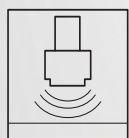
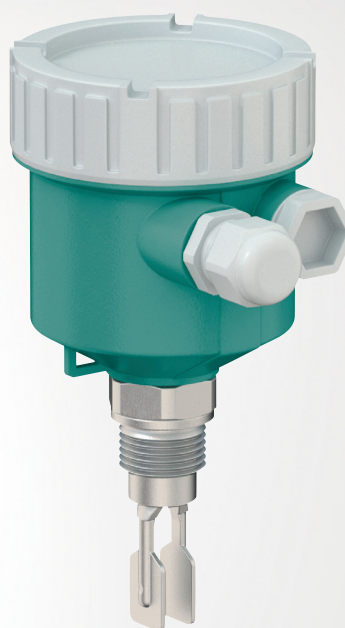


**LVL-M3**

## **Vibration Limit Switch**

**Technical Information**



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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 Electrical Industry (Zentralverband Elektrotechnik und Elektroindustrie (ZVEI) e.V.) in its most recent version as well as the supplementary clause: "Expanded reservation of proprietorship"

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# 1 Introduction

## 1.1 Content of this Document

This document contains information that you need in order to use your product throughout the applicable stages of the product life cycle. These can include the following:

- Product identification
- Delivery, transport, and storage
- Mounting and installation
- Commissioning and operation
- Maintenance and repair
- Troubleshooting
- Dismounting
- Disposal



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**Note**

This document does not substitute the instruction manual.

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**Note**

For full information on the product, refer to the instruction manual and further documentation on the Internet at [www.pepperl-fuchs.com](http://www.pepperl-fuchs.com).

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**Note**

For specific device information such as the year of construction, scan the QR code on the device. As an alternative, enter the serial number in the serial number search at [www.pepperl-fuchs.com](http://www.pepperl-fuchs.com).

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The documentation consists of the following parts:

- Datasheet – product overview  
The datasheet contains the essential technical data for product selection.
- Technical information (TI), present document – planning aid  
The document contains all the technical data on the device and provides an overview of the accessories and other products that can be ordered for the device.
- Manual (BA) – complete information  
The manual contains all information from incoming acceptance to disposal.
- Brief instructions (KA) – guide that takes you quickly to the 1st measured value  
The brief instructions contain all the essential information from incoming acceptance to initial commissioning.
- Instruction manual (SI) – safety-relevant document  
Depending on the approval, the required instruction manuals are supplied with the device.

Additionally, the following parts may belong to the documentation, if applicable:

- EU-type examination certificate
- EU declaration of conformity
- Attestation of conformity
- Certificates
- Control drawings
- Functional safety manual
- Additional documents

## 1.2 Safety Information

### Target Group, Personnel

Responsibility for planning, assembly, commissioning, operation, maintenance, and dismantling lies with the plant operator.

Only appropriately trained and qualified personnel may carry out mounting, installation, commissioning, operation, maintenance, and dismantling of the product. The personnel must have read and understood the instruction manual and the further documentation.

Prior to using the product make yourself familiar with it. Read the document carefully.

## 1.3 Symbols Used

This document contains symbols for the identification of warning messages and of informative messages.

### Warning Messages

You will find warning messages, whenever dangers may arise from your actions. It is mandatory that you observe these warning messages for your personal safety and in order to avoid property damage.

Depending on the risk level, the warning messages are displayed in descending order as follows:



#### **Danger!**

This symbol indicates an imminent danger.

Non-observance will result in personal injury or death.

---



#### **Warning!**

This symbol indicates a possible fault or danger.

Non-observance may cause personal injury or serious property damage.

---



#### **Caution!**

This symbol indicates a possible fault.

Non-observance could interrupt the device and any connected systems and plants, or result in their complete failure.

---



## Informative Symbols



### Note

This symbol brings important information to your attention.

---



### Action

This symbol indicates a paragraph with instructions. You are prompted to perform an action or a sequence of actions.



Reference to another section or to further documentation



### Permitted

Procedures, processes or actions that are permitted.



### Forbidden

Procedures, processes or actions that are forbidden.

## Electrical Symbols



### Ground connection

Grounded clamp, which is grounded via a grounding system.



### Protective earth (PE)

Ground terminals, which must be grounded prior to establishing any other connections. The ground terminals are located on the inside and outside of the device.

## Symbols in Graphics

1, 2, 3 ... Item numbers

A, B, C, ... Views



Explosion-hazardous area



Non-explosion-hazardous area

## 2 Function and System Design

### 2.1 Point Level Detection

Maximum or minimum detection for liquids in tanks or pipes in all industries. Suitable for leakage monitoring, pump dry-running protection or overflow prevention, for example.

Specific versions are suitable for use in hazardous areas.

The device differentiates between the **covered** and **not covered** conditions.

Depending on the MIN (minimum detection) or MAX (maximum detection) modes, there are 2 possibilities in each case: OK status and demand mode.

#### OK status

- In MIN mode, the fork is covered, e. g. pump dry running protection
- In MAX mode, the fork is not covered e. g. overflow prevention

#### Demand mode

- In MIN mode, the fork is not covered e. g. pump dry running protection
- In MAX mode, the fork is covered e. g. overflow prevention

### 2.2 Measuring Principle

The sensor's tuning fork vibrates at its intrinsic frequency. As soon as the liquid covers the tuning fork, the vibration frequency decreases. The change in frequency causes the device to switch.

### 2.3 Measuring System

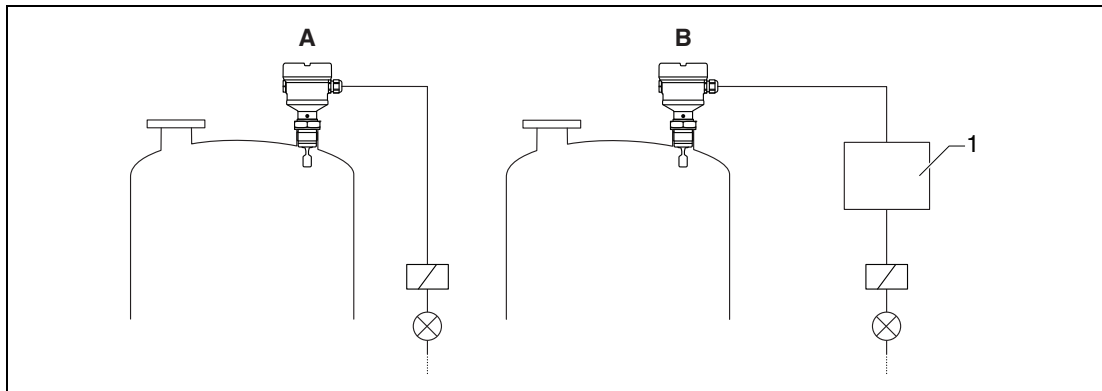


Figure 2.1 Example of a measuring system

- A** Device for direct connection of a load  
**B** Device for connection to a separate switching unit or PLC  
**1** Switching unit, PLC etc.

### **3 Input**

#### **3.1 Measured Variable**

Level (point level), MAX or MIN safety

#### **3.2 Measuring Range**

Depends on the installation location and the pipe extension ordered  
Maximum sensor length 2 m (6.6 foot)

## 4 Output

### 4.1 Output and Input Versions

#### Electronic Inserts

##### 3-wire DC-PNP (electronic insert FEL42)

- 3-wire DC version
- Switches the load via the transistor (PNP) and separate connection, e. g. in conjunction with programmable logical controllers (PLC)

##### Universal current connection, relay output (electronic insert FEL44)

- Switches the loads via 2 volt-free changeover contacts

##### 2-wire NAMUR > 2.2 mA/< 1.0 mA (electronic insert FEL48)

- For separate switching device
- Signal transmission H-L edge 2.2 to 3.8/0.4 to 1.0 mA as per IEC 60917-5-6 (NAMUR) on 2-wire cable

### 4.2 Output Signal

#### Switch Output

The following default switching delay times can be ordered for electronic inserts:

- 0.5 s when the tuning fork is covered and 1.0 s when it is uncovered (factory setting)
- 0.25 s when the tuning fork is covered and 0.25 s when it is uncovered (fastest configuration)
- 1.5 s when the tuning fork is covered and 1.5 s when it is uncovered
- 5.0 s when the tuning fork is covered and 5.0 s when it is uncovered

### 4.3 Safety Related Output Values

The safety related documents (SI) are available on the product detail page of the devices on the Internet at [www.pepperl-fuchs.com](http://www.pepperl-fuchs.com).

Enter the order designation in the search field → Select the appropriate product → Open the product detail page → Open the **Documents** tab.

The specific safety-related documents are included with the devices as standard.

## 5 Electronic Inserts

### 5.1 3-Wire DC-PNP (Electronic Insert FEL42)

- 3-wire DC version
- Switches the load via the transistor (PNP) and separate connection, e. g. in conjunction with programmable logic controllers (PLC), DI modules as per EN 61131-2

#### Supply Voltage



##### Warning!

Risk of potentially life-threatening electric shock!

Failure to use the prescribed power unit.

The electronic insert may only be powered by devices with safe galvanic isolation, as per IEC 61010-1.

$U = 10 \text{ to } 55 \text{ V DC}$



##### Note

Comply with the following according to IEC/EN 61010-1: provide a suitable circuit breaker for the device and limit the current to 500 mA, e. g. by installing a 0.5 A fuse (slow-blow) in the power supply circuit.

#### Power Consumption

$P \leq 0.5 \text{ W}$

#### Current Consumption

$I \leq 10 \text{ mA}$ , without load

The red LED flashes in the event of an overload or short-circuit. Check for an overload or short-circuit every 5 s.

#### Load Current

$I \leq 350 \text{ mA}$ , with overload and short-circuit protection

#### Residual Current

$I < 100 \text{ }\mu\text{A}$ , for blocked transistor

#### Residual Voltage

$U < 3 \text{ V}$ , for switched through transistor

#### Behavior of Output Signal

- OK status: switched through
- Demand mode: blocked
- Alarm: blocked

#### Terminals

Terminals for cable cross-section up to  $2.5 \text{ mm}^2$  (14 AWG). Use ferrules for the wires.

#### Overvoltage protection

Overvoltage category I

### Terminal Assignment

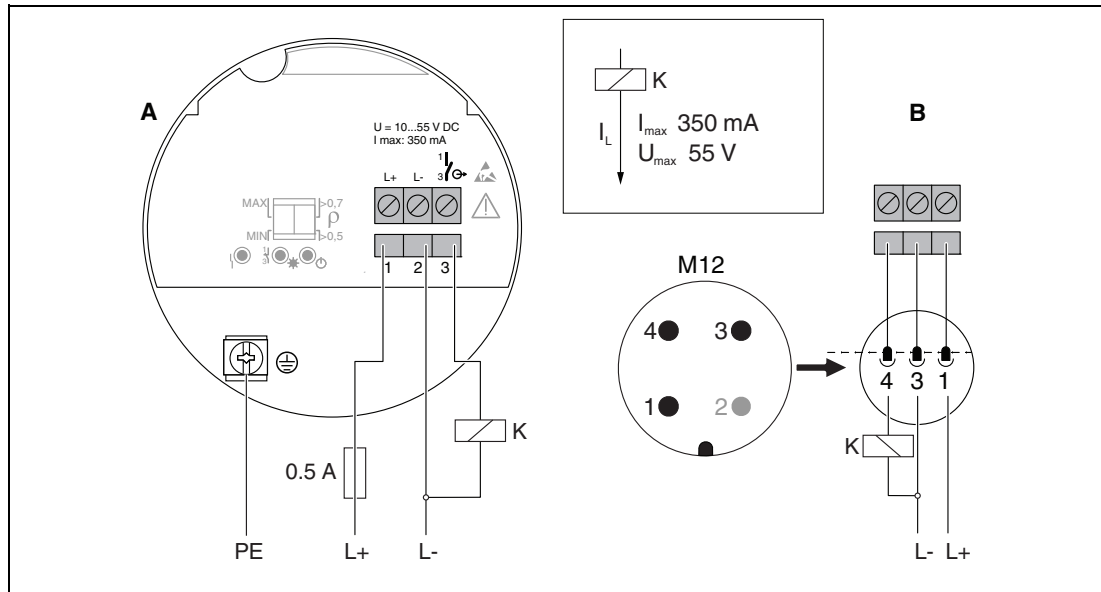


Figure 5.1 3-wire DC-PNP, electronic insert FEL42

- A** Connection wiring with terminals
- B** Connection wiring with M12 plug according to EN 61131-2 standard

### Behavior of Switch Output and Signaling

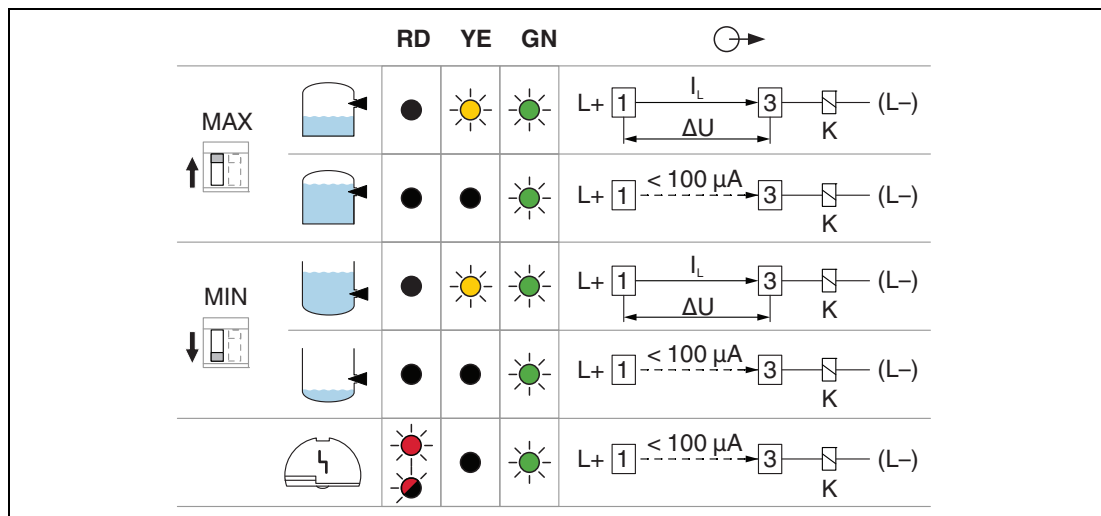


Figure 5.2 Behavior of switch output and signaling, electronic insert FEL42

- MAX** DIP switch for setting MAX safety mode
- MIN** DIP switch for setting MIN safety mode
- RD** LED red for warning or alarm
- YE** LED yellow, switch status
- GN** LED green, operational status, device on
- $I_L$  Load current switched through

## 5.2 Universal Current Connection with Relay Output (Electronic Insert FEL44)

- Switches the loads via 2 volt-free changeover contacts
- 2 separate changeover contacts (DPDT)



### Warning!

Risk of burns by hot surface

An fault at the electronic insert can cause the permitted temperature for touch-safe surfaces to be exceeded.

Do not touch the electronics in the event of a fault!

### Supply Voltage

$U = 19 \text{ to } 253 \text{ V AC, } 50 \text{ Hz}/60 \text{ Hz} / 19 \text{ to } 55 \text{ V DC}$



### Note

Comply with the following according to IEC/EN61010-1: provide a suitable circuit breaker for the device and limit the current to 500 mA, e. g. by installing a 0.5 A fuse (slow-blow) in the power supply circuit..

### Power Consumption

$S < 25 \text{ VA, } P < 1.3 \text{ W}$

### Connectable Load

Loads switched via 2 volt-free changeover contacts (DPDT)

- $I_{AC} \leq 6 \text{ A (Ex de } 4 \text{ A), } U_{\sim} \leq 253 \text{ V AC; } P_{\sim} \leq 1500 \text{ VA, } \cos \varphi = 1, P_{\sim} \leq 750 \text{ VA, } \cos \varphi > 0.7$
- $I_{DC} \leq 6 \text{ A (Ex de } 4 \text{ A) to } 30 \text{ V DC, } I_{DC} \leq 0.2 \text{ A to } 125 \text{ V}$

According to IEC 61010, the following applies: Total voltage from relay outputs and power supply  $\leq 300 \text{ V}$ .

Use electronic insert FEL62 DC PNP for small DC load currents, e. g. for connection to a PLC.

Relay contact material: silver/nickel AgNi 90/10

When connecting a device with high inductance, provide a spark suppressor to protect the relay contact. A fine-wire fuse (depending on the connected load) protects the relay contact in the event of a short-circuit.

Both relay contacts switch simultaneously.

### Behavior of Output Signal

- OK status: relay energized
- Demand mode: relay de-energized
- Alarm: relay de-energized

### Terminals

Terminals for cable cross-section up to  $2.5 \text{ mm}^2$  (14 AWG). Use ferrules for the wires.

### Overvoltage protection

Overvoltage category II

### Terminal Assignment

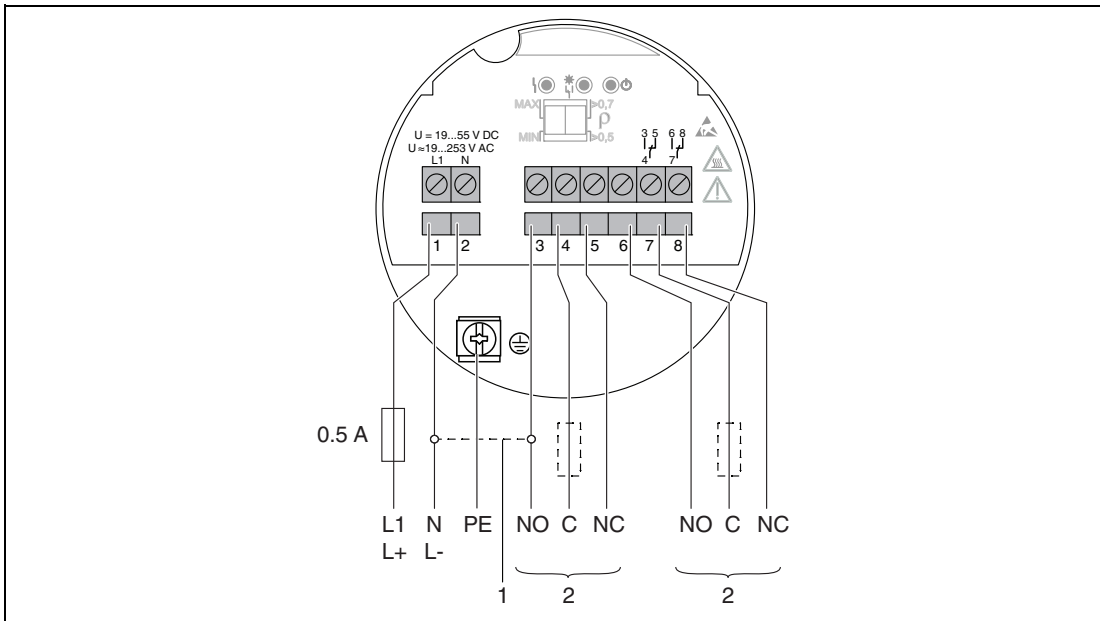


Figure 5.3 Universal current connection with relay output, electronic insert FEL44

- 1 When bridged, the relay output works with NPN logic
- 2 Connectable load

### Behavior of Switch Output and Signaling

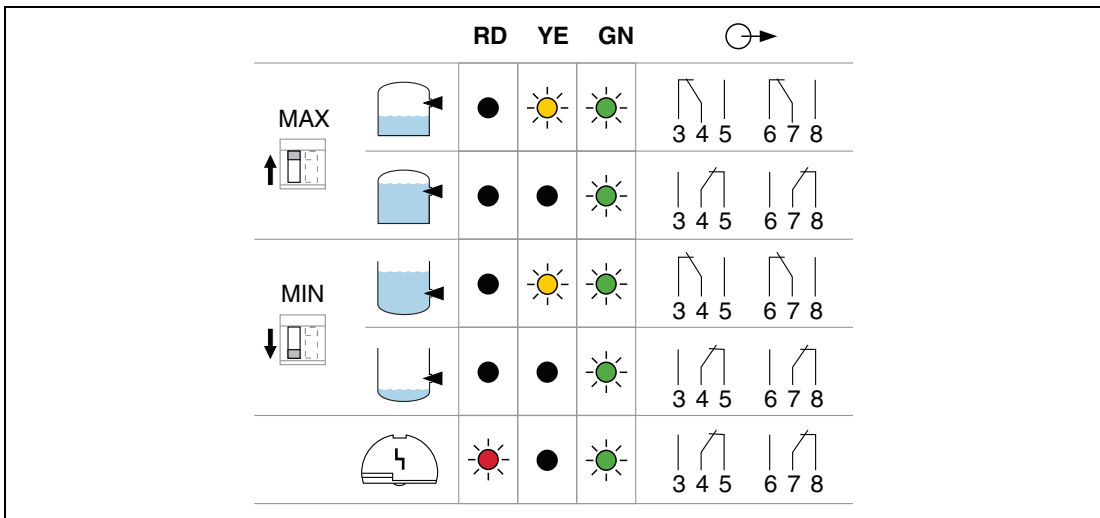


Figure 5.4 Behavior of switch output and signaling, electronic insert FEL44

- MAX** DIP switch for setting MAX safety mode
- MIN** DIP switch for setting MIN safety mode
- RD** LED red for alarm
- YE** LED yellow, switch status
- GN** LED green, operational status, device on



### 5.3 2-Wire NAMUR > 2.2 mA/< 1.0 mA (Electronic Insert FEL48)

- To connect to switch amplifiers according to NAMUR (IEC 60947-5-6), a permanent power supply for the electronic insert must be ensured.
- Signal transmission H-L edge 2.2 to 3.8 mA/0.4 to 1.0 mA as per IEC 60947-5-6 (NAMUR) on 2-wire cabling

#### Supply Voltage

U = 8.2 V DC



#### Note

Comply with the following according to IEC/EN61010-1: provide a suitable circuit breaker for the device.

#### Power Consumption

NAMUR IEC 60947-5-6

#### Behavior of Output Signal

- OK status: output current 2.2 to 3.8 mA
- Demand mode: output current 0.4 to 1.0 mA
- Alarm: output current < 1.0 mA

#### Terminals

Terminals for cable cross-section up to 2.5 mm<sup>2</sup> (14 AWG). Use ferrules for the wires.

#### Overvoltage protection

Overvoltage category I

#### Terminal Assignment

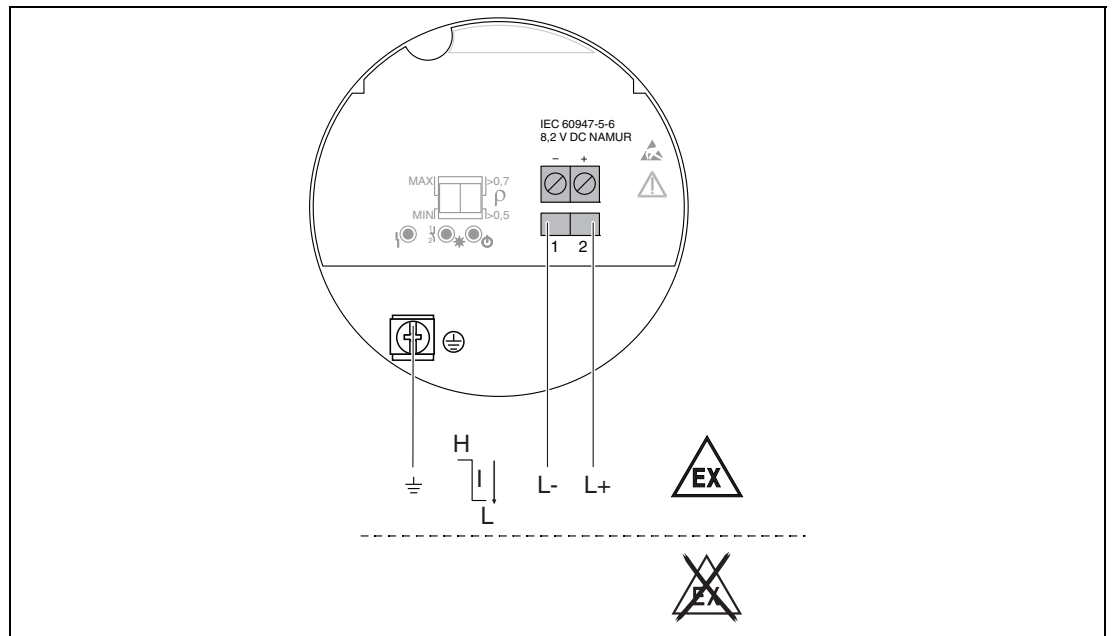


Figure 5.5 2-wire NAMUR > 2.2 mA/< 1.0 mA, electronic insert FEL48

### Behavior of Switch Output and Signaling

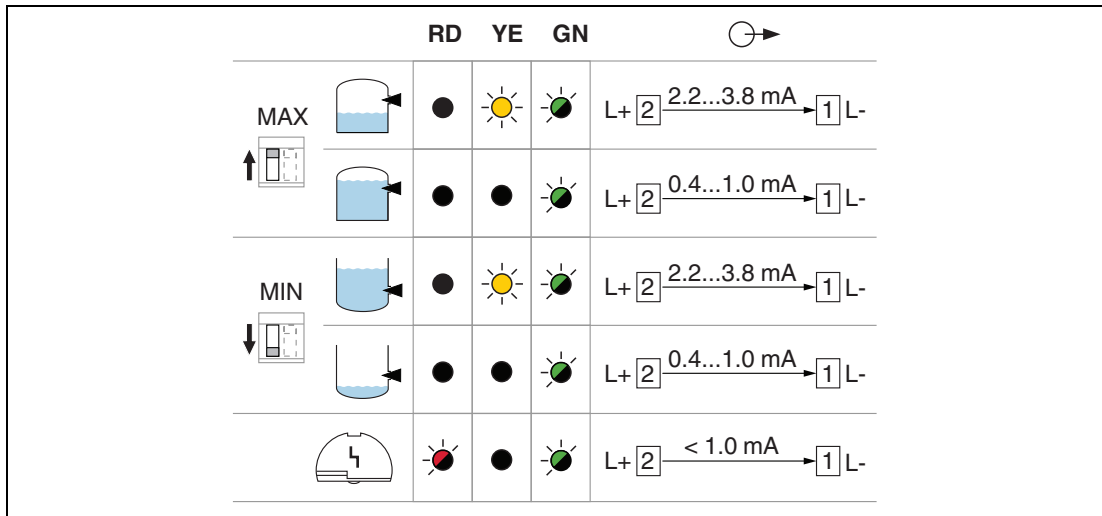


Figure 5.6 Behavior of switch output and signaling, electronic insert FEL48

**MAX** DIP switch for setting MAX safety mode

**MIN** DIP switch for setting MIN safety mode

**RD** LED red for alarm

**YE** LED yellow, switch status

**GN** LED green, operational status, device on

## 6 Performance Characteristics

### 6.1 Reference Operating Conditions

- Ambient temperature: +23 °C (+73 °F)
- Process temperature: +23 °C (+73 °F)
- Density (water): 1 g/cm<sup>3</sup>
- Medium viscosity: 1 mPa·s
- Process pressure: ambient pressure/unpressurized
- Sensor installation: vertically from above
- Density selection switch: > 0.7 g/cm<sup>3</sup> (SGU)
- Switch direction of sensor: uncovered to covered

#### Take Switch Point into Consideration

The following are typical switch points, depending on the orientation of the device:  
water +23 °C (+73 °F)



#### Note

Minimum distance between the fork tip and the tank wall or pipe wall: 10 mm (0.39 inch)

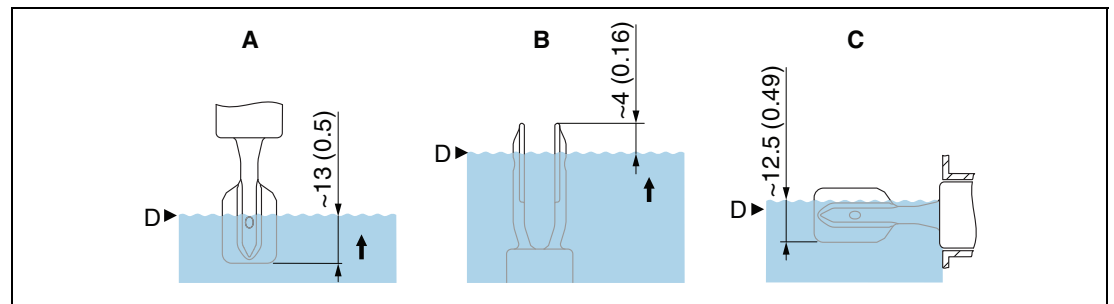


Figure 6.1 Typical switch points, unit of measurement mm (inch)

- A Installation from above
- B Installation from below
- C Installation from the side
- D Switch point

### 6.2 Maximum Measured Fault

At reference operating conditions: max. ±1 mm (0.04 inch) at switch point

### 6.3 Hysteresis

Typically 2.5 mm (0.1 inch)

### 6.4 Non-Repeatability

0.5 mm (0.02 inch)

## 6.5 Influence of the Process Temperature

The switch point moves between +1.4 to -2.6 mm (+0.06 to -0.1 inch) in the temperature range from -40 to +150 °C (-40 to +302 °F)

## 6.6 Influence of the Process Pressure

The switch point moves between 0 to 2.6 mm (0 to 0.1 inch) in the pressure range from -1 to +40 bar (14.5 to 580 psi)

## 6.7 Influence of the Density of the Process Medium (at Room Temperature and Normal Pressure)

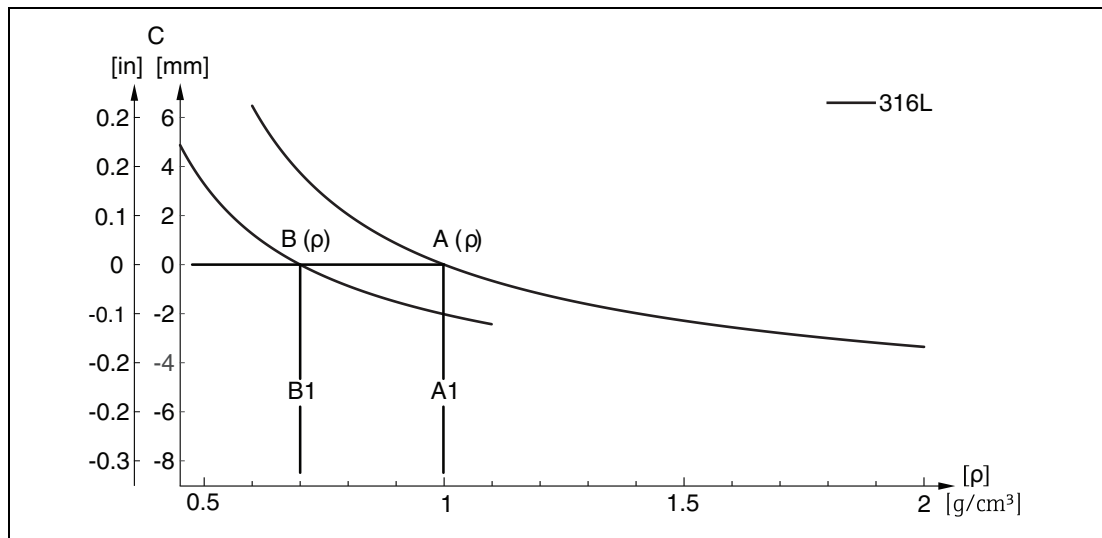


Figure 6.2 Switch point deviation over density

- A** Density switch setting  $(\rho) > 0.7$
- A1** Reference operating condition  $\rho = 1 \text{ g/cm}^3$
- B** Density switch setting  $(\rho) > 0.5$
- B1** Reference operating condition  $\rho = 0.7 \text{ g/cm}^3$
- C** Switch point deviation

### Density setting

- $\text{TK}_{\text{typ}}$ , [mm/10 k]
  - $\rho > 0.7$ : -0.2
  - $\rho > 0.5$ : -0.2
- $\text{Pressure}_{\text{typ}}$ , [mm/10 bar]
  - $\rho > 0.7$ : -0.3
  - $\rho > 0.5$ : -0.4

## 7 Mounting



### Note

Open the device only in a dry environment!

### 7.1 Mounting Location, Orientation

- Any orientation for device with short pipe up to approx. 500 mm (19.7 inch)
- Vertical orientation for device with long pipe
- Minimum distance between the fork tip and the tank wall or pipe wall: 10 mm (0.39 inch)

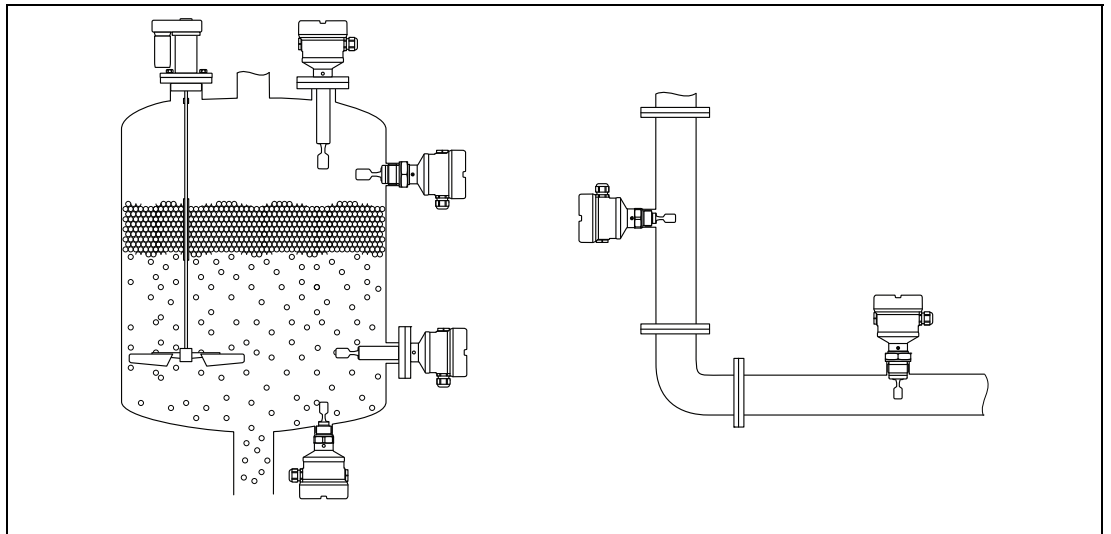


Figure 7.1 Installation examples for a vessel, tank or pipe

## 7.2 Installation Instructions

### 7.2.1 Take Viscosity into Consideration

i

#### Note

Viscosity values

- Low viscosity : < 2000 mPa·s
- High viscosity: > 2000 to 10000 mPa·s

#### Low Viscosity

i

#### Note

Low viscosity, e. g. water: < 2000 mPa·s

It is permitted to position the tuning fork within the installation socket.

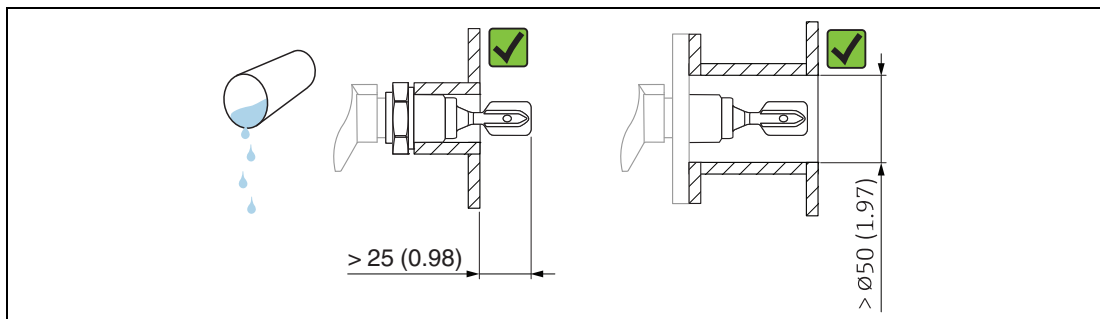


Figure 7.2 Installation example for low-viscosity liquids, unit of measurement mm (inch)

#### High Viscosity

i

#### Note

Highly viscous liquids may cause switching delays.

- Make sure that the liquid can run off the tuning fork easily.
- Deburr the socket surface.

i

#### Note

High viscosity, e. g. viscous oils: < 10000 mPa·s

The tuning fork must be located outside the installation socket!

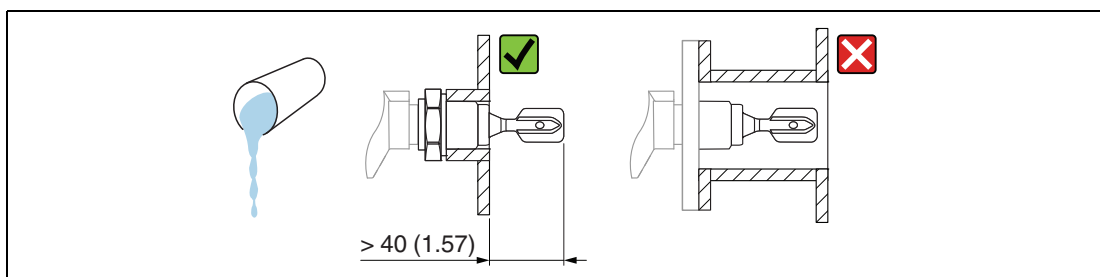


Figure 7.3 Installation example for a highly viscous liquid, unit of measurement mm (inch)

### 7.2.2 Avoid Buildup

- Use short installation sockets to ensure that the turning fork can project freely into the vessel.
- Leave sufficient distance between the buildup expected on the tank wall and the tuning fork.

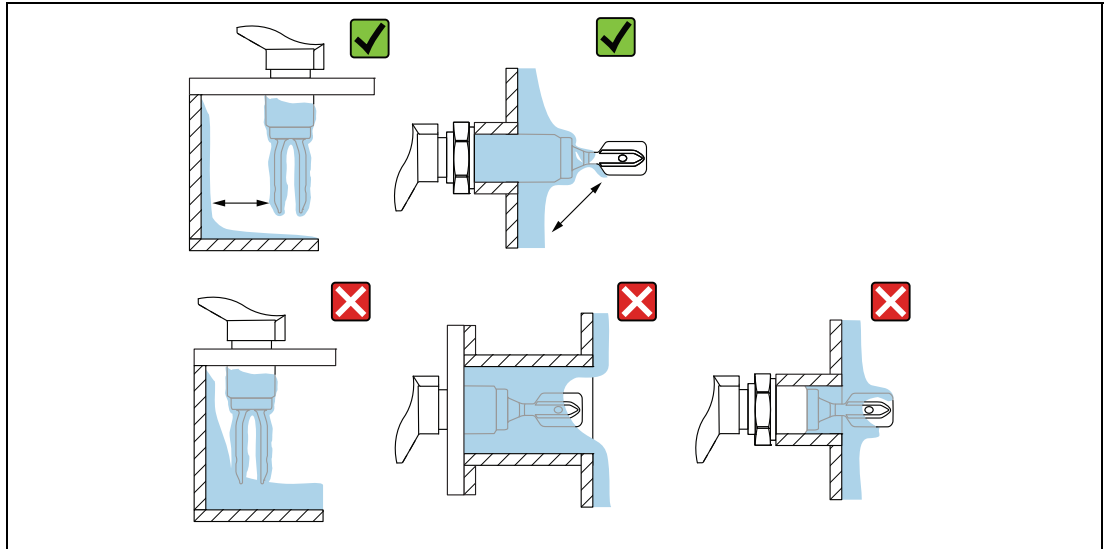


Figure 7.4 Installation examples for a highly viscous process medium

### 7.2.3 Take Clearance into Consideration

Allow sufficient space outside the tank for mounting, connection and settings involving the electronic insert.

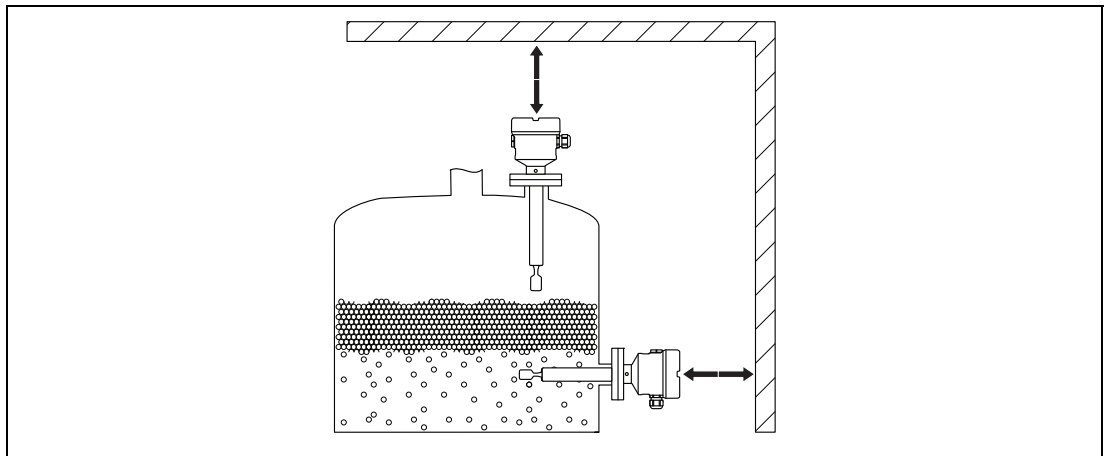


Figure 7.5 Take clearance into consideration

### 7.2.4 Align the Tuning Fork with the Marking

The tuning fork can be aligned using the marking. Medium can thus run off easily and buildup is avoided.

Markings may include the following:

- Material specification, thread description or circle on the hexagonal nut or on the weld-in adapter
- The II symbol on the back of the flange or Tri-Clamp

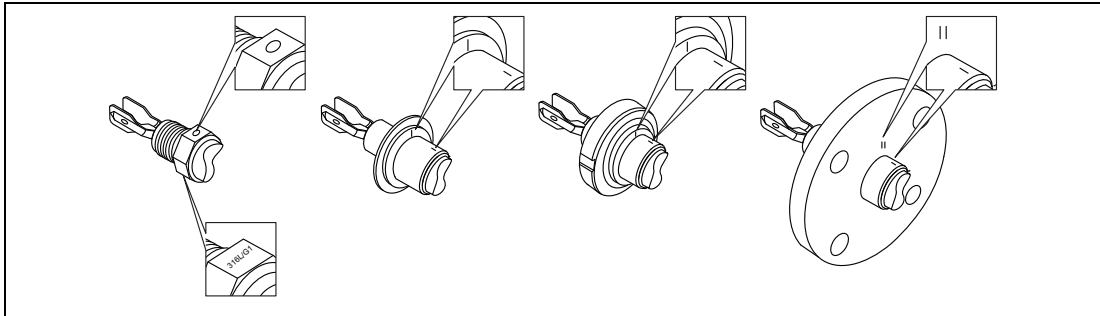


Figure 7.6 Markings to align the tuning fork

### 7.2.5 Installing in Pipes

Flow velocity up to 5 m/s with viscosity 1 mPa·s and density 1 g/cm<sup>3</sup> (SGU).

Check for correct functioning in the event of other process medium conditions.

The flow will not be significantly impeded if the tuning fork is correctly aligned and the marking on the adapter is pointing in the direction of flow.

The marking is visible when installed.

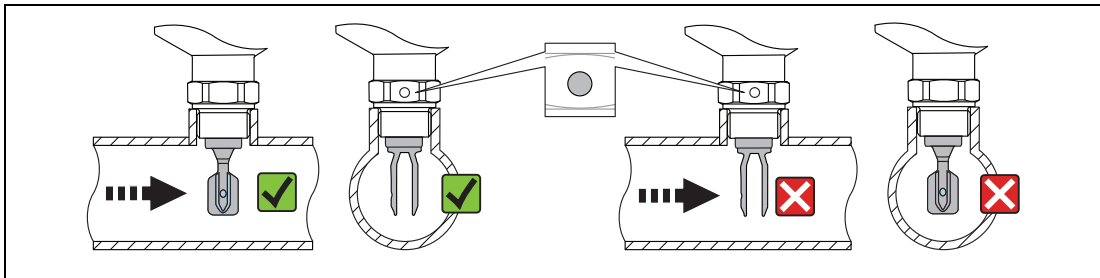


Figure 7.7 Installation in pipes (take fork position and marking into consideration)

### 7.2.6 Aligning the Cable Entry

The housing can be turned and the cable aligned by turning the locking screw.

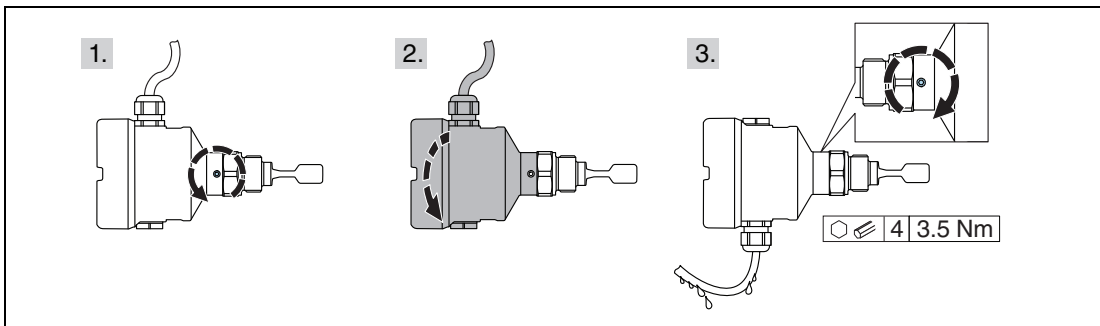


Figure 7.8 Housing with external locking screw



### 7.3 Special Mounting Instructions

#### 7.3.1 Support the Device

Support the device in the event of severe dynamic load. Maximum lateral loading capacity of the pipe extensions and sensors: 75 Nm (55 lbf ft).

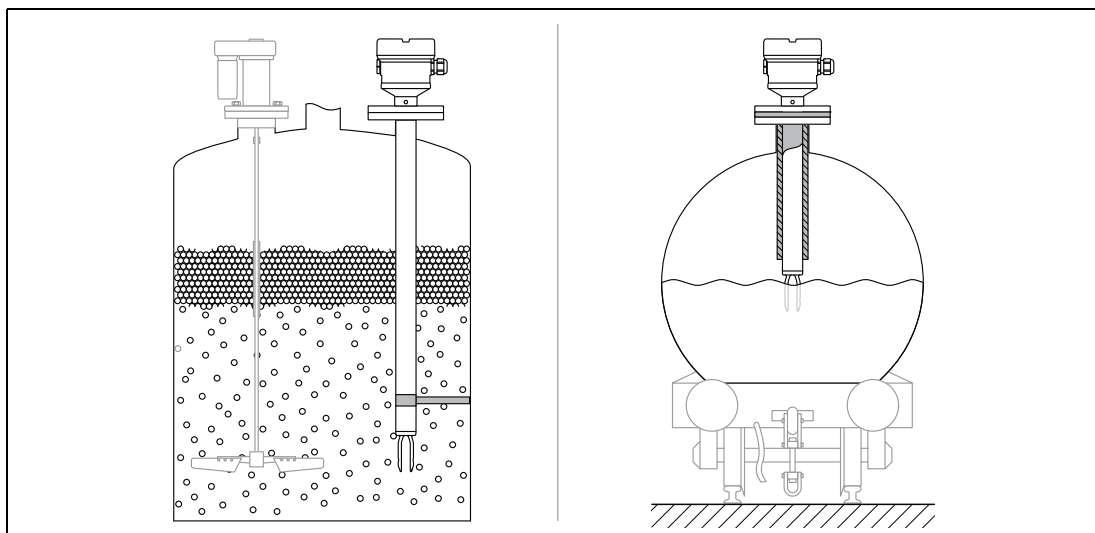


Figure 7.9 Examples of support in the event of dynamic load

#### 7.3.2 Weld-in Adapter with Leakage Hole

Weld in the welding neck in such a way that the leakage hole is pointing downwards. This enables any leaks to be detected quickly.

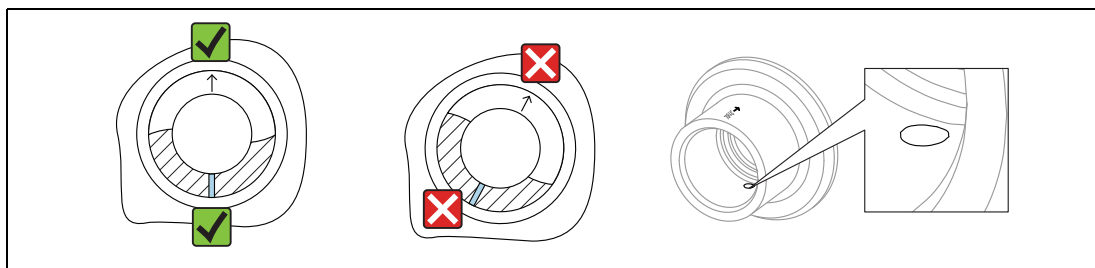


Figure 7.10 Weld-in adapter with leakage hole

#### 7.3.3 Sliding Sleeves

- For more information see chapter 14.

## 8 Environment

### 8.1 Ambient Temperature Range

-40 to +70 °C (-40 to +158 °F)

The minimum permitted ambient temperature of the plastic housing is limited to -20 °C (-4 °F); for North America, **indoor use** applies.

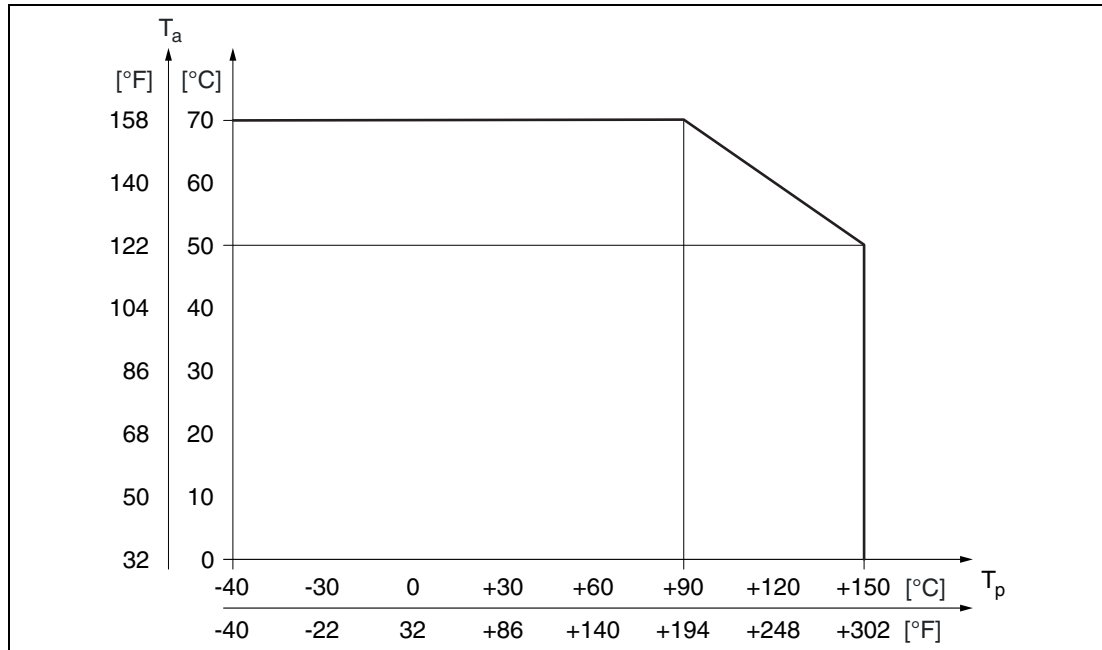


Figure 8.1 For process temperature and FEL44  $T_p > 90$  °C max. load current 4 A

Outdoor operation in strong sunlight:

- Mount the device in the shade.
- Avoid direct sunlight, particularly in warmer climatic regions.
- Use a weather protection cover, which can be ordered as an accessory.

#### Hazardous area

In the hazardous area, the permitted ambient temperature can be limited depending on the zones and gas groups. Pay attention to the information in the Ex documentation (SI).

### 8.2 Storage Temperature

-40 to +80 °C (-40 to +176 °F)

### 8.3 Humidity

Operation up to 100 %. Do not open in a condensing atmosphere.

### 8.4 Operating Altitude

According to IEC 61010-1 Ed.3:

- Up to 2000 m (6500 ft) above sea level
- Can be extended to 3000 m (9800 ft) above sea level if overvoltage protection is used.

## 8.5 Climate Class

According to IEC 60068-2-38 test Z/AD

## 8.6 Degree of Protection

According to DIN EN 60529, NEMA 250

### IP66/IP68 NEMA 4X/6P

Type of housing:

- Single compartment, plastic
- Single compartment; aluminum, coated
- Single compartment; aluminum, coated, Ex d/XP



---

#### Note

Select the required option in the type code: feature **Electrical connection**.

If the **M** option (Plug M12) is selected as the electrical connection, then **IP66/67 NEMA TYPE 4X** is valid for all housing types.

---

## 8.7 Vibration Resistance

According to IEC 60068-2-64-2009

$a(\text{RMS}) = 50 \text{ m/s}^2$ ,  $f = 5 \text{ to } 2000 \text{ Hz}$ ,  $t = 3 \text{ axes} \times 2 \text{ h}$

## 8.8 Shock Resistance

According to IEC 60068-2-27-2008:  $300 \text{ m/s}^2 [= 30 g_n] + 18 \text{ ms}$   
 $g_n$ : standard acceleration of gravity

## 8.9 Mechanical Stress

Support the device in the event of severe dynamic load. Maximum lateral loading capacity of the pipe extensions and sensors: 75 Nm (55 lbf ft).

- ▶ For more information see chapter 7.3.

## 8.10 Electromagnetic Compatibility

- Electromagnetic compatibility according to EN 61326 series and NAMUR recommendation EMC (NE21)
- The requirements of EN 61326-3-1 are fulfilled.

## 9 Process

### 9.1 Process Temperature Range

-40 to +150 °C (-40 to +302 °F)

Pay attention to the pressure and temperature dependence.

- ▶ For additional details see chapter 9.3.

### 9.2 Thermal Shock

≤ 120 K/s

### 9.3 Process Pressure Range



#### Warning!

The maximum pressure for the measuring device is dependent on the lowest-rated element, with regard to pressure, of the selected components. This means that it is necessary to pay attention to the process connection as well as the sensor.

- For pressure specifications, see chapter 10.
- The measuring device must be operated only within the specified limits!
- The Pressure Equipment Directive (2014/68/EU) uses the abbreviation **PS**. The abbreviation **PS** corresponds to the MWP (maximum working pressure) of the measuring device.

---

Permitted pressure values for flanges at higher temperatures can be found in the following standards:

- pR EN 1092-1: With regard to its stability-temperature property, the material 1.4435 is identical to 1.4404, which is classed as 13E0 in EN 1092-1 table 18. The chemical composition of the two materials can be identical.
- ASME B 16.5
- JIS B 2220

The lowest value from the derating curves of the device and of the selected flange applies in each case.



#### Note

Canadian CRN approval: More details on the maximum pressure values are available in the download area of the product detail page under [www.pepperl-fuchs.com](http://www.pepperl-fuchs.com).

---

## 9.4 Test Pressure

PN = 40 bar (580 psi): Test pressure = 1.5 x PN maximum 60 bar (870 psi) depending on process connection selected

The instrument function is limited during the pressure test.

The mechanical integrity is guaranteed at pressures up to 1.5 times the process nominal pressure (PN).

## 9.5 Density

**Liquids with density > 0.7 g/cm<sup>3</sup>**

Switch position > 0.7 g/cm<sup>3</sup> (as-delivered state)

**Liquids with density 0.5 g/cm<sup>3</sup>**

Switch position > 0.5 g/cm<sup>3</sup> (can be configured via DIP switch)

**Liquids with density > 0.4 g/cm<sup>3</sup>**

- Optionally available, not suitable for SIL applications.
- Fixed value that cannot be edited. The function of the DIP switch is interrupted.

## 9.6 Viscosity

≤ 10000 mPa·s

## 9.7 Pressure Tightness

Up to vacuum



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### Note

In vacuum evaporation plants: select the 0.4 g/cm<sup>3</sup> density setting.

---

## 9.8 Solids Contents

Ø ≤ 5 mm (0.2 inch)

## 10 Mechanical Construction



### Note

The following dimensions are rounded values. For this reason, they may deviate slightly from the dimensions given on [www.pepperl-fuchs.com](http://www.pepperl-fuchs.com).

### 10.1 Design, Dimensions

#### Device Height

The device height is calculated from the following components:

- Housing including cover
- Pipe extension, short pipe or compact version
- Process connection

The individual heights of the components can be found in the following sections:

- Determine the height of the device and add the individual heights
- Take into consideration the installation distance (space that is used to install the device)

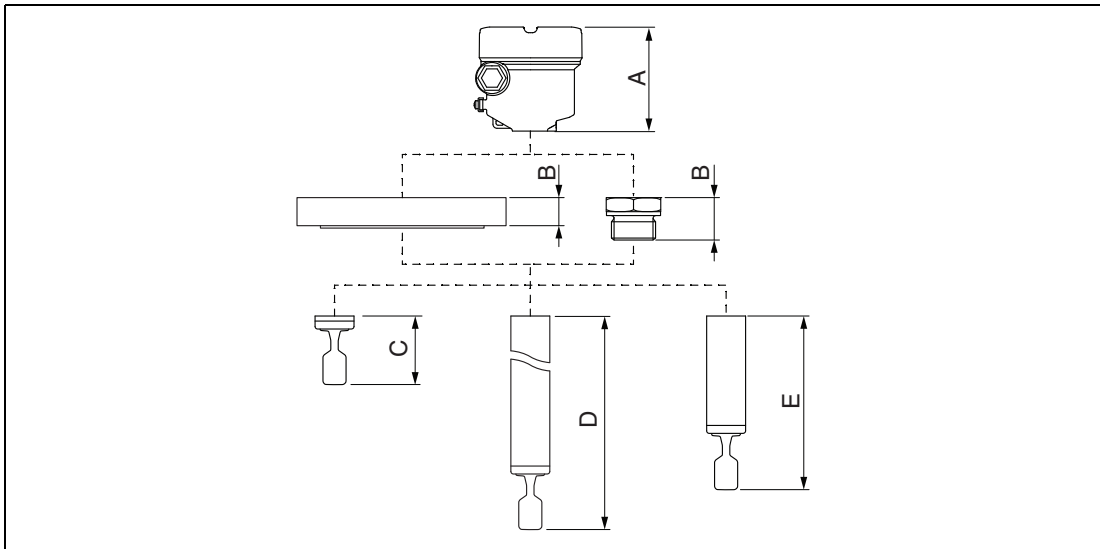


Figure 10.1 Components for determining the height of the device

- A** Housing including cover
- B** Process connection, flange or thread
- C** Compact probe with tuning fork
- D** Pipe extension probe with tuning fork
- E** Short pipe probe with tuning fork

## Housing and Cover

All housings can be aligned. The locking screw on metal housings can be used to secure the alignment of the housing.

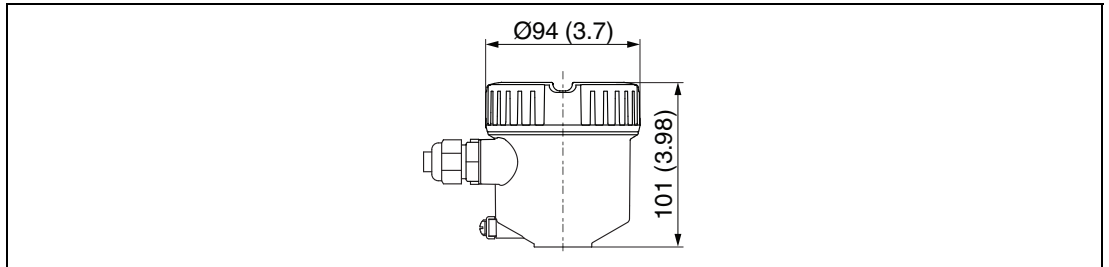


Figure 10.2 Single compartment, plastic, unit of measurement mm (inch)

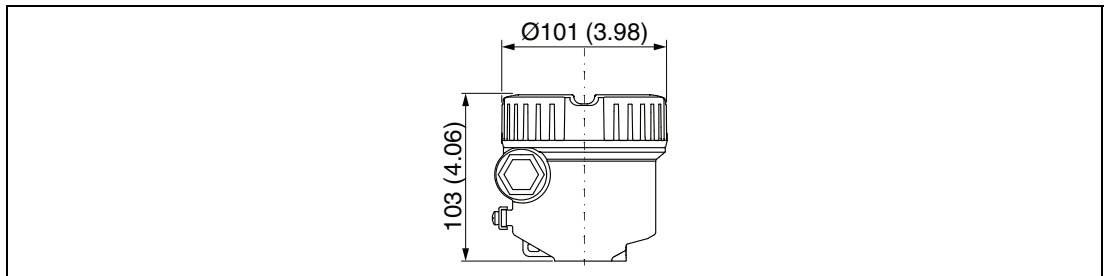


Figure 10.3 Single compartment, aluminum, coated, unit of measurement mm (inch)

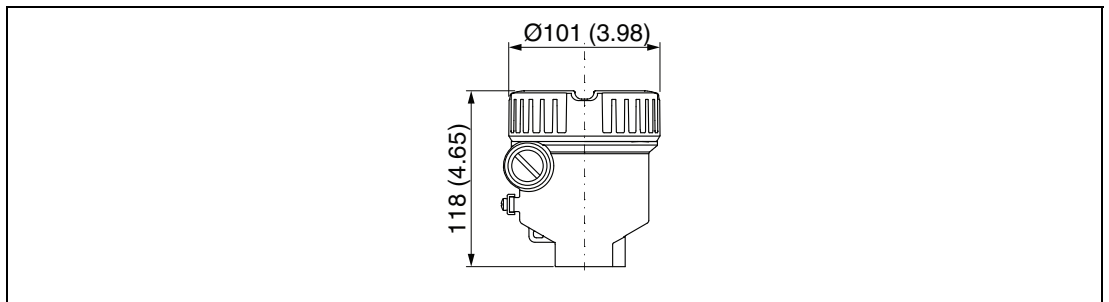


Figure 10.4 Single compartment, aluminum, coated, suitable for Ex d/XP area, unit of measurement mm (inch)

### Ground terminal

- Ground terminal inside the housing, max. conductor cross-section 2.5 mm<sup>2</sup> (14 AWG)
- Ground terminal outside the housing, max. conductor cross-section 4 mm<sup>2</sup> (12 AWG)
- If safety extra-low voltage is used to supply power to electronic inserts, do not connect protective ground

### Cable glands

Cable diameter:

- Plastic: Ø5 to 10 mm (0.2 to 0.38 inch)
- Nickel-plated brass: Ø7 to 10.5 mm (0.28 to 0.41 inch)

The scope of delivery comprises:

- 1 cable gland installed
- 1 cable gland sealed with dummy plug



### Note

A second cable gland (not installed) is also included in the scope of delivery of the relay electronics.

Exceptions: With Ex d/XP, only threaded entries are permitted.

## Probe Design

### Compact

- Material: 316L or Alloy C
- Sensor length L: depends on process connection  
See **Process connections** section: thread G, ASME B1.20.3 MNPT, EN10226 R, Tri-Clamp

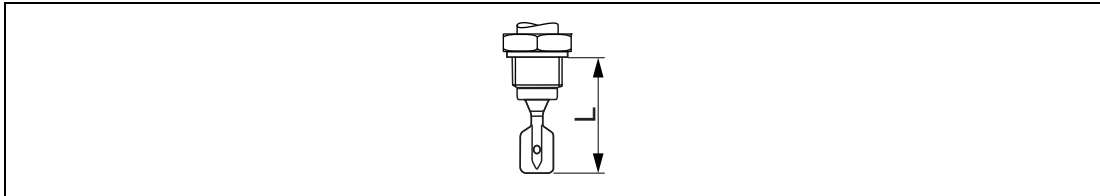


Figure 10.5 Probe design: compact, sensor length L

### Short pipe

- Material: 316L, sensor length L: depends on process connection
- Sensor length L:
  - Flange = 115 mm (4.53 inch)
  - Thread G3/4 = 115 mm (4.53 inch)
  - Thread G1 = 118 mm (4.65 inch)
  - Thread NPT, R = 99 mm (3.9 inch)
  - Tri-Clamp = 115 mm (4.53 inch)

### Pipe extension

- Material: 316L, sensor length L: 117 to 2000 mm (4.7 to 78.7 inch)
- Length tolerances L:
  - < 1 m (3.3 foot) = -5 mm (-0.2 inch),
  - 1 to 3 m (3.3 to 9.8 foot) = (-10 mm (-0.39 inch)

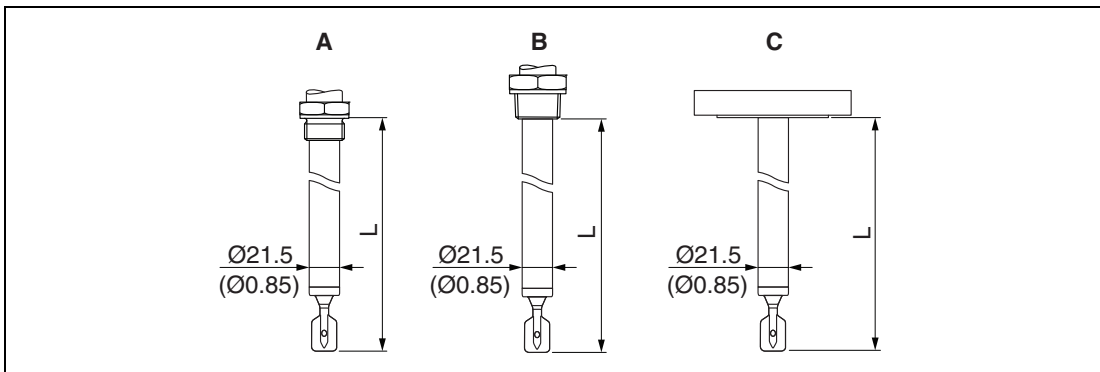


Figure 10.6 Probe designs: pipe extension, short pipe, sensor length L

- A** G3/4, G1
- B** NPT3/4, NPT1, R3/4, R1
- C** Flange, Tri-Clamp



### Tuning Fork

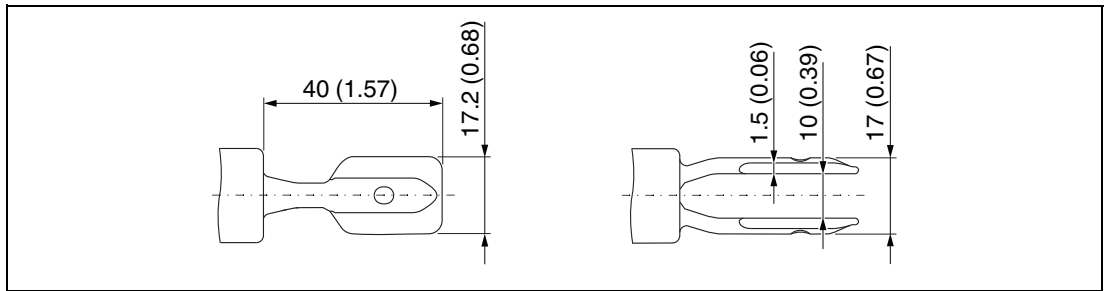


Figure 10.7 Tuning fork, unit of measurement mm (inch)

### Process Connections

#### Height of process connection

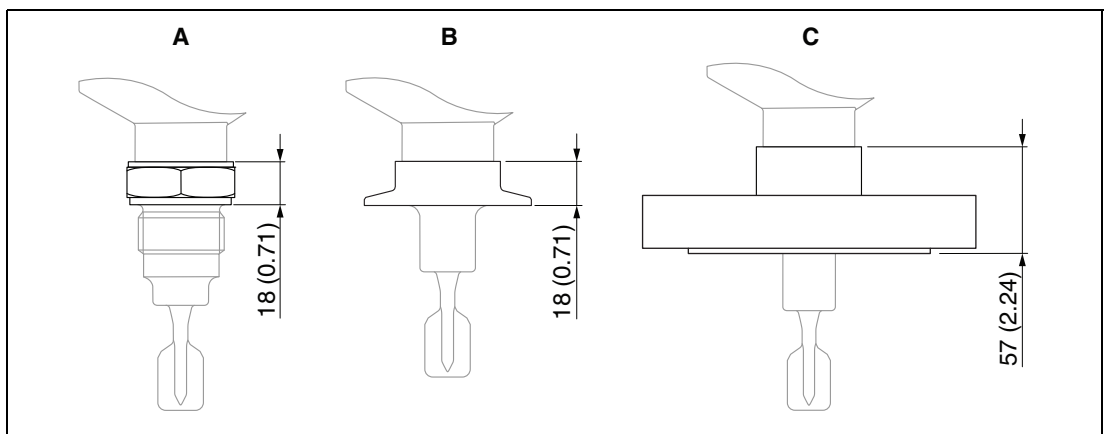


Figure 10.8 Height of process connection, unit of measurement mm (inch)

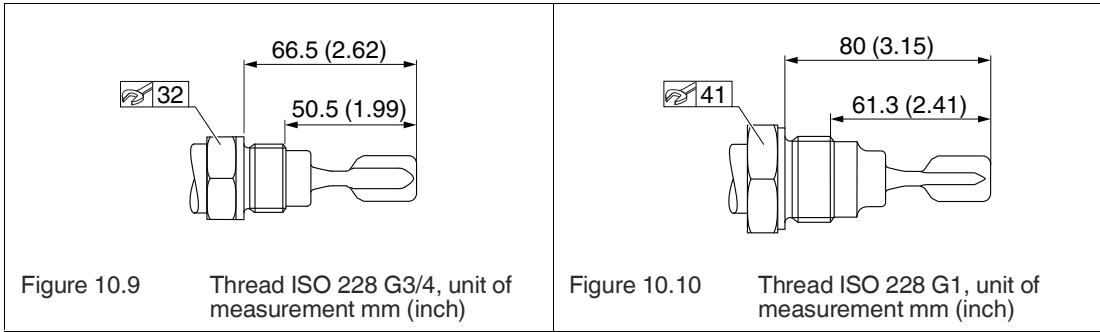
- A** Process connection with threaded connection
- B** Process connection with Clamp
- C** Process connection with flange

**Thread ISO 228 G for installing in weld-in adapter**

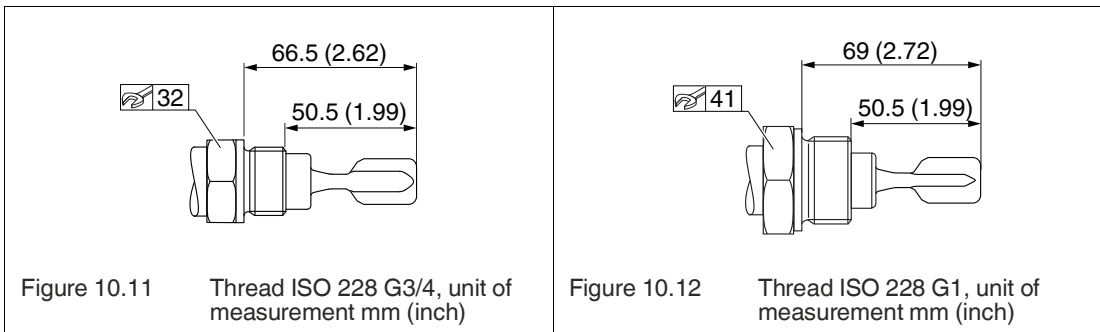
G3/4, G1 suitable for installing in weld-in adapter

- Material: 316L
- Pressure rating, temperature:  $\leq 40$  bar (580 psi),  $\leq 100$  °C (212 °F)
- Pressure rating, temperature:  $\leq 25$  bar (363 psi),  $\leq 150$  °C (302 °F)
- Weight: 0.2 kg (0.44 lb)
- Accessory: weld-in adapter

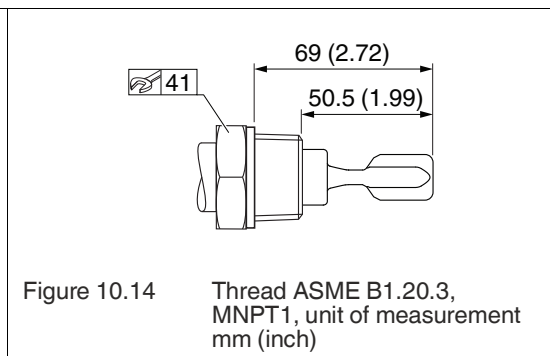
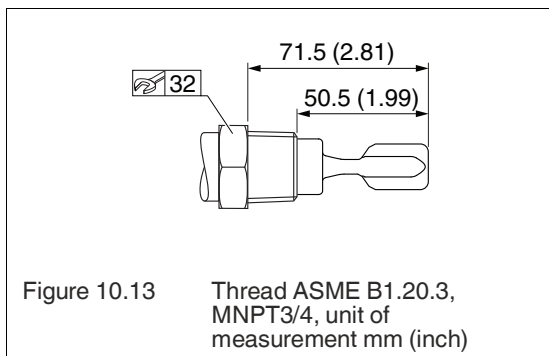
The weld-in adapter is not included in the scope of delivery.



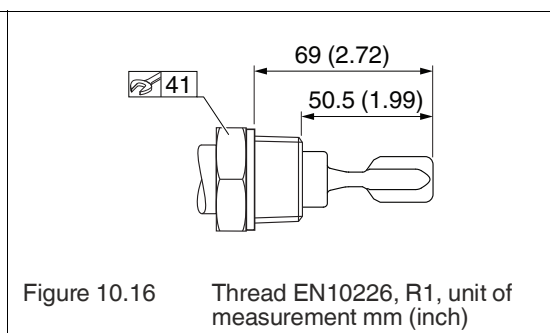
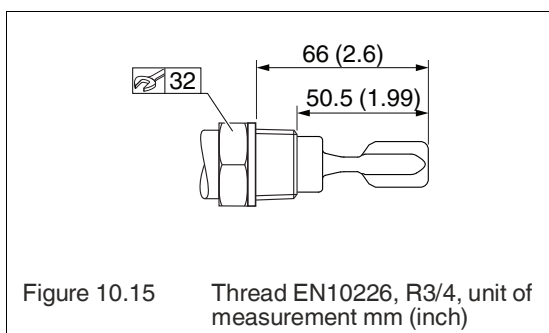
**Thread ISO 228 G with flat seal**



**Thread ASME B1.20.3, MNPT**



**Thread EN 10226, R**



**Tri-Clamp**

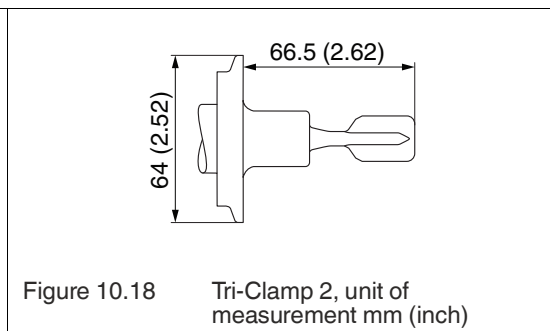
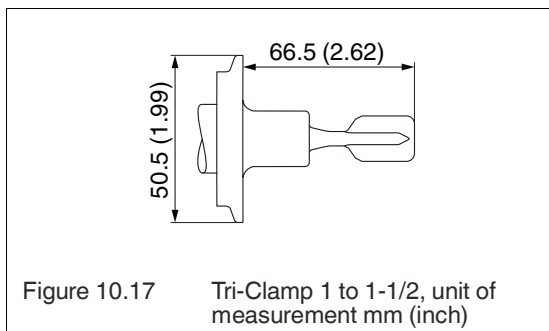
Version ISO 2852 DN25-38 (1 to 1-1/2 inch), DIN 32676 DN25-40

- Material: 316L
- Pressure rating: ≤ 25 bar (363 psi)
- Temperature: ≤ 150 °C (302 °F)
- Weight: 0.22 kg (0.49 lb)

Version ISO 2852 DN40-51 (2 inch), DIN 32676 DN25-40

- Material: 316L
- Pressure rating: ≤ 25 bar (363 psi)
- Temperature: ≤ 150 °C (302 °F)
- Weight: 0.3 kg (0.66 lb)

The maximum temperature and the maximum pressure are dependent on the clamping ring and the seal used. The lowest value applies in each case.



**Sensor dimensions in the case of flanges**

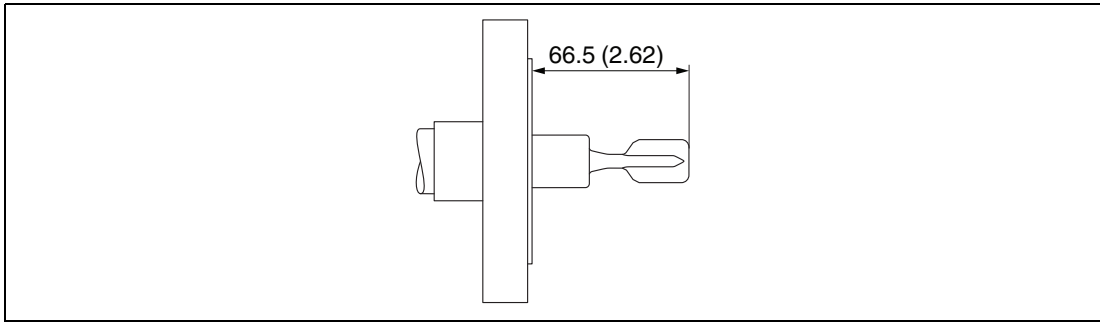


Figure 10.19 Example with flange, unit of measurement mm (inch)

**ASME B16.5 flanges, RF (Raised Face)**

Pressure rating	Type	Material	Weight
Cl.300	NPS2	316/316L	3.2 kg (7.06 lb)
Cl.300	NPS4	316/316L	11.5 kg (25.6 lb)

Table 10.1

**EN flanges EN 1092-1, form A**

Pressure rating	Type	Material	Weight
PN6	DN32	316L (1.4404)	1.2 kg (2.65 lb)
PN6	DN40	316L (1.4404)	1.4 kg (3.09 lb)
PN6	DN50	316L (1.4404)	1.6 kg (3.53 lb)
PN10/16	DN80	316L (1.4404)	4.8 kg (10.58 lb)
PN10/16	DN100	316L (1.4404)	5.6 kg (12.35 lb)
PN25/40	DN25	316L (1.4404)	1.3 kg (2.87 lb)
PN25/40	DN32	316L (1.4404)	2.0 kg (4.41 lb)
PN25/40	DN40	316L (1.4404)	2.4 kg (5.29 lb)
PN25/40	DN50	316L (1.4404)	3.2 kg (7.06 lb)
PN25/40	DN65	316L (1.4404)	4.3 kg (9.48 lb)
PN25/40	DN80	316L (1.4404)	5.9 kg (13.01 lb)
PN25/40	DN100	316L (1.4404)	7.5 kg (16.54 lb)
PN40	DN50	316L (1.4404)	3.2 kg (7.06 lb)

Table 10.2

**EN flanges EN 1092-1, form B1**

Pressure rating	Type	Material	Weight
PN6	DN32	316L (1.4404)	1.2 kg (2.65 lb)
PN6	DN50	316L (1.4404)	1.6 kg (3.53 lb)
PN10/16	DN100	316L (1.4404)	5.6 kg (12.35 lb)
PN25/40	DN25	316L (1.4404)	1.4 kg (3.09 lb)
PN25/40	DN50	316L (1.4404)	3.2 kg (7.06 lb)
PN25/40	DN80	316L (1.4404)	5.9 kg (13.01 lb)

Table 10.3

**JIS flanges B2220**

Pressure rating	Type	Material	Weight
10K	10K 25A	316L (1.4404)	1.3 kg (2.87 lb)
10K	10K 40A	316L (1.4404)	1.5 kg (3.31 lb)
10K	10K 50A	316L (1.4404)	1.7 kg (3.75 lb)

Table 10.4

**Process connection, seal surface**

- Thread ISO 228, G
- Thread ASME, MNPT
- Thread EN 10226, R
- Tri-Clamp ISO 2852
- Flange ASME B16.5, RF (Raised Face)
- Flange EN 1092-1, form A
- Flange EN 1092-1, form B1
- Flange JIS B2220, RF (Raised Face)
- Flange HG/T20592, RF (Raised Face)
- Flange HG/T20615, RF (Raised Face)

## 10.2 Weight



### Note

Depending on the housing, cover and module, the total weight is different from the basic weight.

### Basic Weight: 0.65 kg (1.43 lb)

The basic weight comprises:

- Sensor (compact)
- Electronic insert
- Housing: single compartment, plastic with cover
- Thread, G3/4

### In Addition to the Basic Weight:

#### Housing

Single compartment, aluminum, coated: 0.8 kg (1.76 lb)

#### Pipe extension

- 1000 mm: 0.9 kg (1.98 lb)
- 100 inch: 2.3 kg (5.07 lb)

#### Process connections

See **Process Connection** section

#### Plastic protective cover

0.2 kg (0.44 lb)

## 10.3 Materials

### Materials in Contact with Process

#### Process connection and pipe extension

316L (1.4404 or 1.4435)

#### Flanges

See **Flanges** section

#### Tuning fork

316L (1.4435)

#### Seals

Flat seal for process connection G3/4 or G1: fiber-reinforced elastomer seal, asbestos-free as per DIN 7603

Scope of delivery with flat seal according to DIN 7603:

- Metrical threads G3/4, G1 standard
- Metrical threads G3/4, G1 for installation in weld-in adapter

Scope of delivery without seal:

- Tri-Clamp
- Flanges
- R and NPT thread

## Materials not in Contact with Process

### Plastic housing

- Housing: PBT/PC
- Dummy cover: PBT/PC
- Transparent cover: PBT/PC or PA12
- Cover seal: EPDM
- Potential equalization: 316L
- Seal under potential equalization: EPDM
- Plug: PBT-GF30-FR
- M20 cable gland: PA
- Seal on plug and cable gland: EPDM
- Adapter as substitute for cable glands: 316L
- Nameplate: plastic foil
- TAG plate: plastic film, metal, or provided by customer

### Aluminum housing, coated

- Housing: EN AC 44300 aluminum
- Dummy cover: EN AC 44300 aluminum
- Cover seal materials: HNBR
- Cover seal materials: FVMQ (in low-temperature version only)
- Nameplate: plastic foil
- TAG plate: plastic film, stainless steel, or provided by customer
- M20 cable glands: select material (stainless steel, nickel-plated brass, polyamide)

### Process connections

- Process connection: 316L (1.4404)
- Flanges:
  - According to EN/DIN: 316L (1.4404)
  - According to ASME: 316/316L
  - According to JIS : 316L (1.4404)
- Flat seal for G3/4 or G1 process connection: elastomer fiber, asbestos-free

## 10.4 Surface Roughness

The roughness of the surface in contact with the process is  $R_a < 3.2 \mu\text{m}$  (126  $\mu\text{inch}$ ).

## 11 Operability

### 11.1 Operating Concept

Operation with DIP switches on the electronic insert

### 11.2 Elements on the Electronic Insert

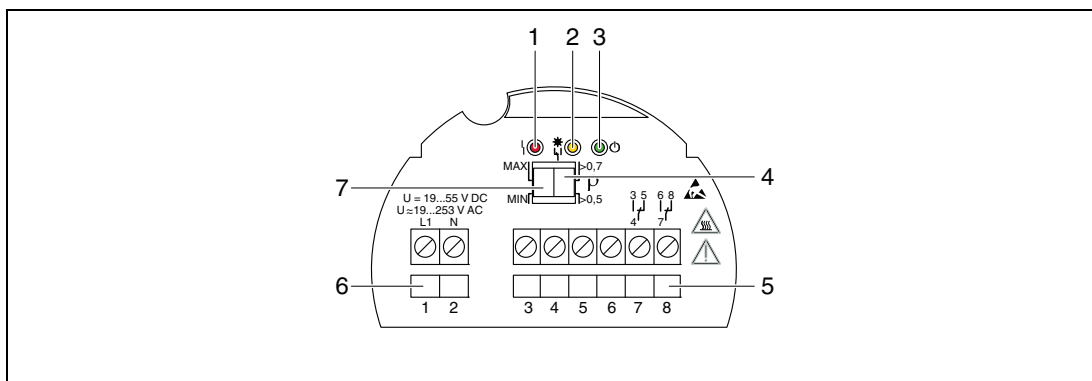


Figure 11.1 Example of electronic insert FEL44

- 1 LED, red, for warning or alarm
- 2 LED, yellow, switch status
- 3 LED, green, operational status (device is on)
- 4 DIP switch for setting density 0.7 or 0.5
- 5 Relay contact terminals
- 6 Power supply terminals
- 7 DIP switch for setting MAX/MIN safety mode

### 11.3 Terminals

Terminals for cable cross-section up to 2.5 mm<sup>2</sup> (14 AWG). Use ferrules for the wires.



## 11.4 Local Operation

### Operation at Electronic Insert

#### MAX/MIN fail-safe mode

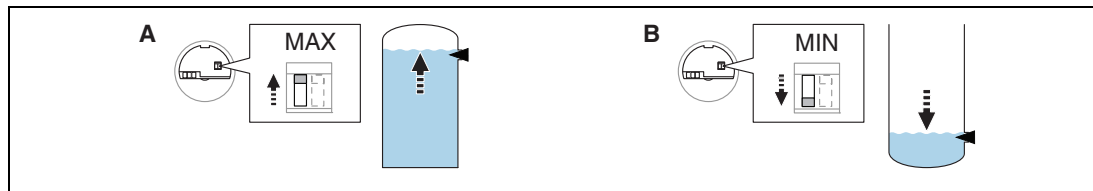


Figure 11.2 Switch position on the electronic insert for fail-safe mode MAX/MIN

**A** MAX (maximum fail-safe mode)

**B** MIN (minimum fail-safe mode)

- Minimum/maximum quiescent current safety can be switched at the electronic insert
- MAX = maximum safety: when the tuning fork is covered the output switches to demand mode, use for overfill protection, for example
- MIN = minimum safety: when the tuning fork is uncovered, the output switches to demand mode, use to prevent pumps from running dry, for example

#### Density switchover

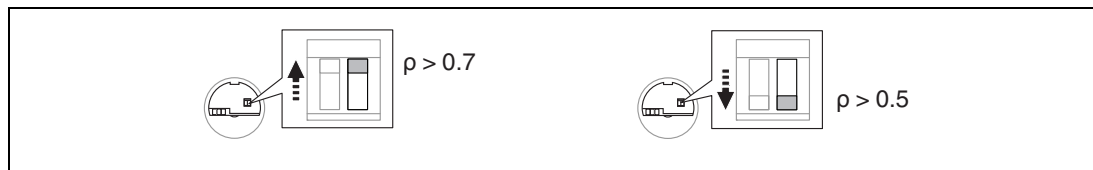


Figure 11.3 Switch position on the electronic insert for density

#### Liquids with density $> 0.7 \text{ g/cm}^3$

Switch position  $> 0.7 \text{ g/cm}^3$  (as-delivered state)

#### Liquids with density $0.5 \text{ g/cm}^3$

Switch position  $> 0.5 \text{ g/cm}^3$  (can be configured via DIP switch)

#### Liquids with density $> 0.4 \text{ g/cm}^3$

- Optionally available, not suitable for SIL applications.
- Fixed value that cannot be edited. The function of the DIP switch is interrupted.

## 12 Certificates and Approvals



### Note

For further information is available on the product detail page of the devices on the Internet at [www.pepperl-fuchs.com](http://www.pepperl-fuchs.com).

Enter the order designation in the search field → Select the appropriate product → Open the product detail page → Open the **Documents** or **Approvals+Certificates** tab.

### 12.1 CE Mark

The measuring system meets the legal requirements of the applicable EU Directives. These are listed in the corresponding EU Declaration of Conformity together with the standards applied. Pepperl+Fuchs confirms successful testing of the device by affixing to it the CE mark.

### 12.2 RCM-Tick Marking

The supplied product or measuring system meets the ACMA (Australian Communications and Media Authority) requirements for network integrity, interoperability, performance characteristics as well as health and safety regulations. Here, especially the regulatory arrangements for electromagnetic compatibility are met. The products are labeled with the RCM-Tick marking on the name plate.



Figure 12.1

### 12.3 Approvals for Explosions-Hazardous Areas

All data relating to explosion protection are provided in separate Ex documentation and are available from the downloads area. The Ex documentation is supplied as standard with all Ex devices.

### 12.4 Overfill Protection

Before mounting the device, observe the documentation from the WHG approvals (German Federal Water Act).

Approved for overfill protection and leakage detection.



### Note

Ordering information: Type code, additional options, feature **Additional approval**, option **WH**

## 12.5 Inspection Certificates

### Test, Certificate, Declaration

The following documents can be ordered:

- Inspection certificate 3.1, EN 10204 (material certificate, wetted parts)
- Pressure test, internal procedure, test report

## 12.6 Service

- Cleaned of oil+grease (wetted)
- PWIS-free (paint-wetting impairment substances)
- Switching delay setting to be spec.
- Setting for MIN safety mode
- Default density setting > 0.4 g/cm<sup>3</sup>
- Default density setting > 0.5 g/cm<sup>3</sup>

### Hard-copy product documentation

Hard-copy versions of the test reports, declarations and inspection certificates can also be ordered.

Ordering information: Type code, additional options, feature **Service**, option **P1** (Product documentation on paper)

The documents are then provided with the device upon delivery.

## 12.7 Pressure Equipment Directive

Pressure equipment with allowable pressure ≤ 200 bar (2900 psi)

Pressure instruments with a flange and threaded boss that do not have a pressurized housing do not fall within the scope of the Pressure Equipment Directive, irrespective of the maximum allowable pressure.

### Reasons:

According to Article 2, point 5 of EU Directive 2014/68/EU, pressure accessories are defined as **devices with an operational function and having pressure-bearing housings**.

If a pressure instrument does not have a pressure-bearing housing (no identifiable pressure chamber of its own), there is no pressure accessory present within the meaning of the Directive.

## 12.8 Process Seal as per ANSI/ISA 12.27.01

North American practice for the installation of process seals. In accordance with ANSI/ISA 12.27.01, Pepperl+Fuchs devices are designed as either single seal or dual seal devices with a warning message. This allows the user to waive the use of - and save the cost of installing - an external secondary process seal in the protective conduit as required in ANSI/NFPA 70 (NEC) and CSA 22.1 (CEC). These instruments comply with the North-American installation practice and provide a very safe and cost-saving installation for pressurized applications with hazardous fluids. More information is provided in the Safety Instructions (SI) for the relevant device.



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### Note

Aluminum and plastic housing are approved as single-seal devices.

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## 12.9 China RoHS Symbol

China RoHS 1, law SJ/T 11363-2006: The measuring system complies with the substance restrictions of the Restriction on Hazardous Substances Directive (RoHS).

## 12.10 RoHS

The measuring system complies with the substance restrictions of the Restriction on Hazardous Substances Directive 2011/65/EU (RoHS 2).

## 12.11 Additional Certification

### ASME B 31.3

Design and materials in accordance with ASME B31.3. The welds are through-penetration welded and meet the requirements of the ASME Boiler and Pressure Vessel Code, Section IX and EN ISO 15614-1.

## 13 Ordering Information

### 13.1 Type Code

This overview does not mark options which are mutually exclusive.

L	V	L	-	M	3	-	(1)	(2)	(3)	(4)	-	(5)	(6)	(7)	(8)	(9)	(10)	-	(11)	(12)	.	L
---	---	---	---	---	---	---	-----	-----	-----	-----	---	-----	-----	-----	-----	-----	------	---	------	------	---	---

<b>LVL-M3</b>	<b>Device</b>
<b>LVL-M3</b>	Limit switch for liquids

<b>(1)</b>	<b>Type of probe</b>
<b>A</b>	Compact version
<b>B</b>	Short tube version
<b>C</b>	Tube extension
<b>X</b>	Special version

<b>(2)</b>	<b>Process connection, sealing surface</b>
<b>A</b>	Flange ASME B16.5, RF (Raised Face)
<b>D</b>	Thread ASME B1.20.3, NPT
<b>E</b>	Flange EN 1092-1, Form A
<b>F</b>	Flange EN 1092-1, Form B1
<b>J</b>	Thread EN 10226, R
<b>K</b>	Flange HG/T20592, RF (Raised Face)
<b>L</b>	Flange HG/T20615, RF (Raised Face)
<b>N</b>	Thread ISO 228, G
<b>P</b>	Flange JIS B2220, RF (Raised Face)
<b>T</b>	Tri-Clamp ISO 2852
<b>X</b>	Special version

<b>(3)</b>	<b>Process connection</b>
<b>ASME B16.5 flanges</b>	
<b>A31</b>	NPS 1 inch, Cl.150, 316/316L
<b>A41</b>	NPS 1-1/4 inch, Cl.150, 316/316L
<b>A42</b>	NPS 1-1/4 inch, Cl.300, 316/316L
<b>A51</b>	NPS 1-1/2 inch, Cl.150, 316/316L
<b>A61</b>	NPS 2 inch, Cl.150, 316/316L
<b>A62</b>	NPS 2 inch, Cl.300, 316/316L
<b>A81</b>	NPS 3 inch, Cl.150, 316/316L
<b>A82</b>	NPS 3 inch, Cl.300, 316/316L
<b>A91</b>	NPS 4 inch, Cl.150, 316/316L
<b>A92</b>	NPS 4 inch, Cl.300, 316/316L
<b>E35</b>	1-1/2 inch, Cl.150, 316L
<b>E45</b>	2 inch, Cl.150, 316L

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(3) Process connection	
<b>E55</b>	3 inch, Cl.150, 316L
<b>E65</b>	1-1/2 inch, Cl.300, 316L
<b>E75</b>	2 inch, Cl.300, 316L
<b>E85</b>	3 inch, Cl.300, 316L
<b>EN 1092-1 flanges</b>	
<b>D75</b>	DN50 PN40, 316L
<b>D95</b>	DN80 PN40, 316L
<b>F45</b>	DN25 PN25/40, 316L
<b>F51</b>	DN32 PN6, 316L
<b>F55</b>	DN32 PN25/40, 316L
<b>F61</b>	DN40 PN6, 316L
<b>F62</b>	DN40 PN40, 316L
<b>F65</b>	DN40 PN25/40, 316L
<b>F71</b>	DN50 PN6, 316L
<b>F75</b>	DN50 PN25/40, 316L
<b>F85</b>	DN65 PN25/40, 316L
<b>F93</b>	DN80 PN10/16, 316L
<b>F95</b>	DN80 PN25/40, 316L
<b>FA3</b>	DN100 PN10/16, 316L
<b>FA5</b>	DN100 PN25/40, 316L
<b>JIS B2220 flanges</b>	
<b>J13</b>	10K 25A, 316L
<b>J16</b>	10K 40A, 316L
<b>J17</b>	10K 50A, 316L
<b>ISO 228 threads, EN 10226 threads, ASME B1.20.3 threads</b>	
<b>G21</b>	G3/4 inch, 316L, installation > accessory weld-in adapter
<b>G31</b>	1 inch, 316L
<b>G3E</b>	1 inch, 316L, installation > accessory weld-in adapter
<b>G41</b>	G3/4 inch, 316L
<b>Tri-Clamp ISO 2852</b>	
<b>T51</b>	DN25-38 (1 to 1-1/2 inch), 316L, DIN 32676 DN25/40
<b>T61</b>	DN40-51 (2 inch), 316L, DIN 32676 DN50
<b>XXX</b>	Special version
(4) Sensor length, material	
<b>B</b>	Compact version, 316L
<b>D</b>	Short tube version, 316L
<b>F</b>	Tube extension, length L in mm, 316L, Ra < 3.2 µm/126 µinch
<b>H</b>	Tube extension, length L in inch, 316L, Ra < 3.2 µm/126 µinch
<b>X</b>	Special version

<b>(5)</b>	<b>Housing, material</b>
<b>A</b>	Single compartment, aluminum, coated
<b>P</b>	Single compartment, plastic
<b>X</b>	Special version
<b>(6)</b>	<b>Electrical connection</b>
<b>A</b>	Gland M20, plastic, IP66/68, NEMA type 4X/6P
<b>B</b>	Gland M20, brass nickel plated, IP66/68, NEMA type 4X/6P
<b>F</b>	Thread M20, IP66/68, NEMA type 4X/6P
<b>G</b>	Thread G1/2, IP66/68, NEMA type 4X/6P
<b>H</b>	Thread NPT1/2, IP66/68, NEMA type 4X/6P
<b>I</b>	Thread NPT3/4, IP66/68, NEMA type 4X/6P
<b>M</b>	Plug M12, IP66/67, NEMA type 4X
<b>X</b>	Special version
<b>(7)</b>	<b>Application, temperature</b>
<b>A</b>	Process: max. 150 °C/302 °F, max. 40 bar
<b>X</b>	Special version
<b>(8)</b>	<b>Surface refinement</b>
<b>A</b>	Standard Ra < 3.2 µm/126 µinch
<b>X</b>	Special version
<b>(9)</b>	<b>Electrical output</b>
<b>E</b>	FEL42, 3-wire PNP, 10 V DC to 55 V DC
<b>N</b>	FEL48, 2-wire NAMUR
<b>W</b>	FEL44, relay DPDT, 19 V AC to 253 V AC/19 V DC to 55 V DC, contact 253 V/6 A
<b>X</b>	Special version
<b>(10)</b>	<b>Display, operation</b>
<b>A</b>	Without display, switch
<b>X</b>	Special version
<b>(11)</b>	<b>Approval</b>
<b>NA</b>	Version for non-hazardous area
<b>CC</b>	CSA C/US Cl. I Div. 2 Gr.A-D
<b>CG</b>	CSA C/US General Purpose
<b>CH</b>	CSA C/US IS Cl. I Div. 1 Gr. A-D, Cl. I Zone 0, AEx/Ex ia IIC T6
<b>CX</b>	CSA C/US XP Cl. I Div. 1 Gr. A-D, Cl. I Zone 1, AEx/Ex d IIC T6
<b>E2</b>	ATEX/IEC II 1/2G, 2G Ex ia IIC T6 Ga/Gb
<b>E3</b>	ATEX/IEC II 1/2G, 2G Ex db IIC T6 Ga/Gb
<b>UB</b>	UK Ex ia IIC T6 Ga/Gb

<b>(11)</b>	<b>Approval</b>
<b>UC</b>	UK Ex db II C T6 Ga/Gb
<b>UR</b>	Non-hazardous area and UK marking

### Additional Options

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

<b>(12)</b>	<b>Test, certificate, declaration</b>
<b>DD</b>	Pressure test, internal procedure, test report
<b>S5</b>	Inspection certificate 3.1, EN 10204 (material certificate wetted parts)
<b>XX</b>	Special version

<b>(12)</b>	<b>Additional approval</b>
<b>WH</b>	WHG overfill protection, leakage

<b>(12)</b>	<b>Accessory mounted</b>
<b>XX</b>	Special version

<b>(12)</b>	<b>Accessory enclosed</b>
<b>WP</b>	Weather protection cover, plastic
<b>XX</b>	Special version

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

<b>L</b>	<b>Sensor length, tube extension</b>
<b>Length</b>	Option F, 316L, length L in mm, 117 mm to 2000 mm
<b>Length</b>	Option H, 316L, length L in inch, 4.61 inch to 78.47 inch



## 13.2 TAG

### Measuring Point (TAG)

The device can be ordered with a tag name.

### Location of the Tag Name

Select in the additional specification:

- Tag plate, stainless steel
- Plastic film
- Plate provided

### Definition of the Tag Name

Specify in the additional specification:

3 lines containing up to 18 characters each

The specified tag name appears on the selected label and/or on the RFID TAG.

## 14 Accessories

### 14.1 Enclosed Accessories

These accessories can be ordered together with the device via the type code, additional options, feature **Accessory enclosed** or can be ordered separately.

#### 14.1.1 Protective Cover for Single Compartment Housing, Aluminum or 316L

Type code, additional options, feature **Accessory enclosed**, Option **WP**

Material: plastic

Order number: 71580796

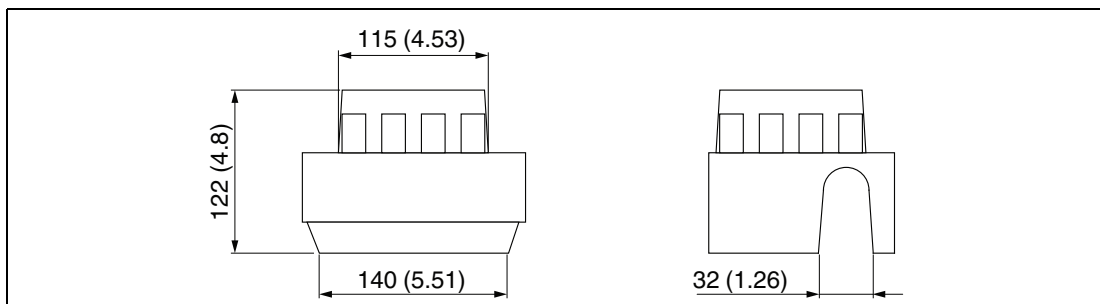


Figure 14.1 Protective cover for single compartment housing, aluminum or 316L, unit of measurement mm (inch)

## 14.2 Additional Accessories

These accessories can be ordered separately.

### 14.2.1 Female Cordset V1-W-5M-PVC

- Interfaces
  - Connector, socket, M12, angled, A-coded
  - Cable 5 m (16 foot)
- Ambient temperature
  - Connector: -40 to 90 °C (-40 to 194 °F)
  - Cable, fixed: -25 to 70 °C (-13 to 158 °F)
  - Cable, flexing: -5 to 70 °C (23 to 158 °F)
- Material
  - Connector
    - Screw connection: zinc diecast, nickel-plated
    - Body: TPU, black
    - Seal: FKM
  - Cable: PVC
- Degree of protection: IP68/IP69
- Border number: 032798

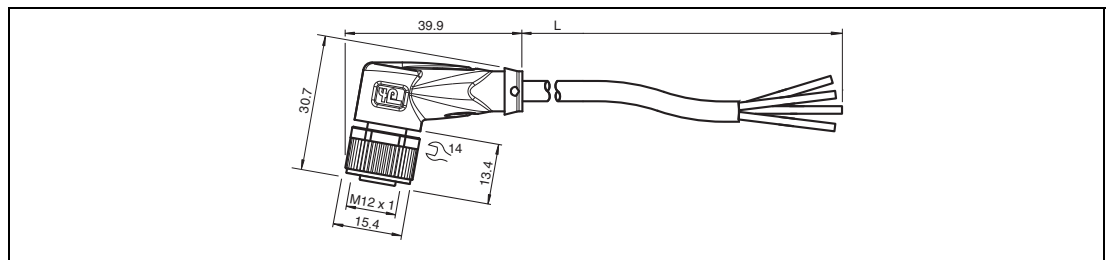


Figure 14.2 Female cordset V1-W-5M-PVC, unit of measurement mm

## 14.2.2 Sliding Sleeves for Unpressurized Operation

Switch point, infinitely adjustable.

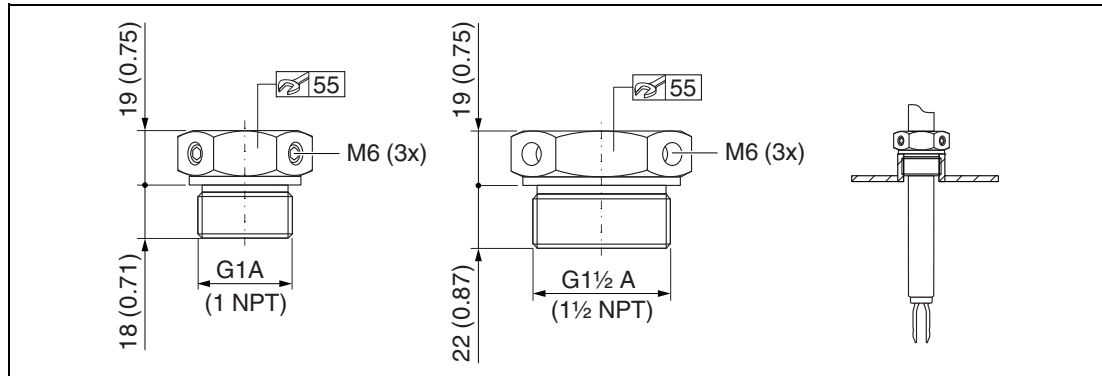


Figure 14.3 Sliding sleeves for unpressurized operation  $p_e = 0$  bar (0 psi), unit of measurement mm (inch)

### G1, DIN ISO 228/1

- Material: 1.4435 (AISI 316L)
- Weight: 0.21 kg (0.46 lb)
- Order number: 52003978
- Order number: 52011888, approval: with inspection certificate EN 10204 - 3.1 material

### NPT1, ASME B 1.20.1

- Material: 1.4435 (AISI 316L)
- Weight: 0.21 kg (0.46 lb)
- Order number: 52003979
- Order number: 52011889, approval: with inspection certificate EN 10204 - 3.1 material

### G1-1/2, DIN ISO 228/1

- Material: 1.4435 (AISI 316L)
- Weight: 0.54 kg (1.19 lb)
- Order number: 52003980
- Order number: 52011890, approval: with inspection certificate EN 10204 - 3.1 material

### NPT1-1/2, ASME B 1.20.1

- Material: 1.4435 (AISI 316L)
- Weight: 0.54 kg (1.19 lb)
- Order number: 52003981
- Order number: 52011891, approval: with inspection certificate EN 10204 - 3.1 material

### Note

For further information is available on the product detail page of the devices on the Internet at [www.pepperl-fuchs.com](http://www.pepperl-fuchs.com).

Enter the order designation in the search field → Select the appropriate product → Open the product detail page → Open the **Documents** tab.



### 14.2.3 High Pressure Sliding Sleeves

- Switch point, infinitely adjustable
- Use in hazardous areas
- Seal package made of graphite
- Graphite seal available as spare part 71078875
- In the case of G1, G1-1/2: seal is included in the delivery

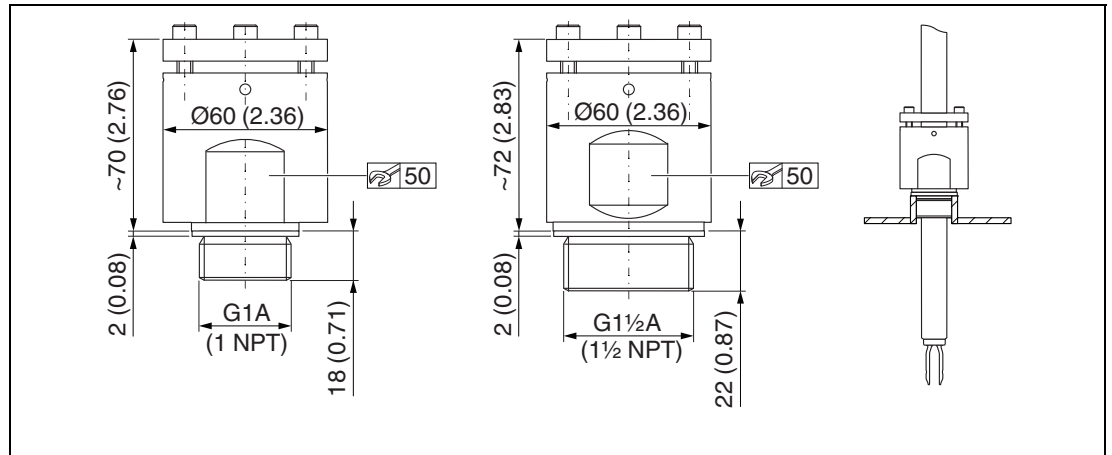


Figure 14.4 High pressure sliding sleeves, unit of measurement mm (inch)

#### G1, DIN ISO 228/1

- Material: 1.4435 (AISI 316L)
- Weight: 1.13 kg (2.49 lb)
- Order number: 52003663
- Order number: 52011880, approval: with inspection certificate EN 10204 - 3.1 material

#### G1, DIN ISO 228/1

- Material: Alloy C22
- Weight: 1.13 kg (2.49 lb)
- Approval: with inspection certificate EN 10204 - 3.1 material
- Order number: 71118691

#### NPT1, ASME B 1.20.1

- Material: 1.4435 (AISI 316L)
- Weight: 1.13 kg (2.49 lb)
- Order number: 52003667
- Order number: 52011881, approval: with inspection certificate EN 10204 - 3.1 material

#### NPT1, ASME B 1.20.1

- Material: Alloy C22
- Weight: 1.13 kg (2.49 lb)
- Approval: with inspection certificate EN 10204 - 3.1 material
- Order number: 71118694

#### G1-1/2, DIN ISO 228/1

- Material: 1.4435 (AISI 316L)
- Weight: 1.32 kg (2.91 lb)
- Order number: 52003665
- Order number: 52011882, approval: with inspection certificate EN 10204 - 3.1 material

### G1-1/2, DIN ISO 228/1

- Material: Alloy C22
- Weight: 1.32 kg (2.91 lb)
- Approval: with inspection certificate EN 10204 - 3.1 material
- Order number: 71118693

### NPT1-1/2, ASME B 1.20.1

- Material: 1.4435 (AISI 316L)
- Weight: 1.32 kg (2.91 lb)
- Order number: 52003669
- Order number: 52011883, approval: with inspection certificate EN 10204 - 3.1 material

### NPT1-1/2, ASME B 1.20.1

- Material: Alloy C22
- Weight: 1.32 kg (2.91 lb)
- Approval: with inspection certificate EN 10204 - 3.1 material
- Order number: 71118695



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#### Note

For further information is available on the product detail page of the devices on the Internet at [www.pepperl-fuchs.com](http://www.pepperl-fuchs.com).

Enter the order designation in the search field → Select the appropriate product → Open the product detail page → Open the **Documents** tab.

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## 15 Supplementary Documentation

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### Note

For further information is available on the product detail page of the devices on the Internet at [www.pepperl-fuchs.com](http://www.pepperl-fuchs.com).

Enter the order designation in the search field → Select the appropriate product → Open the product detail page → Open the **Documents** tab.

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### 15.1 Technical Information (TI)

Planning aid

The document contains all the technical data on the device and provides an overview of the accessories and other products that can be ordered for the device.

### 15.2 Manual (BA)

Your reference guide

This document contains all the information that is required in various phases of the life cycle of the device: from product identification, incoming acceptance and storage, to mounting, connection, operation and commissioning through to troubleshooting, maintenance and disposal.

### 15.3 Brief Instructions (KA)

Guide that takes you quickly to the 1st measured value

This document contains all the essential information from incoming acceptance to initial commissioning.

### 15.4 Instruction Manual (SI)

Depending on the approval, the following instruction manuals (SI) are supplied with the device. These documents are an integral part of the manual.

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### Note

The nameplate indicates the instruction manual (SI) that are relevant to the device.

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## Explosion Protection

- Intrinsic Safety Barriers
- Signal Conditioners
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- Electrical Ex Equipment
- Purge and Pressurization
- Industrial HMI
- Mobile Computing and Communications
- HART Interface Solutions
- Surge Protection
- Wireless Solutions
- Level Measurement

## Industrial Sensors

- Proximity Sensors
- Photoelectric Sensors
- Industrial Vision
- Ultrasonic Sensors
- Rotary Encoders
- Positioning Systems
- Inclination and Acceleration Sensors
- Fieldbus Modules
- AS-Interface
- Identification Systems
- Displays and Signal Processing
- Connectivity

### Pepperl+Fuchs Quality

Download our latest policy here:

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