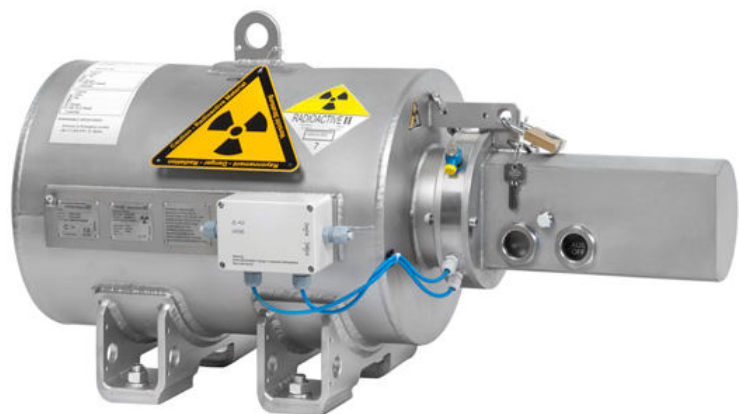
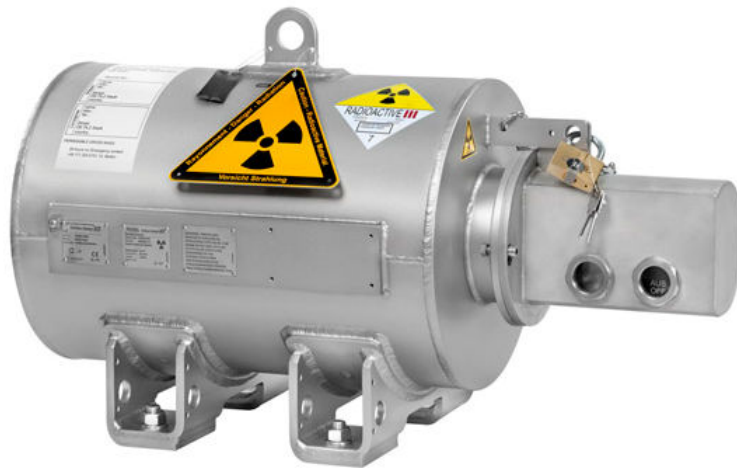
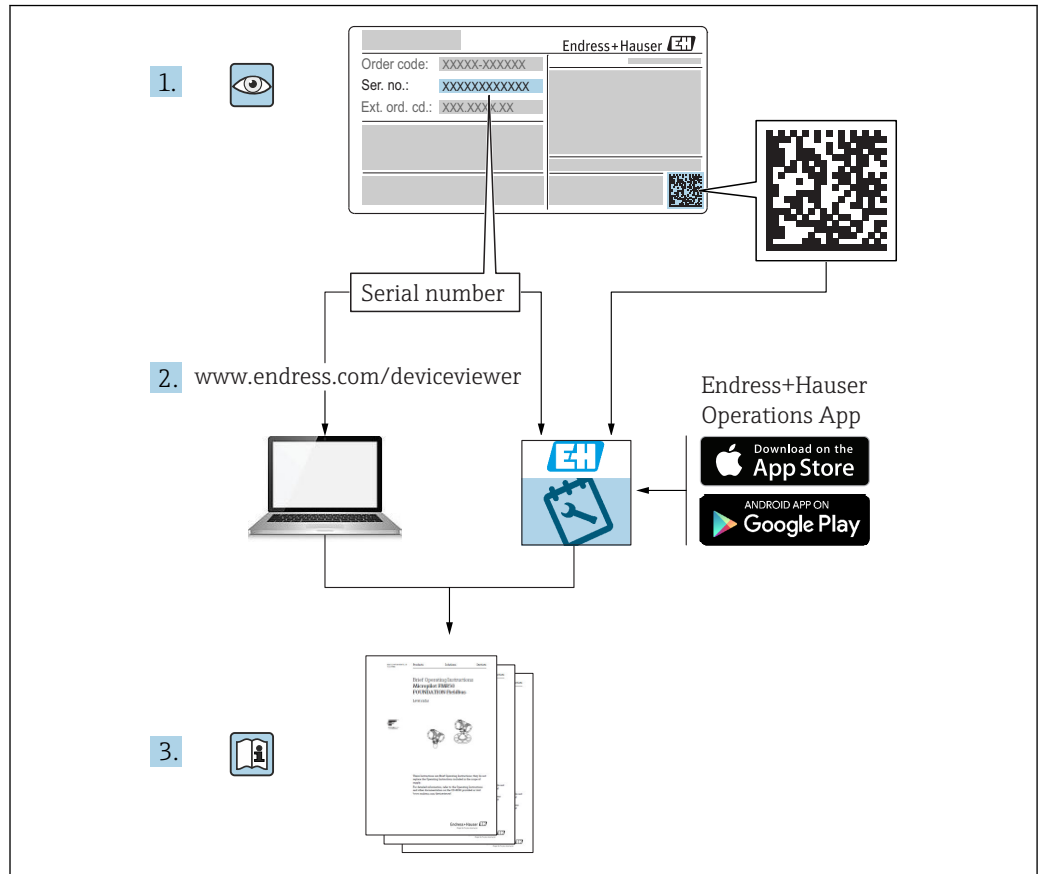


Operating Instructions

Source container FQG66

Radiometric level measurement





A0023555

Table of contents

1	About this document	4	9	Emergency procedure	36
1.1	Document function	4	9.1	Objective and overview	36
1.2	Symbols used	4	9.2	Emergency procedure	36
1.3	Documentation	5	9.3	Notification to authority	37
2	Basic safety instructions	6	10	Repair	38
2.1	Requirements for personnel	6	10.1	General notes	38
2.2	Designated use	6	10.2	Spare parts	38
2.3	Workplace safety	6	10.3	Endress+Hauser services	38
2.4	Operational safety	6	10.4	Return	38
2.5	Product safety	7	10.5	Disposing of the measuring device	40
2.6	Basic instructions for use and storage	7			
2.7	Hazardous area	7			
2.8	General instructions on radiation protection ...	8			
2.9	Legal regulations for radiation protection	8			
2.10	Supplementary safety instructions	9			
3	Product description	10			
3.1	Product design	10			
4	Incoming acceptance and product identification	11			
4.1	Packaging dimensions	11			
4.2	Incoming acceptance	11			
4.3	Product identification	12			
4.4	Manufacturer address	12			
4.5	Nameplate	12			
4.6	Storage and transport	14			
5	Installation	16			
5.1	Installation conditions	16			
5.2	Mounting the measuring device	16			
5.3	Post-installation check	20			
6	Electrical connection	22			
6.1	Connection conditions	22			
6.2	Connecting the measuring device	24			
6.3	Post-connection check	24			
7	Commissioning	26			
7.1	Preparatory steps	26			
7.2	Function check	26			
7.3	Switching ON the measuring device	26			
7.4	Switching OFF the measuring device	30			
8	Maintenance	31			
8.1	Maintenance schedule	31			
8.2	Maintenance tasks	31			
8.3	Measuring and test equipment	35			
8.4	Endress+Hauser services	35			

1 About this document

1.1 Document function

These Operating Instructions provide all of the information that is required in various phases of the life cycle of the device including:

- Product identification
- Incoming acceptance
- Storage
- Installation
- Connection
- Operation
- Commissioning
- Troubleshooting
- Maintenance
- Disposal

1.2 Symbols used

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.

1.2.2 Symbols for certain types of information and graphics

Radiation symbol

Warns against radioactive substances or ionizing radiation

Permitted

Procedures, processes or actions that are permitted

Preferred

Procedures, processes or actions that are preferred

Forbidden

Procedures, processes or actions that are forbidden

Tip

Indicates additional information



Reference to documentation



Reference to graphic



Notice or individual step to be observed

1, 2, 3

Series of steps



Result of a step

1, 2, 3, ...

Item numbers

A, B, C, ...

Views

 →  **Safety instructions**

Observe the safety instructions contained in the associated Operating Instructions

1.3 Documentation

The following documentation types are available in the Downloads section of the Endress+Hauser website (www.endress.com/downloads):



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

1.3.1 Technical Information (TI)

Planning aid

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

1.3.2 Brief Operating Instructions (KA)

Guide that takes you quickly to the 1st measured value

The Brief Operating Instructions contain all the essential information from incoming acceptance to initial commissioning.

2 Basic safety instructions

2.1 Requirements for 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.
- ▶ Personnel must be authorized by the plant owner/operator.
- ▶ Be familiar with federal/national regulations.
- ▶ Before starting work: personnel must read and understand the instructions in the manual and supplementary documentation as well as the certificates (depending on the application).
- ▶ Personnel must follow instructions and comply with general policies.

The operating personnel must fulfill the following requirements:

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

2.2 Designated use

The source containers described in this document contain the radioactive source, which is used for radiometric point level measurement, level measurement and density measurement. They screen the radiation from the surrounding environment and allow it to be emitted almost unattenuated in the direction of measurement only. In order to guarantee the screening effect and rule out damage to the radiation source, it is essential to comply strictly with all the instructions provided in these operating instructions for mounting and operating the unit, as well as all legal regulations surrounding radiation protection. Endress+Hauser does not accept any responsibility for damage caused by incorrect use.

When moving or changing the location of the source container, it is absolutely essential to switch the container to the "AUS/OFF" position (radiation source is switched off).

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 interference-free operation of the device.

Modifications to the device

Unauthorized modifications to the device are not permitted and can lead to unforeseeable dangers and render the product approval null and void:

- ▶ If modifications are nevertheless 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 repair of a 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.

2.6 Basic instructions for use and storage

- Observe applicable regulations and national/international standards.
- Comply with radiation protection regulations when using, storing and working with the radiometric measuring system.
- When storing and transporting the source container, pay attention to the center of gravity and weight indicated on the packaging.
- Heed warning signs and observe safety zones.
- Install and operate the device according to the instructions in this document and as specified by the regulatory authority.
- Never operate or store the device outside the specified parameters.
- When operating and storing the device, protect it against extreme influences (i.e. chemical products, weather, mechanical impacts, vibrations etc.).
- Always secure the "AUS/OFF" switch position by using the lock pin and padlock.
- Before switching on the radiation, make sure that no-one is in the radiation zone (or inside the product vessel). The radiation may only be switched ON by properly instructed staff.
- Do not operate damaged or corroded devices. Seek the advice of the competent radiation safety officer immediately if damage or corrosion occurs. Follow instructions.
- Conduct the required leak test according to the applicable regulations and instructions.

⚠ WARNING

The device is exposed to strong vibrations or impact.

- ▶ At regular intervals, please check that the fastening unit is securely seated and stable and check the condition of the padlock or the retaining element.

⚠ CAUTION

The plant is not in proper operating condition.

Radiation can escape.

- ▶ Check the area around the device for signs of radiation.
- ▶ Notify the radiation safety officer.

2.7 Hazardous area

NOTICE

The suitability of the radiometric measurement method and of the device for applications in hazardous areas must be checked by the plant operator according to the national rules and regulations that apply.

- ▶ Compliance with national rules and regulations is mandatory.

The following must be observed:

- Avoid electrostatic charge at the device. Do not rub synthetic surfaces dry.
- Avoid friction sparks and impact sparks.
- The device must be integrated in the plant potential equalization system.

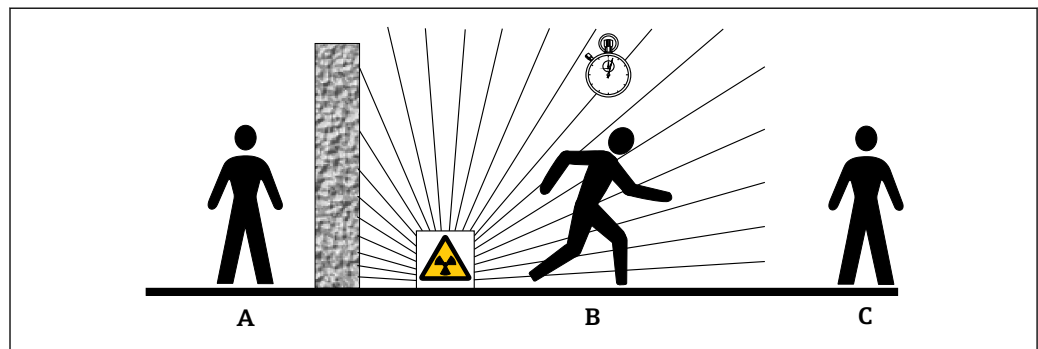
⚠ CAUTION

Source containers with a proximity switch or pneumatic drive are not suitable for hazardous areas.

- ▶ Do not use source containers with a proximity switch or pneumatic drive in hazardous areas.

2.8 General instructions on radiation protection

When working with radioactive sources, avoid any unnecessary exposure to radiation. All unavoidable radiation exposure must be kept to a minimum. Three basic concepts apply to achieve this:



- A Shield
B Time
C Distance

2.8.1 Shield

Ensure the best possible screening between the radiation source and yourself and all other persons. Source containers (e.g. FQG60, FQG61, FQG62, FQG63, FQG66) and all high-density materials (lead, iron, concrete) can be used for effective screening purposes.

2.8.2 Time

The time spent in the exposed area should be kept to a minimum.

2.8.3 Distance

Keep as far away from the radiation source as possible. The local radiation dose rate decreases in proportion to the square of the distance from the radiation source.

2.9 Legal regulations for radiation protection

The handling of radioactive emitters is legally controlled. The radiation protection regulations of the country in which the plant is operated are of overriding importance and must be strictly observed. In the Federal Republic of Germany, the current versions of the Radiation Protection Act and the Radiation Protection Directive apply. The following points derived from this Ordinance are particularly important for radiometric measurement:

2.9.1 Handling permit

A handling permit is required by the operator of a plant that uses gamma radiation. Permit applications are made to the local state government or the authority responsible (State Offices for Environmental Protection, Trade Inspection Offices, etc.). The Endress+Hauser sales organization will be happy to help you obtain the handling permit.

2.9.2 Radiation safety officer

The plant operator must appoint a radiation safety officer (RSO) who has the necessary specialist knowledge and who is responsible for observing the Radiation Protection Directive and all radiation protection procedures. Endress+Hauser offers training courses in which individuals can acquire the necessary specialist knowledge.

2.9.3 Control zone

Only persons who are exposed to radiation during the course of their job and are subject to official personal dose monitoring procedures may work in control zones (i.e. areas where the local dose rate exceeds a specific value). The limit values for the control zone are specified in the current Radiation Protection Ordinance applicable for your area.

The Endress+Hauser sales organization will be pleased to provide further information on radiation protection and regulations in other countries.

2.10 Supplementary safety instructions

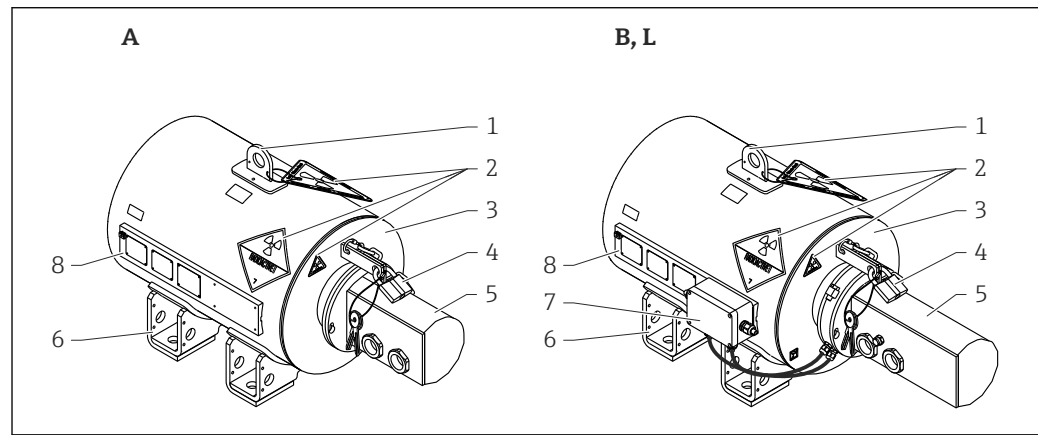
Please observe the safety instructions in documents SD00292F/00 (for Canada) and SD01561F/00 (for the United States).

3 Product description

3.1 Product design

Feature 020 "Version"

- A - "Manual operation"
 - Lock pin to secure the "EIN/ON" and "AUS/OFF" switch position
- B - "Manual operation + proximity switch"
 - Lock pin to secure the "EIN/ON" and "AUS/OFF" switch position, with proximity switch
- L - "Pneumat. drive + proximity switch"
 - Pneumatic drive with proximity switch
 - "EIN/ON" switch position: pressurized
 - "AUS/OFF" switch position: unpressurized



A0023516

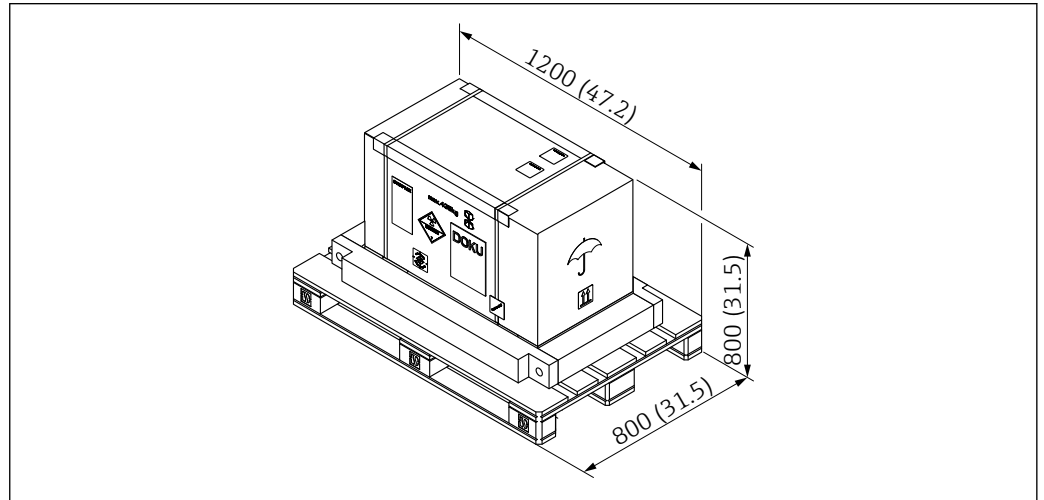
- A Manual operation
 B Manual operation + proximity switch
 L Pneumatic drive + proximity switch
 1 Lifting eye
 2 Radiation symbols: fitted when FQG66 is loaded
 3 Source container
 4 Padlock
 5 Operating unit with protection cap
 6 Bracket for mounting
 7 Terminal housing
 8 Sign holders (for fitting nameplates and connection for potential equalization)

4 Incoming acceptance and product identification

i The radiation source container also serves as Type-A packaging (IATA rules) for the radiation source.

4.1 Packaging dimensions

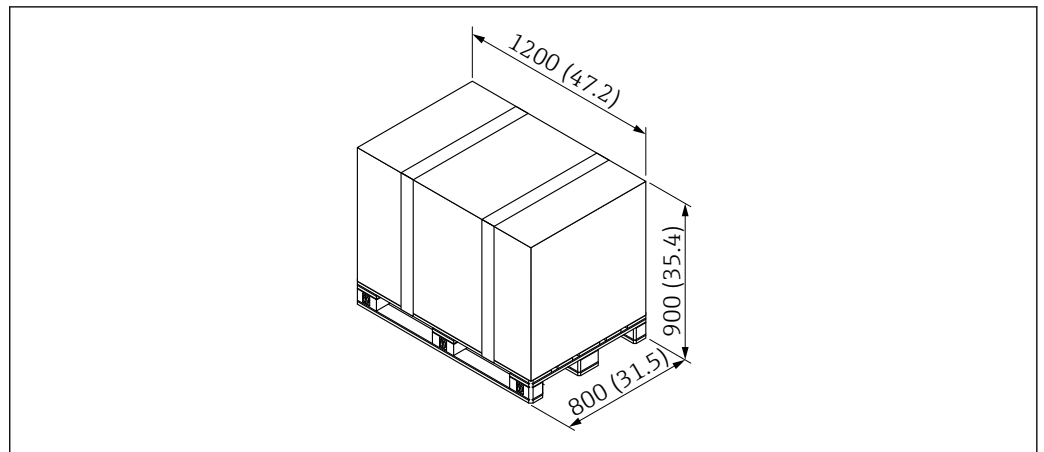
4.1.1 Secondary packaging for loaded / unloaded container



A0042563

1 Dimensions of secondary packaging for unloaded container. Unit of measurement mm (in)

4.1.2 Seaworthy secondary packaging



A0042564


2 Dimensions of seaworthy secondary packaging. Unit of measurement mm (in)

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

4.3 Product identification

The following options are available for the identification of the measuring device:

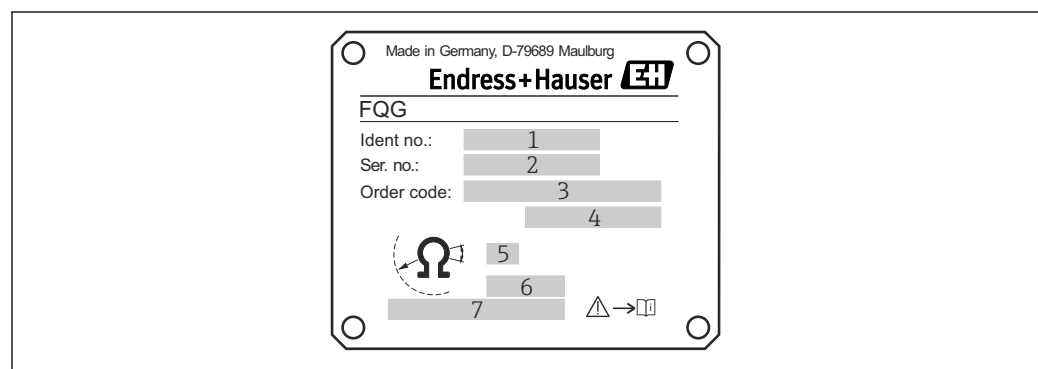
- Nameplate specifications
- Extended order code with breakdown of the device features on the delivery note
- ▶ Enter the serial number from the nameplates into *W@M Device Viewer* (www.endress.com/deviceviewer)
 - ↳ All the information about the measuring device and the scope of the associated Technical Documentation are displayed.
- ▶ Enter the serial number from the nameplate into the *Endress+Hauser Operations App* or use the *Endress+Hauser Operations App* to scan the 2-D matrix code (QR Code) provided on the nameplate
 - ↳ All the information about the measuring device and the scope of the associated Technical Documentation are displayed.

4.4 Manufacturer address

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

4.5 Nameplate

4.5.1 Device nameplate




A0026746

- 1 ID number of source container
- 2 Serial number of source container
- 3 Order code for source container as per product structure
- 4 Order code for source container as per product structure
- 5 Radiation angle of emission
- 6 Specification: horizontal or vertical
- 7 Local dose rate at a defined distance from the surface (when switched off, outside the path of the beam)

Nameplate of the radiation source


Made in Germany, D-79689 Maulburg

Endress+Hauser 

Gamma source

Order Code : 1

Ser. No: 2


Caution Radioactive Material 
3

Radionuclide 4

Source No: 5

Activity: 6

Dat.: 7




A0026744

- 1 Internal Endress+Hauser order code for the radiation source
- 2 Internal Endress+Hauser serial number for the radiation source
- 3 Wording "Caution Radioactive Material", if required
- 4 "Co60" or "Cs137"
- 5 Serial number of the radiation source (according to certificate of the supplier)
- 6 Activity including unit (MBq or GBq)
- 7 Date of loading (month/year)

4.5.2 Supplementary nameplate

Australia



CAUTION RADIATION SOURCE

MANUFACTURED BY: ENDRESS + HAUSER

DATE OF MANUFACTURE: 1

SOURCE: 2

ACTIVITY: 3

SOURCE SERIAL NUMBER: 4

SOURCE MODEL No: 5

INSTRUMENT MODEL: 6

SERIAL NUMBER: 7

MAX. RADIATION LEVEL AT ONE METER: 8

DATE OF MEASUREMENT: 9

ISO CLASS No: 10

Endress + Hauser Australia Pty. Ltd.
Level 1 16 Giffnock Avenue NORTH RYDE NSW 2113
Telephone: 1800 363 7377

A0026743

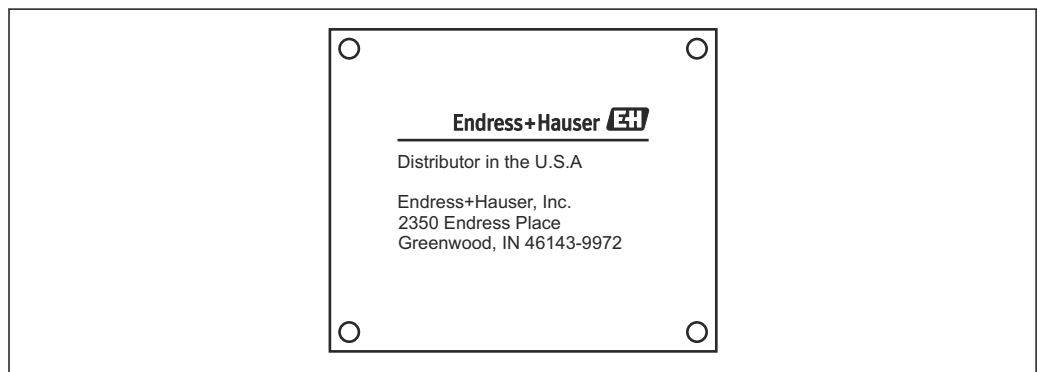
- 1 Date of manufacture of radiation source
- 2 "Co60" or "Cs137"
- 3 Activity including unit (MBq or GBq)
- 4 Serial number of radiation source
- 5 Order code of radiation source
- 6 Internal Endress+Hauser order code for the radiation source
- 7 Internal Endress+Hauser serial number for the radiation source
- 8 Local dose rate at defined distance: 1 m (3.3 ft)
- 9 Date of container inspection
- 10 Material class of radiation source

Norway

A0027290

Sweden

A0026742

USA

A0027291

4.6 Storage and transport**4.6.1 Storage conditions**

- Permitted storage temperature:
 - Order code 020 "Version", option A "Manual operation":
-55 to +100 °C (-67 to +212 °F)
 - Order code 020 "Version", option B "Manual operation + proximity switch", option L
"Pneumat. drive + proximity switch":
-20 to +80 °C (-4 to +176 °F)
- Use original packaging.

4.6.2 Transporting the product to the measuring point

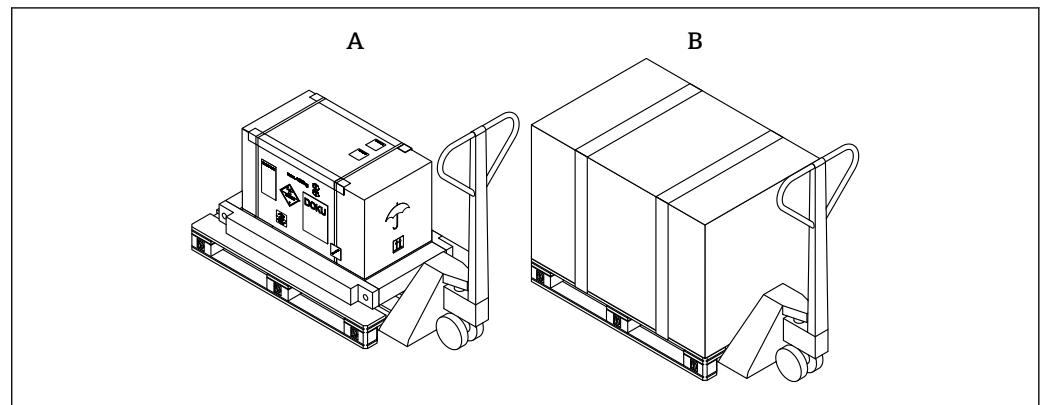
⚠ WARNING

Risk of injury!

- ▶ Transport the measuring device to the measuring point in the original packaging.
- ▶ A lifting eye for lifting by crane is provided on the FQG66 source container as an installation aid.
- ▶ Follow the safety instructions and transport conditions for devices weighing more than 18 kg (39.6 lb).
- ▶ Note the center of gravity and weight.

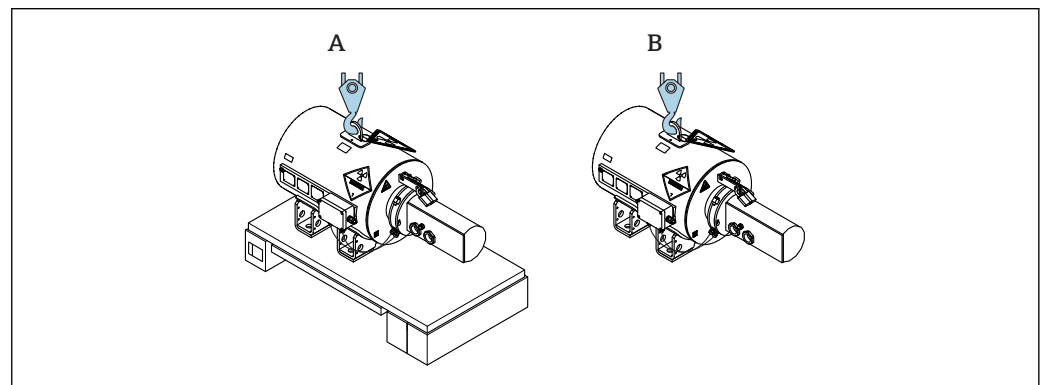
i Total weight

- ~ 450 kg (992 lb) for loaded containers including disposable pallet
- ~ 475 kg (1047 lb) for unloaded containers including Euro pallet



A0042534

- A Original packaging, Euro pallet, loaded / unloaded source container
 B Original packaging, Euro pallet (sea freight)



A0026817

- A Transporting the device screwed to a disposable pallet using a crane attached to the lifting eye
 B Transporting the device using a crane attached to the lifting eye

5 Installation

5.1 Installation conditions

The source container can be mounted as follows:

- On an external construction with low to zero vibration
- Directly mounted on clamping device, provided by customer, attached to the pipe

CAUTION

Mounting the source container

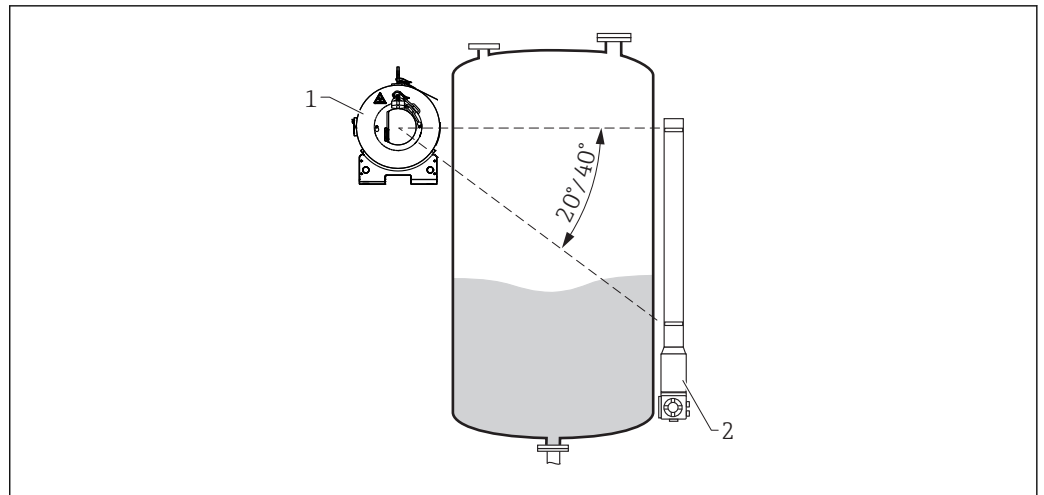
- ▶ The source container may only be mounted according to local regulations and/or the handling permit by certified, specially trained personnel whose radiation exposure is monitored. Ensure that this is allowed by the handling permit. All local conditions must be taken into consideration.
- ▶ Mount the source container in a horizontal position (i.e. with the cover pointing to the right or left).
- ▶ All work must be carried out as quickly as possible and as far away as possible from the radiation source (shielding!). Suitable measures (e.g. blocking of access) must also be taken to protect other individuals from all possible risk.
- ▶ Mounting and removal is only permitted with the switch in the "AUS/OFF" position, secured by the lock pin.
- ▶ Take the weight of the source container into consideration: max. 435 kg (959.18 lb)
- ▶ Optimum fire resistance can only be guaranteed if the FQG66 is mounted horizontally (device standing on the device base).
- ▶ If using the device in non-stationary plants, additional measures must be taken to ensure the device cannot be lost, and to protect it from collision and impact.
- ▶ Use the lifting eye and suitable lifting equipment. Consider the weight and center of gravity of the container!

5.2 Mounting the measuring device

5.2.1 Orientation for level measurement

For continuous level measurement, the source container must be mounted at the height of, or slightly above, the maximum level.

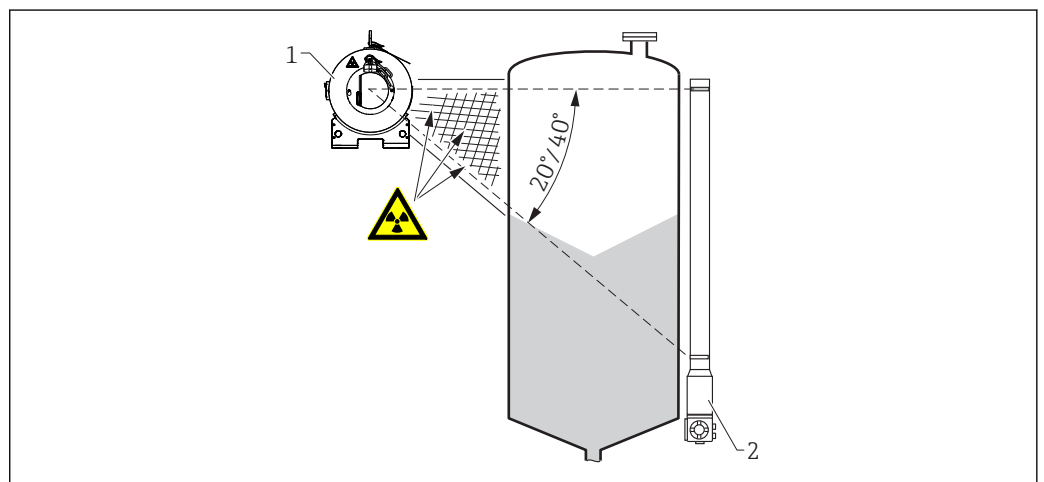
The radiation must be aligned exactly with the detector mounted on the opposite side. The source container and detector should be mounted as close as possible to the product vessel to avoid control zones.



A0023674

- 1 FQG66: Order code 240 "Angle of emission", option 3 "20 degrees, horizontal" or option 5 "40 degrees, horizontal"
- 2 Gammapilot

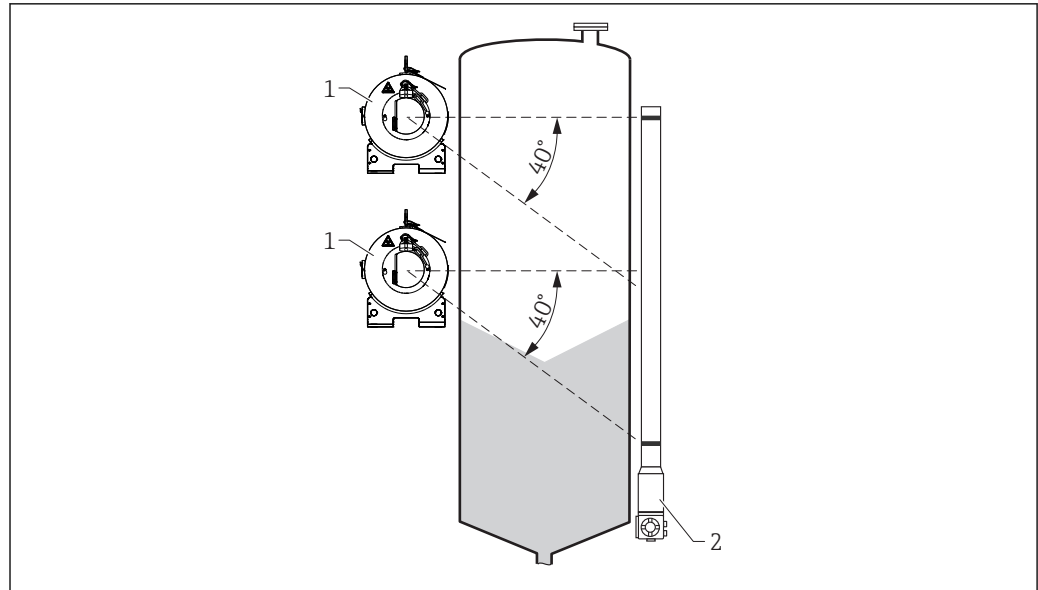
A distance between the source container and the product vessel is often unavoidable if the measuring range is large and the container diameter small. This space must then be secured by grip protection and marked accordingly.



A0023677

- 1 FQG66: Order code 240 "Angle of emission", option 3 "20 degrees, horizontal" or option 5 "40 degrees, horizontal"
- 2 Gammapilot

Two or more source containers are used for large measuring ranges. The use of several sources can be necessary not only due to large measuring ranges but also for accuracy reasons.

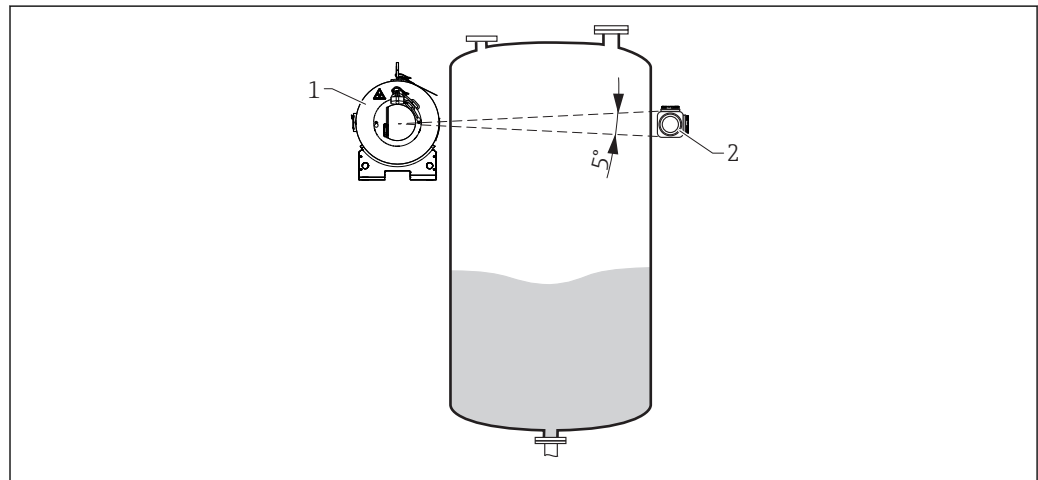


A0023679

- 1 FQG66: Order code 240 "Angle of emission", option 5 "40 degrees"
- 2 Gammapilot

5.2.2 Orientation for point level detection

For point level detection, the radiation source container is mounted at the same height as the detector.



A0023681

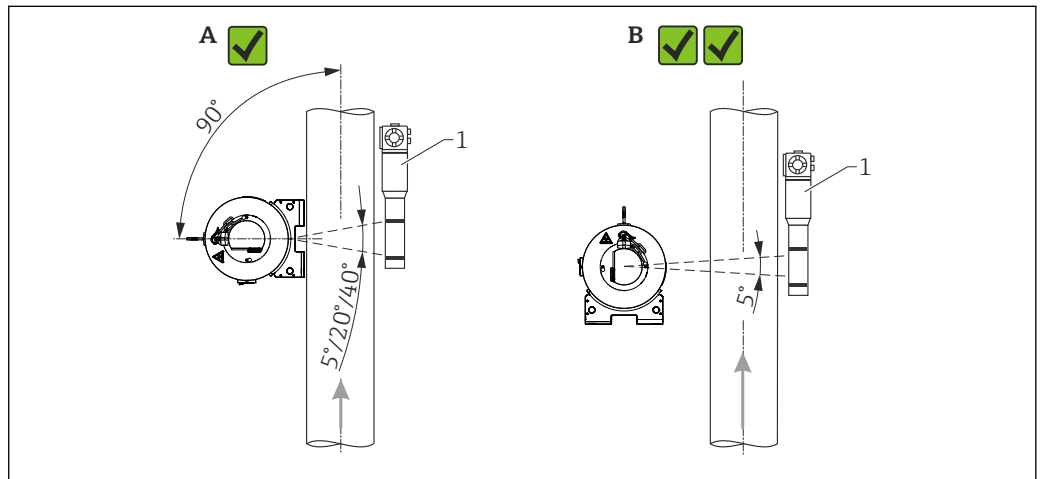
- 1 FQG66: Order code 240 "Angle of emission", option 1 "5 degrees, horizontal"
- 2 Gammapilot

- i** ■ Keep the distance between the FQG66 and the vessel wall to a minimum!
- Secure any intermediate area between the source container and wall by grip protection, if necessary!

5.2.3 Orientation for density measurement

Vertical pipes

If possible, density should be measured with forward flow from bottom to top. With this type of measuring arrangement, the detector (e.g. Gammapilot M FMG60) should preferably be positioned so that it is mounted with the terminal head at the top. If this arrangement is not possible, an additional bracket must be used to secure the detector against slipping.

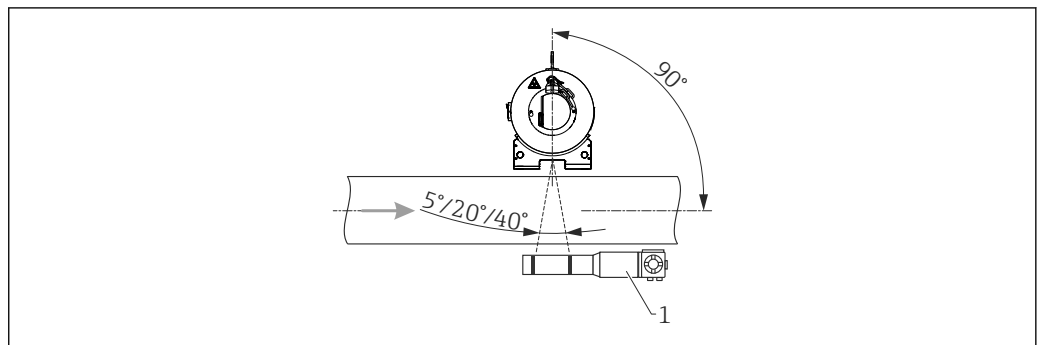


A0023787

- A Order code 240 "Angle of emission", option 2, 4 or 6 "5, 20 or 40 degrees, vertical"
- B Order code 240 "Angle of emission", option 1 "5 degrees, horizontal"
- 1 Gammapilot

Horizontal pipes

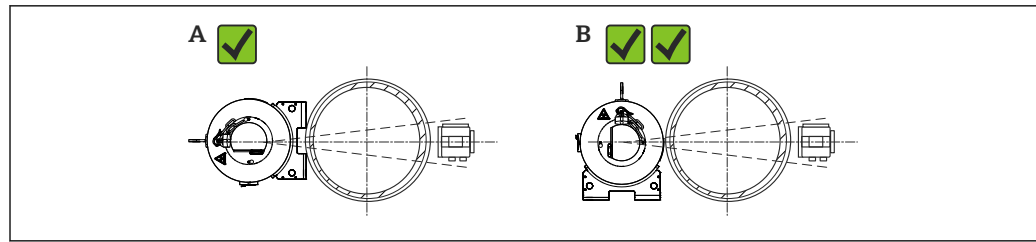
With this type of orientation, it is advisable to mount the FQG66 above the pipe. Attention must be paid to the effect of air bubbles and material buildup in the pipe.



A0023795

- 3 Feature 240 "Angle of emission", option model 2, 4 or 6 "5, 20 or 40 degrees, vertical"
- 1 Gammapilot

Lateral installation is only permitted in low-vibration applications, while taking safety instructions into consideration (regular inspection of the "EIN/ON" or "AUS/OFF" mechanism, padlock or retaining element and mounting clamps).



A Source container FQG66 with vertical beam emission
 B Source container FQG66 with horizontal beam emission

General information

The clamping device must be installed in such a way as to withstand the weight of the source container and the detector (e.g. GammapiLOT) under all anticipated operating conditions (e.g. vibrations). If necessary, the customer should provide additional support with a separate, stable, low-vibration construction.

Note the weights:

- GammapiLOT FMG60: 14 to 29 kg (30.87 to 63.95 lb)
- GammapiLOT FTG20: 15.5 kg (34.18 lb)
- Source container FQG66: 435 kg (959.18 lb)

5.3 Post-installation check

- Is the device undamaged (visual inspection)?
- Are the measuring point identification and labeling correct (visual inspection)?
- Does the device comply with the measuring point specifications? For example:
 - ambient temperature
 - Measuring height
 - Source activity
 - Angle of emission
- Are the securing screws firmly tightened?

5.3.1 Measuring the local dose rate

After mounting, the local dose rate in the vicinity of the source container and the detector must be measured.

CAUTION

- ▶ Depending on the installation, radiation can also occur outside the actual radiation emission channel through scattering. In such cases it must be shielded off by the use of additional lead or steel shielding. Render and mark all control and exclusion areas as prohibited for unauthorized entry.

What to do in event of empty process vessel or pipe

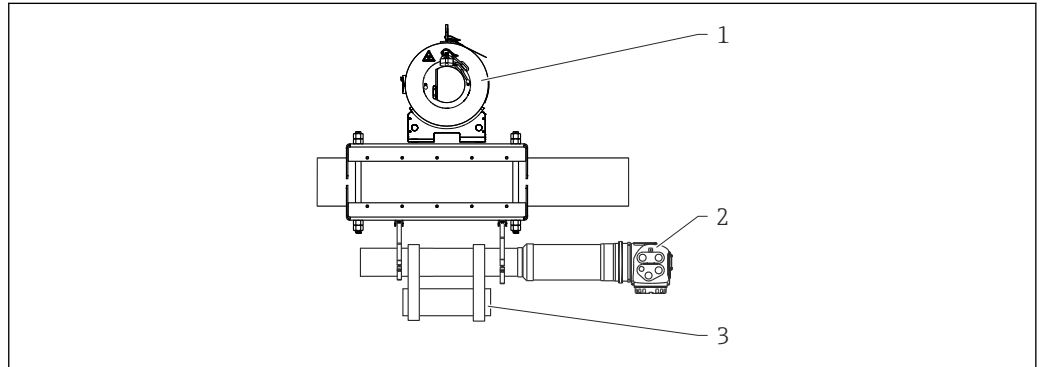
CAUTION

- ▶ If the process vessel is empty, once the unit has been correctly mounted the control area around the empty process vessel must be measured. If necessary, this area must be cordoned off and marked accordingly. If there is an entry into the interior space of the process vessel, it must be sealed off and marked with a "radioactive" safety sign. Access can only be permitted by the competent radiation safety officer after he/she has checked all the safety precautions. The source container must be switched off for access to be permitted. If maintenance is required in or on the product vessel, it is mandatory to switch off the radiation. Additional shielding measures may also be required.

If the pipe becomes empty as a result of operational processes, the level of radiation on the detector side can reach dangerous levels:

- In such cases, the radiation emission channel must be closed immediately for reasons of radiation protection. → Recommendation: Order code 020 "Version", option L "Pneumat. drive + proximity switch"
- A high local dose rate also causes the detector unit to age quickly. → Recommendation: Safety shutdown of the Gammapilot M FMG60 via Gammapilot FTG20 (see TI00363F/00 and BA00236F/00)

The best way to avoid such a situation is to mount a second radiometric measuring system (Gammapilot FTG20) that monitors the radiation intensity. If high radiation levels occur, an alarm occurs and the source container must be switched off ("AUS/OFF" position).



A0023683

- 1 Source container FQG66
- 2 Gammapilot M FMG60
- 3 Gammapilot FTG20

6 Electrical connection

i The following sections only apply for versions with a proximity switch.

6.1 Connection conditions

6.1.1 Cable specification

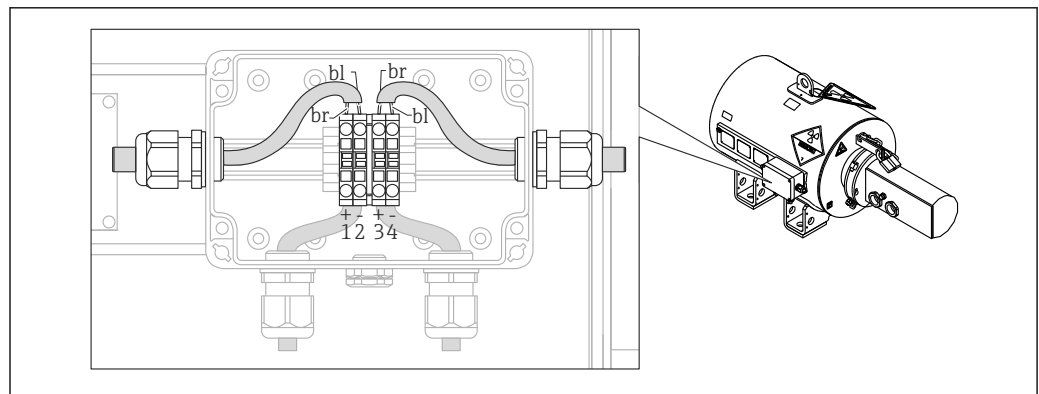
The following specifications apply for single strands for connection to the terminals in the terminal box:

- Cross-section: 0.08 to 2.5 mm² (28 to 14 AWG)
- Cross-section: 0.08 to 4 mm² (28 to 11 AWG)
- Stripping length: 6 to 7 mm (0.24 to 0.28 in)

The following applies for the cable entry of the terminal box:

- Min. cable diameter: \varnothing 5 mm (0.2 in)
- Max. cable diameter: \varnothing 10 mm (0.39 in)

6.1.2 Terminal assignment



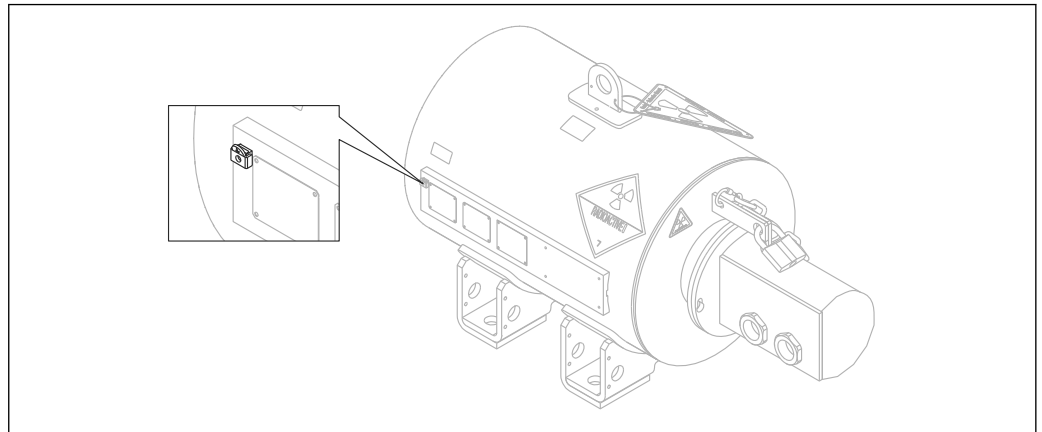
- 1, 2 Proximity switch for "EIN/ON" switch position
 3, 4 Proximity switch for "AUS/OFF" switch position

6.1.3 Proximity switches

Type model: Pepperl+Fuchs 181094-NCB2-12GM35-NO

6.1.4 Potential equalization

Terminal on the sign holder, see the following graphic:



A0026837

Potential equalization: max. 4 mm² (12 AWG)

6.1.5 Connection data

- Nominal voltage: 8 V_{DC}
- Current consumption of "EIN/ON" proximity switch
 - "EIN/ON" switch position = ≤1 mA
 - "AUS/OFF" switch position = ≥3 mA
- "AUS/OFF" proximity switch
 - "EIN/ON" switch position = ≥3 mA
 - "AUS/OFF" switch position = ≤1 mA

6.1.6 Isolating amplifiers

The following isolating amplifiers, for example, can be connected for signal evaluation:

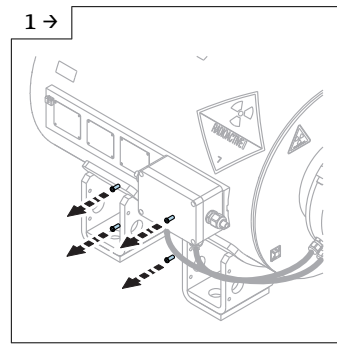
- Nivotester FTL325N (Endress+Hauser)
- KFD2-SH-Ex1, 24 V_{DC} (Pepperl+Fuchs)

6.2 Connecting the measuring device

6.2.1 Electrical connection

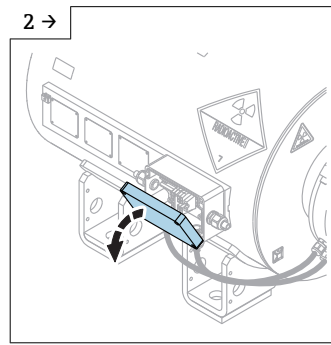
Required tools/accessories:

- Wire stripper
- If using stranded cables:
 - One ferrule for every wire to be connected
- Pliers for pressing on the ferrules



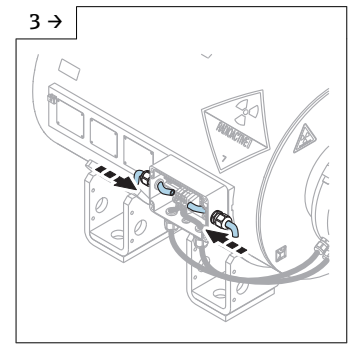
A0027173

- ▶ Release the 1/4 turn fasteners on the cover of the terminal housing.



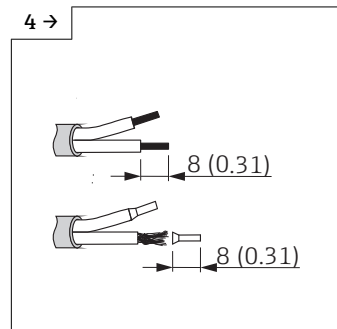
A0027175

- ▶ Fold down the cover of the terminal housing.



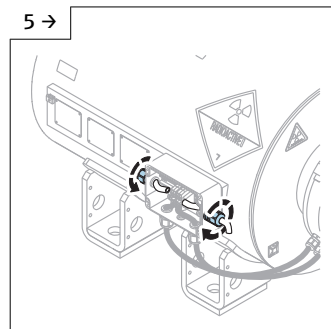
A0027176

- ▶ Guide the cable through the slightly loosened cable entries. To ensure tight sealing, do not remove the sealing ring from the cable entry.



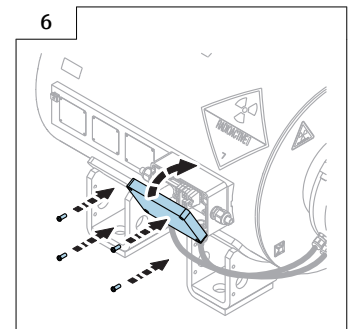
A0027177

- ▶ Remove the cable sheath. Strip the cable ends over a length of 8 mm (0.31 in). In the case of stranded cables: also fit ferrules.



A0027178

- ▶ Firmly tighten the cable gland and connect the cable according to the terminal assignment.



A0027180

- ▶ Put the cover of the terminal housing back on and fix it in place with the 1/4 turn fasteners.

6.2.2 Pneumatic connection

⚠ CAUTION

The throttle check valve is set at the factory and secured with thread locking fluid.

- ▶ Do not change the setting of the throttle check valve!

NOTICE

Pneumatic drive connection

- ▶ Compressed air connection: G1/8"
- ▶ The compressed air is connected to the check valve with choke.

6.3 Post-connection check

- Are the device, cables and terminal housing undamaged (visual check)?

- Do the cables used comply with the requirements?
- Do the mounted cables have adequate strain relief?
- Does the supply voltage match the specifications on the nameplate?
- No reverse polarity, is terminal assignment correct?
- If required: Has a connection to the potential equalization system been established?
- Is the housing cover installed and firmly tightened?
- For order code 020 "Version" with option L "Pneumat. drive + proximity switch": is the compressed air supply connected?

7 Commissioning

7.1 Preparatory steps

7.1.1 Tool required for general operation

- Key for padlock
- Allen screw 6mm across flats
- Pliers for releasing the key from the wire cable

7.2 Function check

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

- "Post-installation check" checklist
- "Post-connection check" checklist

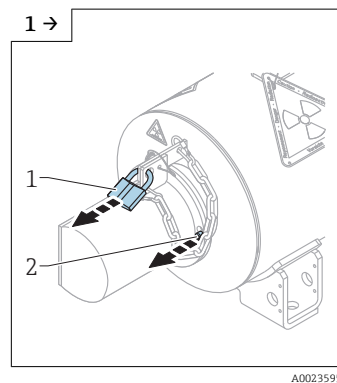
7.3 Switching ON the measuring device

CAUTION

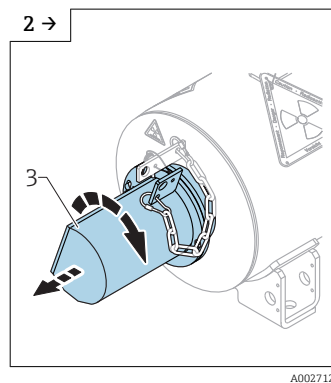
Switching ON the radiation

- ▶ Before switching ON the radiation, make sure that no-one is in the radiation zone (or inside the product vessel).
- ▶ The radiation may only be switched ON by properly instructed staff.

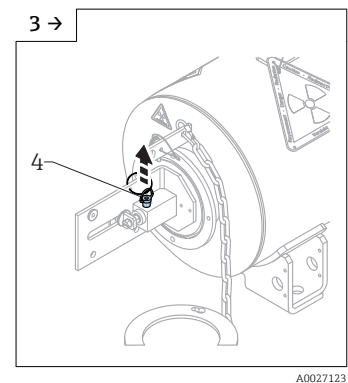
7.3.1 Manual version with/without proximity switch



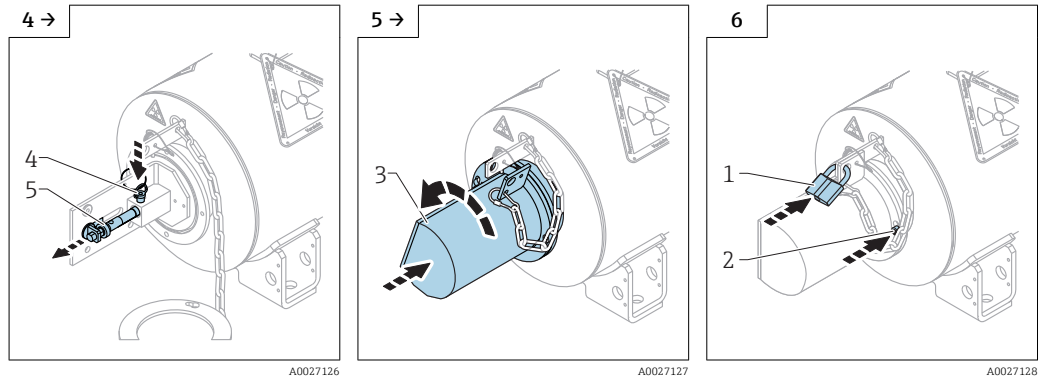
- ▶ Remove padlock (1). Turn the screws (2) (6mm across flats) on the cover three to four times to release them.



- ▶ Remove the cover (3).



- ▶ Remove the lock pin (4) from the guide tube of the source holder rod.



- ▶ Pull out the source holder rod (5) as far as the "EIN/ON" position. Reinsert the lock pin (4) into the bore hole of the guide tube and push it in as far as it will go.
- ▶ Fit the cover (3).
- ▶ Secure the cover with the screws (2) (6mm across flats) and fit the padlock (1) back on.

7.3.2 Pneumatic version

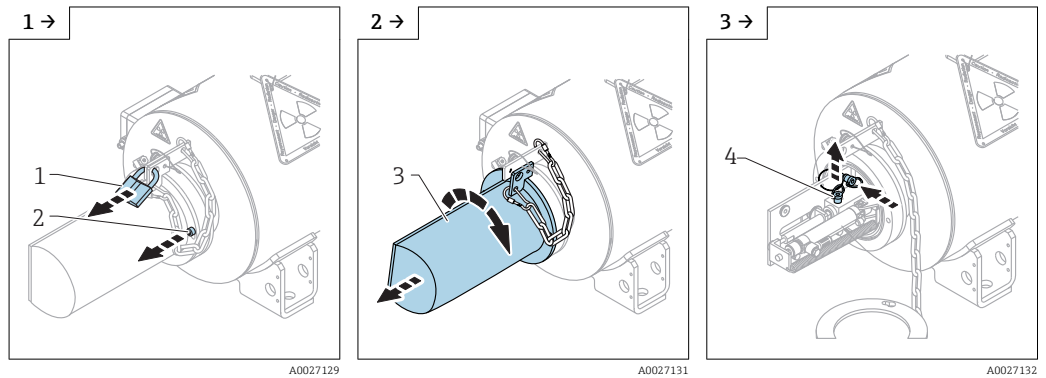
i The measuring device must first be connected to the compressed air supply before the pneumatic version can be put into operation .

⚠ CAUTION

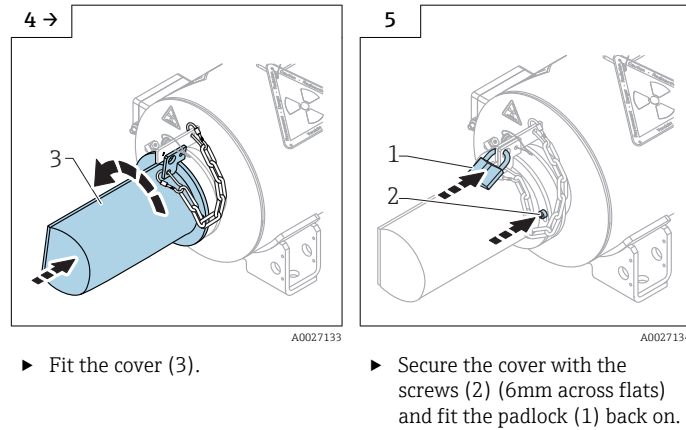
Risk of injury when cover is open

- ▶ Make sure that the pneumatic drive is unpressurized for the entire time the cover is removed!

The device can be switched ON and OFF with the pneumatic controller.



- ▶ Remove padlock (1). Turn the screws (2) (6mm across flats) on the cover three to four times to release them.
- ▶ Remove the cover (3).
- ▶ Remove the lock pin (4) from the guide tube of the source holder rod and insert it into the bore hole ("parking position") provided.



CAUTION

Risk of injury if the device is operated without a cover

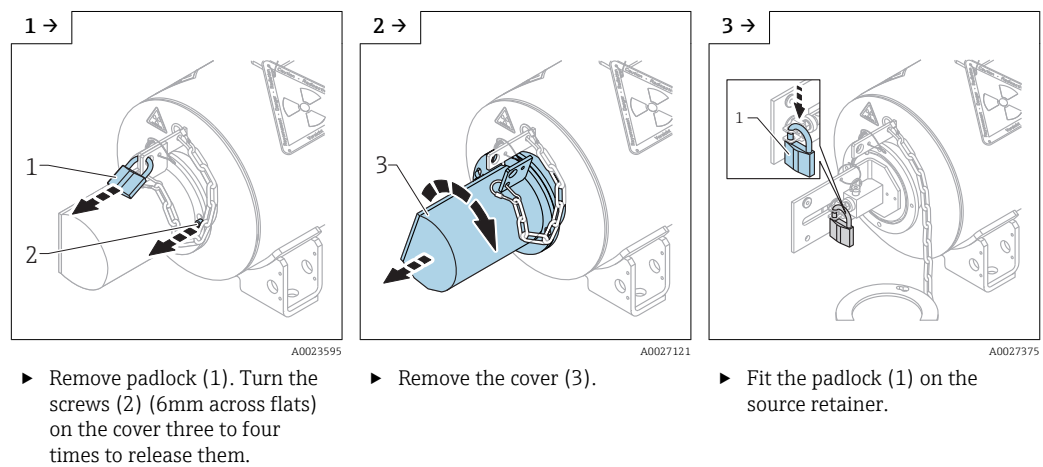
- ▶ Only operate the device with the cover mounted.

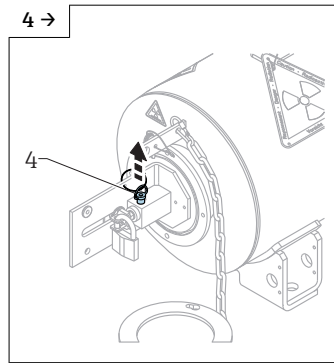
7.3.3 Manual version with/without proximity switch (US version order code 010 "Approval", option AE "NRC")

NOTICE

According to NRC requirements, it must be possible to switch off the source container at any time without the need for any special tools (e.g. key for padlock).

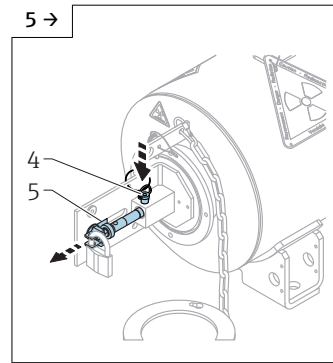
- ▶ Follow the instructions below!





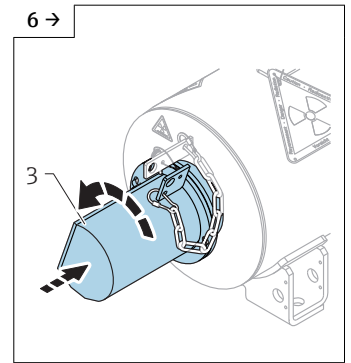
A0027373

- ▶ Remove the lock pin (4) from the guide tube of the source holder rod.



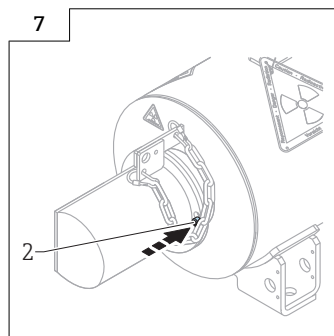
A0027374

- ▶ Pull out the source holder rod (5) as far as the "EIN/ON" position. Reinsert the lock pin (4) into the bore hole of the guide tube.



A0027376

- ▶ Fit the cover (3).



A0027377

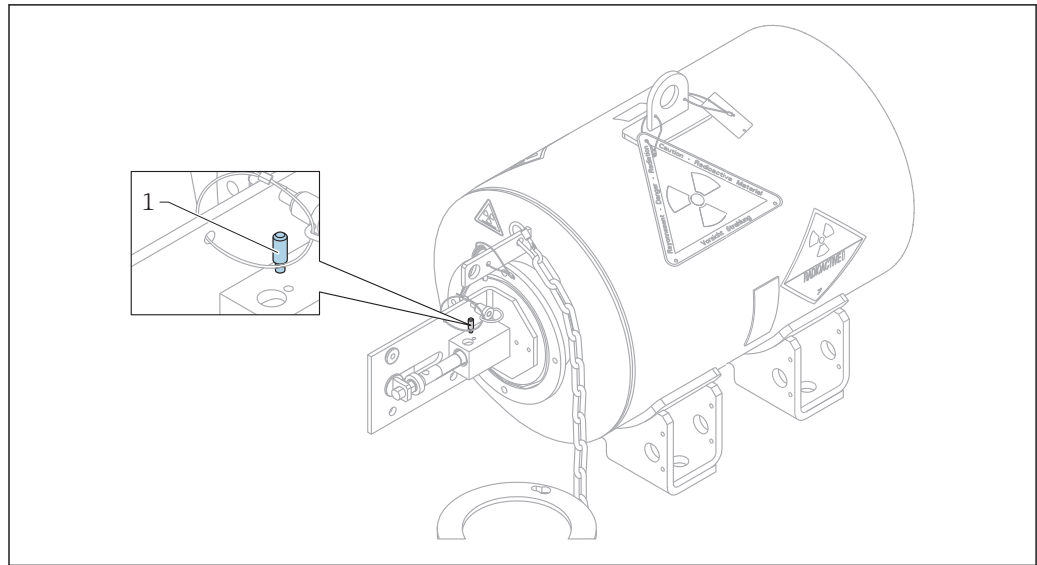
- ▶ Secure the cover with the screws (2) (6mm across flats)

NOTICE

It must be possible to remove the cover at all times without the need for special tools!

- ▶ Make sure that the cover is not secured by a padlock!

7.3.4 Function of the locking screw



A0027390

1 Locking screw



The locking screw function is only relevant when replacing the radiation source: SD00297F/00

No function is associated with the locking screw when switching the radiation ON and OFF.

7.4 Switching OFF the measuring device

To switch the radiation OFF, perform the steps above in reverse order.

8 Maintenance

8.1 Maintenance schedule

No device maintenance is required if the device is used as designated and operated under the specified ambient and operating conditions.

The following checks are recommended as part of routine plant inspections:

- Visual inspection for corrosion of the housing, weld seams, padlock and the "Radiation source" nameplate
- Test of the movability of the shutter mechanism ("EIN/ON" or "AUS/OFF" function)
- Inspection of the readability of all labels and the condition of the warning symbols
- Test of the function of the padlock

CAUTION

What to do in the event of irregularities at the source container

- ▶ If there are any doubts about the operational reliability or proper condition of the device, seek immediate advice from the competent radiation safety officer.
- ▶ Non-routine repairs or maintenance must be performed by the manufacturer or distributor or by a person specially authorized to perform the work.

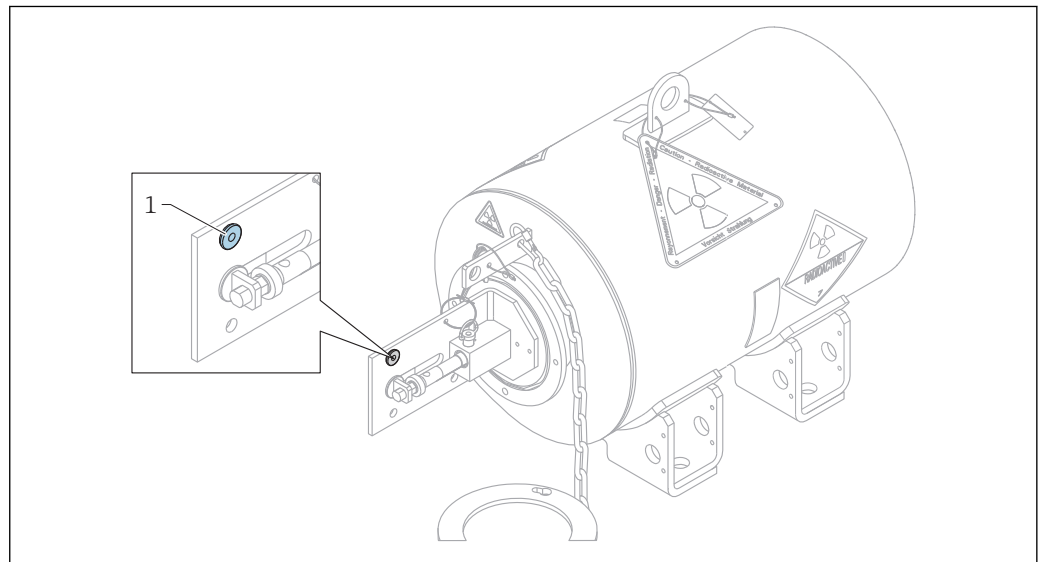
8.2 Maintenance tasks

NOTICE

The following maintenance tasks must be performed together:

- ▶ Check the O-rings (inspection interval as per national specifications)
- ▶ Wipe test - wiping surface on the source holder rod (as per national specifications)

8.2.1 Reference O-ring



1 Reference O-ring

NOTICE

O-ring is cracked or chemically corroded

- ▶ Contact your Endress+Hauser sales organization
- ▶ Replace the reference O-ring and the O-ring between the source holder and the protection pipe
- ▶ Replace the O-rings on the cover

8.2.2 Wipe test

The capsule enclosing the radiation source must be checked for leaks at regular intervals. The frequency of the leak tests must correspond to the intervals specified by the authority or handling authorization.

NOTICE

Leak test

A leak test is not only required as part of routine checks but must also be performed whenever an incident occurs that may impair the casing around the radiation source. In such cases, the leak test must be arranged by the competent radiation safety officer, with due consideration to the applicable regulations. The leak test must comprise both the source container and all other affected parts of the process vessel and must be performed as quickly as possible after the incident. The leak test procedure described below is intended for the following situations:

- ▶ For routine tests during continuous operation
- ▶ When the source container has been in storage for an extended period
- ▶ When the source container is to be put back into operation after storage

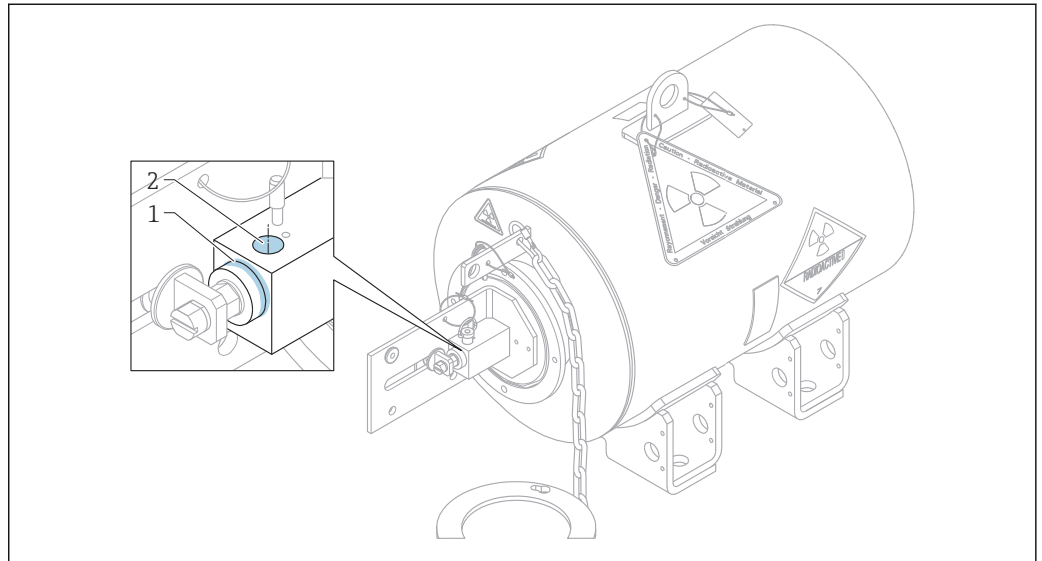
Leak test procedure

Leak tests must be performed by a person or an organization authorized to provide leak test services, or using a leak test kit. Leak test kits must be used according to the manufacturer's instructions. Records of the leak test results must be retained.

Unless otherwise instructed, perform the leak test as follows:

Manual version (order code 020, option A)

- i** The wipe test can be performed when the source holder is in either the "EIN/ON" or "AUS/OFF" position.



- 1 Wiping surface at border between source holder and housing block
2 Wiping surface in the bore hole of the lock pin

1. The wipe sample must at least be taken at the border between the source holder and the housing block, or in the bore hole of the lock pin if necessary.
2. Have the samples analyzed by an authorized organization. A source is considered to be leaking if more than 185 Bq (5 nCi) is detected in the leak test sample.

- i** This limit value applies for the US. National regulations may specify other limits.

NOTICE

The radiation source is leaking

- ▶ Notify the radiation safety officer and follow his/her instructions.
- ▶ Take appropriate measures to prevent a potential spread of radioactive contamination from the source. Secure the radiation source.
- ▶ The competent authority must be notified that a leaking radiation source has been detected.

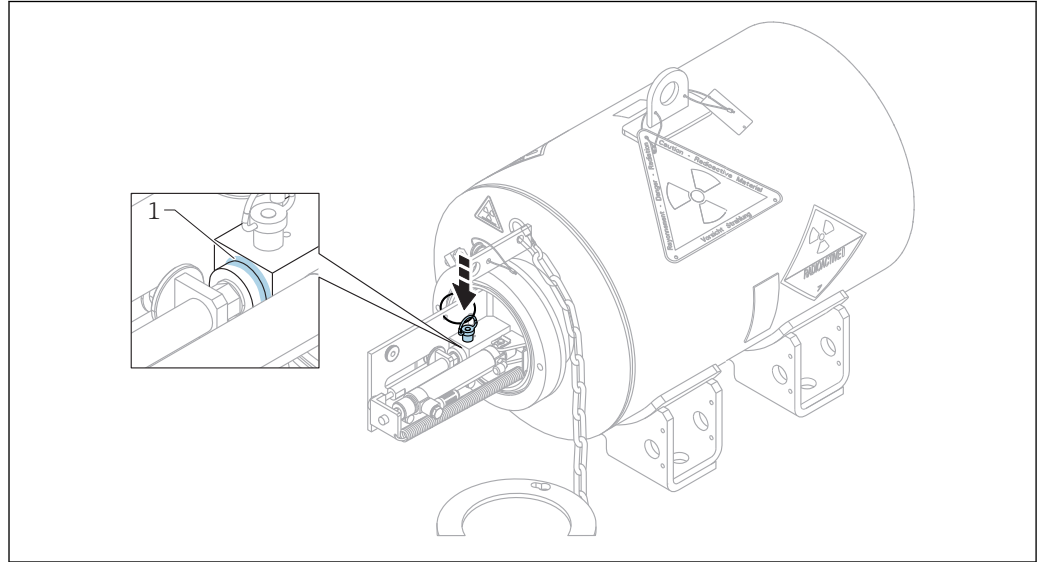
Pneumatic version (order code 020, option L)

CAUTION

Risk of injury when cover is open

- ▶ Make sure that the pneumatic drive is unpressurized for the entire time the cover is removed!

- i** Before performing the wipe test, disconnect the pneumatic drive from the compressed air supply and fix it in place in the "AUS/OFF" position with the lock pin.



A0026816

1 Wiping surface

1. The wipe sample must at least be taken at the border between the source holder and the housing block.
2. Have the samples analyzed by an authorized organization. A source is considered to be leaking if more than 185 Bq (5 nCi) is detected in the leak test sample.

- i** This limit value applies for the US. National regulations may specify other limits.

NOTICE

The radiation source is leaking

- ▶ Notify the radiation safety officer and follow his/her instructions.
- ▶ Take appropriate measures to prevent a potential spread of radioactive contamination from the source. Secure the radiation source.
- ▶ The competent authority must be notified that a leaking radiation source has been detected.

8.2.3 Cleaning

Clean the device at regular intervals. When doing so, observe the following:

- Clean the device of substances which impact the safety function
- Keep labels legible
- Clean the labels with a damp cloth

CAUTION

- ▶ All the safety instructions must be taken into consideration when cleaning.

8.2.4 What to do in the event of corrosion

If there are clear signs of corrosion at the source container, the local dose rate around the device must be measured. If the value is significantly above the normal operation levels, cordon off the area and notify the radiation safety officer responsible.

CAUTION

What to do if the radiation source container is damaged

- ▶ Corroded source containers must be replaced immediately
- ▶ Only use a genuine spare part to replace a damaged padlock

8.3 Measuring and test equipment

Dosimeter to check the control zone

8.4 Endress+Hauser services

Endress+Hauser offers a wide variety of services for maintenance such as recalibration, maintenance service or device tests.



Your Endress+Hauser Sales Center can provide detailed information on the services.

9 Emergency procedure

9.1 Objective and overview

This emergency procedure shall be put into effect immediately to secure an area in the interests of protecting personnel where an exposed source is known, or suspected, to exist.

Such an emergency exists when a radioisotope is exposed either by it becoming separated from the source container or a source container cannot be put into the "AUS/OFF" position. This procedure will safeguard the personnel until the responsible radiation safety officer will attend site and advise on corrective action.

The custodian of the radioactive source (the customer's designated "authorized person") is responsible for observing this procedure.

9.2 Emergency procedure

1. Determine the unsafe area by on-site measurement.
2. Cordon off the concerned area by yellow tape or rope and post international radiation warning signs.

9.2.1 The shutter cannot be switched to the "AUS/OFF" position

In this case the radiation source container should be unbolted from its mounting position and

- in case the radiation emission channel is located horizontally: put the emission channel towards a very thick wall, or
- in case the radiation emission channel is located vertically: put the source container on its device base on the ground

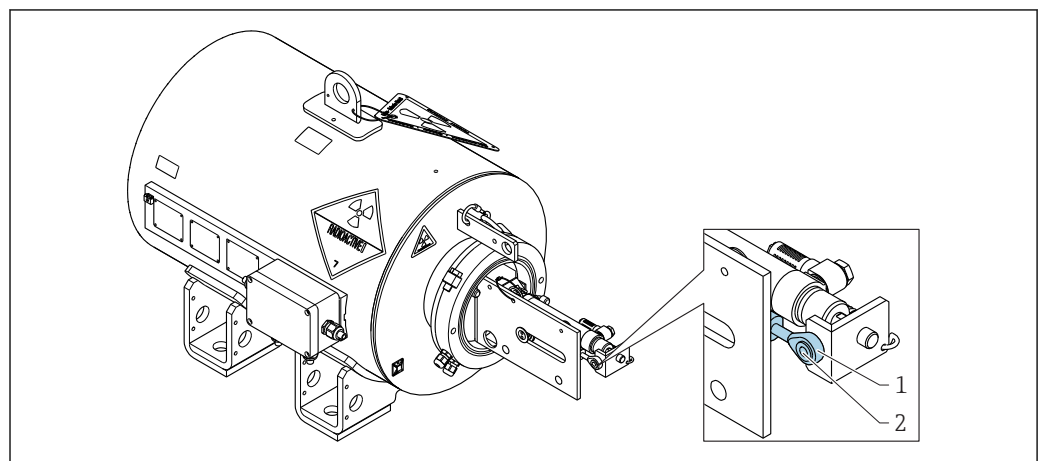
CAUTION

Risk of injury

- ▶ Use lifting tools due to the weight of approx. 435 kg (959.18 lb).

In case of a shutter that will not close due to failure of the pneumatic drive:

Switch off or disconnect compressed air, remove supply lines if necessary. Remove the protection cap. Unscrew the connection screw between the eye bolt at the end of the source holder rod and the pneumatic drive. Move the source holder rod to "AUS/OFF" position and secure it by the means of the locking bolt.



- 1 Eye bolt
- 2 Connection screw

A0027945

9.2.2 The radiation source is outside from the source container

WARNING

High radioactive radiation

- ▶ Observe radiation safety rules!

In this case, the radiation source must be placed at a safe location or additional shielding must be applied.

CAUTION

Handling of the source

- ▶ The source should only be handled via pliers or tongs and held as far away from the body as possible.
- ▶ The time needed for the transport should be estimated and minimized by rehearsal without radiation source prior to execution.

9.3 Notification to authority

1. Make necessary notifications to local authorities within 24 h.
2. After thorough assessment of the situation, the responsible radiation safety officer, in conjunction with local authorities, shall agree a remedy to the specific problem.

 National regulations may require other procedures and reporting obligations.

10 Repair

10.1 General notes

NOTICE

Repairing the source container

- ▶ The source container may only be repaired according to local regulations and/or the handling permit by certified, specially trained personnel whose radiation exposure is monitored. Ensure that this is allowed by the handling permit. All local conditions must be taken into consideration.
- ▶ All work must be carried out as quickly as possible and as far away as possible from the radiation source (shielding!). Suitable measures (e.g. blocking of access etc.) must also be taken to protect other individuals from all possible risk.
- ▶ Repair is only permitted with the switch in the "AUS/OFF" position, secured by the lock pin.
- ▶ Take the weight of the source container into consideration: max. 435 kg (959.18 lb)
- ▶ For more information about service and spare parts contact Endress+Hauser Service: www.endress.com/worldwide.


10.2 Spare parts

W@M Device Viewer (www.endress.com/deviceviewer):

All the spare parts for the measuring device, along with the order code, are listed here and can be ordered. If available, users can also download the associated Installation Instructions.

10.3 Endress+Hauser services

Endress+Hauser offers a wide range of services.

 Your Endress+Hauser Sales Center can provide detailed information on the services.

10.4 Return


10.4.1 Federal Republic of Germany

Contact your Endress+Hauser sales center to organize the return of the radiation source for inspection with a view to reuse or recycling by Endress+Hauser.

10.4.2 Other countries


Contact your Endress+Hauser sales center or the appropriate authority to find a way of returning the radiation source in your country. If it is not possible to return the device in your country, the next steps to be taken must be agreed with the Endress+Hauser sales center/representative concerned. The destination airport for any returns is Frankfurt am Main, Germany (FRA).

10.4.3 Conditions

 If necessary, Endress+Hauser will provide a pallet for returning the device.

The following conditions must be met before returning the device:

- An inspection certificate no more than three months old and confirming the leak-tightness of the radiation source must be submitted to Endress+Hauser (wipe test certificate). The wipe test can be performed on the source itself or on substitute wipe surfaces as defined in the "Maintenance work" section.
- The serial number of the radiation source, the type of isotope (^{60}Co or ^{137}Cs), the nominal activity and the date of manufacture of the radiation source as per the radiation source certificate must be provided. This information can be found in the documents supplied with the radiation source.
- The container may not show severe signs of corrosion, which could call into question the safe storage of the source.
- The container may not show signs of serious mechanical damage from fire, falls or collisions.
- The "EIN/ON" and "AUS/OFF" mechanism must be in correct working order, as described in the "Operation" section.
- The source container must be secured in the "AUS/OFF" position using the lock pin.
- If there are any doubts about the integrity of the source container, the source must be returned in a separate Type A transportation cask. Contact your Endress+Hauser sales office for this purpose.
- The aforementioned checks must be confirmed in an inspection report. The inspection report must be enclosed when returning the product.
- The transport index must be determined in accordance with IAEA safety requirements TS-R-1 (<https://www.iaea.org/publications/7987/security-in-the-transport-of-radioactive-material>) or in accordance with national standards. The radiation source container and any secondary packaging must be labeled accordingly.
- The leak test certificate, the manufacturer's certificate for the radiation source and the duly completed pre-return inspection report must be sent to Endress+Hauser in advance before returning the device.



 Following successful inspection, the FQG6x source container is suitable for shipment as a Type A package. The Type A labeling on the radiation source container itself is, however, no longer valid for any subsequent device returns. Before the container is returned, it must be relabeled according to international regulations concerning the transportation of hazardous materials (ADR/RID, DGR/IATA).

10.4.4 Pre-return inspection

Company	
Name	
Address	
Name of inspector and role	

Container	FQG6_ - _____
-----------	---------------

Radiation source	
Isotope	<input type="checkbox"/> ¹³⁷ Cs <input type="checkbox"/> ⁶⁰ Co
Source serial number	
Nominal activity (MBq / GBq)	
Date of manufacture	

Checks	Result	
		
Wipe test report not older than 3 months is enclosed with the return shipment documents		
A copy of the manufacturer's certificate of the source is enclosed with the return shipment documents		
No significant signs of corrosion which could put the safe storage of the source at risk.		
No signs of serious damage on the container from fire, falls or collisions.		
"EIN/ON" and "AUS/OFF" mechanism works according to the Operating Instructions		
The container is in the "AUS/OFF" position and secured with a padlock		
The transport index has been determined		
The container is labeled according to international regulations concerning the transportation of hazardous materials (ADR/RID, DGR/IATA)		

Date

Signature

10.5 Disposing of the measuring device

WARNING

Danger to personnel and environment from fluids that are hazardous to health.

- ▶ Ensure that the measuring device and all cavities are free of fluid residues that are hazardous to health or the environment, e.g. substances that have permeated into crevices or diffused through plastic.

Observe the following notes during disposal:

- ▶ Observe valid federal/national regulations.

- ▶ Ensure proper separation and reuse of the device components.



www.addresses.endress.com
