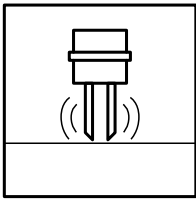


Vibration Limit Switch



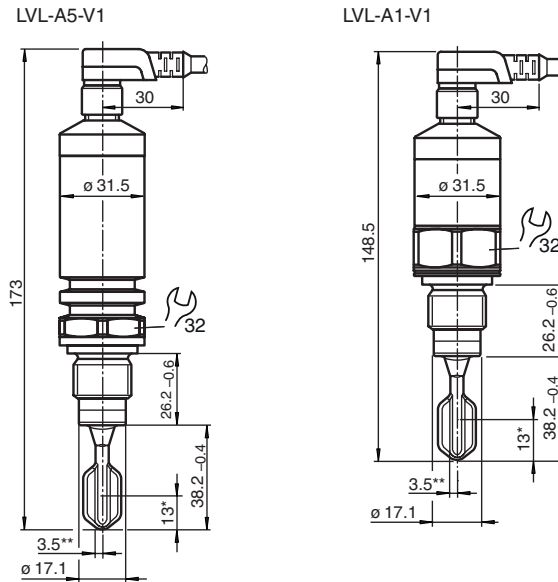
LVL-A*



Features

- Level limit switch for liquids
- External test option using test magnet
- On-site function control using external LED display
- Large selection of process connections for hassle-free installation in existing systems
- Easy to install even at points difficult to access due to compact design
- Rugged stainless steel housing
- Suitable for medium temperatures up to 150 °C (302 °F)
- Cost-saving plug connections

Dimensions



Additional dimensions see section dimensions.

* Switch point for vertical installation
 ** Switch point for horizontal installation
 Switch points at density 0.7 g/cm³, 23 °C (296 K), 0 bar

Function

The Vibracon LVL-A* is a level limit switch for all kinds of fluids and is used in tanks, containers and pipelines. It is used in cleaning and filtering systems and coolant and lubricant tanks as an overspill protection or as a pump protector.

The LVL-A* is ideal for applications which previously used float switches and conductive, capacitive and optical sensors.

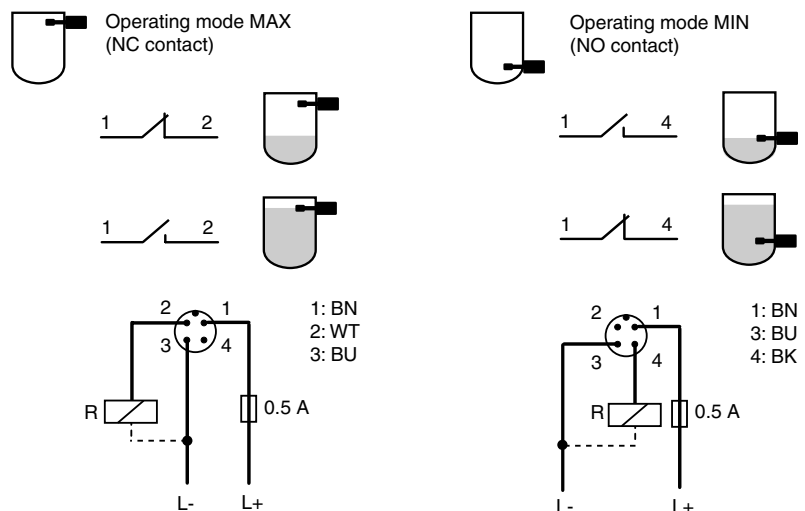
It also works in applications which are unsuitable for these measuring methods due to conductivity, build-ups, turbulence, flows or air bubbles.

The LVL-A* is not suitable for hazardous areas and areas where the medium temperature is above 150 °C (423 K).

For hygienic areas the use of LVL-AH is recommended.

Electrical connection

Example: connection E5 (three-wire DC connection) with V1 connector M12 x 1
 Other connection types see section electrical connections.



Application	
Function principle	The tuning fork is brought to its resonance frequency by means of a piezoelectric drive. If the tuning fork is covered by liquid, this frequency changes. The electronics monitor the resonance frequency and indicate whether the tuning fork is freely vibrating or is covered by liquid.
Input characteristics	
Measured variable	density
Measurement range	min. 0.7 g/cm ³ , other density (e. g. 0.5 g/cm ³) settings on request
Output characteristics	
Fail-safe mode	<p>minimum/maximum closed circuit safety</p> <p>The level limit switch can be connected in two operating modes, depending on the operating mode selected (MAX or MIN safety). The level limit switch will switch off safely in the event of a fault (e. g. if the power supply line is interrupted).</p> <p>MAX = maximum fail-safe mode: The level limit switch keeps the electronic switch closed as long as the fluid level is below the fork. example application: overspill protection</p> <p>MIN = minimum fail-safe mode: The level limit switch keeps the electronic switch closed as long as the fork is immersed in fluid. example application: dry running protection of pumps</p> <p>The electronic switch opens if the limit is reached, if a fault occurs or in the event of a power failure.</p>
Auxiliary energy	
Electrical connection	<p>This device may be used with any sequential circuit, as long as the circuit can support the electrical circuit values of the switching elements.</p> <p>output B3: version AS-Interface output E5: version DC-PNP with M12 x 1 connector or valve connector output WA: version AC with valve connector</p>
Supply voltage	<p>output B3: 24.5 ... 31 V DC (AS-Interface) output E5: 10 ... 35 V DC output WA: 19 ... 253 V AC, 50/60 Hz</p>
Power consumption	<p>output B3: < 825 mW output E5: < 825 mW output WA: < 810 mW</p>
Current consumption	<p>output B3: < 25 mA output E5: < 15 mA output WA: < 3.8 mA</p>
Residual ripple	output E5: 5 V _{pp} at 0 ... 400 Hz
Measurement accuracy	
Reference operating conditions	ambient temperature: 23 °C (296 K), process pressure: 1 bar, medium: water, medium density: 1, medium temperature: 23 °C (296 K), installation from above/vertical, density setting: > 0.7 g/cm ³
Measured value resolution	< 0.5 mm
Measuring frequency	approx. 1100 Hz in air
Maximum measured error	13 mm ± 1 mm
Non-repeatability	± 0.5 mm
Hysteresis	3 mm ± 0.5 mm
Influence of ambient temperature	negligible
Influence of medium temperature	-29.6 x 10 ⁻³ mm/K
Influence of medium pressure	-55.2 x 10 ⁻³ mm/bar
Switching time	when covering the sensor approx. 0.5 s, when uncovering the sensor approx. 1.0 s other switching times on request
Settling time	< 2 s
Operating conditions	
Installation conditions	
Installation position	see section mounting position
Ambient conditions	
Ambient temperature	<p>outputs E5, WA: -40 ... 70 °C (233 ... 343 K) output B3: -25 ... 70 °C (248 ... 343 K)</p>
Ambient temperature limits	<p>version LVL-A5: - derating from 90 °C (363 K) process temperature: reduction to max. 50 °C (323 K) ambient - derating from 90 °C (363 K) process temperature: reduction to max. 150 mA relay switching capacity version LVL-A1: - derating from 80 °C (353 K) process temperature: reduction to max. 50 °C (323 K) ambient - derating from 80 °C (353 K) process temperature: reduction to max. 150 mA relay switching capacity</p>
Storage temperature	-40 ... 85 °C (-40 ... 185 °F)
Overvoltage protected	overvoltage category III
Process conditions	
Medium temperature	<p>version LVL-A5: -40 ... 150 °C (233 ... 423 K), see ambient temperature limit version LVL-A1: -40 ... 100 °C (233 ... 273 K), see ambient temperature limit</p>
Process pressure (static pressure)	-1 ... 40 bar

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Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

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Technical data

Vibration Limit Switch LVL-A*

State of aggregation	liquid
Density	min. 0.7 g/cm ³ , other density setting on request
Viscosity	max. 10000 mm ² /s (10000 cSt)
Gas content	stagnant mineral water
Mechanical specifications	
Protection degree	IP65 with valve connector IP66/67 with M12 x 1 connector PPSU (plastic)
Mechanical construction	
Versions	LVL-A1: version for process temperatures up to 100 °C (373 K) LVL-A5: version for process temperatures up to 150 °C (423 K)
Dimensions	LVL-A1-V1: diameter 31.5 mm (1.24 in), length 148.5 mm (5.8 in) LVL-A1-P*: diameter 40 mm (1.57 in), length 161 mm (6.3 in) LVL-A1-PS: diameter 40 mm (1.57 in), length 155 mm (6.1 in) LVL-A5-V1: diameter 31.5 mm (1.24 in), length 173 mm (6.8 in) LVL-A5-P*: diameter 40 mm (1.57 in), length 185.5 mm (7.3 in) LVL-A5-PS: diameter 40 mm (1.57 in), length 179.5 mm (7.1 in)
Mass	LVL-A1: approx. 210 g LVL-A5: approx. 270 g
Material	vibration fork, process connection and housing: stainless steel 1.4435/316L connection: PSU
Surface quality	R _a < 3.2 µm/80 grit
Process connection	- cylindrical thread G½A, G¾A, G1A to DIN ISO 228/1 - conical thread R½, R¾ to DIN 2999, part 1 - conical thread ½ NPT, ¾ NPT to ANSI B 1.20.1
Electrical connection	electrical connection V1: pinning according to EN 60947-5-2 electrical connection P*: valve plug, cross section max. 1.5 mm ² (AWG 16), diameter 6 ... 9 mm (0.24 ... 0.35 in) electrical connection PS: QUICKON valve plug, cross section 0.34 ... 0.75 mm ² , diameter 3.5 ... 6.5 mm (0.14 ... 0.26 in)
Indication and operation	
Display elements	The LED display is on the connection side. green LED: indication of ready to operate red LED: fault indication, mode indication yellow LED: mode indication (B3)
Programming	AS-Interface profile S-3.A.E The address is defaulted to 0 (hex). It is changeable via the bus master or programming unit. Parameter bits (P0 ... P3) are not used.
Function test	function test with test magnet: Put the testing magnet to the mark of nameplate, the vibration fork reacts with the test magnet as in the case of covering with fluid. outputs E5, WA: on testing, the current state of the electronic switch is reversed output B3: on testing, D0 is inverted
Certificates and approvals	
Application	The general authorization by the board of surveyors must be obtained for the site of installation. It is accessible together with the technical description and the certificate from Pepperl+Fuchs.
Overspill protection	Z-65.11-314 (overspill protection in acc. with WHG) Z-65.40-315 (leak detection system)
General information	
Directive conformity	
Directive 73/23/EEC (Low Voltage Directive)	output WA: EN 50178
Directive 89/336/EEC (EMC)	outputs E5, WA: emitted interference to EN 61326, CLASS B equipment noise immunity to EN 61326, annex A (industrial sector) output B3: EN 50295
Conformity	
Electromagnetic compatibility	NE 21
Protection degree	EN 60529
Interface	output B: AS-Interface profile S-3.A.1 as per EN 50295 (limit switch)
Vibration resistance	EN 60068-2-64
Shock and impact resistance	EN 60068-2-27, 30 g
Supplementary documentation	technical information TI3640 operating instructions KA2130 operating instructions KA1410 weld-in adapter G1 (LVL-Z101) operating instructions KA1860 valve connector PG11 operating instructions KA2190 weld-in adapter G¾ (LVL-Z66) approval ZE2470 overspill protection in acc. with WHG (Z-65.11-314) approval ZE2480 leak detection system (Z-65.40-315)
Supplementary information	Statement of Conformity, Declaration of Conformity, Attestation of Conformity and instructions have to be observed where applicable. For information see www.pepperl-fuchs.com .

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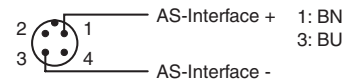
Singapore: +65 6779 9091
pa-info@sg.pepperl-fuchs.com

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PROTECTING YOUR PROCESS

Electrical connection

Output B3 (AS-Interface) (only with V1 connector M12 x 1 available)

Two-wire connection for separate switching unit



Programming instruction AS-Interface profile: S-3.A.E

The address is defaulted to 0 (hex). It is changeable via the bus master or programming unit.

Data bit:

D0:1 Sensor covered	D1:1 State = OK
D0:0 Sensor free	D1:0 State = error
D2 and D3 are not used.	

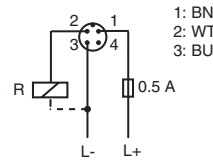
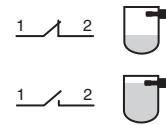
Parameter bits (P0 ... P3) are not used.

Output E5

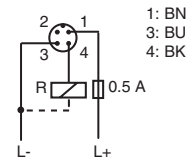
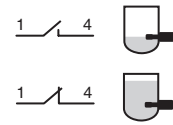
Three-wire DC connection, switching the load via transistor (PNP) and separate connection

V1 connector M12 x 1

Operating mode MAX (NC contact)

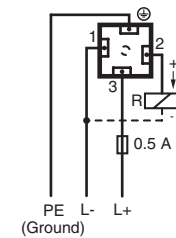
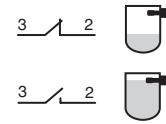


Operating mode MIN (NO contact)

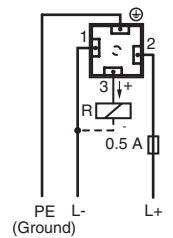
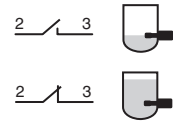


Valve plug

Operating mode MAX



Operating mode MIN

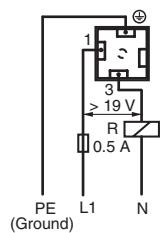
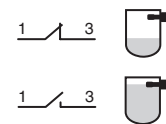


Output WA

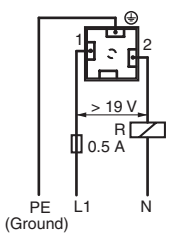
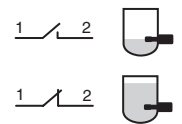
Two-wire AC connection

Valve plug

Operating mode MAX



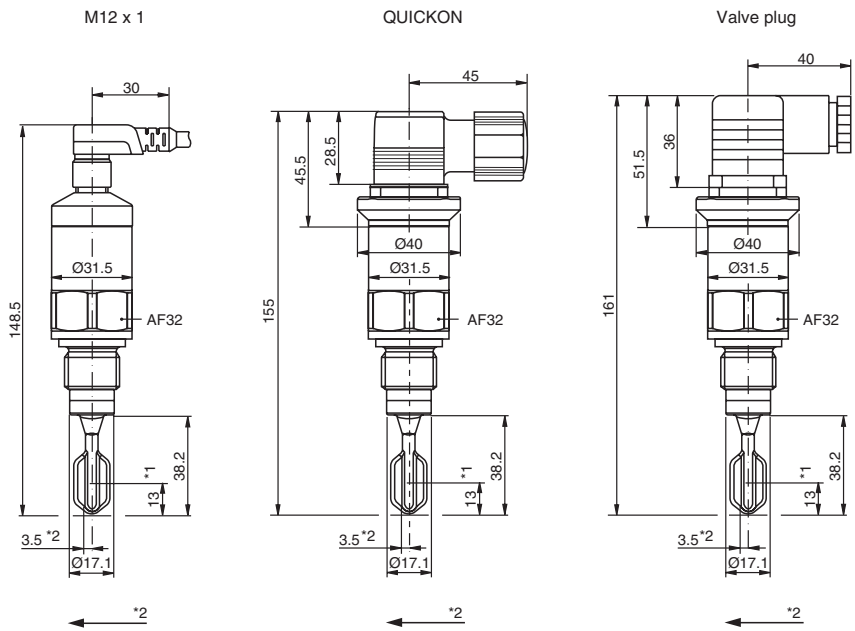
Operating mode MIN



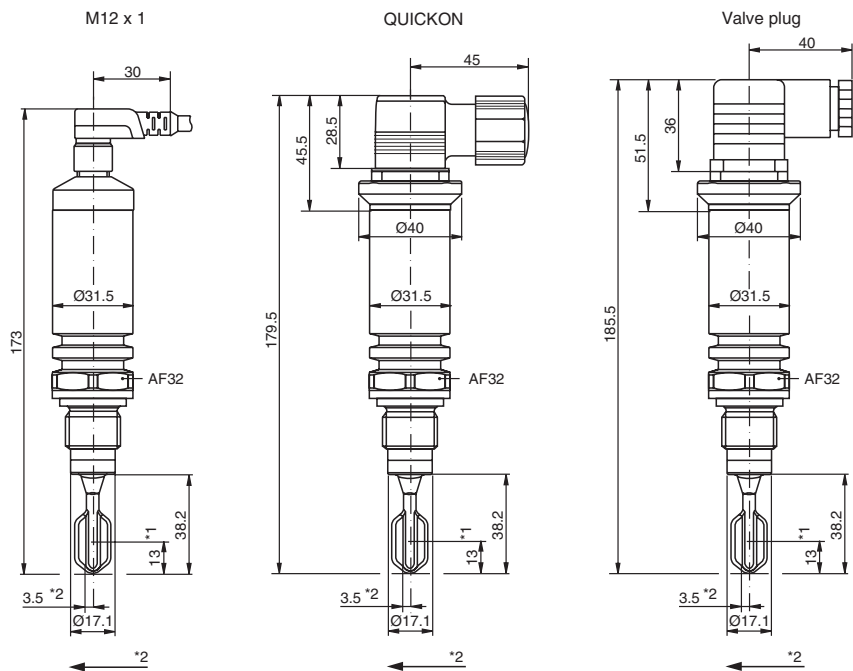
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Dimensions

Version A1



Version A5



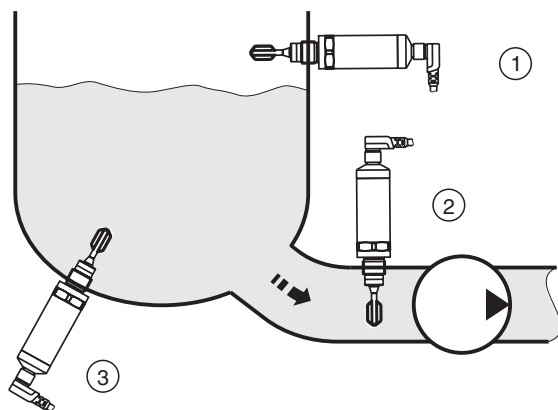
*1 Switch point with vertical installation
 *2 Switch point with horizontal installation; the level increases in the direction of the arrow
 Switch points at: density 1/23 °C (296 K)/0 bar

Dimensions of the process connections see technical information.

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Mounting position

The level limit switch can be installed in any position in a container or pipe. The formation of foam does not impair its function.

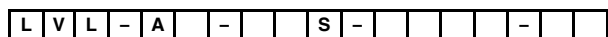


- Example 1: overflow protection or top level detection
- Example 2: dry running protection for pump
- Example 3: lower level detection

Accessories

- LVL-Z65, socket wrench AF32
- LVL-Z66, welding sleeve G3/4 for flush mounting for process connection G2
- LVL-Z101, welding sleeve G1 for flush mounting for process connection G4
- M12 x 1 connector without LEDs

Type code/model number



- Approvals**
- CG CSA general purpose
- WH overspill protection WHG
- Electrical connection**
- PG valve plug PG11, ISO 4400, IP65
- PN valve plug 1/2 NPT, ISO 4400, IP65
- PS valve plug with QUICKON connection
- V1 connector V1, M12 x 1, IP67
- Electrical output**
- B3 AS-Interface bus
- E5 DC, PNP 3-wire
- WA AC, 2-wire
- Fork surface**
- S standard surface, $R_a < 3.2 \mu m$
- Process connection**
- G1 G1/2A, DIN ISO 228/1, 1.4435/316L
- G2 G3/4A with welding neck (accessory), DIN ISO 228/1, 1.4435/316L
- G3 G1A, DIN ISO 228/1, 1.4435/316L
- G4 G1A with welding neck (accessory), DIN ISO 228/1, 1.4435/316L
- N1 1/2 NPT, ANSI B 1.20.1, 1.4435/316L
- N2 3/4 NPT, ANSI B 1.20.1, 1.4435/316L
- R1 R1/2, DIN 2999, 1.4435/316L
- R2 R3/4, DIN 2999, 1.4435/316L
- Process temperature**
- 1 up to 100 °C (373 K)
- 5 up to 150 °C (423 K)

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