

# Technical Information / Operating Instructions

## Source container FQG63

### Radiometric Measurement

#### Source containers with flexible extension element



#### Application

The FQG63 source container is designed to hold the radioactive source during radiometric level limit measurement, level measurement, density measurement and interface measurement.

In the "Off" position, the radiometric source is located in the source container and screens off radiation.

In the "ON" position, the radioactive source with the flexible extensions is located in the protection pipe inside the process vessel.

#### Your benefits

- Very lightweight device provides best possible screening thanks to almost spherical design
- Highest safety classification for the source supplied (DIN 25426/ISO 2919, typical classification C66646)
- Flexible installation length up to 30 m (98 ft)
- Manually operated
- Padlock or locking bolt for fixing the switching position
- Switch status easily identified
- Compact device that is easy to mount
- Adapter and centering flange for existing vessel flanges
- Fire-resistant version +821 °C (+1510 °F) / 30 minutes

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## Safety Instructions

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### Designated use

The FQG63 source container described in this document contains the radioactive source, which is used for radiometric measurement of the level, density and interface and level limit measurement. It screens off the radiation towards the surrounding area and only allows it to be emitted almost unattenuated in the measuring position if the source holder has been positioned in the double-walled protection pipe, which must be provided by the customer, using the flexible extension.

In order to guarantee the screening effect and to exclude damage of the radiation source, all instructions given in this Technical Information for mounting and operation as well as all regulations for radioactive protection are to be followed exactly. Endress+Hauser accepts no responsibility for any damage caused by incorrect use or by use in inappropriate installation environments.

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### Basic Instructions for use and storage

- Observe the applying rules and national regulations.
- Observe the radiation protection regulations in use, storage and for work on the radiometric measuring system.
- Observe warning signs and safety areas.
- Install and operate the device according to this manual and the relevant conditions as specified by the regulatory authority.
- The source holder with the radioactive source may only be operated in the double-walled protection pipe provided at the customer's site.
- The device shall not be operated or stored outside the specified parameters.
- Protect the device against extreme influences (e.g. chemical products, weather, mechanical impacts, vibrations) when operated or stored.
- Always secure the "OFF" position using the padlock.
- Before switching ON the radiation beam it is necessary to ensure that no personnel are within the area of the radiation (or, indeed, inside the vessel). The radiation beam may only be switched ON by specially trained personnel.
- Do not operate or store damaged or corroded devices. Contact the responsible radiation safety officer for appropriate instructions and measures when damage or corrosion occurs.
- Conduct the required leak testing procedure according to the applying regulations and instructions.

#### **▲ WARNING**

If the device is exposed to strong vibrations or mechanical impacts, the safety pin can become abraded inside the housing. This may lead to a loss of the source insert. Stability and tightness of the swivel insert must be checked at regular intervals.

#### **▲ CAUTION**

In case of doubt about proper condition of the device check the area around the device for leakage radiation and/or contact immediately the responsible radiation safety officer.

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### Hazardous area

#### General Instructions

#### **▲ CAUTION**

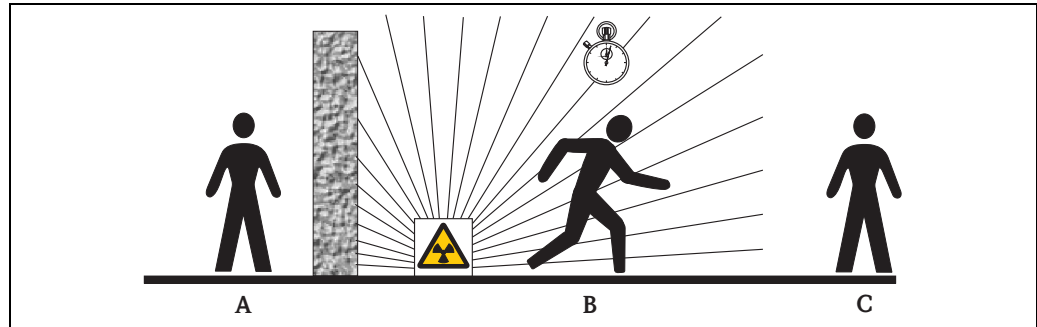
The suitability of the radiometric measurement method and of the device for applications in hazardous areas has to be checked by the operator of the plant according to national regulations.

The following has to be observed:

- Avoid electrostatic charge at the device. Do not rub dry.
- Avoid friction sparks and impact sparks.
- The device must be integrated in the potential equalization of the plant → 18.

## General instructions on radiation protection

When working with radioactive sources, any unnecessary exposure to radiation must be avoided. Unavoidable exposure to radiation must be kept to as low a level as possible. Three important measures help you to achieve this:



A Screening  
B Time  
C Distance

### Screening

Ensure the screening between the radiation source and you and all other persons is as good as possible. Source containers (e.g. FQG60, FQG61/FQG62, FQG63, QG2000) and all high-density materials (lead, iron, concrete etc.) can be used for effective screening purposes.

### Time

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

### Distance

Keep at as large a distance as possible from the radiation source. The local dose rate of the radiation decreases with the square of the distance from the radiation source.

## Legal requirements for radiation protection

Handling radioactive sources is legally controlled. The radiation protection regulations of the country in which the plant is to be operated are to be strictly observed. For example, the valid radiation protection requirements are applicable in Germany. The following important points derived from this for radioactive measurement are:

### Handling permit

A handling permit is required for operating a plant which uses gamma radiation. Application for the permit must be made to the Land government or the authority responsible (Land Offices for Environmental Protection, Trade Inspection Offices, etc.). The Endress+Hauser Sales Organization will be pleased to help you to obtain the permit.

### Radiation Safety Officer

The operator of the plant must nominate someone responsible for radiation protection who has the necessary specialist knowledge and who is responsible for observing all radiation protection regulations and procedures for radiation protection. Endress+Hauser offers training courses in which the necessary specialist knowledge can be acquired.

### Control area

Only persons exposed to radiation during the course of their job may sojourn in control areas (i.e. areas where the local dose rate exceeds a specific value) provided they are subjected to official personnel dose monitoring procedures. For the Federal Republic of Germany the limit values for the control area are specified in the current radiation protection requirements. The Endress+Hauser sales office will be pleased to provide further information of radiation protection and regulations in other countries.





**Supplementary Instructions** Observe the associated Instruction Manuals SD00292F/00/EN (for Canada) and SD00313F/00/EN (for the USA).

**NOTICE**


In conjunction with the nameplates, this document (TI00446F/00/EN) constitutes the documentation for "hochradioaktive Strahlenquellen" according to StSchV §69 (2) of Germany.

**Symbols**

**Safety symbols**

Symbol	Meaning
 A0011189-DE	<b>Danger!</b> This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.
 A0011190-DE	<b>WARNING!</b> This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.
 A0011191-DE	<b>CAUTION!</b> This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.
 A0011192-DE	<b>NOTICE!</b> This symbol contains information on procedures and other facts which do not result in personal injury.

**Symbols for certain types of information**

Symbol	Meaning
 A0015484	<b>Reference to page</b> Refers to the corresponding page number.
1. , 2. , ...	Series of steps

**Symbols in graphics**

Symbol	Meaning
1, 2, 3, 4, ...	Item numbers
1. , 2. , ...	Series of steps
A, B, C, D, ...	Views

## Function and system design

### Function

#### Function of the radiation source container

- The FQG63 source container is designed for applications that require the radioactive source to be positioned inside the process vessel. When it is switched off, the radioactive source in the source container is surrounded by a steel casing filled with lead which screens off gamma radiation. When it is switched on, the radioactive source is located in a double-walled protection pipe inside the process vessel.
- Depending on the installation length, the FQG63 can be used with a flexible extension element (from min. 20 to max. 30000 mm (0.79 to max. 1181 in)).
- The source container can be mounted on the process vessel from above, from the side or from below (max. 4000 mm (157 in)) → [17](#).
- Make sure that no mechanical forces act on the flexible extension as any deformation of the extension can block the ON/OFF switching function.

#### Installation requirements

##### **▲ CAUTION**

##### Protection tube has to be used

- ▶ As the extension element with the source holder rod and the radioactive source may not come into contact with the medium or the atmosphere inside the vessel, a double-walled protection pipe must be installed in the vessel at the customer's site → [17](#).
- ▶ For reasons of safety, the protection pipe must be designed to withstand at least the maximum vessel pressure. The protection pipe must be double-walled, gas-tight and resistant to all the chemical, mechanical and thermal effects to which it is exposed.
- ▶ It must be possible to separate the inner protection pipe from the vessel, e.g. for inspection purposes or if the ON/OFF switching function is blocked, and the protection pipe must be pressureless.
- ▶ By gaskets and covering the installation flange or source container it must be ensured that water or aggressive media cannot enter the protection pipe.

##### **NOTICE**

##### Source position and radiation exposure

- ▶ The FQG63 source container may only be used at the designated measuring point. The radioactive source and the dimensions of the extension element are designed to precisely match this measuring point.
- ▶ A fine-adjustment mechanism can be used to adjust the position of the source holder in the protection pipe to +/- 40 mm (1.57 in).
- ▶ The source container is loaded when delivered and is secured in the "OFF" position with a padlock. The extension element is supplied separately and must be installed on site. The adapter flange is part of the delivery → [10](#) and → [12](#).
- ▶ To keep the radiation exposure during switching ON and OFF as low as possible, the connection nozzle should be as close as possible to the container or pipe. If necessary, an additional shielding of steel or lead has to be attached to the nozzle.

#### Switching the radiation on and off

- To switch the radiation on: Turn the swivel insert 180° and insert the radiation source into the protection pipe using the flexible extension element. To switch off the radiation, reverse this procedure.
- The current switch position (ON or OFF) is clearly indicated on the exterior of the radiation source container.
- The OFF position is secured by a padlock.
- The ON position is secured by a padlock or a locking bolt.
- Switching ON and OFF: In case of high temperatures in the interior of the vessel or tube, use protective gloves.

##### **▲ WARNING**

##### Danger of injury by burns!

#### Fire-resistant version

A fire-resistant version of the radiation source container is available (Feature 670 "Additional function"). This version has a compensation compartment, which is welded laterally onto the housing. In case of fire the liquefied lead will be collected in the compensation compartment thus ensuring the increased fire-resistance → [18](#).

**Attenuation factor and half-value layers**

	<sup>60</sup> Co	<sup>137</sup> Cs
Attenuation factor F <sub>S</sub>	97	1100
Number of half-value layers	6.6	10.1

**NOTICE**

The table contains typical values, which do not take into account production-dependent fluctuations of the source activity and tolerances of the measuring devices.

**Maximum activity of the radiation source**

<sup>60</sup> Co	<sup>137</sup> Cs
max. 3.7 GBq (100 mCi)	max. 111 GBq (3000 mCi)

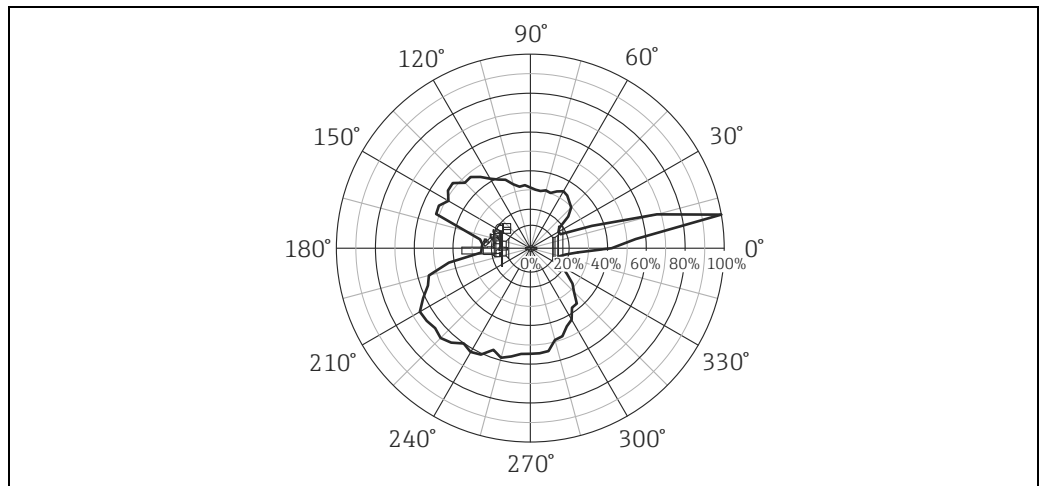
**CAUTION**

The maximum admissible activity may be further restricted by country-specific regulations or approvals.

**Dose rate diagrams**

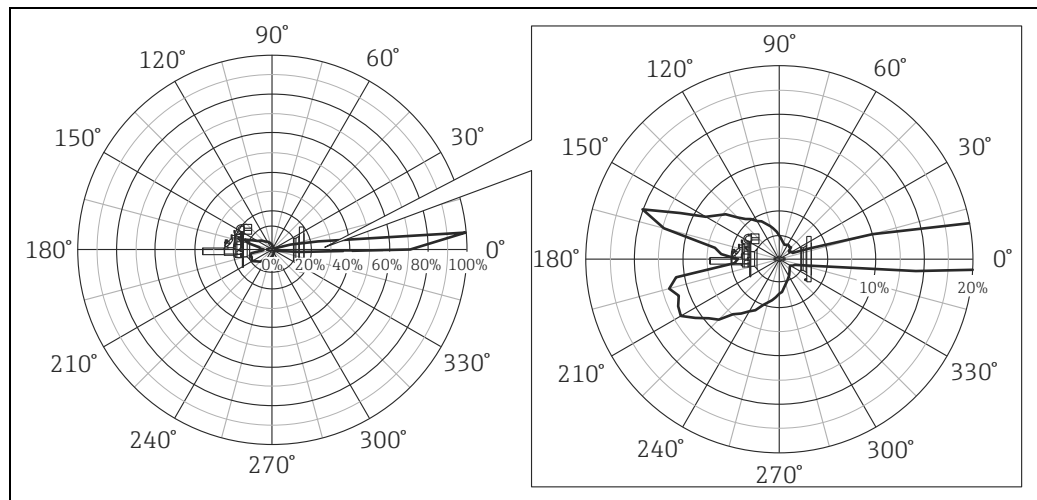
A dose rate diagram specifies the local dose rate in a specified distance from the surface of the radiation source container. Below you can find examples of dose rate diagrams for FQG63. They are valid for a distance of 1 m (3.3 ft) and for selected activities of a <sup>60</sup>Co or <sup>137</sup>Cs radiation source and refer to the radiation being switched OFF (radiation source in source container). Dose rate diagrams for other distances and activities are available on request. The measurements were conducted without adapter flange<sup>1)</sup>. The dose rate diagram for the real loading can be ordered in Feature 590 "Test, Certificate".

**Dose rate diagrams for <sup>60</sup>Co**



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1) The radiation in front of the flange is reduced when using the adapter flange. Measurement with adapter flange on request.

Dose rate diagrams for  $^{137}\text{Cs}$ 

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Option model in Feature 100 "Length; Prepared for Source Activity"	Activity in MBq		max. value (100%) in $\mu\text{Sv/h}$	
	$^{60}\text{Co}$	$^{137}\text{Cs}$	$^{60}\text{Co}$	$^{137}\text{Cs}$
AA	3,7	3,7	0,02	< 0,01
AB	7,4	7,4	0,04	< 0,01
AC	18,5	18,5	0,11	0,01
AD	37	37	0,22	0,02
AE	74	74	0,45	0,04
AF	111	111	0,67	0,06
AG	185	185	1,11	0,10
AH	370	370	2,23	0,20
AK	740	740	4,45	0,40
AL	1110	1110	6,68	0,60
AM	1850	1850	11,13	1,00
AN	3700	3700	22,27	1,99
AP	-	7400	-	3,98
AR	-	11100	-	5,97
AT	-	18500	-	9,95
AW	-	29600	-	15,92
BB	-	37000	-	19,91
BC	-	55500	-	29,86
BD	-	74000	-	39,81
BF	-	111000	-	59,72

**i** Allocation to the option, see the Product Configurator on the Endress+Hauser website:  
[www.endress.com](http://www.endress.com) → Select country → Instruments → Select device → Product page function:  
 Configure this product

**⚠ CAUTION**

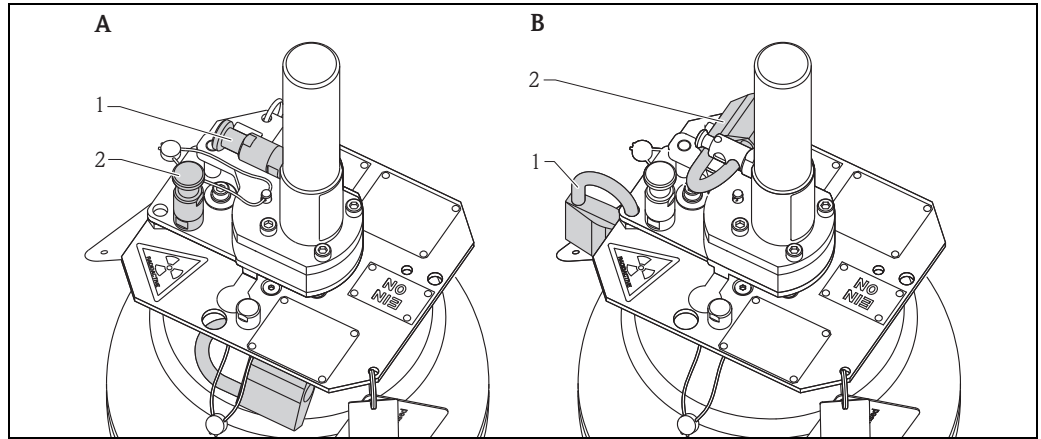
The values for the local dose rate can be higher when the radiation source is located in the protection pipe of the process vessel. Conduct a post-installation check → 18.



## Mechanical construction

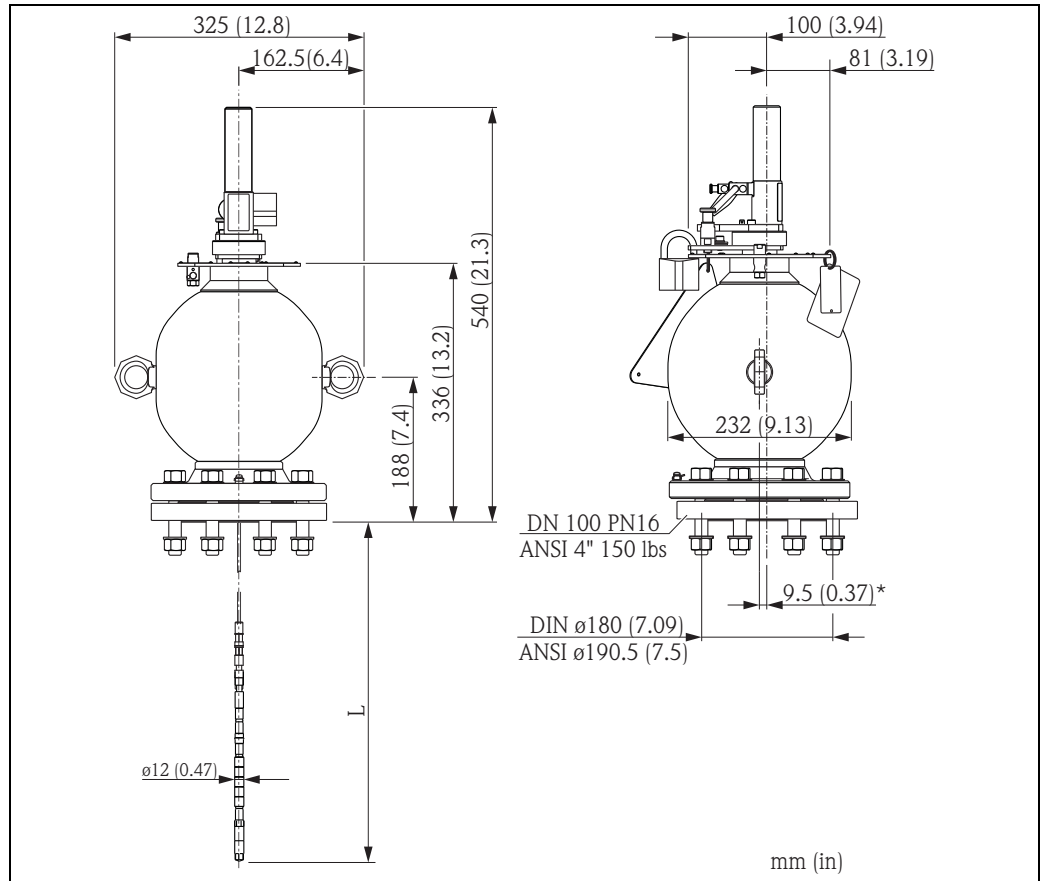
### Version

Feature 020, → 40	Properties
Option model B "Rotary bracket + locking bolt ON + padlock fixation OFF"	<ul style="list-style-type: none"> <li>Locking bolts (No. 1 and 2) to secure the ON position</li> <li>Padlock to secure the OFF position</li> <li>Swivel insert for manual switch-ON/switch-OFF</li> </ul>
Option model C "Padlock fixation ON/OFF + rotary bracket"	<ul style="list-style-type: none"> <li>Padlocks (No. 1 and 2) to secure the ON or OFF position</li> <li>Swivel insert for manual switch-ON/switch-OFF</li> </ul>



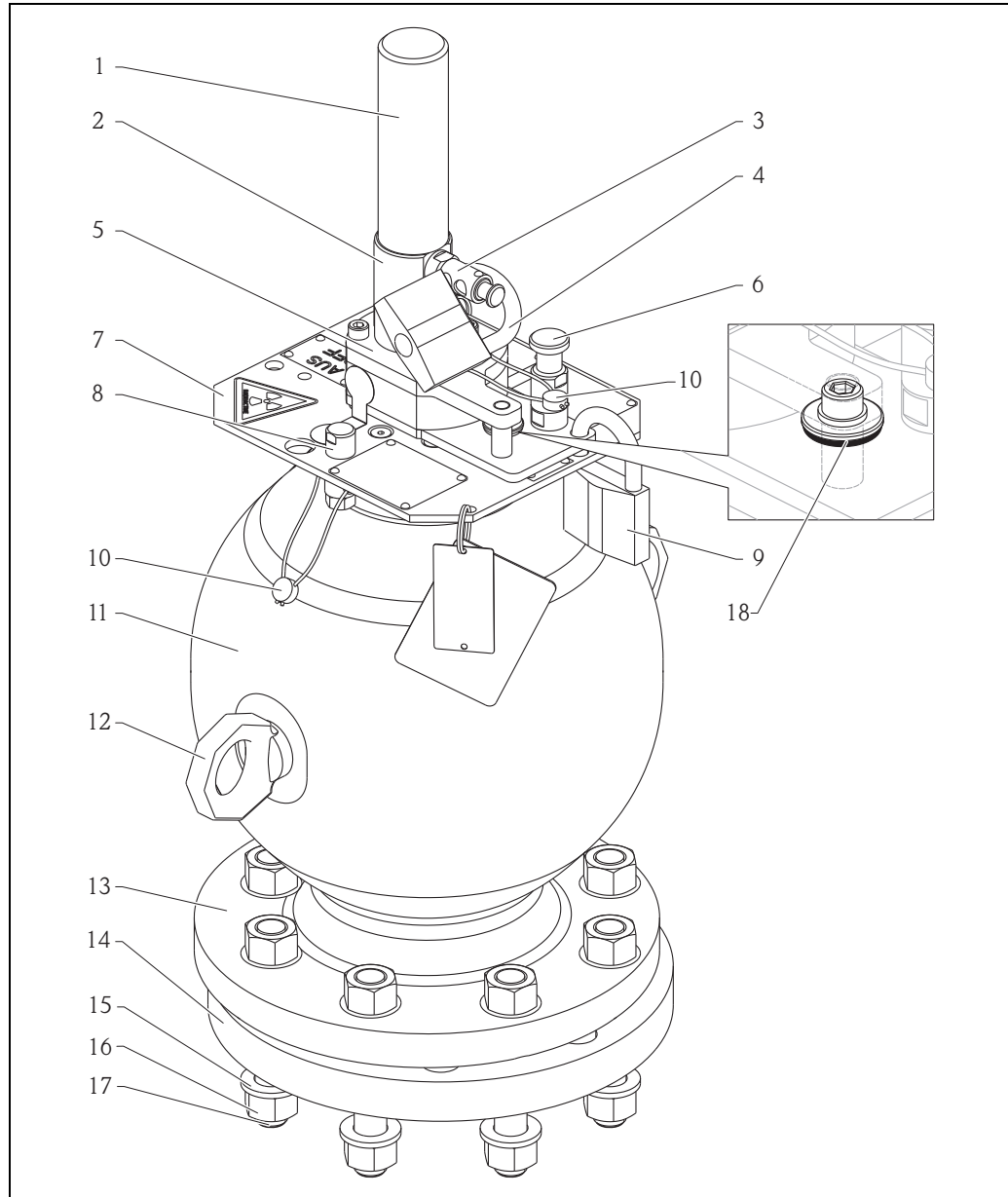
A FQG63 (Feature: Version; Option model: B - Rotary bracket + locking bolt ON + padlock fixation OFF)  
 B FQG63 (Feature: Version; Option model: C - Padlock fixation ON/OFF + rotary bracket)

### Design, Dimensions



L max. 30000 mm (1181 in)  
 \* Eccentricity 9.5 mm (0.37 in)

## Components

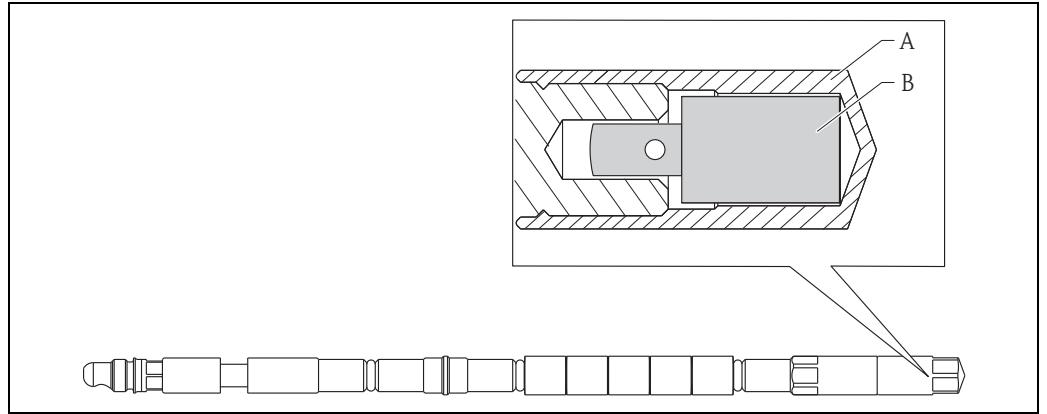


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1	Protection cap	10	Seal
2	Cylinder	11	Container with lead screening
3	Locking bolt no. 1	12	Ring eyelet
4	Padlock no. 2 (only for option model C)	13	Flange
5	Swivel insert	14	Adapter and centering flange
6	Locking bolt no. 2	15	Washer
7	Indication plate	16	Nut M16
8	Stop pin	17	Thread bolt M16x105 (144 Nm (106.20 lbf ft))
9	Padlock no. 1	18	Reference O-Ring <sup>2)</sup>

2) The reference O-ring is used to determine any damage caused by aggressive media. The condition of the reference O-ring is an indicator of the possible condition of the seals inside the source container.

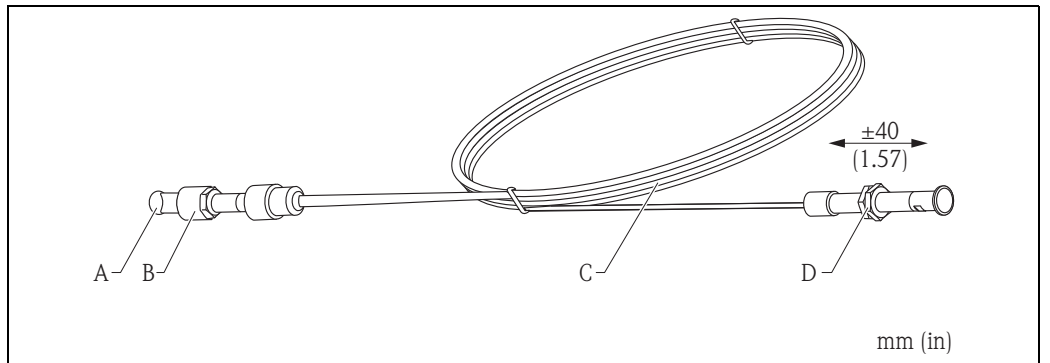
Source holder rod



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- A Protection cap over radiation source
- B Radiation source

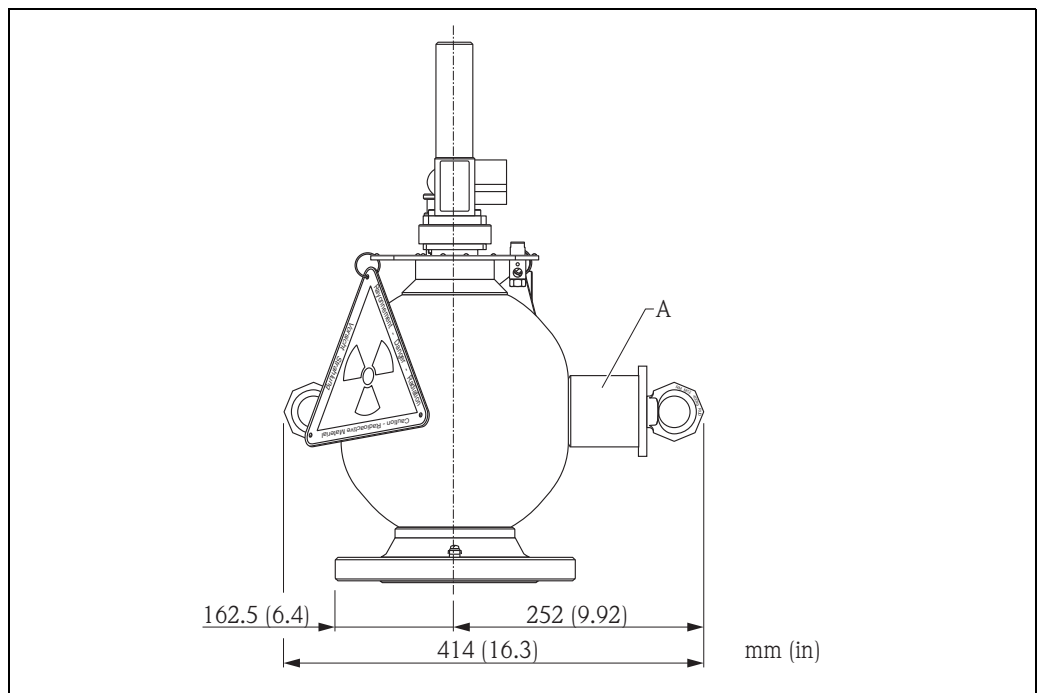
Flexible extension element



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- A Ball head
- B Locking sleeve, can be screwed, after the ball head engages
- C Flexible extension element
- D Counter nuts for the fine adjustment of the position of the radiation source

Optional: "Fire-resistant" additional function



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- A Compensation compartment

Component	Weight
FQG63 (incl. swivel insert, without adapter flange) Version Fireproof	Max. 87 kg (191.84 lbs) Max. 88 kg (194.04 lbs)
Adapter flange (incl. thread bolts and nuts)	Max. 10 kg (22.05 lbs)
Rope extension (with 4 m (13 ft) rope)	Approx. 1 kg (2.21 lbs)
Rope extension (with 30 m (98 ft) rope)	Max. 2,5 kg (5.51 lbs)

Component	Material
Swivel insert and internal parts	316 L (1.4404/1.4435)
Indication plate	316 L (1.4404)
Housing and flange	316 L (1.4404/1.4435)
Surface protection	PUR 2K-texture paint RAL 1003
Screening material	Lead
Padlock	Brass, chrome-plated hardened steel
Grounding connection	Screw: A4; spring washer: A4; clamp: 304 (1.4301), bracket: 316L (1.4404)
Nameplates	A2 (1.4301)
Warning sign	A2 (1.4301)
Grooved-drive stud	A2
Source holder rod	316 L (1.4404/1.4435)
Source holder rope Rope extension	2.4602 316 (1.4401)
Gaskets	FKM
Thread bolt	A4 (316L)
Nuts	
Washer	

**Locking equipment** Padlocks or locking bolts (depending on the device version) ensure locking in the "ON" or "OFF" position.

**Scope of delivery**

- Source container FQG63
- Radiation source (optionally built in)
- Flexible extension element
- Adapter and centering flange (incl. thread bolts, nuts, washers)
- Radiation warning sign
- Technical Information/Operating Instructions: TI00446F/00/EN

#### **NOTICE**

##### **Accessories (to be provided by the customer):**

- ▶ Flange (DN 100 PN16 or ANSI 4" 150 lbs)
- ▶ Double-walled protection pipe; separable inner protection pipe
- ▶ Two seals (thickness: approx. 1.5 to 3 mm (0.06 to 0.12 in))  
(Observe maximum process temperature! → 13)

## Ambient conditions

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**Ambient temperature** Operating elements (above the indication plate): -52 to +120 °C (-62 to +248 °F)  
Flange: -52 to +200 °C (-62 to +392 °F)

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**Process temperature** -52 to +400 °C (-62 to +752 °F)

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### **NOTICE**

#### **Temperature range of radioactive source**

- ▶ With regard to its permitted temperature range, the radioactive source must be suitable for the operating temperature of the source container and for the process temperature in which it is operated.
  - ▶ If the operating temperature range of the applied source capsule is lesser than the above mentioned process temperature range, the process temperature has to be restricted to the operating temperature range of the source.
  - ▶ Nominal temperature operating range → see TI00439F/00/EN. For sources not supplied by Endress+Hauser consult the data sheet of the source for the temperature rating.
- 

**Ambient pressure** Atmospheric pressure

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**Vibration and shock resistance**

- IEC 60068-2-64 test Fh; 10 to 2000 Hz; 1 g<sup>2</sup>/Hz
- IEC 60068-2-27 test Ea; shock 30 g (18 ms) in the OFF position

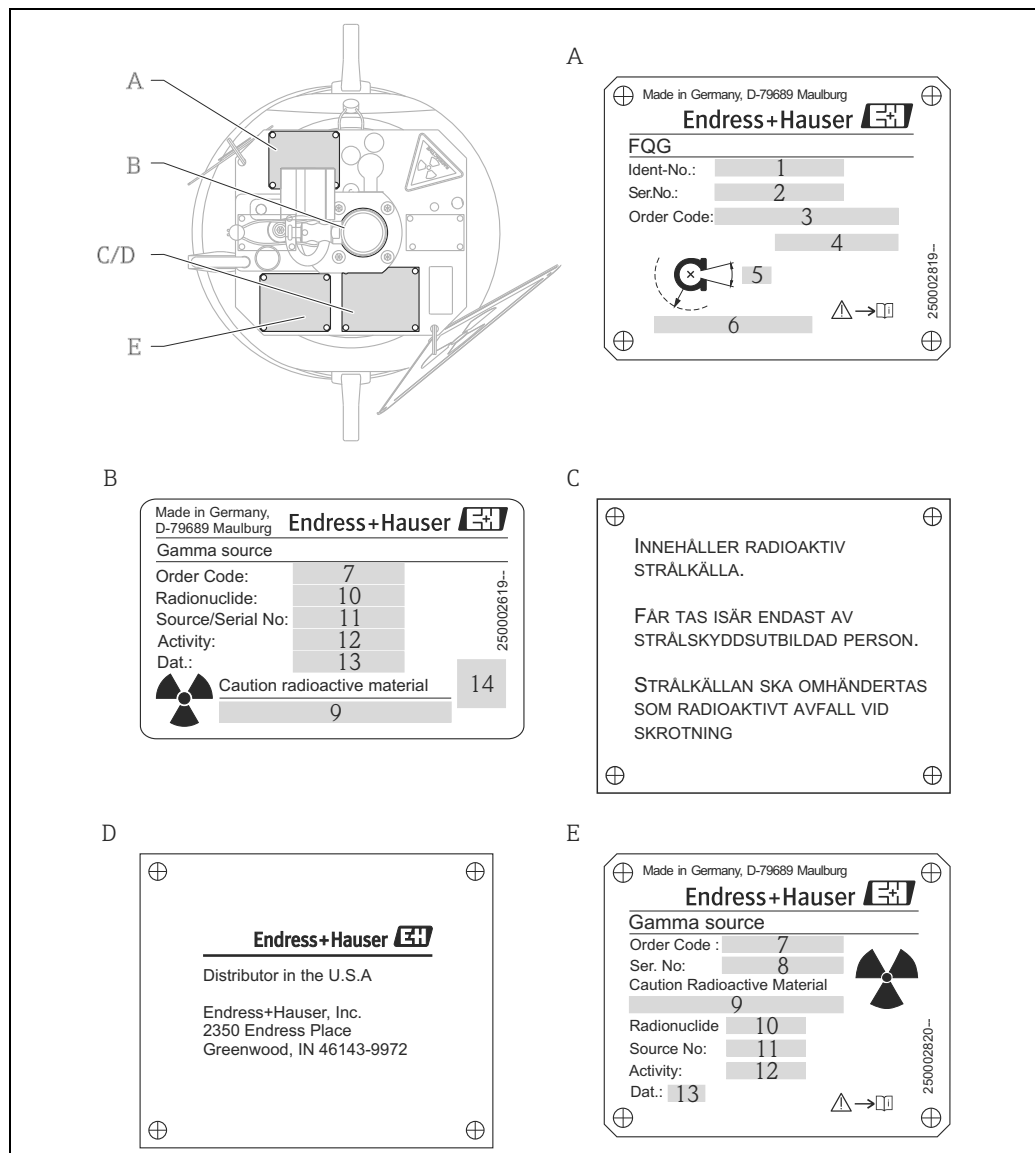
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**Fire** For the fire-resistant version (Feature 670 "Additional Function", Option model "WE"): 30 min. @ 821 °C (1510 °F).

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# Identification

## Nameplates



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- A Nameplate of source container  
 B Nameplate of radiation source  
 C Additional sign for Sweden or Norway only (example)  
 D Additional nameplate of NRC license (optional)  
 only for feature 010 "License", option model AE "NRC Device Registration + wipe test, USA"  
 E Additional nameplate of radiation source
- 1 ID number of source container (abbreviated order code)  
 2 Serial number of source container  
 3/4 Order code for source container as per product structure (→ 40)  
 5 Radiation emission angle (not relevant in source container, radiates 360° in ON position)  
 6 Local dose rate at a defined distance from the surface  
 7 Endress+Hauser internal order code for the radiation source  
 8 Endress+Hauser internal serial number for the radiation source  
 9 Marking "Hochradioaktive Strahlenquelle" (according to German regulations), if required  
 10 "Cs137" or "Co60"  
 11 Serial number of the source capsule (provided for radiation tracking, if necessary)  
 12 Activity in MBq or GBq  
 13 Date (month/year)  
 14 Data matrix code (optional)

### NOTICE

The local dose rate at a defined distance specified on the nameplate refers to the OFF position. It is based on a worst-case estimation and takes into account production-dependent fluctuations of the source activity and tolerances of the measuring devices. Therefore it may be slightly different from the local dose rate which can be calculated from the specified attenuation factors (→ 7).

## Installation

### Incoming acceptance, transport

The radiation source container serves as a type-A packaging (IATA rules) for the radiation source. For transport, it is protected by a foam packaging.  
Package dimensions: 380 x 380 x 600 mm (15 x 15 x 23.6 in)

#### NOTICE

The foam packaging can be disposed like ordinary consumer waste.

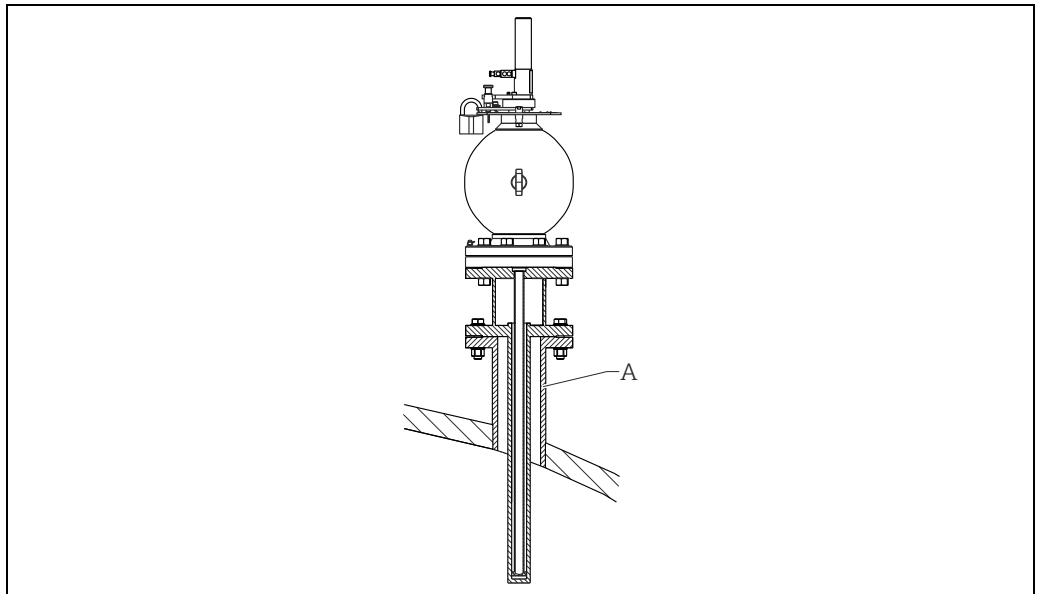
### Mounting hints

With the aid of a nozzle, the source container is mounted on a flange (not pressurized and not in contact with the process) directly on the vessel or pipe.  
The double-walled protection pipe must already be available at the customer's site!

#### CAUTION

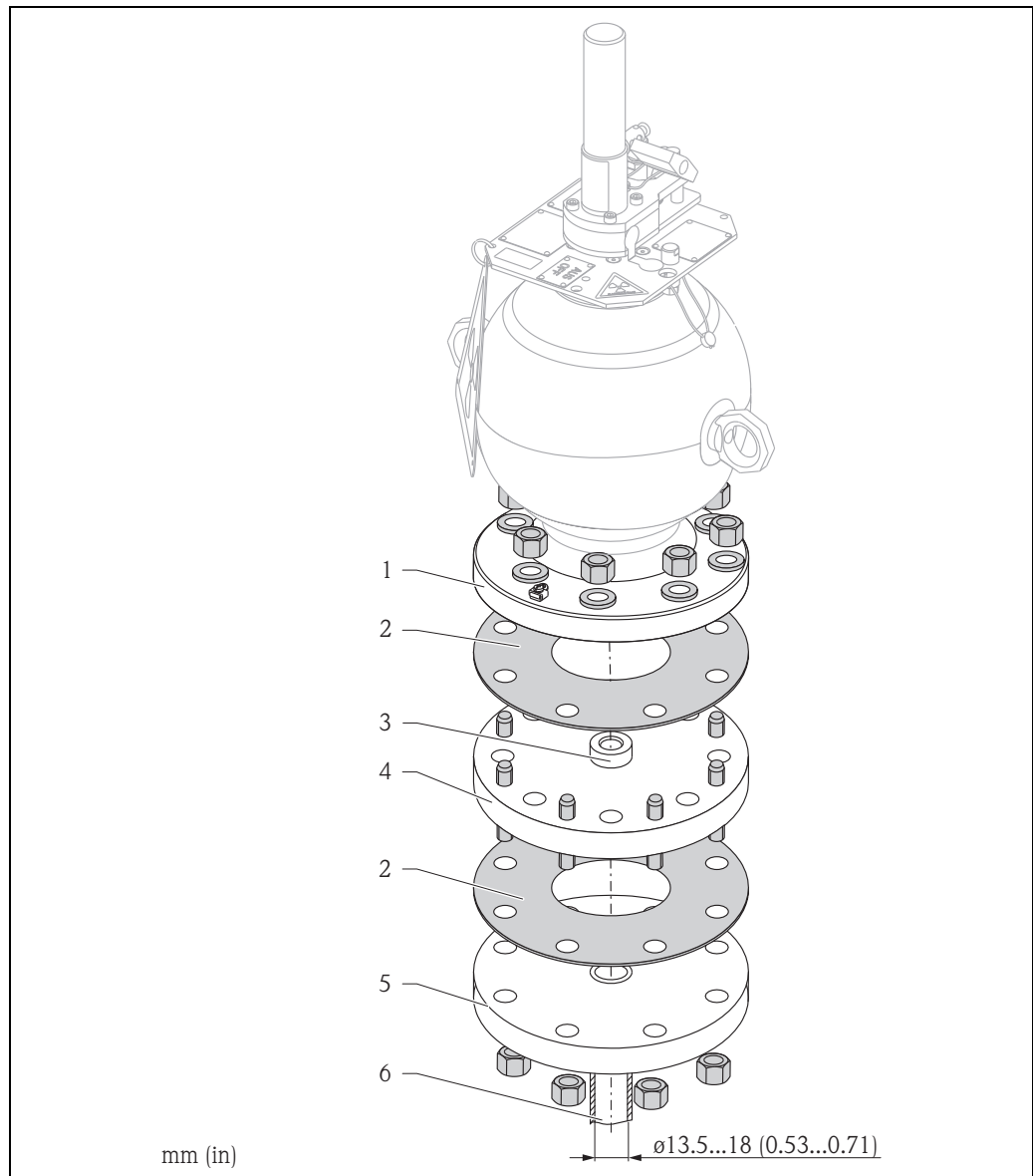
##### To be considered while mounting

- ▶ All maintenance such as mounting, removal or replacement of the radioactive source may only be carried out by supervised personnel who have been specially trained in radiation procedures according to local regulations or the handling permit. Ensure that this is allowed in the handling permit. Local conditions are to be observed.
- ▶ All work must be carried out as quickly as possible and from a distance as large as possible (shielding!). Safety procedures (e.g. blocking of access) must also be carried out to protect personnel from all possible risks.
- ▶ Mounting and dismounting is only allowed in the "OFF" position, secured by a padlock.
- ▶ Take into account the weight of the radiation source container: max. 87 kg (191.84 lbs).
- ▶ Customer-provided screening, to protect the operator against radiation while switching on and off.



A Customer-provided screening: steel (e.g.: 30 to 50 mm (1.18 to 1.97 in)) or plumb (e.g.:15 to 30 mm (0.59 to 1.18 in))

## Mounting the source container



A0019394

- 1 Mounting flange  
 2 Two seals (must be provided by the customer)  
 3 Centering guide (welded on)  
 4 Adapter/centering flange  
 5 Vessel flange (must be provided by the customer)  
 6 Double-walled protection pipe: internal diameter  $\varnothing 13,5$  to 18 mm (0.53 to 0.71 in), must be provided by the customer

1. Fit the adapter/centering flange (4) along with the seal (2) on the vessel flange (5). The centering guide (3) is pointing in the direction of the source container (see graphic).

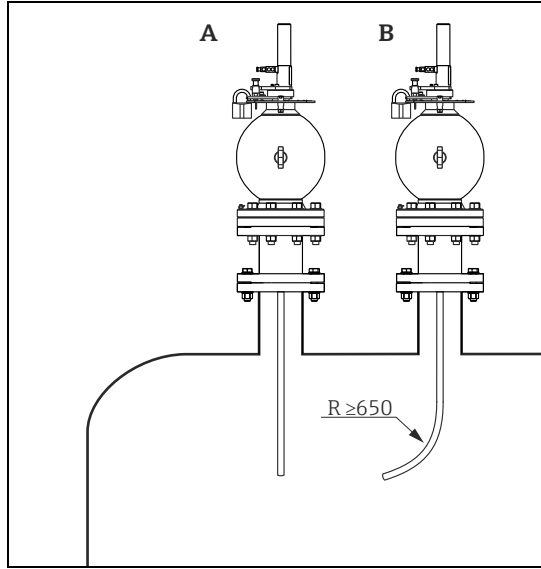
### **⚠ CAUTION**

**Align the adapter/centering flange (4) on the vessel flange (5). The bore hole in the centering flange must be positioned precisely in the center over the protection pipe (6).**

2. Secure the adapter/centering flange and the seal onto the vessel flange, screw the 8 thread bolts (M16) half-way into the centering flange, fit hexagonal nuts and tighten<sup>1)</sup>.
  3. Position the source container along with the seal (7) on the adapter/centering flange. The centering guide and the slotted holes in the mounting flange ensure that the emission channel is positioned exactly over the protection pipe.
  4. Secure the mounting flange with the hexagonal nuts to the adapter/centering flange and the vessel flange<sup>1)</sup>.
- 1) Torque approx. 146 Nm (107.68 lbf ft), SW24/AF24, pay attention to seal characteristic values!



Installation examples



Dimensions: mm (in)

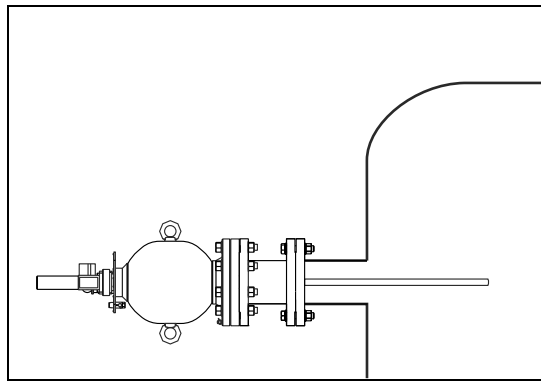
Installing from above

Example A:

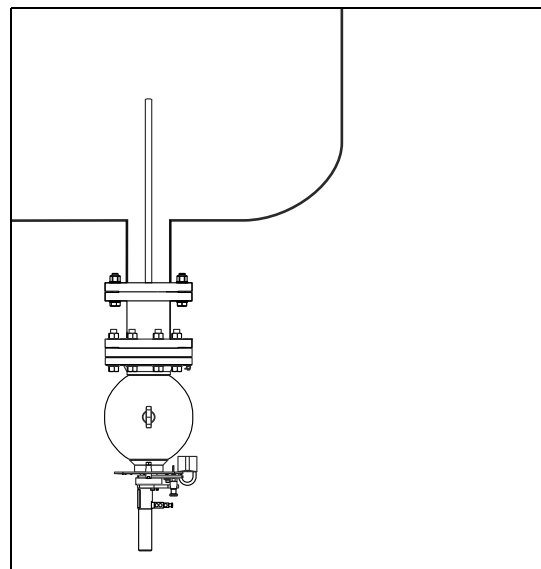
- Straight, double-walled protection pipe
- Internal diameter:  $\varnothing 13.5$  to 18 mm (0.53 to 0.71 in)

Example B:

- Curved protection pipe
- Internal diameter:  $\varnothing 15$  to 18 mm (0.59 to 0.71 in)
- Bending radius  $\geq 650$  mm ( 25.6 in)



Installing from the side



Installing from below

Maximum installation length  
4000 mm (157 in)

**CAUTION**

If there is a possibility of mechanical strain, the double-walled protection pipe must be anchored or secured.

### Orientation of the fireproof version with lateral installation

#### Orientation A (compensation compartment at the top, recommended)

The source container is mounted with the compensation compartment on the top. In the event of a fire, the molten lead can expand upwards and flow back.

#### NOTICE

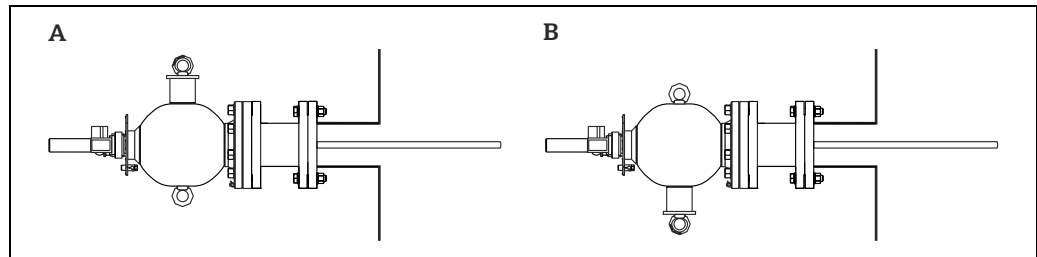
After a fire, the screening is slightly reduced in the upper area of the container.

#### Orientation B (compensation compartment at the bottom, not recommended)

The source container can be mounted with the compensation compartment at the bottom or in lateral position. In case of fire, the compensation compartment will be filled with the liquefied lead.

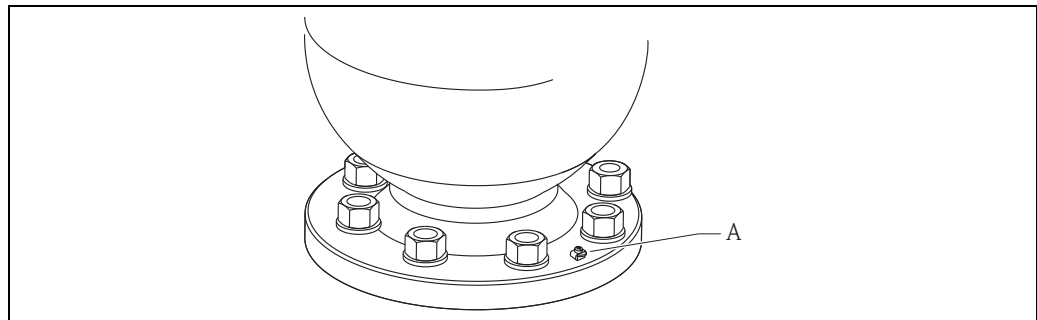
#### NOTICE

After a fire, the screening is significantly reduced in the upper area of the container.



A0019398

### Grounding connection



A0019399

A Ground terminal

The source container must be integrated in the potential equalization of the plant, see also → 3, "Hazardous area".

### Post-installation check

#### Measuring the local dose rate

After mounting, and once the source container has been installed, the local dose rate in the vicinity of the source container, the detector and the process vessel must be measured.

#### ⚠ CAUTION

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

#### Behavior when working in the process vessel

#### ⚠ CAUTION

Once the unit has been correctly mounted, the control area of the empty vessel has to be measured. If it is necessary, this area must be blocked off and marked. If there is an entry into the interior space of the tank, it has to be closed and marked with a sign "radioactive". The entry is only allowed after checking all safety regulation by the responsible radiation protection officer. If maintenance operations are carried out in or at the vessel, it is mandatory to switch the radiation OFF.

## Operation

### Safety instructions for switching on the radiation

- Before switching ON the radiation beam it is necessary to ensure that no personnel are within the area of the radiation or inside the vessel.
- The radiation beam may only be switched ON by specially trained personnel.
- It is absolutely essential to perform the steps in the order indicated.
- Switching ON and OFF: In case of high temperatures in the interior of the vessel or tube, use protective gloves.

#### **⚠ WARNING**

Danger of injury of burns!

#### **NOTICE**

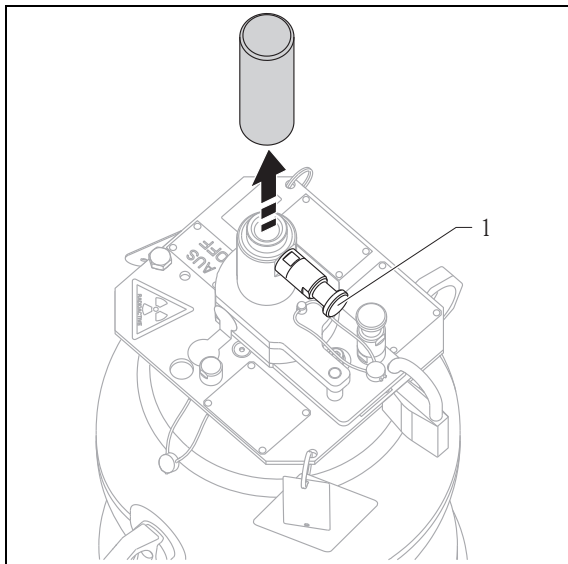
When performing the individual steps, ensure that the locking bolts engage correctly!

### Reading the switch status

- Radiation ON  
The "EIN - ON" sign is visible.
- Radiation OFF  
The "AUS - OFF" sign is visible.

### Switching radiation ON

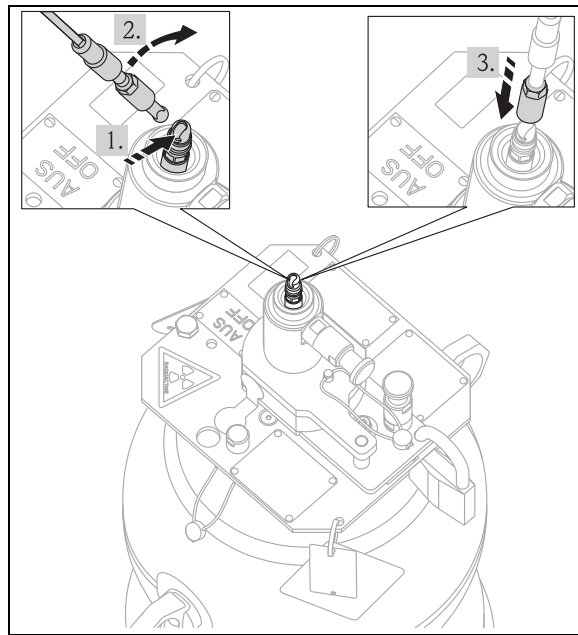
#### FQG63-#B... with locking bolt in ON position



1. Remove the protection cap.

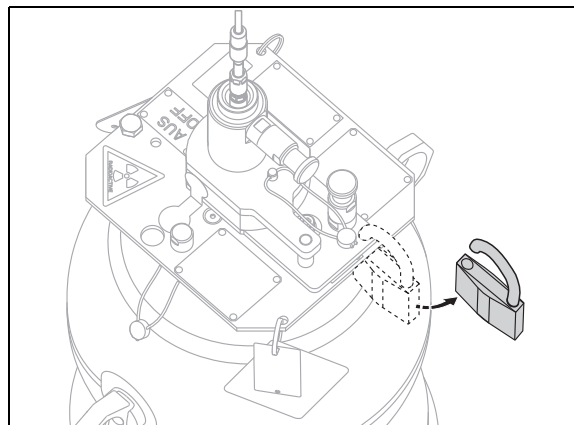
#### **⚠ WARNING**

Do not move bolt No. 1 as this could cause the source holder to fall into the protection pipe in an uncontrolled manner!



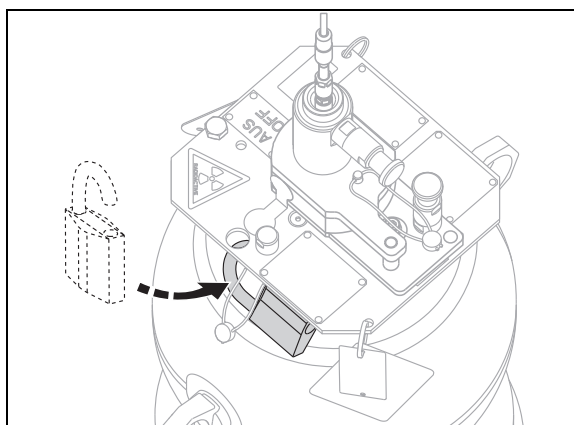
A0019401

2. Connect the flexible extension element with the ball head and tighten the safety sleeve until the limit stop.



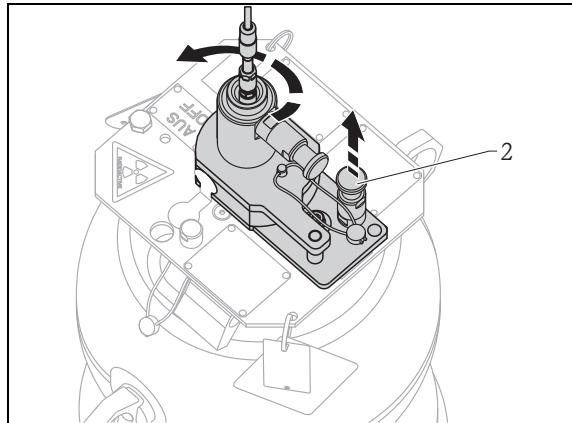
A0019402

3. Remove the padlock.

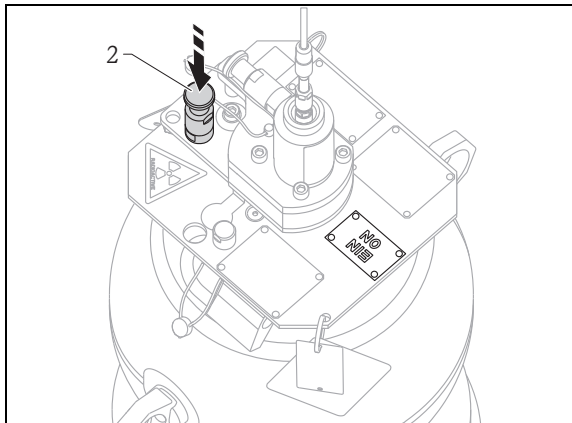


A0019403

4. To store the padlock, hook it in place and lock it (theft protection).



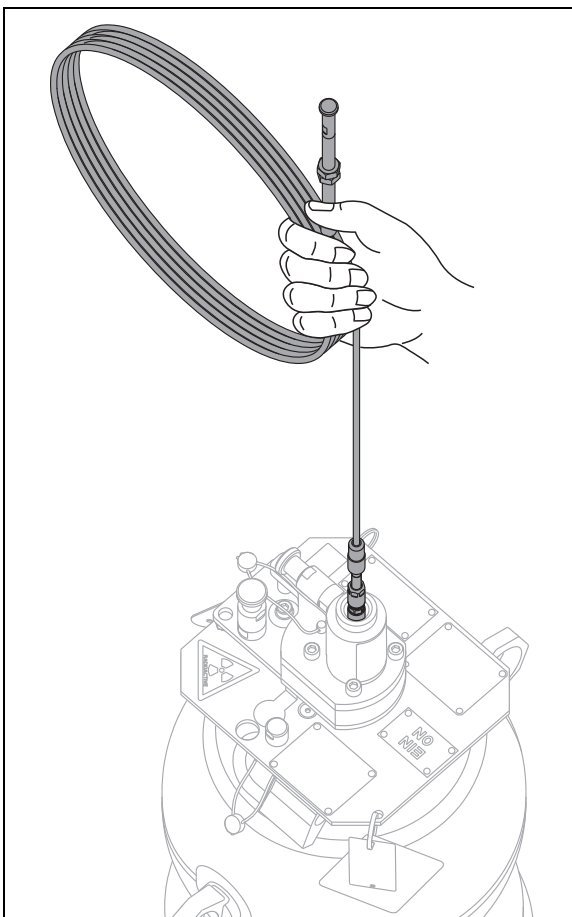
5. Pull up locking bolt No. 2 and turn the swivel insert 180° counter clockwise.



6. Let locking bolt No. 2 snap into place in the "ON" position. Make sure it engages correctly!

**NOTICE**

The position is marked by the visible sign ("ON" or "OFF"). The currently invalid sign is covered by the swivel insert.

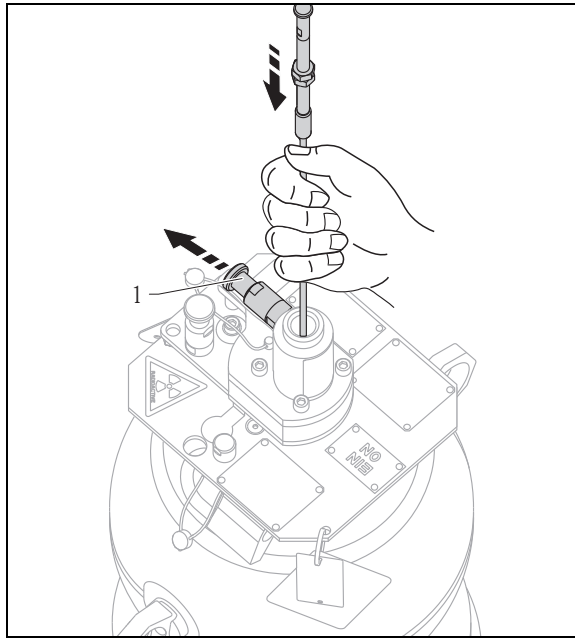


**CAUTION**

When performing the following steps, make sure you always have a secure hold of the flexible extension element!

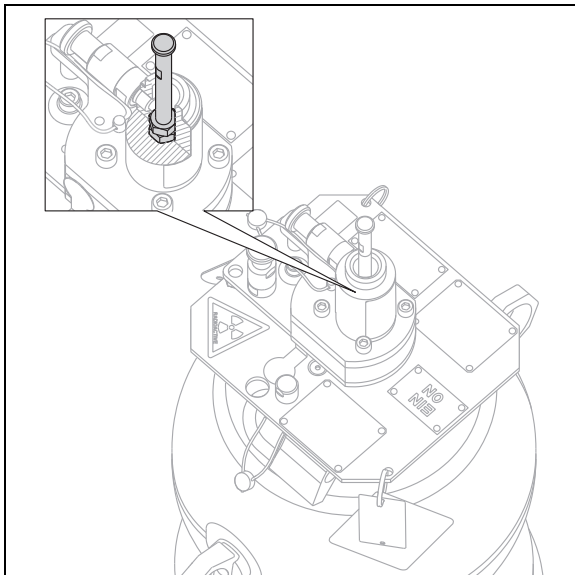
**WARNING**

In the case of upside down installations, the flexible extension element must always be secured against slipping back into the vessel until Step 9 (before fitting the protection cap) is completed.



A0019407

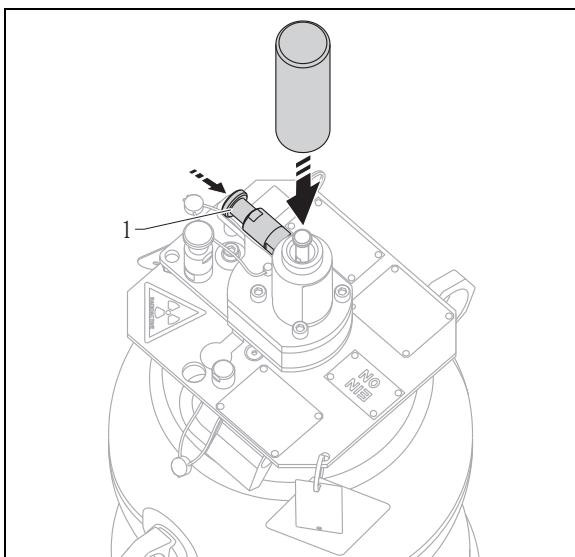
7. Pull locking bolt No. 1 outwards to release the locking mechanism and keep it pulled. Carefully slide the flexible extension element into the source container.



A0019408

8. The position of the radiation source can be optimally adjusted and fixed in place using the two counter nuts (+/- 40 mm). Once the nuts have been adjusted, they must be tightened.

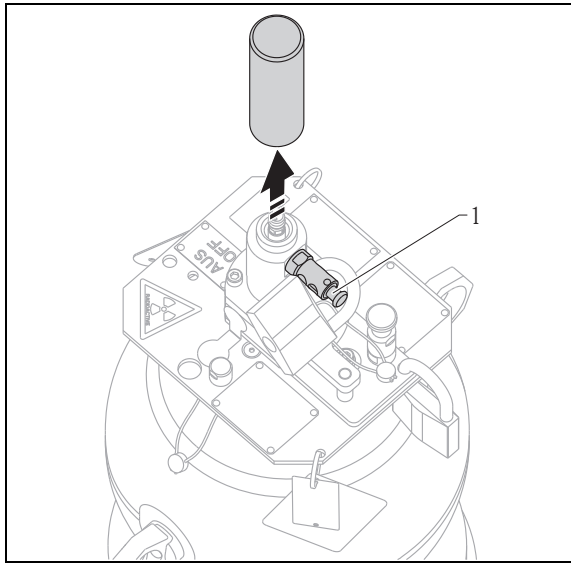
Torque 12 Nm (8.85 lbf ft).



A0019409

9. Let locking bolt No. 1 snap into place in the "ON" position. Make sure it engages correctly! Fit the protection cap and tighten it until the limit stop.

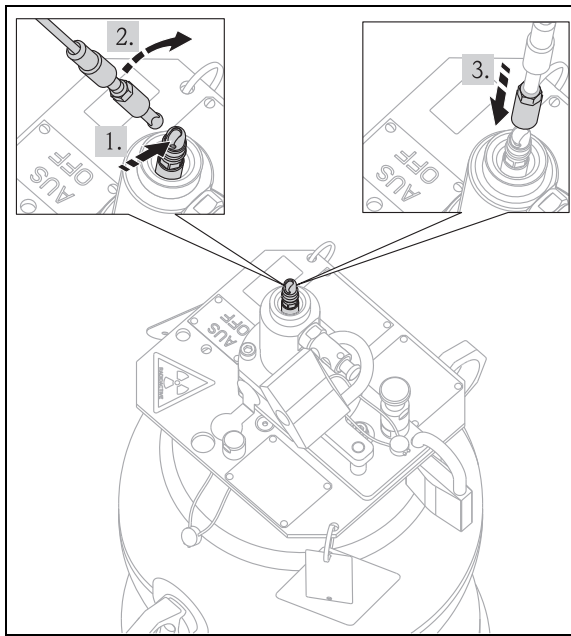
FQG63-#C... with padlock fixation ON/OFF



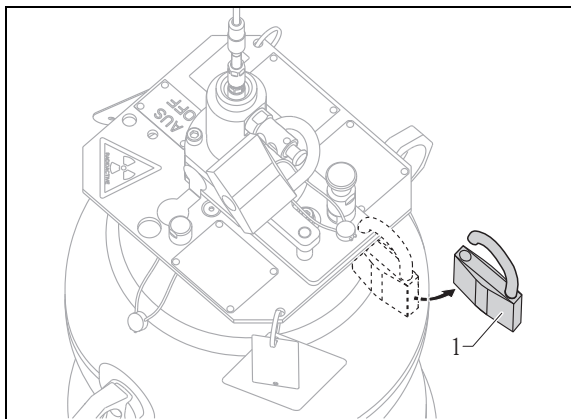
1. Remove the protection cap.

**⚠ WARNING**

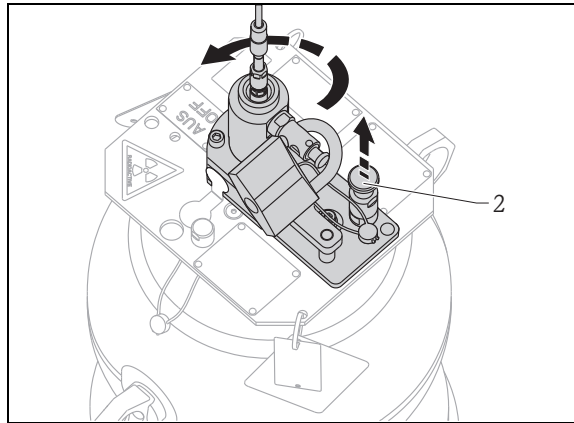
Do not unlock bolt No. 1 as this could cause the source holder rod to fall into the protection pipe in an uncontrolled manner!



2. Connect the flexible extension element with the ball head and tighten the safety sleeve until the limit stop.

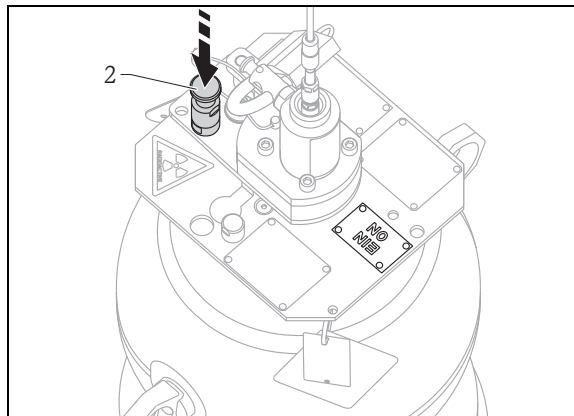


3. Remove padlock No. 1.



A0019413

4. Pull up locking bolt No. 2 and turn the swivel insert 180° counter clockwise.

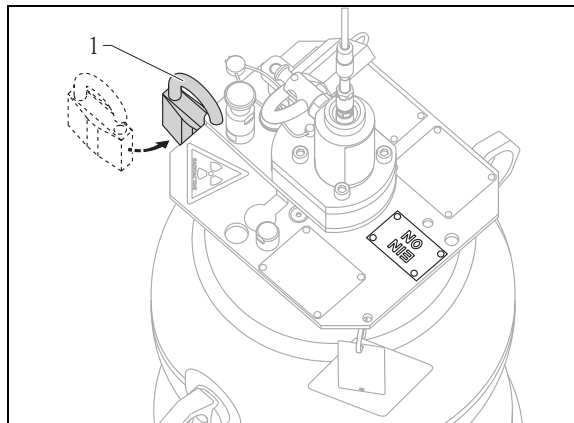


A0019414

5. Let locking bolt No. 2 snap into place in the "ON" position. Make sure it engages correctly!

**NOTICE**

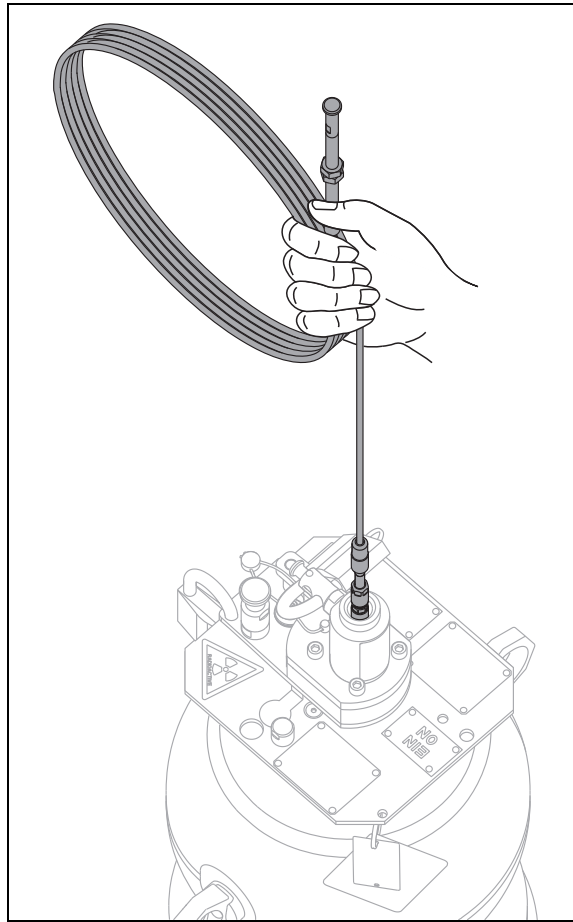
The position is marked by the visible sign ("ON" or "OFF"). The currently invalid sign is covered by the swivel insert.



A0019415

6. Secure the "ON" position with padlock No. 1 at the designated position.



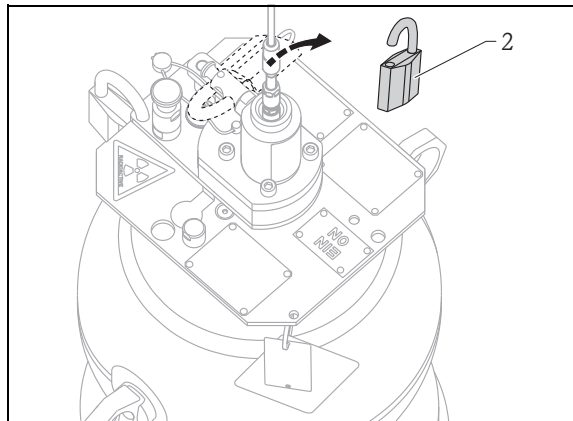


**⚠ CAUTION**

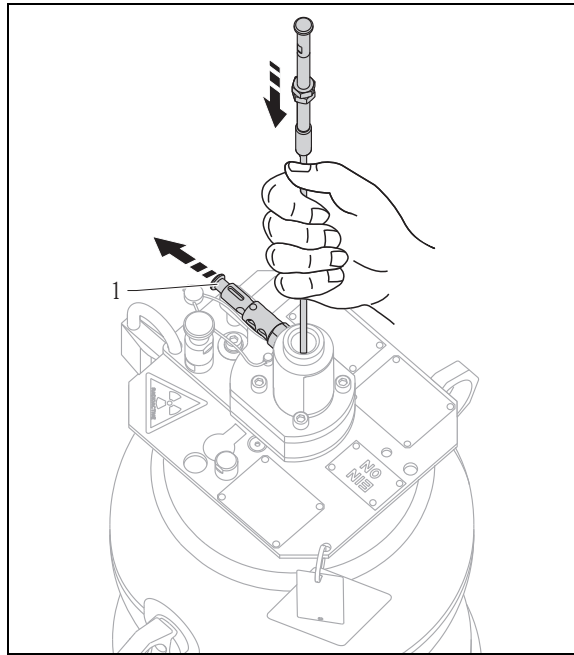
When performing the following steps, make sure you always have a secure hold of the flexible extension element!

**⚠ WARNING**

In the case of upside down installations, the flexible extension element must always be secured against slipping back into the vessel until Step 12 (before fitting the protection cap) is completed.

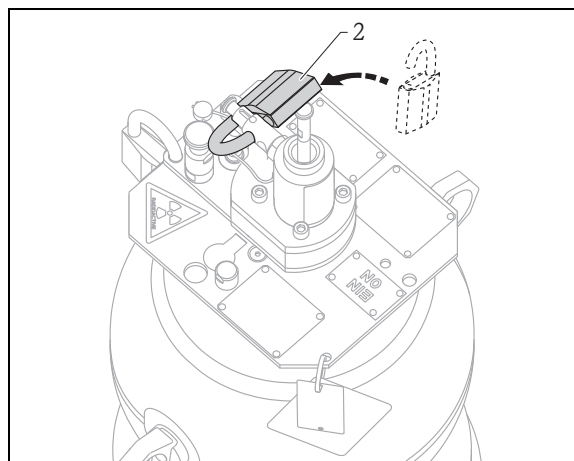


7. Remove padlock No. 2 from the locking mechanism.

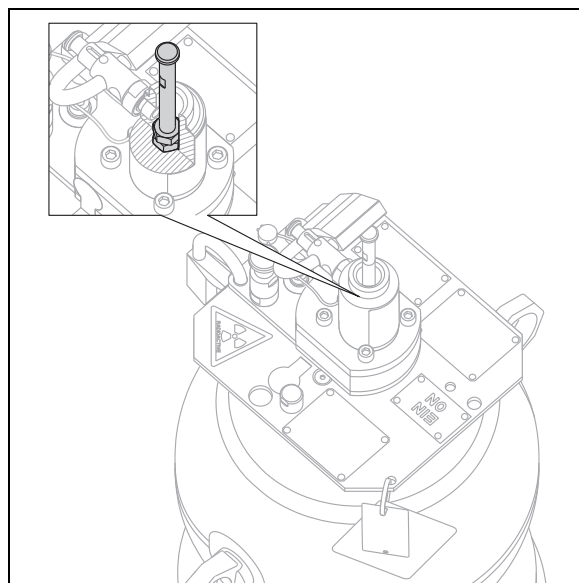


8. Pull locking bolt No. 1 outwards to release the locking mechanism and keep it pulled.

Carefully slide the flexible extension element into the source container as far as the end position.

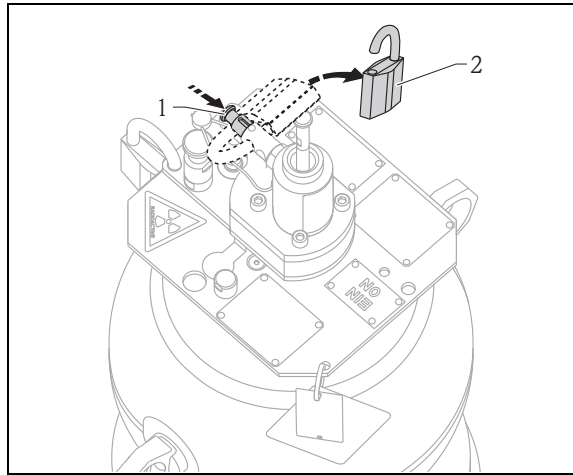


9. To make sure you do not lose padlock No. 2, hook it into the second outer bore hole on the locking mechanism (do not close the padlock).



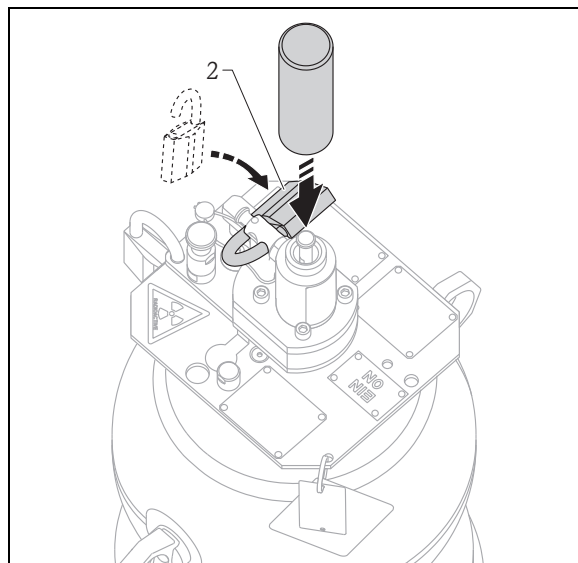
10. The position of the radiation source can be optimally adjusted and fixed in place using the two counter nuts ( $\pm 40$  mm). Once the nuts have been adjusted, they must be tightened.

Torque: 12 Nm (8.85 lbf ft).



11. Remove padlock No. 2.  
Insert locking bolt No. 1 until the limit stop.

A0019421

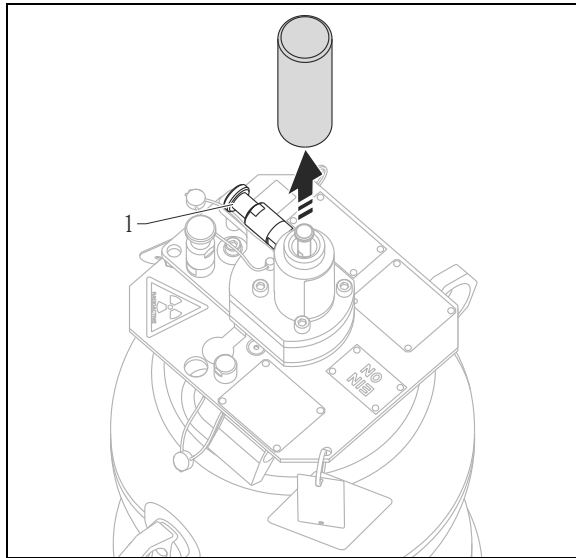


12. Hook padlock No. 2 into the first inner bore hole and close it. Fit the protection cap and tighten it until the limit stop.

A0019422

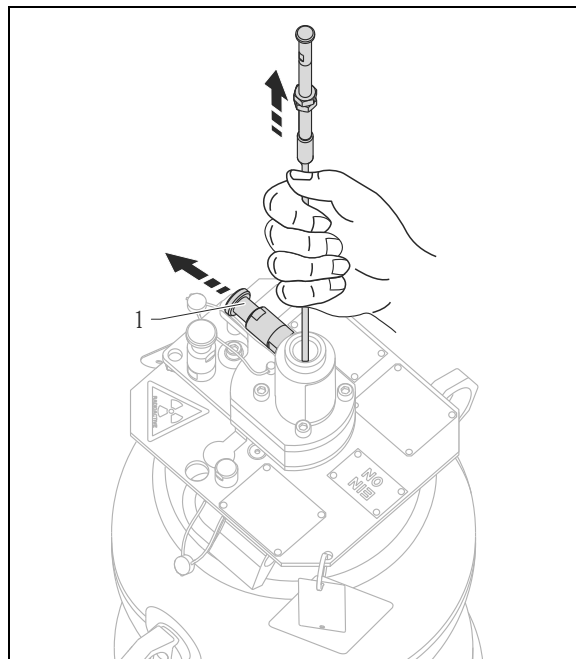
## Switching radiation OFF

## FQG63-#B... with locking bolt in ON position



A0019732

1. Remove the protection cap.



A0019733

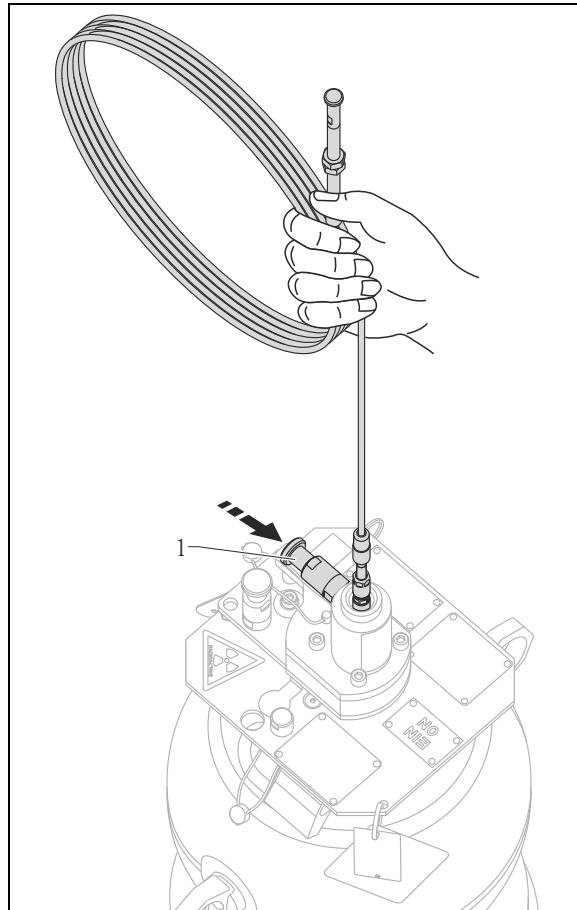
2. Pull locking bolt No. 1 outwards to release the locking mechanism and keep it pulled.

Carefully pull the flexible extension element off the source container until the limit stop.

**⚠ WARNING**

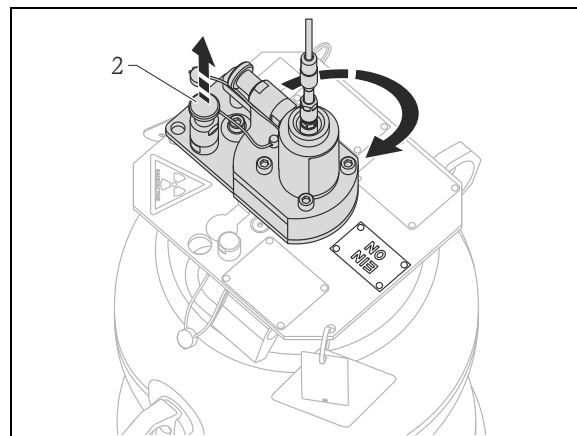
In the case of upside down installations:

To prevent the rope with the radiation source from sliding out unintendedly, make sure that it is well secured when loosening the locking bolt.



A0019757

3. Secure the position of the flexible extension element by the locking bolt No. 1. Make sure it engages correctly!

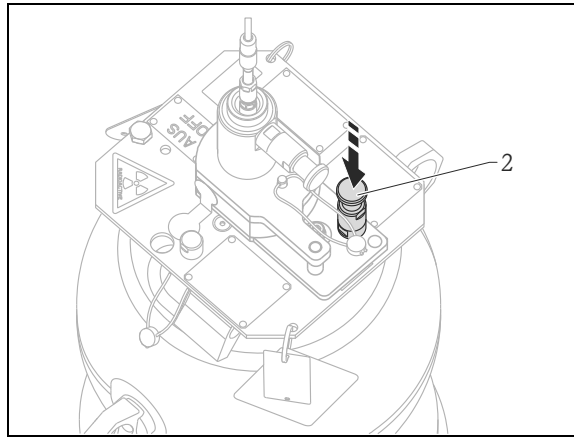


A0019734

4. Pull up locking bolt No. 2 and turn the swivel insert 180°.

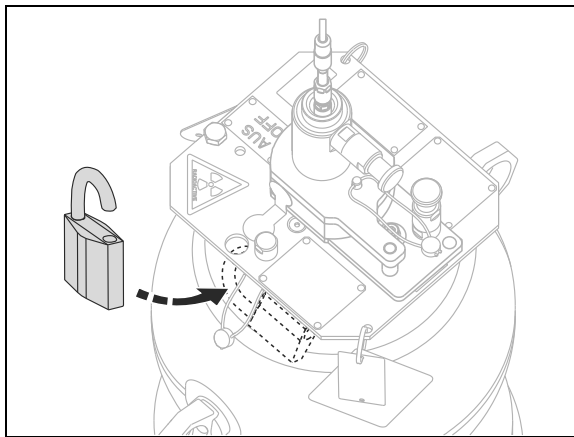
**NOTICE**

The position is marked by the visible sign ("ON" or "OFF"). The currently invalid sign is covered by the swivel insert.



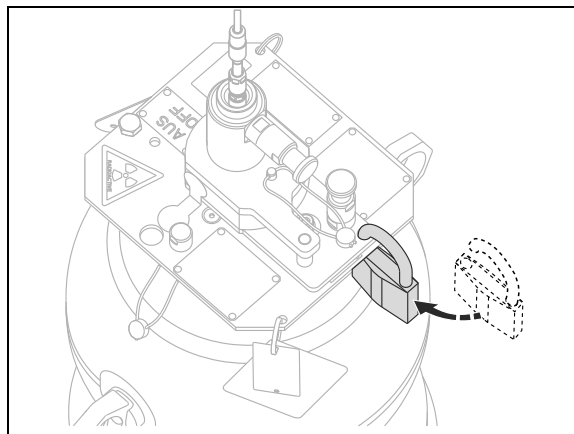
A0019735

5. Let locking bolt No. 2 snap into place in the "AUS - OFF" position. Make sure it engages correctly!



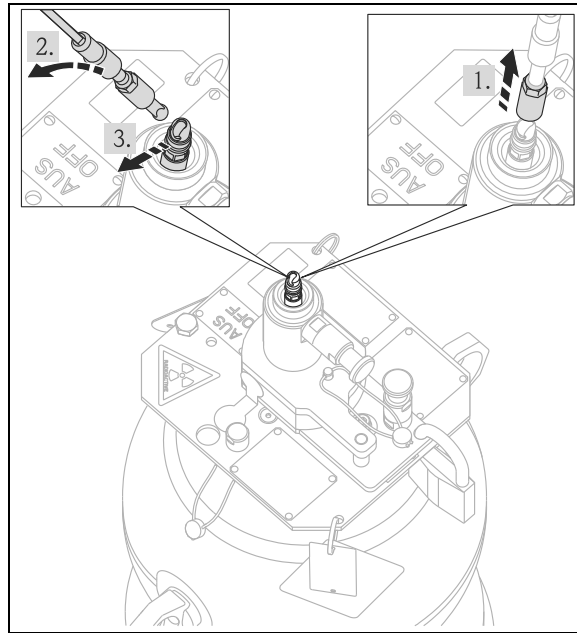
A0019737

6. Remove the padlock.

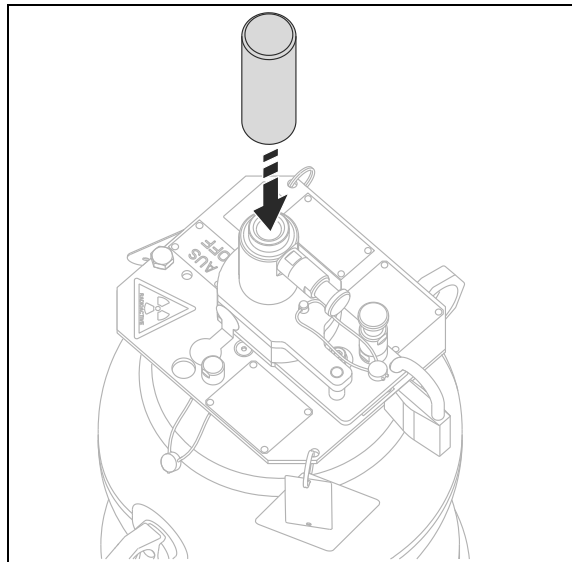


A0019739

7. Hook it in place and lock it.

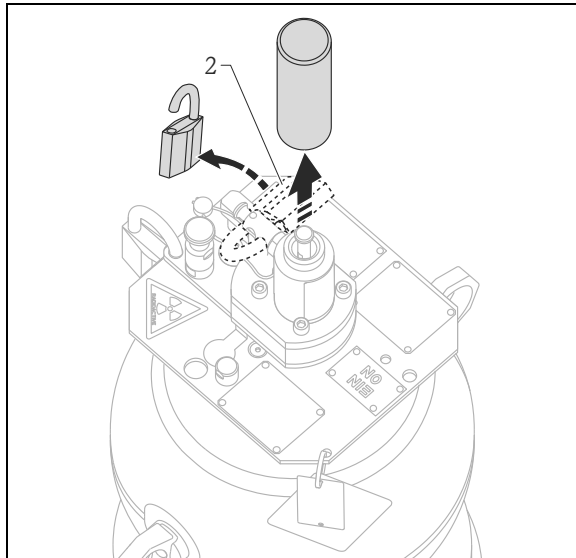


8. Disconnect the safety sleeve and the flexible extension element of the ball head.

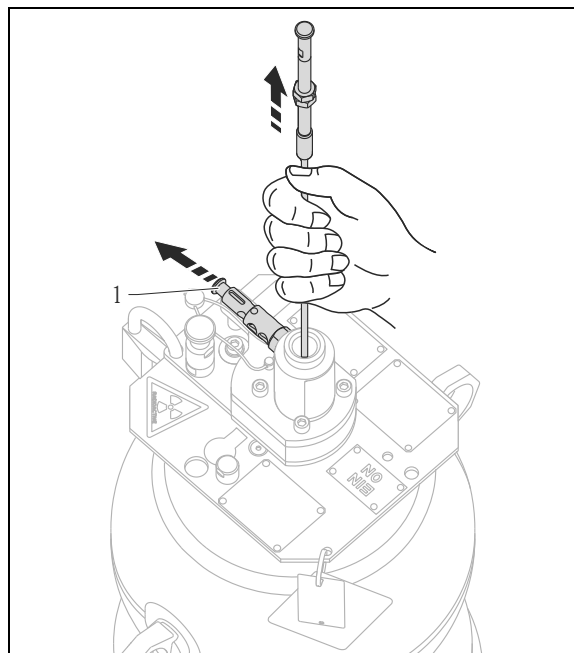


9. Fit the protection cap and tighten it until the limit stop.

## FQG63-#C... with padlock fixation ON/OFF



1. Remove padlock No. 2. from the locking mechanism .  
Remove the protection cap.



2. Pull locking bolt No. 1 outwards to release the locking mechanism and keep it pulled.

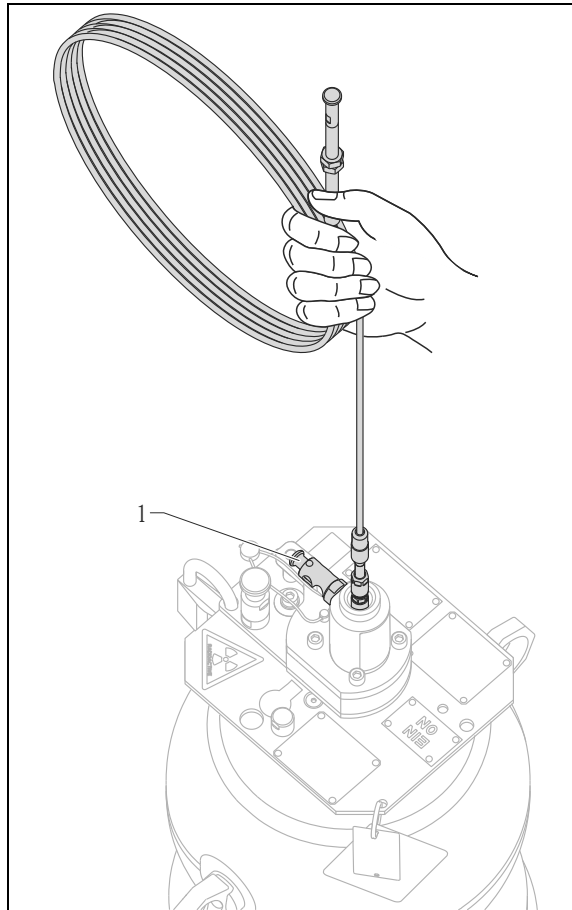
Carefully pull the flexible extension element off the source container until the limit stop.

**⚠ WARNING**

**In the case of upside down installations:**

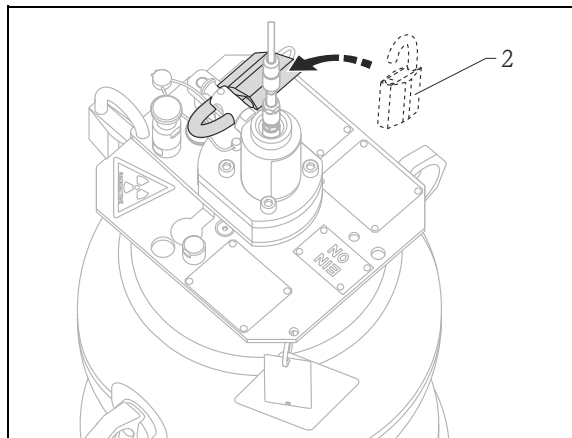
**To prevent the rope with the radiation source from sliding out unintendedly, make sure that it is well secured when loosening the locking bolt.**





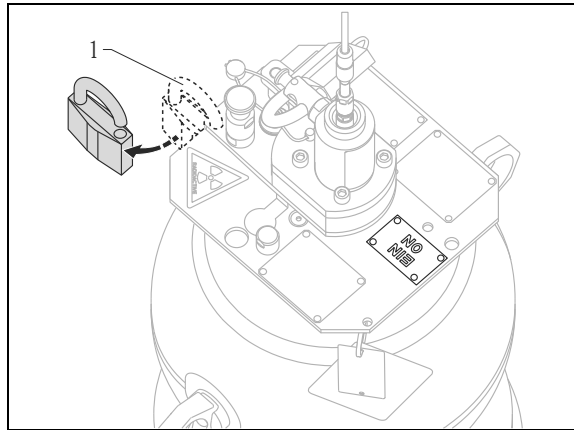
A0019761

3. Secure the position of the flexible extension element by the locking bolt No. 1. Make sure it engages correctly!

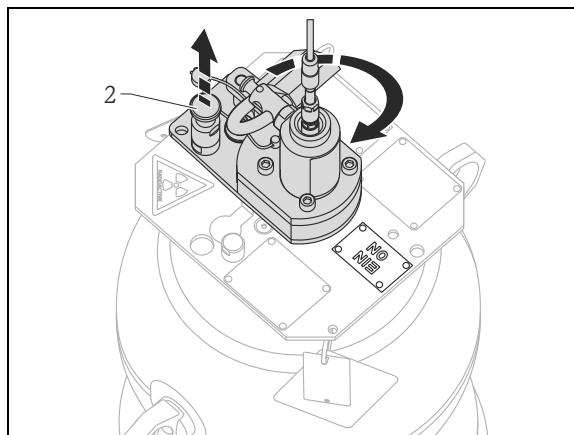


A0019760

4. Hook padlock No. 2 into the first inner bore hole and close it.



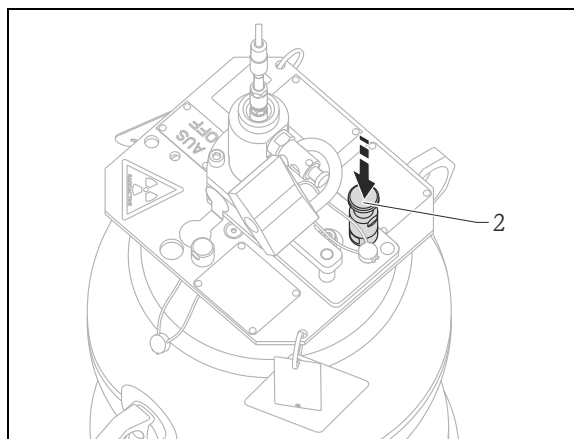
5. Remove padlock No. 1.



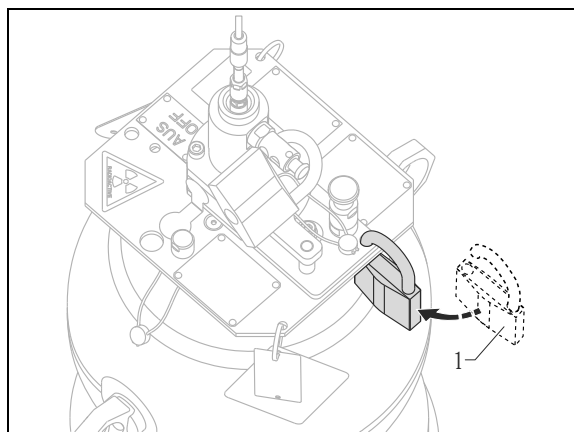
6. Pull up locking bolt No. 2 and turn the swivel insert 180°.

**NOTICE**

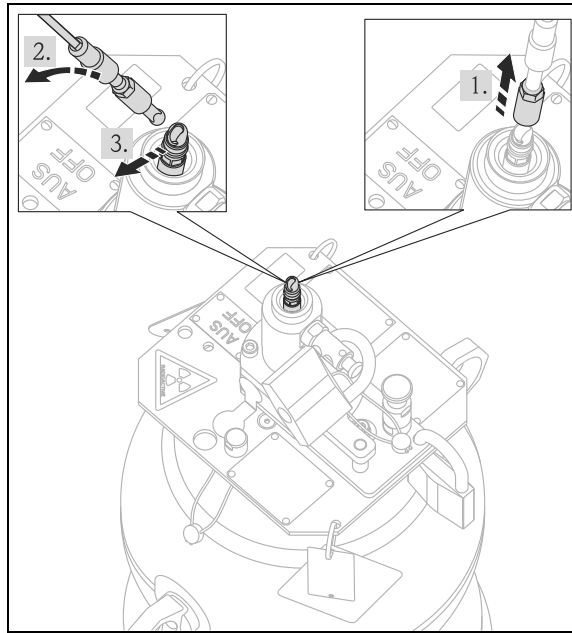
The position is marked by the visible sign ("ON" or "OFF"). The currently invalid sign is covered by the swivel insert.



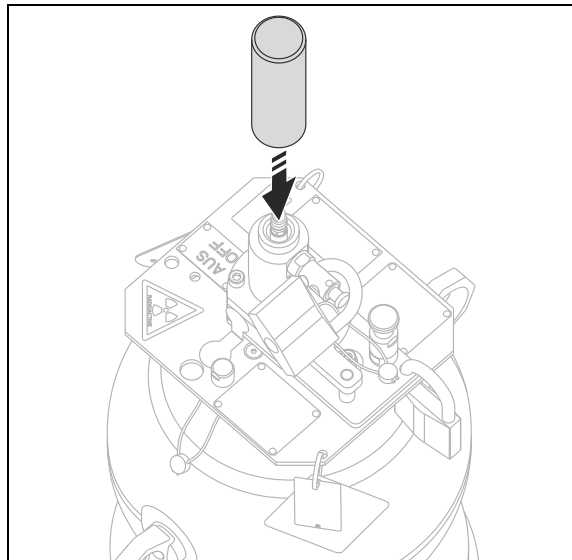
7. Let locking bolt No. 2 snap into place in the "AUS - OFF" position. Make sure it engages correctly!



8. Secure the "AUS - OFF" position with padlock No. 1 at the designated position.



9. Disconnect the safety sleeve and the flexible extension element of the ball head.



10. Fit the protection cap and tighten it until the limit stop.

## Maintenance and Inspection

### Cleaning

Clean the device in periodical intervals. When doing so, observe the following:

- Clean the device from substances which may have impact on safety functions.
- Keep labels in legible condition.
- Clean the labels with a damp cloth and water only.

#### **⚠ CAUTION**

When cleaning the device, the safety instructions have to be observed (→ 3).

### Maintenance and Inspection

In designated use, operated under the specified ambient and operating conditions, no maintenance of the device is required.

Within the framework of routine inspections of the plant the following checks are recommended:

- Visual check regarding corrosion of housing, weld seams, outer parts of source insert and padlock(s).
- Visual inspection of the flexible extension element. The flexible extension element must not show any signs of buckling, damage or corrosion.
- Test of the movability of the swivel insert (switch-on/switch-off function).
- Check to ensure the connection of the source holder and flexible extension element is stable and secure.
- Visual check of the readability of the labels and the condition of the warning symbols.
- Visual inspection of the seals between the adapter flange and the vessel, as well as the adapter flange and FQG63.
- Visual inspection of the reference O-ring.

#### **⚠ CAUTION**

##### **What to do in case of incorrect function**

- ▶ If there is any doubt about correct function or proper condition of the device, immediately contact the responsible radiation safety officer for advice.
- ▶ Non-routine repair or maintenance must be performed by the gauge manufacturer or distributor or - in the USA - by a person specially authorized by NRC or an Agreement State.

##### **Measures in case of corrosion**

If considerable corrosion is visible at the housing, measure the radiation level around the device. If values occur exceeding the normal operation level, cordon off the area and contact the responsible radiation safety officer for instructions immediately. Corroded devices should always be exchanged as soon as possible.

#### **⚠ CAUTION**

**If source containers or accessories, such as locking bolts, padlocks, source holders or the flexible extension element, are corroded, they must be replaced immediately.**

### Routine test of the shutter mechanism

The flexible extension element and the swivel insert must be easy to move and must not show any visible indication of corrosion. Using the flexible extension element retract the source holder in the source container and check that it can be easily moved. Disassemble the flexible extension element if necessary. Switch the source container several times from ON to OFF and from OFF to ON as described in the "Operation" section.

- If the swivel insert does not move easily or shows any other indication of possible malfunctions, secure the source holder with the radioactive source in the "OFF" position and contact the responsible radiation safety officer for further instructions.
- If the source container cannot be switched ON and OFF, follow the instructions in the "Emergency Procedure" section .
- In case of corrosion follow the instructions in the "Maintenance and Inspection" section (Measures in case of corrosion).

**Routine leak test procedure**

The capsule enclosing the radiation source must be checked for leaks in periodical intervals. Leak tests shall be performed according to the interval specified by the authority or handling authorization.

**NOTICE****Leak test**

Leak tests are not only required as routine checkup but also whenever an incident occurs that may damage the sealed source or the shielding. In such a case the leak test procedure shall be defined by the responsible radiation safety officer observing the applicable regulations and considering the source container and all involved parts of the process vessel. The leak test shall be conducted as soon as possible after the incident. The leak test procedure described below is intended for the following situations:

- ▶ As routine leak test procedure during continuous operation.
- ▶ As routine leak test procedure during continuous storage of the radiation source container.
- ▶ When placing back the radiation source container into operation after storage.

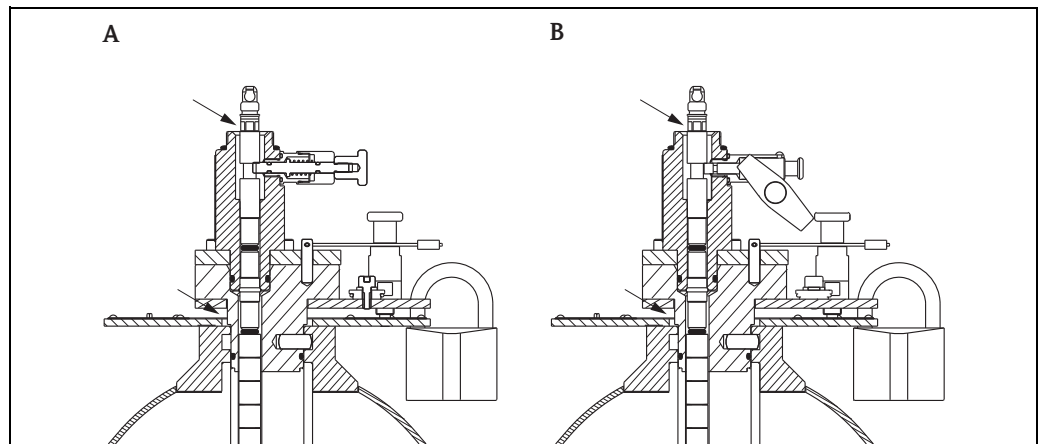
**Leak test procedure**

Leak tests shall be performed by a person or an organization authorized to provide leak test services and using a test kit. The test kit shall be used according to its supplier's instructions. Records of the leak test results shall be maintained. Perform the following procedure at the specified surfaces unless otherwise instructed:

1. The source container must be in the "OFF" position.  
Take a wipe sample along the annular gaps as shown in the graphic.
2. Have the samples analyzed by an authorized organization. A source is considered to be leaking if more than 185 Bq (5 nCi) is detected on a leak test sample.

**NOTICE**

**This limit value is valid for the US. National regulations may define other limits.**



Surfaces to be wiped for the leak test

A Feature 020, Option model B

B Feature 020, Option model C

In case of an indeed leaking source:

- Take appropriate measures to control a potential spread of radioactive contamination from the source. Secure the source.
- Contact the responsible radiation safety officer for instructions
- Notify the authority of the fact that a leaking source has been detected.

## Emergency procedure

### Objective and overview

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

Such an emergency exists when a radioisotope is exposed either by it becoming separated from the source container, if the radiation source is leaking, or if a source holder cannot be put into the "OFF" position.

This procedure will safeguard the personnel until the responsible radiation safety officer can attend site and advise on corrective action. The custodian of the radioactive source (the operator's designated "authorized person") is responsible for observing this procedure.

### Emergency procedure

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

#### The radiation source container cannot be switched to the "OFF" position

Contact the responsible radiation safety officer and coordinate the further course of action to be taken.

##### Situation 1:

The flexible extension element is already retracted but the swivel insert cannot be turned to the "OFF" position. In this case the radiation source container must be unbolted from its mounting position.

##### **⚠ CAUTION**

##### Pay attention to radiation safety rules

- ▶ Point the emission channel towards a very thick wall (e.g. steel or lead) or mount a very thick blind flange in front of the emission channel.
- ▶ Personnel should at all times be behind the source housing, not in front of the emission channel/flange.
- ▶ The lifting eyes on the housing should facilitate safe handling.

##### Situation 2:

The flexible extension element cannot be retracted to the "OFF" position. In this case the radiation source container and the inner protection pipe of the vessel must be unbolted from its mounting position.

##### **⚠ CAUTION**

##### Pay attention to radiation safety rules

- ▶ Place the source container along with the protection pipe on a thick floor and cover the protection pipe with a suitable shielding. Keep the maximum possible distance and conduct all procedures as quickly as possible.
- ▶ Wherever possible, personnel should be behind the source housing, not in front of the flange.
- ▶ Additional measures must be taken together with the responsible radiation safety officer depending on the situation at hand.

#### The radiation source is outside from the source container

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

##### **⚠ CAUTION**

##### Pay attention to radiation safety rules

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

### Notification to authority

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

##### **NOTICE**

National regulations may require other procedures and reporting obligations.

## Procedures after termination of the application

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### Internal measures

As soon as a radiometric measuring device is no longer required, the radiation source on the source container must be switched off. In accordance with all relevant regulations, the source container must be secured in the OFF position, removed and stored in a lockable room having no through traffic. The responsible authorities shall be informed of these measures. The access to the storage room shall be measured out and marked.

The radiation safety officer is responsible for protecting against theft. The radiation source in the source container must not be scrapped with the other parts of the plant. It should be returned as quickly as possible.

#### **⚠ CAUTION**

**Removal of the source container may only be carried out by supervised personnel, who have been specially trained in radiation procedures according to local regulations or handling permit. Ensure that this is allowed in the handling permit. Local conditions are to be observed. All work must be carried out as quickly as possible and from a distance as large as possible (shielding!). Safety procedures (e.g. blocking of access) must also be carried out to protect personnel from all possible risks. The disassembly of the source container can only be executed during OFF position. Make sure that the "OFF" position is secured with a padlock.**

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### Return

#### **Federal Republic of Germany**

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

#### **Other countries**

Contact your Endress+Hauser Sales Center or the appropriate authority to find a way of returning the radiation source nationally. If return is not possible domestically, the further procedure must be agreed with the Sales Center concerned. The destination airport for potential returns is Frankfurt, Germany.

#### **Conditions**

The following conditions must be met before returning the material:

- An inspection certificate no more than three months old confirming the leak-tightness of the radiation source must be in the possession of Endress+Hauser (wipe test certificate).
- The serial number of the source capsule, type of radiation source ( $^{60}\text{Co}$  or  $^{137}\text{Cs}$ ), activity and model of radiation source must be specified. This data may be found in the documents supplied with the radiation source.
- The material must be returned in type-tested type-A packaging (IATA rules), see TI00439F/00/EN.

#### **NOTICE**

**The type-A-labeling at the radiation container itself is invalid for a return of the device.**

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## Ordering information

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### Ordering information

Detailed ordering information is available from the following sources:

- In the Product Configuration on the Endress+Hauser website: [www.endress.com](http://www.endress.com) → Select country → Instruments → Select device → Product page function: Configure this product
- From your Endress+Hauser Sales Center: [www.endress.com/worldwide](http://www.endress.com/worldwide)



#### **Product Configurator - the tool for individual product configuration**

- Up-to-the-minute configuration data
  - Depending on the device: Direct input of measuring point-specific information such as measuring range or operating language
  - Automatic verification of exclusion criteria
  - Automatic creation of the order code and its breakdown in PDF or Excel output format
  - Ability to order directly in the Endress+Hauser Online Shop
- 

### Delivery

#### **Germany**

We can only ship radioactive sources once we have received a copy of the handling permit. We are more than happy to assist in procuring the necessary documents. Please contact our local Sales Center. For safety reasons and to save costs, we generally supply the source container loaded, i.e. with the radiation source installed. If the user requires the source container be delivered first and if the source must be delivered subsequently, transportation drums are used for shipping.

#### **Other countries**

We can only ship radioactive sources once we have received a copy of the import license. Endress+Hauser is more than happy to assist in procuring the necessary documents. Please contact your local Sales Center.

Radioactive sources must be installed in the source container for delivery abroad. This position is secured with a padlock.

The transport of loaded source containers is conducted by a company commissioned by Endress+Hauser and officially certified for executing this type of job. Transportation shall take place in a Type "A" package which complies to the regulations of the European Agreement on the International Transportation of Hazardous Substances on Roads (ADR and DGR/IATA).



## Associated documentation

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### Gamma Radiation Source

**TI00439F/00/EN**

- Technical Information for Gamma Radiation Source FSG60/FSG61
  - Returning source containers
  - Type A packaging
- 

### Gammapiilot M FMG60

**TI00363F/00/EN**

Technical Information for Gammapiilot M FMG60

**BA00236F/00/EN**

Operating Instructions for Gammapiilot M FMG60 (HART)

**BA00329F/00/EN**

Operating Instructions for Gammapiilot M FMG60 (PROFIBUS PA)

**BA00330F/00/EN**

Operating Instructions for Gammapiilot M FMG60 (FOUNDATION Fieldbus)

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### Gammapiilot FTG20

**TI01023F/00/EN**

Technical Information for Gammapiilot FTG20

**BA01035F/00/EN**

Operating Instructions for Gammapiilot FTG20

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### Supplementary Instruction Manuals

**SD00292F/00/EN**

Supplementary Instruction Manual for Canada

**SD00313F/00/A2**

Supplementary Instruction Manual for the USA

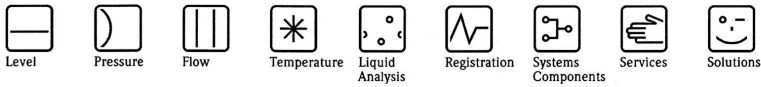
**SD00297F/00/A2**

Instructions for loading and replacing the radiation source

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**Manufacturer Declaration  
Radiation Source Container**



HE-10051a/00

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## Herstellererklärung Manufacturer Declaration

**Endress+Hauser GmbH+Co. KG, Hauptstraße 1, 79689 Maulburg**

erklärt als Hersteller, dass der Strahlenschutzbehälter  
*declares as manufacturer, that the gamma source container*

### FQG63

den Anforderungen über die internationale Beförderung gefährlicher Güter (ADR/RID, DGR/IATA) an ein Typ A Versandstück entspricht. Der Strahlenschutzbehälter ist für den Transport von umschlossenen radioaktiven Stoffen und von umschlossenen radioaktiven Stoffen in besonderer Form vorgesehen.

*conforms to the requirements on international transportation of hazardous materials (ADR/RID, DGR/IATA) for Type A packaging and is intended for the transportation of sealed radioactive materials and sealed special form radioactive materials.*

Maulburg, 30.07.2010

Endress+Hauser GmbH+Co. KG

i. V.

(Dr. Arno Götz)

Abteilungsleiter : Produktsicherheit  
Head of Department : Product Safety

i. V.

(Hartmut Damm)

Abteilungsleiter : Radiometrische Messtechnik  
Head of Department : Radiometric Measurement

**Endress+Hauser**   
People for Process Automation



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