

Features

- Limit switch for liquids
- Large selection of process connections: universal use
- Wide variety of electronic modules (e. g., relay, thyristor signal output): the right connection for every process control system
- No calibration: quick and low-cost start up
- No mechanically moving parts: maintenance-free, no wear, long operating life
- Monitoring of the vibrating fork for damage: guaranteed function
- PROFIBUS PA protocol: commissioning and maintenance quick and easy
- Up to SIL 2 acc. to IEC 61508

Function

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

- for temperature from -50 °C to +150 °C
- for pressures up to 64 bar
- for viscosities up to 10000 mm²/s
- for densities up to 0.5 g/cm³ or 0.7 g/cm³ (other settings available on request)

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

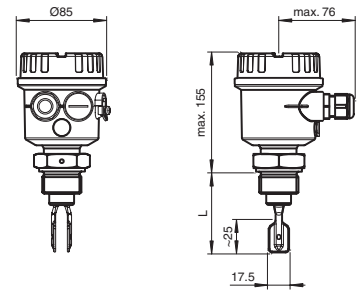
The compact version is ideal for mounting in pipes.

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

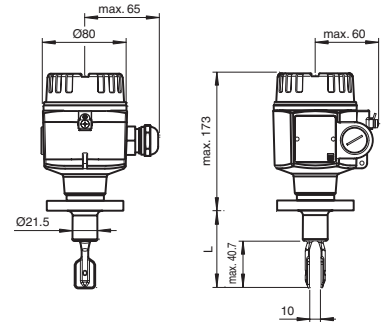
Devices with protection Ex ia and Ex d are available for use in explosion hazardous areas.

Assembly

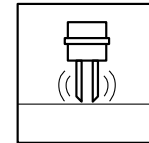
Device with polyester housing P* and process connection G**



Device with aluminium housing A* and process connection with flange



Additional dimensions see section dimensions. Length L see process connection.



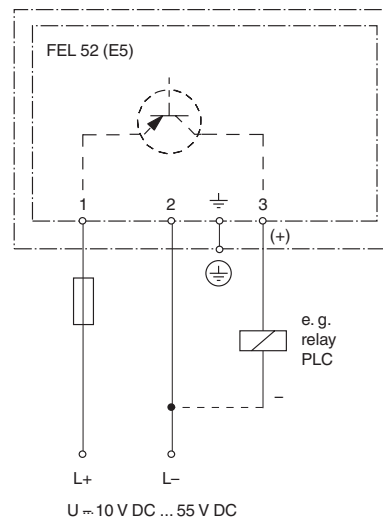
SIL 2



Connection

Connection FEL 52 (E5) 3-wire DC connection (example)

- preferably for use with memory programmable controls (PLC)
- positive signal at the switch output of the electronics (PNP)
- Output blocked on reaching limit level.
- also in compact housing with plug connection available



Other connection types see section electrical connection.

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

| | |
|----------------------------------|---|
| General specifications | |
| Function principle | limit detection Maximum or minimum detection in tanks or pipelines containing all types of liquids including use in explosion hazardous areas. Particularly suited to very aggressive liquids thanks to high degree of corrosion protection. |
| Measuring method | The forks of the sensors vibrate at their intrinsic frequency. This frequency is reduced when covered with liquid. The change in frequency then activates the limit switch. |
| Construction type | compact device |
| Supply | |
| Rated voltage U_r | electronic insert FEL50A (PA): 9 ... 32 V DC electronic insert FEL51 (AC): 253 V AC, 50/60 Hz electronic insert FEL52 (E5): 10 ... 55 V DC electronic insert FEL54 (WA): 19 ... 253 V AC, 50/60 Hz or 19 ... 55 V DC electronic insert FEL55 (SI): 11 ... 36 V DC, PLC electronic insert FEL56 (N1), FEL58 (N2): isolating amplifier acc. to EN 60947-5-6 (NAMUR) |
| Current consumption | electronic insert FEL52 (E5): max. 15 mA |
| Power consumption | electronic insert FEL52 (E5): max. 0.83 W electronic insert FEL54 (WA): max. 1.3 W |
| Electrical specifications | |
| Surge protection | electronic insert FEL51 (AC), electronic insert FEL52 (E5), electronic insert FEL54 (WA), electronic insert FEL55 (SI): overvoltage category III |
| Input | |
| Switching point | see section switch point |
| Measured variable | limit level (limit value) |
| Measurement range | depends on mounting point |
| Output | |
| Switching delay | when fork is covered: approx. 0.5 s, when fork is exposed: approx. 1.0 s (other switching times on request) additionally configurable for PROFIBUS PA (electronic insert FEL50A (PA)): 0.5 ... 60 s |
| Switch behaviour | switch-over for minimum/maximum residual current safety on electronic insert MAX = maximum safety: The output switches to the power fail response when the fork is covered. for use with overspill protection for example MIN = minimum safety: The output switches to the power fail response when the fork is exposed. for use with dry running protection for example When switching on the power supply the output assumes the alarm signal. After max. 2 s it assumes the correct switching mode. |
| Directive conformity | |
| Electromagnetic compatibility | |
| Directive 89/336/EEC | EN 61326 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). |
| Low voltage | |
| Directive 73/23/EEC | EN 61010-1 |
| Conformity | |
| Electromagnetic compatibility | NE 21 |
| Degree of protection | IEC 60529 |
| Vibration resistance | EN 60068-2-6 |
| Climate class | DIN EN 60068-2-38/IEC 68-2-38 |
| Input characteristics | |
| Medium density | adjustment on the electronic insert > 0,5 g/cm ³ or > 0,7 g/cm ³ (other on request) |
| Measurement accuracy | |
| Reference operating conditions | ambient temperature: 23 °C (73.4 °F), medium temperature: 23 °C (73.4 °F), product density: 1 g/cm ³ (water), viscosity: 1 mm ² /s, medium pressure p_e : 0 bar, sensor mounting: vertical from above, density switch: to > 0.7 g/cm ³ |
| Maximum measured error | max. ± 1 mm, specified by mounting position |
| Non-repeatability | 0.1 mm |
| Hysteresis | approx. 2 mm |
| Influence of medium density | max. +4.8 ... -3.5 mm (0.5 ... 1.5 g/cm ³) |
| Influence of medium temperature | max. +1.4 ... -2.8 mm (-40 ... 150 °C (-40 ... 302 °F)) |
| Influence of medium pressure | max. 0 ... -2.5 mm (-1 ... 64 bar) |
| Operating conditions | |
| Installation conditions | |
| Installation position | any position |
| Process conditions | |
| Medium temperature | -50 ... 150 °C (-58 ... 302 °F), exceptions see process connections |
| Medium pressure | $p_e = -1 ... 64$ bar (-14.5 ... 928.3 psi) over the entire temperature range, exceptions see process connections |

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| | |
|--|--|
| Test pressure | max. 100 bar (1.5 times the medium pressure p_e), no function during test pressure, burst pressure of diaphragm 200 bar |
| Thermal shock resistance | max. 120 °C/s (max. 120 K/s) |
| State of aggregation | liquid |
| Density | min. 0.5 g/cm ³ (compact housing 0.7 g/cm ³), other density settings on request |
| Viscosity | max. 10000 mm ² /s (max. 10000 cSt) |
| Solid contents | < Ø5 mm |
| Ambient conditions | |
| Ambient temperature | -50 ... 70 °C (-58 ... 158 °F) , function with reduced data values see section ambient temperature |
| Storage temperature | -50 ... 80 °C (-58 ... 176 °F) |
| Vibration resistance | 10 ... 50 Hz, 0.15 mm, 100 cycles |
| Mechanical specifications | |
| Degree of protection | polyester, steel, and aluminum housing: IP66/IP67 compact housing: - IP65 with valve connector PG11 or 1/2NPT - IP66/IP68 with M12 x 1 connector without LEDs (1.4435/316L) - IP69K with M12 x 1 connector with LEDs (1.4435/316L) |
| Connection | electronic inserts: cross section max. 2.5 mm ² , lace in end splice in acc. with DIN 46228 ground lead in housing: cross section max. 2.5 mm ² external equipotential bonding: cross section 4 mm ² |
| Material | wetted parts: - process connection: 1.4435/316L or 2.4610/Alloy C4 - vibration fork: 1.4435/316L or 2.4610/Alloy C4 - flat seal for process connection G2* or G3*: 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: 1.4435/316L, cover seal: silicone - aluminum housing: EN-AC-AISi10Mg, plastic-coated, cover seal: EPDM - compact housing with valve connector or M12 connector: 1.4435/316L cable gland: polyamide or brass, nickel-plated temperature spacer: 1.4435/316L flameproof bushing: 1.4435/316L |
| Surface quality | R _a < 3.2 µm/80 grit: length, spacer, bushings *A, *B, *E |
| Mass | 600 g , basic weight: compact sensor, electronic insert, stainless steel housing, process connection G2* , additional weight is dependent on housing and process connection process connections: - A31 1000 g, A41 1200 g, A51 1500 g, A6* 2400 g, A81 4900 g, A91 7000 g - 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, 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 - T51 no information, T61 100 g temperature spacer, flameproof bushing: - IA 600 g, QA 700 g |
| Dimensions | housing: diameter max. 85 mm, height max. 173 mm temperature separator, flameproof bushing: additional length L 140 mm process connection: length L 66.5 ... 80 mm extension: length type II, for vertical installation from above same switching point as Vibracon LVL1, LVL2 vibration fork: width 17.5 mm, fork width 10 mm, length 25 mm |
| Process connection | - cylindrical thread G3/4A, G1A to DIN ISO 228/1 with flat seal to DIN 7603 - conical thread R3/4, R1 to DIN 2999, part 1 - conical thread 3/4NPT, 1NPT to ANSI B 1.20.1 - flush-mounted with welding sleeve to factory standard (G3/4A, G1A) - Triclamp 1-1/2 inch, 2 inch to ISO 2852 - flanges to EN 1092-1 from DN25, to ANSI B 16.5 from 1 inch, to JIS B 2238 (RF) from DN25 For further information see type code. |
| Data for application in connection with hazardous areas | |
| EU-Type Examination Certificate | see instruction manuals (SI) |
| International approvals | |
| FM approval | see control drawings (ZD) |
| CSA approval | see control drawings (ZD) |
| IECEX approval | see instruction manuals (SI) |
| Indication and operation | |

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| | |
|-----------------------------------|--|
| Display elements | <p>electronic inserts: - electronic inserts FEL50 A (PA), FEL58 (N2): green LED, yellow LED - electronic inserts FEL51 (AC), FEL52 (E5), FEL54 (WA), FEL55 (SI), FEL56 (N1): green LED, red LED</p> <p>compact housings: compact housing with valve connector - electronic version FEL51 (AC), FEL52 (E5): green LED, red LED - electronic version FEL58 (N2): green LED, yellow LED compact housing with M12 x 1 round connector without LEDs - electronic version FEL52 (E5): green LED, yellow LED, red LED - electronic version FEL58 (N2): green LED, yellow LED compact housing with M12 x 1 round connector with LEDs - electronic version FEL52 (E5): green LED, two yellow LEDs</p> |
| Control elements | <p>electronic insert FEL50A (PA): 8 switches for device address setting electronic inserts FEL51 (AC), FEL52 (E5), FEL54 (WA), FEL55 (SI), FEL56 (N1): two switches for fail-safe mode and density change electronic insert FEL58 (N2): two switches for fail-safe mode and density change and one test button interrupts lead</p> |
| Function test | <p>compact housing: function test with test magnet electronic versions FEL51 (AC), FEL52 (E5) and FEL58 (N2): During the test, the current state of the electronic switch is reversed.</p> |
| Certificates and approvals | |
| SIL classification | up to SIL2 acc. to IEC 61508 |
| Overspill protection | see approval (ZE) |
| General information | |
| Supplementary documentation | <p>technical information (TI) manuals, brief instructions (BA, KA) instruction manuals (SI) control drawings (ZD)</p> |
| Supplementary information | <p>EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity, Attestation of Conformity and instructions have to be observed where applicable. For information see www.pepperl-fuchs.com.</p> |
| Accessories | |
| Designation | see technical information (TI) |

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Pepperl+Fuchs Group
www.pepperl-fuchs.com

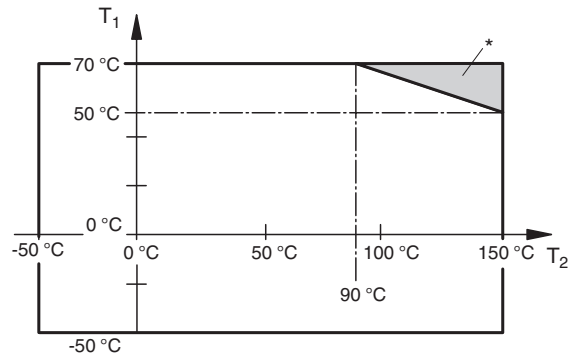
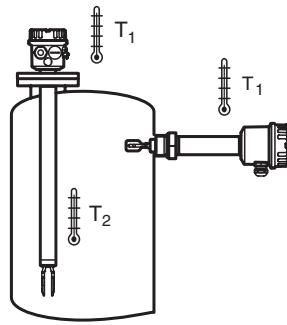
USA: +1 330 486 0002
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Singapore: +65 6779 9091
pa-info@sg.pepperl-fuchs.com

Ambient temperature

Permissible ambient temperature T_1 at the housing depends on the product temperature T_2 in the vessel:



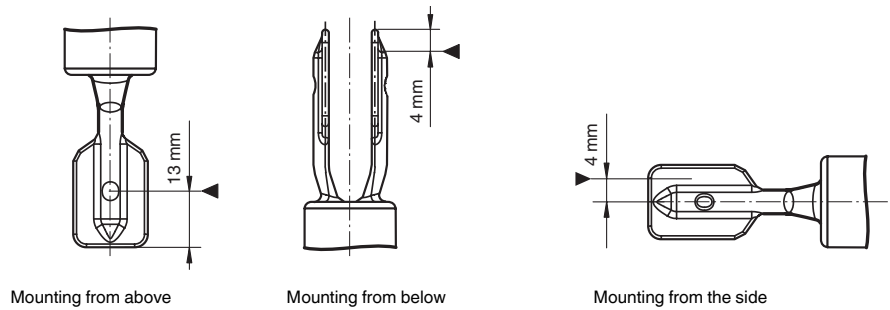
* additional temperature range for sensors with a temperature separator or pressure-tight bushing

Switch point

Switch point ► on the sensor depend on the mounting position, with reference to water, density 1 g/cm³, 23 °C, p_e 0 bar.

Note:

The switch points of the Vibracon LVL-M2C are at other positions to those of the previous versions LVL1, LVL2.



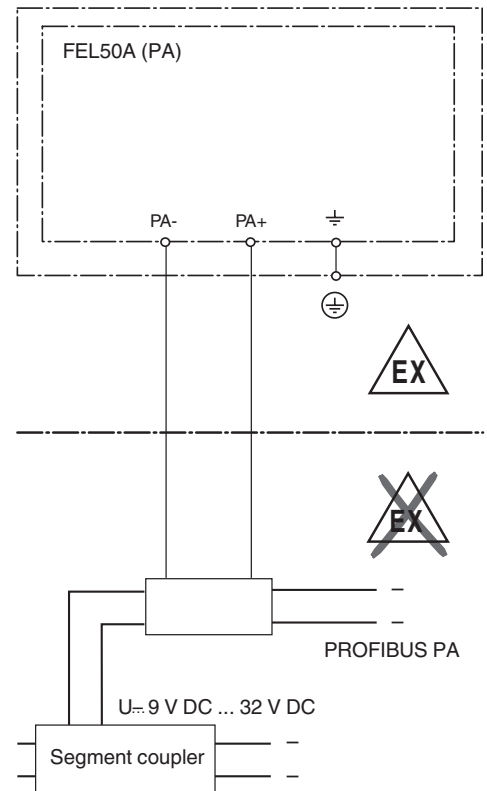
Electrical connection

Electronic insert FEL50A (PA)

2-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).
- You can also visit www.profibus.com for more information.



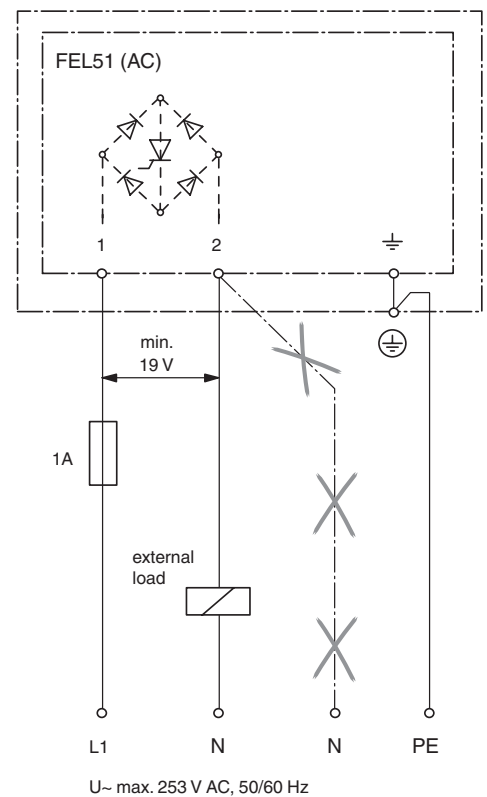
Electronic insert FEL51 (AC)

2-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).

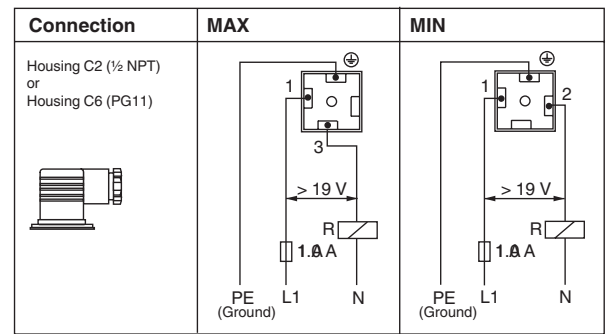


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Electrical connection

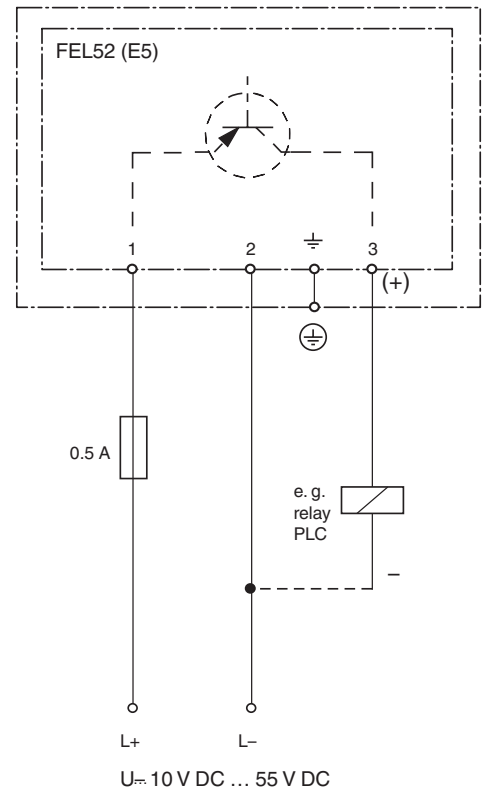
Electronic FEL51 (AC) in compact housing



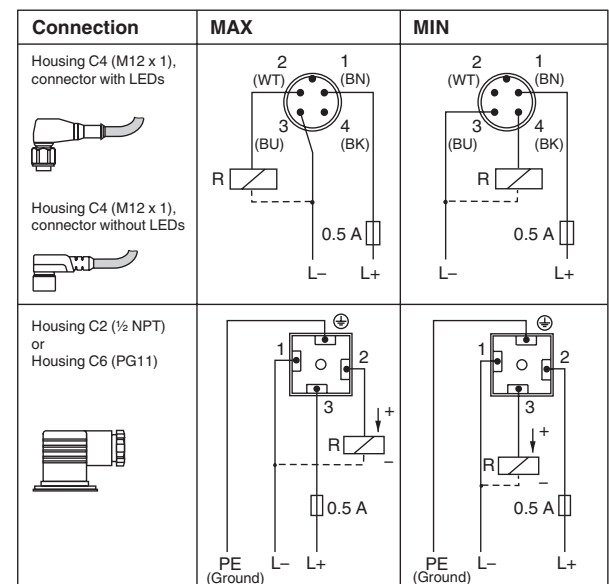
Electronic insert FEL52 (E5)

3-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.



Electronic FEL52 (E5) in compact housing



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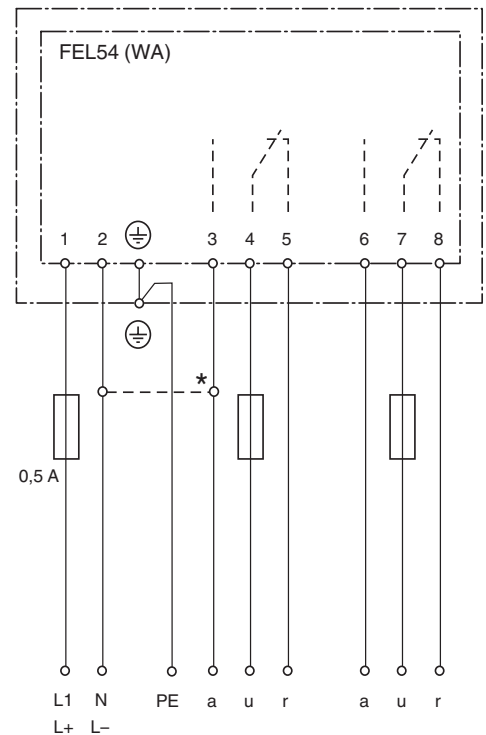
Electrical connection

Electronic insert FEL54 (WA)

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.

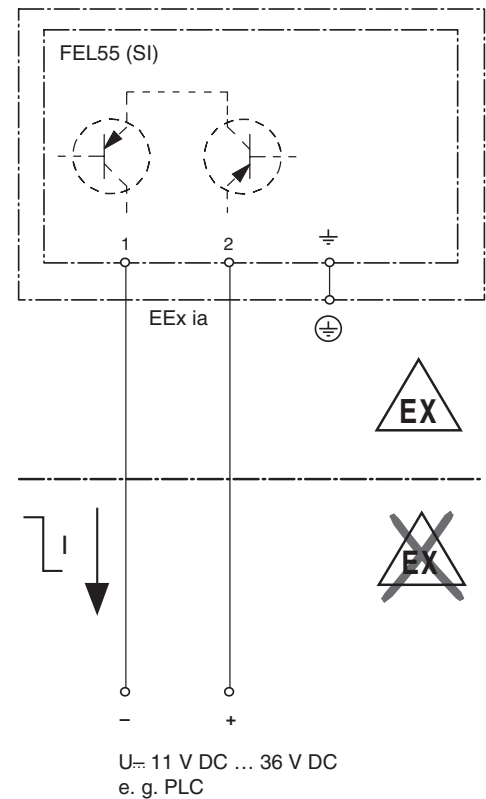


U~ 19 V AC ... 253 V AC, 50/60 Hz
U- 19 V DC ... 55 V DC

Electronic insert FEL55 (SI)

2-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**)



U= 11 V DC ... 36 V DC
e. g. PLC

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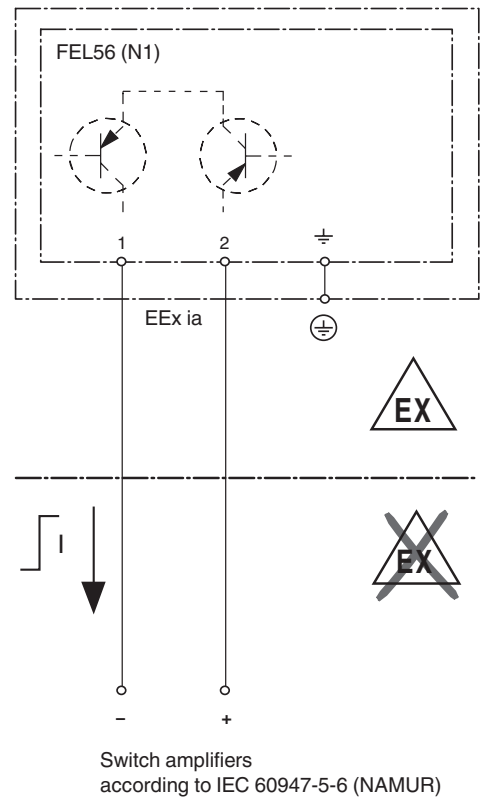
Electrical connection

Electronic insert FEL56 (N1)

2-wire connection for separate switching unit

- for connecting to switch amplifiers acc. to NAMUR (IEC 60947-5-6), e. g. switch amplifiers 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.



Electronic insert FEL58 (N2)

2-wire connection for separate switching unit

- for connecting to switch amplifiers acc. to NAMUR (IEC 60947-5-6), e. g. switch amplifiers from Pepperl+Fuchs
- Output signal jump from high to low current on limit (**H-L edge**)

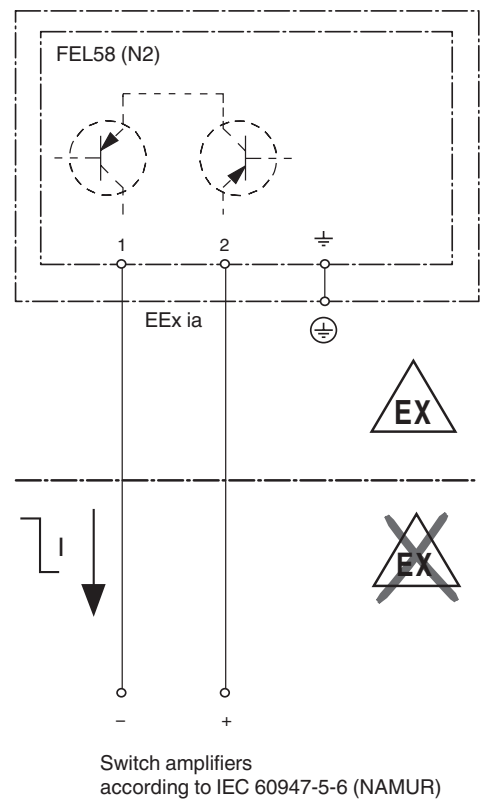
Additional function:

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

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

Note


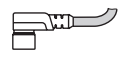
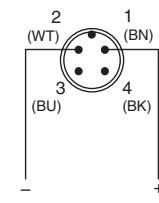
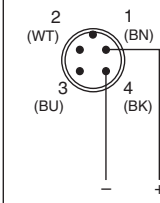
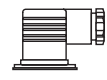
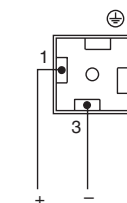
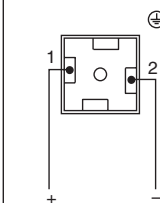
For Ex-d applications, the additional function can only be used if the housing is not exposed to an explosive atmosphere.



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Electrical connection

Electronic FEL58 (N2) in compact housing

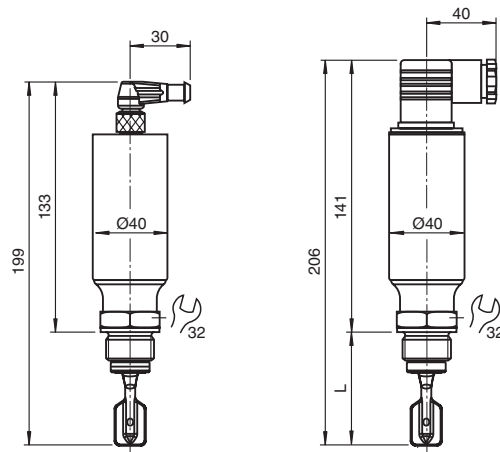
| Connection | MAX | MIN |
|---|---|---|
| Housing C4 (M12 x 1), connector with LEDs  Housing C4 (M12 x 1), connector without LEDs  |  |  |
| Housing C2 (½ NPT) or Housing C4 (PG11)  |  |  |

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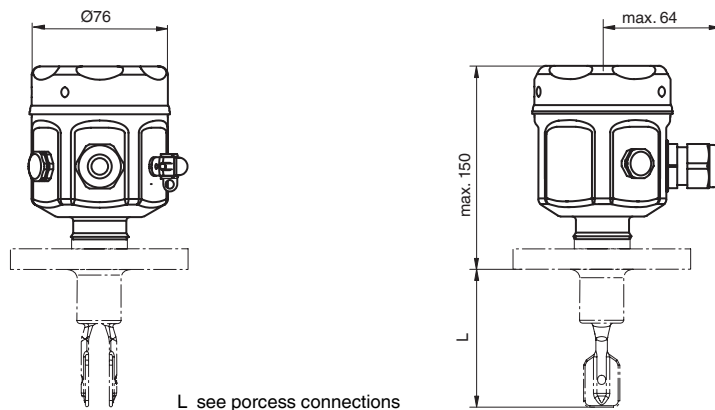
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Dimensions

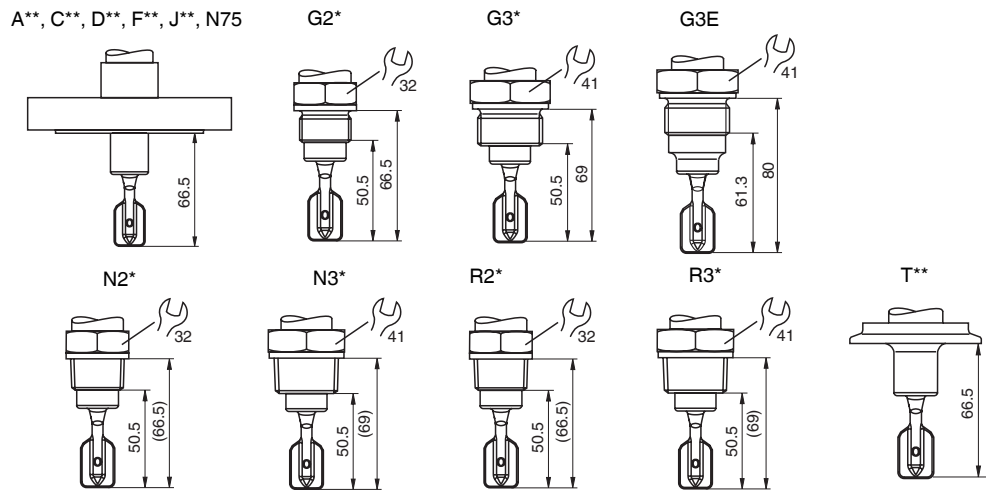
Compact housing C*



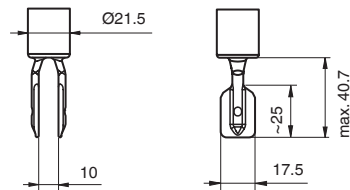
Stainless steel housing E*



Process connections



Vibration fork



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Accessories

Welding sleeves

- LVL-Z100, welding sleeve G3/4 for flush mounting for process connection G21
- LVL-Z101, welding sleeve G1 for flush mounting for process connection G3E
- LVL-Z102, welding sleeve G1 for flush mounting for process connection G3E

Flanges

- LVL-Z105, lap joint round flange DN50 PN40 form A with G1 thread for process connection G31
- LVL-Z106, lap joint round flange ANSI 2 inch with G1 thread for process connection G31
- LVL-Z107, lap joint square flange with G1 thread for process connection G31

Sliding sleeves

- LVL-Z120, sliding sleeve for unpressurised operation G1A
- LVL-Z121, sliding sleeve for unpressurised operation G1-1/2A
- LVL-Z122, sliding sleeve for unpressurised operation 1 NPT
- LVL-Z123, sliding sleeve for unpressurised operation 1-1/2 NPT
- LVL-Z124, high pressure sliding sleeve G1A
- LVL-Z125, high pressure sliding sleeve G1A, Alloy C4/2.4610
- LVL-Z126, high pressure sliding sleeve G1-1/2A
- LVL-Z127, high pressure sliding sleeve G1-1/2A, Alloy C4/2.4610
- LVL-Z128, high pressure sliding sleeve 1 NPT
- LVL-Z129, high pressure sliding sleeve 1 NPT, Alloy C4/2.4610
- LVL-Z130, high pressure sliding sleeve 1-1/2 NPT
- LVL-Z131, high pressure sliding sleeve 1-1/2 NPT, Alloy C4/2.4610

Further accessories

- LVL-Z108, cover with glass sight glass for stainless steel housing E*
- LVL-Z109, cover with PC sight glass for stainless steel housing E*
- LVL-Z110, transparent cover for polyester housing P*
- V1-G, mating connector, straight
- V1-W, mating connector, 90° angled

Type Code



*This overview does not mark options which are mutually exclusive.
Option with * = on request/in preparation.*

| | |
|---------------------------|---|
| Device | |
| LVL-M1 | Limit switch for liquids, compact device |
| Process connection | |
| A31 | Flange 1 inch, ANSI B 16.5, 150 lbs RF, 1.4435/316L |
| A41 | Flange 1-1/4 inch, ANSI B 16.5, 150 lbs RF, 1.4435/316L |
| A51 | Flange 1-1/2 inch, ANSI B 16.5, 150 lbs RF, 1.4435/316L |
| A61 | Flange 2 inch, ANSI B 16.5, 150 lbs RF, 1.4435/316L |
| A6C | Flange 2 inch, ANSI B 16.5, 150 lbs RF, 2.4610/Alloy C4, platinized |
| A62 | Flange 2 inch, ANSI B 16.5, 300 lbs RF, 1.4435/316L |
| A81 | Flange 3 inch, ANSI B 16.5, 150 lbs RF, 1.4435/316L |
| A91 | Flange 4 inch, ANSI B 16.5, 150 lbs RF, 1.4435/316L |
| F45 | Flange DN25 PN25/40 A, EN 1092-1, 1.4435/316L |
| F51 | Flange DN32 PN6 A, EN 1092-1, 1.4435/316L |
| F55 | Flange DN32 PN25/40 A, EN 1092-1, 1.4435/316L |
| F61 | Flange DN40 PN6 A, EN 1092-1, 1.4435/316L |
| F65 | Flange DN40 PN25/40 A, EN 1092-1, 1.4435/316L |
| F71 | Flange DN50 PN6 A, EN 1092-1, 1.4435/316L |
| F75 | Flange DN50 PN25/40 A, EN 1092-1, 1.4435/316L |
| F7F | Flange DN50 PN40 C, EN 1092-1, 1.4435/316L |
| F81 | Flange DN65 PN6 A, EN 1092-1, 1.4435/316L |
| F85 | Flange DN65 PN25/40 A, EN 1092-1, 1.4435/316L |
| F93 | Flange DN80 PN10/16 A, EN 1092-1, 1.4435/316L |
| F95 | Flange DN80 PN25/40 A, EN 1092-1, 1.4435/316L |
| FA3 | Flange DN100 PN10/16 A, EN 1092-1, 1.4435/316L |
| FA5 | Flange DN100 PN25/40 A, EN 1092-1, 1.4435/316L |
| D45 | Flange DN25 PN25/40 B1, EN 1092-1, 1.4435/316L |
| C45 | Flange DN25 PN25/40, EN 1092-1, 2.4610/Alloy C4, 1.4435/316L, platinized |
| D51 | Flange DN32 PN6 B1, EN 1092-1, 1.4435/316L |
| C51 | Flange DN32 PN6, EN 1092-1, 2.4610/Alloy C4, 1.4435/316L, platinized |
| D71 | Flange DN50 PN6 B1, EN 1092-1, 1.4435/316L |
| C71 | Flange DN50 PN6, EN 1092-1, 2.4610/Alloy C4, 1.4435/316L, platinized |
| D75 | Flange DN50 PN25/40 B1, EN 1092-1, 1.4435/316L |
| C75 | Flange DN50 PN25/40, EN 1092-1, 2.4610/Alloy C4, 1.4435/316L, platinized |
| D95 | Flange DN80 PN25/40 B1, EN 1092-1, 1.4435/316L |
| C95 | Flange DN80 PN25/40, EN 1092-1, 2.4610/Alloy C4, 1.4435/316L, platinized |
| DA3 | Flange DN100 PN10/16 B1, EN 1092-1, 1.4435/316L |
| CA3 | Flange DN100 PN10/16, EN 1092-1, 2.4610/Alloy C4, 1.4435/316L, platinized |
| N75 | Flange DN50 PN40 D, EN 1092-1, 1.4435/316L |
| J13 | Flange 10K 25A, JIS B 2238 RF, 1.4435/316L |
| J16 | Flange 10K 40A, JIS B 2238 RF, 1.4435/316L |
| J17 | Flange 10K 50A, JIS B 2238 RF, 1.4435/316L |
| J1C | Flange 10K 50A, JIS B 2238 RF, 2.4610/Alloy C4, platinized |
| J19 | Flange 10K 80A, JIS B 2238 RF, 1.4435/316L |
| J1A | Flange 10K 100A, JIS B 2238 RF, 1.4435/316L |
| R21 | Thread R3/4 BSP, DIN 2999, 1.4435/316L |
| R2C | Thread R3/4 BSP, DIN 2999, 2.4610/Alloy C4, platinized |
| R31 | Thread R1 BSP, DIN 2999, 1.4435/316L |
| R3C | Thread R1 BSP, DIN 2999, 2.4610/Alloy C4 |
| N21 | Thread 3/4NPT, ANSI B 1.20.1, 1.4435/316L |
| N2C | Thread 3/4NPT, ANSI B 1.20.1, 2.4610/Alloy C4 |
| N31 | Thread 1 NPT, ANSI B 1.20.1, 1.4435/316L |
| N3C | Thread 1 NPT, ANSI B 1.20.1, 2.4610/Alloy C4 |
| G21 | Thread G3/4A, DIN ISO 228/1, BSP, 1.4435/316L, for mounting in welding sleeve |
| G2C | Thread G3/4A, DIN ISO 228/1, BSP, 2.4610/Alloy C4 |
| G31 | Thread G1A, DIN ISO 228/1, BSP, 1.4435/316L |
| G3C | Thread G1A, DIN ISO 228/1, BSP, 2.4610/Alloy C4 |

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| Process connection | |
|--------------------|---|
| G3E | Thread G1A, DIN ISO 228/1, BSP, 1.4435/316L, for mounting in welding sleeve |
| T51 | 1-1/2 inch, DN25-38, Triclamp ISO 2852 1.4435/316L |
| T61 | 2 inch, DN40-51, Triclamp ISO 2852 1.4435/316L |
| XXX | Special version |

| Probe version, temperature spacer, flameproof bushing | |
|---|--|
| AA | 66 mm/2.6 inch, $R_a < 3.2 \mu\text{m}/80$ grit |
| IA | 66 mm/2.6 inch, $R_a < 3.2 \mu\text{m}/80$ grit, with temperature spacer |
| QA | 66 mm/2.6 inch, $R_a < 3.2 \mu\text{m}/80$ grit, with flameproof bushing |
| XX | Special version |

| Housing | |
|---------|--|
| A1 | Aluminium housing, IP66, thread M20 |
| A2 | Aluminium housing, NEMA 4X, thread 3/4NPT |
| A3 | Aluminium housing, IP66, entry G1/2A |
| A4 | Aluminium housing, IP66, plug M12 x 1 |
| A5 | Aluminium housing, IP66, PA plug M12 x 1 |
| C2 | Compact housing, NEMA 4X, 1/2NPT, 1.4435/316L |
| C4 | Compact housing, IP66, plug M12 x 1, 1.4435/316L |
| C6 | Compact housing, IP66, thread PG11, 1.4435/316L |
| E1 | Stainless steel housing, IP66, thread M20 |
| E2 | Stainless steel housing, NEMA 4X, thread 1/2NPT |
| E3 | Stainless steel housing, IP66, entry G1/2A |
| E4 | Stainless steel housing, IP66, plug M12 x 1 |
| E5 | Stainless steel housing, IP66, PA plug M12 x 1 |
| P1 | Polyester housing, IP66, thread M20 |
| P2 | Polyester housing, NEMA 4X, thread 1/2NPT |
| P3 | Polyester housing, IP66, entry G1/2A |
| P4 | Polyester housing, IP66, plug M12 x 1 |
| P5 | Polyester housing, IP66, PA plug M12 x 1 |

| Electrical connection | |
|-----------------------|--|
| PA | FEL50A, PROFIBUS PA |
| AC | FEL51, contactless 2-wire switch, 19 V ... 253 V AC |
| E5 | FEL52, PNP 3-wire, 10 V ... 55 V DC |
| WA | FEL54, potential-free change-over contact, DPDT, 19 V ... 253 V AC, 19 V ... 55 V DC |
| SI | FEL55, 8/16 mA, 11 V ... 36 V DC |
| N1 | FEL56, NAMUR, L-H edge |
| N2 | FEL58, NAMUR with push button, H-L edge |

| Additional equipment | |
|----------------------|---|
| NA | without additional equipment |
| Z3 | 3.1.B material, wetted parts 1.4435, inspection certificate to EN 10204 |

| Approval | |
|----------|---|
| NA | Version for non-hazardous area |
| WH | WHG overfill protection |
| E1 | ATEX II 1G EEx ia IIC T6 |
| E2 | ATEX II 1/2G EEx ia IIC T6 |
| E3 | ATEX II 1/2G EEx d IIC T6 |
| EA | ATEX II 1G EEx ia IIC T6, WHG |
| EB | ATEX II 1/2G EEx ia IIC T6, WHG |
| EC | ATEX II 1/2G EEx d IIC T6, WHG |
| EM | ATEX II 3G EEx nA IIC T6, WHG |
| EN | ATEX II 3G EEx nC IIC T6, WHG |
| FI | FM IS, Cl. I, II, III, Div. 1, Gr. A-G |
| FN | FM NI, Cl. I, Div. 2, Gr. A-D |
| FX | FM XP, Cl. I, II, III, Div. 1, Gr. A-G |
| CG | CSA General Purpose |
| CI | CSA IS, Cl. I, II, III, Div. 1, Gr. A-G |
| CX | CSA XP, Cl. I, II, III, Div. 1, Gr. A-G |

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