EA01273F/00/EN/04.24-00
71697549
2025-03-14

Installation Instructions
Sensor electronics, sensor adapter

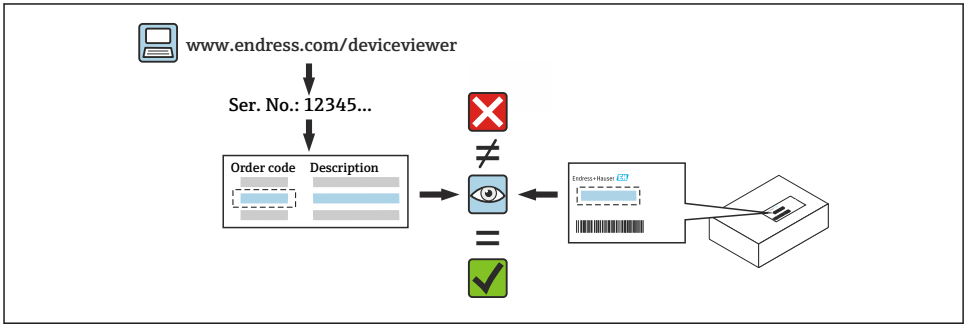
Gammapilot FMG50

Endress+Hauser
People for Process Automation

1 Intended use

- A defective unit can only be replaced with a functioning unit of the same type.
- Use only original parts from Endress+Hauser.
- In the W@M Device Viewer, check if the spare part is suitable for the existing device.

In some devices, an overview of spare parts is provided inside the device. If the spare part set is listed in the overview, it is not necessary to check the Device Viewer.



2 Symbols

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 potentially dangerous situation. Failure to avoid this situation can result in serious or fatal injury.

CAUTION

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

NOTICE

This symbol alerts you to a potentially harmful situation. Failure to avoid this situation can result in damage to the product or something in its vicinity.

2.2 Symbols for certain types of information and graphics

Tip
Indicates additional information

1., 2., 3.
Series of steps

⚠ High voltage warning icon
Indicates a danger zone with high voltage

Symbol for recycling electronic assemblies
In accordance with German law regulating the use of batteries (BattG §28 Para 1 Number 3), this symbol is used to denote electronic assemblies that must not be disposed of as household waste.

3 Personnel authorized to carry out repairs

Technical staff must comply with the following requirements for repair, mounting, electrical installation and commissioning of the devices:

- Be trained in instrument safety.
- Be familiar with the individual operating conditions of the devices.
- In the case of Ex-certified devices, they must also be trained in explosion protection.
- The electronics module can only be replaced by the service team or by instructed specialist staff.
- High voltage testing can only be carried out by specially trained personnel.

Technical staff carrying out work are responsible for ensuring that the work is carried out safely and to the required quality standard. They must also guarantee the safety of the device following repair.

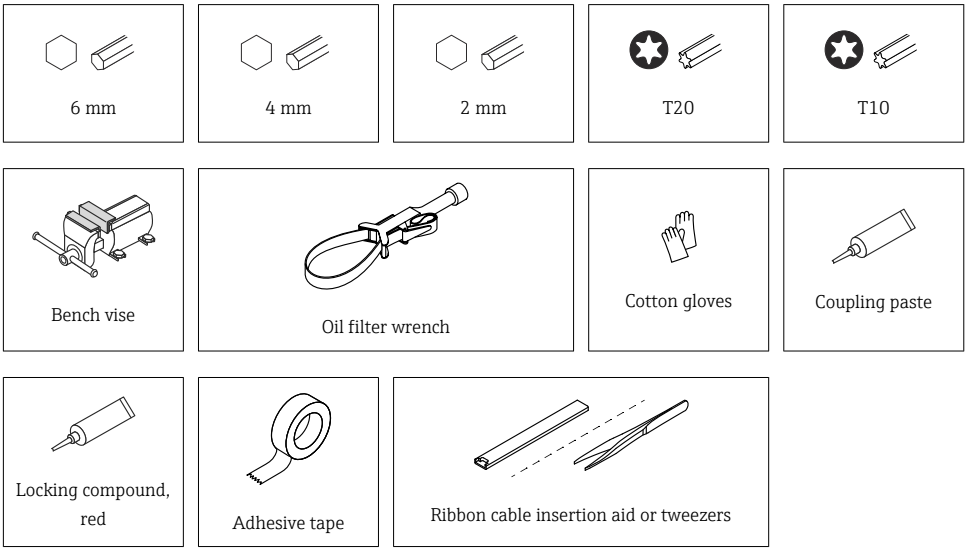
4 Safety instructions

- Observe the Operating Instructions for the device.
- Comply with national regulations regarding mounting, electrical installation, commissioning, maintenance and repair.
- Device is live! Risk of fatal injury from electric shock. Open the device only when the device is deenergized.
- For devices intended for use in hazardous locations, please observe the instructions in the Ex documentation (XA).
- In the case of devices in safety-related applications in accordance with IEC 61508 or IEC 61511: Commission in accordance with Operating Instructions after repair.
- Before removing the device: set the process to a safe state and purge the pipe of dangerous process substances.
- Risk of burns from hot surfaces! Before commencing work: allow the system and device to cool down to a touchable temperature.
- In the case of devices in custody transfer, the custody transfer status no longer applies once the seal has been removed.
- Risk of damaging electronic components! Ensure that the working environment is protected against electrostatic discharge.

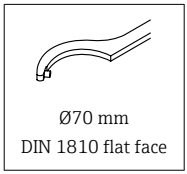
- After removing the electronics compartment cover: risk of electric shock due to removal of contact protection! Switch the device off before removing internal covers.
- Modifications to the device are not permitted.
- Only open the housing for a short period. Avoid ingress of foreign bodies, moisture or contaminants.
- Replace defective seals only with original seals from Endress+Hauser.
- If threads are damaged or defective, the device must be repaired.
- Do not lubricate threads (e.g. of electronics compartment cover and connection compartment cover).
- If spacing is reduced or the dielectric strength of the device cannot be guaranteed during repair work: Perform a test on completion of the work (e.g. high-voltage test in accordance with the manufacturer's specifications).
- Service connector:
  - Do not connect in potentially explosive atmospheres.
  - Only connect to Endress+Hauser service devices.
- Observe the instructions for transporting and returning the device outlined in the Operating Instructions.

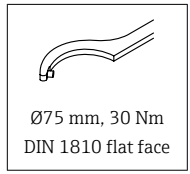
For information on service and spare parts, contact your Endress+Hauser sales center.

5 Tool list



Also required for FMG50 with PVT scintillator:



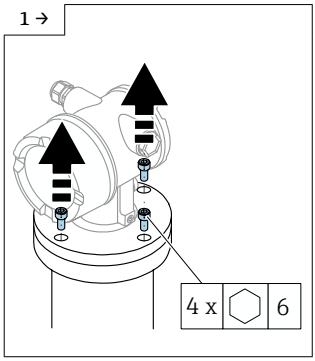


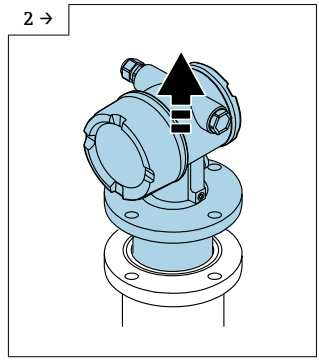
6 Removal

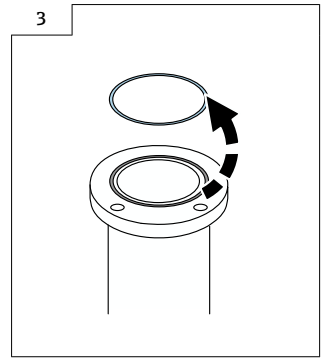
6.1 Removing the sensor electronics

The removal procedure varies depending on whether a PVT scintillator or NaI scintillator is used.

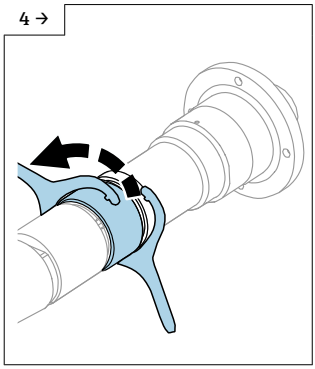
- Gloves must be worn when handling the scintillator!
- Ensure that the environment is dust-free.

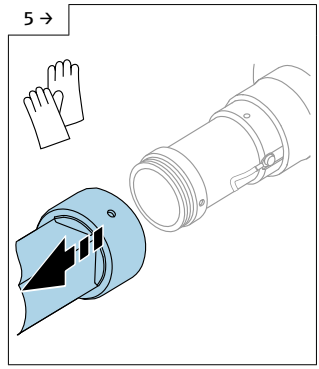


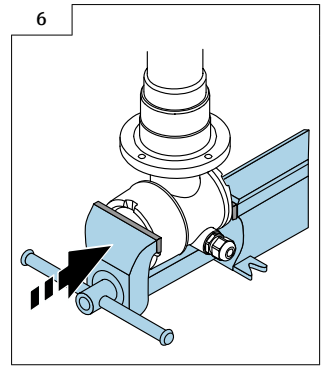




PVT scintillator







NaI scintillator

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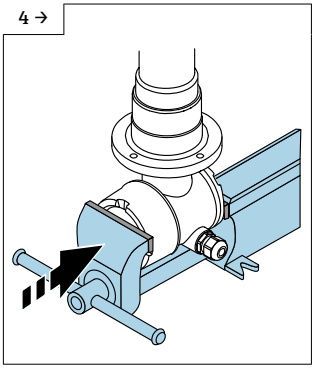

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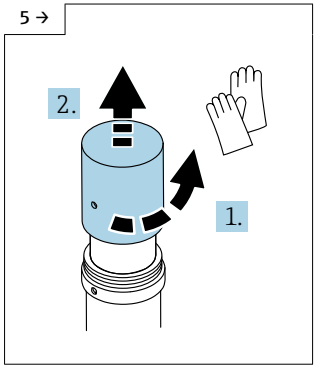

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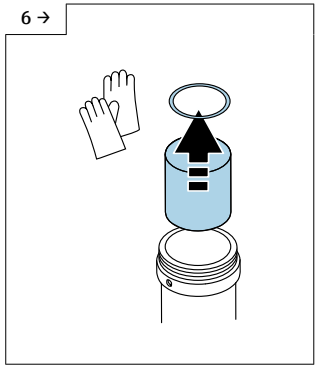

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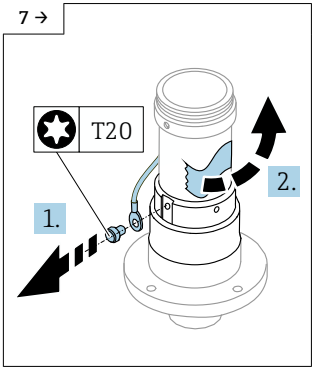

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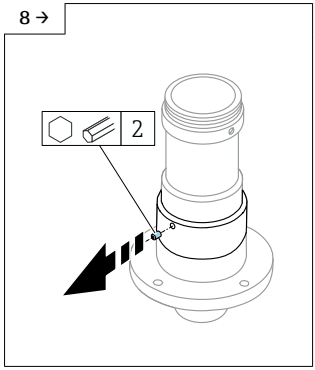

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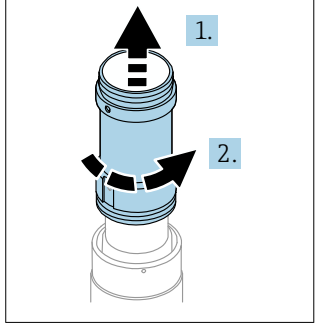

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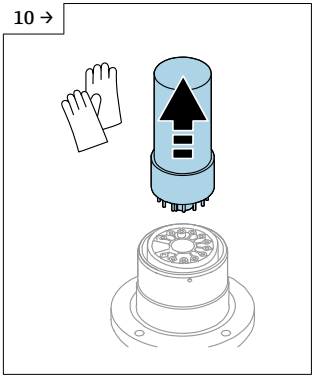

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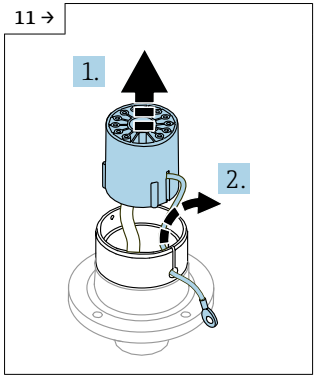

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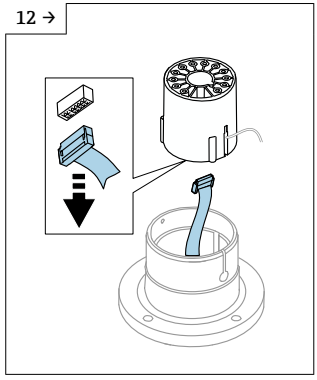

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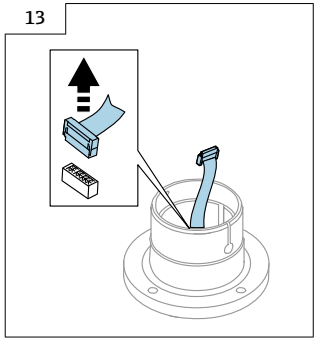
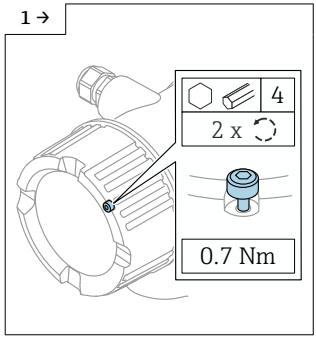


6.2 Removing the housing from the sensor adapter

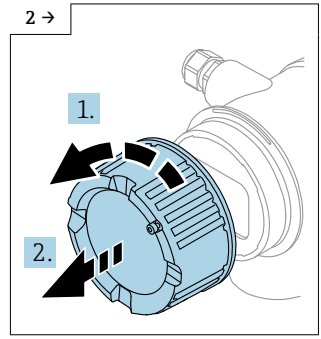
The housing only needs to be removed when replacing the sensor adapter. It does not need to be removed if only the sensor electronics are replaced.

1 →



▶ Optional: cover lock

2 →



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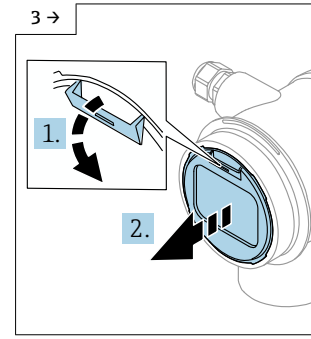
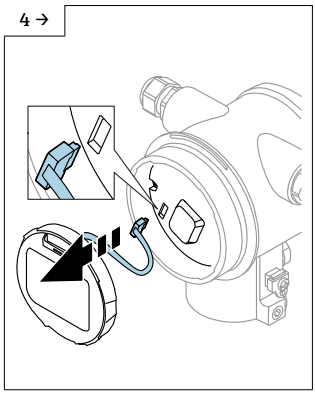


▶ Optional: remove the display.

4 →



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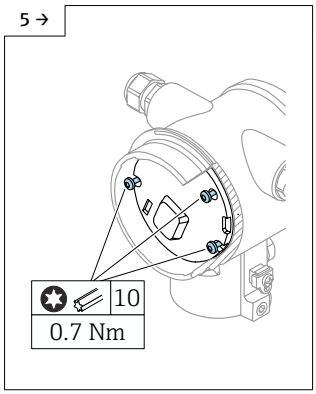

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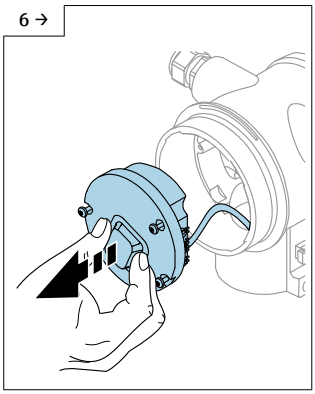
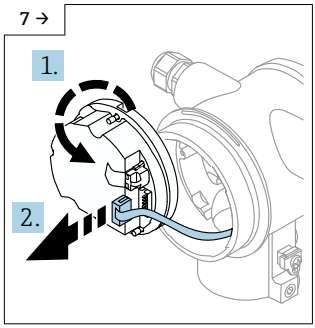


▶ Remove the electronics module.

7 →



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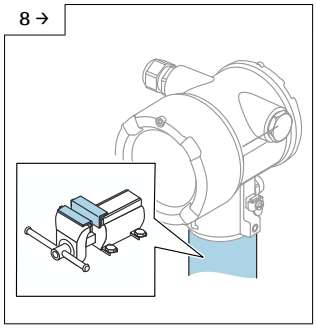
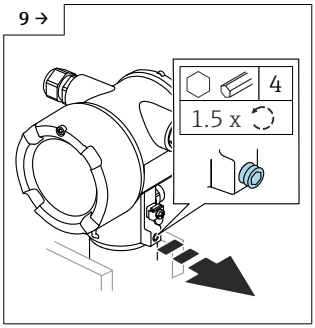


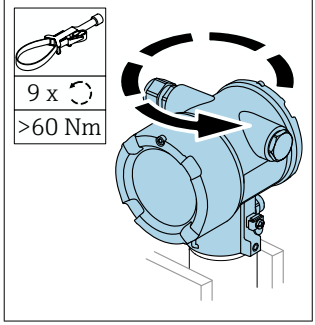
▶ Protect the sensor assembly and housing from damage. Use a bench vise with braces.

9 →



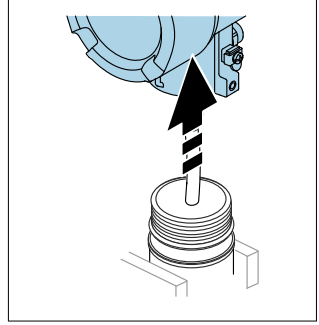
▶ Housing lock for aluminum and stainless steel housing only. Not for plastic and hygienic housing.

10 →



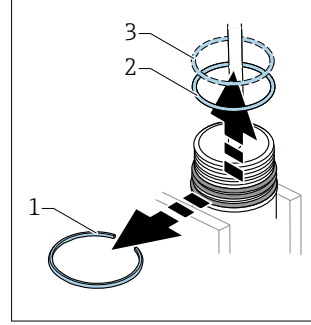
- Using a suitable tool, unscrew the housing by applying significant force (> 60 Nm). This involves applying force several times in and against the screw direction; the snap ring is intentionally destroyed in the process. Do not damage the coating of the housing.

11 →



- Carefully remove the housing from the sensor assembly, taking care not to damage the sensor cable.

12



- Replace the O-ring (2) and snap ring (1). In addition, replace the circlip (3) for the plastic and hygienic housing.

7 Installation

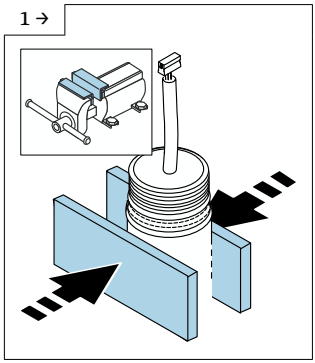
7.1 General installation instructions

Installation is performed by following the removal procedure in reverse order.

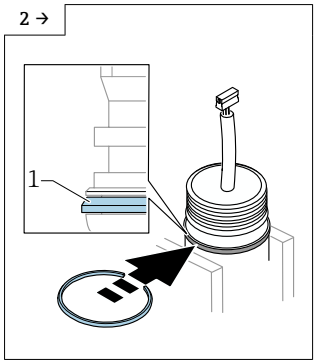
7.2 Special installation instructions

7.2.1 Mount the housing on the sensor adapter

1 →

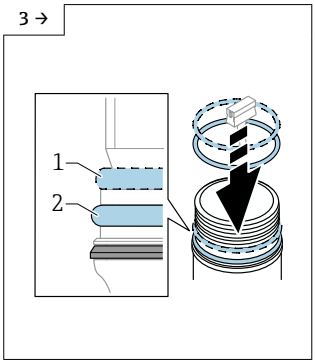


2 →



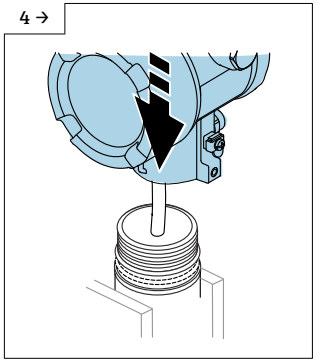
▶ Retaining ring (1)

3 →



▶ Plastic and hygiene housing: mount the annular spring (1) above the O-ring (2) in the groove towards the transmitter.

4 →



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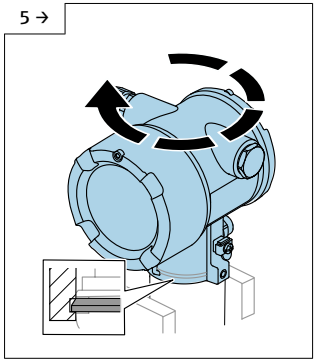

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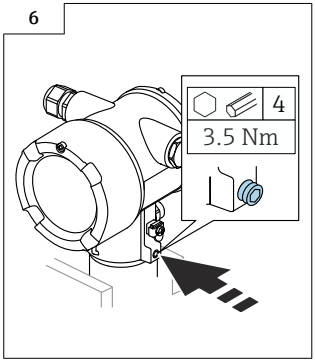


7.2.2 Mount the sensor electronics

NOTICE

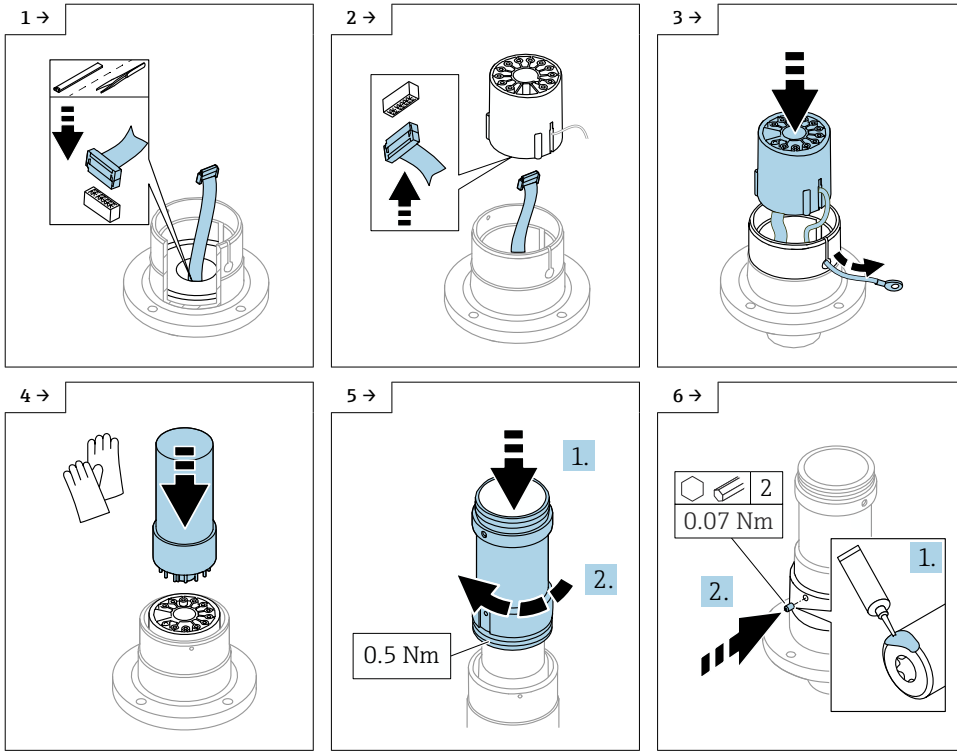
The use of incorrect screws on the thermowell will cause the device to leak.

- ▶ Use only the original screws supplied: DIN912/DIN EN ISO 4762 M8x16 material: A4-70
- ▶ Use only the ribbon cable provided.

Note the following:

- Take care when inserting the sensor electronics to prevent the connecting cables from jamming.
- Secure the set screw using locking compound.
- Clean contact surfaces with a soft, lint-free cloth.
- Apply coupling paste (1 to 1.5 ml), but do not distribute across the surface! The coupling paste will independently distribute itself across the entire end face as you continue with assembly.

NaI scintillator



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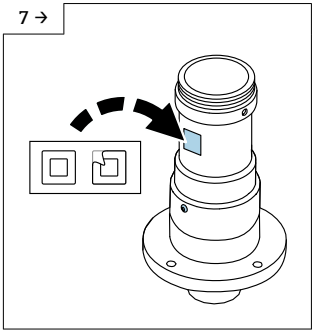

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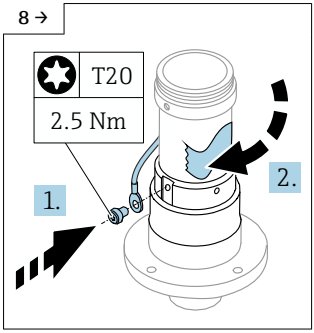

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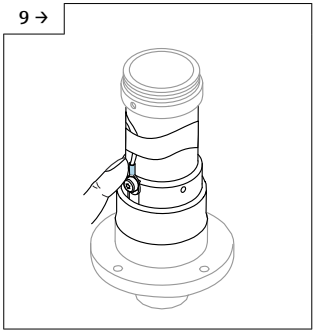
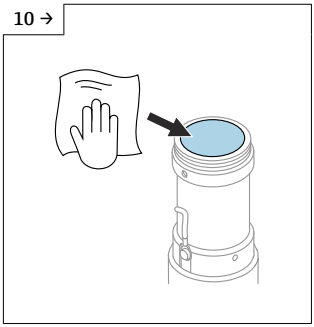


▶ Press the ring cable lug onto the screening tube.

10 →



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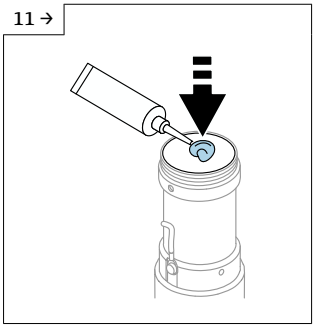

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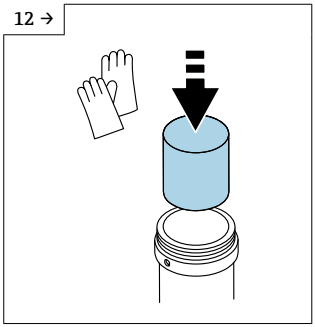

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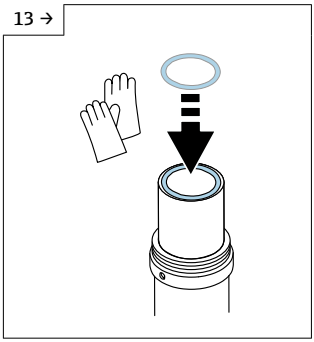

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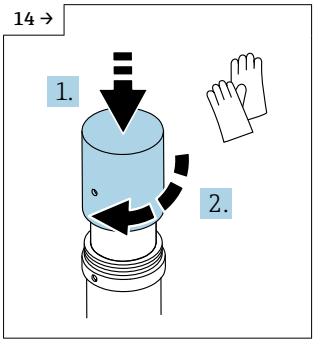

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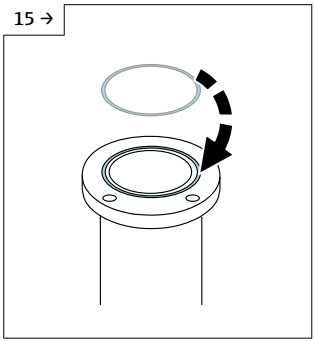

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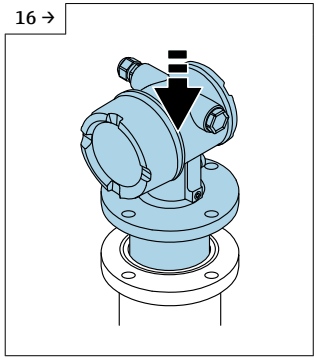

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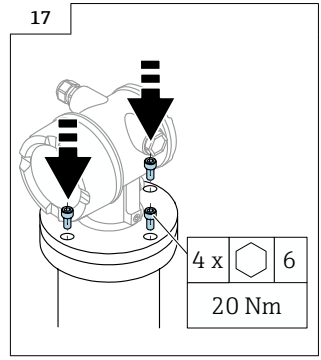
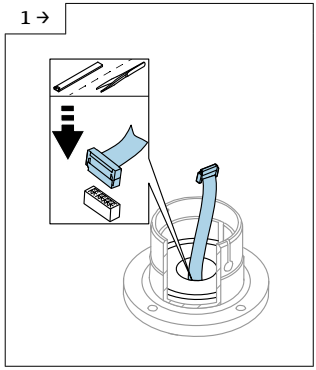


PVT scintillator

1 →



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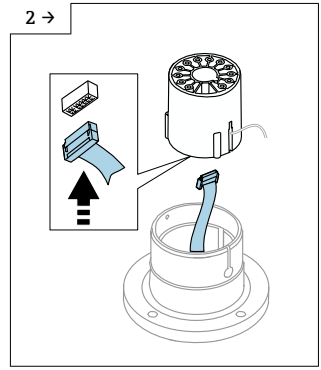

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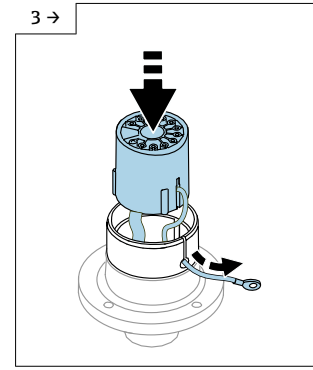

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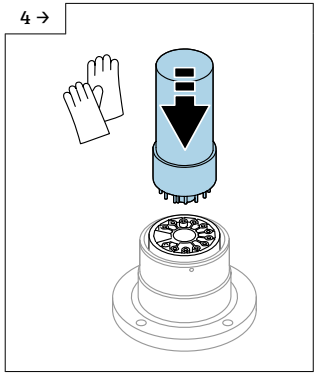

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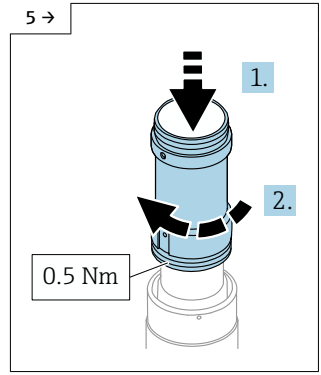

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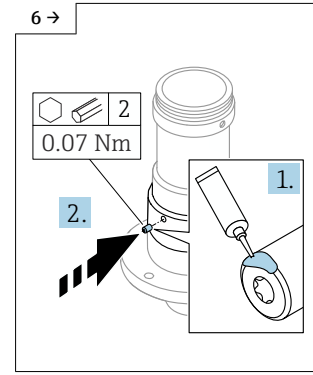

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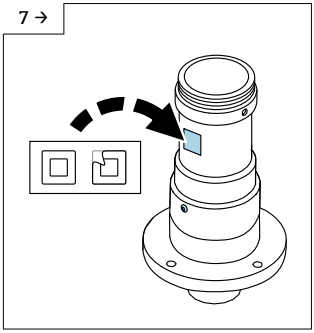

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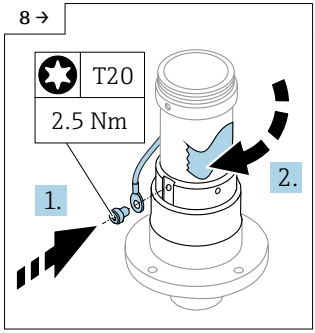

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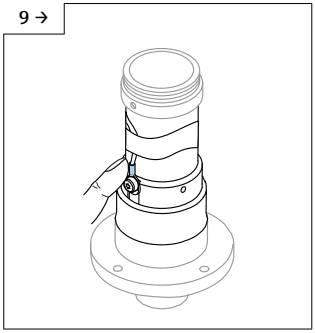
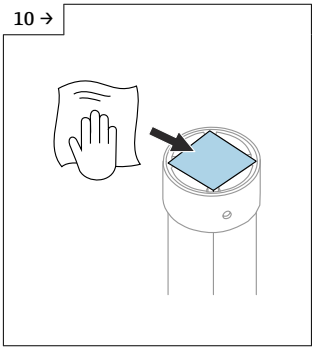


▶ Press the ring cable lug onto the screening tube.

10 →



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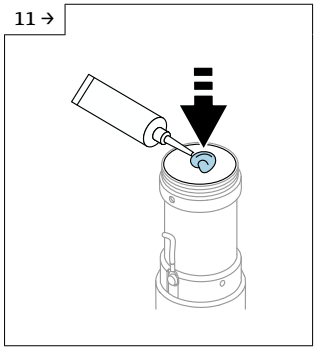

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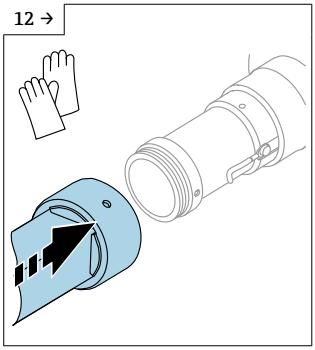

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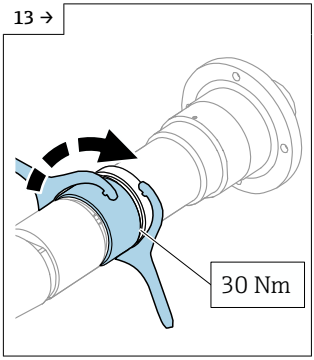

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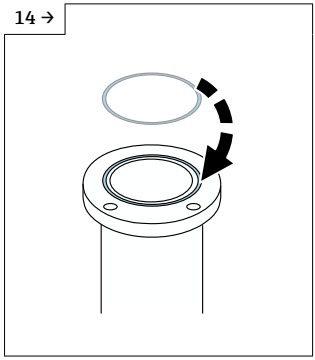

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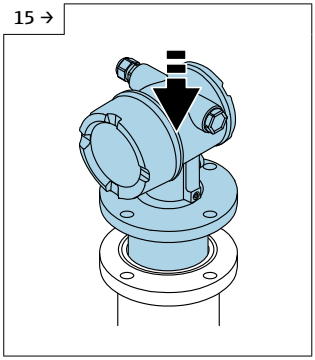

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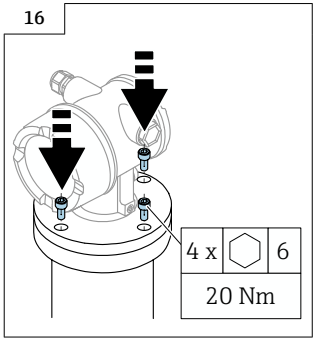


8 Adapting the HV Start Value after replacing sensor component

The **High Voltage Start Value** parameter should be adapted after a sensor component change.

Preliminaries:

1. Set the source container to the ON position.
2. The Pulse rate is displayed in FieldCare/DeviceCare or in the SmartBlue app.
3. Navigate to: Application → Measured values → Pulse rate
4. The Pulse rate must be ≥ 500 cnt/s for 5 min.
   ↳ If the pulse rate is not sufficient or the source container is not available: use an appropriate radiation source.

Alternatively a test radiation source may be used, e.g. place WT20 thoriated tungsten electrodes as per ISO 6848 requirements on the measuring range of the detector.

1. Select Expert user role.
2. Navigate to: System → User management → Enter access code
3. Enter the access code: "4685".
4. Navigate to: Application → Sensor → Sensor Trim Gamma → High voltage output value
5. Read off the High voltage output value and enter it in the High Voltage Start Value parameter field.
6. Carry out a new background calibration.
7. Set the source container to the OFF position.
8. Perform background calibration with the commissioning wizard.

9 Final inspection for Ex devices

Once the spare part has been replaced, carry out a high voltage test for Ex devices. This test is not required for non-Ex devices. The test is passed if the tripping current is ≤ 2.5 mA.

The tripping current must not be exceeded while the testing voltage is applied.

This requires the use of a high-voltage testing device with the following characteristics:
- Output voltage depending on the device version:
  - Devices without overvoltage protection: 707 V_{DC}
  - Devices with overvoltage protection: 410 V_{DC} (lower testing voltage, otherwise discharge tubes will ignite)
- Tripping current: 2.5 mA
- Hold time of testing voltage: 60 s

9.1 Preliminaries

Prior to performing the high voltage test, use a resistance meter to verify that there is minimum contact resistance (0.1 Ω) between the potential equalization connectors and the housing. At the terminals of the FMG50, use a wire jumper to short-circuit the signal circuits as illustrated in the diagrams.

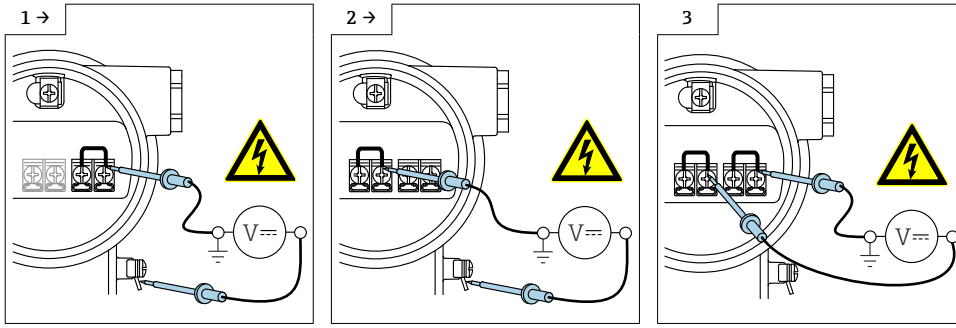
⚠ WARNING

Risk of electric shock from contact with live components!

Contact with live components presents an immediate risk of death.
- ▶ Carefully observe the safety regulations for carrying out work on electrical systems and equipment.
- ▶ During the test, place the device on an insulated surface, without ground connection.
- ▶ Do not touch any live components during operation.
- ▶ Keep moisture away from live components.
- ▶ The above mentioned test levels and the break conditions must be observed in each of steps 1 to 3.

Test steps

- 2-wire electronics module: step 1
- 4-wire electronics module: steps 1 - 3



10 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 the manufacturer for disposal under the applicable conditions.

10.1 Battery disposal

- The end user is legally obliged to return used batteries.
- The end user can return old batteries or electronic assemblies containing these batteries free of charge to Endress+Hauser.

10.2 Disposing of devices with NaI (Tl) crystal

Devices with version NaI(Tl) contain more than 0.1% sodium iodide and are recorded in Safety Datasheet CAS No. 7681-82-5 and in small quantities of thallium iodide in Safety Datasheet CAS No. 7790-30-9 .

⚠ CAUTION

Health hazard if inhaled or swallowed!

The Gammapilot with NaI (Tl) crystal contains sodium iodide (thallium), which is harmful if inhaled or swallowed.

- ▶ Seek medical attention immediately after inhalation or swallowing.
- ▶ If the coating of the NaI (Tl) crystal is not present or is defective, wear personal protective equipment when handling the substance.

⚠ CAUTION

Substance hazardous to the aquatic environment!

The Gammapilot NaI (Tl) crystal contains sodium iodide (thallium), which is very toxic to aquatic organisms. The product must not be disposed of together with domestic waste or allowed to enter the waste water system.

- ▶ Dispose of the product only through an officially authorized waste disposal company.

www.addresses.endress.com

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People for Process Automation