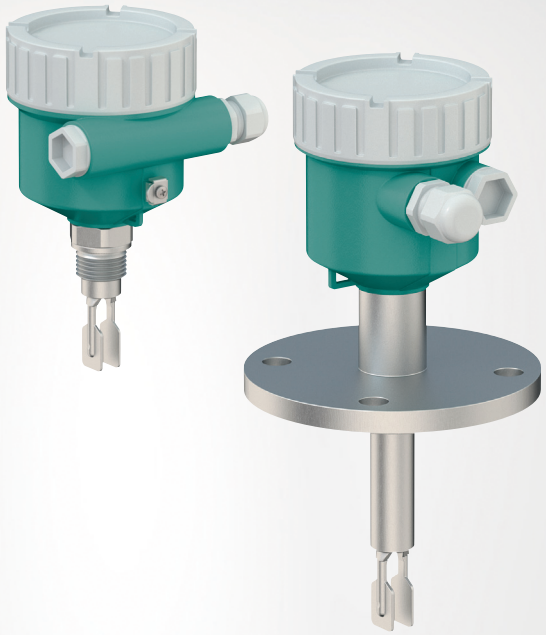
LVL-M4

Vibration Limit Switch

Brief Instructions



ISO9001

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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

Note

This document does not substitute the instruction manual.

Note

For full information on the product, refer to the instruction manual and further documentation on the Internet at www.pepperl-fuchs.com.

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.

The documentation consists of the following parts:

- Datasheet – product overview
  The datasheet contains the essential technical data for product selection.
- 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.
- Manual (BA) – complete information
  The manual contains all information from incoming acceptance to disposal.
- Brief instructions (KA), present document – 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

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1.2 Safety Information

Target Group, Personnel

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

Only appropriately trained and qualified personnel may carry out mounting, installation, commissioning, operation, maintenance, and dismounting 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.

Tool Symbols

Flat-blade screwdriver

Allen key

Open-ended wrench

Symbols in Graphics

1, 2, 3 ... Item numbers

A, B, C, ... Views

Explosion-hazardous area

Non-explosion-hazardous area

1.4 Registered Trademarks

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2 Basic Safety Instructions

2.1 Requirements for Personnel

The personnel must fulfill the following requirements to carry out the necessary tasks, e. g. commissioning and maintenance:

- Trained, qualified specialists must have a relevant qualification for the specific function
- and task
- Are authorized by the plant owner/operator
- Are familiar with federal/national regulations
- Must have read and understood the instructions in the manual and supplementary documentation
- Follow instructions and comply with conditions

2.2 Intended Use

- Only use the device for liquids.
- Improper use can pose hazards.
- Ensure that the device is free of defects while it is in operation.
- Use the device only for media to which the process-wetted materials have an adequate level of resistance.
- Do not exceed or drop below the limit values for the device, see manual and technical information TI01403O/98/EN.

2.2.1 Incorrect Use

The manufacturer is not liable for damage caused by improper or non-intended use.

Residual Risks

Due to heat transfer from the process, the temperature of the electronics housing and the assemblies contained therein may rise to 80 °C (176 °F) during operation.

Danger of burns from contact with surfaces!

- If necessary, ensure protection against contact to prevent burns.

For requirements concerning functional safety in accordance with IEC 61508, the associated SIL documentation must be observed.

2.3 Workplace Safety

For work on and with the device:

- Wear the required personal protective equipment according to federal/national regulations.

2.4 Operational Safety

Risk of injury!

- Operate the device only if it is in proper technical condition, free from errors and faults.
- The operator is responsible for ensuring failure-free operation of the device.

Modifications to the Device

Unauthorized modifications to the device are not permitted and can lead to unforeseeable dangers.

- If, despite this, modifications are required, consult with Pepperl+Fuchs.

Repair

To ensure continued operational safety and reliability:

- Only perform repair work on the device if this is expressly permitted.
- Observe federal/national regulations pertaining to the repair of an electrical device.
- Use original spare parts and accessories from Pepperl+Fuchs only.

Hazardous Area

To eliminate danger to persons or the facility when the device is used in the hazardous area (e. g. explosion protection):

- Check the nameplate to verify whether the ordered device can be used for the intended purpose in the hazardous area.
- Observe the specifications in the separate supplementary documentation that is an integral part of this manual.

2.5 Product Safety

This device is designed in accordance with good engineering practice to meet state-of-the-art safety requirements, has been tested, and left the factory in a condition in which it is safe to operate.

The device meets general safety standards and legal requirements. It also complies with the EU directives listed in the device-specific EU Declaration of Conformity. Pepperl+Fuchs confirms this by affixing the CE mark to the device.

2.6 Functional Safety SIL (Optional)

The functional safety manual must be strictly observed for devices that are used in functional safety applications.

2.7 IT Security

We only provide a warranty if the device is installed and used as described in the instruction manuals. The device has safety mechanisms integrated to prevent users from inadvertently changing settings.

Provide additional protection for the device and data transfer to/from the device

- IT security measures defined in the plant owner/operator's own security policy must be implemented by plant owners/operators themselves.

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3 Incoming Acceptance and Product Identification

3.1 Incoming Acceptance

Check the following during goods acceptance:

- ☐ Are the order codes on the delivery note and the product sticker identical?
- ☐ Are the goods undamaged?
- ☐ Do the nameplate data match the ordering information on the delivery note?
- ☐ If required (see nameplate): Are the Safety Instructions, e. g. SI, provided?

Note

If one of these conditions is not met, please contact the manufacturer's sales office.

3.2 Product Identification

The device can be identified in the following ways:

- Nameplate data
- Extended order code with breakdown of the device features on the delivery note

3.2.1 Nameplate

The information that is required by law and is relevant to the device is shown on the nameplate, e. g.:

- Manufacturer identification
- Order number, extended order code, serial number
- Technical data, degree of protection
- Firmware version, hardware version
- Approval-related information, reference to instruction manuals (SI)
- DataMatrix code (information about the device)

3.2.2 Electronic Insert

Note

Identify the electronic insert via the order code on the nameplate.

3.2.3 Manufacturer Address

Pepperl+Fuchs Group Lilienthalstraße 200, 68307 Mannheim, Germany
Internet: www.pepperl-fuchs.com

Place of manufacture: See nameplate.

3.3 Storage and Transport

3.3.1 Storage Conditions

Use original packaging.

3.3.2 Storage Temperature

- -40 to +80 °C (-40 to +176 °F)
- optional: -50 °C (-58 °F), -60 °C (-76 °F)

3.3.3 Device Transport

Transporting the Device

1. Transport the device to the measuring point in the original packaging.
2. Hold the device by the housing, temperature spacer, flange or extension pipe.
3. Do not bend, shorten or extend the tuning fork.

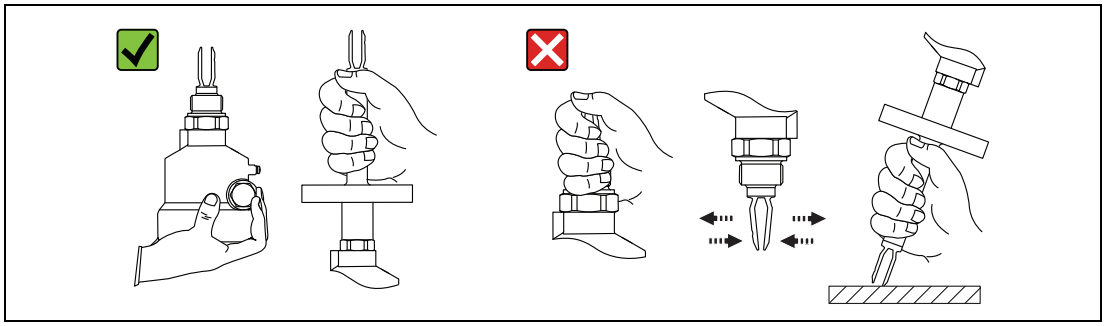

Figure 3.1 Handling the device during transportation

4 Mounting

Warning!

Loss of protection rating if the device is opened in a wet environment.

Only open the device in a dry environment!

Mounting Instructions

- 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)

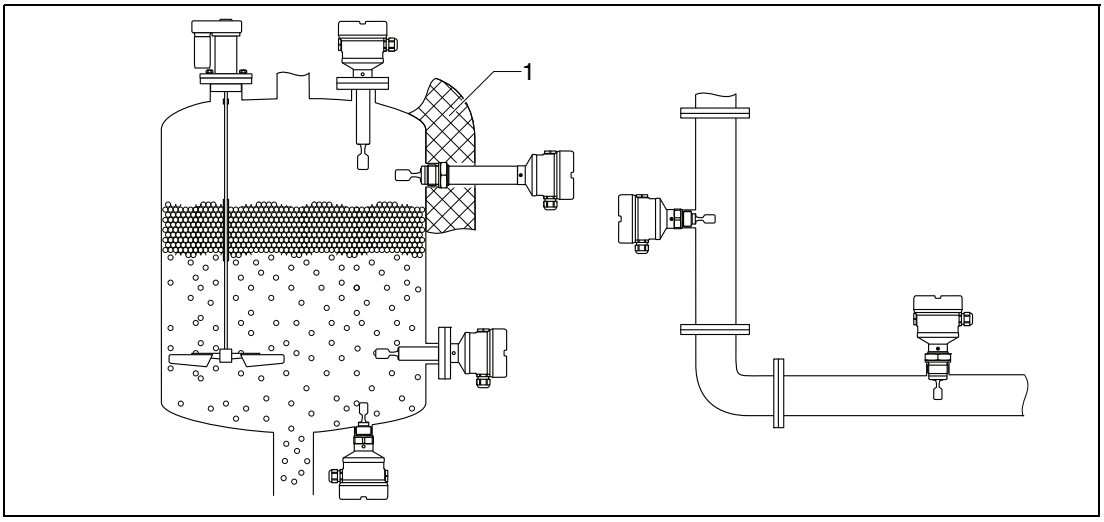

Figure 4.1 Installation examples for a vessel, tank or pipe

1 Vessel insulation (example with temperature spacer/pressure-tight feedthrough)
If process temperatures are high, the device should be included in a vessel insulation system to prevent the electronics from heating as a result of thermal radiation or convection.

4.1 Mounting Requirements

4.1.1 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)

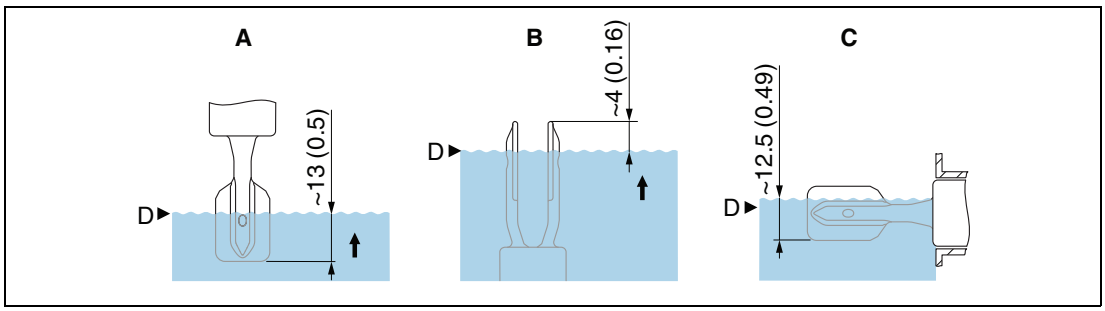

Figure 4.2 Typical switch points, unit of measurement mm (inch)

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

4.1.2 Take Viscosity into Consideration

Note

Viscosity values

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

Low Viscosity

Note

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

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

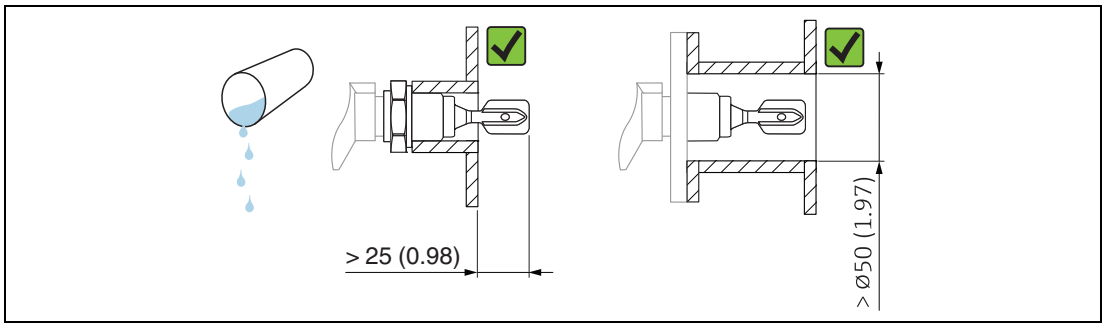

Figure 4.3 Installation example for low-viscosity liquids, unit of measurement mm (inch)

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High Viscosity

Note

Highly viscous liquids may cause switching delays.

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

Note

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

The tuning fork must be located outside the installation socket!

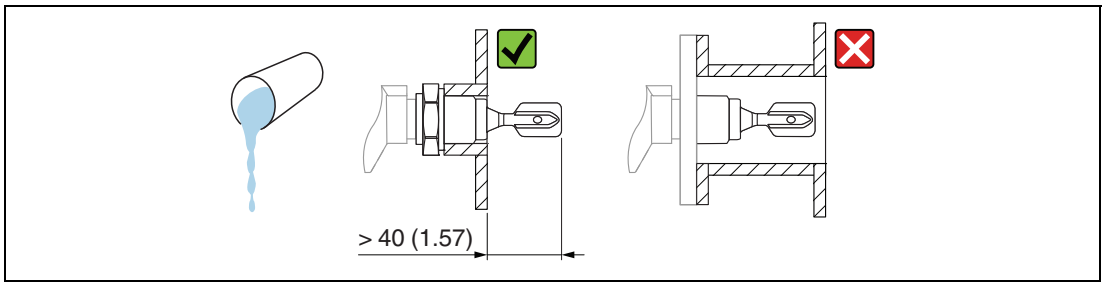

Figure 4.4 Installation example for a highly viscous liquid, unit of measurement mm (inch)

4.1.3 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.

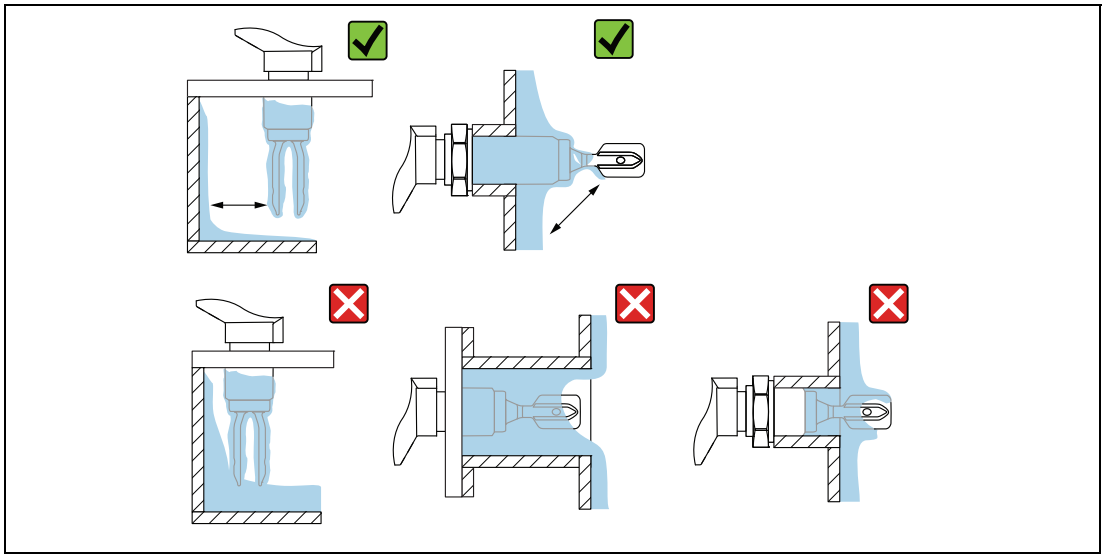

Figure 4.5 Installation examples for a highly viscous process medium

4.1.4 Take Clearance into Consideration

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

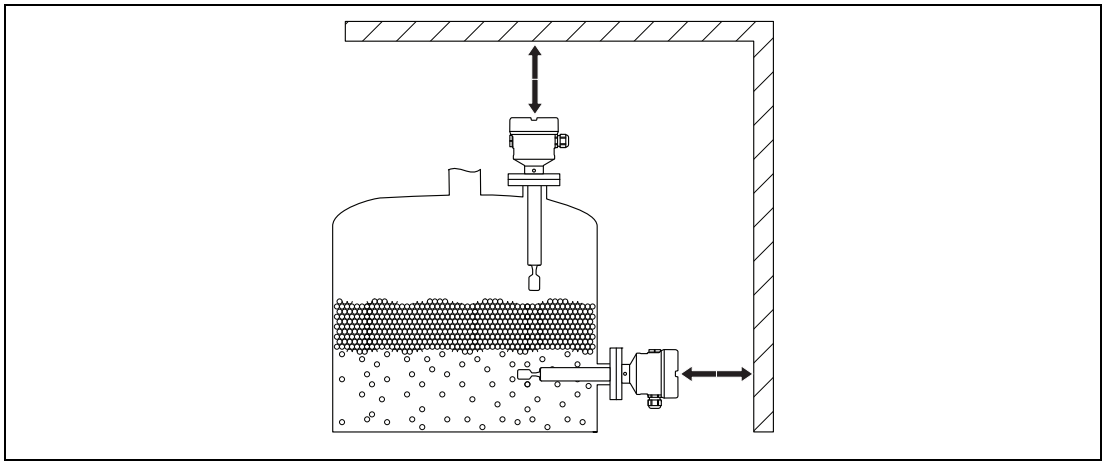

Figure 4.6 Take clearance into consideration

4.1.5 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 foot).

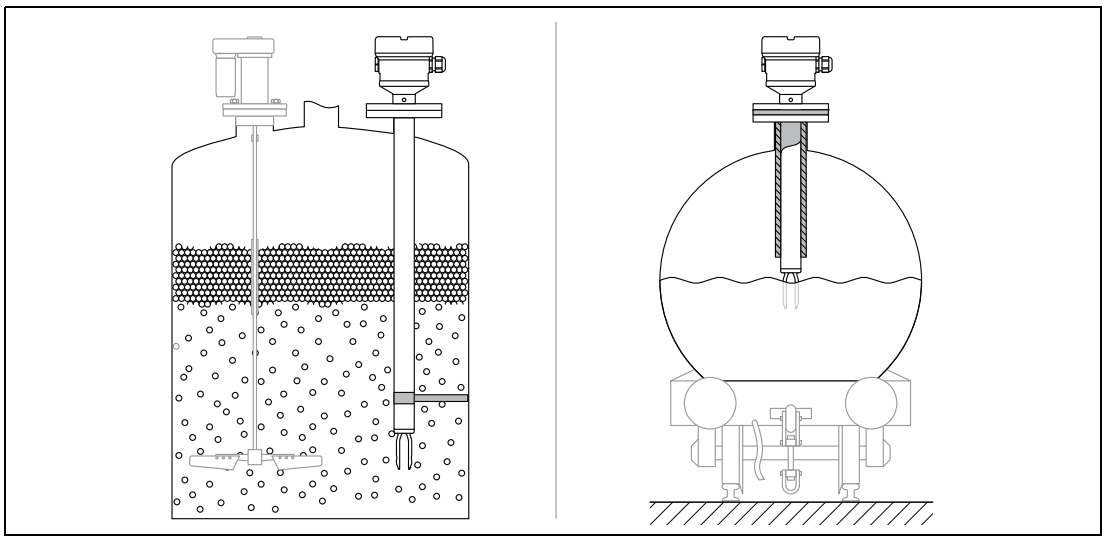

Figure 4.7 Examples of support in the event of dynamic load

4.1.6 Weld-in Adapter with Leakage Hole

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

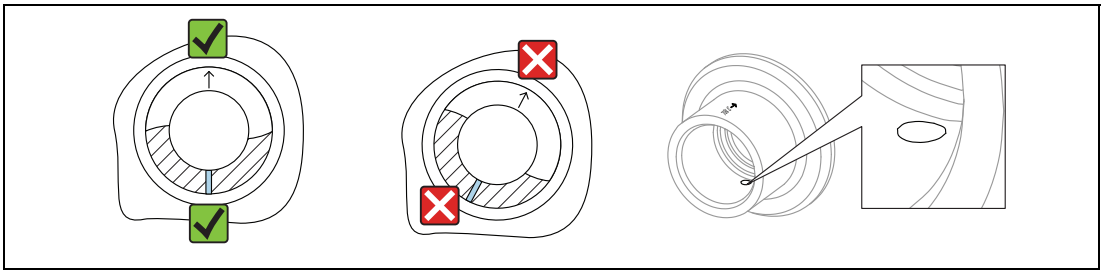

Figure 4.8 Weld-in adapter with leakage hole

4.2 Mounting the Device

Required Tools

- Open-ended wrench for sensor installation
- Allen key for housing locking screw

4.2.1 Installation

Align the Tuning Fork using 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

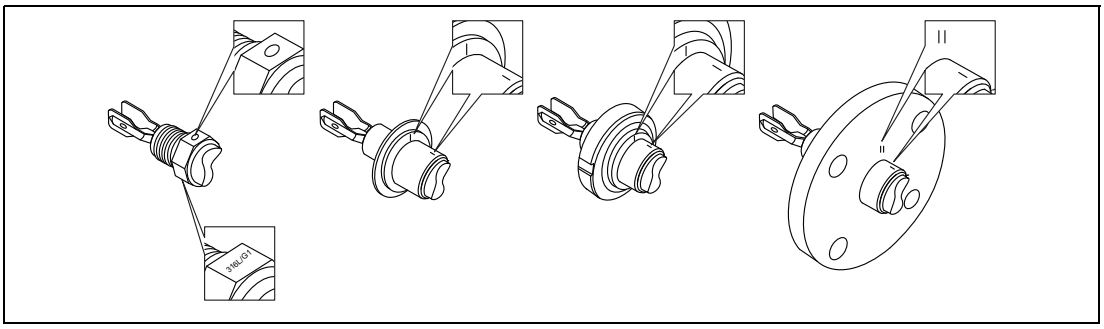

Figure 4.9 Markings to align the tuning fork

Installing in pipes

- Flow velocities up to 5 m/s at a viscosity of 1 mPa·s and density 1 g/cm^3 (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 is pointing in the direction of flow.
- The marking is visible when installed.

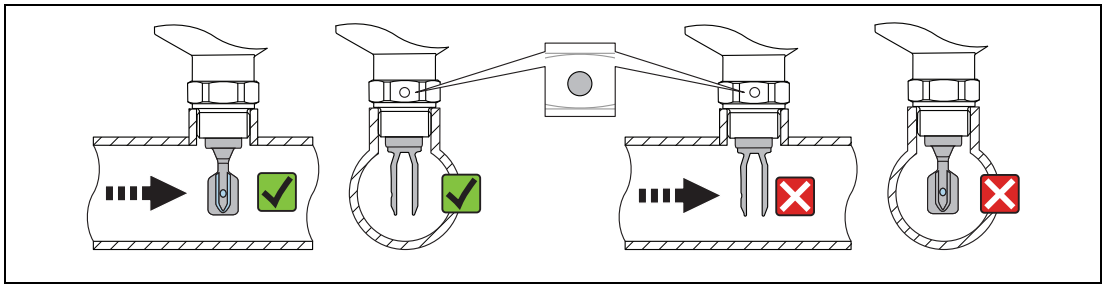

Figure 4.10 Installation in pipes (take fork position and marking into consideration)

Screwing in the Device

- Turn by the hex bolt only, 15 to 30 Nm (11 to 22 lbf foot)
- Do not turn at the housing!

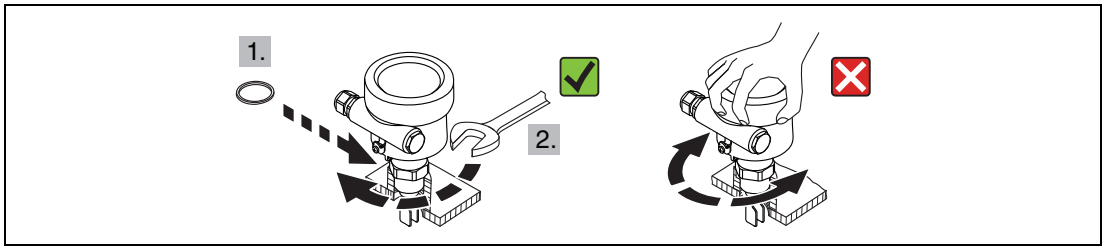

Figure 4.11 Screwing in the device

Aligning the Cable Entry

Note

The locking screw is not tightened when the device is delivered.

Aligning the Cable Entry

1. Loosen the external locking screw (maximum 1.5 turns).
2. Turn the housing, align the cable entry.
   Avoid moisture in the housing, provide a loop to allow moisture to drain off.
3. Tighten the external locking screw.

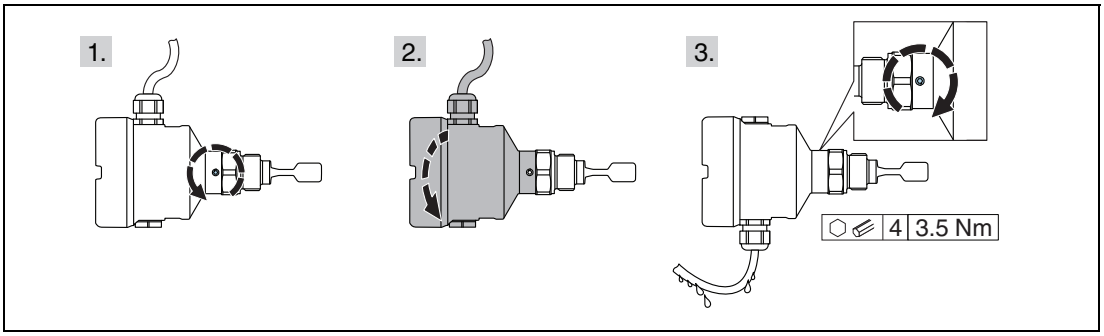

Figure 4.12 Housing with external locking screw

4.3 Sliding Sleeves

► For more information see manual.

4.4 Post-Mounting Check

☐ Is the device undamaged (visual inspection)?

☐ Does the device conform to the measuring point specifications?

For example:

- Process temperature
- Process pressure
- Ambient temperature
- Measuring range

☐ Are the measuring point number and labeling correct (visual inspection)?

☐ Is the device adequately protected against precipitation and direct sunlight?

☐ Is the device properly secured?

5 Electrical Connection

Required Tools

- Screwdriver for electrical connection
- Allen key for screw of cover lock

5.1 Connection Requirements

5.1.1 Cover with Securing Screw

In the case of devices for use in the hazardous area with a certain type of protection, the cover is sealed by a securing screw.

Note

If the securing screw is not positioned correctly, the cover cannot provide secure sealing.

- Open the cover: Slacken the screw of the cover lock with a maximum of 2 turns so that the screw does not fall out. Fit the cover and check the cover seal.
- Close the cover: Screw the cover securely onto the housing, making sure that the securing screw is positioned correctly. There should not be any gap between the cover and housing.

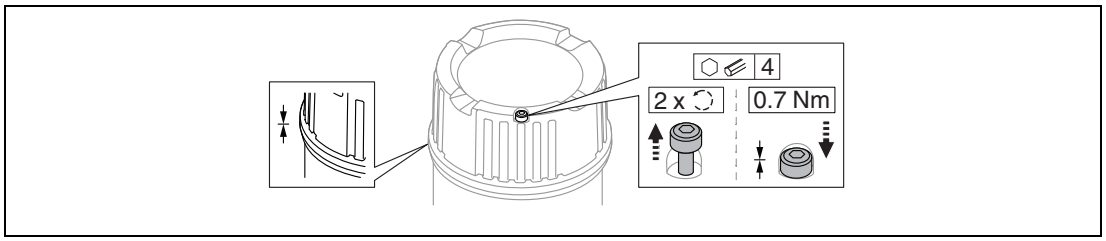

Figure 5.1 Cover with securing screw

5.1.2

5.1.3 Connecting Protective Earth (PE)

The protective earth conductor at the device must only be connected if the device's operating voltage is ≥ 35 V DC or ≥ 16 V AC_{eff}.

When the device is used in hazardous areas, it must always be included in the potential equalization of the system, irrespective of the operating voltage.

Note

The plastic housing is available with or without an external protective earth connection (PE). If the operating voltage of the electronic insert is < 35 V, the plastic housing has no external protective earth connection.

5.2 Connecting the Device

Caution!

Housing thread

The thread of the electronics and connection compartment is coated with lubricant varnish.

Avoid additional lubrication.

5.2.1 2-wire AC (Electronic Insert FEL61)

- 2-wire AC version
- Switches the load directly into the power supply circuit via an electronic switch; always connect in series with a load
- Functional testing without level change

  A functional test can be performed on the device using the test key on the electronic insert.

Supply Voltage

U = 19 to 253 V AC, 50 Hz/60 Hz

Residual voltage when switched through: typically 12 V

Note

Observe the following as per IEC/EN61010-1: Provide a suitable circuit breaker for the device, and limit the current to 1 A, e. g. by installing a 1 A fuse (slow-blow) in the phase (not the neutral conductor) of the supply circuit.

Power Consumption

S ≤ 2 VA

Current Consumption

Residual current when blocked: I ≤ 3,8 mA

The red LED flashes in the event of an overload or short-circuit. Check for an overload or short-circuit every 5 s. The test is deactivated after 60 s.

Connectable Load

- Load with a minimum holding power/rated power of 2.5 VA at 253 V (10 mA) or 0.5 VA at 24 V (20 mA)
- Load with a maximum holding power/rated power of 89 VA at 253 V (350 mA) or 8.4 VA at 24 V (350 mA)
- With overload and short-circuit protection

Behavior of Output Signal

- OK status: load on (switched through)
- Demand mode: load off (blocked)
- Alarm: load off (blocked)

Terminals

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

Overvoltage protection

Overvoltage category II

Terminal Assignment

Always connect an external load. The electronic insert has integrated short-circuit protection.

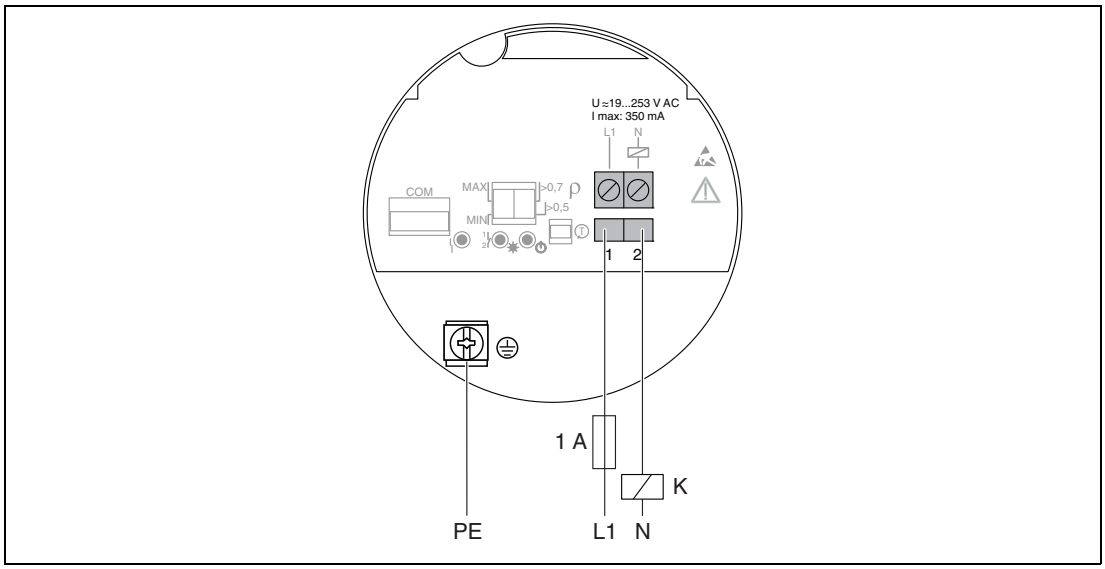

Figure 5.2 2-wire AC, electronic insert FEL61

Behavior of Switch Output and Signaling

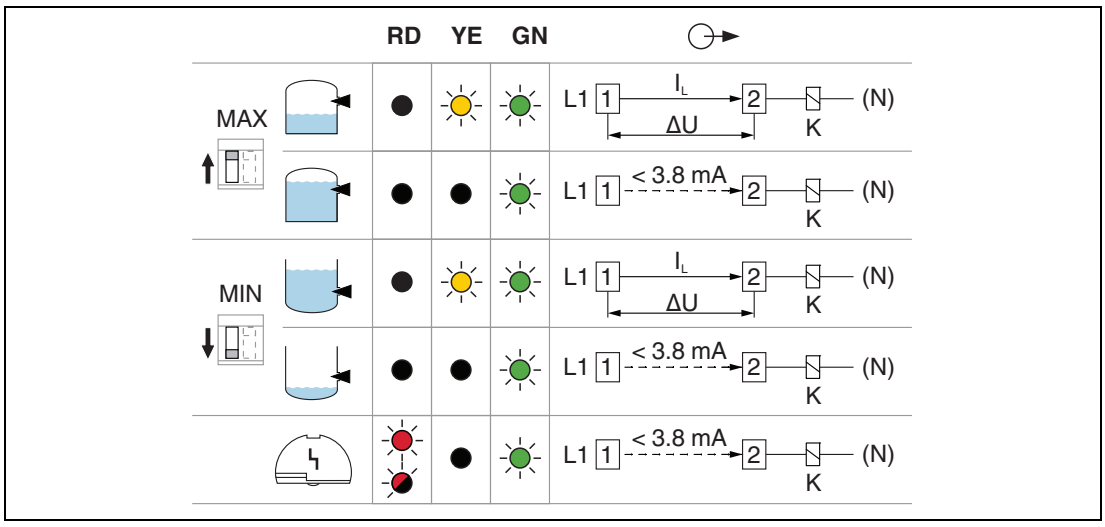

Figure 5.3 Behavior of switch output and signaling, electronic insert FEL61

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

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Selection Tool for Relays

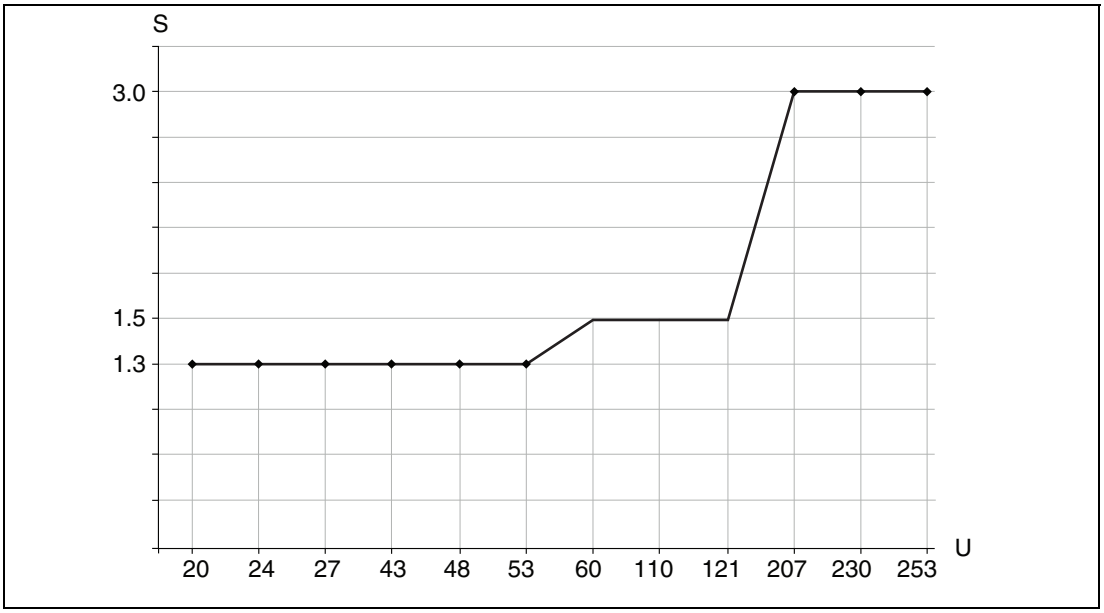

Figure 5.4 Recommended minimum holding power/rated power for load

S Holding power/rated power in VA

U Operating voltage in V

AC Mode

- Operating voltage: 24 V, 50 Hz/60 Hz
- Holding power/rated power: > 0.5 VA, < 8.4 VA
- Operating voltage: 110 V, 50 Hz/60 Hz
- Holding power/rated power: > 1.1 VA, < 38.5 VA
- Operating voltage: 230 V, 50 Hz/60 Hz
- Holding power/rated power: > 2.3 VA, < 80.5 VA

5.2.2 3-Wire DC-PNP (Electronic Insert FEL62)

- 3-wire DC version
- Preferably in conjunction with programmable logic controllers (PLC), DI modules as per EN 61131-2. Positive signal at switch output of electronics module (PNP)
- Functional testing without level change

  A functional test can be performed on the device using the test key on the electronic insert or using the test magnet (can be ordered as an option) with the housing closed.

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 to 55 V DC

Note

Observe the following as per 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 supply circuit.

Power Consumption

P ≤ 0.5 W

Current Consumption

I ≤ 10 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 ≤ 350 mA, with overload and short-circuit protection

Capacitance Load

C ≤ 0.5 µF at 55 V, C ≤ 1.0 µF at 24 V

Residual Current

I < 100 µA, for blocked transistor

Residual Voltage

U < 3 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 mm^2 (14 AWG). Use ferrules for the wires.

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Overvoltage protection

Overvoltage category II

Terminal Assignment

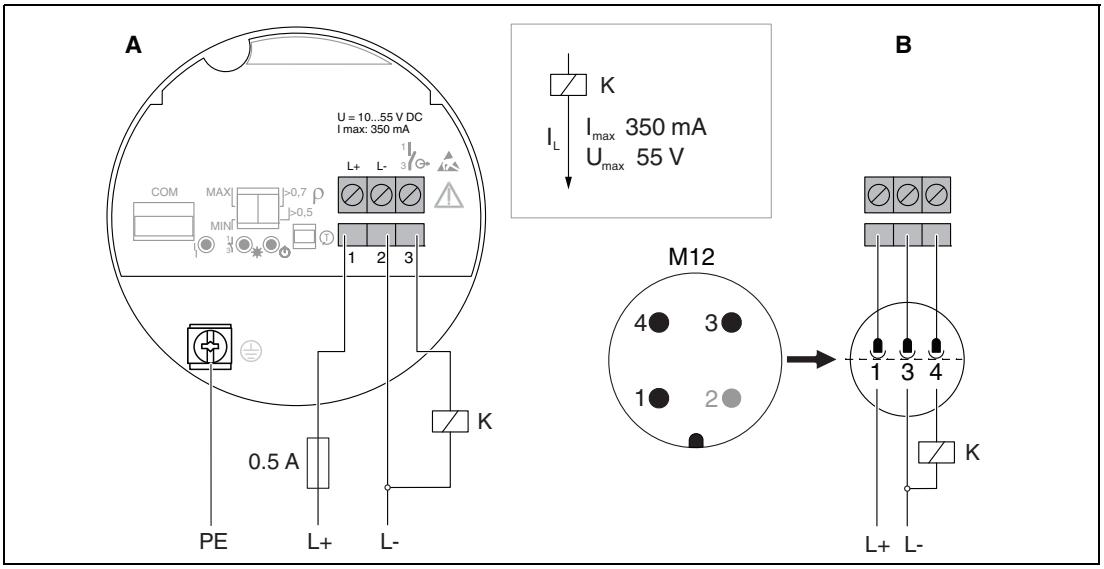

Figure 5.5 3-wire DC-PNP, electronic insert FEL62

A Connection wiring with terminals

B Connection wiring with M12 plug in housing as per EN 61131-2 standard

Behavior of Switch Output and Signaling

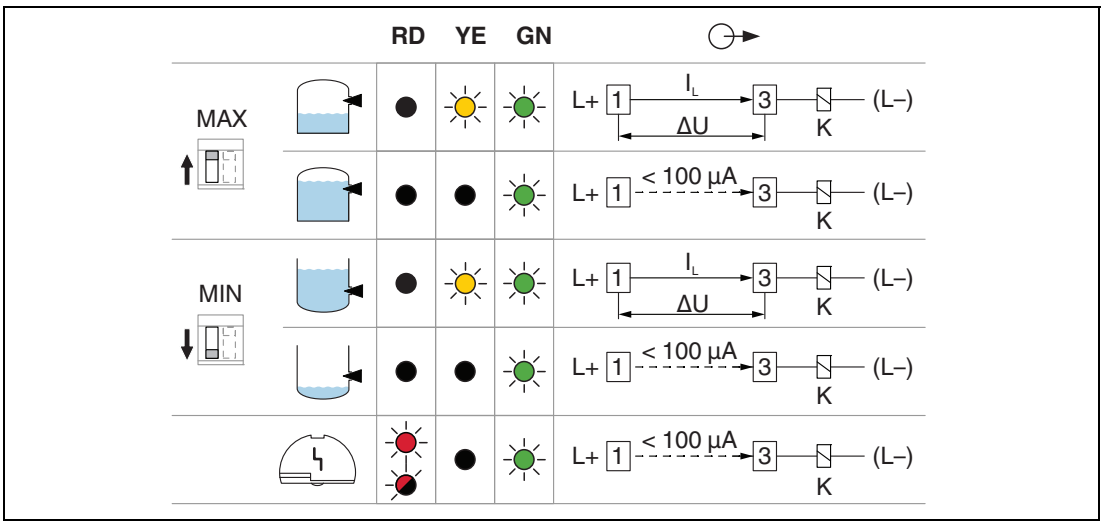

Figure 5.6 Behavior of switch output and signaling, electronic insert FEL62

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

5.2.3 Universal Current Connection with Relay Output (Electronic Insert FEL64)

- Switches the loads via 2 volt-free changeover contacts
- 2 galvanically isolated changeover contacts (DPDT), both changeover contacts switch simultaneously.
- Functional testing without level change. A functional test can be performed on the device using the test key on the electronic insert or using the test magnet (can be ordered as an option) with the housing closed.

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 to 253 V AC, 50 Hz/60 Hz / 19 to 55 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

S < 25 VA, P < 1.3 W

Connectable Load

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

- $I_{AC} \leq 6$ A (Ex de 4 A), U~ ≤ 253 V AC; P~ ≤ 1500 VA, cos φ = 1, P~ ≤ 750 VA, cos φ > 0.7
- $I_{DC} \leq 6$ A (Ex de 4 A) to 30 V DC, $I_{DC} \leq 0.2$ A to 125 V

According to IEC 61010, the following applies: Total voltage from relay outputs and power supply ≤ 300 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 mm^2 (14 AWG). Use ferrules for the wires.

Overvoltage protection

Overvoltage category II

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Terminal Assignment

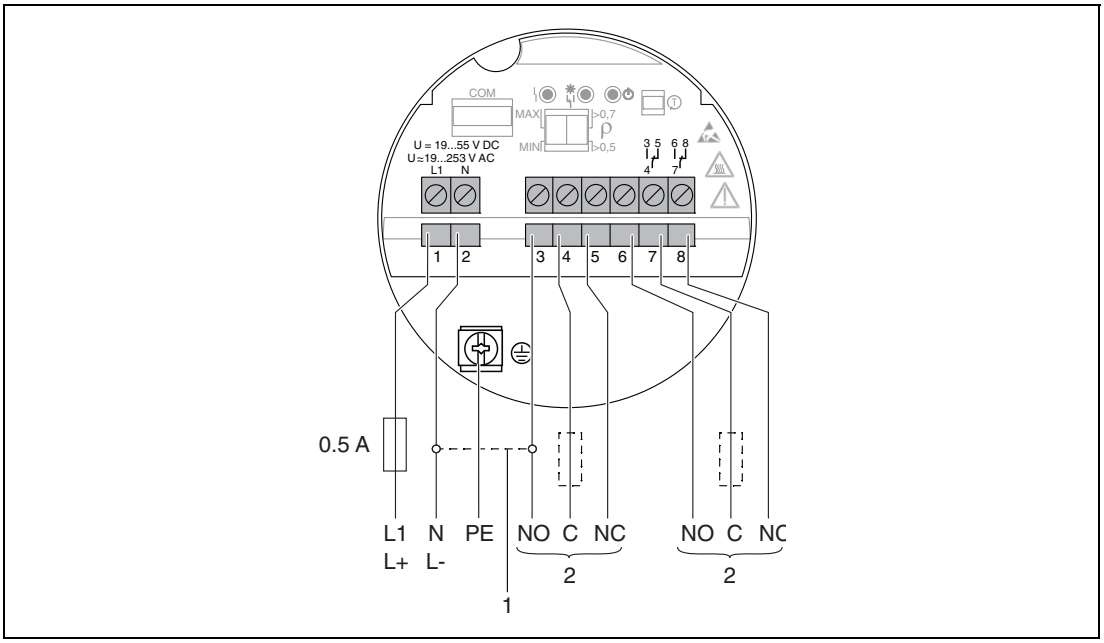

Figure 5.7 Universal current connection with relay output, electronic insert FEL64

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

Behavior of Switch Output and Signaling

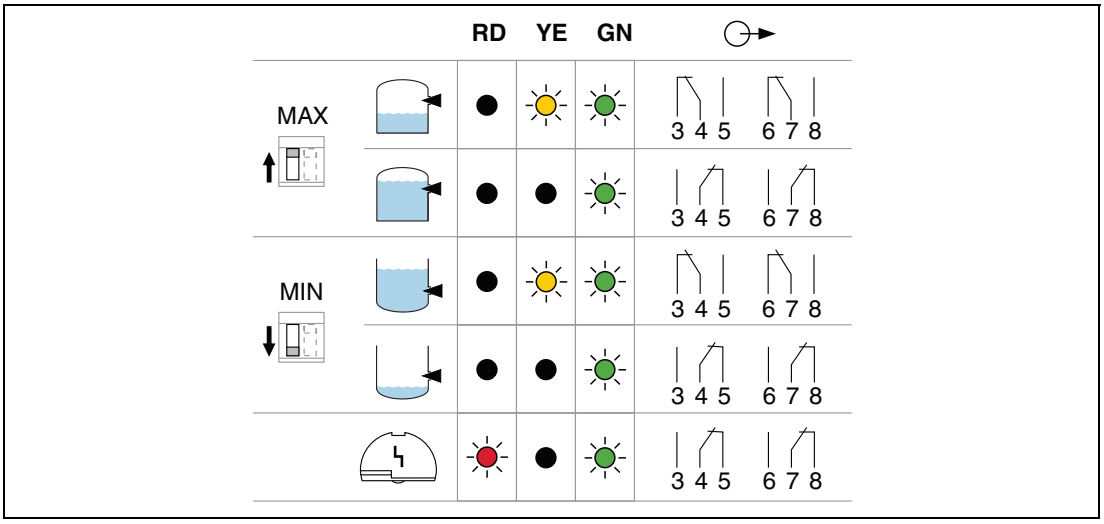

Figure 5.8 Behavior of switch output and signaling, electronic insert FEL64

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

5.2.4 DC Connection, Relay Output (Electronic Insert FEL64DC)

- Switches the loads via 2 volt-free changeover contacts
- 2 galvanically isolated changeover contacts (DPDT), both changeover contacts switch simultaneously.
- Functional testing without level change. Functional testing of the entire device can be performed using the test key on the electronic insert or with the test magnet (can be ordered as an option) with the housing closed.

Supply Voltage

U = 9 to 20 V DC

Note

Observe the following as per 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 < 1.0 W

Connectable Load

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

- $I_{AC} \leq 6$ A (Ex de 4 A), U~ ≤ 253 V AC; P~ ≤ 1500 VA, cos φ = 1, P~ ≤ 750 VA, cos φ > 0.7
- $I_{DC} \leq 6$ A (Ex de 4 A) to 30 V DC, $I_{DC} \leq 0.2$ A to 125 V

According to IEC 61010, the following applies: Total voltage from relay outputs and power supply ≤ 300 V.

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

Relay contact material: silver/nickel AgNi 90/10

When connecting a device with high inductance, provide spark quenching 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.

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 mm^2 (14 AWG). Use ferrules for the wires.

Overvoltage protection

Overvoltage category II

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Terminal Assignment

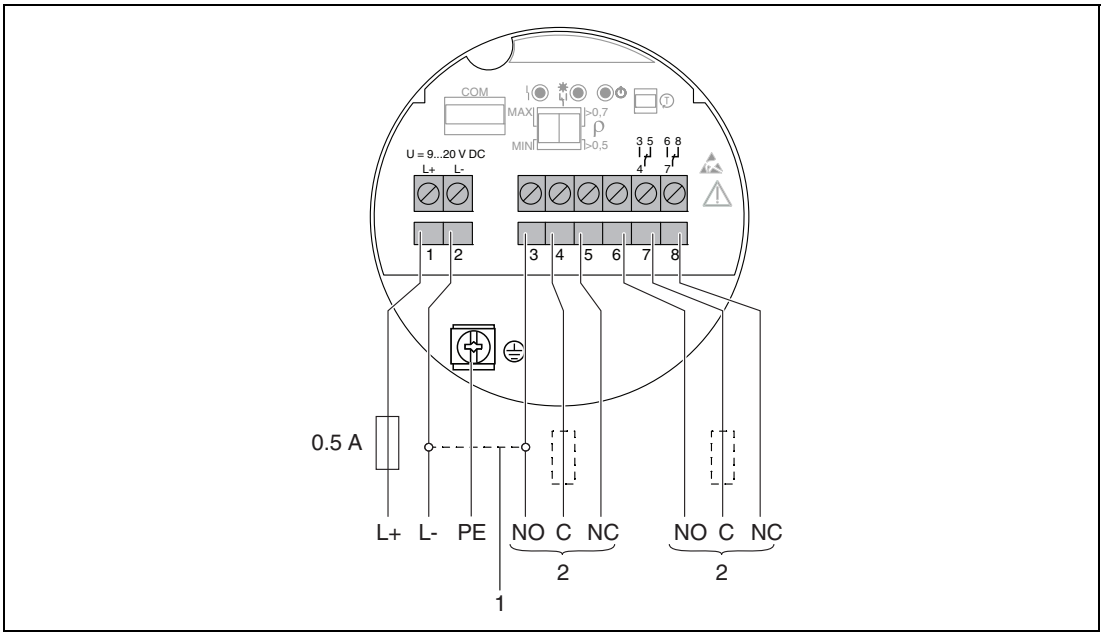

Figure 5.9 DC connection with relay output, electronic insert FEL64DC

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

Behavior of Switch Output and Signaling

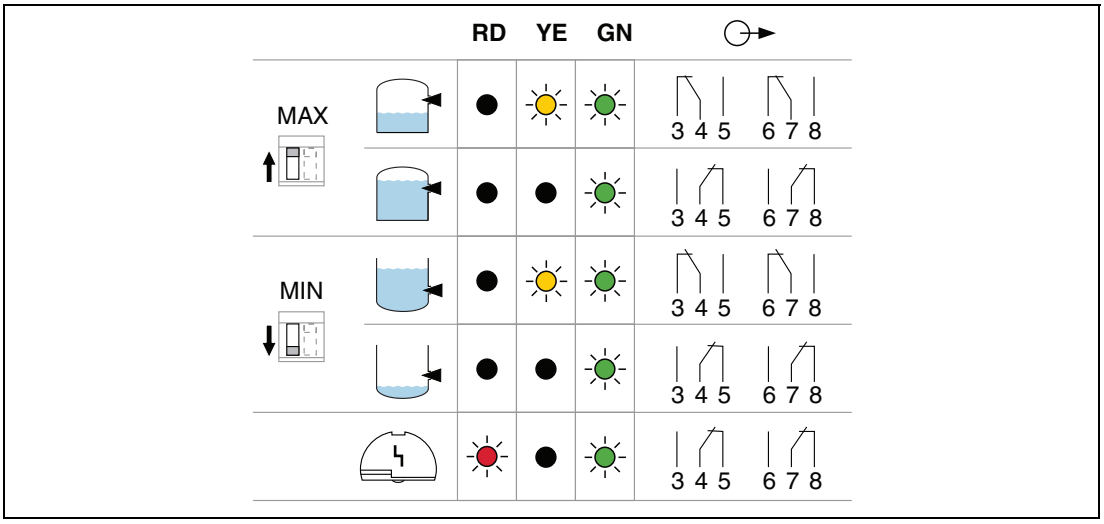

Figure 5.10 Behavior of switch output and signaling, electronic insert FEL64DC

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

5.2.5 2-Wire NAMUR > 2.2 mA/< 1.0 mA (Electronic Insert FEL68)

- 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 according to NAMUR (IEC 60947-5-6) on 2-wire cabling
- Functional testing without level change. A functional test can be performed on the device using the test key on the electronic insert or using the test magnet (can be ordered as an option) with the housing closed.
  The functional test can also be triggered by interrupting the supply voltage or activated directly from the switch amplifier.

Supply Voltage

U = 8.2 V DC ± 20 %

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

< 6 mW with I < 1 mA; < 38 mW with I = 3.5 mA

Connection Data Interface

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^2 (14 AWG). Use ferrules for the wires.

Overvoltage protection

Overvoltage category II

Terminal Assignment

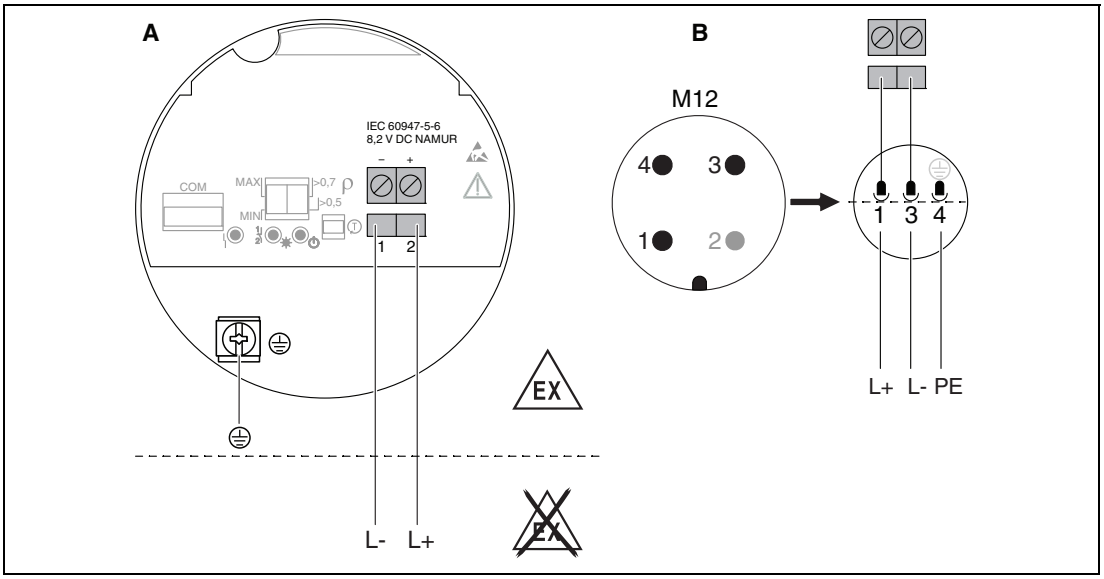

Figure 5.11 2-wire NAMUR > 2.2 mA/< 1.0 mA, electronic insert FEL68

1 Connection wiring with terminals
2 Connection wiring with M12 plug in housing according to EN 61131-2

Behavior of Switch Output and Signaling

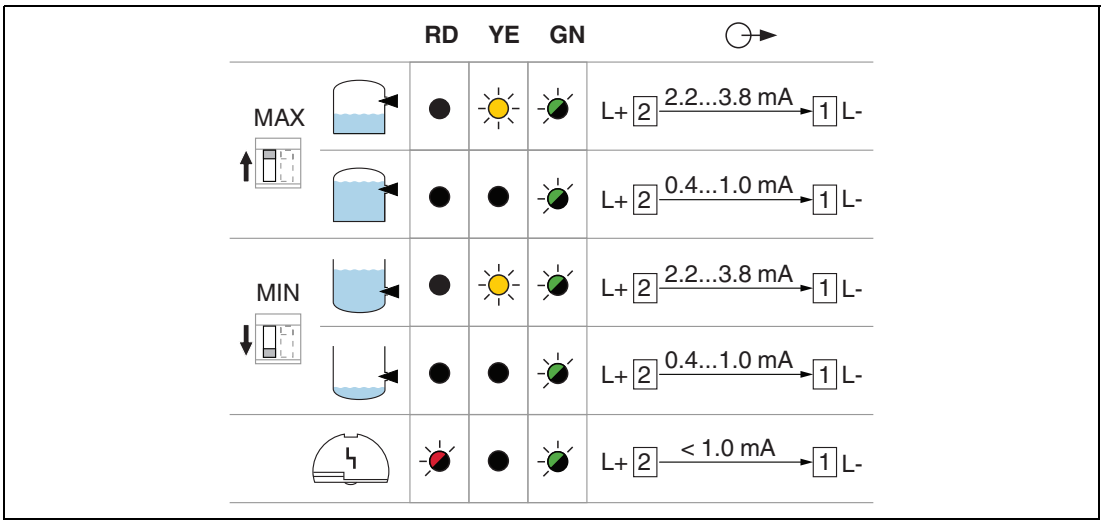

Figure 5.12 Behavior of switch output and signaling, electronic insert FEL68

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

Note

The *Bluetooth*® module for use in conjunction with the electronic insert FEL68 (2-wire NAMUR) must be ordered separately with the necessary battery.

5.2.6 LED Module VU120 (optional)

A brightly lit LED indicates the operational status (switch status or alarm status).
The LED module can be connected to the following electronic inserts:
FEL62, FEL64, FEL64DC.

► For more information see manual.

5.2.7 *Bluetooth*® Module VU121 (optional)

The *Bluetooth*® module can be connected via the COM interface to the following electronic inserts: FEL61, FEL62, FEL64, FEL64 DC und FEL68 (2-wire NAMUR).

The *Bluetooth*® module must be ordered separately, including the required battery, for use in conjunction with electronic insert FEL68 (2-wire NAMUR).

► For more information see manual.

5.2.8 Connecting the Cables

Required tools

- Flat-blade screwdriver (0.6 mm x 3.5 mm) for terminals
- Suitable tool with width across flats AF24/25 (8 Nm (5.9 lbf foot)) for M20 cable gland

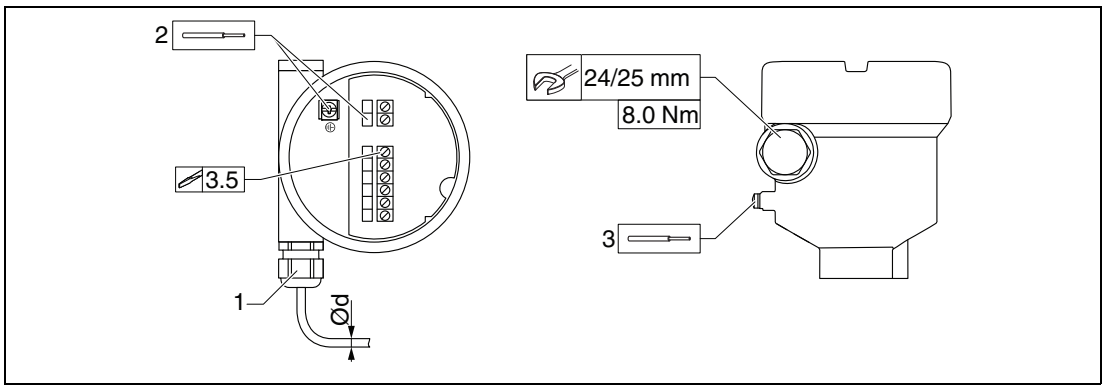

Figure 5.13 Example of coupling with cable entry, electronic insert with terminals

1 M20 coupling (with cable entry), example

2 Maximum conductor cross-section 2.5 mm^2 (AWG 14), ground terminal inside the housing and terminals on the electronics

3 Maximum conductor cross-section 4.0 mm2 (AWG 12), ground terminal outside the housing (example of plastic housing with external protective ground connection (PE))

Ød Nickel-plated brass 7 to 10.5 mm (0.28 to 0.41 inch)

Ød Plastic 5 to 10 mm (0.2 to 0.38 inch)

Ød Stainless steel 7 to 12 mm (0.28 to 0.47 inch)

Note

Pay attention to the following when using the M20 coupling

Following cable entry:

- Counter-tighten the coupling.
- Tighten the union nut of the coupling with a torque of 8 Nm (5.9 lbf foot).
- Screw the enclosed coupling into the housing with a torque of 3.75 Nm (2.76 lbf foot).

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5.3 Post-Connection Check

- ☐ Is the device or cable undamaged (visual inspection)?
- ☐ Do the cables used comply with the requirements?
- ☐ Do the mounted cables have adequate strain relief?
- ☐ Are the cable glands mounted and firmly tightened?
- ☐ Does the supply voltage match the information on the nameplate?
- ☐ No reverse polarity, is terminal assignment correct?
- ☐ If supply voltage is present, is the green LED lit?
- ☐ Are all the housing covers installed and tightened?
- ☐ Optional: Is the cover tightened with securing screw?

6 Operation Options

6.1 Overview of Operation Options

6.1.1 Operating Concept

- Operation with button and DIP switches on the electronic insert
- Display with optional *Bluetooth*® module and P+F Level app via *Bluetooth*® wireless technology
- Indication of operational status (switch status or alarm status) with optional LED module (lights visible from the outside)

  For plastic housing and aluminum housing (standard and Ex d) in conjunction with the DC-PNP (electronic insert FEL62) and relay electronics (electronic inserts FEL64, FEL64DC)

6.1.2 Elements on the Electronic Insert

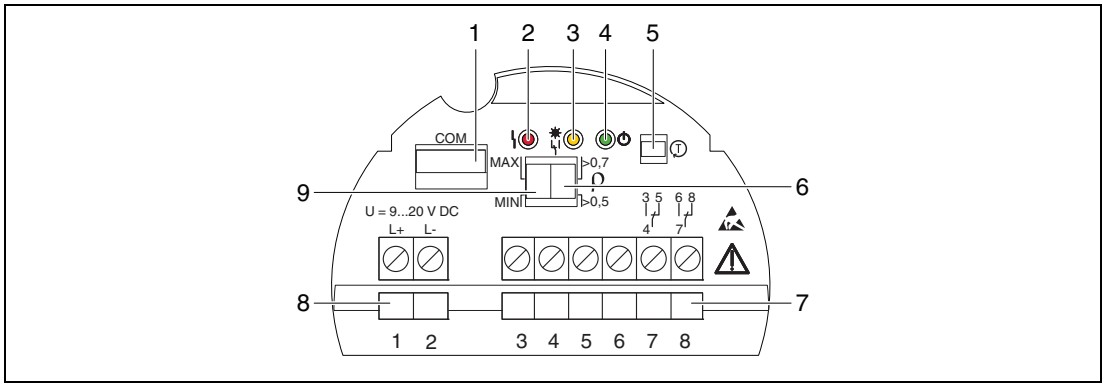

Figure 6.1 Example of electronic insert FEL64DC

1 COM interface for additional modules (LED module, *Bluetooth*® module)
2 LED, red, for warning or alarm
3 LED, yellow, switch status
4 LED, green, operational status (device is on)
5 Test button, activates functional test
6 DIP switch for setting density 0.7 or 0.5
7 Terminals (3 to 8), relay contact
8 Terminals (1 to 2), power supply
9 DIP switch for configuring MAX/MIN safety mode

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6.1.3 *Bluetooth*® Wireless Technology

Access via *Bluetooth*® wireless technology

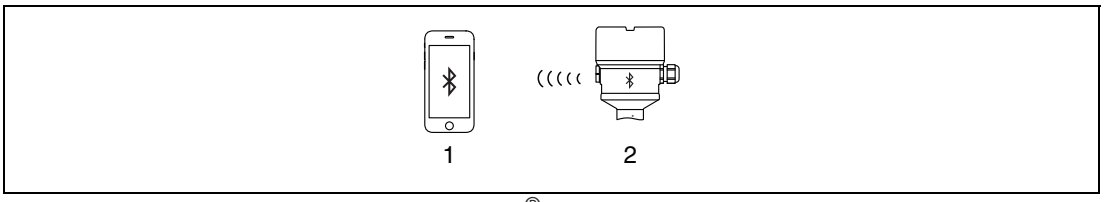

Figure 6.2 Remote operation via *Bluetooth*® wireless technology

1 Mobile phone or tablet with P+F Level app
2 Device with optional *Bluetooth*® module

► For more information see manual.

6.1.4 LED Module VU120 (optional)

► For more information see manual.

7 Commissioning

7.1 Function Check

Before commissioning the measuring point, check whether the post-installation and post-connection checks have been performed:

- ► Post-installation check see chapter 4.4
- ► Post-connection check see chapter 5.3

7.2 Functional Test Using the Button on the Electronic Insert

- The functional test must be performed in the OK state: MAX safety and sensor free or MIN safety and sensor covered.
- The LEDs flash one after another as a chaser light during the functional test.
- Pay attention to the information in the Safety Manual for proof testing safety equipment in accordance with SIL or WHG (German Water Resources Act).

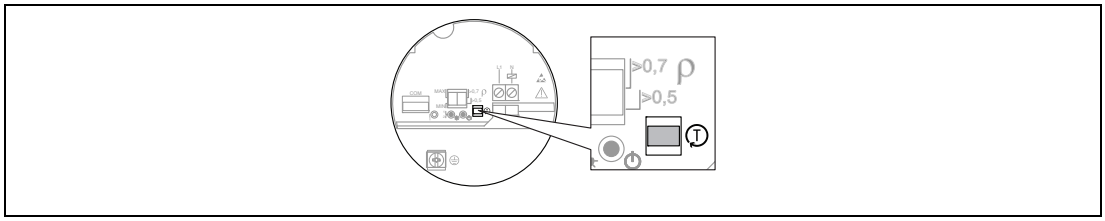

Figure 7.1 Position of button for the functional test for electronic inserts FEL61/62/64/64DC/68

Testing Function

1. Make sure no undesired switching processes are triggered!
2. Press the button **T** on the electronic insert for at least 1 s (e. g. with a screwdriver).

↳ The device functional test is performed. The output changes from the OK state to demand mode.
Functional test duration: at least 10 s or until the button is released if the button is pressed for > 10 s.

The device returns to normal operation if the internal test is successful.

Note

If the housing cannot be opened during operation due to explosion protection requirements, e. g. Ex d /XP, the functional test can also be started from the outside using the test magnet (can be ordered as an option), (FEL62, FEL64, FEL64DC, FEL68).

- ► For more information see chapter 7.3.

Switching Behavior and Signaling

- ► For more information see manual.

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7.3 Functional Test of the Electronic Switch with a Test Magnet

Perform functional test of the electronic switch without opening the device:

Testing Function

Hold the test magnet against the marking on the nameplate on the outside.

↳ Simulation is possible in the case of the FEL62, FEL64, FEL64DC, FEL68 electronic inserts.

The functional test with the test magnet acts in the same way as the functional test using the test key on the electronic insert.

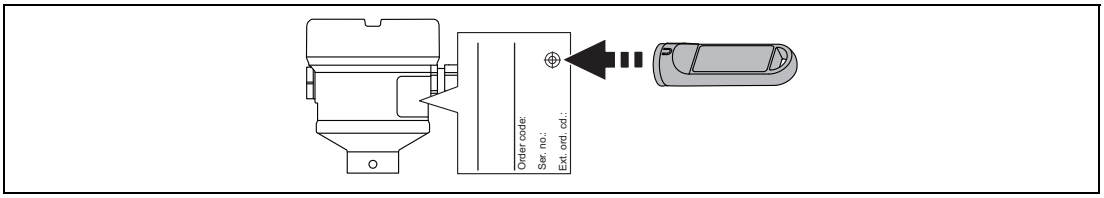

Figure 7.2 Functional test with test magnet

7.4 Switching on the Device

During the power-up time, the device output is in the safety-oriented state, or in the alarm state if available:

- For electronic insert FEL61, the output will be in the correct state after a maximum of 4 s following power-up.
- For electronic inserts FEL62, FEL64, FEL64DC, the output will be in the correct state after a maximum of 3 s following power-up.
- For electronic insert FEL68 NAMUR, a functional test is always performed upon power-up. The output is in the correct state after a maximum of 10 s.

7.5 Establishing a Connection via P+F Level App

► For more information see manual.

7.6 Further Information

Note

For further information is available on the product detail page of the devices on the Internet at 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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