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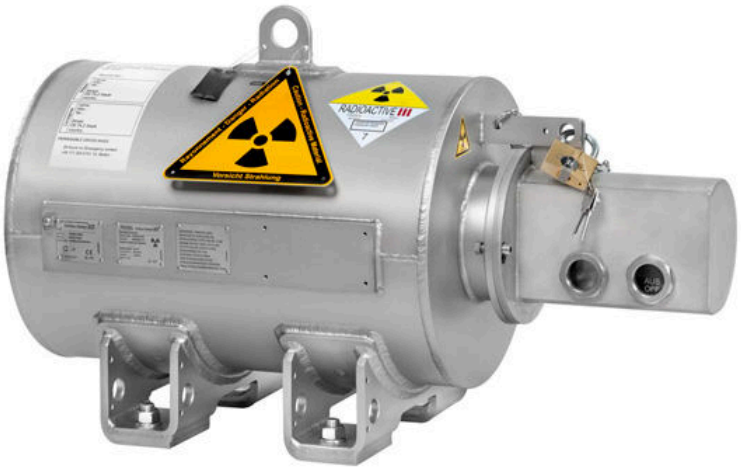
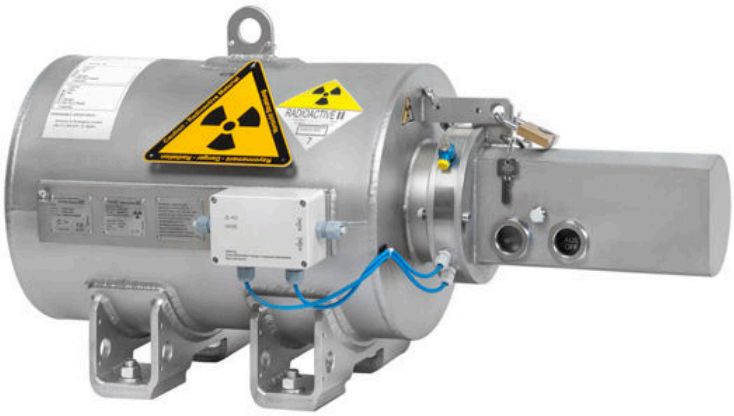
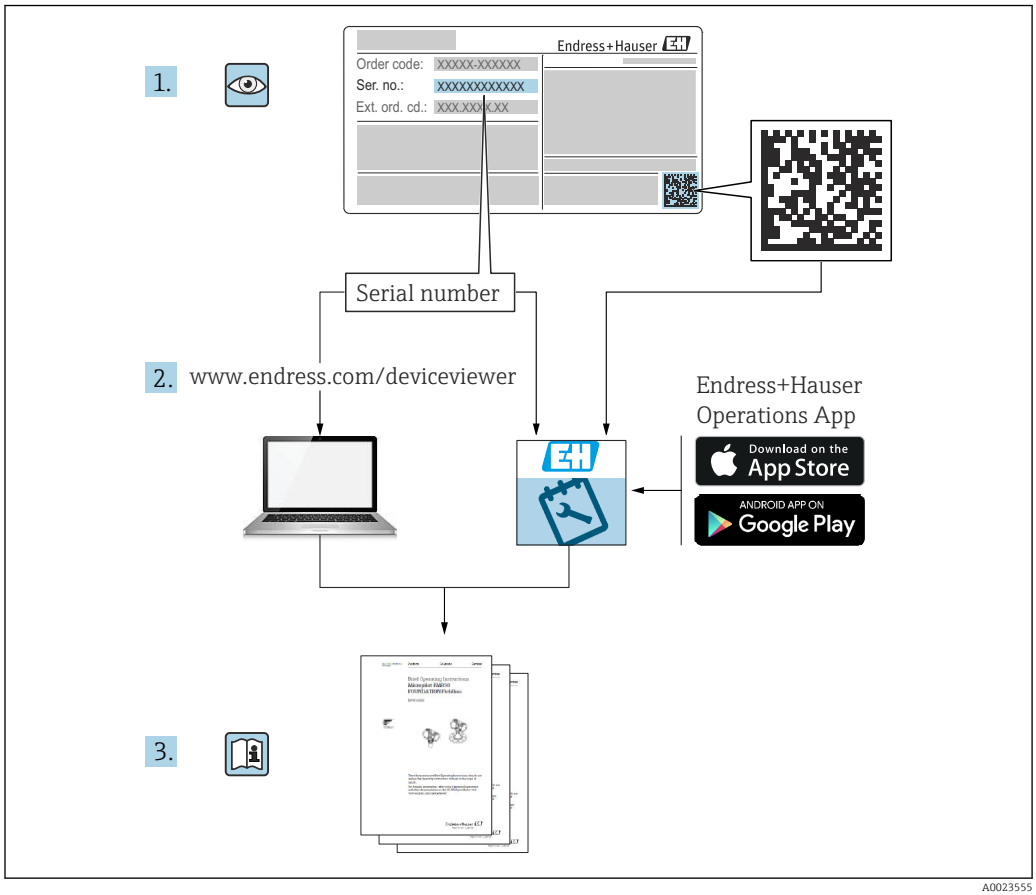
Operating Instructions
Source container FQG66

Radiometric level measurement





Endress+Hauser
People for Process Automation



- Make sure the document is stored in a safe place such that it is always available when working on or with the device
- Avoid danger to individuals or the facility: read the "Basic safety instructions" section carefully, as well as all other safety instructions in the document that are specific to working procedures

The manufacturer reserves the right to modify technical data without prior notice. The Endress+Hauser sales organization will supply you with current information and updates to these instructions.

Table of contents

1 About this document

1.1 Dokumentfunktion

Diese Anleitung liefert alle Informationen, die in den verschiedenen Phasen des Lebenszyklus des Geräts benötigt werden: Von der Produktidentifizierung, Warenannahme, Transport und Lagerung über Montage, Bedienungsgrundlagen und Inbetriebnahme bis hin zur Störungsbeseitigung, Wartung und Entsorgung.

1.2 Symbols

1.2.1 Safety symbols

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

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

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

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

1.2.2 Radiation warning sign

Warning symbol for radioactive source according to ISO 7010

Warning sign for ionizing radiation
Identification of places and objects in and around which the presence of ionizing radiation is to be expected.

Warning symbol for highly radioactive source according to ISO21482

High radiation warning sign
- Warns of highly radioactive substances or ionizing radiation.
- Highly radioactive sources are marked separately on the source containers with the wording "highly radioactive source" and the supplemental warning symbol according to ISO21482.

1.2.3 Symbols for certain types of information and graphics

Permitted
Procedures, processes or actions that are permitted

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

1.2.4 Tool symbols

Phillips head screwdriver

Flat-blade screwdriver

Torx screwdriver

Allen key

Open-ended wrench

Wire cutter

1.3 Documentation

For an overview of the scope of the associated Technical Documentation, refer to the following:
- *Device Viewer* (www.endress.com/deviceviewer): Enter the serial number from the nameplate
- *Endress+Hauser Operations app*: Enter serial number from nameplate or scan matrix code on nameplate.

2 Basic safety instructions

⚠ DANGER

Danger from ionizing radiation in case of incorrect handling or a defective source container

Hazard for persons and the environment posed by ionizing radiation and contamination. Ionizing radiation and contamination could increase the risk of cancer and the risk of genetic birth defects. Depending on the dose received, ionizing radiation could lead to immediate physical harm, such as nausea, vomiting, hair loss, changes to blood count, serious tissue damage and even death.

- **The instructions and warning notes in this manual relating to dangers to health posed by ionizing radiation and contamination must be strictly observed. Disregard for these instructions and warning notes could lead to serious injuries or death and hazards for the environment.**
- Observe applicable national requirements for radioactive radiation sources. Observe requirements for fire protection measures in particular.
- Observe the conditions of use of radiation sources with respect to environmental conditions (e.g. vibration or operating temperature).
- In cases of doubt, contact the responsible radiation safety officer, the responsible national inspectorate or the manufacturer.

In these instructions, warnings about potential risks from ionizing radiation are marked with the warning symbol ☢.

⚠ DANGER

Danger from ionizing radiation if radiation sources lost

If radiation sources are lost, there is a danger to the general public and the environment

- **The instructions and warning notes in this manual relating to dangers to health posed by ionizing radiation and contamination must be strictly observed. Disregard for these instructions and warning notes could lead to serious hazards for the environment and public safety.**
- Observe applicable national requirements for anti-theft measures for radioactive radiation sources throughout the entire life cycle (from delivery to disposal).
- There is a risk of radioactive material being used for criminal or premeditated unauthorized acts, which poses a threat to public safety.

⚠ WARNING

Risk of accident from heavy gross weight

During assembly: If source containers are assembled incorrectly, there is an impact danger to persons in the event of a dropped load and a risk of serious damage to physical items. During transport: In the event of incorrect or unsecured transport of the source container and overpack (loads), there is a risk that persons could go unnoticed or suffer impact because it is not possible to stop in time. Due to a high center of gravity or uneven weight distribution, there is also the risk of the load tipping, which poses a serious risk of personal injury. For suspended loads: There is the danger of persons being impacted by falling loads or parts thereof, of being impacted by moving suspended loads or of bumping into stationary suspended loads. Parts of the overpack and attachment parts of the source container could weigh over 18 kg.

- Observe the assembly instructions.
- Inspect the assembly diligently and check at regular intervals.
- Observe safety instructions and transport conditions for heavy loads.
- Wear personal protective equipment.
- Lift source containers only at the defined lifting points.
- Use only appropriate lifting accessories for the load.
- During assembly and transport, only those persons who are directly involved and have knowledge of guidance and requirements may be present in the danger zone.
- During transport, the center of gravity of the packaging must be taken into consideration and a suitable surface must be ensured.

2.1 Requirements for personnel

⚠ WARNING

Danger from inadequately qualified personnel.

Physical damage and personal injury. Particularly as a consequence of incorrect handling.

- The requirements for personnel described below are mandatory for the plant operator.

Operating personnel

The operating personnel are responsible for operation and monitoring. They switch the radiation on or off, for example. The operating personnel

- must be instructed and authorized by the plant operator according to the requirements of the task, and
- must have a relevant qualification for this specific function and task, in accordance with the relevant national requirements.

Installation and service personnel

The installation and service personnel are responsible for installation, commissioning, maintenance, monitoring, and removal. They must strictly meet the following requirements:

- They must be trained, qualified specialists, having a relevant qualification for this specific function and task, in accordance with the relevant national requirements.
- They must be authorized by the plant operator.
- They must be familiar with federal/national regulations.

Authorized repair personnel

Authorized repair personnel are

- qualified specialists having the appropriate qualification for the relevant function and task and meeting the relevant national requirements,
- authorized by the plant operator and
- familiar with national regulations.

Maintenance personnel – radiation

Maintenance personnel (radiation) carry out any maintenance work affecting the radiation source, including disassembly and replacement. The maintenance personnel – radiation are

- accredited and monitored in relation to radiation exposure
- They must be trained specialists in radiation protection and
- authorized by the plant operator.

Transport personnel

Transport personnel transport the product or parts thereof from, for example, the manufacturer or storage location to the point of use. Transport personnel

- are qualified to transport "Class 7 dangerous goods".

Disposal personnel

Disposal personnel dispose of the product or parts thereof. Disposal personnel are

- accredited and monitored in relation to radiation exposure,
- specialists qualified in radiation protection and
- authorized by the disposal company.

Radiation safety officer

The radiation safety officer is responsible for compliance with all applicable laws and regulations. The company/plant operator must nominate a radiation safety officer in accordance with applicable national legislation. The radiation safety officer is, among other things, responsible for

- monitoring the source container at the respective point of use,
- the training of employees in the context of radiation protection and

- developing and implementing measures in an emergency. The radiation safety officer is therefore reachable at all times.

The radiation safety officer is
- qualified for the task,
- a nationally recognized person for the task and
- a specialist authorized by the plant operator.

2.2 Intended use

The source containers shield the radiation from the environment, only allowing radiation to escape during measurement operations within the measuring application.

The source containers described in this document contain the radioactive radiation sources used for radiometric point level, level and density measurement.

The following are considered intended uses:
- Use as a transport and storage vessel according to hazardous class 7 and as source container in the measuring application
- Exclusive use with radioactive, double-encapsulated materials in special form, in accordance with ISO 2919
- Replacement of radiation sources when the same source capsule type is used

For intended use, the following conditions must be met:
- The instructions and handling guidelines in the Operating Instructions, particularly the radiation protection instructions, must be followed.
- Areas of use must be within the limits of technical specifications.
- Only the radiation sources specified in the technical specifications must be used, in compliance with the maximum activity levels specified there.

2.2.1 Foreseeable incorrect use

Endress+Hauser assumes no liability for damage resulting from improper use.

The following is not permitted:
- Operation outside the technical specifications
- Attaching the lifting gear to points not intended for this purpose
- Permanent process installation of the source container in a suspended state
- Commissioning or switching on radiation while the source container is in a suspended state
- Transporting the source container with an open shutter
- Use with insufficient protection of the radiation sources against corrosion

2.3 Workplace safety

For work on and with the device

1. In case of any doubt in relation to correct handling, contact Endress+Hauser Service.
2. Make detailed preparations to ensure that the source container is installed as quickly and efficiently as possible. Provide all necessary tools and equipment before starting work.
3. Observe all instructions in this manual when working on the source container.
4. When working with radiation sources, avoid any unnecessary exposure to radiation.
5. Keep all unavoidable radiation exposure to a minimum.
6. Implement suitable measures (e.g. blocking of access, shielding) to prevent danger to people.
7. Observe applicable national requirements.

2.4 Operational safety

The “protection from ionizing radiation” function could be affected by damage, tampering, modification or repair. There is a threat of radiation damage or extremely serious injuries.

In cases of doubt in relation to operational safety, the source container must not continue to be used under any circumstances.

The product's suitability as a source container and as a shipping package for the transport of radioactive materials of special form is ensured only when
- all tests and maintenance have been carried out to the manufacturer's specifications and
- no modifications or tampering have been carried out.

The manufacturer offers no guarantee of after-sales service or take-back if modifications have been carried out.

Maintaining operational safety:
- ▶ By carrying out maintenance and formal periodic inspections, make sure that the device is in technically flawless and operationally safe condition.
- ▶ Check moving parts, particularly the closing mechanism, regularly. It must be possible for the radiation to be switched off at any time.
- ▶ Adapt checking intervals to environmental conditions. Check more frequently in harsh and corrosive environments.

Modification
Modifications and attachments to the source container are not permitted without the express written authorization of Endress+Hauser.

Repair
- Do not carry out any repairs unless they are permitted repairs. Permitted repairs are described in this operating instructions manual or reference is made in this manual to the appropriate repair documents.
- Use only original spare parts and original accessories.
- Observe notes on radiation protection, particularly self-protection, hazards to third parties, and compliance with legal requirements.

Tampering
- No tampering with the source container is permitted.
- Endress+Hauser offers no guarantee of after-sales service or take-back in this case.

2.5 Product safety

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

It meets general safety requirements and legal requirements.

2.6 Basic instructions for use, transport, and storage

The handling of radioactive radiation sources involves particular risks and dangers and therefore requires special care.

For safe and legal handling

1. Observe the applicable regulations and national/international standards.
2. Comply with radiation protection regulations when using, storing and working with the radiometric measuring system.

If there is any suspicion of improper condition of a plant with radiometric measuring system

1. Inform the radiation safety officer immediately.
2. Check the area around the device for signs of increased radiation or contamination. See section "What to do in an emergency".

In the event of defects

1. Inform the radiation safety officer immediately.
2. Do not continue to use the device, withdraw it from service as quickly as possible and exchange it.
3. Conduct the required leak test according to the applicable regulations and instructions.

Minimizing the hazard potential through good planning and careful conduct

1. The radiation may be switched on only by instructed personnel.
2. Before switching on the radiation, make sure that no-one is in the radiation zone (or inside the product vessel).
3. Heed warning signs and observe controlled areas.
4. When operating, transporting and storing the device, protect it against extreme influences (e.g. chemical products, weather, mechanical impacts, vibrations).
5. Carry out recurrent tests at regular intervals. These include, for example, checking for safe securement of the source container, checking safety measures or checking for integrity.

For storage and transport

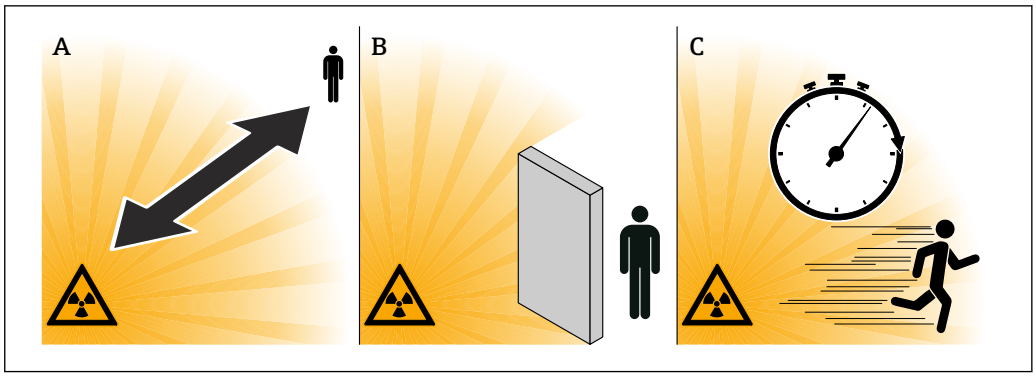
1. Always secure the "AUS/OFF" switch position by using the transport lock and padlock.
2. Carry out recurrent tests before dispatch.
3. Observe the center of gravity and weight information on the packaging.

For use in a potentially explosive atmosphere

1. The use of the radiometric measurement method in potentially explosive atmospheres must be specially checked and implemented by the plant operator based on applicable national rules and regulations.
2. Integrate the device into the potential equalization system of the plant.

2.7 General instructions on radiation protection

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



1 *Protective measures*

A Distance
B Shielding
C Time

Distance

Keep as far away from the radiation source as possible.

The local dose rate decreases in proportion to the square of the distance from the radiation source.

Shielding

Ensure the best possible shielding between the radiation source and personnel.

Effective shielding is provided by source containers and high-density materials (e.g. lead, iron, concrete).

Time

Keep the time spent in the area exposed to radiation as short as possible.

2.8 Legal regulations for radiation protection

The handling of radioactive radiation sources is regulated by law. 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:

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.

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 Ordinance and all radiation protection procedures.

Endress+Hauser offers training courses in which individuals can acquire the necessary specialist knowledge.

Plant operator

The plant operator is responsible for ensuring compliance with all national radiation protection regulations. The operator must also ensure safe operation and adequate qualification of the personnel involved.

Controlled area

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 controlled areas (i.e. areas where the local dose rate exceeds a specific value). The limit values for the controlled area are specified in the current Radiation Protection Ordinance applicable for your area.

For further information on radiation protection and regulations in other countries, please contact the relevant Endress+Hauser sales organization.

2.9 Supplementary safety instructions

Fire and anti-theft protection
To design a safe installation, keeping and storage of the radiation sources, observe the safety measures for the radiation source with respect to fire and anti-theft protection. Implement requirements in accordance with applicable national legislation.

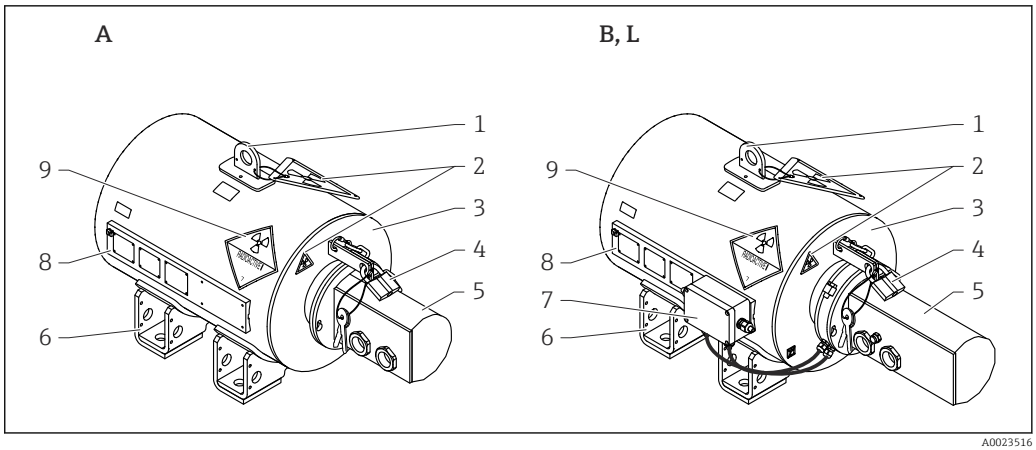
Handling of lead
This device contains more than 0.1% lead with CAS No. 7439-92-1. With the source container in undamaged condition, there is no direct contact with lead.
If the source container suffers damage, national regulations for the handling of lead must be observed.

3 Product description

3.1 Product design

3.1.1 Overview of source container

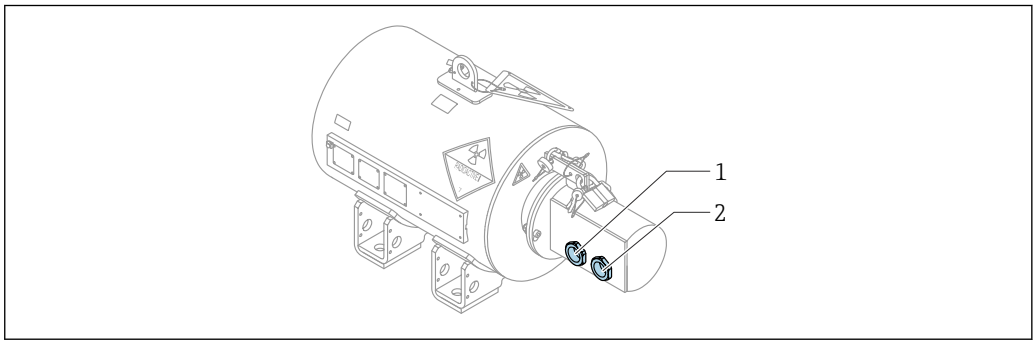
Code 020 "Version"
- A - "Manual operation"
  Lock pin to secure the "EIN/ON" and "AUS/OFF" switch positions
- B - "Manual operation + proximity switch"
  Lock pin to secure the "EIN/ON" and "AUS/OFF" switch positions, with proximity switch
- L - "Pneumat. drive + proximity switch"
  - Pneumatic drive with proximity switch
  - "EIN/ON" switch position: Pressurized
  - "AUS/OFF" switch position: Unpressurized



2 *Overview of versions*

A Manual operation
B Manual operation + proximity switch
L Pneumatic drive + proximity switch
1 Lifting point
2 Radiation warning signs: Fitted when the FQG66 is loaded
3 Source container
4 Padlock
5 Operating unit with protective cover
6 Bracket for mounting
7 Terminal housing
8 Sign holders (for fitting nameplates and connection for potential equalization)
9 "Radioactive" stick-on label for marking packages. Can be removed after transport.

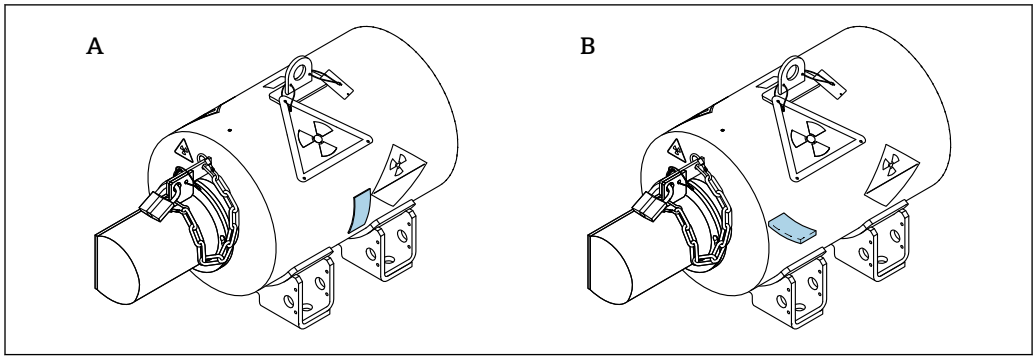
The protective cover is secured with a lock.



3 *Positions of the inspection windows*

1 ON/EIN inspection window
2 AUS/OFF inspection window

3.1.2 Beam exit channel



4 Beam exit areas

A Beam exit area at the side
B Beam exit area at the bottom

Depending on the order, the source container has a beam exit area at the side or at the bottom. See the Technical Information for the exact angle of emission and positions.

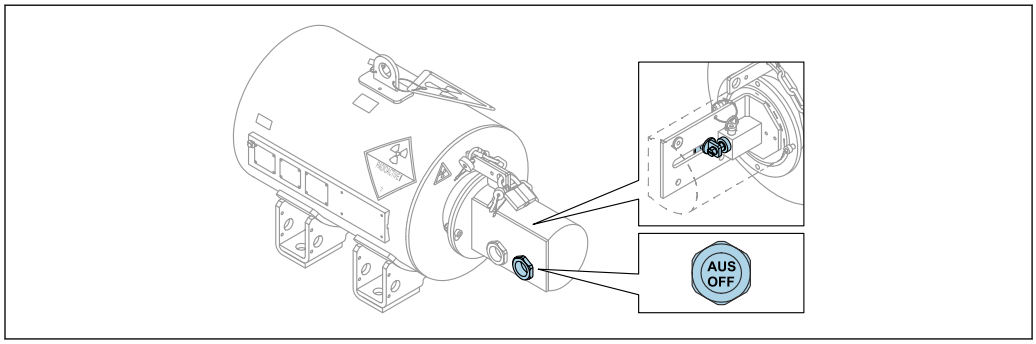
3.2 Shutter

The position of the source holder acts as a shutter.

The "AUS/OFF" or "EIN/ON" position of the shutter can be identified by the inspection windows.

3.2.1 Position of the shutter

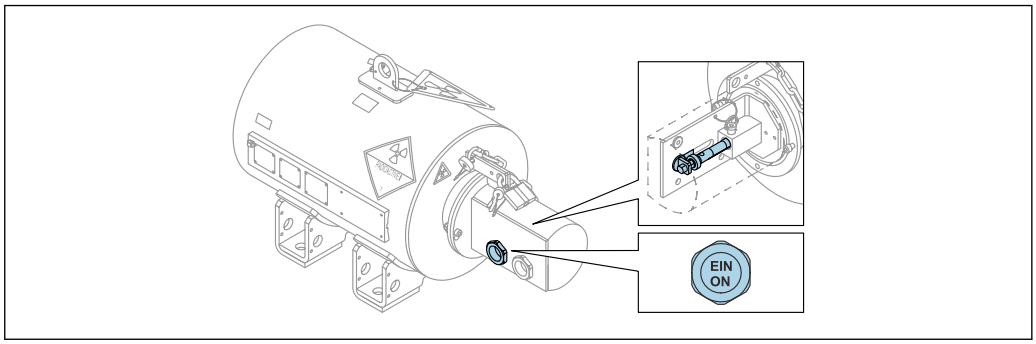
"AUS/OFF" position



5 Source container is switched off.

The path of the beam is closed and the source container is therefore switched off. The "AUS/OFF" position is secured by a padlock. This means that the shutter cannot be moved, even during transport.

"EIN/ON" position



6 *Source container is switched on.*

The path of the beam is enabled and the source container is therefore switched on. Depending on the version, the "EIN/ON" position is secured by a padlock or a locking device to prevent accidental deactivation.

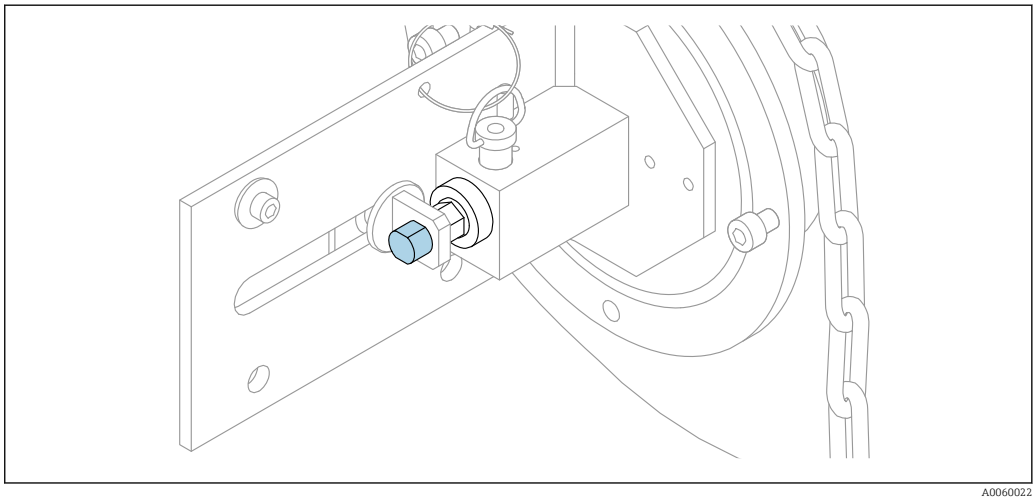
3.3 Source holder

A slidable source holder is located under the cover. The slidable source holder can be moved into the switch position (ON/OFF position) manually or, optionally, pneumatically.

The switch position (ON/OFF position) of the source holder can be identified by two inspection windows.

A lock pin prevents unintentional movement of the slidable source holder. The cover acts as a seal and is secured with a lock.

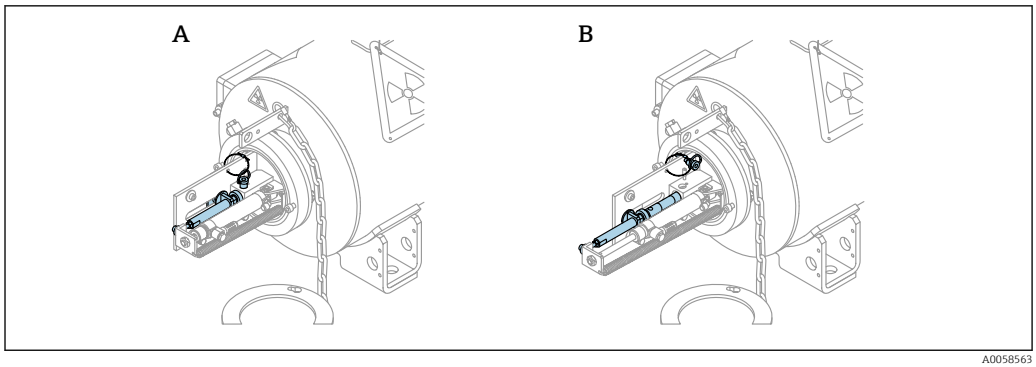
Make sure that you DO NOT operate the screw shown in the figure below.

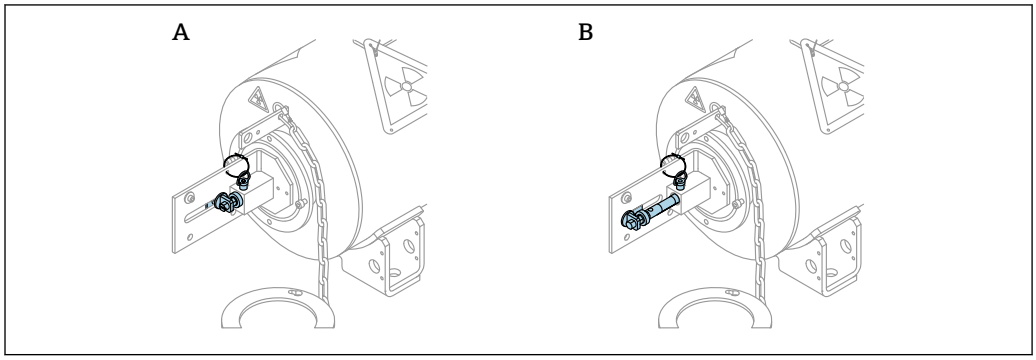


7 *Do not operate the screw on the source holder.*

Position of the source holder

- "OFF/AUS" position: The source holder is fully inserted into the source container and the lock pin is locked in place. This prevents the slidable source holder from being moved by mistake.
  It also provides maximum shielding of the radiation sources.
- "ON/AN" position: The source holder protrudes further from the container, the radiation source is now at the height of the exit channel and the lock pin is locked in place. This prevents the slidable source holder from being moved by mistake.





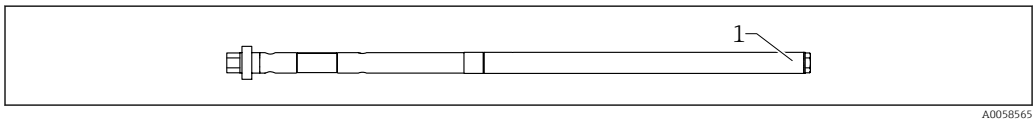
8 Position of the source holder

A Source container in "OFF/AUS" position
B Source container in "ON/AN" position

3.4 Radiation sources

The radiation sources used are provided in the product structure.

The radiation sources are accommodated in the source holder protection cap (front part of the source holder).



9 Rigid source holder with source holder protection cap

1 Source holder protection cap

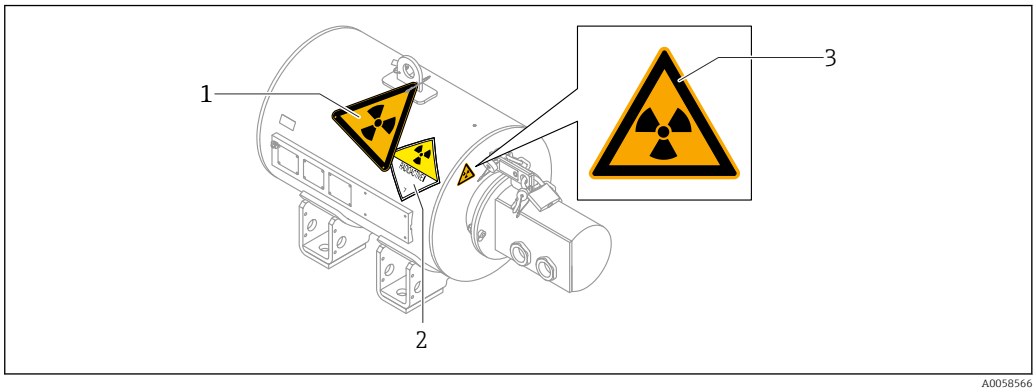
3.5 Radiation warning signs

- The radiation warning signs warn of ionizing radiation.
- The radiation warning signs must be fitted in the appropriate places.

3.5.1 Source container – outside

Depending on the radiation source used, a "Highly radioactive" or "Radioactive" stick-on label is attached to the outside of the source container.

Radioactive radiation source



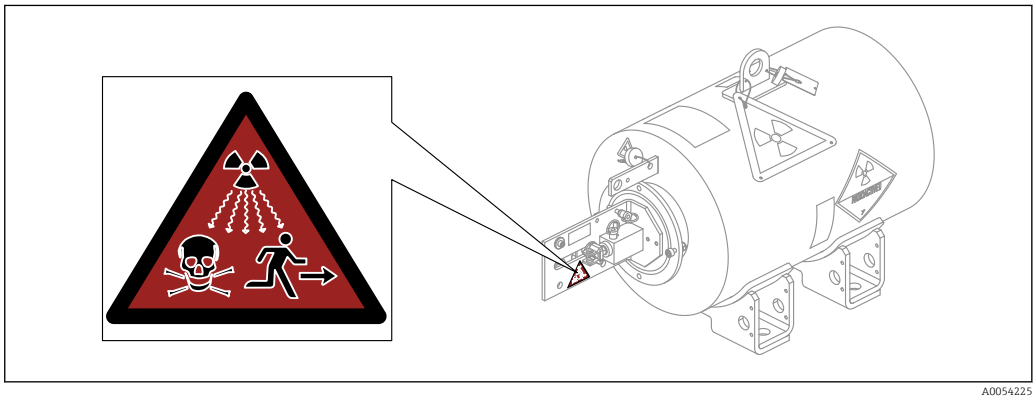
10 *Position of the radiation warning signs when using a radioactive radiation source*

1 "Caution – Radiation" stainless steel warning sign
2 "Radioactive" stick-on label for marking packages. Can be removed after transport.
3 "Radioactive" stick-on label

3.5.2 Source container – inside

Optional: Only for HRQ – Highly radioactive sources

The warning for highly radioactive sources is not a substitute for the yellow warning symbol, but supplements it.



11 *Position of the "Highly radioactive" stick-on label*

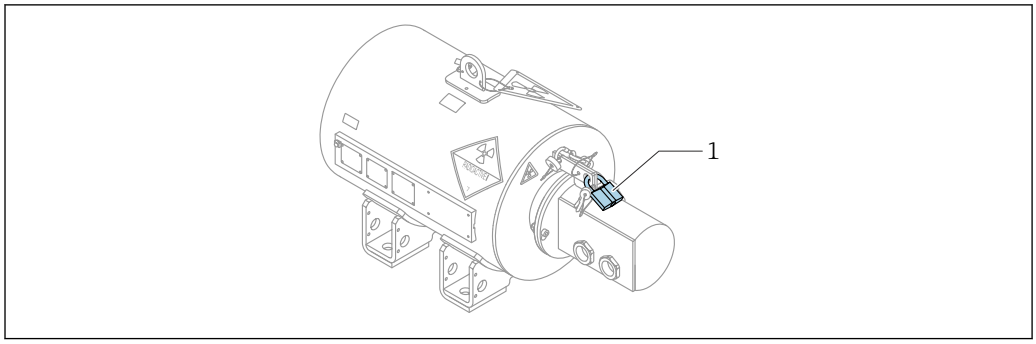
3.6 Anti-theft and tamper protection

A lock on the cover prevents unauthorized tampering with the source container and unauthorized removal of the radiation source.

The NRC/ARPANSA version has advanced anti-theft protection provided by an extra lock; see below.

For Germany: The anti-theft protection does not meet the protective measures required by DIN 25422. Implement appropriate anti-theft measures in installation and storage rooms.

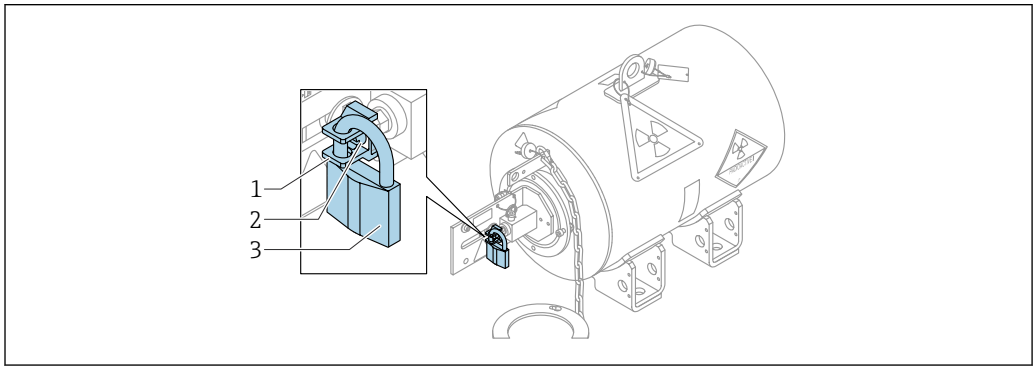
3.6.1 All versions except NRC/ARPANSA



12 *Secured cover*

1 Cover lock

3.6.2 Version NRC/ARPANSA



13 *Anti-theft components*

1 Retaining clip
2 Connecting rod
3 Lock

3.7 Use as Type A packaging

For the definition of Type A packaging, see IAEA safety standards no. SSR-6 (Regulations for the safe transport of radioactive material; International Atomic Energy Agency; 2018 edition; IAEA safety standards series no. SSR-6 (Rev. 1)

The source container can also be used as a Type A transport and storage container in accordance with dangerous goods class 7. The application area is determined by the suitability certificate of the source container.

For further information, see section "Transport and storage -> Transport as Type A package".

4 Incoming acceptance and product identification

Incoming acceptance and product identification requires qualified installation and service personnel. See the "Requirements for personnel" section

Dangerous goods class
- The source container is a Type A transport and storage container in accordance with dangerous goods class 7.
- The source container can be packaged in an overpack.

4.1 Incoming acceptance and unpacking

4.1.1 Incoming acceptance

DANGER

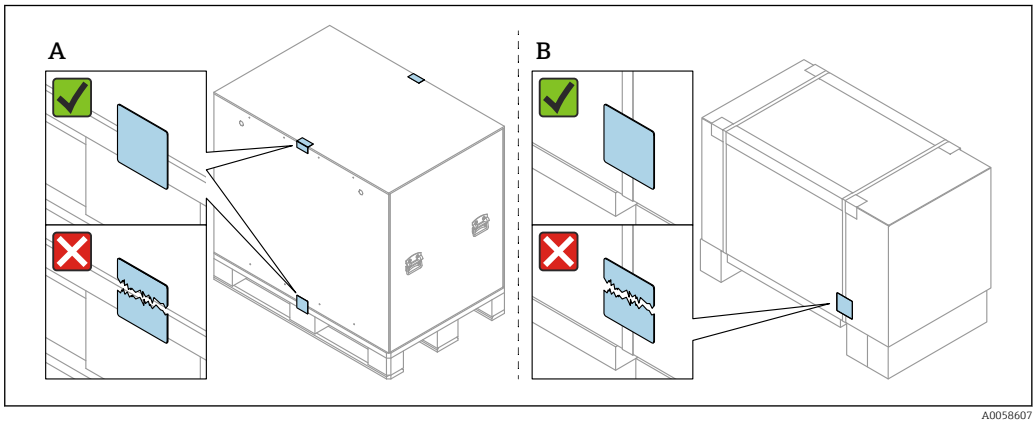
Noncompliance with national rules and regulations for the handling and storage of radiation sources.

Legal consequences and dangers from errors in the handling of radiation sources.

▶ Follow the instructions of radiation safety officers.

Check the following during incoming acceptance:
- Is the overpack free from damage?
- Is the protective seal on the overpack free from damage?
- Do the order code on the delivery note and the packaging label (located on top of the overpack) match?
- **After unpacking:** Are the source container and its protective seal free from damage?
- **After unpacking:** Does the nameplate data correspond to the ordering information on the delivery note? The nameplate is explained in the "Product identification" section.

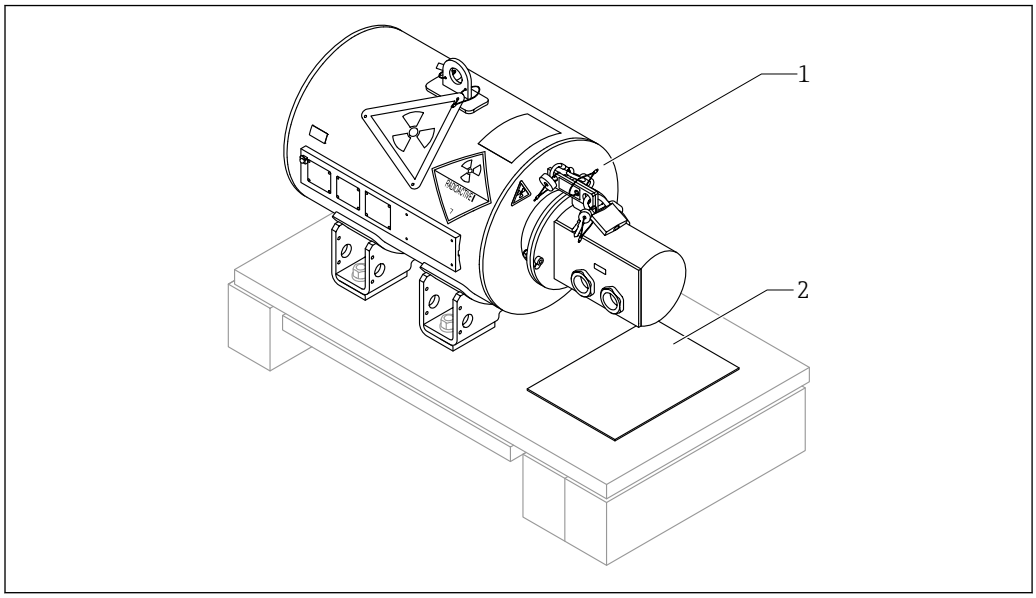
If one of these conditions is not satisfied, the radiation safety officer must be informed immediately. The radiation safety officer will determine the further course of action.



14 *Position of the protective seals*

A Protective seal on seaworthy overpack
B Protective seal on overpack

Scope of delivery



15 *Scope of delivery*

1 Source container
2 Document folder

4.1.2 Required tools

- Tool for opening the seaworthy overpack: Torx screwdriver T20
- Tool for releasing from the Euro pallet: Open-ended wrench AF 24
- Tool for opening the overpack: Side cutter

4.1.3 Unpacking from the seaworthy overpack

⚠ CAUTION

The heavy weight of the overpack could lead to handling errors when unpacking the source container.
This could result in personal injury as a consequence of the crush hazard for hands and feet.
- ▶ Wear protective equipment.
- ▶ Use suitable lifting accessories. In conformity with EN 1492 or EN 13414, for example.

⚠ CAUTION

Sharp edges on secondary packaging.
This could result in personal injury in the form of cuts and abrasions.
- ▶ Wear protective equipment.

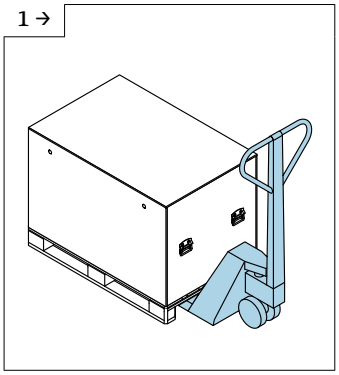
⚠ CAUTION

Overpack not fitted to the crane correctly, leading to possible falling of the overpack.
This could result in personal injury in the form of contusions and crushed body parts.
- ▶ Wear protective equipment.
- ▶ Observe the installation instructions.

⚠ CAUTION

Risk of injury from the heavy weight of the overpack.
This could result in back injuries during heavy lifting.
- ▶ At least two persons are required when using the handles on the overpack.
- ▶ Use of the lifting points in the overpack with suitable lifting accessories. A crane or rope winch, for example.

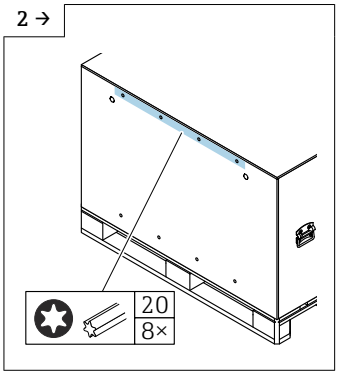
1 →



A0058581

- ⚠ CAUTION: RISK OF INJURY FROM HEAVY WEIGHT! Follow the safety instructions at the start of this section.
- Use pallet trucks for transport.
- ℹ Observe the load capacity.

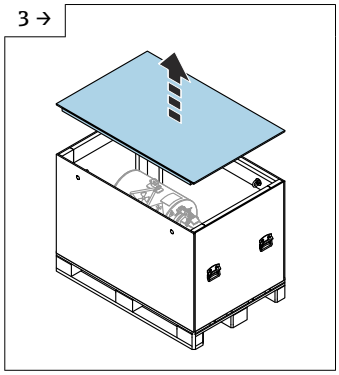
2 →



A0058593

- Unscrew the side screws at the top of the overpack.

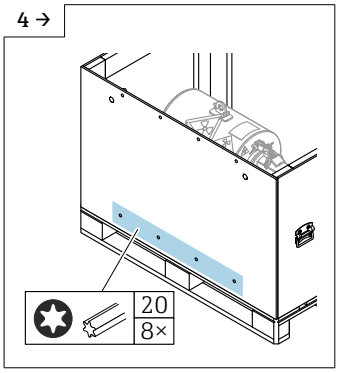
3 →



A0058594

- Remove the crate lid.

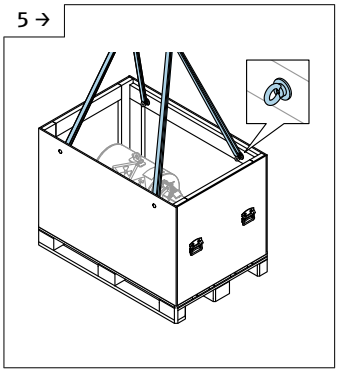
4 →



A0058595

- Unscrew the side screws at the bottom of the overpack.

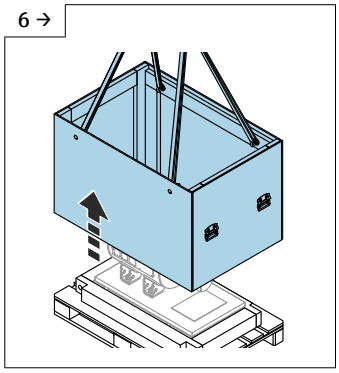
5 →



A0057958

- Attach suitable straps and chains to the lifting points on the crate.

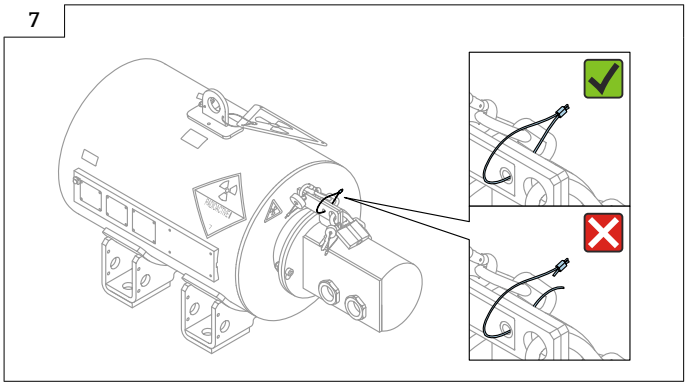
6 →



A0059166

- Use lifting gear to lift the overpack and set it down safely next to the device.
- ⚠ CAUTION: FALL HAZARD! Follow the safety instructions at the start of this section.

7



A0059167

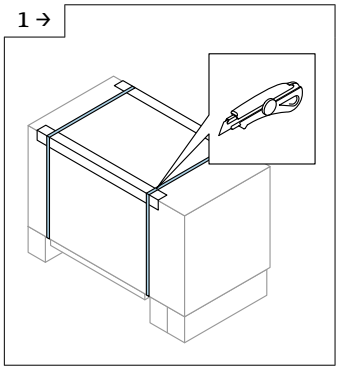
- Check the seal on the source container.
- ℹ If the seal has been broken, notify the radiation safety officer immediately. The radiation safety officer will determine the further course of action.

4.1.4 Unpacking from the overpack

CAUTION

Sharp edges on secondary packaging.
This could result in personal injury in the form of cuts and abrasions.
- ▶ Wear protective equipment.

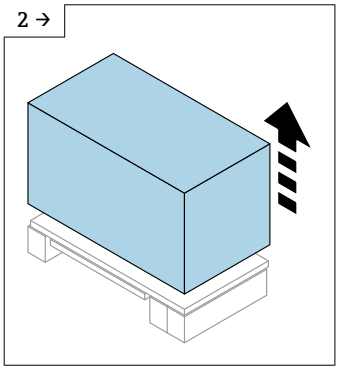
1 →



A0059202

- ▶ Use a side cutter to cut the strapping.

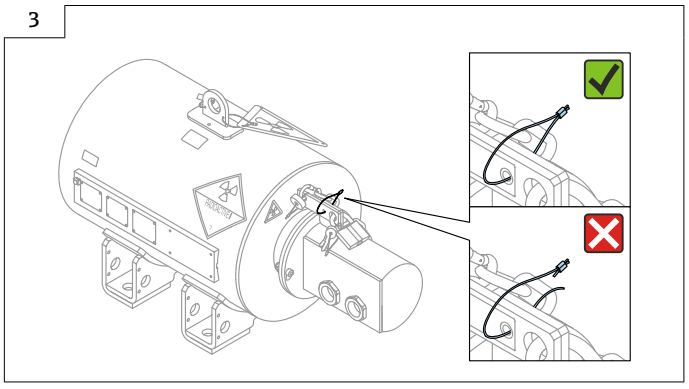
2 →



A0060021

- ▶ Pull up the cardboard box and dispose of it.

3



A0059167

- ▶ Check the seal on the source container.
- ▶ If the seal has been broken, notify the radiation safety officer immediately. The radiation safety officer will determine the further course of action.

4.2 Product identification

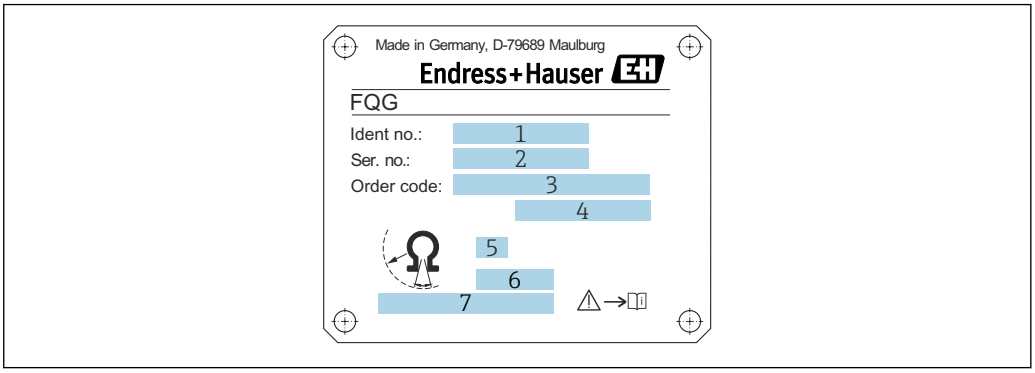
The following options are available for identifying the measuring instrument:
- Nameplate specifications
- Extended order code with breakdown of the device features on the delivery note

- ▶ Enter the serial number of the nameplates into *Device Viewer* (www.endress.com/deviceviewer)
  - ↳ All the information about the measuring instrument and the scope of the associated Technical Documentation is displayed.

- ▶ Enter the serial number from the nameplate into the *Endress+Hauser Operations app* or use the *Endress+Hauser Operations app* to scan the 2D matrix code (QR code) on the nameplate
  - ↳ All the information about the measuring instrument and the scope of the associated Technical Documentation is displayed.

4.2.1 Nameplates

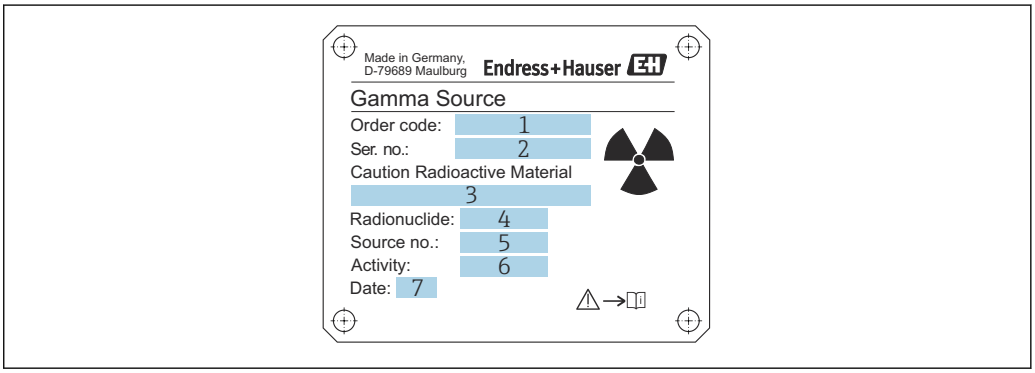
Device nameplate



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 *Beam exit angle*
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)*

Radiation source nameplate

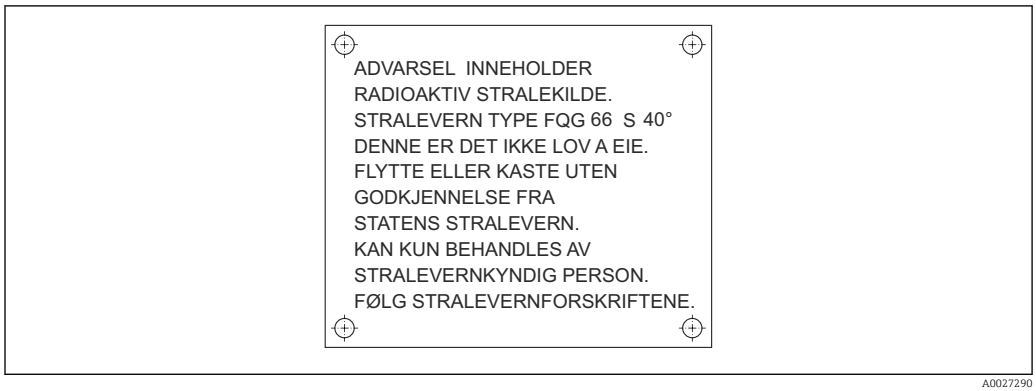


A0026744

1 *Internal Endress+Hauser order code for the radiation source*
2 *Internal Endress+Hauser serial number for the radiation source*
3 *Note "Highly radioactive source", if required*
4 *Isotope designation*
5 *Serial number of radiation source (according to supplier certificate)*
6 *Activity including unit (MBq or GBq)*
7 *Date of manufacture of radiation source*

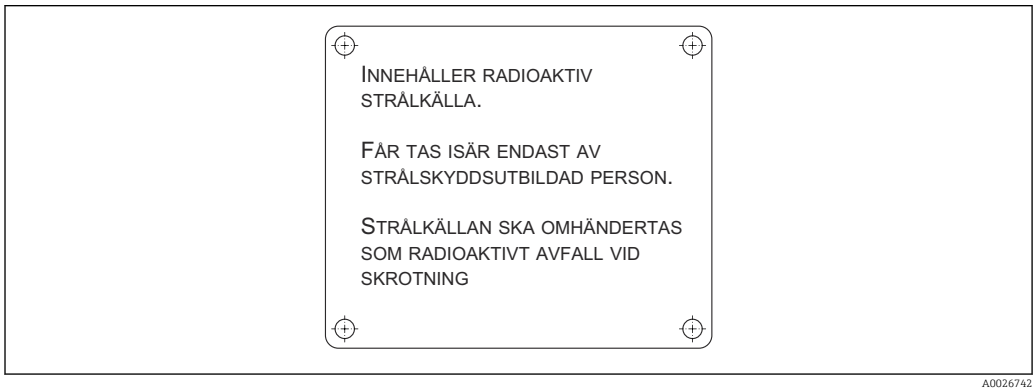
Supplementary nameplate

Norway



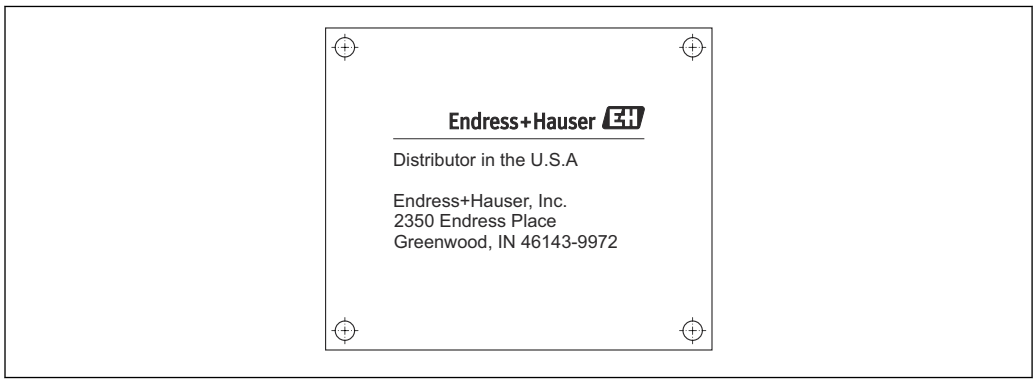
A0027290

Sweden



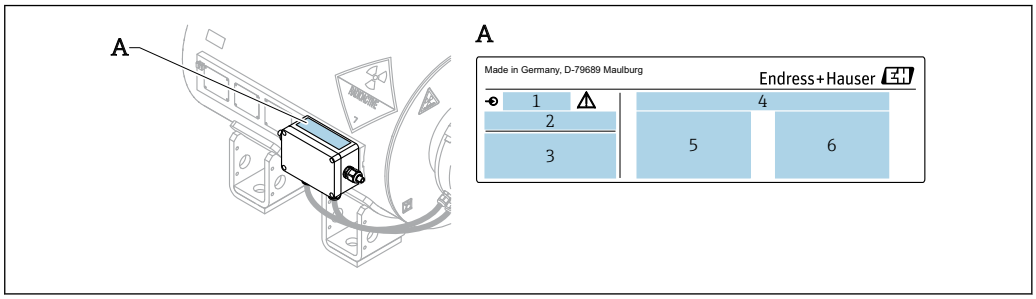
A0026742

USA



A0027291

Terminal housing nameplate



16 *Terminal housing nameplate*

1 *Maximum pressure; only for feature 020, option L*
2 *Temperature information*
3 *Degree of protection*
4 *NAMUR information*
5 *Circuit diagram ON*
6 *Circuit diagram OFF*

4.2.2 Manufacturer address

Endress+Hauser SE+Co. KG
Hauptstraße 1
79689 Maulburg, Germany

Place of manufacture: See nameplate.

5 Transport and storage

The source container can perform the following tasks:
- The source container acts as a Type A package, allowing approved radiation sources to be safely transported from the radiation source manufacturer to the measuring point. For a list of approved radiation sources, see the "Technical Information" documentation.
- The source container is suitable for storing radiation sources.
- The source container enables measuring points to be operated safely.
- At the end of the radiation source's service life, the source container can again be used as a Type A package to return the radiation source to the manufacturer for disposal.

5.1 Transport as Type A package

Transport as a Type A package requires qualified transport personnel. See the "Requirements for personnel" section

5.1.1 General provisions and requirements

The source container can be used as a Type A package in accordance with the certificate of suitability of the source container.

The source container may be used only in good condition. In particular, the condition of the source container must be documented (see the "Maintenance and recurrent checks" section).

Suitability is voided in the event of improper use or any modification to the source container/shipping package not explicitly authorized by the manufacturer.

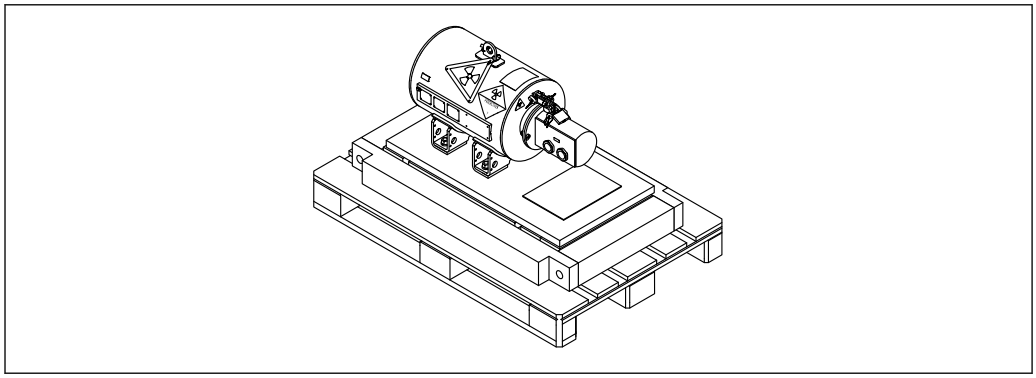
Suitability is voided in the event of any modification to the source container or shipping package not explicitly authorized by the manufacturer.

For the carriage of a shipment, measures for quality assurance and aging management of the packaging must be implemented. Aging management requires the regular checking and appropriate marking of the packaging, see ADR (Agreement concerning the International Carriage of Dangerous Good by Road).

- The source container may be used as a Type A package only with the approved radiation sources. Approved radiation sources are listed in the Technical Information for the source container. Maximum permissible activities could be further restricted by country-specific approvals.
- For transport, the source container must have a valid recurrent check record.
- Extraordinary incidents that occur in the handling of the source container must be reported to the manufacturer.

5.1.2 Overpack

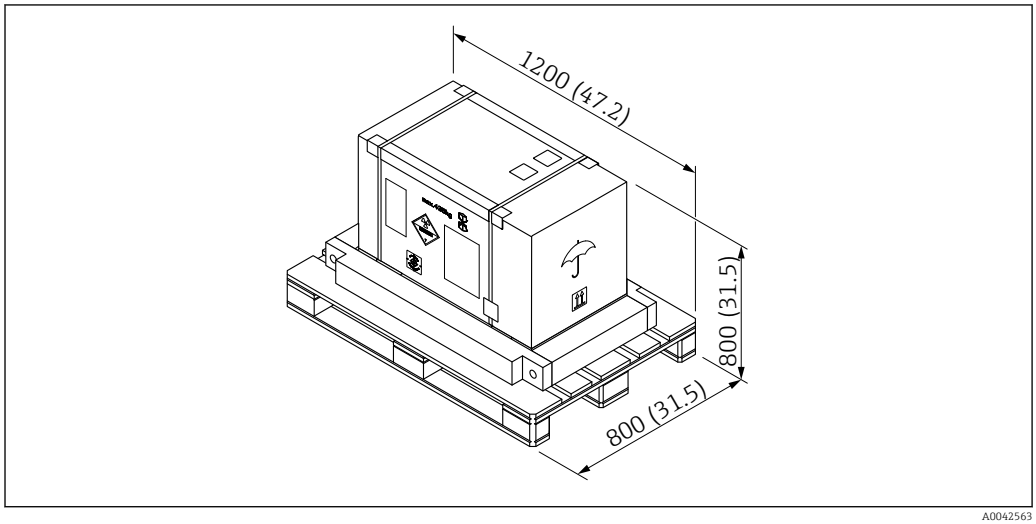
The exact packaging instructions can be found in the special documentation SD00309F.



A0058677

17 *Device mounted on pallet*

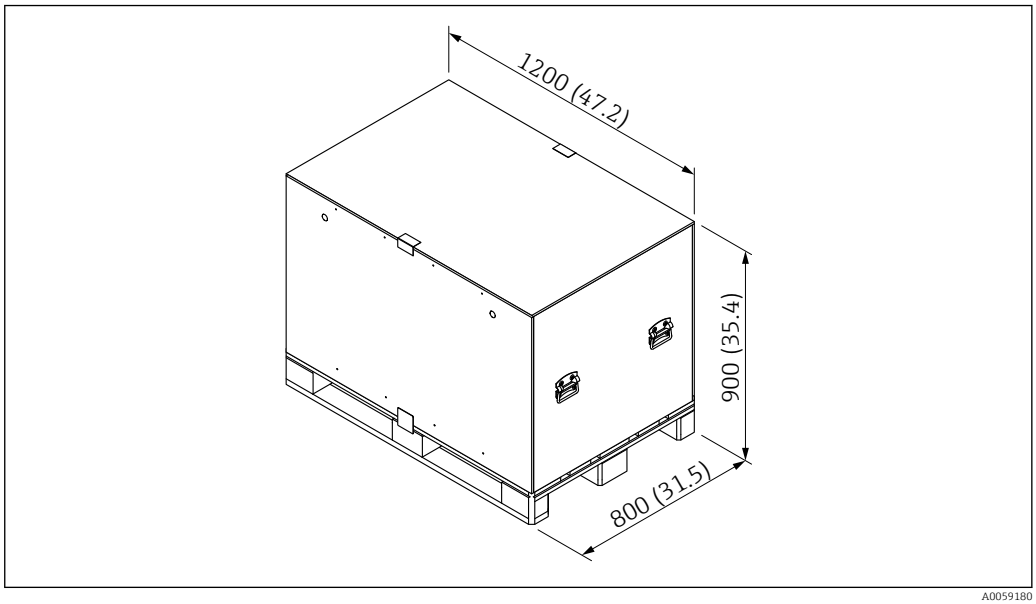
Overpack for loaded/unloaded containers



A0042563

18 *Dimensions of overpack for unloaded container. Unit of measurement mm (in)*

Seaworthy overpack



19 *Dimensions of seaworthy overpack*

5.1.3 Securing loads

DANGER

Displacement of the dangerous goods due to inadequate load securement with single straps.

Damage to or loss of the dangerous goods. Risk of loss of control of the radiation source with the consequence of possible health hazards due to unshielded ionizing radiation.

- The use of single straps could lead to displacement of the dangerous goods. To secure the load, always use load restraint nets and, if necessary, implement further safety measures.

The load securement method must conform to the requirements of the respective traffic codes on the modes of transport used.

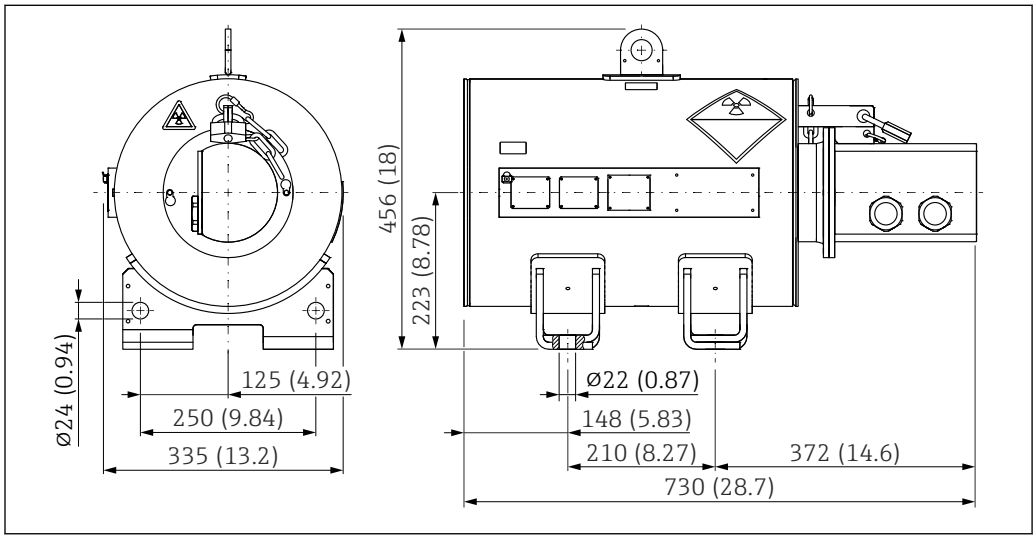
For road transport, load securement is defined by VDI 2700.

5.2 Dimensions, weights

5.2.1 Source container

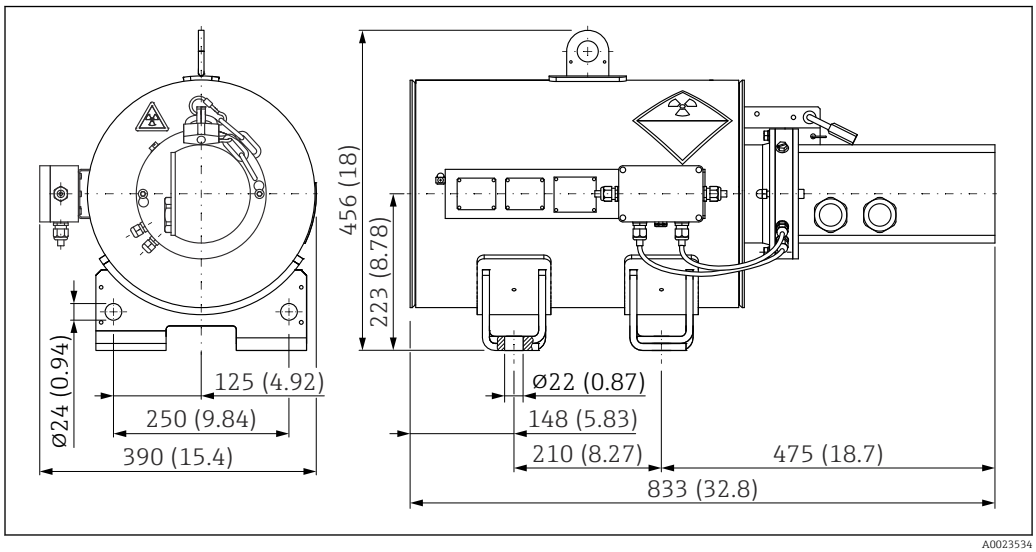
Dimensions

Manual version (feature 020, option A)



20 Unit: mm (in)

Manual version with proximity switch (feature 020, option B) or pneumatic version (feature 020, option L)



21 Unit: mm (in)

Weights

- Source Container FQG66, including disposable pallet: ~450 kg (992 lb)
- Source Container FQG66, including disposable pallet and Euro pallet: ~475 kg (1 047 lb)

5.3 Handling

Handling requires qualified assembly and service personnel. See the "Requirements for personnel" section

⚠ WARNING

Source container not fitted to the crane correctly, potentially causing the source container to fall!

This could result in personal injury or even death as a consequence of impact.

- ▶ Wear protective equipment.
- ▶ Slings must be suitably rated for the gross weight.

⚠ WARNING

Swinging of the source container possible during mounting and dismounting.

This could result in personal injury or even death.

- ▶ Wear protective equipment.
- ▶ Handle heavy loads correctly.

⚠ CAUTION

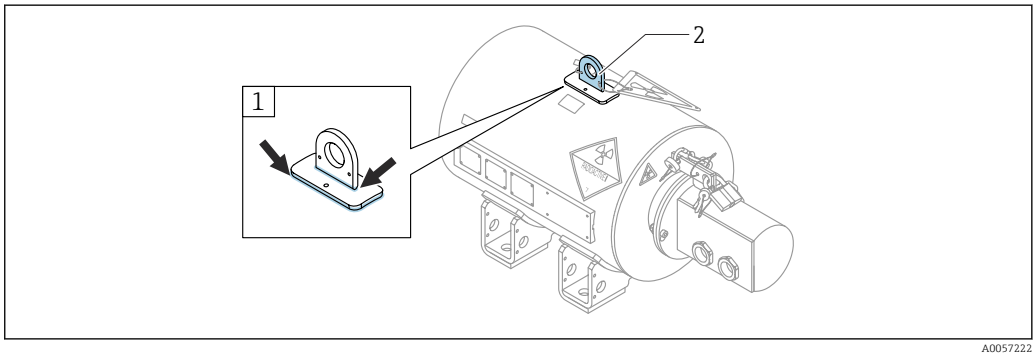
Sharp edges on the source container.

This could result in personal injury in the form of cuts and abrasions.

- ▶ Wear protective equipment.

Additional handling instructions:

- Follow the safety instructions and observe the transport conditions.
- A lifting point is provided on the source container as a transport and mounting aid.
- Only lift and transport the source container using the lifting point.
- The source container can be transported horizontally. See figure.
- Check the weld seams of the lifting point for corrosion prior to use, see the following figure.



22 *Position of the lifting point*

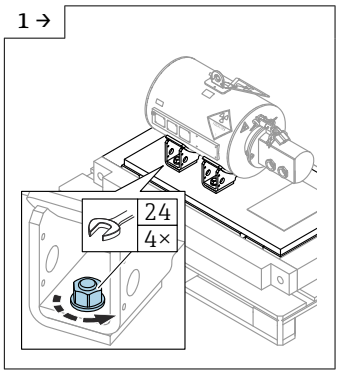
1 Weld seams
2 Lifting point

5.3.1 Required tools

- Allen key AF 6
- Open-ended wrench AF 24

5.3.2 Preparation for transport to the installation location

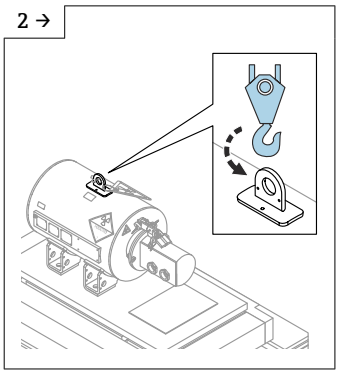
1 →



A0059168

- ⚠ CAUTION: SHARP EDGES! Follow the safety instructions at the start of this section.
- Loosen the fixing screws.

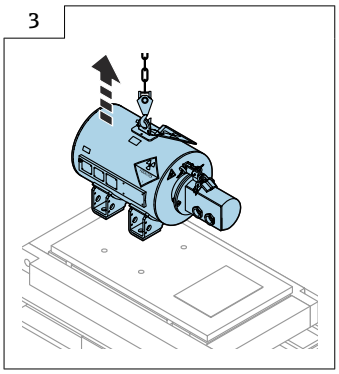
2 →



A0059169

- Hook the crane hook into the lifting point.

3



A0059170

- ⚠ CAUTION: FALL HAZARD! Follow the safety instructions at the start of this section.
- Lift the source container using a crane and transport it to the intended place of use.

5.4 Storage

Permitted storage temperature (excluding packaging):
- Feature 020 "Version", option A "Manual operation": −55 to +120 °C (−67 to +248 °F)
- Feature 020 "Version", option B "Manual operation + proximity switch", option L "Pneumat. drive + proximity switch": −20 to +80 °C (−4 to +176 °F) (manual and pneumatic, with proximity switch)

Fulfill the storage requirements in the "Maintenance -> Recurrent tests" section. Implement anti-theft protection in consideration of national rules and requirements.

6 Installation

Installation requires qualified installation and service personnel – see the "Requirements for the personnel" section.

⚠ WARNING

Installation with open shutter

Ionizing radiation can increase the risk of cancer and genetic birth defects. Depending on the dose, ionizing radiation can cause immediate physical harm such as nausea, vomiting, hair loss, changes in blood composition, and severe tissue damage that may lead to death.
- During installation, the container must not be in the ON position.
- Check the shutter position through the inspection window.

⚠ WARNING

Unsuitable or missing screws or incorrect tightening torque when mounting the source container.

Possible falling of the source container, leading to personal injury or even death as a consequence of impact.
- Observe the installation instructions.

⚠ CAUTION

Sharp edges on the source container.

This could result in personal injury in the form of cuts and abrasions.
- Wear protective equipment.

6.1 Installation requirements

NOTICE

In cases of doubt during mounting, hazardous situations could arise.

- ▶ If there is any uncertainty, contact Endress+Hauser Service for support before work begins.

- Installation must always be carried out in accordance with local legislation or the handling permit. All local conditions must be taken into consideration.
- Installation and removal are only permitted in the "AUS/OFF" switch position. The switch position is secured by a lock pin and lock.
- Use a load-bearing structure for installing the source container.
- Take the weight and center of gravity of the source container into consideration: Max. 435 kg (99.18 lb)
- Use a lifting point and suitable lifting gear.
- The device can be installed on an external, low-vibration construction or directly on the pipe using the customer's mounting device. No other types of installation are permitted.

Temperature range during installation or removal:
−55 to +120 °C (−67 to +248 °F)

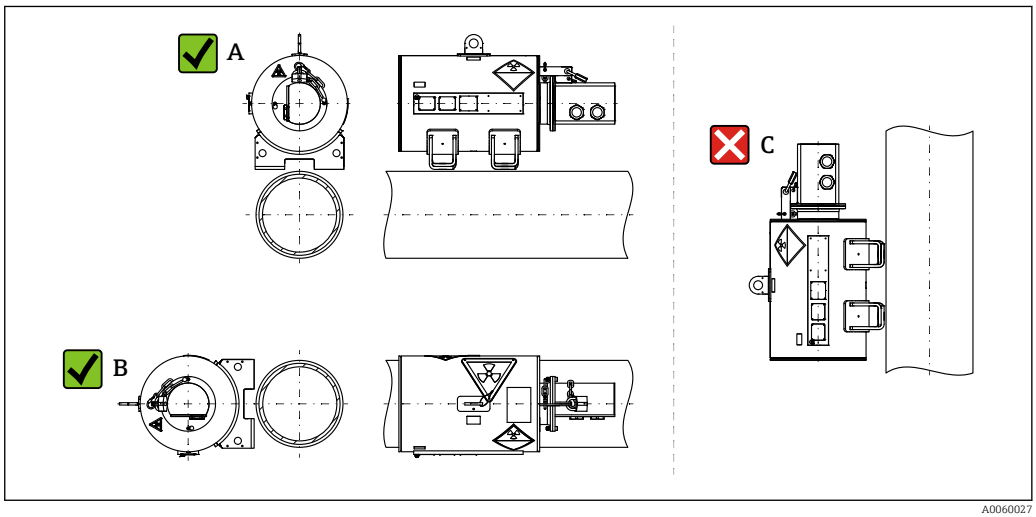
6.2 Orientation

WARNING

Risk of accident from heavy gross weight

Incorrectly installed source containers could lead to personal injuries and serious damage to physical items if they fall.

- ▶ Only the orientations shown below are permitted.
- ▶ The load-bearing construction must be rated for the gross weight of the source container and the vibrations that occur during operation.



23 *Permitted and prohibited orientations*

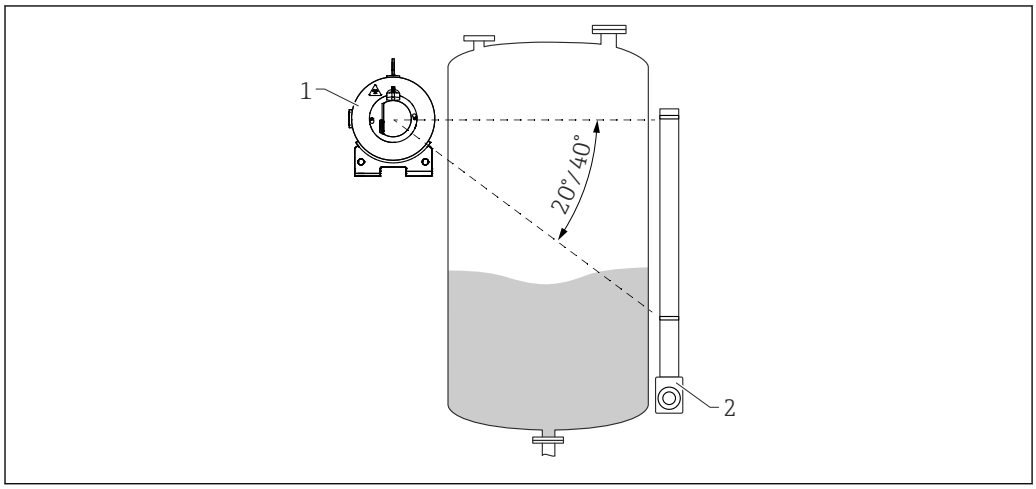
A Permitted
B Permitted
C Prohibited

The source container may only be installed in one of the permitted orientations shown above.

6.2.1 Orientation for level measurement

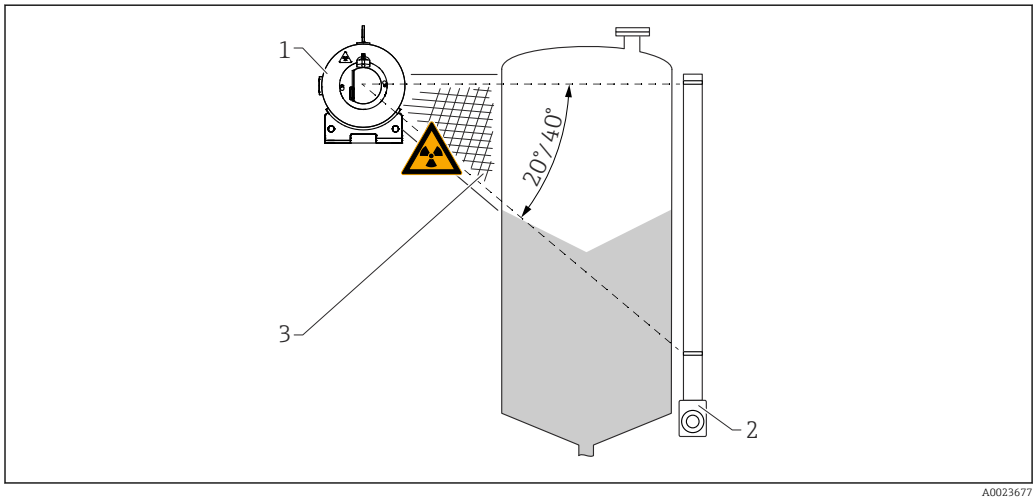
For continuous level measurement, the source container must be installed at the height of, or slightly above, the maximum level.

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



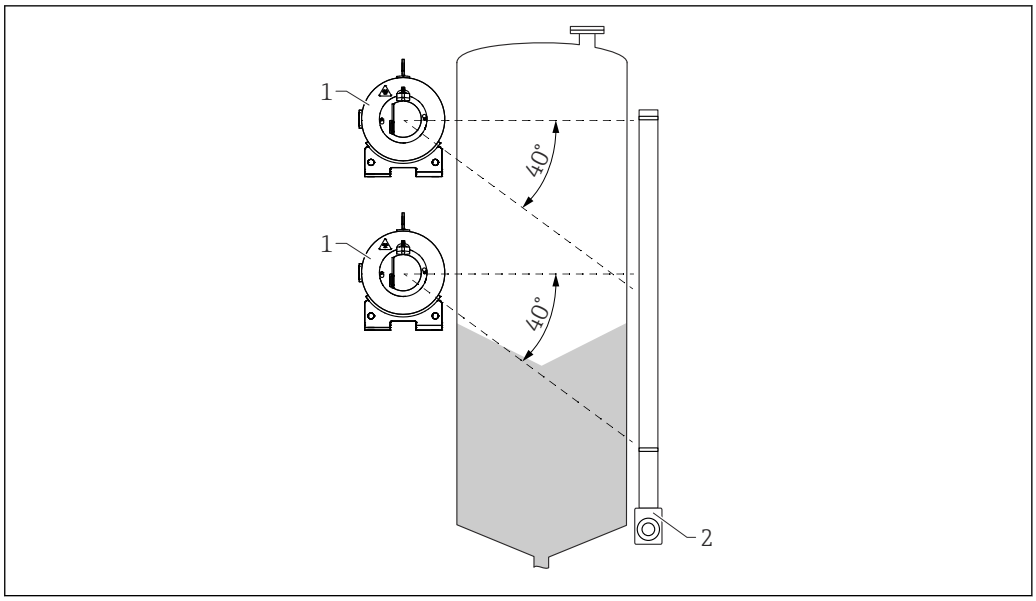
1 FQG66: Feature 240 "Angle of emission", option 3 "20 degrees, horizontal" or option 5 "40 degrees, horizontal"
2 Gammapilot

A distance between the source container and the product vessel is often unavoidable if the measuring range is large and the vessel diameter small. The space in between must then be cordoned off and marked.



1 FQG66: Feature 240 "Angle of emission", option 3 "20 degrees, horizontal" or option 5 "40 degrees, horizontal"
2 Gammapilot
3 Controlled area

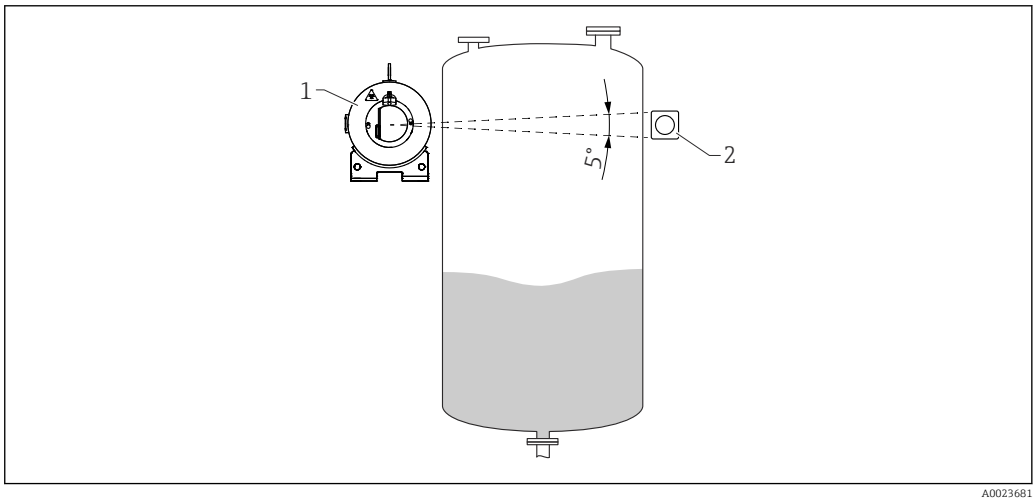
Two or more source containers are used for large measuring ranges. The use of multiple radiation sources increases both the measuring range and the measurement accuracy.



1 FQG66: Feature 240 "Angle of emission", option 5 "40 degrees"
2 Gammapilot

6.2.2 Orientation for point level measurement

For point level measurement, the source container is installed at the same height as the detector.



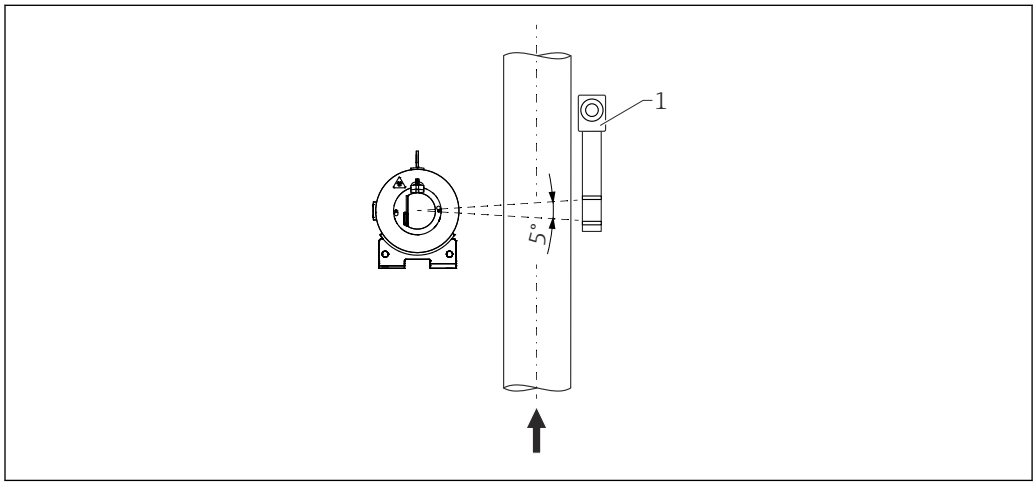
1 FQG66: Feature 240 "Angle of emission", option 1 "5 degrees, horizontal"
2 Gammapilot

- Keep the distance between the FQG66 and the container wall to a minimum.
- Secure any space between the source container and wall by cordoning it off, if necessary.

6.2.3 Orientation for density measurement

Vertical pipes

If possible, density should be measured with a flow direction from bottom to top. With this type of measuring arrangement, the detector (e.g. Gammapilot FMG50) should preferably be positioned so that it is installed with the terminal head at the top. If this arrangement is not possible, an additional bracket must be used to prevent the detector slipping.

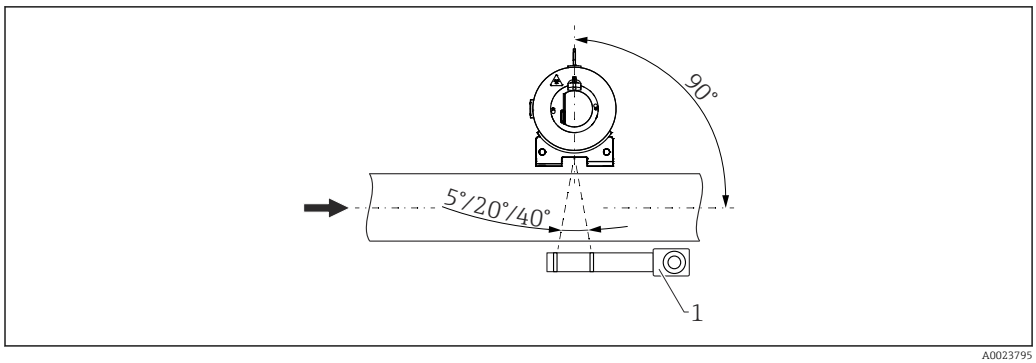


24 Feature 240 "Angle of emission", option 1 "5 degrees, horizontal"

1 Gammapilot

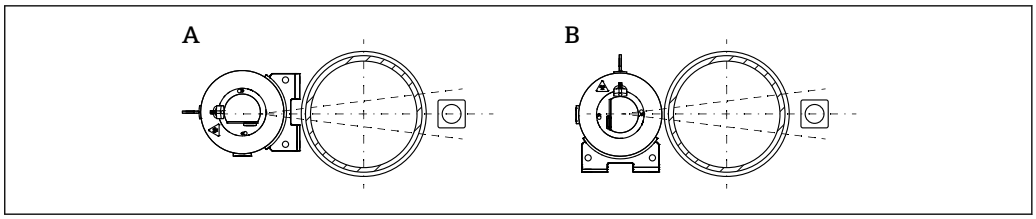
Horizontal pipes

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



25 Code 240 "Angle of emission", option 2, 4 or 6 "5, 20 or 40 degrees, vertical"

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 locking device and mounting clamps).



26 *Source Container FQG66 with horizontal beam exit*

A Source container with beam exit area at the bottom
B Source container with beam exit area at the side

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 FMG50: 9.1 to 37 kg (20 to 81.6 lb)
- Gammapilot FTG20: 15.5 kg (34.18 lb)
- Source Container FQG66: 435 kg (959.18 lb)

6.3 Required tools

Open-ended wrench AF 6

6.4 Installing the source container

⚠ WARNING

Source container not fitted to the crane correctly, potentially causing the source container to fall!
This could result in personal injury or even death as a consequence of impact.
- ▶ Wear protective equipment.
- ▶ Slings must be suitably rated for the gross weight.

⚠ WARNING

Swinging of the source container possible during mounting and dismounting.
This could result in personal injury or even death.
- ▶ Wear protective equipment.
- ▶ Handle heavy loads correctly.

⚠ WARNING

Electrostatic charge in the potentially explosive atmosphere if potential equalization not established.
- ▶ The device must be integrated into the potential equalization system of the plant.

⚠ CAUTION

Sharp edges on the source container.
This could result in personal injury in the form of cuts and abrasions.
- ▶ Wear protective equipment.

⚠ CAUTION

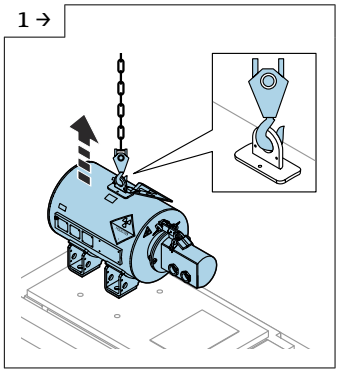
Swinging or tilting from horizontal to vertical position and vice versa during the turning process.

This could result in personal injury in the form of contusions and crushed body parts.

- ▶ Wear protective equipment.
- ▶ Only perform turning maneuvers using a second piece of lifting equipment as demonstrated in the following work steps.

6.4.1 Installation on a horizontal platform

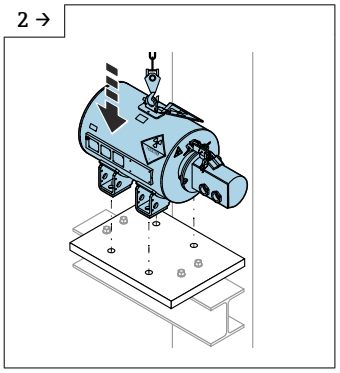
1 →



A0059171

- ▶ Use a crane to lift the source container off the pallet.

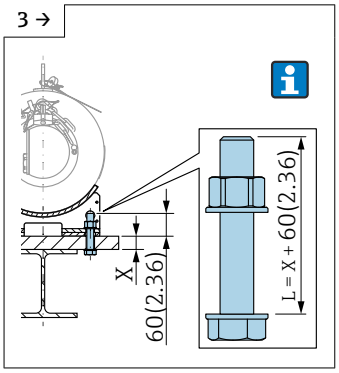
2 →



A0059172

- ▶ ⚠ WARNING: RISK OF INJURY DUE TO CRUSHING OR FRACTURES! Follow the safety instructions at the start of this section.
- ▶ Lift the source container into a horizontal position and lower it to the installation location.
- ▶ Position the device at the installation location over the bore holes.

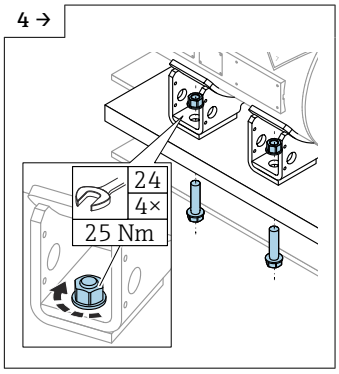
3 →



A0059173

- ▶ ℹ Determine the screw length according to dimensions.
- ▶ ℹ Screws and nuts are not included.

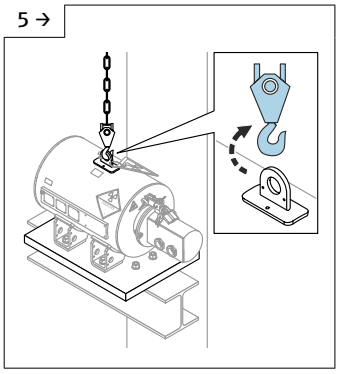
4 →



A0057955

- ▶ ⚠ WARNING: DANGER DUE TO UNSUITABLE SCREWS, MISSING SCREWS OR INCORRECT TIGHTENING TORQUE! Follow the safety instructions at the start of this section.
- ▶ Tighten all fixing screws (M20 – A4 property class 70) and nuts to the tightening torque.

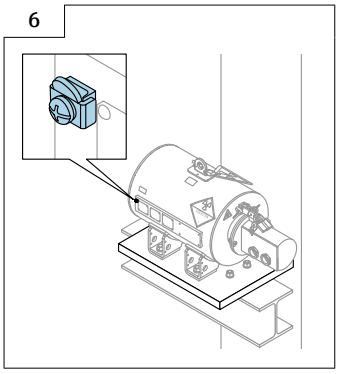
5 →



A0059174

- ▶ Detach the crane hook.

6



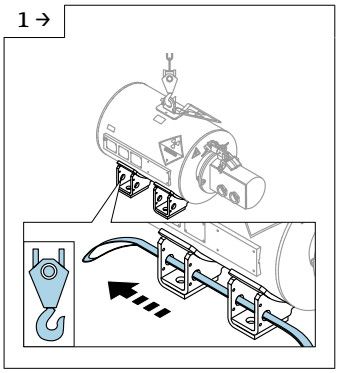
A0059175

- ▶ ⚠ WARNING: ELECTROSTATIC CHARGE! Follow the safety instructions at the start of this section.
- ▶ Connect the source container to the plant's potential equalization via the ground terminal.
- ▶ ℹ Potential equalization: Max. 4 mm² (12 AWG)

6.4.2 Installation in a vertical position

The source container must be tilted to be installed in a vertical position. This procedure is carried out using two pieces of lifting equipment as follows:

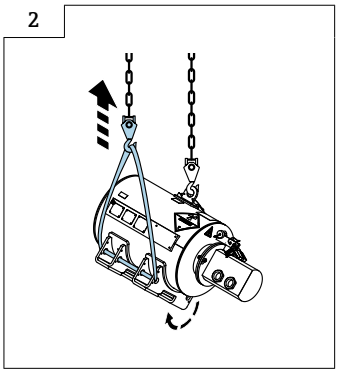
1 →



A0060025

- Attach the first crane hook to the lifting point.
- Pull the rope or chain in a loop through the side openings of the source container feet and hook the second crane hook into the loop.

2



A0060026

- ⚠ CAUTION: RISK OF INJURY DUE TO THE SOURCE CONTAINER SWAYING OR SLIPPING! Follow the safety instructions at the start of this section.
- Use the two pieces of lifting equipment to move the source container into the intended installation position.

Perform all other installation steps as with installation on a horizontal platform.

6.5 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
  - Activity
- Are all the fixing screws on the flange of the source container tightened securely?
- Has the source container been integrated into the plant's potential equalization?

6.6 Removing the source container from the measuring point

⚠ WARNING

Source container not fitted to the crane correctly, potentially causing the source container to fall!

This could result in personal injury or even death as a consequence of impact.

- Wear protective equipment.
- Slings must be suitably rated for the gross weight.

⚠ WARNING

Swinging of the source container possible during mounting and dismounting.

This could result in personal injury or even death.

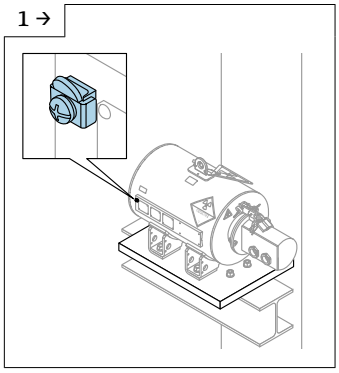
- Wear protective equipment.
- Handle heavy loads correctly.

⚠ CAUTION

Sharp edges on the source container.
This could result in personal injury in the form of cuts and abrasions.
- ▶ Wear protective equipment.

If the radiation sources, including the source container, are to be removed:
Before removing the source container, follow the steps in the "Switching off radiation" section.

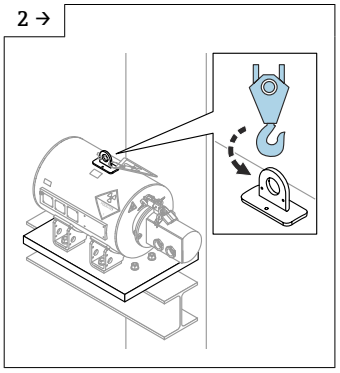
1 →



A0059175

- ▶ Loosen the ground terminal on the source container.
- ▶ Remove the ground terminal.

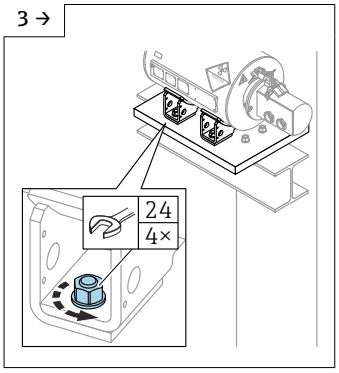
2 →



A0059176

- ▶ Attach the crane hook to the lifting point.

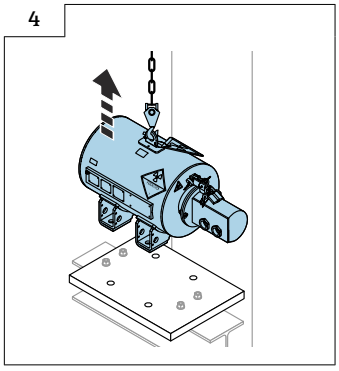
3 →



A0059177

- ▶ ⚠ WARNING: FALL HAZARD! Follow the safety instructions at the start of this section.
- ▶ Loosen the fixing screws.

4



A0059178

- ▶ ⚠ CAUTION: RISK OF INJURY DUE TO THE SOURCE CONTAINER SWAYING OR SLIPPING! Follow the safety instructions at the start of this section.
- ▶ Lift the device using a crane and transport it to the intended position.

If there are radiation sources in the source container:
- Fulfill the storage requirements in the "Maintenance -> Recurrent tests" section.
- Implement anti-theft protection in consideration of national rules and requirements.

7 Electrical connection

The following sections only apply to versions with a proximity switch.

7.1 Required tools

Phillips screwdriver PH2

Spanner AF 19

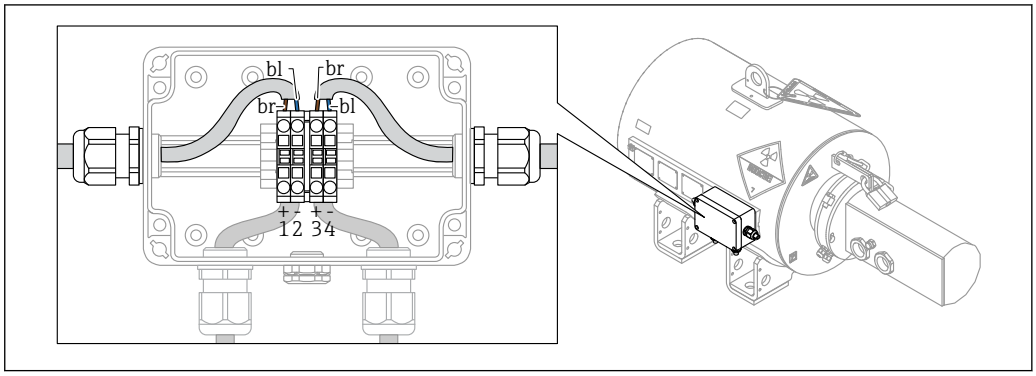
7.2 Connecting requirements

7.2.1 Cable specifications

The following specifications apply to single strands for connection to the terminals in the terminal box:
- Cross-section: 0.08 to 2.5 mm^2 (28 to 14 AWG)
- Cross-section: 0.08 to 4 mm^2 (28 to 11 AWG)
- Stripping length: 6 to 7 mm (0.24 to 0.28 in)

The following applies to the cable entry of the terminal box:
- Min. cable diameter: ø5 mm (0.2 in)
- Max. cable diameter: ø10 mm (0.39 in)

7.2.2 Terminal assignment



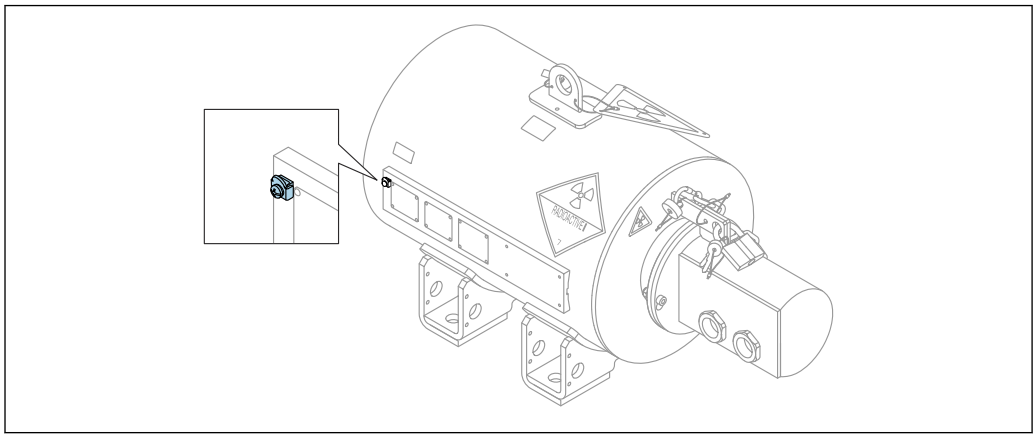
1, 2 Proximity switch for "EIN/ON" switch position
3, 4 Proximity switch for "AUS/OFF" switch position

7.2.3 Proximity switch

Model: Pepperl+Fuchs NCB2-12GM35-NO

7.2.4 Potential equalization

Terminal on the sign holder, see the following figure:



A0026837

Potential equalization: Max. 4 mm^2 (12 AWG)

7.2.5 Connection data

- Rated 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

7.2.6 Isolating amplifiers

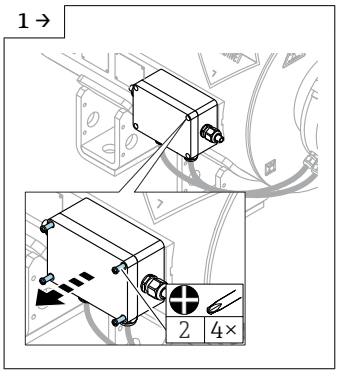
The following isolating amplifiers, for example, can be connected for signal evaluation:
- RLN22 NAMUR isolating amplifier (Endress+Hauser)
- KFD2-SH-Ex1, 24 V_{DC} (Pepperl+Fuchs)

7.3 Connecting the measuring instrument

7.3.1 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

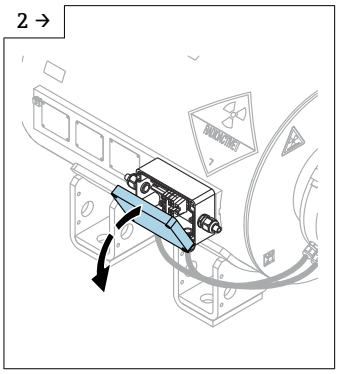
1 →



A0027173

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

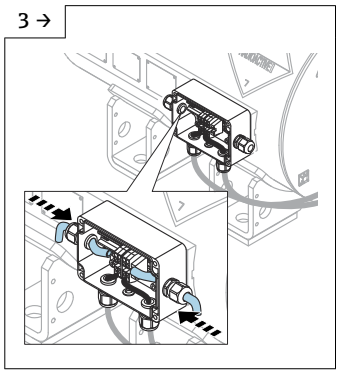
2 →



A0027175

▶ Open the cover of the terminal housing.

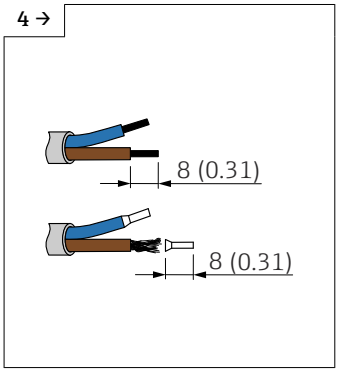
3 →



A0027176

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

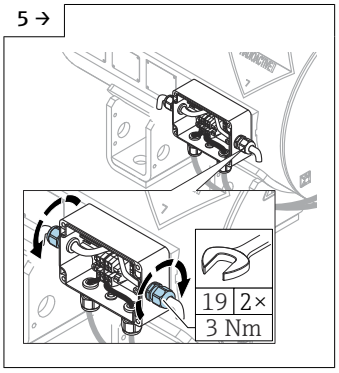
4 →



A0027177

▶ Remove the cable sheath. Strip the cable ends 8 mm (0.31 in). In the case of stranded cables: Also fit ferrules.

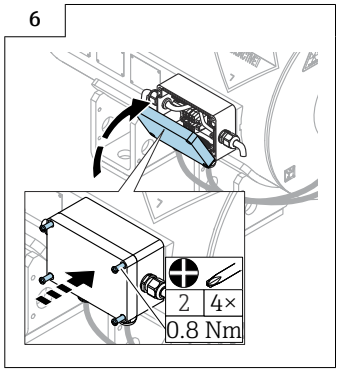
5 →



A0027178

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

6



A0027180

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

7.3.2 Pneumatic connection

⚠ CAUTION

High speed of the actuator if the throttle check valve is missing or set incorrectly!
There is a risk of personal injury from crushing and abrasion to hands.
- ▶ 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 throttle check valve.
- Only use dried and filtered compressed air according to ISO 8573-1. For suitable working conditions, the operating medium must have a dew point of or −20 °C be at least 10 °C below the ambient temperature. The temperature of the operating medium should not be above 85 °C and the maximum particle size must not exceed 40 µm. Monitoring the dew point of the compressed air is recommended.

7.4 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?

8 Commissioning

Commissioning requires qualified operating, installation and service personnel. See the "Requirements for personnel" section

8.1 Preliminaries

During initial commissioning, measure the local dose rate; see the "Measuring the local dose rate" section.

8.2 Required tools

Key for padlock

Allen key AF 6

8.3 Switching on radiation

DANGER

When the shutter is switched to the EIN / ON position, the user will be exposed to unshielded ionizing radiation if they are located in the vicinity of the beam exit channel or look into it.

Ionizing radiation can increase the risk of cancer and genetic defects in offspring. Depending on the radiation dose, ionizing radiation can cause immediate physical harm such as nausea, vomiting, hair loss, changes in blood composition, and severe tissue damage that may lead to death.

- Never remain in the beam outlet area.
- Restrict access to the irradiated area.
- Restrict access to process tanks or pipelines that are exposed to radiation.

⚠ WARNING

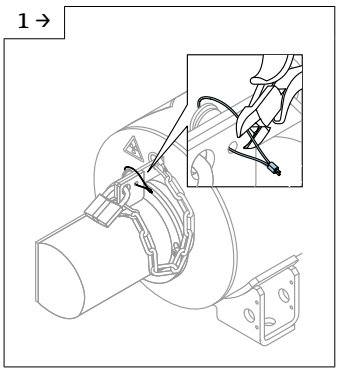
Underestimating the weight of components may result in parts falling!

This may cause severe or fatal injuries due to impact.

- ▶ Wear protective equipment.
- ▶ The area below and around the installation site must be kept clear during installation.

8.3.1 Manual version with/without proximity switch

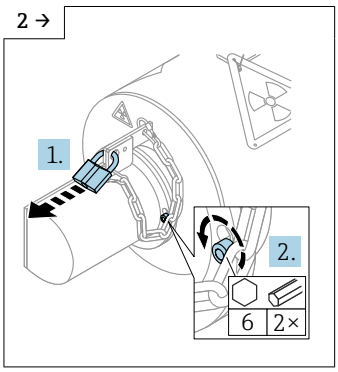
1 →



A0058654

- ▶ Remove the seal.

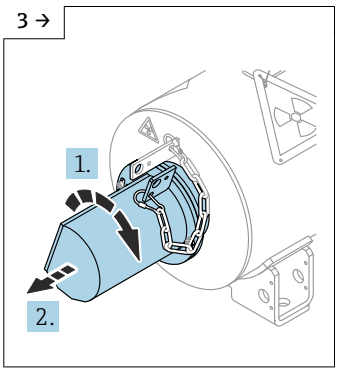
2 →



A0023595

- ▶ Remove the padlock. Turn the screws on the cover three to four times to release them.

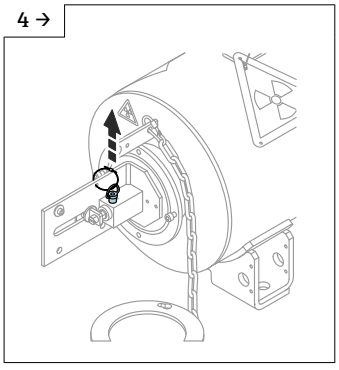
3 →



A0027121

- ▶ Turn the cover clockwise and remove it.

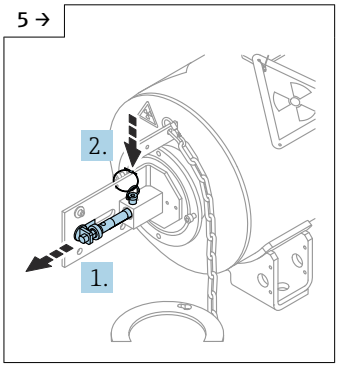
4 →



A0027123

- ▶ Remove the lock pin from the guide tube of the source holder.

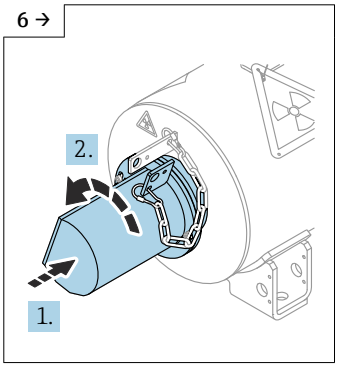
5 →



A0027126

- ▶ Pull the source holder out to the "EIN/ON" position. Reinsert the lock pin into the bore hole of the guide tube and push it in as far as it will go.

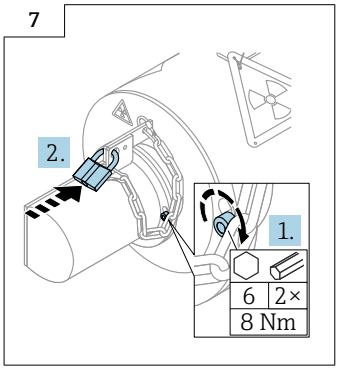
6 →



A0027127

- ▶ Fit the cover and turn it counterclockwise.

7



A0027128

- ▶ Fix the cover in place with the screws and reattach the padlock.

8.3.2 Pneumatic version

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

CAUTION

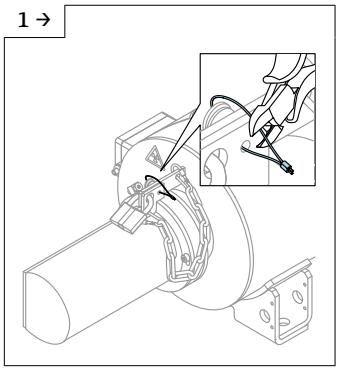
Risk of being crushed by moving parts!

The actuator contains moving parts that can cause crushing injuries if anyone reaches into it.

- Do not remove the cover while the pneumatic auxiliary power supply for the drive is effectively connected.
- When working on the source container, deactivate and lock the pneumatic auxiliary power supply.
- Do not wedge in objects to stop the drive moving.

The device can be switched on and off using the pneumatic controller.

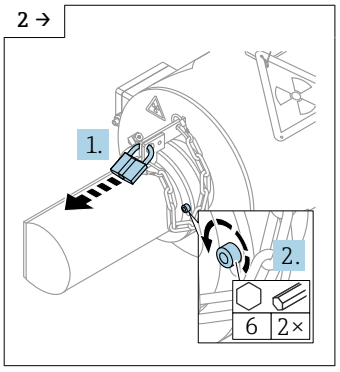
1 →



A0058655

- Remove the seal.

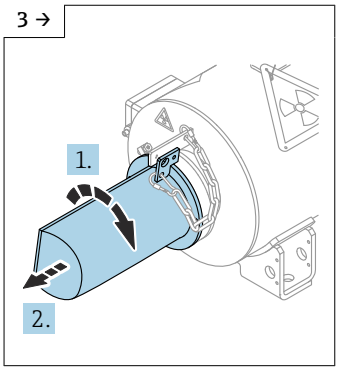
2 →



A0027129

- Remove the padlock. Turn the screws on the cover three to four times to release them.

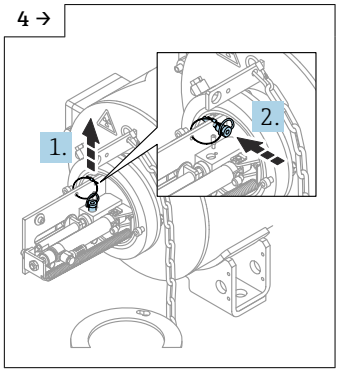
3 →



A0027131

- Turn the cover clockwise and remove it.

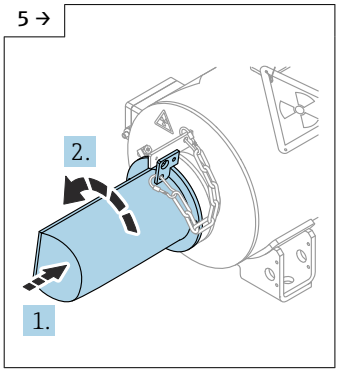
4 →



A0027132

- Remove the lock pin from the guide tube of the source holder and insert it into the bore hole provided ("parking position").

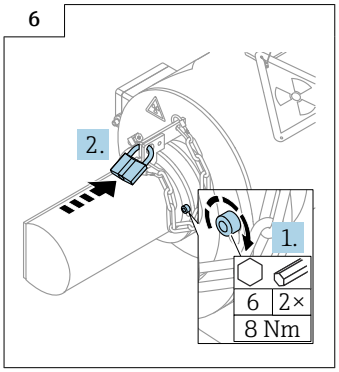
5 →



A0027133

- Fit the cover and turn it counterclockwise.

6

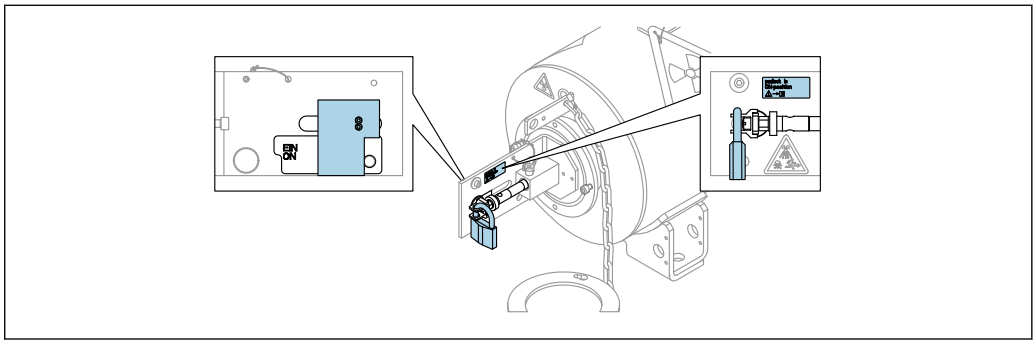


A0027134

- Fix the cover in place with the screws and reattach the padlock.

8.3.3 Manual version with/without proximity switch (US/AUS version feature 015 "Approval", option AE "NRC"; option AG "ARPANSA")

Preparation notes



27 *End position of padlock*

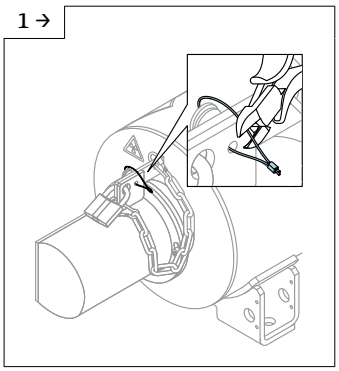
According to NRC/ARPANSA requirements, it must be possible to switch off the source container at any time without the need for any special tools (e.g. key for padlock). Follow the instructions below.

Ensure that the cover is not secured with a padlock. It must be possible to remove the cover at all times without the need for special tools.

When the source container is switched on, the padlock must remain permanently in the end position shown.

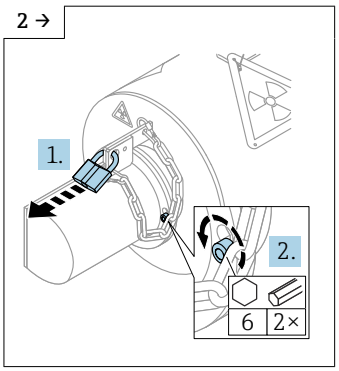
Switching on radiation

1 →



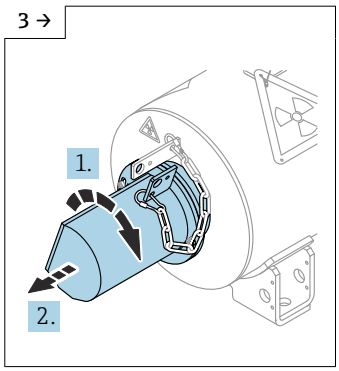
- Remove the seal.

2 →



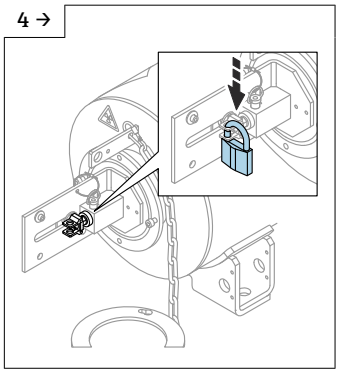
- Remove the padlock. Turn the screws on the cover three to four times to release them.

3 →



- Remove the cover.

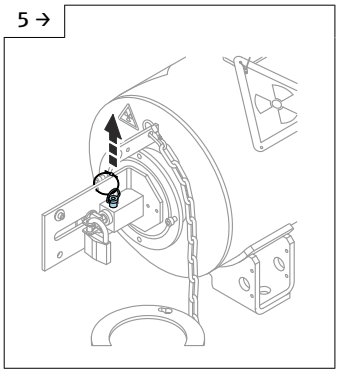
4 →



A0027375

- Fit the padlock on the source retainer.

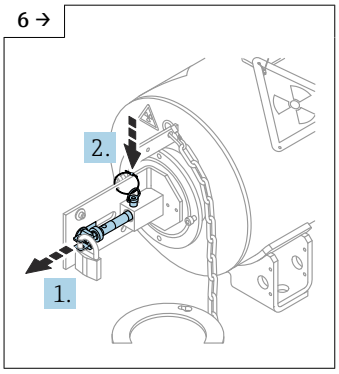
5 →



A0027373

- Remove the lock pin from the guide tube of the source holder.

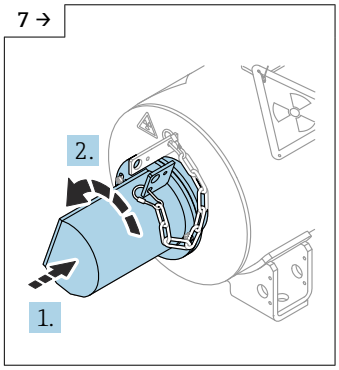
6 →



A0027374

- Pull the source holder out to the "EIN/ON" position. Reinsert the lock pin into the bore hole of the guide tube.

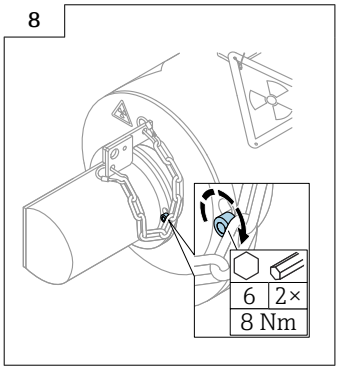
7 →



A0027127

- Fit the cover.

8



A0027377

- Secure the cover with the screws.
- The cover must **not** be secured with a padlock.

8.4 Measuring the local dose rate

- Once mounting is complete, the local dose rate in the vicinity of the source container and the detector must be measured.
- Depending on the installation, ionizing radiation can also occur outside the actual beam exit channel as a consequence of scattering.
- Shield with additional lead or steel sheets.
- Cordon off and mark all controlled and exclusion areas.

8.4.1 What to do if the product vessel is empty

- If the product vessel is empty, after proper installation, measure the controlled area around the product vessel and, if necessary, cordon off and mark this area accordingly.
- If there any access points to the internal space of the product vessel, seal them off and mark them with a "Radioactive" warning sign.
- Only the responsible radiation safety officer may allow access after safety measures have been checked with the source container switched off.
- For work on the product vessel, switch off the radiation and, if necessary, implement additional shielding measures.

8.5 Switching off radiation

DANGER

During opening and closing of the shutter, the user will be exposed to unshielded ionizing radiation if they are located in the vicinity of the beam exit channel or look into it.

Ionizing radiation can increase the risk of cancer and genetic birth defects. Depending on the dose, ionizing radiation can cause immediate physical harm such as nausea, vomiting, hair loss, changes in blood composition, and severe tissue damage that may lead to death.

- Never remain in the beam exit area.
- Restrict access to the irradiated area.
- Restrict access to process tanks or pipes that are exposed to radiation.

WARNING

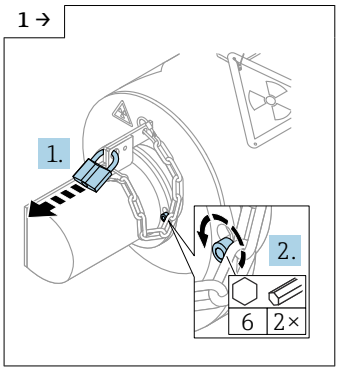
Falling cover if screws are loosened!

This could result in personal injury or even death as a consequence of impact.

- Do not detach the safety chain from the cover.
- Wear protective equipment.

8.5.1 Manual version with/without proximity switch

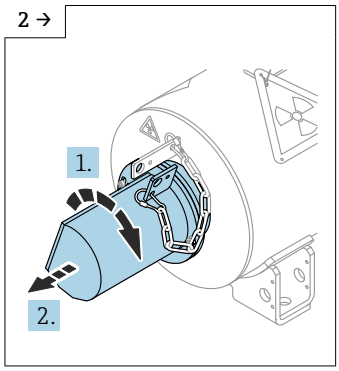
1 →



A0023595

- WARNING: FALLING PARTS! Follow the safety instructions at the start of this section. Remove the padlock and turn the screws on the cover three to four times to release them.

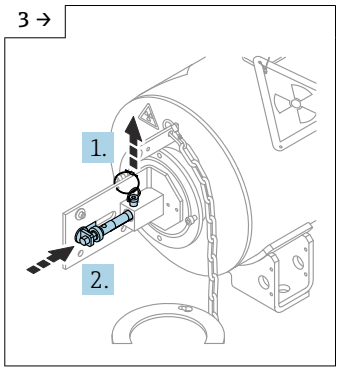
2 →



A0027121

- Remove the cover.

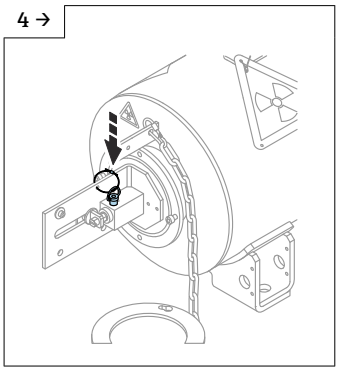
3 →



A0058567

- Remove the lock pin from the bore hole of the source holder guide tube and push the source holder in until it reaches the "AUS/OFF" position.

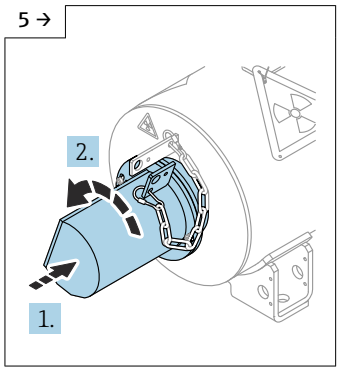
4 →



A0058568

- Reinsert the lock pin into the bore hole of the source holder guide tube.

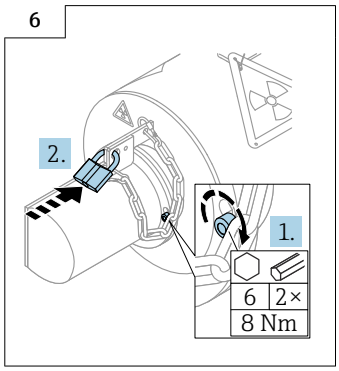
5 →



A0027127

- Fit the cover.

6



A0027128

- Fix the cover in place by tightening the screws to the tightening torque, then reattach the padlock.

8.5.2 Pneumatic version

⚠ CAUTION

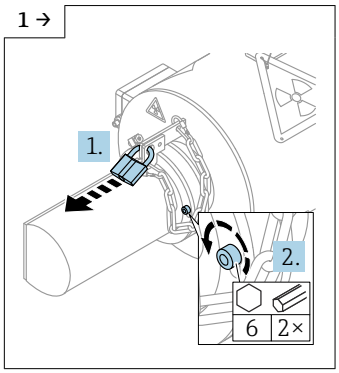
Risk of being crushed by moving parts!

The actuator contains moving parts that can cause crushing injuries if anyone reaches into it.

- ▶ Do not remove the cover while the pneumatic auxiliary power supply for the drive is effectively connected.
- ▶ When working on the source container, deactivate and lock the pneumatic auxiliary power supply.
- ▶ Do not wedge in objects to stop the drive moving.

In normal operation, the device is switched on and off pneumatically. Permanent switching off is described here, i.e. securing the pneumatic drive in the off position.

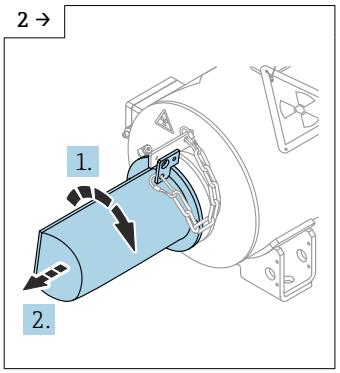
1 →



A0027129

- ▶ Remove the padlock. Turn the screws on the cover three to four times to release them.

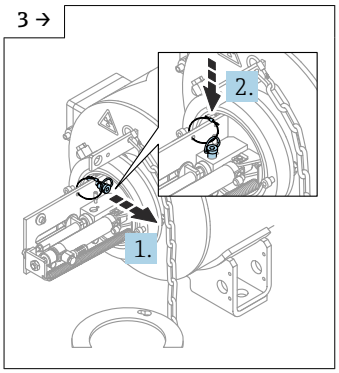
2 →



A0027131

- ▶ Remove the cover.

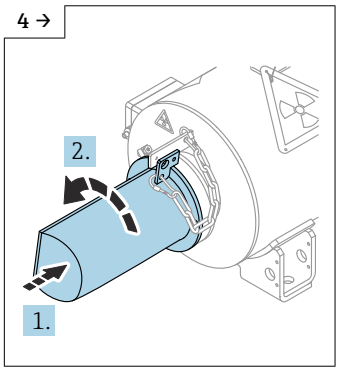
3 →



A0058574

- ▶ Remove the lock pin from the bore hole ("parking position") and insert it into the bore hole provided on the source holder guide tube.

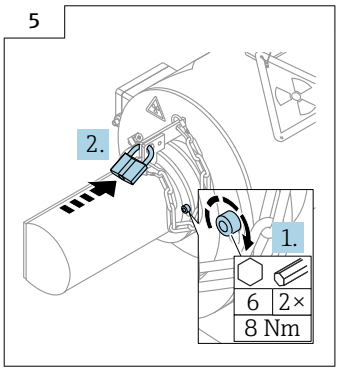
4 →



A0027133

- ▶ Fit the cover.

5

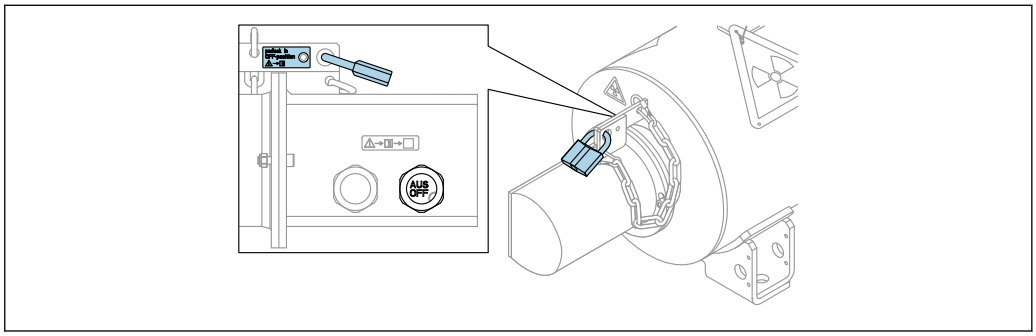


A0027134

- ▶ Fix the cover in place with the screws and reattach the padlock.

8.5.3 Manual version with/without proximity switch (US/AUS version feature 015 "Approval", option AE "NRC"; option AG "ARPANSA")

Preparation notes



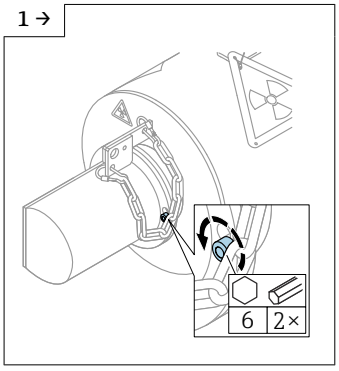
A0061004

28 *End position of padlock*

When the source container is switched off, the padlock must remain permanently in the end position shown.

Switching off radiation

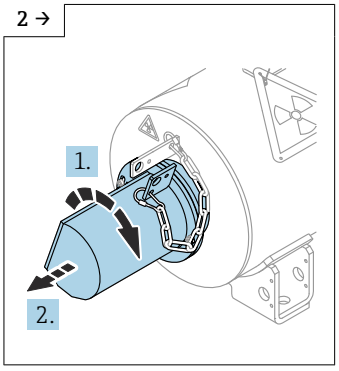
1 →



A0059251

- Turn the screws on the cover three to four times to release them.

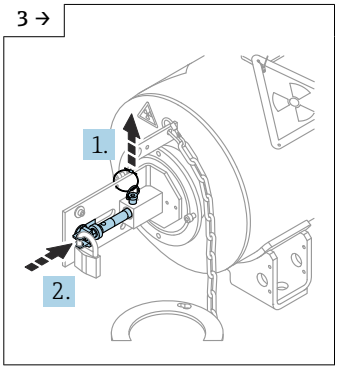
2 →



A0027121

- Remove the cover.

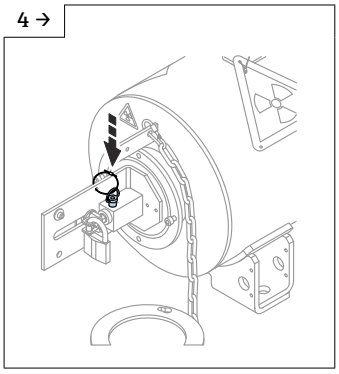
3 →



A0058576

- Remove the lock pin from the bore hole of the source holder guide tube and push the source holder in until it reaches the "AUS/OFF" position.

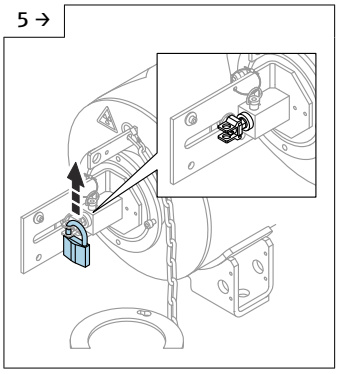
4 →



A0058577

- Reinsert the lock pin into the bore hole of the source holder guide tube.

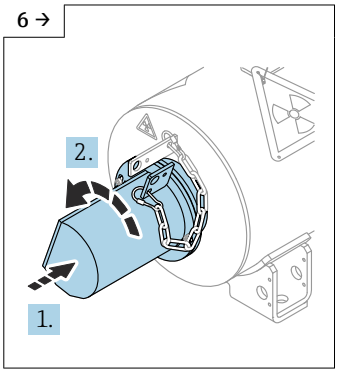
5 →



A0058578

- Remove the padlock from the source retainer.

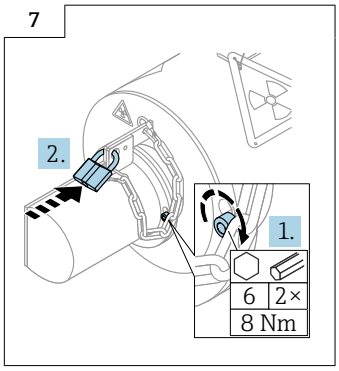
6 →



A0027127

- Fit the cover.

7



A0027128

- Secure the cover with the screws and fit the padlock.
- Fit the padlock.

8.6 Loading and exchanging the radiation sources

Loading and exchanging the radiation sources requires the maintenance personnel – radiation or disposal personnel qualification. See the "Requirements for personnel" section.

This procedure requires expert knowledge above and beyond the operation of the measuring point. Before radiation sources are loaded or exchanged, the procedure must be planned. In particular, the applicable legal radiation protection regulations for the handling of radioactive materials must be observed, see section -> "Basic safety instructions" -> "Legal regulations for radiation protection".

The loading and exchanging of radiation sources must be carried out in accordance with the description in SD03325F.

9 Maintenance

Maintenance requires qualified operating, installation and service personnel.

Maintenance work involving the radiation source requires the maintenance personnel – radiation qualification.

See the "Requirements for personnel" section.

⚠ WARNING

Health hazard from inadequate shielding of the radiation source.
In the event of visible irregularities on the source container, adequate shielding from ionizing radiation cannot be guaranteed.

- Inform the responsible radiation safety officer immediately for further instructions.
- Do not attempt to carry out any repairs of your own. Repairs or maintenance beyond the scope of the routine formal inspection must be carried out only by Endress+Hauser or a person authorized for this purpose.

Maintenance is performed in response to defects identified by a recurrent test. Under normal intended use and adherence to the specified environmental and operating conditions, no periodic maintenance tasks are defined.

9.1 Recurrent tests

Recurrent tests depend on the type of use. In addition to being used as a source container, the container can also be used as a Type A package. Use as a Type A package requires

specific tests. Recurrent tests and tests for use as a Type A package must be documented according to the test instructions.

Tests must be carried out by a qualified, technically competent person. The results of the recurrent tests must be documented in a container-specific test log.

- The user is responsible for maintaining a test log for documenting recurrent tests.
- A template for recurrent tests is provided below.
- A template for a test log is provided below.

9.1.1 Test intervals

Observe national requirements as well as documentation requirements.

Test situation	Interval	Test for
Before transport	Always	Integrity
After transport	Always	Integrity
In the process	Annually	Integrity Function
During storage in "loaded" condition*	Every five years	Integrity Safety
Before dispatch in "loaded" condition*	Always	Integrity Safety Compliance with all regulations
Before dispatch in "empty" condition*	Always	Integrity Function
Before loading	Always	Integrity Function

* The container is not contaminated.

- The time between dispatch and testing must not exceed six months.
- The time between leak testing and dispatch must not exceed three months.
- Use of a loaded source container in the process corresponds to storage in loaded condition from the point of view of transport, i.e. use as a Type A package.

9.1.2 Integrity tests

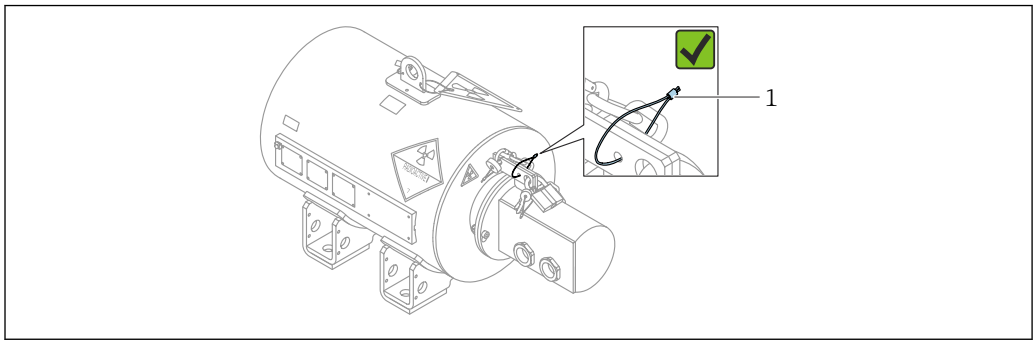
The housing, cover, source magazine, source holder, transportation lock, anti-theft protection, marking, lifting point and seals are tested.

Internal housing parts and internal shielding cannot be tested directly.

It is assumed that damage, e.g. due to corrosion, will already be clearly visible on externally accessible parts.

Observe national requirements and document specifications.

After transport

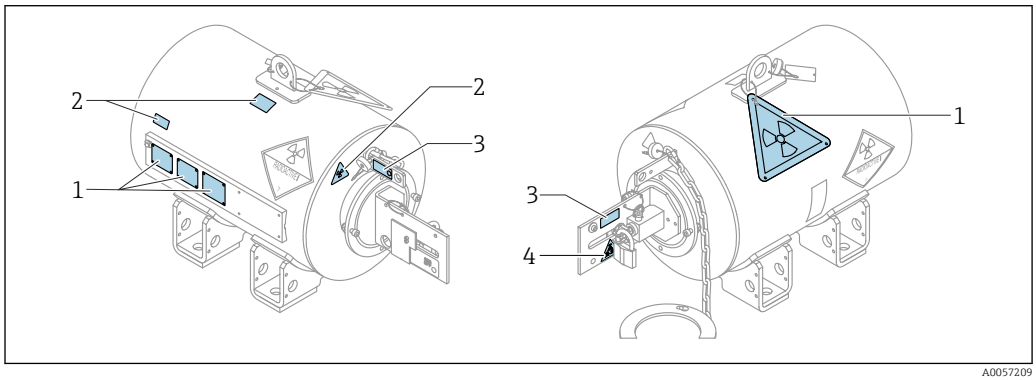


29 Position of the seal

1 Seal

▶ 1. Check whether the seal is present.

General



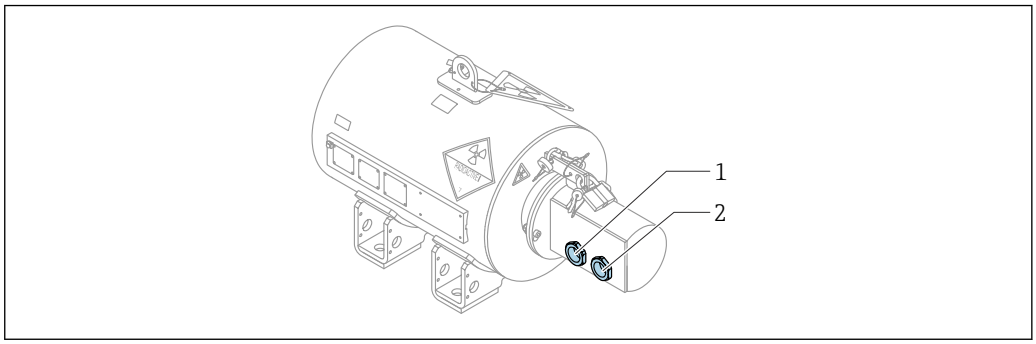
30 Position of metal signs and stick-on labels

1 Position of metal signs
2 Position of stick-on labels
3 Position of stick-on labels (NRC/ARPANSA version)
4 Position of stick-on label (HRQ version)

- For the position of the nameplates, see the "Product description -> Overview" section.
- For an explanation of how to interpret the nameplates, see the "Incoming acceptance and product identification -> Product identification -> Nameplate" section.

1. Identify and document the source container and radiation sources based on the nameplates.
2. Ensure that the correct markings are attached.
3. Ensure that nameplates and warning signs are securely attached and easy to read.
4. Check that the source container and the cover are externally sound.
5. Check that the source container does not show any signs of significant corrosion that could jeopardize the safe storage of the radiation sources.
6. Check that the cover shows no signs of significant corrosion.
7. Check that the source container and cover show no signs of damage caused by fire, falls or collisions.
8. Check that the weld seams are intact.

Inspection windows

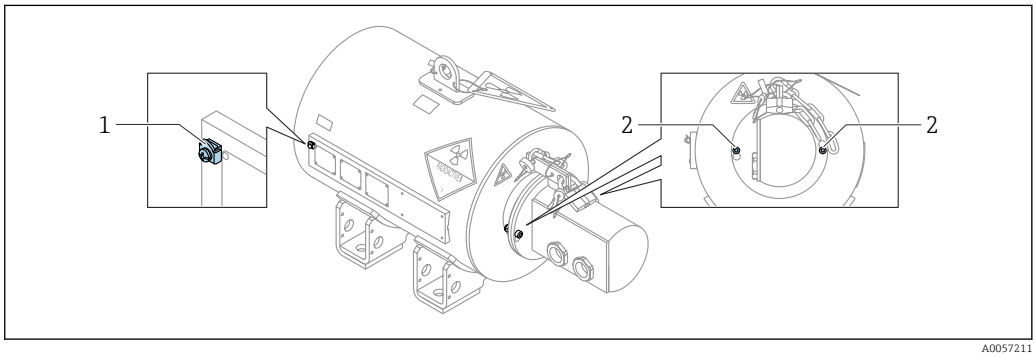


31 *Positions of the inspection windows*

1 EIN/ON inspection window
2 AUS/OFF inspection window

- Ensure that the inspection windows for displaying the ON/OFF position are transparent and not dirty.

Threaded connections on the housing

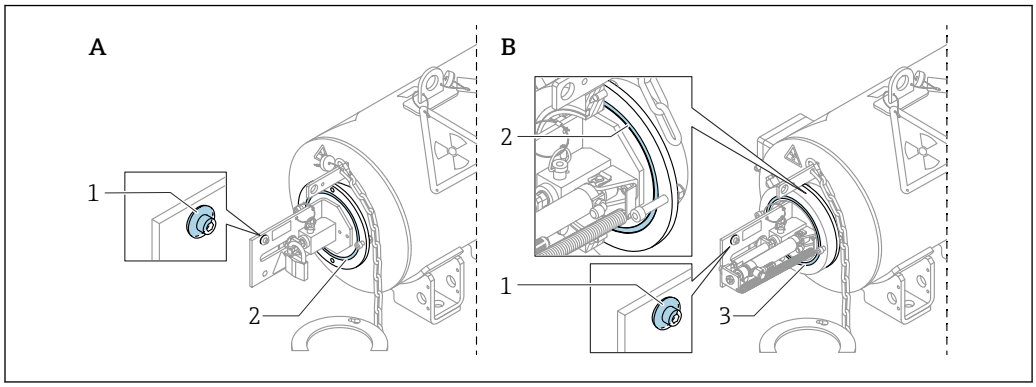


32 *Positions of the threaded connections on the housing*

1 Ground terminal
2 Screws for securing the cover

1. Check that all screws are present.
2. Check that all screws for securing the cover are securely tightened.
3. If the ground terminal is being used, check that the ground cable is securely screwed into the ground terminal.

Seals



33 *Positions of the seals*

1 Reference O-ring
2 Cover flange seal
3 Version with a proximity switch or pneumatic version: Additional seal between housing and flange

For the version with a proximity switch or for the pneumatic version, note there is an additional seal between the housing and the flange.

NOTICE

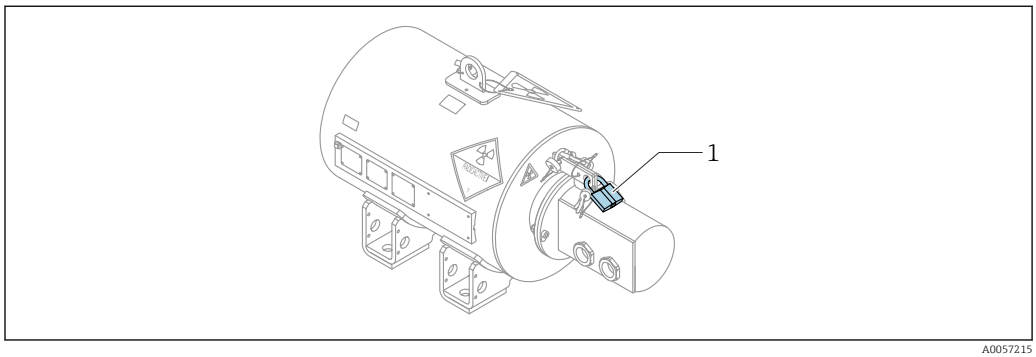
If the reference O-ring is worn, it must be assumed that internal seals are also worn.

▶ Internal seals must also be replaced. Contact E+H Service.

1. Check whether the seals are mechanically damaged.
   ↳ Replace if necessary.
2. Check whether the seals are worn.
   ↳ Replace if necessary.

Anti-theft protection

All versions except NRC/ARPANSA

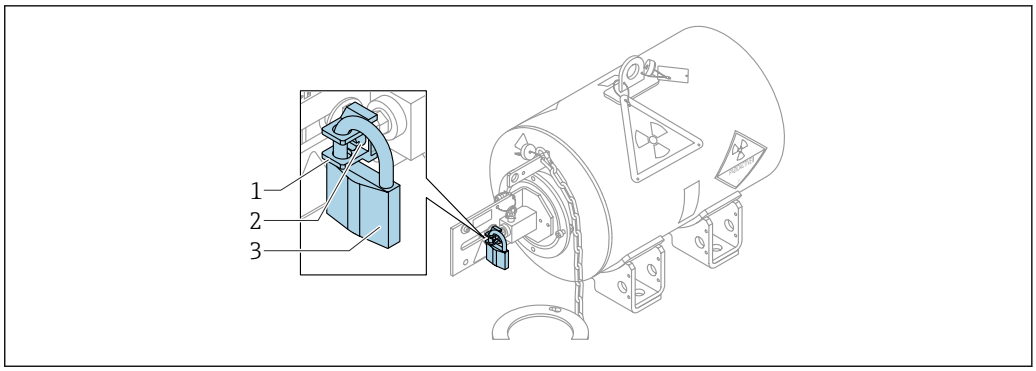


34 *Anti-theft component*

1 Cover lock

1. Check that the lock as an anti-theft device for preventing removal of the source holders is present, undamaged and in working order.
2. Check whether the keys for the lock are available.

Version NRC/ARPANSA



35 *Anti-theft components*

1 *Retaining clip*
2 *Connecting rod*
3 *Lock*

1. Check that all components of the anti-theft device for preventing removal of the source holder are present, undamaged and in working order.
2. Check whether the keys for the lock are available.

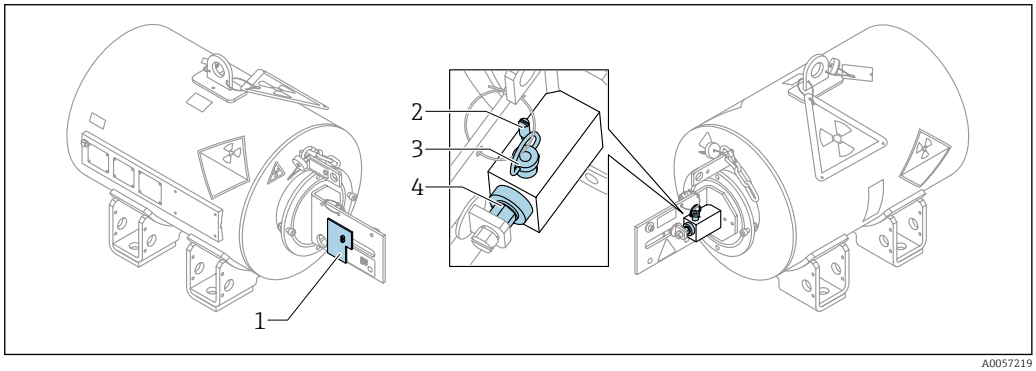
Source holder

DANGER

Risk of injury from ionizing radiation!

Hazard for persons and the environment posed by ionizing radiation and contamination. Ionizing radiation and contamination can increase the risk of cancer and genetic birth defects. Depending on the dose, ionizing radiation can cause immediate physical harm such as nausea, vomiting, hair loss, changes in blood composition, and severe tissue damage that may lead to death.

▶ Never check the source holder directly. Check only on the source holder terminal.

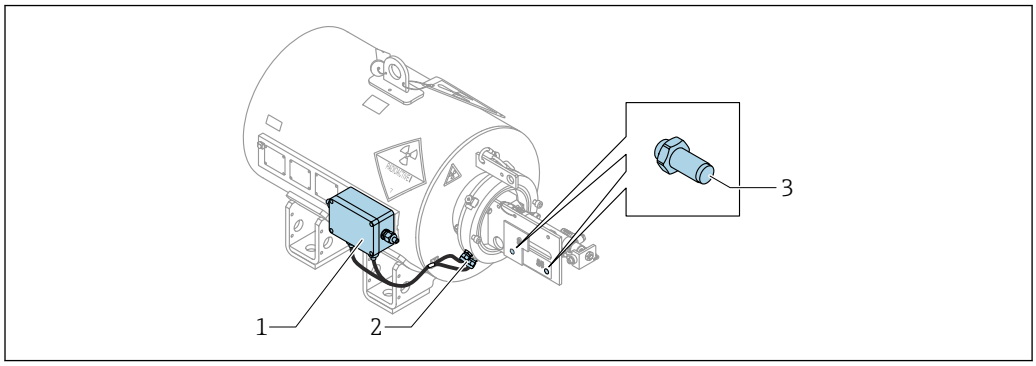


36 *Source holder*

1 *ON/OFF cover plate*
2 *Locking screw*
3 *Lock pin*
4 *Source holder*

1. Check the source magazine for corrosion.
2. Check the source holder terminal for corrosion.
3. Ensure that the ON/OFF cover plate is securely fitted.
4. Perform a visual inspection to ensure that the lock pin and locking screw are present.

Version with proximity switch

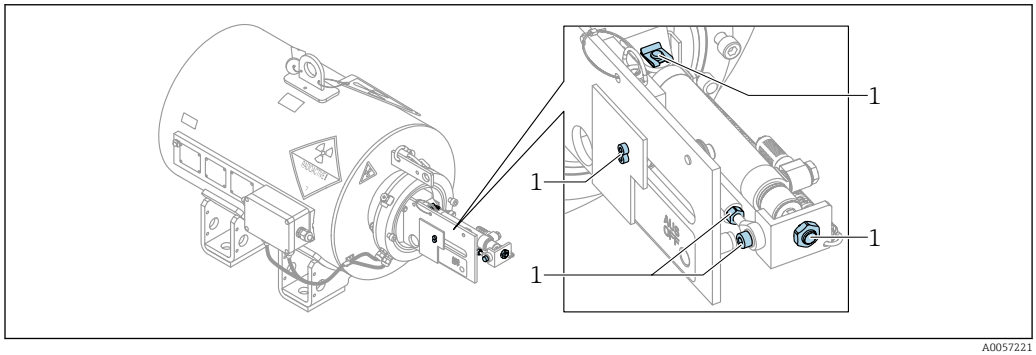


37 *Proximity switch, terminal box and cable entry*

1 *Terminal box*
2 *Cable entry*
3 *Proximity switch*

1. Ensure that the proximity switches are securely fitted.
2. Ensure that the terminal box and the cable entries are securely fitted and in good condition.

Version with pneumatic drive



38 *Screw connections for pneumatic drive*

1 *Screw connections for the pneumatic drive*

1. Ensure that the components of the pneumatic drive are still securely fitted. Check that the threaded connections are secure.
2. Perform a visual inspection to ensure that the components of the pneumatic drive are not corroded.

9.1.3 Functional tests

DANGER

Risk of injury from ionizing radiation!

Ionizing radiation can increase the risk of cancer and genetic birth defects. Depending on the dose, ionizing radiation can cause immediate physical harm such as nausea, vomiting, hair loss, changes in blood composition, and severe tissue damage that may lead to death.

- Only carry out functional tests if the source container is unloaded or the path of the beam is sufficiently shielded, for example by the process medium.

Functional test

- Can the source holder be moved from ON to OFF, and from OFF to ON?

Checking the function – version with a proximity switch

1. Can the source holder be moved from ON to OFF, and from OFF to ON?
2. Checking the function of the proximity switches: Is the position signal transmitted correctly?

Checking the function – version with a pneumatic drive

1. Can the source holder be moved from ON to OFF, and from OFF to ON?
2. Checking the function of the pneumatic drive: Does the source holder move automatically from ON to OFF, and from OFF to ON?

9.1.4 Checking the locking devices on the source container

1. Make sure that the lock is attached and closed.
2. Ensure that the source container is in the "OFF/AUS" position.

Carry out a documented leak test, see the "Maintenance -> Maintenance tasks -> Leak test" section.

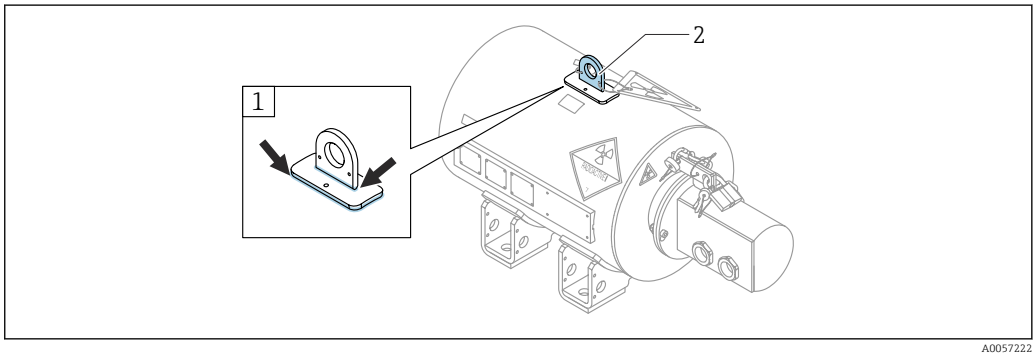
9.1.5 Checking the condition of the lifting point

CAUTION

Risk of damage to the source container due to a defective lifting point

The lifting point material can become brittle in an aggressive environment and rust. This could result in a loss of the load-bearing capacity of the lifting point, causing the source container to fall down. If the source container suffers mechanical damage, it will no longer protect against ionizing radiation.

- In the case of aggressive environments: Check the lifting point and weld seams. If the source container is defective, replace it.



39 *Position of the lifting point*

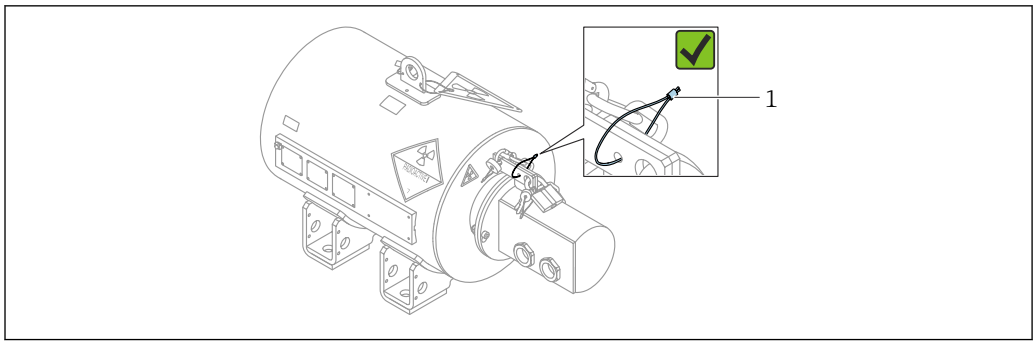
1 Weld seams
2 Lifting point

The lifting point is not in constant use. Check the lifting point as describe below before **each** use.

1. Check whether the weld seams are in good condition.
2. Check whether the lifting point is damaged or deformed.

9.1.6 Checks for compliance with all regulations (for dispatch)

It is prohibited to dispatch the source container without valid and complete documents.



40 Seal on the cover

1 Seal

Dispatch as Type A package:

1. Make sure that the transport index is present and the category is correctly marked for the radiation source concerned.
2. Make sure that the container is marked in accordance with international regulations concerning the transport of dangerous goods (ADR/RID, DGR/IATA).
3. Before dispatch: Attach the seal to the cover.

9.1.7 Template for recurrent tests

Company	
Name	
Address	
Name of inspector and role	

Source container	FQG_-_____

Radiation source	
Isotope	❑ ^{137}Cs ❑ ^{60}Co
Serial number of the radiation source	
Nominal activity (MBq/GBq)	
Date of manufacture	

- A: ❑ After transport
- B: ❑ In the process ❑ Before loading
- C: ❑ Before shipment ("empty")
- D: ❑ During storage in "loaded" condition
- E: ❑ Before dispatch in "loaded" condition

A	B	C	D	E	Tests	☑	☒
x				x	Seal is present and not damaged.		
x	x	x	x	x	Markings are correct and clearly legible.		
x	x	x	x	x	There is no significant corrosion on the source container that could compromise the safe storage of the radiation source.		
x	x	x	x	x	There is no damage caused by fire, falls or collisions.		
x	x	x	x	x	The weld seams are intact.		
x	x	x	x	x	Inspection windows are transparent, and the source position (ON or OFF) is clearly visible.		
x	x	x	x	x	Threaded connections on the source container are secure, and all screws are present.		
x	x	x	x	x	Seals are in good condition and sealing surfaces are free from dirt.		
x	x	x	x	x	All components of the anti-theft devices are present and in working order.		
x	x	x	x	x	The source holder is free from corrosion.		
	x	x			The source holder can easily be moved into the ON and OFF positions		
	x				For versions with a pneumatic drive: Is the pneumatic drive in working order? Are the components of the pneumatic drive securely screwed on?		

A	B	C	D	E	Tests	☑	☒
	x				For versions with a proximity switch: Are the proximity switches in working order and securely screwed on? Are the terminal box and cable entries free from damage and the effects of aging?		
		x	x	x	The source container is closed (in the "OFF" position).		
		x	x	x	The lock has been fitted and locked.		
			x	x	Leak test was verified by performing a wipe test: No contamination was detected.		
				x	The leak testing report is no older than three months old and is included with the delivery documentation.		
				x	The transport index is available.		
				x	The source container is labeled according to international regulations concerning the transportation of dangerous goods (ADR/RID, DGR/IATA).		

Date Signature

9.1.8 Template for the creation of a logbook

The following information should be stated on the cover sheet:

Logbook for a transport container	
Source container type	
Plant operator, user	
Identification number (nameplate)	
Date of acceptance certificate (initial check before commissioning)	
Manufacturer's details	

The following information should be stated inside the logbook:
- Suitability description
- Acceptance certificate (check before commissioning)
- Handling instructions
- Technical data sheet
- Record of exchanged parts
- Logs of recurrent checks
- Records of miscellaneous incidents

9.2 Maintenance tasks

9.2.1 Overview of maintenance tasks

⚠ DANGER

Risk of injury from ionizing radiation.
Ionizing radiation could increase the risk of cancer and the risk of genetic birth defects. Depending on the dose received, ionizing radiation could lead to immediate physical harm, such as nausea, vomiting, hair loss, changes to blood count, serious tissue damage and even death.

- ▶ Do **not** open the shutter if the radiation sources are in the source container.

Source container

1. In the event of cracks and severe corrosion:
   - ↳ - Replace the source container,
     - Contact the manufacturer and
     - Do not use as Type A packaging.
2. Re-tighten the screws for the cover mount if necessary.

Cover

- ▶ If there are any cracks or severe corrosion, replace the cover and do not use it as Type A packaging.

Inspection windows

- ▶ Clean the inspection windows for displaying the ON/OFF position using a cloth (wet or dry). Replace if necessary.

Source holder

1. In the event of corrosion:
   - ↳ Contact the manufacturer.
2. If the radiation source is suspected of leaking:
   - ↳ Initiate emergency measures.
     Inform the radiation safety officer immediately.
     Contact the manufacturer.

Anti-theft protection

1. Replace the lock in the event of a malfunction, such as stiffness or excessive rust, with a lock of the same type.
2. If any parts are missing or damaged, order them as spare parts.

Marking

- ▶ Replace signs promptly if they are no longer clearly visible.

Lifting point

- ▶ In the event of wear or corrosion:
  - ↳ Contact the manufacturer.
    Do not use the lifting point.

Seals

1. Replace seals if necessary.
2. If the reference O-ring is damaged, all seals must be replaced, including those of the source holder.

9.2.2 Leak test

The leak test requires instructed personnel. The radiation safety officer is responsible for compliance with all regulations and for how it is carried out. See the "Requirements for the personnel" section.

Check the leak-tightness of the source capsules at regular intervals. The frequency of the leak tests must correspond to the intervals specified by the authorities or handling permit.

⚠ WARNING

Risk of serious bodily harm if leak test not carried out.
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 responsible 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 soon 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
- If the source container is to be used as a Type A package

Leak test procedure

⚠ WARNING

Be aware of the risk of possible contamination.

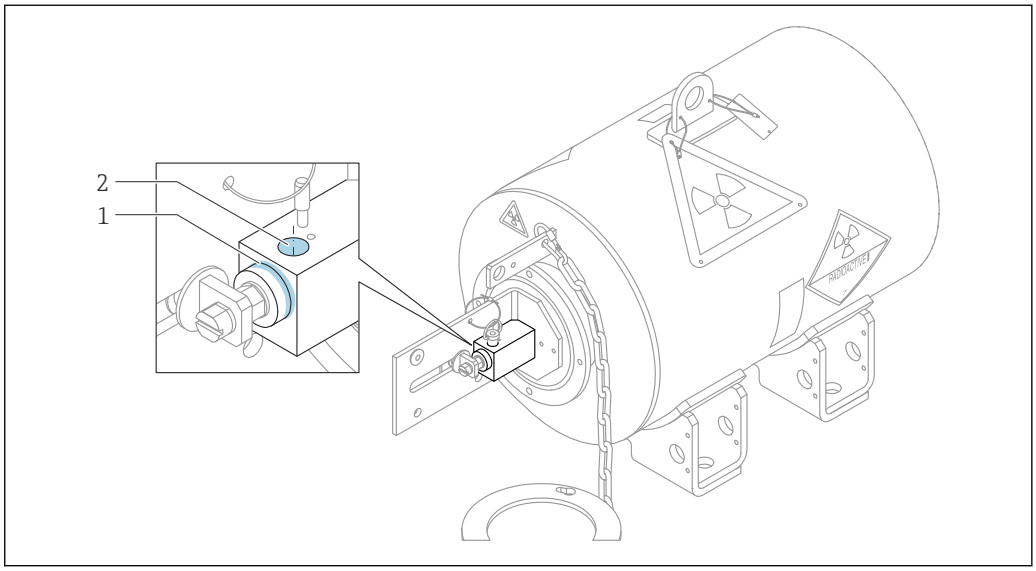
- Use appropriate personal protective equipment.

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

Perform the following leak test procedure unless otherwise instructed:

Manual version (feature 020, option A)

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, if possible, in the bore hole of the lock pin.
2. Have the samples analyzed by an authorized organization. A radiation source is considered to be leaking if more than 185 Bq (5 nCi) is detected in the leak test sample.

This limit value applies to the US. National regulations may specify other limits.

⚠ WARNING

Source capsule is potentially leaking.

- Inform the radiation safety officer immediately and follow his instructions.
- Take appropriate measures to prevent a potential spread of radioactive contamination from the radiation source. Secure the radiation source.
- Inform the responsible authority immediately that a leaking radiation source has been detected.
- Observe national requirements.

Pneumatic version (feature 020, option L)

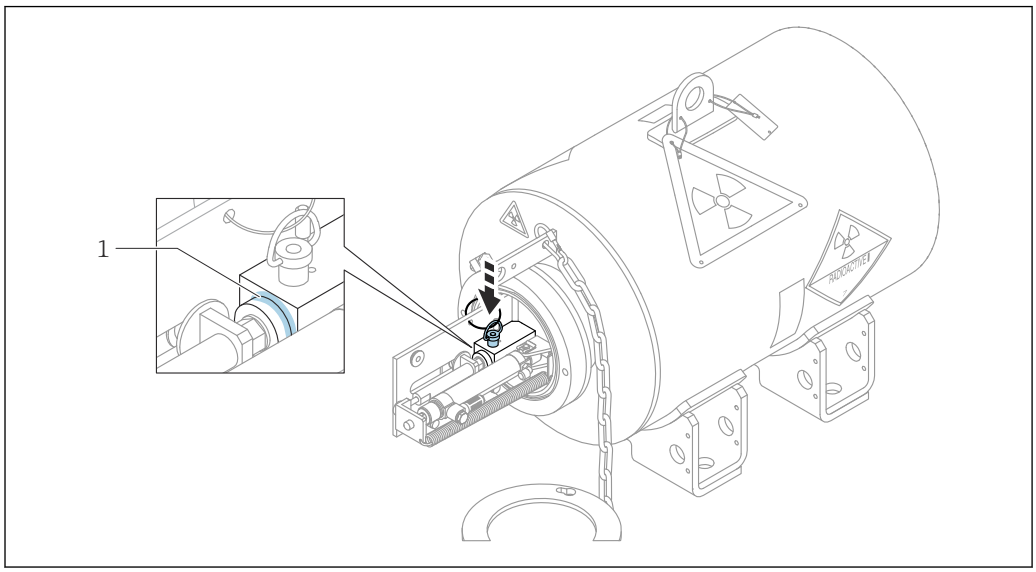
⚠ CAUTION

Risk of being crushed by moving parts!

The actuator contains moving parts that can cause crushing injuries if anyone reaches into it.

- ▶ Do not remove the cover while the pneumatic auxiliary power supply for the drive is effectively connected.
- ▶ When working on the source container, deactivate and lock the pneumatic auxiliary power supply.
- ▶ Do not wedge in objects to stop the drive moving.

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 radiation source is considered to be leaking if more than 185 Bq (5 nCi) is detected in the leak test sample.
3. After performing the wipe test: Remove the lock pin and switch on compressed air.

This limit value applies to the US. National regulations may specify other limits.

⚠ WARNING

Source capsule is potentially leaking.

- ▶ Inform the radiation safety officer immediately and follow his instructions.
- ▶ Take appropriate measures to prevent a potential spread of radioactive contamination from the radiation source. Secure the radiation source.
- ▶ Inform the responsible authority immediately that a leaking radiation source has been detected.
- ▶ Observe national requirements.

9.2.3 Cleaning

DANGER

Risk of injury from ionizing radiation!
Ionizing radiation can increase the risk of cancer and genetic defects in offspring. Depending on the radiation dose, ionizing radiation can cause immediate physical harm such as nausea, vomiting, hair loss, changes in blood composition, and severe tissue damage that may lead to death.
- ▶ Follow all safety instructions during cleaning; see section "Basic safety instructions".

Measures: Clean the source container at regular intervals. Note the following points:

1. Clean the source container to remove any substances that could affect its safety function.
2. Remove dirt, especially from sealing surfaces.
3. Keep labeling in a legible condition.
4. Clean labels with a damp cloth.

9.2.4 Measures in case 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 source container is damaged
- ▶ Corroded source containers must be exchanged immediately
- ▶ Only a genuine spare part may be used to exchange a damaged padlock

9.3 Measuring and test equipment

Dosimeter to check the controlled area

9.4 Endress+Hauser services

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

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

10 Repair

Repair work requires the qualification "Authorized repair personnel".

See the "Requirements for personnel" section.

10.1 General notes

Repairing the source container
- Observe national legislation.
- Verify whether the repair is allowed under the relevant handling permit.
- Take all local conditions into account.
- Crucial factors for avoiding harmful radiation effects are distance, shielding and exposure time. For further information, see the "General instructions on radiation protection" section.

- Repair is only permitted with the switch in the "AUS/OFF" position, secured by the lock pin.
- Take the weight of the source container without pallet into consideration: Max. 435 kg (959.18 lb)
- For more information on service and spare parts, contact Endress+Hauser Service: www.endress.com/worldwide.

10.2 Spare parts

For spare parts currently available for the product, see online at:
https://www.endress.com/deviceviewer (→ Enter serial number)

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 the responsible Endress+Hauser sales center to organize a return for the purpose of testing for reuse or recycling by Endress+Hauser.

10.4.2 Other countries

Contact the responsible Endress+Hauser sales center or appropriate authority to find a way of returning the device within your country, if possible. 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 potential returns is Frankfurt, Germany (FRA).

10.4.3 Conditions

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 radiation source itself or on substitute wiping surfaces as described 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 data is listed in the documents supplied with the radiation source.
- The source container must not show any signs of severe corrosion that could jeopardize the safe storage of the radiation source.
- The source container must not show any signs of serious mechanical damage caused by 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 radiation source must be returned in a separate Type A transportation cask. Contact the responsible 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 according to IAEA Safety Standards No. SSR-6 (https://www.iaea.org/publications/12288/regulations-for-the-safe-transport-ofradioactive- material) or equivalent national standards. The source container and any overpack must be labeled accordingly.
- The leak test certificate, the manufacturer's certificate for the radiation source and the completed pre-return inspection report must be sent to Endress+Hauser before returning the device.

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

10.4.4 Inspection before return

Company	
Name	
Address	
Name of inspector and role	

Source container	FQG_-_____

Radiation source	
Isotope	❑ ^{137}Cs ❑ ^{60}Co
Serial number of the radiation source	
Nominal activity (MBq/GBq)	
Date of manufacture	

Tests	Result ☑	Result ☒
Wipe test report, not older than three months, enclosed with the return delivery documents		
Leak test including test report, not older than three months, enclosed with the return delivery documents		
A copy of the manufacturer's certificate for the radiation source is enclosed with the return delivery documents		
No significant corrosion on the container that could jeopardize the safe storage of the radiation source		
No signs of serious damage on the source container from fire, falls or collisions		
Visual inspection: Weld seams intact?		
"EIN/ON" and "AUS/OFF" mechanism works according to the Operating Instructions		
Is the source container secured in the "AUS/OFF" position with a lock pin?		
Is the transportation lock fitted?		
The transport index has been determined		
The source container is labeled according to international regulations concerning the transportation of dangerous goods (ADR/RID, DGR/IATA)		

Date Signature

10.5 Source container disposal

Observe the following notes during disposal:
- ▶ Observe national regulations.
- ▶ Comply with national regulations governing the disposal of radioactive radiation sources.
- ▶ Comply with national regulations governing the disposal of lead. The source container contains more than 0.1% lead with CAS no. 7439-92-1.
- ▶ Ensure proper separation and reuse of the device components.

11 What to do in an emergency

The procedure described here for what to do in an emergency must be initiated immediately for the safety of persons and the environment.

The procedure is designed to safeguard persons affected until the arrival of the responsible radiation safety officer who will then instruct further measures.

The custodian of the radioactive sources (i.e. the person appointed and authorized by the customer) is responsible for observing this procedure.

11.1 Radiation source no longer at the intended location

11.1.1 Description of the emergency

Radiation source no longer present in the source container

11.1.2 How to identify the emergency

In the following cases, a loss of the radiation source can be assumed:
- **No** measured value even though the measuring system is switched on
- Measured value even though the measuring system is **switched off**
- Suspicion of theft: Damaged security seals or missing locks suggest unauthorized tampering with the source container

11.1.3 Immediate measures

1. Leave the affected area immediately.
2. Make sure that no persons enter the suspected danger zone.
3. Notify the radiation safety officer.
4. Set up an extensive cordon around the suspected danger zone (e.g. with yellow marking tape or rope). For the cordon, also take into consideration the areas above and below the danger zone.
5. Mark the affected area with the international radiation warning symbol.
6. As soon as it becomes possible to measure radiation levels, determine the extent of the danger zone by carrying out a radiation measurement.

Crucial factors for avoiding harmful radiation effects are distance, shielding and exposure time. For further information, see the "General instructions on radiation protection" section.

11.1.4 Further measures

In case of theft: Notify the authorities and police

11.2 Source container or ionizing radiation cannot be switched off

11.2.1 Description of the emergency

Radiation cannot be switched off due to mechanical damage.

11.2.2 How to identify the emergency

- Shutter cannot be moved into the "OFF/AUS" position
- Rod cannot be moved (jammed)
- Shutter cannot be closed

If the closing mechanism can be moved but radiation is still present, radioactive contamination should be suspected.

11.2.3 Immediate measures

1. Notify the radiation safety officer.
2. Notify the person responsible for the process.

Crucial factors for avoiding harmful radiation effects are distance, shielding and exposure time. For further information, see the "General instructions on radiation protection" section.

11.2.4 Further measures

Shutter cannot be moved into the "OFF/AUS" position:
- Remove the source container and aim the beam exit channel preferably toward a process container suitable for shielding or, alternatively, toward a very thick wall or floor.
- Agree on how to proceed with the radiation safety officer and Endress+Hauser

11.3 Source container damaged

11.3.1 Description of the emergency

- Source container has been damaged, e.g. by fire or fall, leading to possible increased radiation exposure
- Shielding performance could be affected by the damage

11.3.2 How to identify the emergency

- External damage such as deformation or cracks
- External discoloration caused by fire
- Constituent parts of the source container broken off or deformed

11.3.3 Immediate measures

1. Leave the area around the source container immediately.
2. Make sure that no persons enter the suspected danger zone.
3. Notify the radiation safety officer.
4. Mark the affected area with the international radiation warning symbol.
5. As soon as it becomes possible to measure radiation levels, determine the extent of the danger zone by carrying out a radiation measurement.

Crucial factors for avoiding harmful radiation effects are distance, shielding and exposure time. For further information, see the "General instructions on radiation protection" section.

Carry out a leak test in the form of a wipe test.

11.3.4 Further measures

- Act appropriately in accordance with radiation measurement
- Exchange defective parts in all cases

11.4 Contamination detected

11.4.1 Description of the emergency

- Damage to the radiation source could lead to contamination
- For all events that could have caused damage to the radiation source, contamination should be suspected
- Contamination is suspected if beta radiation also detected at the point of use in addition to gamma radiation

11.4.2 How to identify the emergency

Leak test revealed leakage.

Example: Leak test in the form of a wipe test is positive.

11.4.3 Immediate measures

1. Leave the affected area immediately.
2. Persons in the affected area should be suspected of having been contaminated. Initiate protective measures for affected persons. Take appropriate measures to avoid spreading the contamination.
3. Make sure that no persons enter the suspected danger zone.
4. Notify the radiation safety officer.
5. Set up an extensive cordon around the suspected danger zone (e.g. with yellow marking tape or rope). For the cordon, also take into consideration the areas above and below the danger zone.
6. Mark the affected area with the international radiation warning symbol.
7. As soon as it becomes possible to measure radiation levels, determine the extent of the danger zone by carrying out a radiation measurement.
8. Immediately forward all required information to the local and national authorities.

11.4.4 Further measures

Report the incident to Endress+Hauser.

11.5 Notifying the responsible authorities and Endress+Hauser

Incidents are generally subject to mandatory reporting.

1. Forward all required notifications to the responsible local and national authorities.
2. The responsible radiation safety officer, together with the local authority, implements suitable remedial measures for the problem concerned.
3. Forward all incidents to Endress+Hauser to ensure information feedback.

National regulations may require other procedures and reporting obligations.
Endress+Hauser assists with any questions and provides technical guidance.

12 Accessories

Accessories currently available for the product can be selected via the Product Configurator at www.endress.com:

1. Select the product using the filters and search field.
2. Open the product page.
3. Select **Spare parts & Accessories**.

13 Technical data

For additional technical data, see "Technical Information FQG66".

www.addresses.endress.com

Endress+Hauser

People for Process Automation