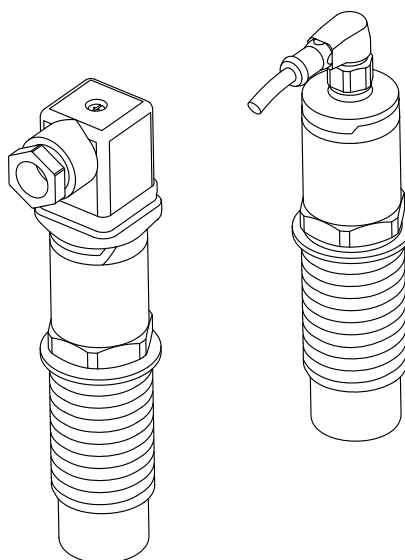


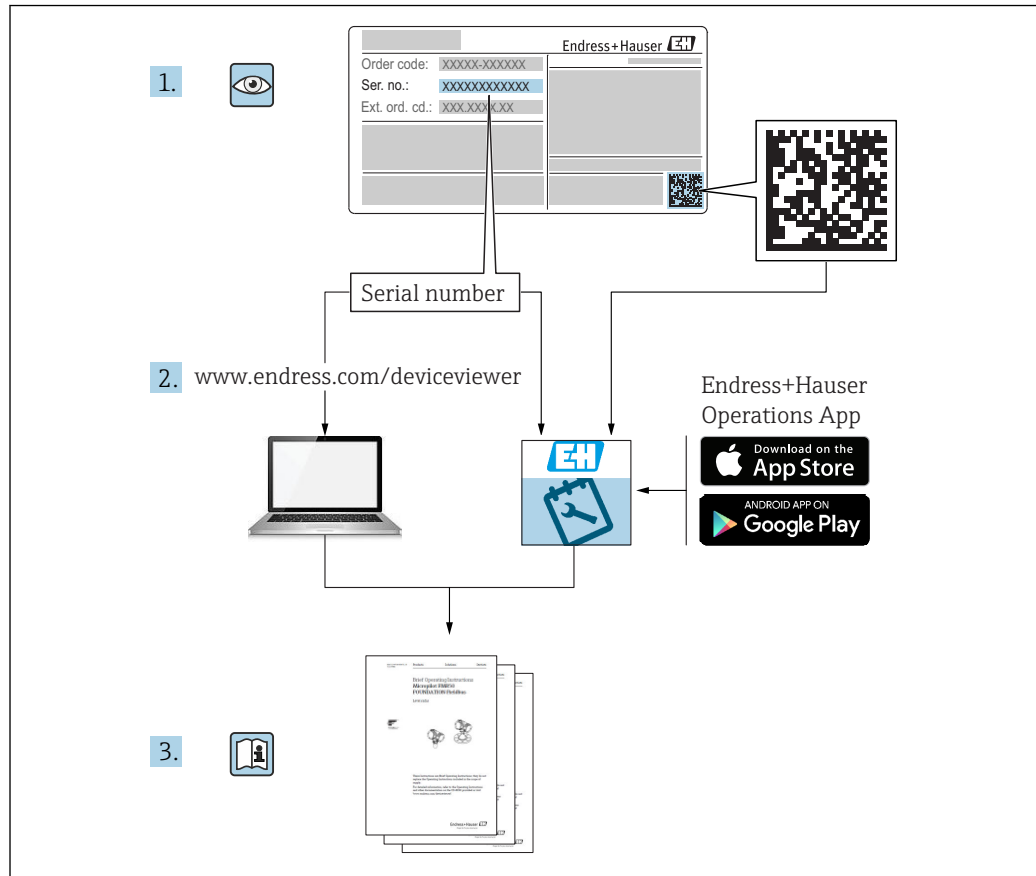
Operating Instructions

Nivector FTI26

Capacitance

Point level switch for powdered and fine-grained solids





A0023555

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1 About this document

1.1 Document function

These Operating Instructions contain 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.

1.2 Symbols

1.2.1 Safety symbols

DANGER

This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.

WARNING

This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.

CAUTION

This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.

NOTICE

This symbol contains information on procedures and other facts which do not result in personal injury.

1.3 Electrical symbols

Symbol	Meaning
	Ground connection A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.
	Protective ground connection A terminal which must be connected to ground prior to establishing any other connections.

1.4 Symbols for certain types of information

Symbol	Meaning
	Preferred Procedures, processes or actions that are preferred.
	Allowed Procedures, processes or actions that are permitted.
	Forbidden Procedures, processes or actions that are forbidden.
	Tip Indicates additional information.
	Reference to page
	Series of steps

Symbol	Meaning
	Result of a step
	Visual inspection

1.5 Symbols for graphics

Symbol	Meaning
1, 2, 3 ...	Item numbers
A, B, C, ...	Views

1.6 Documentation

 For an overview of the scope of the associated Technical Documentation, refer to the following:

- *W@M Device Viewer* (www.endress.com/deviceviewer): Enter the serial number from nameplate
- *Endress+Hauser Operations App*: Enter the serial number from the nameplate or scan the 2D matrix code (QR code) on the nameplate

1.7 Standard documentation

- TI01384F → Nivector FTI26, IO-Link
- BA01830F → Nivector FTI26 without IO-Link
- BA01832F → Nivector FTI26, IO-Link
- KA01408F → Nivector FTI26

1.8 Supplementary documentation

- TI00426F/00 → Weld-in adapter, process adapter and flanges (overview)
- SD01622P/00 → Weld-in adapter (installation instructions)
- SD00356F/00 → Valve plug (installation instructions)
- SD02242F/00 → Protector (installation instructions)

1.9 Certificates

Depending on the option selected in the "Approval" order code, Safety Instructions are supplied with the device, e. g. XA. This documentation is an integral part of the Operating Instructions. The nameplate indicates the Safety Instructions (XA) that are relevant to the device.

Safety instructions

- XA01734F/00 → ATEX; IECEx
- XA01821F/00 → CSA Ex
- XA01943F/00 → EAC Ex

2 Basic safety instructions

2.1 Requirements for the personnel

The personnel for installation, commissioning, diagnostics and maintenance must fulfill the following requirements:

- ▶ Trained, qualified specialists must have a relevant qualification for this specific function and task.
- ▶ Are authorized by the plant owner/operator.
- ▶ Are familiar with federal/national regulations.
- ▶ Before starting work, read and understand the instructions in the manual and supplementary documentation as well as the certificates (depending on the application).
- ▶ Follow instructions and comply with basic conditions.

The operating personnel must fulfill the following requirements:

- ▶ Are instructed and authorized according to the requirements of the task by the facility's owner-operator.
- ▶ Follow the instructions in this manual.

2.2 Designated use

The measuring device described in these instructions may be used only as a point level switch for powdery and fine-grained bulk solids. Incorrect use may pose a hazard. To ensure that the measuring device remains in perfect condition during the operating time:

- Measuring devices must be used only for media to which the process-wetted materials have an adequate level of resistance.
- The relevant limit values must not be violated, see TI01384F/00/EN.

2.2.1 Incorrect use

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

CAUTION

Hot surfaces

Danger of burns from contact with surfaces!

- ▶ In the event of elevated fluid temperatures, ensure protection against contact to prevent burns.

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

CAUTION

Risk of injury!

- ▶ The operator is responsible for the trouble-free operation of the device.
- ▶ Operate the device only if it is in proper technical condition, free from errors and faults.
- ▶ The device must be operated with a 500 mA fine-wire fuse (slow-blow) which is suitable for DC current in accordance with IEC 60127-2.

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 Endress+Hauser.

Repair

To ensure continued operational safety and reliability:

- ▶ Carry out repairs on the device only if they are expressly permitted.
- ▶ Observe federal/national regulations pertaining to the repair of an electrical device.
- ▶ Use original spare parts and accessories from Endress+Hauser only.

2.5 Product safety

This measuring 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.

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

2.6 IT security

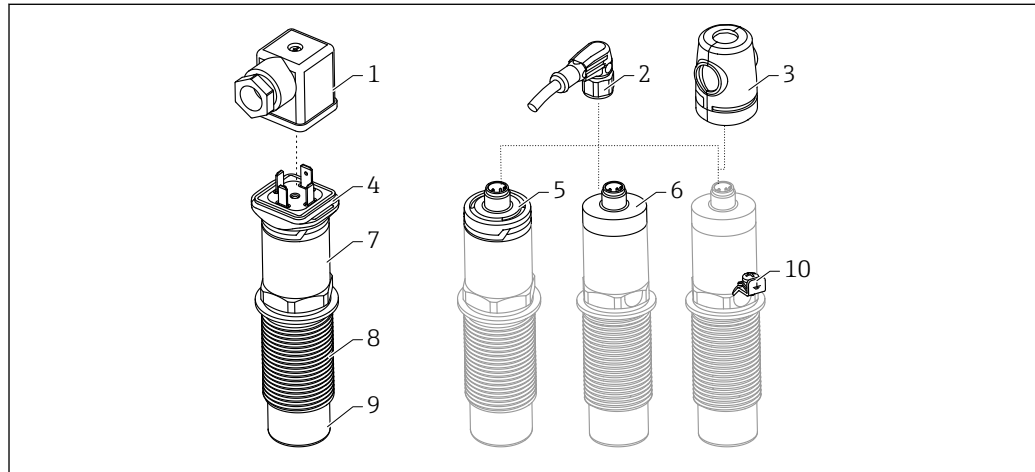
Our warranty is valid only if the device is installed and used as described in the Operating Instructions. The device is equipped with security mechanisms to protect it against any inadvertent changes to the settings.

IT security measures, which provide additional protection for the device and associated data transfer, must be implemented by the operators themselves in line with their security standards.

3 Product description

Capacitance point level switch for powdery and fine-grained bulk solids; use preferably in bulk solids vessels, e.g. silos

3.1 Product structure



A0035860

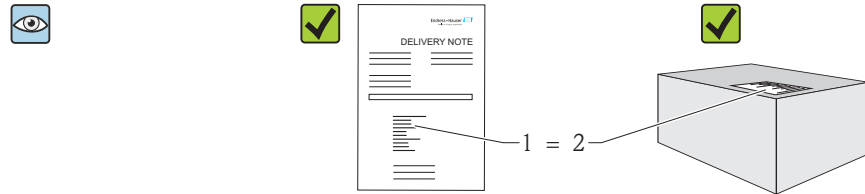
1 Product structure of Nivector FTI26, connection and housing covers optional

- 1 Valve plug
- 2 M12 plug
- 3 Ex protection cover → 24
- 4 Plastic housing cover with LED for valve plug, IP65
- 5 Plastic housing cover with LED, IP65/67
- 6 Metal housing cover, IP66/68/69
- 7 Housing
- 8 Process connection G 1"
- 9 Sensor
- 10 Ground terminal (hazardous area)

Additional and optional accessories available to order, from → 22.

4 Incoming acceptance and product identification

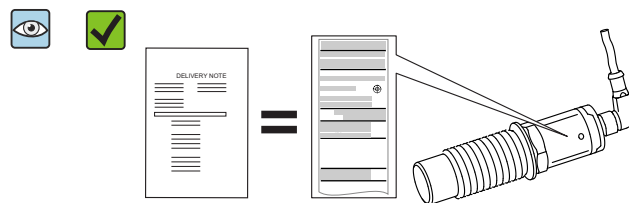
4.1 Incoming acceptance



A0016051

Is the order code on the delivery note (1) identical to the order code on the product sticker (2)?

Are the goods undamaged?



A0035872

Do the data on the nameplates correspond to the order specifications on the delivery note?



If one of these conditions is not satisfied, contact your Sales Center.

4.2 Product identification

The measuring device can be identified in the following ways:

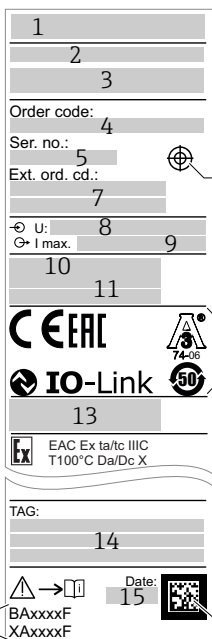
- Nameplate data
- Order code with breakdown of the device features on the delivery note
- Enter serial number from nameplates in *W@M Device Viewer* (www.endress.com/deviceviewer): All information on the measuring device is displayed

The serial number on the nameplate can also be used to obtain an overview of the technical documentation supplied with the device in *W@M Device Viewer* (www.endress.com/deviceviewer)

4.2.1 Manufacturer address

Endress+Hauser SE+Co. KG
Hauptstraße 1
79689 Maulburg, Germany
Address of the manufacturing plant: See nameplate.

4.2.2 Nameplate



1: Company logo
2: Device name
3: Manufacturer address
4: Order code
5: Serial number
6: Marking for test magnet
7: Extended order code
8: Supply voltage
9: Signal output
10: Process and ambient temperature
11: Process pressure
12: Certificate symbols, communication (optional)
13: Degree of protection: e.g. IP, NEMA
14: Measuring point identification (optional)
15: Date of manufacture (year, month)
16: Data matrix code with E+H serial number
17: Document number of Operating Instructions (BA), Safety Regulations (XA)

A0036631

 The test magnet is included in the scope of delivery. It can be canceled optionally.
→  25

4.3 Storage and transport

4.3.1 Storage conditions

- Permitted storage temperature: -25 to +85 °C (-13 to +185 °F)
- Use original packaging.

4.3.2 Transport

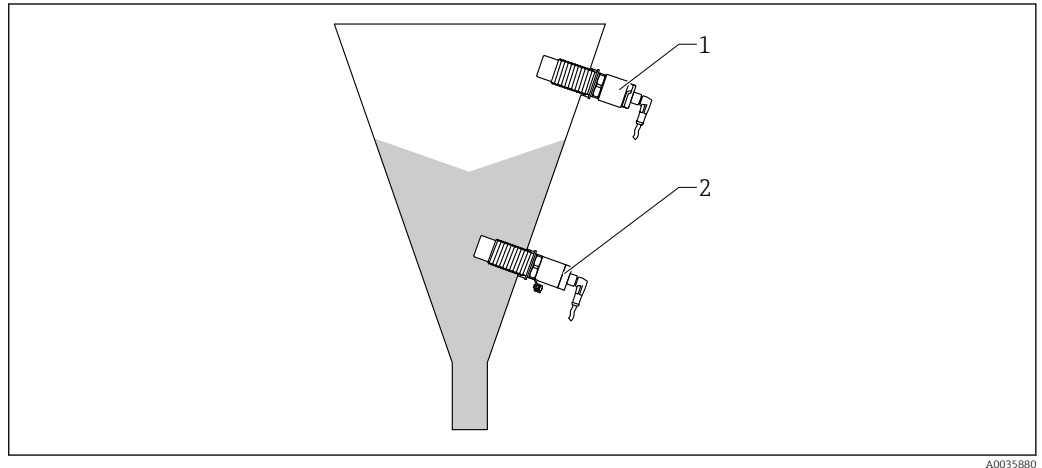
Transport the device to the measuring point in the original packaging.

5 Installation

5.1 Installation conditions

Lateral mounting in bulk solids vessel, e.g. silo

A miniature contactor, a solenoid valve or a programmable logic controller (PLC) can be connected directly to the point level switch.



A0035880

2 Application examples

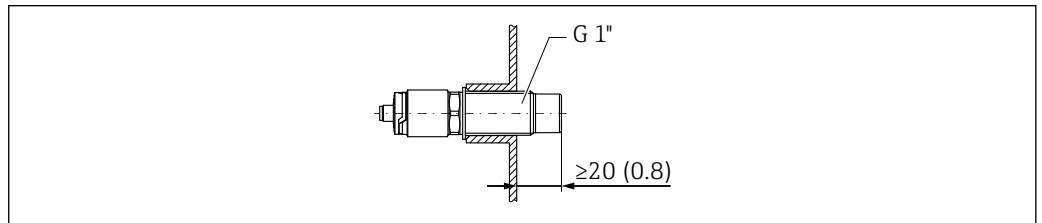
- 1 Overfill prevention or upper level detection (MAX)
- 2 Dry-running protection or lower level detection (MIN)

5.2 Mounting the measuring device

5.2.1 Required tools

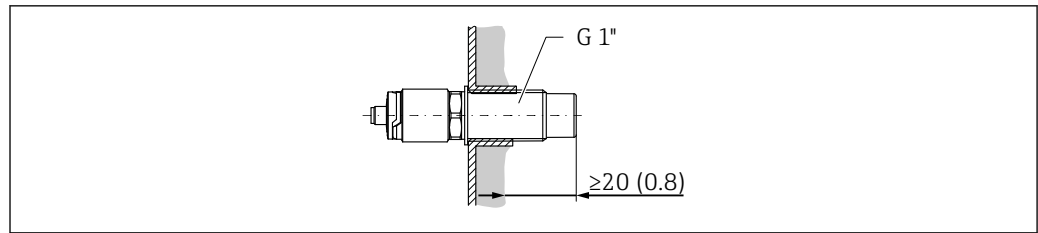
- Open-ended wrench AF32
 - When screwing in, turn by the hex bolt only.
 - Torque: 5 to 12 Nm (3.7 to 8.9 lbf ft)
- Sensor surface ≥ 20 mm (0.79 in) projecting into silo (when installing with weld-in adapter 20 mm (0.79 in))
- Silo wall thickness < 35 mm (1.38 in) or welding socket G 1" < 50 mm (1.97 in)

5.2.2 Installation examples



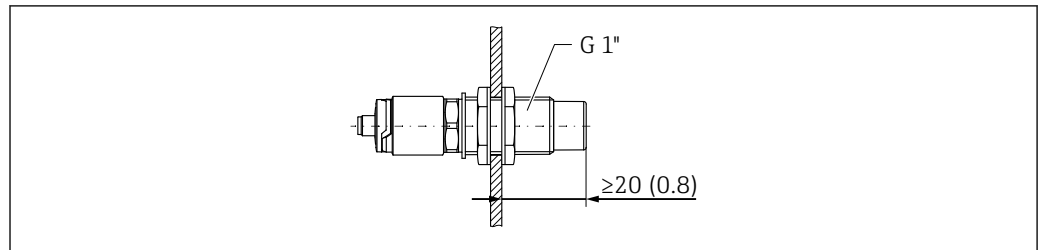
A0035881

3 Standard installation with external G 1" threaded adapter



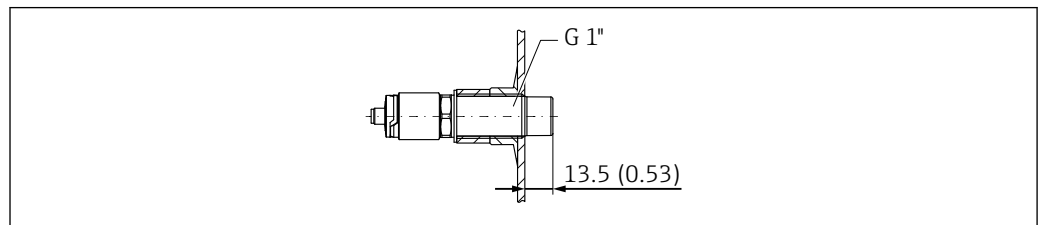
A0036360

4 Where buildup occurs on the silo wall with internal G 1" threaded adapter



A0036359

5 Bore hole in silo wall with lock nuts, can be ordered as an accessory → 22



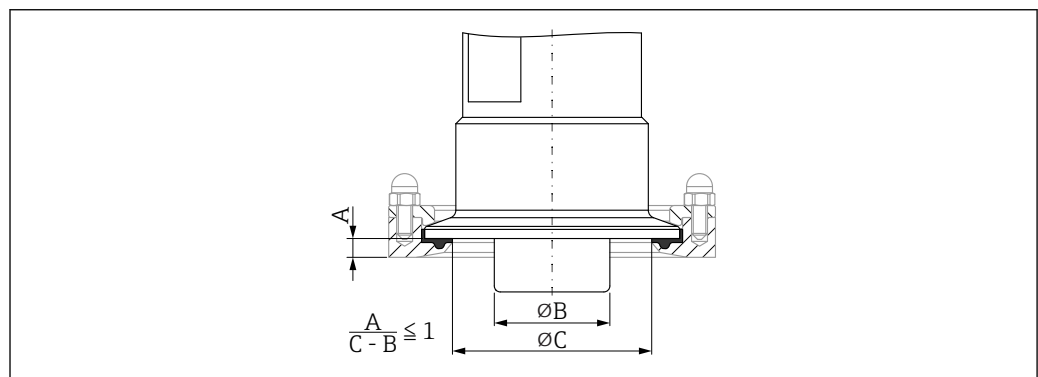
A0036362

6 Installation with weld-in adapter, can be ordered as an accessory → 22

NOTICE

Installation in a conventional T-section or in a metallic tank nozzle reduces the measuring performance of the sensor.

- Install Tri-Clamp version, e. g. NA Connect adapter for hygiene-compliant connection. This minimizes dead legs and increases cleanability.



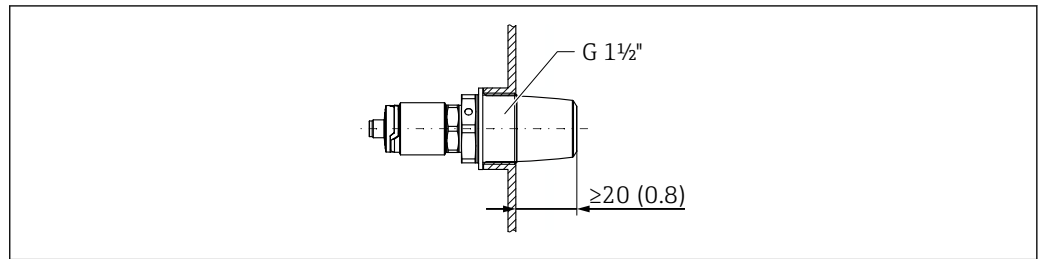
A0036363

7 Installation with Tri-Clamp, which can be ordered as an accessory, → 22 and with NA Connect adapter provided by customer

- A Distance between Tri-Clamp and NA Connect adapter
- B Diameter of Nivector
- C Diameter of NA Connect adapter

Installation with protector

- Protection of point level switch against damage by particularly abrasive or coarse product
- Outflow protection in silo for functional testing when silo is full



A0036361

8 Installation with protector, can be ordered as an accessory → 22

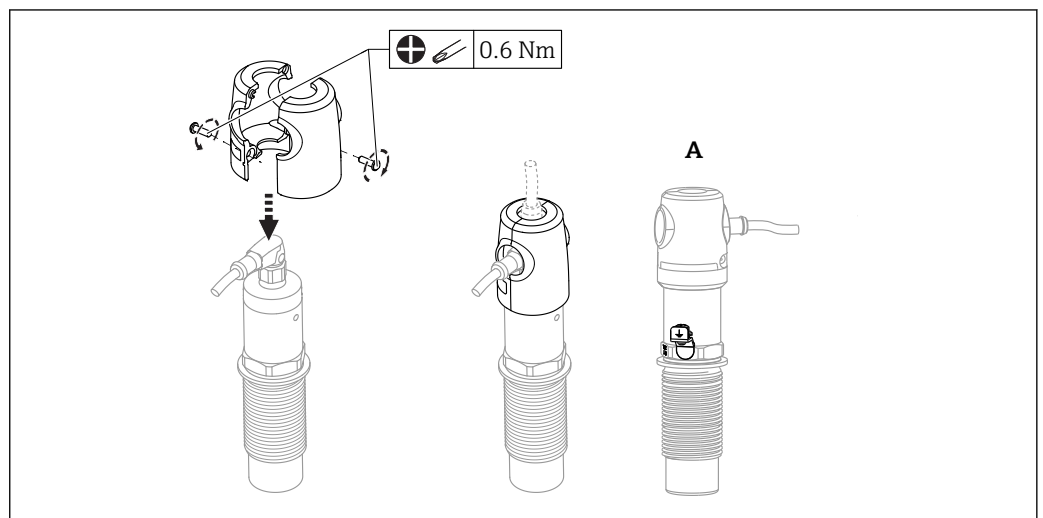
i Take account of metallic or non-metallic vessels in accordance with EMC guidelines, see Technical Information TI01384F.

5.2.3 Protection cover for hazardous areas

WARNING

Damage to the device from impact.

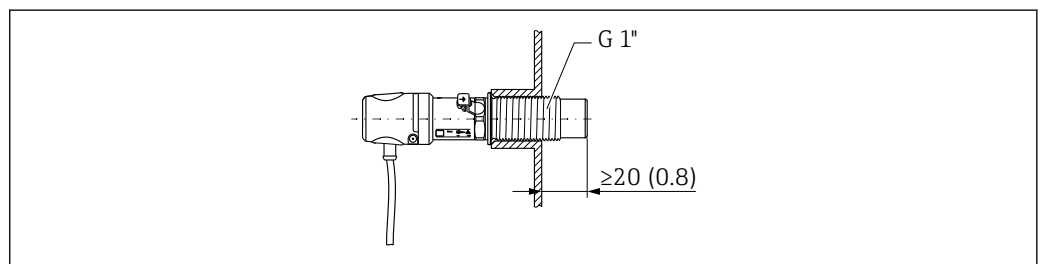
- The protection cover must be fitted before the device is put into operation.



A0035999

A View with ground terminal

Can also be ordered as an accessory → 22



A0036433

9 Installation with protection cover, included in scope of delivery for hazardous areas or can be ordered as an accessory → 22

5.3 Post-installation check

☐	Is the device undamaged (visual inspection)?
☐	Is the device adequately protected from wet conditions and direct sunlight?
☐	Is the device properly secured?
☐	Use in hazardous areas: Is the protection cover installed?

6 Electrical connection

6.1 Connection conditions

The measuring device has two modes of operation:

- Maximum point level detection (MAX): e.g. for overfill prevention
The device keeps the electrical switch closed as long as the sensor is not yet covered by medium.
- Minimum point level detection (MIN): e.g. Dry running protection
The device keeps the electrical switch closed as long as the sensor is covered by medium.

Choosing the MAX or MIN mode of operation ensures that the device switches in a safety-oriented manner even in an alarm condition, e.g. if the power supply line is disconnected. The electronic switch opens if the point level is reached, if a fault occurs or if the power fails (quiescent current principle).

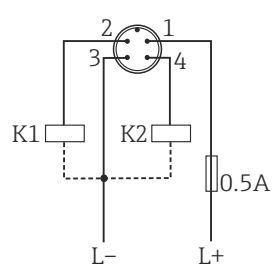
6.2 Connecting the measuring device

- Supply voltage 12 to 30 V DC
- In accordance with IEC/EN61010 a suitable circuit breaker must be provided for the measuring device.
- Voltage source: Non-hazardous contact voltage or Class 2 circuit (North America).
- The device must be operated with a 500 mA fine-wire fuse (slow-blow) which is suitable for DC current in accordance with IEC 60127-2.
- Depending on the analysis of the switch outputs, the measuring device works in the MAX or MIN modes.

6.2.1 Function monitoring

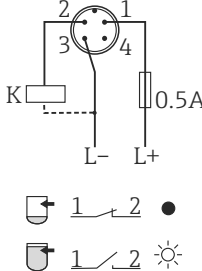
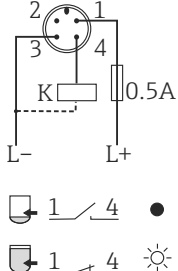
With two-channel evaluation, functional monitoring of the sensor is also possible in addition to level monitoring.

When both outputs are connected, the MIN and MAX outputs assume opposite states (XOR) when the device is operating fault-free. In the event of an alarm condition or a cable break, both outputs are de-energized.

Connection for function monitoring using XOR operation			Yellow LED (ye)	Red LED (rd)
	Sensor covered	 1 — 2  1 — 4		
	Sensor free	 1 — 2  1 — 4		

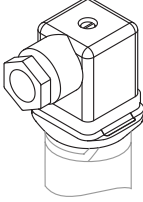
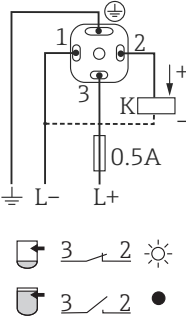
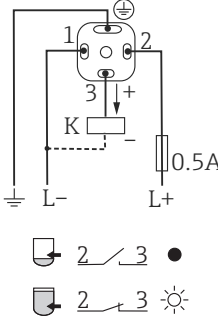
Connection for function monitoring using XOR operation			Yellow LED (ye)	Red LED (rd)
	Fault	 $\frac{1}{1} \frac{2}{4}$		
Symbols	Description			
	LED lit			
	LED not lit			
	Fault or warning			
K1/K2	External load			

6.2.2 M12 plug

Electrical connection	Operating mode	
M12 plug	MAX	MIN
		
Symbols	Description	
	Yellow LED (ye) lit	
	Yellow LED (ye) not lit	
K	External load	

6.2.3 Valve plug

Depending on the assignment of the connector or the wiring of the cable, the device works in either the MAX or MIN operating mode.

Electrical connection	Operating mode	
Valve plug	MAX	MIN
 A0022900		
Symbols	Description	
	Yellow LED (ye) not lit	
	Yellow LED (ye) lit	
K	External load	

6.2.4 Post-connection check

☐	Is the device or cable undamaged (visual check)?
☐	Do the cables 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 specifications on the nameplate?
☐	If supply voltage is present, is the green LED lit?

7 Commissioning

7.1 Function check

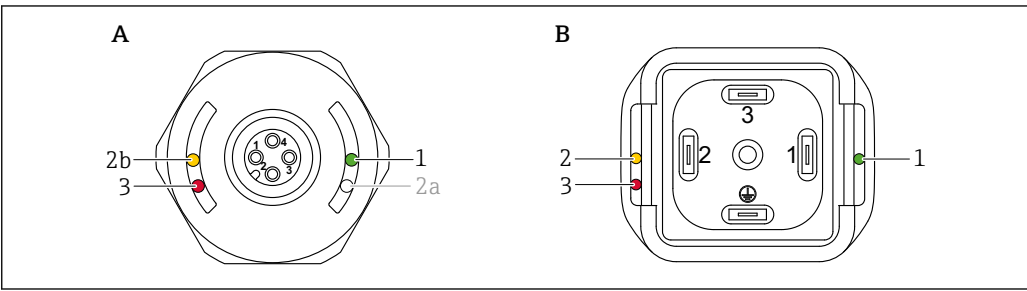
Before commissioning your measuring point, ensure that the post-installation and post-connection checks have been performed:

- "Post-installation check" checklist → 14
- "Post-connection check" checklist → 16

7.2 Commissioning with an operating menu

- The device is preconfigured at the factory in such a way that it can be used for the majority of applications without the need for an adjustment. The electrical switch point of the device is factory-set to product with a particle size $\varnothing < 10\text{ mm}$ and a relative dielectric constant $\epsilon_r \geq 1.6$. Depending on the option ordered, the device is configured for the type of installation with a protector or without a protector with lock nuts (installation is intended in a metal tank in each case). A customer-specific adjustment (empty and full adjustment) is recommended for other types of installation (e.g. installation in plastic tanks, weld-in adapters).
- For switch-sensitive applications, the measurement performance can be improved by a customer-specific adjustment. An adjustment is recommended for:
 - sensitive media ($< 1.6\text{ DC}$)
 - different type of installation
- In processes with large variations in temperature, the temperature dependence of the medium must be taken into account. A new empty and full calibration can compensate for these variations.

7.3 Light signals (LEDs)



10 Position of LEDs on housing cover

- A Housing cover with M12 plug, plastic
- B Housing cover with valve plug

Position	LEDs	Description of function
1	Green LED (gn)	Lit: Measuring device is operational
2	Yellow LED (ye)	M12 plug: LED 2a Active only in conjunction with IO-Link communication.

Position	LEDs	Description of function
		LED 2b display of sensor status Sensor is covered by medium. Valve plug: Indicates switch status MAX mode (overflow protection): Sensor is not covered by medium MIN mode (dry-running protection): Sensor is covered by medium
3	Red LED (rd)	Warning/Maintenance required flashing: Error remediable, e. g. invalid calibration Fault/device failure lit: Error not remediable, e. g. Electronics error

i There is no external signaling via LEDs on the metal housing cover (IP69). A connecting cable with an M12 plug and LED display can be ordered as an accessory if necessary. This cable has no red LED. See "Accessories".

7.4 Function of LEDs

i Any configuration of the switch outputs is possible.

Operating mode		MAX		MIN		Warning	Fault
		free	covered	free	covered		
1							
2							
3							

LED indicator	LED colors	Symbols/description
1 M12 plug on plastic housing cover	gn green	● not lit
2 M12 plug including LEDs	ye yellow	⦿ lit
3 Valve plug	rd red	⦿ flashing
		⚡ fault/warning
		— no signaling

7.5 Operation with test magnet

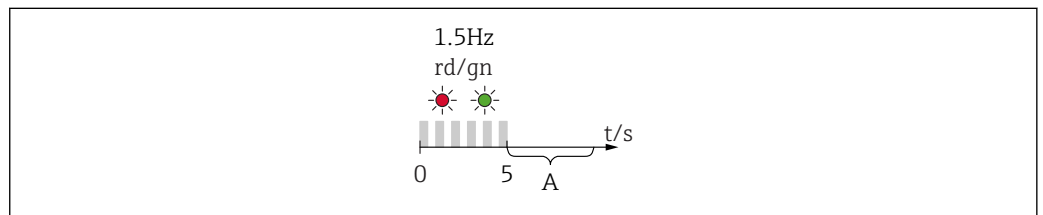
7.5.1 Full adjustment

Prerequisite: Sensor is covered by the medium

1. Hold the test magnet against the marking on the housing.
2. Apply operating voltage to the device.

3. The green and red LEDs flash at a frequency of 1.5Hz.
4. The LEDs stop flashing after 5s.
5. Remove test magnet.
 - ↳ The full adjustment is performed and the switching thresholds are set accordingly.

i The test magnet must be removed in the timeframe between 5 seconds and 10 seconds. A full adjustment is not performed if the magnet is removed outside this timeframe.



A0036912

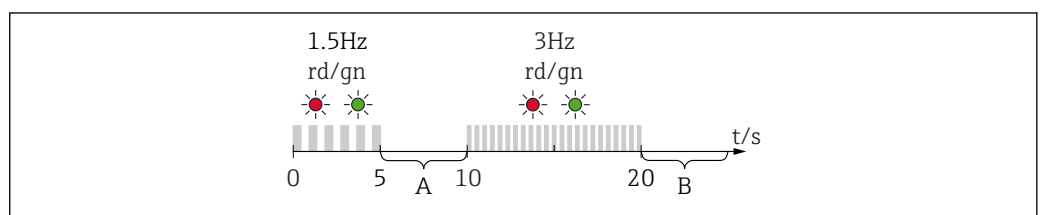
A Remove the magnet now for full adjustment.

7.5.2 Empty adjustment

Prerequisite: Sensor is free

1. Hold the test magnet against the marking on the housing
2. Apply operating voltage to the device
3. The green and red LEDs flash at a frequency of 1.5Hz
4. The LEDs stop flashing after 5s
5. At 10s, the green and red LEDs start flashing at a frequency of 3Hz
6. The LEDs stop flashing after 20s
7. Remove test magnet.
 - ↳ The empty adjustment is performed and the switching thresholds are set accordingly.

i The test magnet must be removed in the timeframe between 20 seconds and 25 seconds. An empty adjustment is not performed if the magnet is removed outside this timeframe.



A0036913

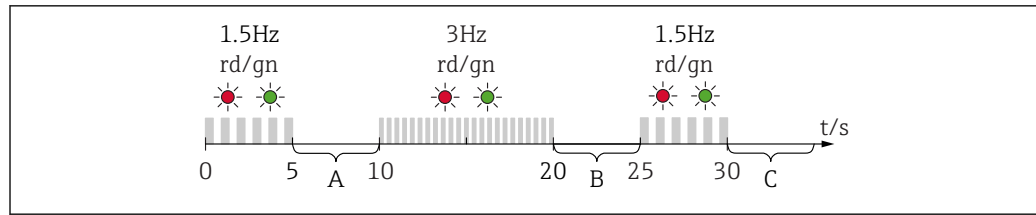
A Remove the magnet now for full adjustment.

B Remove the magnet now for empty adjustment.

7.5.3 Resetting to factory settings

If the test magnet is held against the marking for ≥ 30 seconds, the switching thresholds are reset to the factory setting. Pay attention to the time or flashing frequencies!

i If a medium-specific switching threshold is active, this is signaled by a flashing green LED indicator during the first 5 seconds of the operating voltage being applied.



A0036914

- A Remove the magnet now for full adjustment.
 B Remove the magnet now for empty adjustment.
 C Remove the magnet now to reset to factory settings.

7.5.4 Function test

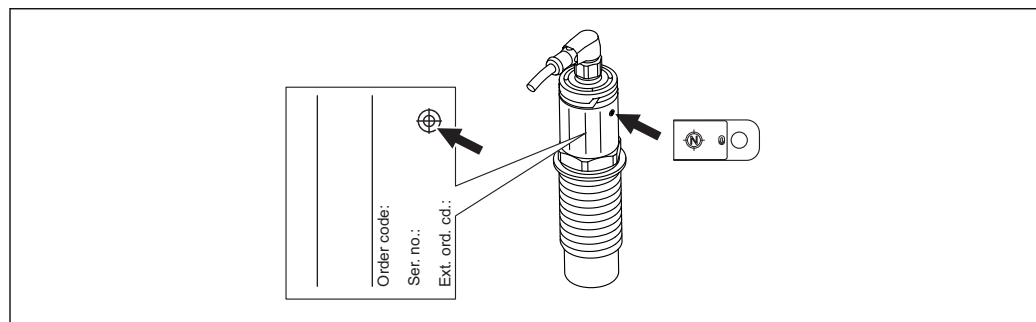
Carry out a function test while the device is in operation.

- Hold the test magnet against the marking on the housing for at least 2 seconds.
 - ↳ This inverts the current switch status, and the yellow LED changes state. When the magnet is removed, the switch status valid at that time is adopted.

If the test magnet is held against the marking for ≥ 30 seconds, the red LED will flash: The device returns automatically to the current switch status.



The test magnet is included in the scope of delivery. It can be canceled optionally.



A0035882

11 Position for test magnet on housing nameplate

8 Diagnostics and troubleshooting

8.1 Diagnostic information via LED indicator

LED indicator on housing cover

Malfunction	Possible cause	Corrective action
Green LED not lit	No power supply	Check plug, cable and power supply.
Red LED flashing	Overload or short-circuit in load circuit	■ Clear the short-circuit. ■ Reduce maximum load current to below 200 mA.
	Ambient temperature outside of specification	Operate measuring device in specified temperature range.
	Calibration error	Reset calibration and perform calibration again.
	Test magnet held against marking for too long	Repeat function test.
	Device incorrectly connected	Remove plug and check connection.
	Simulation active	Deactivate simulation.
Red LED lit	Internal sensor error	Replace device.

LED indicator on M12 plug, can be ordered as an accessory

Malfunction	Possible cause	Corrective action
Green LED not lit	No power supply	Check plug, cable and power supply.
Yellow LED both lit / not lit	Internal sensor error Short-circuit in load circuit	■ Check cable. ■ Replace device.

9 Maintenance

No special maintenance work is required.

9.1 Cleaning

The sensor must be cleaned if necessary. Cleaning can also be performed while installed. Care must be taken to ensure that no damage occurs to the sensor in the process.

10 Repair

10.1 General information

Repair is not envisaged for this measuring device.

10.2 Spare parts

No spare parts are provided for this measuring device.

10.3 Return

The requirements for safe device return can vary depending on the device type and national legislation.

1. Refer to the website for more information:
<http://www.endress.com/support/return-material>
2. Return the device if repairs or a factory calibration are required, or if the wrong device was ordered or delivered.

10.4 Disposal



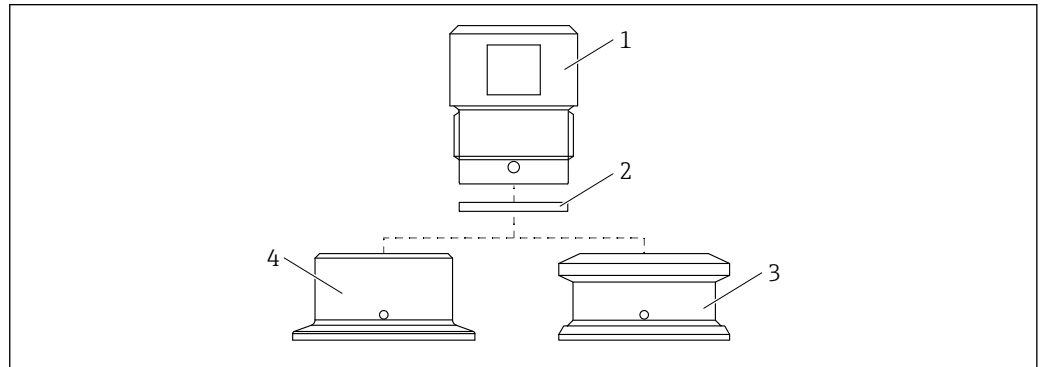
If required by the Directive 2012/19/EU on waste electrical and electronic equipment (WEEE), the product is marked with the depicted symbol in order to minimize the disposal of WEEE as unsorted municipal waste. Do not dispose of products bearing this marking as unsorted municipal waste. Instead, return them to Endress+Hauser for disposal under the applicable conditions.

11 Accessories

- Accessories can be ordered with the device (optional) or separately.
- The adapters are also available with inspection certificate 3.1 EN10204. For more information on process adapters and weld-in adapters, please refer to the supplementary documentation .

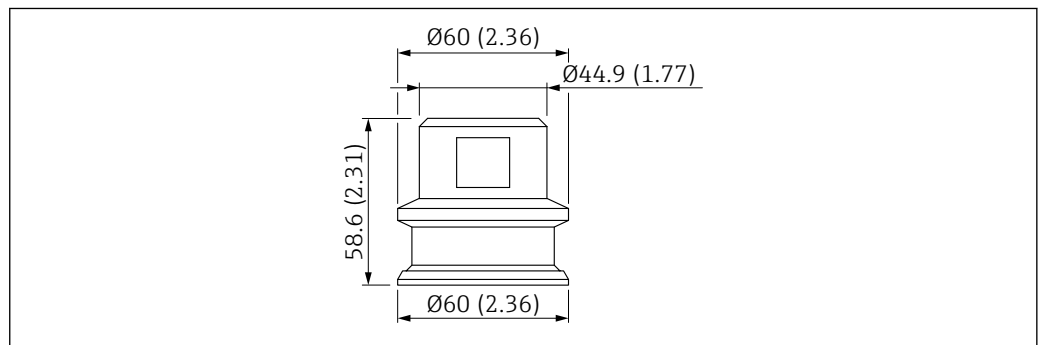
11.1 Adapter

- For hygiene sector and hazardous areas
- Material: 316L (1.4404), seal: VMQ
- Weight
 - Weld-in adapter with threaded sleeve: 466 g (16.44 oz)
 - Tri-Clamp 2" with threaded sleeve: 503 g (17.74 oz)
- Order number
 - Weld-in adapter G 1", threaded sleeve, molded seal: 71444432
 - Process adapter G 1" Tri-Clamp 2" , threaded sleeve, molded seal: 71444431



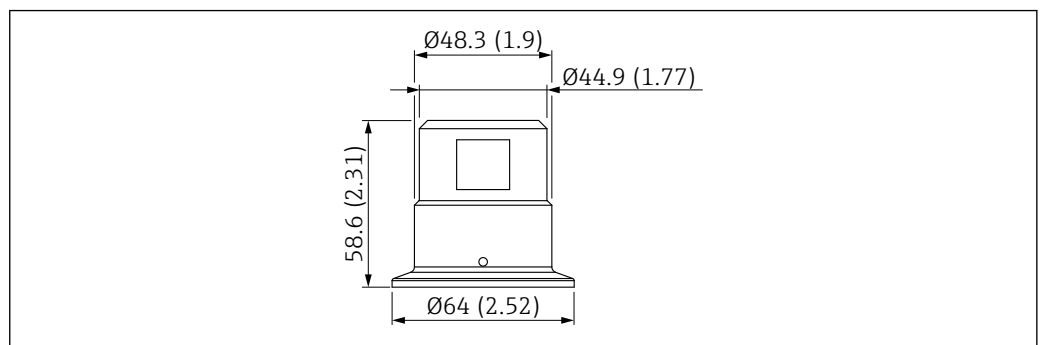
A0040366

- 1 Threaded sleeve
 2 Molded seal
 3 Weld-in adapter G 1", order code 620, option PK
 4 Process adapter G 1" Tri-Clamp 2", order code 620, option RK



A0040367

12 Weld-in adapter G 1" with threaded sleeve. Unit of measurement mm (in)



A0036229

13 Process adapter G 1" Tri-Clamp 2" with threaded sleeve. Unit of measurement mm (in)

11.2 Protector G 1½", R 1½", NPT 1½"

G 1½"

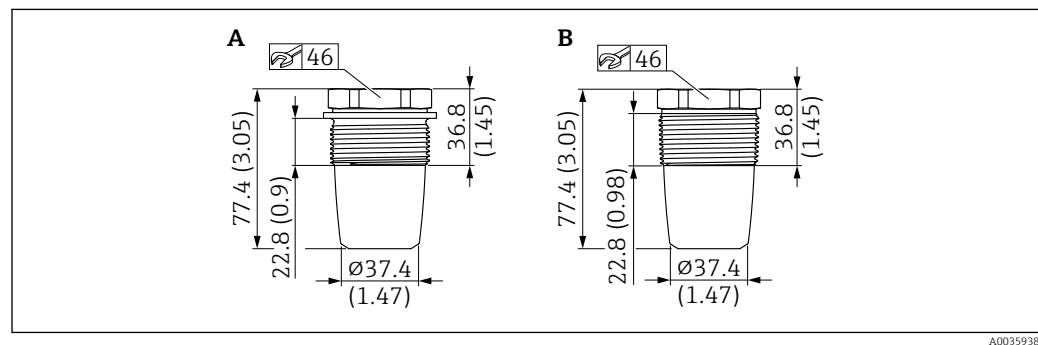
- Material: PBT-GF
- Weight: 74 g (2.610 oz.)
- Order number: 71395785

R 1½"

- Material: PBT-GF
- Weight: 71 g (2.504 oz.)
- Order number: 71395862

NPT 1½"

- Material: PBT-GF
- Weight: 71 g (2.504 oz.)
- Order number: 71416936



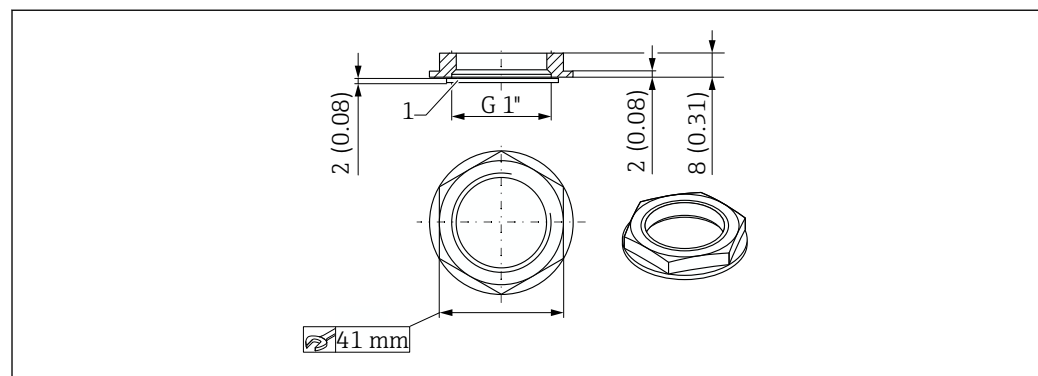
A0035938

A G 1½", order code 620, option PA

B R 1½", order code 620, option PB; NPT 1½", order code 620, option PC

11.3 Lock nut

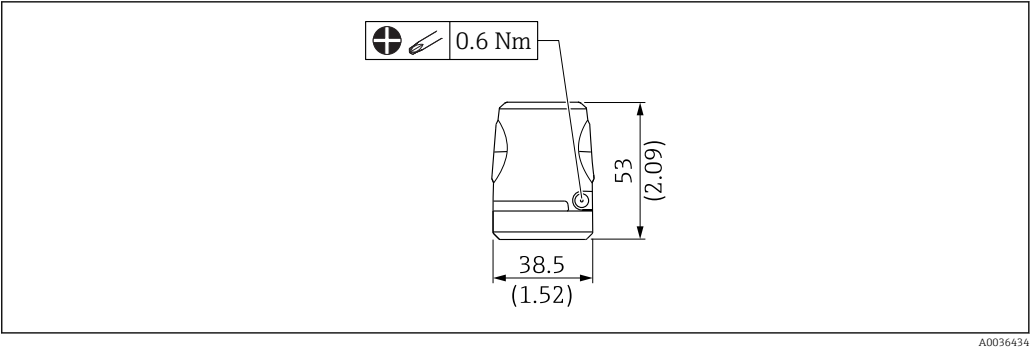
- Material: PA
- Order number: 71395801



A0036041

11.4 Protection cover

- Material: PC
- Order number: 71395803



11.5 Test magnet

Order number: 71267011

11.6 Plug-in jack, connection adapter

Identifier		Order number	Option ¹⁾
Cable, plug-in jack Engineering unit mm (in) gn ye 1 ye 2 Example: M12 with LED	M12 IP69 with LED ▪ Elbowed 90°, terminated at one end ▪ 5 m (16 ft) PVC cable (orange) ▪ Body: PVC (transparent) ▪ Slotted nut 316L M12 IP69 without LED ▪ Elbowed 90°, terminated at one end ▪ 5 m (16 ft) PVC cable (orange) ▪ Body: PVC (orange) ▪ Slotted nut 316L (1.4435) M12 IP67 without LED ▪ Elbowed 90° ▪ 5 m (16 ft) PVC cable (gray) ▪ Slotted nut Cu Sn/Ni ▪ Body: PUR (blue)	52018763	RX
	M12 IP67 without LED ▪ Straight, self-terminated connection to M12 plug ▪ Slotted nut Cu Sn/Ni ▪ Body: PBT	52024216	RW
		52010285	RZ
		52006263	R1
Wire colors for M12 plug: 1 = BN (brown), 2 = WT (white), 3 = BU (blue), 4 = BK (black)			

1) See order code 620 in Product Configurator

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