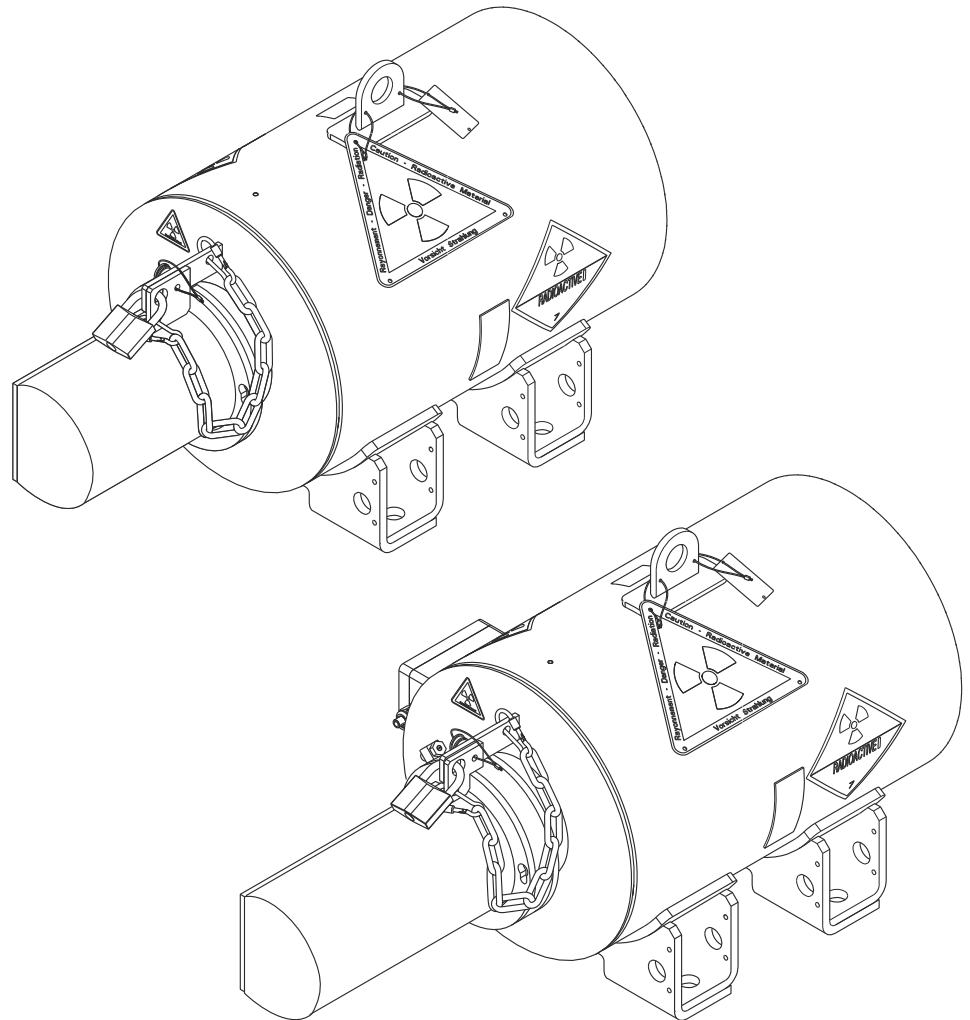


Operating Instructions

FQG66 source container

Radiometric level measurement



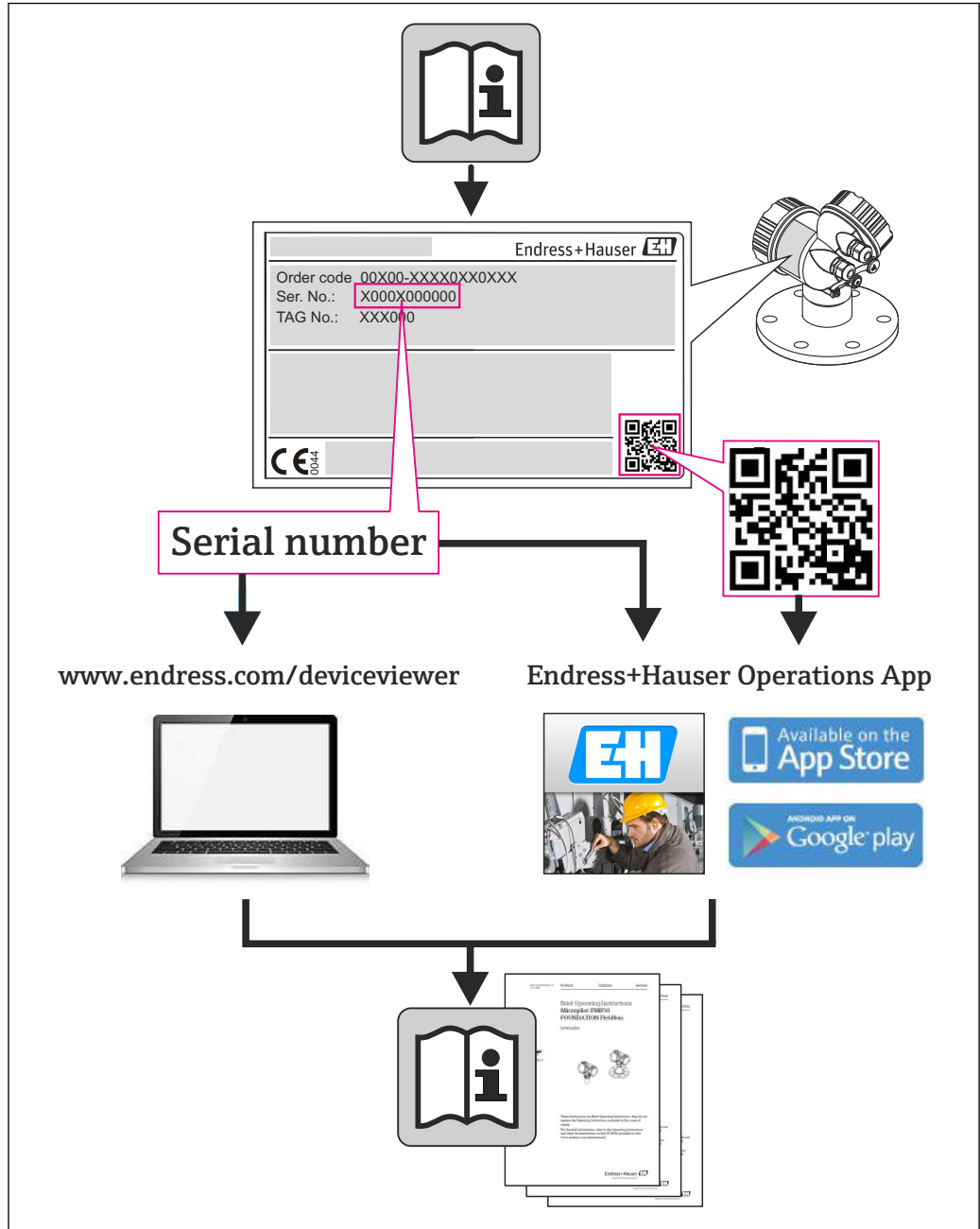


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1 Document information

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 used

1.2.1 Safety symbols

Symbol	Meaning
	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.
	NOTE! 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

Symbol	Meaning
 A0027384	Radiation symbol Warns against radioactive substances or ionizing radiation.
 A0011182	Permitted Indicates procedures, processes or actions that are permitted.
 A0011183	Preferred Indicates procedures, processes or actions that are preferred.
 A0011184	Forbidden Indicates procedures, processes or actions that are forbidden.
 A0011193	Tip Indicates additional information.
 A0011194	Reference to documentation Refers to the corresponding device documentation.
 A0011195	Reference to page Refers to the corresponding page number.
	Series of steps

1.2.3 Symbols in graphics

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

1.3 Documentation

Document	Purpose and content of the document
Technical Information TI01171F/00	Planning aid for your device 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.
Special Documentation SD00297F/00	Instructions for loading and changing the source
Technical Information TI00439F/00	Gamma radiation source FSG60, FSG61



The following document types are available:

In the Download Area of the Endress+Hauser web site: www.endress.com → Downloads

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 beginning work, the specialist staff must have read and understood the instructions in the Operating Instructions and supplementary documentation as well as in the certificates (depending on the application)
- ▶ Following instructions and basic conditions

The operating personnel must fulfill the following requirements:

- ▶ Being instructed and authorized according to the requirements of the task by the facility's owner-operator
- ▶ Following the instructions in these Operating Instructions

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.

In the case of non-stationary plants or applications, it is absolutely essential to switch the source container to the "AUS/OFF" position (radiation source is switched off) before transporting the device.

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 in proper technical condition and fail-safe condition only.
- ▶ 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, despite this, modifications are required, consult with Endress+Hauser.

Repairs

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.
- 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 respectively.

⚠ 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.

NOTICE

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

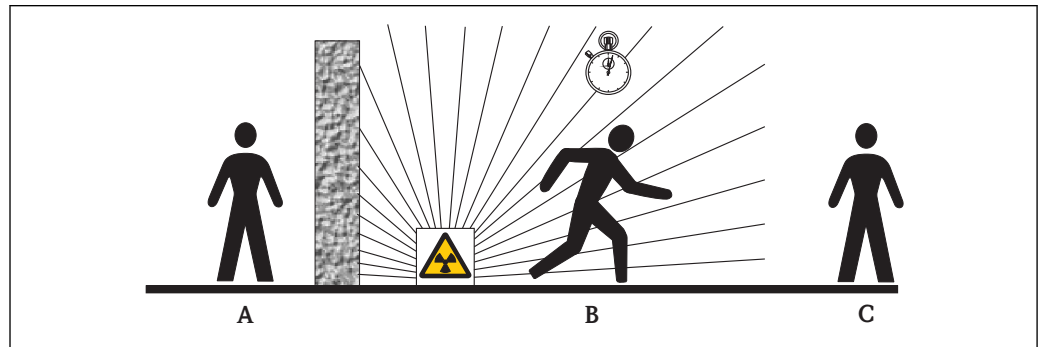
- ▶ Do not use source containers with a proximity switch or pneumatic drive in hazardous areas.
- ▶ Source containers with a manual drive and without a proximity switch can be used in hazardous areas.

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.

2.8 Radiation protection basics

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:



A0016373

- A Shielding
 B Time
 C Distance

2.8.1 Shielding

Ensure the best possible screening between the radiation source and yourself and all other persons. Effective shielding is provided by source containers (e.g. FQG60, FQG61, FQG62, FQG63, FQG66) and all high-density materials (lead, iron, concrete etc.).

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 Radiation Protection Directive applies. In particular, the following points derived from this directive are 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 Directive applicable for your area.

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

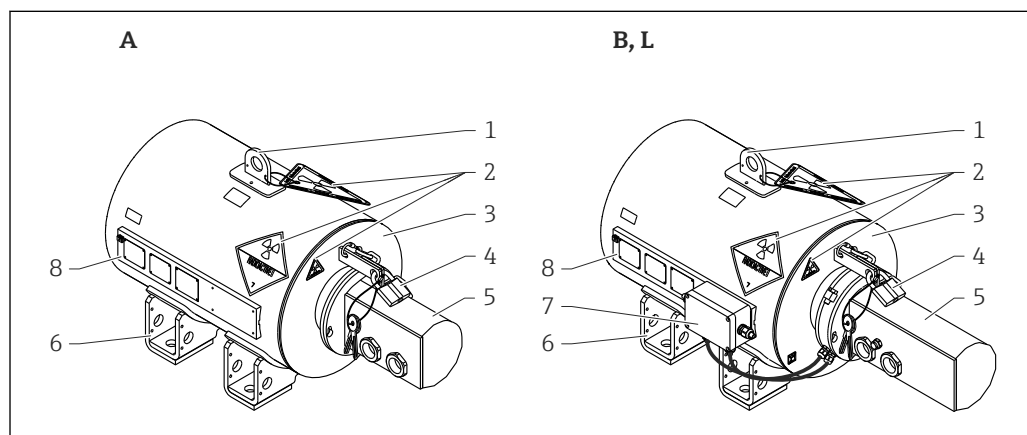
2.10 Supplementary safety instructions

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"	Properties
Option model <ul style="list-style-type: none"> ▪ A "Manual operation" ▪ B "Manual operation + proximity switch" 	<ul style="list-style-type: none"> ▪ Lock pin to secure the "EIN/ON" and "AUS/OFF" switch position ▪ Option model B with proximity switch
Option model <ul style="list-style-type: none"> ▪ L "Pneumat. drive + proximity switch" 	<ul style="list-style-type: none"> ▪ Pneumatic drive with proximity switch ▪ "EIN/ON" switch position: pressurized ▪ "AUS/OFF" switch position: unpressurized



A0023516

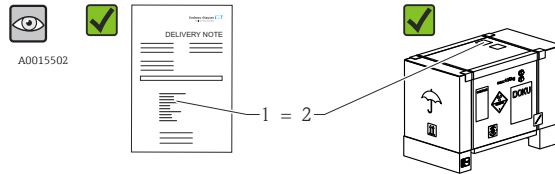
- A Manual operation
 B Manual operation + proximity switch
 L Pneumatic drive + proximity switch
 1 Lifting eye
 2 Radiation symbols: fitted when FQG66 is loaded
 3 Radiation source container
 4 Padlock
 5 Operating unit with protection cap
 6 Bracket for mounting
 7 Terminal housing
 8 Sign holders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

4 Incoming acceptance and product identification

4.1 Incoming acceptance

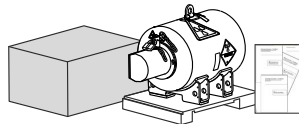
The radiation source container also serves as Type-A packaging (IATA rules) for the radiation source.

Package dimensions (L x B x H): 905 x 500 x 650 mm (35.6 x 19.7 x 25.6 in)

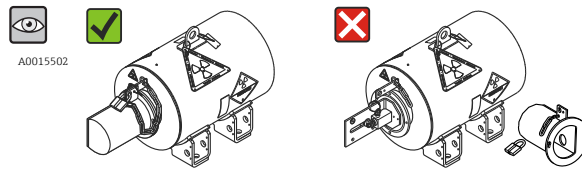


Are the order codes on the delivery note (1) and the product sticker (2) identical?

A0023565

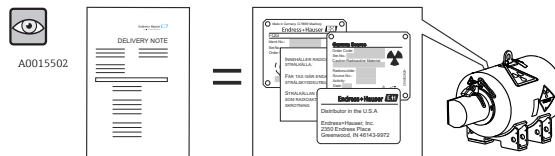


A0023561



Are the goods undamaged?

A0023554



Do the nameplate data match the ordering information on the delivery note?

A0023684



If required (see nameplate): Are the safety instructions (XA) present?

A0022494

i If one of these conditions is not met, please contact your Endress+Hauser sales office.

4.2 Product identification

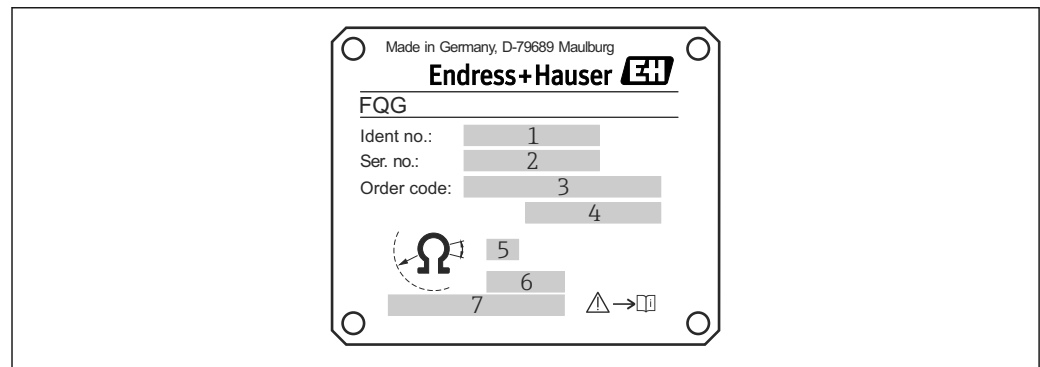
The following options are available for identification of the measuring device:

- Nameplate specifications
- Extended order code with breakdown of the device features on the delivery note
- Enter serial numbers from nameplates in *W@M Device Viewer* (www.endress.com/deviceviewer): All information about the measuring device is displayed.
- Enter the serial numbers on the nameplates into the *Endress+Hauser Operations App* or scan the 2-D matrix code (QR code) on the nameplate with the *Endress+Hauser Operations App* : all the information about the measuring device is displayed.

For an overview of the technical documentation provided, enter the serial number from the nameplates in the *W@M Device Viewer* (www.endress.com/deviceviewer)

4.2.1 Nameplate

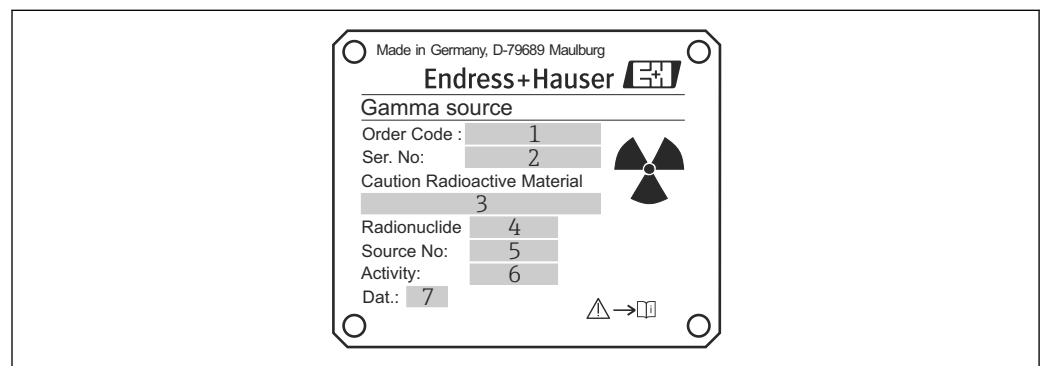
Nameplate of the device



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 radiation path)

Nameplate of the radiation source

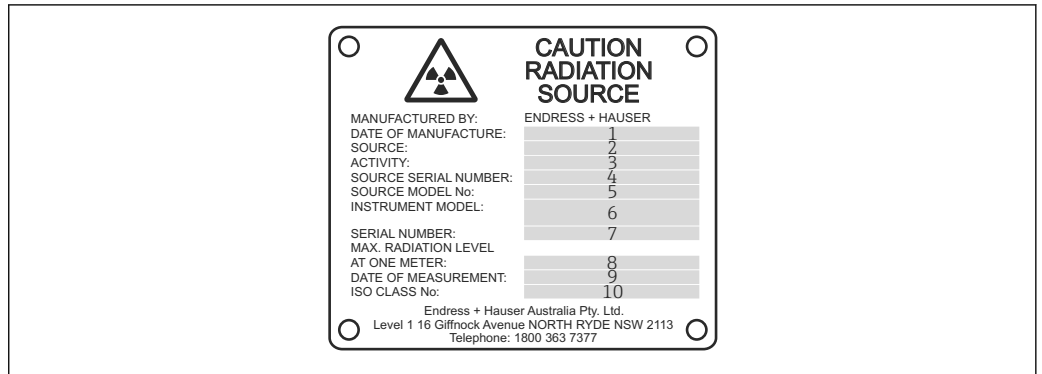


A0026744

- 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)

Additional nameplate

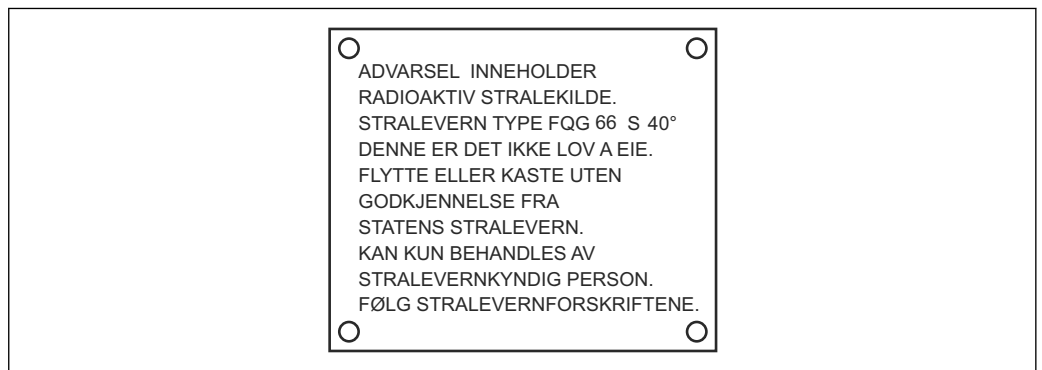
Australia



A0026743

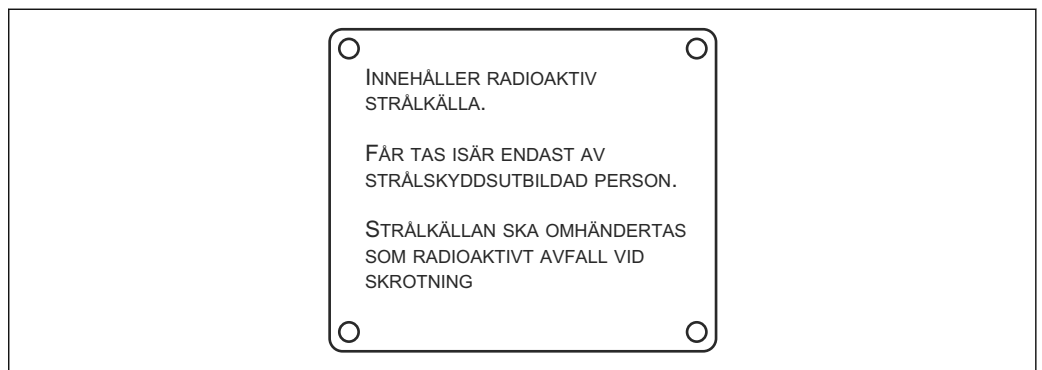
- 1 *Date of manufacture of radiation source*
- 2 *"Co60" or "Cs137"*
- 3 *Activity including unit (MBq or GBq)*
- 4 *Serial number of radiation source*
- 5 *Order code of radiation source*
- 6 *Internal Endress+Hauser order code for the radiation source*
- 7 *Internal Endress+Hauser serial number for 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



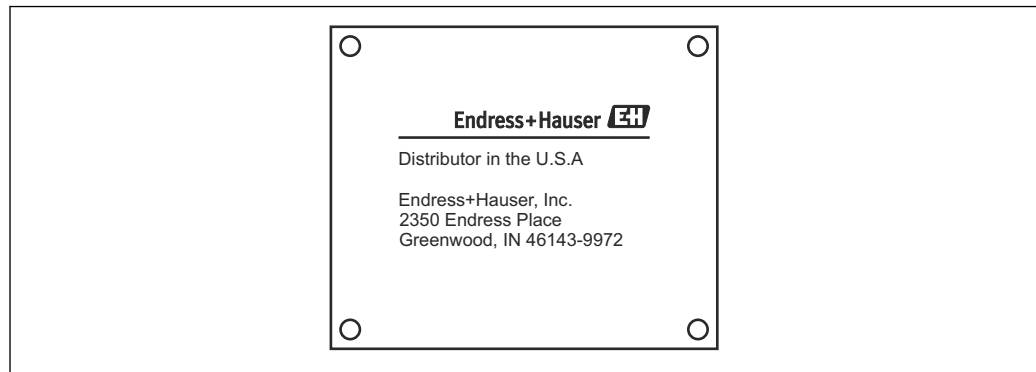
A0027290

Sweden



A0026742

USA



A0027291

4.3 Storage and transport

4.3.1 Storage conditions

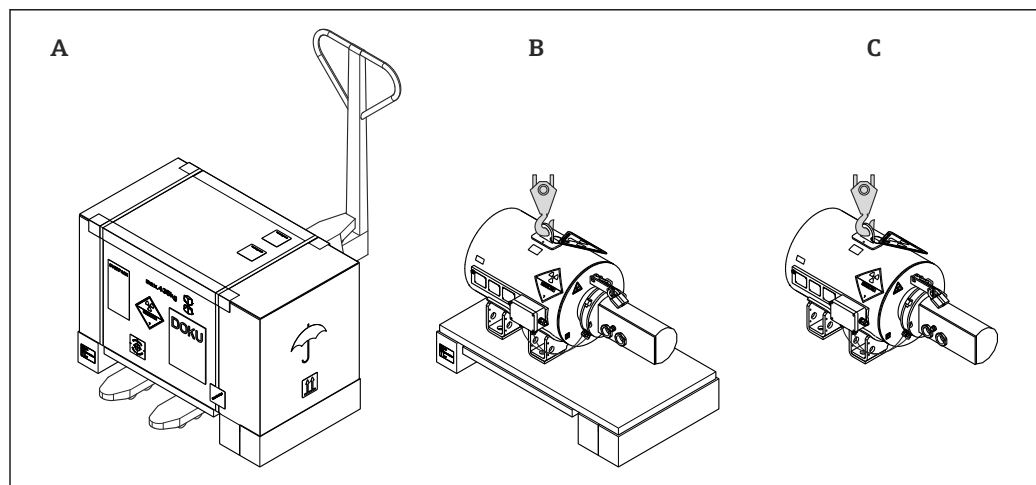
- Permitted storage temperature:
 - Order code 020 "Version", option A "Manual operation":
-55 to +100 °C (-67 to +212 °F)
 - Order code 020 "Version", option B "Manual operation + proximity switch", option L "Pneumat. drive + proximity switch":
-20 to +80 °C (-4 to +176 °F)
- Use original packaging.

4.3.2 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).



A0026817

- A Transportation of the measuring device to the measuring point in the original packaging
- B Transportation of the measuring device to the measuring point by crane with the measuring device screwed to the pallet
- C Transportation of the measuring device to the measuring point by crane using the lifting eye

5 Installation

5.1 Installation conditions

The radiation source container can be mounted in one of the following ways:

- 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

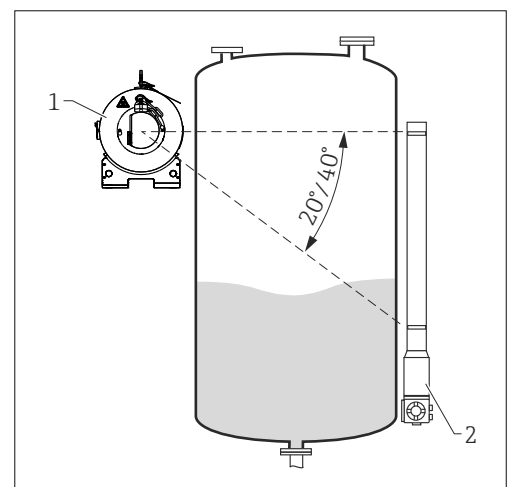
- ▶ The source container may only be mounted according to local regulations and/or the handling permit by certified, specially trained personnel whose radiation exposure is monitored. Ensure that this is allowed by the handling permit. Local conditions must be taken into consideration.
- ▶ Do not mount the source container in an upright position (i.e. with the cover pointing upwards or downwards).
- ▶ All work must be carried out as quickly as possible and at as large a distance as possible from the radiation source (shielding!). Suitable measures (e.g. cordoning off access) must also be taken to protect other individuals from any possible risks. Abschrankung etc) zu verhindern.
- ▶ 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.

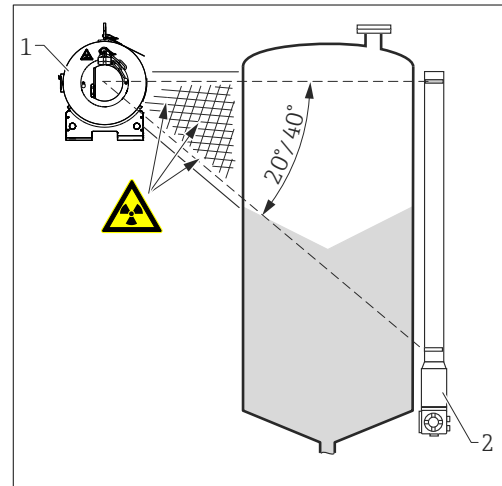
The radiation must be aligned exactly with the detector mounted on the opposite side. The source container and detector should be mounted as close as possible to the product vessel to avoid control zones.



A0023674

- 1 FQG66: Order code 240 "Angle of emission", option 3 "20 degrees, horizontal" or option 5 "40 degrees, horizontal"
- 2 Gammapilot M FMG60

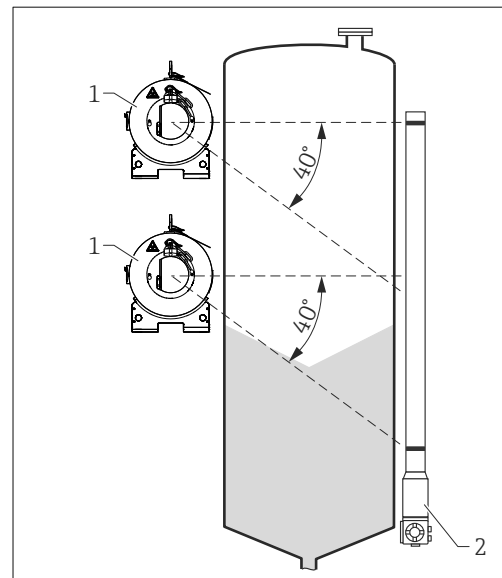
A distance between the source container and the product vessel is often unavoidable if the measuring range is large and the container diameter small. This space must then be secured by grip protection and marked accordingly.



A0023677

- 1 FQG66: Order code 240 "Angle of emission", option 3 "20 degrees, horizontal" or option 5 "40 degrees, horizontal"
- 2 Gammapilot M FMG60

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.




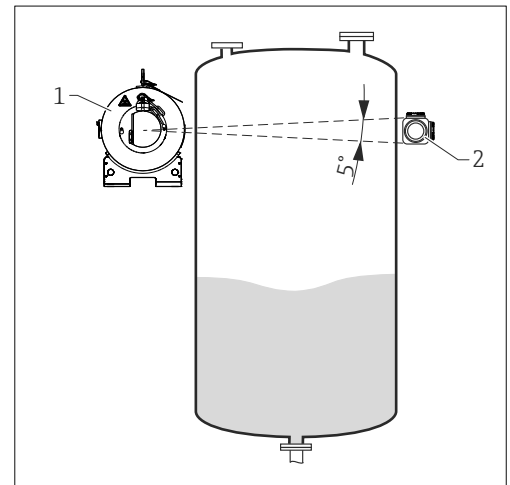
A0023679

- 1 FQG66: Order code 240 "Angle of emission", option 5 "40 degrees"
- 2 Gammapilot M FMG60

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.

-  ■ 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!



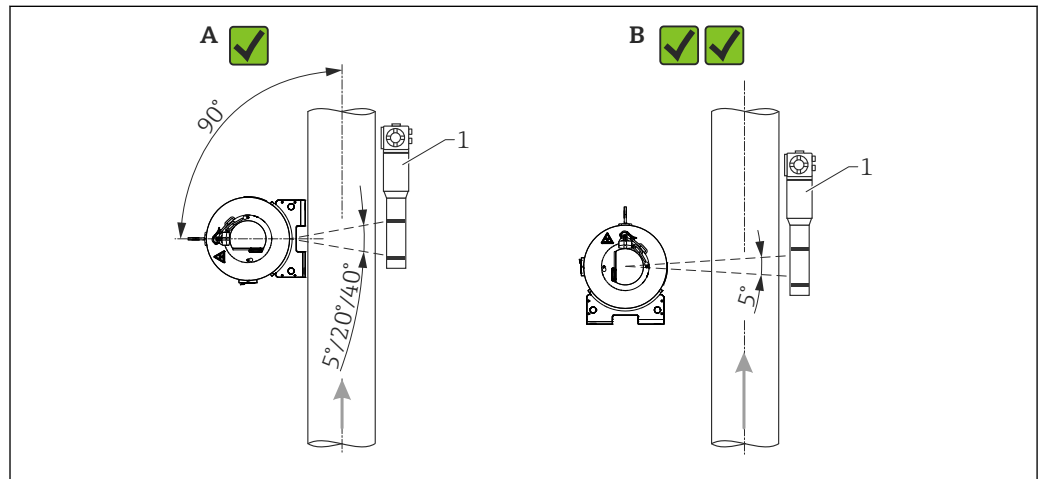
A0023681

- 1 FQG66: Order code 240 "Angle of emission", option 1 "5 degrees, horizontal"
- 2 Gammapilot M FMG60

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 (e.g. Gammapilot M FMG60) against slipping.

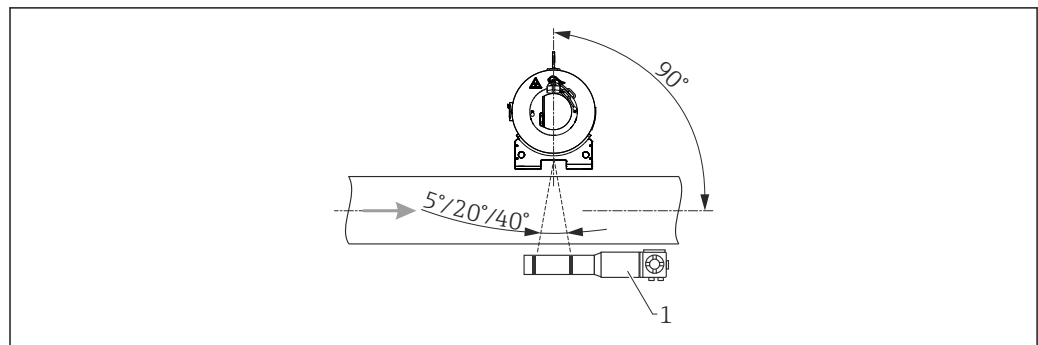


A0023787

- 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 M FMG60

Horizontal pipes

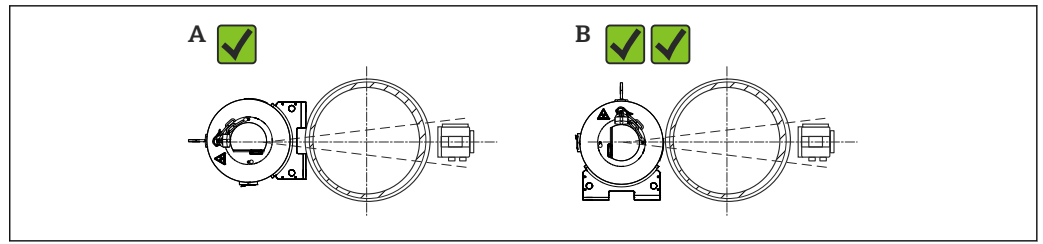
With this type of orientation, it is advisable to mount the FQG66 above the pipe. Attention must be paid to the effect of air bubbles and material buildup in the pipe.



A0023795

- 1 Feature 240 "Angle of emission", option model 2, 4 or 6 "5, 20 or 40 degrees, vertical"
 1 Gammapilot M FMG60

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 fitted in such a way as to withstand the weight of the source container and the detector (e.g. Gammapilot M FMG60) 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 M 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)?
- Does the device conform to the measuring point specifications? For example:
 - Ambient temperature
 - Source activity
 - Angle of emission
- Are the measuring point identification and labeling correct (visual inspection)?
- Are the securing screws tightened securely?

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.

5.3.2 What to do in event of empty process vessel or pipe

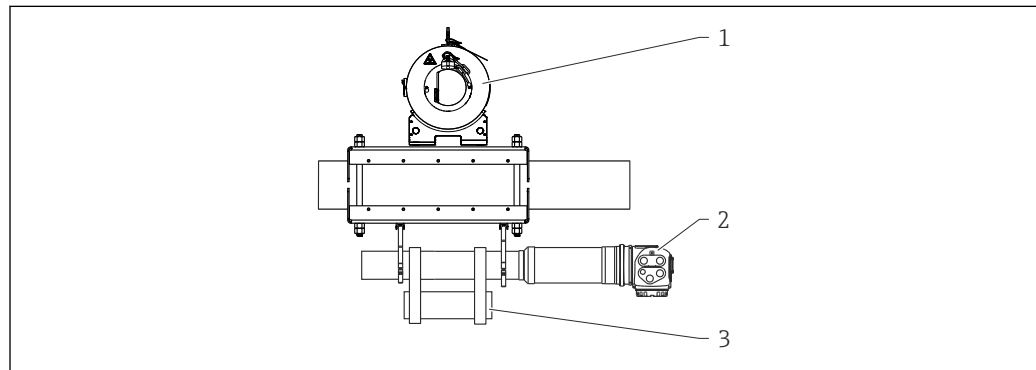
CAUTION

- ▶ 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 FQG66 source container
- 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

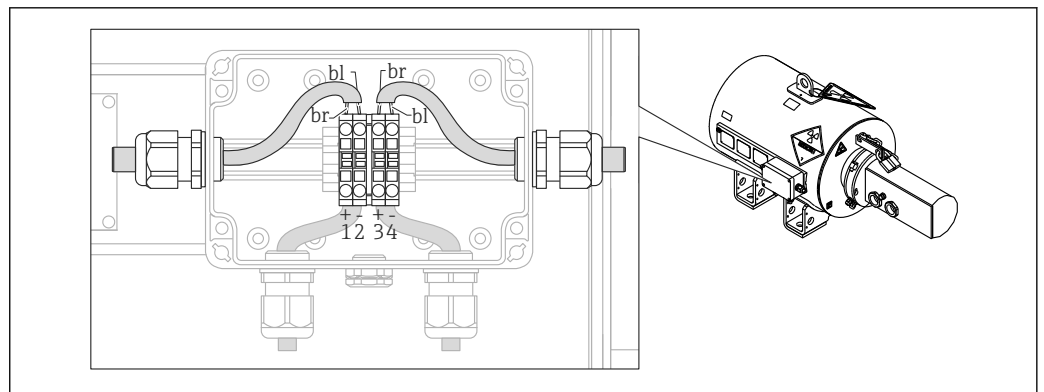
The following specifications apply for single strands for connection to the terminals in the terminal box:

- 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



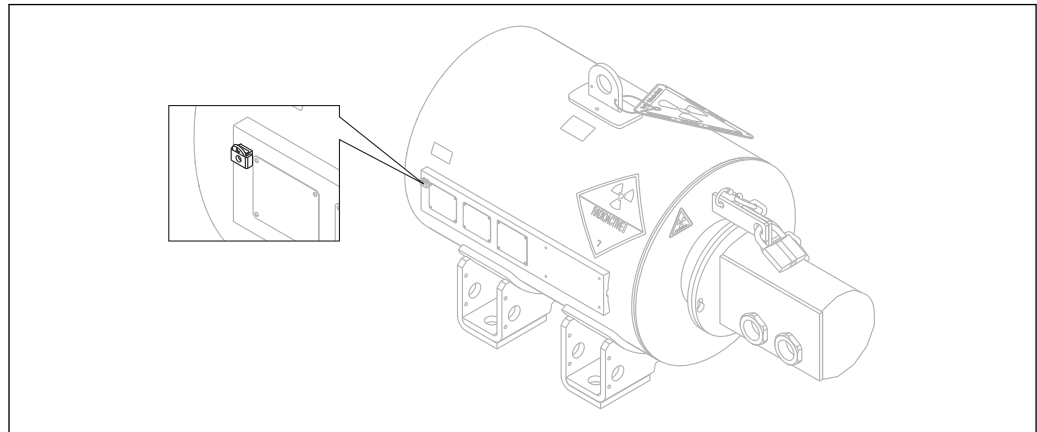
- 1, 2 Proximity switch for "EIN/ON" switch position
 3, 4 Proximity switch for "AUS/OFF" switch position

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: see the following table

	"EIN/ON" switch position	"AUS/OFF" switch position
"EIN/ON" proximity switch	≤1 mA	≥3 mA
"AUS/OFF" proximity switch	≥3 mA	≤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)

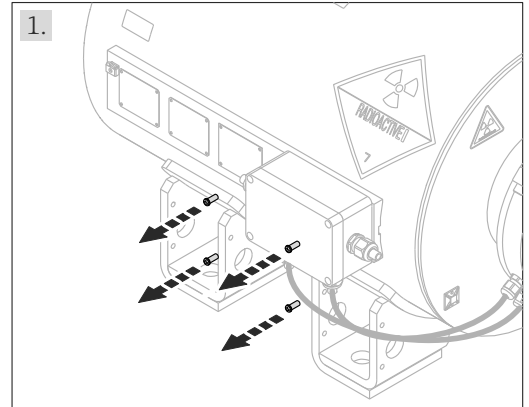
6.2 Connecting the measuring device

6.2.1 Electrical connection

Required tools/accessories:

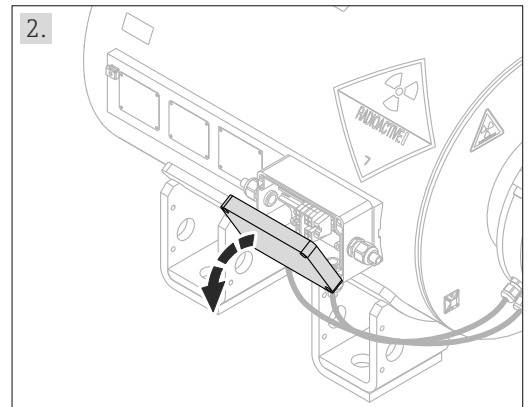
- Wire stripper
- If using stranded cables:
 - One ferrule for every wire to be connected
- Pliers for pressing on the ferrules

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



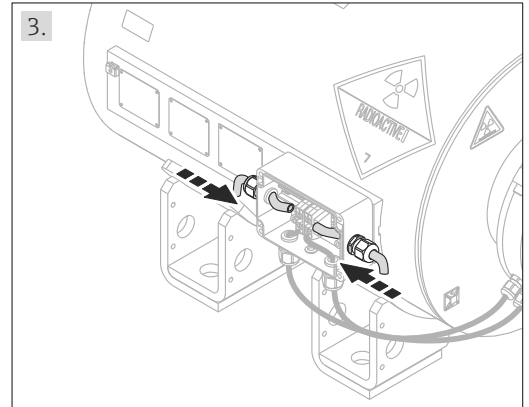
A0027173

2. Fold down the cover of the terminal housing.



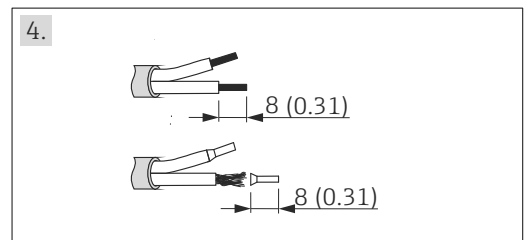
A0027175

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



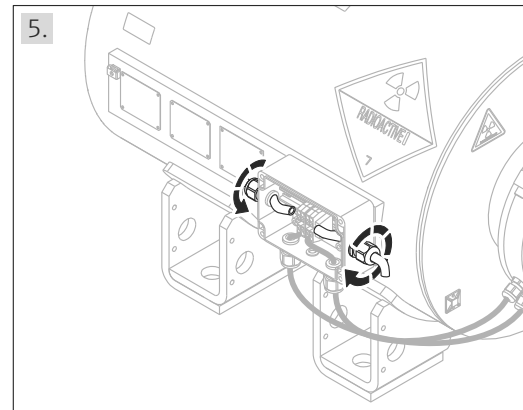
A0027176

4. 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.



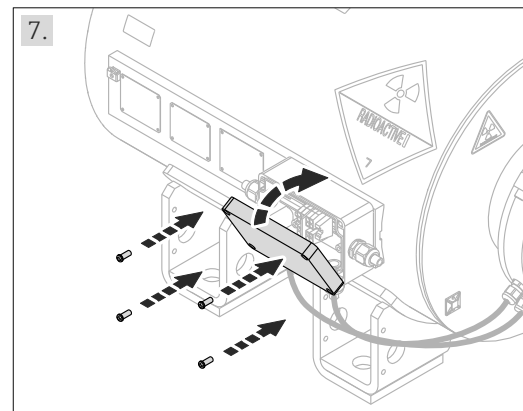
A0027177

5. Firmly tighten the cable gland.



A0027178

6. Connect the cable in accordance with the terminal assignment → 21.
7. Put the cover of the terminal housing back on and fix it in place with the 1/4 turn fasteners.



A0027180

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 comply with the requirements ?
- Do the cables have adequate strain relief?
- Does the supply voltage match the specifications on the nameplate?
- Is the terminal assignment correct → 21?
- If required: has the connection to potential equalization been established → 22?
- 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 →  19
- "Post-connection check" checklist →  24

7.3 Switching ON the measuring device

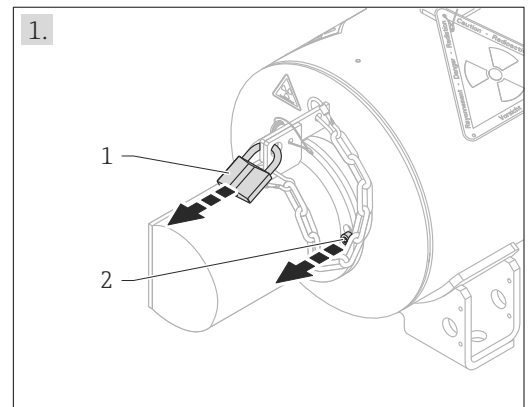
CAUTION

Switching ON the radiation

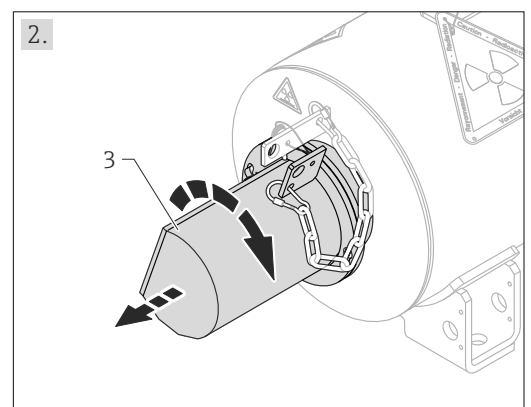
- ▶ Before switching ON the radiation, make sure that no-one is in the radiation zone (or inside the product vessel).
- ▶ The radiation may only be switched ON by properly instructed staff.

7.3.1 Manual version with/without proximity switch

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

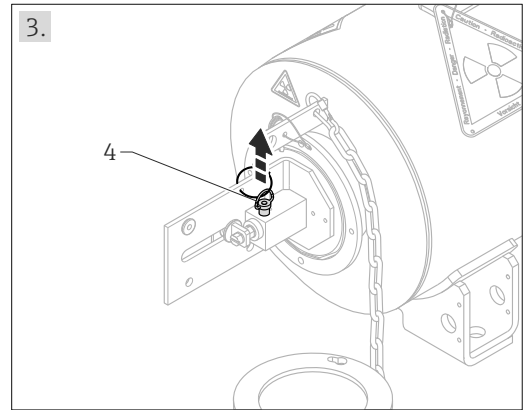


2. Remove the cover (3).



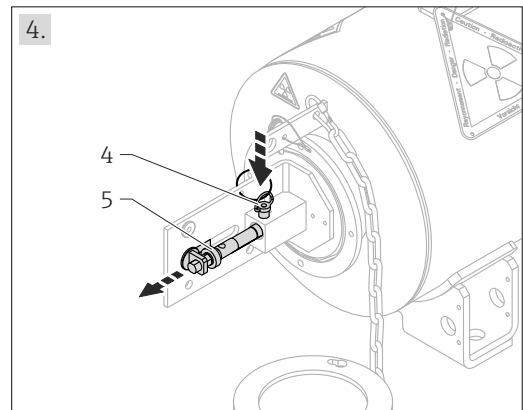
A0027121

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



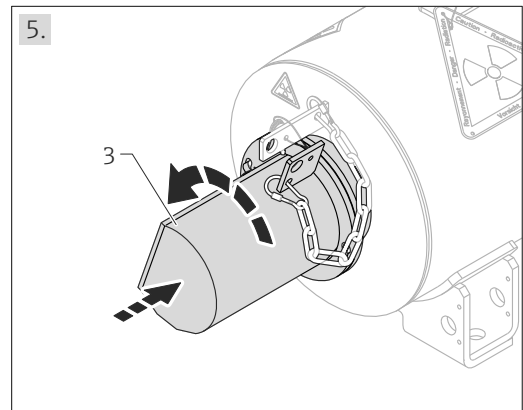
A0027123

4. 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.



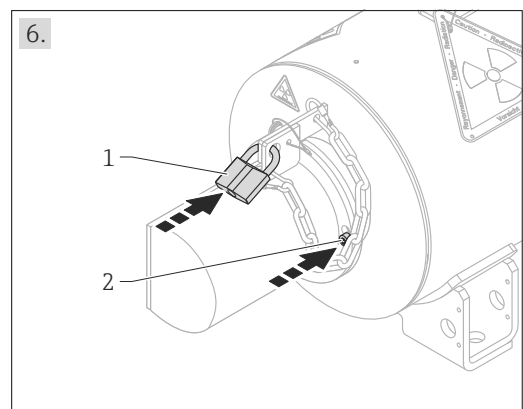
A0027126

5. Fit the cover (3).




A0027127

6. Secure the cover with the screws (2) (6mm across flats) and fit the padlock (1) back on.



A0027128

7.3.2 Pneumatic version

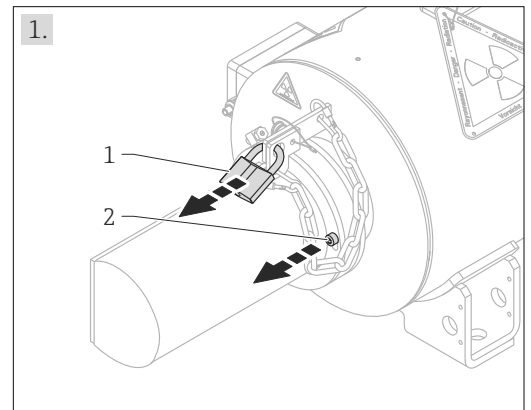
i The measuring device must first be connected to the compressed air supply before the pneumatic version can be put into operation →  21.

CAUTION

Risk of injury when cover is open

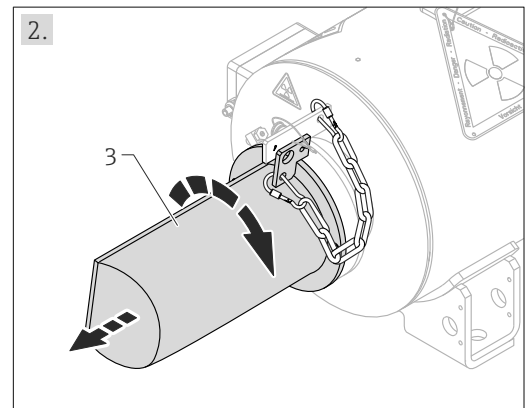
- ▶ Make sure that the pneumatic drive is unpressurized for the entire time the cover is removed!

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



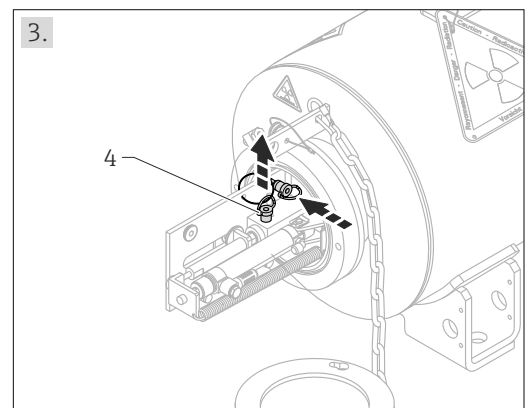
A0027129

2. Remove the cover (3).



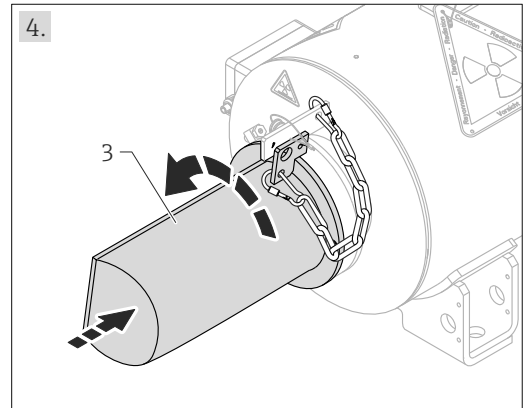
A0027131

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.



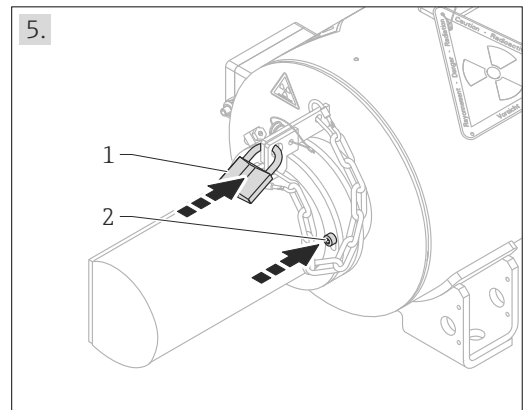
A0027132

4. Fit the cover (3).



A0027133

5. Secure the cover with the screws (2) (6mm across flats) and fit the padlock (1) back on.



A0027134

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

CAUTION

Risk of injury if the device is operated without a cover

- ▶ Only operate the device with the cover mounted.

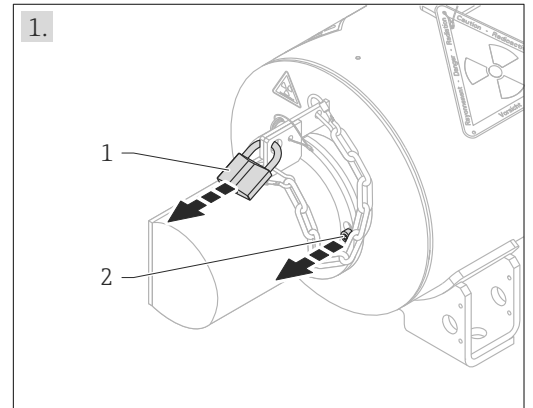
7.3.3 Manual version with/without proximity switch (US version order code 010 "Approval", option AE "NRC")

NOTICE

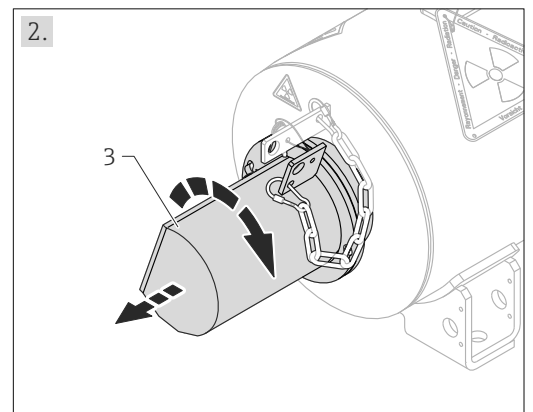
According to NRC requirements, it must be possible to switch off the source container at any time without the need for any special tools (e.g. key for padlock).

- ▶ Follow the instructions below!

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

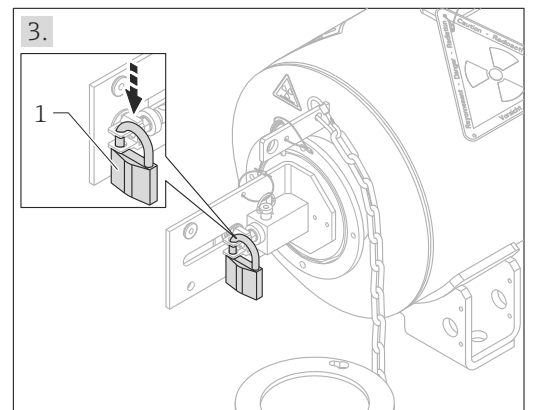


2. Remove the cover (3).



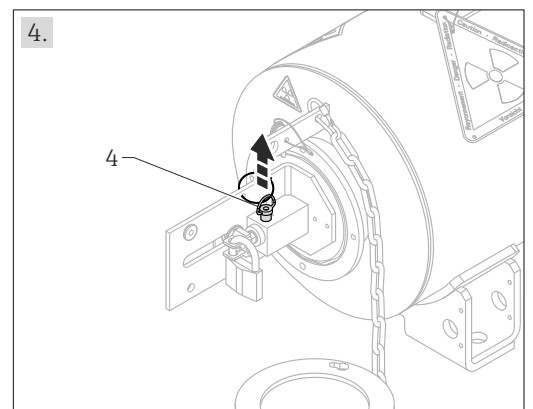
A0027121

3. Fit the padlock (1) on the source retainer.



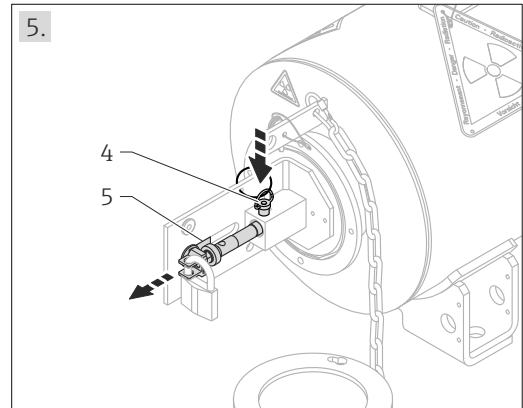
A0027375

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



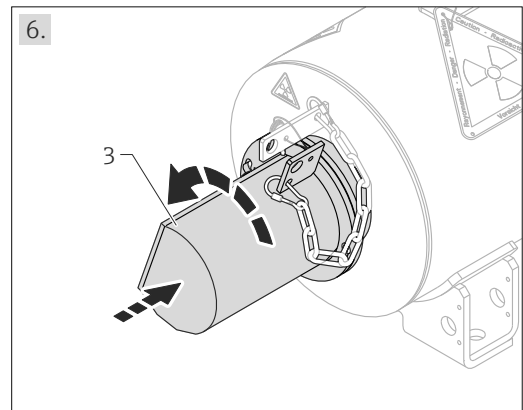
A0027373

5. 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.



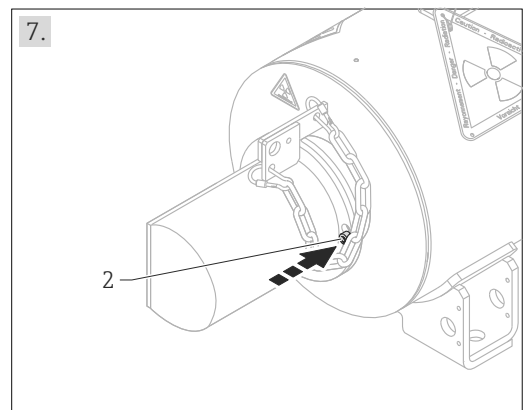
A0027374

6. Fit the cover (3).



A0027376

7. Secure the cover with the screws (2) (6mm across flats)



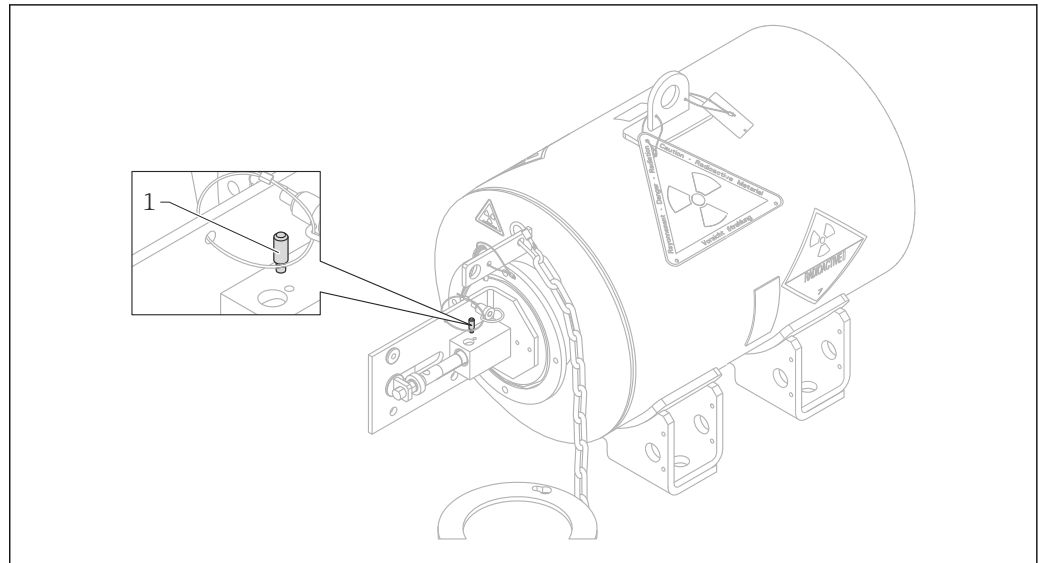
A0027377

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.

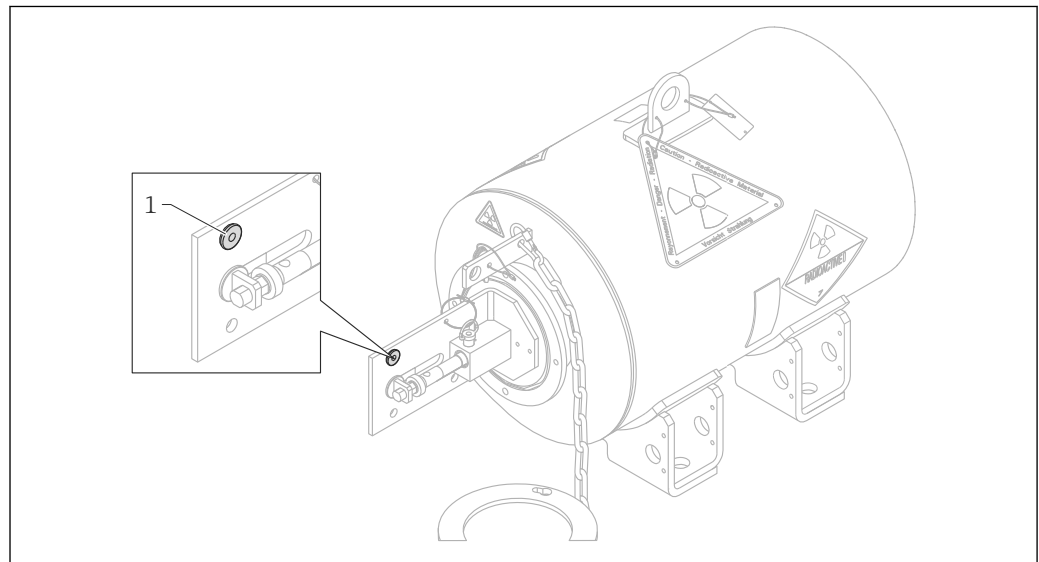
8.2 Maintenance tasks

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



A0026818

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

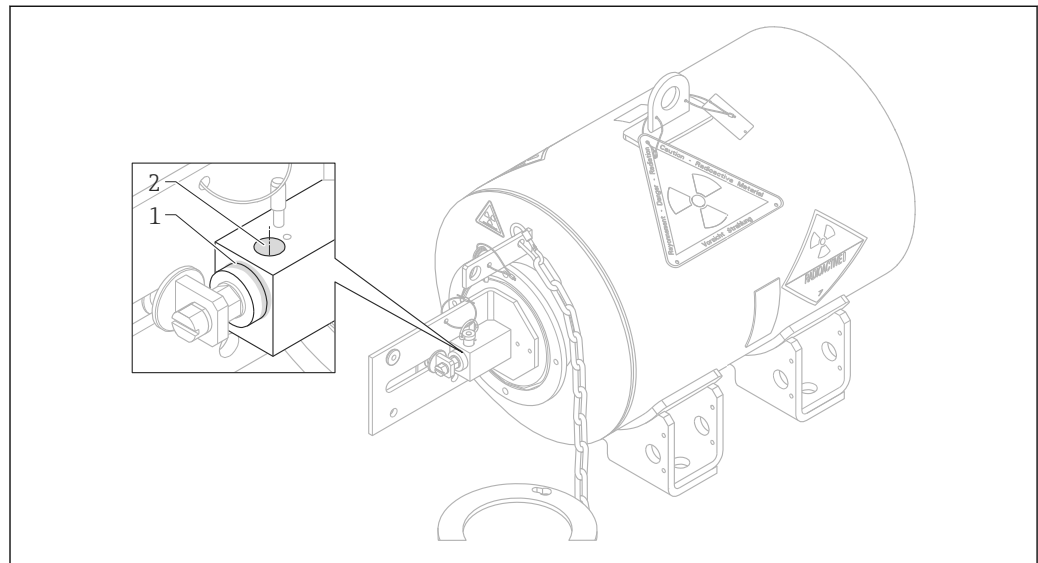
Leak test procedure

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.



A0027388

- 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.

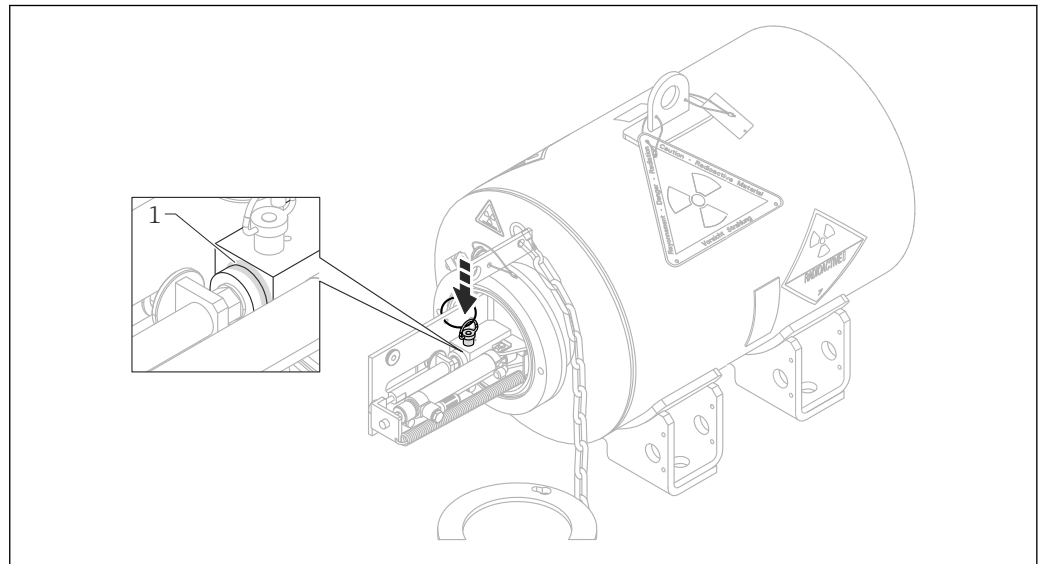
Pneumatic version (order code 020, option L)

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

- ▶ When cleaning the device, all safety instructions must be observed → 6

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 Repairs

9.1 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. Local conditions must be taken into consideration.
- ▶ All work must be carried out as quickly as possible and at as large a distance as possible from the radiation source (shielding!). Suitable measures (e.g. cordoning off access) must also be taken to protect other individuals from any possible risks. Abschränkung etc.) zu verhindern.
- ▶ 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.

9.2 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.

9.3 Endress+Hauser services

 Contact your Endress+Hauser Sales Center for information on services and spare parts.

9.4 Return


9.4.1 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.


9.4.2 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).

9.4.3 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 tasks" 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 work correctly as specified 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 TS-R-1 of the IAEA (http://www-pub.iaes.org/mtcd/publications/pdf/pub1225_web.pdf) 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).

9.5 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.



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