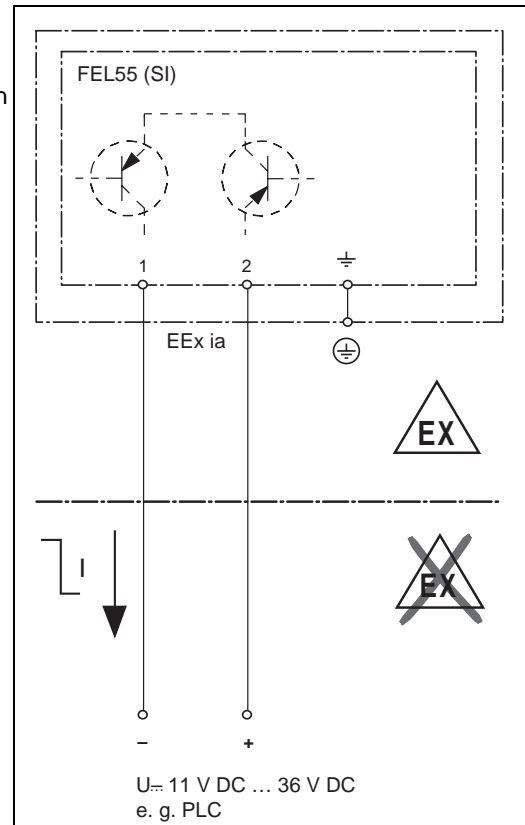
19 V AC ... 253 V AC voltage, 50/60 Hz or 19 V DC ... 55 V DC voltage  
Power consumption max. 1.3 W  
Reverse polarity protection  
Overvoltage protection FEL 54 (WA): overvoltage category III

## 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)**



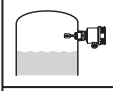

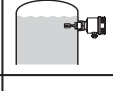
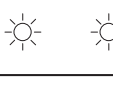
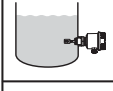

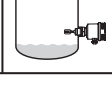
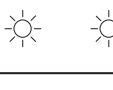
### Output signal

~ 16 mA = 16 mA ± 5 %

~ 8 mA = 8 mA ± 6 %

 = lit

 = unlit

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

### 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

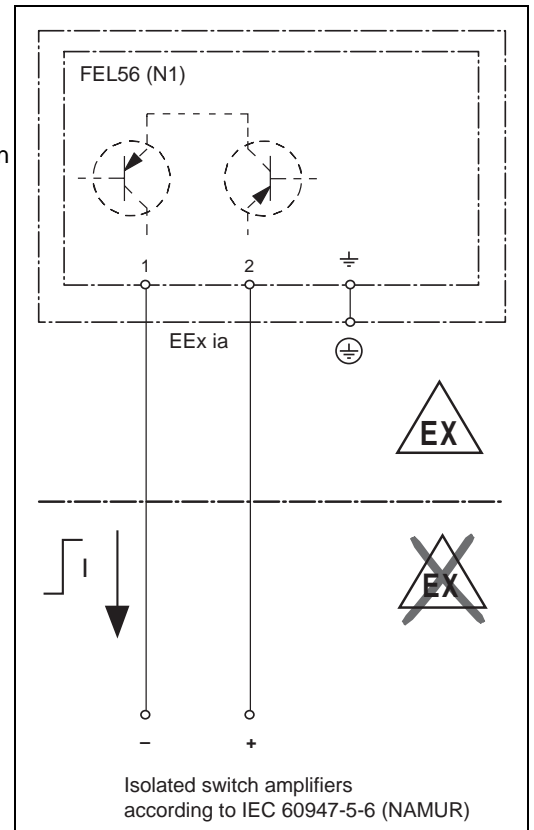
## Electronic insert FEL 56 (N1)

### Electrical connection




#### Two-wire connection for separate switching unit

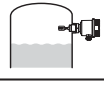

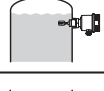

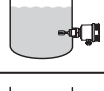

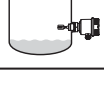

- for connecting to isolating amplifiers acc. to NAMUR (IEC 60947-5-6), e. g. isolating amplifier KFD2-SR2-Ex1.W or remote process interface KSD-BI-Ex2 from Pepperl+Fuchs
- Output signal jump from low to high current on limit. **(L-H edge)**

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

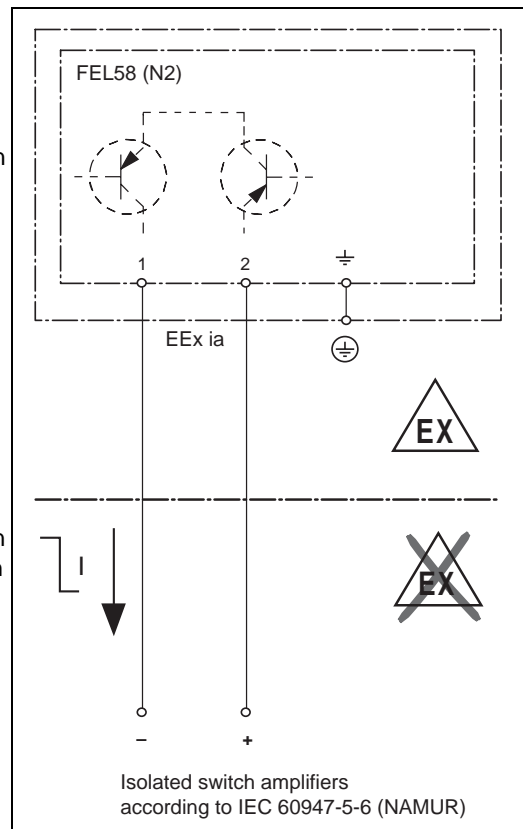
Pressing the key breaks the connection to the isolating amplifier.

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 ... 2 - 3.5 mA → 1	 
		+ 0.6 mA ... 2 - 1.0 mA → 1	 
Min.		+ 2.2 mA ... 2 - 3.5 mA → 1	 
		+ 0.6 mA ... 2 - 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 FEL 58 (N2) in compact housing

### Electrical connection

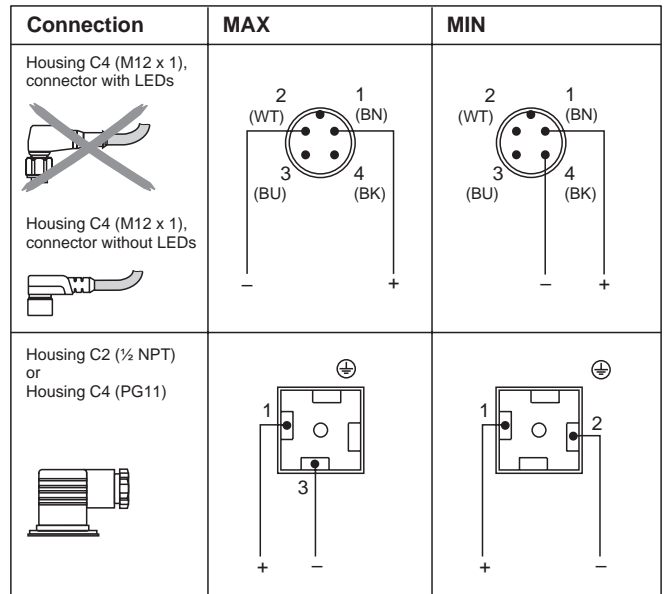
#### Two-wire connection for separate switching unit

- 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:  
If the test magnet is held against the marking on the nameplate, the output signal is inverted.

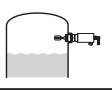


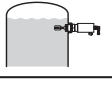


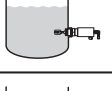


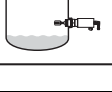


Connecting to multiplexer:  
set clock time to min. 3 s.

**Note**  
The NAMUR interface has a defined power consumption thus, it is not possible to use the M12 connector with integrated LED.



### Output signal

-  = lit
-  = flashes
-  = unlit

Safety connection	Level	Output signal	LEDs green yellow
Max.		+ 2.2 mA ... 3.5 mA - 1 → 3	 
		+ 0.6 mA ... 1.0 mA - 1 → 3	 
Min.		+ 2.2 mA ... 3.5 mA - 1 → 2	 
		+ 0.6 mA ... 1.0 mA - 1 → 2	 

### 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)

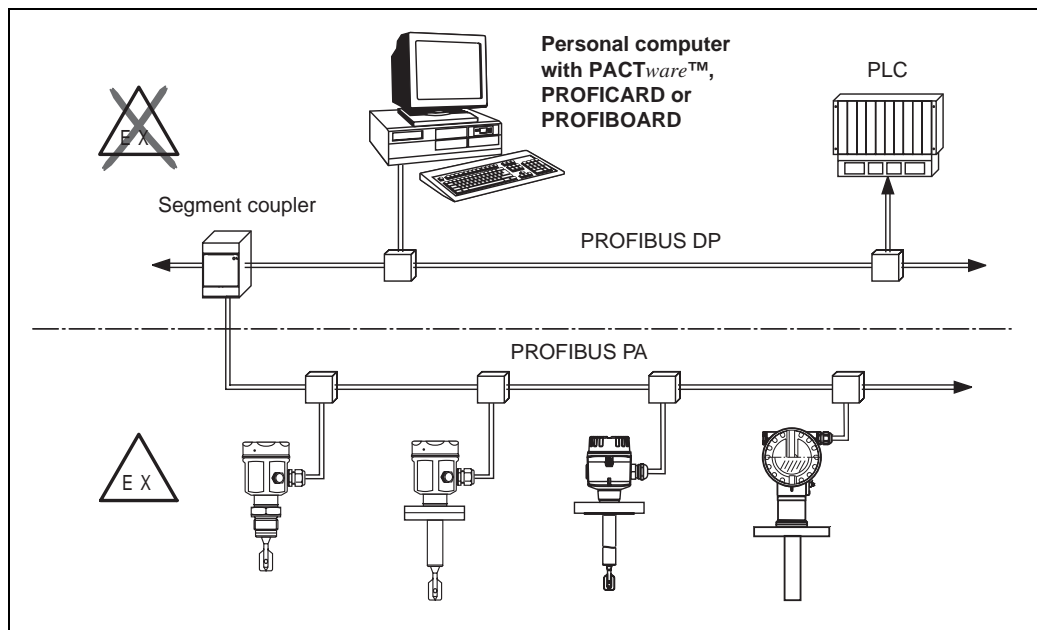
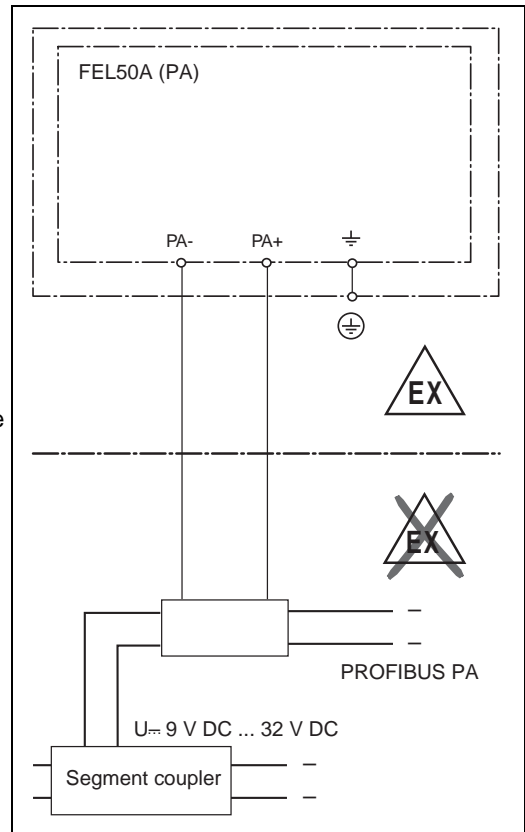
**Electrical connection**

**Two-wire connection for power supply and data transfer**

for connecting to PROFIBUS PA



Additional functions:

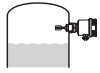


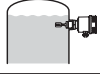


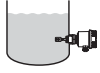


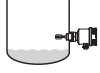


- Digital communication enables the representation, reading and editing of the following parameters: fork frequency, switch-on frequency, switch-off frequency, switch-on time and switch-off time, status, measured value, density switch.
- Matrix locking possible.
- Switch to WHG mode possible (WHG approval).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

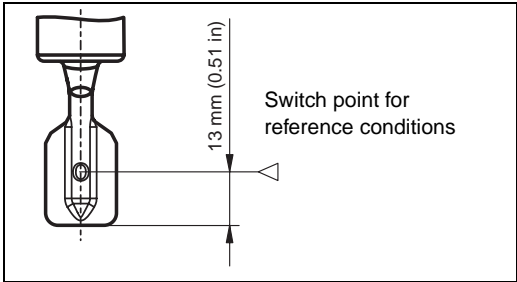
**Signal on alarm**

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

## Connection and function

<b>Connecting cables</b>	<ul style="list-style-type: none"> <li>• Electronic inserts: cross-section max. 2.5 mm<sup>2</sup>, strand in ferrule to DIN 46228</li> <li>• Protective earth in housing: cross-section max. 2.5 mm<sup>2</sup></li> <li>• External equipotential bonding connection on housing: cross-section max. 4 mm<sup>2</sup></li> </ul>
<b>Fail-safe mode</b>	<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>
<b>Switching time</b>	<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>
<b>Switch-on behaviour</b>	<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

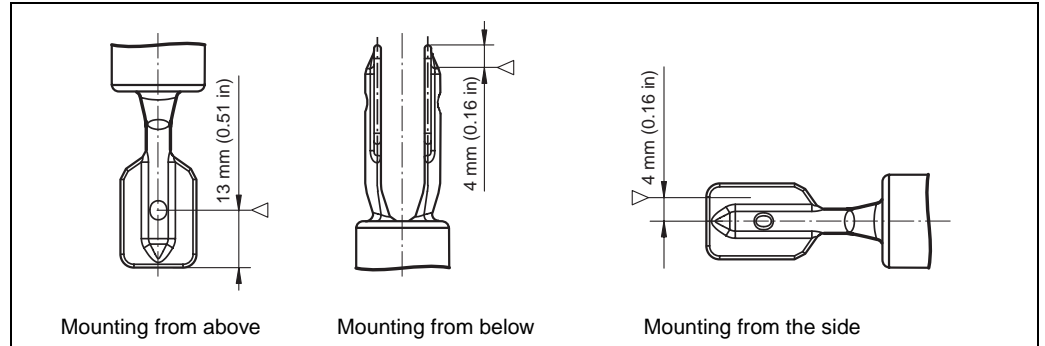
<b>Reference operating conditions</b>	<p>Ambient temperature: 23 °C (296 K)</p> <p>Medium temperature: 23 °C (296 K)</p> <p>Product density: 1 g/cm<sup>3</sup> (water)</p> <p>Viscosity: 1 mm<sup>2</sup>/s</p> <p>Medium pressure p<sub>e</sub>: 0 bar</p> <p>Sensor mounting: vertical from above</p> <p>Density switch: to &gt; 0.7</p>	
<b>Maximum measured error</b>	specified by mounting position: max. ±1mm	
<b>Repeatability</b>	0.1 mm	
<b>Hysteresis</b>	approx. 2 mm (0.08 in)	
<b>Influence of medium temperature</b>	max. +1.4 mm ... -2.8 mm (+0.05 in ... -0.11 in) (-40 °C ... +150 °C (233 K ... 423 K))	
<b>Influence of product density</b>	max. +4.8 mm ... -3.5 mm (+0.19 in ... -0.14 in) (0.5 g/cm <sup>3</sup> ... 1.5 g/cm <sup>3</sup> )	
<b>Influence of medium pressure</b>	max. 0 mm ... -2.5 mm (0 in ... -0.1 in) (-1 bar ... 64 bar)	

## Operating conditions

### Installation

#### Installation instructions

Switch point  $\triangleright$  on the sensor depend on the mounting position, with reference to water, density  $1 \text{ g/cm}^3$ ,  $23 \text{ }^\circ\text{C}$  (296 K),  $p_e$  0 bar.



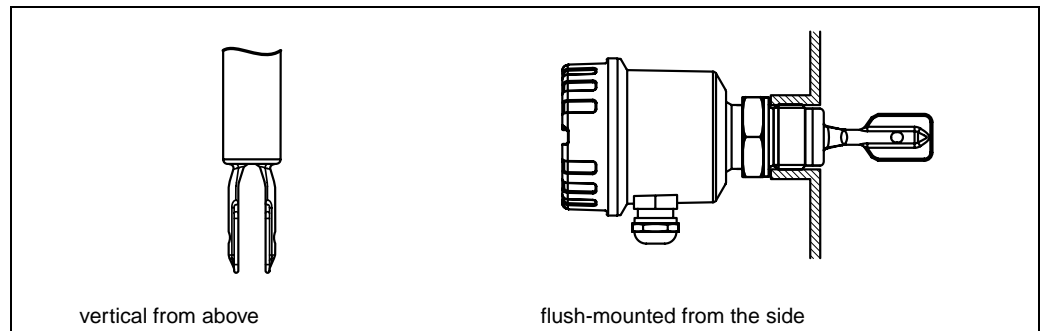
#### Note

The switchpoints of the Vibracon LVL-M\*\* are at other positions to those of the previous version LVL1, LVL2.

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

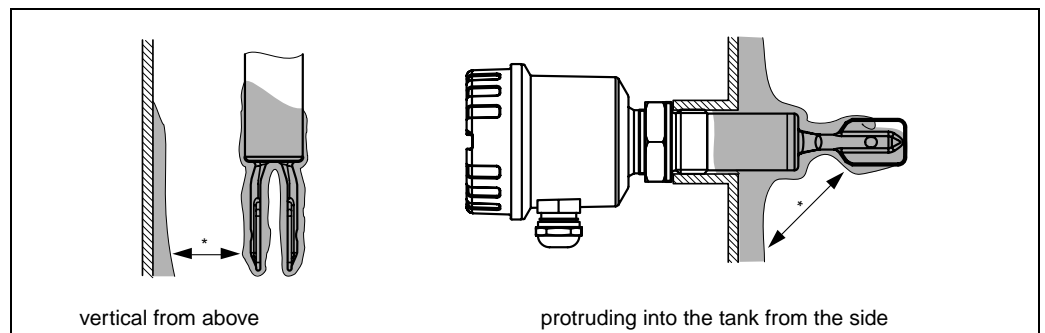
#### Optimum mounting, without problem even with high viscosity:

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



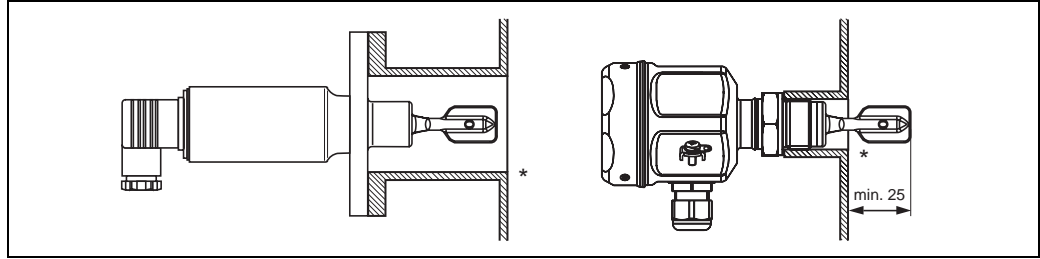
#### with build-up on the tank walls:

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



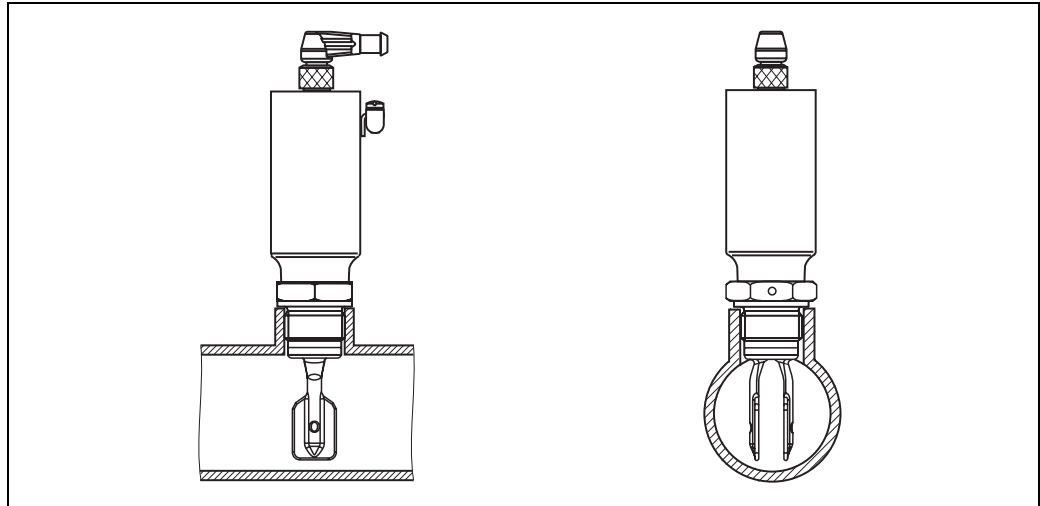
**Mounting positions with low viscosity (up to 2000 mm<sup>2</sup>/s):**

\* deburr the nozzle surfaces

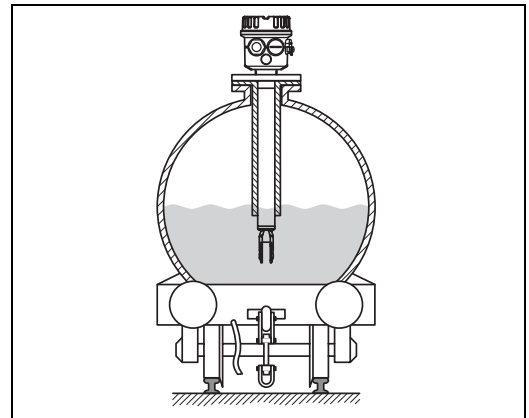


**Mounting in piping from 2"**

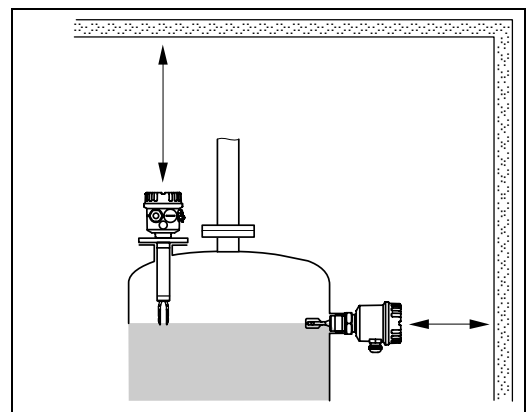
Fluid velocities up to 5 m/s for viscosity 1 mm<sup>2</sup>/s and density 1 g/cm<sup>3</sup>  
(Check the function for other operating conditions.)



Support the Vibracon LVL-M2\*  
in the event of high dynamic loads.



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



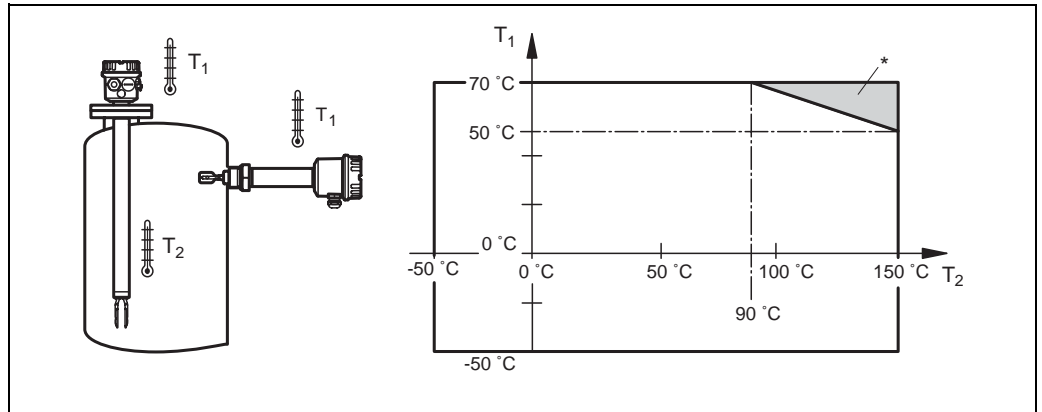
**Orientation**

LVL-M1\* and LVL-M2\* with short pipe (up to approx. 500 mm (19.7 in)) – any position,  
LVL-M2\* 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

### 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
- Compact housing:
  - IP65 with valve connector PG 11/½ NPT
  - IP66/68 with M12 x 1 connector without LEDs 1.4435 (AISI 316L) (stainless steel),
  - IP69k with M12 x 1 connector, elbowed, L = 5 m (15 ft) and LED display

### 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 ... +150 °C (223 K ... 423 K), for exceptions see process connections

### Thermal shock

max. 120 °C/s (120 K/s)

### Medium pressure

$p_e = -1 \text{ bar} \dots +64 \text{ bar}$  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

### State of aggregation

liquid

### Density

min. 0.5 g/cm<sup>3</sup> (compact housing 0.7 g/cm<sup>3</sup>)  
other density settings on request

### Viscosity

max. 10000 mm<sup>2</sup>/s

### Solids content

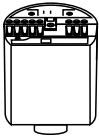
max. Ø5 mm (0.2 in)

## Mechanical construction


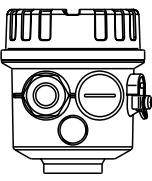
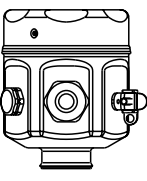
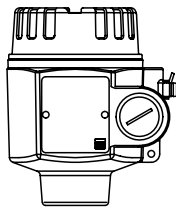
### Design

Summary of all electrical and mechanical versions


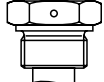
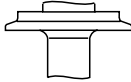
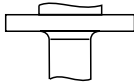
#### Plug-in electronic inserts to mount in the housing

	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	
* Electronics also available as compact housing. The electronics cannot be exchanged!		

### Housing

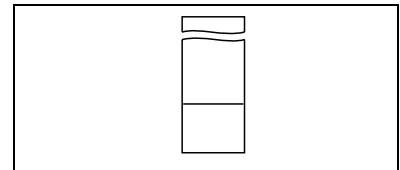
			
Compact (1.4435 (AISI 316L))	Polyester (PBT)	Stainless steel (1.4435 (AISI 316L))	Aluminium (also for EEx d), coated

### Process connections

			
G $\frac{3}{4}$ A, DIN ISO 228/1 R $\frac{3}{4}$ , DIN 2999 $\frac{3}{4}$ NPT, ANSI B 1.20.1 (AF 32)	G1, DIN ISO 228/1 R1, DIN 2999 1 NPT, ANSI B 1.20.1 (AF 41)	Diverse hygienic and aseptic connections	Flanges to DIN, ANSI, JIS from DN 25/1"

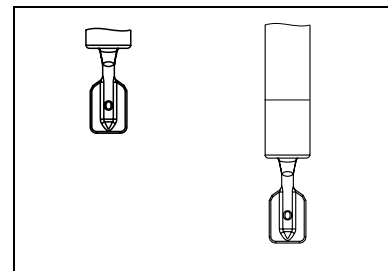
### Bushings

Temperature spacer and pressure-tight bushing



### Sensors

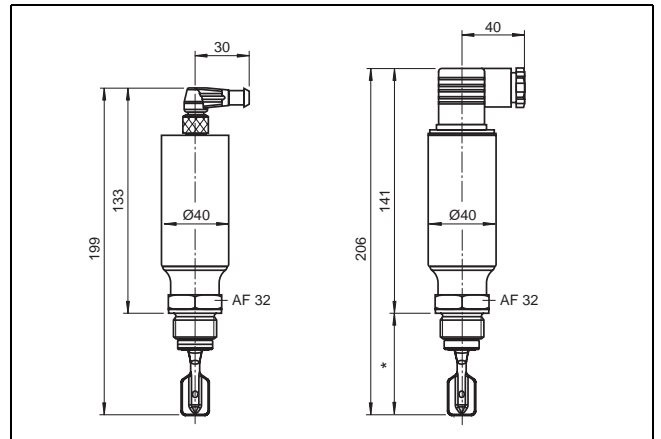
Compact or with extension pipe up to 3 m (10 ft)



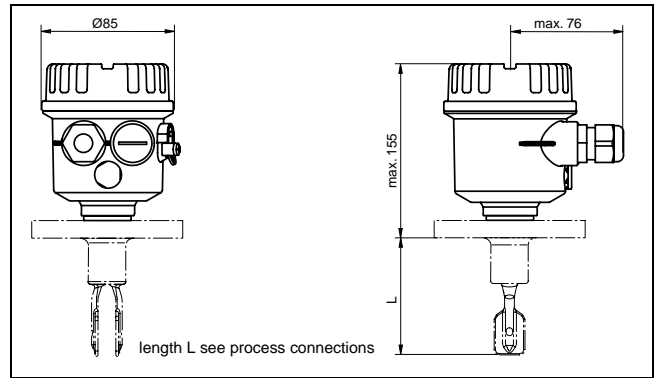
Dimensions

Housing and sensor LVL-M1\*

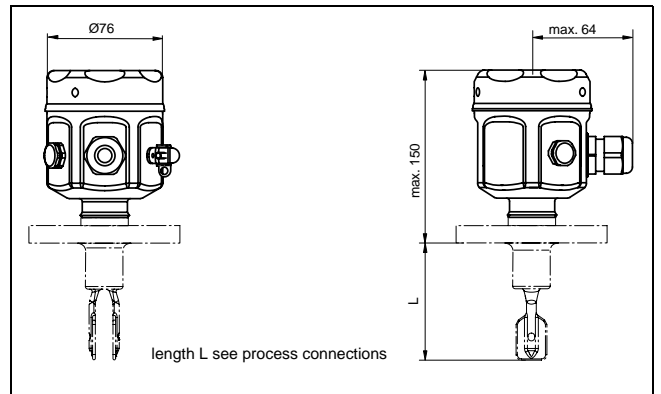
Compact housing



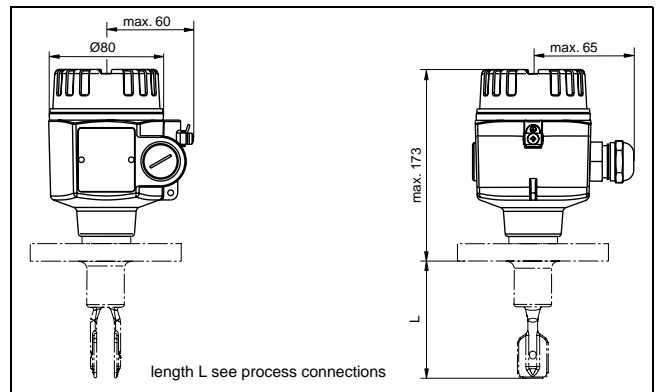
Polyester housing P\*



Stainless steel housing E\*



Aluminium housing A\*





**Note**

The switchpoints of the Vibracon LVL-M\*\* are at other positions to those of the previous version LVL1, LVL2.

**Bushings: temperature spacer, pressure-tight bushing**

additional length L 140 mm (5.5 in)

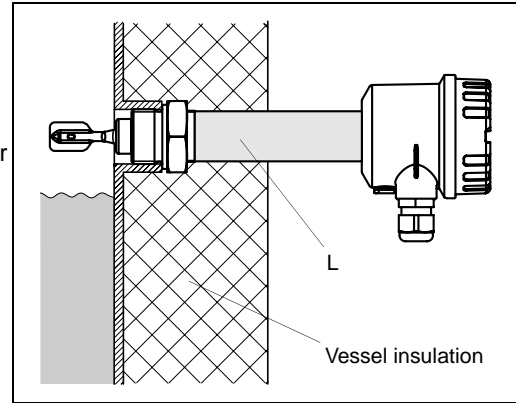
**Temperature spacer**

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

**Pressure-tight bushing**

Protects the housing from pressures up to 64 bar if the sensor is damaged.

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

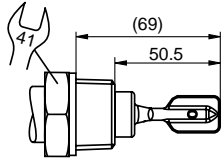
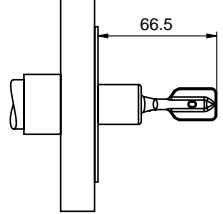
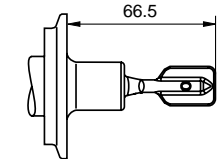
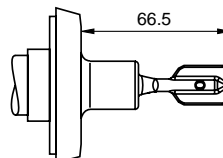
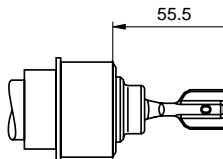
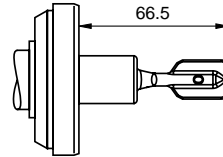
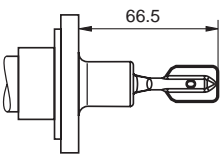
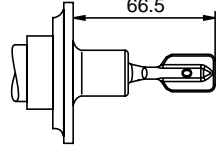
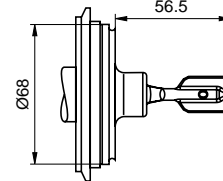


**Process connections**

Process connection		Dimensions	Accessories	Pressure/temperature
<b>G<sup>3/4</sup>A</b> DIN ISO 228/1, BSP	G21 G2C			max. 64 bar max. 150 °C (423 K)  with welding boss max. 25 bar max. 250 °C (523 K)
<b>G<sup>3/4</sup>A</b> DIN ISO 228/1	G2E		<b>Welding sleeve</b> (without fork positioning) with silicone O-ring model number LVL-Z100 in conformity with FDA* see accessories	max. 25 bar max. 150 °C (423 K)  max. 40 bar max. 100 °C (373 K)
<b>G1A</b> DIN ISO 228/1	G31 G3C			max. 64 bar max. 150 °C (423 K)
<b>G1A</b> DIN ISO 228/1	G3E		<b>Welding sleeve</b> (without fork positioning) with silicone O-ring model number LVL-Z101 <b>Welding sleeve</b> (with fork positioning) with silicone moulded seal model number LVL-Z102 in conformity with FDA* see Accessories	max. 25 bar max. 150 °C (423 K)  max. 40 bar max. 100 °C (373 K)
<b>3/4 NPT</b> ANSI B 1.20.1  or <b>R<sup>3/4</sup></b> DIN 2999	N21 N2C  R21 R2C		in conformity with FDA*	max. 64 bar max. 150 °C (423 K)
* FDA approved materials according to 21 CFR part 177.1550/2600				

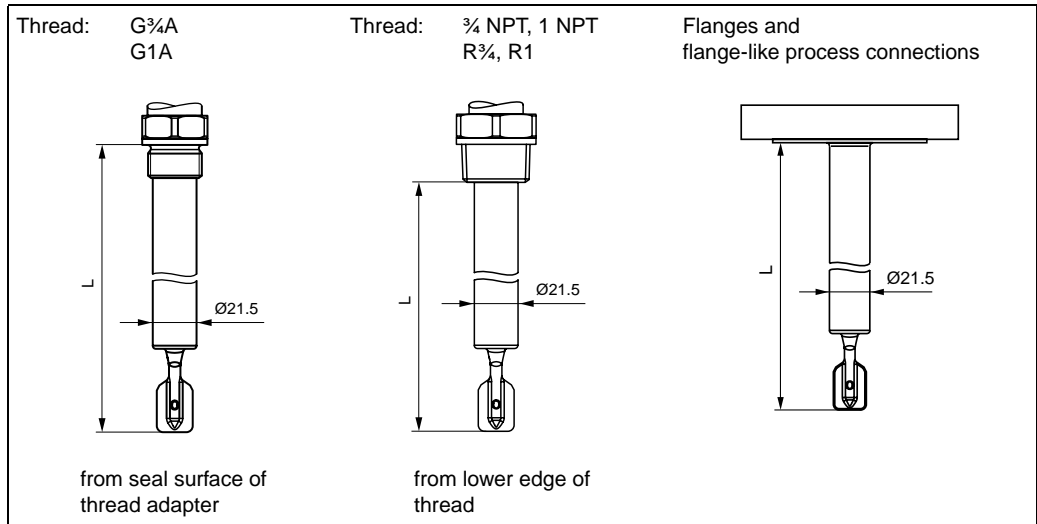
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Process connection		Dimensions	Accessories	Pressure/ temperature
<b>1 NPT</b> ANSI B 1.20.1  or <b>R1</b> DIN 2999	N31 N3C  R31 R3C		in conformity with FDA*	max. 64 bar max. 150 °C (423 K)
<b>Flanges</b> ANSI B 16.5 (RF) EN 1092-1 (DIN 2527 B) JIS B 2238 (RF)	A** C** D** F** J** N75		seal according to design installed on site in conformity with FDA*	see nominal pressure of flange, however max. 64 bar max. 150 °C (423 K)
<b>Triclamp</b> 1½" = Ø50.5 mm 2" = Ø64.0 mm ISO 2852	T51 T61		clamping ring and front seal installed on site in conformity with FDA*	max. 16 bar max. 120 °C (393 K)  max. 64 bar max. 150 °C (423 K)
<b>threaded pipe joint</b> DN32 DN40 DN50 DIN 11851  with screw cap	R5R R6R R7R		sealing ring with collar, installed on site in conformity with FDA*	DN32, DN40: max. 40 bar max. 100 °C (373 K) max. 25 bar max. 140 °C (413 K) DN50: max. 25 bar max. 140 °C (413 K)
<b>flush-mounted for 1" welding neck</b> factory standard with silicone seal (supplied) and screw cap	S13		<b>Welding neck</b> for flush-mounting (fork can be positioned) model number LVL-Z103 factory standard in conformity with FDA* see accessories	max. 40 bar max. 100 °C (373 K)  max. 25 bar max. 150 °C (423 K)
<b>aseptic</b> DN 50 DIN 11864-1 Form A for pipe DIN 11850 with screw cap	D7A		sealing ring, installed on site in conformity with FDA*	max. 25 bar max. 140 °C (413 K)
<b>DRD</b> DN50 with clamped flange	D7D		<b>Welding flange</b> with PTFE flat seal (fork can be positioned) model number LVL-Z104 in conformity with FDA* see accessories (or installed on site)	max. 40 bar max. 100 °C (373 K)  max. 25 bar max. 150 °C (423 K)
<b>SMS</b> 2" (DN51) with screw cap	S61		sealing ring, installed on site in conformity with FDA*	max. 25 bar max. 140 °C (413 K)
<b>Varivent</b> for piping ≥ DN65 ≥ O.D. 3" ≥ I.P.S. 3"	SV1		clamping ring and O-ring seal, installed on site factory standard Tuchenhagen in conformity with FDA*	max. 64 bar max. 150 °C (423 K)

\* FDA approved materials according to 21 CFR part 177.1550/2600

Sensor length L for LVL-M2\*, depending on process connection



Extension tube: any length L 148 mm ... 3000 mm (6 in ... 115 in), special version on request up to 6000 mm (20 ft)



**Note**

The switchpoints of the Vibracon LVL-M\*\* are at other positions to those of the previous version LVL1, LVL2.

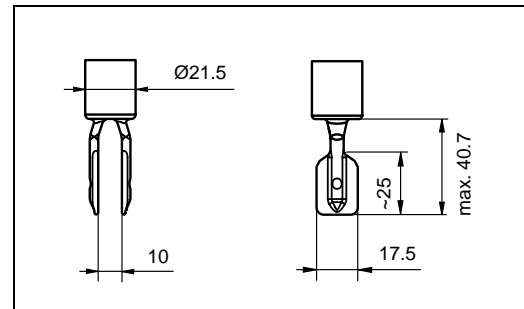
Extension tube: special length "L II" with vertical mounting from above the same switchpoint as for the Vibracon LVL1, LVL2

"L II" depends on process connection:

- 115 mm (4.5 in) for flanges and flange-like process connections
- 99 mm (3.9 in) for threads NPT and R (BSPT)
- 118 mm (4.6 in) for threads G1 (BSP 1)
- 115 mm (4.5 in) for threads G $\frac{3}{4}$  (BSP  $\frac{3}{4}$ )
- 104 mm (4.1 in) for flush-mounted 1"

**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**

- LVL-M1/LVL-M2: 600 g, basic weight: compact sensor, electronic insert, stainless steel housing, process connection G $\frac{3}{4}$ A, additional weight is dependent on extension tube, housing and process connection
- LVL-M1H/LVL-M2H: 700 g, basic weight: compact sensor, electronic insert, stainless steel housing, process connection G $\frac{3}{4}$ A, additional weight is dependent on extension, housing and process connection

**Additional weight**

- Process connection:
  - A3\* 1000 g, A4\* 1200 g, A5\* 1500 g, A6\* 2400 g, A72 4800 g, A81 4900 g, A82 6800 g, A91 7000 g, A92 11.5 kg, A93 17.3 kg
  - C45 1400 g, C51 1200 g, C71 1600 g, C75 3200 g, C95 5900 g, CA3 5600 g
  - D45 1400 g, D51 1200 g, D71 1600 g, D75 3200 g, D7A 300 g, D7D 300 g, D95 5900 g, DA3 5600 g
  - F45 1400 g, F51 1200 g, F55 2000 g, F61 1400 g, F65 2400 g, F71 1600 g, F75 3200 g, F7F 2600 g, F81 2400 g, F85 4300 g, F93 4800 g, F95 5900 g, FA3 5600 g, FA5 7500 g
  - G3\* 200 g
  - J13 no information, J16 no information, J17 1700 g, J19 no information, J1A no information, J1C 1700 g
  - N3\* 200 g, N75 2900 g
  - R3\* 200 g, R\*R no information
  - S13 300 g, S61 200 g
  - T61 100 g
- Length, spacer, bushings:
  - B\* 900 g/m, C\* 2300 g/100 in
  - D\* 100 g
  - I\* 600 g
  - J\* 900 g/m and 600 g, K\* 2300 g/100 in and 600 g
  - L\*, Q\* 700 g
  - R\* 900 g/m and 700 g, S\* 2300 g/100 in and 700 g
  - T\* 800 g

**Material**

- Wetted parts:
  - Process connection and extension pipe: AISI 316L (1.4435) or 2.4610 (Alloy C4)
  - tuning fork: AISI 316L (1.4435) or 2.4610 (Alloy C4)
  - Flat seal for process connection G¾A or G1A: elastomer fibre, asbestos-free
- 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
  - Compact housing with valve connector or M12 connector: AISI 316L (1.4435)
- 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 \*A, \*B, \*E (LVL-M\*)
- $R_a < 1.5 \mu\text{m}/120$  grit: length, spacer, bushings \*C (LVL-M\*H)
- $R_a < 0.3 \mu\text{m}/320$  grit: length, spacer, bushings \*D (LVL-M\*H)

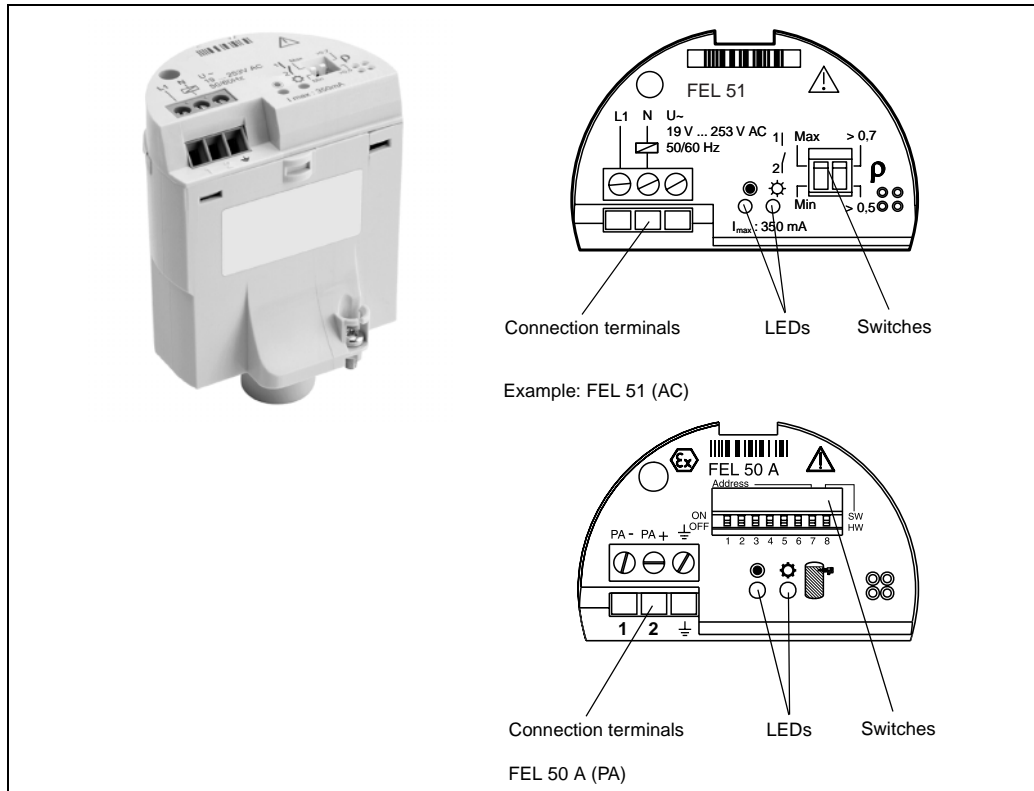
**Process connection**

- Parallel thread G¾A, G1A to DIN ISO 228/1 with flat seal to DIN 7603
- Tapered thread R¾, R1 to DIN 2999 part 1
- Tapered thread ¾ -14 NPT, 1 - 1½ NPT to ANSI B 1.20.1
- Flush-mounted with welding sleeve to factory standard (G¾A, G1A)
- Flush-mounted with welding neck to factory standard (1"), sensor can be positioned
- Triclamp 1½", 2" to ISO 2852
- Threaded pipe joint DN32, DN40, DN50 to DIN 11851
- Aseptic connection DN50 to DIN 11864-1 form A for pipe DIN 11850
- SMS connection 2" (DN51)
- DRD flange, 65 mm
- Varivent® DN50 (50/40) to factory standard Tuchenhagen
- Flanges to EN/DIN from DN25, for standards see dimensions process connections, to ANSI B 16.5 from 1", to JIS B 2238 (RF)

## Indication and operation

### Overview indication and operation

### Electronic inserts



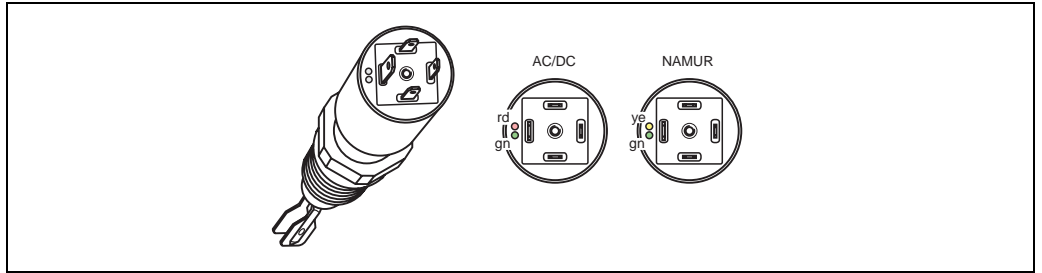
### Indicating elements

### 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

**Compact housings**

- Compact housing with valve connector

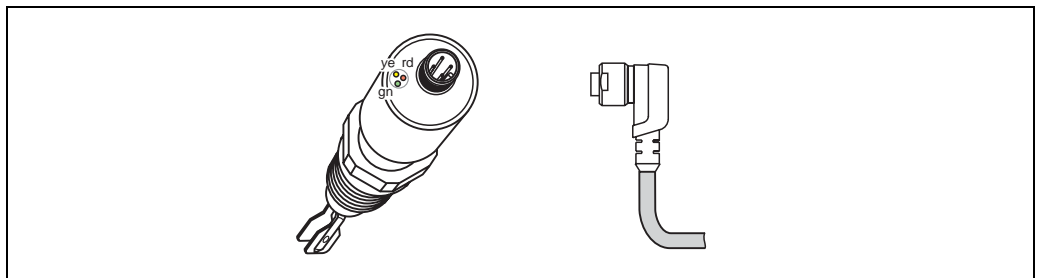
**Electronic version FEL 51 (AC), FEL 52 (E5)**

- green LED (gn) to display standby
- red LED (rd) to display switching state:
  - MAX application mode (overflow protection): sensor is immersed in liquid
  - MIN application mode (dry running protection): sensor is not immersed in liquid
- red LED (rd) flashing at failure

**Electronic version FEL 58 (N2)**

- green LED (gn) flashing to display standby
- yellow LED (ye) to display switching state:
  - MAX application mode (overflow protection): sensor is not immersed in liquid
  - MIN application mode (dry running protection): sensor is immersed in liquid

- Compact housing with M12 x 1 connector without LEDs, 316L (1.4435)

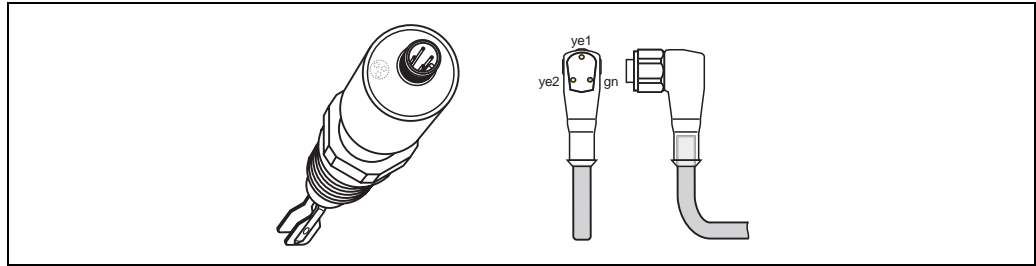
**Electronic version FEL 52 (E5)**

- green LED (gn) to display standby
- yellow LED (ye) to display switching state, sensor is immersed in liquid
- red LED (rd) flashing at failure

**Electronic version FEL 58 (N2)**

- green LED (gn) flashing with 1 Hz to display standby
- yellow LED (ye) to display switching state
  - MAX application mode (overflow protection): sensor is not immersed in liquid
  - MIN application mode (dry running protection): sensor is immersed in liquid
- green LED (gn) flashing with 0.3 Hz at failure

- Compact housing with M12 x 1 connector with LEDs, 316L (1.4435)



Electronic version FEL 52 (E5)

- green LED (gn) to display standby
- yellow LED (ye 1) to display switching state:  
MAX application mode (overflow protection): sensor is not immersed in liquid  
MIN application mode (dry running protection): sensor is not immersed in liquid
- yellow LED (ye 2) to display switching state:  
MAX application mode (overflow protection): sensor is immersed in liquid  
MIN application mode (dry running protection): sensor is immersed in liquid
- green LED (gn) lights up, both yellow LEDs (ye 1+2) do not light up at failure

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

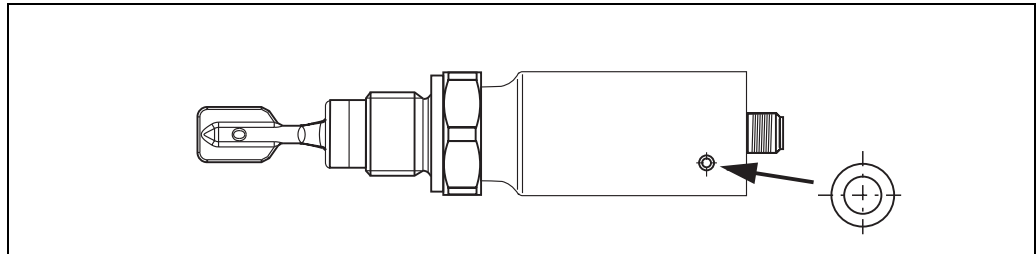
Function test

Compact housing

Function test with test magnet

Electronics FEL 51 (AC), FEL 52 (E5) and FEL 58 (N2):  
During the test, the current state of the electronic switch is reversed.

Performing the test: hold the test magnet against the marking on the nameplate



The switching status is changed.

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)
E1	II 1G EEx ia IIC T6		
E2	II 1/2G EEx ia IIC T6	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)
E3	II 1/2G EEx d IIC T6	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)
EA	II 1G EEx ia IIC T6, WHG		
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)
EN	II 3G EEx nC IIC T6, WHG	P1, P2, P3, P4, P5 E1, E2, E3, E4, E5 A1, A2, A3, A4, A5	FEL 54 (WA)
	II 3G EEx nC IIC T6, WHG II 3D T85°C, WHG	E1, E2, E3, E4, E5 A1, A2, A3, A4, A5	FEL 54 (WA)
EM	II 3G EEx nA II T6, WHG	P1, P2, P3, P4, P5 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)
	II 3G EEx nA II T6, WHG II 3D T85°C, WHG	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)
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	FEL 51 (AC), FEL 52 (E5) FEL 54 (WA), FEL 55 (SI) FEL 56 (N1), FEL 58 (N2)
		P2	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	FEL 51 (AC), FEL 52 (E5) FEL 54 (WA), FEL 55 (SI) FEL 56 (N1), FEL 58 (N2)
		P2	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)

	Certificate, applications	Housings	Electronic inserts
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)



**Note**

On polyester housing (PBT), electric connecting cables run in pipes:  
Do not screw cable entries firmly to the piping. Use flexible connections (e. g. with armoured hose).  
If the piping is used for earthing then ensure that there is a continuous electrical connection.



**Note**

Despite the additional dust-Ex-certificate, the LVL-M\*\* is to be used as a liquid limit switch only.

**Overspill protection**

Z-65.11-306 (German Water Resources Law)

**General approvals**

for Vibracon LVL-M\*H:  
EHEDG certification (from TNO, The Netherlands)  
Report No. V99.394, 3-A Certificate (USA, Authorisation No. 459):



with regard to process connections:

- Aseptic connection DN50 to DIN 11864 (HE2)
- Varivent® DN50 (50/40) to factory standard Tuchenhagen (WE2)
- Triclamp 2" with special seal from Hyjoin Limited, UK
- P+F flush-mounted



**Warning**

To avoid risk of contamination, install according to the "Hygienic Equipment Design Criteria (HDC)" as stated in the subgroup design principles of the EHEDG, doc. 8, July 1993. The flow of liquid during cleaning is important and should be in compliance with HDC.



# Ordering information

Product structure  
Vibracon LVL-M\*



Specification of length  
without unit for design M2

**Certificates**

- NA** for non-hazardous areas
- WH** WHG overspill protection
- E1** II 1G EEx ia IIC T6
- E2** II 1/2G EEx ia IIC T6
- E3** II 1/2G EEx d IIC T6
- EA** II 1G EEx ia IIC T6, WHG
- EB** II 1/2G EEx ia IIC T6, WHG
- EC** II 1/2G EEx d IIC T6, WHG
- EN** II 3G EEx nC IIC T6, WHG
- EM** II 3G EEx nA 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
- Z3** 3.1.B material, wetted parts 1.4435, inspection certificate to EN 10204, in accordance with specification 52005759

**Electronic insert**

- PA** FEL 50 A, PROFIBUS PA
- AC** FEL 51, contactless 2-wire switch, 19 V AC ... 253 V AC
- E5** FEL 52, PNP 3-wire, 10 V DC ... 55 V DC
- WA** FEL 54, potential-free change-over contact, DPDT, 19 V AC ... 253 V AC, 19 V DC ... 55 V DC
- SI** FEL 55, 8/16 mA, 11 V DC ... 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
- C2** compact housing, Nema 4x, ½ NPT plug connector, 1.4435/316L
- C4** compact housing, IP66, plug connector M12 x 1, 1.4435/316L
- C6** compact housing, IP66, PG11 plug connector, 1.4435/316L
- 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

**Length, temperature spacer, pressure-tight bushing**

- AA** 66 mm/2.6 in, Ra < 3.2 µm/80 grit
- IA** 66 mm/2.6 in, Ra < 3.2 µm/80 grit, with temperature spacer
- QA** 66 mm/2.6 in, Ra < 3.2 µm/80 grit, with pressure-tight bushing
- BB** mm L 1.4435/316L, Ra < 3.2 mm/80 grit
- BE** mm L Alloy C4/2.4610, Ra < 3.2 mm/80 grit
- CB** in L 1.4435/316L, Ra < 3.2 mm/80 grit
- CE** in L Alloy C4/2.4610, Ra < 3.2 mm/80 grit
- DB** special length L II, 1.4435/316L, Ra < 3.2 mm/80 grit, switch point = Vibracon compact
- DE** special length L II, Alloy C4/2.4610, Ra < 3.2 mm/80 grit, switch point = Vibracon compact
- JB** mm L 1.4435/316L, with temperature spacer
- JE** mm L Alloy C4/2.4610, with temperature spacer
- KB** in L 1.4435/316L, with temperature spacer
- KE** in L Alloy C4/2.4610, with temperature spacer
- LB** special length L II, 1.4435/316L, with temperature spacer, switch point = Vibracon compact
- LE** special length L II, Alloy C4/2.4610, with temperature spacer, switch point = Vibracon compact
- RB** mm L 1.4435/316L, with pressure-tight bushing
- RE** mm L Alloy C4/2.4610, with pressure-tight bushing
- SB** in L 1.4435/316L, with pressure-tight bushing
- SE** in L Alloy C4/2.4610, with pressure-tight bushing
- TB** special length L II, 1.4435/316L, with pressure-tight bushing, switch point = Vibracon compact
- TE** special length L II, Alloy C4/2.4610, with pressure-tight bushing, switch point = Vibracon compact

**Design**

- M1** compact design
- M2** extended design (148 mm/6 in ... 3,000 mm/115 in)

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Product structure  
Vibracon LVL-M\*  
continuation



Process connection and material

A31	ANSI 1", 150 lbs RF, 1.4435/316L	
A41	ANSI 1 1/4", 150 lbs RF, 1.4435/316L	
A42	ANSI 1 1/4", 300 lbs RF, 1.4435/316L	design M2
A51	ANSI 1 1/2", 150 lbs RF, 1.4435/316L	
A52	ANSI 1 1/2", 350 lbs RF, 1.4435/316L	design M2
A61	ANSI 2", 150 lbs RF, 1.4435/316L	
A6C	ANSI 2", 150 lbs RF, Alloy C4, platinised	
A62	ANSI 2", 300 lbs RF, 1.4435/316L	design M2
A63	ANSI 2", 600 lbs RF, 1.4435/316L	design M2
A72	ANSI 2 1/2", 300 lbs RF, 1.4435/316L	design M2
A81	ANSI 3", 150 lbs RF, 1.4435/316L	
A82	ANSI 3", 300 lbs RF, 1.4435/316L	design M2
A91	ANSI 4", 150 lbs RF, 1.4435/316L	
A92	ANSI 4", 300 lbs RF, 1.4435/316L	design M2
A93	ANSI 4", 600 lbs RF, 1.4435/316L	design M2
F45	DN25 PN40 Form B, 1.4435/316L	
F51	DN32 PN6 Form B, 1.4435/316L	
F55	DN32 PN40 Form B, 1.4435/316L	
F61	DN40 PN6 Form B, 1.4435/316L	
F65	DN40 PN40 Form B, 1.4435/316L	
F71	DN50 PN6 Form B, 1.4435/316L	
F75	DN50 PN40 Form B, 1.4435/316L	
F81	DN65 PN6 Form B, 1.4435/316L	
F85	DN65 PN40 Form B, 1.4435/316L	
F93	DN80 PN16 Form B, 1.4435/316L	
F95	DN80 PN40 Form B, 1.4435/316L	
FA3	DN100 PN16 Form B, 1.4435/316L	
FA5	DN100 PN40 Form B, 1.4435/316L	
D45	DN25 PN40 Form C, 1.4435/316L, sealing strip	
C45	DN25 PN40 Form C, Alloy C4/2.4610, platinised	
D51	DN32 PN6 Form C, 1.4435/316L, sealing strip	
C51	DN32 PN6 Form C, Alloy C4/2.4610, platinised	
D71	DN50 PN6 Form C, 1.4435/316L, sealing strip	
C71	DN50 PN6 Form C, Alloy C4/2.4610, platinised	
D75	DN50 PN40 Form C, 1.4435/316L, sealing strip	
C75	DN50 PN40 Form C, Alloy C4/2.4610, platinised	
D95	DN80 PN40 Form C, 1.4435/316L, sealing strip	
C95	DN80 PN40 Form C, Alloy C4/2.4610, platinised	
DA3	DN100 PN16 Form C, 1.4435/316L, sealing strip	
CA3	DN100 PN16 Form C, Alloy C4/2.4610, platinised	
F7F	DN50 PN40 Spring, 1.4435/316L	
R21	R 3/4 BSP DIN 2999, 1.4435/316L	
R2C	R 3/4 BSP DIN 2999, Alloy C4/2.4610, platinised	
R31	R1 BSP DIN 2999, 1.4435/316L	
R3C	R1 BSP DIN 2999, Alloy C4/2.4610	
N21	3/4 NPT, 1.4435/316L	
N2C	3/4 NPT, Alloy C4/2.4610	
N31	1 NPT, 1.4435/316L	
N3C	1 NPT, Alloy C4/2.4610	
G21	G 3/4 BSP, 1.4435/316L, mounting for welded sleeve	design M1
G2C	G 3/4 BSP, Alloy C4/2.4610	
G31	G1 BSP, 1.4435/316L	
G3C	G1 BSP, Alloy C4/2.4610	
G3E	G1 BSP, 1.4435/316L, mounting for welded sleeve	
J13	JIS RF 10K 25A, 1.4435/316L	
J16	JIS RF 10K 40A, 1.4435/316L	
J17	JIS RF 10K 50A, 1.4435/316L	
J1C	JIS RF 10K 50A, Alloy C4/2.4610, platinised	
J19	JIS RF 10K 80A, 1.4435/316L	
J1A	JIS RF 10K 100A, 1.4435/316L	
N75	DN50 PN40 with groove, 1.4435/316L	
T51	1 1/2", DN25-38, Triclamp ISO 2852, 1.4435/316L	
T61	2", DN40-51, Triclamp ISO 2852, 1.4435/316L	
XXX	special version	

Design

- M1 compact design
- M2 extended design (148 mm/6 in ... 3,000 mm/115 in)



Product structure  
Vibracon LVL-M\*H  
continuation



Process connection and material

- A31 ANSI 1", 150lbs RF, 1.4435/316L
- A41 ANSI 1¼", 150 lbs RF, 1.4435/316L
- A51 ANSI 1½", 150 lbs RF, 1.4435/316L
- A61 ANSI 2", 150 lbs RF, 1.4435/316L
- A62 ANSI 2", 300 lbs RF, 1.4435/316L design M2
- A72 ANSI 2½", 300 lbs RF, 1.4435/316L design M2
- A81 ANSI 3", 150lbs RF, 1.4435/316L
- A82 ANSI 3", 300lbs RF, 1.4435/316L design M2
- A91 ANSI 4", 150lbs RF, 1.4435/316L
- A92 ANSI 4", 300lbs RF, 1.4435/316L design M2
- F45 DN25 PN40 Form B, 1.4435/316L
- F51 DN32 PN6 Form B, 1.4435/316L
- F55 DN32 PN40 Form B, 1.4435/316L
- F61 DN40 PN6 Form B, 1.4435/316L
- F65 DN40 PN40 Form B, 1.4435/316L
- F71 DN50 PN6 Form B, 1.4435/316L
- F75 DN50 PN40 Form B, 1.4435/316L
- F81 DN65 PN6 Form B, 1.4435/316L
- F85 DN65 PN40 Form B, 1.4435/316L
- F93 DN80 PN16 Form B, 1.4435/316L
- F95 DN80 PN40 Form B, 1.4435/316L
- FA3 DN100 PN16 Form B, 1.4435/316L
- FA5 DN100 PN40 Form B, 1.4435/316L
- D75 DN50 PN40 Form C, 1.4435/316L, sealing strip
- D95 DN80 PN40 Form C, 1.4435/316L, sealing strip
- DA3 DN100 PN16 Form C, 1.4435/316L, sealing strip
- S13 flush-mounted for welding adapter 1", 1.4435
- G21 G¾ BSP, 1.4435/316L, mounting for welding adapter design M1
- G3E G1A BSP, 1.4435/316L, mounting for welding adapter
- D7A DN50, aseptic coupler DIN11864, 1.4435
- R5R DN32 PN25, sanitary coupling DIN 11851, 1.4435/316L
- R6R DN40 PN25, sanitary coupling DIN 11851, 1.4435/316L
- R7R DN50 PN25, sanitary coupling DIN 11851, 1.4435/316L
- D7D DRD, 65 mm, 1.4435/316L
- T51 1½", DN25-38, Triclamp ISO 2852, 1.4435/316L
- T61 2", DN40-51, Triclamp ISO 2852, 1.4435/316L
- S61 2", SMS, PN25, 1.4435/316L
- SV1 Varivent, DN65-162 PN10, 1.4435/316L
- XXX special version

Design

- H hygienic version

Design

- M1 compact design
- M2 extended design (148 mm/6 in ... 3,000 mm/115 in)

**Supplementary documentation**


Operating manual KA 143O (LVL-M\*)  
 Operating manual KA 144O (LVL-M\*H)  
 Operating manual KA 220O (LVL-M\*\* with compact housing)  
 Safety information SI 031O-C (KEMA 01 ATEX 2117)  
 Safety information SI 063O-C (KEMA 01 ATEX 1089)  
 Safety information SI 064O-B (KEMA 01 ATEX 1147 X)  
 Safety information SI 154O-A (KEMA 01 ATEX 1089), PROFIBUS PA version  
 Safety information SI 182O-A  
 Safety information ZE 233O (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 ... T6

KEMA 01 ATEX 1089,  II 1/2 G (1/2 D T80°C)  
 EEx ia/ib IIC/IIB T3 ... T6

KEMA 01 ATEX 1147 X,  II 1 G EEx ia IIC/IIB 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  
 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](http://www.pepperl-fuchs.com).

Accessories

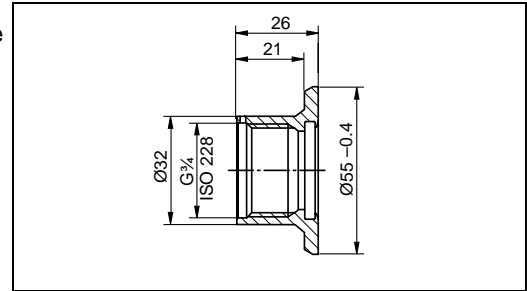
**Welding sleeve G<sup>3/4</sup>**

Model number: LVL-Z100

max. 25 bar, max. 150 °C (423 K)  
max. 40 bar, max. 100 °C (373 K)

for flush-mounting a Vibracon LVL-M\*\*  
with process connection G21, sensor cannot be  
positioned

Material: corrosion-resistant steel  
1.4435 (AISI 316L)  
Weight: 130 g  
Seal: silicone O-ring (FDA listed)



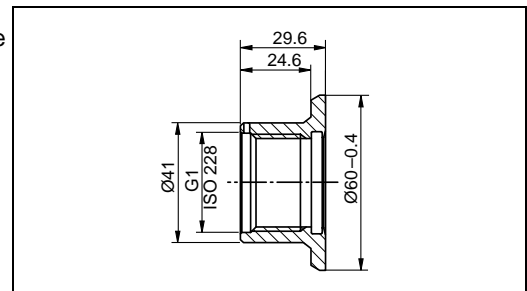
**Welding sleeve G1**

Model number: LVL-Z101

max. 25 bar, max. 150 °C (423 K)  
max. 40 bar, max. 100 °C (373 K)

for flush-mounting a Vibracon LVL-M\*\*  
with process connection G3E, sensor cannot be  
positioned

Material: corrosion-resistant steel  
1.4435 (AISI 316L)  
Weight: 190 g  
Seal: silicone O-ring (FDA listed)



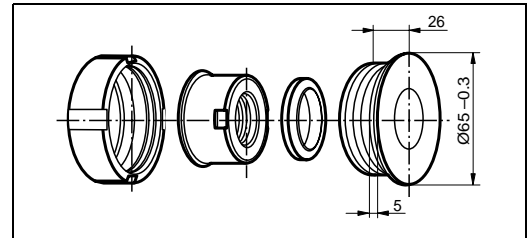
**Welding sleeve G1**

Model number: LVL-Z102

max. 25 bar, max. 150 °C (423 K)  
max. 40 bar, max. 100 °C (373 K)

for flush-mounting a Vibracon LVL-M\*\*  
with process connection G3E, sensor can be  
positioned

Material (wetted): corrosion-resistant steel  
1.4435 (AISI 316L)  
Weight: 430 g  
Seal: silicone moulded seal (FDA listed)

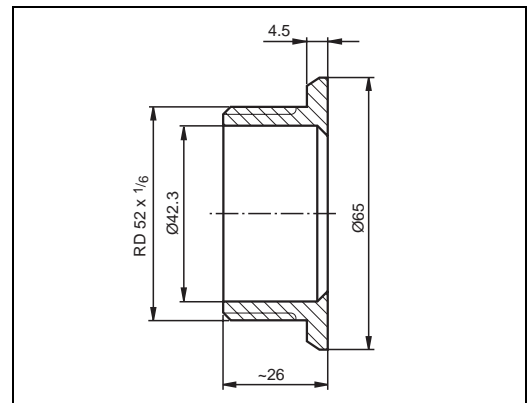


**Welding neck**

Model number: LVL-Z103

for flush-mounting a Vibracon LVL-M\*\*H  
with process connection S13, sensor can be  
positioned

Material: corrosion-resistant steel  
1.4435 (AISI 316L)  
Weight: 150 g  
Seal on Vibracon: silicone moulded seal  
(FDA listed)



**DRD welding flange**

Model number: LVL-Z104

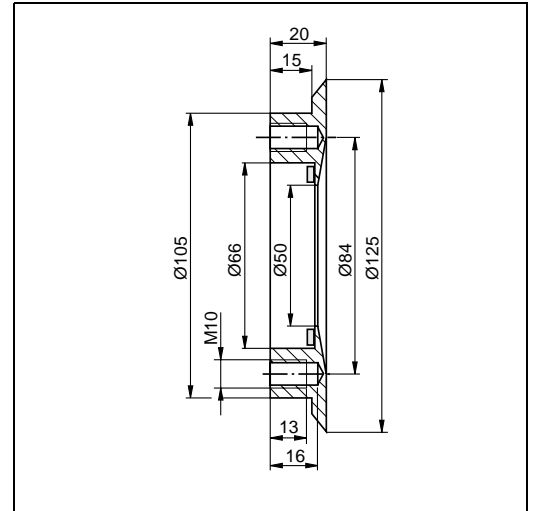
for flush-mounting a Vibracon LVL-M\*H  
with process connection D7D, sensor can be  
positioned

Material: corrosion-resistant steel

1.4435 (AISI 316L)

Weight: 900 g

Seal: PTFE flat seal (FDA listed)

**Lap joint round flange**

Model number:

LVL-Z105 (DN50 PN40, Form A, EN 1092-1)

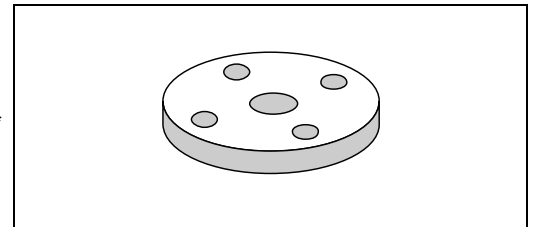
LVL-Z106 (ANSI 2", 150 psi, RF)

with G1 thread for mounting a Vibracon LVL-M\*  
with process connection G31

Material: corrosion-resistant steel

1.4571 (AISI 316 Ti)

Weight: LVL-Z105 3110 g, LVL-Z106 2380 g

**Lap joint square flange**

Model number: LVL-Z107

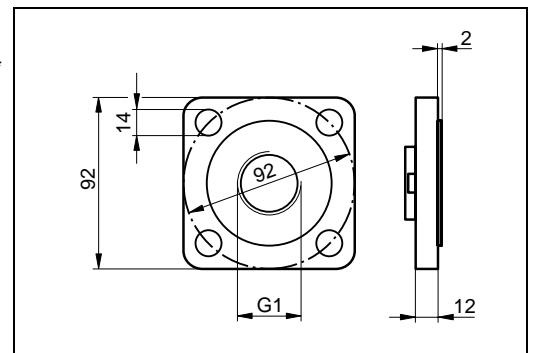
with G1 thread for mounting a Vibracon LVL-M\*  
with process connection G31

Pressure: up to 40 bar

Material: corrosion-resistant steel

1.4301 (AISI 304)

Weight: 540 g

**Cover with sight glass**

Model number:

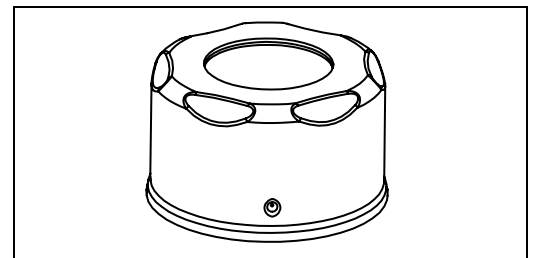
LVL-Z108 (with glass sight glass)

LVL-Z109 (with PC sight glass (not for CSA,  
General Purpose))

for stainless steel housing E\*

Material: 1.4435 (AISI 316L)

Weight: 160 g

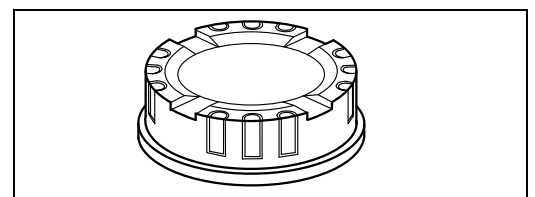
**Transparent cover**

Model number: LVL-Z110

for polyester housing P\*

Material: PA 12

Weight: 40 g

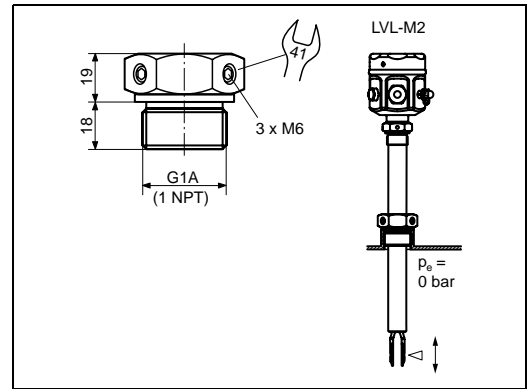


**Sliding sleeve**

Model number:  
LVL-Z120 (G1A)  
LVL-Z122 (1 NPT)

for unpressurised operation for continuous adjustment of the switch point of a Vibracon LVL-M2

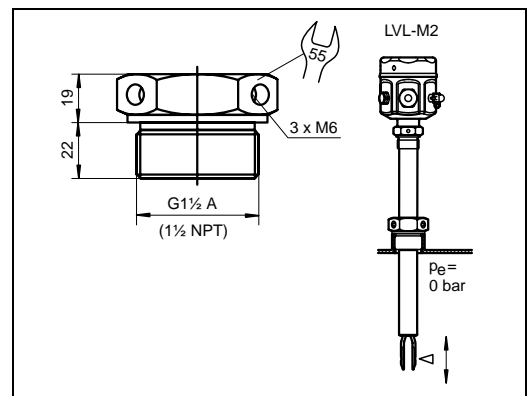
Material: corrosion-resistant steel  
1.4435 (AISI 316L)  
Weight: 210 g



Model number:  
LVL-Z121 (G1½A)  
LVL-Z123 (1½ NPT)

for unpressurised operation for continuous adjustment of the switch point of a Vibracon LVL-M2

Material: corrosion-resistant steel  
1.4435 (AISI 316L)  
Weight: 540 g



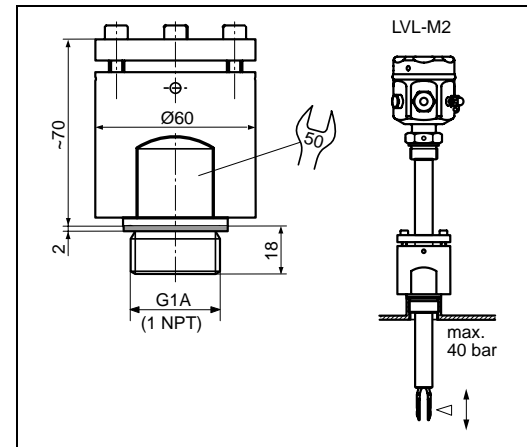
**High pressure sliding sleeve**

Model number:  
LVL-Z124 (G1A)  
LVL-Z125 (G1A)  
LVL-Z128 (1 NPT)  
LVL-Z129 (1 NPT)

for continuous adjustment of the switch point of a Vibracon LVL-M2

Material:  
LVL-Z124, LVL-Z128 corrosion-resistant steel 1.4435 (AISI 316L)  
LVL-Z125, LVL-Z129 Alloy C4  
Weight: 1130 g  
Seal package made of graphite.

-1 bar ... +40 bar, -40 °C ... +150 °C (233 K ... 423 K)

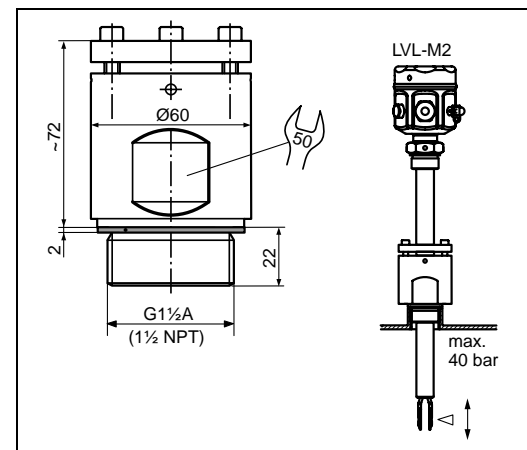


Model number:  
LVL-Z126 (G1½A)  
LVL-Z127 (G1½A)  
LVL-Z130 (1½ NPT)  
LVL-Z131 (1½ NPT)

for continuous adjustment of the switch point of a Vibracon LVL-M2

Material:  
LVL-Z126, LVL-Z130 corrosion-resistant steel 1.4435 (AISI 316L)  
LVL-Z127, LVL-Z131 Alloy C4  
Weight: 1320 g  
Seal package made of graphite.

-1 bar ... +40 bar, -40 °C ... +150 °C (233 K ... 423 K)



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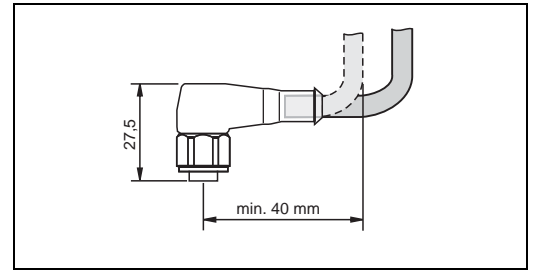
**Cable connectors****M12 x 1 connector with integrated LEDs****Material:**

- cable: PVC (orange) 5 m (15 ft) length
- body: PVC (transparent)
- coupling nut: 1.4435/316L

Protection degree: IP69K (fully locked)

Temperature range:

-25 °C ... +70 °C (248 K ... 343 K)

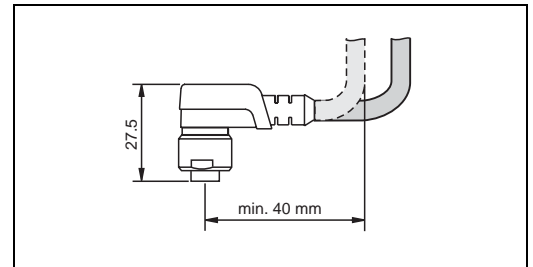
Wire cross section: 4 x 0.34 mm<sup>2</sup>**M12 x 1 connector without LEDs****Material:**

- cable: PVC (grey) 5 m (15 ft) length
- body: PUR (blue)
- coupling nut: CuSn/Ni

Protection degree: IP67

Temperature range:

-25 °C ... +70 °C (248 K ... 343 K)

Wire cross section: 4 x 0.34 mm<sup>2</sup>



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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